

# FOR OFFICIAL USE ONLY

1. DATE 24 Apr 67		2. FISCAL YEAR 1969		MILITARY CONSTRUCTION LINE ITEM DATA			3. DEPARTMENT ARMY		4. INSTALLATION FORT HUACHUCA	
3. PROPOSED AUTHORIZATION \$1,754,000.00		6. PRIOR AUTHORIZATION P.L.		7. CATEGORY CODE NUMBER 84190		8. PROGRAM ELEMENT NUMBER 651220971		9. STATE/COUNTRY ARIZONA		
10. PROPOSED APPROPRIATION \$1,754,000.00				11. BUDGET ACCOUNT NUMBER 6100		12. LINE ITEM NUMBER 098000		13. LINE ITEM TITLE Water Development Canyons and Water Conservation		

  

SECTION A - DESCRIPTION OF LINE ITEM		SECTION B - COST ESTIMATES		
18. PHYSICAL CHARACTERISTICS OF PRIMARY FACILITY		20. PRIMARY FACILITY		
a. PERMANENT	b. NO. OF BLDGS N/A	a. Pipe Lines	U/M	
b. TEMPORARY	c. DESIGN CAPACITY	b. Oxidation Ponds	QUANTITY	
c. TEMPORARY	d. DESIGN CAPACITY	c. Infiltration Galleries	UNIT COST	
15. TYPE OF WORK	e. COOLING	d. Well Drilling 3'-8" & 1'-24"	COST (\$000)	
d. NEW FACILITY	f. GROSS AREA	e. 8/1000 GPM Booster		
b. ADDITION	19. DESCRIPTION OF WORK TO BE DONE	f. 6/ 700 GPM Booster & Clear Well		
c. ALTERATION	Construct cut-off dams (below stream surface) with infiltration galleries and collection piping. Install ment basin together with observation wells. Install deep well pump clear-well and booster pump. Provide secondary sewage treatment by constructing oxidation ponds. Provide water line and booster pump to deliver treated effluent for irrigation of Post Golf Course.	g. Electrical Distribution		
e. OTHER (Specify)		h. 2/ Pump Sullere		
16. REPLACEMENT		i. 1/ Chlorination System		
17. TYPE OF DESIGN		k. 4/ Pump Controls		
a. STANDARD DESIGN		l. 1/ US Geological Survey Supervision		
b. SPECIAL DESIGN				
c. DRAWING NO.				
X			IR (95,245 )	2.00 ( 672 )
			IS ( 1,330 )	216.00 ( 420 )
			JOB ( 1 )	15 ( 410 )
		EA ( 4 )	34,000 ( 138 )	
		EA	800.00 ( 1 )	
		EA	15 ( 30 )	
		SF	260 ( 16 )	
		JOB	10,000 ( 3 )	
		LF	3,000 ( 6 )	
		JOB	3,500 ( 11 )	
		JOB	15 ( 7 )	
		JOB	15 ( 40 )	

  

SECTION C - BASIS OF REQUIREMENT		22. TOTAL LINE ITEM COST	
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item is required to provide additional water for domestic and irrigation use as well as to reduce the amount of water withdrawn from the diminishing underground water basin.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 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.		U/M	COST (\$000)
23. QUANTITATIVE DATA			\$ 1,754
a. TOTAL REQUIREMENT (U/M )	655,205		
b. EXISTING SUBSTANDARD	0		
c. EXISTING ADEQUATE	559,860		
d. FUNDED, NOT IN INVENTORY	0		
e. ADEQUATE ASSETS (t & d)	559,860		
f. UNFUNDED PRIOR AUTHORIZATION	0		
g. INCLUDED IN FY PROGRAM	0		
h. DEFICIENCY (a - f - g)	95,345		
i. RELATED LINE ITEMS NONE	95,345		

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

**1. GENERAL:**

The water supply system must accommodate an average 24-hour population of 16,000. 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 eleven (11) 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
1966	2,398,000	4,464,000	863,532,000

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 City of Sierra Vista and Ft. Y.

**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 5,600,000 GALLONS PER DAY WITH ALL WELLS AND BOOSTER PUMPS OPERATING ON A 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 data on file at this installation indicate that the underground water table in the existing well field has declined an average of 19 feet during the period of 1959 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 ground 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) result 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 and evaporates 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:

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<p>(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.</p> <p>(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 or settlement basin and utilized to restore the recharging elevation. 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.</p> <p>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:</p>	<p>(2) Sewage Effluent System:</p> <p>(a) Oxidation ponds will be constructed adjacent to Sewer Plant No. 2. Six ponds are required with a water surface of 530 feet square.</p> <p>(b) Connect oxidation ponds with existing sewer plant effluent line.</p> <p>(c) Construct 9,000 feet of main to golf course together with pump house.</p> <p>(d) Install 1,000 gallon per minute pump with miscellaneous connections.</p> <p>4. <u>ANALYSIS OF ALTERNATIVE FACILITIES AND LOCATIONS:</u> The following alternate courses of action have been investigated:</p> <p>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 test pumping. This operation would result in expenditure of funds in the thousands of dollars and could 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.</p> <p>b. Drill additional wells in present well field 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.</p> <p>5. <u>ANALYSIS OF CRITERIA FOR A NEW CONSTRUCTION:</u> 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 limits.</p> <p>6. <u>STATEMENT OF PROGRAM FOR RELATED EQUIPMENT:</u> No related equipment is required in support of this project.</p>	
<p>(1) Spring Water System:</p> <p>(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).</p> <p>(b) Construct 85,745 feet of pipe line (4" to 20" diameter) between collection works and ground storage reservoirs. as recharge well or as a supply well from settlement basin. Install 700 gallon per minute well pump and 700 gallon per minute booster together with clear well and tie into post water supply system.</p> <p>(d) Drill and case three (3) 8-inch observation wells. These wells are for observing recharge rates and conditions.</p> <p>(e) Supervision of recharging and construction work at the springs will be by the US Geological Survey, Ground Water Branch.</p>	<p>(1) Spring Water System:</p> <p>(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).</p> <p>(b) Construct 85,745 feet of pipe line (4" to 20" diameter) between collection works and ground storage reservoirs. as recharge well or as a supply well from settlement basin. Install 700 gallon per minute well pump and 700 gallon per minute booster together with clear well and tie into post water supply system.</p> <p>(d) Drill and case three (3) 8-inch observation wells. These wells are for observing recharge rates and conditions.</p> <p>(e) Supervision of recharging and construction work at the springs will be by the US Geological Survey, Ground Water Branch.</p>	

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LINE ITEM NUMBER  
098000

LINE ITEM TITLE  
Water Development Canyons and Water Conservation

DRF

INSTALLATION  
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.

  
N. C. ANSEL  
Colonel, SigC  
Commanding

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