



WATER-RIGHT DOCKET

De Soto National Memorial

Docket No: 1

MEMORIAL WATER SUPPLY (WELL)

Preliminary Docket Information

00-00-0000: desoto national memorial, index

DESOTO NATIONAL MEMORIAL

DOCKET # 1
100" Well

I N D E X

Part I - Investigation

1. Letter of July 18, 1950 to Coordinating Superintendent, Southeastern National Monuments, from Superintendent, De Soto National Memorial.
2. Memorandum of July 24, 1950 to Regional Director, Region One from Coordinating Superintendent, Southeastern National Monuments.
3. Memorandum of August 23, 1950 to Regional Director, Region One from Coordinating Superintendent, Southeastern National Monuments.
4. Letter of January 18, 1951 to Mr. R. G. Hopper, Bradenton, Florida from Robert B. Anders, USGS, Tallahassee, Florida with copy of log of the well.
5. Record of Well
6. Memorandum of January 11, 1961 to Regional Director, Region One from Superintendent, De Soto National Memorial.
7. Statement concerning water source for De Soto National Memorial.

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
GROUND WATER BRANCH
P. O. BOX 1233
TALLAHASSEE, FLORIDA

January 18, 1951

Mr. R. G. Hopper
P. O. Box 572
Bradenton, Florida

Attached is a copy of the geological log of the well drilled for the Department of the Interior, at the De Soto National Monument, by Mr. R. C. Penelman.

At the time of completion, November 24, 1950, my analysis showed the water flowing from this well to have a total hardness, as calcium carbonate, of 486 parts per million parts of water and a chloride content of 95 parts per million parts of water. The water from this well was also analysed for chloride on January 16, 1951 and showed no change.

The well is reported, by Mr. Penelman, to have 23 feet of 6 inch casing.

It had a static head of approximately 8 feet above the land surface on November 25, 1950.

/s/ Robert B. Anders
/t/ Robert B. Anders
Geologist

cc: Mr. H. H. Cooper

C O P Y

Geologic log of well drilled for the Department of
the Interior at the De Soto National Monument.
Completed 11/24/50

Depth in feet	Description
25 to 30	Primarily a sandy limestone. Phosphate grains common. Sand is predominately fine.
30 to 40	Fine to coarse, phosphatic sand with a loose limestone cement. Fine sand and phosphate grains predominate.
40 to 50	Dense grayish-cream limestone.
50 to 55	Similar to the 40 to 50 interval.
55 to 65	Medium-gray, dense, limestone. Phosphate grains of various colors with a small amount of chert and considerable fine sand are well distributed throughout the interval represented. Some of the sand and phosphate is probably cavings.

The geologic
from the cutti

C O P Y

U.S. GEOLOGICAL SURVEY

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WATER RESOURCES BRANCH

RECEIVED

RECORD OF WELL

B & N M

			K

1. Location: State Florida County Manatee
 Nearest P. O. Palm Sol Direction from P. O. N. W.
 Distance from P. O. 1 1/2 miles; N. 1/4 sec. 24, T. 34, R. 16
 If in city, give street and number _____

Locate well on plat of section.

