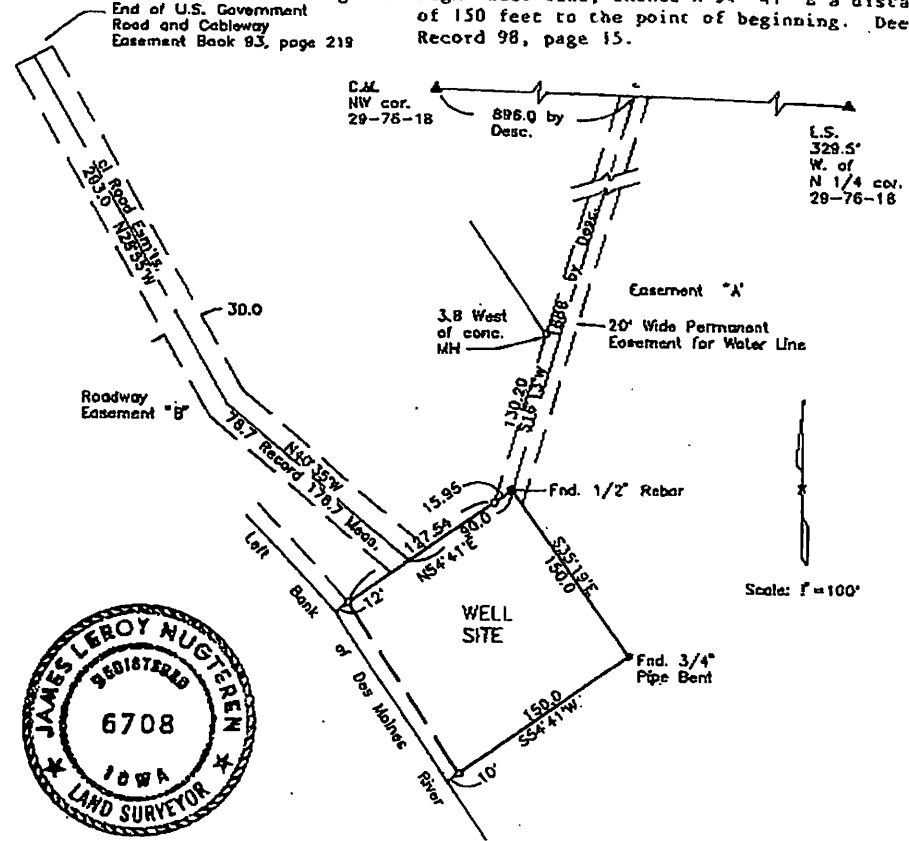


Plat of Survey

Commencing at the NW corner of Section 29, Township 76 North, Range 18 West of the 5th P.M.; thence S 88° E along the north line of said Section 29 a distance of 896 feet thence S 16° 13' W a distance of 1686 feet; to an iron pipe and the point of beginning, thence S 35° 19' E a distance of 150 feet to an iron pipe; thence S 54° 41' W a distance of 150 feet to the high water line of the left bank of the Des Moines River; thence N 35° 19' W a distance of 150 feet along said high water line; thence N 54° 41' E a distance of 150 feet to the point of beginning. Deed Record 98, page 15.

End of U.S. Government Road and Cableway Easement Book 93, page 219




I hereby certify that this plat, map, survey or report was made by me or under my direct personal supervision and that I am a duly registered Land Surveyor under the laws of the State of Iowa.

Signed _____ Date _____

James Leroy Nugteren Feb 13, 1999
 JAMES LEROY NUGTEREN, L.S. Iowa Reg. No. 6708

- Pin Found
- Pins Set
- ▲ Sec. Cor. Fnd.

REVISIONS		
REV. NO.	DATE	DESCRIPTION



GARDEN & ASSOC.

