WELL INSTALLATION REPORT

LAYNE-WESTERN

1. CONTRACT WITH: West Des Moines Water Works DATE: 8/29/97
2. CITY AND STATE: West Des Moines, Iowa DRILLER: Dave Deaver
3. WELL NO: Deep #3 AT TEST HOLE NUMBER 97-1 WELL LOCATION: Near ball diamonds at east end of Raccoon River Park.
4. WORK COMPLETED: 8/29/97 TOTAL MAN HOURS CHARGED TO JOB:

5. MATERIAL:

	LENGTH	DIA.	GAUGE OR THICKNESS	MATERIAL	TYPE	SLOT SIZE
6. SCREEN:						
7. INNER CASING:						
8. OUTER CASING:	80'	30"	0.375"	Steel	Std.	

9. ____ TONS OF GRAVEL PACK USED IN THE WELL. SIZE:
10. TEST OF WELL: TEST PUMP OR PERMANENT PUMP: ____ BOWL SIZE ____ STAGES
11. SIZE OF ORIFICE: ____ x ____ ORIFICE TUBE READING: ____
12. PUMPING TEST - MEASUREMENTS FROM GROUND LEVEL:

TIME	GPM	STATIC	DRAWDOWN	PUMPING LEVEL

13. RECOVERY IN 5 MINUTES: , IN 30 MINUTES:
14. DID YOU SEAL BOTTOM OF WELL No THICKNESS: MATERIAL:
15. WELL UNDERREAMED? No FROM ____ TO ____, FROM ____ TO ____
16. IF ALL SCREEN WAS NOT PLACED AT BOTTOM, STATE HOW IT WAS PLACED?
    FROM ____ TO ____; FROM ____ TO ____; FROM ____ TO ____
17. DEPTH OF WELL FROM GROUND LEVEL 79' SIZE OF DRILL HOLE: 36"
18. WAS CEMENT PLACED AROUND OR BETWEEN ANY OF THE CASINGS? Yes
19. IF SO, STATE INTERVALS, QUANTITY, AND METHOD USED: From 0' - 79', placed with tremie pipe.

WELL INSTALLATION REPORT (PAGE 2)

LAYNE-WESTERN

CONTRACT WITH: West Des Moines Water Works **WELL NO:** Deep #3

LOG OF WELL FROM GROUND LEVEL:

FEET		FEET	FORMATION
0	to	19	Clay
19	to	42	Sand & gravel w/cobbles
42	to	48	Sticky gray clay
48	to	61	Red shale
61	to	68	Hard gray shale
68	to	78	Gray shale
78	to	80	Hard gray shale
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Layne

Layne Christensen Company

Subject Drillers Log West Roswell Date

Jordan #3

90 - 95	Sandy Weathered Limestone
95 - 205	Gray Shale
205 - 272	Gray Shale - Soft White Limestone
272 - 310	Gray - Brown Limestone
310 - 320	Brown Limestone - Chert - Gypsum
320 - 325	Gray Shale
325 - 355	Sandy Limestone
355 - 380	Shale - Limestone
380 - 385	Shale - Sandstone
385 - 461	Gray Limestone - Chert - Shale
461 - 500	Light Gray Limestone
500 - 525	Sandy Limestone - Chert - Quartz
525 - 645	Gray Limestone - Chert
645 - 665	Gray Limestone - Gypsum
665 - 670	Gray Shale
670 - 710	Sandy - Dolomite - Traces Chert
710 - 720	Shale
720 - 735	Red Clay - Broken Limestone
735 740	Gray Limestone
740 - 750	Red Clay - Shale
750 - 780	Gray Limestone - Shale
780 - 793	Limestone - Gypsum - Shale
793 - 800	Brown Limestone
800 - 823	Brown Limestone - Brown Gray Clay - Shale
823 - 965	Brown - Gray Limestone - Gypsum
965 - 1001	Brown - Gray Limestone - Shale - Chert - Gypsum
1001 - 1060	Brown Dolomite Fractured at 1022 - 1025 Lost Circ.
1060 - 1105	Gray Limestone - Brown Dolomite
1105 - 1190	Gray And - Brown Dolomite
1190 - 1200	Blue Shale
1200 - 1260	Light Brown Dolomite
1260 - 1332	Gray Limestone - Dolomite - Traces Shale
1332 - 1460	Gray Limestone - Brown - Dolomite - Shale - Gypsum
1460 - 1640	Gray Shale - Limestone
1640 - 1723	Gray - Brown Limestone - Dolomite
1723 - 1760	Gray - Brown - Sandy Limestone - Dolomite
1760 - 1870	Light Brown - Dolomite
1870 - 1890	Light Gray Dolomite
1890 - 1920	Dark Brown Dolomite - Traces Sandstone
1920 - 1960	Gray Shale - Sandstone
1960 - 1987	Brown Dolomite
1987 - 2000	Brown Dolomite - Gray Shale
2000 - 2105	Gray - Brown Dolomite

