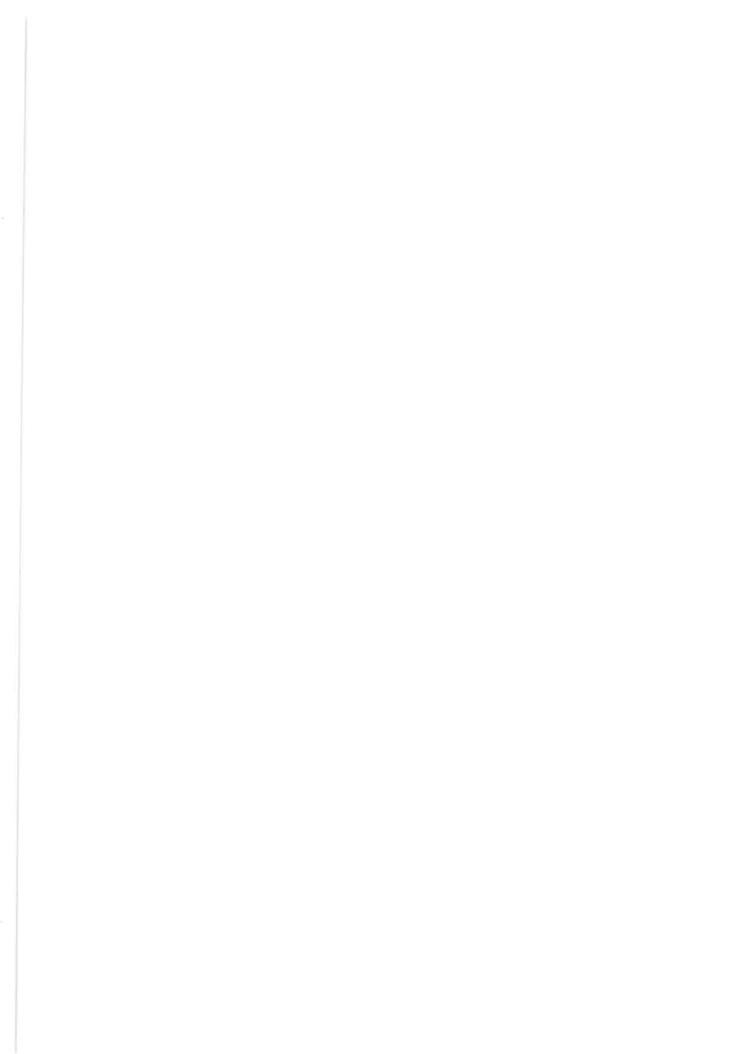
Howard R. Green Company Project No. 604980J

Wastewater Treatment Facility Plan Harrisburg, South Dakota

APPENDIX A

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Howard R. Green Company Project No. 604980J

Wastewater Treatment Facility Plan Harrisburg, South Dakota

		5	
8			
	APPENDIX B		

Dakota Harrisburg, South Zoning of City

LEGEND

EXHIBIT B-1



SINGLE FAMILY RESIDENTIAL



MULTIPLE FAMILY RESIDENTIAL



CENTRAL BUSINESS DISTRICT



GENERAL BUSINESS DISTRICT



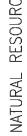
LIGHT INDUSTRY

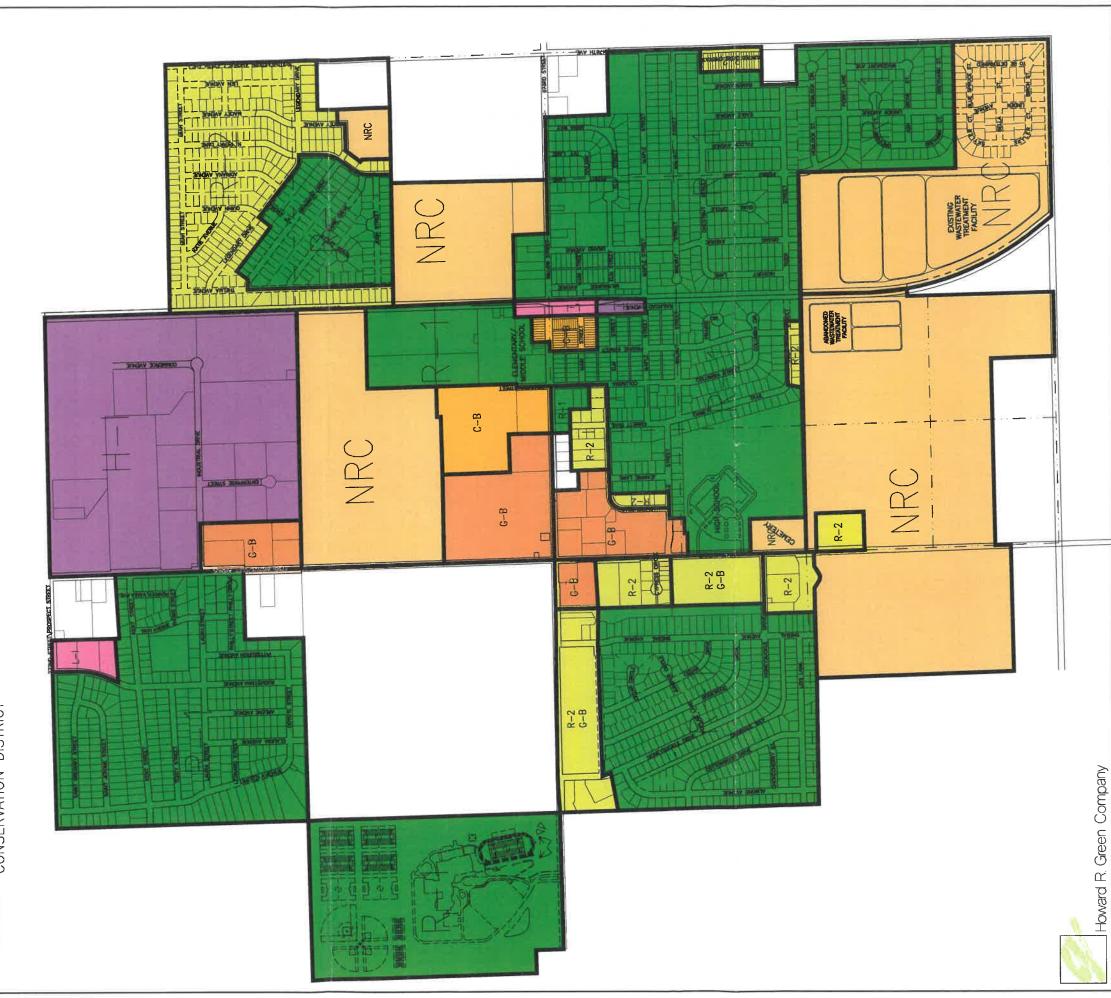


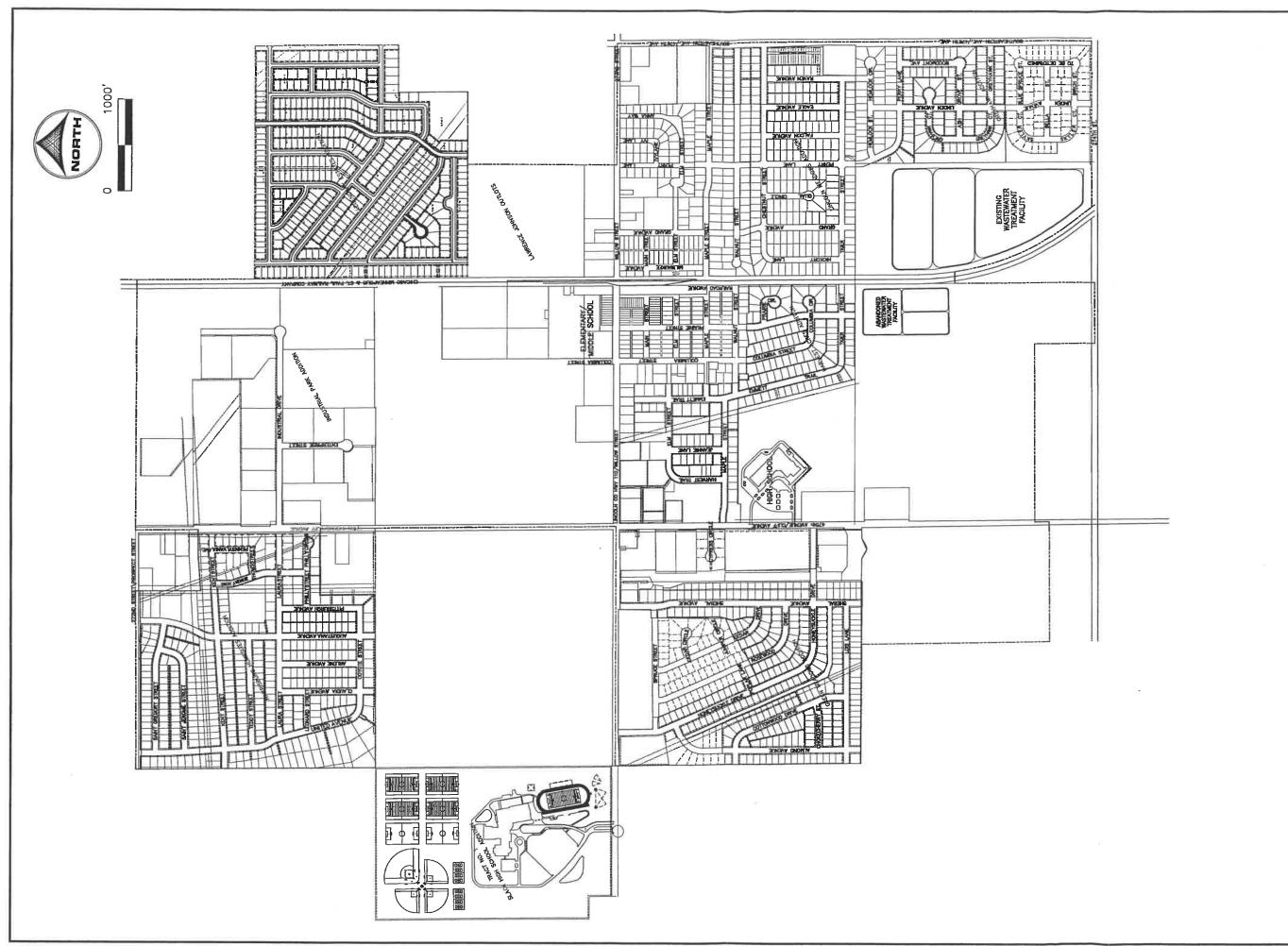
HEAVY INDUSTRY



NATURAL RESOURCE CONSERVATION DISTRICT





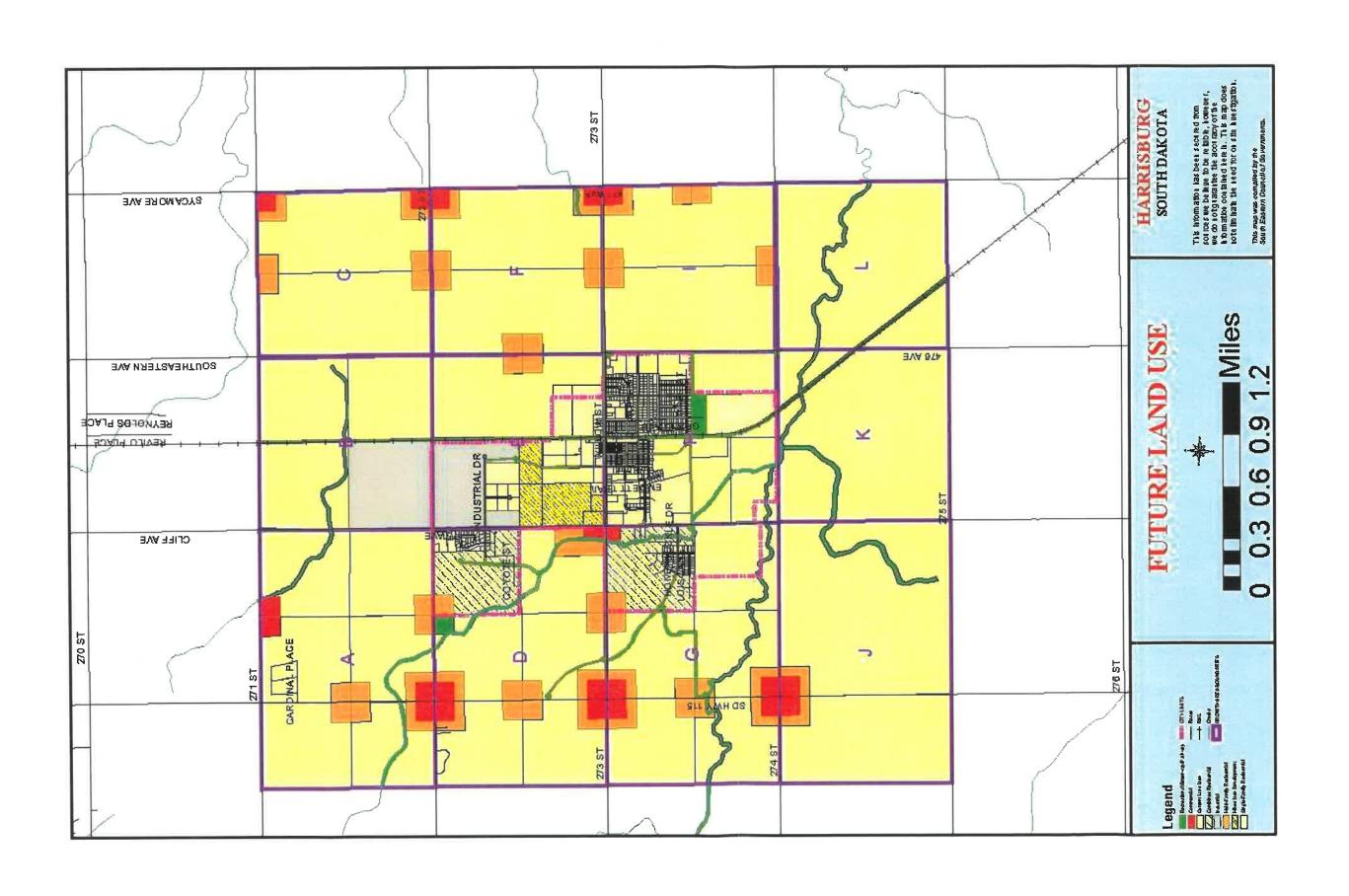


South Harrisburg,

出い

Exhibit

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



Howard R. Green Company Project No. 604980J

Wastewater Treatment Facility Plan Harrisburg, South Dakota

APPENDIX C

CITY OF HARRISBURG EXISTING EVAPORATION PONDS







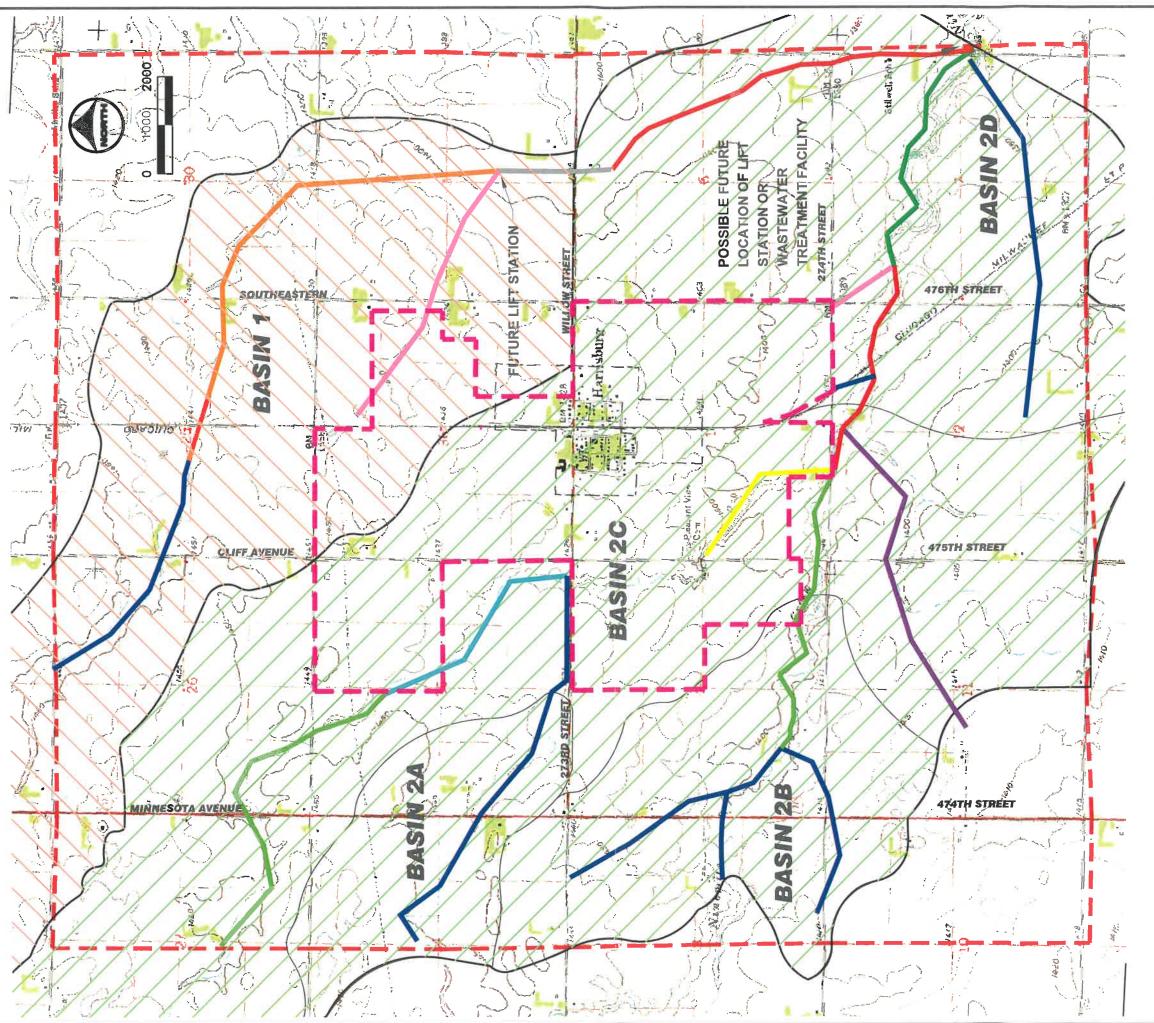
EXHIBIT C-1

MASTER SYSTEM USE COLLECTION SEWER MALIO N SANITARY

AND

FUTURE

2025



MAP LEGEND

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

1 AREA 2 AREA

BASIN

SEWER PROPOSED SANITARY



ANITARY SI	ANITARY S	ANITARY S ANITARY S	ARY	ANITARY	SANITARY SEWER	ANITARY	ANITARY SI	FORCE MAIN
12"	15	21	30"	33	36	42	18	



TABLE C-1: 2000 Wastewater Lagoon Reports

fear 2000					Depth	of Cel	l (ft-in)		
Date	Time	Flow (gpd)	Temp. (F)	Wind	1	2	3	Condition	Weather
	3:12 PM	46,500	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	3:11 PM	40,600	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	2:30 PM	39,800	N/A	N/A	N/A	N/A	N/A	N/A	N/A
ebruary 8, 2000	1:15 PM	77,500	40	N/A	2'	0	0	N/A	N/A
	4:35 PM	46,500	20	calm	2'	0	0	OK	no precip in last 3 days
ebruary 15, 2000	1:37 PM	36,500	35	NW 20	2'-2"	0	0	OK	normal temps
ebruary 22, 2000	2:00 PM	44,000	50	S 10	2'-2"	0	0	OK-little odor	above normal temps-little snow lef
ebruary 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	ОК	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
	4:25 PM	40,600	52	E8	2'-9"	0	0	OK	Above normal temps, no precip
March 28, 2000	4:10 PM	50,600	53	W 13	2'-9"	0	0	good	Above normal temps, no precip
pril 4, 2000	1:15 PM	49,400	40	N 15	2'-9"	0	0	OK	4" snow, cool & windy
pril 11, 2000		47,000	64	N 17	2'-9"	0	0	good	1/2" rain, cool & windy
pril 18, 2000	2:30 PM 3:35 PM	46,500	66	S 23	2'-3"	6"	0	OK	no precipitation
April 25, 2000		48,000	77	\$ 25	2'	1'	0	a little smell	no precipitation
May 2, 2000	1:17 PM	54,730	65	NW 18	2'-1"	1'	0	OK	1 1/2" rain
May 11, 2000	3:15 PM	48.000	65	E 13	2'-1"	9"	0	good	0.6" rain & hail
May 16, 2000	3:00 PM		70	W 10	2'-4"	11"	0	good	2.6" rain
May 24, 2000	1:50 PM	47,600	66	E 20	2'-6"	8"	0	add water to cell #2	
May 31, 2000	3:00 PM	44,000		S 9	2'	1'	0	good	windy & warmer
June 7, 2000	2:20 PM	46,700	81	SE 10	1'-8"	8"	0	little red	stormy
June 13, 2000	3:30 PM	50,630	68	W 18	1'-8"	6"	0	mowed top of berm	
June 20, 2000	10:40 AM	56,160	65		1'-9"	6"	0	good	2" rain, mild
June 27, 2000	4:38 PM	32,000	68	calm	1'-8"	6"	0	rock getting weedy	warm & humid
July 3, 2000	4:00 PM	72,600	78	E 17	1'-8"	3"	0	OK OK	no precip, warm & humid
July 11, 2000	10:40 AM	48,500	70	E 14	1'-9"	0	0	sprayed rock	1.2", 7", 0.2", 7/8" rain, cool
July 18, 2000	3:30 PM	67,000	62	SW 6	1'-6"	0	0	OK	0.3 rain, cool & seasonal
July 25, 2000	2:18 PM	57,250	78	NW 11	1'-6"		0	very low	no precipitation
August 1, 2000	2:15 PM	48,840	86		1'-10'		0	added water	3" rain
August 8, 2000	2:50 PM	52,330	81	N 8	1'-10'		0	OK	0.3" in last week
August 22, 2000	1:40 PM	56,500	69	N 11	_		0	OK	2" rain
September 5, 2000	2:22 PM	55,600	74	SE 20	1'-10'		0	OK	no precipitation
	11:30 AM		66	SSW 12	17-10	0	0	low	no precipitation
September 19, 2000	2:15 PM	46,900	63	NW 13	1'-7"		0	OK	1/2" rain, cool & windy
September 25, 2000		54,200	67	SW 8	1'-6"			OK	1/2" rain
October 3, 2000	1:45 PM	80,500	50	E 8	1'-8"		0		cold
October 10, 2000	5:08 PM	93,760	63	S 15	1'-8"		0	OK	0.25 rain
October 17, 2000	3:40 PM	42,840	67	SW 8	1'-4"		0	OK	0.25 rain
October 24, 2000	3:52 PM		64	SE 9	1'-8"		0	OK	
October 31, 2000	1:50 PM	64,770	65	\$ 15	1'-10		0	OK	0.75 rain
November 8, 2000	1:50 PM		24	W 20	1'-11'		0	50% freeze over	
November 14, 2000	1:45 PM		16	W 10	1'-11		0	Froze over	seld below permel
November 22, 2000	1:30 PM		18	E 8	1'-11		0	froze over	cold, below normal
November 28, 2000	2:30 PM		36	W 26	1'11'		0	mostly ice now	-14.0
December 5, 2000	3:00 PM		7	SE 8	15-11		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		0	NW 10		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	\$5	2'-2"	0	0	OK, iced over	foggy, some snow melt
January 16, 2001	4:30 PM	43,700	21	8 W	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"	0	stop discharge to #2	
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	N6	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	89	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 4, 2001 December 11, 2001	10:15 AM		25	SE 15	2'-8"	8"	0	opened up a little	no precipitation
December 11, 2001 December 18, 2001	1:44 PM	127,300	33	N 5	2'-6"	8"	0	a little open	most snow gone
December 18, 2001 December 26, 2001	1:44 PM	110,100	17	N7	2'-6"	8"	0	iced over	no snow, below normal tem
	Daily Flow		gal/day	1 14 1	2-0	0	1 0	ICEG CVEI	THE CHOW, DEIGHT HORINGI COM

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)		r
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	N5	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	- X	0.8" rain, cold, damp & windy
May 14, 2003	4:19 PM	70,430	59	NW 18	1'-10"	1'-8"	0		1.8" rain, cold, damp & windy
May 29, 2003	1:50 PM	41,490	78	89	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	boop	3 1/2" rain, cool
September 23, 2003	3:30 PM	114,000	73	S 10	21-3"	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	

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:

A 15 1 5 5 5 5	
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 ft Bottom Storage = Seepage = 0 1/16 in/day

Desired Detention Time = 270 days ft³

Actual Tot. Vol. Corrected for Seepage= 13,529,658

Actual Detention Time = 808.0

Total BOD Loading = 5.2

days 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	,,	.,001,010	10,020,000
% 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	
7,601,320	2005	2,077	-5,106,412	2,494,908	11,910,814
8,361,452	2006	2,285	-5,106,412		9,415,906
9,197,597	2007	2,513	-5,106,412	3,255,040	6,160,867
10,117,357	2008	2,764	-5,106,412	4,091,185	2,069,682
11,129,093	2009	3,041	-5,106,412	5,010,945	-2,941,263
12,242,002	2010	3,345	-5,106,412	6,022,680	-8,963,943
13,466,202	2011	3,680		7,135,590	-16,099,533
14,812,823	2012	4,047	-5,106,412	8,359,790	-24,459,323
16,294,105	2013	4,452	-5,106,412	9,706,410	-34,165,733
17,923,515	2014	4,897	-5,106,412	11,187,692	-45,353,426
19,715,867	2015	5,387	-5,106,412	12,817,103	-58,170,528
21,687,454	2016	5,926	-5,106,412	14,609,454	-72,779,983
23,856,199	2017		-5,106,412	16,581,041	-89,361,024
26,241,819	2018	6,519	-5,106,412	18,749,787	-108,110,811
28,866,001	2019	7,170	-5,106,412	21,135,406	-129,246,217
31,752,601	2020	7,887	-5,106,412	23,759,588	-153,005,805
34,927,861	2020	8,676	-5,106,412	26,646,188	-179,651,994
38,420,647		9,544	-5,106,412	29,821,448	-209,473,442
42,262,712	2022	10,498	-5,106,412	33,314,235	-242,787,677
46,488,983	2023	11,548	-5,106,412	37,156,299	-279,943,976
10,700,300	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

			Evaporation		
			(Based on		Volume
Flow to Pond	Year	Population	Middle Area)	Volume Used	Remaining
(cu. ft. per year)			(cu. ft. per year)	(cu. ft. per year)	(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

Howard R. Green Company Project No. 604980J

APPENDIX D

Wastewater Treatment Facility Plan Harrisburg, South Dakota

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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



Howard R. Green Company Project No. 604980J Wastewater Treatment Facility Plan Harrisburg, South Dakota

APPENDIX E

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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/i	
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	dave	

tual Detention Time = 365 days
Total BOD Loading = 7.1 lb BOD/acre-day

				Tertiary	
	Units	Primary Pond	Secondary Pond	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	

