Lakeside-02

Appendix A Supporting the Prepared Direct Testimony of Daryl Maas

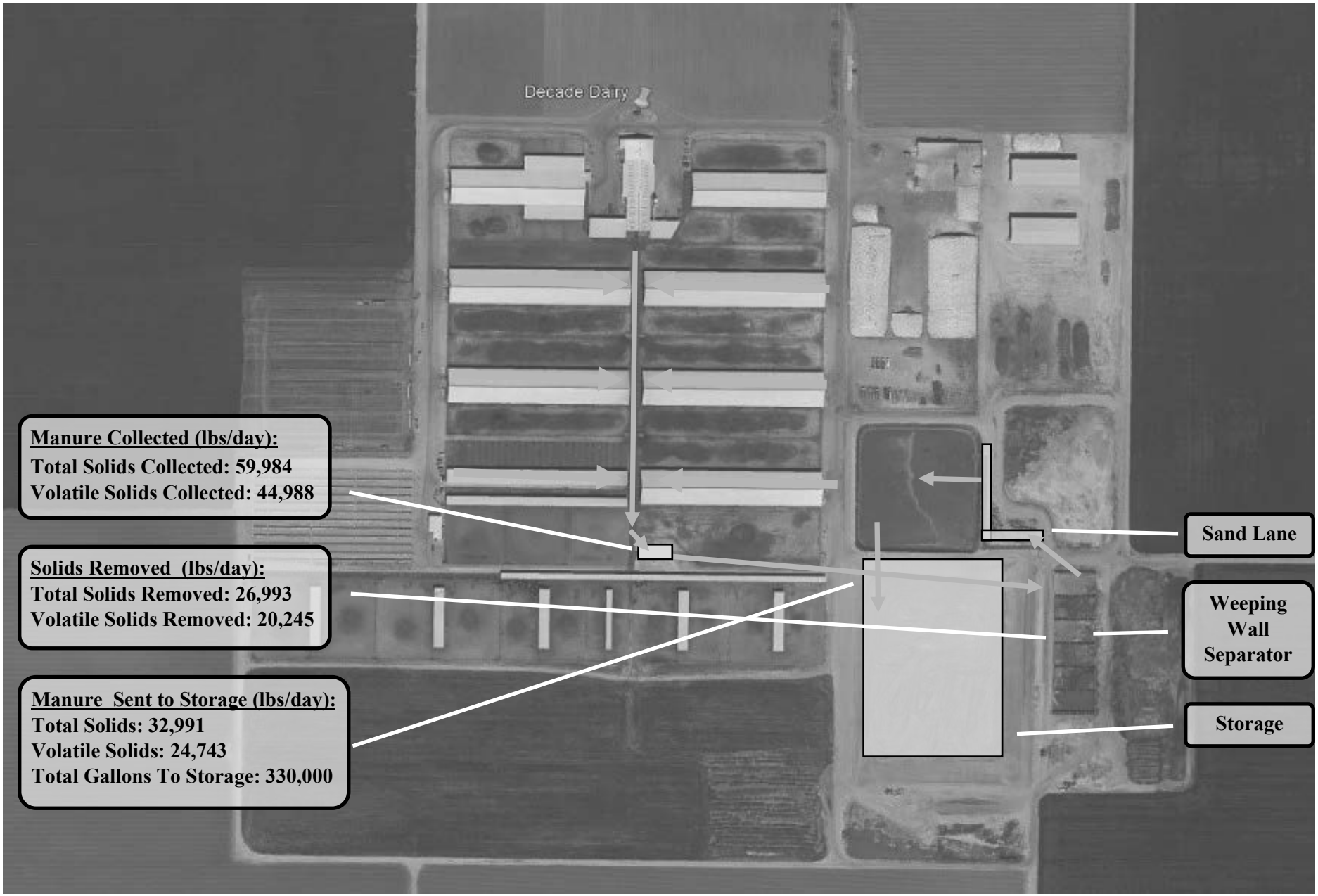
(Pilot Project)

[PUBLIC VERSION VOLUME 2]

