MAURER ▲ STUTZ, INC.
ENGINEERS SURVEYORS

PROJECT: Gene Bank of North America
PROJECT NO.: 238-05044A
COMPUTATION BY: MJR DATE: 10/3/06 SH. NO.: 1
CHECKED BY: DATE: OF: 1

Subject: Animal Waste Produced

Animal Data

	Actual		ASAE D384.2		NRCS		VS		TS		AU
		Weight	Manure	Weight	Manure	Manure					
Animals	Quantity	lbs	lbs/d-a	lbs	cf/d/AU	CF/day	lbs/d/AU	lbs/day	lbs/d/AU	lbs/day	
Heifers	160	600	0.78	970	0.80	77.2	7.77	745.9	9.14	877.4	96.00
Cow	300	1100	1.00	1400	0.71	235.7	6.20	2046.0	7.30	2409.0	330.00
Steers HFD	55	1500	0.71	750	0.95	78.1	6.04	498.3	6.78	559.4	82.50
Heifers	250	1100	0.78	970	0.80	221.1	7.77	2136.8	9.14	2513.5	275.00
			0.00	0	0.00	0.0	0.00	0.0	0.00	0.0	0.00
			0.00	0	0.00	0.0	0.00	0.0	0.00	0.0	0.00
			0.00	0	0.00	0.0	0.00	0.0	0.00	0.0	0.00
			0.00	0	0.00	0.0	0.00	0.0	0.00	0.0	0.00
			0.00	0	0.00	0.0	0.00	0.0	0.00	0.0	0.00
Total	765					612.14		5427		6359.3	783.5

Rainfall Data

Location	DuQuoin, IL
Precip for storage period	44.2 in
Annual Lake Evap	38.0 in
% Evap for storage period	100%
1 Yr 24 Hr Strom Event	2.7 in
10 Yr 1 Hr Strom Event	4.8 in
25 Yr 24 Hr Strom Event	6.0 in
Storage Period	12.0 Months
VS Loading Rate	3.00 lb/d*1000 CF
ODOR Loading Rate	1.90 lb/d*1000 CF

Location Data

Animals	Holding Pond		Covered Stack					Uncovered Stack					Rect. Tank						Circular Tank		Pasture		Settling Basin	
	P 1	P 2	CS 1	CS 2	CS 3	CS 4	CS5	UCS1	UCS2	UCS 3	UCS 4	UCS 5	RT 1	RT 2	RT 3	RT 4	RT 5	RT 6	CT 1	CT 2	Pas 1	Pas 2	Basin 1	Basin 2
Heifers	10%							10.0%	10.0%	10.0%	10.0%											50%		
Cow																					100%			
Steers HFD	10%							10.0%	10.0%	10.0%	10.0%											50%		
Heifers																					100%			
Parlor		0%																						
Sprinkler		0%																						
Waters		0%																						
Cow Prep		0%																						
Bedding		0%																						
Runoff		100%																						
25Y Runoff		100%																						

*Values calculated above are based on data from the Livestock Waste Facilities Handbook

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Subject: Animal Waste Produced

Additions Data							
			Bedding				
Animals	Wash Gal/day	Flush Gal/day	Type	Rate lbs/d/AU	Amount lbs/day	Density lb/CF	Amount CF/day
Heifers*					0		0.00
Cow*					0		0.00
Steers HFD*					0		0.00
Heifers*					0		0.00
*					0		0.00
*					0		0.00
*					0		0.00
*					0		0.00
*					0		0.00
Parlor**							0.00
Sprinkler**							0.00
Waters**							0.00
Cow Prep**							0.00
Bedding**							0.00
**							0.00
**							0.00
Total					0		0.00

*Values calculated above are based on data from the Livestock Waste Facilities Handbook

S:\238\2005 project numbers\23805044 (David Pearl)\mjr files downloaded 10-3-06\Gene Bank proposed AWM V.9.1 (2 Pasture) 10-3-06

MAURER ▲ STUTZ, INC.
ENGINEERS SURVEYORS

PROJECT: Gene Bank of North America
PROJECT NO.: 238-05044A
COMPUTATION BY: MJR DATE: 10/3/06 SH. NO.: 1
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Subject: Runoff Calculations

