REPORTS CONTROL SYMBOL....ENG 120

MASTER PLAN
ANALYSIS
OF
EXISTING FACILITIES
U.S. ARMY GARRISON
FORT HUACHUCA, ARIZONA

Partial

DATE: 30 JUNE 1971

PREPARED BY: U.S. ARMY ENGINEERS
DISTRICT, SACRAMENTO

ANALYSIS OF EXISTING FACILITIES
FORT HUACHUCA

	Government Owned	Company Owned
Crossover Track	260 feet	0 feet
Gasoline Spur	453 feet	0 feet
Warehouse Spur (Cons Prop)	2,460 feet	284 feet
Main Branch Line on Reservation	0 feet	11,286 feet
Main Gate Track	0 feet	761 feet
Warehouse Spur (Transportation)	527 feet	0 feet
	7,366 feet	12,509 feet

9-03 WATER SUPPLY AND DISTRIBUTION

a. References:

(1) Basic Information Maps.

(2) Records, R&U Division, Utilities Branch, Fort Huachuca.

(3) Geological Survey Water Supply Paper, 1819-D.

b. General:

(1) Fort Huachuca, situated on the northeast flank of the Huachuca Mountains, is in the southern part of the San Pedro River drainage basin in Arizona. The main sources of water available in the reservation area are ground water stored in two unconsolidated sedimentary deposits filling the San Pedro Basin, and spring flow in Garden and Huachuca Canyons in the Huachuca Mountains. The unconsolidated deposits are divided into upper and lower units of basin fill, and it is these units whichyield the major part of the Post's water supply. "Lower units of basin fill" are light-gray sedimentary rocks unconformably overlying semi-consolidated brownish-red to brownish-gray conglomerate; "upper units of basin fill" consist of weakly cemented and compacted soft reddosj-brown clay, gravel, sand and silt. In Garden Canyon, spring flow is derived from solution channels and fracture in carbonate rocks; and in Huachuca Canyon, from fractures in mudstone, sandstone, carbonate rocks, and granit. The flow from springs generally is not used by the Post, but it appears sufficient to supply a large part of the entire water demand.

(2) The northwest trending Huachuca Mountains, a faulted complex of granite, carbonate rocks, conglomerate and claystone from the

southwestern part of the Fort Huachuca area. The southern segment of the San Pedro basin, which forms the eastern and northern parts of the area, is chiefly underlain by unconsolidated gravel, sand, sandstone and silt deposits. The lower slopes of the northwestern flank of the Huachuca Mountains are granitic in nature; higher on the slope and extending almost to the crest is found limestone, dolomite and claystone. The San Pedro basin, northeast of the Huachuca Mountains, is filled with unconsolidated sediments which unconformably overlie a conglomerate.

(3) "Consolidated rocks" are principally those rocks that form the Huachuca Mountains and they crop out in the Charleston-Fairbanks area along the San Pedro River. These rocks are impermeable, but fractures and cracks in them trap water from precipitation and small streams and release water slowly to springs. These rocks are characterized by their low permeability and, except where broken by faults or joints, yield no water to wells and generally act as impermeable barriers to the passage of ground water. On the west side of the Huachuca Mountains are host rocks to a few small springs that have extremely variable discharge. In those formations on the higher slopes of the Huachuca Mountains are found thick calcareous beds which are highly fractured and cavernous where water has entered and dissolved carbonate along the fractures and bedding planes. Ground water in this area generally moves topographically downward through the cavernous openings and, as a consequence, large springs often occur in canyons where the normal downward flow of ground water is interrupted by impermeable rocks. A large slow-draining ground water reservoir exists in the headwater area of Garden Canyon where the cavernous flow is dammed on the downstream side by impervious rocks. This area receives about 25 inches of precipitation per year and includes a considerable length of stream bed; this combination facilitates recharge to the groundwater reservoir.

(4) "Unconsolidated rocks" are found principally in the lowland areas surrounding the Huachuca Mountains. These rocks consist of conglomerate, upper and lower units of basin fill, and thin deposits of terrace gravel and stream alluvium that overlie the consolidated rocks. Although these formations do not crop out extensively, all have been penetrated by many of the wells at Fort Huachuca. Theupper and lower units of basin fill are the chief aquifiers tapped by the wells at the Post.

c. Water Supply:

(1) Water for Fort Huachuca is obtained from wells at no cost to the Government except for facility maintenance. The Fort Huachuca

well field obtains ground water from the 2 basin-fill aquifier. The uppermost aquifier is the upper unit of basin fill, which is estimated to range in permeability from moderate to good. The lower aquifier is to range in permeability from moderte to good. The lower aquifier is the lower unit of basin fill and permeability estimates range from fair to moderate, and the unit can be expected to produce and store a considerable smount of water. Suppy f acilities consist of 6 wells located along a north-south line in the eastern portion of the Cantonment area. Data pertinent to well characteristics and pumpage are presented in Tables 1 and 2 of this report. Electric logs for the well are not available.

(a) Records maintained by the US Geological Survey as well as data on file at this installation indicate that the underground water table in the existing well field has declined on an average of 2.4 feet per year. This rate of decline in the water table has not been uniform, but is in proportion to the water withdrawn by pumping from the aquifiers. The increasing demands on this underground water basin created demand in adjacent well fields in surrounding communities (Sierra Vista consumes at present 1,400,000 gallons per day), result in an increasing rate of decline in the static water level.

d. Water Storage: Data pertinent to water storage facilities are presented in Table 6 of this report. Combined storage capacity amount to 5,960,000 gallons and is considered adequate for all present and forseeable requirements. It is, however, planned in a future MCA program to replace Reservoir No. 1 (200,000 gal) and No. 2 (250,000 gal). Both were constructed in 1938 and are in deteriorating condition.

e. Water Distribution:

(1) Each of the 6 well pumps discharges water to a 50,000 gallon surge tank located adjacent to each well. Booster pumps, some 14 in all, take suction from these surge tanks and deliver water to the various storage facilities. Data pertinent to booster pumps are presented in Table 5 of this report. Following is a description of booster pump operations:

(a) Booster pump No. 1 normally takes suction from surge tank No. 1 and delivers water through a 10-inch steel main to the 1-1/2-million gallon tank or to the Old Post reservoirs.

