1 Sep 1966	1969		A
1,754,000.00		34190	

10. PROPOSED APPROPRIATION	11. BUDGET ACCOUNT NUMBER	12. LINE ITEM NUMBER	13. LINE ITEM TITLE
5,000.00	6100	998000	Water Development Conservation and Water Conservation

SECTION A - DESCRIPTION OF LINE ITEM

14. TYPE OF CONSTRUCTION	
Replacement	X
Improvement	
Expansion	
Alteration	
Conversion	
Relocation	
Demolition	
15. REPLACEMENT	
17. TYPE OF DESIGN	
A. STANDARD DESIGN	
B. SPECIAL DESIGN	X
C. DRAWING NO.	

18. PHYSICAL CHARACTERISTICS OF PRIMARY FACILITY

a. NO. OF UNITS N/A b. NO. OF STORIES N/A c. LENGTH N/A d. WIDTH N/A
e. DESIGN CAPACITY N/A f. GROSS AREA N/A
g. PARKING N/A CAP N/A h. [illegible] N/A

19. DESCRIPTION OF WORK TO BE DONE

Construct cut-off dams with infiltration galleries and collection piping. Install chlorination system. Drill and case observation wells and recharge well. Install deep well pump and booster. Provide secondary sewage treatment by constructing oxidation ponds; provide pump inclosure and 8-inch water main from pump station to Post Golf Course to allow use of treated effluent for irrigation purposes.

SECTION B - COST ESTIMATES

20. PRIMARY FACILITY	U/M	QUANTITY	UNIT COST $	COST $ 000
a. Pipe Lines	LF	95345	7.00	672
b. Oxidation Ponds	TG	1338	316.	420
c. Infiltration Galleries	JOB	1	LS	410
d. Well Drilling 3 -8" & 1 -24"	EA	4	34,000.	138
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX		XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX		
e. 1000 GPM Booster	EA	1	800.00	1
f. 700 GPM Booster & Clear Well	JOB	1	LS	30
g. 700 GPM Well Pump	EA	1	16,000.	16
h. Pump Shelters	SF	261	10.00	3
i. Chlorination System	JOB	1	LS	6
j. Electrical Distribution	LF	3000	3.50	11
k. Pump Controls	JOB	1	LS	7
l. US Geol. Survey Supervision	JOB	1	LS	40
22. TOTAL LINE ITEM COST				$ 1,754

SECTION C - BASIS OF REQUIREMENT: Factor developed by US Geol. Survey over a 5-year period

23. QUANTITATIVE DATA (U/M LF)	
a. TOTAL REQUIREMENT	655,205
b. EXISTING SUB-STANDARD	(0)
c. EXISTING ADEQUATE	559,860
d. [illegible] INVENTORY	0
e. [illegible] (c+d)	559,860
	AUTHORIZED / FUNDED
f. [illegible] AUTHORIZATION	0
[illegible]	95,345
None	

25. REQUIREMENT FOR LINE ITEM: This item is required to provide additional water for domestic and irrigation use as well as to reduce the amount of water withdrawn from the diminishing underground water basin. Water used at this installation as well as surrounding communities is supplied from the same underground basin at a depth of some 475 feet. A continuous lowering (18 feet since 1954) of the static level of this basin has become a problem of grave concern to this installation. The demand for water on the installation as well as surrounding communities has increased over the past 8 years from approximately 1,140,000 gallons per day to 6,600,000 gallons per day.

This project proposes to supplement the existing Post water supply by utilizing, to every practical extent possible, the water supply afforded by springs in Sachuca [illegible] Canyon as recommended by the U[illegible] Geological Survey. In addition, the sewage effluent will be used for irrigation.

