ENGINEERING REPORT
FOR
Lake Region Water and Sewer Company

Shawnee Bend/Lake of the Ozarks
Camden County, Missouri

Water System

PREPARED BY:
Krehbiel Engineering, Inc.
63 Blair Ave.
Camdenton, MO 65020

Date Prepared: October 2007

ENGINEERING REPORT

FOR

Lake Region Water and Sewer Company

Shawnee Bend/Lake of the Ozarks
Camden County, Missouri

Water System

October 2007

PREPARED FOR:
Lake Region Water and Sewer Company
802 Bittersweet
Lake Ozark, MO 65049

Krehbiel Engineering, Inc.
63 BLAIR AVENUE POST OFFICE BOX 587 CAMDENTON, MISSOURI 65020
573-346-5316 FAX 573-346-3851 info@krehbielengineering.com www.krehbielengineering.com

TABLE OF CONTENTS

ENGINEERING REPORT
FOR
Lake Region Water and Sewer Company

Shawnee Bend/Lake of the Ozarks
Camden County, Missouri

Water System

BACKGROUND:

Lake Region Water and Sewer Company is certificated by the Missouri Public Service Commission to serve an area in Shawnee Bend at the Lake of the Ozarks in Camden County, Missouri. The certificated area is shown on the attached Exhibit 1.

The water system is being operated under System ID Number MO3031201.

PURPOSE:

The purpose of this engineering report is provide the information in regard to the transfer of ownership of LRW&S from the previous owner to the present owner. LRW&S, in the order with the Missouri Public Service Commission (PSC), "agreed to conduct an engineering study of the facility improvements that will likely be needed in the long-term,..."

FLOW DATA:

Daily metered well flow measurements were conducted for the last 4 days of June, all of July and August, and the first 26 days of September.

This period was selected as seasonal fluctuations in water demands are anticipated in the Lake of the Ozarks area. Higher flows are anticipated during July and August and on weekends and holidays. The testing period included the entire months of July and August and the July 4th and Labor Day holidays. The data collected is shown in Exhibit 2.

WATER SUPPLY:

Water supply is provided by Well No. 1 and Well No. 2.

Well No. 1 was drilled in 1994 and was reported by consulting engineer Harms to have a yield of approximately 500 gpm.

Well No. 2 was drilled in 1998 and Krehbiel Engineering could find no record of the yield test. Conflicting information was found regarding the depth of this well. The pump installed was tested in 2005 and a yield of 250 gpm was recorded.

Based on a comparison of the records of the two wells, Krehbiel Engineering believes that the yield of Well No. 2 should closely approximate the yield of Well No. 1.

Because of a lack of specific confirmation of the yield of Well No. 2 and for the purposes of this report, Krehbiel Engineering recommends the use of the 250 gpm figure.

Yield

Well No. 1	500 gpm x 1440	=	720,000 gpd
Well No. 2	250 gpm x 1440	=	360,000 gpd

In August 2007, the average daily usage was 303,577 gpd. The system has the capacity to supply this demand with what is assumed to be the highest yield well (Well No. 1) out of service.

Based on the Harms' report that Well No. 1 has a yield of approximately 500 gpm, the potential exists for the water supply capacity to be increased by installing larger pumps in one, or both, wells.

In the 2005 Feasibility Study provided to the PSC in Case No. WA-2005-0643, et al., it was projected "that a new well will not be

necessary due to this expansion or internal growth for five years or more".

Krehbiel Engineering would concur that at the present rate of growth, and with the existing pumps, the supply should be adequate for the 3 years or more. The capacity of the wells could be increased with the installation of larger pumps prior to the drilling of an additional well.

Naturally, growth patterns will affect usage. There is always the potential that some form of major development may be announced at anytime. The utility is constantly monitoring any potential development and would react in accordance with the demand.

WATER STORAGE;

The existing storage capacity consists of a 200,000 gallon elevated storage tank erected in 2003 (Krehbiel Engineering has not been able to confirm a more specific date).

The maximum day's usage was recorded on August 15, 2007 (Exhibit 2) to be 470,300 gallons.

The supply, storage and distribution system has been modeled using WaterCAD. Running the model at the maximum days usage and with both pumps in operation, at the present well yield of 250 gpm each (Exhibit 3), the minimum nominal finished water storage needed to maintain design operating pressure and flow in accordance with the DNR Design Guide is 35,000 gallons (Exhibit 4).

In the absence of documentation of the diurnal flow pattern and the maximum day's usage, DNR suggests that a reasonable default value for minimum storage needed is 25% of design maximum day's usage. For the system, at this time, that would be 25% of 470,300 gallons. That equals 117,575 gallons.

CONCLUSIONS:

It appears that there is adequate supply and storage for the short-term.

