

C-139 BASIN BEST MANAGEMENT PRACTICES DEMONSTRATION GRANT 2008 -2011

IMPOUNDMENT OPTIMIZATION DEMONSTRATION PROJECT FINAL REPORT

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This is the final report of the impoundment optimization demonstration project. Discussion on the engineering and design, construction, data collection and BMP performance are presented in the document. Data collected can be found in the attachments.

Project Location: The demonstration project was conducted at C & B Farms located in Hendry County on the southeast corner of the C-139 Basin next to the District stormwater treatment area (STA) 5. The total farm acreage is approximately 1,687 acres out of which 1,225 acres are used for vegetable production. Drainage from the vegetable fields is routed to three impoundments (reservoirs) as shown in Figure 1.



Figure 1. Project Location

Engineering and Design: This project evaluated the phosphorus (P) removal effectiveness of the southernmost reservoir (reservoir 3) after modifications were made. The modifications consisted of a series of internal smaller cells separated by low dikes or berms and connected with weired

culverts with risers set at elevations to insure shallow flooding and treatment within each cell (see Figures 2 and 3). As depicted in Figure 2, cell 6A discharges to cells 6B, 6C, 6D and 6E; cell 6C discharges to cell 6D; and cells 6B, 6D, and 6E discharge to 6F. In addition, the discharge structure was moved 0.45 miles north, away from the nearest inflow pump structure to maximize storage and prevent any short-circuiting. Once the water leaves reservoir 3, it can either be recovered by a tail water recovery system or can flow to the S&M Canal. Richard Thompson with RHT Engineering, Inc. completed the engineering and permitting phase while D. R. Rogers surveyed dike and culvert weir elevations.

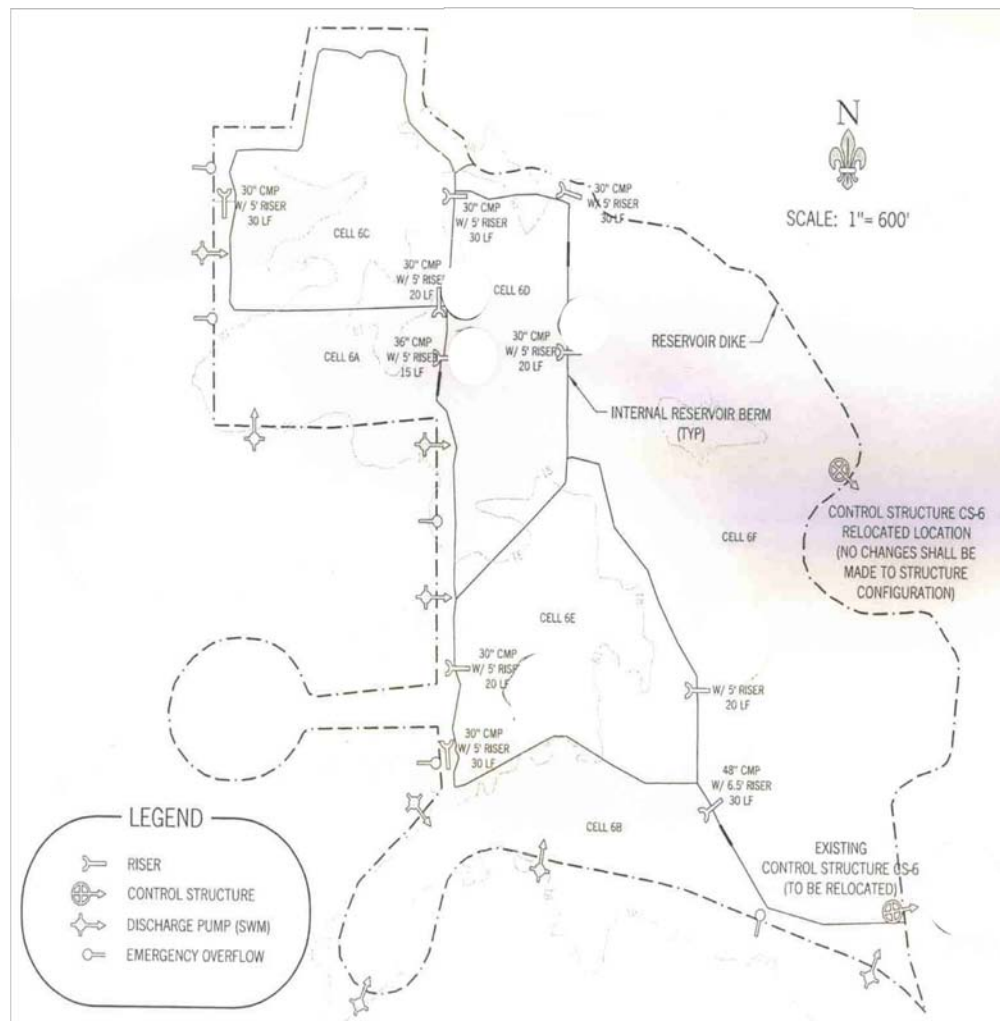


Figure 2. Mapping of Internal Cells

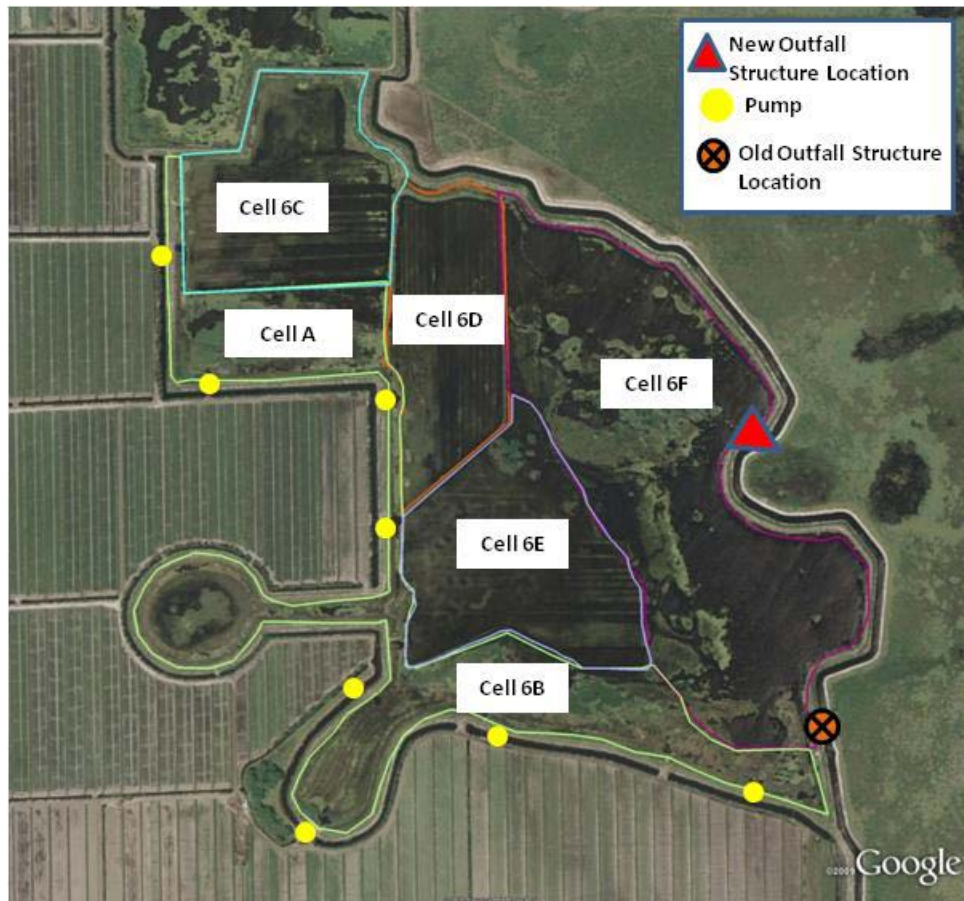


Figure 3. Reservoir 3 Configuration

Construction: The berms were constructed by a track hoe provided by Interlaken, Inc. The soils were dug on both sides of the berms as a series of shallow pits to avoid creating a borrow canal that would allowed for channeling around the cells. An inflow and an outflow weired culvert were installed in each of the seven cells for a total of 14 weired (see Attachment 1 for pictures of the construction and installation of equipment). Also, to keep the integrity of the original perimeter dike when water levels are above the berms' heights, the internal dikes were then compressed and graded.

Data Collection: Water quality and quantity data were monitored during the period of August 2009 through August 2010. Flow proportional automatic samplers and depth sensors (to measure the height of the water flowing over the weir) were installed in the header canal (initial Cell 6A) and at the discharge structure (final Cell 6F) to measure total phosphorus (TP) concentrations and flow. See Attachment 3 for pictures of the equipment installed.

During periods of discharge, water quality samples were collected by the autosampler, preserved and composited for a maximum of 7 days. The composite samples were analyzed for TP no later than 28 days from the date the first individual sample was collected. Additionally, grab samples were collected during 7 discharge events and analyzed for TP, dissolved P (TDP) and soluble reactive P (SRP). Particulate P was calculated as the difference between TP and TDP.

Results and Discussion: Review of data from December 2009 to April 2010 (dry season) indicates that the modified reservoir reduced monthly P loadings from 57% to 94%, and the results from June to August 2010 (wet season) also showed remarkable reduction of P loading from 66% to 92%. Attachment 2 contains daily values of canal stage, daily flow, daily load as well as the grab samples results for a 12 month period. The full 12 months of data could not be used because of unexpected conditions as described next:

- From August through November 2009 the measured out flows were greater than the inflows because of unmeasured inflows from upstream reservoirs 1 and 2. Weather conditions blew the weired culvert and it could not be repaired because high water table levels prevented equipment access. When the water levels on the north portion of Cell 6F lowered, the weired culvert was re-installed ensuring that all inflows were through the measured header canal and did not bypass any treatment cells.
- In May heavy rainfall caused a breach on the east side of cell 6B (between cell 6B and 6F), short-circuiting the inflows to the discharge structure. The breach was caused by excessive vegetation plugging the outlet culvert of the cell. The breach was fixed promptly but May data were compromised.

Over all, including the month of May, when the berm failed, an average of 78% reduction of P loading was obtained. TP concentrations were also substantially reduced between inflows (550 ppb) and out flow (236 ppb) on average as indicated by autosampler measurements. The grab samples also substantiate the auto sample collections.

