COMPLETION REPORT

COVERING THE DESIGN OF

CAMP LEJEUNE

U. S. MARINE BARRACKS

NEW RIVER, NORTH CAROLINA

Central Heating Plant

FOR THE

U. S. NAVY

Bureau of Yards and Docks

CONTRACT NOy 4751

APRIL 15, 1941 - SEPTEMBER 30, 1942

PREPARED BY

CARR AND J. E. GREINER COMPANY

ARCHITECT

G. W. CARR, ARCHITECT
DURHAM, NORTH CAROLINA

ENGINEERS

J. E. GREINER COMPANY
BALTIMORE, MARYLAND

VOL. I

COPY No. 18

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CARR AND J. E. GREINER COMPANY
ARCHITECT ENGINEERS
DURHAM, N. C. BALTIMORE, MD.

GEO. WATTS CARR, A. I. A.
JOHN E. GREINER, HON. M. AM. SOC. C. E.
HERSCHEL H. ALLEN, M. AM. SOC. C. E.

REPLY TO
1201 ST. PAUL STREET
BALTIMORE, MD.

July 17, 1943.

Officer-in-Charge, Contract NOy-4751,
Camp LeJeune,
New River, North Carolina.

Dear Sir:

We are submitting herewith our Completion Report - "Contract NOy-4751 for Architectural Services for Marine Corps Training Base at New River, Jacksonville, N. C."

The work covered by this report was started immediately upon the execution of the contract, April 15, 1941, and was terminated on September 30, 1942. Between October 1, 1942 and March 13, 1943 certain of the key personnel of our organization were retained at the site for the purpose of completing the report and certain of the work under our contract which had not been completed prior to September 30, 1942.

The facilities included in the Marine Corps Training Base may be divided into twelve separate types, as follows:

1. Housing and Training Center with Recreational and Administrational Facilities for One Division of Five Regiments and One Battalion of Post Troops.

2. Industrial and Supply Area.

3. 700 Bed Base Hospital.

4. Residential Area consisting of 180 Commissioned Officers' Homes and Quarters for Bachelor Officers.

5. Rifle Range.

6. Balloon Barrage Training Area and Housing for One Battalion.

7. Amphibian Base.

8. Parachute Training Area.

9. Glider Training Base.

10. Tent Camps.

11. Residential Area of 700 Low Cost Housing Units.

12. Impact and Combat Areas, Umpire and Fire Control Facilities.

The report is divided into two parts: the first of which comprises a brief history and chronological development of the preliminary work and a summary of the facilities provided; and the second part is a brief description of the engineering work performed in the seventeen and one-half month period during which the Architect-Engineer Contract was in operation.

In general, the work involved original designs, although a small part involved the adaptation of typical plans previously prepared by the Navy Department. All work was performed at the site under the general supervision and direction of the Officer-in-Charge representing the Chief of the Bureau of Yards and Docks, who, under the terms of the contract, is the authorized representative of the Navy Department for the purposes of the administration of the contract.

Between April 15, 1941, when the work was started, and July 10, 1942, the work was performed under the supervision of Mr. W. C. Roberts, Project Manager, representing the Architect-Engineers. Between July 10, 1942 and September 30, 1942 the work was performed under the supervision of Mr. W. C. Munroe, Project Manager. During the period between October 1, 1942 and March 13, 1943 the work was performed under the supervision of Mr. B. E. Beavin, Project Manager.

The Officer-in-Charge, representing the Chief of the Bureau of Yards and Docks as Contracting Officer under the Contract, was Lieut. Commander Madison Nichols, for the period between April 15, 1941 and August, 1942; and between the dates of August, 1942 and March 13, 1943 the work has been done under the direction of Lieut. Commander Richard A. Williams. During the entire period the United States Marine Corps was represented by Col. W. P. T. Hill, and we would like to take this occasion to express our appreciation of the cooperation and assistance which has been extended to us throughout the entire period of the contract on the part of the Navy and Marine Corps personnel with whom we have been in contact.

Respectfully submitted,

CARR AND J. E. GREINER COMPANY

by G. W. Carr
G. W. Carr

by H. H. Allen
H. H. Allen

HHA:MED

CHAPTER A PART I

PURPOSE AND SCOPE OF THE REPORT

The purpose of the report is to present in concise form a record of the conception, engineering procedure and design of the project. The report is a condensed statement of the work performed by the Architect-Engineers and in the future will serve as a source of information for those concerned with the operation of the various activities.

Part I covers generally the events leading up to the design of the project, fundamental engineering data, and a summary of the facilities provided.

Part II covers the work involved in the actual design of the project. This part is sub-divided so as to present the work of the various departments into which the Architect-Engineers organization was divided. Part II also contains lists of the drawings and specifications prepared.

In referring to various parts of this report, it should be noted that construction of the original project was not completed at the end of the period covered (Sept. 30, 1942) and that new areas were developed and original areas and their structures modified and enlarged subsequently. The design of these extensions and modifications will be covered in a Supplementary report.

CHAPTER B PART I

ARCHITECT - ENGINEERS' CONTRACT

B-1. The J. E. Greiner Company, Engineers of Baltimore, Maryland, and G. W. Carr, Architect, Durham, North Carolina, were associated as Architect-Engineers to design a Marine Corps Training Base situated on both sides of New River near Jacksonville, North Carolina. The contract was executed on April 15, 1941, on a fixed fee basis. The Secretary of Navy was authorized by an act of Congress approved April 25, 1939 (Public -#43-76th. Congress) to enter into such a contract without reference to the Classification Act of 1923 (42 STAT.1488) as amended (5 U.S.C. ch. 13) or to Section 3709 of the Revised Statutes of the United States (41 U.S.C.5).

B-2. Under the terms of the contract, the Architect-Engineers were required to organize and establish properly a field office in the vicinity of Jacksonville, N. C. with a competent, adequate and experienced architectural and engineering organization properly supervised by specialists in electrical, mechanical, structural, architectural, municipal, sanitary, specification work and field surveys, to render all services required by the Chief of the Bureau of Yards and Docks or his authorized representative for the effective planning, coordination and execution of all construction and including:

(1) Cadastral, hydrographic, topographic, and location surveys; staking out work and checking lines and grades; soil tests, test piles, borings and associated work; and establishment of permanent monuments and bench marks.

(2) Engineering investigations and reports to obtain complete data for design of buildings and utilities; such other investigations, surveys, preliminary plans, estimates and reports as may in the opinion of the Chief of Bureau of Yards and Docks be required for future development; and a final technical report for record purposes describing general scope of work performed including physical and technical features, difficulties encountered and methods used.

(3) Preliminary studies, designs, sketches, estimates, working drawings, renderings, progress charts, detail drawings, record drawings, subsurface drawings, large scale drawings, maps, etc., complete including necessary drawings and specifications for tent camp, grading and fencing; concrete masonry, timber and structural steel work; sewers, sewage treatment plants and incinerators; distribution systems for water, electric power, and steam; water supply and purification power plants; drainage, roads, railroads, streets and pavements; plumbing, heating, air conditioning, mechanical and electrical equipment; pumping stations; temporary landing fields, parade grounds and recreational facilities; communication and signal systems; waterfront development including piers, bulkheads, dredging, bridges and trestles· and all new construction required in the project.

(4) The adaptation, including modifications and extensions of existing plans and specifications for utilities and for permanent structures, and for emergency structures of a temporary nature which may be required in the project.

(5) Checking and approving of all shop drawings on work or equipment which will be under contract, or under requisition in connection with the development of the project.

The Architect-Engineer further was required to pass upon materials, samples, and models upon request.

The Navy Department was to provide office and drafting room supplies and equipment, electricity, heat, office space, typewriters, adding machines, calculators, desks, filing cases and chairs, together with all necessary blue printing, photostating, and similar services.

Note: The Navy Department furnished the inspection staff which had complete control of construction work, interpretation of specifications and plans, and the collection of as-built data. The Architect-Engineer handled the design phase of the project only, doing only the field work necessary for the preparation of plans and specifications, and passing upon part of the shop drawings. Some structures were designed by the Contractor. It should be noted that most of the features of the project were of permanent construction with complex mechanical and electrical installations, increasing the design work far beyond that required for the usual cantonment.

CHAPTER C · PART I

REPORT OF U. S. MARINE BOARD

C-1. Inasmuch as the design of the entire project was based fundamentally on the studies made by the U. S. Marine Board, appointed to submit preliminary plans for the establishment of a Division Training Center, New River, N. C., it has been considered advisable to reproduce the record and report of the board in order that the same may be available for future reference.

C-2. On February 24, 1941, the Major General Commandant wrote the following letter outlining the scope of the project.

COPY

HEADQUARTERS U. S. MARINE CORPS
WASHINGTON

1975-30
AE-277-gjf

24 February 1941

From: The Major General Commandant
To: The President of the Board to submit plans for establishment of Division Training Center, New River, North Carolina.

Subject: Units and activities contemplated for the Division Training Center, vicinity of New River, North Carolina.

Enclosures: (A) Table of Organization-Marine Division.
(B) Table of Organization-Defense Battalion.
(C) Table of Organization-Amphibian Battalion.

1. It is contemplated that the following units will be stationed at the Division Training Center, New River, North Carolina. Tentative Tables of Organization of these units are enclosed herewith:

(a) One Marine Division.
(b) Four Defense Battalions.
(c) One Amphibian Battalion
(d) Post Troops and Specialists Training Center.

2. It is expected that the following activities will be conducted within the Division Training Center by the various units stationed thereat:

(a) Rifle range firing.
(b) Long range and antiaircraft machine gun firing.
(c) Combat practice firing.
(d) Antiaircraft artillery firing.
(e) Light artillery firing.
(f) Medium artillery firing.
(g) 5" firing at towed targets.
(h) Boat gun firing at beach targets.
(i) Anti-boat gun firing at beach targets.
(j) Troop Landing operations thru surf, etc.
(k) Maneuvering and training in rubber boats.
(l) Land and water training with amphibians.
(m) Maneuvering and training in use of artillery and tank lighters.
(n) Maneuvering and training landing boat crews.
(o) Ship and boat loading.
(p) Tank and antitank training.
(q) Training of parachute troops.
(r) Balloon barrage training.
(s) Training in tactics and maneuvers on land.
(t) Training in beach defense.
(u) Training of hospital units.

/s/
A. A. VANDERGRIFT
Acting

Copy for: The Quartermaster

The Board had organized on February 21, 1941, and on April 10, 1941, submitted the following report:

COPY

A-36-ptl 21 February 1941

Board to submit plans for establishment of Division Training Center, New River Area, North Carolina.

The Board met at 0900, February 21, 1941, pursuant to orders of Major General Commandant, original prefixed marked "A". A letter of instruction from the Major General Commandant to the Board is prefixed "B".

Present: Colonel Julian C. Smith
Colonel Earl C. Long
Colonel Pedro A. del Valle

(Colonel del Valle was detached 8 March 1941)

It was decided that no formal meetings would be held but that each

member would proceed on duties assigned in connection with map and ground studies of the area under consideration and report the results of his work at meetings called from time to time by the Senior Member. After a careful study of all available maps and ground reconnaissance, the Board submits the following facts and recommendations regarding the location, boundaries and various contemplated training, housing and supply facilities to be constructed with the Training Center. (See attached map marked Exhibit "1").

1. LOCATION, BOUNDARIES AND DESCRIPTIONS:

(a) The East Coast Training Center is located on both banks of the New River in Onslow County, North Carolina. It is adjacent to Jacksonville, North Carolina, which is on U. S. Highway No. 17. The nearest large towns are Wilmington, 50 miles to the southwest and New Bern on the Neuse River, 37 miles to the northeast, both on Route 17. The nearest seaports are Wilmington and Morehead City, the latter of which is 46 miles from Jacksonville on N. C. Route No. 24. Both of these ports have thirty foot dredged channels and docking facilities. Both are connected with Jacksonville by railroad. There is a branch of the Atlantic Coast Line Railroad running through a part of the reservation which joins the main line of the Atlantic Coast Line Railroad at Wilmington and the Norfolk Southern Railroad at New Bern. The Atlantic and North Carolina Railroad connects New Bern with Morehead City.

(b) The contemplated air base on the Neuse River is approximately 30 miles or about 10 minutes flight time distant. This will permit of close cooperation and combined training of air and ground troops.

(c) The terrain is generally flat. The area is trapezoidal in shape and extends about 15 miles from the beach inland with about 10 miles of ocean front. It contains approximately 83,000 acres of land area and 20,000 acres of water area. The inland waterway parallels the ocean beach. The New River divides the area with approximately one-fourth of the land area on the right bank and three-fourths on the left bank. There is a 10-foot dredged channel from the sea to Jacksonville. The terrain is essentially flat pine land with some clearing, consisting of low, well-drained ridges about 30 feet above sea level and gulleys drained by creeks into the New River (with improvements they will furnish drainage for the housing areas). There is some swampy land along the creeks but not sufficient in extent to interfere materially with the housing and training facilities.

(d) The boundaries in general are natural terrain features, - the ocean, inlets, creeks and public highways. The dredged channel at the mouth of New River was selected as a boundary and a number of small islands included in the reservation in order that they be kept under Government control in case it should be considered advisable at some future date to widen and deepen the New River Channel as well as to give access to the channel. The area north of North East Creek was included for future development of officers' Quarters, a possible temporary camp ground after the emergency landing field is in operation and in order to prevent the establishment of residences or other installations on its banks with consequent polution of the water. It furnishes a suitable location for an emergency landing field during occupation of the temporary camp and a permanent secondary landing

field as well as a site for a C.C.C. Camp.

3. ARTILLERY TRAINING AREA:

The location and extent of the artillery impact and firing areas were determined as furnishing ample manouver and firing facilities and causing the least possible interference with training and movements of troops and supplies. They permit traverse of 500 mils at a maximum range of approximately 20,000 yards. Guns may be landed through the surf, -- open fire, displace forward as much as 5,000 yards from the initial firing position and re-open fire. As all firing points are to the west of the main highway through the Training Center and fire is generally in a northwesterly direction, no interference with other activities will be encountered, -- except that the artillery firing will have to be coordinated with boat gun and anti-boat gun practice. In order to give variation in problems, firing may also be conducted in a general southerly direction from the vicinity of the emergency flying field.

4. INFANTRY, INCLUDING TANK AND ANTI-TANK, COMBAT TRAINING:

The infantry combat training area and infantry weapons impact area lie east of the central highway, railway, power line and warehouses. It covers an area approximately 7,500 yards square and is conveniently located with respect to other training and maintenance activities. Troops will be able to reach it with a minimum of marching and all infantry weapons may be used simultaneously without interference with the normal operations of the post maintenance and supply facilities or with the training of other troops. For instance, with proper safety precautions, .30 caliber and .50 caliber machine gunnery at ground targets, tank and anti-tank gunnery practice, infantry combat practice and rifle range firing can be conducted at the same time. Anti-aircraft practice at towed sleeves can be conducted with .30 and .50 caliber weapons or any weapon with a maximum range not exceeding 7,500 yards but the use of the infantry combat area by other troops will be restricted during such firing. The guns can be so located however as not to interfere with the use of the rifle range.

5. RIFLE RANGE:

The rifle range area was selected so that the direction of fire will be approximately due north, which permits the best use of the range during all daylight hours. As there are no hills on the reservation to form backstops, it will be advisable to mark out a danger zone corresponding to the extreme range of the M2 ammunition, approximately 4,000 yards. (2,900 yards is the safety limit set in Army regulations for this ammunition and 3,900 yards for the M1 ammunition as it is considered that only an accidental shot will be fired with the rifle held at an elevation giving a greater range). By locating the rifle range so that the greater part of its danger zone lies within the impact area of the infantry combat range, the combined areas of the danger zones are reduced to a minimum.

6. BOAT GUN AND ANTI-BOAT GUN RANGES:

(a) The New River furnishes boat gun and anti-boat gun ranges. Troops may embark in boats immediately adjacent to their barracks, proceed across

the river to points in the artillery impact area and conduct boat gun firing followed by landings with advances inland. All infantry weapons may be fired in these practices without restriction except as to direction.

(b) Anti-boat gun practice may be held with guns set up in the barracks area and targets towed up or down the westerly side of the river firing into the artillery impact area.

7. ANTIAIRCRAFT PRACTICE:

Long range antiaircraft fire and machine gun antiaircraft fire may be conducted from the vicinity of the ocean beach subject only to the customary safety precautions. The sea lanes are 25 miles out and the only interference would be from small fishing boats, or if the guns were set up inland of the inland waterway, from boats using the waterway.

8. FIVE-INCH GUN PRACTICE:

Five-inch gun practice at towed targets can be fired from the vicinity of the beach with the same facility and subject only to the same restrictions as apply to antiaircraft practice. Destroyers, tugs or other towing craft will find limited harbor at Morehead City about 25 miles distant.

9. BOATS AND BOAT CREW TRAINING:

(a) The main boat basin should be located as near as practicable to the mouth of the river in order to shorten the run to the open sea. Court House Bay, which is sheltered and within easy access of main roads and located northeast of Marines, seems to offer the best location, although some dredging will be required. It is about 3 miles from the mouth of the river and of ample size to accommodate all the boats, tank lighters, etc., of a division. There are some buildings and deep wells in the vicinity of Marines that could be used.

(b) A secondary boat basin can be constructed in Frenchs Creek in the vicinity of the barracks area --where boats could be kept for such training as may be conducted in the river. Amphibian boats can operate from this location or others along the river or sea coast.

(c) Rubber boats can be used for elementary training in the river and for more advanced training in the ocean with landing practice through the surf.

(d) All conditions of water, swamp and land are to be found in the Training Center for any type of training with landing boats, amphibians, tank lighters or rubber boats.

10. BALLOON BARRAGE:

A balloon barrage may be operated along the main road through the Training Center without interfering with firing or other training activities.

11. PARACHUTE TROOPS:

Parachute troops may be trained in their particular specialty on the emergency landing fields, the parade ground or any other open space of cleared land in the Training Area. All the facilities of the Training Center will be available to them for their active combat training.

12. TACTICS AND MANEUVERS ON LAND:

The whole area is well suited to training in tactics of land warfare, lacking only hills and rolling terrain. The highest point is some 30 feet above sea level. There is room for extensive land maneuvers including attack and defense of a river line; attack, defense, limited pursuits and withdrawals, with displacement of artillery and supply units; extended marches with bivouac, outpost problems, etc., can be undertaken by regiments or combat teams, or even with the whole division. It is well suited for instruction in small wars and jungle warfare.

13. LANDING OPERATIONS:

For training in landing operations, the conditions are ideal. Both banks of the New River for about 13 miles are within the limits of the Training Center. It varies in width from one mile to two miles, is shallow with about one foot rise and fall of tide and very slight current. Opposite the barracks area is the artillery impact area with a beach about five miles in extent where landing operations may be practiced supported by the fire of infantry weapons and boat guns. Advances of from two to five miles inland may be made depending on the point of landing. The technique of landings without firing may be practiced at other points along the river with no interference or conflict with the firing of any weapons or the training of other units. There is an ocean beach approximately 10 miles in extent which may be utilized for landings from transports lying off the coast. A landing on a 4½ mile front may be made by all elements of a Marine Division with an advance inland of 8 miles. A great variety of tactical landing and beach defense problems may easily be worked out within the limits of the Training Center.

14. BEACH DEFENSE:

For beach defense operations there is ample frontage and depth for the deployment of an entire division in defense of the 10 miles of ocean frontage, while the 20 or more miles of New River shore line offer terrain suitable to an almost infinite number of defensive problems for smaller units.

15. HOSPITAL UNITS:

The terrain is as suitable in every way for the training of medical units in tactics and technique as it is for the other elements of a Marine Division.

16. EMERGENCY LANDING FIELD:

The area selected for the emergency landing field lies between the highway No. 17 and the right-of-way of the Atlantic Coast Line Railroad. It is approximately 2 miles long by 1 mile wide, with its length in the general direction of the prevailing winds which are southeast or northwest. It is partly cleared. An alternate field is suggested just to the northwest of the bridge over North East Creek. As this is nearer the Training Area than the

previously mentioned field, it may eventually prove more desirable for permanent use.

17. TEMPORARY CAMP SITE:

The site of the emergency landing field was also chosen for the temporary camp. It has ample space to tent 10,000 men, is partly cleared, well drained and is close to both railroad and highway. It can be occupied without interference with the construction of the main base. All clearing for the temporary camp will be utilized for the landing field. For the requirements of tentage, warehousing, mess halls, sewage disposal, see Exhibit "2". Wells will be required for water supply. The Board was directed by the Major General Commandant to lay out the camp in 600 men plots, each to contain tentage, mess halls, sanitary and storage facilities. The tentative location of the camp is shown on Exhibit "1".

AREAS OTHER THAN THOSE FOR TRAINING

18. BARRACKS -- BATTALION HEADQUARTERS, MESS HALLS, ORGANIZATION STOREROOMS:

(a) The site chosen for barracks is on the East bank of the New River between Wallace Creek and Frenchs Creek. The advantages of this location are accessibility to training areas, high ground, best orientation as regards summer breezes, reasonable first costs, small amount of low ground, drainage, attractiveness and comparative freedom from mosquitos.

(b) Construction utilizing the rectangular scheme is considered the most desirable, - sketch appended marked "3". The advantages of this scheme are comparative compactness, reasonable installation costs, ease of communication, simplifies the road net, provides ready access for power, sewer and water lines, convenient parking area for motor vehicles and allows space for future additional building. It is not necessarily intended this scheme should be adopted as presented but after further study, particularly involving costs that generally the rectangular layout be utilized. After consideration of various building materials for temporary barracks and other buildings, it is considered that strip steel prefabrication offers such advantages over wood frame structures that the Board recommends such construction. Advantages are: comparative favorable first cost, less time to build, termite proof, ease of erection, reduced painting costs, less maintenance expense, longer life, better sound insulation (assuming concrete floors) and more pleasing appearance. Also the Board considers that a modified standard B-1 Navy Type layout having a 58-man squadroom (single bunks) as shown by Exhibit "4" is the one most suited to Marine Corps needs. It offers sufficient space for emergency requirements and, by the installation of movable steel partitions, various interior arrangements may be made to provide a recreation room, a sergeants' room, offices, etc. Generally a 58-man squadroom conforms to peacetime organization training allowances without undesirable mixing of units. The Board believes aquamedias (projecting approximately 36 inches) over dormitory or squadroom windows, such as are in practice by the U. S. Army, to be most essential, and also recommends consideration be given them for use over buildings devoted principally to offices. (Aquamedia is a term adopted by the U. S. Army for a skirt or canopy on buildings allowing open windows during rainfall, -- particularly desirable in warm weather.

(c) The schematic layout indicates locations for certain organization

storehouses, mess halls and battalion headquarters. It is recommended that the same building materials, - prefabricated strip steel be used in these buildings for reasons stated above. The standard Marine Corps mess hall ("family service") with kitchen equipment for a minimum of 600 men is considered the most satisfactory. A floor plan is appended marked "6". As it is believed urgent in the interests of economy, it is recommended that barracks be constructed for the present in lieu of battalion headquarters, buildings and storerooms, - that those activities be housed in barracks until funds are available to provide for them in locations as shown by the rectangular layout.

(d) Recommendation for large storehouses for special equipment such as artillery, antiaircraft, motor vehicles, etc., is not made part of this report.

19. DIVISION HEADQUARTERS

This area was selected according to usual practice, - that it be centrally located in regard to other headquarters and generally for all activities. If usual Army plans are followed, hostess houses, assembly halls (pictures and other gatherings) will be located in this area.

20. GENERAL PARADE GROUND

This area is centrally located and selected so that it may be enlarged from time to time as funds are available. To secure a satisfactory parade ground requires a composition having sufficient rock to provide an armored surface to prevent breaking-up tractors, tanks and other motorized equipment.

21. HOSPITAL

Hadnot Point logically suggests itself since it is centrally located, yet providing privacy and quiet. It is unusually well situated to secure the greatest degree of relief from summer heat. This location, as well as all areas along the river bank affords an opportunity for beautification by simple landscaping. There is ample space allowed for any future expansion either as regards buildings or grounds. If a tent camp for 6,000 troops is to be immediately established, thought should be given to attendant required hospitalization which suggests early construction on Hadnot Point.

22. RECREATION FOR ENLISTED MEN

Because of the isolation of the New River Training Area, special attention should be paid to providing for every reasonable field sport, - football, baseball, cinder path, tennis, basketball, handball, etc. Tentatively, areas adjacent to the parade ground have been selected for these forms of exercise. A further study on the ground may suggest combining these areas. However, should the strength of the post approximate 20,000 enlisted, it is considered very desirable to have several recreation areas in order to encourage various forms of athletics by providing facilities nearby the barracks, - possibly in each regimental area. Both the river and the ocean beach provide splendid opportunity for swimming. It may be desirable to locate a hostess house, - assembly hall (moving pictures) in each

regimental area.

23. RECREATION FOR OFFICERS, WARRANT OFFICERS AND NONCOMMISSIONED OFFICERS (FAMILIES)

Because of the isolation of this station, it is considered that more than usual attention need be paid to some provision for athletics for all interested persons residing in the post. Accordingly, tentative areas have been selected (as indicated on the enclosed map) in each quarters group, officers, warrant officers and noncommissioned officers.

24. UTILITIES - SUPPLY

Adequate railroad, highway and power facilities are not now in the Training Area. As all will be urgently needed on beginning construction, steps to initiate them should be taken immediately, particularly as regards the railroad and power line. A later study should be made in connection with providing docking facilities on the river for ocean-going vessels. However, a tentative location has been selected in the vicinity of Marines. Also, attention should be given at a later date to docking facilities at Morehead City, - particularly if it appears that wharfage at Wilmington will prove inadequate in an emergency. Barging between the Training Area and Morehead City does not appear to offer satisfactory transportation possibilities, but should be kept in mind.

25. WIRE COMMUNICATIONS

As neither telephonic or telegraphic communications are sufficient to cover proposed installations, a determination of requirements should be made, and the utility companies concerned informed accordingly.

26. RAILROAD-HIGHWAY--HIGH TENSION LINE

A proposed general location for a railroad, a main highway and pole lines (entering the reservation) are indicated on the attached map.

27. SANITATION

(a) As it is very undesirable to have raw sewage discharged into the river, adequate sewage disposal plants will need to be installed.

(b) Because of the presence of sluggish creeks and marshy areas, and the report of the presence of malaria and the anopheles mosquito, it is considered urgent that surveys be made without delay in order that mosquito control may be established.

28. WATER SUPPLY

A deep-well water supply is being explored by sinking test wells.

29. QUARTERMASTER

A general area for such quartermaster supply activities as shops,

bakery, laundry, commissary, cold storage, fuel, lumber, clothing, and equipment material storage is indicated on the accompanying layout, leaving details of construction as a matter for future study. Since a bakery, laundry, cold storage and commissary will be early requisites of the more permament construction, they should be provided among the first buildings as their facilities can well be utilized in the very near future by the temporary tent camp.

30. C. C. C. CAMP:

A suggested site for a C. C. C. Camp is indicated on the accompanying map. It would be necessary to provide water at their camp.

31. LABOR CAMP:

Should a labor camp be necessary or desirable, it could be on the reservation at any location convenient to construction activities, and near water.

32. OFFICERS' WARRANT OFFICERS' AND NONCOMMISSIONED OFFICERS' QUARTERS:

These areas were selected after locating the barracks areas. Thought for these locations was mainly directed by accessibility to all activities, installation costs, reasonable privacy and utilization of river scenery which is most attractive as the water is clear, little current or tide, and with stretches of clean sandy beaches. The areas are located with officers' and warrant officers' quarters to the northward as this allows of shorter distances for commissioned officers to travel to their duties. Because of the cost limit placed by law on these quarters, it is probable that resort will be necessary to modified Navy Low Cost Defense Housing. In this connection, the Federal Housing Activity has interesting layouts, including small towns. They are worthy of study and consideration. The layout for officers' quarters and noncommissioned officers' quarters contemplates approximately 200-feet frontage for general officers, 100-feet for commissioned officers, 60-feet for warrant officers and 50-feet for noncommissioned officers' quarters. It is believed a pleasing landscape effect will be secured by laying out a river drive, and locating quarters with this as the controlling theme but following, in a modified way, the usual city plan of streets at right angles. It should be noted that the plan contemplates quarters only in each alternate block. This allows all quarters to face upon a small park already planted with native trees and shrubs. These unoccupied blocks can be built upon at a later date if found necessary but it is believed it will prove very desirable to keep them for their landscape value, -- a place where tennis courts, etc., may be installed and providing readily accessible playgrounds for children. Also retention of as many trees and shrubs as practicable will have a tendency to moderate hot summer days.

33. LANDSCAPING:

It is considered desirable that where practicable all existing trees, shrubs, etc,, be carefully preserved, not only for their landscape value, but to minimize blowing sand, to reduce summer temperature and to retain ground moisture. As previously mentioned, a riverside drive is contemplated for the fine scenery it will unfold and its usefulness as a

Camp Lejeune

072/251

Headquarters, First Marine Division,
Fleet Marine Force, Marine Barracks,
Quantico, Virginia.

1941.

Clay,
- Ran across this while looking for an old copy of the Range SOP ----
- 52 years later we are still looking & developing Training areas --- in the year 2050 we may be back to this or own all of Onslow County!?
Lc

Sup

1. racks, New Ri North Caroli ent to Jackso that city, and and 20 ly 11 miles north- east to Bear Inlet, and extends inland approximately 10 miles in the vicinity of Jacksonville, N.C. Approximately one fourth of the land area is west of the New River and three fourths east of the New River. The importance of the U.S. Marine Barracks, New River, N.C., is due to its size, which affords a base on the east coast where large units of marines can assemble intact, and to varied and extensive training facilities which permit of both landing and shore operations, and the firing of artillery.

2. TOPOGRAPHY. The terrain of the entire area comprising the U.S. Marine Barracks, New River, N.C., is generally flat, the highest elevation being under 30 feet. The vegetation of the area consists of pine and oak with underbrush of varying density. The wooded areas inland from the coastal beach for a distance of approximately 2 miles are very dense and difficult of passage, except over occasional unimproved roads and trails. As the elevation increases inland, the vegetation becomes less dense. Forest fires have burned over many sections within the area, and appearances indicate frequent and extensive fires during the dry seasons. The only indication of extensive agriculture is in the south central section of that area north-east of New River, where a belt of cultivated areas extend along the southern border of the Gillett-Duck Creek-Starling road, and in the area west of the New River, particularly north and west of Stone Bay, and in the vicinity of Holmes Point. The soils on the reservation are Lakewood fine sand, Onslow sandy loam, Portsmouth fine sand muck and tidal marsh. Lakewood fine sand is found extensively inland, where the terrain is more elevated and the vegetation sparse. The soil of tidal marsh varies from dark gray to bluish drab or steel colored loam, 6 to 8 inches deep. The soil in the cultivated areas is mostly Norfolk fine sand. The sub-soil is black, bluish or steel colored clay loam, extending to depths of 3 feet or more. The tidal marsh supports a luxuriant growth of marsh grass.

3. INTRACOASTAL WATERWAY. The New York-Key West section of the intracoastal waterway, passes through the reservation, closely paralleling the coastal beach. Construction of the

Camp Lejeune

072/251

Headquarters, First Marine Division,
Fleet Marine Force, Marine Barracks,
Quantico, Virginia.

5 September, 1941.

STUDY ON

NEW RIVER MARINE BASE
(Revised)
Supersedes study on same subject dated 21 June , 1941.

1. GENERAL. The area comprising the U.S. Marine Barracks, New River, N.C., is located on the southeastern coast of North Carolina, along both banks of the New River. It is adjacent to Jacksonville, N.C., being located south and southeast of that city, and is comprised of approximately 83,000 acres of land and 20,000 acres of water area. The area has approximately 11 miles of coastal beach, reaching from the New River Inlet northeast to Bear Inlet, and extends inland approximately 15 miles in the vicinity of Jacksonville, N.C. Approximately one fourth of the land area is west of the New River and three fourths east of the New River. The importance of the U.S. Marine Barracks, New River, N.C., is due to its size, which affords a base on the east coast where large units of marines can assemble intact, and to varied and extensive training facilities which permit of both landing and shore operations, and the firing of artillery.

2. TOPOGRAPHY. The terrain of the entire area comprising the U.S. Marine Barracks, New River, N.C., is generally flat, the highest elevation being under 30 feet. The vegetation of the area consists of pine and oak with underbrush of varying density. The wooded areas inland from the coastal beach for a distance of approximately 2 miles are very dense and difficult of passage, except over occasional unimproved roads and trails. As the elevation increases inland, the vegetation becomes less dense. Forest fires have burned over many sections within the area, and appearances indicate frequent and extensive fires during the dry seasons. The only indication of extensive agriculture is in the south central section of that area northeast of New River, where a belt of cultivated areas extend along the southern border of the Gillett-Duck Creek-Starling road, and in the area west of the New River, particularly north and west of Stone Bay, and in the vicinity of Holmes Point. The soils on the reservation are Lakewood fine sand, Onslow sandy loam, Portsmouth fine sand muck and tidal marsh. Lakewood fine sand is found extensively inland, where the terrain is more elevated and the vegetation sparse. The soil of tidal marsh varies from dark gray to bluish drab or steel colored loam, 6 to 8 inches deep. The soil in the cultivated areas is mostly Norfolk fine sand. The sub-soil is black, bluish or steel colored clay loam, extending to depths of 3 feet or more. The tidal marsh supports a luxuriant growth of marsh grass.

3. INTRACOASTAL WATERWAY. The New York-Key West section of the intracoastal waterway, passes through the reservation, closely paralleling the coastal beach. Construction of the

intracoastal waterway, which runs from Boston, Mass., to the Rio Grande, Texas, was authorized by Congress. It is maintained, regulated, and controlled by the Corps of Engineers, U.S. Army, and no toll is charged along its route. Within the limits of the U.S. Marine Barracks area the intracoastal waterway had a controlling depth of 11 feet at mean low water in June, 1940, and the channel has a width of approximately 90 feet. The shore lines, which are regular and clearly defined, are approximately 70 yards apart. The course of the intracoastal waterway is approximately 500 yards from the coastal beach at Brown's Inlet, 300 yards from the coastal beach at Hurst Ferry and aproximately 575 yards from the coastal beach at Salliers Bay. On any advance inland from the coastal beach, the intracoastal waterway offers an almost immediate obstacle which must be overcome in order to make an advance inland.

Approximately 2,000 yards south of the road intersection at Duck Creek, the Hurst Ferry operates over the intracoastal waterway. In the past this has been a state owned and operated ferry. The present ferry has a capacity of 8 tons and will carry approximately 40 equipped men or 2 passenger cars. The ferry is powered by an outboard motor, and maintained in position by a steel cable during crossings. To allow the passage of watercraft along the intracoastal waterway, the cable is slackened and lowered to the channel bottom. Time required for crossing is approximately 3 minutes.

4. ROADS. The reservation has a fairly good road net. The main roads are either improved, or with hard natural surface. U.S. Highway #17 forms the southwestern boundary of the reservation, with several roads branching off into that part of the reservation southwest of the New River. N.C. Route #24 forms the northern boundary of the reservation. The Starling-Duck Creek road runs through the eastern and southeastern part of the reservation. The Piney Green-Duck Creek-Hurst Ferry road runs generally north and south through the central part of the area east of the New River, the south terminal being on the beach. Many unimproved roads connect the main roads laterally. The unimproved roads are in most cases former logging roads, no longer used for this purpose. Troops and all mechanized equipment can be moved over these unimproved roads if the weather is dry. However, they will not hold up under heavy usage, and in wet weather will soon develope bad stretches in low places which must be corduroyed or filled in if continued use of roads is required. Bridges over the small streams within the area generally have an 8 ton capacity. Bridges are in most cases narrow in width and can be readily reinforced.

In addition to the Piney Green-Duck Creek-Hurst Ferry, road, the following roads are suitable for movement inland from the coastal beach:

(a) Approximately 800 yards northeast of Hurst Ferry, an unimproved road known locally as Horseheads road, runs in northwesterly direction from the intracoastal waterway, and intersects the Duck Creek-Hurst Ferry road approximately 200 yards south of the Duck Creek road intersection. A direct extension of this road exists southeast of the intracoastal waterway, and terminates on the coastal beach, a passage having been cut through the sand dunes.

(b) Approximately 750 yards south southwest of Hurst Ferry, an unimproved road runs in a northwesterly direction from the intracoastal waterway, intersecting the Duck Creek-Gillett road approximately 750 yards southwest of Duck Creek. A direct extension of this road exists southeast of the intracoastal waterway, and terminates on the coastal beach, a passage having been cut through the sand dunes.

(c)Approximately 1600 yards southwest of Hurst Ferry, an unimproved road runs in a northerly direction from the intracoastal waterway, converging into the road noted in (b) above, at a point approximately 1250 yards inland from the intracoastal waterway. A direct extension of this road exists south of the intracoastal waterway, and terminates on the coastal beach, a passage having been cut through the sand dunes.

(d) Approximately 2400 yards southwest of Hurst Ferry, an unimproved road runs in a northerly direction from the intracoastal waterway, intersecting the Duck Creek-Gillett road approximately 2000 yards southwest of Duck Creek. A direct extension of this road exists south of the intracoastal waterway, and terminates on the coastal beach, a passage having been cut through the sand dunes.

(e) At Gillett's Landing, opposite Brown's Inlet, an unimproved road runs in a northerly direction, intersecting the Duck Creek-Starling road 1500 yards north of the intracoastal waterway.

5. RAILROADS. A branch of the Atlantic Coast Line passes along the southwest boundary of the reservation, and joins the main line of the Atlantic Coast Line at Wilmington, N.C., and the Norfolk and Southern Railroad at New Bern, N.C. A spur from the Atlantic Coast Line has been laid into the reservation.

6. CITIES AND TOWNS. Jacksonville, N.C., is immediately adjacent to the U.S. Marine Barracks, New River, N.C. Other large towns are New Bern, N.C., 37 miles to the northeast, and Wilmington, N.C., 47 miles to the southwest. All above noted cities are on U.S. Highway #17. Kinston, a large tobacco center, is 40 miles to the North on U.S. Highway #258, while Moorehead City, a well known summer resort, is 44 miles to the east on U.S. Highway #70.

7. TIDES. The high water interval along the coastal beach at the U.S. Marine Barracks, New River, N.C., is 7 hours and 12 minutes, with normal mean range of 3 feet.

8. TEMPERATURE. The mean maximum temperature at 71.8, and the mean minimum is 54.6. The mean temperature is 63.1.

9. BEACHES, GENERAL. The coastal beach of the reservation is approximately 19,000 yards long, extending from New River Inlet to Bear Inlet. The shore line is most uniform in appearance and character and is broken only by the flow of Brown's Inlet, 5800 yards southwest of Bear Inlet. The coastal beach is composed of white and light gray, fine or medium to coarse sand. Sea shells are scattered throughout the sand, which is very hard and has a depth of several feet. The beaches are broad and flat, and shoal very gradually for a distance of approximately 500 yards off shore, where the depth sheers off abruptly to an average of 18 feet. Many shallow troughs exist offshore, the seaward sides of which have well rounded crowns and present the appearance of low sand bars in evidence only

at low water. Other than this the entire beach is characterized by the absence of rocks, reefs or other barriers which would offer obstacles to the landing of troops from seaward. The entire coastal beach must be classed as very favorable for the landing of infantry. Heavy equipment, including artillery, scout cars, tanks and trucks can be landed along the beach, but for this purpose advantage must be taken of favorable tide and surf conditions. Incoming tides, from midhigh to high water, or ebbing tides from high water to mid-low, with medium surf conditions are most favorable for landings. Properly handled boats, not using anchors astern, can be grounded close inshore, insuring a short run to the beach for wheeled vehicles or tanks, and a minimum carry for cargo. A freshening surf to medium offers no material bar to landings, but aids retraction of boats. Due to the straight coast line of the reservation, and low terrain inland, surf conditions are subject to rapid change. Except at high tide, all type of vehicles and equipment can be moved laterally along the beach. Along its entire length, the beach is backed by sand dunes, approximately 12 to 15 feet high. The dunes are kept from excessive shifting by a growth of long grass, which generally covers them. From Brown's Inlet to New River Inlet, immediately inland from the sand dunes, a belt of vegetation comprised of myrtle, cedar and scrub oak, and approximately 15 to 20 feet high and varying in width from 25 to 75 yards, extends the length of the sector. Except for extensive cleared stretches in the Salliers Bay and Hurst Beach-Onslow Beach area, and occasional trails elsewhere, passage through this vegetation is difficult, and lanes must be cut for the passage of troops and equipment.

Centrally located on the coastal beach are some 40 cottages which formerly comprised the Hurst Beach and Onslow Beach summer colonies. The Hurst Ferry-Duck Creek road which terminates on the beach, separates these beaches, Hurst Beach being north and Onslow Beach south of the road. Immediately in rear of the row of cottages a hard surface road extends the full length of the two beaches for a distance of 2,000 yards.

10. AREA BETWEEN COASTAL BEACH TO INTRACOASTAL WATERWAY. Along certain sections of the coastal beach, the terrain immediately inland is such that passage of troops and equipment cannot be made directly to the intracoastal waterway. From Bear Inlet to Brown's Inlet, the area is flooded by the waters of these inlets, and covered with a network of streams and creeks, bordered with tidal marsh and deep swamps which are continually under water and are impassible. From Brown's Inlet to the northeast end of Hurst Beach, the area inland is swampy with tidal marsh. The depth of water within this area averages from 6 inches near Hurst Beach to 20 inches near Brown's Inlet. The channels of several meandering creeks are somewhat deeper. There is a firm bottom under approximately 8 inches of mud. Lightly equipped infantry can cross this area to the intracoastal waterway, but the movement would be slow and difficult. From the northeast end of Hurst Beach to a point opposite Craig Point, a distance of approximately 6,800 yards, the terrain inland is dry and passage to the intracoastal waterway feasible. From the coastal beach opposite Craig Point to the New River Inlet the terrain is flooded by the waters of the New River Inlet and passage to the intracoastal waterway cannot be made.

11. INLAND FROM THE INTRACOASTAL WATERWAY. The wooded areas inland from the intracoastal waterway for a distance of approximately 2 miles are very dense, and feasible only for the advance inland of infantry. Unless new roads are cut through the wooded

areas, advance inland of vehicles and other heavy equipment to the Gillett-Duck Creek-Starling road can be made only over the roads indicated as suitable for this purpose in paragraph 4.

The following areas are unfavorable for advance inland:

(a) The swamps and marshes bordering Tull Creek and Brown's Creek.

(b) The dense woods extending from the unimproved road 1600 yards southwest of the Hurst Ferry to Salliers Bay.

(c) The marshes and swamps extending from Salliers Bay southwest and west to the New River.

(d) An extensive swamp area in the south central portion of the area bounded by the Starling-Duck Creek and the Piney Green-Duck Creek roads, and approximately 6000 yards northeast of Duck Creek.

12. THE NEW RIVER. The New River runs generally north and south through the western part of the reservation, extending from the intersection of New River Inlet and the intracoastal waterway near Traps Bay north to Jacksonville, N.C., from which place it narrows into a small stream. The New River follows a very irregular course, and varies in width from 600 yards to 3,600 yards, with an approximate average width of 2,000 yards. It is shallow in depth, but has a 10 feet dredged channel from the intracoastal waterway to Jacksonville, N.C. The outlet of the New River to the sea is through the New River Inlet which extends from the coast a distance of 3,400 yards inland, where it intersects the intracoastal waterway and merges with the New River. Several wide expanses of water along the course of the New River, particularly Stone Bay, Farnell Bay and Morgan Bay, afford suitable locations for the landing of seaplanes.

13. NEW RIVER INLET. Experienced boatmen, with shallow draft boats under favorable tide conditions can effect passage through the New River Inlet. If the above conditions do not obtain, the passage should not be attempted. The entrance is narrow with a shifting channel, and is difficult to buoy. There is a strong ebb current from the inlet sometimes as long as 3 hours after low tide, which causes a heavy break on the bar when there is any sea running outside, and results in a bad chop, particularly when the ebb current runs against south and southeast winds. The controlling depth at mean low water in the entrance was one foot in June, 1939, but the entrance channel is subject to change.

14. BROWN'S INLET. Approximately 4500 yards northeast of Hurst Beach. Brown's Inlet offers an approach to the inland areas of New River marine barracks via the intracoastal waterway. The channel is narrow and winding in passing between the sand dunes at the mouth of the inlet and follows in general the left bank. Experienced boatmen with shallow draft boats under favorable tide conditions can transport both infantry and equipment through the inlet. The channel has not been buoyed in the past. At last recording of depth Brown's Inlet was reported to have 2 feet of water at mean low tide. Light tanks have been transported through this inlet, and landed at Gillett's landing.

15. BEAR INLET. Bear Inlet has not been extensively investigated for possible use in connection with training at the New River marine reservation. In the past it has been used as a harbor by local boats. The entrance is about 1/4 mile wide between high sand dunes. It has a broad straight channel, and is marked by buoys, which are shifted from time to time as the position of the channel changes. Strangers should not attempt to enter the inlet, or pass to the intracoastal waterway without the aid of a local pilot.

U.S. Weather Bureau
Meteorological Table

Month	Air Temperature Mean For Mon.	Mean Max.	Mean Min.	Precipitation Average Fall	Wind Average Hourly Velocity	number of days gales 32 miles or over	Number of days fog
January	46.5	56.3	38.2	3.29	8.2	(2)	2
February	47.9	57.8	39.6	3.26	8.7	(2)	1
March	53.3	63.9	45.4	3.17	9.0	(2)	1
April	62.0	70.6	52.4	2.66	9.2	(2)	1
May	70.8	78.4	61.2	3.44	7.9	(2)	(2)
June	76.8	84.3	68.3	5.10	7.4	(2)	(2)
July	79.1	86.9	71.9	7.13	7.2	(2)	(2)
August	77.6	86.1	70.9	6.36	6.3	(2)	(2)
September	73.1	82.1	66.3	4.51	6.7	(2)	1
October	65.3	73.4	55.6	1.96	7.1	(2)	1
November	56.0	64.6	45.7	2.78	7.1	(2)	1
December	49.1	57.5	39.4	2.78	7.6	(2)	2
Mean	63.1	71.8	54.6		7.6		
Total				46.93		2	12

(2) - Less than 1.

Source and degree of authenticity.

(a) Inside route pilot, Intracoastal waterway-New York to Key West 1936.
(b) U.S. Engineer office, Wilmington, N.C., chart of New River from Intracoastal waterway to Jacksonville, N.C., April 15, 1939.
(c) Department of Agriculture pamphlet, Soils of Onslow County, North Carolina. 1933, and colored chart same subject.
(d) H.O. Chart 777. New River, North Carolina.
(e) Tide Tables, Atlantic Ocean, 1941.
(f) Report to MGC of Board to investigate New River for Marine Corps Training site.
(g) Personal reconnaissance and observation.

BY COMMAND OF BRIGADIER GENERAL P.H. TORREY.

OFFICIAL:
Frank B Goettge
FRANK B. GOETTGE,
Lt. -Col., USMC,
D-2

LeR. P. HUNT,
Colonel, U.S. Marine Corps,
Chief of Staff.

TIDE TABLES
FOR NEW RIVER INLET, NORTH CAROLINA,
MONTH OF OCTOBER, 1941.
(Standard Time)

Hour		Feet
October 1		
0121	MH	1.96
0428	H	3.02
0729	ML	1.96
1036	L	0.9
1345	MH	1.97
1653	H	3.04
1959	ML	1.92
2305	L	0.8
October 2		
0212	MH	2.1
0518	H	3.3
0725	ML	2.05
1131	L	0.8
1436	MH	2.1
1740	H	3.4
2046	ML	2.1
2352	L	0.7
October 3		
0257	MH	2.1
0601	H	3.5
0910	ML	2.1
1219	L	0.7
1520	MH	2.1
1821	H	3.4
2027	ML	2.1
----	L	---
October 4		
0032	L	0.7
0337	MH	1.7
0642	H	3.6
0952	ML	2.1
1301	L	0.7
1601	MH	2.1
1901	H	3.4
2210	ML	2.0
October 5		
0109	L	0.6
0415	MH	2.1
0720	H	3.6
1030	ML	2.2
1339	L	0.7
1639	MH	2.0
1938	H	3.3
2241	ML	2.0
October 6		
0144	L	0.6
0450	MH	2.1
0756	H	3.6
1106	ML	2.2
1416	L	0.7
1715	MH	2.0
2014	H	3.3
2316	ML	2.0

Hour		Feet
October 7		
0218	L	0.7
0526	MH	2.2
0834	H	3.6
1142	ML	2.2
1450	L	0.8
1751	MH	2.0
2051	H	3.2
2352	ML	2.0
October 8		
0252	L	0.8
0600	MH	2.2
0908	H	3.5
1217	ML	2.2
1526	L	0.9
1827	MH	2.0
2127	H	3.1
----	ML	---
October 9		
0026	ML	2.0
0325	L	0.9
0635	MH	2.2
0945	H	3.4
1255	ML	2.2
1604	L	1.0
1905	MH	2.0
2205	H	3.0
October 10		
0103	ML	2.0
0400	L	1.0
0711	MH	2.2
1022	H	3.4
1334	ML	2.3
1646	L	1.1
1945	MH	2.0
2244	H	2.9
October 11		
0104	ML	2.1
0441	L	1.1
0752	MH	2.2
1103	H	3.3
1419	ML	2.3
1735	L	1.2
2034	MH	2.0
2332	H	2.8
October 12		
0232	ML	2.0
0532	L	1.2
0840	MH	2.2
1148	H	3.2
1510	ML	2.2
1832	L	1.2
2126	MH	2.0
----	H	---

TIDE TABLES
(continued)

Hour		Feet
	October 13	
0020	H	2.7
0326	ML	2.0
0632	L	1.2
1006	MH	1.7
1240	H	3.1
1665	ML	2.2
1930	L	1.2
2226	MH	2.0
	October 14	
0121	H	2.7
0428	ML	2.0
0737	L	1.2
1039	MH	2.2
1341	H	3.1
1665	ML	2.1
2029	L	1.1
2329	MH	2.0
	October 15	
0228	H	2.8
0534	ML	2.0
0840	L	1.1
1143	MH	2.1
1446	H	3.1
1805	ML	2.1
2123	L	1.0
----	MH	---
	October 16	
0028	MH	2.0
0332	H	3.0
0637	ML	2.1
0942	L	1.1
1245	MH	2.1
1547	H	3.0
1901	ML	1.9
2215	L	0.8
	October 17	
0121	MH	2.1
0427	H	3.3
0733	ML	2.1
1039	L	0.8
1341	MH	2.1
1643	H	3.4
1954	ML	2.0
2305	L	0.6
	October 18	
0210	MH	2.1
0516	H	3.5
0825	ML	2.1
1133	L	0.6
1433	MH	2.1
1732	H	3.5
2043	ML	2.2
2353	L	0.4

Hour		Feet
	October 19	
0259	MH	2.1
0605	H	3.8
0915	ML	2.1
1225	L	0.4
1524	MH	2.2
1823	H	3.5
2131	ML	1.9
----	L	---
	October 20	
0039	L	0.2
0346	MH	2.1
0653	H	4.0
1004	ML	2.2
1315	L	0.3
1614	MH	2.0
1912	H	3.6
2219	ML	1.9
	October 21	
0126	L	0.1
0435	MH	2.1
0743	H	4.1
1054	ML	2.2
1405	L	0.2
1703	MH	1.9
2001	H	3.5
2306	ML	1.8
	October 22	
0211	L	0.1
0522	MH	2.1
0833	H	4.1
1144	ML	2.2
1455	L	0.2
1755	MH	1.9
2054	H	3.5
2357	ML	1.9
	October 23	
0259	L	0.2
0612	MH	2.1
0925	H	4.0
1236	ML	2.2
1547	L	0.4
1847	MH	1.9
2147	H	3.3
----	ML	---
	October 24	
0048	ML	1.9
0350	L	0.4
0705	MH	2.2
1019	H	3.9
1331	ML	2.3
1642	L	0.7
1943	MH	1.9
2243	H	3.1

TIDE TABLES
(continued)

October 25

Hour		Feet
0145	ML	1.9
0448	L	0.6
0802	MH	2.2
1116	H	3.7
1431	ML	2.2
1745	L	0.7
2043	MH	1.9
2341	H	3.0

October 26

0247	ML	1.9
0554	L	0.8
0904	MH	2.1
1214	H	3.4
1532	ML	2.1
1850	L	0.8
2148	MH	1.9
----	H	---

October 27

0045	H	2.9
0355	ML	1.9
0705	L	0.9
1012	MH	2.1
1319	H	3.2
1637	ML	2.0
1955	L	0.8
2256	MH	1.9

October 28

0156	H	2.9
0506	ML	1.9
0815	L	0.9
1122	MH	2.0
1429	H	3.1
1742	ML	2.0
2055	L	0.9
----	MH	---

October 29

Hour		Feet
0001	MH	1.9
0307	H	2.9
0614	ML	1.9
0920	L	0.9
1227	MH	2.0
1534	H	3.1
1841	ML	2.0
2148	L	0.9

October 30

0058	MH	2.0
0408	H	3.0
0714	ML	1.9
1019	L	0.8
1324	MH	2.0
1629	H	3.1
1933	ML	1.9
2237	L	0.7

October 31

0146	MH	2.0
0456	H	3.2
0804	ML	2.0
1111	L	0.8
1413	MH	2.0
1715	H	3.1
2019	ML	1.9
2322	L	0.6

communicating highway to post activities and housing areas. Barracks and quarters are located on turnouts from the river road since this adds to general attractiveness and decreases traffic hazards. When clearing areas for any purpose, the value of trees and shrubs now growing should be kept in mind and every reasonable attempt made for their preservation. Contractors and others interested in construction alone give little thought to the destruction of plant life.

34. COMMENT:

(a) In planning utilization of the base, consideration was given in the order name to training and combat areas, covenient location of barracks thereto, -- quarters, and services. Careful study has been given each installation in order that any future systematic expansion will logically follow the general plan, and, prove to be desirable and staisfactory. This statement also is intended to include provision for areas not mentioned herein, and engineer park, tank park, amphibian park, or other required space.

(b) Because of greatly increased travel over public highways on the perimeter of the area, and to the river and ocean beaches through the area, the danger from forest and brush fires is increasing to such an extent as to become a matter of concern with the approach of dry summer weather. Accordingly, it is suggested that as soon as the Government has title to the area that an adequate fire partol be organized, -- observation towers constructed and telephonic communication installed, -- the towers later to be utilized for artillery fire control, and safety measures.

****

The following maps, sketches, etc., are appended and marked as indicated below: (Note: It was found impracticable to reproduce these exhibits in the completion report of the Architect-Engineers.)

General Map of the Area....."1"
Memo to Chief of Bureau of Yards & Docks....."2"
Re material, storehouses, etc., for a
tent camp to accommodate 6,000 men
Regimental Layout (Typical)....."3"
Barracks Floor Plan....."4"
First and second floors and estimates
Barracks....."5"
Sections through Dormitory and connecting
Wing showing "Aquamedias"
Mess Hall - Floor Plan....."6"
Street Layout (Typical)....."7"
Commissioned Officers' Quarters
Block Layout (Typical)....."8"
Commissioned Officers' Quarters
Suggested School Building (Children)....."9"
Alternate Mess Hall (Seating 1000)....."10"

J. C. Smith, Colone., U.S.M.C.
Senior Member

Z. C. Long, Colonel, U.S.M.C.
Member

C-3. On April 14, 1941, the report of the Board was approved subject to certain exceptions which are shown below:

COPY

HEADQUARTERS U. S. MARINE CORPS
WASHINGTON 14 April 1941

The Report of the Board to submit plans for Establishment of a Division Training Center, New River Area, North Carolina, is approved subject to the following comments:

a. Paragraph 18 - Type of construction will be subject to further recommendations by the Quartermaster after consultation with the Bureau of Yards & Docks. Mess Halls will have a capacity of approximately 900 men.

The Quartermaster will provide plans for storehouses, administrative activities, and facilities not covered in subject report.

b. Paragraphs 19 and 22. It would appear desirable to locate moving picture theatres, and possibly hostess houses, in proximity to each regimental area, if sufficient funds are available.

c. Enclosure 1 is approved as to the general location of the various facilities. If sufficient funds are not available to complete all of the regimental areas indicated, sufficient areas will be omitted, beginning in the southeast, to come within available funds.

d. Enclosure 3 (A) is the accepted plan for a regimental area. Three mess halls, for approximately 900 men each, will be provided.

e. Enclosures 4 and 5 are approved as the general layout for the barracks with the exception that necessary office space will have to be provided in certain squad-rooms.

f. Enclosures 6 and 10 - Mess Halls in the regimental areas shall have a capacity of approximately 900 men.

g. Enclosures 7 and 8 - It is desired that a new plan for typical plat layout for officers' quarters be prepared by the Quartermaster. In order to conserve funds, the following general principles will apply:

(1) Size of lots approximately as proposed in subject report.
(2) Streets will be reduced to a minimum even though this necessitates greater distances in going from one part of the area to another.

(3) Garages will not be provided for initial installation, but consideration will be given as to the possible location of garages for subsequent development.

h. Enclosure 9 - The general plan for the school building is approved for construction when funds become available.

General layouts, based on further reconnaissance and surveys will be submitted by the Quartermaster to the Major General Commandant for approval.

T. Holcomb

CHAPTER D PART I

CHANGES OF SITES FOR VARIOUS ACTIVITIES

D-1. Tent Camps #1 and #2. The Marine Board report contemplated locating the tent camps just east of the Atlantic Coast line Railroad and about a mile south of Brinson Creek, with emergency landing fields #2 and #3 located on the east side of U. S. Route 17, one North and one South of an existing earth road. Careful examination disclosed the fact that the proposed tent camp site was so poorly drained that it was not suitable for housing troops and the location therefore was changed to the site formerly considered for Emergency Landing Field No. 2. Very thorough study was given the proposed site for Emergency Landing Field No. 3 and it was found to require such expensive drainage and other construction that a new site was selected on New River between Peterfield Point and South West Creek. This field later was developed into a glider training base.

D-2. Residential Area. Generally speaking, the quarters for officers were provided in the locality shown on the general area map prepared by the U. S. Marine Board with the exception that the warrant officers and non-commissioned officers' quarters are being provided in Midway Park.

D-3. Rifle Range. The Rifle Range originally was planned for the area between French's Creek and Bear Creek. It was felt that firing on the range would conflict with regular use of the combat area and the location therefore was changed to the west side of Stone Bay between Stone Creek and Everett's Creek.

D-4. Balloon Barrage Area. The location originally suggested for this area was along the Main Access Road into the Division Training Area. After the date of the Marine Board report, water-borne balloon barrage training became necessary and the location therefore was shifted to Courthouse Bay. The new location possessed also the advantage of remoteness from flying fields, main roads, power lines, radio stations, and combat areas.

D-5. Additional Areas. Additional areas provided were:

(1) An area for parachute training and jumping towers along the main access road to the Division Training Area.
(2) A small camp for a Tank Battalion on U. S. 17 about 2 miles south of Tent Camps 1 and 2.
(3) A small camp for temporary housing of Amphibian Troops on the west side of New River at Peterfield Point.
(4) A small camp for the housing and training of about 1500 colored troops at Mumford Point.

D-6. With the exception of the tent camps, landing field, rifle range and balloon barrage area, the final layout of the area conforms very well with the layout prepared by the U. S. Marine Board. This is most remarkable inasmuch as no topographic map ever had been made of the area at the time the Marine Board report was drawn.

D-7. Sites for the various activities are discussed in detail in Chapter D, Part II, "Site Planning".

CHAPTER E - PART I

DESIGN CONSIDERATIONS AND RESTRICTIONS

In the design of all structures, utilities, etc. as well as in the planning of building sites, the following criteria were established:

(1) Fire zones with a minimum width of 300 feet were established between all regimental areas. Officers' homes in Residential Area were of necessity grouped into isolated sections because of the numerous natural drainage features that indent the New River shore line.

(2) All buildings were spaced not less than 60 feet apart.

(3) In regimental areas buildings were grouped according to battalions providing housing, administrational, storage and subsistence facilities.

(4) Limits of roadways were set at 70 feet for two lane roads and 130 feet for divided highway construction, with center parkway. This provided flat slopes for side ditches and allowed easy maintenance with road / patrol machinery.

(5) Soil bearing foundations were fixed at not less than 1'-4" below grade not only to eliminate any trouble from frost but to reach soil capable of sustaining loads. A maximum depth was set at three feet in order to stay above a plastic clay stratum peculiar to this locality and that in some locations came within eight feet of grade. Pile foundations varied as discussed in Chapter F of Part II.

(6) Soil bearing pressures were held to a maximum of 2,000 pounds per square foot.

(7) Drawoff of wells was limited to a maximum of 600,000 gallons per square mile per day.

(8) Type of architecture was modified early American except in Industrial and Supply Area where industrial architecture prevailed. Permanent masonry construction was adopted as directed by the Officer in Charge.

(9) The height of structures had to be considered carefully in locating the same in order to preserve the necessary gliding angle for landing fields.

(10) Careful attention had to be given to the location of buildings and utilities to avoid infringement upon combat and impact areas.

(11) Rifle ranges had to be located so as that the beaten zone did not create a hazard to life and property.

(12) The climate is warm and humid in the summertime, therefore water-front locations and careful attention to prevailing winds help to secure a more favorable layout.

(13) Accessibility to roads and railroads was an important item in the location of some of the activities.

(14) For purposes of camouflage and to enhance the beauty of the base, a great deal of study was given to each projected site to avoid unnecessary damage to existing trees and shrubs.

CHAPTER F PART I

ENGINEERING DATA

F-1. Rainfall. Average annual precipitation is 50 inches. Monthly precipitation averages as percentages of annual rainfall are:

January	7.22%
February	7.38%
March	7.33%
April	6.42%
May	7.59%
June	10.73%
July	13.48%
August	12.60%
September	9.38%
October	6.33%
November	4.76%
December	6.78%

F-2. Runoff. Average annual runoff available for sewage dilution in New River is estimated to be 20% of the rainfall.

F-3. Temperature. The average annual temperature is 63 degrees with a high of 103 degrees and a low of 3 degrees.

F-4. Winds. The prevailing direction of the wind is from the Southwest for 19% of the time. Other winds are:

From South 14% of the time.
From Northeast 13% of the time.
From Northwest 12% of the time.
From North 12% of the time.
From West 8% of the time.
From East 7% of the time.
From Southeast 7% of the time.

Average velocity, 8 miles per hour.

Maximum velocity, 45 miles per hour. (Gusts of 60 miles per hour were logged at Courthouse Bay December 1, 1942).

F-5. Humidity. The relative humidity averages 73% with a maximum for summer months of 86%.

F-6. Snowfall. Snowfall annual average is two inches.

F-7. Groundwater. The depth of groundwater below grade varied, but was found within 3 or 4 feet of the surface in some sections of the Base. Water from comparatively shallow wells, that is, from above the underlying Coquina Rock, is fairly high in bicarbonates and contains appreciable quantities of iron, aluminum and silica. The total hardness is about 200 parts per million. Calcium salts form most of this hardness, but there is also a small amount of magnesium present. pH is about 7.4. Water from the deep wells, although considerably softer than that from the shallow wells, is relatively high in alkalinity and sulphates, and contains considerably more mineral matter. Considerable amounts of silica, iron and aluminum are found in this water. pH is above 8.0. Ground water temporature is about 60 degrees F.

F-8. Soil. Soils consist of fine sands, silts, clays and a bluish gumbo-like mud of great plasticity. Pocosins are numerous and particularly near swales and gulleys the strata dip in such a manner as to indicate subsidence due to underlying ancient river channels or solution channels in the limestone. From an agricultural standpoint, the soil is poor.

F-9. Distances from Nearby Centers of Population.

Town	Distance	Population
Jacksonville	10 miles	3000
Morehead City	45 miles	3500
Wilmington	59 miles	32,980
Kinston	51 miles	11,350
New Bern	46 miles	11,975

F-10. Malarial Conditions. Malarial incidence among population inhabiting area on which Base is now located varied from 2% to 20% of the population. Heavy breeding of the Anopheles mosquito was found in all areas except along the coast. Malarial control program was handled entirely by the U. S. Navy Bureau of Medicine and Surgery.

F-11. Tides. There is practically no periodic tide in New River above Hatch Point. Ordinary tides observed during 1941 and 1942 ranged between 0.1 and 0.4 feet above mean sea level. The highest tide observed during this period occurred on October 16, 1942, after several days of heavy rainfall, with moderate winds. At this time the tide reached an elevation of 2.3 feet above mean sea level.

F-12. Horizontal and Vertical Datum. Coordinates are based on North Carolina State System of plane coordinates as described in U. S. Department of Commerce special publication No. 218 - "First and Second Order Triangulation and Traverse in North Carolina (1927 datum) - Volume II".

Elevations are referred to mean sea level.

F-13. Magnetic Declination. The declination varies considerably over the reservation. The average for 1942 is 4 degrees 20 minutes (west of true north.)

CHAPTER G - PART I

SUMMARY OF FACILITIES PROVIDED

As of the termination date of the Architect-Engineers' Contract, September 30, 1942, the U. S. Marine Barracks located on New River, in Onslow County, North Carolina, provided the following facilities:

(1) A division training center for the housing of five regiments, and one battalion of Post Troops, including recreational and administrational facilities.

(2) An Industrial and Supply Area providing six warehouses with 327,350 sq. ft. storage, a laundry, a cold storage plant, a bakery, a commissary, a gasoline and oil storage area, a central heating plant (for Division Training Area and this area), two garages, a repair shop, 772,000 sq. ft. of motor storage area, three railroad sidings and miscellaneous equipment building and material sheds.

(3) Base Hospital, including a 650-bed main hospital, a 50-bed family hospital and housing for the personnel.

(4) Residential Area of 180 homes for commissioned officers and housing for bachelor commissioned officers.

(5) Rifle Range consisting of three 50-target ranges and one Pistol Range with 50 mechanical targets.

(6) Balloon Barrage Training for one battalion including separate housing area for this group.

(7) Amphibian Base for the harboring, repair and servicing of landing boats, tank lighters, amphibian tanks, etc.

(8) Parachute Training, including mock-up planes, and three jumping towers.

(9) Glider Training Base, consisting of three 5,000 ft. runways, a seaplane ramp and glider repair shops.

(10) Four temporary Tent Camps for:

(a) Housing 16,000 troops (Tent Camps No. 1 & 2)

(b) Housing Tank Battalion

(c) Housing Engineer Battalion (formerly used by amphibian troops)

(d) Housing 1500 colored troops (Mumford Point).

(11) Residential area of 700 low-cost housing units for non-commissioned officers and civilian personnel connected with the Base.

(12) Impact and combat areas, umpire and fire control facilities.

To provide these facilities there had to be provided 1431 buildings, 1050 hut buildings, two incinerator plants, 117 miles of roads, 17 bridges, 51 miles of sewers, 9 sewage pumping stations, 5 sewage treatment plants, 78 miles of water mains, 51 wells with pumping stations, 2 water treatment and pumping plants, 200 miles of electric distribution lines, 6 electric substations, 83 miles of telephone lines, 3 automatic telephone exchanges, 3 manual telephone exchanges, 14 miles of railroad, 18 1/2 miles of steam mains, 12 central heating plants, and 5 1/2 miles of propane gas lines.

Buildings designed contained over 102,000,000 cubic feet.

These facilities will serve an approximate population of 43,000.

The estimated cost of the Base as described is $58,000,000.

The Base is situated on both sides of the New River between Jacksonville and the Sneads Ferry bridge and on the east side of the river from this point to the ocean. This area comprises approximately 155 square miles, of which about 20 per cent is New River and tributaries, and has an ocean frontage of approximately 11 miles. New River has an average width of one mile and extends approximately 20 miles from the Atlantic Ocean to Jacksonville. Altogether, the location and terrain for the Base seem well adaptabed for the training to be given.

* This area also is known as Montford Point.