For the long-term, assuming that growth will continue in this area, and there is no reason to believe differently, a well and elevated water storage tank will be needed. It is my opinion that it would be premature to determine the location and size of the well and storage tank at this time. Growth and usage patterns need to be monitored and the model needs to be updated and reviewed on a periodic basis.

Respectfully submitted:

David Krehbiel

David Krehbiel, E-11594

P.S.C. MO NO. 1 SECOND REVISED SHEET NO. 3

CANCELLING P.S.C. MO NO. 1 FIRST REVISED SHEET NO. 3

LAKE REGION WATER AND SEWER COMPANY: SHAWNEE BEND SERVICE AREA FOR WATER SERVICE

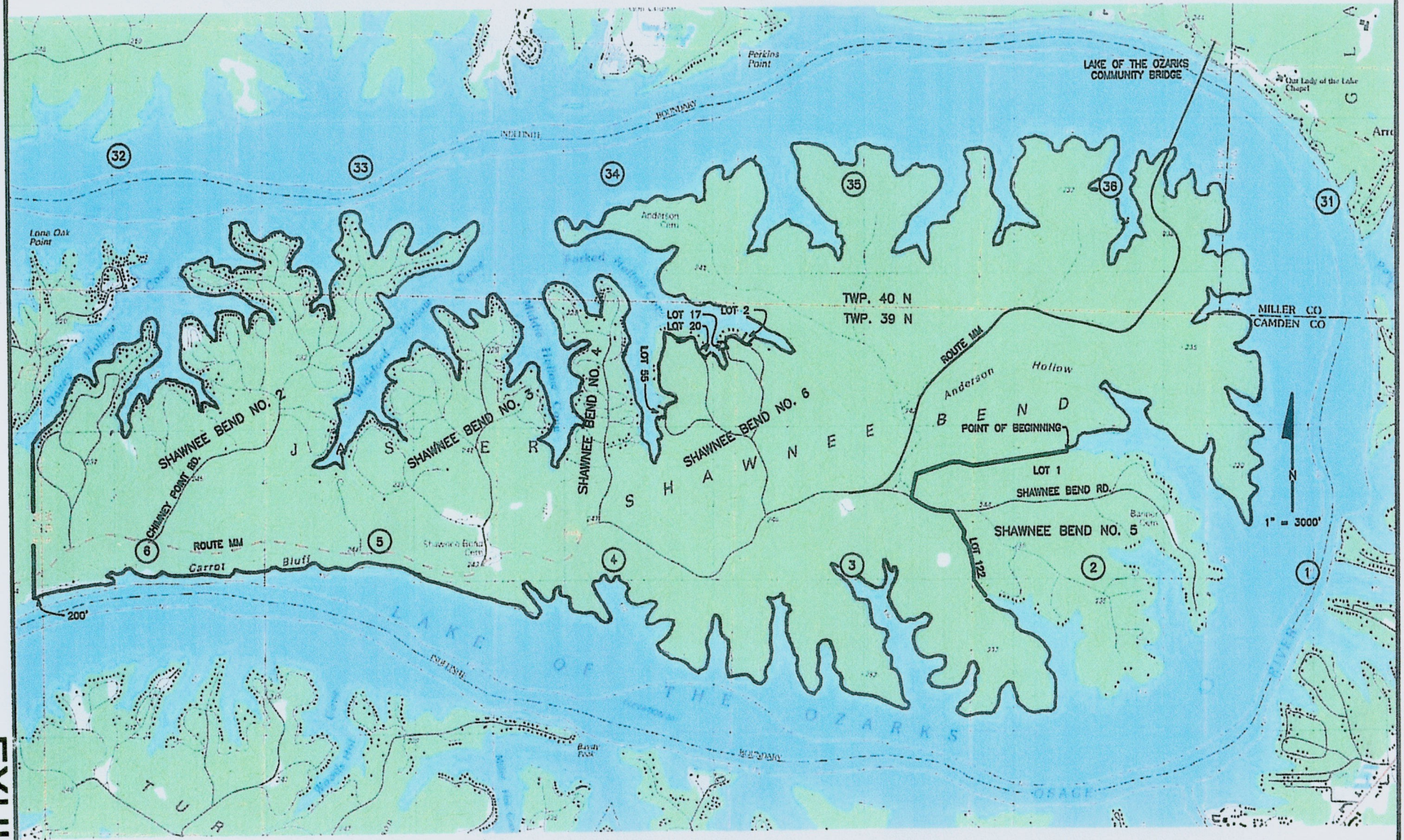


EXHIBIT 1

R. 17 W
R. 16 W

DATE OF ISSUE 1-4-07 DATE EFFECTIVE 2-3-07

ISSUED BY:

NAME OF OFFICER: John Summers TITLE: General Manager ADDRESS: P.O. Box 608 Lake Ozark, Missouri 65049

