APPENDIX A

APPENDIX B

City of Harrisburg, South Dakota

Zoning Map

EXHIBIT B-1

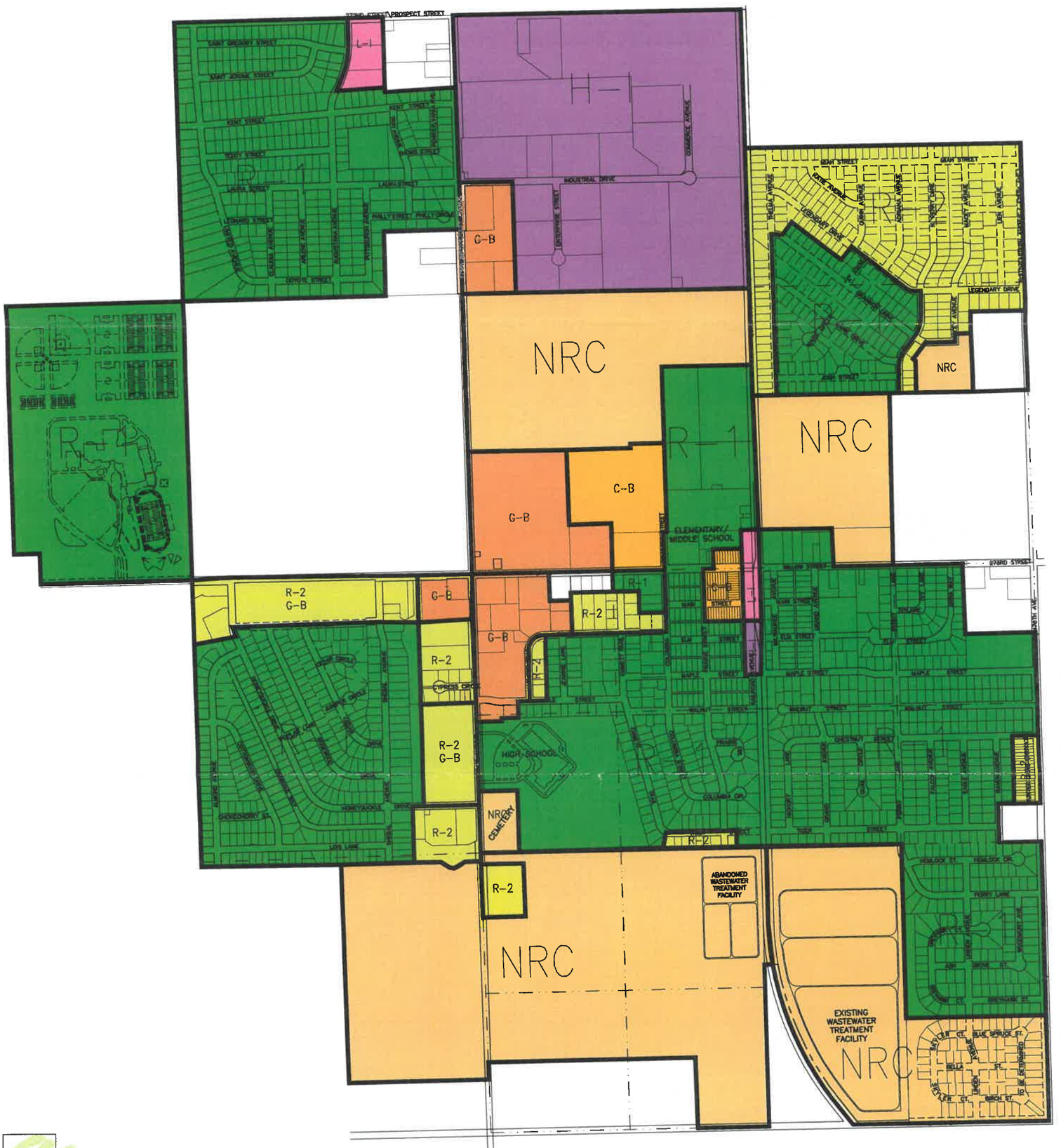
LEGEND

- R-1 SINGLE FAMILY RESIDENTIAL
- R-2 MULTIPLE FAMILY RESIDENTIAL
- C-B CENTRAL BUSINESS DISTRICT
- G-B GENERAL BUSINESS DISTRICT
- L-I LIGHT INDUSTRY
- H-I HEAVY INDUSTRY
- NRC NATURAL RESOURCE CONSERVATION DISTRICT

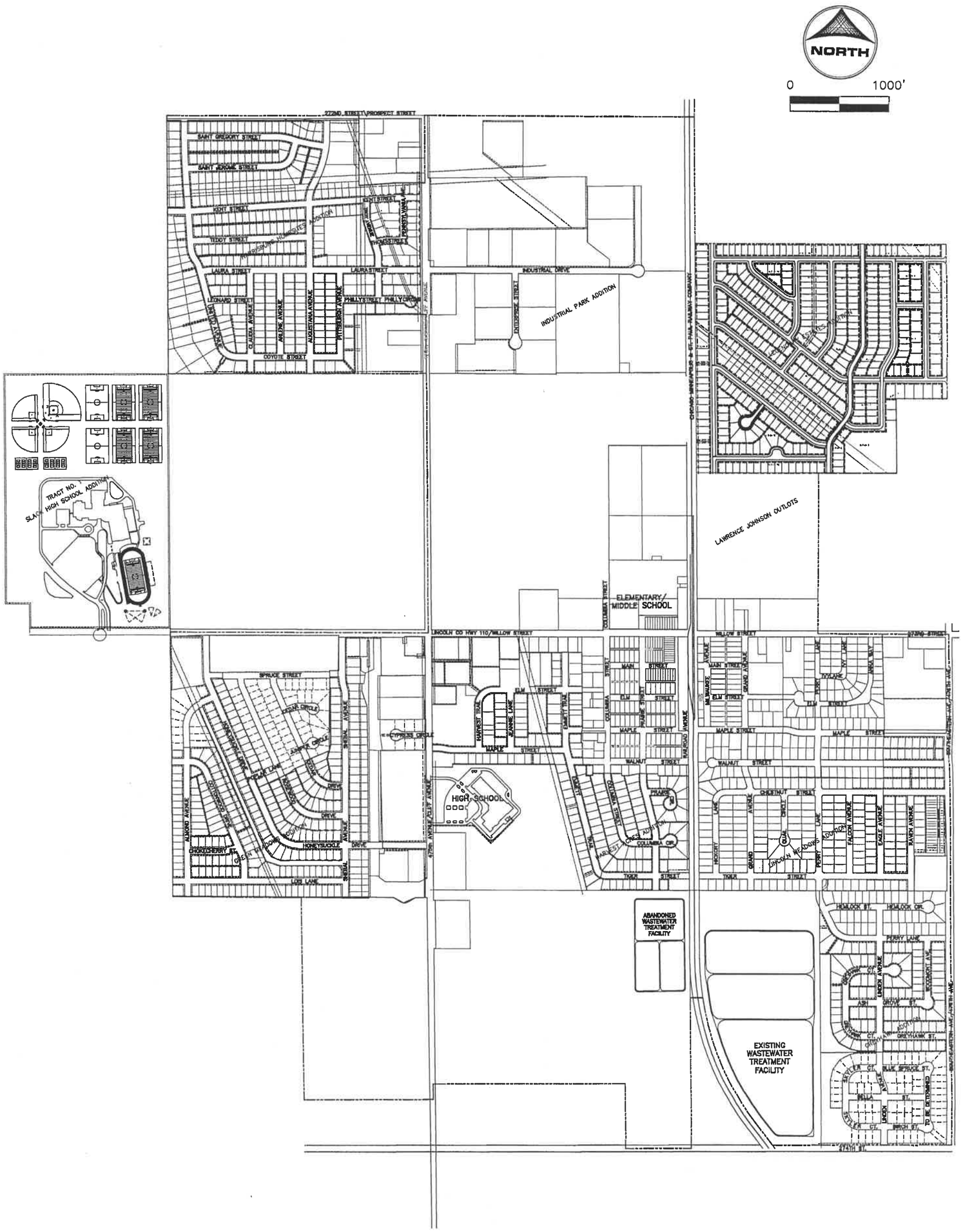
NORTH

0 500

1"=500'



Howard R. Green Company



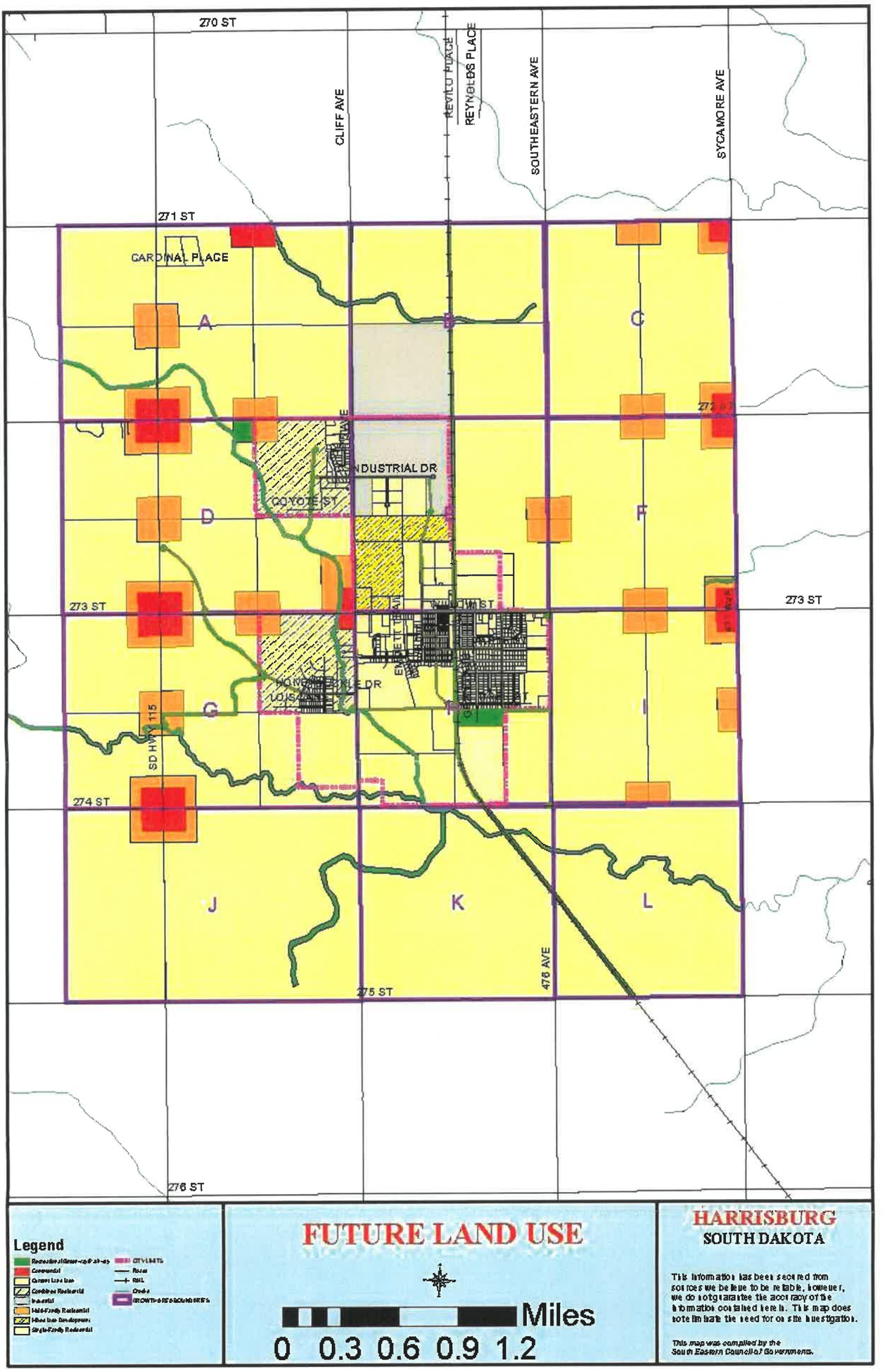
City of Harrisburg, South Dakota

Howard R. Green Company

Exhibit B-2

Xrefs: HARRISBURG-BASE-UTM14.DWG

June 05, 2007 3:10:48 p.m.
603580J\Exhibits\11X17 BASE MAP.DWG


270 ST
271 ST
273 ST
274 ST
275 ST
276 ST
CLIFF AVE
REVILO PLACE
REYNOLDS PLACE
SOUTHEASTERN AVE
SYCAMORE AVE
CARDINAL PLACE
INDUSTRIAL DR
COYOTE ST
SD HWY 115
478 AVE
A
B
C
D
F
G
I
J
K
L
Legend
FUTURE LAND USE
Miles
0 0.3 0.6 0.9 1.2
HARRISBURG
SOUTH DAKOTA
This information has been secured from sources we believe to be reliable, however, we do not guarantee the accuracy of the information contained herein. This map does not eliminate the need for on site investigation.
This map was compiled by the South Eastern Council of Governments.

APPENDIX C

CITY OF HARRISBURG

EXISTING EVAPORATION PONDS

NORTH

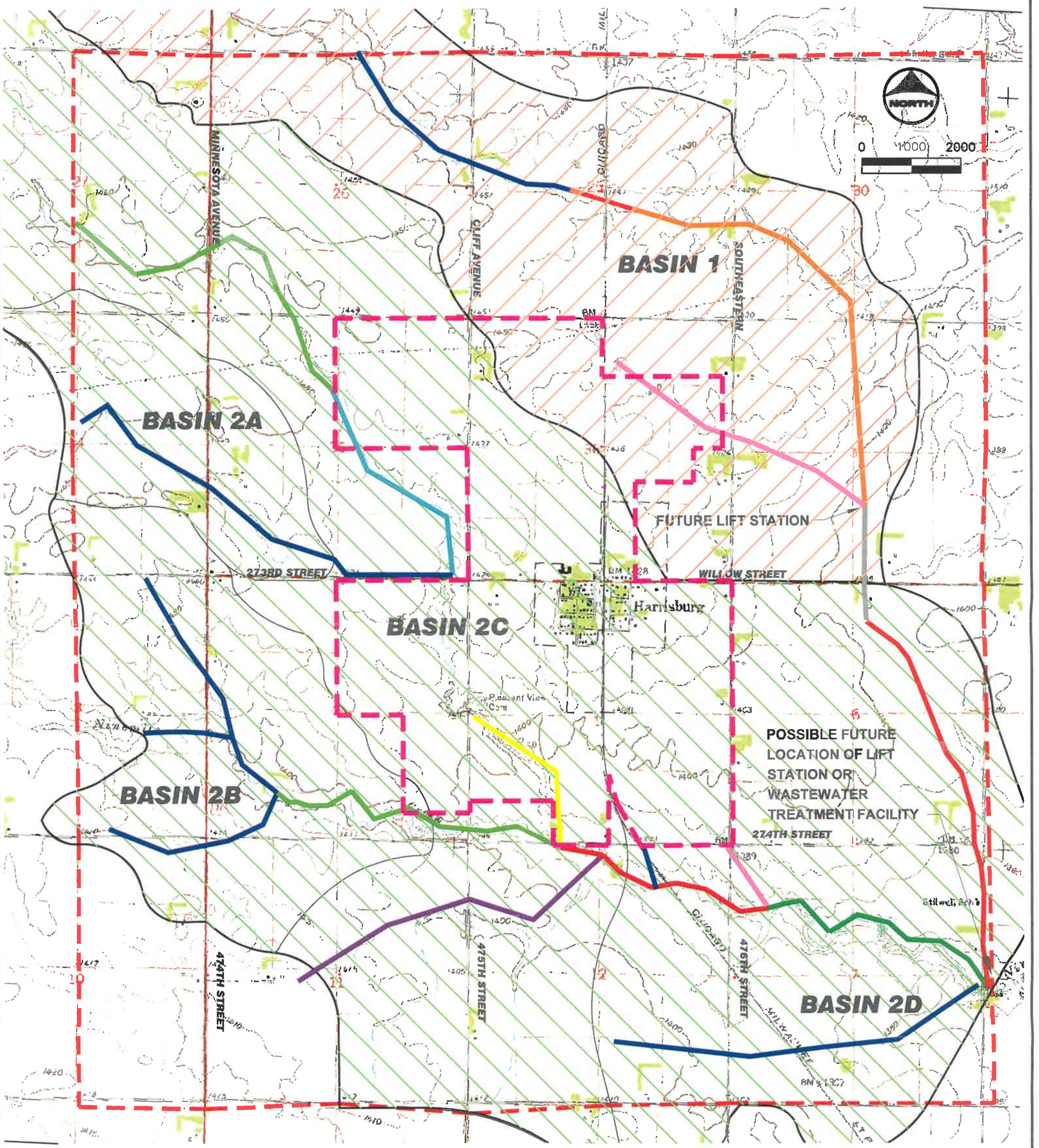
0 600

Howard R. Green Company

EXHIBIT C-1

CITY OF HARRISBURG

SANITARY SEWER COLLECTION SYSTEM MASTER PLAN
2025 FUTURE LAND USE



MAP LEGEND

- EXISTING CITY LIMITS
- 2025 FUTURE LAND USE BOUNDARY
- SANITARY SEWER BASIN BOUNDARY
- SANITARY SEWER SUB-BASIN BOUNDARY
- BASIN 1 AREA
- BASIN 2 AREA

PROPOSED SANITARY SEWER LEGEND

- 12" SANITARY SEWER
- 15" SANITARY SEWER
- 18" SANITARY SEWER
- 21" SANITARY SEWER
- 30" SANITARY SEWER
- 33" SANITARY SEWER
- 36" SANITARY SEWER
- 42" SANITARY SEWER
- 48" SANITARY SEWER
- FORCE MAIN

Howard R. Green Company

EXHIBIT C-2

TABLE C-1: 2000 Wastewater Lagoon Reports

Year 2000					Depth of Cell (ft-in)				
Date	Time	Flow (gpd)	Temp. (F)	Wind	1	2	3	Condition	Weather
January 18, 2000	3:12 PM	46,500	N/A	N/A	N/A	N/A	N/A	N/A	N/A
January 25, 2000	3:11 PM	40,600	N/A	N/A	N/A	N/A	N/A	N/A	N/A
February 1, 2000	2:30 PM	39,800	N/A	N/A	N/A	N/A	N/A	N/A	N/A
February 8, 2000	1:15 PM	77,500	40	N/A	2'	0	0	N/A	N/A
February 11, 2000	4:35 PM	46,500	20	calm	2'	0	0	OK	no precip in last 3 days
February 15, 2000	1:37 PM	36,500	35	NW 20	2'-2"	0	0	OK	normal temps
February 22, 2000	2:00 PM	44,000	50	S 10	2'-2"	0	0	OK-little odor	above normal temps-little snow left
February 29, 2000	2:00 PM	40,500	50	N 18	2'-6"	0	0	OK-ice almost gone	0.75" rain, above normal temps
March 7, 2000	1:25 PM	51,800	73	S 12	2'-8"	0	0	OK-open water	warm, no precipitation
March 14, 2000	1:55 PM	48,000	52	SW 10	2'-8"	0	0	OK	2" snow, above avg. temps
March 21, 2000	1:35 PM	46,900	46	W 5	2'-8"	0	0	OK a little green	cloudy & foggy, no precip
March 28, 2000	4:25 PM	40,600	52	E 8	2'-9"	0	0	OK	Above normal temps, no precip
April 4, 2000	4:10 PM	50,600	53	W 13	2'-9"	0	0	good	Above normal temps, no precip
April 11, 2000	1:15 PM	49,400	40	N 15	2'-9"	0	0	OK	4" snow, cool & windy
April 18, 2000	2:30 PM	47,000	64	N 17	2'-9"	0	0	good	1/2" rain, cool & windy
April 25, 2000	3:35 PM	46,500	66	S 23	2'-3"	6"	0	OK	no precipitation
May 2, 2000	1:17 PM	48,000	77	S 25	2'	1'	0	a little smell	no precipitation
May 11, 2000	3:15 PM	54,730	65	NW 18	2'-1"	1'	0	OK	1 1/2" rain
May 16, 2000	3:00 PM	48,000	65	E 13	2'-1"	9"	0	good	0.6" rain & hail
May 24, 2000	1:50 PM	47,600	70	W 10	2'-4"	11"	0	good	2.6" rain
May 31, 2000	3:00 PM	44,000	66	E 20	2'-6"	8"	0	add water to cell #2	3/4" rain
June 7, 2000	2:20 PM	46,700	81	S 9	2'	1'	0	good	windy & warmer
June 13, 2000	3:30 PM	50,630	68	SE 10	1'-8"	8"	0	little red	stormy
June 20, 2000	10:40 AM	56,160	65	W 18	1'-8"	6"	0	mowed top of berm	no precipitation
June 27, 2000	4:38 PM	32,000	68	calm	1'-9"	6"	0	good	2" rain, mild
July 3, 2000	4:00 PM	72,600	78	E 17	1'-8"	6"	0	rock getting weedy	warm & humid
July 11, 2000	10:40 AM	48,500	70	E 20	1'-8"	3"	0	OK	no precip, warm & humid
July 18, 2000	3:30 PM	67,000	62	E 14	1'-9"	0	0	sprayed rock	1.2", 7", 0.2", 7/8" rain, cool
July 25, 2000	2:18 PM	57,250	78	SW 6	1'-6"	0	0	OK	0.3 rain, cool & seasonal
August 1, 2000	2:15 PM	48,840	86	NW 11	1'-6"	0	0	very low	no precipitation
August 8, 2000	2:50 PM	52,330	81	N 8	1'-10"	0	0	added water	3" rain
August 22, 2000	1:40 PM	56,500	69	N 11	1'-10"	0	0	OK	0.3" in last week
September 5, 2000	2:22 PM	55,600	74	SE 20	1'-10"	0	0	OK	2" rain
September 12, 2000	11:30 AM	53,500	66	SSW 12	1'-10"	0	0	OK	no precipitation
September 19, 2000	2:15 PM	46,900	63	NW 13	1'-7"	0	0	low	no precipitation
September 25, 2000	1:30 PM	54,200	67	SW 8	1'-6"	0	0	OK	1/2" rain, cool & windy
October 3, 2000	1:45 PM	80,500	50	E 8	1'-8"	0	0	OK	1/2" rain
October 10, 2000	5:08 PM	93,760	63	S 15	1'-8"	0	0	OK	cold
October 17, 2000	3:40 PM	42,840	67	SW 8	1'-4"	0	0	OK	0.25 rain
October 24, 2000	3:52 PM	48,300	64	SE 9	1'-8"	0	0	OK	0.25 rain
October 31, 2000	1:50 PM	64,770	65	S 15	1'-10"	0	0	OK	0.75 rain
November 8, 2000	1:50 PM	42,000	24	W 20	1'-11"	0	0	50% freeze over	
November 14, 2000	1:45 PM	48,600	16	W 10	1'-11"	0	0	Froze over	
November 22, 2000	1:30 PM	35,000	18	E 8	1'-11"	0	0	froze over	cold, below normal
November 28, 2000	2:30 PM	43,600	36	W 26	1'11"	0	0	mostly ice now	
December 5, 2000	3:00 PM	41,000	7	SE 8	1'-11"	0	0	iced over	cold & windy
December 13, 2000	4:10 PM	41,540	5	S 5	2'	0	0	OK	record cold, 2'-9" snow
December 19, 2000	1:08 PM	53,000	0	NW 10	2'	0	0	OK	cold & windy
December 26, 2000	1:49 PM	70,750	15	NW 10	2'	0	0	OK	cold & windy, 1" snow

Average Daily Flow: **51,008** **gal/day**
2003 Population **991**
Average Daily Flow: **51.47** **gal/person/day**

TABLE C-2: 2001 Wastewater Lagoon Reports

Year 2001					Depth of Cell (ft-in)				
Date	Time	Flow (gpd)	Temp. (F)	Wind	1	2	3	Condition	Weather
January 2, 2001	4:40 PM	55,400	12	W 10	2'	0	0	OK, iced over	cold & windy
January 12, 2001	10:05 AM	55,600	15	S 5	2'-2"	0	0	OK, iced over	foggy, some snow melt
January 16, 2001	4:30 PM	43,700	21	W 8	2'-2"	0	0	OK, iced over	6" snow
January 23, 2001	2:30 PM	44,600	25	W 8	2'-4"	0	0	OK	normal temps
February 15, 2001	3:14 PM	44,380	18	S 10	2'-4"	0	0	OK	lots of snow, wind & cold
February 20, 2001	3:40 PM	79,160	14	NW 21	2'-6"	0	0	OK	windy & cold
February 28, 2001	4:00 PM	39,500	21	SW 10	2'-6"	0	0	OK	5" snow, below normal cold
March 6, 2001	1:10 PM	123,500	24	SSW 6	2'-10"	0	0	OK	melting weather
March 13, 2001	3:45 PM	53,000	36	W 13	2'-10"	0	0	OK	4" snow
March 20, 2001	2:30 PM	80,180	47	Var 3	3'-2"	0	0	open at outflow	melting snow
March 27, 2001	4:00 PM	54,060	32	S 10	3'-6"	0	0	OK	cold, no precipitation
April 3, 2001	4:20 PM	90,600	44	E 15	3'-10"	0	0	little odor	no precipitation
April 10, 2001	2:50 PM	70,200	57	NE 12	4'	0	0	all ice turned over	little rain
April 18, 2001	4:11 PM	59,500	66	S 22	4'-2"	0	0	some smell	1 1/2" rain, variable temps
April 24, 2001	10:15 AM	165,100	45	SW 10	4'-6"	0	0	discharge to #2 cell	3 1/2" rain, 2" snow
May 1, 2001	1:45 PM	90,200	79	W 25	4'-6"	6"	0	discharge to #2 cell	0.1" rain, windy
May 8, 2001	2:10 PM	82,000	70	W 10	2'6"	2'-8"	O	stop discharge to #2	1 1/4" rain, cool
May 15, 2001	4:50 PM	62,570	90	SW 20	2'-4"	2'-6"	0	smell good	windy & warmer
May 22, 2001	3:00 PM	39,503	56	NW 20	2'-4"	2'-6"	0	no smell	0.1" rain
May 30, 2001	2:24 PM	78,100	66	E 14	2'-2"	2'	0	#2 little milky	no precipitation
June 6, 2001	3:15 PM	44,030			2'-2"	2'	0	good	0.5" rain
June 12, 2001	4:05 PM	53,000	67	SE 10	2'-2"	2'	0	a little smell	1/2" rain
June 19, 2001	3:35 PM	57,900	71	NW 6	2'-8"	1'-8"	0	Cell #1 up a little	1 1/2" rain
June 26, 2001	4:07 PM	39,800	81	E 12	2'-6"	1'-6"	0	OK	0.2" rain
July 3, 2001	3:20 PM	31,500	86	N 6	2'-6"	1'-6"	0	OK	0.85" rain
July 10, 2001	1:51 PM	41,050	85	N 4	2'-7"	1'-4"	0	a little green	0.25" rain, hot & muggy
July 17, 2001	3:55 PM	48,700	87	SE 9	2'-6"	1'	0	OK	hot & muggy
July 24, 2001	1:32 PM	38,900	69	NE 16	3'	1'-6"	0	OK	2' rain
July 31, 2001	2:15 PM	81,000	92	S 26	2'-6"	2'	0	very green	0.2" rain, hot & humid
August 7, 2001	2:00 PM	39,900	92	SE 10	2'-4"	1'-8"	0	green	hot & muggy
August 14, 2001	3:32 PM	33,000	69	SE 12	2'-4"	1'-6"	0	green	no precipitation
August 21, 2001	4:35 PM	48,500	77	S 9	2'	1'	0	green	no precipitation
September 4, 2001	5:00 PM	31,200	86	S 17	2'	10"	0	green	0.5" rain, hot & dry
September 11, 2001	5:00 PM	58,490	85	S 15	2'	10"	0	OK	0.6" rain, warm & dry
September 12, 2001	10:00 AM	76,210	53	calm	2'-6"	10"	0	green	2" rain
September 25, 2001	2:45 PM	46,910	62	SE 12	2'-6"	8"	0	OK	first frost
October 2, 2001	10:44 AM	49,330	60	E 14	2'-8"	6"	0	OK	no precipitation
October 9, 2001	4:25 PM	54,440	61	SE 14	2'	1'	0	OK	no precipitation
October 16, 2001	2:45 PM	59,690	48	N 9	1'-8"	1"	0	OK	below normal temps
October 23, 2001	4:50 PM	45,500	63	S 10	1'-8"	8"	0	OK	no precipitation
October 30, 2001	2:45 PM	58,200	58	SE 13	1'-10"	8"	0	OK	no precipitation
November 6, 2001	1:34 PM	50,600	67	NE 12	1'-10"	7"	0	OK	no precipitation
November 13, 2001	1:55 PM	47,100	64	S 13	1'-10"	7"	0	OK	no precipitation
December 4, 2001	1:46 PM	77,000	fog, 34	NE 6	2'	1'	0	almost froze over	3" rain, 1" snow
December 11, 2001	10:15 AM	119,100	25	SE 15	2'-8"	8"	0	opened up a little	no precipitation
December 18, 2001	1:44 PM	127,300	33	N 5	2'-6"	8"	0	a little open	most snow gone
December 26, 2001	1:40 PM	110,100	17	N 7	2'-6"	8"	0	iced over	no snow, below normal temp

Average Daily Flow: **63,389** **gal/day**
2003 Population **1,034**
Average Daily Flow: **61.31** **gal/person/day**

TABLE C-3: 2003 Wastewater Lagoon Reports

Year 2003					Depth of Cell (ft-in)				
Date	Time	Flow (gpd)	Temp. (F)	Wind	1	2	3	Condition	Weather
January 7, 2003	2:50 PM	80,160	53	NW 20	2'-4"	0	0	breaking up	no snow on ground
January 14, 2003	4:20 PM	140,000	17	WNW 16	2'-4"	0	0	iced up	no precipitation
January 21, 2003	3:31 PM	29,600	9	W 8	2'-4"	0	0	iced up	1/2" snow, cold
January 28, 2003	4:33 PM	65,200	33	calm	2'-4"	0	0	iced up	1/2" snow, rain
February 4, 2003	2:20 PM	54,400	17	NW 10	2'-8	0	0	iced up	little precipitation
February 11, 2003	3:45 PM	39,100	25	NW 40+	2'-8"	2"	0	open in middle	cold, no precipitation
February 18, 2003	3:45 PM	47,300	35	NW 20	2'-8"	2"	0	OK	6" snow
February 25, 2003	3:36 PM	24,200	20	S 15	2'-8"	2"	0	OK	1" snow, cold
March 4, 2003	4:15 PM	58,400	10	N 5	2'8"	1"	0	OK	5" snow, variable temps
March 12, 2003	3:05 PM	63,300	31	N 15	2'-8"	1'	0	OK	cold, 4" snow
March 18, 2003	3:17 PM	70,200	56	ENE 18	2'-10"	6"	0	stinks, ice turning over	all snow gone
March 25, 2003	2:20 PM	74,500	60	SW 20	2'-10"	6"	0	smelly & turning over	no precipitation
April 3, 2003	4:25 PM	73,700	38	N 10	2'-10"	6"	0	milky, no wind action	no precipitation
April 9, 2003	3:30 PM	68,500	48	S 23	2'-10"	6"	0	some wind action	9" snow
April 22, 2003	3:50 PM	87,300	62	E 10	3'-2"	6"	0	start overflowing to #2	2.0" rain, normal temps
April 30, 2003	1:00 PM	86,600	52	NE 16	1'-8"	1'-4"	0	continue to dump to #2	0.8" rain, cold, damp & windy
May 14, 2003	4:19 PM	70,430	59	NW 18	1'-10"	1'-8"	0	stopped dumping into #2	1.8" rain, cold, damp & windy
May 29, 2003	1:50 PM	41,490	78	S 9	1'-10"	1'-8"	0	little floating red things	dry, normal temps
June 10, 2003	3:36 PM	34,240	64	N 15	2'	1'-8"	0	OK	1" rain, below normal temps
June 17, 2003	5:10 PM	41,300	84	N 6	1'-10"	1'-4"	0	OK	hot & dry
June 24, 2003	3:05 PM	47,900	88	W 18	1'-10"	1"	0	lots of ducks	1.2" rain, warm & muggy
July 1, 2003	3:17 PM	72,600	85	S 20	2'	1'	0	OK	1.5" rain
July 8, 2003	5:32 PM	69,000	75	SE 10	2'-2"	1'	0	OK	1 1/2" rain, stormy
July 15, 2003	3:00 PM	29,900	84	NW 16	2'-3"	1'	0	OK, mowed dikes	no rain, humid
July 29, 2003	3:20 PM	68,600	84	S 18	2'	1'	0	green	hot & dry
August 12, 2003	3:50 PM	37,400	82	S 10	2'	1'	0	green	hot & dry
August 19, 2003	4:11 PM	73,900	84	S 20	2'	1'	0	green	hot & dry
August 26, 2003	3:15 PM	94,000	91	NE 12	2'	6"	0	green, stinky	hot & dry
September 2, 2003	5:15 PM	77,700	88	SW 10	2'	0	0	green	no precipitation
September 9, 2003	10:40 PM	98,000	62	S 15	2'	0	0	green, good waves	some rain
September 16, 2003	4:10 PM	129,000	83	S 25	2'-2"	6"	0	good	3 1/2" rain, cool
September 23, 2003	3:30 PM	114,000	73	S 10	2'-3"	0	0	good	0.75" rain, cool
October 7, 2003	2:25 PM	no elec.	80	S 18	2'-3"	0	0	good	dry, above normal temps
October 14, 2003	3:18 PM	190,000	-	NW 9	2'-4"	0	0	OK	4" rain, normal temps
November 11, 2003	1:36 PM	143,100	56	calm	2'-4"	0	0	OK	little precipitation, cold
November 18, 2003	3:20 PM	122,000	52	NW 25	2'-5"	0	0	OK, lots of geese	no precipitation
December 2, 2003	4:40 PM	51,500	37	SE 17	2'-8"	0	0	almost froze over	6" snow
December 23, 2003	1:55 PM	103,700	28	WNW 10	3'	0	0	froze over	12" snow but thawing temps
December 30, 2003	2:42 PM	49,030	35	S 12	3'	0	0	froze over, one open spot	above normal temps

Average Daily Flow: **72,340** **gal/day**
2003 Population **1,487**
Average Daily Flow: **48.65** **gal/person/day**

TABLE C-4: Capacity of Existing Wastewater Lagoons

Design Basis for Existing Harrisburg Wastewater Lagoons

Design Population	pop.	1,670
Design Year		2,017
Average Daily Flow	gpd	125,250
Average Daily	gpcd	75
Average Daily	gpm	87
Peak Design	gpm	225

Size of Existing Harrisburg Wastewater Lagoons

		Primary	Secondary	Tertiary
Water Surface Area	ac	10.2	10.2	19.6
Water Surface Area	sq ft	444,748	443,441	853,776
Water Volume	gal	6,598,000	9,594,000	36,831,000
Water Surface Elev	ft	1,398	1,398	1,398
Bottom Elev	ft	1,393	1,392	1,390
Depth	ft	5	6	8

Other Assumptions:

Annual Rainfall (in)	24.62
Annual Evaporation (in)	39
Seepage (in per day)	0.06
Seepage (in per year)	22.81
Net Loss (in)	-37.19
Net Loss (ft)	-3.10

TABLE C-4: Capacity of Existing Wastewater Lagoons

WASTEWATER LAGOON CAPACITY CALCULATIONS

Flow =	0.12525	MGD
Influent BOD =	200	mg/l
Bottom Storage =	0	ft
Seepage =	1/16	in/day
Desired Detention Time =	270	days
Actual Tot. Vol. Corrected for Seepage=	13,529,658	ft^3
Actual Detention Time =	808.0	days
Total BOD Loading =	5.2	lb BOD/acre-day

	Units	Primary Pond	Secondary Pond	Tertiary Pond	TOTAL
Actual Depth	ft	5	6	8	
Usable Depth	ft	5	6	8	
Slope	ft/ft	3	3	3	
L to W Ratio	ft/ft				
Top Length	ft	1,072	1,068	1,200	
Top Width	ft	415	415	711	
Top Area	ft^2	444,880	443,220	853,200	
Middle Length	ft	1,057	1,050	1,176	
Middle Width	ft	400	397	687	
Middle Area	ft^2	422,800	416,850	807,912	
Bottom Length	ft	1,042	1,032	1,152	
Bottom Width	ft	385	379	663	
Bottom Area	ft^2	401,170	391,128	763,776	
Volume	acre-ft^2	49	57	148	
Volume	ft^3	2,114,375	2,501,748	6,464,832	11,080,955
Vol. Corr. For Seepage	ft^3	2,739,988	3,125,026	7,664,645	13,529,658
BOD Loading	lb BOD/acre-day	20.5			
% of Tot. Pond Area	%	25.5	25.5	49.0	

TABLE C-4: Capacity of Existing Wastewater Lagoons

Time to Fill Ponds Based on 75 gpcd

Flow to Pond (cu. ft. per year)	Year	Population	Evaporation (Based on Middle Area) (cu. ft. per year)	Volume Used (cu. ft. per year)	Volume Remaining (cu. ft. per year)
	2004			1,618,844	11,910,814
7,601,320	2005	2,077	-5,106,412	2,494,908	9,415,906
8,361,452	2006	2,285	-5,106,412	3,255,040	6,160,867
9,197,597	2007	2,513	-5,106,412	4,091,185	2,069,682
10,117,357	2008	2,764	-5,106,412	5,010,945	-2,941,263
11,129,093	2009	3,041	-5,106,412	6,022,680	-8,963,943
12,242,002	2010	3,345	-5,106,412	7,135,590	-16,099,533
13,466,202	2011	3,680	-5,106,412	8,359,790	-24,459,323
14,812,823	2012	4,047	-5,106,412	9,706,410	-34,165,733
16,294,105	2013	4,452	-5,106,412	11,187,692	-45,353,426
17,923,515	2014	4,897	-5,106,412	12,817,103	-58,170,528
19,715,867	2015	5,387	-5,106,412	14,609,454	-72,779,983
21,687,454	2016	5,926	-5,106,412	16,581,041	-89,361,024
23,856,199	2017	6,519	-5,106,412	18,749,787	-108,110,811
26,241,819	2018	7,170	-5,106,412	21,135,406	-129,246,217
28,866,001	2019	7,887	-5,106,412	23,759,588	-153,005,805
31,752,601	2020	8,676	-5,106,412	26,646,188	-179,651,994
34,927,861	2021	9,544	-5,106,412	29,821,448	-209,473,442
38,420,647	2022	10,498	-5,106,412	33,314,235	-242,787,677
42,262,712	2023	11,548	-5,106,412	37,156,299	-279,943,976
46,488,983	2024	12,703	-5,106,412	41,382,570	-321,326,546

