



WATER-RIGHT DOCKET

Shenandoah National Park

Docket No: 10

WELL. THORNTON GAP WATER SYSTEM

Preliminary Docket Information

00-00-0000: index: thornton gap water system

SHENANDOAH NATIONAL PARK

Docket #10

Thornton Gap Water System

I N D E X

PART I - INVESTIGATION

1. Completion Report for construction of water supply and sewage disposal systems dated November 16, 1960.
2. Geologic and Topographic Map of Thornton Gap Area, Shenandoah National Park.
3. Preliminary Report, Thornton Gap Area, prepared by Virginia Division of Mineral Resources, Charlottesville, Virginia, November, 1962.
4. Pump Test Data Sheet.
5. Water Analyses.
6. Drawdown and Partial Recovery Curves.
7. Geologic Log.
8. Water Well Completion Report.
9. Final Report, Thornton Gap Area, prepared by Virginia Division of Mineral Resources, Charlottesville, Virginia, January 15, 1965.
10. Memorandum to Chief, EODC, from Superintendent, Shenandoah National Park, dated February 2, 1965.
11. Memorandum to Chief, EODC, from Acting Assistant Regional Director, Operations, Southeast Region, dated February 18, 1965.

12 *Layout of water system (2 sheets NP-SHG-2760)*

PART II - WATER RIGHTS

Part III Alien Water Use - Town of Luray

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF CONSERVATION AND ECONOMIC DEVELOPMENT
DIVISION OF MINERAL RESOURCES
JAMES L. CALVER, COMMISSIONER

VDMR 948
WWCR 79
OFFICE ADDRESS:
McCormick Road
Charlottesville, Virginia

MAILING ADDRESS:
Box 3667, University Sta.
Charlottesville, Virginia

WATER WELL COMPLETION REPORT

OWNER: Shenandoah National Park Mailing Address: Luray, Virginia

TENANT: Thornton Gap Well No: 1 Mailing Address: _____

DRILLER: Sydnor Pump & Well Co., Inc. Mailing Address: Richmond 12, Virginia

WELL LOCATION: County Page Approx. 1/2 ^{feet}/_{miles} southwest (direction) of
Int. of Skyline Drive and U.S. 211 and 1200 ^{feet}/_{miles} south (direction) of U.S. Hwy. 211

(GIVE DIRECTION AND DISTANCE IN FEET OR MILES FROM TWO REFERENCE POINTS - ROADS, TOWNS, RIVERS, ETC. - ON COUNTY HIGHWAY OR OTHER MAP.)

DATE STARTED: 1/27/64 DATE COMPLETED: 2/11/64

TYPE OF DRILL RIG USED: Air Rotary TOTAL DEPTH 333 feet

WATER LEVEL: Stands 20 feet below surface OR
has NATURAL flow of _____ gallons per minute.

YIELD TEST: Method (See test pump log for data) HOLE SIZE: 10 inches from 0 to 27 feet
Drawdown _____ feet 6-1/4 inches from 27 to 333 feet
Rate 5 gal. per min. _____ inches from _____ to _____ feet
Duration 18 hrs., _____ min. SCREEN SIZE: _____ inches from _____ to _____ feet
_____ inches from _____ to _____ feet

WATER ZONES: from 144 to 145 feet
from 195 to 196 feet
from 229 to 230 feet
from 270 to 271 feet

WATER: Color OK Taste OK
Odor OK Temp. 54 °F

WELL TO SUPPLY: (check one) Home _____
Farm _____ Town _____ School _____
Industry _____ Other Public

GROUTING: Method Gravity
Material cement & water Depth 27 feet

PUMP: Type Summo (test)
Capacity _____ gal. per min.
Depth of intake 320 feet

WATER ANALYSIS AVAILABLE: Yes X No _____

DRILL CUTTINGS SAVED: Yes X No _____

DRILL CUTTINGS SHOULD BE COLLECTED AT 10 FOOT INTERVALS. THESE SAMPLES MAY BE SHIPPED TO THIS OFFICE EXPRESS COLLECT. SAMPLE BAGS ARE FURNISHED FREE OF CHARGE UPON REQUEST.)

REMARKS: Bedrock at 15 feet.

Log and samples to Div. of Min. Resources

LOG

Rig 65 FURNISHED BY: Sydnor Pump & Well Co., Inc. DATE: 2/12/64

Data from drillers notes by Jesse Snyder, Jr.

DEPTH (feet)		TYPE OF ROCK OR SOIL PENETRATED (gravel, clay, etc., hardness, color, etc.)	REMARKS (water, caving, shot, screen, sample, etc.)
FROM	TO		
0	15	Clay boulders weathered limestone	
15	24	Greenstone weathered with clay seams	
24	27	Hard greenstone	
27	108	Greenstone	
108	190	Greenstone	
190	196	Weathered greenstone	
196	228	Greenstone	
228	230	Weathered greenstone	
230	242	Greenstone	
242	243	Brown weathered rock	
243	270	Greenstone	
270	273	Dark green rock	
273	320	Green blue and brown rock	
320	325	Green blue and brown rock getting harder	
325	333	Blue green rock hard	
		AS Air lift test indicated about 8 gpm. The driller thought some water was coming from surface fracture system. Well was grouted before pump test and pump test indicated 5 gpm. See test log for complete data.	

Land History

Form 10-559
(Nov. 1958)

U. S. DEPARTMENT OF THE INTERIOR - NATIONAL PARK SERVICE

FIXED PROPERTY RECORD

DESCRIPTION OF PROPERTY (Include reference to the location within the Park, how the asset was acquired, name of contractor, etc)

Location: Panorama Development, Thornton Gap - North District

Four Springs

One 20,000 Gallon Concrete Reservoir & One 50,00 Gal. Reservoir & one 200,000 Gal. reservoir

One Concrete Weir House, 8'x10'

2,800 Linear Feet of Pipe plus 3,181 L.F. of pipe

One Stone-Masonry Drinking Fountain Three 4" Fire Hydrants

One Fire Hydrant

Three stone drinking fountains

Gravity System(Chlorinated)

Constructed by CCC in 1936, Force Acct.

1999 Contract 14-10-137-78, Brack & Davis

LINE	DATE	REFERENCE		QUANTITY			COST		
		Journal Voucher	Other	Unit	No. of Units	Accumulated Total	Direct Costs	Indirect Costs	Accumulated Costs
1	8/27/59	37-10		System	1				4,900.00
2	6/30/60	37-123			1		18,531.28	3,248.33	26,688.61
3	1/25/62	37-89			1		771.53	147.03	27,618.19
4	6/12/64	37-129			1		23,302.00	3,722.14	34,655.63
5									
G.L. Acct. No. 100-2		General Classification			Sub-Classification		Region	State	Park or Office

THIS DEED, Executed in the names of the State of Virginia and of the State Commission on Conservation and Development, by the Governor of Virginia and the Chairman of the said State Commission on Conservation and Development, under and pursuant to authority vested in them by an Act of the General Assembly of Virginia, approved March 22, 1928, the short title of which is the "National Park Act" (Acts of 1928, Chapter 371, Page 928), on and as of the day and date on which the said Chairman of the State Commission on Conservation and Development acknowledges his signature thereto as disclosed by the annexed notarial certificate. WITNESSETH that.

B. The fee simple estate in lands in Page County, Virginia, which is herein given, granted, conveyed and transferred to the United States of America, is subject nevertheless; (1) To such easement of passage and rights of way as have heretofore been acquired by the United States of America in, on or over a strip of land one hundred feet wide running through the said lands; and, (2) To such rights of way and easements in, on or over the said lands for the erection, maintenance, repair, replacement, and operation of poles and wires or other appliances or means for the transmission of electricity as have heretofore been lawfully acquired therein by the South East Public Service Corporation; and by the Page Power Company of Virginia, Incorporated; and, (3) To such rights of way or easements heretofore lawfully acquired by or established in favor of the Town of Luray, Virginia, to take, use and exploit in connection with its municipal water system, water originating or flowing over or through the said lands and to conserve the same from contamination and in suitable form for use in connection with the said water system, and to construct, maintain, repair, replace and operate a system of pipe lines from the Mary's Rock intake to the reservoir for a distance of approximately three and one-half miles.

C. The fee simple estate in lands in Rockingham County, Virginia, which is herein given, granted, conveyed and transferred to the United States of America, is subject nevertheless; (1) To such easement of passage and rights of way as have heretofore been acquired by the United States of America in, on or over a strip of land one hundred feet wide running through

Form 10-174
(June 1962)UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

FACE SHEET FOR COMPLETION REPORT

Park Shenandoah National Park	Region Southeast Region	Work Order No. 211701
Location in Park Thornton Gap Big Meadows Loft Mountain	State(s) Virginia	Fund Symbol 14X1035
☒ Contract and/or ☐ Day Labor	County or Counties Madison Rockingham Albemarle	Year Programmed 1966
Work Order Title Utilities, Seas.Qtrs., Big Meadows, Utilities for Firehouse, Workshop & Equip.Bldg., Big Meadows, Im- provement to Water System, Concess.Area, Thornton Gap; Utilities Ext. Concess. Dev. Big Meadows; Water Tank (100,000 gal), Concess. Dev., Big Meadows; Chain Link, etc.	Page 1	PCP No. U-86, U-117, U-152, U-164, U-165, M-145
DESCRIPTION OF FIXED ASSETS (For completion by employee in charge of project)	Master Plan No. NP-SHE 3145	Master Plan Corrected By
(Recap of Asset Accounts C&DL)	As Built Drawings By D&C PSC	Date Started July 1965
230 Utility System \$69,539.95	Date Completed July 1966	TOTAL COSTS (For completion by FFO)
240 Grounds & Other Improvements 635.00		
262 Equipment Not Subject to Depreciation Funding 580.00		
570 Invested and Donated Capital 885.00		
TOTAL \$		83,102.34

DISTRIBUTION		THE FIXED ASSET DESCRIBED ABOVE HAS BEEN COMPLETED IN ACCORDANCE WITH APPROVED DRAWINGS, SPECIFICATIONS, AND AUTHORIZED CHANGES	
No.	To	Submitted	Title: _____ Date: _____
		By: _____	
		Approved	Title: _____ Date: _____
		By: _____	
		COSTS VERIFIED	Title: _____ Date: _____
		BY <u>T. J. Baer</u> <i>TJB</i>	Regional Accountant MAY 16 1968