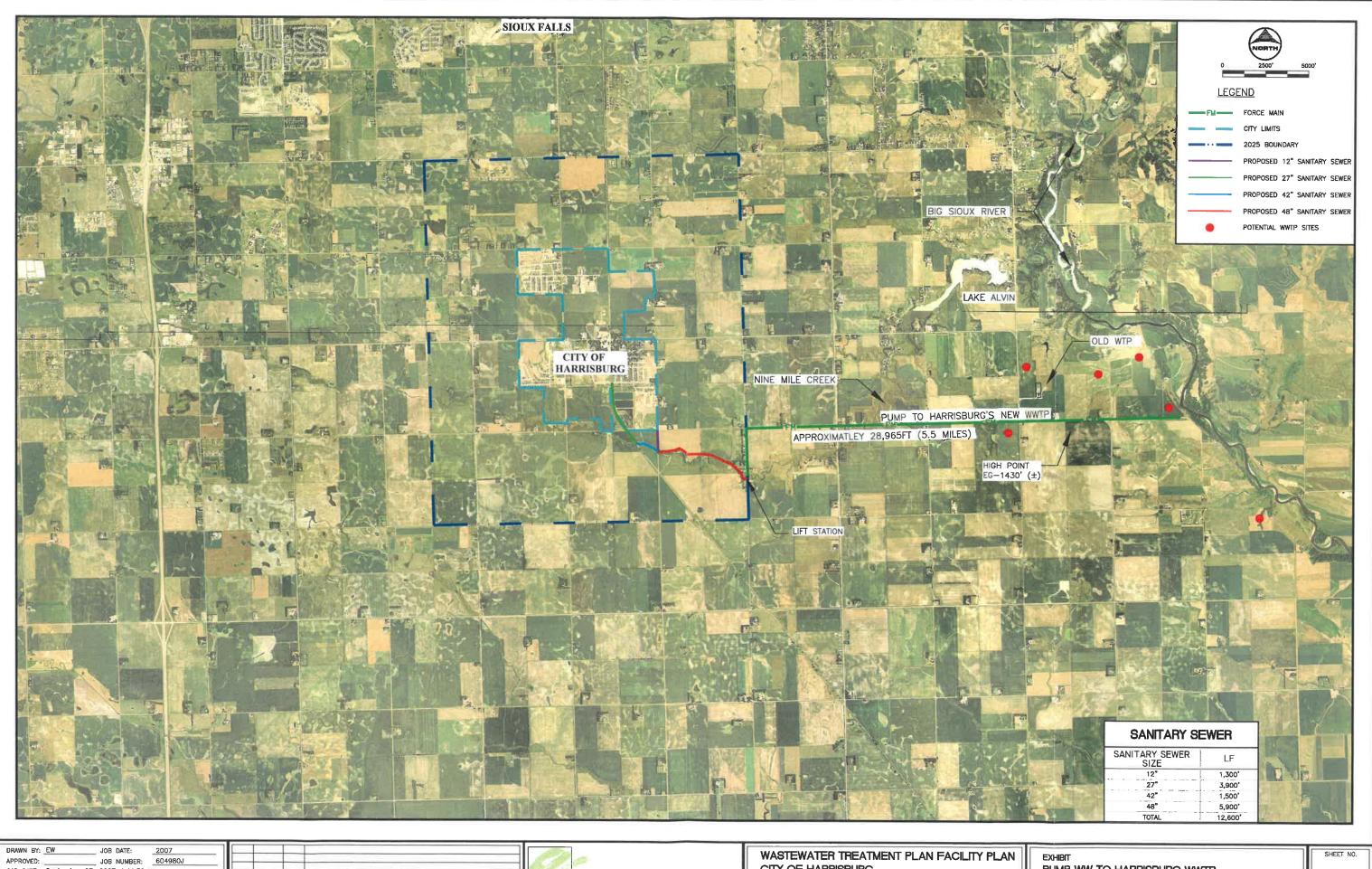
O:\PROJ\604980J\CALCS\P\lagoon fill & flow projection

1 of 2

TABLE E-1: Capacity of Future Wastewater Lagoons

Time to Fill Ponds Based on 75 gpcd

	a on to good				
			Evaporation		
	1		(Based on	Volume	Totalized
Flow to Pond	Year	Population	Middle Area)	Used	Volume Used
(ft ³ /year)			(ft³/year)	(ft ³ /year)	(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	2/
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



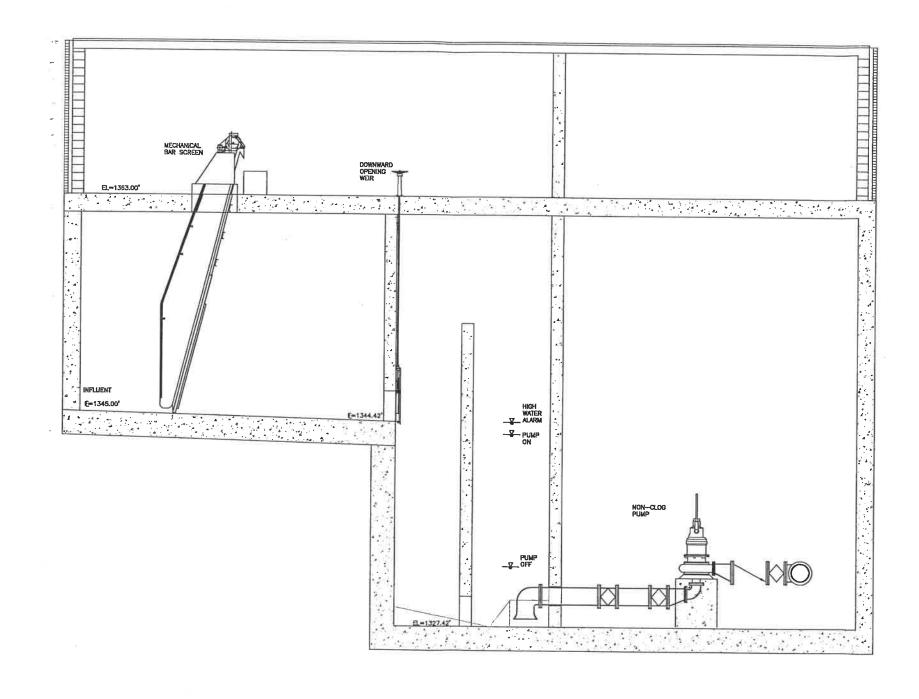
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CITY OF HARRISBURG HARRISBURG, SOUTH DAKOTA

PUMP WW TO HARRISBURG WWTP

E-1



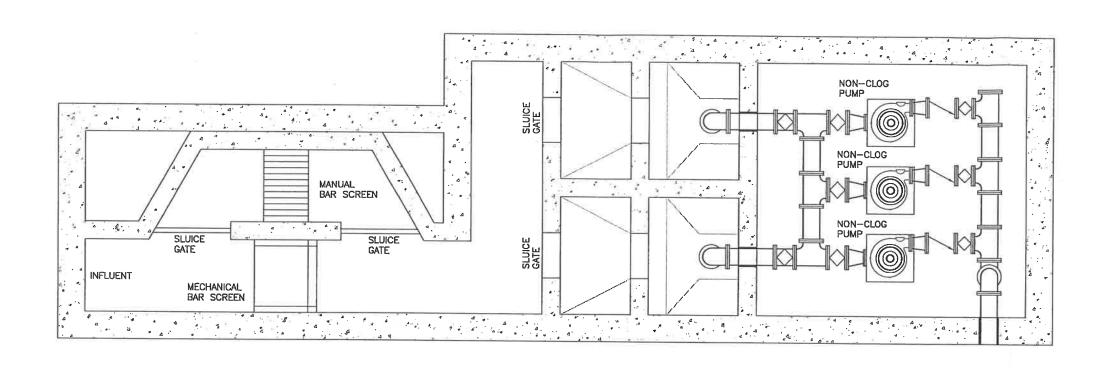
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PROCESS
LIFT STATION EXHIBIT
SECTION VIEW WETWLL/DRYWELL



PLAN

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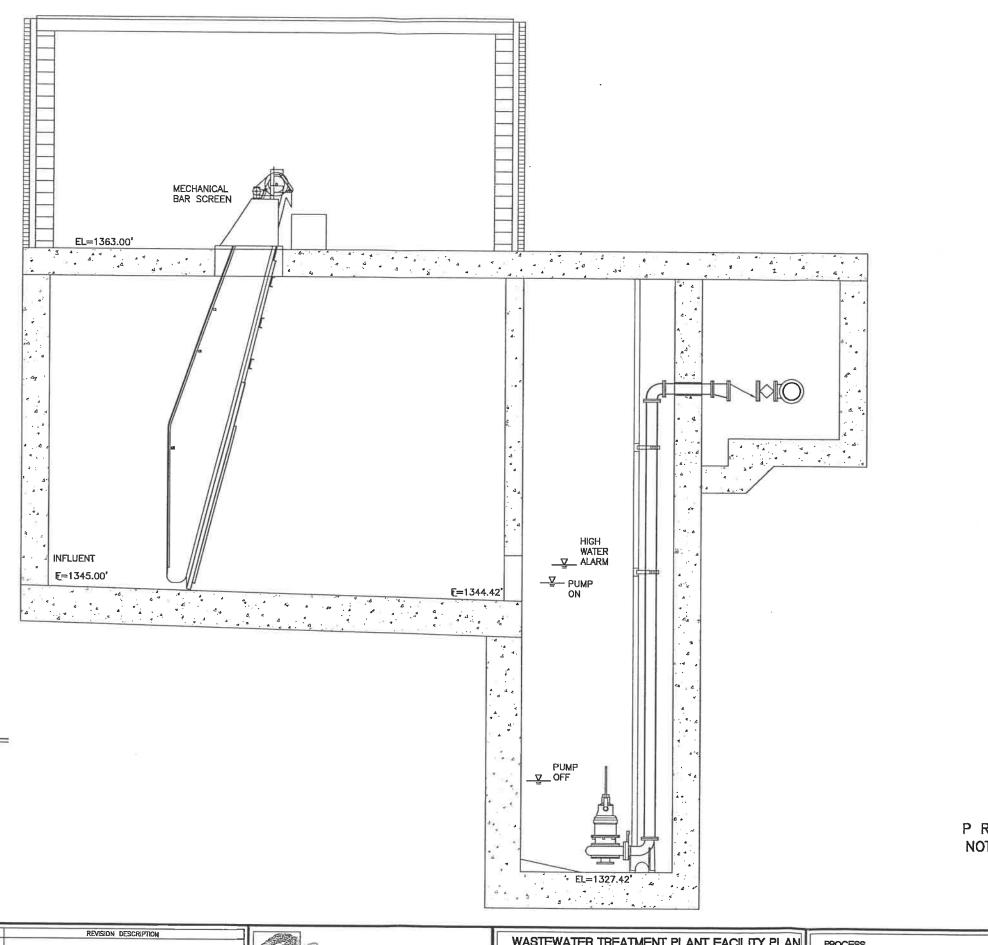
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PLAN VIEW WETWELL/DRYWELL



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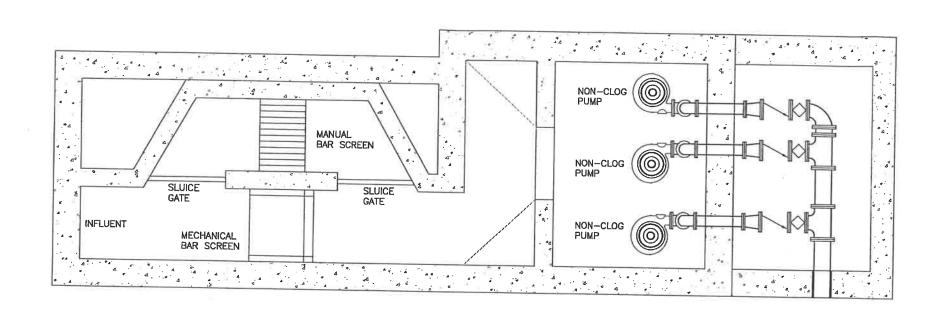
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Howard R. Green Company	NO.	DATE	BY:	REVISION DESCRIPTION	
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Toward R. Green Company			-		Howard D. Cross Carrage
					I Howard R. Green Company

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

PROCESS
LIFT STATION EXHIBIT
SECTION VIEW SUBMERSIBLE DESIGN



1 PLAN
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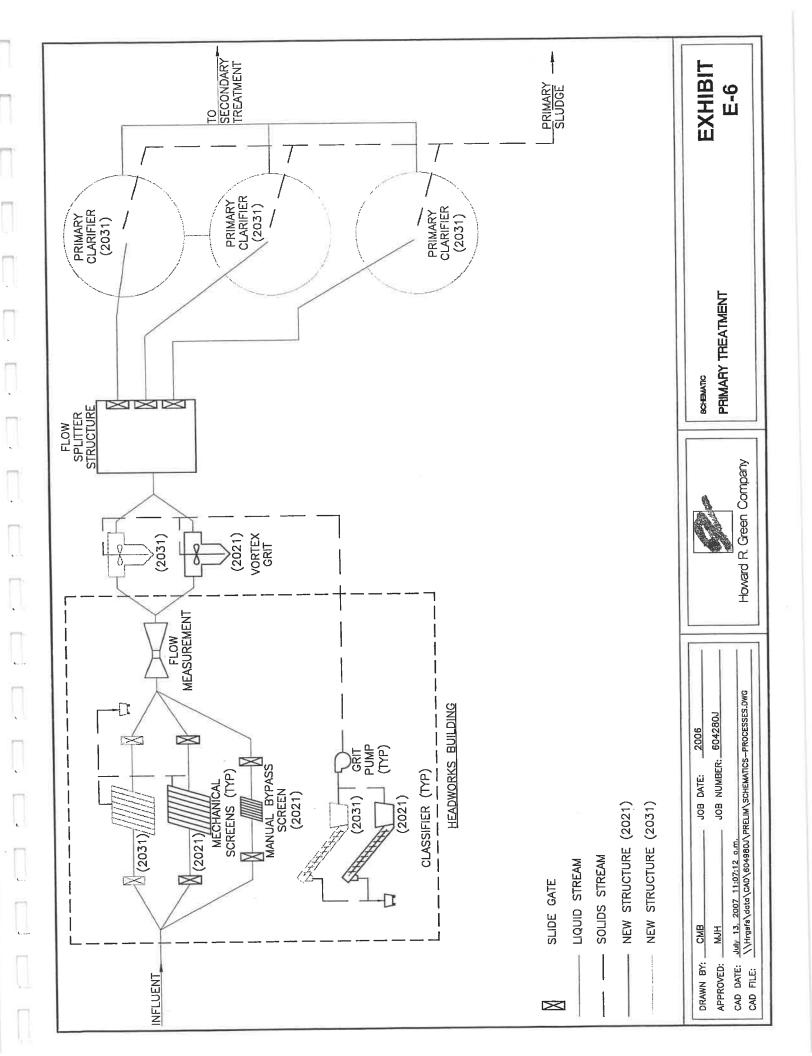
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Howard R. Green Company

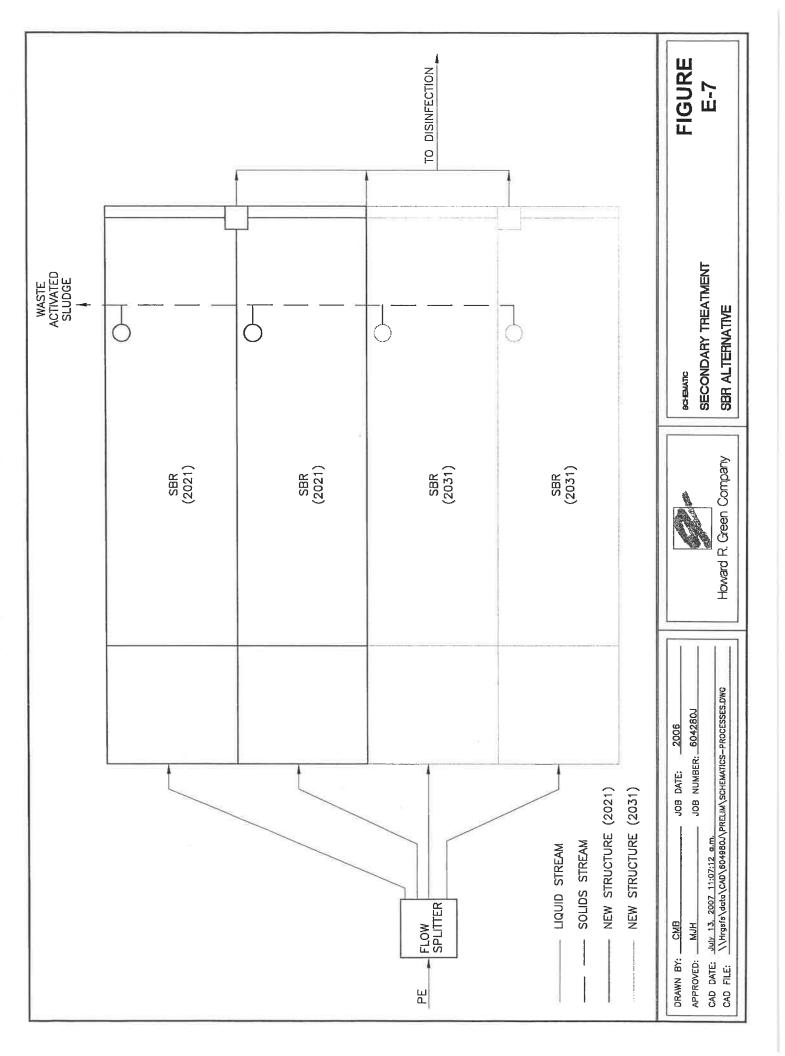
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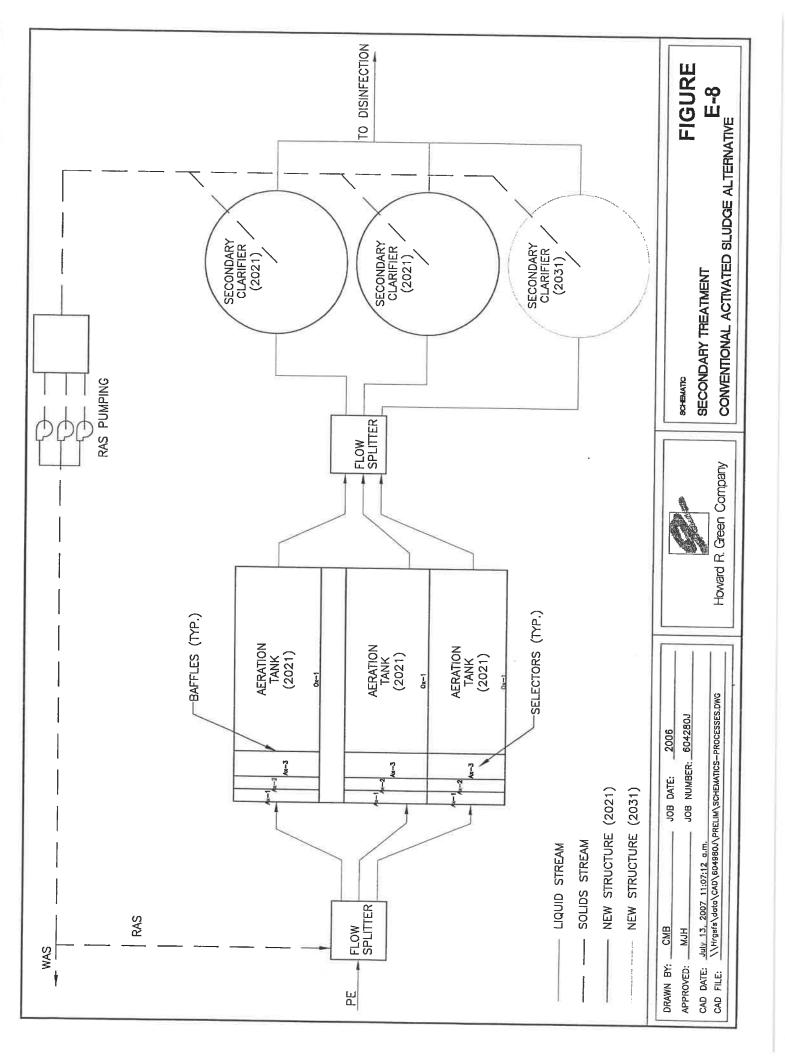
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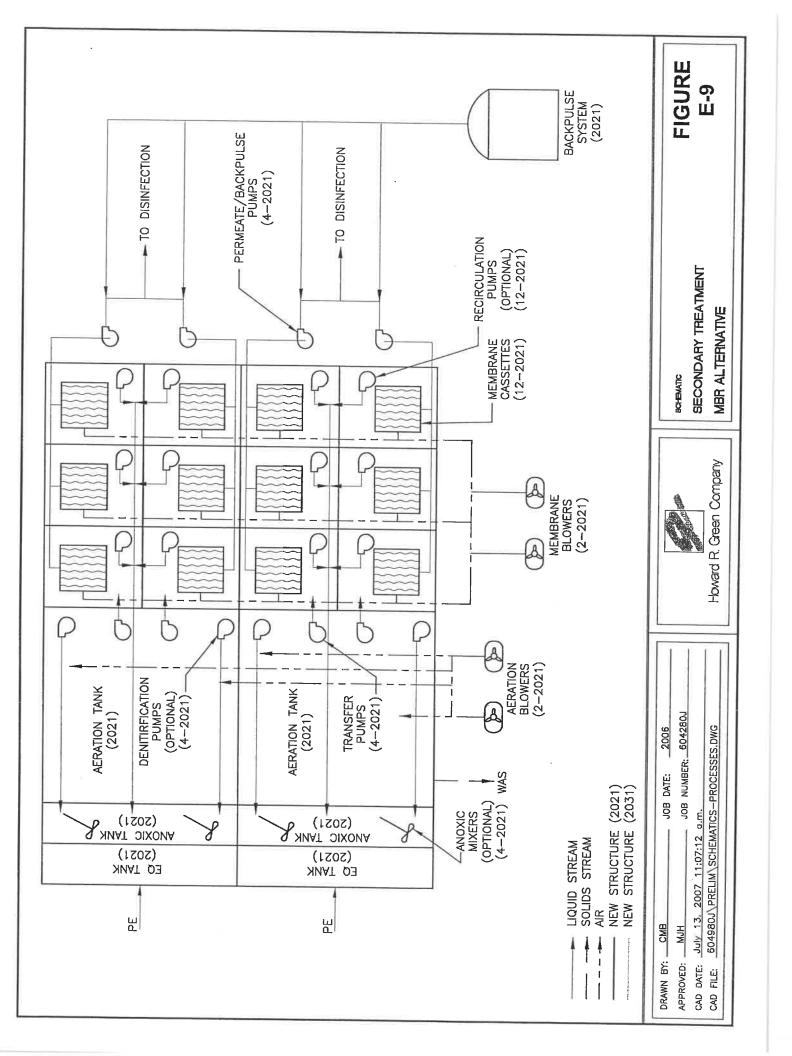
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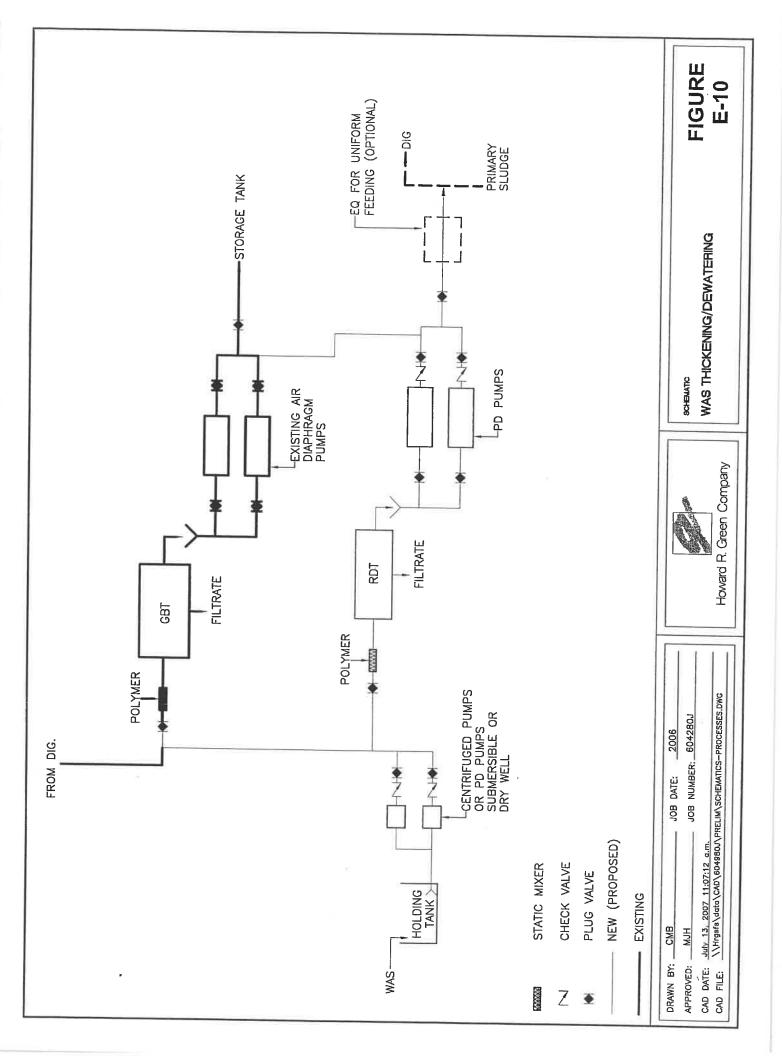