CITY OF PELLA
 WELL SITE 29-76-18
 MARION COUNTY

DATE: 2/89 DRN: *GRH* APP: _____
 DWG. NO. _____ REV. _____

Arnold Van Zee
Marion County, Iowa
CA Project 608128

Legal Description

Tract No. 1

A part of Lot 11 of the North 1/2 of Section 29, Township 76 North, Range 18 West of the 5th P.M., Marion County, Iowa according to the plat thereof recorded in Surveyor's Record Book 2, Page 293 in the office of the Marion County Recorder and more particularly described as follows: Commencing at the NW corner of Lot 11, said point also being the NW corner of said Section 29; thence South 1078.8 feet along the west line thereof to the point of beginning; thence S 79 Degrees 30 Minutes 20 Seconds E 150.6 feet; thence S 42 Degrees 22 Minutes 50 Seconds E 124.25 feet; thence S 36 Degrees 54 Minutes 00 Seconds W 268.0 feet to the left bank of the Des Moines River; thence Northwesterly along said left bank 95.2 feet to the west line of said Lot 11; thence North 270.0 feet to the point of beginning containing 1.1 acres more or less. The west line of said Lot 11 is assumed to bear due north for purposes of this description.

Legal Description

Tract No. 2

A part of Lot 11 of the North 1/2 of Section 29, Township 76 North, Range 18 West of the 5th P.M., Marion County, Iowa according to the plat thereof recorded in Surveyor's Record Book 2, Page 293 in the office of the Marion County Recorder and more particularly described as follows: Commencing at the NW corner of Lot 11, said point also being the NW corner of said Section 29; thence South 1078.8 feet along the West line thereof; thence S 79 Degrees 30 Minutes 20 Seconds E 150.6 feet; thence S 42 Degrees 22 Minutes 50 Seconds E 124.25 feet to the point of beginning; thence continuing S 42 Degrees 22 Minutes 50 Seconds E 426.65 feet; thence S 13 Degrees 34 Minutes 30 Seconds W 130.20 feet to a point on the northwest line of the City of Pella Well Site which is 15.95 feet from the north corner thereof; thence S 52 Degrees 21 Minutes 50 Seconds W 139.5 feet along said northwest line to the left bank of the Des Moines River; thence Northwesterly along said left bank 438.5 feet; thence N 36 Degrees 54 Minutes 00 Seconds E 268.0 feet to the point of beginning containing 2.6 acres more or less. The west line of said Lot 11 is assumed to bear due north for purposes of this description.

No. 7692 P. 3

AUG. 26. 1999 7:42PM

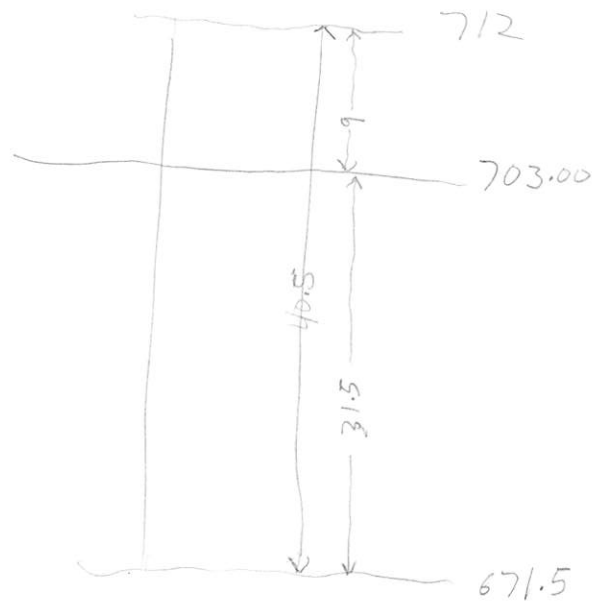
TABLE 1
COLLECTOR WELL DESIGN
THE CITY OF PELLA, IOWA

AQUIFER

Top of Aquifer.....	690.0 feet MSL	<i>thickness = 18ft</i>
Base of Aquifer.....	672.0 feet MSL	

CAISSON DESIGN

Grade Elevation.....	703.0 feet MSL
Inside Diameter Caisson.....	16.0 feet ←
Outside Diameter Caisson.....	19.0 feet
Elevation Top Slab.....	712.00 feet MSL ←
Elevation Top of Plug.....	671.5 feet MSL
Caisson Depth (from top slab to top of plug).....	40.5 feet ←
Elevation Centerline Laterals and Valves (Upper Tier, Nos. 3, 4 & 5).....	675 feet MSL
Elevation Centerline Laterals and Valves (Lower Tier, Nos. 1 & 2).....	673-674 feet MSL
Elevation Centerline Laterals and Valves (New Laterals, Nos. 6 & 7).....	674 feet MSL
Maximum Design Pumping Level.....	677.0.0 feet MSL