TABLE C-4: Capacity of Existing Wastewater Lagoons

Time to Fill Ponds Based on 54 gpcd

Flow to Pond (cu. ft. per year)	Year	Population	Evaporation (Based on Middle Area) (cu. ft. per year)	Volume Used (cu. ft. per year)	Volume Remaining (cu. ft. per year)
	2004			1,618,844	11,910,814
5,472,951	2005	2,077	-5,106,412	366,538	11,910,814
6,020,246	2006	2,285	-5,106,412	913,833	10,996,981
6,622,270	2007	2,513	-5,106,412	1,515,858	9,481,123
7,284,497	2008	2,764	-5,106,412	2,178,085	7,303,039
8,012,947	2009	3,041	-5,106,412	2,906,534	4,396,504
8,814,242	2010	3,345	-5,106,412	3,707,829	688,675
9,695,666	2011	3,680	-5,106,412	4,589,253	-3,900,578
10,665,232	2012	4,047	-5,106,412	5,558,820	-9,459,398
11,731,756	2013	4,452	-5,106,412	6,625,343	-16,084,741
12,904,931	2014	4,897	-5,106,412	7,798,519	-23,883,260
14,195,424	2015	5,387	-5,106,412	9,089,012	-32,972,271
15,614,967	2016	5,926	-5,106,412	10,508,554	-43,480,825
17,176,463	2017	6,519	-5,106,412	12,070,051	-55,550,876
18,894,110	2018	7,170	-5,106,412	13,787,697	-69,338,573
20,783,521	2019	7,887	-5,106,412	15,677,108	-85,015,681
22,861,873	2020	8,676	-5,106,412	17,755,460	-102,771,142
25,148,060	2021	9,544	-5,106,412	20,041,647	-122,812,789
27,662,866	2022	10,498	-5,106,412	22,556,453	-145,369,242
30,429,152	2023	11,548	-5,106,412	25,322,740	-170,691,982
33,472,068	2024	12,703	-5,106,412	28,365,655	-199,057,637

APPENDIX D

Table D-1: City of Harrisburg Projected Sanitary Sewer Flows

Year	Expected Population	Peaking Factor*	Average Day Dry Weather Flow** (gpd)	Peak Hour Dry Weather Flow (gpd)	Average Day Wet Weather Flow*** (gpd)	Maximum Day Wet Weather Flow**** (gpd)	Peak Hour Wet Weather Flow (gpd)
2007	3,758	3.4	281,854	946,315	375,805	751,610	1,261,754
2008	4,209	3.3	315,676	1,045,974	420,901	841,803	1,394,632
2009	4,714	3.3	353,557	1,155,638	471,410	942,819	1,540,851
2010	5,280	3.2	395,984	1,276,259	527,979	1,055,957	1,701,678
2011	5,808	3.2	435,582	1,386,943	580,777	1,161,553	1,849,257
2012	6,389	3.1	479,141	1,506,779	638,854	1,277,708	2,009,039
2013	7,027	3.1	527,055	1,636,490	702,740	1,405,479	2,181,986
2014	7,730	3.1	579,760	1,776,850	773,014	1,546,027	2,369,133
2015	8,503	3.0	637,736	1,928,697	850,315	1,700,630	2,571,596
2016	9,353	3.0	701,510	2,092,932	935,346	1,870,693	2,790,576
2017	10,102	3.0	757,631	2,235,250	1,010,174	2,020,348	2,980,333
2018	10,910	2.9	818,241	2,386,824	1,090,988	2,181,976	3,182,431
2019	11,783	2.9	883,700	2,548,235	1,178,267	2,356,534	3,397,647
2020	12,725	2.9	954,396	2,720,103	1,272,529	2,545,057	3,626,805
2021	13,743	2.8	1,030,748	2,903,086	1,374,331	2,748,662	3,870,781
2022	14,568	2.8	1,092,593	3,049,444	1,456,791	2,913,581	4,065,926
2023	15,442	2.8	1,158,149	3,202,895	1,544,198	3,088,396	4,270,527
2024	16,368	2.7	1,227,637	3,363,774	1,636,850	3,273,700	4,485,031
2025	17,351	2.7	1,301,296	3,532,433	1,735,061	3,470,122	4,709,910
2026	18,392	2.7	1,379,373	3,709,242	1,839,165	3,678,329	4,945,656
2027	19,495	2.7	1,462,136	3,894,590	1,949,515	3,899,029	5,192,786
2028	20,665	2.6	1,549,864	4,088,882	2,066,485	4,132,971	5,451,843
2029	21,905	2.6	1,642,856	4,292,547	2,190,474	4,380,949	5,723,396
2030	23,219	2.6	1,741,427	4,506,032	2,321,903	4,643,806	6,008,043
2031	24,612	2.6	1,845,913	4,729,809	2,461,217	4,922,434	6,306,412

*Peaking factor based on Ten States Standards (18+SQRT(P))/(4+SQRT(P)), where P is population in thousands.
**Assumes 75 gal/person/day
***Assumes 100 gal/person/day
****Assumes a peaking factor of 2.0 times Average Day Wet Weather Flows

APPENDIX E

TABLE E-1: Capacity of Future Wastewater Lagoons

Design Basis for Existing Harrisburg Wastewater Lagoons

Design Population	pop.	24,520
Design Year		2,031
Average Daily Flow	gpd	1,838,981
Average Daily	gpcd	75
Average Daily	gpm	1,277
Peak Design	gpm	4,366

Other Assumptions:

Annual Rainfall (in)	24.62
Annual Evaporation (in)	39
Seepage (in per day)	0.06
Seepage (in per year)	22.81
Net Loss (in)	-37.19
Net Loss (ft)	-3.10

WASTEWATER LAGOON CAPACITY CALCULATIONS

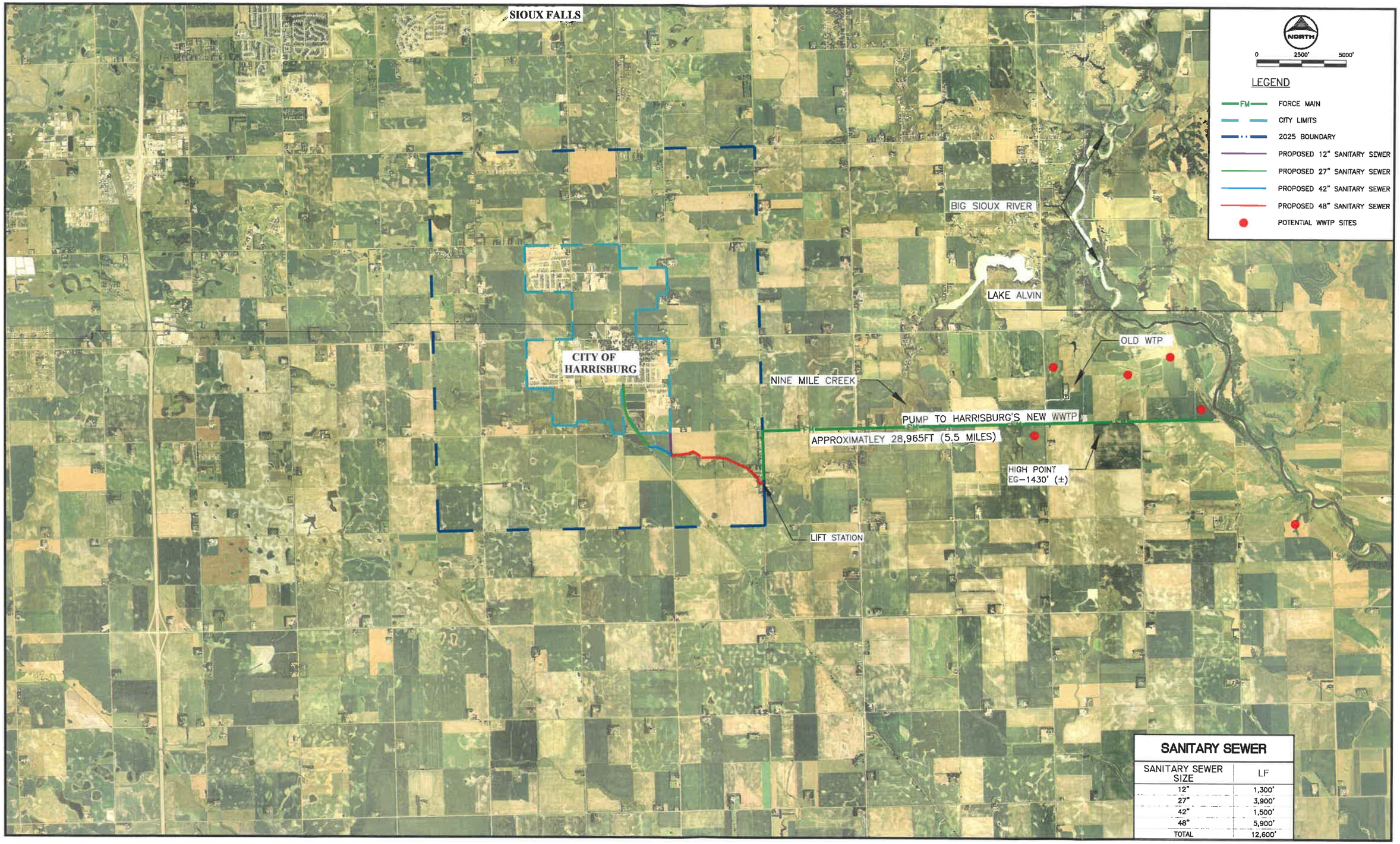
Flow =	1.84	MGD
Influent BOD =	210	mg/l
Bottom Storage =	0	ft
Seepage =	1/16	in/day
Desired Detention Time =	365	days
Actual Tot. Vol. =	112,923,136	ft^3
Actual Detention Time =	365	days
Total BOD Loading =	7.1	lb BOD/acre-day

	Units	Primary Pond	Secondary Pond	Tertiary Pond	TOTAL
Actual Depth	ft	5	6	8	
Usable Depth	ft	5	6	8	
Slope	ft/ft	3	3	3	
L to W Ratio	ft/ft				
Top Length	ft	4,160	2,496	2,496	
Top Width	ft	2,746	1,647	1,647	
Top Area	ft^2	11,421,696	4,111,811	4,111,811	
Middle Length	ft	4,145	2,478	2,472	
Middle Width	ft	2,731	1,629	1,623	
Middle Area	ft^2	11,318,337	4,037,554	4,012,946	
Bottom Length	ft	4,130	2,460	2,448	
Bottom Width	ft	2,716	1,611	1,599	
Bottom Area	ft^2	11,215,428	3,963,946	3,915,233	
Volume	acre-ft^2	1,299	556	737	
Volume	ft^3	56,592,060	24,225,972	32,105,103	112,923,136
BOD Loading	lb BOD/acre-day	12			
% of Tot. Pond Area	%	58	21	21	

TABLE E-1: Capacity of Future Wastewater Lagoons

Time to Fill Ponds Based on 75 gpcd

Flow to Pond (ft^3/year)	Year	Population	Evaporation (Based on Middle Area) (ft^3/year)	Volume Used (ft^3/year)	Totalized Volume Used (ft^3/year)
19,250,190	2010	5,260	-60,031,289	-40,781,099	
21,175,209	2011	5,786	-60,031,289	-38,856,080	
23,292,730	2012	6,365	-60,031,289	-36,738,560	
25,622,003	2013	7,001	-60,031,289	-34,409,287	
28,184,203	2014	7,701	-60,031,289	-31,847,086	
31,002,623	2015	8,471	-60,031,289	-29,028,666	
34,102,885	2016	9,318	-60,031,289	-25,928,404	
36,831,116	2017	10,064	-60,031,289	-23,200,173	
39,777,605	2018	10,869	-60,031,289	-20,253,684	
42,959,814	2019	11,738	-60,031,289	-17,071,475	
46,396,599	2020	12,677	-60,031,289	-13,634,690	
50,108,327	2021	13,692	-60,031,289	-9,922,962	
53,114,827	2022	14,513	-60,031,289	-6,916,463	
56,301,716	2023	15,384	-60,031,289	-3,729,573	
59,679,819	2024	16,307	-60,031,289	-351,470	
63,260,608	2025	17,285	-60,031,289	3,229,319	3,229,319
67,056,245	2026	18,323	-60,031,289	7,024,956	10,254,275
71,079,619	2027	19,422	-60,031,289	11,048,330	21,302,605
75,344,397	2028	20,587	-60,031,289	15,313,107	36,615,712
79,865,060	2029	21,822	-60,031,289	19,833,771	56,449,484
84,656,964	2030	23,132	-60,031,289	24,625,675	81,075,159
89,736,382	2031	24,520	-60,031,289	29,705,093	110,780,251



SANITARY SEWER

SANITARY SEWER SIZE	LF
12"	1,300'
27"	3,900'
42"	1,500'
48"	5,900'
TOTAL	12,600'

Xrefs: LINCOLN COUNTY 2006 AERIAL.DWG MINNEHAHA COUNTY 2006 AERIAL.DWG

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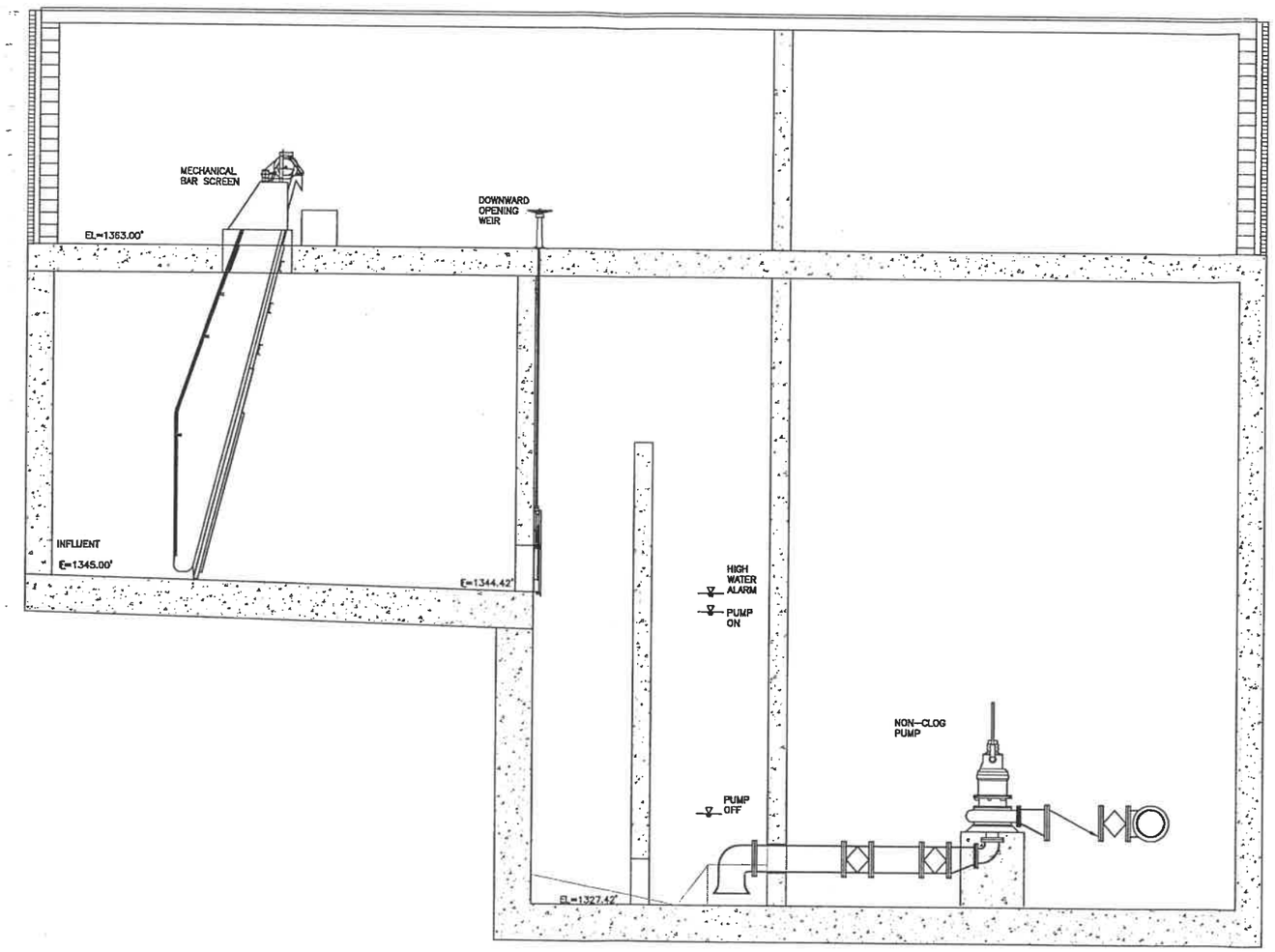
Howard R. Green Company

WASTEWATER TREATMENT PLAN FACILITY PLAN
CITY OF HARRISBURG
HARRISBURG, SOUTH DAKOTA

EXHIBIT
PUMP WW TO HARRISBURG WWTP

SHEET NO.
E-1



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Howard R. Green Company

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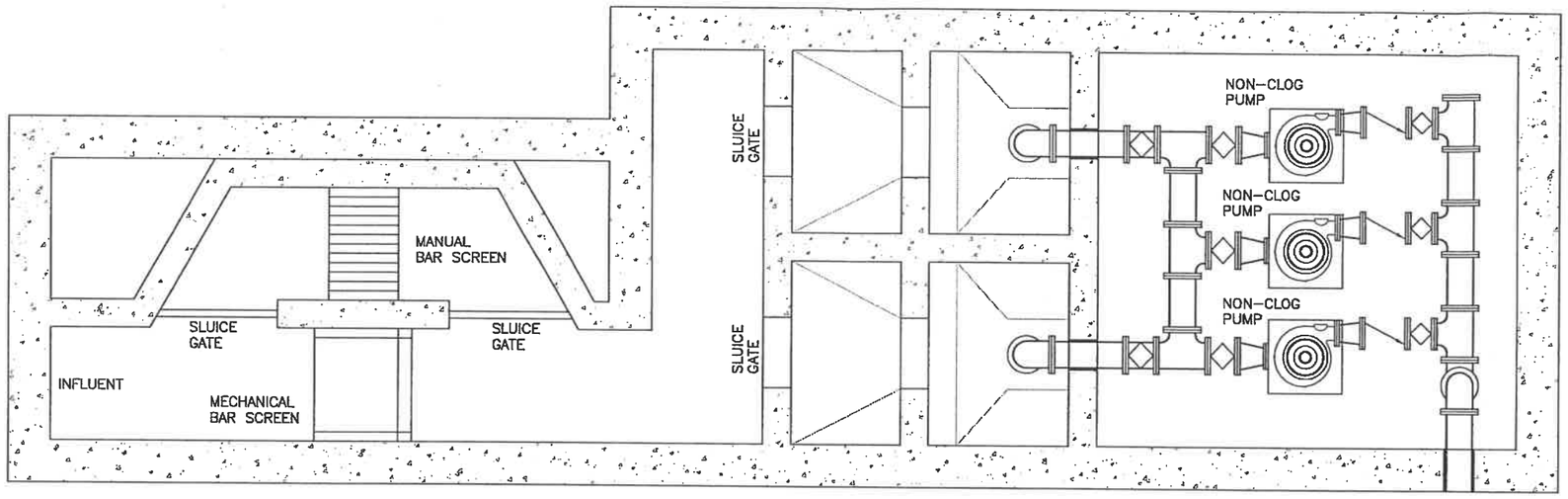
CITY OF HARRISBURG
HARRISBURG, SOUTH DAKOTA



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Howard R. Green Company

WASTEWATER TREATMENT PLANT FACILITY PLAN
CITY OF HARRISBURG
HARRISBURG, SOUTH DAKOTA

PROCESS
LIFT STATION EXHIBIT
PLAN VIEW WETWELL/DRYWELL

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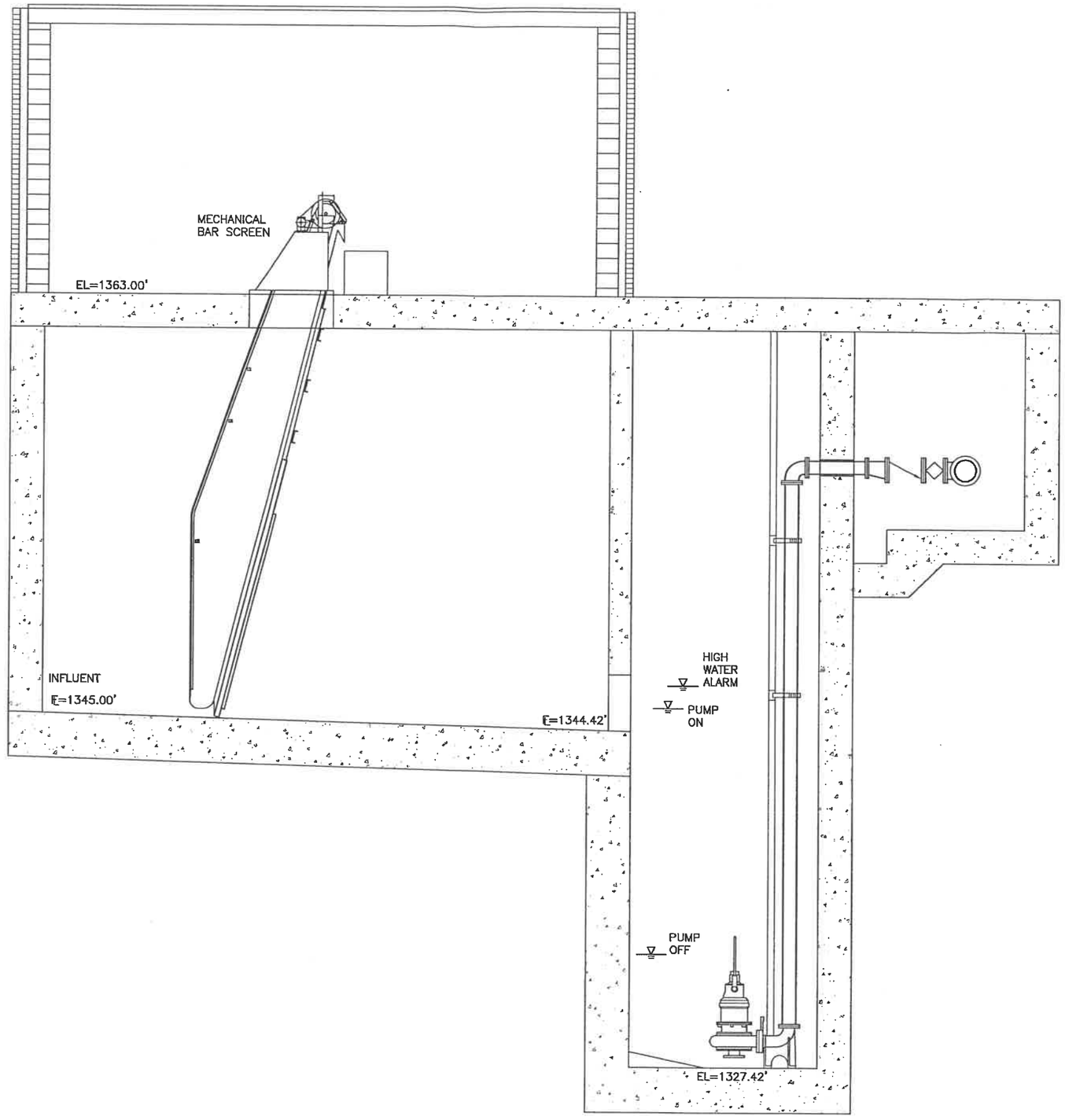
E-3



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Howard R. Green Company

WASTEWATER TREATMENT PLANT FACILITY PLAN
CITY OF HARRISBURG
HARRISBURG, SOUTH DAKOTA

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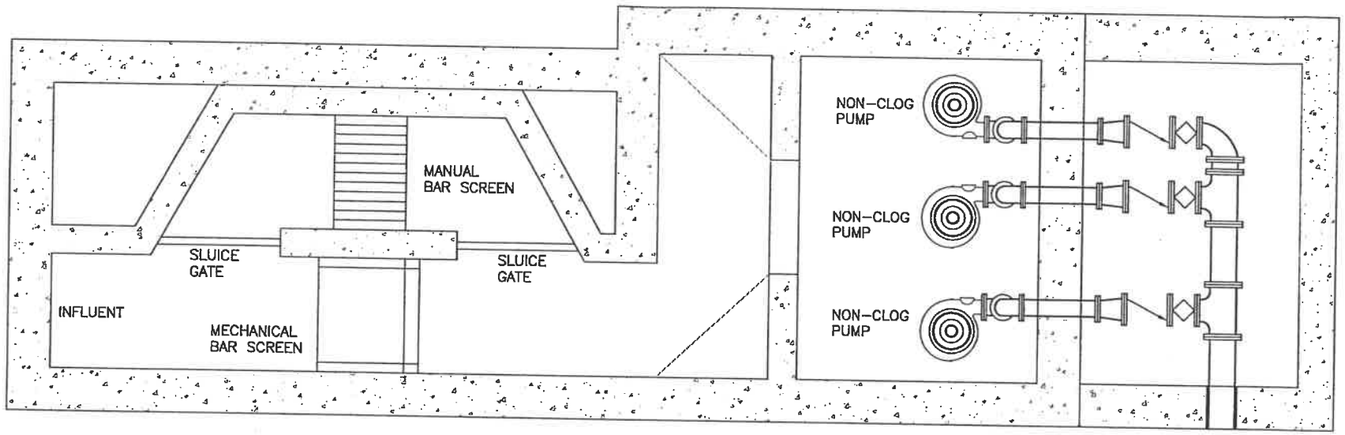

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Howard R. Green Company

WASTEWATER TREATMENT PLANT FACILITY PLAN
CITY OF HARRISBURG
HARRISBURG, SOUTH DAKOTA

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PLAN VIEW SUBMERSIBLE DESIGN

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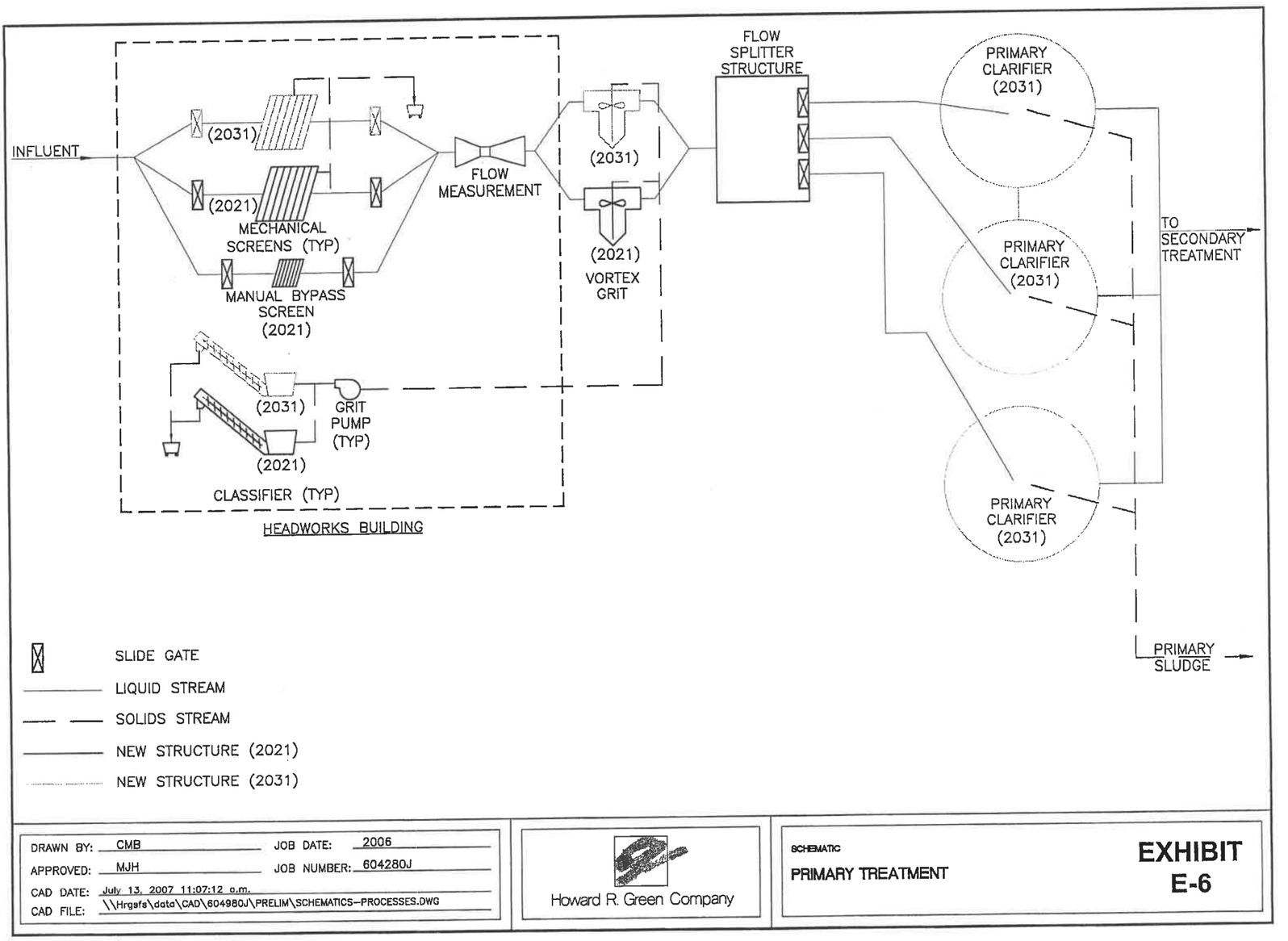

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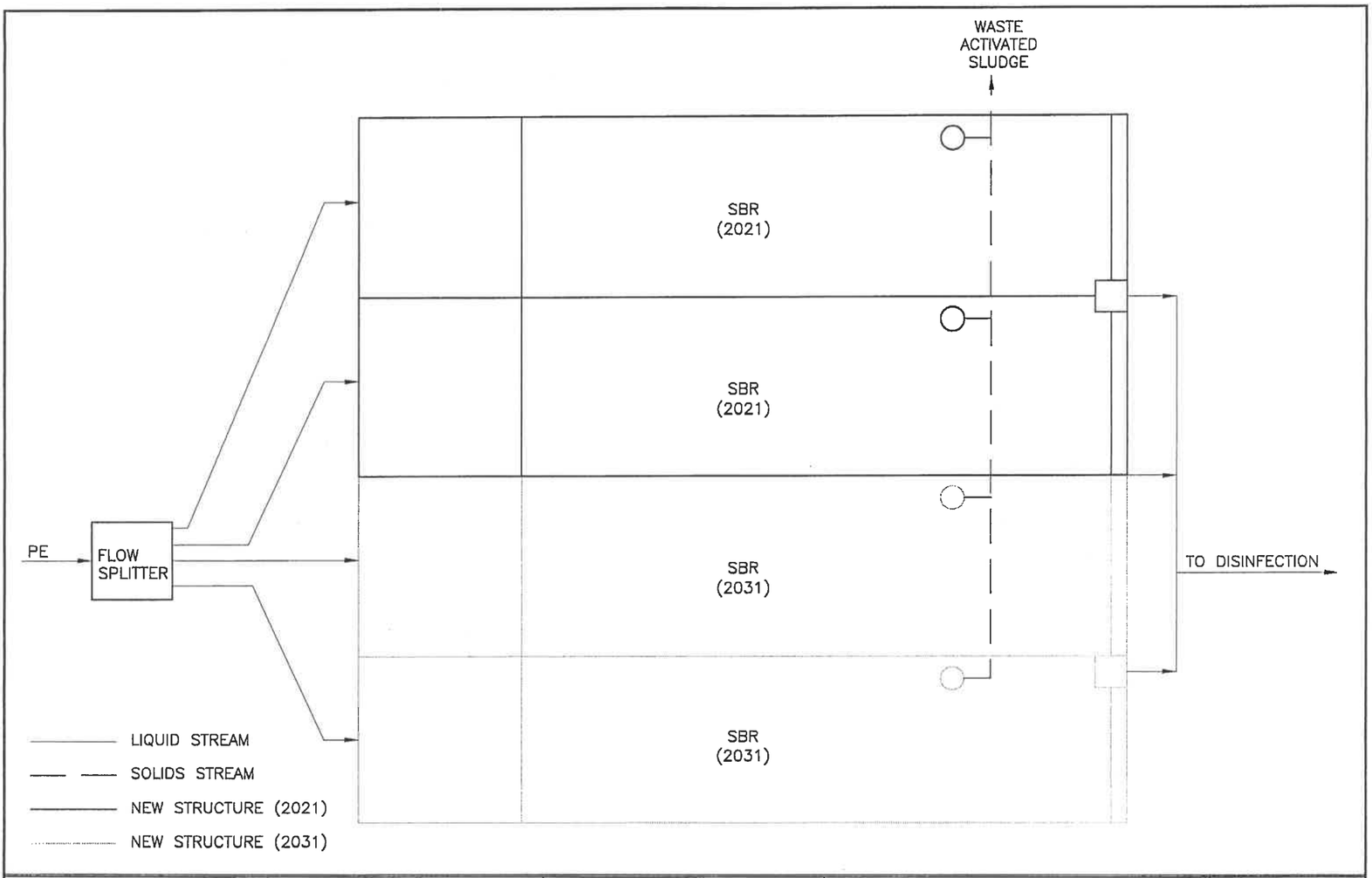
Howard R. Green Company

SCHEMATIC

PRIMARY TREATMENT

EXHIBIT E-6



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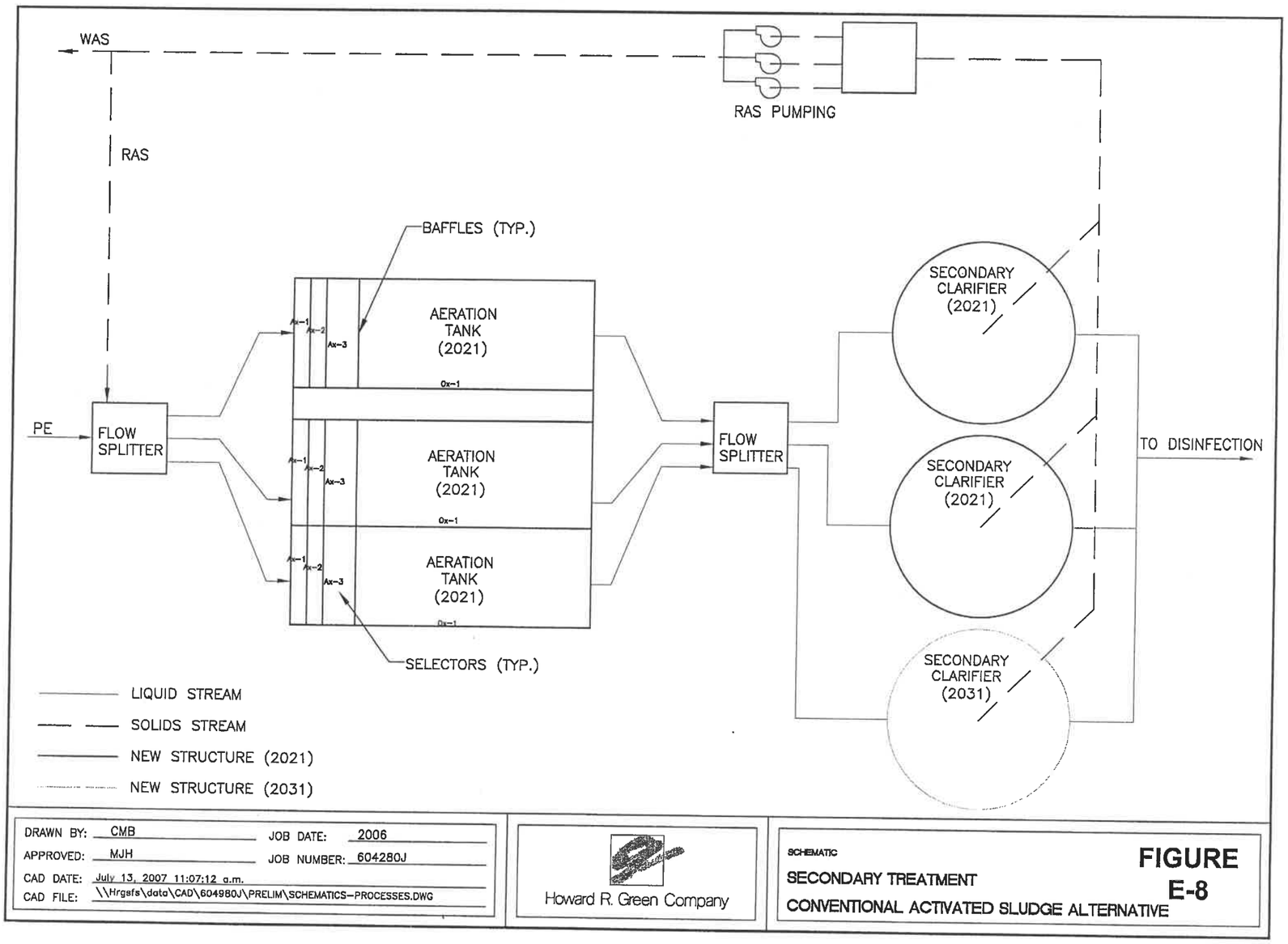
Howard R. Green Company

SCHEMATIC
SECONDARY TREATMENT
SBR ALTERNATIVE

FIGURE E-7



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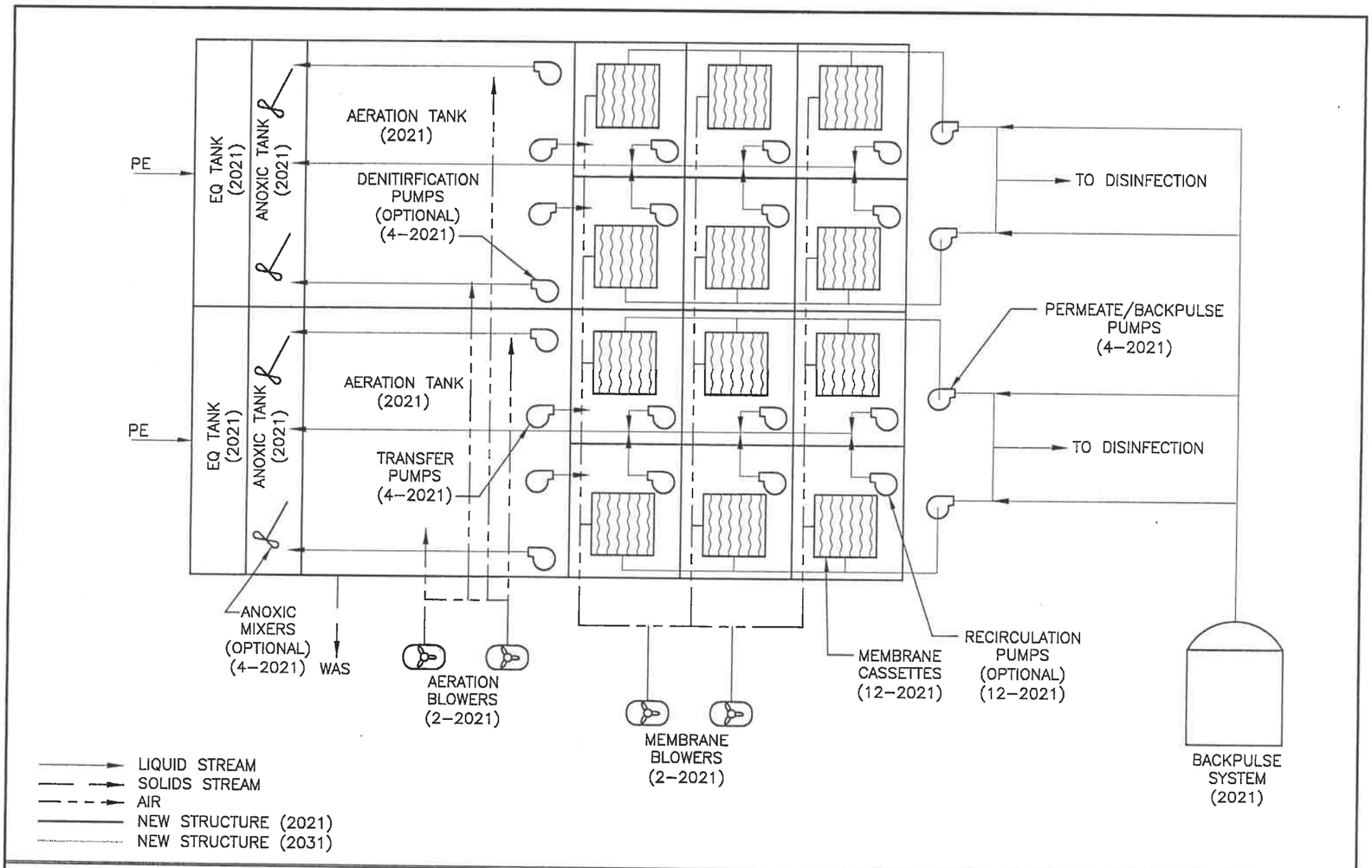
Howard R. Green Company

