US Army Corps
of Engineers
Rock Island District

Defense Environmental Restoration Program
for
Formerly Used Defense Sites
Ordnance and Explosives

Archives Search Report

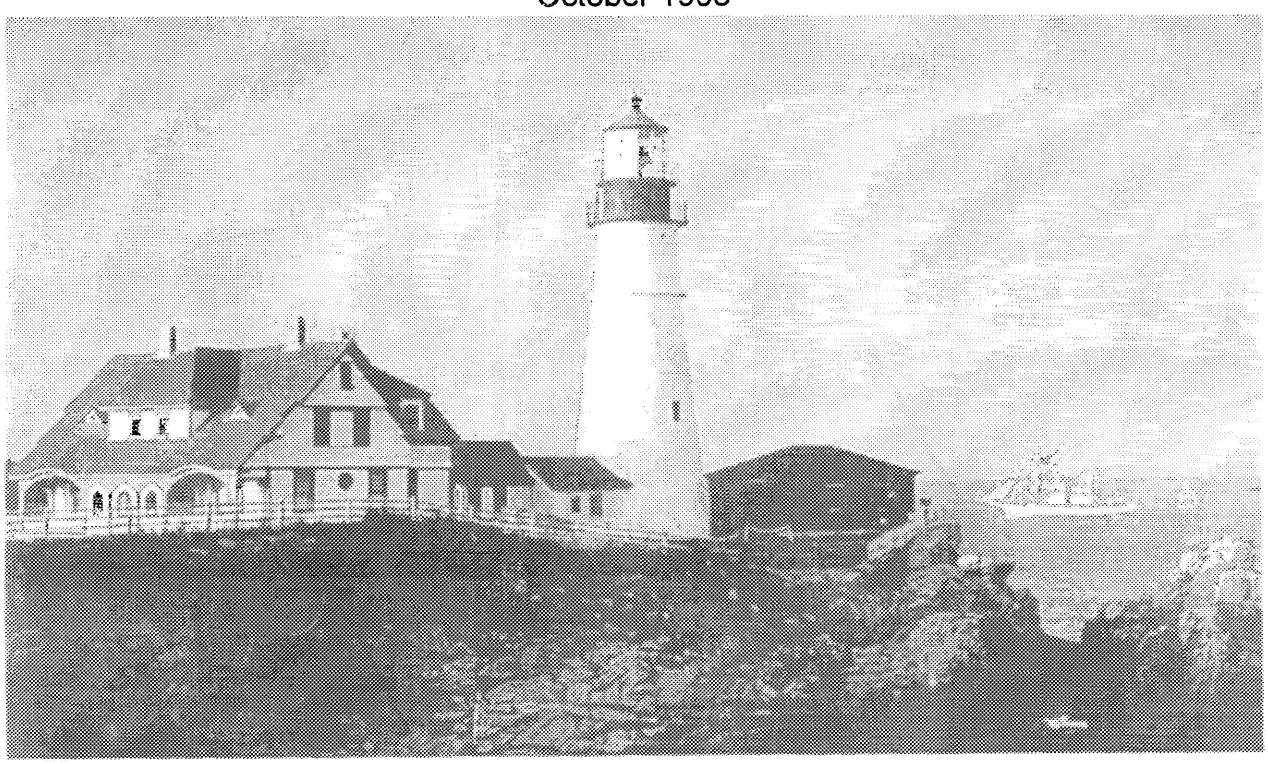
FINDINGS

for
the former

BAILEY ISLAND FIRE CONTROL STATION

Harpswell, Maine
Project Number D01ME009801

October 1995



DEFENSE ENVIRONMENTAL RESTORATION PROGRAM
for
FORMERLY USED DEFENSE SITES

FINDINGS

ORDNANCE AND EXPLOSIVES ARCHIVES SEARCH REPORT FOR BAILEY ISLAND FIRE CONTROL STATION CUMBERLAND COUNTY, MAINE PROJECT NUMBER D01ME009801

October 1995

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ORDNANCE AND EXPLOSIVES
ARCHIVES SEARCH REPORT
FOR
BAILEY ISLAND FIRE CONTROL STATION
CUMBERLAND COUNTY, MAINE
PROJECT NUMBER D04ME009801

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ORDNANCE AND EXPLOSIVES
ARCHIVES SEARCH REPORT
FOR
BAILEY ISLAND FIRE CONTROL STATION
CUMBERLAND COUNTY, MAINE
PROJECT NUMBER D01ME009801

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ORDNANCE AND EXPLOSIVES
ARCHIVES SEARCH REPORT
FOR
BAILEY ISLAND FIRE CONTROL STATION
CUMBERLAND COUNTY, MAINE
PROJECT NUMBER D01ME009801

1. INTRODUCTION

a. Subject and Purpose

(1) This report presents the findings of an historical records search and site inspection for ordnance and explosives (OE) located at the former Bailey Island Fire Control Station, Harpswell, Maine (see plate 1 for general location map). The investigation was performed under the authority of the Defense Environmental Restoration Program for Formerly Used Defense Sites (DERP FUDS).

(2) This investigation focused on 7.37 acres of land that were used as the Bailey Island Fire Control Station (FCS). The site was used as an Anti-Motor Torpedo Boat (AMTB) Battery by the Army from 1942 to 1952.

(3) The purpose of this investigation was to characterize the site for potential OE contamination, to include conventional ammunition and chemical warfare material (CWM). This investigation was conducted by experienced ordnance experts through thorough evaluation of historical records, interviews and on-site visual inspection results.

b. Scope

(1) This report presents the site history, site description, real estate owner information, and confirmed ordnance presence (prior to and after site closure), based on available records, interviews, site inspections and analyses. The analyses provide a complete evaluation of all information to assess current day potential ordnance contamination where ordnance presence has not been confirmed.

(2) For the purposes of this report, OE contamination consists of live ammunition, live ammunition components, CWM or explosives which have been lost, abandoned, discarded, buried, fired or thrown from demolition pits or burning pads. These items were either manufactured, purchased, stored, used and/or disposed of by the War Department/Department of Defense. Such

ammunition/components are no longer under accountable record control of any DoD organization or activity.

(3) **Expended** small arms ammunition (.50 cal or smaller), is **not** considered OE contamination. OE further includes ``explosive soil'' which refers to any mixture in soil, sand, clays, etc., such that the mixture itself is explosive. Generally 10% or more by weight of secondary explosives in a soil mixture is considered explosive soil.

2. PREVIOUS INVESTIGATIONS

a. 1993 Preliminary Assessment

(1) A Preliminary Assessment of Bailey Island FCS was conducted under the Defense Environmental Restoration Program Formerly Used Defense Sites (DERP FUDS) by the U.S. Army Corps of Engineers, New England Division (see document E-1). At that time, the Findings and Determination of Eligibility, dated 3 March 1993, concluded that the 7.37 acre site located in Cumberland County, Maine, had been formerly used by the Army.

(2) This investigation concluded that there was an eligible category of hazard under the DERP FUDS program. Due to the fact that the site contained a four gun 90mm AMTB battery used the Army, one project was recommended. Table 2-1 summarizes the projects recommended in the preliminary assessment.

TABLE 2-1
DERP-FUDS PRELIMINARY ASSESSMENT PROJECTS

Project Number	DERP Category	Present Phase	Comments	Location
--	CON/HTRW	--	None	--
--	HTRW	--	None	--
--	BD/DR	--	None	--
D01ME009801	OE	SI	OE Contamination	7.37 acres

b. Other Previous Investigations

No other previous investigations of Bailey Island FCS were discovered during the historical document search.

3. SITE DESCRIPTION

a. Existing Land Usage

The former Bailey Island FCS consisted of approximately 7.37 acres of land in Cumberland County, Maine (see plate 1). Currently, all acreage is privately owned by Mrs. Judith Adams, trustee of the Timothy J. Adams Trust. The primary use of the land is a residence used as a summer home. Table 3-1 represents the current land usage of the site.

TABLE 3-1
LAND USAGE

AREA	FORMER USAGE	PRESENT OWNER	PRESENT USAGE	SIZE/ ACRES*	COMMENTS
A	Gun Site and FCS	Mrs. Judith Adams	Summer residence	7.37	Only area addressed by FDE
B	Practice Firing Impact Area	(open ocean)	Commercial fishing/ lobstering	8,775.00	Not addressed by FDE
C	Combat Field of Fire	Various private entities plus open ocean	Commercial fishing/ lobstering, residential on islands	52,470.00	Not addressed by FDE
				61,252.37	TOTAL

* Indicates approximated acreage

b. Climatic Data

(1) Cumberland County climate is characterized by cool to moderately warm summers, fairly cold winters, and generally ample rainfall. In the coastal region where Bailey Island FCS is, the Atlantic Ocean acts primarily as a moderating influence on climate. The average annual temperature is 45.4 degrees F. January, the coldest month, has an average monthly temperature of 20.8 degrees F with an average daily minimum temperature of 11.4 degrees F. July, the warmest month, has an average monthly temperature of 68.6 degrees F with an average daily maximum temperature of 78.8 degrees F.

(2) Total annual precipitation for the area is approximately 44 inches, with about 20% of the rain falling between June and August. The wettest month of the year is November, followed by December and April. Seasonal totals for snowfall is approximately 70 inches with an average duration of the longest snow cover being approximately 1 1/2 months.

(3) The average relative humidity in midafternoon is about 60%. The relative humidity is higher at night, and

the average at dawn is about 80%. Sunshine ranges from 48% in late fall to 63% in summer. Prevailing winds are from the south at about 8.8 mph. The highest average windspeed, 10 mph, is in spring.

c. **Topography**

The site lies within a small chain of islands in the Atlantic Ocean that are connected to the mainland. Elevations on the site range from sea level to about 70 feet above sea level. Sheer cliffs up to approximately 30-40 ft exist along the shore.

d. **Geology and Soils**

(1) The soils of Bailey Island FCS belong to the Lyman Soil Series. Lyman series soils consist of shallow, somewhat excessively drained, moderately coarse textured, gently sloping to steep soils that have a few to many rock outcrops. The soils formed in glacial till, and depth to bedrock ranges from 12 to 18 inches.

(2) The specific soil type within the Lyman series found at Bailey Island FCS is Lyman very rocky fine sandy loam with 8 to 20 percent slopes. It is on the sides of wooded ridges and runoff is rapid. Shallowness to bedrock limits use of this soil for community development and for most recreational activities.

(3) A representative profile of this soil, taken just east of the site, is given in Table 3-2.

TABLE 3-2
TYPICAL SOIL PROFILE AT BAILEY ISLAND FCS

HORIZON	DEPTH	DESCRIPTION
O2	1 in to 0	Partly decomposed forest litter
A1	0 to 1 in	Black fine sandy loam; weak, fine granular structure; friable when moist; many root; 2 percent coarse fragments; strongly acid; clear, smooth boundary
A2	1 to 3 in	Reddish-gray fine sandy loam; weak, fine, granular structure; friable when moist; many roots; 5 percent coarse fragments; strongly acid; clear smooth boundary
B21h	3 to 8 in	Dark reddish brown fine sandy loam; weak, fine, granular structure; friable when moist; many roots; 10 percent coarse fragments; strongly acid; clear, wavy boundary
B22ir	8 to 16 in	Dark red sandy loam; weak, fine, granular structure; friable when moist; many roots; 15 percent coarse fragments; strongly acid; abrupt, smooth boundary
R	16 in	Dark gray, mica schist bedrock

e. **Hydrology**

(1) There is no surface water on the former Bailey Island FCS. No information on groundwater at the site was found. Obtaining groundwater is assumed to be unpractical because of the closeness of bedrock to the surface and the affect of the ocean on the salinity of the water.

(2) Ocean tides are generally of the semi-diurnal type, with two highs and two lows occurring daily. The typical range between high and low tide is approximately 10 feet. Daily tidal information for 1996 at Harpswell Harbor, which is near the site, can be found at document F-17.

f. **Natural Resources**

The Maine Department of Economic and Community Development provided a list of threatened and endangered plant species on Bailey Island (see document F-16). The Maine Department of Inland Fisheries and Wildlife provided a list of threatened and endangered animal species on Bailey Island (see document F-15). These species may exist within the bounds of Bailey Island FCS and are listed below in Table 3-3.

TABLE 3-3
NATURAL RESOURCES

Resource Classification	Type	Comment
Plant	Screwstem	State endangered only
	Marsh-elder	State threatened only
Animal Bird	Roseate Tern	Federal and state endangered

g. **Historical/Cultural Resources**

According to the Maine Historic Preservation Commission, the are no historic or prehistoric archeological sites on Bailey Island FCS (see document F-13).

4. HISTORICAL ORDNANCE USAGE

a. **Chronological Site Summary**

(1) Before 1942

Prior to 1942, the Bailey Island FCS area was privately owned and used for private residences. In August 1942, four months prior to official acquisition of the site, B Battery, 240th Coastal Artillery Regiment, moved from Stockton Springs to the Bailey Island site. They were equipped with two (2) 155mm towed guns, a range finder, and a searchlight. However, the unit did not have any ammunition for the guns (see documents F-5 and F-6).

(2) 1942 to 1952

(a) Between December 1942 and February 1943, the Army acquired 7.37 acres (4.5 lease acres, 2.5 fee acres and 0.37 easement acres) to establish an anti-motor torpedo boat battery and fire control station on Bailey Island (see documents F-2, F-3, G-1 through G-3). The site was known as the Bailey Island Fire Control Station.

(b) Facilities at Bailey Island FCS included an AMTB battery, two (2) eight story observation towers for fire control, a radar operations building, a battery commander station, generator buildings, a barracks and a mess hall (see documents E-1, F-10, L-1, L-2 and plate). The site housed approximately 250 soldiers during the WWII timeframe (see document F-9). Document F-10 also suggests the site contained subterranean powder magazines. However, no additional evidence supporting this statement was discovered, and the construction of subterranean magazines is unlikely due to the presence of bedrock close to the surface.

(c) Bailey Island FCS was an integral part of the Harbor Defenses of Portland, Maine. The AMTB battery, known as AMTB 10, was part of a system of ten AMTB batteries with interlocking fields of fire. The two observation/fire control towers were used to observe and coordinate coastal defense gun firing at other locations. The northern tower, equipped with an SCR-96 radar, served Battery Steele, a 16'' gun battery, and Battery Cravens, a 6'' gun battery. Both batteries were located on Peaks Island, approximately 11 miles southeast of Bailey Island. The southern tower served Battery Foote, a 12'' gun battery and Battery 202 (gun size unknown). These batteries were located at Fort Levett on Cushing Island, about 13 miles southeast of Bailey Island (see documents F-8 and F-9).

(d) Additionally, the Navy acquired land during WWII on Bailey Island just adjacent to and east of the FCS. The Navy used the site to operate a submarine detection facility that utilized large cables on the ocean floor that produced a magnetic field (see documents F-8, F-10 and F-14). This site was completely separate from the Bailey Island FCS and has been addressed by CENED under project number D01ME049700.

(e) Sometime in 1943 or 1944, the 155mm guns at Bailey Island FCS were replaced by a 90mm AMTB battery. The AMTB battery consisted of four (4) 90mm guns, two fixed and two mobile, and a section of 37mm guns for support (see documents F-8, F-9 and F-11).

(f) At some point and time during WWII, the 37mm section was detached to Drinkwater Point, east of Bailey Island near Yarmouth, Maine. The section was used to guard a submarine net in the area (see document F-8). Later this 37mm section would be upgraded to 40mm guns (see document F-9). The site at Drinkwater Point used by the detached 37mm section has already been addressed by CENED under project number D01ME055600.

(g) No documentation was discovered that described the firing practices at Bailey Island FCS. It is assumed that Bailey Island FCS would have conducted practice firing of all its weapons in order to maintain unit readiness. The combat field of fire as shown in document L-4 covers many land areas that would have been inhabited by civilians as well as other military units. Therefore, in order to minimize the hazard to civilians and the military, it is also assumed that a practice firing impact area would have been established. This impact area would have utilized the large expanse of open ocean directly south of the site and minimized the use of inhabited islands. Plate shows the known combat field of fire and the anticipated practice firing impact area.

(h) On 17 August 1945, the lease on 4.5 acres, the western 2/3rds of the site, was terminated. Army use of the remaining 2.87 acres of Bailey Island FCS continued until 18 April 1950, when the site was reported excess to GSA (see document E-1 and G-1).

(3) 1952 to Present

(a) On 22 October 1952, GSA conveyed the remaining 2.48 acres to Ester Root Adams. The land containing the former site has remained in the Adams family since disposal. Currently, the land is owned by Judith Adams, daughter in-law of Ester Root Adams and trustee of the Timothy J. Adams Trust.

(b) The Adams' currently use the property as a summer residence. Most of the buildings constructed by the military still remain. The barracks building was moved and renovated into the summer residence. The two observation towers still stand and are in good condition.

b. **Ordnance Records Review**

(1) A historical document search was conducted by the SI team to obtain ordnance related records relevant to Bailey Island FCS. Research sites included, but was not limited to, National and State Archives, state, county and local libraries, historical centers and societies, local newspapers, state, county and local law enforcement agencies and current owners of Bailey Island FCS (see appendix A for a complete listing of contacts). All documents obtained were thoroughly reviewed by the SI team. The following documents are important to the verification of real property use by the War Department and the presence or non-presence of ordnance contamination.

(2) Documents D-1 through D-5 are ammunition data sheets consistent with the ammunition that may have been utilized at Bailey Island FCS from 1942 to 1952.

(3) Document F-1 gives the units stationed at Bailey Island FCS.

(4) Documents F-2 and F-3 deal with the acquisition of land for Bailey Island FCS, while document F-4 gives priorities for post war utilization of several harbor defense sites.

(5) Documents F-5 and F-6 are letters from Mr. Guilford Sawyer, a former Bailey Island FCS battery commander. Mr. Sawyer described the installation of 155mm guns on the site in August 1942. Document F-7 is a letter from Mr. Leonard Cronkhite, also a former battery commander at Bailey Island FCS.

(6) Document F-8 is an excerpt from a college thesis paper on the harbor defenses of Portland. Of particular interest is the chapter on the WWII period where all major improvements to harbor defenses, including Bailey Island FCS, are thoroughly described.

(7) Document F-9 is an excerpt from ``The Modern Defenses of the Coast of Maine'' by Joel Eastman. The paper gives information on the AMTB battery at Bailey Island FCS including the guns, buildings and other equipment used at the site.

(8) Document F-10 is an excerpt from the book ``The Evolution of Bailey's Island'' by Beth Hill. In the chapter on the WWII timeframe, the book gives a brief description of the facilities and activities at Bailey Island FCS.

(9) Document F-11 is an excerpt from the book ``Modern American Harbor Defenses'' by Mark A Berhow. It lists the guns used at the site from 1943 to 1946.

(10) Documents F-12 and F-14 are letters from historians to SIOAC-ESL giving some basic history of Bailey Island FCS.

(11) Documents F-13, F-15 and F-16 lists archaeological sites and threatened and endangered plant and animal species at Bailey Island FCS.

(12) Documents F-17 gives the tide data for 1996 at Harpswell Harbor, which is near the site.

(13) Documents G-1 through G-8 are various real estate documents including acquisition and disposal deeds and current owner plat maps.

(14) Documents L-1 through L-6 are various maps of Bailey Island FCS. Documents L-1 and L-2 give a cross section of the fire control tower and the site building layout, respectively. Document L-3 is a real estate map and document F-4 shows the combat field of fire for the AMTB battery. Documents L-5 and L-6 show various locations of the harbor defenses of Portland.

c. **Interviews with Site Related Personnel**

(1) Area law enforcement officials and EOD units were interviewed during the site inspection:

(a) Detective Gerard Brady of the Cumberland County Sheriff's Department has been assigned to the Bailey Island area for about 1 1/2 years. There have been no reports of any incidents involving OE. However, the Bailey Island FCS site is an attractive nuisance to local teens. Groups of teens gather at the site to party and drink alcohol in the observation towers. One individual was recently arrested for vandalizing the former BC station building by shooting it with a rifle (see document I-4).

(b) The 54th EOD at Fort Monmouth was contacted during the historical records search. The files of the 54th go back only two years and there are no records of any incidents involving OE at the site.

(2) The current land owner and other local interests were interviewed during the site inspection.

(a) Mrs. Judith Adams, the current land owner, escorted the SI team during the visual site inspection. The site was originally purchased by Mrs. Adams' mother in-law, Ester Root Adams, at the time of disposal in 1952. The site has been in the Adams family ever since and is used as a summer residence. To the best of her knowledge, there have never been any incidents involving OE at the site. Mrs. Adams expressed concern about local teens trespassing in the two observation towers to party. The family sealed the windows and door to the tower, but they were broken into again with a sledgehammer. She feels that the towers are an attractive nuisance, that somebody will eventually get hurt, and that it would be best if the towers were removed (see document I-1).

(b) Ms. Dawnna Black is the current Town Office Manager for the Town of South Harpswell. She has worked for the town office for 19 years. All reports of major incidents would go through their office since the County Sheriff's detachment is located there. To the best of her knowledge, there have never been any incidents involving OE reported through official channels (see document I-2).

(c) Mr. Howard Hutchins is the proprietor of Lands End, a gift shop just east of the site. His parents own the land adjacent to and just east of the Bailey Island FCS. They have owned the land since the early 1960's. He played in the woods on the site as a child, but never found any OE. He has never heard of any OE being found on the site or washing ashore eon Bailey Island (see document I-3).

(d) Mr. Chip Black is a lifetime resident of Bailey Island, the proprietor of a local hotel and a member of the local historical society. He has never heard of any OE being found at the site or any OE washing ashore on Bailey Island (see document I-5).

(e) Mr. Nelson Lawry is an historian and a member of the Coastal Defense Study Group. He supplied the SI team with general information about the equipment and operations at Bailey Island FCS (see document I-6).

5. SITE ELIGIBILITY

a. **Confirmed Formerly Used Defense Sites**

(1) Former land usage and ownership of Bailey Island FCS by the War Department has been confirmed and

summarized in the COE Findings and Determination of Eligibility dated 3 March 1993 (see document E-1). The site consisted of 7.37 acres acquired between December 1942 and February 1943 to be used as a AMTB Battery by the Army.

(2) The lease on 4.50 acres was terminated on 17 August 1945. The remaining 2.87 acres (2.50 fee and 0.37 easement) were reported excess to GSA on 18 April 1950. GSA conveyed the 2.87 acres to Ester Root Adams on 22 October 1952. Today, the entire site belongs to Judith Adams, daughter in-law of Ester Root Adams, and trustee of the Timothy J. Adams trust.

b. **Potential Formerly Used Defense Sites**

(1) Document L-4 clearly shows a combat field of fire for the AMTB Battery at Bailey Island FCS. The field of fire extends over 13,000 yards into the Atlantic Ocean with nearly 180 degrees of coverage (see plate 3). Document L-4 also shows a combat field of fire for the 37mm section detached to Drinkwater Point, located just southeast of the town of Yarmouth, in Cumberland County, Maine. The field of fire extends nearly 5,000 yards into Casco Bay with nearly 180 degrees of coverage (see plate 3).

(2) Since the AMTB battery and the detached 37mm section did not see combat, it is assumed that their respective combat fields of fire were not fully utilized. Full use of the combat fields of fire would have also endangered several inhabited residential areas as well as other military installations. Therefore, it is assumed practice firing areas would have been established that would have utilized the open water areas and minimized firing over inhabited land.

(3) Recommend CENED amend the existing FDE to add the 8,775.00 acres of Area B, the AMTB practice firing impact area. CENED is in process of performing an INPR for the AMTB at Drinkwater Point, site number D01ME055600, so no additional preliminary assessment action for the 37mm detachment from Bailey Island FCS is necessary at this time.

6. <u>VISUAL SITE INSPECTION</u>

a. **General Procedures and Safety**

(1) During the period 8-17 August 1995, members of the Site Inspection (SI) Team traveled to the site of the former Bailey Island, Maine. This travel was in support of and IAW references B-1 through B-4. The primary task of the SI team was to assess OE presence and potential. The site

inspection was limited to non-intrusive methods, i.e., subsurface sampling was not authorized or performed.

(2) Real Estate rights-of-entry were not obtained by the SI team due to the willingness of the current owner to grant access to the site.

(3) A site safety plan was developed and used by the SI team to assure an injury-free site inspection. A briefing was conducted prior to the SI stressing that OE should be handled only by military EOD personnel.

(4) Prior to the site visit, a thorough review of available reports, historical documents, texts and maps gathered during the historical records search was performed.

b. **Area A: Gun Site and FCS**

(1) Area A is the entire 7.37 acres that comprised Bailey Island FCS (see plates 3 and 4). It is located at the southern tip of Baileys Island just west of the termination of Route 24. Most of the area is thickly vegetated, with an open area immediately surrounding the Adams residence and a field between the residence and the Atlantic ocean (see photos J-19 through J-21).

(2) Most of the structures built by the military remain in the area. The two observation towers have been sealed to discourage trespassers, but the seal on the door to one tower has been broke (see photos J-13 through J-15, J-17 and J-18). Foundations to the barracks and mess hall remain, and are as high as five feet in places (see photos J-26 through J-28). The remainder of the buildings are beneficially used by the current owner (see photos J-19 through J-24).

(3) No OE or evidence of OE was discovered by the SI team during the visual site inspection.

c. **Area B: Practice Firing Impact Area**

(1) Area B is the suspected impact area for practice firing of the AMTB battery's weapons (see photos J-2 through J-4). Although no documentation was found that established such an area, it is assumed that one would have been established to minimize the hazard to inhabited islands. Plate 3 shows the anticipated location of the practice firing impact area.

(2) Because the area consists of open ocean, the visual inspection was limited to viewing from Bailey Island.

d. **Area C: Combat Field of Fire**

(1) Area C is the combat field of fire taken from document L-4 minus the acreage in Area B. The area extends over 13,000 yards into the Atlantic Ocean with nearly 180 degrees of coverage (see plate 3).

(2) Because the area consists of open ocean and some islands, the visual inspection was limited to viewing from Bailey Island (see photos J-2 through J-4).

7. EVALUATION OF ORDNANCE HAZARDS

a. **General Procedures**

(1) Each area was evaluated to determine confirmed, potential or uncontaminated ordnance presence. Confirmed ordnance contamination is based on verifiable historical evidence or direct witness of ordnance items. Verifiable historical records evidence consists of ordnance items located on site and documented by the local bomb squad, Army EOD team, newspaper articles, correspondence, current findings, etc. Direct witness of ordnance items involves the inspection team locating ordnance items during the visual inspection. Additional field data is not required to identify a confirmed ordnance area.

(2) Potential ordnance contamination is based on a lack of confirmed ordnance. Potential ordnance contamination is inferred from records or indirect witness. Inference from historical records would include common practice in production, storage, usage or disposal that could have allowed present day ordnance contamination. Potential ordnance contamination could also be based on indirect witness or from present day site features. Additional field data is needed to confirm potential ordnance areas.

(3) Uncontaminated ordnance areas are based on a lack of confirmed or potential ordnance evidence. All historical records and present day site inspections do not indicate confirmed or potential ordnance contamination. There is no reasonable evidence, either direct or inferred, to suggest present day ordnance contamination. Additional field data is not needed to assess uncontaminated ordnance areas.

b. **Area A: Gun Site and FCS**

(1) Area A is considered **uncontaminated** due to a lack of present day OE hazard. Maps and other documents

indicate the site was used as an AMTB battery, but there is no evidence that a present day OE hazard exists in the area.

(2) There was no direct witness of OE by the SI team during the visual site inspection. The current owner's family has owned the property in the area since disposal in 1952, and there has never been an incident involving OE.

c. **Area B: Practice Firing Impact Area**

(1) OE contamination in Area B is considered **potential** based on suspected past use of the area. It has been assumed a practice firing impact area for the AMTB battery was established, but no documents have been found to support this assumption.

(2) The visual site inspection of Area B was limited to viewing the ocean from Bailey Island. Therefore, it was impossible for the SI team to determine if OE was present on the ocean floor.

(3) Current policy dictates that only the first 100 yards of ocean from mean high tide would be eligible for remediation. Because of the caliber of weapon fired at Bailey Island FCS, the likelihood of OE contamination existing within the first 100 yards of ocean is low.

d. **Area C: Combat Field of Fire**

(1) Area B is considered **uncontaminated** because the entire combat field of fire would not have been used as it would have endangered civilians. Any firing of guns at Bailey Island FCS would have been limited to the acreage in Area B.

(2) The visual site inspection of Area C was limited to viewing the ocean from Bailey Island. Therefore, it was impossible for the SI team to determine if OE was present on the ocean floor.

8. SITE ORDNANCE TECHNICAL DATA

a. **End Item Technical Data**

Table 8-1, a listing of ammunition and explosive fillers used on Bailey Island FCS and Table 8-2, a summary of site ordnance fillers have been developed. These tables are based on a review of historical documentation and specifications stated at appendices D-1 through D-5. Exact models/types have been included as documentation has permitted.

b. **Chemical Data of Ordnance Fillers**

Table 8-2 has been developed to provide information on the explosive/chemical compounds used in the ordnance cited in Table 8-1.

TABLE 8-1

AMMUNITION USED AND EXPLOSIVE/CHEMICAL FILLER

ITEM	MODEL/TYPE	FILLER/WEIGHT	FUZE/TYPE
37mm Gun	Shell, HE-T, M54	Propellant - 6 ounces FNH powder Primer - M23A2 Charge - 0.10 lb tetryl Projectile - steel	M56, PD
	Shell, Practice, M55A1	Propellant - 6 ounces FNH powder Primer - M23A2 Charge - 0.017 lb tracer Projectile - steel	M50, Dummy
	Shot, APC, M59	Propellant - 0.31 lb FNH powder Primer - M23A2 Charge - 0.01 lb tracer Projectile - steel	None
	Shot, AP, M74	Propellant - 4 ounces FNH powder Primer - M23A2 Charge - 0.01 lb tracer Projectile - steel	None
	Cartridge, drill, M21	Inert (steel)	M50, Dummy
37mm Subcaliber	Shell, TP, M63	Propellant - 0.06 lb FNH powder Primer - M23A2 Charge - 0.086 lb black powder Projectile - steel	M58, BD, Practice
	Shell, TP, M92	Propellant - 0.07 lb FNH powder Primer - M38A1 Charge - 0.081 lb black powder Projectile - steel	M74, PD

TABLE 8-1
AMMUNITION USED AND EXPLOSIVE/CHEMICAL FILLER (CONTINUED)

ITEM	MODEL/TYPE	FILLER/WEIGHT	FUZE/TYPE
40mm Gun	Cartridge, AP-T, M81A1	Propellant - 10.4 ounces FNH powder Primer - M38A1 Charge - 0.02 lb tracer Projectile - steel	None
	Shell, HE-T, Mk2	Propellant - 11.49 ounces FNH powder Primer - M38A1 Charge - TNT Projectile - steel	Mk 27, PD
	Shell, TP-T, Mk2	Propellant - 11.49 ounces FNH powder Primer - M38A1 Charge - inert Projectile - steel	M69, Dummy
	Shell, TP-T, M91	Propellant - 11.49 ounces FNH powder Primer - M38A1 Charge - 0.02 lb tracer Projectile - steel	M69, Dummy
	Cartridge, Drill, M17	Inert (bronze and steel)	None
90mm Gun	Shell, HE, M71	Propellant - 7.31 lb NH powder Primer - M28A2 Charge - 2.04 lb TNT Projectile - steel	M48A1, MT
	Shot, AP-T, M77	Propellant - 7.31 lb NH powder Primer - M28A2 Charge - 0.01 lb tracer Projectile - steel	None

TABLE 8-1
AMMUNITION USED AND EXPLOSIVE/CHEMICAL FILLER (CONTINUED)

ITEM	MODEL/TYPE	FILLER/WEIGHT	FUZE/TYPE
90mm Gun (continued)	Projectile, APC, M82	Propellant - 7.31 lb NH powder Primer - M28A2 Charge - 0.31 lb ammonium picrate Projectile - steel	M68, BD
	Shell, TP, M71	Propellant - 7.31 lb NH powder Primer - M28A2 Charge - inert Projectile - steel	M73, Dummy
	Cartridge, Drill, M12B2	Inert (bronze)	None
155mm Gun	Shell, HE, M101	Primer - Mk2A4 Charge - 15.56 lb TNT Projectile - steel	M51, PD M67, MT
	Projectile, AP, M112	Primer - Mk2A4 Charge - 1.44 lb ammonium picrate Projectile - steel	M51, PD M67, MT
	Shell, HE MkIIIAI	Primer - Mk2A4 Charge - 15.21 lb TNT Projectile - steel	M51A4, PD
	Shell, TP, M101	Primer - Mk2A4 Charge - inert (sand) Projectile - steel	Dummy

TABLE 8-2
CHEMICAL DATA OF ORDNANCE FILLERS

FILLER	SYNONYM(S)	CHEMICAL FORMULA
Ammonium Picrate	Composition D, Ammonium 2,4,6-trinitrophenolate	$C_7H_5(NO_2)_3$
Black Powder	Saltpeter, Niter	
74% Potassium Nitrate		KNO_3
11% Sulfur		S
15% Charcoal		C
Charcoal	Carbon	C
Composition D	(see Ammonium Picrate)	
FNH Powder	(see nitrocellulose)	Cu
Nitrocellulose	Guncotton; Pyroxylin; Nitrocotton; Cellulose Nitrate	$[(C_6H_8)_5(NO_2)_3]_n$
NH Powder	(see nitrocellulose)	
Potassium Nitrate		KNO_3
Sulfur		S
Tetryl	Trinitrophenylmythlynitramine	$(NO_2)_3C_6H_2N(NO_2)CH_3$
TNT	Trinitrotoluene, Triton, Trotyl, Trilite, Trinol, Tritolo	$CH_3C_6H_2(NO_2)_3$
Tracer Compositions	Tracer Mixture	
R-256		
8.3% Calcium Resinate		
26.7% Strontium Peroxide		SrO_2
26.7% Magnesium Powder		Mg
33.3% Strontium Nitrate		$Sr(NO_3)_2$
R-284		
17% Polyvinyl Chloride		
28% Magnesium Powder		Mg
55% Strontium Nitrate		$Sr(NO_3)_2$
R-321		
16% Polyvinyl Chloride		
26% Magnesium Powder		Mg
52% Strontium Nitrate		$Sr(NO_3)_2$

9. EVALUATION OF OTHER ENVIRONMENTAL HAZARDS

a. **Hazardous, Toxic and Radiological Waste**

No activities involving hazardous materials or containerized hazardous materials occurred at the site. Therefore, no HTRW or CON HTRW hazards are apparent at the site.

b. **Building Demolition/Debris Removal**

(1) Several structures were constructed during the Army's ownership of Bailey Island Fire Control Station. Most have been put to beneficial use by the current owner, as the site has been in their family since disposal in 1952. However, a few remaining structures not beneficially used by the owner do present a BD/DR hazard.

(2) Two (2) eight-story observation towers remain on the site and are in very good condition. However, they are an attractive nuisance for local teens and children. The towers are a local gathering point for adolescents. Partying, vandalism and alcohol drinking occurs frequently, especially at the top of the towers. The current owner has sealed the doors and windows to both towers, but trespassers have broken the seals. The towers have not been put to beneficial use by the current owner. The current owner believes that someone will eventually get hurt, especially with alcohol drinking involved, and that it is in the best interest of everyone involved to remove the two towers.

(3) Foundations to the barracks and mess hall buildings remain in the wooded area between the two observation towers. In places, the foundation can be as high as 5 feet or greater above the ground. It acts as an attractive nuisance to young children playing in the woods and adolescents partying in and around the towers. Due to the height of the foundation in places, it is definitely a fall hazard. The foundations have not been beneficially used by the current owner. The current owner would like the foundations removed before somebody gets hurt walking or playing on them.

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APPENDIX A

REFERENCE SOURCES

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REFERENCE SOURCES

The following organizations and personnel are acknowledged for their support.

Organization	Name	Telephone	Nature of Support
GOVERNMENT AGENCIES			
FEDERAL			
Department of Defense			
Headquarters			
Pentagon Library Pentagon Rm 1A518 Washington, D.C. 20310-6080	DLOD Computer	(703)697-4658	CD-ROM computer search No information
Defense Technical Information Center (DTIC) Cameron Station Alexandria, VA 22304-6145	DTIC Computer	(202)274-6434	On-line computer search No information
Defense Mapping Agency 6001 McCarthur Blvd Bethesda, MD 20816-5001	Mr. Jimmy Thompson	(301)227-2495	No information
Army			
Defense Logistics Studies Information Exchange (DLSIE) U.S. Army Logistics Management College Fort Lee, VA 23801-6043	DLSIE Computer	(804)765-4007	On-line computer search No information
Historical Accident Database U.S. Army Technical Center for Explosives Safety ATTN: SMCAC-ESM Savanna, IL 61074-9639	DDESB Computer	(703)325-8624	On-line computer search No information
Army Safety Management Information System (ASMIS) Fort Rucker, AL 36322	ASMIS Computer	(205)255-6485	On-line computer search No information

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REFERENCE SOURCES Continued

The following organizations and personnel are acknowledged for their support.

Organization	Name	Telephone	Nature of Support
U.S. Army Corps of Engineers Office of History 7701 Telegraph Road Alexandria, VA 22310-3865	(Contractor supplied)	(703)355-8172	RE document
U.S. Army Engineer Division New England ATTN: CENED-RE-AM 424 Trapelo Road Waltham, MA 02254-9149	Ms. Anne Laster Mr. Bob Batt	(617)647-8584	RE documents, maps
U.S. Army Chemical Corps Museum ATTN: ATZN-CM-MM BLDG 2299 Fort McClellan, AL 35205	SGM Murray	(205)848-6555	No evidence of chemical use or storage at site.
U.S. Army Center for Military History ATTN: DAMH-RAS 1099 14th Street, NW Franklin Court Building Washington, D.C. 20005-3402	(Contractor supplied)	(202)761-5416	Order of Battle Brief Fact Sheet
U.S. Army Armament Munitions and Chemical Command Historical Office ATTN: AMSMC-HO Rock Island, IL 61299	Dr. Herb Lepore	(309)794-1276	No information
54th EOD Ft. Monmouth, NJ 07703		(908)532-3528	No calls to site

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The following organizations and personnel are acknowledged for their support.

Organization	Name	Telephone	Nature of Support
U.S. Military History Institute Library Carlisle Barracks, Bldg 52 Carlisle, PA 17013-5008	Mr. John J. Slonaker Mr. Dennis Vetock	(717)245-3611	RE documents
U.S. Army Chemical and Biological Defense Command Aberdeen Proving Ground, MD 21010-5401	Ms. Kathleen Ciolfo	(410)679-4430	No information
Ordnance Corps Museum Aberdeen Proving Ground Aberdeen, MD 21005	Mr. Roger Godin	DSN 298-3602	Source of historical technical manuals
Air Force			
1st Camera Squadron Det 9, 1 CTCS/DOV 3720 Fetchet Ave Andrews AFB, MD 20331-5157	Mr. L. Moore	(301)981-2257	No information
Air Force History Research Agency 600 Chennault Drive Maxwell AFB, AL 36112-6424	IRIS system	(205)953-2437	On-line computer search No information
Navy			
Naval Construction Battalion ATTN: Code 1564 1000 23rd Ave Port Hueneme, CA 93043-4300	Mr. Bob Brickey	(805)982-5569	No information
Naval Construction Battalion ATTN: Code 10H 1 Pleasant Valley Rd Port Hueneme, CA 93043-4300	Mr. Vince Transano	(805)982-5913	No information

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The following organizations and personnel are acknowledged for their support.

Organization	Name	Telephone	Nature of Support
Naval Facility Engineering Command Environmental Restoration Br Philadelphia, PA 19113-2090	Mr. Al Hering	(610)595-0567	No information
Naval War College 666 Cushing Road Newport, RI 02841-1207	Ms. Barbara Donnely	(410)841-3052	No information
Navy Historical Center BLDG 57 Washington Navy Yard Washington, DC 20374	(Contractor supplied)	(202)433-3171	Positive Findings: None Negative Findings: All record groups
Marine Corps Historical Center BLDG 58 Washington Navy Yard Washington, DC 20374	(Contractor supplied)	(202)433-3483	Positive Findings: None Negative Findings: All record groups
Department of Agriculture			
USDA - Agricultural Stabilization and Conservation Service (ASCS) Aerial Photography Field Office, Customer Services 2222 W. 2300 South P.O. Box 30010 Salt Lake City, UT 84130-0010	Ms. Sherrie Holyoak	(801)975-3503	Historic aerial photos available
USDA - Natural Resources Conservation Service 381 Main St, Suite 3 Gorham, ME 04038	Mr. David Chiapetta	(207)839-7842	Soil survey book; maps and aerial photos of area available

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The following organizations and personnel are acknowledged for their support.

Organization	Name	Telephone	Nature of Support
Department of Interior			
Reston - ESIC 507 National Center Reston, VA 22092	Mr. Dave Keys	(509)353-2524	Source of maps, coastal marine geologic environments, geologic survey
Sioux Falls - ESIC EROS Data Center Sioux Falls, SD 57198-0001	Mr. Bill Schaefer	(605)594-6151	Source of aerial photos
Department of Commerce			
National Oceania and Atmospheric Administration Air Weather Service Federal Bldg, Room 305 Asheville, NC 28801	Ms. Janet Wall	(704)271-4404	Climate data
National Archives and Records Administration			
National Archives and Records Administration New England Region 380 Trapelo Road Waltham, MA 02145	Mr. Stan Tozeski	(617)647-8460	Positive Findings: Record Group 269 Negative Findings: Record Groups 30, 77, 92, 111, 156, 270, 338, 392, 407
National Archives and Records Administration Archives I Military Reference Branch Pennsylvania and 7th Washington, DC 20408	(Contractor supplied)	(202)501-5385	Positive Findings - Record Groups 77, 153, 165 Negative Findings - Record Groups 18, 35, 92, 160, 407

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The following organizations and personnel are acknowledged for their support.

Organization	Name	Telephone	Nature of Support
National Archives and Records Administration Archives II Cartographic & Architectural Branch 8601 Adelphi Rd. College Park, MD 20740-6001	(Contractor supplied)	(301)713-7040	Positive Findings - none Negative Findings - all record groups
National Archives and Records Administration Archives II Still Picture Branch 8601 Adelphi Rd. College Park, MD 20740-6001	(Contractor supplied)	(301)713-6660	Positive Findings - none Negative Findings - all record groups
National Archives and Records Administration Archives II Motion Picture, Sound and Video Branch 8601 Adelphi Rd. College Park, MD 20740-6001	(Contractor supplied)	(301)713-7060	Positive Findings - none Negative Findings - all record groups
National Archives and Records Administration Archives II Civil Reference Branch 8601 Adelphi Rd. College Park, MD 20740-6001	(Contractor supplied)	(301)713-7250	Positive Findings - none Negative Findings - all record groups

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The following organizations and personnel are acknowledged for their support.

Organization	Name	Telephone	Nature of Support
National Archives and Records Administration Archives II Textual Branch 8601 Adelphi Rd. College Park, MD 20740-6001	(Contractor supplied)	(301)713-7250	Positive Findings - none Negative Findings - all record groups
National Archives and Records Administration Suitland Branch 4205 Suitland Parkway Washington, DC 20409	(Contractor supplied)	(301)457-7190	Positive Findings - Record Group 77 Negative Findings - Record Groups 112, 156, 159, 168, 175,181, 319, 338, 394, 407, 71, 72, 74, 77, 92
National Personnel Records Center 9700 Page Ave. St. Louis, MO 63132	Mr. Bill Siebert	(314)538-4085	No information
Congress			
Library of Congress Washington, D.C. 20536	(Contractor supplied)	(202)707-5522	USGS topographical map
Smithsonian Institute			
Smithsonian Institute Historical Research Division Washington, DC 20560	(Contractor supplied)	(202)357-3133	Positive Findings - none Negative Findings - all collections

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The following organizations and personnel are acknowledged for their support.

Organization	Name	Telephone	Nature of Support
STATE			
Maine National Guard Camp Keyes ATTN: MEARNG-PAO Augusta, ME 04333-0033	CWO Roussel	(207)626-4378	Miscellaneous information
Maine Department of Agriculture Station 28 Augusta, ME 04333	Ms. Anne Gibbs	(207)287-3891	Threatened/endangered plant information
Maine Department of Environmental Protection Station 17 Augusta, ME 04333	Mr. Harry Toby	(207)287-2651	No EAs performed in area
Maine Department of Natural Resources 217 State Street Augusta, ME 04333	Ms. Trisha Zmudski	(207)622-3101	Referral
Maine Department of Inland Fisheries and Wildlife Station 41 Augusta, ME 04333	Mr. Allen Hutchinson	(207)941-4466	Threatened/endangered animal information
Maine Historical Society 485 Congress Street Portland, ME 04101	Mr. Bill Barry	(207)774-1822	No information
Maine State Library LMA Building Station 64 Augusta, ME 04333	Ms. Louise Hinkley	(207)287-5600	References

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The following organizations and personnel are acknowledged for their support.

Organization	Name	Telephone	Nature of Support
Maine State Museum and Archives LMA Building Station 64 Augusta, ME 04333	Staff	(207)287-5600	No information
Maine Historic Preservation Commission 55 Capitol Street Augusta, ME 04333	Mr. Earle Shettleworth Director Mr. Kirk Mahoney Architectural Historian	(207)287-2132	Historic information
Metropolitan District of Boston 20 Somerset Street Boston, MA 02108	Mr. Al Shroder	(617)727-5250	Referral
University of Maine Library Raymond Folger Library Orono, ME 04469	Ms. Muriel Sanford	(207)581-1688	References
LOCAL			
County			
Cumberland County Recorder of Deeds Congress Street South Portland, ME	Clerk	(207)781-8389	Referral
Cumberland County Sheriff 50 Ogden Bridge Street Portland, ME 04102	Det. Gerard Brady	(207)774-1444	Interview
City/Township			
Brunswick Chamber of Commerce 59 Pleasant Street Brunswick, ME 04011	Ms. Claire LeDuc	(207)725-8797	Travel literature

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The following organizations and personnel are acknowledged for their support.

Organization	Name	Telephone	Nature of Support
Harpswell Neck Fire Department RR 1, P.O. Box 250 Orrs Island, ME 04066	Mr. William Beasley	(207)833-6365	Available for assistance
Portland Public Library 5 Monument Square Portland, ME 04101-4072	Mr. Tom Gaffney	(207)871-1700	Local history
South Portland Public Library 482 Broadway South Portland, ME 04106	Ms. Judith Anderson	(207)767-7660	Referral
Town of South Harpswell Mountain Rd, P.O. Box 139 South Harpswell, ME 04079	Ms. Dawnna Black Town Office Manager	(207)833-5771	Interview, plat maps
	NON GOVERNMENT AGENCIES		
NATIONAL			
SIRSI Corporation 689 Discovery Drive Huntsville, AL 35806	Computer (STILAS)	(205)922-9820	On-line computer search No information
DIALOG Information Services Midwest Regional Office 75 East Wacker Dr. Chicago, IL 60601	Computer (DIALOG)	(312)726-9206	On-line computer search No information
Online Computer Library Center 6565 Frantz Rd. Dublin, OH 43017-3395	Computer (OCLC)	(800)848-5878	On-line computer search No information
Northern Illinois Library System 4034 East State Street Rockford, IL 61108	Computer (NILS)	(815)229-0330	On-line computer search Source of inter-library loans

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The following organizations and personnel are acknowledged for their support.

Organization	Name	Telephone	Nature of Support
Council On America's Past 518 Why Worry Lane Phoenix, AZ 85021	Heliogram Publication	(800)396-4693	General information
STATE			
(None)			
LOCAL			
City/Township/County			
College of the Atlantic Library; Thorndike Center Bar Harbor, ME 04609-9986	Mr. Damon Lear	(207)288-5015	No information
Curtis Memorial Library 23 Pleasant Street Brunswick, ME 04011	Mr. Brian Damien	(207)725-5242	Book on local history
Orrs Island Library RR 1, P.O. Box 119 Orrs Island, ME 04003	Ms. Joann Rogers	(207)833-5576	Referral
(Landowner) Bailey Island, ME	Mrs. Judith Adams	(207)833-7715 (202)966-7890	Interview, guide on site
(Knowledgeable Person) Route 24 Bailey Island, ME 04003	Mr. Chip Black	(207)833-5435	Interview
(Knowledgeable Person) 170 5th Ave Oswego, NY 13126-1808	Mr. Robert Zink	(703)775-7929	General information
(Knowledgeable Person) 327 Rollins Road Rollinsford, NH 03869-5109	Mr. Nelson Lawry	(603)742-0543	Interview

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APPENDIX B

REFERENCES AND ABSTRACTS

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SECTION I

BIBLIOGRAPHIES

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B-1 Army Regulation 200-1, Environmental Quality, Environmental Protection and Enhancement, DA, 23 April 1990

B-2 Mandatory Plan for Ordnance and Explosive Waste (OEW) Mandatory Center of Expertise (MCX) and Design Center, CEHND 1105-3-9, U.S. Army Corps of Engineers, Huntsville Division, 10 August 1992

B-3 Defense Environmental Restoration Program for Formerly Used Defense Sites, Ordnance and Explosive Waste Archives Search Report Instructions, Version 1.0 with changes, U.S. Army Corps of Engineers, Rock Island District, 21 December 1992

B-4 Site Safety Plan for OEW Investigations (Appendix A-104, only), U.S. Army Corps of Engineers, Rock Island District, July 1995

B-5 Artillery Ammunition, TM 9-1901, War Department, 29 June 1944 (D-1, D-2, D-3, D-4, D-5)

B-6 Ammunition Inspection Guide, TM 9-1904, War Department, 2 March 1944 (D-1, D-4, D-5)

B-7 Complete Round Charts No. 5981, Ordnance Department, 1 May 1947 (D-1, D-2, D-3, D-4, D-5)

B-8 Inventory Project Report for Site No. D01ME009801, U.S. Army Corps of Engineers, New England Division, 5 May 1993 (E-1)

B-9 Posts, Camps and Stations, undated; Center for Military History, Historical Research Branch, Hossfeld Compilation Vol II (B) (F-1)

B-10 Modernization Program; Harbor Defenses of Portland, Office of the Chief of Coast Artillery, 1 October 1941; NARA, Washington DC, RG 165, Box 118, File 622.1/22-C-3 (F-2)

B-11 Memorandum, First Service Command, Subject: Transmittal of Lease with Mary F. Hazell, 23 December 1942; NARA, Suitland Branch, RG 77, Box 166, Folder 601.53 (F-3)

B-12 Memorandum, Subject: Preparation of Preliminary Draft for Study for the Utilization of Posts, Camps and Stations,

with Particular Emphasis on the Post-war Military Requirements, 22 July 1944; NARA, Washington DC, RG 165, Box 47, File 370.01/A (F-4)

B-13 Letter, Headquarters 240th Engineer Group to Mr. Nelson Lawry, 18 December 1972 (F-5)

B-14 Letter, Headquarters 240th Engineer Group to Mr. Nelson Lawry, 27 December 1972 (F-6)

B-15 Letter, Mr. Leonard W. Chronkhite to Mr. Nelson Lawry, 29 November 1979 (F-7)

B-16 Thesis, Portland Defended, A History of the United States Government Fortifications of Casco Bay 1794-1945, Donna Lee McKinnon, August 1987 (F-8)

B-17 Modern Defenses of the Coast of Maine, Joel W. Eastman, 31 October 1988 (F-9)

B-18 The Evolution of Bailey's Island, Beth E. Hill, 1992 (F-10)

B-19 Modern American Harbor Defenses, Mark A. Berhow, Fort MacArthur Military Press, 1992 (F-11)

B-20 Letter, Mr. Robert Zink to SMCAC-ESL, 30 March 1995 (F-12)

B-21 Letter, Maine Historic Preservation Commission to SMCAC-ESL, 3 April 1995 (F-13)

B-22 Letter, Coast Defense Study Group to SMCAC-ESL, 6 April 1995 (F-14)

B-23 Letter, Maine Department of Inland Fisheries and Wildlife, 24 April 1995 (F-15)

B-24 Letter, Maine Department of Economic and Community Development to SMCAC-ESL, 3 May 1995 (F-16)

B-25 Tide data at Harpswell Harbor for 1996, National Ocean Service (F-17)

B-26 Realty Control File Summary, undated; Corps of Engineers Office of History (G-1)

B-27 Deed, Mary F. Hazell, et al, to United States of America, 9 December 1942; NARA, Washington DC, RG 153, Reservation File 1800-1950, Box 201 (G-2)

B-28 Deed, Agnes I. Paton to United States of America, 3 February 1943; NARA, Washington DC, RG 153, Reservation File 1800-1950, Box 201 (G-3)

B-29 Real Property Classification, General Services Administration, 19 November 1951 (G-4)

B-30 Memorandum, GSA Boston to GSA Regional Director, 10 September 1952 (G-5)

B-31 Deed, United States of America to Ester Root Adams, 22 October 1952 (G-6)

B-32 Property Map of Harpswell, Maine, May 1963 revised to 11 February 1988 (G-7)

B-33 Current owner plat map, undated (G-8)

Center for Military History, Historical Research Branch
Posts, Camps, and Stations (Hossfield Compilation), Vol. II (B);
Order of Battle Brief Fact Sheet, "Chapter VII."

Library of Congress Geography & Map Division
U.S. Dept. of Interior Geological Survey, Bailey Island Quad-1957;
Map

NARA Suitland, MD
RG 77, Records of the Office of the Chief of Engineers;
Entry: Security Classified Subject Files, 1940-1945; Box 166; Folder 601.53;
G.W. Gillette to the Chief of Engineers on Real Estate, 23 December 1942, with rel. corresp.

NARA Washington, DC
RG 153, Records of the Office of the Judge Advocate General (Army);
Reservation File, 1800-1950; Box 201, ME; File, Bailey Island, ME;
Title Papers, Tract 3, Bailey Island.

NARA Washington, DC
RG 153, Records of the Office of the Judge Advocate General (Army);
Reservation File, 1800-1950; Box 201, ME; File, Bailey Island, ME;
Title Papers, Tract 2, Bailey Island.

NARA Washington, DC
RG 153, Records of the Office of the Judge Advocate General (Army):
Reservation File, 1800-1950; Box 201, ME; File, Bailey Island, ME;
Title Papers, Bailey Island, 1 & 4, 2/5/43.

NARA Washington, DC
RG 165, Records of the War Department General and Special Staffs;
Office of the Director of Services, Supply, and Procurement (G-4), Service Group, Installations Branch; Entry 257, Security-Classified Correspondence and Maps Relating to Harbor Defense Installations, 1914-1946; Box 118; File 662.1/22-C-3.
Modernization Program, Harbor Defenses of Portland, 1941.

NARA Washington, DC
RG 165, Records of the War Department General and Special Staffs;
Office of the Director of Services, Supply and Procurement (G-4), Service Group, Installations Branch; Entry 257, Security-Classified Correspondence and Maps Relating to Harbor Defense Installations, 1914-1946; Box 142; File 675/22-A;
Office of the Chief of Engineers on Construction Directive for Power Installations, 2/28/44, with rel. corres.

NARA Washington, DC
RG 165, Records of the War Department General and Special Staffs; Office of the Director of Services, Supply and Procurement (G-4), Service Group, Installations Branch; Entry 257, Security-Classified Correspondence and Maps Relating to Harbor Defense Installations, 1914-1946; Box 47; File 370.01/A;
Memorandum for the Director, Mobilization Division on Projected Post-War Military Requirements, 7/22/44.

U.S. Army Corps of Engineers, Office of History
Real Estate Records;
Realty Control File Summary (Land Acquisition and Disposals Subsequent to 1 July 1940)

Bailey Island Fire Control Station
Negative Reports

SECTION II
NATIONAL CAPITOL REGION ARCHIVES SEARCH
PART B: NEGATIVE FINDINGS

Center for Air Force History;
All Records;
Nothing Found

Library of Congress Still Photos Branch, College Park, MD;
All Records;
Nothing Found

NARA Archives II, College Park, MD
RG 107, Records of the Office of the Secretary of War;
Entry 211: Office of the Assistant Secretary of War for Air, Establishment of Airfields and Airbases, 1940-1945;
Nothing Found

NARA Archives II, College Park, MD
RG 107, Records of the Office of the Secretary of War;
Entry 102: Office of the Administrative Assistant of the Secretary of War, Coordination and Records Project Decimal File, 1943-Jan. 1946, Aviation Fields and Air Bombing Ranges 580;
Nothing Found

NARA Archives II, College Park, MD
RG 16, Records of the Office of the Secretary of Agriculture
Entry 16: Index to the General Correspondence, 1906-1970;
Nothing Found

NARA Archives II, College Park, MD
RG 269, Records of the General Services Administration;
Entry 62, Real Property Disposal Case Files Transferred from FCA;
Nothing Found

NARA Archives II, College Park, MD
RG 270, Records of the War Assets Administration;
General Review Board, Action Files, 1946-1949;
Nothing Found

NARA Archives II, College Park, MD
RG 270, Records of the War Assets Administration;
Office Files of WAA Administrator Jesse Larson, 1942-53;
Nothing Found.

NARA Archives II, College Park, MD
RG 30, Records of the Bureau of Public Roads;
Entry 2: General Correspondence, 1893-1912;
Entry 6: Classified Central File, 1912-1950;
Entry 54: Correspondence, 1941-1945;
Entry 54A: Correspondence and Memos Relating to National Defense Highway Construction, 1940-June 1943;
Entry 63: Records Relating to National Highway and Defense Highway Program, 1940-1055;
Nothing Found

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NARA Archives II, College Park, MD
RG 95, Records of the U.S. Forest Service;
Entry 76: Exchange Cases, 1922-1946;
Entry 79: Exchange, Purchase and Donation Cases, 1946-1951;
Nothing Found

NARA Cartographic & Architectural Branch, College Park, MD
All Record Groups;
Nothing Found

NARA Motion Picture, Sound & Video Branch, College Park, MD;
All Records;
Nothing Found

NARA Still Pictures Branch, College Park, MD;
All Record Groups;
Nothing Found

NARA Suitland, MD
RG 112, Records of the Office of the Surgeon General;
Entry 31: Geographic Series, 1938-1946;
Nothing Found

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RG 112, Records of the Office of the Surgeon General;
Entry 32: Geographic Series (Security Classified), 1938-1946;
Nothing Found

NARA Suitland, MD
RG 156, Records of the Office of the Chief of Ordnance;
Entry 687: Disaster File Comprising Reports of Investigations with Photographs & Correspondence of the Effects of Accidents at Ordnance Facilities, 1941-1949;
Nothing Found

NARA Suitland, MD
RG 156, Records of the Office of the Chief of Ordnance;
Entry 949: Records Relating to Expansion of Production Facilities, 1942-1944;
Nothing Found

NARA Suitland, MD
RG 156, Records of the Office of the Chief of Ordnance;
Entry 798: Plans & Drawings of Facilities, 1922-1942;
Nothing Found

NARA Suitland, MD
RG 156, Records of the Office of the Chief of Ordnance;
Entry 794: Records Relating to Facilities Expansion, 1940-1948;
Nothing Found

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NARA Suitland, MD
RG 156, Records of the Office of the Chief of Ordnance;
Entry 775: Records Relating to Ordnance Owned and Contractor Operated Facilities, 1941-1945;
Nothing Found

NARA Suitland, MD
RG 156, Records of the Office of the Chief of Ordnance;
Entry 646: Histories of Ordnance Installations and Activities, 1940-1945;
Nothing Found

NARA Suitland, MD
RG 156, Records of the Office of the Chief of Ordnance;
Entry 44: Correspondence Relating to Reports of Operations, 1939-1940;
Nothing Found

NARA Suitland, MD
RG 156, Records of the Office of the Chief of Ordnance;
Entry 41: Correspondence Relating to Inspections, 1927-1940;
Nothing Found

NARA Suitland, MD
RG 156, Records of the Office of the Chief of Ordnance;
Entry 39: Confidential Correspondence, 1917-1940;
Nothing Found

NARA Suitland, MD
RG 156, Records of the Office of the Chief of Ordnance;
Entry: Annual and Semi-Annual Histories, 1955-1962;
Entry: Histories of Ordnance Field Installations and Activities, 1940-1945;
Nothing Found

NARA Suitland, MD
RG 159, Records of the Office of the Inspector General;
Entry 11: Annual Inspection Reports, 1912-1939;
Entry 26E: General Correspondence, 1939-1947;
Nothing Found

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RG 168, Records of the National Guard Bureau;
Entry 12C: Unclassified Decimal Correspondence, 1922-1954;
Entry 12D: Classified Decimal Correspondence, 1922-1954;
Nothing Found

NARA Suitland, MD
RG 175, Records of the Chemical Warfare Service;
Entry 1: Central Correspondence, 1918-1942;
Entry 67A4900: Station File, 1946-1954;
Nothing Found

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NARA Suitland, MD
RG 319, Records of the Army Staff;
Entry 47: Army Intelligence Project Decimal File, 1941-1954;
Nothing Found

NARA Suitland, MD
RG 338, Records of the U.S. Army Commands;
Entry: 6th Service Command;
Entry: 8th Service Command;
Entry: Central Defense Command;
Nothing Found

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RG 338, Records of the U.S. Army Commands;
Entry: Posts, Camps and Stations;
Entry: Eastern Defense Command;
Nothing Found

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Entry 14: Correspondence Relating to Coastal Defense, 1914-1929;
Entry 16: Security Classified General Correspondence, 1920-1932;
Entry 17: Reports of Investigation, 1918-1939;
Entry 18: Annual Inspection Reports, 1928-1939;
Entry 20: Correspondence Relating to Acquisition and Disposal of Real Estate, 1924-1934;
Nothing Found

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RG 394, Records of U.S. Army Continental Commands, 1920-1942;
Entry 189: Security Classified Records of Investigation, 1937-1938;
Entry 192: General Correspondence, 1920-1939;
Entry 194: Correspondence Relating to WPA, 1937-1940;
Entry 263: General Correspondence of Construction Division, 1921-1942;
Entry 350: Newspaper Clippings;
Nothing Found

NARA Suitland, MD
RG 407, Records of the Adjutant General's Office;
Entry 427: World War II Operations Reports;
Nothing Found

NARA Suitland, MD
RG 71, Records of the Bureau of Yards & Docks;
Entry: Correspondence Relating to Contracts, 1925-1942;
Entry 46: Index to Contract Correspondence, 1925-1942;
Entry 49: Contract Cards, 1917-1926;
Nothing Found

NARA Suitland, MD
RG 72, Records of the Bureau of Aeronautics;
Entry: Records Relating to Inactive Air Stations, 1943-1989;
Nothing Found

NARA Suitland, MD
RG 74, Records of the Bureau of Ordnance;
Entry 25: Confidential General Correspondence, 1926-1944;
Entry 25: Restricted General Correspondence, 1926-1944;
Accession 9218: General Correspondence, 1907-1947;
Nothing Found

NARA Suitland, MD
RG 74, Records of the Bureau of Ordnance;
Accession 4529: Construction and Procurement Subject File, 1945;
Accession 4444: Construction and Procurement Subject File, 1946;
Accession 5595: Construction and Procurement Subject File, 1947;
Nothing Found

NARA Suitland, MD
RG 77, Records of the Office of the Chief of Engineers;
Entry 58A-1076: Real Estate Files;
Nothing Found

NARA Suitland, MD
RG 77, Records of the Office of the Chief of Engineers;
Entry 409: Field Survey Notebooks, 1907-1939;
Nothing Found

NARA Suitland, MD
RG 77, Records of the Office of the Chief of Engineers;
Entry A53-182: Miscellaneous Files, 1945;
Nothing Found

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RG 77, Records of the Office of the Chief of Engineers;
Entry 394: Historical Record of Buildings, Abandoned Army Posts, 1918-1942;
Nothing Found

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Entry 393: Historical Record of Buildings, 1905-1942;
Nothing Found

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RG 77, Records of the Office of the Chief of Engineers;
Accession A51-59: Records Relating to Airfields, 1945, Part I & Part II;
Nothing Found

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NARA Suitland, MD
RG 77, Records of the Office of the Chief of Engineers;
Entry A52-87: Harbor Defense Files, Classified, 1918-1945;
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Entry A50-23: Harbor Defense Files, 1918-1945;
Nothing Found

NARA Suitland, MD
RG 77, Records of the Office of the Chief of Engineers;
Entry 391: Construction Completion Reports, 1917-1943;
Nothing Found

NARA Suitland, MD
RG 77, Records of the Office of the Chief Engineer;
Accession: 61A-1547;
Accession: 63A-1551;
Accession: 64A-2139;
Accession: 66A-3184;
Nothing Found

NARA Suitland, MD
RG 92, Records of the Office of the Quartermaster General;
Entry 1890A: Formerly Classified General Correspondence, 1936-1945;
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NARA Suitland, MD
RG 92, Records of the Office of the Quartermaster General;
Entry 1890: General Correspondence, 1936-1945;
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NARA Suitland, MD
RG 92, Records of the Office of the Quartermaster General;
Entry 1888: General Correspondence, 1917-1922;
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NARA Suitland, MD
RG 92, Records of the Office of the Quartermaster General;
Entry 1891: General Correspondence (Geographic File), 1922-1935;
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NARA Suitland, MD
RG 92, Records of the Office of the Quartermaster General;
Entry 1892: General Correspondence (Geographic File), 1936-1954;
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NARA Suitland, MD
RG 92, Records of the Office of the Quartermaster General;
Entry 1998: Real Estate Records, 1917-1922;
Nothing Found

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NARA Suitland, MD
RG 92, Records of the Office of the Quartermaster General;
Entry 1975: Construction Completion Reports, 1917-1938;
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Entry 1974: Construction Completion Reports, 1917-1919;
Nothing Found

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RG 160, Records of Headquarters Army Service Forces;
Entry 27, Mobilization Div., Command Installations Branch,
Correspondence File, 1942-46;
Nothing Found

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RG 165, Records of the War Department General and Special Staffs;
Legislative and Liaison Div., Federal Agencies Branch; Entry 484E,
Security Classified Federal Works Agency Project Files, 1942-45;
Nothing Found

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RG 18, Records of the Army Air Forces;
Air AG, Classified Decimal File, 1945;
Nothing Found

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RG 18, Records of the Army Air Forces;
Air AG, Unclassified Records, Decimal File, 6/44-46 & 1947;
Nothing Found

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RG 18, Records of the Army Air Forces;
Central Decimal File, 10/42-1944;
Nothing Found

NARA Washington, DC;
RG 18, Records of the Army Air Forces;
Project Files, Airfields, 1939-42;
Nothing Found

NARA Washington, DC;
RG 35, Records of the Civilian Conservation Corps;
Entry 115, Camp Inspection Reports;
Nothing Found

NARA Washington, DC
RG 407, Records of the Adjutant General's Office, 1917-;
Project Decimal File, 1940-45;
Nothing Found

Bailey Island Fire Control Station
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NARA Washington, DC
RG 407, Records of the Adjutant General's Office, 1917-;
Administrative Services Div., Operations Branch; Entry 366, Special Projects, Harbor Defenses, 1929-48;
Nothing Found

NARA Washington, DC
RG 407, Records of the Adjutant General's Office, 1917-;
Army AG, Decimal File, 1940-45;
Nothing Found

National Geographic Society
All Records (Photographic);
Nothing Found

Navy Historical Yards, Navy Department Library;
All Collections;
Nothing Found

Navy Historical Yards, Operational Archives;
All Records;
Nothing Found

Smithsonian National Air and Space Museum;
All Records;
Nothing Found

Ordnance and Explosives
Archives Search Report
for
Bailey Island Fire Control Station
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Project Number D01ME009801

APPENDIX C

GLOSSARY

APPENDIX C

GLOSSARY

AP	Armor-Piercing
AP-T	Armor Piercing-Tracer
AR	Aircraft Rocket
BD/DR	Building Demolition/Debris Removal
CEHND	U.S. Army Corps of Engineers, Huntsville Division
CEMRD	U.S. Army Corps of Engineers, Missouri River Division
CENCE	U.S. Army Corps of Engineers, Detroit District
CENCR	U.S. Army Corps of Engineers, Rock Island District
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
DA	Department of Army
D.A.	Direct Action (British)
D.B.	Double Base
DERA	Defense Environmental Restoration Account
DERP	Defense Environmental Restoration Program
DOD	Department of Defense
EOD	Explosive Ordnance Disposal
EPA	Environmental Protection Agency
FDE	Findings and Determination of Eligibility
FNH	Flashless Nonhygroscopic
FS	Feasibility Study
FUDS	Formerly Used Defense Site(s)
gr	Grain
HE	High Explosive
HE-I	High Explosive-Incendiary

HTRW	Hazardous, Toxic and Radiological Waste
HTW	Hazardous and Toxic Waste
HVAR	High Velocity Aircraft Rocket
I	Incendiary
INPR	Inventory Project Report
IRP	Installation Restoration Program
M	Model Number
Mk	Mark
mm or MM	Millimeter
NAS	Naval Air Station
NH	Nonhygroscopic
OEW	Ordnance and Explosive Waste
PA	Preliminary Assessment
P.D.	Point Detonating
PN	Project Number
RA	Remedial Action
RAC	Risk Assessment Code
RD	Remedial Design
RD/RA	Remedial Design/Remedial Action
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
SAA	Small Arms Ammunition
SARA	Superfund Amendments and Reauthorization Act
SCAR	Subcaliber Aircraft Rocket
SI	Site Investigation or Site Inspection
T	Tracer

USA	U.S. Army
USACE	U.S. Army Corps of Engineers
USADACS	U.S. Army Defense Ammunition Center and School
USAHND	U.S. Army Engineer Division, Huntsville
USATCES	U.S. Army Technical Center for Explosives Safety
UXO	Unexploded Ordnance
WD	War Department
#	Pounds (lbs.)

Ordnance and Explosives
Archives Search Report
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APPENDIX D

TEXTS/MANUALS

APPENDIX D

TEXTS/MANUALS

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D-1 37mm Anti-Aircraft (B-5, B-6, B-7)

D-2 37mm Subcaliber (B-5, B-7)

D-3 40mm Anti-Aircraft (B-5, B-7)

D-4 90mm Gun (B-5, B-6, B-7)

D-5 155mm Gun (B-5, B-6, B-7)

ARTILLERY AMMUNITION

Section II

AMMUNITION FOR 37-MM GUNS

30. GENERAL.

a. **General Discussion.** There are four basic types of 37-mm ammunition described herein. The 37-mm M1916, M12, M13, and M14 Subcaliber Gun ammunition is described in section XXII (fig. 32).

b. **Identification.** Painting and marking for identification is in accordance with the basic color scheme prescribed in TM 9-1900.

c. **Fuzes.** FUZE, P.D., M56, is fitted to all high-explosive 37-mm ammunition employed against aircraft and similar targets. This is a supersensitive fuze which will function on impact with light materiel targets. For other high-explosive 37-mm rounds, a direct-action inertia-type base detonating fuze is fitted into the base of the shell. FUZE, B.D., M58, is used with all shell of current manufacture.

d. **Cartridge Cases.**

(1) STANDARD TYPES. Ammunition for M1A2 and AN-M9 Automatic Guns is assembled with CASE, cartridge, 37-mm, M17. This case is 8.75 inches long and has an extractor groove near the head. The M16 Cartridge Case is used with ammunition for M3, M3A1, M5, M5A1, and M6 Guns. This case also is 8.75 inches long and has an extractor rim instead of the extractor groove. Ammunition used with the AN-M4 and M10 Automatic Guns has the Mk. IIIA2 Cartridge Case, which is 5.69 inches long and also has an extractor rim. The Mk. IA2 Case, for 37-mm subcaliber guns is described in section XXII. All standard cases are made of brass.

(2) STEEL CASES. Rounds for the M1A2, M3, M3A1, M5, M5A1, M6, AN-M4, and M10 Guns also are fitted with cases made of steel. In general, these steel cases have a thinner head and are slightly lighter in weight than those of drawn brass. In certain rounds, a reduction in muzzle velocity is necessary for satisfactory functioning. Steel case rounds are not authorized for use in the 37-mm Automatic Gun AN-M9. Steel cases are signified in model designation by addition of letter "B" followed by an arabic numeral, example, "M17B1."

e. **Primers.** PRIMER, percussion, 55-grain, M38, or M38A1, has recently superseded the 20-grain M23A2 Primer for use with 37-mm ammunition. However, until present stocks are exhausted, target-practice rounds are to be assembled with M23A2 Primer (ch. 3, sec. III).

31. COMPLETE ROUND TABLE.

a. Data concerning the 37-mm complete rounds and components thereof are given in table 9, chapter 5.

32. PACKING AND SHIPPING DATA.

a. Packing and shipping data are given in ORD 11 SNL's P-5, P-8, R-1, R-5, and R-6.

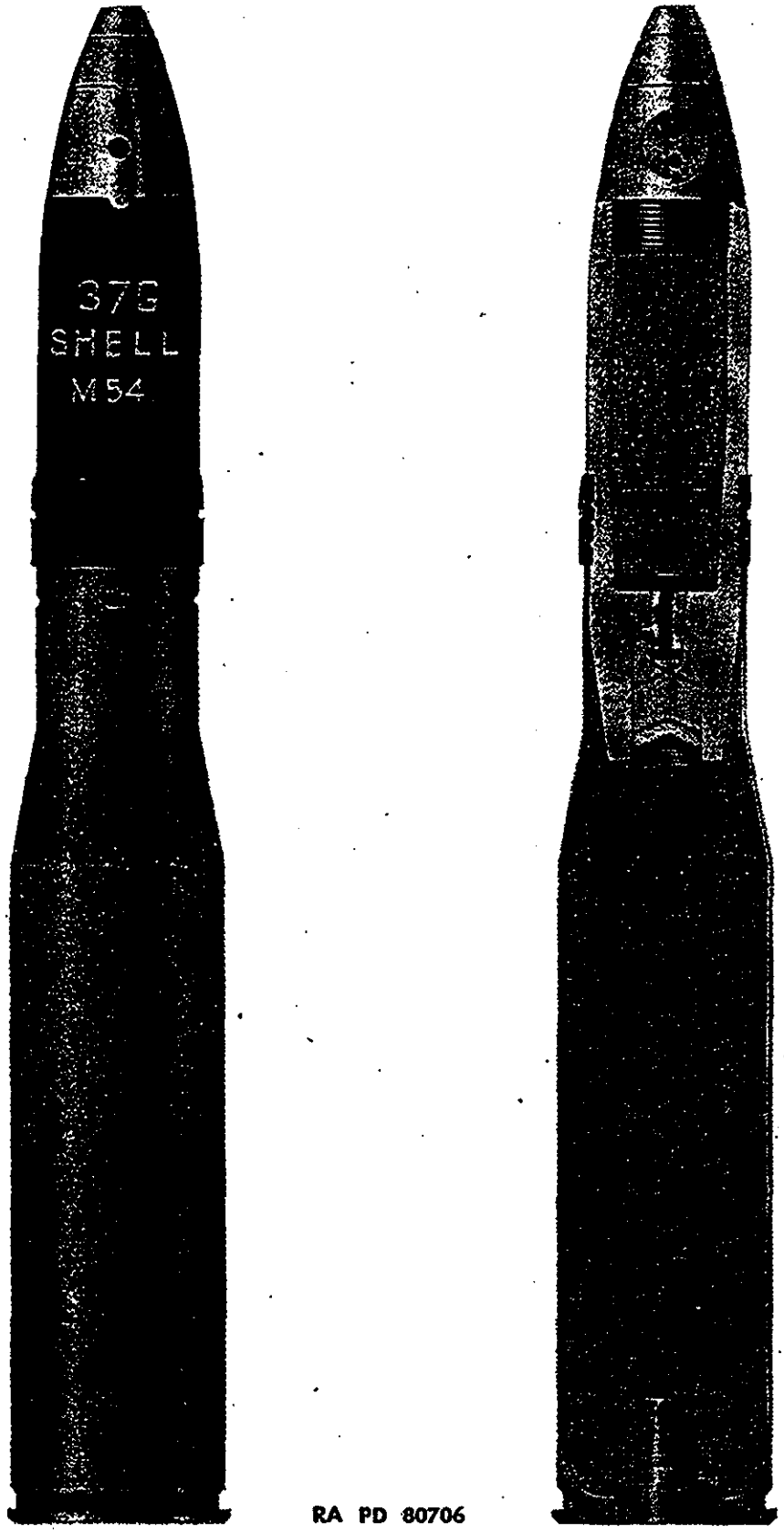

Figure 33 — SHELL, Fixed, H.E., M54, w/TRACER, SD, and FUZE, P.D., M56, 37-mm Auto. Guns, M1A2 and AN-M9

FIXED AND SEMIFIXED ROUNDS AND SEPARATE-LOADING PROJECTILES

33. SHELL, FIXED, H. E., M54, W/TRACER, SD, AND FUZE, P. D., M56, 37-MM AUTO. GUNS, M1A2 AND AN-M9 (fig. 33), is provided for use in the M1A2 and AN-M9 Guns for firing against aircraft, hence is fitted with a supersensitive type fuze. The same shell and fuze are also used with the AN-M4 and M10 Aircraft Guns. However, when fired from the M1A2 and AN-M9 Guns, the round is assembled with the M17 Cartridge Case, or for the M1A2 Gun only, with the M17B1 (steel) Cartridge Case. The projectile consists of a relatively thin-welded shell body, a tetryl bursting charge, FUZE, P.D., M56, and a shell-destroying tracer. The nose is threaded to receive the fuze and the "boat-tailed" base is threaded to receive a tracer assembly containing a relay housing, an igniter charge, and a relay igniting charge. These charges connect the tracer with a black powder pellet in the base end of the bursting charge cavity. The tracer burns for about 8 seconds, equivalent to about 3,500 yards, whereupon the relay pellet is ignited and causes the bursting charge to detonate if prior functioning has not been caused by impact.

DATA

Weight of complete round	2.62 lb	Type of base	Boat-tailed
Length of complete round	12.81 in.	Degree of taper base	9 deg 15 min
Length of fuzed projectile	5.87 in.	Radius of ogive	4.34 cal.
Length of cartridge case	8.75 in.	Muzzle velocity	2,600 ft per sec
Width of rotating band	0.74 in.	Maximum range	3,500 yd*

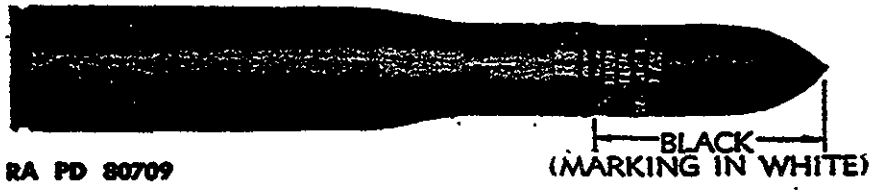

Figure 34 — SHOT, Fixed, A.P., M74, w/TRACER, 37-mm Auto. Gun, M1A2

34. SHOT, FIXED, A. P., M74, W/TRACER, 37-MM AUTO. GUN, M1A2 (fig. 34), has the same shot as that used in the corresponding round for M3, M3A1, M5, M5A1, and M6 Guns (par. 43). However, when fired from the M1A2 Gun, it is assembled with the M17 Cartridge Case, which has an extractor groove. The tracer burns for 2,000 yards.

DATA

Weight of complete round	3.07 lb	Radius of ogive	1.52 cal.
Length of complete round	13.01 in.	Muzzle velocity	2,050 ft per sec
Length of projectile	4.84 in.	Maximum range	7,290 yd
Length of cartridge case	8.75 in.	Penetration (in. at 0-deg obliquity of homogeneous plate at 1,000 yd)	1.2
Width of rotating band	0.74 in.		
Type of base	Square		

*—Limited by shell-destroying tracer. Theoretical maximum is 8,875 yards, horizontal, and 6,200 yards, vertical.

Figure 35 — SHOT, Fixed, A.P.C., M59, w/TRACER, 37-mm Auto. Gun, M1A2

35. SHOT, FIXED, A.P.C., M59, W/TRACER, 37-MM AUTO. GUN, M1A2 (fig. 35), has been adapted from the M51 Projectile (par. 42) to provide armor-piercing ammunition for the 37-mm Automatic Gun M1A2, and more recently for the AN-M9 Gun. The projectile body, armor-piercing cap, and tracer are similar to the corresponding parts of the M51 Armor-piercing Projectile, but the windshield is omitted. This gives the M59 Shot a blunt flat-nosed appearance, in contrast to the long tapered shape of the M51 Shot. Penetrating qualities are not affected, so that both projectiles are about equally effective against the same types of armor plate. However, the effective range is less than that of the M51 Shot.

DATA

Weight of complete round	3.12 lb	Width of rotating band	0.74 in.
Length of complete round	12.76 in.	Type of base	Square
Length of projectile	4.59 in.	Muzzle velocity	2,050 ft per sec*
Length of cartridge case	8.75 in.	Maximum range	5,790 yd*
Penetration (in. at 0-deg obliquity of face-hardened plate at 1,000 yd)			0.7*

*Data for M1A2 Gun. Muzzle velocity for AN-M9 Gun is 2,800 feet per second.

36. SHOT, FIXED, A.P.C., M59, W/TRACER, 37-MM AUTO. GUN, M9 (fig. 35), differs from the round described in paragraph 35 only in the propelling charge (hence the muzzle velocity) and the marking on the cartridge case, which is as follow: "37G, M9, MV 2800." See table 8, chapter 5, complete round table for ammunition for 37-mm guns, for further details. Armor penetration for this projectile in the AN-M9 Gun will be much greater than when fired in the M1A2 due to the greater muzzle velocity to which should be added the velocity of the airplane.

37. SHOT, FIXED, A.P.C., M59A1, W/TRACER, 37-MM AUTO. GUN, M1A2, differs from the round described in paragraph 35 only in the method of attaching the armor-piercing cap to the propectile body, which is by means of a 360-degree crimp.