Lakeside Pipeline Dairy Digester Cluster

Decade Centralized Dairy - Digester 1

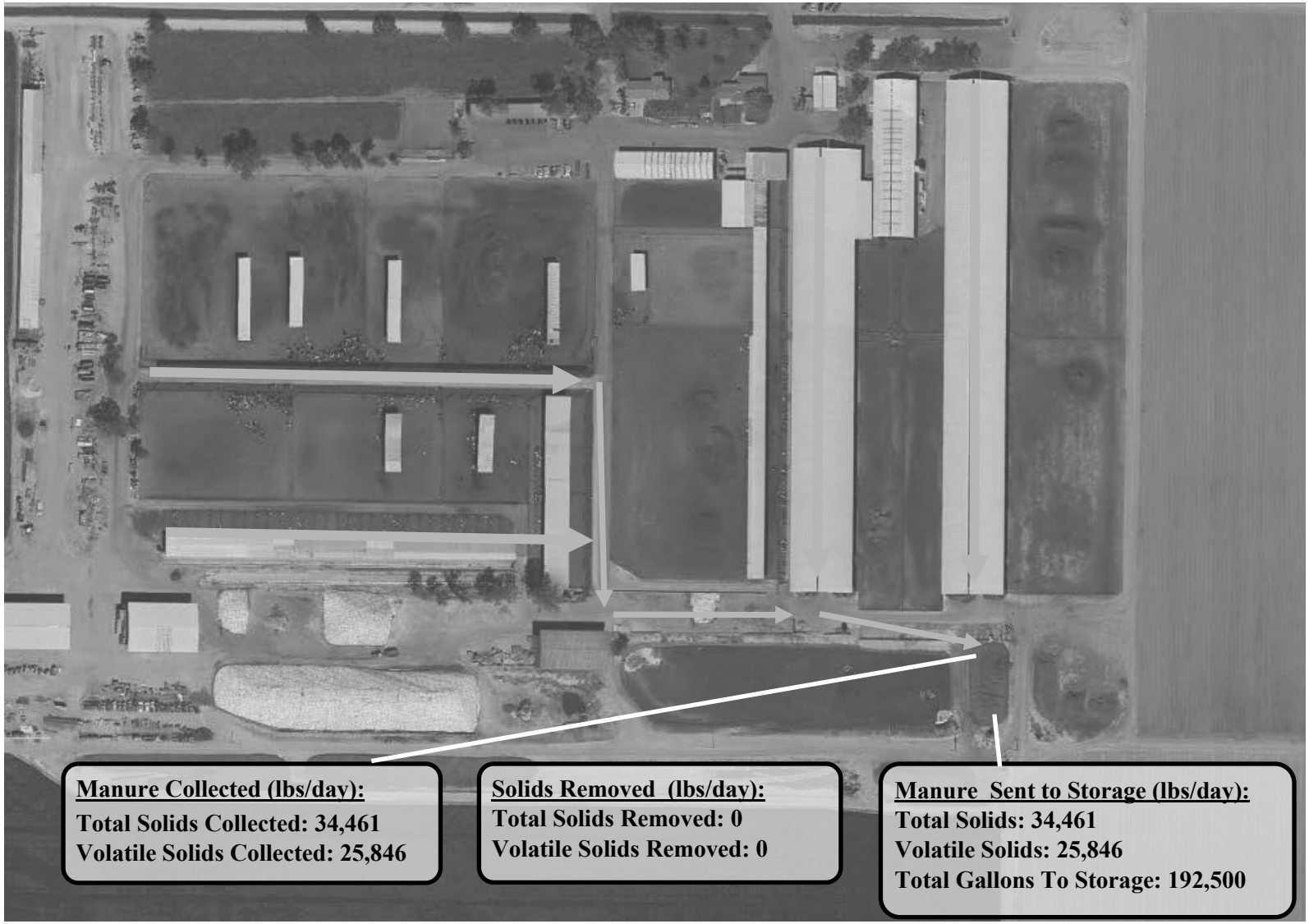
Annotated Manure Treatment Diagram (pre-project)



Lakeside Pipeline Dairy Digester Cluster

Decade Centralized Dairy - Digester 1

Richard Westra Dairy Annotated Manure Treatment Diagram (pre-project)