SCHEMATIC

SECONDARY TREATMENT
CONVENTIONAL ACTIVATED SLUDGE ALTERNATIVE

FIGURE E-8



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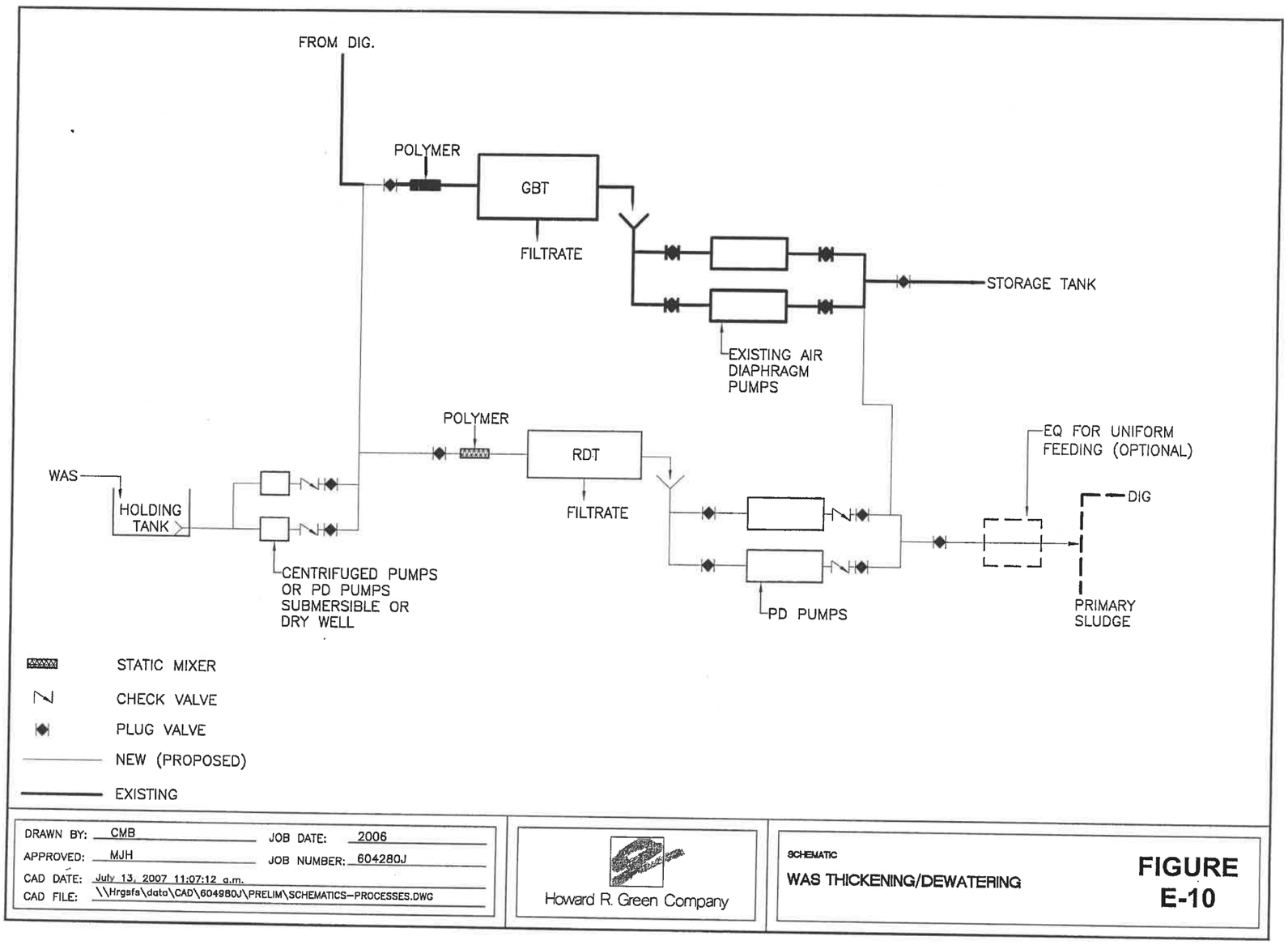
Howard R. Green Company

SCHEMATIC

SECONDARY TREATMENT

MBR ALTERNATIVE

FIGURE E-9



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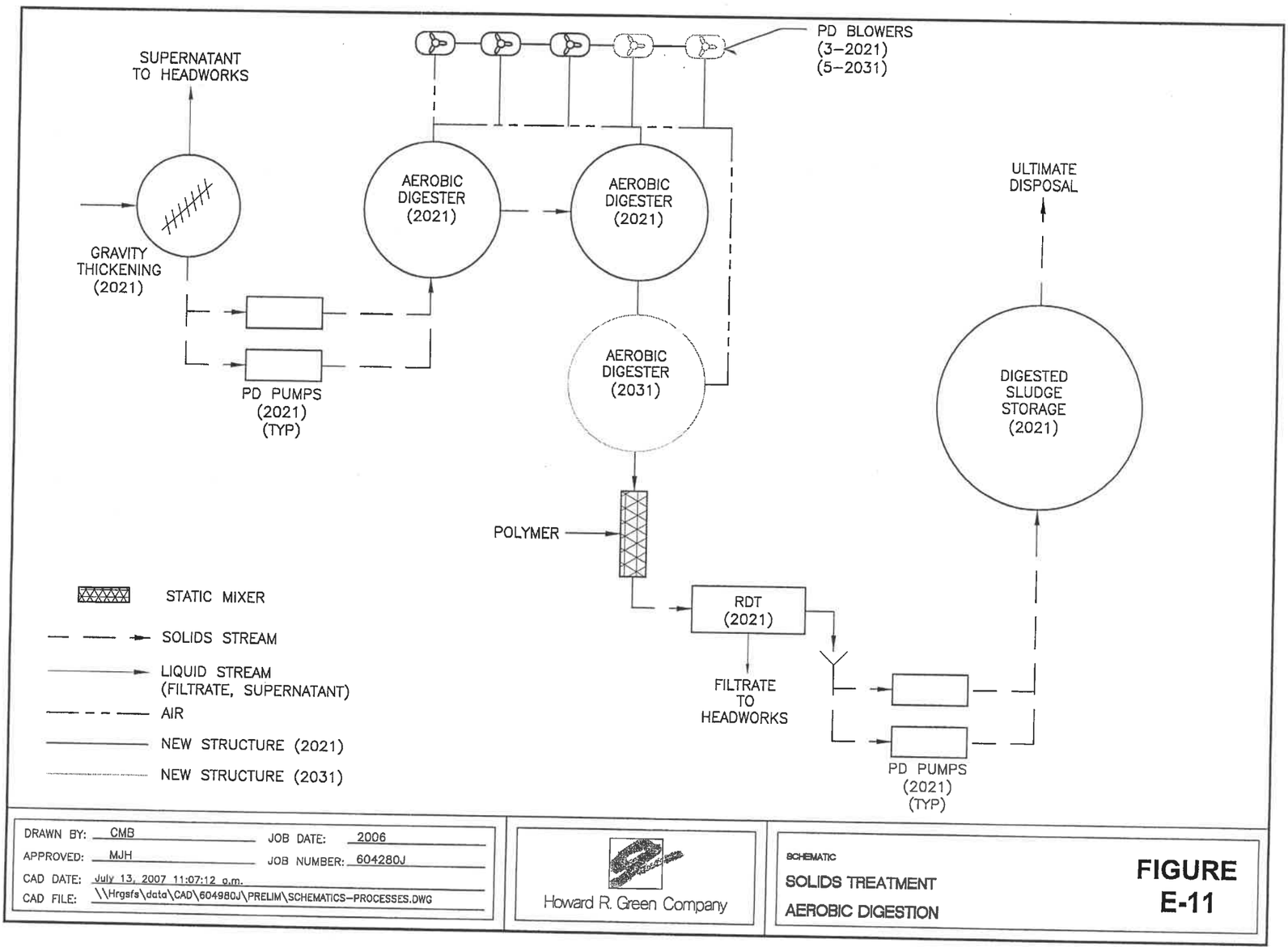
Howard R. Green Company

SCHEMATIC

WAS THICKENING/DEWATERING

FIGURE E-10



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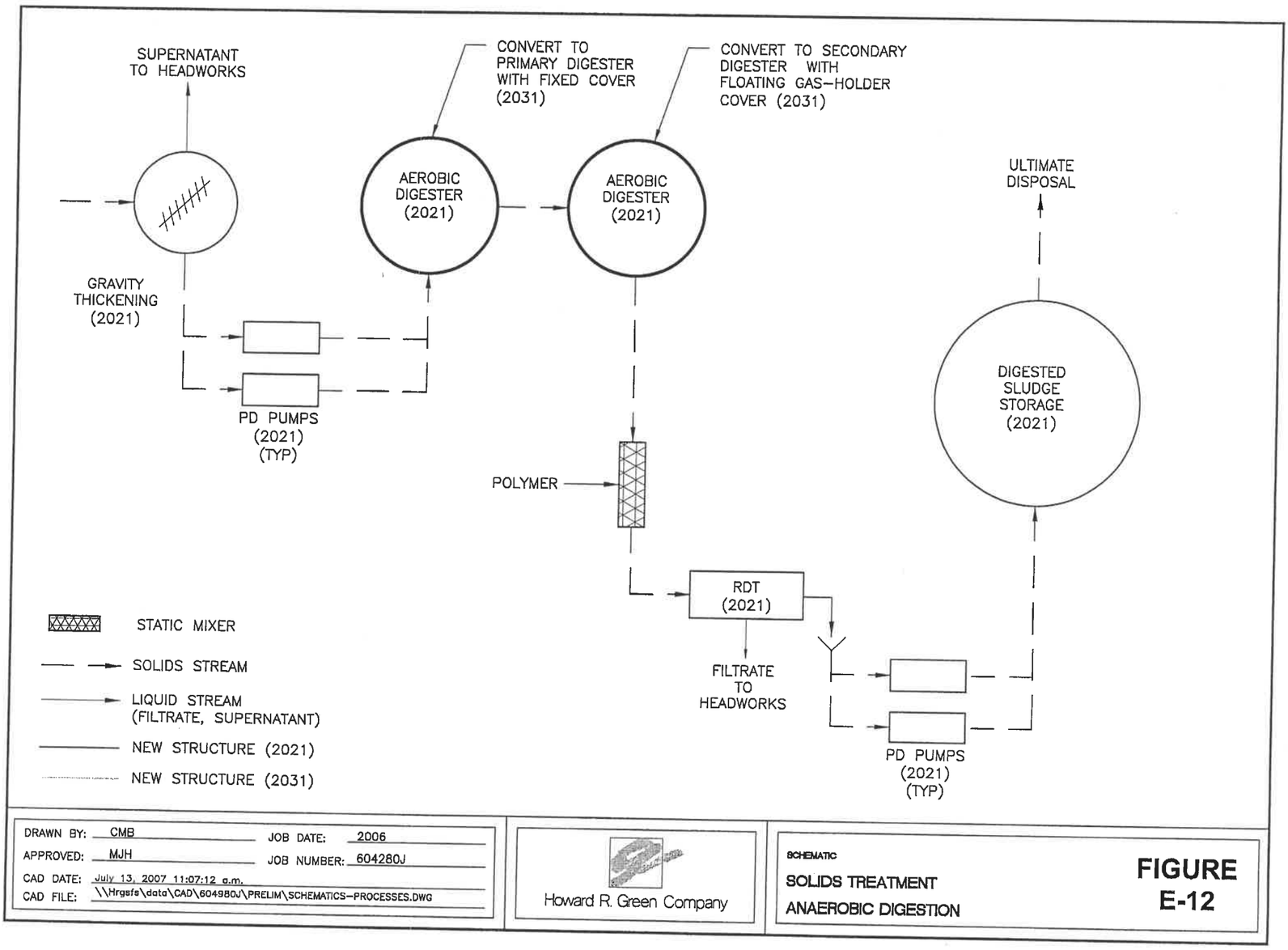
Howard R. Green Company

SCHEMATIC
SOLIDS TREATMENT
AEROBIC DIGESTION

FIGURE E-11



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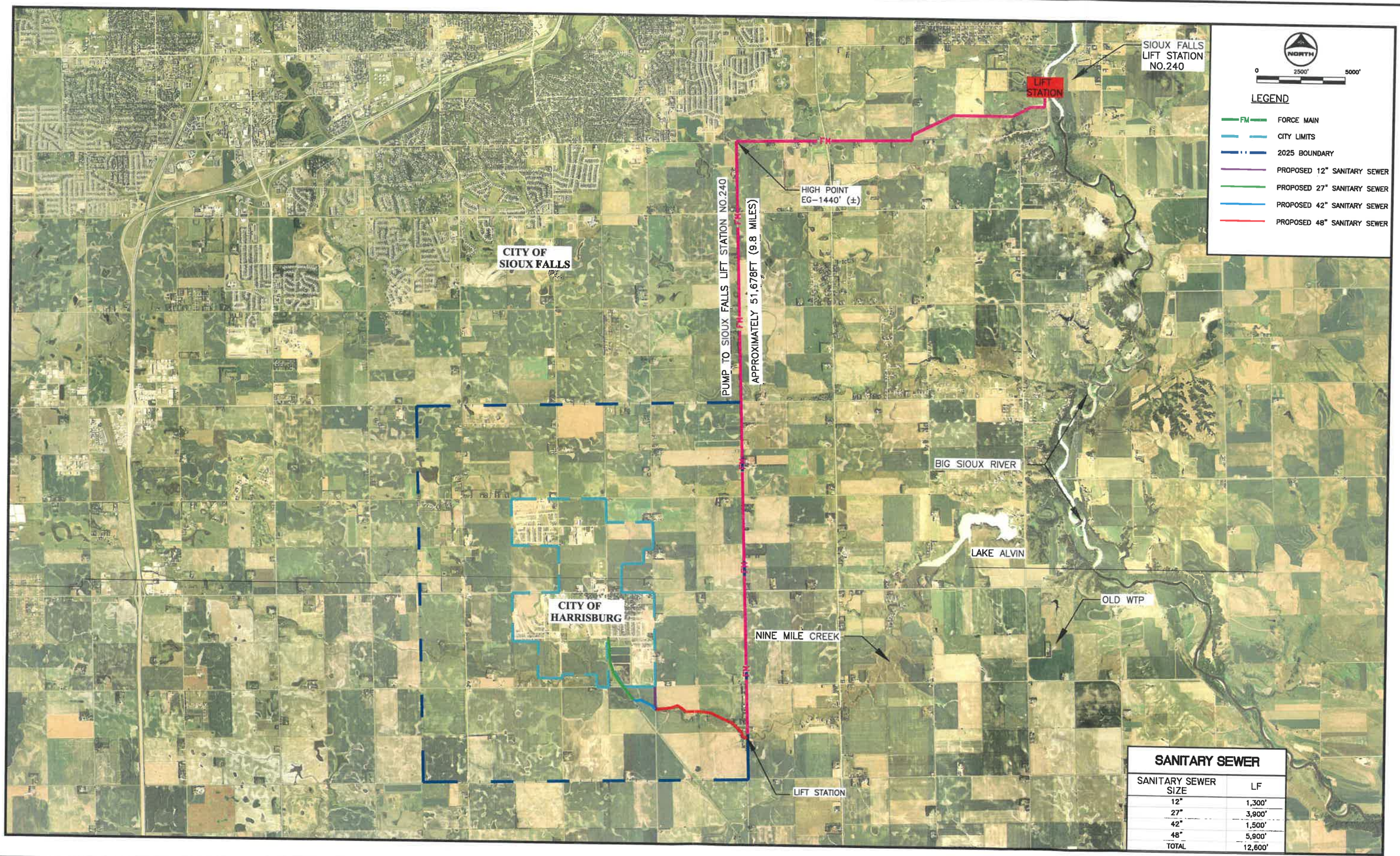

SANITARY SEWER	
SANITARY SEWER SIZE	LF
12"	1,300'
27"	3,900'
42"	1,500'
48"	5,900'
TOTAL	12,600'

Xrefs: LINCOLN COUNTY 2006 AERIAL.DWG MINNEHAHA COUNTY 2006 AERIAL.DWG

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Howard R. Green Company

WASTEWATER TREATMENT PLAN FACILITY PLAN
CITY OF HARRISBURG
HARRISBURG, SOUTH DAKOTA

EXHIBIT
PUMP WW TO SIOUX FALLS WWTP

SHEET NO.
E-13

APPENDIX G

TABLE G-1
CITY OF HARRISBURG, SOUTH DAKOTA
OPINION OF PROBABLE COST FOR ANNUAL O&M COST

NEW WASTEWATER LIFT STATION TO A NEW WWTP
1900 GPM 2021 Peak Day Demand

AVE DAY WATER TO SYSTEM *(GAL)*	1,198,080
NET ANNUAL WATER TO SYSTEM *(GAL)*	437,299,200
ELECTRICAL COST *($/KW-HR)*	$0.060

DESCRIPTION	FACTORS	CURRENT ANNUAL $	COST PER 1000 GAL PUMPED
O&M FIXED COSTS			
AIR COMPRESSOR		$3,921	$0.0090
HORSEPOWER DRAW	15.0		
HOURS OF OPERATION PER DAY	16		
KW-HR PER YEAR	65,350		
GAS HEATING			
TREATMENT BUILDING AREA *(SF)*	1,940	$4,850	$0.0111
$ PER YEAR PER SQ FT	$2.50		
LIGHTING/GENERAL POWER		$3,399	$0.0078
TREATMENT BUILDING AREA *(SF)*	1,940		
WATTS PER SQ FT	10.00		
HOURS OF OPERATION PER DAY	8.0		
KW-HR PER YEAR	56,648		
ODOR CONTROL UNIT			
FAN		$1,960	$0.0045
HORSEPOWER DRAW	5.0		
HOURS OF OPERATION PER DAY	24		
KW-HR PER YEAR	32,675		
RECIRCULATION PUMP		$784	$0.0018
HORSEPOWER DRAW	2.0		
HOURS OF OPERATION PER DAY	24		
KW-HR PER YEAR	13,070		
HEATERS		$7,884	$0.0180
NUMBER OF HEATERS	2.0		
HOURS OF OPERATION PER DAY	12		
RATED CAPACITY (PEAK) - KW	20		
KW-HR USED FOR CALCS	15		
KW-HR PER YEAR	131,400		
OPERATION SALARIES & BENEFITS		$10,400	$0.0238
NUMBER OF OPERATORS	1		
OPERATOR STAFF *(HOURS PER DAY)*	1		
ANNUAL OPERATOR HOURS	260		
HOURLY RATE	$40.00		
ANNUAL COST	$10,400		
VEHICLE		$1,500	$0.0034
ANNUAL COST	$1,500		

TABLE G-1
CITY OF HARRISBURG, SOUTH DAKOTA
OPINION OF PROBABLE COST FOR ANNUAL O&M COST

NEW WASTEWATER LIFT STATION TO A NEW WWTP
1900 GPM 2021 Peak Day Demand

AVE DAY WATER TO SYSTEM *(GAL)*	1,198,080
NET ANNUAL WATER TO SYSTEM *(GAL)*	437,299,200
ELECTRICAL COST *($/KW-HR)*	$0.060

DESCRIPTION	FACTORS	CURRENT ANNUAL $	COST PER 1000 GAL PUMPED
PUMP CLEANING		$4,000	$0.0091
NUMBER OF PUMPS	2.0		
CLEANING COSTS PER PUMP	$1,000		
ESTIMATED CLEANING INTERVAL *(YEARS)*	0.5		
TOTAL O&M FIXED COSTS		**$38,699**	**$0.0885**
O&M VARIABLE COSTS			
PUMP POWER		$10,626	$0.0243
PUMPING HEAD (FT)	90		
OVERALL PUMPING EFFICIENCY	70%		
KW-HR PER YEAR	177,106		
WATER		$2,000	$0.0046
COST PER 1000 GALLONS	$2.00		
GAL PER YEAR	1,000,000		
REPAIRS & MAINTENANCE		$5,000	$0.0114
ANNUAL COST	$5,000		
TOTAL VARIABLE O&M COSTS		**$17,626**	**$0.0403**
TOTAL ANNUAL O&M COSTS		**$56,325**	**$0.1288**
INFLATION RATE	3.00%		
INTEREST RATE	4.75%		
PRESENT WORTH O&M COSTS		**$533,161**	

TABLE G-2
CITY OF HARRISBURG, SOUTH DAKOTA
OPINION OF PROBABLE COST FOR ANNUAL O&M COST

NEW WASTEWATER LIFT STATION TO A NEW WWTP
3410 GPM 2031 Peak Day Demand

AVE DAY WATER TO SYSTEM *(GAL)*	2,145,600
NET ANNUAL WATER TO SYSTEM *(GAL)*	783,144,000
ELECTRICAL COST *($/KW-HR)*	$0.060

DESCRIPTION	FACTORS	CURRENT ANNUAL $	COST PER 1000 GAL PUMPED
O&M FIXED COSTS			
AIR COMPRESSOR		$3,921	$0.0050
HORSEPOWER DRAW	15.0		
HOURS OF OPERATION PER DAY	16		
KW-HR PER YEAR	65,350		
GAS HEATING			
TREATMENT BUILDING AREA *(SF)*	1,940	$4,850	$0.0062
$ PER YEAR PER SQ FT	$2.50		
LIGHTING/GENERAL POWER		$3,399	$0.0043
TREATMENT BUILDING AREA *(SF)*	1,940		
WATTS PER SQ FT	10.00		
HOURS OF OPERATION PER DAY	8.0		
KW-HR PER YEAR	56,648		
ODOR CONTROL UNIT			
FAN		$1,960	$0.0025
HORSEPOWER DRAW	5.0		
HOURS OF OPERATION PER DAY	24		
KW-HR PER YEAR	32,675		
RECIRCULATION PUMP		$784	$0.0010
HORSEPOWER DRAW	2.0		
HOURS OF OPERATION PER DAY	24		
KW-HR PER YEAR	13,070		
HEATERS		$7,884	$0.0101
NUMBER OF HEATERS	2.0		
HOURS OF OPERATION PER DAY	12		
RATED CAPACITY (PEAK) - KW	20		
KW-HR USED FOR CALCS	15		
KW-HR PER YEAR	131,400		
OPERATION SALARIES & BENEFITS		$10,400	$0.0133
NUMBER OF OPERATORS	1		
OPERATOR STAFF *(HOURS PER DAY)*	1		
ANNUAL OPERATOR HOURS	260		
HOURLY RATE	$40.00		
ANNUAL COST	$10,400		
VEHICLE		$1,500	$0.0019
ANNUAL COST	$1,500		

TABLE G-2
CITY OF HARRISBURG, SOUTH DAKOTA
OPINION OF PROBABLE COST FOR ANNUAL O&M COST

NEW WASTEWATER LIFT STATION TO A NEW WWTP
3410 GPM 2031 Peak Day Demand

AVE DAY WATER TO SYSTEM *(GAL)*	2,145,600
NET ANNUAL WATER TO SYSTEM *(GAL)*	783,144,000
ELECTRICAL COST *($/KW-HR)*	$0.060

DESCRIPTION	FACTORS	CURRENT ANNUAL $	COST PER 1000 GAL PUMPED
PUMP CLEANING		$4,000	$0.0051
NUMBER OF PUMPS	2.0		
CLEANING COSTS	$1,000		
ESTIMATED CLEANING INTERVAL *(YEARS)*	0.5		
TOTAL O&M FIXED COSTS		**$38,699**	**$0.0494**
O&M VARIABLE COSTS			
PUMP POWER		$25,374	$0.0324
PUMPING HEAD *(FT)*	120		
OVERALL PUMPING EFFICIENCY	70%		
KW-HR PER YEAR	422,898		
WATER		$2,000	$0.0026
COST PER 1000 GALLONS	$2.00		
GAL PER YEAR	1,000,000		
REPAIRS & MAINTENANCE		$5,000	$0.0064
ANNUAL COST	$5,000		
TOTAL VARIABLE O&M COSTS		**$32,374**	**$0.0413**
TOTAL ANNUAL O&M COSTS		**$71,072**	**$0.0908**
INFLATION RATE	3.00%		
INTEREST RATE	4.75%		
PRESENT WORTH O&M COSTS		**$512,309**	

TABLE G-3
CITY OF HARRISBURG, SOUTH DAKOTA
OPINION OF PROBABLE COST FOR ANNUAL O&M COST

NEW WASTEWATER LIFT STATION TO SIOUX FALLS
1900 GPM 2021 Peak Day Demand

AVE DAY WATER TO SYSTEM *(GAL)*	1,198,080
NET ANNUAL WATER TO SYSTEM *(GAL)*	437,299,200
ELECTRICAL COST *($/KW-HR)*	$0.060

DESCRIPTION	FACTORS	CURRENT ANNUAL $	COST PER 1000 GAL PUMPED
O&M FIXED COSTS			
AIR COMPRESSOR		$3,921	$0.0090
HORSEPOWER DRAW	15.0		
HOURS OF OPERATION PER DAY	16		
KW-HR PER YEAR	65,350		
GAS HEATING			
TREATMENT BUILDING AREA *(SF)*	2,540	$6,350	$0.0145
$ PER YEAR PER SQ FT	$2.50		
LIGHTING/GENERAL POWER		$4,450	$0.0102
TREATMENT BUILDING AREA *(SF)*	2,540		
WATTS PER SQ FT	10.00		
HOURS OF OPERATION PER DAY	8.0		
KW-HR PER YEAR	74,168		
ODOR CONTROL UNIT			
FAN		$1,960	$0.0045
HORSEPOWER DRAW	5.0		
HOURS OF OPERATION PER DAY	24		
KW-HR PER YEAR	32,675		
RECIRCULATION PUMP		$784	$0.0018
HORSEPOWER DRAW	2.0		
HOURS OF OPERATION PER DAY	24		
KW-HR PER YEAR	13,070		
HEATERS		$7,884	$0.0180
NUMBER OF HEATERS	2.0		
HOURS OF OPERATION PER DAY	12		
RATED CAPACITY (PEAK) - KW	20		
KW-HR USED FOR CALCS	15		
KW-HR PER YEAR	131,400		
OPERATION SALARIES & BENEFITS		$10,400	$0.0238
NUMBER OF OPERATORS	1		
OPERATOR STAFF *(HOURS PER DAY)*	1		
ANNUAL OPERATOR HOURS	260		
HOURLY RATE	$40.00		
ANNUAL COST	$10,400		
VEHICLE		$1,500	$0.0034
ANNUAL COST	$1,500		

CITY OF HARRISBURG, SOUTH DAKOTA
OPINION OF PROBABLE COST FOR ANNUAL O&M COST

NEW WASTEWATER LIFT STATION TO SIOUX FALLS
1900 GPM 2021 Peak Day Demand

AVE DAY WATER TO SYSTEM *(GAL)*	1,198,080
NET ANNUAL WATER TO SYSTEM *(GAL)*	437,299,200
ELECTRICAL COST *($/KW-HR)*	50.060

DESCRIPTION	FACTORS	CURRENT ANNUAL $	COST PER 1000 GAL PUMPED
PUMP CLEANING		$4,000	$0.0091
NUMBER OF PUMPS	2.0		
CLEANING COSTS	$1,000		
ESTIMATED CLEANING INTERVAL *(YEARS)*	0.5		
TOTAL O&M FIXED COSTS		**$41,250**	**$0.0943**
O&M VARIABLE COSTS			
PUMP POWER		$14,759	$0.0338
PUMPING HEAD *(FT)*	125		
OVERALL PUMPING EFFICIENCY	70%		
KW-HR PER YEAR	245,981		
WATER		$2,000	$0.0046
COST PER 1000 GALLONS	$2.00		
GAL PER YEAR	1,000,000		
REPAIRS & MAINTENANCE		$5,000	$0.0114
ANNUAL COST	$5,000		
TOTAL VARIABLE O&M COSTS		**$21,759**	**$0.0498**
TOTAL ANNUAL O&M COSTS		**$63,009**	**$0.1441**
INFLATION RATE	3.00%		
INTEREST RATE	4.75%		
PRESENT WORTH O&M COSTS		**$596,427**	

TABLE G-4
CITY OF HARRISBURG, SOUTH DAKOTA
OPINION OF PROBABLE COST FOR ANNUAL O&M COST

NEW WASTEWATER LIFT STATION TO SIOUX FALLS
3410 GPM 2031 Peak Day Demand

AVE DAY WATER TO SYSTEM *(GAL)*	2,145,600
NET ANNUAL WATER TO SYSTEM *(GAL)*	783,144,000
ELECTRICAL COST *($/KW-HR)*	$0.060

DESCRIPTION	FACTORS	CURRENT ANNUAL $	COST PER 1000 GAL PUMPED
O&M FIXED COSTS			
AIR COMPRESSOR		$3,921	$0.0050
HORSEPOWER DRAW	15.0		
HOURS OF OPERATION PER DAY	16		
KW-HR PER YEAR	65,350		
GAS HEATING			
TREATMENT BUILDING AREA *(SF)*	2,540	$6,350	$0.0081
$ PER YEAR PER SQ FT	$2.50		
LIGHTING/GENERAL POWER		$4,450	$0.0057
TREATMENT BUILDING AREA *(SF)*	2,540		
WATTS PER SQ FT	10.00		
HOURS OF OPERATION PER DAY	8.0		
KW-HR PER YEAR	74,168		
ODOR CONTROL UNIT			
FAN		$1,960	$0.0025
HORSEPOWER DRAW	5.0		
HOURS OF OPERATION PER DAY	24		
KW-HR PER YEAR	32,675		
RECIRCULATION PUMP		$784	$0.0010
HORSEPOWER DRAW	2.0		
HOURS OF OPERATION PER DAY	24		
KW-HR PER YEAR	13,070		
HEATERS		$7,884	$0.0101
NUMBER OF HEATERS	2.0		
HOURS OF OPERATION PER DAY	12		
RATED CAPACITY (PEAK) - KW	20		
KW-HR USED FOR CALCS	15		
KW-HR PER YEAR	131,400		
OPERATION SALARIES & BENEFITS		$10,400	$0.0133
NUMBER OF OPERATORS	1		
OPERATOR STAFF *(HOURS PER DAY)*	1		
ANNUAL OPERATOR HOURS	260		
HOURLY RATE	$40.00		
ANNUAL COST	$10,400		
VEHICLE		$1,500	$0.0019
ANNUAL COST	$1,500		

TABLE G-4
CITY OF HARRISBURG, SOUTH DAKOTA
OPINION OF PROBABLE COST FOR ANNUAL O&M COST

NEW WASTEWATER LIFT STATION TO SIOUX FALLS
3410 GPM 2031 Peak Day Demand

AVE DAY WATER TO SYSTEM *(GAL)*	2,145,600
NET ANNUAL WATER TO SYSTEM *(GAL)*	783,144,000
ELECTRICAL COST *($/KW-HR)*	$0.060

DESCRIPTION	FACTORS	CURRENT ANNUAL $	COST PER 1000 GAL PUMPED
PUMP CLEANING		$4,000	$0.0051
NUMBER OF PUMPS	2.0		
CLEANING COSTS	$1,000		
ESTIMATED CLEANING INTERVAL *(YEARS)*	0.5		
TOTAL O&M FIXED COSTS		**$41,250**	**$0.0527**
O&M VARIABLE COSTS			
PUMP POWER		$45,250	$0.0578
PUMPING HEAD *(FT)*	214		
OVERALL PUMPING EFFICIENCY	70%		
KW-HR PER YEAR	754,168		
WATER		$2,000	$0.0026
COST PER 1000 GALLONS	$2.00		
GAL PER YEAR	1,000,000		
REPAIRS & MAINTENANCE		$5,000	$0.0064
ANNUAL COST	$5,000		
TOTAL VARIABLE O&M COSTS		**$52,250**	**$0.0667**
TOTAL ANNUAL O&M COSTS		**$93,500**	**$0.1194**
INFLATION RATE	3.00%		
INTEREST RATE	4.75%		
PRESENT WORTH O&M COSTS		**$673,971**	

PROJECT 604980J, WASTEWATER FACILITY PLAN
CITY OF HARRISBURG, SD - 2007
TREATMENT COSTS TO PUMP TO SIOUX FALLS

ENGINEER'S OPINION OF PROBABLE COST - AUGUST 2007

TABLE G-5: TREATMENT COSTS TO PUMP TO SIOUX FALLS

YEAR	RATE	YEARLY FLOW*	YEARLY COST	TERM	INTEREST RATE	PRESENT WORTH
	($ / 1000 gal)	(gal)	($)	(years)	(%)	($)
2007	$ 1.34					
2008	$ 1.47					
2009	$ 1.62					
2010	$ 1.78					
2011	$ 1.96	184,788,988	$ 362,536	4	4.75%	$ 301,117
2012	$ 2.08	203,267,887	$ 422,717	5	4.75%	$ 335,181
2013	$ 2.14	223,594,675	$ 478,939	6	4.75%	$ 362,540
2014	$ 2.21	245,954,143	$ 542,638	7	4.75%	$ 392,132
2015	$ 2.27	270,549,557	$ 614,809	8	4.75%	$ 424,138
2016	$ 2.34	297,604,513	$ 696,578	9	4.75%	$ 458,758
2017	$ 2.41	321,412,874	$ 774,873	10	4.75%	$ 487,181
2018	$ 2.48	347,125,904	$ 861,969	11	4.75%	$ 517,365
2019	$ 2.56	374,895,976	$ 958,855	12	4.75%	$ 549,420
2020	$ 2.63	404,887,654	$ 1,066,630	13	4.75%	$ 583,460
2021	$ 2.71	437,278,667	$ 1,186,519	14	4.75%	$ 619,610
2022	$ 2.79	463,515,387	$ 1,295,442	15	4.75%	$ 645,814
2023	$ 2.88	491,326,310	$ 1,414,363	16	4.75%	$ 673,126
2024	$ 2.97	520,805,888	$ 1,544,202	17	4.75%	$ 701,593
2025	$ 3.05	552,054,242	$ 1,685,959	18	4.75%	$ 731,265
2026	$ 3.15	585,177,496	$ 1,840,730	19	4.75%	$ 762,191
2027	$ 3.24	620,288,146	$ 2,009,709	20	4.75%	$ 794,424
2028	$ 3.34	657,505,435	$ 2,194,201	21	4.75%	$ 828,022
2029	$ 3.44	696,955,761	$ 2,395,628	22	4.75%	$ 863,040
2030	$ 3.54	738,773,106	$ 2,615,547	23	4.75%	$ 899,539
2031	$ 3.65	783,099,493	$ 2,855,654	24	4.75%	$ 937,581

** Calculated on the basis of 6 months of ADW and 6 months of AWW flows.*

FUTURE WORTH = $ 27,818,499 PRESENT WORTH = $ 12,867,497

TABLE G-6
Headworks Building Treatment
Harrisburg WWTP
7/12/2007
Design Condition: 2021 (from 2011-2021)

PRELIMINARY

Design life: 10 years
Interest Rate: 5%
Inflation Rate: 3%

Fine Screen		
Nameplate Horsepower:		1
Electricity Cost:	$	0.06
1hp=		0.746 kwh
Number of units:		1
Hours of operation per day:		12
Total Max Electricity Draw:		0.75 KW H
Annual Electricity Cost:	$	196.049
Design life:		10 years
Interest Rate:		5%
Inflation Rate:		3%
Electricity Present Worth (2011):	$	1,736.97

Grit Vortex		
Nameplate Horsepower:		1
Electricity Cost:	$	0.06
1hp=		0.746 kwh
Number of units:		1
Hours of operation per day:		24
Total Max Electricity Draw:		0.75 KW H
Annual Electricity Cost:	$	392.098
Design life:		10 years
Interest Rate:		5%
Inflation Rate:		3%
Electricity Present Worth (2011):	$	3,473.94

Grit Classifier		
Nameplate Horsepower:		1
Electricity Cost:	$	0.06
1hp=		0.746 kwh
Number of units:		1
Hours of operation per day:		12
Total Max Electricity Draw:		0.75 KW H
Annual Electricity Cost:	$	196.049
Design life:		10 years
Interest Rate:		5%
Inflation Rate:		3%
Electricity Present Worth (2011):	$	1,736.97

Grit Pump		
Nameplate Horsepower:		5
Electricity Cost:	$	0.06
1hp=		0.746 kwh
Number of units:		1
Hours of operation per day:		12
Total Max Electricity Draw:		3.73 KW H
Annual Electricity Cost:	$	980.244
Design life:		10 years
Interest Rate:		5%
Inflation Rate:		3%
Electricity Present Worth (2011):	$	8,684.86

TABLE G-7

Headworks TREATMENT OMR COSTS

Design Condition:	2021 (from 2011-2021)	
Design Life	14	years
All costs shown in 2007 dollars		
Interest Rate	4.75%	
Inflation Rate	3%	

Preliminary Treatment		
Capital Cost[3]:		
Item	Annual Cost	Present Worth (2007)
Operation		
Electricity[1]		
Fine Screen	$ 196.05	$ 2,353.86
Grit Vortex	$ 392.10	$ 4,707.71
Grit Classifier	$ 196.05	$ 2,353.86
Grit Pump	$ 980.24	$ 11,769.28
Subtotal	$ 1,764.44	$ 21,184.71
Maintenance		
Labor[2]	$ -	$ -
Subtotal	$ -	$ -
Replacement		
Parts	$ 1,098.88	$ 8,589.22
Subtotal	$ 1,098.88	$ 8,589.22
TOTAL	$ 2,863.32	$ 29,773.93

Notes:
1) Headworks building only
2) Included with secondary treatment
3) Capital costs are for preliminary treatment system only.

