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WAR DEPARTMENT
OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES DISTRICT
LOS ANGELES 55, CALIFORNIA

ANALYSIS OF EXISTING FACILITIES
FOR
MASTER PLANNING

FORT HUACUCA

COCHISE COUNTY, ARIZONA

WATER 14-17

Capacity 1946
wells & springs
5.4 MGD *

max historical consumption
of 3.9 MGD
p14 of 1946 Report

* includes 700,000 gals from
springs

only 5 wells in use 1946
150 gal / day capacity for a pop
of 20,000

1.4 billion
gallons
4367 ac ft

Sewage 1946 Report 18-20
- cap pop 12,000
Sewage Plant #1 & 2 - cap pop 15,000
75-gal / day / capita
1944 average pop 21,200
max sewage flow 61,470,000 gal
per day ~~per capita~~ or 92 gals
per day per capita
effluent flows from #2 to E. Range
via 21" pipe
No sewage ever prod in
1946

1 NOVEMBER 1946

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WATER 14-17

Capacity 1946
wells & springs
5.4 MGD *

max historical consumption
of 3.9 MGD

p 14 of 1946 Report

* includes 700,000 gals from
springs

only 5 wells in use 1946
150 gal / 43 / capita for a pop
26,000

1.4 billion
gallons
4367 ac ft

Sewage 1946 Report 18-20
- cap pop 12,000
Sewage Plant # 142 - cap pop 15,000
75 gal / day / capita

1944 average pop 21,200
max sewage flow 64,420,000 gal
per day ~~per capita~~ or 92 gals
per day per capita
effluent flows from #2 to E Range
via 21" pipe

No sewage ever pond in
1946

1 NOVEMBER 1946

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MASTER PLANNING
AT
PERMANENT INSTALLATIONS

ANALYSIS
OF
EXISTING FACILITIES

FORT HUACHUCA
COCHISE COUNTY, ARIZONA

15 NOVEMBER 1946

RESTRICTED

WAR DEPARTMENT
OFFICE OF THE DISTRICT ENGINEER
LOS ANGELES DISTRICT
LOS ANGELES 55, CALIFORNIA

ANALYSIS OF EXISTING FACILITIES
FOR
MASTER PLANNING

FORT HUACHUCA
COCHISE COUNTY, ARIZONA

1 NOVEMBER 1946

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ANNEX "A"

Recommendations of Commanding Officer

LIST OF BUILDINGS AND STRUCTURES

B

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ANALYSIS OF EXISTING FACILITIES
FOR
MASTER PLANNING

FORT HUACHUCA, ARIZONA

1 November 1946

I. INTRODUCTION

1. Authority. Pursuant to the establishment by the War Department of Fort Huachuca as a List "A" station, and the subsequent initiation of long-range planning of the installation as a part of the Permanent Military Establishment in accordance with the provisions of Army Regulations No. 210-20, dated 11 June 1946, and War Department Memorandum No. 210-20-1, dated 10 September 1946, this analysis of existing facilities for master planning has been prepared.

2. Purpose. Existing facilities, physical characteristics, cultural improvements and operational conditions at Fort Huachuca have been investigated and are herein described and analyzed to serve, in conjunction with the Basic Information Maps for Master Planning, as a sound basis for determining suitability of the various areas and facilities for permanent retention, adaptability to alternate uses, or desirability of disposal. Upon such a foundation can be evolved a comprehensive master plan for future development of the installation as a part of the Permanent Military Establishment.

3. Scope. Presented herein are operational and technical data for Fort Huachuca, which together with the Basic Information Maps (referred to throughout the text) provide such general and special information as may be helpful for over-all future planning. Empirical operational data represent the best opinions of available military and civilian personnel who have had direct contact and operational experience with the installation.

4. Sources of data. In addition to field investigations and files and records of the District Engineer, Los Angeles District, information has been obtained from the Commanding Officer, Post Engineer, and other staff officers of Fort Huachuca, and from utility and railroad companies.

5. History. A brief history of Fort Huachuca follows:

a. CAVALRY AND INFANTRY OUTPOST (1877 to December 1942):
Fort Huachuca was at first a small outpost in hostile Indian country. Various troops of the 6th, 4th, 1st, and 3rd Cavalry occupied the post through 1883, together with various companies of the 12th, 1st, 8th, and 9th Infantry Regiments. During the following 25 years, various units of the 2nd, 7th, 1st, 5th, 8th, 9th, 12th, 6th, and 4th Cavalry and the 11th, 24th, 15th, and 25th (during 1898-99) Infantry Regiments occupied the post. Fort Huachuca was strictly a cavalry post from 1912 to 1924, the 10th Cavalry (colored) occupying the post from 1913 to 1942. In 1924, the

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25th Infantry (colored) joined in occupancy of the post until 1928. A squad of Indian scouts is still quartered on the post. Post is considered very satisfactory for the 65 years of regular army missions.

b. 1922 SERVICE COMMAND UNIT (June 1942 to date): Mission of regular army post administration, maintenance, supply, repairs and utilities for post and cantonment and for all firing ranges and training areas within the reservation, plus the following operations:

Rehabilitation and reconditioning center.
Disciplinary detention center (minimum).
Separation center for colored personnel.
Motor and ordnance repair shops and supply depot for colored troops in training.

Post is considered satisfactory for service mission.

c. INFANTRY DIVISIONS: Full divisions (colored), totaling 12,000 to 15,000 officers and men, occupied the post as listed below and were engaged in basic and field training. Post is considered very satisfactory for training mission.