LAKE REGION WATER SEWER
SHAWNEE BEND
CAMDEN COUNTY, MO

WASTEWATER (Permit No. MO 0123722)							
Metered Hours					DAILY FLOW		
Date	Pump #1	Pump #2	Total Hours	Rainfall (Inches)	Flow Pump #1 (Gal.)	Flow Pump #2 (Gal.)	Total Flow (Gal.)
06/27/07	9.98	11.1	21.08		23,952	26,640	50,592
06/28/07	4.33	15.1	19.43		10,392	36,240	46,632
06/29/07	22.9	16.3	39.2		54,960	39,120	94,080
06/30/07	11.5	13.1	24.6		27,600	31,440	59,040
TOTALS	48.71	55.6	104.31	0	116,904	133,440	250,344

WATER (Permit No. MO 3031201)		
DAILY FLOW		
Flow Pump #1 (Gal.)	Flow Pump #2 (Gal.)	Total Flow (Gal.)
248,000	-	248,000
54,000	-	54,000
221,000	-	221,000
240,000	-	240,000
763,000	-	763,000

JUNE 2007

EXHIBIT 2

LAKE REGION WATER SEWER
SHAWNEE BEND
CAMDEN COUNTY, MO

WASTEWATER (Permit No. MO 0123722)							
Metered Hours					DAILY FLOW		
Date	Pump #1	Pump #2	Total Hours	Rainfall (Inches)	Flow Pump #1 (Gal.)	Flow Pump #2 (Gal.)	Total Flow (Gal.)
07/01/07	17.69	21.10	38.79	-	42,456	50,640	93,096
07/02/07	20.05	18.00	38.05	0.40	48,120	43,200	91,320
07/03/07	13.45	14.40	27.85	-	32,280	34,560	66,840
07/04/07	14.08	15.40	29.48	-	33,792	36,960	70,752
07/05/07	22.64	18.90	41.54	-	54,336	45,360	99,696
07/06/07	11.52	17.90	29.42	Trace	27,648	42,960	70,608
07/07/07	14.36	17.20	31.56	-	34,464	41,280	75,744
07/08/07	16.99	14.90	31.89	-	40,776	35,760	76,536
07/09/07	19.55	13.20	32.75	-	46,920	31,680	78,600
07/10/07	13.00	6.80	19.80	-	31,200	16,320	47,520
07/11/07	13.10	4.40	17.50	-	29,082	9,768	38,850
07/12/07	10.94	4.40	15.34	-	24,287	9,768	34,055
07/13/07	9.08	3.90	12.98	-	20,158	8,658	28,816
07/14/07	14.29	4.90	19.19	-	31,724	10,878	42,602
07/15/07	18.05	19.50	37.55	-	40,071	43,290	83,361
07/16/07	14.09	1.00	15.09	-	31,280	2,220	33,500
07/17/07	17.15	5.40	22.55	-	38,073	11,988	50,061
07/18/07	4.26	7.00	11.26	-	9,457	15,540	24,997
07/19/07	9.40	4.10	13.50	-	20,868	9,102	29,970
07/20/07	12.14	8.00	20.14	0.25	26,951	17,760	44,711
07/21/07	11.43	6.20	17.63	-	25,375	13,764	39,139
07/22/07	15.41	12.30	27.71	-	34,210	27,306	61,516
07/23/07	13.19	12.30	25.49	-	29,282	27,306	56,588
07/24/07	13.19	10.60	23.79	-	29,282	23,532	52,814
07/25/07	8.42	4.60	13.02	-	18,692	10,212	28,904
07/26/07	8.64	5.00	13.64	-	19,181	11,100	30,281
07/27/07	9.97	11.40	21.37	-	22,133	25,308	47,441
07/28/07	10.08	11.40	21.48	-	22,378	25,308	47,686
07/29/07	10.08	15.20	25.28	-	22,378	33,744	56,122
07/30/07	19.06	11.20	30.26	-	42,313	24,864	67,177
07/31/07	12.68	9.30	21.98	-	28,150	20,646	48,796
TOTALS	417.98	329.90	747.88	0.65	957,315	760,782	1,718,097

WATER (Permit No. MO 3031201)		
DAILY FLOW		
Flow Pump #1 (Gal.)	Flow Pump #2 (Gal.)	Total Flow (Gal.)
128,000	-	128,000
318,000	111,600	429,600
151,000	111,700	262,700
124,000	300,000	424,000
-	300,000	300,000
184,000	37,700	221,700
141,000	305,200	446,200
-	305,200	305,200
-	305,200	305,200
142,000	-	142,000
225,000	-	225,000
299,000	-	299,000
124,000	-	124,000
140,000	325,800	465,800
212,000	32,100	244,100
345,000	32,200	377,200
69,000	6,500	75,500
186,000	264,400	450,400
186,000	-	186,000
199,000	-	199,000
304,000	-	304,000
289,000	-	289,000
290,000	-	290,000
203,000	-	203,000
290,000	-	290,000
254,000	-	254,000
261,000	-	261,000
342,000	-	342,000
364,000	-	364,000
267,000	-	267,000
156,000	-	156,000
6,193,000	2,437,600	8,630,600