Replacement - Preliminary Treatment Only

Part

Year	Screen Cleaning Brush Every year: Present Cost 1 @ $500 ea.	Screen Cleaning Brush: Inflated Yearly Cost	Screen Mechanical Rebuild Every 15 years: 1 @ $40000 ea.	Screen Mechanical Rebuild: Inflated Yearly Cost	Grit Pump Seals Once every 5 years: Present Cost 1 @ $1000 ea.	Grit Pump Seals: Inflated Yearly Cost	Grit Pump Wear Plate Once every 2 years: Present Cost 1 @ $500 ea.	Grit Pump Wear Plate: Inflated Yearly Cost	3 @ $1000 ea.	Inflated Yearly Cost	Present Cost 2 @ $300 ea.	Inflated Yearly Cost	Present Cost 3 @ $1000 ea	Inflated Yearly Cost	Present Cost 1 @ $1000 ea.	Inflated Yearly Cost	Total Inflated Yearly Cost	Present Worth
0	$ 500.00	$ -	$ 40,000.00	$ -	$ 1,000.00	$ -	$ 500.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
1		$ 515.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -	$ 515.00	$ 491.65
2		$ 530.45		$ -		$ -		$ 530.45		$ -		$ -		$ -		$ -	$ 1,060.90	$ 966.87
3		$ 546.36		$ -		$ -		$ -		$ -		$ -		$ -		$ -	$ 546.36	$ 475.36
4		$ 562.75		$ -		$ -		$ 562.75		$ -		$ -		$ -		$ -	$ 1,125.51	$ 934.83
5		$ 579.64		$ -		$ 1,159.27		$ -		$ -		$ -		$ -		$ -	$ 1,738.91	$ 1,378.82
6		$ 597.03		$ -		$ -		$ 597.03		$ -		$ -		$ -		$ -	$ 1,194.05	$ 903.86
7		$ 614.94		$ -		$ -		$ -		$ -		$ -		$ -		$ -	$ 614.94	$ 444.38
8		$ 633.39		$ -		$ -		$ 633.39		$ -		$ -		$ -		$ -	$ 1,266.77	$ 873.91
9		$ 652.39		$ -		$ -		$ -		$ -		$ -		$ -		$ -	$ 652.39	$ 429.65
10		$ 671.96		$ -		$ 1,343.92		$ 671.96		$ -		$ -		$ -		$ -	$ 2,687.83	$ 1,689.90
										$ -		$ -		$ -		$ -	$ -	$ -
										$ -		$ -		$ -		$ -	$ -	$ -
										$ -		$ -		$ -		$ -	$ -	$ -
										$ -		$ -		$ -		$ -	$ -	$ -
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										$ -		$ -		$ -		$ -	$ -	$ -
										$ -		$ -		$ -		$ -	$ -	$ -
										$ -		$ -		$ -		$ -	$ -	$ -
										$ -		$ -		$ -		$ -	$ -	$ -
										$ -		$ -		$ -		$ -	$ -	$ -
																TOTAL PRESENT WORTH	=	$ 8,589.22

Notes:
1) Present costs for replacement parts are based on estimates provided by the equipment manufacturer.

TABLE G-8
Headworks Building Treatment
Harrisburg WWTP
7/12/2007
Design Condition: 2031 (from 2021-2031)

PRELIMINARY

Design life:	10 years
Interest Rate:	5%
Inflation Rate:	3%

Fine Screen	
Nameplate Horsepower:	1
Electricity Cost:	$ 0.06
1hp=	0.746 kwh
Number of units:	2
Hours of operation per day:	12
Total Max Electricity Draw:	1.49 KW H
Annual Electricity Cost:	$ 392.098
Design life:	10 years
Interest Rate:	5%
Inflation Rate:	3%
Electricity Present Worth (2011):	$ 2,184.15

Grit Vortex	
Nameplate Horsepower:	1
Electricity Cost:	$ 0.06
1hp=	0.746 kwh
Number of units:	2
Hours of operation per day:	24
Total Max Electricity Draw:	1.49 KW H
Annual Electricity Cost:	$ 784.195
Design life:	10 years
Interest Rate:	5%
Inflation Rate:	3%
Electricity Present Worth (2011):	$ 4,338.30

Grit Classifier	
Nameplate Horsepower:	1
Electricity Cost:	$ 0.06
1hp=	0.746 kwh
Number of units:	2
Hours of operation per day:	12
Total Max Electricity Draw:	1.49 KW H
Annual Electricity Cost:	$ 392.098
Design life:	10 years
Interest Rate:	5%
Inflation Rate:	3%
Electricity Present Worth (2011):	$ 2,184.15

Grit Pump	
Nameplate Horsepower:	5
Electricity Cost:	$ 0.06
1hp=	0.746 kwh
Number of units:	2
Hours of operation per day:	12
Total Max Electricity Draw:	7.46 KW H
Annual Electricity Cost:	$ 1,960.488
Design life:	10 years
Interest Rate:	5%
Inflation Rate:	3%
Electricity Present Worth (2011):	$ 10,920.75

TABLE G-9

PRELIMINARY TREATMENT OMR COSTS

Design Condition: 2031 (from 2021-2031)
Design Life 14 years
All costs shown in 2007 dollars
Interest Rate 4.75%
Inflation Rate 3%
Net Rate 1.75%

Preliminary Treatment		
Capital Cost[3]:		
Item	Annual Cost	Present Worth (2007)
Operation		
Electricity[1]		
Fine Screen	$ 392.10	$ 3,241.05
Grit Vortex	$ 784.20	$ 6,482.09
Grit Classifier	$ 392.10	$ 3,241.05
Grit Pump	$ 1,960.49	$ 16,205.23
Subtotal	$ 3,528.88	$ 29,169.42
Maintenance		
Labor[2]	$ -	$ -
Subtotal	$ -	$ -
Replacement		
Parts	$ 5,363.17	$ 42,314.09
Subtotal	$ 5,363.17	$ 42,314.09
TOTAL	$ 8,892.05	$ 71,483.50

Notes:
1) Headworks building only
2) Included with secondary treatment
3) Capital costs are for preliminary treatment system only.

Replacement - Preliminary Treatment Only																		
	Part																	
	Screen Cleaning Brush Every year		Screen Mechanical Rebuild Every 15 years		Grit Pump Seals Once every 5 years		Grit Pump Wear Plate Once every 2 years											
Year	Present Cost 2 @ $500 ea.	Inflated Yearly Cost	1 @ $40000 ea.	Inflated Yearly Cost	Present Cost 2@ $1000 ea.	Inflated Yearly Cost	Present Cost 2@ $500 ea.	Inflated Yearly Cost	3 @ $1000 ea.	Inflated Yearly Cost	Present Cost 2 @ $300 ea.	Inflated Yearly Cost	Present Cost 3 @ $1000 ea	Inflated Yearly Cost	Present Cost 1 @ $1000 ea.	Inflated Yearly Cost	Total Inflated Yearly Cost	Present Worth
0	$ 1,000.00	$ -	$ 40,000.00	$ -	$ 2,000.00	$ -	$ 1,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
1		$ 1,030.00		$ -		$ -		$ -		$ -		$ -		$ -		$ -	$ 1,030.00	$ 983.29
2		$ 1,060.90		$ -		$ -		$ 1,060.90		$ -		$ -		$ -		$ -	$ 2,121.80	$ 1,933.73
3		$ 1,092.73		$ -		$ -		$ -		$ -		$ -		$ -		$ -	$ 1,092.73	$ 950.71
4		$ 1,125.51		$ -		$ -		$ 1,125.51		$ -		$ -		$ -		$ -	$ 2,251.02	$ 1,869.66
5		$ 1,159.27		$ 46,370.96		$ 2,318.55		$ -		$ -		$ -		$ -		$ -	$ 49,848.79	$ 39,526.14
6		$ 1,194.05		$ -		$ -		$ 1,194.05		$ -		$ -		$ -		$ -	$ 2,388.10	$ 1,807.71
7		$ 1,229.87		$ -		$ -		$ -		$ -		$ -		$ -		$ -	$ 1,229.87	$ 888.76
8		$ 1,266.77		$ -		$ -		$ 1,266.77		$ -		$ -		$ -		$ -	$ 2,533.54	$ 1,747.82
9		$ 1,304.77		$ -		$ -		$ -		$ -		$ -		$ -		$ -	$ 1,304.77	$ 859.31
10		$ 1,343.92		$ -		$ 2,687.83		$ 1,343.92		$ -		$ -		$ -		$ -	$ 5,375.67	$ 3,379.81
										$ -		$ -		$ -		$ -	$ -	$ -
										$ -		$ -		$ -		$ -	$ -	$ -
										$ -		$ -		$ -		$ -	$ -	$ -
										$ -		$ -		$ -		$ -	$ -	$ -
										$ -		$ -		$ -		$ -	$ -	$ -
										$ -		$ -		$ -		$ -	$ -	$ -
										$ -		$ -		$ -		$ -	$ -	$ -
										$ -		$ -		$ -		$ -	$ -	$ -
										$ -		$ -		$ -		$ -	$ -	$ -
										$ -		$ -		$ -		$ -	$ -	$ -
															TOTAL PRESENT WORTH		=	$ 53,946.94

Notes:
1) Present costs for replacement parts are based on estimates provided by the equipment manufacturer.

TABLE G-10: Primary Treatment Process

	Primary Clarifier	PS Pumps					
Nameplate Horsepower	1	5					
Hours of Operation	24	12					
Electricity Cost, $			0.06				
			1 hp = 0.746 KWH				
Max Electricity Draw, KWH	0.746	3.73	0	0	0	0	0
Electricity Cost	$ 392.10	$ 980.24	$ -	$ -	$ -	$ -	$ -
Number of Units	3	3	2	2	2	2	2
	(see Note 1)	(see Note 1)	(see Note 1)	(see Note 1)	(see Note 1)	(see Note 2)	
Total Electricity Cost	$ 1,176.29	$ 2,940.73	$ -	$ -	$ -	$ -	$ -
TOTAL		**$**					**4,117.02**

Notes:

1) 3 units operating at PHWW flow

2) Assumed HP from flow.

TABLE G-11
PRIMARY TREATMENT OMR COSTS

Design Life	14	years
All costs based on 2007 dollars		
Interest Rate	4.75%	
Inflation Rate	3%	
Net Rate	1.75%	

Primary Treatment - Existing Site				
Capital Cost[3]:				
Item		Annual Cost		2007 Present Worth
Operation				
Electricity[1]				
Primary Clarifier	$	1,176.29	$	9,723.14
PS Pumps	$	2,940.73	$	24,307.85
	$	-	$	-
	$	-	$	-
	$	-	$	-
Subtotal	$	4,117.02	$	34,030.98
Maintenance				
Labor[2]	$	-	$	-
Subtotal	$	-	$	-
Replacement				
Parts	$	3,247.87	$	25,524.67
Subtotal	$	3,247.87	$	25,524.67
TOTAL	$	7,364.89	$	59,555.65

Notes:
1) See electricy costs appendix for per unit annual electrical cost calculations.
2) No additional labor costs for primary treatment
3) Capital costs are for preliminary treatment system only.

Replacement - Existing Site - Primary Treatment Only																				
	Part																			
	Primary Clarifier Drives Oil Change		PS Pump Seals Every 5 years																	
Year	Present Cost 3@ $1,000 ea	Inflated Yearly Cost	Present Cost 3@ $1,000 ea	Inflated Yearly Cost	Inflated Yearly Cost		Inflated Yearly Cost		Inflated Yearly Cost		Inflated Yearly Cost		Inflated Yearly Cost		Inflated Yearly Cost		Inflated Yearly Cost		Total Inflated Yearly Cost	Present Worth
0	$ 3,000.00	$ -	$ 3,000.00	$ -	$	-	$	-	$	-	$	-	$	-	$	-	$	-	$ -	$ -
1		$ 3,090.00			$	-	$	-	$	-	$	-	$	-	$	-	$	-	$	-	$ 3,090.00	$ 2,949.88
2		$ 3,182.70			$	-	$	-	$	-	$	-	$	-	$	-	$	-	$	-	$ 3,182.70	$ 2,900.80
3		$ 3,278.18			$	-	$	-	$	-	$	-	$	-	$	-	$	-	$	-	$ 3,278.18	$ 2,852.14
4		$ 3,376.53			$	-	$	-	$	-	$	-	$	-	$	-	$	-	$	-	$ 3,376.53	$ 2,804.49
5		$ 3,477.82		$ 3,477.82	$	-	$	-	$	-	$	-	$	-	$	-	$	-	$	-	$ 6,955.64	$ 5,515.28
6		$ 3,582.16			$	-	$	-	$	-	$	-	$	-	$	-	$	-	$	-	$ 3,582.16	$ 2,711.57
7		$ 3,689.62			$	-	$	-	$	-	$	-	$	-	$	-	$	-	$	-	$ 3,689.62	$ 2,666.27
8		$ 3,800.31			$	-	$	-	$	-	$	-	$	-	$	-	$	-	$	-	$ 3,800.31	$ 2,621.72
9		$ 3,914.32			$	-	$	-	$	-	$	-	$	-	$	-	$	-	$	-	$ 3,914.32	$ 2,577.92
10		$ 4,031.75		$ 4,031.75	$	-	$	-	$	-	$	-	$	-	$	-	$	-	$	-	$ 8,063.50	$ 5,069.71
11					$	-	$	-	$	-	$	-	$	-	$	-	$	-	$	-	$ -	$ -
12					$	-	$	-	$	-	$	-	$	-	$	-	$	-	$	-	$ -	$ -
13					$	-	$	-	$	-	$	-	$	-	$	-	$	-	$	-	$ -	$ -
14					$	-	$	-	$	-	$	-	$	-	$	-	$	-	$	-	$ -	$ -
15					$	-	$	-	$	-	$	-	$	-	$	-	$	-	$	-	$ -	$ -
16					$	-	$	-	$	-	$	-	$	-	$	-	$	-	$	-	$ -	$ -
17					$	-	$	-	$	-	$	-	$	-	$	-	$	-	$	-	$ -	$ -
18					$	-	$	-	$	-	$	-	$	-	$	-	$	-	$	-	$ -	$ -
19					$	-	$	-	$	-	$	-	$	-	$	-	$	-	$	-	$ -	$ -
20					$	-	$	-	$	-	$	-	$	-	$	-	$	-	$	-	$ -	$ -
																		TOTAL PRESENT WORTH =		$ 32,669.58

Notes:
1) Present costs for replacement parts are based on estimates provided by the equipment manufacturer.

TABLE G-12
Conventional AS
Harrisburg WWTP
8/16/2007
Design Condition 2021

PRELIMINARY

Aeration Blowers		
Nameplate Horsepower:		75
Electricity Cost:	$	0.06
1hp=		0.746 kwh
Number of units:		2
Hours of operation per day:		24
Total Max Electricity Draw:		111.90 KW H
Annual Electricity Cost:	$	58,814.640
Design life:		10 years
Interest Rate:		5%
Inflation Rate:		3%
Electricity Present Worth:	$	521,091.69

RAS Pumps		
Nameplate Horsepower:		0.75
Electricity Cost:	$	0.06
1hp=		0.746 kwh
Number of units:		3
Hours of operation per day:		6
Total Max Electricity Draw:		1.68 KW H
Annual Electricity Cost:	$	220.555
Design life:		10 years
Interest Rate:		5%
Inflation Rate:		3%
Electricity Present Worth:	$	1,954.09

WAS Pumps		
Nameplate Horsepower:		3
Electricity Cost:	$	0.06
1hp=		0.746 kwh
Number of units:		3
Hours of operation per day:		6
Total Max Electricity Draw:		6.71 KW H
Annual Electricity Cost:	$	882.220
Design life:		10 years
Interest Rate:		5%
Inflation Rate:		3%
Electricity Present Worth:	$	7,816.38

Secondary Clarifiers		
Nameplate Horsepower:		2
Electricity Cost:	$	0.06
1hp=		0.746 kwh
Number of units:		2
Hours of operation per day:		24
Total Max Electricity Draw:		2.98 KW H
Annual Electricity Cost:	$	1,568.390
Design life:		10 years
Interest Rate:		5%
Inflation Rate:		3%
Electricity Present Worth:	$	13,895.78

SECONDARY TREATMENT OMR COSTS

Design Condition 2021 (from 2011 thru 2021)
Design Life 10 years

Interest Rate 4.75%
Inflation Rate 3%

Conv AS		
Capital Cost[3]:		
Item	Annual Cost	2007 Present Worth
Operation		
Electricity[1]		
Blowers	$ 58,814.64	$ 432,810.73
RAS Pumps	$ 220.53	$ 1,623.04
Secondary Clarifiers	$ 1,568.39	$ 11,541.62
WAS pumps	$ 882.22	$ 6,492.16
Subtotal	$ 61,485.80	$ 452,467.55
Maintenance		
Labor[2]	$ 90,000.00	$ 662,300.51
Subtotal	$ 90,000.00	$ 662,300.51
Replacement		
Parts	$ 9,142.44	$ 67,278.29
Subtotal	$ 9,142.44	$ 67,278.29
TOTAL	$ 160,628.25	$ 1,182,046.35

Notes:
1) See electricy costs appendix for per unit annual electrical cost calculations.
2) Annual maintenance labor costs are based on 1 1/2 persons, $60,000/yr (salary + benefits)
3) Capital costs are for secondary treatment system only.

Replacement - Secondary Treatment Only

	Part																	
	Membrane Diffusers Every 7 years		Blower Belt Every 2 years		Blower Lubrication Every year		Blower Filters 6 times per year		WAS Pump Seals Every 5 years		RAS Pump Seals Every 5 years		Clarifier Drives Oil Change Once every year			
Year	Present Cost 440@$10 ea.	Inflated Yearly Cost	Present Cost 6 @ $75 ea	Inflated Yearly Cost	Present Cost 2 @ $1000 ea	Inflated Yearly Cost	Present Cost 12 @ $150 ea	Inflated Yearly Cost	Present Cost 3 @ $1000 ea.	Inflated Yearly Cost	Present Cost 3 @ $1000 ea.	Inflated Yearly Cost	Present Cost 2@ $1,000 ea	Inflated Yearly Cost	Total Inflated Yearly Cost	Present Worth
0	$ 4,400.00	$ -	$ 450.00	$ -	$ 2,000.00	$ -	$ 1,800.00	$ -	$ 3,000.00	$ -	$ 3,000.00	$ -	$ 2,000.00	$ 2,000.00	$ **2,000.00**	$ 2,000.00
1		$ -		$ -		$ 2,060.00		$ 1,854.00		$ -		$ -		$ 2,060.00	$ 5,974.00	$ 5,793.10
2		$ -		$ 477.41		$ 2,121.80		$ 1,909.62		$ -		$ -		$ 2,121.80	$ 6,630.63	$ 6,242.91
3		$ -		$ -		$ 2,185.45		$ 1,966.91		$ -		$ -		$ 2,185.45	$ 6,337.82	$ 5,514.14
4		$ -		$ 506.48		$ 2,251.02		$ 2,025.92		$ -		$ -		$ 2,251.02	$ 7,034.43	$ 5,842.89
5		$ -		$ -		$ 2,318.55		$ 2,086.69		$ 3,477.82		$ 3,477.82		$ 2,318.55	$ 13,679.43	$ 10,846.71
6		$ -		$ 537.32		$ 2,388.10		$ 2,149.29		$ -		$ -		$ 2,388.10	$ 7,462.83	$ 5,649.10
7		$ 5,411.45		$ -		$ 2,459.75		$ 2,213.77		$ -		$ -		$ 2,459.75	$ 12,544.71	$ 9,065.31
8		$ -		$ 570.05		$ 2,533.54		$ 2,280.19		$ -		$ -		$ 2,533.54	$ 7,917.31	$ 5,461.92
9		$ -		$ -		$ 2,609.55		$ 2,348.59		$ -		$ -		$ 2,609.55	$ 7,567.68	$ 4,983.99
10		$ -		$ 604.76		$ 2,687.83		$ 2,419.05		$ 4,031.75		$ 4,031.75		$ 2,687.83	$ 16,452.98	$ 10,350.66
11															$ -	$ -
12															$ -	$ -
13															$ -	$ -
14															$ -	$ -
15															$ -	$ -
16															$ -	$ -
17															$ -	$ -
18															$ -	$ -
19															$ -	$ -
20															$ -	$ -
											TOTAL PRESENT WORTH	=	$	71,460.52		

TABLE G-14
Conventional AS
Harrisburg WWTP
8/16/2007
Design Condition 2031

PRELIMINARY

Aeration Blowers		
Nameplate Horsepower:		75
Electricity Cost:	$	0.06
1hp=		0.746 kwh
Number of units:		4
Hours of operation per day:		24
Total Max Electricity Draw:		223.80 KW H
Annual Electricity Cost:	$	117,629.280
Design life:		10 years
Interest Rate:		5%
Inflation Rate:		3%
Electricity 2011 Present Worth:	$	1,042,183.38

RAS Pumps		
Nameplate Horsepower:		0.75
Electricity Cost:	$	0.06
1hp=		0.746 kwh
Number of units:		3
Hours of operation per day:		6
Total Max Electricity Draw:		1.68 KW H
Annual Electricity Cost:	$	220.555
Design life:		10 years
Interest Rate:		5%
Inflation Rate:		3%
Electricity Present Worth:	$	1,954.09

WAS Pumps		
Nameplate Horsepower:		3
Electricity Cost:	$	0.06
1hp=		0.746 kwh
Number of units:		3
Hours of operation per day:		6
Total Max Electricity Draw:		6.71 KW H
Annual Electricity Cost:	$	882.220
Design life:		10 years
Interest Rate:		5%
Inflation Rate:		3%
Electricity Present Worth:	$	7,816.38

Secondary Clarifiers		
Nameplate Horsepower:		2
Electricity Cost:	$	0.06
1hp=		0.746 kwh
Number of units:		3
Hours of operation per day:		24
Total Max Electricity Draw:		4.48 KW H
Annual Electricity Cost:	$	2,352.586
Design life:		10 years
Interest Rate:		5%
Inflation Rate:		3%
Electricity Present Worth:	$	20,843.67

SECONDARY TREATMENT OMR COSTS

Design Condition		**2031** (from 2021 thru 2031)
Design Life	**14**	years
all costs based on 2007 dollars		
Interest Rate	**4.75%**	
Inflation Rate	**3%**	
Net Rate	**1.75%**	

Conv AS		
Capital Cost[3]:		
Item	Annual Cost	2007 Present Worth
Operation		
Electricity[1]		
Blowers	$ 117,629.28	$ 972,313.85
RAS pumps	$ 220.55	$ 1,823.09
Seconary Clarifiers	$ 2,352.59	$ 19,446.28
WAS pumps	$ 882.22	$ 7,292.35
Subtotal	$ 121,084.64	$ 1,000,875.57
Maintenance		
Labor[2]	$ 161,000.00	$ 1,330,812.62
Subtotal	$ 161,000.00	$ 1,330,812.62
Replacement		
Parts	$ 11,625.23	$ 91,720.17
Subtotal	$ 11,625.23	$ 91,720.17
TOTAL	**$ 293,709.87**	**$ 2,423,408.36**

Notes:

1) See electricy costs appendix for per unit annual electrical cost calculations.
2) Annual maintenance labor costs are based on 2 FTE $161,000/yr (salary + benefits)
3) Capital costs are for secondary treatment system only.

	Replacement - Secondary Treatment Only															
	Part															
	Membrane Diffusers Every 7 years		Blower Belt Every 2 years		Blower Lubrication Every year		Blower Filters 6 times per year		WAS Pump Seals Every 5 years		RAS Pump Seals Every 5 years		Clarifier Drives Oil Change Once every year			
Year	Present Cost 880@$10 ea.	Inflated Yearly Cost	Present Cost 12 @ $75 ea	Inflated Yearly Cost	Present Cost 4 @ $1000 ea	Inflated Yearly Cost	Present Cost 24 @ $150 ea	Inflated Yearly Cost	Present Cost 4 @ $1000 ea.	Inflated Yearly Cost	Present Cost 3 @ $1000 ea.	Inflated Yearly Cost	Present Cost 3 @ $1000 ea.	Inflated Yearly Cost	Total Inflated Yearly Cost	Present Worth
0	$ 880.00	$ -	$ 900.00	$ -	$ 4,000.00	$ -	$ 3,600.00	$ -	$ 4,000.00	$ -	$ 3,000.00	$ -	$ 3,000.00	$ 3,000.00	$ 3,000.00	$ 3,000.00
1		$ -		$ -		$ 4,120.00		$ 3,708.00		$ -		$ -		$ 3,090.00	$ 10,918.00	$ 10,422.91
2		$ -		$ 954.81		$ 4,243.60		$ 3,819.24		$ -		$ -		$ 3,182.70	$ 12,200.35	$ 11,118.96
3		$ -		$ -		$ 4,370.91		$ 3,933.82		$ -		$ -		$ 3,278.18	$ 11,582.91	$ 10,077.56
4		$ -		$ 1,012.96		$ 4,502.04		$ 4,051.83		$ -		$ -		$ 3,376.53	$ 12,943.35	$ 10,750.55
5		$ -		$ -		$ 4,637.10		$ 4,173.39		$ 4,637.10		$ 3,477.82		$ 3,477.82	$ 20,403.22	$ 16,178.14
6		$ -		$ 1,074.65		$ 4,776.21		$ 4,298.59		$ -		$ -		$ 3,582.16	$ 13,731.60	$ 10,394.34
7		$ 1,082.29		$ -		$ 4,919.50		$ 4,427.55		$ -		$ -		$ 3,689.62	$ 14,118.95	$ 10,202.91
8		$ -		$ 1,140.09		$ 5,067.08		$ 4,560.37		$ -		$ -		$ 3,800.31	$ 14,567.86	$ 10,049.94
9		$ -		$ -		$ 5,219.09		$ 4,697.18		$ -		$ -		$ 3,914.32	$ 13,830.60	$ 9,108.66
10		$ -		$ 1,209.52		$ 5,375.67		$ 4,838.10		$ 5,375.67		$ 4,031.75		$ 4,031.75	$ 24,862.45	$ 15,631.61
11															$ -	$ -
12															$ -	$ -
13															$ -	$ -
14															$ -	$ -
15															$ -	$ -
16															$ -	$ -
17															$ -	$ -
18															$ -	$ -
19															$ -	$ -
20															$ -	$ -
											TOTAL PRESENT WORTH	=	$	116,935.59		

TABLE G-16
ICEAS - SBR
Harrisburg WWTP
8/16/2007
Design Condition 2021

PRELIMINARY

Aeration Blowers		
Nameplate Horsepower:		50
Electricity Cost:	$	0.06
1hp=		0.746 kwh
Number of units:		2
Hours of operation per day:		12
Total Max Electricity Draw:		74.60 KW H
Annual Electricity Cost:	$	19,604.880
Design life:		10 years
Interest Rate:		5%
Inflation Rate:		3%
Electricity Present Worth:	$	173,697.23

Decanter		
Nameplate Horsepower:		0.75
Electricity Cost:	$	0.06
1hp=		0.746 kwh
Number of units:		2
Hours of operation per day:		6
Total Max Electricity Draw:		1.12 KW H
Annual Electricity Cost:	$	147.037
Design life:		10 years
Interest Rate:		5%
Inflation Rate:		3%
Electricity Present Worth:	$	1,302.73

WAS Pumps		
Nameplate Horsepower:		3
Electricity Cost:	$	0.06
1hp=		0.746 kwh
Number of units:		2
Hours of operation per day:		6
Total Max Electricity Draw:		4.48 KW H
Annual Electricity Cost:	$	588.146
Design life:		10 years
Interest Rate:		5%
Inflation Rate:		3%
Electricity Present Worth:	$	5,210.92

SECONDARY TREATMENT OMR COSTS

Design Condition		2021 (from 2011 thru 2021)
Design Life	10	years
Interest Rate	4.75%	
Inflation Rate	3%	

ICEAS-SBR

Capital Cost[3]:

Item	Annual Cost	2007 Present Worth
Operation		
Electricity[1]		
Blowers	$ 19,604.88	$ 144,270.24
Decanter	$ 147.04	$ 1,082.03
WAS pumps	$ 568.15	$ 4,328.11
Subtotal	$ 20,340.06	$ 149,680.38
Maintenance		
Labor[2]	$ 90,000.00	$ 662,300.51
Subtotal	$ 90,000.00	$ 662,300.51
Replacement		
Parts	$ 5,648.74	$ 41,568.45
Subtotal	$ 5,648.74	$ 41,568.45
TOTAL	$ 115,988.80	$ 853,549.33

Notes:
1) See electricy costs appendix for per unit annual electrical cost calculations.
2) Annual maintenance labor costs are based on 1 1/2 persons, $90,000/yr (salary + benefits)
3) Capital costs are for secondary treatment system only.

Replacement - Secondary Treatment Only

	Part													
	Membrane Diffusers Every 7 years		Blower Belt Every 2 years		Blower Lubrication Every year		Blower Filters 6 times per year		WAS Pump Seals Every 5 years					
Year	Present Cost 440@$10 ea.	Inflated Yearly Cost	Present Cost 6 @ $75 ea	Inflated Yearly Cost	Present Cost 2 @ $1000 ea	Inflated Yearly Cost	Present Cost 12 @ $150 ea	Inflated Yearly Cost	Present Cost 2 @ $1000 ea.	Inflated Yearly Cost	Present Cost	Inflated Yearly Cost	Total Inflated Yearly Cost	Present Worth
0	$ 4,400.00	$ -	$ 450.00	$ -	$ 2,000.00	$ -	$ 1,800.00	$ -	$ 2,000.00	$ -	$ -	$ -	$ -	$ -
1		$ -		$ -		$ 2,060.00		$ 1,854.00		$ -		$ -	$ 3,914.00	$ 3,736.52
2		$ -		$ 477.41		$ 2,121.80		$ 1,909.62		$ -		$ -	$ 4,508.83	$ 4,109.18
3		$ -		$ -		$ 2,185.45		$ 1,966.91		$ -		$ -	$ 4,152.36	$ 3,612.71
4		$ -		$ 506.48		$ 2,251.02		$ 2,025.92		$ -		$ -	$ 4,783.41	$ 3,973.03
5		$ -		$ -		$ 2,318.55		$ 2,086.69		$ 2,318.55		$ -	$ 6,723.79	$ 5,331.43
6		$ -		$ 537.32		$ 2,388.10		$ 2,149.29		$ -		$ -	$ 5,074.72	$ 3,841.39
7		$ 5,411.46		$ -		$ 2,459.75		$ 2,213.77		$ -		$ -	$ 10,084.97	$ 7,287.80
8		$ -		$ 570.05		$ 2,533.54		$ 2,280.19		$ -		$ -	$ 5,383.77	$ 3,714.11
9		$ -		$ -		$ 2,609.55		$ 2,348.59		$ -		$ -	$ 4,958.14	$ 3,285.37
10		$ -		$ 604.76		$ 2,687.83		$ 2,419.05		$ 2,687.83		$ -	$ 8,399.48	$ 5,280.95
11												$ -	$ -	$ -
12												$ -	$ -	$ -
13												$ -	$ -	$ -
14												$ -	$ -	$ -
15												$ -	$ -	$ -
16												$ -	$ -	$ -
17												$ -	$ -	$ -
18												$ -	$ -	$ -
19												$ -	$ -	$ -
20												$ -	$ -	$ -
											TOTAL PRESENT WORTH	=		$ 44,152.48

TABLE G-18
ICEAS - SBR
Harrisburg WWTP
8/16/2007
Design Condition 2031

PRELIMINARY

Aeration Blowers		
Nameplate Horsepower:		50
Electricity Cost:	$	0.06
1hp=		0.746 kwh
Number of units:		4
Hours of operation per day:		12
Total Max Electricity Draw:		149.20 KW H
Annual Electricity Cost:	$	39,209.760
Design life:		10 years
Interest Rate:		5%
Inflation Rate:		3%
Electricity 2011 Present Worth:	$	347,394.46

Decanter		
Nameplate Horsepower:		0.75
Electricity Cost:	$	0.06
1hp=		0.746 kwh
Number of units:		4
Hours of operation per day:		6
Total Max Electricity Draw:		2.24 KW H
Annual Electricity Cost:	$	294.073
Design life:		10 years
Interest Rate:		5%
Inflation Rate:		3%
Electricity Present Worth:	$	2,605.46

WAS Pumps		
Nameplate Horsepower:		3
Electricity Cost:	$	0.06
1hp=		0.746 kwh
Number of units:		4
Hours of operation per day:		6
Total Max Electricity Draw:		8.95 KW H
Annual Electricity Cost:	$	1,176.293
Design life:		10 years
Interest Rate:		5%
Inflation Rate:		3%
Electricity Present Worth:	$	10,421.83

TABLE G-13

SECONDARY TREATMENT OMR COSTS

Design Condition		2031 (from 2021 thru 2031)
Design Life	14	years
All costs based on 2007 dollars		
Interest Rate	4.75%	
Inflation Rate	3%	
Net Rate	1.75%	

ICEAS-SBR

Capital Cost[3]:

Item	Annual Cost	2007 Present Worth
Operation		
Electricity[1]		
Blowers	$ 39,209.76	$ 272,484.02
Decanter	$ 294.07	$ 2,043.63
WAS pumps	$ 1,176.29	$ 8,174.52
Subtotal	$ 40,680.13	$ 282,702.17
Maintenance		
Labor[2]	$ 161,000.00	$ 1,118,852.23
Subtotal	$ 161,000.00	$ 1,118,852.23
Replacement		
Parts	$ 11,297.47	$ 78,510.56
Subtotal	$ 11,297.47	$ 78,510.56
TOTAL	$ 212,977.60	$ 1,480,064.96

Notes:

1) See electricy costs appendix for per unit annual electrical cost calculations.
2) Annual maintenance labor costs are based on 2 FTE $161,000/yr (salary + benefits)
3) Capital costs are for secondary treatment system only.

Replacement - Secondary Treatment Only

Year	Membrane Diffusers Every 7 years: Present Cost 880@$10 ea.	Membrane Diffusers Every 7 years: Inflated Yearly Cost	Blower Belt Every 2 years: Present Cost 12 @ $75 ea	Blower Belt Every 2 years: Inflated Yearly Cost	Blower Lubrication Every year: Present Cost 4 @ $1000 ea	Blower Lubrication Every year: Inflated Yearly Cost	Blower Filters 6 times per year: Present Cost 24 @ $150 ea	Blower Filters 6 times per year: Inflated Yearly Cost	WAS Pump Seals Every 5 years: Present Cost 4 @ $1000 ea.	WAS Pump Seals Every 5 years: Inflated Yearly Cost	Part: Present Cost	Part: Inflated Yearly Cost	Total Inflated Yearly Cost	Present Worth
0	$ 8,800.00	$ -	$ 900.00	$ -	$ 4,000.00	$ -	$ 3,600.00	$ -	$ 4,000.00	$ -	$ -	$ -	$ -	$ -
1		$ -		$ -		$ 4,120.00		$ 3,708.00		$ -		$ -	$ 7,828.00	$ 7,473.03
2		$ -		$ 954.31		$ 4,243.60		$ 3,819.24		$ -		$ -	$ 9,017.65	$ 8,218.36
3		$ -		$ -		$ 4,370.91		$ 3,933.82		$ -		$ -	$ 8,304.73	$ 7,225.42
4		$ -		$ 1,012.96		$ 4,502.04		$ 4,051.83		$ -		$ -	$ 9,566.82	$ 7,946.06
5		$ -		$ -		$ 4,637.10		$ 4,173.39		$ 4,637.10		$ -	$ 13,447.58	$ 10,662.87
6		$ -		$ 1,074.85		$ 4,776.21		$ 4,296.59		$ -		$ -	$ 10,149.44	$ 7,682.77
7		$ 10,822.89		$ -		$ 4,919.50		$ 4,427.55		$ -		$ -	$ 20,169.93	$ 14,575.59
8		$ -		$ 1,140.09		$ 5,067.08		$ 4,560.37		$ -		$ -	$ 10,767.55	$ 7,428.22
9		$ -		$ -		$ 5,219.09		$ 4,697.18		$ -		$ -	$ 9,916.28	$ 6,533.74
10		$ -		$ 1,209.52		$ 5,375.67		$ 4,838.10		$ 5,375.67		$ -	$ 16,798.95	$ 10,561.90
11												$ -	$ -	$ -
12												$ -	$ -	$ -
13												$ -	$ -	$ -
14												$ -	$ -	$ -
15												$ -	$ -	$ -
16												$ -	$ -	$ -
17												$ -	$ -	$ -
18												$ -	$ -	$ -
19												$ -	$ -	$ -
20												$ -	$ -	$ -
											TOTAL PRESENT WORTH	=		$ 88,304.96

TABLE G-20
MBR
Harrisburg WWTP
8/16/2007
Design Condition 2021

PRELIMINARY

Aeration Blowers		
Nameplate Horsepower:		75
Electricity Cost:	$	0.06
1hp=		0.746 kwh
Number of units:		2
Hours of operation per day:		24
Total Max Electricity Draw:		111.90 KW H
Annual Electricity Cost:	$	58,814.640
Design life:		10 years
Interest Rate:		5%
Inflation Rate:		3%
Electricity Present Worth:	$	521,091.69

RAS Pumps		
Nameplate Horsepower:		0.75
Electricity Cost:	$	0.06
1hp=		0.746 kwh
Number of units:		6
Hours of operation per day:		6
Total Max Electricity Draw:		3.36 KW H
Annual Electricity Cost:	$	441.110
Design life:		10 years
Interest Rate:		5%
Inflation Rate:		3%
Electricity Present Worth:	$	3,908.19

WAS Pumps		
Nameplate Horsepower:		3
Electricity Cost:	$	0.06
1hp=		0.746 kwh
Number of units:		3
Hours of operation per day:		6
Total Max Electricity Draw:		6.71 KW H
Annual Electricity Cost:	$	882.220
Design life:		10 years
Interest Rate:		5%
Inflation Rate:		3%
Electricity Present Worth:	$	7,816.38

Membrane Air Scour Blowers		
Nameplate Horsepower:		15
Electricity Cost:	$	0.06
1hp=		0.746 kwh
Number of units:		1
Hours of operation per day:		2
Total Max Electricity Draw:		11.19 KW H
Annual Electricity Cost:	$	490.122
Design life:		10 years
Interest Rate:		5%
Inflation Rate:		3%
Electricity Present Worth:	$	4,342.43

Permeate/Backpulse Pumps		
Nameplate Horsepower:		5
Electricity Cost:	$	0.06
1hp=		0.746 kwh
Number of units:		2
Hours of operation per day:		1
Total Max Electricity Draw:		7.46 KW H
Annual Electricity Cost:	$	163.374
Design life:		10 years
Interest Rate:		5%
Inflation Rate:		3%
Electricity Present Worth:	$	1,447.48

SECONDARY TREATMENT OMR COSTS

Design Condition		2021 (from 2011 thru 2021)
Design Life	10	years
Interest Rate	4.75%	
Inflation Rate	3%	

	MBR	
Capital Cost[3]:		
Item	Annual Cost	2007 Present Worth
Operation		
Electricity[1]		
Blowers	$ 58,814.64	$ 432,810.73
RAS Pumps	$ 441.11	$ 3,246.09
Membrane Blowers	$ 490.12	$ 3,606.76
Permeate/Backpulse pumps	$ 183.37	$ 1,202.25
WAS pumps	$ 882.22	$ 6,492.16
Subtotal	$ 60,791.47	$ 447,357.98
Maintenance		
Labor[2]	$ 90,000.00	$ 662,300.51
Subtotal	$ 90,000.00	$ 662,300.51
Replacement		
Cleaning Chemicals	$ 6,000.00	$ 58,871.16
Parts	$ 13,352.61	$ 98,260.43
Subtotal	$ 13,352.61	$ 157,131.58
TOTAL	$ 164,144.07	$ 1,266,790.07

Notes:
1) See electricity costs appendix for per unit annual electrical cost calculations.
2) Annual maintenance labor costs are based on 1 1/2 persons, $60,000/yr (salary + benefits)
3) Capital costs are for secondary treatment system only.