Over Size Form

☐ Too Large ☒ Bound Book

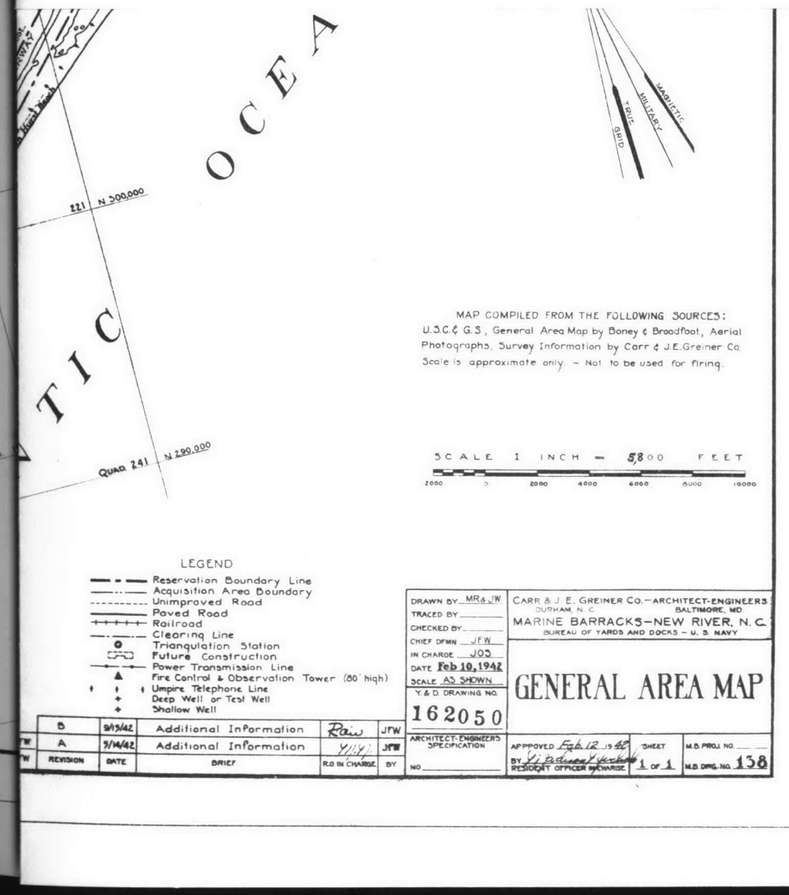
☐ Fragile ☐ Other_____

Sheet Number: _____

Drawing/NAVFAC Number: 162050

Title

General Area Map


OCEAN
ATLANTIC
MAGNETIC
TRUE
GRID
221 N 300,000
Quad 241 N 290,000
MAP COMPILED FROM THE FOLLOWING SOURCES:
U.S.C.& G.S., General Area Map by Boney & Broadfoot, Aerial Photographs, Survey Information by Carr & J.E.Greiner Co.
Scale is approximate only. - Not to be used for firing.
SCALE 1 INCH = 5800 FEET
2000 0 2000 4000 6000 8000 10000
LEGEND
Reservation Boundary Line
Acquisition Area Boundary
Unimproved Road
Paved Road
Railroad
Clearing Line
Triangulation Station
Future Construction
Power Transmission Line
Fire Control & Observation Tower (80' high)
Umpire Telephone Line
Deep Well or Test Well
Shallow Well
B 9/13/42 Additional Information Raw JFW
A 5/14/42 Additional Information JFW
REVISION DATE BRIEF R.O. IN CHARGE BY
DRAWN BY MR & JW
TRACED BY
CHECKED BY
CHIEF OFMN JFW
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DATE Feb 10, 1942
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Y. & D. DRAWING NO. 162050
ARCHITECT-ENGINEERS SPECIFICATION NO.
CARR & J. E. GREINER CO. - ARCHITECT-ENGINEERS
DURHAM, N. C. BALTIMORE, MD.
MARINE BARRACKS - NEW RIVER, N. C.
(BUREAU OF YARDS AND DOCKS - U. S. NAVY)
GENERAL AREA MAP
APPROVED Feb 12 1942
BY J. Rathmell Wicker
RESIDENT OFFICER IN CHARGE
SHEET 1 OF 1
N.B. PROJ. NO.
N.B. DRWG. NO. 138

CHAPTER A - PART II

PROJECT MANAGER'S OFFICE

TABLE OF CONTENTS

Section	Title
A-1	Introduction
A-2	Offices
A-3	Organization
A-4	Personnel
A-5	Office Procedure
A-6	Administration of Project
A-7	Narrative

CHAPTER A - PART II

PROJECT MANAGER'S OFFICE

A-1. Introduction. On April 18, 1941, a party consisting of Mr. W. Calvert Roberts, Project Manager, and Messrs. Walter C. Munroe, R. B. Maxwell and B. Everett Beavin, left the Baltimore office for New River, North Carolina. The party reported for duty on the morning of April 19th. to the representative of the Navy Department, who then was located temporarily in a small building on the grounds of the Starling Livery Stable just outside of Jacksonville. At this time, the most pressing problems confronting the company were as follows:

(a) To become familiar with the terrain of the Base and to initiate vertical and horizontal control surveys and the preparation of topographic maps of proposed sites.

(b) Rushing the preparation of site plans for Tent Camp No. 1.

(c) Expanding the initial personnel to a size capable of handling the project and devising departmental scheme which would divide responsibilities for the work and the natural sub-divisions.

(d) Providing adequate office space, together with the necessary drafting equipment, computing machines, office supplies and equipment, communications, and other necessary services.

A-2. Offices. Offices occupied by the company were as follows:

April 19, 1941 to April 29, 1941, part of Navy office at Starling Livery Stables.

April 30, 1941 to May 4, 1941, in the Gurganus farm house at Tent Camp No. 1. This building later was converted into a residence for the Commanding General.

May 4, 1941 to November 22, 1941, occupied warehouse building at the corner of "1st" and "C" streets, Tent Camp No. 1.

From November 22, 1941 to September 30, 1942, the offices were located in Barracks No. 205, Division Training Area. The entire northeast wing, part of the first and second floors in the central part, and all of the second floor in the southwest wing, were devoted to the purposes of the Architect-Engineers.

A-3. Organization. Shown hereinafter is the arrangement of the organization for the period of the contract.

The Project Manager reported to the Naval Officer representing the Chief of the Bureau of Yards and Docks. From the beginning of the project, Lt. Commander Madison Nichols was in charge until August 5, 1942, at which time he was succeeded by Lt. Commander Richard A. Williams who remained until the termination of the contract.

The Project Manager's duties were administrative. He was charged with the building up of the organization, securing equipment, obtaining

necessary typical plans and specifications from the Navy Department, handling the funds of the association and making decisions concerning design. Mr. William Calvert Roberts served in this capacity from the beginning of the work until his resignation on July 10, 1942. Mr. Walter C. Munroe then became Project Manager and served until September 30, 1942. At that time the Architect-Engineers' contract was terminated and Mr. B. Everett Beavin thenceforth served in the dual capacity of project manager to close out the affairs of the Architect-Engineers and as engineer in charge of the technical and clerical forces which then were transferred to the payroll of the Contractors, Contract NOy-4750.

Reporting directly to the Project Manager were the heads of the following departments:

Office Engineer. Mr. William H. Pahl served as Office Engineer until June 29, 1942, at which time his duties were assumed by Mr. Creston E. Funk who remained in charge until the post of Office Engineer was abolished on September 7, 1942.

Auditing Department. Mr. Leo E. Barnes served as Auditor throughout the entire project.

Site Planning Department. Mr. R. B. Maxwell served as head of the department until June 8, 1942, at which time his assistant, Mr. Andrew H. Knecht assumed the duties of site planner and carried on until the termination of the contract.

Architectural Department. The work of this department was in charge of Mr. C. W. Goudy, Jr. assisted by Mr. J. D. Rivers. After the termination of the contract, Mr. Rivers remained in charge of architectural work.

Structural Department. Structural work was under the direction of Mr. C. W. Goudy, Jr. until January 3, 1942 at which time Mr. Hugh L. Waugh took charge of this work and continued until the termination of the contract.

Mechanical Department. Was headed by Mr. W. J. McClain until about November 1, 1941, at which time Mr. H. A. Akers took charge. On January 19, 1942, Mr. W. C. Munroe took charge of this department and, upon becoming Project Manager on June 10, 1942, he was succeeded by Mr. Charles S. Wilmot who remained in charge until the termination of the contract.

Electrical Department. This department was headed by Mr. W. J. McClain until about November 1, 1941, at which time Mr. H. A. Akers took charge of this department and was succeeded on June 10, 1942, by Mr. A. E. McCall who remained in charge until September 12, 1942. Mr. Joseph G. Thompson then took charge until the termination of the contract.

Plumbing. The Plumbing work was under the direction of the Mechanical Department until January 15, 1942, at which time it was placed under the direction of Mr. W. M. Wallace II, who remained in charge until the termination of the contract.

Central Heating Plants. The work of designing all central heating plants was under the Mechanical Department until January 9, 1942, at which time Mr. J. M. Shutt was given control of the design of the Main Central Heating Plant. On September 1, 1942, Mr. Shutt was given the responsibility for all central heating plants and continued in charge until the termination of the contract.

Communications. Work of this department was under the control of the Electrical Department until January 20, 1942, at which time Mr. H. B. D'Oyley assumed full responsibility for design and remained in that position until the termination of the contract.

Roads, Railroads, Drainage and Airports. Mr. Nathan L. Smith was in charge of this department until February 14, 1942. Mr. H. B. McDonald was in charge until September 12, 1942, at which time Mr. A. E. Ellington took the responsibility of the work until the termination of the contract.

Water Supply and Distribution. Mr. Walter C. Munroe was in charge of this department until July 10, 1942 and Mr. F. D. Kramer was in charge until the termination of the contract.

Sewage Collection and Treatment. Mr. W. C. Munroe was in charge of this department also until July 10, 1942, at which time he was succeeded by Mr. B. E. Beavin who remained in charge until the termination of the contract.

Surveys. Mr. Joseph O. Sime was in charge of this department until July 8, 1942, at which time Mr. B. E. Beavin took charge until the termination of the contract.

Record Mapping. This department was instituted on June 17, 1942. Mr. B. E. Beavin was in charge of this department until the termination of the contract.

A-4. Personnel. Due to the sparsely settled area in which the project is located, extreme shortage of housing and transportation facilities and to the large amount of war-time construction already underway, it was with great difficulty that competent employees were persuaded to remain at the site of the work, in sufficient numbers to expedite the work. Various sources of supply were utilized. Many engineers applied for work at the local offices. The majority so applying had had very little professional experience, although some very good men were secured from this source. The Baltimore and Durham offices of the firm procured a number of employees and advertisements were placed with engineering employment services, the Engineering News-Record, employment and technical publications in New York, Baltimore, Durham, Chicago, and Philadelphia. In addition, representatives of the company visited Washington, Baltimore, Philadelphia and New York interviewing applicants and hiring the most promising ones. In spite of all the handicaps, a compact, well-balanced, and qualified organization was built up rapidly and was ready at any time to furnish the services required by the Officer in Charge. A tabulation of the number of employees appearing at monthly intervals is given below:

Date	Number of Employees
April 19, 1941	4
May 1, 1941	60
June 1, 1941	213
July 1, 1941	229
August 1, 1941	231
September 1, 1941	195
October 1, 1941	194
November 1, 1941	188
December 1, 1941	185
January 1, 1942	200
February 1, 1942	225
March 1, 1942	263
April 1, 1942	255
May 1, 1942	245
June 1, 1942	201
July 1, 1942	164
August 1, 1942	134
September 30, 1942	82

A-5. Office Procedure. In order to remove matters of detail from the Project Manager, a rather complete filing system was installed which is outlined below:

A-5.01. The regular filing systems consisted of three (3) complete files: Correspondence file, Topic file, and Reading file. These files covered copies of all correspondence and communications written by the entire organization of the Carr and J. E. Greiner Company, as well as copies of all written correspondence from the Navy Department and certain other outside organizations.

(a) The Correspondence File was a complete file of all correspondence filed chronologically, according to the Addressee of the letter. Certain deviations follow:

1. Letters to and from the Navy were filed chronologically in the same folder with transmittal letters to Department Heads attached to the original letters from the Navy.

2. Routine letters such as Survey reports, personnel additions and reductions, etc. were filed in individual folders.

3. Advertisements, letters to employment agencies, other organizations, etc. regarding future employees were filed together in the same folder (Applications General).

The correspondence file copy of the diary was filed separately in loose-leaf notebooks, which books remained in the possession of the Project Manager. Copies of all letters pertaining to any individual member of the organization or any former member of the organization were filed in the personnel files. (Explained in Sec. 5.02, Paragraph a.)

The correspondence file was routed daily through the Project Manager's office where each letter was read and reviewed.

(b) The Topic File was a complete file, arranged as its name implies, according to topics. All letters written about or in regard to a definite project were filed under that project number. Letters that had no definite project number or referred to no certain project were filed in accordance with a special file list. Each project folder of the topic file carried an index at the front in the form of a brief description, which index was kept up to date periodically, approximately once or twice a month. The topic file copy of the diary was filed separately in loose-leaf folders according to the department in which it originated.

(c) The Reading File was a complete file, arranged in daily chronological order in the same folder, and grouped according to the Addressor of the letter. The reading file diary was arranged exactly as the regular file but was placed in a separate folder. Copies of all telegrams in the reading file were placed together in an individual folder. At monthly intervals, these telegrams were checked against the invoice from the telegraph company and were turned over to the Accounting Department along with invoice for payment.

The above files enabled one to find any correspondence by either of the following methods; (1) Whom the letter was addressed to (Addressee); The subject of the letter (Topic); (3) Whom the letter was from (Addressor).

The Topic and Reading files were filed daily, thus being kept up to date. The Correspondence file was usually delayed one or two days while it was being reviewed and diary notes recorded.

A-5.02. In addition to the three (3) regular files, certain other files were maintained as follows: Specification file, Weekly Status of Plans and Specifications file, Personnel file, Application file, Estimate file, Advance Planning and Follow-up File.

(a) The Specification File consisted of one copy of each specification with addenda issued by the Carr and J. E. Greiner Company. These specifications were filed according to project numbers, with the main specifications on top and other specifications and addenda following. An index sheet was kept in the front of each folder with the specifications and addenda listed in the order in which they were issued.

(b) The Weekly Status of Plans and Specifications File consisted of weekly schedules of working drawings including revisions and specifications including addenda, which schedules were prepared by the Office Engineer.

(c) The Personnel Files consisted of a complete and separate folder for each employee. In these folders was a copy of each person's experience record and a copy of each letter to, from or pertaining to the individual employee. These copies of letters regarding employee were taken from the correspondence file and were not found in the regular correspondence file, but in the employee's personal folder. At the termination of an employee's services, his personnel file was placed in a separate portion of the file and marked "Closed".

(d) The Application File consisted of applications for employment with this organization. These applications were filed according to the department in which the applicant was applying for work, such as Architectural, Structural, Mechanical, Survey, etc. A complete index of these files, listing applicants with their addresses and date of application, was kept separately for each specific branch of work. A form letter along with other correspondence to the applicant were filed in the application file unless the person was employed, then, the employee's application together with all correspondence pertaining to him was withdrawn and placed in a separate folder in the Personnel Active file. An employment questionnaire was used to inquire as to an employee's references and qualifications regarding former employment. These questionnaires, when returned, were also filed in the Personnel folders.

(e) The Estimate File consisted of a copy of all estimates filed in loose-leaf binders according to project numbers. In the event that the estimate pertained to no particular project and there was no project number, the estimate was placed in a folder in the Topic File marked "Estimates General". These copies were in addition to the three file copies and were used for quick reference.

(f) The Advance Planning and Design Data File consisted of copies of letters from the Navy Department requesting preliminary sketches estimates, working drawings, etc. and forwarding copies of drawings and reference material to be used in the preparation of these requirements. This file was arranged according to project numbers. General letters, not pertaining to a particular project were filed in a miscellaneous or general folder.

(g) The Follow-up File consisted of copies of letters from Navy Department requesting preliminary sketches, estimates, working drawings, etc. and transmitting copies of drawings and reference material to be used in the preparation of these requirements. These letters were used to follow-up and expedite the requirements requested and also to ascertain the return of all reference material. Each of these letters was indexed, according to date, in a loose-leaf folder, in order to facilitate follow-up procedure. Copies of these letters were retained in a notebook until the required work had been performed, or the reference material had been returned. Then, they were placed in the follow-up files to no definite project number, being placed in folders of miscellaneous nature. (The advance planning file was duplicated in the follow-up file).

A-5.03 Miscellaneous. Passes, Personnel Charts, Deferments, Distribution of Correspondence and Mail.

(a) Passes were obtained from the Navy Department to permit the entrance of friends and relatives of employees into the reservation. The permanent passes were issued in the form of a pass which might be used indefinitely or until notice of expiration. Temporary passes were issued in the form of a letter requesting that instructions be given the Sentry to permit entrance of the person or persons. A record was kept of all permanent passes issued, which record included name of person, relationship to the employee, pass number, and expiration date, if such was designated. The return of those passes which were issued for a given

length of time or those which were in the possession of persons who left our employ was requested so that each pass might be accounted for.

(b) Personnel Charts. A personnel chart with each employee's name under the department to which he was assigned was retained in the Project Manager's office. When an employee was transferred from one department to another or an addition or reduction was made in the organization, the change was indicated immediately so that the chart might be kept up to date at all times. At frequent intervals a total was made of the number of employees in each department, as well as a grand total of the entire personnel. These totals were also posted in the Project Manager's office. At intervals of approximately two weeks, a typewritten list was made up of the personnel as it stood at that time. This list was in alphabetical order, with the employee's name, together with the department to which he was assigned.

(c) Deferments. Copies of letters requesting deferment from selective service were filed according to the regular schedule with the exception of the Correspondence copy. This copy was placed in the employee's personal folder. Also, letters from Draft Boards designating classifications, deferment expiration dates, etc. were filed in the personal folders. For quick reference an index was kept of each employee's deferment status.

(d) Distribution of Correspondence and Mail. All outgoing and inter-office correspondence, with all copies attached, was directed to the Project Manager's office. The outgoing correspondence was reviewed, routed, and delivered or stamped and mailed. The inter-office correspondence was routed and delivered to the various departments. Three copies were detached and retained in this office for our files. Letters originating in this office were routed and distributed in the same manner. Mail for the entire organization was picked up twice a day and delivered to this office. From here it was distributed to the individual departments. All outgoing mail was received in this office and placed in the Post Office immediately before each mail left.

A-6. Administration of Project. The organization had no connection with construction work and was limited to fundamental data, typical plans, information and directives from the Officer in Charge. Preliminary surveys and topographic maps were provided by the Survey Department.

The administration of the project thus became a problem of maintaining an organization qualified to produce plans and specifications for the various projects which were authorized from time to time. The Project Manager was prepared to conduct the preliminary conferences and to assign various parts of the work to appropriate departments. Much of the work was handled in this fashion although in many instances during the first year, department heads and individual draftsmen, designers, and specification writers were given their instructions directly by the Officer in Charge or his representatives.

All matters concerning salary were submitted to the Officer in Charge for approval.

Most of the drafting, computing, and office equipment and furniture were secured through the Officer in Charge.

The relations with the Contractors, Contract NOy-4750, and with the Liaison Officer, U. S. Marine Corps, and his staff were most cordial and every courtesy was extended us by these groups.

We feel that the Contractor carried out a very successful scheme for the construction of the project. Railroad and access roads were installed at the earliest possible moment to insure easy and economical access of material and men to all parts of the job. Water and sewer line construction was pushed through in order that building construction could be carried on without being hampered by the presence of numerous and deep excavations. The buildings as constructed have a very pleasing appearance and are a credit to the U. S. Marine Corps.

The Project Manager relied upon the several department heads and exercised general supervision over their work without interfering in the routine technical work for which they were well fitted as specialists in their respective lines. Appropriate standards of design were followed. In some cases, design assumptions, loads, and stresses were made the subject of directives rather than being arrived at by independent investigation on the part of this company.

The approval of shop drawings constituted an important part of the work although many of the drawings were handled directly by the Officer in Charge.

The Project Manager participated in the discussions leading up to the preparation of site plans and used these plans as a guide for coordinating the work of the various departments concerned with outside utilities.

Generally speaking, the architectural floor plans were used as a basis for coordinating the work of the departments interested in mechanical and electrical installations within the buildings. Most of the detailed coordination was accomplished by direct contact between the several departments with the Project Manager helping to perfect such cooperation.

The progress of the work was checked carefully at all times and continual effort made to obtain necessary design data and to expedite the work by issuing plans and specifications according to priorities set up by the Officer in Charge and according to needs reported at progress meetings. The Contractor always had a back-log of work for which the plans and specifications were ready.

A-7. Narrative. In order that a clear picture may be had of the time involved from the conception of the project to the termination of Carr & J. E. Greiner Company's contract, a brief outline, arranged in chronological order, is given below:

February 21, 1941 — The United States Marine Board convened to begin study of the proposed base.

February 24, 1941	The Major General Commandant outlined for the U.S. Marine Board the activities to be conducted and the units to be housed at the new Marine Base.
April 10, 1941	U. S. Marine Board submitted report for the establishment of the Marine Base.
April 14, 1941	The Major General Commandant approved the report of the board subject to certain comments.
April 15, 1941	Architect-Engineers' contract executed.
April 18, 1941	Parties began topographic surveys of Tent Camp Area.
April 21, 1941	Contract NOy-4750 was signed for the construction of the project.
April 30, 1941	Construction started on Tent Camp No. 1.
May 15, 1941	First preliminary site plan of Division Training Area prepared.
May 22, 1941	Received from Navy Department a list of buildings required in the Division Training Area.
May 26, 1941	Plans for hospital at Hadnot Point requested by the Officer in Charge.
May 26, 1941	Preliminary plans for barracks building submitted to the Officer in Charge for approval.
June 6, 1941	Received from the Officer in Charge an authorized list of buildings to be located in the Division Training Area.
June 13, 1941	First preliminary site plan for Hadnot Point hospital submitted.
June 18, 1941	Received directive to proceed with detail design of main buildings in Division Training Area.
June 2, 1941	Directed to proceed with design of a 200-bed hospital for Division Training Area.
July 11, 1941	Directed to prepare preliminary maps for housing project between Northeast Creek and Piney Green on northerly side of North Carolina State Highway # 24.
July 21, 1941	Preliminary site plan for housing project approved.
July 31, 1941	Industrial and Supply Area site plan approved.
August 1, 1941	Started re-study of housing project site plans to provide for 700 houses instead of 1200 as originally requested.

August 5, 1941	Site plan for entire Division Training Area was approved.
August 7, 1941	Preliminary site plan submitted for Amphibian Base.
September 3, 1941	Officers' Quarters site plan approved.
September 24, 1941	Site plan of housing project as approved by Federal Works Agency signed by Officer in Charge.
October 24, 1941	Hospital site plan approved.
November 2, 1941	Notified by Officer in Charge that hospital will be designed for 700 beds.
November 5, 1941	Bachelor Officers' Quarters site plan approved.
November 11, 1941	New site plan for hospital approved.
December 8, 1941	Directed to prepare plans for Tent Camp No. 2.
December 9, 1941	Site for Rifle Range near Dixon approved.
December 16, 1941	Regimental Area No. 5 site plan approved.
December 16, 1941	Landing Field site plan approved.
December 21, 1941	Tent Camp No. 2 site plan approved.
January 3, 1942	Parachute Training Area site plan approved.
January 9, 1942	Directed to prepare site plan for a magazine area.
January 13, 1942	Rifle Range site plan approved.
January 30, 1942	Hospital Area site plan approved.
February 15, 1942	First Balloon Barrage Area site plan approved.
March 2, 1942	Amphibian Base site plan approved.
March 10, 1942	Magazine Area site plan approved.
April 20, 1942	Mumford Point Tent Camp site plan approved.
April 24, 1942	Directed to prepare plans for Boat Basin in Wallace Creek.
May 27, 1942	Seaplane Base site plan approved.
June 19, 1942	Notified to proceed with utility plans for Parachute Training Area.
June 22, 1942	Separate department set up for record drawings.

July 10, 1942	W. C. Munroe succeeded W. C. Roberts as project manager for Carr and J. E. Greiner Company.
July 20, 1942	Boat Basin site plan approved.
July 28, 1942	Directed to proceed with detail plans for Glider Base facilities at Landing Field.
August 5, 1942	Lieutenant Commander R. A. Williams succeeded Lt. Commander M. Nichols as Officer-in-Charge.
September 30, 1942	Carr and J. E. Greiner Company contract terminated.

CHAPTER B - PART II

OFFICE ENGINEER

B-1. General. For the majority of the work, the standards of design, types of construction, and the fundamental data were controlled by Standard Navy Specifications, cost estimates, directives from the Officer in Charge, directives from other governmental bureaus, and towards the latter stages of the work, by availability of materials.

The work done by this office consisted of;

(a) Coordinating and expediting the efforts of the individual departments towards the common goal of issuing working drawings and specifications at the proper intervals so that the construction forces would not be delayed and that materials could be purchased well in advance of their installation.

(b) The arrangement and charge of drawing and specification numbering systems and the filing of the drawings and specifications for all departments.

(c) The routing of all shop drawings to the various departments and expediting their approval.

(d) Maintaining adequate blue printing and mimeographing departments.

(e) Securing information for all departments to aid them plan their respective work.

(f) Making recommendations for types of foundations for various structures.

(g) The preparation of a weekly index, mimeographed in pamphlet form, of all plans, revisions to plans, specifications and addenda to specifications, that had been issued to date for the Navy and Contractors' use.

(h) Handling many of the matters pertaining to personnel difficulties after their employment, and

(i) Maintaining janitor service.

B-2. Drawing and Specification Numbers.

B-2.01. Drawings; Division Training Area. Drawing numbers were assigned consecutively by departments as follows; 1 to 100, 101 to 199, 1100 to 1199, 2100 to 2199, etc., General and Preliminary.

200 to 299, 1200 to 1299, 2200 to 2299, 3200 to 3299, etc. Roads, Railroads, Walks, Runways, Drainage, and Bridges.

300 to 399, etc., Site Plan.

400 to 499, 1400 to 1499, etc., Sewers and Sewage Disposal.

500 to 599, 1500 to 1599, etc., Water Supply, Storage, Treatment and Distribution.

600 to 699, 1600 to 1699, 2600 to 2699, 3600 to 3699, etc. Mechanical, Heating, Plumbing, Ventilation and Refrigeration.

700 to 799, 1700 to 1799, 2700 to 2799, 3700 to 3799, etc. Electrical and Communications.

800 to 1099, 1800 to 1899, 2800 to 2899, 3800 to 3899, etc. Architectural and Structural.

B-2.02. Drawings: Tent Camps 1 and 2. Drawing numbers were assigned consecutively but were not segregated by Departments and were prefixed by T. C. as follows:

TC 1 to TC 199, Tent Camp No. 1.
TC 200 to TC 499, Tent Camp No. 2.

B-2.03. Drawings: Outlying Tent Camps. Drawing numbers were assigned consecutively and prefixed by letters designating the location, but were not segregated by Departments as follows:

TB 1 to TB 99, Tank Battalion.
CCC 1 to CCC 99, CCC Camp.
MP 1 to MP 99, Mumford Point Tent Camp.

B-2.04. Drawings: Low Cost Housing Development. Drawing numbers were assigned consecutively but were not segregated by Departments and were prefixed by L.C.H. as follows:

LCH 1 to LCH 99, Low Cost Housing.

B-2.05. When a drawing number was assigned to a department, an index card was prepared with the same number, and title of drawing and project number was inserted if known.

When a drawing was issued as evidenced by copy of transmittal letter routed to clerk assigned, entry was made as to date of drawing, date of approval and date of issue.

When a drawing was revised, as evidenced by copy of transmittal letter routed to clerk assigned, entry was made as to revision letter, date of revision and date of issue.

At the time of recording issue of drawings and revisions entry was also made on a weekly check sheet, from which the weekly list of drawings and revisions was prepared.

B-2.05 (Cont'd)

Master sheets were provided for each department, each sheet bearing 100 numbers, with columns provided for recording, after each drawing number, the project number, Y. & D. drawing number, specification number, title of drawing, date of drawing, approval date, issue date, and revision dates and issue. Master sheets were kept posted from the index cards daily. (See P.W. Drawings Nos. 26 to 69 incl., and No. 84).

Linen tracings of each master sheet were brought up to date periodically so that prints could be had as necessary.

B-2.06. Specifications: Specification numbers were assigned consecutively by departments but with no segregation by areas except as follows:

100 to 199, Tent Camp Areas.
200 to 299, Roads, Railroads, Walks, Runways, Drainage, and Bridges.
300 to 399, Site Plan.
400 to 499, Sewers and Sewage Disposal.
500 to 599, Water Supply, Storage, Treatment and Distribution.
600 to 699, Mechanical, Heating, Plumbing, Ventilation, Refrigeration.
700 to 799, Electrical and Communications.
800 to 979, Architectural.
980 to 1000, Miscellaneous.

If Mechanical, Heating, Plumbing, Ventilation, Refrigeration, Electrical Specifications were issued as Sections, the same specification number was used as for the corresponding architectural specification. Table of Contents tabulated the sections by number and title and was kept up to date as sections and addenda were issued.

B-2.07. Specification Number Index: When a specification number was assigned to a department, an index card was prepared with the same number, and title of project and project number was inserted if known.

When a specification was issued, as evidenced by copy of transmittal letter routed to a clerk assigned, entry was made as to date of specification and date of issue.

As additional sections and addenda were anticipated, numbers were assigned and recorded on the index card, and, when issued, dates were recorded the same as for the original specification.

At the time of recording issue of specifications, additional sections and addenda, entry was also made on a weekly check sheet, from which the weekly list of specifications and addenda was prepared.

B-2.08. Weekly List of Drawings and Specifications. Weekly check sheet was compared with similar sheets kept by each department and discrepancies adjusted. Then issue of plans and specifications was posted

to the previous weekly list, dates changed on each page, new projects added as they occurred, and stencils cut for mimeographing a complete new book weekly. When plan and specification issue was reduced to a minimum in the closing stages of the contract, only supplementary lists were prepared weekly, tabulating only the weekly issue of plans and specifications, and complete weekly list was not issued until a final book could be published after all plans and specifications were issued.

B-2.09. Tracings. Tracings were filed in flat, shallow drawers by building name, utility, roads, site plans, preliminary sketches and miscellaneous drawings; files all being located at one central point.

When a tracing was removed from the file an "Out" slip was placed in the drawer, designating the drawing number, project number and title and to whom the drawing was charged.

When a tracing was removed from the file for blue printing, "Out" slip was prepared in duplicate, one (1) placed in the file and one (1) accompanying the tracing or group of tracings as an order for prints to the blue print room.

As tracings were returned, "Out" slips were destroyed.

Some file drawers contained more than one project, in which case folders were provided to separate the project.

Frequent checks were made with the drawing schedule book to be sure all tracings were filed or accounted for.

B-2.10. Y. & D. Numbers. During the progress of the project very few Y. & D. numbers were used. After the rush of the work was over, the tracings were re-grouped by building and utility types and consecutive Yards and Docks numbers assigned, thus it is possible in most cases to find all working drawings pertaining to any one building filed as a group. It is recommended that henceforth all these drawings be filed in numerical order with the Y. & D. numbers. Chapter Q, Part II, furnishes a convenient list of the drawings prepared. P. W. drawings numbers P. W. 26 to P. W. 69, inclusive, and P. W. 84 show the drawings prepared, their Y. & D. numbers, revisions, approval dates, and other pertinent information. A list of specifications prepared is shown in Chapter R, Part II.

B-3. Foundation Recommendations. The soils are very spotty and consist of top soil, peaty soils, silts, sands of various types, clay, mixtures of sand and clay in widely different proportions, and a gumbo-like mud of varying plasticity.

It was assumed that the gumbo-like mud would sustain a load of 500 lbs. per square foot and that the pressures through the over-lying strata would spread on 1/2 to 1 slopes. An allowable soil pressure of 1000 lbs. per square foot was recommended where there was a minimum of 5 ft. of good material over-lying the gumbo. Where this overburden amounted to a minimum of 8 ft. an allowable soil pressure of 2000 lbs. per square foot was recommended; by direction, this was considered a maximum.

B-3. (Cont'd).

To determine the allowable soil bearing, hand auger borings were taken at the site of each building. The size and type of the structure determined the number of borings, which were usually taken to a depth of 12 feet. After visual inspection of the samples, recommendations were made to the Officer in Charge for his approval. The Officer in Charge would satisfy himself as to recommendations made and in cases where agreements could not be reached load bearing tests were taken by the Navy. Field notes covering soil borings are listed in Chapter 0, Part II.

The majority of the structures had spread footing foundations, the allowable soil values of which were determined as noted above. Where the soil conditions did not permit spread footings, piling (timber, composite, and cast-in-place concrete) was used. By direction of the Officer in Charge, an allowable pile load of 20 tons was used for the timber and composite piling, and 40 tons for the cast-in-place concrete piles.

CHAPTER C - PART II

AUDITING DEPARTMENT

C-1. The personnel of the Auditing Department was made up of the following:

1. Chief Auditor
2. Auditor
3. Accountant
4. Cost Clerk
5. Payroll Clerk
6. Stenographer Typist

The Chief Auditor, assisted by the Auditor, supervised the work of this department and hired and supervised all administrative personnel. He arranged for all rental agreements on equipment, purchased all insurance and the more expensive equipment and materials required by the Architect-Engineer.

C-2. In purchasing the equipment and supplies for the company, every endeavor was made to obtain the lowest possible price on equipment and materials. Purchase order, Form #24030 in sextuplicate, was prepared showing the various items and their cost, which was submitted to the Officer in Charge for approval or disapproval. If approved, the original of the purchase order was sent to the vendor on which it was drawn, this serving as an order. When the material was received it was checked and inspected by a Government checker and a Receiving and Inspection Report, Form #26505, was then made up in triplicate.

C-3. Invoices for material purchased, which were required in quadruplicate, were checked upon receipt against the purchase order for price, terms, freight and mathematical accuracy, and then checked against the receiving report for quantity. After checking the invoice in every respect they then were discounted and paid. In paying the invoice, three copies of the invoice together with Form #FC409 were returned to the vendor to be receipted and signed, with a request that they be returned to us immediately. Upon receiving the invoices from the vendor, properly receipted, they were entered on a Transmittal Summary, Form #FC411, and forwarded, together with a copy of the check, purchase order and Receiving and Inspection report to the Navy Project Auditor for audit purposes. Re-imbursements to the Architect - Engineer for proper expenditures were made as follows: Semi-monthly reimbursement request, Form #FC308, was made up in triplicate and forwarded to the Navy Auditor who prepared a Public Voucher, Form #77, and forwarded both documents to the Naval Operating Base for the purpose of a post audit, after which they were sent to Washington for reimbursement.

C-4. All non-expendable material and equipment had to be returned to the government. Therefore an accurate record was kept of each such item. Upon issuance of a purchase order for non-expendable equipment, an Equipment Receiving and Inspection report, Form #FC501, was made up and upon receipt of the equipment in question it was checked and inspected by a government inspector and charged to us accordingly. Each employee using this equipment was charged with the particular piece of equipment so that upon his termination of employment the equipment could be returned to us and the employee credited. Upon termination of our contract all of the non-expendable equipment was inventoried in the presence of a government inspector and returned to the government. Upon the return of this non-expendable equipment to the government the Navy Project Auditor signed the Equipment Receiving and Inspection report showing that the return had been made to the government satisfactorily.

C-5. This department arranged for the rental of the Transits and Levels used in Survey work. This equipment was rented on a monthly basis and purchase orders were made out periodically to cover. Insurance, freight and repairs on rented equipment were paid for by the lessor.

C-6. The Auditing Department handled the Architect-Engineer's payrolls. Before being placed on the payroll, each employee was required to submit proof of citizenship; a complete record of previous employment, which was filed with the current personnel record maintained on the project; and he finger-printed for record and further investigation. Salaries were set in accordance with an approved scale. A time clock was used to record each employee's working time and this was figured on the time card, allowance being made to the one quarter hour. This time was then transferred to the payroll sheets which were prepared in quadruplicate.

C-7. Payrolls were disbursed in the presence of a government witness and individual pay receipts were signed in his presence by each recipient. The receipts contained the following information -

Employee's name
Badge Number
Total number of hours
Rate
Gross amount
Social security tax deduction
Net amount
Signature of employee
Signature of Government Time Checker

Two copies of the payroll were sent to the Navy Project Auditor in whose office the calculation of hours and extensions was audited and checked against the pay receipts. The payroll was broken down by departments in order to show the cost of any given department for that particular payroll period.

C-8. Payroll authorizations were secured in writing from the Officer in Charge and any changes of salary due to promotions or otherwise were also submitted to the Officer in Charge for approval in writing. A further approval from the Officer in Charge was secured in writing for all overtime. The department head or Project Manager was designated to approve this overtime but in accordance with letter from Officer in Charge, individual department heads were relieved from signing the payroll or Public Voucher.

C-9. A personnel chart was maintained by the Project Manager's Office from information furnished by this office. The personnel chart showed the names of each employee by department together with the heads of the respective departments.

C-10. The accounting system used was in accordance with the regulations of the Navy Manual. When invoices were received they were entered in a voucher register, Form #FC402, and distributed in this voucher register to the proper cost accounts. When checks were made in payment of these invoices they were recorded in a check register, U. S. Government Printing Office Form #313416. All cash receipts were entered in a cash receipts register, Form #FC407.

C-11. A very comprehensive cost system was maintained. When payrolls were made out a direct charge was made by this department to the proper project number, which was furnished to us by the Navy Department, and each payroll was supported by a cost break-down showing the amount of money expended by each department for each project worked on during the course of that particular pay period. These cost break-downs were forwarded in duplicate to the Navy Project Auditor when requesting reimbursement. When the final voucher was prepared it was supported by a cost break-down of the entire project cost, together with a statement of cost of overtime, a release signed by the Architect-Engineers, and all other data required by the Bureau of Yards and Docks in connection with the request for final payment.

CHAPTER D PART II

SITE PLANNING

D-1 General Location

D-1.01 This subject has been satisfactorily covered in the report of the U. S. Marine Board, under date of April 10, 1941. (See Chapter C Part 1) This report in a general way limited the areas to be occupied by the proposed activities, and it therefore was the problem of the Carr & J. E. Greiner Company to arrange the various elements of the camp in their proper relation over the terrain selected. The important factors considered in making the selections of the various areas were as follows:

(a) Accessibility of training areas.

(b) Character of the terrain.

Generally speaking, the section is part of the flat Atlantic Coastal Plain, including the following types of land:

1. Open sandy farm land, formerly used for the growing of farm crops peculiar to the section.

2. Timber covered areas, occupied by stands of yellow pines, mixed hardwoods, and heavy undergrowth. Generally speaking, these areas were quite rough, and in many cases, poorly drained.

3. Swamps and sloughs. These areas occurred at frequent intervals along the shore line and presented steep, rough or wet ground totally unsuited for building sites or for other post purposes.

(c) Proximity to New River. Every effort was made to keep the various housing units of the post as near to the water as possible. By so doing we were able to secure the full value of pleasant aspects, cool prevailing breezes, and comparative freedom from mosquitoes.

(d) Location of combat area, impact area, and rifle range. By locating the housing and barracks areas along the river bank, the rough, wet and otherwise unsuitable areas were left in the rear to be used for the various training purposes given above and other functions to be described subsequently.

(e) Economy in road and utility installation.

(f) Foundation Conditions. These conditions are discussed in Part II, Chapter B.

D-2. Preliminary Plans

D-2.01 The general preliminary studies were based on all of the above factors, plus certain directives given by the Officials in charge. Perhaps the most important of these was the one asking for a plan to embody eight (8) regimental areas, with the proper planning to increase these to sixteen (16) areas in the future. Such planning obviously required large areas, and necessitated, in the early studies, the introduction of a second tier of regimental areas abutting the tier along the river edge. Later the number of areas was reduced to five (5), and these were incorporated in the final plan. Another factor influencing the size of the regimental area, and therefore the total amount of land occupied, was the spacing between buildings, and the relation of the three (3) battalions within each regimental area. In all, a total of eleven (11) general preliminary studies was made, involving various spacings, locations, and patterns before a final selection was made. This selection was made at a conference attended by General Williams, Captain Cotter, Commander Madison Nichols and Officials of the Carr and J. E. Greiner Company. This plan is entitled "Site Development Plan No. 11", M.B. Drawing No. 26, Y & D Drawing No. 162061, and was signed by the Resident Officer on August 5, 1941. Briefly, this plan provided for five (5) Regimental Areas arranged along the edge of New River, and symmetrically arranged as far as the limiting factors of terrain, economy of construction, and other factors would permit. The areas were limited on the south by the River Road, on the north by the Service Road, and on the east and west by company streets. Certain large areas of included land were not used for the reasons cited above. The suggestion is made that such areas be carefully improved and protected for purposes of recreation. They will in most cases make attractive small parks. Suggestions for improving these areas may be found on page 9, of Specification No. 301, under the heading of "Woodland Improvement". Perhaps the most interesting of these parks is the one along the river edge and limited by the River Road. No buildings encroach on this area except Division Headquarters.

D-3. Final Site Plans

D-3.01 Regimental Areas. Five regimental areas have been developed bounded on the north by Main Service Road, on the south by River Road, and the east by "O" Street, and on the west by Cross Street. The Main Access Road (Holcomb Blvd.) bisects Area No. 3, and is terminated by the Division Headquarters Building, which stands as an accent feature in a commanding position. Each Regimental Area includes the following buildings:

12 Barracks
3 Mess Halls
12 Battalion Warehouses
1 Regimental Headquarters
3 Battalion Headquarters
1 Post Exchange
1 Regimental Infirmary
1 Regimental Theater
1 Regimental Service Club

D-3.02 Post Troops This group of buildings is centrally located at the corner of Holcomb Blvd. and Service Road. This location offers the greatest economy in the installation of utilities and in the convenience of administration. The Post Headquarters Building stands as an imposing structure at the traffic circle.

D-3.03 Naval Hospital. Hadnot Point was the logical location for this imposing group of buildings. It is centrally located, yet privacy and quiet are provided, together with beautiful surroundings. It is well located to secure the greatest degree of relief from summer heat and to take advantage of the aesthetic qualities of beautiful woodlands and water views.

D-3.04 Industrial and Supply Area. After much study this area was located on the east side of the Holcomb Blvd., approximately 3500 feet northeast of the Regimental Areas. In this position the functions of the area can be carried on with a minimum of annoyance to the troops housed near by. An area 450 feet wide has been reserved as a park between the Industrial and Supply Area and Holcomb Blvd. The natural tree growth on this land should be carefully preserved. This growth together with new plantings will afford a screen to partly hide the buildings and activities in the Industrial and Supply Area. In the Area are located warehouses, shops, laundry, bakery, storage buildings, central heating plant, gas and oil stations, and propane gas stations all carefully placed with respect to railroad, roads, and each other.

D-3.05 Residential Area. Homes for commissioned officers have been located at Paradise Point along the edge of New River. In this location the homes are accessible to all activities by way of the River Road which crosses Wallace Creek. At this location the officers and their families may enjoy privacy, beautiful river scenery, sandy beaches, and the comfort of prevailing south west breezes. A pleasing landscape effect has been secured by basing the lots on a winding river road located at varying distances from the water-edge. A modified system of the rectangular lot pattern has been developed with pleasing effect. Where rough or wet ground has been encountered, these areas have not been used, but have been reserved as small interesting parks. An outstanding feature of the Officers Homes Area is the location and treatment of the Bachelor Officers' Quarters. Twelve buildings constitute this group. They lie mostly between the River Road and the edge of New River. The spot selected is separated from the other officers homes by a deep wooded valley. This gives a desired privacy to both groups. The Officers Mess and Club has been placed as the central feature of the group. This arrangement provides convenience, economy of installation, and attractiveness. Along the northeast edge of the Area, quarters were provided for servants, while along the westerly edge, but somewhat separated from the group, a guest house was located to accomodate ten to twelve guests.

D-3.06 Other Housing (Warrant Officers and Civilian Employees) Building sites have been provided for additional homes along River Drive at points well removed from the Commissioned Officers Area. Such sites are well suited for Warrant Officers' homes or for civilian employees, as the proper authorities may elect.

A large area has been allocated for Low Cost Defense homes along Route #24 near the main entrance and between Northeast Creek and Piney Green. Provision has been made for 346 single family units and 177 double family units. This site plan has been developed on the curvilinear pattern, which provides for groups of homes arranged around small interior parks. A central area has been provided for certain public buildings such as a church, school, and community building. A central playground has also been provided. The final plan was the outgrowth of about three weeks of study, in which several studies were made showing various arrangements of the elements involved. A trip to Washington was necessary in order that the plans might be placed before the proper reviewing authorities.

D-3.07 Parade Ground. The site selected for the parade ground lies between the Industrial and Supply Area and the Main Service Road. It runs easterly from the Holcomb Blvd. a distance of approximately 3500 feet. This parcel of ground is now lightly wooded, and only a small amount of grading will be required. The cost of conversion will therefore be held at a minimum.

D-3.08 Tent Camp Areas. The location and general arrangement of the Tent Camp was the first site planning problem to be solved. After careful field study, a site was selected on Route #17 about two miles southwest of Jacksonville. After consultation with all departments, a camp to house about 6,000 troops was laid out on the rectangular pattern. This plan was approved on May 3, 1941. Later in the year the camp was doubled, with possible extension to a capacity of 16,000. This second Tent Camp Site Plan was signed by the Officer in Charge on December 21, 1941.

D-3.09 Rifle Range. This area was located on the easterly side of New River near Stone Bay, and is well removed from all other areas and operations. Three 50-target rifle ranges, with firing lines at 200 yards, 300 yards, 500 yards and 600 yards; 1 pistol range and a future machine gun range have been provided. On the basis of six weeks being required to train a regiment on a range of this size and that the target season is only 7 months, every man in the Division Training Area should be able to shoot at least once a year. A tunnel from the butts to the 200-yard and 300-yard firing lines was provided for direct communication between these lines and the target operators. Housing and other incidental buildings were provided to accomodate one battalion while in training.

D-3.10 Balloon Barrage Battalion and Amphibian Base Area. This area was located also, in a location remote from all other activities, principally because of the nature of its activities. Located on the East side on New River, at Courthouse Bay, it is approximately 5 miles from the nearest activities at the Rifle Range and the Division Training Area, and 9 1/2 miles from other air activities at the Glider Training Base.

The area consists of three principal sections: (1) a residential and housing section, (2) a balloon barrage school section, and (3) an amphibian base. The residential and housing section was located on the river front at what was formerly the village of Marines. This section commands a pleasing view of the river and enjoys the prevailing southwest winds in the summer. The school section was located approximately 1800

feet northeast of the residential and housing section, and along Marines Road, the Access Road to the balloon barrage section of this area. The amphibian base was located on the northwest shore of Courthouse Bay just off of New River. Provisions have been made for storage, repair, and servicing of amphibious units. An entrance channel, eight feet deep and one hundred and twenty feet wide was provided from the existing navigation channel in New River to an eight foot deep basin in front of the base. Courthouse Bay, which is a naturally land locked estuary, therefore, was transferred into a well protected harbor.

D-3.11 Parachute Training Area. This area is located along the west side of Holcomb Blvd. near the Industrial and Supply Area and about a mile northeast of the Division Training Area. Generally speaking, the area is astride the ridge between Bearhead Creek and Beaverdam Creek. Adequate area for expansion and activities has been provided by this location without encroaching upon space for future expansion of the Division Training Area. Being in the vicinity of the Division Training Area, housing for this area is at present provided by the Division Training Area. However, space has been allocated for the housing of an entire battalion at this location. The area was originally designed for a captive tower, a free drop tower, a parachute building and a parachute training building. Later, another free drop tower was added. The free drop towers are provided with a cleared and graded landing field of 600 foot radius all around the tower.

D-3.12 Glider Training Base. This area was originally laid out as an air field in connection with the training of parachute troops. Later buildings with facilities for glider training were added. It is located about one and a half miles southeast of Tent Camp No. 2 and on the west side of New River across from the Residential Area. This location was chosen because the terrain was sparsely wooded, fairly level and was accessible to other activities.

As of October 1, 1942, the following were provided:

1. Two 5000-feet long runways, 150 feet wide, north - south and northeast - southwest.

2. Future northwest - southeast runway.

3. 2700-foot x 3600-foot parachute landing field.

4. Glider Training facilities.

5. Taxiway and ramp for seaplanes.

Minimum side clearance of 500 feet each side of center line and end clearance of 1000 feet were provided for each runway. At extreme edges of end cleared areas, the clearance width was increased to 650 feet each side of runway center line produced.

D-3.13 Magazine Area. Location of this area is naturally remote from all other operations. The closest area is the Division Training Area, which is almost 2 miles away. A very densely wooded section on the Snead's

Ferry Road was selected as the site. It is bounded on the west by French Creek, on the north by Cowhead Creek and on the south by Jumping Run Creek.

Six small arms magazines were provided with a minimum clear distance between them and from the Snead's Ferry Road of 300 feet. Nine fuse and detonator magazines were provided with clear distances of 200 feet. The fixed ammunition magazines were located as far from Snead's Ferry Road as possible. Clear distances between buildings were held to a minimum of 400 feet. A complete system of roads connects all the buildings.

D-3.14 Mumford Point Tent Camp. This site was originally a small tent camp for housing Post Troops. After these troops moved into the Division Training Area, it was decided to expand the camp to house 1500 men, and to use the area for the training of colored marines. The original area was rearranged to suit layout of "Homasote" type of buildings and a new area was added about three times the size of the original one. Location is on the northerly side of Northeast Creek about two miles from Jacksonville.

D-3.15 Other smaller sites that were all laid out in a rectangular pattern were: (1) Peterfield Point Tent Camp, (2) Tank Battalion Tent Camp on U. S. Highway #17 about 3 1/2 miles south of Jacksonville, (3) C.C.C. Camp on north side of Northeast Creek, (4) White Cemetery on North Carolina State Highway #24 at Mumford Point Landing Road, and (5) a colored cemetery on U. S. Highway #17 about seven miles south of Jacksonville.

D-4 Recreation

D-4.01 Because of the isolation of this station, it has been thought proper to pay more than the usual attention to this matter. Space has therefore been provided for every reasonable field sport such as football, baseball, track, tennis, basket-ball, etc., for both Officers and men. A large central athletic field has been set aside north of Service Road, and east of "K" Street. In addition smaller local fields have been set aside, distributed more or less uniformly over the area. These fields are specifically shown on the Landscape Development Plans.

D-5 Landscape Treatment

D-5.01 The value of tree and shrub growth on the area has been an influencing factor throughout the site planning. Our purpose has been to preserve the native growth not only for the aesthetic qualities, but for the comfort to be offorded by their presence. Trees, shrubs, and smaller plant growth tend to minimize the blowing of sand, to reduce summer temperatures, and to retain ground moisture. A specification has therefore been prepared (No. 301, dated February 1942) outlining proper ways and means to preserve and improve the existing growth, and to add trees and shrubs where the need is obvious. A set of landscape planting plans has been prepared to accompany this specification. Both plans and specification were turned over to the Officer in Charge under date of May 20, 1942. These plans were modified later by the Contractors.

D-6 Summary

D-6.01 To describe briefly the magnitude of the site planning work,

it was necessary to prepare site plans for 17 different locations, including two cemeteries, and involving 74 barracks, 28 Mess Halls, 174 Warehouses, 10 Infirmaries, 10 post exchanges, 11 Theaters, 19 Battalion Headquarters, 196 Officers Quarters, 523 Low Cost Defense Houses, and other miscellaneous buildings. In all there were 1431 buildings that had to be located and on which floor elevations had to be set. A complete schedule of buildings according to areas is shown in Part II, Chapter E, Section E-18 and according to type of buildings in Part II, Chapter E, Section E-19.

In all 100 site plans (See Table D-6.02), and 22 landscaping plans were prepared. 17 of these plans were for the Division Training Area and five were for the Naval Hospital Area.

TOTAL SITE DRAWINGS PREPARED

Table D-6.02

AREA	No. of Appr'd. Plans	No. of Prelim. Plans	Total Plans Prepared
Division Training, Including Post Troops	18	14	32
Industrial & Supply	2	5	7
Naval Hospital	5	1	6
Residential	10	11	21
Rifle Range	4	1	5
Balloon Barrage & Amphibian Base	5	0	5
Parachute Training	3	0	3
Glider Training Base	2	0	2
Tent Camps Nos.1 & 2	4	0	4
Mumford Pt. Camp No. 1	2	1	3
Poterfield Pt. Tent Camp	1	0	1
Tank Battalion Tent Camp	1	0	1
Midway Park Residential	3	0	3
C. C. C. Camp	1	0	1
White Cemetery	2	0	2
Colored Cemetery	1	0	1
Magazine	3	0	3
Totals:	67	33	100

CHAPTER E PART II

ARCHITECTURAL DEPARTMENT

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E-18	Schedule of Buildings by Areas
E-19	Schedule of Buildings by Type

E-1. Introduction

The Architectural Department under the direction of Charles W. Goudy, Jr., Chief Architect and Joseph D. Rivers, Principal Assistant, designed all buildings at the Marine Barracks, New River, North Carolina.

The buildings are of Modified Early American Colonial Architecture and designed in keeping with the Government plan for conservation of strategic materials.

The Marine Barracks, New River, North Carolina, in general, includes the areas listed in the table of contents on the preceding page.

The following report describes the buildings as designed and does not take into account unreported field changes.

E-2. Division Training Area

E-2.01 Location. The area is located on the east bank of New River near the center of the reservation and is composed of five (5) Regimental Areas, each include the following number and type of buildings:

12 Barracks Buildings
3 Mess Halls
12 Battalion Warehouses
1 Regimental Infirmary
1 Post Exchange
1 Regimental Theater
3 Battalion Headquarters Buildings
1 Regimental Headquarters Building
1 Regimental Service Club

Additional utility buildings are covered in the chapters on the various utilities.

E-2.02 Barracks Buildings: Two story H shape building

Ground Area Covered	145' x 157
First Floor Area	11056 sq. ft.
Second Floor Area	11056 sq. ft.
Total Floor Area	22,112 sq. ft.
Cubic Contents	318,546 cu. ft.

Design data as follows:

First Floor:

Dormitories (2)	7964 sq. ft.
Bed Rooms (2)	272 sq. ft.
Shower Rooms (2)	394 sq. ft.
Drying Rooms (2)	256 sq. ft.
Wash Rooms (2)	384 sq. ft.
Toilet Rooms (2)	384 sq. ft.
Connecting Bath	72 sq. ft.

Storage Rooms	130 sq. ft.
Closets	12 sq. ft.
Stairs and Corridors	975 sq. ft.

Second Floor:

Dormitories (2)	7964 sq. ft.
Bed Rooms (2)	272 sq. ft.
Shower Rooms (2)	394 sq. ft.
Drying Rooms (2)	256 sq. ft.
Wash Rooms (2)	384 sq. ft.
Toilet Rooms (2)	384 sq. ft.
Connecting Bath	72 sq. ft.
Storage Rooms	226 sq. ft.
Closets	12 sq. ft.
Stairs and Corridors	879 sq. ft.

Toilets and Wash Rooms:

First Floor:

Shower Rooms (2) 6 showers (each)
Wash Rooms (2) 12 lavatories (each)
Toilets (2) 6 urinals, 5 water closets, 1 service sink (each)
Connecting Bath 2 water closets, 2 lavatories, 1 shower

Second Floor:

Shower Rooms (2) 6 showers (each)
Wash Rooms (2) 12 lavatories (each)
Toilets (2) 6 urinals, 5 water closets, 1 service sink (each)
Connecting Bath 2 water closets, 2 lavatories, 1 shower

Each Dormitory: 58 Beds single deck
Each Building: 232 men single deck
Each Bed: 69 square feet of floor
Each shower head: 10 men
Each Urinal: 10 men
Each Water Closet: 12 men
Each Lavatory: 5 men

General Construction:

Strip steel frame; concrete floor slabs on fill or supported; 4" brick veneer walls.

Foundations:

Either plain or reinforced concrete spread footings or piles. Soil pressures 1000 to 2000 lbs. per square foot. Pile capacity 15 tons each.

E-2.02 BARRACKS

E-2.03 MESS HALL

Finishes:

Cement floors, plaster walls and ceilings, steel windows and asbestos shingle roof.

Design Loads:

Roof - Liveload 20 pounds per square foot
First and Second Floors - Liveload 75 lbs. per sq. ft.
Wind - 30 pounds per square foot

E-2.03 Mess Halls: One story, irregular "T" shape

Ground Area Covered	167' x 267'
Floor Area	22,065 sq. ft.
Cubic Contents	484,532 cu. ft.

Design data as follows:

Mess Hall seating 912 men or 14.8 sq.ft. per man	13,143 sq. ft.
Galley	3450 sq. ft.
Scullery	504 sq. ft.
Storage	903 sq. ft.
Refrigerator Room	504 sq. ft.
Preparation Rooms	684 sq. ft.
Machinery Room	380 sq. ft.
Garbage	288 sq. ft.
Cooks Quarters	690 sq. ft.
Toilet Room	132 sq. ft.
Office	96 sq. ft.
Gear Room	60 sq. ft.
Corridors	780 sq. ft.

Toilets: 2 water closets, 2 showers, 3 lavatories

General Construction:

Structural steel frame with strip steel secondary framing; concrete floor slab or fill; 4" brick veneer walls

Foundations:

Spread footings
Soil pressures 700 to 2000 pounds per square foot

Finishes:

Cement floors, plaster walls and ceilings, steel sash, asbestos shingle roof.

Design Loads:

Roof - Liveload 20 lbs. per sq. ft.
Wind - 30 lbs. per sq. ft.

E-2.04. Battalion Warehouses: One story, rectangular shape

Ground Area Covered	33' x 113'
Floor Area	3526 sq. ft.
Cubic Contents	48,501 cu. ft.
Clear Ceiling Height	9' - 0"

General Construction:

(a) Strip steel frame; 4" brick veneer walls; concrete floor slab on fill
(b) Solid 8" brick bearing walls; strip steel roof trusses; concrete floor slab on fill

Foundations:

Spread footings
Soil pressures 1000 or 2000 lbs. per sq. ft.

Finishes:

Cement floor, steel windows and asbestos shingle roof.

Design Loads:

Roof - Live load 20 pounds per sq. ft.
Wind - 30 lbs. per sq. ft.

E-2.05. Regimental Infirmary: One story, rectangular shape

Ground Area Covered	41' x 111'
Floor Area	3382 sq. ft.
Cubic Contents	57,305 cu. ft.

Design Data as follows:

Entrance Porch	144 sq. ft.
Waiting Rooms and Corridors	630 sq. ft.
Heads (Officers, Men's, Venereal)	260 sq. ft.
Offices	870 sq. ft.
Wards, Dressing Rooms, Diet Kitchen	590 sq. ft.
Gear and Store Room	40 sq. ft.
Main Dressing Room	258 sq. ft.
Lab. Pharmacy, X-Ray, Dark Room	378 sq. ft.
Dental Offices	212 sq. ft.

E-2.04 BATTALION WAREHOUSE

E-2.05

REGIMENTAL INFIRMARY

General Construction:

Strip steel frame; concrete floor slabs on fill or supported; 4" brick veneer walls

Foundations:

Spread footings
Soil pressures 1000 or 2000 lbs. per sq. ft.

Finishes:

Cement, tile and linoleum floors, plaster walls and ceilings, steel windows and asbestos shingle roof.

Design Loads:

Roof - Live load 20 pounds per square foot
First Floor - Live load 75 lbs. per sq. ft.
Wind - 30 lbs. per sq. ft.

E-2.06. Post Exchange: One story, rectangular shape

Ground Area Covered	45' x 107'
Floor Area	3322 sq. ft.
Cubic Contents	47,841 cu. ft.

Design data as follows:

Porches and stoop	204 sq. ft.
Vestibule	122 sq. ft.
Sales Space	1867 sq. ft.
Barber Shop (8 chairs)	521 sq. ft.
Toilet	115 sq. ft.
Storage	157 sq. ft.
Office	131 sq. ft.
Tailors and Cobblers Shop Receiving Room	96 sq. ft.

Toilet: 3 water closets, 3 urinals, 3 lavatories

General Construction:

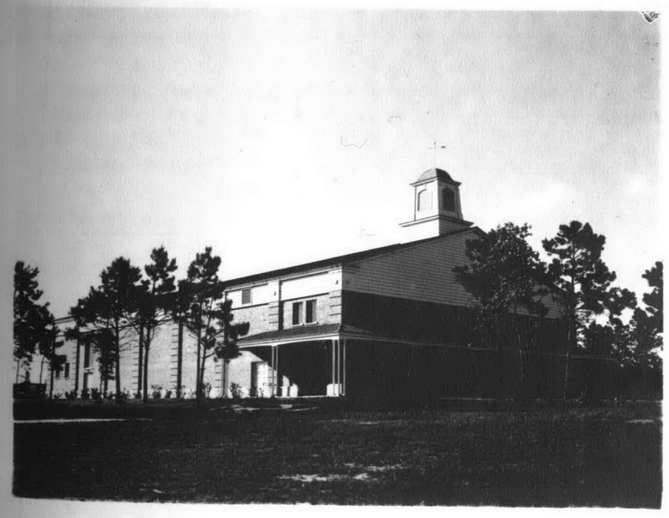
Strip steel frame; concrete floor slabs on fill; 4" brick veneer walls.

Foundations:

Spread footings
Soil pressures 1000 to 2000 lbs. per sq. ft.

E-2.06

POST EXCHANGE



E-2.07

REGIMENTAL THEATER

Finishes:

Cement floors, plaster walls and ceiling steel windows and asbestos shingle roof.

Design Loads

Roof - Live load 20 lbs. per sq. ft.
Wind - 30 lbs. per sq. ft.

E-2.07 Regimental Theater: One story, rectangular shape building with mezzanine across front.

Ground Floor Area	78' x 138'
Seating Capacity	1000 seats
First Floor Area	10,205 sq. ft.
Mezzanine Area	1560 sq. ft.
Total Area	11,765 sq. ft.
Cubic Contents	346,106 cu. ft.

Design data as follows:

Auditorium	7059 sq. ft.
Stage	1365 sq. ft.
Stage Dressing Rooms and Toilets	547 sq. ft.
Offices	254 sq. ft.
Public Toilets	559 sq. ft.
Projection and Winding Rooms	510 sq. ft.
Lobby, Vestibule, Entries, Stairs and Halls	1460 sq. ft.

Stage Toilets 2, 1 water closet, 2 showers, 1 lavatory (each)
Mens Toilet, 3 water closets, 3 urinals, 2 lavatories, 1 service sink
Ladies Toilet; 2 water closets, 4 lavatories

General Construction:

Structural steel frame; concrete floor slab on fill; 12½" solid brick walls.

Foundations:

Spread footings or composite piles.
Soil pressures 1000 or 2000 lbs. per sq. ft. Pile capacity 20 tons each.

Finishes:

Cement, wood and tile floors, wood wainscot, plaster and accustical plaster walls and ceilings steel windows and metal roof.

Design Loads:

Roof - Live load 20 lbs. per sq. ft.
Wind - 30 lbs. per sq.ft.

E-2.08. Battalion Headquarters: One story, "T" shape building

Ground Area Covered	62' x 127'
Floor Area	4569 sq. ft.
Cubic Contents	79,988 cu. ft.

Design data as follows:

Porch, Lobby and Corridors	1052 sq. ft.
Toilets	252 sq. ft.
Storage, Closets and Gear	166 sq. ft.
Offices	3099 sq. ft.

Toilet for Officers: 2 water closets, 2 urinals, 3 lavatories
Toilet for Enlisted Men: 2 water closets, 2 urinals, 3 lavatories

General Construction:

Strip steel frame; concrete floor slabs supported; 4" brick veneer walls.

Foundations:

Spread footings
Soil pressures 1000 to 2000 lbs. per sq. ft.

Finishes:

Tile and asphalt tile floors, plaster walls and ceilings, tile wainscots in toilets, wood windows, asbestos shingle roof.

Design Loads:

Roof - Live load 20 lbs. per sq. ft.
First Floor - Live load 75 lbs. per sq. ft.
Wind - 30 lbs. per sq. ft.

E-2.09 Regimental Headquarters: One story, "U" shape building

Ground Area Covered	61' x 137'
Floor Area	6351 sq. ft.
Cubic Contents	101,922 cu. ft.

Design data as follows:

Lobby and Corridors	1467 sq. ft.
Toilets	341 sq. ft.
Storage	191 sq. ft.
Offices	4352 sq. ft.

Officers Toilet: 2 water closets, 2 urinals, 3 lavatories
Enlisted Mens Toilet: 2 water closets, 2 urinals, 3 lavatories

E-2.08 BATTALION HEADQUARTERS

E-2.09 REGIMENTAL HEADQUARTERS

General Constructions:

Strip steel frame; concrete floor slab supported; 4" brick veneer walls.

Foundations:

Spread footings
Soil pressures 1500 or 2000 lbs. per sq. ft.

Finishes:

Tile and asphalt tile floors, plaster walls and ceilings, tile wainscot in toilet rooms, wood windows, asbestos shingle roof.

Design Loads:

Roof - Live load 20 lbs. per sq. ft.
Floor - Live load 75 lbs. per sq. ft.
Wind - 30 lbs. per sq. ft.

E-2.10 Regimental Service Club: One story building with center unit two stories, rectangular in shape with center unit projecting at front and rear.

Ground Area Covered	75' x 252'
First Floor Area	12,159 sq. ft.
Second Floor Area	2900 sq. ft.
Total Floor Area	15,059 sq. ft.
Cubic Contents	297,145 cu. ft.

Design data as follows:

First Floor:

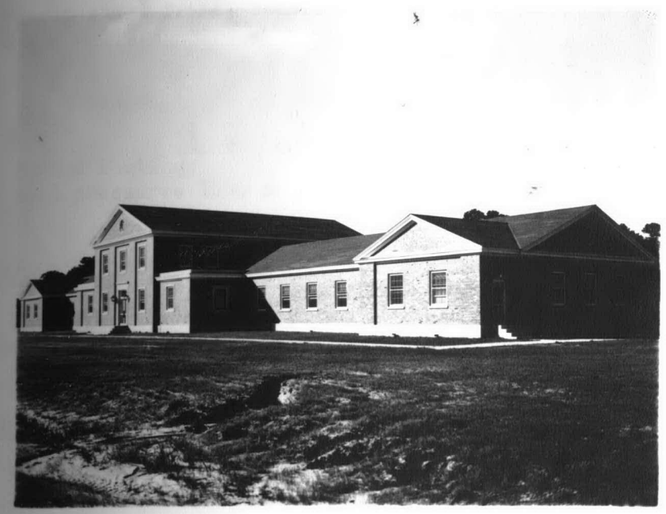
Entrance Hall and Entries	1175 sq. ft.
Locker Rooms	156 sq. ft.
Toilets	568 sq. ft.
Bowling Alleys (6) & Bleacher Seats for 70	3970 sq. ft.
Game Rooms	3970 sq. ft.
Fountain Room: 24 tables, 94 seats	1840 sq. ft.
Office	112 sq. ft.
Storage and Gear	368 sq. ft.

Second Floor:

Library	2900 sq. ft.

Toilet Rooms:

1-Men's: 5 water closets, 5 urinals, 4 lavatories
1-Women's: 3 water closet, 3 lavatories
2-Helps: 1 water closet, 1 lavatory (each)



E-2.10 REGIMENTAL SERVICE CLUB

E-2.03 MESS HALL (REAR VIEW)

General Construction:

Strip steel frame; concrete floor slabs supported; 4" brick veneer walls.

Foundations:

Spread footings
Soil pressures 1500 or 2000 lbs. per sq. ft.

Finishes:

Wood floors and tile floors, plaster walls and ceilings, tile wainscots in toilets wood windows asbestos shingle and built up roofs.

Design Loads:

Roof - Live load 20 lbs. per sq. ft.
First Floor - Live load 100 lbs. per sq. ft.
Second Floor - Live load 125 lbs. per sq. ft.
Wind - 30 lbs. per sq. ft.

E-3. Post Troops Activities:

E-3.01 Location. These activities extend over the entire reservation. Most of the buildings are in an area which adjoins and is northeast of the Regimental Areas and includes the following number and types of buildings:

1 Post Headquarters Building
1 Division Headquarters Building
1 Brig
1 Post Exchange
4 Barracks Buildings
4 Battalion Warehouses
1 Mess Hall

1 Battalion Headquarters Building
1 Hostess House
1 Post Dispensary
1 Protestant Chapel
1 Catholic Chapel
1 Firehouse
1 Post Theater
1 Water Treatment Plant
1 Incinerator
1 Radio Transmitter Building
1 Post Tailor and Cobbler Shop
1 Waller Gunnery Building
1 Boat House and Toilet Building
1 Gate House

Additional utility buildings are covered in the chapters on the various utilities.

E-3.02. Post Headquarters Building: Two story building with partial basement, "U" shape, two story portion with one story wing in center at rear.

Ground Area Covered	112' x 205'
Basement Floor Area	2614 sq. ft.
First Floor Area	14,809 sq. ft.
Second Floor Area	12,852 sq. ft.
Total Floor Area	30,275 sq. ft.
Cubic Contents	535,196 cu. ft.

Design data as follows:

Basement:

Corridors and Stairs	463 sq. ft.
Storage	620 sq. ft.
Vault	124 sq. ft.
Offices	1407 sq. ft.

First Floor:

Corridors, Stairs and Lobbies	3210 sq. ft.
Portico	238 sq. ft.
Toilets and Gear Rooms	691 sq. ft.
Storage	413 sq. ft.
Post Office Department	2510 sq. ft.
Vaults	152 sq. ft.
Offices	7595 sq. ft.

Second Floor:

Corridors, Stairs and Lobbies	3466 sq. ft.
Portico	238 sq. ft.
Toilets and Gear Room	750 sq. ft.
Storage	425 sq. ft.
Vaults	140 sq. ft.

E-3.02 POST HEADQUARTERS

E-3.03 DIVISION HEADQUARTERS

Offices 7831 sq. ft.

Toilet Rooms:

First Floor:

Officers (2): 2 water closets, 2 urinals, 2 lavatories (each)
Enlisted Men (2): 3 water closets, 2 urinals, 2 lavatories (each)
Womens (2): 1 water closet, 2 lavatories (each)
Private Toilet Room: 1 water closet, 1 lavatory

Second Floor:

Private Toilet Rooms (4): 1 water closet, 1 lavatory (each)
Enlisted Mens (2): 2 water closets, 2 urinals, 2 lavatories (each)
Officers (2): 2 water closets, 2 urinals, 2 lavatories (each)
Womens: 1 water closet, 2 lavatories

General Construction:

Strip steel roof trusses on 12½" brick bearing walls; concrete floor slabs supported, 2'-0" thick concrete slab in basement floor.

Foundations:

Spread footings
Soil pressure 1500 lbs. per sq. ft.

Finishes:

Terrazzo, tile, asphalt tile and linoleum floors, plaster walls, tile wainscots in toilet rooms, accustical tile ceilings, wood windows, asbestos shingle roof.