JULY 2007

WASTEWATER
(Permit No. MO 0123722)

Metered Hours					DAILY FLOW		
Date	Pump #1	Pump #2	Total Hours	Rainfall (Inches)	Flow Pump #1 (Gal.)	Flow Pump #2 (Gal.)	Total Flow (Gal.)
08/01/07	10.41	10.80	21.21		24,984	25,920	50,904
08/02/07	12.79	0.90	13.69		30,696	2,160	32,856
08/03/07	12.84	11.80	24.64		30,816	28,320	59,136
08/04/07	8.29	14.00	22.29		19,896	33,600	53,496
08/05/07	11.37	16.50	27.87		27,288	39,600	66,888
08/06/07	12.93	12.60	25.53		31,032	30,240	61,272
08/07/07	13.34	7.60	20.94		32,016	18,240	50,256
08/08/07	9.68	14.00	23.68		23,232	33,600	56,832
08/09/07	5.15	13.00	18.15		12,360	31,200	43,560
08/10/07	10.03	6.90	16.93		24,072	16,560	40,632
08/11/07	17.52	9.50	27.02		42,048	22,800	64,848
08/12/07	11.45	14.50	25.95		27,480	34,800	62,280
08/13/07	16.10	10.60	26.70		38,640	25,440	64,080
08/14/07	8.32	12.50	20.82		19,968	30,000	49,968
08/15/07	12.06	0.00	12.06		28,944	0	28,944
08/16/07	0.03	11.70	11.73		72	28,080	28,152
08/17/07	11.52	5.10	16.62		27,648	12,240	39,888
08/18/07	14.15	8.60	22.75		33,960	20,640	54,600
08/19/07	15.60	12.10	27.70		37,440	29,040	66,480
08/20/07	13.31	19.50	32.81		31,944	46,800	78,744
08/21/07	3.79	16.20	19.99		9,096	38,880	47,976
08/22/07	16.92	6.50	23.42		40,608	15,600	56,208
08/23/07	9.01	1.60	10.61		21,624	3,840	25,464
08/24/07	13.65	0.00	13.65		32,760	0	32,760
08/25/07	2.94	8.90	11.84		7,056	21,360	28,416
08/26/07	5.88	5.20	11.08		14,112	12,480	26,592
08/27/07	8.52	5.70	14.22		20,448	13,680	34,128
08/28/07	4.24	11.30	15.54		10,176	27,120	37,296
08/29/07	6.15	6.30	12.45		14,760	15,120	29,880
08/30/07	5.09	2.90	7.99		12,216	6,960	19,176
08/31/07	4.50	5.00	9.50		10,800	12,000	22,800
TOTALS	307.58	281.80	589.38	0	738,192	676,320	1,414,512

WATER
(Permit No. MO 3031201)

DAILY FLOW		
Flow Pump #1 (Gal.)	Flow Pump #2 (Gal.)	Total Flow (Gal.)
400,000	-	400,000
151,000	-	151,000
218,000	-	218,000
397,000	57,900	454,900
330,000	58,000	388,000
316,000	57,900	373,900
308,000	58,000	366,000
126,000	58,000	184,000
-	247,600	247,600
234,000	400	234,400
374,000	400	374,400
341,000	400	341,400
274,000	400	274,400
330,000	400	330,400
228,000	242,300	470,300
-	335,100	335,100
213,000	-	213,000
329,000	-	329,000
280,000	-	280,000
370,000	-	370,000
216,000	-	216,000
298,000	-	298,000
223,000	-	223,000
320,000	-	320,000
328,000	-	328,000
326,000	-	326,000
295,000	-	295,000
317,000	-	317,000
353,000	-	353,000
282,000	-	282,000
117,000	100	117,100
8,294,000	1,116,900	9,410,900