BMP Performance Evaluation Method: The evaluation method consisted of comparing the performance of the modified reservoir 3 (post BMP) to an unmodified reservoir 1 (pre-BMP) within the same farm. Both reservoirs were monitored concurrently, thus were subject to similar rainfall, cropping conditions, and farming operation methods. Note, however, that the reservoirs were subject to different unit flow and P surface loading conditions. Please refer to Table 1.

Table 1. Reservoir Characteristics during the Studies Overlapping Period

Reservoir Data	Pre-condition (Reservoir 1) ¹	Post-condition (Reservoir 3) ¹
Acreage	36.7	192.81
TP In (ppb, average)	545	550
TP Out (ppb, average)	411	236
Inflows (in)	339	537
Outflows (in)	406	307
P Load In (kg)	887	6298
P Load Out (kg)	775	1125

¹ Evaluation Period: December 2009 through July 2010

The use of the data collected at reservoir 3 prior to the modifications was initially considered to develop the pre-BMP conditions. However, there were various factors that discouraged their use including 1) different rainfall distribution during the monitoring period with, 2) no reservoir inflow data being available, 3) reservoir outflow data collected on a time-proportional basis, while the post-BMP data were flow-proportional, and 4) some leakage was observed at the original reservoir discharge structure.

Project Costs:

Table 2. Project Costs

Item	Unit Price	No. Units	Total ¹
Engineering Services			
Administrative	\$8.00	9	\$72.00
Engineer	\$130.00	127.5	\$16,562.00
Construction			
Built berm	-	-	\$6,815.00
Culverts	\$1,476.686	10	\$14,766.86
Set up culverts	-	-	\$1,200.00
Survey land elevation and set weir height	-	-	\$4,000.00
Relocation of discharge structure	-	-	\$15,000.00
Total funding provided by District			\$56,595.00
Additional construction and engineering costs by C&B Farms			\$11,820.86
Total Design & Construction			\$68,415.86

Table 3. Demonstration Costs

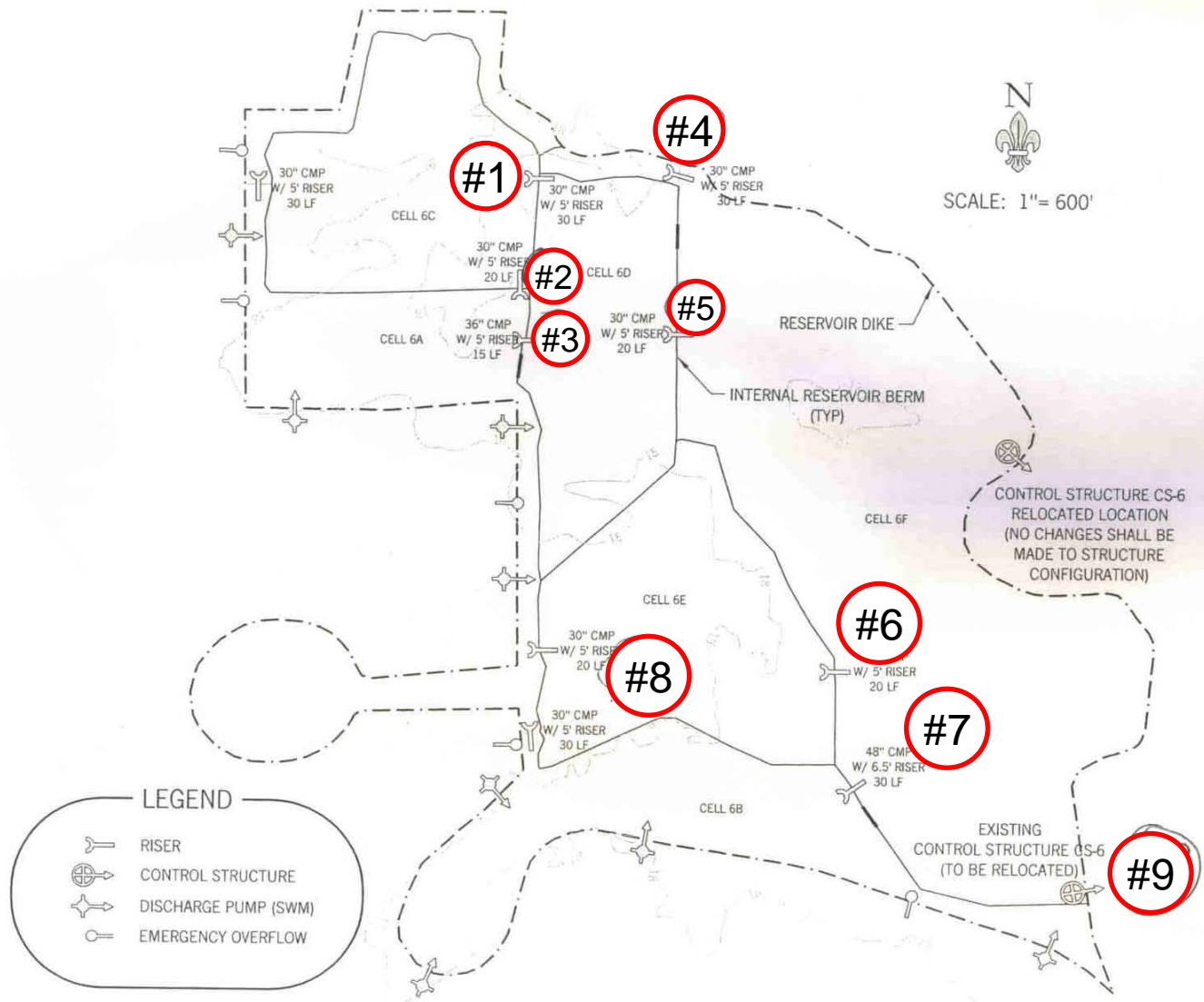
Item	Unit Price	No. Units	Total ¹
Monitoring			
Datalogger w/ radio	\$716.90	2	\$1,433.80
Sealed white fiberglass enclosure	\$278.20	2	\$556.40
Polyphaser surge protector w/18-inch jumper	\$139.10	2	\$278.20
Antenna cable	\$89.88	2	\$179.76
Antenna	\$208.65	2	\$417.30
Sampler control cable	\$186.18	2	\$372.36
ISCO Sampler	\$2,461.00	2	\$4,922.00
20-Watt solar panel	\$481.50	2	\$963.00
Pressure transducer	\$782.44	2	\$1,564.88
Other (shipping)	-	1	\$217.30
Lab analyses	-		\$7,000.00
Reports			
Final Report			\$5,000.00
Monitoring equipment & reporting funding provided by District			\$19,084.14
Additional equipment, maintenance & reporting funding provided by C&B Farms			\$10,000.00
Total monitoring equipment & reporting			\$99,320.85

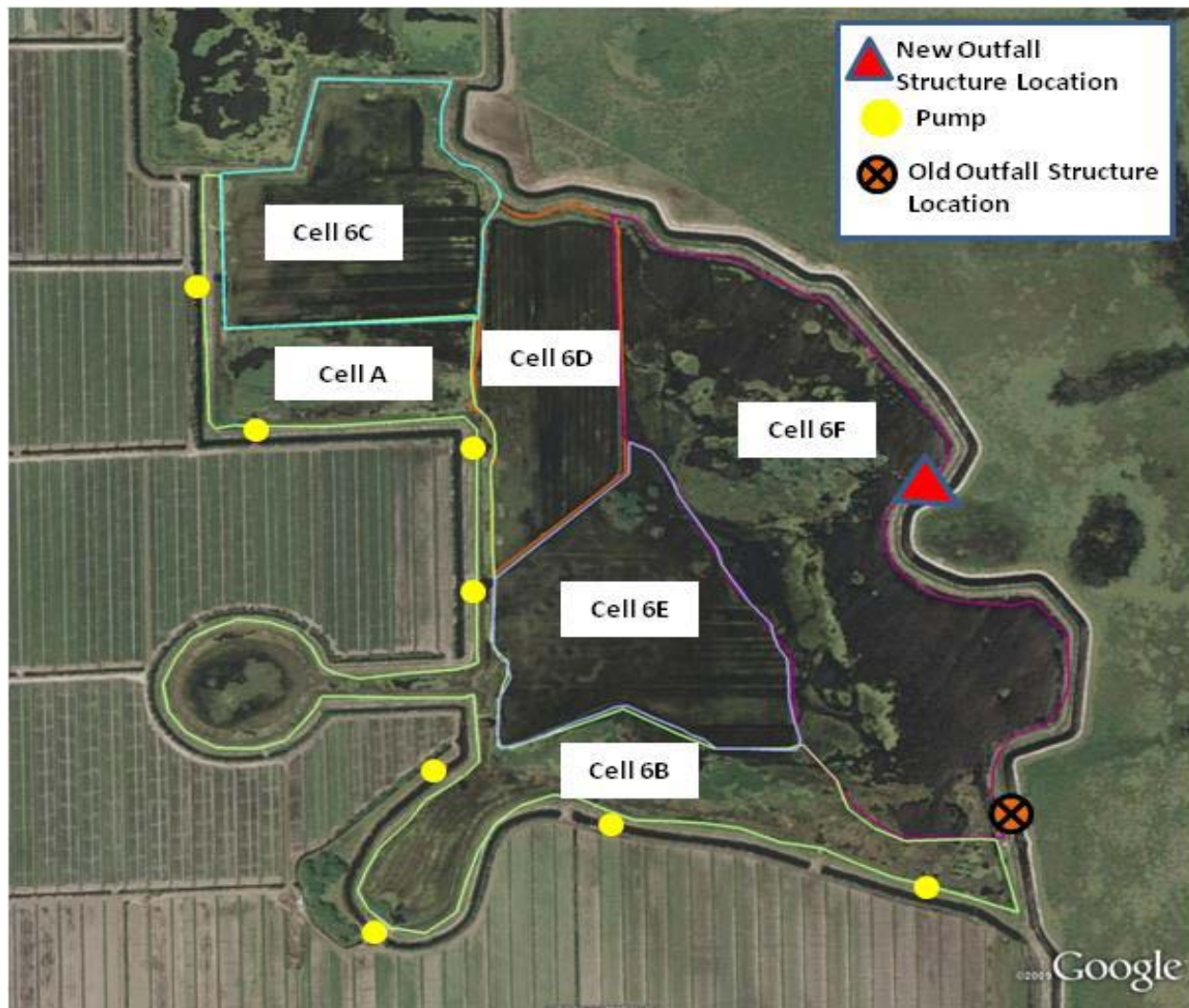
¹Taxes (7%) included

Conclusion:

This study and demonstration project suggests that by constructing internal berms within an existing reservoir and correctly flowing water through these constructed cells, farm TP loads can be further reduced in comparison to the water quality treatment provided by typical reservoirs. Based on eight (8) months of data collected, assuming a project life of 10 years and maintenance costs of \$5,000 per year, the cost of the additional P removed because of the project is approximately \$13.30. Additional water quality and flow monitoring would be required to

quantify BMP effectiveness in the long term. This is a good and simple alternative for land owners to reduce TP loads leaving their properties.