The method utilized herein proposed will reduce pumping during the summer [illegible] and eliminate [illegible] during the winter season. This project is [illegible] replenish the un[illegible] and will stabilize the water table by replacing [illegible] water than will [illegible] the [illegible]

USF200001902

USF200001903

LINE ITEM NUMBER	LINE ITEM TITLE	INSTALLATION
008000	Water Development Canyons and Water Conservation OEF	Fort Huachuca

1. GENERAL:

The water supply system must accommodate an average 24-hour population of 12,000. The peak water consumption which occurs during the months of March through June exceeds 4,000,000 gallons per day. The following is a tabulation of the water consumption in gallons during the past nine (9) years:

Year	Average Day	Maximum Day	Year Total
1956	1,226,000	2,622,000	447,005,000
1957	1,524,000	3,207,000	556,121,000
1958	1,874,000	3,460,000	683,968,000
1959	2,055,000	3,540,000	750,228,000
1960	2,200,000	4,205,000	802,806,000
1961	2,250,000	3,990,000	821,217,000
1962	2,476,000	4,461,000	903,730,000
1963	2,187,000	4,416,000	798,217,000
1964	2,115,000	4,020,000	771,858,000
1965	2,530,000	3,580,000	912,366,000

This project will produce water for domestic use, water basin recharge, and irrigation in excess of 450,000,000 gallons per year. It is estimated that 250,000,000 gallons a year can be used for domestic consumption. Since the cost of producing water at this installation is 14 cents per thousand gallons, a savings of some $35,000.00 per year would result; however, the principal consideration is not in a monetary savings to the Government but in the conservation of a critical natural resource which is being depleted. This depletion is evident by the lowering of the underground water table, at this installation, as verified by the US Geological Survey, (records from 1959 through present) of some 2.4 feet per year. Furthermore, the rate of this depletion is continually increasing as more and more new wells are drilled adjacent to this installation by the Cities of Sierra Vista and Fry.

2. DATA ON ACCOMMODATIONS NOW IN USE:

The existing water system consists of six deep wells with clear wells, booster pumps and storage capacity of 5,450,000 gallons, which is made up of one 500,000 gallon elevated steel tank, one 3,000,000 gallon concrete ground level reservoir, one 1,500,000 gallon concrete reservoir and the two old masonry reservoirs in the main post area with a combined capacity of 450,000 gallons. There also exist two booster stations, one in the Wherry Housing Area which delivers water to the 1,500,000 gallon reservoir and one at the base of this reservoir which delivers water to the 450,000 gallon masonry reservoirs on the ridge above the main post. This system of wells and well booster pump is capable of maximum production of 5,400,000 gallons per day with all wells and booster pumps operating on a full 24-hour schedule. (See Supplemental Data Sheets for detail description of existing system).

The existing sewage system was constructed in 1942 consisting of two primary treatment plants. Effluent discharges into an arroyo on the east reservation range. This effluent dissipates through evaporation and transpiration with no beneficial result. An average of 1,330,000 gallons per day of effluent is being generated by this installation.

3. ANALYSIS OF DEFICIENCY:

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 an average of 18 feet during the period of 1954 to 1962 on an average of 2.4 feet per year. This rate of decline in the water table has not been a uniform 2.4 feet per year but rather is in proportion to the water withdrawn by pumping from the aquifer. The ever increasing demands on this underground water basin created by heavy water usage at this installation (as indicated under General paragraph above) as well as the ever increasing demand in adjacent well fields in surrounding communities (Sierra Vista consumes at present 1,400,000 gallons per day) results in an ever increasing rate of decline in the static water level. This installation is constantly drawing upon a steadily decreasing resource at a steadily increasing rate. The inevitable result will be a complete depletion of a critical natural resource. Recorded water flow figures, as developed by the US Geological Survey, for Garden and Huachuca Canyon Springs, indicate an average flow of 1,000,000 gallons per day, which is lost to transpiration and evaporation (a very small quantity of this water penetrates to recharge the underground water basin). In addition, 1,330,000 gallons per day of effluent, generated by the sewage disposal system, is also lost. If this installation is to be assured of an adequate water supply in the future, the water table must be stabilized i.e., the rate of water withdrawal must not exceed the rate of recharge. To achieve this, all water available (spring water and effluent) must be utilized. The water generated by the Springs will be utilized as follows:

LINE ITEM NUMBER	LINE ITEM TITLE	INSTALLATION
098000	Water Development Canyons and Water Conservation DEF	Fort Huachuca

(1) During periods of maximum demand the entire volume of spring water production will be delivered into the domestic water supply storage system. This spring supply will be supplemented by pumping from wells as necessary to maintain full storage capacity at all times.