Normal Runoff

Area = 28118 Area = 340880 Area = 15625

	Concrete (CN=97)				Earth (CN=90)				Roof (CN=100)			
	Months	R	P	Total CF	Months	R	P	Total CF	Months	R	P	Total CF
X	JAN	57	2.75	3672.9	JAN	27	2.75	21092	JAN	100	2.75	3580.73
X	FEB	53	2.61	3241.3	FEB	20	2.61	14828.3	FEB	100	2.61	3398.44
X	MAR	59	4.3	5944.6	MAR	25	4.3	30537.2	MAR	100	4.3	5598.96
X	APR	56	4.27	5603	April	25	4.27	30324.1	April	100	4.27	5559.9
X	May	59	4.81	6649.7	May	27	4.81	36891.7	May	100	4.81	6263.02
X	June	60	4.23	5947	June	28	4.23	33644.9	June	100	4.23	5507.81
X	July	62	3.54	5142.8	July	29	3.54	29162.3	July	100	3.54	4609.38
X	AUG	60	3.33	4681.6	AUG	30	3.33	28378.3	AUG	100	3.33	4335.94
X	SEPT	61	3.27	4673.9	SEPT	27	3.27	25080.2	SEPT	100	3.27	4257.81
X	OCT	58	3.17	4308.1	OCT	25	3.17	22512.3	OCT	100	3.17	4127.6
X	NOV	60	4.44	6242.2	NOV	29	4.44	36576.4	NOV	100	4.44	5781.25
X	DEC	54	3.47	4390.6	DEC	23	3.47	22671.4	DEC	100	3.47	4518.23
	Total		44.2	56825	Total			310607	Total			53958

Net Normal Ruoff = 421,390 CF

25 YR - 24HR Storm Event

Concrete (CN=97)			Earth (CN=90)			Roof (CN=100)		
CN	97		CN	90		CN	100	
S	0.31	in	S	1.11	in	S	0.00	in
I	6.00	in	I	6.00	in	I	6.00	in
Q	5.64	in	Q	4.85	in	Q	6.00	in
Vol	13225.25	CF	Vol	137655.24	CF	Vol	7812.50	CF

Net Storm Event Runoff = 158,693 CF

Notes

Concrete Areas:
concrete pads in lots = 28,118 sqf
solid manure storage = 2000 sqf
feed storage = 16502 sqf

Earthen Areas:
Dirt lots = 340,880 sqf

Roofed Areas:
Pond 1 = 15,625 sqf
Precip & Strom water for pond 1 are stored in pond 2.

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Subject: Animal Waste Produced

Facility Volumes (CF/day)

	Holding Pond		Covered Stack					Uncovered Stack					Rect. Tank						Circular Tank		Pasture		Settling Basin	
Facility	P 1	P 2	CS 1	CS 2	CS 3	CS 4	CS5	UCS1	UCS2	UCS 3	UCS 4	UCS 5	RT 1	RT 2	RT 3	RT 4	RT 5	RT 6	CT 1	CT 2	Pas 1	Pas 2	Basin 1	Basin 2
Manure	15.53	0.00	0.00	0.00	0.00	0.00	0.00	15.53	15.53	15.53	15.53	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	456.85	77.65	0.00	0.00
Wash	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Flush	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bedding	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Runoff	0.00	1170.53	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Daily Vol	15.53	1170.53	0.00	0.00	0.00	0.00	0.00	15.53	15.53	15.53	15.53	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	456.85	77.65	0.00	0.00
Annual Vol	5591	421390	0	0	0	0	0	5591	5591	5591	5591	0	0	0	0	0	0	0	0	0	164465	27953	0	0
Density lb/cf	0	0	50	50	50	50	50	60	60	60	60	0	0	0	0	0	0	0	0	0	0	0	0	0
Annual Tons	0	0	0	0	0	0	0	168	168	168	168	0	0	0	0	0	0	0	0	0	0	0	0	0
Annual Gal	41801	3150734	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1229708	209007	0	0
% OF VOL	1%	66%	0%	0%	0%	0%	0%	1%	1%	1%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	26%	4%	0%	0%

Facility	Manure	Wash	Flush	Bedding	Runoff	Total V
Total CF/d	612.1	0.0	0.0	0.0	1170.5	1782.7

Annual Manure & Wates Water Volumes

Facility	Manure	Wash	Flush	Bedding	Runoff	Total V
Total CF	223433	0	0	0	427243	650675

Storage Volumes (CF/Period)