Form 10-174
(June 1962)UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

211701

FACE SHEET FOR COMPLETION REPORT

Park Shenandoah National Park	Region Southeast	Work Order No. B-62 (SNP)
Location in Park Thornton Gap Big Meadows Loft Mountain	State(s) Virginia	Fund Symbol 14X1035
	County or Counties Madison Rockingham Albemarle	Year Programmed 1966
☒ Contract and/or ☐ Day Labor		PCP No. U-86, U-117, U-152, U-164, U-165, M-145
Work Order Title Utilities, Seas. Qtrs., Big Meadows; Utilities for Firehouse, Workshop & Equip. Bldg., Big Meadows, Improvement to Water System, Concess. Area, Thornton Gap; Utilities Ext. Concess. Dev., Big Meadows; Water Tank (100,000-gal), Concess. Dev., Big Meadows; Chain Link Fencing for 3 Reservoirs, 100 ft. M.		Master Plan No. NP-SHE 3145
		Master Plan Corrected By --
		As Built Drawings By D&C PSC
		Date Started July 1965
		Date Completed July 1966
(For completion by employee in charge of project) CONTRACT PORTION		TOTAL COSTS (For completion by FFO)

230. Utility Systems:**1. Water Systems**

Big Meadows: Construct 100,000-gallon concrete reservoir with chamber, 781 l.f. of 6" C. I. water line and 27 l.f. of 4" C. I. water line with valves and fittings, 2 water meters, 2 fire hydrants, markers and electrical work

Thornton Gap: Construct 5,000-gallon wet well, 1,577 l.f. of 2" G. S. water line, valves and fittings, 1 H. P. pump, 10 H. P. submersible pump, chlorinator and housing, controls and electrical work

Loft Mountain: Construct 747 feet of chain link fence and 2 gates for the protection of the water system

2. Sewer Systems

Big Meadows: Construct 1,011 l.f. of 6" sewer line with four 48" manholes

(MISCELLANEOUS FORCE ACCOUNT WORK**(APPLIED TO WATER SYSTEMS BY MEANS OF)****Total**\$ **60,832.20****TOTAL**

\$

DISTRIBUTION		THE FIXED ASSET DESCRIBED ABOVE HAS BEEN COMPLETED IN ACCORDANCE WITH APPROVED DRAWINGS, SPECIFICATIONS, AND AUTHORIZED CHANGES			
No.	To	Submitted By:	Title:	Date:	
1	WASO	Robert R. Wiley	Project Supervisor	1966	
1	D&C PSC	Robert R. Wiley			
1	SERO	Robert R. Wiley			
1	SERO FO	R. Taylor Hoskins	Superintendent	2-7-68	
1	Shenandoah	R. Taylor Hoskins			
		BY			

Form 10-174
(June 1962)UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

FACE SHEET FOR COMPLETION REPORT

Park Shenandoah National Park	Region Southeast	Work Order No. 211701
Location in Park Thornton Gap Big Meadows Loft Mountain	State(s) Virginia	B-62 (SNP)
☐ Contract and/or ☒ Day Labor	County or Counties Page Madison Rockingham Albemarle	Fund Symbol 14X1035
Work Order Title Utilities, Seas. Qtrs., Big Meadows; Utilities for Firehouse, Workshop & Equip. Bldg., Big Meadows; Improvement to Water System, Concess. Area, Thornton Gap; Utilities Ext. Concess. Dev., Big Meadows; Water Tank (100,000-gal), Concess. Dev., Big Meadows; Chain Link Fencing for 2 Reservoirs, Loft Mt.	Year Programmed 1966	PCP No. U-86, U-117, U-152, U-164, U-165 & M-145
	Master Plan No. NP-SHE 3145	Master Plan Corrected By ---
	As Built Drawings By ---	Date Started July 1965
		Date Completed December 1966
		TOTAL COSTS (For completion by FFO)

DAY LABOR PORTION

230. Utility Systems:

1. Water System

Thornton Gap

Drill Production Well, 333' deep

\$ 2,387.00

Locate and develop spring flow and construct
concrete reinforced spring box and tie with
36"-2" G. S. to contract work

1,750.00

Big Meadows: Relocate 195' of existing water line
adding 15' of 6" C. I. pipe to existing footage,
install 1 - 6" fire hydrant and 2 valves, make
connection to building w/3" G. S. pipe, gate valve
and 2" meter.

2,970.75

2. Sewer System

Big Meadows: Construct 250' of 6" C. I. sewer line,
and 1 manhole, connected to existing system.

1,250.00

5. Electric System

Install 2 floodlight poles w/4 - 150 watt bulbs
each and 185' of #10-2 conductor.

350.00

TOTAL \$

DISTRIBUTION		THE FIXED ASSET DESCRIBED ABOVE HAS BEEN COMPLETED IN ACCORDANCE WITH APPROVED DRAWINGS, SPECIFICATIONS, AND AUTHORIZED CHANGES		
No.	To	Submitted By:	Title:	Date:
1	WASO	Thomas R. Lowe	Chief of Park	FEB 5 1968
1	D&C PSC	Thomas R. Lowe	Maintenance	
1	SERO	By: P. Taylor Hookins	Title:	Date:
1	SERO FO		Superintendent	2-8-68
1	Shenandoah			
		COSTS VERIFIED	Title:	Date:
		BY		

11360

Form 10-174A
(June 1962)UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

211701

COMPOSITION OF COST FOR COMPLETION REPORT

Work Order Number

B-62 (SNP)

Fund Symbol

14X1035

Park

Shenandoah National Park

Region

SE

Year Programmed

1966

Location in Park

North, Central and South Districts

Work Order Title Utilities, Seas. Qtrs., Big Meadows (U-86); Utilities for Firehouse, Workshop & Equip. Bldg., Big Meadows (U-117); Improvement to Water System, Concess. Area, Thornton Gap (U-152); Utilities Ext. Concess. Dev., Big Meadows (U-164); Water Tank (100,000-gal.), Concess. Dev., Big Meadows (U-165); Chain Link Fencing for 3 reservoirs, Loft Mt. (M-145)

COMPOSITION OF COST

COSTS CHARGED TO FUNDS ALLOTTED TO FIELD FINANCE OFFICE

(1) Personal Services.....	\$ 4,254.08	
(2) Travel..... (Reimburse Water Resources Account)	2,387.00	
(3) Contract Work ... Baughan Construction Company, Inc.	60,832.20	
(4) Supplies and Materials.....	3,098.32	
(5) Other Direct Expenses..... and Depreciation		
(6) Operation of Equipment.....	488.35	
(7) Depreciation of Equipment.....		
(8) Purchase of Construction Equipment.....		
(9) Purchase of Other Accountable Equipment 262	580.00	
(10) Other Costs:		
(11) TOTAL COST CHARGED TO FFO FUNDS.....	xxxxxxxxxx	\$ 71,639.95
OTHER COSTS:		
(12) PS&S, AP, and/or Facilitating Services @ 16 %.....	\$ 11,462.39	
(13) Inventory and Other Non-Fund Costs		11,462.39
(14) GROSS WORK ORDER COSTS	xxxxxxxxxx	\$ 83,102.34
LESS:		
(15) Residual Value of Construction Equipment on Line 8.....	\$	
(16) Other Credits		
(17) NET COST OF FIXED ASSETS.....	xxxxxxxxxx	\$ 83,102.34

Identify other costs and other credits by line item entry, on an attached schedule, or explain in narrative.

COMPLETION REPORT

Narrative

Contract No.: 14-10-0137-0183

Prime Contractor: Baughan Construction Company, Inc.

Sub-Contractors: Plumbing - J. Rex Burner Company, Luray, Va.
Electrical - Burner Electric, Luray, Va.
Roadwork - Painter & Mundy, Elkton, Va.

Sub-Sub.: Roadwork - Oscar Sours, Luray, Va.

Contract No. 14-10-0137-0183

The work on this contract was performed under the prime contracting firm of Baughan Construction Company of Luray, Virginia. It consisted of construction in the three separate districts of the Shenandoah National Park as follows:

District 3 - Loft Mountain - Here two existing reservoirs of 100,000 gallons each and a booster pump with a lesser gallonage reservoir were enclosed with chain link fencing.

District 2 - Big Meadows - Access roads to a fire house and to a parking area for proposed seasonal quarters along with water and sewer lines to service the proposed quarters were constructed at the maintenance area. Near the vicinity of the lodge and concessioner dwellings a 100,000 gallon reinforced concrete reservoir was constructed with the requisite water mains to integrate the new reservoir with the two existing 50,000 gallon adjacent reservoirs. Sewer lines for servicing dormitories and dwellings in the same vicinity were installed.

District 1 - Thornton Gap - At this location an existing well was activated by a 10 HP pump, pumping water into a 5000 wet well storage reservoir constructed under the contract. This reservoir also received water from a nearby spring box. The water thus obtained and stored was pumped through a new 2 inch pipe line toward the Panorama complex where in turn it could be valved into the existing lines from the reservoirs on top of the mountain as an auxiliary supply in times of drought.

The work was accomplished in accordance with the specifications and drawing being modified by change order where it was considered that an improved location or method would produce a more efficient plant without excessive additional cost.