#1



#2



#3



#4



#5



#6



#7



#8





MONITORING EQUIPMENT



Header Canal



Discharge Structure

ATTACHMENT 2

DAILY DATA

Inflow					
Date	Daily Average Canal Stage (ft NGVD29)	Daily Flow (ft ³ x 10 ⁶)	Daily Flow (m ³ x 10 ³)	Daily Loading (kg)	Daily Loading (lbs)
8/12/2009	17.87	0.02	0.61	0	0
8/13/2009	18.88	0.93	26.33	0	0
8/14/2009	18.23	0.00	0.00	0	0
8/15/2009	18.70	0.98	27.83	0	0
8/16/2009	18.76	0.50	14.22	0	0
8/17/2009	18.48	0.06	1.79	0	0
8/18/2009	18.44	0.04	1.08	0	0
8/19/2009	18.40	0.00	0.00	0	0
8/20/2009	18.11	0.00	0.00	0	0
8/21/2009	17.95	0.00	0.06	0.02	0.05
8/22/2009	18.54	0.04	1.00	0.38	0.83
8/23/2009	18.55	0.07	1.95	0.74	1.62
8/24/2009	18.38	0.00	0.06	0.02	0.05
8/25/2009	18.36	0.00	0.00	0	0
8/26/2009	18.35	0.00	0.00	0	0
8/27/2009	18.25	0.01	0.37	0.14	0.31
8/28/2009	18.58	0.19	5.47	2.07	4.56
8/29/2009	18.74	0.38	10.89	4.11	9.07
8/30/2009	18.63	0.17	4.86	1.84	4.05
8/31/2009	18.58	0.10	2.88	1.09	2.4
9/1/2009	18.54	0.06	1.84	0.69	1.52
9/2/2009	18.70	0.30	8.63	3.23	7.13
9/3/2009	18.58	0.09	2.48	0.93	2.05
9/4/2009	18.57	0.08	2.27	0.85	1.88
9/5/2009	18.80	0.52	14.71	5.51	12.15
9/6/2009	18.92	0.83	23.38	8.76	19.31
9/7/2009	18.70	0.29	8.35	3.13	6.89
9/8/2009	18.63	0.19	5.46	2.04	4.51
9/9/2009	18.50	0.03	0.84	0.32	0.7
9/10/2009	18.46	0.02	0.63	0.24	0.52
9/11/2009	18.59	0.24	6.80	2.85	6.28
9/12/2009	18.65	0.19	5.41	2.27	5.01
9/13/2009	18.63	0.19	5.37	2.26	4.97
9/14/2009	18.50	0.02	0.59	0.25	0.54
9/15/2009	18.37	0.00	0.00	0	0
9/16/2009	18.39	0.04	1.18	0.49	1.09
9/17/2009	18.44	0.04	1.16	0.49	1.08
9/18/2009	18.49	0.04	1.01	0.4	0.87
9/19/2009	18.48	0.05	1.33	0.41	0.9
9/20/2009	18.59	0.25	7.02	2.16	4.76
9/21/2009	18.62	0.21	5.92	1.82	4.01
9/22/2009	18.64	0.22	6.14	1.89	4.16

9/23/2009	18.74	0.43	12.19	3.75	8.26
9/24/2009	18.72	0.37	10.38	3.19	7.04
9/25/2009	18.69	0.32	9.17	2.82	6.22
9/26/2009	18.66	0.20	5.80	1.78	3.93
9/27/2009	19.67	1.72	48.80	15	33.07
9/28/2009	19.60	2.95	83.57	25.69	56.63
9/29/2009	19.40	2.38	67.41	20.72	45.68
9/30/2009	19.17	1.60	45.33	13.94	30.72
10/1/2009	19.03	1.17	33.20	10.21	22.5
10/2/2009	18.94	0.91	25.88	11.74	25.88
10/3/2009	18.73	0.36	10.07	6.41	14.12
10/4/2009	18.65	0.21	5.93	3.77	8.31
10/5/2009	18.58	0.11	3.03	1.93	4.25
10/6/2009	18.66	0.32	9.18	5.83	12.86
10/7/2009	18.51	0.03	0.88	0.56	1.24
10/8/2009	18.61	0.27	7.55	4.8	10.59
10/9/2009	18.52	0.05	1.54	0.98	2.15
10/10/2009	18.59	0.12	3.32	2.11	4.66
10/11/2009	18.58	0.17	4.72	3	6.62
10/12/2009	18.51	0.03	0.91	0.58	1.28
10/13/2009	18.43	0.01	0.14	0.11	0.25
10/14/2009	18.43	0.03	0.84	0.67	1.47
10/15/2009	18.44	0.01	0.25	0.2	0.43
10/16/2009	18.45	0.05	1.28	1.02	2.24
10/17/2009	18.40	0.02	0.50	0.4	0.88
10/18/2009	18.25	0.00	0.00	0	0
10/19/2009	18.18	0.00	0.00	0	0
10/20/2009	18.22	0.00	0.00	0	0
10/21/2009	18.38	0.06	1.73	1.38	3.04
10/22/2009	18.40	0.01	0.38	0.3	0.66
10/23/2009	18.52	0.13	3.54	1.14	2.51
10/24/2009	18.47	0.02	0.43	0.12	0.27
10/25/2009	18.45	0.00	0.07	0.02	0.05
10/26/2009	18.41	0.00	0.00	0	0
10/27/2009	18.46	0.02	0.61	0.17	0.38
10/28/2009	18.53	0.12	3.35	0.94	2.07
10/29/2009	18.49	0.01	0.35	0.1	0.22
10/30/2009	18.50	0.03	0.97	0.27	0.6
10/31/2009	18.45	0.02	0.51	0.14	0.32
11/1/2009	18.40	0.00	0.13	0.04	0.08
11/2/2009	18.45	0.06	1.77	0.43	0.95
11/3/2009	18.44	0.01	0.31	0.05	0.12
11/4/2009	18.46	0.08	2.21	0.39	0.86
11/5/2009	18.46	0.04	1.02	0.18	0.4
11/6/2009	18.41	0.00	0.00	0	0
11/7/2009	18.40	0.00	0.00	0	0
11/8/2009	18.35	0.00	0.07	0.01	0.03

11/9/2009	18.36	0.00	0.13	0.02	0.05
11/10/2009	18.37	0.06	1.70	0.69	1.52
11/11/2009	18.39	0.02	0.50	0.2	0.45
11/12/2009	18.33	0.00	0.00	0	0
11/13/2009	18.16	0.00	0.00	0	0
11/14/2009	18.21	0.00	0.00	0	0
11/15/2009	18.18	0.00	0.00	0	0
11/16/2009	18.19	0.00	0.00	0	0
11/17/2009	18.24	0.00	0.00	0	0
11/18/2009	18.32	0.00	0.00	0	0
11/19/2009	18.32	0.00	0.00	0	0
11/20/2009	18.37	0.03	0.83	0.34	0.75
11/21/2009	18.54	0.07	2.10	0.86	1.89
11/22/2009	18.61	0.19	5.48	2.24	4.93
11/23/2009	18.66	0.26	7.26	2.96	6.53
11/24/2009	18.75	0.44	12.57	5.13	11.3
11/25/2009	18.91	0.94	26.52	10.82	23.85
11/26/2009	18.88	0.80	22.66	9.24	20.38
11/27/2009	18.53	0.11	3.09	1.26	2.78
11/28/2009	18.57	0.07	2.03	0.83	1.82
11/29/2009	18.48	0.00	0.03	0.01	0.03
11/30/2009	18.45	0.01	0.32	0.15	0.33
12/1/2009	18.62	0.20	5.77	2.65	5.85
12/2/2009	18.77	0.55	15.61	7.18	15.83
12/3/2009	18.96	1.05	29.87	13.74	30.29
12/4/2009	18.82	0.61	17.15	9.47	20.88
12/5/2009	18.96	1.12	31.61	21.18	46.7
12/6/2009	18.70	0.40	11.33	7.6	16.75
12/7/2009	18.46	0.03	0.73	0.49	1.08
12/8/2009	18.56	0.09	2.51	1.22	2.68
12/9/2009	18.67	0.28	7.80	3.78	8.33
12/10/2009	18.80	0.60	16.85	8.16	17.99
12/11/2009	18.81	0.59	16.67	7.02	15.48
12/12/2009	18.82	0.63	17.85	6.92	15.26
12/13/2009	18.90	0.86	24.22	9.39	20.7
12/14/2009	19.00	1.19	33.74	13.08	28.84
12/15/2009	19.10	1.55	43.91	17.02	37.53
12/16/2009	19.14	1.65	46.79	18.14	39.99
12/17/2009	19.08	1.46	41.28	16.49	36.36
12/18/2009	19.53	3.41	96.54	39.31	86.67
12/19/2009	19.78	4.05	114.66	46.69	102.93
12/20/2009	19.39	2.20	62.41	25.42	56.03
12/21/2009	19.22	1.77	50.19	15.87	34.98
12/22/2009	19.12	1.54	43.55	10.54	23.24
12/23/2009	19.16	1.73	48.94	11.84	26.11
12/24/2009	19.15	1.69	47.94	11.6	25.58
12/25/2009	19.15	1.70	48.22	11.67	25.72