38. SHOT, FIXED, A.P.C., M59A1, W/TRACER, 37-MM AUTO. GUN, M9, differs from the round described in paragraph 36 only in the method of attaching the armor-piercing cap to the projectile body, which is by means of a 360-degree crimp.

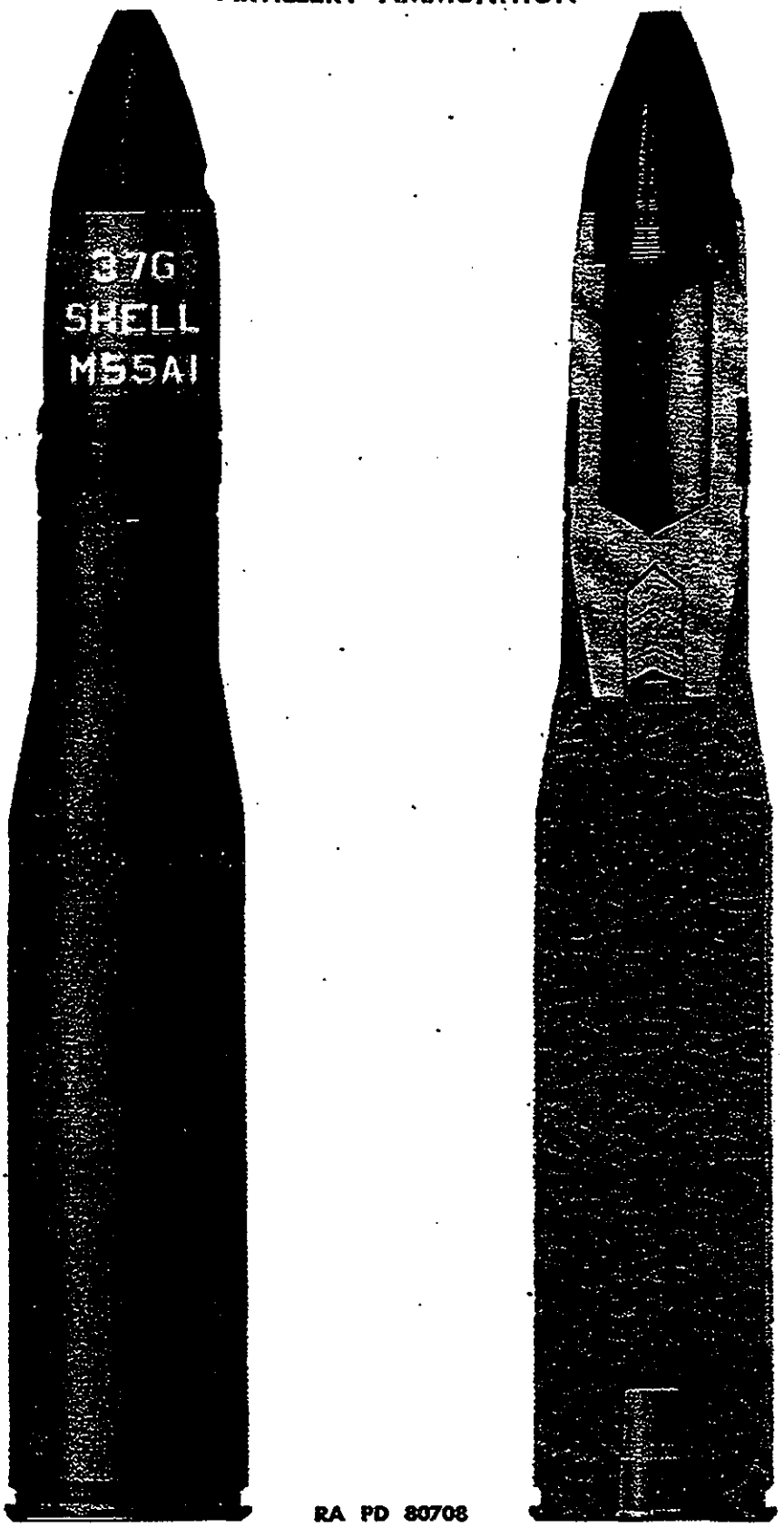

Figure 36 — SHELL, Fixed, Practice, M55A1, w/TRACER, and FUZE, Dummy, M50, 37-mm Auto. Guns, M1A2 and AN-M9

FIXED AND SEMIFIXED ROUNDS AND SEPARATE-LOADING PROJECTILES

39. SHELL, FIXED, PRACTICE, M55A1, W/TRACER, AND FUZE, DUMMY, M50, 37-MM AUTO. GUNS, M1A2 AND AN-M9 (fig. 36), provides practice ammunition for the M1A2 and AN-M9 Guns with about the same ballistic characteristics as the high-explosive Service Round M54 (par. 33). The M17 Cartridge Case and a service primer and propelling charge are used. The projectile is similar in contour to, and of the same weight as the M54 Shell, but has no bursting charge and is fitted with a dummy fuze. In addition, the shell-destroying tracer of the service round is replaced by a composition for tracing purposes only. The tracer, consisting of a red tracer composition and an igniter composition, burns for about 8 seconds, or 3,500 yards. FUZE, dummy, M50, simulates the M56 Service Fuze but has no explosive elements.

DATA

Weight of complete round..... 2.63 lb	Width of rotating band..... 0.74 in.
Length of complete round.... 12.81 in.	Type of base..... Boat-tailed
Length of fuzed projectile..... 5.87 in.	Degree of taper of base.. 9 deg 15 min
Length of cartridge case..... 8.75 in.	Muzzle velocity..... 2,600 ft per sec
Maximum range .....8,875 yd	(Horizontal; vertical range is 6,200 yd)

Figure 37 — SHOT, Fixed, A.P., M80, w/TRACER, 37-mm Auto. Gun, AN-M9

40. SHOT, FIXED, A.P., M80, W/TRACER, 37-MM AUTO. GUN, AN-M9 (fig. 37), is used in rounds to be fired from the AN-M4 as well as the AN-M9 Aircraft Gun. When to be fired from the AN-M9 Gun, the round is assembled with the grooved M17 Brass Cartridge Case. The shot is of the same general design as the M74 Shot used with the M1A2 Gun (par. 34) but is shorter and lighter. The body is of the uncapped monobloc type, with the nose formed to a relatively short ogive. The base contains a tracer composition for observation purposes which burns for 2,000 yards of flight.

DATA

Weight of complete round..... 3.15 lb	Width of rotating band..... 0.74 in.
Length of complete round.... 12.40 in.	Type of base..... Square
Length of projectile..... 4.23 in.	Radius of ogive..... 1.62 cal.
Length of cartridge case..... 8.75 in.	Muzzle velocity ..... 3,050 ft per sec

Penetration (in. at 0-deg obliquity of homogeneous plate at 1,000 yd)..... 2.1

The canister, high-explosive, and drill rounds are packed 1 round per fiber container, 20 containers (20 rounds) per unlined wooden box.

The armor-piercing, armor-piercing capped, and target-practice rounds are packed in two ways:

1. 1 round per fiber container, 20 containers (20 rounds) per unlined wooden box.

2. 20 rounds per metal-lined wooden box.

Packing information on the old type blank ammunition for tank and antitank guns is not available at this time. The new type is packed in a chest containing 10 Adapters M2; 100, 10-gage blank cartridges; and 1 ramrod. Subsequent shipments of 25 to a carton, 20 cartons (500 cartridges) to a wooden box.

AMMUNITION FOR 37-MM AUTOMATIC GUN M1A2 (ANTIAIRCRAFT).

General.

Weapon. With the advent of aviation as a major factor in combat, it became necessary to develop a light, mobile, automatic antiaircraft weapon that would fire an explosive projectile. First, the 37-mm Automatic Gun M1A1, and later, the M1A2 were adopted to serve this purpose. The M1A2 is a fully automatic weapon. It is loaded automatically from a clip carrying 10 rounds. A cartridge case with an extracting groove in the base is required for ejection by the automatic extractor mechanism of the gun. The gun is mounted on a 4-wheeled trailer carriage capable of being towed 50 miles per hour on good roads. Antitank as well as antiaircraft firing is possible with this weapon.

Types of ammunition. There are three types of rounds used in the M1A2 antiaircraft gun:

Types	Filler
High-explosive	Tetryl
Armor-piercing	None
Practice	None

Cartridge cases. The Cartridge Case M17 is made of cartridge brass, and is the same size and shape as the M16 used in the 37-mm tank and antitank guns (page 345). The only difference in the two cases is that the M16 has an extracting flange while the M17 has an extracting groove located just above the head of the cartridge case.

The Cartridge Case M17B1 is "Substitute Standard." Except for being made of steel and having a slightly thinner head and primer seat, it is exactly the same as the M17 Cartridge Case.

Primer. The M23A2, 20-grain, Percussion Primer is "Standard" for all 37-mm antiaircraft ammunition. Some rounds may be found primed with M23A1 Primer (primers, page 331).

AMMUNITION INSPECTION GUIDE

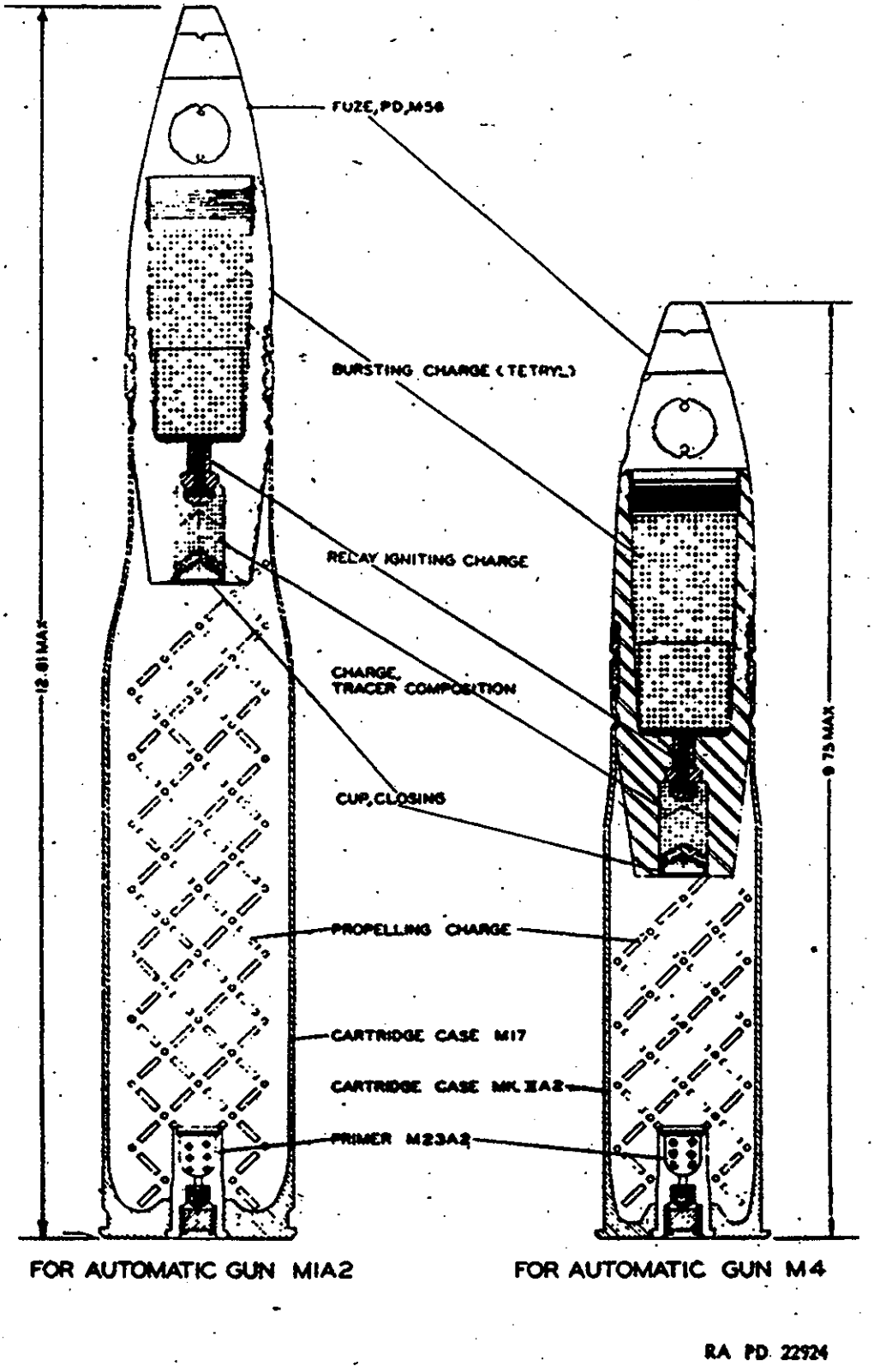

Figure 138 — SHELL, H.E., M54, for 37-mm Guns M1A2 and M4

ARTILLERY AMMUNITION

SHELL, Fixed, H.E., M54 w/S.D. TRACER.

Complete round. The burst of the M54 High-explosive Shell is one of the best means known by the Army to discourage attack by enemy aircraft. The combination of a tetryl loaded shell and supersensitive fuze spells destruction for light material targets such as planes. The same projectile is used in the M4 (Aircraft) Gun against planes.

Cartridge Cases. The M17 Case is "Standard," the M17B1 is "Substitute Standard" (cartridge cases, page 353).

Primer. The M23A2 is "Standard." Some rounds on hand may be primed with the M23A1 (primers, page 331).

Propelling charge. A muzzle velocity of 2,600 feet per second is imparted to the projectile by 6 ounces of FNH powder.

Projectile. The Projectile M54, as fired, weighs 1.34 pounds and is about 5.9 inches long. It is the same projectile as the M54 fired from the M4 Aircraft Gun. The projectile consists of three components: the body with its bursting charge; the Point-detonating Fuze M56; and the shell-destroying tracer.

The body is machined from bar steel and is 4.13 inches long. Only 2.32 inches of the body itself protrudes from the cartridge case. The base of the projectile is very thick (over 1½ inches) and is tapered for streamlining purposes. The cavity for the shell-destroying tracer is machined into this heavy base. The bursting charge of 0.10 pound of tetryl is pressed into the body in two increments: a base pellet and a main charge.

The shell-destroying tracer assembly consists of a quantity of tracer composition, an ignited charge, a celluloid closing cup, a relay igniting charge and a relay pellet. The tracer charge is held in place by a celluloid cup sealed with adhesive compound. The celluloid cup transfers the flame from the propellant to the igniter charge of 20 grains of igniter composition. The igniter fires the red tracer composition which weighs 90 grains. When the tracer composition is almost completely burned, it initiates the relay igniting charge of 1.68 grains of black powder contained in a steel housing which screws into the tracer cavity just below the tetryl base pellet. This relay igniter carries the flame to the relay pellet of 23 grains of black powder which covers the entire base of the bursting charge cavity. The relay pellet is sufficient to effectively detonate the tetryl base pellet of the bursting charge, and finally the main bursting charge itself.

The maximum vertical range of the high-explosive shell is 6,200 yards and the maximum horizontal range is 8,875 yards. The tracer compound, however, burns out and ignites the black powder relay pellet after approximately 3,500 yards of vertical travel or 4,000 yards of horizontal travel, so the shell is destroyed before it reaches its maximum limit. This eliminates the possibility of the shell's

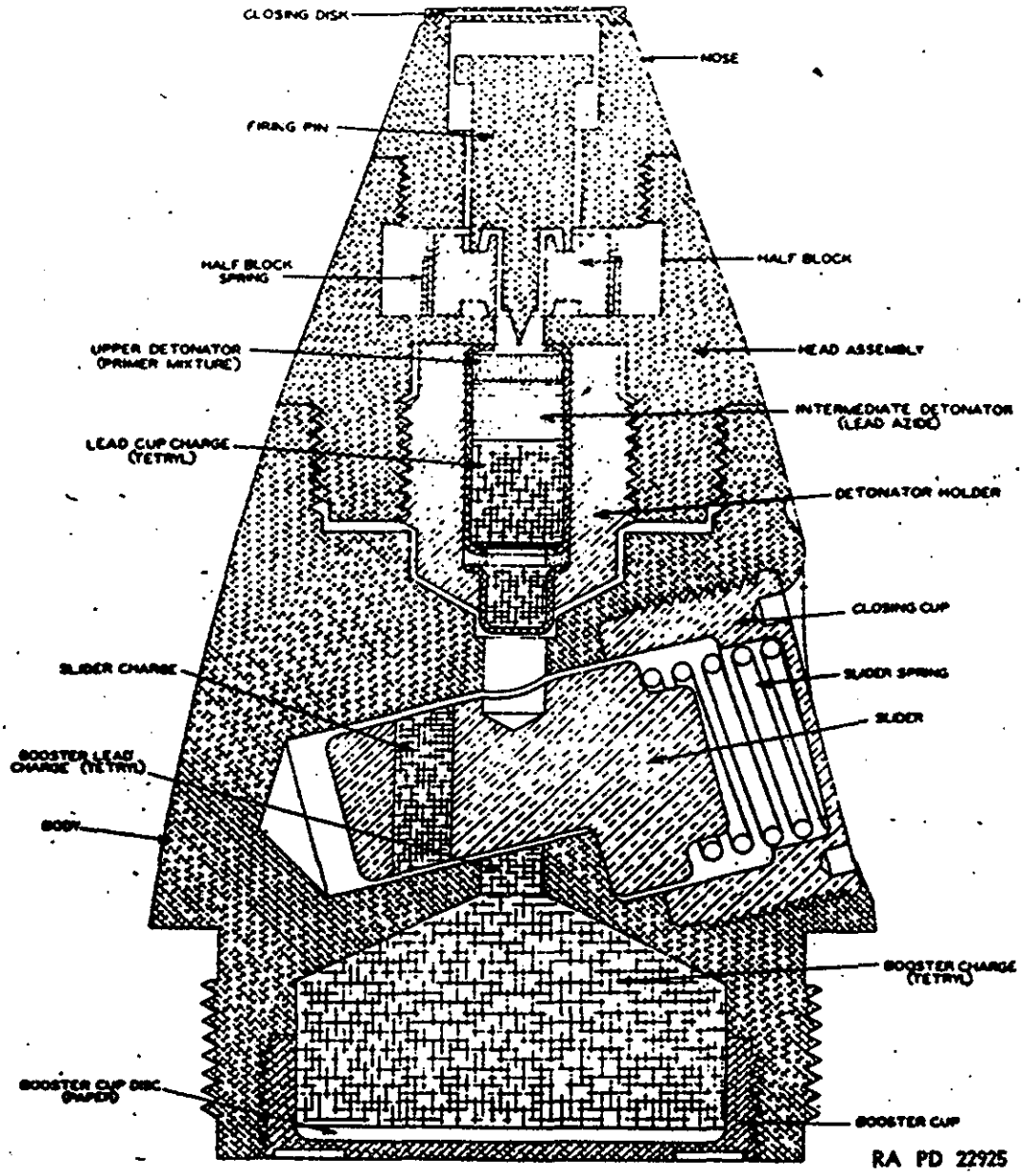

Figure 139 — FUZE, P.D., M56

falling to the ground, detonating, and causing casualties among friendly troops.

FUZE, point-detonating, M56. Since the High-explosive Round M54 is required to function on impact with light materials such as those used in planes, a supersensitive fuze is needed. A supersensitive fuze is one which will detonate on very slight impact such as with a double thickness of airplane fabric. The M56 is both supersensitive and superquick because the firing pin is protected only by a very thin aluminum closing cup and rests, at the time of impact, right on the detonator which initiates an almost uninterrupted train of detonating explosives.

The body of the fuze is divided into three parts; the body loading assembly, the head assembly, and cap. The booster of tetryl is

pressed into a cavity in the lower part of the body, and is held in place by an aluminum closing cup which screws into the base of the fuze. The body loading assembly also contains an eccentrically weighted slider. The slider incorporates a charge of tetryl and is held in place, with its charge out of line with the rest of the explosive train, by a spring backed up by a cup-shaped brass retaining screw which assembles into the side of the fuze body. The detonator assembly consists of a brass detonator holder, which screws into the body loading assembly; a detonator of priming mixture, lead azide and tetryl, and a lead charge of tetryl. Semicircular, brass half blocks held together by a flat steel spring sit loosely in a cavity in the head assembly which screws over the detonator holder and into the body loading assembly. These half blocks have beveled notches which seat a rim on the firing pin. The firing pin fits into a cap closed with a very light aluminum cup. The cap containing the firing pin screws into the head assembly. All of the parts just described except the slider, the detonator holder, and the half blocks and their spring, are made of aluminum alloy.

The function of the fuze begins when the projectile has cleared the muzzle of the weapon and centrifugal force comes into play. The velocity with which the projectile rotates as it leaves the gun causes the eccentrically weighted slider to compress its spring and bring its tetryl charge into line with the explosive train. At the same time, the half blocks spread outward against their spring and the firing pin rides up the beveled notches. As the half blocks spread a sufficient distance apart, the firing pin comes gradually down between them and rests on the light aluminum closing disc of the detonator. When the projectile contacts the material of the target, the light aluminum closing cup in the cap is pushed in, and forces the firing pin into the priming mixture. The priming mixture initiates the explosive train of detonator, lead azide and tetryl, lead charge of tetryl, slider charge of tetryl, tetryl booster, and bursting charge of tetryl. These explosives are arranged in a practically uninterrupted train which gives the fuze superquick action.

Identification. The complete round of M54, H.E. Shell can be identified for the Antiaircraft Gun M1A2 by the extracting groove in the cartridge case. The presence of the M56 Fuze identifies the round as H.E. M54. The only other 37-mm round for the M1A2 Gun that has a fuze is the practice round. The fuze for the practice shell is a dummy made of cast aluminum. The M54 is painted olive drab and stenciled in yellow. The complete round is 12.81 inches long and weighs 2.62 pounds.

SHELL, Fixed, Practice, M55A1 w/TRACER.

Complete round. This round was designed to simulate the M54, H.E. Shell for practice firing.

AMMUNITION INSPECTION GUIDE

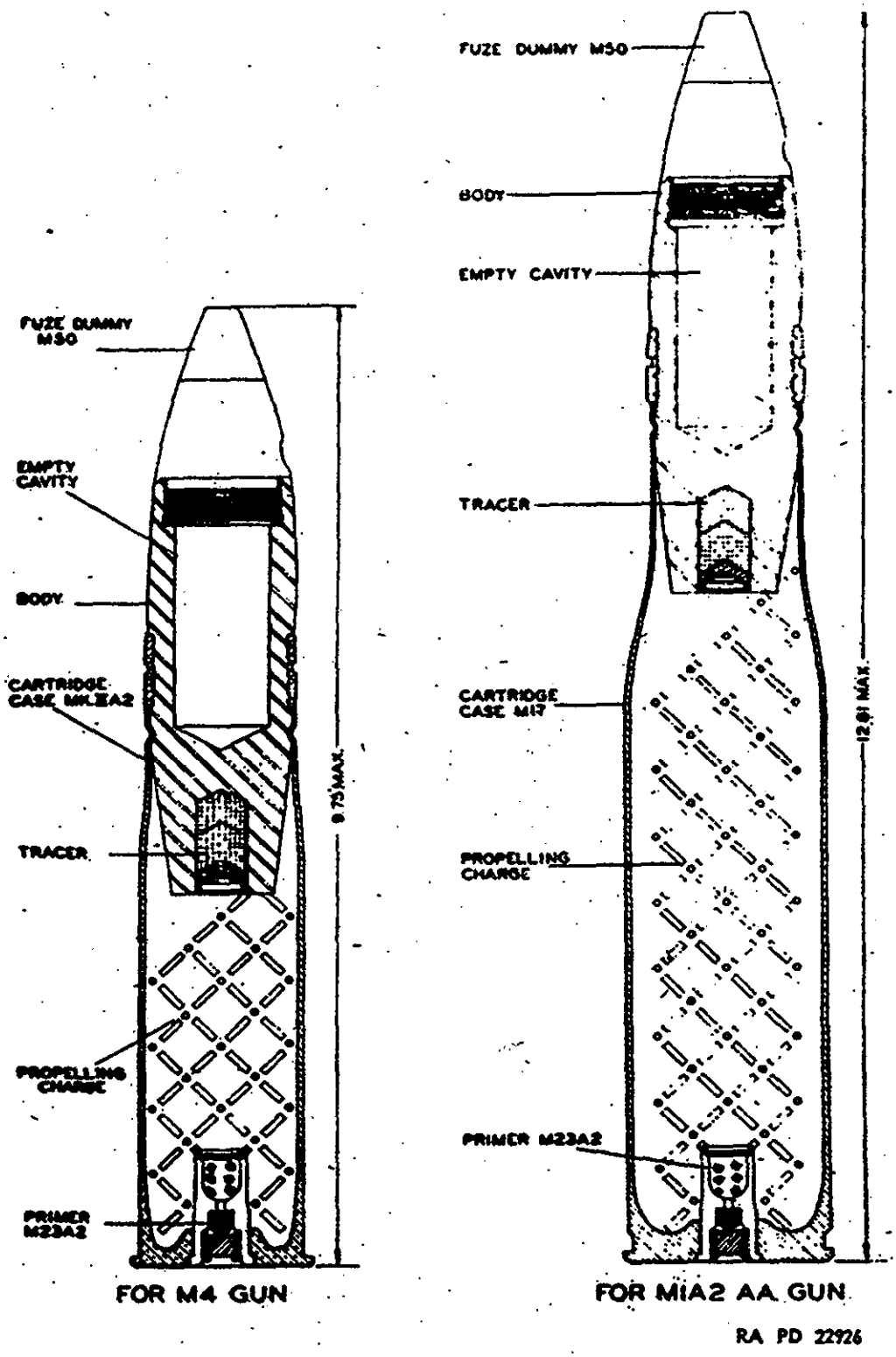

Figure 140 — SHELL, Practice, M55A1, for 37-mm Guns M4 and M1A2

Cartridge cases. M17 is "Standard," M17B1 is "Substitute Standard" (cartridge cases, page 353).

Primer. M23A2, 20-grain, Percussion Primer is "Standard." Some rounds may be found primed with M23A1 Primer (primers, page 331).

Propelling charge. The propelling charge consists of 6 ounces of FNH powder.

Projectile. The projectile is of the same length, weight, and contour as the H.E. Shell M54 (page 355). It is made up of three parts.

The body has no filler, but is made to the same size and weight as the high-explosive M54. A tracer cavity is machined into the base. Of course, since no filler is used, the tracer does not have shell-destroying qualities.

The tracer consists of red tracer composition and igniting compound closed into the tracer cavity with a celluloid cup which is sealed with adhesive compound.

The FUZE, dummy, M50, is entirely inert and is made in one piece of cast aluminum. It is of the same size, shape, and weight as the M56 Fuze.

Identification. The complete round can be identified for the M1A2, 37-mm Antiaircraft Gun by its size and the extracting groove in the cartridge case. Aside from the blue painting and white stenciling on the projectile, it may be distinguished as the Practice Round M55A1 by the Dummy Fuze M50. The complete round measures 12.81 inches in length and weighs 2.62 pounds.

SHOT, Fixed, A.P.C., M59 w/TRACER.

Complete round. This round is "Standard" for use against any type of armor plate. It is very similar to the SHOT, APC, M51, used in the 37-mm Antitank and Tank Guns M3, M3A1, M5, and M6. The main differences are in the cartridge cases and in the fact that the M59 Shot does not have a windshield to extend the ogive.

Cartridge cases. M17 is "Standard," M17B1 is "Substitute Standard" (cartridge cases, page 353).

Primer. M23A2, 20-grain, Percussion Primer is "Standard." Some rounds on hand may incorporate the M23A1 Primer (primers, page 331).

Propelling charge. A propelling charge of 0.31 pounds of FNH powder gives the projectile a muzzle velocity of 2,050 feet per second.

Projectile. Aside from the following differences, the projectile is the same as the SHOT, APC, M51, used in the Tank and Antitank Guns M3, M3A1, M5, and M6 (page 349).

The chambering of the Antiaircraft Gun M1A2 does not permit the use of a windshield.

The M59 Antiaircraft Round contains more tracer composition in the base (enough to burn 3,500 yards) than does the M51 Antitank Round.

The M59 Projectile is a trifle lighter than the M51.

Identification. The complete round may be identified for the antiaircraft group by the size and extracting groove of the cartridge case. The black painting with white stencil and the armor-piercing cap distinguishes it as SHOT, APC, M59. The complete round is 12.76 inches long and weighs 3.12 pounds.

SHOT, Fixed, A.P., M74 w/TRACER.

Complete round. As indicated by the nomenclature, this round does not include an armor-piercing cap. It was designed as "Substitute Standard" for SHOT, APC, M59. It does satisfactory work against homogeneous armor plate, but not against face hardened armor plate.

Cartridge cases. M17 and M17B1 are "Standard" and "Substitute Standard" respectively (cartridge cases, page 353).

Primer. M23A2, 20-grain, Percussion Primer is "Standard." Some rounds may still contain M23A1 Primer (primers, page 331).

Propelling charge. 4 ounces of FNH powder impact a muzzle velocity of 2,050 feet per second to the shot.

Projectile. The projectile is exactly the same as the M74 used for 37-mm Tank and Antitank Guns M5, M6, M3, and M3A1 (page 350).

Identification. The extracting groove on the cartridge case, and size of the round identify it as belonging to 37-mm antiaircraft group. The black painting with white stencil and the stubby nose (ogive radius of 2.205 inches) distinguish it as SHOT, AP, M74. The complete round is 13.01 inches long and weighs 3.07 pounds.

Packing of Ammunition for 37-mm Antiaircraft Gun M1A2. 37-mm antiaircraft ammunition is packed as follows:

The high-explosive and practice rounds are packed in two ways:

1. 1 round per fiber container, 25 containers (25 rounds) per wooden box.

2. 20 rounds per metal-lined wooden box.

The armor-piercing, and armor-piercing capped rounds are shipped 1 per fiber container, 25 containers (25 rounds) per wooden box.

AMMUNITION FOR 37-MM AUTOMATIC GUN M4 (AIRCRAFT).

Weapon. With the rapid advancement of aviation, the development of new techniques and purposes for aircraft, and the improvement of aviation armor, it was found necessary to design an aircraft weapon with a high-explosive round. The 37-mm Automatic Gun M4

was the answer to this necessity. It has a standard muzzle velocity of 2,000 feet per second. The ammunition is fed into the gun by a 5-round feeder, by a 15-round articulated-link belt housed in a magazine, or by a 37-mm Endless Belt M6 containing 30 rounds. A peculiarity of the weapon is that while it is automatic, the cartridge cases used with the ammunition have extracting flanges and no grooves.

Types of Ammunition. Types of ammunition used in the aircraft weapon are as follows:

Types	Filler
High-explosive	Tetryl
Armor-piercing	None
Practice	None

Cartridge Cases. The Mk. IIIA2 Cartridge Case is "Standard" for all ammunition used in the Aircraft Gun M4. It is made of cartridge brass and can be distinguished from all other 37-mm cartridge cases by its length (5.69 inches). The extracting mechanism of the weapon requires a cartridge case with a flange.

The Mk. IIIA2B1 Cartridge Case is "Substitute Standard." It differs from the Mk. IIIA2 only in that it is made of steel and has a slightly thinner head and primer seat.

Primer. The M23A2, 20-grain, Percussion Primer is "Standard" for all aircraft rounds. Some rounds may be on hand, primed with the M23A1 Primer.

Propelling Charges. The high-explosive and practice rounds require a propellant of 2.5 ounces of FNH powder. The armor-piercing round requires 2.3 ounces of FNH powder.

SHELL, Fixed, H.E., M54, w/TRACER. The projectile of this round is exactly the same as the M54, H.E., Shell for the Antiaircraft Gun M1A2 (page 355). The only differences in the complete rounds are in the cartridge case and propelling charge. The aircraft shell may be distinguished as such by its shorter cartridge case (5.69 inches) with its extracting flange. The complete round is 9.75 inches long and weighs 1.94 pounds.

SHELL, Fixed, Practice, M55A1, w/TRACER. This round is the same as the M55A1 Practice Shell for the Antiaircraft Gun M1A2 except for differences in the cartridge case and propelling charge (page 359). The aircraft round may be distinguished by the length (5.69 inches) and extracting flange of its cartridge case. The complete round is 9.75 inches long and weighs 1.94 pounds.

SHELL, Fixed, Armor-piercing, M80, w/TRACER. The M80 is very similar to the M74 Armor-piercing Shot which is fired from the

TABLE 9
COMPLETE ROUND TABLE FOR AMMUNITION FOR 37-MM GUNS
(This table is not to be confused with official Complete Round Charts, Form No. 5981.)

Note References	Designation of Cannon	PROJECTILE						FUZE		Cartridge Case	PROPELLING CHARGE		PRIMER	
		Kind	Type	Model	Filler Kind	Filler Weight (Lb.)	Weight as Fired (Lb.)	Type and Model	Action		Kind	Weight (Lb.)	Model[1]	Type
						Service Ammunition								
2, 3	M1A2 and AN-M9	SHELL	H.E.	M54	Tetryl	0.10	1.34	P.D., M56	Supersensitive	M17	FNH, M1	0.38	M38A2	55-gr. perc.
2, 4	M1A2	SHOT	A.P.C.	M59A1	None	—	1.91	None	—	M17	FNH, M1	0.31	M38A2	55-gr. perc.
4	AN-M9	SHOT	A.P.C.	M59A1	None	—	1.91	None	—	M17	FNH, M5	0.52	M38A2	55-gr. perc.
3, 4	M1A2	SHOT	A.P.C.	M59	None	—	1.91	None	—	M17	FNH, M1	0.31	M38A2	55-gr. perc.
4	AN-M9	SHOT	A.P.C.	M59	None	—	1.91	None	—	M17	FNH, M5	0.52	M38A2	55-gr. perc.
3, 4, 5	M1A2	SHOT	A.P.	M74	None	—	1.92	None	—	M17	FNH, M1	0.25	M38A2	55-gr. perc.
4, 5	AN-M9	SHOT	A.P.	M80	None	—	1.66	None	—	M17	FNH	0.56	M38A2	55-gr. perc.
6	M3, M3A1, M5, M5A1, M6	CANISTER	—	M2	Steel balls	122 balls	1.89	None	—	M16	FNH, M1	0.48	M38A2	55-gr. perc.
6, 8	M3, M3A1, M5, M5A1, M6	SHELL	H.E.	M63	TNT	0.085	1.61	B.D., M58	Nondelay	M16	FNH, M1	0.44	M38A2	55-gr. perc.
4, 6	M3, M3A1, M5, M5A1, M6	SHOT	A.P.	M74	None	—	1.92	None	—	M16	FNH, M1 or M5	0.44	M38A2	55-gr. perc.
4, 6, 7, 9	M3, M3A1, M5, M5A1, M6	SHOT	A.P.C.	M51	None	—	1.92	None	—	M16	FNH, M1 or M5	0.15	M38A2	55-gr. perc.
2, 6	AN-M4, M10	SHELL	H.E.	M54	Tetryl	0.10	1.34	P.D., M56	Supersensitive	Mk. IIIA2	FNH, M2	0.15	M38A2	55-gr. perc.
4, 6	AN-M4, M10	SHOT	A.P.	M80	None	—	1.66	None	—	Mk. IIIA2	FNH, M2	0.14	M38A2	55-gr. perc.
						Practice Ammunition								
3, 4	M1A2 and AN-M9	SHELL	Practice	M55A1	None	—	1.34	Dummy, M50	Inert	M17	FNH, M1 or M2	0.38	M38A2	55-gr. perc.
4, 6	M3, M3A1, M5, M5A1, M6	SHOT	T.P.	M51A2	None	—	1.92	None	—	M16	FNH, M1	0.44	M23A1	20-gr. perc.
4, 6	M3, M3A1, M5, M5A1, M6	SHOT	T.P.	M51A1	None	—	1.92	None	—	M16	FNH, M1	0.44	M23A1	20-gr. perc.
4, 6	AN-M4, M10	SHELL	Practice	M55A1	None	—	1.34	Dummy, M50	Inert	Mk. IIIA2	FNH, M2	0.15	M38A2	55-gr. perc.
						Blank Ammunition								
10	M3, M3A1, M5, M5A1, M6	AMMUNITION	Blank	No projectile						M28	Blk. Pwdr.	0.20	M23A2	20-gr. perc.
10	M1916, M3, M3A1, M5, M5A1, M6	CARTRIDGE	Blank, 10-gage	No projectile						Commercial type shotgun cartridge				

TABLE 9 (Contd.)
COMPLETE ROUND TABLE FOR AMMUNITION FOR 37-MM GUNS (Contd.)

Note References	Designation of Cannon	PROJECTILE						FUZE		Cartridge Case	PROPELLING CHARGE		PRIMER	
		Kind	Type	Model	Filler Kind	Filler Weight (Lb.)	Weight as Fired (Lb.)	Type and Model	Action		Kind	Weight (Lb.)	Model[1]	Type
						Drill Ammunition								
—	M1A2 and AN-M9	CARTRIDGE	Drill	M21	None	—	—	Dummy, M50B2	Inert	M17B1	None	—	None	—
11	M3, M3A1, M5, M5A1, M6	CARTRIDGE	Drill	M13	None	—	—	None	—	M16	None	—	None	—
11	M3, M3A1, M5, M5A1, M6	CARTRIDGE	Drill	M__(T5)	None	—	—	None	—	M16	None	—	None	—
11	AN-M4, M10	CARTRIDGE	Drill	M23(T31)	None	—	—	None	—	None	None	—	None	—

A.P.—armor-piercing
A.P.C.—armor-piercing-capped
B.D.—base-detonating
Blk. pwdr.—black powder
FNH—flashless nonhygroscopic
gr.—grain
H.E.—high-explosive
P.D.—point-detonating
perc.—percussion
T.P.—target practice

1—PRIMER, percussion, 55-grain, M38, and modifications now standard for 37-mm ammunition, superseding M23 and modifications for future manufacture.
2—Shell has a shell-destroying tracer.
3—Alternative rounds also assembled with steel cartridge case for M1A2 gun only.
4—Projectile contains a tracer.
5—Some projectiles have been manufactured which do not contain a tracer.
6—Alternative rounds also assembled with steel cartridge case which weighs 0.22-lb. less than standard brass case.
7—Propelling charge shown is for rounds of 2600 f/s muzzle velocity. Rounds of current manufacture to have 2900 f/s muzzle velocity when assembled with brass cartridge cases.
8—Rounds of current manufacture have 2600 f/s muzzle velocity. Rounds of older manufacture have 2700 f/s muzzle velocity.
9—Projectile may be marked M51, M51B1 or M51B2. Rounds are identical in functioning the B1 and B2 designations signifying manufacturing alternatives. For restrictions on shipments, see SNL R-1.
10—For use with ADAPTER, M1, 37-mm gun, M1916, and ADAPTER, M2, 37-mm guns, M3, M3A1, M5, and M6, when the cartridge is used with the guns specified.
11—Assembled from inert service components. For positive identification, holes are drilled in the cartridge cases. Cartridges not so drilled will not be used for drill purposes.

Notes	Designation of Gun	Cartridge Drg No.	Projectile: Kind	Projectile: Type	Projectile: Designation	Projectile: Drg No.	Projectile: Wt. loaded and fused lb	Projectile: Charge: Wt lb	Projectile: Charge: Kind	Projectile: Charge: Drg No.	Projectile: Material	Projectile: Forging or Casting Type	Fuse: Designation	Fuse: Type	Fuse: Drg No.	Cartridge Case: Designation	Cartridge Case: Drg No.	Propelling Charge: Nominal Weight lb	Propelling Charge: Designation	Primer: Type	Primer: Designation ***	Primer: Drg No.	Packing: Primer Drg No.	Packing: Fuse Drg No.	Packing: Cartridge: Packing & Marking Drg No.	Packing: Cartridge: Shipped	Assembly No.
S & N	All	75-1-71	Shell	HE-T	M54	75-2-279	1.34	.10	Tetryl	75-14-225	Steel	Bar stock	M56	PD	71-2-153	M17 **	71-2-100	.18	M1, M2 M5	Percussion	M38A1	74-2-63	20-4-164	20-4-230	PIP-11	Fused	1
S & N	M1A2	75-1-117	Shot	APC-T	M59A1	75-2-289	1.91	.01	Tracer	75-14-279	Steel	Bar stock	-	-	- - -	M17 **	71-2-100	.11	M1	Percussion	M38A1	74-2-63	20-4-164		PIP-11	Complete	2
S	M1A2	75-1-138	Shot	AP-T	M74	75-2-306	1.92	.01	Tracer	75-14-312	Steel	Bar stock	-	-	- - -	M17 **	71-2-100	.11	M1	Percussion	M38A1	74-2-63	20-4-164		PIP-11	Complete	3
S & N	AN-M9	75-1-117	Shot	APC-T	M59A1	75-2-289	1.91	.01	Tracer	75-14-279	Steel	Bar stock	-	-	- - -	M17	71-2-100	.52	M5	Percussion	M38A1	74-2-63	20-4-164		PIP-11	Complete	4
S & N ♯	AN-M9		Shot	AP-T	M80	75-2-310	1.66	.01	Tracer	75-14-126	Steel	Bar stock	-	-	- - -	M17	71-2-100	.56	M5	Percussion	M38A1	74-2-63	20-4-164		PIP-11	Complete	5
																											6
																											7
																											8
																											9
S & N	All	75-1-72	Shell	TP-T	M55A1	75-2-278	1.34	.017	Tracer	75-14-224	Steel	Bar stock	M50	Dummy	72-5-4	M17 **	71-2-100	.18	M1, M2 M5	Percussion	M38A1	74-2-63	20-4-164		PIP-11	Fused	10
																											11
																											12
																											13
																											14
S & N	All	72-3-92	Ctg.	drill	M21	- -	2.67 ●	-	- -	- - -	Steel	- - - -	M50	Dummy	72-5-4	M1781	71-2-100	-	-	-	- -	- - -	- - -		PIP-11	Fused	15
																											16
																											17
																											18

S - Issue
N - Manufacture
HE-T - High explosive - tracer
APC-T - Armor piercing cap - tracer
PD - Point detonating
Ctg - Cartridge
TP-T - Target practice - tracer
AP-T - Armor piercing - tracer

** - Cartridge Case, M1781, substitute standard, Drg 71-2-100, for ground training only.
*** - Some rounds, with Primer, percussion, M23A1 or M23A2, are on hand. Primer, percussion, M38B1 or M38B2, is an alternative.
● - Total weight of Cartridge, drill, M21.
♯ - This round uses a shell destroying tracer. Wt of tracer charge .025-lb.
ǂ - Substitute Standard.

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Sheet No. 2

Section XXII

AMMUNITION FOR SUBCALIBER WEAPONS

294. GENERAL.

a. Subcaliber ammunition is intended for use in subcaliber guns for training personnel in target practice. For small caliber weapons, interior type subcaliber guns are provided which fire small-arms ammunition, such as cal. .22 and cal. .30 cartridges. Cal. .30 and cal. .50 cartridges are also used in machine guns on exterior subcaliber mounts on the 37-mm Antiaircraft Gun M1A2, and on medium caliber antitank weapons. For the remaining medium and heavy weapons, the 37-mm Subcaliber Guns M12, M13, M14, and M1916 and modifications are used on appropriate subcaliber mounts. See table 2 for a list of weapons and their subcaliber weapons and ammunition. This section deals primarily with ammunition for the 37-mm Subcaliber Guns M12, M13, M14, and M1916. Also described in this section is the Field Artillery Trainer M3, which, although not subcaliber equipment, simulates field artillery firings.

b. **Identification.** The 37-mm subcaliber rounds are completely identified by means of the painting and marking on the items themselves.

c. **Fuzes.** See chapter 3, section I.

d. **Cartridge Cases.** The standard 37-mm cartridge case for ammunition used in 37-mm Subcaliber Gun M1916 is the Mk. IA2. The Mk. IA2B1 Case is a steel case alternate and is 0.02 pound lighter than the Mk. IA2 Case, which is made of drawn brass.

e. **Primers.** See chapter 3, section III.

295. COMPLETE ROUND TABLE.

a. Data concerning the 37-mm subcaliber rounds are given in table 28, chapter 5.

296. PACKING AND SHIPPING DATA.

a. Data concerning the 37-mm subcaliber rounds are given in ORD 11 SNL R-1.

FIXED AND SEMIFIXED ROUNDS AND SEPARATE-LOADING PROJECTILES

TABLE 2

SUBCALIBER MATERIEL AND AMMUNITION

Weapon and Mount	Subcaliber Weapon and Mount	Subcaliber Ammunition
37-mm guns, M3, M3A1, on CARRIAGE, gun, 37-mm, M4	RIFLE, subcaliber, cal. .22, M2A1 MOUNT, subcaliber, cal. .22-.30, M6*	CARTRIDGE, ball, cal. .22, long rifle
CARRIAGE, gun, 37-mm, M4A1	MOUNT, subcaliber, cal. .22-.30, M7*	
CARRIAGE, motor, 37-mm gun, M6	MOUNT, subcaliber, cal. .22-.30, M7A1*	
57-mm gun M1, on CARRIAGE, gun, 57-mm, M1A3	MOUNT, subcaliber, cal. .22-.30, M14*	
37-mm gun, M6, in light, medium, and heavy tanks	RIFLE, subcaliber, cal. .22, M5 MOUNT, subcaliber*	
37-mm guns, M3, M3A1, on CARRIAGE, gun, 37-mm, M4	RIFLE, subcaliber, cal. .30, M1903A2 MOUNT, subcaliber, cal. .22-.30, M6	CARTRIDGE, ball, cal. .30, M2 CARTRIDGE, ball, cal. .30, M1
CARRIAGE, gun, 37-mm, M4A1	MOUNT, subcaliber, cal. .22-.30, M7*	
CARRIAGE, motor, 37-mm gun, M6	MOUNT, subcaliber, cal. .22-.30, M7A1*	
57-mm gun, M1, on CARRIAGE, 57-mm, M1A3	MOUNT, subcaliber, cal. .22-.30, M14*	
37-mm auto. gun, M1A2, on CARRIAGE, automatic, 37-mm, M3	GUN, machine, cal. .30, Browning, M1917A1 MOUNT, subcaliber, cal. .30, M8†	
76-mm gun, M1, M1A1, M1A2, on CARRIAGE, motor, 76-mm gun, M18	GUN, machine, cal. .50, Browning, M2, HB (flexible) MOUNT, subcaliber, cal. .50, M10†	CARTRIDGE, ball, cal. .50, M2
3-inch gun, M7, on CARRIAGE, motor, 3-inch gun, M10, M10A1	MOUNT, subcaliber, cal. .50, M9†	
3-inch gun, M5, on CARRIAGE, gun, 3-inch, M1	MOUNT, subcaliber, cal. .50, M12†	

ARTILLERY AMMUNITION

Weapon and Mount	Subcaliber Weapon and Mount	Subcaliber Ammunition
75-mm gun, M1917, on CARRIAGE, gun, 75-mm, M1917A1	GUN, subcaliber, 37-mm, M1916A1 MOUNT, subcaliber (interior type)*	SHELL, fixed, practice, M92, w/ FUZE, P.D., M74, 37-mm sub-caliber guns, M12, M13, M14, and M1916††
75-mm gun, M1897, on CARRIAGE, gun, 75-mm, M1897MIA2, M1897A4	GUN, 37-mm, M1916	SHELL, fixed, practice, M63-Mod. 1, w/FUZE, base, practice, M58, 37-mm subcaliber guns, M12, M13, M14, and M1916††
CARRIAGE, gun, 75-mm, M2, M2A1, M2A2, M2A3	MOUNT, subcaliber, 37-mm, M2†	
CARRIAGE, gun, 75-mm, M1897MI, M1897A4	MOUNT, subcaliber, 37-mm, M7†	SHELL, fixed, practice, Mk. IIA1, w/FUZE, base, practice, M38, 37-mm subcaliber gun, M1916†† §
75-mm gun, M1916, on CARRIAGE, gun, 75-mm, M1916A1	MOUNT, subcaliber, 37-mm, M8†	
75-mm how., M1, M1A1, on CARRIAGE, how., 75-mm, M1, M2A1, M3, M3A2, M3A3	MOUNT, subcaliber, 37-mm, M9†	
105-mm how., M2, M2A1, on CARRIAGE, how., 105-mm, M2, M2A1, M2A2, and CARRIAGE, motor, 105-mm how., M7....	MOUNT, subcaliber, 37-mm, M5†	
4.5-inch gun, M1, on CARRIAGE, gun, 4.5-inch, M1	MOUNT, subcaliber, 37-mm, M16†	
155-mm how., M1, on CARRIAGE, how., 155-mm, M1	MOUNT, subcaliber, 37-mm, M13A1†	
155-mm how., M1917-17A1-18, on CARRIAGE, how., 155-mm, M1917A4 or M1918A3	MOUNT, subcaliber, 37-mm, M13A1†	
155-mm gun, M1917-17A1-18MI, on CARRIAGE, gun, 155-mm, M1917-17A1-M1918-18A1, M2, M3....	MOUNT, subcaliber, 37-mm, M4†	
155-mm gun, M1, M1A1, on CARRIAGE, gun, 155-mm, M1	MOUNT, subcaliber, 37-mm, M1†	
8-inch how., M1, on CARRIAGE, how., 8-inch, M1	MOUNT, subcaliber, 37-mm, M10†	
	MOUNT, subcaliber, 37-mm, M10†	

FIXED AND SEMIFIXED ROUNDS AND SEPARATE-LOADING PROJECTILES

Weapon and Mount	Subcaliber Weapon and Mount	Subcaliber Ammunition
75-mm how., M1, M1A1, on CARRIAGE, how., 75-mm, M1A1 75-mm how., M2 and M3, on CARRIAGE, motor, 75-mm how., M8	GUN, subcaliber, 37-mm, M12*	SHELL, fixed, practice, M92, w/FUZE, P.D., M74, 37-mm subcaliber guns, M12, M13, M14, and M1916†† SHELL, fixed, practice, M63-Mod. 1, w/FUZE, base, practice, M58, 37-mm subcaliber guns, M12, M13, M14, and M1916††
105-mm how., M2, M2A1, on CARRIAGE, how., 105-mm, M2A2 105-mm, how., M3, on CARRIAGE, how., 105-mm, M3, M3A1 105-mm how., M4, on CARRIAGE, motor, 105-mm how., T76, M7 medium tanks, M4, M4A3	GUN, subcaliber, 37-mm, M13*	
90-mm gun, M1, on CARRIAGE, gun, 90-mm, M3	GUN, subcaliber, 37-mm, M14*	SHELL, fixed, practice, Mk. IIA1, w/FUZE, base, practice, M38, 37-mm subcaliber gun, M1916†† §
76-mm gun, M1A1, M1A2, on CARRIAGE, motor, 76-mm gun, M18	GUN, subcaliber, 37-mm, T34*	
3-inch gun, M5, on CARRIAGE, gun, 3-inch, M1, M1A1, M6	GUN, subcaliber, 37-mm, T36*	

*—Interior mount. †—Exterior mount. ††—Also assembled with "steel case".
§—This round is not to be fired over the heads of troops, and no personnel in the vicinity of the gun are to be forward of a line perpendicular to the muzzle.

297. CARTRIDGE, BALL, CAL. .22, LONG RIFLE (fig. 149). The muzzle velocity of the 40-grain lead bullet is 1,130 feet per second and the maximum range is 1,350 yards.

298. CARTRIDGE, BALL, CAL. .30, M2 (fig. 149). Weight of the complete cartridge is 396 grains. Muzzle velocity of the 150-grain bullet is 2,760 feet per second and maximum range is 4,700 yards.

299. CARTRIDGE, BALL, CAL. .30, M1, is used in the same weapon and for the same purpose as CARTRIDGE, ball, cal. .30, M2, described in paragraph 298. The weight of the complete cartridge is 420 grains. Muzzle velocity of the 174-grain bullet is 2,647 feet per second and the maximum range is 4,950 yards.

300. CARTRIDGE, BALL, CAL. .50, M2 (fig. 149), is for use with the Browning Machine Gun, cal. .50, M2, HB (flexible), on subcaliber mounts on medium caliber antitank guns. Muzzle velocity of 698-grain bullet is 2,935 feet per second in a 45-inch barrel, and maximum range is 7,600 yards.

ARTILLERY AMMUNITION

301. SHELL, FIXED, PRACTICE, MK. IIA1, W/FUZE, BASE, PRACTICE, M38, 37-MM SUBCALIBER GUN, M1916 (fig. 150), is limited standard for use only in M1916 Gun for subcaliber purposes. A service cartridge case, primer and propelling charge are used in the round. The explosive filler consists of graphite (15 percent) and black powder and serves as a spotting charge. This round is not to be fired over the heads of troops, and no personnel in the vicinity of the gun are to be forward of a line perpendicular to the muzzle.

DATA

Weight of complete round	1.61 lb	Width of rotating band	0.74 in.
Length of complete round	6.92 in.	Radius of ogive	2.24 cal.
Length of fuzed projectile	4.60 in.	Muzzle velocity	1,276 ft per sec
Length of cartridge case	3.64 in.	Maximum range	4,915 yd

302. SHELL, FIXED, PRACTICE, M63-MOD. 1, W/FUZE, BASE, PRACTICE, M58, 37-MM SUBCALIBER GUNS, M12, M13, M14, AND M1916. Except for the explosive charge which consists of black powder and diameter of rotating band which is 1.491 inches, the M63-Mod. 1 Projectile is the same as the M63 Projectile described in paragraph 41.

DATA

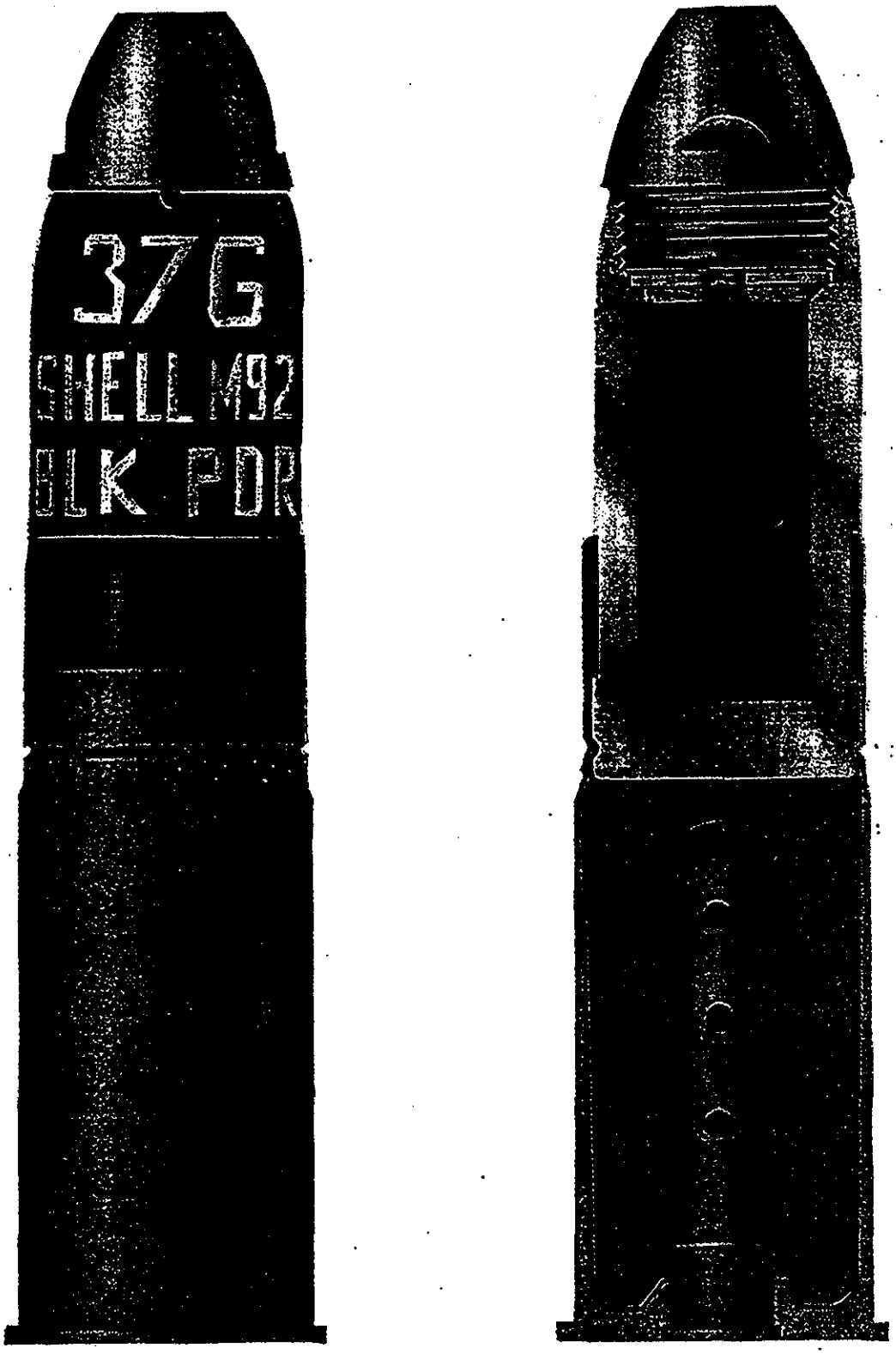
Weight of complete round	2.01 lb	Width of rotating band	0.76 in.
Length of complete round	8.98 in.	Radius of ogive	8.97 cal.
Length of fuzed projectile	6.15 in.	Muzzle velocity	1,100 ft per sec
Length of cartridge case	3.64 in.	Maximum range	4,980 yd

303. SHELL, FIXED, PRACTICE, M92, W/FUZE, P. D., M74, 37-MM SUBCALIBER GUNS, M12, M13, M14, AND M1916 (fig. 151), uses a service cartridge case, primer, and propelling charge as used in the round. The explosive charge consists of pressed black powder. The cartridge case is of brass; rounds are also made with steel cartridge cases.

DATA

Weight of complete round	1.65 lb	Width of rotating band	0.74 in.
Length of complete round	7.21 in.	Radius of ogive	2.24 cal.
Length of fuzed projectile	4.175 in.	Muzzle velocity	1,276 ft per sec
Length of cartridge case	3.64 in.	Maximum range	5,165 yd

304. FIELD ARTILLERY TRAINER, M3, is a compressed air unit comprising a miniature gun mounted on a miniature carriage. Four units mounted on a firing platform make up a field artillery trainer battery. The M3 Trainer is a modification of, and has replaced, the M2 and M2A1 Trainers, which use a cal. .22 short blank cartridge as propellant. The projectile is a 1-inch commercial steel ball weighing approximately 1,024 grains. The range is 90 yards.



RA PD 80888

Figure 151 — SHELL, Fixed, Practice, M92, w/FUZE, P.D., M74, 37-mm Subcaliber Guns, M12, M13, M14, and M1916

TABLE 28

COMPLETE ROUND TABLE FOR AMMUNITION FOR 37-MM SUBCALIBER GUNS M12, M13, M14, AND M1916

(This table is not to be confused with official Complete Round Charts, Form No. 5981.)

Note References	Designation of Cannon	PROJECTILE						FUZE		Cartridge Case	PROPELLING CHARGE		PRIMER	
		Kind	Type	Model	Filler		Weight as Fired (Lb.)	Type and Model	Action		Kind	Weight (Lb.)	Model	Type
					Kind	Weight (Lb.)								
							Service Ammunition							
#	M1916	SHELL	Pract.	Mk. IIA1	*	.053	1.23	M38	Base, Pract.	Mk.IA2°	FNH	.07	M23A2	perc.
—	M1916, M12, M13, M14	SHELL	Pract.	M92	BLK. PDR.	.086	1.21	M74	P.D.	Mk. IA2°	FNH	.07	M38A1	perc.
—	M1916, M12, M13, M14	SHELL	Pract.	M63-Mod. 1	BLK. PDR.	.09	1.63	M58	Base, Pract.	Mk. IA2	FNH	.056	M23A2	perc.

FNH—flashless, nonhygroscopic powder P.D.—point-detonating pract.—practice perc.—percussion

*—Low-explosive charge of graphite (15%) and black powder (85%).
°—Rounds assembled with steel case are substitute standard.
#—Limited standard. May be fired provided personnel observe safety precautions of remaining to the rear of a line perpendicular to muzzle of gun.

SUBCALIBER AMMUNITION FOR FIELD ARTILLERY AND SEACOAST GUNS AND HOWITZERS

Cannon Subcalibered	Subcaliber Gun	Notes	Complete Round Drg. No.	Projectile: Kind	Projectile: Type	Projectile: Designation	Projectile: Drg. No.	Projectile: Weight Loaded & Fuze Lb.	Projectile: Charge Weight Lb.	Projectile: Charge Kind	Projectile: Loading Drg. No.	Projectile: Material	Projectile: Forging or Casting Type	Projectile: Forging or Casting Drg. No.	Fuze: Designation	Fuze: Type	Fuze: Drg. No.	Cartridge Case: Designation	Cartridge Case: Drg. No.	Cartridge Case: Weight of Propelling Charge Lb.	Primer: Type $	Primer: Designation	Primer: Drg. No.	Packing Box: Round Drg. No.	Packing Box: Round Shipped	Assembly No.
75-mm How., M1, M2 & M3 76-mm Gun, M1A2 90-mm Guns, M1, M1A1 & M3 105-mm How., M2A1, M3 & M4 4.5 in. gun M1 155-mm Gun, M2 155-mm How., M1 8 in. How., M2	37-mm M12 37-mm M15 37-mm M14 37-mm M13 37-mm M1916 37-mm M1916 37-mm M1916 37-mm M1916	S & M	75-1-169	Shell	TP	M92	75-2-331	1.20	.081	Bk Pow	75-14-423	Steel	Bar	-	M74	PD	73-2-209	1A2	71-2-73	.07	Perc.	M38A1	74-2-63	20-4-408	Fused	1
		S & M	75-1-172*	Shell	TP	M93 Mod 1	OA 2299	1.63	.086	Bk Pow	75-14-429	Steel	Bar	-	M58	Frac. HD	73-1-191	1A2	71-2-73	.06	Perc.	M23A2	74-2-37	PIF-11	Fused	2
6 in. Guns, M1900, M1903A2, M1905A2 & 1908M2 8 in. Guns, M1888A1, M1888M1A1 & M1888M2A1 12 in. Gun, M1895M1	1.457 in. 1.457 in. 1.457 in.	S & M	75-1-44	Shell	TP	M94	75-13-2	1.05	-	None	-	Steel	Bar	-	None	-	-	3A2	71-2-48	.16	Ignit	M25A1	74-3-13	20-4-107	Complete	3
14 in. Guns, M1910 & M1920M2 16 in. Gun, M2M1	75-mm M1916 75-mm M1916	S & M	75-1-165	Shell	TP	M48	75-2-269	14.70	1.72	Sand	75-1-165	Steel	Forg	75-20-77	M48@	Inert	73-2-140	M18#	71-2-71	1.35	Perc.	M22A3	74-2-63	PIF-1	Complete	4
		S	75-1-20	Shell	-	Mk 1	75-2-164	11.85	1.83	Sand	75-1-20	Steel	Forg	75-20-1	Mk 4#	Inert	73-1-81	M18	71-2-71	1.35	Perc.	M22A1	74-2-35	20-4-159	Complete	5
155-mm Gun, M2 (Seacoast) 8 in. Gun, Mk6 Mod 3A2 12 in. Gun, M1895A4 & M1895M1A4 16 in. Guns, M1919M2 & M1919M3 16 in. How., M1920	75-mm M25 75-mm M8 75-mm M7 75-mm M12 75-mm M9	S & M	75-1-245	Shell	TP	M48	75-2-269	14.70	1.72	Sand	75-1-245	Steel	Forg	75-20-77	M48@	Inert	73-2-140	M18#	71-2-71	1.35	Ignit	M48	74-2-63	PIF-1	Complete	6

S - Issue
M - Manufacture
TP - Target Practice
PD - Point Detonating
HD - Base Detonating
PERC - Percussion
IGNT - Igniting

* - Substitute Standard.
\# - Case, Cartridge, M18A1 is substitute standard.
@ - Fuze, PD M48 with booster body.
Fuze, Dummy M73, Drg. 72-5-11, May also be used.
\# - Only part of fuze used to close cavity.
$ - Rounds with igniting primers take, in addition, the regular service primer for that weapon.
\# - Complete round with shrapnel Mk. I, See Dwg. 75-1-6

ISSUED - August 29, 1924
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Section III

AMMUNITION FOR 40-MM GUNS

56. GENERAL.

a. **General Discussion.** Sometimes referred to as the "Bofors" gun, GUN, automatic, 40-mm, M1, is primarily a rapid-fire automatic gun for antiaircraft defense, but can be set for a single shot. The gun is fed by an automatic mechanism into which 4-round charger clips are loaded by hand. Use of the word "cartridge" to indicate a complete round of 40-mm fixed ammunition resulted from a joint agreement of the U.S. Army, the U.S. Navy and the British.

b. **Interchangeability.** Since the M1 Gun is basically the same as Navy and British 40-mm guns, the ammunition may be interchanged.

c. **Identification.** Rounds of Army procurement are painted and marked for identification in accordance with basic color scheme prescribed in TM 9-1900 and in figures 48, 49, and 50. In other cases, painting and marking may follow practices of other services.

d. **Fuzes.** Four models of supersensitive point-detonating fuzes have been used with 40-mm high-explosive shell—FUZE, P. D., Mk. 27 (Navy), FUZE, P.D., M71, FUZE, P.D., M64A1, and FUZE, P. D., 251, Mk. I (ch. 3, sec. I, and par. 61).

e. **Cartridge Cases.** CASE, cartridge, 40-mm, M25, or M25B1, is used with 40-mm ammunition of Army procurement. The M25B1 Case, made of steel, differs from the M25 in having a thinner head and primer seat, and weighs approximately 0.31 pound less. Ammunition of Navy design will have the Mk. 2 or Mk. 2-Mod. 1 Brass Case or the Mk. 3 Steel Case; the brass case weighs 1.89 pounds and the steel case weighs 0.36 pound less. Ammunition of British design will have the M22 Case, which differs from the American standard case in that the primer hole is threaded to fit the British primer.

f. **Primers.** PRIMER, percussion, 55-grain, M38A1, is standard for rounds of Army procurement, but the earlier standard 20-grain M23A1 Primer may still be found in rounds of less recent manufacture. Alternative primers are the Mk. 22 Navy Primer and the M38B2 Percussion Primer. Rounds with CASE, cartridge, 40-mm, M22, and those manufactured according to British design, will have PRIMER, percussion, Q.F. cartridges, No. 12, Mk. II/L. For descriptions of these primers see chapter 3, section III.

57. COMPLETE ROUND TABLE.

a. Data concerning the 40-mm complete rounds and components thereof are given in table 10, chapter 5.

58. PACKING AND SHIPPING DATA.

a. Packing and shipping data are given in ORD 11 SNL's P-5 and P-8.

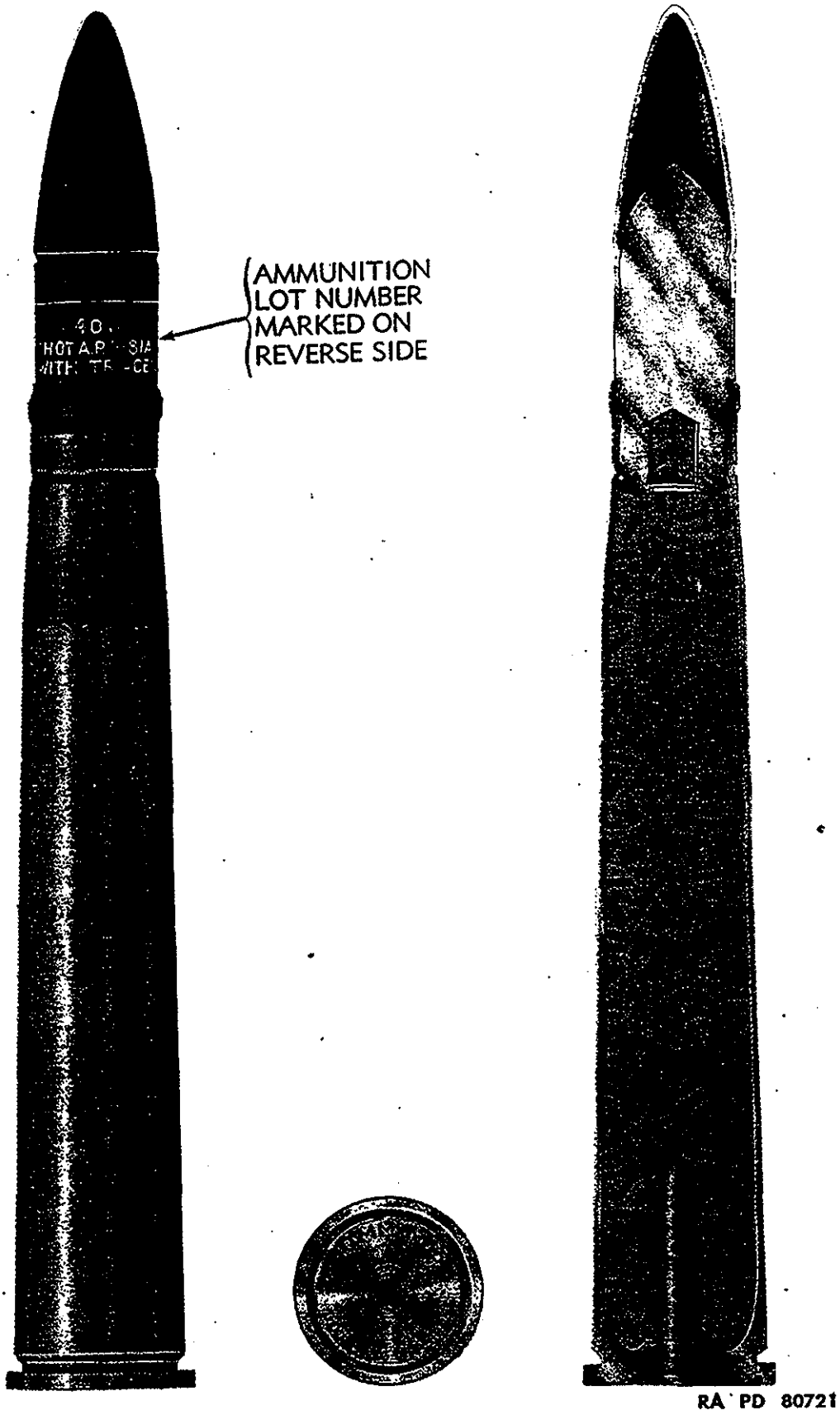

Figure 48 — CARTRIDGE, AP-T, M81A1, 40-mm AA. Guns

FIXED AND SEMIFIXED ROUNDS AND SEPARATE-LOADING PROJECTILES

59. **CARTRIDGE, AP-T, M81A1, 40-MM AA. GUNS** (fig. 48), is provided for the 40-mm guns for firing against armored targets. The projectile is a monobloc type, of solid steel. A tracer cavity in the base holds a red tracer composition. The nose of the body proper is shaped to a relatively blunt ogive. However, a long false ogive is provided, for better ballistics, by securing a light-weight windshield or false ogive to the shot body by a 360-degree crimp just forward of the bourrelet. The M81A1 Shot has no armor-piercing cap. The length of trace is 12 seconds.

DATA

Weight of complete round	4.57 lb
Length of complete round	17.62 in.
Length of projectile	6.19 in.
Length of cartridge case	12.24 in.
Width of rotating band	0.64 in.
Type of base	Square
Radius of ogive	5.78 cal.
Muzzle velocity	2,870 ft per sec
Maximum range	9,475 yd
Penetration (in. at 0-deg obliquity of face-hardened plate at 1,000 yd	1.7
Penetration (in. at 0-deg obliquity of homogeneous plate at 1,000 yd	1.8

60. **CARTRIDGE, AP-T, M81, 40-MM AA. GUNS,** is an earlier design of armor-piercing shot which is identical with that described in paragraph 59 except that the windshield is secured to the body of the shot by means of an adapter. For data refer to paragraph 59.

61. **CARTRIDGE, H.E., MK. I (NAVY), W/FUZE, MK. 27 (NAVY), 40-MM AA. GUNS,** has a shell very similar to the Mk. II Shell (described in par. 62) used with rounds of Army manufacture, and functions like it. For Navy procurement, the shell is fuzed with the Mk. 27 Navy Fuze and Cartridge Case Mk. 1 or Mk. 2. Standard Navy primer is the Mk. 22, a press-in type; earlier standard was the Mk. 21* which screwed into the base of the cartridge case. The Shell-destroying Tracer Mk. 8 or Mk. 10 may be assembled in the base of the shell.

DATA

Weight of complete round	4.60 lb
Length of complete round	17.60 in.
Length of fuzed projectile	7.10 in.
Length of cartridge case	12.24 in.
Width of rotating band	0.60 in.
Type of base	Boat-tailed
Muzzle velocity	2,800 ft per sec
Maximum range	10,800 yd

*—Rounds assembled with the Mk. 21 Primer have been declared unsafe to fire.

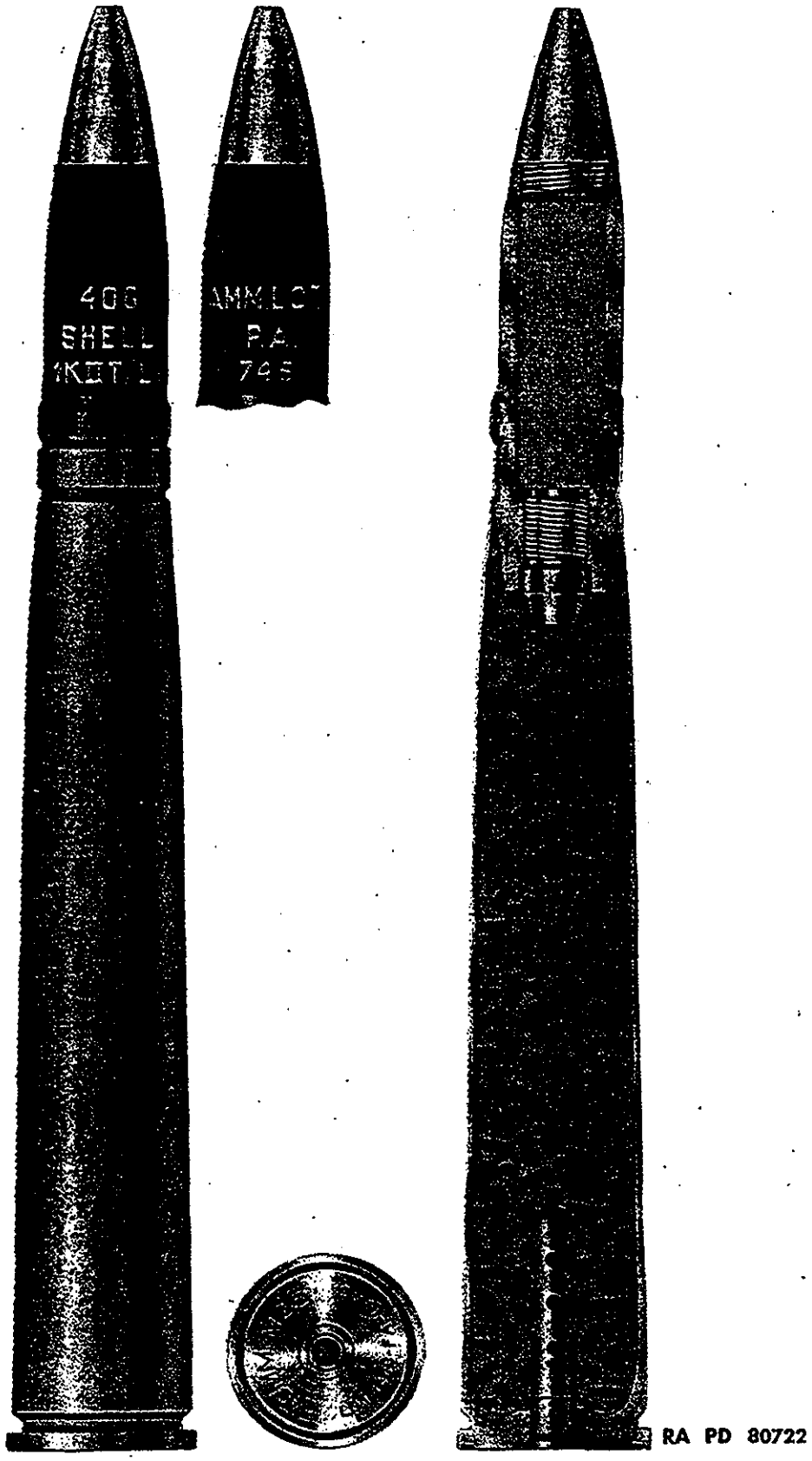

Figure 49 — CARTRIDGE, HE-T (SD, Mk. 11 or Mk. 11-Mod. 2), Mk. II, w/FUZE, P.D., Mk. 27 (Navy), 40-mm AA. Guns

62. CARTRIDGE, HE-T (SD, MK. 11 OR MK. 11-MOD. 2), MK. II, W/FUZE, P.D., MK. 27 (NAVY), 40-MM AA. GUNS (fig. 49), consists of the M25 brass or M25B1 alternative steel Cartridge Case with the M38A1 Primer and an FNH powder charge crimped rigidly to a Mk. II High-explosive Shell fitted with the Mk. 27 supersensitive Fuze. The Mk. II Shell consists of three principal parts—a hollow steel casing containing a high-explosive bursting charge of pressed TNT, the point-detonating fuze, and a shell-destroying (SD) tracer. The nose of the shell is conical, with a 7-degree 45-minute taper, and is cut and threaded internally to receive the fuze. The base is boat-tailed (conical) with an 8-degree 15-minute taper, and is threaded internally to accommodate the shell-destroying Tracer Assembly Mk. 11 or Mk. 11-Mod. 2, of Navy origin, which protrudes beyond the base of the shell for approximately 0.56 inch. The tracer consists of an igniting charge, a red tracer composition, and a relay igniting charge of black powder. The red tracer composition burns with a visible trace for 9 to 12 seconds, equivalent to a range of 4,300 to 5,200 yards. As the tracer burns out, the relay igniting charge is ignited, detonating the bursting charge of the shell unless prior detonation has been caused by functioning of the fuze. The Mk. 11 and Mk. 11-Mod. 2 Tracers are similar to the M3 Tracer except for details of the relay igniting assembly.

DATA

Weight of complete round	4.70 lb	Type of base	Boat-tailed
Length of complete round	17.60 in.	Degree of taper	8 deg 15 min
Length of fuzed projectile	7.64 in.	Muzzle velocity	2,870 ft per sec
Length of cartridge case	12.24 in.	Maximum range, horizontal	5,200 yd*
Width of rotating band	0.64 in.	Maximum range, vertical	5,100 yd*

*—Limited by shell-destroying tracer. Theoretical maximum: 10,850 yards, horizontal, and 7,625 yards, vertical.

63. CARTRIDGE, HE-T (SD), MK. II, OF EARLIER MANUFACTURE are listed in ORD 11 SNL P-5 and their data presented in table 9, chapter 5, and the subparagraphs below. The standard Mk. II HE-T Round is described in paragraph 62.

a. The first rounds used in 40-mm guns were adapted from British ammunition. These Mk. II Shell are loaded with TNT and fitted with the TRACER and IGNITER, shell, No. 12, Mk. I/L/, internal. The fuze used is the No. 251 Mk. I, which was replaced by the

M64A1, this fuze in turn being replaced by the Mk. 27 (Navy) Fuze. The muzzle velocity of these rounds is 2,870 feet per second. The No. 12 tracer, of British origin, consists of a primer, an igniting charge, a red tracer composition, and a relay igniting charge. The primer strikes a firing pin by set-back upon firing, igniting the red tracer composition. This burns for about 9 seconds, equivalent to a range of about 3,500 to 4,000 yards. As the tracer burns out, the relay igniting charge is ignited, detonating the bursting charge of the shell unless prior detonation has been caused by functioning of the fuze. Weights of these complete rounds are approximately 4.82 pounds. Length of the projectile with the No. 12 tracer is 7.08 inches.

b. The muzzle velocity of the Mk. II HE-T Rounds was reduced from 2,870 feet per second to 2,700 feet per second. Rounds manufactured with this velocity contained the No. 12 tracer and the M64A1, Mk. 27, and M71 Fuzes.

c. An improved tracer, TRACER, SD, M3, of American manufacture was adopted to replace the No. 12 tracer. The M3 Tracer differs from the No. 12 in that the primer and firing pin are omitted, the powder train consisting of an igniter charge, three charges of red tracer composition pressed at various loads in a steel body, and a relay igniting charge. The body is threaded externally to screw into the base of the shell. Unlike the tracer No. 12, which is flush with the rear surface of the shell when fully inserted, the M3 Tracer protrudes for about 0.75 inch. The bursting charge used in shell with the M3 Tracer is tetryl in preliminary design shell, and explosive D in the base and tetryl in the rest of shell of subsequent manufacture. A black powder wafer is also loaded in the base of the shell adjacent to the tracer relay charge to cause detonation of the bursting charge. The M3 Tracer has a burning time of 12 to 14 seconds, corresponding to a maximum horizontal range of 6,000 yards and a maximum vertical range of 5,750 yards (based on 2,870 ft per sec muzzle velocity). Rounds manufactured with the M3 Tracer have the Mk. 27 and M64A1 Fuzes. The Mk. 27 fuzed shell have a muzzle velocity of 2,700 feet per second, but shell fuzed with the M64A1 have been manufactured with both the 2,700 and 2,870 feet per second muzzle velocity. Weights of these complete rounds are approximately 4.82 pounds. Length of the fuzed projectile with the M3 Tracer is 7.88 inches. Maximum horizontal range is 6,000 yards and maximum vertical range is 5,750.

d. The next development was an improved tracer, the M3A1. Details of these rounds with the M3A1 are the same as described in subparagraph c, above, except that only the muzzle velocity of 2,700 feet per second is applicable. Rounds with the M3A1 Tracer are also assembled with the Mk. 27 and M64A1 Fuzes. The TRACER, SD, M3A1, differs from the M3 in having an initiator and the same tracer and igniter composition as in the Mk. 11 Navy tracer.

e. The earlier types described in subparagraphs a to d, above, are superseded by the present standard round, described in paragraph 62, which has the Mk. 11 or Mk. 11-Mod. 2 tracer and the muzzle velocity of 2,870 feet per second. Rounds with these tracers are assembled with the Mk. 27 and M71 Fuzes, and the bursting charge is pressed TNT.