As-Built Quantities and Cost:

Form 10-194
(Rev. 9/60)UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICESubmitted by
BAUGHAN CONSTRUCTION
COMPANY, INC.Shenandoah National Park
(Park)

Check One:

Monthly
Estimate ☐Final
Estimate ☒

C.M. Judd, Sec'y

UNIT PRICE CONTRACT

ESTIMATE NO.
Six & FinalFOR (Period)
December 31 1965 to July 1 1966DATE
July 1966CONTRACT NO.
14-10-0157-0183COMPLETION DATE
December 16 1965EXTENDED DATE
July 1 1966CONTRACTOR
Baughan Construction Co., Inc., Luray, Va.ORIGINAL
CONTRACT \$ 74,670.50PROJECT
Roads & UtilitiesCHANGE (See over)
ORDERS* 47.45LOCATION
Big Meadows/Thornton Gap/Loft MountainTOTAL
CONTRACT \$ 74,623.05

ITEM NO.	CONTRACT QUANTITY	DESCRIPTION	QUANTITY TO DATE	UNIT PRICE	AMOUNT TO DATE
508-1	L/B	Site Preparation	L/B	\$550	550.00
508-2	1000 cy	Borrow Excavation	466 cy	4.65	2166.90
508	975 cy	Base Prime/Bit Conc Surface*	796 cy	5.50	4378.00
519-1	8 ea	Concrete Wheel Stops	8 ea	15.00	120.00
703-1A	870 lf	C.I. Water Main	781 lf	10.31	8072.11
703-1B	1650 lf	2" Galv'd Water Main *	1577 lf	5.47	8626.19
703-10	50 lf	4" C.I. Water Main	27 lf	8.22	221.94
703-2	10 ea	Waterline Markers	9 ea	12.50	112.50
703-2A	1 ea	4" Gate Valve w/Box	1 ea	125	125.00
703-2B	8 ea	6" Gate Valve w/Box	8 ea	2138	17104.00
703-2C	4 ea	6" Check Valve	4 ea	167.5	670.00
703-2D	4 ea	2" Gate Valve w/Box	4 ea	348	1392.00
703-1	2 ea	4-1/2" Fire Hydrant	2 ea	375	750.00
703-1	2 ea	Water Meter w/Box (00 #4)	2 ea	278	556.00
707-1	1000 lf	6" Conc Sewer Pipe	1000 lf	7.10	7100.00
707-2	50 lf	6" C.I. Sewer Pipe	11 lf	7.50	82.50
708-1	4 ea	48" Manholes	4 ea	250	1000.00
908-4	900 lf	Chainlink Fence	747 lf	3.50	2614.50
908-5	2 ea	Chainlink Gate	2 ea	200	400.00
729-1	L/B	70 gal Wet Well	L/B	\$8521	8521.00
728-1	L/B	1000 gal Reservoir	L/B	\$1955	1955.00
528-22	L/B	Miscel Force Asst*	L/B	\$1000	641.86
528-23	225 cy	Task Cost	247 cy	3.35	827.45
528-23		2" Bit. Conc. Surface			
528-30		Less Base			
		CHANGE ORDER #3:			
		(a) Change in Chlorinator	ADD		249.00
		(b) Move Fire Hydrant	ADD		358.60

*See C.O. #2

RECOMMENDED (Project Supervisor)

(SIGNED)

APPROVED (Contracting Officer)

DATE

JUL 15 1966

SUMMARY

TOTAL TO DATE	\$ 68874.55
LESS RETAINED AMOUNT	
NET	
LESS PREVIOUS PAYMENTS	49807.22
LESS LIQUIDATED DAMAGES	
DUE THIS ESTIMATE	19067.33
% COMPLETED TO DATE:	100%

*Copy Breakdown on Reverse

(See Reverse for Distribution)

NARRATIVE TO ACCOMPANY PROJECT COMPLETION REPORT

WORK ORDER B-62 (SNP) (CONTRACT PORTION)

Utilities, Seasonal Quarters, Big Meadows (U-86); Utilities for Firehouse, Workshop and Equipment Building, Big Meadows (U-117); Improvement to Water System, Concessioner Area, Thornton Gap (U-152); Utilities Extension Concessioner Development, Big Meadows (U-164); Water Tank (100,000-gallon), Concessioner Development, Big Meadows (U-165); Chain Link Fencing for 3 Reservoirs, Loft Mountain (M-145)

A Work Order was submitted June 28, 1965, requesting funds in the amount of \$69,137.50, for Contract and Force Account work. The Contract work amounted to \$62,750.50 for additions to utilities systems in the park (actual expenditure, \$60,832.20) and \$2,387.00 for reimbursement to the Water Resources Account for a production well drilled at Thornton Gap under a previous contract. The Force Account portion amounted to \$4,000.00 for developing and tying into the existing system at Thornton Gap. The total amount of these funds was received by Allotment Advice No. 3-106, June 29, 1965.

Day Labor work on developing the spring began immediately with the removal of the topsoil and overburden. The source of the spring was located in a crevice in the ledge rock and the flow was determined to be seven gallons per minute minimum. The area was cleaned out and forms set for footings and walls. The collecting box was constructed of steel reinforced concrete approximately 5' x 5' by 6' deep with 6" walls and an open bottom. The top was covered with a hinged 3/16" sheet steel lid for protection of the system. The outflow lines were tied into the contractor's work in the area and the area was graded. After the contractor moved out, the entire area was seeded.

The first revision of Work Order B-62 was submitted September 24, 1965, requesting an increase of \$4,355.00 for additional Force Account work. The requested funds were received by Allotment Advice No. 3-6-15, October 15, 1965.

These funds were used to purchase four fire hose storage buildings; two - Big Meadows Visitor Center, one - Big Meadows Wayside, and one - Shower/laundry building, and for the utilities extensions to the Concessioner shower/laundry complex at Big Meadows. With the building of the shower/laundry complex and parking areas, it was necessary to relocate 195 feet of 6" water line and install 210 feet of new 6" C. I. water line and a fire hydrant for fire protection. For the building connection, a 3-inch gate valve and 2-inch meter were installed using 15 feet of 3-inch G. S. pipe. Installation of 250 feet of 6-inch C. I. sewer line was made using the salvaged water pipe and some new pipe. One manhole was constructed. The line tied into the existing system. Two floodlight poles were fabricated and four 150-watt bulbs mounted

on each, 185 feet of No. 10-2 conductor underground wire were connected to a time clock mounted on the shower/laundry building.

The old shower/laundry building in the Big Meadows Trailer Campground was razed and all salvageable materials saved for future use.

Some additional cleanup and seeding work was deemed necessary in certain of the areas after the contractor had completed his work. This work was accomplished by Day Labor as time and weather conditions permitted.

Thomas R. Lowe
Thomas R. Lowe
Chief of Park Maintenance
Project Supervisor



UNITED STATES
DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE
SOUTHEAST REGION
P. O. BOX 10008
RICHMOND, VIRGINIA 23240

IN REPLY REFER TO:

L54 SER(OLW)

FEB 18 1965

Memorandum

To: Chief, EODC

From: Acting Assistant Regional Director, Operations,
Southeast Region

Subject: Thornton Gap Area final water resources report,
Shenandoah

We are enclosing for your information a copy of the subject report prepared by the Virginia Division of Mineral Resources, Charlottesville, Virginia. Also included are copies of the Water Well Completion Report, Geologic Log, Water Analyses, Pump Test Data Sheet and Drawdown and Partial Recovery Curves for Thornton Gap Well No. 1.

Superintendent Hoskins has requested that the existing spring and deep well be connected into the water distribution system for Thornton Gap. This work has been scheduled in the 1966 F.Y. construction program. It is believed these two water sources will provide an adequate supply for the concession development during future years. Therefore, no further test well drilling is planned at this area until additional water demands are placed on the system.

W. Mikell

Enclosures 6

cc:
Director, w/encs.
Supt., Shenandoah

D5039

To: Chief, EODC

From: Superintendent, Shenandoah

Subject: Improvement to Water System, Thornton Gap

The spring is located about 150 feet from the well and is sufficiently higher in elevation to provide a gravity flow to the well location. The spring flow ranges from 5 to 15 GPM. A temporary collection system has been installed for the spring and it has been used in emergencies to supplement the existing Thornton Gap supply.

2-10-1964

CC:
→ SERO

National Park Service
Contract No. 14-10-0137-0169

Final Report
THORNTON GAP AREA
Shenandoah National Park

Sydnor Pump and Well Company began drilling Test Hole #1 on January 27, 1964, at the site recommended by the Virginia Division of Mineral Resources (Thornton Gap Preliminary Report, November 1962). This hole and a hole at an alternate site 15 feet to the south were each abandoned at less than 25 feet because of mud and boulder conditions that prevented further drilling. A second alternate site for Test Hole #1 was selected approximately 60 feet east of the original site, and the 20 feet of overburden was successfully cased off on February 5, 1964.

Geology

In the Thornton Gap Area the Pedlar Formation is thrust-faulted over the Catoctin Formation, and it was intended to locate Test Hole #1 so as to penetrate this fault zone at a depth of approximately 65 feet. In the portion of the Area most accessible for a drilling rig, and where electric power is available, the surface trace of this fault is buried beneath several feet of soil and rocks in a zone some 200 yards wide. The drilling site was selected in this zone at a location believed to be southeast of the fault trace, in the Pedlar Formation. As the first bedrock drill cuttings were of the Catoctin Formation present on the northwest side of the fault, it was evident the fault occurs farther south in the covered zone than anticipated. On February 7, 1964, it was recommended that drilling be continued at the second alternate site because, (1) to relocate the Test Hole site 100 yards south would move the location to an area of less favorable subsurface recharge, and (2) it was

- 2 -

considered that the rocks of the Catoclin Formation within 100 yards of the fault zone would be sufficiently shattered to be water-bearing.

Test Hole Drilling

It was anticipated that approximately 10 gallons per minute would be obtained from fractures penetrated in the first 250 feet of drilling, but instructions were given that drilling should be continued if field examination of the drill cuttings indicated lithologic changes, or if water-bearing fractures were penetrated near the termination depth. At 200 feet, fractures had been encountered at 25, 145, and 195 feet below ground level and it was recommended that drilling be continued to approximately 50 feet below the last water-bearing fracture. Two of these were penetrated at 230 and 270 feet, and drilling was terminated at 333 feet. After two hours of air testing the total yield was determined to be 8 gallons per minute.

Quantity of Water

On February 10, 1964, a pump test was conducted with a submersible pump after casing and grouting had eliminated 2 gpm from the aquifer at 25 feet. At the end of 18 hours of continuous pumping, 5-1/2 gallons per minute was being discharged with a pumping level that had stabilized for the last 2 hours at 271.49 feet. That the well will produce 6 gallons per minute with a pump intake at 320 feet was further verified by the recovery rate of the static water level, which was 78.54 feet in the first 15 minutes, or 8.39 gallons per minute. It should be emphasized that the final yield figure of 6 gallons per minute was made from a 2-hour pump test during the "wet" season and from water-filled cracks and crevices not previously tapped. It is possible that continuous

- 3 -

pumping during the "dry" season will dewater the fracture-reservoirs to a recharge level that may reduce the long-term safe yield to 5 or 4 gallons per minute.