93rd Infantry Division (triangular) - Jun. '42 to Sept. '43.
92nd " " " " - Oct. '43 to Jan. '44.

d. SPECIAL UNITS: Miscellaneous colored units of various strengths (included in figures of total population), have occupied the post irregularly from the summer of 1942 to May 1945 for specialized training as follows:

372nd Inf. Reg.	1316th Eng. Reg.
827th Tank Bn.	150th QM Truck Co.
715th MP Bn.	3740th QM Truck Co.
734th MP Bn.	373rd QM Truck Co.
3551st Ord. Co.	390th QM Truck Co.
333rd Ord. Co.	393rd QM Truck Co.
406th Ord. Co.	17th SS Co.
3417th Ord. Co.	29th SS Co.
3550th Ord. Co.	37th SS Co.
335th Sta. Hosp.	714th Med. San. Co.

II. REGIONAL BASE MAP

6. Location. Fort Huachuca is in Cochise County, Arizona, approximately 57 airline miles southeast of the city of Tucson, Arizona, and 28 airline miles west-northwest of the city of Bisbee, Arizona.

a. MAJOR HIGHWAY SYSTEMS AND ACCESS HIGHWAYS: Highways approach the reservation from all directions. The main access road is Arizona State Highway 92, a two-lane bituminous roadway which traverses the reserva-

tion for a distance of about five (5) miles and extends north and south-easterly therefrom. This main access road connects with State Highway 82 and other state and Federal Highways in the vicinity, the most important being U.S. Highway 80 (about 10 miles east of the reservation) which extends easterly through El Paso, Texas, and westerly through Tucson, Arizona, to San Diego, California. In addition to these primary access roads, there are several gravel roads which provide access in the immediate vicinity of the reservation; namely, due east from Fort Huachuca to U.S. Highway 80, northeast to Tombstone, Arizona, and west to Canelo and Nogales, Arizona. Distances by highway from the headquarters at Fort Huachuca to various geographical points are as follows:

Hereford Army Airfield, Arizona	23 miles	southeast
Bisbee, Arizona	43	" east-southeast
Nogales, Mexico	66	" south-southwest
Tucson, Arizona	95	" northwest
El Paso, Texas	320	" east
San Diego, California	482	" west

b. RAILROADS: Fort Huachuca is served by the Southern Pacific Railroad, which maintains a branch line into the cantonment and post areas from Lewis Spring on the company's main east-west line along San Pedro River, 14 miles east of the cantonment. This branch line is operated solely for freight and troop movements to and from the fort. The company's main line extending through Tucson, Lewis Spring, and Douglas, has a maximum capacity of approximately eight (8) trains per day each way.

c. AIRFIELDS: Fort Huachuca landing field is immediately south-east of the cantonment area and consists only of two (2) graded earth runways. one NNE/SSW about 4,300 feet long and 75 feet wide, and the other NW/SE about 3,500 feet long and 40 feet wide. These facilities have been satisfactory for occasional use by observation and transient aircraft of moderate size. Approximately two (2) miles beyond the southwesterly end of the NNE/SSW runway are the Huachuca mountains; however, a satisfactory improved landing field for use of the fort could be constructed south-easterly of the present location with glide angles of approximately 50:1 in the direction of prevailing winds. The nearest improved landing field to Fort Huachuca is Hereford Army Airfield, at present under jurisdiction of the District Engineer, Los Angeles District, for care and custody. This airfield is fifteen (15) airline miles southeast of the cantonment area of the reservation at an elevation of 4,300 feet above sea level. Facilities available at Hereford are as follows:

Runways	- Direction:	17-35 (N/S)	2-20(NE/SW)	11-29 (NW/SE)
	Length:	6,770 feet	6,500 feet	6,500 feet
	Width:	150 feet	150 feet	150 feet
	Surfacing:	Asph, Conc.	Asph, Conc.	Asph, Conc.
	Gross Load:	5,000 lb.	5,000 lb.	5,000 lb.
	Lighting:	B-2 portable	B-2 portable	B-2 portable
Taxiways	- Length:	7,550 feet		
	Width:	50 feet		
	Surfacing:	Asph, Conc.		
	Gross Load:	5,000 lb.		

Parking Apron - Area: 2,500 sq. yd.
 Surfacing: Portland Cement Concrete
 Gross Load: 10,000 lb.

All gross loads indicated are actual field evaluations and are based on capacity operation.

7. Health Conditions. General health conditions are excellent. There are no swamps, although during the rainy season there are some open water areas in creek beds along the east boundary of the cantonment area. However, these areas are of a temporary nature and the water does not pond long enough to become stagnant. Very few mosquitoes exist in the region and no Anophelos have been found, and no cases of malaria are known to have developed. The location of this station would be an ideal site for a health resort or permanent sanitarium for lung and respiratory ailments.

8. Temperature. Annual temperature variations are broad. Temperatures below freezing occur occasionally during the winter. At Fort Huachuca over a period of 37 years, the average daily temperature has ranged from 33° during January to 91° during June, July, and August. At Bisbee, Arizona, situated at a comparable elevation to that of Fort Huachuca and 28 airline miles east thereof, temperature extremes have been 8 and 106 degrees. Frost data for Fort Huachuca are not available; however, records for Bisbee indicate that between 1901 and 1943 there were only six (6) days during which temperature was continuously below freezing; therefore, it is believed that at Fort Huachuca frost probably would not penetrate the ground sufficiently to affect the subgrade.

9. Precipitation occurs mostly from July through September. Snow falls occasionally at Fort Huachuca between December and March, but no snowfall records are available. Thunderstorms are common during July and August. The average annual precipitation at Fort Huachuca over a period of 37 years has been about 18-1/2 inches. Records of snowfall at Bisbee, Arizona, indicate an average of 2 to 3 inches per month during the winter.

10. Clearing and Visibility. At Fort Huachuca an average of 242 days per year the sky is clear, 74 days partly cloudy, and 50 days cloudy. Fog does not occur.