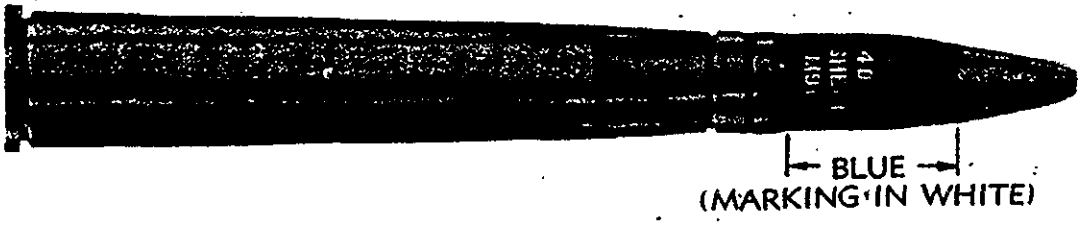

Figure 50 — CARTRIDGE, TP-T, M91, w/FUZE, Dummy or Inert, M__, 40-mm AA. Guns

64. CARTRIDGE, TP-T, M91, W/FUZE, DUMMY OR INERT, M__, 40-MM AA. GUNS (fig. 50), has a projectile which resembles the high-explosive shell in the Mk. II Cartridge but has a solid base except for a small tracer cavity. The shell-destroying tracer is replaced in the practice projectile by a burning composition for observation only, and the bursting charge cavity is empty. The shell may be fitted with FUZE, dummy, M69, or M69B1, which simulates the supersensitive point-detonating fuzes or may be an inert service fuze unserviceable for high-explosive loading.

DATA

Weight of complete round	4.72 lb	Type of base	Boat-tailed
Length of complete round	17.60 in.	Degree of taper	8 deg 15 min
Length of fuzed projectile	7.08 in.	Muzzle velocity	2,870 ft per sec
Length of cartridge case	12.24 in.	Maximum range, horizontal	10,850 yd
Width of rotating band	0.64 in.	Maximum range, vertical	7,625 yd

65. **CARTRIDGE, HE-T, MK. II, INERT LOADED, W/FUZE, DUMMY OR INERT, M__, 40-MM AA. GUNS,** is an alternative practice round to CARTRIDGE, TP-T, M91, w/FUZE, dummy or inert, M__, 40-mm AA. Guns. It consists of a service cartridge case, primer, and propelling charge; an inert-loaded Mk. II High-explosive Shell; and an inert fuze. FUZE, dummy, M69 or M69B1, or an inert service fuze (the M71 or Mk. 27 (Navy)) may be assembled to the shell.

66. **CARTRIDGE, DRILL, M17, 40-MM GUNS,** is a completely inert assembly for drill purposes. The iron body is shaped in the general form of a service projectile and a fixed cartridge case. The nose end of the assembly may be left open and threaded to hold an iron plug resembling a service fuze, or the body and nose may be made in one piece. The base end of the body is closed by an iron base plate which screws into the body and has a flange to provide for extraction of the cartridge after loading in the gun. The complete assembly weighs approximately 4.53 pounds and is 17.62 inches long.

TABLE 10

COMPLETE ROUND TABLE FOR AMMUNITION FOR 40-MM GUNS[1]

(This table is not to be confused with Official Complete Round Charts, Form No. 5981)

Note References	Designation of Cannon	PROJECTILE						FUZE		SD Tracer[2]	Cartridge Case	PROPELLING CHARGE		PRIMER	
		Kind	Type	Model	Filler		Weight as Fired (Lb.)	Type and Model	Action			Kind	Weight (Lb.)	Model[3]	Type
					Kind	Weight (Lb.)									
Service Ammunition															
4	M1	CARTRIDGE	AP-T	M81A1	None	—	1.96	None	—	*	M25	FNH	0.72	M38A1	55-gr. perc.
4	M1	CARTRIDGE	AP-T	M81	None	—	1.96	None	—	*	M25	FNH	0.72	M38A1	55-gr. perc.
—	M1	CARTRIDGE	HE	Mk. I (Navy)	TNT	0.1	2.0	P.D., Mk. 27	S.Q.	Mk. 8 or 10	Mk. I	FNH, M1	0.66	Mk. 22	64-gr. perc.
4	M1	CARTRIDGE	HE-T	Mk. II	TNT	0.15	1.93	P.D., No. 251, Mk. 1	S.Q.	No. 12	M25	FNH	0.72	M38A1	55-gr. perc.
4	M1	CARTRIDGE	HE-T	Mk. II	TNT	0.14	1.96	P.D., M64A1	S.Q.	No. 12	M25	FNH	0.72	M38A1	55-gr. perc.
4	M1	CARTRIDGE	HE-T	Mk. II	TNT	0.168	1.93	P.D., Mk. 27	S.Q.	No. 12	M25	FNH	0.72	M38A1	55-gr. perc.
5	M1	CARTRIDGE	HE-T	Mk. II	TNT	0.14	1.96	P.D., M64A1	S.Q.	No. 12	M25	FNH	0.68	M38A1	55-gr. perc.
5	M1	CARTRIDGE	HE-T	Mk. II	TNT	0.168	1.93	P.D., Mk. 27	S.Q.	No. 12	M25	FNH	0.68	M38A1	55-gr. perc.
5	M1	CARTRIDGE	HE-T	Mk. II	TNT	0.168	1.93	P.D., M71	S.Q.	No. 12	M25	FNH	0.68	M38A1	55-gr. perc.
5	M1	CARTRIDGE	HE-T	Mk. II	Tetryl[6]	0.05	2.06	P.D., Mk. 27	S.Q.	M3	M25	FNH	0.68	M38A1	55-gr. perc.
5	M1	CARTRIDGE	HE-T	Mk. II	Tetryl[6]	0.05	2.06	P.D., M64A1	S.Q.	M3	M25	FNH	0.68	M38A1	55-gr. perc.
4	M1	CARTRIDGE	HE-T	Mk. II	Tetryl[6]	0.05	2.06	P.D., M64A1	S.Q.	M3	M25	FNH	0.72	M38A1	55-gr. perc.
5	M1	CARTRIDGE	HE-T	Mk. II	Tetryl[6]	0.05	2.06	P.D., Mk. 27	S.Q.	M3A1	M25	FNH	0.68	M38A1	55-gr. perc.
5	M1	CARTRIDGE	HE-T	Mk. II	Tetryl[6]	0.05	2.06	P.D., M64A1	S.Q.	M3A1	M25	FNH	0.68	M38A1	55-gr. perc.
4	M1	CARTRIDGE	HE-T	Mk. II	TNT	0.07	1.99	P.D., Mk. 27	S.Q.	Mk. 11[5]	M25	FNH	0.72	M38A1	55-gr. perc.
4	M1	CARTRIDGE	HE-T	Mk. II	TNT	0.07	1.99	P.D., M71	S.Q.	Mk. 11[5]	M25	FNH	0.72	M38A1	55-gr. perc.

TABLE 10 (Contd.)

COMPLETE ROUND TABLE FOR AMMUNITION FOR 40-MM GUNS[1] (Contd.)

Note References	Designation of Cannon	PROJECTILE						FUZE		SD Tracer[2]	Cartridge Case	PROPELLING CHARGE		PRIMER	
		Kind	Type	Model	Filler		Weight as Fired (Lb.)	Type and Model	Action			Kind	Weight (Lb.)	Model[3]	Type
					Kind	Weight (Lb.)									
Practice Ammunition															
4	M1	CARTRIDGE	TP-T	M91	None	—	1.96	Dummy, M69[Δ]	—	*	M25	FNH	0.72	M38A1	55-gr. perc.
4	M1	CARTRIDGE	HE-T	Mk. II	Inert loaded	—	1.99	Dummy, M69[Δ]	—	*	M25	FNH	0.72	M38A1	55-gr. perc
Drill Ammunition															
7	M1	CARTRIDGE	Drill	M17	None	—	—	None	—	None	None	None	—	None	—

AP-T—armor-piercing-tracer
FNH—flashless nonhygroscopic
gr.—grain
HE—high-explosive
HE-T—high-explosive-tracer
P.D.—point-detonating
TP-T—target practice-tracer
perc.—percussion
SD—shell-destroying
S.Q.—superquick, w/supersensitive response

*—Tracer for observation purposes only.
°—Or Mk. 11-Mod. 2 SD Tracer.
Δ—Or M69B1 dummy fuze or an inert service fuze.
1—Data in this table is based on standard components. Rounds may be found which have been assembled from similar components procured from other services. Interchanged components can be identified by the marking.
2—M25, a brass case, is standard. Substitute standard is M25B1, a steel case.
3—M38A1 primer is standard for American manufacture, superseding M23A1 which may still be found in rounds of earlier manufacture. M38B2 and Mk. 22 (Navy) are alternatives.
4—Muzzle velocity, 2,870 f/s.
5—Muzzle velocity 2,700 f/s.
6—Or tetryl and explosive D. Includes black powder pellet.
7—One-piece simulating cartridge case, projectile and fuze.

NOTES	Model of Gun	Cartridge Drg No.	Projectile: Kind	Projectile: Type	Projectile: Designation	Projectile: Drg No.	Projectile: Wt Loaded & Fused lb	Charge: Wt lb	Charge: Kind	Charge: Drg No.	Projectile: Material	Projectile: Forging or Casting Type	Fuze: Designation	Fuze: Type	Fuze: Drg No.	Cartridge Case: Designation	Cartridge Case: Drg No.	Propelling Charge: Nominal Weight oz	Propelling Charge: Kind	Primer: Designation	Primer: Drg No.	Packing: Primer Drg No.	Packing: Cartridge: Fiber Container Drg No.	Packing: Cartridge: Packing & Marking Drg No.	Packing: Cartridge: Shipped	Assembly No.
S & N	A12	75-1-140	Shot	AP-T	M2A1	75-2-311	1.96	.02	Tracer	75-14-333	Steel	Bar Stock	--	--	---	M25 ∂	71-2-122	10.4	M1	M38A1 $	74-2-63	20-4-164	PIF-18	FD 6373	Complete	1
S & N	A12	75-1-166	Shell	HE-T ‡‡	Mk 2 *	75-2-298	1.905	--	TNT	(Navy) 394620	Steel	Bar Stock	Mk 27 ⊕	FD	(Navy) 300423	M25 ∂	71-2-122	11.49	M1	M38A1 $	74-2-63	20-4-164	PIF-18	FD 6373	Fused	2
																										3
																										4
																										5
																										6
																										7
S & N	A12	75-1-170	Shell	TP-T	Mk 2	75-2-298	1.988	.13	Inert	75-14-424	Steel	Bar Stock	M69 **	Dummy	72-5-9	M25 ∂	71-2-122	11.49	M1	M38A1 $	74-2-63	20-4-164	PIF-18	FD 6373	Fused	8
S & N	A12	75-1-173	Shell	TP-T	M71	75-2-329	1.96	.02	Tracer	75-14-433	Steel	Bar Stock	M69 **	Dummy	72-5-9	M25 ∂	71-2-122	11.49	M1	M38A1 $	74-2-63	20-4-164	PIF-18	FD 6373	Fused	9
																										10
																										11
																										12
																										13
																										14
S & N	A12	72-3-84	Cartridge	Drill	M17 ⊕	72-3-91	4.75 ≤	--	--	---	Bronze A Steel	Cast	--	None	72-3-91	--	---	--	--	---	---	----	PIF-18	FD 6373	Complete	15
S & N	A12	72-3-101	Cartridge	Drill	M25 oo	75-2-290	4.75 ≤	--	--	---	Steel	---	M69B1	Dummy	72-5-9	M25B1 (Modified)	72-3-101	--	--	---	---	----	PIF-18	FD 6373	Fused	16
																										17
																										18
																										19
																										20

S - Issue
N - Manufacture
AP-T - Armor piercing - tracer
HE-T - High explosive - tracer
Perc - Percussion
TNT - Trinitrotoluene
TP-T - Target practice - tracer
FD - Point Detonating

$ - Some Cartridges assembled with Primer, percussion, M38A2. Primers, percussion, M38B1 or M38B2 and Primer, percussion, Mk 22 (Navy Drg 320952), are alternatives
∂ - Cartridge Case, M25B1, alternate (Drg 71-2-130). Navy alternates:Case, cartridge, Mk 2 Mod 0, and Mk 2 Mod. 1, Drg 329377, or Mk 3 (steel) Drg 330825.
⊕ - Fuze, PD, M71, alternate standard. Drg 73-2-201.
* - Assembled with (Navy) Tracer, Mk 11, Drg 394460, or Mk 11 Mod 2, Drg 423429. Some cartridges also assembled with Tracer, M3 or M3A1, Drg 75-17-7 - Cartridges assembled with Tracer, M3 or M3A1, are limited standard.
** - Alternative Fuzes (Inert): Fuze, PD, Mk 27 (Navy), Fuze, PD, M71, or Fuze, dummy, PD, M69B1.
≤ - Total weight of Cartridge, drill.
‡‡ - All tracers are of the shell destroying type.
• - M17B1, made from malleable iron, Drg 72-3-84, is substitute standard.
oo - Use Shell, HE, 40-mm, Mk 2.

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Section XII

AMMUNITION FOR 90-MM GUNS

190. GENERAL.

a. General. Originally intended for antiaircraft defense, the 90-mm gun has since been adapted, by the use of various types of mounts, for use also against ground and water-borne targets. Of the several models of 90-mm guns now in use, all have the same type of chamber and can fire the same ammunition. The ammunition is of the fixed type, that is the rounds have propelling charges which are not adjustable and are loaded into the cannon in one operation. Armor-piercing, high-explosive, practice, blank, and drill rounds are provided. Rounds requiring fuzes are shipped with fuzes assembled. Once removed from packing materials, the rounds require only adjustment of the fuzes to be ready for firing.

b. Identification. Painting and marking for identification is in accordance with the basic color scheme as prescribed in TM 9-1900.

c. Fuzes. Shell for antiaircraft use are fitted with the M43 Mechanical Time Fuze (all modifications), which permits adjustment of setting to 30 seconds but has no impact element. Shell for ground fire or anti-motor-torpedo-boat defense are shipped fuzed with M48 series fuzes. These provide for selective superquick or delay setting, for surface burst or for detonation after penetration or upon ricochet with either 0.05-second or 0.15-second delay. The modification, M48A2, is manufactured with either delay, depending on the lot. The M48 and M48A1 Fuzes are manufactured with 0.05-second and 0.15-second delay, respectively, but some M48A1 Fuzes modified to have 0.05-second delay elements are in existence. Fuzes with 0.15-second delay are used in anti-motor-torpedo-boat firing, while models with the short (0.05-sec) delay are used against ground targets. Loaded armor-piercing projectiles are fitted with FUZE, B.D., M68, a base-detonating fuze which functions with delay action. Practice and drill rounds are fitted with either dummy or inert service fuzes. For a complete description of fuzes, see chapter 3, section I.

d. Cartridge Cases. CASE, cartridge, 90-mm, M19, made of brass, is standard for all ammunition except blank. Substitute standard is CASE, cartridge, 90-mm, M19B1. The M19B1 is a steel case weighing 10.1 pounds whereas the brass case weighs 11 pounds. CASE, cartridge, M27 or M27B1, is used with 90-mm blank ammunition.

e. NH (nonhygroscopic, flashing) propellent powder has been established as standard for all 90-mm ammunition except time-fuzed rounds, which, for AA. fire, will be loaded with FNH (flashless nonhygroscopic) powder. Impact-fuzed rounds with FNH powder are to be reserved for target-practice firing insofar as is practicable. Time-fuzed NH rounds will be used for daytime fire or for practice until supplies are exhausted and replaced by rounds with the standard propellant.

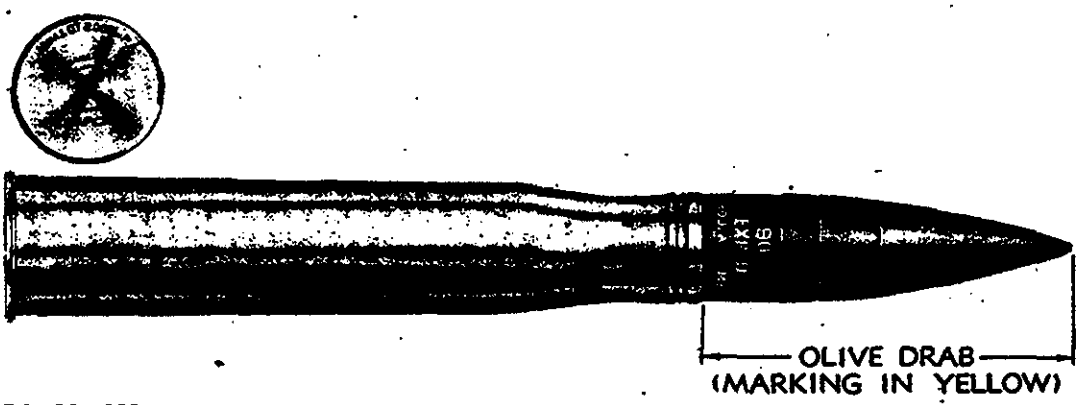
f. **Primers.** PRIMER, percussion, 300-grain, M28A2, is standard for all ammunition for 90-mm guns except blank ammunition. Alternative primer is PRIMER, percussion, 300-grain, M28B2 (steel). Rounds of earlier manufacture may have PRIMER, percussion, 300-grain, M28A1 or M28B1A1. PRIMER, percussion, 100-grain, M1B1A2, is used with blank ammunition (ch. 3, sec. III).

191. COMPLETE ROUND TABLE.

a. Data concerning complete rounds for 90-mm guns, and components thereof, are given in table 18, chapter 5.

192. PACKING AND SHIPPING DATA.

a. Packing and shipping data for 90-mm ammunition are given in ORD 11 SNL's P-5, P-7, and P-8.



RA PD 80778

Figure 106 — PROJECTILE, Fixed, A.P.C., M82, NH, w/FUZE, B.D., M68, and TRACER, 90-mm Guns

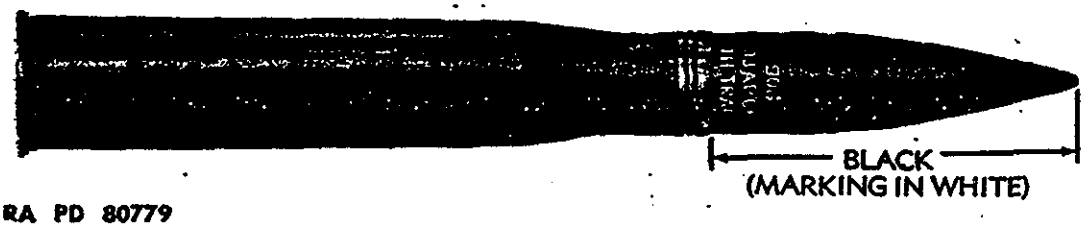
193. PROJECTILE, FIXED, A.P.C., M82, NH, W/FUZE, B.D., M68, AND TRACER, 90-MM GUNS (fig. 106), is provided for 90-mm guns for use against ground targets, particularly armored materiel. The projectile, which has been manufactured both with and without a high-explosive charge (par. 194) is similar to other standard types especially adapted for combating face-hardened armor. The body proper is made of hard steel, with a square base and a nose

shaped to a relatively short ogive. The nose is sweated to a softer steel cap, on which in turn is screwed a light-weight steel ballistic cap or windshield. The rear portion of the body contains a small cavity which, in the loaded projectile, holds a small charge of explosive D. The base hole is threaded to receive the M68 Base-detonating Fuze. This fuze, a simple inertia type, functions with delay action. The rear housing of the fuze extends approximately ¾ inch beyond the rear surface of the projectile base. This portion of the fuze contains a red tracer for observation purposes. Operating independent of the fuze mechanism, the tracer composition is ignited by the propelling charge when the round is fired. It burns with a visible tracer for about 3 seconds, equivalent to a range of about 2,400 yards.

DATA

Weight of complete round	42.75 lb	Radius of ogive (false ogive)	9.09 cal.
Length of complete round	38.24 in.	Muzzle velocity	2,650 ft per sec
Length of fuzed projectile	16.19 in.	Maximum range	13,540 yd
Length of cartridge case	23.70 in.	Penetration (in. at 0-deg obliquity of face-hardened plate at 1,000 yd)	6.0
Width of rotating band	1.20 in.		
Type of base	Square		

Penetration (in. at 0-deg obliquity of homogeneous plate at 1,000 yd).... 5.5



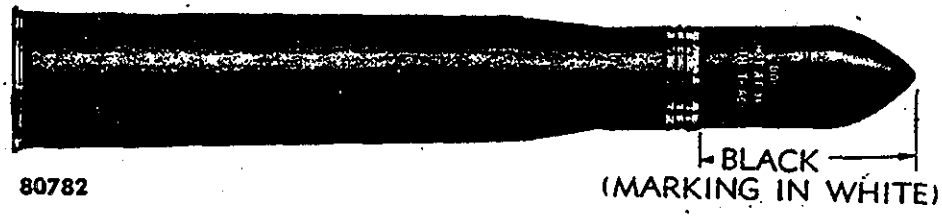
RA PD 80779

Figure 107 — PROJECTILE, Fixed, A.P.C., M82, NH, w/TRACER, 90-mm Guns

194. PROJECTILE, FIXED, A.P.C., M82, NH, W/TRACER, 90-MM GUNS (fig. 107), was manufactured prior to the standardization of the M68 Base Fuze, which permitted loading and fuzing the projectile for blast as well as penetrating effect. In this round, the projectile bursting charge cavity is left empty. The base hole is plugged with a steel plug which contains a tracer similar to that in the fuze of the loaded projectile. Weight of the complete round is 42.04 pounds; over-all length of the projectile is 15.49 inches, 0.70 inch less than the fuzed propectile due to the omission of the fuze, otherwise, the data in paragraph 193 is applicable to this round.

195. SHOT, FIXED, A.P., M77, NH, W/TRACER, 90-MM GUNS (fig. 108), has the same components, other than the projectile, as the M82 Armor-piercing-capped Round, and is used for the same purpose. The shot is a solid steel slug similar in contour to the body of the

M82 Projectile but lacking the armor-piercing cap and ballistic windshield of the standard projectile and without explosive. The base is drilled to provide a small cavity for holding a red tracer. The tracer is similar to that in the loaded and fuzed round and burns for approximately 3 seconds.



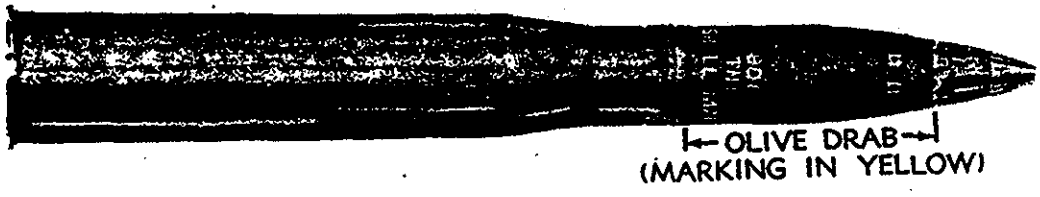
RA PD 80782

Figure 108 — SHOT, Fixed, A.P., M77, NH, w/TRACER, 90-mm Guns

DATA

Weight of complete round	42.04 lb	Radius of ogive	1.51 cal.
Length of complete round	32.75 in.	Muzzle velocity	2,700 ft per sec
Length of projectile	10.00 in.	Maximum range	12,790 yd
Length of cartridge case	23.70 in.	Penetration (in. at 0-deg obliquity of face-hardened plate at 1,000 yd)	4.5
Width of rotating band	1.20 in.		
Type of base	Square		

Penetration (in. at 0-deg obliquity of homogeneous plate at 1,000 yd).... 5.5



RA PD 80781

Figure 109 — SHELL, Fixed, H.E., M71, w/FUZE, Time, Mechanical, M43 (All Modifications), 90-mm Guns

196. SHELL, FIXED, H.E., M71, W/FUZE, TIME, MECHANICAL, M43 (ALL MODIFICATIONS), 90-MM GUNS (fig. 109), consists of a hollowed steel casing containing a high-explosive filler and a booster, and fitted with a point fuze. The bursting charge cavity tapers in conical fashion over the lower half of the cavity and is hemispherical at the bottom. The result is a relatively small cavity, with comparatively thick walls, for a high-explosive shell. The base is boat-tailed and the nose formed to a long ogive, the sweep of which is continued by the contour of the fuze. When to be fired against aircraft, the projectile is fitted with the M43 Mechanical Time Fuze. This fuze gives selective time setting up to 30 seconds but has no impact element. To obtain the desired fragmentation and blast effect, the shell is loaded with TNT; an alternative high-explosive is 50-50

amatol. The high-explosive charge is shaped at the front end to provide for a booster well. When 50-50 amatol is used, an additional booster is provided by surrounding the booster well with TNT. BOOSTER, M20A1, is a manufacturing component of the shell, being inserted after loading and staked permanently in position.

DATA

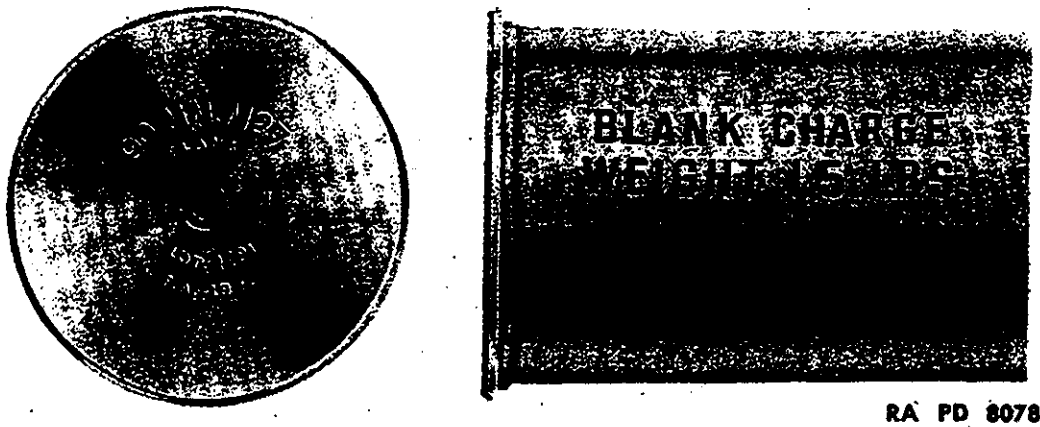
Weight of complete round	42.04 lb	Degree of taper	7 deg 15 min
Length of complete round	37.44 in.	Radius of ogive	9.01 cal.
Length of fuzed projectile	16.37 in.	Muzzle velocity	2,700 ft per sec
Length of cartridge case	23.70 in.	Maximum range (at 45 deg)	19,560 yd*†
Width of rotating band	1.20 in.		
Type of base	Boat-tailed		

*—Effective maximum range limited by fuze time limits to around 13,000 yards.
†—Range shown in horizontal range; maximum vertical height is about 12,000 yards.

197. SHELL, FIXED, H.E., M71, NH, W/FUZE, P.D., M48A2, SQ & 0.05-SEC. DELAY, 90-MM GUNS, has the same components as the round described in paragraph 196, except for the fuze. Since this round is intended for use against ground targets, the shell is fuzed with an impact type fuze, either FUZE, P.D., M48A2, M48A1, or M48. The M48A2 Fuze is manufactured with 0.05-second delay, the M48A1 with 0.15-second delay (although modified fuzes with 0.05-sec delay are in existence), and the M48 with 0.05-second delay. The short-delay models are prescribed for batteries firing against ground targets. As loaded with a 7.31-pound propelling charge of NH powder, the projectile has a muzzle velocity of 2,700 feet per second and a maximum range of approximately 19,500 yards (at approx 45 deg 45 min). Other data is the same as that given in paragraph 196 for the time-fuzed AA. round.

198. SHELL, FIXED, H.E., M71, NH, W/FUZE, P.D., M48A2, SQ & 0.15-SEC. DELAY, 90-MM GUNS, is exactly the same as the M71 Round described in paragraph 197 except for the delay element in the fuze. The data described in paragraphs 196 and 197 are applicable. This long-delay fuze (0.15-sec delay) is for use in rounds to be fired in anti-motor-torpedo-batteries.

199. SHELL, FIXED, PRACTICE, INERT LOADED, M71, NH, W/FUZE, DUMMY OR INERT, M __, 90-MM GUNS, is provided for training in marksmanship in anti-motor-torpedo-boat firing. It differs from the M71 Service Round in that the shell is loaded with inert material and fuzed with an inert service M48A1 Fuze or FUZE, dummy, M73. Data for the practice round is the same as that for the M71 Round given in paragraphs 197 and 196.



RA PD 80783

Figure 110 — AMMUNITION, Blank, 90-mm Guns

200. **AMMUNITION, BLANK, 90-MM GUNS** (fig. 110), consists of the M27 or M27B1 (steel) Cartridge Case, similar to a service case but shortened to 7.25 inches; a 100-grain M1B1A2 Primer or alternative PRIMER, percussion, 100-grain, M1A2; and a 1.5-pound charge of black powder (sodium nitrate). The round is constructed like other standard types of blank ammunition, the blank charge being held in a cotton bag which is so loaded into the cartridge case as to surround the primer. The charge is held firmly in position at the base of the case by a closing cup assembly. For 90-mm blank ammunition, the closing cup assembly consists of two pulpboard disks glued one to each surface of a felt disk or wad. The assembly is inserted into the case and glued securely in position about 2.42 inches from the mouth of the case. Weight of complete round is 8.23 pounds and length is 7.27 inches.

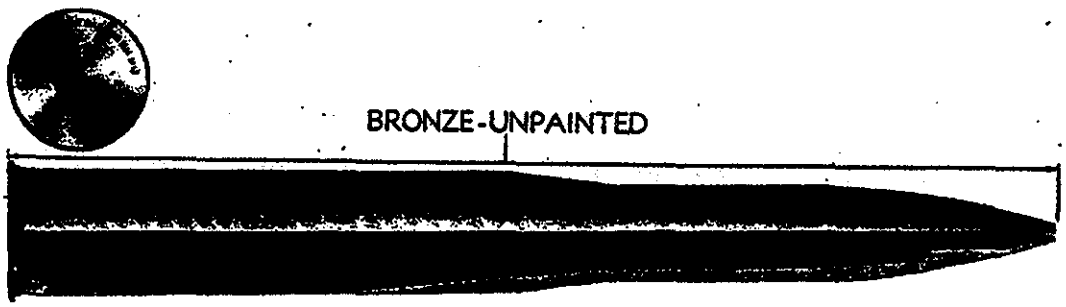


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Figure 111 — CARTRIDGE, Drill, M12, w/FUZE, Dummy, M44A2, 90-mm Guns

201. **CARTRIDGE, DRILL, M12, W/FUZE, DUMMY, M44A2, 90-MM GUNS** (fig. 111), may be stamped either M12 or M12B1. Both are functionally alike and completely inert. However, the M12B1, which is being manufactured at present, is made of malleable

iron and steel parts whereas the M12 is made of bronze and brass parts. Both are 1-piece castings threaded at the base to receive the base plate and at the nose to hold the M44A2 Dummy Fuze. The base plate is held in position by a set screw; the fuze, by a set screw and shoe arrangement. Both parts are replaceable. FUZE, dummy, M44A2, used with this cartridge, may be made of bronze, brass, aluminum, copper alloy or sintered iron. In form, the casting resembles the M43 Fuze but is without the time ring. The complete assembly weighs 39.15 pounds, and is 37.44 inches long. This drill cartridge is not used in the 90-mm M2 Gun which has a power-operated rammer.

TABLE 18

COMPLETE ROUND TABLE FOR AMMUNITION FOR 90-MM GUNS

(This table is not to be confused with official Complete Round Charts, Form No. 5981.)

Note References	Designation of Cannon	PROJECTILE						FUZE		Booster,* Adapter-Booster, or Burster	Cartridge Case	PROPELLING CHARGE		PRIMER	
		Kind	Type	Model	Filler Kind	Filler Weight (Lb.)	Weight as Fired (Lb.)	Type and Model	Action			Kind△	Weight (Lb.)	Model†	Type
							Service Ammunition								
1, 2	M1, M1A1, M2, M3	PROJECTILE	A.P.C.	M82	Exp. D	0.44	24.11	B.D., M68	Delay	—	M19	NH, M1	7.31	M28A2	300-gr. perc.
3	M1, M1A1, M2, M3	PROJECTILE	A.P.C.	M82	None	—	23.40	None	—	—	M19	NH, M1	7.31	M28A2	300-gr. perc.
1	M1, M1A1, M2, M3	SHELL	H.E.	M71	TNT	2.04	23.29	M.T., M43#	Time to 30 sec.	M20A1	M19	FNH, M1	7.31	M28A2	300-gr. perc
1	M1, M1A1, M2, M3	SHELL	H.E.	M71	TNT	2.04	23.29	P.D., M48A2	S.Q. & Del.**	M20A1	M19	NH, M1	7.31	M28A2	300-gr. perc.
3	M1, M1A1, M2, M3	SHOT	A.P.	M77	None	—	23.40	None	—	—	M19	NH, M1	7.31	M28A2	300-gr. perc.
							Practice Ammunition								
—	M1, M1A1, M2, M3	SHELL	Practice	M71	Inert	2.04	23.40	‡	Inert	—	M19	NH, M1	7.31	M28A2	300-gr. perc.
							Blank Ammunition								
—	M1, M1A1, M2, M3	NONE	.....								M27	Blk. Powder	1.50	M1B1A2	100-gr. perc.
							Drill Ammunition								
4	M1, M1A1, M3	CARTRIDGE	Drill	M12	None	—	—	Dummy, M44A2	Inert	None	—	None	—	None	—

A.P.—armor-piercing
A.P.C.—armor-piercing-capped
B.D.—base-detonating
gr.—grain
H.E.—high-explosive
M.T.—mechanical time
NH—nonhygroscopic
P.D.—point-detonating
perc.—percussion

*—Alternative is BOOSTER, M24.
△—Standard propellent powder; rounds with non-standard type may be encountered.
†—Alternative primer: PRIMER, percussion, 300-grain, M28B2 (steel). Rounds of earlier manufacture may have PRIMER, percussion, 300-grain, M28A1 or M28B1A1.
#—All modifications.
**—Fuze, P.D., M48A2, may have 0.05-second or 0.15-second delay, depending on lot. Rounds of earlier assembly were fused with M48 or M48A1 fuzes, with 0.05-second and 0.15-second delay, respectively. Rounds with modified fuzes having other than original delay may be encountered.
‡—FUZE, inert, P.D., M48A1; or FUZE, dummy, M73.
1—Rounds also assembled with steel cartridge case, CASE, cartridge, 90-mm, M19B1. This case is approximately 0.90 pound lighter than the standard brass case.
2—Fuze contains tracer.
3—Projectile contains tracer.
4—M12 is a bronze assembly. M12B1 is of malleable iron and steel (standard for current manufacture).

by cutting down a regular service cartridge case. The charge in each type is black powder, but each type uses a different weight charge. The standard for all purposes except firing salutes of international courtesy is a 6-ounce charge. A charge of 6.9 ounces, called a single pellet charge, is provided for use in lieu of the 6-ounce charge. A charge of 1 pound is provided for firing salutes of international courtesy, with a 13.8-ounce double pellet for use as an alternate.

Each round of blank ammunition is packed in an individual fiber container, and 10 rounds are packed in a wooden packing box.

In general, Blank Ammunition M10 for the 3-inch field gun is similar to the blank rounds discussed in connection with the 3-inch AA ammunition.

FURTHER REFERENCES: Complete Round Chart No. 5981; OS 9-20; OS 9-18; TR 1360-3A, 1370-A; OS 9-48.

Chapter 9

Ammunition for 90-mm Guns

GENERAL.

One of the most effective AA weapons used by the various arms today, is the 90-mm Gun M1. It is fired from a self-propelled mount as well as from the more common mobile mount. The self-propelled mount is used as a tank destroyer, and is moved about on half or full tracks by its own power. The mobile mount which can be used against tanks and aircraft is a towed carriage.

Types of ammunition provided for the 90-mm Gun M1 are:

High-explosive
Projectile, A.P.C.
Shot, A.P.
Practice
Drill

Fuzes. All fuzes used with complete rounds of 90-mm ammunition have been previously discussed.

P.D., M48, and M48A1, selective, time and super quick—Fully discussed with 75-mm gun ammunition.

B.D., M68—Identical in all respects to the FUZE, B.D., M66A1, discussed with 75-mm gun ammunition, except for the fact that the body of the M68 is larger.

Mechanical Time M43 (all modifications)—Fully discussed in the chapter dealing with 3-inch AA ammunition.

Boosters. All boosters are of the M20-series (M20, M20A1, etc.).

Cartridge Case. The case used on all 90-mm ammunition is the M19 or M19B1 (steel). This case is usually of drawn brass, and is about 23⅝ inches long. The case has an extracting flange on the head which acts to stop the round when it is loaded into the weapon, and also to eject the case after firing. The metal near the mouth of the case is comparatively thin and soft, so that the pressure of the propelling charge gases expands it tightly against the walls of the chamber, thus preventing the leakage of any gases past the cartridge case.

Propelling Charge. The propellent charge for 90-mm ammunition consists of approximately 7 pounds of NH smokeless powder poured loosely in the cartridge case.

Primer. The primer used in all complete rounds is the M28-series of 300-grain percussion type of cannon primer.

SHELL, FIXED, PRACTICE, M58.

General. This complete round was originally developed as the High-explosive Round M58. Due to the thin body walls, prematures resulted. As a result, the filler was washed out and a substitute filler of sand and a black powder spotting charge was substituted. The round, thus, has been designated a practice round.

Projectile. The projectile is of steel construction. It is streamlined, with a boat-tail base. The fuze continues the exterior streamline of the projectile. The shell has a steel base plate welded to its base.

Components. A complete round of M58 Practice Ammunition consists of the following: An M58 Projectile with 2.11 pounds of inert filler and 0.56 pound black powder spotting charge in pellet form; an M20 Booster and an M43A2 Fuze; and an M19 Cartridge Case with a propellent charge of NH smokeless powder.

Guns. This complete round is fired from all models of the M1 Guns.

SHELL, FIXED, H.E., M71.

General. The M71 Shell was developed to replace the M58. The walls are made thicker to overcome the prematuring factor. In all other respects (outwardly) the shell is identical to the M58.

Projectile. The M71 Shell is streamlined, with a boat-tail base and a steel base plate. The fuze continues the streamline of the projectile. It is of forged steel construction.

Components. The filler for this round is 2.04 pounds of cast TNT, which is detonated by the M20A1 Booster used in conjunction with the M43-series mechanical time fuze for AA work, and the P.D. M48 or M48A1 for firing against ground targets. The loaded and fuzed projectile is assembled to an M19 Cartridge Case containing approxi-

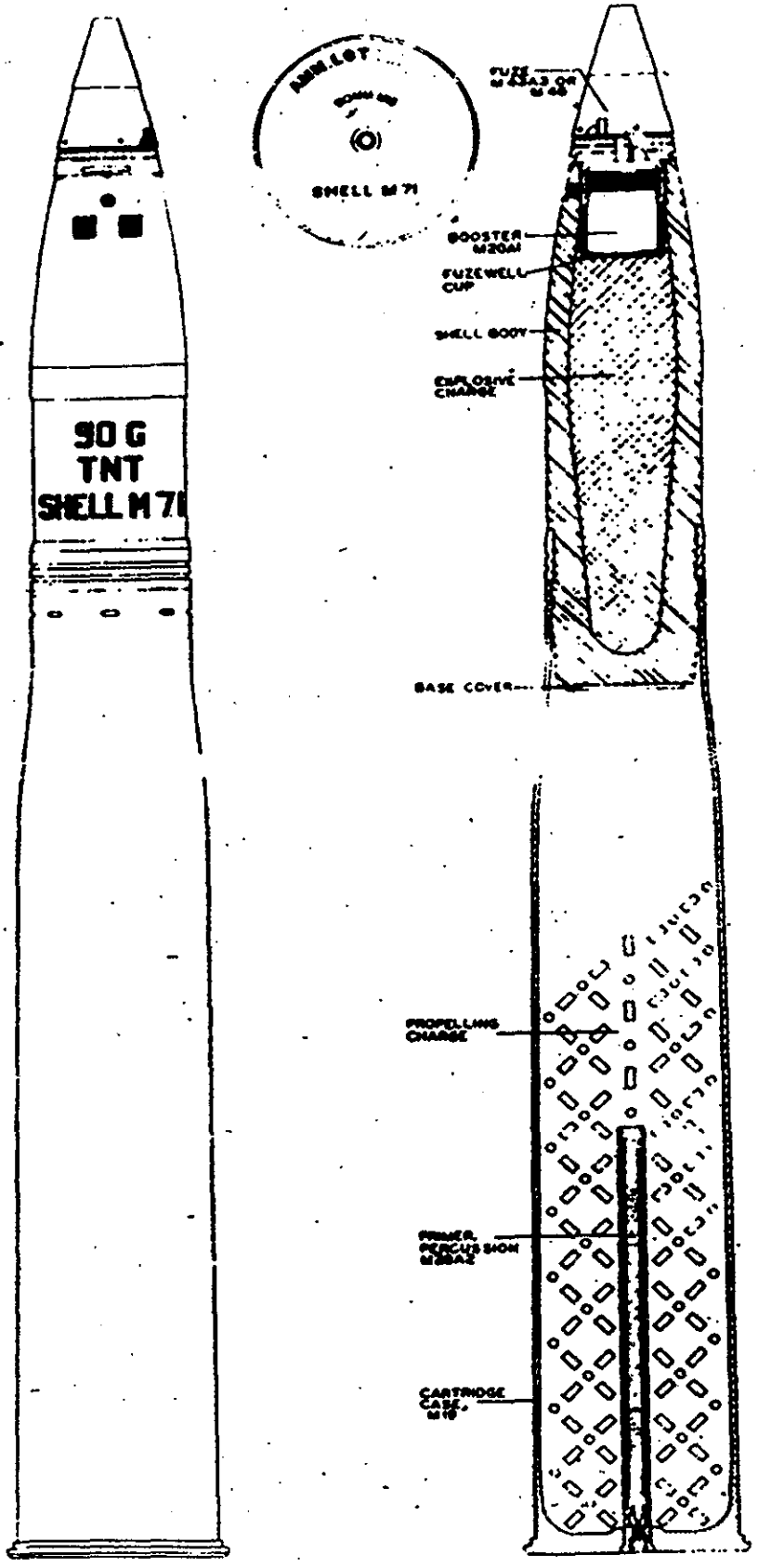

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Figure 184 — SHELL, H.E., 90-mm, M71

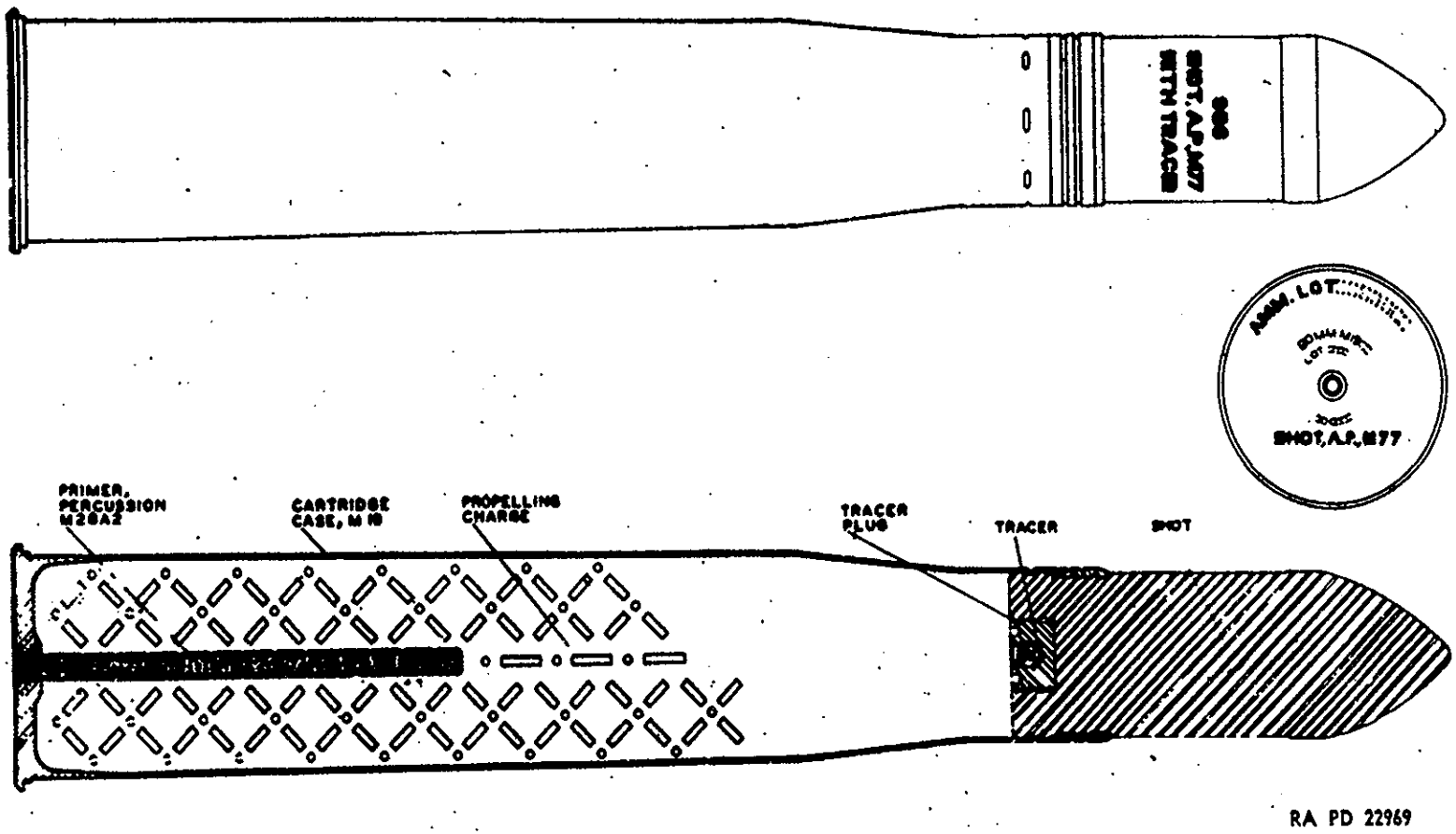

Figure 186 — SHOT, A.P., 90-mm, M77

mately 7 pounds of loose NH smokeless powder and an M28A1 or A2 Primer.

Gun. This round is fired from the 90-mm AA or AT Gun M1.

SHELL, FIXED, H.E., M58 (AMMANOL).

General. This round of ammunition was developed largely for testing purposes. It is identical in every way to the SHELL, H.E., M71, except for filler which consists of TNT, ammonium nitrate, and flaked aluminum. The aluminum gives a brilliant flash when the shell functions, and produces an incendiary effect against inflammable targets.

SHOT, FIXED, A.P., M77.

General. As the 90-mm Gun M1 can be used either against aircraft or tanks, the ammunition is adapted to both targets. The Shot M77 is provided for antitank use.

Projectile. The projectile consists of a heat-treated solid steel shot with no provision made for booster or fuze.

Components. The complete round consists of a SHOT, A.P., M77, firmly attached to an M19 Cartridge Case containing NH smokeless powder (approx. 7 lb) and an M28A1 or A2 Primer.

Gun. The 90-mm Gun M1 fires this round against tanks.

PROJECTILE, FIXED, A.P.C., M82.

General. This round is the more effective of the two armor-piercing rounds provided for the 90-mm gun when used against tanks.

Projectile. This round is the same as other A.P.C. rounds previously discussed, in that it has the heat-treated solid steel shot with an A.P. cap sweated on, and a false ogive or windshield screwed to this cap. Provisions are made for an explosive filler and base-detonating fuze.

Components. The complete round consists of the A.P.C. Projectile M82, with an explosive D filler and a B.D. Fuze M68. The M68 is similar to the B.D. M66, the only difference being in size. The M68 is larger than the M66. The fuze has a tracer composition in a boat-tail shaped portion that protrudes from the base of the projectile. The loaded and fuzed projectile is firmly crimped to the M19 Cartridge Case with its NH smokeless powder propellant and the M28A1 or A2 Primer.

Gun. This round is issued for firing in the M1 Gun when used against tanks.

COMPLETE ROUNDS FOR 90-MM GUNS

Complete Round	Status	Projectile	Filler	Fuze	Booster	Cartridge Case	Primer
Shell, Prac., M58	S	M58	Sand	Inert M43A2	Inert M20	M19	M28A1
Shell, H.E., M71	S&M	M71	TNT	M43A2 M48 M48A1	M20A1	M19	M28A1
Shell, H.E., M58	S	M71	Ammonal	M43	M20A1	M19	M28A1
Shot, A.P., M77	S&M	M77	.....	.....	.....	M19	M28A1
Projectile, A.P.C., M82	S&M	M82	Exp. "D"	M68	.....	M19	M28A1
Cartridge, Drill, M12	S&M	Cast Bronze	.....	M44A2 Dummy	.....	Cast Bronze	Inert

CARTRIDGE, DRILL, M12.

General. This round serves the same purpose and is of the same construction as other drill rounds already discussed. It is used to train troops in loading, and fuzing of ammunition. It is of 1-piece cast bronze construction that simulates a service round. The fuze used is the M44A2 Dummy Fuze, and an inert primer is also provided.

PACKING.

All rounds except the drill cartridge are packed one round per individual fiber container, and two or four rounds in containers per wooden box. The drill cartridge is packed as required. All rounds are shipped fuzed and boostered.

FURTHER REFERENCES: OS 9-20; Complete Round Chart.

Chapter 10

Ammunition for 105-mm Guns and Howitzers

AMMUNITION FOR 105-MM AA GUN M3.

General. The 105-mm AA Gun M3 is being replaced by other caliber AA guns that have proven to be more effective. It has been used for AA protection to harbor installations.

The types of ammunition provided for the 105-mm AA Gun M3, Pedestal Mount, are:
High-explosive
Practice
Drill

FUZE, M.T., M43 (All Modifications). This fuze has been discussed in conjunction with 3-inch AA ammunition components.

FUZE, M.T., M2. This fuze is similar to the M43, the only difference being the fact that it is a much larger fuze, and that it has a booster as an integral part of its make-up. Its function and parts are for all practical purposes the same.

Booster M20 (All Modifications). This booster is used on all 105-mm AA ammunition. It has been previously discussed in connection with 75-mm ammunition components.

Cartridge Case. The cartridge case used on 105-mm ammunition is the Brass Case M6. The M6 is 30.37 inches long, weighs 19.0 pounds, and is designed to seat the M28A2 Percussion Primer. It is

AMMUNITION (FIXED) FOR 90-MM GUNS, M1, M1A1, M2, M3 & T8

90-M1

NOTES	Mark or Model of Gun	Complete Round Drg No.	PROJECTILE: Kind	Type	Designation	Drg No.	Weight Loaded and Fused lb	Charge: Wt lb	Charge: Kind	Charge: Drg No.	Material	Forging or Casting		BOOSTER: K No. Designation	Drg No.	FUZE: Designation	Type	Drg No.	CARTRIDGE CASE: Designation	Drg No.	PROPELLING CHARGE: Nominal Weight lb	Composition Designation	PRIMER: Type	Designation	Drg No.	PACKING: Fuze Drg No.	Booster Drg No.	Primer Drg No.	Complete Round: Packing & Marking Drg No.	Shipped	Assembly No.
S & H	A11	75-3-195	Shot11	HE	M71	75-18-42	23.4	2.04	TNT	75-14-305	Steel	Forg	75-20-92	M214A	73-8-154	M514	HT	73-7-89	M19	73-8-112	7.32	M6	Percu	M2A2	73-8-63	20-4-425	20-4-194	76-1-555	20-4-218	Fused	1
S & H	A11	75-3-197	Shot11	HE	M71	75-18-42	23.4	2.04	TNT	75-14-305	Steel	Forg	75-20-92	M214A	73-8-154	M514	FD	73-8-146	M19	73-8-112	7.32	M6	Percu	M2A2	73-8-63	20-4-512	20-4-194	76-1-555	20-4-218	Fused	2
S & H	A11	75-3-207	Shot11	HE	M71	75-18-42	23.4	1.9	TNT	75-14-146	Steel	Forg	75-20-92	M214A	73-8-154	M514	FD	73-8-146	M19	73-8-112	7.32	M6	Percu	M2A2	73-8-63	20-4-512	20-4-194	76-1-555	20-4-218	Fused	3
S & H	A11	75-3-[illegible]	Shot11	HE	M71	75-18-42	23.4	1.9	TNT	75-14-146	Steel	Forg	75-20-92	M214A	73-8-154	M514	HT	73-7-89	M19	73-8-112	7.32	M6	Percu	M2A2	73-8-63	20-4-425	20-4-194	76-1-555	20-4-218	Fused	4
S & H	A11	75-3-243	Shot11	HE	M71	75-18-42	23.4	2.04	TNT	75-14-305	Steel	Forg	75-20-92	M214A	73-8-154	M514	TBQ	73-3-155	M19	73-8-112	7.32	M6	Percu	M2A2	73-8-63	20-4-512	20-4-194	76-1-555	20-4-218	Fused	5
S & H	A11	75-3-256	Shot11	HE	M71	75-18-42	23.65	1.9	TNT	75-14-146	Steel	Forg	75-20-92			M71, M72, M73	TT		M19	73-8-112	7.32	M6	Percu	M2A2	73-8-63			76-1-555	20-4-218	w/o Fuze	6
S & H	A11	75-3-136	Shot	AP-T	M77	75-18-44	23.4	.03	Tracer	75-14-110	Steel								M19	73-8-112	7.32	M6	Percu	M2A2	73-8-63			76-1-555	20-4-218	Complete	7
S	A11	75-3-145	Proj	APC-T	M82	75-18-46	24.22	.22	D	75-14-114	Steel					M58	BD	73-8-181	M19	73-8-112	7.32	M6	Percu	M2A2	73-8-63	20-4-359		76-1-555	20-4-218	Fused	8
S & H	A11	75-3-145	Proj	APC-T	M82	75-18-46	24.22	.22	D	75-14-114	Steel					M58	BD	73-8-181	M19	73-8-112	8.06	M6	Percu	T33	73-8-74	20-4-359		76-1-555	20-4-218	Fused	9
S & H	A11	75-3-214	Shot	HVAP-T	M304	75-8-375	16.8	.03	Tracer	75-14-573	Steel () Al. Alloy								M19	73-8-112	8.40	M6	Percu	M8A1	73-8-68			76-1-555	20-4-218	Complete	10
S & H	A11	75-3-234	Shot11	Dummy	M233	75-8-369	23.4	1.97	WP	75-14-502	Steel					M57	FD	73-8-138	M19	73-8-112	7.32	M6	Percu	M2A2	73-8-63	20-4-492		76-1-555	20-4-218	Fused	11
																															12
																															13
																															14
S & H	A11	75-3-363	Shot11	TP	M71	75-18-42	23.4	2.04	Inert	75-1-363	Steel	Forg	75-20-92		§	M73 §	Dummy	73-5-11	M19	73-8-112	7.32	M6	Percu	M2A2	73-8-63			76-1-555	20-4-218	Fused	15
S & H	A11	73-3-76	Cartridge	Br111	M2[illegible]		40.04			-	Bronze	Casting	73-3-77			M342	Inert	73-7-89														16
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CP - Concrete Piercing
D - Ammonium Picrate
HE - High Explosive
HVAP-T - Hypervelocity Armor Piercing-Tracer
K - Manufacture
MT - Mechanical Time
PD - Point Detonating
Percu - Percussion
S - Smoke
TNT - Trinitrotoluene
TP - Target Practice
TBQ - Time & Superquick
WP - White Phosphorus

* - This is a smokeless round.
() - Core is made from tungsten carbide.
** - Wt as fired when using PD88, TT, M97, M93, M97 is 23.65 lb.
† - Container, Metal, Ammunition, 90-mm, M15M2, Drg 76-1-672, used only when specially authorized. Not authorized for Shot, HVAP-T, 90-mm, M304.
†† - This is a flashless round.
* - Fuzes, PD, M404 and M514A have .05 and .15 second delay as marked.
** - Some Rounds on hand assembled with Booster, M204A1, Drg No. 73-8-112.
§ - Alternatives:- Fuze, dummy, M442 - Drg 73-5-8
Fuze, PD, M514A, Insert - Drg 73-8-146
(Rejected lots of M404 Fuzes (Inert) may be used.)
§§ - Shipped with Base Plug & Washer, Drg 75-14-575.
* - Primer, Percussion, M72A2B, Alternative for Primer, M2A2. Also, Primer, Percussion, M28B2 may be used.
** - Wt includes complete cartridge.

§ - Booster bodies used with Alternative fuzes:
M204A1 Drg placemark 73-8-111B
M214A Drg placemark 73-8-156B
§§ - M6 Composition with $KClO_4$ used with mechanical time fuze rounds.
† - Fuze, CP, M78, Drg No. 73-8-414 and Booster, M25, Drg No. 73-8-413; Fuze, MT, M97A1, Drg No. 73-7-97, can be used.
†† - Some rounds were loaded with PD88, MT, M345; manufacture of this model (A5) fuze has been discontinued.
* - With Supplementary Charge; Wt of Supplementary Charge - .895 lb.
** - As fired weight with Fuze, MT, M345 or M344 - 23.40 lb. This wt includes supplementary charge.
*** - The following fuzes may be used in this round; supplementary charge in place:
Fuze, PD, M514A
Fuze, TBQ, M553
Fuze, MT, M344
Fuze, CP, M78

ISSUED - 1 January 1940
REVISED - 1 May 1947

Sheet No. 14

Section XVIII

AMMUNITION FOR 155-MM GUNS

260. GENERAL.

a. The 155-mm Guns M1917-17A1-18MI, M1, and M1A1, being chambered alike, fire the same projectiles. The projectiles for these guns are of two general design types, those of earlier design distinguished by two narrow rotating bands, each approximately 0.6 inch wide, and those of current design which have a broad rotating band approximately 2 inches wide. Only those of current design are authorized for use in the 155-mm Guns M1 and M1A1. However, there are certain cases of emergency interchangeability, which may be followed only in accordance with specific regulations permitting same. Although projectiles for the 155-mm guns and the 155-mm howitzers are of the same size and shape, they are readily distinguished by the marking as well as by the rotating bands. The howitzer projectiles have rotating bands 0.6 inch or 1.02 inches wide; the gun projectiles have two bands, 0.6 inch wide, or one band 2 inches wide.

b. **Identification.** The ammunition, including components, for the 155-mm guns, is completely identified by the painting and marking on the items themselves.

c. **Fuzes.** See chapter 3, section I.

d. **Propelling Charges.** The propelling charge for the 155-mm Guns M1 and M1A1 is of the base and increment type, approximately 6½ inches in diameter. This charge should not be confused with the 155-mm gun Propelling Charge M1917-17A1-18MI, which is of approximately the same over-all length, but somewhat smaller in diameter (approx 5¾ in.). The FLASH REDUCER, M1, is for use with the propelling charges for 155-mm guns. It greatly reduces the flash and is primarily intended for night firing (ch. 3, sec. II).

e. **Primers.** See chapter 3, section III.

f. **Interchangeability.**

(1) The H.E. M101 and H.E. Mk. IIIA1 Shell are authorized for emergency use in the 155-mm Guns M1 and M1A1 with the propelling charge intended for the M1917-17A1-18MI Guns (full charge only).

(2) The H.E. Mk. IIIA1 Shell is authorized for emergency use in the 155-mm Guns M1 and M1A1 with the propelling charge standard for these weapons (base section only, or in case of extreme emergency, the full charge).

ARTILLERY AMMUNITION

261. COMPLETE ROUND TABLE.

a. Data concerning complete rounds for 155-mm Guns M1917-17A1, 18MI, M1, and M1A1, are given in table 24, chapter 5.

262. PACKING AND SHIPPING DATA.

a. Packing and shipping data concerning 155-mm gun rounds are given in ORD 11 SNL's P-1, P-2, and P-8.

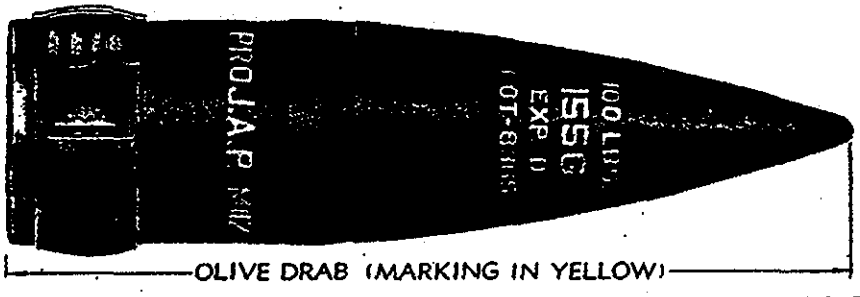

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Figure 134 — PROJECTILE, A.P., 100-lb., M112, w/FUZE, B.D., M60, 155-mm Guns, M1917-17A1-18MI, M1, and M1A1

263. PROJECTILE, A.P., 100-LB., M112, W/FUZE, B.D., M60, 155-MM GUNS, M1917-17A1-18MI, M1, AND M1A1 (fig. 134), is intended for use against armored targets, concrete emplacements, and similar targets. It consists of a hardened steel body which contains a cavity in the base filled with explosive D, a base-detonating fuze with delay action, and a ballistic cap or windshield. A base cover is fitted over the fuze in the base of the projectile.

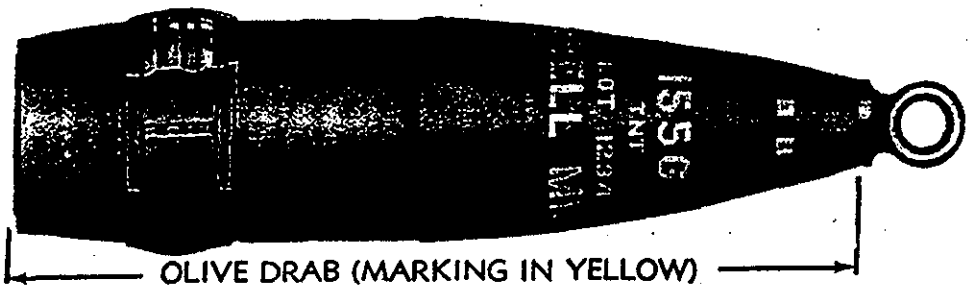
DATA

Length of projectile	23.62 in.
Width of rotating band	2.00 in.
Type of base	Square
Radius of ogive	10.70 cal.
Muzzle velocity (supercharge)	2,740*; 2,360 ft per sec†
Maximum range, supercharge	24,075*; 19,200 yd†
Penetration (in. at 0-deg obliquity of homogeneous plate at 1,000 yd)	7.5*
Penetration (in. of reinforced concrete at 1,000 yd)	60

*—In M1 and M1A1 Guns.
†—In M1917-17A1-18 MI Guns.

264. SHELL, H.E., M101, UNFUZED, 155-MM GUNS, M1917-17A1-18MI, M1, AND M1A1 (fig. 135), was developed from the Mk. IIIA1 Shell described in paragraph 265, differing chiefly in that it has a single wide rotating band, and the angle of taper of the boat-tailed base is 0.5 degree greater. The rear of the rotating band is located approximately 3.48 inches forward of the base. The shell is adapted for either the P.D. M51 Fuze and modifications, or the M67 Mechanical Time Fuze and modifications.

FIXED AND SEMIFIXED ROUNDS AND SEPARATE-LOADING PROJECTILES



RA PD 80812

Figure 135 — SHELL, H.E., M101, Unfuzed, 155-mm Guns, M1917-17A1-18MI, M1, and M1A1 (Early Type Grommet Fastening Shown)

DATA

Length of projectile*..... 26.88 in.
Width of rotating band..... 2.00 in.
Type of base ..... Boat-tailed
Degree of taper..... 8.5 deg
Radius of ogive..... 10.75 cal.
Muzzle velocity:
Maximum charge, M1 and M1A1 Guns ..... 2,800 ft per sec
Maximum charge, M1917-17A1-18 Guns .... 2,410 ft per sec
Maximum range:
M1A1 Gun (at 46 deg 49 min) ..... 25,715 yd
M1917-17A1-18 Guns (at 35 deg 24 min)..... 20,100 yd

*—With eyebolt-lifting plug.

RA PD 80813

Figure 136 — SHELL, H.E., Mk. IIIA1, Unfuzed, 155-mm Guns, M1917-17A1-18MI

265. SHELL, H.E., MK. IIIA1, UNFUZED, 155-MM GUNS, M1917-17A1-18MI (fig. 136), being of earlier design than projectiles for 155-mm Guns M1 and M1A1, is distinguished by two narrow rotating bands. It is a modification of the earlier Mk. III Projectile, the nose being adapted to the new type fuzes. This modification of ogive and use of a standard contour fuze improve the ballistic characteristics.

DATA

Length of projectile*..... 26.88 in.
Width of rotating bands (two each) ..... 0.59 in.
Type of base.....8 deg—boat-tailed
Radius of ogive ..... 10.75 cal.
Muzzle velocity, supercharge ..... 2,410*; 2,800 ft per sec††
Maximum range, supercharge:
(35 deg 22 min)..... 19,100 yd†
(35 deg) ..... 22,450 yd††

*—With eyebolt-lifting plug. †—In M1917-17A1-18MI Guns. ††—In M1 and M1A1 Guns.

TABLE 24

COMPLETE ROUND TABLE FOR AMMUNITION FOR 155-MM GUNS, M1917-17A1-18MI, M1, AND M1A1

(This table is not to be confused with official Complete Round Charts, Form No. 5981.)

Note References	Designation of Cannon	PROJECTILE						FUZE		Booster, Adapter-Booster, or Burster	PROPELLING CHARGE		PRIMER^	
		Kind	Type	Model	Filler		Weight as Fired (Lb.)	Type and Model	Action		Kind§	Weight (Lb.)	Model	Type
					Kind	Weight (Lb.)								
					Service Ammunition									
—	All models	PROJECTILE	A.P.	M112	Exp. D	1.44	100.00	B.D., M60	Del	—	M1917-18, M1 and M1A1*	26.17	Mk. IIA4	17-gr. perc.
—	All models	PROJECTILE	A.P.	M112	Exp. D	1.44	100.00	B.D., M60	Del	—	M1 and M1A1	32.23	Mk. IIA4	17-gr. perc.
—	All models	SHELL	H.E.	Mk. IIIA1	TNT	15.21	96.08	P.D., M51A4*	SQ or Del	M21A4	M1917-18, M1 and M1A1*	26.17	Mk. IIA4	17-gr. perc.
—	All models	SHELL	H.E.	Mk. IIIA1	TNT	15.21	96.08	P.D., M51A4*	SQ or Del	M21A4	M1 and M1A1#	32.23	Mk. IIA4	17-gr. perc
—	All models	SHELL	H.E.	Mk. IIIA1	TNT	15.21	96.08	M67A4†	M.T.	M21A4	M1917-18, M1 and M1A1*	26.17	Mk. IIA4	17-gr. perc.
—	All models	SHELL	H.E.	Mk. IIIA1	TNT	15.21	96.08	M67A4†	M.T.	M21A4	M1 and M1A1#	32.23	Mk. IIA4	17-gr. perc.
—	All models	SHELL	H.E.	M101	TNT	15.56	94.69	P.D., M51A4*	SQ or Del	M21A4	M1917-18, M1 and M1A1*	26.17	Mk. IIA4	17-gr. perc.
—	All models	SHELL	H.E.	M101	TNT	15.56	94.69	P.D., M51A4*	SQ or Del	M21A4	M1 and M1A1	32.23	Mk.IIA4	17-gr. perc.
—	All models	SHELL	H.E.	M101	TNT	15.56	94.69	M67A4†	M.T.	M21A4	M1917-18, M1 and M1A1*	26.17	Mk. IIA4	17-gr. perc.
—	All models	SHELL	H.E.	M101	TNT	15.56	94.69	M67A4†	M.T.	M21A4	M1 and M1A1	32.23	Mk. IIA4	17-gr. perc.
—	All models	SHELL	GAS	M104	H	11.70	94.42	P.D., M51A4*	SQ or Del	M6	M1917-18, M1 and M1A1*	26.17	Mk. IIA4	17-gr. perc.
—	All models	SHELL	GAS	M104	H	11.70	94.42	P.D., M51A4*	SQ or Del	M6	M1 and M1A1	32.23	Mk. IIA4	17-gr. perc.
—	All models	SHELL	SMOKE	M104	FS	16.90	99.71	P.D., M51A4*	SQ or Del	M6	M1917-18, M1 and M1A1*	26.17	Mk. IIA4	17-gr. perc.
—	All models	SHELL	SMOKE	M104	FS	16.90	99.71	P.D., M51A4*	SQ or Del	M6	M1 and M1A1	32.23	Mk. IIA4	17-gr. perc.
—	All models	SHELL	SMOKE	M104	WP	15.60	98.42	P.D., M51A4*	SQ or Del	M6	M1917-18, M1 and M1A1*	26.17	Mk. IIA4	17-gr. perc.
—	All models	SHELL	SMOKE	M104	WP	15.60	98.42	P.D., M51A4*	SQ or Del	M6	M1 and M1A1	32.23	Mk. IIA4	17-gr. perc.

of wood, filling the hole with lead, and inserting it in the base of the cartridge bag. The dummy igniter is also made of cotton duck, is filled with gravel, and dyed red. The igniter, base charge, and increment are each appropriately stenciled with the word "Dummy."

Igniter pad and protector. The igniter pad attached to the M7 Charge and the base of the M8 Charge is filled with approximately 5 ounces of Grade A-1 Army black powder. It can be distinguished from the rest of the charge by its red color and stenciling. To protect the igniter cap during handling and shipment, a protector cap made either of cloth or of paper and containing a felt pad in its base is used. It is secured to the base of the propelling charge by a draw string.

Primer. Mk. II or Mk. IIA 21-grain Percussion Primer is used to ignite the propelling charge (see page 509 for description). Mk. IIA1 Primer is restricted to use in 155-mm howitzers. All of these primers are standard for issue only. A new Primer, Mk. IIA3, 18-grain Percussion, is listed in SNL R-3; however, no information on this primer is available at this time.

Packing for Shipment and Storage. The components of a complete round of SHELL, H.E., M65, are prepared for shipment and storage as follows:

The projectile is shipped with eyebolt lifting plug to protect the fuze cavity and facilitate handling, and rope grommet protecting the rotating band from damage. The grommets are removed and the shell are stacked on their sides in storage.

The propelling charges are packed one per fiber container, three containers (three charges) per bundle. These bundles are crated for export shipment. The charges remain crated during storage, in emergency, to facilitate immediate shipment. In peacetime, the crates are removed when the charges are stored.

Fuzes and boosters are assembled together for shipment and storage. They are packed 1 fuze and booster per fiber container, 25 containers (25 fuzes and boosters) per box.

The primers are packed 50 primers per metal container, 48 containers (2,400 primers) per box.

FURTHER REFERENCES: SNL R-2 and R-3; Ordnance Drawings; OS 9-20; Complete Round Chart No. 5981.

Chapter 13

Ammunition for 155-mm Guns and Howitzers

GENERAL.

Weapons. The 155-mm weapons were developed during World War I. They are classed as mobile field artillery and their function is

to provide the fire power necessary to support other ground forces in combat. The 155-mm gun has been the standard heavy mobile artillery weapon of the United States Army since the first World War. It is a much more powerful weapon than the howitzer, having a greater muzzle velocity and range. The M1917-17A-18MI Guns fire the M101 H.E. Shell at a muzzle velocity of 2,410 feet per second to a maximum range of 20,100 yards, or approximately 11.5 miles. The new Guns M1 and M1A1 are still more powerful, firing the same projectile at a muzzle velocity of 2,800 feet per second to a maximum range of 25,400 yards, or about 14.5 miles. The 155-mm gun has been of great service in World War II, mounted on a tank chassis and being used as a tank destroyer.

The howitzers have shorter barrels and smaller powder chambers than the guns. Their purpose is to fire at intermediate ranges between the 155-mm gun and lighter artillery. The old M1917-17A1-18 Howitzer weapons fire the M102 H.E. Shell at a muzzle velocity of 1,476 feet per second to a maximum range of 12,775 yards with a full propelling charge. The new M1 Howitzer, fully charged, fires the M107 H.E. Shell at a muzzle velocity of 1,850 feet per second to a maximum range of 16,000 yards. The 155-mm howitzer was originally a French weapon, and most of the ammunition for the old 155-mm weapons was patterned from French designs.

Class. All 155-mm ammunition is of the separate loading class, meaning that it is loaded into the gun or howitzer in more than one operation. The general procedure for loading weapons with such ammunition is as follows:

The projectile is inserted into a weapon in such a manner that the rotating band fits tightly into the forcing cone of the bore of the weapon.

The propelling charge is placed in the powder chamber so that the igniter pad will take the flame from the primer. In larger guns, such as 14-inch, the propelling charge is divided into separate sections of a size that requires loading into the weapon one at a time. In this case, the placing of the propelling charge requires several operations.

The primer is finally inserted into the breech mechanism.

Types of Ammunition.

For 155-mm guns. The following types of ammunition are used in the guns:

Type	Filler
Low-explosive (shrapnel)	Black powder and lead balls in resinous material
High-explosive	TNT or substitutes
Practice	Sand
Chemical	H, FS, WP
Armor-piercing	Explosive D
Dummy	None

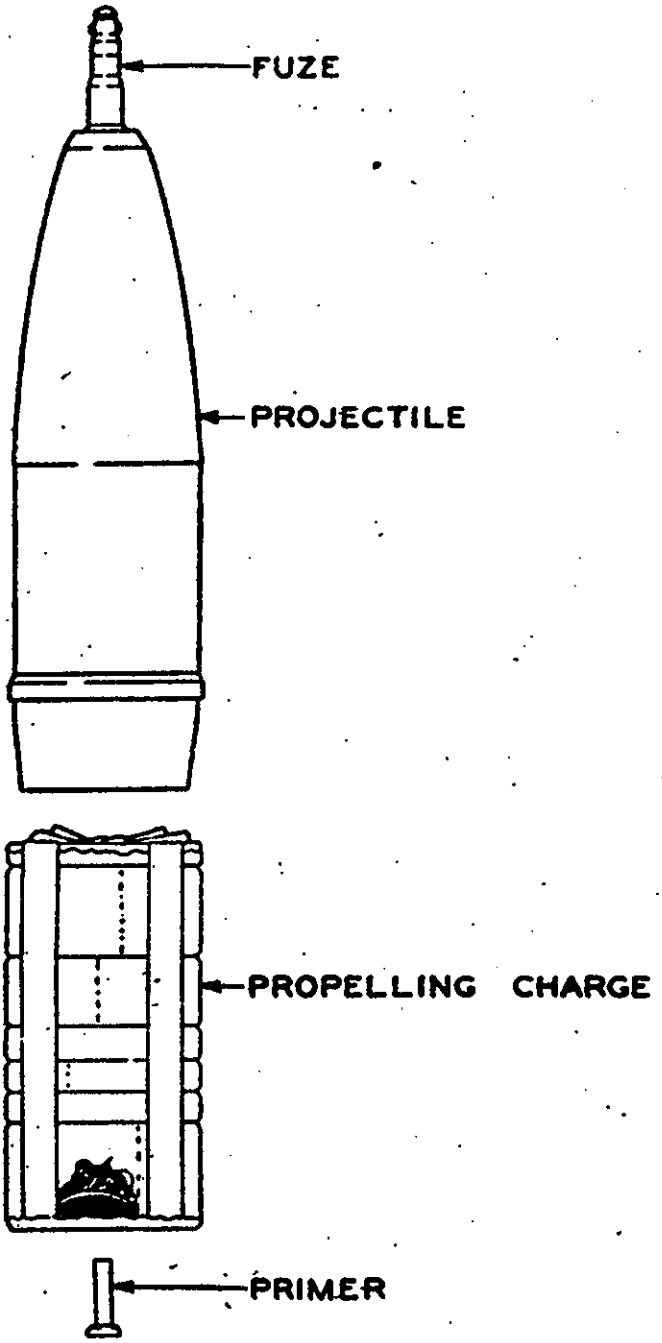


Figure 194 — Complete Round, Separate-loading Ammunition (155-mm Howitzer Shell)

For 155-mm howitzers. The same types of ammunition as those provided for guns are used in the howitzers, with the exceptions that HC and FM are added to the chemical fillers and that the armor-piercing round is omitted. The lower muzzle velocity of the howitzer as compared to the gun makes it unsatisfactory for armor-piercing work.

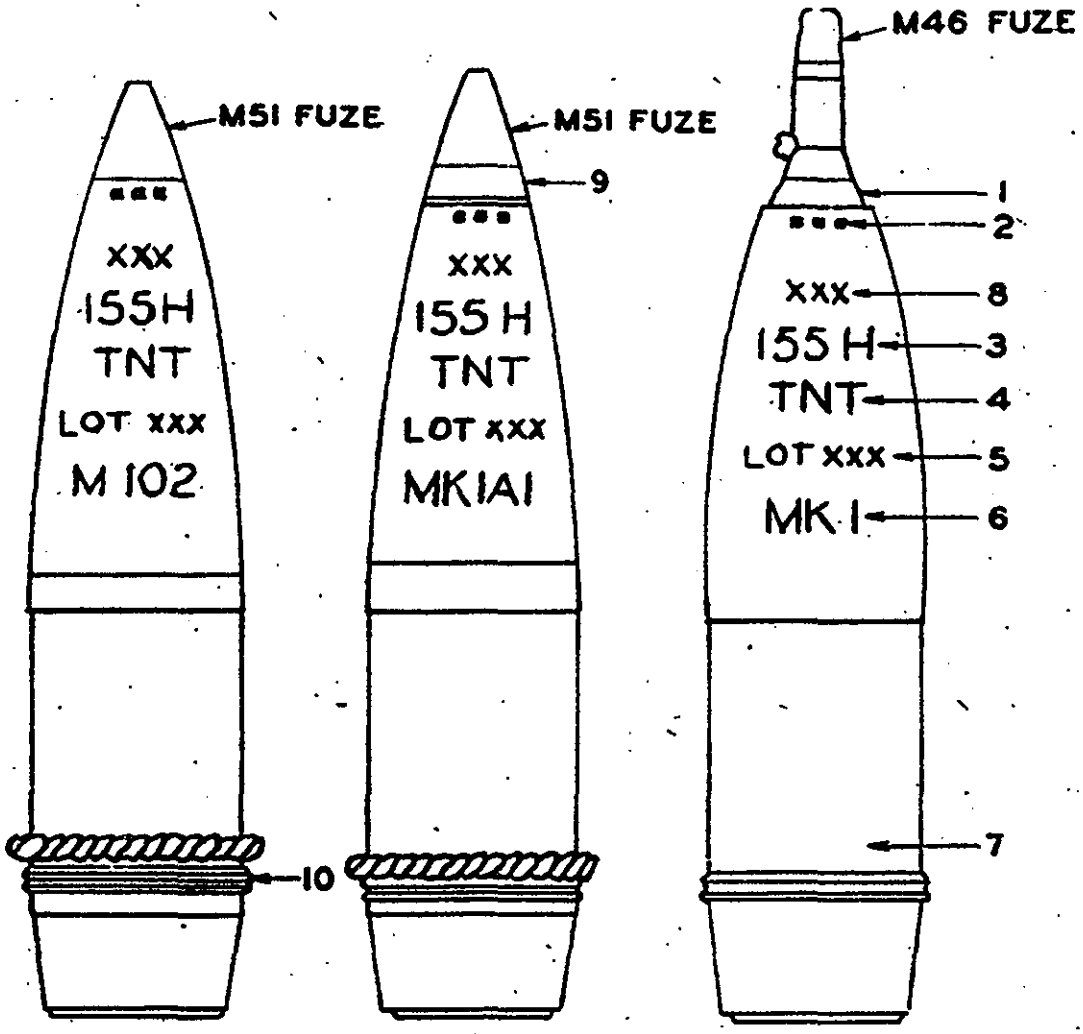
PROJECTILES.

Body. The bodies of all 155-mm projectiles except the dummy, armor-piercing, and base ejection are very similar in construction. They all have a radius of ogive of approximately 65 inches or 10 calibers, range from 22.84 inches to 23.80 inches in length, have tapered bases, are manufactured from forged steel, and are hollowed out to nearly their entire length to receive a filler of some type. The AP dummy and base ejection projectiles will be discussed under complete rounds since their construction is peculiar to the type.

Rotating Bands. The recesses for rotating bands machined into the bodies of the 155-mm projectiles vary in size depending on the weapon in which the projectile is used. The width of the rotating band varies directly as the power of the weapon. As the propelling charge gets larger, the rotating band must be wider to act as a gas check at the increased pressures. The Mk. and modified Mk. series gun shell have two rotating bands, each 0.602 inch in width and separated by a space of 0.5625 inch. These rotating bands are sufficient for the old M1917-17A1-18MI Guns, but do not suffice for the new M1 and M1A1 Guns. Therefore, Mk. and modified Mk. series gun shell cannot be used in the M1 and M1A1 weapons. The M-series gun projectiles are provided with a single rotating band 2.02 inches wide. The 2.02-inch rotating band is sufficient to withstand the pressure in both old and new guns so the M-series projectiles are interchangeable. Rotating bands for both gun and howitzer are made of gilding metal.