Quality of Water

At the conclusion of the pump test, water samples were collected for chemical analyses. As the results of these analyses gave some unexpected values for some constituents, it was suspected either the sampling procedures or the water containers were unsatisfactory. Therefore, at the request of this Division, a second pump-test and sampling of the water was conducted by Shenandoah National Park personnel and the second set of water samples were analyzed. The results of these chemical analyses were consistent with those for water from other wells that penetrate the same rocks as the Thornton Gap Test Hole.

Recommendations

In accordance with the Thornton Gap Preliminary Report, a drilling site for Test Hole #2 was selected after evaluation of data from Test Hole #1. The site for Test Hole #2 was tentatively staked out approximately 400 feet west of Test Hole #1 where a 250-foot hole would penetrate the Catoclin Formation. Although the rocks are the same as in Test Hole #1, recharge conditions at the site for Test Hole #2 are more favorable. The most favorable drilling sites on the west slope of the Blue Ridge at Thornton Gap are actually some distance to the south and southwest. There is no electric power in that area and access roads would be a job of considerable magnitude because of the distance, vege-

- 4 -

tation, boulders, and very irregular and steep terrain. It was suggested that before this area is explored, it would be advisable to consider one or two test holes on the east side of Thornton Gap. In accordance with Acting Superintendent House's request of September 25, 1964, a reconnaissance will be made there in the spring of 1965.

Enclosed are copies of the Thornton Gap Test Hole #1 Water Well Completion Report form, pump-test data sheets and drawdown curve, water analyses from 2 sampling dates, and a geologic log of the drill cuttings.

Virginia Division of Mineral Resources
Charlottesville, Virginia
January 15, 1965

Form 10-195
(Rev. 9/60)UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICEShenandoah National Park
(Park)

Check One:

Monthly
Estimate ☐Final
Estimate ☒Page 1 of 2 pages
L U M P S U M C O N T R A C T

ESTIMATE NO. <u>4</u>	FOR (Period) <u>May 8 thru May 17, 1964</u>	DATE <u>June 24, 1964</u>
CONTRACT NO. <u>14-10-0137-0181</u>	COMPLETION DATE <u>November 19, 1963</u>	EXTENDED DATE <u>May 17, 1964</u>
CONTRACTOR <u>W. E. Caldwell Company, Incorporated, 200 East Brandeis Avenue, Louisville 8, Kentucky</u>		ORIGINAL CONTRACT \$ <u>93,347.00</u>
PROJECT <u>Water Reservoirs, Left Mountain, Thornton Gap & Skyland</u>		CHANGE ORDERS* \$ <u>---</u>
LOCATION <u>Shenandoah National Park, Virginia</u>		TOTAL CONTRACT \$ <u>93,347.00</u>

DESCRIPTION	COST BREAKDOWN	PERCENT COMPLETE	VALUE	REMARKS
Foundations				
200,000-gal. res., Left Mtn.	\$1,870.00	100%	\$1,870.00	
200,000-gal. res., Left Mtn.	1,870.00	100%	1,870.00	
50,000-gal. res., Left Mtn.	1,326.00	100%	1,326.00	
200,000-gal. res., Thorn. Gap	2,370.00	100%	2,370.00	
200,000-gal. res., Skyland	2,370.00	100%	2,370.00	
Fabricated Material for Job Site:				
200,000-gal. res., Left Mtn.	8,211.35	100%	8,211.35	
200,000-gal. res., Left Mtn.	8,211.35	100%	8,211.35	
50,000-gal. res., Left Mtn.	3,464.70	100%	3,464.70	
200,000-gal. res., Thorn. Gap	8,219.10	100%	8,219.10	
200,000-gal. res., Skyland	8,212.00	100%	8,212.00	
Field Erection:				
200,000-gal. res., Left Mtn.	5,334.00	100%	5,334.00	
200,000-gal. res., Left Mtn.	5,334.00	100%	5,334.00	
50,000-gal. res., Left Mtn.	4,084.00	100%	4,084.00	
200,000-gal. res., Thorn. Gap	5,334.00	100%	5,334.00	
200,000-gal. res., Skyland	5,334.00	100%	5,334.00	
Field Painting:				
200,000-gal. res., Left Mtn.	1,795.00	100%	1,795.00	
200,000-gal. res., Left Mtn.	1,795.00	100%	1,795.00	
50,000-gal. res., Left Mtn.	673.00	100%	673.00	
200,000-gal. res., Thorn. Gap	1,795.00	100%	1,795.00	
200,000-gal. res., Skyland	1,795.00	100%	1,795.00	
Piping:				
200,000-gal. res., Left Mtn.	1,739.15	100%	1,739.15	
200,000-gal. res., Left Mtn.	1,739.15	100%	1,739.15	

(4-195
9/60)FEDERAL DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

Shenandoah National Park

(Park)

Page 2 of 2 pages

LUMP SUM CONTRACT

Check One:

Monthly
Estimate☐Final
Estimate☒

ESTIMATE NO. 4	FOR (Period) May 8 thru May 17, 1964	DATE June 24, 1964
CONTRACT NO. 14-10-0137-01A1	COMPLETION DATE November 19, 1963	EXTENDED DATE May 17, 1964
CONTRACTOR W. E. Caldwell Company, Incorporated, 200 East Brandeis Avenue, Louisville 8, Kentucky		ORIGINAL CONTRACT \$ 93,347.00
PROJECT Water Reservoirs, Loft Mountain, Thornton Gap & Skyland		CHANGE ORDERS* \$
LOCATION Shenandoah National Park, Virginia		TOTAL CONTRACT \$ 93,347.00

DESCRIPTION	COST BREAKDOWN	PERCENT COMPLETE	VALUE	REMARKS
<u>Piping (cont'd)</u>				
50,000-gal. res., Loft Mtn.	\$1,654.30	100%	\$1,654.30	
200,000-gal. res., Thorn. Gap	5,590.90	100%	5,590.90	
200,000-gal. res., Skyland	3,226.00	100%	3,226.00	
TOTAL CONTRACT PRICE \$93,347.00				\$93,347.00

RECOMMENDED (Project Supervisor)

Gerald J. Rogers
Gerald J. Rogers, Project Supervisor (EODC)

APPROVED (Contracting Officer)

B. Taylor Hoskins
B. Taylor Hoskins

DATE

6-26-64

SUMMARY

TOTAL TO DATE.....	\$ 93,347.00
LESS RETAINED AMOUNT.....	
NET.....	93,347.00
LESS PREVIOUS PAYMENTS.....	0.00
LESS LIQUIDATED DAMAGES.....	0.00
DUE THIS ESTIMATE.....	10,736.34
% COMPLETED TO DATE:	100%

*Show Breakdown on Reverse

(See Reverse for Distribution)

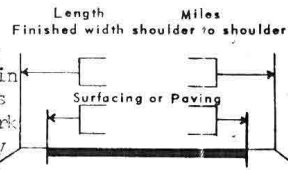
1964 Final Payment Nov 30 1964

Form 10-411
(Rev. 2/62)UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

PROJECT CONSTRUCTION PROPOSAL

1. Statement of requirements, proposed work and construction data, justification, etc. (Use additional sheets as necessary.)

The intent of this proposal is to supplement the existing water system, which has proven inadequate in past years during the heavy use dry season period, with a well, pumping equipment and connecting water line to the existing water main serving the Panorama Restaurant. During the past few summers it was necessary to haul water from the Town of Luray and Park Headquarters and add to the existing system to meet the heavy use demand. The addition of this proposed system to be used primarily during the dry season will furnish a sufficient quantity of water to operate the development and consequently will obviate the costly hauling of water.



2. Land Status (if Govt.-owned, what agency), Water Rights, Research, Etc.

Government-owned (NPS)

3. PCP Data Prepared by (Name, Title & Date)

James M. Stump 1/21/64
James M. Stump
Park Engineer

4. Cross-reference PCP's to this Project: None

PCP numbers of previously completed portions:

None

5. Construction by:

Day Labor ☒ Contract ☐

Work supervised by:

Park ☒ Reg. ☐ Design Office ☐

6. CLASS C ESTIMATE

Construction..... \$ 11,400

Plans, Surveys, & Supervision..... 1,620

Contingencies..... 680

SUB TOTAL 13,700

Exhibits, Audio-Visual Installations, etc..... 0

GRAND TOTAL \$ 18,700

7. DISTRIBUTION OF COPIES

No	To
6	SERO

8. Recommended by Park Office (Signature, title, date)

R. Taylor Hoskins
R. Taylor Hoskins, Superintendent, January 22, 1964

9. Approved by Regional Office (Signature, title, date)

E. M. Gail
E. M. Gail, Regional Director, FEB 5 1964

10. Reviewed by D&C Field Office (Signature, Title, Date)

Vincent N. Mauro
Vincent N. Mauro, Project Control Officer, EODC 2/14/64

11. Location within Area or Termini

Thornton Gap, Central District

Lat. 38-39-30

Long. 78-19-30

12. Master Plan No.

NP-SHE 3001C

13. Bldg. or Rt. # and Sec.

Central District

14. Region

SE

15. Park

Shenandoah National Park

16. Project

Improvement to Water System, Thornton Gap

Page

(County)

Virginia

(State)

17. PCP Index No.

U-152

18. P. S. & S. by

BPR / / NPS ☒

Preliminary Report
Thornton Gap Area
Shenandoah National Park

The Thornton Gap Area is located between the towns of Luray and Sperryville at the intersection of U. S. Highway 211 and the Skyline Drive.

Topography

The Area includes the northern slopes of Marys Rock Mountain south of the Gap, and the southern slopes of Pass Mountain north of Thornton Gap. Elevation at the Gap is about 2300 feet above sea level, and over 3500 feet at Marys Rock; maximum relief in the Area is approximately 1500 feet.

Geology

The Thornton Gap Area is underlain principally by the Pedlar and Catoctin formations of Precambrian age. Generally, metamorphic rocks of the Pedlar formation are present south of the Gap, and basalt flows of the Catoctin formation occur north of the Gap. The contact between these two formations is the eastward extension of the Stanley Fault that strikes east through Thornton Gap and dips approximately 30 degrees to the south and southeast. The cleavage of the Catoctin formation is approximately 60 degrees to the southeast. In the fault zone both the Pedlar and Catoctin formations are probably sheared and fractured.