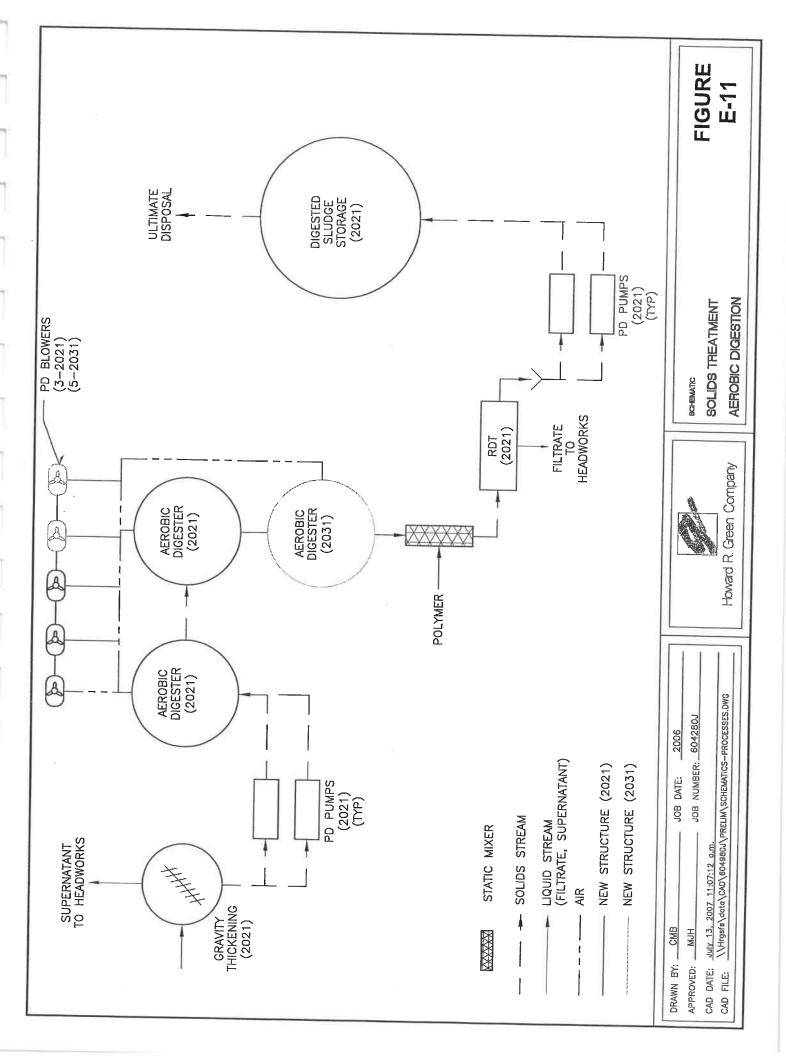
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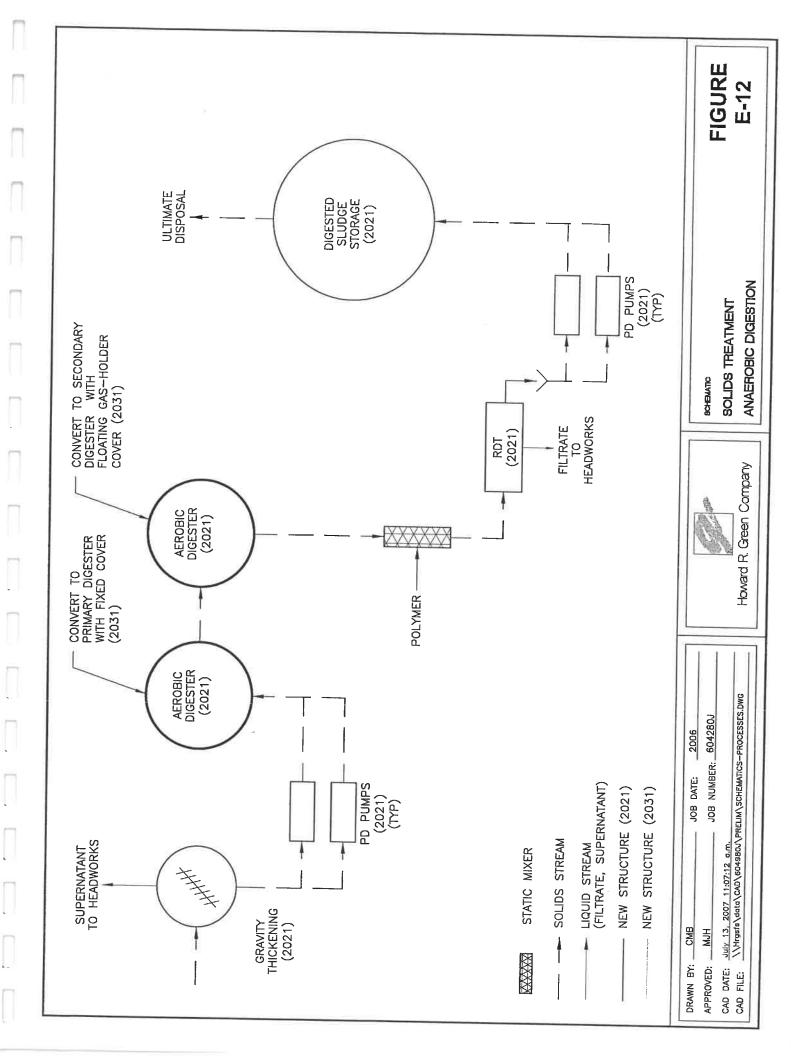


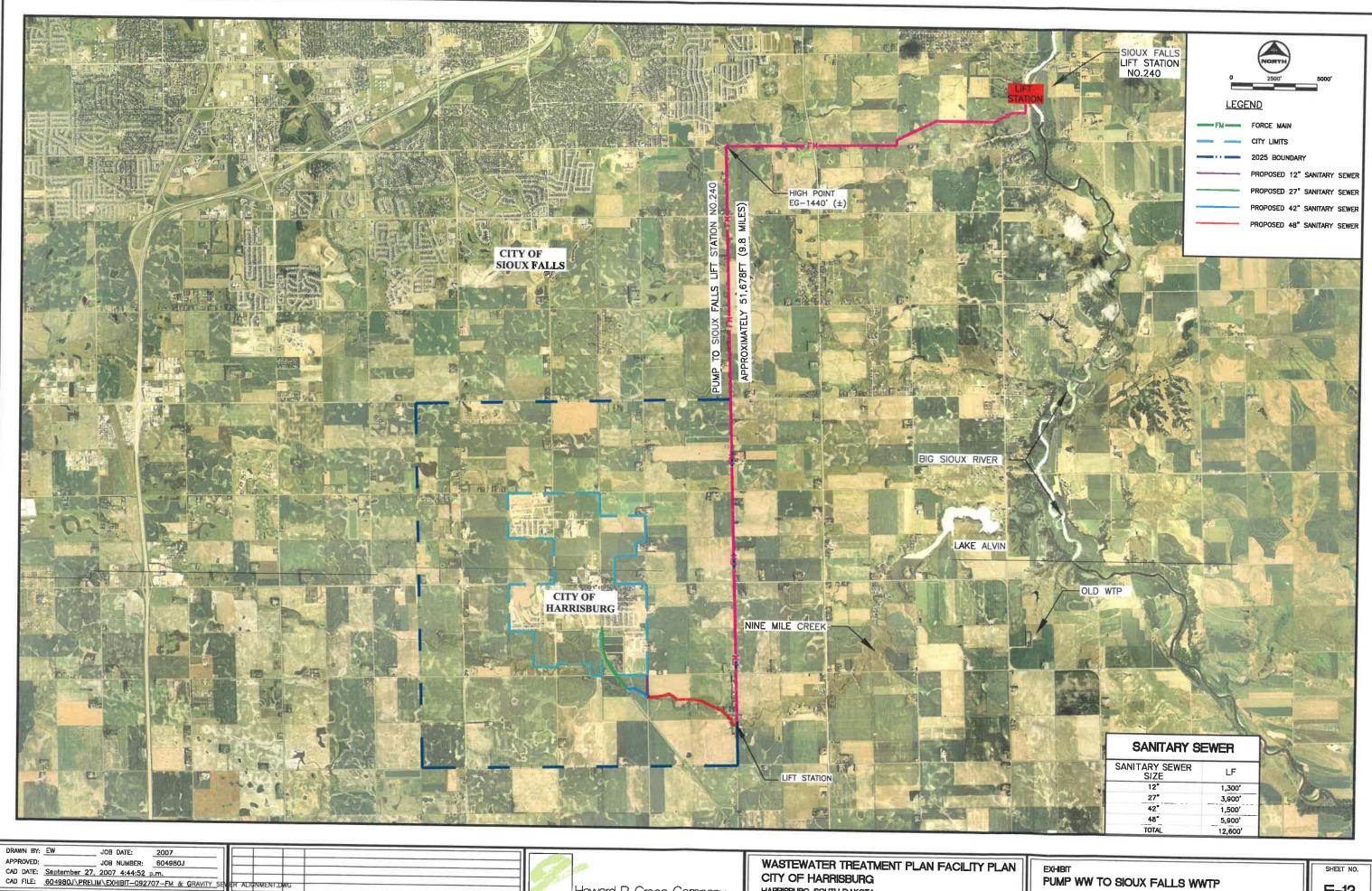












Howard R. Green Company

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

PUMP WW TO SIOUX FALLS WWTP

E-13

Howard R. Green Company Project No. 604980J

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

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

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

	Turious	ANNUALS	GAL PUMPED
O&M FIXED COSTS			
AIR COMPRIESSOR HORSEPOWER DRAW HOURS OF OPERATION PER DAY KW-HR PER YEAR	15.0 16 65,350	\$3,921	\$0.0090
GAS HEATING TREATMENT BUILDING AREA(SF) \$ PER YEAR PER SQ FT	1,940 \$2.50	\$4,850	\$0.0111
LIGHTING/GENERAL POWER THEATMENT BUILDING AREA (SF) WATTS PER SQ. FT HOURS OF OPERATION PER DAY KW-HR PER YEAR	1,940 10.00 8.0 35,548	662,63	\$0.0078
OXOR CONTROL UNIT HORSIN HORSINOWER DRAW HOURS OF OPERATION PER DAY KW-HR PER YEAR	5.0 24 32,675	\$1,960	\$0.0045
RECIRCULATION PUAP HORSEPOWER DRAW HOURS OF OPERATION PER DAY KW-HR PER YEAR	2.0 24 13,070	\$784	\$0.0018
HEATERS NUMBER OF HEATERS HOURS OF OFERATION PER DAY RATED CAPACITY (PEAX) - KW KW-HR USED FOR CALCS KW-HR PER YEAR	2.0 12 20 15 131,400	\$7,884	\$0.0180
OPERATON SALARIES & BENJEITS NUMBER OF OPERATORS NUMBER OF OPERATORS ANUTAL OPERATOR HOURS HOURLY RATE ANNUAL COST	1 1 260 \$40.00 \$10,400	\$10,400	\$0.0238
VEHICLE ANNUAL COST	\$1,500	\$1,500	\$0.0034

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

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

AVE DAY WATER TOSYSTEM (GAL)
NET ANNUAL WATER TO SYSTEM (GAL)
ELECTRICAL COST (\$KW-HR)

1,198,080 437,299,200 \$0.060

DESCRIPTION FACTORS CURRENT COST PER 1000
NG SA000 \$90,091 \$38,699 \$10,626 \$5,000 \$17,626 \$56,325 \$2,000 \$533,161 2.0 \$1,000 0.5 \$2.00 90 70% 177,106 \$5,000 3.00% ZUMP CLEANING
NUMBER OF PUMPS
CLEANING COSTS PER PUMP
SSTIMATED CLEANING INTERVAL (YEARS) PUMP POWER
PUMPING HEAD (FT)
OVERALL PUMPING EFFICIENCY
KW-HR PER YEAR TOTAL VARIABLE O&M COSTS PRESENT WORTH O&M COSTS TOTAL ANNUAL O&M COSTS TOTAL O&M FIXED COSTS REPAIRS & MAINTENANCE ANNUAL COST WATER COST PER 1000 GALLONS GAL PER YEAR O&M VARIABLE COSTS INFLATION RATE INTEREST RATE

\$0.0403 \$0.1288

\$0.0114

\$0.0885

\$0.0243

\$0.0046

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

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

DESCRIPTION	FACTORS CURRENT ANNUAL S		COST PER 1000 GAL PUMPED
O&M FIXED COSTS			
AIR COMPRESSOR HORSEPOWER DRAW HOURS OF OPERATION PER DAY KW-HR PER YEAR	15.0 16 65,350	\$3,921	\$0.0050
GAS HEATING TREATMENT BUILDING AREA (SF) § PER YEAR PER SQ FT	1,940	\$4,850	\$0.0062
LIGHTINIG/CENTERAL FOWER WATTS PER SQ I HOURS OF OPERATION PER DAY KW-HR PER YEAR	1,940 10.00 8.0 56,648	83,399	\$0.0043
ODOR CONTROL UNIT HORSIPOWER DRAW HOURS OF OPERATION PER DAY KW-HR PER YEAR	5.0 24 32,675	\$1,960	\$0.0025
RECIRCULATION PUMP FORSEPOWER DRAW FOURS OF OPERATION PER DAY KW-HR PER YEAR	2.0 24 13,070	\$784	\$0.0010
HEATERS (IN)MERE OF HEATERS HOURS OF OPERATION PER DAY RAITED CAPACITY (PEAK) - KW KW-HR USED FOR CALCS KW-HR VER YEAR	2.0 12 20 15 131,400	\$7,884	\$0.0101
OPERATION SALARIES & BENJETIS NUMBER OF OPERATORS OPERATOR STAFF (HOLIRS PER DAY) ANNUAL OPERATOR HOURS HOURLY RATE ANNUAL COST	1 1 260 \$40.00 \$10,400	\$10,400	\$0.0133
VEHICLE ANNUAL COST	\$1,500	\$1,500	\$0.0019

TABLE G-2 CITY OF HARRISBURG, SOUTH DAKOTA OPINION OF PROBABLE COST FOR ANNUAL 0&M COST

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

Y WATER TO SYSTEM (GAL)	NNUAL WATER TO SYSTEM (GAL)	CAL COST (\$/KW-HR)
AVE DAY WATER	NET ANNUAL W	8

2,145,600 783,144,000 \$0.060

DESCRIPTION	FACTORS C	- CURRENT ANNUAL S	COST PER 1000 GAL PUMPED
PLANT CLEANING NUMBER OF PUMPS CLEANING COSTS ETIMATED CLEANING INTERVAL (YEARS)	2.0 \$1,000 0.5	\$4,000	
TOTAL O&M FIXED COSTS		\$38,699	\$0.0494
O&M VARIABLE COSTS			
EUMP EOWER FUMPING HAD (FT) VOKERALL FUMPING EFFICIENCY KW-FIR PER YEAR	120 70% 422,898	\$25,374	\$0.0324
WATER COST PER 1000 CALLCNS GAL PER YEAR	\$2.00 1,000,000	\$2,000	\$0.0026
REPAIRS & MAINTENANCE ANNUAL COST	000′5\$	\$5,000	\$0.0064
TOTAL VARIABLE O&M COSTS		\$32,374	\$0.0413
TOTAL ANNUAL O&M COSTS		\$71,072	\$0.0908
INFLATION RATE INTEREST RATE	3.00%		
PRESENT WORTH O&M COSTS		\$512,309	

TABLE G-3 CITY OF HARRISBURG, SOUTH DAKOTA OFINION OF PROBABLE COST FOR ANNUAL 0&M COST

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

YSTEM (GAL)	TO SYSTEM (GAL)	KW-HR)
AVE DAY WATER TO SYSTEM (GAL)	NET ANNUAL WATER TO SYSTEM (CAL)	ELECTRICAL COST (§

1,198,080 437,299,200 \$0.060

\$0.0090 \$0.0045 \$0.0145 \$0.0018 \$0.0180 FACTORS CURRENT COST PER 1000
ANNUAL S GAL PUMPED. \$0.0238 \$0.0034 \$3,921 \$4,450 \$6,350 \$1,960 \$7,884 \$10,400 \$1,500 \$784 15.0 16 65,350 5.0 24 32,675 2.0 24 13,070 2.0 12 20 15 15 131,400 \$1,500 OPERATION SALARIES & BENEFITS
NUMBER OF OPERATIONSS
OPERATOR STAFF (HOURS PER DAY)
ANNUAL OPERATOR HOURS
ANNUAL OPERATOR COST LICHTING/GENERAL POWER
TREATMENT BUILDING AREA(5F)
WATTS PER SQ FT
HOURS OF OPERATION PER DAY
KW-HR PER YEAR DESCRIPTION AIR COMPRESSOR HORSEPOWER DRAW HOURS OF OPERATION PER DAY KW-HR PER YEAR ODOR CONTROL UNIT.
FAN.
HORSEPOWER DRAW
HOURS OF OPERATION PER DAY
KW-HR PER YEAR RECIRCULATION PUMP HORSEPOWER DRAW HOURS OF OPERATION PER DAY KW-HR PER YEAR HEATERS
NUMBER OF HEATERS
HOURS OF OPERATION PER DAY
KAYEN USED POR CALCS
KW-HR USED POR CALCS
KW-HR PER YEAR GAS HEATING TREATMENT BUILDING AREA(SF) \$ PER YEAR PER SQ FT O&M FIXED COSTS VEHICLE ANNUAL COST

CITY OF HARRISBURG, SOUTH DAKOTA OPINION OF PROBABLE COST FOR ANNUAL 0&M COST

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

AVE DAY WATER TO SYSTEM (GAL)
NET ANNUAL WATER TO SYSTEM (GAL)
ELECTRICAL COST (5,KW-HR)

1,198,080 437,299,200 50.060

DESCRIPTION	FACTORS	CURRENT	CAL PINAPER
PLAR CITAANING NUMBER OF PUARPS CILAANING COSTS ESTIMATED CLEANING INTERVAL (YEARS)	2.0 \$1,000 0.5	000°74\$	\$0.0091
TOTAL O&M FIXED COSTS		\$41,250	\$0.0943
O&M VARIABLE COSTS			
EUMPROWER FUMPING HEAD (FT) OVERALL PUMPING EFFICIENCY KW-HR PER YEAR	125 70% 245,981	\$14,759	\$0.0338
WATER COST PER 1000 GALLONS GAL PER YEAR	\$2.00	\$2,000	\$0.0046
REPAIRS & MAINTENANCE ANNUAL COST	\$5,000	\$5,000	\$0.0114
TOTAL VARIABLE O&M COSTS		\$21,759	\$0.0498
TOTAL ANNUAL O&M COSTS		\$63,009	\$0.1441
INFLATION RATE INTEREST RATE	3.00%		
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) NET ANNUAL WATER TO SYSTEM (GAL) ELECTRICAL COST (\$/KW-HR)	2,145,600 783,144,000 \$0.060		
DESCRIPTION	FACTORS	CURRENT ANNUAL S	COST PER 1000 GAL PUMPED
O&M FIXED COSTS			
AIR COMPRESSOR HONESTOWNER DRAW HOURS OF OPERATION PER DAY KW-HR PER YEAR	15.0 16 65,350	\$3,921	\$0.0050
GAS HEATING TREATMENT BUILDING AREA(SF) § PER YEAR PER SQ FT	2,540 \$2.50	\$6,350	\$0.0081
LIGHTING/GENERAL POWER TREATMENT BUILDING AREA (SF) WATTS PER SQ FT HOURS OF OPERATION PER DAY KW-HR PER YEAR	2,540 10.00 8.0 74,168	\$4,450	\$0.0057
ODOR.CONTROL. UNIT FAN HORSEPOWER DRAW HOURS OF OPERATION PER DAY KW-HR PER YEAR	5.0 24 32,675	\$1,960	\$0.0025
RECIRCULATION PUMP HONERDWIE DRAW HOUTS OF OPERATION PER DAY KW-HR PER YEAR	2.0 24 13,070	\$784	\$0.0010
HEATERS NUMBER OF HEATERS HOUNSO FO PERACTION PER DAY RATED CAPACITY (FEAK) - KW KW-HR USED FOR CALCS KW-HR PER YEAR	2.0 12 20 15 13 131,400	\$7,884	\$0.0101
OPERATION SALARIES & BENEFITS NUMBER OF OPERATORS OFFRATOR STAFF (HOURS PER DAY) HOURLY RATE ANNUAL COST	1 1 260 \$40.00 \$10,400	\$10,400	\$0.0133
VEHICLE ANNUAL COST	\$1,500	\$1,500	\$0.0019

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)
NET ANNUAL WATER TO SYSTEM (GAL)
ELECTRICAL COST (\$,KW-HR)

2,145,600 783,144,000 \$0.060

DESCRIPTION	FACTORS	CURRENT	COST PER 1000
PUMP CLEANING		\$4,000	8
NUMBER OF PUMPS	2.0		
ESTIMATED CLEANING INTERVAL (YEARS)	\$1,000		
TOTAL O&M FIXED COSTS		\$41,250	\$0.0527
O&M VARIABLE COSTS			
PUMP POWER		\$45,250	\$0.0578
FUMPING HEAD (FT) OVERALL PUMPING EFFICIENCY	214 70%		
KW-HR PER YEAR	754,168		
WATER COST PER 1000 CATTONIS	000	\$2,000	\$0.0026
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 INTEREST RATE	3.00%		
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

PRESENT WORTH	(\$)					301,117	335,181	362,540	392,132	424,138	458,758	487,181	517,365	549,420	583,460	619,610	645,814	673,126	701,593	731,265	762,191	794,424	828,022	863,040	899,539	937,581
INTEREST RATE	(%)					4.75% \$	4.75% \$	4.75% \$	1	4.75% \$	4.75% \$	4.75% \$	4.75% \$	4.75% \$	4.75% \$	4.75% \$	4.75% \$	4.75% \$	4.75% \$	4.75% \$	4.75% \$	4.75% \$	4.75% \$	T	4.75% \$	
TERM	(years)					4	r.	9	7	80	6	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
YEARLY	(\$)					362,536	422,717	478,939	542,638	614,809	696,578	774,873	861,969	958,855	1,066,630	1,186,519	1,295,442	1,414,363	1,544,202	1,685,959	1,840,730	2,009,709	2,194,201	2,395,628	2,615,547	2,855,654
YEARLY FLOW*	(gal)					184,788,988 \$	\$ 203,267,887 \$	223,594,675 \$	245,954,143 \$	270,549,557 \$	297,604,513 \$	321,412,874 \$	347,125,904 \$	374,895,976 \$	404,887,654 \$	437,278,667 \$	463,515,387 \$	491,326,310 \$	520,805,888 \$	552,054,242 \$	585,177,496 \$	620,288,146 \$	657,505,435 \$	\$ 192,256,969	738,773,106 \$	783,099,493 \$
RATE	(\$ / 1000 gal)	1.34	1.47	1.62	1.78	1.96	2.08	2.14	2.21	2.27	2.34	2.41	2.48	2.56	2.63	271	2.79	2.88	2.97	3.05	3.15	3.24	3.34	3.44	3.54	3.65
YEAR	(\$)	2007 \$	2008 \$	\$ 6002	2010 \$	2011 \$	2012 \$						7	2019 \$	1			7		\exists	\exists	\exists	\$ 8202	\$ 6707		2031 \$

* 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

O:\PROJ\604980J\CALCS\P\LS & FM\calc-080307-sioux falls treament costs

TABLE G-6
Headworks Building Treatment
Harrisburg WWTP
7/12/2007
Design Condition:

2021 (from 2011-2021)

Design life: Interest Rate: Inflation Rate:

10 years 5% 3%

100000			
Nameplate Horsepower:		-	
Electricity Cost:	₩	90.0	
1hp=		0.746 kwh	kwh
Number of units:			
Hours of operation per day:		12	
Total Max Electricity Draw:		0.75	0.75 KW H
Annual Electricity Cost:	₩	196.049	
Design life:		10	10 years
Interest Rate:		2%	
Inflation Rate:		3%	
Electricity Present Worth (2011):	69	\$ 1,736.97	

Grit Vortex	×	
Nameplate Horsepower:		_
Electricity Cost:	4	90.0
1hp=		0.746 kwh
Number of units:		•
Hours of operation per day:		24
Total Max Electricity Draw:		0.75 KW H
Annual Electricity Cost.	S	392.098
Design life:		10 years
Interest Rate:		2%
Inflation Rate:		3%
Electricity Present Worth (2011):	ы	3,473,94

Nameplate Horsepower:		
Electricity Cost:	S	0.06
1hp=		0.746 kwh
Number of units:		-
Hours of operation per day:		12
Total Max Electricity Draw:		0.75 KW H
Annual Electricity Cost:	69	196.049
Design life:		10 1000
Internation in the second		וס אבמוס
IIIIGIASI VAIG.		2%
Inflation Rate:		3%
Electricity Present Worth (2011):	69	1,736.97
Grit Pump		
Nameplate Horsepower:		S
Electricity Cost:	(/)	90.0
1hp=		0.746 kwh
Number of units:		-
Hours of operation per day:		12
Total Max Electricity Draw:		3.73 KW H
Annual Electricity Cost:	S	980.244
Design life;		10 years
Interest Rate:		2%
Inflation Rate:		3%
Electricity Present Worth (2011):	69	8.684.86

JABLE USA Distance TREATMENT OMR COSTS Distance Condition: 2021 (from 2011-2021) All Costs them in 2007 dollers 415% Inflation Rate 3%

		The state of the s		
Capital Cost ^{O)} .				
lem	An	Annual Cost	Present Worth (2007)	th (2007)
Operation Electricity ⁽¹⁾				
Fine Screen	s	196.05	69	2 353 BR
Grit Vortex	·	392 10	• 64	A 707 74
Grit Classifler	co	198.05	· 01	2 353 86
Grit Pump	ca	980.24	· uŋ	11 769 28
Subtotal	u)	1,764.44	co.	21,184.71
Labor ⁽²⁾	ug	•		
Subtotal	49	,	49	1
Replacement Parts	us	1.098.88	65	8 580 22
Subtotal	69	1.098.88	07	8 589 22
TOTAL	us	2.863.32		29 773 93

Secretaring thanks Secretaring Rough Contractive Property Systems Contractive Propert	Present Cost Inflated S 200 55000 aan Yearly Cost of 60 51000 aan Inflated Vearly Cost of 60 51000 aan Inflated Vearly Cost of 60 50 50 50 50 50 50 50 50 50 50 50 50 50	Present Cost Inflated Yearly 1 (@ \$1000 ea. Cost	Total Infalled Present W Very Cost Present
Present Coar Inflated Yearly (2) Storoor Inflated Yearly (2) Present Coar Inflat	Inflated Phraam Cost 3 (%) 5 (%) 6 (Inflated Yearly Cost	
\$ 50000 \$ 5.			
515.00 51	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		515.00 \$ 1,080.90 \$ 546.38 \$ 1,125.51 \$ 1,194.05 \$ 614.94 \$ 1,286.77 \$
5-60-50-50 5-60-50 5-60-50 5-60-50-50 5-60-50-50 5-60-50-50 5-60-50-50 5-60-50-50 5-6			515.00 \$ 1,000.30 \$ 546.38 \$ 1,738.91 \$ 1,194.94 \$ 1,296.77 \$
62.738			1,050.30 \$ 546.38 \$ 1,125.51 \$ 1,738.91 \$ 1,194.05 \$ 614.94 \$ 1,256.77 \$
200 00 00 00 00 00 00 00 00 00 00 00 00		00000	546.38 \$ 1,125.51 \$ 1,738.91 \$ 1,194.05 \$ 614.94 \$
57247 6 6 6 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7			1,125.51 \$ 1,738.91 \$ 1,194.05 \$ 614.94 \$
00 00 00 00 00 00 00 00 00 00 00 00 00			1,738.91 \$ 1,194.05 \$ 614.94 \$
6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6		9	1,194.05 \$ 614.94 \$ 1,286.77 \$
0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.0	US 45		1,256.77 \$
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0			1,286.77 \$
00 00138 00 - 00138 00 - 00138 00 - 00138 00 - 00138		69	
5 1,243,522 S	,		852.39 S
4 44 49 49 49		1 69	2,687.83 \$
			49
		69	
		1 49	- 69
			1
		9	49
		9	4/9
	69		1
		1 9	1
			- 65

2031 (from 2021-2031)

TABLE G-8
Headworks Building Treatment
Harrisburg WWTP
7/1/2/2007
Destign Condition:
20
Destign life:
Interest Rale:
Inflation Rate:

10 years 5% 3%

.: \$ 392,	ino so o iii .	-	
6 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Nameplate Horsepower:		,
day: aw: \$ 392./	Electricity Cost:	69	0.06
day: aw: \$ 392.4	1hp=		0.746 kwh
eration per day: leothrity Draw: Airdity Cost: \$ 392.4	Number of units:		2
aw: \$ 392.	Hours of operation per day:		12
392.	Total Max Electricity Draw:		1.49 KW H
47.0	Annual Electricity Cost:	69	392.098
	Design life;		10 vears
	Interest Rate:		2%
	Inflation Rate:		3%
Electricity Present Worth (2011): \$ 2.184.15	Electricity Present Worth (2011):	49	2.184.15

Grit Vortex	Xe	
Nameplate Horsepower:		1
Electricity Cost:	69	90:0
1hp=		0.746 kwh
Number of units:		2
Hours of operation per day:		24
Total Max Electricity Draw:		149 KW H
Annual Electricity Cost:	69	784.195
Design life;		40 202
Interest Rate:		10 years
Inflation Rate:		3%
Electricity Present Worth (2011);	69	\$ 4.358.30

DIRECTION OF THE	2			
Nameplate Horsepower:		-		_
Electricity Cost:	69	0.06		
1hp=		0.746 kwh	, dw	
Number of units;		2		
Hours of operation per day:		12		
Total Max Electricity Draw:		1.49 KW H	N.	
Annual Electricity Cost:	↔	392.098		
Design life:		10 viores	840	
Interest Rate:		26.2	2013	
Inflation Rate:		3%		_
Electricity Present Worth (2011):	69	\$ 2,184.15		
				_
Grit Pump				