Replacement - Secondary Treatment Only

	Part																	
	Membrane Diffusers Every 7 years		Blower Belt Every 2 years		Blower Lubrication Every year		Blower Filters 6 times per year		WAS Pump Seals Every 5 years		RAS Pump Seals Every 5 years		UF Membrane Replacement Every 10 years		Permeate/Backpulse Pump Seals Every 5 years			
Year	Present Cost 440@$10 ea.	Inflated Yearly Cost	Present Cost 12 @ $75 ea	Inflated Yearly Cost	Present Cost 4 @ $1000 ea	Inflated Yearly Cost	Present Cost 24 @ $150 ea	Inflated Yearly Cost	Present Cost 3 @ $1000 ea.	Inflated Yearly Cost	Present Cost 6 @ $1000 ea.	Inflated Yearly Cost	Present Cost 12@ $1100 ea	Inflated Yearly Cost	Present Cost 2 @ $1000 ea.	Inflated Yearly Cost	Total Inflated Yearly Cost	Present Worth
0	$ 4,400.00	$ -	$ 900.00	$ -	$ 4,000.00	$ -	$ 3,600.00	$ -	$ 3,000.00	$ -	$ 5,000.00	$ -	$ 13,200.00	$ -	$ 2,000.00	$ -	$ -	$ -
1		$ -		$ -		$ 4,120.00		$ 3,708.00		$ -		$ -		$ -		$ -	$ 7,828.00	$ 7,473.03
2		$ -		$ 954.81		$ 4,243.60		$ 3,819.24		$ -		$ -		$ -		$ -	$ 9,017.65	$ 8,218.38
3		$ -		$ -		$ 4,370.91		$ 3,933.82		$ -		$ -		$ -		$ -	$ 8,304.73	$ 7,225.42
4		$ -		$ 1,012.96		$ 4,502.04		$ 4,051.83		$ -		$ -		$ -		$ -	$ 9,566.82	$ 7,946.06
5		$ -		$ -		$ 4,637.10		$ 4,173.39		$ 3,477.82		$ 6,955.64		$ -		$ -	$ 10,149.44	$ 7,682.77
6		$ -		$ 1,074.65		$ 4,776.21		$ 4,298.59		$ -		$ -		$ -		$ 2,318.55	$ 14,758.49	$ 10,865.07
7		$ 5,411.45		$ -		$ 4,919.50		$ 4,427.55		$ -		$ -		$ -		$ -	$ 10,767.55	$ 7,428.22
8		$ -		$ 1,140.09		$ 5,067.08		$ 4,560.37		$ -		$ -		$ -		$ -	$ 9,916.28	$ 6,530.74
9		$ -		$ -		$ 5,219.09		$ 4,697.18		$ -		$ -		$ -		$ -	$ 41,258.23	$ 25,940.02
10		$ -		$ 1,209.52		$ 5,375.67		$ 4,838.10		$ 4,031.75		$ 8,083.50		$ 17,739.70		$ 2,687.83	$ -	$ -
11																	$ -	$ -
12																	$ -	$ -
13																	$ -	$ -
14																	$ -	$ -
15																	$ -	$ -
16																	$ -	$ -
17																	$ -	$ -
18																	$ -	$ -
19																	$ -	$ -
20																	$ -	$ -
											TOTAL PRESENT WORTH	=	$ 104,368.62					

TABLE G-22
MBR
Harrisburg WWTP
8/16/2007
Design Condition 2031

PRELIMINARY

Aeration Blowers		
Nameplate Horsepower:		75
Electricity Cost:	$	0.06
1hp=		0.746 kwh
Number of units:		4
Hours of operation per day:		24
Total Max Electricity Draw:		223.80 KW H
Annual Electricity Cost:	$	117,629.280
Design life:		10 years
Interest Rate:		5%
Inflation Rate:		3%
Electricity 2011 Present Worth:	$	1,042,183.38

RAS Pumps		
Nameplate Horsepower:		0.75
Electricity Cost:	$	0.06
1hp=		0.746 kwh
Number of units:		12
Hours of operation per day:		6
Total Max Electricity Draw:		6.71 KW H
Annual Electricity Cost:	$	882.220
Design life:		10 years
Interest Rate:		5%
Inflation Rate:		3%
Electricity Present Worth:	$	7,816.38

WAS Pumps		
Nameplate Horsepower:		3
Electricity Cost:	$	0.06
1hp=		0.746 kwh
Number of units:		3
Hours of operation per day:		6
Total Max Electricity Draw:		6.71 KW H
Annual Electricity Cost:	$	882.220
Design life:		10 years
Interest Rate:		5%
Inflation Rate:		3%
Electricity Present Worth:	$	7,816.38

Membrane Air Scour Blowers		
Nameplate Horsepower:		15
Electricity Cost:	$	0.06
1hp=		0.746 kwh
Number of units:		2
Hours of operation per day:		2
Total Max Electricity Draw:		22.38 KW H
Annual Electricity Cost:	$	980.244
Design life:		10 years
Interest Rate:		5%
Inflation Rate:		3%
Electricity Present Worth:	$	8,684.86

Permeate/Backpulse Pumps		
Nameplate Horsepower:		5
Electricity Cost:	$	0.06
1hp=		0.746 kwh
Number of units:		4
Hours of operation per day:		1
Total Max Electricity Draw:		14.92 KW H
Annual Electricity Cost:	$	326.748
Design life:		10 years
Interest Rate:		5%
Inflation Rate:		3%
Electricity Present Worth:	$	2,894.95

SECONDARY TREATMENT OMR COSTS

Design Condition		2031 (from 2021 thru 2031)
Design Life	14	years
all costs based on 2007 dollars		
Interest Rate	4.75%	
Inflation Rate	3%	
Net Rate	1.75%	

MBR		
Capital Cost[3]:		
Item	Annual Cost	2011 Present Worth
Operation		
Electricity[1]		
Blowers	$ 117,629.28	$ 817,452.06
RAS pumps	$ 882.22	$ 6,130.89
Membrane Blowers	$ 980.24	$ 6,812.10
Permeate/backpulse pumps	$ 326.75	$ 2,270.70
WAS pumps	$ 882.22	$ 6,130.89
Subtotal	$ 120,700.71	$ 838,796.65
Maintenance		
Labor[2]	$ 161,000.00	$ 1,118,852.23
Subtotal	$ 161,000.00	$ 1,118,852.23
Replacement		
Cleaning Chemicals	$ 8,000.00	$ 55,595.14
Parts	$ 20,839.36	$ 144,820.92
Subtotal	$ 20,839.36	$ 200,416.06
TOTAL	$ 302,540.07	$ 2,158,064.93

Notes:

1) See electricy costs appendix for per unit annual electrical cost calculations.
2) Annual maintenance labor costs are based on 2 FTE $161,000/yr (salary + benefits)
3) Capital costs are for secondary treatment system only.

Replacement - Secondary Treatment Only

	Part																			
	Membrane Diffusers Every 7 years		Blower Belt Every 2 years		Blower Lubrication Every year		Blower Filters 6 times per year		WAS Pump Seals Every 5 years		RAS Pump Seals Every 5 years		Permeate/Backpulse Pump Seals Every 5 years		UF Membrane Replacement Every 10 years			
Year	Present Cost 880@$10 ea.	Inflated Yearly Cost	Present Cost 12 @ $75 ea	Inflated Yearly Cost	Present Cost 4 @ $1000 ea	Inflated Yearly Cost	Present Cost 48 @ $150 ea	Inflated Yearly Cost	Present Cost 3 @ $1000 ea.	Inflated Yearly Cost	Present Cost 12 @ $1000 ea.	Inflated Yearly Cost	Present Cost 4 @ $1000 ea.	Inflated Yearly Cost	Present Cost 24@ $1100 ea	Inflated Yearly Cost	Total Inflated Yearly Cost	Present Worth
0	$ 880.00	$ -	$ 900.00	$ -	$ 4,000.00	$ -	$ 7,200.00	$ -	$ 3,000.00	$ -	$ 12,000.00	$ -	$ 4,000.00	$ -	$ 28,400.00	$ -	$ -	$ -
1		$ -		$ -		$ 4,120.00		$ 7,416.00		$ -		$ -		$ -		$ -	$ 11,536.00	$ 11,012.89
2		$ -		$ 954.81		$ 4,243.60		$ 7,638.48		$ -		$ -		$ -		$ -	$ 12,836.89	$ 11,699.08
3		$ -		$ -		$ 4,370.91		$ 7,867.63		$ -		$ -		$ -		$ -	$ 12,238.54	$ 10,647.99
4		$ -		$ 1,012.96		$ 4,502.04		$ 8,103.66		$ -		$ -		$ -		$ -	$ 13,618.66	$ 11,311.45
5		$ -		$ -		$ 4,637.10		$ 8,346.77		$ 3,477.82		$13,911.29		$ 4,637.10		$ -	$ 35,010.08	$ 27,760.22
6		$ -		$ 1,074.65		$ 4,776.21		$ 8,597.18		$ -		$ -		$ -		$ -	$ 14,448.03	$ 10,938.66
7		$ 1,082.29		$ -		$ 4,919.50		$ 8,855.09		$ -		$ -		$ -		$ -	$ 14,856.88	$ 10,735.17
8		$ -		$ 1,140.09		$ 5,067.08		$ 9,120.74		$ -		$ -		$ -		$ -	$ 15,327.92	$ 10,574.28
9		$ -		$ -		$ 5,219.09		$ 9,394.37		$ -		$ -		$ -		$ -	$ 14,613.46	$ 9,924.25
10		$ -		$ 1,209.52		$ 5,375.67		$ 9,676.20		$ 4,031.75		$16,127.00		$ 5,375.67		$ 35,479.39	$ 77,275.19	$ 48,584.73
11																	$ -	$ -
12																	$ -	$ -
13																	$ -	$ -
14																	$ -	$ -
15																	$ -	$ -
16																	$ -	$ -
17																	$ -	$ -
18																	$ -	$ -
19																	$ -	$ -
20																	$ -	$ -
											TOTAL PRESENT WORTH	=	$ 162,887.71					

TABLE G-24
UV Disinfection - SBR
Harrisburg WWTP
8/16/2007

PRELIMINARY

UV Modules - 2021		
Nameplate Horsepower:		
Electricity Cost:	$	0.06
Power draw per unit		12.6 kW
Number of units:		2
Hours of operation per day:		18
Total Max Electricity Draw:		25.20 KW H
Annual Electricity Cost:	$	9,933.840
Design life:		10 years
Interest Rate:		5%
Inflation Rate:		3%
Electricity Present Worth:	$	88,012.81

UV Modules - 2031		
Nameplate Horsepower:		
Electricity Cost:	$	0.06
Power draw per unit		12.6 kW
Number of units:		2
Hours of operation per day:		18
Total Max Electricity Draw:		25.20 KW H
Annual Electricity Cost:	$	9,933.840
Design life:		10 years
Interest Rate:		5%
Inflation Rate:		3%
Electricity Present Worth:	$	88,012.81

TABLE G-25
UV Disinfection - AS
Harrisburg WWTP
8/16/2007

PRELIMINARY

UV Modules - 2021		
Nameplate Horsepower:		
Electricity Cost:	$	0.06
Power draw per unit		12.6 kW
Number of units:		1
Hours of operation per day:		24
Total Max Electricity Draw:		12.60 KW H
Annual Electricity Cost:	$	6,622.560
Design life:		10 years
Interest Rate:		5%
Inflation Rate:		3%
Electricity Present Worth:	$	58,675.20

UV Modules - 2031		
Nameplate Horsepower:		
Electricity Cost:	$	0.06
Power draw per unit		12.6 kW
Number of units:		2
Hours of operation per day:		24
Total Max Electricity Draw:		25.20 KW H
Annual Electricity Cost:	$	13,245.120
Design life:		10 years
Interest Rate:		5%
Inflation Rate:		3%
Electricity Present Worth:	$	117,350.41

TABLE G-26
UV Disinfection - MBR
Harrisburg WWTP
8/16/2007

PRELIMINARY

UV Modules - 2021		
Nameplate Horsepower:		
Electricity Cost:	$ 0.06	
Power draw per unit	12.6	kW
Number of units:	1	
Hours of operation per day:	24	
Total Max Electricity Draw:	12.60	KW H
Annual Electricity Cost:	$ 6,622.560	
Design life:	10	years
Interest Rate:	5%	
Inflation Rate:	3%	
Electricity Present Worth:	$ 58,675.20	

UV Modules - 2031		
Nameplate Horsepower:		
Electricity Cost:	$ 0.06	
Power draw per unit	12.6	kW
Number of units:	2	
Hours of operation per day:	24	
Total Max Electricity Draw:	25.20	KW H
Annual Electricity Cost:	$ 13,245.120	
Design life:	10	years
Interest Rate:	5%	
Inflation Rate:	3%	
Electricity Present Worth:	$ 117,350.41	

TABLE G-27
UV DISINFECTION OMR COSTS

Design Life	10	years
Design Year	2021	
Interest Rate	4.75%	
Inflation Rate	3%	
Net Rate	1.75%	

UV-SBR

Capital Cost[3]:

Item	Annual Cost	2007 Present Worth
Operation		
Electricity[1]		
UV Modules	$ 9,933.84	$ 73,102.08
Subtotal	$ 9,933.84	$ 73,102.08
Maintenance		
Labor[2]	$ -	$ -
Subtotal	$ -	$ -
Replacement		
Parts	$ 11,576.79	$ 85,192.40
Subtotal	$ 11,576.79	$ 85,192.40
TOTAL	$ 21,510.63	$ 158,294.48

Notes:
1) UV disinfection only
2) Included with secondary treatment cost
3) Capital costs are for solids treatment and disposal systems only.

UV-AS

Capital Cost[3]:

Item	Annual Cost	2007 Present Worth
Operation		
Electricity[1]		
UV Modules	$ 6,622.56	$ 48,734.72
Subtotal	$ 6,622.56	$ 48,734.72
Maintenance		
Labor[2]	$ -	$ -
Subtotal	$ -	$ -
Replacement		
Parts	$ 5,788.40	$ 42,596.20
Subtotal	$ 5,788.40	$ 42,596.20
TOTAL	$ 12,410.96	$ 91,330.92

Notes:
1) UV disinfection only
2) Included with secondary treatment cost
3) Capital costs are for solids treatment and disposal systems only.

UV-MBR

Capital Cost[3]:

Item	Annual Cost	2007 Present Worth
Operation		
Electricity[1]		
UV Modules	$ 6,622.56	$ 48,734.72
Subtotal	$ 6,622.56	$ 48,734.72
Maintenance		
Labor[2]	$ -	$ -
Subtotal	$ -	$ -
Replacement		
Parts	$ 5,788.40	$ 42,596.20
Subtotal	$ 5,788.40	$ 42,596.20
TOTAL	$ 12,410.96	$ 91,330.92

Notes:
1) UV disinfection only
2) Included with secondary treatment cost
3) Capital costs are for solids treatment and disposal systems only.

Replacement - UV Disinfection - SBR

Year	Part: Lamp Replacement Every 2 years — Present Cost 80 @ $250 ea	Inflated Yearly Cost	Present Cost 3 @ $1000 ea	Inflated Yearly Cost	Present Cost 18 @ $150 ea	Inflated Yearly Cost	Present Cost 80 @ $10 ea	Inflated Yearly Cost	Present Cost 2 @ $1000 ea	Inflated Yearly Cost	Present Cost 1 @ $350 ea	Inflated Yearly Cost	Total Inflated Yearly Cost	Present Worth
0	$ 20,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
1		$ -		$ -		$ -		$ -		$ -		$ -	$ -	$ -
2		$ 21,218.00		$ -		$ -		$ -		$ -		$ -	$ 21,218.00	$ 19,337.32
3		$ -		$ -		$ -		$ -		$ -		$ -	$ -	$ -
4		$ 22,510.18		$ -		$ -		$ -		$ -		$ -	$ 22,510.18	$ 18,696.61
5		$ -		$ -		$ -		$ -		$ -		$ -	$ -	$ -
6		$ 23,881.05		$ -		$ -		$ -		$ -		$ -	$ 23,881.05	$ 18,077.12
7		$ -		$ -		$ -		$ -		$ -		$ -	$ -	$ -
8		$ 25,335.40		$ -		$ -		$ -		$ -		$ -	$ 25,335.40	$ 17,478.15
9		$ -		$ -		$ -		$ -		$ -		$ -	$ -	$ -
10		$ 26,878.33		$ -		$ -		$ -		$ -		$ -	$ 26,878.33	$ 16,899.04
11				$ -		$ -		$ -		$ -		$ -	$ -	$ -
12				$ -		$ -		$ -		$ -		$ -	$ -	$ -
13				$ -		$ -		$ -		$ -		$ -	$ -	$ -
14				$ -		$ -		$ -		$ -		$ -	$ -	$ -
15				$ -		$ -		$ -		$ -		$ -	$ -	$ -
16				$ -		$ -		$ -		$ -		$ -	$ -	$ -
17				$ -		$ -		$ -		$ -		$ -	$ -	$ -
18				$ -		$ -		$ -		$ -		$ -	$ -	$ -
19				$ -		$ -		$ -		$ -		$ -	$ -	$ -
20				$ -		$ -		$ -		$ -		$ -	$ -	$ -
													TOTAL PRESENT WORTH =	$ 90,488.24

Replacement - UV Disinfection - Conv. AS

Year	Part: Lamp Replacement Every 2 years — Present Cost 40 @ $250 ea	Inflated Yearly Cost	Present Cost 3 @ $1000 ea	Inflated Yearly Cost	Present Cost 18 @ $150 ea	Inflated Yearly Cost	Present Cost 80 @ $10 ea	Inflated Yearly Cost	Present Cost 2 @ $1000 ea	Inflated Yearly Cost	Present Cost 1 @ $350 ea	Inflated Yearly Cost	Total Inflated Yearly Cost	Present Worth
0	$ 10,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
1		$ -		$ -		$ -		$ -		$ -		$ -	$ -	$ -
2		$ 10,609.00		$ -		$ -		$ -		$ -		$ -	$ 10,609.00	$ 9,668.66
3		$ -		$ -		$ -		$ -		$ -		$ -	$ -	$ -
4		$ 11,255.09		$ -		$ -		$ -		$ -		$ -	$ 11,255.09	$ 9,348.30
5		$ -		$ -		$ -		$ -		$ -		$ -	$ -	$ -
6		$ 11,940.52		$ -		$ -		$ -		$ -		$ -	$ 11,940.52	$ 9,038.56
7		$ -		$ -		$ -		$ -		$ -		$ -	$ -	$ -
8		$ 12,667.70		$ -		$ -		$ -		$ -		$ -	$ 12,667.70	$ 8,739.08
9		$ -		$ -		$ -		$ -		$ -		$ -	$ -	$ -
10		$ 13,439.16		$ -		$ -		$ -		$ -		$ -	$ 13,439.16	$ 8,449.52
11				$ -		$ -		$ -		$ -		$ -	$ -	$ -
12				$ -		$ -		$ -		$ -		$ -	$ -	$ -
13				$ -		$ -		$ -		$ -		$ -	$ -	$ -
14				$ -		$ -		$ -		$ -		$ -	$ -	$ -
15				$ -		$ -		$ -		$ -		$ -	$ -	$ -
16				$ -		$ -		$ -		$ -		$ -	$ -	$ -
17				$ -		$ -		$ -		$ -		$ -	$ -	$ -
18				$ -		$ -		$ -		$ -		$ -	$ -	$ -
19				$ -		$ -		$ -		$ -		$ -	$ -	$ -
20				$ -		$ -		$ -		$ -		$ -	$ -	$ -
													TOTAL PRESENT WORTH =	$ 45,244.12

Replacement - UV Disinfection - Conv. AS

Year	Part: Lamp Replacement Every 2 years — Present Cost 40 @ $250 ea	Inflated Yearly Cost	Present Cost 3 @ $1000 ea	Inflated Yearly Cost	Present Cost 18 @ $150 ea	Inflated Yearly Cost	Present Cost 80 @ $10 ea	Inflated Yearly Cost	Present Cost 2 @ $1000 ea	Inflated Yearly Cost	Present Cost 1 @ $350 ea	Inflated Yearly Cost	Total Inflated Yearly Cost	Present Worth
0	$ 10,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
1		$ -		$ -		$ -		$ -		$ -		$ -	$ -	$ -
2		$ 10,609.00		$ -		$ -		$ -		$ -		$ -	$ 10,609.00	$ 9,668.66
3		$ -		$ -		$ -		$ -		$ -		$ -	$ -	$ -
4		$ 11,255.09		$ -		$ -		$ -		$ -		$ -	$ 11,255.09	$ 9,348.30
5		$ -		$ -		$ -		$ -		$ -		$ -	$ -	$ -
6		$ 11,940.52		$ -		$ -		$ -		$ -		$ -	$ 11,940.52	$ 9,038.56
7		$ -		$ -		$ -		$ -		$ -		$ -	$ -	$ -
8		$ 12,667.70		$ -		$ -		$ -		$ -		$ -	$ 12,667.70	$ 8,739.08
9		$ -		$ -		$ -		$ -		$ -		$ -	$ -	$ -
10		$ 13,439.16		$ -		$ -		$ -		$ -		$ -	$ 13,439.16	$ 8,449.52
11				$ -		$ -		$ -		$ -		$ -	$ -	$ -
12				$ -		$ -		$ -		$ -		$ -	$ -	$ -
13				$ -		$ -		$ -		$ -		$ -	$ -	$ -
14				$ -		$ -		$ -		$ -		$ -	$ -	$ -
15				$ -		$ -		$ -		$ -		$ -	$ -	$ -
16				$ -		$ -		$ -		$ -		$ -	$ -	$ -
17				$ -		$ -		$ -		$ -		$ -	$ -	$ -
18				$ -		$ -		$ -		$ -		$ -	$ -	$ -
19				$ -		$ -		$ -		$ -		$ -	$ -	$ -
20				$ -		$ -		$ -		$ -		$ -	$ -	$ -
													TOTAL PRESENT WORTH =	$ 45,244.12

TABLE G-28
UV DISINFECTION OMR COSTS
all costs based on 2007 dollars

Design Life	**14**	**years**
Design Year	**2031**	
Interest Rate	**4.75%**	
Inflation Rate	**3%**	
Net Rate	**1.75%**	

UV-SBR

Capital Cost[3]:

Item	Annual Cost	2007 Present Worth
Operation		
Electricity[1]		
UV Modules	$ 9,933.84	$ 69,034.16
Subtotal	$ 9,933.84	$ 69,034.16
Maintenance		
Labor[2]	$ -	$ -
Subtotal	$ -	$ -
Replacement		
Parts	$ 8,995.95	$ 62,516.37
Subtotal	$ 8,995.95	$ 62,516.37
TOTAL	**$ 18,929.79**	**$ 131,550.53**

Notes:
1) UV disinfection only
2) Included with secondary treatment cost
3) Capital costs are for solids treatment and disposal systems only.

UV-AS

Capital Cost[3]:

Item	Annual Cost	2007 Present Worth
Operation		
Electricity[1]		
UV Modules	$ 13,245.12	$ 92,045.54
Subtotal	$ 13,245.12	$ 92,045.54
Maintenance		
Labor[2]	$ -	$ -
Subtotal	$ -	$ -
Replacement		
Parts	$ 8,995.95	$ 62,516.37
Subtotal	$ 8,995.95	$ 62,516.37
TOTAL	**$ 22,241.07**	**$ 154,561.91**

Notes:
1) UV disinfection only
2) Included with secondary treatment cost
3) Capital costs are for solids treatment and disposal systems only.

UV-MBR

Capital Cost[3]:

Item	Annual Cost	2007 Present Worth
Operation		
Electricity[1]		
UV Modules	$ 13,245.12	$ 92,045.54
Subtotal	$ 13,245.12	$ 92,045.54
Maintenance		
Labor[2]	$ -	$ -
Subtotal	$ -	$ -
Replacement		
Parts	$ 8,995.95	$ 62,516.37
Subtotal	$ 8,995.95	$ 62,516.37
TOTAL	**$ 22,241.07**	**$ 154,561.91**

Notes:
1) UV disinfection only
2) Included with secondary treatment cost
3) Capital costs are for solids treatment and disposal systems only.

Replacement - UV Disinfection - SBR

	Part															
	Lamp Replacement Every 2 years															
Year	Present Cost 80 @ $250 ea	Inflated Yearly Cost	Present Cost 3 @ $1000 ea	Inflated Yearly Cost	Present Cost 18 @ $150 ea	Inflated Yearly Cost	Present Cost 80 @ $10 ea	Inflated Yearly Cost	Present Cost 2 @ $1000 ea	Inflated Yearly Cost	Present Cost 1 @ $350 ea	Inflated Yearly Cost	Total Inflated Yearly Cost	Present Worth
0	$ 20,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
1		$ -		$ -		$ -		$ -		$ -		$ -	$ -	$ -
2		$ 21,218.00		$ -		$ -		$ -		$ -		$ -	$ 21,218.00	$ 19,337.32
3		$ -		$ -		$ -		$ -		$ -		$ -	$ -	$ -
4		$ 22,510.18		$ -		$ -		$ -		$ -		$ -	$ 22,510.18	$ 18,696.61
5		$ -		$ -		$ -		$ -		$ -		$ -	$ -	$ -
6		$ 23,881.05		$ -		$ -		$ -		$ -		$ -	$ 23,881.05	$ 18,077.12
7		$ -		$ -		$ -		$ -		$ -		$ -	$ -	$ -
8		$ 25,335.40		$ -		$ -		$ -		$ -		$ -	$ 25,335.40	$ 17,478.15
9		$ -		$ -		$ -		$ -		$ -		$ -	$ -	$ -
10		$ 26,878.33		$ -		$ -		$ -		$ -		$ -	$ 26,878.33	$ 16,899.04
11				$ -		$ -		$ -		$ -		$ -	$ -	$ -
12				$ -		$ -		$ -		$ -		$ -	$ -	$ -
13				$ -		$ -		$ -		$ -		$ -	$ -	$ -
14				$ -		$ -		$ -		$ -		$ -	$ -	$ -
15				$ -		$ -		$ -		$ -		$ -	$ -	$ -
16				$ -		$ -		$ -		$ -		$ -	$ -	$ -
17				$ -		$ -		$ -		$ -		$ -	$ -	$ -
18				$ -		$ -		$ -		$ -		$ -	$ -	$ -
19				$ -		$ -		$ -		$ -		$ -	$ -	$ -
20				$ -		$ -		$ -		$ -		$ -	$ -	$ -
												TOTAL PRESENT WORTH	=	**$ 90,488.24**

Replacement - UV Disinfection - Conv. AS

	Part															
	Lamp Replacement Every 2 years															
Year	Present Cost 80 @ $250 ea	Inflated Yearly Cost	Present Cost 3 @ $1000 ea	Inflated Yearly Cost	Present Cost 18 @ $150 ea	Inflated Yearly Cost	Present Cost 80 @ $10 ea	Inflated Yearly Cost	Present Cost 2 @ $1000 ea	Inflated Yearly Cost	Present Cost 1 @ $350 ea	Inflated Yearly Cost	Total Inflated Yearly Cost	Present Worth
0	$ 20,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
1		$ -		$ -		$ -		$ -		$ -		$ -	$ -	$ -
2		$ 21,218.00		$ -		$ -		$ -		$ -		$ -	$ 21,218.00	$ 19,337.32
3		$ -		$ -		$ -		$ -		$ -		$ -	$ -	$ -
4		$ 22,510.18		$ -		$ -		$ -		$ -		$ -	$ 22,510.18	$ 18,696.61
5		$ -		$ -		$ -		$ -		$ -		$ -	$ -	$ -
6		$ 23,881.05		$ -		$ -		$ -		$ -		$ -	$ 23,881.05	$ 18,077.12
7		$ -		$ -		$ -		$ -		$ -		$ -	$ -	$ -
8		$ 25,335.40		$ -		$ -		$ -		$ -		$ -	$ 25,335.40	$ 17,478.15
9		$ -		$ -		$ -		$ -		$ -		$ -	$ -	$ -
10		$ 26,878.33		$ -		$ -		$ -		$ -		$ -	$ 26,878.33	$ 16,899.04
11				$ -		$ -		$ -		$ -		$ -	$ -	$ -
12				$ -		$ -		$ -		$ -		$ -	$ -	$ -
13				$ -		$ -		$ -		$ -		$ -	$ -	$ -
14				$ -		$ -		$ -		$ -		$ -	$ -	$ -
15				$ -		$ -		$ -		$ -		$ -	$ -	$ -
16				$ -		$ -		$ -		$ -		$ -	$ -	$ -
17				$ -		$ -		$ -		$ -		$ -	$ -	$ -
18				$ -		$ -		$ -		$ -		$ -	$ -	$ -
19				$ -		$ -		$ -		$ -		$ -	$ -	$ -
20				$ -		$ -		$ -		$ -		$ -	$ -	$ -
												TOTAL PRESENT WORTH	=	**$ 90,488.24**

Replacement - UV Disinfection - Conv. AS

	Part															
	Lamp Replacement Every 2 years															
Year	Present Cost 80 @ $250 ea	Inflated Yearly Cost	Present Cost 3 @ $1000 ea	Inflated Yearly Cost	Present Cost 18 @ $150 ea	Inflated Yearly Cost	Present Cost 80 @ $10 ea	Inflated Yearly Cost	Present Cost 2 @ $1000 ea	Inflated Yearly Cost	Present Cost 1 @ $350 ea	Inflated Yearly Cost	Total Inflated Yearly Cost	Present Worth
0	$ 20,000.00	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
1		$ -		$ -		$ -		$ -		$ -		$ -	$ -	$ -
2		$ 21,218.00		$ -		$ -		$ -		$ -		$ -	$ 21,218.00	$ 19,337.32
3		$ -		$ -		$ -		$ -		$ -		$ -	$ -	$ -
4		$ 22,510.18		$ -		$ -		$ -		$ -		$ -	$ 22,510.18	$ 18,696.61
5		$ -		$ -		$ -		$ -		$ -		$ -	$ -	$ -
6		$ 23,881.05		$ -		$ -		$ -		$ -		$ -	$ 23,881.05	$ 18,077.12
7		$ -		$ -		$ -		$ -		$ -		$ -	$ -	$ -
8		$ 25,335.40		$ -		$ -		$ -		$ -		$ -	$ 25,335.40	$ 17,478.15
9		$ -		$ -		$ -		$ -		$ -		$ -	$ -	$ -
10		$ 26,878.33		$ -		$ -		$ -		$ -		$ -	$ 26,878.33	$ 16,899.04
11				$ -		$ -		$ -		$ -		$ -	$ -	$ -
12				$ -		$ -		$ -		$ -		$ -	$ -	$ -
13				$ -		$ -		$ -		$ -		$ -	$ -	$ -
14				$ -		$ -		$ -		$ -		$ -	$ -	$ -
15				$ -		$ -		$ -		$ -		$ -	$ -	$ -
16				$ -		$ -		$ -		$ -		$ -	$ -	$ -
17				$ -		$ -		$ -		$ -		$ -	$ -	$ -
18				$ -		$ -		$ -		$ -		$ -	$ -	$ -
19				$ -		$ -		$ -		$ -		$ -	$ -	$ -
20				$ -		$ -		$ -		$ -		$ -	$ -	$ -
												TOTAL PRESENT WORTH	=	**$ 90,488.24**

TABLE G-29
Harrisburg WWTP Improvements
Design Life 10 years
Design Condition 2021 (from 2011-2021)
7/13/2007

PRELIMINARY

	Solids Treatment & Disposal Unit									
	RDT	Polymer Feed Pump	Polymer Mixer	Aeration Blowers	RDT Feed Pumps	RDT-to-Digester Feed Pumps	Belt Filter Press Feed Pump	Belt Filter Press	BFP-to-Sludge Storage Tank Feed Pumps	Sludge Storage Tank Mixer
Nameplate Horsepower	0	0.5	0.5	125	0	0	5	10	5	15
Daily Hours of Operation	4	4	4	24	4	4	4	4	4	1
Electricity Cost, $			0.06							
			1 hp = 0.746 KWH							
Max Electricity Draw, KWH	0	0.373	0.373	93.25	0	0	3.73	7.46	3.73	11.19
Annual Electricity Cost	$ -	$ 32.67	$ 32.67	$ 49,012.20	$ -	$ -	$ 46.55	$ 93.10	$ 326.75	$ 34.91
Number of Units	1	1	1	2	1	1	1	1	1	1
Total Annual Electricity Cost	$ -	$ 32.67	$ 32.67	$ 98,024.40	$ -	$ -	$ 46.55	$ 93.10	$ 326.75	$ 34.91
TOTAL	$									98,591.06

SOLIDS TREATMENT OMR COSTS

Harrisburg WWTP Improvements

Design Life	10	years
Design Condition	2021	(from 2011-2021)
Interest Rate	4.75%	
Inflation Rate	3%	

Alternative 1 - Aerobic Digester		
Capital Cost[3]:	????	
Item	Annual Cost	2007 Present Worth
Operation		
Electricity[1]		
RDT	$ -	$ -
Polymer Feed Pump	$ 32.67	$ 240.45
Polymer Mixer	$ 32.67	$ 240.45
Aeration Blowers	$ 98,024.40	$ 721,351.22
RDT Feed Pumps	$ -	$ -
RDT-to-Digester Feed Pumps	$ -	$ -
Belt Filter Press Feed Pump	$ 46.55	$ 342.56
Belt Filter Press	$ 93.10	$ 685.12
BFP-to-Sludge Storage Tank Feed Pumps	$ 326.75	$ 2,404.50
Sludge Storage Tank Mixer	$ 34.91	$ 256.92
Subtotal	$ 98,591.06	$ 725,521.23
Maintenance		
Labor[2]	$ -	$ -
Subtotal	$ -	$ -
Replacement		
Parts	$ 8,111.40	$ 59,690.91
Subtotal	$ 8,111.40	$ 59,690.91
TOTAL	$ 106,702.46	$ 785,212.13

Notes:
1) Solids treatment and storage only
2) Included in secondary treatment
3) Capital costs are for solids treatment and disposal systems only

PRELIMINARY

Replacement - Solids Treatment & Disposal Only

Part

Year	Blower Belt (Every 2 years) Present Cost 6 @ $75 ea	Blower Belt Inflated Yearly Cost	Blower Lubrication (Every year) Present Cost 2 @ $1000 ea	Blower Lubrication Inflated Yearly Cost	Blower Filters (6 times per year) Present Cost 12 @ $150 ea	Blower Filters Inflated Yearly Cost	RDT Turnion Wheels (Every 5 years) Present Cost 0 @ $300 ea	RDT Turnion Wheels Inflated Yearly Cost	RDT Drive Chain (Every 5 years) Present Cost 0 @ $40 ea	RDT Drive Chain Inflated Yearly Cost
0	$ 450.00	$ -	$ 2,000.00	$ -	$ 1,800.00	$ -	$ -	$ -	$ -	$ -
1		$ -		$ 2,060.00		$ 1,854.00		$ -		$ -
2		$ 477.41		$ 2,121.80		$ 1,909.62		$ -		$ -
3		$ -		$ 2,185.45		$ 1,966.91		$ -		$ -
4		$ 506.48		$ 2,251.02		$ 2,025.92		$ -		$ -
5		$ -		$ 2,318.55		$ 2,086.69		$ -		$ -
6		$ 537.32		$ 2,388.10		$ 2,149.29		$ -		$ -
7		$ -		$ 2,459.75		$ 2,213.77		$ -		$ -
8		$ 570.05		$ 2,533.54		$ 2,280.19		$ -		$ -
								$ -		
9		$ -		$ 2,609.55		$ 2,348.59		$ -		$ -
10		$ 604.76		$ 2,687.83		$ 2,419.05		$ -		$ -

Year	Polymer Pump Rebuild Kit (Every year) Present Cost 1 @ $350 ea	Polymer Pump Rebuild Kit Inflated Yearly Cost	RDT Feed Pump Seals (Every 5 years) Present Cost 0@ $2000 ea	RDT Feed Pump Seals Inflated Yearly Cost	RDT-to-Digester Feed Pumps (Every 5 years) Present Cost 0 @ $2000 ea	RDT-to-Digester Feed Pumps Inflated Yearly Cost	BFP Bearings (Every 5 years) Present Cost 2 @ $250 ea	BFP Bearings Inflated Yearly Cost	BFP Hydraulic Drive Oil (Every year) Present Cost 1 @ $100 ea	BFP Hydraulic Drive Oil Inflated Yearly Cost
0	$ 350.00	$ -	$ -	$ -	$ -	$ -	$ 500.00	$ -	$ 100.00	$ -
1		$ 360.50		$ -		$ -		$ -		$ 103.00
2		$ 371.32		$ -		$ -		$ -		$ 106.09
3		$ 382.45		$ -		$ -		$ -		$ 109.27
4		$ 393.93		$ -		$ -		$ -		$ 112.55
5		$ 405.75		$ -		$ -		$ 579.64		$ 115.93
6		$ 417.92		$ -		$ -		$ -		$ 119.41
7		$ 430.46		$ -		$ -		$ -		$ 122.99
8		$ 443.37		$ -		$ -		$ -		$ 126.68
9		$ 456.67		$ -		$ -		$ -		$ 130.48
10		$ 470.37		$ -		$ -		$ 671.96		$ 134.39