Design Loads:

Roof - Live load 20 lbs. per sq. ft.
First Floor - Live load 100 lbs. per sq. ft.
Second Floor - Live load 75 lbs. per sq. ft.
Wind - 30 lbs. per sq. ft.

E-3.03. Division Headquarters: Two story "U" Shape building

Ground Area Covered	96' x 185'
First Floor Area	9259 sq. ft.
Second Floor Area	9103 sq. ft.
Total Floor Area	18,362 sq. ft.
Cubic Contents	297,866 cu. ft.

Design data as follows:

First Floor:

Corridors, Lobby and Stairs	2248 sq. ft.
Toilets	451 sq. ft.
Storage	483 sq. ft.
Offices	4965 sq. ft.
Vaults	139 sq. ft.
Court Room	780 sq. ft.
Porch	193 sq. ft.

Second Floor:

Corridors and Stairs	1908 sq. ft.
Toilets	322 sq. ft.
Storage	192 sq. ft.
Staff Rooms	1025 sq. ft.
Offices	5627 sq. ft.
Vaults	29 sq. ft.

Toilet Rooms:

First Floor:

Officers: 2 water closets, 2 urinals, 3 lavatories
Womens: 3 water closets, 2 lavatories
Enlisted Mens: 3 water closets, 2 urinals, 3 lavatories

Second Floor:

Officers: 3 water closets, 2 urinals, 3 lavatories
Enlisted Mens: 3 water closets, 2 urinals, 3 lavatories
Private Toilets (2): 1 water closet, 1 lavatory (each)

General Construction:

Strip steel roof trusses on 12½" brick bearing walls
Concrete floor slabs supported

Foundations:

Concrete foundation walls on wall footings
Soil pressure 2000 lbs. per sq. ft.

Finishes:

Terrazzo, tile, asphalt tile, and linoleum floors plaster walls, tile wainscots in toilets, accustical tile ceilings, wood windows and asbestos shingle roof.

Design Loads:

Roof - Live load 20 lbs. per sq. ft.
First floor - Live load 75 and 50 lbs. per sq. ft.
Second floor - Live load 75 lbs. per sq. ft.
Wind - 30 lbs. per sq. ft.

E-3.04. Brig: Two story "U" shaped building

Ground Area Covered	79' x 190'
First Floor Area	8434 sq. ft.
Second Floor Area	8391 sq. ft.
Total Floor Area	16,825 sq. ft.
Cubic Contents	246,128 cu. ft.

Design data as follows:

First Floor: Capacity 100 prisoners single deck

Corridors, Stairs and Lobby	1035 sq. ft.
Portico and Entry	234 sq. ft.
Toilets, lavs., and Wash Room	636 sq. ft.
Storage	1166 sq. ft.
Offices	677 sq. ft.
Cooks Dormitory (10 beds)	600 sq. ft.
Guards Dormitory (20 beds)	1088 sq. ft.
Guards Bed Room (2 Beds)	208 sq. ft.
Galley and Mess Hall (132 seats)	2790 sq. ft.

Second Floor:

Corridors and Stairs	1436 sq. ft.
Toilets, Wash Rooms and Showers	1112 sq. ft.
Storage	42 sq. ft.
Dormitories for Prisoners (90 men)	4945 sq. ft.
Solitary (8 cells)	716 sq. ft.
Padded Cells (2 cells)	140 sq. ft.

Toilet Rooms:

First floor:

Shower Room: 5 shower heads
Wash Room: 6 lavatories
Toilet Room: 3 water closets, 3 urinals
Private toilet room: 1 water closet, 1 lavatory
Bath: 1 water closet, 1 lavatory, 1 shower

Second Floor:

Shower Rooms (2) 7 shower heads (each)
Wash Rooms (2) 10 lavatories (each)
Toilet Rooms (2) 5 toilets, 5 urinals (each)

General Construction:

Strip steel roof trusses on 12½" brick bearing walls;
Concrete slab floors on fill on first floor, supported on second floor.

Foundations:

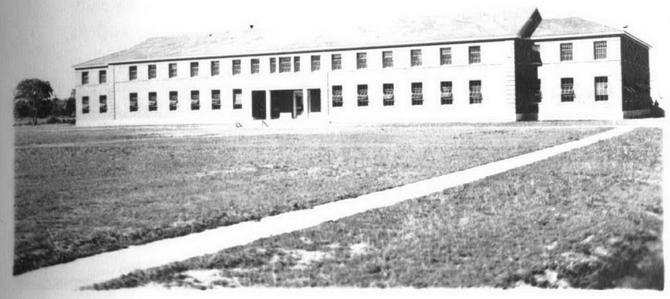
Concrete foundation walls on wall footings
Soil pressure 2000 lbs. per sq. ft.

Finishes:

Cement floors, salt glazed brick walls, plaster ceilings, steel windows and asbestos shingle roof.

Design Loads:

Roof - Live load 20 lbs. per sq. ft.
Floor - Live load 75 lbs. per sq. ft.
Stairways - Live load 100 lbs. per sq. ft.
Wind - 30 lbs. per sq. ft.



E-3.04

BRIG

E-3.06

HOSTESS HOUSE

E-3.05: Post Exchange, Barracks, Battalion Warehouses, Mess Hall, Battalion Headquarters: These buildings are similar to types as described under "Division Training Area."

E-3.06. Hostess House: Two story "T" shape building.

Ground Area Covered	128' x 149'
First Floor Area	7062 sq. ft.
Second Floor Area	6103 sq. ft.
Total Floor Area	13,165 sq. ft.
Cubic Contents	218,492 cu. ft.

Design data as follows:

First Floor:

Porches	586 sq. ft.
Lounge	1543 sq. ft.
Office	168 sq. ft.
Coat Room	36 sq. ft.
Refreshment Room	544 sq. ft.
Dining Room (22 tables, 88 seats)	1643 sq. ft.
Kitchen	726 sq. ft.
Kitchen Entry and Stores	235 sq. ft.
Cooks Wash Room	56 sq. ft.
Gear Rooms	35 sq. ft.
Toilets and Baths	356 sq. ft.
Bed Rooms (4)	565 sq. ft.
Linen Closet	72 sq. ft.
Closets	65 sq. ft.
Stairs and Corridor	432 sq. ft.

Second Floor.

Stairs, Corridors and Alcove	1447 sq. ft.
Toilets, and Baths	411 sq. ft.
Gear Room	60 sq. ft.
Linen Room	120 sq. ft.
Closets	175 sq. ft.
Bed Rooms (25)	3890 sq. ft.

Toilet and Bath Rooms:

First Floor:

Cooks Wash Room: 1 water closet, 1 lavatory
Mens Bath: 2 water closets, 2 urinals, 2 lavatories, 1 shower
Womens Bath: 2 water closets, 2 lavatories, 1 tub
Bath: 1 water closet, 1 lavatory, 1 tub
Bed Rooms: 1 lavatory (each)

Second Floor:

Mens Bath: 3 water closets, 1 urinal, 2 lavatories, 2 showers
Womens Bath: 4 water closets, 2 lavatories, 2 tubs
Bed Rooms: 1 lavatory (each)

General Construction:

Wood frame; 4" brick veneer walls
Supported concrete slab floors in kitchen and service rooms.
Supported wood floors elsewhere.

Foundations:

Spread footings
Soil pressure 2000 lbs. per sq. ft.

Finishes:

Wood and tile floors, plaster walls, and ceilings, wood windows and asbestos shingle roof.

Design Loads:

Roof - Live load 20 lbs. per sq. ft.
Floors - Bed rooms 40 lbs. per sq. ft.; Public rooms 100 lbs. per square foot
Wind - 30 lbs. per sq. ft.

E-3.07, Post Dispensary: Two story building with partial basement, "U" shaped

Ground Area Covered	147' x 224'
Basement Floor Area	2133 sq. ft.
First Floor Area	16,052 sq. ft.
Second Floor Area	16,052 sq. ft.
Total Floor Area	34,237 sq. ft.
Cubic Contents	509,688 cu. ft.

Design data as follows:

Basement:

Storage	713 sq. ft.
Transformer Room	655 sq. ft.
Elevator, Stairs and Halls	477 sq. ft.

First Floor:

Corridors, Stairs, Lobbies, Elevator and Waiting Room	4380 sq. ft.
Portico	242 sq. ft.
Toilets	465 sq. ft.
Storage	2521 sq. ft.
Vaults	24 sq. ft.
Offices and Treatment Rooms	6683 sq. ft.

This floor contains seven departments viz: Outpatient; Eye, Ear, Nose and Throat; Venereal; X-Ray; Laboratory and Pharmacy; Malaria Control and Executive.

Second Floor:

Corridors, Stairs, Elevator and Waiting Rooms	3938 sq. ft.
Portico	242 sq. ft.
Toilets, Locker Rooms and Gear Rooms	998 sq. ft.
Storage	118 sq. ft.
Offices, Treatment Rooms, Wards and Rooms	9004 sq. ft.

This floor contains three departments viz; Complete Dental Clinic (21 chairs) Operating Suite and Hospital (4 private rooms and 1-22 bed ward.)

Toilet Rooms:

First Floor:

Senior Medical Officers: 1 water closet, 1 lavatory
Executive Officers: 1 water closet, 1 lavatory
Officers: 1 water closet, 1 lavatory, 1 urinal
Enlisted Mens: 2 water closets, 1 lavatory, 1 shower
O. D.'s Bath: 1 water closet, 1 lavatory, 1 shower
Womens: 1 water closet, 1 lavatory
Nurses: 1 water closet, 1 lavatory
Venereal: 1 shower, 2 straddle troughs, 2 lavatories
Outpatient: (2) 1 water closet, 1 lavatory (each)

Second Floor:

Officers: 2 water closets, 1 urinal, 1 lavatory
Corpsmen's: 2 water closets, 1 urinal, 1 lavatory
Senior Dental Officers: 1 water closet, 1 lavatory
Medical Officers: 1 water closet, 1 lavatory
Connecting Bath Between Private Rooms: 1 water closet, 1 lavatory, 1 shower
Connecting Bath Between Quiet Rooms: 1 water closet, 1 lavatory, 1 shower
Nurses: 1 water closet, 1 lavatory
Ward Bath and Toilet: 2 water closets, 3 lavatories, 2 urinals, 2 showers

General Construction:

Reinforced Concrete frame and floors, 12½" masonry walls, wood framed roof.

Foundations:

Pile foundation, concrete walls.

Finishes:

Terrazzo, tile, linoleum and asphalt tile floors, plaster walls and ceilings, tile wainscots in corridors, toilets and some treatment rooms, wood windows, asbestos shingle roofs.

Design Loads:

Roof - Live load 20 lbs. per sq. ft.
Floors - Live load 75 lbs. per sq. ft.
Wind - 30 lbs. per sq. ft.

E-3.07 POST DISPENSARY

E-2.02 BARRACKS GROUP

E-3.08 Protestant Chapel: One story building, rectangular in shape

Ground Area Covered	57' x 123'
Floor Area	5935 sq. ft.
Cubic Contents	214,574 cu. ft.

Design data as follows:

Number of Pews	54
Seating Capacity	600
Narthex	600 sq. ft.
Nave	4300 sq. ft.
Chancel	580 sq. ft.
Choir Room	160 sq. ft.
Sacristy	160 sq. ft.
Toilets	50 sq. ft.
Entries	62 sq. ft.
Closet	23 sq. ft.

General Construction:

Built from Y&D plans on foundations designed by Carr & J. E. Greiner Company.

Foundations:

Soil pressure 2000 lbs. per sq. ft.

Finishes:

Asphalt tile floor, painted cinder block walls, open timber trusses with fiber beard ceilings, wood windows and asbestos shingle roofs.

E3.09. Catholic Chapel: One story building, rectangular in shape

Ground Area Cowered	56' x 126'
Floor Area	5839 sq. ft.
Cubic Contents	184,309 cu. ft.

Design data as follows:

Number of Pews	60
Seating Capacity	650
Narthex	217 sq. ft.
Nave	4300 sq. ft.
Sanctuary	305 sq. ft.
Sacristy No. 1	106 sq. ft.
Sacristy No. 2	193 sq. ft.
Passage	94 sq. ft.
Gear Closet	9 sq. ft.
Toilet	40 sq. ft.
Entry	25 sq. ft.

E-3.08

PROTESTANT CHAPEL

E-3.09

CATHOLIC CHAPEL

E-9.

PARACHUTE TOWER

General Construction:

Built from Y&D Plans on foundations designed by Carr and J. E. Greiner Company.

Foundations:

Soil pressures 2000 lbs. per sq. ft.

Finishes:

Asphalt tile floor, painted cinder block walls, open timber trusses, fiberboard ceilings, wood windows and asbestos shingle roofs.

E-3.10. Firehouse: Two story building, irregularly rectangular in shape

Ground Area Covered	42' x 75'
First Floor Area	2680 sq. ft.
Second Floor Area	2247 sq. ft.
Total Floor Area	4927 sq. ft.
Cubic Contents	65,177 cu. ft.

Design data as follows:

First Floor:

Engine Room (3 engines)	1550 sq. ft.
Hose Room	405 sq. ft.
Day Room and Alarm Room	502 sq. ft.

Second Floor:

Dormitory (20 men)	1550 sq. ft.
Hall	280 sq. ft.
Shower and Toilet Room	240 sq. ft.

2 water closets, 2 urinals, 4 lavatories, 2 showers

General Construction:

Strip steel frame; 1st floor concrete floor slabs on fill; 4" brick veneer walls.

Foundations:

Spread footings or creosoted wood piles
Soil pressure 1000 lbs. per sq. ft. Pile capacity 20 tons each

Finishes:

Cement floors, plaster walls and ceilings, steel windows, asbestos shingle roof.

Design Loads:

Roof - Live load 20 lbs. per sq. ft.
Second floor - Live load 75 lbs. per sq. ft.
Wind - 30 lbs. per sq. ft.

E-3.11. Post Theater: Plan, fan shaped, with part basement, mezzanine floor and balcony.

Ground Area Covered	130' x 177'
Seating Capacity Total for Bldg.	1985 sq. ft.
First Floor Area	17,378 sq. ft.
Mezzanine Floor Area	4262 sq. ft.
Balcony Floor Area	8748 sq. ft.
Basement Area	4597 sq. ft.
Total Floor Area	34,985 sq. ft.
Cubic Contents	801,783 cu. ft.

Design data as follows:

Basement:

Transformer Room	192 sq. ft.
Battery Room	112 sq. ft.
Mechanical Pit	216 sq. ft.
Toilet Room	144 sq. ft.
Access to Mechanical Equip.	850 sq. ft.
Stairs and Circulation	138 sq. ft.
Storage	2476 sq. ft.

First Floor:

Stage	3396 sq. ft.
Orchestra Pit	404 sq. ft.
Auditorium	8713 sq. ft.
Lobby, Stairs and Corridors	2404 sq. ft.
Dressing Rooms and Toilets	703 sq. ft.
Office, Check Room and Box Office	282 sq. ft.
Entrance Portico and Side Entrances	455 sq. ft.

Mezzanine Floor:

Corridors, Stairs and Circulation	1880 sq. ft.
Toilets	940 sq. ft.
Dressing Rooms	990 sq. ft.

Balcony Floor:

Balcony	4956 sq. ft.
Dressing Room	495 sq. ft.
Storage	607 sq. ft.
Corridors and Stairs	992 sq. ft.
Machine Room	432 sq. ft.
Projection Room	504 sq. ft.
Winding Room	130 sq. ft.

Toilets:

Basement Toilet: 2 water closets, 2 lavatories
First Floor Dressing Room Toilets (6): 1 water closet, 1 shower (each)
First Floor Dressing Rooms (6): 1 lavatory (each)
Mezzanine Mens Toilet: 6 water closets, 8 urinals, 6 lavatories
Mezzanine Womens Toilet: 7 water closets, 6 lavatories
Mezzanine Dressing Room Toilets (2): 2 water closets, 2 showers (each)
Mezzanine Dressing Rooms (2): 3 lavatories (each)
Balcony Dressing Room Toilet (1): 2 water closets, 2 showers
Balcony Dressing Room (1): 3 lavatories
Balcony, Operators Toilet: 1 water closet, 1 urinal, 1 lavatory, 1 service sink

General Construction:

Wood roof trusses; 13" brick bearing walls; Reinforced concrete balcony and mezzanine; Reinforced concrete floor slabs and stairs. First floor concrete slab on fill.

Foundations:

Concrete foundation wallsand wall footings
Soil pressure 2000 lbs. per sq. ft.

Finishes:

Terrazzo, tile and cement floors, plaster and unfinished masonry walls, wood wainscots in Lobby and auditorium,tile wainscots in public toilets, accustical plaster ceiling in auditorium other ceilings plaster, wood windows, built-up roof.

Design Loads:

Roof - Live load 20 lbs. per sq. ft.
Balcony - Live load 60 lbs. per sq. ft.
Other public floor space - Live load 100 lbs. per sq. ft.
Wind - 30 lbs. per sq. ft.

E-3.12. Water Treatment Plant: Building designed under the supervision of the Water and Sanitary Department. All design data is noted in the report of the aforementioned department.

E-3.13. Incinerator: One story building with full basement, rectangular shaped

Ground Area Covered	44' x 49'
Ground Floor Area	1152 sq. ft.
First Floor Area	1112 sq. ft.
Total Floor Area	2264 sq. ft.
Cubic Contents	42,335 cu. ft.

Design data as follows: - based on 15-ton capacity

2 Destructors, 7 1/2 ton capacity each

Ground Floor:

Destructor Room	1125 sq. ft.
Ash Hoist	27 sq. ft.

First Floor:

Charging Floor Area (6 chutes)	872 sq. ft.
Can Washing Room	201 sq.ft.
Toilet (1 water closet, 1 lavatory)	39 sq. ft.

General Construction:

Reinforced concrete beam and slab construction throughout with concrete walls - 60'-0" free standing brick stack.

Foundations:

Spread footings
Soil pressure 2000 lbs. per sq.ft.

Finishes:

Cement floors, unfinished concrete walls and ceilings, steel windows and built up roof.

Design Loads:

Charging floor designed for live load of two ten-ton truck concentrations
Wind - 30 lbs. per sq. ft.

E-3.14. Radio Transmitter Building: One story, rectangular shape

Ground Area Covered	29' x 81'
Basement Floor Area	2077 sq. ft.
First Floor Area	2005 sq. ft.
Total Floor Area	4082 sq. ft.
Cubic Contents	61,702 cu. ft.

Design data as follows:

Basement	2077 sq. ft.

First Floor:

Transmitter Room	1646 sq. ft.
Office or Sleeping Room	128 sq. ft.
Closet	18 sq. ft.
Toilet (1 shower, 1 water closet, 1 lavatory	37 sq. ft.
Work Shop	176 sq. ft.

General Construction:

Strip steel roof trusses on 13" brick bearing walls; Concrete 1st. floor slabs supported - Basement slab on fill.

Foundations:

Concrete foundation walls on wall footings
Soil pressure 2000 lbs. per sq. ft.

Finishes:

Cement floor, plaster walls and ceilings, steel windows and asbestos shingle roof.

Design Loads:

Roof - Live load 20 lbs. per sq. ft.
First floor - Live load 200 lbs. per sq. ft.
Wind - 30 lbs. per sq. ft.

E-3.15. Post Tailor and Cobbler Shop: One story building, rectangular in shape.

Ground Area Covered	57' x 192'
Floor Area	9385 sq. ft.
Cubic Contents	199,766 cu. ft.

Design data as follows:

Service Area & Tailoring Dept.	1158 sq. ft.
Offices	460 sq. ft.
Cleaning & Pressing Dept.	5375 sq. ft.
Womens Toilet (2 lavatories, 2 water closets)	86 sq. ft.
Mens Toilet (2 lavatories, 2 water closets, 1 urinal	94 sq. ft.
Toilet Room (1 lavatory, 1 water closet)	63 sq. ft.
Cobbler Shop	1673 sq. ft.

General Construction:

Strip steel roof trusses on 8" brick bearing walls; concrete floor slab on fill.

Foundations:

Concrete foundation walls
Soil pressure 2000 lbs. per sq. ft.

Finishes:

Cement and tile floors, plaster walls and ceilings, steel windows asbestos shingle roof.

Design Loads:

Roof - Live load 20 lbs. per sq. ft.
Wind - 20 lbs. per sq. ft.

E-3.16. Waller Gunnery Building (Navy Type): Two story building,"L" shaped, constructed from Yards and Docks plans and specifications.

Ground Area Covered	46' x 61'
First Floor Area	2217 sq. ft.
Second Floor Area	873 sq. ft.
Total Floor Area	3090 sq. ft.
Cubic Contents	58,589 cu. ft.

Design data as follows:

First Floor:

Training Room	1340 sq. ft.
Mechanical Room	184 sq. ft.
Work Room	327 sq. ft.
Office	80 sq. ft.
Toilet (1 water closet, 1 lavatory, 1 urinal)	52 sq. ft.
Hall, vestibule and Stair	234 sq. ft.

Second Floor:

Gallery	74 sq. ft.
Stair	81 sq. ft.
Equipment Space	718 sq. ft.

E-3.17. Toilet Building (Boat Basin): One story, rectangular shape

Ground Area Covered	13' x 22'
Floor Area	226 sq. ft.
Cubic Contents	3228 cu. ft.

Design data as follows:

Mens Toilet (2 water closets, 2 lavatories)	113 sq. ft.
Womens Toilet (2 water closets, 2 lavatories)	113 sq. ft.

General Construction:

Wood frame; concrete slab floor on fill; asbestos shingle siding.

Foundations:

Concrete foundation walls and wall footings.

Finishes:

Cement floors, wood walls and ceiling wood windows, asbestos shingle roof.

E-3.18. Boat House: One story building, rectangular shape, with projecting wing on one end.

Ground Area Covered	39' x 115'
Floor Area	3319 sq. ft.
Cubic Contents	46,445 sq. ft.

Design data as follows:

Canoe Shed (42 canoes)	2367 sq. ft.
Locker Room(84 lockers)	700 sq. ft.
Hall	36 sq. ft.
Office	108 sq. ft.
Store Room	108 sq. ft.

General Construction:

Wood frame, asbestos shingle siding.

Foundations:

Built on timber deck

Finishes:

Wood floors, wood walls, unfinished ceilings, wood sash asbestos shingle roof.

Design Loads:

Roof live load 20 lbs. per sq. ft.
Wind - 20 lbs. per sq. ft.

E-3.19. Gate House: One story, part two story, irregular "L" shaped building.

Ground Area Covered	79' x 106'
First Floor Area	5372 sq. ft.
Second Floor Area	720 sq. ft.
Total Floor Area	6092 sq. ft.
Cubic Contents	61,636 cu. ft.

Design data as follows:

First Floor:

Poroh	1090 sq. ft.
Waiting Room	445 sq. ft.
Offices	1055 sq. ft.
Exam. Room, Eye and Ear Test, and Prophylaxis Station	830 sq. ft.
Toilets and Gear	520 sq. ft.
Storage	95 sq. ft.
Detention Room	93 sq. ft.
Guards Room	92 sq. ft.
Heater Room	88 sq. ft.
Corridors and Stairs	367 sq. ft.

Second Floor:

Dormitory	430 sq. ft.
Bath	153 sq. ft.
Stairs	63 sq. ft.

Toilet and Bath Rooms:

Mens Toilet: 2 water closets, 2 urinals, 1 lavatory
Womens Toilet: 2 water closets, 2 lavatories
Prophylaxis Station: 1 water closet, 1 urinal, 1 lavatory
Mens Toilet (office): 1 water closet, 1 urinal, 1 lavatory
Womens Toilet (office): 1 water closet, 1 lavatory
Guards Toilet: 1 water closet, 1 lavatory

Second Floor Bath:

Bath: 1 water closet, 1 urinal, 2 lavatories, 1 shower

Gate House Guard Station: 1 story octagonal shaped building

Ground Area Covered	11' x 17'
Floor Area	157 sq. ft.
Cubic Contents:	1838 cu. ft.

Design data as follows:

Guards Room	135 sq. ft.

General Construction:

Wood frame; concrete floor slabs on fill; 4" brick veneer walls to second floor, wood siding above.

Foundations:

Soil pressure 2000 lbs. per sq. ft.

Finishes:

Cement or asphalt tile floors, plaster walls and ceilings, wood windows, asbestos shingle roof.

Design Loads:

Roof - Live load 20 lbs. per sq. ft.
Second floor - Live load 75 lbs. per sq. ft.
Wind - 30 lbs. per sq. ft.

E-4. Industrial and Supply Area:

E-4.01. Location. This area is situated east of the Division Training Area and Post Troops Area, and includes the following number and types of buildings:

1 Gas and Oil Station
1 Filling Station
5 Warehouses
24 Open Side Motor Sheds
4 Open Shed Warehouses
1 Commissary
1 Post Shop Building
1 Cold Storage
4 Lumber Sheds
1 Balloon Storage Building
1 Firehouse
1 Bakery
1 Post Exchange Storehouse
1 Reclamation Building
1 Laundry Building
2 Garage and Repair Buildings
1 Propane Gas Building
1 Central Heating Plant
1 Scale House

Additional utility buildings are covered in the chapters on the various utilities.

E-4.02. Gas and Oil Station: One story rectangular shaped building.

Ground Area Covered	21' x 29'
Floor Area	599 sq. ft.
Cubic Contents	6733 cu. ft.

Design data as follows:

Porch	130 sq. ft.
Office	92 sq. ft.
Toilets	64 sq. ft.
Storage	235 sq. ft.
Officers Toilet: 1 water closet, 1 lavatory	
Mens Toilet: 1 water closet, 1 lavatory	

General Construction:

Wood roof on concrete block walls; concrete floor slab.

Foundations:

Concrete foundation walls, piers and footings
Soil pressure 2000 lbs. per sq. ft.

Finishes

Cement floors, painted masonry walls, asbestos board and wood ceilings, wood windows, and asbestos shingle roof.

Design Loads:

Roof - Live load 20 lbs. per sq. ft.
Wind - 30 lbs. per sq. ft.

E-4.03. Filling Station: This building similar to Gas and Oil Station except Officers Toilet becomes Womens Toilet.

E-4.04. Warehouses: One story rectangular shaped buildings with loading platform on both long sides.

Ground Area Covered	200' x 360'
Floor Area	72,000 sq. ft.
Cubic Contents	1,411,383 cu. ft.

Design data as follows:

Loading Platforms	7200 sq. ft.
Storage	62,424 sq. ft.
Office	678 sq. ft.
Corridor	95 sq. ft.
Toilets	161 sq. ft.

Officers Toilet: 1 water closet, 1 urinal, 1 lavatory
Enlisted Mens Toilet: 2 water closets, 1 urinal, 2 lavatories

General Construction:

Monitor type reinforced concrete building with 12" concrete block outside walls; concrete floor slab and loading platforms.

Foundation

Spread footings or piles
Soil pressure 2000 lbs. per sq. ft.; pile capacities 15 and 20 tons

Finishes:

Cement floors, unfinished masonry walls, unfinished concrete slab ceilings, steel windows, built up roofs.

Design Loads:

Live load on loading platform 250 lbs. per sq. ft.
Live load on first floor 600 lbs. per sq. ft.
Wind - 30 lbs. per sq. ft.

E-4.04

WAREHOUSE

E-4.17

GARAGE AND REPAIR SHOP

E-4.05. Open Side Motor Sheds: One story rectangular shaped building, open on one entire side.

Ground Area Covered	31' x 157'
Floor Area	4420 sq. ft.
Cubic Contents	76,936 cu. ft.

Design data as follows:

Storage of 13 motor vehicles

General Construction:

Wood roof trusses on 8" cement block bearing walls, concrete floor slab.

Foundations:

Spread footings
Soil pressures 750 to 2000 lbs. per sq. ft.

Finishes:

Cement floor. Unfinished masonry walls, no ceilings, steel windows and asbestos shingle roof.

Design Load:

Roof - Live load 20 lbs. per sq. ft.
Wind - 10 lbs. per sq. ft.

E-4.06. Open Shed Warehouses: One story rectangular shaped buildings open on side except end bays.

Ground Area Covered	28' x 180'
Floor Area	5040 sq. ft.
Cubic Contents	85,680 cu. ft.

General Construction:

Wood frame, galvanized corrugated iron siding; concrete floor slabs

Foundations:

Spread footings
Soil pressure 3000 lbs. per sq. ft.

Finishes:

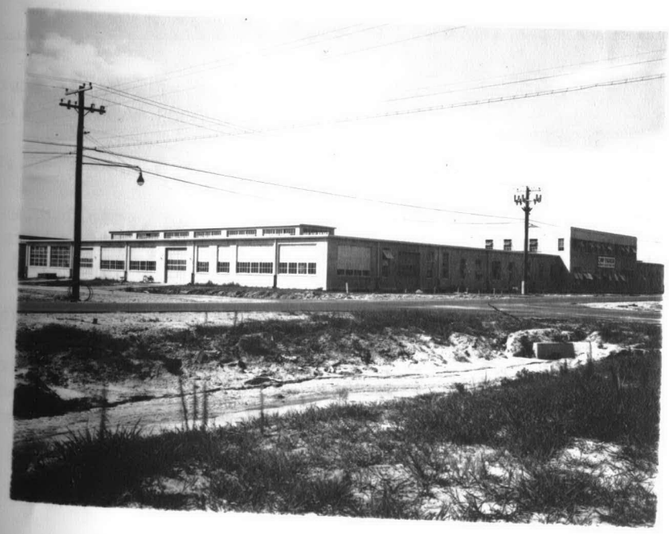
Cement floors, unfinished walls, no ceilings, steel windows, metal roof.

Design Load:

Wind - 30 lbs. per sq. ft.

E-4.05

OPEN SIDE MOTOR SHED



E-4.08

POST SHOP

E-4.07. Commissary: One story rectangular shaped building with loading platform on one entire long side and part of other long side.

Ground area Covered	103' x 368'
Floor Area	33,759 sq. ft.
Cubic Contents	541,005 cu. ft.

Design data as follows:

Porches, Platforms and Steps	4959 sq. ft.
Warehouse Store Room	18,215 sq. ft.
Sales Store	5068 sq. ft.
Commissary Store Room	2399 sq. ft.
Butcher Shop	209 sq. ft.
Refrigerator Boxes	721 sq. ft.
Machine Room	115 sq. ft.
Offices	655 sq. ft.
Corridor	210 sq. ft.
Toilets	268 sq. ft.

Mens Toilet: 2 water closets, 2 urinals, 2 lavatories, 1 service sink
Womens Toilet: 2 water closets, 2 lavatories

General Construction:

Reinforced concrete building with 8" concrete block curtain walls; concrete floor slab, concrete loading platform.

Foundation:

Foundation walls and wall footings
Soil pressure 2000 lbs. per sq. ft.

Finishes:

Cement floors, part plastered, part unfinished masonry walls, part plaster walls, part unfinished concrete slab ceilings. Steel windows, built-up roofs.

Design Loads:

Roof - Live load 20 lbs. per sq. ft.
Floor - Live load 600 lbs. per sq. ft.
Wind - 30 lbs. per sq. ft.

E-4.08. Post Shop Building: One story, part two story, "E" shaped building.

Ground Area Covered	181' x 360'
First Floor Area	45,693 sq. ft.
Second Floor Area	3521 sq. ft.
Total Floor Area	49,214 sq. ft.
Cubic Contents	853,438 cu. ft.

Design data as follows:

General Office	550 sq. ft.
Private Office	140 sq. ft.
Storage and Files (Office)	180 sq. ft.
Office Toilets	50 sq. ft.
White Locker, Shower and Toilet Rooms	1050 sq. ft.
Colored Locker, Shower and Toilet Rooms	800 sq. ft.
Gear Rooms	74 sq. ft.
Plumbing Shop Office	210 sq. ft.
Plumbing Shops	3650 sq. ft.
Plumbing Tool Room	200 sq. ft.
Sheet Metal Shop	2670 sq. ft.
Machine Shop	3780 sq. ft.
Machine Shop Store Room	180 sq. ft.
Welding Shop	550 sq. ft.
Blacksmith Shop	850 sq. ft.
Blacksmith Shop Office	110 sq. ft.
Blacksmith Store Room	85 sq. ft.
Electrical Shops	1740 sq. ft.
Electrical Office	190 sq. ft.
Electrical File Room	150 sq. ft.
Electrical Instrument Room	150 sq. ft.
General Stock Room	1150 sq. ft.
Special Store Rooms	780 sq. ft.
Refrigerator Shop	1400 sq. ft.
Refrigerator Shop Store Room	150 sq. ft.
Paint Shop	2850 sq. ft.
Spray Room	300 sq. ft.
Paint Office	300 sq. ft.
Paint Storage	580 sq. ft.
Plaster and Mason's Room	590 Sq. ft.
Labor's Call Room	780 sq. ft.
Heater and Air Compressor Room	275 sq. ft.
Transformer Room	210 sq. ft.
Carpenters Shop	11,455 sq. ft.
Cabinet and Gluing Room	760 sq. ft.
Tool Makers Room	182 sq. ft.
Carpenters Tool Room	85 sq. ft.
Carpenters Office	85 sq. ft.
Carpenters Store Room	310 sq. ft.
Corridors, Stairs and Entrances	3470 sq. ft.

Second Floor:

Dormitory	1742 sq. ft.
Storage Rooms	883 sq. ft.
Toilet and Gear Rooms	200 sq. ft.
Office	171 sq. ft.
Stairway	161 sq. ft.

First Floor Toilets:

Office Toilets: (2) 1 water closet, 1 lavatory (each)
White Shower and Toilet Room (2): 4 water closets, 4 urinals, 6 lavatories, 3 showers (each)
Colored Shower & Toilet Room (2): 2 water closets, 3 urinals, 4 lavatories, 3 showers (each)

Second Floor Toilet:

2 Water closets, 2 showers, 2 lavatories

General Construction:

Reinforced concrete building with 12" cement block walls on second story and front wall of first story. Other walls concrete, concrete floor slabs; concrete beam and slab roof with concrete monitors.

Foundation:

Soil pressure 2000 lbs. per sq. ft.

Finishes:

Cement and asphalt tile floors, part plaster, part painted masonry walls, part plaster part painted concrete slab ceilings, steel windows, built-up roofs.

Design Load:

Roof - Live load 20 lbs. per sq. ft.
Second Floor - Live load 75 lbs. per sq. ft.

E-4.09. Cold Storage Building:. One story rectangular shaped building with loading platforms on both long sides.

Ground Area Covered	138' x 180'
Floor Area	22,785 sq. ft.
Cubic Contents	386,415 cu. ft.

Design data as follows:

Loading Platforms	2733 sq. ft.
Offices and Toilets	670 sq. ft.
Trucking Hallway	1342 sq. ft.
Vegetable Storage	4518 sq. ft.
Receiving, Meat Storage & Issue Room	5686 sq. ft.

Dry Storage	769 sq. ft.
Fish Storage	445 sq. ft.
Ice Storage, Freezing Tank and Machinery Room	5297 sq. ft.

Toilet in Storage Area: 2 water closets, 2 urinals, 2 lavatories, 1 shower
Toilet in Machinery Area: 1 water closet, 1 lavatory

General Construction:

Reinforced concrete building with 12" concrete block curtain walls stuccoed on outside, concrete loading platform, concrete floor slabs.

Foundations:

Pile foundation
Pile capacities - 20 tons each

Finishes:

Cement floors, plaster walls and ceilings steel windows and built-up roof.

Design Loads:

Roof - Live load 20 lbs. per sq. ft.
Wind - 30 lbs. per sq. ft.

E-4.10. Lumber Sheds: One story rectangular shaped open all sides.

Ground Area Covered	22'x 113', 42' x 113'
Floor Area	2306 sq. ft., 4545 sq. ft.
Cubic Contents	42,666 cu. ft., 90,900 cu.ft.

Design data as follows:

All buildings divided into eight bays each approximately 14' center to center.

General Construction:

Wood frame

Foundation:

Continuous concrete footings

Finishes:

Dirt floor, unfinished end walls, no ceiling. Rolled mineral surface roofing.

E-4.11. Balloon Storehouse and Shop: One story "U" shaped building.

Ground Area Covered	100' x 140'
Floor Area	10,400 sq. ft.
Cubic Contents	102,268 cu. ft.

Design data as follows:

Storage	7630 sq. ft.
Receiving, Boxing and Carting	2320 sq. ft.

General Construction:

Wood roof on concrete block walls, concrete floor slab.

Foundation:

Concrete foundation walls and footing
Soil pressure 2000 lbs. per sq. ft.

Finishes:

Cement floors, painted masonry walls, asbestos board ceiling steel windows asphalt roll roofs.

E-4.12. Firehouses: This building similar to type as described under Post Troops Area.

E-4.13. Bakery: One story, rectangular in shape with loading platform on one long side and part of other long side.

Ground Area Covered	142' x 162'
Floor Area	20,736 sq. ft.
Cubic Contents	469,227 cu. ft.

Design data as follows:

Loading Platforms	1792 sq. ft.
Flour Storage	8425 sq. ft.
Bakery	6160 sq. ft.
Ingredient Room	340 sq. ft.
Cold Storage Room	58 sq. ft.
Ferméntation Room	400 sq. ft.
Bread Storage and Issue Room	3870 sq. ft.
Storage	840 sq. ft.
Office	280 sq. ft.
Toilet, Shower & Locker Room	458 sq. ft.

Toilet: 3 water closets, 2 urinals, 3 lavatories

General Construction:

Reinforced concrete building with 8" concrete block curtain walls, stuccoed; concrete floor slabs and loading platform.

Foundation:

Concrete foundation walls and footings
Soil pressure 2000 lbs. per sq. ft.

Finishes:

Cement and terrazzo, painted masonry and plaster walls, plaster and painted concrete slab ceilings, steel windows, built-up roofs.

Design Load:

Roof - Live load 20 lbs. per sq. ft.
Floor - Live load 300 lbs. per sq. ft.
Loading Platform - Live load 250 lbs. per sq. ft.

E-4.14. Post Exchange Warehouse: One story rectangular shaped building with loading platforms on one long side and one end.

Ground Area Covered	72' x 158'
Floor Area	11,850 sq. ft.
Cubic Contents	194,925 cu. ft.

Design data as follows:

Loading Platforms	1800 sq. ft.
Storage	6912 sq. ft.
Offices	1414 sq. ft.
Storage (Valuable Md'se)	230 sq. ft.
Toilets	142 sq. ft.

Mens Toilet: 1 water closet, 1 lavatory
Womens Toilet: 1 water closet, 1 lavatory

General Construction

Reinforced concrete building with 8" concrete block curtain walls; concrete loading platform and floor slabs.

Foundation:

Concrete foundation walls and footings
Soil pressure 2000 lbs. per sq. ft.

Finishes:

Cement floors, plaster walls in offices, and toilets, unfinished walls elsewhere wood windows built-up roof.

E-4.13

BAKERY

E-4.16

LAUNDRY

Design Load:

Roof - Live load 20 lbs. per sq. ft.

E-4.15. Reclamation Building: One story rectangular shape.

Ground Area Covered	76' x 150'
Floor Area	10,050 sq. ft.
Cubic Contents	158,138 cu. ft.

Design data as follows:

Storage	4279 sq. ft.
Shops	4508 sq. ft.
Offices	317 sq. ft.
Toilets	296 sq. ft.
Corridors	191 sq. ft.

White Toilet: 2 water closets, 3 urinals, 3 lavatories
Colored Toilet: 2 water closets, 3 urinals, 3 lavatories, 1 service sink

General Construction:

Reinforced concrete building with 8" concrete block curtain walls; concrete floor slab.

Foundation:

Concrete foundation walls.
Soil pressure 2000 lbs. per sq. ft.

Finishes:

Built up roof unfinished walls and ceilings except in toilets where plaster finish is used. Cement floors, steel windows.

Design Load:

Roof - Live load 20 lbs. per sq. ft.

E-4.16. Laundry Building: One story rectangular shaped building with wings at both ends.

Ground Area Covered	143' x 293'
Floor Area	25,491 sq. ft.
Cubic Contents	490,384 sq. ft.

Design data as follows:

Receiving Room	2540 sq. ft.
Work and Delivery Space	15,505 sq. ft.
Marking Room	883 sq. ft.
Disinfecting Rooms	553 sq. ft.
Mechanical Equipment	995 sq. ft.
Shop	625 sq. ft.
Storage	910 sq. ft.
Office	350 sq. ft.
Locker Rooms	1201 sq. ft.
Toilets	535 sq. ft.

Office Toilet: 1 water closet, 1 lavatory
White Mens Toilet: 2 water closets, 1 urinal, 2 lavatories
White Mens Locker Room: 16 lockers
White Womens Toilet: 3 water closets, 2 lavatories, 1 service sink
White Womens locker Room: 18 lockers
Colored Womens Toilet: 8 water closets, 8 lavatories
Colored Womens Locker Room: 72 lockers
Colored Mens Toilet: 3 water closets, 2 urinals, 3 lavatories, 1 service sink
Colored Mens Locker Room: 30 lockers

General Construction:

Structural steel frame; 13 inch terra cotta tile walls; concrete floor slab.

Foundations:

Spread footings
Soil Pressure 2000 lbs. per sq. ft.

Finishes:

Cement floors, painted masonry walls, painted ceilings, steel windows and built up roof.

Design Load:

Storage and loading platform - Live load 300 lbs. per sq. ft.
Other floors - Live load 100 lbs. per sq. ft.

B-4.17. Garage and Repair Building: One story rectangular building with mezzanine floor in one end.

Ground Area Covered	162' x 360'
First Floor Area	57,210 sq. ft.
Mezzanine Floor Area	5025 sq. ft.
Total Floor Area	62,235 sq. ft.
Cubic Contents	1,161,271 cu. ft.

Design data as follows:

First Floor:

Offices	1132 sq. ft.
Chauffers Waiting Room	257 sq. ft.
Toilets, Showers and Locker Rms.	1250 sq. ft.
Pedestrian Circulation	1208 sq. ft.
Vehicular Circulation	13,617 sq. ft.
Vehicular Parking Space	19,520 sq. ft.
Work Shops	12,729 sq. ft.
Storage	5541 sq. ft.

Mezzanine Floor:

Dormitory	3360 sq. ft.
Night Officers Room	217 sq. ft.
Toilets and Showers	417 sq. ft.
Storage	425 sq. ft.

Office Toilet: 1 water closet, 1 lavatory
White Toilet & Showers: 2 water closets, 4 urinals, 7 lavatories, 7 showers
Colored Toilet & Showers: 3 water closets, 4 urinals, 4 lavatories, 5 showers
Mezzanine Toilet & Showers: 3 water closets, 4 urinals, 7 lavatories, 5 whowers

General Construction:

Reinforced concrete building with monolithic concrete walls; concrete floor slab.

Foundation:

Spread footings
Soil pressure 2000 lbs. per sq. ft.

Finishes:

Cement floors, painted masonry walls and concrete ceilings except in toilets, showers and locker rooms, these are cement plsater, steel windows and built-up roof.

Design Load:

Roof - Live load 25 lbs. per sq. ft.
Mezzanine Floor - Live load 50 lbs. per sq. ft.
Wind - 30 lbs. per sq. ft.

E-4.18. Building for Propane Gas System: One story rectangular shaped building with platform on one end and part of one side.

Ground Area Covered	20' x 26'
Floor Area	467 sq. ft.
Cubic Contents	6150 Cu. Ft.

Design data as follows:

Platforms	141 sq. ft.
Equipment Space	273 sq. ft.

General Construction:

Reinforced concrete slab roof on 8" brick bearing walls; concrete floor slab.

Foundations:

Concrete foundation walls and footings
Soil pressure 1000 lbs. per sq. ft.

Finishes:

Cement floors, unfinished brick walls, wood windows, built up roof.

Design Loads:

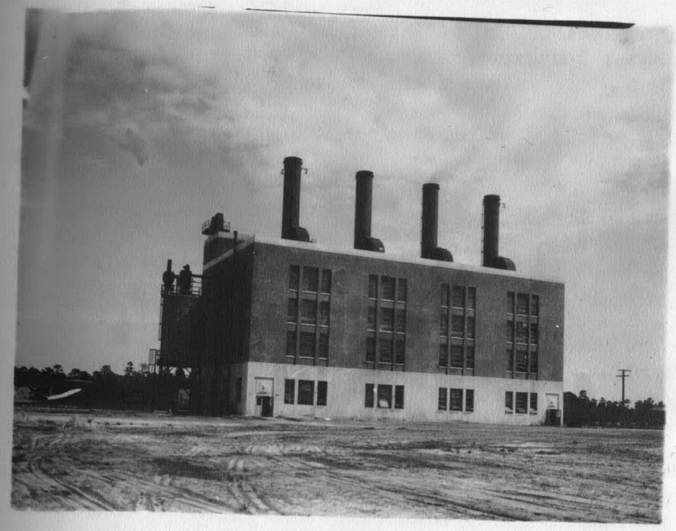
Roof - Live load 20 lbs. per sq. ft.

E-4.19. Central Heating Plant: Rectangular shaped building with projection at rear.

Ground Area Covered	89' x 150'
Ground Floor Area	10,971 sq. ft.
Mezzanine Floor Area	398 sq. ft.
Operating Floor Area	10,624 sq. ft.
Scale Platform Floor Area	5400 sq. ft.
Boiler Access Floor Area	945 sq. ft.
Catwalks over Boilers Area	379 sq. ft.
Surge Tank Floor Area	1259 sq. ft.
Convey Floor Area	1220 sq. ft.
Total Floor Area	31,196 sq. ft.
Cubic Contents	745,199 cu. ft.

General Construction:

Structural steel frame with 12½" brick curtain walls above operating floor level and concrete walls below; Floors, concrete slabs or metal grating; Reinforced concrete coal handling pits.



E-4.19

CENTRAL HEATING PLANT

Foundations:

Concrete piers and concrete filled; steel shell piles.
Pile capacities 40 tons each

Finishes:

Cement floors painted brick walls, steel windows, built up roof.

Design Loads:

Floor generally designed for a live load of 150 lbs. per sq. ft. except the operating floor where the slabs are designed for a 400 lb. live load on the slabs and 250 lbs. on the beams.

E-4.20. **Scale House:** One story rectangular building with platform scales located beyond building.

Ground Area Covered	23' x 30' scales & bldgs.
Ground Area Covered	10' x 14' building only
Scale Platform Area	300 sq. ft.
Building Area	140 sq. ft.
Total Area	440 sq. ft.
Cubic Contents	2898 cu. ft. scales & bldg.
Cubic Contents	1470 cu. ft. building only

General Construction:

Wood roof on concrete block bearing walls, concrete floor slab on fill.

Foundations:

Concrete foundation walls

Finishes:

Cement floor, unfinished walls, no ceiling, wood windows, asbestos shingle roof.

Design Loads:

Roof - Live load 20 lbs. per sq. ft.

E-5. Naval Hospital Area:

E-5.01. Location. This area is situated on Hadnot Point, northwest of the Division Training Area, and includes the following number and types of buildings:

1 Administration Building, Mess Hall and Recreation Building
11 Wards and Corridors
1 Nurses Home
1 Family Hospital
1 Civilian Nurses Home
1 Medical Warehouse
1 Garage
1 Shop Building
1 Heating Plant
1 Warehouse
1 Laundry
2 Corpsmen's Barracks
3 Officers Quarters
1 Warrant Officers Quarters
1 Bachelor Officers Quarters
1 Servant Quarters for Men
1 Servants Quarters for Women
4 Transformer Buildings

Additional utility buildings are covered in the chapters on the various utilities.

E-5.02. Administration Building, Mess Hall and Recreation Building, Wards and Corridors; Irregular-shaped building, part two-story, part three-story, with partial basement.

Ground Area Covered	400' x 986'
Basement Floor Area	23,143 sq. ft.
First Floor Area	154,296 sq. ft.
Second Floor Area	144,542 sq. ft.
Third Floor Area	24,841 sq. ft.
Total Floor Area	346,822 sq. ft.
Cubic Contents	5,471,458 cu. ft.

The basement of the building is designed as a tunnel under the main connecting corridor with additional areas at service bays and under the Administration Building. The basement houses mechanical piping and equipment. It also may be used as a bomb shelter if necessary.

The first floor of the Administration Building contains the executive and administrative offices, telephone offices, emergency suite and elevators No. 1 and No. 2.

The first floor of the Mess Hall and Recreation Building contains a mess hall for patients and corpsmen seating 512 men; a mess hall for officers seating 48 men; a mess hall for Chief Petty Officers seating 48 men and the galley, preparation and storage rooms for the preparation of food.

The first floor of the Wards and Corridors consist of eleven ward buildings connected by corridors. In these corridors are four service bays in which are located elevators Nos. 3, 4, 5 and 6.

E-5.02

NAVAL HOSPITAL - ADMINISTRATION BUILDING

E-5.02

NAVAL HOSPITAL - GENERAL VIEW

The eleven wards designated numbers 6 through 16, (numbers 1 through 5 were used to indicate sections of Administration Building, Mess Hall and Recreation Building) contain the following:

No. 6, Sick Officers Quarters; 14 private rooms, 2-2 bed wards, 18 beds.

Nos. 7, 8, 9, 10, 12, 13, 14 and 15, Medical Wards, 27 beds per ward and 2-2 bed wards, 31 beds each.

No. 11, Urological Ward; 27 beds in ward and 2-2 bed wards, 31 beds.

No. 16, Neuropsychiatric Ward; 25 beds in ward and 4 strong rooms, 29 beds.

The second floor of the Administration Building contains the pharmacy, laboratories, the dental clinic, eye, ear, nose and throat clinic, the library and board room.

The second floor of the Mess Hall and Recreation Building contains the recreational facilities consisting of an auditorium, with 594 seats, 516 on main floor and 78 in the balcony; a Recreation Room with refreshment area, a patient library, post office, tailor shop, ship store, barber shop and large terraces.

Second floor of Wards and Corridors is similar to the first floor and contains the following:

Ward Nos. 6 and 12, Sick Officers Quarters; 14 private rooms, 2-2 bed wards, 18 beds each.

Wards Nos. 7, 8, 9, 10, 13, 14 and 15, Surgical Wards; 27 beds per ward and 2-2 bed wards, 31 beds each.

Ward No. 11, Dermatology and Syphilis Ward; 27 beds in ward and 1-2 bed ward, 29 beds.

Ward No. 16, Isolation Ward; 4-2 bed wards, 5-3 wards and 1-5 bed wards, 28 beds.

Third floor of Administration Building and Mess Hall and Recreation Building contains the X-Ray suite, sundry treatment rooms, operating suite, fan room and the upper part of the auditorium and balcony.

In addition to the beds listed above, which total 637, there are 371 additional emergency beds, or a grand total of 1,013 beds which can be set up in the Wards and connecting corridors.

Design data as follows:

Basement Administration, Mess Hall and Recreation Building:	
Pipe Tunnel	1125 sq. ft.
Mechanical Rooms	900 sq. ft.
Transformer Room	396 sq. ft.
Stairs, Elevators and Circulation	1504 sq. ft.
Window Areas	320 sq. ft.

Basement Wards and Corridors:	
Pipe Tunnel	6050 sq. ft.
Mechanical Rooms	1052 sq. ft.
Transformer Rooms	437 sq. ft.

Stairs, Elevators and Circulation	6350 sq. ft.
Window and Entrance Area	972 sq. ft.

First Floor Administration Building:

Lobby, Corridors, Waiting Rooms, Stairs and Elevators	6985 sq. ft.
Offices	3184 sq. ft.
P. B. X.	262 sq. ft.
Officer of the Day	350 sq. ft.
Examination and Treatment Rms.	713 sq. ft.
Wards (5 beds)	693 sq. ft.
Toilets, Gear, Utility, Closets, etc.	1583 sq. ft.
Storage	416 sq. ft.

First Floor Mess Hall Buildings:

Corridors, Stairs and Circulation	3013 sq. ft.
General Mess Hall	9683 sq. ft.
Officers Mess Hall	975 sq. ft.
C. P. O. Mess Hall	990 sq. ft.
Sculleries (2)	840 sq. ft.
Service Pantry (Officers Mess)	318 sq. ft.
Offices	429 sq. ft.
Galley	6148 sq. ft.
Bake Shop	462 sq. ft.
Refrigerator Rooms	1674 sq. ft.
Preparation Rooms	1034 sq. ft.
Storage Rooms	1740 sq. ft.
Garbage Room	260 sq. ft.
Mechanical Room	182 sq. ft.
Toilets, Locker Room and Gear	445 sq. ft.

First Floor Wards and Corridors:

Corridors, Stairs, Elevators, and Porches	20,395 sq. ft.
Wards and Sick Rooms	53,135 sq. ft.
Treatment Rooms and Doctors Office	4419 sq. ft.
Sun Rooms	4492 sq. ft.
Closets, Storage, and etc.	6089 sq. ft.
Baths, Toilets, Utility Rms. & Gear Rooms	6193 sq. ft.
Diet Pantries	2475 sq. ft.

Second Floor Administration Building:

Waiting Rooms, Corridors, Stairs & Elevators	5747 sq. ft.

Pharmacy	864 sq. ft.
Eye, Ear, Nose & Throat Clinic	1572 sq. ft.
Laboratories	1530 sq. ft.
Dental Clinic	630 sq. ft.
Offices & Treatment Rooms	1361 sq. ft.
Library and Board Room	1029 sq. ft.
Red Cross Room	210 sq. ft.
Toilets	563 sq. ft.
Closets and Storage	712 sq. ft.

Second Floor Mess Hall Building (Recreation):

Corridor Passage and Stairs	1441 sq. ft.
Auditorium	3885 sq. ft.
Stage and Back Stage	897 sq. ft.
Recreation Room	1770 sq. ft.
Refreshment Room and Kitchen	810 sq. ft.
Patients Library and Library Work Room	1004 sq. ft.
Post Office	240 sq. ft.
Barber Shop	343 sq. ft.
Tailor Shop	318 sq. ft.
Ship Store	343 sq. ft.
Chaplins Office & Interviewing Room	392 sq. ft.
Terraces	8344 sq. ft.
Toilets, Locker Rooms and Gear Rooms	522 sq. ft.
Closets and Storage	241 sq. ft.

Second Floor Wards and Corridors:

Corridors, Stairs and Elevators	11,389 sq. ft.
Wards and Sick Rooms	49,674 sq. ft.
Treatment Rooms and Doctors Office	4435 sq. ft.
Sun Rooms	4080 sq. ft.
Closets, Storage, etc.	648 sq. ft.
Toilets, Baths, Utility Rooms and Gear	7212 sq. ft.
Diet Pantries	2475 sq. ft.

Third Floor Administration Building and Mess Hall Buildings:

Corridors, Stairs and Elevators	3728 sq. ft.
X-Ray Suite	2837 sq. ft.
Offices and Treatment Rooms	3811 sq. ft.
Operating Suite	5037 sq. ft.

Breakdown of Operating Suite:

Waiting Room, Corridors & Nurses Stations	1360 sq. ft.
Sterilizing and Steril Storage	1752 sq. ft.

Operating Rooms (3)	1133 sq. ft.
Anesthesia Room	220 sq. ft.
Recovery Room	202 sq. ft.
Toilets, Locker and Dressing Rms.	360 sq. ft.
Fan Room	1888 sq. ft.
Auditorium Balcony	603 sq. ft.
Projection Room	200 sq. ft.
Dressing Rooms and Passage (back stage)	232 sq. ft.
Control Room	214 sq. ft.
Toilets and Gear Rooms	871 sq. ft.
Closets, Dressing Rooms and Storage	1257 sq. ft.

Toilets and Baths:

First Floor, Administration Building:

Womens Toilets: 1 water closet, 1 lavatory
Mens Toilets: 1 water closet, 1 lavatory, 1 urinal
Ward Bath and Utility Rooms: 1 shower, 1 water closet, 1 lavatory, 1 utility sink, 1 bedpan sterilizer
O. O. D's Bath: 1 water closet, 1 lavatory, 1 shower
Office Toilets:(3) 1 water closet, 1 lavatory (each)
Officers Toilet: 1 water closet, 1 lavatory, 1 urinal
Corpsmens Toilet: 1 water closet, 2 lavatories, 2 urinals

First Floor Mess Hall and Recreation Building:

Helps Toilet: 2 water closets, 5 lavatories, 4 urinals, 2 showers
Office Toilets (2): 1 water closet, 1 lavatory (each)

First Floor Wards and Corridors:

Ward No. 6, Sick Officers Quarters:

Connecting Baths (7): 1 water closet, 1 shower (each)
Private Baths (2): 1 water closet, 1 tub (each)
Nurses Toilet: 1 water closet, 1 lavatory
Utility Room: 1 utility sink, 1 bedpan sterilizer
Doctors Toilet: 1 water closet
Doctors Office: 1 lavatory
Sick Rooms: 1 lavatory, in each room

Wards 7, 8, 9, 10, 12, 13, 14 and 15, Medical Wards:

Toilet: 3 water closets, 2 urinals, 1 lavatory
Wash Rooms: 4 lavatories, 2 dental lavatories
Shower Room: 2 showers
Utility Room: 1 utility sink, 1 bedpan sterilizer
Nurses Toilet: 1 water closet, 1 lavatory
Connecting Bath: 1 shower, 1 water closet
Doctors Toilet: 1 water closet
Sick Room: 1 lavatory in each room

Doctors Office: 1 lavatory

Ward No. 11, Urological Ward:

Toilet: 3 water closets, 2 urinals, 1 lavatory
Wash Room: 3 lavatories, 2 dental lavatories
Shower Room: 2 showers
Infections Toilet: 1 water closet, 1 shower, 1 lavatory, 1 dental lavatory
Utility Room: 1 utility sink, 1 bedpan sterilizer
Nurses Toilet: 1 water closet, 1 lavatory
Connecting Bath: 1 water closet, 1 shower
Sick Room: 1 lavatory (each)
Doctors Toilet: 1 water closet
Doctors Office: 1 lavatory
Treatment Room: 1 straddle trough, 1 sitz bath, 1 treatment lavatory

Ward No. 16, Neurosychiatric Ward:

Toilet: 3 water closets, 2 urinals, (Tamper proof fixtures)
Wash Room: 4 lavatories (Tamper proof fixtures)
Shower Room: 3 shower heads (Tamper proof fixtures)
Bath: 1 continuous flow bath tub, 1 lavatory (Tamper proof fixtures)
Utility Room: 1 utility sink, 1 bedpan sterilizer
Nurses Toilet: 1 water closet, 1 lavatory
Doctors Toilet: 1 water closet, 1 lavatory
Treatment Rooms: 1 lavatory
Strong Room Bath: 1 tub, 1 water closet, 1 lavatory
Service Bay Toilets and Utility Rooms (4): 1 water closet, 1 lavatory, 1 bedpan sterilizer and 1 service sink (each)

Second Floor Administration Building:

Mens Toilet: 2 water closets, 1 urinal, 1 lavatory
Womens Toilet: 2 water closets, 1 lavatory
Dental Office Toilet: 1 water closet, 1 lavatory
Office Bath: 1 water closet, 1 lavatory, 1 shower
Corpsmens Toilet: 2 water closets, 1 lavatory
Red Cross Toilet: 1 water closet, 1 lavatory

Second Floor Mess Hall and Recreation Building:

Chaplins Office: 1 water closet, 1 lavatory
Mens Toilet and Bath: 2 water closets, 2 showers, 2 lavatories, 1 urinal
Womens Toilet: 2 water closets, 2 lavatories
Toilet Back Stage: 1 water closet, 1 lavatory

Second Floor Wards and Corridors:
Ward Nos. 6 and 12, Sick Officers Quarters, same as No. 6 first floor.

Ward Nos. 7, 8, 9, 10, 13, 14 and 15, Surgical Wards, same as Nos. 7, 8, 9, 10, 13, 14 and 15 first floor.

Ward No. 11, Dermatology and Syphilis:

Toilet: 3 water closets, 2 urinals, 1 lavatory
Wash Room: 3 lavatories, 2 dental lavatories
Shower Room: 2 showers
Utility Room: 1 utility sink, 1 bedpan sterilizer
Infectious Toilet: 1 water closet, 1 shower, 1 lavatory, 1 dental lavatory
Nurses Toilet: 1 water closet, 1 lavatory
Private Bath: 1 water closet, 1 shower
Sick Room: 1 lavatory
Doctors: 1 water closet
Doctors Office: 1 lavatory
Treatment Rooms: 1 continuous bath tub, 1 treatment lavatory
Treatment Toilet: 1 water closet

Ward No. 16, Isolation Ward:

Ward Baths (8): 1 water closet, 1 shower, 1 lavatory (each)
Connecting Bath: 1 water closet, 1 shower
Sick Rooms: 1 lavatory (each)
Utility Rooms: 1 utility sink, 1 bedpan sterilizer
Bath: 1 bath tub
Disinfector Room: 1 disinfector
Doctors Toilet: 1 water closet
Doctors Office and Treatment Room: 1 lavatory (each)

Service Bay Toilet and Utility Rooms (4) same as service bay rooms on first floor.

Third Floor Administration Building and Mess Hall and Recreation Building:

Mens Toilet: 2 water closets, 2 lavatories, 1 urinal
Womens Toilet: 2 water closets, 2 lavatories
Treatment Room Toilet (3): 1 water closet (each)
Toilet Rooms (X-Ray suite) (4): 1 water closet, 1 lavatory (each)
Doctors Office Toilet: 1 water closet, 1 lavatory
Corpsmen's Toilet: 2 water closets, 1 lavatory, 1 urinal
Officers Toilet: 2 water closets, 1 lavatory, 1 urinal
Operating Suite Toilet: 1 water closet, 1 lavatory

General Construction:

Reinforced concrete and strip steel frame; concrete floor slabs; 4" brick veneer walls.

Foundations:

Concrete foundation walls and footings
Soil pressure 2000 lbs. per sq. ft.

Finishes:

Floors generally asphalt tile with terrazzo, ceramic tile, quarry tile, linoleum and cement finishes being used in special places. Walls generally painted plaster. Ceilings, generally painted plaster. Windows generally wood with steel windows in operating rooms and psychiatric wards. Roof, asbestos shingle.

Design Loads:

Roof - Live load 20 lbs. per sq. ft. plus 200 lbs. concentrated load
Floors - Live load 75 lbs. per sq. ft.
Wind - 30 lbs. per sq. ft.

E-5.03. Nurses Home: Two story building "H" shape

Ground Area Covered	181' x 235'
First Floor Area	17,785 sq. ft.
Second Floor Area	15,257 sq. ft.
Total Floor Area	33,042 sq. ft.
Cubic Contents	456,614 cu. ft.

Design data as follows: This building was designed to accommodate one supervising nurse, 1 chief nurse, 1 housekeeper, 70 nurses and 2 guests. In addition to their room, provisions were made for living and recreation rooms, dining rooms, galley and a small infirmary for three beds.

First Floor:

Lobby, Stairs and Corridors	2915 sq. ft.
Reception Room	665 sq. ft.
Living Room	1704 sq. ft.
Library	296 sq. ft.
Recreation Room	345 sq. ft.
Supervising Nurses Suite	464 sq. ft.
Housekeepers Suite	464 sq. ft.
Guest Rooms (2)	286 sq. ft.
Nurses Rooms (24)	3432 sq. ft.
Dining Room	1604 sq. ft.
Kitchen	1230 sq. ft.
Kitchen Stores and Refrigerators	475 sq. ft.
Loading Platform	150 sq. ft.
Trunk Room	281 sq. ft.
Laundry	138 sq. ft.
Linen Rooms (Clean and Soiled)	247 sq. ft.
Storage and Closets	403 sq. ft.
Toilets, Baths and Gear	839 sq. ft.

E-5.03

NURSES HOME

E-5.05

CIVILIAN NURSES HOME

Second Floor:

Corridors and Stairs	3242 sq. ft.
Infirmary	253 sq. ft.
Utility Room	83 sq. ft.
Sewing Room	206 sq. ft.
Chief Nurses Suite	420 sq. ft.
Nurses Rooms (46)	6578 sq. ft.
Linen Rooms (clean and soiled)	388 sq. ft.
Closets and Storage	688 sq. ft.
Toilets, Baths and Gear	993 sq. ft.

Toilets and Baths First Floor:

Mens Toilet: 1 water closet, 1 lavatory, 1 urinal
Womens Toilet: 2 water closets, 2 lavatories
Connecting Baths (13): 1 water closet, 1 shower (each)
Bath (housekeeper and supervising nurse): 1 water closet, 1 shower, 1 lavatory (each)
Nurses and Guest's Bed Room (26): 1 lavatory (each)
Colored Mens Toilet: 2 water closets, 2 lavatories
Colored Women's Toilet: 2 water closets, 2 lavatories

Second Floor:

Connecting Baths (23): 1 water closet, 1 shower (each)
Bath (chief nurse): 1 water closet, 1 shower, 1 lavatory
Utility Room: 1 sink, 1 service sink, 1 water closet
Nurses Rooms: (46) 1 lavatory (each)

General Construction:

Strip steel frame; concrete floor slabs; 4 inch brick veneer wall.

Foundations:

Soil pressure 2000 lbs. per sq. ft.

Finishes:

Floors, ceramic tile in toilets, cement in storage rooms, etc., and asphalt tile elsewhere. Plaster walls and ceilings painted. Wood windows and asbestos shingle roof.

Design Loads:

Roof - Live load 20 lbs. per sq. ft.
First floor - Live load 75 lbs. per sq. ft.
Wind - 30 lbs. per sq. ft.

E-5.04. Family Hospital: Two story "T" shaped building with partial basement.

Ground Area Covered	175' x 231'
Basement Floor Area	185 sq. ft.
First Floor Area	15,096 sq. ft.
Second Floor Area	13,952 sq. ft.
Penthouse Floor Area	515 sq. ft.
Total Floor Area	29,748 sq. ft.
Cubic Contents	443,022 cu. ft.

The basement is designed to house the mechanical equipment including transformers, steam equipment, blowers and elevator pit.

The first floor contains the administrative offices, examining and treatment rooms, the laboratories, galley and food preparation areas, a dining room for nurses, a delivery suite and six rooms for obstetrical patients.

The second floor contains the operating suite, childrens wards, and twenty-five rooms for patients.

The penthouse contains air conditioning equipment and elevator machinery.

Design data as follows:

First Floor:

Lobby, Waiting Room, Corridors, stairs and elevator		3096 sq. ft.
Record Office and Storage		306 sq. ft.
Doctors Offices and Treatment Rooms		2302 sq. ft.
X-Ray and Dark Room		243 sq. ft.
Laboratory and Storage		198 sq. ft.
Nurses Dining Room		315 sq. ft.
Galley		881 sq. ft.
Storage and Refrigeration		315 sq. ft.
Laundry		159 sq. ft.
Cooks Bed Room, Closet and Bath		200 sq. ft.
Pharmacy and Drug Vault		198 sq. ft.
Patients Rooms & Closets (6 each)		877 sq. ft.
Delivery Suite		1240 sq. ft.
Delivery Room	207 sq. ft.	
Labor Room	180 sq. ft.	

Sterilizing	45 sq. ft.	
Scrub Up	32 sq. ft.	
Nursery	234 sq. ft.	
Preparation Room	104 sq. ft.	
Formula Room	72 sq. ft.	
Isolation Room	56 sq. ft.	
Toilet	28 sq. ft.	
Circulation	282 sq. ft.	
Total		1240 sq. ft.
Utility Room		96 sq. ft.
Diet Kitchen		140 sq. ft.
Nurses Stations		126 sq. ft.
Toilets and Gear Rooms		558 sq. ft.
Closet and Storage		172 sq. ft.
Machine Room		290 sq. ft.
Sun Room		418 sq. ft.
Porches		938 sq. ft.
Terrace		507 sq. ft.

Second Floor:

Corridors, Stairs and Elevator		3288 sq. ft.
Sun Rooms (2)		781 sq. ft.
Patient Rooms (25)		3617 sq. ft.
Patients Closets (25)		275 sq. ft.
Childrens Ward (8 beds)		522 sq. ft.
Surgical Dressing Room		164 sq. ft.
Diet Kitchens (2)		304 sq. ft.
Utility Rooms (2)		280 sq. ft.
Nurses Station		88 sq. ft.
Toilets, Baths and Gear		989 sq. ft.
Storage and Closets		336 sq. ft.
Operating Suite		
Operating Room	360 sq. ft.	
Scrub Up Room	48 sq. ft.	
Sterilizing Rooms	172 sq. ft.	
Operating and Fracture	238 sq. ft.	
Examining Room	126 sq. ft.	
Recovery Room	217 sq. ft.	
Sterile Supply Rm.	360 sq. ft.	
Surgeons Dressing Room	140 sq. ft.	
Nurses Dressing Station	64 sq. ft.	
Total		1725 sq. ft.

Toilets and Baths:

First Floor:

Labor Room Toilet: 1 water closet, 1 lavatory
Patients Baths (3): 1 water closet, 1 lavatory, 1 shower (each)
Nurses Toilet: (2) 1 water closet, 1 lavatory (each)
Doctors Office Toilets (3): 1 water closet, 1 lavatory (each)
Mens Toilet: 1 water closet, 1 lavatory, 1 urinal
Womens Toilet: 1 water Closet, 1 lavatory
Cooks Bath: 1 water closet, 1 lavatory, 1 shower
Helps' Toilet (men): 1 water closet, 1 lavatory, 1 urinal
Helps' Toilet (women): 1 water closet, 1 lavatory

Second Floor:

Patients Baths (10): 1 water closet, 1 lavatory, 1 shower (each)
Patients Bath (3): 1 water closet, 1 lavatory, 1 tub (each)
Childrens Bath and Toilet: 1 water closet, 1 lavatory, 1 shower, 1 tub
Nurses Toilet: 1 water closet, 1 lavatory
Surgeons Dressing Room: 1 water closet, 1 lavatory, 1 shower
Nurses Dressing Room: 1 water closet, 1 lavatory

General Construction:

Reinforced concrete frame up to second floor with 12½" brick bearing walls above; wood roof trusses; first floor curtain walls, 12½" brick and tile; concrete floor slabs.