- National Park Service
 2. Owner: De Soto National Memorial Address P. O. Box 572; Bradenton, Florida
 Driller: R. C. Penelmon and Sons Address Bowles Creek; Bradenton, Florida
 3. Situation: Is well on upland, in valley, or on hillside? coast
 4. Elevation of top of well: 7 ft. above the level of sea
(Above or below) (Sea, depot, lake, or stream)
 5. Type of well: drilled; kind of drilling rig used solid tool
(Dig, driven, bored, or drilled) (Solid tool, jetting, rotary, etc.)
 6. Depth of well: 100 ft.; year in which well was finished 1950
 Does well enter rock? yes; if so, at what depth? 25 ft.; kind of rock limestone
 7. Diameter: At top 6 inches; at bottom 5 inches.
 8. Principal water bed: limestone
(Gravel, sand, clay, or rock. If rock, state kind.)
 Depth to principal water bed _____ ft.; thickness of bed _____ ft.
 If other water supplies were found, give depth to each _____
 9. Casings: Kind cast steel; size 6"; length _____ ft.; between depths of _____ and _____ ft.
 Kind _____; size _____; length _____ ft.; between depths of _____ and _____ ft.
 Kind _____; size _____; length _____ ft.; between depths of _____ and _____ ft.
 Packers (if any): Depth at which packers were used none; kind _____
 Screen or Strainer: Was well finished with screen? none; kind of screen _____;
 length of screen _____ ft.; diameter _____ inches; size of openings _____
 10. Head: Does well at present overflow without pumping? yes; did it overflow when new? yes;
 if flowing, give pressure 18 lb. per sq. inch; or height water will rise in a pipe _____ ft. above surface;
 original pressure or head 18; if not flowing, give water level in well _____ ft. below surface.
 11. Pump: Is the well pumped? yes; kind of pump Centrifugal, 1 1/2 H.P. electric motor;
 size or capacity of pump 1 1/2 H.P.; kind of power electric
 12. Yield: Natural flow at present (if any) 85 gallons per minute; original flow 85 gallons per minute;
 well has been pumped at _____ gallons per minute continuously for _____ hours;
 quantity of water ordinarily obtained from well _____ gallons per day.
 13. Use: For what purpose is the water used? watering of grass, trees and shrubs and for drinking
 14. Quality of the water: hard; is there an analysis? yes
(Hard or soft, fresh or salt, etc.)
 15. Cost of well, not including pump: \$ 194.82 Temperature of water _____ ° F.
 Name of person filling blank R. B. Hopper
 Date February 21, 1951 Address Box 572, Bradenton, Fla.

On the back of this sheet give the record of the hole through which the well passes and any other facts not given above.

6-5043



IN REPLY REFER TO:

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
Water Resources Division
P. O. Box 2315
Tallahassee, Florida 32304

October 11, 1965

Mr. Al Vick, Hydraulic Engineer
National Park Service
Southeast Region
P. O. Box 10008
Richmond, Virginia 23240

Dear Al:

Reference is made to your inquiry as to adequacy of the well water supply at DeSoto National Monument.

I checked into our files and found that one of our men made a record of the existing well at the monument when it was completed in November 1950. At that time an analysis of the water gave a hardness of 486 ppm and a chloride content of 95 ppm with the water level about 8 feet above land surface. The well was drilled by R. C. Pemelman, Bradenton, who reported a depth of 95 feet with 6-inch casing to a depth of 25 feet.

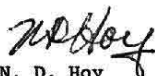
We had our man stationed in Sarasota visit the monument at the end of last September and he reported the following:

1. That presently well provides water for 8 rainbird heads and four other sprinkler heads or approximately 60 gpm.
2. Water level 4.2 feet above land surface.
3. Chloride 90 ppm (a water sample was collected but the analysis has not been made as yet).
4. The centrifugal pump is about 15 years old but seems to be in fair shape.
5. The water has an excellent taste with possibly a little iron.

Attached is the report "Ground-water resources of Manatee County, Florida." Some additional data for the monument well (No. 31-38-4) are given on pages 83 and 87.

From the above information which shows that there has been no appreciable change in the quality of the water nor in the water level during the past 15 years of use, it would appear that the existing well should meet the needs for some time.

Sincerely yours,

A handwritten signature in dark ink, appearing to read "N. D. Hoy". The signature is written in a cursive, somewhat stylized script.