Grit Pump	dι		
Nameplate Horsepower:		5	
Electricity Cost:	69	0.00	
1hp=		3.746 kwh	kwh
Number of units:		2	
Hours of operation per day:		1 5	
Total Max Electricity Draw:		7.46	7.45 KW H
Annual Electricity Cost;	44	1,960.488	
Design life:		10	10 years
Interest Rate:		2%	
Inflation Rate:		3%	
Electricity Present Worth (2011):	C.	\$ 10 920 75	

HADLE G-V-ST PRELIMINARY TREATMENT OMR COSTS Design Condition: 20x1 (from 20x1-20x31) Augign Life (144 years) All costs state (175% years) Inflation Rate (175% NR Face (1

	Freuntinary Treatment	itment		
Capital Cost ⁴³ .				
tem	An	Annual Cost	Present	Present Worth (2007)
Operation				
Electricity**1				
Fine Screen	vi	392.10	67	3 241 05
Grit Vortex	69	784.20	v	8 482 No
Grit Classifier	es es	392.10	· 03	3 241 05
Grit Pump	S	1.960.49	v	16 205 23
Subtotal	S	3.528.88	S	29 169 42
Maintenance				The same of the sa
Labor ²¹	w		6	,
Subtotal	07		5	
Replacement				
Parts	60	5,363,17	S	42.314.09
Subtotal	44	5,363,17	(A)	42.314.09
TOTAL	*	8,892,05	s	71.483.50

Notes:
1) Headword
2) Included on

ks building only	with secondary treatment	acts are for professionry beatment system or fig.
works b	dwb9	al costs

					Part Committee of the C	and the second								
	Screen Cleaning Erush Every year	Screen Mechanical Rebuild Every 15 years	Grif Pump Seats Once every 5 years	Grit Pump Wear Plate	5									
Year	Present Cost Inflated Yearly 2 @ \$500 ea. Cost	1 @ \$40000 Inflated Yearly ea. Cost	Inflated Yearly Present Cost Inflated Yearly Cost 2@ \$1000 ea. Cost	Present Cost Inflated	3 @ \$1000	Inflated	Present Cost	Inflated Present Cost		To Bashood Name of Contract	Present Cost Inflated Yearly	Inflated Yearly	Total Inflated	
0	\$ 1,000.00 \$	S 40,000.00 S	S		v.	S	Z (conseq.	o land file	110	- 1	I (2) STUDO BA.	COSE	reany cost	Present Worth
-	\$ 1,030.00	c/s		0		,	,	,	,	,				, ;
2	\$ 1,060.90			9 100000	5	,	0 0	,	9 (4			2 1,030.00	\$ 883.29
67	\$ 1002.73	· ·	7 4	3,000,1	2	0	99		L/9	,		,	\$ 2,121.80	\$ 1,933.73
A		7 4	,	·		,	S	,	(A)			1	\$ 1,092.73	\$ 950.71
v		2	, !	\$ 1,125,51		s	U)		49	•		,	\$ 2,251.02	\$ 1,869.66
0 (0	90 101 0	a 40,370.90	\$ 2,318,55	i ia		9	49	•	40	1			\$ 49,848.79	\$ 39,526,
10		A (\$ 1,194.05	92	1	49	c	69	•		•	\$ 2,388.10	1,807,71
- 0			1	· ·		·	59	1	49			,	\$ 1,229.87	888
0 0	5 , 200.77	,	1	\$ 1,266.77	2	1	49	1	69				\$ 2,533.54	\$ 1.747.82
,	904.7	·	1	·		1	69	,	69				\$ 1,304.77	\$ 859.31
2		Ą	\$ 2,687.83	\$ 1,343.92	2	1	49	1	69			1	\$ 5,375.67	\$ 3,379.81
						1	(A)	ř	67	1		1		s
						1	S	ï	ca.	•		1	49	S
						69	S	r	S				•	S
						1 69	69	1	S	9				S
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						,	69	5	S				69	s
						•	69		S			,		s
						9	49	,	S					S
							60	,	S					s

12 5 12 14 14 14 15 16 16 16 17 18 18 18 18 18 18 18 18 18 18 18 18 18	1ABLE G-10: Prim 5 72 73 0 74 \$ 3 2) (see Note 1)	PS Pumps 5 12 12 3.73 0 \$ 980.24 \$
TABLE G-10: Primal 12 1 hp = 0. 1 kg \$ - 8 3 8 8 8 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9	1ABLE G-10: Prim 5 12 73 0 4 \$ 0 8 3 2) (see Note 1)	Primary Clarifier PS Pumps 24 12 1 hp = 0 0.746 3.73 0 \$ 392.10 \$ 980.24 \$ (see Note 1) (see Note 1)
TABLE G-10: P 5 12 12 13 24 \$ 13 (see Note 1)	### 178 Pumps 1 5 24 12 24 12 24 3.73 2.746 3.73 3 (see Note 1) (see Note 1)	Primary Clarifier PS Pumps 24 0.746 3 3 382.10 \$ 980.2 3 (see Note 1 (see
	ifier PS Pumps 24 24 3.746 3 3 (see Note	Primary Clarifier 24 0.746 \$ 392.10

14 4.75% 3% 1.75% I ABLLE G-11
PRIMARY TREATMENT OMR COSTS
Obsign Life
AV cast based on 2007 dollars
Interest Rise
Infancy no see the se

Capital Cost ⁰ 3.				
ftern	Ą	Annual Cost		2007 Present Worth
Operation Electricity ⁽¹⁾			1	
Primary Clarifler	s	1,176,29	v	9.723.14
PS Pumps	s	2,940.73	u	24,307.85
000000000000000000000000000000000000000	es.		S	•
	s	1	49	•
	s	,	49	
			u	
Subtotal	co	4.117.02	s	34.030.98
Maintenance				
Labor	45		s	
Subtotal	cs		S	
Replacement				
Parts	43	3,247,87	v	25 624 87
Subtotal	s	3,247,87	S	25.624.87
TOTAL	5	7,364.89	4	59.655.85

		1	The same of the sa				TIES.				
		, 3	Primary Clarifier Drives Oil Change	PS Pump Seals Every 5 years							_
	2007	Year	ated Yearly Cost	Present Cost Inflated Yearly 3@ \$1,000 ea Cost	Inflated Yearly Cost	Inflated Yearly Cost	Inflated	Inflated Yearly Cost	Inflated Yearly Cost	inflated Yearly Cost	_
Arunai Cost		0	\$.3,000.00 \$	S 3,000.00 S -		·	v			,	1
		-	\$ 3,090.00		v				, v		
		2	\$ 3,182.70						, , ,	, ,	
w e	1,176.29 \$ 9,723.14	8	\$ 3,278.18						2 00	200	
27.7	s	4	\$ 3,376,53) o		,		_
es ·		10	\$ 3,477.82	\$ 3.477.82							_
us		9	\$ 3,582.16			, , ,	,		,	0.0	_
ıs		7	\$ 3.689.62				,			,	_
		- 00	\$ 3 BDD 3-		,			,	,		_
8	4,117,02 \$ 34,030,98		3 044 30			,	ı və t		,		
		ç	10. 10. 10. 10. 10. 10. 10. 10. 10. 10.							•	
u		2 ;	4,031.73	5 4,031.75	,		·	,	·	69	_
		= 4			,		•	•		•	_
,		2 5					•	9	,	. 69	_
\$ 37	47 R7 S S 78 7 B 7 B 7 B 7 B 7 B 7 B 7 B 7 B 7 B	2 7				•					_
8	3.247.87 \$ 25.824.87	ŧ ť			,					44	
5 7.3	64.89 \$ 59.85.85	2 4					·		·	•	_
		2 1						•			_
ndir for ner link annual electrical cost calculations		- 4			•		•		·	•	_
for ordered feedbased		9			•		• • • • • • • • • • • • • • • • • • • •	•		•	
Sentence for story of an artist		2			•	•	•				_
married of the control of the contro		20			·						_

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

2021

75 0.06 0.745 kwh 24 111.90 KW H \$ 58,814,640 10 years 5% 3% \$ 521,091.69

KAS	KAS Pumps	
Nameplate Horsepower:		0.75
Electricity Cost:	69	90.0
1hp=		0.746 kwh
Number of units:		co
Hours of operation per day:		9
Total Max Electricity Draw:		1.68 KW H
Annual Electricity Cost	69	220.555
Design life:		0,000
		in years
Interest Rate:		2%
Inflation Rate:		3%
Electricity Present Worth:	69	1 954 09

WAN	WAS Fullips	
Nameplate Horsepower:	-	က
Electricity Cost:	69	0.06
1hp=		0.746 kwh
Number of units:		m
Hours of operation per day:		9
Total Max Electricity Draw:		6.71 KW H
Annual Electricity Cost:	69	882.220
Design life:		10 years
Interest Rate:		2%
Inflation Rate;		3%
Electricity Present Worth:	69	7,816.38

Nameplate Horsepower:		2
Electricity Cost:	69	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:	69	1,568.390
Design life:		10 years
Inferest Rate:		2%
Inflation Rate:		3%
Electricity Present Worth:	69	13,895.78

	ConvAS		
Capital Cost ⁽³⁾ .			
llem	¥	Annual Cost	2007 Present Worth
Operation Electricity ⁽¹⁾			
Blowers	69	58 814 64	420 040 70
RAS Pumps	01	220 65	1,010,101
Seconary Clariflers	69	1 568 39	1154182
WAS pumps	69	882.22	S 8 402 16
Subtotal	69	61.485.80	\$ 450 A67 SE
Waintenance	۰	00000	
D. Marie	9	80,000,00	
Replacement	14	90,000.00	\$ 662,300,51
Parts	69	9,142,44	S 87.278.29
Subtotal	co	9,142,44	
TOTAL	4	4ED E28 2E	**

0	See electricy easts appendix for per unit annual electrical cast calculations.
8	Annue mentenance labor costs are based on 1 1/2 persons, \$90,000hr (relany+ henetie)
8	3) Capital costs are for secondary trealment system only

				Vorth	2,000.00	5,703.10	0,042.31	ż :	5,842.69	0,846.71	5,649.10	9,065.31	5,461.92	1,983,99	0,350,66	,	,	,	,	,	,	,	,	,
				Prese	,	69 6	, ,	, ,	n	\$ 10,8	9,6	\$ 9,01	5,40	\$ 4.9	\$ 10,3		49	49	65	69	S	49	49	49
			Total Inflated	reany Cost	2,000.00	5,974.00	6 327 83	20.100,0	7,034,43	13,679.43	7,462.83	12,544.71	7,917.31	7,567.68	18,462.98	Y	1	1	r		2	ı	1	þ
		Clarifier Drives Oil Change			2,000.00	2,060,00	2,121,00	2 Carron 12	2,231.02	2,318,55	2,388.10	2,459.75	2,533.54 \$	2,609.55	2,687.83		-	4	\$	69	49	4	49	\$
		Clarifier Dri	Inflated Present Cost		4 4,000.00 4	AV				9 6	2	20	60	49	5									
		Seals	Inflated	S contract	,	, ,			W 122 C	20.114,00		,	,	,	\$ 4,031.75									
		RAS Pump Seals	Present Cost 3 @ \$1000	000																				
		p Seals	Inflated Vearly Cost			9 69	69		2 477 03	20.114.0	9 6		,	1	\$ 4,031.75									
		WAS Pump Seals Every 5 years	Present Cost 3 @ \$1000 Infla	\$ 3,000.00											•									
dine in only				-	S 5 854 00	\$ 1,909,62	1,966.91	\$ 2.025.92	\$ 2 086 69	0 140 20	224977	200040	2,200.13	2,346.59	5 2,419.05									
table of the second of the sec		Blower Filters 6 times per year	Present Cost Inflated 12 @ \$150 ea Yearly Cost	\$ 1,800.00																				
	Fan	rication	Inflated Yearly Cost		2.080.00	2,121.80	2,185,45	2,251.02	2.318.55	2,388.10	245075	O K93 KA	200000	2,008.33	2,687.83									
		Blower Lubrication Every year	Inflated Yearty Present Cost In Cost 2 @ \$1000 ea	\$ 2,000.00 \$	(A	'us	60	44	440	40	. 4.5	***	. 4	0 4										
		3elt ears	sflated Yearly Cost			477.41	É	506.48		537.32		570.05		an you	904.70									
		Blower Belt Every 2 years	Present Cost fr 6 @ \$75 ea	\$ 450.00 \$	S	s)	69	S	69	69	40	65			•									
		Diffusers	Inflated Yearly Present Cost Cost 6 @ \$75 ea					- 4	-		5,411,45													
	-	Membrane Diffusers Every 7 years	Present Cost 1 440@\$10 ea.	\$ 4,400.00							-/													
			Year	0	1	27	m	41	n	9	7	8	6	10	=	12	13	14	15	16	17	18	19	20

Aeration Blowers	Slowers	
Nameplate Horsepower:		75
Electricity Cost:	69	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 vectre
Interest Rate:		50% 50%
Inflation Rate:		3%8
Electricity 2011 Present Worth:	69	\$ 1.042.183.38

RAG	STILL ON	
Nameplate Horsepower:		0.75
Electricity Cost:	49	90.0
1hp=		0.746 kwh
Number of units:		က
Hours of operation per day:		9
Total Max Electricity Draw:		1.68 KW H
Annual Electricity Cost:	69	220.555
Design life:		10 years
Interest Rate:		2%
Inflation Rate:		3%
Electricity Present Worth:	မာ	1,954.09

PRELIMINARY	75 0.06 0.745 kwh 4 24 24 223.80 KW H 117,629.280 10 years 5% 3% 1,042,183.38	0.75 0.06 0.746 kwh 3 8 1.68 KW H 220.555 10 years 5% 3%	3 0.06 0.746 kwh 3 6.71 KW H 882.220 10 years 5% 7,816.38	2 0.06 0.746 kwh 3 24 4.48 kW H 2,352.586 10 years 5% 3% 20,843.67
2031		SQUI	Signal Si	Slariflers & & &
TABLE G-14 Conventional AS Harrisburg WWTP 8/16/2007 Design Condition	Aeration Blowers Electricity Cost. \$1.10p= Number of units. Hours of operation per day: Total Max Electricity Draw: Annual Electricity Cost: Costgon life: Interest Rab:	RAS Pumps Nameplate Horsepower. Electricity Cost; Thp= Number of units: Hours of operation per day; Total Max Electricity Draw; Annual Electricity Cost: Design life: Interest Rate: Inflation Rate: Electricity Present Worth:	WAS Pumps Nameplate Horsepower: Electricity Cost: 1 hp= Number of units: Hours of operation per day: Total Max Electricity Draw: Annual Electricity Cost: Design life: Interest Rate: Inflation Rate: Electricity Present Worth:	Secondary Clarifiers Secondary Clarifiers Secondary Clarifiers Secondary Clarifiers Thp= Number of units: Hours of operation per day. Toda Max Electricity Cost. Design life: Interest Rate: Intrafron Rate: Intrafron Rate: Intrafron Rate: Intrafron Rate: Intrafron Rate: Intrafron Rate: Electricity Present Worth: \$

SECONDARY TREATMENT OMR COSTS

Design Connition

14 years

14 years

14 years

14 years

16 osta based on 2007 dollars

16 mileres Rate

17 st.

17 hinton Rate

17 st.

17 st.

	ConvAS	5	П	
Capital Cost ^(d) .				
lem	4	Annual Cost		2007 Present Worth
Operation Electricity ⁽¹⁾				
Blowers	49	117,629,28	49	972.313.85
RAS pumps	us,	220,55	69	1,823.09
Seconary Clariflers	49	2,352.59	S	19,446.28
WAS pumps	69	882.22	u	7,292,35
Subtotal	69	121,084.64	69	1,000,875,57
Labor	ss	161,000.00	44	1,330,812.62
Subtotal	s	161,000.00	44	1,330,812.62
Parts	s	11.625.23	4	91 720 17
Sublotal	s	11,625.23	w	91,720,17
TOTAL	5	293.709.87	4	25 BUY 2CY C

1	•	00.000.101	9	20000
Subtotal	s	161,000.00	44	1,330,812.
Parts	v	44 805 22	6	200
	9 (02.020,1	4	91,720.
Subjoidi	4	11,625.23	s	91,720.
POTAL	s	293,709.87	s	2,423,408
dotest				
See electricy costs appendix for per unit annual electrical cost calculations	r unit annual electrical cost	celculations,		
2) Annual maintenence labor costs are based on 2 FTE S181,000\yr (salary + benefits)	based on 2 FTE \$161,00	JOAy (salary + benefit	(8	
A Combidence of the contract o				

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

PRELIMINARY

Aeration Blowers	Blowers	
Nameplate Horsepower:		20
Electricity Cost:	69	90.0
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:	69	19,604.880
Design life:		10 years
Interest Rate:		2%
Inflation Rate:		3%
Electricity Present Worth:	↔	\$ 173,697.23

Decanter		
Nameplate Horsepower:	0.75	Г
Electricity Cost:	\$ 0.06	
1hp=	0.746 kwh	
Number of units:	2	
Hours of operation per day:	9	
Total Max Electricity Draw:	1.12 KW H	
Annual Electricity Cost:	\$ 147.037	
Design life:	10 years	
Interest Rate:	2%	
Inflation Rate:	3%	
Electricity Present Worth:	1,302.73	

WAS Pumps	nmps	
Nameplate Horsepower:		က
Electricity Cost:	69	90.0
1hp=		0.746 kwh
Number of units:		2
Hours of operation per day:		9
Total Max Electricity Draw:		4.48 KW H
Annual Electricity Cost:	69	588.146
Design life:		10 years
Interest Rate:		2%
Inflation Rate:		3%
Electricity Present Worth:	€9	5,210.92

2021 (from 2011 thru 2021) 10 years 4,75% 3% SECONDARY TREATMENT OMR COSTS
Design Countion
10
Indexes Rate
4.75%
Initiation Rate
3%

	ICEAS-SBR	3R	П	
Capital Cost ⁽³⁾ .				
Item	∢	Annual Cost		2007 Present Worth
Operation				
Electricity ⁽¹⁾				
Blowers	69	19.604.88	65	144 270 24
Decanter	- 49	147.04	49	1 082 03
WAS pumps	. 49	588.15	- 49	4.328 11
Subtotal	49	20.340.06	69	149 680 38
Maintenance				2000000
Labor ⁽²⁾	69	90,000.00	69	662 300 54
Subtotal	69	90.000.00		662 300 51
Replacement		2000		2000,000
Parts	60	5,648,74	40	41.568.45
Subtotal	cs.	5,648.74	49	41.568.45
TOTAL	s	115.988.80	L	853 549 23

5	 Annual maintenance labor costs are based on 11/2 persons, \$90,000/vr (salary + bene
3	Capital costs are for secondary treatment system only.

Present Cost Inflated Yearly							1 011							
Present Cost Inflated Yearly Cost Inflated Yearly Cost Inflated Yearly Present Cost Inflated Yearly Co		Membrane E	Diffusers	Blowe	ar Belt	Blower	Lubrication	Blower Filters	WAS Pum	p Seals				
#### Control of State	,	1	inflated Yearly	Present Cost	Inflated Yearly	Present Cost	Inflated Yearly	_	Prese 2 @	years		Inflated	Total Inflated	
5 7,40000 5 2,00000 5 2,00000 5 6 7 7 6 6 7	I Cal	क्स्वतिक 10 हव.	toos	o @ \$/2 63	Cost	2 @ \$1000 ca		12 @ \$150 ea Yearly Co		Yearly Cost	Present Cost	Yearly Cost	Yearly Cost	Present Worth
5 5 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	0	\$ 4,400.00	,	\$ 450.00		\$ 2,000.00	69	\$ 1,800.00 \$	\$ 2,000.00			69		
5 4774	-		,				\$ 2,060.00	69	_	- 49		69	\$ 391400 \$	2 726 E2
\$ 2,165.45 \$ \$ 1,000.81 \$ \$ 2,216.45 \$ \$ \$ 1,000.81 \$ \$ \$ 2,216.25 \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$	7				\$ 477.41		\$ 2,121.80	65	25				\$ 4,508.83 \$	4,109.18
6 5.414 6 5 5.72	en	-7			· •>		\$ 2,185.45	s,	<u> </u>	,		•	\$ 4,152.36 \$	3,612.71
557.22 5.5.248.55 5.2.18.5	4	<i>y</i> ,			\$ 506.48		\$ 2,251.02	49	24	,		S	S 478341 \$	3 079 03
5.7722 55 5.788.10 5.218.372 55 5.288.10 5.218.372 55 5.288.10 5.218.372 55 5.288.10 5.218.372 55 5.288.10 5.218.372 55 5.288.10 5.218.372 55 5.288.10 5.288	ın o		,		, so		\$ 2,318.55	45	ġ.	\$ 2,318.55		45	\$ 6,723.79 \$	5.331.43
5. 2. 2. 2. 2. 2. 2. 2. 2. 2. 2. 2. 2. 2.	0 1				\$ 537.32	4	\$ 2,388,10	S	6:			•	\$ 5.074.72 \$	3,841.39
6 5 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	, ,		\$ 5,411.45				\$ 2,459.75	4	4	•			\$ 10,084,97 \$	7.287.80
7 2,248.59 W 2,449.05 W 2,44	00				\$ 570.05		\$ 2,533,54	69	6	,		5	\$ 5,383.77 \$	3.714.11
2,2419.05 W 2,419.05	D 5		,				\$ 2,609.55	49	6			•	\$ 4,958,14 \$	3.265.37
	2 7	-			\$ 60476		\$ 2,687.83	49		\$ 2,687.83		4	\$ 8,399.48 \$	5,280.95
	. 5											•		
	4 6													
	2 7											- 4	,	•
	± 4											-	4	•
	2 4											1		
	2 1											1		
	- 60											1	69 ,	•
	2 0												- 4	•
	2 5											,	· ·	•
	1		1									69		

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

2031

PRELIMINARY

Aeration Blowers	owers	
Nameplate Horsepower:		20
Electricity Cost:	69	90.0
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:		2%
Inflation Rate:		3%
Electricity 2011 Present Worth:	69	347,394.46

Decanter	er	
Nameplate Horsepower:		0.75
Electricity Cost:	↔	90.0
1hp=		0.746 kwh
Number of units:		4
Hours of operation per day:		9
Total Max Electricity Draw:		2.24 KW H
Annual Electricity Cost:	69	294.073
Design life:		10 years
Interest Rate:		2%
Inflation Rate:		3%
Electricity Present Worth:	↔	2,605.46

WAS Pumps		
Nameplate Horsepower:		3
Electricity Cost:	44	90.0
1hp=		0.746 kwh
Number of units:		4
Hours of operation per day:		9
Total Max Electricity Draw:		8.95 KW H
Annual Electricity Cost:	1,17	1,176.293
Design life:		10 years
Interest Rate:		2%
Inflation Rate:		3%
Electricity Present Worth:	5 10,42	10,421.83

2034 (from 2021 thru 2031) 14 years 4,75% 2% 1,75% SECONDARY TREATMENT OMR COSTS
Design Condition
14
All costs based on 2007 dollars
All costs based on 2007 dollars
All costs have a cost of the cost factor of the cost of the c

Capital Cost ⁽³⁾ :			
fem	٩	Annual Cost	2007 Present Worth
Operation Electricity ⁽¹⁾			
Blowers	49	39,209,76	\$ 272.484.02
Decanter	S	294.07	2 043 63
WAS pumps	s	1,176.29	8.174.52
Subtotal Maintenance	s	40,680.13 \$	28
Labor ⁽²⁾	s	161,000,00	1,118,852,23
Subtotal	44	161,000,00 \$	1,118,852.23
Parts	49	11,297.47 \$	78,510.56
Subtotal	69	11,297.47 \$	
TOTAL	us	212,977,60 \$	1,480,064.96

Finance.

1) See electricy code appendix for per unit annual electrical cost calculations.

2) Annual maintenance labor costs are based on 2 FTE \$161,000/yr (palary + benefits).

3) Capital code are for eacondary treatment system only.