Mk., modified Mk., and M-series projectiles for the M1917-17A1-18 Howitzers have single rotating bands 0.602 inch in width. It is in the same position on the shell as the back rotating band on the Mk. and modified Mk. series gun shell which is of the same width. For this reason, Mk. and modified Mk. series shell for the old guns may be modified to old howitzers by simply trimming the front rotating band down even with the shell body. The new M1 Howitzer is much more powerful than the old howitzer, so a wider rotating band (1.02 inches) is required. The 0.602-inch band is not sufficient to withstand the pressures developed in the M1 weapon. On the other hand, the 1.02-inch band does not produce the desired ballistics in the M1917-17A1-18 Howitzer. Consequently, rounds for the old and new howitzers are not interchangeable.

AMMUNITION INSPECTION GUIDE



1. ADAPTER BOOSTER
2. WEIGHT ZONE MARKS
3. CALIBER AND TYPE OF CANNON
4. FILLER
5. LOT NUMBER OF FILLED SHELL
6. MK OR M NUMBER
7. MANUFACTURERS MARKINGS (STAMPED UNDER PAINT)
8. MEAN OR NORMAL WEIGHT OF SHELL (UNFUZED)
9. ADAPTER—TAKES NEW BOOSTERS
10. WIDER ROTATING BAND

RA PD 22977

Figure 195 — Marking and Comparison of Old and New 155-mm Explosive Shell

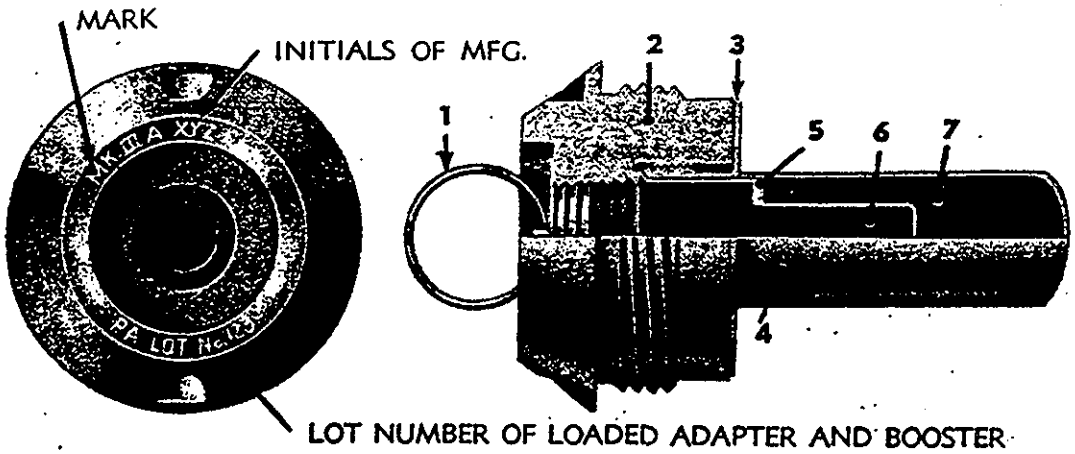
It should be understood that 155-mm shell are not to be interchanged except in the cases specified. Such interchange is certain to result in faulty ballistics, and may even be dangerous. For example, if an attempt is made to use a Mk. series gun shell in the howitzer, the front rotating band on the gun shell, being positioned farther forward than the rotating band of the howitzer, will engage the forcing cone so as to leave the base of the projectile protruding too far into the powder chamber. The space in the powder chamber will consequently be reduced, and when the howitzer is fired, the pressures built up in the decreased space may be sufficient to burst the weapon. Vice versa, if the howitzer shell were substituted for the gun, the rotating band, being positioned nearer the base would result in increased chamber space, reduce the pressure from the propellant and decrease the range.

Nose Fittings. The old Mk. series high-explosive and chemical shell are threaded in the nose to take adapter boosters. However, the nose of the Mk. series chemical shell is fitted with tapered pipe threads instead of standard threads in order to form a gastight seal when the adapter booster is screwed into place. These adapter boosters take the old M46 and M47 Fuzes. The modified Mk. and M-series H.E. shell are threaded in the nose to take the new M21 and M21A1 Boosters directly. The modified Mk. and M-series chemical shell are fitted with an adapter which is screwed into the nose threads and brazed with silver to form a gastight seal. An opening in the bottom of the adapter provides for press-fitting the burster casing. This adapter will receive the M21 or M21A1 Booster. In addition to the fittings just described for the modified Mk. and M-series chemical and H.E. shell, there is provided a bakelite fuze well cup which screws into the nose or adapter threads, as the case may be, and is cemented in place with N.R.C. compound.

Filler Cavities. A variation in the method of manufacture of the new M-series H.E. and chemical shell leaves filler cavities of some with flat bottoms and others with hemispherical bottoms. The shell with flat cavity bottoms are designated with just plain model numbers; for example, M101, while those with hemispherical cavity bottoms are given a B1 designation, example M101B1. In addition, both the modified Mk. and M-series chemical shell have a recess machined into the base to receive the burster well and hold it in place.

ADAPTER BOOSTERS AND BOOSTERS.

Adapter Booster Mk. IIIA. The Mk. IIIA is used in the Mk. series H.E. shell for both 155-mm gun and howitzer. It is made up of an adapter, a booster casing, and a fuze socket. The booster casing is threaded into the lower part of the adapter and contains a charge of either 1 ounce of tetryl or 0.50 ounce of tetryl and 0.50 ounce of



1 — ADAPTER PLUG
2 — ADAPTER
3 — FELT WASHER
4 — BOOSTER CASING
5 — FELT WASHER
6 — FUZE SOCKET
7 — BOOSTER CHARGE, (TETRYL)

RA PD 22978

Figure 196 — Adapter Booster Mk. IIIA

TNT, the tetryl being placed around the fuze socket. The fuze socket is press-fit into the booster casing and is of a shape to receive the M46 Fuze. The adapter is threaded internally at the top to take the external threads of the M46 Fuze.

Adapter Booster Mk. IIIAMI. The M1 modification of the Mk. IIIA consisted of beveling the inside shoulder at the top of the adapter so that the Mk. III Fuze would screw in entirely. (The Mk. III Fuze was replaced by the M46.) The interruptor of the Mk. III Fuze was situated so as to contact the shoulder of the Mk. IIIA Adapter before the fuze was screwed all the way in.

Adapter Booster Mk. IIIAM2. The only difference between Adapter Boosters Mk. IIIAMI and Mk. IIIAM2 is that the shoulder of the Mk. IIIA Adapter was beveled in the field to become Mk. IIIAMI while the manufacture of the Mk. IIIAM2 included the beveled shoulder.

Booster M21. This booster is used in modified Mk. and M-series H.E. and chemical projectiles for 155-mm guns and howitzers. It is identical with Booster M20 used in 75-mm ammunition, except that the centrifugal pin lock pin is omitted, and a spring is placed behind the centrifugal pin. This change was necessary because the set-back action of the larger caliber weapons when fired in the lower zones of fire was not sufficient to cause the lock pin to release the centrifugal pin.

Booster M21A1. The A1 modification of the M21 Booster was the enlargement of the diameter of the flash hole from 0.125 to 0.25

inch. It was found that, with the smaller flash hole, the M21 Booster and the fuze assembled to it did not aline themselves perfectly.

Adapter Booster Mk. VIB. This booster is used with the old Mk. series chemical shell for 155-mm guns and howitzers. It is commonly called an adapter burster because its function is to burst the shell body and release the chemical filler. The Mk. VIB consists of an adapter and exterior booster casing made in one piece, an interior booster casing and a fuze socket. The exterior booster casing is threaded externally with tapered pipe threads to form a gastight seal when screwed into the nose of the projectile. This outside booster contains the main booster charge of 9 ounces of TNT. The main charge is detonated by the interior booster which fits inside the main charge and contains 1 ounce of tetryl. The fuze socket fits into the adapter and extends into the inner booster. It seats the M46 Fuze. The adapter booster is protected against injury to the threads and the entrance of foreign substances by an adapter plug.

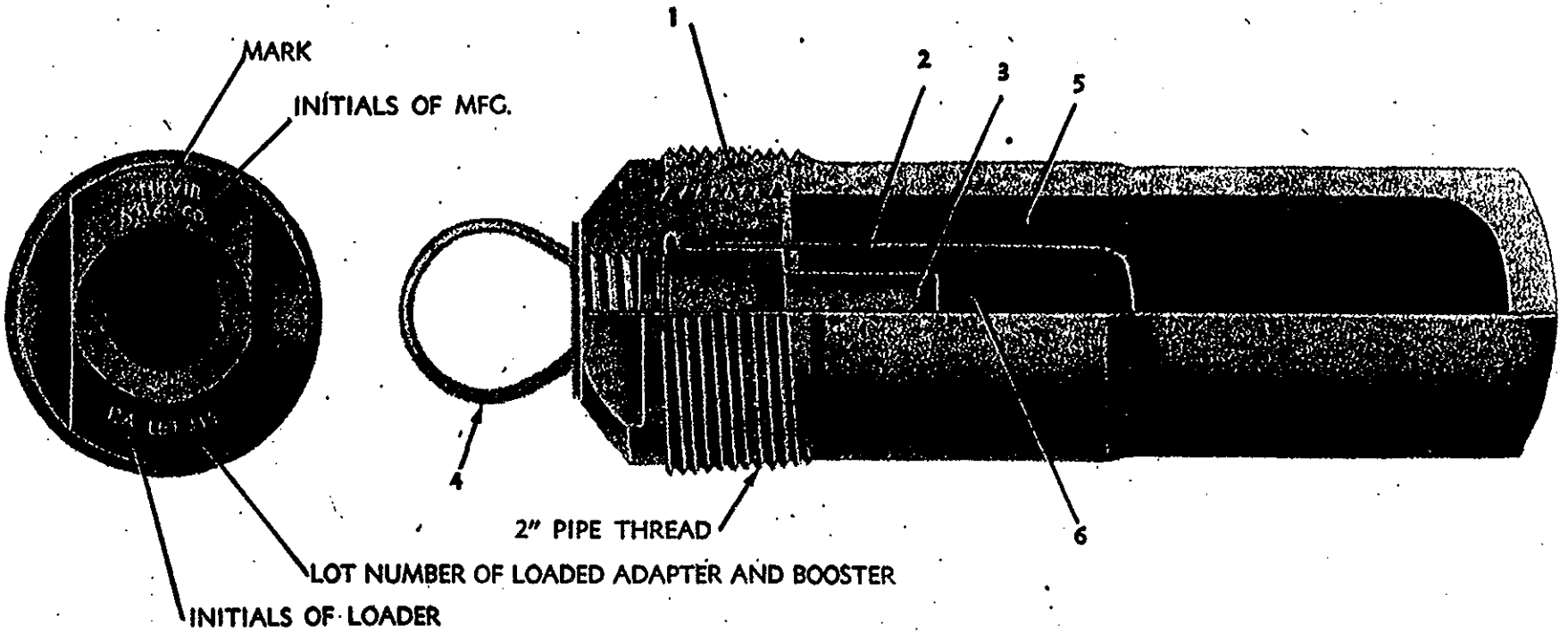
Burster M6. The Burster M6 is used in conjunction with the Burster Casing M1. It is used in all modified Mk. and M-series chemical shell for 155-mm weapons. The Casing M1 is press-fit into the nose adapter and extends the full length of the chemical shell. It fits into a recess in the bottom of the filler cavity which prevents any movement of the burster. The Burster M6 is made up of 2,550 grains of tetryl in the form of 45 pellets contained in an aluminum alloy tube. The tube is 20.45 inches long, 0.745 inch in diameter, and 0.061 inch thick.

FUZES.

FUZE, P.D., M46. This fuze is used on Mk. series 155-mm H.E. and chemical shell. The M46 with explosives removed is also used in sand-loaded shell for practice firing. Its instantaneous action is required in the case of the chemical shell for above-ground bursting. The description and function of the M46 Fuze were previously discussed in the chapter on 75-mm ammunition.

FUZE, P.D., M47. This fuze is of the old type and has a delay of 0.05 second; therefore, it is used on high-explosive, Mk. series, 155-mm shell where the 0.05-second delay is desired. The inert M47 Fuze is also used on sand-loaded practice shell. The description and function of the M47 may be found in the chapter on 75-mm ammunition.

FUZE, P.D., M54. The M54 Combination Time and Superquick Fuze is used without a booster to ignite the black powder charge in base-ejection shell. Such shell are issued for both old and new 155-mm howitzers. The M54 Fuze is discussed in the chapter on 75-mm ammunition.



1 — EXTERIOR BOOSTER CASING
2 — INTERIOR BOOSTER CASING
3 — FUZE SOCKET
4 — ADAPTER PLUG
5 — BOOSTER CHARGE (TNT)
6 — AUXILIARY OR INTERIOR BOOSTER CHARGE (TETRYL)

RA PD 22979

Figure 197 — Adapter Booster Mk. VIB

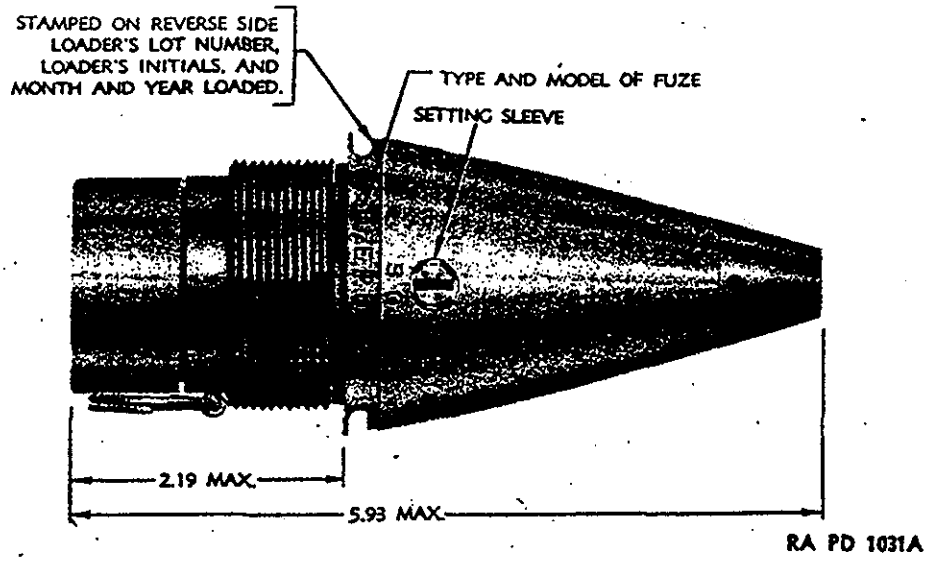


Figure 198 — FUZE, P.D., M51A1, w/BOOSTER M21A1

FUZE, P.D., M51. FUZE, M51, with BOOSTER, M21, is "Limited Standard" since it is superseded by the M51A1. It is used with all modified Mk. series and M-series, 155-mm, high-explosive and chemical shell except base ejection. It is identical with FUZE, P.D., M48, as discussed with 75-mm ammunition, except for the addition of an arming fork in the plunger assembly. The rotational velocity of major caliber projectiles is not sufficient, throughout their flight, to keep the plunger arming pins of the M48 Fuze in the receded position. As rotational velocity decreases the arming pins are forced, by their springs, back into the unarmed position sustaining the plunger support and thus prevent the primer from being driven onto the firing pin. To prevent this action a light, centrifugally weighted arming fork is pivoted in such a position as to swing its prongs between the arming pins when centrifugal force comes into play. The springs of the arming pins tend to push them back into place so that, as centrifugal force decreases, the pins contact the prongs of the fork and, while being held apart themselves, help to keep the fork in the armed position. There is enough room between the prongs of the fork for the plunger support to pass. The addition of the arming fork and use with the M21 instead of the M20 Booster resulted in changing the fuze nomenclature from M48 to M51.

FUZE, P.D., M51A1. When the M21 was changed to the M21A1 Booster, the A1 designation was also added to the fuze since the fuze and booster are shipped assembled to each other.

FUZES, Time and Superquick, M55 and M55A1. FUZE, time and superquick, M54, when assembled to the M21 Booster is designated M55. When the same fuze is assembled to the M21A1 it is designated M55A1. Fuzes M55 and M55A1 are used on modified

Mk. and M-series high-explosive shell for M1917-17A1-18 Howitzers. For description and function, see **FUZE**, time and superquick, M54, in the chapter on 75-mm gun ammunition.

FUZE, B.D., M60. This fuze is used in the armor-piercing round for 155-mm guns. The function and explosive train of the M60 are the same as those of the Mk. X, B.D. Fuze used in 14-inch ammunition (see description and illustration of Mk. X in chapter on 14-inch ammunition); the only difference in the two fuzes is in the body. The M60 has fewer threads for screwing into the projectile, and the diameter of the threads is greater than those of the Mk. X. The M60 body also has a flange for fitting over the base of the projectile which is omitted on the Mk. X.

Description. The M60 Fuze has a heavy steel body with a zinc plate as a rust-preventive. There is a cavity in the base into which is inserted the rotor assembly, the primer and delay assembly, the restraining spring, the plunger assembly, and a base plug, in the order given. The rotor assembly includes a brass rotor, a rotor charge of mercury fulminate and tetryl, a rotor lock pin, and a rotor lock pin lock. The primer and delay assembly fits in behind the rotor and contains a variable delay or no delay, and a percussion primer. The delay and primer holder is brass and has a sleeve extending rearward into which the restraining spring and plunger assembly fits. The plunger assembly consists of a sleeve, a plunger body, a firing pin, a pivot pin, and centrifugal pins backed up by springs. The firing pin is eccentrically weighted. Its point, in the unarmed position, is inside the plunger assembly. Two centrifugal pins, the heads of which engage recesses in the firing pin, hold it in the unarmed position. The sleeve fits around the plunger body and holds th ecentrifugal pins and their springs in place. The sleeve is held in position by a small pin. A heavy base plug screws into the fuze body behind the plunger assembly.

A cavity in the upper part of the fuze body is connected with a small hole to the rotor cavity. A lead charge of tetryl is pressed into this hole. A booster pellet of 278 grains of tetryl is pressed in over the lead charge. The upper cavity is closed with a hollow closing screw containing another booster pellet of 170 grains of tetryl. Centrifugal pins backed up by springs are inserted through diametrically opposed holes in the fuze body and are held in place by retaining screws. These pins are for the purpose of holding the rotor in the unarmed position. One of the rotor centrifugal pins is at an angle of 30 degrees. A small hole in the side of the slider cavity is backed up by a pin inserted through the side of the body and soldered in place. A rotor stop pin is also inserted through the fuze body and soldered in place.

Function. The function of the M60 Fuze begins with centrifugal force when the projectile leaves the bore of the weapon. The

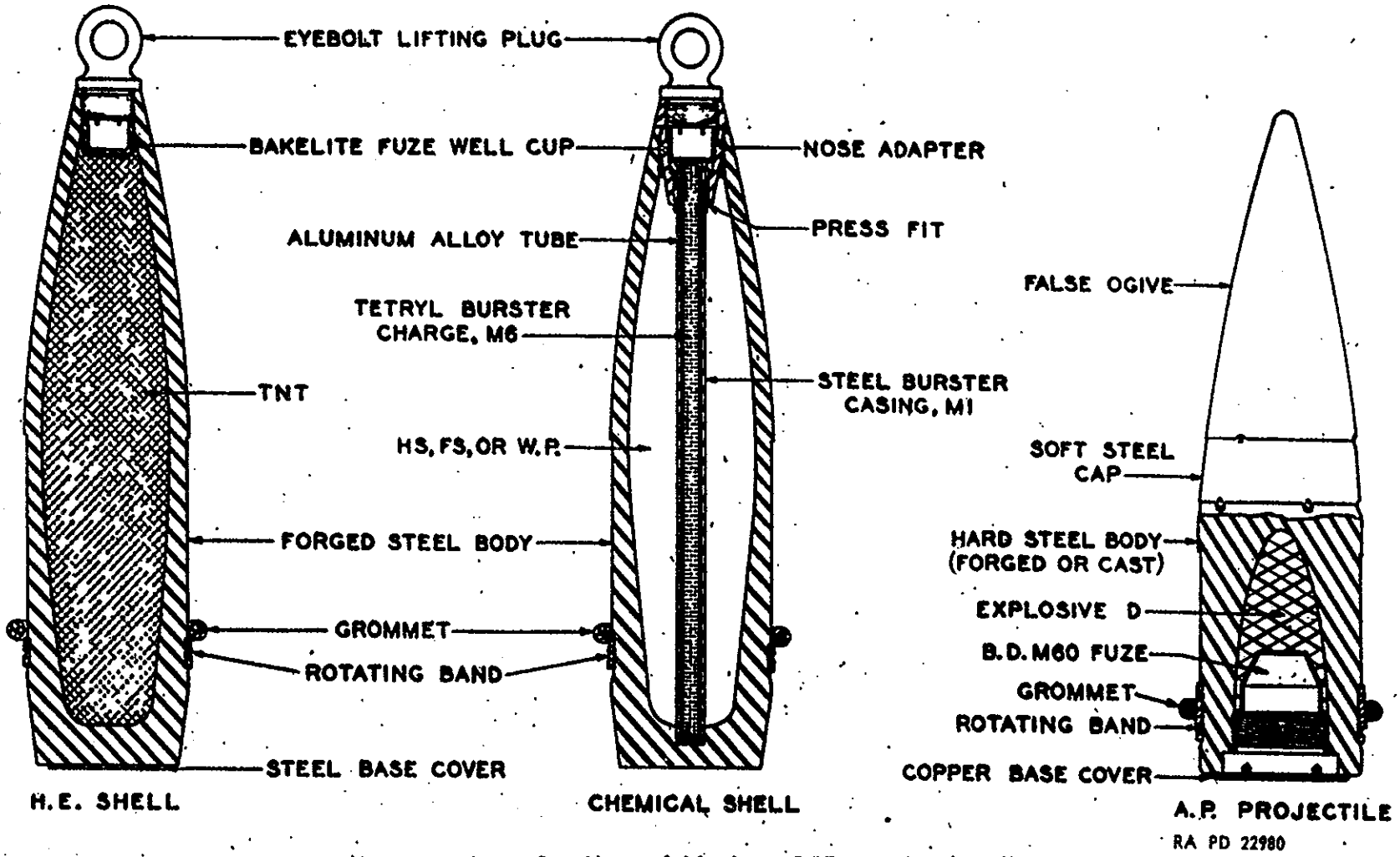


Figure 199 — Section of Modern 155-mm Projectiles

centrifugal pins holding the firing pin in place move outward against their springs. The eccentrically weighted firing pin, now being free, swings on its pivot to an upright position with the point protruding from the plunger assembly and in line with the primer. While these actions are taking place, the centrifugal pins in the upper part of the fuze spread against their springs and leave the rotor free to move. The rotor, being weighted off center, swings around its pivot until it contacts the rotor stop. At this instant the rotor lock pin, also acted upon by centrifugal force, moves partially outward into the recess in the fuze body and thus locks the rotor securely in place. The rotor lock pin lock, due to air retardation or "creep" in the projectile, moves in behind the rotor lock pin providing additional insurance that the rotor will remain armed. In this armed position the rotor detonator is in line with the rest of the explosive train.

On impact, the plunger compresses the restraining spring and carries the firing pin into the primer. The flash from the primer either ignites a variable delay of black powder or flashes through the hole to the detonator if no delay is present. The explosion of the mercury fulminate in the detonator, which is detonated by the primer flash or the burning delay, initiates the remainder of the explosive train of tetryl detonator pellet, tetryl lead charge, booster of tetryl, and shell bursting charge of explosive D.

FUZE, Time, Mechanical, M67. This time fuze is used on modified Mk. and M-series 155-mm projectiles when a time setting rather than impact with the target is desired. The action of the fuze is similar to the M43 with its modifications (see M43 Fuze, in chapter on 3-inch AA ammunition). The fundamental differences are as follows:

The centrifugal gears in the M67 are spring-driven and will, therefore, complete their part of the function without the aid of centrifugal force.

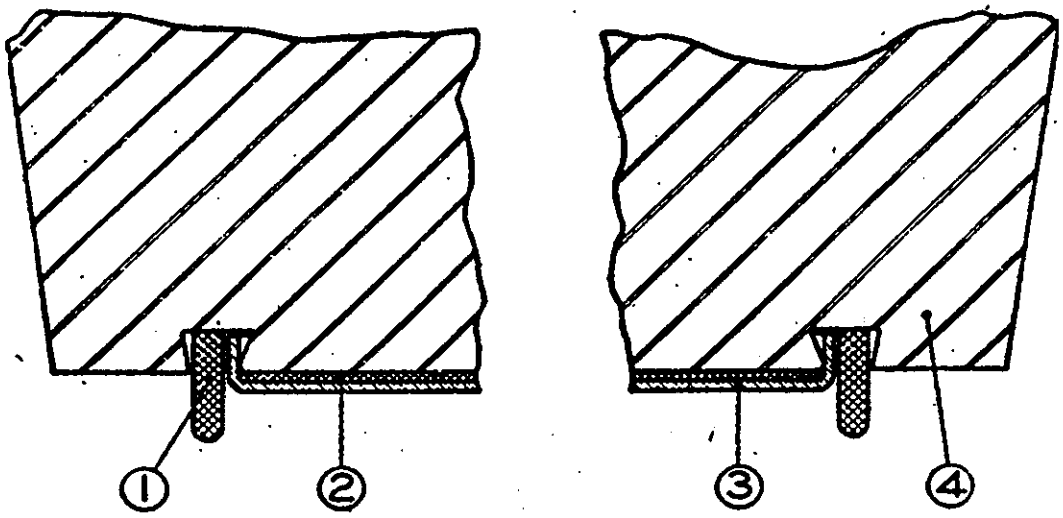
The escapement is so controlled that the time setting is from 0 to 75 seconds.

The escapement lever is released by a centrifugal plate which is backed up by the set-back pin. This is an added safety precaution against the accidental functioning of the fuze before it is fired from the weapon.

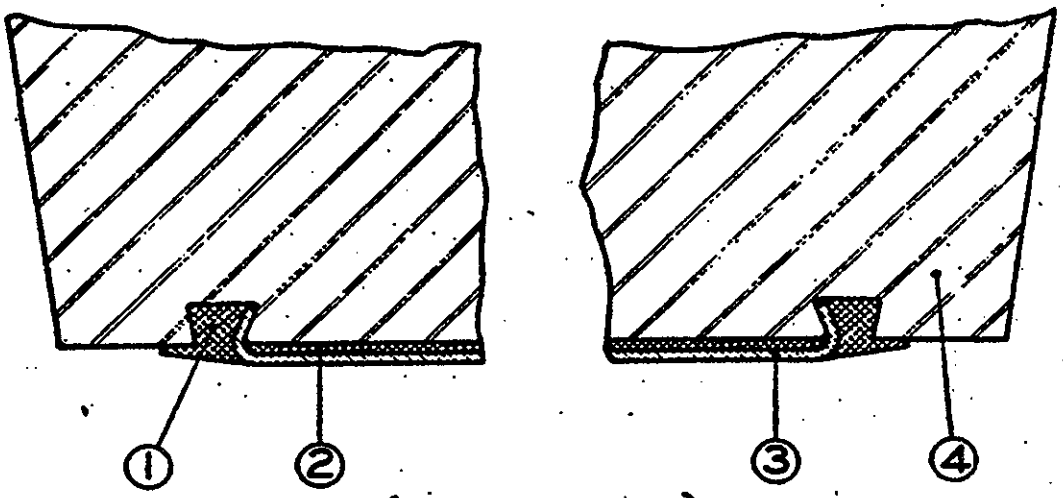
A safety pin is added under the set-back pin to insure its staying in position during handling, shipment, and storage.

BASE COVERS.

Two types of base covers may be found on 155-mm, H.E. shell. The old type of cover consists of a lead disc, a copper cover, and lead calking wire. The copper cover, with lead disc inside, fits into a groove machined into the base of the projectile and is secured by calking the lead wire into the remaining space in the groove. The new type con-



(BEFORE ASSEMBLY)



(AFTER ASSEMBLY)

1. LEAD CALKING WIRE
2. LEAD DISK
3. COPPER CUP
4. BASE OF SHELL

RA PD 22981

Figure 200 — Base Cover

sists of a thin steel cover, 0.031 inch (22 U.S.Ga.) in thickness, secured to the base with either a continuous overlapping spot weld or a seam weld around the entire edge of the cover.

The Mk. and modified Mk.-series H.E. projectiles in the field will be found with old type copper base covers. The Armor-piercing Projectile M112 also uses this cover after the M60 B.D. Fuze is inserted. M-series H.E. projectiles will usually be found with the new steel cover; however, the copper cover is an alternative in manufacture.

PAINTING AND MARKING.

The regular Army system of painting and marking is followed with 155-mm projectiles. The listing below shows painting and marking as to type:

Type	Painting and Marking
Low-explosive	Red with black stencil
High-explosive	Olive drab with yellow stencil
Practice	Blue with white stencil
Chemical	Blue gray with appropriate stencil and bands
Armor-piercing	Olive drab with yellow stencil
Dummy	Unpainted or black

WEIGHT ZONING.

All 155-mm H.E. and chemical projectiles are weight-zoned. The weights of the chemical projectiles, loaded and unfuzed, vary from 90.1 pounds to 100 pounds. High-explosive shell, loaded and unfuzed, vary in weight from 89 pounds to 95.6 pounds. Obviously, so much variation in weight would result in considerable variation in range. In order that the service may conveniently note these differences in weight, the shell are divided into 10 weight zones. Each particular lot number of ammunition contains only shell of one weight zone. The ballistic results are more uniform when firing shell from the same weight zone. The weight zone marks are yellow, 0.5-inch squares with a prick punch in the center for identification at night. These marks are in a straight line running at right angles to the axis and just below the nose of the shell. If more than five zone marks are required, the excess marks will be placed in another line immediately below the first five.

Variance in weight of projectiles may be caused by differences in manufacture, densities of metals, and densities of fillers. The first weight zone was between weights of 89 and 90.1 pounds. Projectiles within these weights were found to be too light to produce the desired results and were therefore rejected. This fact accounts for not finding projectiles with only one zone mark. High-explosive projectiles have a maximum weight of 95.6 pounds, which is in the sixth zone; therefore, high-explosive shell never bear more than 6

zone marks while chemical shell, with a maximum weight of 100 pounds, may have as many as 10 zone marks.

PROPELLING CHARGES.

General. Propelling charges for projectiles of all sizes are divided into two classes: the single section and the multisection.

Single section class. The single section is made up of the propellent powder in a single cartridge bag with an igniter pad sewn to the base. The cartridge bag cloth is made of raw silk or a substitute, such as wool, that will burn completely and leave very little ash. The igniter is made up of black powder contained in a pad of raw silk which is dyed red and stenciled in black. Old charges may have a white igniter pad stenciled in black. Its purpose is to ignite the base of the propellent uniformly and thus insure uniform and complete burning. The charge may or may not be putteed or wrapped with strips of raw silk to facilitate handling. Since black powder is very sensitive, a felt padded cloth or paper bag, called an igniter protector cap, is placed over the igniter and pulled tight with a draw string.

Multisection class. The multisection class consists of propelling charges divided into more than one cartridge bag. This class is divided into three types: the equally related type (sometimes referred to as aliquot parts type), the unequally related type, and the base and increment type. The equally related type consists of a propelling charge divided into separate cartridge bags of two or more equal parts. The igniter pad of all types is attached to one part known as the base charge and is covered with a protector cap.

The unequally related charge is divided into equal sections, one of which is further divided into two half sections. Each section is contained in an individual cartridge bag. The name of this type is derived from the fact that while the two half sections are not equal to the other sections, they are directly related. The advantage of such a propelling charge is in the additional zones of fire that may be obtained. For example, the Mk. I, unequally related charge, for 240-mm howitzers consists of four one-fifth and two one-tenth sections. The zones of fire that may be obtained are as follows:

Zone 1 ..... Base section ($\frac{1}{5}$)
Zone 2 ..... Base and one $\frac{1}{10}$ section
Zone 3 ..... Base and one $\frac{1}{5}$ section
Zone 4 ..... Base, one $\frac{1}{5}$ and one $\frac{1}{10}$ section
Zone 5 ..... Base and two $\frac{1}{5}$ sections
Zone 6 ..... Base, two $\frac{1}{5}$ sections, and one $\frac{1}{10}$ section
Zone 7 ..... Base and three $\frac{1}{5}$ sections
Zone 8 ..... Base, three $\frac{1}{5}$ sections, and one $\frac{1}{10}$ section
Zone 9 ..... Full charge—four $\frac{1}{5}$ sections and two $\frac{1}{10}$ sections.

Such arrangement gives four more zones of fire than could have been obtained with five equally related sections.

The base and increment type of charge is made up just as the name implies. Any desired number of increments, parts of the full charge in individual cartridge bags, may be attached to the base charge. Each increment is stenciled with the zone of fire for which it is intended; for example, the old M1917-17A1-18, white bag, charge for 155-mm howitzers has seven zones of fire. The top increment is stenciled with "Zone 7" and, used with the previous five increments and base charge, gives the greatest range for that particular charge. The projectile may be fired into zone 6 by discarding the bag marked "Zone 7" and using the remainder of the charge. All multisection charges are assembled together with straps sewn to the base and tied above the last section.

The variation in ranges required makes the base and increment type of charges best suited to 155-mm weapons. The guns, having longest range, require two zones of fire. The howitzers fire to many varied ranges between the 155-mm gun and lighter artillery weapons. This wide variation of ranges requires a propelling charge that will fire into seven zones. It should be noted, also that the difference between old and new howitzers and guns necessitates changes in propelling charges. The new weapons have larger chambers that can stand greater pressures than those of the old.

Propelling Charge for 155-mm Guns M1917-17A1-18MI. The full charge of base and increment for the old 155-mm guns measures from 35 to 37 inches in length, has a maximum diameter of 5.8 inches, and weighs approximately 26.17 pounds. The base is filled with 19.125 pounds of NH smokeless powder. The increment contains 5.875 pounds of NH smokeless powder, making a total charge of 25 pounds. Both base and increment are putteed.

Propelling Charge for 155-mm Guns M1 and M1A1. The new M1 and M1A1 Guns have larger and stronger powder chambers than the old M1917-17A1-18MI models and therefore take a larger propelling charge. The charge for the new gun is made up in the same manner as the old M1917-17A1-18MI. The chief differences are in the diameters and weights of the charges; the charge for M1 and M1A1 Guns having a maximum diameter of 6.5 inches and weighing 32.24 pounds, whereas the old charge has a maximum diameter of 5.8 inches and weighs 26.17 pounds. The base of the M1 and M1A1 Charge contains 20.35 pounds of NH smokeless powder. The increment contains the balance of 10.35 pounds of powder, making a total of 30.70 pounds. Both the old and new charges are contained in white cartridge bags made of silk, wool, or mohair and are putteed.

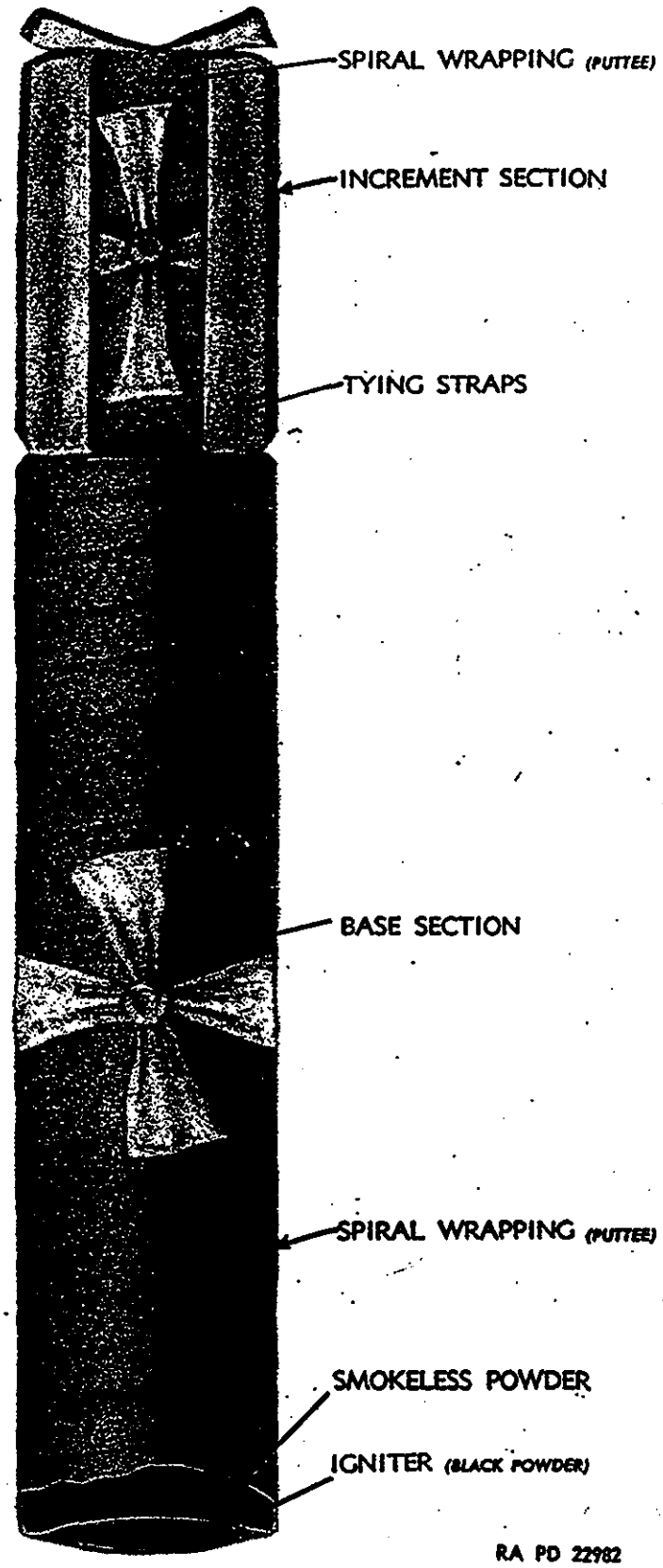


Figure 201 — 155-mm Gun Propelling Charge

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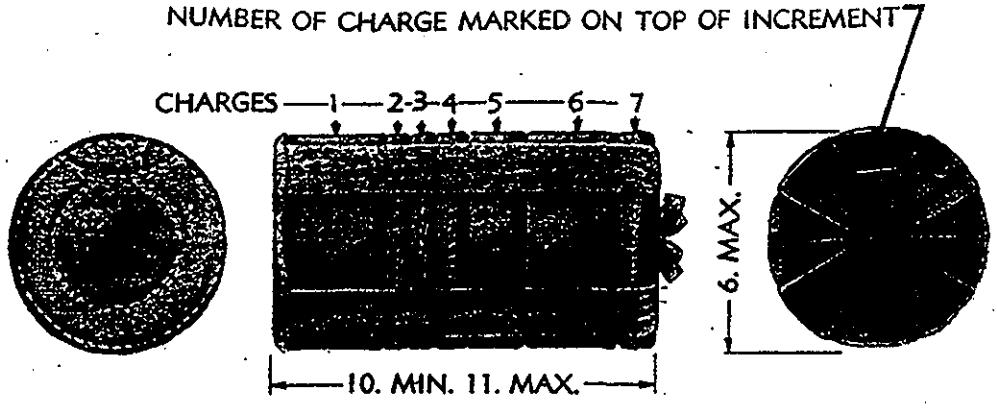

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Figure 202a — Propelling Charges for 155-mm Howitzer M1917-17A1-18, White Bag

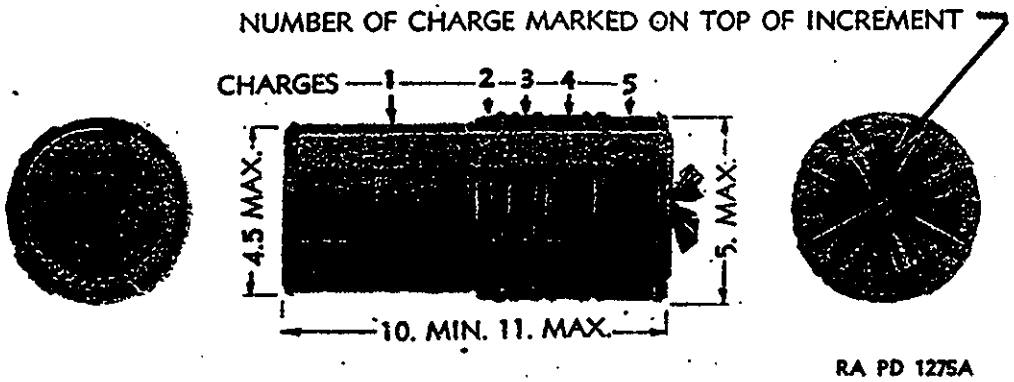

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Figure 202b — Propelling Charges for 155-mm Howitzer M1917-17A1-18, Green Bag M1A1

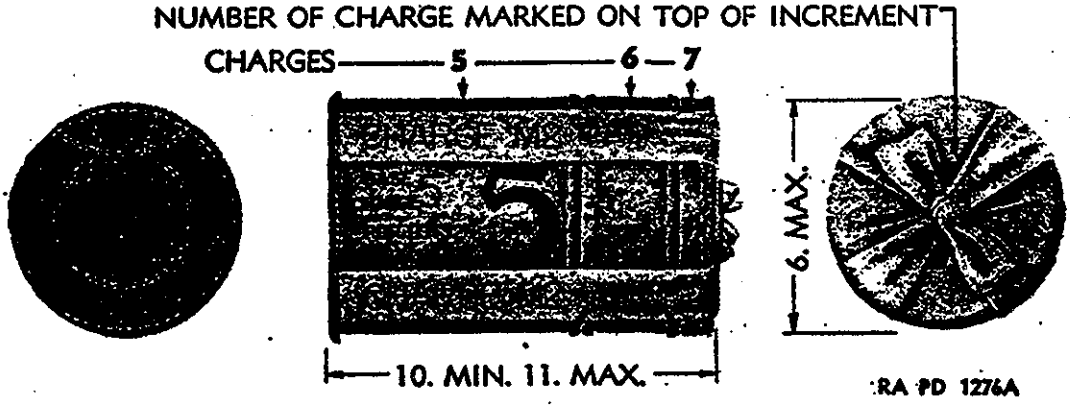

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Figure 202c — Propelling Charges for 155-mm Howitzer M1917-17A1-18, White Bag M2

Propelling Charges for 155-mm Howitzers M1917-17A1-18.

First charge developed (white bag). As previously stated, all 155-mm howitzers fire in seven zones, and take base and increment propelling charges of seven sections (a base and six increments) or

the equivalent. Since howitzer charges are much smaller than those for the gun it is not necessary to puttee them for handling purposes. The first charge developed for the M1917-17A1-18 Howitzers is packed into white cartridge bags of base and six increments. The full charge is between 10 and 11 inches long, has a maximum diameter of 6 inches and weighs 8.64 pounds. The propellent is FNH smokeless powder as is true of all propellants used in 155-mm howitzers.

M1 (green bag). It was found that when using the base and 6-increment charge for firing in the lower zones, a large amount of powder was wasted, therefore, two new charges for the M1917-17A1-18 Howitzers were developed. One is designated as the M1 Charge and consists of the base charge and four increments, or the first five zones. It has a maximum diameter of 6 inches, is about 6 inches in length, and weighs approximately 3.93 pounds. The M1 Charge is contained in cartridge bags dyed green, and is designated as a "Green Bag" charge to distinguish it as the one used for the first 5 zones of fire in the howitzer.

M2 (white bag). Another charge was developed for firing in zones 5, 6, and 7, and is designated M2 (white bag) to distinguish it for firing in the outer zones. The M2 has powder ballistically equal to the first five zones of fire incorporated into one bag or base. Zones 6 and 7 in separate bags are strapped to this base charge. The M2 Charge being for the same weapons is about the same size and weight as the old propelling charge including all seven zones. With this arrangement, by using the M1 (green bag) Charge for firing in the inner zones, the zone 6 and 7 increments are not wasted.

M1A1 (green bag). The M1 (green bag) Charge did not prove satisfactory because of its length. Since it was only as long (6 in.) as its diameter, it would topple over in the chamber of the weapon exposing the side instead of the igniter pad to the flash from the primer. The result was poor ignition and irregular burning of the propelling charge. To remedy this disadvantage, the M1 was modified to M1A1 by changing the length to 10 inches and the diameter to about 4.5 inches. The weight remains the same; decreased diameter compensates for increased length.

Propelling Charges for 155-mm Howitzer M1. Propelling Charges M3 (green bag) and M4 (white bag) for the M1 Howitzer are made up in the same way as the M1A1 (green bag) and M2 (white bag) for the old M1917-17A1-18 Howitzers. The M3 is used for the five inner zones of fire and the M4 incorporates five zones in the base charge and has zones 6 and 7 detachable. Since the M1 Howitzer is more powerful than the old weapons, it requires more propellant. The M3 (green bag) Charge is between 14 and 15 inches in length, has a maximum diameter of 5 inches, and weighs 5.94 pounds. The M4

(white bag) Charge is between 19 and 21 inches in length, has a maximum diameter of 5.8 inches, and weighs 13.87 pounds.

PRIMERS.

General. The Mk. IIA1 21-grain Percussion Primer is standard for issue for 155-mm howitzers. PRIMERS, percussion, Mk. II and Mk. IIA, may be used in all 155-mm weapons, but should be reserved, where practicable, for issue for weapons other than 155-mm howitzers. Information on the primer that is standard for issue and manufacture for 155-mm weapons is not available at this time; however, a new, 18-grain percussion primer is listed in SNL R-3, part 1 which may be the one in question.

PRIMER, Percussion 21-grain Mk. IIA1. The Mk. IIA1 was derived through modification of the Mk. II and Mk. IIA 21-grain Percussion Primers. Information on the exact nature of these modifications is not available. The Mk. IIA1, while used for 155-mm and larger weapons up to 10 inches in caliber, is much smaller than primers used in fixed and semifixed ammunition larger than 37-mm. Separate loading ammunition requires a primer for the purpose of igniting only the igniter pad attached to the base of the propelling charge, while fixed and semifixed ammunition primers must ignite the propelling charge directly.

The body of the Mk. IIA1 21-grain Percussion Primer is 1.595 inches long and the diameter, except for the flange at the head, tapers from 0.356 inch at the head to 0.348 inch at the open end for press-fitting into the cartridge case. The primer body is made of cartridge brass. The percussion assembly consisting of anvil, paper disc, percussion compound, and percussion cup is inserted into the flanged head of the primer in the order given. The primer charge of 21 grains of Army black powder. Grade A4, glazed, is put in through the forward end of the primer and consolidated into a definite space by sealing it with onionskin paper, beeswax, and shellac. The beeswax must be a minimum of 0.11 inch in thickness.

Function. The primer is functioned by the firing pin in the breech mechanism. The firing pin indents the percussion cup and crushes the percussion composition against the anvil, causing the composition to explode. The flame from the percussion composition passes through vents in the anvil and a flash hole in the body to the primer charge. The heat and gasses from the primer charge melt the beeswax and consume the onionskin paper, allowing the flame from the primer charge to ignite the igniter pad attached to the base of the propelling charge.

PACKING FOR STORAGE AND SHIPMENT.

Projectiles. All 155-mm projectiles, except armor-piercing and shrapnel, are shipped uncrated. The Armor-piercing Round M112 is

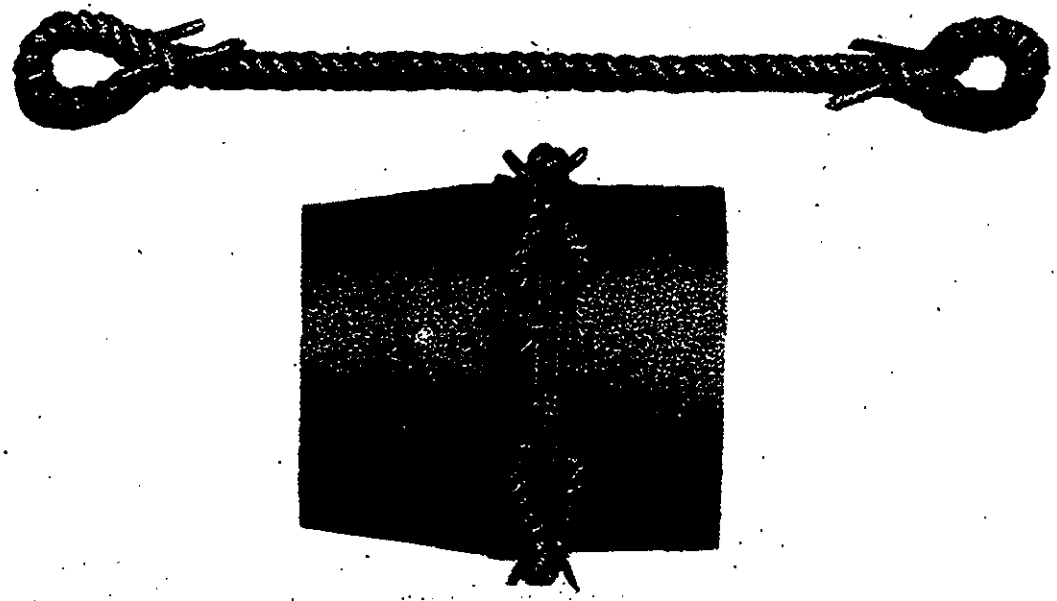

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Figure 203 — Rope Grommet

shipped one per box. The shrapnel is shipped two per box. All other projectiles are shipped fitted with grommets protecting the rotating bands and with eyebolt lifting plugs.

Eyebolt lifting plug. Plug screwed into fuze cavity for the following purposes: to keep foreign materials out of fuze cavity; to protect threads to which the fuze assembles; and to facilitate handling.

Grommets. The grommet may be one of three types: rope, rubber, or metal. The rope grommet is made of a length of rope splice-looped at either end and joined with heavy hemp twine. It is used on all Mk. and modified Mk. series 155-mm shell, and is fitted between the rotating bands on gun shell, and just above the rotating bands on howitzer shell. The rubber type grommet consists of a rubber strip backed by canvas. An eyelet is placed in either end through which heavy cord is threaded and tied. This grommet replaced rope on the M102 Shell but, due to the strategic value of rubber in World War II, it was not provided for other M-series shell. The rope on all M-series 155-mm shell, except the H.E. M102 Howitzer Shell was replaced by metal type grommets. The metal grommet has the same construction as the rubber grommet except that the rubber strip was replaced by steel. These grommets are placed on the rotating bands on the M-series shell. It is very important that all rotating bands be protected, because a damaged band may result in improper seating of the projectile in the bore of the weapon, and in poor obturation.

Propelling Charges. Propelling charges may be packed in metal cartridge storage cases or in new type fiber containers for shipment. If fiber containers are used, three are assembled into a clover-leaf

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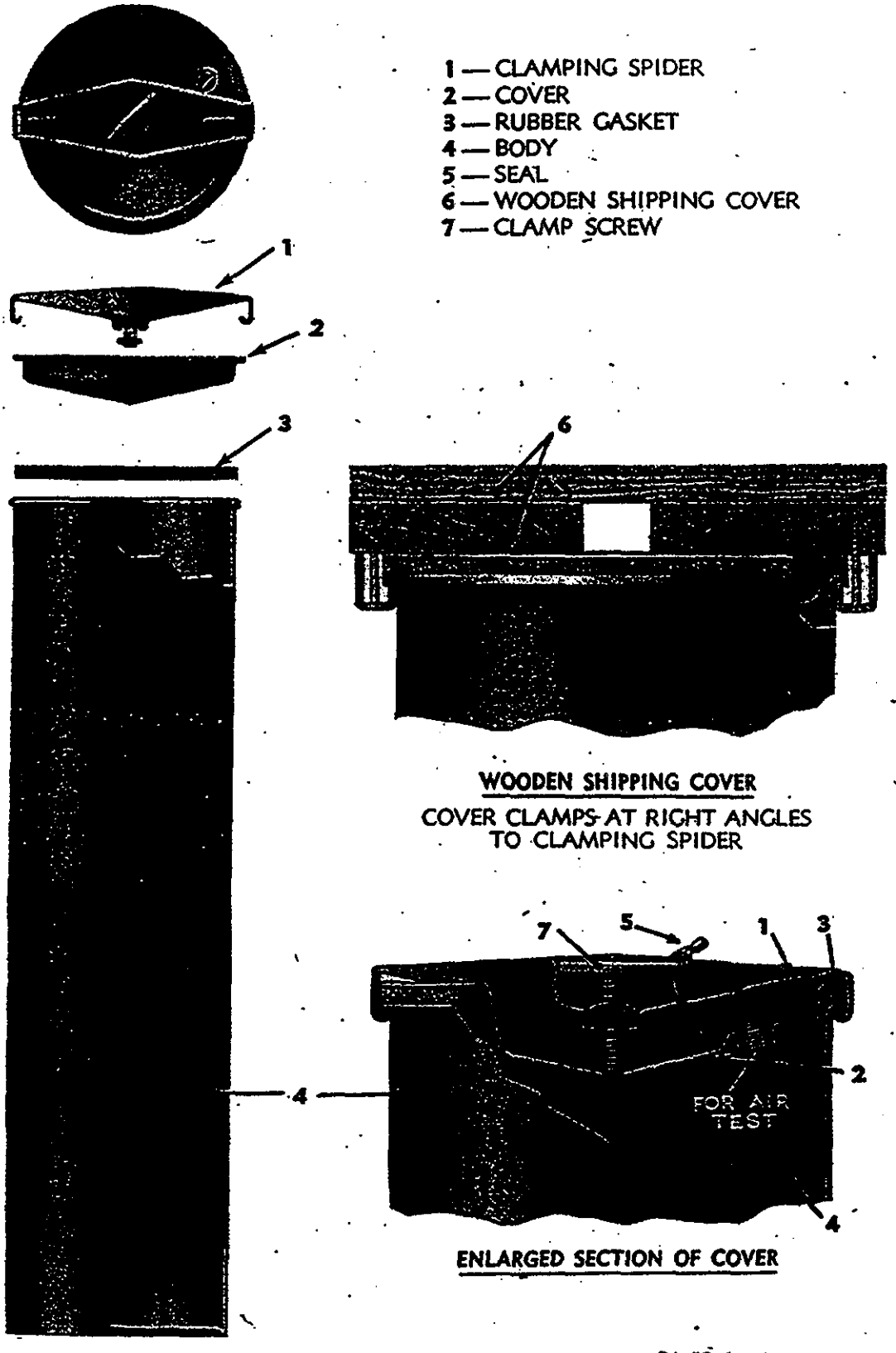


Figure 204 — Cartridge Storage Case

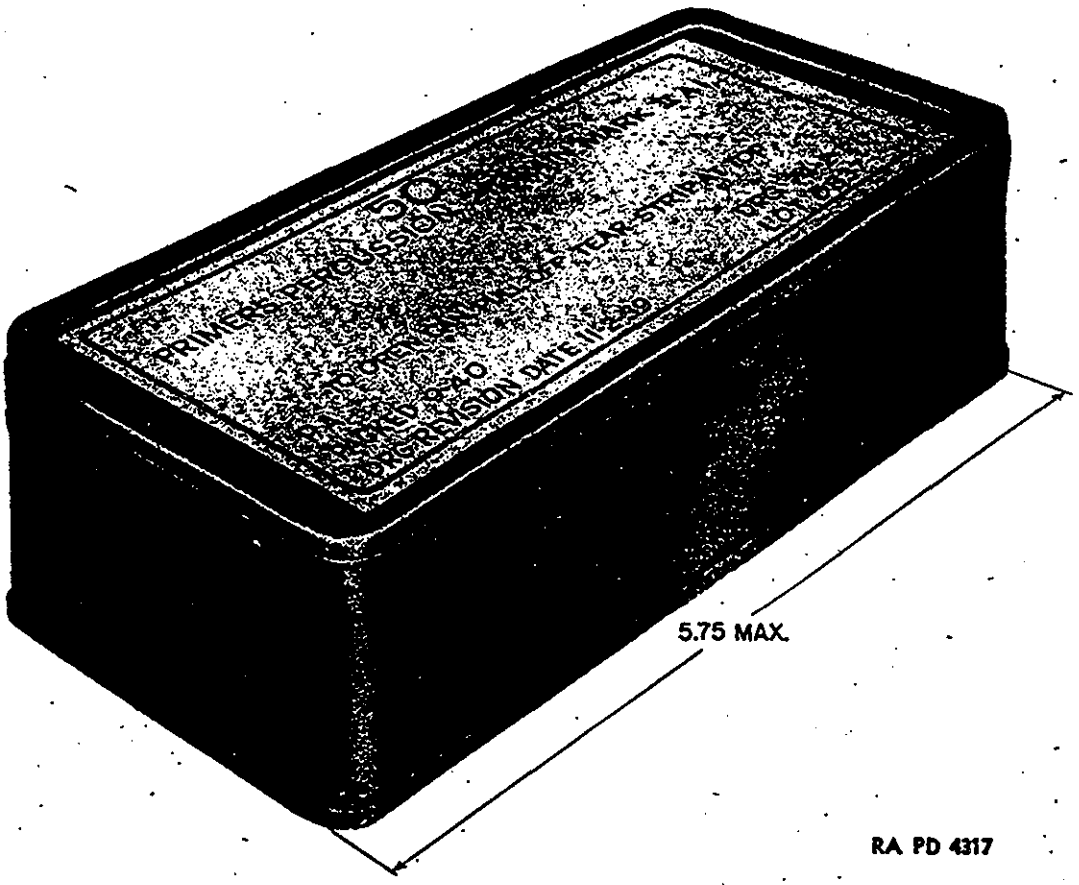


Figure 205 — Packing Can for 21-grain Percussion Primers Mk. II-A

bundle to facilitate handling, and conserve space. Export shipments require cartridge storage cases and clover-leaf bundles to be crated.

Primer. The 21- and 18-grain percussion primers are packed 50 to a metal container. Forty-eight of these metal containers are then packed in a box, making a total of 2,400 primers per box.

Fuzes. All 155-mm high-explosive and chemical shell are shipped unfuzed. Shrapnel is issued unfuzed for peacetime issue, but may be fuzed prior to issue in time of emergency. Fuzes that are shipped separate from projectiles are packed as follows:

FUZES, P.D., M46 and M47, are packed 50 per metal-lined box.

FUZES, P.D., M51, with M21 Booster attached and M51A1, with M21A1 Booster attached and FUZE, time, mechanical, M67, with M21A1 Booster attached are packed 1 per fiber container, 25 containers (25 fuzes) per box.

FUZE, P.D., M54, is packed 1 per fiber container, 50 containers (50 fuzes) per box.

FUZE, combination, 45-second, M1907M, is packed 1 per tin container, 50 containers (50 fuzes) per box.

Storage. Boxed armor-piercing and shrapnel rounds remain in their boxes for storage and are stacked in block style. All other projectiles have their grommets removed for storage, and are stacked on their sides. In peacetime, export crates on propelling charge containers are removed before the charges are stored. In wartime, however, the crates are left on to facilitate immediate shipment. Primers and fuzes are stored in block form in their regular shipping containers.

COMPLETE ROUNDS FOR 155-MM GUNS M1917-17A1-18MI, AND M1A1.

General. The Mk. and modified Mk.-series 155-mm gun shell are used with the old models, M1917-17A1-18MI Guns, only. M-series gun shell may be used in both the old models, M1917-17A1-18MI Guns, and new models, M1 and M1A1 Guns. All of the M-series rounds are standard for both issue and manufacture, while the Mk. and modified Mk. series are standard for issue only.

SHELL, H.E., Mk. III. This was the first high-explosive round to be developed for 155-mm guns. The complete round, as fired, consists of the projectile fuzed either with P.D. M46 or M47 Fuze, the propelling charge for 155-mm Guns M1917-17A1-18MI, and either a Mk. II or Mk. IIA 21-grain Percussion Primer.

SHELL, H.E., Mk. IIIA1. The Mk. III Round was modified by adapting the nose of the projectile to take new fuzes and boosters. Complete round of Mk. IIIA1, as fired, consists of the following:

Projectile. The projectile fuzed with either the Selective Fuze M51 with Booster M21, or Fuze M51A1 with Booster M21A1; or FUZE, time, mechanical, M67, with Bootser M21A1.

Propelling charge. The propelling charge for 155-mm Guns M1917-17A1-18MI.

Primer. Mk. II or Mk. IIA 21-grain Percussion Primer.

SHELL, H.E., M101. This is the new high-explosive round for use in either old or new 155-mm guns. The complete round consists of the following:

Projectile. The projectile fuzed with either the Selective Fuze M51 with Booster M21, or M51A1 with Booster M21A1; or FUZE, time, mechanical, M67, with Booster M21A1.

Propelling charge. The propelling charge for M1917-17A1-18MI Guns or M1 and M1A1 Guns, depending on the weapon the round is to be fired in.

Primer. Mk. II or Mk. IIA 21-grain Percussion Primer.

SHELL, Chemical, Mk. VII. This shell was the original chemical shell developed for the American 155-mm guns. It may be filled with either H or WP. Complete round, as fired, consists of the projectile

with M46 PD Fuze, the propelling charge for M1917-17A1-18MI Guns, and either a Mk. II or Mk. IIA 21-grain Percussion Primer.

SHELL, Chemical, Mk. VIIA1. The Projectile Mk. VII was modified to take new fuzes, adapters, and bursters. It may be filled with H, FS, or WP. The complete round consists of the following:

Projectile. The projectile fuzed with the Selective Fuze M51 with M21 Booster, or M51A1 with M21A1 Booster.

Propelling charge. The propelling charge for M1917-17A1-18MI 155-mm Guns.

Primer. Mk. II or Mk. IIA 21-grain Percussion Primer.

SHELL, Chemical, M104. The new chemical shell for old and new 155-mm guns may be filled with H, FS, or WP. The complete round consists of the following:

Projectile. The projectile fuzed with the Selective Fuze M51 with M21 Booster, or M51A1 with M21A1 Booster.

Propelling charge. The propelling charge for M1917-17A1-18MI or M1 and M1A1 Guns, depending on the weapon the round is to be fired in.

Primer. Mk. II or Mk. IIA 21-grain Percussion Primer.

SHELL, Empty, for Sand-loading, 95-lb, Mk. III. This round is used to simulate high-explosive and chemical shell for practice firing. The complete round consists of the following:

Projectile. An empty Mk. III High-explosive Projectile. The projectile is sand-loaded to service weight at the point of use. It is fuzed with an inert M46 or M47 Fuze.

Propelling charge. The propelling charge for M1917-17A1-18MI 155-mm Guns is furnished.

Primer. Mk. II or Mk. IIA 21-grain Percussion Primer is used.

PROJECTILE, AP, 100-lb, M112. This round was designed for armor-piercing work with old and new 155-mm guns. The complete round consists of the following:

Projectile. The projectile is filled with 1.44 pounds of explosive D, and fuzed with the B.D. Fuze M60. The projectile consists of a heavy steel body hollowed out to receive the filler and fuze, a steel adapter soldered and crimped to the nose of body and a steel windshield threaded to the adapter. The addition of the windshield continues the ogive which has a radius of approximately 65 inches. The base of the projectile is not tapered, and has a groove cut in it to receive a copper base cover after the M60 Fuze has been inserted. The fuze

designation and lot number are stamped on the rotating band, and the appropriate delay is stenciled on the base cover. The projectile loaded and fuzed weighs 100 pounds. Since it contains a high explosive, the projectile is painted olive drab and stenciled in yellow.

Propelling charge. The propelling charge for M1917-17A1-18MI or M1 and M1A1 Guns, depending on the weapon the round is to be used in.

Primer. Mk. II or Mk. IIA 21-grain Percussion Primer.

Shrapnel Mk. I. The shrapnel is the only projectile that may be fired from either 155-mm guns or howitzers, however, its use is limited to the old M1917-17A1-18MI Guns and M1917-17A1-18 Howitzers for impact practice fire. Only in cases of extreme emergency would shrapnel be used for combat. The complete round, as fired, consists of the following:

Projectile. The projectile with the Combination 45-sec Fuze M1907M. Except for size, the 155-mm shrapnel projectile is the same as that described in 75-mm ammunition.

Propelling charge. The propelling charge for 155-mm Guns M1917-17A1-18MI.

Primer. Mk. II or Mk. IIA 21-grain Percussion Primer.

PROJECTILE, Dummy, 95-lb, Mk. I. In the larger caliber weapons, drill rounds are used to give personnel practice in loading and unloading weapons, and handling ammunition without the expense of actually firing the weapon. The components of such a round are entirely inert. The drill or dummy round for 155-mm guns consists of the following:

Projectile. The dummy projectile has approximately the same size, shape, and weight as the service rounds it simulates. The projectile is made up of a steel body, an inert fuze, a removable bronze band forming the bourrelet, a cast steel base on which is mounted a forged steel sliding ring, and a removable bronze band which is attached to the sliding ring and simulates the rotating band. Both the bronze bourrelet and rotating bands are secured with set screws so that they may be replaced when they become unserviceable. Bronze is used because it is soft as compared to steel, and protects the weapon. The cast steel base screws into the body and, with its handle and sliding ring, provides a means of extracting the projectile. There is always starting space between the sliding ring with its bronze rotating band and the base of the projectile for removal from the weapon.

Propelling charge. A dummy propelling charge is used to simulate the propelling charge used with the weapon concerned.

AMMUNITION (SEPARATE LOADING) FOR 155-MM GUN, M2

NOTES	Mark or Model of Gun	PROJECTILE: Kind	Type	Mk or Mod	Drg No.	Wt Loaded and Fused lb	Charge: Wt lb	Kind	Drg No.	Material	Forging or Coating: Type	Drg No.	ADAPTER AND BOOSTER OR BURSTER: Mk or Designation	Drg No.	FUZE: Designation	Type	Drg No.	PROPELLING CHARGE: Cartridge Bag: Number or Type	Drg No.	Nominal Weight Charge	PRIMER: Type	Mk or Mod	Drg No.	PACKING: Fuze Drg No.	Booster Drg No.	CBC Drg No.	Primer Drg No.	Projectile: Drg No.	Shipped	Assembly No.
5	M2	Shell	HE	3	75-4-36	95.30	15.17	TNT*	75-14-138	Steel	Forg	75-20-4	3A2E	73-1-305	M47	FD	73-8-157	M1	73-9-49 [88]	25	Fuze	M14	76-2-21	20-4-163	76-7-260	20-4-422	20-4-492	xx	Unfused	1
5	M2	Shell	HE	3	75-4-36	95.30	15.17	TNT*	75-14-138	Steel	Forg	75-20-4	3A2E	73-1-305	M46	FD	73-8-126	M1	73-9-49 [88]	25	Fuze	M14	76-2-21	20-4-163	76-7-260	20-4-422	20-4-492	xx	Unfused	2
5	M2	Shell	HE	3A1	75-4-83	96.08	15.21	TNT	75-14-228	Steel	Forg	75-20-4	M21A4	73-8-154	M21A4 [6]	FD	73-8-146	M1	73-9-49 [88]	25	Fuze	M14	76-2-21	20-4-522	20-4-194	20-4-422	20-4-492	xx	Unfused	3
5 & M	M2	Shell	HE	M101	75-4-80	95.59	15.56	TNT	75-14-616	Steel	Forg	75-20-80	M21A4	73-8-154	M21A4 [6]	FD	73-8-146	M19	73-9-94 [55]	31	Fuze	M14	76-2-21	20-4-522	20-4-194	20-4-422	20-4-492	x	Unfused	4
5 & M	M2	Shell	HE	M101	75-4-80	95.59	15.56	TNT	75-14-616	Steel	Forg	75-20-80	M21A4	73-8-154	M21A3 [6]	MT	73-7-97	M19	73-9-94 [55]	31	Fuze	M14	76-2-21	20-4-172	20-4-194	20-4-422	20-4-492	x	Unfused	5
5 & M	M2	Proj	AP	M112 [cf]	75-4-301	100	1.44	B	75-14-320	Steel					M60	BD	73-8-165	M19	73-9-94	31	Fuze	M14	76-2-21	20-4-301		20-4-422	20-4-492	20-4-311	Fused	6
*5	M2	Shell	Smoke	M1	75-4-86	98.34	14.80	WP	75-14-214	Steel	Forg	75-20-4	Mk 5 M21A4	73-1-179 73-8-154	M21A4 [6]	FD	73-8-146	M1	73-9-49 [88]	25	Fuze	M14	76-2-21	20-4-512	20-4-194	20-4-422	20-4-492	xx	Unfused	7
*5	M2	Shell	Smoke	M1	75-4-86	99.73	16.23	FS	75-14-215	Steel	Forg	75-20-4	Mk 5 M21A4	73-1-179 73-8-154	M21A4 [6]	FD	73-8-146	M1	73-9-49 [88]	25	Fuze	M14	76-2-21	20-4-512	20-4-194	20-4-422	20-4-492	xx	Unfused	8
5	M2	Shell	Smoke	M1	75-4-86			FM		Steel	Forg	75-20-4	Mk 5 M21A4	73-1-179 73-8-154	M21A4 [6]	FD	73-8-146	M1	73-9-49 [88]	25	Fuze	M14	76-2-21	20-4-512	20-4-194	20-4-422	20-4-492	xx	Unfused	9
5 & M	M2	Shell	Smoke	M104	75-4-89	98.71	15.60	WP	75-14-236	Steel	Forg	75-20-80	Mk 5 M21A4	73-1-179 73-8-154	M21A4 [6]	FD	73-8-146	M19	73-9-94 [55]	31	Fuze	M14	76-2-21	20-4-512	20-4-194	20-4-422	20-4-492	x	Unfused	10
5 & M	M2	Shell	Smoke	M104	75-4-89	100.01	16.90	FS	75-14-236	Steel	Forg	75-20-80	Mk 5 M21A4	73-1-179 73-8-154	M21A4 [6]	FD	73-8-146	M19	73-9-94 [55]	31	Fuze	M14	76-2-21	20-4-512	20-4-194	20-4-422	20-4-492	x	Unfused	11
5 & M	M2	Shell	Gas	M104	75-4-89	94.81	11.70	N	75-14-236	Steel	Forg	75-20-80	Mk 5 M21A4	73-1-179 73-8-154	M21A4 [6]	FD	73-8-146	M19	73-9-94 [55]	31	Fuze	M14	76-2-21	20-4-512	20-4-194	20-4-422	20-4-492	x	Unfused	12
5 & M	M2	Shell	HE Smoke	M117	75-4-117	94.72	15.84	HC	75-14-149	Steel	Forg		.25-14 Mk Pdr	75-14-149	M54	TBQ	73-3-154	M19	73-9-94 [55]	31	Fuze	M14	76-2-21	20-4-482		20-4-422	20-4-492	x	Unfused	13
5 & M	M2	Shell	Illum	M118	75-4-120 [cf]	103.06	8.92	Illum	75-14-144 [cf]	Steel	Forg		.125-14 Mk Pdr	75-14-144	M54	TBQ	73-3-154	M19	73-9-94 [55]	31	Fuze	M14	76-2-21	20-4-482		20-4-422	20-4-492	x	Unfused	14
5	M2	Proj	Dummy	1	72-1-88	95.				CI, Steel, and Bronze								M100	73-8-68	38.2	Fuze	M14	76-2-21			20-4-422	20-4-492	76-3-9	Complete	15
5 & M	M2	Proj	Dummy	M7	72-1-49	95.				CI, Steel, and Bronze								M100	73-8-68	38.2	Fuze	M14	76-2-21			20-4-422	20-4-492	76-3-9	Complete	16
																															17
																															18
																															19
																															20

AP = Armor Piercing
BAI = Base & Incendiary
CP = Concrete Piercing
CBC = Cartridge Storage Case
D = Ammonium Picrate
FM = Titanium Tetrachloride Mixture
FS = Sulphur Trioxide Solution
H = Mustard Gas
HC = Hexachloroethane Mixture
HE = High Explosive
Illum = Illuminating
N = Nonfuming
MT = Mechanical Time
PD = Point Detonating
Perc = Percussion
S = Tacoma
TNT = Trinitrotoluene
TBQ = Time and Superquick
WP = White Phosphorus

* = Fuze, CP, M76, Drg 73-2-214, and Booster, M25, may be used, nondelay or .025 sec.
* = Produced by converting Chemical Shell, Mk 7, Drg 75-4-42.
cf = Produced by converting HE Shell, Mk 3, Drg 75-4-34.
6 = Some Shell on hand are loaded with 98/2 or 80/20 Amatol.
x = Use Eyebolt Lifting Ring, Drg 75-14-42, and Rope Grommet, Drg 75-14-371.
6 = Assembled with Booster, M21A4, Drg 73-8-154; other combinations of Fuze, FD, M53 & MT, M57 with Booster, M21, are also on hand.
S = Burster Casting M1, Drg 73-1-158.
cf = Projectile, AP, 155-mm, M112E2, Drg 75-4-308.
88 = Propelling Charge, shown on Drg 73-9-49, may be used with this round for training purposes.
55 = Propelling Charge, shown on Drg 73-9-49, may be used with this round for training purposes.
cf = Drawings 75-14-120 and 75-4-124 apply to Shell, Illum, M118E1.
xx = Use eyebolt lifting ring, Drg. 75-14-42, and rope grommet, Drg. 75-14-43.

ISSUED - 15 August 1924
REVISED - 1 May 1947

Sheet No. 19

Ordnance and Explosives
Archives Search Report
for
Bailey Island Fire Control Station
Cumberland County, Maine
Project Number D01ME009801

APPENDIX E

REPORTS/STUDIES

APPENDIX E

REPORTS/STUDIES

Table of Contents

E-1 INPR for Site No. D01ME009801, 5 May 1993 (B-8)

DEPARTMENT OF THE ARMY
U.S. Army Corps of Engineers
WASHINGTON, D.C. 20314-1000

REPLY TO
ATTENTION OF:

CEMP-RF (200-1a)

05 MAY 1993

MEMORANDUM FOR

COMMANDER, HUNTSVILLE DIVISION, ATTN: CEHND-PM-OT (R. Britton)
COMMANDER, NEW ENGLAND DIVISION, ATTN: CENED-PD-L (B. Holtham)

SUBJECT: Defense Environmental Restoration Program for Formerly Used Defense Sites (DERP-FUDS) - Property of Timothy J. Adams Trust (Former Bailey Island Fire Control Station), Harpswell, Maine, Site No. D01ME0098, Project No. D01ME009801 (OEW).

1. Reference CEHND-PM-OT memorandum, 8 Apr 93, DERP-FUDS Inventory Project Reports (INPRs) Requiring an Ordnance and Explosive Waste (OEW) Engineering Evaluation/Cost Analysis (EE/CA).

2. This memorandum authorizes an Ordnance and Explosive Waste (OEW) project at the subject site. The first phase of this project will be an Engineering Evaluation/Cost Analysis (EE/CA) as recommended in the above reference. If subsequent activities, beyond the EE/CA are required, CEHND must provide CEMP-RF a revised project cost estimate.

3. Overall Project Management (PM) for this site is the responsibility of the New England Division. This memorandum assigns Technical Management (TM) responsibility for execution of the subject OEW project through remedial design to the Huntsville Division. If required, execution of any remedial action will be performed by the CENED.

4. Note the approved project number is consistent with that assigned by CENED. CEHND and CENED must ensure that this project number appears on all INPR OEW cost estimate sheets and any other OEW project specific documentation.

5. During the investigation, and potential remediation of the above sites, CEHND must pay particular attention to any deed restrictions recorded with the transfer of the sites to private ownership since current policy states "deed restrictions may absolve or limit DoD responsibility for OEW projects".

CEMP-RF (200-1a)
SUBJECT: Defense Environmental Restoration Program for Formerly Used Defense Sites (DERP-FUDS) - Property of Timothy J. Adams Trust (Former Bailey Island Fire Control Station), Harpswell, Maine, Site No. D01ME0098, Project No. D01ME009801 (OEW).

6. We request:

a. CENED, within sixty days of the date of this memorandum, ensure the landowners are notified of the decision and provide copies of the notification letter to CEMP-RF and CEHND-PM-OT.

b. CENED ensure the project is programmed in the appropriate DERP-FUDS fiscal year workplan and the five-year workplan. All contracts should be awarded before the end of the third quarter of any fiscal year.

c. CENED will update the DERP-FUDS database located at the Corps of Engineers Waterways Experiment Station. CEHND will periodically screen the DERP-FUDS database to ensure that the required update has been completed.

7. CEMP-RF POC for this action is Mr. J. R. Gibson, (202) 504-4709.

FOR THE DIRECTOR OF MILITARY PROGRAMS:

Jim Baird
for MICHAEL H. FELLOWS
Colonel, Corps of Engineers
Chief, Environmental Restoration Division
Directorate of Military Programs

CF:
CEMP-RF (J. Coppola)
CENED-RE-AM (A. Laster)

CEHND-PM-OT (415-10f) 8 April 1993

MEMORANDUM FOR Commander, HQUSACE, ATTN: CEMP-RF (Mr. Jim Coppola), 20 Massachusetts Avenue, NW, Washington, DC 20314-1000

SUBJECT: DERP-FUDS Inventory Project Reports (INPRs) Requiring an Ordnance and Explosive Waste (OEW) Engineering Evaluation/Cost Analysis (EE/CA)

1. The enclosed INPRs have been submitted for further investigation or action by Huntsville Division. We have reviewed the INPRs and recommend a phased EE/CA for the following sites:

DIVISION	PROJECT NO.	RAC	SITE NAME
NED	D01MA045401	3	Hummock Pond Aerial Target Range (encl 1)
	[redacted]	[redacted]	[redacted]
	D01MA045501	3	Sheep Pond Bombing Area (encl 3)
SWD	K06OK001405	1	Clinton-Sherman Air Force Base (encl 4)

2. A completed DD1391 cost estimate is included with the enclosures. Request you approve the OEW projects as quickly as possible for our action.

3. The POC is Mr. Robert Britton, DSN 645-5482 or commercial 205-955-5482.

FOR THE DIRECTOR OF PROGRAMS
AND PROJECT MANAGEMENT:

/S/

4 Encls
as

LAWSON S. LEE, P.E.
Chief, Ordnance and Technical
Programs Division

174.2
- 18.0
156.2
5

3-252

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02254-9149

CENED-RE-AM (200-1a) 3 March 1993

MEMORANDUM FOR

HQ, USACE, ATTN: CEMP-R
COMMANDER, MRD-ED-HP
COMMANDER, HND-PM-EA

SUBJECT: DERP-FUDS Inventory Project Report (INPR) for Site No. D01ME0098, Property of Timothy J. Adams Trust (Former Bailey Island Fire Control Station), Harpswell, Maine

1. Forwarded is the INPR for the former Bailey Island Fire Control Station, Harpswell, Maine. The site is eligible for DERP-FUDS. The proposed OEW project is eligible for DERP-FUDS.

2. CENED will forward the proposed OEW project to CEHND-PM-OT for further action.

Encl

BRINK P. MILLER
COL, EN
Commanding

Bailey Island Encl

SITE SURVEY SUMMARY SHEET
FOR
DERP-FUDS SITE NO. D01ME0098
PROPERTY OF TIMOTHY J. ADAMS TRUST
(BAILEY ISLAND FIRE CONTROL STATION)
HARPSWELL, MAINE
9 February 1993

SITE NAME: Bailey Island Fire Control Station.

LOCATION: At Harpswell, Maine; site map attached.

SITE HISTORY: The United States acquired a total of 7.37 acre (2.50 acres fee, 0.37 acre easement, and 4.50 acres leasehold) by purchase between December 1942 and February 1943. The Army used the site for harbor defense. Between 1943 and 1944, the Army built two 8-story observation towers; an SCR-296A radar set which consisted of a metal antenna tower, concrete block operations building and two concrete block generator buildings; and a 90mm Anti-Motor Torpedo Boat (AMTB) Battery at the site. The Army also constructed several barracks and a mess hall at the site. The Army reported 2.50 acres fee and 0.37 acre easement excess to General Services Administration (GSA) in April 1950. The leasehold over 4.50 acres was terminated in August 1945. GSA conveyed 2.50 acres fee and 0.37 acre easement to Esther Root Adams in October 1952. Only the two concrete observation stations and an operations building remain at the site. The site is currently owned by the Timothy J. Adams Trust. It is utilized as a summer residence.