N. D. Hoy
Administrative Geologist

Enclosure

REPORT OF INVESTIGATIONS No. 18

83

Well No.	Date of collection	Calcium (Ca)	Magnesium (Mg)	Sodium and potassium (Na+K)	Bicarbonate (HCO ₃)	Sulfate (SO ₄)	Chloride (Cl)	Dissolved solids	Hardness as CaCO ₃		Specific conductance (micromhos at 25°C)	Temperature (°F)	pH
									Total	Noncarbonate			
31-31-2	1-27-54	137	53		170	448	23	860	556		1,050	77	7.4
*31-32-2	3-25-55	178	80	58	365	490	64	1,130	773	474	1,510		7.2
*31-32-3	3-25-55	58	78	49	259	278	50	712	465	253	1,030		7.4
31-32-4	3-25-55	103	67	28	165	542	31	1,010	682	497	1,280	78.8	7.2
31-32-8	2-8-55	150	66	42	176	535	26	914	646	502	1,180	78	7.7
*31-34-1	3-25-55	57	34	20	331	19	24	352	232	11	580		7.3
31-34-10	1-21-54	193	117		162	608	92	1,260	802	851	1,510	80	7.5
31-34-13	2-4-55	236	98	133	172	790	225	1,670	966		2,120	78	7.3
31-37-3	1-29-54	227	97		172	722	252	1,710	968		2,260	77	7.4
31-37-6	1-21-54	187	113		188	580	232	1,510	858	854	2,300	80	7.4
31-37-10	2-7-55	252	99		162	725	323	1,750	949	310	1,940	75	7.4
31-38-4	2-18-55	104	56	167	220	240	10	3,580	1,340	1,186	5,260	81.5	7.4
31-39-2	2-18-55	286	132	628	232	675	1,100	3,580	9,800	2,934	9,662	75.5	7.3
*31-39-3	11-20-50	1,590	1,590	13,100	201	1,170	25,500	43,570	9,800	9,600	53,600	78	7.6
31-43-2	1-20-54	216	83		188	178	40	1,570	924		2,320	78	7.4
32-25-4	2-15-55	52	38	11	188	178	28	454	355	201	671	81.4	7.4
32-27-3	2-15-55	94	48	3.2	188	215	22	492	402	248	725	79	7.7
32-29-3	2-15-55	103	47	1.4	200	232	21	550	432	265	784	77	7.5
32-32-1	2-7-54	153	76		178	342	33	752	450		904	77	7.5
32-32-7	2-7-55	152	69	54	124	670	38	1,100	694	592	1,300	79	7.9
32-33-2	2-7-55	179	69	51	160	570	70	1,090	712	582	1,350	79	7.4
32-33-4	2-4-55	261	109	106	156	750	332	1,870	1,150	1,020	2,400	84	7.5
*32-33-6	3-25-55	169	73	33	156	575	48	1,140	722	504	1,340	80	7.9
32-34-6	2-4-55	179	74	47	193	580	65	1,140	751	593	1,430		7.3
32-34-6	2-4-55	173	81	66	190	660	87	1,270	764	666	1,500	80	8.0
32-35-1	2-8-55	175	32	11	180	153	18	444	318	171	636	82	7.8
*32-35-1	3-25-55	44	23	6.4	262	5	6	254	204	204	418		7.3
32-31-1	2-4-55	136	60	23	192	420	30	856	586	428	1,100	81	7.9

Taken from U. S. Geological Survey Report entitled "Ground-Water Resources of Manatee County, Florida" by Harry M. Peek, U. S. Geological Survey, Tallahassee, Florida, 1958.

Table 6 (continued)

Well No.	Date	Water level	Date	Water level	Date	Water level	Date	Water level
31-38-4	2-16-51	5.8	10-2-51	5.6	3-30-53	5.6	8-18-54	7.5
	8-8-51	5.1	9-27-52	8.3	5-15-53	3.2		
	8-9-51	7.1	12-11-52	5.6	9-15-53	8.5		
	9-19-51	8.3	2-11-53	8.3	12-16-53	8.8		
32-20-3	6-22-52	2.05	5-16-53	- 3.90	10-15-53	5.0	6-28-54	5.0
	7-20-52	3.20	7-21-53	3.57	12-10-53	5.05	8-23-54	5.2
	2-11-53	3.6	9-17-53	5.09	2-25-54	0.9	9-17-54	4.6
	4-1-53	1.77						
32-30-1	9-20-54	- 10.05	2-2-55	- 13.5	10-26-55	- 14.45		
	12-22-54	- 11.9	5-9-55	- 18.9	12-15-55	- 13.37		
35-26-1	9-20-54	- 11.5	4-6-55	- 15.3	5-31-55	- 17.95	12-15-55	
	3-9-55	- 16.8	5-9-55	- 20.6	10-26-55	- 14.80		
35-33-6	2-7-51	8.4	12-28-51	10.4	10-30-52	9.8	7-21-53	9.8
	4-16-51	10.8	4-10-52	7.0	12-29-52	7.5	9-14-53	10.7
	6-6-51	5.5	5-4-52	4.34	2-10-53	10.5	10-14-53	10.1
	8-23-51	11.9	7-29-52	12.0	4-1-53	8.0	12-17-53	9.6
	9-26-51	11.5	9-15-52	11.2	5-15-53	4.9	2-2-55	8.4
	10-2-51	11.3	10-11-52	10.2	6-2-53	6.1		
36-29-2	12-7-52	- 7.5	3-10-55	- 10.60	10-26-55	- 8.07		
	9-22-54	- 2.7	5-31-55	- 8.10	12-15-55	- 5.99		
36-32-2	3-20-51	13.1	7-29-52	13.0	5-15-53	6.7	9-14-54	13.6
	4-16-51	14.2	9-15-52	14.3	6-2-53	8.0	9-28-54	15.5
	6-6-51	11.5	10-15-52	14.1	7-27-53	11.4	3-9-55	9.0
	8-13-51	14.1	10-30-52	12.1	9-14-53	14.1	5-31-55	11.6
	3-4-52	7.6	2-10-53	3.2	10-15-53	13.6		
	6-26-52	11.3	4-2-53	9.0	12-17-53	13.6		