12/26/2009	19.13	1.63	46.04	11.14	24.56
12/27/2009	19.11	1.59	44.94	10.87	23.97
12/28/2009	19.10	1.53	43.27	10.47	23.08
12/29/2009	19.07	1.40	39.78	9.63	21.22
12/30/2009	19.09	1.50	42.41	10.26	22.63
12/31/2009	19.09	1.48	41.86	10.13	22.33
1/1/2010	19.13	1.65	46.74	11.31	24.94
1/2/2010	19.06	1.36	38.45	9.31	20.52
1/3/2010	19.03	1.28	36.33	8.79	19.38
1/4/2010	19.24	2.05	58.13	11.75	25.9
1/5/2010	19.37	2.63	74.42	11.58	25.52
1/6/2010	19.33	2.43	68.94	10.72	23.64
1/7/2010	19.46	2.98	84.28	13.11	28.9
1/8/2010	19.34	2.36	66.75	10.38	22.89
1/9/2010	19.11	1.50	42.42	6.6	14.54
1/10/2010	19.20	1.92	54.42	8.46	18.66
1/11/2010	19.43	2.87	81.14	12.62	27.82
1/12/2010	19.31	2.20	62.34	9.7	21.38
1/13/2010	19.20	1.80	51.10	8.58	18.91
1/14/2010	19.04	1.29	36.47	6.93	15.29
1/15/2010	18.97	1.06	30.08	5.72	12.61
1/16/2010	18.88	0.77	21.86	4.16	9.16
1/17/2010	19.12	1.66	47.07	8.95	19.73
1/18/2010	19.32	2.37	67.14	12.76	28.14
1/19/2010	19.21	1.86	52.76	13.44	29.62
1/20/2010	19.10	1.49	42.16	15.46	34.09
1/21/2010	19.01	1.18	33.48	12.28	27.06
1/22/2010	19.01	1.20	34.05	12.49	27.53
1/23/2010	18.96	1.04	29.35	10.76	23.72
1/24/2010	19.09	1.53	43.20	15.84	34.93
1/25/2010	19.15	1.70	48.07	17.63	38.86
1/26/2010	19.08	1.43	40.42	13.38	29.5
1/27/2010	19.00	1.17	33.22	9.78	21.56
1/28/2010	18.98	1.10	31.22	9.19	20.25
1/29/2010	19.05	1.35	38.34	11.28	24.88
1/30/2010	19.09	1.47	41.67	12.26	27.04
1/31/2010	19.05	1.35	38.09	11.21	24.71
2/1/2010	19.37	2.71	76.81	22.61	49.84
2/2/2010	19.61	3.42	96.84	28.5	62.83
2/3/2010	19.59	3.06	86.72	22.46	49.52
2/4/2010	19.38	2.16	61.15	11.29	24.89
2/5/2010	19.24	1.80	50.98	9.41	20.75
2/6/2010	19.30	2.06	58.28	10.76	23.72
2/7/2010	19.21	1.76	49.82	9.2	20.28
2/8/2010	19.13	1.52	43.12	7.96	17.55
2/9/2010	19.02	1.23	34.94	6.45	14.22
2/10/2010	18.94	0.97	27.52	5.08	11.2

2/11/2010	18.92	0.92	26.18	4.65	10.26
2/12/2010	19.52	3.48	98.57	16.09	35.47
2/13/2010	19.89	4.56	129.07	21.06	46.44
2/14/2010	19.67	3.40	96.14	15.69	34.59
2/15/2010	19.50	2.65	75.02	12.24	26.99
2/16/2010	19.34	0.20	5.79	0.95	2.08
2/17/2010					
2/18/2010					
2/19/2010					
2/20/2010					
2/21/2010					
2/22/2010					
2/23/2010	19.14	0.77	21.93	6.79	14.98
2/24/2010	19.45	2.86	81.00	25.09	55.32
2/25/2010	19.92	4.79	135.60	42.01	92.61
2/26/2010	19.65	3.28	92.96	28.8	63.49
2/27/2010	19.53	2.84	80.39	24.91	54.91
2/28/2010	19.50	2.71	76.65	23.75	52.35
3/1/2010	19.32	2.08	58.78	18.21	40.15
3/2/2010	19.26	1.93	54.72	16.95	37.37
3/3/2010	19.24	1.91	54.14	13.91	30.67
3/4/2010	19.09	1.44	40.71	5.8	12.78
3/5/2010	19.05	1.34	37.96	5.41	11.92
3/6/2010	19.12	1.62	45.94	6.54	14.42
3/7/2010	19.11	1.56	44.19	6.29	13.87
3/8/2010	19.14	1.67	47.18	6.72	14.81
3/9/2010	19.15	1.72	48.59	6.92	15.26
3/10/2010	19.11	1.55	43.95	6.26	13.8
3/11/2010	19.33	2.48	70.12	113.43	250.06
3/12/2010	20.23	6.10	172.86	379.77	837.24
3/13/2010	20.24	5.67	160.58	352.8	777.78
3/14/2010	19.63	3.26	92.26	202.69	446.85
3/15/2010	19.12	1.65	46.82	82.44	181.74
3/16/2010	18.75	0.43	12.16	3.76	8.28
3/17/2010	18.70	0.28	8.03	2.48	5.47
3/18/2010	18.73	0.40	11.28	3.49	7.68
3/19/2010	18.77	0.48	13.56	4.19	9.24
3/20/2010	18.82	0.60	16.97	5.24	11.56
3/21/2010	19.00	1.22	34.61	10.69	23.58
3/22/2010	19.18	1.78	50.34	15.56	34.29
3/23/2010	19.03	1.25	35.35	10.92	24.08
3/24/2010	18.93	0.93	26.24	8.25	18.19
3/25/2010	18.85	0.68	19.34	6.33	13.97
3/26/2010	18.95	1.02	28.87	9.46	20.85
3/27/2010	18.89	0.82	23.22	7.61	16.77
3/28/2010	18.89	0.71	20.02	6.56	14.46
3/29/2010	19.49	2.62	74.11	26.65	58.74

3/30/2010	19.59	2.91	82.33	31.94	70.42
3/31/2010	19.38	2.17	61.51	23.86	52.61
4/1/2010	19.23	1.80	50.96	19.77	43.59
4/2/2010	19.12	1.51	42.86	16.63	36.66
4/3/2010	19.00	1.14	32.35	12.55	27.67
4/4/2010	18.89	0.82	23.17	8.99	19.82
4/5/2010	18.90	0.86	24.32	9.43	20.8
4/6/2010	18.90	0.85	23.98	9.3	20.51
4/7/2010	18.86	0.73	20.74	8.05	17.74
4/8/2010	18.85	0.69	19.41	7.53	16.6
4/9/2010	18.82	0.60	17.09	6.63	14.62
4/10/2010	18.79	0.53	14.97	5.81	12.81
4/11/2010	18.98	1.20	33.90	13.15	28.99
4/12/2010	19.24	1.95	55.08	25.3	55.77
4/13/2010	19.31	2.11	59.86	34.01	74.99
4/14/2010	19.19	1.73	48.93	27.8	61.29
4/15/2010	19.02	1.21	34.25	19.46	42.9
4/16/2010	19.02	1.23	34.75	19.74	43.53
4/17/2010	19.06	1.37	38.82	22.06	48.63
4/18/2010	19.25	1.90	53.70	30.51	67.27
4/19/2010	19.75	3.52	99.70	55.8	123.02
4/20/2010	19.76	3.57	101.08	55.11	121.49
4/21/2010	20.21	4.89	138.51	75.52	166.48
4/22/2010	20.04	4.38	123.93	67.57	148.96
4/23/2010	19.72	3.27	92.71	50.55	111.44
4/24/2010	19.52	2.66	75.27	41.04	90.47
4/25/2010	19.37	2.17	61.54	33.55	73.97
4/26/2010	19.77	3.40	96.41	52.56	115.88
4/27/2010	19.91	3.77	106.89	58.28	128.48
4/28/2010	19.70	3.20	90.66	52.83	116.47
4/29/2010	19.46	2.43	68.85	44.26	97.58
4/30/2010	19.34	2.09	59.12	38.01	83.79
5/1/2010	19.23	0.24	6.94	4.46	9.83
5/2/2010	19.15	0.27	7.68	4.94	10.89
5/3/2010	19.13	0.20	5.64	3.63	7.99
5/4/2010	19.17	0.24	6.81	4.38	9.65
5/5/2010	19.19	0.23	6.64	4.27	9.42
5/6/2010	19.20	0.25	7.21	4.63	10.22
5/7/2010	19.10	0.05	1.34	0.86	1.9
5/8/2010					
5/9/2010					
5/10/2010					
5/11/2010					
5/12/2010	18.76	0.01	0.40	0.16	0.36
5/13/2010	18.84	0.05	1.40	0.58	1.27
5/14/2010	18.90	0.03	0.73	0.3	0.67
5/15/2010	18.86	0.05	1.30	0.54	1.18

5/16/2010	18.96	0.07	1.87	0.77	1.7
5/17/2010	19.19	0.28	7.80	3.22	7.1
5/18/2010	19.35	1.00	28.34	9.18	20.24
5/19/2010	19.33	2.14	60.57	19.26	42.46
5/20/2010	19.23	1.78	50.38	16.02	35.32
5/21/2010	19.10	1.45	41.13	13.08	28.84
5/22/2010	18.93	0.93	26.29	8.36	18.43
5/23/2010	18.88	0.77	21.81	6.94	15.29
5/24/2010	18.83	0.62	17.53	5.57	12.29
5/25/2010	18.77	0.47	13.18	4.19	9.24
5/26/2010	18.86	0.73	20.75	6.6	14.55
5/27/2010	18.95	0.99	28.12	8.94	19.71
5/28/2010	18.91	0.86	24.31	7.73	17.05
5/29/2010	19.03	1.27	36.07	11.47	25.29
5/30/2010	19.08	1.44	40.78	12.97	28.59
5/31/2010	19.02	1.23	34.80	11.07	24.4
6/1/2010	19.30	2.25	63.62	30.64	67.55
6/2/2010	19.42	2.51	71.19	43.81	96.59
6/3/2010	19.54	2.06	58.27	35.86	79.06
6/4/2010	19.32	0.12	3.38	2.08	4.59
6/5/2010	19.21	0.11	3.04	1.87	4.12
6/6/2010	19.49	0.14	4.07	2.5	5.52
6/7/2010	19.33	0.08	2.36	1.45	3.21
6/8/2010	19.17	0.03	0.98	0.61	1.33
6/9/2010	19.10	0.05	1.36	0.84	1.85
6/10/2010		0.00	0.00	0	0
6/11/2010	19.13	0.78	21.97	33.97	74.89
6/12/2010	19.17	1.76	49.78	76.96	169.66
6/13/2010	19.17	1.77	50.16	77.54	170.95
6/14/2010	19.05	1.32	37.45	57.9	127.65
6/15/2010	19.07	1.42	40.19	62.13	136.96
6/16/2010	18.96	1.03	29.24	45.2	99.65
6/17/2010	19.11	1.56	44.24	68.39	150.78
6/18/2010	19.00	1.16	32.90	50.86	112.13
6/19/2010	19.00	1.18	33.29	51.47	113.46
6/20/2010	19.01	1.18	33.53	51.83	114.27
6/21/2010	18.91	0.86	24.34	37.63	82.95
6/22/2010	18.78	0.50	14.07	21.75	47.96
6/23/2010	18.89	0.84	23.67	30.68	67.63
6/24/2010	18.75	0.42	11.95	9.95	21.94
6/25/2010	18.71	0.36	10.18	8.48	18.69
6/26/2010	18.65	0.20	5.60	4.67	10.28
6/27/2010	18.68	0.27	7.56	6.29	13.87
6/28/2010	18.65	0.21	5.82	4.84	10.68
6/29/2010	18.69	0.35	9.87	8.22	18.12
6/30/2010	18.68	0.33	9.24	7.7	16.97
7/1/2010	18.90	0.82	23.17	19.29	42.52