	Holding Pond		Covered Stack					Uncovered Stack					Rect. Tank						Circular Tank		Pasture		Settling Basin	
Storage	P 1	P 2	CS 1	CS 2	CS 3	CS 4	CS5	UCS1	UCS2	UCS 3	UCS 4	UCS 5	RT 1	RT 2	RT 3	RT 4	RT 5	RT 6	CT 1	CT 2	Pas 1	Pas 2	Basin 1	Basin 2
Period (M)	12	12						6	6	6	6										12	12		
Period (D)	365	365	0	0	0	0	0	180	180	180	180	0	0	0	0	0	0	0	0	0	365	360	0	0
Required Vol																								
CF	5665	427009	0	0	0	0	0	2795	2795	2795	2795	0	0	0	0	0	0	0	0	0	166658	27953	0	0
GALLONS	42359	3192744	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1246104	209007	0	0
TONS	0	0	0	0	0	0	0	84	84	84	84	0	0	0	0	0	0	0	0	0	0	0	0	0
Designed Vol																								
CF	84755	504328	0	0	0	0	0	3056	3056	3056	3056	0	0	0	0	0	0	0	0	0	181500	29948	0	0
GALLONS	633712	3770858	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1357076	223917	0	0
TONS	0	0	0	0	0	0	0	92	92	92	92	0	0	0	0	0	0	0	0	0	0	0	0	0
Extra																								
CF	79090	77319	0	0	0	0	0	261	261	261	261	0	0	0	0	0	0	0	0	0	14842	1994	0	0
GALLONS	591353	578114	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	110972	14911	0	0
TONS	0	0	0	0	0	0	0	8	8	8	8	0	0	0	0	0	0	0	0	0	0	0	0	0

Storage Volumes	Required Vol CF	Required Vol GALLONS	Designed Vol CF	Designed Vol GALLONS	Extra CF
Total	638467	4690213	812754	5985929	174287

PASTURE 1 ACRES	200.0 ac
PASTURE 2 ACRES	33.0 ac

(FIGURES 0.25 IN COVER ON ENTIRE PASTURE)

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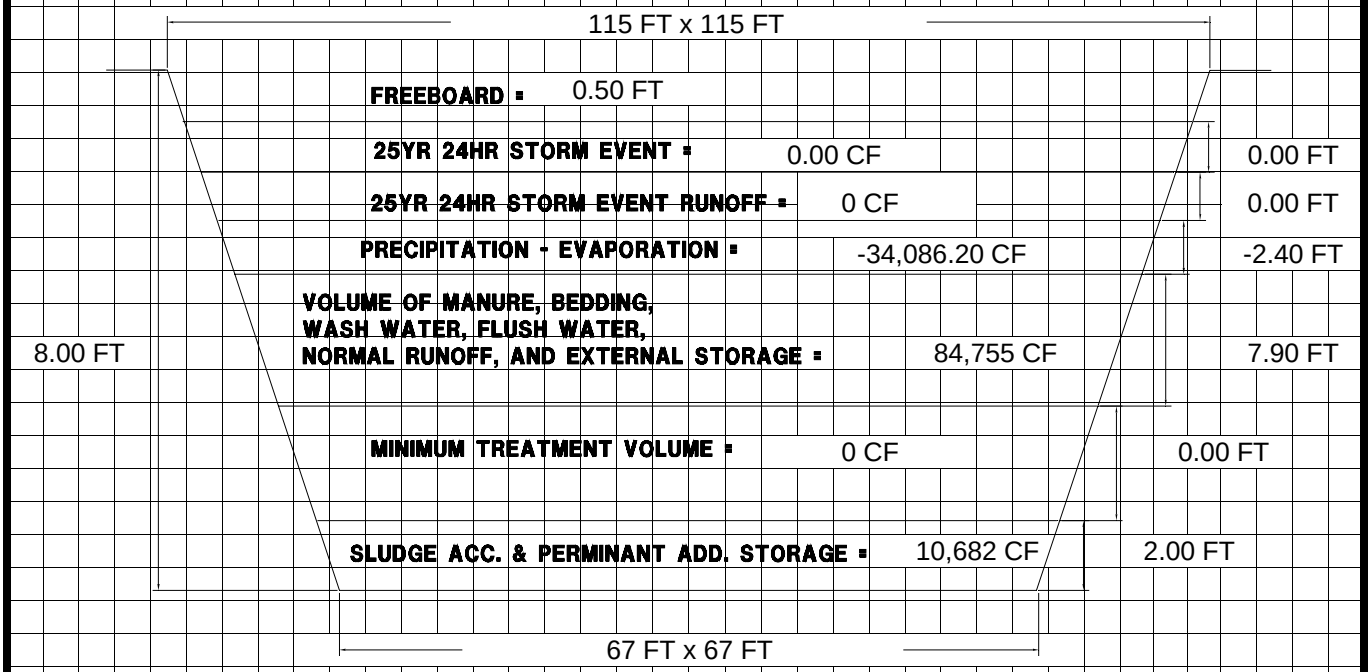
PROJECT: Gene Bank of North America
PROJECT NO.: 238-05044A
COMPUTATION BY: MJR DATE: 10/3/06 SH. NO.: 1
CHECKED BY: DATE: OF: 1