AUGUST 2007

SEPTEMBER 2007

WASTEWATER (Permit No. MO 0123722)							
Metered Hours					DAILY FLOW		
Date	Pump #1	Pump #2	Total Hours	Rainfall (Inches)	Flow Pump #1 (Gal.)	Flow Pump #2 (Gal.)	Total Flow (Gal.)
09/01/07	6.24	12.80	19.04		14,976	30,720	45,696
09/02/07	8.90	33.10	42.00		21,360	79,440	100,800
09/03/07	34.82	11.60	46.42		83,568	27,840	111,408
09/04/07	10.24	21.10	31.34		24,576	50,640	75,216
09/05/07	15.63	13.30	28.93		37,512	31,920	69,432
09/06/07	6.22	9.00	15.22		14,928	21,600	36,528
09/07/07	6.97	4.70	11.67		16,728	11,280	28,008
09/08/07	8.71	16.40	25.11		20,904	39,360	60,264
09/09/07	9.69	3.90	13.59		23,256	9,360	32,616
09/10/07	13.45	3.90	17.35		32,280	9,360	41,640
09/11/07	11.02	14.70	25.72		26,448	35,280	61,728
09/12/07	3.06	7.40	10.46		7,344	17,760	25,104
09/13/07	7.83	3.70	11.53		18,792	8,880	27,672
09/14/07	2.78	8.30	11.08		6,672	19,920	26,592
09/15/07	3.74	5.90	9.64		8,976	14,160	23,136
09/16/07	9.27	3.70	12.97		22,248	8,880	31,128
09/17/07	3.48	3.80	7.28		8,352	9,120	17,472
09/18/07	3.49	7.80	11.29		8,376	18,720	27,096
09/19/07	12.49	7.90	20.39		29,976	18,960	48,936
09/20/07	5.14	4.70	9.84		12,336	11,280	23,616
09/21/07	23.05	16.50	39.55		55,320	39,600	94,920
09/22/07	0.00	8.10	8.10		0	19,440	19,440
09/23/07	4.30	10.70	15.00		10,320	25,680	36,000
09/24/07	6.87	9.70	16.57		16,488	23,280	39,768
09/25/07	8.66	5.00	13.66		20,784	12,000	32,784
09/26/07	8.55	2.60	11.15		20,520	6,240	26,760
09/27/07			0.00		0	0	0
09/28/07			0.00		0	0	0
09/29/07			0.00		0	0	0
09/30/07			0.00		0	0	0
TOTALS	234.60	250.30	484.90	0	563,040	600,720	1,163,760

WATER (Permit No. MO 3031201)		
DAILY FLOW		
Flow Pump #1 (Gal.)	Flow Pump #2 (Gal.)	Total Flow (Gal.)
213,000	264,500	477,500
68,000	456,000	524,000
68,000	100	68,100
345,000	0	345,000
334,000	0	334,000
184,000	0	184,000
183,000	0	183,000
251,000	0	251,000
280,000	0	280,000
108,000	0	108,000
322,000	0	322,000
178,000	0	178,000
168,000	0	168,000
178,000	0	178,000
230,000	0	230,000
217,000	0	217,000
218,000	500	218,500
184,000	332,100	516,100
51,000	0	51,000
326,000	0	326,000
117,000	0	117,000
309,000	0	309,000
206,000	0	206,000
278,000	0	278,000
136,000	0	136,000
253,000		253,000
		0
		0
		0
		0
5,405,000	1,053,200	6,458,200