Foundations:

Concrete foundation walls and footings
Soil pressures 2000 lbs. per sq. ft. except at elevator pit where it was reduced to 1500 lbs. per sq. ft.

Finishes:

Floors, terrazzo in lobby, operating suites etc., linoleum in corridors, cement in storage rooms, etc., tile in toilets, asphalt tile elsewhere. Painted plaster walls; painted concrete or plaster ceilings, wood windows, asbestos shingle roof.

Design Loads:

Roof - Live load 20 lbs. per sq. ft. plus concentrated loads of 125 lbs. at lower chord roof truss panel points.
Floors--Live load 75 lbs. per sq. ft.

E-5.04 FAMILY HOSPITAL

E-5.12 CORPSMEN'S BARRACKS

E-5.05. Civilian Nurses Home: Two story irregular shaped building.

Ground Area Covered	78' x 64'
First Floor Area	2891 sq. ft.
Second Floor Area	3028 sq. ft.
Total Floor Area	6099 sq. ft.
Cubic Contents	83,465 cu. ft.

Design data as follows:

First Floor:

Corridors, Stairs and Reception Rm.	607 sq. ft.
Living Room	372 sq. ft.
Kitchen	113 sq. ft.
Head Nurses Room	154 sq. ft.
Nurses Home (5)	799 sq. ft.
Toilets and Bath Rooms	252 sq. ft.
Closets and Storage	125 sq. ft.

Second Floor:

Corridors and Stairs	550 sq. ft.
Nurses Rooms (7)	1264 sq. ft.
Sewing Room	137 sq. ft.
Toilets and Bath Rooms	200 sq.ft.
Closets and Storage	598 sq. ft.

Baths and Toilets:

First Floor:

Head Nurses Bath: 1 water closet, 1 lavatory, 1 tub
Mens Toilet: 1 water closet, 1 lavatory
Bath: 2 water closets, 2 lavatories, 2 showers
Nurses Bed Rooms (5): 1 lavatory (each)

Second Floor:

Bath: 2 water closets, 2 lavatories, 2 showers
Nurses Bed Rooms (7): 1 lavatory (each)

General Construction:

Wood frame, wood floors, 4" brick veneer walls up to second floor with wood siding above.

Foundations:

Concrete
Soil pressure 2000 lbs. per sq. ft.

Finishes:

Wood floors, plaster walls, and ceilings, painted
Wood windows, asbestos shingle roof.

Design Loads:

Roof - Live load 20 lbs. per sq. ft.

E-5.06. Medical Warehouse: One story rectangular shaped building.

Ground Area Covered	74' x 224'
Floor Area	14,640 sq. ft.
Cubic Contents	223,252 cu. ft.

Design data as follows:

Loading Platform	1440 sq. ft.
Medical Storage	3692 sq. ft.
General Storage	5691 sq. ft.
Bag Storage	1600 sq. ft.
Blanket Storage	173 sq. ft.
Narcotics Vault	152 sq. ft.
Alcohol Vault	171 sq. ft.
Cold Room	72 sq. ft.
Office	198 sq. ft.
Autopsy Room	480 sq. ft.
Mortuary Refrigerator	100 sq. ft.
Machine Room	85 sq. ft.
Toilets	152 sq. ft.
Closet	13 sq. ft.

Toilets and Baths:

Officers Toilet: 1 water closet, 1 lavatory
Mens Toilet: 2 water closets, 1 lavatory, 1 urinal
Bath: 1 water closet, 1 lavatory, 1 shower

General Construction:

Reinforced concrete building with concrete floor slabs and loading platform.

Foundations:

Concrete foundation walls and footings.

Finishes:

Office floor asphalt tile, autopsy room terrazzo, toilets tile other floors cement. Walls painted plaster or unfinished brick. Plaster ceilings except in storage spaces which are unfinished. Steel windows, built up roof.

Design Loads:

Platform - Live load 250 lbs. per sq. ft.

E-5.07. Garage: One story rectangular shaped building

Ground Area Covered	49' x 120'
Floor Area	5260 sq. ft.
Cubic Contents	76,503 cu. ft.

Design data as follows:

Garage	4225 sq. ft.
Storage	478 sq. ft.
Office	172 sq. ft.
Toilets and Wash Rooms	120 sq. ft.

Office Toilet: 1 water closet, 1 lavatory
Wash Room: 1 water closet, 1 lavatory, 1 urinal, 1 shower

General Construction:

Reinforced concrete building with 8" brick curtain walls; concrete floor slab.

Foundations:

Concrete foundation walls and footings
Soil pressure 2000 lbs. per sq. ft.

Finishes:

Floors, asphalt tile in office, terrazzo in toilet, cement elsewhere, walls painted plaster in office and toilet, painted brick elsewhere. Painted plaster ceilings in office and toilet, painted concrete elsewhere. Steel windows, built up roof.

Design Loads:

Roof - Live load 20 lbs. per sq. ft.

E-5.08. Shop Buildings: One story rectangular shaped building.

Ground Area Covered	39' x 109'
Floor Area	4202 sq. ft.
Cubic Contents	62,487 cu. ft.

Design data as follows:

Office	145 sq. ft.
Carpentry Shop	1967 sq. ft.
Paint Shop	633 sq. ft.
Plumbing Shop	650 sq. ft.
Electric Shop	292 sq. ft.
Stock Room	172 sq. ft.
Toilet	78 sq. ft.

Toilet: 1 water closet, 1 urinal, 1 lavatory, 1 shower

General Construction:

Strip steel roof trusses on 8" brick bearing walls; concrete floor slab.

Foundations:

Concrete foundation walls and footings
Soil pressure 2000 lbs. per sq. ft.

Finishes:

Floors, office asphalt tile, toilet terrazzo, cement elsewhere. Walls painted brick or plaster. Painted plaster ceilings. Steel windows, asbestos shingle roof.

Design Loads:

Roof - Live load 20 lbs. per sq. ft. plus 250 lbs. concentrated load at center.
Wind - 30 lbs. per sq. ft.

E-5.09. Heating Plant: One story rectangular shaped building.

Ground Area Covered	37' x 82'
Floor Area	2840 sq. ft.
Cubic Contents	67,894 cu. ft.

Design data as follows:

Boiler Room	2415 sq. ft.
Office	112 sq. ft.
Toilet	57 sq. ft.
Closet	10 sq. ft.
Platform over Office & Toilet	198 sq. ft.

Toilet: 1 water closet, 1 lavatory, 1 shower

General Construction:

Reinforced concrete frame with 12" brick curtain walls; concrete floor slabs.

Foundations:

Concrete foundation walls on wall footings and column footings.
Soil pressure 2000 lbs. per sq. ft.

Finishes:

Cement floors, painted brick walls, painted concrete ceiling.
Steel windows, built up roof.

E-5.09 NAVAL HOSPITAL - HEATING PLANT AND LAUNDRY

E-5.11

E-5.18 NAVAL HOSPITAL - TRANSFORMER BUILDING

Design Loads:

Roof - Live load 20 lbs. per sq. ft.
Wind - 20 lbs. per sq. ft.

E-5.10 Warehouse: One story rectangular shaped building.

Ground Area Covered	39' x 109'
Floor Area	4202 sq. ft.
Cubic Contents	61,980 cu.ft.

Design data as follows:

Storage Room	4007 sq. ft.

General Construction:

Strip steel roof trusses on 8" brick bearing walls; concrete floor slab and loading platform.

Foundations:

Concrete foundation walls on wall footings
Soil pressure 2000 lbs. per sq. ft.

Finishes:

Cement floors, unfinished walls, painted plaster ceiling.
Steel windows, asbestos shingle roof.

Design Loads:

Roof - Live load 20 lbs. per sq. ft. plus 250 lbs. concentrated load.

E-5.11. Laundry: One story rectangular shaped building.

Ground Area Covered	62' x 136'
Floor Area	7904 sq. ft.
Cubic Contents	135,297 cu. ft.

Design data as follows:

Receiving Area	300 sq. ft.
Working Area	5223 sq. ft.
Sorting and Delivery	707 sq. ft.
Infected Room	100 sq. ft.
Disinfected Room	154 sq. ft.
Mechanical Room	206 sq. ft.
Office	137 sq. ft.

Office Toilet	52 sq. ft.
White Women's Toilet	61 sq. ft.
Colored Men's Toilet	179 sq. ft.
Colored Women's Toilet	234 sq. ft.
Storage	161 sq. ft.

Toilets:

Office: 1 water closet, 1 lavatory
White Women: 1 water closet, 1 lavatory
Colored Men: 1 water closet, 2 urinals, 3 lavatories, 1 shower
Colored Women: 3 water closets, 3 lavatories

General Construction:

Reinforced concrete frame with 8" brick curtain walls. Concrete floor slabs.

Foundations:

Concrete foundation walls and wall footings
Soil pressure 2000 lbs. per sq. ft.

Finishes:

Cement floors, painted brick or plaster walls painted plaster ceilings. Steel windows, built up roof.

Design Loads:

Roof - Live load 20 lbs. per sq. ft.
Monorail - 3000 lbs.
Wind - 30 lbs. per sq. ft.

E-5.12 Corpsmen's Barracks: Two story H shaped building.

Ground Area Covered	105' x 171'
First Floor Area	11,410 sq. ft.
Second Floor Area	9396 sq. ft.
Total Floor Area	20,806 sq. ft.
Cubic Contents	248,177 cu. ft.

Design data as follows:

First Floor Porches	1390 sq. ft.
Corridors and Stair Halls	1254 sq. ft.
Lounge	983 sq. ft.
Game Room	278 sq. ft.
Dormitories (4)	4076 sq. ft.

Bed Rooms (8)	1088 sq. ft.
Toilets, Baths and Gear	830 sq. ft.
Closets and Storage	416 sq. ft.

Second Floor:

Corridors and Stair Halls	1154 sq. ft.
Reading Room	569 sq. ft.
Scrub Deck	278 sq. ft.
Dormitories (4)	4076 sq. ft.
Bed Rooms (8)	1088 sq. ft.
Toilets, Baths and Gear	830 sq. ft.
Closets and Storage	384 sq. ft.

Toilet and Baths:

Toilets, Baths and Wash Rooms (4), 3 water closets, 3 urinals, 6 lavatories, 3 showers (each)
Connecting Baths (8) 1 water closet, 1 lavatory, 1 shower (each)

Dormitories: 12 men each	96 men single deck
or	192 men double deck
Single Deck Equals	85 sq. ft. per bed
or	765 cu. ft. per bed
1 Shower Head per	8 men
1 Urinal for	8 men
1 Water Closet for	8 men
1 Lavatory for	4 men

General Construction:

Strip steel frame, concrete floor slabs; 4" brick veneer walls

Foundations:

Concrete foundation walls and footings
Soil pressure 2000 lbs. per sq. ft.

Finishes:

Floors, tile in toilets, cement in storage rooms etc., asphalt tile elsewhere, painted plaster walls and ceilings. Wood windows, asbestos shingle roof.

Design Loads:

Roof - Live load 20 lbs. per sq. ft.
First and Second floors - Live load 75 lbs. per sq. ft.
Wind - 30 lbs. per sq. ft.

E-5.13 Officers Quarters: Two story, part one story, building of irregular shape.

Ground Area Covered	34' x 68'
First Floor Area	1566 sq. ft.
Second Floor Area	1025 sq. ft.
Total Floor Area	2591 sq. ft.
Cubic Contents	29,867 cu. ft.

Design data as follows:

First Floor:

Porches	189 sq. ft.
Living Room	306 sq. ft.
Dining Room	196 sq. ft.
Kitchen	131 sq. ft.
Heater Room	45 sq. ft.
Bed Room	226 sq. ft.
Bath	45 sq. ft.
Hall and Stairs	176 sq. ft.
Closets	38 sq. ft.

Second Floor:

Hall and Stairs	109 sq. ft.
Bed Rooms (3)	580 sq. ft.
Baths (2)	101 sq. ft.
Closets	68 sq. ft.

Baths:

First Floor: 1 water closet, 1 lavatory, 1 tub with shower over
Second Floor: 1 water closet, 1 lavatory, 1 shower
Second Floor: 1 water closet, 1 lavatory, 1 tub shower over

General Construction:

Wood frame; wood floors and siding

Foundations:

Brick and concrete

Finishes:

Wood floors, painted plaster walls and ceilings. Wood windows, asbestos shingle roof.

Design Loads:

Roof - Live load 20 lbs. per sq. ft.

E-5.14 Warrant Officers Quarters: One story irregular building.

Ground Area Covered	57' x 58'
Floor Area	1895 sq. ft.
Cubic Contents	22,640 cu. ft.

Design data as follows:

Porches	225 sq. ft.
Halls	126 sq. ft.
Living Room	284 sq. ft.
Dining Room	184 sq. ft.
Kitchen	140 sq. ft.
Bed Rooms (3)	496 sq. ft.
Bath	58 sq. ft.
Closets and Storage (7)	89 sq. ft.

Bath: 1 water closet, 1 lavatory, 1 tub with shower over

General Construction:

Wood frame; wood floors and siding

Foundations:

Brick foundation walls and piers on concrete footings

Finishes:

Wood floors, painted plaster walls and ceilings. Wood windows, asbestos shingle roof.

Design Loads:

Roof - Live load 20 lbs. per sq. ft.

E-5.15 Bachelor Officer Quarters: Two story, part one story, part basement irregular building.

Ground Area Covered	67' x 237'
Basement Floor Area	371 sq. ft.
First Floor Area	8412 sq. ft.
Second Floor Area	7905 sq. ft.
Total Floor Area	16,688 sq. ft.
Cubic Contents	237,955 cu. ft.

Design data as follows:

Basement, Boiler Room and Cold Storage	371 sq. ft.

First Floor:

Reception Hall	472 sq. ft.
Public Lounge	686 sq. ft.
Private Lounge	222 sq. ft.
Powder Room	79 sq. ft.
Corridors, and Stair Halls	1083 sq. ft.
Dining Room	1216 sq. ft.
Galley	544 sq. ft.
Galley Storage	228 sq. ft.
Refrigerator Room	49 sq. ft.
Compressor Room	34 sq. ft.
Cooks Bed Room	137 sq. ft.
Cooks Bath	27 sq. ft.
Stewards Room	125 sq. ft.
Stewards Bath	27 sq. ft.
Trunk Room	170 sq. ft.
Bed Rooms (10)	1730 sq. ft.
Toilets and Wash Room	137 sq. ft.
Closets and Storage (17)	165 sq. ft.

Second Floor:

Corridors and Stair Halls	1460 sq. ft.
Bed Rooms (26)	4498 sq. ft.
Toilet and Wash Room (2)	306 sq. ft.
Trunk Room	304 sq. ft.
Closets and Storage	297 sq. ft.

Baths, First Floor:

Toilet and Wash: 2 water closets, 2 urinals, 1 lavatory
2 showers
Stewards Bath: 1 water closet, 1 shower
Cooks Bath: 1 water closet, 1 shower
Powder Room: 1 water closet, 1 lavatory
All Bed Rooms: 1 lavatory each

Second Floor:

Toilets and Wash Rooms (2): 3 water closets, 2 urinals, 1 lavatory, 2 showers (each)
All Bed Rooms: 1 lavatory each

General Construction:

Wood frame; wood floors; 4" brick veneer walls

Foundations:

Concrete foundation walls and footings
Soil pressure 2000 lbs. per sq. ft.

Finishes:

Cement floors in galley, storage rooms, refrigeration rooms, etc., asphalt tile or ceramic tile in toilets, wood elsewhere . Walls and ceilings painted plaster. Wood windows, asbestos shingle roof.

Design Loads:

Roof - Live load 20 lbs. per sq. ft.
Floors - Live load 100 lbs. per sq. ft. in public rooms and work rooms; 40 lbs. per sq. ft. in bedrooms.

E-5.16 Servants Quarters for Men: One story rectangular building.

Ground Floor Area	51' x 184'
Floor Area	5310 sq. ft.
Cubic Contents	84,278 cu. ft.

Design data as follows:

Living Rooms (2)	584 sq. ft.
Bed Rooms (4)	476 sq. ft.
Dormitory (asst. cooks) 11 beds single deck	1026 sq. ft.
Dormitory 17 beds single deck	1582 sq. ft.
Toilet and Wash Room	425 sq. ft.
Closets and Storage	124 sq. ft.
Boiler Room	227 sq. ft.
Hall	80 sq. ft.
Porch	436 sq. ft.

Toilet and Wash Room: 4 water closets, 4 urinals, 4 showers, 6 lavatories, 1 service sink

General Construction:

Wood frame, wood floors, asbestos cement shingle siding.

Foundations:

Concrete block piers and concrete footings
Soil pressure 2000 lbs. per sq. ft.

Finishes:

Cement floors in toilet rooms, storage rooms etc., wood floors elsewhere. Painted plaster walls and ceilings. Wood windows, asbestos shingle roof.

Design Loads:

Roof - Live load 20 lbs. per sq. ft.
Wind - 30 lbs. per sq. ft.

E-5.17 Servants Quarters for Women: One story U-shaped building.

Ground Area Covered	57' x 122'
Floor Area	6306 sq. ft.
Cubic Contents	99,368 cu. ft.

Design data as follows:

Living Rooms (2)	770 sq. ft.
Corridors	936 sq. ft.
Sewing Room	123 sq. ft.
Laundry	95 sq. ft.
Bed Room (20) 2 beds each	2696 sq. ft.
Baths (2)	526 sq. ft.
Boiler Room	216 sq. ft.
Closets and Storage	251 sq. ft.

Baths (2): 4 water closets, 6 lavatories, 4 showers each

General Construction:

Wood frame; wood floors; asbestos cement shingle siding

Foundations:

Concrete block piers and concrete footings
Soil pressure 2000 lbs. per sq. ft.

Finishes:

Cement floors in toilet and boiler rooms, wood floors elsewhere. Painted plaster walls and ceilings. Wood windows, asbestos shingle roof.

Design Loads:

Roof - Live load 20 lbs. per sq. ft.
Wind - 30 lbs. per sq. ft.

E-5.18 Transformer Buildings: One story rectangular building, manhole below.

Ground Area Covered	12' x 21'
Floor Area	168 sq. ft.
Cubic Contents	2652 cu. ft.

Design data as follows:

Manhole	51 sq. ft.
Transformer Room	120 sq. ft.

General Construction

Wood roof on 12½" brick bearing walls; concrete floor slab.

Foundations:

Concrete foundations walls and wall footings
Soil pressure 1300 lbs. per sq. ft.

Finishes:

Cement floor, unfinished walls.
Wood windows, asbestos shingle roof.

Design Loads:

Roof - Live load 20 lbs. per sq. ft.

E-6. Residential Area:

E-6.01 Location: This area is situated northwest of the Division Training Area beyond Hadnot Point the site of the Naval Hospital and includes the following number and types of buildings:

180 Married Officers Quarters
8 Bachelor Officers Quarters
1 Officers Recreation Building combined with Bachelor Officers Mess Hall
1 Guest House
1 Servants Quarters for Men
1 Servants Quarters for Women
1 Firehouse

Additional utility buildings are covered in the chapters on the various utilities.

E-6.02 Married Officers Quarters: Two story building, rectangular in shape with one story wing at one side and porch at other. Plan of all buildings alike, with ten different elevation designs.

Ground Floor Area	36' x 71'
First Floor Area	1640 sq. ft.
Second Floor Area	1016 sq. ft.
Total Floor Area	2656 sq. ft.
Cubic Contents	29,937 cu. ft.

Design data as follows:

E-6.02

MARRIED OFFICERS QUARTERS

E-6.02

MARRIED OFFICERS QUARTERS GROUP

First Floor:

Porches	208 sq. ft.
Hall and Stairs	116 sq. ft.
Living Room	305 sq. ft.
Dining Room	200 sq. ft.
Heater Room	44 sq. ft.
Lavatory	28 sq. ft.
Servants Quarters (bed rm., bath, closet)	126 sq. ft.
Garage	112 sq. ft.

Second Floor:

Hall and Stairs	104 sq. ft.
Bed Rooms (3)	594 sq. ft.
Closets	69 sq. ft.
Baths (2)	105 sq. ft.

General Construction:

Wood frame; wood floors and siding

Foundations:

Brick foundation walls on concrete wall footings.

Finishes:

Floors, tile in bathrooms, cement in heater and store rooms, wood elsewhere. Walls and ceilings painted plaster, wood windows, tile roof.

E-6.03 Bachelor Officers Quarters: Two story rectangular building with projections front and rear.

Ground Area Covered	58' x 208'
First Floor Area	7346 sq. ft.
Second Floor Area	6841 sq. ft.
Total Floor Area	14,187 sq. ft.
Cubic Contents	189,816 cu. ft.

Design data as follows:

First Floor:

Corridors, Entries and Reception Room	1710 sq. ft.
Toilets, Wash Rooms and Gear	378 sq. ft.
Trunk Room	164 sq. ft.

E-6.03

BACHELOR OFFICERS QUARTERS

E-6.05

GUEST HOUSE

Storage Closets	200 sq. ft.
Public Lounge	767 sq. ft.
Private Lounge	260 sq. ft.
Bed Rooms (17 Officers and 1 Steward)	2720 sq. ft.
Bed Room Closets	135 sq. ft.

Second Floor:

Corridors and Stairs	1262 sq. ft.
Toilets, Wash Room and Gear	287 sq. ft.
Linen Closet	62 sq. ft.
Trunk Room	288 sq. ft.
Bed Rooms (22 officers)	3811 sq. ft.
Bed Room Closets	173 sq. ft.

Toilets and Baths:

First Floor:

Officers Toilet & Wash Rooms (2): 2 water closets, 2 showers
2 urinals, 1 lavatory, 1 service sink (each)
Ladies Toilet: 1 water closet, 1 lavatory
Stewards Bath: 1 water closet, 1 shower

Second Floor:

Officers Toilet and Wash Rooms (2): 3 water closets, 2 showers, 2 urinals, and 1 lavatory (each)

One lavatory in each bed room first and second floor.

General Construction:

Wood frame; wood floors; 4" brick veneer walls

Foundations:

Concrete walls piers and footings
Soil pressure 1000 or 2000 lbs. per sq. ft.

Finishes:

Floors, tile in toilets and wash rooms, wood elsewhere. Painted plaster walls and ceilings. Wood windows, tile roof.

Design Loads:

Roof - Live load 20 lbs. per sq. ft.
Wind - 30 lbs. per sq. ft.

E-6.04 Officers Recreation Building combined with Bachelor Officers Mess Hall: One story, part two story, irregular building.

Ground Area Covered	225' x 357'
First Floor Area	32,250 sq. ft.
Second Floor Area	1242 sq. ft.
Total Floor Area	33,492 sq. ft.
Cubic Contents	701,211 cu. ft.

Design data as follows:

Lobby, Corridors and Passages	3275 sq. ft.
Stairs	50 sq. ft.
Coat Room	275 sq. ft.
Telephone Alcove	116 sq. ft.
Office and Information	297 sq. ft.
B. O. Mess Hall	6350 sq. ft.
Public Dining Room	4756 sq. ft.
Bar	2596 sq. ft.
Bar Storage	350 sq. ft.
Lounge	2290 sq. ft.
Card Rooms	1235 sq. ft.
Toilets	646 sq. ft.
Galley, Scullery, and Chefs' Office	4005 sq. ft.
Galley Storage	1431 sq. ft.
Cold Storage	327 sq. ft.
Garbage	119 sq. ft.
Preparation Rooms	396 sq. ft.
Office	129 sq. ft.
Helps Toilet and Locker Rooms	506 sq. ft.
Gear Rooms	75 sq. ft.
Transformer Room	120 sq. ft.
Refrigerator Machine Room	114 sq. ft.
Boiler Room	1326 sq. ft.

Second Floor:

Telephone Exchange	635 sq. ft.
Office	290 sq. ft.
Stairs and Corridor	317 sq. ft.

Toilets:

Mens Toilet: 4 water closets, 5 urinals, 1 shower, 8 lavatories
Womens Toilet: 4 water closets, 4 lavatories
White Mens (help): 1 water closet, 1 lavatory
Colored Mens (help: 2 water closets, 2 urinals, 4 lavatories, 1 shower
Colored Womens (help): 1 water closet, 2 lavatories

E-6.04 OFFICERS RECREATION BUILDING & BACHELOR OFFICERS MESS
(FRONT VIEW)

R-6.04 OFFICERS RECREATION BUILDING & BACHELOR OFFICERS MESS
(REAR VIEW)

General Construction:

Wood roof on 8" brick bearing walls wood floors.

Foundations:

Concrete foundation walls and footings.

Finishes:

Floors, terrazzo in bar room, ceramic tile in toilet rooms, asphalt tile in corridors, card rooms office etc., cement in galley, etc. wood or wood block elsewhere. Painted plaster walls and ceilings. Wood windows, tile roof.

Design Loads:

Roof - Live loads 20 lbs. per sq. ft.
Wind - 30 lbs. per sq. ft.

E-6.05 Guest House: Two story rectangular building with wing at both ends and small basement.

Ground Area Covered	42' x 57'
Basement Floor Area	95 sq. ft.
First Floor Area	1532 sq. ft.
Second Floor Area	1532 sq. ft.
Total Floor Area	3159 sq. ft.
Cubic Contents	38,460 cu. ft.

Design data as follows:

First Floor:

Living Room	352 sq. ft.
Hall and Stairs	127 sq. ft.
Bed Rooms (3)	596 sq. ft.
Baths (2)	85 sq. ft.
Closets	40 sq. ft.

Second Floor:

Hall and Stairs	185 sq. ft.
Bed Rooms (4)	854 sq. ft.
Baths (3)	150 sq. ft.
Closets	83 sq. ft.

Each bath contains: 1 water closet, 1 lavatory, 1 tub or shower

General Construction:

Wood frame with 4" brick veneer walls wood floors

Foundations:

Concrete foundation walls and footings

Finishes:

Tile floors in bathrooms, wood elsewhere. Wood panelled walls in living room, painted plaster elsewhere. Ceilings painted plaster, wood windows, tile roof.

E-6.06 Servants Quarters for Men: One story rectangular building.

Ground Area Covered	40' x 164'
Floor Area	4113 sq. ft.
Cubic Contents	66,002 cu. ft.

Design data as follows:

Living Rooms (2)	576 sq. ft.
Dormitories (2)	2714 sq. ft.
Storage Rooms	88 sq. ft.
Closets	66 sq. ft.
Toilets, Showers & Wash Room	422 sq. ft.
Porches	171 sq. ft.

Toilet, Showers and Wash Room: 3 water closets, 3 urinals, 3 showers, 6 lavatories, 1 service sink

General Construction:

Wood frame; wood floors; asbestos shingle siding

Foundations:

Concrete walls, piers and footings
Soil pressure 2000 lbs. per sq. ft.

Finishes:

Wood floors in corridors and bed rooms, cement elsewhere. Plaster walls and ceiling. Wood windows, asbestos shingle roof.

Design Loads:

Roof - Live load 20 lbs. per sq. ft.
Wind - 30 lbs. per sq. ft.

E-6.07 Servants Quarters for Women: One story rectangular building.

Ground Area Covered	35' x 71'
Floor Area	1840 sq. ft.
Cubic Contents	27,969 cu. ft.

Design data as follows:

Living Room	300 sq. ft.
Corridor	197 sq. ft.
Bed Rooms (6)	808 sq. ft.
Storage and Linen Closet	85 sq. ft.
Toilet and Wash Room	183 sq. ft.
Porches	72 sq. ft.

Toilet and Wash Room: 2 water closets, 2 lavatories, 1 shower, 1 service sink

General Construction:

Wood frame; wood floors; asbestos cement shingle siding

Foundations:

Concrete walls piers and footings
Soil pressure 2000 lbs. per sq. ft.

Finishes:

Wood floors in dormitories, cement floors elsewhere. Plaster walls and ceilings. Wood windows asbestos shingle roof.

Design Loads:

Roof - Live load 20 lbs. per sq. ft.
Wind - 30 lbs. per sq. ft.

E-6.08 Firehouse: Similar to type described under Post Troops Area.

E-7 Rifle Range Area:

E-7.01 Location: This area is situated across New River and southwest of Division Training Area and includes the following number and types of buildings:

4 Barracks
1 Mess Hall
4 Battalion Warehouses
1 Regimental Theater
1 Regimental Infirmary
1 Post Exchange

1 Armory and Office Building
1 Heating Plant
3 Target Houses (Rifle Range)
2 Target Houses (Pistol Range)
1 Firing Line Shelter (Pistol Range)
4 Range Houses
4 Magazines
9 Toilet Buildings
5 Married Officers Quarters
1 Bachelor Officers Quarters

Additional utility buildings are covered in the chapters on the various utilities.

E-7.02 Barracks, Mess Hall, Battalion Warehouses, Regimental Theater, Regimental Infirmary and Post Exchange are similar to type as described under Division Training Area.

E-7.03 Armory and Office Building: Two story H shaped building.

Ground Area Covered	117' x 162'
First Floor Area	9357 sq. ft.
Second Floor Area	9357 sq. ft.
Total Floor Area	18,714 sq. ft.
Cubic Contents	232,666 cu. ft.

Design data as follows:

First Floor:

Corridors and Stairs	937 sq. ft.
Armory	2824 sq. ft.
Toilets	350 sq. ft.
Telephone Room	81 sq. ft.
Supply Room	72 sq. ft.
Closets	54 sq. ft.
Offices (6)	1357 sq. ft.
Store Room	2824 sq. ft.

Second Floor:

Corridors and Stairs	94 sq. ft.
Supply Room	105 sq. ft.
Toilets	350 sq. ft.
Offices (7)	1500 sq. ft.
Class Rooms (4)	5621 sq. ft.

Toilets:

Officers (1st and 2nd floors): 2 water closets, 2 urinals, 2 lavatories, 1 shower
Enlisted Mens (1st and 2nd floors): 3 water closets, 2 urinals, 3 lavatories, 1 service sink

General Construction:

Strip steel frame with 4" brick veneer walls concrete floor slabs.

Foundations:

Concrete foundation walls and footings.
Soil pressure 1000 lbs. per sq. ft.

Finishes:

Cement floors, painted plaster walls and ceiling. Steel windows, asbestos shingle roof.

Design Loads:

Roof - Live load 20 lbs. per sq. ft.
Wind - 30 lbs. per sq. ft.

E-7.04 Heating Plant: One story rectangular building.

Ground Area Covered	34' x 56'
Floor Area	1312 sq. ft.
Cubic Contents	40,674 cu. ft.

Design data as follows: One room housing 2 boilers and other equipment; 1 water closet and service sink placed in a corner behind screen partition.

General Construction:

Reinforced concrete frame with 12½" brick spandrel walls; concrete slab floors, 40' free standing brick stack.

Foundations:

Spread footings
Soil pressure 2000 lbs. per sq. ft.

Finishes:

Cement floors, unfinished walls. Steel windows, built-up roof.

Design Loads:

Roof - Live load 100 lbs. per sq. ft. on slab and 80 lbs. per sq. ft. on beams and girders.
Wind - 20 lbs. per sq. ft.

E-7.05 Target House (Rifle Range): One story rectangular in shape with platforms at both ends.

Ground Area Covered	21' x 90'
Floor Area	1862 sq. ft.
Cubic Contents	11,341 cu. ft.

Design data as follows:

Platforms	618 sq. ft.
Repair Room and Storage	1126 sq. ft.

General Construction:

Reinforced concrete roof on 8" brick bearing walls; concrete floor slab.

Foundations:

Concrete foundation walls and footings

Finishes:

Cement floor, unfinished walls and ceiling. Steel windows, built-up roof.

Design Loads:

Roof - Live load 20 lbs. per sq. ft.

E-7.06 Target House (Pistol Range): One story rectangular in shape.

Ground Area Covered	15' x 30'
Floor Area	443 sq. ft.
Cubic Contents	5360 cu. ft.

Design data as follows:

Repair Shop and Storage	406 sq. ft.

General Construction:

Wood frame and siding, concrete floor slab.

Foundations:

Concrete foundation walls and footings

Finishes:

Cement floor, unfinished walls, wood windows, asbestos shingle roof.

E-7.07 Firing Line Shelter (Pistol Range): One story rectangular in shape open on all sides except for control room at center.

Ground Area Covered	15' x 253'
Floor Area	3900 sq. ft.
Cubic Contents	22,959 cu. ft.

Design data as follows:

Control Room	53 sq. ft.
Open Shed	3830 sq. ft. Shed divided into 20 bays 12' center to center of posts.

General Construction:

Wood roof on wood columns

Foundations:

Concrete foundation walls and pedestals

Finishes:

Roll roofing.

E-7.08 Range Houses: One story rectangular in shape.

Ground Area Covered	30' x 41'
Floor Area	1222 sq. ft.
Cubic Contents	14,515 cu. ft.

Design data as follows:

Porch	415 sq. ft.
Statistical Office	114 sq. ft.
Toilets	210 sq. ft.
Storage	355 sq. ft.

Toilets:

Officers: 1 water closet, 1 urinal, 1 lavatory
Enlisted Men: 3 water closets, 4 urinals, 3 lavatories

3 Drinking fountains on porch

General Construction:

Wood roof on 8" brick bearing walls; concrete floor slab.

Foundations:

Concrete foundation walls and footings
Soil pressure 1500 lbs. per sq. ft.

Finishes:

Cement floors, masonry walls with glazed tile wainscoting, asbestos board ceilings. Steel windows, asbestos shingle roof.

Design Loads:

Roof - Live load 20 lbs. per sq. ft.
Wind - 30 lbs. per sq. ft.

E-7.09 Magazines: These buildings were not designed by Carr and J. E. Greiner Company, Bureau of Yards and Docks plans used.

E-7.10 Toilet Buildings: One story rectangular in shape. Those on range designed with pitched roof, those behind butts designed with flat roof.

Ground Area Covered	12' x 14'
Floor Area	162 sq. ft.
Cubic Contents	1658 cu. ft. on range
	1445 cu. ft. behind butts

Design data as follows:

Toilet Room	128 sq. ft.

2 water closets, 2 urinals, 1 lavatory, 1 drinking fountain

General Construction:

Wood roof (except at Butts where a concrete flat slab roof was used) on 8" brick bearing walls. Concrete floor slab.

Foundations:

Concrete foundation walls and footings
Soil pressure 1500 lbs. per sq. ft.

Finishes:

Cement floors, painted masonry walls, plaster ceiling, steel windows, asbestos shingle roof. (built-up roof where flat slab roof was used)

Design Loads:

Roof - Live load 20 lbs. per sq. ft.
Wind - 30 lbs. per sq. ft.

E-7.11 Married Officers Quarters and Bachelor Officers Quarters: Are similar to type described under Residential Area.

E-8 Barrage Balloon Battalion and Amphibian Base Area:

E-8.01 Location: This area is situated south of the Division Training Area at the site of the former village of Marines and includes the following number and types of buildings:

1 Battalion Headquarters Building
4 Barracks Buildings
1 Mess Hall
4 Battalion Warehouses
1 Post Exchange
1 Regimental Infirmary
1 Regimental Theater (Drill and Recreation Building)
8 Married Officers Quarters
2 Heating Plants
1 Administration Building
1 Barrage Balloon School Building
1 Balloon Building
1 Transportation Building
1 Storage and Supply Building
1 Field Operation Building
1 Tractor Storage Building
1 Machine Shop
1 Carpenter Shop

Additional utility buildings are covered in the chapters on the various utilities.

E-8.02 Battalion Headquarters Building, Barracks Buildings, Mess Hall, Battalion Warehouses, Post Exchange, Regimental Infirmary and Regimental Theater are similar to type described under Division Training Area.

E-8.03 Married Officers Quarters: Are similar to type described under Residential Area.

E-8.04 Heating Plant: Is similar to type described under Rifle Range.

E-8.05 School Heating Plant, Administration Buildings, Barrage Balloon School Building, Balloon Building, Transportation Building, Storage and Supply Building, Field Operation Building and Tractor Storage Building were not designed by Carr and J. E. Greiner Company.

E-8.06 Machine Shop: One story rectangular building.

Ground Covered	85' x 178'
Floor Area	13,611 sq. ft.
Cubic Contents	297,155 cu. ft.

Design data as follows:

Motor Repair Area	6974 sq. ft.
Dynamometer Test	1140 sq. ft.
Machine Shop	1130 sq. ft.
Parts and Supplies	1140 sq. ft.
Degreasing	380 sq. ft.
Propeller Shop	370 sq. ft.
Tractor Shop	760 sq. ft.
Battery Shop	370 sq. ft.
Office	285 sq. ft.
Office Toilet	45 sq. ft.
Wash Room	342 sq. ft.

Toilets:

Office Toilet: 1 water closet, 1 urinal, 1 lavatory
Wash Room: 2 water closets, 2 urinals, 4 lavatories

General Construction:

Reinforced concrete frame with concrete spandrel walls; concrete floor slabs.

Foundation:

Spread footings
Soil pressure 1500 or 2000 lbs. per sq. ft.

Finishes:

Floors, asphalt tile in office, cement elsewhere. Plaster walls and ceilings in offices and toilet rooms, plain concrete elsewhere. Steel windows, built-up roof.

Design Loads:

Roof - Live load 20 lbs. per sq. ft.
Wind - 30 lbs. per sq. ft.

E-8.07 Carpenter Shop: One story rectangular building.

Ground Area Covered	85' x 178'
Floor Area	13,611 sq. ft.
Cubic Contents	297,443 cu. ft.

Design data as follows:

Primary Work Space	7070 sq. ft.
Secondary Work Space	1450 sq. ft.
Work Area and Lumber Storage	2337 sq. ft.
Paint Shop	372 sq. ft.

Offices (3)	1052 sq. ft.
Office Toilets (2)	96 sq. ft.
Wash Room	355 sq. ft.
Boiler Room	372 sq. ft.

Toilets:

Office Toilets (2): 1 water closet, 1 urinal, 1 lavatory each
Wash Room: 2 water closets, 2 urinals, 4 lavatories

General Construction:

Reinforced concrete frame with concrete curtain walls; concrete floor slab.

Foundations:

Spread footings
Soil pressure 2000 lbs. per sq. ft.

Finishes:

Floors, asphalt tile in offices, cement elsewhere. Plaster or concrete walls. Plaster ceilings in offices and toilet rooms. Steel windows, built up roof.

Design Loads:

Roof - Live load 20 lbs. per sq. ft.
Wind - 30 lbs. per sq. ft.

E-9 Parachute Training Area:

E-9.01 Location: This area is situated northwest of Division Training Area and includes the following buildings:

3 Buildings under Parachute Towers
1 Parachute Training Building
1 Parachute Building
1 Heating Plant

Additional utility buildings are covered in the chapters on the various utilities.

E-9.02 Buildings Under Parachute Towers: Two story square buildings.

Ground Area Covered	35' x 35'
First Floor Area	1225 sq. ft.
Second Floor Area	1225 sq. ft.
Total Floor Area	2450 sq. ft.
Cubic Contents	32,346 cu. ft.

Design data as follows:

First Floor:

Machinery Room	898 sq. ft.
Transformer Room	101 sq. ft.
Storage Room	121 sq. ft.

Second Floor:

Office	81 sq. ft.
Drying Room	89 sq. ft.
Toilet	135 sq. ft.
Storage	810 sq. ft.

Toilets: 2 water closets, 4 urinals, 2 lavatories

General Construction:

Wood roof on 8" tile bearing walls, stuccoed; concrete floor slabs

Foundations:

Concrete foundation walls and spread footings
Soil pressure - 2000 lbs. per sq. ft.

Finishes:

Cement floors. Walls, painted plaster in drying tower, unfinished brick or tile elsewhere. Ceilings, unfinished concrete in machinery and storage rooms, plaster elsewhere. Steel windows, asbestos shingle roof.

Design Loads:

Roof - Live loads - 20 lbs. per sq. ft.
Wind - 30 lbs. per sq. ft.

E-9.03 Parachute Training Building: One story, portion two story, rectangular building.

Ground Area Covered	90' x 120'
First Floor Area	8670 sq. ft.
Second Floor Area	488 sq. ft.
Total Floor Area	9158 sq. ft.
Cubic Contents	385,573 cu. ft.

Design data as follows:

First Floor:

Recreation and Training Hall	7515 sq. ft.
Enlisted Mens Toilet	180 sq. ft.
Officers Toilet	106 sq. ft.
Storage Rooms (2)	192 sq. ft.
Stair Hall and Entrance Vestibules	252 sq. ft.

Second Floor:

Stairs	74 sq. ft.
Projection Room	193 sq. ft.
Generator Room	114 sq. ft.

Toilets:

Enlisted Mens: 2 water closets, 3 lavatories, one 8' urinal
Officers: 1 water closet, 2 lavatories, one 5' urinal

General Construction:

Wood frame

Foundations:

Grade beams on buttress footings and spread footings
Soil pressure 2000 lbs. per sq. ft.

E-9.04 Parachute Building: One story rectangular building.

Ground Area Covered	107' x 272'
Floor Area	29,024 sq. ft.
Cubic Contents	673,540 cu. ft.

Design data as follows:

Packing Room	18,522 sq. ft.
Parachute Storage	1279 sq. ft.
Rigger School and Work Shop	3324 sq. ft.
Drying Room	2454 sq. ft.
Shake Out Room	1213 sq. ft.
Supply Room	434 sq. ft.
Passages	488 sq. ft.
Toilets	421 sq. ft.
Office	175 sq. ft.
Closet	33 sq. ft.

Toilets:

Enlisted Mens: 4 water closets, 8 lavatories, two 6' urinals
Officers: 1 water closet, 1 lavatory

General Construction:

Wood frame

Foundations:

Concrete grade beams
Soil pressure 2000 lbs. per sq. ft.

Design Loads:

Roof - Live load 20 lbs. per sq. ft.
Wind - 20 lbs. per sq. ft.

E-9.05 Heating Plant: One story rectangular building.

Ground Area Covered	28' x 33'
Floor Area	562 sq. ft.
Cubic Contents	13,927 cu. ft.

Design data as follows:

Boiler Room	490 sq. ft.

In one corner of boiler room is a water closet enclosed by a wooden screen and a service sink.

General Construction:

Wood frame; wood siding; concrete floor slab; free standing brick stack, 36'-0" high

Foundations:

Concrete foundation walls and footings
Soil pressure 2000 lbs. per sq. ft.

Finishes:

Cement floor, unfinished walls. Wood windows, roll roofing

E-10 Glider Training Base:

E-10.01 Location: This base is located on the west side of New River west of the Residential Area, and includes the following number and types of buildings:

1 Administration Building
1 Operations Building
1 Utility Shop "A"
1 Carburetor Test Shop "B"
1 Nose Hangar "C"

1 Utility Shop "D"
1 Paint and Dope Storage Shed "E"
1 Heating Plant
1 Transformer House near Operations Building
1 Transformer House near Shop

Additional utility buildings are covered in the chapters on the various utilities.

E-10.02 Administration Building: One story rectangular building.

Ground Area Covered	62' x 96'
Floor Area	4488 sq. ft.
Cubic Contents	82,335 cu. ft.

Design data as follows:

Flight Control Room	305 sq. ft.
Corridor	338 sq. ft.
Squad Commanders Office	262 sq. ft.
Cadet Radio Room	315 sq. ft.
Cadet Ready Room	1013 sq. ft.
Locker Room	1005 sq. ft.
Parachute Issue Room	305 sq. ft.
Winter Flying Gear	150 sq. ft.
Toilets	226 sq. ft.

Toilets:

Officers Toilet: 1 water closet, 1 lavatory
Enlisted Mens Toilet: 3 water closets, 2 urinals, 4 lavatories, 1 service sink

General Construction:

Wood frame, wood siding and floors

Foundations:

Concrete piers and footings
Soil pressure 1000 lbs. per sq. ft.

Finishes:

Floors, cement in toilet rooms, wood elsewhere. Plaster walls and ceiling, wood windows, roll roofing.

Design Loads:

Roof - Live load 20 lbs. per sq. ft.
Floor - Live load 75 lbs. per sq. ft.

E-10.03 Operations Building: One story with two story control tower, rectangular building.

Ground Area Covered	59' x 75'
First Floor Area	3563 sq. ft.
Second Floor Area	289 sq. ft.
Total Area	3852 sq. ft.
Cubic Contents	63,498 cu.ft.

Design data as follows:

Operations Office	256 sq. ft.
Ready Room	640 sq. ft.
Bunk Room (10 Bunks)	576 sq. ft.
C.P.O's Bed Room	119 sq. ft.
Locker and Gear Rooms (2)	376 sq. ft.
Toilets	380 sq. ft.
Visiting Pilots Rooms (2)	266 sq. ft.
Officer of the Day	116 sq. ft.
Passages	76 sq. ft.
Heater Room	132 sq. ft.
Storage and Closets	127 sq. ft.

Second Floor:

Control Room	256 sq. ft.
Toilets (2): 2 water closets, 2 urinals, 2 lavatories, 2 showers each	

General Construction:

Wood frame, wood floors; 4" brick veneer walls

Foundations:

Concrete walls piers and footings
Soil pressure 2000 lbs. per sq. ft.

Finishes:

Floors cement in heater room, tile in toilet, wood elsewhere. Painted plaster walls and ceiling, wood windows, asbestos shingle roof.

Design Loads:

Roof - Live load 20 lbs. per sq. ft.
Wind - 30 lbs. per sq. ft.

E-10.04 Utility Shop "A": One story rectangular building.

Ground Area Covered	60' x 80'
Floor Area	4846 sq. ft.
Cubic Contents	101,892 cu. ft.

Design data as follows:

Machine Shop	628 sq. ft.
Parachute Shop	615 sq. ft.
Parachute Loft	228 sq. ft.
Propeller Shop	1124 sq. ft.
Storage	120 sq. ft.
Metal Shop	448 sq. ft.
Engine Accessories Test Area	896 sq. ft.
Radio, Electrical and Instrument Shop	313 sq. ft.
Ordinance Shop	313 sq. ft.

E-10.05 Carburetor Test Shop "B": One story square building.

Ground Area covered	12'4" x 12'4"
Floor Area	151 sq. ft.
Cubic Contents	1801 cu. ft.

Design data as follows:

Test Shop	137 sq. ft.

E-10.06 Nose Hangar "C": Two story rectangular building.

Ground Area Covered	70' x 116'
First Floor Area	6561 sq. ft.
Second Floor Area	2500 sq. ft.
Total Floor Area	9061 sq. ft.
Cubic Contents	133,155 cu. ft.

Design data as follows:

First Floor:

Hangar Area	1608 sq. ft.
Engine Storage Room	520 sq. ft.
Tool Room	512 sq. ft.
Locker Room (61 lockers)	240 sq. ft.
Toilet Room	145 sq. ft.
Stairs	60 sq. ft.
Service Area	2890 sq. ft.
Covered Passage	240 sq. ft.

Second Floor:

Service Platforms	2500 sq. ft.

Toilet: 3 water closets, 3 urinals, one 54" semi-circular lavatory

E-10.07 Utility Shop "D": One story rectangular building.

Ground Area Covered	31' x 68'
Floor Area	1401 sq. ft.
Cubic Contents	17,274 cu. ft.

Design data as follows:

Woodworking Shop	397 sq. ft.
Battery Shop	317 sq. ft.
Carbon Dioxide Shop	317 sq. ft.
Oxygen Shop	317 sq. ft.

E-10.08 Paint and Dope Storage Shed "E": One story square building.

Ground Area Covered	12' 4" x 12' 4"
Floor Area	151 sq. ft.
Cubic Contents	1801 cu. ft.

Design data as follows:

Storage Space	137 sq. ft.

E-10.09 Heating Plant: Is similar to type described under Parachute Training Area.

E-10.10 Transformer House near Operations Building: One story rectangular building.

Ground Area Covered	17' x 25'

Floor Area	377 sq. ft.
Cubic Contents	4338 cu. ft.

Design data as follows:

Transformer Room	300 sq. ft.

General Constructions:

Wood roof on 12" brick bearing walls, concrete floor slab

Foundations:

Concrete walls and footings

Finishes:

Cement floor, unfinished walls, wood windows, asbestos shingle roof.

E-10.11 Transformer House Near Shop: One story rectangular building.

Ground Area Covered	15' x 18'
Floor Area	206 sq. ft.
Cubic Contents	2335 cu. ft.

Design data as follows:

Transformer Room	150 sq. ft.

General Construction:

Wood roof on 12" brick bearing walls. Concrete floor slab.

Foundations:

Concrete walls and footings.

Finishes:

Cement floor, unfinished walls, wood windows, asbestos shingle roof

E-11 Tent Camp No. 1.

E-11.01 Location: This camp is located in the northwestern corner of the reservation on U. S. Highway No. 17 about 2 miles southwest of Jacksonville, N. C., and includes the following number and types of buildings:

2 Mess Halls
34 Small Warehouses
6 Large Warehouses
41 Enlisted Mens Wash Rooms
8 Officers Wash Rooms

1 Ice Storage Building
1 Hospital
1 Hospital Storehouse
1 Hospital Laboratory
1 Hospital Administration Building
1 Recreation Building
1 Chapel
1 Incinerator
1 Central Heating Plant
2 Open Side Sheds

Additional utility buildings are covered in the chapters on the various utilities.

E-11.02. Mess Halls: One story irregular building.

Ground Area Covered	227' x 257'
Floor Area	35,247 sq. ft.
Cubic Contents	588,131 cu. ft.

Design data as follows:

Mess Halls (7) 1596 seats (enlisted men)	20,566 sq. ft.
Mess Hall (1) 150 seats (Officers)	2609 sq. ft.
Cafeteria Serving Spaces (4)	2688 sq. ft.
Scullories (4)	1956 sq. ft.
Passages (2)	246 sq. ft.
Galley	2938 sq. ft.
Preparation Rooms	521 sq. ft.
Refrigerated Storage	520 sq. ft.
Mechanical Room	200 sq. ft.
Storage	732 sq. ft.
Office	100 sq. ft.
Toilets and Gear Room	375 sq. ft.
Corridor	536 sq. ft.

Toilets:

Officers: 4 water closets, one 6' urinal and 7 lavatories
Help's: 2 water closets, one 5' urinal and 2 lavatories

General Construction:

Strip steel frame; concrete floor slab; gunite exterior wall finish

Foundations:

Concrete walls and footings
Soil pressure 4000 lbs. per sq. ft.

Finishes:

Cement floors, walls, wood ceiling in scullery, open studs in mess halls, other rooms plywood. Ceilings, wood in galley and scullery, fibre board elsewhere. Wood windows, roll roofing.

Design Loads:

Roof - Live load 20 lbs. per sq. ft.
Wind - 30 lbs. per sq. ft.

E-11.03 Small Warehouses: One story rectangular buildings.

Ground Area Covered	24' x 108'
Floor Area	2592 sq. ft.
Cubic Contents	33,048 cu. ft.

Design data as follows:

Storage Room	2439 sq. ft.

General Construction:

Steel frame, metal roof and siding, concrete floor slab

Foundations:

Concrete walls and footings
Soil pressure 2000 lbs. per sq. ft.

Finishes:

Cement floors, celotex ceiling. Steel windows

E-11.04 Large Warehouses: One story rectangular buildings.

Ground Area Covered	80' x 152'
Floor Area	12,124 sq. ft.
Cubic Contents	189,071 cu. ft.

Design data as follows:

Loading Platforms	2968 sq. ft.
Storage Room	8873 sq. ft.

General Construdtion:

Steel frame, metal roof and siding, concrete floor slab

Foundations:

Concrete walls and footings.

Finishes:

Cement floors, celotex ceiling, steel windows.

E-11.05 Wash Rooms for Enlisted Men: One story rectangular buildings.

Ground Area Covered	40' x 50'
Floor Area	2012 sq. ft.
Cubic Contents	30,421 cu. ft.

Design data as follows:

Wash Room	540 sq. ft.
Toilet Room	492 sq. ft.
Shower Room	205 sq. ft.
Drying Room	220 sq. ft.
Scrub Deck Room	400 sq. ft.

Fixtures:

Wash Room: 40 positions at wash sinks, 4 drinking fountains
Toilet Room: 18 water closets, four 4' and four 5' urinals
Shower Rooms: 12 heads
Scrub Deck Rooms: 16 positions at scrub decks

General Construction:

Wood frame and siding, concrete floor slab

Foundations:

Concrete foundation walls and footings

Finishes:

Cement floors, wood ceiling or walls and ceiling. Wood windows, roll roofing.

E-11.06 Wash Rooms for Officers: One story rectangular buildings.

Ground Area Covered	22' x 31'
Floor Area	671 sq. ft.
Cubic Contents	8555 cu. ft.

Design data as follows:

Wash Room	182 sq. ft.
Toilet Room	201 sq. ft.
Shower Room	144 sq. ft.
Drying Room	92 sq. ft.

Fixtures:

Wash Room: 10 lavatories
Toilet: 6 water closets, two 6' urinals
Shower Room: 8 heads

General Construction:

Wood frame and siding, concrete floor slab

Foundations:

Concrete foundation walls and footings

Finishes:

Cement floors, wood ceiling on walls and ceiling. Wood windows, roll roofing.

E-11.07 Ice Storage Building: One story rectangular building with loading platforms:

Ground Area Covered	36' x 80'
Floor Area	1753 sq. ft.
Cubic Contents	17,573 cu. ft.

Design data as follows:

Loading Platforms	829 sq. ft.
Ice Storage Room	800 sq. ft.

General Construction:

Wood frame and siding, concrete floor slab; wood loading platform

Foundations:

Concrete walls and footings

Finishes:

Wood grating on cement floors, 4" rock cork board on walls and ceiling. Roll roofing.

E-11.08 Hospital: One story irregular shaped building.

Ground Area Covered	230' x 380'
Floor Area	35,898 sq. ft.
Cubic Contents	578,684 cu. ft.

Design data as follows:

Open Covered Passages		3118 sq. ft.
Lobby and Corridors		3577 sq. ft.
Wards and Sick Rooms (229 beds)		19,468 sq. ft.
Baths, Toilets and Utility Rooms		2308 sq. ft.
Diet Kitchens		956 sq. ft.
Storage, Closets and Gear Rooms		944 sq. ft.
Offices, Examination and Treatment Rooms		1743 sq. ft.
Operating Suite		917 sq. ft.
Consisting of: Operating Room	350 sq. ft.	
Sterilizing Rm.	100 sq. ft.	
Scrub Up Room	94 sq. ft.	
Surgeons Locker Room	104 sq. ft.	
Toilet	54 sq. ft.	
X-Ray Room	131 sq. ft.	
Dark Room	84 sq. ft.	
Officers of the Day Bed Room	104 sq. ft.	

Baths and Toilets:

Officers Quarters (2): 1 water closet, 1 lavatory, 1 tub with shower over (each)
Officers Quarters (2): 1 water closet, 1 lavatory, 1 shower (each)
O. O. D's Bath: 1 water closet, 1 lavatory, 1 shower
Ward Toilets (2): 3 water closets, 2 urinals, 3 lavatories, 1 service sink, 1 bedpan sterilizer (each)
Ward Bath (2): 2 showers 1 tub with shower over (each)
Surgeons Toilet: 1 water closet, 1 lavatory, 1 shower
Wards Toilet (2): 5 water closets, 4 urinals, 8 lavatories, 1 service sink, 1 bedpan sterilizer (each)
Ward Bath (2): 4 showers, 1 tub with shower over (each)
Isolation Baths (2): 1 water closet, 1 lavatory, 1 shower (each)
Isolation Bath: 1 water closet, 1 lavatory, 1 tub with shower over
Isolation Utility Room: 1 bedpan sterilizer, 1 service sink
Ward Bath: 4 lavatories, 2 showers, 1 tub with shower over, 1 service sink
Ward Toilet: 3 water closets, 2 urinals, 1 bedpan sterilizer

General Construction:

Wood frame and siding, concrete floor slab

Foundations:

Concrete walls and footings
Soil pressure 2500 lbs. per sq. ft.

Finishes:

Cement floors, plywood or plaster walls, fibreboard or plaster ceilings. Wood windows, roll roofing.

B-11.09 Hospital Storehouse: One story rectangular building:

Ground Area Covered	24' x 108'
Floor Area	2625 sq. ft.
Cubic Contents	34,991 cu. ft.

Design data as follows:

Storage Room	2494 sq. ft.

General Construction:

Wood frame and siding, concrete floor slab

Foundations:

Concrete foundation walls and footings

Finishes:

Cement floors, unfinished walls and ceiling. Wood windows, roll roofing.

E-11.10 Hospital Laboratory: One story rectangular shaped building.

Ground Area Covered	17' x 25'
Floor Area	377 sq. ft.
Cubic Contents	4810 cu. ft.

Design data as follows:

Vestibule	28 sq. ft.
Laboratory Room	312 sq. ft.

General Construction:

Wood roof, wood frame and siding, concrete floor slab.

Foundations:

Concrete foundation walls and footings

Finishes:

Cement floors, plywood walls and ceilings, wood windows, roll roofing

E-11.11 Hospital Administration Building: One story rectangular building.

Ground Area Covered	36' x 108'
Floor Area	2827 sq. ft.
Cubic Contents	49,350 cu. ft.

Design data as follows:

Corridors	585 sq. ft.
Offices (10)	1678 sq. ft.
Toilet	96 sq. ft.
Utility Room	84 sq. ft.
Closets (10)	133 sq. ft.

Toilet: 2 water closets, 2 urinals, 1 lavatory

General Construction:

Wood frame, wood floors and siding

Foundation:

Concrete walls and footings
Soil pressure 2000 lbs. per sq. ft.

Finishes:

Floors, linoleum in toilet, wood elsewhere
Walls, painted plywood. Ceiling, painted fibreboard. Wood windows, roll roofing.

E-11.12 Recreation Building: One story part two story T shaped building.

Ground Area Covered	136' x 213'
First Floor Area	9260 sq. ft.
Balcony Floor Area	1960 sq. ft.
Total Floor Area	11,220 sq. ft.
Cubic Contents	484,424 cu. ft.

Design data as follows:

First Floor:

Auditorium (669 seats)	5356 sq. ft.
Stage	462 sq. ft.
Dressing Rooms	208 sq. ft.
Lobby	425 sq. ft.
Library	981 sq. ft.

Reading Room	350 sq. ft.
Writing Room	285 sq. ft.
Fountain Room	1283 sq. ft.
Passages and Stair Halls	451 sq. ft.
Toilets	265 sq. ft.
Storage	151 sq. ft.
Porches	424 sq. ft.

Balcony Floor:

Auditorium Balcony (135 seats)	1144 sq. ft.
Projection Room	279 sq. ft.
Vestibules (2)	137 sq. ft.

Toilets:

Main Toilet: 3 water closets, 3 lavatories, 6 urinals, 1 service sink
Waiting Room Toilet: 1 water closet, 1 lavatory
Dressing Room Toilets (2): 1 water closet, 1 lavatory each

General Construction:

Wood frame and siding; concrete floor slab

Foundations:

Concrete walls and footings
Soil pressure 2000 lbs. per sq. ft.

Finishes:

Cement floors, fibreboard walls and ceiling. Wood windows, roll roofing.

E-11.13 Chapel: One story cross shaped building.

Ground Area Covered	92' x 159'
Floor Area	6267 sq. ft.
Cubic Contents	131,720 cu. ft.

Design data as follows:

Nave	2052 sq. ft.
Secondary Nave	459 sq. ft.
Chancel	675 sq. ft.
Transept	1134 sq. ft.
Choir	392 sq. ft.
Corridor	210 sq. ft.
Bapistry	146 sq. ft.

Offices (2)	403 sq. ft.
Toilets (3)	176 sq. ft.
Closets	40 sq. ft.
Confessionals (5)	57 sq. ft.
Boiler Room	131 sq. ft.

Toilets:

Womens': 2 water closets, 1 lavatory
Men's: 2 water closets, 2 urinals, 2 lavatories

General Construction:

Wood frame; wood floors and siding

Foundations:

Concrete piers and footings
Soil pressure 2000 lbs. per sq. ft.

Finishes:

Cement floors, fibreboard walls and ceilings. Wood windows, roll roofing.

Design Loads:

Roof - Live load 2000 lbs. per sq. ft.
Wind - 30 lbs. per sq. ft.

E-11.14 Incinerator: Two story rectangular building.

Ground Area Covered	20' x 45'
First Floor Area	640 sq. ft.
Second Floor Area	640 sq. ft.
Total Floor Area	1280 sq. ft.
Cubic Contents	12,276 cu. ft.

Design data as follows:

Stoking Room (1-7½ ton destructor)	540 sq. ft.
Charging Space	640 sq. ft.

General Construction:

Reinforced concrete frame with concrete walls; concrete floor slabs, free standing brick stack 65'0" high.

Foundations:

Spread footings
Soil pressure 2000 lbs. per sq. ft.

Finishes:

Cement floors, unfinished walls and ceiling. Roll roofing.

Design Loads:

Charging floor - Live load, 15 ton truck

E-11.15 Central Heating Plant: One story L shaped building.

Ground Area Covered	33' x 79'
Floor Area	2138 sq. ft.
Cubic Contents	56,397 cu. ft.

Design data as follows:

Boiler Room	2014 sq. ft.
Toilet (1 water closet, 1 service sink)	15 sq. ft.

General Construction:

Steel frame, concrete floor slab corrugated galvanized iron siding.

Foundations:

Concrete walls and footings
Soil pressure 2000 lbs. per sq. ft.

Finishes:

Cement floor unfinished walls steel windows, corrugated galvanized iron roofing.

E-11.16 Open Side Sheds: One story rectangular building.

Ground Area Covered	28' x 160'
Floor Area	4480 sq. ft.
Cubic Contents	40,320 cu. ft.

General Construction:

Steel frame, metal siding

Foundations:

Concrete walls and pedestals

Finishes:

Paved floor. Steel windows, metal roof.

E-12 Tent Camp No. 2

E-12.01 Location: This camp is located south of and adjacent to Tent Camp No. 1 and includes the following number and types of buildings:

2	Mess Halls
1	Officers Mess Hall
38	Small Warehouses
5	Large Warehouses
32	Enlisted Mens Wash Rooms
8	Officers Wash Rooms
1	Recreation Building
1	Post Exchange
1	Hostess House
1	Heating Plant

Additional utility buildings are covered in the chapters on the various utilities.

E-12.02 Mess Halls: One story irregular shaped buildings.

Ground Area Covered	227' x 257'
Floor Area	35,247 sq. ft.
Cubic Contents	588,131 cu. ft.

Design data as follows:

Mess Halls (8) (1824 enlisted men)	23,504 sq. ft.
Cafeteria Serving Spaces (4)	2688 sq. ft.
Sculleries (4)	1956 sq. ft.
Passages (2)	246 sq. ft.
Galley	2938 sq. ft.
Preparation Rooms	521 sq. ft.
Refrigerated Storage	520 sq. ft.
Mechanical Room	96 sq. ft.
Garbage Room	98 sq. ft.
Storage	732 sq. ft.
Office	100 sq. ft.
Toilet and Gear Room	165 sq. ft.
Corridor	536 sq. ft.

Toilet:

Helps Toilet: 2 water closets, one 5' urinal, 2 lavatories.

General Construction:

Strip steel frame; concrete floor slabs; gunite exterior wall finish

Foundations:

Concrete walls and footings
Soil pressure 4000 lbs. per sq. ft.

Finishes:

Cement floors, plywood walls except in mess rooms, wood ceiling, wood windows, roll roofing.

Design Loads:

Roof - Live load 20 lbs. per sq. ft.
Wind - 30 lbs. per sq. ft.

E-12.03 Officers Mess Hall: One story irregular shaped building.

Ground Area Covered	181' x 247'
Floor Area	15,284 sq. ft.
Cubic Contents	300,601 cu. ft.

Design data as follows:

Refreshment Room (120 seats)	1848 sq. ft.
Toilet Room	320 sq. ft.
Refreshment Storage	136 sq. ft.
Mess Halls (2)	6668 sq. ft.
Cafeteria	623 sq. ft.
Scullery	547 sq. ft.
Passages (2)	214 sq. ft.
Galley	1854 sq. ft.
Corridors (2)	427 sq. ft.
Office	130 sq. ft.
Refrigerated Storage	296 sq. ft.
Mechanical Room	124 sq. ft.
Storage	559 sq. ft.
Preparation Room	476 sq. ft.
Garbage Room	105 sq. ft.
Helps Toilet	681 sq. ft.
Porches	276 sq. ft.

Toilets:

Offices: 5 water closets, 6 urinals, 10 lavatories, 1 service sink
Galley Toilet: 2 water closets, 2 urinals, 2 lavatories
White Womens: 2 water closets, 3 lavatories, 15 lockers
Colored Women: 1 water closet, 1 lavatory, 5 lockers
White Men: 1 water closet, 1 urinal, 1 lavatory, 10 lockers
Colored Men: 1 water closet, 1 urinal, 1 lavatory, 10 lockers

General Construction:

Wood frame and siding, concrete floor slabs

Foundations:

Concrete walls and footings
Soil pressure 2000 lbs. per sq. ft.

Finishes:

Cement floors, plywood walls, fibreboard ceilings except in galley and scullery where wood ceiling is used. Wood windows, roll roofing.

Design Loads:

Roof - Live load 20 lbs. per sq. ft.
Wind - 30 lbs. per sq. ft.

E-12.04 Small Warehouses, Large Warehouses, Wash Rooms for Enlisted Men, Wash Rooms for Officers and Recreation Building are of similar type and design to those described under Tent Camp No. 1.

E-12.05 Post Exchange and Hostess House were not designed by Carr and J. E. Greiner Company.

E-12.06 Central Heating Plant: One story rectangular building.

Ground Area Covered	33' x 39'
Floor Area	1300 sq. ft.
Cubic Contents	31,000 cu. ft.

Design data as follows:

Boiler Room	1216 sq. ft.
Toilet: 1 water closet, 1 service sink	15 sq. ft.

General Construction:

Wood frame and sheathing, corrugated galvanized iron siding, concrete fl. slab, free standing brick stack 40'-0" high

Foundations:

Concrete foundation walls and footings
Soil pressure 2000 lbs. per sq. ft.

Finishes:

Cement floors, unfinished walls. Steel windows, corrugated galvanized iron roofing.

E-13 Mumford Point Camp No. 1:

E-13.01 Location: This camp is located south of North Carolina State Highway No. 24 about 3 miles east of Jacksonville, N. C. and includes the following number and types of buildings:

1 Mess Hall
1 Recreation Building
1 Brig
2 Large Warehouses
1 Dispensary
1 Chapel
1 Post Exchange
7 Enlisted Mens Wash Rooms
1 Administration Building
1 Heating Plant

Additional utility buildings are covered in the chapters on the various utilities.

E-13.02 Mess Hall: One story irregular shaped building.

Ground Area Covered	121' x 247'
Floor Area	12,474 sq. ft.
Cubic Contents	247,578 cu. ft.

Design data as follows:

Mess Halls (2)	6668 sq. ft.
Scullery	560 sq. ft.
Cafeteria	623 sq. ft.
Galley	1854 sq. ft.
Corridors	427 sq. ft.
Refrigerated Storage	296 sq. ft.
Mechanical Room	124 sq. ft.
Storage Rooms	520 sq. ft.
Preparation Room	476 sq. ft.
Garbage Room	105 sq. ft.
Office	130 sq. ft.
Toilets	153 sq. ft.
Porch	538 sq. ft.

Toilets:

Office: 1 water closet, 1 lavatory
Helps: 2 water closets, 2 urinals, 2 lavatories

General Construction:

Wood frame and siding, concrete floor slab

Foundations:

Concrete walls and footings
Soil pressure 2000 lbs. per sq. ft.

Finishes:

Cement floors, wood walls in scullery, open studs in mechanical room, plywood walls elsewhere. Wood ceiling in galley, scullery and garbage rooms, fibreboard ceilings elsewhere. Wood windows, roll roofing.

E-13.03 Recreation Building: Is of similar type and design to that described under Tent Camp No. 1.

E-13.04 Brig: One story T shaped building.

Ground Area Covered	45' x 76'
Floor Area	2358 sq. ft.
Cubic Contents	38,532 cu. ft.

Design data as follows:

Office	152 sq. ft.
Guard Room (3 bunks)	140 sq. ft.
Toilet	50 sq. ft.
O. O. D's Office	83 sq. ft.
Toilet	36 sq. ft.
Corridors	292 sq. ft.
Heating Room	86 sq. ft.
Storage	40 sq. ft.
Dormitory (10 bunks)	604 sq. ft.
Solitary Cells (8)	432 sq. ft.
Prisoners Toilets	176 sq. ft.

Toilets:

O. O. D's: 1 water closet, 1 lavatory

Guards: 1 water closet, 1 lavatory, 1 service sink
Prisoners: 2 water closets, 1 urinal, 3 lavatories, 2 showers

General Construction:

Wood frame; wood floors and siding

Foundations:

Concrete walls, piers and footings
Soil pressure 2000 lbs. per sq. ft.

Finishes:

Cement floors, plywood walls, fiberboard ceiling, wood windows, roll roofing.

E-13.05 Large Warehouses: One story rectangular building.

Ground Area Covered	61' x 153'
Floor Area	9320 sq. ft.
Cubic Contents	149,120 cu. ft.

Design data as follows:

Store Room	8697 sq. ft.
Office	407 sq. ft.