Subject: Holding Pond 1 Design Sheet



EARTHEN STORAGE

TOTAL DEPTH	8.00 FT
FREEBOARD	0.50 FT
RESIDUAL SOLIDS	2.00 FT
MINIMUM TREATMENT	0.00 FT
PRECIP-EVAP DEPTH	-2.40 FT
25 YR, 24-HR Runoff V	0 CF
25 YR, 24-HR Runoff D	0.00 FT
25 YR, 24-HR EFF	0.00 FT
WORKING DEPTH	7.90 FT

Deminsions	
BOTTOM WIDTH	67 FT
BOTTOM LENGTH	67 FT
INSIDE SLOPE	3 FT
TOP WIDTH	115 FT
TOP LENGTH	115 FT
START PUMPING	-
STOP PUMPING	-

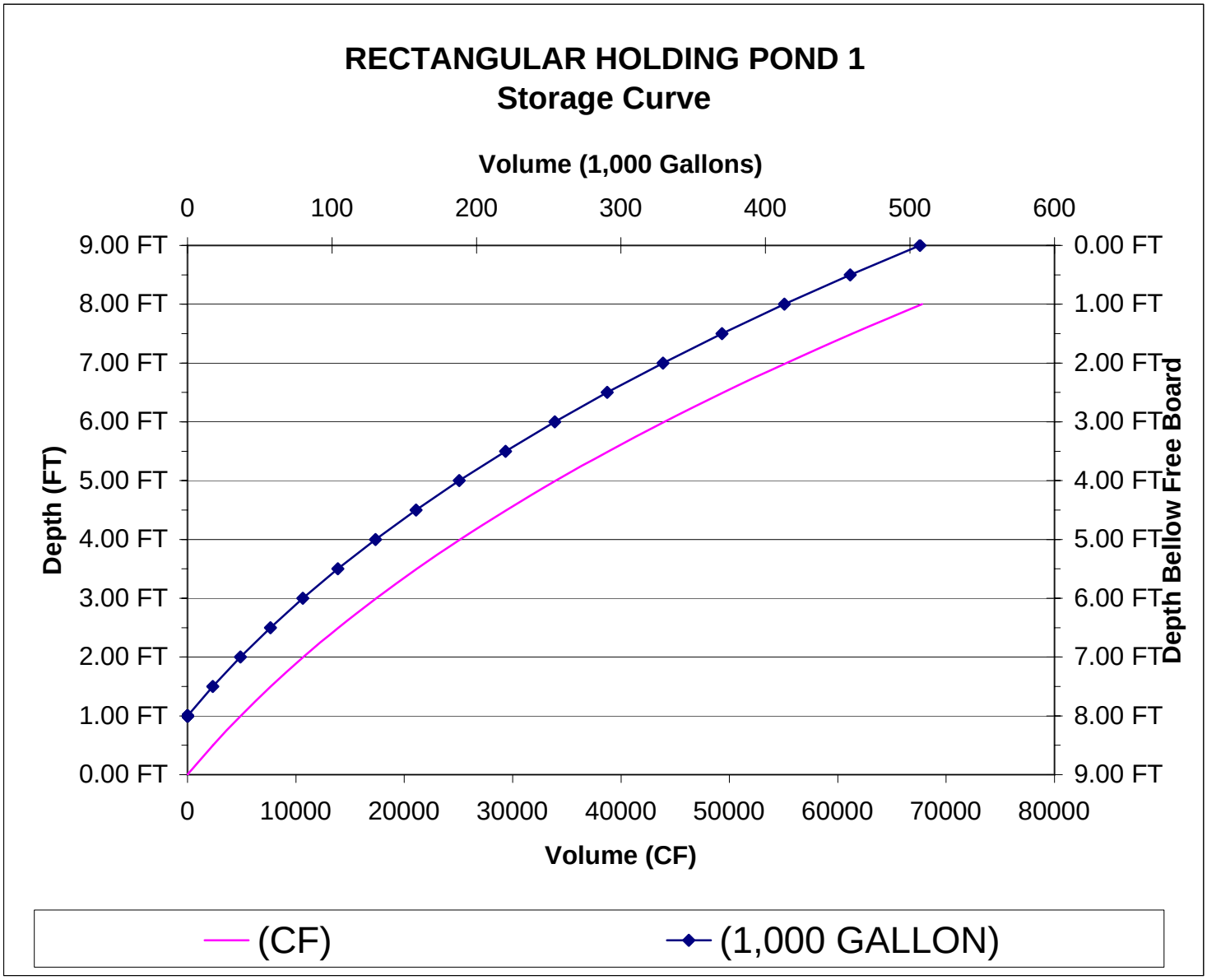
25 YR, 24-HR VOL	0 CF	≈	0.00 MG
PRECIP-EVAP VOL	-34,086 CF	≈	-0.25 MG
WORKING VOLUME	84,755 CF	≈	0.63 MG
MINIMUM TREATMENT	0 CF	≈	0.00 MG
RESIDUAL SOLIDS	10,682 CF	≈	0.08 MG
TOTAL RAMP VOL	0 CF	≈	0.00 MG
FREEBOARD		≈	0.00 MG
TOTAL VOLUME	67,784 CF	≈	0.51 MG