Taken from U. S. Geological Survey Report entitled "Ground-Water Resources of Manatee County, Florida" by Harry M. Peek, W. S. Geological Survey, Tallahassee, Florida, 1958.

Volume III, Section I
Utilities Inventory
Page 1

*Sheila -
Please file in
De Soto water rights
Docket # 1.*

MASTER PLAN
FOR THE PRESERVATION AND USE
OF
DE SOTO NATIONAL MEMORIAL

Volume III, General Park Information
Section I, Utilities Inventory

Prepared by: Park Staff Date February 1963

Accepted by: Lloyd M. Pierson Date February 28, 1963
Superintendent

August 1963

Volume III, Section I
Utilities Inventory
Page 2

Section I. Utilities Inventory

1. Water System

Source. Well - National Park Service.

Ownership and Operation. U. S. Government.

Location and Nature. Well and pump are located in the southwest corner of the area, consisting of one 100 ft. well with 6" casing.

Intake Structures and Control Works. One 1½ h.p. electric pump and one 120 gallon tank located in small frame building which covers the well.

Quantity Available. 85 gallons per minute.

Supply Mains. None.

Storage. One 120 gallon tank.

Treatment. None

Distribution Mains. 420 ft. of 1½" pipe, 640 ft. of 1½" pipe, 580 ft. of 1" pipe, 560 ft. of ¾" pipe; 370 ft. of 2" pipe; sprinkler heads approximately every 50 ft.

Pumping Equipment. One 1½ h.p. centrifical, electric motor.

Consumption. Unknown.

Nonpotable Water. Not applicable.

2. Sewerage Systems

Ownership and Operation. None

Site Factors. Shallow water table. Low absorption in sand and shell soil.

August 1963

Volume III, Section I
Utilities Inventory
Page 3

Collecting Systems

- a. Sewer Lines
- b. Pumping Stations
- c. Flushing Devices
- d. Treatment. Septic tanks used locally. Concrete types.

Disposal Systems

- a. Method. Shell fill dispersal field.
- b. Sludge Disposal

Storm Drainage and Flood Control. System of drainage ditches to control flood waters and tide waters in the mangrove swamps.

3. Garbage and Refuse Disposal

Collection. Light use because of no picnic or camping areas. Collected infrequently.

Disposal. Burning in an open incinerator and burial of residue.

4. Power System

Source. Florida Power and Light Company

Supply Lines.

- a. Ownership. Commercial
- b. Length.
- c. Conductors
- d. Voltage and Phases
- e. Overhead or Underground

August 1963

Notes on DeSoto National Memorial

No other well on this property prior to the drilling of
Artesian well by R. C. Pemelman and Sons on November 24, 1950.

UNITED STATES
DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE
SOUTHEASTERN NATIONAL MONUMENTS
St. Augustine, Florida

August 23, 1963

REGION 1	
AUG 23 1963	
Reg. Dir.	
Asst. Reg. Dir.	
Admin. Officer	
Co. Eng. & Engrs.	
Architect	
Historian	
Archaeologist	
Soil Conservation	
Forestry	
Concessions	
Land & Rec.	