7/2/2010	19.20	1.62	45.75	38.09	83.97
7/3/2010	19.56	2.72	77.02	64.13	141.38
7/4/2010	20.18	5.00	141.63	117.92	259.98
7/5/2010	20.36	5.69	161.03	134.07	295.58
7/6/2010	20.50	6.19	175.36	146	321.88
7/7/2010	20.39	5.65	159.92	133.15	293.55
7/8/2010	20.22	5.00	141.65	117.94	260.01
7/9/2010	19.95	4.17	118.22	98.43	217
7/10/2010	19.79	3.92	110.97	92.39	203.69
7/11/2010	19.62	3.31	93.60	77.93	171.81
7/12/2010	19.40	2.44	69.23	57.64	127.07
7/13/2010	19.21	1.78	50.41	41.97	92.54
7/14/2010	19.06	1.29	36.62	38.82	85.59
7/15/2010	19.03	1.25	35.50	47.15	103.94
7/16/2010	18.98	1.08	30.52	40.53	89.35
7/17/2010	18.85	0.70	19.74	26.21	57.79
7/18/2010	19.08	1.53	43.20	57.37	126.48
7/19/2010	19.08	1.45	40.95	54.38	119.88
7/20/2010	19.11	1.58	44.70	59.36	130.87
7/21/2010	19.09	1.50	42.51	56.45	124.45
7/22/2010	19.08	1.47	41.71	55.38	122.1
7/23/2010	19.14	1.65	46.74	62.07	136.84
7/24/2010	19.01	1.18	33.45	44.42	97.93
7/25/2010	19.11	1.58	44.77	59.45	131.07
7/26/2010	19.19	1.84	52.18	69.29	152.76
7/27/2010	19.15	1.69	47.90	43.88	96.74
7/28/2010	19.11	1.55	43.81	27.72	61.11
7/29/2010	19.05	1.33	37.79	23.91	52.71
7/30/2010	18.90	0.83	23.40	14.81	32.64
7/31/2010	18.76	0.44	12.45	7.87	17.36
8/1/2010	18.64	0.19	5.25	3.32	7.33
8/2/2010	18.59	0.11	3.01	1.91	4.2
8/3/2010	18.64	0.18	4.98	3.15	6.95
8/4/2010	18.78	0.49	13.89	8.79	19.37
8/5/2010	19.11	1.46	41.48	26.24	57.86
8/6/2010	19.44	2.70	76.35	48.31	106.5
8/7/2010	19.24	1.85	52.27	33.07	72.91
8/8/2010	19.09	1.39	39.45	24.96	55.02
8/9/2010	19.25	1.55	43.97	28.51	62.86
8/10/2010					
8/11/2010					
8/12/2010					
8/13/2010					
8/14/2010					
8/15/2010					
8/16/2010					
8/17/2010					

8/18/2010	19.03	0.54	15.35	10.3	22.7
8/19/2010	18.78	0.49	13.95	9.36	20.63
8/20/2010	18.59	0.10	2.87	1.92	4.24
8/21/2010	18.49	0.00	0.05	0.03	0.07
8/22/2010	18.63	0.36	10.12	6.79	14.96
8/23/2010	19.00	1.16	32.74	21.97	48.43
8/24/2010	18.73	0.36	10.25	3.6	7.93

Discharge					
Date	Daily Average Discharge Stage (ft NGVD29)	Daily Flow (ft ³ x 10 ⁶)	Daily Flow (m ³ x 10 ³)	Daily Loading (kg)	Daily Loading (lbs)
8/12/2009	16.44	0.32	8.92	0.00	0.00
8/13/2009	16.99	1.55	43.95	0.00	0.00
8/14/2009	17.56	2.51	71.16	0.00	0.00
8/15/2009	17.66	2.72	77.10	0.00	0.00
8/16/2009	17.89	3.15	89.32	0.00	0.00
8/17/2009	17.56	2.56	72.41	0.00	0.00
8/18/2009	17.21	1.90	53.68	0.00	0.00
8/19/2009	17.10	1.72	48.82	13.15	28.98
8/20/2009	16.91	1.41	39.87	25.00	55.12
8/21/2009	16.61	0.93	26.31	16.50	36.38
8/22/2009	16.52	0.79	22.34	14.01	30.88
8/23/2009	16.44	0.68	19.33	12.12	26.72
8/24/2009	16.43	0.67	18.99	11.90	26.24
8/25/2009	16.42	0.66	18.58	11.65	25.68
8/26/2009	16.37	0.58	16.47	10.33	22.77
8/27/2009	16.30	0.49	13.84	8.68	19.14
8/28/2009	16.40	0.62	17.59	11.03	24.31
8/29/2009	16.58	0.88	24.89	15.61	34.41
8/30/2009	16.75	1.14	32.27	20.23	44.60
8/31/2009	16.74	1.13	31.86	19.98	44.04
9/1/2009	16.79	1.21	34.19	16.17	35.65
9/2/2009	16.80	1.22	34.68	10.70	23.59
9/3/2009	16.90	1.39	39.42	12.16	26.81
9/4/2009	16.87	1.34	37.95	11.71	25.81
9/5/2009	16.89	1.38	38.96	12.02	26.49
9/6/2009	17.08	1.69	47.93	14.79	32.60
9/7/2009	17.09	1.70	48.25	14.89	32.82
9/8/2009	17.02	1.59	45.12	13.92	30.68
9/9/2009	16.88	1.36	38.44	11.86	26.14
9/10/2009	16.72	1.11	31.35	9.67	21.32
9/11/2009	16.65	1.00	28.21	5.16	11.38
9/12/2009	16.75	1.15	32.50	5.95	13.11
9/13/2009	16.73	1.12	31.64	5.79	12.76
9/14/2009	16.72	1.11	31.34	5.73	12.64
9/15/2009	16.57	0.86	24.45	4.47	9.86
9/16/2009	16.42	0.65	18.39	3.36	7.42
9/17/2009	16.33	0.53	15.09	2.76	6.09
9/18/2009	16.33	0.54	15.17	2.78	6.12
9/19/2009	16.38	0.60	17.02	3.11	6.87
9/20/2009	16.42	0.65	18.49	3.38	7.46
9/21/2009	16.51	0.79	22.24	4.07	8.97
9/22/2009	16.55	0.84	23.91	4.83	10.65

9/23/2009	16.69	1.05	29.86	6.69	14.75
9/24/2009	16.77	1.18	33.32	7.47	16.46
9/25/2009	16.69	1.05	29.63	6.64	14.64
9/26/2009	16.68	1.04	29.55	6.62	14.60
9/27/2009	17.22	1.95	55.22	12.37	27.28
9/28/2009	17.79	2.94	83.13	18.63	41.07
9/29/2009	17.81	3.01	85.10	19.07	42.05
9/30/2009	17.58	2.59	73.42	16.45	36.27
10/1/2009	17.43	2.31	65.33	14.64	32.28
10/2/2009	17.24	1.97	55.78	15.77	34.77
10/3/2009	17.03	1.60	45.31	15.31	33.76
10/4/2009	16.89	1.38	38.95	13.16	29.01
10/5/2009	16.85	1.31	36.98	12.50	27.55
10/6/2009	16.72	1.10	31.21	10.55	23.25
10/7/2009	16.68	1.03	29.30	9.90	21.83
10/8/2009	16.57	0.86	24.43	8.26	18.20
10/9/2009	16.55	0.83	23.59	7.97	17.58
10/10/2009	16.57	0.86	24.45	8.26	18.22
10/11/2009	16.60	0.92	26.06	8.81	19.41
10/12/2009	16.61	0.93	26.22	8.86	19.53
10/13/2009	16.55	0.83	23.60	7.98	17.58
10/14/2009	16.46	0.71	20.05	5.99	13.19
10/15/2009	16.46	0.71	20.15	3.09	6.82
10/16/2009	16.43	0.67	18.83	2.89	6.38
10/17/2009	16.43	0.67	18.85	2.90	6.38
10/18/2009	16.39	0.62	17.52	2.69	5.93
10/19/2009	16.27	0.46	12.91	1.98	4.37
10/20/2009	16.20	0.37	10.37	1.59	3.51
10/21/2009	16.21	0.39	10.91	1.68	3.69
10/22/2009	16.30	0.50	14.18	2.18	4.80
10/23/2009	16.42	0.65	18.38	2.77	6.11
10/24/2009	16.48	0.74	20.99	3.10	6.85
10/25/2009	16.44	0.69	19.41	2.87	6.33
10/26/2009	16.41	0.64	18.13	2.68	5.91
10/27/2009	16.38	0.60	17.01	2.52	5.55
10/28/2009	16.42	0.65	18.38	2.72	5.99
10/29/2009	16.49	0.75	21.18	3.13	6.91
10/30/2009	16.46	0.71	20.01	2.96	6.52
10/31/2009	16.42	0.66	18.62	2.75	6.07
11/1/2009	16.41	0.65	18.29	2.70	5.96
11/2/2009	16.37	0.61	17.41	2.48	5.46
11/3/2009	16.40	0.62	17.67	2.17	4.79
11/4/2009	16.38	0.60	16.93	2.08	4.59
11/5/2009	16.39	0.61	17.36	2.13	4.70
11/6/2009	16.39	0.61	17.36	2.13	4.70
11/7/2009	16.32	0.52	14.83	1.82	4.02
11/8/2009	16.27	0.46	13.03	1.60	3.53