LATERAL SCREEN DESIGN

EXISTING LATERALS (Nos. 1, 2, 3, 4 and 5) installed 1974

Material - Low Carbon Steel, punched slots
Screen Diameter - 12.625 inches OD, 12.0 inches ID, Open Area approx. 18%

LATERAL NUMBER	SCREEN LENGTH (FEET)	BLANK LENGTH (FEET)	LATERAL LENGTH (FEET)
1	242	20	262
2	226*	20	246
3	199	20	219
4	142	0	142
5	166	20	186
TOTAL	975	80	1055

* Screen length shortened in 1990 by 12 feet (original length 238 feet)

NEW LATERALS (Nos. 6 and 7) installed 2003

Material - Stainless Steel, Type 304, continuous slot, wire-wound
Screen Diameter - 12.75 inches OD, 12.0 inches ID, Open Area 32-54%

LATERAL NUMBER	SCREEN LENGTH (FEET)	BLANK LENGTH (FEET)	LATERAL LENGTH (FEET)
6	240	10	250
7	240	10	250
TOTAL	480	20	500

SCREEN SLOT SIZE PLACEMENT (feet from inside caisson wall)

LATERAL NUMBER	SCREEN SLOT SIZE				
	0.060 "	0.080 "	0.100 "	0.125 "	0.150 "
6		10-20, 210-250	20-40, 180-210	40-100, 170-180	100-170
7	180-200	170-180	10-70, 160-170, 200-210, 230-250	70-90, 150-160, 210-230	90-150

Total Open Area = 707 square feet

Table 2
Pre-Maintenance Test Summary
 Pella, Iowa

Well ID	Reference Elevation ft, msl	Q = 610 gpm		Q = 0 gpm			Q = 560 gpm			Q = 410 gpm		
		Depth to Water	Water Elevation	Depth to Water	Water Elevation	Observed Recovery	Depth to Water	Water Elevation	Observed Drawdown	Depth to Water	Water Elevation	Observed Drawdown
		2/17/03 3 PM	2/17/03 3 PM	2/18/03 8 AM	2/18/03 8 AM		2/18/03 2 PM	2/18/03 2 PM		2/19/03 7 AM	2/19/03 7 AM	
		feet	ft, msl	feet	ft, msl	feet	feet	ft, msl	feet	feet	ft, msl	feet
Casebon	712.33	34.20	678.13	29.40	682.93	4.80	33.75	678.58	4.35	34.30	678.03	4.90
OW-1	706.93	28.38	678.55	23.95	682.98	4.43	27.40	679.53	3.45	28.20	678.73	4.25
OW-2	704.93	21.76	683.17	21.48	683.45	0.28	21.40	683.53	-0.08	21.54	683.39	0.06
OW-3	708.83	27.04	681.59	25.06	683.57	1.98	26.25	682.38	1.19	26.75	681.88	1.69
OW-4	708.04	24.00	684.04	24.04	684.00	-0.04	24.02	684.02	-0.02	24.02	684.02	-0.02
OW-5	709.12	27.20	681.92	26.21	682.91	0.99	26.31	682.81	0.10	26.91	682.21	0.70
OW-6	709.57	27.74	681.63	27.40	682.17	0.34	27.40	682.17	0.00	27.20	682.37	-0.20
River			683.5		683.5			683.5			683.5	

Collector Well Specific Capacity (gpm/ft of drawdown)	127.1	128.7	83.7
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Differential - ft/1000 gpm			
OW-1	0.69	1.70	1.71
OW-3	5.67	6.79	9.39
OW-5	6.21	7.55	10.20