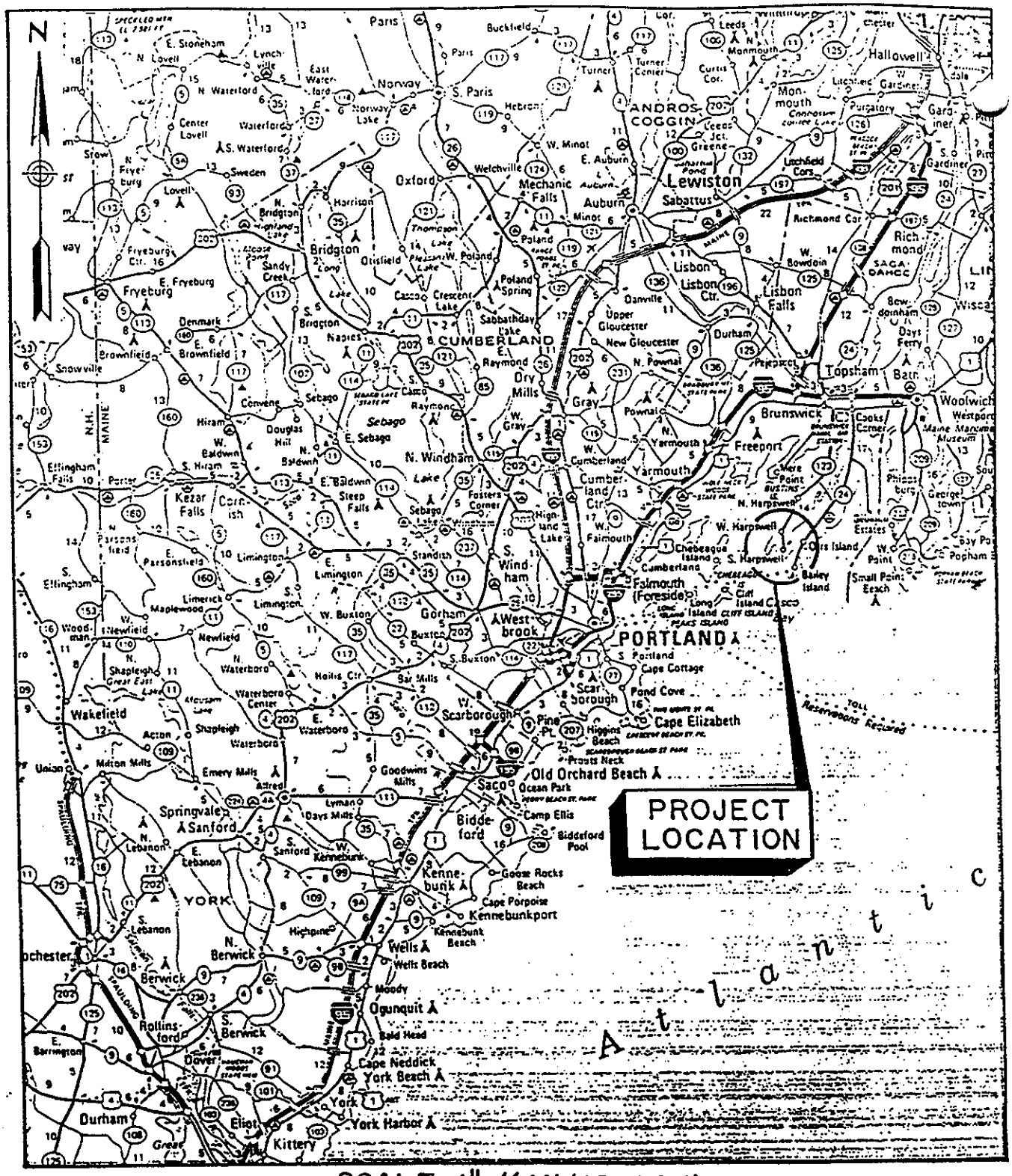
SITE VISIT: A site inspection was performed on 27 October 1992 by David Larsen and Robert Martin of CENED-PL. The current property owner, Mrs. Timothy J. Adams, Trustee of the Timothy J. Adams Trust (202-966-7890), was contacted by telephone.

CATEGORY OF HAZARD: OEW

HAZARD DESCRIPTION: OEW. The site contained an Anti-Motor Torpedo Boat (AMTB) battery. There have been no incidents of ordnance being found at the site. However, due to the existence of the battery, there is the possibility that ordnance exists at the site.

AVAILABLE STUDIES AND REPORTS: None identified.

DIVISION POC: Anne Laster, CENED-RE-AM, 617-647-8584.



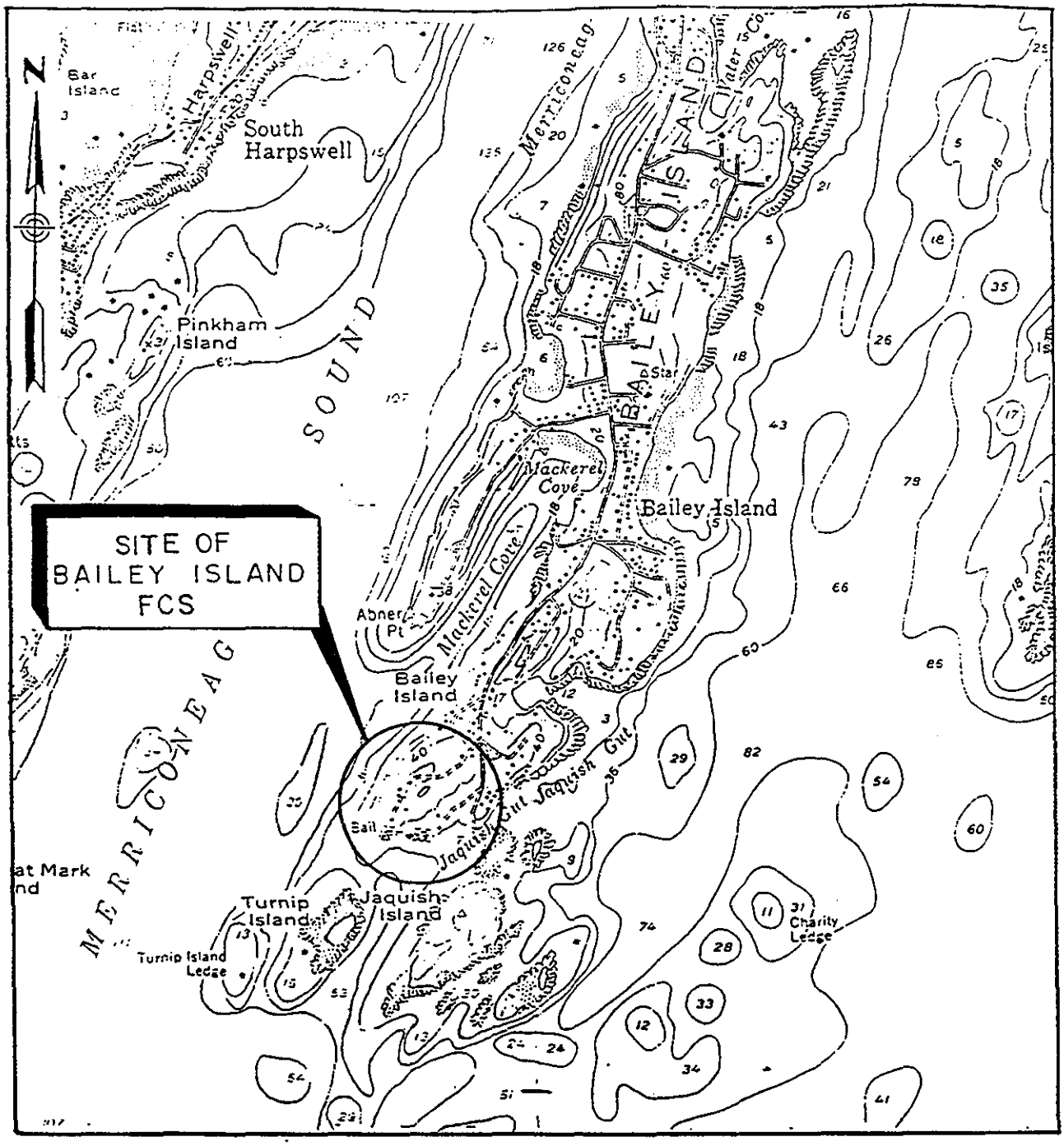
SCALE: 1" =11 Mi.(APPROX.)

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION
CORPS OF ENGINEERS

DEFENSE ENVIRONMENTAL RESTORATION PROGRAM

HARPSWELL, ME.
BAILEY ISLAND FCS
LOCATION MAP

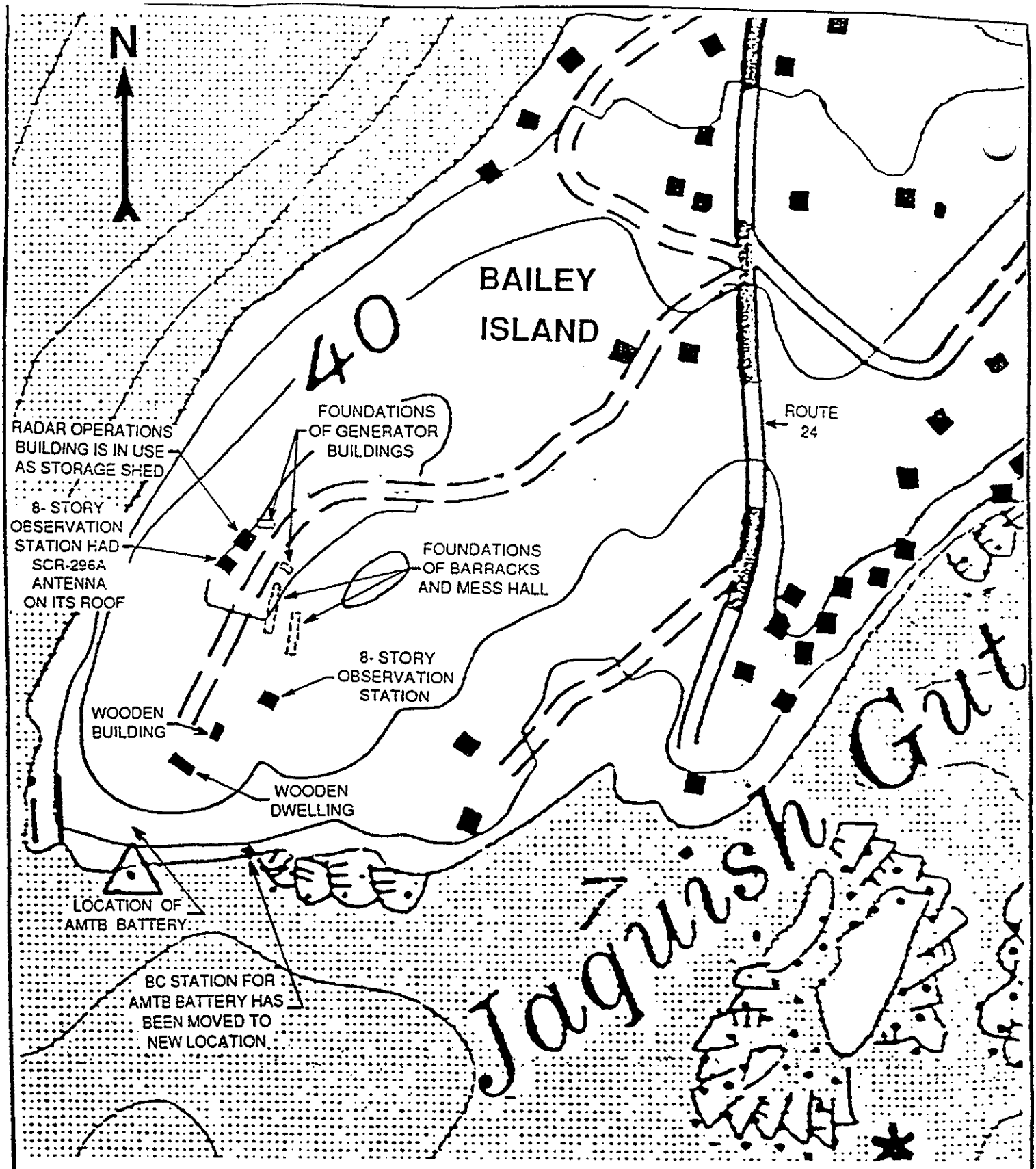
E-1



SCALE: 1" = 2000 FT.

DEPARTMENT OF THE ARMY NEW ENGLAND DIVISION CORPS OF ENGINEERS	DEFENSE ENVIRONMENTAL RESTORATION PROGRAM HARPSWELL, ME. BAILEY ISLAND FCS

E-1



SCALE: 1"= 450 feet (approx.)

DEPARTMENT OF THE ARMY NEW ENGLAND DIVISION CORPS OF ENGINEERS WALTHAM, MASS	DEFENSE ENVIRONMENTAL RESTORATION PROGRAM HARPSWELL, ME. BAILEY ISLAND FIRE CONTROL STATION SITE PLAN	3 E-1

DEFENSE ENVIRONMENTAL RESTORATION PROGRAM
FOR
FORMERLY USED DEFENSE SITES
FINDINGS AND DETERMINATION OF ELIGIBILITY
DERP-FUDS SITE NO. D01ME0098
PROPERTY OF TIMOTHY J. ADAMS TRUST
(BAILEY ISLAND FIRE CONTROL STATION)
HARPSWELL, MAINE

FINDINGS OF FACT

1. The United States acquired a total of 7.37 acre (2.50 fee, 0.37 acre easement, and 4.50 acres leasehold) by purchase between December 1942 and February 1943.

2. The site was known as the Bailey Island Fire Control Station. The Army used the site for harbor defense. The Army built two 8-story observation towers; an SCR-296A radar set which consisted of a metal antenna tower, a concrete block operations building, two concrete block generator buildings; and a four-gun 90mm Anti-Motor Torpedo Boat (AMTB) Battery at the site. The Army also constructed several barracks and a mess hall at the site. There is no evidence that the site was under other than DOD control during the period of DOD ownership.

3. The Army reported 2.50 acres fee and 0.37 acre easement excess to General Services Administration (GSA) on 18 April 1950. The leasehold over 4.50 acres was terminated on 17 August 1945. GSA conveyed 2.50 acres fee and 0.37 acre easement to Esther Root Adams by deed dated 22 October 1952. The deed reserved to the United States all uranium, thorium, and all other materials essential to the production of fissionable materials contained in the land and the right to enter upon, mine and remove the same. The deed did not contain a restoration or recapture clause or other special conditions.

DETERMINATION

Based on the foregoing findings of fact, the site has been determined to be formerly used by DOD. It is therefore eligible for the Defense Environmental Restoration Program - Formerly Used Defense Sites established under 10 USC 2701 et seq.

3 March 1993
Date

BRINK P. MILLER
Colonel, Corps of Engineers
Commanding

PROJECT SUMMARY SHEET
FOR
DERP-FUDS OEW PROJECT NO. D01ME009801
PROPERTY OF TIMOTHY J. ADAMS TRUST
(BAILEY ISLAND FIRE CONTROL STATION)
HARPSWELL, MAINE
DERP-FUDS SITE NO. D01ME0098
9 February 1993

DESCRIPTION OF OEW HAZARD: The site contained a four-gun 90mm AMTB battery (two guns were mounted on concrete gun blocks and two were mobile mounts in temporary emplacements). There have been no incidents of ordnance being found at the site. However, due to the existence of the battery, there is a possibility that ordnance exists at the site.

PROJECT ELIGIBILITY: During DOD control of the site, the Army constructed a 90mm AMTB battery for harbor defense of Portland.

POLICY CONSIDERATIONS: The current owner has not brought ammunition to the site. DOD would be responsible for any ammunition or ordnance found at the site.

PROPOSED PROJECT: This INPR should be referred to CEHND for a determination of further action.

RAC: Attached.

DD FORM 1391: N/A.

DIVISION POC: Anne Laster, CENED-RE-AM, 617-647-8584.

Ordnance and Explosives
Archives Search Report
for
Bailey Island Fire Control Station
Cumberland County, Maine
Project Number D01ME009801

APPENDIX F

LETTERS/MEMORANDUMS/MISCELLANEOUS ITEMS

APPENDIX F

LETTERS/MEMORANDUMS/MISCELLANEOUS ITEMS

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F-1 Document, Posts, Camps and Stations, undated (B-9)

F-2 Document, Modernization Program; Harbor Defenses of Portland, 1 October 1941 (B-10)

F-3 Memorandum, Subject: Transmittal of Lease with Mary F. Hazell, 23 December 1942 (B-11)

F-4 Memorandum, Subject: Preparation of Preliminary Draft for Study for the Utilization of Posts, Camps and Stations, with Particular Emphasis on the Post-war Military Requirements, 22 July 1944 (B-12)

F-5 Letter, Headquarters 240th Engineer Group to Mr. Nelson Lawry, 18 December 1972 (B-13)

F-6 Letter, Headquarters 240th Engineer Group to Mr. Nelson Lawry, 27 December 1972 (B-14)

F-7 Letter, Mr. Leonard W. Chronkhite to Mr. Nelson Lawry, 29 November 1979 (B-15)

F-8 Thesis, Portland Defended, A History of the United States Government Fortifications of Casco Bay 1794-1945, Donna Lee McKinnon, August 1987 (B-16)

F-9 Modern Defenses of the Coast of Maine, Joel W. Eastman, 31 October 1988 (B-17)

F-10 The Evolution of Bailey's Island, Beth E. Hill, 1992 (B-18)

F-11 Modern American Harbor Defenses, Mark A. Berhow, 1992 (B-19)

F-12 Letter, Mr. Robert Zink to SMCAC-ESL, 30 March 1995 (B-20)

F-13 Letter, Maine Historic Preservation Commission to SMCAC-ESL, 3 April 1995 (B-21)

F-14 Letter, Coast Defense Study Group to SMCAC-ESL, 6 April 1995 (B-22)

F-15 Letter, Maine Department of Inland Fisheries and Wildlife, 24 April 1995 (B-23)

F-16 Letter, Maine Department of Economic and Community Development to SMCAC-ESL, 3 May 1995 (B-24)

F-17 Tide data at Harpswell Harbor for 1996, National Ocean Service (B-25)

ORDER OF BATTLE OF THE ARMY OF THE UNITED STATES IN WORLD WAR II, ZONE OF THE I

CHAPTER VII - POSTS, CAMPS, AND STATIONS

PLACE (NAME AND LOCATION): BAILEY'S ISLAND, Maine, Establishments at

CORPS AREA, SERVICE COMMAND, ARMY: First Service Command

ESTABLISHED: CLOSED: DISPOSITION:

NAMED IN HONOR OF -

FACILITIES:

TYPE OF STATION: Eastern Defense Command MAXIMUM STRENGTH: 3 6/43, 5

CONSTRUCTION:

Started ; completed ; costs - About $

AREA OF CAMP: About acres.

COMMAND STATUS:

CAMP COMMANDERS:

REMARKS: [illegible]

TROOPS: See reverse.

NAME OF STATION:

TROOPS:

ARMY SERVICE FORCES -

DIVISIONAL TROOPS -

NONDIVISIONAL TROOPS -

240th CA Regt (HD) (Type A) - Btry "B" (EDC)
10th CA Regt (HD) (Type B) - Btry "E" (EDC)
241st CA Regt (HD) (Type C) - Btry M (EDC)

5th CA [illegible] (Type A) - Btry L (EDC)

NND 760026
1-27-45

DUCED AT THE NATIONAL ARCHIVES

SECURITY CLASSIFICATION NOT REGRADED
AUTHORITY TAG FOR 1 [illegible]

DECLASSIFIED
Authority NND 760026
By JM NARA Date 20 Nov 95

SECRET

SECURITY CLASSIFICATION NOT REGRADED
AUTHORITY TAG FOR 1 [illegible]

2.0001

MODERNIZATION PROGRAM

HARBOR DEFENSES OF PORTLAND

Revision Copy

COPY NO. 2

194

SECURITY CLASSIFICATION NOT REGRADED
AUTHORITY TAG FOR 1 [illegible]

F-2

NND 760026
1-27-45
DUCED AT THE NATIONAL ARCHIVES

COPY SECRET COPY

AG 660.2

OFFICE OF THE CHIEF OF COAST ARTILLERY

M:vb

RECORD OF COMMUNICATION RECEIVED

Dated	Recd.
10-1-41	10-25-41

From: st CAD
, Gen. T.A. Terry)

To: , 1st Corps Area, Army Base, Boston, Mass.

Subject: l Board Proceedings, Modernization Harbor Defenses of Portland.

1. sed herewith are four (4) copies, Local Board Proceedings, Modernization of Defense Projects, Continental United States, for the Harbor Defenses of Port

2. proceedings are submitted in conformity with instructions contained in par 0, Secret Letter, AGO file AG 660.2 (9-11-40) M-WPD-M, subject: "Moder n of Harbor Defenses, Continental United States", and Secret Letter orders Corps Area, subject: "Board of Officers", file AG 660.2 dated June 30, 19

1 Incl
Mod on Program HD Portland
Cop 1 - 4.

AG 66
1st 2-41 Hq. 1st Corps Area, Army Base, Boston, Mass. Thru: C.G., 1st Army Ft. N.C. To: AGO.

AA-6
2nd 8-41 Hq. 1st Army, Hoffman, N.C. To: AGO.
ed.

C SECRET COPY

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Form #19. Annex B. H. D. of Portland

Cost Estimate and Priority Guide

FIRE CONTROL - ENGINEER (SUMMARY)

Loc. No.	Place	Exhibit	Material	Labor	Land	Total
154	Gelaspus Point			H. D. of Portsmouth		
155	Cape Porpoise	S-B- 1	$ 10,800	$ 7,200	$ 2,500	$ 20,500
156	Fletcher's Neck	S-B- 2	18,000	12,000	5,100	35,100
157	Prout Neck	S-B- 2	19,200	13,200	5,400	37,800
158	Cape Elizabeth	S-B- 3	21,000	15,000	-	36,000
159	Trundy Point	S-B- 4	7,800	5,400	-	13,200
160	Fort Williams	S-B- 5	18,500	14,850	-	33,350
161	Fort Levett	S-B- 6	23,820	18,420	-	42,240
162	Fort Preble	S-B- 7	6,720	7,440	-	14,160
163	Peak Island	S-B- 8	24,250	19,450	1,400	45,100
164	Fort McKinley	S-B- 8	4,000	4,000	-	8,000
165	Fort Lyon	S-B- 8	-	-	-	-
166	Long Island	S-B- 8	7,200	4,800	-	12,000
167	Jewell Island	S-B- 9	14,950	10,050	-	25,000
168	Bailey Island	S-B-10	15,600	10,800	1,450	27,850
169	Small Point	S-B-10	8,400	6,000	1,000	15,400
170	Fort Baldwin	S-B-11	6,000	3,600	500	10,100
	Datum Points	S-B-12	2,880	4,320	-	7,200
	TOTALS		209,120	156,530	17,350	383,000

Note.- Above costs do not include funds already approved in Augmented Expenditure Program, 1941.

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Form #40. Annex B. H. D. of Portland

Basic Information for Construction of

FIRE CONTROL AND COMMUNICATIONS DIAGRAMS

Designation of Installation	Purpose of Telephone	Type of Phone	Termination of Each Circuit: Installation	Termination of Each Circuit: Place	Loc. No.	Check Column
JEWELL ISLAND, LOCATION NO. 167 (cont'd)						
Site 2-B						
SL Powerhouse	Post	Wall	PSB	Ft. McKinley	164	
SL 22P	Ord. & Int.	HS	SDCP	Ft. Williams	160	
SL 23P	Ord. & Int.	HS	G3-CP	Peak Island	163	
4-.50cal(AA)	Ord. & Int.	HS	AACP	Ft. Preble	162	
2-.37mm (AA)	Ord. & Int.	HS	AACP	Ft. Preble	162	
BAILEY ISLAND, LOCATION NO. 168						
Site 1-A						
$B_{11}^{4}S_{11}^{4}$	Observer	HS	P11	Jewell Island	167	
	Reader	HS	P11	Jewell Island	167	
(Constr.#202)	Spotter	HS	P11	Jewell Island	167	
	TI	-	FSB	Jewell Island	167	
	~~Post~~	Wall	PSB	Ft. McKinley	164	
$B_{5}^{6}S_{5}^{6}$	Observer	HS	P5	Ft. Levett	161	
	Reader	HS	P5	Ft. Levett	161	
(Foote)	Spotter	HS	P5	Ft. Levett	161	
	TI	-	FSB	Ft. Levett	161	
Site 1-B						
$B_{8}^{5}S_{8}^{5}$	Observer	HS	P8	Peak Island	163	
	Reader	HS	P8	Peak Island	163	
(Constr.#203)	Spotter	HS	P8	Peak Island	163	
	TI	-	FSB	Peak Island	163	
$B_{7}^{7}S_{7}^{7}$	Observer	HS	P7	Peak Island	163	
	Reader	HS	P7	Peak Island	163	
(Constr.#102)	Spotter	HS	P7	Peak Island	163	
	TI	-	FSB	Peak Island	163	
$B_{2}^{8}S_{2}^{8}$	Observer	HS	P2	Cape Elizabeth	158	
	Reader	HS	P2	Cape Elizabeth	158	
(Constr.#101)	Spotter	HS	P2	Cape Elizabeth	158	
	TI	-	FSB	Cape Elizabeth	158	
	~~Post~~	Wall	PSB	Ft. McKinley	164	
AAIS-OP8	Observer	EE8	AACP	Ft. Preble	162	
SL 24P	Ord. & Int.	HS	SDCP	Ft. Williams	140	
SL 25P	Ord. & Int.	HS	G3-CP	Peak Island	163	

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Form #33. Annex H. H. D. of Portland

SUMMARY OF LAND PROCUREMENT RECOMMENDED

Ref. Par.	Loc. No.	Purpose	Acreage	Estimated Cost	Exhibit	Reference to Authority for Procurement
167		JEWELL ISLAND				
		Site #1 for location of Btry. #11, two 2-story steel towers and one bombproof magazine	56 acres	$25,000	2-H-7	Approved Site Board Proceedings, Reference #10
168		BAILEY ISLAND				
		Site #1 for location of a 3-story steel tower and a 2-story steel tower	200 x 600	1,450	2-H-8	Not yet approved
169		SMALL POINT				
		Site #1 for location of a 3-story steel tower	2 acres	1,000	2-H-9	Not yet approved
170		FORT BALDWIN				
		Site #1 for location of a 1-story steel tower	38.13 acres	500	2-H-10	Not yet approved
		TOTAL		180,750		

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Form #34. Annex H. H. D. of Portland

MAP OF PROPOSED LAND ACQUIREMENT Location No. 168

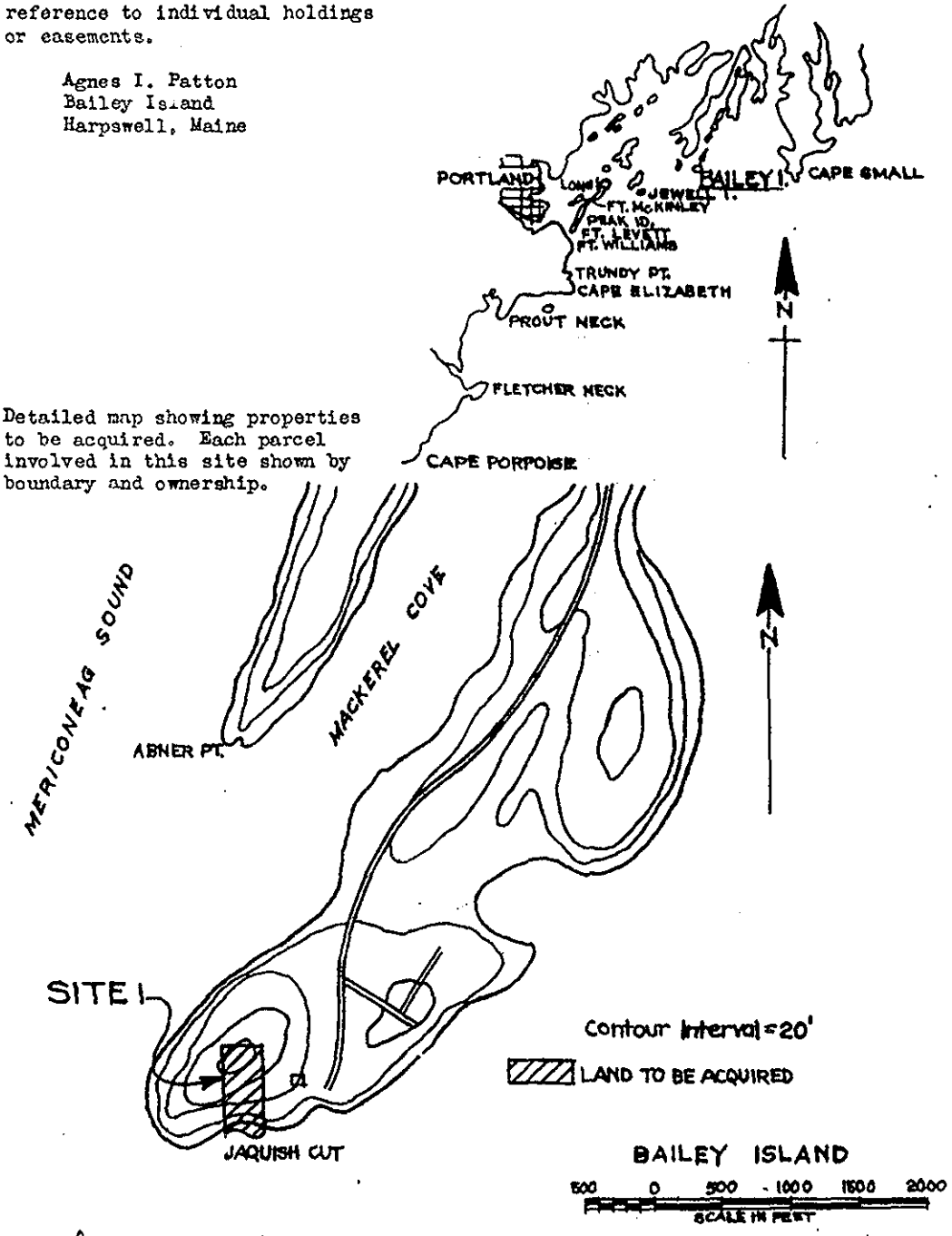
Place: BAILEY ISLAND

Town: Harpswell County: Cumberland State: Maine

List of ownership involved with reference to individual holdings or easements.

Agnes I. Patton
Bailey Island
Harpswell, Maine

Detailed map showing properties to be acquired. Each parcel involved in this site shown by boundary and ownership.



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S E C R E T

Form #35. Annex H.

H. D. of Portland

Location No. 168
Site #1

PRELIMINARY DATA FOR PROPOSED LAND ACQUIREMENT

1. For installation of AAIS-OP 8, $B_2^8S_2^8$, $B_7^7S_7^7$, $B_{11}^4S_{11}^4$, $B_5^6S_5^6$, $B_8^5S_8^5$

2. Place (Local name) Bailey Island

Town Harpswell County Cumberland State Maine

3. Owner: Name Agnes I. Patton,

Address Bailey Island, Harpswell, Maine

4. Area to be acquired 200' x 600', approx.

5. Site is: Developed No Undeveloped

6. Site is part of: Farm No Summer Estate No

7. Active shore lot development No Inactive

8. Does site include buildings No No. & Type

9. Is site contiguous to public road No. 800 ft.

10. Is easement required for right-of-way Yes Length 800 ft.

11. Is easement required for cable No Length

12. Assessed value of land, $ 1,000 Buildings, $

If no land or right-of-way is required, state, "none required" in appropriate space below.

13. Estimated purchase cost of land and buildings $ 1,000

14. Estimated cost of right-of-way $ 50

15. Estimated cost of cable easement $ None

16. Estimated cost of removal of utilities $ None

17. Estimated cost of taking surveys $ 200

18. Estimated cost of legal transfer $ 200

19. Total estimated cost of site $ 1,450

20. Do you believe condemnation proceedings necessary? No

REMARKS: (Refer to numbered items.)

#12. Area not known by assessors.

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S E C R E T

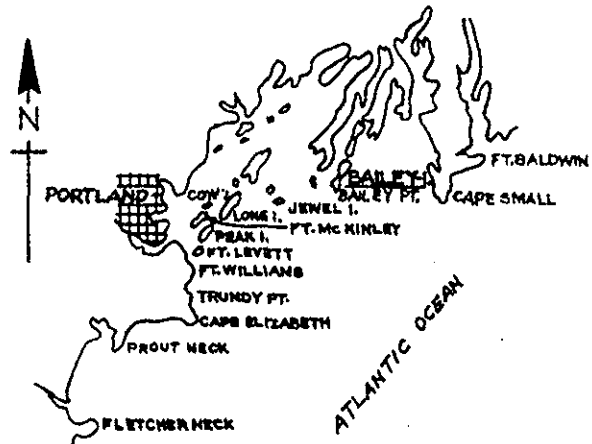
Form #36. Annex I. H. D. of Portland

MAP OF ARTILLERY INSTALLATIONS Location No. 168

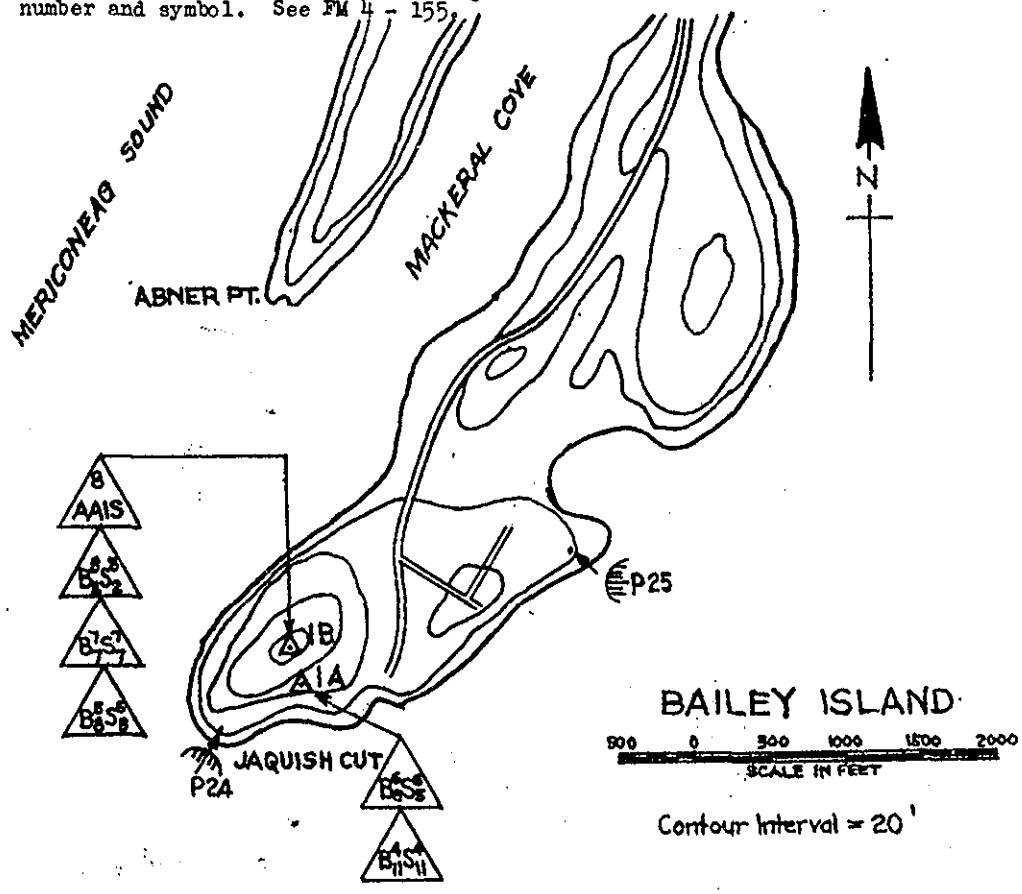
Place: BAILEY ISLAND

Town Harpswell County Cumberland State Maine

Site No.	Installation
1	A
1	B



Scale map showing the site of each proposed artillery installation by number and symbol. See FM 4 - 155.



S E C R E T

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S E C R E T

Form #37. Annex I. H. D. of Portland

INFORMATION FOR DESIGN AND CONSTRUCTION OF INSTALLATIONS

LOCATION NO. 163

PLACE Bailey Island

Town Harpswell County Cumberland State Maine

1. Installations to be located here:

✓1-A B^6_5 S^6_5

B^4_{11} S^4_{11}

✓1-B AAIS-OP 8

B^8_2 S^8_2

B^7_7 S^7_7

B^5_8 S^5_8

2. Number and type of structures to be constructed:

1-A One 2-story 48' steel tower

1-B One 3-story 60' steel tower

3. Type of Site: Open _____ Wooded X Hilly X Level _____

Ledge _____ Smooth _____ Obstructions to sight 40' trees

UTILITIES INFORMATION - Give location and approximate distance to:

4. Approach road None - 800 feet

5. Proposed fire control cable hut Cable terminal

6. Nearest commercial electric power 800 feet

7. Delcotype generator required None

8. Housing facilities necessary 44 men

9. Sewer facilities None

10. Type of water supply: City Harpswell Distance 800 feet

Well (estimated depth) None

11. Elevation of each construction site above mean low water

1-A: 70' 1-B: 80'

REMARKS:

2SL	2
AAIS	3
AWS	3
2 Sta	30
	44

S E C R E T

F-2

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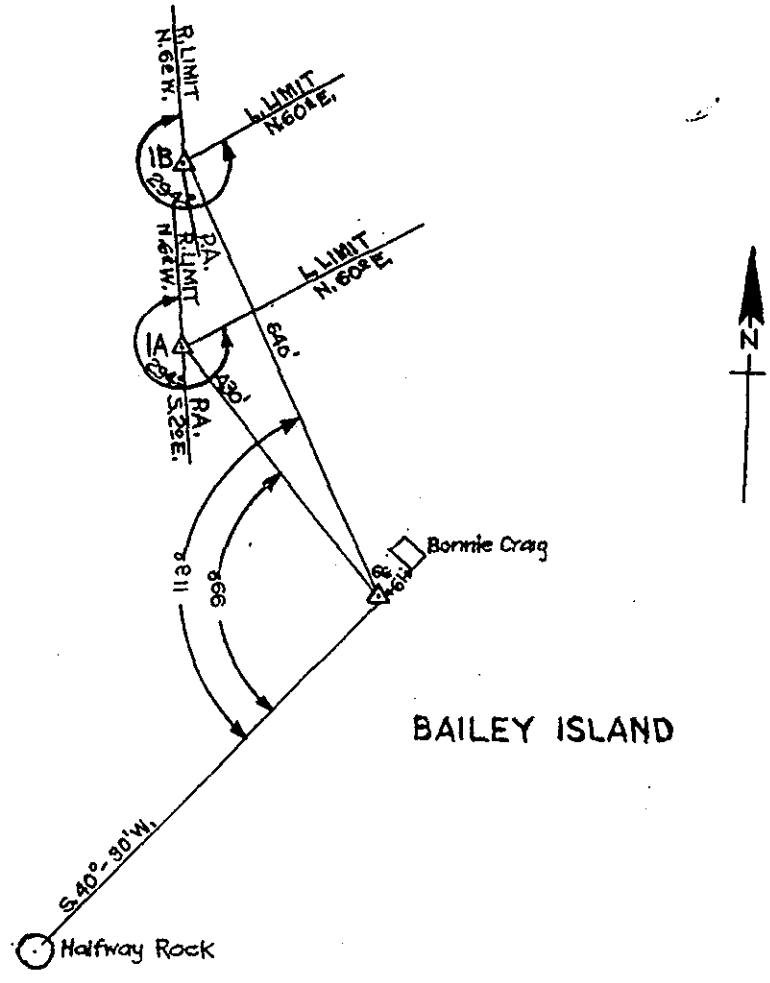
Form 38, Annex I

H. D. of Portland

Location No. 168

Place: BAILEY ISLAND

Site No.	Type	Floor	Station Assignments	Designation of Battery and Armament	Instrument H'gt	Instrument Type
1-A	2-story steel tower type observing station	Upper	B^6_5 S^6_5	Foote 2-12" BC	131'	DPF
		Lower	B^4_{11} S^4_{11}	Constr. #202 2 - 6" BC	123'	DPF
1-B	3-story steel tower typr observing station	Roof	AAIS-OPS			
		Upper	B^8_2 S^8_2	Constr. #101 2 - 16" BC	161'	DPF
		Middle	B^7_7 S^7_7	Constr. #102 2 - 16" BC	153'	DPF
		Lower	B^5_8 S^5_8	Constr. #203 2 - 6" BC	145'	DPF



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Form #39. Annex J. H. D. of Portland

INDEX AND SUMMARY

By Location

Priority	Item No.	Loc. No.	Site No.	Type of Structure and Purpose	Approximate Size	Aerial Protection	Gas Proofing	Exhibit
	168			BAILEY ISLAND				
1			1-A	2-story steel tower Upper $B_5^6 S_5^6$ Lower $B_{11}^4 S_{11}^4$	SB		N	1-I-15
2			1-B	3-story steel tower Roof AAIS-OP 8 Upper $B_2^8 S_2^8$ Middle $B_1^7 S_1^7$ Lower $B_8^5 S_8^5$	SB		N	1-I-15
	169			SMALL POINT				
2			1-A	3-story steel tower Roof AAIS-OP 9 Upper $B_2^9 S_2^9$ Middle $B_7^8 S_7^8$ Lower $B_{11}^5 S_{11}^5$	SB		N	1-I-16
	170			FORT BALDWIN				
3			1-A	1-story steel tower Roof AAIS-OP 10 Floor $B_7^9 S_7^9$	SB		N	1-I-17

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DECLASSIFIED PER EXECUTIVE ORDER 12356, SECTION 3.3, NND PROJECT NND 947556 BY RB/KM, DATE 11/15/94

S E C R E T

SECRET

By ... Engineer

12-23-42 date ATS initials

WAR DEPARTMENT
FIRST SERVICE COMMAND, S.O.S.
REAL ESTATE, REPAIRS & UTILITIES DIVISION
BOSTON, MASS.

ADDRESS REPLY TO
COMMANDING GENERAL
FIRST SERVICE COMMAND S.O.S.
ATT: DIRECTOR RRU DIVISION
75 FEDERAL STREET
BOSTON, MASS.

REFER TO FILE NO.
601.53(Bailey Island, Me.)DRE4

25162

OFFICE CHIEF OF ENGINEERS
DEC 27 1942
601.53 (Bailey Island, Hampswell, Me.)

December 23, 1942

SUBJECT: Transmittal of Lease with Mary R. Hazell

TO : Chief of Engineers
Real Estate Branch
Leasing Section
Washington, D. C.

1. Transmitted herewith are two numbers of Lease, Contract No. W. 1732 eng 833 between Mary R. Hazell, Theodore E. Hazell, Ada J. Ball, and Mary E. Ball and the United States of America.

2. Attention is invited to attached copy of August 4, 1942 letter with 1st and 2nd Indorsements thereto requesting and approving the leasing of subject premises.

3. There are two commissioned officers quartered on subject premises.

4. No furnishings of the Lessor are being utilized.

5. It is recommended distribution be accomplished in accordance with existing regulations.

For the Commanding General:

G. W. Gillette
G. W. GILLETTE
Colonel, Corps of Engineers
Acting Director, RRU Division

DEC 29 '42 PM

RECEIVED
CONSTRUCTION DIV.
REAL ESTATE BRANCH

2 Incls.
1. Lease in dup.
2. Cyp. ltr. 8/4/42 w/1st. & 2nd Inds.

FILE

FOR DEFENSE
BUY
UNITED STATES SAVINGS BONDS

[redacted]

S E C R E T

AC 77
S.C.
Box 166
F-601.53
real estate & site usage

F-3

REPRODUCED AT THE NATIONAL ARCHIVES

DECLASSIFIED PER EXECUTIVE ORDER 12356, SECTION 3.3, NND PROJECT NND 947556 BY RB/KM, DATE 11/15/94

601.53 (Bailey Island Maine) (Thomas E. Hazell Heirs)

HEADQUARTERS HARBOR DEFENSES OF PORTLAND
Office of the Harbor Defense Commander
Fort Williams, Maine

August 4, 1942

In Reply
refer to : 620

Subject: Lease of Land and Buildings, Bailey Island

To: Commanding General, New England Sector, 150 Causeway Street, Boston, Mass.

1. It is requested that a lease be secured on the land and buildings shown as Exhibit " to inclosure 1 (Right of Entry) herewith. This land is to be the locateon for two 155 mm guns authorized per paragraph 1, 1st Ind. dated July 30, 1942, to secret letter, Subject: "155 mm Battery, Stockton Springs, Maine." file 470 dated July 27, 1942.

2. The buildings on the land (plot A) make up a summer hotel known as "The Homestead." With small alterations this hotel will provide excellent quarters for the battery personnel.

Thomas H. Jones
Brigadier General, U.S. Army
Commanding

4 Incls:
Incl 1 - Right of Entry
Incl 2 - Survey of Condition
Incl 3 - Lease Information
Incl 4 - Pictures of the Homestead (3 photos)

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By authority of C.G. ASF.

SPAOE

22 July 1944
Date Initials

MEMORANDUM FOR THE DIRECTOR, MOBILIZATION DIVISION:

Subject: Preparation of Preliminary Draft of Study for the Utilization of Posts, Camps and Stations, with Particular Emphasis on the Post-war Military Requirements.

1. Reference is made to memorandum on the above subject addressed to the ACofS, OPD, WDGS, under date 14 July 1944 (SPMOC 370.01). This memorandum requested advice as to which harbor defense installations would be required for the post-war military establishment in the continental United States under Categories A, B and C.

2. The memorandum cited above was returned to the CG, ASF, by disposition form OPD 680 (14 July 44), dated 17 July 1944, for comment and recommendation by the Seacoast Defense Projects Branch of Planning Division. Reply has been made to the ACofS, OPD, WDGS, in memorandum, same subject, dated 21 July 1944 (SPOPS 680). It is assumed that the ACofS, OPD, WDGS, will return this chain of correspondence indicating the decision on the matter of post-war status of harbor defenses in the continental United States. It is the understanding in this office that the next step will be for Mobilization Division to incorporate the approved decision of OPD in a tabulation which will again go to the WDGS for approval. It will be noted that this procedure introduced several unnecessary links in the chain of correspondence.

3. It is requested that future actions involving harbor defense installations be coordinated with the Seacoast Defense Projects Branch of Planning Division prior to submission to the WDGS for information or decision, in order that unnecessary correspondence may be avoided.

W. A. WOOD, JR.,
Brigadier General, G.S.C.,
Acting Director of Plans and Operations, A.S.F.

C. E. COTTER,
Colonel, G. S. C.,
Executive for Plans & Operations, A.S.F.

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Copy for: DIRECTOR, PLANNING DIVISION

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LIST OF SEACOAST HARBOR DEFENSES

1. The following list of Seacoast Defense installations comprise the permanent harbor defense fortifications in the continental United States. Several harbor defenses include tracts of lands which have not been assigned official names and therefore are listed below as military reservations. Localities carrying the name "Fort" are in general equipped with permanent type of housing and facilities. The principal tracts of land only are included for each harbor defense.

2. It should be noted that permanent harbor defense batteries have been recently modernized and are expected to have a useful life of many years or until the development of new weapons, such as long range controlled rockets require a revision of present weapons.

3. Harbor Defenses are listed below in groups according to overall strategical importance without special reference to the present war. (This classification is not an official listing, it merely reflects the views of the present Chief, Seacoast Defense Projects Branch, Planning Division, ASF).

Priority	Installation
1	HD of New York Fort Hancock (Hq) Miller Field (Small portion only) Navesink Military Reservation Norton's Point Fort Tilden Fort Totten Fort Wadsworth Fort Hamilton
1	HD of Long Island Sound Camp Hero Fort Wright (includes Mt. Prospect) (Hq) Fort Terry Fort Michie Wilderness Point Military Reservation Pine Island (Small portion only by Navy permit)
1	HD of Chesapeake Bay Fort Monroe Fort Story (Hq) Fort Custis Fishermans Island Military Reservation Little Creek Military Reservation Fort Wool

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2 Copies furnished to Al Col Chase, Ex 72741 (compiled at his request) in study on Post War Defense
370.01/A-11-A

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List of Seacoast Harbor Defenses (continued)

Priority	Installation
1	HD of Boston
	Fort Andrews
	Fort Banks (Hq)
	Fort Dawes
	Fort Duvall
	East Point, Nahant
	Fourth Cliff
	Great Brewster Island
	Fort Heath
	Outer Brewster Island
	Point Allerton
	Fort Revere
	Fort Ruckman
	Fort Standish
	Fort Strong
	Fort Warren
1	HD of Narragansett Bay
	Fort Adams (Hq)
	Fort Burnside
	Fort Church
	Fort Getty
	Fort Greene
	Fort Kearney
	Fort Varnum
	Fort Wetherill
1	HD of San Francisco
	Fort Baker
	Fort Barry
	Fort Cronkhite
	Fort Funston
	Fort Miley
	Fort Winfield Scott (Hq)
1	HD of Puget Sound
	Fort Worden (Hq)
	Fort Casey
	Fort Ebey
	Fort Flagler
	Camp Hayden (Striped Peak)

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List of Seacoast Harbor Defenses (continued)

Priority	Installation
2	HD of Portland Baileys Island Military Reservation Cape Elizabeth Military Reservation Chebeague Island Military Reservation Jewell Island Military Reservation Fort Levett Long Island Military Reservation Fort Lyon Fort McKinley Peak Island Fort Preble Fort Williams (Hq)
2	HD of Los Angeles Bolsa Chica Fort MacArthur (Hq) Point Vicente Whites Point
2	HD of San Diego Fort Emory Fort Rosecrans (Hq)
2	HD of Delaware Cape May Military Reservation Fort Miles (Hq)
3	HD of The Columbia Fort Stevens (Hq) Fort Canby Fort Columbia
3	HD of Portsmouth Fort Constitution Fort Dearborn Fort Foster Camp Langdon (Hq) Fort Stark
3	HD of Charleston Fort Moultrie (Hq) Fort Sumter Marshall Military Reservation

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List of Seacoast Harbor Defenses (continued)

Priority	Installation
3	HD of Key West Key West Barracks Fort Taylor (Hq) West Martello Tower
4	HD of New Bedford Mishaum Point Military Reservation Fort Rodman (Hq)
4	HD of Pensacola Fort Barrancas (Hq) Fort McRee Fort Pickens
4	HD of Galveston Fort Crockett (Hq) Fort San Jacinto Fort Travis

4. The following tracts or military reservations appear to be no longer required in so far as their connection with harbor defense activities are concerned. These are not shown as List "C" in the 31 January 1945 issue of Monthly Progress Report, Section 15 (Utilization of Command Installations):

Camp Angeles
Cape George Military Reservation
Camp Clatsop Military Reservation

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HEADQUARTERS
240TH ENGINEER GROUP
STATE ARMORY
WATERVILLE, MAINE 04901

18 December 1972

Mr. Nelson H. Lawry
RFD # 3
Box 145 D
Dover, New Hampshire 03820

Dear Mr. Lawry:

I am in receipt of a letter (Copy) of 3 Sep 72 written by you to TAG, ME concerning information relative to the activities of Btry B 240th C.A. at Stockton Springs and Bailey Island during WW II. Some of the questions you ask I can give you approx. answers for as I was a 1LT at this time and the CO of Btry B 240th C.A. I have no accurate records on hand, so much of my recolection may be off a few weeks one way or another.

Reference Btry B moving to Stockton Springs, ME. This did not happen until after Btry F had been sent to Biddeford Pool and completely implaced because prior to moving Btry B from Ft Levett to Stockton Springs, I had made a recon to Biddeford Pool to observe the set up. I would say sometime in late June or July of 42 Btry B arrived at Stockton Springs, without artillery peices I might add.

Shortly after coincident arrival, two 155 GPF towed guns were delivered by comman carrier, and also coincident range finder. A search light crew also arrived. Ammo arrived still later and I don't think fuses ever arrived.

After approx. six weeks, the unit with its armament was moved to Bailey's Island, which would have been late Aug 1942, swamped out a road to the shore and set up the GPF on cement slabs we built in the rocks.

No other unit replaced Btry B at Sotckton Springs, however, an ~~Inf~~ unit, I believe the 181st, took over beach patrol. This same unit patrolled all beaches, highways, and bridges from Wells to Popham.

I departed Btry B at Bailey Island sometime in Sep of 42 and CPT Len Cronkhite, currently a two star General in the Mass NG, took over. At that time, I left the harbor and can tell you nothing more concerning the 240th C.A.

I might add that the Bailey Island move was apparently made because of a U-

HEADQUARTERS

boat sighting in Aug of 42 and because there was an old hotel available for troop accomadations. Troops at Stockton Springs were housed under canvas during their stay.

Regret I can be of no further assistance and that I can not give you firm dates. At this point in time memory is not to reliable.

Yours very truly,

Guilford B. Sawyer
COL, CE, MeARNG
Commanding

COPY

HEADQUARTERS
240TH ENGINEER GROUP
STATE ARMORY
WATERVILLE, MAINE 04901

27 December 1972

Mr. N. H. Lawry
3042 Perry Ave
Bronx, New York 10467

Dear Mr. Lawry:

Reference your letter of 25 Dec 72, perhaps the following info may answer some of the questions for which you still seek answers.

The two GPF's that were at Stockton Springs were the same two that were hauled in by low bed to Bailey's Island. It is true that they arrived at night. There was also a coincidence range finder and a searchlight that came with the same shipment from Stockton Springs to Bailey's Island.

I can recall that we borrowed axes and saws from the Town of Brunswick and cut a road from the hotel (used as a billets for Btry B) to the shore line, a distance of perhaps 1¼ miles. At the same time I had borrowed a compressor and jack hammer as well as a cement mixer from the Town of Brunswick. We leveled off two areas on the rocks at the shore and poured two slabs for the guns and one for the range finder.

The 155's were dropped on the concrete slabs with a center field of fire perpendicular to the shore line. As I recall the bottom carriage of the 155's and the trails made the only contact on the slab. I can't recall whether the spades were mounted in the concrete slab or not.

Not done → It's of course possible that at a later date 6" guns were brought in, but I am certain the original armament was two 155 GPF's. Incidentally, the 155 is approx. the same caliber as a 6" gun.

Reference your postscript, I am a member of the Officer's Assoc., 240th CA. Harold Lawrence is of course an old friend and associate of mine, going back to 1940 or 1941.

Yours very truly,

Guilford B. Sawyer
COL, CE, MeARNG
Commanding

F-6

COPY

THE MEDICAL COLLEGE OF WISCONSIN
561 NORTH FIFTEENTH STREET
MILWAUKEE, WISCONSIN 53233

OFFICE OF THE PRESIDENT
(414) 257-8225

November 29, 1977

Mr. Nelson H. Lawry
2839 Valentine Avenue
Apt. 5C
Bronx, New York 10458

Dear Mr. Lawry:

This is in response to your letter of November 19. I wish my memory served me better - I will do the best I can.

I was in the Portland area from September, 1940 until January or February, 1944. My first assignment was at Ft. McKinley in 1940 and I remember serving two 6-inch disappearing guns which had to be Battery Acker and at least one battery of 8-inch disappearing guns - the name Honeycutt rings a bell. Those two were scrapped the summer of 1943. Very shortly after that I was sent to Cow Island, Ft. Lyon. At that time there were three 3-inch anti-aircraft guns mounted on pedestals and three 3-inch guns Sea Coast also pedestal mounted. I am almost certain there were no 6-inch guns mounted on that island. The 3-inch anti-aircraft were replaced by 90mm later on.

My next assignment was a short tour on Bailey Island, at the time of the submarine surfacing you spoke about. The guns were emplaced two months after the sub sighting which gave three 155 Batteries at Popham Beach, Bailey Island and Biddeford Pool. The second sub sighting off Jewell Island I don't recall at all. I then returned to Ft. Levett and commanded Battery Foote before it was casemated. I think your list on Levett is reasonably accurate except I don't remember Battery Daniels as being 3-inch guns. There were three 3-inch anti-aircraft guns near Battery Ferguson.

ust → rumor

was removed 1920

My last assignment was commanding the Third Battalion 240th, which was the anti-aircraft battalion. By this time, 1943, there were 90mm batteries at Ft. Lyon, NO Jewell Island, Ft. Preb~~b~~le NO and Ft. Levett. There was also a searchlight battery scattered in multiple positions around Portland.

I recall witnessing the firing of the mortar battery at Ft. Preb~~b~~le in early 1940. I am pretty certain they were not fired thereafter, but I do not recall when they were actually scrapped. I do not think the mortars at Ft. McKinley were actually fired.

F-7

With respect to the 8th Coast Artillery, it was certainly still there when I departed the Harbor Defenses in early 1944, but my memory says that it left very early in 1944 after having had many levies made on its personnel.

There was a 10-inch disappearing battery at Ft. Williams which I test fired in late 1942 or early 1943. I remember this quite vividly since we managed to blow down most of the wooden warehouses located in the immediate front of the battery and break many of the windows in the homes adjacent to the fort.

Of the ten 90mm dual purpose batteries emplaced during WW II, I commanded only four: at Preble, Lyon, Jewell and Levett. The remainder, while being dual purpose, were certainly not in my intelligence net while I had the Third Battalion.

I hope these scraps of information will be of some help to you and your friend, and I apologize for not having a more detailed remembrance of those early days.

Warmest personal regards.

Sincerely,

Leonard W. Cronkhite, Jr., M.D.
MG USAR (Ret.)

LWC/er

Dr Cronkhite's otherwise excellent memory fails with a 90mm gun battery at Fort Lyon: none of the ten 90mm AMTB batteries was there. And he confuses the 90mm gun battery at Fort Williams with one at Fort Preble (none there).

PORTLAND DEFENDED

A HISTORY OF THE UNITED STATES GOVERNMENT FORTIFICATIONS OF CASCO BAY 1794 - 1945

By

Donna Lee McKinnon

B.A. University of Southern Maine, 1980

A Thesis

Submitted in Partial Fulfillment of the

Requirements for the Degree of

Master of Arts

(in History)

The Graduate School

University of Maine

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CHAPTER 8

WORLD WAR II, 1940 to 1945

Beginning in March, 1940, the Harbor Defense Board resurveyed defense needs, which took on a new urgency with the fall of France in June and the aggressive behavior of the Japanese. Naval attacks against the Atlantic coast had been a remote possibility before, but with the fate of French and British fleets uncertain, and American naval inferiority in either the Atlantic or Pacific a disquieting prospect, the danger took on new dimensions. Defenses had to be planned for use against vessels which varied from battleships to motor torpedo boats. The battleship, with sixteen inches of armor plate, a speed of thirty knots and nine 16-inch guns capable of firing twenty-three miles, represented the ultimate fighting platform, measuring 800 feet long by 108 feet wide with a draught of 30 feet. Motor torpedo boats, carrying two to six 21-inch torpedo tubes and two 47mm anti-aircraft guns, were capable of speeds of 36 knots, which allowed them to enter a harbor through a narrow passage and disrupt shipping. These small fast boats measured 105 feet long by 24 feet wide with a draught of less than 5 feet. Between these two classes of vessels were a variety of armored cruisers, cruisers, destroyers, and torpedo boats. Additional naval weapons of this era included submarines and aircraft carriers.[1] The survey broadened into a complete reassessment of harbor defenses. The results showed the need for 16-inch guns, 6-inch support weapons, mines, anti-motor torpedo boat guns and anti-aircraft guns.

[1]Fred T. Jane, *Jane's Fighting Ships, 1941*, (New York: MacMillan Co., 1942), pp. 22, 25, 164, 205, 288.

The board proposed construction on the American coast of twenty-seven twin-gun 16-inch casemated batteries with a range of 25.4 miles, to deal with battleships and heavy cruisers. The 16-inch Naval ordnance, planned for use on vessels eliminated by the Washington Naval Treaty of 1922, became available to the Army. Also recommended were casemates to provide air cover for the ten 16-inch and thirteen 12-inch batteries including Battery Foote installed since World War I. Also proposed were fifty twin-gun 6-inch batteries with a range of fifteen and a half miles for use against cruisers and other fast light ships. These would be reinforced by existing secondary batteries that were to be retained in the defense system. As proposed, the plans called for twenty-five 16-inch batteries, one 8-inch battery and thirty-one 6-inch batteries. Construction got under way, and by the end of the war, twelve 16-inch, one 8-inch battery, and eighteen 6-inch batteries had been completed in the continental United States. This modernization program competed with other expenditures of the Army and Navy in the early 1940's.[2]

Portland Harbor received her share of the new defense program. On Peaks Island, construction included a 16-inch emplacement (Battery Steele) and one of three 6-inch guns batteries, (Battery Cravens on Peaks Island, Jewell Island to the northeast and Cape Elizabeth, south of Portland). The Jewell Island and Cape Elizabeth batteries never received names. Cape Elizabeth was to have received a 16-inch battery, but revisions in November 1942, eliminated it.[3]

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[2]Adjutant General's Office, WWII Operations Reports, American Theater, "History of the Eastern Defense Command," NA RG 94 [hereafter cited as "Eastern Defense Command"], pp. 19, 23; Parkman, *Army Engineers*, pp. 126-127; Lewis, *Seacoast Forts*, p. 116.
[3]"Eastern Defense Command," pp. 21-22.

According to the Army: "The principal requirements of the Harbor Defenses of Portland were to prevent entrance of enemy ships into the harbor and to hold their naval units to a line far enough from shore to render bombardment ineffective."[4] The two 16-inch guns of Battery Steele were capable of hurting the heaviest of battleships. The guns were emplaced in reinforced concrete casemates and covered with earth, sand and sod to make them less visible from sea. Although the casemates restricted the field of fire, the protection they provided justified such a restriction. The casemated structure between the guns housed the magazines, power generators, air-conditioning equipment, communications, storage and service rooms. Problems with concussion caused plotting rooms to be located on a separate site. With a range of 25.4 miles the guns of Battery Steele could open fire on vessels that they could not even see. Daylight visibility on the Atlantic Coast could not be counted on to be more than six to eight and a half miles.[5] Radar removed some of the range restrictions although the fire control system was not perfected during the war. Radar was used for surveillance, and position finding.

The new 6-inch guns at Cape Elizabeth, Peaks Island and Jewell Island could keep cruisers and smaller vessels at bay. These new guns were protected all around by a curved steel shield four to six inches thick, providing protection from machine-gun and light cannon fire. The magazine complex was to the rear of the two guns, which were 200 feet apart, and contained powder rooms, shell rooms, air conditioning and generator room,

[4]"Eastern Defense Command," pp. 18, 19.
[5]Ibid., p. 29.

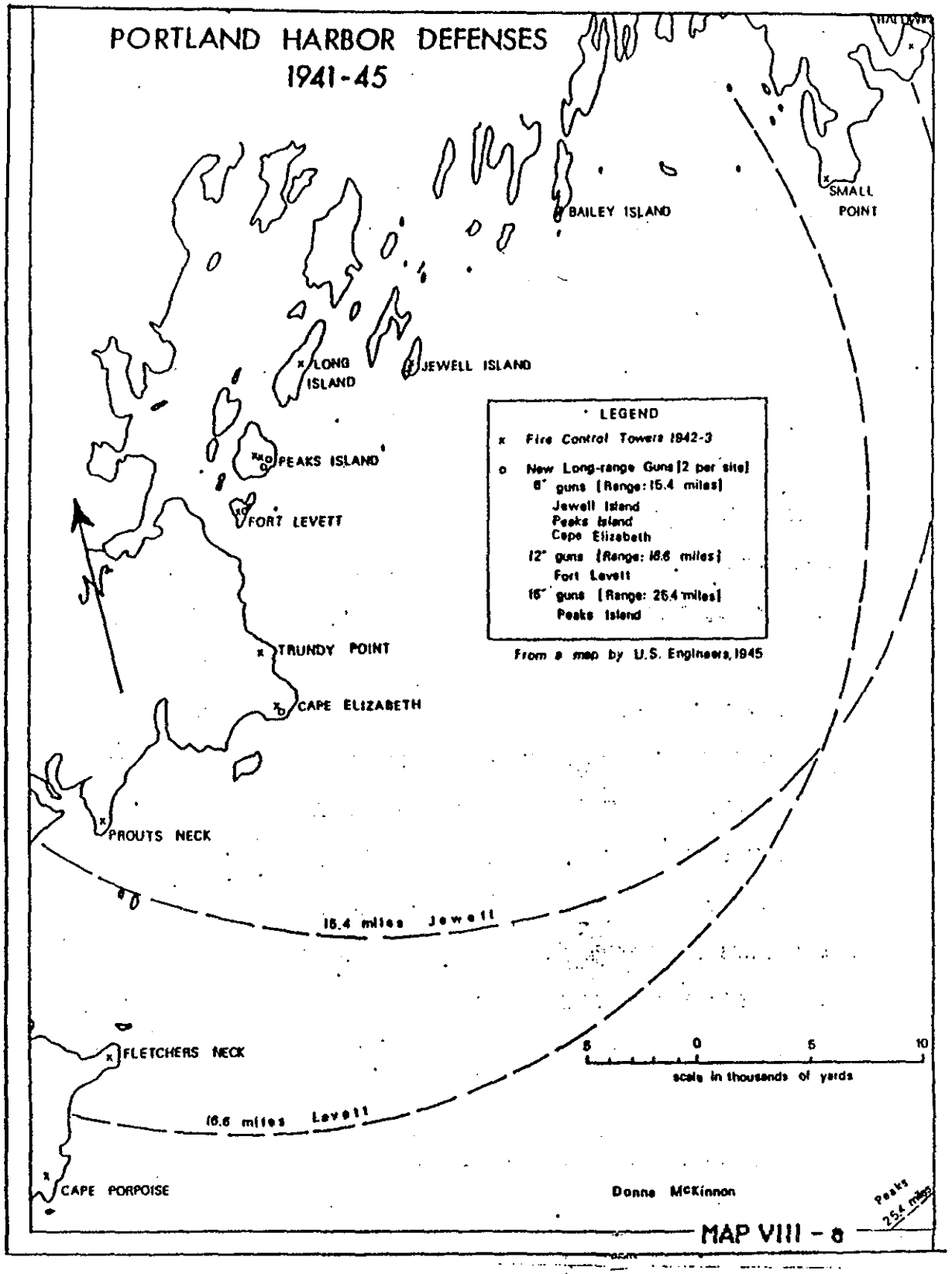
switchboard, spotting or radio room and entrances near either gun position or through an off-center rear corridor.[6] (see Plan VIII - a, 6-inch Battery).

There were also ten anti-torpedo boat batteries with 90mm guns - to handle the smallest of vessels, mostly torpedo boats, and anti-aircraft guns with 37mm and 3-inch guns. These were located on most inlets into Portland Harbor, from Bailey Island to Fort Williams. Another element of the defenses was the thirty-six or sixty-inch searchlights.

This was also the period when the fire control towers were constructed along the coast. These concrete towers, twelve to fifteen feet square or round, became the eyes of the forts. Those within kept watch on the waters around the well-defended harbors and notified the commanders of the big guns of the approaching enemy. The fire control towers were located (north to south) at Fort Baldwin (Phippsburg), Small Point, Baileys Island, Jewell Island, Long Island, Peaks Island, Fort Levett (Cushing Island), Trundy Point, Cape Elizabeth, Prouts Neck, Fletchers Neck, and Cape Porpoise.[7] (see Map VIII - a, Harbor Defenses of Portland - World War II).

The Navy also had a hand in the defensive plans. It had a need for a North Atlantic base to support the Neutrality Patrol, especially the escorts protecting vessels transiting between the United States coast and Iceland. Casco Bay was selected as a destroyer base in the summer of 1941. Initially vessels there were serviced by itinerant tenders and oilers, but on December 30, 1941, Long Island was selected as a fueling annex to include three underground concrete tanks. During 1942 an additional eight fuel oil and four diesel oil tanks were installed. When all the construction was

[6]Plans of 6-inch battery of World War II from Bureau of Parks and Recreation at Two Lights Park, Cape Elizabeth. [Single sheet undocumented].
[7]"Annexes to Harbor Defenses of Portland, Fire Control, 1945," NA RG 407.


PORTLAND HARBOR DEFENSES
1941-45
BAILEY ISLAND
SMALL POINT
LONG ISLAND
JEWELL ISLAND
PEAKS ISLAND
FORT LEVETT
TRUNDY POINT
CAPE ELIZABETH
PROUTS NECK
FLETCHERS NECK
CAPE PORPOISE
LEGEND
x Fire Control Towers 1942-3
o New Long-range Guns (2 per site)
6" guns (Range: 15.4 miles)
Jewell Island
Peaks Island
Cape Elizabeth
12" guns (Range: 18.6 miles)
Fort Levett
16" guns (Range: 26.4 miles)
Peaks Island
From a map by U.S. Engineers, 1945
15.4 miles Jewell
18.6 miles Levett
5 0 5 10
scale in thousands of yards
Donna McKinnon
Peaks 26.4 miles

MAP VIII - 8

completed in June, 1943, the facility could hold 480,000 barrels of fuel oil, 108,000 barrels of diesel fuel, and 300,000 gallons of gasoline. Also, in 1942 a seaplane ramp and hanger were added to permit PBY *Catalina* patrol bombers to operate, primarily on training missions with the convoy escorts operating from Casco Bay. The Naval Auxiliary Air Field, Long Island, begun January 15, 1943, was attached to Naval Air Station Brunswick, and served as a base for its air-sea rescue boats as well as a site for the launching of target drones. Additional facilities built on the south side of Peaks Island serviced the escorts, and the Navy took over the Maine State Pier on the mainland as a supply pier.[8]

The mission of the navy was to provide support for the Task Forces using the fleet anchorage in Casco Bay, by maintaining fleet landings at Portland and fleet training, recreational and other facilities on the islands adjacent to the anchorage. Fleet units using the anchorage were supposed to be self-supporting.[9]

The Navy provided for the local defense of the harbor with patrol craft and mine sweeping and laying vessels. It installed a system of mine nets and booms, and a magnetic loop with a station at Bailey Island. (see Plans VIII - b, Underwater facilities) Wartime personnel ashore numbered 90 officers and 700 enlisted men.[10] On July 1, 1946, the lease for the Magnetic Loop Station, at Bailey Island was allowed to terminated and the land was returned to the previous owners. On September 6, 1946, the removal of fixed obstructions in Casco Bay was completed.[11]

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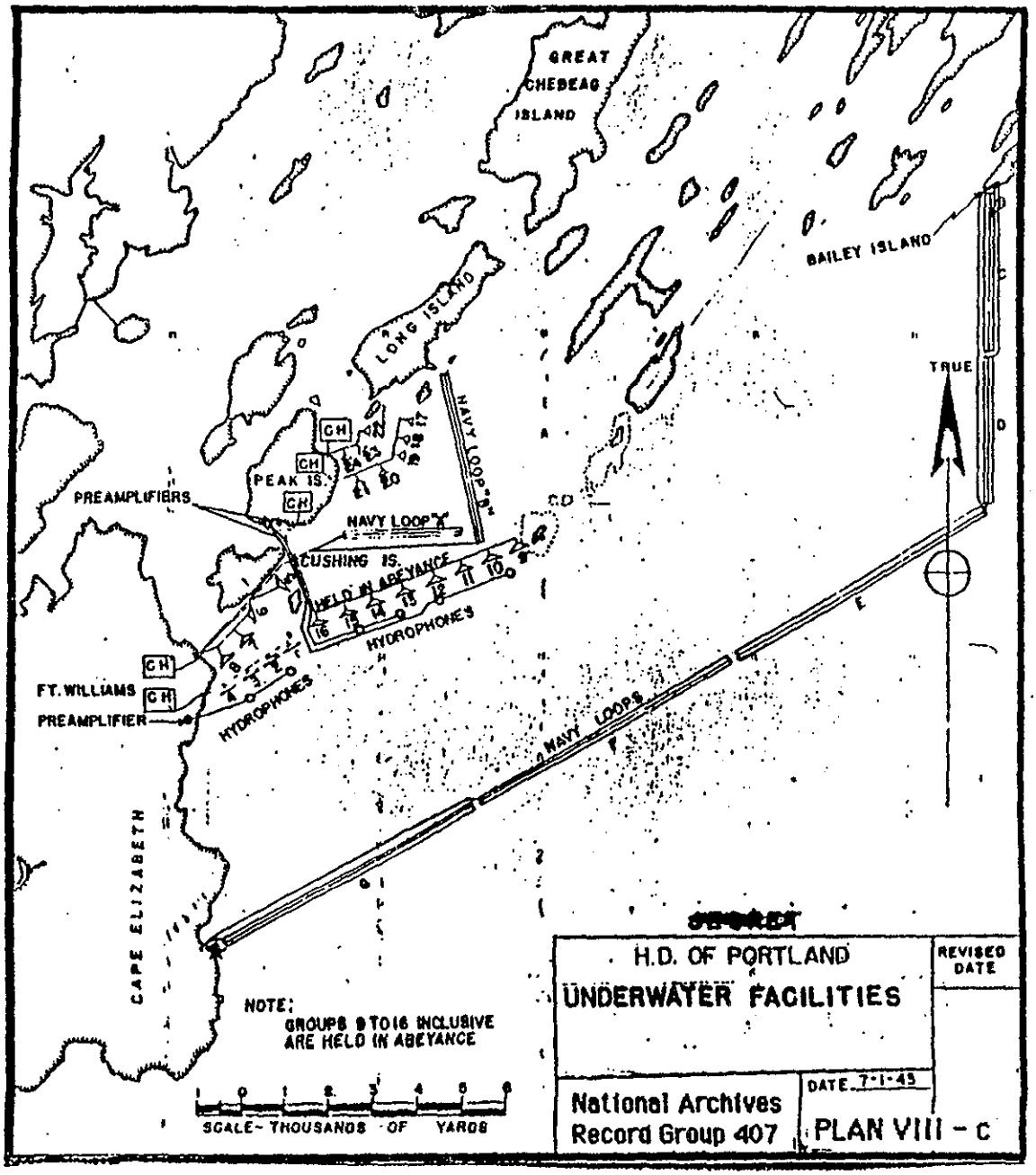
[8]Coletta, *US Navy Bases*, p. 74.
[9]Department of the Navy. Operational Archives Branch. Naval Historical Station. "U.S. Naval Station-Portland, ME. Administrative History," 1946, p. 5.
[10]Ibid., pp.1-2.
[11]Ibid., pp. 2-3.


GREAT CHEBEAG ISLAND
BAILEY ISLAND
LONG ISLAND
NAVY LOOP "B"
TRUE
CH
PEAK IS.
PREAMPLIFIERS
NAVY LOOP "A"
CUSHING IS.
HELD IN ABEYANCE
HYDROPHONES
FT. WILLIAMS
PREAMPLIFIER
HYDROPHONES
NAVY LOOP "E"
CAPE ELIZABETH
NOTE:
GROUPS 9 TO 16 INCLUSIVE ARE HELD IN ABEYANCE
SCALE~ THOUSANDS OF YARDS
H.D. OF PORTLAND
UNDERWATER FACILITIES
REVISED DATE
DATE 7-1-45
National Archives
Record Group 407
PLAN VIII - C

The end of World War II brought also an end to conventional coastal defenses. The Normandy landings proved that large numbers of men could be landed effectively at locations other than ports. Moreover, the atomic bomb and long range, high-altitude bombers were weapons beyond the capabilites of harbor defenses. Defenses followed the technology of the day and became mobile defenses with early warning systems, and continued their trend to meet the changes with changes of their own. One by one the forts were deemed obsolete and sold out of government service.

Many of the Forts were acquired by State and local government for public purposes and a few are in private hands. Fort Preble, in South Portland, with its multi-systems, is used as the Southern Maine Vocational Technical Institute. It retains construction features of the Second and Third Systems and Endicott Period. The original stone work from the Second System fort serves as a retaining wall for the earth fronting Endicott Battery Rivardi. Endicott Battery Mason sits between Third System powder magazines. Additional powder magazines are to the west of Battery Rivardi. The exterior granite walls of the Third System remain much as left by the Engineers over a hundred years ago. Many of the Quartermaster Corps buildings, barracks, fire house, officers' quarters, hospital, etc. still exist and are being used by SMVTI. Fort Williams was acquired by the Town of Cape Elizabeth and made into a park. The larger batteries were filled in to prevent injury. The smaller batteries, Keyes and Garesche, still remain, as does Battery Hobart though they are over grown. Most of the buildings were destroyed for reasons of safety. Another State park in Cape Elizabeth is the site of the 6-inch battery from World War II. The guns positions provide platforms for picnic tables and the round fire control tower from World War II serves as a pleasant place to view Casco Bay and look for ships.

Leaving the mainland, one finds that the islands of Casco Bay provide a history lesson of fortification construction. To get to any other island from the Portland docks one has to pass Third System Fort Gorges. This granite monument to architectural skill is a city-owned park, unmaintained. The earth added in the 1870's has allowed seepage into the brickwork arches causing the unsetting of the bricks. This is the only fort in the harbor with a gun in it. On the top tier is a 300 pounder Parrott Rifle. Privately owned Third System Fort Scammel has regular tours and is maintained for such. This remains as an excellent example of a Third System fort with little modification. Also privately owned is Fort Levett. This Endicott, World War I and II fort has been developed as year-round dwellings, and summer cottages utilize the existing buildings. The batteries and fire control towers are neither vandalized nor preserved, but are durable. Battery Foote, one of only thirteen such batteries on the East and West Coasts, serves as the only remnant of the World War I construction era in Portland, though modified in World War II.

On Peaks Island is the only example of a 16-inch battery in the State of Maine and one of only twelve such structures within the continental United States. This gun position with its massive overhead canopy represents the ultimate in protection and once housed the largest weapons emplaced in the nation. In the same area on the higher land of the island are the 6-inch battery and two fire control towers. Another 6-inch battery is located on Jewell Island which is also the site of two fire control towers.

The last two Endicott forts, McKinley and Lyon, are privately owned. Fort McKinley has received the most headlines in recent newspapers as the new owners, who want to turn the buildings into condominiums. This fort remains in the most complete state of any of the Endicott era forts. Although

vandalized, most of the buildings remain intact, and none of the batteries has been filled. It has the only mortar battery left in the state. Additional fire control towers dot the coast as additional reminders of the military presence of yesteryear.

THE MODERN DEFENSES OF THE COAST OF MAINE

1891-1945

by

Joel W. Eastman

Prepared for

Maine Historic Preservation Commission
Augusta, Maine

October 31, 1988

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pads on which tents were erected each year. A Citizens Military Training Camp was established at Fort McKinley which also held summer encampments and developed its own permanent camping area with a wooden mess hall and tents. While the batteries of all the forts were on caretaker status between the wars, the buildings at Forts McKinley and Williams were occupied by the Fifth Infantry Regiment which arrived in 1923 after occupation duty in Europe.(16) During the Great Depression, the U.S. Army was given the responsibity for administering the Civilian Conservation Corps, and a CCC Camp was constructed at Fort Williams in 1935. Additional Federal funding for construction was provided by the National Industrial Recovery Act, the Works Progress Administration, and the Public Works Administration, all of which was used particularly for recreational facilities such as theaters, tennis courts, handball courts, and at Fort Williams, a swimming pool and lily pad pond.

World War II, 1939-1945

In 1937, despite inadequate funding, the U.S. Army designed and built a prototype of a new generation of coast defense battery at San Francisco. It was a huge, heavily-reinforced concrete structure providing all-around protection and concealment for two 16 inch rifles and all of their ancillary equipment -- shell rooms, powder magazines and power rooms. A separate poison gas-proof structure housed the battery's plotting, telephone switchboard and radio rooms. With the outbreak of World War II in Europe the Army's Harbor Defense Board made recommendations for modernized defenses for thirty-three locations, including Portland, Maine, and the harbor of Portsmouth, New Hampshire, and Kittery, Maine. The board recommended retain

most 3 inch and some 6 inch batteries and providing the guns with steel shields. The 12 inch long range batteries built during World War I were to be modernized by providing overhead protection and concealment for the guns, gas-proofing their plotting rooms, telephone switchboard rooms and latrines, and adding larger electric power plants.(17)

The heart of the new harbor defense system, however, was to be the new 16 inch batteries, which would utilize surplus naval rifles with a range of 26 miles to counter the new naval threat. A newly-designed 6 inch battery would supplement the 16 inch guns. It would also include a heavily reinforced concrete structure, but only for magazines, shell rooms, plotting, switchboard and radio rooms and power room--the guns, which had a range of 17 miles, would be mounted adjacent to the structure and be protected by steel shields. The final artillery component of the new system were anti-motor torpedo boat batteries, designed to counter the threat of enemy torpedo boats entering a naval anchorage. The AMTB batteries temporarily utilized 3 inch guns, but were soon modified to utilize new rapid-fire 90mm guns. Each battery was equipped with two fixed guns with steel shields and two mobile guns, and four 40mm mobile guns to supplement the larger weapons. The range of the modern guns required fewer batteries and personnel to defend the harbors than the earlier systems. Standardization of the new batteries to many fewer sizes meant savings in construction and maintenance, and ammunition manufacturing and handling, and also less complex tactics and simplified training of personnel. (18)

Standardization was also applied to the other components of the new system. A new generation of mine casemates were built c

heavily reinforced concrete and well concealed, and new battery commander stations and mine observation stations were built entirely of concrete and concealed or camouflaged where possible. A large number of observation stations had to be provided to serve the longer range guns, and although elements of the stations were built to standardized designs, considerable variation was allowed so that individual stations could be tailored to fit the terrain and neighborhood. Radar towers were usually designed to look like water towers, and radar operations and generator buildings were highly standardized and often prefabricated. Most uniform in design were the structures in which the personnel lived while manning these new defenses. Officers quarters, barracks, mess halls, administration and recreation buildings, post exchanges, and storehouses were all built of wood on concrete foundations to standardized designs drawn up by the Corps of Engineers which took over the responsiblity for building and maintaining these buildings from the Quartermaster Corps in 1941.(19)

The harbor defenses of Portland and Portsmouth were fully incorporated into the modernization program. All of the mainland forts had been given vehicle garages in 1940 as the Army mechanized, and the same year, after the call-up of the National Guard, work began on temporary wooden barracks, mess halls, recreation and administration buildings to allow a doubling of the strength of the regiment through the Selective Service Act. After the attack on Pearl Harbor on December 7, 1941, the harbor defense forts were placed on alert. The older batteries were manned and test-fired, and the mobile 155mm batteries were set up at Biddeford Pool and old Fort Baldwin to provide interim protection unil the new defenses could be built

of the modern batteries in Portland were begun until 1942, but the resultant modernization was most the extensive and powerful system built. Fort Foster in Kittery was modernized with a new mine casemate and double mine control station, a 90mm anti-motor torpedo boat battery, and a 6 inch battery. Two concrete observation towers and a radar station were also built on Gerrish Island. Each of the new batteries was provided with a set of temporary wooden buildings to house and support the personnel of the unit. Additional observation towers were constructed north as far as Gelaspus Point in Kennebunkport to serve the 16 inch battery in New Hampshire which guarded the port of Portsmouth and the Naval Shipyard in Kittery, and each tower was provided with a combination barracks and mess hall.(20)

Three major new batteries were built in Portland. A 16 inch battery, Battery Steele, and a 6 inch battery, Battery Cravens, were constructed on Peaks Island, while 6 inch batteries were constructed at Two Lights in Cape Elizabeth and on Jewell Island. Three inch anti-motor torpedo boat batteries were constructed on Peaks, Long and Great Chebeague Islands. These small batteries mounted two guns on heavy concrete gun blocks and included two story concrete range finder stations and magazines. The 3 inch batteries were later incorporated into a larger system of eight 90mm AMTB batteries which extended from Fort Williams to Bailey Island, covering all of the entrances to the naval anchorage north of Long Island. Observation towers and radar stations to serve the new 6 and 16 inch batteries were built from Cape Porpoise in Kennebunkport to Fort Baldwin at Popham Beach. A new mine casemate was constructed on Peaks Island to control the mine field in Hussey Sound and double mine observation stations were built on Peaks Island and at Fort Levett. A number of older batteries and stru

were given minor improvements, such as enlarged gun platforms and new rangefinder stations.(21)

As at Fort Foster, each of the modern batteries was given temporary buildings adjacent to the batteries to house and support the personnel manning the guns. Each 90mm AMTB battery, for instance, had a compliment of approximately 250 men and required four barracks, a mess hall and a combination latrine, lavatory and storehouse. The largest of the World War II reservations were those on Peaks and Jewell Islands. Peaks, for example, had facilities to serve the 129 man crew of Battery Steele, the 123 men of Battery Cravens, the 500 men of its two AMTB Batteries, plus the personnel of a mine casemate and mine control station, a radar station, searchlight units, and two observation towers. Jewell Island housed the crews of a six inch battery, two AMTB Batteries, a radar station, searchlight units, and two observation towers. Temporary buildings on Jewell Island included seven barracks, three mess halls, three lavatory-latrines, a officers quarters, two dispensaries, a service club and post exchange, a chapel and theater, a fire station, a storehouse, and two well shelters.(22)

Construction of the new system was cut back beginning in 1943 as it became obvious that a major attack was unlikely, and the program was halted, for the most part, in 1944. Despite the cutbacks, the 1940 Modernization Program produced the most extensive and formidable harbor defense system ever built in the United States. By 1948, the concept of harbor defense by long range artillery had become obsolete after the experience of amphibious landings and air attacks of World War II. Beginning in 1948, the modern guns were scrapped, and in 1950, the U.S. Army harbor defense commands were disbanded and the Coast Artillery abolished.(23)

shields, two mobile guns in temporary emplacements; two 37mm breechloading rifles on mobile mounts in temporary emplacements (guns removed after World War II)
Battery Commander's Station, 4 barracks, mess hall, combination latrine, lavatory and warehouse, 1 story, wood on concrete foundations (salvaged or collapsed)
Current status: concrete gun blocks survive along with concrete foundations of buildings; wood battery commander's station was blown down in 1987.