	Membrane Diffuse Every 7 years	Membrane Diffusers Every 7 years	Blower Belt Every 2 years	. Belt years	Blower	Blower Lubrication Every year	Blower Fitters 6 times per year	Filters	WAS Pump Seals	np Seals					
Year	Present Cost 880@\$10 ea.	Inflated Yearly Cost	Present Cost 12 @ \$75 ea	Inflated Yearly Cost	Inflated Yearly Present Cost Cost 4 @ \$1000 ea	Inflated Yearly Cost	Pres 24 @	_	Present Cost 4 @ \$1000 ea.	rCost	Inflated Present Cost Yearly Cost	Inflated Yearly Cost	Total Inflated Yearly Cost	Present Worth	€
0	\$ 8,800.00	·	\$ 900,000	40	\$ 4,000.00	4	\$ 3,600.00	1	\$ 4,000.00	69			69	44	1
-				45		\$ 4,120.00		\$ 3,708.00				69	S 7 828 00	64	473 03
2		65	.00	\$ 954.31		\$ 4,243.60		\$ 3,819.24				1	\$ 9,017.65	69	3,218.36
69						\$ 4,370.91		\$ 3,933.82		•		•	\$ 8,304.73	49	7,225.42
41		49	2000	\$ 1,012.96		\$ 4,502.04		\$ 4,051.83		-			\$ 3,566.82	49	7,946.06
ימו		1		•		\$ 4,637.10		\$ 4,173.39		\$ 4,637.10		59	\$ 13,447,58	69	10.662.87
10 1				\$ 1,074.65		\$ 4,776.21		\$ 4,298.59		65		-	\$ 10,149,44	49	682
		\$ 10,822,89		·		\$ 4,919.50		\$ 4,427.55				1	\$ 20,169.93	5	14,575.59
00 0				1,140.09		\$ 5,067.08		\$ 4,560.37		1 69		. 65	\$ 10,787.55	49	7,428.22
n ;		,		69-		\$ 5,219.09		\$ 4,697.18		1		,	\$ 9,916.28	49	6,530.74
2 3		,		\$ 1,209.52		\$ 5,375.67		\$ 4,838.10		\$ 5,375.67		1 49	08.3	\$	10,561.90
- 2												. 69	49	49	'
7 0												. 49	43	49	1
0 7												,	9	S	
4 4												4	49	(s)	1
D 4												69	40	(s)	
0 5												. 69	1	69	1
10												1		69	2
0 9												69	4	49	*
n c													4	49	-
20															

PRELIMINARY

2021

KAS	KAS Pumps	
Nameplate Horsepower:		0.75
Electricity Cost:	69	90'0
1hp=		0.746 cwh
Number of units;		9
Hours of operation per day:		
Total Max Electricity Draw:		3.36 KW H
Annual Electricity Cost.	69	441.110
Design life:		10 vears
nterest Rate:		2%
Inflation Rate:		3%
Electricity Present Worth:	69	3.908.19

\$ 0.074 87.2021 87.2021 87.2021 87.616.33 87.616.33 11.11	Nameplate Horsepower:		67	
\$ 882. \$ 7,816 \$ 7,816 \$ 0 \$ 0	Electricity Cost	69	0.08	
\$ 882. \$ 7,816 and Air Scour Blowers \$ 0.0	46.00	•	00.0	
\$ 882. \$ 7,816 \$ 7,816 \$ 0 : \$ 490,	=du:		0.746	hwh
\$ 882. \$ 7,816 ane At Sour Blowers \$ 0	Number of units:		63	
\$ 7246 \$ 7,846 \$ 0 0 \$ 490,0	Hours of operation per day:		9	
\$ 882.2 8 7,816 8 0 0 0 0 0 0 0 0	Total Max Electricity Draw:		6.71	KWH
3 7,816.2 ante Air Scour Blowers 0.7.0 0.7.1	Annual Electricity Cost.	49	882.220	
\$ 7,816.5 \$ 0.00 \$ 0.07	Design life:		0	Sare
ane Air Scour Blowers	Interest Rate:		20%	
ane Air Scour Blowers	Inflation Rate:		3%	
ane Air Scour Blowers \$	Electricity Present Worth:	87	7,816.38	
ane Air Scour Blowers				
(F)	Membrane Air	Scour Blow	ers	
Ø.	Nameplate Horsepower.		15	
Ø.	Electricity Cost:	49	90'0	
67	1hp=		0.746	hvo
\$	Number of units:		-	
aw: \$ 49	Hours of operation per day:		N	
8 48	Total Max Electricity Draw:		11.19	H W
	Annual Electricity Cost	69	490.122	

Permeate/Backpulse Pumps	kpulse Pum	sdi
Nameplate Horsepower:		5
Electricity Cost	69	90'0
1hp=		0.746 kwh
Number of units:		2
Hours of operation per day:		-
Total Max Electricity Draw:		7.46 KW H
Annual Electricity Cost:	GP.	163.374
Design life:		10 years
nterest Rate:		2%
Inflation Rate:		3%
Electricity Present Worth:	45	1 147 48

2021 (from 2011 ftvs 2021) 10 years 4.75% 3% SECONDARY TREATMENT OMR COSTS
Design Condition
To Interest Rate 475%
Intation Rate 8.47%
34,

	MBR		
Capital Cost ⁰¹ .			
tem	A	Annual Cost	2007 Present Worth
Operation Electricity ⁽¹⁾			
Blowers	69	58,814.64	\$ 432.810.73
RAS Pumps	69	441.11	3.246.08
Membrane Blowers	69	490,12	3.606.76
Permeate/Backpulse pumps	w	163.37	1,202.25
WAS pumps	s	882.22	6.492.16
Subtotal	v4	60,791.47	\$ 447,357.98
Labor ^{R3}	69	8 00,000,00	682 300 54
Subtotal	u)		
Replacement			
Cleaning Chemicals	u)	8,000,000 \$	58.871.16
Parts	49	13,352.61 \$	
Subtotal	49		,
FOTAL	u	164 144 07 \$	4 366 700 67

	P	Annual Cost		Present Worth
ation			ı	
ectricity ⁽¹⁾				
Blowers	69	58,814.64	S	432.810.73
RAS Pumps	69	441.11	s	3,246,08
Membrane Blowers	w	490,12	49	3,606.76
Permeate/Backpulse pumps	w	163.37	49	1.202.25
WAS pumps	S	882.22	69	6,492.16
ibtotal	69	60,791.47	69	447 357 98
enance				
bor ⁴²⁾	69	90,000,00	09	682.300.51
iptotal	63	90,000,00	S	682 300 54
cement			í	D'ONO TOO
eaning Chemicals	us	8,000,00	49	58.871.16
rıts	49	13,352,61	47	98.260.43
ptotal	49	13,352,61	69	157 131 58
II.	u	164,144.07	un	1,266,790.07

										Tar								
		7	. 1		Membrane	Membrane Diffusers	Blower Belt	r Belt	Blower Lubrication	rication	Blower Filters	ters	WAS Pumo Seals	Seals	RAS Pumo Spale	Spale	IIF Membrane R	S one
			-		Every	Every 7 years	Every 2 years	years	Every year	ear	6 times per year		Every 5 years	ars	Every 5 years	ars	Every 10 v	100
		2007	9	Year	Present Cost 440@S10 ea.		Present Cost 12 @ \$75 ea	Inflated Yearly Cost	Inflated Yearly Present Cost Inflated Yearly Present Cost In Cost 12 @ \$75 ea Cost 4 @ Stonnes	Inflated Yearty	Present Cost Inflated	_	Cost		00 st	Inflated	Present Cost	
Ar	Annual Cost	Present Worth		0	\$ 4.400.00	U.	8 00000	L	S COUNTY S	T	T COOOD S	-0-	- I'			early Cost	Yearly Cost 12@ \$1100 ea	Inita
					1,000,000		900000	9 1	e 4'00'00 s		\$ 3,600.00 \$	_	\$ 3,000.00 \$	1	\$ 6,000.00	1	\$ 13,200,00	
				_		,		1	6.7	4,120.00	69	3,708.00	49	1		,		
				2		1		\$ 954.81	67	4,243.60	49	3,819.24	69					
69	58,814.64 \$	432.810.73		er					en.	4,370.91	64	3,933,82	69	1		,		
69	441.11 \$	3.246.08		4				200000	•									
67	490 12 \$	9 606 7B		- u				1,012.90	2	4,502.04	60	4,051.83	60	1				
U	162 37 6	1,203,25		2 0				-	47	4,637.10	64	4,173,39	60	3,477.82	•	6.955.64	,	
9 4	000000	57,202,1		10 (\$ 1,074.65	47	4,776.21	59	4,298,59	49	,				
3 6	00 277700	0,492.10		1		\$ 5,411,45			S	4.919.50	49	4 427 55	- 60					
9	\$ 74.187,00	447,357,98		0		-		\$ 1,140.09	60	5,057.08	69	4,560.37	- 49	1	, .,	,	, •	
6	00 000 00			on i		69		1 69	47	5,219.09	69	4,697.18	649	,	, 0,			
9	80,000,00	652,300.51		10		·		\$ 1,209.52	**	5 37E 67		A 220 to	- 6	4 NOA 7E		00000		
u)	\$ 00,000,00	682,300.51		=						2000	7	a'non' in	9	4,001.73	~	4 6,003.3J		
us	8,000,00	58.871.16		51 52														
49	13,352.61 \$	98,260,43		14														
49	13,352.61 \$	157,131,58		10														
us	164,144.07 \$	1,266,790.07		16														
				17														
trical cost o	rical cost calculations.			18														
persons, \$	persons, \$90,000/yr (salary + benefits)	eĝis)		19														
				-														

Permeate/Backpulse Pump Seals Every 5 years

UF Membrane Replacement Every 10 years

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

2031 Aeration Blowers

Nameplate Horsepower.		75	
Electricity Cost	69	90'0	
1hp=		0.746 kwh	kwh
Number of units:		4	
Hours of operation per day:		75	
Total Max Electricity Draw:		223.80	223.80 KW H
Annual Electricity Cost	49	117,629.280	
Design life:		10	10 years
Interest Rate:		5%	
inflation Rate:		3%	
Electricity 2011 Present Worth:	69	\$ 1,042,183.38	

RAS	RAS Pumps	
Vameplate Horsepower.		0.75
Electricity Cost:	ь	90.0
1hp=		0.746 kwh
Number of units:		12
Hours of operation per day:		Ф
Total Max Electricity Draw:		6.71 KW H
Annual Electricity Cost	69	882,220
Design life:		10 years
Interest Rate:		2%
Inflation Rate:		3%
Electricity Present Worth:	69	7.816.38

CMAN	www.ruinbs	
Nameplate Horsepower:		8
Electricity Cost	w	90'0
1hp=		0.746 kwh
Number of units:		69
Hours of operation per day:		9
Total Max Electricity Draw.		6.71 KW H
Annual Electricity Cost	65	882,220
Design life:		10 years
Inferest Rate:		2%
Inflation Rate:		3%
Electricity Present Worth:	w	7,816,38

	200	000	
Nameplate Horsepower.		15	
Electricity Cost	49	90.0	
1hp=		0.746 kwh	kwh
Number of units:		24	
Hours of operation per day:		2	
Total Max Electricity Draw:		22.38	22.38 KW H
Annual Electricity Cost	69	980.244	
Design life:		. 4	10 years
Interest Rate:		5%	
Inflation Rate:		3%	
Electricity Present Worth:	69	8,684.86	

Permeate/Bar	Permeate/Backpulse Pumps	bs	
Nameplate Horsepower.		5	L
Electricity Cost:	us.	0.06	
1hp=		0.746	0.746 kwh
Number of units:		4	
Hours of operation per day:		_	
Total Max Electricity Draw:		14.92	14.92 KW H
Annual Electricity Cost	49	326.748	
Design life:		11	10 years
Interest Rate:		2%	
Inflation Rate:		3%	
Flectricity Present Worth	6	20 804 05	

| SECONDARY TREATMENT OMR COSTS | SOST (from 2021 from 2031) | Design Committee | 14 | years | all costs based on 2007 dollars | 4.75% | Interest Rale in Interest Rale in Interest Rale | 1.75% | Net Rale | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% | 1.75% |

	Vigu		I	
Capital Cost ^a t.				
tem		Annual Cost		2011 Present Worth
Operation Electricity ⁽¹⁾			1	
Blowers	co.	117 629 28	64	817 452 08
RAS pumps	69	882.22	1	6 130 89
Membrane Blowers	69	980.24	· v	681210
Permeaterbackpulse pumps	49	326.75	47	2.270.70
WAS pumps	s	882.22	v,	8 130 89
Subtotal	es	120,700.71	49	838.796.65
Maintenance			8	
Labor ⁽³⁾	69	161,000.00	S	1,118,852,23
Subtotal	cs	161,000.00	69	1 118 852 23
Replacement			k.	
Cleaning Chemicals	us	8,000.00	69	55 595 14
Parls	co	20,839.36	69	144.820.92
Subtotal	s	20,839.36	69	200.416.06
TOTAL	4	102 540 07	0	2 450 064 03

tem	~	Annual Cost		2011 Present Worth
Operation Electricity ⁽¹⁾			1	
Blowers	v)	117,629,28	69	817,452.06
RAS pumps	69	882.22	u	6.130.89
Membrane Blowers	69	980.24	S	8 812 10
Permeate/backpulse pumps	49	326.75	49	2,270,70
WAS pumps	s	882.22	u,	5.130.89
Subtotal	so	120,700.71	44	938,796.65
naintenance Labor ⁽²⁾	49	161.000.00	45	1 118 852 23
Subtotal	44	161,000.00	69	1,118,852.23
Replacement Cleaning Chemicals	s	8,000.00	69	55.595.14
Parts	us.	20,839.36	69	144.820.92
Subtotal	s	20,839.36	69	200,416,06
TOTAL	s	302,540,07	u	2,158,064,93

	lacement	Present Cost Inflated Yearly Total Inflated Yearly Total Inflated Yearly Total Inflated Yearly Morth	5	C 11 538 00 6		69	,	5	s	69	69	69	35,479.39 \$ 77,275.19 \$ 48,584.73	 	 	6A ,	· · · · · ·	· · · · ·	(A)	
	UF Membrare Replacement Every 10 years	Present Cost Inflat 24@ \$1100 ea	6	200000	00	(4	•	69	\$	•	**	49	4							
	Permeate/Backpulse Pump Seals Every 5 years	st Inflated Yearly Cost				,		\$ 4,637.10	9	9	9	•	\$ 5,375,67							
		Inflated Present Cost Yearly Ccst 4 @ \$1000 ea.	- \$ 4,000.00					13,911.29			,		\$16,127.00							
	RAS Pump Seals Every 5 years	Present Cosi 12 @ \$1000 Infli- ea. Yearf	\$ 12,000.00 \$	co	S	s	67	\$13,9	6 4	49	49	64	\$16,1							
	WAS Pump Seals Every 5 years	3 @ \$1000 Inflated ea. Yearly Cost	\$ 3000000 \$		69	69	69	\$ 3,477.82				0	\$ 4,031.75							
	Blower Filters 5 times per year	Present Cost Inflated 48 @ \$150 ea Yearly Cost	\$ 7,200.00 \$	\$ 7,416.00	\$ 7,636.48	\$ 7,887.63	\$ 8,103.66	\$ 8,346.77	\$ 8,597.18	\$ 8,855,09	\$ 9,120.74	\$ 9,394.37	\$ 9,676.20							
Part	Blower Lubrication Every year	Present Cost Inflated Yearly 4 @ \$1000 ea Cost	-	\$ 4,120.00	\$ 4,243.80	\$ 4,370.91	\$ 4,502.04	\$ 4,637.10	\$ 4,776.21	\$ 4,919.50	\$ 5,067.08	\$ 5,219.09	\$ 5,375,67							
	Blower Belt Every 2 years	Inflated Yearly Cost	\$ 900.008 \$	s	\$ 954.81	69	\$ 1,012.96		20,4/0,1		\$ 1,140,US		\$ 1,209.52							
	Membrane Diffusers Every 7 years	Inflated Yearly Cost	\$ 880.00 \$		· ·	•	•	4 0	00000	67'700'' 9	9 4	9 6								

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

rection - SBR PRELIMINARY
rg WWTP

DV Modules - 2021	7		_
Nameplate Horsepower:			_
Electricity Cost:	69	90.0	
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:	69	9,933.840	
Design life:		10 years	
Interest Rate:		2%	_
Inflation Rate:		3%	
Electricity Present Worth:	69	88,012.81	_

UV Modules - 2031	s - 2031	
Nameplate Horsepower:		
Electricity Cost:	69	90'0
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:		2%
Inflation Rate:		3%
Electricity Present Worth:	69	88,012.81

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

PRELIMINARY

UV Modules - 2021	3 - 2021	
Nameplate Horsepower:		
Electricity Cost:	↔	90.0
Power draw per unit		12.6 kW
Number of units:		-
Hours of operation per day:		24
Total Max Electricity Draw:		12.60 KW H
Annual Electricity Cost:	G	6,622.560
Design life:		10 years
Interest Rate:		2%
Inflation Rate:		3%
Electricity Present Worth:	↔	58,675.20

UV Modules - 2031	21	
Nameplate Horsepower:		
Electricity Cost:	€Đ	90.0
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	5.120
Design life:		10 years
Interest Rate:		2%
Inflation Rate:		3%
Electricity Present Worth:	\$ 117,350.41	50.41

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

PRELIMINARY

UV Modules - 2021	021	
Nameplate Horsepower:		
Electricity Cost:	69	90.0
Power draw per unit		12.6 kW
Number of units:		_
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:		2%
Inflation Rate:		3%
Electricity Present Worth:	9	58,675.20

UV Modules - 2031	31	
Nameplate Horsepower:		
Electricity Cost:	4	90.0
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:	49	\$ 13,245.120
Design life:		10 years
Interest Rate:		2%
Inflation Rate:		3%
Electricity Present Worth:	↔	\$ 117,350.41

years 10 2021 4.75% 3% 1.75% TABLE G-27
UV DISINFECTION OMR COSTS
Design Lie
Design Vear
Interest Rare
Interest Rare
Infatered Rare
Infatere

	UV-SBR			
Capital Cost ⁰¹ .	e e	Annual Cost	200 Present	2007 Present Worth
Operation Electricity ⁽¹⁾				
UV Modules	us.	9,933.84	S	73,102.08
Subtotal	64	9,933.84	69	73,102.08
Maintenance Labor ⁽²⁾	s	,	9	•
Subtotal	w		49	ľ
Parts	49	11,576.79	49	85,192.40
Subtotal	s	ш	8	85,192.40
TOTAL	u			458 294 AS

\$ 21,218.00 \$ 22,510.18 \$ 23,881.05 \$ 25,335,40 \$ 26,878.33

18,696.61 18,077.12 17,478.15

22,510,18 \$ 23,881,05 \$ 25,335,40 \$ 25,335,40 \$ 25,335,40 \$ 25,335,40 \$ 25,335,40 \$ 25,335,40 \$ 25,878,33 \$ 25,878

Present Cost Inflated Yearly Present Cost Inflated 18 @ \$150 ca Cost 80 @ \$10 ca Yearly Cost 2 @ \$1000 ca Yearly Cost

Lamp Roplacament
Every 2 years
Present Cost Inflated Yearly
Present Cost Inflated Yearly
\$ 20,000.00
\$ 5.00,000.00
\$ 5.00,000.00
\$ 5.00,000.00

teplacement - UV Disinfection - SBR Part

Capital Cost ⁽³⁾ ,				
				2007
Item	Ä	Annual Cost		Present Worth
Operation Electricity ⁽¹⁾				
UV Modules	69	6,622.58	69	48,734.72
Subtotal	40	6.622.56	60	48.734.72
Maintenance				
Labor ⁽²⁾	w		49	•
Subtotal	40		44	
Replacement				
Parts	s	5,788,40	49	42,596.20
Subtotal	49	5,788.40	49	42,596.20
TOTAL	5	12 410.96		91 330 92

Capital Cost ⁰³ .	*		
Item	¥	Annual Cost	2007 Present Worth
Operation Electricity***			
UV Modules	ø	6,622.56	48,734.72
Subtotal	65	6,622.56 \$	48,734.72
Maintenance	٠		
Subtotal			
Replacement			
Parts	*	5,788.40 \$	
Subtotal	69	5,788.40 \$	42,598.20
TOTAL	u	12,410,96 \$	

Present Cost Inflated Yearly 3 @ \$1000 ea Cost
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Inflated Yearly Present Cost Cost 18 @ \$150 ea
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Replacement - UV Disinfection - SBR Part

Inflated Yearly Cost

Present Cost 18 @ \$150 ea

Inflated Yearly Cost

Present Cost Inflated Yearly Present Cost 80 @ \$250 ea Cost 3 @ \$1000 ea \$ 20,000.00 \$...

\$ 21,218.00 \$ 22,510.18 \$ 23,881.05 \$ 25,335.40 \$ 26,878.33

	MOSAO		
Capital Cost ⁰³ . Item	A	Annual Cost	2007 Present Worth
Operation Electricity ¹¹ UV Modules	v ,	9,933.84	69,034.16
Subtotal	675	9,933.84 \$	69,034.16
Labord	ø	,	,
Subtotal Replacement	49		
Parts	•	8,995,95	
Subtotal	69	8,995.95 \$	
TOTAL	64	18,929,79	

21,218.00 \$ 22,510.18 \$ 23,881.05 \$ 25,335.40 \$ 26,878.33 \$ 26,878.33 \$ \$

Capital Cost ^{est} :			
ltem	¥	Annual Cost	2007 Present Worth
Operation Electricity ⁽¹⁾			
UV Modules	€>	13,245.12 \$	92,045,54
Subtotal	en.	13,245.12 \$	92,045,54
Maintenance Labor ^{c3}	69		
Subtotal	64		c
Parts	69	8,995,95	62.516.37
Subtotal	s	8,995.95	
TOTAL	5	22,241.07 \$	-

\$ 21,218.00 \$ 22,510.18 \$ 23,881.05 \$ 25,335.40 \$ 26,878.33

21,218.00 \$ 22,510.18 \$ 23,861.05 \$ 25,335.40 \$ 26,878.33 \$

| Lang Persentent | Persent Cost | Inflated Yeary | Persent Cost | Persent Cost | Inflated | Persent Cost | Pers

Replacement - UV Disinfection - Conv. AS Part

it								
	2007 Present Worth	69,034.16	69,034.16 - - 62,516.37 62,516.37 131,550,53	2007 Present Worth	92,045,54	92,045.54 62,516.37 62,516.37 154,581.91	2007 Present Worth 92,045,54	62,046,54 62,048,37 62,516,37 144,381,31
years	_	•	w w w w w		s		69	* * * * * * * * * * * * * * * * * * * *
14 2031 4.75% 3% 1.75%	Annual Cost	9,933.84	8,995,95 8,995,95 18,929,79	S Annual Cost	13,245.12	13,245.12 B 885.95 B,985.95 22,241.07	R Annual Cost 13,245.12	13,245,12 8,895,35 8,895,35 22,241,07
JV-SBR	5	٧,	esal ayeldens only;	UVAS	€9	SO S	Ann Ann	62 63 63 64 64 65 65 65 65 65 65 65 65 65 65 65 65 65
TABLE G-28 VD ISINFECTION OMR COSTS all costs based on 2007 dollars costs based on 2007 dollars to costs that costs that costs and was rate influences rate was rate was rate	Capital Cost ⁽²⁾ .	Operation Electricity ⁷¹ UV Modules	Subtorial Material Control (1900-7) Subtorial Subtorial Subtorial Figure Control (1000-7) Subtorial Figure Control (1000-7) Subtorial Figure Control (1000-7) Subtorial Figure Control (1000-7) Subtorial control	Capital Cost [®] . Hern Operation	Electricity ³¹¹ UV Modules	Subdicibil Malifirmation Labe/20 Subdicibil Replacement Paris Subdicibil Tor/Au Modes 10 I VI distributed with secondary heathwat code 2) included with secondary heathwat code 3) Capital code on the reside the secondary heathwat code 3) Capital code on the reside the secondary heathwat code 4) Capital code on the reside the secondary heathwat code	Cipphal Cost ⁽¹⁾ . Ren Operation Electricay ⁽¹⁾ UV Mockles	Substitution Liabora Substitution Substituti
	()				_ ·_			

			Present Worth		•	18,337.32	•	18,696,61	,	18,077.12		17,478.15	•	16,899.04	,	•	•		3		3	ij	
				on	us	44	es	49	v	49	os	49	S	49	s	uş	s	49	49	49	4	4	
			Total Inflated Yearly Cost	45		\$ 21,218.00		\$ 22,510.18		\$ 23,881.05	-	\$ 25,335.40	-	\$ 26,878.33	-	-	49			- 40			
			Inflated Yearly Cost								. 49					,							
			Present Cost 1 @ \$350 ea																				
			Inflated Yearly Cost	· ·	69	69			1 69	69	69	69	69		4		,		,				
			Present Cost 2 @ \$1000 ea																				
n - Conv. AS			Inflated Yearly Cost								•						·	,				-	
Replacement - UV Disinfection - Conv. AS			Present Cost 80 @ \$10 ea	,																			
Replacement	Part		Inflated Yearly Cost	,				,		,			,		1				•	6	,		
			Present Cost 18 @ \$150 ea	65								-	•	-	-					-		-	
			Inflated Yearly Cost				•	•	•		,		•					•	•	•			
			Present Cost 3 @ \$1000 ea																				
		lacement years	Inflated Yearly Cost	•	69	\$ 21,218.00	, ss	\$ 22,510.18	s	\$ 23,881.05		\$ 25,335.40	•	\$ 26,878.33									
		Lamp Replacement Every 2 years	Present Cost 80 @ \$250 ea	\$ 20,000.00																			
	ľ		Year		,	2	e	4	10	9	7	89	6	10	F	12	13	4	15	18	17	18	10

	169'86																				\$	77/101
16.	\$ 34	326.75	\$	01,68 \$		\$ 46.55		- \$		- \$	024.40	98'	\$	32.67	2	1	32.6	\$		_	\$	1200 JATOT
1															·	_	0 00	9			-9	Electricity
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١.			- 1																			Total
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16.	\$ 34	326.75	ا پ	01.59 \$		00.04						Q										Number of
1 20	yc 5	37 306	\$	01.89 \$		\$9,84		\$		- \$	02,210	64	\$	32.67	\$	L	32.6	\$		-	\$	Cost
			-																			Electricity
91.1	L	57.5	- 1	9 4 .7	2	57.8	0		0		93.25			£7£.0		٠.			_			IsunnA
1			- 1		Ĭ	0	•		v		30 00			828 0		EZ	6.0		0			Draw, KWH
1			-																			Electricity
			-									46 KWH	7.0	= du L								Max
			-									90.0										Cost, \$
		2	1																			Electricity
14		ħ	ľ	b	Þ		7		Þ		24			Þ		Þ			Þ			of Operation
			1																			Daily Hours
91		g	1,	10	g		^															- 1
12"		7	ľ	J V	2		0		0		125			3.0		G. 0	1		0			Horsepower
Jax	Tank M	sdmuq baa	+	Press	_	Feed Pump		edum i	_	adum i	212112		_			-						Nameplate
		torage Tank				Belt Filter Press	naa	Pumps Pumps		Pumps	OWers	a noitste	A	ixer	Polymer M	du	mer Feed Pur	Yloq			RDT	
1	egbulg	PP-to-Sludge	ä	Doll Cilian		Polt Eiltor Droo	poo	RDT-to-		PDT Feed												- 1
			1					-1 TOO														
			1									tinU			-				_			1
			L								lssoq	sid & Jns	eu:	ids Treat	los							- 1

years (from 2011-2021)

PRELIMINARY

TABLE G-29 Harrlaburg WWTP improvements Design Condition TOS/SOOT

77-197-19 5 ... 3 \$ 4,317.50 \$ 4,179.00 \$ 4,986.23 \$ 4,544.25 \$ 4,986.23 \$ 4,944.50 \$ 19,786.62 \$ 1,567.27 \$ 5,917.20 \$ 5,917.20 \$ 5,917.20 \$ 5,917.20 \$ 5,917.20 2,687.83 \$ 403.17 \$ 10,781.33 \$ 130,48 571.96 | Color | Specific | Color | C | Blower Beat | | Blower Beat 804.78 10-10-00-0 e 2

Design Life	10		Vence	
Design Condition	2021		ffrom 2011-2021)	
Interest Rate	475%			
enflation Rate	K			
Attentions	Alternativa 1 - Aerobia Digester	3		П
Captal Cost?.	E			
J	1		2007	
	N. PORTON	J	TOTAL WOLL	I
Berticion				
RDT		,		•
Polymor Food Pump		196		24045
Polymer Mone	40	22.67		24045
Auration Blowers	5 98.024.40	440	5 721	724 354 22
RDT Food Pumps		,		
RDT-to-Oxpenter Food Purpos	v			
Bell Filter Press Feed Pump		66.55		342.5E
Salt Place Precs		93.10		645.17
BFP-to-Sludge Storage Tank Food				
Pumps	30	326.75	\$ 24	2404.50
Studye Storage Timb Mone		34.91	. 2	256.95
Subtotal	\$ 58,58	56,581.06	\$ 725.5	725.521.23
Wainfactance				Ī
Labor®	4		5	
Subsection		,	5	ŀ
Seplecement.				Ī
Parts	5 9.11	8,111.40	\$ 55.8	10.00
Subtotal		1,40	3 59.68	59,690,91
TOTAL	40578	2 40		12 44

PREJIMINARY

Harrisburg WWTP Improvements TABLE G-31

TOA

Annual Electricity Cost TOTAL

Draw, KWH Annual Electricity Cost Number of Units

Max Electricity

Dally Hours of Operation Electricity Cost, \$

Horsepower

Nameplate

atinU IstoT

YAANIMIJARY

\$25.75 \$ 34.93 8.886,9

16.16

61,11

12

L

\$ 67.925

57.8

7

Ġ

Storage Tank Storage Feed Pumps Tank Mixer

BFP-to-Sludge Sludge

\$ 01.89 \$ 33.94

01.59

94.7

ļ

\$ 99.94

3.73

Press

\$ 67.828

L

Þ

Feed Pump

\$ 37.928

\$ 37.925

ļ

\$ 37.928

87.8

Þ

Pumps

\$ 56.148,7

\$ 86.026,6

94.7

54

10

sdwnd

PDT Feed

7

RDT-to-Digester Feed Belt Filter Press Belt Filter Press Press Solids Treatment & Disposal Design Life Design Condition 7///3/2007 years (from 2021-2031) 10 10

\$ 79.28

L

\$ 79.26

675.0

1 hp = 0.746 KWH

Tube Mixers

Internal Draft

\$ 75.25

L

\$ 79.28

676.0

6.0

Polymer Feed Pump Polymer Mixer

\$ 57.928

Ļ

\$ 92.928

87.6

5771101 5 4680.23 52197.77 50,19140 \$ 6,613.00 \$ 5,326.00 \$ 5,781.31 \$ 5,283.00 \$ 6,952.00 \$ 1,611.30 \$ 7,753.13 \$ 7,1860.01 \$ 6,507.20 \$ 4,962.01 \$ 6,007.50 \$ 4,702.10 2,587,83 \$ 2,687.63 130,48 671.96 2,667,83 2,687.83 | DET Table (1994) | Det Cloth | Payer Long black (1) | Det Cloth | Det Clot \$ 456.67 53.76 44 5,523.87 44

2270.70 227.07 227.07 227.07 2270.70 2270.70 2270.70 2220.70 242.50 542.65 542.65 542.65) ners (hom 2021-2031) 2007 Present Worth 326.75 326.75 326.75 326.75 46.55 46.55 53.10 53 8,161.01 3 6,161.01 3 7,549.67 3 2031 473% 338 173% 173% SOLIDS TREATMENT OMR C furth sharp WVIP heprovenents all costs based on 2007 dollars Daslyn Life Daslyn Life Charles Ras Harbiden Reta Mat Rata

ESTIMATE years (from 2011-2021)

5,000 \$/year \$5,000 Biosolids Management Program Harrisburg WWTP Improvements

Design Life

Design Condition

7/20/2007

All costs are based on 2007 dollars

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

10 2021 4.75% 3% 1.75% TABLE G-34
SOLIDS DISPOSAL OMR COSTS
Harrisburg WWTP Improvements
all costs based on 2007 dollars
Design Life
Design Condition
Interest Rate
Interest Rate
Real Interest Rate
Real Interest Rate
Real Interest Rate

years (from 2011-2021)

	Tale pige and	10100	ı	
tem	∢	Annual Cost		Present Worth
Biosolids Hauling				
Land Application	69	28,533.48	49	215.694.15
Biosolids Transport 20 mi	↔	35,666.85	69	269,617.69
Subtotal	69	64,200,33	69	485.311.84
Overhead Fees				
Transport Mobilization Fee	69	2,000.00	69	15.118.67
Subtotal	69	2,000.00	69	15,118.67
Management Program				
Lump Sum: Yearly	69	5,000.00	69	37,796.68
Subtotal	€9	5,000.00	49	37,796.68
TOTAL	ss	71,200.33	49	538,227.19

Notes:

1) Assumed solids concentration for aerobic digestion is 10%

ESTIMATE

			minare costs							
	Land Application	Biosolids Tra	Biosolids Transport 20 mi	Transportation	Transportation Mobilization Fee	Biosolids Management Program	anagement ram			
Year	Present Cost Inflated Yearly Present Cost Inflated Yearly Per Year Cost Cost Cost	Present Cost Per Year	Inflated Yearly Cost	Present Cost Per Year	Inflated Yearly Cost	Present Cost Per Year	Inflated Yearly Cost	Total Inflated Yearly Cost	Present Worth	Ę.
0	\$ 28,533.48 \$ -	\$ 35,666.85	69	\$ 2,000.00	\$	\$ 5,000.00	69	69	69	
_	\$ 29,389.48		\$ 36,736.86	8	\$ 2,060.00		\$ 5,150.00	\$ 73,336.34	\$ 70,010.83	10.8
7	\$ 30,271.17		\$ 37,838.96		\$ 2,121.80		\$ 5,304.50	\$ 75,536.43	\$ 68,841.19	41.
က	\$ 31,179.30		\$ 38,974.13		\$ 2,185.45		\$ 5,463.64	\$ 77,802.52	\$ 67,691.10	91.
4	\$ 32,114.68		\$ 40,143.35		\$ 2,251.02		\$ 5,627.54	\$ 80,136.60	\$ 66,560.22	80.
2	\$ 33,078.12		\$ 41,347.65		\$ 2,318.55		\$ 5,796.37	\$ 82,540.70	\$ 65,448.24	48.
9	\$ 34,070.47		\$ 42,588.08		\$ 2,388.10		\$ 5,970.26	\$ 85,016.92	\$ 64,354.83	54.
7	\$ 35,092.58		\$ 43,865.73		\$ 2,459.75		\$ 6,149.37	\$ 87,567.43	\$ 63,279.69	79.
00	\$ 36,145.36		\$ 45,181.70		\$ 2,533.54		\$ 6,333.85	\$ 90,194.45	\$ 62,222.51	22.
o	\$ 37,229.72		\$ 46,537.15		\$ 2,609.55		\$ 6,523.87	\$ 92,900.28	\$ 61,183.00	83.
10	\$ 38,346.61		\$ 47,933.26		\$ 2,687.83		\$ 6,719.58	\$ 95,687.29	\$ 60,160.85	80.8
								1	\$ 649,752.47	52.