ACTUAL PRECIP	0.0 in
ACTUAL EVAP	38.0 in
25 YR, 24-HR ACT	0.0 in

CALCULATE

S:\238\2005 project numbers\23805044 (David Pearl)\mjr files downloaded 10-3-06\Gene Bank proposed AWM V.9.1 (2 Pasture) 10-3-06

POND 2 - STAGE STORAGE				
TOTAL DEPTH	VOLUME (CF)	VOLUME (1,000 GALLON)	DEPTH BELOW TOP OF BERM	VOLUME (1,000 GAL / 1/2 FT)
8.00 FT	67784	507	0.00 FT	0.0
7.50 FT	61343	459	0.50 FT	48.2
7.00 FT	55237	413	1.00 FT	45.7
6.50 FT	49459	370	1.50 FT	43.2
6.00 FT	43998	329	2.00 FT	40.8
5.50 FT	38847	290	2.50 FT	38.5
5.00 FT	33995	254	3.00 FT	36.3
4.50 FT	29435	220	3.50 FT	34.1
4.00 FT	25156	188	4.00 FT	32.0
3.50 FT	21151	158	4.50 FT	29.9
3.00 FT	17409	130	5.00 FT	28.0
2.50 FT	13923	104	5.50 FT	26.1
2.00 FT	10682	80	6.00 FT	24.2
1.50 FT	7679	57	6.50 FT	22.5
1.00 FT	4903	37	7.00 FT	20.8
0.50 FT	2347	18	7.50 FT	19.1
0.00 FT	0	0	8.00 FT	17.5
0.00 FT	0	0	8.00 FT	0.0
0.00 FT	0	0	8.00 FT	0.0
0.00 FT	0	0	8.00 FT	0.0
0.00 FT	0	0	8.00 FT	0.0
0.00 FT	0	0	8.00 FT	0.0
0.00 FT	0	0	8.00 FT	0.0
0.00 FT	0	0	8.00 FT	0.0
0.00 FT	0	0	8.00 FT	0.0
0.00 FT	0	0	8.00 FT	0.0
0.00 FT	0	0	8.00 FT	0.0
0.00 FT	0	0	8.00 FT	0.0
0.00 FT	0	0	8.00 FT	0.0
0.00 FT	0	0	8.00 FT	0.0
0.00 FT	0	0	8.00 FT	0.0


RECTANGULAR HOLDING POND 1
Storage Curve
Volume (1,000 Gallons)
0
100
200
300
400
500
600
9.00 FT
8.00 FT
7.00 FT
6.00 FT
5.00 FT
4.00 FT
3.00 FT
2.00 FT
1.00 FT
0.00 FT
Depth (FT)
0.00 FT
1.00 FT
2.00 FT
3.00 FT
4.00 FT
5.00 FT
6.00 FT
7.00 FT
8.00 FT
9.00 FT
Depth Bellow Free Board
0
10000
20000
30000
40000
50000
60000
70000
80000
Volume (CF)
(CF)
(1,000 GALLON)