Radar Tower, 1944
steel tower on concrete piers
Current status: salvaged

Radar Operations Building, 1944
1 story, corrugated steel on steel frame on concrete foundation
Current status: roof has recently collapsed.

Reservation Housing, 1943
1 story, wood buildings on concrete foundations

3 Barracks, Type B-A-T
Mess Hall, Type M-C-T
2 Dispensaries, Type T-D
Officers Quarters, Type OQ-A-T
Service Club and Post Exchange, Type PX-A-T
Chaple and Theater Type, RCC-A-T
Storehouse Type, SH-A-T
Lavatory, Type C-D-T
Fire Station Type FS-C-T
Well Shelter, concrete (extant)
Storehouse, 1 story, concrete block on concrete foundation (extant)
Current status: all buildings were either salvaged or have now collapsed, with the exception of the well shelter, the concrete storehouse, and a large chimney.

Location number 168--Bailey Island, Harpswell
Private property

World War II, 1939-1940

90mm Anti-Motor Torpedo Boat Battery No. 970, 1944
four 90mm breechloading rifles, two mounted on concrete gun blocks with steel shields, two mobile guns in temporary emplacements (guns removed after World War II)
Battery Commander's Station, 1 story, wood
Current status: concrete gun blocks survive; battery commander's station appears to have been moved and is in use as a summer house. Two other wooden structures on site may date to World War II.

Observation Tower, 1944
6 stories, concrete
2 observing levels serving Battery Foote and Battery 202.
Current status: unaltered; good condition

Observation Tower, 1944
8 stories, concrete,
2 observing levels serving Battery Steele and Battery Cravens and a SCR-296 radar antenna on the roof
Current status: radar antenna and housing removed; otherwise, unaltered and in good condition.

Radar Operations Building, 1944
1 story, concrete block
Current status: unaltered; good condition

Reservation Housing, 1943
3 barracks and mess hall, 1 story, wood on concrete foundations
Current status: salvaged; concrete foundations survive

Location 168A--Drinkwater Point, Yarmouth

37mm Section of AMTB No. 970, 1943
two 37mm breechloading rifles on mobile mounts in temporary emplacements to guard submarine net between the mainland and Cousins Island. Housing would have been provided for the gun's crews. Private property.

Location number 169--Small Point, Phippsburg

Observation Tower, 1944
6 stories, concrete
2 observing levels serving Battery Steele and Battery Cravens and a telephone switchboard. There would have been a combination barracks and mess hall on site.
Current status: tower apparently unaltered; in use as summer cottage; private property.

Location number 170--Fort Baldwin, Popham Beach, Phippsburg

Fort Baldwin was abandoned after World War I and was acquired by the state for park. The property was returned to the Army for use during World War II and then turned back to the state after the war.

Endicott and Taft Periods, 1891-1905

Battery Patrick Cogan, 1908
1 story, concrete emplacements, magazines and guard room
two 3 inch breechloading rifles (Model 1903) on pedestal mounts (Model 1903). Guns removed after World War I.
Range-finder Station added on parapet, 1921, 1 story, concrete
Current status; unaltered; good condition

Battery John Hardman, 1908
1 story, concrete emplacement, shell room, magazine, guard room and office
one 6 inch breechloading rifle (Model 1902) on disappearing car

ANNEXES

TO THE MODERN DEFENSES OF THE COAST OF MAINE

1891-1945

Compiled by

Joel W. Eastman

Prepared for

Maine Historic Preservation Commisssion
Augusta, Maine

October 23, 1988

INTRODUCTION

The following annexes have been compiled to supplement the main report by providing maps of all of the sites and drawings and photographs of representative types of ordnance, batteries and structures. The maps come mainly from the 1938 and 1945 "Annexes to the Harbor Defense Project, Harbor Defenses of Portland." The battery and structure plans come from the records of the Corps of Engineers at the National Archives. The ordnance drawings and photographs come from a variety of publications of the departments of Army, Ordnance and War. The historic photographs of buildings come from the Quartermaster building record forms 117 in the possession of the South Portland-Cape Elizabeth Historic Society and the Cape Elizabeth Town Library. The contemporary photographs were taken by the author.

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LIST OF ANNEXES

Introduction

Annex 1--Maps of Forts, Reservations and Locations

Annex 2--Representative Batteries and Ordnance

Annex 3--Plans of Representative Structures

Annex 4--Photographs of Representative Structures

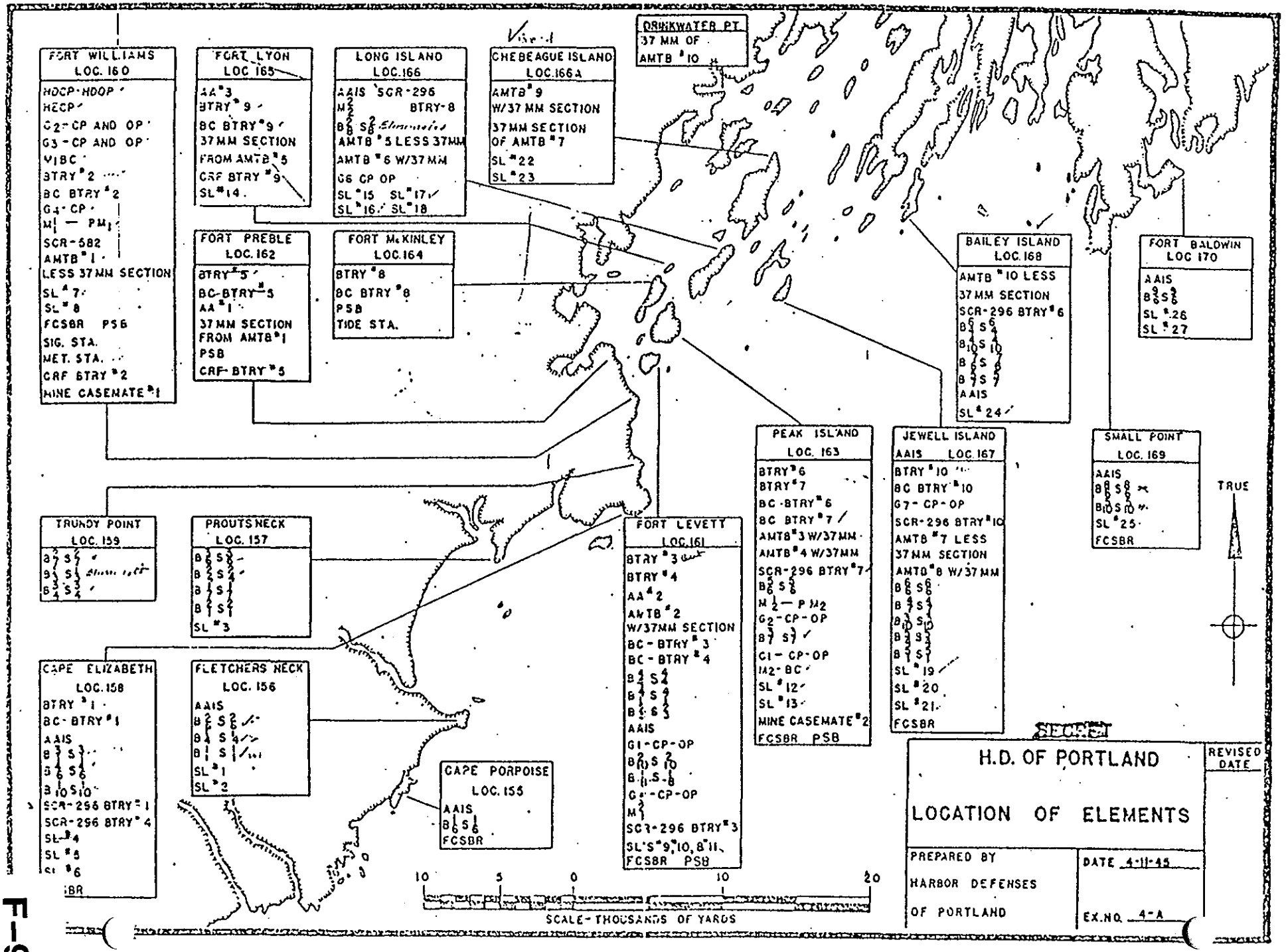
Annex 1--MAPS OF FORTS, RESERVATIONS AND LOCATIONS

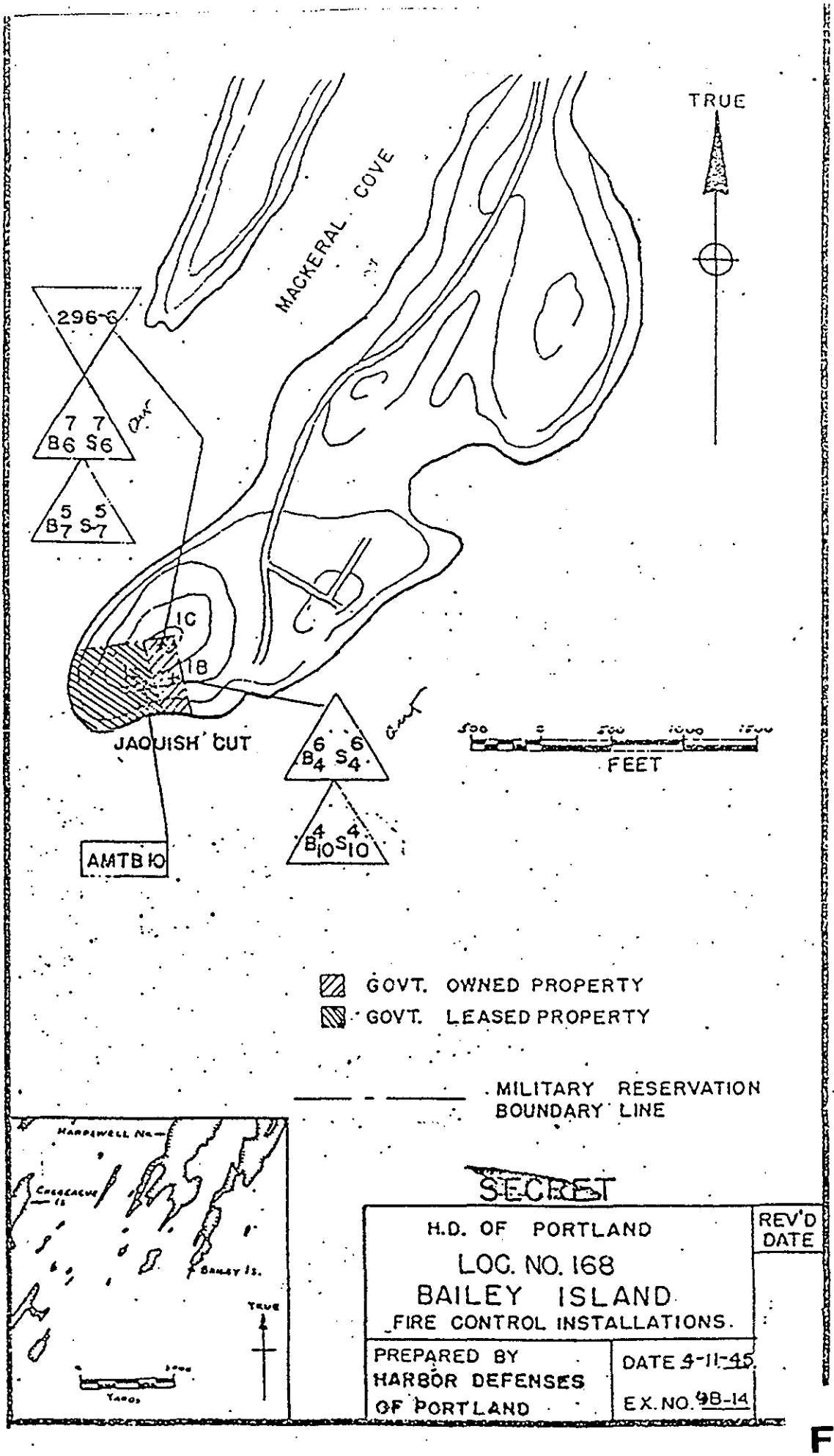
Endicott, Taft and Inter-War Periods, 1891-1938

Fort Baldwin, Kennebec River, 1920
Fort Foster, Gerrish Island, 1935
Fort Gorges, Diamond Island Ledge, 1935
Fort Levett, Cushing Island, 1935
Fort Lyon, Cow Island, 1935
Fort McKinley, Great Diamond Island, 1935
    D-1 North Fork
    D-2 Parade Ground
    D-3 North and South Forks
Fort Preble, Spring Point, 1935
Fort Scammel, House Island, 1935
Fort Williams, 1935
Jewells Island, 1935
Long Island, 1919
Peaks Island, 1935

World War II, 1939-1945

Location of Elements, Harbor Defenses of Portland, 1945
Location no. 148 Fort Foster
Location no. 149 Sisters Point
Location no. 150 Seal Head Point
Location no. 151 Cape Neddick
Location no. 152 Bald Head Cliff
Location no. 153 Moody Beach
Location no. 154 Gelaspus Point
Location no. 155 Cape Porpoise
Location no. 156 Fletchers Neck
Location no. 157 Prouts Neck
Location no. 158 Cape Elizabeth
Location no. 159 Trundy Point
Location no. 160 Fort Williams
Location no. 161 Fort Levett
Location no. 162 Fort Preble
Location no. 163 Peak Island
Location no. 164 Fort McKinley
Location no. 165 Fort Lyon
Location no. 166 Long Island
Location no. 166A Great Chebeague Island
Location no. 167 Jewell Island
Location no. 168 Bailey Island
Location no. 169 Small Point
Location no. 170 Fort Baldwin


FORT WILLIAMS LOC. 160
HDCP-HDCP
HECP
G2-CP AND OP
G3-CP AND OP
VIBC
BTRY #2
BC BTRY #2
G4-CP
M1 — PM1
SCR-582
AMTB #1
LESS 37MM SECTION
SL #7
SL #8
FCSBR PSB
SIG. STA.
MET. STA.
CRF BTRY #2
MINE CASEMATE #1
FORT LYON LOC 165
AA #3
BTRY #9
BC BTRY #9
37MM SECTION
FROM AMTB #5
CRF BTRY #9
SL #14
LONG ISLAND LOC.166
AAIS SCR-296
M2 BTRY-8
B8 S8
AMTB #5 LESS 37MM
AMTB #6 W/37MM
G6 CP OP
SL #15 SL #17
SL #16 SL #18
CHEBEAGUE ISLAND LOC.166A
AMTB #9
W/37 MM SECTION
37MM SECTION
OF AMTB #7
SL #22
SL #23
DRINKWATER PT.
37 MM OF
AMTB #10
FORT PREBLE LOC. 162
BTRY #5
BC-BTRY #5
AA #1
37MM SECTION
FROM AMTB #1
PSB
CRF-BTRY #5
FORT McKINLEY LOC.164
BTRY #8
BC BTRY #8
PSB
TIDE STA.
BAILEY ISLAND LOC.168
AMTB #10 LESS
37MM SECTION
SCR-296 BTRY #6
B6 S6
B4 S4
B10 S10
B5 S5
B7 S7
AAIS
SL #24
FORT BALDWIN LOC 170
AAIS
B9 S9
SL #26
SL #27
PEAK ISLAND LOC. 163
BTRY #6
BTRY #7
BC-BTRY #6
BC BTRY #7
AMTB #3 W/37MM
AMTB #4 W/37MM
SCR-296 BTRY #7
B2 S2
M2 — PM2
G2-CP-OP
B3 S3
G1-CP-OP
M2-BC
SL #12
SL #13
MINE CASEMATE #2
FCSBR PSB
JEWELL ISLAND LOC. 167
AAIS
BTRY #10
BC BTRY #10
G7-CP-OP
SCR-296 BTRY #10
AMTB #7 LESS
37MM SECTION
AMTB #8 W/37MM
B6 S6
B4 S4
B10 S10
B3 S3
B7 S7
SL #19
SL #20
SL #21
FCSBR
SMALL POINT LOC. 169
AAIS
B8 S8
B10 S10
SL #25
FCSBR
TRUE
TRUNDY POINT LOC. 159
B7 S7
B3 S3
B4 S4
PROUTS NECK LOC. 157
B6 S6
B2 S2
B4 S4
B7 S7
B1 S1
SL #3
FORT LEVETT LOC. 161
BTRY #3
BTRY #4
AA #2
AMTB #2
W/37MM SECTION
BC-BTRY #3
BC-BTRY #4
B2 S2
B4 S4
B1 S1
B5 S5
AAIS
G1-CP-OP
B10 S10
B11 S11
G-CP-OP
M3
SCR-296 BTRY #3
SL'S #9, 10, 8 #11
FCSBR PSB
CAPE ELIZABETH LOC. 158
BTRY #1
BC-BTRY #1
AAIS
B3 S3
B6 S6
B10 S10
SCR-296 BTRY #1
SCR-296 BTRY #4
SL #4
SL #5
SL #6
FCSBR
FLETCHERS NECK LOC. 156
AAIS
B2 S2
B4 S4
B1 S1
SL #1
SL #2
CAPE PORPOISE LOC. 155
AAIS
B1 S1
FCSBR
10 5 0 10 20
SCALE-THOUSANDS OF YARDS
SECRET
H.D. OF PORTLAND
LOCATION OF ELEMENTS
REVISED DATE
PREPARED BY
HARBOR DEFENSES
OF PORTLAND
DATE 4-11-45
EX.NO. 4-A



4 - 50 cal. guns in Anti-motor Torpedo boat battery #3

The Evolution of
Bailey's Island

A story in which those remembered
may come to life again for later generations.

Beth E. Hill

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Services leased the Hazell property at the south end of the island and erected among the pine trees two sixty-foot concrete observation towers. They were manned by the army. About one hundred men lived in barracks built on the property. A navy searchlight team occupied the adjacent Barrett's property. A long cable extended out towards Halfway Rock to detect submarine sounds. The army constructed gun emplacements, subterranean powder magazines, and air-raid shelters that were concealed from sea and air. Sand bags were filled from a sandpit on the northwest end of the island (still evident on the bank of the road to Cook's Lobster House).

The Homestead became headquarters and men were billeted in the annex. Several houses in the area were rented to officers. The commander of the naval forces lived at "White Sails," while Durants was occupied by the army commander. The general lived in Portland with a large pleasure yacht for his use. Islanders say officers down to colonel had their personal yachts.

Life on the island changed drastically. A net strung across the mouth of Portland Harbor, to blockade submarines, allowed ferries to only operate within this net and prevented travel by sea to Portland. Coast Guard permits were necessary before you could go on the water. The *Aucocisco* was taken over by the army for transporting troops. Mail delivery was overland from Brunswick, under contract with Sinnett's store, where Phil Johnson posted a sign, "Ladies please do not bring your fat cans in here on Friday." Library Hall became a U. S. O. social center, and York's Crab Factory, a coffee and soda shop. Charles Down from Brunswick ran a taxi service to the island. Movies were shown at Red Man's Hall once or twice a week. Gasoline rationing again restricted islanders' contacts with the mainland. Civilian volunteer plane spotters scanned the skies from the fire station, one reported a seagull.

The Conels and Fords were standing outside the "Barnacle" one evening near dusk in early June, when two planes zoomed out of the fog to fly so low that they almost hit their chimney. They headed straight out to sea, west to east, and within seconds the onlookers heard "boom, boom," which they decided were depth charges exploding. At the store the next day, the scuttlebutt confirmed the appearance of a submarine and the naval personnel claimed the sub had been hit and sunk. However, post-war German records reported the submarine escaped outside Small Point, only to be sunk later in the Mediterranean.

From among the fishermen, four Johnsons and Jerry Gilliam became officers of the Army Water Transportation Corps. As civil servants in uniform employed by the army, they operated fifteen boats, from sixty-eight to one hundred fifty feet long, which carried provisions, transported troops, and planted mines from Portland to Connecticut, Rhode Island, New York, and New Jersey. On duty for seventy-two-hour stretches, they "took efficiency rooms" in Portland, where they were stationed.

Elroy Johnson became manager of a Chicago-based moss-raking factory at Small Point. Dark red and purple sea moss grows in clumps on rocks or ledges below sea level. After locating the moss by boat, the rakers stood on ledges where, depending on the tide, the water might be from chest high to ankle deep, and with home-made rakes, raked the moss into baskets attached behind the prongs. Draggers scraped the deeper ledges at any tide. The full baskets were emptied into a skiff, delivered to the factory, scooped from the boat and sold by the pound. Five hundred to one thousand pounds was a good days work. When dried the moss went to a processor to be transformed into an emulsifier or stabilizing agent in ice cream, puddings, and jello—a process for making gelatin well-known all over the world throughout the ages.

The annex at the Homestead had to be torn down after the war; it was "so stroyed" by the troops. The army bulldozed the gun emplacement area before leaving, but the towers remain. The land and barracks were bought by Esther Root Adams. For ten years, her husband, F. P. Adams, a newspaper columnist and author, had been a witty member of the "Information Please" radio panel. She remodeled the barracks into a summer

12

World War II: 1940-1950

To be prepared for war is one of the most effectual means of preserving peace.

George Washington

Nineteen forty-one was an eventful year. Log cabins became very popular: Stanley Chase built a cottage near the bridge, Cook's Lobster Pound and a restaurant nearby and Mr. Wise's house on York Hill. And the north end acquired rural mail delivery from Orr's Island post office.

Around ten in the morning of June 29, 1941, thirty-five picnickers boarded the *Don*, a forty-four-foot motor-cruiser, for Monhegan Island. It was a calm hazy blue day. They were not due back until seven-thirty, after a shore dinner.

When the time for their return passed, no one worried. Captain Johnson was intimately acquainted with the coast. Roaming these waters in darkness was not new to him, for the *Don* was a former rumrunner. The cruiser had recently been overhauled and carried plenty of fuel. By dark the weather was becoming unsettled, fog creeping in and lightning flickering, but no *Don*.

Anxiety had heightened by the next morning when a dungeon of fog enveloped the shore. Several boats searched cautiously and were reassured when they found nothing—seldom was a vessel lost without life jackets, gear, or some debris being found afloat. If the fog would lift, planes could search for them, but darkness came with no *Don*.

Halfway Rock's foghorn was still moaning when daylight broke. The signal for help, a siren screaming from Helen Murray's rooftop, brought grim fishermen to the post office to learn that Claude Johnson had found the first body. Scores of small craft entered the search from Bailey Island, Boothbay, and the Coast Guard station at Popham. Bill Munsey and his crew pulled aboard the bodies of two women.

For six endless days and nights boats at Mackerel Cove one by one "loomed from the relentless fog to report nothing, others to leave their grim cargoes." The only man's body retrieved, that of Captain Johnson, washed into Smith Cove. As described in *Yankee Magazine*, "He wore an expression of terror on his face, as if something had scared him to death. His arms were crossed over his body, he was tied to a keg with three fathoms of line, and all he had on was his shoes and underwear!" The body of an exceptionally strong swimmer, a teenage boy, was found on Ragged Island's shore. Thirteen victims were recovered from Sequin Island to Damariscove: several of their watches had stopped at eleven-forty-five. The body of one woman bore marks resembling burns, but the medical examiner said the ten bodies that he examined had all been in the water for at least twenty-five hours, and the marks were "skin crawling" caused by immersion.

The mystery of the *Don's* disappearance was never solved. The Coast Guard said there was no explosion or fire. One Bailey Islander firmly believed that the Don ran smack into a ledge, stove in her bow on the ledge so no planks floated free, and she sank like a stone. This would account for a sardiner hearing an engine racing wildly, as the captain tried to back her off.

Another theory was that the men were below decks playing cards and were caught there when the boat capsized. Others suggested the cruiser struck a mine, but there was no evidence of an explosion. With German submarines not uncommon off the coast, another farfetched idea was that one might have escorted the *Don* to sea and sunk her to prevent her reporting a sighting. (A dragger in 1967 picked up some old shoes and a pair of badly corroded binoculars out in a sandy gulch that runs near the ledges, which they felt were from the *Don*.)

On August 2, 1963, Bernard Johnson and John Lazarou, dragging in fog on a course they hadn't planned near Round Rock, hauled up the wreckage of the *Don*. Much debris was in the bow, such as foot gear and binoculars left when the *Don* ran aground there.

But most exciting to the islanders that summer was the great interest of Maine officials in the Tuna Tournament, as a contest based on individual rather than team participation. It became a state of Maine Tournament held at Bailey Island, with state officials in charge. Ray Campo, field and stream editor of the *New York Times* and Henry Moore, outdoor writer for the *Boston Herald*, became involved. The fifty-five entrants caught fifty tuna. Henry Strator's was the largest; but the trophy was awarded to Mrs. Maurice Meyers, Jr., her 813-pound fish established the new world record for women.

Using rod and reel to capture the "bluefin," as tuna were called, was an exciting and challenging sport. *Nebo*, one of the thirty-four boats participating in one tournament, had a bluefin strike at three-forty in the afternoon. George Rudin, the fisherman, played the fish and remained in his chair until three minutes after six the following morning. It had been close to midnight before he raised the fish. At five-thirty in the morning, when the bluefin sounded again, it rolled and caused the line to whiz through the rod guides at such speed that it frayed at two spots. Three minutes after six, with about fifty-feet astern, the line parted. The catch was lost.

The Tuna Tournament, which was soon relinquished by the state to the old Tuna Club, was interrupted by the second island tragedy of the year; the much greater one our county experienced, Pearl Harbor. Bailey Islanders not only served their country, but the island became an outpost on one of America's frontiers. Forty-seven youths went to war: between 1941 and 1945 eighteen males and one female joined the army, twenty-four served in the navy, five in the merchant marine, and one in the marines.

Army
Barbara Bixby
Charles Dexter Jr.
Paul Doughty
Leeman Dudley
Neil Durant
Elmer Gardner
Albert Johnson
Franklin Johnson
Raymond Johnson
Stanley Johnson
Arthur Leeman
Warren Lubee
Donald Matheson
John Murray, Jr.
Prosper Richards
Adelbert Richardson
Franklin Smith
Harmon York, Jr.
Harold York

Merchant Marines
Stuart Ford
George Johnson
Alton Leeman, Jr.
Russell Lord
Carl Nordstrom

Marines
Richard Bixby

Navy
Perry Allen, Jr.
Thurl Allen
Clayton Baker
Harold Baker
William Black
Elroy Doughty
Phillip Freeman
Ernest Gardner, Jr.
Kenneth Gardner
Paul Gardner
Augustus Johnson Jr.
Bernard Johnson
Carlton Johnson
Glendon Johnson
Granville Johnson
Parker Johnson
Reginald Johnson
Boylston Leeman
Walter Leeman, Jr.
Dana Lord
James Shea
Carlton Skillings
Paul Skillings
William Skillings

John Murray and Harmon York, two army recruits, gave their lives.

Jean Doughty recalls the armed forces marching in convoy with all their heavy equipment down Route 24, the day they arrived to create their outpost. The United States Armed

MODERN AMERICAN HARBOR DEFENSES

MILITARY RESERVATIONS AND CONCRETE GUN EMPLACEMENTS

1890-1950

Compiled by Mark A. Berhow

Fort MacArthur Military Press

Fort MacArthur Military Museum Association
Fort MacArthur Station Box 2777, San Pedro, California 90731

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This is an attempt to list the concrete emplacements built by the U.S. Army Corps of Engineers to hold seacoast armament of the "Modern era" (1890-1950). It includes four major generations of American coast defense construction (the Endicott Board Program, Taft Board Program, the post-World War I batteries, and the 1940 Program), as well as those batteries built during emergency situations. Every effort has been made to make this list as accurate as possible, but it will most likely contain a number of errors and omissions. The author would greatly appreciate being contacted about any corrections.

Fort and battery names used in this list are those perceived by the author as *being the last official designation*. Named batteries are *listed by surname only*, even though as many as a third of them were designated by the full name of the person (an Army officer or a prominant American figure) they were named after. The battery service years listed here are generally from the year in which the battery was transferred to the Coast Artillery Corps (or the year the battery was completed) to the year the battery was ordered removed from service (or the year the last gun was removed). Where possible, the information in a listing was confirmed from a Report of Completed Works, otherwise information from other published sources was used.

Sample Entry:

Harbor Defenses of . . .
FORT NAME Location current ownership service years (if known) rating
Battery name / # of guns / caliber / carriage type / service years / notes
(Several forts were officially abandoned as harbor defense posts in 1928 and 1947 and are denoted by parenthesis)
(Batteries known to have been completed but whose exact service years are not known are designated by an era, such as WWII)

Explanation of Comments in Notes:

destroyed	emplacement destroyed
buried	emplacement buried
empl	emplacement
repl	replaced
rem	removed
AFF	carriage designed for 360 degree fire.
number (#101)	1940 Project battery construction number (used for battery name in some cases)
NB	emplacement not built
NC	emplacement built, but not completed
NA	emplacement completed, but not armed
Still Emplaced (SE)	Original (or appropriately replaced) guns still in the battery today.

Carriage Abbreviations (N = Navy gun):

A	British Armstrong guns on pedestal mounts
AGL	altered gun lift carriage
BC	barbette carriage
BCLR	long range barbette carriage, Army gun
BCLRN	long range barbette carriage, Navy gun
BP	balanced pillar mount
CBC	long range barbette carriage in casemate, Navy gun (16" 1940 Program)
CM	casemated mount
DC	disappearing carriage
F	fixed pedestal mount (anti-motor torpedo battery (AMTB) mount)
GLC	gun lift carriage
LRH	long range howitzer carriage
M	mortar carriage
MP	masking pedestal mount (balanced pillar)
NT	turreted mount- Navy
NP	Navy gun on pedestal mount
P	pedestal mount
Pne	pneumatic (dynamite) gun and carriage
RM	railway mount- mortar
RY	railway mount- gun
SBC	long range barbette carriage with shield (6" 1940 Program)
TM	turreted mount- Army

Not Listed: Fixed (emplaced) antiaircraft (AA) guns (3" or less), some of the temporary railway carriage guns (8" RY, 12" RM) parked at site (unless emplacements were built, but some those positions prepared in Hawaii during WWII may not be listed), 155 mm GPF guns (Panama mounts and field mounts), some of the AMTBs in Hawaii, Canada, Panama or the Caribbean, fire control stations, mine facilities, searchlights.

ARF Disappearing Gun Carriages: There were three 10" DC ARF installed in circular concrete emplacements (one at Fort San Jacinto, two at Fort Stevens) and one 16" DC ARF was emplaced at Fort Michie. All 12" and 16" BCLR emplacements built prior to 1936 were ARF until they were casemated.

1940 Project Battery Constructions: For the sake of completeness, all 1940 Project batteries (6", 8", 12" and 16") are listed here, even those not actually built.

4 Gun Mortar Pits: Many (but not all) 4 gun mortar pits had 2 guns removed during the years 1917-1918. This is not necessarily noted in the list.

Prepared 240 mm Howitzer Positions in Hawaii: 12 positions for 240mm howitzers on movable M1918 carriages were prepared in 1920. Eight more positions were added during 1938-1945, although there only 12 of these weapons were on hand.

AMTB (Anti Motor Torpedo Boat) Batteries: Only the fixed emplacements are listed here. Complete 1940 Program AMTB batteries were composed of 2 - 90mm M1 guns on fixed M3 mounts, 2 - 90mm M1 guns on mobile M1 mounts and two 37mm (later 40mm) machine guns. Some of the AMTBs listed here were not completely armed with full compliment of the mobile guns. Many other positions not listed here were armed with only mobile guns. Earlier (1942) "AMTB" batteries (repositioned M1903 3" pedestal mounts) are also listed.

Current Disposition of Military Reservations and Batteries: This list contains the current information (as of 1992) on the ownership of the coast defense military reservations. This, unfortunately, is subject to change. Emplacements known to have been modified, buried, or destroyed are so noted. The fort rating system is an arbitrary device used by the author to give the reader some overall idea of what to expect to find at the sites today.

Fort Rating System

*****	all or most emplacements intact, many or most buildings remain
****	all or most emplacements intact, several buildings remain
***	all or most emplacements intact, some buildings remain
**	all or most emplacements intact, few or no buildings remain
*	some emplacements intact, few or no buildings
X.	nothing remains at the site

Sources: Much of the information tabulated in this list came from a variety of original documents, lists, books, and correspondence. As far as possible, and especially for those batteries along the Pacific Coast, the data listed in this table came from the Reports of Completed Works filed by the Corps of Engineers for each gun battery built. Additional information was obtained from some of the various Annexes to Harbor Defense Projects. More information was gleaned from the various articles, books, brochures and other publications both of a general nature and on specific forts or Harbor Defenses by various agencies such as the National Park Service, State and local historical agencies, which are too numerous to list here (For further information please see Dale Floyd's United States *Coastal Defense 1775-1950, A Bibliography*, USCOE, Washington, D.C. 1985). Additional help and information was obtained from Alvin Grobmeier, Terrance McGovern, Gregg Hagge, Bob Zink Joel Eastman, Bill Dorrance and others.

List updates: The author plans to continue to update this list. The date of this version is on the bottom of each page. Current versions of this list will always be available directly from the author or he can be contacted via the Fort MacArthur Military Press, P.O. Box 2777, San Pedro, CA 90731.

Seacoast Guns and Carriage Models used in America Coastal Defenses

For informational purposes only. The list does not contain gun and carriage model information for the individual batteries. All DC carriages are L.F., unless specifically noted as A.R.F.

Gun Models		Carriage Types and Models
16"	M1895	(DC)- M1912 (1-Ft. Grant)
16"	M1919	(DC)- M1917 ARF (1- Ft. Michie)
16"	M1919MII or MIII	(BCLR)- M1919 (2- Ft. Duvall, 2-Ft. Tilden, 2-Ft. Weaver)
16"	M1920 howitzer	(LRH)- M1920 (4- Ft. Story)
16"	Navy MKIIMI	(BCLR) - M1919M1 (2- Ft. Barette, 4- Ft. Kobbe),
16"	Navy MKIIMI	(CBC)-M1919M2, M3, M4, M5
14"	M1907, M1907MI, M1910	(DC)- M1907, M1907M1
14"	M1909	(TM)- M1909 (4- Ft. Drum)
14"	M1920 MII (Navy)	(RY)- M1920 (2- Ft. MacArthur and 2-Panama)
12"	M1895, M1900	(DC)- M1896, M1897, M1901
12"	M1888, M1895	(BC)- M1892, M1892 AGL(GLC), M1897 AGL
12"	M1895MI	(BCLR)- M1917 (32 guns mounted)
12"	M1890, M1890MI mortors	(M)- M1896, M1896MI & MII
12"	M1890, M1890MI mortors	(RM)-M1918
12"	M1908 mortars	(M)- M1908
12"	M1912 mortars	(M)- M1896 MIII
10"	M1888MI or MII	(BC)- M1893
10"	M1888MI or MII, M1895MI, M1900	(DC)- M1894M1, M1896, M1896 ARF
10"	M1900	(DC)- M1901
8"	M1888	(DC)- M1896, M1897
8"	M1888	(BC)- M1892
8"	M1888	(RY)- M1918
8"	Mk VI M3A2 (Navy)	(BCLR) M1
6"	M1897MI	(DC)- M1898
6"	M1900, M1903, M1905	(DC)- M1903, M1905, M1905MI & M2
6"	M1908	(DC)- M1908
6"	M1900	(P)- M1900
6"	M1908, M1908MI	(CM)- M1910, (P)- M1910
6"	M1903A2, M1905, (T2)M1	(SBC)- M1, M2, M3, M4
6"	Armstrong	(A)-Armstrong pedestal
5"	M1896	(BP)- M1896
5"	M1900	(P)- M1903
4.7"	Armstrong	(A)-Armstrong pedestal
4"	M1896	(P)- M1896
3"	M1898	(MP)- M1898
3"	M1902MI, M1903	(P) M1902, M1903
90m	M1	M1, M1A1 (mobile), M3 (fixed)

14" & 8" Navy gun turrets (NT)- Hawaiian turrets were eight twin 8" Navy gun mounts removed from the USS Lexington and USS Saratoga and two 14" triple Navy gun turrets removed from the sunken USS Arizona and emplaced as coastal defense batteries during World War II and manned by C.A.C. units.

The Harbor Defenses of the Kennebec

FORT BALDWIN	Sabino Head 1905 - (1928)			state park		**
unnamed	1	8"	BC	1899-1910		
Hardman	1	6"	DC	1908-1917		
Hawley	2	6"	DC	1908-1924		
Cogan	2	3"	P	1908-1924		

The Harbor Defenses of Portland

FORT McKINLEY	Great Diamond Island 1896			private		*****
Ingalls	8	12"	M	1904-1942		
Berry	2	12"	DC	1901-1943		
Thompson	3	8"	DC	1902-1942		
Weymouth	3	8"	DC	1901-1942		
Honeycutt	2	8"	DC	1901-1942		
Acker	2	6"	DC	1902-1943		
Carpenter	2	6"	P	1906-1947		
Farry	2	3"	MP	1902-1920		
Ramsay	2	3"	MP	1902-1920		
FORT LYON	Cow Island 1896			private		**
Bayard	3	6"	DC	1907-1917		
Abbott	3	3"	P	1909-1946		
FORT WILLIAMS	Cape Cottage 1898			city park		**1/2
Blair	2	12"	DC	1903-1943	partially buried	
Sullivan	3	10"	DC	1898-1938	buried	
DeHart	2	10"	DC	1898-1942	buried	
Garesche	2	6"	DC	1906-1917		
Hobart	1	6"	A	1900-1913		
Keyes	2	3"	P	1905-1946		
AMTB 961	2	90m	F	1943-1946		
FORT LEVETT	Cushing Island 1903			private		**?
Foote	2	12"	LRBC	1924-1948	casemated-WWII	
Bowdoin	3	12"	DC	1903-1943		
Kendrick	2	10"	DC	1903-1942		
Ferguson	2	6"	P	1906-1947		
Daniels	3	3"	MP	1903-1920		
AMTB 962	2	90m	F	1943-1946		
FORT PREBLE	Spring Point 1808			State school		***
Kearny	8	12"	M	1901-1942	buried	
Chase	8	12"	M	1901-1942	buried	
Rivardi	2	6"	DC	1906-1918		
Mason	1	3"	P	1906-1946	gun moved to new position 1942	
Peake Island Military Reservation				private		**
Steele (#102)	2	16"	CBC	1945-1948		
Cravens (#203)	2	6"	SBC	1945-1948		
unnamed	2	3"	P	1942-1943		
AMTB 963	2	90m	F	1943-1946		
AMTB 964	2	90m	F	1943-1946		
Cape Elizabeth Military Reservation				state park		**
#101	2	16"	CBC		NB, location not in park but nearby	
#201	2	6"	SBC	194? NA		
Jewell Island Military Reservation				state prop		**
#202	2	6"	SBC	1944 NC		
AMTB 967	2	90m	F	1943-1946		
AMTB 968	2	90m	F	1943-1946		
Long Island Military Reservation				private		?
unnamed	2	3"	P	1942-1943		
AMTB 965	2	90m	F	1943-1946		
AMTB 966	2	90m	F	1943-1946		
Other locations						?
unnamed	2	3"	P	1942-1944	Chebeague Island	
AMTB 969	2	90m	F	1943-1946	Great Chebeague Island, buried	
AMTB 970	2	90m	F	1943-1946	Bailey Island	

170 Fifth Avenue
Oswego, NY 13126-1808
March 30, 1995
(315) 342-2840

ATTN: SMCAC-ESL (Shirley Daniels)
DIRECTOR
USADACF
SAVANNA, IL 61074-9639

Dear Ms. Daniels:

I do not have much information directly pertaining to armament or explosives at Fort Popham, Maine. In fact, nothing I have indicates that the fort ever fired a gun. I have a tiny and uncopiable drawing from 1873 that seems to show 40 to 50 guns mounted in the old fort. A drawing in the National Archives, a copy of my handwritten notes enclosed, dated January 1886, states that there were six 8" Rodman guns and five 100 pounder Parrott rifles mounted. But only one magazine was finished and "the finished magazine is very damp." This would seem to indicate that no powder was kept at the fort.

In 1898, in response to a perceived threat from the Spanish fleet (its exact location was unknown after it left Spain headed west - so it was presumed to be planning to bombard the entire U.S. Atlantic coast), many U.S. ports were temporarily armed "just in case". There was a plan in the National Archives to build several (5 or 6) emplacements for "modern" guns to defend the Kennebec River (mostly, the shipbuilding at the Bath Iron Works). The only part built seems to have been the emplacement for one modern 8" gun on a reinforced carriage designed originally for a 15" Rodman smoothbore gun of Civil War vintage (plan enclosed). That emplacement, about 50 yards southwest of Fort Popham, next to the access road, still existed in 1990 and still does, as far as I know.

The "Kennebec River / Fort Baldwin / Sabino Head" map enclosed shows a "T.S." (Torpedo Storage - "torpedo" was the nomenclature for the equipment of an electrically controlled minefield), Bldg 31 is an Ordnance Storehouse, 80 thru 82 are Lightkeeper's house, Woodshed and Oil house, respectively. Outside the fort, 6 is NCO qtrs, 12 (looks like 17 on the copy) is the boathouse, 13 is stable, 14 is woodshed. There are two small open squares that are part of minefield controls: the one with a black square inside was the casemate (electric equipment, perhaps a small (5 hp) generator), the other (M") was an observation post (telephone, telescope).

I have heard stories that the minefield in front of Fort Popham was set up in World War I, but seen no evidence (except that the above "suitable structures" had been built at some date) either way.

The 3" and 6" guns on Fort Baldwin (1200 feet southwest) were installed around 1905, removed around 1918, may have fired practise rounds. In WW II, a battery of four 155mm (WW I vintage) guns were installed on Fort Baldwin (in modified Battery Hawley & just north of it). Those guns may have fired for practise.

Both Fort Popham and Fort Baldwin are in the Maine State Park system, open to the public much of the year. Left to the mosquitoes in summer, the weather in winter.

The BAILEY ISLAND "LOC. NO. 168" map shows the location of the 90mm AMTB battery with respect to the towers (which still stand, I believe). I assume that the battery fired, but I do not know. The normal 90mm battey included four guns (two on mobile and two on fixed (bolted down & armored) mounts, radar, magazines, etc. Bailey Island is fairly densely populated - a nice ferry ride/commute to Portland, a short drive to Brunswick.

Additional information might be gleaned from Joel Eastman, 36 Lester Drive, Portland, ME 04103 (207 797 2745) or Glen Williford, 634 Silver Dawn Court, Zionsville, IN 46077 (317 873 6760). Both the above are home addresses and phone numbers.

Consider the enclosed a present to the government, the 35 cents plus postage would no doubt break the Defense budget.

Sincerely yours,

Bob Zink

Robert D. Zink

Encls

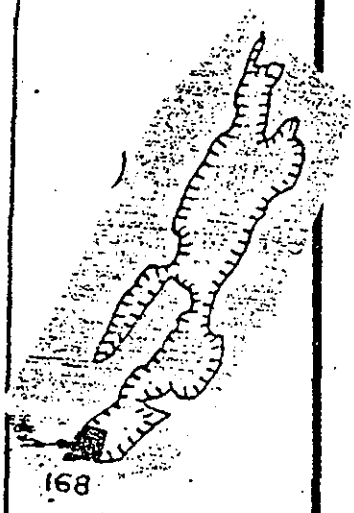
WW II
Battery
AMTB-10
2-90mm

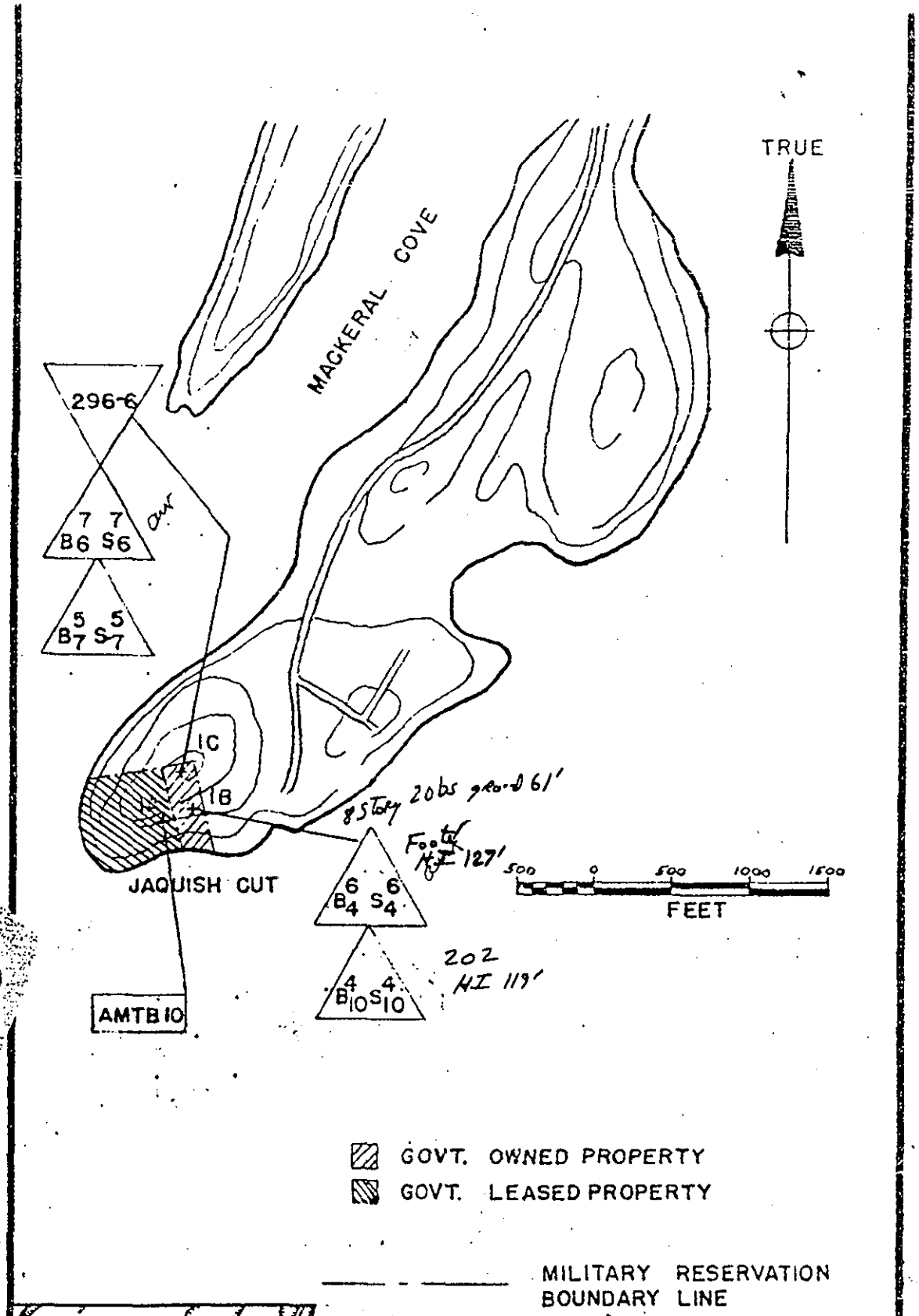
STEELE
202
201
ground 70
Antenna 147

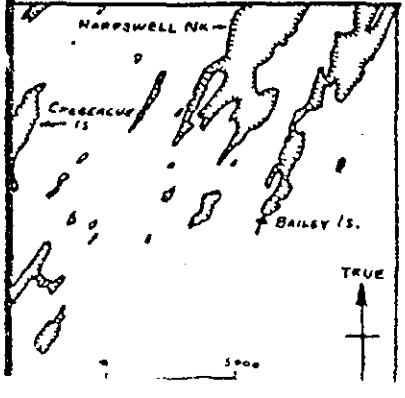
STEELE
HI 138

CRAVENS
HI 130'

6 STORY 20 obs
ground 70'



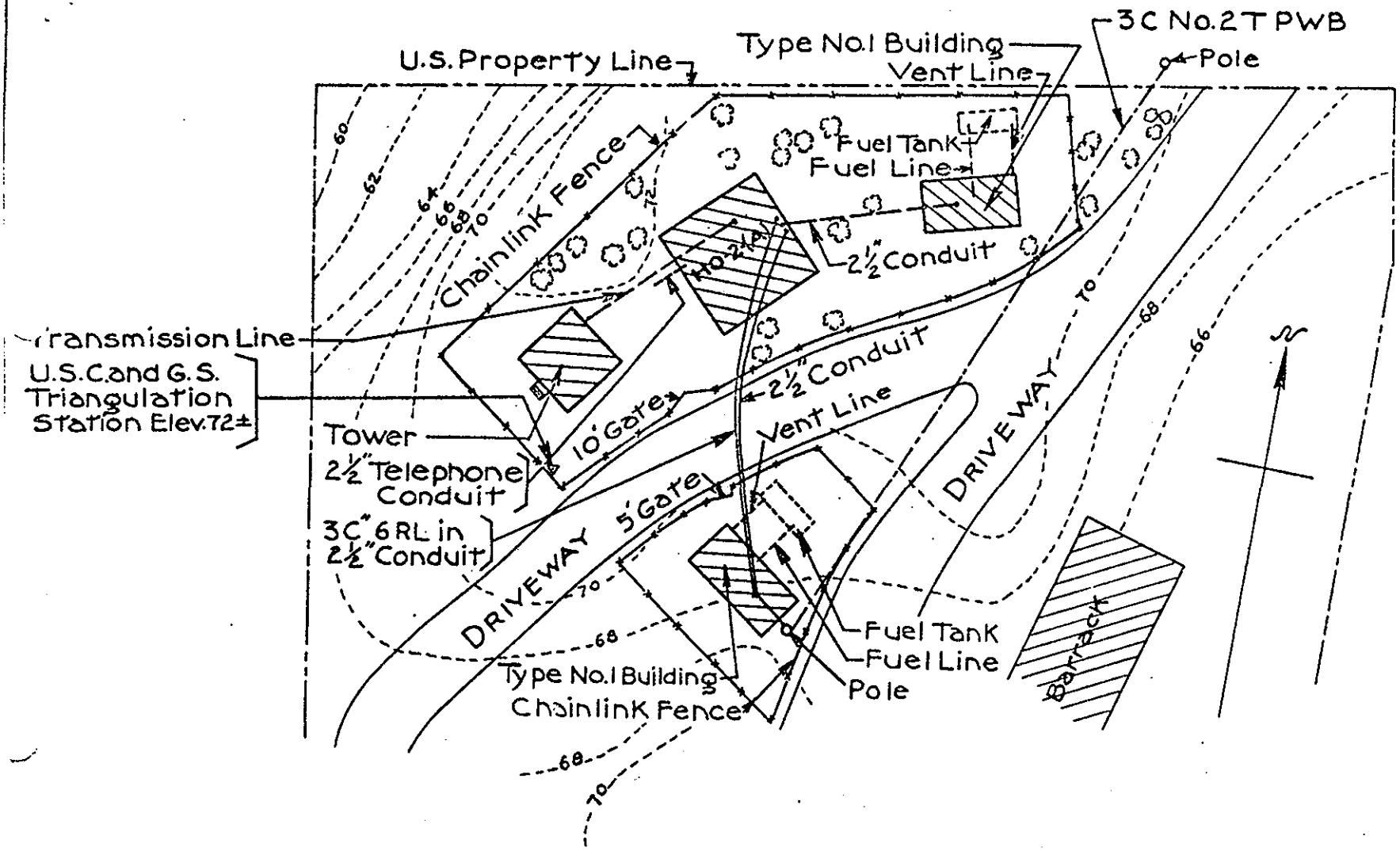




~~SECRET~~

H.D. OF PORTLAND	REV'D DATE
LOC. NO. 168 BAILEY ISLAND FIRE CONTROL INSTALLATIONS	
PREPARED BY HARBOR DEFENSES	DATE 4-11-45

F-12



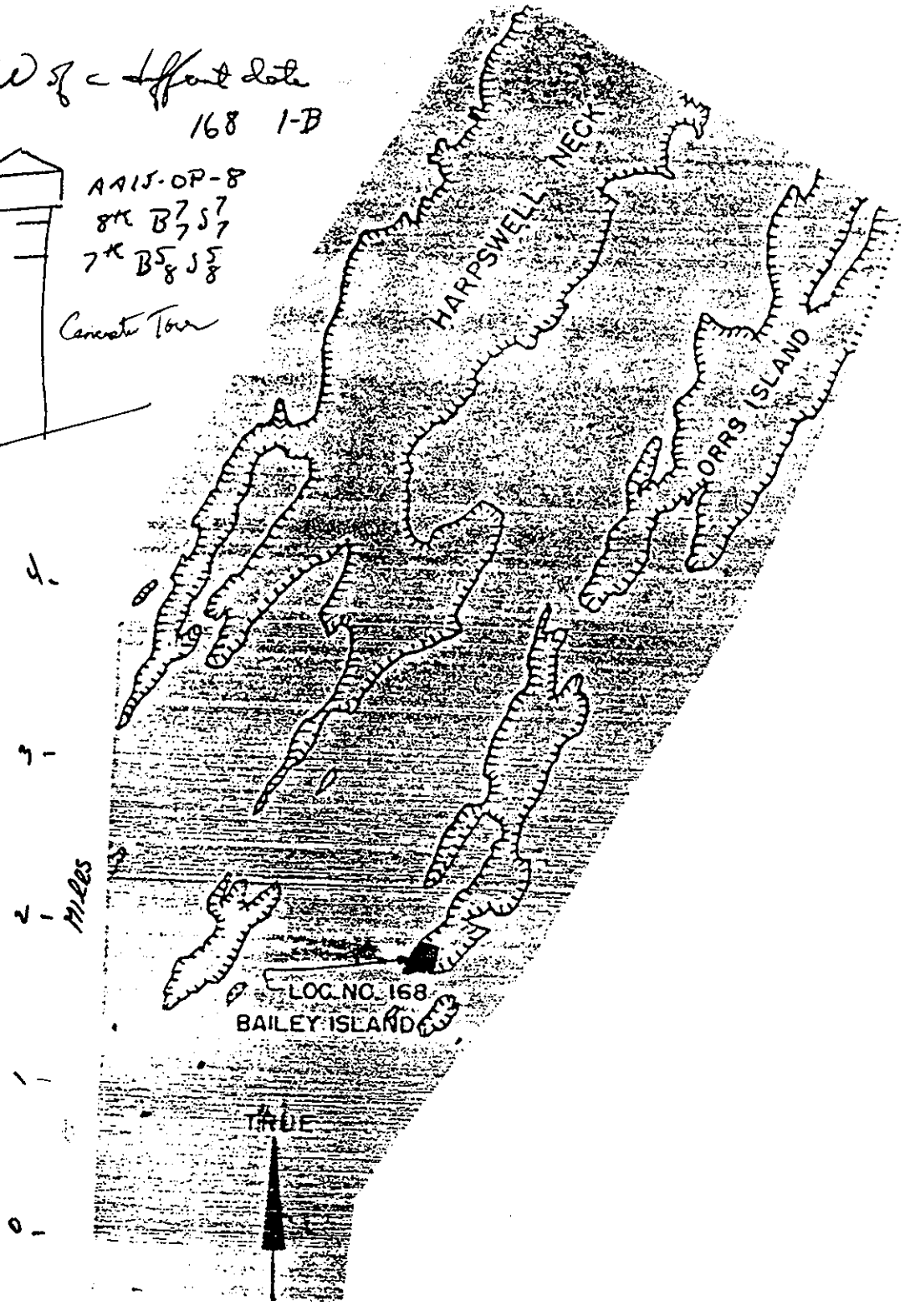
PLAN

SCALE

0 10 20 30 40 50 60 70 80 90 100

Observation Tower
Location No. 163. Site 1B.
Harbor Defenses of Portland,
Maine

F-12


RCW of a different date
168 1-B
AA15-OP-8
8th B7 7 S7 7
7th B5 8 S5 8
Concrete Tower
HARPSWELL NECK
ORRS ISLAND
LOC. NO. 168
BAILEY ISLAND
TRUE
MILES
4
3
2
1
0

THE FORTS OF "WHEREVER" #2
Robert D. Zink

This is the second in a series which is explained in CDSG NEWS Vol 3 # 1. The first article covered the seacoast defenses from Passamaquoddy Bay (northeast tip of Maine) to the forts along the Kennebec River, including Fort Baldwin.

This column includes the defenses southward to the north limits of the defenses of Portsmouth, NH. The presence of a Location (Loc) number (170 for Fort Baldwin) indicates coast defense usage in World war II. Though all batteries had Tactical Numbers, they are given here only for the Anti-Motor Torpedo Boat batteries, as, AMTB #10. This number series (1-10) applies to this harbor only. Fire control tower battery assignments are true for a period which may have been brief. They are given to illustrate how far-flung some battery's fire control (FC) systems were.

THE COAST DEFENSES OF PORTLAND, MAINE

SMALL POINT, Loc 169 is a SW facing point on the same peninsula as is Fort Baldwin, south of Phippsburg. The point is at the end of Small Point Road, off SH 216 near Small Point Beach. Fort Baldwin is 7200 yards NE. At the end of about 4 miles of private roads through thick, tall woods on the top of an 86 foot hill is or was (I do not know if it exists) a six story concrete tower serving B Steele (16") and B Cravens (6"). There was a fire control switchboard in the tower.

BAILEY ISLAND, Loc 168 - Just west of the south end of SH 24 can be seen two concrete FC towers facing out to sea. The N tower served B Steele and B Cravens and had an SCR 296 FC radar antenna. The S tower served B 202 (6") and Foote (12"). There was a 90mm AMTB battery (AMTB 10) a few yards W of the S tower.

DRINKWATER POINT, near South Freeport, was the site of a 37mm mobile mount attached to battery AMTB 10, on Bailey Island.

GREAT CHEBEAGUE ISLAND, Loc 166A, had a 3" M1902 gun on pedestal mount, replaced by a 90mm AMTB battery with 37mm section, AMTB9, on the N tip of the island, now probably covered by house construction. The 37mm section of AMTB 7 (Jewell Is.) was located on a point just N of Division Point, facing Littlejohn Island.

JEWELL ISLAND, Loc 167, is in the outermost line of islands of Casco Bay, about 7 mi E of Fort Allen Park in PTL. The island is an unmanned Maine state park. From the SW tip of the island and 90mm Battery AMTB 7: 450 feet NNE to B 202, two 6" guns on World War II long-range mounts (BCLR). Then 450 ft NNE to a 4 story FC tower (which appears to be made to look like a small castle or house with short tower and dates from 1934) serving B Foote and 201 (6") and Gun Group 7 OP - CP (Observation Post - Command Post). Then a few yards N to an 8 story tower serving B Steele, Cravens and 202. An SCR 296 fire control radar was sited a few yards N. About 900 yards NE was 90mm AMTB 8 (with 37mm mobile gun detachment) on the east shore of the island just sou of Punchbowl (bay). The remains of the Army pier are 1100 feet of the radar site.

MAINE HISTORIC PRESERVATION COMMISSION
55 Capitol Street
State House Station 65
Augusta, Maine 04333

Earle G. Shettleworth, Jr.
Director

Telephone:
207-287-2132

April 3, 1995

Department of the Army
Attention: SMCAC-ESL (Shirley Daniels)
Director USACACS
Savanna, Illinois 61074-9639

Dear Shirley:

Pursuant to our recent telephone conversastion, enclosed please find a copy of portions of "The Modern Defenses of the Coast of Maine," which was prepared for the Commission in 1988 by Joel W. Eastman. I am sending Parts I and II of the report as well as Annex I. A section and elevation of the Bailey Island fire control tower is also included. In addition, I have enclosed a copy of the National Register nomination for Fort Popham along with copies of some photographs. We have no information about the Sanford property.

There are no known prehistoric archaeological sites at either of the properties. However, the sandy, undisturbed areas at the Sanford airport offer the potential for sites. There are no historic archaeological properties at Bailey Island or Sanford, but Fort Popham is the site of eighteenth and early nineteenth century forts, in addition to the 1862-65 complex.

If I may be of any further assistance, please do not hesitate to contact me.

Sincerely,

Kirk F. Mohney,
Architectural Historian

Enc.

KFM/slm

COAST DEFENSE STUDY GROUP

731 BALTIMORE PIKE BEL AIR, MARYLAND 21014
327 Rollins Road
Rollinsford, New Hampshire 03869-5109

6 April 1995

Shirley Daniels, SMCAC-ESL
USADACS
Savanna, Illinois 61074-9639

Dear Shirley:

Thank you for your telephone call earlier today and I enjoyed speaking with you. Enclosed are two somewhat different accounts written by me about the defenses built along the Kennebec River in Maine, one published in CAMP's Periodical, the other in the Fort Western Museum's Kennebec Proprietor, during 1984-85. Also enclosed is the promised photograph of the twin fire control towers erected during WWII at Bailey Island, Maine, and xeroxed copies of three letters by former officers who were there.

As I explained to you, the submarine incident mentioned briefly in the volumes of the Morison history is a conundrum of the first order. At the time I wrote the history of the Kennebec River defenses, I was in possession of documents obtained from the U.S. Naval Historical Center. Those documents clearly identify the only German submarine in Grid Quadrat BA (which included most of the Gulf of Maine, and thus Casco Bay) as U-87. Had to be the villain in Casco Bay, right? Wrong. A fellow CDSG member and naval historian researched the log books of U-87 and other possible candidates in the National Archives and came up empty. In fact, on 22 June 1942 U-87* had just crossed from Quadrat BA into adjacent Quadrat BB (east of Cape Sable, N.S.) and was homeward bound. Additional trips to Archives to look at increasingly long shots, and letters to German naval historians, have been equally unsuccessful. No one on either side of the Atlantic believes that an Italian submarine had strayed that far from Mare Nostrum.

But submarine incursion there was, as shown by U.S. Navy war logs from different echelons, including SOPA (Senior Officer Present Afloat) in Portland Harbor. If the sub was American, that fact should have occurred to someone and the potentially lethal anti-submarine measures halted. They were not. Within a few months of the incident, the harbor defenses of Portland and the Kennebec River underwent significant change: (i) The base-end station at Small Point for the Fort Baldwin 155mm battery was shifted shoreward and rebuilt with a second story, giving it a better field of view to the west. [This was not the later, concrete fire control tower at Small Point erected for the WWII harbor defense program that survives today.] (ii) The two 155mm guns emplaced at the mouth of the Penobscot River were moved southwest to Baileys

*On 15 June 1942, U-87 sank two merchantmen in the lower gulf.

Island (the sailors at the Baileys Island magnetic loop station saw the sub, but could do nothing with but a .45 cal pistol at the station). This was clearly NOT one of the hundreds of false alarms that occurred during the early months of WWII, and it remains a big mystery to this day.

I look forward to receiving the material from your office and to speaking with you on these historical events in the near future.

Sincerely,

Nelson H. Lawry
Preserv. & Projects
(603) 742-0543

encls. (8)

John R. McKernan, Jr.
Governor

Ray B. Owen, Jr.
Commissioner

DEPARTMENT OF INLAND FISHERIES AND WILDLIFE
Telephone (207) 287-3371

April 24, 1995

Mike Harper
Project Leader
Department Of The Army
US Army Defense Ammunition Center and School
Savanna, Illinois 61074-9639

Dear Mr. Harper:

I have checked our wildlife resource files for the three sites you had questions on. While we have no site specific records of endangered species for these areas, we do have records of threatened/endangered species within the larger circles indicated on the map.

Bailey Island Site:	Roseate Terns(Threatened)-Pond Island east of the search area.
Popham Beach Site:	Bald Eagle(Endangered)-Kennebec River, Piping Plovers and Least Terns (Endangered)-Popham Beach, Hunnewell Beach.
Sanford Site:	Blandings Turtle (Threatened)-Curtis Pond, Ribbon Snake (Special Concern)- Curtis Pond, Route 109.

If you have any questions or need additional information, feel free to contact me at 207 657-3258.

Sincerely,

Warren Eldridge
Asst. Regional Wildlife Biologist

F-15

DEPARTMENT OF
INLAND FISHERIES AND WILDLIFE
284 STATE STREET
STATE HOUSE STATION 41
AUGUSTA, MAINE 04333

Dept. of Inland Fisher[illegible] [illegible]dlife
Wildlife Division - [illegible]
R. R. #1, 328 Shaker Road
Gray, Maine 04039

PORTLAND, ME 041
PM
24 APR
1995

Old Glory
USA G
For U.S. addresses only

MIKE HARPER
PROJECT LEADER
DEPT. OF THE ARMY
US ARMY DEFENSE AMMUNITION CENTER
SAVANNA, ILLINOIS, 61074-9639

61074/9639

SMCAC-ESL

March 30, 1995

Maine Inland Fisheries & Wildlife
ATTN: Alan Hutchinson
650 State Street
Bangor, Maine 04401-5654

Dear Mr. Hutchinson:

The U.S. Army Technical Center for Explosives Safety is supporting the U.S. Army Corps of Engineers in assessing Formerly Used Defense Sites for potential ordnance and explosives waste contamination. This mission is related to the Defense Environmental Restoration Program and one aspect of the process is an in-depth historical record search.

We are asking you for information regarding the endangered species in the state of Maine. Our fourth quarter sites are Sanford Naval Auxiliary Air Facility (York County), Fort Popham (Sagdahoc County), and Bailey Island (Cumberland County). I am enclosing maps of those areas to help you in your research.

For further information please contact the undersigned at the following address:

ATTN: SMCAC-ESL (Shirley Daniels)
DIRECTOR
USADACS
SAVANNA IL 61074-9639
Phone: (815) 273-8716

Any assistance you can provide will be most appreciated.

Mike Harper
Project Leader

Enclosure

Angus S. King, Jr.
Governor

DEPARTMENT
of
ECONOMIC AND COMMUNITY DEVELOPMENT
33 Stone Street
State House Station 59
Augusta, Maine 04333

Thomas D. McBrierty
Commissioner
207-287-2656
FAX 207-287-2861

May 3, 1995

Mike Harper
Department of the Army
US Army Defense Ammunition center and School
Savanna, Illinois 61074-9639

Re: Sanford Naval Auxiliary Air Facility, York County
Fort Popham, Sagadahoc County
Bailey Island, Cumberland County

Dear Mr. Harper:

I have searched the Natural Areas Program's Biological and Conservation Data System files in response to your request of March 30, 1995, for the presence of rare or unique botanical features and Registered Critical Areas documented from three defense sites in Maine. Rare and unique botanical features include the habitat of rare, threatened, or endangered plant species and unique or exemplary natural communities; Registered Critical Areas are natural areas that the landowner(s) have agreed to voluntarily conserve. Our review involves examining maps, manual, and computerized records, other sources of information such as scientific articles or published references, and the personal knowledge of staff or cooperating experts.

Our official response covers only botanical features and Registered Critical Areas. For authoritative information and official response for zoological features you must make a similar request to the Maine Department of Inland Fisheries and Wildlife, 284 State Street, Augusta, Maine 04333.

I have included lists of features known to occur on the project sites. The list includes the date of last observation, which in some cases is considered historic. Many of the species for which we have documented records have not been recently field verified to occur at these locations. A rank explanation sheet is included for your reference. Our staff botanist indicates a good potential for these species to occur on the subject property if suitable habitat is available. To ensure that such features are not inadvertently harmed, we suggest that you have the property inventoried by a

Office of Community Development
219 Capitol Street
State House Station 130
Augusta, Maine 04333
207-624-6800

qualified field botanist for rare plants and natural communities.

This finding is available and appropriate for preparation and review of environmental assessments, but it is not a substitute for on-site surveys. The quantity and quality of data maintained by the Natural Areas Program are dependent on the research and observations of many individuals and organizations; and, comprehensive field surveys do not exist for all natural areas in Maine. For this reason, in the absence of a specific field investigation, the Maine Natural Areas Program cannot provide a definitive statement on the presence or absence of unusual natural features on this site.

The Natural Areas Program welcomes coordination with individuals or organizations proposing environmental alteration, or conducting environmental assessments. If, however, data provided by the Natural Areas Program are to be published in any form, the Program should be informed at the outset and credited as the source.

The Natural Areas Program has instituted a fee structure to recover the actual cost of processing your request for information. Our fee is $75.00 an hour with a minimum fee of $50.00. Please return the bottom of the invoice along with remittance to the Department of Community Development, 219 Capitol Street, State House Station 130, Augusta, Maine 04333.

Thank you for using the Natural Areas Program in the environmental review process. Please do not hesitate to contact me if you have further questions about the Natural Areas Program or about Registered Critical Areas and rare or unique botanical features on this site.

Sincerely,

Sarah H. Holbrook
Information Manager
Maine Natural Areas Program

Enclosures

Sanford Naval Auxiliary Air Facility

Saxifraga pensylvanica (swamp saxifrage, S2/G5/T(SC)), 1985

Fort Popham

Carex silicea (sea-beach sedge, S2/G5/(PE)/ no federal), 1992
Pitch pine dune semi-forest, 1992
Popham Beach Critical Area #44
Pitch pine woodland, 1989
Agalinis maritima, (saltmarsh false-foxglove, S2/G5/WL/ no federal), 1990
Village Marsh Ancient Shoreline Critical Area #289

Bailey Island

Bartonia paniculata (screwstem, S1/G5/E/ no federal), 1917
Iva frutescens (marsh-elder, S1/G5T5/T/ no federal), 1981-south end
Bailey Island Marine invertebrate Area Critical Area #455-south end

MAINE NATURAL AREAS PROGRAM

STATE RANKS (S-RANK)

S1 Critically imperiled in Maine because of extreme rarity (five or fewer occurrences or very few remaining individuals or acres) or because some aspect of its biology makes it especially vulnerable to extirpation from the State of Maine.

S2 Imperiled in Maine because of rarity (6-20 occurrences or few remaining individuals or acres) or because of other factors making it vulnerable to further decline.

S3 Rare in Maine (on the order of 20-100 occurrences).

S4 Apparently secure in Maine.

S5 Demonstrably secure in Maine.

SA Accidental in Maine, including species that only sporadically breed in Maine.

SE An exotic species established in Maine; may be native elsewhere in North America.

SH Occurred historically in Maine, and could be rediscovered; not known to have been extirpated.

SU Possibly in peril in Maine, but status uncertain; need more information.

SX Apparently extirpated in Maine (historically occurring species for which habitat no longer exists in Maine).

Note: **"S-RANKS"** determined by the Maine Natural Areas Program.
"G-RANKS" indicate global ranks as determined by The Nature Conservancy, and follow the criteria listed above for state ranks. For example, "G1" means 1-5 occurrences and critically imperiled throughout its entire range.

MAINE STATUS: PLANTS

NOTE: This column reflects State-listed status according to 5 M.R.S.A. § 13076-13079, which mandates the Department of Economic and Community Development to produce and biennially update the official list of Maine's endangered and threatened plants. The list is derived by a technical advisory committee of botanists who use data in the Natural Heritage Program's database to recommend status changes to the Department of Economic and Community Development. The current official list is based on 1988 data, and bears a printing date of May 1990. In June 1990, the advisory committee conducted its biennial update, and proposed status changes for certain species. These changes (noted in parentheses on the list) remain unofficial because the June 1990 list has not been signed by the Commissioner of the Department of Economic and Community Development.

E ENDANGERED SPECIES; represented in Maine by <u>one</u> recent (within the last twenty years) documented occurrence, or federally listed as Endangered (but see exceptions below).

T THREATENED SPECIES; represented in Maine by <u>two to four</u> recent documented occurrences, or federally listed as Threatened (but see exceptions below).

SC SPECIAL CONCERN; represented in Maine by <u>five to ten</u> recent documented occurrences and could, within the foreseeable future become Threatened (but see exceptions below).

PE POSSIBLY EXTIRPATED; has not been documented in Maine within the last twenty years (zero recent occurrences). If found and documented, the taxon is placed in Endangered status.

WL WATCH LIST; represented in Maine by <u>more than ten</u> recent, documented occurrences, but still of concern.

N NOMINATED; meets criteria for Endangered or Threatened status.

C CANDIDATE; need further information to determine list status.

Exceptions to the numerical criteria for these categories are (a) small population sizes, (b) confined to a small geographic area in Maine, and (c) the taxon is clearly and imminently jeopardized.

FEDERAL STATUS

LE Listed as Endangered at the national level.

LT Listed as Threatened at the national level.

C2 Category 2; Candidate taxa which may qualify as Threatened or Endangered, but insufficient data exist to determine true status.

3B Formerly a listed or candidate species but recent taxonomic revisions indicate "species" status is not longer valid and no longer meets the Endangered Species Act's definition of a species.

3C Formerly listed, but is now known to be more abundant or widespread than previously believed; not subject to any identifiable threat.