Hydrology

Springs occur on the west and east slopes of Marys Rock Mountain. Before issuing on the surface, the water is believed to flow along the top of the bedrock beneath the rock talus and soil cover on the slopes.

-2-

Two such sources of water on the west slope of Marys Rock Mountain had a combined measured flow of 7.2 gallons per minute in early November, 1962. These measurements were near the end of a prolonged dry period and indicate the perennial nature of these springs. Whether similar conditions occur on the east slope has not been established because there was a heavy rainfall and some snow prior to investigation of the springs on the east slope. These springs were not observed during periods of dry weather.

Springs also occur on Pass Mountain, three of which currently supply water to the Area. The water is fed into two large reservoirs and from there through a pipeline to Thornton Gap.

Proposed Test Drilling

Hydrogeologic conditions indicate the area south of Thornton Gap to be the most favorable portion of the Area for the occurrence of ground water.

The two proposed test hole sites on the west slope of Marys Rock Mountain have been picked and their locations are indicated on the accompanying map. The wells should penetrate the Pedlar formation and encounter Catoclin greenstone below the fractured and sheared rocks in the fault zone. A total depth of 300 feet is estimated for Test Hole No. 1. The location of Test Hole No. 2 is subject to change, dependent upon the review of data from Test Hole No. 1.

Laurence H. Gardner II, Geologist
Division of Mineral Resources
November, 1962

**Eastern Office
Division of Design and Construction
143 South Third Street
Philadelphia 6, Pa.**

D5039

March 10, 1960

**Mr. J. H. Roadcap, Jr., Director
Sewage Pollution Control Section
415 West Franklin Street
Richmond 20, Virginia**

Dear Mr. Roadcap:

Your letter of February 24 requests additional information about the recently completed sewage disposal facilities to serve the Thornton Gap area of Shenandoah National Park in Virginia.

The sewage disposal facilities are designed for a daily sewage load of approximately 10,000 gallons. The sewage treatment facilities consist of an Imhoff Tank sludge drying bed and spray field. The plant is enclosed by a woven wire fence. The spray field operates by discharge of a dosing siphon and a small dosing tank.

There is no discharge into State waters. To insure against any possibility of this sewage disposal contributing to the watershed for the municipality of Luray, the installation is located on the opposite eastern slope of the mountain ridge. By experience we have found that natural vegetation within 50-foot of the spray field is capable of handling the sewage by increased growth and transpiration. The full sewage load for which the plant is designed is only developed during the peak of the summer season. The plans and specifications for this installation have been reviewed and approved by the U. S. Public Health Service, 700 E. Jefferson Street, Charlottesville, Virginia.

Sincerely yours,

**ROSS F. SWEENEY
Ross F. Sweeney
Supervisory Engineer**

Copy to: Regional Director, Region One - w/copy of EODC memo 5/6/59
Supt., Shenandoah NP

Form 10-174
(Rev. 8-56)UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

COMPLETION REPORT OF CONSTRUCTION PROJECT

REGION One	AREA Shenandoah National Park	COUNTY Page	STATE Virginia
PROJECT OR JOB TITLE Water Supply and Sewage Disposal Systems		PAGE NO. B-78	
LOCATION IN AREA Thornton Gap		BUILDING NO.	
WORKING DRAWING NO. AND TITLE NP-SHE 3051A, Water Supply and Sewage Disposal Systems		WORK ORDER NO. B-8	
APPROPRIATION TITLE AND SYMBOL		DATE WORK COMPLETED July 17, 1959	
CONTRACT NO. 14-10-137-78		DATE WORK STARTED March 26, 1959	
NAME OF CONTRACTOR Brook and Davis, Inc.		ADDRESS P. O. Box 563 Waynesboro, Virginia	

COST ANALYSIS

CONSTRUCTION ITEMS	QTY	UNIT COST IN PLACE	TOTAL COST IN PLACE
1. 4" Class 150 C.I. Water Line	2790	\$ 2.67	\$7,449.30
2. 2" Galv. Steel Water Line	91	1.38	125.58
3. 1" Galv. Steel Water Line	300	.99	297.00
4. 4" Fire Hydrant	3	266.00	798.00
5. 4" Gate Valve w/C.I. Valve Box	3	80.00	240.00
6. 3" Gate Valve w/C.I. Valve Box	1	71.50	71.50
7. 2" Gate Valve w/C.I. Valve Box	4	50.60	202.40
8. 1" Gate Valve w/C.I. Valve Box	1	43.25	43.25
9. 2" Water Meter w/Meter Box	1	297.00	297.00
10. 1 1/2" Water Meter w/Meter Box	1	184.50	184.50
11. 1" Water Meter w/Meter Box	1	183.50	183.50
12. Stone Drinking Fountain	3	341.00	1,023.00
13. 50,000 Gal. Concrete Reservoir	1	L.S.	6,540.00
14. Spring Box and 1 1/2" Pipe Relocation	1	L.S.	225.00
15. 4" Collecting Line (Not Regd.)			
16. 6,500 Gal. Imhoff Tank	1	L.S.	4,100.00
17. Sludge Drying Bed	1	L.S.	508.80
(See Attached Continuation Sheet)			TOTAL \$30,912.61

Form 10-174
(Rev. 8-56)UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

COMPLETION REPORT OF CONSTRUCTION PROJECT

REGION	AREA	COUNTY	STATE
ONE	Shenandoah National Park	Page	Virginia
PROJECT OR JOB TITLE	Water Supply and Sewage Disposal Systems		PCP NO.
LOCATION IN AREA	Thomson Gap		BUILDING NO.
WORKING DRAWING NO. AND TITLE	WD-618-30514, Water Supply and Sewage Disposal Systems		WORK ORDER NO.
APPROPRIATION TITLE AND SYMBOL	1-10-137-78		DATE WORK STARTED
CONTRACT NO.	1-10-137-78		DATE WORK COMPLETED
NAME OF CONTRACTOR	Grock and Davis, Inc.		ADDRESS
	P. O. Box 543		
	Pinebluffs, Virginia		

COST ANALYSIS

CONSTRUCTION ITEMS	QTY.	UNIT COST IN PLACE	TOTAL COST IN PLACE
18. Standard Manhole	6	140.00	840.00
19. 6" Class 150 C. I. Sewer Line	1296.5	4.25	5,510.13
20. 4" Galv. Steel Sewer Line	196	3.15	617.40
21. Sewage Spray Field	1	L. S.	510.00
22. Rock Excavation	14.75	15.00	221.25
Change Order No. 1			
Moving 2,000 cu. yds. Topsoil		L. S.	275.00
Change Order No. 2			
Excavating, Transporting, and Placing Fill Material	260	2.50	650.00
PS & S Costs (17.51)			5,412.80
Footnote: Change Order No. 3, representing overruns, is included in the above.			
Verified by Field Finance Office			
		TOTAL	36,325.41

SUMMARY OF EXPENDITURES			
PERSONAL SERVICES	EQUIPMENT	MATERIALS AND SUPPLIES	
OTHER			
PS & S 35,412.80			
CHANGE ORDERS			
ORIGINAL CONTRACT AMOUNT	FIRST	SECOND	THIRD
130,686.10	275.00	625.00	3856.51
130,912.61			
THIS PROJECT OR JOB HAS BEEN COMPLETED IN ACCORDANCE WITH APPROVED DRAWINGS, SPECIFICATIONS, AUTHORIZED CHANGES			
SUBMITTED BY (Name and title)	DATE		
APPROVED BY (Name and title) James H. Stump, Project Supervisor	November 16, 1960		
R. Taylor Hoskins, Superintendent	November 16, 1960		
(ATTACH NARRATIVE STATEMENT, PHOTOGRAPHS, AND "AS BUILT" DRAWINGS TO THIS FORM)			

30105

NARRATIVE REPORT

Contract No. 14-10-137-78

Water Supply and Sewage Disposal Systems
Thornton Gap
Shenandoah National Park

Preliminary field surveys were made for the project during September and October, 1958. The contract specifications and working drawing No. NP-SHE 3051 (10 sheets) were prepared during November and December, 1958.

Design computations for the water supply and sewage disposal systems were based on past requirements for the old Thornton Gap Development, the expected increase in visitation for the new development, and recommendations from the United States Public Health Service.

The design and layout for the project was greatly influenced by other construction projects in progress in the same area. Coordination of this project with the Bureau of Public Roads work was important.

Bids were opened on February 27, 1959, for construction of the water supply and sewage disposal systems. A total of seven bids was received. Brock and Davis, Inc. of Waynesboro, Virginia submitted the low bid in the amount of \$29,656.10. This bid was approximately 15 per cent under the engineering estimate. Brock and Davis, Inc. was found to be a reputable firm, and the contract was awarded to the company. A notice to proceed was issued on March 12, 1959. The first calendar day of the contract was recorded as March 18, 1959.

Materials and equipment were moved into the area on March 23, and construction was started on March 24. The progress of the project and the contractor's workmanship were satisfactory.

Materials for the project were supplied by the following companies:

- | | |
|---|--|
| 1. Mechanical Joint Cast Iron
Water and Sewer Pipe | Lynchburg Foundry Co.
Lynchburg, Virginia |
| 2. Fire Hydrants and Valves | Mueller Corporation |
| 3. Reinforcing Steel | Virginia Steel Company
Richmond, Virginia |
| 4. Concrete Blocks | Valley Block Company
Harrisonburg, Virginia |
| 5. Transit-Mix Concrete | Baughan Construction Co.
Luray, Virginia |

Change Order No. 1 was issued on April 28, 1959, to move approximately 2,000 cubic yards of topsoil at the lump sum of \$275.00.

Change Order No. 2, dated May 28, 1959, covered transporting approximately 250 cubic yards of fill material from Thornton Gap to the new water storage reservoir on Pass Mountain at a cost of \$2.50 per cubic yard.

The contract was finished, inspected, and accepted in writing on July 17, 1959. The final payment estimate (total cost \$30,912.61) was also prepared on July 17, 1959.