Table 3
Step-Drawdown Test Summary (4/4/03)
Pella, Iowa

Well ID	Reference Elevation ft. msl	Static		Step 1, Q = 390 gpm			Step 2, Q = 620 gpm			Step 3, Q = 800 gpm			Step 4, Q = 1120 gpm		
		Depth to Water	Water Elevation	Depth to Water	Water Elevation	Observed Drawdown	Depth to Water	Water Elevation	Observed Drawdown	Depth to Water	Water Elevation	Observed Drawdown	Depth to Water	Water Elevation	Observed Drawdown
		4/4/03 8 AM feet	4/4/03 8 AM ft. msl	4/4/03 10 AM feet	4/4/03 10 AM ft. msl	feet	4/4/03 Noon feet	4/4/03 Noon ft. msl	feet	4/4/03 2 PM feet	4/4/03 2 PM ft. msl	feet	4/4/03 4 PM feet	4/4/03 4 PM ft. msl	feet
		17.66										21.27		3.61	
Calcedn	713.82	28.28	685.34	29.37	684.25	1.09	30.05	683.67	1.77	30.88	682.63	2.71	31.89	681.73	3.61
OW-1	706.93	21.49	685.44	22.27	684.66	0.78	22.82	684.11	1.33	23.57	683.36	2.08	24.34	682.59	2.65
OW-2	704.93	18.46	685.47	19.45	685.47	0.00	19.47	685.46	0.01	19.48	688.45	0.02	19.50	685.43	0.04
OW-3	708.63	23.43	685.20	23.48	685.15	0.05	23.55	685.08	0.12	23.70	684.83	0.27	23.82	684.81	0.39
OW-4	708.04	23.70	684.34	23.70	684.34	0.00	23.70	684.34	0.00	23.70	684.34	0.00	23.70	684.34	0.00
OW-5	708.12	23.62	685.50	23.71	685.41	0.09	23.78	685.34	0.16	23.92	685.20	0.30	24.08	685.04	0.48
OW-6	709.57	24.25	685.32	24.27	685.30	0.02	24.27	685.3	0.02	24.28	685.29	0.03	24.29	685.28	0.04
River	688.65	3.58	685.07	3.56	685.08	-0.02	3.57	685.08	-0.01	3.58	685.09	-0.02	3.58	685.07	0

Collector Well Specific Capacity (gpm/ft of drawdown)	357.80	350.3	332.1	310.2
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Differential - ft/1000 gpm				
OW-1		1.06	0.87	0.61
OW-3		2.31	2.44	2.56
OW-5		2.97	2.85	2.86

713.62
- 703.00 land surf

10.62

TABLE 5
 Lateral Flow Analysis - Post-Maintenance Test
 Horizontal Collector Well - Pumping Rate 950 GPM - 4/7/03
 City of Pella, Iowa

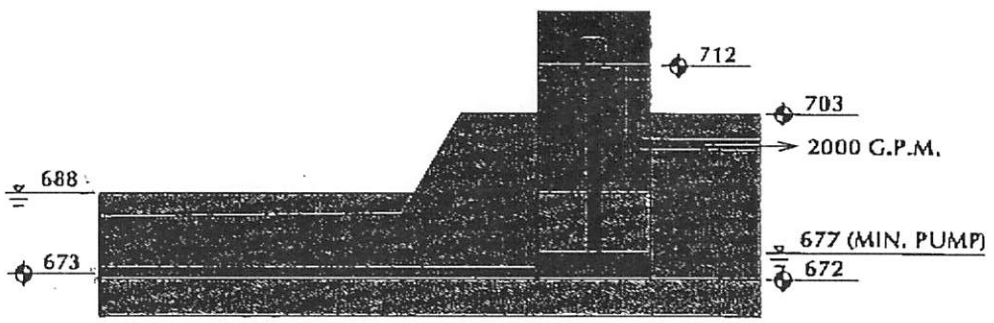
Lateral No.	Elevation Centerline Feet, msl	Total As-Built Lateral Length, feet from inside wall	Lateral Diameter inches	Lateral Velocity kilometers/hour	Water Temperature ° F	Per Cent of Total Flow (%)	Flow gpm	Diver's Comments
1	674.1	262	12	< 0.05	41.5	< 3	< 30	relatively clean
2**	673.2	246	12	< 0.05	42.4	< 3	< 30	dirty, rusty, some buildup, minor amount of sand
3	675.2	219	12	< 0.05	43.5	< 3	< 30	somewhat rusty, 1/4 to 1/2 inch of sand in lateral
4	675.1	142	12	< 0.05	47.0	< 3	< 30	rusty, worst appearance of all laterals, noticeable algae (bacterial) growth
5	675.0	186	12	< 0.05	45.0	< 3	< 30	rusty, trace of sand
6	674.0	250	12	0.70	42.1	> 44	> 420	New, no sand
7	674.0	250	12	0.65	41.8	> 41	> 390	New, no sand
Average		222.1			42			