TABLE G-36
SOLIDS DISPOSAL OMR COSTS
Harrisburg WWTP Improvements
and toosis based on 2007 dollars
Design Condition
Interest Rate
Inflation Rate
Inflation Rate
Real Interest Rate (adjusted for inflation)

Docion Life	7		1
ESIGN FINE	01	years	ars
Design Condition	2031	(fro	(from 2021-2031)
Interest Rate	4.75%		
Inflation Rate	3%		
Real Interest Rate (adjusted for inflation)	1.75%		
Anaero	Anaerobic Digester		
Jem Jem	Annual Cost		2007 Present Worth
Biosolids Hauling			
Land Application	\$ 23,810.08	\$ 80	196,714.55
Biosolids Transport 20 mi	\$ 29,762.60	\$ 00	245,893.18
Subtotal	\$ 53,572.68	88	442,607.73
Overhead Fees			
Transport Mobilization Fee	\$ 2,000.00	\$ 00	16,523.64
Subtotal	\$ 2,000.00	\$ 00	16,523.64
Management Program			
Lump Sum: Yearly	\$ 5,000.00	\$ 00	41,309.09
Subtotal	\$ 5,000.00	\$ 00	41,309.09
TOTAL	\$ 60,572.68	\$ 89	500,440.46
7 100			

ESTIMATE

	Land Application	Biosolids Transport 20 mi	Transportation Mobilization Fee	Biosolids Management Program	7 1	
Year	Present Cost Inflated Yearly Per Year Cost	Inflated Yearly Present Cost Inflated Yearly Cost Per Year Cost	Present Cost Inflated Yearly Per Year Cost	Present Cost Inflated Per Year Yearly Cost	Total Inflated Yearly Cost	Present Worth
0	\$ 23,810.08 \$ -	\$ 29,762.60 \$	\$ 2,000.00 \$	\$ 00.000,5	69	69
_	\$ 32,958.72	\$ 41,198.40	\$ 2,768.47	\$ 6,921.17	83,846.76	\$ 50,325.94
7	\$ 33,947.48	\$ 42,434.35	\$ 2,851.52	\$ 7,128.80	3 \$ 86,362.16	\$ 49,485.17
3	\$ 34,965.91	\$ 43,707.38	\$ 2,937.07	\$ 7,342.67	7 \$ 88,953.02	\$ 48,658,45
4	\$ 36,014.88	\$ 45,018.60	\$ 3,025.18	\$ 7,562.95	5 \$ 91,621.61	\$ 47,845.54
2	\$ 37,095.33	\$ 46,369.16	\$ 3,115.93	\$ 7,789.84	4 \$ 94,370.26	\$ 47,046.21
9	\$ 38,208.19	\$ 47,760.24	\$ 3,209.41	\$ 8,023.53	3 \$ 97,201.37	\$ 46,260.24
7	\$ 39,354.43	\$ 49,193.04	\$ 3,305.70	\$ 8,264.24	1 \$ 100,117.41	\$ 45,487.40
89	\$ 40,535.07	\$ 50,668.83	\$ 3,404.87	\$ 8,512.17	7 \$ 103,120.93	\$ 44,727.46
6	\$ 41,751.12	\$ 52,188.90	\$ 3,507.01	\$ 8,767.53	3 \$ 106,214.56	\$ 43,980.23
10	\$ 43,003.65	\$ 53,754.57	\$ 3,612.22	\$ 9,030.56	5 \$ 109,401.00	\$ 43,245.47
					· ·	\$ 467,062.12

Howard R. Green Company Project No. 604980J

ESTIMATE	years	CU2-1 202
ES	10	1004

tion & Management	Jement		
ot du Mobilize	Mobilization Fee	Biosolids Management Program	ent
5,252			
2.5 ¢/gal	1,000 \$/trip	0 a	5,000 \$/year
2		2	
3,763	\$2,000	0	\$5,000
3,573			

	ATE	Biosolids Management Program	5,000 \$/year	\$5,000
--	-----	------------------------------------	------------------	---------

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

	2015	3 968 841	340 340 00	447046066	4,113,100.00	17.00		551,250.00	29.549.11		2.045,382,21	614,808.56	3,240,989.88	3%	938 170 78	2	239,538.60 \$ 1,177,709.38	1.46
	2014	3 397 422	182 886 24	3 580 308 70	4 01.000,000,	8/		\$ 00.000,626	28.142.01		,045,382.21 \$	542,637.74 \$	3,141,161.96 \$	3%	439.146.73		239,538.60 \$	1.21
		6	6	. 6	9			9	69		5	69	8		49			
	2013	2 893 665	150 031 60	\$ 3.052,697.04	100V	17.70		47	26,801.91		\$ 2,045,382.21 \$ 2,045,382.21 \$ 2.045,382.21	478,938.87	\$ 3,051,123.00	3%	1.574.01 \$		620,400.67 \$ (201,182.14) \$ (199,608.13) \$	1.00
		69	64			,	•	Ą	69.	_			69		69		\$	
	2012	2.010 834	138 288 35	0	A70/				25,525.63 \$	41,000.00	2,045,382.21	422,717.45	2,970,705.52	%9	\$ (1,337,472.22) \$ (821,582,81) \$		(201,182.14	0.61
		69	6				•	4	69	69	69	69	63		8		69	
	2011	1,343,386	120 250 74	1.463.636.39	46%		20 020 200	321,619.61	24,310.13	41,000.00	2,045,382.21	362,536.41	2,801,108.61	802%	(1,337,472.22	u e		0.36
		6.0	65	40			6	9	69	69	69	69	65		S		45	
	2010	897,313	104.565.86	1.001,879.23	45%		240 500 00	240,020.22	23,152.50	41,000.00	į	1	310,678.72	75%	691,200.51		1,957,872.90	17.86
		69	69	149	١		6	9	69	69	69	69	69		69.		69	
	2009	599,231	90.926.84	690,157,72	44%		105 250 06	100,000,00	22,050.00	41,000.00	1	1	248,408.06	23%	441,749.66 \$		\$ 1,266,672.38 \$ 1,957,872.90 \$	11.77
		69	69	63			6	9	69.	69	69	69.	n	100	4		69	
	2008	\$ 400,070	\$ 79.066.81	69	43%		\$ 130 3EE 0E	00,000,001	\$ 21,000.00	\$ 41,000.00	69	69	\$ 165,787.19 \$ 201,366.96	%17	\$ 277,770.31		\$ 824,922.73	77.7
	2007	\$ 267,027	\$ 68,753.75	\$ 335,780.28	114%		48 228 57 \$ 104 787 40 \$ 130 365 05	01.101,101	\$ 20,000,00	\$ 41,000.00	69	69.1	\$ 165,787.19	%)-	\$ 169,993.09 \$ 277,770.31 \$		\$ 547,152.41	5.15
rst 6 months		115,850.20	40,765.31	156,615.51	40%		48 228 57	20000	32,044.75	19,909.12	1		100,182.44		56,433.07			3.83
Œ		69	69	₩-	0		65	• •	A .	٠	69	69 (59	0	4			
	2006	\$200,712.42	\$ 59,785.87	\$ 260,498.29	25%		\$ 78787.36	00000	,,	\$ 39,818.24	· 69 (**	\$178,266.02	S	\$ 82,232.27		\$377,159.32	3.07
	2005	\$ 155,049.8	\$ 52,606.	\$207,656.00	32%		\$ 59.364.64	0 400 00	1.45 \$ 5,195.92	\$ 45,725.70	, se e	, 0	\$ 108,284.26 \$	ę.	2.40 \$ 99,371.74 \$ 82,232.27			
	₩.	6.82	4.37	11.19	30%		9.12	2	54.	8.24	1	, ,	10%	2	2.40			

TABLE H-2: AMORTIZATION FOR PROPOSED SRF LOAN

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

<u>Balance</u> \$28,659,640	\$27,545,696	\$26,395,549	\$25,208,022	\$23,981,900	\$22,715,930	\$21,408,815	\$20,059,220	\$18,665,762	\$17,227,017	\$15,741,513	\$14,207,730	\$12,624,099	\$10,989,000	\$ 9,300,760	\$ 7,557,653	\$ 5,757,894	\$ 3,899,644	\$ 1,981,000	(0)	
Interest Payment 966,502	931,438	895,235	857,855	819,261	779,412	738,268	695,786	651,925	606,637	559,878	511,599	461,751	410,283	357,142	302,275	245,624	187,132	126,738	64,382	\$11,169,124
69	69	69	49	4	44	4	69	69	4	0	63	69	€9	69-	69	69	49	49	69	69
Principal Payment \$ 1,078,880	\$ 1,113,944	\$ 1,150,147	\$ 1,187,527	\$ 1,226,122	\$ 1,265,970	\$ 1,307,114	\$ 1,349,596	\$ 1,393,458	\$ 1,438,745	\$ 1,485,504	\$ 1,533,783	\$ 1,583,631	\$ 1,635,099	\$ 1,688,240	\$ 1,743,108	\$ 1,799,759	\$ 1,858,251	\$ 1,918,644	\$ 1,981,000	\$29,738,520
Total Payment \$ 2,045,382	\$ 2,045,382	\$ 2,045,382	\$ 2,045,382	\$ 2,045,382	\$ 2,045,382	\$ 2,045,382	\$ 2,045,382	\$ 2,045,382	\$ 2,045,382	\$ 2,045,382	\$ 2,045,382	\$ 2,045,382	\$ 2,045,382	\$ 2,045,382	\$ 2,045,382	\$ 2,045,382	\$ 2,045,382	\$ 2,045,382	\$ 2,045,382	\$40,907,644
\$30,705,022	\$29,591,078	\$28,440,931	\$27,253,404	\$26,027,282	\$24,761,312	\$23,454,198	\$22,104,602	\$20,711,144	\$19,272,399	\$17,786,895	\$16,253,112	\$14,669,481	\$13,034,382	\$11,346,142	\$ 9,603,035	\$ 7,803,276	\$ 5,945,026	\$ 4,026,382	\$ 2,045,382	
\$966,502	\$931,438	\$895,235	\$857,855	\$819,261	\$779,412	\$738,268	\$695,786	\$651,925	\$506,637	\$559,878	\$511,599	\$461,751	\$410,283	\$357,142	\$302,275	\$245,624	\$187,132	\$126,738	\$ 64,382	
Interest Rate 3.25%	3.25%	3.25%	3.25%	3.25%	3.25%	3.25%	3.25%	3.25%	3.25%	3.25%	3.25%	3.25%	3.25%	3.25%	3.25%	3.25%	3.25%	3.25%	3.25%	
Principal \$29,738,520	\$28,659,640	\$27,545,696	\$26,395,549	\$25,208,022	\$23,981,900	\$22,715,930	\$21,408,815	\$20,059,220	\$18,365,762	\$17,227,017	\$15,741,513	\$14,207,730	\$12,624,099	\$10,989,000	\$ 9,300,760	\$ 7,557,653	\$ 5,757,894	\$ 3,899,644	\$ 1,981,000	
Fiscal <u>Year</u> 2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	TOTAL

Table H.3. Peyenne Drojection

				able H-3	Revenue	able H-3: Revenue Projections	Suc					
	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2044	2004
Number of Accounts as of December ¹	548	727	891	1030	1190	1374	1586	1830	2110	2023	2000	61.07
Billed Water Usage (gallons)	42,165,800	51,313,400	64,318,100	75,877,265	87,258,855	75,877,265 87,258,855 100,347,683	115	132	152 616 282	175 508 725	201	3228
Rafes until August 2006								1		1,000,000	200,000,102	202,110,200
0-2000 gallons	\$16.00	\$18.00	448,00									
Over 2,000 gallons	\$19.00											
Rates Affer August 2006												
Customer Charge Revenue												
(No water included)			\$10.00	\$10.00	613 00	4000	1070	0	1			
Volume Charge Revenue			2			#10.30	951.97	\$28.50	\$37.13	\$46,41	\$47.34	\$48.05
(per 100 gallons)			\$0.20	\$0.20	\$0.26	\$0 37	60.44	20 60	77.00	C	L C	
							11.00		\$0.74	\$0.93	CR.U&	\$0.96
Projected Revenue ²		\$ 145,350	\$ 200.878	\$ 145.350 \$ 200.878 \$ 267.027	\$ 400.070	\$ 500 224	¢ 807 242	\$4 249 206	40040004	100 000 0	-	
Actual Revenue	\$ 123,277	\$ 155,050	\$ 200,712		2000	200,400		000,040,1 \$	\$2,010,034	\$ 2,695,665 \$ 5,397,422	_	\$ 3,968,841
Pronoced Date Ingress												
I lobosed Nate il ichease					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%	000	00 0	000	000	8				200
				200	0.00	00.00	0.00	0.00	0.00	0.00	0.00	00.00

Accounts for 2007 and beyond are projected. These number account for the 37 customers that do not receive sewer bills.
 Projected revenue based on the average number of customers from current year and past year to reflect growth in customers throughout the year.

Howard R. Green Company Project No. 604980J

Page 1

Confidential

Percent of Households

Race/Ethnicity

Q4A-F

3.30% 99.30% 3.00% 2.70% 3.70% 2.00%

Number considered physically/mentally challenged One or more White in household One or more Native American in household One or more Black in household One or more Hispanic in household One or more Hispanic in household One or more Asian in household One or more Asian in household

Harrisburg - INCOME SURVEY June 27, 2006

Maring - HICOMESON EL	OXVEL June 2/, 2000	20
Table Frequencies		
Total Number of households Total Number of Individuals in Households	Households	301 962
Q2A - H Income		
High Income Total Households Total Individuals	212 672	70.4%
Low to Moderate Income Total Households Total Individuals	89 290	29.6%
Percent of Individuals in Household	sehold	
Percent Individuals in High Income Household	igh Income Household	%6.69
Percent Individuals in Low to Moderate Income Households	ow to Moderate Income	30.1%
Gender		
Male Female		34.2% 65.8%
Head of Household		
Male Female		86.7% 13.3%

Income Survey

Hello, this is conducting an income survey to determine eligibility for state grant assistance. We are calling on behalf of the city of will not ask for any charitable contributions. I will not be saking 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?

How many people currently live in your household? 01:

One (skip to Q2A)	Two (skip to Q2B)	Three (skip to Q2C)	Four (skin to O2D)
_;	2,	ε,	4

Four (skip to Q2D)
Five (skip to Q2E)
Six (skip to Q2F)
Seven (skip to Q2G)
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.

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

د	×
NO.	3elov
7	_

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

Above Below

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

Above Below

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

Above Below

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

Above Below

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

Above Below

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

Above Below

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

Above Below

Male Female

Is the head of household male or female?

33

white	
considered	
are	
household	
your	
Ξ.	
persons	
many	
How	
¥	

3. 3. 3.			Alaskan Native and White?
One Two Three Frour Five Six Seven Bight or more	How many in the household are also considered Hispanic or Latino? One Two Three Frour Five Six Seven Bight or more None		How many persons in the household are considered American Indian or Alaskan Native and White? One. Two Thre Four Five Six Six Sight or more None.
One Two Three Frour Five Six Seven Bight or more None	How many in the One Two Three Four Five Six Seven Bight or more	One Two Three Four Five Six Seven Light or more	How many perso One Two Three Four Five Six Seven Eight or more None
- d 6 4 6 6 6 8 6	Q4AA: 11. 22. 23. 24. 26. 27. 27.	4 % 4 % 0 % 8 9 9 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	746 55. 7. 7. 66. 99. 88. 99. 88. 99. 88. 99. 99. 99. 99

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

1. One 2. Two 3. Three 4. Five 6. Six 7. Seven 8. Bight or more 9. None Q4C: How many persons in your household are considered Black or Africation of the properties of the pr

How many persons in your household are considered Asian and White?	One Two Three Four Five Six Seven Bight or more None	Q4DDD: How many persons in your household are also considered Hispanic or Latino? 1. One 3. Three 4. Four 5. Five 6. Six 7. Seven 7. Seven 8. Bight or more 9. None	How many persons in the household are considered Native Hawaiian or Other Pacific Islander?	One Two Three Four Five Six Six Ser Eight or more None How many persons in your household are also considered Hispanic?	One Two Three Four Five Six Sevan Eight or more	How many persons in your household are multi-racial other than specified earlier?	One Two Thre Four Five Six Sevan Eight or nore	How many persons in your household are considered physically/mentally challenged?	One Two Three Floar Floar Six Six Sight or more
Q4DD:	i こまよぶらてるら	Q4DDD 1. 2. 3. 3. 4. 4. 4. 4. 4. 4. 4. 4. 4. 4. 4. 4. 4.	Q4E:	Q4EE	i るまよよらできる	Q4F:	1.4.4.4.4.4.4.4.4.4.4.4.4.4.4.4.4.4.4.4	Ó2:	1.2.6.4.4.6.2.8
				1	_ \$ _ \$			V	4 4

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

Howard R. Green Company Project No. 604980J

Wastewater Treatment Facility Plan Harrisburg, South Dakota

APPENDIX F

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

ITEM NO.	ITEM DESCRIPTION	UNIT	QUANTITY	T I	NIT PRICE	Г	TOTAL
110.	SITE WORK		£0141111	L	THE PROPERTY OF		LOIML
1	CLEARING & GRUBBING						
2	SALVAGE TOPSOIL	LS	1.0		10,000.00	\$	10,0
3	PLACING TOPSOIL	CY	8,800		2.00	\$	17,6
4	LOCATING UTILITIES	CY	8,800	-	4.00	\$	35,2
_		EA	10	\$	500.00	\$	5,0
_	SITE WORK SUBTOTAL					\$	67,8
	EROSION CONTROL			H		_	
5	TEMPORARY SILT FENCE	LF	15,800	\$	5.00	\$	79,0
6	PERMANENT SEEDING	LB	1,925	-	12.00	\$	23,1
7	FERTILIZING	LB	7,255		1.00	\$	7,3
8	MULCHING	TON	7,233	\$	150.00	\$	
	EROSION CONTROL SUBTOTAL	I OIT	,,	a	150.00	\$	11,3
_	SURFACING						,,
	GRAVEL SURFACING	marri		_			
-		TON	30	\$	20.00	\$	60
	SURFACING SUBTOTAL			_		\$	6
	TRAFFIC CONTROL			\vdash			
10	TRAFFIC CONTROL, IN PLACE, COMPLETE	LS	1.0	0	£ 000 00	•	
	TRAFFIC CONTROL SUBTOTAL	LO	1.0	\$	5,000.00	\$	5,0 5,0
						Φ	3,0
11	SANITARY SEWER TRENCH DEWATERING						
		LS	1		200,000.00	\$	200,0
_	TRENCH STABILIZATION MATERIAL	TON	1,460		21.00	\$	30,6
14	GRANULAR INITIAL BACKFILL FOR SANITARY SEWER	TON	5,500		11.00	\$	60,5
	MH FRAME AND COVER	EA	33		350.00	\$	11,5
16	MH CONSTRUCTION PLATE MARKER	EA		\$	200.00	\$	6,6
17	MH EXTERNAL FRAME SEAL	EA	33	\$	400.00	\$	13,20
	48"ø HDPE LINED MH, IN PLACE, COMPLETE	EA	4	\$	4,500.00	\$	18,00
19	72"ø HDPE LINED MH, IN PLACE, COMPLETE	EA	10	\$	13,000.00	\$	130,00
20	84"ø HDPE LINED MH, IN PLACE, COMPLETE	EA	4	\$	17,500.00	\$	70,0
21	96"ø HDPE LINED MH, IN PLACE, COMPLETE	EA	15		22,000.00	\$	330,00
22 2	12" SAN SWR PVC PIPE SDR 35	LF	1,300		50.00	\$	65,00
23	27" SAN SWR PVC PIPE SDR 35	LF	3,900		245.00	\$	955,50
24	12" SAN SWR HOBAS PIPE 18" SAN SWR HOBAS PIPE	LF	1,500	_	340.00	\$	510,00
25	ALL EVER TO A THOUGHT IN A COURT OF THE	LF	5,900	_	415.00	\$	2,448,50
	MH EXFILTRATION\VACUUM TEST	EA		\$	300.00	\$	9,90
	SAN SWR EXFILTRATION TESTING	LF	12,600	<u> </u>	1.25	\$	15,75
-	SWR PIPE DEFLECTION TEST	LF	12,600	\$	1.00	\$	12,60
	SANITARY SEWER SUBTOTAL					\$	4,890,00
	SUBTOTAL CONSTRUCTION COSTS						
	CONTINGENCY (20%)	-		_		\$	5,084,10
	PRELIMINARY OPINION OF CONSTRUCTION COSTS					\$	1,017,00
100	CONSTRUCTION CONSTRUCTION COSTS					\$	6,101,10
F	ENGINEERING, LEGAL, CONSTRUCTION ADMINISTRATION	T (0000)		_		\$	1,220,22

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

AUGUST 2007 ITEM ITEM DESCRIPTION UNIT QUANTITY UNIT PRICE NO. TOTAL SITE WORK 1 CLEARING & GRUBBING LS 1.0 10,000.00 10,000 \$ 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 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 S 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 \$ TRENCH DEWATERING 13 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 BORE & JACK 26" STEEL CASING PIPE 18 LF 150 \$ 275.00 \$ 41,300 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%)

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

TOTAL ENGINEER'S OPINION OF PROBABLE PROJECT COST

\$

\$

569,000

3,413,000

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

ITEM NO.	ITEM DESCRIPTION	UNIT	QUANTITY	υ	NIT PRICE	Г	TOTAL
	SITE WORK	-		L		Ļ	
1	CLEARING & GRUBBING	LS	1.0	•	10 000 00	_	10.00
2	SALVAGE TOPSOIL	CY	14,355	-	,	\$	10,00
3	PLACING TOPSOIL	CY	14,355	\$		\$	28,80
4	LOCATING UTILITIES	EA	14,333	\$		\$	57,50
	SITEWORK SUBTOTAL		10	3	500.00	\$ \$	5,00
						1	101,30
5	EROSION CONTROL						
_	TEMPORARY SILT FENCE	LF	51,678			\$	258,40
6	PERMANENT SEEDING	LB	3,145	\$	12.00	\$	37,80
7	FERTILIZING	LB	11,865	\$	1.00	S	11,90
8	MULCHING	TON	178	\$	150.00	\$	26,70
_	EROSION CONTROL SUBTOTAL					\$	334,80
	SURFACING	_		_			
9	GRAVEL SURFACING	TON	49	S	20.00		1.00
	SURFACING SUBTOTAL	ION	49	2	20.00	\$	1,00
	SCHEACHIG SUBJUTAL			-		\$	1,00
	TRAFFIC CONTROL						
10	TRAFFIC CONTROL, IN PLACE, COMPLETE	LS	1.0	\$	5,000.00	S	5,00
	TRAFFIC CONTROL SUBTOTAL					\$	5,00
	SANITARY SEWER	\vdash					
11	TRENCH STABILIZATION MATERIAL	TON	1.172	-	10.10	_	
12	FORCE MAIN BEDDING MATERIAL	TON	1,163		12.50	\$	14,60
13	TRENCH DEWATERING	LS	23,255		6.50	\$	151,20
	CONNECT TO EXISTING SEWER	EA			175,000.00	\$	175,00
15	16" CL. 235 PVC AWWA C905 FORCE MAIN, F&I	LF	1.0	•	5,000.00	\$	5,00
16	FORCE MAIN FITTINGS, F&I (@ 15% OF FORCE MAIN COST)	LS	51,678		55.00	\$	2,842,30
17	26" STEEL CASING PIPE, FURNISH & INSTALL	LF			427,000.00	\$	427,000
18	BORE & JACK 26" STEEL CASING PIPE	LF	225 225	\$	175.00	\$	39,400
19	16" CL. 235 PVC AWWA C905 CARRIER PIPE	LF	225		275.00	\$	61,900
	SANITARY SEWER SUBTOTAL	LF	225	\$	100.00	\$	22,500
	THE TAXABLE OF THE CONTROL OF THE CO					2	3,738,900
	SUBTOTAL CONSTRUCTION COSTS					\$	4,181,000
	CONTINGENCY (20%)					\$	837,000
	PRELIMINARY OPINION OF CONSTRUCTION COSTS			Ξ		\$	5,018,000
ł	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	U	NIT PRICE		TOTAL
1101	SITE WORK			_		L	
1	CLEARING & GRUBBING	LS	1.0	S	10,000.00	\$	10,000
2	SALVAGE TOPSOIL	CY	556		2.00	S	1,200
3	PLACING TOPSOIL	CY	556		4.00	\$	2,300
4	ROCK EXCAVATION	CY	290	_	180.00	S	52,20
	SITEWORK SUBTOTAL		250	4	180.00	\$	65,700
	EROSION CONTROL					L	
5	TEMPORARY SILT FENCE	LF	4,000	\$	5.00	\$	20,000
6	PERMANENT SEEDING	LB	125	\$	12.00	S	1,50
7	FERTILIZING	LB	475	\$	1.00	\$	50
8	MULCHING	TON	7	\$	150.00	\$	1,10
_	EROSION CONTROL SUBTOTAL			Ì		\$	23,10
	SANITARY SEWER						
9	COFFER DAM, FLOW BYPASS, IMPERVIOUS MATERIAL	LS	1		\$80,000.00	\$	80,000
10	TRENCH STABILIZATION MATERIAL	TON	75	\$	12.50	\$	1,00
11	FORCE MAIN BEDDING MATERIAL	TON	240	\$	6.50	\$	1,60
12	TRENCH DEWATERING	LS	1.0	\$	175,000.00	S	175,000
13	CONNECT TO EXISTING SEWER	EA	2.0	\$	1,000.00	S	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					S	645,300
	ENGINEERING, LEGAL, CONSTRUCTION ADMINISTRATION (20%)					\$	130,000
	TOTAL ENGINEER'S OPINION OF PROBABLE PROJECT COST					S	775,000