James M. Stump
Project Supervisor

8-21-22, 1944
2 - 2 Spring

PARK BUILDING SURVEY

Name of Building: Bower and Spring House

Date of Photo: 2/25/44

Location: Thornton Gap about 2 miles West of East Park boundary on short spur road branching left off Lee Highway. The houses are about $\frac{1}{4}$ mile from the Lee Highway right next to the Thornton River. The approach is in bad condition but has good possibilities, passing between two fine specimens of oak. The land is good. There are extensive plantings and the remains of a diversified orchard — pear, grape, peach, plum, etc. and many ornamental shrubs. View, to the east, is excellent. The site is visible from several points along Lee Highway and Skyline Drive.

Description: Spring House: A fine house of stone construction, 24 x 16 with added frame shed. Dry set stone walls with original oak window frames and bars in lower window. Floors, windows, doors and roof in good condition except for minor details. Interior whitewashed over logs, board partitions, etc., spring in cellar. Condition is good—generally better than most of the other old houses.

Bower House: This house, the main structure, has burned and collapsed—nothing remains but the foundations and part of one wall. It was of the same stone construction as the Spring house but was larger (28 by 30 ft.) and better situated. The house is capable of reconstruction—the stone is all there and old lumber is available from other old houses that should be razed. A few photographs are available.

Outbuildings: A stone tool house in good condition stands near the Bower house. There is (near the Spring house) the foundation of a barn.

History and Present Use: History indicates it was built about 1775 by Frank Skinner and later passed into the Barbee family. William Russell Barbee was a partner in building the Thornton Gap road in 1783. He also built the Haverberry Inn. He recently William Randolph Barbee, a well-known American sculptor lived at the Bower. The house is unique because:

1. It is the only stone house in the Park
2. It is possibly the oldest house in the Park
3. It has more historical associations than others
4. It contains some elements of "fort" construction

For present condition see Description above.

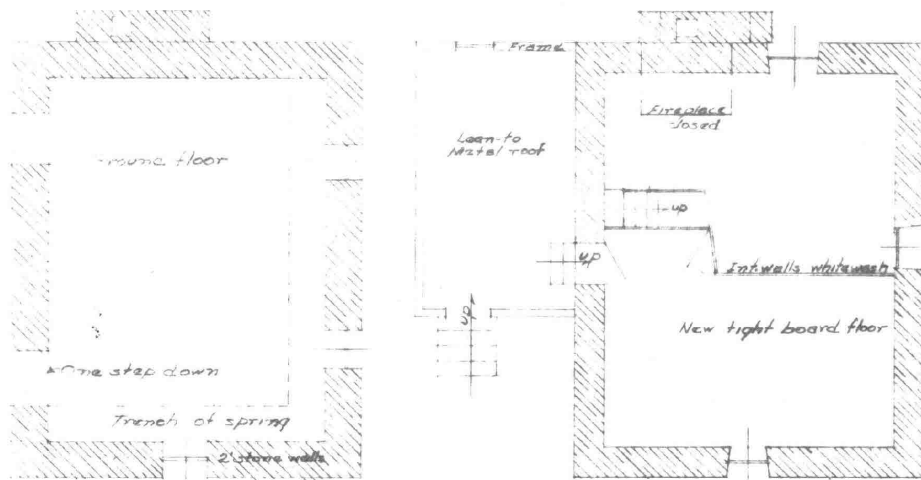
Recommendation: If the Up and Down Sawmill is a desirable project, then serious consideration should be given to the other nearby buildings, i.e. Herbert Atkins, Edie Atkins and the Bower and Spring Houses. This would mean the development of the entire lower end of Thornton Gap—a project which has much to commend itself. The entire site is most attractive but it needs early attention if such an undertaking is to be considered. Another thing to be done

is contacting old inhabitants, etc. for information which can only be obtained by word of mouth. Mrs. Katie Barbee Jones offered (in 1936) to help us. If she is still alive it would be invaluable to have her story of the house where she lived and description of details of Bower House, etc. However unless the large project is feasible, no better case can be made for the isolated buildings, desirable as they are. Whatever decision is made, it should be made soon. Recommend these buildings be retained pending further study and investigation.

Date this Survey 1/26/45
Robert B. Moore



POWELL (SPRING) HOUSE
Date 2/25/77 Scale 3/16 inch = 1 foot



MOUNTAIN HOMES
SHENANDOAH NATIONAL PARK

Stearns report No. 6B

NP-SNE 6504-2-2

Water System - Operating Costs - Shenandoah National Park.

December 1959.

Reference W-1.

Location of System:	Panorama		Skyland		Big Meadows		Swift Run Gap		Elk Wallow		Dickey Ridge		Total				
	Inv.	Depr.	Inv.	Depr.	Inv.	Depr.	Inv.	Depr.	Inv.	Depr.	Inv.	Depr.	Inv.	Depr.	%	Unit	Charge
Investment (Ref-W-2)	\$4,055		\$15,950		\$17,550		\$1,445		\$5,160		\$19,187		\$41,547				Per M.Gal.
Depreciation Rate																	
10%			615	162	1,510	151											
5%	595	30	1,440	72	1,420	71	690	34	3,420	171	252	12					
2 1/2%	1,200	25	6,790	170	10,505	262	70	2			17,405	435		1,896	45 1/2%	10¢	
2%	2,260	45	4,115	82	4,115	82	695	14	1,740	85	1,550	31					
		100	486		566		50			206	478						
Annual Operating Costs																	
Electric Energy			524		590									914	21%	5¢	
Repairs	25		100		100		20		50		75		370	8 1/2%	2¢		
Labor	25		500		500		20		50		75		1,170	27%	6¢		
Total Annual Costs	150		1,410		1,756		90		506		628		4,540	100%	25¢		
Annual Water Output																	
M. Gal.	2,500		4,500		8,000		1,500		1,000		1,500		18,800				

Average Unit Cost - $\frac{\$4,540}{18,800}$ - \$0.23 per M. Gal.

UNITED STATES
DEPARTMENT OF THE INTERIOR
SHENANDOAH NATIONAL PARK
LURAY, VIRGINIA

April 6, 1937.

Mr. Oliver G. Taylor,
Deputy Chief Engineer,
National Park Service,
Washington, D. C.

Dear Mr. Taylor:

Reference is made to your letter of March 13, enclosing Mr. Moskey's Memorandum for The Director of February 25, relative to the Luray water supply.

I am enclosing herewith a section of the advance topographic sheets on a scale of 1 inch equals 2,000 feet, on which has been indicated in orange the two watersheds of the Town of Luray. Also indicated by red circles are present and possible water supply sources for Skyland and the Thornton Gap Entrance Station. There are also enclosed records of these springs as compiled by Mr. Diraulaitis.

The history of the Town's water supply is as follows:

The Town's first installation of a municipal water system was placed in operation in 1901. This was the existing Dry Run supply, consisting of a concrete intake built across the valley of Dry Run, a terra cotta gravity line to the reservoir and distribution mains to and through town. In 1911, the Mary's Rock supply was added, as there was insufficient water from Dry Run. Again in 1930 there was a shortage of water, which made necessary further expansion. This was met by increasing the storage reservoir to an ultimate capacity of 12,000,000 gallons, but so far the reservoir, due to poor design, has only been partially filled to about 2,000,000 gallons. This latter work was completed in 1933.

Last summer again caught the town in a precarious position. Consumption has steadily increased, reaching approximately 120,000 gallons per day last summer. This shows a loss of 60,000 gallons per day, but does not include reservoir leakage, which must be quite high. The reservoir is merely an excavated hole in the ground, with the excavation piled around it to form a dyke. The leakage is quite noticeable at one place on the north side of the reservoir, amounting to at least 20,000 gallons per day.

Mr. Taylor

Page 2.

4/6/37

As for Furnace Spring, the headwaters of the Dry Run supply, Mr. Pollock has been using this water for Skyland for the past 40 or 45 years, prior to the establishment of a municipal water system for the Town. Our taking over of the Skyland area carried with it Mr. Pollock's prior rights to the waters of Furnace Spring, and so there is no legal question as to our rights to this water. This has been admitted by the Town authorities, their plea being based at present on moral grounds.

It is not known how much water Mr. Pollock pumped from Furnace Spring, but it is safe to assume that he pumped as much or more than we will use. As you know, his water system was a haphazard affair, with leaking storage tank and many leaking lines and plumbing fixtures.

For us to go to the east slope of the ridge for water for Skyland it will be necessary for us to develop and combine the three Park springs lying to the south of Skyland. This will entail the laying of 4,500 feet of pumping main, 2,000 feet of gravity line to collect the three springs into a collecting well, the installation of 1 mile of underground electric cable for operation of the pump, and 1 mile of a lighter cable for automatic control of the pump. An estimate of cost of this installation is:

4,500 feet	6" C.I. Pipe	@ 1.25	\$5625
2,000 "	5" " "	@ .80	1600
5,000 "	Electric cable	@ .60	3000
80000 "	Control cable	@ .25	750
Developing 3 springs		@ 500.00	1500
Collecting well and pump house			2000
Pump and equipment			525
			<u>\$15,800</u>

In addition to the capital outlay of \$15,800, the additional operation charges must be considered. Furnace Spring is 544 feet below the storage tank and the Parks springs will be approximately 100 feet lower. This gives a static pumping head head of 444 feet to which must be added the loss of head through approximately 1 mile of pipe. This will result in considerable increase in annual cost of pumping. There is also involved the greater distance the operator will have to go to look after the pump. In the present case, it is only a matter of a few hundred feet as compared to over a mile from the center of Skyland.

White Oak Canyon is one of the scenic spots of the Park with its tumbling cascades and falls. As you know, this stream becomes very low, with a corresponding lowering of the scenic value of the canyon. The diversion of water at the head of this drainage area will materially affect this stream. Consideration should be given to this before definitely deciding to utilize the waters from White Oak Canyon for Skyland.

Mr. Taylor

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At the Panorama supply--Bowen Spring--it was necessary to develop more water for use at the comfort station last summer. This supply fell to about 2.5 gallons per minute, which, with our limited storage of approximately 3,000 gallons, was inadequate to meet the demands on days of heavy traffic. To meet this demand, some development was undertaken around the spring which resulted in increasing the supply to nearly 8 gallons per minute, an increase of 5.5 gallons. The Town officials claim that this work resulted in cutting their water supply from the Mary's Rock watershed in half. If this be the case, regardless of our abandonment of this supply, the Town will have to make other arrangements for an adequate water supply.