11/9/2009	16.27	0.45	12.78	1.99	4.39
11/10/2009	16.22	0.63	17.79	3.97	8.74
11/11/2009	16.28	0.47	13.20	2.94	6.49
11/12/2009	16.29	0.48	13.71	3.06	6.74
11/13/2009	16.23	0.41	11.68	2.60	5.74
11/14/2009	16.13	0.29	8.26	1.84	4.06
11/15/2009	16.07	0.23	6.44	1.44	3.16
11/16/2009	16.06	0.22	6.09	1.36	2.99
11/17/2009	16.08	0.24	6.68	1.49	3.28
11/18/2009	16.09	0.24	6.92	1.54	3.40
11/19/2009	16.11	0.27	7.78	1.73	3.82
11/20/2009	16.06	0.22	6.09	2.48	5.47
11/21/2009	15.94	0.11	3.09	1.91	4.20
11/22/2009	15.81	0.03	0.73	0.45	0.99
11/23/2009	15.68	0.00	0.00	0.00	0.00
11/24/2009	15.60	0.00	0.00	0.00	0.00
11/25/2009	16.07	0.00	0.00	0.00	0.00
11/26/2009	17.17	0.00	0.00	0.00	0.00
11/27/2009	17.17	0.00	0.00	0.00	0.00
11/28/2009	16.93	0.00	0.00	0.00	0.00
11/29/2009	16.73	0.00	0.00	0.00	0.00
11/30/2009	16.59	0.00	0.00	0.00	0.00
12/1/2009	16.51	0.00	0.00	0.00	0.00
12/2/2009	16.47	0.00	0.00	0.00	0.00
12/3/2009	16.63	0.00	0.00	0.00	0.00
12/4/2009	16.68	0.00	0.00	0.00	0.00
12/5/2009	16.89	0.00	0.00	0.00	0.00
12/6/2009	17.41	0.00	0.00	0.00	0.00
12/7/2009	17.36	0.00	0.00	0.00	0.00
12/8/2009	17.28	0.00	0.00	0.00	0.00
12/9/2009	17.23	0.00	0.00	0.00	0.00
12/10/2009	17.19	0.00	0.00	0.00	0.00
12/11/2009	17.17	0.00	0.00	0.00	0.00
12/12/2009	17.17	0.00	0.00	0.00	0.00
12/13/2009	17.19	0.00	0.00	0.00	0.00
12/14/2009	17.24	0.00	0.00	0.00	0.00
12/15/2009	17.40	0.00	0.00	0.00	0.00
12/16/2009	17.69	0.00	0.02	0.00	0.01
12/17/2009	17.86	0.05	1.32	0.31	0.68
12/18/2009	18.30	0.51	14.42	3.54	7.81
12/19/2009	18.98	1.50	42.51	10.44	23.02
12/20/2009	18.98	1.51	42.84	10.52	23.19
12/21/2009	18.78	1.18	33.32	8.32	18.35
12/22/2009	18.60	0.91	25.64	6.53	14.41
12/23/2009	18.50	0.76	21.47	5.47	12.06
12/24/2009	18.44	0.67	18.90	4.82	10.62
12/25/2009	18.41	0.63	17.72	4.52	9.96

12/26/2009	18.43	0.65	18.48	4.71	10.39
12/27/2009	18.37	0.57	16.13	4.11	9.06
12/28/2009	18.34	0.54	15.15	3.86	8.51
12/29/2009	18.31	0.50	14.12	3.60	7.94
12/30/2009	18.29	0.47	13.35	3.40	7.50
12/31/2009	18.29	0.46	13.15	3.35	7.39
1/1/2010	18.32	0.51	14.55	3.71	8.17
1/2/2010	18.44	0.67	18.97	4.83	10.66
1/3/2010	18.34	0.53	15.13	3.86	8.50
1/4/2010	18.37	0.58	16.33	2.95	6.51
1/5/2010	18.46	0.70	19.89	2.07	4.56
1/6/2010	18.53	0.80	22.53	2.34	5.16
1/7/2010	18.57	0.85	24.20	2.51	5.54
1/8/2010	18.70	1.05	29.79	3.10	6.82
1/9/2010	18.62	0.93	26.23	2.73	6.01
1/10/2010	18.46	0.70	19.84	2.06	4.54
1/11/2010	18.50	0.75	21.38	2.22	4.90
1/12/2010	18.72	1.08	30.47	3.17	6.98
1/13/2010	18.65	0.97	27.40	3.16	6.96
1/14/2010	18.53	0.80	22.54	3.07	6.77
1/15/2010	18.40	0.61	17.36	2.36	5.21
1/16/2010	18.31	0.49	13.90	1.89	4.17
1/17/2010	18.34	0.54	15.20	2.07	4.56
1/18/2010	18.60	0.90	25.55	4.41	9.72
1/19/2010	18.64	0.97	27.48	6.35	14.01
1/20/2010	18.55	0.83	23.45	5.42	11.95
1/21/2010	18.44	0.67	18.86	4.36	9.62
1/22/2010	18.33	0.52	14.72	3.40	7.50
1/23/2010	18.25	0.42	11.84	2.74	6.03
1/24/2010	18.23	0.40	11.25	2.60	5.73
1/25/2010	18.34	0.54	15.28	3.53	7.79
1/26/2010	18.45	0.68	19.25	4.44	9.78
1/27/2010	18.41	0.63	17.78	4.09	9.01
1/28/2010	18.32	0.51	14.54	3.34	7.37
1/29/2010	18.27	0.44	12.46	2.86	6.31
1/30/2010	18.23	0.39	11.05	2.54	5.60
1/31/2010	18.22	0.38	10.84	2.49	5.49
2/1/2010	18.35	0.56	15.72	3.61	7.96
2/2/2010	18.84	1.28	36.29	8.34	18.38
2/3/2010	19.03	1.59	44.92	10.81	23.82
2/4/2010	18.97	1.49	42.14	10.98	24.21
2/5/2010	18.82	1.24	35.22	9.18	20.23
2/6/2010	18.82	1.25	35.30	9.20	20.28
2/7/2010	18.76	1.14	32.28	8.41	18.55
2/8/2010	18.66	0.99	28.16	7.34	16.18
2/9/2010	18.52	0.78	22.16	5.77	12.73
2/10/2010	18.42	0.65	18.32	4.77	10.53

2/11/2010	18.32	0.51	14.42	3.25	7.16
2/12/2010	18.39	0.62	17.46	2.57	5.67
2/13/2010	19.01	1.55	43.92	6.47	14.27
2/14/2010	19.05	1.63	46.05	6.79	14.96
2/15/2010	19.03	1.59	45.00	6.63	14.62
2/16/2010	18.91	1.39	39.33	5.35	11.79
2/17/2010	18.77	1.17	33.00	4.15	9.14
2/18/2010	18.69	1.04	29.37	3.69	8.14
2/19/2010	18.61	0.91	25.69	3.23	7.12
2/20/2010	18.54	0.81	22.88	2.88	6.34
2/21/2010	18.52	0.79	22.24	2.80	6.16
2/22/2010	18.49	0.74	20.85	2.62	5.78
2/23/2010	18.39	0.60	16.98	2.07	4.56
2/24/2010	18.42	0.64	18.26	2.16	4.76
2/25/2010	18.98	1.52	42.94	5.08	11.19
2/26/2010	19.07	1.65	46.81	5.53	12.20
2/27/2010	18.97	1.50	42.39	5.01	11.05
2/28/2010	18.97	1.48	42.01	4.97	10.95
3/1/2010	18.87	1.32	37.38	4.42	9.74
3/2/2010	18.80	1.20	34.05	4.03	8.87
3/3/2010	18.74	1.12	31.78	3.76	8.28
3/4/2010	18.59	0.88	25.03	2.96	6.52
3/5/2010	18.41	0.62	17.68	2.09	4.61
3/6/2010	18.28	0.45	12.86	1.52	3.35
3/7/2010	18.20	0.37	10.36	1.22	2.70
3/8/2010	18.18	0.34	9.69	1.14	2.52
3/9/2010	18.21	0.37	10.57	1.25	2.75
3/10/2010	18.22	0.39	10.93	1.29	2.85
3/11/2010	18.33	0.52	14.82	1.75	3.86
3/12/2010	19.17	1.85	52.33	6.19	13.64
3/13/2010	19.44	2.31	65.52	7.74	17.07
3/14/2010	18.94	1.40	39.70	4.69	10.34
3/15/2010	18.43	0.68	19.21	2.27	5.00
3/16/2010	18.03	0.18	5.21	0.62	1.36
3/17/2010	17.91	0.07	2.08	0.25	0.54
3/18/2010	17.88	0.06	1.68	0.20	0.44
3/19/2010	17.92	0.08	2.36	0.28	0.61
3/20/2010	17.92	0.08	2.34	0.28	0.61
3/21/2010	18.05	0.24	6.75	0.80	1.76
3/22/2010	18.56	0.84	23.84	2.82	6.21
3/23/2010	18.56	0.84	23.72	2.80	6.18
3/24/2010	18.47	0.71	20.11	2.38	5.24
3/25/2010	18.37	0.58	16.31	1.93	4.25
3/26/2010	18.45	0.68	19.32	2.28	5.03
3/27/2010	18.52	0.78	22.18	2.62	5.78
3/28/2010	18.51	0.78	21.95	2.59	5.72
3/29/2010	19.00	1.54	43.62	5.16	11.37