General Construction:

Wood frame and siding, concrete floor slab.

Foundations:

Concrete foundation walls and footings
Soil pressure 2000 lbs. per sq. ft.

Finishes:

Cement floors, unfinished walls, wood windows, roll roofing.

E-13.06 Dispensary: One story rectangular building.

Ground Area Covered	32' x 96'
Floor Area	3099 sq. ft.
Cubic Contents	55,896 cu. ft.

Design data as follows:

Waiting Room	180 sq. ft.
Corridor	230 sq. ft.
Examining Room	196 sq. ft.
Dental Offices (2 chairs)	232 sq. ft.
Drug Room	32 sq. ft.
Ward	1336 sq. ft.
Offices (2)	204 sq. ft.
Diet Kitchen	95 sq. ft.
Toilets and Gear	251 sq. ft.
Linen Closet	18 sq. ft.

Toilets:

Toilet: 2 water closets, 2 lavatories, 1 tub
Venereal Toilet: 2 straddle troughs, 1 lavatory

General Construction:

Wood frame, wood floors and siding

Foundations:

Concrete walls, piers and footings
Soil pressure 2000 lbs. per sq. ft.

Finishes:

Cement floors, plywood walls, fibreboard ceiling. Wood windows, roll roofing.

E-13.07 Chapel: Is similar in type and design to Chapel in Tent Camp No. 1.

E-13.08 Post Exchange: One story rectangular building.

Ground Area Covered	46' x 110'
Floor Area	3438 sq. ft.
Cubic Contents	52,259 cu. ft.

Design data as follows:

Porches and Stoop	238 sq. ft.
Vestibule	123 sq. ft.
Sales Space	1862 sq. ft.
Barber Shop	531 sq. ft.
Toilet	116 sq. ft.
Storage	167 sq. ft.
Office	132 sq. ft.
Tailors & Cobblers Shop Receiving Room	96 sq. ft.

Toilet: 3 water Closets, 3 urinals, 2 lavatories, 1 service sink

General Construction:

Wood frame and siding, concrete floor slab

Foundations:

Concrete walls and footings
Soil pressure 2000 lbs. per sq. ft.

Finishes:

Cement floors, plywood walls, fibreboard ceiling. Wood windows, roll roofing.

E-13.09. Enlisted Men's Wash Rooms: These are similar in type and design to those under Tent Camp No. 1.

E-13.10. Administration Building: One story rectangular building.

Ground Area Covered	36' x 108'
Floor Area	2561 sq. ft.
Cubic Contents	49,350 cu. ft.

Design data as follows:

Corridors	609 sq. ft.
Offices (10)	1770 sq. ft.
Toilets	182 sq. ft.

Toilets:

Officers: 2 water closets, 2 urinals, 1 lavatory
Enlisted Men's: 2 water closets, 1 urinal, 1 lavatory, 1 service sink

General Construction:

Wood frame, wood floors and siding

Foundation:

Concrete piers and footings
Soil pressure 2000 libs. per sq. ft.

Finishes:

Wood floors, plywood walls, fibreboard ceilings. Wood windows, roll roofing.

E-13.11 Central Heating Plant: One story rectangular building.

Ground Area Covered	28' x 33'
Floor Area	940 sq. ft.
Cubic Contents	20,557 cu. ft.

Design data as follows:

Boiler Room	837 sq. ft.
Toilet (1 water closet, 1 service sink	15 sq. ft.

General Construction:

Wood frame and siding; concrete floor slab. Free standing brick stack 48'-0" high.

Foundations:

Concrete walls and footings
Soil pressure 2000 lbs. per sq. ft.

Finishes:

Cement floors, unfinished walls.
Steel windows, galvanized corrugated iron roofing.

E-14 Peterfield Point Camp:

E-14.01 Location: This camp is located about 2 miles from and east of Tent Camp No. 2 and includes the following number and types of buildings:

1 Galley
3 Open Shed Warehouses
Quarters and Wash rooms at this camp are standard Homasote Huts.

E-14.02 Galley: One story rectangular building.

Ground Floor Area	28' x 57'
Floor Area	1517 sq. ft.
Cubic Contents	22,755 cu. ft.

Design data as follows:

Galley Room	1485 sq. ft.

To this Galley were attached several standard huts which provide space as Mess Halls.

E-14.03 Open Shed Warehouses: Were not designed by Carr and J. E. Greiner Company.

E-15 Tank Battalion Camp:

E-15.01 Location: This camp is located about 2 miles southwest of Tent Camp No. 2, east of U. S. Highway No. 17 and includes the following number and types of buildings:

1 Galley
2 Open Shed Warehouses

E-15.02 Galley: Is similar in type and design to those under Peterfield Point Camp.

Quarters and wash rooms at this camp are standard Homasote Huts.

E-15.03 Open Shed Warehouses: These were not designed by Carr and J. E. Greiner Company.

E-16 Midway Park:

E-16.01 Location: The area is located north of Highway No. 24 and across from Main Entrance to the Reservation and includes the following number and types of buildings:

346 Single Family Houses
177 Double Houses

E-16.02 Single Family Houses: One story rectangular building.

Ground Area Covered	25' x 31'
Floor Area	806 sq. ft.
Cubic Contents	10,874 cu. ft.

Design data as follows:

Living Room	186 sq. ft.
Kitchen	113 sq. ft.
Bed Rooms (2)	246 sq. ft.
Bath	33 sq. ft.
Heating Alcove	9 sq. ft.
Hall and Entry	45 sq. ft.
Storage Closet	34 sq. ft.
Closets (4)	29 sq. ft.

Bath: 1 water closet, 1 lavatory, 1 tub
Kitchen: 1 combination laundry tray and kitchen sink

General Construction:

Wood frame and asbestos shingle siding. Wood floors.

Foundations:

Concrete piers and footings.

Finishes:

Wood floors, plaster walls and ceilings. Wood windows, asbestos shingle roofing.

E-16.03 Double Houses: One story rectangular building.

Ground Area Covered	25' x 61'
Floor Area	1607 sq. ft.
Cubic Contents	21,706 cu. ft.

Design data as follows:

Living Rooms (2)	372 sq. ft.
Kitchens (2)	226 sq. ft.
Bed Rooms (4)	492 sq. ft.
Baths (2)	66 sq. ft.
Heating Alcoves (2)	18 sq. ft.
Halls and Entries (2)	90 sq. ft.
Storage Closets (2)	68 sq. ft.
Closets (8)	58 sq. ft.

Baths (2): 1 water closet, 1 lavatory, 1 tub each
Kitchens (2): 1 combination laundry tray and kitchen sink each

General Construction:

Wood frame and asbestos shingle siding , wood floors.

Foundations:

Concrete piers and footings.

Finishes:

Wood floors, plaster walls and ceilings, wood windows, asbestos shingle roof.

E-17 Miscellaneous:

E-17.01 Magazine Area:

6 Small Arms Magazines
8 Fixed Ammunition Magazines
9 Fuse and Detonator Magazines

None of the above buildings were designed by Carr and J. E. Greiner Company, they were built from U. S. Navy Bureau of Yards and Docks Drawings.

E-17.02 Office and Tool House for Cemetery: One story rectangular building.

Ground Area Covered	14' x 29'
Floor Area	427 sq. ft.

Cubic Contents	4360 cu. ft.

Design Data as follows:

Office	107 sq. ft.
Tool Room	204 sq. ft.
Porch	44 sq. ft.

General Construction:

Wood roof and wood frame with 4" brick veneer. Concrete floor slab.

Foundations:

Concrete foundation walls and footings.

Finishes:

Cement floors, plywood walls and ceilings in office, unfinished walls and ceiling in tool room. Wood windows, asbestos shingle roof.

E-17.03 Camp Knox: No buildings in this area were designed by the Architectural Department of Carr and J. E. Greiner Company.

E-17.04 U. S. S. Mock-Up: This structure, built at the waters edge to simulate a ship, is a dock, 362 feet long, variable in width, and having an area of 7802 sq. ft. The docks at the waters edge vary in height and size as follows:

Forecastle Deck: 86' long, 16' above water	1398 sq. ft.
Bridge Deck: 240' long, 22' above water	960 sq. ft.
After Deck: 36' long, 16' above water	612 sq. ft.

CHAPTER E - PART II

E-18 - SCHEDULE OF BUILDINGS BY AREAS

October 1, 1942

E-18.01	Regimental Area No. 1	
P-101-1	12	Barracks
P-101-2	3	Mess Halls
P-227-6	6	Battalion Warehouses
P-101-3	6	Battalion Warehouses
P-101-4	1	Regimental Infirmary
P-101-5	1	Post Exchange
P-209	1	Regimental Theater
P-210	3	Battalion Headquarters
P-211	1	Regimental Headquarters
P-212	1	Regimental Service Club

E-18.02	Regimental Area No. 2	
P-101-1	12	Barracks
P-101-2	3	Mess Halls
P-101-3	6	Battalion Warehouses
P-227-6	6	Battalion Warehouses
P-101-4	1	Regimental Infirmary
P-101-5	1	Post Exchange
P-209	1	Regimental Theater
P-210	3	Battalion Headquarters
P-211	1	Regimental Headquarters
P-212	1	Regimental Service Club

E-18.03	Regimental Area No. 3.	
P-101-1	12	Barracks
P-101-2	3	Mess Halls
P-101-3	6	Battalion Warehouses
P-227-6	6	Battalion Warehouses
P-101-4	1	Regimental Infirmary
P-101-5	1	Post Exchange
P-107-4	1	Regimental Theater
P-210	3	Battalion Headquarters
P-211	1	Regimental Headquarters
P-212	1	Regimental Service Club

P-18.04	Regimental Area No. 4.	
P-101-1	12	Barracks
P-101-2	3	Mess Halls
P-101-3	6	Battalion Warehouses
P-227-6	6	Battalion Warehouses
P-101-4	1	Regimental Infirmary

E-18.04 (Cont'd)

P-101-5	1	Post Exchange
P-209	1	Regimental Theater
P-210	3	Battalion Headquarters
P-211	1	Regimental Headquarters
P-212	1	Regimental Service Club

E-18.05 Regimental Area No. 5.

P-200-1	12	Barracks
P-200-2	3	Mess Halls
P-200-3	6	Battalion Warehouses
P-227-6	6	Battalion Warehouses
P-200-4	1	Regimental Infirmary
P-200-5	1	Post Exchange
P-200-15	1	Regimental Theater
P-200-6	3	Battalion Headquarters
P-200-7	1	Regimental Headquarters
P-212	1	Regimental Service Club

E-18.06 Division Activities

P-107-2	1	Division Headquarters

P-18.07 Post Troops Activities

P-107-10-1	1	Post Headquarters
P-201-4	1	Post Exchange
P-107-5	1	Brig
P-201-2	1	Mess Hall
P-201-1	4	Barracks
P-201-3	2	Battalion Warehouses
P-210	1	Battalion Headquarters
P-214	1	Hostess House
P-400-3	1	Post Dispensary
P-220	1	Chapel - Protestant
P-220	1	Chapel - Catholic
P-107-6	1	Firehouse
P-201-12	1	Post Theater
P-108-4	1	Main Water Pumping and Treatment Plant
P-108-5	1	Main Sewage Pumping Station No. 1
P-108-5	1	Sludge Pumping and Chlorinating Station and Laboratory (Sewage Treatment Plant)
P-108-5	1	Sludge Control Station (Sewage Treatment Plant)
P-108-12	1	Incinerator
P-120	1	Radio Transmitter Building
P-221-7	1	Post Tailor and Cobbler Shop
P-227-6	2	Battalion Warehouses

E-18.07 (Cont'd)

P-130	1	Waller Gunnery Building
P-226	1	Wallace Creek Boat House
P-226	1	Wallace Creek Toilet Building
P-221-4	1	Gate House
P-221-4	1	Guard House
P-108-4	10	Well Pump Houses No. 1-10 incl.
P-230-1	1	Emergency Pumping Station
P-219-1	11	Well Pump Houses No. 11 to 21 incl.

E-18.08 Industrial and Supply Area

P-108-11	1	Main Gas and Oil Station
P-108-4	1	Ground Water Storage Recorder
P-108-11	1	Control Box (Gasoline Tank Farm)
P-108-11	1	Post Exchange Filling Station
P-227-3	1	Warehouse
P-206-1	2	Warehouses
P-106-2	2	Warehouses
P-106-1	4	Open Shed Warehouses
P-227-1	24	Open Side Motor Storage Sheds
P-107-8	1	Commissary
P-207	1	Post Shop Building
P-107-9	1	Cold Storage Building
P-227-5	4	Lumber Storage Sheds
P-227-2	1	Balloon Storehouse and Shop
P-221-1	1	Firehouse No. 3
P-208	1	Bakery
P-227-4	1	Post Exchange Storehouse
P-221-6	1	Reclamation Building
P-107-3	1	Laundry
P-228	1	Garage and Repair Shop (Division)
P-221-5	1	Garage and Repair Shop (Post Troops)
P-127	1	Propane Gas Building
P-108-7	1	Central Heating Plant
P-221-3	1	Scales House

E-18.09 Naval Hospital Area

P-400-1-5	11	Wards
P-400-1-4	1	Administration Building
P-400-1-4	1	Mess Hall and Recreation Building
P-400-1-7	1	Nurses Home
P-134	1	Family Hospital
P-134-1	1	Civilian Nurses Home
P-400-1-8	1	Medical Storehouse
P-400-1-9	1	Garage
P-400-1-13	1	Shop
P-400-1-18	1	Power Plant (Central Heating Plant)
P-400-1-12	1	Laundry
P-400-1-13	1	Warehouse

E-18.10 (Cont'd)

P-400-1-6	2	Corpsmen's Barracks
P-400-1-14	3	Officers Quarters
P-400-1-15	1	Warrant Officers' Quarters
P-108-5	1	Sewage Pumping Station No. 2.
P-403	1	Men Servant's Quarters
P-403	1	Women's Servants Quarters
P-402	1	Bachelor Officers' Quarters
P-400-1-22	1	Transformer House "B"
P-400-1-22	1	Transformer House "E"
P-400-1-22	1	Transformer House "D"
P-400-1-21	1	Well House E-1

E-18.11 Residential Area

P-105-1	133	Officers' Quarters
P-205-1	47	Officers' Quarters
P-104-1	8	Bachelor Officer's Quarters
P-104-2	1	Guest House
P-215	1	B.O.Q. Mess and Officers' Club
P-107-6	1	Fire House
P-215	1	Men Servant's Quarters (B.O.Q.)
P-215	1	Women Servant's Quarters (B.O.Q.)
P-108-5	1	River Road Sewage Pumping Station No.4
P-108-5	1	Autumn Oval Sewage Pumping Station No.5
P-108-5	1	Wallace Creek Sewage Pumping Station No.3
P-108-4	1	Well House "R"

E-18.12 Rifle Range Area

P-203-1	4	Barracks
P-203-2	1	Mess Hall
P-227-6	2	Battalion Warehouses
P-203-3	2	Battalion Warehouses
P-203-17	1	Theater (Drill & Recreation Bldg.)
P-203-16	1	Bachelor Officers' Quarters
P-203-14	1	Post Exchange
P-203-4	1	Armory and Office Building
P-203-19	1	Infirmary
P-203-13	1	Central Heating Plant
P-203-6	2	Target House- Pistol Range
P-203-20	1	Range House - Pistol Range
P-216	1	Magazine - Pistol Range
P-203-7	1	Firing Line Shed - Pistol Range
P-203-20	3	Range Houses - Rifle Range
P-216	3	Magazines - Rifle Range
P-203-20	9	Toilets - Rifle Range
P-203-6	3	Target Houses - Rifle Range
P-203-12	1	Chlorinator House (Sewage Treatment Plt.)
P-205-1	5	Officers Quarters
P-203-11	2	Wells No. S and No. T Houses

E-18.13 Barrage Balloon and Amphibian Base Area

T-202-15	1	Sewage Pumping Station No. 7
T-202-19	1	Drill and Recreation (Theater)
T-202-11	1	Post Exchange
T-202-15	1	Chlorinator House (Sewage Treatment Plant)
T-202-12	1	Battalion Headquarters
P-202-10	2	Battalion Warehouses
P-227-6	2	Battalion Warehouses
P-202-9	1	Mess Hall
P-202-16	1	Central Heating Plant
P-202-20	1	Infirmary
P-202-8	4	Barracks
P-205-1	8	Officers Quarters
P-202-4	1	Central Heating Plant B.B.S.A.*
P-202-4	1	Administration Building *
P-202-4	1	Barrage Balloon School *
P-202-4	1	Balloon Building *
P-202-4	1	Transportation Building *
P-202-4	1	Storage and Supply Building *
P-202-4	1	Gas Generator Shed *
P-202-4	1	Gas Cylinder Storage Shed *
P-202-4	1	Field Operations Building *
P-202-14	2	Well No. W and No. V Houses
P-202-5	1	Carpenter Shop
P-202-6	1	Machine Shop
P-202-3	1	Amphibian Store House *
P-202-14	1	Water Balancing Tank Building
P-202-14	1	Well No. U House

E-18.14 Parachute Training Area

P-138	1	Parachute Building
P-138	1	Parachute Training Building
P-138	1	Parachute Training Area Heating Plant
P-123-3	1	Parachute Tower House (Free)
P-123-3	1	Parachute Tower House (Captive)
P-129-1	1	Parachute Tower House (Free)
P-123-6	1	Sewage Pumping Station No. 9

E-18.15 Glider Training Base

P-115	1	Operations Building
P-142-1	1	Administration Building
P-142-6	1	Transformer Vault
P-142-1	1	Paint and Dope Storage Shed
P-142-1	1	Utility Shop
P-142-1	1	Nose Hangar
P-142-1	1	Utility Shop
P-142-1	1	Heating Plant
P-142-1	1	Carburetor Test Shop
P-142-6	1	Transformer Building

E-18.16	White Cemetery	
P-112	1	Office and Tool House
P-112	1	Well House W. C.-1

E-18.17	Tent Camp No. 1.	
P-1-4	8	Well Houses No. A to G incl. and BH-1
P-1-4	1	Water Aerating, Chlorinating and Pumping Station
P-133	1	Chemical Feed and Chlorinating Bldg. (Sewage Treatment Plant)
P-133	1	Sludge Pumping Station (Sewage Treatment Plant)
P-1-3	1	Tool House (Sewage Treatment Plant)
P-133	1	Sewage Pumping Station No. 8
P-1-5	2	Mess Halls
P-1-6	34	Warehouses (Small)
P-400-2-4	1	Warehouse (Small)
P-1-7	6	Warehouses (Large)
P-1-15	41	Enlisted Men's Washrooms
P-1-16	8	Officers' Washrooms
P-1-18	1	Ice House
P-1-19-1	1	Hospital
P-400-2-12	1	Hospital Administration Bldg.
P-7	1	Recreation Building (R-2)
P-8	1	Chapel
P-140	1	Incinerator
P-1-17	2	Open Side Motor Storage Sheds
P-1-10	1	Central Heating Plant
P-400-2-7	1	Laboratory and Generator

E-18.18	Tent Camp No. 2.	
P-250-1-4	6	Well Houses No. H to M incl.
P-250-1-5	2	Mess Halls
P-250-1-6	1	Officers Mess
P-250-1-7	38	Warehouses (Small)
P-250-1-8	5	Warehouses (Large)
P-250-1-15	30	Enlisted Men's Washrooms
P-400-2-10	2	Enlisted Men's Washrooms
P-250-1-16	8	Officers' Washrooms
P-250-1-18	1	Recreation Building (R-2)
P-250-1-19	1	Post Exchange (Remodeled Large Warehouse)
P-250-1-20	1	Hostess House *
P-250-1-11	1	Central Heating Plant
P-250-1-17	2	Open Side Motor Storage Sheds

E-18.19	Mumford Point Camp No. 1	
P-500-3	2	Well Houses No. Z and Z-1

E-18.19. (Cont'd)

P-500-4	1	Mess Hall
P-500-2	1	Chlorinator House (Sewage Treatment Plant)
P-500-5	1	Recreation Building (R-2)
P-500-6	1	Brig
P-500-7	2	Warehouses (Large)
P-500-11	1	Infirmary
P-500-12	1	Chapel
P-500-13	1	Post Exchange
P-500-14	7	Enlisted Men's Washrooms
P-500-15	1	Administration Building
P-500-16	1	Central Heating Plant

E-18.20 Peterfield Point Camp

P-250-4-9	1	Galley 28' x 56'
P-250-4-7	6	Enlisted Men's Washrooms (Huts)
P-250-4-8	1	Officers' Washroom (Hut)
P-250-4-10	3	Open Shed Warehouses *

E-18.21 Tank Battalion Camp

P-250-3-4	1	Well House No. 0
P-250-3-8	7	Enlisted Men's Washrooms (Huts)
P-250-3-7	1	Galley 28' x 56'
P-250-3-10	2	Steel Sheds (100 x 28) Shops *
P-250-3-9	1	Officers Washroom (Hut)
P-250-3-4	1	Water Balancing Tank Building

E-18.22 Midway Park Residential Area

P-301-201	177	Double Unit Dwellings
P-301-202	346	Single Unit Dwellings
P-301-407	2	Well Houses L.C.H. -1 and L.C.H. -2
P-301-405	1	Sewage Pumping Station No. 6.

E-18.23 Camp Knox

P-108-65-2	2	Well Houses C.C.C. -1 and C.C.C. -2

E-18.24 Magazine Areas

P-216	6	Small Arms Magazines *
P-216	9	Fuse and Detonator Magazines *
P-216	8	Fixed Ammunition Magazines *

E-18.25	Mock-Up	
P-132	1	Well House No. X
P-132	1	Mockup Ship

Total Bldgs. 1431

The total figure does not include approximately 1030 Homasote huts provided for housing.
Prefix "P" indicates accounting project number.

* Indicates buildings designed by others.

CHAPTER E - PART II

E-19 - SCHEDULE OF BUILDINGS BY TYPES

OCTOBER 1, 1942

			Totals
E-19.01	**Barracks**		
P-101-1	Regimental Area No. 1	12	
P-101-1	Regimental Area No. 2	12	
P-101-1	Regimental Area No. 3	12	
P-101-1	Regimental Area No. 4	12	
P-200-1	Regimental Area No. 5	12	
P-201-1	Post Troops	4	
P-203-1	Rifle Range	4	
P-202-8	Barrage Balloon Battalion and Amphibian Base	4	
P-400-1-6	Naval Hospital Corpsman's Barracks	2	74
E-19.02	**Mess Halls**		
P-101-2	Regimental Area No. 1	3	
P-101-2	Regimental Area No. 2	3	
P-101-2	Regimental Area No. 3	3	
P-101-2	Regimental Area No. 4	3	
P-200-2	Regimental Area No. 5	3	
P-201-2	Post Troops	1	
P-203-2	Rifle Range	1	
P-202-9	Barrage Balloon & Amphibian Base	1	
P-400-1-4	Naval Hospital Mess Hall and Recreation Bldg.	1	
P-215	Bachelor Officers Mess & Officers Club	1	
P-1-5	Tent Camp No. 1	2	
P-250-1-5	Tent Camp No. 2	2	
P-250-1-6	Tent Camp No. 2 Officers Mess	1	
P-500-4	Mumford Point Mess Hall	1	
P-250-3-7	Galley (28' x 56') Tank Battalion	1	
P-250-4-9	Galley (28' x 56') Peterfield Point	1	28
E-19.03	**Warehouses**		
P-101-3	Battalion - Regimental Area No. 1	6	
P-227-6	Battalion - Regimental Area No. 1	6	
P-101-3	Battalion - Regimental Area No. 2	6	
P-227-6	Battalion - Regimental Area No. 2	6	
P-101-3	Battalion - Regimental Area No. 3	6	
P-227-6	Battalion - Regimental Area No. 3	6	
P-101-3	Battalion - Regimental Area No. 4	6	
P-227-6	Battalion - Regimental Area No. 4	6	
P-200-3	Battalion - Regimental Area No. 5	6	
P-227-6	Battalion - Regimental Area No. 5	6	
P-201-3	Battalion - Post Troops	2	

E-19.03	Warehouses (Cont'd)		Totals
P-227-6	Battalion - Post Troops	2	
P-203-3	Battalion - Rifle Range	2	
P-227-6	Battalion - Rifle Range	2	
P-202-10	Battalion - Barrage Balloon and Rifle Range	2	
P-227-6	Battalion - Barrage Balloon & Rifle Range	2	
P-106-1	Open Shed Warehouses - Ind. Area	4	
P-250-4-10	Open Shed Warehouses - Peterfield Pt. *	3	
P-106-2	Concrete Warehouse- Industrial Area	2	
P-206-1	Concrete Warehouse- Industrial Area	2	
P-227-3	Concrete Warehouse- Industrial Area	1	
P-400-1-13	Naval Hospital Warehouse	1	
P-1-6	Warehouse (Small) Tent Camp No. 1	34	
P-400-2-4	Warehouse (Small) Tent Camp Hospital	1	
P-250-1-7	Warehouse (Small) Tent Camp No. 2	38	
P-1-7	Warehouse (Large) Tent Camp No. 1	6	
P-250-1-8	Warehouse (Large) Tent Camp No. 2	5	
P-500-7	Warehouse (Large) Mumford Point	2	
P-227-4	Post Exchange Storehouse - Ind. Area	1	
P-400-1-8	Naval Hospital Medical Storehouse	1	
P-202-3	Amphibian Base Amphibian Storehouse *	1	174

E-19.04.	Infirmaries		
P-101-4	Regimental Areas Nos. 1,2,3 and 4	4	
P-200-4	Regimental Area No. 5	1	
P-203-19	Rifle Range - Regimental	1	
P-202-20	Barrage Balloon and Amphibian Base-Reg.	1	
P-500-11	Mumford Point Infirmary	1	
P-1-19-1	Tent Camp Hospital	1	
P-400-3	Post Dispensary	1	10

E-19.05	Hospitals		
P-400-1-5	Naval Hospital - Wards	11	
P-134	Family Hospital	1	12

E-19.06	Hospital Administration Buildings		
P-400-1-4	Naval Hospital Administration Building	1	
P-400-2-12	Tent Camp Hospital Administration Bldg.	1	2

E-19.07	Nurses Homes		
P-400-1-7	Naval Hospital Nurses Home	1	
P-134-1	Civilian Nurses Home	1	2

				Totals
E-19.08	**Post Exchanges**			
P-101-5	Regimental Areas Nos. 1, 2, 3, and 4		4	
P-200-5	Regimental Area No. 5		1	
P-201-4	Post Troops		1	
P-203-14	Rifle Range		1	
P-202-11	Barrage Balloon & Amphibian Base		1	
P-250-1-20	T. C. No. 2 Post Exchange (remodeled large warehouse)	*	1	
P-500-13	Mumford Point		1	10
E-19.09	**Theaters**			
P-209	Regimental Areas Nos. 1, 2, and 4		3	
P-107-4	Regimental Area No. 3		1	
P-200-15	Regimental Area No. 5		1	
P-201-12	Post		1	
P-202-19	Barrage Balloon and Amphibian Base (Drill & Rec. Hall)		1	
P-203-17	Rifle Range (Drill & Recreation Hall)		1	
P-7	Tent Camp No. 1 (Recreation (R-2) Bldg.)		1	
P-250-1-18	Tent Camp No. 2 (Recreation (R-2* Bldg)		1	
P-500-5	Mumford Point (Recreation (R-2) Building)		1	11
E-19.10	**Regimental Service Clubs**			
P-212	Regimental Areas Nos. 1,2,3,4, and 5		5	5
E-19.11	**Battalion Headquarters**			
P-210	Regimental Area No. 1		3	
P-210	Regimental Area No. 2		3	
P-210	Regimental Area No. 3		3	
P-210	Regimental Area No. 4		3	
P-200-6	Regimental Area No. 5		3	
P-210	Post Troops		1	
P-202-12	Barrage Balloon and Amphibian Base		1	
P-500-15	Mumford Point - Administration Bldg.		1	
P-203-4	Armory and Office Building Rifle Range		1	19
E-19.12	**Regimental Headquarters**			
P-211	Regimental Areas Nos. 1,2,3, and 4		4	
P-200-7	Regimental Area No. 5		1	5

			Totals
E-19.13	**Post Headquarters**		
P-107-10-1		1	1
E-19.14	**Division Headquarters**		
P-107-2		1	1
E-19.15	**Brigs**		
P-107-5	Post Troops	1	
P-500-6	Mumford Point	1	2
E-19.16	**Chapels**		
P-220	D.T.A. - Protestant	1	
P-220	D.T.A. - Catholic	1	
P-8	Tent Camps Nos. 1 and 2	1	
P-500-12	Mumford Point Tent Camp	1	4
E-19.17	**Firehouses**		
P-107-6	Post Troops Activities	1	
P-221-1	Supply and Industrial Area	1	
P-107-6	Residential Area	1	3
E-19.18	**Incinerators**		
P-108-12	Post Troop Activities	1	
P-140	Tent Camp No. 1	1	2
E-19.19	**Radio Transmitter Building**		
P-120		1	1
E-19.20	**Post Tailor and Cobbler Shop**		
P-221-7		1	1
E-19.21	**Waller Gunnery Trainer Building**		
P-130		1	1

			Totals
E-19.22	**Wallace Creek Boat House**		
P-226		1	1
E-19.23	**Toilets**		
P-223	Wallace Creek Boat House Toilet	1	
P-203-20	Rifle Range Toilets	9	10
E-19.24	**Gate House**		
P-221-4		1	1
E-19.25	**Guard House**		
P-221-4		1	1
E-19.26	**Open Side Motor Storage Sheds**		
P-227-1	Supply and Industrial Area	24	
P-1-17	Tent Camp No. 1	2	
P-250-1-17	Tent Camp No. 2	2	28
E-19.27	**Gasoline and Oil Stations**		
P-108-11	Main Gasoline and Oil Station	1	
P-108-11	Post Exchange Filling Station	1	2
E-19.28	**Control Box - Gasoline Tank Farm**		
P-108-11		1	1
E-19.29	**Commissary**		
P-107-8		1	1
E-19.30	**Shop Buildings**		
P-207	Post Shop Building	1	
P-400-1-13	Naval Hospital Shop	1	
P-202-5	Amphibian Base Carpentry Shop	1	
P-202-6	Amphibian Base Machine Shop	1	
P-250-3-10	Tank Battalion Steel Sheds (100' x 28') Shops *	2	
P-227-2	Balloon Storehouse and Shop	1	7

E-19.31	Garages		Totals
P-221-5	Garage and Repair Shop (Post Troops)	1	
P-228	Garage and Repair Shop (Division)	1	
P-400-1-9	Naval Hospital Garage	1	3
E-19.32	Cold Storage Building (S. and I. Area)		
P-107-9		1	1
E-19.33	Icehouse (Tent Camp No. 1)		
P-1-18		1	1
E-19.34	Lumber Storage Sheds (S. and I. Area)		
P-227-5		4	4
E-19.35	Bakery (S. and I. Area)		
P-208		1	1
E-19,36	Reclamation Building (S. and I. Area)		
P-221-6		1	1
E-19.37	Laundries		
P-107-3	Laundry - Supply and Industrial Area	1	
P-400-1-12	Naval Hospital Laundry	1	2
E-19.38	Propane Gas Bldg. (Supply & Ind. Area)		
P-127		1	1
E-19.39	Officers' Quarters		
P-105-1	Residential Area	133	
P-205-1	Residential Area	47	
P-400-1-14	Naval Hospital	3	
P-205-1	Rifle Range	5	
P-205-1	Barrage Balloon	8	196

				Totals
E-19.40	**Bachelor Officers' Quarters**			
P-104-1	Residential Area		8	
P-203-16	Rifle Range		1	
P-402	Naval Hospital		1	10
E-19.41	**Naval Hospital Warrant Officers Quarters**			
P-400-1-15			1	1
E-19.42	**Servants Quarters**			
P-403	Naval Hospital Men Servants'Quarters		1	
P-403	Naval Hospital Women Servants'Quarters		1	
P-215	Bachelor Officer's Quarters Men Servants' Quarters		1	
P-215	Bachelor Officers'Quarters Women Servants' Quarters		1	4
E-19.43	**Hostess Houses**			
P-104-2	Bachelor Officers' Quarters Guest House		1	
P-214	Hostess House - Regimental Areas		1	
P-250-1-20	Hostess House - Tent Camp No. 1	*	1	3
E-19.44	**Target Houses**			
P-203-6	Pistol Range		2	
P-203-6	Rifle Range		3	5
E-19.45	**Range Houses**			
P-203-20	Pistol Range		1	
P-203-20	Rifle Range		3	4
E-19.46	**Firing Line Shed - Pistol Range**			
P-203-7			1	1
E-19.47	**Magazines**			
P-216	Small Arms - Magazine Areas	*	6	
P-216	Fuse and Detonators - Magazine Areas	*	9	
P-216	Fixed Ammunition - Magazine Areas	*	8	
P-216	Pistol Range		1	
P-216	Rifle Range		3	27

E-19.48	Barrage Balloon School Area			
P-202-4	Administration Building	*	1	
P-202-4	Barrage Balloon School	*	1	
P-202-4	Balloon Building	*	1	
P-202-4	Transportation Building	*	1	
P-202-4	Storage and Supply Building	*	1	
P-202-4	Gas Generator Shed	*	1	
P-202-4	Gas Cylinder Storage Shed	*	1	
P-202-4	Field Operations Building	*	1	8
E-19.49	Glider Training Base			
P-115	Operations Building		1	
P-142-1	Administration Building		1	
P-142-1	Paint and Dope Storage Shed		1	
P-142-1	Utility Shop		1	
P-142-1	Utility Shop		1	
P-142-1	Nose Hangar		1	
P-142-1	Carburetor Test Shop		1	7
E-19.50	Parachute Building - Parachute Tr. Area			
P-138			1	1
E-19.51	Parachute Training Bldg.-Parachute Tr. Area			
P-138			1	1
E-19.52	Parachute Tower Houses			
P-123-3	One Free and One Captive		2	
P-129-1	One Additional Free		1	3
E-19.53	Tool Houses			
P-112	White Cemetery - Office & Tool House		1	
P-1-3	Tent Camp No. 1 - Tool House (Former Chlorinator House)		1	2
E-19.54	Midway Park Residential Area Dwellings			
P-301-201	Double Unit Dwellings		177	
P-301-202	Single Unit Dwellings		346	523

			Totals
E-19.55	**Mockup Ship**		
P-132		1	1
E-19.56	**Sewage Pumping Stations**		
P-108-5	Main Station No. 1	1	
P-123-6	Parachute Troops Area No. 9	1	
P-108-5	Naval Hospital No. 2	1	
P-108-5	Wallace Creek No. 3	1	
P-108-5	Autumn Oval No. 5	1	
P-108-5	River Road No. 4	1	
P-202-15	Barrage Balloon & Amphibian Base No. 7	1	
P-301-405	Midway Park No. 6	1	
P-133	Tent Camp No. 8	1	9
E-19.57	**Sewage Treatment Plants**		
P-108-5	D.T.A.-Sludge Pumping and Chlorinating Station and Laboratory	1	
P-108-5	D.T.A.-Sludge Control Station	1	
P-203-12	Rifle Range - Chlorinator House	1	
P-202-15	Barrage Balloon and Amphibian Base-Chlorinator House	1	
P-133	T. C. No. 1 Chemical Feed & Chlorinating Building	1	
P-133	Tent Camp No. 1 Sludge Pumping Station	1	
P-500-2	Mumford Point Chlorinator House	1	7
E-19.58	**Water Treatment Plants**		
P-108-4	Main Water Pumping & Treatment Plant	1	
P-1-4	Tent Camp No. 1 Aerating, Chlorinating and Pumping Station	1	2
E-19.59	**Well Pump Houses**		
P-108-4	Wells Nos. 1 to 10 inclusive	10	
P-219-1	Wells Nos. 11 to 21 inclusive	11	
P-400-1-21	Naval Hospital - Well No. E-1	1	
P-108-4	Residential Area - Well No. R	1	
P-203-11	Rifle Range - Wells Nos. S and T	2	
P-202-14	B.B. and Amp. Base - Wells Nos. V and W	2	
P-202-14	B.B.B. School Area- Well No. U	1	
P-112	White Cemetery - Well No. WC-1	1	
P-1-4	Tent Camp No. 1 Wells No. A to G & B.H.-1	8	
P-250-1-4	Tent Camp No. 2 Wells No. H to M incl.	6	
P-500-3	Mumford Point T. C. Wells No. Z and Z-1	2	
P-250-3-4	Tank Battalion Well No. O	1	
P-301-407	Midway Park Well No. LCH-1 and LCH-2	2	
P-108-65-2	Camp Knox Wells Nos. CCC-1 and CCC-2	2	
P-132	Mockup Well No. X	1	51

E-19.60	Emergency Pumping Station - Indus. Area		Totals
P-230-1		1	1
E-19.61	**Ground Water Stage Recorder-Ind. Area**		
P-108-4		1	1
E-19.62	**Water Balancing Tank Control Buildings**		
P-202-14	Amphibian Base	1	
P-250-3-4	Tank Battalion	1	2
E-19.63	**Scale house -D.T.A. Central Heating Plant**		
P-221-3		1	1
E-19.64	**Transformer Houses**		
P-400-1-22	Naval Hospital T.H. "B"	1	
P-400-1-22	Naval Hospital T.H. "E"	1	
P-400-1-22	Naval Hospital T.H. "D"	1	
P-142-6	Glider Training Base	1	
P-142-6	Glider Training Base Transformer Vault	1	5
E-19,65	**Central Heating Plants**		
P-108-7	D.T.A. - Industrial Area	1	
P-400-1-18	Naval Hospital	1	
P-203-13	Rifle Range	1	
P-202-16	Barrage Balloon and Amphibian Base	1	
P-202-4	Barrage Balloon School Area	1	
P-138	Parachute Training Area	1	
P-142-1	Glider Training Base	1	
P-1-10	Tent Camp No. 1	1	
P-250-1-11	Tent Camp No. 2	1	
P-500-16	Mumford Point Tent Camp	1	10
P-19.66	**Enlisted Men's Washrooms**		
P-1-15	Tent Camp No. 1	41	
P-250-1-15	Tent Camp No. 2	30	
P-400-2-10	Tent Camp No. 2	2	
P-500-14	Mumford Point Tent Camp	7	
P-250-4-7	Peterfield Point (Huts)	6	
P-250-3-8	Tank Battalion (Huts)	7	93

E-19,67	Officers' Washrooms		Totals
P-1-16	Tent Camp No. 1	8	
P-250-1-16	Tent Camp No. 2	8	
P-250-4-8	Peterfield Point (Huts)	1	
P-250-3-9	Tank Battalion (Huts)	1	18
		Total Buildings	1431

The total figure does not include approximately 1030 Homasote huts provided for housing.

* Indicates buildings designed by others.

Prefix "P" indicates accounting project number.

CHAPTER F - PART II

STRUCTURAL DEPARTMENT

TABLE OF CONTENTS

Section	Title
F-1	Scope
F-2	Types of Structures
F-3	Specifications and Design Data
F-4	Foundations

F-1. Scope. This Department was responsible for the design of the structural elements of all the buildings and other structures and facilities designed by Carr & J. E. Greiner Company.

F-2. Types of Structures. The buildings and other facilities fall into two classes: (a) permanent structures, intended to form part of the permanent establishment in the New River Area, and (b) temporary structures.

The majority of the permanent buildings carrying light loads were, by direction, of strip steel frame construction with brick veneer walls. The use of strip steel was later discontinued, in order to conserve steel, and subsequent buildings of this type, by direction, were built either with solid masonry bearing walls and wood roof trusses or of wood frame with brick veneer walls.

Permanent buildings, such as the buildings in the Industrial Area, which are subjected to heavy loadings, have reinforced concrete frames in most cases. Structural Steel was used in buildings where special conditions, such as long spans, made the use of reinforced concrete impractical for certain elements.

In the case of some buildings, such as the Central Heating Plant in the Division Training Area, the nature of the building was such that structural steel was the only practicable material for use in the frame and supports for the heavy equipment installed in the building. As a general rule, however, in order to conserve steel, the use of structural steel was limited to applications where there was no satisfactory substitute.

The permanent Officers' Quarters were of wood frame construction throughout.

With a few minor exceptions, the temporary buildings were of wood construction throughout.

Chapter E, Part II of this report gives a list of all buildings constructed and a brief description of each, including their principal structural features.

In addition to the buildings, numerous other structures were designed by this Department. These include fixed and pontoon bridges, piers and other waterfront structures and structures for water supply and sewage facilities.

In general, the type of structure and materials to be used were fixed by directive. Also certain structures were built from plans furnished by the Bureau of Yards and Docks. In some cases these plans were modified to meet local conditions.

F-3. Specifications and Design Data. During the first nine months, the design of all structures incorporating either structural steel or reinforced concrete was based on Navy Department Specifications, "Standards of Design for Structural Steel, #12Yb" or "Standards of Design for Concrete, # 3Yb". In the same period the concrete mixes used were based on the Navy Department Specification for "Concrete Construction, #13Yc". In general, Class D1 or Class E1 concrete, as described in the specification referred to above, was used, the latter being specified for concrete work in contact with water.

On January 17, 1942, following a request by the Department, permission was granted by the Officer in Charge to use the American Institute of Steel Construction Building Code, adopted in 1936, and the American Concrete Institute Building Code, adopted in 1941. This substitution permitted the employment of higher working stresses for these materials, resulting in general economies throughout the structures affected. Moreover, the designers being more familiar with the A.I.S.C. and A.C.I. Codes, the rate of turning out plans was accelerated materially. The adoption of the A.I.S.C. code increased the basic working stress for structural steel from 18,000 to 20,000 pounds per square inch. The basic working stresses of 18,000 and 875 pounds per square inch for reinforcing steel and concrete, respectively, were raised to 20,000 and 1125 pounds per square inch.

On February 21, 1942, the Bureau of Yards and Docks issued addenda to the Navy Department standards of design, revising the working stresses for steel and concrete. The new stresses for structural steel, as set forth in these addenda, conform generally to the stresses allowed under the A.I.S.C. Code. Also the stresses governing the welding of structural steel were increased to conform to the stresses currently employed in general practice. With respect to stresses in reinforced concrete, these addenda completely revised the working stresses of the various mixes, generally moving Class A concrete to Class B, Class B to Class C and so on. At the same time, allowable stress for reinforcing steel bars was increased from 18,000 to 20,000 pounds per square inch for intermediate and hard grade steel. Further modifications of the "Standards of Design for Concrete" were received on April 1, 1942 and May 19, 1942. The former consisted of an addendum to the Navy

Department Specification for "Concrete Construction, No. 13Yc" and was a directive reducing the cement factor on the basis of climatic conditions. This directive was complied with immediately. The latter modification, an addendum entitled, "Design Precepts for Reinforced Concrete Construction" completely revised the design standards to conform generally to Joint Committee Specifications for 1940. This latter specification is practically identical with the A.C.I. Code and thereafter was used in place of the A.C.I. Code.

On August 1, 1942 a letter from the Bureau of Yards and Docks revised the class of concrete for buildings from "D" to "C" and for other relatively important structures from "E" to "D". On September 22, 1942 a directive further increased the basic stress for reinforcing steel to 24,000 pounds per square inch.

Prior to August 11, 1942, all timber structures were designed in accordance with the latest published information of the Timber Engineering Company. In general the structures were designed for timber meeting the requirements of 1200 pound stress grade lumber and the normal working stresses for this grade were used. On the above date instructions were received from the Bureau of Yards and Docks governing all subsequent designs in wood. These instructions were embodied in "Bureau of Yards and Docks, Design Standards for Timber Construction, June 1942" and "Bureau of Yards and Docks, Lumber for Emergency Construction, June 1942". The effect of the former was to increase working stresses by 15% for all temporary wood construction. The latter set forth the recommended practice with regard to selection of grades and species with reference to the intended use of the lumber.

F-4. Foundations. The type of foundation for all structures as well as the allowable soil pressure or pile bearing value and type of pile were determined by the Officer in Charge. In this he was guided by the recommended soil bearing value as determined by the Office Engineer who was responsible for conducting soil investigations. Chapter B, Part II, of this report contains a discussion of soil conditions in this area.

PART II - CHAPTER G

MECHANICAL DEPARTMENT

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Section	Title
G-1	Heating.
G-2	Steam Distribution System
G-3	Propane Gas
G-4	Gasoline and Fuel Oil Storage & Dist.
G-5	Refrigeration
G-6	Air Conditioning
G-7	Ventilation
G-8	Mechanical Equipment

G-1. Heating:

G-1.01. General: The design of heating facilities as applied to the Marine Base has included numerous problems not found in ordinary practice. Accordingly the conventional methods of setting up basic computations governing loads and load factors have, in many instances required extensive modification, in order to meet the numerous conditions peculiar to an institution of this character. The result has been that while some buildings have been treated in a conventional manner, many have had to be treated in the light of unusual peak load conditions. In taking these unusual conditions into account, we have had to rely on observation of similar installations already in use, together with very helpful comments and suggestions made from time to time by officers of the Navy and the Marine Corps. In general, heating computations have been based on transfer coefficients and technical data as set forth in current copies of the"Guide" published by the American Society of Heating and Ventilating Engineers. Deviations from this procedure have occurred only on process and industrial loads where equipment manufacturers recommendations have been followed when available. Where no recommendations or standards have been readily available, empirical formulae set up by our engineering staff have been used. The general subject of heating for the purpose of this report is broken down into the following divisions; "Heating of Buildings", "Heating of Hot Water", and "Heating for Process Use".

G-1.02. Heating of Buildings: (a) In the heating of the various and sundry buildings on this base, two primary methods of approach have been used; one, the central station system comprising a steam generating

plant connected to the various buildings by means of a distribution system, and the other, the individual heating system wherein each building has a heating plant of its own. The steam generating plants are covered under Chapter "J" of this report and the distribution systems are covered under Chapter "G", Section G 2 of this report. (b) All thermal loss computations used in the sizing of heating units for the heating of buildings are based on an outside temperature of +15° and an inside temperature ranging from 45° to 80° depending on the use to which the building is to be put. (c) Buildings serviced by central stations receive steam from their respective systems at pressure ranging from 175 p.s.i. to 15 p.s.i. Within each building the pressure is reduced to 5 p.s.i. for use in radiators and 5 p.s.i. or 50 p.s.i. for use in unit heaters, blast coils, air conditioning units, pipe coils, etc. Steam used for heating of buildings is returned 100% to the central station in the form of condensate by means of turbine type pumps. The five pound condensate is returned direct from the system to the condensate receiver while the return from all systems operating at pressures higher than five pounds is passed through an economizer coil in the hot water generator to reduce its temperature below the flash point prior to introducing it into the condensate receiver. In the sizing of steam lines within the building, we have used the Babcock formula and its tabular form "Economical Pipe Sizing" published by Grinnell Company. Care has been taken properly to balance out the systems and the sizing has been based on a total pressure drop not to exceed 2 p.s.i. throughout the longest run. In putting this type of heating system into operation care must be taken to ascertain whether or not the building is in active use. If this proves to be the case, a check should be made to make sure that the hot water generator is full of water. If the hot water generator is empty or if the building proves not to be in full use, the economizer coil must be by-passed to the drain in order to prevent dangerous over-heating of the generator. Care also must be taken to make sure that the valves in the building and steam distribution manhole, which control the condensate return on the discharge side of the condensation return pump, are open. Should they be in closed position the pump, if operated, very likely will be seriously damaged due to over pressure. (d) Many of the smaller buildings, especially in the outlying areas, are heated individually by means of independent heating systems of the forced hot water or forced warm air type. The forced hot water systems are of the two pipe reverse flow type and their design has been based on data set forth in Bell & Gossetts handbook on hot water heating and the "Guide" published by the American Society of Heating and Ventilating Engineers. The "Guide" has also been used as the standard reference for the design of the forced warm air systems.

G-1.03. Heating of Hot Water: The heating of hot water has been covered in Section I of this report in so far as quantity requirements is concerned. Throughout the Division Training Area the actual heating has been accomplished by means of storage generators, heated by steam at 50 p.s.i. steam pressure. Tent Camp No. 1 has been equipped with instantaneous type generators operating at 50 lbs. steam pressure. Tent Camp No. 2 has been equipped in part with instantaneous hot water heaters and in part with oil fired water heaters. The officers homes and a few isolated small buildings have been equipped with electric hot water

heaters. These electric heaters were selected and purchased by the Marine Corps.

G-1.04. Heat for Process Use: Steam for process use is in general supplied to laundry equipment, sterilizer equipment, galley equipment, oil heating units, etc. The pressure at which the steam is furnished has been determined by equipment manufacturers' recommendations when such has been available. When such data has not been ready at hand, computed thermal requirements have been the determining factor.

G-1.05. Summary: A tabular summary follows which sets forth in detail, by project number, the buildings treated in our design, the number of buildings covered by each project, the type of heat supplied, the number of radiators or unit heaters employed with their size and the amount of hot water and process load handled.

ORIGINAL TENT CAMP # 1

*Note: R - Radiator; U.H. - Unit Heater; P.C. - Pipe Coil; H.W. - Hot Water; O.S.H. - Oil Space Heater

Project No	Building Type	Building No.	BTU Requirements Per Building		Lbs. of Steam Per Bdg.	Type of System
1-5	Mess Hall	2	64 U.H.	1,843,200		Central Station Steam
			H. W.	773,500		
			Process	1,730,900		
			Total *	4,347,600	4672	
1-12	Fuel Oil Dist.	1	Process	381,250		
			Total	381,250	434	"
1-15	Enlisted Men's Washrooms	32	3 U.H.	178,800		
			H. W.	867,700		
			Total	1,046,500	1150	"
1-16	Officers' Washrooms	4	2 U.H.	100,800		
			H. W.	945,700		
				1,046,500	1150	"
1-19-1	Hospital	1	103 R.	965,145		
			H. W.	1,321,200		
			Process	4,855		
			Total	2,291,200	2459	"
5	Add. Officers' Washrooms	4	1-O.S.H.	50,000		Individual Oil Fired Heater
			H. W.	166,600		
				216,600		

Original Tent Camp #1 (Cont'd)

Project No	Building Type	No.	BTU Requirements Per Building		Lbs. of Steam Per Bdg.	Type of System
6	Add. Enlisted Men's Washrooms	8	1-O.S.H.	50,000		Individual Oil Fired Heater
			H. W.	166,600		
			Total	216,600		
7	R-2, Recreation	1	52 R.	511,440		Central Station Steam
			4 U.H.	292,000		
			H. W.	92,083		
			Total	895,523	938	
8	Chapel	1	39 R.	324,050		(H.W. Heat)
			Total	324,050		
400-2-3	Add to Hospital	1	124 R.	1,406,315		Central Station Steam
			H. W.	1,117,060		
			Process	19,144		
			Total	2,542,519	2711	
400-2-12	Admin. Building	1	18 R.	165,420		"
			Total	165,420	172	
250-1-19	P.X.(Remod.Sh-13)	1	9 U. H.	500,000		"
			Total	500,000	548	
	TENT CAMP NO. 2					
250-1-5	Mess Halls	2	64 U.H.	1,843,200		Central Station Steam
			H. W.	773,500		
			Process	1,730,900		
			Total	4,347,600	4672	
250-1-6	Officers' Mess	1	8 R.	69,540		
			20 U.H.	1,193,579		
			H. W.	519,350		
			Process	519,612		
			Total	2,302,081	2521	"
250-1-13	Fuel & Oil Dist.	1	Process	102,000		
			Total	102,000	116	"
250-1-15	Enlisted Men's Washrooms	30	1-O.S.H.	50,000		Forced Warm Air
			H. W.	166,600		
			Total	216,600		

Tent Camp No. 2 (Cont'd)

Project No.	Building Type	Building No.	BTU Requirements Per Building		Lbs. of Steam Per Bdg.	Type of System
250-1-16	Officers' Washrms.	8	1-O.S.H.	50,000		Forced Warm Air
			H. W.	166,600		
			Total	216,600		
250-1-18	R-2, Recreation Building	1	52 R.	511,440		Central Station Steam
			4 U.H.	292,000		
			H. W.	92,083		
			Total	895,523	938	
250-3-8	Enlisted Men's Washrooms	7	1-O.S.H.	50,000		Forced Warm Air
			H. W.	166,600		
			Total	216,600		
250-3-9	Officers' Washrms.	1	1-O.S.H.	50,000		
			H. W.	166,600		
			Total	216,600		"
250-4-7	Enlisted Men's Washrooms	6	1-O.S.H.	50,000		
			H. W.	166,600		
			Total	216,600		"
250-4-8	Officers' Washrms.	1	1-O.S.H.	50,000		
			H. W.	166,600		
			Total	216,600		"
400-2-10	Enlisted Men's Washrooms	2	1-O.S.H.	50,000		
			H. W.	166,600		
				216,600		"
	DIVISION TRAINING AREA					
101-1	Barracks	48	84 R.	858,960		Central Station Steam
			H. W.	957,180		
			Total	1,816,140	1945	
101-2	Mess Halls	12	12 R.	99,600		
			1 U.H.	750,000		
			H. W.	506,850		
			Process	2,691,955		
			Total	4,048,405	4394	"
101-4	Reg. Infirmaries	4	26 R.	219,461		
			H. W.	187,790		
			Process	63,812		
			Total	471,063	505	"

Division Training Area (Cont'd)

Project No.	Building Type	Building No.	BTU Requirements Per Building		Lbs. of Steam Per Bdg.	Type of System
101-5	Post Exchange	4	16 R.	205,320		
			H. W.	187,790		Central Station Steam
			Total	393,110	420	
104-1	B. O. Q.	8	66 R.	513,600		
			H. W.	580,125		
			Total	1,093,725	1171	"
104-2	Guest House	1	22 R.	111,400		
			H. W.	83,300		Forced Hot Water
			Total	194,700		
105-1	Officers' Quarters Types A, A-1, A-2, B, C, B-1, C-1, D, E, D-1, E-1, H, I, H-1, I-1, J.		16 R.	97,000		
			Total	97,000		Forced Hot Water
	Officers' Quarters Types F, G, F-1, G-1.		16 R.	100,700		
			Total	100,700		Forced Hot Water
107-2	Division Headqtrs.	1	80 R.	616,920		
			H. W.	227,630		Central Station Steam
			Total	844,550	892	
107-3	Laundry	1	23 U.H.	1,825,000		
			H. W.	16,327,480		
			Process	6,802,635		
			Total -	24,955,115	28,339	"
107-4	Theater (3rd. Reg.)	1	18 R.	143,520		
			1 U.H.	1,650,000		
			H. W.	209,668		
			Total	2,003,188	2,190	"
107-5	Brig	1	87 R.	969,840		
			1 U.H.	17,000		
			H. W.	1,381,250		
			Total	2,368,090	2,818	"
107-6	Firehouse	2	10 R.	93,720		
			4 U.H.	109,700		
			H. W.	227,630		
			Total	431,050	418	"

Division Training Area (Cont'd)

Project No.	Building Type	Building No.	BTU Requirements Per Building		Lbs. of Steam Per Bdg.	Type of System
107-8	Commissary	1	4 R.	55,860		Central Station Steam
			4 U.H.	467,700		
			H. W.	184,143		
			Total	707,703	747	
107-9	Cold Storage Plant	1	2 U.H.	60,340		
			Total	60,340	67	"
107-10	Post Headquarters	1	135 R.	1,032,720		
			H. W.	276,250		
			Total	1,308,970	1379	"
108-4	Water Treatment	1	15 R.	153,680		
			Total	153,680	160	"
108-5	Sludge Pumping	1	1-W.A. Furnace 114,900 BTU; 1-Gas Fired Water Boiler 250,800 BTU.			
108-7	Gasoline and Oil Storage	1	Process	3,050,000		Central Station Steam
			Total	3,050,000	3472	
123-2	Parachute Tower	2	Electric Unit Heaters			
127	Propane Gas	1	Process	354	354	"
130	Waller Gunnery	1				"
134	Family Hospital	1	Total	3,098,456	3310	"
138	Parachute Training Tower	2	Electric Unit Heaters			
200-1	Barracks	12	84 R.	856,680		
			H. W.	957,180		
			Total	1,813,860	1942	"
200-2	Mess Hall	3	12 R.	99,600		
			1 U.H.	750,000		
			H. W.	506,850		
			Process	2,691,955		
			Total	4,048,405	4394	"
200-4	Reg. Infirmary	1	26 R.	219,461		
			H. W.	187,790		
			Process	63,812		
			Total	471,063	505	"

Division Training Area (Cont'd)

Project No.	Building Type	No.	BTU Requirements Per Building		Lbs. of Steam Per Bdg.	Type of System
200-5	P. X.	1	16 R.	205,320		Central Station Steam
			H. W.	187,790		
			Total	393,110	420	
200-6	Battalion Headqtrs.	3	31 R.	240,242		
			H. W.	60,166		
			Total	300,408	319	"
200-7	Reg. Headquarters	1	37 R.	282,240		
			H. W.	60,166		
			Total	342,400	360	"
200-15	Theater	1	18 R.	143,520		
			1 U.H.	1,650,000		
			H. W.	209,668		
			Total	2,003,188	2190	"
201-1	Barracks	4	84 R.	856,680		
			H. W.	957,180		
			Total	1,813,860	1942	"
201-2	Mess Hall	1	12 R.	99,600		
			1 U.H.	750,000		
			H. W.	506,850		
			Process	2,691,955		
			Total	4,048,405	4394	"
201-4	P. X.	1	16 R.	205,320		
			H. W.	187,790		
			Total	393,110	420	"
201-12	Theater	1	18 R.	143,520		
			1 U.H.	1,650,000		
			H. W.	209,668		
			Total	2,003,188	2190	"
202-4	Administration	1	22 R.	130,560		
			H. W.	60,166		
			Total	190,726	202	"
202-4	School	1	29 R.	207,120		
			H. W.	60,166		
			Total	267,286	282	"
202-4	Balloon	1	5 U.H.	468,000		
			Total	468,000	488	"

Division Training Area (Cont'd)

Project No.	Building Type	No.	BTU Requirements Per Building		Lbs. of Steam Per Bdg.	Type of System
202-4	Transport	1	2 U.H.	56,000		Central Station Steam
			Total	56,000	58	
202-4	Supply & Storage	1	2 R.	24,000		
			3 U.H.	123,000		
			Total	147,000	154	"
202-5	Carpenter Shop	1	6 R.	90,408		
			6 U.H.	868,000		
			H. W.	63,360		
			Total	1,021,768	1064	"
202-6	Machine Shop	1	4 R.	56,064		
			7 U.H.	861,700		
			H. W.	63,360		
			Process	78,431		
			Total	1,059,555	1106	"
202-8	Barracks	4	84 R.	856,680		
			H. W.	957,180		
			Total	1,813,860	1942	"
202-9	Mess Hall	1	12 R.	99,600		
			1 U.H.	750,000		
			H. W.-	506,850		
			Process	2,691,955		
			Total	4,048,405	4394	"
202-11	P. X.	1	16 R.	205,320		
			H. W.	187,790		
			Total	393,110	420	"
202-12	Battalion Headqtrs.	1	31 R.	240,242		
			H. W.	60,166		
			Total	300,408	319	"
202-19	Drill & Recreation	1	18 R.	143,520		
			1 U.H.	1,650,000		
			H. W.	209,668		
			Total	2,003,188	2190	"
202-20	Infirmary	1	26 R.	219,461		
			H. W.	187,790		
			Process	63,812		
			Total	471,063	505	"

Division Training Area (Cont'd)

Project No.	Building Type	No.	BTU Requirements Per Building		Lbs. of Steam Per Bdg.	Type of System
203-1	Barracks	4	84 R.	856,680		
			H. W.	957,180		Central Station Steam.
			Total	1,813,860	1942	
203-2	Mess Hall	1	12 R.	99,600		
			1 U.H.	750,000		
			H. W.	506,850		
			Process	2,691,955		
			Total -	4,048,405	4394	"
203-4	Armory & Office	1	59 R.	788,040		
			H. W.	60,166		
			Total	848,206	887	"
203-14	P. X.	1	16 R.	205,320		
			H. W.	187,790		
			Total	393,110	420	"
203-16	B. O. Q.	1	66 R.	513,600		
			H. W.	580,125		
			Total	1,093,725	1171	"
203-17	Drill & Recreation	1	18 R.	143,520		
			1 U.H.	1,650,000		
			H. W.	209,668		
			Total	2,003,188	2190	"
203-19	Infirmary	1	26 R.	219,461		
			H. W.	187,790		
			Process	63,812		
			Total	471,063	505	"
203-20	Range House		4-O.S.H.	82,200		
			H. W.	132,600		Forced Warm Air
			Total	214,800		
205-1	Officers' Quarters	55	16 R.	116,400		
			Total	116,400		Forced Hot Water
205-1	Officers' Quarters	5	16 R.	116,400		
			Total	116,400	121	Central Station Steam
207	Post Shop	1	30 U.H.	2,525,000		
			29 P.C.	526,000		
			H. W.	635,375		
			Total	3,686,375	4044	"

Division Training Area (Cont'd)

Project No.	Building Type	Building No.	BTU Requirements Per Building		Lbs. of Steam Per Bdg.	Type of System
208	Bakery	1	4 R.	46,944		Central
			6 U.H.	680,195		Station
			H. W.	141,440		Steam
			Process	198,135		
			Total	1,066,714	1201	
209	Theater	3	18 R.	143,520		
			1 U.H.	1,650,000		
			H. W.	209,668		
			Total	2,003,188	2190	"
210	Battalion Headqtrs.	13	31 R.	240,242		
			H. W.	60,166		
			Total	300,408	319	"
211	Regimental Headqtrs.	4	37 R.	282,240		
			H. W.	60,166		
			Total	342,406	360	"
212	Reg. Service Clubs	5	40 R.	495,744		
			H. W.	60,166		
			Total	555,910	582	"
214	Hostess House	1	80 R.	592,752		
			H. W.	255,248		
			Process	110,304		
			Total	958,304	1018	"
215	B. O. Q. Mess	1	65 R.	744,000		
			3 U.H.	900,000		
			H. W.	655,200		
			Process	1,356,461		
			Total	3,655,661	3969	"
215	Servants' Qtrs. (M)	1	15 R.	170,808		
			H. W.	141,440		
			Total	312,248	333	"
215	Servants' Qtrs. (W)	1	10 R.	80,256		
			H. W.	141,440		
			Total	221,696	239	"
220	Chapel (C)	1	22 R.	343,200		
			Total	343,200	358	"
220	Chapel (P)	1	18 R.	338,400		
			Total	338,400	353	"

Division Training Area (Cont'd)

Project No.	Building Type	No.	BTU Requirements Per Building		Lbs. of Steam Per Bdg.	Type of System
221	Fire House #3	1	10 R.	93,720		Central
			4 U.H.	109,700		Station
			H. W.	227,630		Steam
			Total	431,050	418	
221-2	Add. Gas & Oil Storage	1	Process	3,050,000		
			Total	3,050,000	3557	"
221-4	Gate House	1	34 R.	286,000		Forced
			H. W.	112,455		Hot Water
			Total	398,455		
221-5	Garage & Repair Shop	1	31 U.H.	3,453,772		Central
			4 P.C.	249,840		Station
			H. W.	651,950		Steam
			Total	4,355,562	4778	
221-6	Reclamation Bldg.	1	9 U.H.	260,010		
			3 P.C.	123,525		
			H. W.	45,580		
			Total	429,115	471	"
221-7	Tailor & Cobbler	1	16 R.	260,160		
			7 P.C.	234,990		
			H. W.	45,580		
			Total	540,730	566	"
227-2	Balloon Storehouse	1	2-O.S.H.	100,000		Forced
			Total	100,000		Warm Air
228	Garage & Repair Shop	1	31 U.H.	3,453,772		Central
			4 P.C.	249,840		Station
			H. W.	651,950		Steam
			Total	4,355,562	4778	
400-3	Post Dispensary, Dent. Clinic & Sick Bay	1	144 R.	1,372,320		
			H. W.	468,520		
			Process	293,535		
			Total	2,134,375	2266	"
	HOSPITAL AREA					
400-1-4	Admin. & Mess Hall	1	285 R.	2,058,040		
			11 U.H.	6,552,712		
			H. W.	1,371,958		
			Process	2,889,407		
			Total	12,872,117	13,946	"

Hospital Area (Cont'd)

Project No.	Building Type	No.	BTU Requirements Per Building		Lbs. of Steam Per Bdg.	Type of System
400-1-5	Wards & Corridors	1	1046 R.	9,763,200		Central Station Steam
			H. W.	2,304,525		
			Process	647,236		
			Total	12,714,961	13,408	
400-1-6	Corpsmen's Barracks	2	115 R.	890,400		
			H. W.	1,093,920		
			Total	1,984,320	2,128	"
400-1-7	Nurses' Home	1	165 R.	1,086,720		
			H. W.	519,350		
			Process	255,248		
			Total	1,861,318	1,982	"
400-1-8	Medical Storehouse	1	13 U.H.	514,300		
			H. W.	55,250		
			Total	569,550	625	"
400-1-9	Garage	1	3 R.	39,840		
			1 U.H.	350,000		
			H. W.	55,250		
			Total	445,090	467	"
400-1-11	Nurses' Quarters	1	33 R.	196,944		
			H. W.	55,250		
			Total	252,194	266	"
400-1-12	Laundry	1	11 U.H.	492,000		
			H. W.	1,855,424		
			Process	3,730,222		
			Total	6,077,646	6,902	"
400-1-13	Maintenance Shops	2	8 U.H.	285,350		
			H. W.	55,250		
			Total	340,600	374	"
400-1-14	Officers' Quarters	3	16 R.	93,200		Forced Hot Water
			Total	93,200		
400-1-15	Warrant Officers Quarters	1	11 R.	63,360		Central Station Steam
			Total	63,360	66	
402	B. O. Q.	1	67 R.	516,528		Individual Steam Plant
			H. W.	472,940		
			Total	989,468	1,056	

Hospital Area (Cont'd)

Project No.	Building Type	Building No.	BTU Requirements Per Building		Lbs. of Steam Per Bdg.	Type of System
403	Servants' Quarters (M)		21 R.	220,800		Forced Hot Water
			H. W.	124,950		
			Total	345,750		
403	Servants' Quarters (W)		29 R.	208,800		
			H. W.	166,600		
			Total	375,400		"
	Gas & Oil Storage		Process	52,785		Central Station Steam
			Total	52,785	61	

MUMFORD POINT TENT CAMP # 1

500-4	Mess Hall	1	14 U.H.	525,760		
			H. W.	773,500		
			Process	1,730,900		
			Total	3,030,160	3324	"
500-5	R-2, Recreation	1	52 R.	511,440		
			4 U.H.	292,000		
			H. W.	92,083		
			Total	895,523	938	"
500-6	Brig	1	27 R.	197,360		Forced Hot Water
			Total	197,360		
500-11	Dispensary	1	19 R.	215,376		Central Station
			H. W.	110,500		
			Total	325,876	345	Steam
500-12	Chapel	1	39 R.	324,050		Forced Hot Water
			Total	324,050		
500-13	P. X.	1	9 U.H.	500,000		Central Station Steam
			Total	500,000	548	
500-14	Enlisted Men's Washrooms	7	1-O.S.H.	50,000		Forced Warm Air
			H. W.	166,600		
			Total	216,600		
500-15	Administration Bldg.	1	18 R.	158,640		Central Station
			Total	158,640	165	Steam

GLIDER TRAINING BASE

Project No.	Building Type	Building No.	BTU Requirements Per Building		Lbs. of Steam Per Bdg.	Type of System
142-1	Administration Bldg.	1	19 R.	155,280		Central Station Steam
			Total	155,280	162	
	Utility Shop A	1	9 U.H.	526,693		
			Total	526,693	578	"
	Carburetor Test Shop B	1	1 P.C.	19,405		
			Total	19,405	21	"
	Nose Hangar C	1	2 U.H.	76,500		
			2 P.C.	37,050		
			Total	113,550	125	"
	Utility Shop D	1	2 U.H.	37,200		
			3 P.C.	68,050		
			Total	105,250	115	"
115	Operations Bldgs.	1	23 R.	185,900		Hot Water Heat
			Total	185,900		

PETERFIELD POINT CAMP

250-4-9	Mess Hall (28 x 56 galley)	1	H. W.	133,280		Oil Fired Unit
			Total	133,280		
250-4-7	Enlisted Men's Washrooms	6	H. W.	166,600		Forced Warm Air
			1-O.S.H.	50,000		
			Total	216,600		
250-4-8	Officers' Washrooms	1	1-O.S.H.	50,000		
			H. W.	166,600		
			Total	216,600		"

G-2. Steam Distribution System.

G-2.01. General. Steam distribution systems in the following areas are covered by this report.

Area	Dwgs. No.	Specification No.
Industrial and Supply	627 and 630	604
1st to 5th Regimental	631 - 645	604
Post Troops	672 - 679	604
Naval Hospital	3664 and 3665	604
Rifle Range	680 and 681	607
Balloon Barrage Battalion and Amphibian Base	3653 and 3654	607
Balloon Barrage Battalion and School Area	4610	607
Bachelor Officers Quarters	4611 and 4612	607
Mumford Point Tent Camp (Overhead Distribution)	MP No. 15	107
Glider Base	5626	168
Tent Camp No. 1	T. C. 37	107
Tent Camp No. 2	T. C. 318	107

Following is a report on each system covering (1) the estimated pressure drop of the steam system under peak load conditions, also the pressure at each branch connection, (2) the friction of the condensate return system, including the head against which each condensate pump operates, (3) the distribution losses, sometimes called "line losses", including the location of the trip traps and the amount of condensate at each drip point. Appropriate suggestions are made in each of the above reports to facilitate the economical maintenance and operation.