VERTICAL TURBINE

PUMP INSTALLATION REPORT

Layne-Western Company

JOB NAME: City of West Des Moines
Address:
City,State: West Des Moines, IA

DATE: 1/26/99

Oil - Water Lube

PUMP NO: 397166 New - Repair

Pump Trouble: New Installation

PUMP SIZE	DIAMETER	LENGTHS
Discharge	10" Above / Below	
Column	10" Screw / Flange	16 x Random Lgths
Tubing		
Shaft	Stainless / Carbon	

Column Setting to Bowl: 346'

BOWL:

Manufacturer: Goulds
Diameter: 13 1/2" Shaft Diameter:
Type: 14RJHC Stages: 5
Material: Bronze Bowl Length: 83"
Suction Diam: NA Suct. Length: NA
Special Paint, Coatings, Sleeves, etc:
Column: Epoxy Paint
Submersible Cable Size: 750mcm

MOTOR OR GEAR DRIVE:

Make: Plueger HP: 300
Speed: 1750 rpm Volts: 480
Frame: CD:
BD:
Serial # 3332604801
Running Amps:
Running Volts:
Gear Drive Ratio: Standard / Comb.

WELL:

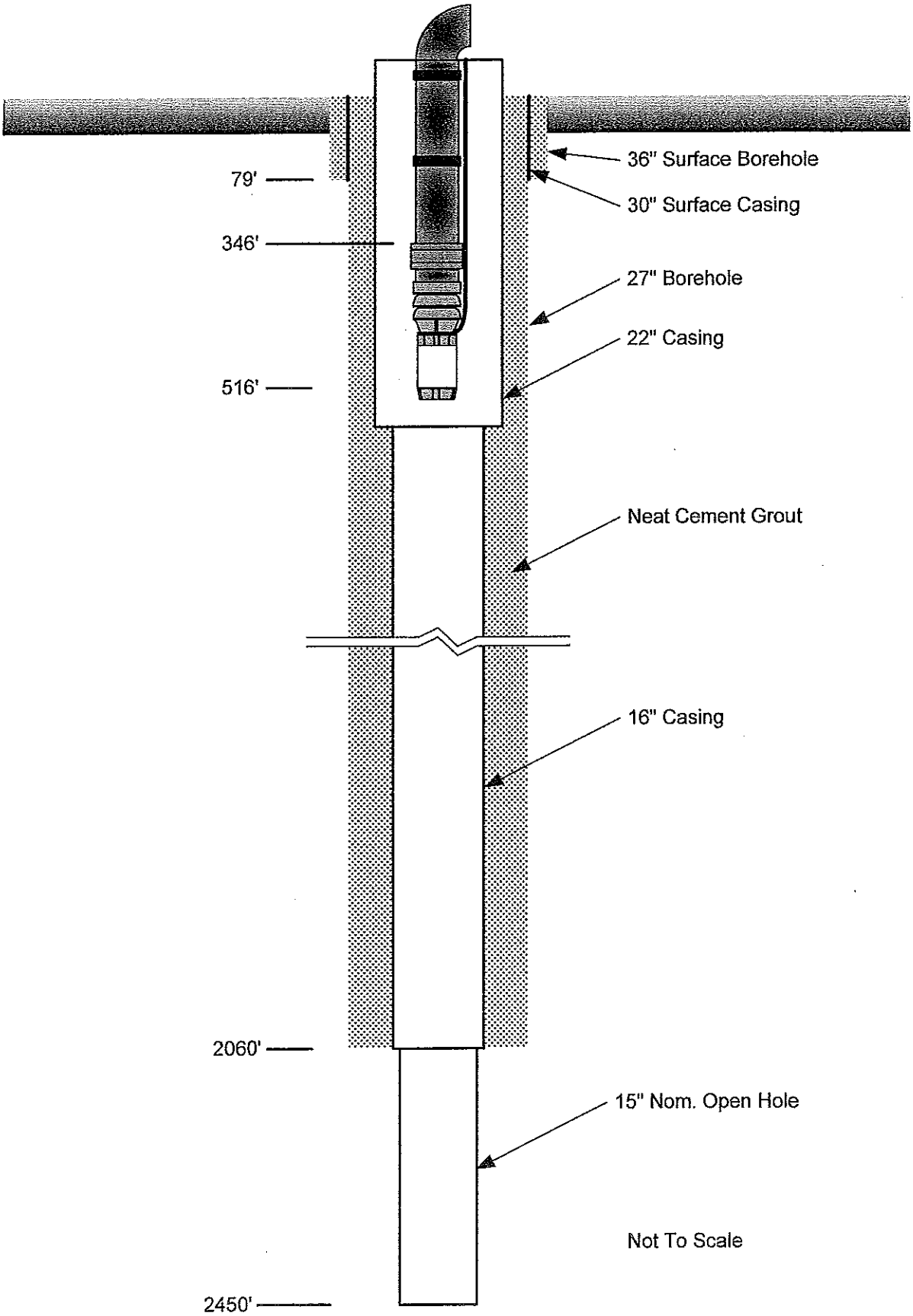
No: Jordan Year Drilled: 1997
Location: Raccoon Park, West Des Moines
Diameter: 22" Depth: 2450'
Measured from top of 22 inch diameter casing which is 2 feet above ground
Tape to water: 215'
2 - Airline length: 346' A.L. Material: Toro
Static Gauge: 131 Static Level: 215'
Pumping Gauge: Pumping Level:
Disch. Pressure: psi when pumping into system at gpm.