MAURER ▲ STUTZ, INC.
ENGINEERS SURVEYORS

PROJECT: Gene Bank of North America
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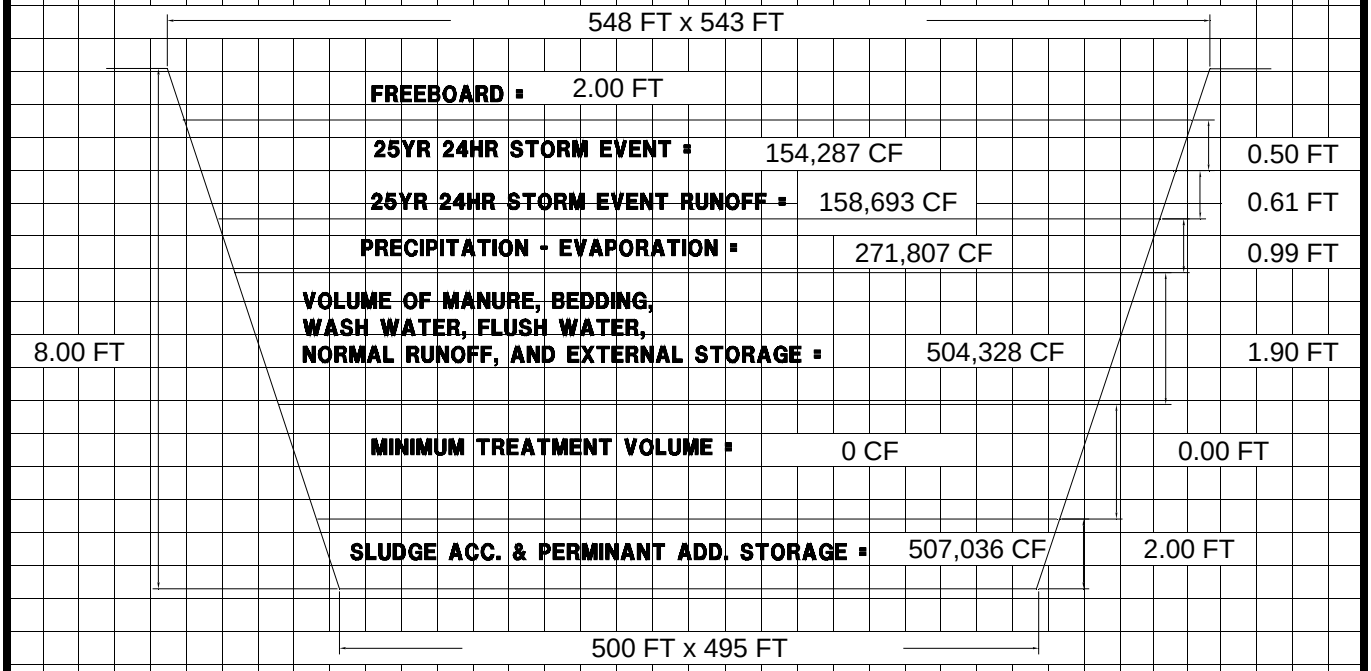
Subject: Holding Pond 2 Design Sheet



EARTHEN STORAGE

TOTAL DEPTH	8.00 FT
FREEBOARD	2.00 FT
RESIDUAL SOLIDS	2.00 FT
MINIMUM TREATMENT	0.00 FT
PRECIP-EVAP DEPTH	0.99 FT
25 YR, 24-HR Runoff V	158,693 CF
25 YR, 24-HR Runoff D	0.61 FT
25 YR, 24-HR EFF	0.50 FT
WORKING DEPTH	1.90 FT

Deminsions	
BOTTOM WIDTH	500 FT
BOTTOM LENGTH	495 FT
INSIDE SLOPE	3.0 FT
TOP WIDTH	548 FT
TOP LENGTH	543 FT
START PUMPING	-
STOP PUMPING	-