Details of design have not been considered in the body of this report as the drawings and specifications listed herein cover this phase of the work. Ample factors of safety have been used in computing stresses on anchors and other structural parts and the expansion joints as specified are adequate for maximum conditions. Care has been taken to run all lines with adequate grade to insure easy flow of condensate, and counter flows have been held to a minimum.

The pipe used throughout the underground steam distribution system is of standard weight and joints are of welded construction. The pipe is

encased in 1½" thick insulation applied without longitudinal joints, treated to be moisture resistant. The entire assembly of pipe and insulation is enclosed by a helically corrugated ingot iron, zinc coated shell which in turn is wrapped with asphalt saturated asbestos felt to a thickness of 1/8". The entire assembly is further protected by a wrapping of heavy Kraft paper. Joints between sections of the casing are welded and the weld is protected by an outside covering sleeve welded to the conduit. The entire joint section is protected by wrapping as above described. The pipe, its insulation and protective casing was selected by the Officer-in-Charge and installed at his direction. The thickness of the protective conduit casing is 18 gauge for sizes up to and including 10" diameter and 16 gauge for larger sizes. This assembly of pipe insulation and casing is manufactured under the trade name "Hel-Cor" by the Ric-Wil Company.

The return lines are of steel pipe and therefore subject to rapid corrosion peculiar to steel under condensate return conditions, and we strongly recommend that chemical treatment be provided at suitable intervals along the system for the purpose of retarding corrosion. A full engineering report, prepared by Mr. Sheppard T. Powell, Chemical Engineer, covering chemical treatment of the condensate return has been turned over to the Officer-in-Charge for record purposes.

The report includes detailed recommendations as to method of treatment and location of chemical equipment. Careful inspection of all manholes should made at frequent intervals to insure their being kept in a dry condition. Serious damage to the insulation and its surrounding "Hel-Cor" may occur if the manholes are allowed to become flooded. High pressure drip traps should be checked at frequent intervals, not only from the economy angle, which is discussed further in the report, but also because it is not a remote possibility that a leaky trap will overheat the returning condensate to the point where excessive flash might occur in the lines within the Central Heating Plant. This flashing if in large quantity might throw a heavy live load on the structural members and the pipe itself. Under normal conditions the returns should come back to the boiler house at about 180° F. A rise above this temperature should be investigated at once as it probably will give notice of either a leaky trap or an open by-pass.

It will be noted from the tabulations which follow that the maximum discharge head, within the Division Training Area, for condensate return is 168.0 feet equivalent to 72.6 p.s.i. The sequence of pump operation can not be predicted in advance and it is entirely possible that a large number of pumps may operate simultaneously and thus increase the rate of discharge and the friction losses above those indicated. Accordingly, all condensate return pumps for the Division Training Area have been specified to deliver their respective capacities against 100 p.s.i. In our opinion this should provide a safe margin but if in the future the friction losses increase above 100 p.s.i. because of natural incrustations or pipe deterioration, then a booster pump should be installed in the return at the Central Heating Plant.

Condensate return pumps for all of the detached areas have been specified with a liberal margin of safety to operate against the head actually found.

The amount of condensate has been estimated throughout at 0.06 pounds per hour per square foot of external pipe surface, plus an allowance of 100% to cover possible leaks in traps, the operation of economizer coils, domestic water heaters, etc., making the total condensate 0.12 pounds per hour per square ft. of external pipe surface. Total distribution losses are generally assumed to be double the actual heat losses from the steam mains, because of steam syphon operation, valve stems, expansion point packing, drip traps, etc. and leaking steam.

G-2.02. Steam Distribution, Pressure Drop Study.

(a) Division Training Area. This area includes Regimental Areas 1, 2, 3, 4, and 5, Post Troops Area and the Industrial and Supply Area. The purpose of the study was to find the pressure drop throughout the steam distribution system.

The pressure leaving the station is taken at 175 p.s.i. gauge pressure. The boilers are good for 190 p.s.i, but maximum operating pressure is expected to be around 175-180 with a maximum of 175 lbs. leaving the plant under peak conditions. Buildings added after the system was designed are not listed in the tables.

(b) Industrial Area. This study shows that with 175 p.s.i. at the station the pressure at the Laundry will be 163.4, thus if the Laundry requires only 100 p.s.i., the pressure leaving the Central Heating Plant could be reduced to about 125 p.s.i. even under peak load conditions. This is based on existing loads plus 10,000 pounds per hour for future additions to the laundry.

It is recommended that the minimum allowable pressure be maintained. The purpose of maintaining the lowest possible pressure in the system is to reduce maintenance and heat losses to a minimum. Expansion joint packing glands, valve stems, drip traps, etc. all will function better and waste less steam when pressures are maintained at a minimum. The steam pressure requirements can best be determined by installing a long distance recorder. In this instance, we recommend that the transmitter be installed in the Laundry, and the recorder be installed in the Central Heating Plant alongside of the control valve of the out-going feeder. If a long distance pressure recorder is not available, then a graph or chart should be prepared to show the desired balance between steam pressure leaving the plant and the minimum pressure required at the Laundry.

(c) Regimental Areas 1 -5, Inclusive, and Post Troops Area. The 14" North feeder from the Central Heating Plant was figured to feed one half of Area 3, Areas 1 and 2, the Post Troops area plus an allowance of 54,000 lbs. per hour at the end of the trunk line in Area 1 available for the Naval Hospital if a tie line should be installed to the Hospital. The bypass in manhole TL No. 6 at the Traffic Circle was considered to be closed.

The minimum pressure was computed to be 115.1 p.s.i. in Area No. 1 at the Fire House.

The water heaters are sized for steam at 50 p.s.i. which plus 20 lbs. for the pressure reducing valve, indicates that 75 p.s.i. will furnish sufficient pressure at the far end of the system. Under present conditions a pressure of about 150 lbs. at the Central Heating Plant will maintain the stated minimum pressure including the Hospital load. Without the Hospital load, a pressure considerably under 150 lbs. should be sufficient even under peak load conditons. In the Spring, Fall and Summer a pressure of 100 lbs. at the Central Heating Plant should be sufficient. A procedure similar to that outlined for the Industrial Area is recommended for securing proper balance between plant pressure and steam flow either by long distance pressure recorder installed at the Fire House or by preparing a suitable chart based upon known facts.

The 14" South feeder from the Central Heating Plant was designed to supply the south half of Area No. 3, Areas 4 and 5 plus an allowance of 20,000 pounds per hour for a future Regimental Area. The minimum pressure was calculated to be 99.6 p.s.i. at the Regimental Administration Building in Area 5. Without the 20,000 pounds per hour, allowance for a future regimental area, it would appear that a pressure between 125 and 150 lbs. leaving the Central Heating Plant should be sufficient to maintain 75 p.s.i. at the Area No. 5 Regimental Administration Building under peak load conditions. For less than peak load, a lower pressure will be sufficient. The same method of operating as outlined for the Industrial Area is recommended for this portion of the system.

G-2.02. (d) Industrial Area Steam. Dwg. 627.

	Pipe Length	Size	Bldg. Load lbs.	Load lbs. per hr.	Pr.Drop lbs.	Resultant Pr. p.s.i
From C.H.P. to M.H.						175
No. 131	168'	8"		47,919	1.5	173.5
M.H. 131 to 133	954'	8"	39,751	47,919	8.7	164.8
Bakery and Fire Station to M.H. 135	281'	6"	2,912	8,168	.4	164.4
To M.H. 136	645'	6"	4,500	5,256	.3	164.1
M.H. 138	339'	4"	756	756	-	164.1
			Branch"C"			
C.H.P. to Propane Gas M.H. 130	91'	8"	750	8,250	-	175 175.0
Garage Oil Tanks To M. H. 139	441'	4"	7,500	7,500	5.1	169.9

G-2.02. (d) (Cont'd)

	Pipe Length	Size	Bldg. Load lbs.	Load lbs. per hr.	Pr.Drop lbs.	Resultant Pr.p.s.i.
Branch "A"						
M.H. 133						164.8
to Laundry	208'	8"	34,751	39,751	1.4	163.4
To Garage and Reclamation	467'	4"	5,000	5,000	2.6	160.8
Branch "B"						
M.H. 136 to						164.1
Cold Storage	77'	4"	200	4,500	.3	163.8
Post Shop	573'	4"	3,500	4,300	2.4	161.4
Future	350'	4"	800	800	.1	161.3
Entire Load via 8" through M. H. 130						
From C.H.P.						175
to M.H. 130	91'	8"	8,250	56,169	1.1	173.9
M.H. 130 to						
M.H. 131	199'	8"	47,919	47,919	1,8	172.1
Entire Load via 8" through M. H. 131						
From C.H.P.						175
to M.H. 131	168'	8"	8,250	56,169	2.1	172.9

G-2.02 (e) Trunk Line --Steam--Central Heating Plant To Areas 3, 2, and 1: Dwgs. 672, 673, 674.

From C.H.P. to-						175.0
TL #5 Dispensary	1823'4"	14"	1,500e	178,598	16.4	158.6
To TL #6	520'0"	14"	-	177,098	4.8	153.8
To Post HQ and M.H. TL#7	450'	14"	17,989	177,098	4.4	149.4
Water Pumping Station	250'	14"	200	159,109	2.0	147.2
To M1H. TL#8	180'	14"	17,757	158,909	1.4	145.8

G-2.02 (e) (Cont'd)

	Pipe Length	Size	Bldg. Load lbs.	Load lbs. per hr.	Pr.Drop lbs.	Resultant Pr.p.s.i.
TL #9	490'	12"	16,194	141,152	5.4	140.4
TL #10	420'	12"	16,687	124,958	3.7	136.7
#204 2-16B	85'	12"	3,888	108,271	.6	136.1
Messhall 206 2-5M	330"	12"	4,401	104,383	2.0	134.1
Post Theater TL #13	400'	12"	4,000e	99,982	2.3	131.8
TL #14 #107	400'	12"	4,401	95,982	2.2	129.6
115MT TL #15	360'	12"	1,958	91,581	1.8	127.8
TL #16	175'	12"	9,273	89,623	.8	127.0
TL #17	410'	10"	13,300	80,350	4.2	122.8
TL #18	320'	10"	6,345	67,050	2.3	120.5
TL #19 #124 #127 #128, #125	270'	10"	54,000e Hospital 4,761 58,761	58,761	1.5	117.7

G-2.02 (f) North Side Main Access Road: Steam Area #3, Dwg. 636

From M.H. TL#7 to #300	560'	6"	1,958	16,652	3.1	149.4 146.3
#302 PX #322 SC	470'	5"	981	14,694	5.7	140.6
#304 BA #308	630'	5"	2,255	13,713	6.8	133.8
#312 #314	211'1"	5"	6,345	11,458	1.6	132.2
#316	283'1"	4"	1,944	5,113	1.5	130.7
#318	217'1"	3"	1,944	3,169	2.0	128.7

G-2.02 (f) (Cont'd)

	Pipe Length	Size	Bldg. Load lbs.	Load lbs. per hr.	Pr.Drop lbs.	Resultant Pr.p.s.i.
#320	217'1"	3"	366	1,225	.3	128.4
#2 - Div. H.Q.	440'	3"	859	859	.3	128.1

G-2.02. (g) Steam--Post Troops: Post Troops Dwg. 645

From TL #8						145.8
to PT-11BA	200'	5"	311	17,657	3.6	142.2
#12	100'	5"	1,944	17,346	1.7	140.5
#10						
#9	217'1"	4"	6,345	15,402	10.4	130.1
#8	424'2"	4"	1,944	9,057	7.4	122.7
#6	232'1"	4"	1,944	7,113	2.5	120.2

G-2.02 (h) Steam --South Side--E Street: Area #2 - Dwg. 634

From TL #9						140.4
to #201	170'	5"	1,958	16,194	2.5	137.9
To #205						
#203	210'	5"	2,363	14,236	2.5	135.4
#209	246'1"	5"	1,944	11,873	2.0	133.4
#211						
#213						
#225	539'7"	4"	6,907	9,929	11.0	122.4
#217	223'1"	3"	1,944	3,022	1.9	120.5
AD #6	300'	3"	-	1,078	.3	120.2
#219	80'	2½"	311	1,078	.3	119.9
#221	163'7"	2½"	401	767	.3	119.6
#223	270'	2½"	366	366	.1	119.5

G-2.02. (i) Steam--North Side--E Street: Area #2 - Dwg. 633

From M.H. TL#10						136.7
to #208	320'	5"	1,944	16,687	5.1	131.6
To #212	217'1"	5"	1,944	14,743	2.8	128.8

G-2.02. (i) (Cont'd)

	Pipe Length	Size	Bldg. Load lbs.	Load lbs. per hr.	Pr.Drop lbs.	Resultant Pr.p.s.i.
#216						
#214	217'1"	5"	622	12,799	2.2	126.6
#220	247'	5"	1,944	12,177	2.3	124.3
#224						
#226	211'1"	5"	6,345	10,233	1.4	122.9
#228	280'11"	3"	1,944	3,888	4.2	118.7
#227	217'1"	3"	1,944	1,944	.8	117.9

G-2.02. (j) Steam--South Side--B Street; Area #1 - Dwg. 632

From TL #16						127.0
to #117	164'	4"	419	1,497	.1	126.9
To #119	410'	4"	401	1,078	.1	126.8
#121						
#123	160'	4"	677	677	-	126.8
From TL #16						127.0
to #111	70'	4"	1,944	7,776	.9	126.1
To #109	217'1"	4"	1,944	5,832	1.6	124.5
#105	424'2"	4"	1,944	3,888	1.4	123.1
#101	217'1"	4"	1,944	1,944	.2	122.9

G-2.02. (k) Steam--North Side--B Street; Area #1 - Dwg. 631

From TL #17						122.8
to #114 and #112	15'	5"	2,255	13,300	.2	122.6
To #108	246'1"	5"	1,944	11,045	2.0	120.6
To M.H. B #14 and #104 B	474'9½"	5"	1,944	9,101	2.6	118.0
To #102	100'	4"	1,944	7,157	1.1	116.9
Catholic Church	160'	4"	400	5,213	1.0	115.9
#106	150'	4"	4,401	4,813	.8	115.1
To Fire House #18	530'	4"	412	412	-	115.1

G-2.02. (1) Trunk Line--Steam--Central Heating Plant to Areas #4 and 5; Dwgs. 674, & 675.

	Pipe Length	Pipe Size	Bldg. Load lbs.	Load lbs. per hr.	Pr.Drop lbs.	Resultant Pr.p.s.i.
From C.H.P. to MH TL#6 & Hostess House	2343'4"	14"	350e	128,517	10.5	175 164.5
To TL #20	370'	12"	25,066	128,167	2.9	161,6
TL #21, #315	250'	12"	311	103,101	1.3	160.3
#425	290'	12"	562	102,790	1.5	158.8
TL #23 and Prot. Church	460'	12"	25,426	102,228	2.4	156.4
TL #24	400'	10"	13,674	76,802	3.0	153.4
TL #25 & #401	200'	8"	1,958	63,128	3.5	149.9
TL #26 to TL #27	730'	8"	14,865	61,170	12.6	137.3
To Tl #28 to end of TL	640'	8"	26,305	46,305	6.8	130.5
		(Future)	20,000			

G-2.02. (m) Steam--South Side Main Access Road; Area #3 - Dwg 635.

From MH Tl#20						161.6
To #301 and #305	200'	6"	3,888	25,066	2.3	159.3
To #309, #313 and #307	516'2"	6"	8,289	21,178	4.1	155.2
#321	561'	5"	1,944	12,889	4.7	150.5
#323	217'1"	5"	1,944	10.945	1.4	149.1
#327	277'1"	5"	1,944	9,001	1.2	147.9
#325 and #326	211'1"	4"	6,345	7,057	1.9	146.0
MH MA #1	189'1"	2"	712	712	1.0	145.0

G-2.02. (n) Steam--North Side--K Street; Area #4- Dwg. 637

From MH TL #23 to						156.4
#400, & #404	220'	6"	2,255	24,976	2.6	153.8

G-2.02. (n) (Cont'd)

	Pipe Length	Size	Bldg. Load Lbs.	Load lbs. per hr.	Pr.Drop lbs.	Resultant Pr.p.s.i.
To #406 and #408	211'1"	6"	6,345	22,721	2.1	151.7
#410	281'1"	5"	1,944	16,376	4.0	147.7
#412	217'1"	5"	1,944	14,432	2.5	145.2
#420, #422, #424 and #416	513'2"	5"	8,600	12,488	4.4	140.8
#426	291'1"	4"	1,944	3,888	.9	139.9
#427	217'1"	4"	1,944	1,944	.2	139.7
G-2.02. (c) Steam--South Side--K Street; Area #4 - Dwg. 638						
From MH TL 24 to						153.4
#403 and #407	485'	5"	2,363	13,674	4.9	148.5
#409	241'1"	5"	1,944	11,311	1.6	146.9
#411 and #415	539'7"	5"	6,345	9,367	2.6	144.3
#417	248'1"	4"	1,944	3.022	.4	143.9
#419 and #421	355'	4"	712	1,078	.1	143.8
#423	225'	4"	366	366	-	143.8
G-2.02. (p) Steam--North Side--N Street; Area #5, Dwg. 639						
From TL #27 to						137.3
#500	70'	5"	1,958	14,865	.9	136.4
#502	310'	5"	1,944	12,907	2.9	133.5
#506 and #508	217'1"	5"	6,345	10.963	1.5	132.0
#510	357'1"	3"	1,944	4,618	7.0	125.0
#514	217'1"	3"	1,944	2,674	1.5	123.5
#516 and #518	180'	2½"	730	730	.3	123.2

G-2.02. (q) Steam--South Side--N Street; Area #5, Dwg. 640.

	Pipe Length	Pipe Size	Bldg. Load lbs.	Load lbs. per hr.	Pr.Drop lbs.	Resultant Pr.p.s.i.
From TL to						130.5
#501 and #504	125'	6"	873	26,305	1.9	128.6
#503	420'	6"	1,944	25,432	6.1	122.5
#507	217'1"	6"	1,944	23,488	2.8	119.7
#511 and #509	357'1"	6"	6,345	21,544	3.9	115.8
#515	217'1"	5"	1,944	15,199	3.3	112.5
#517	515'	5"	1,944	13,255	6.4	106.1
#519	217'1"	5"	1,944	11,311	2.0	104.1
#523						
#521	277'1"	5"	6,345	9,367	1.8	102.3
#527	217'1"	3"	1,944	3.022	2.2	100.1
#526	30'	3"	311	1,078	.1	100.0
#520 and #522	580'	3"	767	767	.39	99.6

G-2.03. Condensate Return Friction Loss Study:

(a) Purpose of Study: The purpose of this study is to determine maximum pressure head against which the condensate pumps in the various buildings will operate. The receiver tank at the Central Heating Plant is 70' feet above elevation 28.0, which is grade, and accordingly all condensate returned to the Central Heating Plant must be discharged against this fixed head plus friction loss through the return system. Friction loss calculations are based on the condensate being returned uniformely at the same rate that the steam leaves the plant.

(b) The maximum head in the Industrial Area was found to be 99.0' (43 p.s.i.) in the return main at the Garage and Reclamation Buildings.

(c) The maximum head on the branch to Area #1 was found to be 167.1' (or 72 p.s.i.) in the return main at the Fire House.

G-2.03. (d) Industrial Area--Condensate Return: Dwg. 627

	Pipe Length	Pipe Size	Bldg. Load	Load lbs Per hr.	Load GPM	Friction loss in Feet	Total Head in Feet
From C.H.P.					Static		70.0
to M.H. 131	168'	4"	8,250	56,169	112.3	2.6	
					Static	5.	
						7.6	77.6

G-2.03 (d) (Cont'd)

	Pipe Length	Pipe Size	Bldg. Load	Load lbs Per hr.	Load GPM	Friction loss in Feet	Total Head in Feet
To M.H. 133	954'	4"	39,751	47,919	95.8	10.7	
					Static	3.	
						13.7	91.3
To M.H. 135	281'	2½"	2,912	8,168	16.3	1.2	
					Static	2.	
						3.2	94.5
To M.H. 136	645'	2½"	4,500	5,256	10.5	1.2	95.7
To M.H. 138	239'	2½"	756	756	1.5	-	95.7
			Branch C				
M.H. 131 to						Static	77.6
M.H. 130	199'	2½"	750	8,250	16.5	.9	78.5
To M.H. 139	441'	2½"	7,500	7,500	15.0	1.5	
					Static	2.	
						3.5	82.0
			Branch A				
M.H. 133 to						Static	91.3
Laundry	208'	3"	34,751	39,751	79.5	5.9	
					Static	1.0	
						6.9	98.2
To Garage and Reclamation Bldg.	467'	2½"	5,000	5,000	10.	.8	99.0
			Branch B				
M.H. 136 to						Static	95.7
Cold Storage	77'	2½"	200	4.500	9.	.1	95.8
To Post Shop Bldg.	573'	2½"	4,300	4,300	8.1	.6	96.4

G-2.03. (e) Condensate Return--Central Heating Plant to Regimental Areas; Trunk Line --Dwgs. 672, 673 and 674

G-2.03. (e) (Cont'd)

	Pipe Length	Size	Bldg. Load	Load Lbs Per hr.	Load GPM	Friction loss in Feet	Total Head in Feet
From C.H.P.	1,823'4"						Tank El.
to M.H. #5	100e			178,598			98.0
and Dispensary	in plant			128,517			70.0
	1,923'4"	8"	1,500e	307,115	614.23	23.4	97.4
					Static	4.	
						27.4	
To M.H. TL #6			350				
& Hostess House	520'	8"	128,167	305,615	611.	6.2	104.6
			128,517		Static	1.	
						7.2	
To Post H.Q. and M.H. TL #7	450"	6"	17,989	177,098	354.2	8.1	
					Static	1.0	
						9.1	113.7
To Water Pumping Sta.	250'	6"	200	159,109	318.2	3.5	117.2
To M.H. TL #8	180'	6"	17,757	158,909	317.8	2.5	
					Static	1.	
						3.5	120.7
To TL #9	490'	6"	16,194	141,152	282.3	5.6	
					Static	1.	
						6.6	127.3
TL #10	420"	6"	16,687	124,958	249.9	4.0	
					Static	1.	
						5.0	132.3
#204 and #202	85'	6"	3,888	108,271	216.5	.6	132.9
#206	330'	5"	4,401	104,383	208.8	5.3	
					Static	1.	
						6.3	139.2
To Post Theater and TL #13	400'	5"	4,000e	99,982	199.9	6.0	
					Static	1.	
						7.0	146.2

G-2.03. (e) (Cont'd)

	Pipe Length	Size	Bldg. Load	Loadlbs Per hr.	Load GPM	Friction Loss In Feet	Total Head in Feet
To #107 TL #14	400'	5"	4,401	95,982	199.2	6.0	152.2
To #115 TL #15	360'	5"	1,958	91,581	183.2	4.5	156.7
TL #16	175'	5"	9,273	89,623	179.2	2.2	158.9
TL #17	410'	5"	13,300	80,350	160.7	3.9	162.8
TL #18	320'	5"	6,345	67,050	134.1	2.2	165.0
1-9B	211'1"	5"	1,944	60,705	121,4	1.2	166.2
TL #19 #127,#128 and #125	270' Hospital	5"	4,761 54,000e 58,761	58,761	117.5	1.5	167.7

G-2.03. (f) Condensate Return--North Side--Holcomb Boulevard Main Access Road; Area #3

From TL #17						Static	113.7
to #300	560'	3"	1,958	16,652	33.3	2.9	
					Static	6.	
						8.9	122.6
To #302 and #322	470'	3"	981	14,694	29.4	2.0	
					Static	1.	
						3.0	125.6
To #304 and #308	630'	3"	2,255	13,713	27.4	2.4	
					Static	2.	
						4.4	130.0
#312 and 314	211'1"	2½"	6,345	11,458	22.9	1.7	131.7
#316	283'1"	2"	1,944	5,113	10.2	1.1	132.8
#318	217'1"	2"	1,944	3,169	6.3	.4	133.2
#320	217'1"	1½"	366	1,225	2.3	.2	133.4
Div. H.Q.	440'	1½"	859	859	1.7	.3	133.7

G-2.03 (g) Condensate Return--Post Troop Area;

From TL #8						Static	120.7
to #13	200'	2½"	311	17,657	35.3	3.6	124.3

G-2.03 (g) (Cont'd)

	Length	Pipe Size	Bldg. Load	Load lbs Per hr.	Load GPM	Friction Loss in Feet	Total Head In Feet
#12	100'	2½"	1,944	17,346	34.7	1.8	126.1
#10 and #9	217'1"	2½"	6,345	15,402	30.8	3.0	129.1
#8	424'2"	2½"	1,944	9,057	18.1	2.3	131.4
#6	232'1"	2½"	1,944	7,113	14.2	.8	132.2
#4	449'0"	2½"	419	5,169	10.3	.9	133.1
#3 and #25	255'0"	2½"	4,750	4,750	9.5	.4	
					Static	1.	
						1.4	134.5

G-2.03 (h) Condensate Return--South Side--E Street: Area #2 Dwg 634

From M.H. TL						Static	127.3
#9 to #201	170'	3"	1,958	16,194	32.4	.8	128.1
To #205 and #203	210'	3"	2,363	14,236	28.5	.8	128.9
#209	246'1"	2½"	1,944	11,873	23.7	2.2	131.1
#211 and 213 and 225	539'7"	2½"	6,907	9,929	19.8	3.4	
					Static	2.	
						5.4	136.5
#217	223'1"	2"	1,944	3,022	6.0	1.4	137.9
#219	380'	1½"	311	1,078	2.2	.3	138.2
#221	163'7"	1½"	401	767	1.5	.1	138.3
#223	270'	1½"	366	366	1.	.1	
					Static	1.0	
						1.1	139.4

G-2.03. (i) Condensate Return--North Side--E Street: Area #2

From M.H. TL						Static	132.3
#10 and #208	320'	3"	1,944	16,687	33.4	1.7	134.0
To #212	217'1"	3"	1,944	14,743	29.5	.9	134.9
#214 and #216	217'1"	3"	622	12,799	25.6	.7	135.6
#220	247'	3"	1,944	12,177	24.3	.7	136.3

G-2.03. (i) (Cont'd)

	Pipe Length	Size	Bldg. Load	Load lbs Per hr.	Load GPM	Friction Loss in Feet	Total Head in Feet
#224 and #226	211'1"	2½"	6,345	10,233	20.5	1.4	
					Static	1.	
						2.4	138.7
#228	280'11"	2"	1,944	3,888	7.8	.7	
					Static	2.	
						2.7	141.4
#227	217'1"	1½"	1,944	1,944	3.9	.6	142.0

G-2.03. (j) Condensate Return--South Side--B Street; Dwg. 632

From TL #16						Static	158.9
to #117	164'	2"	419	1,497	2.99	.1	159.0
To #119	410'	2"	401	1,078	2.2	.1	159.1
#121 and #123	160'	2"	677	677	1.3	-	159.1
From TL #16						Static	158.9
to #111	70'	2½"	1,944	7,776	15.6	.3	159.2
To #109	217'1"	2½"	1,994	5,832	11.7	.5	159.7
To #105	424'2"	2½"	1,944	3,888	7.8	.5	160.2
#101	217'1"	2"	1,944	1,944	3.9	.2	160.4

G-2.03 (k) Condensate Return--North Side--B Street; Dwg. 631

From TL #17 to						Static	162.8
#114 to #112	15'	3"	2,255	13,300	26.6	.1	162.9
To #108	246'1"	3"	1,944	11,045	22.1	.6	163.5
To M. H. B #14 and #104	474'9½"	2½"	1,944	9,101	18.2	2.6	166.1
#102	100'	2½"	1,944	7,157	14.3	.4	166.5
Catholic Church	160'	2½"	400	5,313	10.4	.3	166.8
#106	150'	2½"	4,401	4,813	9.6	.2	167.0
Fire House #18	530'	2"	412	412	.82	.1	167.1

G-2.03 (1) Condensate Return to Areas #4 and #5:

	Pipe Length	Size	Bldg. Load	Load lbs Per hr.	Load GPM	Friction Loss in Feet	Total Head in Feet
M.H. TL #6 to TL #20	370'	6"	25,066	128,167	256.3	Static 3.5	104.6 108.1
TL #21 #315	250'	5"	311	103,101	206.2	3.8	
					Static	1.	
						4.8	112.9
To #425	290'	5"	562	102,790	205.6	4.4	
					Static	1.	
						5.4	118.3
TL #23 and Prot.Church	460'	5"	25,426	102,228	205.5	7.0	
					Static	2.	
						9.0	127.3
From TL #23 to TL #24	400'	5"	13,674	76,802	153.6	Static 3.6	127.3
					Static	1.	
						4.6	131.9
TL #25 #401	200'	5"	1,958	63,128	126.2	1.2	133.1
To TL #27	730'	5"	14,865	61,170	122.3	4.3	137.4
To end of Trunk Line	640'	4"	26,305				
		Future	20,000				
			46,305	46,305	92.6	6.8	144.2

G-2.03. (m) Condensate Return--South Side--Holcomb Boulevard Main Access Road; Dwg. 635

From TL #2 #301 to #305	200'	3"	3,888	25,066	50.1	Static 2.3	104.6
					Static	3.	109.9
To #309, #313 and #307	516'2"	3"	8,289	21,178	42.4	4.3	
					Static	1.	
						5.3	115.2
#321	561"	3"	1,944	12,889	25.8	2.1	
					Static	3.	
						5.1	120.3

G-2.03. (m) (Cont'd)

	Pipe Length	Size	Bldg. Load	Load lbs. Per hr.	Load GPM	Friction Loss in Feet	Total Head in Feet
#323	217'1"	2½"	1,944	10.945	21.9	1.6	121.9
#327	277'1"	2½"	1,944	9,001	18	1.5	123.4
#325 and #326	211-1"	2"	6,345	7,057	14.1	1.4	
					Static	1.	
						2.4	125.8
M.H. MA#1	189"1"	1½"	712	712	1.4	.1	
					Static	3.	
						3.1	128.9

G-2.03 (n) Condensate Return--North Side--N Street; Area #5 dwg No. 639.

From TL #27 to #500	70'	3"	1,958	14,865	29.7	Static	137.4
						.3	137.7
#502	310'	3"	1,944	12,907	25.8	1.0	138.7
#506 and #508	217'1"	2½"	6,345	10.963	21.9	1.6	
					Static	1.0	
						2.6	141.3
#510	357'1"	2"	1,944	4,618	9.2	1.2	142.5
#514	217'1"	2"	1,944	2,674	5.3	.3	142.8
#516 and #518	180'	1½"	730	730	1.3	.1	
					Static	1.0	
						1.1	143.9

G-2.03. (o) Condensate Return--South Side--N Street; Area #5 Dwg. 640

From TL to #501 and #524	125'	3"	873	26,305	52.6	Static	144.2
						1.6	
					Static	2.0	
						3.6	147.8
#503	420'	3"	1,944	25,432	50.9	5.0	152.8
#507	217'1"	3"	1,944	23,488	47.0	2.3	155.1
#511 and #509	357'1"	3"	6,345	21,544	43.1	3.2	158.3
#515	217'1"	3"	1,944	15,199	30.4	1.0	159.3

G-2.03. (o) (Cont'd)

	Pipe Length	Pipe Size	Bldg. Load lbs.	Load lbs. Per hr.	Load GPM	Friction Loss in Feet	Total Head in Feet
#517	515'1"	3"	1,944	13,255	26.5	1.8	
					Static	1.0	
						2.8	162.1
#519 #523	217'1"	2½"	1,944	11,311	22.6	1.7	163.8
#521	277'1"	2½"	6,345	9,367	18.7	1.6	165.4
#527	217'1"	2"	1,944	3,022	6.	.4	
					Static	2.	
						2.4	167.8
#526 #520	36'	2"	311	1,078	2.1	0.0	167.8
#522	580'	2"	767	767	1.5	.1	167.9

G-2.03. (p) Condensate Return--North Side--K Street; Area #4
Dwg No. 637

From TL #23 to #400 and #404	220'	3"	2,255	24,976	49.9	2.6	Static 127.3
					Static	2.0	
						4.6	131.9
To #406 and 408	211'1"	3"	6,345	22,721	45.4	2.1	
					Static	1.0	
						3.1	135.0
#410	281'1"	3"	1,944	16,376	32.8	1.4	136.4
#412	217'1"	2½"	1,944	14,432	28.9	2.7	139.1
#420, #422 #424 and #416	513'2"	2½"	8,600	12,488	25.0	4.7	143.8
#426	291'1"	2"	1,944	3,888	7.8	.8	
					Static	2.	
						2.8	146.6
#427	217'2"	2"	1,944	1,944	3.9	.2	
					Static	1.0	
						1.2	147.8

G-2.03 (q) Condensate Return--South Side--K Street:

	Pipe Length	Size	Bldgs. Load lbs.	Load lbs per hr.	Load GPM	Friction Loss in Feet	Total Head in Feet
From MH T1 #24 to #403 and #407	485'	3"	2,363	13,674	27.3	Static 1.8	131.9
					Static	1.0	
						2.8	134.7
#409	241'1"	2½"	1,944	11,311	22.6	1.9	
					Static	1.0	
						2.9	137.6
#411 and #415	539'7"	2½"	6,345	9,367	18.7	3.1	140.7
#417	248'1"	2½"	1,944	3,022	6.	.2	140.9
#421 and #419	355'	2"	712	1,078	2.2	.1	141.0
#423	255'	2"	366	366	.7	0.0	145.0
					Static	4.0	
						4.0	

G-2.04 (a) Division Training Area Total Distribution Losses.

	Lbs. per hr.	Lbs. per yr.
Industrial Area	976	8,550,000
14" North Feeder to half of Area 3, Areas 1 & 2 and Post Troops	6,336	55,500,000
14" South Feeder to half of Area 3 & Areas 4 & 5	4,858	42,500,000
Total	12,170	106,550,000

Allowing 35¢ per 1000 lbs. as the incremental cost of production at the Central Heating Plant, then line losses amount to 106,550 x $.35 = $ 37,300 per year. This is an important item of expense and should be watched carefully - for a variation of 10% amounts to $ 3,700 per year. Every effort should be made by scheduled inspections, routine maintenance etc. to keep leaks, uninsulated pipe surface etc. reduced to a minimum.

The maximum amount of condensate normally handled by one trap is in Manhole TL No. 10, where one trap drains the 430' of 14" and 910' of 12" pipe extending back to Manhole TL No. 7, totaling 553 lbs. of condensate per hour.

There are a total of 137 drip traps in manholes and mechanical pits used for draining the steam distribution system. Some of the mechanical pits contain traps for dripping the inside high pressure piping, through the steam service. Drip traps, valves, expansion joints and strainers should have daily inspection when first put into service and as the system and equipment operates smoothly the inspection period may be gradually lengthened to monthly intervals which should be kept up for at least the first year. Records showing maintenance performed on each trap, mechanical pit, manhole, etc. should then be used as a guide for permanent routine inspection and maintenance.

Distribution Losses as used in the following tabulations are:

Steam Pipe Size	Condensate per hr. per 100' of pipe
1-1/2"	6
2"	7.5
2-1/2"	9
3"	11
4"	14
5"	17.5
6"	21
8"	27
10"	34
12"	40
14"	44

G-2.04. (b) Condensate Drips, Industrial Area.

	Location of Drip pt.	Pipe Length	Pipe Size	Cond.lbs.per hr.per 100' pipe	Cond.lbs. per hour	Cond.cumulative lbs. per hour
From C.H.P to MH No.131	MH 133	168'	8"	27	45	
C.H.P. to MH No. 130		91'	8"	27	25	
MH 130 to No. 131		199'	8"	27	54	
Propane Gas		110'	2½"	9	10	
MH 131 to No. 133		954'	8"	27	257	
					391	391
MH 133 to MH No. 135		281'	6"	21	59	
To MH 136	MH 135	645'	6"	21	135	
Bakery		90'	3"	11	10	
Fire House		175'	2½"	9	16	
					220	611
MH 136 to No. 138	MH 136	339'	4"	14	47	
Commissary		140'	2½"	9	13	
					60	671
		Branch C				
MH 130 to MH 139	MH 139	441'	4"	14	62	
Garage		90'	3"	11	10	
					72	743
		Branch A				
MH 133 Reclamation	MH 134	208'	8"	27	56	
		467'	4"	14	65	
		90'	2½"	9	8	
					129	872
Garage	Garage	20'	3"	11	2	874

G-2.04. (b) Continued.

Location of Drippt.		Length	Pipe Size	Cond.lbs.per hr.per 100'pipe	Cond.lbs. per hr.	Cond.cumulative lbs. per hour
			Branch B			
MH 136 to Post Shop	MH 137	650'	4"	14	91	
		100'	3"	11	11	
					102	976

G-2.04 (c) Drips from Central Heating Plant to Areas 3, 2, & 1. Dwg. 674.

C.H.P. to MH TL 3	MH TL #2	908'	14"	44	400	400
To A.D.# 6A at 24.8'	TL No. 3	250'	14"	44	110	510
To A.D.# 6A at 24.15	TL No. 5	925'	14"	44	407	917
Dispensary	Dispensary	430'	3"	11	47	964
From A.D.#6A to MH TL#6	TL No. 6	260'	14"	44	114	1078
			Drawing No. 673.			
From TL No.6 to MH TL # 7	Bldg.302	450'	14"	44	198	
From TL No.7 to MA # 17	Bldg.302	560'	6"	21	118	
To MA # 16	Bldg.302	470'	5"	17.5	82	
To Bldg.302	Bldg.302	80'	$2\frac{1}{2}$"	9.	7.	
		80'	2"	7.5	6.	
To Bldg.322	Bldg.302	300'	$2\frac{1}{2}$"	9.	27	
					438	1516
Bldg.300	Bldg.300	110'	2"	7.5	8	1524
From MA 16 to Bldg.308	Bldg. 308	630'	5"	17.5	110	
Bldg. 308	Bldg. 308	90'	2"	7.5	6	
					116	1640
Bldg. 304	Bldg. 304	90'	$1\frac{1}{2}$"	6	5.	1645

G-2.04 (c) Continued.

	Location of Drip pt.	Pipe Length	Size	Cond.lbs.per hr.per 100' pipe	Cond.lbs per hr.	Cond.cumulative lbs. per hour
From Bldg.308 to Bldg.316	Bldg.316	211'1"	5"	17.5	37.	
		283'1"	4"	14.	40.	
Bldg. 316	Bldg.316	90'	2"	7.5	7.	
					84	1729
MA # 13 to Bldg. 312	Bldg.312	80'	4"	14	11	
		20'	1½"	6	1	
					12	1741
	Drawing 636.					
From Bldg.312 to Bldg.314	Bldg.314	400'	4"	14	56	1797
Bldg.318	Bldg.318	217'1"	3"	11	24	
		90'	2"	7.5	7	
					31	1828
Bldg.320	Bldg.320	217'1"	3"	11	24	
		20'	2"	7.5	2	
					26	1854
Div.H.Q.(2)	Bldg.2	440'	3"	11	48	1902
	Drawing 673.					
Post HQ (1)	Bldg.1	50'	2"	7.5	4	1906
MH TL # 7 to TL # 10	TL #10	430'	14"	44	189	
		910'	12"	40	364	
					553	2459
Water Pumping Station (20)	Bldg.20	310'	2½"	9	28	2487
TL No. 8 to Bldg. 12	Bldg.12	300'	5"	17.5	52	2539
Bldg.13	Bldg.13	130'	2½"	9	12	2551
Bldg.10	Bldg.10	217'1"	4"			
		320'	4"			
		537'1"	4"	14	75	2626
Bldg.8	Bldg.8	424'2"	4"	14	59	2685

G-2.04. (c) Continued.

	Location of Drip Pt.	Pipe Length	Size	Cond.lbs.per hr.per 100'pipe	Cond.lbs. per hr.	Cond. cumulative lbs. per hour
Bldg. 6	Bldg.#8	232'1"	4"	14	32	2717
MH PT #1	MH PT#1	704'	4"	14	98	
Bldg.3		120'	3"	11	13	
Bldg. 25		220'	3"	11	24	
					135	2852
	Drawing 645.					
Bldg.4	Bldg.4	120'	1½"	6	7	2859
	Drawing 634.					
TH #9 to		170'	5"	17.5	30.	
E #16	Bldg.201	210'	2"	7.5	16	
					46	2905
Bldg. 209	Bldg.209	456'1"	5"	17.5	80	
		100'	2"	7.5	8	
					88	2993
Bldg. 205	Bldg.205	110'	1½"	6	7.	3000
Bldg.203	Bldg.203	140'	1½"	6	8	3008
E-3	Bldg.213	539'7"	4"			
		90'	4"			
		629'7"	4"	14	88	
Bldg.211		100'	4"	14	14	
Bldg.213		20'	2"	7.5	2	
					104	3112
Bldg. 225	Bldg.225	210'	2½"	9	19	3131
Bldg. 217	Bldg.217	223'1"	3"	11	24	
		90'	2½"	9	8.	
					32	3163
E#1	Bldg.221	300'	3"	11	33	
		243'7"	3½"	9	22	
		60'	2"	9.5	4	
					59	3222
Bldg.219	Bldg.219	140'	2"	7.5	10	
Bldg.223	Bldg.223	270'	2½"	9	24	
		200'	2"	7.5	15	
					39	3271
	Drawing 633.					
MH TL#10		537'1"	5"	17.5	94.	
to Bldg.212	Bldg.212	90'	2"	7.5	7	
					161	3432

G-2.04. (c) Continued.

Location of Drip Pt.		Pipe Length	Size	Cond.lbs.per hr. per 100' pipe	Cond.lbs. per hr.	Cond.cumulative lbs.per hour
Drawing 633 (cont'd)						
Bldg.208	Bldg.208	90'	2"	7.5	7	3439
To E#10	Bldg.220	464'1"	5"	17.5	81	
		90'	2½"	9	8	
					89	3528
Bldg.216	Bldg.216	400'	2"	7.5	30	3558
Bldg.214	Bldg.214	80'	2"	7.5	6	3564
MH E # 8	Bldg.228	211'1"	5"	17.5	37	
		280'11"	3"	11.	31	
Bldg.224		90'	4"	14	13	
2-8B, 228		90'	3"	11	10	
					91	3655
Bldg. 226	Bldg.224	385'	4"	14	54	
		20'	1½"	6	1	
					55	3710
Bldg.227	Bldg.227	217'1"	3"			
		90'	3"			
		307'1"	3"	11	34	3744
From TH#10 to TL #13	TL # 13	85'	12"			
		330'				
		400'				
		815'	12"	40	326	
Bldg. 206		90'	3"	11	10	
TH#13 to TL # 14	TL#13	400'	12"	40	160	
					496	4240
P.Theater No.19	P.T.#19	450'				
		450'	4"	14	63	4303
TL#14 to TL #15 107	TL#14	360'	12"	40	144	
		220'	4"	14	31	
					174	4477
From TL#15 to TL#16 115	115	175'	12"	40	70	
		140'	2"	7.5	10	
					80	4557

G-2.04 (c) Continued.

Location of Drip Pt.	Pipe Length	Size	Cond.lbs.per hr. per 100'pipe	Cond.lbs. per hr.	Cond.cumulative lbs. per hour
Drawing 632.					
From TL #16 to 117	Bldg.117 164'	4"	14	23	
117	130'	1½"	6	8	
				31	4588
To 123	Bldg.123 410'	4"			
	160'	4"	14	80	
	570'				
Bldg.123	210'	2"	7.5	16	
				96	4684
Bldg.119	Bldg.119 50'	2"	7.5	4	4688
Bldg.121	Bldg.121 40'	2"	7.5	3	4691
From Tl#16 to 111	Bldg.111 70'	4"	14	10	
111	90'	2"	7.5	7	
				17	4708
MH B #5	Bldg.111 217'1"	4"	14	30	
	90'	2"	7.5	7	
				37	4745
MH B #6	Bldg.105 424'2"	4"	14	59	
	90'	2"	7.5	7	
				66	4811
Bldg.101	Bldg.101 217'1"	4"	14	30	
	90'	2½"	9	8	
				38	4849
TL#16 to TL#18	MH..TL#18 730'	10"			
	381'1"	10"			
	1111'1"	10"	34	376	5225
From TL #17 to Bldg 108	108 261'1"	5"	17.5	46	
	90'	2"	7.5	7	
				53	5278
Bldg.112	Bldg.112 90'	2½"	9	8	
	20'	2"	7.5	2	
				10	5788
Bldg.114	Bldg.114 230'	2"	7.5	17	5805

G-2.04. (c) Continued.

Location		Pipe Length	Size	Cond.lbs.per hr.per 100' pipe	Cond.lbs. per hr.	Cond.cumulative lbs. per hour
Drawing 632 Continued.						
MH B#13 to 102	Bldg.102	474'9½"	5"	17.5	83	
		275'	4"	14	38	
		90'	3"	11	10	
					131	5936
Fire Hse.18	F.H.18					
104		100'	4"			
Cath.Church	(17)	160'	4"			
106		150'	4"			
Fire Hse.18		530'	4"			
106		90'	4"			
		1030'	4"	14	142	
Fire Hse.18		50'	2"	7.5	4	
					146	6082
104	104	30'	2"	7.5	2	6084
Cath.Church	17 CC17	700'	2½"	9	63	6147
Bldg.118	Bldg.118	90'	4"	14	14	6161
Bldg.122	Bldg.122	450'	4"	14	14	6223
Bldg.120	120	90'	2"	7.5	7.	6230
MH TL#19	MH TL19	no pipe		no cond.	0	6230
MH TL#19 to MH B #8	Bldg.128	220'	4"	14	31	
		150'	2½"	9	14	
					45	6275
Bldg.124	Bldg.124	40'	2"	7.5	3	6278
Bldg.127	Bldg.127	245'	3"	11	29	
		15'	2"	7.5	1	
Bldg.125		210'	2½"	9	28	
					58	6336

G-2.04. (d) Drips From Central Htg. Plant to Areas 4 & 5. Drawing 674.

C.H.P. to #3 MH	TL#2	908'	14"	44	400	400
To AD#6A at 24.8	TL#5	250'	14"	44	110	510
To AD #6A at 24.15	TL# 5	925'	14"	44	407	917

G-2.04 (d) Continued.

	Location of Drip Pt.	Pipe Length	Size	Cond.lbs.per hr.per 100' pipe	Cond.lbs. per hr.	Cond.cumulative lbs.per hour
To TL #6	TL # 6	260'	14"	44	114	1078
Hostess Hse. (No.14)		500'	2½"	9	45	1123
To TL#20	Bldg.301	370'	12"	40	148	
Drawing 635.						
To MA #9		200'	6"	21	42	
Bldg.301		85'	2½"	9	8	
					198	1321
Bldg. 305	Bldg.305	30'	2"	7.5	2	1323
MA #4	Bldg.321	516'2"	6"	21	109	
		561'	5"	17.5	98	
		90'	3"	11	10	
Bldg.321		90'	2"	7.5	7	
					224	1547
Bldg.307 to 313	Bldg.313	410'	3"	11	44	
		20'	1½"	7.5	2	
					46	1593
Bldg.309	Bldg.309	20'	1½"	6	1	1594
Bldg.323	Bldg.323	217'1"	5"	17.5	38	
		90'	1½"	6	5	
					43	1637
MA #3	Bldg.327	277'1"	5"	17.5	48	
Bldg.327		90'	2"	7.5	7	
					55	1692
MA #3 to	Bldg.324	211'1"	4"	14	27	
Bldg.324		189'1"	2"	7.5	14	
		60'	2"	7.5	4	
					45	1737
Bldg.326	Bldg.326	90'	4"	14	13	
		20'	1½"	6	1	
					14	1751
Bldg.325	Bldg.325	400'	4"	14	56	1807
Bldg. 317	Bldg.317	220'	2"	7.5	16	1823

G-2.04 (d) Continued.

Location of Drip Pt.		Pipe Length	Size	Cond.lbs.per hr.per 100'pipe	Cond.lbs. per hr.	Cond.cumulative lbs. per hour
Drawing 675.						
From MH TL 20 to 315	Bldg.315	250'	12"	40	100	
		180'	2"	7.5	14	
					114	1937
TL# 21 to TL # 23	TL #23	290'	12"			
		460'	12"	40	300	2237
		750'	12"			
Bldg.425	Bldg.425	120'	2"	7.5	9.	2246
TL #23 to Prot.Ch. Bldg.16	Bldg.16	330'	2½"			
		450'	2½"			
		780'	2½"	9	70	2316
Drawing 637.						
MH TL #23 to 404	Bldg.404	220'	6"	21	46	
404		90'	2½"	9	8	
400		120'	2"	7.5	8	
					62	2378
J-#13 to J#12	MH J#14	211'1"	6"	21	44	
		480'	4"	14	67	
		498'2"	5"	17.5	87	
					198	2576
Bldg.406	Bldg.406	10'	2"	7.5	1	2577
Bldg. 410	Bldg.410	90'	2"	7.5	7	2584
Bldg.412	Bldg.412	251'7"	5"	17.5	44	
		90'	2"	7.5	7	
					51	2635
To 427	Bldg.427	261'7"	5"	17.5	46	
		291'1"	4"	14	41	
		217'1"	4"	14	30	
		90'	2½"	9	8	
					125	2760
Bldg.424	Bldg.424	500'	4"	14	70	2830

G-2.04 (d) Continued.

	Location of Drip Pt.	Pipe Length	Pipe Size	Cond.lbs.per hr. per 100'pipe	Cond.lbs. per hr.	Cond. cumulative lbs. per hour
Bldg. 422	Bldg.422	20'	2"	7.5	2	2832
Bldg. 420	Bldg.420	10'	2"	7.5	1	2833
Bldg.416	Bldg.416	260'	2½"	9	23	2856
Bldg.426	Bldg. 426	90'	2"	7.5	7	2863
	Drawing 675.					
From TH#23 to TL#27	MH TL#24	400'	10"	34	136	
		930'	8"	27	251	
	Drawing 638.					
From TL#24 to 409	Bldg.409	539'1"	5"	17.5	94	
		485'	5"	17.5	85	
		241'1"	5"	17.5	42	
		90'	2"	7.5	7	
					228	3478
Bldg. 407	Bldg,407	90'	2½"	9	8	
		30'	2"	7.5	2	
					10	3488
Bldg.403	Bldg.403	100'	2"	7.5	8	3492
MH J3 to MH J#2	Bldg.411	248'1"	4"			
		300'	4"			
Bldg. 411		548'1"	4"	14	77	3569
Bldg.415	Bldg.415	10'	1½"	6	1	3670
Bldg.417	Bldg.417	90'	2"	7.5	7	3677
From MH J2		580'	4"	14	81	
to 423	Bldg.423	170'	2"	7.5	13	
Bldg.419		140'	2"	7.5	10	
					104	3781
Bldg.421	Bldg.421	40'	2"	7.5	3	3784
	Drawing 675.					
Bldg. 401	Bldg.401	140'	2"	7.5	10	3794

G-2.04 (d) Continued.

Location of Drip Pt.		Pipe Length	Size	Cond.lbs.per hr.per 100'pipe	Cond.lbs. per hr.	Cond.cumulative lbs. per hour
Drawing 639.						
MH TL#27 to Bldg. 502	Bldg.502	380'	5"	17.5	66	3860
Bldg.500	Bldg.500	201'	2"	7.5	2.	3862
To MH M#4	M#4	217'1"	5"	17.5	39	
		290'	4"	14	41	
					80	3942
To Bldg.510	510	357'1"	3"	11	39	3981
Bldg. 514	514	217'1"	3"	11	24	4005
Bldg.516	516	180'	2½"	9	16	
		120'	2"	7.5	9	
					25	4030
Bldg. 518	518	300'	2"	7.5	22	4052
Drawing 675						
TH #27 to end of Trunk Line	501	640'	8"	27	173	
Drawing 640.						
To Bldg.501		125'	6"	21	26	
		30'	2"	7.5	2	
Bldg.503		420'	6"	21	88	
					289	4341
To 507	Bldg.507	217'1"	6"	21	46	4387
To Bldg.511	511	357'1"	6"	21	75	
		290'	4"	14	41	
					116	4503
Bldg.515	515	217'1"	5"	17.5	38	4541
Bldg.517	517	732'1"	5"	17.5	128	4669
Bldg. 519	519	none	--	---	0	4669
Bldg. 523	523	277'1"	5"	17.5	48	4717
Bldg. 521	521	290'	4"	14	41	4758

G-2.04 (d) Continued.

Location	of Drip Pt.	Pipe Length	Size	Cond.lbs.per hr.per 100'pipe	Cond.lbs. per hr.	Cond.cumulative lbs.per hour
Drawing 640 (Continued)						
Bldg.527	Bldg.527	217'1"	3"			
		30'	3"			
		580'	3"			
		827'1"	3"	11	91	4849
Bldg.526	626	40'	2"	7.5	3.	4852
Bldg.522	522	10'	1½"	6	1.	4853
Bldg. 520	520	90'	1½"	6	5.	4858

G-2.05. Naval Hospital Steam Distribution.

(a) Pressure Drop Study. The purpose of this study is to determine the pressure drop throughout the steam distribution system at the Naval Hospital.

The lowest pressure was calculated to be 119.6 lbs. per sq. inch at the wards with 125 lbs. per sq. inch leaving the Hospital Power House, and 123.7 lbs. at the Hospital Laundry. This would indicate that the outgoing pressure under peak load conditions could be 105-110 lb. and at times other than peak load a pressure of 90 should be sufficient even with the Laundry operating, assuming the Laundry can operate with steam at 80 lbs. per sq. inch.

An operating schedule should be developed showing outgoing plant pressure required to maintain nimimum allowable working pressures for each hour of the day including a correct allowance for outdoor weather conditions.

If in the future a tie line is installed to connect the Hospital with Regimental Area No. 1, this main should be 10" diameter. An 8" line would give a pressure of 41.4 lbs. per sq. inch at the terminal point of the 6" main serving the Family Hospital. This is based on transmitting 54,000 lbs. per hour to the Hospital Area which is about 5,000 lbs (or 10%) in excess of the present load requirement. The excess is being reserved for two additional wards.

The pressure will be slightly higher if this additional 5,000 lbs. per hour is not transmitted.

Sound engineering practice indicates the need of a 10" connecting main to Area #1, with resulting pressure at the Family Hospital of 101.1 lbs. and 77.2 lbs. at the Laundry.

If the Hospital Area is served from the Central Heating Plant in the Division Training Area, the existing boiler plant should be maintained as an active emergency standby.

G-2.05. (b) Steam--Naval Hospital: Dwg. 3644

	Pipe Length	Pipe Size	Bldg. Load lbs.	Load lbs. per hour	Press. Drop lbs.	Resultant Pr. p.s.i.
From Power House to M.H. #152	70'	8"	5,860	49,044	.9	125.0 124.1
To Laundry H-21	40'	8"	3,295	43,184	.4	123.7
To M.H. 153	170'	8"	4,250	39,889	1.4	122.3
To Nurses Home H-14	160'	8"	2,250	35,639	.1	121.3

G-2.05 (b) (Cont'd)

	Pipe Length	Size	Bldg. Load lbs.	Load lbs. Per hour	Press. Drop lbs.	Resultant Pr. p.s.i.
To M.H. 154 to Wards	300'	8"	33,389	33,389	1.7	119.6
From M. H. 152 to Shops and Corpsmen Barracks	240'	4"	400 4,400 4,800	5,860	1.8	122.3
To Garage	180'	4"	460	1,060	-	122.3
To Medical Warehouse H-17	280'	4"	600	600	-	122.3
From Shops to M.H. 150 to Corpsmen Barracks H-23 & H-24	480'	4"	4,400	4,400	.2	122.3 120.3
From M.H. 153 to AD#6 at Civilian Nurses Home H-16 & Family Hospital H-15	310'	6"	1,250 3,000 4,250	4,250	.1	122.3 122.2
From Power House to M.H. 156 Warrant Officers Home H-28	330'	2½"	150	150	.1	125. 124.9
G-2.05. (c) Tie Line From Regimental Area:						
From Area #1 MH TL #19 to A.D. #6 at Family Hospital H-15	3400'	8"	54,000	54,000	76.3	117.7 41.4 117.7
MH TL 19 to A.D. #6 at Family Hospital H-15	3400'	10"	4,250	54,000	17.6	101.1
To MH 153	310'	6"	35,639	49,750	23.6	77.5
To Laundry H-21	170'	8"	3,295	14,111	.3	77.2

G-2.05. (d) Hospital Area Steam Distribution - Condensate Return Friction Loss Study. The purpose of this study is to determine the friction loss throughout the condensate return system and to determine the head against which the condensate pumps must operate.

The maximum head in the return main was found to be 22.3' at the Wards

with no allowance for future loads. However, insofar as return line capacity back to the Power House is concerned, there is more than ample capacity.

If the tie line is installed to the Regimental Area connecting at M.H. TL #19, then the head at M.H. 153 in the Hospital Area would be 203.7' or 90 p.s.i. at peak loads.

Condensate pumps have been specified to operate against 100 p.s.i.

G-2.05. (e) Condensate Return - Hospital Area.

	Pipe Length	Size	Bldg. Load Lbs.	Load Lbs. Per Hour	Load GPM		Friction Loss in Feet	Total in Feet
From C.H.P.						Static -	12.0'	8.0
to M.H. #152	70'	4"	5,860	49,044	98		0.8	
						Static -	4.00	12.8
							4.8	
To Laundry H-21	40'	4"	3,295	43,184	86		.38	13.2
To M.H. #153	170'	4"	4,250	39,889	80		1.4	
						Static -	1.00	
							2.4	15.6
To Nurses' Home H-14	160'	4"	2,250	35,639	71		1.0	
						Static -	4.00	
							5.00	20.6
To M.H. #154 and Wards	300'	4"	33,389	33,389	67		1.7	22.3
From M.H. #152			400					
To Shops H-19 &			4,400					
Corpsmen Barracks H-23 & H-24	240'	2½"	4,800	5,860	12		.60	12.8
						Static -	1.00	
							1.60	14.4
To Garage	180'	2½"	460	1,060	.2		.02	14.4
To Medical Warehouse H-17	280'	2½"	600	600	1.2		0	14.4
								14.4
From Shops H-19 To Corpsmen H-23 & H-24 MH 150	480'	2½"	4,400	4,400	8.8		.77	
						Static -	2.00	
							2.77	17.2

G-2.05. (e) (Cont'd)

	Pipe Length	Size	Bldg. Load Lbs.	Load Lbs. Per Hour	Load GPM	Friction Loss in Feet	Total in Feet
From MH 153						Static -	15.6
to AD#6	310'	3"	3,000	4,250	8.5	0.2	15.8
From AD#6 to Civilian Nurses Home H-16	470'	2½"	1,250	1,250	2.5	0.1	15.9
						Static -	167.7
From Area #1 MH TL #19 to AD #6 of Family Hospital	3400'	5"	4,250	54,000	108	13.6	
				Static	-	9.0	
						22.6	190.3
From AD#6 to MH #153	310'	3"	35,639	49,750	99	12.4	
				Static	-	1.0	
						13.4	203.7

G-2.05. (f) Naval Hospital Total Steam Distribution Losses.

Losses - Pounds per Hour - 562, Pounds per Year - 4,940,000

Allowing 35¢ per M. pounds as the incremental cost of production at the Central Heating Plant, then line losses amount to

4940 x .35 = $1,730 per year.

This is an important item of expense and should be watched carefully - for a variation of 10% amounts to $173 per year. Every effort should be made by scheduled inspections, routine maintenance, etc. to keep leaks, uninsulated pipe surface, etc. reduced to a minimum.

The maximum amount of condensate normally handled by one trap, is in Manhole #154 where one trap drains a section of main giving 307 lbs. per hour of condensate.

There are a total of 8 drip traps in manholes and mechanical pits used for draining the steam distribution system. Some of the mechanical pits have traps for dripping the inside high pressure piping, through the steam service.

Drip traps, valves, expansion joints and strainers should have daily inspection when first put into service and as the system and equipment operates smoothly, the inspection period may be gradually lengthened to monthly intervals which should be kept up for at least the first year.

Records showing maintenance performed on each trap, mechanical pit, manhole, etc. should then be used as a guide for permanent routine inspection and maintenance.

Distribution Losses as used in the following tabulations are:

STEAM PIPE SIZE	CONDENSATE #/HR/100' OF PIPE
2-1/2"	9
3"	11
4"	14
5"	17.5
6"	21.
8"	27

G-2.05. (g) Hospital Distribution Losses:

Location of Drip Point		Pipe Length	Size	Cond. lbs. per hr. per 100' Pipe	Cond. lbs. per hr.	Cond. cumulative lbs. per hour
C.H.P. to Wards & Anchor at Family Hospital H-15	MH#154	70'	8"	27	19	
		40'	8"	27	11	
		65'	4"	14	9	
		170'	8"	27	46	
		310'	6"	21	65	
		160'	8"	27	43	
		300'	8"	27	80	
		50'	3"	11	6	
		200'	4"	14	28	307
					307	
AD#6 to Civilian Nurses Home H-16	MH#155	200'				
		270'				
		470'	2½"	9	42	
					42	349
From MH#152 to Garage & Corpsmen B. H-23 & H-24		240'	4"	14	34	
	MH#150	480'	4"	14	68	
		50'	3"	11	6	
		180'	4"	14	25	
					123	472
Branch to Bldg. Shops	H-19	35'	2½"	9	3	
					3	475

G-2.05. (g) (Cont'd)

	Location of Drip Point	Pipe Length	Pipe Size	Cond. lbs. per hr. per 100' Pipe	Cond. lbs. per hour	Cond. cumulative lbs. per hour
Branch to Corpsmen H-24	Bldg.H-24	50'	3"	11	6	
					6	481
From MH # 151 to Medical Warehouse H-17	Garage	280'	4"	14	39.0	
		25'	2½"	9	2.	
					41.0	522
Branch to Medical Warehouse H-17	Bldg.H-17	15'	2½"	9	1.0	
					1.0	523
C.H.P. to Warrant Officers Home H-28	MH #156	430'	2½"	9	39.	
					39	562

G-2.06. Rifle Range--Steam Distribution:

(a) Pressure Drop Study: The purpose of this study is to determine the pressure drop throughout the steam distribution system under peak load conditions.

With an allowance of 4,000 lbs. per hour at Building RR 5 and 3,500 lbs. per hour at Building RR 8, the minimum pressure was computed to be 103.8 p.s.i. gauge at manhole RR #9, near the Officers Quarters. With the water heater requiring 50 p.s.i. plus an allowance of 25 lbs for pressure drop through the pressure reducing valve, a working pressure of of 75 p.s.i. would seem ample under peak load conditions. This would permit operating the boiler plant at 100 lbs. under peak load conditions and without the future load allowed for, an even lower pressure would be sufficient.

Under peak load conditions, a boiler pressure around 75 lbs. should be sufficient. For efficient operation a graph should be prepared showing necessary boiler pressure under different weather conitions required to maintain minimum effective pressure at the far end of the system. Boilers should be operated at the lowest possible pressure at all times for maximum economy in fuel and maintenance.

(b) Steam--Rifle Range: Pressure Drop Table, Dwg. 680

	Pipe Length	Size	Bldg. Load	Load lbs per hr.	Press. Drop lbs.	Resultant Pr.p.s.i.
From C.H.P.						125
RR 15 to RR 1	210'	6"	1,944	24,735	3.2	121.8
To M.H. RR2	160'	6"	14,233	22,791	2.0	119.8
To M.H. RR7, RR11 and RR10	395'	4"	1,219	8,558	6.6	113.2
RR9	325'	4"	980	7,339	4.1	109.1
M.H. RR8 and RR 12	210'	4"	401	6,359	2.0	107.1
To RR8			1,958			
		Future	3,500			
	350'	4"	5,458	5,958	3.1	104.0
To M.H. RR9 Officers Quarters	260'	2½"	500	500	.2	103.8
		South Branch from M.H. RR 2				
From M.H. RR2 to M.H. RR 3	57'1"	6"	1,944	14,233	.3	119.8 119.5

G-2.06. (b) (Cont'd)

	Pipe Length	Size	Bldg. Load	Load lbs per hr.	Press. Drop lbs.	Resultant Pr.p.s.i.
RR3	90'	6"	4,401	12,289	.3	119.2
To RR 4	267'1"	4"	1,944	7,888	3.7	115.5
RR 5	217'1"	4"	1,944			
		Future	4,000			
			5,944	5,944	1.7	113.8

G-2.06 (c) Condensate Return Friction Loss Study: The purpose of this study was to determine the friction loss throughout the condensate return system, and to determine the head against which the condensate pumps will have to operate.

The maximum head (32.3') was found to be at manhole RR #9 where a three valve lifting trap returns the condensate from the Officer's Quarters. With a head of 32.3' when allowing for 3,500 lbs. per hour future load at the theater and 4,000 lbs. per hour future at Building RR 5, then the return line has sufficient capacity.

G-2.06 (d) Condensate Return--Rifle Range:

	Pipe Length	Size	Bldg Load	Load lbs per hr.	Load GPM	Friction Loss in Feet	Friction Total Headin Feet
							6.0
From C.H.P.RR 15 to RR 1	210'	2½"	1,944	24,735	49.5	7.4	
					Static -	3.5	
						10.9	16.9
To MH RR 2	160'	2½"	14,233	22,791	45.6	4.8	
					Static -	2.	
						6.8	23.7
To MH RR 7	395'	2½"	1,219	8,558	17.1	2.0	
					Static -	4.	
						6.0	29.7
B.O.Q. RR 9	325'	2½"	980	7,339	14.7	1.2	30.9
MH RR 8	210'	2½"	401	6,359	12.7	.6	31.5
To RR 8	350'	2½"	5,458	5,958	11.9	.8	32.3
To MH RR 9	260'	2½"	500	500	1.0	-	32.3

G-2.06 (d) (Cont'd)

South Branch From MH RR 2

	Pipe Length	Pipe Size	Bldg. Load	Load lbs. per hr.	Load GPM	Friction Loss in Feet	Total Head in Feet
							23.7
From MH RR 2 to MH RR 3	57'1"	2½"	1,944	14,233	28.5	.7	24.4
To RR 3	90'	2½"	4,401	12,289	24.6	.9	25.3
RR 4	267'1"	2½"	1,944	1,888	15.8	1.1	26.4
RR 5	217'1"	2½"	5,944	5,944	11.9	.5	26.9

G-2.06. (e) Rifle Range--Total Steam Distribution Losses: Losses in pounds per hour, 501; pounds per year, 4,380,000. Allowing 35 cents per M. pounds as the incremental cost of production at the Central Heating Plant, then line losses ammount to

4,380 x .35¢ = $1,536.00 per year.

While this is not a large expense it is an important one and should be watched carefully. Every effort should be made by scheduled inspections, routine maintenance etc. to keep leaks, uninsulated pipe surface etc. reduced to a minimum. The maximum amount of condensate normally handled by one trap is in Building RR 10 where the condensate amounts to 114 pounds per hour.

There are a total of 11 drip traps in manholes and mechanical pits used for draining the steam distribution system. Some of the mechanical pits have traps for dripping the inside high pressure piping, through the steam service. This system should have the same routine inspection and maintenance as recommended for the Division Training Area -Section G-2.04.

Steam Distribution Losses

	Location of Drip Pt	Pipe Length	Pipe Size	Cond.lbs.per hr.per 100'pipe	Cond.lbs. per hr.	Cond.cumulative lbs.per hour
From C.H.P. RR15 to RR 1	RR 1	210'	6"			
		160'	6"			
		57'1"	6"			
		427'1"	6"	21	90	90
RR 2 to RR 3	RR 2	90'	6"	21	19	109
RR 3	RR 2	285'	4"	14	40	149

G-2.06 (e) (Cont'd)

	Location of Drip Pt	Pipe Length	Pipe Size	Cond. lbs. per hr. per 100' pipe	Cond. lbs. per hr.	Cond. cumulative lbs. per hour
To RR 4	RR 4	267'1"	4"			
		217'1"	4"			
		484'2"	4"	14	68	217
From MH RR2						
to RR 10	RR 10	395'	4"	14	55	
		80'	2½"	9	7	
		70'	2½"	9	6	
To B.O.Q. RR9		325'	4"	14	46	
					114	331
RR #11 Armory	RR#11	80'	2½"	9	7	338
B.O.Q. RR9						
to RR 8	B.O.Q.	560'	4"	14	78	
	RR 9	21'	2½"	9	2	
					80	418
RR 12	RR 12	50'	2½"	9	4	422
From RR8 to						
MH RR #9	RR 8	260'	2½"			
		30'	2½"			
		290'	2½"	9	26	448
From MH RR	Low pr.	500'	2½"	9	45	
#9 to end	Trap MH RR #9	100'	2"	7.5	8	
					53	501
	High Pr. Trap MH RR #9	no main dripped			0	501

G-2.07. Barrage Balloon Battalion--Steam Distribution:

(a) Pressure Drop Study: The purpose of this study is to determine the pressure drop throughout the Steam Distribution System under peak load conditions and to recommend operating pressures. With an allowance of 2,00 lb. per hour at manhole BB #5 and an allowance of 12,488 lb. per hour at manhole BB #1 for a future group comprising 4 Barracks, one Mess Hall, and one Battalion Administration Building, the minimum computed pressure is 106.5 p.s.i. at Manhole BB #5. With a maximum of 75 p.s.i. required, the boilers could be operated at 100 p.s.i. during peak load conditions and during other than peak load conditions pressures between 75 and 100 should be sufficient. Without the future load connected, the pressure drop will be very small even under peak load conditions.