* Lateral No. 6 and 7 New (2003), other five Installed in 1974

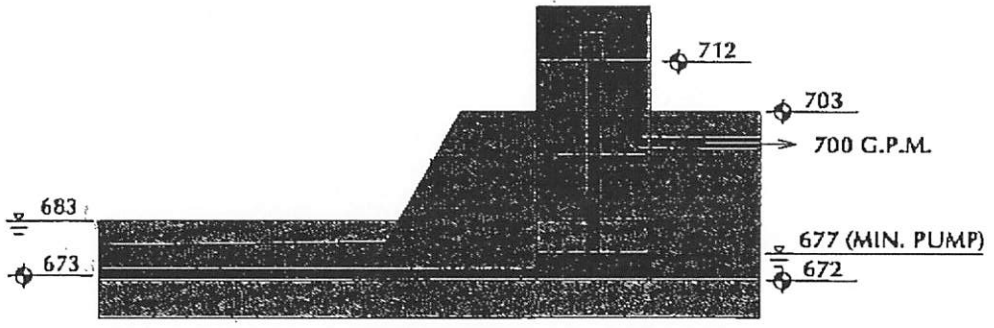
** - Length of Lateral No. 2 shortened 12 feet in 1990

TABLE 6
Constant-Rate Test Sand Testing Results
Collector Well Post-Maintenance Testing
City of Pella, Iowa

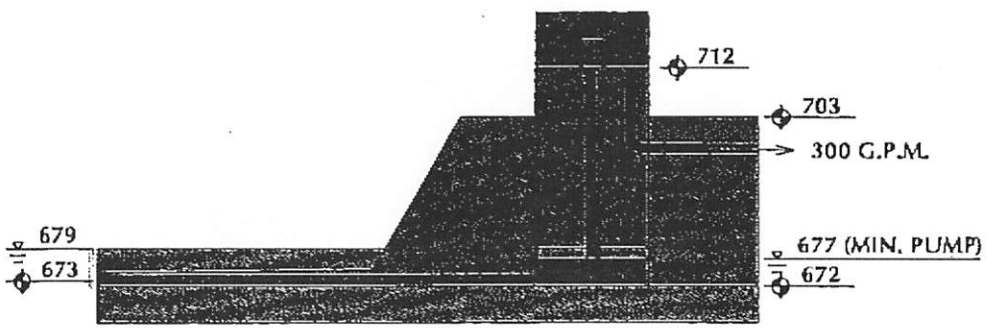
Specifics of Test	Collector Pumping Rate, gpm	Date Start Time	Time of Reading	Elapsed Time (minutes)	Sand Volume (ml)	Sand Content (ppm)
Step Test, one hour into last step	1120	4/4/03 15:00	4/4/03 15:10	10	< 0.01	< 0.5
Constant Rate Test, elapsed time two hours	950	4/5/03 14:00	4/5/03 14:10	10	< < 0.01	< < 0.5
Constant Rate Test, elapsed time eight hours	950	4/5/03 22:00	4/5/03 22:10	10	< 0.01	< 0.5
Constant Rate Test, elapsed time 24 hours	950	4/6/03 12:00	4/6/03 12:10	10	< 0.01	< 0.5
Constant Rate Test, elapsed time 47 hours	950	4/7/03 11:00	4/7/03 11:10	10	< 0.01	< 0.5
					Average	< 0.5



1975 CONDITION



2000 CONDITION



PROJECTED FUTURE CONDITION

PELLA, IOWA
COLLECTOR WELL
RIVER STAGE IMPACT
FIGURE 4

No. 7692 P. 11

AUG 26, 1999 7:43PM

Post-It® Fax Note		7671	Date	8-24-99	# of Pages	18
To	Robert Rowden		From	Curt Jones		
Co. Dept	JDAIR		Co.	City of Peella		
Phone #	319 335 1567		Phone #	641 628 2464		
Fax #	319 335 2754		Fax #	641 628 4114		

CITY OF PEELLA

UNIVERSITY AVE

EXISTING JORDAN WELL

EXISTING WATER TREATMENT PLANT

EXISTING PUMP STATION

EXISTING COLLECTOR WELL

EXISTING ALLUVIAL WELL FIELD

PROPOSED COLLECTOR WELL

PROPOSED SURFACE RECHARGE BASIN

PROPOSED INFACE RECHARGE BASIN

ALTERNATE #3 & #4