11. Soils. The surface soil near the base of the mountains is a gravelly sand and clay mixture which is not readily susceptible to erosion by water and wind. The mountain slopes have numerous rock outcrops, and in many places in the canyons bedrock has been uncovered by floodwaters. The artillery area east of the building area is a gravelly sand with clay and boulders. Well drillings in the cantonment area indicate that immediately below the surface there is a relatively thick layer of adobe soil mixed with boulders. Most of the post area is covered with grass and trees; in the cantonment area there are no trees or grass. No training time has been lost due to adverse soil conditions.

12. Drainage. Drainage facilities in the post area consist of gutters paved and unpaved ditches, pipes, and culverts which are considered adequate to carry the run-off from ordinary storms; however, these facilities are not capable of carrying the run-off from high intensity rainfall. In the cantonment area, the existing drainage facilities are less adequate than those in the post area and summer rains have flooded several buildings. Adverse drainage conditions have not impeded operations or training.

13. Wind. The prevailing surface wind direction is from the south-east quadrant. Average wind velocities are between 4 and 12 miles per hour; winds of 35 to 50 miles per hour rarely occur.

14. Dock Facilities. There are no dock facilities within a radius of 50 miles of the reservation and the nearest facilities are at San Diego, California.

15. Airways. Green Airway No. 5, a main East-West route, lies approximately 40 airline miles north of the reservation.

III. RESERVATION BOUNDARY AND LAND USE MAP

16. Reservation Area. The reservation is irregularly shaped and comprises a total of approximately 76,500 acres, as follows:

a. ORIGINAL RESERVATION: The original Fort Huachuca reservation, composed of areas 1 through 18, comprising 44,760 acres of land withdrawn from public lands for military purposes.

b. ARTILLERY RANGE: The artillery range area (area 19), comprising 31,741 acres distributed as follows:

- (1) 24,523 acres owned in fee simple by War Department.
- (2) 3,933 acres withdrawn from public domain for use of War Department as long as necessary.
- (3) 3,220 acres leased by War Department from Boquillas Land and Cattle Company for the duration of the national emergency, plus 6 months.

c. LAYOUT: The post area, approximately 1-1/2-miles long and 1/2-mile wide, lies at the mouth of Huachuca Canyon at the base of the Huachuca Mountains in the west-central portion of the reservation and comprises areas 1 through 5. The cantonment area, situated 2 miles east of the post area, is approximately 1-3/4 miles long and 1-1/2 miles wide, and comprises areas 7 through 14. Buildings in the extreme northerly portion of area 18 are known as the nondivisional troops area. The magazine area is in area 2, approximately 3/4 mile west of the post area. The southerly part of the reservation (areas 17 and 18) is used for firing ranges and miscellaneous training aids situated on the foothill slopes of the Huachuca Mountains. The artillery area (area 19) comprises the northeasterly portion of the reservation.

17. Terrain. The surface features of the reservation are variable. The southwesterly portion lies on the easterly slopes of the Huachuca Mountains which rise to an elevation of approximately 8,700 feet above sea level, the southwesterly boundary of the reservation being coincident with the watershed divide. In the northwest portion are the Mustang Mountains which rise to an elevation of 6,300 feet. To the northeast, the reservation extends to the San Pedro River which flows northerly and drains the broad San Pedro Valley. Elevations within the reservation (including the artillery range area) vary from 4,000 to 8,700 feet above sea level, those in the old post area being between 5,000 and 5,200 feet, and those in the cantonment area between 4,600 feet and 4,800 feet. Slopes in the old post and cantonment areas are generally between 2 and 3 percent. Trees are common in the old post area, whereas the cantonment area contains only scattered vegetation. On the mountain slopes there is a dense growth including numerous pine trees. The lower areas of the reservation are covered with desert brush.

18. Ranges, Training Aids and Areas. Adequate training aids and firing ranges are available on the military reservation for the requirements of a combat infantry division, together with many other AGF and ASF units, including light tank battalions. The reservation is sufficiently large to accommodate various types of tactical exercises and maneuvers and provides numerous bivouac areas away from danger zones. A number of training aids not requiring extensive safety zones are located adjacent to the post and cantonment areas; however, most aids and ranges are situated north of the post area and south of the cantonment area. No undue loss in training time has occurred because of present locations of training aids and firing ranges. Motorized transportation and equipment have generally been used in reaching the more distant training areas and ranges, as well as the mock village in the northeasterly leased portion of the reservation northwest of Charleston.

a. AREAS NEARBY: The following training aids are located adjacent to the post and cantonment areas:

- 1 Sanitation demonstration area - Area 12
- 1 Drivers' training area - area 11
- 1 Signal area - area 12
- 1 Swimming pool - area 12
- 1 Engineer bridge bldg. and training area - north of area 15
- 1 Amphibious landing area (flooded lake) - area 11
- 3 Bayonet courses (27 lanes total) - areas 7, 8, and 11
- 3 Obstacle courses (27 lanes total) - areas 7, 8, and 11
- 3 Grenade courts (practice) - areas 7, 8, and 11
- 1 Grenade court (live) - range G
- 2 Gas chambers (chlorine and cyanide) - area 11
- 3 1,000-inch antitank (sub-cal.) ranges (3 firing points) - range D, area 6
- 3 1,000-inch machine gun (sub-cal.) range (90 tracks) - range D, area 6
- 3 Landscape ranges (9 targets total) - range E, areas 6 and 17
- 1 Pistol (45-cal.) range (15 and 25 yds., 25 targets) - range F, area 17
- 1 Antiaircraft towed target range - range H,; area 17

b. AREAS REMOVED FROM CANTONMENT AREA: Training aids and firing ranges more than 30 minutes marching time from the post and cantonment areas are as follows, with approximate distances indicated.