An operating schedule should be made up showing boiler pressure necessary to maintain minimum allowable pressure under varying weather conditions. Boilers and Steam Distribution System should be operated at the lowest possible pressure for maximum economy in fuel and maintenance.

G-2.07 (b) Steam--Barrage Balloon Battalion: Pressure Drop Table Dwg. No. 3653.

	Pipe Length	Pipe Size	Bldg. load	Load lbs. per hour	Pressure Drop lbs.	Resultant Pr.p.s.i.
From C.H.P. BB9 to M. H.						125
BB #1	242'	6"	14,889	29,754	5.1	119.9
To AD #6 at			419			
BB 3			1,958			
D and BB 2			2,377			
Future 4-B7776			12,488			
1-M4401	88'	6"	14,865	14,865	.5	119.4
1-BA311						
12488						
From M.H. BB #1 to						119.9
BB 7	124'	6"	4,401	14,889	.7	119.2
To M.H. BB #2	266'	4"	3,888	10,488	6.6	112.6
To M.H. BB #3	308'	4"	1,944	6,600	3.1	109.5
To M.H. BB #4	252'	4"	1,944	6,456	2.6	106.9
To M.H. BB #5			712			
		Future	2,000			
	260'	4"	2,712	2,712	.4	106.5
From M.H. BB #2 to M.H.						112.6
BB #6	238'	4"	1,944	1,944	.2	112.4

(c) Condensate Return Friction Loss Study: The purpose of this study was to determine the friction loss throughout the condensate return system and to determine the head against which the condensate pumps have to operate. The maximum head in the return main will be 28.2 feet (12 p.s.i.) at MH BB#5 including the future load of four Barracks, one Mess Hall and one Battalion Administration Building totaling 12,488 lbs. per hour at the branch to the Post Exchange plus 2,000 lbs. per hour at MH BB#5. Accordingly the return line has ample reserve capacity.

G-2.07. (d) Condensate Return: Drawing No. 3653

	Pipe Length	Pipe Size	Bldg. Load	Load lbs. per hr.	Load GPM	Friction Loss in Feet	Total Head in Ft.
From C.H.P. to M. H.					Static	13.0	6.0
BB #1	242'	2½"	14,889	29,754	59.5	12.1	
					Static	4.	22.1
						16.1	
To AD #6 at BB 3							
D and BB 2	88'	2½"	14,865	14,865	29.7	1.1	
					Static	2.	
						3.1	25.2
From M.H. BB #1 to						Static	22.1
BB 7	124'	2½"	4,401	14,889	29.8	1.6	23.7
To M. H. BB #2	266'	2½"	3,888	10.488	21.0	1.8	25.5
To M. H. BB #3	308'	2½"	1,944	6,600	13.2	.9	26.4
To M. H. BB #4	252'	2½"	1,944	6,456	12.9	.7	27.1
To M. H. BB #5	206'	2½"	2,712	2,712	5.4	.1	
					Static	1.0	
						1.1	28.2
From M.H. BB #2 to M. H.						Static	25.5
BB #6	238'	2½"	1,944	1,944	3.9	-	
					Static	1.0	26.5

G-2.07. (e) Barrage Balloon Battallion--Total Steam Distribution Losses: Loss in pounds per hour, 327; pounds per year 2,860,000. Allowing 35 cents per M pounds as the incremental cost of production at the Central Heating Plant, then line losses amount to

2,860 x .35¢ = $1,000 per year.

This item of expense should be watched carefully - for a variation of 10% amounts to $100.00 per year. Every effort should be made by scheduled inspections, routine maintenance etc to keep leaks, uninsulated pipe surface etc. reduced to a minimum.

The maximum amount of condensate normally handled by one trap, is in Building BB 2 amounting to 117 lbs.per hour. There are a total of seven drip traps in manholes and mechanical pits used for dripping the steam distribution system. Some of the mechanical pits have traps for dripping the inside high pressure piping, through the steam service. This system should have the same routine inspection and maintenance as recommended for the Division Training Area - Section G-2.04.

G-2.07. (f) Steam Distribution Losses:

	Location of Drip Pt	Pipe Length	Size	Cond.lbs.per hr.per 100' pipe	Cond.lbs. per hr.	Cond.cumulative lbs per hour
From C.H.P. to MH BB #1	BB 2	242'	6"	21	51	
		88'	6"	21	18	
		125'	3"	11	14	
		85'	2½"	9	8	
		124'	6"	21	26	
					117	117
BB 7	BB 7	15'	3"	11	2	119
BB-7M to BB #13	BB 13	266'	4"			
		308'	4"			
		574'	4"	14	80	199
From BB 13 to BB 14	BB 14	238'	4"	14	33	232
From BB 12 to BB 11	BB 12	252'	4"	14	34	266
BB 11 to MH #5	BB 10	206'	4"	14	29	
		190'	2½"	9	17	
		100'	2½"	9	9	
					55	321
BB 5	BB 5	70'	2½"	9	6	327

G-2.08. Barrage Balloon Battalion School Area Steam Distribution:

(a) Pressure Drop Study: The purpose of this study is to determine the pressure drop throughout the steam distribution system under peak load conditions.

With an allowance of 700 pounds at the Balloon and the Transportation Buildings, the minimum pressure will be 5.8 pounds per square inch at the Transportation Building with 12 pounds initial pressure at the Central Heating Plant. This indicates that under peak load conditions a minimum of 12 pounds will have to be maintained at the boiler. During mild weather, the boiler should be operated to maintain, say three pounds at the far end of the system. Where no reducing valves are planned, it would be rather important for best heating results to vary the boiler pressure with heating requirements, maintaining the minimum pressure at which the fartherest building will operate.

For efficient operation a graph or schedule should be prepared showing the necessary boiler pressures, under different weather conditions required to maintain minimum working pressure at the far end of the system.

Boilers should be operated at the lowest possible pressure at all times for maximum economy in fuel and maintenance.

G-2.08 (b) Steam:

	Pipe Length	Size	Bldg. Load	Load lbs. per hr.	Pressure Drop lbs.	Resultant Press. p.s.i.
From C.H.P. BB26 to Int.	130'	4"	1400	3000	1.2	10.8
Int. to Balloon Bldg. BB29	140'	3"	800	1600	1.7	9.1
Balloon Bldg. BB29 to Anchor Point	240'	Future 2-1/2"	100 700 800	800	2.8	6.3
Int. to Adm. Bldg. BB27	60'	3"	200	1400	.55	10.8 10.3
Adm. Bldg.BB27 to Int.	235'	3"	300	1100	1.39	8.9
Int. to Tr.Bldg. BB30 Anchor	220"	Future 2-1/2"	200 700 900	900	3.15	5.8

The maximum head in condensate return is 14.7 feet, indicating ample reserve capacity.

G-2.08 (c) Condensate Return - Barrage Balloon Battalion School Area:

	Pipe Length	Size	Bldg. Load	Load lbs. per hr.	Load G.P.M.	Friction Loss in Feet	Total Head in Feet
From C.H.P.							10.0
BB26 to Int.	130'	2½"	1400	3000	6.0	Static 15.5	
						.09	
						Static 11.0	
						4.5	
						4.59	14.6
Int. to Balloon Bldg. BB29	140'	2½"	800	1600	4.0	.06	14.7
Balloon Bldg. BB29 to Anchor Point	240'	2½"	800	800	2.0	.02	14.7
							14.6
Int. to Adm. Bldg. BB27	60'	2½"	200	1400	3.0	.01	14.6
Adm. Bldg. BB27 to Int.	235'	2½"	300	1200	2.5	.02	14.6
Int. to Tr. Bldg. BB30 Anchor	220'	2½"	900	900	2.0	.02	14.7

G-2.08 (d) Total Steam Distribution Losses:

Loss in pounds per hour, 118; per year, 1,032,000

Allowing 35¢ per M. pounds as the incremental cost of production at the Central Heating Plant, then line losses amount to:

1,032 x .35 = $ 360.00 per year

This expense is an important one and should be watched carefully. Every effort should be made by scheduled inspections, routine maintenance, etc. to keep leaks, uninsulated pipe surface, etc. reduced to a minimum.

All condensate drips to the one drip trap in the Administration Building normally totaling 118 pounds per hour. Routine inspection and maintenance should be carried out as specified for the Division Training Area. (Sec. G-2.04)

G-2.08 (e) Steam Distribution Losses:

	Location of Drip Point	Pipe Length	Pipe Size	Cond. lbs. per hr per 100' pipe	Cond. lbs. per hr.	Cond. Cumul. lbs / hr.
From C.H.P. BB26 to entire system	Adm. Bldg. BB27	130'	4"	14	8	
		140'	3"			
		60'	3"			
		235'	3"			
		435'	3"	11	48	
		240'	2-1/2"			
		220'	2-1/2"			
		15'	2-1/2"			
		15'	2-1/2"			
		15'	2-1/2"			
		100'	2-1/2"			
		90'	2-1/2"			
		695'	2-1/2"	9	62	
					118	118

G-2.09. Bachelor Officers' Quarters - Steam Distribution:

(a) Pressure Drop Study: The purpose of this study is to determine the pressure drop throughout the steam distribution system under peak load conditions.

With 125 pounds per square inch initial pressure at the boiler plant, the minimum pressure will be 115.7 pounds in the steam main at the Women's Servants Quarters. With the water heater requiring 50 p.s.i. plus an allowance of 35 pounds for transmission losses, pressure reducing valve operation, etc., then a boiler operating pressure of 85 pounds should prove satisfactory. Under other than peak load conditions, a lower pressure should be satisfactory.

A graph or schedule should be prepared showing necessary boiler pressure under different weather conditions to maintain minimum working pressure at the far end of the system.

Boilers should be operated at the lowest possible pressure at all times for maximum economy in fuel and maintenance.

G-2.09 (b) Steam Pressure Drop Table:

	Pipe Length	Pipe Size	Bldg. Load	Load lbs per hr	Pressure Drop lbs.	Resultant Press. p.s.i.
				BRANCH C		125.
From Plant to MH 194	400'	4"	1960	4,882	2.2	122.8
North to 2603	70'	3"	980	2,922	.6	122.2
To 2602	400'	2-1/2"	980	1,942	5.	117.2

G-2.09 (b) (Cont'd)

	Pipe Length	Size	Bldg. Load	Load lbs per hr	Pressure Drop lbs	Resultant Press. p.s.i.
Fire station 2600	400'	2-1/2"	412	962	1.2	116.0
To Men's Quarters 2624	170'	2-1/2"	350	550	.2	115.8
To Women's Quarters 2625	220'	2-1/2"	200	200	.1	115.7
MH 194 to 2605	180'	2-1/2"	980	1,960	2.2	122.8 120.6
To 2607	260'	2-1/2"	980	980	.8	119.8
				BRANCH A		
From Plant to MH 191	130'	3"	1960	3,920	1.9	125. 123.1
To 2611	210'	2-1/2"	980	1,960	2.6	120.5
To 2609	220'	2-1/2"	980	980	.6	119.9
From MH 191 to 2613	20'	2-1/2"	980	1,960	.2	123.1 122.9
To 2604	450'	2-1/2"	980	980	1.4	121.5

G-2.09 (c) Condensate Return:

	Pipe Length	Size	Bldg. Load	Load lbs per hr.	Load G.P.M.	Friction Loss in ft.	Total Head in Feet
				BRANCH C		Static	12.0
From C.H.P. to MH #194	400'	2-1/2"	1960	4882	9.8	.72 Static 5.80 6.52	18.52
North to 2603	70'	2-1/2"	980	2922	6	.05	18.57
To 2602	400'	2-1/2"	980	1942	4	.16	18.7
Fire House 2600	400'	2-1/2"	412	962	2	.04	18.74
To Men's Qtrs. 2624	170'	2-1/2"	350	550	1	0	18.74

G-2.09 (c) (Cont'd)

	Pipe Length	Size	Bldg. Load	Load lbs per hr	Load G.P.M.	Friction Loss in ft.	Total Head in feet
To Women's Qtrs. 2625	220'	2-1/2"	200	200	.4	0	
						Static 1.0	
						1.0	19.74
MH 194 to 2605	180'	2-1/2"	980	1960	4.0	.07	Static 18.52
							18.6
To 2607	260'	2-1/2"	980	980	2.0	.03	18.63
				BRANCH A			
Plant to MH # 191	130'	2-1/2"	1960	3920	8.0	.2	
						Static 7.3	
						7.5	19.5
To 2611	210'	2-1/2"	980	1960	4.0	.1	19.6
To 2609	220'	2-1/2"	980	980	2.0	.02	19.62
From MI #191							19.5
to 2613	20'	2-1/2"	980	1960	4.0	.01	19.51
To 2604	450'	2-1/2"	980	980	2.0	.05	
						Static .5	
						.55	20.1

The maximum head in the return main is 20.1 feet, as indicated above. An appreciable additional load can be added without our taxing its capacity.

G-2.09 (d) Bachelor Officers' Quarters Total Steam Distribution Losses:

Loss in pounds per hour, 356; per year 3,120,000

Allowing 35¢ per M. pounds as the incremental cost os production at the Central Heating Plant, then line losses amount to:

3120 x .35 = $ 1,090.00

This is an important item of expense which should be watched carefully. A variation of 10% amounts to $173 per year. Every effort should be made by scheduled inspections, routine maintenance, etc., to keep leaks, uninsulated pipe surface, etc. reduced to a minimum.

The maximum amount of condensate normally handled by one trap, is in MH #194 where one trap drains a section of main giving 145 pounds per hour of condensate.

There is a total of four drip traps in manholes and mechanical pits used for dripping the steam distribution system. Some of the mechanical pits have traps for dripping the inside high pressure piping, through the steam service. Routine inspection and maintenance should be carried out as specified for the Divsion Training Area. (Sec. G-2.04)

G-2.09.(e) Steam Distribution Losses:

From To	Location of Drip Point	Pipe Length	Pipe Size	Cond. lbs per hr. per 100 ft.	Cond.lbs per hr.	Cum. lbs. per hour
			BRANCH C			
Plant to MH 194	MH 194	400'	4"	14	56	
		70'	3"	11	8	
		400'	2-1/2"			
		20'	2-1/2"			
		180'	2-1/2"			
		260'	2-1/2"			
		40'	2-1/2"			
		900'	2-1/2"	9	81	
					145	145
2602	2602	190'	2-1/2"	9	17	162
MH 195 to Men's Quarters 2624	Men's Servants Quarters 2624	400'	2-1/2"			
		15'	2-1/2"			
		170'	2-1/2"			
		15'	2-1/2"			
		600'	2-1/2"	9	54	216
To Womens Quarters 2625	Womens Quarters 2625	220'	2-1/2"			
		15'	2-1/2"			
		235'	2-1/2"	9	21	237

G-2.09 (e) (Cont'd)

From To	Location of Drip Point	Pipe Length	Pipe Size	Cond. lbs per hr per 100 ft.	Cond. lbs per hour	Cond. lbs per hour
Plant to 2604 & 2609	MH #190	130'	3"	11	14	
		210'				
		25'				
		120'				
		20'				
		40'				
		20'				
		190'				
		725'	2-1/2"	9	65	
		450'	2-1/2"	9	40	
					119	356

G-2.10. Mumford Point Tent Camp Steam Distribution:

(a) Pressure Drop Study: With no allowance for future loads, the minimum pressure will be 114.5 pounds per square inch at the Administration Building. With the water heater requiring 50 p.s.i. an allowance of 25 pounds for pressure drop through the pressure reducing valve, a pressure of 75 p.s.i. should be ample under peak load conditions. This will permit operating the boiler plant at 90 pounds under peak load conditions. Without allowance for future loads a lower pressure will be sufficient.

For less than peak load conditions, a boiler pressure of 75 pounds should be sufficient.

A graph or schedule should be prepared showing necessary boiler pressures under different weather conditions required to maintain minimum working pressure at the far end of the system.

Boilers should be operated at the lowest possible pressure at all times for maximum economy in fuel and maintenance.

G-2.10 (b) Steam Pressure Drop Table:

	Pipe Length	Pipe Size	Bldg. Load	Load lbs per hour	Pressure Drop lbs.	Resultant Press. p.s.i.
From C.H.P.						125
M-103 to M-102	175'	3"	401	5052	4.2	120.8
M-102 to M-101	290'	3"	4401	4651	6.2	114.6
M-101 to M-100	275'	2-1/2"	250	250	.1	114.5
C.H.P. M-103						125.0
to M-104	235'	3"	987	1406	.4	124.6
M-104 to M-105	255'	2-1/2"	419	419	.1	124.5

G-2.10 (c) Condensate Return:

	Pipe Length	Pipe Size	Bldg. Load	Load lbs. per hour	Load GPM	Friction Loss in Feet	Total Hd in feet
From C.H.P. M-103 to M-102	175'	2½"	401	5,052	Static 37.0 10.	0.3	
					Static 19	18.3	18.3
From M-102 to M-101	290'	2½"	4,401	4,651	9.3	.5	18.8
From M-101 to M-100	275'	2"	250	250	0.5	0	18.8
C.H.P. M-103 to M-104	235'	2"	987	1,406	2.8 Static 19	.1	
						17.0 17.1	17.1
M-104 to M-105	255'	2"	419	419	0.8 Static 18.0	0	
						1.0 1.0	18.1

(d) Mumford Point Tent Camp--Steam Distribution Losses:

Loss in pounds per hour, 253; per year 2,220,000.

Allowing 35¢ per M. pounds as the incremental cost of production at the Central Heating Plant, then line losses amount to:

2,220 x .35 = $775.00 per year.

This ia an important item of expense which should be watched carefully. Every effort should be made by scheduled inspections, routine maintenance etc. to keep leaks, uninsulated pipe surface etc. reduced to a minimum. The maximum amount of condensate normally handled by one trap is in the Mess Hall where the condensate amounts to 155 lbs. per hour. There is is total of two drip traps in manholes and mechanical pits used for draining the steam distribution system. Some of the mechanical pits have traps for dripping the inside high pressure piping, through the steam service. Because of this piping being overhead the estimated losses were doubled.

G-2.10. (e) Steam Distribution Losses:

Location of Drip Point	Pipe Length	Pipe Size	Cond. lbs. per 100' Pipe	Cond. lbs. per hour	Cond. Cumul. lbs per hour
C.H.P. M-103 to M-102 and M-100	M-101 175'	3"	22	39	
	290'	3"	22	66	
	275'	2½"	18	50	
				155	155
C.H.P. M-103 to M-105	M-105 235'	3"	22	52	
	255'	2½"	18	46	
				98	253

G-2.11. Glider Base--Steam Distribution:

(a) This steam distribution system is too small in scope to warrant a lengthy discussion. The same general conditions applicable to other outlying systems apply hereto.

(b) A pressure drop study discloses that the final pressure on the branch line to the administration building is 124.8 p.s.i. with a drop along the line of .2 p.s.i. The drop in the branch line through the nose hanger and utility shops is .8 p.s.i. giving a final pressure of 49.2 pounds. The steam for this last mentioned line leaves the boiler plant at 50 pounds pressure. Pressures in this system should be modulated at the boiler plant to give the most economical results under actual operating conditions.

(c) A return line study discloses that the maximum head against which the condensate return pumps will operate is 40.1 feet or 17.32 p.s.i.

(d) The steam distribution losses for the entire system amount to 154 pounds per hour.

G-2.12. Tent Camp No. 1--Steam Distribution:

(a) This study is compiled to show the basic design, the estimated pressure drop, the estimated friction head against which the condensate return pumps operate and the probable thermal or line loss of the system.

(b) Pressure Drop Study:

Run From	To	Load lbs per hour	Load Factor	Demand Load	Length	Size	Pr.Drop Total	Pressure Drop Initial	Pressure Drop Resultant
C.H.P.	330	37,886	61%	23,100	340	6"	4.4	125	120.1
330	321	33,254	64%	21,300	370	6"	4.2	120.1	115.9
321	Branch	28,542	67%	19,100	310	4"	26.7	115.9	89.2
Branch	Branch	19,170	70%	13,400	10	3½"	1.1	89.2	88.1
Branch	313	13,061	73%	9,530	10	3½"	0.54	88.1	87.6
313	316	11,911	76%	9,060	100	3½"	4.8	87.6	82.8
316	410	9,200	79%	7,260	320	3½"	10.6	82.8	72.2
410	411	8,050	82%	6,600	25	3½"	0.75	72.2	71.5
411	412	6,900	85%	5,860	90	3½"	2.16	71.5	69.3
412	413	5,750	88%	5,060	90	3½"	1.50	69.3	67.8
413	510	4,600	91%	4,190	255	2½"	24.2	67.8	43.6
510	511	3,450	94%	3,240	25	2½"	2.0	43.6	41.6
511	512	2,300	97%	2,230	90	2½"	3.5	41.6	38.1
512	513	1,150	100%	1,150	90	2½"	0.99	38.1	37.1
Branch	315	6,109	67%	4,210	20	3½"	0.21	89.2	89.0
315	311	3,398	83⅓%	2,840	115	3½"	.54	89.0	88.5
311	301	939	100%	939	515	2½"	2.01	88.5	86.5

Note: First two columns refer to building numbers;

G-2.12. (b) (Cont'd)

Run From	To	Load lbs per hour	Load Factor	Demand Load	Length	Size	Pr.Drop Total	Pressure Drop Initial	Pressure Drop Resultant
Branch	314	9,372	67%	6,280	100	3½"	2.30	89.2	86.9
314	213	9,200	71.1%	6,550	175	3½"	4.46	86.9	82.4
213	212	8,050	75.3%	6.060	25	3½"	0.58	82.4	81.8
212	211	6,900	79.4%	5,480	90	3½"	1.69	81.8	80.1
211	210	5,750	83.5%	4,800	90	3½"	1.31	80.1	78.8
210	113	4,600	87.6%	4,020	255	2½"	19.90	78.8	58.9
113	112	3,450	91.8%	3,160	25	2½"	1.5	58.9	57.4
112	111	2,300	95.9%	2,210	90	2½"	2.75	57.4	54.6
111	110	1,150	100%	1,150	90	2½"	.75	54.6	53.9
C. H. P.	440	11,500	60%	6,900	350	3"	16.3	125	108.7
440	441	10,350	64.4%	6,650	25	3"	1.2	108.7	107.5
441	Branch	9,200	69.0%	6,350	30	3"	1.35	107.5	106.1
Branch	442	8,050	73.5%	5,910	65	2½"	8.78	106.1	97.3
442	443	6,900	77.9%	5,370	90	2½"	10.80	97.3	86.5
443	540	5,750	82.3%	4,730	250	2½"	24.77	86.5	61.7
540	541	4.600	86.8%	3,950	25	2½"	2.28	61.7	59.4
541	Branch	3,450	91.1%	3,140	30	2½"	1.77	59.4	57.6
Branch	542	2,300	95.6%	2,200	65	2½"	1.95	57.6	55.7
542	543	1,150	100%	1,150	90	2½"	.75	55.7	55.0
Branch	450	1,150	100%	1,150	325	2½"	1.62	106.1	104.5
Branch	550	1,150	100%	1,150	325	2½"	2.66	57.6	55.0
C. H. P.	243	11,500	60%	6,900	330	3"	15.4	125	109.6
243	242	10,350	64.4%	6.650	25	3"	1.2	109.6	108.4
242	241	9,200	69.0%	6,350	90	3"	4.05	108.4	104.3
241	Branch	8,050	73.5%	5,910	30	3"	1.20	104.3	103.1
Branch	240	6,900	77.9%	5,370	65	2½"	7.50	103.1	95.6
240	143	5,750	82.3%	4,730	250	2½"	23.20	95.6	72.4
143	142	4,600	86.8%	3,950	25	2½"	2.02	72.4	70.4
142	141	3,450	91.1%	3,140	90	2½"	4.68	70.4	65.7
141	Branch	2,300	95.6%	2,200	30	2½"	0.88	65.7	64.8
Branch	140	1,150	100%	1,150	65	2½"	0.48	64.8	64.3
Branch	250	1,150	100%	1,150	325	2½"	1,69	103.1	101.4
Branch	150	1,150	100%	1,150	325	2½"	2.40	64.8	62.4

(c) A review of the condensate return system discloses that the maximum head against which the return pumps will operate is 12.3 p.s.i. Pumps were specified to discharge against a head of 30 p.s.i.

(d) Steam loss computations disclose atotal loss of 945 pounds per hour throughout the system.

(e) The foregoing table and data includes the Tent Camp Hospital Groups and the Recreation Building which were after considerations not provided for in the original plan. It should be noted that in the sizing of the steam and condensate lines an accumulative load factor of 60% has been used; that is, the loads on the mains were accumulated from 100% full load at the end of the

main down to 60% at the boiler house in increments proportionate to the number of individual loads accumulated. This is common practice on steam distribution systems of this size and type. Experience since the system was built, has shown that a diversity of 40% does not at all times hold true, in that clock work rather than the human element controls the use of many of the utilities in this camp. We therefore recommend that, at the first opportunity, a study be made of the entire systems under actual operating conditions and, that the distribution system be reinforced should the study bring to light excessive pressure drops.

G-2.13. Tent Camp No. 2--Steam Distribution:

(a) This steam distribution system serves that portion of the original tent camp known as Tent Camp #2. It differs from Tent Camp No. 1 only in the scope of its service. The buildings served are two S-3 Mess Halls, one Officers Mess Hall and one Recreation Building.

(b) A pressure drop study shows a pressure of 3.6 p.s.i. throughout the system resulting in a final pressure of 121.4 p.s.i. at the end of the line. This shows that the boiler plant pressure may be modulated to a considerable degree thereby lowering maintenance and operating expense.

(c) A study of the condensate return system shows that the maximum head against which any pump will have to operate is 29.5 feet or 12.7 p.s.i.

(d) Condensate losses throughout the entire system total 162 pounds per hour.

G-3. Propane Gas System: Throughout the Division Training Area, a gas distribution system has been installed mainly for the purpose of furnishing gas to ovensand ranges in the mess halls. Other buildings which require gas and are within economical range of the mains have been connected thereto, but those buildings which require small amounts of gas and are not within economical range of the mains have their gas supplied by portable flasks.

The following table summarizes the buildings supplied, use of gas, and method of supply:

Building	Use	Supplied By
Mess Halls	Cooking	Main
Brig	Cooking	Main
Regimental Infirmaries	Dental Chair	Flasks
Naval Hospital	Cooking & Laboratories	Main
N.H. Boiler Plant	Boiler Ignition	Flask
N.H. B. O. Q.	Cooking	Main
N.H. Nurses Home	Cooking	Main
Family Hospital	Laboratory	Main
Central Heating	Boiler Ignition	Main
Rifle Range	Dental	Flask
Balloon Barrage	Dental	Flask

Liquid propane is brought to the Industrial Area by tank car and pumped into three 17,000 gallon steel storage tanks designed for 200 p.s.i. working pressure, having a liquid propane storage capacity of 15,000 gallons each.

The liquid gas, at temperatures above 40 degrees F, vaporizes at a maximum pressure of 70 p.s.i. Below 40 degrees F. the liquid is taken from the storage tanks and passed through a steam jacketed evaporating kettle before being pumped into the distribution system.

Gas passes through a reducing valve with 22 p.s.i. leaving pressure, thence through a recording meter and into the distribution system.

Portable flasks for use in certain activities, as above listed, are filled and weighed at the propane plant.

Filling is accomplished by direct pressure if available or by means of a pump when pressure is low.

At the mess halls and points of use the distribution pressure is lowered by two reducing valves in parallel, to a pressure of 11 inches of water. Flask pressure is also reduced by a pressure reducing valve before the gas is distributed to the various appliances.

The gas mains are of screwed or caulked cast iron pipe laid about three feet below ground. Complete record plans have been drawn showing the location of all mains, valves, etc. but no profile has been made as propane is a dry gas and no drip points are required.

G-4. Gasoline and Fuel Oil Storage and Distribution:

G-4.01. General: It is the intent under this heading to enumerate and discuss the pertiment features of all bulk storage and day storage tank installations and to furnish such information as will be of value to those who will take over the operation and maintenance of the installations or systems.

Pertinent information is given concerning all installations, with particular reference to mechanical equipment. Accurate plans have been prepared showing the location of all underground tanks, pipes, valves, fittings and appurtenances. Legends and notations are provided to give a clear understanding of the installations.

Bulk storage is provided in two locations, one in the Industrial Area of the permanent base, and one in the Tent Camp Area of the temporary base. Day storage is located in both permanent and temporary bases adjacent to the locations where it is to be used. All of the tanks in the bulk storage at the permanent base in the Industrial Area, with the exception of the 10,000 barrel tank for the storage of No. 6 fuel oil, are located underground, while all of the tanks at the temporary base at the Tent Camp Area are above ground. All day storage tanks, or service tanks, are located underground.

G-4.02. Industrial Area Gasoline, Kerosene, Diesel and No. 3 Fuel Oil Storage: At the Industrial Area Bulk Storage there are six 12,000 gallon tanks, each eight feet in diameter by 32 feet long and eight 15,000 gallon tanks, each 10 feet in diameter by 26' 6" long with a total of 192,000 gallons of storage capacity. These tanks are buried so that the bottom of each tank is set above the ground water level, which in this case was approximately 6' below the grade. Earth is mounded up over the tops of the tanks with the result that the finished grade is 8' above the surrounding grade. The slope of the mound is approximately four to one.

Five Blackner Rotary Pumps, each having a capacity of 100 G.P.M. connected by reduction gears to five horse power explosion proof 208 volt, 3 phase, 60 cycle electric motors are provided to pump various products from the tank cars to the storage tanks, from the storage tanks to the truck loading platforms, and from the storage tanks to the day storage at the Main Service Station, which is adjacent to the bulk plant. The pumps and pipe lines are so connected and cross-connected that each pump has a standby unit except the aviation gasoline.

Three overhead tank car unloading racks, two double and one single, are provided at the track site adjacent to the storage tanks. Three tank cars may be unloaded simultaneously, the contents may be pumped direct from tank cars into the storage tanks, tank trunks, or day storage tanks.

Each tank in the battery of 14 is provided with a 2" pressure and vacuum vent and a 6" emergency pressure vent with a built-in fire screen.

Tanks Nos. 1, 2, 3, 4 and 9 are connected at the bottom to their respective day tanks at the Main and PX Service Stations by a three inch line. The valves on this line are lubricated plug type and are located in boxes at the ends of the tanks. For normal operation the valves always will be closed, but in the event of a power failure they may be opened and the day tanks can be filled by gravity from the storage tanks.

Provision also is made for loading three trucks simultaneously from three loading racks, two double and one single.

The number and contents of each group of tanks is as follows:

Contents	No. of Tanks	Capacity Each	Total Capacity
Aviation Gasoline	2	12,000 gallons	24,000 gallons
Regular "	6	15,000 gallons	90,000 gallons
Motor Fuel "V"	2	15,000 gallons	30,000 gallons
Kerosene	1	12,000 gallons	12,000 gallons
Diesel Fuel	1	12,000 gallons	12,000 gallons
No. 3 Fuel Oil	2	12,000 gallons	24,000 gallons
Total:	6 -	12,000 gallon tanks	192,000 gallons
	8 -	15,000 " "	

The above sotrage represents 24-8,000 gallon tank cars or 19-10,000 gallon tank cars.

G-4.03. 10,000 Bbl.#6 Fuel Oil Storage Tank: The 10,000 barrel or 420,000 gallon tank for No. 6 fuel oil is approximately one-half mile distant from the gaoline and light fuel oil storage . The tank 60 feet in diameter by 20 feet high is set above the grade and is surrounded by an earthen dike 5 feet 6 inches high, 30 feet wide with a 3 feet crown. The capacity of the dike enclosure is 1 1/4 times greater than the total capacity of the tank.

A railroad siding adjacent to the tank serves the tank for oil deliveries. On this siding are located four tank car unloading racks arranged for bottom unloading and steaming.

Two electric motor driven rotary pumps manufactured by Blackmer Pump Company of 100 G.P.M. each are grouped together outside the dike. These pumps are connected by means of reduction gears to 10 horsepower, 3 phase, 208 volt, 60 cycle explosion proof motors. Connections and cross-connections are provided for every possible operating condition. The No. 6 fuel oil is maintained in fluid condition for pumping by means of a suction line heater which consists of a bundle of steel tubing enclosed in a 15" pipe through which the oil is drawn to the pumps, is installed in the manhole near the bottom of the tank. Steam is passed through the tubing which in turn heats the oil drawn through the 15" pipe. At the end of the 15" pipe or shell in the tank, an 8" flanged gate valve has been installed, the handle of which is extended up through the roof of the tank.

If it becomes necessary to withdraw the steam tube bundle for cleaning or repairing, it is possible to withdraw same without emptying the tank by closing the 8" valve.

Steam is supplied to the tank at 175 pounds of pressure from the Central Heating Plant. The capacity of the oil heater is 3600 gallons of No. 6 fuel oil at 100 pounds steam pressure. Steam and oil lines are piped together in concrete pipe trenches. Where the pipe trench passes through the dike, the pipes are sealed with two concrete walls within the pipe trench itself. Condensate from oil heating coils and traps; is in all cases wasted in the nearest ditch.

The total capacity of the tank for No. 6 fuel oil is 420,000 gallons or 42-lo,000 gallon tank cars. Steam pipe was sized large enough to heat one tank of 10,000 gallons per hour from plus 10 degrees F to 100 degrees F.

G-4.04. Tent Camp No. 1 Bulk Storage: The bulk storage at Tent Camp No. 1 includes 2-15,000 gallon tanks for Regular Gasoline, 1-15,000 gallon tank for Kerosent, and 2-15,000 gallon tanks for No. 6 fuel oil. Because this storage was temporary, the tanks were placed approximately six feet above ground on brick piers and steel or concrete saddles. The storage is adjacent to the railroad siding where two overhead and one underneath tank car unloading racks are located.

Mechanical equipment consists of six driven Blackmer Rotary Pumps with explosion proof motors, as follows: 2 - 3 H.P. for gasoline at 100 G.P.M. each, 2 - 7-1/2 H.P. for No. 6 fuel oil at 100 G.P.M. each, 2 - 3 H.P. for kerosene at 75 G.P.M. each. This equipment operated at 240 volts, 3 phase, 60 cycles and is provided for unloading tank cars, and also to pump gasoline to two (2) dispensers each equipped with meter and recording mechanism.

This equipment also pumps kerosene and No. 6 fuel oil to a double trunk loading rack and No. 6 oil to the 1300 gallon tank used for day storage at Tent Camp No. 1 Boiler Plant. Fuel oil is hauled to an 8000 gallon storage tank at the Tent Camp No. 2 Boiler Plant.

G-4.05. Central Heating Plant: One (1) 8,000 gallon tank is installed underground for the Central Heating Plant. No. 6 fuel oil is supplied to this tank by means of a 4" oil line connected to the pump manifold at the bulk plant. This line and a 4-inch steam line are jacketed together in a Hel-Cor casing, thus providing heat for the oil line which is approximately 520' long. A cross-connection at the bulk plant pump manifold and a cross-connection at the day storage tank makes it possible to pull directly from the 420,000 gallon tank to the oil pump serving the oil burners in the Central Heating Plant.

G-4.06. No. 6 Fuel Oil Day Storage Tanks: Day storage tanks for No. 6 fuel oil are equipped with spiral coils for heating the oil. These coils are constructed of 1-1/2" seamless steam tubing, 22" overall diameter. This permits them to be installed in a 24" inside diameter manhole with the supply and condensate stubs welded through the manhole cover.

The steam supply is connected to the coil, the steam being controlled by a globe valve in the line, the condensate and is connected to a bucket trap on high pressure lines, and a float and thermostatic trap on low pressure lines. The discharge from traps is wasted to the nearest ditch. The suction line to each oil burner is inserted through the manhole cover and the suction stub is placed within the steam coil in the tank. The common return line from the oil burners discharges the return oil to the center of the coil in the tank in order to conserve heat. All valves on oil suction and return lines are specially ground gate valves with rising stems. They are placed in the lines at the tanks in the manhole pits. All fill pipes are three inches and all vent pipes are two inches on No. 6 fuel oil tanks.

G-4.07. Naval Hospital Heating Plant: Two 15,000 gallon tanks are installed underground at the Naval Hospital Heating Plant for the storage of No. 6 fuel oil.

G-4.08. Rifle Range and Barrage Balloon Central Heating Plants: The Central Heating Plants at the Rifle Range and the Barrage Balloon are identical, the heating demand being approximately the same for both plants. The oil storage for both is the same.

Two 10,000 gallon tanks are installed underground at each of the above heating plants for the storage of No. 6 fuel oil.

G-4.09. Bachelor Officers' Mess Hall: Two 8,000 gallon tanks are installed underground at the Bachelor Officers' Mess Hall for the storage of No. 6 fuel oil.

G-4.10. Amphibian Base and Barrage Balloon Training School: The heating plants at the Amphibian Base Carpenter and Machine Shop and the Barrage Balloon Training School are identical and the heating load is approximately the same. One 5,000 gallon tank was placed underground for each plant.

G-4.11. Officers' Homes: There are 196 Officers' Homes, each provided with a 560 gallon underground tank for the storage of No. 3 fuel oil. The temperature range for heating was taken as plus 10 degrees F. outside and plus 70 degrees inside. Assuming that there are 2340 degrees days per year, the average amount of 140,000 gallons oil consumed per home will be 1300 gallons. At that rate it will be necessary to fill each tank three times per heating season.

Total estimated amount of oil to be consumed at 196 homes - 254,800 gallons.

The Guest Hous, Chapel at Tent Camp, Gate House, Mumford Point Brig, Mumford Point Chapel, Naval Hospital, Servants Quarters, Water Treatment Plant, Radio Transmitter Building and operations building were all figured in the same manner as the officers' homes. The table below shows the number and size of tanks and the amount of No. 3 fule oil consumed per heating season.

ESTIMATED ANNUAL CONSUMPTION OF NO. 3 FUEL OIL

Location	No. of Bldgs.	Size of Tanks	Unit Consumption	Total
Officers Homes	196	560	1300	254,800
Guest House	1	560	2531	2,531
Chapel at Tent Camp	1	560	5180	5,180
Mumford Point Brig	1	560	2566	2,566
Mumford Point Chapel	1	560	4213	4,213
Naval Hosp. Ser. Qts.	4	560	2344	9,375
Water Treat. Plant	1	560	1998	1,998
Radio Trans. Bldg.	1	1000	3250	3,250
Operations Bldg.	1	560	2417	2,417
Homasote Huts	936	110	665	622,440
Wash Rooms	72	110	3257	234,504
Mess Halls Tent Camp	4	2000	52,560	210,240
Mess Halls Rifle Range	1	2000	18,280	18,280
Mess Halls Barrage Balloon	1	2000	18,280	18,280
Mess Halls Mumford Pt.	1	2000	18,280	18,280
Officers Mess Tent Camp	1	2000	12,000	12,000
Guard Houses	2	110	250	500
			Total:	1,425,067 gallons

G-4.12. Gasoline and Diesel Fuel Day Storage and Distribution: Gasoline and Diesel Fuel is stored at various locations as enumerated below and dispensed at these locations by means of electrically driven gasoline pumps of 15 and 25 G.P.M. respective capacities. These pumps take suction from the underground storage tanks and discharge through meters and recording devices into cars, trucks, boats, or other motor powered vehicles. The 15 G.P.M. pumps are powered by 1/3 H.P. electric explosion proof motors and the 25 G.P.M. pumps with 3/4 or 1/2 H.P. electric explosion proof motors. In case of a power failure these pumps can be operated by hand by attaching the hand crank furnished with each unit. All gasoline and diesel fuel suction lines have an extractible suction stub by means of which the foot valve located at the bottom of the stub, can be removed. Special wrenches are furnished to perform this operation without unearthing the tank.

The following table shows the location, number and size of tanks, pumping capacity and products pumped:

GASOLINE, KEROSENE & DIESEL FUEL - DAY STORAGE & DISTRIBUTION

Location	No. of Bldgs.	Size of Tanks	Capacity of Pump G.P.M.	Liquid Pumped
Industrial Area PX Service Station	1	1000	15	Motor Fuel "V"
Industrial Area Main Service Station	2	1000	25	Aviation Gasoline

Gasoline, Kerosene & Diesel Fuel - Day Storage & Distribution (Cont'd)

Location	No. of Bldgs.	Size of Tanks	Capacity of Pump G.P.M.	Liquid Pumped
Industrial Area Main Service Station	4	1000	25	Regular Gasoline
Industrial Area Main Service Station	1	1000	25	Diesel Fuel
Industrial Area Main Service Station	1	1000	25	Kerosene
Tent Camp Tank Batt.	1	2000	25	Regualr Gasoline
Tent Camp Tank Batt.	1	2000	25	Diesel Fuel
Tent Camp Amphb. Bs.	1	2000	25	Regular Gasoline
Tent Camp Amphb. Bs.	1	2000	25	Diesel Fuel
B. B. Training School	1	1000	25	Regular Gasoline
Rifle Range	1	10,000	25	Regular Gasoline
Coast Guard Training Facilities	1	2000	25	Regular Gasoline
Coast Guard Training Facilities	1	2000	25	Diesel Fuel
Naval Hospital Garage	1	10,000	15	Regular Gasoline
Division Garage and Repair Shop	2	560	25	Regular Gasoline
Post Garage & Repair Shop	2	560	25	Regular Gasoline
Wallace Crk Boat Basin	1	1000	Gravity	Regular Gasoline
Amphibian Base Storage Shed	1	5000	15	Gasoline
Amphibian Base Carpenter Shop	1	10,000	100	Gasoline
Amphibian Base Carpenter Shop	1	10,000	100	Diesel Oil
Naval Hospital Boiler Plant	1	1000	Hand	Diesel Oil

G-4.13. Amphibian Base Gasoline and Diesel Fuel Storage & Distribution: At the Amphibian Base two 10,000 gallon tanks were installed, one for regular and one for diesel storage. Gasoline and diesel fuel are pumped by two separate electric rotary pumps to two hose racks located on the dock. A plugged extension has been provided for a future hose rack near the end of the pier. The pumping units are operated by remote control by means of push buttons located at each hose rack. Each pump is a 2-1/2" rotary pump of 100 G.P.M. capacity manufactured by the Blackmer Pump Company with strainer and by-pass valves built into same. The pump motors are explosion proof, 5 H.P. each, 208 volts, 3 phase, 60 cycle, and are enclosed with the discharge and suction line manifolds in a concrete pump pit. The pumps are cross-connected so that in case of a motor failure, one can be used to pump both gasoline and diesel fuel alternately by opening and closing the manifold valves.

G-4.14. Landing Field Basoline System: At the landing field a water displacement gasoline delivery system was installed. The location of gasoline delivery pits and storage tanks were furnished to the manufacturers of the "Aqua System" who designed and installed all of the equipment for the handling and delivery of two different grades of gasoline.

The landing field warming up platforms are equipped with three double reel pits for servicing land planes. The distribution lines are sized for future additional installation. At the seaplane service pit, a single reel was placed in a double reel pit and though only one type of gasoline may be delivered at one time, a by-pass has been provided at the storage tanks between the two gasoline storage systems, so that a change over from one type of gas to the other may be made. Both systems may be independently controlled from the seaplane service pit. The piping to this pit has been sized for future additional installation.

G-5. Refrigeration:

G-5.01. General: Refrigeration equipment installed in buildings or rooms requiring a temperature lower than atmospheric for the preservation of foods or other purposes, is of the mechanical type, using an electric motor driven reciprocating compressor as a heat engine. Dichloro-difluro-methane (F-12) has been used as a refrigerant in all installations excepting the cold storage plant which utilizes ammonia. Evaporators are of various types as required by the project specifications.

G-5.02. Loads:

(a) Refrigeration loads are based on an ambient temperature of 95 degrees F.

(b) Transmission loads were figured on each wall of each refrigerator as follows:

Walls - Not exposed to radiant heat.	95	degrees	F
Walls - Sun Exposed	110	"	"
Floors - Above crawl space	95	"	"
Floors on concrete on earth, or earth fill,	70	"	"
Ceiling - Air space and roof above	120	"	"
Ceiling - Sun Exposed	140	"	"

(c) The transmission load Ht was based on the use of a good commercial grade of vegetable cork board using a "C" factor of eight B.T.U. per square foot of cork per one (1) inch of thickness, per 24 hours, and an inverse ratio of the factor for walls of greater thickness.

(d) The product load (Hp) was based on loading the entire floor area with one hundred pounds of produce per square foot and removing the heat over a 24-hour period.

(e) The service load (Hs) was based on a total heat gain of from 3000 to 6000 B.T.U. per hour per door or from 15,000 to 30,000 B.T.U. per door per 24 hours total gain depending upon size and intensity of service.

(f) Equipment was in general selected to remove the total heat gained from all sources, during a 24 hour period, in 16 hours operating time.

$\frac{\text{Ht plus Hp plus Hs}}{16}$ = Minimum capacity of the compressor and its evaporators in B.T.U. per hour.

(g) It is not to be presumed from paragraph (g) that compressor should operate exactly 16 hours in any 24-hour period when the given conditions exist, as this figure, while common practice in the industry is an arbritary figure and is intended to give a reserve capacity for abnormal conditions, such as pick up with hot regrigerators, defrosting time for boxes with temperatures above freezing, and idling time which tends to increase the life of the equipment.

G-5.03. Unit Coolers and Evaporators.

(a) Fan type unit coolers, pipe and plate coils were selected for the various heat absorbation applications in accordance with latest data in common practice.

(b) Evaporators were selected with sufficient capacity to maintain relative humidities of from 80% in bulk meat storage rooms to 90% in vegetable storage rooms.

G-5.04. Defrosting Equipment.

(a) In general, a manual type of electric defrosting was provided for each low temperature (below 32°F) room. In certain installations in the hospital, because of material scarcities a system of hot gas defrosting was installed.

(b) Units subjected to severe conditions (ie. high outside relative humidities and heavy duty) should be defrosted daily. Units subjected to normal operating conditions should be defrosted from two to four times per week.

(c) Failure to defrost regularly or thoroughly will result in an accumulation of ice on the coils. This is turn will increase the running time of the compressor and will cause high operational and service costs. A unit should never be partially defrosted but should have the entire frost accumulation removed at each and every defrosting operation.

G-5.05. Compressors.

(a) Two compressors were installed in each of the Battalion type Mess Hall commissaries within the Division Training Area and also in Tent Camp No. 1 and No. 2 subsistance buildings, the Officers Mess Hall in Tent Camp No. 2 and Mumford Point Camp No. 1 Mess Hall. With the exception of Tent Camp No. 1 subsistance buildings, all of the above installations have sufficient capacity to provide refrigeration for emergency periods with one compressor running continuously.

(b) Standby compressors were provided in each of the installations in the bakery and in the hospital group. Each standby unit is equal to one half the total load in the larger installations, and equal to the total load in the smaller installations.

(c) Equalizing lines are installed permitting two of the three condensers to operate when three compressors were installed. When two compressors only were installed provision was made for simultaneous operation with sequence controls when desired.

G-5.06. Condensers.

(a) Evaporative condensers were furnished for each installation except for subsistance buildings in Tent Camp No. 1; the bakery in the Division Training Area, which is air cooled and in the Naval Hospital B. O. Q. in which shell and coil condensers were installed.

G-5.07. The Cold Storage Plant:

(a) The cold storage plant was designed with storage space for 150,000 rations, (15,000 troops, 10 days) and with an ice making capacity of 25 tons in 24 hours with 15° F brine.

(b) Three ammonia compressors were installed each with a capacity equal to one half the total load.

(c) Four evaporative condensers were provided equal to one third the total load.

(d) Loads were computed as set forth in paragraph G-5.01.

(e) Brine from the ice tank is circulated to three brine circuits. Each circuit is complete with a standby brine pump. Room temperature is controlled by a thermostat and a motor operated valve.

G-5.08. Service.

(a) The service department should instruct stewards in the proper procedure and method of defrosting the units, and the proper procedure in case of an emergency shut down.

(b) All service, repair,and adjustment to any equipment, including the cutting in and out of standby equipment should be done by a qualified refrigeration service man.

(c) Standby equipment should have all valves closed, when idle.

G-5.09. List of Compressors.

Type Building	Location	No of Bldgs.	Spec. No.	No.Comp. Instld.	Type Condensor	Tonnage Installed
Mess Hall	T C #1	2	108	2	Shell &Coil	2.99
Mess Hall	T C #2	2	150	2	Shell &Tube	6.15
Mess Hall	T C #2	1	153	2	Evap. Cond.	2.47

G-5.09. (Cont'd)

Type Building	Location	No of Bldgs.	Spec. No.	No.Comp. Instld.	Type Condenser	Tonnage Installed
Mess Hall	Reg.Area 1	3	804	2	Evap.Cond.	4.3
Mess Hall	Reg.Area 2	3	804	2	Evap.Cond.	4.3
Mess Hall	Reg.Area 3	3	804	2	Evap.Cond.	4.3
Mess Hall	Reg.Area 4	3	804	2	Evap.Cond.	4.3
Mess Hall	Reg.Area 5	3	804	2	Evap.Cond.	4.3
Mess Hall	Post Troops	1	804	2	Evap.Cond.	4.3
Mess Hall	Bar.Balloon Amp. Base	1	804	2	Evap.Cond.	4.3
Commissary	Ind.& Supply Area	1	806	2	Evap.Cond.	9.82
Cold Storage	Ind. & Supply Area	1	825	3*	Evap. Cond.	90.4
Bakery	Ind. & Supply Area	1	860	2*	Water Air Cooled	0.5
Mess	B. O. Q.	1	814	2*	Evap.Cond.	6.25
Mess	M. P. #1	1	153	2	Evap. Cond.	2.47
Mess	Family Hosp.	1	890	2*	Evap. Cond.	1.38
Mess	Naval Hosp.	1	833	5*	Evap. Cond.	10.3
Mess	Nurses Home Naval Hosp.	1	844	2*	Evap. Cond.	1.38
Storehouse	Naval Hosp.	1	818	2*	Evapo. Cond.	1.43
Morturay	Naval Hosp.	1	818	2*	Shell& Coil	0.91
Mess	B.O. Q. Naval Hosp.	1	875	2*	Shell &Tube	1.38

* Denotes; Extra Compressor Capacity or full standby compressor.

G-6. Air Conditioning.

G-6.01. General. Comfort air conditioning equipment was installed in portions of certain buildings in the hospital group in which it was felt that temperature control would be an adjunct in the treatment of and contribute to the welfare of patients and to the efficiency of the attendants.

Air conditioning also was installed in the Waller Gunnery Trainer building.

G-6.02. Type: The type of system installed is the direct expansion central plenum type arranged for both summer and winter operation. A motor driven, multi cylinder reciprocating refrigerating unit installed for summer operation. Steam is provided for Winter heating and other applications as required.

The refrigerant used was dichloro-difluoro-Methane (F_{12}).

G-6.03. Design Data. The selection of cooling and heating equipment was based on the following conditions:

Outside D B - (summer)	95°F
Outside W B "	79°F
Outside D B - (winter)	15°F
Inside Conditions	
D B - (summer)	70°F
D B - (winter)	80°F
Relative Humidity	55%

The dirrect system was designed with reheat and re-humidifying coils so that proper manipulation of controls would provide entirely different conditions in different sections or zones of the air conditioned space.

G-6.04. Methods.

(a) A central plenum chamber was provided in a convenient location in which were placed direct expansion coils, heating coils, humidifiers, reheaters, filters, and the necessary control, safety valves and instruments required for automatic operation. Air was taken from the plenum by a fan and forced through a system of ducts to the conditioned rooms. In the hospitals, re-heaters and re-humidifiers were installed in certain branch ducts with the proper valves and remote control instruments to give a wide choice in the conditions attained - namely, 70°F and 55% humidity in service rooms and a choice of temperature and humidity conditions (above these conditions) for operating rooms.

G-6.05. Control.

(a) The systems are controlled by a Johnson Service Company's pneumatic control system in connection with the usual electric safety devices.

G-6.06. Capacity Reductions.

(a) With the exception of the Post Dispensary the capacity of the coils are controlled by modulating type thermostatic expansion valves connected into the pneumatic control system. The capacities of the compressors are controlled from full load to 25% load by progressive "cutting out" of compressor cylinders. The remaining capacity is modulated by a Kromer load balancer - (a patented device, manufactured by the Kramer Trenton Company, Trenton, N. J.) in conjunction with the pneumatic control system.

(b) The capacity of the compressor in the Post Dispensary is constant. Coil capacity is controlled by action of thermostatic expansion valves. The compressor is cycled by the suction pressure control, as required, to maintain temperatures.

G-6.07. Operation.

(a) In the Post Dispensary one set of instruments controls the temperature.

(b) In the hospital a set of master controls govern the conditions of air leaving the conditioning units. Re-heaters and re-humidifiers with control instruments located in the air conditioned spaces as zoned, maintain any desired condition within reason in these zones above the temperature and humidity of the air leaving the units.

G-6.08. Instructions.

(a) The control systems should be regularly inspected by a competent service man. Relative humidities and temperature should be checked periodically with standard instruments and control instruments should be calibrated.

(b) Refrigeration equipment should never be touched, except for starting and stopping, by any one other than a competent service man.

(c) Heating equipment in connection with the system should be regularly inspected. Pressure reducing valves, traps, and steam control valves should be kept in repair. The humidifiers must be kept clean.

(d) The filters must be kept clean as the success of the system depends upon a constant supply of air.

G-6.09. Waller Gunnery Trainer Building. The equipment in the Waller Gunnery Training Building was purchased by the Navy from plans provided by the Bureau of Yards and Docks.

G-7. Ventilation.

G-7.01. General. This section covers the various designs which involve the handling of air by mechanical means.

Basic computations, design standards and formulae follow very closely the recommendations and data contained in the "Guide" (published by the American Society of Heating and Ventilating Engineers). The greatest departure from the above standards exists in the Mess Hall galley ventilation, where air quantities were held to a minimum, by direction. Thirty-two complete designs were turned out covering three hundred twenty-three separate buildings and providing for the mechanical handling of 1,615,809 cubic feet of air per minute. Of this total, 1,100,972 cubic feet per minute represents the volume of air exhausted from three hundred twenty five buildings as covered by twenty-one basic designs; 497,457 cubic feet of air per minute represents the volume of tempered air supplied to 31 buildings for heating as covered by 8 basic designs; and 17,400 cubic feet of air per minute is the volume of conditioned air supplied to three buildings under three basic designs.

G-7.02. Ventilation by Projects. A complete breakdown of ventilation is as follows:

(a) Seventy-two Barracks covered by project numbers 101-1, 200-1, 201-1, 202-8 and 203-1, have been provided with toilet and shower room exhaust in the amount of 2,600 cubic feet of air per minute each; - Total - 187,200 C.F.M.

(b) Eighteen Mess Halls covered by project numbers 101-2, 200-2, 201-2, 202-9 and 203-2, have been provided with galley and scullery exhaust in the amount of 23,500 cubic feet of air per minute each; and tempered air supply in the amount of 9,600 cubic feet per minute each; - Total 595,800 C.F.M.

(c) Eight Regimental Infirmaries covered by project numbers 101-4, 200-4, 202-20 and 203-19, have been provided with dark room ventilation in the amount of 350 cubic feet of air per minute each; - Total 2,800 C.F.M.

(d) One hundred ninety six Officers' Quarters covered by project numbers 105-1, 205-1 and 400-1-14, have been provided with kitchen ventilation in the amount of 250 cubic feet of air per minute each; - Total 49,000 C.F.M.

(e) The Post Shop building covered by project number 207 has been provided with spray-booth ventilation, and exhaust for removal of smoke and heat in the amount of 16,122 cubic feet of air per minute; a sawdust removal system has also been proposed to handle 19,080 cubic feet of air per minute. It is recommended that this installation be made as promptly as possible - Present Total 16,122 C.F.M.

(f) Seven Regimental Theaters covered by project numbers 200-15, 209 and 203-17 are provided with exhaust in the amount of 24,625

cubic feet of air per minute each, for general ventilation, including projection and toilet room exhaust and 30,000 cubic feet of tempered air per minute for heating - Total 382,375 C.F.M.

(g) The Post Troops Theater covered by project number 201-12 is provided with exhaust in the amount of 45,000 cubic feet of air per minute for general ventilation and for projection and toilet room exhaust and 50,000 cubic feet of tempered air per minute for heating - Total 95,000 C.F.M.

(h) The Brig, covered by project number 107-5, is provided with galley, scullery and toilet room ventilation in the amount of 7,390 cubic feet of air per minute and 357 cubic feet of air per minute for heating - Total 7,747 C.F.M.

(i) Post Headquarters, covered by project number 107-10-1, is provided with ventilation for the blue print room in the amount of 2,200 cubic feet of air per minute - Total 2,200 C.F.M.

(j) The Hostess House covered by project number 214 is provided with galley and scullery exhaust in the amount of 4,800 cubic feet of air per minute - Total 4,800 C.F.M.

(k) The Post Dispensary covered by project number 400-3 has been provided with exhaust for toilets and operating room in the amount of 3,225 cubic feet of air per minute and a supply of 600 cubic feet of conditioned air per minute for heating - Total 3,825 C.F.M.

(l) Two Garage & Repair Shops covered by project numbers 221-5 and 228 have been provided with exhaust in the amount of 12,478 cubic feet of air per minute for spray booth ventilation and the removal of exhaust fumes from motors - Total 24,956 C.F.M.

(m) The Reclamation Building covered by project number 221-6 has been provided with exhaust in the amount of 4,000 cubic feet of air per minute for spray booth and general ventilation - Total 4,000 C.F.M.

(n) Naval Hospital Administration Building and Mess Hall, covered by project number 400-1-4 is provided with exhaust in the amount of 48,750 cubic feet of air per minute to ventilate the galley, the operating and treatment rooms and toilets, 9,000 cubic feet of conditioned and 52,000 cubic feet of tempered air per minute for heating - Total 109,750 C.F.M.

(o) The Wards & Corridors of the Naval Hospital covered by project number 400-1-5 are provided with 5,584 cubic feet of air per minute of exhaust to ventilate toilet rooms and solitary confinement rooms. - Total 5,584 C.F.M.

(p) The Nurses' Home at the Naval Hospital covered by project number 400-1-7 is provided with exhaust in the amount of 5,130 cubic feet of air per minute to provide galley and scullery ventilation. - Total 5,130 C.F.M.

(q) The Medical Storehouse covered by project number 400-1-8 is provided with exhaust in the amount of 500 cubic feet of air per minute for general ventilation - Total 500 C.F.M.

(r) The Naval Hospital B.O.Q. covered by project number 402 is provided with exhaust in the amount of 6,330 cubic feet of air per minute for galley, scullery and toilet room ventilation. - Total 6,330 C.F.M.

(s) The Family Hospital covered by project number 134 is provided with 15,550 cubic feet of air per minute of exhaust to ventilate the galley, scullery and operating suite and 7,800 cubic feet of conditioned air for heating - Total 23,350 C.F.M.

(t) Tent Camp # 1 Hospital, covered by project number 1-19-1, is provided with exhaust in the amount of 2,790 cubic feet of air per minute for operating room and general ventilation - Total 2,790 C.F.M.

(u) Three Recreation Buildings covered by project number 7, 250-1-18 and 500-5 are provided with exhaust in the amount of 24,750 cubic feet of air per minute for general ventilation - Total 74,250 C.F.M.

(v) The Radio Transmitter Building covered by project number 120 is supplied with 3,600 cubic feet of tempered air per minute for heating - Total 3,600 C.F.M.

(w) The Parachute Building covered by project number 138 is provided with tempered air supply of 6,500 cubic feet of air per minute for heating - Total 6,500 C.F.M.

(x) The Utility Shop of the Glider Training Base, covered by project number 142-1 is provided with a tempered air supply of 2,200 cubic feet per minute for heating - Total 2,200 C.F.M.

G-8. Equipment.

G-8.01. General. Most of the collateral equipment on the base was furnished by either the Navy Department or the Marine Corps on specifications of their own. Some few notable exceptions wherein we specified the equipment are hereinafter listed. We are also listing the basis of design and source of design data.

G-8.02. Regimental Infirmaries. Seven in number; project numbers 101-4, 200-4, 202-20 and 203-19. In these buildings we covered by specification, the Instrument Sterilizers. Design was based on recommendation by a representative of the Bureau of Medicine & Surgery.

G-8.03. Amphibian Base Machine Shop and Carpenter Shop. Project numbers 202-6 and 202-5. In these buildings we covered by specification all of the shop equipment including small tools. Selection of type and size of the various items specified was made after consultation with the operating personnel of the Amphibian Base at the Naval Operating Base, Norfolk, Virginia.

G-8.04. The Hostess House. Project number 214. We specified the galley equipment for this building. Design was based on the requirements of the building and materials readily available.

G-8.05. Division Infirmary. Project number 400-3. In this building we covered by specification the Sterilizer Equipment and the X-Ray equipment in accordance with recommendations of representatives of the Bureau of Medicine & Surgery. We also specified the elevator, the design of which was based on the service requirements of the building.

G-8.06. Naval Hospital Administration Building and Mess Hall - Wards & Corridors. Project numbers 400-1-4 and 400-1-5. For these projects we specified the galley equipment, including small collateral equipment, in accordance with recommendations of representatives of the Navy Department - Bureau of Medicine and Surgery. We also specified the Sterilizer and Operating suite equipment as well as fixed laboratory equipment, X-Ray equipment, treatment equipment, and tailor shop equipment, after consultation between our engineers and representatives of the Bureau of Medicine & Surgery, the Bureau of Yards and Docks and a representative of the American Sterilizer Co. The elevator, design of which was based on building service requirements was also specified.

G-8.07. Nurses' Home. Project number 400-1-7. We specified the galley, collateral, and laundry equipment for this project based on estimated service requirements.

G-8.08. Medical Storehouse. Project number 400-1-8. We specified the Mortuary equipment for this project after consultation with representatives of the Bureau of Medicine & Surgery and the American Sterilizer Co.

G-8.09. Family Hospital - Nurses' Quarters. Project number 400-1-11. We covered by specification the kitchen equipment for this project based on estimated service requirements.

G-8.10. Naval Hospital - Laundry. Project number 400-1-12. We specified the complete equipment for this project. Design was based on recommendations of the Bureau of Yards and Docks and Bureau of Medicine & Surgery.

G-8.11. Family Hospital. Project number 134. We covered the Sterilizer Equipment, operating, X-Ray, recovery, nursery suite equipment and galley and Laundry equipment all after consultation with representatives of the Bureau of Yards and Docks, the Bureau of Medicine & Surgery and a representative of the American Sterilizer Co.

G-8.12. Glider Training Base. Project number 142-1. We specified all of the shop equipment for this project including small tools. Selection of type and size of equipment was made after consultation with a representative of the Marine Air Force.

CHAPTER H - PART II

ELECTRICAL DEPARTMENT

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H-1. Introduction.

H-1.01. The purpose of this report is to describe the general scope, characteristics and essential details pertaining to the design and construction of the Outside Transmission and Distribution Systems as well as the Interior Wiring for lighting, power, and other requirements throughout the Division Training Area and associated activities. Description and recommendations concerning the operation and maintenance both outside and interior electrical systems are included where necessary.

H-2. Power Source - Description of Existing Facilities.

H-2.01. Electricity for the Marine Barracks Project, including all temporary Tent Camp Areas, Outlying Areas, and the Midway Park Residential Area is purchased from the Jones-Onslow Electric Membership Corporation, a local unit of the National Rural Electrification Administration. An abstract of the electricity purchase contract and agreement is included in this report. (See Section H-10.)

H-2.02. The REA Corporation properties now include a diesel electric plant at the Marine Barracks and a steam-electric generating plant at Cherry Point Marine Air Base, and an interconnection with the Tide-Water Power Company, the local operating utility.

The diesel-electric generating plant consists of two 1300 Kw 6600 volt 3-phase units, which were removed from the original purchasers premises and installed at their present site in 1941-42. This plant is

H-2.02. (continued)

located on the Marine Barracks property five and one-half (5-1/2) miles east of Jacksonville, N. C. along the New River and adjacent to highway No. 24.

The steam electric plant at Cherry Point which is in the process of construction, is scheduled to deliver 5000 Kw to the system by October 15, 1942. This plant is designed for two 5000 Kw units ultimately; however, the War Production Board has ruled that only one 5000 Kw unit may be installed for the duration. The steam plant is interconnected with the diesel plant by a 33 Kv, overhead transmission line of recent construction. It is approximately thirty-five (35) miles in length and follows a straight line across country between the two points.

The interconnection with the local power company consists of a 5000 Kw sub-station located near Jacksonville, N. C. This sub-station is connected to the local system by a 33000 volt overhead transmission line. It is approximately five and one-half (5-1/2) miles in length and follows the north side of highway No. 24 from Jacksonville to the Marine Barracks' sub-station. The 5000 Kw sub-station at Jacksonville is fed by two 110,000 volt transmission lines; one, by way of Wilmington and Camp Davis from Abbottsburg, N. C., a distance of approximately one hundred (100) miles and the other, across country by way of Kinston from La Grange, N. C., a distance of about forty (40) miles.

The War Production Board has authorized an additional 110,000 volt line across country from the 5000 Kw generating plant at Cherry Point to the sub-station at Jacksonville.

The sub-station which is located at the diesel plant site is fed from the three sources mentioned above. This sub-station consists of two banks of transformers. One transformer bank of 3000 Kva capacity, connected to step the 6600 volt diesel supply to 7200/12470 volts, and the second transformer bank of 5000 Kva capacity connected to step the 33000 volt supply of both the steam plant and the interconnecting line to 7200/12470 volts, which makes a total of 8000 Kva of transformer capacity installed. This 8000 Kva is connected to a common bus to deliver 7200/12470 volt grounded neutral, 60 cycle, 3-phase, 3 or 4-wire power to the Marine Barracks' system. The direct feeder of the Jones-Onslow Electric Membership Corporation into the diesel plant is protected by G. E. Company type IAC relay set at 300 amp. to operate in 79 cycles.

The lines from the diesel plant to the inner loop #1 are protected by G. E. Company type IAB relay set at 240 amp. to operate in 62 cycles.

H-3. Marine Barracks Main Supply Feeders and Protective Systems

H-3.01. The Marine Barracks project is supplied by two loop feeder transmission systems. These will be referred to as the inner loop No. 1 and the outer loop No. 2 in this report.

H-3.02. Loop No. 1 is connected to the central sub-station supply bus through two oil circuit breakers, one on each end of the loop. This loop feeder is of overhead construction using ASA class 3 creosoted poles with 175' span lengths. The conductors are 4/0 copper with 56" effective spacing supported on Douglass Fir standard 8 foot arms, with steel pins and Locke

H-3.02. (continued)

Cat. No. 88 insulators. The overall length of this loop is 12.5 miles.

This feeder is designed for National Electrical Safety Code grade "A" construction in a medium loading district to supply a maximum demand of 9500 Kw at 90% power factor with approximately 9-1/2% voltage drop. The anticipated maximum load on this feeder based on approximately 40% of the installed load will be around 7500 Kw which will produce 7-1/2 maximum voltage drop.

The loop is divided into sections and each section is protected by pilot wire connected current differential relays controlling unit type metal clad fault sectionalizing oil circuit breakers.

The relays used in connection with the pilot wire tripping are Westinghouse type HCB. These relays are capable of automatically disconnecting a faulty section of the loop in 1/30 of a second providing the fault current is of sufficient magnitude. The use of this type of protection prevents making branch feeder connections directly on the loop sections; therefore, from between each of the protected stations an underbuilt primary feeder is necessary. All branch taps should be made on the underbuilt feeder.

There are six of these sectionalizing stations as follows:

Station No. 1 is located at the beginning of the loop near the diesel station and feeds an underbuilt section of primary for the Gate House and the water pumping equipment. This station has two breakers; one for sectionalizing the loop feeder and one for feeding the underbuilt section.

Station No. 2 is located near the intersection of Holcomb Blvd. and Gum Street in the Industrial and Supply Area. This station consists of five breakers; two for sectionalizing the loop feeder, one for feeding the Industrial and Supply Area, and one for feeding the Central Heating Plant and one spare breaker for a future duplicate feeder to the Central Heating Plant. The Industrial and Supply Area breaker also feeds the Parachute Training Area underbuilt section and the second loop No. 2.

Station No. 3 is located near the Post Headquarters Building in the Post Troops Area and consists of 3 breakers; two for the loop feeder and one for the Division Training Area, Post Troops Area and for an emergency feeder through Regimental Area No. 1 to the Naval Hospital. The underbuilt sections from this station are of No. 1/0 copper.

Station No. 4 is located at Cross Street and Main Service Road at the far end of Regimental Area No. 1 and consists of 3 breakers; two for the loop feeder and one for the Naval Hospital feeder. This station also serves the Radio Tower and the Wallace Creek Sewage Pumping Station, No. 3. The feeder to the Naval Hospital Area is of 1/0 copper and is located on the south side of Cross Street.

Station No. 5 is located at the sub-station at the Batchelors Officers' Quarters and consists of three breakers; two for sectionalizing the loop feeder, and one to feed the Residential Area sub-station. This breaker serves the entire Residential Area.

H-3.02. (continued)

Station No. 6 is similar to Station No. 1 and is located on the other end of Loop No. 1 near the diesel plant. This station has one sectionalizing breaker and one feeder breaker which supplies the C.C.C. Camp, Mumford Point Tent Camp, Tent Camps Nos. 1 and 2, Peterfield Point Tent Camp and the Glider Training Base. This system is four-wire overhead construction to Tent Camps Nos. 1 and 2, and underground from a sub-station located at the intersection of the Atlantic Coast Line Railroad and the Glider Training Base access road to Peterfield Point Tent Camp and the Glider Training Base. This sub-station is fed by an overhead line from the Tent Camps Nos. 1 and 2 transmission line. The voltage transformation at this sub-station is 7200/12470 to 2400/4160-volt.