Harpswell Harbor, Maine
Tide Predictions (High and Low Waters) January, 1996
NOAA, National Ocean Service

Standard Time

Day		Time		Ht.	Time		Ht.	Time		Ht.	Time		Ht.
1	M	123	L	0.8	746	H	9.5	1406	L	0.3	2020	H	8.4
2	Tu	214	L	0.8	835	H	9.5	1456	L	0.1	2110	H	8.5
3	W	301	L	0.8	919	H	9.6	1540	L	0.0	2154	H	8.5
4	Th	343	L	0.8	959	H	9.7	1620	L	-0.1	2233	H	8.6
5	F	421	L	0.8	1036	H	9.7	1656	L	-0.1	2310	H	8.6
6	Sa	457	L	0.8	1111	H	9.7	1730	L	-0.1	2345	H	8.6
7	Su	532	L	0.8	1146	H	9.6	1803	L	0.0			
8	M	19	H	8.6	607	L	0.8	1221	H	9.5	1836	L	0.0
9	Tu	53	H	8.6	643	L	0.8	1257	H	9.3	1911	L	0.1
10	W	128	H	8.7	722	L	0.8	1335	H	9.2	1948	L	0.2
11	Th	206	H	8.7	804	L	0.9	1417	H	9.0	2028	L	0.3
12	F	248	H	8.8	851	L	0.9	1504	H	8.7	2113	L	0.5
13	Sa	334	H	8.9	943	L	0.8	1555	H	8.5	2202	L	0.6
14	Su	425	H	9.1	1040	L	0.7	1653	H	8.4	2258	L	0.6
15	M	521	H	9.3	1142	L	0.4	1756	H	8.4	2357	L	0.5
16	Tu	621	H	9.7	1246	L	0.0	1901	H	8.6			
17	W	59	L	0.3	722	H	10.2	1348	L	-0.6	2004	H	9.0
18	Th	200	L	-0.1	822	H	10.7	1447	L	-1.1	2104	H	9.5
19	F	259	L	-0.5	919	H	11.2	1543	L	-1.6	2200	H	9.9
20	Sa	355	L	-0.9	1015	H	11.5	1636	L	-2.0	2254	H	10.3
21	Su	450	L	-1.2	1109	H	11.6	1728	L	-2.1	2346	H	10.5
22	M	544	L	-1.3	1202	H	11.5	1819	L	-2.0			
23	Tu	38	H	10.5	638	L	-1.2	1256	H	11.1	1910	L	-1.7
24	W	131	H	10.4	733	L	-0.9	1350	H	10.5	2002	L	-1.2
25	Th	224	H	10.2	830	L	-0.5	1446	H	9.9	2056	L	-0.6
26	F	319	H	9.8	929	L	-0.1	1545	H	9.2	2152	L	0.1
27	Sa	416	H	9.5	1031	L	0.3	1647	H	8.6	2250	L	0.6
28	Su	515	H	9.2	1135	L	0.6	1750	H	8.2	2350	L	1.0
29	M	614	H	9.0	1238	L	0.7	1853	H	8.0			
30	Tu	49	L	1.2	712	H	8.9	1336	L	0.7	1950	H	8.0
31	W	144	L	1.2	805	H	9.0	1428	L	0.5	2042	H	8.1

Harpswell Harbor, Maine
Tide Predictions (High and Low Waters) February, 1996
NOAA, National Ocean Service

Standard Time

Day	Time	Ht.	Time	Ht.	Time	Ht.	Time	Ht.
1 Th	234 L	1.1	853 H	9.2	1514 L	0.4	2128 H	8.2
2 F	318 L	1.0	935 H	9.3	1555 L	0.2	2208 H	8.4
3 Sa	358 L	0.8	1014 H	9.5	1631 L	0.0	2244 H	8.6
4 Su	434 L	0.6	1049 H	9.6	1704 L	-0.1	2318 H	8.8
5 M	509 L	0.5	1123 H	9.6	1736 L	-0.1	2350 H	8.9
6 Tu	543 L	0.4	1157 H	9.6	1808 L	-0.1		
7 W	23 H	9.0	618 L	0.3	1232 H	9.5	1841 L	-0.1
8 Th	56 H	9.1	656 L	0.3	1310 H	9.4	1917 L	0.0
9 F	133 H	9.2	737 L	0.2	1350 H	9.2	1957 L	0.1
10 Sa	214 H	9.3	823 L	0.3	1436 H	8.9	2041 L	0.2
11 Su	300 H	9.4	914 L	0.3	1528 H	8.7	2132 L	0.4
12 M	353 H	9.4	1011 L	0.3	1627 H	8.5	2229 L	0.5
13 Tu	452 H	9.5	1116 L	0.2	1732 H	8.4	2332 L	0.6
14 W	556 H	9.7	1223 L	0.0	1841 H	8.6		
15 Th	39 L	0.4	703 H	10.0	1330 L	-0.4	1948 H	8.9
16 F	145 L	0.0	808 H	10.5	1432 L	-0.9	2050 H	9.5
17 Sa	247 L	-0.5	908 H	10.9	1528 L	-1.4	2146 H	10.0
18 Su	344 L	-1.0	1004 H	11.2	1621 L	-1.7	2238 H	10.4
19 M	438 L	-1.3	1057 H	11.3	1710 L	-1.8	2328 H	10.7
20 Tu	530 L	-1.5	1148 H	11.2	1759 L	-1.7		
21 W	17 H	10.7	621 L	-1.4	1238 H	10.8	1846 L	-1.4
22 Th	105 H	10.6	712 L	-1.1	1328 H	10.3	1934 L	-0.8
23 F	153 H	10.2	803 L	-0.6	1420 H	9.7	2023 L	-0.2
24 Sa	243 H	9.8	857 L	-0.1	1513 H	9.0	2115 L	0.4
25 Su	335 H	9.3	953 L	0.4	1610 H	8.4	2209 L	1.0
26 M	431 H	8.9	1054 L	0.8	1711 H	8.0	2308 L	1.4
27 Tu	530 H	8.6	1156 L	1.1	1813 H	7.7		
28 W	9 L	1.6	631 H	8.5	1257 L	1.1	1913 H	7.7
29 Th	108 L	1.6	728 H	8.6	1352 L	1.0	2007 H	7.9

Harpswell Harbor, Maine
Tide Predictions (High and Low Waters) March, 1996
NOAA, National Ocean Service

Standard Time

Day		Time		Ht.	Time		Ht.	Time		Ht.	Time		Ht.
1	F	201	L	1.4	820	H	8.8	1440	L	0.7	2054	H	8.2
2	Sa	248	L	1.1	905	H	9.1	1522	L	0.5	2135	H	8.5
3	Su	329	L	0.8	946	H	9.3	1559	L	0.3	2212	H	8.8
4	M	407	L	0.5	1023	H	9.5	1632	L	0.1	2246	H	9.1
5	Tu	442	L	0.2	1058	H	9.6	1704	L	0.0	2318	H	9.3
6	W	517	L	0.0	1133	H	9.7	1737	L	-0.1	2351	H	9.5
7	Th	553	L	-0.2	1209	H	9.7	1811	L	-0.2			
8	F	26	H	9.7	632	L	-0.3	1247	H	9.6	1849	L	-0.1
9	Sa	104	H	9.8	714	L	-0.3	1329	H	9.4	1931	L	0.0
10	Su	147	H	9.9	801	L	-0.3	1417	H	9.2	2018	L	0.2
11	M	235	H	9.8	853	L	-0.2	1510	H	8.9	2110	L	0.4
12	Tu	329	H	9.7	952	L	0.0	1610	H	8.7	2210	L	0.6
13	W	431	H	9.6	1057	L	0.1	1718	H	8.6	2317	L	0.7
14	Th	540	H	9.7	1207	L	0.0	1828	H	8.7			
15	F	28	L	0.5	650	H	9.8	1315	L	-0.3	1936	H	9.1
16	Sa	136	L	0.1	757	H	10.2	1417	L	-0.7	2037	H	9.7
17	Su	238	L	-0.4	858	H	10.5	1512	L	-1.0	2131	H	10.2
18	M	334	L	-0.9	953	H	10.8	1603	L	-1.2	2221	H	10.6
19	Tu	426	L	-1.2	1044	H	10.9	1651	L	-1.3	2308	H	10.8
20	W	515	L	-1.4	1132	H	10.7	1737	L	-1.1	2353	H	10.8
21	Th	602	L	-1.3	1219	H	10.4	1821	L	-0.8			
22	F	37	H	10.6	649	L	-1.0	1306	H	10.0	1905	L	-0.3
23	Sa	121	H	10.2	736	L	-0.5	1353	H	9.4	1950	L	0.3
24	Su	206	H	9.8	824	L	0.0	1441	H	8.9	2037	L	0.8
25	M	254	H	9.3	914	L	0.5	1533	H	8.4	2128	L	1.3
26	Tu	345	H	8.9	1009	L	0.9	1628	H	8.0	2223	L	1.7
27	W	442	H	8.5	1108	L	1.2	1728	H	7.8	2323	L	1.9
28	Th	542	H	8.3	1208	L	1.4	1827	H	7.8			
29	F	24	L	1.8	642	H	8.4	1305	L	1.3	1922	H	7.9
30	Sa	120	L	1.6	737	H	8.5	1355	L	1.1	2011	H	8.3
31	Su	210	L	1.3	826	H	8.8	1438	L	0.9	2054	H	8.6

Harpswell Harbor, Maine
Tide Predictions (High and Low Waters) April, 1996
NOAA, National Ocean Service

Standard Time

Day	Time	Ht.	Time	Ht.	Time	Ht.	Time	Ht.
1 M	255 L	0.9	910 H	9.1	1517 L	0.6	2132 H	9.1
2 Tu	335 L	0.4	950 H	9.3	1553 L	0.3	2208 H	9.5
3 W	412 L	0.0	1028 H	9.6	1628 L	0.1	2243 H	9.8
4 Th	450 L	-0.3	1106 H	9.7	1705 L	-0.1	2319 H	10.1
5 F	529 L	-0.6	1145 H	9.8	1743 L	-0.2	2357 H	10.4
6 Sa	611 L	-0.8	1227 H	9.8	1825 L	-0.1		

Daylight Saving Time begins at 0200

7 Su	39 H	10.5	756 L	-0.8	1413 H	9.6	2010 L	0.0
8 M	226 H	10.4	845 L	-0.7	1503 H	9.4	2100 L	0.2
9 Tu	317 H	10.3	939 L	-0.5	1559 H	9.2	2156 L	0.4
10 W	415 H	10.0	1039 L	-0.3	1701 H	9.0	2259 L	0.7
11 Th	519 H	9.8	1144 L	-0.1	1809 H	9.0		
12 F	8 L	0.7	629 H	9.7	1253 L	0.0	1918 H	9.1
13 Sa	120 L	0.5	740 H	9.7	1359 L	-0.1	2023 H	9.5
14 Su	227 L	0.2	847 H	9.9	1500 L	-0.3	2121 H	9.9
15 M	328 L	-0.3	947 H	10.1	1554 L	-0.5	2214 H	10.3
16 Tu	423 L	-0.7	1041 H	10.2	1644 L	-0.6	2302 H	10.6
17 W	513 L	-1.0	1130 H	10.3	1730 L	-0.5	2347 H	10.7
18 Th	559 L	-1.1	1216 H	10.2	1814 L	-0.3		
19 F	29 H	10.7	644 L	-1.0	1300 H	9.9	1856 L	-0.1
20 Sa	110 H	10.5	727 L	-0.7	1344 H	9.6	1937 L	0.3
21 Su	151 H	10.1	809 L	-0.3	1427 H	9.2	2019 L	0.7
22 M	233 H	9.8	853 L	0.1	1511 H	8.8	2103 L	1.1
23 Tu	317 H	9.4	938 L	0.5	1558 H	8.4	2149 L	1.5
24 W	404 H	9.0	1026 L	0.9	1647 H	8.2	2240 L	1.8
25 Th	455 H	8.6	1118 L	1.2	1741 H	8.0	2336 L	1.9
26 F	551 H	8.4	1213 L	1.4	1836 H	8.0		
27 Sa	34 L	1.9	649 H	8.3	1307 L	1.4	1929 H	8.2
28 Su	132 L	1.7	746 H	8.4	1359 L	1.3	2019 H	8.5
29 M	225 L	1.4	839 H	8.6	1446 L	1.1	2105 H	8.9
30 Tu	313 L	0.9	928 H	8.8	1529 L	0.8	2147 H	9.4

Harpswell Harbor, Maine
Tide Predictions (High and Low Waters) May, 1996
NOAA, National Ocean Service

Daylight Saving Time

Day	Time	Ht.	Time	Ht.	Time	Ht.	Time	Ht.
1 W	358 L	0.4	1013 H	9.1	1611 L	0.5	2227 H	9.9
2 Th	440 L	-0.1	1056 H	9.5	1652 L	0.2	2307 H	10.3
3 F	523 L	-0.6	1139 H	9.7	1734 L	0.0	2349 H	10.7
4 Sa	606 L	-1.0	1223 H	9.9	1817 L	-0.2		
5 Su	33 H	11.0	652 L	-1.2	1310 H	9.9	1904 L	-0.2
6 M	119 H	11.0	740 L	-1.2	1359 H	9.9	1954 L	-0.1
7 Tu	210 H	10.9	832 L	-1.1	1453 H	9.8	2048 L	0.1
8 W	305 H	10.7	928 L	-0.8	1551 H	9.6	2147 L	0.3
9 Th	405 H	10.3	1027 L	-0.5	1653 H	9.5	2251 L	0.5
10 F	510 H	10.0	1131 L	-0.2	1758 H	9.5		
11 Sa	0 L	0.6	618 H	9.7	1236 L	0.0	1903 H	9.6
12 Su	110 L	0.5	728 H	9.5	1340 L	0.1	2005 H	9.8
13 M	216 L	0.2	833 H	9.5	1439 L	0.1	2103 H	10.1
14 Tu	316 L	-0.1	933 H	9.6	1534 L	0.1	2155 H	10.4
15 W	409 L	-0.4	1026 H	9.6	1624 L	0.1	2243 H	10.5
16 Th	458 L	-0.6	1115 H	9.6	1709 L	0.2	2326 H	10.5
17 F	543 L	-0.6	1200 H	9.5	1752 L	0.4		
18 Sa	7 H	10.4	625 L	-0.5	1242 H	9.4	1832 L	0.6
19 Su	46 H	10.2	705 L	-0.4	1322 H	9.2	1911 L	0.8
20 M	124 H	10.0	745 L	-0.1	1402 H	9.0	1951 L	1.1
21 Tu	203 H	9.7	824 L	0.2	1443 H	8.8	2032 L	1.3
22 W	244 H	9.4	905 L	0.5	1525 H	8.6	2115 L	1.5
23 Th	328 H	9.1	948 L	0.8	1609 H	8.4	2201 L	1.7
24 F	414 H	8.8	1032 L	1.0	1656 H	8.4	2252 L	1.8
25 Sa	504 H	8.6	1120 L	1.2	1745 H	8.4	2345 L	1.8
26 Su	558 H	8.4	1210 L	1.3	1835 H	8.5		
27 M	40 L	1.6	653 H	8.4	1300 L	1.3	1925 H	8.8
28 Tu	136 L	1.3	748 H	8.4	1351 L	1.1	2014 H	9.2
29 W	229 L	0.9	842 H	8.7	1440 L	0.9	2101 H	9.7
30 Th	319 L	0.3	934 H	9.0	1529 L	0.6	2148 H	10.2
31 F	408 L	-0.3	1024 H	9.3	1617 L	0.3	2235 H	10.7

Harpswell Harbor, Maine
Tide Predictions (High and Low Waters) June, 1996
NOAA, National Ocean Service

Daylight Saving Time

Day	Time	Ht.	Time	Ht.	Time	Ht.	Time	Ht.
1 Sa	456 L	-0.8	1113 H	9.7	1705 L	0.0	2323 H	11.1
2 Su	545 L	-1.2	1202 H	9.9	1755 L	-0.3		
3 M	12 H	11.4	634 L	-1.5	1253 H	10.1	1846 L	-0.4
4 Tu	103 H	11.5	726 L	-1.5	1346 H	10.2	1940 L	-0.3
5 W	157 H	11.3	819 L	-1.4	1441 H	10.1	2036 L	-0.2
6 Th	254 H	11.0	915 L	-1.2	1539 H	10.1	2137 L	0.0
7 F	354 H	10.6	1013 L	-0.8	1639 H	10.0	2241 L	0.2
8 Sa	458 H	10.1	1114 L	-0.4	1741 H	9.9	2348 L	0.3
9 Su	604 H	9.6	1216 L	0.0	1843 H	9.9		
10 M	55 L	0.3	711 H	9.3	1317 L	0.3	1944 H	10.0
11 Tu	200 L	0.2	815 H	9.2	1417 L	0.5	2041 H	10.1
12 W	259 L	0.1	915 H	9.1	1512 L	0.6	2134 H	10.1
13 Th	353 L	-0.1	1009 H	9.1	1602 L	0.7	2222 H	10.2
14 F	442 L	-0.2	1058 H	9.1	1648 L	0.7	2305 H	10.2
15 Sa	526 L	-0.2	1142 H	9.0	1730 L	0.8	2346 H	10.1
16 Su	606 L	-0.2	1222 H	9.0	1809 L	0.9		
17 M	23 H	10.0	644 L	-0.1	1300 H	8.9	1847 L	1.0
18 Tu	100 H	9.9	721 L	0.1	1338 H	8.8	1925 L	1.1
19 W	137 H	9.7	757 L	0.2	1415 H	8.8	2003 L	1.2
20 Th	216 H	9.5	834 L	0.4	1453 H	8.7	2043 L	1.3
21 F	256 H	9.3	912 L	0.6	1532 H	8.7	2126 L	1.4
22 Sa	338 H	9.0	952 L	0.7	1614 H	8.7	2212 L	1.5
23 Su	423 H	8.8	1034 L	0.9	1658 H	8.8	2301 L	1.5
24 M	513 H	8.6	1120 L	1.0	1745 H	8.9	2354 L	1.3
25 Tu	606 H	8.4	1210 L	1.1	1835 H	9.1		
26 W	50 L	1.1	702 H	8.4	1303 L	1.0	1927 H	9.5
27 Th	147 L	0.7	800 H	8.6	1358 L	0.8	2021 H	9.9
28 F	244 L	0.2	858 H	8.9	1453 L	0.5	2115 H	10.4
29 Sa	339 L	-0.4	955 H	9.3	1548 L	0.2	2208 H	11.0
30 Su	433 L	-1.0	1049 H	9.7	1642 L	-0.2	2301 H	11.4

Harpswell Harbor, Maine
Tide Predictions (High and Low Waters) July, 1996
NOAA, National Ocean Service

Daylight Saving Time

Day	Time	Ht.	Time	Ht.	Time	Ht.	Time	Ht.
1 M	525 L	-1.4	1143 H	10.0	1736 L	-0.5	2355 H	11.6
2 Tu	617 L	-1.7	1236 H	10.3	1830 L	-0.7		
3 W	49 H	11.7	710 L	-1.8	1330 H	10.5	1926 L	-0.7
4 Th	144 H	11.5	803 L	-1.6	1425 H	10.5	2023 L	-0.6
5 F	241 H	11.1	857 L	-1.3	1521 H	10.5	2122 L	-0.4
6 Sa	339 H	10.6	953 L	-0.9	1618 H	10.4	2224 L	-0.1
7 Su	441 H	10.0	1051 L	-0.4	1717 H	10.2	2329 L	0.1
8 M	544 H	9.5	1151 L	0.1	1818 H	10.0		
9 Tu	34 L	0.3	649 H	9.0	1252 L	0.5	1918 H	9.9
10 W	138 L	0.4	753 H	8.8	1351 L	0.8	2016 H	9.8
11 Th	238 L	0.4	853 H	8.6	1448 L	1.0	2110 H	9.8
12 F	333 L	0.3	948 H	8.6	1539 L	1.1	2159 H	9.8
13 Sa	421 L	0.2	1037 H	8.7	1626 L	1.1	2244 H	9.8
14 Su	505 L	0.1	1120 H	8.7	1708 L	1.0	2324 H	9.8
15 M	545 L	0.1	1159 H	8.8	1747 L	1.0		
16 Tu	2 H	9.8	621 L	0.1	1236 H	8.8	1824 L	1.0
17 W	37 H	9.8	655 L	0.2	1311 H	8.8	1859 L	1.0
18 Th	113 H	9.7	728 L	0.2	1345 H	8.9	1936 L	1.0
19 F	148 H	9.5	802 L	0.3	1419 H	8.9	2013 L	1.0
20 Sa	226 H	9.3	837 L	0.4	1455 H	9.0	2053 L	1.0
21 Su	305 H	9.1	914 L	0.6	1534 H	9.0	2136 L	1.1
22 M	348 H	8.9	955 L	0.7	1616 H	9.1	2223 L	1.0
23 Tu	436 H	8.7	1040 L	0.8	1702 H	9.2	2315 L	1.0
24 W	528 H	8.5	1131 L	0.9	1754 H	9.4		
25 Th	13 L	0.8	626 H	8.5	1226 L	0.9	1850 H	9.7
26 F	113 L	0.5	728 H	8.6	1326 L	0.7	1949 H	10.0
27 Sa	215 L	0.0	831 H	8.9	1427 L	0.4	2049 H	10.5
28 Su	315 L	-0.5	931 H	9.3	1526 L	0.0	2147 H	11.0
29 M	412 L	-1.0	1029 H	9.8	1624 L	-0.4	2244 H	11.4
30 Tu	506 L	-1.5	1124 H	10.2	1720 L	-0.8	2340 H	11.6
31 W	559 L	-1.7	1217 H	10.6	1815 L	-1.0		

Harpswell Harbor, Maine
Tide Predictions (High and Low Waters) August, 1996
NOAA, National Ocean Service

Daylight Saving Time

Day	Time	Ht.	Time	Ht.	Time	Ht.	Time	Ht.
1 Th	34 H	11.7	651 L	-1.8	1310 H	10.8	1910 L	-1.1
2 F	129 H	11.5	743 L	-1.6	1403 H	10.9	2006 L	-1.0
3 Sa	224 H	11.0	835 L	-1.2	1457 H	10.7	2103 L	-0.7
4 Su	320 H	10.5	929 L	-0.7	1552 H	10.5	2202 L	-0.3
5 M	419 H	9.8	1024 L	-0.1	1648 H	10.1	2304 L	0.1
6 Tu	520 H	9.2	1122 L	0.4	1747 H	9.8		
7 W	7 L	0.4	623 H	8.7	1223 L	0.9	1847 H	9.5
8 Th	110 L	0.6	727 H	8.4	1323 L	1.2	1947 H	9.4
9 F	211 L	0.7	827 H	8.3	1421 L	1.3	2043 H	9.3
10 Sa	306 L	0.6	922 H	8.4	1514 L	1.3	2134 H	9.4
11 Su	356 L	0.5	1010 H	8.5	1602 L	1.2	2219 H	9.5
12 M	439 L	0.4	1053 H	8.6	1644 L	1.0	2300 H	9.6
13 Tu	518 L	0.3	1131 H	8.8	1722 L	0.9	2337 H	9.7
14 W	552 L	0.2	1206 H	8.9	1758 L	0.8		
15 Th	13 H	9.7	625 L	0.2	1239 H	9.0	1833 L	0.7
16 F	47 H	9.6	656 L	0.3	1311 H	9.1	1908 L	0.6
17 Sa	121 H	9.5	728 L	0.3	1344 H	9.2	1944 L	0.6
18 Su	157 H	9.4	803 L	0.4	1419 H	9.3	2022 L	0.6
19 M	236 H	9.2	840 L	0.5	1457 H	9.4	2105 L	0.6
20 Tu	319 H	9.0	922 L	0.6	1540 H	9.4	2152 L	0.6
21 W	406 H	8.8	1008 L	0.7	1628 H	9.5	2245 L	0.6
22 Th	500 H	8.6	1101 L	0.8	1722 H	9.6	2344 L	0.5
23 F	600 H	8.5	1200 L	0.9	1823 H	9.8		
24 Sa	48 L	0.3	705 H	8.6	1304 L	0.7	1926 H	10.0
25 Su	153 L	0.0	811 H	9.0	1409 L	0.4	2031 H	10.4
26 M	255 L	-0.5	913 H	9.5	1511 L	-0.1	2132 H	10.9
27 Tu	354 L	-1.0	1011 H	10.0	1610 L	-0.6	2230 H	11.2
28 W	448 L	-1.4	1106 H	10.5	1706 L	-1.1	2325 H	11.4
29 Th	540 L	-1.6	1157 H	10.9	1800 L	-1.3		
30 F	19 H	11.4	630 L	-1.6	1248 H	11.1	1853 L	-1.4
31 Sa	111 H	11.2	719 L	-1.3	1338 H	11.0	1946 L	-1.2

Harpswell Harbor, Maine
Tide Predictions (High and Low Waters) September, 1996
NOAA, National Ocean Service

Daylight Saving Time

Day	Time	Ht.	Time	Ht.	Time	Ht.	Time	Ht.
1 Su	204 H	10.7	809 L	-0.9	1429 H	10.8	2040 L	-0.8
2 M	258 H	10.1	901 L	-0.3	1521 H	10.4	2136 L	-0.4
3 Tu	353 H	9.5	954 L	0.3	1615 H	9.9	2234 L	0.1
4 W	452 H	8.9	1050 L	0.8	1712 H	9.5	2335 L	0.6
5 Th	553 H	8.5	1150 L	1.3	1812 H	9.2		
6 F	37 L	0.9	655 H	8.2	1251 L	1.5	1912 H	9.0
7 Sa	138 L	1.0	755 H	8.2	1350 L	1.6	2010 H	9.0
8 Su	233 L	0.9	849 H	8.3	1445 L	1.4	2102 H	9.1
9 M	322 L	0.8	937 H	8.5	1533 L	1.2	2149 H	9.2
10 Tu	405 L	0.6	1019 H	8.7	1616 L	1.0	2231 H	9.4
11 W	444 L	0.5	1057 H	9.0	1654 L	0.7	2309 H	9.5
12 Th	518 L	0.4	1132 H	9.2	1730 L	0.5	2344 H	9.6
13 F	550 L	0.3	1204 H	9.4	1804 L	0.4		
14 Sa	19 H	9.6	622 L	0.3	1236 H	9.5	1839 L	0.2
15 Su	54 H	9.5	655 L	0.3	1309 H	9.6	1916 L	0.1
16 M	131 H	9.4	730 L	0.4	1345 H	9.7	1955 L	0.1
17 Tu	211 H	9.2	810 L	0.5	1425 H	9.8	2039 L	0.1
18 W	255 H	9.1	854 L	0.6	1511 H	9.8	2128 L	0.2
19 Th	345 H	8.9	944 L	0.7	1602 H	9.7	2223 L	0.3
20 F	441 H	8.7	1040 L	0.9	1700 H	9.7	2324 L	0.3
21 Sa	544 H	8.7	1143 L	0.9	1804 H	9.7		
22 Su	30 L	0.2	651 H	8.8	1250 L	0.7	1912 H	9.9
23 M	136 L	-0.1	757 H	9.2	1358 L	0.3	2018 H	10.2
24 Tu	239 L	-0.4	859 H	9.7	1501 L	-0.2	2121 H	10.6
25 W	336 L	-0.8	955 H	10.3	1600 L	-0.7	2218 H	10.9
26 Th	429 L	-1.1	1048 H	10.8	1654 L	-1.2	2312 H	11.0
27 F	519 L	-1.2	1137 H	11.1	1746 L	-1.4		
28 Sa	3 H	10.9	607 L	-1.1	1225 H	11.2	1836 L	-1.4
29 Su	53 H	10.7	655 L	-0.8	1312 H	11.0	1925 L	-1.2
30 M	143 H	10.3	742 L	-0.4	1359 H	10.7	2015 L	-0.8

Harpswell Harbor, Maine
Tide Predictions (High and Low Waters) October, 1996
NOAA, National Ocean Service

Daylight Saving Time

Day	Time	Ht.	Time	Ht.	Time	Ht.	Time	Ht.
1 Tu	233 H	9.7	831 L	0.2	1448 H	10.2	2107 L	-0.2
2 W	325 H	9.2	921 L	0.7	1539 H	9.7	2200 L	0.3
3 Th	420 H	8.7	1015 L	1.2	1633 H	9.2	2257 L	0.7
4 F	518 H	8.3	1112 L	1.6	1731 H	8.9	2356 L	1.0
5 Sa	617 H	8.1	1213 L	1.8	1831 H	8.7		
6 Su	55 L	1.2	715 H	8.1	1313 L	1.8	1929 H	8.6
7 M	151 L	1.2	809 H	8.3	1408 L	1.6	2023 H	8.7
8 Tu	240 L	1.1	857 H	8.5	1458 L	1.3	2112 H	8.9
9 W	324 L	0.9	940 H	8.8	1542 L	0.9	2156 H	9.1
10 Th	403 L	0.7	1018 H	9.2	1622 L	0.6	2236 H	9.3
11 F	438 L	0.5	1053 H	9.5	1659 L	0.3	2313 H	9.4
12 Sa	512 L	0.4	1127 H	9.7	1735 L	0.0	2349 H	9.5
13 Su	546 L	0.3	1201 H	10.0	1811 L	-0.2		
14 M	27 H	9.5	622 L	0.3	1237 H	10.1	1850 L	-0.4
15 Tu	106 H	9.4	702 L	0.3	1316 H	10.2	1933 L	-0.4
16 W	149 H	9.3	745 L	0.4	1400 H	10.2	2019 L	-0.4
17 Th	237 H	9.2	833 L	0.5	1449 H	10.1	2110 L	-0.3
18 F	330 H	9.0	926 L	0.7	1544 H	10.0	2207 L	-0.1
19 Sa	429 H	8.9	1026 L	0.8	1645 H	9.8	2309 L	0.0
20 Su	533 H	9.0	1132 L	0.8	1752 H	9.7		
21 M	15 L	0.0	640 H	9.2	1242 L	0.6	1901 H	9.7
22 Tu	121 L	-0.1	745 H	9.5	1350 L	0.2	2008 H	9.9
23 W	222 L	-0.3	845 H	10.0	1452 L	-0.3	2110 H	10.1
24 Th	319 L	-0.5	939 H	10.5	1550 L	-0.7	2207 H	10.3
25 F	411 L	-0.7	1030 H	10.9	1642 L	-1.1	2259 H	10.4
26 Sa	500 L	-0.7	1118 H	11.0	1732 L	-1.3	2348 H	10.3

Standard Time begins

27 Su	446 L	-0.5	1103 H	11.0	1719 L	-1.2	2336 H	10.1
28 M	531 L	-0.3	1147 H	10.8	1805 L	-1.0		
29 Tu	22 H	9.7	616 L	0.1	1231 H	10.4	1851 L	-0.6
30 W	109 H	9.3	701 L	0.6	1316 H	10.0	1937 L	-0.1
31 Th	156 H	8.9	748 L	1.0	1403 H	9.5	2026 L	0.3

Harpswell Harbor, Maine
Tide Predictions (High and Low Waters) November, 1996
NOAA, National Ocean Service

Standard Time

Day	Time	Ht.	Time	Ht.	Time	Ht.	Time	Ht.
1 F	246 H	8.5	838 L	1.4	1452 H	9.1	2117 L	0.7
2 Sa	338 H	8.3	931 L	1.7	1546 H	8.7	2210 L	1.0
3 Su	433 H	8.1	1028 L	1.9	1643 H	8.5	2305 L	1.2
4 M	528 H	8.1	1127 L	1.9	1740 H	8.4	2358 L	1.3
5 Tu	620 H	8.3	1224 L	1.7	1836 H	8.4		
6 W	48 L	1.2	709 H	8.6	1315 L	1.4	1928 H	8.5
7 Th	134 L	1.1	753 H	8.9	1402 L	1.0	2015 H	8.7
8 F	216 L	0.9	834 H	9.3	1445 L	0.5	2058 H	8.9
9 Sa	255 L	0.7	912 H	9.7	1525 L	0.1	2140 H	9.2
10 Su	334 L	0.4	950 H	10.1	1605 L	-0.3	2220 H	9.3
11 M	413 L	0.2	1029 H	10.4	1646 L	-0.6	2301 H	9.5
12 Tu	454 L	0.1	1109 H	10.6	1728 L	-0.9	2345 H	9.5
13 W	538 L	0.0	1153 H	10.7	1814 L	-0.9		
14 Th	32 H	9.5	625 L	0.1	1241 H	10.7	1903 L	-0.9
15 F	122 H	9.4	716 L	0.2	1333 H	10.5	1956 L	-0.7
16 Sa	218 H	9.4	813 L	0.4	1430 H	10.2	2053 L	-0.5
17 Su	317 H	9.3	915 L	0.5	1533 H	9.9	2155 L	-0.3
18 M	421 H	9.3	1023 L	0.5	1641 H	9.7	2259 L	-0.2
19 Tu	526 H	9.5	1132 L	0.4	1750 H	9.5		
20 W	3 L	-0.1	630 H	9.8	1240 L	0.1	1857 H	9.5
21 Th	104 L	-0.1	729 H	10.1	1342 L	-0.3	1959 H	9.6
22 F	201 L	-0.2	823 H	10.4	1439 L	-0.6	2055 H	9.7
23 Sa	253 L	-0.2	914 H	10.7	1531 L	-0.9	2147 H	9.7
24 Su	342 L	-0.2	1000 H	10.7	1618 L	-1.0	2235 H	9.6
25 M	427 L	0.0	1044 H	10.7	1703 L	-0.9	2320 H	9.5
26 Tu	510 L	0.2	1126 H	10.5	1746 L	-0.7		
27 W	3 H	9.3	552 L	0.5	1207 H	10.2	1828 L	-0.4
28 Th	45 H	9.0	634 L	0.8	1248 H	9.8	1909 L	-0.1
29 F	127 H	8.7	717 L	1.1	1330 H	9.5	1952 L	0.3
30 Sa	211 H	8.5	801 L	1.3	1414 H	9.1	2036 L	0.6

Harpswell Harbor, Maine
Tide Predictions (High and Low Waters) December, 1996
NOAA, National Ocean Service

Standard Time

Day	Time	Ht.	Time	Ht.	Time	Ht.	Time	Ht.
1 Su	257 H	8.3	849 L	1.6	1502 H	8.7	2122 L	0.9
2 M	345 H	8.2	941 L	1.7	1553 H	8.4	2210 L	1.1
3 Tu	434 H	8.2	1035 L	1.7	1647 H	8.2	2300 L	1.2
4 W	525 H	8.3	1131 L	1.6	1743 H	8.1	2350 L	1.3
5 Th	615 H	8.6	1226 L	1.4	1837 H	8.2		
6 F	39 L	1.2	702 H	8.9	1317 L	1.0	1930 H	8.3
7 Sa	127 L	1.0	748 H	9.3	1406 L	0.5	2019 H	8.6
8 Su	213 L	0.7	833 H	9.8	1452 L	-0.1	2106 H	8.9
9 M	258 L	0.4	917 H	10.3	1537 L	-0.6	2152 H	9.2
10 Tu	343 L	0.1	1001 H	10.7	1622 L	-1.0	2238 H	9.5
11 W	430 L	-0.2	1047 H	11.0	1709 L	-1.3	2326 H	9.7
12 Th	518 L	-0.4	1135 H	11.1	1757 L	-1.5		
13 F	15 H	9.8	609 L	-0.4	1226 H	11.1	1848 L	-1.4
14 Sa	108 H	9.8	703 L	-0.3	1320 H	10.8	1941 L	-1.3
15 Su	203 H	9.8	801 L	-0.2	1418 H	10.5	2038 L	-1.0
16 M	302 H	9.8	903 L	0.0	1520 H	10.0	2137 L	-0.6
17 Tu	404 H	9.7	1010 L	0.1	1626 H	9.6	2239 L	-0.3
18 W	507 H	9.8	1118 L	0.2	1735 H	9.2	2343 L	0.0
19 Th	610 H	9.8	1226 L	0.0	1842 H	9.1		
20 F	45 L	0.2	710 H	10.0	1329 L	-0.2	1945 H	9.0
21 Sa	143 L	0.2	807 H	10.1	1426 L	-0.4	2043 H	9.0
22 Su	237 L	0.3	858 H	10.2	1518 L	-0.6	2134 H	9.1
23 M	326 L	0.3	945 H	10.3	1605 L	-0.6	2221 H	9.1
24 Tu	411 L	0.3	1028 H	10.2	1648 L	-0.6	2304 H	9.0
25 W	452 L	0.4	1108 H	10.1	1728 L	-0.5	2343 H	8.9
26 Th	531 L	0.6	1146 H	9.9	1806 L	-0.3		
27 F	21 H	8.8	610 L	0.7	1223 H	9.7	1842 L	-0.1
28 Sa	59 H	8.7	648 L	0.9	1301 H	9.5	1919 L	0.1
29 Su	137 H	8.6	728 L	1.0	1341 H	9.2	1957 L	0.4
30 M	216 H	8.5	810 L	1.2	1423 H	8.8	2037 L	0.6
31 Tu	258 H	8.4	856 L	1.3	1508 H	8.5	2119 L	0.8

Ordnance and Explosives
Archives Search Report
for
Bailey Island Fire Control Station
Cumberland County, Maine
Project Number D01ME009801

APPENDIX G

REAL ESTATE DOCUMENTS

APPENDIX G

REAL ESTATE DOCUMENTS

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REALTY CONTROL FILE SUMMARY
(Land Acquisitions and Disposals Subsequent to 1 July 1940)

/231

RESERVATION NAME:

Bailey's Island Fire Control Station, Maine

OFFICIALLY DESIGNATED BY:

LOCATION:

In Cumberland County, 13 mi. NE of Portland, Maine

TYPE:

Fire Control Station - Portland Harbor Defenses

LAND OWNERSHIP AND COST DATA

ACQUISITION ACTIONS

Exhibits "A"

DISPOSAL ACTIONS

Exhibits "B"

NET AREA

2.50 acres, fee
0.37 of an acre, easements (3)
2.87 acres, total area acquired
2.87 acres*
0.00

GROSS COST

2,645.00

JURISDICTION

Exhibit "C"

RELOCATIONS

FINAL PROJECT MAP:

Exhibit "F"

MISCELLANEOUS PAPERS:

Exhibit "E"

REMARKS:

* Reported excess to GSA (GSA Form 30), 18 April 1950, and conveyed to Esther Root Adams by quitclaim deed, dated 22 October 1952.

0-1603

REPRODUCED AT THE NATIONAL ARCHIVES

Office of the Attorney General
Washington, D.C.

February 5, 1943

OFFICE CHIEF OF ENGINEERS
FEB 6 1943

Honorable Henry L. Stimson
Secretary of War
Washington, D. C.

My dear Mr. Secretary:

A re-examination has been made of the title data relating to .09 of an acre of land, more or less, Tract No. 3, Bailey Island Fire Control Site Project in Cumberland County, Maine. This land is conveyed to the United States of America under the provisions of existing legislation by Mary F. Hazell, unmarried, et al., under deed dated December 9, 1942 and recorded among the land records of the county on January 23, 1943 in Book 1706 of Deeds at page 111. Your reference is No. 601.1 DRE 6, and the file number of this Department is 33-20-191-2.

The land is described in the aforesaid deed, which recites a consideration of $435.00.

The abstract, consisting of 69 pages, was last satisfactorily certified on January 25, 1943 by George E. Curley, Abstractor.

The abstract, recorded deed and accompanying data disclose valid title to be vested in the United States of America, subject to easements for roads, highways and public utilities, if any, not shown of record, which your Department has advised will not interfere with the contemplated use of the land.

The abstract of title, deed and related papers are enclosed.

Respectfully,

RECEIVED FEB 6 PM O.C.E. 1943

FEB 6

Francis Biddle

Attorney General

Bailey Island, Me. (Hazell Mary F. Hazell) Fee

REPRODUCED AT THE NATIONAL ARCHIVES

Know all Men by those Presents:

That we, Mary F. Hazell, unmarried, of the Town of Norton, County of Bristol, and Commonwealth of Massachusetts, and Ada J. Ball, unmarried (sometimes known as Ada Jane Ball), of the City of Springfield, County of Hampden, and Commonwealth of Massachusetts, and Mary E. Ball, unmarried, of Washington, D. C., and Theodore E. Hazell, married, of the City of Gainesville, and State of Florida, in consideration of Four Hundred Thirty-five Dollars ($435.00) to us paid by the United States of America and its assigns, the receipt whereof is hereby acknowledged, the right to construct, operate, and maintain a right of way not exceeding 16.5 feet in width over, upon, and across that certain strip of land situated in the Town of Harpswell, County of Cumberland, and State of Maine, the centerline of said right of way being described as follows:

> Beginning at a stake set in the ground on the westerly boundary line of a road leading from Brunswick to road and landing so-called which beginning point bears S 13° E 23.8 feet from an iron pipe set in the ground at the southeasterly corner of land of one Johnson and the northeasterly corner of land of said Hazell, et al.; thence crossing the land of said Hazell, et al. with bearings and distances between points in the centerline of said right of way as follows: S 43° 45' W 163.2 feet to a stake set in the ground and S 8° 43' W 156.8 feet to a stake set in the ground on the northeasterly boundary of Agnes I. Paton, the said right of way herein conveyed containing between the exterior boundary lines thereof 0.09 of an acre, more or less.

W-29

293d

REPRODUCED AT THE NATIONAL ARCHIVES

Together with the right to enter upon, and to construct, operate, maintain, repair, rebuild, and patrol said right of way, together with the right to trim, cut, fell, and remove all trees and underbrush within the limits of the above-described right of way and for such distances upon such limits as is necessary to provide adequate clearance and to eliminate hazards to said roadway.

TO HAVE AND TO HOLD the above-described easement with all the privileges and appurtenances thereof, to the said United States of America and its assigns, to its and their use and behoof.

And for the consideration of aforesaid, I, Etta K. Hazell, wife of the said grantor Theodore E. Hazell, do hereby release unto the grantee and its assigns all my rights of dower and homestead in the granted premises.

IN WITNESS WHEREOF, we, the said Etta K. Hazell, Theodore E. Hazell, Ada J. Ball, Mary E. Ball, and Mary F. Hazell, hereunto set our hands and seals this 9th day of December 1942

Signed, sealed and delivered in the presence of

Arden Street	Etta K. Hazell (Etta K. Hazell)
Don C. Mason	Theodore E. Hazell (Theodore E. Hazell)
Janet D. Patriquin	Ada J. Ball (Ada J. Ball)
R. Tribert	Mary E. Ball (Mary E. Ball)
Janet D. Patriquin	Mary F. Hazell (Mary F. Hazell)

W-29

293d

G-2

REPRODUCED AT THE NATIONAL ARCHIVES

STATE OF FLORIDA)
County of Alachua
: SS:

CITY OF GAINESVILLE) December 9, 1942

Personally appeared the above-named Theodore E. Hazell and Etta K. Hazell and acknowledged the foregoing instrument to be their free act and deed.

Before me, Arden Street
Notary Public

(NOTARIAL SEAL)

My commission expires on Feb 12, 1943

WASHINGTON)
: SS:

DISTRICT OF COLUMBIA) Dec. 17, 1942

Personally appeared the above-named Mary E. Ball and acknowledged the foregoing instrument to be her free act and deed.

Before me, Robert Tribuck
Notary Public

(NOTARIAL SEAL)

My commission expires on Aug. 15, 1945

COMMONWEALTH OF MASSACHUSETTS)
: SS:

COUNTY OF ~~HAMPDEN~~ Bristol) Dec. 28, 1942

Personally appeared the above-named Ada J. Ball and acknowledged the foregoing instrument to be her free act and deed.

Before me, Janet D Patriquin
Notary Public

(NOTARIAL SEAL)

My commission expires on Aug. 13, 1948.

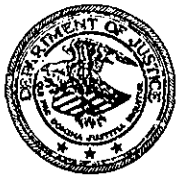
W-29

-3-

293d

REPRODUCED AT THE NATIONAL ARCHIVES

J.A.G.



Office of the Attorney General
Washington, D.C.

February 5, 1943

OFFICE CHIEF OF ENGINEERS
FEB 5 1943
601.1 Bailey Island Fire Control Site Maine (Mary)

Tracts 1 + 4

Honorable Henry L. Stimson
Secretary of War
Washington, D. C.

My dear Mr. Secretary:

A re-examination has been made of the title data relating to 2.5 acres of land, more or less, Tract No. 1, and a permanent easement upon, over, and across .19 of an acre of land, Bailey Island Fire Control Site Project in Harpswell, Cumberland County, Maine. This land is conveyed to the United States of America under the provisions of existing legislation by Mary F. Hazell, unmarried, et al., under deed dated December 9, 1942, and recorded among the land records of the county on January 23, 1943, in Book 1706 of Deeds at page 109. Your reference is No. 601.1 DRE 6, and the file number of this Department is 33-20-191-2.

The land and easement are described in the aforesaid deed, which recites a consideration of $1,125.00.

The abstract, consisting of 26 pages, was last satisfactorily certified on January 25, 1943, by George E. Curley, Abstractor.

The abstract, recorded deed, and accompanying data disclose valid title to the land and permanent easement to be vested in the United States of America, subject to easements for roads, highways and public utilities, if any, not shown of record, which your Department has advised will not interfere with the contemplated use of the land.

The abstract of title, deed, and related papers are enclosed.

FEB 5 '43 PM

Respectfully,

Francis Biddle

Attorney General

FEB 5 AM

TR. 1 + 4 (easement)

REPRODUCED AT THE NATIONAL ARCHIVES

Know all Men by these Presents:

That I, Agnes I. Paton, being a widow, of the Town of Maplewood, County of Essex, and State of New Jersey, in consideration of Eighty-five Dollars ($85.00), to me paid by the United States of America, the receipt whereof is hereby acknowledged, do hereby give, grant, bargain, sell and convey unto the said United States of America and its assigns a right of way not exceeding 16.5 feet in width over, upon, and across a certain strip of land containing 0.09 of an acre, more or less, located in the Town of Harpswell, County of Cumberland, and State of Maine, the centerline of said right of way being bounded and described as follows:

> Beginning at a stake set in the ground marking the junction of the southwesterly boundary line of land of Mary E. Hazell et al, shown on a plan hereinafter mentioned and the centerline of said easement, which beginning point bears N 66 deg. 43' W 16.4 feet from an iron pipe set in the ground at an angle point in the southwesterly boundary line of land of said Mary E. Hazell et al; THENCE Crossing land of said Paton with bearings and distances between points on the centerline of said easement as follows: S 45 deg. 52' W 107.7 feet, S 36 deg. 02' W 135.9 feet and S 61 deg. 07' W 2.9 feet to a stake set in the ground on the northeasterly boundary line of land of Theodore E. Hazell, et al and shown on plan of a tract of land of Agnes I. Paton dated February 16, 1942 and made by the United States Engineer Office, Boston, Massachusetts.
>
> Together with the perpetual right to enter upon and to construct, operate, maintain, repair, rebuild, and patrol said right of way and the right to trim, cut, fell and remove all trees and under-brush within the limits thereof and upon such limits as may be necessary to provide adequate clearance and to eliminate hazards to said right of way.

W-30 1 210e

REPRODUCED AT THE NATIONAL ARCHIVES

TO HAVE AND TO HOLD the above-described easement with all the privileges and appurtenances thereof, to the said United States of America and its assigns, to its and their use and behoof forever.

IN WITNESS WHEREOF, I, the said Agnes I. Paton, hereunto set my hand and seal this 3rd day of Feb, 1943

Signed, sealed and delivered
in the presence of

Florence M. Closer Agnes I. Paton
(Agnes I. Paton)

STATE OF NEW JERSEY)
: SS:
COUNTY OF ESSEX) Feb. 3, 1943.

Personally appeared the above-named Agnes I. Paton and acknowledged the foregoing instrument to be their free act and deed.

Before me, W H Martin
Notary Public

(NOTARIAL SEAL)

My commission expires on 5/26/46

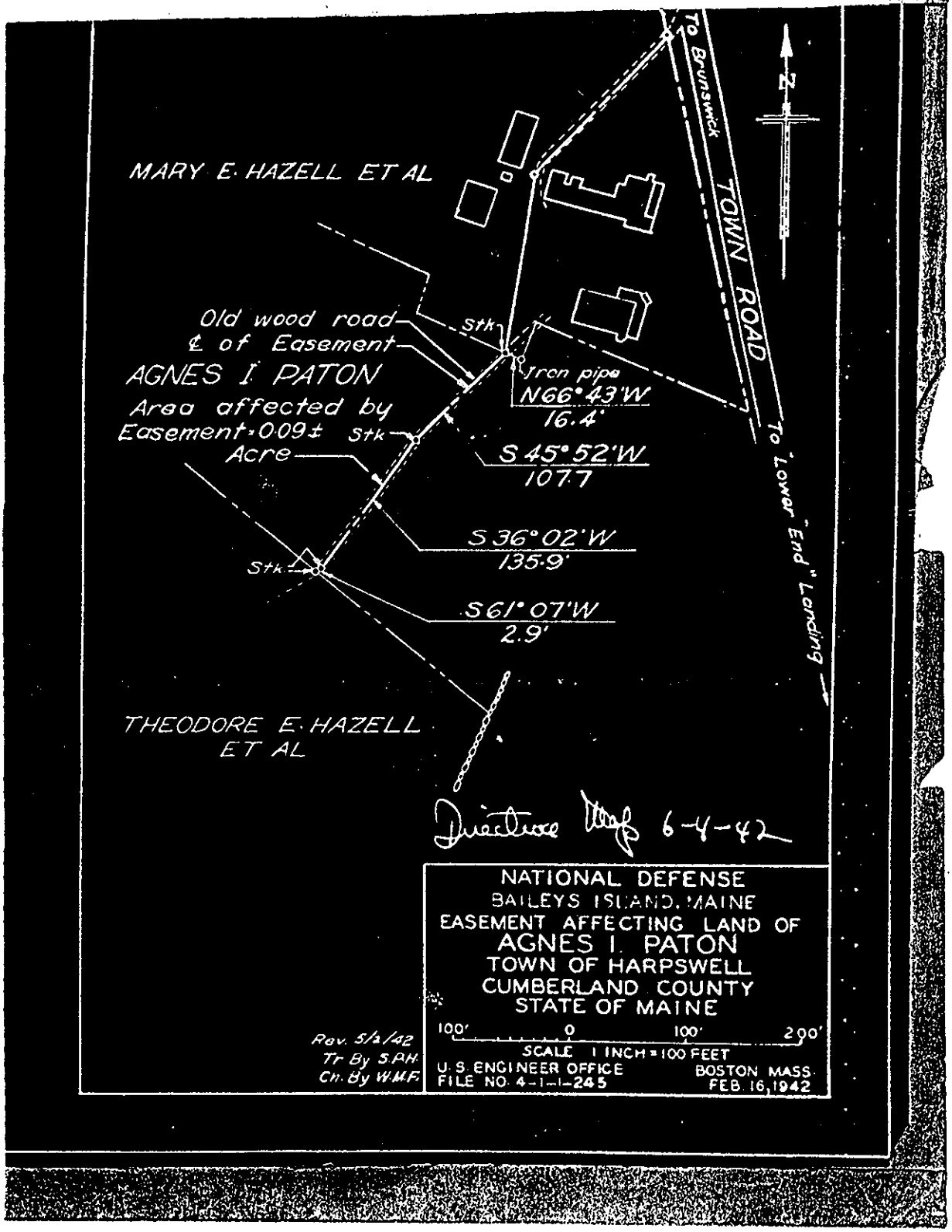
STATE OF MAINE
Cumberland, ss. REGISTRY OF DEEDS
Received FEB 9 1943
at 4 H 50 M P M, and recorded
in Book 1706 Page 215
Attest: A Maude Cavitt
Register

W-30

210e

G-3

REPRODUCED AT THE NATIONAL ARCHIVES



REPRODUCED AT THE NATIONAL ARCHIVES

N A T I O N A L D E F E N S E

FIRE CONTROL SITE

ABSTRACT OF TITLE
THEODORE E. HAZELL ET ALI
Tract #1

TOWN OF HARPSWELL, CUMBERLAND COUNTY, MAINE

WAR DEPARTMENT
UNITED STATES ENGINEERS, NEW ENGLAND DIVISION
REAL ESTATE BRANCH

ABSTRACT SUBMITTED August 17, 1942
ABSTRACT PREPARED BY Hilda N. Johnson
ABSTRACT EXAMINED BY

REPRODUCED AT THE NATIONAL ARCHIVES

CR Form No. 6

Revised (1-15-42)

Project: **Fire Control Site**

Vendor: **Theodore E. Hazell, et al.**

Tract No.: #1

Contract No.:

WAR DEPARTMENT

Office of the Chief of Engineers - Construction Division - Real Estate Branch

OPTION FOR PURCHASE OF LAND

In consideration of One Dollar ($1.00) and other valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the undersigned, hereinafter called the "Vendor", who represents that he is the owner of the property hereinafter described, hereby for himself and his heirs, executors, administrators, successors and assigns, agrees to convey to the United States of America, in accordance with the terms and conditions set forth below, the following described land, together with all rights, hereditaments, easements, appurtenances, and improvements thereunto belonging, located in County of ~~Cumberland~~, State of ~~Maine~~, bounded and described as follows:

said land is situated in the town of Harpswell: Beginning at a stake and stones marking the northeasterly corner of a tract of land shown as 2.5 acres, more or less and marked "Theodore E. Hazell, et al"on a plan dated February 13, 1942 made by the United States Engineer of Boston, Massachusetts; THENCE crossing land of said Hazell et al S 19 degrees, 28' E 578.0 feet to a stake and stones, and continuing on the same course 5.0 feet to a point on the low water mark of Casco Bay; THENCE along the low water mark of said Casco Bay with bearings and distances between points on said low water mark as follows: S 73 degrees 55' W 53.0 feet, N 1 deg. 15' W 110.0 feet, S 60 deg. 30' W 25.0 feet, S 29 deg 40' W 109.0 feet, S 68 deg. 30' W 31.0 feet, N 46 deg. 50' W 20.0 feet, N 4 deg. 45' W 52.0 feet and S 35 deg. 01' W 58.3 feet; THENCE crossing land of said Hazell et al N 19 deg. 28' W 3.0 feet to a stake and stones and continuing on the same course 515.1 feet to a stake set in the ground; THENCE N 70 deg. 34' E 152.3 feet to a stake set in the ground marking the junction of the centerline of an easement shown on the abovementioned plan and the northwesterly boundary line of the tract herein described and continuing on the same course 47.5 feet to the point of beginning containing 2.5 acres, more or less.

the Vendor agrees to convey to the United States as hereinafter provided, a

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valid, indefeasible fee simple title to said land, subject to the following reservations and exceptions:

The terms of this option are as follows:

(1) The purchase price of said land is to be the sum of One Thousand ----------no/100 dollars ($ 1000.00) for the tract as a whole, payable as soon as the United States has accepted this option and has had a reasonable time within which to secure and examine the evidence of title to said land, provided the Vendor can execute and deliver to the United States a general warranty deed conveying said land to the United States of America in fee simple, free from all encumbrances; except that in conveyance by states, municipal corporations, fiduciaries, and other persons acting in a representative capacity, a deed which does not contain general warranty covenants may be acceptable if otherwise satisfactory to the United States.

(2) The Vendor hereby agrees that this option may be accepted by the United States through any duly authorized representative, by delivering, mailing, or telegraphing a notice of acceptance to the Vendor at the address stated below, at any time within three (3) month(s) from the date hereof.

(3) The Vendor agrees to deliver to the representatives of the United States any abstracts, certificates or evidence of title available or in his possession and, if not available, the United States will procure at its own expense the necessary abstracts, certificates or evidence of title, and will prepare the necessary deed of conveyance.

(4) The Vendor agrees that all taxes and encumbrances which are a lien against the land shall be satisfied of record at his expense at or before the transfer of

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title, and if the Vendor fails to do so, the United States may pay any taxes, assessments, and encumbrances which are a lien against the land, and that the amount of such payments shall be deducted from the purchase price of the land. The Vendor further agrees that at the request of the United States and without prior payment or tender of the purchase price, he will execute and deliver the general warranty deed hereinabove provided for conveying to the United States the land herein described and agrees to pay the documentary revenue stamp tax and to obtain and record such other evidence of title as may be required by the United States; it being understood that the Government will pay the fee for recordation of the deed to the United States.

(5) The Vendor agrees that loss or damage to the property by fire or acts of God shall be at the risk of the Vendor until the title to the land and deed to the United States have been accepted by the United States through its duly authorized representative, or until the right of immediate occupancy and use of the land, as hereinbelow provided for, has been exercised by the United States; and in the event that such loss or damage occurs, the United States may, without liability, refuse to accept conveyance of title, or it may elect to accept conveyance of title to such property, in which case there shall be an equitable adjustment of the purchase price.

(6) The Vendor agrees that in the event the United States determines, notwithstanding the prior exercise of this offer, the title to said land or any portion thereof or any interest therein, to be unsatisfactory for purchase by deed or for any other reason, the United States, at its election, may acquire the same by condemnation with or without a declaration of taking; and in that event, the Vendor agrees to cooperate with the United States in the prosecution of such proceedings, and the Vendor agrees that this option shall constitute a stipulation which may be filed in such proceedings and shall be final and conclusive evidence of the true value of the whole of said property and of the proper award to be made in such proceedings.

(7) The Vendor grants to the United States the right of immediate occupancy and use of the land hereinabove described for any purpose whatsoever from and after the acceptance by the United States of this option until such time as said land is conveyed to the United States by the Vendor as hereinabove provided, and upon demand the Vendor will immediately vacate the property and deliver possession to the United States.

(8) It is agreed that the spouse, if any, of the Vendor by signing below, agrees to join in any deed to the United States and to execute any instrument deemed necessary to convey to the United States any separate or community estate or interest in the contracted property or to relinquish and release any dower, courtesy, homestead or other rights or interest of such spouse therein.

(9) The above description of the real estate is subject to such modifications as may be necessary to conform to survey (if any) made by the agents of the United States.

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(10) The Vendor represents and it is a condition of acceptance of this option, that no member of or Delegate to Congress, or Resident Commissioner, shall be admitted to or share any part of this option, or to any benefits that may arise therefrom; but this provision shall not be construed to extend to any contract if made with a corporation for its general benefit.

(11) Wherever the context thereof requires, the singular number as used herein shall be read as plural, and the masculine gender as feminine or neuter.

SIGNED, SEALED, AND DELIVERED in quadruplicate, this 2nd (day) of July (month) 1942

WITNESSES:

/s/ Charles J. Nichols	/s/ Mary F. Hazell, Town of Norton, Mass	(SEAL)
/s/ Charles J. Nichols	/s/ Ada J. Ball, Washington D.C.	(SEAL)
/s/ Arlene Ball	/s/ Mary E. Ball " "	(SEAL)
/s/ Catherine S. Hazell	/s/ Theodore E. Hazell	(SEAL)
/s/ Catherine S. Hazell	/s/ Etta K. Hazell	(SEAL)
		(SEAL)

Address to which notice of exercise of option is to be sent.

Box 2384

Gainesville, Florida

WASHINGTON, D. C.

Date:

The offer of the Vendor contained in this option is hereby accepted for and on behalf of the United States of America.

WITNESS:

By

Contracting Officer
Office of Chief of Engineers

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RE Form 68 OPTION FOR ROADWAY EASEMENT "Tract" Easement

State Maine County Cumberland Tract No. 0.19 Acre More or Less

Fire Control Site, Bailey Island, Maine

In consideration of the sum of One Dollar ($1.00) cash in hand paid, receipt whereof is hereby acknowledged, the Undersigned, Theodore E. Hazell, et al, hereby grant to the United States of America through the Secretary of War (hereinafter referred to as the Secretary) the option to purchase for the further sum of One Hundred and Twenty-Five ($125.00) Dollars a permanent easement and right of way not exceeding 16.5 feet in width as now surveyed and staked in, over, upon and across that certain tract of land consisting of 0.19 acre, more or less, and located in the town of Harpswell, County of Cumberland and State of Maine.

The easement to be acquired is the right to use, maintain and improve a road leading from a tract of land shown as 2.5 acres, more or less and marked "Theodore E. Hazell, et al" on a plan dated February 15, 1942 made by the United States Engineer of Boston, Massachusetts to land of Agnes I. Paton as said road now exists.

Beginning at a stake set in the ground marking the junction of the northwesterly boundary line of the tract described above with the centerline of said easement, which beginning point bears S 70 deg. 34' W 47.5 feet from a stake and stones marking the northeasterly corner of said tract; THENCE crossing land of said Hazell et al with bearings and distances between points on said centerline as follows: N 37 deg. 26' E 42.4 feet to a stake set in the ground; N 57 deg. 55' E 113.8 feet to a stake set in the ground, N 66 deg. 47' E 63.3 feet to a stake set in the ground, N 85 deg. 40' E 106.0 feet to a stake set in the ground, N 66 deg. 04' E 96.2 feet to a stake set in the ground, N 88 deg. 45' E 58.4 feet to a stake set in the ground and N 61 deg 07' E 22.0 feet to a stake set in the ground on the southwesterly boundary line of land of Agnes I. Paton. The areaaffected by said easement consists of 0.19 acres, more or less.

Said easement and right of way shall be for the following purposes: Namely the perpetual right to enter and to construct, operate, maintain, repair, rebuild and patrol a roadway including all appurtenances and privileges thereunto belonging, together with the right to trim, cut, fell and remove all trees and under-brush within the limits of the above described right of way and for such distance beyond and limits and adjacent thereto as is necessary to provide adequate clearance and to eliminate hazards to said roadway.

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This option shall continue in force for a period of three months from the day it bears date, and at any time within said period the United States of America, shall have the right to exercise said option by giving the undersigned written notice of its determination so to do, such notice to be delivered to the undersigned, either in person or by registered letter mailed to the address given below. At any time within said three months' period the Secretary, his agents, assigns or contractors, may enter upon the land of the undersigned for the purposes of exercising any of the easements rights above described, it being understood that in such event the United States of America shall be deemed to have thereby finally exercised this option, PROVIDED, HOWEVER, that the purchase price shall not become payable until the United States of America has had reasonable time to examine and approve title to the land affected, and prepare a conveyance of the easement and right of way as herein provided for; and PROVIDED, FURTHER, that the Secretary, his representatives and employees, may enter upon the land of the undersigned for the purpose of making surveys without being deemed to have exercised this option.

We covenant and agree to and with the United States of America and its assigns that we are the owner in fee simple of the above described land and that the land is free and clear of all liens or encumbrances except as follows:

If the United States of America shall elect to exercise this option the undersigned agree that at such time as the United States of America may name, within the time limit hereof, they will execute and deliver to the United States of America a properly executed instrument of conveyance whereby the above described easement and right of way is conveyed to the United States of America free from encumbrances, including current or past due taxes, and the undersigned understand and hereby agree that the purchase price above stated will be paid to them upon the delivery and recordation of such conveyance. The abstract or certificate of title required in this transaction will be furnished by the United States of America, at its expense.

If for any reason the title to the land is not approved by the Attorney General, the Government may proceed to acquire the land by condemnation proceedings instituted in the District Court of the United States in which said property is located, under a consent verdict fixing the award at the agreed valuation and will upon filing its petition in such proceedings deposit said agreed purchase price with the clerk of said court, same to be disbursed by said officer pursuant to the decree entered in such condemnation proceedings. In such event the occupancy and use of the land by the Government as granted aforesaid shall not be interrupted but shall continue to be enjoyed by the Government throughout the pendency of said condemnation proceedings.

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No Member or Delegate to Congress, or Resident Commissioner, shall be admitted to any share or part of this contract or to any benefit that may arise therefrom unless it is made with a corporation for its general benefit.

DATED this 2nd day of July, 1942.

WITNESSES:

/s/ CHARLES J. NICHOLS

/s/ Charles J. Nichols

/s/ Arlene Ball

/s/ Catherine E. Hazell

/s/ Catherine E. Hazell

/s/ Mary F. Hazell
Mary F. Hazell

/s/ Ada J. Ball
Ada J. Ball

/s/ Mary E. Ball
Mary E. Ball

/s/ Theodore E. Hazell
Theodore E. Hazell

/s/ Etta K. Hazell
Etta K. Hazell

Address to which notice of exercise of option is to be sent:

Box 2584

Gainesville, Florida

Accepted by and on behalf of the United States of America this

day of ,1942.

WITNESS:

By

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REPORT ON PARCEL EXAMINED

This parcel is comprised of Lots A and D, as shown on plan, sheet 5.

In my opinion, the earliest deed abstracted, of which locus is a part, in the matter of said parcel, is sufficiently old from which to commence my examination.

Title to said Lots A and D is in Theodore E. Hazell (2/6 interest), Mary F. Hazell (2/6 interest), Mary E. Ball (1/6 interest) and Ada Jane Ball (1/6 interest) by virtue of partition of real estate of Stillman A. Elden, late of Harpswell, Cumberland County, Maine, recorded Cumberland County Registry of Deeds, Book 659, Page 301, sheet 11, and by virtue of probate of Annie H. Ball, formerly Annie R. Hazell, who deceased May 9, 1924, intestate, Cumberland County Probate Case No. 20363, sheet 15, and by virtue of probate of John J. Ball, who deceased November 26, 1940, intestate, Cumberland County Probate Case No. 32588, sheet 19. - page 15.

The abstract of title is good and sufficient and free from encumbrances except as noted on sheet 4.

DESCRIPTION OF PARCEL EXAMINED

A certain lot or parcel of land situated on Bailey's Island in the Town of Harpswell, Cumberland County, Maine, bounded and described as follows:-

Commencing at the end of a stone wall on the southwesterly shore of said Island, running nearly parallel with the road leading to Town Landing and lying on the northwesterly side of the same; "A" on plan - sheet 5.

Thence Northeasterly by said wall to a large spruce tree blazed on the northwest side;

Thence Northwesterly about thirty (30) rods to a stone monument marked with a cross in the top;

Thence Northeasterly about 600 feet to a pointed stone monument marked with a cross on its northwest side;

Thence Northwesterly to the corner of a lot conveyed to Ada E. Hazell in October 1869 by Mary L. and Florence L. Elden;

Thence by the eastern and southern boundaries of said lot so conveyed to Ada E. Hazell to the western shore of the island;

Thence southerly by the shore to the Point so-called;

Thence northeasterly by the shore to the first mentioned bounds; together with the flats, beaches and privileges belonging thereto.

Together with a strip of land twenty-five (25) feet in width located and described as follows:- "D" on plan - sheet 5.

Commencing on the westerly side of the Town Road leading to the Town Landing so-called, at a point sixty-five (65) feet from the shore end;

Thence running northwesterly in a straight line so that the middle line of said strip shall be 17½ feet northerly from the northerly side of a well situated about sixty (60) feet easterly from the stonewall; said strip extending from said Town Road leading to said Land to the stone wall aforesaid.

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CHAIN OF TITLE

(Lots A and D on plan - sheet 5)

1885	Ephraim Johnson	to	Stillman A. Elden	Sheet 6
---	Stillman A. Elden Hrs.		see	Sheet 7
(1895	Mary L. Elden (includes "interest" in (locus	to	Charles B. Horton and Francis V. B. Kern, Trustees	" 8
(1896	Elden Emerson (includes "interest"in locus)	to	Mary L. Elden	Sheet 10
1897	Stillman A. Elden Estate (Partition)	to	(Theodore E. Hazell 1/3 int. (Mary F. Hazell 1/3 int. (Annie R. Hazell 1/3 int.	Sheet 11
1924	Annie H. Ball Probate (formerly Annie R. Hazell)			Sheet 15
1924	Annie H. Ball (1/3 interest) (by descent)	to	(John J. Ball - 1/9 int. (Ada Jane Ball - 1/9 int. (Mary E. Ball - 1/9 int.	Sheet 15
1941	John James Ball Probate			Sheet 19
1941	John James Ball (1/9 interest) (by descent)	to	(Ada Jane Ball - 1/18 int. (Mary E. Ball - 1/18 int.	Sheet 19

Theodore E. Hazell - 2/6 interest)
Mary F. Hazell - 2/6 interest) Present
Ada J. Ball - 1/6 interest) Owners.
Mary E. Ball - 1/6 interest)

YOUR ATTENTION IS CALLED TO THE FOLLOWING:

1. Remarks Sheet 7
2. Tax records not examined - sheet 21.

UNITED STATES OF AMERICA
GENERAL SERVICES ADMINISTRATION

REAL PROPERTY CLASSIFICATION

1. Property Identification	3. GSA Case Number
Bailey Island Fire Control Station Harpswell, Maine	~~D-Me-410~~ Owning Agency Number
2. Area	~~04-1323~~ Date of Declaration
2.5 acres	~~4/19/50~~

4. Classification

	Acquisition Cost
(06) Residential	
Buildings	$51,576
Land	1,645
Total	$53,221

5. Remarks: Appraised August 31, 1951 - Paul E. Kelleher, Property Management Officer - Total Fair Value $2,000, as follows:

Land	$1,700
Improvements	300
Total	$2,000

Highest use is a summer cottage site.

Recommended	Approved
Paul E. Kelleher	[signature]
Real Property Management Officer	Deputy Regional Director, PBS
6. Field Initial P.E.K. November 13, 1951	11-19-51
Date	Date

The above fair value, as stated herein, is established as indicated.

APPROVED: [signature]
J. J. O'CONNOR
Regional Director

PI-310 (6-4-51)

GENERAL SERVICES ADMINISTRATION, BOSTON 9, MASS.

RECEIVED
SEP 22 1952
REGIONAL COUNSEL'S OFFICE

MEMORANDUM TO THE REGIONAL DIRECTOR: September 10, 1952

I. PROJECT IDENTIFICATION: D-Maine-410
Bailey Island Fire Control Station
Harpswell, Maine

II. SUBJECT: Disposal of Real Property

III. DESCRIPTION:

Subject property comprises a parcel of land containing about 2½ acres with a precipitous shore frontage of 200 feet. It is located on Bailey Island in the Township of Harpswell, Maine, which is about 45 miles from Portland.

Improvements and buildings on the land include two 60' concrete towers, three one-story cement block buildings 20 x 20 x 10, a pump house, and 1000-gallon water tank, and a 11' x 16' frame shed.

IV. PROPOSED PURCHASER: Esther Root Adams
2 West 67th Street
New York 23, New York

FILE

V. SUMMARY OF VALUES: *Actual Cost - $55,281.00
**Fair Value - $2,000.00

*Actual cost taken from GSA Form 30, dated April 18, 1950.
**Fair Value as determined by appraisal, dated August 31, 1951, prepared by Paul N. Kelleher, Property Management Officer.

VI. SURPLUS:

This property was declared excess by GSA Form 30, dated April 18, 1950, was screened against known defense and civilian requirements, and determined to be surplus on July 26, 1951.

VII. HISTORY:

Due to the extenuating circumstances involved in considering the disposal of this property, it was determined by the Administrator to be a "hardship" case, and he further determined that as disposal by advertising would not better protect the public interest, he was authorizing a negotiated sale of the property to Mrs. Franklin P. Adams, of Westport, Connecticut, at not less than its appraised fair value as a means of relieving the hardship, which disposal by advertising would impose upon her as the owner of the adjoining land.

Under date of August 5, 1952, the Administrator notified the Honorable John L. McClellan, Chairman, Committee on Government Operations, United States Senate, and the Honorable William L. Dawson, Chairman, Committee on Expenditures in the Executive Departments, that pursuant to Section 203(e) of the Federal Property and Administrative Services Act of 1949 (63 Stat. 377, Public Law 152, 81st Congress), as recently amended by subsection (i) of Section 1 of Public Law 522, 82nd Congress, which amendment provides as follows:

"(e) Unless the Administrator of General Services shall determine that disposal by advertising will in a given case better protect the public interest, surplus property disposals may be made without regard to any provision of existing law for advertising until 12 o'clock noon, eastern standard time, June 30, 1953: Provided, That an explanatory statement shall be prepared and submitted to the appropriate committees of Congress and a copy preserved in the file of all cases where negotiated disposal occurs."

"That pursuant to the foregoing authority, the Administrator proposes on September 1, 1952 to authorize the Regional Director, Region 1, General Services Administration, Boston, Massachusetts, to negotiate the sale at not less than its appraised fair value of certain property comprising a portion of the former Bailey's Island Fire Control Station, Harpswell, Maine, to Mrs. Franklin P. Adams, 51 Riverside Ave., Westport, Connecticut."

VII. HISTORY (Cont'd)

The Regional Director, Region 1, Boston, Massachusetts, was authorized by Memorandum dated August 6, 1952, "to negotiate with Mrs. Adams on or after September 1, 1952, and conclude the same for the purchase of the property located at Harpswell, Maine, at not less than its appraised fair value, without further notice from the Central Office."

Negotiations with Mrs. Adams for the purchase of the property were conducted in the Regional Office on September 10, 1952, and resulted in Mrs. Adams' offer to purchase the property for $2,150.00 which is $150.00 in excess of the established fair value.

VIII. RECOMMENDATION:

It is recommended that the offer of Mrs. Franklin P. Adams (Esther R. Adams) to purchase the subject property for $2,150.00 cash be accepted, subject to the following terms and conditions:

1. Terms: $2,150.00 all cash on closing.

2. Title to be conveyed by a good and sufficient deed without warranties express or implied and property to be delivered at a date to be mutually agreed upon.

3. All deeds or other instruments conveying any interests in the property herein offered, shall contain a reservation to the United States of America, of all fissionable materials, pursuant to Section 5(b) (1) of the Atomic Energy Act of 1946.

4. Any other requirements deemed necessary by the Office of General Counsel, General Services Administration.

RECOMMENDED BY:

Paul J. O'Brien
Chief, Real Property Disposal Division

RECOMMENDATION CONCURRED IN BY:

C. H. Cool,
Deputy Regional Director, PBS

APPROVED AS TO LEGAL REQUIREMENTS:

Daniel J. Young, Regional Counsel

APPROVED:

Paul F. Healy, Assistant Regional Director

J. J. O'Connor, Regional Director

DATE: September 10, 1952

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Duplicate Copy

KNOW ALL MEN BY THESE PRESENTS: That the UNITED STATES OF AMERICA, acting by and through the ADMINISTRATOR of GENERAL SERVICES, under and pursuant to the powers and authority contained in the provisions of the Federal Property and Administrative Services Act of 1949 (63 Stat. 377) as amended, and regulations and orders promulgated thereunder, for and in consideration of the sum of TWO THOUSAND ONE HUNDRED FIFTY DOLLARS ($2,150.00) to it paid by ESTHER ROOT ADAMS of the Town of Harpswell, County of Cumberland, State of Maine, the receipt of which is hereby acknowledged, does hereby remise, release and forever quit-claim unto the said ESTHER ROOT ADAMS, her heirs and assigns forever all its right, title and interest in and to the following described real estate, together with all buildings and structures thereon:

A certain lot or parcel of land situated in the Town of Harpswell, and County of Cumberland, and State of Maine, the said parcel of land being bounded and described as follows:

Beginning at a stake and stones marking the northeasterly corner of a tract of land shown as 2.5 acres, more or less, and marked "Theodore E. Hazell, et al" on a plan dated February 15, 1942 made by the United States Engineers of Boston, Massachusetts; thence crossing land of said Hazell et al, South 19° 28' East, 578.0 feet to a stake and stones, and continuing on the same course 5.0 feet to a point on the low water mark of Casco Bay; thence along the low water mark of Casco Bay with bearings and distances between points on said low water mark as follows:

South 73° 55' West, 53.0 feet, North 1° 15' West, 110.0 feet, South 60° 30' West, 25.0 feet, South 29° 40' West, 109.0 feet, South 68° 30' West, 31.0 feet, North 46° 50' West, 20.0 feet, North 4° 45' West, 52.0 feet and South 35° 01' West, 58.3 feet; thence crossing land of said Hazell et al, North 19° 28' West, 3.0 feet to a stake and stones and continuing on the same course 515.1 feet to a stake set in the ground; thence North 70° 34' East, 152.3 feet to a stake set in the ground marking the junction of the centerline of an easement shown on the above-mentioned plan and the northwesterly boundary line of the tract herein described, and continuing on the same course 47.5 feet to the point of beginning. Containing 2.5 acres, more or less. Subject to easements for roads, highways and public utilities, if any.

A right-of-way upon, over, and across a strip of land not exceeding 16.5 feet in width containing 0.19 of an acre, more or less, and situated in the Town of Harpswell, County of Cumberland, and State of Maine, the centerline of said right-of-way being delineated and described on the above-mentioned plat as follows:

Beginning at a stake set in the ground marking the junction of the northwesterly boundary line of the tract described above with the centerline of said easement, which beginning point bears South 70°34' West, 47.5 feet from a stake and stones marking the northeasterly corner of said tract;

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thence crossing land of said Hazell et al, with bearings and distances between points on said centerline as follows: North 37° 26' East, 42.4 feet to a stake set in the ground; North 37° 55' East, 113.8 feet to a stake set in the ground; North 66° 47' East, 63.3 feet to a stake set in the ground; North 85° 40' East, 106.0 feet to a stake set in the ground; North 66° 04' East, 96.2 feet to a stake set in the ground; North 88° 45' East, 58.4 feet to a stake set in the ground, and North 61° 07' East, 22.0 feet to a stake set in the ground on the southwesterly boundary line of land of Agnes I. Paton.

Together with the right of the United States and its assigns to enter upon said strip of land and to construct, operate, maintain, repair, rebuild, and patrol a roadway, together with the right to trim, cut, fell, and remove all trees and underbrush within the limits of the above-described right-of-way and for such a distance upon such limits as may be necessary to provide adequate clearance and to eliminate hazards to said right-of-way.

The above-described parcel of land together with the above-described permanent easement were acquired by the United States of America by deed of Mary F. Hazell, Ada J. Ball, Mary E. Ball and Theodore E. Hazell, dated December 9, 1942, and recorded in Book 1706, Page 109, Cumberland County Registry of Deeds, Maine.

A right of way not exceeding 16.5 feet in width over, upon, and across a certain strip of land containing 0.09 of an acre, more or less, located in the Town of Harpswell, County of Cumberland, and State of Maine, the centerline of said right of way being bounded and described as follows:

Beginning at a stake set in the ground marking the junction of the southwesterly boundary line of land of Mary E. Hazell et al, shown on a plan hereinafter mentioned and the centerline of said easement, which beginning point bears North 66° 43' West, 16.4 feet from an iron pipe set in the ground at an angle point in the southwesterly boundary line of land of said Mary E. Hazell et al;

thence crossing land of said Paton with bearings and distances between points on the centerline of said easement as follows: South 45° 52' West, 107.7 feet; South 36° 02' West 135.9 feet and South 61° 07' West 2.9 feet to a stake set in the ground on the northeasterly boundary line of land of Theodore E. Hazell, et al and shown on plan of a tract of land of Agnes I. Paton dated February 16, 1942 and made by the United States Engineer Office, Boston, Massachusetts.

Together with the perpetual right to enter upon and to construct, operate, maintain, repair, rebuild, and patrol said right of way and the right to trim, cut, fell and remove all trees and under-brush within the limits thereof and upon such limits as may be necessary to provide adequate clearance and to eliminate hazards to said right of way.

Subject, however, to easements for roads, highways and public utilities, if any, not of record, and subject to an easement for a power line.

The above-described permanent easement was acquired by the United States of America from Agnes I. Paton by deed dated February 3, 1943 and duly recorded in Book 1706, Page 215, Cumberland County Registry of Deeds, Maine.

The right to construct, operate, and maintain a right-of-way not exceeding 16.5 feet in width over, upon, and across that certain strip of land situated in the Town of Harpswell, County of Cumberland, and State of Maine, the centerline of said right-of-way being described as follows:

Beginning at a stake set in the ground on the westerly boundary line of a road leading from Brunswick to road and landing so-called, which beginning point bears South 13° East, 23.8 feet, from an iron pipe set in the ground at the southeasterly corner of land of one Johnson and the northeasterly corner of land of said Hazell, et al;

thence crossing the land of said Hazell, et al, with bearings and distances between points in the centerline of said right-of-way as follows: South 43° 45' West, 163.2 feet to a stake set in the ground and South 8° 43' West, 156.8 feet to a stake set in the ground on the northeasterly boundary of Agnes I. Paton, the said right-of-way herein conveyed containing between the exterior boundary lines thereof 0.09 of an acre, more or less.

Together with the right to enter upon, and to construct, operate, maintain, repair, rebuild, and patrol said right-of-way, together with the right to trim, cut, fell, and remove all trees and underbrush within the limits of the above-described right-of-way and for such distances upon such limits as is necessary to provide adequate clearance and to eliminate hazards to said roadway.

Subject, however, to easements for roads, highways, and public utilities.

The above-described permanent easement was acquired by the United States of America from Mary F. Hazell, et al, by deed dated December 9, 1942 and recorded in Book 1706, Page 111 in the Cumberland County Registry of Deeds, Maine.

All uranium, thorium, and all other materials determined pursuant to section 5(b)(1) of the Atomic Energy Act of 1946 (60 Stat. 761) to be peculiarly essential to the production of fissionable materials, contained, in whatever concentration, in deposits in the lands covered by this instrument are hereby reserved for the use of the United States, together with the right of the United States through its authorized agents or representatives at any time to enter upon the land and prospect for, mine, and remove the same, making just compensation for any damage or injury occasioned thereby. However, such land may be used, and any rights otherwise acquired by this disposition may be exercised, as if no reservation had been made; except that, when such use results in the extraction of any such material from the land in quantities which may not be transferred or delivered without a license under the Atomic Energy Act of 1946, as it now exists or may hereafter be amended, such material shall be the property of the United States Atomic Energy Commission, and the Commission may

require delivery of such material to it by any possessor thereof after such material has been separated from the ores in which it was contained. If the Commission requires the delivery of such material to it, it shall pay to the person mining or extracting the same, or to such other person as the Commission determines to be entitled thereto, such sums, including profits, as the Commission deems fair and reasonable for the discovery, mining, development, production, extraction, and other services performed with respect to such material prior to such delivery, but such payment shall not include any amount on account of the value of such material before removal from its place of deposit in nature. If the Commission does not require delivery of such material to it, the reservation hereby made shall be of no further force or effect.

Said property transferred hereby was duly determined to be surplus and was assigned to General Services Administration for disposal pursuant to the Federal Property and Administrative Services Act of 1949 (63 Stat. 377) and applicable rules, orders and regulations.

This deed is executed and delivered to the said ESTHER ROOT ADAMS without any covenants whatsoever, either express or implied.

TO HAVE AND TO HOLD the foregoing described property with all the privileges and appurtenances thereto belonging to the said ESTHER ROOT ADAMS, her heirs and assigns, to their own use and behoof forever.

IN WITNESS WHEREOF, the UNITED STATES OF AMERICA, acting by and through the ADMINISTRATOR of GENERAL SERVICES, has caused these presents to be executed in its name and behalf this 22nd day of October 1952.

UNITED STATES OF AMERICA,
Acting by and through the
ADMINISTRATOR of GENERAL SERVICES

WITNESSES:

Hazel M. Mahoney

J. F. Callahan

By [signature]
Regional Director
General Services Administration
Boston, Massachusetts

G-6

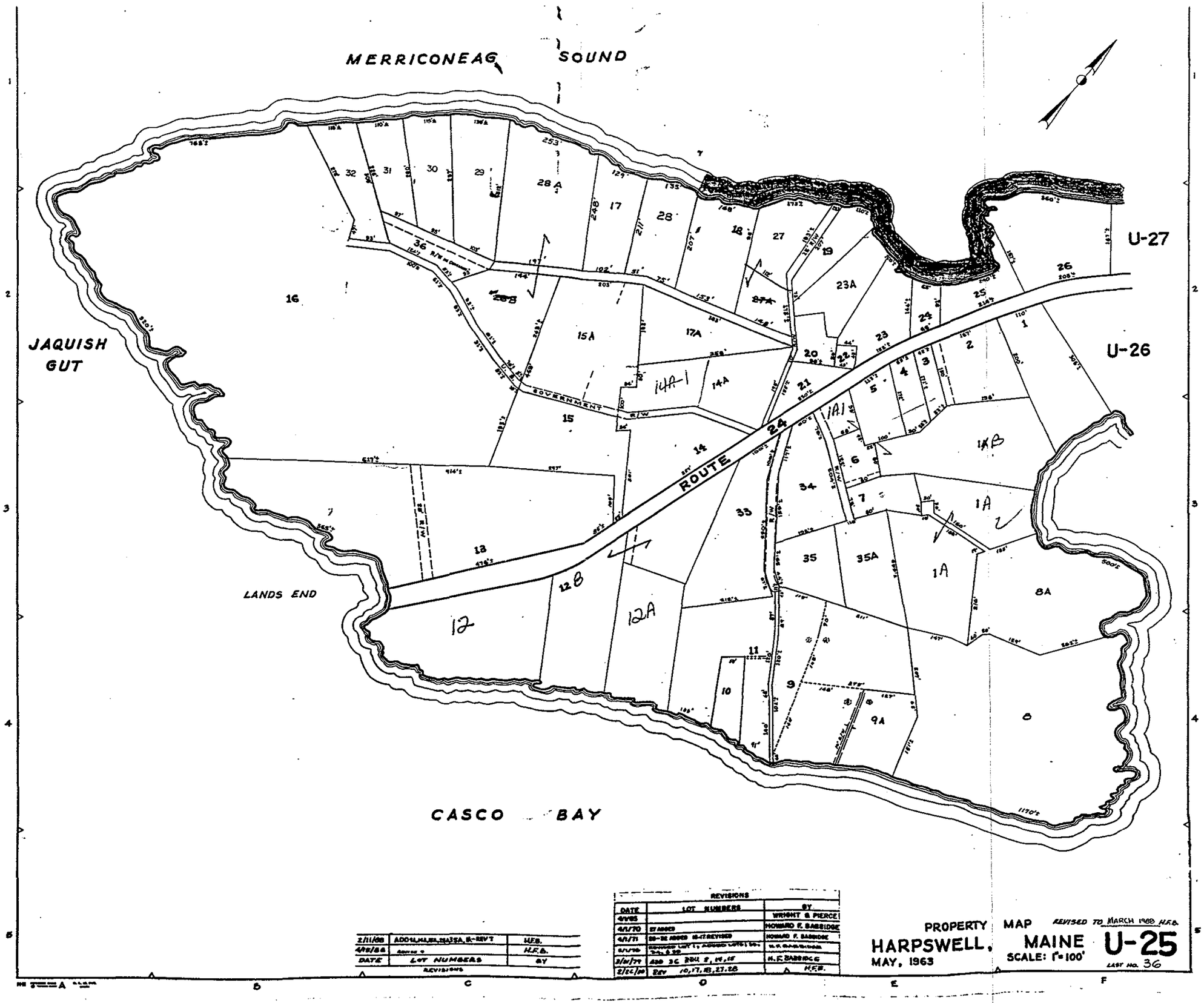
COMMONWEALTH OF MASSACHUSETTS)
COUNTY OF SUFFOLK) ss.

On this 22nd day of October 1952, before me, Daniel J. Young, Notary Public, then and there personally appeared the above-named J. J. O'Connor, Regional Director, General Services Administration, Boston, Massachusetts, duly empowered and authorized and delegated by the Administrator of General Services by his General Delegation of Authority dated November 8, 1950 (15 F.R. 7775), who signed the foregoing instrument and acknowledged the same to be his free act and deed in his said capacity and the free act and deed of the UNITED STATES OF AMERICA.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my official seal the day and year aforesaid.