Year	BFP Belts (Every 5 years) Present Cost 2 @ $4000 ea	BFP Belts Inflated Yearly Cost	BFP Doctor Blades (Every 5 years) Present Cost 1 @ $300 ea	BFP Doctor Blades Inflated Yearly Cost	BFP Feed Pump Seals (Every 5 years) Present Cost 1@ $2000 ea	BFP Feed Pump Seals Inflated Yearly Cost	BFP-to-Sludge Storage Tank/Feed Pumps (Every 5 years) Present Cost 1 @ $2000 ea	BFP-to-Sludge Storage Tank/Feed Pumps Inflated Yearly Cost	Total Inflated Yearly Cost	Present Worth
0	$ 8,000.00	$ -	$ 300.00	$ -	$ 2,000.00	$ -	$ 2,000.00	$ -	$ -	$ -
1		$ -		$ -		$ -		$ -	$ 4,377.50	$ 4,179.00
2		$ -		$ -		$ -		$ -	$ 4,966.23	$ 4,544.27
3		$ -		$ -		$ -		$ -	$ 4,644.09	$ 4,040.53
4		$ -		$ -		$ -		$ -	$ 5,289.89	$ 4,393.70
5		$ 9,274.19		$ 347.78		$ 2,318.55		$ 2,318.55	$ 19,765.62	$ 15,672.57
6		$ -		$ -		$ -		$ -	$ 5,612.05	$ 4,248.12
7		$ -		$ -		$ -		$ -	$ 5,226.96	$ 3,777.21
8		$ -		$ -		$ -		$ -	$ 5,953.82	$ 4,107.37
9		$ -		$ -		$ -		$ -	$ 5,545.29	$ 3,652.06
10		$ 10,751.33		$ 403.17		$ 2,687.83		$ 2,687.83	$ 23,518.54	$ 14,786.66
									$ -	$ -
									$ -	$ -
									$ -	$ -
									$ -	$ -
									$ -	$ -
									$ -	$ -
									$ -	$ -
									$ -	$ -
									$ -	$ -
									$ -	$ -
							TOTAL PRESENT WORTH		=	$ 63,401.49

TABLE G-31
Harrisburg WWTP Improvements
Design Life 10 years
Design Condition 2031 (from 2021-2031)
7/13/2007

PRELIMINARY

	Solids Treatment & Disposal									
	Unit									
	RDT	Polymer Feed Pump	Polymer Mixer	Internal Draft Tube Mixers	RDT Feed Pumps	RDT-to-Digester Feed Pumps	Belt Filter Press Feed Pump	Belt Filter Press	BFP-to-Sludge Storage Tank Feed Pumps	Sludge Storage Tank Mixer
Nameplate Horsepower	5	0.5	0.5	10	5	5	5	10	5	15
Daily Hours of Operation	4	4	4	24	4	4	4	4	4	1
Electricity Cost, $				0.06						
				1 hp = 0.746 KWH						
Max Electricity Draw, KWH	3.73	0.373	0.373	7.46	3.73	3.73	3.73	7.46	3.73	11.19
Annual Electricity Cost	$ 326.75	$ 32.67	$ 32.67	$ 3,920.98	$ 326.75	$ 326.75	$ 46.55	$ 93.10	$ 326.75	$ 34.91
Number of Units	1	1	1	2	1	1	1	1	1	1
Total Annual Electricity Cost	$ 326.75	$ 32.67	$ 32.67	$ 7,841.95	$ 326.75	$ 326.75	$ 46.55	$ 93.10	$ 326.75	$ 34.91
TOTAL	$									9,388.86

SOLIDS TREATMENT OMR COSTS

Harrisburg WWTP Improvements
all costs based on 2007 dollars

Design Life	14	years
Design Condition	2031	(from 2021-2031)
Interest Rate	4.75%	
Inflation Rate	3%	
Net Rate	1.75%	

PRELIMINARY

Alternative 1 - Anaerobic Digester

Capital Cost[2]:	7777	
Item	Annual Cost	2007 Present Worth
Operation		
Electricity[1]		
RDT	$ 326.75	$ 2,270.70
Polymer Feed Pump	$ 32.67	$ 227.07
Polymer Mixer	$ 32.67	$ 227.07
Internal Draft Tube Mixers	$ 7,841.95	$ 54,496.80
RDT Feed Pumps	$ 326.75	$ 2,270.70
RDT-to-Digester Feed Pumps	$ 326.75	$ 2,270.70
Belt Filter Press Feed Pump	$ 48.55	$ 323.50
Belt Filter Press	$ 93.10	$ 646.99
BFP-to-Sludge Storage Tank Feed Pumps	$ 326.75	$ 2,270.70
Sludge Storage Tank Mixer	$ 34.91	$ 242.62
Subtotal	$ 9,365.60	$ 65,216.66
Maintenance		
Labor[3]	$ -	$ -
Subtotal	$ -	$ -
Replacement		
Parts	$ 6,181.01	$ 56,714.08
Subtotal	$ 6,181.01	$ 56,714.08
TOTAL	$ 17,548.67	$ 121,960.94

Notes:
1) Solids treatment and storage only
2) Included in secondary treatment
3) Combined costs only for solids treatment and disposal systems only

Replacement - Solids Treatment & Disposal Only

Year	Yearly Internal Draft Tube Mixer Maintenance: Present Cost 6 @ $75 ea	Yearly Internal Draft Tube Mixer Maintenance: Inflated Yearly Cost	Part: Present Cost 2 @ $2500 ea	Part: Inflated Yearly Cost	Part: Present Cost 12 @ $150 ea	Part: Inflated Yearly Cost	RDT Turbine Wheels Every 5 years: Present Cost 5 @ $300 ea	RDT Turbine Wheels Every 5 years: Inflated Yearly Cost	RDT Drive Chain Every 5 years: Present Cost 1 @ $40 ea	RDT Drive Chain Every 5 years: Inflated Yearly Cost	Polymer Pump Rebuild Kit Every year: Present Cost 1 @ $350 ea	Polymer Pump Rebuild Kit Every year: Inflated Yearly Cost	RDT Feed Pump Seals Every 5 years: Present Cost 1 @ $2000 ea	RDT Feed Pump Seals Every 5 years: Inflated Yearly Cost	RDT-to-Digester Feed Pumps Every 5 years: Present Cost 1 @ $2000 ea	RDT-to-Digester Feed Pumps Every 5 years: Inflated Yearly Cost	BFP Bearings Every 5 years: Present Cost 2 @ $250 ea	BFP Bearings Every 5 years: Inflated Yearly Cost	BFP Hydraulic Drive Oil Every year: Present Cost 1 @ $100 ea	BFP Hydraulic Drive Oil Every year: Inflated Yearly Cost	BFP Belts Every 5 years: Present Cost 2 @ $4000 ea	BFP Belts Every 5 years: Inflated Yearly Cost	BFP Doctor Blades Every 5 years: Present Cost 1 @ $300 ea	BFP Doctor Blades Every 5 years: Inflated Yearly Cost	BFP Feed Pump Seals Every 5 years: Present Cost 1@ $2500 ea	BFP Feed Pump Seals Every 5 years: Inflated Yearly Cost	BFP-to-Sludge Storage Tank/Feed Pumps Every 5 years: Present Cost 1 @ $2000 ea	BFP-to-Sludge Storage Tank/Feed Pumps Every 5 years: Inflated Yearly Cost	Total Inflated Yearly Cost	Present Worth
0	$ -	$ -	$ 5,000.00	$ -	$ -	$ -	$ 1,500.00	$ -	$ 40.00	$ -	$ 350.00	$ -	$ 2,000.00	$ -	$ 2,000.00	$ -	$ 500.00	$ -	$ 100.00	$ -	$ 8,000.00	$ -	$ 300.00	$ -	$ 2,000.00	$ -	$ 2,000.00	$ -	$ -	$ -
1		$ -		$ 5,150.00		$ -		$ -		$ -		$ 360.50		$ -		$ -		$ -		$ 103.00		$ -		$ -		$ -		$ -	$ -	$ -
2		$ -		$ 5,304.50		$ -		$ -		$ -		$ 371.32		$ -		$ -		$ -		$ 106.09		$ -		$ -		$ -		$ -	$ 5,813.90	$ 5,358.56
3		$ -		$ 5,463.64		$ -		$ -		$ -		$ 382.45		$ -		$ -		$ -		$ 109.27		$ -		$ -		$ -		$ -	$ 5,781.91	$ 5,289.12
4		$ -		$ 5,627.54		$ -		$ -		$ -		$ 393.93		$ -		$ -		$ -		$ 112.55		$ -		$ -		$ -		$ -	$ 5,953.36	$ 5,181.28
5		$ -		$ 5,796.37		$ -		$ 1,738.91		$ 46.37		$ 405.75		$ 2,318.55		$ 2,318.55		$ 579.64		$ 115.93		$ 9,274.19		$ 347.78		$ 2,318.55		$ 2,318.55	$ 8,134.62	$ 5,994.13
6		$ -		$ 5,970.26		$ -		$ -		$ -		$ 417.92		$ -		$ -		$ -		$ 119.41		$ -		$ -		$ -		$ -	$ 27,579.13	$ 21,568.67
7		$ -		$ 6,149.37		$ -		$ -		$ -		$ 430.46		$ -		$ -		$ -		$ 122.99		$ -		$ -		$ -		$ -	$ 5,507.39	$ 4,295.61
8		$ -		$ 6,333.85		$ -		$ -		$ -		$ 443.37		$ -		$ -		$ -		$ 126.68		$ -		$ -		$ -		$ -	$ 6,702.61	$ 4,843.72
								$ -																				$ 5,903.90	$ 4,762.60
9		$ -		$ 6,523.87		$ -		$ -		$ -		$ 456.67		$ -		$ -		$ -		$ 130.48		$ -		$ -		$ -		$ -	$ 7,111.01	$ 4,683.23
10		$ -		$ 6,719.58		$ -		$ 2,015.87		$ 53.78		$ 470.37		$ 2,687.83		$ 2,687.83		$ 671.96		$ 134.39		$ 10,751.33		$ 403.17		$ 2,687.83		$ 2,687.83	$ 31,971.77	$ 20,191.40
																												$ -	$ -
																												$ -	$ -
																												$ -	$ -
																												$ -	$ -
																												$ -	$ -
																												$ -	$ -
																												$ -	$ -
																											TOTAL PRESENT WORTH	=	$ 82,688.81

TABLE G-33
Harrisburg WWTP Improvements
Design Life 10 years
Design Condition 2021 (from 2011-2021)
7/20/2007
all costs are based on 2007 dollars

ESTIMATE

Biosolids Land Application & Management

	Spread Biosolids	Haul Biosolids up to 20 miles	Mobilization Fee	Biosolids Management Program
Number of gallons	713,337	713,337		
Unit Cost	2 ¢/gal	2.5 ¢/gal	1,000 $/trip	5,000 $/year
Trips per year	2	2	2	
Total Cost	$28,533	$35,667	$2,000	$5,000
TOTAL COST PER YEAR		**$71,200**		

TABLE G-34

SOLIDS DISPOSAL OMR COSTS

Harrisburg WWTP Improvements
all costs based on 2007 dollars

Design Life	10	years
Design Condition	2021	(from 2011-2021)
Interest Rate	4.75%	
Inflation Rate	3%	
Real Interest Rate (adjusted for inflation)	1.75%	

ESTIMATE

Aerobic Digester

Item	Annual Cost	Present Worth
Biosolids Hauling		
Land Application	$ 28,533.48	$ 215,694.15
Biosolids Transport 20 mi	$ 35,666.85	$ 269,617.69
Subtotal	$ 64,200.33	$ 485,311.84
Overhead Fees		
Transport Mobilization Fee	$ 2,000.00	$ 15,118.67
Subtotal	$ 2,000.00	$ 15,118.67
Management Program		
Lump Sum: Yearly	$ 5,000.00	$ 37,796.68
Subtotal	$ 5,000.00	$ 37,796.68
TOTAL	$ 71,200.33	$ 538,227.19

Notes:
1) Assumed solids concentration for aerobic digestion is 10%

Inflated Costs

Year	Land Application: Present Cost Per Year	Land Application: Inflated Yearly Cost	Biosolids Transport 20 mi: Present Cost Per Year	Biosolids Transport 20 mi: Inflated Yearly Cost	Transportation Mobilization Fee: Present Cost Per Year	Transportation Mobilization Fee: Inflated Yearly Cost	Biosolids Management Program: Present Cost Per Year	Biosolids Management Program: Inflated Yearly Cost	Total Inflated Yearly Cost	Present Worth
0	$ 28,533.48	$ -	$ 35,666.85	$ -	$ 2,000.00	$ -	$ 5,000.00	$ -	$ -	$ -
1		$ 29,389.48		$ 36,736.86		$ 2,060.00		$ 5,150.00	$ 73,336.34	$ 70,010.83
2		$ 30,271.17		$ 37,838.96		$ 2,121.80		$ 5,304.50	$ 75,536.43	$ 68,841.19
3		$ 31,179.30		$ 38,974.13		$ 2,185.45		$ 5,463.64	$ 77,802.52	$ 67,691.10
4		$ 32,114.68		$ 40,143.35		$ 2,251.02		$ 5,627.54	$ 80,136.60	$ 66,560.22
5		$ 33,078.12		$ 41,347.65		$ 2,318.55		$ 5,796.37	$ 82,540.70	$ 65,448.24
6		$ 34,070.47		$ 42,588.08		$ 2,388.10		$ 5,970.26	$ 85,016.92	$ 64,354.83
7		$ 35,092.58		$ 43,865.73		$ 2,459.75		$ 6,149.37	$ 87,567.43	$ 63,279.69
8		$ 36,145.36		$ 45,181.70		$ 2,533.54		$ 6,333.85	$ 90,194.45	$ 62,222.51
9		$ 37,229.72		$ 46,537.15		$ 2,609.55		$ 6,523.87	$ 92,900.28	$ 61,183.00
10		$ 38,346.61		$ 47,933.26		$ 2,687.83		$ 6,719.58	$ 95,687.29	$ 60,160.85
									$ -	$ 649,752.47

TABLE G-36

SOLIDS DISPOSAL OMR COSTS

ESTIMATE

Harrisburg WWTP Improvements
all costs based on 2007 dollars

Design Life	10	years
Design Condition	2031	(from 2021-2031)
Interest Rate	4.75%	
Inflation Rate	3%	
Real Interest Rate (adjusted for inflation)	1.75%	

Anaerobic Digester

Item	Annual Cost	2007 Present Worth
Biosolids Hauling		
Land Application	$ 23,810.08	$ 196,714.55
Biosolids Transport 20 mi	$ 29,762.60	$ 245,893.18
Subtotal	$ 53,572.68	$ 442,607.73
Overhead Fees		
Transport Mobilization Fee	$ 2,000.00	$ 16,523.64
Subtotal	$ 2,000.00	$ 16,523.64
Management Program		
Lump Sum: Yearly	$ 5,000.00	$ 41,309.09
Subtotal	$ 5,000.00	$ 41,309.09
TOTAL	**$ 60,572.68**	**$ 500,440.46**

Notes:
1) Assumed solids concentration for anaerobic digestion is 15%

Inflated Costs

Year	Land Application: Present Cost Per Year	Land Application: Inflated Yearly Cost	Biosolids Transport 20 mi: Present Cost Per Year	Biosolids Transport 20 mi: Inflated Yearly Cost	Transportation Mobilization Fee: Present Cost Per Year	Transportation Mobilization Fee: Inflated Yearly Cost	Biosolids Management Program: Present Cost Per Year	Biosolids Management Program: Inflated Yearly Cost	Total Inflated Yearly Cost	Present Worth
0	$ 23,810.08	$ -	$ 29,762.60	$ -	$ 2,000.00	$ -	$ 5,000.00	$ -	$ -	$ -
1		$ 32,958.72		$ 41,198.40		$ 2,768.47		$ 6,921.17	$ 83,846.76	$ 50,325.94
2		$ 33,947.48		$ 42,434.35		$ 2,851.52		$ 7,128.80	$ 86,362.16	$ 49,485.17
3		$ 34,965.91		$ 43,707.38		$ 2,937.07		$ 7,342.67	$ 88,953.02	$ 48,658.45
4		$ 36,014.88		$ 45,018.60		$ 3,025.18		$ 7,562.95	$ 91,621.61	$ 47,845.54
5		$ 37,095.33		$ 46,369.16		$ 3,115.93		$ 7,789.84	$ 94,370.26	$ 47,046.21
6		$ 38,208.19		$ 47,760.24		$ 3,209.41		$ 8,023.53	$ 97,201.37	$ 46,260.24
7		$ 39,354.43		$ 49,193.04		$ 3,305.70		$ 8,264.24	$ 100,117.41	$ 45,487.40
8		$ 40,535.07		$ 50,668.83		$ 3,404.87		$ 8,512.17	$ 103,120.93	$ 44,727.46
9		$ 41,751.12		$ 52,188.90		$ 3,507.01		$ 8,767.53	$ 106,214.56	$ 43,980.23
10		$ 43,003.65		$ 53,754.57		$ 3,612.22		$ 9,030.56	$ 109,401.00	$ 43,245.47
									$ -	**$ 467,062.12**

APPENDIX H

ESTIMATE	
10	years
2031	(from 2021-2031)

tion & Management		
ıp to		Biosolids Management Program
Mobilization Fee		
5,252		
2.5 ¢/gal	1,000 $/trip	5,000 $/year
2	2	
3,763	$2,000	$5,000
),573		

Table H-1: Harrisburg Sanitary Sewer Department Historical and Projected Financials

4	2005	2006	First 6 months of 2007	2007	2008	2009	2010	2011	2012	2013	2014	2015
'6.82	$ 155,049.83	$ 200,712.42	$ 115,850.20	$ 267,027	$ 400,070	$ 599,231	$ 897,313	$ 1,343,386	$ 2,010,834	$ 2,893,665	$ 3,397,422	$ 3,968,841
4.37	$ 52,606.17	$ 59,785.87	$ 40,765.31	$ 68,753.75	$ 79,066.81	$ 90,926.84	$ 104,565.86	$ 120,250.74	$ 138,288.35	$ 159,031.60	$ 182,886.34	$ 210,319.29
1.19	**$ 207,656.00**	**$ 260,498.29**	**$ 156,615.51**	**$ 335,780.28**	**$ 479,137.28**	**$ 690,157.72**	**$ 1,001,879.23**	**$ 1,463,636.39**	**$ 2,149,122.71**	**$ 3,052,697.01**	**$ 3,580,308.70**	**$ 4,179,160.66**
30%	32%	25%	-40%	114%	43%	44%	45%	46%	47%	42%	17%	17%
9.12	$ 59,364.64	$ 78,787.36	$ 48,228.57	$ 104,787.19	$ 139,366.96	$ 185,358.06	$ 246,526.22	$ 327,879.87	$ 436,080.23	$ 500,000.00	$ 525,000.00	$ 551,250.00
1.43	$ 3,193.92	$ 59,660.42	$ 32,044.75	$ 20,000.00	$ 21,000.00	$ 22,050.00	$ 23,152.50	$ 24,310.13	$ 25,525.63	$ 26,801.91	$ 28,142.01	$ 29,549.11
8.24	$ 45,725.70	$ 39,818.24	$ 19,909.12	$ 41,000.00	$ 41,000.00	$ 41,000.00	$ 41,000.00	$ 41,000.00	$ 41,000.00			
-	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 2,045,382.21	$ 2,045,382.21	$ 2,045,382.21	$ 2,045,382.21	$ 2,045,382.21
-	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 362,536.41	$ 422,717.45	$ 478,938.87	$ 542,637.74	$ 614,808.56
8.79	**$ 108,284.26**	**$ 178,266.02**	**$ 100,182.44**	**$ 165,787.19**	**$ 201,366.96**	**$ 248,408.06**	**$ 310,678.72**	**$ 2,801,108.61**	**$ 2,970,705.52**	**$ 3,051,123.00**	**$ 3,141,161.96**	**$ 3,240,989.88**
19%	7%	65%		-7%	21%	23%	25%	802%	6%	3%	3%	3%
2.40	**$ 99,371.74**	**$ 82,232.27**	**$ 56,433.07**	**$ 169,993.09**	**$ 277,770.31**	**$ 441,749.66**	**$ 691,200.51**	**$ (1,337,472.22)**	**$ (821,582.81)**	**$ 1,574.01**	**$ 439,146.73**	**$ 938,170.78**
		$ 377,159.32		$ 547,152.41	$ 824,922.73	$ 1,266,672.38	$ 1,957,872.90	$ 620,400.67	$ (201,182.14)	$ (199,608.13)	$ 239,538.60	$ 1,177,709.38
		3.07	3.83	5.15	7.77	11.77	17.86	0.36	0.61	1.00	1.21	1.46

TABLE H-2: AMORTIZATION FOR PROPOSED SRF LOAN

Assumed loan would be issued July 1, 2011 with 1st payment due on June 30, 2012

Fiscal Year	Principal	Interest Rate	Interest	Balance	Total Payment	Principal Payment	Interest Payment	Balance
2011	$29,738,520	3.25%	$966,502	$30,705,022	$ 2,045,382	$ 1,078,880	$ 966,502	$28,659,640
2012	$28,659,640	3.25%	$931,438	$29,591,078	$ 2,045,382	$ 1,113,944	$ 931,438	$27,545,696
2013	$27,545,696	3.25%	$895,235	$28,440,931	$ 2,045,382	$ 1,150,147	$ 895,235	$26,395,549
2014	$26,395,549	3.25%	$857,855	$27,253,404	$ 2,045,382	$ 1,187,527	$ 857,855	$25,208,022
2015	$25,208,022	3.25%	$819,261	$26,027,282	$ 2,045,382	$ 1,226,122	$ 819,261	$23,981,900
2016	$23,981,900	3.25%	$779,412	$24,761,312	$ 2,045,382	$ 1,265,970	$ 779,412	$22,715,930
2017	$22,715,930	3.25%	$738,268	$23,454,198	$ 2,045,382	$ 1,307,114	$ 738,268	$21,408,815
2018	$21,408,815	3.25%	$695,786	$22,104,602	$ 2,045,382	$ 1,349,596	$ 695,786	$20,059,220
2019	$20,059,220	3.25%	$651,925	$20,711,144	$ 2,045,382	$ 1,393,458	$ 651,925	$18,665,762
2020	$18,665,762	3.25%	$606,637	$19,272,399	$ 2,045,382	$ 1,438,745	$ 606,637	$17,227,017
2021	$17,227,017	3.25%	$559,878	$17,786,895	$ 2,045,382	$ 1,485,504	$ 559,878	$15,741,513
2022	$15,741,513	3.25%	$511,599	$16,253,112	$ 2,045,382	$ 1,533,783	$ 511,599	$14,207,730
2023	$14,207,730	3.25%	$461,751	$14,669,481	$ 2,045,382	$ 1,583,631	$ 461,751	$12,624,099
2024	$12,624,099	3.25%	$410,283	$13,034,382	$ 2,045,382	$ 1,635,099	$ 410,283	$10,989,000
2025	$10,989,000	3.25%	$357,142	$11,346,142	$ 2,045,382	$ 1,688,240	$ 357,142	$ 9,300,760
2026	$ 9,300,760	3.25%	$302,275	$ 9,603,035	$ 2,045,382	$ 1,743,108	$ 302,275	$ 7,557,653
2027	$ 7,557,653	3.25%	$245,624	$ 7,803,276	$ 2,045,382	$ 1,799,759	$ 245,624	$ 5,757,894
2028	$ 5,757,894	3.25%	$187,132	$ 5,945,026	$ 2,045,382	$ 1,858,251	$ 187,132	$ 3,899,644
2029	$ 3,899,644	3.25%	$126,738	$ 4,026,382	$ 2,045,382	$ 1,918,644	$ 126,738	$ 1,981,000
2030	$ 1,981,000	3.25%	$ 64,382	$ 2,045,382	$ 2,045,382	$ 1,981,000	$ 64,382	$ (0)
TOTAL					$40,907,644	$29,738,520	$11,169,124	

Table H-3: Revenue Projections

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Number of Accounts as of December[1]	548	727	891	1030	1190	1374	1586	1830	2110	2431	2802	3228
Billed Water Usage (gallons)	42,165,800	51,313,400	64,318,100	75,877,265	87,258,855	100,347,683	115,399,835	132,709,811	152,616,282	175,508,725	201,835,033	232,110,288
Rates until August 2006												
0-2000 gallons	$16.00	$16.00	$16.00									
Over 2,000 gallons	$19.00	$19.00	$19.00									
Rates After August 2006												
Customer Charge Revenue (No water included)			$10.00	$10.00	$13.00	$16.90	$21.97	$28.56	$37.13	$46.41	$47.34	$48.05
Volume Charge Revenue (per 100 gallons)			$0.20	$0.20	$0.26	$0.34	$0.44	$0.57	$0.74	$0.93	$0.95	$0.96
Projected Revenue[2]		**$ 145,350**	**$ 200,878**	**$ 267,027**	**$ 400,070**	**$ 599,231**	**$ 897,313**	**$ 1,343,386**	**$ 2,010,834**	**$ 2,893,665**	**$ 3,397,422**	**$ 3,968,841**
Actual Revenue	**$ 123,277**	**$ 155,050**	**$ 200,712**									
Proposed Rate Increase					30%	30%	30%	30%	30%	25%	2.0%	1.5%
Percent Increase in Water Usage		21.7%	25.3%	18.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%	15.0%
Coverage Ratio		32.7%	22.6%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

1. Accounts for 2007 and beyond are projected. These number account for the 37 customers that do not receive sewer bills.

2. Projected revenue based on the average number of customers from current year and past year to reflect growth in customers throughout the year.

APPENDIX I

Harrisburg - INCOME SURVEY June 27, 2006

Table Frequencies

Total Number of households	301
Total Number of Individuals in Households	962

Q2A - H Income

High Income		70.4%
Total Households	212	
Total Individuals	672	
Low to Moderate Income		29.6%
Total Households	89	
Total Individuals	290	

Percent of Individuals in Household

Percent Individuals in High Income Household	69.9%
Percent Individuals in Low to Moderate Income Households	30.1%

Gender

Male	34.2%
Female	65.8%

Head of Household

Male	86.7%
Female	13.3%

Q4A-F **Race/Ethnicity** Percent of Households

Number considered physically/mentally challenged	3.30%
One or more White in household	99.30%
One or more Native American in household	3.00%
One or more Black in household	2.70%
One or more Hispanic in household	3.70%
One or more Asian in household	2.00%
One or more Other in household	1.70%

Income Survey

Hello, this is _____ calling from Robinson Muenster Associates. We are calling on behalf of the city of _____ conducting an income survey to determine eligibility for state grant assistance. We are not selling anything and will not ask for any charitable contributions. I will not be asking the actual dollar amount of your household income. All responses will be confidential and no names will be attached to the survey responses. We will also be asking some questions regarding ethnicity that may or may not apply to your family, but are required grant assistance. May I speak with an adult in the household who is 18 or over?

Q1: How many people currently live in your household?

1. One (skip to Q2A)
2. Two (skip to Q2B)
3. Three (skip to Q2C)
4. Four (skip to Q2D)
5. Five (skip to Q2E)
6. Six (skip to Q2F)
7. Seven (skip to Q2G)
8. Eight (skip to Q2H)

Instructions: Income is based on the total income of all household members from your last Federal Income Tax Form. If you own a farm or a business, those deductions may be taken off of your gross income, but NO PERSONAL DEDUCTIONS. DO NOT USE the TAXABLE INCOME FIGURES from your income tax form.

Q2A: Does your current income fall above or below $27,600?

1. Above
2. Below

Q2B: Does your current income fall above or below $31,550?

1. Above
2. Below

Q2C: Does your current income fall above or below $35,500?

1. Above
2. Below

Q2D: Does your current income fall above or below $39,450?

1. Above
2. Below

Q2E: Does your current income fall above or below $42,600?

1. Above
2. Below

Q2F: Does your current income fall above or below $45,750?

1. Above
2. Below

Q2G: Does your income fall above or below $48,900?

1. Above
2. Below

Q2H: Does your income fall above or below $52,050?

1. Above
2. Below

Q3: Is the head of household male or female?

1. Male
2. Female

Q4A: How many persons in your household are considered white?

1. One
2. Two
3. Three
4. Four
5. Five
6. Six
7. Seven
8. Eight or more
9. None

Q4AA: How many in the household are also considered Hispanic or Latino?

1. One
2. Two
3. Three
4. Four
5. Five
6. Six
7. Seven
8. Eight or more
9. None

Q4B: How many persons in your household are considered American Indian or Alaska Native?

1. One
2. Two
3. Three
4. Four
5. Five
6. Six
7. Seven
8. Eight or more
9. None

Q4BB: How many persons in the household are considered American Indian or Alaskan Native and White?

1. One
2. Two
3. Three
4. Four
5. Five
6. Six
7. Seven
8. Eight or more
9. None

Q4BBB: How many persons in the household are considered American Indian or Alaskan Native and Black or African American?

1. One
2. Two
3. Three
4. Four
5. Five
6. Six
7. Seven
8. Eight or more
9. None

Q4BBBB: How many persons are also considered Hispanic or Latino?

1. One
2. Two
3. Three
4. Four
5. Five
6. Six
7. Seven
8. Eight or more
9. None

Q4C: How many persons in your household are considered Black or African American?

1. One
2. Two
3. Three
4. Four
5. Five
6. Six
7. Seven
8. Eight or more
9. None

Q4CC: How many persons in your household are considered Black or African American and White?

1. One
2. Two
3. Three
4. Four
5. Five
6. Six
7. Seven
8. Eight or more
9. None

Q4CCC: How many persons in the household are also considered Hispanic?

1. One
2. Two
3. Three
4. Four
5. Five
6. Six
7. Seven
8. Eight or more
9. None

Q4D: How many persons in your household are considered Asian?

1. One
2. Two
3. Three
4. Four
5. Five
6. Six
7. Seven
8. Eight or more
9. None

Q4DD: How many persons in your household are considered Asian and White?

1. One
2. Two
3. Three
4. Four
5. Five
6. Six
7. Seven
8. Eight or more
9. None

Q4DDD: How many persons in your household are also considered Hispanic or Latino?

1. One
2. Two
3. Three
4. Four
5. Five
6. Six
7. Seven
8. Eight or more
9. None

Q4E: How many persons in the household are considered Native Hawaiian or Other Pacific Islander?

1. One
2. Two
3. Three
4. Four
5. Five
6. Six
7. Seven
8. Eight or more
9. None

Q4EE: How many persons in your household are also considered Hispanic?

1. One
2. Two
3. Three
4. Four
5. Five
6. Six
7. Seven
8. Eight or more
9. None

Q4F: How many persons in your household are multi-racial other than specified earlier?

1. One
2. Two
3. Three
4. Four
5. Five
6. Six
7. Seven
8. Eight or more
9. None

Q5: How many persons in your household are considered physically/mentally challenged?

1. One
2. Two
3. Three
4. Four
5. Five
6. Six
7. Seven
8. Eight or more

9. None

END

That completes our income survey. I thank you for your time and patience in answering my questions. Thanks again.

APPENDIX F

TABLE F-1: PRELIMINARY ENGINEERS OPINION OF PROBABLE COST
GRAVITY SEWER
AUGUST 2007

ITEM NO.	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL
	SITE WORK				
1	CLEARING & GRUBBING	LS	1.0	$ 10,000.00	$ 10,000
2	SALVAGE TOPSOIL	CY	8,800	$ 2.00	$ 17,600
3	PLACING TOPSOIL	CY	8,800	$ 4.00	$ 35,200
4	LOCATING UTILITIES	EA	10	$ 500.00	$ 5,000
	SITE WORK SUBTOTAL				**$ 67,800**
	EROSION CONTROL				
5	TEMPORARY SILT FENCE	LF	15,800	$ 5.00	$ 79,000
6	PERMANENT SEEDING	LB	1,925	$ 12.00	$ 23,100
7	FERTILIZING	LB	7,255	$ 1.00	$ 7,300
8	MULCHING	TON	75	$ 150.00	$ 11,300
	EROSION CONTROL SUBTOTAL				**$ 120,700**
	SURFACING				
9	GRAVEL SURFACING	TON	30	$ 20.00	$ 600
	SURFACING SUBTOTAL				**$ 600**
	TRAFFIC CONTROL				
10	TRAFFIC CONTROL, IN PLACE, COMPLETE	LS	1.0	$ 5,000.00	$ 5,000
	TRAFFIC CONTROL SUBTOTAL				**$ 5,000**
	SANITARY SEWER				
11	TRENCH DEWATERING	LS	1	$ 200,000.00	$ 200,000
12	TRENCH STABILIZATION MATERIAL	TON	1,460	$ 21.00	$ 30,660
13	GRANULAR INITIAL BACKFILL FOR SANITARY SEWER	TON	5,500	$ 11.00	$ 60,500
14	MH FRAME AND COVER	EA	33	$ 350.00	$ 11,550
15	MH CONSTRUCTION PLATE MARKER	EA	33	$ 200.00	$ 6,600
16	MH EXTERNAL FRAME SEAL	EA	33	$ 400.00	$ 13,200
17	48"ø HDPE LINED MH, IN PLACE, COMPLETE	EA	4	$ 4,500.00	$ 18,000
18	72"ø HDPE LINED MH, IN PLACE, COMPLETE	EA	10	$ 13,000.00	$ 130,000
19	84"ø HDPE LINED MH, IN PLACE, COMPLETE	EA	4	$ 17,500.00	$ 70,000
20	96"ø HDPE LINED MH, IN PLACE, COMPLETE	EA	15	$ 22,000.00	$ 330,000
21	12" SAN SWR PVC PIPE SDR 35	LF	1,300	$ 50.00	$ 65,000
22	27" SAN SWR PVC PIPE SDR 35	LF	3,900	$ 245.00	$ 955,500
23	42" SAN SWR HOBAS PIPE	LF	1,500	$ 340.00	$ 510,000
24	48" SAN SWR HOBAS PIPE	LF	5,900	$ 415.00	$ 2,448,500
25	MH EXFILTRATION\VACUUM TEST	EA	33	$ 300.00	$ 9,900
26	SAN SWR EXFILTRATION TESTING	LF	12,600	$ 1.25	$ 15,750
27	SWR PIPE DEFLECTION TEST	LF	12,600	$ 1.00	$ 12,600
	SANITARY SEWER SUBTOTAL				**$ 4,890,900**
	SUBTOTAL CONSTRUCTION COSTS				$ 5,084,100
	CONTINGENCY (20%)				$ 1,017,000
	PRELIMINARY OPINION OF CONSTRUCTION COSTS				**$ 6,101,100**
	ENGINEERING, LEGAL, CONSTRUCTION ADMINISTRATION (20%)				$ 1,220,220
	TOTAL ENGINEER'S OPINION OF PROBABLE PROJECT COST				**$ 7,321,000**

TABLE F-2: PRELIMINARY ENGINEERS OPINION OF PROBABLE COST
FORCE MAIN TO NEW WWTP
AUGUST 2007

ITEM NO.	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL
	SITE WORK				
1	CLEARING & GRUBBING	LS	1.0	$ 10,000.00	$ 10,000
2	SALVAGE TOPSOIL	CY	8,046	$ 2.00	$ 16,100
3	PLACING TOPSOIL	CY	8,046	$ 4.00	$ 32,200
4	LOCATING UTILITIES	EA	10	$ 500.00	$ 5,000
	SITEWORK SUBTOTAL				**$ 63,300**
	EROSION CONTROL				
5	TEMPORARY SILT FENCE	LF	28,965	$ 5.00	$ 144,900
6	PERMANENT SEEDING	LB	1,765	$ 12.00	$ 21,200
7	FERTILIZING	LB	6,650	$ 1.00	$ 6,700
8	MULCHING	TON	100	$ 150.00	$ 15,000
	EROSION CONTROL SUBTOTAL				**$ 187,800**
	SURFACING				
9	GRAVEL SURFACING	TON	37	$ 20.00	$ 800
	SURFACING SUBTOTAL				**$ 800**
	TRAFFIC CONTROL				
10	TRAFFIC CONTROL, IN PLACE, COMPLETE	LS	1.0	$ 5,000.00	$ 5,000
	TRAFFIC CONTROL SUBTOTAL				**$ 5,000**
	SANITARY SEWER				
11	TRENCH STABILIZATION MATERIAL	TON	652	$ 12.50	$ 8,200
12	FORCE MAIN BEDDING MATERIAL	TON	13,034	$ 6.50	$ 84,800
13	TRENCH DEWATERING	LS	1.0	$ 100,000.00	$ 100,000
14	CONNECT TO EXISTING SEWER	EA	1.0	$ 5,000.00	$ 5,000
15	16" CL. 235 PVC AWWA C905 FORCE MAIN, F&I	LF	28,965	$ 55.00	$ 1,593,100
16	FORCE MAIN FITTINGS, F&I (@ 15% OF FORCE MAIN COST)	LS	1.0	$ 239,000.00	$ 239,000
17	26" STEEL CASING PIPE, FURNISH & INSTALL	LF	150	$ 175.00	$ 26,300
18	BORE & JACK 26" STEEL CASING PIPE	LF	150	$ 275.00	$ 41,300
19	16" CL. 235 PVC AWWA C905 CARRIER PIPE	LF	150	$ 100.00	$ 15,000
	SANITARY SEWER SUBTOTAL				**$ 2,112,700**
	SUBTOTAL CONSTRUCTION COSTS				$ 2,369,600
	CONTINGENCY (20%)				$ 474,000
	PRELIMINARY OPINION OF CONSTRUCTION COSTS				**$ 2,843,600**
	ENGINEERING, LEGAL, CONSTRUCTION ADMINISTRATION (20%)				$ 569,000
	TOTAL ENGINEER'S OPINION OF PROBABLE PROJECT COST				**$ 3,413,000**

TRENCH STABILZATION MATERIAL WAS CALCULATED FOR 1/5 PIPE LENGTH, 6" DEEP
FORCE MAIN PIPE COST WAS DOUBLED BASED ON WHAT HD SUPPLY PROVIDED
FORCE MAIN BEDDING WAS ASSUMED TO BE SAME BEDDING REQUIREMENTS AS SIOUX FALLS WATERMAIN

TABLE F-3: PRELIMINARY ENGINEERS OPINION OF PROBABLE COST
FORCE MAIN TO L.S. NO. 240
AUGUST 2007

ITEM NO.	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL
	SITE WORK				
1	CLEARING & GRUBBING	LS	1.0	$ 10,000.00	$ 10,000
2	SALVAGE TOPSOIL	CY	14,355	$ 2.00	$ 28,800
3	PLACING TOPSOIL	CY	14,355	$ 4.00	$ 57,500
4	LOCATING UTILITIES	EA	10	$ 500.00	$ 5,000
	SITEWORK SUBTOTAL				**$ 101,300**
	EROSION CONTROL				
5	TEMPORARY SILT FENCE	LF	51,678	$ 5.00	$ 258,400
6	PERMANENT SEEDING	LB	3,145	$ 12.00	$ 37,800
7	FERTILIZING	LB	11,865	$ 1.00	$ 11,900
8	MULCHING	TON	178	$ 150.00	$ 26,700
	EROSION CONTROL SUBTOTAL				**$ 334,800**
	SURFACING				
9	GRAVEL SURFACING	TON	49	$ 20.00	$ 1,000
	SURFACING SUBTOTAL				**$ 1,000**
	TRAFFIC CONTROL				
10	TRAFFIC CONTROL, IN PLACE, COMPLETE	LS	1.0	$ 5,000.00	$ 5,000
	TRAFFIC CONTROL SUBTOTAL				**$ 5,000**
	SANITARY SEWER				
11	TRENCH STABILIZATION MATERIAL	TON	1,163	$ 12.50	$ 14,600
12	FORCE MAIN BEDDING MATERIAL	TON	23,255	$ 6.50	$ 151,200
13	TRENCH DEWATERING	LS	1.0	$ 175,000.00	$ 175,000
14	CONNECT TO EXISTING SEWER	EA	1.0	$ 5,000.00	$ 5,000
15	16" CL. 235 PVC AWWA C905 FORCE MAIN, F&I	LF	51,678	$ 55.00	$ 2,842,300
16	FORCE MAIN FITTINGS, F&I (@ 15% OF FORCE MAIN COST)	LS	1.0	$ 427,000.00	$ 427,000
17	26" STEEL CASING PIPE, FURNISH & INSTALL	LF	225	$ 175.00	$ 39,400
18	BORE & JACK 26" STEEL CASING PIPE	LF	225	$ 275.00	$ 61,900
19	16" CL. 235 PVC AWWA C905 CARRIER PIPE	LF	225	$ 100.00	$ 22,500
	SANITARY SEWER SUBTOTAL				**$ 3,738,900**
	SUBTOTAL CONSTRUCTION COSTS				$ 4,181,000
	CONTINGENCY (20%)				$ 837,000
	PRELIMINARY OPINION OF CONSTRUCTION COSTS				**$ 5,018,000**
	ENGINEERING, LEGAL, CONSTRUCTION ADMINISTRATION (20%)				$ 1,004,000
	TOTAL ENGINEER'S OPINION OF PROBABLE PROJECT COST				**$ 6,022,000**