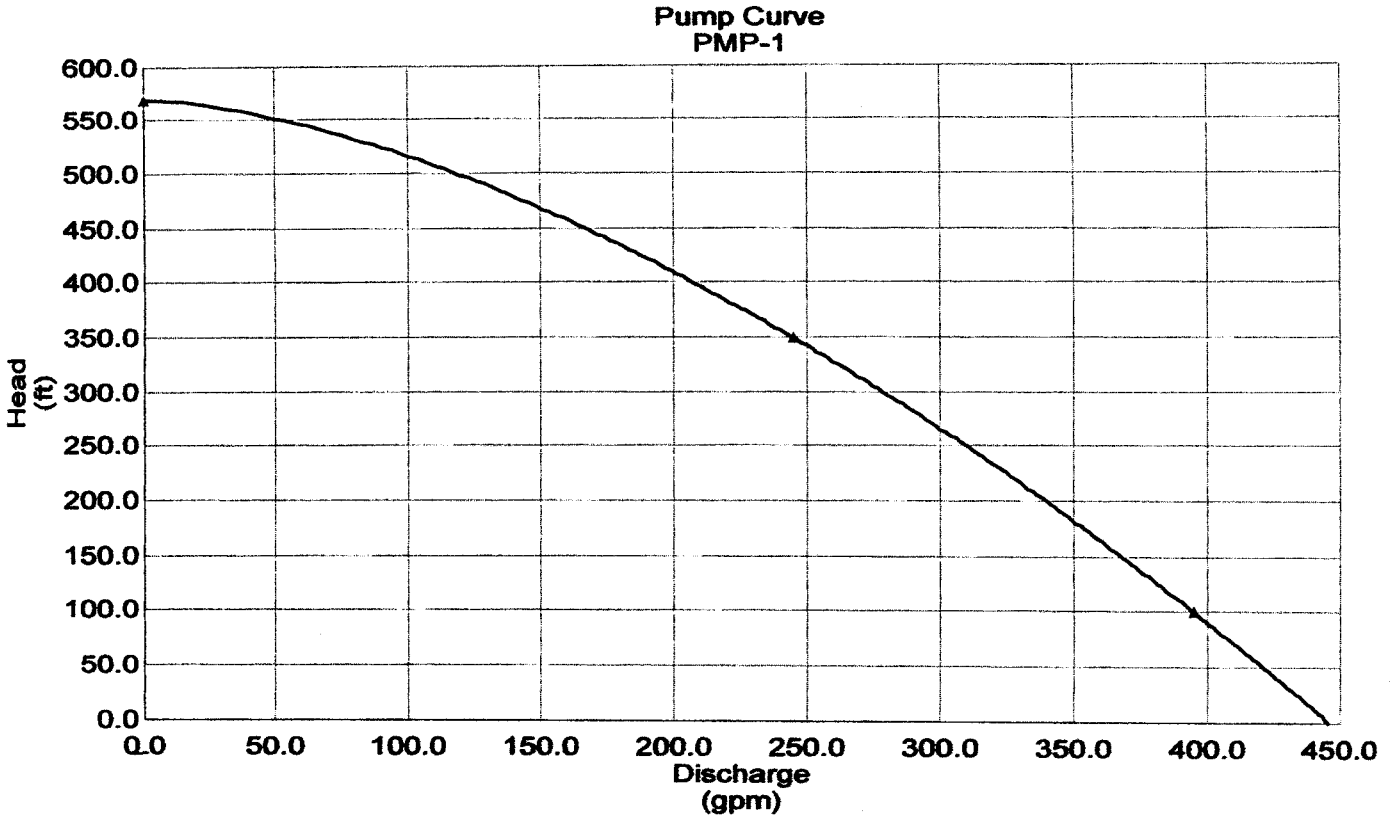
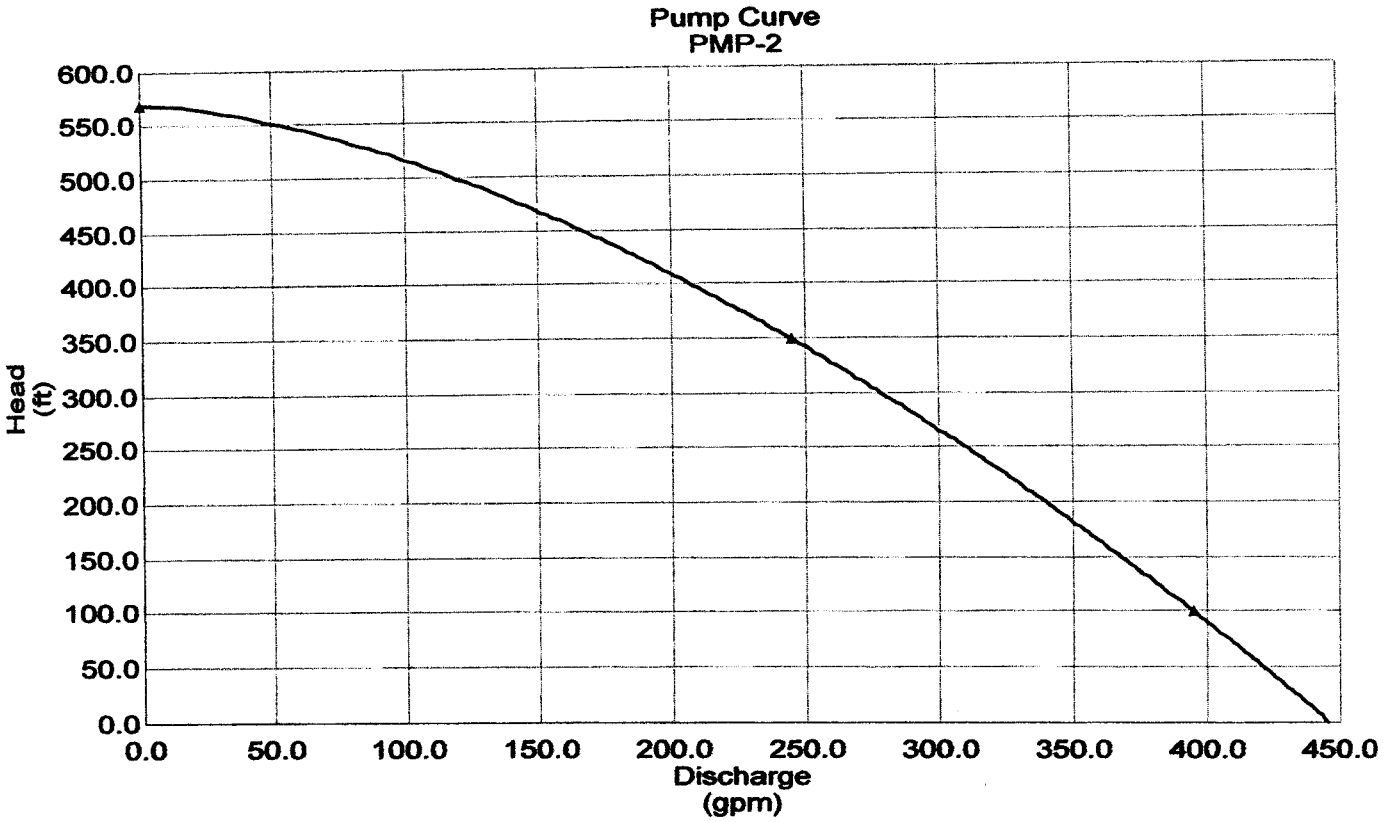