In order to get our supply for Thornton Gap from another drainage area, there are two possibilities open. There are a series of springs at the old Armentrout house, about 2,200 feet north of the present supply, and a spring south of the tunnel, although the records of these springs show very little water in dry seasons, it is our belief, concurred in by Mr. Dirzulaitis, that more water can be developed. The Armentrout springs will require about 3,500 feet of 1 1/2" pipe to connect with the present supply line. The Tunnel Spring is located in extremely rough and rocky terrain which would make its development difficult, as it would require considerable work to insure the exclusion of surface water. It would also require the laying of a pipe in the shoulder of the Skyline Drive. In going through the tunnel, it would be necessary to shoot a ditch back of the curb to sufficient depth to prevent freezing. This shooting might affect the concrete paving. Accordingly, I am opposed to using this spring except as a last resort.

I do not know how much water we will require at either Skyland or Panorama. Assuming that Skyland will be developed to a maximum capacity of 400, and using an average of 50 gallons per person per day, we get a daily consumption of 20,000 gallons. I do not know what the daily consumption per person is for a resort like Skyland, but Mr. Monteith should have some figures.

The Thornton Gap entrance station should not require in excess of a daily consumption of 5,000 gallons. This amount will probably be exceeded this year due to the Panorama Tea Room, but when this is removed and there is only an entrance station with comfort facilities the 5,000 gallons should meet the demand.

This shows a maximum amount of 25,000 gallons per day that we will use from the two watersheds of the Town of Luray. Throughout the summer, that is, from May 1 to October 31, I think we would be safe in estimating a daily average consumption of half of this amount, or 12,500 gallons.

Mr. Taylor

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Since the Town was short 60,000 gallons per day last summer, this amount will not materially affect their supply.

It will be necessary to continue the operation of both of the existing sources this summer. A meter will be placed on both systems and a definite record kept of daily consumption so that we will know just how much water we are using.

Sincerely yours,

J. R. Lassiter,
Superintendent.

JHL/wbt

UNITED STATES
DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE
WASHINGTON

March 1, 1937.

Memorandum for the Files:

Mr. Wilbur C. Hall, Chairman of the State Commission on Conservation and Development, arranged a meeting in this office on January 28, 1937, which was attended by Mr. Hall and a delegation of citizens from the Town of Luray, Virginia, including Messrs. Lawler, Reynolds, Campbell, and Derrigillitis. This Service was represented by Superintendent Lassiter, O. G. Taylor, D. K. Lee, and myself.

to the park "The Town's delegation requested this Service to curtail its use of waters in Shenandoah National Park on the Luray side of the mountain near Mary's Rock at Panorama. The Town of Luray maintains a system of pipes, to obtain its water supply. Due to the dry season last year the town received barely enough water for its needs. The delegation felt that our use of park waters on the Luray side of the mountain at Panorama, if increased in the future, would result in a water shortage at Luray. It was suggested that we pump our water from the eastern side of the mountain and leave the Luray watershed supply intact. This would entail considerable expense to the park.

The delegation raised the legal question of whether, under the reservation in the Shenandoah National Park deed (No. 1, p. 149) from the State of Virginia, this Service had the right to use water from the Luray side of the mountain if such use threatened the Town's supply. The reservation in question reads as follows:

"The fee simple estate in lands in Page County, Virginia, is, * * * conveyed * * * to the United States * * * subject * * * to such rights of way or easements heretofore lawfully acquired by or established in favor of the Town of Luray, Virginia, to take, use and exploit in connection with its municipal water system, water originating or flowing over or through the said lands and to conserve the same from contamination and in suitable form for use in connection with the said water system, and to construct, maintain, repair, replace and operate a system of pipe lines from the Mary's Rock intake to the reservoir for a distance of approximately three and one-half miles."

During the discussion Mr. Hall stated that he believed the view of this Service was correct, namely, that the park was entitled to a reasonable use of waters at Panorama irrespective of whether this might curtail the Town's water supply. In this connection he referred us to the Virginia case of Clinchfield Coal Corporation vs. Compton (139 S.E. 308), which holds that a land owner may make reasonable use of percolating waters subjacent to his soil, although such use might interfere with or divert percolating waters of a neighboring proprietor. It appears that the above quoted reservation does not prohibit such reasonable use of park waters by this Service. On February 9 Superintendent Lassiter reported that the water being used at Panorama is percolating water.

It was suggested to the town delegation that a letter be addressed to the Director stating whether it was considered that this Service in any way was interfering with vested legal rights of the town when using park waters at Panorama. It was also suggested that if no infringement of the legal rights of the town were shown, this Service could be requested to consider administratively the possibility of using water on the other side of the mountain.

(SOP - A MONKEY)

G. A. Monkey.
Assistant Director.


cc Supt. Lassiter
Mr. O. C. Taylor

660-05

UNITED STATES
DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE
WASHINGTON

February 4, 1937.

*Jms
010?*

The Superintendent,
Shenandoah National Park,
Luray, Virginia.

Dear Sir:

Reference is made to the conference recently held in this Office regarding the Luray water supply.

Mr. Hall, Chairman of the Virginia Commission on Conservation and Development has referred us to the case of Clinchfield Coal Corporation vs. Compton (139 S.E. 308) in which the court indicated that the rights of land owners are dependent to some extent, upon whether underground waters or percolating waters are involved. The court referred to the following description of percolating waters used in Gould vs. Eaton (44 P. 319):

"Water which has fallen upon a mountainside and sunk into the earth and which has followed the streams and cracks in the strata of sandstone of which the mountain is composed is percolating water and its character as such is not altered by the fact that at one place it breaks through the sandstone forming small springs which, without a well defined channel or current, find their way into the stream."

Underground waters were defined as streams of known and well defined channels below or above the surface. In Gould vs. Eaton, supra, it was stated that "unless it is shown that the underground water flows in a defined and known channel, it will be presumed to be percolating water."

For our records, please advise whether, in your opinion, the waters mentioned in the Luray discussion were percolating or underground waters, so we may have this information available to guide us should the Town of Luray allege that our operations are violative of their legal rights.

Sincerely yours,

J. Edgar Hoover
Assistant Director.

COUNCILMEN
L. M. LAWLER
H. F. LUCAS
R. C. HARNSEBERGER
C. B. GRAVES
MILLER E. ROUDABUSH
J. T. CAMPBELL

TOWN OF LURAY, VIRGINIA

THE MIDDLE GATEWAY TO THE SHENANDOAH PARK

660-0
DR. J. V. SPITLER
MAYOR
J. H. BOOTON
JUSTICE
G. W. SLUSHER
CHIEF POLICE
SLOGAN
"EVERYBODY BUSY"

Oct 13 1936
for 010?

Mr. J. R. Lassiter, Supt.,
Shenandoah National Park,
Luray, Virginia.

Dear Sir:

The officials of the Town have had a very close watch on the Stony Man water supply this season, and feel that the amount of water that the Park Service have used at Skyland has greatly diminished the town's supply, as we have had no water coming into our reservoir since the first of July from this source.

The town would like very much to have an investigation made in regards to this water supply and feel sure the Government is equipped to make this investigation and would cooperate with the town of Luray in doing so.

Yours very truly,

TOWN OF LURAY

J. Vincent Spittle

Dr. J. Vincent Spittle, Mayor.

JVS:LR

UNITED STATES
DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE
WASHINGTON

C
O
P
Y.

November 12, 1935.

Memorandum for
Mr. Moskey:

Reference is made to your request of November 11, for a report on whether the Town of Luray, Virginia, has reserved any restriction on the water originating or flowing over the western watershed of the Blue Ridge Mountains. This report, I understand, is desired inasmuch as CCC operations on this western watershed have been suspended, pending a report on the matter.

A deed, executed by the Governor of Virginia and the Chairman of the State Commission on Conservation and Development, conveying lands in the Blue Ridge Mountains of Virginia to the United States for use as a public park (Shenandoah National Park) contains the following language: (Page 149, B, (3)).

"The fee simple estate in lands in Page County, Virginia, which is herein given, granted, conveyed and transferred to the United States of America, is subject nevertheless; *****To such rights of way or easements heretofore lawfully acquired by or established in favor of the Town of Luray, Virginia, to take, use and exploit in connection with its municipal water system, water originating or flowing over or through the said lands and to conserve the same from contamination and in suitable form for use in connection with the said water system, and to construct, maintain, repair, replace and operate a system of pipe lines from the Mary's Rock intake to the reservoir for a distance of approximately three and one-half miles."