Memorandum

To: Regional Director, Region One

From: Coordinating Superintendent, Southeastern National Monuments

Subject: Water System Plan - De Soto National Memorial

Enclosed is tracing original of Plan NMem-Des-5350, *6 20 P.M.*
Water System, De Soto National Memorial. This has been prepared so as to permit installation of the water system before work of topsoiling, grassing and planting is done. The job was discussed in my memorandum to you of July 24th, and revision has been made according to "Asst. Regional Director" Zimmer's memorandum of August 18th.

The proposed layout conforms generally to Supt. Hopper's and Engineer Kuffin's recommendations. The well is located on the only high ground at the area, near the southwest property corner, a logical place to avoid salt water intrusion as well as a site for a small "dog house" for pump and pressure tank, as used at Frederica. The Power Company will run electric service to this corner. These facilities will be out of sight, screened by dense jungle.

The piping layout now appears satisfactory, although quite a bit of turning of valves must be done to water the central lawn panel without soaking the operator. However, it will work; and pipe is now in, under the paved parking areas. We should install this system right away; and then topsoil, grass, and plant. The revised De Soto P.C.P. was forwarded in late July, showing that savings on roads and trails would permit other work which is necessary. Early action to approve the P.C.P. and the enclosed plan is requested so that further com-

pletion of the project with approved funds may be done before the heavy winter tourist season arrives. Constant watering of lawns and plantings will have to be done from October to June, normally a very dry season.

Detailed specifications and approximate costs have been given in Supt. Hopper's memorandum of July 19th, sent to you with mine of July 24th. The only items I question in Mr. Hopper's list are:

- 1.) Page 1 - 82 gallon pressure tank. The tank should be 300 gal. capacity at least, a cost complete of about \$200.00.
- 2.) Use reducing couplings in place of bushings wherever possible, as the former will give better protection against salt water corrosion.

Your early approval of the well and water system job will help us to get along with the rest of the work. The well will be drilled according to State Road Department specifications for a similar well in that vicinity.



Coordinating Superintendent.

Attachment-1

In duplicate.

Copy to: Supt. Hopper, DeSoto

UNITED STATES
DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE
SOUTHEASTERN NATIONAL MONUMENTS
St. Augustine, Florida

621 Encl

REGION ONE	
JUL 25 1950	
☒	Assoc. Reg. Dir.
☒	Asst. Reg. Dir.
☒	Adm. Officer
☒	Ch. Insp. & Maint.
☒	Land Arch.
☒	Architecture
☒	History
☒	Archaeology
☒	Soil Conserv.
☒	Forestry
☒	Concessions

July 28, 1950

Memorandum

To: Regional Director, Region One

From: Coordinating Superintendent, Southeastern National Monuments

Subject: De Soto National Memorial - Proposed Water System.

Enclosed are rough sketches for your guidance in the preparation of a plan for a water system at De Soto National Memorial. Engineer Ruffin has sent the small topo sketch dated 6/30/50; and Superintendent Hopper has recorded his recommendations on plan NMEM-DeS-2002. I have added suggestions to the latter for the location of several ground-joint unions and plugged T's, to permit future repairs or changes. Your comments on the plan are requested, especially as to pipe sizes.

This system is needed before the work of lawns and plantings can proceed. We should have the system installed before road and walk paving is done, but if this is not possible because of a delay in plans you might give us advance information so that capped lengths of pipe could be run under paving to avoid later cutting of roads and walks.

Enclosed are two copies of Supt. Hopper's memo of July 19th, giving details of materials and costs. According to this information, it appears that funds will be available for the well and most of the system, so I am summarizing the recommendations received as follows:

- 1.) Well - 300' to 500' deep - 6" casing to hard rock (40' to 60') cost \$450 to \$750. Small sketch shows location of proposed Power Co. line, and well and pump house can be in this S.W. corner. As water will be used almost entirely for grounds, no treatment is proposed, and pressure system is recommended in Supt. Hopper's memo of July 19, copy attached, cost \$428.00 installed.

- 2.) Pipe lines, sprinklers and hose outlets,
cost according to Hopper layout, \$709.62.
Installation by our labor crew, \$215.00.
- 3.) Small "dog-house" for pump and tank -
\$100.00.

Total cost \$1900 to \$2200, according
to depth of well.