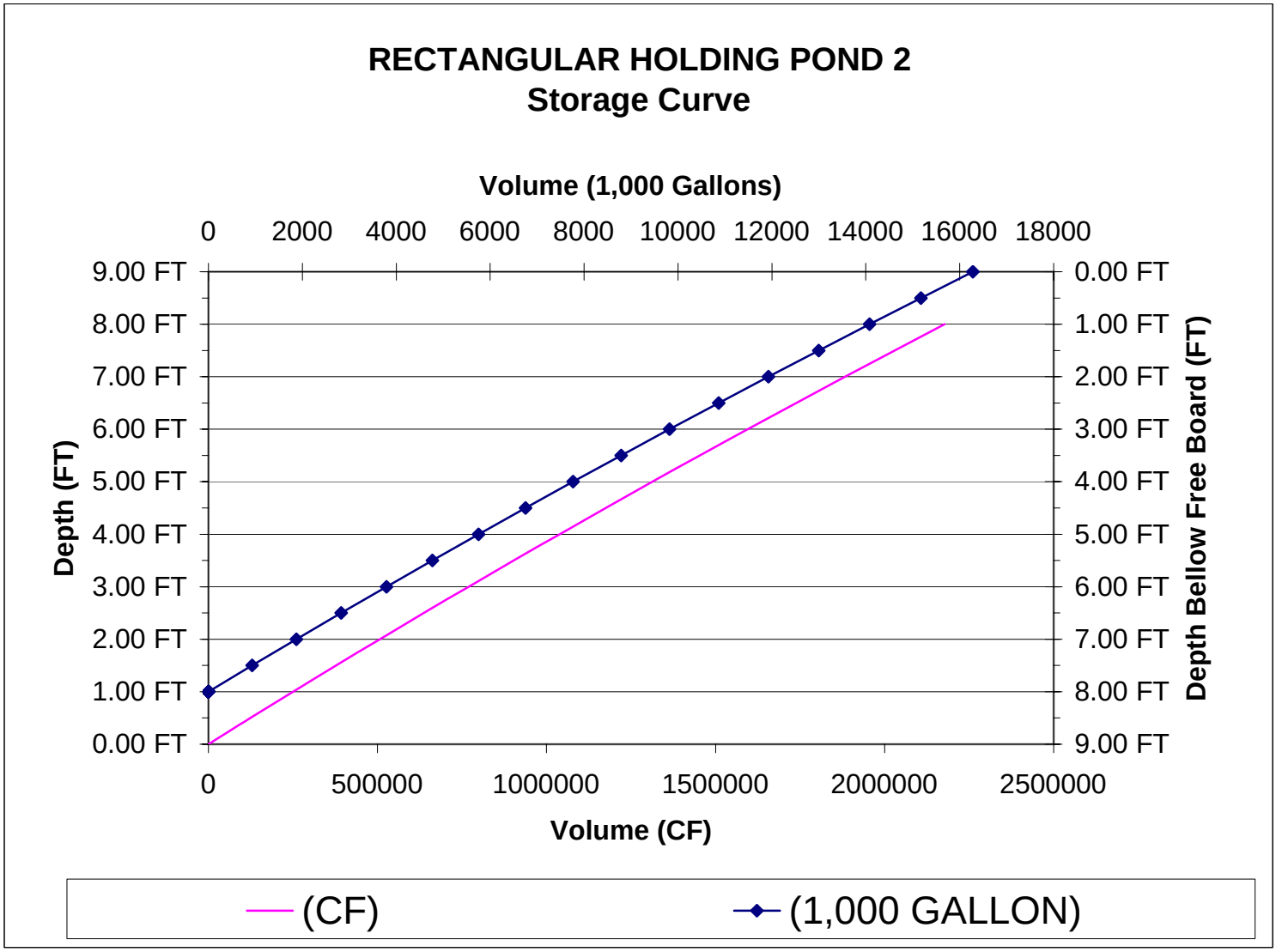
25 YR, 24-HR VOL	154,287 CF	≈	1.15 MG
PRECIP-EVAP VOL	271,807 CF	≈	2.03 MG
WORKING VOLUME	504,328 CF	≈	3.77 MG
MINIMUM TREATMENT	0 CF	≈	0.00 MG
RESIDUAL SOLIDS	507,036 CF	≈	3.79 MG
TOTAL RAMP VOL	0 CF	≈	0.00 MG
FREEBOARD	582,132 CF	≈	4.35 MG
TOTAL VOLUME	2,177,184 CF	≈	16.28 MG

ACTUAL PRECIP	44.2 in
ACTUAL EVAP	38.0 in
25 YR, 24-HR ACT	6.0 in

CALCULATE

S:\238\2005 project numbers\23805044 (David Pearl)\mjr files downloaded 10-3-06\Gene Bank proposed AWM V.9.1 (2 Pasture) 10-3-06

POND 2 - STAGE STORAGE				
TOTAL DEPTH	VOLUME (CF)	VOLUME (1,000 GALLON)	DEPTH BELOW TOP OF BERM	VOLUME (1,000 GALLON)
8.00 FT	2177184	16279	0.00 FT	0.0
7.50 FT	2029219	15172	0.50 FT	1106.3
7.00 FT	1882881	14078	1.00 FT	1094.2
6.50 FT	1738162	12996	1.50 FT	1082.1
6.00 FT	1595052	11926	2.00 FT	1070.0
5.50 FT	1453543	10868	2.50 FT	1058.1
5.00 FT	1313625	9822	3.00 FT	1046.2
4.50 FT	1175290	8788	3.50 FT	1034.3
4.00 FT	1038528	7765	4.00 FT	1022.6
3.50 FT	903331	6754	4.50 FT	1010.9
3.00 FT	769689	5755	5.00 FT	999.2
2.50 FT	637594	4767	5.50 FT	987.7
2.00 FT	507036	3791	6.00 FT	976.2
1.50 FT	378007	2826	6.50 FT	964.8
1.00 FT	250497	1873	7.00 FT	953.4
0.50 FT	124498	931	7.50 FT	942.1
0.00 FT	0	0	8.00 FT	930.9
0.00 FT	0	0	8.00 FT	0.0
0.00 FT	0	0	8.00 FT	0.0
0.00 FT	0	0	8.00 FT	0.0
0.00 FT	0	0	8.00 FT	0.0
0.00 FT	0	0	8.00 FT	0.0
0.00 FT	0	0	8.00 FT	0.0
0.00 FT	0	0	8.00 FT	0.0
0.00 FT	0	0	8.00 FT	0.0
0.00 FT	0	0	8.00 FT	0.0
0.00 FT	0	0	8.00 FT	0.0
0.00 FT	0	0	8.00 FT	0.0
0.00 FT	0	0	8.00 FT	0.0
0.00 FT	0	0	8.00 FT	0.0
0.00 FT	0	0	8.00 FT	0.0
0.00 FT	0	0	8.00 FT	0.0