3/30/2010	19.11	1.73	49.05	5.80	12.78
3/31/2010	18.96	1.48	41.90	4.95	10.92
4/1/2010	18.80	1.21	34.31	4.05	8.94
4/2/2010	18.63	0.95	26.83	3.17	6.99
4/3/2010	18.52	0.79	22.32	2.64	5.82
4/4/2010	18.44	0.67	18.99	2.24	4.95
4/5/2010	18.40	0.61	17.27	2.04	4.50
4/6/2010	18.36	0.56	15.97	1.89	4.16
4/7/2010	18.34	0.53	15.04	1.78	3.92
4/8/2010	18.32	0.51	14.53	1.72	3.79
4/9/2010	18.31	0.50	14.02	1.66	3.65
4/10/2010	18.29	0.47	13.25	1.57	3.45
4/11/2010	18.39	0.61	17.15	2.03	4.47
4/12/2010	18.69	1.04	29.36	3.47	7.65
4/13/2010	18.80	1.21	34.19	4.04	8.91
4/14/2010	18.69	1.04	29.53	3.49	7.70
4/15/2010	18.55	0.83	23.39	2.76	6.09
4/16/2010	18.45	0.68	19.15	2.26	4.99
4/17/2010	18.49	0.74	20.87	2.47	5.44
4/18/2010	18.80	1.21	34.19	4.04	8.91
4/19/2010	19.20	1.89	53.40	6.31	13.92
4/20/2010	19.21	1.90	53.68	6.34	13.99
4/21/2010	19.67	2.72	77.08	9.11	20.09
4/22/2010	19.49	2.40	68.06	8.04	17.74
4/23/2010	19.25	1.98	56.00	6.62	14.59
4/24/2010	19.06	1.64	46.30	5.47	12.06
4/25/2010	18.92	1.42	40.14	4.74	10.46
4/26/2010	19.29	2.05	58.10	6.87	15.14
4/27/2010	19.44	2.32	65.62	7.76	17.10
4/28/2010	19.23	1.94	54.97	6.50	14.32
4/29/2010	19.04	1.61	45.59	5.39	11.88
4/30/2010	18.91	1.38	39.15	4.63	10.20
5/1/2010	18.77	1.16	32.80	3.88	8.55
5/2/2010	18.66	0.98	27.84	3.29	7.25
5/3/2010	18.54	0.82	23.13	2.73	6.03
5/4/2010	18.50	0.75	21.35	2.52	5.56
5/5/2010	18.50	0.76	21.44	2.53	5.59
5/6/2010	18.56	0.84	23.78	2.81	6.20
5/7/2010	18.56	0.84	23.87	2.82	6.22
5/8/2010	18.49	0.74	20.99	2.48	5.47
5/9/2010	18.43	0.65	18.44	2.18	4.81
5/10/2010	18.36	0.57	16.02	1.89	4.17
5/11/2010	18.29	0.47	13.44	1.59	3.50
5/12/2010	18.25	0.42	11.85	1.40	3.09
5/13/2010	18.22	0.38	10.84	1.28	2.82
5/14/2010	18.19	0.35	9.85	1.16	2.57
5/15/2010	18.23	0.39	11.12	1.31	2.90

5/16/2010	18.31	0.50	14.11	1.67	3.68
5/17/2010	18.68	1.02	28.80	3.40	7.50
5/18/2010	18.86	1.30	36.85	9.09	20.05
5/19/2010	18.86	1.30	36.90	15.16	33.43
5/20/2010	18.79	1.19	33.77	13.88	30.60
5/21/2010	18.62	0.93	26.34	10.82	23.86
5/22/2010	18.45	0.69	19.45	7.99	17.62
5/23/2010	18.37	0.58	16.32	6.71	14.79
5/24/2010	18.30	0.48	13.60	5.59	12.33
5/25/2010	18.21	0.37	10.41	4.28	9.43
5/26/2010	18.14	0.30	8.38	3.44	7.59
5/27/2010	18.13	0.28	8.01	3.29	7.26
5/28/2010	18.26	0.44	12.36	5.08	11.20
5/29/2010	18.32	0.50	14.30	5.88	12.95
5/30/2010	18.28	0.45	12.77	5.25	11.57
5/31/2010	18.28	0.46	12.97	5.33	11.75
6/1/2010	18.59	0.90	25.44	9.80	21.60
6/2/2010	18.87	1.33	37.54	13.88	30.59
6/3/2010	19.28	2.03	57.35	21.20	46.73
6/4/2010	19.83	3.03	85.76	31.70	69.88
6/5/2010	19.59	2.58	73.00	26.98	59.48
6/6/2010	19.61	2.62	74.23	27.44	60.49
6/7/2010	19.49	2.39	67.78	25.05	55.23
6/8/2010	19.33	2.12	59.95	22.16	48.85
6/9/2010	19.12	1.75	49.57	17.09	37.69
6/10/2010	18.88	1.34	38.06	10.85	23.93
6/11/2010	18.70	1.06	29.98	8.55	18.85
6/12/2010	18.52	0.78	21.98	6.27	13.82
6/13/2010	18.45	0.68	19.29	5.50	12.13
6/14/2010	18.42	0.65	18.26	5.21	11.48
6/15/2010	18.38	0.58	16.49	4.70	10.37
6/16/2010	18.40	0.61	17.28	4.93	10.87
6/17/2010	18.40	0.62	17.47	4.98	10.98
6/18/2010	18.51	0.77	21.68	6.18	13.63
6/19/2010	18.50	0.75	21.14	6.03	13.29
6/20/2010	18.51	0.76	21.55	6.15	13.55
6/21/2010	18.45	0.68	19.19	5.47	12.07
6/22/2010	18.34	0.54	15.21	4.34	9.56
6/23/2010	18.24	0.41	11.69	2.79	6.15
6/24/2010	18.17	0.33	9.37	1.52	3.36
6/25/2010	18.17	0.33	9.34	1.52	3.35
6/26/2010	18.19	0.35	9.92	1.61	3.56
6/27/2010	18.09	0.24	6.86	1.12	2.46
6/28/2010	18.03	0.18	5.10	0.83	1.83
6/29/2010	17.99	0.15	4.15	0.68	1.49
6/30/2010	18.14	0.30	8.57	1.39	3.07
7/1/2010	18.59	0.89	25.08	4.08	9.00

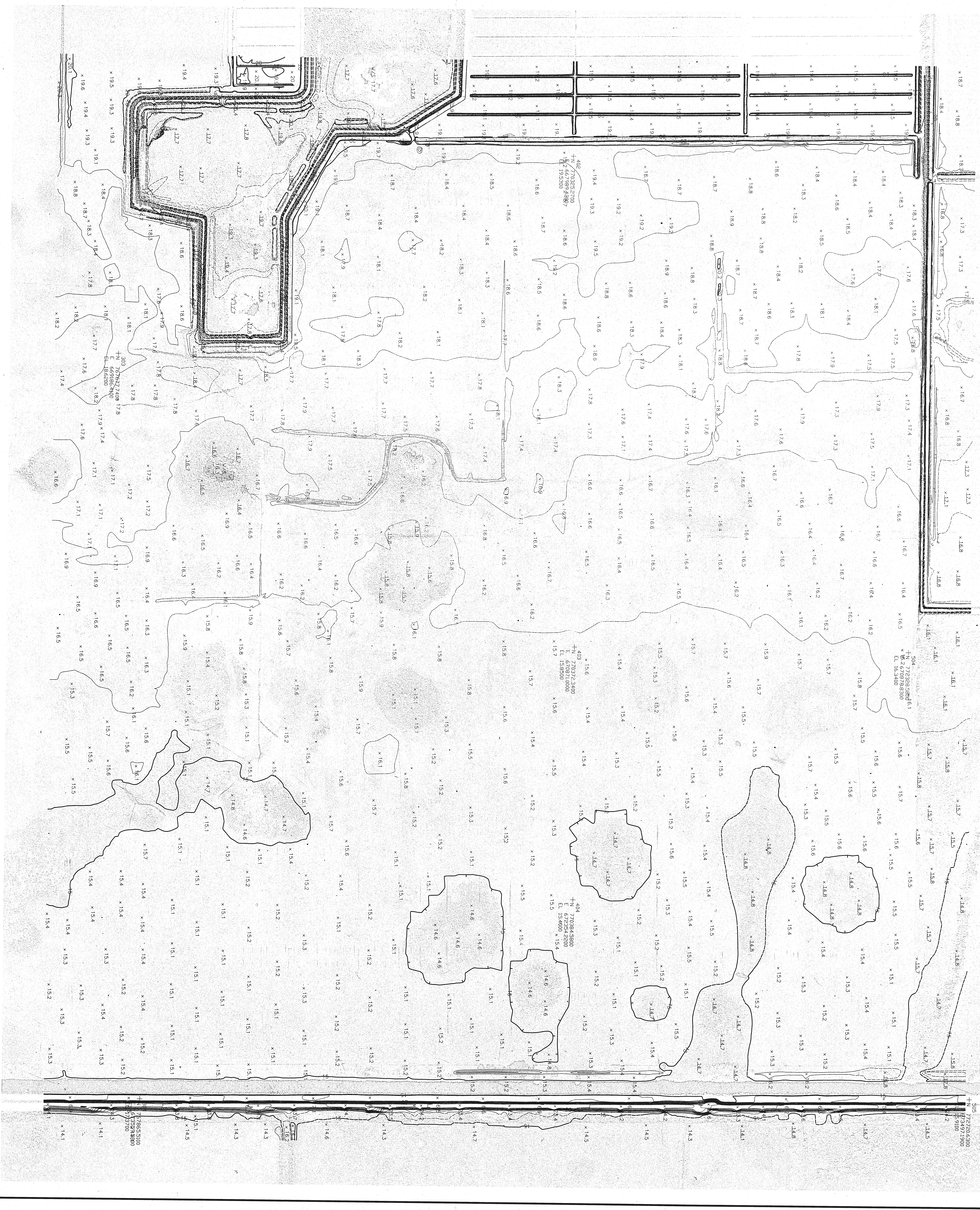
7/2/2010	18.85	1.29	36.45	5.93	13.07
7/3/2010	19.12	1.75	49.67	8.08	17.81
7/4/2010	19.58	2.56	72.58	11.81	26.03
7/5/2010	19.70	2.79	79.00	12.85	28.34
7/6/2010	19.81	2.99	84.57	13.76	30.33
7/7/2010	19.77	2.92	82.76	13.46	29.68
7/8/2010	19.67	2.72	77.09	12.54	27.65
7/9/2010	19.38	2.20	62.28	10.13	22.34
7/10/2010	19.11	1.73	49.09	7.99	17.61
7/11/2010	18.96	1.47	41.74	6.79	14.97
7/12/2010	18.85	1.29	36.57	5.95	13.12
7/13/2010	18.75	1.13	32.05	5.21	11.50
7/14/2010	18.66	0.99	27.95	3.72	8.21
7/15/2010	18.55	0.82	23.32	2.30	5.06
7/16/2010	18.50	0.75	21.11	2.08	4.58
7/17/2010	18.43	0.65	18.45	1.82	4.01
7/18/2010	18.38	0.59	16.78	1.65	3.64
7/19/2010	18.40	0.61	17.25	1.70	3.75
7/20/2010	18.39	0.59	16.84	1.66	3.66
7/21/2010	18.38	0.58	16.47	1.62	3.58
7/22/2010	18.40	0.62	17.52	1.73	3.81
7/23/2010	18.52	0.78	22.09	2.18	4.80
7/24/2010	18.53	0.80	22.71	2.24	4.93
7/25/2010	18.52	0.78	21.98	2.16	4.77
7/26/2010	18.54	0.81	22.88	2.25	4.97
7/27/2010	18.51	0.77	21.91	2.65	5.85
7/28/2010	18.48	0.72	20.32	2.82	6.21
7/29/2010	18.44	0.66	18.79	2.61	5.75
7/30/2010	18.40	0.61	17.19	2.38	5.26
7/31/2010	18.34	0.54	15.27	2.12	4.67
8/1/2010	18.30	0.48	13.52	1.88	4.13
8/2/2010	18.29	0.47	13.22	1.83	4.04
8/3/2010	18.35	0.55	15.52	2.15	4.75
8/4/2010	18.47	0.72	20.28	2.81	6.20
8/5/2010	18.70	1.05	29.68	4.12	9.07
8/6/2010	18.82	1.24	35.23	4.89	10.77
8/7/2010	18.79	1.20	33.85	4.70	10.35
8/8/2010	18.67	1.00	28.33	3.93	8.66
8/9/2010	18.64	0.95	26.99	4.07	8.97
8/10/2010	18.78	1.18	33.52	5.51	12.14
8/11/2010	18.84	1.28	36.11	5.93	13.08
8/12/2010	18.77	1.16	32.92	5.41	11.93
8/13/2010	18.66	0.98	27.86	4.58	10.09
8/14/2010	18.54	0.81	22.98	3.78	8.32
8/15/2010	18.45	0.68	19.37	3.18	7.01
8/16/2010	18.44	0.67	19.07	3.13	6.91
8/17/2010	18.43	0.66	18.66	3.07	6.76