- 3 Known-distance ranges (100-200-300-500 yds., 150 firing points) - range K, 3 miles
- 1 Submachine gun range (1 firing point) - range O, 4 miles
- 3 Miniature antiaircraft ranges (3 firing points) - range C, 3 miles
- 3 1,000-inch 37-mm antitanks (sub-cal.) ranges, Apex, (3 firing points) - range O, 4 miles
- 1 Moving vehicle range (1 firing point) - range J, 4 miles
- 2 Moving target ranges (4 firing points total) - range P, 4 miles
- 2 Field firing (30-cal.) ranges, rifle and machine gun (6 pits each) - ranges A and Q, 7 and 5 miles
- 1 Mortar range - range N, 4 miles
- 1 Rifle mortar range - range L, area 18
- 1 Rocket launcher range - range M, 3 miles
- 2 Transition ranges - ranges R and T, 8 and 8-1/2 miles
- 2 Transition ranges - ranges S and U, 8 and 9 miles
- 1 Close combat course - range B, 3-1/2 miles
- 2 Antiaircraft CQ-2A airplane target ranges - space available in range H and artillery range (area 19), 2 miles and 8 miles
- 1 Demolition area - range N, 4 miles
- 1 Infiltration course - range V, 9 miles
- 1 Artillery range, up to 155 mm (5 observation points, impact area in mountains in northeast portion of artillery range - area 19, 8 miles to battery positions on south and east boundaries, battery position also in range A)
- 1 Fortified assault area (mortar and rocket) - 12 miles

c. TRAINING AREAS: The topography, which is generally flat at about 4,400 feet elevation and which rises to extreme mountain elevations of about 8,700 feet, is very suitable for all types of ground training required for triangular infantry or mechanized divisions, including attached components. Acceptability of the topography and area of the reservation for various uses, based upon the opinions of training and service command personnel who have had experience with operations at the post, is as follows:

<u>Type of Training</u>	<u>Topography</u>	<u>Area</u>	<u>Remarks</u>
Antiaircraft artillery	Yes	No	
Field artillery and mortar fire	Yes	Yes	Limited to mountain impact area
Infantry	Yes	Yes	Ideal, up to full division with attached units
Mechanized units	Yes	Yes	Desert and rocky terrain

<u>Type of Training</u>	<u>Topography</u>	<u>Area</u>	<u>Remarks</u>
Tank deployment	Yes	Yes	Desert and rocky terrain
Maneuvers	Yes	Yes	" " " "
Amphibious training	No	No	Limited to artificial lake
Small arms	Yes	Yes	Ideal range locations
Review	Yes	Yes	Up to full division
Drill	Yes	Yes	Up to full division
Army post duty	Yes	Yes	Excellent permanent post facilities

IV. GENERAL SITE AND BUILDING USE MAP

19. General. Facilities available in the post and cantonment areas include housing and messing for officers, enlisted men, WAC, and civilian men and women, both white and colored in all categories; vehicle and weapon parking and service facilities for one (1) division and all attached units; warehouses, shops, and miscellaneous service facilities; a station hospital consisting of two (2) interconnected units having a total capacity of 1000 beds on a basis of 100 square feet per bed. The majority of the present buildings in areas 1, 2, 3, and 4 were built between 1910 and 1920, and are of masonry, a combination of wood and masonry, and wood-frame construction. Extensive landscaping, drainage facilities, walkways, and stone walls, together with some grading and road paving, were accomplished in the post area as WPA projects. Cantonment housing and service facilities in areas 7 and 8, and the smaller hospital in area 13 (with few exceptions), together with some scattered buildings in the post area, are mobilization type built by the construction quartermaster and completed in May 1941. Expansion of the cantonment facilities was commenced in January 1942 and all subsequent construction, including civilian war housing by Federal Public Housing Authority in areas 3 and 5, has been theater-of-operations type. The group of buildings at the northerly edge of area 18 was construction crew quarters built by the contractor which, though of substandard construction, were later converted into housing for nondivisional troops.

a. HOUSING: The total capacity of housing facilities at Fort Huachuca, based upon War Department Circular 233, dated 3 August 1946, is as follows:

Officers (Post area):			
*12 Officers' Qtrs.	(2S Irregular)	1 fam. ea.	12
*15 Officers' Qtrs.	(2S Various shapes)	2 " "	<u>30</u>
Subtotal (Officers' families - post area)			42 ✓
* 1 Bach. Officers' Qtrs.	(21' x 93')	5 men ea.	5
* 1 Bach. Officers' Qtrs.	(34' x 35' & 36'x105')	8 " "	<u>8</u>
Subtotal (Bachelor Officers - post area)			13

Officers (Cantonment area):

1 MGQ-1	(36' x 44')	1 man ea.	1
2 BGQ-1	(29' x 39')	1 " "	2
4 RCQ-1	(29' x 30')	1 " "	4
12 BOQ-44	(2S 29' x 136')	19 men "	225
1 BOQM-40	(2S 29' x 166')	19 " "	19
5 OQ-40	(2S 29' x 130')	40 " "	200
2 OQ-40 (Mod.)	(2S 29' x 146')	40 " "	80
**1 Officers' Qtrs.	(32' x 146' & 2S 32' x 260')	53 " "	53
**1 Officers' Qtrs.	(24' x 190')	27 " "	27
2 HQM-20	(29' x 190')	20 " "	40
3 HQ-24	(29' x 150')	24 " "	72
1 HQ-18	(29' x 120')	18 " "	18
1 HQ-12	(29' x 80')	12 " "	12
Subtotal (Officers' Qtrs. - cantonment area)			<u>756</u>

Total Officers

811

Nurses (Cantonment area):

1 HQ-24	(29' x 150')	24 nur. ea.	24
1 HQM-17	(29' x 164')	17 " "	17
2 HQ-18	(29' x 120')	18 " "	36
Subtotal (Nurses - cantonment area)			<u>77</u>

Total Nurses

77

Enlisted Men (Post area):

*6 N.C.O. Qtrs.	(Various shapes)	2 fam. ea.	12
83 " "	(" ")	1 " "	83
8 Indian Scout Qtrs.	20' x 20'	1 " "	8
Subtotal (Enlisted Mens' families - post area)			<u>103</u>