TRENCH STABILZATION MATERIAL WAS CALCULATED FOR 1/5 PIPE LENGTH, 6" DEEP
FORCE MAIN PIPE COST WAS DOUBLED BASED ON WHAT HD SUPPLY PROVIDED
FORCE MAIN BEDDING WAS ASSUMED TO BE SAME BEDDING REQUIREMENTS AS SIOUX FALLS WATERMAIN

TABLE F-4: PRELIMINARY ENGINEERS OPINION OF PROBABLE COST
FORCE MAIN FROM L.S. NO. 240 TO FUTURE SF WWTP
SEPTEMBER 2007

ITEM NO.	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL
	SITE WORK				
1	CLEARING & GRUBBING	LS	1.0	$ 10,000.00	$ 10,000
2	SALVAGE TOPSOIL	CY	556	$ 2.00	$ 1,200
3	PLACING TOPSOIL	CY	556	$ 4.00	$ 2,300
4	ROCK EXCAVATION	CY	290	$ 180.00	$ 52,200
	SITEWORK SUBTOTAL				**$ 65,700**
	EROSION CONTROL				
5	TEMPORARY SILT FENCE	LF	4,000	$ 5.00	$ 20,000
6	PERMANENT SEEDING	LB	125	$ 12.00	$ 1,500
7	FERTILIZING	LB	475	$ 1.00	$ 500
8	MULCHING	TON	7	$ 150.00	$ 1,100
	EROSION CONTROL SUBTOTAL				**$ 23,100**
	SANITARY SEWER				
9	COFFER DAM, FLOW BYPASS, IMPERVIOUS MATERIAL	LS	1	$80,000.00	$ 80,000
10	TRENCH STABILIZATION MATERIAL	TON	75	$ 12.50	$ 1,000
11	FORCE MAIN BEDDING MATERIAL	TON	240	$ 6.50	$ 1,600
12	TRENCH DEWATERING	LS	1.0	$ 175,000.00	$ 175,000
13	CONNECT TO EXISTING SEWER	EA	2.0	$ 1,000.00	$ 2,000
14	16" CL. 235 PVC AWWA C905 FORCE MAIN, F&I	LF	2,000	$ 55.00	$ 110,000
15	FORCE MAIN FITTINGS, F&I (@ 15% OF FORCE MAIN COST)	LS	1.0	$ 17,000.00	$ 17,000
16	26" STEEL CASING PIPE, FURNISH & INSTALL	LF	225	$ 175.00	$ 39,400
17	16" CL. 235 PVC AWWA C905 CARRIER PIPE	LF	225	$ 100.00	$ 22,500
	SANITARY SEWER SUBTOTAL				**$ 448,500**
	SUBTOTAL CONSTRUCTION COSTS				$ 537,300
	CONTINGENCY (20%)				$ 108,000
	PRELIMINARY OPINION OF CONSTRUCTION COSTS				**$ 645,300**
	ENGINEERING, LEGAL, CONSTRUCTION ADMINISTRATION (20%)				$ 130,000
	TOTAL ENGINEER'S OPINION OF PROBABLE PROJECT COST				**$ 775,000**

TABLE F-5: PRELIMINARY ENGINEERS OPINION OF PROBABLE COST
SMALL EQUALIZATION BASIN
SEPTEMBER 2007

ITEM NO.	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL
	EARTHWORK				
1	EXCAVATION	CY	13,993	$ 5.00	$ 70,000
2	FILL AND COMPACT	CY	4,789	$ 5.00	$ 24,000
	EARTHWORK SUBTOTAL				**$ 94,000**
	CONCRETE				
3	CONCRETE SCOUR PAD	SY	1276	$ 28.00	$ 36,000
	CONCRETE SUBTOTAL				**$ 36,000**
	SITEWORK				
4	SITE PIPING	LS	1	$ 25,000.00	$ 25,000
5	MISCELLANEOUS SITEWORK	LS	1	$ 10,000.00	$ 10,000
6	FENCE (CHAIN LINK W/ 3 STRANDS BARB WIRE)	LF	1,960	$ 20.00	$ 40,000
	SITEWORK SUBTOTAL				**$ 75,000**
	TOTAL ITEMS 1 THROUGH 5				
	SUBTOTAL CONSTRUCTION COSTS				$ 205,000
	CONTINGENCY (20%)				$ 41,000
	PRELIMINARY OPINION OF CONSTRUCTION COSTS				**$ 246,000**
	ENGINEERING, LEGAL, CONSTRUCTION ADMINISTRATION (20%)				$ 50,000
	TOTAL ENGINEER'S OPINION OF PROBABLE PROJECT COST				**$ 296,000**

TABLE F-6: PRELIMINARY ENGINEERS OPINION OF PROBABLE COST
2 LARGE EQUALIZATION BASINS
SEPTEMBER 2007

ITEM NO.	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL
	EARTHWORK				
1	EXCAVATION	CY	170,754	$ 5.00	$ 853,800
2	FILL AND COMPACT	CY	170,754	$ 5.00	$ 853,800
3	HAUL, FILL AND COMPACT	CY	16,944	$ 10.00	$ 169,500
	EARTHWORK SUBTOTAL				**$ 1,707,600**
	ODOR CONTROL				
4	AERATORS	EA	30	$ 10,000.00	$ 300,000
	ODOR CONTROL SUBTOTAL				**$ 300,000**
	CONCRETE				
5	CONCRETE SCOUR PAD	SY	5,107	$ 28.00	$ 143,000
	CONCRETE SUBTOTAL				**$ 150,000**
	SITEWORK				
6	SITE PIPING	LS	1	$ 100,000.00	$ 100,000
7	MISCELLANEOUS SITEWORK	LS	1	$ 50,000.00	$ 50,000
8	FENCE	LF	4,575	$ 20.00	$ 92,000
	SITEWORK SUBTOTAL				**$ 150,000**
	SUBTOTAL CONSTRUCTION COSTS				$ 2,307,600
	CONTINGENCY (20%)				$ 462,000
	PRELIMINARY OPINION OF CONSTRUCTION COSTS				**$ 2,769,600**
	ENGINEERING, LEGAL, CONSTRUCTION ADMINISTRATION (20%)				$ 554,000
	TOTAL ENGINEER'S OPINION OF PROBABLE PROJECT COST				**$ 3,324,000**

TABLE F-7: PRELIMINARY ENGINEERS OPINION OF PROBABLE COST
LIFT STATION TO PUMP TO HARRISBURG WWTP (2011-2021)
AUGUST 2007

ITEM NO.	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL
	SITE WORK				
1	CLEARING & GRUBBING	LS	1.0	$ 10,000.00	$ 10,000
2	DEWATERING	LS	1.0	$ 30,000.00	$ 30,000
3	L.S. & WETWELL EXCAVATION	CY	23,200	$ 5.00	$ 116,000
4	STRUCTURAL FILL	CY	33,900	$ 5.00	$ 169,500
5	CRUSHED ROCK UNDER WET WELL & VALVE VAULT	TON	250	$ 25.00	$ 6,300
6	ASPHALT SURFACING	LS	1.0	$ 60,000.00	$ 60,000
7	LANDSCAPING	LS	1.0	$ 10,000.00	$ 10,000
8	FENCING	LS	1.0	$ 15,000.00	$ 15,000
9	GATE	EA	1.0	$ 5,000.00	$ 5,000
10	WATER SERVICE	LF	2,640	$ 25.00	$ 66,000
	SITE WORK SUBTOTAL				**$ 487,800**
	LIFT STATION AND WETWELL				
11	REINFORCED CONCRETE BOTTOM SLAB	CY	150.0	$ 400.00	$ 60,000
12	REINFORCED CONCRETE TOP SLAB	CY	80.0	$ 1,200.00	$ 96,000
13	REINFORCED CONCRETE WALLS	CY	332.0	$ 700.00	$ 232,400
14	FILLABLE CONCRETE	CY	5.0	$ 200.00	$ 1,000
15	ENTRANCE & EQUIPMENT HATCH	LS	1.0	$ 10,000.00	$ 10,000
16	ENTRANCE LADDER	EA	1.0	$ 5,000.00	$ 5,000
17	SLUICE & STOP GATES	LS	1.0	$ 40,000.00	$ 40,000
	LIFT STATION & WETWELL SUBTOTAL				**$ 444,400**
	PUMPS AND PIPING				
18	NON CLOG PUMPS & VFD'S	EA	2.0	$ 105,000.00	$ 210,000
19	16" D.I. FLANGED PIPE (PROCESS)	LS	1.0	$ 15,000.00	$ 15,000
20	PIPE FITTINGS (PROCESS)	LS	1.0	$ 10,000.00	$ 10,000
21	VALVES (PROCESS)	LS	1.0	$ 100,000.00	$ 100,000
22	SUMP PUMP & ASSOCIATED PIPING	LS	1.0	$ 1,500.00	$ 1,500
23	WATER AND PUMPING TESTS	LS	1.0	$ 2,500.00	$ 2,500
	PUMPS AND PIPING SUBTOTAL				**$ 339,000**
	BUILDING				
24	PRECAST ROOF SYSTEM	SF	1405	$ 15.00	$ 22,000
25	MASONRY BUILDING (BRICK & BLOCK)	SF	1405	$ 40.00	$ 57,000
26	METALS (STAIRS, HANDRAILS, ETC)	SF	1405	$ 12.00	$ 17,000
27	THERMAL & MOISTURE PROTECTION	SF	1405	$ 15.00	$ 22,000
28	DOORS & WINDOWS	SF	1405	$ 25.00	$ 36,000
29	PAINTING	LS	1.0	$ 75,000.00	$ 75,000
30	PLUMBING	LS	1.0	$ 66,000.00	$ 66,000
31	HVAC	LS	1.0	$ 128,500.00	$ 129,000
32	ELECTRICAL (NON-EQUIPMENT)	LS	1.0	$ 195,000.00	$ 195,000
33	HOIST/MONORAIL	EA	1.0	$ 25,000.00	$ 25,000
34	SURGE TANK	LS	1.0	$ 40,000.00	$ 40,000
35	ODOR CONTROL UNIT	LS	1.0	$ 100,000.00	$ 100,000
36	GENERATOR	LS	1.0	$ 340,000.00	$ 340,000
37	INSTRUMENTATION AND CONTROL SYSTEM	LS	1.0	$ 90,000.00	$ 90,000
38	MAG METER	LS	1.0	$ 7,000.00	$ 7,000
	BUILDING SUBTOTAL				**$ 1,230,000**
	SCREENING				
39	MECHANICAL BAR SCREEN	LS	1.0	$ 175,000.00	$ 175,000
	SCREENING SUBTOTAL				**$ 175,000**
	TOTAL ITEMS 1 THROUGH 39				
	SUBTOTAL CONSTRUCTION COSTS				$ 2,676,200
	CONTINGENCY (20%)				$ 536,000
	PRELIMINARY OPINION OF CONSTRUCTION COSTS				**$ 3,212,200**
	ENGINEERING, LEGAL, CONSTRUCTION ADMINISTRATION (20%)				$ 643,000
	TOTAL ENGINEER'S OPINION OF PROBABLE PROJECT COST				**$ 3,855,000**

TABLE F-8: PRELIMINARY ENGINEERS OPINION OF PROBABLE COST
LIFT STATION TO PUMP TO SIOUX FALLS (2011-2021)
AUGUST 2007

ITEM NO.	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL
	SITE WORK				
1	CLEARING & GRUBBING	LS	1.0	$ 10,000.00	$ 10,000
2	DEWATERING	LS	1.0	$ 30,000.00	$ 30,000
3	L.S. & WETWELL EXCAVATION	CY	25,000	$ 5.00	$ 125,000
4	STRUCTURAL FILL	CY	36,600	$ 5.00	$ 183,000
5	CRUSHED ROCK UNDER WET WELL & VALVE VAULT	TON	295	$ 25.00	$ 7,400
6	ASPHALT SURFACING	LS	1.0	$ 60,000.00	$ 60,000
7	LANDSCAPING	LS	1.0	$ 10,000.00	$ 10,000
8	FENCING	LS	1.0	$ 15,000.00	$ 15,000
9	GATE	EA	1.0	$ 5,000.00	$ 5,000
10	WATER SERVICE	LF	2,640	$ 25.00	$ 66,000
	SITE WORK SUBTOTAL				**$ 511,400**
	LIFT STATION AND WETWELL				
11	REINFORCED CONCRETE BOTTOM SLAB	CY	180.0	$ 400.00	$ 72,000
12	REINFORCED CONCRETE TOP SLAB	CY	95.0	$ 1,200.00	$ 114,000
13	REINFORCED CONCRETE WALLS	CY	440.0	$ 700.00	$ 308,000
14	FILLABLE CONCRETE	CY	5.0	$ 200.00	$ 1,000
15	ENTRANCE & EQUIPMENT HATCH	LS	1.0	$ 10,000.00	$ 10,000
16	ENTRANCE LADDER	EA	1.0	$ 5,000.00	$ 5,000
17	SLUICE & STOP GATES	LS	1.0	$ 40,000.00	$ 40,000
	LIFT STATION & WETWELL SUBTOTAL				**$ 550,000**
	PUMPS AND PIPING				
18	4 - NON CLOG PUMPS (2 IN SERIES) & VFD'S	LS	1.0	$ 350,000.00	$ 350,000
19	16" D.I. FLANGED PIPE (PROCESS)	LS	1.0	$ 20,000.00	$ 20,000
20	PIPE FITTINGS (PROCESS)	LS	1.0	$ 15,000.00	$ 15,000
21	VALVES (PROCESS)	LS	1.0	$ 125,000.00	$ 125,000
22	SUMP PUMP & ASSOCIATED PIPING	LS	1.0	$ 1,500.00	$ 1,500
23	WATER AND PUMPING TESTS	LS	1.0	$ 2,500.00	$ 2,500
	PUMPS AND PIPING SUBTOTAL				**$ 514,000**
	BUILDING				
24	PRECAST ROOF SYSTEM	SF	1705	$ 15.00	$ 26,000
25	MASONRY BUILDING (BRICK & BLOCK)	SF	1705	$ 40.00	$ 69,000
26	METALS (STAIRS, HANDRAILS, ETC)	SF	1705	$ 12.00	$ 21,000
27	THERMAL & MOISTURE PROTECTION	SF	1705	$ 15.00	$ 26,000
28	DOORS & WINDOWS	SF	1705	$ 25.00	$ 43,000
29	PAINTING	LS	1.0	$ 75,000.00	$ 75,000
30	PLUMBING	LS	1.0	$ 85,000.00	$ 85,000
31	HVAC	LS	1.0	$ 165,000.00	$ 165,000
32	ELECTRICAL (NON-EQUIPMENT)	LS	1.0	$ 286,000.00	$ 286,000
33	HOIST/MONORAIL	EA	1.0	$ 25,000.00	$ 25,000
34	SURGE TANK	LS	1.0	$ 40,000.00	$ 40,000
35	ODOR CONTROL UNIT	LS	1.0	$ 100,000.00	$ 100,000
36	GENERATOR	LS	1.0	$ 441,000.00	$ 441,000
37	INSTRUMENTATION AND CONTROL SYSTEM	LS	1.0	$ 121,000.00	$ 121,000
38	MAG METER	LS	1.0	$ 7,000.00	$ 7,000
	BUILDING SUBTOTAL				**$ 1,530,000**
	SCREENING				
39	MECHANICAL BAR SCREEN	LS	1.0	$ 175,000.00	$ 175,000
	SCREENING SUBTOTAL				**$ 175,000**
	TOTAL ITEMS 1 THROUGH 39				
	SUBTOTAL CONSTRUCTION COSTS				$ 3,280,400
	CONTINGENCY (20%)				$ 657,000
	PRELIMINARY OPINION OF CONSTRUCTION COSTS				**$ 3,937,400**
	ENGINEERING, LEGAL, CONSTRUCTION ADMINISTRATION (20%)				$ 788,000
	TOTAL ENGINEER'S OPINION OF PROBABLE PROJECT COST				**$ 4,725,000**

TABLE F-9: PRELIMINARY ENGINEERS OPINION OF PROBABLE COST
LIFT STATION TO PUMP TO HARRISBURG WWTP (2021-2031)
AUGUST 2007

ITEM NO.	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL
	PUMPS AND PIPING				
1	PUMP REPLACEMENT	EA	2.0	$ 232,000.00	$ 464,000
2	WATER AND PUMPING TESTS	LS	1.0	$ 2,500.00	$ 2,500
	PUMPS AND PIPING SUBTOTAL				**$ 466,500**
	BUILDING				
3	ELECTRICAL & CONTROLS UPGRADE	LS	1.0	$ 70,000.00	$ 70,000
	BUILDING SUBTOTAL				**$ 70,000**
	TOTAL ITEMS 1 THROUGH 3				
	SUBTOTAL CONSTRUCTION COSTS				$ 536,500
	CONTINGENCY (20%)				$ 108,000
	PRELIMINARY OPINION OF CONSTRUCTION COSTS				**$ 644,500**
	ENGINEERING, LEGAL, CONSTRUCTION ADMINISTRATION (20%)				$ 129,000
	TOTAL ENGINEER'S OPINION OF PROBABLE PROJECT COST				**$ 774,000**

TABLE F-10: PRELIMINARY ENGINEERS OPINION OF PROBABLE COST
LIFT STATION TO PUMP TO SIOUX FALLS (2021-2031)
AUGUST 2007

ITEM NO.	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL
	PUMPS AND PIPING				
1	PUMP REPLACEMENT	EA	4.0	$ 178,000.00	$ 712,000
2	WATER AND PUMPING TESTS	LS	1.0	$ 2,500.00	$ 2,500
	PUMPS AND PIPING SUBTOTAL				**$ 714,500**
	BUILDING				
3	ELECTRICAL & CONTROLS UPGRADE	LS	1.0	$ 110,000.00	$ 110,000
	BUILDING SUBTOTAL				**$ 110,000**
	TOTAL ITEMS 1 THROUGH 3				
	SUBTOTAL CONSTRUCTION COSTS				$ 824,500
	CONTINGENCY (20%)				$ 165,000
	PRELIMINARY OPINION OF CONSTRUCTION COSTS				**$ 989,500**
	ENGINEERING, LEGAL, CONSTRUCTION ADMINISTRATION (20%)				$ 198,000
	TOTAL ENGINEER'S OPINION OF PROBABLE PROJECT COST				**$ 1,188,000**

CITY OF HARRISBURG, SOUTH DAKOTA
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Table F-11: Sequencing Batch Reactor Alternative 2021 Construction Costs

Item Description			Total Cost
PRELIMINARY TREATMENT			
Fine Screens (including washer/compactor)	1 ea	$ 50,000.00	$50,000
Sampler	1 ea	$ 6,500.00	$6,500
Grit Removal Equipment			
Structure			
Slabs	28 cu yds	$ 400.00	$11,200
Channel/Foundation Walls	21 cu yds	$ 700.00	$14,700
Vortex Chamber Walls	6 cu yds	$ 1,000.00	$6,000
Excavation	500 cu yds	$ 8.00	$4,000
Structural Backfill	20 cu yds	$ 26.00	$520
Backfill	175 cu yds	$ 12.00	$2,100
Grit Equipment (Vortex/Classifier)	1 ea	$150,000.00	$150,000
Grit Pumps	1 ea	$ 15,000.00	$15,000
Process Piping	1 Lump Sum	$ 15,000.00	$15,000
Misc. Metals	1 ea	$ 5,000.00	$5,000
Slide Gates	1 ea	$ 8,000.00	$8,000
Stop Plates	3 ea	$ 2,500.00	$7,500
Painting	1 Lump Sum	$ 15,000.00	$15,000
Flowmeter-Parshall Flume	1 ea	$ 7,000.00	$7,000
Headworks Structure			
Slabs	128 cu yds	$ 400.00	$51,200
Walls	58 cu yds	$ 700.00	$40,600
Excavation	930 cu yds	$ 8.00	$7,440
Structural Backfill	350 cu yds	$ 26.00	$9,100
Backfill	350 cu yds	$ 12.00	$4,200
Misc. Metals	1 Lump Sum	$ 15,000.00	$15,000
Superstructure	1500 sq ft	$ 70.00	$105,000
HVAC	Lump Sum	15%	$35,000
Plumbing	Lump Sum	15%	$35,000
Equipment Installation	Lump Sum	20%	$45,700
Electrical	Lump Sum	15%	$83,000
Instrumentation & Controls	Lump Sum	5%	$28,000
		Subtotal =	$776,800
BIOLOGICAL TREATMENT SPLITTER STRUCTURE			
Structure	Lump Sum		$38,350
Process			
Pipe	Lump Sum		$13,700
Stop Plates	3 ea	$ 800.00	$2,400
Excavation	500 cu yds	$ 8.00	$4,000
Structural Backfill	70 cu yds	$ 26.00	$1,820
Backfill	1000 cu yds	$ 12.00	$12,000
		Subtotal=	$72,270

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Table F-11: Sequencing Batch Reactor Alternative 2021 Construction Costs

SBR - BIOLOGICAL TREATMENT			
Structure			
Slab/footing	941 cu yd	$ 400.00	$376,400
Walls	780 cu yd	$ 700.00	$546,000
Excavation	6750 cu yd	$ 8.00	$54,000
Backfill	2378 cu yd	$ 12.00	$28,536
Structural Backfill	941 cu yd	$ 26.00	$24,466
Miscellaneous Structure	Lump Sum	4%	$41,176
Process			
Equipment Package	1 Lump Sum	$747,500.00	$747,500
Process/Aeration Piping	1 Lump Sum	$100,000.00	$100,000
Painting	1 Lump Sum	$ 20,000.00	$20,000
Electrical	Lump Sum	10%	$194,000
Instrumentation & Controls	Lump Sum	0%	$0
		Subtotal =	$2,132,078
EFFLUENT/DISINFECTION STRUCTURE			
Flowmeter-Parshall Flume	1 ea	$ 7,000.00	$7,000
Sampler	1 ea	$ 8,000.00	$8,000
UV Equipment	1 Lump Sum	$180,000.00	$180,000
Sluice Gate	1 ea	$ 8,000.00	$8,000
Structure			
Slab/footing	4.5 cu yd	$ 400.00	$1,800
Walls	10 cu yd	$ 700.00	$7,000
Excavation	51 cu yd	$ 8.00	$408
Backfill	25.5 cu yd	$ 12.00	$306
Metals (handrail, grating, stairs)	1 Lump Sum	$ 20,000.00	$20,000
Electrical		8%	$19,000
Instrumentation & Controls		4%	$9,000
		Subtotal =	$260,514
AEROBIC DIGESTION			
Existing Digestion Facilities			
Primary Digester Concrete			
Walls	795 cu yds	$ 700.00	$556,500
Slab	435 cu yds	$ 400.00	$174,000
Excavation	4620 cu yds	$ 8.00	$36,960
Backfill	1960 cu yds	$ 12.00	$23,520
Structural Backfill	190 cu yds	$ 26.00	$4,940
125 hp Blowers	2 ea	$ 75,000.00	$150,000
Diffusers and Piping	1 Lump Sum	$ 40,000.00	$40,000
Process Pipe and Fittings	1 Lump Sum	$ 50,000.00	$50,000
Electrical		14%	$145,000
Instrumentation & Controls		5%	$52,000
		Subtotal =	$1,232,920

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Table F-11: Sequencing Batch Reactor Alternative 2021 Construction Costs

THICKENING/DEWATERING BUILDING			
RDT	0 EA	$182,000.00	$0
RDT Feed Pumps	0 EA	$ 20,000.00	$0
RDT-to-Digester Feed Pumps	0 EA	$ 25,000.00	$0
Polymer Feed Unit	1 EA	$ 15,000.00	$15,000
BFP	1 EA	$300,000.00	$300,000
BFP Feed Pumps	2 EA	$ 20,000.00	$40,000
Conveyor	1 EA	$ 60,000.00	$60,000
Process			
Piping	1 Lump Sum	$ 20,000.00	$20,000
Valves	1 Lump Sum	$ 15,000.00	$15,000
Structure	1800 sq ft	$ 150.00	$270,000
Footing	30 cu yds	$ 400.00	$12,000
Slab	35 cu yds	$ 400.00	$14,000
Misc Concrete	10 cu yds	$ 700.00	$7,000
Excavation	100 cu yds	$ 8.00	$800
Structural Backfill	35 cu yds	$ 26.00	$900
Backfill	100 cu yds	$ 12.00	$1,200
WAS Holding Tank	1 Lump Sum	$ 15,000.00	$15,000
Excavation	1400 cu yds	$ 8.00	$11,200
Backfill	500 cu yds	$ 12.00	$6,000
Structural Backfill	250 cu yds	$ 26.00	$6,500
Walls	130 cu yds	$ 700.00	$91,000
Slab	200 cu yds	$ 400.00	$80,000
Roofing	1800 sq ft	$ 100.00	$180,000
HVAC		6%	$63,000
Plumbing		7%	$74,500
Electrical		12%	$137,500
Instrumentation & Controls		6%	$68,700
		Subtotal =	$1,489,300

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Table F-11: Sequencing Batch Reactor Alternative 2021 Construction Costs

NEW CONTROL BUILDING			
Structure	1000 Sq Ft	$ 100.00	$100,000
Laboratory Equip	1 Lump Sum	$ 25,000.00	$25,000
Plumbing	1000 Sq Ft	$ 20.00	$20,000
HVAC	1000 Sq Ft	$ 15.00	$15,000
Roofing	1000 Sq Ft	$ 50.00	$50,000
Finishes	1 Lump Sum	$ 10,000.00	$10,000
Electrical Modifications		10%	$22,000
Instrumentation & Controls		8%	$18,000
		Subtotal =	$260,000
Subtotal			$6,223,882
SITEWORK		10%	$622,388
Subtotal			$6,846,270
GENERAL REQUIREMENTS		10%	$685,000
Subtotal			$7,531,270
CONTINGENCY		20%	$1,506,000
Opinion of Probable Construction Cost			**$9,037,270**

*** Based on 2007 costs**

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CITY OF HARRISBURG, SOUTH DAKOTA
WASTEWATER TREATMENT IMPROVEMENTS
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Table F-12: Sequencing Batch Reactor Alternative 2031 Construction Costs

Item Description				Total Cost*
PRELIMINARY TREATMENT				
Fine Screens (including washer/compactor)	1 ea	$	50,000.00	$50,000
Sampler	0 ea	$	6,500.00	$0
Grit Removal Equipment				$0
Structure				$0
Slabs	0 cu yds	$	400.00	$0
Channel/Foundation Walls	0 cu yds	$	700.00	$0
Vortex Chamber Walls	0 cu yds	$	1,000.00	$0
Excavation	0 cu yds	$	8.00	$0
Structural Backfill	0 cu yds	$	26.00	$0
Backfill	0 cu yds	$	12.00	$0
Grit Equipment (Vortex/Classifier)	1 ea	$	150,000.00	$150,000
Grit Pumps	1 ea	$	15,000.00	$15,000
Process Piping	1 Lump Sum	$	15,000.00	$15,000
Misc. Metals	1 ea	$	5,000.00	$5,000
Slide Gates	1 ea	$	8,000.00	$8,000
Stop Plates	3 ea	$	2,500.00	$7,500
Painting	1 Lump Sum	$	15,000.00	$15,000
Flowmeter-Parshall Flume	0 ea	$	7,000.00	$0
Headworks Structure				$0
Slabs	0 cu yds	$	400.00	$0
Walls	0 cu yds	$	700.00	$0
Excavation	0 cu yds	$	8.00	$0
Structural Backfill	0 cu yds	$	26.00	$0
Backfill	0 cu yds	$	12.00	$0
Misc. Metals	1 Lump Sum	$	15,000.00	$15,000
Superstructure	0 sq ft	$	70.00	$0
HVAC	Lump Sum		0%	$0
Plumbing	Lump Sum		15%	$2,000
Equipment Installation	Lump Sum		20%	$43,000
Electrical	Lump Sum		15%	$42,000
Instrumentation & Controls	Lump Sum		5%	$14,000
		Subtotal =		$381,500

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WASTEWATER TREATMENT IMPROVEMENTS
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Table F-12: Sequencing Batch Reactor Alternative 2031 Construction Costs

PRIMARY CLARIFIER				
Structure				
Walls	376	cu yds	$ 700.00	$263,200
Slab	528	cu yds	$ 400.00	$211,200
Misc concrete	55	cu yds	$ 700.00	$38,500
Excavation	4647	cu yds	$ 8.00	$37,176
Structural Backfill	715	cu yds	$ 26.00	$18,590
Backfill	2033	cu yds	$ 12.00	$24,396
Pump Structure				$0
Walls	80	cu yds	$ 700.00	$56,000
Slab	50	cu yds	$ 400.00	$20,000
Suspended Slab	50	cu yds	$ 700.00	$35,000
Misc Metals	3	ea	$ 5,000.00	$15,000
Primary Sludge Pumps	3	ea	$ 15,000.00	$45,000
Piping & Valves	1	Lump	$ 20,000.00	$20,000
Misc Metals	3	ea	$ 5,000.00	$15,000
Process				$0
4" Pipe	30	lin ft	$ 24.00	$720
6" Pipe	135	lin ft	$ 36.00	$4,860
18" Pipe	135	lin ft	$ 108.00	$14,580
Concrete Encasement	270	lin ft	$ 20.00	$5,400
Mechanisms	3	ea	$ 100,000.00	$300,000
Weirs & Baffles	3	ea	$ 8,000.00	$24,000
Scum Pumping Structures	3	ea	$ 5,000.00	$15,000
Painting	1	Lump Sum	$ 20,000.00	$20,000
Equipment Installation		Lump Sum	20%	$73,800
Electrical		Lump Sum	15%	$178,000
Instrumentation & Controls		Lump Sum	5%	$59,000
			Subtotal=	$1,494,422
PRIMARY CLARIFIER SPLITTER STRUCTURE				
Structure	1	Lump Sum	$ 38,350.00	$38,350
Process				$0
Pipe		Lump Sum		$0
Slide Gates	3	ea	$ 6,000.00	$18,000
Excavation	500	cu yds	$ 8.00	$4,000
Structural Backfill	70	cu yds	$ 26.00	$1,820
Backfill	1000	cu yds	$ 12.00	$12,000
			Subtotal=	$74,170

CITY OF HARRISBURG, SOUTH DAKOTA
WASTEWATER TREATMENT IMPROVEMENTS
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Table F-12: Sequencing Batch Reactor Alternative 2031 Construction Costs

BIOLOGICAL TREATMENT SPLITTER STRUCTURE			
Structure	1 Lump Sum	$38,350	$38,350
Process			
Pipe	1 Lump Sum	$ 13,700.00	$13,700
Stop Plates	3 ea	$ 800.00	$2,400
Excavation	500 cu yds	$ 8.00	$4,000
Structural Backfill	70 cu yds	$ 12.00	$840
Backfill	1000 cu yds	$ 26.00	$26,000
		Subtotal =	$85,290
SBR - BIOLOGICAL TREATMENT			
Structure			
Slab/footing	882 cu yd	$ 400.00	$352,800
Walls	595 cu yd	$ 700.00	$416,500
Excavation	5688 cu yd	$ 8.00	$45,504
Backfill	1412 cu yd	$ 12.00	$16,944
Structural Backfill	882 cu yd	$ 26.00	$22,932
Miscellaneous Structure	Lump Sum	4%	$34,200
Process			
Equipment Package	1 Lump Sum	$ 644,000.00	$644,000
Process/Aeration Piping	1 Lump Sum	$ 100,000.00	$100,000
Painting	1 Lump Sum	$ 20,000.00	$20,000
Electrical	Lump Sum	10%	$165,000
Instrumentation & Controls	Lump Sum	0%	$0
		Subtotal =	$1,817,880
EFFLUENT/DISINFECTION STRUCTURE			
Flowmeter-Parshall Flume	0 ea	$ 7,000.00	$0
Sampler	0 ea	$ 8,000.00	$0
UV Equipment	0 Lump Sum	$ 115,000.00	$0
Sluice Gate	0 ea	$ 8,000.00	$0
Structure	0 Lump Sum	$ 30,000.00	$0
Electrical		8%	$0
Instrumentation & Controls		4%	$0
		Subtotal =	$0

CITY OF HARRISBURG, SOUTH DAKOTA
WASTEWATER TREATMENT IMPROVEMENTS
OPINION OF PROBABLE PROJECT COST
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Table F-12: Sequencing Batch Reactor Alternative 2031 Construction Costs

ANAEROBIC DIGESTION CONVERSION			
Existing Digestion Facilities			
Selective Demolition			
Aeration System	1 Lump Sum	$ 20,000.00	$20,000
Digester Cleaning	2 ea	$ 5,000.00	$10,000
New Digestion Facilities			$0
Dual-fuel Boiler	2 ea	$ 100,000.00	$200,000
Heat Exchanger	2	$ 20,000.00	$40,000
Recirculation Pumps	1	$ 30,000.00	$30,000
Equipment Building	1	$ 62,500.00	$62,500
Waste Gas Burner, Piping, & Controls	1 Lump Sum	$ 100,000.00	$100,000
Primary Digester Mixing System	1 ea	$ 75,000.00	$75,000
Primary Digester Covers-fixed	1 ea	$ 125,000.00	$125,000
Secondary Digester Cover-floating	1 ea	$ 200,000.00	$200,000
Process Pipe and Fittings	1 Lump Sum	$ 25,000.00	$25,000
Electrical		14%	$120,000
Instrumentation & Controls		5%	$43,000
		Subtotal =	$1,050,500
THICKENING/DEWATERING BUILDING			
RDT	1 EA	$ 182,000.00	$182,000
RDT Feed Pumps	2 EA	$ 20,000.00	$40,000
RDT-to-Digester Feed Pumps	2 EA	$ 25,000.00	$50,000
Polymer Feed Unit	1 EA	$ 15,000.00	$15,000
BFP	0 EA	$ 300,000.00	$0
BFP Feed Pumps	0 EA	$ 20,000.00	$0
Conveyor	0 EA	$ 60,000.00	$0
Process			
Piping	0 Lump Sum	$ 20,000.00	$0
Valves	0 Lump Sum	$ 15,000.00	$0
Structure	0 sq ft	$ 150.00	$0
Footing	0 cu yds	$ 400.00	$0
Slab	0 cu yds	$ 400.00	$0
Misc Concrete	0 cu yds	$ 700.00	$0
Excavation	0 cu yds	$ 8.00	$0
Structural Backfill	0 cu yds	$ 26.00	$0
Backfill	0 cu yds	$ 12.00	$0
WAS Holding Tank	0 Lump Sum	$ 15,000.00	$0
Excavation	0 cu yds	$ 8.00	$0
Backfill	0 cu yds	$ 12.00	$0
Structural Backfill	0 cu yds	$ 26.00	$0
Walls	0 cu yds	$ 700.00	$0
Slab	0 cu yds	$ 400.00	$0
Roofing	0 sq ft	$ 100.00	$0
HVAC		6%	$15,800
Plumbing		7%	$18,700

Table F-12: Sequencing Batch Reactor Alternative 2031 Construction Costs

Electrical			12%	$34,400
Instrumentation & Controls			6%	$17,200
		Subtotal =		$373,100
NEW CONTROL BUILDING				
Structure	0 Sq Ft	$	100.00	$0
Laboratory Equip	0 Lump Sum	$	25,000.00	$0
Plumbing	0 Sq Ft	$	20.00	$0
HVAC	0 Sq Ft	$	15.00	$0
Roofing	0 Sq Ft	$	50.00	$0
Finishes	0 Lump Sum	$	10,000.00	$0
Electrical Modifications		10%		$0
Instrumentation & Controls		8%		$0
		Subtotal =		$0
Subtotal				$5,276,862
SITEWORK	10%			$527,686
Subtotal				$5,804,548
GENERAL REQUIREMENTS	10%			$580,000
Subtotal				$6,384,548
CONTINGENCY	20%			$1,277,000
Opinion of Probable Construction Cost				**$7,661,548**

*** Based on 2007 costs**

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CITY OF HARRISBURG, SOUTH DAKOTA
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TABLE F-13: Conventional Activated-Sludge Alternative 2021 Construction Costs

Item Description				Total Cost
PRELIMINARY TREATMENT				
Fine Screens (including washer/compactor)	1 ea	$	50,000.00	$50,000
Sampler	1 ea	$	6,500.00	$6,500
Grit Removal Equipment				
Structure				
Slabs	28 cu yds	$	400.00	$11,200
Channel/Foundation Walls	21 cu yds	$	700.00	$14,700
Vortex Chamber Walls	6 cu yds	$	1,000.00	$6,000
Excavation	500 cu yds	$	8.00	$4,000
Structural Backfill	20 cu yds	$	26.00	$520
Backfill	175 cu yds	$	12.00	$2,100
Grit Equipment (Vortex/Classifier)	1 ea	$	150,000.00	$150,000
Grit Pumps	1 ea	$	15,000.00	$15,000
Process Piping	1 Lump Sum	$	15,000.00	$15,000
Misc. Metals	1 ea	$	5,000.00	$5,000
Slide Gates	1 ea	$	8,000.00	$8,000
Stop Plates	3 ea	$	2,500.00	$7,500
Painting	1 Lump Sum	$	15,000.00	$15,000
Flowmeter-Parshall Flume	1 ea	$	7,000.00	$7,000
Headworks Structure				
Slabs	128 cu yds	$	400.00	$51,200
Walls	58 cu yds	$	700.00	$40,600
Excavation	930 cu yds	$	8.00	$7,440
Structural Backfill	350 cu yds	$	26.00	$9,100
Backfill	350 cu yds	$	12.00	$4,200
Misc. Metals	1 Lump Sum	$	15,000.00	$15,000
Superstructure	1500 sq ft	$	70.00	$105,000
HVAC	Lump Sum		15%	$35,000
Plumbing	Lump Sum		15%	$35,000
Equipment Installation	Lump Sum		20%	$45,700
Electrical	Lump Sum		15%	$83,000
Instrumentation & Controls	Lump Sum		5%	$28,000
		Subtotal =		$776,800
BIOLOGICAL TREATMENT SPLITTER STRUCTURE				
Structure	Lump Sum			$38,350
Process				
Pipe	Lump Sum			$13,700
Stop Plates	3 ea	$	800.00	$2,400
Excavation	500 cu yds	$	8.00	$4,000
Structural Backfill	70 cu yds	$	26.00	$1,820
Backfill	1000 cu yds	$	12.00	$12,000
		Subtotal=		$72,270