INSTALLER: David Poulos & Joe Dooling
Rig Used: R - 12

PUMP REPAIR

CONDITION OF PUMP WHEN PULLED	NEW PARTS INSTALLED
Column:	Column: New Installation
Tubing:	Tubing: N/A
Shafting:	Shafting: N/A
Bowl:	Bowl: New Installation
Suction:	Suction:
MACHINE WORK:	1. DRAIN PORTS OPEN Yes No 2. CHLORINATE WELL Yes No 3. PUMP RUNS 4. ALIGN PUMP HEAD WITH DIAL INDICATOR Yes No 5. GROUTED HEAD-BASE PLATE Yes No

ɜep Well #3 Construction Det
West Des Moines Water Works
Completed 1/26/99



PUMPING TEST REPORT
LAYNE-WESTERN

CUSTOMER: West Des Moines Water Works **FOREMAN:** Joe Dooling
LOCATION: West Des Moines, Iowa **DATE:** 2/17/98
WELL NO: Deep Well No. 3 **AIRLINE LENGTH:** 370'
ORIGINAL SPECIFIC CAPACITY: **IN** 19
METER SIZE & TYPE:

PUMPING TEST DATA - Step Test After Acid Treatment

Orifice Size 10" x 8"	Flow Rate (GPM)	Airline Reading (FEET)	Water Level (FEET)	Draw Down (FEET)	Disch. Press. (PSI)	Total Dyn. Head (FEET)	Specific Capacity (GPM/FT)
	1224	111	259	38			32.2
	1833	84	286	65			28.2
	2439	55	315	94			25.9

STATIC WATER LEVEL: 221' **AVERAGE SPECIFIC CAPACITY (gpm/ft):** 28.8

Test Results/Recommendations/Comments: All water levels are being taken from the rotary table on the drilling rig which is approximately 6 feet above grade.

Pump Operates (smooth, vibrates at high flow, etc.):

Motor (seals, leaks, noise, oil change, etc.):

PUMPING TEST REPORT
LAYNE-WESTERN

CUSTOMER: West Des Moines Water Works **FOREMAN:** Joe Dooling
LOCATION: West Des Moines, Iowa **DATE:** 1/27/98
WELL NO: Deep Well No. 3 **AIRLINE LENGTH:** 350'
ORIGINAL SPECIFIC CAPACITY: **IN 19**
METER SIZE & TYPE:

PUMPING TEST DATA - Initial Step Test After Surge Pumping

Orifice Size 10" x 8"	Flow Rate (GPM)	Airline Reading (FEET)	Water Level (FEET)	Draw Down (FEET)	Disch. Press. (PSI)	Total Dyn. Head (FEET)	Specific Capacity (GPM/FT)
	707		280	62			11.4
	1000		300	82			12.2
	1348		335	117			11.5