*3 Enlisted Mens'

Bks. w/Mess (2S 30' x 142' & 33' x 40')	65 men ea.	195	
*2 Enlisted Mens' Barracks (2S 27' x 140')	76 " "	152	
*5 " " " (2S 27' x 140')	87 " "	435	
*1 " " " "			
1 Bks. w/Mess (3S 52' x 208' & 2-50' x 95')	250 " "	250	
***6 CCC Barracks (21' x 106')	31 " "	186	
Subtotal (Enlisted Men - post area)			<u>1,216</u>

Enlisted men (Cantonment area):

108 Barracks (2S 29' x 80')	50 men ea.	5,400	
153 " (2S 29' x 90')	57 " "	8,721	
2 PBG-74 (2S 29' x 90')	51 " "	102	
**9 Barracks (20' x 30' & 2-20' x 230')	170 " "	1,530	
**4 " (20' x 125')	41 " "	164	
**2 " & Admin. (20' x 125')	20 " "	80	
10 HB-54 (29' x 170')	43 " "	430	
2 HB-31 (29' x 90')	27 " "	54	
Subtotal (Enlisted men - cantonment area)			<u>16,531</u>

Total Enlisted Men

17,341

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Enlisted WAC (Cantonment area):

6 WEKS-A	(2S 29'x 90')	44 wom. ea.	264
2 B-B-T	(96'x92' H-shape)	39	<u>79</u>
Subtotal (Enlisted WAC - cantonment area)			343

Total enlisted WAC

343

Total military personnel

26,578

Civilians (post area):

13 Civilian Qtrs.	(Various sizes)	1 fam. ea.	18
2 "	(1-1/2S 29'x 41')	1 " "	2
3 "	(22'x 31')	1 " "	3
1 "	(1-1/2S 37'x 37')	2 " "	2
1 "	(34'x119')	4 " "	4
8 C.W.H.	(21'x 74')	4 " "	32
37 "	(21'x104')	4 " "	148
4 "	(26'x63')	2 " "	8
11 "	(24'x 58')	2 " "	22
12 "	(24'x 67')	2 " "	24
37 "	(24'x 60')	2 " "	<u>74</u>

Subtotal (Civilian families - post area)

337

* 1 Dormitory	(1S 33'x40' & 30'x240')	63 men ea.	63
* 1 "	(1S 2-33'x40' & 30'x240')	130 " "	<u>130</u>

Subtotal (Civilian Men - post area)

193

1 C.W.H.-38	(2S 29'x104')	27 wom. ea.	27
6 WD-3-48 Mod.	(37'x186')	38 " "	228
1 "	(37'x218')	48 " "	48
1 Maids' Quarters	(23'x 36')	9 " "	9
8 "	(12'x 18')	2 " "	<u>16</u>

Subtotal (Civilian Women - post area)

328

Total civilian (post area)

358

Civilians (Cantonment area):

1 WD-3-48 Dormitory	(37'x218)	48 wom. ea.	48
1 CWH-48	(2S & 29'x104')	27 " "	27
1 Dormitory	(1S 38'x50' & 30'x250')	72 " "	72
1 Civilian Qtrs.	(18'x 24')	3 " "	<u>3</u>

Subtotal (Civilian Women - cantonment area)

150

Total civilians (cantonment area)

150

Total civilian personnel

1,003

- * Permanent buildings of early type.
- ** Converted construction crew quarters.
- *** Temporary buildings of early type.

b. STORAGE: Available gross storage areas (except as otherwise indicated) are given below in square foot.

(1) Warehouses.

Typical	242,900	
Medical storehouses	26,500	
Miscellaneous buildings used for storage	<u>41,400*</u>	
Gross building area		310,200

* Includes about 20,000 square feet in three stables being used with the stalls in place.

The above gross building area comprises:

Mobilization or more permanent type construction	258,900 (83.3%)
Theater-of-operations type construction	51,900 (16.7%)

Net available storage space reported by the Post Engineer is about 271,650 square feet having the following characteristics:

Heated areas	45,260, or 16.7%
Sprinklered areas	None
Floors above grade (wood)	198,700, or 73%, of which
Live load capacities are:	
300 lbs. per sq. ft.	- 52%
250 " " " "	- 20%
200 " " " "	- 18%
150 " " " "	- 10%

(2) Cold Storage Space.
(approximately 16,600 sq. ft. net) 33,700

(3) Sheds.
General 33,800

(4) Open Storage Areas.
High grade (concrete or asphalt surfaced) None
Semifinished (gravel or rock surfaced) 460,000
Total hardstanding area 460,000

(5) Vehicle Parking Area.
Hardstandings (excluding service requirements) 1,080,000

(6) Services.

Miscellaneous service facilities available at Fort Huachuca include the following:

Two bakeries - total capacity about 2,500 pounds bread per day.

Two cold storage buildings - have satisfactorily handled maximum post demand, plus that of Regional Supply Depot, San Antonio, Texas.

One ice-making plant - capacity 40 tons.

Two laundries - total capacity adequate for requirements of 30,000 persons - has handled a maximum of 500,000 miscellaneous pieces, plus 700,000 pieces of clothing during one month.

Repair shops - for reclaiming wearing apparel, equipment and tents, a maximum of 10,000 pairs of shoes alone have been repaired during a single month.

Dry cleaning plant - capable of handling requirements of a 15,000-man encampment.

(7) Magazines. (See General Site Plan and Building Use Maps.)

(20 igloos, totaling 8,580 square ft. net) 8,900 sq. ft.

In addition to the above, three 78-horse stables (now used partially to accommodate about 20 mounts) would provide, with stalls removed, about 20,000 square feet of storage space.