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TABLE F-13: Conventional Activated-Sludge Alternative 2021 Construction Costs

CONVENTIONAL AS - BIOLOGICAL TREATMENT			
Structure			
Slab/footing	905.2 cu yd	$ 400.00	$362,080
Walls	566.6 cu yd	$ 700.00	$396,620
Excavation	5237 cu yd	$ 8.00	$41,896
Backfill	1877 cu yd	$ 12.00	$22,524
Structural Backfill	905.2 cu yd	$ 26.00	$23,535
Miscellaneous Structure	Lump Sum	4%	$33,866
Process			
75 Hp Blowers	3 ea	$ 45,000.00	$135,000
Air Piping	1 Lump Sum	$ 70,000.00	$70,000
Diffusers	1 Lump Sum	$ 150,000.00	$150,000
Baffles	1 Lump Sum	$ 50,000.00	$50,000
Painting	1 Lump Sum	$ 10,000.00	$10,000
Electrical	Lump Sum	10%	$130,000
Instrumentation & Controls	Lump Sum	4%	$52,000
		Subtotal =	$1,477,521
SECONDARY CLARIFIER SPLITTER STRUCTURE			
Structure	Lump Sum		$38,350
Process			
Pipe	Lump Sum		$13,700
Stop Plates	3 ea	$ 800.00	$2,400
Excavation	500 cu yds	$ 8.00	$4,000
Structural Backfill	70 cu yds	$ 26.00	$1,820
Backfill	1000 cu yds	$ 12.00	$12,000
		Subtotal=	$72,270
SECONDARY CLARIFIER			
Clarifier Structure			
Concrete Structures	1 Lump Sum	$ 375,000.00	$375,000
Miscellaneous Structures	1 Lump Sum	$ 40,000.00	$40,000
Secondary Solids Handling			
Incl. WAS, RAS, scum, structures	1 Lump Sum	$ 1,000,000.00	$1,000,000
Process			
Equipment (incl. installation)	1 Lump Sum	$ 260,000.00	$260,000
Piping	1 Lump Sum	$ 25,000.00	$25,000
Electrical	Lump Sum	10%	$170,000
Instrumentation & Controls	Lump Sum	4%	$68,000
		Subtotal=	$1,938,000
EFFLUENT/DISINFECTION STRUCTURE			
Flowmeter-Parshall Flume	1 ea	$ 7,000.00	$7,000
Sampler	1 ea	$ 8,000.00	$8,000
UV Equipment	1 Lump Sum	$ 120,000.00	$120,000
Sluice Gate	1 ea	$ 8,000.00	$8,000
Structure			
Slab/footing	4.5 cu yd	$ 400.00	$1,800
Walls	10 cu yd	$ 700.00	$7,000
Excavation	51 cu yd	$ 8.00	$408
Backfill	25.5 cu yd	$ 12.00	$306
Metals (handrail, grating, stairs)	1 Lump Sum	$ 20,000.00	$20,000
Electrical		8%	$14,000
Instrumentation & Controls		4%	$7,000
		Subtotal =	$193,514

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TABLE F-13: Conventional Activated-Sludge Alternative 2021 Construction Costs

AEROBIC DIGESTION				
Existing Digestion Facilities				
Primary Digester Concrete				
Walls	795 cu yds	$	700.00	$556,500
Slab	435 cu yds	$	400.00	$174,000
Excavation	4620 cu yds	$	8.00	$36,960
Backfill	1960 cu yds	$	12.00	$23,520
Structural Backfill	190 cu yds	$	26.00	$4,940
125 hp Blowers	2 ea	$	75,000.00	$150,000
Diffusers and Piping	1 Lump Sum	$	40,000.00	$40,000
Process Pipe and Fittings	1 Lump Sum	$	50,000.00	$50,000
Electrical			14%	$145,000
Instrumentation & Controls			5%	$52,000
		Subtotal =		$1,232,920
THICKENING/DEWATERING BUILDING				
RDT	0 EA	$	182,000.00	$0
RDT Feed Pumps	0 EA	$	20,000.00	$0
RDT-to-Digester Feed Pumps	0 EA	$	25,000.00	$0
Polymer Feed Unit	1 EA	$	15,000.00	$15,000
BFP	1 EA	$	300,000.00	$300,000
BFP Feed Pumps	2 EA	$	20,000.00	$40,000
Conveyor	1 EA	$	60,000.00	$60,000
Process				
Piping	1 Lump Sum	$	20,000.00	$20,000
Valves	1 Lump Sum	$	15,000.00	$15,000
Structure	1800 sq ft	$	150.00	$270,000
Footing	30 cu yds	$	400.00	$12,000
Slab	35 cu yds	$	400.00	$14,000
Misc Concrete	10 cu yds	$	700.00	$7,000
Excavation	100 cu yds	$	8.00	$800
Structural Backfill	35 cu yds	$	26.00	$900
Backfill	100 cu yds	$	12.00	$1,200
WAS Holding Tank	1 Lump Sum	$	15,000.00	$15,000
Excavation	1400 cu yds	$	8.00	$11,200
Backfill	500 cu yds	$	12.00	$6,000
Structural Backfill	250 cu yds	$	26.00	$6,500
Walls	130 cu yds	$	700.00	$91,000
Slab	200 cu yds	$	400.00	$80,000
Roofing	1800 sq ft	$	100.00	$180,000
HVAC			6%	$63,000
Plumbing			7%	$74,500
Electrical			12%	$137,500
Instrumentation & Controls			6%	$68,700
		Subtotal =		$1,489,300

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TABLE F-13: Conventional Activated-Sludge Alternative 2021 Construction Costs

NEW CONTROL BUILDING				
Structure	1000 Sq Ft	$	100.00	$100,000
Laboratory Equip	1 Lump Sum	$	25,000.00	$25,000
Plumbing	1000 Sq Ft	$	20.00	$20,000
HVAC	1000 Sq Ft	$	15.00	$15,000
Roofing	1000 Sq Ft	$	50.00	$50,000
Finishes	1 Lump Sum	$	10,000.00	$10,000
Electrical Modifications		10%		$22,000
Instrumentation & Controls		8%		$18,000
		Subtotal =		$260,000
Subtotal				$7,512,595
SITEWORK	10%			$751,260
Subtotal				$8,263,855
GENERAL REQUIREMENTS	10%			$826,000
Subtotal				$9,089,855
CONTINGENCY	20%			$1,818,000
Opinion of Probable Construction Cost				**$10,907,855**

*** Based on 2007 costs**

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Table F-14: Conventional Activated-Sludge Alternative 2031 Construction Costs

Item Description			Total Cost*
PRELIMINARY TREATMENT			
Fine Screens (including washer/compactor)	1 ea	$ 50,000.00	$50,000
Sampler	0 ea	$ 6,500.00	$0
Grit Removal Equipment			$0
Structure			$0
Slabs	0 cu yds	$ 400.00	$0
Channel/Foundation Walls	0 cu yds	$ 700.00	$0
Vortex Chamber Walls	0 cu yds	$ 1,000.00	$0
Excavation	0 cu yds	$ 8.00	$0
Structural Backfill	0 cu yds	$ 26.00	$0
Backfill	0 cu yds	$ 12.00	$0
Grit Equipment (Vortex/Classifier)	1 ea	$150,000.00	$150,000
Grit Pumps	1 ea	$ 15,000.00	$15,000
Process Piping	1 Lump Sum	$ 15,000.00	$15,000
Misc. Metals	1 ea	$ 5,000.00	$5,000
Slide Gates	1 ea	$ 8,000.00	$8,000
Stop Plates	3 ea	$ 2,500.00	$7,500
Painting	1 Lump Sum	$ 15,000.00	$15,000
Flowmeter-Parshall Flume	0 ea	$ 7,000.00	$0
Headworks Structure			$0
Slabs	0 cu yds	$ 400.00	$0
Walls	0 cu yds	$ 700.00	$0
Excavation	0 cu yds	$ 8.00	$0
Structural Backfill	0 cu yds	$ 26.00	$0
Backfill	0 cu yds	$ 12.00	$0
Misc. Metals	1 Lump Sum	$ 15,000.00	$15,000
Superstructure	0 sq ft	$ 70.00	$0
HVAC	Lump Sum	0%	$0
Plumbing	Lump Sum	15%	$2,000
Equipment Installation	Lump Sum	20%	$43,000
Electrical	Lump Sum	15%	$42,000
Instrumentation & Controls	Lump Sum	5%	$14,000
		Subtotal =	$381,500

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Table F-14: Conventional Activated-Sludge Alternative 2031 Construction Costs

PRIMARY CLARIFIER			
Structure			
Walls	376 cu yds	$ 700.00	$263,200
Slab	528 cu yds	$ 400.00	$211,200
Misc concrete	55 cu yds	$ 700.00	$38,500
Excavation	4647 cu yds	$ 8.00	$37,176
Structural Backfill	715 cu yds	$ 26.00	$18,590
Backfill	2033 cu yds	$ 12.00	$24,396
Pump Structure			$0
Walls	80 cu yds	$ 700.00	$56,000
Slab	50 cu yds	$ 400.00	$20,000
Suspended Slab	50 cu yds	$ 700.00	$35,000
Misc Metals	3 ea	$ 5,000.00	$15,000
Primary Sludge Pumps	3 ea	$ 15,000.00	$45,000
Piping & Valves	1 Lump	$ 20,000.00	$20,000
Misc Metals	3 ea	$ 5,000.00	$15,000
Process			$0
4" Pipe	30 lin ft	$ 24.00	$720
6" Pipe	135 lin ft	$ 36.00	$4,860
18" Pipe	135 lin ft	$ 108.00	$14,580
Concrete Encasement	270 lin ft	$ 20.00	$5,400
Mechanisms	3 ea	$100,000.00	$300,000
Weirs & Baffles	3 ea	$ 8,000.00	$24,000
Scum Pumping Structures	3 ea	$ 5,000.00	$15,000
Painting	1 Lump Sum	$ 20,000.00	$20,000
Equipment Installation	Lump Sum	20%	$73,800
Electrical	Lump Sum	15%	$178,000
Instrumentation & Controls	Lump Sum	5%	$59,000
		Subtotal=	$1,494,422
PRIMARY CLARIFIER SPLITTER STRUCTURE			
Structure	1 Lump Sum	$ 38,350.00	$38,350
Process			$0
Pipe	Lump Sum		$0
Slide Gates	3 ea	$ 6,000.00	$18,000
Excavation	500 cu yds	$ 8.00	$4,000
Structural Backfill	70 cu yds	$ 26.00	$1,820
Backfill	1000 cu yds	$ 12.00	$12,000
		Subtotal=	$74,170

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Table F-14: Conventional Activated-Sludge Alternative 2031 Construction Costs

BIOLOGICAL TREATMENT SPLITTER STRUCTURE			
Structure	Lump Sum		$0
Process			
Pipe	Lump Sum		$0
Stop Plates	0 ea	$ 800.00	$0
Excavation	0 cu yds	$ 8.00	$0
Structural Backfill	0 cu yds	$ 26.00	$0
Backfill	0 cu yds	$ 12.00	$0
		Subtotal=	$0
CONVENTIONAL AS - BIOLOGICAL TREATMENT			
Structure			
Slab/footing	0 cu yd	$ 400.00	$0
Walls	0 cu yd	$ 700.00	$0
Excavation	0 cu yd	$ 8.00	$0
Backfill	0 cu yd	$ 12.00	$0
Structural Backfill	0 cu yd	$ 26.00	$0
Miscellaneous Structure	Lump Sum	4%	$0
Process			
75 Hp Blowers	2 ea	$ 45,000.00	$90,000
Air Piping	1 Lump Sum	$ 25,000.00	$25,000
Diffusers	0 Lump Sum	$ 150,000.00	$0
Baffles	0 Lump Sum	$ 50,000.00	$0
Painting	0 Lump Sum	$ 10,000.00	$0
Electrical	Lump Sum	10%	$12,000
Instrumentation & Controls	Lump Sum	4%	$5,000
		Subtotal =	$132,000
SECONDARY CLARIFIER SPLITTER STRUCTURE			
Structure	Lump Sum		$0
Process			
Pipe	Lump Sum		$0
Stop Plates	0 ea	$ 800.00	$0
Excavation	0 cu yds	$ 8.00	$0
Structural Backfill	0 cu yds	$ 26.00	$0
Backfill	0 cu yds	$ 12.00	$0
		Subtotal=	$0

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Table F-14: Conventional Activated-Sludge Alternative 2031 Construction Costs

SECONDARY CLARIFIER			
Clarifier Structure			
Concrete Structures	1 Lump Sum	$200,000.00	$200,000
Miscellaneous Structures	1 Lump Sum	$ 10,000.00	$10,000
Secondary Solids Handling			
Incl. WAS, RAS, scum, structures	1 Lump Sum	$ -	$0
Process			
Equipment (incl. installation)	1 Lump Sum	$130,000.00	$130,000
Piping	1 Lump Sum	$ 10,000.00	$10,000
Electrical	Lump Sum	10%	$35,000
Instrumentation & Controls	Lump Sum	4%	$14,000
		Subtotal=	$399,000
EFFLUENT/DISINFECTION STRUCTURE			
Flowmeter-Parshall Flume	0 ea	$ 7,000.00	$0
Sampler	0 ea	$ 8,000.00	$0
UV Equipment	1 Lump Sum	$ 60,000.00	$60,000
Sluice Gate	0 ea	$ 8,000.00	$0
Structure	0 Lump Sum	$ 30,000.00	$0
Electrical		8%	$5,000
Instrumentation & Controls		4%	$2,000
		Subtotal =	$67,000
ANAEROBIC DIGESTION CONVERSION			
Existing Digestion Facilities			
Selective Demolition			
Aeration System	1 Lump Sum	$ 20,000.00	$20,000
Digester Cleaning	2 ea	$ 5,000.00	$10,000
New Digestion Facilities			$0
Dual-fuel Boiler	2 ea	$100,000.00	$200,000
Heat Exchanger	2 ea	$ 20,000.00	$40,000
Recirculation Pumps	1 ea	$ 30,000.00	$30,000
Equipment Building	1 ea	$ 62,500.00	$62,500
Waste Gas Burner, Piping, & Controls	1 Lump Sum	$100,000.00	$100,000
Primary Digester Mixing System	1 ea	$ 75,000.00	$75,000
Primary Digester Covers-fixed	1 ea	$125,000.00	$125,000
Secondary Digester Cover-floating	1 ea	$200,000.00	$200,000
Process Pipe and Fittings	1 Lump Sum	$ 25,000.00	$25,000
Electrical		14%	$120,000
Instrumentation & Controls		5%	$43,000
		Subtotal =	$1,050,500

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Table F-14: Conventional Activated-Sludge Alternative 2031 Construction Costs

THICKENING/DEWATERING BUILDING			
RDT	1 EA	$182,000.00	$182,000
RDT Feed Pumps	2 EA	$ 20,000.00	$40,000
RDT-to-Digester Feed Pumps	2 EA	$ 25,000.00	$50,000
Polymer Feed Unit	1 EA	$ 15,000.00	$15,000
BFP	0 EA	$300,000.00	$0
BFP Feed Pumps	0 EA	$ 20,000.00	$0
Conveyor	0 EA	$ 60,000.00	$0
Process	0		
Piping	0 Lump Sum	$ 20,000.00	$0
Valves	0 Lump Sum	$ 15,000.00	$0
Structure	0 sq ft	$ 150.00	$0
Footing	0 cu yds	$ 400.00	$0
Slab	0 cu yds	$ 400.00	$0
Misc Concrete	0 cu yds	$ 700.00	$0
Excavation	0 cu yds	$ 8.00	$0
Structural Backfill	0 cu yds	$ 26.00	$0
Backfill	0 cu yds	$ 12.00	$0
WAS Holding Tank	0 Lump Sum	$ 15,000.00	$0
Excavation	0 cu yds	$ 8.00	$0
Backfill	0 cu yds	$ 12.00	$0
Structural Backfill	0 cu yds	$ 26.00	$0
Walls	0 cu yds	$ 700.00	$0
Slab	0 cu yds	$ 400.00	$0
Roofing	0 sq ft	$ 100.00	$0
HVAC		6%	$15,800
Plumbing		7%	$18,700
Electrical		12%	$34,400
Instrumentation & Controls		6%	$17,200
		Subtotal =	$373,100
NEW CONTROL BUILDING			
Structure	0 Sq Ft	$ 100.00	$0
Laboratory Equip	0 Lump Sum	$ 25,000.00	$0
Plumbing	0 Sq Ft	$ 20.00	$0
HVAC	0 Sq Ft	$ 15.00	$0
Roofing	0 Sq Ft	$ 50.00	$0
Finishes	0 Lump Sum	$ 10,000.00	$0
Electrical Modifications		10%	$0
Instrumentation & Controls		8%	$0
		Subtotal =	$0
Subtotal			$3,971,692
SITEWORK		10%	$397,169
Subtotal			$4,368,861
GENERAL REQUIREMENTS		10%	$437,000
Subtotal			$4,805,861
CONTINGENCY		20%	$961,000
Opinion of Probable Construction Cost			**$5,766,861**

*** Based on 2007 costs**

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CITY OF HARRISBURG, SOUTH DAKOTA
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Table F-15: Membrane Biological Reactor Alternative 2021 Construction Costs

Item Description				Total Cost
PRELIMINARY TREATMENT				
Fine Screens (including washer/compactor)	1 ea	$	200,000.00	$200,000
Sampler	1 ea	$	6,500.00	$6,500
Grit Removal Equipment				
Structure				
Slabs	28 cu yds	$	400.00	$11,200
Channel/Foundation Walls	21 cu yds	$	700.00	$14,700
Vortex Chamber Walls	6 cu yds	$	1,000.00	$6,000
Excavation	500 cu yds	$	8.00	$4,000
Structural Backfill	20 cu yds	$	26.00	$520
Backfill	175 cu yds	$	12.00	$2,100
Grit Equipment (Vortex/Classifier)	1 ea	$	150,000.00	$150,000
Grit Pumps	1 ea	$	15,000.00	$15,000
Process Piping	1 Lump Sum	$	15,000.00	$15,000
Misc. Metals	1 ea	$	5,000.00	$5,000
Slide Gates	1 ea	$	8,000.00	$8,000
Stop Plates	3 ea	$	2,500.00	$7,500
Painting	1 Lump Sum	$	15,000.00	$15,000
Flowmeter-Parshall Flume	1 ea	$	7,000.00	$7,000
Headworks Structure				
Slabs	128 cu yds	$	400.00	$51,200
Walls	58 cu yds	$	700.00	$40,600
Excavation	930 cu yds	$	8.00	$7,440
Structural Backfill	350 cu yds	$	26.00	$9,100
Backfill	350 cu yds	$	12.00	$4,200
Misc. Metals	1 Lump Sum	$	15,000.00	$15,000
Superstructure	1500 sq ft	$	70.00	$105,000
HVAC	Lump Sum		15%	$35,000
Plumbing	Lump Sum		15%	$35,000
Equipment Installation	Lump Sum		20%	$75,700
Electrical	Lump Sum		15%	$105,000
Instrumentation & Controls	Lump Sum		5%	$35,000
		Subtotal =		$985,800
BIOLOGICAL TREATMENT SPLITTER STRUCTURE				
Structure	Lump Sum			$38,350
Process				
Pipe	Lump Sum			$13,700
Stop Plates	3 ea	$	800.00	$2,400
Excavation	500 cu yds	$	8.00	$4,000
Structural Backfill	70 cu yds	$	26.00	$1,820
Backfill	1000 cu yds	$	12.00	$12,000
		Subtotal=		$72,270

MEMBRANE - BIOLOGICAL TREATMENT			
Structure			
Slab/footing	441 cu yd	$ 400.00	$176,400
Walls	350 cu yd	$ 700.00	$245,000
Excavation	2700 cu yd	$ 8.00	$21,600
Backfill	1130 cu yd	$ 12.00	$13,560
Structural Backfill	441 cu yd	$ 26.00	$11,466
Miscellaneous Structure	Lump Sum	5%	$23,401
Process			
75 Hp Blowers	3 ea	$ 45,000.00	$135,000
Air Piping	1 Lump Sum	$ 65,000.00	$65,000
Diffusers	1 Lump Sum	$ 80,000.00	$80,000
Baffles	1 Lump Sum	$ 30,000.00	$30,000
Painting	1 Lump Sum	$ 10,000.00	$10,000
Electrical	Lump Sum	10%	$34,000
Instrumentation & Controls	Lump Sum	4%	$14,000
		Subtotal =	$859,427
MEMBRANE CLARIFICATION			
Membrane Module Tank Structure			
Slab/footing	45 cu yd	$ 400.00	$18,000
Walls	142 cu yd	$ 700.00	$99,400
Excavation	350 cu yd	$ 8.00	$2,800
Membrane Module Equipment Bldg	1 Lump Sum	$ 665,300.00	$665,300
Membrane Process Equipment Package	1 Lump Sum	$2,152,600.00	$2,152,600
Electrical	Lump Sum	10%	$282,000
Instrumentation & Controls	Lump Sum	0%	$0
		Subtotal=	$3,220,100
EFFLUENT/DISINFECTION STRUCTURE			
Flowmeter-Parshall Flume	1 ea	$ 7,000.00	$7,000
Sampler	1 ea	$ 8,000.00	$8,000
UV Equipment	1 Lump Sum	$ 120,000.00	$120,000
Sluice Gate	1 ea	$ 8,000.00	$8,000
Structure			
Slab/footing	4.5 cu yd	$ 400.00	$1,800
Walls	10 cu yd	$ 700.00	$7,000
Excavation	51 cu yd	$ 8.00	$408
Backfill	25.5 cu yd	$ 12.00	$306
Metals (handrail, grating, stairs)	1 Lump Sum	$ 20,000.00	$20,000
Electrical		8%	$14,000
Instrumentation & Controls		4%	$7,000
		Subtotal =	$193,514
AEROBIC DIGESTION			
Existing Digestion Facilities			
Primary Digester Concrete			
Walls	795 cu yds	$ 700.00	$556,500
Slab	435 cu yds	$ 400.00	$174,000
Excavation	4620 cu yds	$ 8.00	$36,960
Backfill	1960 cu yds	$ 12.00	$23,520
Structural Backfill	190 cu yds	$ 26.00	$4,940
125 hp Blowers	2 ea	$ 75,000.00	$150,000
Diffusers and Piping	1 Lump Sum	$ 40,000.00	$40,000
Process Pipe and Fittings	1 Lump Sum	$ 50,000.00	$50,000
Electrical		14%	$145,000
Instrumentation & Controls		5%	$52,000
		Subtotal =	$1,232,920

THICKENING/DEWATERING BUILDING				
RDT	0	EA	$ 182,000.00	$0
RDT Feed Pumps	0	EA	$ 20,000.00	$0
RDT-to-Digester Feed Pumps	0	EA	$ 25,000.00	$0
Polymer Feed Unit	1	EA	$ 15,000.00	$15,000
BFP	1	EA	$ 300,000.00	$300,000
BFP Feed Pumps	2	EA	$ 20,000.00	$40,000
Conveyor	1	EA	$ 60,000.00	$60,000
Process				
Piping	1	Lump Sum	$ 20,000.00	$20,000
Valves	1	Lump Sum	$ 15,000.00	$15,000
Structure	1800	sq ft	$ 150.00	$270,000
Footing	30	cu yds	$ 400.00	$12,000
Slab	35	cu yds	$ 400.00	$14,000
Misc Concrete	10	cu yds	$ 700.00	$7,000
Excavation	100	cu yds	$ 8.00	$800
Structural Backfill	35	cu yds	$ 26.00	$900
Backfill	100	cu yds	$ 12.00	$1,200
WAS Holding Tank	1	Lump Sum	$ 15,000.00	$15,000
Excavation	1400	cu yds	$ 8.00	$11,200
Backfill	500	cu yds	$ 12.00	$6,000
Structural Backfill	250	cu yds	$ 26.00	$6,500
Walls	130	cu yds	$ 700.00	$91,000
Slab	200	cu yds	$ 400.00	$80,000
Roofing	1800	sq ft	$ 100.00	$180,000
HVAC			6%	$63,000
Plumbing			7%	$74,500
Electrical			12%	$137,500
Instrumentation & Controls			6%	$68,700
			Subtotal =	$1,489,300
NEW CONTROL BUILDING				
Structure	1000	Sq Ft	$ 100.00	$100,000
Laboratory Equip	1	Lump Sum	$ 25,000.00	$25,000
Plumbing	1000	Sq Ft	$ 20.00	$20,000
HVAC	1000	Sq Ft	$ 15.00	$15,000
Roofing	1000	Sq Ft	$ 50.00	$50,000
Finishes	1	Lump Sum	$ 10,000.00	$10,000
Electrical Modifications			10%	$22,000
Instrumentation & Controls			8%	$18,000
			Subtotal =	$260,000
Subtotal				$8,313,331
SITEWORK			10%	$831,333
Subtotal				$9,144,664
GENERAL REQUIREMENTS			10%	$914,000
Subtotal				$10,058,664
CONTINGENCY			20%	$2,012,000
Opinion of Probable Construction Cost				**$12,070,664**

*** Based on 2007 costs**

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CITY OF HARRISBURG, SOUTH DAKOTA
WASTEWATER TREATMENT IMPROVEMENTS
OPINION OF PROBABLE PROJECT COST
October 24, 2007

Table F-16: Membrane Biological Reactor Alternative 2031 Construction Costs

Item Description				Total Cost*
PRELIMINARY TREATMENT				
Fine Screens (including washer/compactor)	1 ea	$	200,000.00	$200,000
Sampler	0 ea	$	6,500.00	$0
Grit Removal Equipment				$0
Structure				$0
Slabs	0 cu yds	$	400.00	$0
Channel/Foundation Walls	0 cu yds	$	700.00	$0
Vortex Chamber Walls	0 cu yds	$	1,000.00	$0
Excavation	0 cu yds	$	8.00	$0
Structural Backfill	0 cu yds	$	26.00	$0
Backfill	0 cu yds	$	12.00	$0
Grit Equipment (Vortex/Classifier)	1 ea	$	150,000.00	$150,000
Grit Pumps	1 ea	$	15,000.00	$15,000
Process Piping	1 Lump Sum	$	15,000.00	$15,000
Misc. Metals	1 ea	$	5,000.00	$5,000
Slide Gates	1 ea	$	8,000.00	$8,000
Stop Plates	3 ea	$	2,500.00	$7,500
Painting	1 Lump Sum	$	15,000.00	$15,000
Flowmeter-Parshall Flume	0 ea	$	7,000.00	$0
Headworks Structure				$0
Slabs	0 cu yds	$	400.00	$0
Walls	0 cu yds	$	700.00	$0
Excavation	0 cu yds	$	8.00	$0
Structural Backfill	0 cu yds	$	26.00	$0
Backfill	0 cu yds	$	12.00	$0
Misc. Metals	1 Lump Sum	$	15,000.00	$15,000
Superstructure	0 sq ft	$	70.00	$0
HVAC	Lump Sum		0%	$0
Plumbing	Lump Sum		15%	$2,000
Equipment Installation	Lump Sum		20%	$73,000
Electrical	Lump Sum		15%	$65,000
Instrumentation & Controls	Lump Sum		5%	$22,000
		Subtotal =		$592,500

CITY OF HARRISBURG, SOUTH DAKOTA
WASTEWATER TREATMENT IMPROVEMENTS
OPINION OF PROBABLE PROJECT COST
October 24, 2007

Table F-16: Membrane Biological Reactor Alternative 2031 Construction Costs

PRIMARY CLARIFIER				
Structure				
Walls	376 cu yds	$	700.00	$263,200
Slab	528 cu yds	$	400.00	$211,200
Misc concrete	55 cu yds	$	700.00	$38,500
Excavation	4647 cu yds	$	8.00	$37,176
Structural Backfill	715 cu yds	$	26.00	$18,590
Backfill	2033 cu yds	$	12.00	$24,396
Pump Structure				$0
Walls	80 cu yds	$	700.00	$56,000
Slab	50 cu yds	$	400.00	$20,000
Suspended Slab	50 cu yds	$	700.00	$35,000
Misc Metals	3 ea	$	5,000.00	$15,000
Primary Sludge Pumps	3 ea	$	15,000.00	$45,000
Piping & Valves	1 Lump	$	20,000.00	$20,000
Misc Metals	3 ea	$	5,000.00	$15,000
Process				$0
4" Pipe	30 lin ft	$	24.00	$720
6" Pipe	135 lin ft	$	36.00	$4,860
18" Pipe	135 lin ft	$	108.00	$14,580
Concrete Encasement	270 lin ft	$	20.00	$5,400
Mechanisms	3 ea	$	100,000.00	$300,000
Weirs & Baffles	3 ea	$	8,000.00	$24,000
Scum Pumping Structures	3 ea	$	5,000.00	$15,000
Painting	1 Lump Sum	$	20,000.00	$20,000
Equipment Installation	Lump Sum		20%	$73,800
Electrical	Lump Sum		15%	$178,000
Instrumentation & Controls	Lump Sum		5%	$59,000
		Subtotal=		$1,494,422
PRIMARY CLARIFIER SPLITTER STRUCTURE				
Structure	1 Lump Sum	$	38,350.00	$38,350
Process				$0
Pipe	Lump Sum			$0
Slide Gates	3 ea	$	6,000.00	$18,000
Excavation	500 cu yds	$	8.00	$4,000
Structural Backfill	70 cu yds	$	26.00	$1,820
Backfill	1000 cu yds	$	12.00	$12,000
		Subtotal=		$74,170

CITY OF HARRISBURG, SOUTH DAKOTA
WASTEWATER TREATMENT IMPROVEMENTS
OPINION OF PROBABLE PROJECT COST
October 24, 2007

Table F-16: Membrane Biological Reactor Alternative 2031 Construction Costs

BIOLOGICAL TREATMENT SPLITTER STRUCTURE				
Structure	1 Lump Sum		$38,350	$38,350
Process				
Pipe	1 Lump Sum	$	13,700.00	$13,700
Stop Plates	3 ea	$	800.00	$2,400
Excavation	500 cu yds	$	8.00	$4,000
Structural Backfill	70 cu yds	$	26.00	$1,820
Backfill	1000 cu yds	$	12.00	$12,000
		Subtotal=		$72,270
MEMBRANE - BIOLOGICAL TREATMENT				
Structure				
Slab/footing	645 cu yd	$	400.00	$258,000
Walls	484 cu yd	$	700.00	$338,800
Excavation	3800 cu yd	$	8.00	$30,400
Backfill	1460 cu yd	$	12.00	$17,520
Structural Backfill	644 cu yd	$	26.00	$16,744
Miscellaneous Structure	Lump Sum		5%	$33,073
Process				
75 Hp Blowers	2 ea	$	45,000.00	$90,000
Air Piping	1 Lump Sum	$	15,000.00	$15,000
Diffusers	1 Lump Sum	$	35,000.00	$35,000
Baffles	1 Lump Sum	$	15,000.00	$15,000
Painting	1 Lump Sum	$	10,000.00	$10,000
Electrical	Lump Sum		10%	$20,000
Instrumentation & Controls	Lump Sum		4%	$8,000
		Subtotal =		$887,537
MEMBRANE CLARIFICATION				
Membrane Module Tank Structure				
Slab/footing	45 cu yd	$	400.00	$18,000
Walls	142 cu yd	$	700.00	$99,400
Excavation	350 cu yd	$	8.00	$2,800
Membrane Module Equipment Bldg	1 Lump Sum	$	670,320.00	$670,320
Membrane Process Equipment Package	1 Lump Sum	$	2,152,600.00	$2,152,600
Electrical	Lump Sum		10%	$282,000
Instrumentation & Controls	Lump Sum		0%	$0
		Subtotal=		$3,225,120
EFFLUENT/DISINFECTION STRUCTURE				
Flowmeter-Parshall Flume	0 ea	$	7,000.00	$0
Sampler	0 ea	$	8,000.00	$0
UV Equipment	1 Lump Sum	$	60,000.00	$60,000
Sluice Gate	0 ea	$	8,000.00	$0
Structure	0 Lump Sum	$	30,000.00	$0
Electrical		8%		$5,000
Instrumentation & Controls		4%		$2,000
		Subtotal =		$67,000

CITY OF HARRISBURG, SOUTH DAKOTA
WASTEWATER TREATMENT IMPROVEMENTS
OPINION OF PROBABLE PROJECT COST
October 24, 2007

Table F-16: Membrane Biological Reactor Alternative 2031 Construction Costs

ANAEROBIC DIGESTION CONVERSION				
Existing Digestion Facilities				
Selective Demolition				
Aeration System	1 Lump Sum	$	20,000.00	$20,000
Digester Cleaning	2 ea	$	5,000.00	$10,000
New Digestion Facilities				$0
Dual-fuel Boiler	2 ea	$	100,000.00	$200,000
Heat Exchanger	2	$	20,000.00	$40,000
Recirculation Pumps	1	$	30,000.00	$30,000
Equipment Building	1	$	62,500.00	$62,500
Waste Gas Burner, Piping, & Controls	1 Lump Sum	$	100,000.00	$100,000
Primary Digester Mixing System	1 ea	$	75,000.00	$75,000
Primary Digester Covers-fixed	1 ea	$	125,000.00	$125,000
Secondary Digester Cover-floating	1 ea	$	200,000.00	$200,000
Process Pipe and Fittings	1 Lump Sum	$	25,000.00	$25,000
Electrical			14%	$120,000
Instrumentation & Controls			5%	$43,000
		Subtotal =		$1,050,500
THICKENING/DEWATERING BUILDING				
RDT	1 EA	$	182,000.00	$182,000
RDT Feed Pumps	2 EA	$	20,000.00	$40,000
RDT-to-Digester Feed Pumps	2 EA	$	25,000.00	$50,000
Polymer Feed Unit	1 EA	$	15,000.00	$15,000
BFP	0 EA	$	300,000.00	$0
BFP Feed Pumps	0 EA	$	20,000.00	$0
Conveyor	0 EA	$	60,000.00	$0
Process				
Piping	0 Lump Sum	$	20,000.00	$0
Valves	0 Lump Sum	$	15,000.00	$0
Structure	0 sq ft	$	150.00	$0
Footing	0 cu yds	$	400.00	$0
Slab	0 cu yds	$	400.00	$0
Misc Concrete	0 cu yds	$	700.00	$0
Excavation	0 cu yds	$	8.00	$0
Structural Backfill	0 cu yds	$	26.00	$0
Backfill	0 cu yds	$	12.00	$0
WAS Holding Tank	0 Lump Sum	$	15,000.00	$0
Excavation	0 cu yds	$	8.00	$0
Backfill	0 cu yds	$	12.00	$0
Structural Backfill	0 cu yds	$	26.00	$0
Walls	0 cu yds	$	700.00	$0
Slab	0 cu yds	$	400.00	$0
Roofing	0 sq ft	$	100.00	$0
HVAC			6%	$15,800
Plumbing			7%	$18,700

CITY OF HARRISBURG, SOUTH DAKOTA
WASTEWATER TREATMENT IMPROVEMENTS
OPINION OF PROBABLE PROJECT COST
October 24, 2007

Table F-16: Membrane Biological Reactor Alternative 2031 Construction Costs

Electrical				12%	$34,400
Instrumentation & Controls				6%	$17,200
			Subtotal =		$373,100
NEW CONTROL BUILDING					
Structure	0 Sq Ft	$	100.00		$0
Laboratory Equip	0 Lump Sum	$	25,000.00		$0
Plumbing	0 Sq Ft	$	20.00		$0
HVAC	0 Sq Ft	$	15.00		$0
Roofing	0 Sq Ft	$	50.00		$0
Finishes	0 Lump Sum	$	10,000.00		$0
Electrical Modifications		10%			$0
Instrumentation & Controls		8%			$0
		Subtotal =			$0
Subtotal					$7,836,619
SITEWORK	10%				$783,662
Subtotal					$8,620,281
GENERAL REQUIREMENTS	10%				$862,000
Subtotal					$9,482,281
CONTINGENCY	20%				$1,896,000
Opinion of Probable Construction Cost					**$11,378,281**

*** Based on 2007 costs**

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TABLE F-17: PRELIMINARY ENGINEERS OPINION OF PROBABLE COST
GRAVITY OUTFALL
SEPTEMBER 2007

ITEM NO.	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT PRICE	TOTAL
	SITE WORK				
1	CLEARING & GRUBBING	LS	1.0	$ 10,000.00	$ 10,000
2	SALVAGE TOPSOIL	CY	1,125	$ 2.00	$ 2,300
3	PLACING TOPSOIL	CY	1,125	$ 4.00	$ 4,500
4	LOCATING UTILITIES	EA	2	$ 500.00	$ 1,000
5	RIPRAP	TON	50	$ 30.00	$ 1,500
	SITE WORK SUBTOTAL				**$ 19,300**
	EROSION CONTROL				
6	TEMPORARY SILT FENCE	LF	2,000	$ 5.00	$ 10,000
7	PERMANENT SEEDING	LB	250	$ 12.00	$ 3,000
8	FERTILIZING	LB	925	$ 1.00	$ 1,000
9	MULCHING	TON	15	$ 150.00	$ 2,300
	EROSION CONTROL SUBTOTAL				**$ 16,300**
	SANITARY SEWER				
10	TRENCH DEWATERING	LS	1	$ 50,000.00	$ 50,000
11	TRENCH STABILIZATION MATERIAL	TON	160	$ 21.00	$ 3,360
12	GRANULAR INITIAL BACKFILL FOR SANITARY SEWER	TON	525	$ 11.00	$ 5,775
13	MH FRAME AND COVER	EA	4	$ 350.00	$ 1,400
14	MH CONSTRUCTION PLATE MARKER	EA	4	$ 200.00	$ 800
15	MH EXTERNAL FRAME SEAL	EA	4	$ 400.00	$ 1,600
16	48"ø MH, IN PLACE, COMPLETE	EA	4	$ 2,500.00	$ 10,000
17	30" SAN SWR PVC PIPE SDR 35	LF	2,000	$ 300.00	$ 600,000
18	MH EXFILTRATION\VACUUM TEST	EA	4	$ 300.00	$ 1,200
19	SAN SWR EXFILTRATION TESTING	LF	2,000	$ 1.25	$ 2,500
20	SWR PIPE DEFLECTION TEST	LF	2,000	$ 1.00	$ 2,000
	SANITARY SEWER SUBTOTAL				**$ 680,000**
	TOTAL ITEMS 1 THROUGH 20				
	SUBTOTAL CONSTRUCTION COSTS				$ 715,600
	CONTINGENCY (20%)				$ 143,120
	PRELIMINARY OPINION OF CONSTRUCTION COSTS				**$ 858,720**
	ENGINEERING, LEGAL, CONSTRUCTION ADMINISTRATION (20%)				$ 171,744
	TOTAL ENGINEER'S OPINION OF PROBABLE PROJECT COST				**$ 1,030,000**