Most of the transformers in Tent Camps Nos. 1 and 2, Mumford Point Tent Camp and the C.C.C. Camp are single phase, 7200 to 120/240 volts. All laterals that are fed in any of these areas from the underbuilt section are protected by open type fused cut-outs with fuse size depending upon the connected transformer loads.

H-3.03. Loop No. 2 begins at the rear of the Industrial and Supply Area at the end of Gum Street and is fed from Loop No. 1. This line is of overhead construction similar to Loop No. 1, except that it is of 1/0 copper conductors and has an average span length of two hundred (200') feet. This loop follows the Sneads Ferry Road to Dixon where it connects through a pole top disconnect as an emergency feed to a 1/0 line of the REA on Route 17. The length of this loop, including the REA sections is approximately forty (40) miles in length. This loop feeds the Mock-up, the Barrage Balloon Battalion, the Amphibian Base Area, the Amphibian Shop and the Rifle Range. Hurst Beach which is now fed from REA will be reconnected to Loop No. 2. This loop is designed on the basis of grade "A" construction and is capable of carrying approximately 6000 Kw at ninety (90%) percent power factor. However, due to the length, the voltage drop transmitting this amount of power would be prohibitive and regulators would be required. The present load on this loop will not exceed 2000 Kw with approximately 8.5% voltage drop. All lines taking off of Loop No. 2 are protected by means of open type fused cut-outs.

H-4. Distribution Systems Including Primary Voltage Characteristics Sub-Station, etc. for the Entire Project

The various distribution systems connected to the inner loop feeder are as follows:

H-4.01. Industrial and Supply Area System

This system is of overhead construction, 12,470 volts, 3-phase, 3-wire primary and in this Area generally 3-phase transformers giving a secondary service voltage of 120/208 connected wye are used. All primaries on 3-phase transformers are connected delta. Detail service for each building will be given in Section H-11 of this report.

H-4.02. Division Training Area Distribution System

This system is of overhead construction, 12,470 volts, 3-phase, 3-wire primary and 3-phase transformers. These transformers are connected delta-wye

H-4.02. (continued)

and deliver 120/208 volts for building services. This Area, consisting of five Regiments, is essentially living quarters, subsistence and recreation, including various Administrative Office Buildings. These buildings will be discussed later in this report.

H-4.03. Naval Hospital Area Distribution System

The Naval Hospital distribution system is a 2300 volt, 3-phase, 3-wire underground system consisting of underground ducts, concrete manholes, and brick transformer houses. The Area distribution system is fed by an overhead outdoor type transformer sub-station connected to a switching station located near the entrance to the Hospital Area by means of a three conductor 15000 volt 1/0 cable. Provisions have been made in the duct system for the installation of a duplicate cable.

The Hospital sub-station consists of three 500 Kva 12470/2300 volt transformers connected delta/delta and four outgoing 2300 volt feeders, three of which are protected with automatic oil circuit breakers. Also provision for street lighting and X-Ray service is made in this sub-station. The main Hospital buildings, which include Wards, Corridors, and Administrative sections, are fed by two separate cables and are equipped with three unit type transformer sub-stations for 120/208 volts, 3-phase, 4-wire service. A 147.5 Kw diesel driven generator supplies the emergency lighting in case of power failure from the main source. The operating room suite is further equipped with batteries for the operating room lights.

The Family Hospital is connected to the main source by two cables feeding an individual transformer sub-station installed within the building for 120/208 volts 3-phase, 4-wire service. This sub-station also serves the Family Hospital Nurses' Quarters. The transformers for service to the remainder of the buildings in this Area are installed in small brick transformer houses. Details of this are shown on M. B. Drawing No. 1796.

The Hospital switching-station is located at the entrance to the Hospital Area on the west side of the Hospital road at the entrance to the Bachelor Officers' Quarters Building. This station is fed from two overhead feeders; one passing through Regimental Area No. 1 is termed an emergency feeder and the other, which originates at Station No. 4 is termed the main Hospital feeder. The main feeder is equipped with a 3-shot, automatic, reclosing oil circuit breaker at the loop station No. 4. The emergency feeder is protected by means of power fuses at the tap-off in the Training Area. The entire Hospital Area is metered at the switching station location.

H-4.04. Residential Area Distribution System

This distribution system is fed from loop No. 1, station No. 5 through a bank of three 750 Kva transformers. These transformers step the voltage from 12,470 to 2400 volts and are connected delta/delta. The primary distribution system in this Area was designed for 2400-volt due to the fact that the Marine Corps wished to preserve all possible trees in this area. The primary is located along the alley in the rear of the buildings. The distribution transformers are 3-phase, connected delta/wye, providing 120/208 volt service to each house.

H-5. Loop No. 2 feeds the following distribution systems:

H-5.01. The Mock-up is fed by an overhead line connected to Loop No. 2 through open type fused cut-outs.

H-5.02. The Barrage Balloon Battalion and Amphibian Troops Area Distribution System is fed by an overhead line connected to loop No. 2 through open type fused cut-outs serving a 750 Kva transformer sub-station located on the south side of the Sneads Ferry Road. The primary distribution feeder is a 2300-volt 3 conductor underground cable; however, the distribution in the Troops Area is by means of overhead construction.

H-5.03. The distribution system for the Barrage Balloon Area is by means of overhead construction connected to the primary underground cable feeder to the Troops Area.

H-5.04. The Amphibian Shop Area is fed by an overhead line directly from Loop No. 2 protected by open type fused cut-outs.

H-5.05. The Rifle Range distribution system is by overhead construction equipped with 3-phase 12470/120-208 volt transformers connected delta/wye, with the general design similar to that of the Regimental Areas.

H-6. Suggested Operation Procedure of Primary Distribution Transmission and Street Lighting

H-6.01. The rules for the operation of electrical lines and equipment as set forth in the National Electric Safety Code and the National Electric Code of the National Board of Fire Underwriters should be secured and copies given to the personnel charged with the responsibility of maintenance and repair of the electrical systems.

The National Electric Safety Code may be obtained from the Government Printing Office, Washington, D. C. and is as follows:

Part 1 - Safety Rules for the Installation and Maintenance of Electric Supply Stations
Part 2 - Safety Rules for the Installation and Maintenance of Electric Supply and Communication Lines
Part 3 - Safety Rules for the Installation and Maintenance of Electric Utilization Equipment
Part 4 - Safety Rules for the Operation of Electric Equipment and Lines
Part 5 - Safety Rules for Radio Installation

The National Electric Code may be obtained from the National Board of Fire Underwriters, 85 John Street, New York, New York.

The above codes have been approved by the American Standards Association.

H-6.02. The supply for the Marine Barracks Project in the form of a loop means that under normal operations any tap is fed from two directions. Work on any section of the loop requires both ends of the section to be disconnected. In case of trouble on the loop, the loop feeder may be used

H-6.02. (continued)

to advantage in that the section in which the fault occurs may be entirely disconnected to permit repairs, and the load may be fed during this period of repair from the adjacent ends of the open loop.

Faulty circuits should be de-energized before linesmen are permitted to climb the poles to make repairs. Conventional hot line equipment should be used with extreme care to prevent accident. Rubber gloves inside suitable canvas protective gloves and an operating stick should be used when attempting to replace primary fuses in any of the open cut-outs. Attempting to open cut-outs with gloves or hot stick alone is a very dangerous practice. Ground the de-energized section of a circuit during the period of repair.

Overhead lines should be patrolled frequently and cleared of all over hanging branches or dangerous trees. Distribution and power transformers are provided with over-current indicators of the thermal type. Transformers are also provided with means for sampling oil.

H-6.03. Refer to the respective manufacturer's operating instructions and recommendations concerning operation and maintenance of such equipment as transformers, oil circuit breakers, protective relays, disconnecting type switches, lightning arresters, metering equipment, fusible cut-outs, motors and motor starting equipment, street lighting equipment, black-out control systems and carrier-frequency pump and water control system.

The equipment nameplates generally have the Instruction Bulletin identifying number stamped thereon.

H-6.04. Cracked or damaged insulators and lightning arresters may be detected by means of a portable radio set. Lines should be de-energized before an attempt is made to replace bad insulators or lightning arresters. Disconnect switches are not designed for interrupting load currents, therefore, remove the load by means of breakers before the disconnects are opened or closed. The same is true of power fuses which are designed to automatically interrupt faults, not to be used as manual disconnect devices. A creosoted pole is a fair conductor of current; therefore, when replacing poles, care should be taken that the pole does not touch a "hot" conductor.

H-6.05. Most of the street lighting systems are 6.6 ampere series circuits with 10 Kw. regulators which will deliver approximately 2000 volts on open circuit. This voltage will be present at a break in the line even though the ends of the line are on the ground. The danger of this condition has been minimized by the installation of open circuit protectors; however, great care should be exercised when repairing any part of these circuits. Series lamp socket clips are equipped with an insulating disc type cut-out. When a lamp burns out this disc is automatically broken down by the open voltage and thereby shunts the lamp out of circuit. When a series socket is removed from a fixture receptacle the receptacle automatically short circuits so that the series loop remains closed. All lighting circuits should be patrolled at least once each week at which time the linesman patrolling the line should note the condition of the insulators and the clearance between this circuit, tree limbs, etc., as well as to replace burned out bulbs. The regulator capacity is based on the number and size of lamps connected;

H-6.05. (continued)

therefore, changing the number and size of lamps requires checking the regulator for suitable capacity. The oil switches which control the regulators are opened and closed by an astronomically corrected contact making clock. This oil switch can be operated manually be a control handle mounted on the back of the switch case. The open circuit protector is equipped with a reset button which must be depressed when an open circuit fault causes the protector to function.

H-7. Street Lighting Systems

H-7.01. The Street Lighting Systems for the various Areas are designed to provide enough light for the movement of Troops or pedestrians by night. Street lighting in the Industrial and Supply Area is provided from a 10 Kw constant current regulator serving an overhead 6.6 amp. series circuit connected to pole mounted brackets with globe and deflector type luminaires. The regulator is located on Gum Street near the Central Heating Plant. A 2500 lumen street light is located at most intersections. The regulator is supplied power by a single phase transformer which steps the voltage from 12,470 to 2400 volts. The constant current regulator is automatically controlled by an oil switch which in turn is controlled by an astronomical dial clock. This clock is spring driven and is wound electrically. The period of lighting for this system will be approximately from sun set to sunrise. The circuit is further provided with an open circuit protector which will automatically open the oil switch and disconnect the primary supply to the constant current regulator if the series circuit is broken.

H-7.02. The Division Training Area is lighted by a similar system utilizing the same type of brackets and luminaires. However, this system consists of two 10 Kw 6.6 amp. constant circuit regulators connected to separate circuits; one for all night lighting similar to the Industrial Area, and the other for part night lighting, which may be set to extingush the lights at midnight. The all-night lights are generally located at street intersections and other points where all night service is desired. In addition to the pole mounted brackets and luminaires in the area, a number of concrete standards with appropriate luminaires and underground wiring are located along the double lane of Holcomb Blvd. leading to the Division Headquarters. Approximately half of these luminaire standards are connected to the part night lighting circuit. The street lighting regulators supplying these Areas are identical in connection and in method of control to that in the Industrial and Supply Area. These regulators are located on the south side of Holcomb Bldv. across from the Post Headquarters Building.

H-7.03. The Naval Hospital street lighting system consists entirely of concrete standards supplied by underground cable similar to the lights on Holcomb Blvd. These lights are also provided with a part night and all night circuit. The system is supplied by a 10 Kw 6.6 amp. constant current regulator located at the Hospital sub-station. The control is similar to that of the Industrial Supply and Division Training Areas, except there is extra equipment installed in the circuit to cut out half of the lights at midnight.

H-7.04. The Residential Area is lighted by pole mounted brackets with glass bowl luminaires mounted on creosoted poles similar to the Industrial Area, except that these lights are fed by an underground cable. These lights are spaced for Residential service and are generally located only at street intersections. These are supplied by a 10 Kw 6.6 amp. constant circuit regulator located at the Residential sub-station near the Fire Station for this Area. The control is identical to that in the Industrial and Supply Area, except that the regulator is connected directly to the distribution system without utilizing a step down transformer.

H-7.05. The Tent Camps Nos. 1 and 2 have 1000 lumen radial wave reflectors mounted on 10 foot mast arms fastened to the distribution poles with an overhead circuit supplied by a 5 Kw constant current 6.6 amp. regulator. The regulator is connected directly to the primary by means of a clock controlled oil switch.

H-7.06. The Mumford Point Tent Camp is similar in detail to Tent Camps Nos. 1 and 2.

H-7.07. The Rifle Range street lighting system is similar to that in the Division Training Area.

H-7.08. The Amphibian Shops, Barrage Balloon School and Amphibian Base are supplied by lights connected to a 110/220 volt multiple system obtained from the distribution transformer and controlled from the Administrative Offices of these Areas.

H-8. Control Systems for Blackout and Water Pumping Equipment

H-8.01. Blackout of all Areas is accomplished by means of a pilot wire system which is normally energized to close a small relay installed in tha trip coil circuit of a larger contactor. The blackout system is designed so that the lights in all buildings would be automatically extinguished in case of a failure of the relay or the pilot wire system from natural causes or from sabotage. The Industrial and Supply and Division Training Areas are controlled from a control panel located in the Post Headquarters building. This panel is so designed that if a failure of power supply occurs, all relays will remain closed, thereby making it unnecessary to turn the lights on after power resumption. The panel has a master control black-out button and fiftean individual circuit controls. The sirens are connected to one of the fifteen circuits, therefore, if it is desired to blow the sirens in advance of a black-out, this may be accomplished by pressing the respective button. The master control black-out button controls all interior lighting as well as the street lighting and this button when depressed will automatically extinguish all normal lighting in the Industrial and Supply and the Division Training Areas. To restore service to the various Areas without causing a momentary overload on the power source, it is necessary to consecutively press each of the fifteen buttons on the control panel. All obstruction lighting on the water tanks, stacks and radio towers are connected to the street lighting circuit by means of transformers. Therefore, when the Areas are blacked-out, all obstruction lighting will also be blacked-out.

H-8.01. (continued)

The various buildings which are normally occupied at night, are equipped with a black-out lighting system. This system of lights is automatically energized when the normal lighting is blacked-out and it is for the purpose of leading the occupants to the nearest exit without confusion.

H-8.02. Water Pumping Control Equipment

The Water Pumping equipment which will ultimately consist of approximately twenty-seven (27) wells located within the Marine Barracks Area, which pump water into the main treatment plant located at the intersection of the Service Road and "G" Street, will be controlled by a carrier current system as manufactured by the General Electric Company. This sytem consists of a high frequency generator driven by a squirrel-cage motor. This generator by means of coupling transformers imposes a 720 cycle control current impulse on the normal distribution system. This current is controlled by a selective group control panel controlling nine channels each of which serves with a predetermined impulse to the various channel responsive relays located at each well and connected to start and stop the pump motor. The wells are generally controlled in groups of three which may be varied as found necessary. Due to the length of time required for delivery of this equipment, it will be necessary to control these wells by hand until the equipment is installed. The carrier current control will also be used to control the incoming water lines from the various well locations by means of a carrier current responsive relay in the control circuit of a suitable valve. This control will be described under the operation of the water plant.

H-9. General Notes on Interior Design

H-9.01. The permanent type buildings constructed in the main Areas as well as the outlying activities are designed using type RH wire and rigid conduit. However, due to the shortage of steel for strategic uses, some of the buildings utilized thin wall conduit. Inaccordance with the Bureau's practice the smallest size of wire used for lighting circuits and for convenient outlets is No. 12. The maximum allowable load for any branch circuit is 1500 watt. However, in the design the connected load is limited to 1000 watts maximum. The amount of illumination in any of the permanent buildings is generally ten (10) ft. candles except in the sleeping quarters and in some parts of the subsistence buildings, the illumination is around seven (7) to eight (8) ft. candles and in the Offices, Administration buildings, and other places where more illumination was desirable, approximately twelve (12) ft. candles were provided. Panels were provided with toggle switches and plug fuses with adequate spare circuits for the future installation of miscellaneous services. The type of fixture used generally conformed to the U. S. Bureau of Yards and Docks Specification 9Yc. In accordance with Navy direction, most of the buildings are supplied through four-wire services which permit 120 volt single phase for light and 208 volts 3-phase power for ventilation fans and condensate pumps. Due to the fact that instructions were issued to provide black-out facilities after a considerable number of buildings were under construction, an attempt was made to design a system which would necessitate the least amount of changes and revisions both to the interior and outside distribution system. As discussed under the black-out control, Section H-7 of this report, the black-out of each building is controlled from

H-9.01. (continued)

a pilot wire. The system used on the interior of the buildings as shown on M.B. Drawing No. 751 utilizes a low energy magnetic contactor normally open, which is inserted in the control circuit of a larger contactor rated in accordance with the installed amount of lighting. There is also a normally closed contactor, which automatically turns on the black-out lights when the normal lighting circuit is de-energized.

In the subsistence type of building, some 220 volt 3-phase kitchen equipment has been bought to conform to the 110/220 volt 3-phase 4-wire open delta system originally designed and later changed to 120/208 volt by Navy direction. An auto transformer to step the voltage from 208 to 220 volts was installed to provide the proper voltage.

H-9.02. All temporary types of buildings such as tents and the most recently constructed frame buildings were wired with non-metallic sheathed cable and in some cases thin wall conduit. All electrical work of a temporary or a permanent nature has been designed and installed in accordance with the National Electric Safety Code and the Bureau of Yards and Docks design manual.

H-9.03. The various types of buildings, installed loads and voltage characteristics are listed in Section H-11.

H-10. Electrical Features of the Central Heating Plant, Cold Storage Plant, Post Shops, and Naval Hospital

H-10.01. Central Heating Plant

The Central Heating Plant located on Gum Street in the Industrial and Supply Area is designed to furnish steam heating facilities to the Industrial and Supply Area, five Regimental Areas and the Post Troops Area. This plant is served from Loop No. 1 through sectionalizing Station No. 2. Service, as originally designed, for this building was to be by means of two 3-conductor No. 0, 15,000 volt cables. However, due to a shortage in this type of cable, an overhead feeder has been installed from Loop Station No. 2 to the plant location. The service enters the building through two underground 15,000 volt cables, which terminate in two 750 Kva unit type sub-stations. Each of the 750 Kva transformers serve two complete boiler installations through coordinated low voltage circuit breakers. The two unit-type sub-stations are interconnected by means of a 2000 ampere low tension tie. This enables any of the four heating plant boilers to be operated from either of the two sub-stations, however, each sub-station will carry only three boilers. All equipment, panels, etc., are designed for 120/208 volt, 3-phase service. The heating plant has a total of 1667 HP in various size motors and a total of approximately 43 Kw in lighting. This plant is the largest single electrical installation. Each of the four boiler installations are provided with;

(1) 1 150HP induced draft fan
(2) 1 75HP forced draft fan
(3) 2 75HP pulverizers
(4) 2 1HP feeder motors
(5) 2 1/2HP scale motors

H-10.01 (continued)

All of these motors are connected for sequence operation. It is necessary to start No. 1, and Nos. 2 and 3 follow in the order named. The feeder motors and scale motors, Items Nos. 4 and 5, are connected through the pulverizer breakers. Therefore, it is necessary for the pulverizers to be in operation before the feeder or scale motors can be started. Item No. 1, the induced draft fan, is provided with a selector switch. This allows the induced draft fan to stop and Items Nos. 2, 3 and 4 to continue operating in sequence on natural draft. The operation of boilers Nos. 2, 3 and 4 are the same as described for boiler No. 1. Refer to specification No. 810-12 and drawings 1725 and 1727 for further information concerning the electrical controls and the future provision for a turb-alternator.

The coal handling equipment is controlled from the coal handling panel, which in turn is fed from the auxiliary unit sub-station. This panel controls: - (1) Flight Conveyor - (2) Bucket Elevator - (3) Crusher - (4) Apron Feeder. These motors are started in the sequence noted. The coal handling equipment may be operated either at the control panel or from the various motor locations. The reserve coal handling is also operated from a control panel located near the reserve coal handling equipment. This panel is also fed from the auxiliary unit sub-station. This panel controls: - (1) A Vertical Elevator and (2) The Apron Feeder. These motors are also operated in the sequence noted.

The ash handling equipment consists of an unloader and vibrator. There is also a 1/2HP sump and a 5HP fuel pump. There is a total of eight 1/4HP vibrators and four 1/2HP rotary valves. Panel No. 5, as shown on M.B. Drawing No. 2745 supplies two softeners of 1/2HP each, two air compressors of 7-1/2HP each, two magnetic separator motor generator sets of 3HP each and two condensate pumps of 2HP each. There is also a 20HP air compressor installed in the plant. The purpose of the magnetic separators is to separate tramp iron from the coal before it enters the pulverizers. This separator is operated on direct current furnished by the motor generator sets.

The control panels are equipped with emergency lighting fed from batteries; also, a black-out system of lighting so that all gauges, meters, valves, etc. may be operated during a black-out or emergency.

The main boiler auxiliaries, including induced and forced draft fans and the two pulverizer motors, are provided with ammeters located in the combustion control assembly. These meters are intended to indicate the running or overload condition of each motor. These meters are operated from current transformers located in the switch gear compartments. The combustion panel for each boiler is also equipped with a watt-hour meter to register the kilowatt hour and the demand of the connected motor load. Provision has been made on the switchboard section for the installation of two ammeters and two volt meters on the incoming feeders. There is also one watt-hour meter to record the total load on the boiler combustion control panels, one watt-hour meter for auxiliary motor power, one watt-hour meter for indicating total power load and one watt-hour meter for indicating the total lighting load.

H-10.02. Cold Storage Plant

The Cold Storage Plant,which is located in the Industrial and Supply Area, is electrically operated and thermostatically controlled throughout. This plant is capable of making approximately twenty-fiwe (25) tons of ice every twenty-four hours. In addition to the ice capacity, there is considerable storage space for fruits, vegetables, meats, dairy products, etc. The temperature in these various storage rooms varies in accordance with the type of product stored. The plant is connected to the overhead distribution lines in the Industrial Area by means of an underground cable, three conductor #1, type "H", paper insulated, 15,000 volt cable. This cable has primary disconnect switches mounted outside of the building on a pole. The cable supplies a 300 Kva oil filled transformer, which steps the voltage from 12,470 volts delta to 120/208 volts wye. All motors, panels, etc. in the building are designed for this voltage. The secondary of the transformer is connected through necessary buses to the secondary switch gear. This switch gear consists of several sections. The first section houses the metering equipment and the transfer control panel. The second section houses three 300-ampere circuit breakers for the compressors and one 225-ampere spare circuit breaker. The third section houses a 50-ampere breaker for the lighting and a 50-ampere, a 100-ampere and 225-ampere breaker for the miscellaneous power. These breakers, like the Central Heating plant, are designed for sequence operation. The compressor will automatically stop in the event of excess pressure or a failure of the water supply. The brine circuit is controlled by motor driven valves, which are operated by thermostats in the various storage rooms.

Generally, all branch and subfeeder wiring is in concealed rigid conduit using type RH wire with RLM industrial type reflectors for lighting. The wiring in the refrigerated rooms is installed exposed and supported on porcelain cleats, having weatherproof cleat receptacles or fixtures. This method of wiring is used in all refrigerated rooms including the various mess halls or subsistence buildings in the Regimental Area and is in accordance with Yards and Docks Specification No. 9Yc.

H-10.03. Post Shop Building

The Post Shop Building is designed for maintenance of equipment and furnishings in the Division Training Area. It houses the various carpentry, machine, electric, painting, refrigerating, blacksmith shops and storerooms in each of which there are machines operated by electric motors.

Service is brought into the building at 12,470 volts underground by separate feeders to the power unit sub-station, and the lighting unit sub-station. These unit sub-stations have primary disconnecting potheads, transformer sections and low tension switch gear sections.

The unit sub-stations main feeders are run to power and lighting panelboards. In the case of the power panelboards, there is one in each of the shops where there is electric powered machinery, either single or three phase, and in the case of the lighting panelboards, they are located in the corridors where they are easily accessible.

H-10.03. Continued.

Motors in all cases are provided with separate disconnecting switches within sight of the motor beside being provided with a disconnecting means at the power panelboard. All lights are controlled from wall mounted tumbler switches, except in the case of lights in the carpenters' shop, which are controlled from the panelboard.

The black-out control for the Post Shop Building differs in several respects from that in any of the other buildings. The black-out system provides for a signal horn to sound a few seconds prior to the lights being extinguished; the thought behind this being that there would be extreme hazard to the operator of such machines as rip and band saws, planers and other such machines having exposed cutting edges, should all lights be extinguished without warning.

H-10.04. Naval Hospital - Administration, Wards, Corridors, etc.

The Naval Hospital, Wards and Corridors, and Administration Bldg. and Mess Hall are, in reality, one building, the units being contiguous to one another and formed by tunnels and connecting corridors at floor levels.

Electrically, with the exception of control and signal systems, they are treated as three separate units. The main unit is the Administration and Mess Hall building, three stories in height occupying the center; and the second unit is to the east and includes Wards Nos. 9,10,11,14,15 and 16 each of two stories, and the third unit is to the west and includes Wards Nos. 6,7,8,12 and 13. Provision has been made in all systems for a future addition of two wards at both the east and west wings.

Electrical equipment is served from a main transformer and switchboard room in the basement of the Administration Building for the center unit of Administration Building and Mess Hall. The east group of wards has a transformer and switchboard room located in the basement of Service Bay No. 20. The west group of wards has similar equipment located in the Service Bay No. 17.

Service is brought into all three transformer rooms underground at 2400 volts and transformed to 120/208 volts 3 phase. The ward load predominantly consists of lighting. The Mess Hall and Administration Building load is about evenly divided between light and power. A separate 2400 volt underground service is brought into the Administration Building vaults for X-Ray equipment, and another 2400 volt service is brought in to serve the emergency lighting transformer,

The three transformers and switchboard rooms distribute energy by means of 3-phase 4-wire 120/208 volt circuits for lighting and 3-phase 3-wire 208 volt circuits for power feeding distribution panelboards located at various load centers. Each ward is served from a single panel for each floor. The Administration Building has two panels per floor. The Mess Hall building has separate pahels for the Operating Suite, and the Theater, and two panels for the Recreation suite; also separate power, light, and cooking panels for the Mess Hall proper. A separate panel is located on

H-10.04. Continued.

the third floor of the Administration Building for the X-Ray equipment.

The Administration Building power consists of pumps, fans, compressor, elevators and electric cooking equipment such as griddle, ovens, fryers, etc.

The main part of the mechanical equipment for ventilation of various units and for air-conditioning of the Operating Suite is located in a fan room on the third floor and is served by means of two power feeders to the Fan room distribution panels. Motors in the fan room are remotely controlled from push buttons located at central points on floors served by the fan equipment.

H-10.05. Hospital Auxiliary Systems

(a) Nurses' Call System. Each ward floor has an individual nurses' call system with a nurses' call annunciator at the nurses' station, and calling buttons at bed locations. Quiet rooms and Officers Quarters' rooms are also equipped with calling buttons. Operation of calling buttons causes visual and sound indication at the nurses' station annunciator and also at the diet kitchen annunciator; also in the case of rooms and wards a pilot lamp lights over the entrance door on the corridor side. The operation of the system is by means of 24 volt alternating current obtained by means of a transformer located in each ward.

(b) Doctors' Paging System. The doctors' paging annunciators are located on each floor of the various wards and on the first, second and third floors of the Administration Building, and they are operated by means of a master control, located in the telephone PBX room on the first floor of the Administration Building. A doctor can be paged anywhere throughout the building group by means of illuminated coded numbers which flash on these annunciators.

(c) Doctors' "IN" and "OUT" Register. A Doctors' "IN" and "OUT" Register control is located in the PBX room with a lamp illuminated annunciator installed in the information office. By means of this equipment the information clerk has at all times a visual and ready reference as to whether or not any particular doctor on the staff is in or out of the building. If he is in, he can be immediately brought to the nearest telephone by means of the Doctors' paging annunciator system previously described.

(d) Emergency Lighting. Service for the emergency lighting system is supplied through a separate transformer in the transformer room of Administration Building. Feeders are provided to emergency lights in the Administration Building and Mess Hall, Corridors and stairways. A separate subfeeder serves for auxiliary supply for the Theater emergency light panel. Separate feeders distribute current from the same switchboard to the emergency light panels in Service Bays 17 and 20 for the wards, where again separate branch circuits serve emergency lights on each floor of the ward buildings.

H-10.05. (d) Continued

The emergency light transformer is served by a separate underground 2400 volt service supplied by an emergency engine driven generator set located in the Heating Plant of the Naval Hospital group of buildings.

Operating room lights are served by a normal 120 volt lighting circuit and an auxiliary emergency battery lighting system.

(e) Black-out Lights. Black-out lights are located in various corridors and stair walls. Master control of the Hospital Area black-out lighting originates from the PBX office, where operation of a switch serves to operate relays in the Administration Building control room, which relays in turn, act to open operating coils of various lighting circuit breakers in Service Bays 17 and 20, and Administration Building switchboard groups. The pilot control line serving outside buildings of the area is also de-energized. With lighting breakers open, lighting is cut off, and another relay closes to furnish current to black-out light panels in various units.

(f) X-Ray Suite - Administration Building. A separate 2400 volt underground service supplies a 100 Kva single phase transformer in the Administration Building transformer room. Through a secondary breaker 120/240 volt single phase current is brought to a distribution panel in the X-Ray Suite on the third floor. Separate branch feeders are run to switches in the superficial therapy, fluoroscopic, radiographic rooms 1 and 2, deep therapy and cystoscopic room. Connections and raceways are provided to the control panels and equipment from the room switches.

Polarized single phase 120 volt receptacles are provided in various rooms for possible use of portable equipment. The dark room in the X-Ray Suite has electrical provision for dryers, refrigeration and lighting.

(g) Temperature Control. At the eaves of each ward building and Administration Building outside thermostats are located which are connected to a panel located in the basement of the Administration Building for the control of sectionalizing steam valves in the wards. Influenced by outside weather conditions and relative building exposure, the supply of steam is accordingly regulated by means of thermostats and control panel with the individual electrically operated steam valve.

H-10.06. Abstracts from the Electrical Service Supply Contract with the Jones-Onslow Electric Membership Corporation.- Schedule "N".

Availability. Available to the United States Navy Department for service to the Marine Training Base near Jacksonville, North Carolina and the Marine Air Base proposed to be constructed on the Neuse River, North Carolina.

Rate. Maximum demand charge:

First 1000 kw of maximum demand per month	@	$1.25 per kw
Next 4000 kw of maximum demand per month	@	1.00 per kw
Over 5000 kw of maximum demand per month	@	.75 per kw

H-10.06. Continued.

Plus energy charge.

First 150 hours use of maximum demand per month @ $0.008 per kwh
Next 150 hours use of maximum demand per month @ 0.007 per kwh
Over 3000 hours use of maximum demand per month @ 0.0065 per kwh

Determination of Maximum Demand. The maximum demand shall be determined by suitable instruments and shall be the highest average rate at which energy is used during any fifteen minute period of the month for which determination is made.

Application of Rate. The above rate shall be applied to the combined meter readings of the several delivery points specified in the attached invitation to bid._____.

Power Factor Adjustment. The Navy shall at all times take and use power in such manner that the power factor shall be as near 100 percent as possible, but when the power factor at time of maximum monthly demand is less than eighty-five (85) percent lagging, the billing demand shall be determined by multiplying the maximum demand recorded by the meter during the month by eighty-five (85) percent and dividing the product thus obtained by the power factor at time of maximum monthly demand expressed in percent.

Meter Readings and Payment of Bills. Seller shall read meters monthly. Electric energy furnished hereunder shall be paid for at the office of Seller in Jacksonville, State of North Carolina, monthly within fifteen (15) days after the bill therefor is mailed to Consumer. If Consumer shall fail to pay such bill within such fifteen (15) day period Seller may discontinue delivery of electric energy hereunder upon fifteen (15) days written notice to Consumer of his intention to do so.

Meter Testing and Billing Adjustments. Seller shall test and calibrate meters by comparison with accurate standards at intervals of twelve (12) months. Seller shall also make special meter tests at any time at Consumer's request. The costs of all tests shall be borne by Seller, provided, however, that if any special meter test made at Consumer's request shall disclose that the meters are recording accurately, Consumer shall reimburse Seller for the cost of such test. Meters registering not more than two (2) percent above or below normal, shall be deemed to be accurate. The Readings of any meter which shall have been disclosed by test to be inaccurate shall be corrected for the ninety (90) days previous to such tests in accordance with the percentage of inaccuracy found by such test. If any meter shall fail to register for any period, Consumer and Seller shall agree as to the amount of energy furnished during such period and Seller shall render a bill therefor.

COPY

MAY 22, 1941.

17x0806-(1) N.S.A. Fund Stores
CURRENT ELECTRIC, FOR MARINE BARRACKS, NEW RIVER, N.C. AND MARINE AIR BASE, ON THE NEUSE RIVER, ARAPAHOE OR HAVELOCK, N.C., DURING THE FISCAL YEAR 1942.

BPS:HEW/ISBI/MAG

Lot No.1, NSA Reg'n. No. 39 (1942).

Current, electric power, for locations and time specified below, account Public Works Dept. Serial #4796-41, dated 5/21/41.

Item No.	Quan. Reqd.	Stock Classification 204	per mo.	Total
1		Services for furnishing electric Power- 3 phase, 60 cycle, 12450/7200 volts at Marine Barracks, New River, North Carolina, in the vicinity of Jacksonville - any quantity up to 3000 KW.		Rates to be as per schedule N attached.
2		Services for furnishing electric POWER- 3 phase, 60 cycle, 12450/7200 volts at Marine Air Base on the Neuse River in the vicinity of Arapahoe, N.C., or Havelock, N.C., as may be determined by the PWO, Fifth Naval District - any quantity up to 3000 KW		
3		Services for furnishing, beginning July 1, 1941, electric POWER, 3 phase, 60 cycle, 12450/7200 volt at Marine Barracks, New River near Jacksonville, N.C. - any quantity up to 600 KW for construction purposes.		
4		Services for furnishing, beginning July 1, 1941, electric POWER, 3 phase, 60 cycle, 12450/7200 volts at Marine Air Base on the Neuse River in the vicinity of Arapahoe, N.C., or Havelock, N.C., as may be determined by the PWO, Fifth Naval District - any quantity up to 600 KW for construction purposes.		

It is understood that power under items 1 and 2 will be taken as soon as construction of stations is completed and that adequate notice will be given by the Navy Department if power in excess of the quantities indicated is required. Power under items 1 and 2 shall be provided from a primary generating station consisting of two Diesel plants of approximately 1500 KW steam driven generators situated on the Neuse River in the vicinity of Arapahoe, N.C., or Havelock, N.C., as may be determined by the PWO, Fifth Naval District.

It is mutually understood and agreed:

(a) That the agency supplying power under the contract will undertake at its own expense, the immediate construction of the two generating stations above-mentioned, and that the Diesel plant in the vicinity of Jacksonville will be ready for service by September 1, 1941.

(b) That the agency furnishing power under this contract will, at its own expense, provide an adequate tie-in service between the two primary generating stations, and will further arrange, at its own expense for a secondary source of power by tying in the generating station in the vicinity of Jacksonville, N.C., with the high tension lines at Jacksonville, N.C., or Holly Ridge, N.C.

(c) That the agency supplying this power will, by means of portable generating plants of adequate capacity, supply power under items 3 and 4 as required for construction purposes pending the completion of the primary generating stations.

(d) That the agency supplying power under this contract will provide stepdown transformer stations to deliver power to the distribution system to be constructed by the Navy Department; and that power furnished from the primary generating station shall be delivered to the Navy's distribution system at a voltage not varying more than three percent from voltage specified.

Service under this contract shall cover the Marine Barracks, New River, N.C. and the proposed Air Base on the Neuse River when authorized and constructed. Billing shall be made through separate meters at each station and on the basis of the consolidated meter readings.

Above services shall be rendered in a manner satisfactory to the Public Works Officer, Naval Operating Base, Norfolk, Va.

Bills shall be rendered and paid monthly.

Item 1 - Bills for services to be rendered to Quartermaster Dept., Headquarters Marine Corps, Washington, D.C.

Item 2 - Bills for services to be rendered to Officer-in-Charge, Naval Supply Depot, Norfolk, Va.

Items 3 and 4 - Bills for services to be rendered to Resident Officer, Cont. NOy-4750, Marine Barracks, New River, North Carolina.

H-11. List of Buildings Showing Connected Loads and Service Voltage

H-11.01. Division Training, Post Troops, Industrial & Supply & Parachute Training Areas

No. Unit	Type Building	Installed Lighting	Installed Heating	Installed Power	Watts Total Load	Service Voltage
64	Barracks	2,300,160	-	229,888	2,530,048	120/208 3Ø
16	Mess Halls	481,920	416,000	470,048	1,367,968	120/208 3Ø
64	Battalion Warehouse	134,400	-	-	134,400	120/208 3Ø
5	Regimental Infirmaries	91,425	-	4,280	95,705	120/208 3Ø
6	Post Exchange	88,620	-	37,488	126,108	120/208 3Ø
21	Well Pump Houses	-	-	122,695	122,695	120/208 3Ø
28	Open Shed Warehouse	73,920	-	-	73,920	120/240 1Ø
5	Concrete Warehouse	156,200	-	1,768	157,968	120/208 3Ø
1	Post Shops Building	85,000	-	314,080	399,080	120/240 3Ø
1	Division Headquarters	41,440	-	2,552	43,992	120/208 3Ø
1	Laundry	28,200	-	67,639	95,839	120/240 1Ø Lighting 208 Power 3Ø
1	Post Exchange Gas Station	2,940	3,250	-	6,190	120/240 1Ø
1	Main Gas Station	9,672	3,250	-	12,922	120/240 1Ø
5	Theaters	343,600	-	137,385	480,985	120/208 3Ø
1	Brig	30,945	26,000	29,378	86,323	120/208 3Ø

H-11.01. Division Training, Post Troops, Industrial & Supply & Parachute Training Areas (Cont'd)

No. Unit	Type Building	Installed Lighting	Installed Heating	Installed Power	Watts Total Load	Service Voltage
2	Firehouse	12,900	-	12,230	25,130	120/208 3Ø
1	Commissary	23,940	-	8,918	32,858	120/208 3Ø
1	Cold Storage Plant	12,570	-	158,378	170,948	120/208 3Ø
1	Post Headquarters	31,000	-	9,000	40,000	120/208 3Ø 120 1Ø radio
1	Incinerator	2,770	-	14,600	17,370	120/208 3Ø
1	Transmitter Building	7,870	-	66,560	74,380	120/240 1Ø Lighting 240 3Ø Radio
16	Battalion Headquarters	210,640	-	31,616	242,256	120/208 3Ø
5	Regimental Headquarters	78,100	-	31,616	109,716	120/208 3Ø
1	Bakery	21,220	-	146,432	167,652	120/240 1Ø Lighting 240 3Ø Power
5	Regimental Service Clubs	180,400	-	25,000	205,400	120/208 3Ø
1	Hostess House	12,728	-	24,856	37,584	120/208 3Ø
2	Chapels	18,000	15,000	2,656	35,658	120/208 3Ø
1	Gate House	12,715	-	-	12,715	120/240 1Ø
1	Division Infirmary	97,000	15,000 X-Ray	20,007	132,007	120/208 3Ø 240 1Ø X-Ray
2	Garage and Repair Shop	113,800	-	272,064	385,864	120/208 3Ø

H-11.01. Division Training, Post Troops, Industrial & Supply & Parachute Training Areas (Cont'd)

No. Unit	Type Building	Installed Lighting	Installed Heating	Installed Power	Watts Total Load	Service Voltage
1	Reclamation Building	13,515	-	72,754	86,269	120/208 3Ø
1	Post Tailor & Cobbler Shop	11,420	-	33,280	44,700	120/208 3Ø
1	Liquefied Gas Storage Bldg.	300	-	6,614	6,914	120/240 3Ø
1	Parachute Training Building	9,380	-	12,480	21,860	120/208 3Ø
1	Parachute Building	48,615	-	-	48,615	120/208 3Ø
1	Wallace Creek Boat Basin	2,460	-	-	2,460	120/240 1Ø
1	Balloon Storehouse & Shop	5,380	-	-	5,380	120/240 3Ø
1	Storehouse for Post Exchange	6,000	-	-	6,000	120/240 1Ø
1	Waller Gunnery Trainer	11,323	-	20,365	31,688	120/208 3Ø
1	Regimental & Supply Area Central Heating Plant	39,220	3,000	893,581	935,801	120/208 3Ø
1	Parachute Training Area Central Heating Plant	660	-	-	620	120/208 3Ø
1	Gas and Oil Storage	6,000	-	24,440	30,440	120/208 3Ø
1	Post Theater	255,730	62,400 Prot. Mach.	20,870	339,000	120/208 3Ø
3	Parachute Equipment Tower Building	11,760	-	58,152	69,912	120/240 3Ø
1	Main Pumping Plant	10,388	-	170,061	180,449	120/208 3Ø

H-11.01. Division Training, Post Troops, Industrial & Supply & Parachute Training Areas (Cont'd)

No. Unit	Type Building	Installed Lighting	Installed Heating	Installed Power	Watts Total Load	Service Voltage
1	Sewage Treatment Plant	11,240	-	10,774	22,014	126/218 3Ø
1	Sewage Pumping Station 1	3,420	-	15,800	19,280	126/218 3Ø
1	Sewage Pumping Station 3	3,420	-	15,800	19,280	120/208 3Ø
	Street Lights	-	-	30,000	30,000	6.6 amperes
	Grand Total				9,323,363	

H-11.02. Naval Hospital Area

3	Officers' Quarters	9,765	27,000	-	36,765	120/208 3Ø
1	Well Pump House	-	-	4,846	4,846	120/208 3Ø
1	Admin. Bldg. & Mess Hall	203,210	116,700 50,000 K-Ray	153,504	523,414	120/208 3Ø L & P 120/240 1Ø X-Ray
	Wards and Corridors	423,000	-	44,428	467,428	120/208 3Ø
2	Corpsmen Barracks	74,300	-	3,952	78,252	120/208 3Ø
1	Nurses' Home	58,490	19,600	5,949	63,439	120/208 3Ø
1	Garage	6,420	-	1,976	8,396	120/208 3Ø
1	Family Hospital Nurses' Quarters	7,415	12,000	1,976	21,391	120/208 3Ø
1	Laundry	15,630	-	42,085	57,715	120/208 3Ø
1	Warehouse	6,240	-	-	6,240	120/240 1Ø

H-11.02. Naval Hospital Area (Continued)

No. Unit	Type Building	Installed Lighting	Installed Heating	Installed Power	Watts Total Load	Service Voltage
1	Shop	9,960	-	12,750	22,710	120/208 3Ø
1	Warrant Officers' Quarters	2,705	7,500	-	10,205	120/208 3Ø
	Family Hospital	39,990	7,000	41,888	88,878	120/208 3Ø
1	Men Servant Quarters	5,660	-	-	5,660	120/208 3Ø
1	Women Servant Quarters	7,965	-	-	7,965	120/208 3Ø
1	B. O. Q.	24,490	16,500	14,473	55,463	120/208 3Ø
1	Central Heating Plant	4,510	-	20,031	24,541	120/208 3Ø
1	Sewage Pumping Station No. 2	1,920	-	3,307	5,227	120/208 3Ø
1	Medical Storehouse	14,490	13,000	2,080	29,570	120/208 3Ø
	Street Lights	10,000	-	-	10,000	6.6 amperes
	Grand Total				1,439,227	

H-11.03. Residential Area

8	Bachelor Officers' Quarters	173,200	-	21,920	195,120	120/208 3Ø
1	B. O. Q. Guest House	3,065	-	1,976	5,041	120/208 3Ø
180	Officers' Quarters	583,900	1,620,000	-	2,203,900	120/208 3Ø
1	Well Pump House	-	-	11,440	11,440	120/208 3Ø
1	Sewage Pumping Station No. 4	1,920	-	3,307	5,227	120/208 3Ø
1	Sewage Pumping Station No. 5	400	-	3,952	4,532	120/208 3Ø

H-11.03. Residential Area (Continued)

No. Unit	Type Building	Installed Lighting	Installed Heating	Installed Power	Watts Total Load	Service Voltage
1	Firehouse	6,450	-	6,115	12,565	120/208 3Ø
1	Officers' Recreation Building and B.O.Q. Mess Hall	43,285	178,000	70,523	311,808	120/208 3Ø
1	Men Servant Quarters	6,210	-	2,552	8,762	120/208 3Ø
1	Women Servant Quarters	2,670	-	2,552	5,222	120/208 3Ø
	Street Lights	10,000	-	-	10,000	6.6 amperes
	Grand Total				2,773,437	

H-11.04. Barrage Balloon Battalion & Amphibian Base Area

4	Barracks	143,760	-	14,368	158,128	120/208 3Ø
1	Mess Hall	30,120	26,000	29,378	85,498	120/208 3Ø
1	Regimental Infirmaries	18,285	-	2,552	20,837	120/208 3Ø
1	Post Exchange	14,770	-	6,248	21,018	120/208 3Ø
8	Officers' Quarters	26,040	72,000	-	98,040	120/208 3Ø
3	Well Pump House	-	-	20,384	20,384	120/208 3Ø
4	Battalion Warehouses	8,400	-	-	8,400	120/208 3Ø
1	Theater	68,720	-	27,477	96,197	120/208 3Ø
1	Battalion Headquarters	13,165	-	1,976	15,141	120/208 3Ø

H-11.04. Barrage Balloon Battalion & Amphibian Base Area (Continued)

No. Unit	Type Building	Installed Lighting	Installed Heating	Installed Power	Watts Watts Load	Service Voltage
1	Barrage Balloon Administration Building	9,130	-	-	9,130	120/240 1Ø
1	Barr. Balloon School Bldg.	13,330	-	-	13,330	120/240 1Ø
1	Barr. Balloon Balloon Bldg.	19,200	-	36,000	55,200	120/240 1Ø Light 240 3Ø Power
1	Barrage Balloon Transportation Building	3,940	-	-	3,940	120/240 1Ø
1	Barr. Balloon Supply and Storage	11,060	-	-	11,060	120/240 1Ø
1	Barrage Balloon Operations Building	3,760	-	-	3,760	120/240 1Ø
1	Amphibian Storehouse	25,900	-	-	25,900	120/240 1Ø
1	Amphibian Machine Shop	24,400	-	19,842	44,242	120/240 1Ø Light 240 3Ø Power
1	Amphibian Carpenter Shop	24,400	-	19,842	44,242	120/240 1Ø Light 240 3Ø Power
1	Central Heating Plant	2,160	-	6,614	8,774	120/240 1Ø Light 240 3Ø Power
1	Central Heating Plant at School Area	540	-	4,638	5,178	120/240 1Ø Light 240 3Ø Power
1	Sewage Pumping Station	1,760	-	2,952	4,712	120/208 3Ø

H-11.04. Barrage Balloon Battalion & Amphibian Base Area (Continued)

No. Unit	Type Building	Installed Lighting	Installed Heating	Installed Power	Watts Total Load	Service Voltage
-	Street Lights	4,600	-	-	4,600	120 V
	Grand Total				757,711	
	Q-11.05. Rifle Range					
4	Barracks	143,760	-	14,368	158,128	120/208 3Ø
1	Mess Hall	30,120	26,000	29,378	85,498	120/208 3Ø
4	Battalion Warehouse	8,400	-	-	8,400	120/208 3Ø
1	Regimental Infirmaries	18,285	-	2,552	20,837	120/208 3Ø
1	Post Exchange	14,770	-	6,248	21,018	120/208 3Ø
1	Bachelor Officers' Quarters	21,650	-	2,740	24,390	120/208 3Ø
5	Officers' Quarters	16,275	45,000	-	61,275	120/208 3Ø
2	Well Pump House	-	-	16,972	16,972	120/208 3Ø
1	Theater	68,720	-	27,477	96,197	120/208 3Ø
1	Central Heating Plant	2,160	-	6,614	8,774	120/240 1Ø Light 240 3Ø Power
1	Firing Line Shelter	-	-	19,842	19,842	120/240 3Ø
4	Range Houses	7,120	-	-	7,120	120/240 1Ø
1	Armory & Officers' Bldg.	31,060	-	2,552	33,612	120/208 3Ø

H-11.05. Rifle Range (Continued)

No. Unit	Type Building	Installed Lighting	Installed Heating	Installed Power	Watts Total Load	Service Voltage
1	Tunnel	1,000	-	-	1,000	120/240 1ø
	Street Lights	5,000	-	-	5,000	6.6 amperes
	Grand Total				568,063	
	H-11.06. Mock Up					
1	Well Pump House	-	-	1,331	1,331	120/208 3ø
	H-11.07. Ponton Bridge					
1	Ponton Bridge	2,560	-	-	2,560	
	H-11.08. Tent Camp No. 1					
1	Central Heating Plant	2,100	-	5,940	8,040	120/240 1ø Light 240 3ø Power
14	Well Houses	-	-	43,159	43,159	120/208 1ø Light 240 3ø Power 120/208 3ø
2	Mess Halls	105,610	-	146,400	252,010	120/240 1ø Light 240 3ø Power
34	(SH 9) Warehouses	30,940	-	-	30,940	120/240 1ø
6	(SH 13) Warehouses	10,860	-	-	10,860	120/240 1ø
41	Enlisted Men Washrooms	86,305	-	-	86,305	120/240 1ø
8	Officers' Washrooms	15,000	-	-	15,000	120/240 10

H-11.08. Tent Camp No. 1 (Continued)

No. Unit	Type Building	Installed Lighting	Installed Heating	Installed Power	Watts Total Load	Service Voltage
1	Ice House	640	-	--	640	120/240 1Ø
2	Open House Warehouse	5,040	-	--	5,040	120/240 1Ø
1	Hospital	74,405	65,000 14,400 X-Ray	3,960	157,765	120/240 1Ø
1	Hospital Admin. Bldg.	8,360	-	-	8,360	120/240 1Ø
1	R. 2 Building	27,595	-	7,680	35,275	120/240 1Ø
1	Gas & Oil Storage	-	-	13,640	13,640	120/240 1Ø Light 240 3Ø Power
1	Chapel	10,173	-	-	10,173	120/240 1Ø
1	Water Treatment Plant	230	-	49,280	49,510	120/240 1Ø Light 240 3Ø Power
1	T. C. Incinerator	660	-	-	660	120/240 1Ø
1	Boxing Ring	9,000	-	-	9,000	120/240 1Ø
1	Traffic Light	400	-	-	400	120/240 1Ø
1504	Tents	225,600	-	-	225,600	120/240 1Ø
	Street Lights	10,000	-	-	10,000	6.6 amperes
	Grand Total				972,377	

H-11.09. Tent Camp No. 2

No. Unit		Installed Lighting	Installed Heating	Installed Power	Watts Total Load	Service Voltage
2	Mess Halls	105,610	-	146,400	252,010	120/240 3Ø
1	Officers' Mess Hall	22,200	-	22,996	45,196	120/240 3Ø
38	(SH 9) Warehouse	34,580	-	-	34,580	120/240 1Ø
5	(SH 13) Warehouse	9,050	-	-	9,050	120/240 1Ø
32	Enlisted Men's Washrooms	67,360	-	-	67,360	120/240 1Ø
8	Officers' Washrooms	15,000	-	-	15,000	120/240 1Ø
1	Recreation Building	27,595	-	7,680	35,275	120/240 1Ø
2	Open Shed Warehouse	5,040	-	-	5,040	120/240 1Ø
1	Post Exchange	9,968	-	12,740	22,708	120/240 1Ø
1	Hostess House	13,000	-	15,000	28,000	120/240 1Ø
1	Chapel	10,173	-	-	10,173	120/240 1Ø
744	Huts	572,880	-	-	572,880	120/240 1Ø
1	Central Heating Plant	2,000	-	5,940	7,940	120/240 3Ø
1	Sewage Pumping Station	7,560	-	18,719	26,279	120/240 1Ø Light 240 3Ø Power
	Street Lights	10,000	-	-	10,000	6.6 amperes
	Grand Total				1,127,991	

H-11.10. Tank Battalion Tent Camp

No. Unit	Type Building	Installed Lighting	Installed Heating	Installed Power	Watts Total Load	Service Voltage
1	Mess Hall	4,080	-	-	4,080	120/240 1Ø Light
7	Enlisted Men's Washrooms (Huts)	5,390	-	-	5,390	120/240 1Ø
1	Officers' Washroom (Hut)	770	-	-	770	120/240 1Ø
2	Open Shed Building	5,040	-	-	5,040	120/240 1Ø
1	Well House	-	-	5,060	5,060	120/240 1Ø
83	Huts	63,910	-	-	63,910	120/240 1Ø
	Grand Total				84,250	

H-11.11. Peterfield Point Tent Camp

1	Mess Hall	4,080	-	-	4,080	120/240 1Ø
6	Enlisted Men Washrooms (Huts)	4,620	-	-	4,620	120/240 1Ø
1	Officers' Washroom (Hut)	770	-	-	770	120/240 1Ø
3	Open Shed Warehouse	7,560	-	-	7,560	120/240 1Ø
84	Huts	64,680	-	-	64,680	120/240 1Ø
	Grand Total				81,710	

H-11.12. Glider Training Base

No. Unit	Type Building	Installed Lighting	Installed Heating	Installed Power	Watts Total Load	Service Voltage
1	Operation Building	7,430	-	-	7,430	120/240 L & P 240 1Ø Radio
1	Administration Building	12,390	-	-	12,390	120/208 3Ø
1	Utility Shop "A" Carburetor Test Shop "B"	9,160	42,000	32,166	83,326	120/208 3Ø 120/208 3Ø
1	Nose Hanger "C"	4,200	-	13,085	17,285	120/208 3Ø
1	Utility Shop "D"	5,420	-	3,500	8,920	120/208 3Ø
	Central Heating Plant	540	-	4,638	5,178	120/208 1Ø Lighting 208 3Ø Power
	Grand Total				134,529	

H-11.13. Mumford Point Tent Camp

1	Mess Hall	22,200	-	22,996	45,196	120/240 1Ø Light 240 3Ø Power
1	Recreation Building	27,595	-	7,680	35,275	120/240 1Ø
1	Brig	2,840	-	-	2,840	120/240 1Ø
2	(SH 13) Warehouse	3,620	-	-	3,620	120/240 1Ø
1	Infirmary	5,460	1,500 2,400 X-Ray	1,976	11,336	120/240 1Ø
1	Chapel	10,173	-	-	10,173	120/240 1Ø

H-11.13. Mumford Point Tent Camp (Continued)

No. Unit	Type Building	Installed Lighting	Installed Heating	Installed Power	Watts Total Load	Service Voltage
1	Post Exchange	14,770	-	6,240	21,018	120/240 1Ø Light 240 3Ø Power
7	Enlisted Men's Washrooms	14,735	-	-	14,735	120/240 1Ø
1	Administration Building	7,420	-	1,976	9,396	120/240 1Ø
150	Huts	115,500	-	-	115,500	120/240 1Ø
1	Central Heating Plant	1,960	-	3,307	5,267	120/240 1Ø Light 240 3Ø Power
1	Well House	-	-	8,320	8,320	120/208 3Ø
	Street Lights	5,000	-	-	5,000	
	Grand Total				287,676	
	H-11.14. Midway Park Residential Area					
700	Housing Units	861,000	6,300,000	-	7,161,000	120/240 1Ø
2	Wells	-	-	44,440	44,440	120/208 3Ø
1	Sewage Pumping Plant	1,930	-	8,798	10,728	120/208 3Ø
	Street Lights	10,000	-	-	10,000	6.6 amperes
	Grand Total				7,226,168	
	H-11.15. C.C.C. Camp					
	Grand Total				57,600	

SUMMARY OF AREAS

H-11.15.

	AREA	TOTAL LOAD WATTS
1.	Division Training, Post Troops, Industrial & Supply and Parachute Training Areas	9,323,363
2.	Naval Hospital Area	1,439,227
3.	Residential Area	2,773,437
4.	Balloon Barrage Battalion and Amphibian Base Area	757,711
5.	Rifle Range	568,063
6.	Mock-Up	1,331
7.	Ponton Bridge	2,560
8.	Tent Camp #1	972,377
9.	Tent Camp #2	1,127,991
10.	Tank Battalion Tent Camp	84,250
11.	Mumford Point Tent Camp	287,676
12.	Glider Training Base	134,529
13.	Peterfield Point Tent Camp	81,710
14.	Midway Park Residential Area	7,226,168
15.	C.C.C. Camp	57,600
16.	Hurst Beach	19,386
	GRAND TOTAL	24,857,379.

CHAPTER I - PART II

PLUMBING

CONTENTS

Section	Title
I-1	Drainage and Vent Systems
I-2	Water Services
I-3	Fire Protection Systems
I-4	Hot and Cold Water Systems
I-5	Hot Water Storage Tanks and Generators
I-6	Hot Water Circulating Pumps
I-7	Plumbing Fixtures
I-8	Materials
I-9	Symbols
I-10	Drawings and Specifications

I-1 Drainage and Vent Systems:

I-1.01 The soil, waste and vent systems were generally designed in accordance with the U. S. Department of Commerce, National Bureau of Standards, Plumbing Manual Report No. BMS-66, dated November 22, 1940, issued by the Government Printing Office of Washington, D. C. The soil, waste and vent piping was specified to be extra heavy cast iron, the minimum size to be two inches. Where structural or architectural restrictions made the use of two inch cast iron pipe impossible, galvanized steel pipe was used, as authorized by the representative of the Officer in Charge to meet these special conditions.

I-1.02 The size of the soil, waste and vent pipes were estimated from the capacity data as tabulated in the Plumbing Manual Report with special reference to Tables 803, 805 and 807.

I-2 Water Services:

I-2.01 Building water mains were specified to extend five (5) feet outside of the building for connection to the building service. Mains below ground were specified to be A.W.W.A. cast iron bell and spigot water pipe, terminating at or within the building with a flanged "T" in order to provide separate connections for the fire protection system and the domestic or process water systems, respectively.

The entire supply is controlled by one main gate valve on the inlet side of the "T". A hose bib connection is provided so that the entire piping system can be drained.

I-3 Fire Protection Systems:

I-3.01 The fire protection systems specified for the interior of buildings provide fire hose racks equipped with standard 1-1/2" fire hose and nozzles. This equipment complies with Federal Specification WW-P-541a, which is classified and described by the National Bureau of Fire Underwriters as "First Aid Fire Protection", providing means for retarding a fire until the fire department reaches the building.

The water service pipes and building mains for the large warehouses and similar buildings that should be equipped with sprinkler systems, were made sufficiently large and provided with capped branches for the future installation of these fire protective systems.

Prior to the restrictions placed upon the use of strategic materials by the Bureau of Yards and Docks, the fire line piping was specified to be of galvanized steel. After these restrictions were issued, certain buildings for which pipe had not already been bought, were specified to be black genuine wrought iron if available or black steel if wrought iron was not available.

I-4 Hot and Cold Water Piping:

I-4.01 The sizing of water piping for the various buildings was determined by deducting from the available pressure at the service entrance the friction losses resulting from the designed flows, so that a minimum pressure of 10 pounds per square inch would be available at the highest fixtures equipped with flush valves and five pounds per square inch for fixtures not equipped with flush valves.

I-4.02 The water pressure available for pipe friction losses was computed by means of equation:

$$\frac{P - (L + H)}{E \times .01} = F$$

In which:

P = The available pressure at the service entrance in pounds per square inch
L = The desired pressure at the highest fixture in pounds per square inch
H = The static head pressure required to lift water from the service entrance to the highest fixture in pounds per square inch. (This was obtained from the difference in elevation in feet divided by 2.31).
E = The equilavent length of developed pipe in lineal feet from service entrance to the highest fixture with allowance for fittings.
F = The allowable friction loss per one hundred feet of pipe in pounds per square inch.

Allowable friction losses, thus computed, were used as a basis for

selecting pipes of proper size for a given number of fixtures.

Interior systems with risers to high fixtures at different elevations were computed and sized separately.

I-4.03. The following table was used to estimate the maximum flow of water:

TABLE "A"

APPROXIMATE MAXIMUM WATER FLOW FROM FIXTURES IN GALLONS PER MINUTE

Fixture	Cold Water	Hot Water
Water Closets, Flush Valve	25	0
Water Closets, Flush Tank	5	0
Urimals, Flush Valve	15	0
Trough Urinals, Perforated Pipe	5	0
Lavatories	1-1/2	1-1/2
Showers, Small Heads	1-1/2	1-1/2
Showers, Large Heads	3	3
Bath Tubs	3	3
Slop Sinks	3	3
Electric Water Coolers	1/2	0
Laundry Trays	3	3
Kitchen Sinks	3	3
Galley Sinks	4	4
Pot Sinks	5	5
Dish Washers	5	5
Wall Hydrants and Hose Bibs	5	0
Other Equipment	Actual Requirements	

The probable flow in the branches and mains serving a number of fixtures was computed from the percentage as tabulated below applied to the maximum flow obtained by means of "Table A":

TABLE "B"

PROBABLE PERCENTAGE OF MAXIMUM FLOW

Number of Fixtures	System Predominantly For Flush Valves	System Predominantly For Flush Tanks
1	100 percent	100 percent
2	100	100
3	80	90
4	70	82
5	63	76
6	56	72
7	50	68
8	46	65

TABLE "B" (CONT'D)

Number of Fixtures	System Predominantly For Flush Valves	System Predominantly For Flush Tanks
9	43	63
10	40	61
12	36	58
15	31	55
20	26	50
25	22	45
30	20	41
35	18	38
40	16-1/2	35
45	15	32-1/2
50	14	31
55	13	29
60	12-1/2	27-1/2
70	11	25
80	10	23
90	10	21-1/2
100	9	20
120	8	18-1/2
150	7	16
200	6	14

I-4.04. The probable flow computed for each main or branch together with the allowable friction loss, by reference to the flow charts (Figure 7 for Copper Pipe or Figure 8 for Steel Pipe) on pages 36 and 37 of the Plumbing Manual BMS-66 determined the size of pipe required.

Where steel pipe was contemplated minimum size of 3/4" for 1 to 3 small fixtures, 1-1/4" for one flush valve and 1-1/2" for two flush valves were arbitrarily specified due to the unpredictable amount of incrustation to be expected in the pipe over a period of years.

I-4.05. Pressure reducing valves for the purpose of maintaining constant pressure on the domestic systems have been given careful consideration where the service pressure was materially in excess of the actual requirement for a given building and also to minimize flow variations and fluctuations in hot and cold water.

As a result of our studies, it appeared that good practical results could be secured, generally, without the use of reducing valves and that this equipment should be limited to those activities in which close regulation of pressure is required for the proper operation of mechanical equipment and special appliances.

Pressure regulating valves are specified for installation at the main laundry and various buildings within the hospital group.

I-5 Hot Water Storage Tanks and Generators:

I-5.01. The requirements for various types of fixtures in different buildings using hot water were taken from the following table:

TABLE "C"

HOURLY DEMAND FOR HOT WATER IN GALLONS FOR VARIOUS FIXTURES

	B. O. Q. & Barracks	Garage	Hospital	Laundry	Residence	Mess Hall	Post Theater
Private Lavatories	3	3	2	3	3	-	-
Public Lavatories	10	12	6	20	-	8	10
Slop Sinks	15	-	20	20	-	15	15
Bath Tubs	30	-	20	-	15	-	-
1st. Shower	100	100	100	100	100	100	100
Additional Showers each	30	30	30	30	30	30	30
Kitchen Sink	-	-	20	-	10	30	-
Pantry Sink							
Utility	-	-	10	-	-	20	-
Wash Rack	-	50	-	-	-	-	-
Pot Sinks						40	-
Dish Washer	1/2 gallon per hour per person to be served						

The requirements for hot water heating and storage capacity were determined from the following table:

TABLE "D"

HOURLY HEATING CAPACITY AND STORAGE CAPACITY
IN PERCENT OF TOTAL HOURLY DEMAND

	B. O. Q. And Barracks	Garage	Hospital	Laundry	Residence	Mess Hall	Post Theater
Heating Capacity	75%	80%	35%	100%	50%	100%	75%
Storage Capacity	50%	60%	75%	30%	100%	100%	50%

I-5.02 After obtaining the total hourly demand the storage capacity percentage was applied to determine the size of the storage tank. In some instances due to physical restrictions or other influencing factors these percentages were modified. The coil heating capacity was calculated from the percentage factor shown above. Generally the hot water temperature rise was based on 50 degrees F. inlet water raised 100 to 150 degrees F and the coil sizes were selected from manufacturers heating rate tables for the steam pressure available to the coil. The steam pressure was ordinarily to be at 50 pounds per square inch except where low pressure boilers were to be installed.

Heating coil chambers were specified to have 1/2" vacuum breakers and all storage tanks were specified to be equipped with pressure relief valves, temperature relief valves, blow-off and drain valves and thermometers.

The steam supply to the heating coils specified to be controlled from a suitable regulating valve to automatically maintain a constant storage water temperature. It was contemplated that these valves would be adjusted to maintain 150 degrees F. storage water in all buildings without galleys and 180 degrees F. in buildings with galleys.

A number of the hot water storage tanks were provided with economizer coils to reduce the temperature of condensate from the high pressure steam traps. These coils and the piping arrangement are discussed more fully in Section G-1 paragraph 1.02 of this report.

I-6. Hot Water Circulating Pump:

I-6.01 Buildings in which long lines of hot water pipe occured and the probable usage warranted it, hot water circulating pumps were specified and shown on the drawings. The capacity of these pumps was generally determined by allowing one gallon per minute for each 20 fixtures which used hot water, except for buildings having an extremely long run such as the Post Theater, the actual heat loss in the line was caculated and the capacity determined to limit the temperature drop in the hot water circuit to within 10 degrees F.

These pumps were specified to be controlled by immersion aquastats installed in the hot water return circulating pipe together with a thermometer to check the setting of the aquastats at 140 degrees F.

I-7 Plumbing Fixtures:

I-7.01 The plumbing fixtures were specified by reference to figure numbers in Federal Specifications WW-P-541a and WW-P-542 except where the required fixtures were not included in these publications. These instances, such as the Dispensary, Hospitals and Infirmaries, the manufacturers figure numbers were used with the following qualifying paragraph:

"The fixtures and trim designated by various manufacturer's names and figure numbers are mentioned only to indicate the style and quality of the materials desired and it is not intended to limit bidders to the manufacturers mentioned. Materials of other manufacturers which are similar in design and equal in quality will be acceptable".

I-8 Materials:

I-8.01 Materials were specified to be in accordance with Navy and Federal Specifications and a list of these material specifications applicable to the requirements of each building was included as a part of the plumbing specifications.

The plumbing specifications as the progress of the work permitted, were modified to comply with the Directive for War-time Construction as promulgated by the War & Navy Departments and the War Production Board; and also, the Navy Department Circular Letters pertaining to the use of critical construction materials as they were issued.

I-9 Symbols:

I-9.01 Symbols for the various pipe and fixture designations are included in a legend which appears on the drawings. A standard "Plumbing Symbols" legend is included herewith in Figure I-9.02.

I-10 Drawings and Specifications:

I-10.01 Chapters Q and R of this report include complete lists of the drawings and specifications and reference thereto will furnish complete information as to the fixtures and materials specified and the method of installation of the plumbing systems.

KEY TO PLUMBING SYMBOLS.

W OR S	———	Waste or Soil (Cast Iron).
TC	——— ——— ———	Vitrified Terra Cotta.
AW	——— AW ——— AW ———	Acid Waste.
V	— — — — — — — —	Vent.
C W	——— - ——— - ———	Cold Water.
H W	——— - - ——— - - ———	Hot Water.
H W R (HWC)	——— · · ——— · · ———	H.W. Return (Circulating)
I W	——— IW ——— IW ———	Chilled Water
I W R	——— IWR ——— IWR ———	Chilled Water Return.
F V	——— FV ——— FV ———	Flush Valve Riser
D W	——— DW ——— DW ———	Distilled Water
G	——— G ——— G ———	Gas
A	——— A ——— A ———	Air
V	——— V ——— V ———	Vacuum
Gl.V.	———⊙———	Globe Valve (Control)
Ck.	———⩘———	Check Valve.
G.V.	———▼———	Gate Valve (Shut-Off)
SP	——— S ——— S ———	Sprinkler (Standpipe)
L R	—+———+———+—	Refrigerant Liquid Line
R R	—‖———‖———‖—	Refrigerant Return Line
F.L.	—/———/———/—	Fire Line
I.D.	——— ID ——— ID ———	Indirect Waste

AFH	Anti-Freeze Hydrant	LT	Laundry Tray
C.O	Clean-out	DP	Deck Plate
MC	Medicine Cabinet	RT	Running Trap
LD	Leader	FD	Floor Drain
RD	Roof Drain	Ac.D	Access Door
	Gas Outlet	AD	Area Drain
HB	Hose Bibb	P.R.V.	Pressure Reducing Valve
DF	Drinking Fountain	FT	Strainer OR Fish Trap.
SS	Slop Sink	F.A.I.	Fresh Air Inlet
——→	Grade down with arrow	S & W	Stop & Waste Valve
EWC	Electric Water Cooler	L.	Lavatory
DT	Drum Trap	W.C.	Water Closet
SH	Shower	Ur.	Urinal (Wall)

9-30-42. WE

FIGURE I-902

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