20. Building Use. Information required in paragraphs 8c and d of the Regional Review Board's Check List has not been accurately determined by the Installation Planning Board at the time this report is published. In lieu of aforesaid information, there is inclosed a list of buildings, corrected to agree with W.D. Circular No. 233, dated 3 August 1946, on housing capacity. As soon as information reaches the office of the District Engineer, Los Angeles, California, it will be tabulated and forwarded in the form of Annex "A" and Sections IV and V of this report.

V. DETAIL SITE PLANS AND BUILDING USE MAPS

21. See Annex "A".

VI. GENERAL ROAD MAP

22. General. Roads, street and parking facilities on the reservation are in good repair and include access to training aids and firing ranges.

a. ROADS: Roadway mileage totals approximately 108 miles segregated as follows:

Primary roads - bituminous	- 24 ft. wide:	11.5 miles	
	- 25 " "	0.8 "	
	- 28 " "	0.3 "	
	- 33 " "	0.3 "	
	- 36 " "	3.4 "	
	- 46 " "	0.3 "	
Secondary roads - bituminous	- 20 " "	17.4 "	
	- 22 " "	8.3 "	
- gravel	- 22 " "	0.2 "	
Tertiary roads - bituminous	- 16 " "	2.8 "	
	- 18 " "	1.3 "	
	- 14 " "	0.4 "	
- gravel	- 12 " "	1.3 "	
	- 16 " "	43.3 "	
- graded earth rds.	- 10 " "	10.0 "	
	- 12 " "	2.3 "	
	- 16 " "	4.0 "	

b. RAILROADS: The Southern Pacific Railroad serves Fort Huachuca with a branch line into the reservation, the average grade is 2.5 percent with a maximum of about 2.9 percent. The total length of company and government-owned railroad trackage within the reservation (9.1 miles) is constructed entirely of 70-pound rail which is in good condition. The trackage is segregated as follows:

(1) Company-owned railroad trackage:		
Branch line		21,500 feet
Post Area:		
Passing tracks		2,400 "
Ramp track (including wye)		1,600 "
Warehouse spurs		1,500 "
Railroad station siding		650 "
Cantonment Area:		
Passing tracks		<u>5,400 "</u>
Total company-owned trackage		33,050 "
(2) Government-owned trackage:		
Post Area:		
Cold storage spur		1,130 "
Coal trestle spur		940 "
Interchange track		490 "
Key and granary shed spur		300 "
Salvage warehouse spur		<u>280 "</u>

RESTRICTED

Cantonment Area:		
Warehouse spurs		6,000 feet
Warehouse tracks		4,800 "
Ordinance spurs		400 "
Crossovers		800 "
Total government-owned trackage		15,140 "

VII. GENERAL UTILITIES MAPS

23. Water Supply. Water for Fort Huachuca is obtained from wells and springs at no cost to the Government except for operation and maintenance of supply facilities. Under the present state of development, the sources of supply are capable of furnishing about 5,400,000 gallons per day, which is substantially in excess of the maximum historical consumption of 3,900,000 gallons per day (see subparagraph 23 h. below). However, this total supply includes an average flow of 700,000 gallons per day from springs which are known to have greatly diminished flow during extended periods of drouth. Further, utilization of the full supply from the wells is restricted by the limited capacities of the booster pumps in relation to the existing piping arrangement. The water is of good quality and not excessively hard. Water storage and distribution facilities are adequate on the basis of maximum fire demand and fire flow requirements of the Engineer Manual, except that there are locations in the post area where the residual pressure is lower than that required for a fire flow of 1,000 gallons per minute.

a. WATER SYSTEMS: There are three (3) individual operating systems:

- (1) The post area (areas 1 through 5) is supplied from two (2) reservoirs (Nos. 1 and 2) of 200,000 and 250,000 gallon capacity, which receive water from wells Nos. 1 and 2, and from springs in Huachuca and Tanner Gardens Canyons. This system can also supply water to the cantonment area through a by-pass line from the reservoirs.
- (2) The higher portion of the cantonment area (areas 7, 8, 9, 10, 13, 18, and portions of 11, 12, and 14) is supplied from a 3,000,000-gallon ground reservoir and a 500,000 gallon elevated tank (which maintains pressure on the system). This reservoir and tank are supplied from wells Nos. 2, 3, 4, and 5.
- (3) The lower portion of the cantonment area (most of areas 12 and 14 and the south portion of 11) is supplied from a 500,000-gallon elevated tank, the system being designed so that pressure is maintained by the system in the upper cantonment area through an altitude valve. However, for several months the altitude valve has not been functioning and it has been necessary to by-pass the valve, thus causing unregulated pressure on the lower cantonment system.

RESTRICTED

b. WELLS: The five (5) wells are located along a north-south line in area 14 in the easterly portion of the cantonment area. The actual combined capacity of all five (5) wells is about 3,300 gallons per minute. There have been no water shortages since the wells have been drilled, and records show no evidence of sanding. Well data are as follows:

Well No	Diameter	Depth	Static Level	Draw-down	Actual pumping capacity	Pump powered by
	Inches	Feet	Feet	Feet	Gallons per min.	
1	14	702	453	26	500	Electricity
2	14	710	484	39	760	"
3	18-16	802	460	28	655	"
4	18	807	452	18	770	"
5	18-16	800	447	69	637	"
6	16	1200			780	"

c. SPRINGS: There are eight springs which supply water to the post area.

- (1) Huachuca Canyon system consists of four (4) springs with infiltration galleries and junction boxes, which discharge by gravity through approximately 20,000 feet of 4-inch steel pipe into reservoir No. 1 south of the post area. The average flow from the four (4) springs is approximately 100,000 gallons per day.
- (2) Tanner Garden Canyon system consists of four (4) springs (two (2) in Tanner Garden Canyon and two (2) in tributary McClure Canyon) with infiltration galleries and junction boxes which discharge by gravity through 47,000 feet of 4-inch steel pipe into reservoir No. 1. The average flow from the four (4) springs is approximately 600,000 gallons per day.

d. WATER TREATMENT: Treatment required for the spring water is chlorination and removal of excess iron content. This treatment takes place at reservoir No. 1. Water from the wells requires only chlorination which is accomplished at each well pumphouse.

e. WATER STORAGE facilities consist of the following:

- One (1) 3,000,000-gallon concrete ground reservoir (north-east of post area).
- One (1) 200,000-gallon two-compartment, masonry, ground reservoir No. 1 (on hill south of post area).
- One (1) 250,000-gallon concrete ground reservoir No. 2 (adjacent to reservoir No. 1).
- Two (2) 500,000-gallon elevated steel tanks (in cantonment area).