RECTANGULAR HOLDING POND 2
Storage Curve
Volume (1,000 Gallons)
0
2000
4000
6000
8000
10000
12000
14000
16000
18000
9.00 FT
8.00 FT
7.00 FT
6.00 FT
5.00 FT
4.00 FT
3.00 FT
2.00 FT
1.00 FT
0.00 FT
Depth (FT)
0.00 FT
1.00 FT
2.00 FT
3.00 FT
4.00 FT
5.00 FT
6.00 FT
7.00 FT
8.00 FT
9.00 FT
Depth Bellow Free Board (FT)
0
500000
1000000
1500000
2000000
2500000
Volume (CF)
(CF)
(1,000 GALLON)

MAURER ▲ STUTZ, INC.
ENGINEERS SURVEYORS

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COMPUTATION BY: MJR DATE: 10/3/06 SH. NO.: 1
CHECKED BY: DATE: OF: 1

Subject: Manure Stack Pad Volume

UNCOVERED STACK PAD 1 - in between blgs 1&2

	Side 1	Side 2	Side 3	Side 4	Summatoin
			Match to open	Open Side	
Wall Length	25	25	20	20	
Wall Height	4	4	4	0	
Max Stack Height	8	8	8	8	
Slope of repose	1	1	1	1	
Side Length	13	13	12	12	
Side Calc Ft^3	**104**	**104**	**96**	**384**	
Corner Calc	**21.33**	**21.33**	**170.67**	**170.67**	
	Length	Width	Height		
Top Bulk	13	12	4	**624**	
Bot Bulk	17	20	4	**1360**	
			Volume	**3056**	**ft^3**
			Area	500	**ft^2**

UNCOVERED STACK PAD 2 - in between blgs 2&3

	Side 1	Side 2	Side 3	Side 4	Summatoin
			Match to open	Open Side	
Wall Length	25	25	20	20	
Wall Height	4	4	4	0	
Max Stack Height	8	8	8	8	
Slope of repose	1	1	1	1	
Side Length	13	13	12	12	
Side Calc Ft^3	**104**	**104**	**96**	**384**	
Corner Calc	**21.33**	**21.33**	**170.67**	**170.67**	
	Length	Width	Height		
Top Bulk	13	12	4	**624**	
Bot Bulk	17	20	4	**1360**	
			Volume	**3056**	**ft^3**
			Area	500	**ft^2**

MAURER ▲ STUTZ, INC.
ENGINEERS SURVEYORS

PROJECT: Gene Bank of North America
PROJECT NO.: 238-05044A
COMPUTATION BY: MJR DATE: 10/3/06 SH. NO.: 1
CHECKED BY: DATE: OF: 1

Subject: Manure Stack Pad Volume

UNCOVERED STACK PAD 3 - in between blgs 3&4

	Side 1	Side 2	Side 3	Side 4	Summatoin	
			Match to open	Open Side		
Wall Length	25	25	20	20		
Wall Height	4	4	4	0		
Max Stack Height	8	8	8	8		
Slope of repose	1	1	1	1		
Side Length	13	13	12	12		
Side Calc Ft^3	**104**	**104**	**96**	**384**		
Corner Calc	**21.33**	**21.33**	**170.67**	**170.67**		
	Length	Width	Height			
Top Bulk	13	12	4	**624**		
Bot Bulk	17	20	4	**1360**		
			Volume	**3056**	**ft^3**	
			Area	500	**ft^2**	

UNCOVERED STACK PAD 4 - in between blgs 4&5

	Side 1	Side 2	Side 3	Side 4	Summatoin	
			Match to open	Open Side		
Wall Length	25	25	20	20		
Wall Height	4	4	4	0		
Max Stack Height	8	8	8	8		
Slope of repose	1	1	1	1		
Side Length	13	13	12	12		
Side Calc Ft^3	**104**	**104**	**96**	**384**		
Corner Calc	**21.33**	**21.33**	**170.67**	**170.67**		
	Length	Width	Height			
Top Bulk	13	12	4	**624**		
Bot Bulk	17	20	4	**1360**		
			Volume	**3056**	**ft^3**	
			Area	500	**ft^2**	