(b) Booster pump Nos. 2A and 2B are immediately adjacent to each other, being located in the same building, and are located about 100 feet from boost pump No.1. As noted abouce, booster pump No. 1 normally takes suction from surge tank No. 1; however, there is a header

line between surge tank Nos. 1 and 2, which, by valve manipulation, can direct the capacity of the 2 surge tanks to the suction sides of booster pump Nos. 1, 2A or 2B. This provides flexibility as to selection of source and/or ability to continue production into the supply system should either wells Nos. 1 or 2 be out of service.

1. Booster pump No. 2A which normally takes suction from surge tank No. 2, discharges through a supply net into the 3-million gallon storage tank.

2. Booster pump No. 2B normally takes suction from surge tank No. 2 and delivers water through a 10-inch steel main, as does booster pump No. 1, to either the 1-1/2-million gallon tank or to the Old Post reservoirs. This booster pump can, by means of valve manipulation, also deliver water to the 3-million gallon tank.

(c) Booster pumps Nos. 3, 4, 5 and 6, all take suction from their adjacent tanks and discharge into the 3-million gallon tank.

(d) Booster pumps Nos. 7A, 7B, 7C and 7D are located in the Wherry Booster Station and are manifolded, taking common suction from the 3-million gallon tank and from there delivering water to the 1-1/2-million gallon tank. This latter storage serves the intermediate area between the lower elevation area served by the 3-million gallon tank and the higher elevation area served by the concrete reservoirs located in the Old Post area.

(e) Booster pumps Nos. 8A, 8B and 8C are located in a building adjacent to the 1-1/2-million gallon tank and are manifolded, taking suction from the 1-1/2-million gallon tank and from there delivering water to the two reservoirs located in the Old Post area.

(2) Water supply mains consist of cast-iron, asbestos-cement and steel pipe, and comprise approximately 53,100 feet in length.

f. Water Consumption: Table 3 shows Maximum Daily Water Consumption by months.

g. Water Quality:

(1) Water samples have been collected intermittently since 1941 from the Fort Huachuca well field and springs in Garden and Huachuca Canyons. In general, water from all the sources sampled is of excellent

quality and would be satisfactory for most uses without extensive treatment. Recent analyses of samples from the well field and presented in Table 4 of this report. Inasmuch as recent data pertaining to Garden and Huachuca Canyons are not available, no analyses, waters from the canyons would approximate those from the well field.

h. New Water Supply Sources:

(1) The existing well field has experienced a continous lowering of static water levels and with an encreasing water demand, a new source of water supply is deemed necessary. In order to supplement the well field supply, and MCA project was included in the FY-69 MCA program to develop the spring water supply in Huachuca and Garden Canyons. This project now providing a portion of the supply for Post requirements.

(2) A second well field, if developed in the North Gate-Libyy Field area, would partly decrease the concentrated draft on the Fort Huachuca well field, and would utilize ground water that now moves unused northeastward to the San Pedro River. As additional water needs are required, consideration is being given to developing this well field.

(3) Treated effluent from sewage treatment plant No. 1 is used for irrigation of the golf course.

(4) San Pedro River Development: At the present time, feasibility studies are being conducted by the Bureau of Reclamation for development of a multi-purpose dam and reservior on the San Pedro River in the Charleston-Fairbanks area. This facility will, according to present planning, be utilized for flood control, conservation, fish and wildlife services and recreational purposes. Tentative plans call for delivery of water to Tucson, Arizona, for municipal and industrial usage, with some water also being provided for irrigation intersts downstream of the proposed facility. Based on current municipal water requirements and available water supplies, it is not anticipated that Fort Huachuca and surronding communities will be supplied with water, nor is it

anticipated that any water will be utilized for ground water recharge. It must be emphasized that this project is still in the feasibility stage.

9-04 FIRE PROTECTION

a. Reference: Basic Information Maps.

b. Fire Hydrants: There are 426 fire hydrants distributed over the built-up areas of the installation. All fire hydrants are standard 2-2½" hose connections and 1-4½" pumper connections and are in good working order.

c. Sprinkler System: The following buildings have fire sprinkler system:

(1)	22215	Prefab steel building (ASA)
(2)	22414	Commissary
(3)	T-30126	Auto Shop
(4)	T-30120	Post Laundry
(5)	T-30123	QM Maintenance Shop/Bakery
(6)	43002	Officers Club
(7)	T-66050	Service Club
(8)	T-51026	Main Post Exchange
(9)	T-67361	Warehouse
(10)	T-67362	Warehouse
(11)	T-68350	Warehouse
(12)	48060	Warehouse
(13)	16510	Service Club
(14)	T-85002	Confinement Barracks
(15)	T-72908	Maintenance Shop
(16)	T-90420	Warehouse
(17)	T-90310	Warehouse
(18)	91114	Roto Wing Hangar
(19)	91110	Fixed Wing Hangar
(20)	T-90012	Warehouse
(21)	70525	NCO Club

(22) The following buildings are part of the mobilization hospital constructed in 1942:

T-13025	Ward	T-13045	Ward
T-13027	Ward	T-13046	Ward
T-13026	Ward	T-13047	Ward
T-13028	Ward	T-13048	Ward
T-13030	Hosp Rec	T-13049	Ward