One (1) 10,000-gallon wooden tank (for laundry)

All water-storage facilities are in good condition except the wooden tank, which shows some leakage.

f. WATER PUMPING: In addition to the well pumps (see subparagraph 22 b. above), each well has a 50,000-gallon surge tank with booster pump. The well and booster pumps at each station are operated as a unit. Well No. 1 booster pump delivers water into reservoir No. 1. Well No. 2 booster pump can pump either into reservoir No. 1 or into cantonment area system. Well and booster pumps Nos. 3, 4, and 5 deliver water into the lower cantonment area system. Results of field tests of various combinations of booster pump operation in contrast to well pump capacities are as follows:

<u>Booster Pumps</u>	<u>Combined capacity of booster pumps</u>	<u>Combined capacity of well pumps</u>
	<u>Gallons per minute</u>	<u>Gallons per minute</u>
4	675	770
3 and 4	1,305	1,425
2, 3, and 4	2,025	2,185
2, 3, 4, and 5	1,970	2,822
3, 4, and 5	1,361	2,062
4 and 5	1,070	1,407

The above data show that the existing piping arrangement does not permit full delivery of well capacities with the booster pumps operating simultaneously. Under these circumstances the maximum quantity of water which can be supplied to the distribution systems by both the wells and the springs is reduced from 5,400,000 to about 4,000,000 gallons per day.

g. WATER SUPPLY AND DISTRIBUTION LINES total about 244,000 feet. Distribution lines in the post area are looped except for an area known as Bonnie Blink in area 2. About 75 percent of the pipes in the post area are in good condition, the remainder being in fair condition. In the cantonment area, the distribution lines are contained in three (3) grid systems fully looped and are in good condition. The pressure in the post area varies from 20 to 120 pounds per square inch (reduced by pressure valves); in the higher portion of the cantonment area, 40 to 75 pounds per square inch; and in the lower portion of the cantonment area, 35 to 85 pounds per square inch. The supply lines from the springs in Euachuca and Tanner Garden Canyons are old but repair and maintenance costs have been nominal. No wood-stave or thin-walled steel pipe has been used in either supply or distribution lines. Water lines consist of the following:

- (1) Water supply mains from wells to distribution systems:
 - *16-inch cast-iron pipe, 150 lb. class - 5,000 feet
 - *12-inch " " " 150 lb. class - 11,400 "
 - **10-inch steel pipe - 16,900 "
 - *** 6-inch " " - 1,800 "

- (2) Water collection lines from springs to post area:
 4-inch steel pipe (Huachuca Canyon) -20,000 feet
 8-inch " " (Tanner Garden Canyon)-47,000 feet
- (3) Water distribution lines in post area (excluding building service lines):
 8-inch steel pipe, standard weight - 500 feet
 6-inch cast-iron pipe, 150 lb. class - 16,600 "
 6-inch steel pipe, standard weight - 3,800 "
 6-inch transite pipe, 150-lb. class - 6,000 "
 4-inch cast-iron pipe, 150 lb. class - 5,000 "
 4-inch steel pipe, standard weight - 800 "
- (4) Water distribution lines in cantonment and non-divisional troops areas (excluding building service lines):
 14-inch cast-iron pipe, 150 lb. class - 2,718 feet
 12-inch " " " " " " - 29,005 "
 12-inch transite pipe, " " " - 22,405 "
 10-inch cast-iron pipe, " " " - 11,570 "
 8-inch " " " " " " - 25,532 "
 8-inch transite pipe, " " " - 2,368 "
 6-inch cast-iron pipe " " " - 5,770 "
 6-inch steel pipe, standard weight - 2,420 "
 4-inch steel pipe, " " - 6,132 "
 4-inch transite pipe, 150 lb. class - 768 "

* To cantonment area.

** To post area.

*** To non-divisional troops area (Area 18).

h. WATER CONSUMPTION: Records indicate an average per capita water consumption at Fort Huachuca of 150 gallons per day when the population is about 20,000. The maximum consumption for a single day has been 3,900,000 gallons, which includes an estimated 400,000 gallons per day which are expended in irrigation in the post area. Such irrigation is customary during the summer.

24. Fire Protection.

a. FIRE HYDRANTS: There are 316 standard fire hydrants distributed as follows:

87 in post area
 224 in cantonment area
 5 in non-divisional troops area

b. FIRE REPORTING TELEPHONES: Situated at strategic and pre-determined locations, are 90 fire-reporting telephones, pole-mounted, ruby globe located. This system was installed by contract in conformity with the requirements of the National Electrical Code Standards of the National Board of Fire Underwriters, and the National Electrical Safety Code of the U.S. Department of Commerce. The following materials were furnished by the Government and installed by the contractor:

RESTRICTED

- 15,000 Feet - No. 10 AWG wire
- 4,500 Feet - No. 14 AWG wire
- 700 Feet - No. 8A copperweld cable
- 90 Each - Mixture Type VA-1 with Type YN-75 ruby globe and guard
- 90 Each - No. 3629 Switch, 5-amp., "Russel and Stoll"

25. Sewage Disposal. The post area and the cantonment areas are both served by waterborne sanitary sewer systems which terminate in two (2) separate treatment plants. In addition, there is a septic tank which serves the main gatehouse and another which serves No. 2 Pumphouse. Storm water enters the sewerage system at one (1) location in the post area. Laundry waste water does not enter the sewerage system but is discharged into Huachuca Creek. The water from swimming pools is also wasted without entering the sewer. No odors or other nuisances have developed from the disposal of sewage or waste water.

a. SEWER SYSTEMS: Fort Huachuca has three (3) individual sewer systems which can operate independently or together.