(2) During periods of minimum demand, when the volume of spring water production exceeds the requirements of the post, the excess above post requirements will be diverted to the recharging well and utilized to restore the water table elevation, in the cone of depression, created by withdrawal through the wells during operation of pumps. There will be a considerable volume of water available from the springs for recharging since maximum production occurs during the winter months when post water demand is the least. Also, during these months it should not be necessary to operate the pumps at all, or, if pumping is necessary, it should be only for short periods at intervals immediately following peak withdrawal from storage.

b. The water generated from sewage effluent will be utilized to irrigate the 9-hole post golf course as well as other post lawns and vegetation. This will reduce the use of well water for irrigation and allow the water table to build-up. The principal features of construction are as follows:

(1) Spring Water System:

(a) Excavation to bed-rock and construct concrete cut-off dams. These dams will be backfilled with gravel and sand to allow water to collect and be drained off by the collection piping. Dams will be located at each of the springs. (Ten (10) locations).

(b) Construct 85,745 feet of pipe line (4" to 20" diameter) between collection works and ground storage reservoirs.

(c) Drill and case recharge well (24" diameter) in post well field. Install 700 gallon per minute well pump and 700 gallon per minute booster pump to tie into post water distribution system. Well pump is required to back wash recharge well.

(d) Drill and case three (3) 8-inch observation wells. These wells are for observing recharge rates and conditions.

(e) Supervision of recharging and construction work at the springs will be by the US Geological Survey, Ground Water Branch.

(2) Sewage Effluent System:

(a) Oxidation ponds will be constructed adjacent to sewer plant #2. Six ponds are required with a water surface of 330 feet square.

(b) Connect oxidation ponds with existing sewer plant effluent line.

(c) Construct 9,000 feet of main to golf course together with pump house.

(d) Install 1,000 gallon per minute pump with miscellaneous connections.

4. ANALYSIS OF ALTERNATIVE FACILITIES AND LOCATIONS: The following alternate courses of action have been investigated:

a. Extending present wells to greater depths to intercept additional water bearing materials. Studies of the geology, prepared by the US Geological Survey, indicate that the productive aquifer lies between 450 feet and 600 feet from the ground surface. All existing wells are of such a depth as to intercept the entire aquifer. Well Number 6 was drilled to a depth of 1,230 feet as a test hole and no additional water was intercepted between 600 feet to 1,230 feet. The above facts indicate that (1) obtaining additional water at greater depths is dubious and would require test drilling in the well field area as well as pumping. This operation would result in expenditure of funds in the thousands of dollars and could be a total loss; (2) pumping of water from depths of 1,500 feet would be a costly operation (present water costs including maintenance is 14 cents per 1,000 gallons pumping from 600 feet) approximately 23 cents per 1,000 gallons produced.

b. Drill additional wells to supply the required water. This would be a solution to the immediate problem of additional water; however, since any additional wells would draw from the same aquifer, utilized by the present well field, this solution would accelerate the complete depletion of the underground water supply.

5. ANALYSIS OF CRITERIA FOR A NEW CONSTRUCTION: The conservation of a critical natural resource is the main factor influencing the proposed construction. In addition, the existing wells are producing water at or near their economical limit.

6. STATEMENT OF PROGRAM FOR RELATED EQUIPMENT: No related equipment is required in support of this project.

USF200001904

LINE ITEM NUMBER	LINE ITEM TITLE	INSTALLATION
098000	Water Development Canyons and Water Conservation DEF	Fort Huachuca

7. DISPOSITION OF PRESENT ACCOMMODATIONS: The existing pipe lines in Huachuca and Garden Canyons, installed in early 1900's by post personnel, are in poor condition. These pipe lines vary in size from 2" to 8" and those portions, which are serviceable, will be utilized in the proposed project. Since this project is for the purpose of augmenting the existing water supply system, none of the existing facilities will be replaced or abandoned.

B. H. Pochyla

B. H. POCHYLA
Major General, USA
Commanding

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