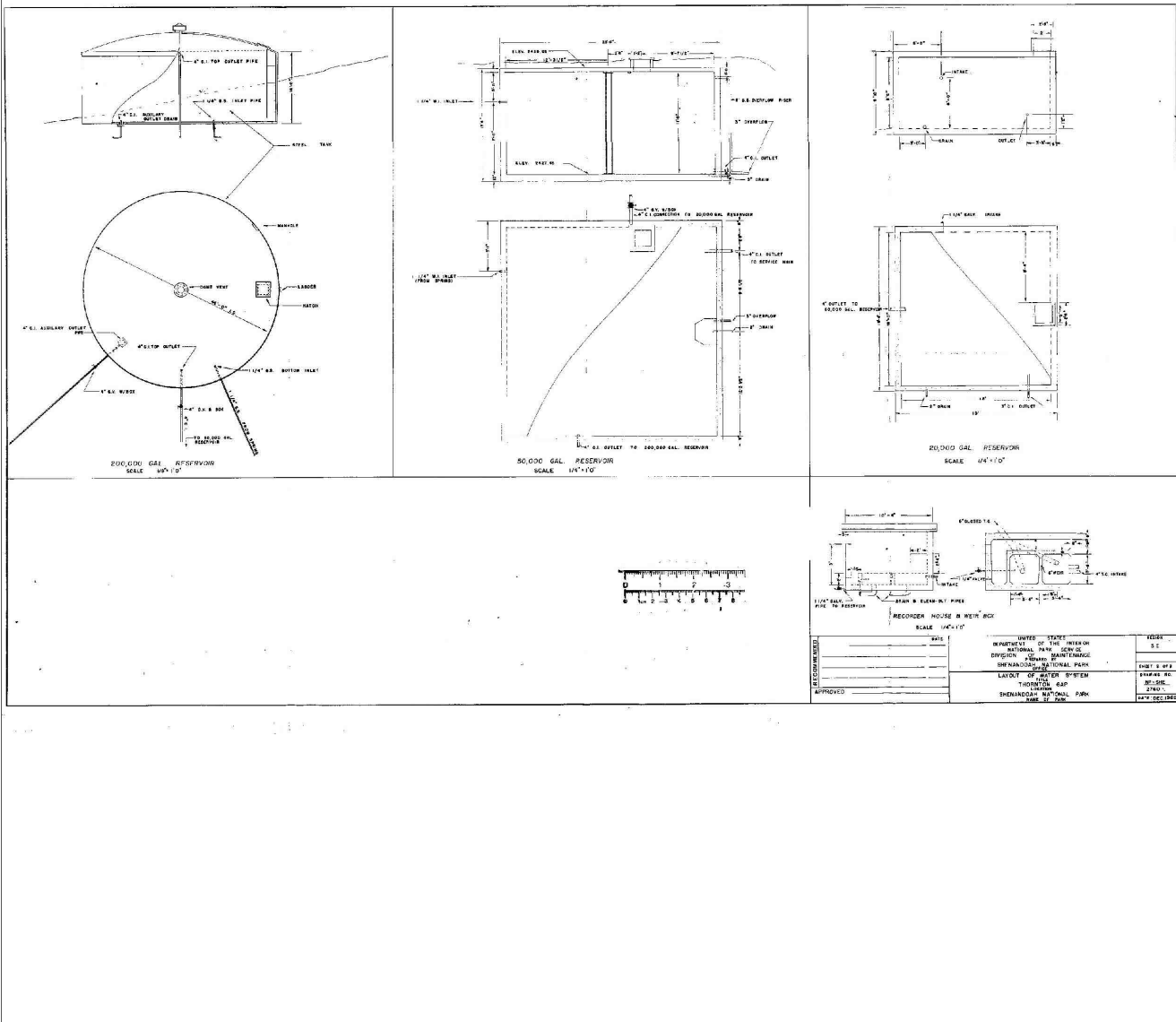
This office has no record of the extent of the restriction above-outlined. However, it is assumed that the Virginia State Commission on Conservation and Development has a record of the restriction in question. Therefore, the attached copy of a letter has been prepared with a view of obtaining a clear definition of the reservation made in the deed for the Town of Luray.

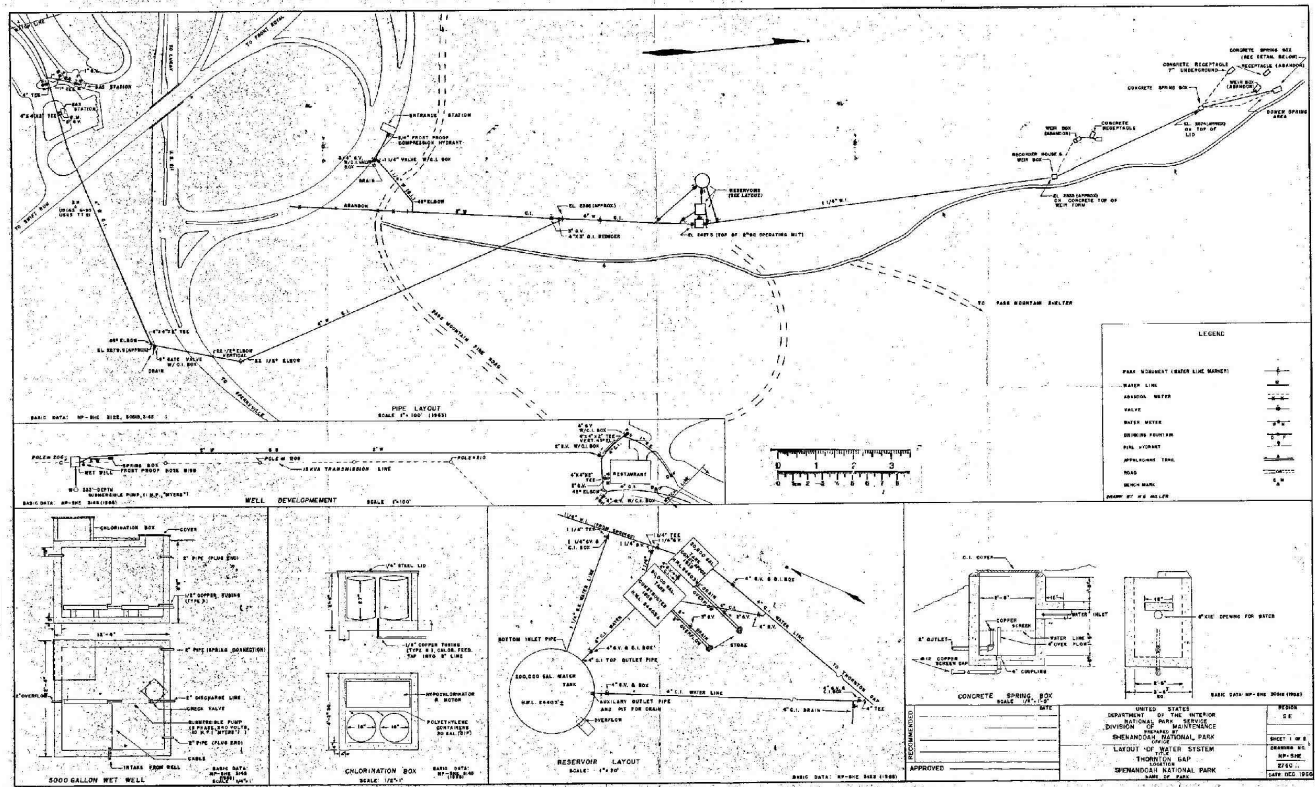
In the meantime, it is imperative that agencies of the Federal Government refrain from in any way contaminating waters flowing over or through the watershed in Page County until it is known what action would do violence to this reservation. As before stated, from the meager data we have the extent of the restriction is not known and it may be necessary to examine numerous deeds, now on record in Virginia, to ascertain the permissible extent of our operations on the watershed. At any rate, with this restriction specifically written into the deed we are put on notice that the Town of Luray has certain equitable restrictions in the water flow. Obviously if an agency of the Federal Government should contaminate the Luray water supply, it would be subject to adverse criticism, as well as possible suit by the Town of Luray.

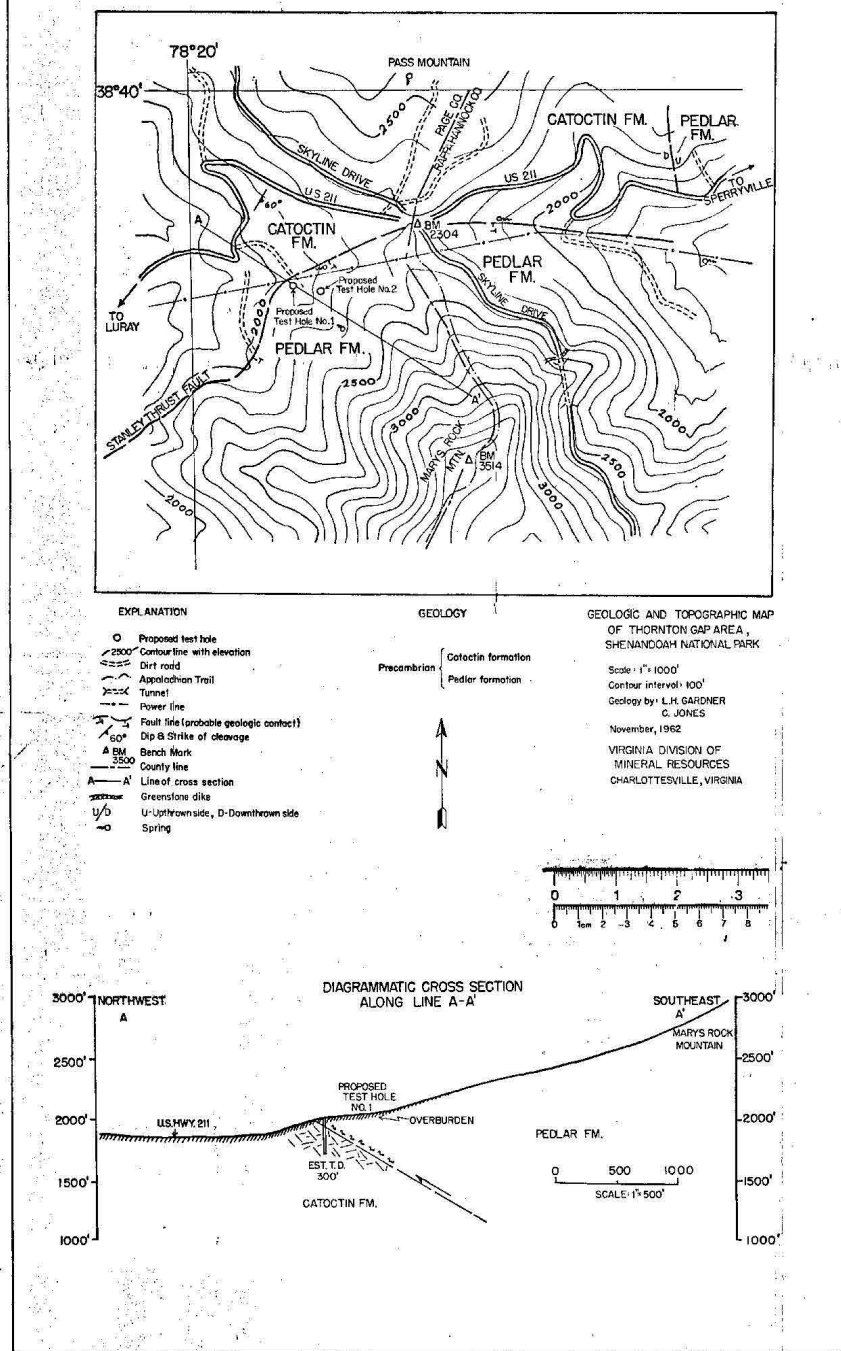
Lee.

P.S. Before final acceptance of the above-mentioned deed, we should consider carefully whether it is desirable to accept lands in Shenandoah National Park subject to this servitude.

HLB:EM







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Number of Documents in Docket	49		
Documents Dated from	11/12/1935	to	6/15/1968
Docket Compiled:	6/17/2011		