- (1) The post system serves areas 1 through 5 and flows to the south cantonment system through an 8-inch vitrified clay pipe outfall.
- (2) The south cantonment system serves areas 7, 8, 12, 13, 14, 18, and a portion of 11 (approximately 75 percent of the total cantonment area), and also receives the flow from the post system and discharges into Treatment Plant No. 1. However, it is possible to divert the combined flow from the post system and that from areas 7, 8, and portions of 12 and 13 into Treatment Plant No. 2.
- (3) The north cantonment system serves areas 9, 10, and a portion of 11 (approximately 25 percent of the entire cantonment area) and flows into Treatment Plant No. 2.

b. SEWER PIPE LINES in the collection system total approximately 233,500 feet, as follows:

(1) Post Area (Areas 1 through 5):

10-inch vitrified clay pipe	-	700	feet
8-inch " " " "	-	13,825	"
6-inch " " " "	-	51,800	"
6-inch cast-iron " "	-	1,600	"

Pipes in the post area are generally in fair to good condition, except that tree roots have penetrated pipe joints along Grierson Avenue.

(2) Cantonment Area (Areas 7 through 14):

21-inch vitrified clay pipe -	5,110 feet
16-inch " " " -	386 "
15-inch " " " -	11,001 "
12-inch " " " -	7,621 "
10-inch " " " -	16,103 "
10-inch cast-iron pipe -	345 "
8-inch vitrified clay pipe -	62,251 "
8-inch cast-iron pipe -	250 "
6-inch vitrified clay pipe -	56,515 "
6-inch cast-iron pipe -	140 "

All pipes in the cantonment area are in good condition.

(3) Non-divisional troops area (northerly portion of area 18):

10-inch vitrified clay pipe -	650 feet
8-inch " " " -	1,440 "
6-inch " " " -	2,850 "
6-inch steel pipe -	700 "

Pipes in the non-divisional troops area are generally in fair condition; some are in good condition.

There is no concrete pipe in the sewerage system or in the outfall sewer line.

c. SEWAGE PUMPING is necessary only in the non-divisional troops area. The pumping station consists of a sump with two (2) 500-gallon per minute pumps powered by five horsepower electric motors equipped with electric float switches.

d. SEWAGE TREATMENT PLANT: Fort Huachuca has two (2) sewage treatment plants, no parts of which are constructed of wood.

(1) Sewage Treatment Plant No. 1 is near the east boundary of the cantonment area in the proximity of "E" Avenue in area 14. This plant is constructed of concrete and includes a grit chamber, a Parshall flume, twin flocculation tanks with mixing mechanism, twin sedimentation tanks with mechanical scraper, twin sludge digester tanks (one with floating steel gas holder), and 11 sludge beds (3,000 square feet each) without underdrainage. On a basis of 75 gallons per capita per day, it is estimated that this plant is adequate for a population of 12,000.

(2) Sewage Treatment Plant No. 2 is near the east boundary of the cantonment area in area 14, approximately 3/4-mile north of Treatment Plant No. 1. Treatment Plant No. 2 is constructed of concrete and includes a grit chamber, Parshall flume, single flocculator tank with

mixing mechanism, single sedimentation tank with mechanical scraper, single digester tank, with floating steel gas holder and twenty (20) sludge beds (3,500 square feet each) without underdrains. On a basis of 75 gallons per capita per day, it is estimated that this plant is adequate for a population of 15,000. During June 1944 when the average population was 21,200, the maximum combined sewage flow was 61,470,000 gallons, or about 97 gallons per capita per day. At this rate of flow, the two (2) plants combined accomplished a minimum removal of 80 percent of suspended solids.

e. EFFLUENT from the two (2) sewage treatment plants join in a manhole near Plant No. 2, whence it flows through a single 21-inch outfall for a distance of approximately 0.6 mile and discharges into an open ditch in the artillery range. After the flow reaches the ditch, it flows approximately 1/2 mile before disappearing into the ground.

26. Electrical System. Fort Huachuca is served both by commercial and stand-by electric power sources.

a. PRIMARY POWER SUPPLY, since 1942, has been furnished by Tucson Gas, Electric Light and Power Company through one (1) circuit approximately fifty (50) miles long. This transmission line is a 44-kv., 3-phase, 60-cycle, 3-wire line which ties in at Continental, approximately 40 airline miles west-northwest of Fort Huachuca to the company-owned 44-kv. transmission line extending from Tucson to Nogales. The stopdown substation at Fort Huachuca is located in area 14 and consists of:

- Four (4) 1,000-kva., 44 to 13.2-kv. transformers.
- One (1) 300-kva., 13.2-kv. voltage regulator with necessary metering and switching equipment.

On the basis of consumption records, it is estimated that there is sufficient electric power available for a population of approximately 25,000. Numerous power failures have occurred, as follows:

<u>Date</u>	<u>Duration of Outage</u>	<u>Cause of Outage</u>
24 June '42	10 hrs. 53 min.	Line down at fort
31 May '43	16 " 58 "	Army shot down line near fort
2 Aug '43	21 " 42 "	Army shot down line inside fort
26 Oct '43	11 " 17 "	Line shot down at fort
27 Oct '43	9 " 35 "	" " " " "
9 Nov '43	12 " 50 "	" " " " "
17 Nov '43	22 " 9 "	" " " " "
29 Jul '44	73 " 41 "	" " " " "
17 Aug '44	121 " 16 "	Army shot down line
23 Sep '44	2 " 45 "	Lightning
13 Oct '44	2 " 55 "	Parker Dam line out