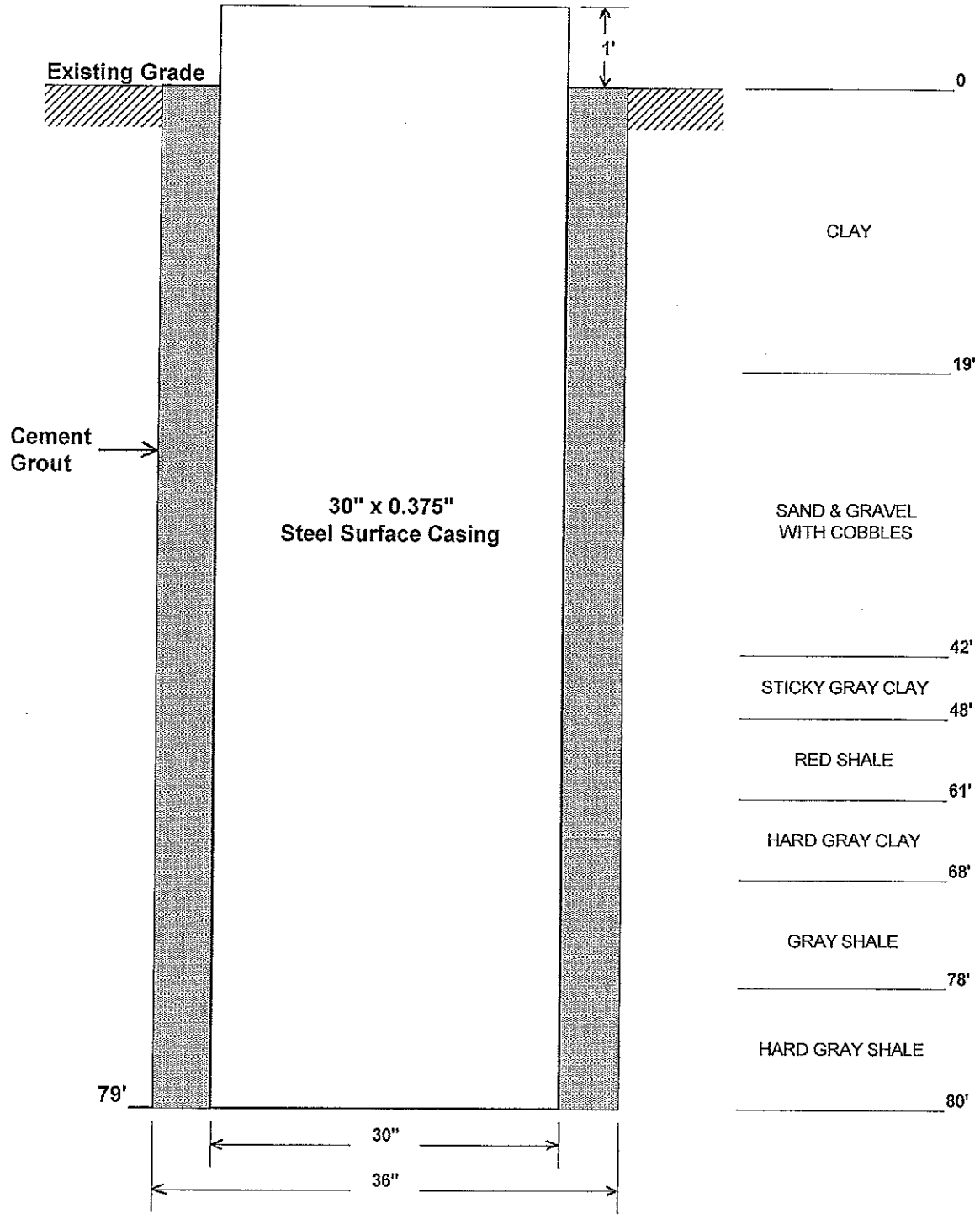
STATIC WATER LEVEL: 218' **AVERAGE SPECIFIC CAPACITY (gpm/ft):** 11.7

Test Results/Recommendations/Comments: All water levels are being taken from the rotary table on the drilling rig which is approximately 6 feet above grade.

Pump Operates (smooth, vibrates at high flow, etc.):

Motor (seals, leaks, noise, oil change, etc.):

SURFACE CASING DETAIL
WEST DES MOINES WATER WORKS
DEEP WELL NO. 3



NOT TO SCALE