Daniel J. Young
Notary Public

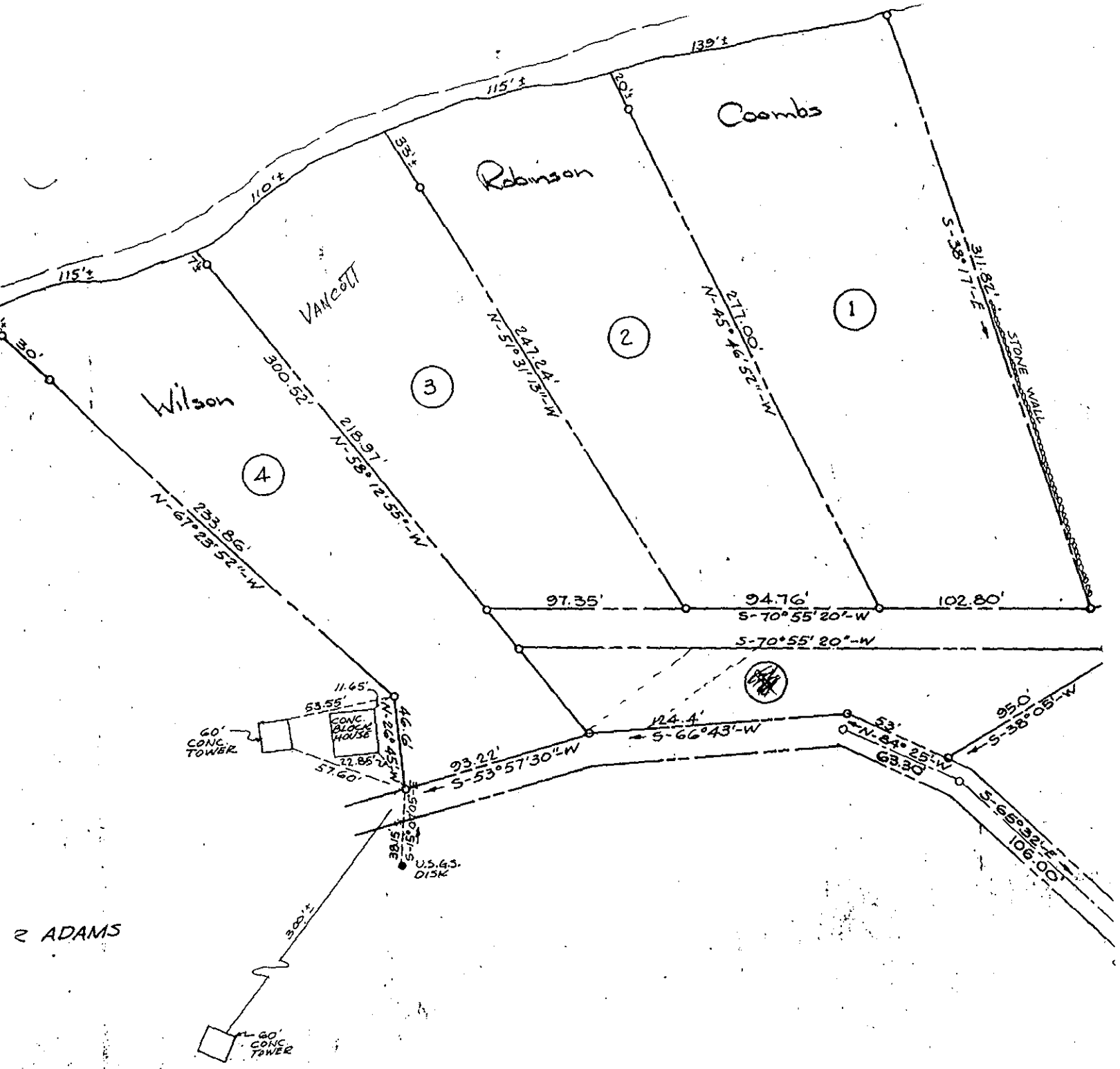
My commission expires June 15, 1957.



REVISIONS		
DATE	LOT NUMBERS	BY
4/1/65		WRIGHT & PIERCE
4/1/70	27 ADDED	HOWARD F. BABBIDGE
4/1/71	20-32 ADDED 16-17 REVISED	HOWARD F. BABBIDGE
5/1/76	REVISED LOT 1, ADDED LOTS 1, 30-34, & 35	H.F. BABBIDGE
3/31/79	ADD 3C REV 2, 14, 15	H.F. BABBIDGE
2/26/80	REV 10, 17, 18, 27, 28	H.F.B.

2/11/88	ADD 1A, 1A1, 1A2, 1A3, 1A4, 1B-REV 7	H.F.B.
4/18/88	ADDED 9	H.F.B.
DATE	LOT NUMBERS	BY
	REVISIONS	

PROPERTY MAP
HARPSWELL, MAINE
MAY, 1963
SCALE: 1"=100'
REVISED TO MARCH 1988 H.F.B.
U-25
LAST NO. 36


Coombs
Robinson
VANCOTT
Wilson
1
2
3
4
139'±
115'±
110'±
115'±
20'±
33'±
30'
311.82'
S-38°17'-E
STONE WALL
277.00'
N-45°46'52"-W
247.24'
N-57°31'13"-W
218.97'
N-58°12'55"-W
300.52'
233.86'
N-67°23'52"-W
97.35'
94.76'
S-70°55'20"-W
102.80'
S-70°55'20"-W
11.65'
53.55'
CONC. BLOCK HOUSE
60' CONC. TOWER
22.86'
57.60'
46.6'
N-22°45'-W
93.22'
S-53°57'30"-W
124.4'
S-66°43'-W
53'
N-84°25'-W
63.30
95.0'
S-38°05'-W
S-65°32'-E
106.00'
38.15'
S-15°04'05"-E
U.S.G.S. DISK
300'±
60' CONC. TOWER
2 ADAMS

Ordnance and Explosives
Archives Search Report
for
Bailey Island Fire Control Station
Cumberland County, Maine
Project Number D01ME009801

APPENDIX H

NEWSPAPERS/JOURNALS

(Not Used)

Ordnance and Explosives
Archives Search Report
for
Bailey Island Fire Control Station
Cumberland County, Maine
Project Number D01ME009801

APPENDIX I

INTERVIEWS

APPENDIX I

INTERVIEWS

Table of Contents

I-1 Conversation Record with Mrs. Judith Adams, current owner, and SI Team, 11 August 1995

I-2 Conversation Record with Ms. Dawnna Black, South Harpswell Town Office, and SI Team, 14 August 1995

I-3 Conversation Record with Mr. Howard Hutchins, local resident, and SI Team, 15 August 1995

I-4 Conversation Record with Det. Gerard Brady, Cumberland County Sheriff's Dept., and SI Team, 15 August 1995

I-5 Conversation Record with Mr. Chip Black, local resident, and SI Team, 15 August 1995

I-6 Conversation Record with Mr. Nelson Lawry, coast defense historian, and SI Team, 15 August 1995

CONVERSATION RECORD	TIME 1000	DATE 11 August 1995

TYPE

[X] VISIT [ ] CONFERENCE [ ] TELEPHONE [ ] INCOMING [ ] OUTGOING

NAME OF PERSON CONTACT WITH	ORGANIZATION	TELEPHONE NO.
Judith Adams		(202) 966-7890 (207) 833-7715

SUBJECT

Bailey Island Fire Control Station

SUMMARY

Mrs. Adams is the current owner of the site. The site is used as a summer residence. When the site was purchased from the govt by Mrs. Adams mother-in-law, the barracks building was removed from it's foundation and moved to the south end of the site near the ocean. Other former govt buildings are being used as sheds and guest rooms.

Mrs. Adams complained that trespassers have vandalized the property and that teenagers use the two observation towers to party in. The owners sealed the doors and windows to the towers, but trespassers used a sledgehammer to make a hole to enter one tower. Mrs. Adams believes the towers are an attractive nuisance and that somebody will eventually get hurt while partying in them. The Adams' have had no beneficial use from the towers.

The site has been owned by the Adams family since disposal and no OE has ever been found on site.

Mrs. Adams allowed the SI team to inspect her property. No OE or evidence of OE was discovered by the SI team. The magnetometer recorded "hits" throughout the site. However, it "hit" on bare rock. Since the island is all rock with a limited amount of soil, it is believed the rock must have enough iron content to trip the magnetometer.

The site is heavily vegetated with a small open area around the residence surrounded by thick woods. The ocean are immediately surrounding the site is heavily travelled

ACTION REQUIRED

ACTION TAKEN

NAME OF PERSON DOCUMENTING COVERSATION	ORGANIZATION	TELEPHONE NUMBER
SIGNATURE	TITLE	DATE

CONVERSATION RECORD	TIME	DATE

TYPE

☐ VISIT ☐ CONFERENCE ☐ TELEPHONE ☐ INCOMING ☐ OUTGOING

NAME OF PERSON CONTACT WITH	ORGANIZATION	TELEPHONE NO.
Judith Adams		

SUBJECT
Bailey Island Fire Control Station (Continued)

SUMMARY
and is commercially lobstered.

Three Defense Mapping Agency survey markers and one US Coast and Geodetic Survey marker was found during the inspection.

The only evidence of the former AMTB battery's existence other than buildings is two pedestals mounts for 37mm or 40mm guns.

Foundations of the barracks and mess hall still exist. In some places, the height of the foundation is 5' or greater. It is definitely a fall hazard.

Mrs. Adams expressed interest in having at least the two observation towers removed. She has no use for them and she does not want anyone to get hurt playing/partying in them.

ACTION REQUIRED
File

ACTION TAKEN
Filed

NAME OF PERSON DOCUMENTING COVERSATION	ORGANIZATION	TELEPHONE NUMBER
Christopher J. Churney	CENCR-ED-DO	(309)794-6011
SIGNATURE Christopher J. Churney	TITLE Chem Engineer	DATE 11 Aug 1995

CONVERSATION RECORD	TIME 1600	DATE 14 August 1995

TYPE

[X] VISIT [ ] CONFERENCE [ ] TELEPHONE [ ] INCOMING [ ] OUTGOING

NAME OF PERSON CONTACT WITH	ORGANIZATION	TELEPHONE NO.
Dawnna Black -Town Office Manager; Town of South Harpswell	P.O. Box 139 South Harpswell, ME 04079	(207)833-5771

SUBJECT

Bailey Island Fire Control Station

SUMMARY

Ms. Black is currently the Town Office manager for the Town of South Harpswell. She has been with the Town Office for 19 years. Ms. Black stated that she has seen all reports that go through the Town Office for the last few years. To the best of her knowledge, no OE has ever been discovered on Bailey Island. Ms. Black gave the following referrals:

Deputy Clayton Stromski - Cumberland Co Sheriff (207)729-8000

SGT Bob Walsh - local police - (207)774-1444

Selectman Malcolm Whidden - (207)883-2376

ACTION REQUIRED

File

ACTION TAKEN

Filed

NAME OF PERSON DOCUMENTING COVERSATION	ORGANIZATION	TELEPHONE NUMBER
Christopher J. Churney	CENCR-ED-DO	(309)794-6011
SIGNATURE Christopher J. Churney	TITLE Chem Engineer	DATE 14 Aug 1995

CONVERSATION RECORD	TIME 1300	DATE 15 August 1995

TYPE

[X] VISIT [ ] CONFERENCE [ ] TELEPHONE [ ] INCOMING [ ] OUTGOING

NAME OF PERSON CONTACT WITH	ORGANIZATION	TELEPHONE NO.
Howard Hutchins	Lands End Bailey Island, ME 04003	(207)833-2313

SUBJECT

Bailey Island Fire Control Station

SUMMARY

Mr. Hutchins is the operator of Lands End, a gift shop at the south end of Bailey Island just east of the site. His parents, Ed and Ruby Hutchins, own property adjacent to and east of the Adams property. The Hutchins bought Lands End in 1959 and purchased the land adjacent to the Adams in the 1960's.

Mr. Hutchins remembers playing in the woods on the site as as child. He stated that manholes, quonset huts and large cables (formerly for sub detection) were on the site. He never found any OE on the site.

Mr. Hutchins stated that he has never found or heard of OE washing ashore on Baileys Island.

ACTION REQUIRED
File

ACTION TAKEN
Filed

NAME OF PERSON DOCUMENTING COVERSATION	ORGANIZATION	TELEPHONE NUMBER
Christopher J. Churney	CENCR-ED-DO	(309)794-6011
SIGNATURE Christopher J Churney	TITLE Chem Engineer	DATE 15 Aug 1995

CONVERSATION RECORD	TIME 1430	DATE 15 August 1995

TYPE

[X] VISIT [ ] CONFERENCE [ ] TELEPHONE [ ] INCOMING [ ] OUTGOING

NAME OF PERSON CONTACT WITH	ORGANIZATION	TELEPHONE NO.
Detective Gerard Brady	Cumberland County Sheriff	(207)774-1444 1-800-266-1444

SUBJECT

Bailey Island Fire Control Station

SUMMARY

Detective Brady has been assigned to the Harpwell (Bailey Island) area for about 1 1/2 years. Their have been no reports of incidents involving OE. He talks to town people frquently and has never heard of any OE being discovered at the site.

Detective Brady has been called to the Adams property to investigate trespassing and vandalism. He stated that the local kids use the observation towers to hang out and drink alcohol. The kids believe the towers are "their towers". Detective Brady recently arrested an individual for vandalizing the former BC station on the Adams property by shooting it with a rifle.

ACTION REQUIRED
File

ACTION TAKEN
Filed

NAME OF PERSON DOCUMENTING COVERSATION	ORGANIZATION	TELEPHONE NUMBER
Christopher J. Churney	CENCR-ED-DO	(309)794-6011
SIGNATURE Christopher J. Churney	TITLE Chem Engineer	DATE 15 Aug 1995

CONVERSATION RECORD	TIME 1900	DATE 15 August 1995

TYPE

[ ] VISIT [ ] CONFERENCE [X] TELEPHONE [ ] INCOMING [X] OUTGOING

NAME OF PERSON CONTACT WITH	ORGANIZATION	TELEPHONE NO.
Mr. Chip Black (Bailey Island Motel)	Route 24 Bailey Island, ME 04003	(207)833-2886

SUBJECT

Bailey Island Fire Control Station

SUMMARY

Mr. Black has lived his entire life on Bailey Island (51 years), is the proprietor of a hotel just north of the site, and is the director of the local historical society.

Mr. Black has never heard about any firing over the ocean from Bailey Island FCS. To the best of his knowledge, no OE has been discovered in the area. As a child, he played on concrete pads and in the observation towers on the site.

Mr. Black is aware of the cables used for submarine detection existing on the site. He heard that a ship was salvaging the cable that remained in the ocean.

ACTION REQUIRED
File

ACTION TAKEN
Filed

NAME OF PERSON DOCUMENTING COVERSATION	ORGANIZATION	TELEPHONE NUMBER
Christopher J. Churney	CENCR-ED-DO	(309)794-6011
SIGNATURE Christopher J Churney	TITLE Chem Engineer	DATE 15 Aug 1995

CONVERSATION RECORD	TIME 2100	DATE 15 August 1995

TYPE

[ ] VISIT [ ] CONFERENCE [X] TELEPHONE [ ] INCOMING [X] OUTGOING

NAME OF PERSON CONTACT WITH	ORGANIZATION	TELEPHONE NO.
Mr. Nelson Lawry	327 Rollins Road Rollinsford, NH 03869-5109	(603)742-0543

SUBJECT

Bailey Island Fire Control Station

SUMMARY

Mr. Lawry is the head of Preservation and Projects for the Coast Defense Study Group in Bel Air, MD. According to Mr. Lawry, two 155mm GPF guns were placed at Bailey Island FCS in June 1942 as a fill in. They were replaced in 1943 by one 90mm AMTB battery, which consisted of 2 fixed and 2 mobile guns. A 37mm AAA section from the AMTB battery was detached to Drinkwater Point. This section was later replaced with 40mm guns. A former Battery Commander at Bailey Island FCS is Mr. Guilford Sawyer.

(This conversation was originally between Mr. Greg Lippman, SMCAC-ESL, the alternate TM, and Mr. Lawry earlier the same day. Notes were taken by Mr. Lippman and given to me.)

ACTION REQUIRED

File

ACTION TAKEN

Filed

NAME OF PERSON DOCUMENTING COVERSATION	ORGANIZATION	TELEPHONE NUMBER
Christopher J. Churney	CENCR-ED-DO	(309)794-6011
SIGNATURE Christopher J. Churney	TITLE Chem Engineer	DATE 15 Aug 1995

Ordnance and Explosives
Archives Search Report
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Cumberland County, Maine
Project Number D01ME009801

APPENDIX J

PRESENT SITE PHOTOGRAPHS

APPENDIX J

PRESENT SITE PHOTOGRAPHS

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J-1 View of Bailey Island from Mackerel Cove

J-2 View of AMTB field of fire

J-3 View of AMTB field of fire

J-4 View of AMTB field of fire

J-5 UXO Safety Specialist inspecting suspected firing area

J-6 UXO Safety Specialist inspecting suspected firing area

J-7 UXO Safety Specialist inspecting suspected firing area

J-8 Pedestal mount for 37mm or 40mm gun

J-9 Pedestal mount for 37mm or 40mm gun

J-10 Defense Mapping Agency survey marker

J-11 Defense Mapping Agency survey marker

J-12 Defense Mapping Agency survey marker

J-13 North observation tower

J-14 North observation tower

J-15 Front door of north observation tower

J-16 US Coast and Geodetic Survey marker

J-17 South observation tower

J-18 Front door of south observation tower

J-19 Front view of residence

J-20 Back view of residence

J-21 Former military buildings

J-22 Former generator building

J-23 Former battery control station

J-24 Former battery control station

J-25 Former radar operations building

J-26 Foundation of barracks or mess hall

J-27 Foundation of barracks or mess hall

J-28 Foundation of barracks or mess hall

J-1 View of Bailey Island from Mackerel Cove. Note the two observation towers in the background.

J-2 Area B and C : Field of fire for AMTB battery; Jaquish Island in background; looking S; see plate 6.

J-3 Area B and C: Field of fire for AMTB battery; Turnip Island in background; looking SW; see plate 6.

J-4 Area B and C : Field of fire for AMTB battery; Haskell Island in far background; looking SW; see plate 6.

J-5 Area A: CENCR's UXO Safety Specialist inspecting suspected firing area; see plate 6.

J-6 Area A: CENCR's UXO Safety Specialist inspecting suspected firing area; see plate 6.

J-7 Area A: CENCR's UXO Safety Specialist inspecting suspected firing area; see plate 6.

J-8 Area A: Pedestal mount for 37mm or 40mm guns supporting AMTB battery; SE corner of site; see plate 6.

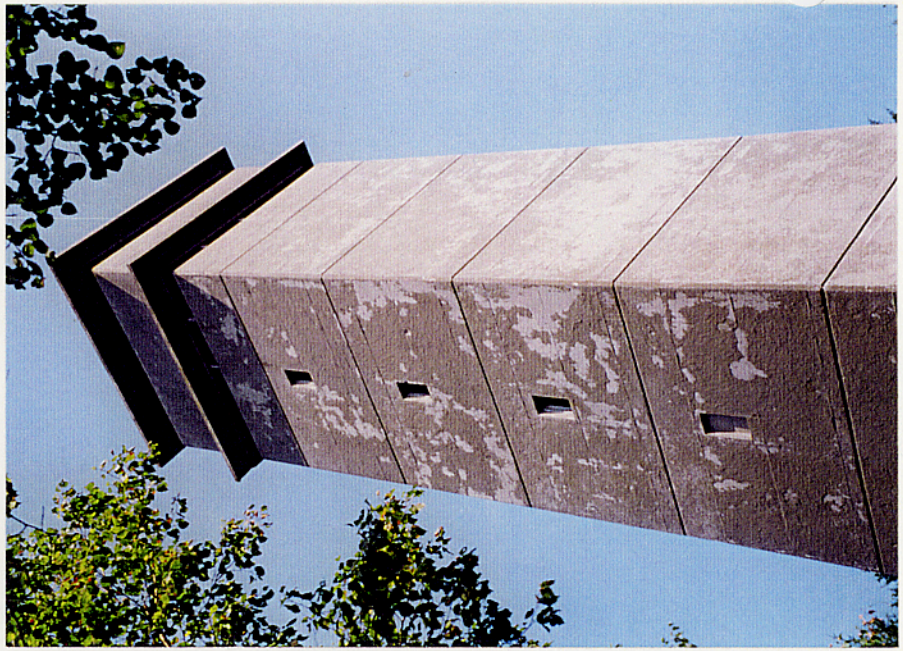
J-9 Area A: Pedestal mount for 37mm or 40mm guns supporting AMTB battery; SW corner of site; see plate 6.

J-10 Area A: Defense Mapping Agency survey marker on top of pedestal in photo J-9; see plate 6.

J-11 Area A: Defense Mapping Agency survey marker in area near pedestal in photo J-9; see plate 6.

J-12 Area A: Defense Mapping Agency survey marker in area near pedestal in photo J-9; see plate 6.

J-13 Area A: Top of northern observation tower; looking north; see plate 6.



J-14 Area A: Northern observation tower; see plate 6.

J-15 Area A: Sealed front door to northern observation tower; see plate 6.

J-16 Area A: U.S. Coast and Geodetic Survey marker dated 1941 next to northern observation tower; see plate 6.

J-17 Area A: Top of southern observation tower and other military building; looking north; see plate 6.

J-18 Area A: Front door to southern observation tower; sealed door broken by trespassers; see plate 6.

J-19 Area A: Front of former barracks or mess hall; now Adams summer residence; looking south; see plate 6.

J-20 Area A: Back of former barracks or mess hall; now Adams summer residence; looking north; see plate 6.

J-21 Area A: Former military buildings used as shed and guest room just NE of Adams residence; see plate 6.

J-22 Area A: Former generator shed northwest of Adams residence just inside treeline; see plate 6.

J-23 Area A: Former battery control station moved to point overlooking ocean; looking east; see plate 6.

J-24 Area A: Former battery control station moved to point overlooking ocean; looking west; see plate 6.

J-25 Area A: Former radar operations building next to northern observation tower; used as shed; see plate 6.

J-26 Area A: Foundation of suspected former barracks or mess hall building; see plate 6.

J-27 Area A: Foundation of suspected former barracks or mess hall building; see plate 6.

J-28 Area A: Foundation of suspected former barracks or mess hall building; see plate 6.

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APPENDIX K

HISTORICAL PHOTOGRAPHS

APPENDIX K

HISTORICAL PHOTOGRAPHS

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K-1 Bailey Island from Mackerel Cove, early 1970's

K-1

Ordnance and Explosives
Archives Search Report
for
Bailey Island Fire Control Station
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APPENDIX L

REFERENCE MAPS/DRAWINGS

APPENDIX L

REFERENCE MAPS/DRAWINGS

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L-1 Drawing of observation tower, undated

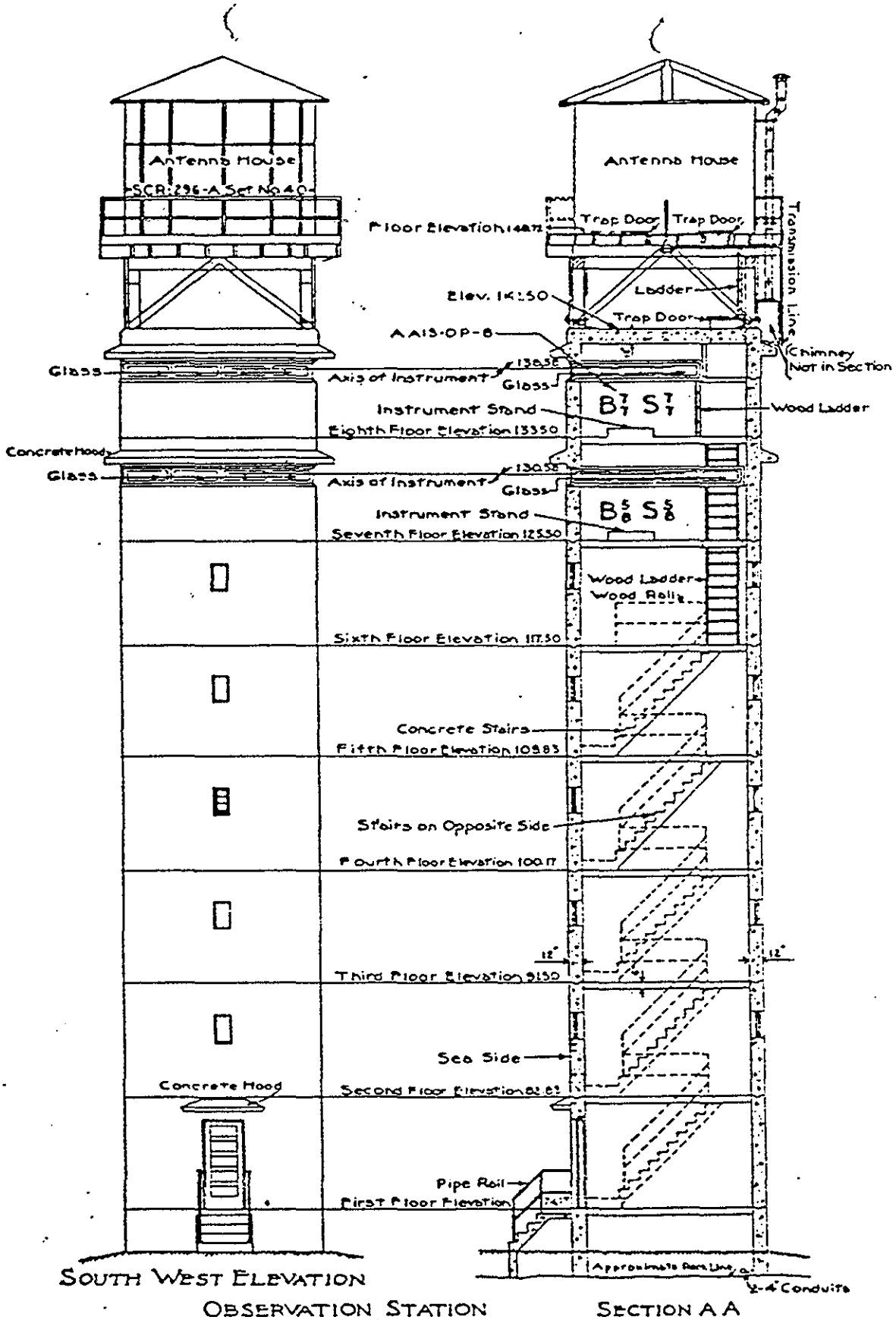
L-2 Building layout, undated

L-3 Map, Real Estate, Bailey Island FC Station, April 1945

L-4 Map, HD of Portland, Field of Fire, 11 April 1945

L-5 Map, HD of Portland, Fire Control Installations, 11 April 1945

L-6 Map, HD of Portland, Location of Elements, 11 April 1945



SOUTH WEST ELEVATION

SECTION A A

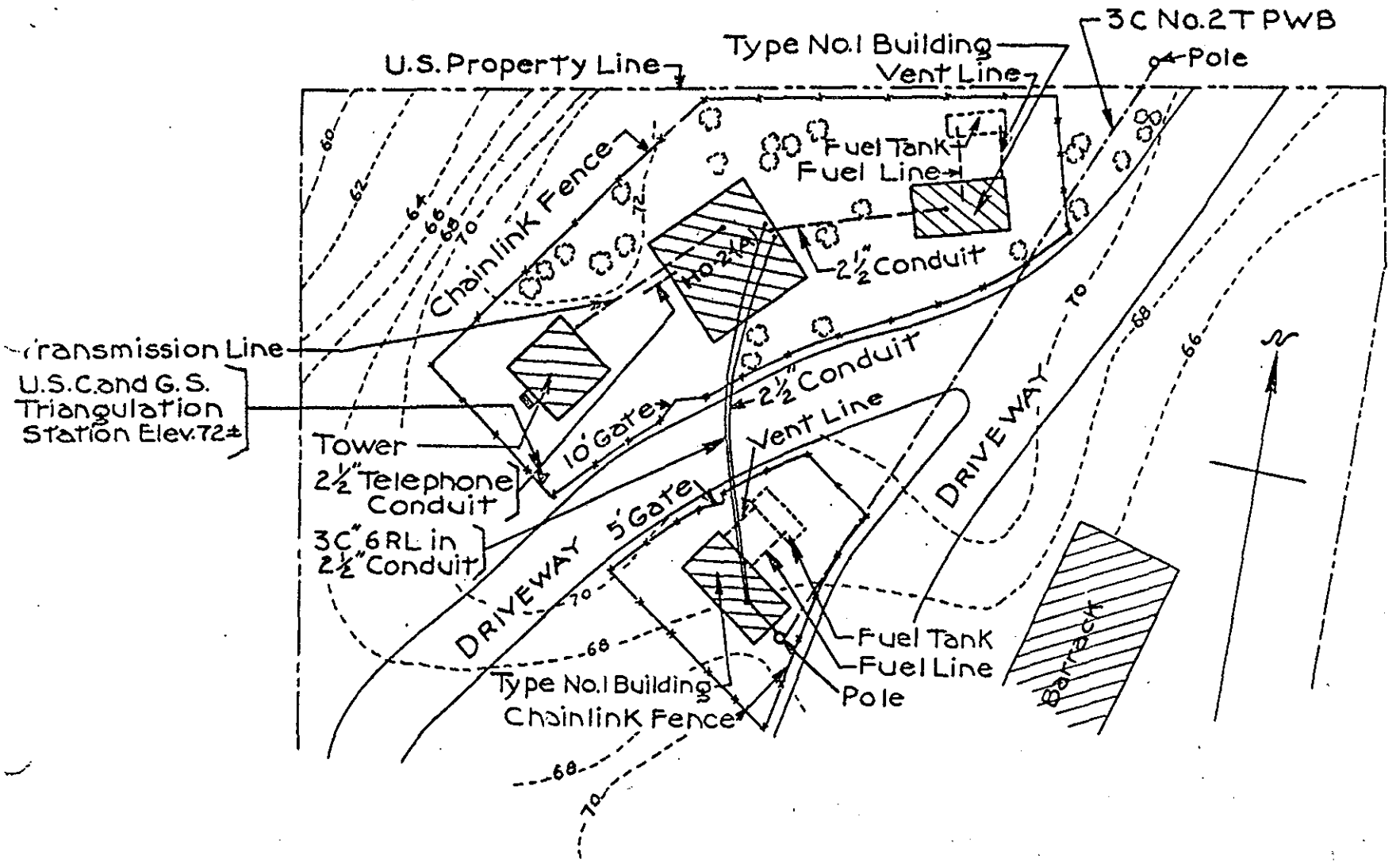
OBSERVATION STATION
LOCATION No. 168 SITE 1B
SEE REPORT FOR
SCR-296-A SET No. 40 ON ROOF

SCALE
0 1 2 3 4 5 10 15

WAR DEPARTMENT

CORPS OF ENGINEERS, U.S. ARMY

1



PLAN

SCALE

0 10 20 30 40 50 60 70 80 90 100

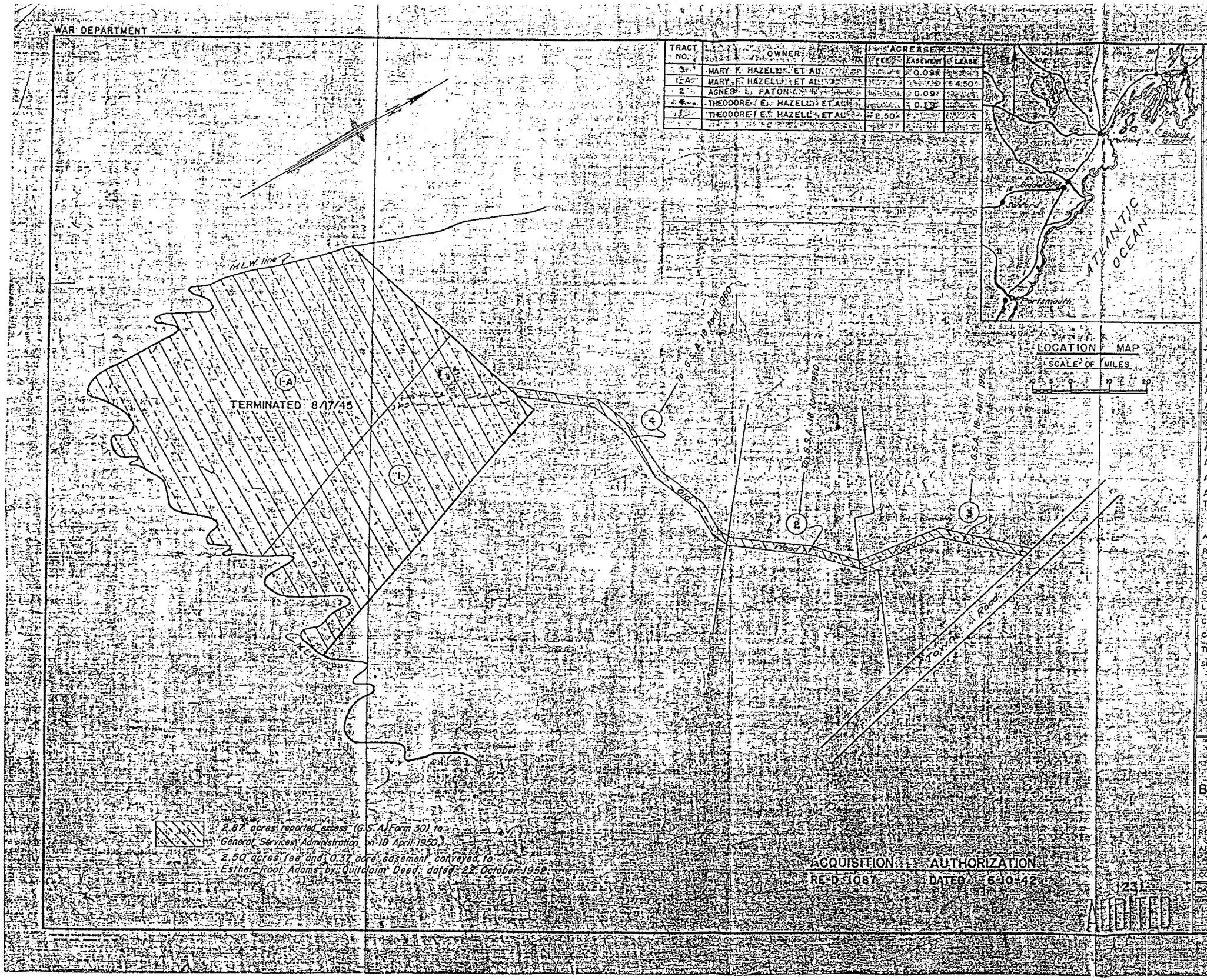
Observation Tower
Location No. 168, Site 1B.
Harbor Defenses of Portland, Maine

L-2

WAR DEPARTMENT

CORPS OF ENGINEERS, U.S. ARMY

TRACT NO.	OWNER	ACREAGE FEE	EASEMENT	LEASE
3	MARY F. HAZELL ET AL		0.09	
1-A	MARY F. HAZELL ET AL			4.50
2	AGNES L. PATON		0.09	
4	THEODORE E. HAZELL ET AL		0.19	
1	THEODORE E. HAZELL ET AL	2.50		



FINAL PROJECT MAP

LAND ACQUISITION
(TYPE OF MAP)

STATE MAINE
COUNTY CUMBERLAND
DIVISION NEW ENGLAND
DISTRICT BOSTON
SERVICE COMMAND FIRST
USING AGENCY H.Q. OF PORTLAND
13 MILES N.E. OF PORTLAND
117 MILES N.E. OF BOSTON
IN HARPSWELL, ME.

TRANSPORTATION FACILITIES

BOSTON & MAINE RAILROAD
ROUTE 24 STATE ROAD
ROUTE 1 FEDERAL ROAD
AIRLINE

LAND AREA

TOTAL ACRES ACQUIRED	7.37
ACRES UNDER EASEMENT BY W.D.	0.37
ACRES OWNED BY W.D.	2.50
ACRES LEASED BY W.D.	4.50
ACRES LEASED FROM W.D.	
ACRES TRANSFERRED TO W.D.	
ACRES DONATED TO W.D.	

DISPOSALS

TOTAL ACRES DISPOSED OF	7.37
ACRES SOLD	
ACRES LEASES TERMINATED	4.50
ACRES EXCHANGED	
ACRES OTHERWISE TO GSA (Fee 2.50, Ea. 0.37)	2.87

LEGEND

AVIGATION EASEMENT
RESERVATION LINE
STATE OR PROVINCE LINE
COUNTY LINE
CIVIL DISTRICT PRECINCT
LAND GRANT LINE
CITY, VILLAGE, OR BOROUGH
CEMETERY, SMALL PARK, ETC.
TOWNSHIP LINE
SECTION LINE

SCALE
100 0 100 200
1 INCH = 100 FEET

WAR DEPARTMENT O.C.E.
CONSTRUCTION DIVISION
REAL ESTATE

BAILEYS ISLAND F.C. STATION
MILITARY RESERVATION

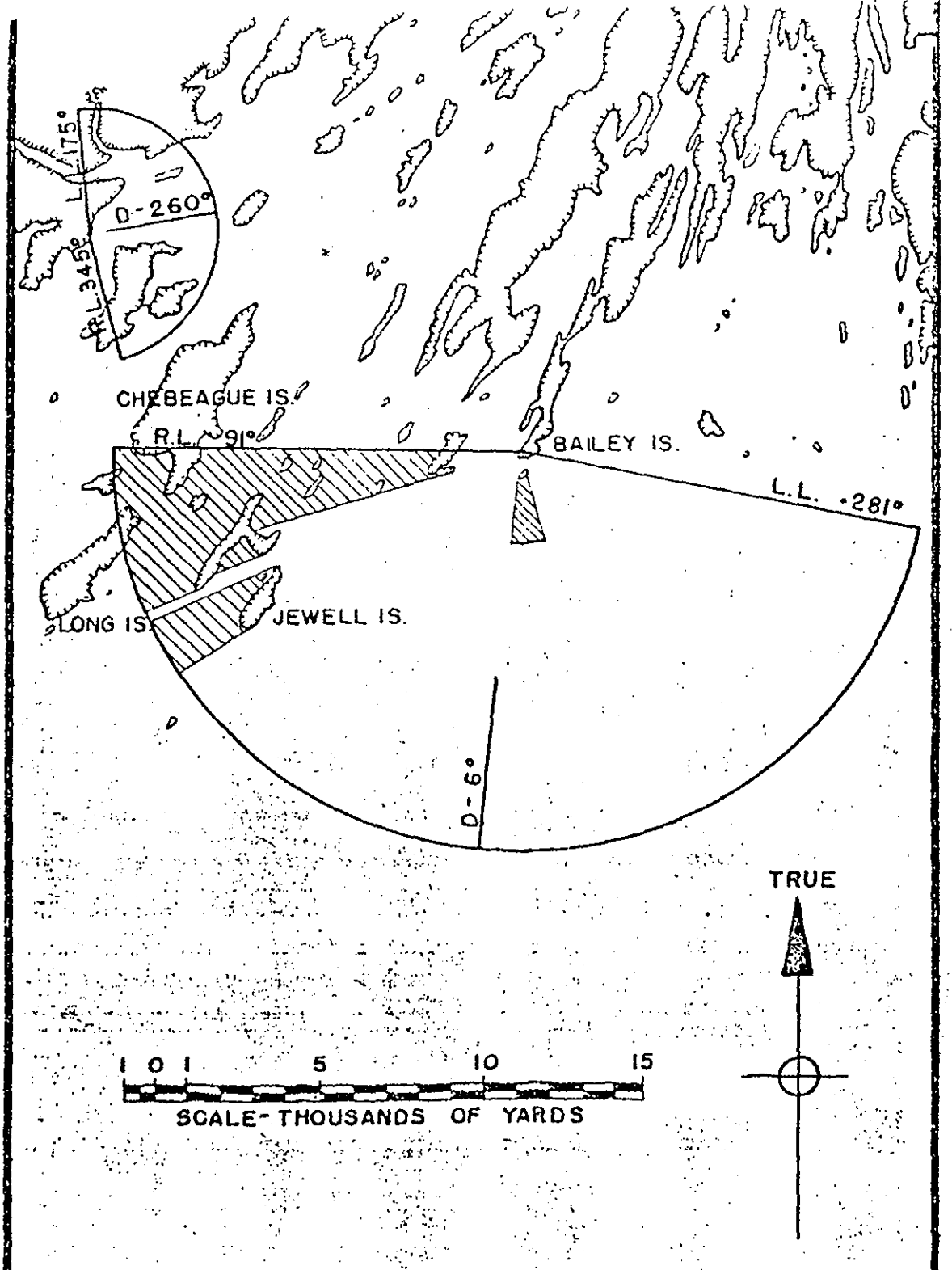
RECOMMENDED [signature] DATE 20 APRIL 1948
APPROVED [signature] DATE APRIL 1948

COMPILED F.N.T. CHECKED F.J.C. CHECKED

DATE	BY	REVISIONS	APPROVED

SHEET NO. NED-PA

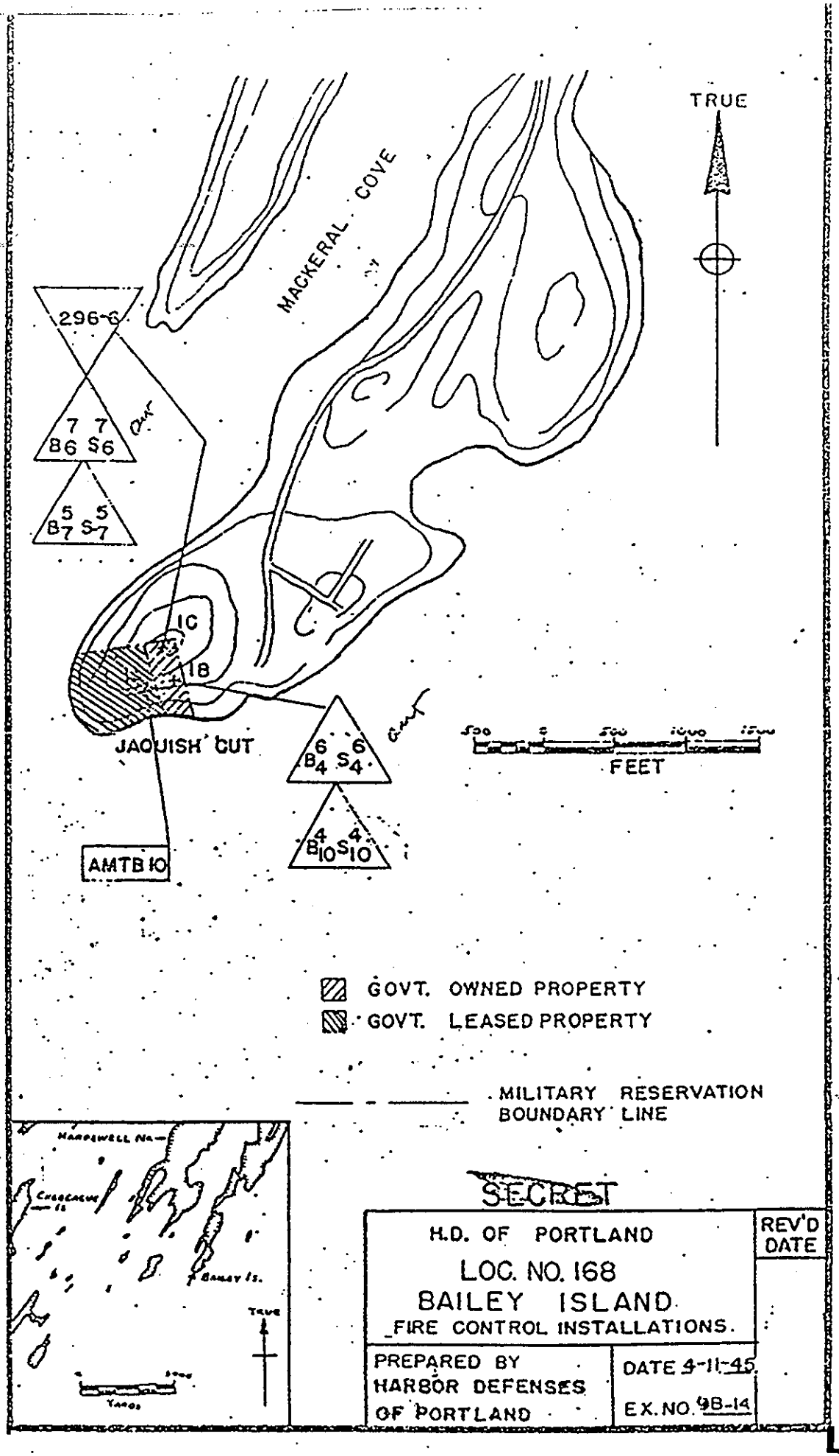
L-3



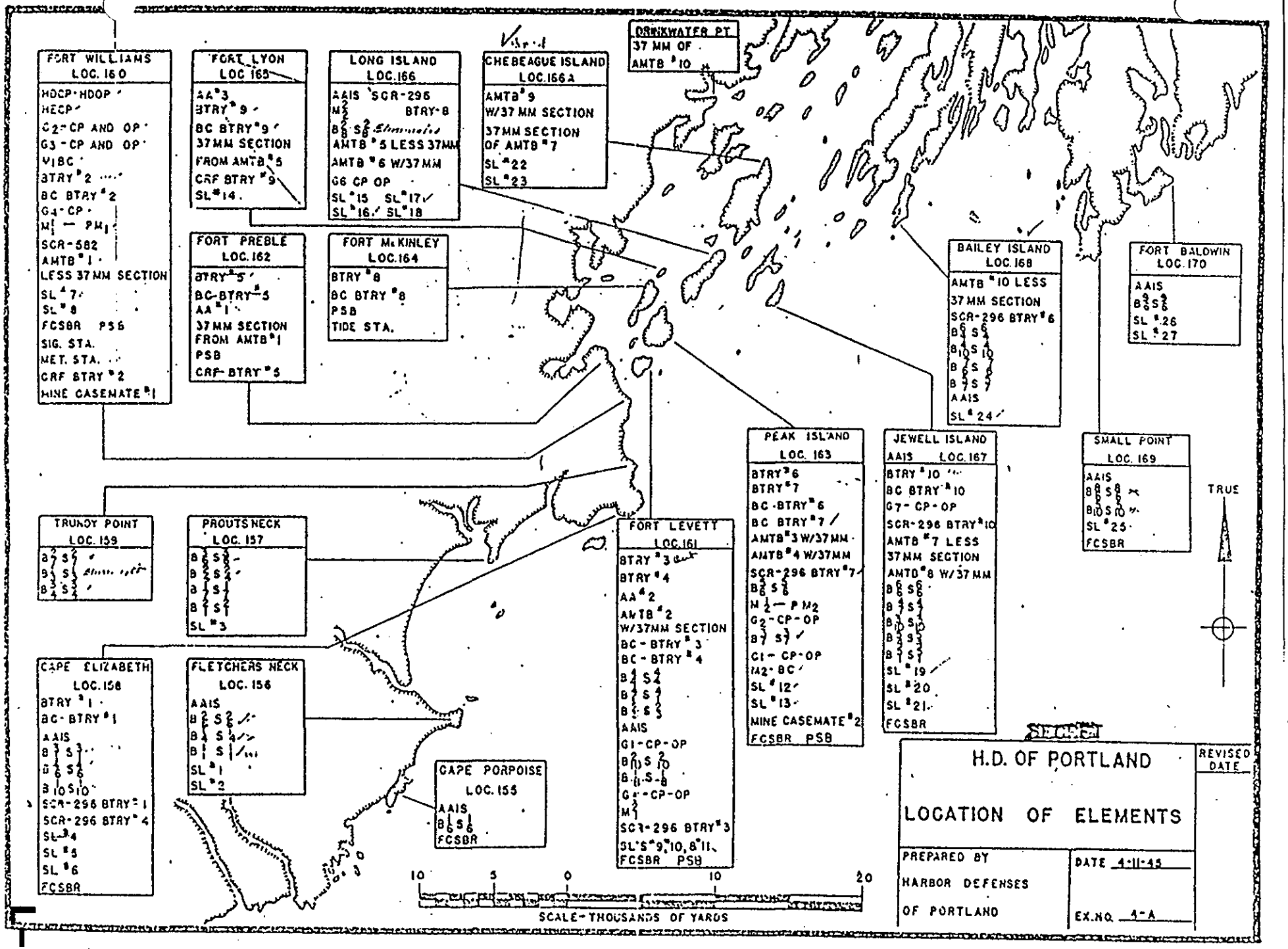
~~SECRET~~

H.D. OF PORTLAND **FIELD OF FIRE** **AMTB 10** **BAILEY IS.** 37mm Sect. At Drinkwater Pt.	REVISED DATE
PREPARED BY HARBOR DEFENSES OF PORTLAND	DATE 4-11-45 EX. NO. 7-A-10

One of ten 90mm AMTB gun batteries. This one replaced the earlier pair of 155mm GPFs.



4 - 50 cal. guns in Anti-motor Torpedo boat in Bay #3


FORT WILLIAMS LOC. 160
HDCP-HDOP
HECP
G2-CP AND OP
G3-CP AND OP
M1BC
BTRY #2
BC BTRY #2
G4-CP
M1 — PM1
SCR-582
AMTB #1
LESS 37MM SECTION
SL #7
SL #8
FCSBR PSB
SIG. STA.
MET. STA.
CRF BTRY #2
MINE CASEMATE #1
FORT LYON LOC 165
AA #3
BTRY #9
BC BTRY #9
37MM SECTION
FROM AMTB #5
CRF BTRY #9
SL #14
LONG ISLAND LOC. 166
AAIS SCR-296
M2 BTRY-8
B8 S8
AMTB #5 LESS 37MM
AMTB #6 W/37MM
G6 CP OP
SL #15 SL #17
SL #16 SL #18
CHEBEAGUE ISLAND LOC. 166A
AMTB #9
W/37 MM SECTION
37MM SECTION
OF AMTB #7
SL #22
SL #23
DRINKWATER PT.
37 MM OF
AMTB #10
FORT PREBLE LOC. 162
BTRY #5
BC BTRY #5
AA #1
37MM SECTION
FROM AMTB #1
PSB
CRF BTRY #5
FORT McKINLEY LOC. 164
BTRY #8
BC BTRY #8
PSB
TIDE STA.
BAILEY ISLAND LOC. 168
AMTB #10 LESS
37MM SECTION
SCR-296 BTRY #6
B6 S6
B10 S10
B6 S6
B7 S7
AAIS
SL #24
FORT BALDWIN LOC. 170
AAIS
B9 S9
SL #26
SL #27
PEAK ISLAND LOC. 163
BTRY #6
BTRY #7
BC-BTRY #6
BC BTRY #7
AMTB #3 W/37MM
AMTB #4 W/37MM
SCR-296 BTRY #7
B6 S6
M1 — PM2
G2-CP-OP
B7 S7
G1-CP-OP
M2-BC
SL #12
SL #13
MINE CASEMATE #2
FCSBR PSB
JEWELL ISLAND LOC. 167
AAIS
BTRY #10
BC BTRY #10
G7-CP-OP
SCR-296 BTRY #10
AMTB #7 LESS
37MM SECTION
AMTB #8 W/37MM
B6 S6
B8 S8
B10 S10
B9 S9
B7 S7
SL #19
SL #20
SL #21
FCSBR
SMALL POINT LOC. 169
AAIS
B8 S8
B10 S10
SL #25
FCSBR
TRUE
TRUNDY POINT LOC. 159
B2 S2
B3 S3
B4 S4
PROUTS NECK LOC. 157
B6 S6
B5 S5
B4 S4
B7 S7
SL #3
FORT LEVETT LOC. 161
BTRY #3
BTRY #4
AA #2
AMTB #2
W/37MM SECTION
BC-BTRY #3
BC-BTRY #4
B4 S4
B5 S5
B3 S3
AAIS
G1-CP-OP
B10 S10
B11 S11
G2-CP-OP
M1
SCR-296 BTRY #3
SL #9, #10, #11
FCSBR PSB
CAPE ELIZABETH LOC. 158
BTRY #1
BC-BTRY #1
AAIS
B3 S3
B6 S6
B10 S10
SCR-296 BTRY #1
SCR-296 BTRY #4
SL #4
SL #5
SL #6
FCSBR
FLETCHERS NECK LOC. 156
AAIS
B5 S5
B4 S4
B1 S1
SL #1
SL #2
CAPE PORPOISE LOC. 155
AAIS
B6 S6
FCSBR
10 5 0 10 20
SCALE-THOUSANDS OF YARDS
SECRET
H.D. OF PORTLAND
LOCATION OF ELEMENTS
REVISED DATE
PREPARED BY
HARBOR DEFENSES
OF PORTLAND
DATE 4-11-45
EX. NO. 4-A

Ordnance and Explosives
Archives Search Report
for
Bailey Island Fire Control Station
Cumberland County, Maine
Project Number D01ME009801

APPENDIX M

ARCHIVES SEARCH REPORT CORRESPONDENCE

(Not Used)

Ordnance and Explosives
Archives Search Report
for
Bailey Island Fire Control Station
Cumberland County, Maine
Project Number D01ME009801

APPENDIX N

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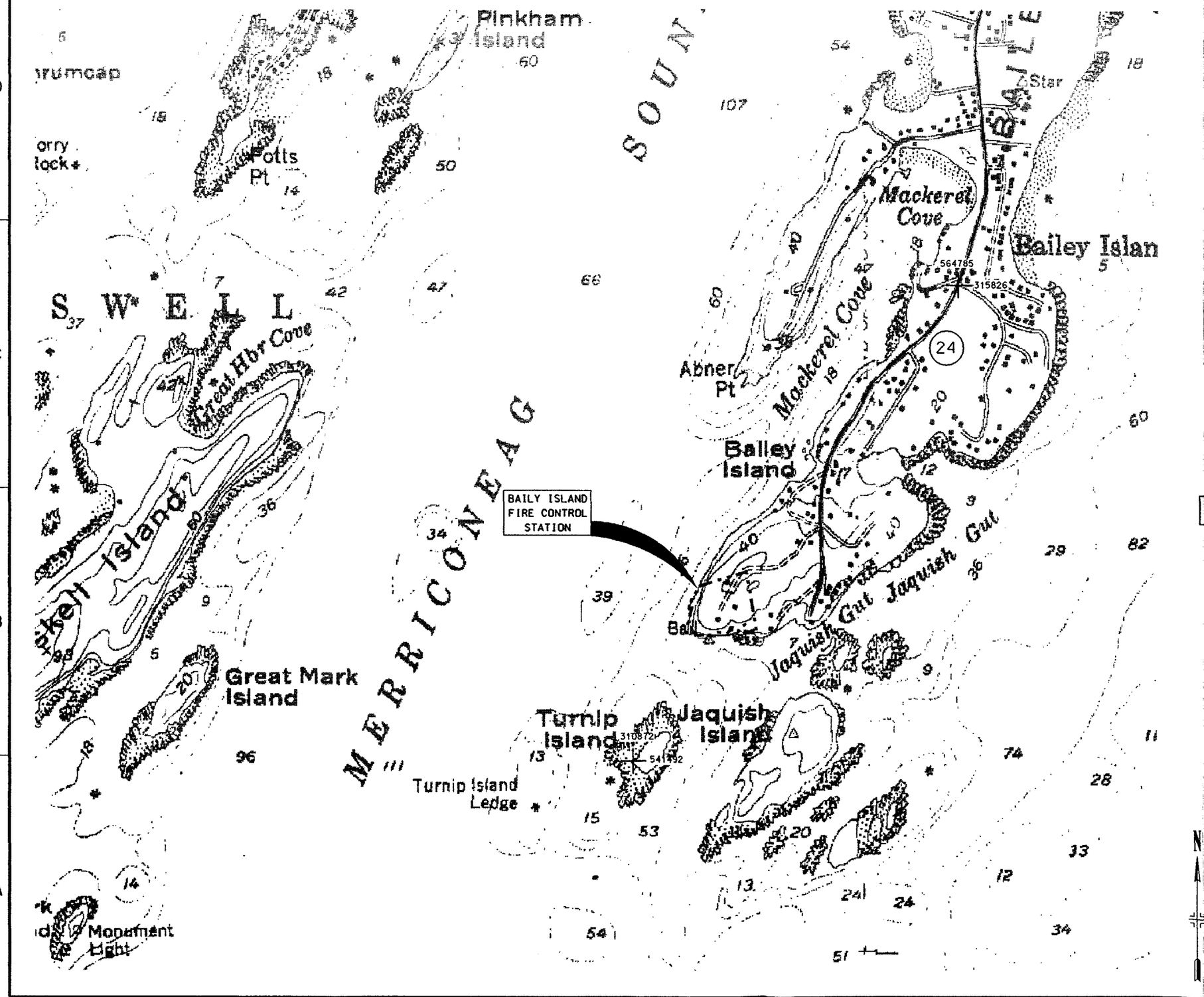
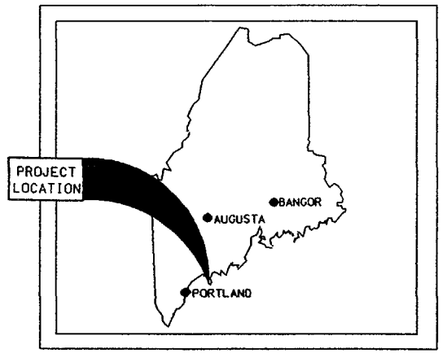
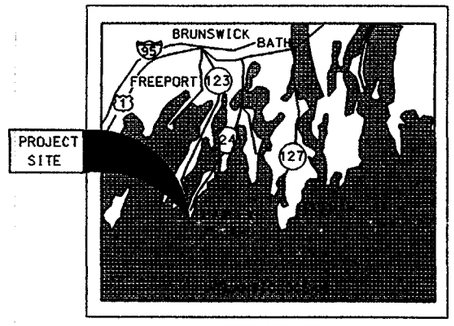
Ordnance and Explosives
Archives Search Report
for
Bailey Island Fire Control Station
Cumberland County, Maine
Project Number D01ME009801

REPORT PLATES





STATE MAP OF MAINE



VICINITY MAP

LEGEND:

BAILEY ISLAND FIRE CONTROL STATION SITE BOUNDARY

STATE PLANE COORDINATES

500 250 0 500 1000FT

Revisions			
Symbol	Description	Date	Approved

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
ROCK ISLAND, ILLINOIS

BAILY ISLAND FIRE CONTROL STATION
HARPSWELL, MAINE

SITE PLAN

Designed by: C. CHURNEY
Drawn by: W. BOYD
Checked by: M.J. CIVIS
Reviewed by: D. HOLMES
Approved by:
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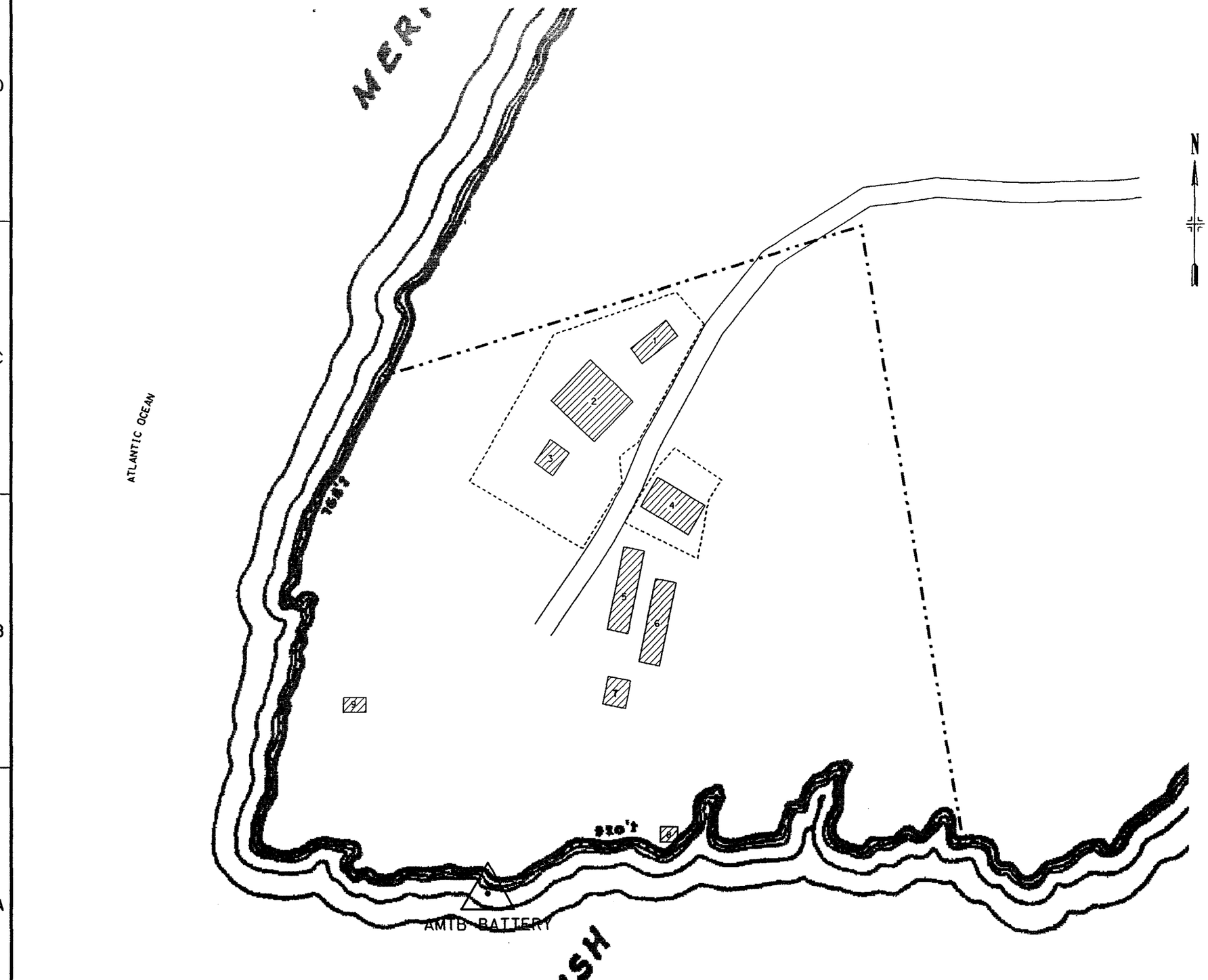
PLATE 1



N

BUILDING INDEX	
1	GENERATOR BUILDING
2	RADAR OPERATIONS BUILDING
3	FIRE CONTROL TOWER
4	GENERATOR BUILDING
5	BARRACKS
6	MESS HALL
7	FIRE CONTROL TOWER
8	BC STATION
9	GENERATOR BUILDING

LEGEND:

- BAILEY ISLAND FIRE CONTROL STATION SITE BOUNDARY
- FENCE
- BUILDINGS
- AMTB BATTERY

50 25 0 50 100FT

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U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
ROCK ISLAND, ILLINOIS

Designed by: C. CHURNEY
Drawn by: W. BOYD
Checked by: M.J. CIVIS
Reviewed by: D. HOLMES
Approved by:

US Army Corps of Engineers

BAILY ISLAND FIRE CONTROL STATION
HARPSWELL, MAINE

FACILITY LAYOUT
CIRCA 1942-1952

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PLATE 2

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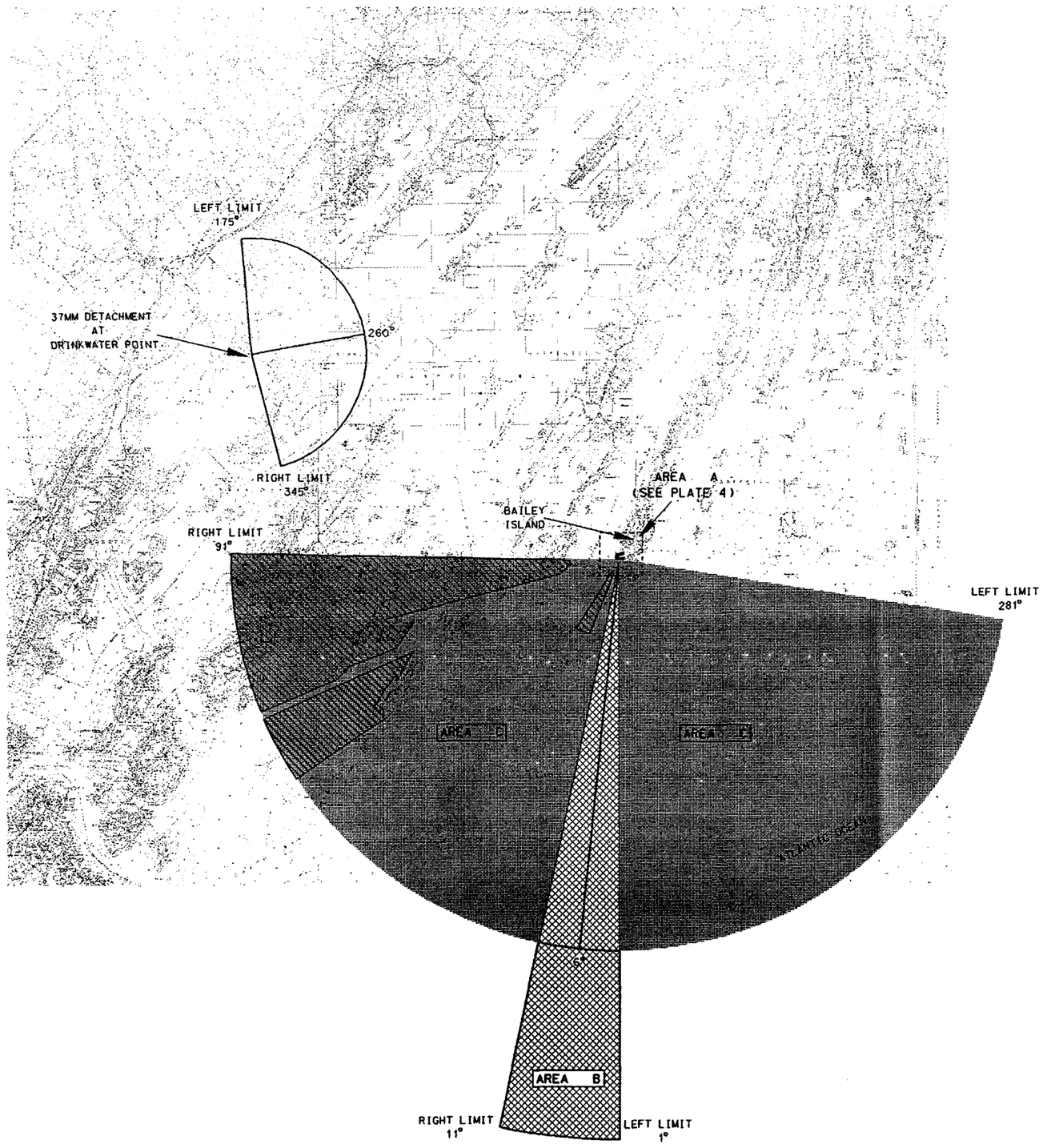

N

SUMMARY OF AREAS			
AREA	FORMER USAGE	OE PRESENCE	APPROX. ACREAGE
A	AMTB/FCS	UNCONTAMINATED	7.37
B	PRACTICE FIRING IMPACT AREA	POTENTIAL	8775.00
C	COMBAT FIELD OF FIRE	UNCONTAMINATED	52470.00
TOTAL APPROXIMATE ACREAGE:			61252.37

NOTES:

1. 37MM DETAHCMENT AT DRINKWATER ALREADY ADDRESSED IN PROJECT D01M5055600.
2. AREA B IS ASSUMED LOCATION OF PRACTICE FIRING IMPACT AREA.
3. FOR AREA B. MAXIMUM RANGES OF AMMUNITION USED IN AREA IS AS FOLLOWS:

AMMUNITION	MAX RANGE (YARDS)
37MM	3500 - 7290
37MM SUBCAL	4980 - 5165
40MM	9475 - 10850
90MM	12790 - 13540
155MM	19100 - 20100

4. FOR FIRING FAN REFERENCES SEE DOCUMENT L-4.

LEGEND:

DEADSPACE FOR COMBAT FIELD OF FIRE

6000 3000 0 6000 12000FT

Revisions			
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U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
ROCK ISLAND, ILLINOIS

US Army Corps of Engineers
Rock Island District

BAILY ISLAND FIRE CONTROL STATION
HARPSWELL, MAINE

PROJECT AREAS

Designed by: C. CHURNEY
Drawn by: W. BOYD
Checked by: M.J. CIVIS
Reviewed by: D. HOLMES
Approved by:

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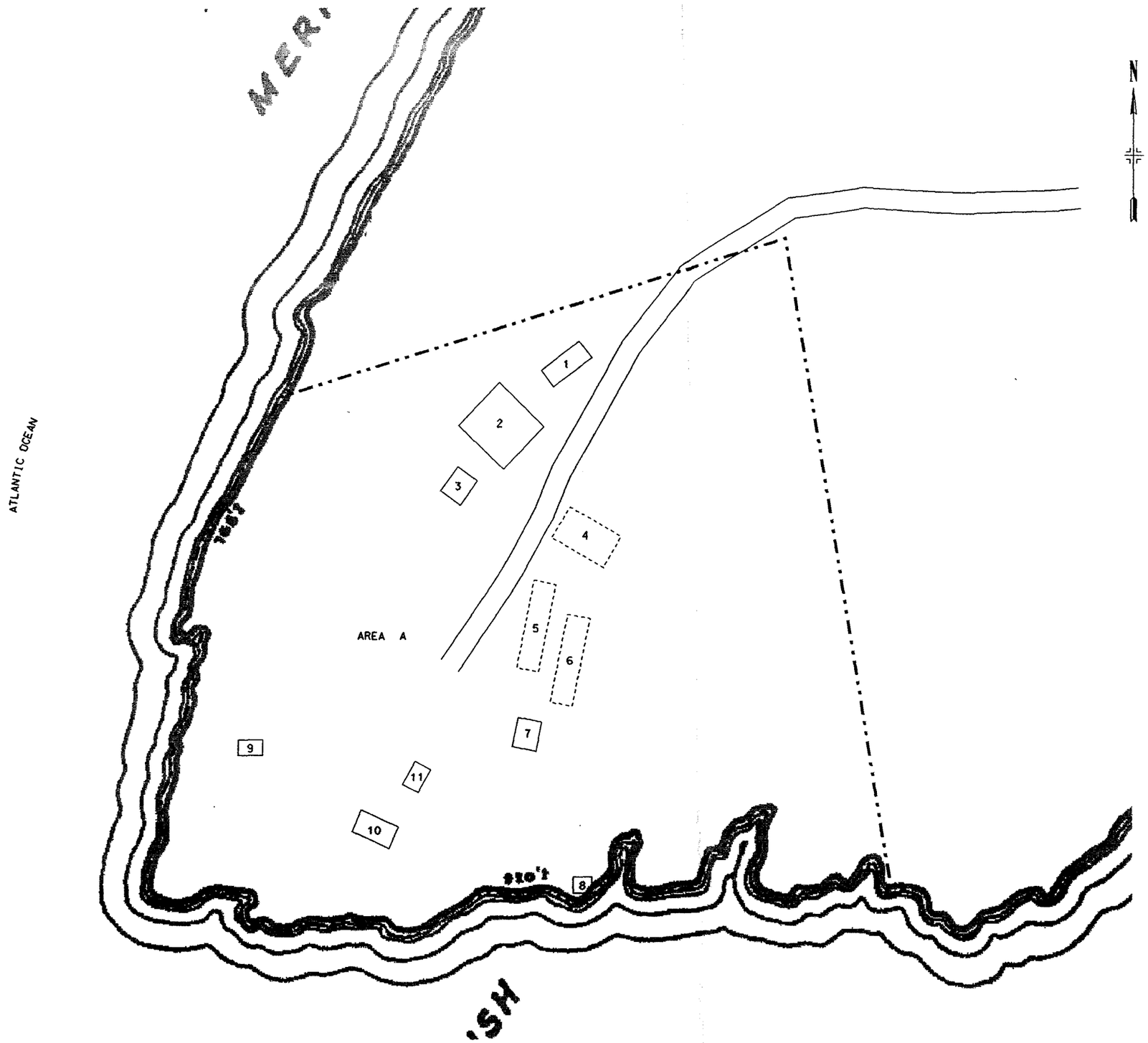
PLATE 3



SUMMARY OF AREAS			
AREA	FORMER USAGE	DE PRESENCE	APPROX. ACREAGE
A	AMTB/FCS	UNCONTAMINATED	7.37

BUILDING INDEX		
BLDG. NO.	FORMER USE	CURRENT USE
1	GENERATOR BUILDING	STORAGE
2	RADAR OPERATIONS BUILDING	STORAGE
3	FIRE CONTROL TOWER	NONE
4	GENERATOR BUILDING	(FOUNDATION ONLY)
5	BARRACKS	(FOUNDATION ONLY)
6	MESS HALL	(FOUNDATION ONLY)
7	FIRE CONTROL TOWER	NONE
8	BC STATION	RECREATIONAL
9	GENERATOR BUILDING	UNKNOWN
10	-	SUMMER RESIDENCE
11	-	GUEST HOUSE

LEGEND

BAILEY ISLAND FIRE CONTROL STATION SITE BOUNDARY

50 25 0 50 100FT

Revisions			
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U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
ROCK ISLAND, ILLINOIS

Designed by: C. CHURNEY
Drawn by: W. BOYD
Checked by: M.J. CIVIS
Reviewed by: D. HOLMES
Approved by:

US Army Corps of Engineers
Rock Island District

BAILY ISLAND FIRE CONTROL STATION
HARPSWELL, MAINE

AREA A

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PLATE 4

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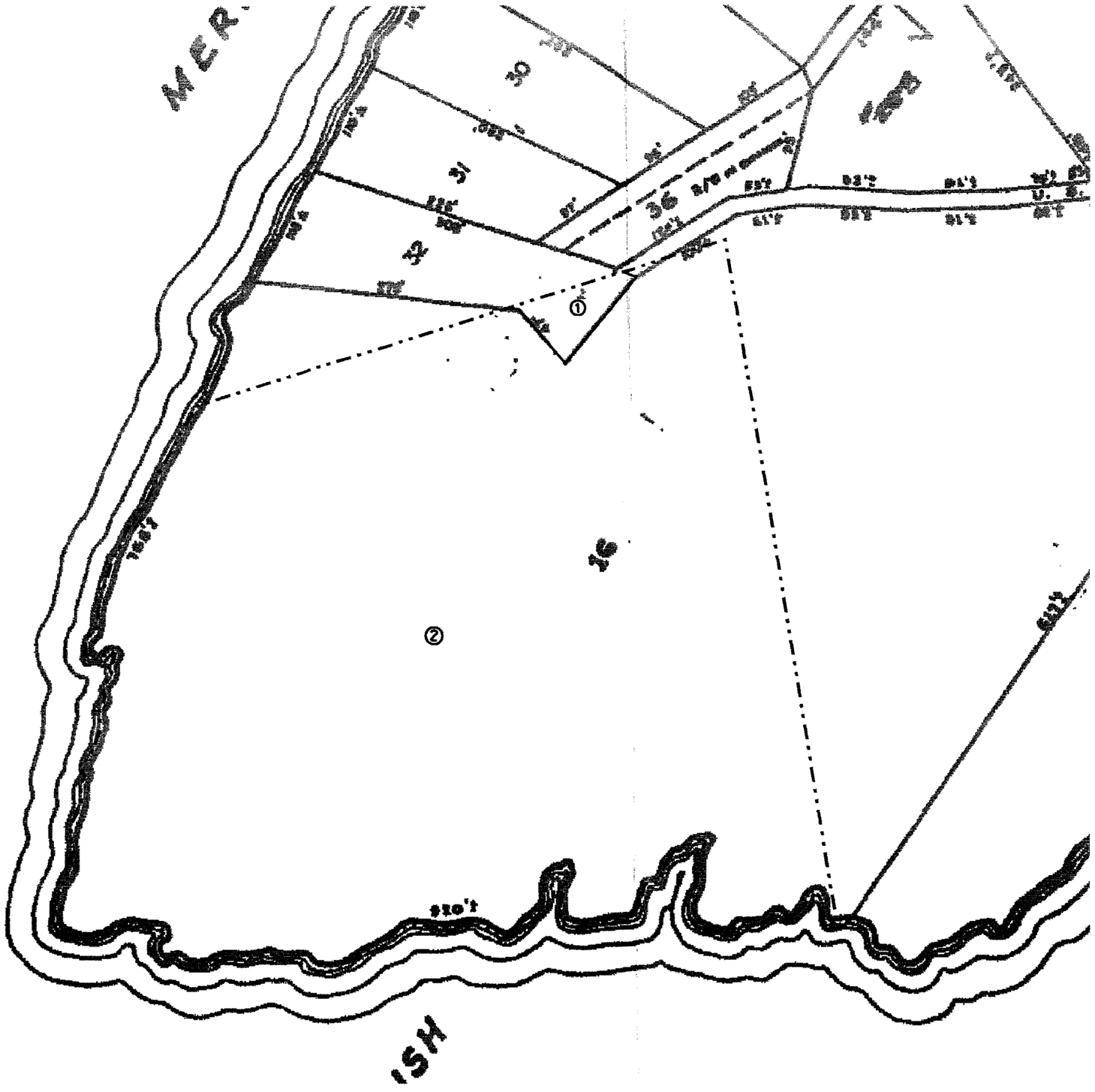

SUMMARY OF OWNERS		
PARCEL	OWNER	ACREAGE
①	ALAN B. AND CAROLYN C. WILSON	0.10
②	TIMOTHY J. AND JUDITH C. ADAMS	7.27
TOTAL ACREAGE		7.37

* INDICATES APPROXIMATED ACREAGE

N

LEGEND

BAILEY ISLAND FIRE CONTROL STATION SITE BOUNDARY

OWNERSHIP BOUNDARIES

50 25 0 50 100FT

Revisions			
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U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
ROCK ISLAND, ILLINOIS

US Army Corps of Engineers

BAILY ISLAND FIRE CONTROL STATION
HARPSWELL, MAINE

LAND OWNERSHIP
1988

Designed by: C. CHURNEY
Drawn by: W. BOYD
Checked by: M.J. CIVIS
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PLATE 5

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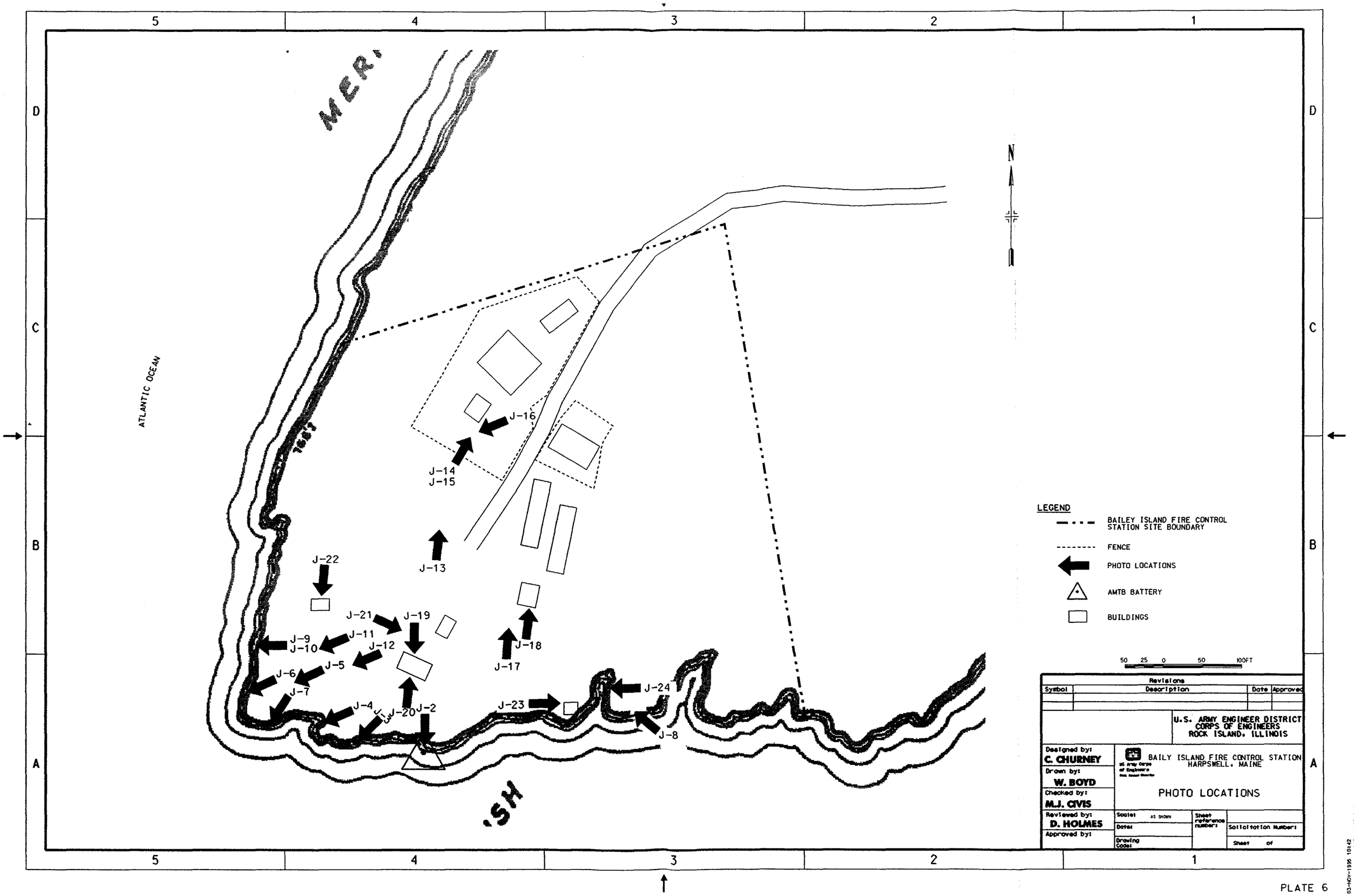

PLATE 6

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