We are especially anxious to have your instructions on
pipe sizes so that capped pipes may be laid under road and walk
crossings before paving is finished. Then, final work according
to your approved plan can follow.

This work is being set up in the DeSoto P.C.P. revision
on which I am now working.



Coordinating Superintendent.

Attachments-4

Copy to: Supt. Hopper, DeSoto
Engr. Ruffin, DeSoto

UNITED STATES
DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE
De Soto National Memorial
Bradenton, Florida

July 19, 1950

Memorandum

To: Coordinating Superintendent, Southeastern National Monuments
From: Superintendent, De Soto National Memorial
Subject: Proposed well and water system, De Soto

Local well drillers are of the opinion that at De Soto National Memorial, the depth of a 6" well will probably run from 300' to 500' with cost varying from \$450 to \$750, depending on depth of well and amount of pipe used. Mr. R. G. Dungan of Palmetto Pump and Irrigation Company, advises that a few good wells come in on the coast at considerable less depth but for us not to plan on it. Well drilling firms prefer to bid on a per foot basis for drilling and for casing.

The inclosed planting plan, 2002, has a water system sketched in. We have worked with Mr. Dungan, who prepares many of the water system plans in this area, in preparing this system. The possibility of future comfort stations and museum have been kept in mind.

I suggest placing pipe 12" below surface of the ground to protect them from physical injury; also damage from rust will be less.

Following are materials needed for water system:

A. Pump and tanks:

1--1 1/2 H. P. centrifugal jet pump with brass impeller, monel metal shaft, electrical motor 1, automatic pressure gauge attached.	\$44.00
1--tank, 22 gallon, pneumatic galvaniz- ed.	60.00
1--6" ell	7.50
1--6" x 2" bushing	1.25
10--2" galvanized pipe @ 45¢ per foot	4.50
1--2" dresser coupling	2.75
1--2" check valve	8.00
Total	\$428.00

This price will cover installation costs.

B. Water lines and lawn sprinkling system:

790'—1½" galvanized pipe @ 37¢ per ft.	\$292.30
570'—1½" galvanized pipe @ 29¢ per ft.	165.30
430'—1" galvanized pipe @ 21¢ per ft.	100.30
148'—¾" galvanized pipe @ 15¢ per ft.	22.20
10—1½" tees @ 88¢ each	8.80
1—1½" cross @ \$1.26 each	1.26
12—1½" tees @ 70¢ each	8.40
8—1½" bushings @ 25¢ each	2.00
9—1" tees @ 45¢ each	4.05
9—1" bushings @ 21¢ each	1.89
3—¾" tees @ 34¢ each	1.02
12—hose bibs @ 95¢ each	11.40
4—1½" gate valve @ \$5.70 each	22.80
3—1½" 45° el @ 70¢ each	2.10
2—1½" 90° el @ 65¢ each	1.30
3—1½" 45° el @ 60¢ each	1.80
1—1½" 90° el @ 50¢ each	.50
10—sprinklers to cover 52' diameter @ \$4.25 each	42.50
2—sprinklers, w/base to cover 52' diameter @ \$6.75 each	13.50
Total	\$709.62

The above prices for parts A and B are the regular selling price as quoted by a local firm. If material were purchased by bid I believe the total cost would be 15% to 20% less.

Installation of water line and lawn sprinkling system can be done by one of the following methods:

1. Installation work and materials included in one bid.
2. By a contract for installation
3. We can use local laborers and make installation.

The approximate cost for this installation will be:

200 hours labor @ 85¢ per hour	\$170.00
Tools required for work	45.00
Total	\$215.00

The above system will give good coverage. The 52 foot grass panel in loop road has a row of rotating sprinklers down the center of plot with coverage to road on each side. There is sufficient water to run five sprinklers at a time but not ten, therefore the reason for the valves. The flush pop-up type sprinkler was considered but will cost considerable more, the diameter coverage being much less, which would require much more pipe. The hose bibs are so spaced that hose sprinklers can be used, to water grass strips along road, planted trees, and grass in open area around marker. The 1 1/2" water line ends at possible future comfort stations.

A legend has been added on the right side of map to indicate water lines, sprinklers, hose bibs, size of pipe and valves.

/s/ Richard G. Hopper
Superintendent

C
O
P
Y