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

SEPTEMBER 2007

NO.	ITEM DESCRIPTION	UNIT	QUANTIT Y	Ui	NIT PRICE		TOTAL
	EARTHWORK					H	
1	EXCAVATION	CY	13,993	S	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			-		\vdash	
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 THROUG	H 5					
	SUBTOTAL CONSTRUCTION COSTS			-		\$	205,000
	CONTINGENCY (20%)					\$	41,000
	PRELIMINARY OPINION OF CONSTRUCTION COSTS					\$	246,000
	ENGINEERING, LEGAL, CONSTRUCTION ADMINISTRATION	ON (209	%)			\$	50,000
	TOTAL ENGINEER'S OPINION OF PROBABLE PROJEC	T COS	T			\$	296,000

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

ITEM NO.	ITEM DESCRIPTION	UNIT	QUANTITY	υ	NIT PRICE	Г	TOTAL
	EARTHWORK			-		⊨	_
1	EXCAVATION	CY	170,754	S	5.00	s	853,800
2	FILL AND COMPACT	CY	170,754		5.00	s	853,800
3	HAUL, FILL AND COMPACT	CY	16,944		10.00	\$	169,500
	EARTHWORK SUBTOTAL		20,211		10.00	-	1,707,600
	ODOR CONTROL					-	
4	AERATORS	EA	30	\$	10,000.00	S	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	S	100,000
	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					S	2,307,600
1	CONTINGENCY (20%)					S	462,000
	PRELIMINARY OPINION OF CONSTRUCTION COSTS						2,769,600
į	ENGINEERING, LEGAL, CONSTRUCTION ADMINISTRATIO	N (20%	6)			\$	554,000
	TOTAL ENGINEER'S OPINION OF PROBABLE PROJECT	rcos	r	_			3,324,000

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

AT	CI	CT	20	07

rames -	AUGUST 200	7					
ITEM NO.	ITEM DESCRIPTION	UNIT	QUANTITY	υ	NIT PRICE	Γ	TOTAL
	SITE WORK	-		-		1	
1	CLEARING & GRUBBING			L		┖	
2		LS	1.0		10,000.00	\$	
3	DEWATERING	LS		\$	30,000.00	\$	30,000
	L.S. & WETWELL EXCAVATION	CY	23,200		5.00	\$	116,00
4	STRUCTURAL FILL	CY	33,900	\$	5.00	\$	169,50
5	CRUSHED ROCK UNDER WET WELL & VALVE VAULT	TON	250	\$	25.00	\$	6,30
6	ASPHALT SURFACING	LS	1.0	\$	60,000.00	\$	60,00
	LANDSCAPING	LS	1.0	S	10,000.00	1 8	10,00
8	FENCING	LS		\$	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		2,040	۳	23.00	S	487,800
	Y YORK ORD LOWON, AND AVERTAIN THE					Ĺ	
11	LIFT STATION AND WETWELL						
11	REINFORCED CONCRETE BOTTOM SLAB	CY	150.0		400.00	\$	60,000
	REINFORCED CONCRETE TOP SLAB	CY	80.0	\$	1,200.00	\$	96,000
	REINFORCED CONCRETE WALLS	CY	332.0	\$	700.00	\$	232,400
	FILLABLE CONCRETE	CY	5.0		200.00	\$	1,000
15	ENTRANCE & EQUIPMENT HATCH	LS	1.0	-	10,000.00	\$	10,000
	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	LO	1.0	3	40,000.00	S	444,400
	WYVE STOR A NOW WARRING TO					Ť	,
	PUMPS AND PIPING NON CLOG PUMPS & VFD'S	7.4					
19	16" D.I. FLANGED PIPE (PROCESS)	EA	2.0		105,000.00	\$	210,000
		LS	1.0		15,000.00	\$	15,000
	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
-1	BUILDING			_			
	PRECAST ROOF SYSTEM	SF	1405		15.00		
	MASONRY BUILDING (BRICK & BLOCK)		1405	\$	15.00	\$	22,000
26	METALS (STAIRS, HANDRAILS, ETC)	SF	1405	\$	40.00	\$	57,000
27	THERMAL & MOISTURE PROTECTION	SF	1405	\$	12.00	\$	17,000
		SF	1405	\$	15.00	\$	22,000
	DOORS & WINDOWS	SF	1405	\$	25.00	\$	36,000
-	PAINTING	LS	1.0	\$	75,000.00	\$	75,000
30	PLUMBING	LS	1.0	S	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
	HOIST/MONORAIL	EA	1.0			_	
	SURGE TANK			_	25,000.00	\$	25,000
_	ODOR CONTROL UNIT	LS	1.0		40,000.00	\$	40,000
2.6		LS	1.0		100,000.00	\$	100,000
	GENERATOR	LS	1.0		340,000.00	\$	340,000
	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
\dashv	TOTAL ITEMS 1 THROUG	H 30				_	
	TOTALITEMS I THROUG	M JY		_			
	SUBTOTAL CONSTRUCTION COSTS					\$	2,676,200
Į.	CONTINGENCY (20%)					\$	536,000
l li	PRELIMINARY OPINION OF CONSTRUCTION COSTS			_		_	3,212,200
ħ	ENGINEERING, LEGAL, CONSTRUCTION ADMINISTRATION	N (200	a .	_		-	
- 19	TOTAL ENGINEER'S OPINION OF PROBABLE PROJEC	21 (20%)	n e	_		\$	643,000 3,855,000
	IOTAL KNGINKKKS OPINION OF DRODABLE PRATEC						

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

AUGUST 2007

יי גיעיר	AUGUST 200	/		_		_	
TEM NO.	ITEM DESCRIPTION	UNIT	QUANTITY	U	NIT PRICE		TOTAL
	SITE WORK	-		_		┡	
1	CLEARING & GRUBBING	1.0		-	40.00	1	
2	DEWATERING	LS		\$	10,000.00	\$	10,0
		LS		\$	30,000.00	\$	30,0
3	L.S. & WETWELL EXCAVATION	CY	25,000	_	5.00	\$	125,0
4	STRUCTURAL FILL	CY	36,600		5.00	\$	183,0
5	CRUSHED ROCK UNDER WET WELL & VALVE VAULT	TON	295	\$	25.00	\$	7,4
6	ASPHALT SURFACING	LS	1.0	\$	60,000.00	\$	60,0
7	LANDSCAPING	LS	1.0	\$	10,000.00	\$	10,0
8	FENCING	LS	1.0	\$	15,000.00	\$	15,0
9	GATE	EA	1.0	\$	5,000.00	\$	5,0
10	WATER SERVICE	LF	2,640	_	25.00	\$	66,0
	SITE WORK SUBTOTAL			Ť	25100	\$	511,4
_	LIFT STATION AND WETWELL						
11	REINFORCED CONCRETE BOTTOM SLAB	CXC	100.0		100.00	_	
12	REINFORCED CONCRETE TOP SLAB	CY	180.0	_	400.00	\$	72,0
	VERNLOYCED CONCRETE TOL STAR	CY	95.0	_	1,200.00	\$	114,0
	REINFORCED CONCRETE WALLS	CY	440.0		700.00	\$	308,0
14	FILLABLE CONCRETE	CY	5.0		200.00	\$	1,0
	ENTRANCE & EQUIPMENT HATCH	LS	1.0	\$	10,000.00	\$	10,0
	ENTRANCE LADDER	EA	1.0	\$	5,000.00	\$	5,0
17	SLUICE & STOP GATES	LS	1.0	_	40,000.00	\$	40,0
	LIFT STATION & WETWELL SUBTOTAL					\$	550,0
	PUMPS AND PIPING						
	4 - NON CLOG PUMPS (2 IN SERIES) & VFD'S	LS	1.0	6	250 000 00	6	250.0
19	16" D.I. FLANGED PIPE (PROCESS)	LS	1.0	\$	350,000.00	\$	350,0
	PPE FITTINGS (PROCESS)		1.0	-	20,000.00	\$	20,0
	VALVES (PROCESS)	LS	1.0		15,000.00	\$	15,0
		LS	1.0		125,000.00	\$	125,0
23	SUMP PUMP & ASSOCIATED PIPING	LS	1.0	\$	1,500.00	\$	1,5
23	WATER AND PUMPING TESTS	LS	1.0	\$	2,500.00	\$	2,5
	PUMPS AND PIPING SUBTOTAL					\$	514,0
	BUILDING						
	PRECAST ROOF SYSTEM	SF	1705	\$	15.00	\$	26,0
25	MASONRY BUILDING (BRICK & BLOCK)	SF	1705	\$	40.00	S	69,0
26	METALS (STAIRS, HANDRAILS, ETC)	SF	1705		12.00	\$	21,0
27	THERMAL & MOISTURE PROTECTION	SF	1705		15.00	\$	26,0
	DOORS & WINDOWS	SF	1705	_	25.00	_	
_	PAINTING	LS		-		\$	43,0
	PLUMBING		1.0	\$	75,000.00	\$	75,0
	HVAC	LS	1.0		85,000.00	\$	85,0
		LS	1.0	\$	165,000.00	\$	165,0
32	ELECTRICAL (NON-EQUIPMENT)	LS	1.0	\$	286,000.00	\$	286,0
	HOIST/MONORAIL	EA	1.0	_	25,000.00	\$	25,0
	SURGE TANK	LS	1.0		40,000.00	\$	40,0
	ODOR CONTROL UNIT	LS	1.0	\$	100,000.00	\$	100,0
	GENERATOR	LS	1.0	_	441,000.00	\$	441,0
	INSTRUMENTATION AND CONTROL SYSTEM	LS	1.0		121,000.00	\$	121,0
38	MAG METER	LS	1.0		7,000.00	\$	7,0
-	BUILDING SUBTOTAL					\$	1,530,0
	SCREENING			_			
39	MECHANICAL BAR SCREEN	LS	1.0	S	175,000.00	\$	175,0
	SCREENING SUBTOTAL			_	170,000.00	\$	175,0
4	MONITY YEAR OLD THE COLUMN TO A SECOND COLUMN TO A						
+	TOTAL ITEMS 1 THROUG	H 39					
\neg	SUBTOTAL CONSTRUCTION COSTS			-		\$	3,280,4
	CONTINGENCY (20%)			_			
	PRELIMINARY OPINION OF CONSTRUCTION COSTS	_		_		\$	657,0
H	ENGINEERING, LEGAL, CONSTRUCTION ADMINISTRATION	AT /00-	· · · · · · · · · · · · · · · · · · ·				3,937,4
ŀ	TOTAL ENGINEER'S OPINION OF PROBABLE PROJEC	1N (20%	0)			\$	788,0
	ILLIAL BINGHIEREN OPINION OR PROBARTE PROTECT	I COST			1	\$.	4,725,0

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	QUANTIT Y	U	NIT PRICE	7	TOTAL
	PUMPS AND PIPING	İ					
1	PUMP REPLACEMENT	EA	2.0	S	232,000.00	S	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	S	70,000
	BUILDING SUBTOTAL					\$	70,000
	TOTAL ITEMS 1 THROUG	Н 3		_			
	SUBTOTAL CONSTRUCTION COSTS			-		\$	536,500
	CONTINGENCY (20%)					\$	108,000
	PRELIMINARY OPINION OF CONSTRUCTION COSTS				\$	644,500	
	ENGINEERING, LEGAL, CONSTRUCTION ADMINISTRATION					\$	129,000
	TOTAL ENGINEER'S OPINION OF PROBABLE PROJECT	T COS	ST			S	774,000

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

AUGUST 2007

ITEM	YELM DESCRIPTION						_
NO.	ITEM DESCRIPTION	UNIT	QUANTITY	U	NIT PRICE	ı	TOTAL
	PUMPS AND PIPING	Î					
1	PUMP REPLACEMENT	EA	4.0	S	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					H	
3	ELECTRICAL & CONTROLS UPGRADE	LS	1.0	\$	110.000.00	\$	110,000
-	BUILDING SUBTOTAL					\$	110,000
	TOTAL ITEMS 1 THROU	GH 3					
	SUBTOTAL CONSTRUCTION COSTS			-		S	824,500
	CONTINGENCY (20%)					\$	165,000
	PRELIMINARY OPINION OF CONSTRUCTION COSTS					\$	989,500
	ENGINEERING, LEGAL, CONSTRUCTION ADMINISTRATION					\$	198,000
	TOTAL ENGINEER'S OPINION OF PROBABLE PROJEC	T COS	T			\$	1,188,000

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	1 04	Ψ 0,500.00	φ0,500
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 \$15,000
Misc. Metals	1 ea	\$ 5,000.00	\$5,000
Slide Gates	1 ea	\$ 8,000.00	
Stop Plates	3 ea	\$ 2,500.00	\$8,000 \$7,500
Painting	1 Lump Sum	\$ 15,000.00	\$7,500 \$15,000
Flowmeter-Parshall Flume	1 ea	\$ 7,000.00	\$15,000
Headworks Structure	1 Ca	φ 7,000.00	\$7,000
Slabs	128 cu yds	\$ 400.00	¢E4 200
Walls	58 cu yds	\$ 700.00	\$51,200 \$40,600
Excavation	930 cu yds	\$ 700.00	\$40,600
Structural Backfill	350 cu yds	\$ 26.00	\$7,440 \$0,400
Backfill	350 cu yds	\$ 12.00	\$9,100
Misc. Metals	1 Lump Sum	\$ 15,000.00	\$4,200 \$4,500
Superstructure	1500 sq ft	\$ 70.00	\$15,000
HVAC	Lump Sum	15%	\$105,000
Plumbing	Lump Sum	15%	\$35,000
Equipment Installation	Lump Sum	20%	\$35,000
Electrical	Lump Sum	15%	\$45,700
Instrumentation & Controls	Lump Sum	5%	\$83,000
	Lump Sum	Subtotal =	\$28,000
BIOLOGICAL TREATMENT SPLITTER STRUCTURE		Subiolal -	\$776,800
Structure	Lump Sum		\$38,350
Process	Lamp Cam		ψ30,330
Pipe	Lump Sum		\$13,700
Stop Plates	3 ea	\$ 800.00	\$13,700 \$2,400
Excavation	500 cu yds	\$ 8.00	\$2,400 \$4,000
Structural Backfill	70 cu yds	\$ 26.00	\$4,000 \$1,820
Backfill	1000 cu yds	\$ 12.00	\$1,020 \$12,000
	. Joo ou yus	Subtotal=	
		oubtotal-	\$72,270

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

SBR - BIOLOGICAL TREATMENT			
Structure			
Slab/footing	941 cu yd	\$ 400.00	070 400
Walls	•	·	\$376,400
Excavation	780 cu yd		\$546,000
Backfill	6750 cu yd	\$ 8.00	\$54,000
Structural Backfill	2378 cu yd	\$ 12.00	\$28,536
Miscellaneous Structure	941 cu yd	\$ 26.00	\$24,466
	Lump Sum	4%	\$41,176
Process	4.1	A-	*
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			+=00,011
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	•	\$ 50,000.00	
Electrical	1 Lump Sum	•	\$50,000 \$145,000
Instrumentation & Controls		14%	\$145,000
monumentation & Controls		5%	\$52,000
		Subtotal =	\$1,232,920

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	. —.	4 00,000.00	Ψου,ουυ
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

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	109	%	\$622,388
Subtotal			\$6,846,270
GENERAL REQUIREMENTS	109	\$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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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	•
Grit Removal Equipment	- Ju	Ψ	0,000.00	\$0 \$0
Structure				\$0 \$0
Slabs	0 cu yds	\$	400.00	\$0 \$0
Channel/Foundation Walls	0 cu yds	\$	700.00	\$0 \$0
Vortex Chamber Walls	0 cu yds	\$	1,000.00	\$0 \$0
Excavation	0 cu yds	\$	8.00	\$0 \$0
Structural Backfill	0 cu yds	\$	26.00	\$0 \$0
Backfill	0 cu yds	\$	12.00	\$0 \$0
Grit Equipment (Vortex/Classifier)	1 ea	\$	150,000.00	\$150,000
Grit Pumps	1 ea	\$	15,000.00	\$150,000 \$15,000
Process Piping	1 Lump Sum	\$	15,000.00	\$15,000 \$15,000
Misc. Metals	1 ea	\$	5,000.00	\$5,000 \$5,000
Slide Gates	1 ea	\$	8,000.00	\$8,000
Stop Plates	3 ea	\$	2,500.00	\$7,500 \$7,500
Painting	1 Lump Sum	\$	15,000.00	\$15,000
Flowmeter-Parshall Flume	0 ea	\$	7,000.00	\$15,000 \$0
Headworks Structure	3 3 4	Ψ	7,000.00	\$0 \$0
Slabs	0 cu yds	\$	400.00	\$0 \$0
Walls	0 cu yds	\$	700.00	\$0 \$0
Excavation	0 cu yds	\$	8.00	\$0 \$0
Structural Backfill	0 cu yds	\$	26.00	\$0 \$0
Backfill	0 cu yds	\$	12.00	\$0 \$0
Misc. Metals	1 Lump Sum	\$	15,000.00	\$15,000
Superstructure	0 sq ft	\$	70.00	\$13,000 \$0
HVAC	Lump Sum	Ψ	0%	\$0 \$0
Plumbing	Lump Sum		15%	\$2,000
Equipment Installation	Lump Sum		20%	\$43,000
Electrical	Lump Sum		15%	\$42,000 \$42,000
Instrumentation & Controls	Lump Sum		5%	\$14,000
		Suh	ototal =	\$381,500
		- 310		Ψοσ 1,000

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		Ψ	12.00	Ψ24,530 \$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		Ψ	0,000.00	\$0 \$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	Ψ	20%	\$73,800
Electrical	Lump Sum		15%	\$178,000
Instrumentation & Controls	Lump Sum		5%	\$59,000
		Sul	ototal=	\$1,494,422
		-		Ψ1, το τ, τεε
PRIMARY CLARIFIER SPLITTER STRUCTURE				
Structure	1 Lump Sum	\$	38,350.00	\$38,350
Process		*	00,000.00	\$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
	•		ototal=	\$74,170
				Ψ· 1,110

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

BIOLOGICAL TREATMENT SPLITTER STRUCTURE				
Structure	1 Lump Sum		\$38,350	\$38,350
Process	,		, ,	400,000
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
	·	Su	btotal =	\$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
		Sul	btotal =	\$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%	i .	\$0
Instrumentation & Controls		4%		\$0
		Sul	ototal =	\$0

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	\$20,000
New Digestion Facilities	2 Ga	φ	5,000.00	\$10,000
Dual-fuel Boiler	2 ea	dr.	400 000 00	\$0
Heat Exchanger	2 64	\$	100,000.00	\$200,000
Recirculation Pumps		\$	20,000.00	\$40,000
Equipment Building	1	\$	30,000.00	\$30,000
Waste Gas Burner, Piping, & Controls	1	\$	62,500.00	\$62,500
Primary Digester Mixing System	1 Lump Sum	\$	100,000.00	\$100,000
Primary Digester Mixing System Primary Digester Covers-fixed	1 ea	\$	75,000.00	\$75,000
	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
THOUSE WHO CONTROL OF THE PROPERTY OF THE PROP		Sul	btotal =	\$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			,	40
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 \$0
Slab	0 cu yds	\$	400.00	\$0 \$0
Misc Concrete	0 cu yds	\$	700.00	\$0 \$0
Excavation	0 cu yds	\$	8.00	\$0 \$0
Structural Backfill	0 cu yds	\$	26.00	
Backfill	0 cu yds	\$	12.00	\$0 \$0
WAS Holding Tank	0 Lump Sum			\$0 \$0
Excavation	0 cu yds	\$	15,000.00	\$0
Backfill	0 cu yds	\$	8.00	\$0
Structural Backfill	•	\$	12.00	\$0
Walls	0 cu yds	\$ \$	26.00	\$0
Slab	0 cu yds	\$	700.00	\$0
Roofing	0 cu yds	\$	400.00	\$0
HVAC	0 sq ft	\$	100.00	\$0
Plumbing			6%	\$15,800
r rambing			7%	\$18,700

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

Electrical			12%	¢24 400
Instrumentation & Controls				\$34,400
model another a congress			6%_	\$17,200
NEW CONTROL BUILDING		Sub	ototal =	\$373,100
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	
Finishes	0 Lump Sum			\$0
Electrical Modifications	o cump sum	\$	10,000.00	\$0
		10%		\$0
Instrumentation & Controls		8%		\$0
		Sub	ototal =	\$0
Subtotal				\$5,276,862
SITEWORK	109	%		\$527,686
Subtotal	107			\$5,804,548
GENERAL REQUIREMENTS	400	17		
Subtotal	109	70		\$580,000
				\$6,384,548
CONTINGENCY	20%		\$1,277,000	
Opinion of Probable Construction Cost				\$7,661,548

^{*} Based on 2007 costs

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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	d-	E0 000 00	A 50.000
Sampler	1 ea	\$ \$	50,000.00	\$50,000
Grit Removal Equipment	ı ca	Ф	6,500.00	\$6,500
Structure				
Slabs	28 cu yds	œ.	400.00	* 44.000
Channel/Foundation Walls	21 cu yds	\$	400.00	\$11,200
Vortex Chamber Walls	6 cu yds	\$	700.00	\$14,700
Excavation	500 cu yds	\$	1,000.00	\$6,000
Structural Backfill	20 cu yds	\$ \$	8.00	\$4,000
Backfill	175 cu yds		26.00	\$520
Grit Equipment (Vortex/Classifier)	1 ea	\$	12.00	\$2,100
Grit Pumps	1 ea	\$	150,000.00	\$150,000
Process Piping	1 Lump Sum	\$	15,000.00	\$15,000
Misc. Metals	1 ea	\$	15,000.00	\$15,000
Slide Gates	1 ea	\$	5,000.00	\$5,000
Stop Plates	3 ea	\$	8,000.00	\$8,000
Painting		\$	2,500.00	\$7,500
Flowmeter-Parshall Flume	1 Lump Sum	\$	15,000.00	\$15,000
Headworks Structure	1 ea	\$	7,000.00	\$7,000
Slabs	400			
Walls	128 cu yds	\$	400.00	\$51,200
Excavation	58 cu yds	\$	700.00	\$40,600
Structural Backfill	930 cu yds	\$	8.00	\$7,440
Backfill	350 cu yds	\$	26.00	\$9,100
Misc. Metals	350 cu yds	\$	12.00	\$4,200
Superstructure	1 Lump Sum	\$	15,000.00	\$15,000
HVAC	1500 sq ft	\$	70.00	\$105,000
Plumbing	Lump Sum		15%	\$35,000
Equipment Installation	Lump Sum		15%	\$35,000
Electrical	Lump Sum		20%	\$45,700
Instrumentation & Controls	Lump Sum		15%	\$83,000
monumentation & Controls	Lump Sum		5%	\$28,000
BIOLOGICAL TREATMENT SPLITTER STRUCTURE		Sub	total =	\$776,800
Structure	1			
Process	Lump Sum			\$38,350
Pipe	L			
Stop Plates	Lump Sum			\$13,700
Excavation	3 ea	\$	800.00	\$2,400
Structural Backfill	500 cu yds	\$	8.00	\$4,000
Backfill	70 cu yds	\$	26.00	\$1,820
	1000 cu yds	\$	12.00	\$12,000
		Sub	total=	\$72,270

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

- Walland Wolfer	ridage Alternative 20	41 G0	instruction Cos	ts
CONVENTIONAL AS - BIOLOGICAL TREATMENT				
Structure				
Slab/footing	0050			
Walls	905.2 cu yd	\$	400.00	\$362,080
Excavation	566.6 cu yd	\$	700.00	\$396,620
	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
	ţ	Su	btotal =	\$1,477,521
SECONDARY CLARIFIER SPLITTER STRUCTURE			Stole)	Ψ1,777,021
Structure	Lump Sum			\$38,350
Process	Lump Oum			\$30,33U
Pipe	Lump Sum			649 700
Stop Plates	3 ea	\$	900.00	\$13,700
Excavation	500 cu yds		800.00	\$2,400
Structural Backfill	70 cu yds	\$	8.00	\$4,000
Backfill		\$	26.00	\$1,820
	1000 cu yds	\$	12.00 _	\$12,000
SECONDARY CLARIFIER		Sui	ototal=	\$72,270
Clarifier Structure				
Concrete Structures	4.1.			
Miscellaneous Structures	1 Lump Sum	\$	375,000.00	\$375,000
Secondary Solids Handling	1 Lump Sum	\$	40,000.00	\$40,000
Incl. WAS, RAS, scum, structures Process	1 Lump Sum	\$1,000,000.00		\$1,000,000
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
		Sub	ototal=	\$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		•	-,	40,000
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	
Metals (handrail, grating, stairs)	1 Lump Sum	\$		\$306 \$30,000
Electrical	r Lump Sunt	ъ 8%	20,000.00	\$20,000
Instrumentation & Controls				\$14,000
- Control		4%	4-4-1	\$7,000
		Sub	total =	\$193,514