Pump Curve
PMP-1
600.0
550.0
500.0
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
Head (ft)
0.0
50.0
100.0
150.0
200.0
250.0
300.0
350.0
400.0
450.0
Discharge (gpm)

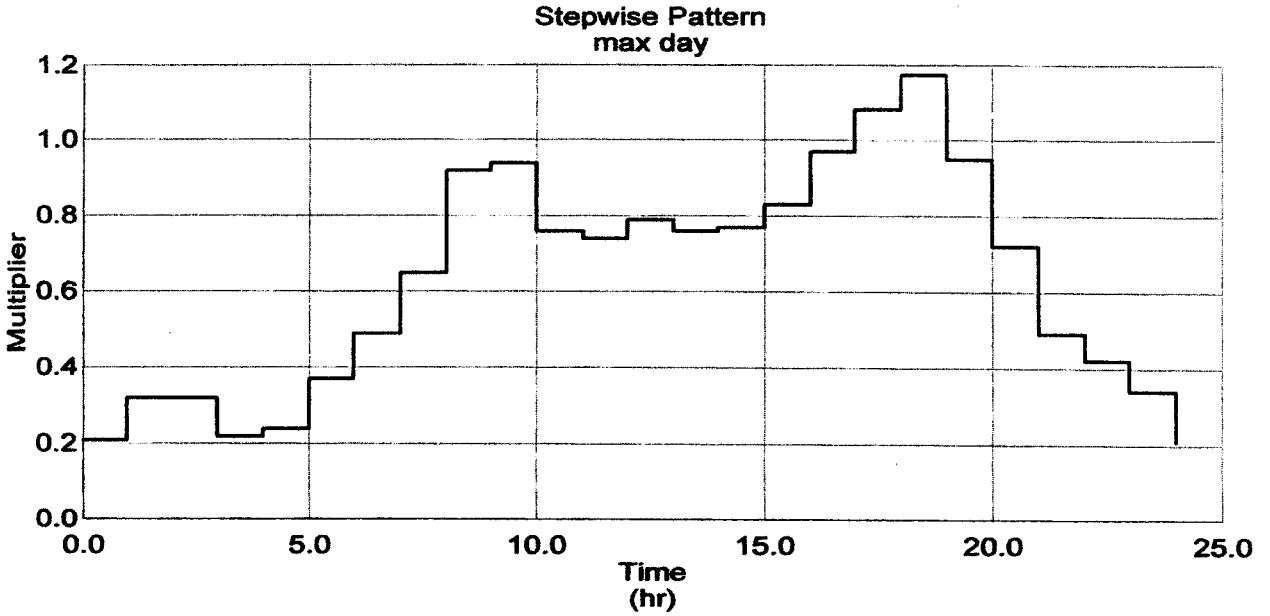
EXHIBIT 3


Pump Curve
PMP-2
600.0
550.0
500.0
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
Head (ft)
0.0
50.0
100.0
150.0
200.0
250.0
300.0
350.0
400.0
450.0
Discharge (gpm)

Detailed Report for Pattern: max day

Pattern Summary			
Pattern	max day	Format	Stepwise
Start Time	0.00 hr	Starting Multiplier	0.21
Duration	24.00 hr		

Pattern	
Time from Start (hr)	Multiplier
1.00	0.32
2.00	0.32
3.00	0.22
4.00	0.24
5.00	0.37
6.00	0.49
7.00	0.65
8.00	0.92
9.00	0.94
10.00	0.76
11.00	0.74
12.00	0.79
13.00	0.76
14.00	0.77
15.00	0.83
16.00	0.97
17.00	1.08
18.00	1.17
19.00	0.95
20.00	0.72
21.00	0.49
22.00	0.42
23.00	0.34
24.00	0.21



KREHBIEL ENGINEERING, INC.
Darren Krehbiel, P.E., P.L.S.
Dave Krehbiel, P.E., P.L.S.
Chris Michaelree, E.I.T.
Vernon Moore, P.L.S.
Ronnie Testerman, Waste Water Specialist

JOB LAKE REGION WATER & SEWER
SHEET NO. 1 OF 1
CALCULATED BY DAVE KREHBIEL DATE 26 OCT 07
CHECKED BY _____ DATE _____
SCALE _____

CALCULATION OF MINIMUM WATER STORAGE NEEDED:

MODEL WAS RUN AT MAXIMUM DAYS USAGE OF 470,300 GAL. (LABELED AS "MAX DAY")

ELEVATION IN TOWER FLUCTUATED FROM FULL 928.5' TO LOW OF 923.9' (SEE ATTACHED TALK HYDRAULIC GRADE)

HEAD RANGE = 928.5 − 923.9 = 4.6'

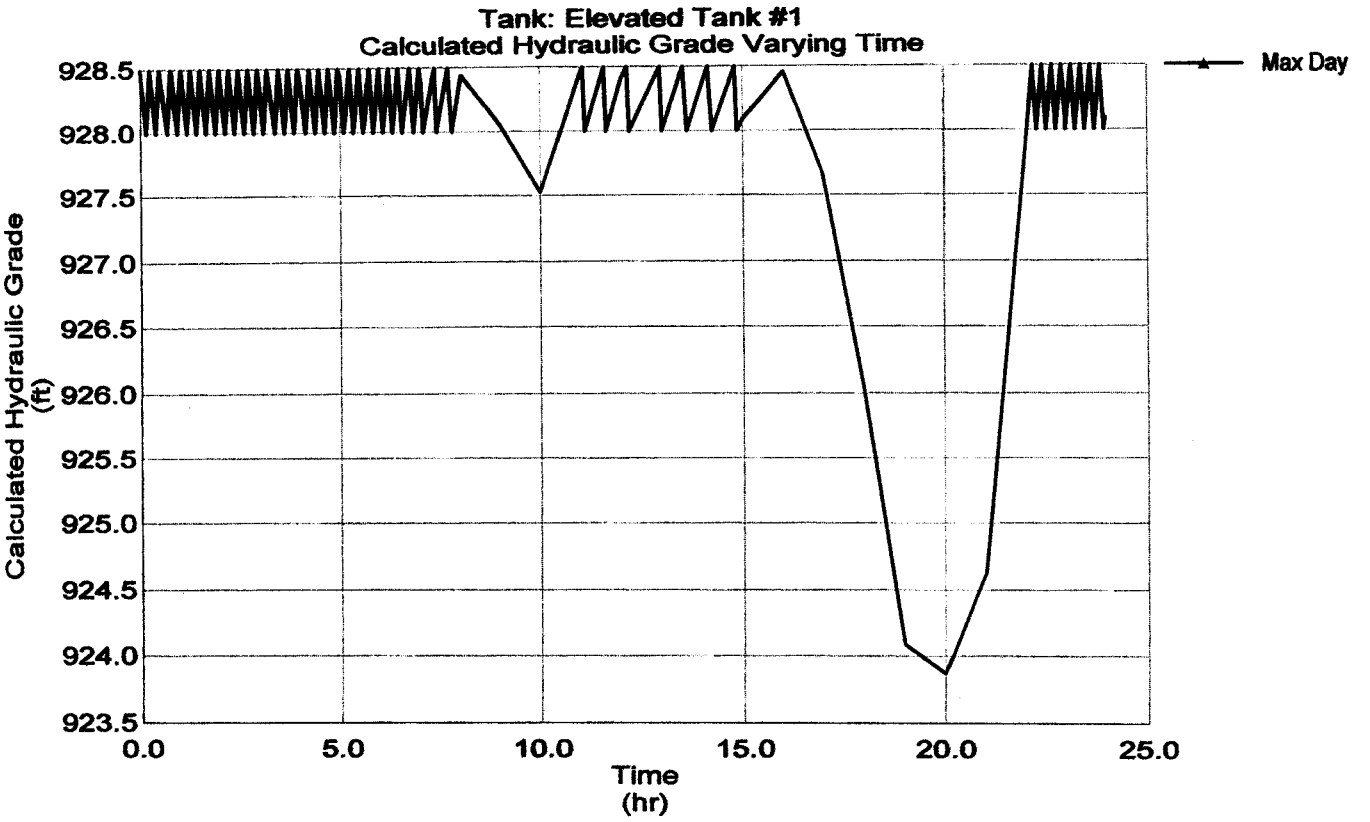
EXISTING TOWER CAPACITY = 200,000 GALLONS
(DIAMETER = 36', HEAD RANGE = 26.5')
$18^2 \times 3.14 \times 26.5 \times 7.48 = 200{,}000$ GAL.

CAPACITY PER FOOT = 200,000/26.5 = 7547 GALLONS

MINIMUM NOMINAL FINISHED WATER STORAGE NEEDED:

= 4.6' × 7547 GALLONS = 34,716 GALLONS

EXHIBIT 4


Tank: Elevated Tank #1
Calculated Hydraulic Grade Varying Time
Max Day
Calculated Hydraulic Grade (ft)
928.5
928.0
927.5
927.0
926.5
926.0
925.5
925.0
924.5
924.0
923.5
0.0
5.0
10.0
15.0
20.0
25.0
Time (hr)