8/18/2010	18.41	0.62	17.56	2.89	6.36
8/19/2010	18.48	0.72	20.33	3.34	7.36
8/20/2010	18.45	0.68	19.15	3.15	6.94
8/21/2010	18.37	0.58	16.37	2.69	5.93
8/22/2010	18.35	0.54	15.37	2.52	5.57
8/23/2010	18.42	0.64	18.19	2.99	6.59
8/24/2010	18.53	0.79	22.40	1.57	3.45

ATTACHMENT 3

C&B FARMS TOPOGRAPHY

NE



INTERMEDIATE CONTOUR
DEPRESSED INTERMEDIATE
DISCOURSED INTERMEDIATE
DISCOURSED DEP INTERMEDIATE

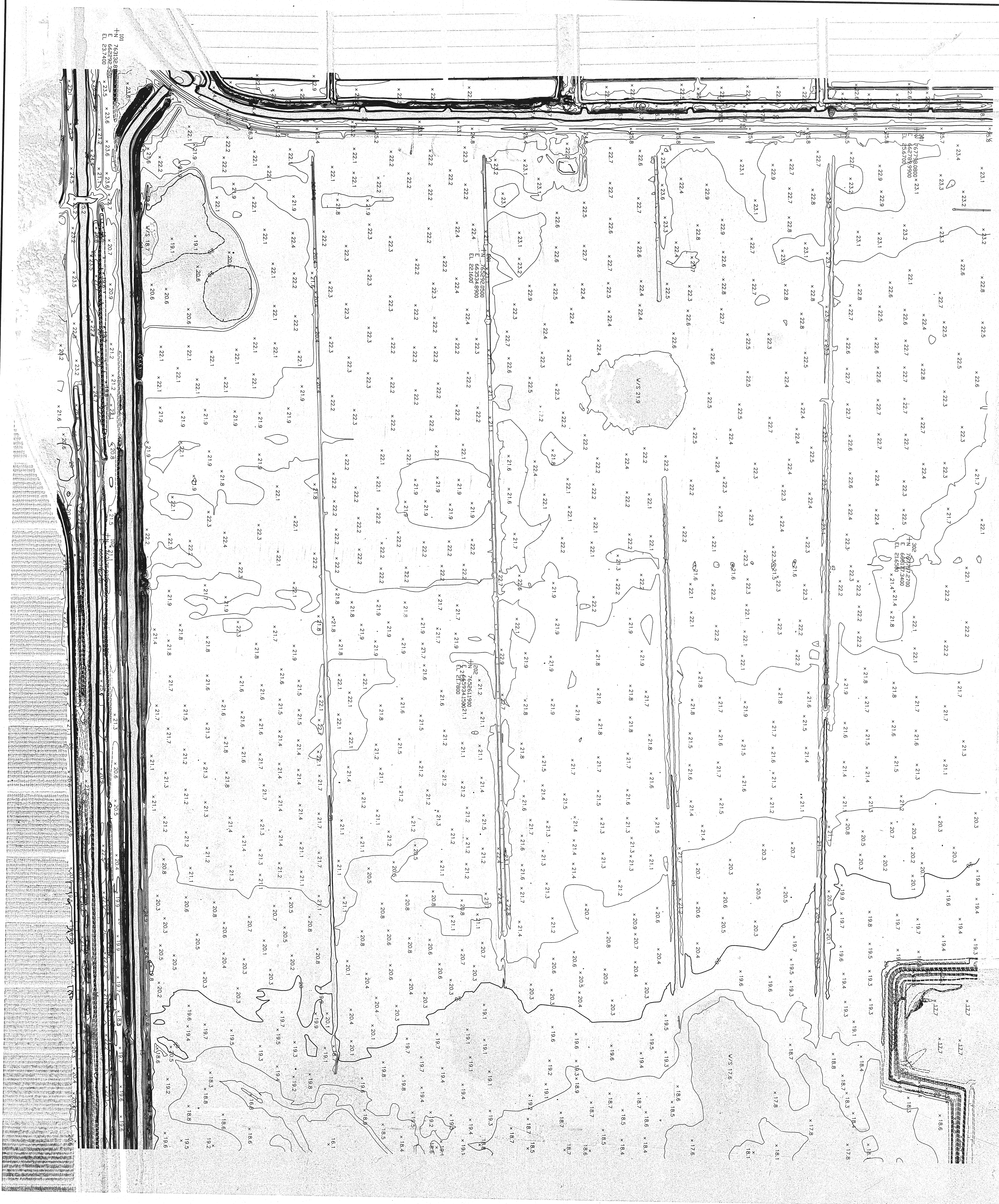
LEGEND

CONTROL POINT
SPOT HEIGHT
DISCOURSED SPOT HEIGHT
CON. LABEL
ELEVATION

1. THE UNDESIGNED REGISTERED SURVEYOR & MAPPER
HEREBY CERTIFIES THAT THE PHOTOGRAPHIC SURVEY
WAS MADE IN ACCORDANCE WITH THE STANDARDS
AND CORRECT TO THE BEST OF HIS KNOWLEDGE AND BELIEF.
THIS SURVEY MEETS THE MINIMUM TECHNICAL STANDARDS
FOR THE PREPARATION OF A PHOTOGRAPHIC SURVEY
Pursuant to the 1957-1958 Act (Chapter 100, F.S.)
DATE OF SURVEY: 1957 J. M. K. R. 7/4/57
UNLESS THIS MAP IS USED FOR THE PURPOSES OF A
SURVEY, THE USER ASSUMES ALL RESPONSIBILITY
FOR THE ACCURACY OF THE DATA AND THE MAP.
NOTE: THIS MAP IS FOR INFORMATION ONLY AND IS NOT VALID.

L.F. ROOKS & ASSOCIATES, INC.
INC. IN FLORIDA
PLANT CITY, FL. 33606
N
0 200 400 600
PHOTOGRAMMETRIC TOPOGRAPHIC SURVEY

SCHREUDER, INC.
JAC VIGARO HENDRY COUNTY
SECTIONS 29, 30, 31 & 32 T. 46 S. R. 34 E.
SHEET 6 OF 6



5 W

INTERMEDIATE CONTOUR
DEPRESSED INTERMEDIATE
DISCISED INTERMEDIATE
DISCISED DEP INTERMEDIATE

INDEX CONTOUR
DEPRESSED INDEX
DISCISED INDEX
DISCISED DEP INDEX

CONTROL POINT
SPOT HEIGHT
DISCISED SPOT HEIGHT

CONTOUR LABEL
W/S
ELEVATION

1. THE UNDERSIGNED, ENGINEER, CERTIFY THAT THIS MAP WAS PREPARED BY ME OR UNDER MY CLOSE PERSONAL SUPERVISION AND THAT I AM A LICENSED ENGINEER IN THE STATE OF FLORIDA. I HEREBY CERTIFY THAT THIS MAP WAS PREPARED IN ACCORDANCE WITH THE STANDARDS AND PRACTICES OF THE PROFESSION OF SURVEYING AND MAPPING AS SET FORTH IN THE FLORIDA CHAPTER OF THE NATIONAL MAPS ACT OF 1932, AS AMENDED, AND IN THE FLORIDA CHAPTER OF THE NATIONAL MAPS ACT OF 1932, AS AMENDED, AND IN THE FLORIDA CHAPTER OF THE NATIONAL MAPS ACT OF 1932, AS AMENDED.

DATE OF PHOTOGRAPHY: JUNE 1, 1967
SURVEYED BY: J. R. HENDRY, JR.
CHECKED BY: J. R. HENDRY, JR.
DATE OF PHOTOGRAPHY: JUNE 1, 1967
SURVEYED BY: J. R. HENDRY, JR.
CHECKED BY: J. R. HENDRY, JR.

DATE: 6-1-67
SCALE: 1" = 200'
DRAWN BY: J. R. HENDRY, JR.
CHECKED BY: J. R. HENDRY, JR.

J.R. HENDRY & ASSOCIATES, INC.
100 N. W. 10th St.
Fort Lauderdale, FL 33304
602-755-2113

INC. VIGARO HENDRY COUNTY
SECTIONS 29, 30, 31 & 32 T. 46 S. R. 34 E.
SHEET 3 OF 4