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

	and the state of t	V21 00	instruction co:	313
AEROBIC DIGESTION				
Existing Digestion Facilities				
Primary Digester Concrete				
Walls	795 cu yds	\$	700.00	\$556,500
Slab	435 cu yds	\$	400.00	
Excavation	4620 cu yds	\$		\$174,000
Backfill	1960 cu yds	\$	8.00 12.00	\$36,960
Structural Backfill	190 cu yds	φ \$		\$23,520
125 hp Blowers	2 ea	\$	26.00	\$4,940
Diffusers and Piping	1 Lump Sum		75,000.00	\$150,000
Process Pipe and Fittings	1 Lump Sum		40,000.00	\$40,000
Electrical	r Lamp Sum	Ф	50,000.00	\$50,000
Instrumentation & Controls			14%	\$145,000
montanion & Controls		0	5%_	\$52,000
THICKENING/DEWATERING BUILDING		Su	btotal =	\$1,232,920
RDT	0 = 4	Φ.	400 000 00	A -
RDT Feed Pumps	0 EA	\$	182,000.00	\$0
RDT-to-Digester Feed Pumps	0 EA	\$	20,000.00	\$0
Polymer Feed Unit	0 EA	\$	25,000.00	\$0
BFP	1 EA	\$	15,000.00	\$15,000
BFP Feed Pumps	1 EA	\$	300,000.00	\$300,000
Conveyor	2 EA	\$	20,000.00	\$40,000
Process	1 EA	\$	60,000.00	\$60,000
Piping	4.1			
Valves	1 Lump Sum	\$	20,000.00	\$20,000
Structure	1 Lump Sum	\$	15,000.00	\$15,000
Footing	1800 sq ft	\$	150.00	\$270,000
Slab	30 cu yds	\$	400.00	\$12,000
Misc Concrete	35 cu yds	\$	400.00	\$14,000
Excavation	10 cu yds	\$	700.00	\$7,000
Structural Backfill	100 cu yds	\$	8.00	\$800
Backfill	35 cu yds	\$	26.00	\$900
WAS Holding Tank	100 cu yds	\$	12.00	\$1,200
Excavation	1 Lump Sum	\$	15,000.00	\$15,000
Backfill	1400 cu yds	\$	8.00	\$11,200
	500 cu yds	\$	12.00	\$6,000
Structural Backfill Walls	250 cu yds	\$	26.00	\$6,500
Slab	130 cu yds	\$	700.00	\$91,000
	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
		Sub	ototal =	\$1,489,300

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
		Sub	total =	\$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		Ψ 0,000.00	\$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 sqft	\$ 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
			•

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

PRIMARY CLARIFIER			
Structure			
Walls	376 cu yds	\$ 700.00	then ann
Slab	528 cu yds	\$ 400.00	\$263,200
Misc concrete	55 cu yds	\$ 700.00	\$211,200
Excavation	4647 cu yds	\$ 700.00	\$38,500
Structural Backfill	715 cu yds	\$ 26.00	\$37,176
Backfill	2033 cu yds		\$18,590
Pump Structure	2000 ca yas	\$ 12.00	\$24,396
Walls	80 cu yds	\$ 700.00	\$0
Slab	50 cu yds		\$56,000
Suspended Slab	50 cu yds		\$20,000
Misc Metals	3 ea	\$ 700.00 \$ 5,000.00	\$35,000
Primary Sludge Pumps	3 ea		\$15,000
Piping & Valves	1 Lump	\$ 15,000.00	\$45,000
Misc Metals	3 ea	\$ 20,000.00	\$20,000
Process	o ea	\$ 5,000.00	\$15,000
4" Pipe	30 lin ft	Φ 0400	\$0
6" Pipe	135 lin ft	\$ 24.00	\$720
18" Pipe	135 lin ft	\$ 36.00	\$4,860
Concrete Encasement		\$ 108.00	\$14,580
Mechanisms	270 lin ft	\$ 20.00	\$5,400
Weirs & Baffles	3 ea	\$100,000.00	\$300,000
Scum Pumping Structures	3 ea	\$ 8,000.00	\$24,000
Painting	3 ea	\$ 5,000.00	\$15,000
Equipment Installation	1 Lump Sum	\$ 20,000.00	\$20,000
Electrical	Lump Sum	20%	\$73,800
Instrumentation & Controls	Lump Sum	15%	\$178,000
modulientation & Controls	Lump Sum	5%	\$59,000
		Subtotal=	\$1,494,422
PRIMARY CLARIFIER SPLITTER STRUCTURE			
Structure	4.1	. .	
Process	1 Lump Sum	\$ 38,350.00	\$38,350
Pipe			\$0
Slide Gates	Lump Sum		\$0
Excavation	3 ea	\$ 6,000.00	\$18,000
Structural Backfill	500 cu yds	\$ 8.00	\$4,000
Backfill	70 cu yds	\$ 26.00	\$1,820
Sagran	1000 cu yds	\$ 12.00	\$12,000
		Subtotal=	\$74,170

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

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

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

SECONDARY CLARIFIER Clarifier Structure			
Concrete Structures	4.1		
Miscellaneous Structures	1 Lump Sum	\$200,000.00	\$200,000
Secondary Solids Handling	1 Lump Sum	\$ 10,000.00	\$10,000
Incl. WAS, RAS, scum, structures	4.1	•	
Process	1 Lump Sum	\$ -	\$0
Equipment (incl. installation)	4.1	0.400.000.00	
Piping	1 Lump Sum	\$130,000.00	\$130,000
Electrical	1 Lump Sum	\$ 10,000.00	\$10,000
Instrumentation & Controls	Lump Sum	10%	\$35,000
on a contract of	Lump Sum	4%_	\$14,000
EFFLUENT/DISINFECTION STRUCTURE		Subtotal≕	\$399,000
Flowmeter-Parshall Flume	0 ea	ф 7 000 оо	
Sampler		\$ 7,000.00	\$0
UV Equipment	0 ea	\$ 8,000.00	\$0
Sluice Gate	1 Lump Sum 0 ea	\$ 60,000.00	\$60,000
Structure		\$ 8,000.00	\$0
Electrical	0 Lump Sum	\$ 30,000.00	\$0
Instrumentation & Controls		8%	\$5,000
		4%	\$2,000
ANAEROBIC DIGESTION CONVERSION		Subtotal =	\$67,000
Existing Digestion Facilities			
Selective Demolition			
Aeration System	1 Lump Sum	¢ 00 000 00	
Digester Cleaning	2 ea	\$ 20,000.00	\$20,000
New Digestion Facilities	2 C a	\$ 5,000.00	\$10,000
Dual-fuel Boiler	2 ea	£400,000,00	\$0
Heat Exchanger	2 ea	\$100,000.00	\$200,000
Recirculation Pumps	1 ea	\$ 20,000.00	\$40,000
Equipment Building	1 ea	\$ 30,000.00	\$30,000
Waste Gas Burner, Piping, & Controls	1 Lump Sum	\$ 62,500.00	\$62,500
Primary Digester Mixing System	1 ea	\$100,000.00	\$100,000
Primary Digester Covers-fixed	1 ea	\$ 75,000.00	\$75,000
Secondary Digester Cover-floating	1 ea	\$125,000.00	\$125,000
Process Pipe and Fittings	1 Lump Sum	\$200,000.00	\$200,000
Electrical	r Lump Sum	\$ 25,000.00	\$25,000
Instrumentation & Controls		14%	\$120,000
		5%	\$43,000
		Subtotal =	\$1,050,500

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

THICKENING/DEWATERING BUILDING			
RDT	1 EA	\$182,000.00	¢102 000
RDT Feed Pumps	2 EA	\$ 20,000.00	\$182,000 \$40,000
RDT-to-Digester Feed Pumps	2 EA	\$ 25,000.00	\$50,000
Polymer Feed Unit	1 EA	\$ 15,000.00	
BFP	0 EA	\$300,000.00	\$15,000
BFP Feed Pumps	0 EA	\$ 20,000.00	\$0 \$0
Conveyor	0 EA	\$ 60,000.00	\$0 \$0
Process	0	\$ 00,000,00	\$0
Piping	0 Lump Sum	ቀ 20.000.00	**
Valves	0 Lump Sum	\$ 20,000.00	\$0
Structure	•	\$ 15,000.00	\$0
Footing	0 sq ft	\$ 150.00	\$0
Slab	0 cu yds 0 cu yds	\$ 400.00	\$0
Misc Concrete		\$ 400.00	\$0
Excavation	0 cu yds	\$ 700.00	\$0 ,
Structural Backfill	0 cu yds	\$ 8.00	\$0
Backfill	0 cu yds	\$ 26.00	\$0
WAS Holding Tank	0 cu yds	\$ 12.00	\$0
Excavation	0 Lump Sum	\$ 15,000.00	\$0
Backfill	0 cu yds	\$ 8.00	\$0
Structural Backfill	0 cu yds	\$ 12.00	\$0
Walls	0 cu yds	\$ 26.00	\$0
Slab	0 cu yds	\$ 700.00	\$0
Roofing	0 cu yds	\$ 400.00	\$0
HVAC	0 sq ft	\$ 100.00	\$0
Plumbing		6%	\$15,800
Electrical		7%	\$18,700
		12%	\$34,400
Instrumentation & Controls		6%	\$17,200
NEW CONTROL BUILDING		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
C.M. I.I.		Subtotal =	\$0
Subtotal			\$3,971,692
SITEWORK	109	6	\$397,169
Subtotal Security States			\$4,368,861
GENERAL REQUIREMENTS	10%	6	\$437,000
Subtotal			\$4,805,861
CONTINGENCY	20%	6	\$961,000
Opinion of Probable Construction Cost			\$5,766,861

* Based on 2007 costs

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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	ስላለ በለርቁ
Sampler	1 ea	\$	6,500.00	\$200,000 \$6,500
Grit Removal Equipment	. ou	Ψ	0,300.00	υυς,σφ
Structure				
Slabs	28 cu yds	\$	400.00	¢44 000
Channel/Foundation Walls	21 cu yds	\$	700.00	\$11,200 \$14,700
Vortex Chamber Walls	6 cu yds	\$	1,000.00	\$14,700
Excavation	500 cu yds	\$	8.00	\$6,000 \$4,000
Structural Backfill	20 cu yds	\$	26.00	\$4,000 \$520
Backfill	175 cu yds	\$	12.00	•
Grit Equipment (Vortex/Classifier)	1 ea	\$	150,000.00	\$2,100
Grit Pumps	1 ea	\$	15,000.00	\$150,000
Process Piping	1 Lump Sum		15,000.00	\$15,000 \$45,000
Misc. Metals	1 ea	\$	5,000.00	\$15,000
Slide Gates	1 ea	φ \$	8,000.00	\$5,000 \$3,000
Stop Plates	3 ea	φ \$	-	\$8,000
Painting	1 Lump Sum		2,500.00	\$7,500
Flowmeter-Parshall Flume	1 ea	Ф \$	15,000.00	\$15,000
Headworks Structure	ı ca	Φ	7,000.00	\$7,000
Slabs	128 cu yds	¢.	400.00	A 54.000
Walls	58 cu yds	\$	400.00	\$51,200
Excavation	930 cu yds	\$	700.00	\$40,600
Structural Backfill	350 cu yas	\$	8.00	\$7,440
Backfill	350 cu yds	\$	26.00	\$9,100
Misc. Metals	1 Lump Sum	\$	12.00	\$4,200
Superstructure	1500 sq ft	\$ \$	15,000.00	\$15,000
HVAC		ф	70.00	\$105,000
Plumbing	Lump Sum		15%	\$35,000
Equipment Installation	Lump Sum		15%	\$35,000
Electrical	Lump Sum		20%	\$75,700
Instrumentation & Controls	Lump Sum		15%	\$105,000
modulionation of Controls	Lump Sum	0.1	5%_	\$35,000
BIOLOGICAL TREATMENT SPLITTER STRUCT	riibe	Sui	ototal =	\$985,800
Structure	Lump Sum			400.000
Process	Lamp Sum			\$38,350
Pipe	Luman Cuma			A10
Stop Plates	Lump Sum	ው	000.00	\$13,700
Excavation	3 ea	\$	800.00	\$2,400
Structural Backfill	500 cu yds	\$	8.00	\$4,000
Backfill	70 cu yds	\$	26.00	\$1,820
	1000 cu yds	\$	12.00	\$12,000
		Sut	ototal=	\$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
THE STATE OF THE S		Su	btotal =	\$859,427
MEMBRANE CLARIFICATION				7000,127
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	2,152,600.00	\$2,152,600
Electrical	Lump Sum		10%	\$282,000
Instrumentation & Controls	Lump Sum		0%	\$0
		Su	btotal=	\$3,220,100
EFFLUENT/DISINFECTION STRUCTURE				+0,220,100
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			7, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,	ψο,οοο
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
Allhania			ototal =	\$193,514
AEROBIC DIGESTION				Ψ100,011
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
		Sub	total =	\$1,232,920
				+ - ,===,020

Opinion of Probable Construction Cost			_	\$12,070,664
CONTINGENCY	20%	6		\$2,012,000
Subtotal				\$10,058,664
GENERAL REQUIREMENTS	10%	6		\$914,000
Subtotal				\$9,144,664
SITEWORK	109	6		\$831,333
Subtotal				\$8,313,331
0.14.4			total =	\$260,000
Instrumentation & Controls		8%		\$18,000
Electrical Modifications		10%		\$22,000
Finishes	1 Lump Sum	\$	10,000.00	\$10,000
Roofing	1000 Sq Ft	\$	50.00	\$50,000
HVAC	1000 Sq Ft	\$	15.00	\$15,000
	1000 Sq Ft	\$	20.00	\$20,000
Plumbing	1 Lump Sum	\$	25,000.00	\$25,000
Laboratory Equip	1000 Sq Ft	\$	100.00	\$100,000
Structure	4000 6 ***	_		
NEW CONTROL BUILDING		Sub	ototal =	\$1,489,300
modulicitization & Controls			6%_	\$68,700
Instrumentation & Controls			12%	\$137,500
Electrical			7%	\$74,500
Plumbing			6%	\$63,000
HVAC	1800 sq ft	\$	100.00	\$180,000
Roofing	200 cu yds	\$	400.00	\$80,000
Slab	130 cu yds	\$	700.00	\$91,000
Walls	250 cu yds	\$	26.00	\$6,500
Structural Backfill	500 cu yds	\$	12.00	\$6,000
Backfill	1400 cu yds	\$	8.00	\$11,200
Excavation	1 Lump Sum	\$	15,000.00	\$15,000
WAS Holding Tank	100 cu yds	\$	12.00	\$1,200
Backfill	35 cu yds	\$	26.00	\$900
Structural Backfill	100 cu yds	\$	8.00	\$800
Excavation	10 cu yds	\$	700.00	\$7,000
Misc Concrete	35 cu yds	\$	400.00	\$14,000
Slab	30 cu yds	\$	400.00	\$12,000
Footing	1800 sq ft	\$	150.00	\$270,000
Structure	1 Lump Sum	\$	15,000.00	\$15,000
Valves	1 Lump Sum	\$	20,000.00	\$20,000
Piping	4.1	_		
Process	1 EA	\$	60,000.00	\$60,000
Conveyor	2 EA	\$	20,000.00	\$40,000
BFP Feed Pumps	1 EA	\$	300,000.00	\$300,000
BFP	1 EA	\$	15,000.00	\$15,000
Polymer Feed Unit	0 EA	\$	25,000.00	\$0
RDT-to-Digester Feed Pumps	0 EA	\$	20,000.00	\$0
RDT Feed Pumps	0 EA	\$	182,000.00	\$0
RDT	2 = 4	_		
THICKENING/DEWATERING BUILDING				

^{*} Based on 2007 costs

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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	# 000 000
Sampler	0 ea	\$ \$	200,000.00	\$200,000
Grit Removal Equipment	o ca	φ	6,500.00	\$0
Structure				\$ 0
Slabs	0 cu yds	\$	400.00	\$0 \$0
Channel/Foundation Walls	0 cu yds	\$	400.00 700.00	\$0
Vortex Chamber Walls	0 cu yds	\$		\$0 ***
Excavation	0 cu yds	\$ \$	1,000.00	\$0 \$0
Structural Backfill	0 cu yds	\$	8.00 26.00	\$0 \$0
Backfill	0 cu yds	\$		\$0
Grit Equipment (Vortex/Classifier)	1 ea	\$	12.00 150,000.00	\$0
Grit Pumps	1 ea	\$	15,000.00	\$150,000
Process Piping	1 Lump Sum	\$	15,000.00	\$15,000 \$45,000
Misc. Metals	1 ea	\$	5,000.00	\$15,000
Slide Gates	1 ea	\$	8,000.00	\$5,000
Stop Plates	3 ea	\$	2,500.00	\$8,000
Painting	1 Lump Sum	\$	15,000.00	\$7,500
Flowmeter-Parshall Flume	0 ea	\$	7,000.00	\$15,000
Headworks Structure	0 00	Ψ	7,000.00	\$0 *0
Slabs	0 cu yds	\$	400.00	\$0 #0
Walls	0 cu yds	\$	700.00	\$0 \$0
Excavation	0 cu yds	\$	8.00	\$0 \$0
Structural Backfill	0 cu yds	\$	26.00	\$0 *0
Backfill	0 cu yds	\$	12.00	\$0 *0
Misc. Metals	1 Lump Sum	\$	15,000.00	\$0 \$15,000
Superstructure	0 sq ft	\$	70.00	
HVAC	Lump Sum	Ψ	70.00	\$0
Plumbing	Lump Sum		15%	\$0 \$2,000
Equipment Installation	Lump Sum		20%	
Electrical	Lump Sum		15%	\$73,000
Instrumentation & Controls	Lump Sum		5%	\$65,000 \$33,000
	Lump Cum	Subf	otal =	\$22,000
		Gubi	Julia -	\$592,500

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

PRIMARY CLARIFIER				
Structure				
Walls Slab	376 cu yds	\$	700.00	\$263,200
	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
		Sub	total=	\$1,494,422
PRIMARY CLARIELER COLUTTER CONTROL				
PRIMARY CLARIFIER SPLITTER STRUCTURE Structure				
Process	1 Lump Sum	\$	38,350.00	\$38,350
Pipe				\$0
Slide Gates	Lump Sum			\$0
Excavation	3 ea	\$	6,000.00	\$18,000
Structural Backfill	500 cu yds	\$	8.00	\$4,000
Backfill	70 cu yds	\$	26.00	\$1,820
Dagkilli	1000 cu yds	\$	12.00	\$12,000
		Subt	otal=	\$74,170

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

BIOLOGICAL TREATMENT SPLITTER STRU	CTURE			
Structure	1 Lump Sum		\$38,350	ቀ ንዕ ንፑሲ
Process	· amp cam		Ψ30,330	\$38,350
Pipe	1 Lump Sum	\$	13,700.00	£40.700
Stop Plates	3 ea	\$	·	\$13,700
Excavation	500 cu yds		800.00	\$2,400
Structural Backfill	70 cu yds	\$ \$	8.00	\$4,000
Backfill	1000 cu yds	\$	26.00	\$1,820
	1000 ca yas		12.00	\$12,000
MEMBRANE - BIOLOGICAL TREATMENT		Sui	ototal=	\$72,270
Structure				
Slab/footing	645 cu yd	ው	400.00	0000
Walls	484 cu yd	\$	400.00	\$258,000
Excavation	3800 cu yd	\$	700.00	\$338,800
Backfill	1460 cu yd	\$	8.00	\$30,400
Structural Backfill	644 cu yd	\$	12.00	\$17,520
Miscellaneous Structure	•	\$	26.00	\$16,744
Process	Lump Sum		5%	\$33,073
75 Hp Blowers	0	•		
Air Piping	2 ea	\$	45,000.00	\$90,000
Diffusers	1 Lump Sum	\$	15,000.00	\$15,000
Baffles	1 Lump Sum	\$	35,000.00	\$35,000
Painting	1 Lump Sum	\$	15,000.00	\$15,000
Electrical	1 Lump Sum	\$	10,000.00	\$10,000
Instrumentation & Controls	Lump Sum		10%	\$20,000
morality a colling	Lump Sum		4%_	\$8,000
MEMBRANE CLARIFICATION		Sub	total =	\$887,537
Membrane Module Tank Structure				
Slab/footing	4.5			
Walls	45 cu yd	\$	400.00	\$18,000
Excavation	142 cu yd	\$	700.00	\$99,400
Membrane Module Equipment Bldg	350 cu yd	\$	8.00	\$2,800
	1 Lump Sum	\$	670,320.00	\$670,320
Membrane Process Equipment Package Electrical	1 Lump Sum	\$ 2	2,152,600.00	\$2,152,600
Instrumentation & Controls	Lump Sum		10%	\$282,000
modulieritation & Controls	Lump Sum		0%_	\$0
EFFLUENT/DISINFECTION STRUCTURE		Sub	total=	\$3,225,120
Flowmeter-Parshall Flume				
Sampler	0 ea	\$	7,000.00	\$0
	0 ea	\$	8,000.00	\$0
UV Equipment Sluice Gate	1 Lump Sum	\$	60,000.00	\$60,000
Structure	0 ea	\$	8,000.00	\$0
Electrical	0 Lump Sum	\$	30,000.00	\$0
		8%		\$5,000
Instrumentation & Controls		4%		\$2,000
		Subt	otal =	\$67,000
				,

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

				7313
ANAEROBIC DIGESTION CONVERSION				
Existing Digestion Facilities				
Selective Demolition				
Aeration System	1 Lump Sum	φ	20,000,00	
Digester Cleaning	2 ea	\$ \$	20,000.00	\$20,000
New Digestion Facilities	2. 00	φ	5,000.00	\$10,000
Dual-fuel Boiler	2 ea	ው	100 000 00	\$0
Heat Exchanger	2	\$ \$	100,000.00	\$200,000
Recirculation Pumps	1	\$ \$	20,000.00	\$40,000
Equipment Building	1	\$ \$	30,000.00	\$30,000
Waste Gas Burner, Piping, & Controls	1 Lump Sum	\$ \$	62,500.00	\$62,500
Primary Digester Mixing System	1 ea	\$ \$	100,000.00	\$100,000
Primary Digester Covers-fixed	1 ea	\$	75,000.00	\$75,000
Secondary Digester Cover-floating	1 ea	\$	125,000.00	\$125,000
Process Pipe and Fittings	1 Lump Sum	\$ \$	200,000.00	\$200,000
Electrical	r Lump Sum	ф	25,000.00	\$25,000
Instrumentation & Controls			14%	\$120,000
		01	5%_	\$43,000
THICKENING/DEWATERING BUILDING		Sub	ototal =	\$1,050,500
RDT	1 EA	Φ.	400 000 00	. .
RDT Feed Pumps	2 EA	\$ \$	182,000.00	\$182,000
RDT-to-Digester Feed Pumps		\$	20,000.00	\$40,000
Polymer Feed Unit	2 EA	\$	25,000.00	\$50,000
BFP	1 EA	\$	15,000.00	\$15,000
BFP Feed Pumps	0 EA	\$	300,000.00	\$0
Conveyor	0 EA	\$	20,000.00	\$0
Process	0 EA	\$	60,000.00	\$0
Piping	0.1.			
Valves	0 Lump Sum	\$	20,000.00	\$0
Structure	0 Lump Sum	\$	15,000.00	\$0
Footing	0 sq ft	\$	150.00	\$0
Slab	0 cu yds	\$	400.00	\$0
Misc Concrete	0 cu yds	\$	400.00	\$0
Excavation	0 cu yds	\$ \$	700.00	\$0
Structural Backfill	0 cu yds	\$	8.00	\$0
Backfill	0 cu yds	\$	26.00	\$0
WAS Holding Tank	0 cu yds	\$	12.00	\$0
Excavation	0 Lump Sum	\$	15,000.00	\$0
Backfill	0 cu yds	\$	8.00	\$0
Structural Backfill	0 cu yds	\$	12.00	\$0
Walls	0 cu yds	\$	26.00	\$0
Slab	0 cu yds	\$	700.00	\$0
	0 cu yds	\$	400.00	\$0
Roofing HVAC	0 sq ft	\$	100.00	\$0
			6%	\$15,800
Plumbing			7%	\$18,700
			1 /0	Ψ10,100

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

Electrical			4004				
Instrumentation & Controls			12%	· -	4,400		
30/14/0/3			6%		7,200		
NEW CONTROL BUILDING Structure		Subto	otal =	\$37	3,100		
	0 Sq Ft	\$	100.00		\$0		
Laboratory Equip	0 Lump Sum	\$	25,000.00		\$0		
Plumbing	0 Sq Ft	\$	20.00		\$0 \$0		
HVAC	0 Sq Ft	\$	15.00		\$0 \$0		
Roofing	0 Sq Ft	\$	50.00				
Finishes	0 Lump Sum	\$	10,000.00		\$0 ***		
Electrical Modifications	• Zamp Gam	τ 10%	10,000.00		\$0		
Instrumentation & Controls					\$0		
		8% Subto			\$0		
Subtotal			\$0				
SITEWORK				\$7,836	6,619		
Subtotal	109	\$783,662					
					\$8,620,281		
GENERAL REQUIREMENTS	10%			\$862,000			
Subtotal				\$9,482			
CONTINGENCY	20%			\$1,896,000			
Opinion of Probable Construction Cost					\$11,378,281		
				Φ11,3/8	,∠81		

^{*} Based on 2007 costs

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

TEM	SEPTEMBER 200		OTLANTING			_	
NO.	ITEM DESCRIPTION	UNIT	QUANTIT Y		UNIT PRICE		TOTAL
	SITE WORK	1				t	
1	CLEARING & GRUBBING	LS	1.0	8	10,000.00	\$	10,0
2	SALVAGE TOPSOIL	CY	1,125	\$	2.00		2,3
3	PLACING TOPSOIL	CY	1,125		4.00	_	2,3 4,5
4	LOCATING UTILITIES	EA	2	_	500.00	\$	
5	RIPRAP	TON	50		30.00	\$	1,0
	SITE WORK SUBTOTAL			Ψ	50.00	\$	1,5 19,3
	EROSION CONTROL						
6	TEMPORARY SILT FENCE	LF	2,000	6	C 00		400
7	PERMANENT SEEDING	LB	250	_	5.00	\$	10,0
	FERTILIZING	LB	925		12.00	\$	3,0
9	MULCHING	TON			1.00	\$	1,0
_	EROSION CONTROL SUBTOTAL	TON	15	\$	150.00	\$ \$	2,3 16,3
	SANITARY SEWER					Ė	
10	TRENCH DEWATERING	LS		_		_	
	TRENCH STABILIZATION MATERIAL		1		50,000.00	\$	50,0
12	GRANULAR INITIAL BACKFILL FOR SANITARY SEWER	TON	160		21.00	\$	3,3
13	MH FRAME AND COVER	TON EA	525	_	11.00	\$	5,7
14	MH CONSTRUCTION PLATE MARKER		4	\$	350.00	\$	1,4
15	MH EXTERNAL FRAME SEAL	EA	4	\$	200.00	\$	80
16	48"ø MH, IN PLACE, COMPLETE	EA	4	\$	400.00	\$	1,60
17	30" SAN SWR PVC PIPE SDR 35	EA		\$	2,500.00	\$	10,00
18	MH EXFILTRATION/VACUUM TEST	LF		\$	300.00	\$	600,00
19	SAN SWR EXFILTRATION TESTING	EA		\$	300.00	\$	1,20
20	SWR PIPE DEFLECTION TEST	LF	2,000		1.25	\$	2,50
	SANITARY SEWER SUBTOTAL	LF	2,000	\$	1.00	\$	2,00 680,0 0
\dashv						ф	000,00
寸	TOTAL ITEMS 1 THROUGH	20					
5	SUBTOTAL CONSTRUCTION COSTS			_		\$	715 60
	CONTINGENCY (20%)			-		\$	715,60
1	PRELIMINARY OPINION OF CONSTRUCTION COSTS			_		_	143,12
1	ENGINEERING, LEGAL, CONSTRUCTION ADMINISTRATION	N (20%)	_		\$	858,72
15	TOTAL ENGINEER'S OPINION OF PROBABLE PROJECT	1 (2U/0	7			\$	171,74