Lakeside Pipeline Dairy Digester Cluster

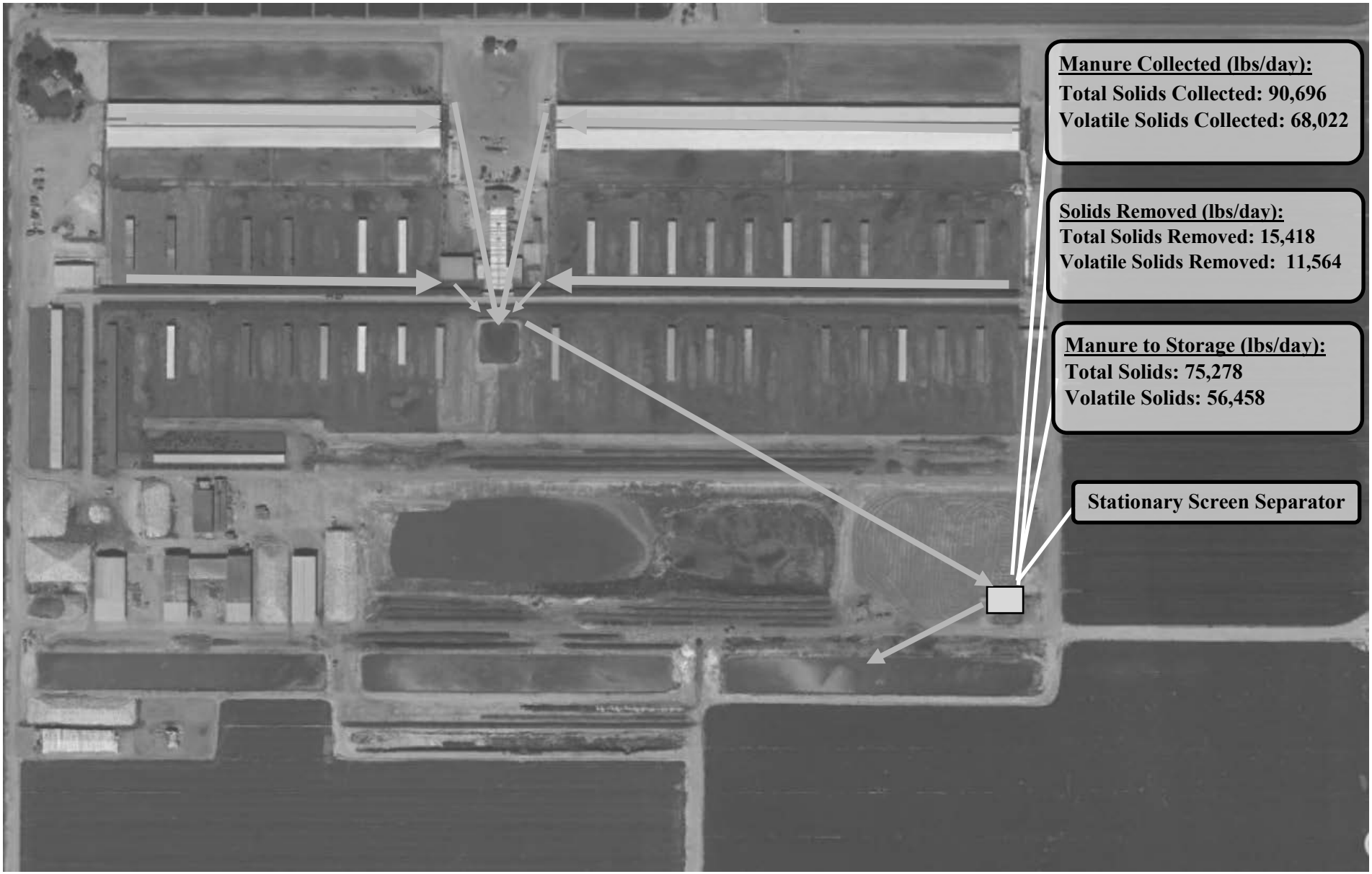
Clear Lake Dairy - Digester 2

Annotated Manure Treatment Diagram (pre-project)

Lakeside Pipeline Dairy Digester Cluster

Dixie Creek Dairy - Digester 3

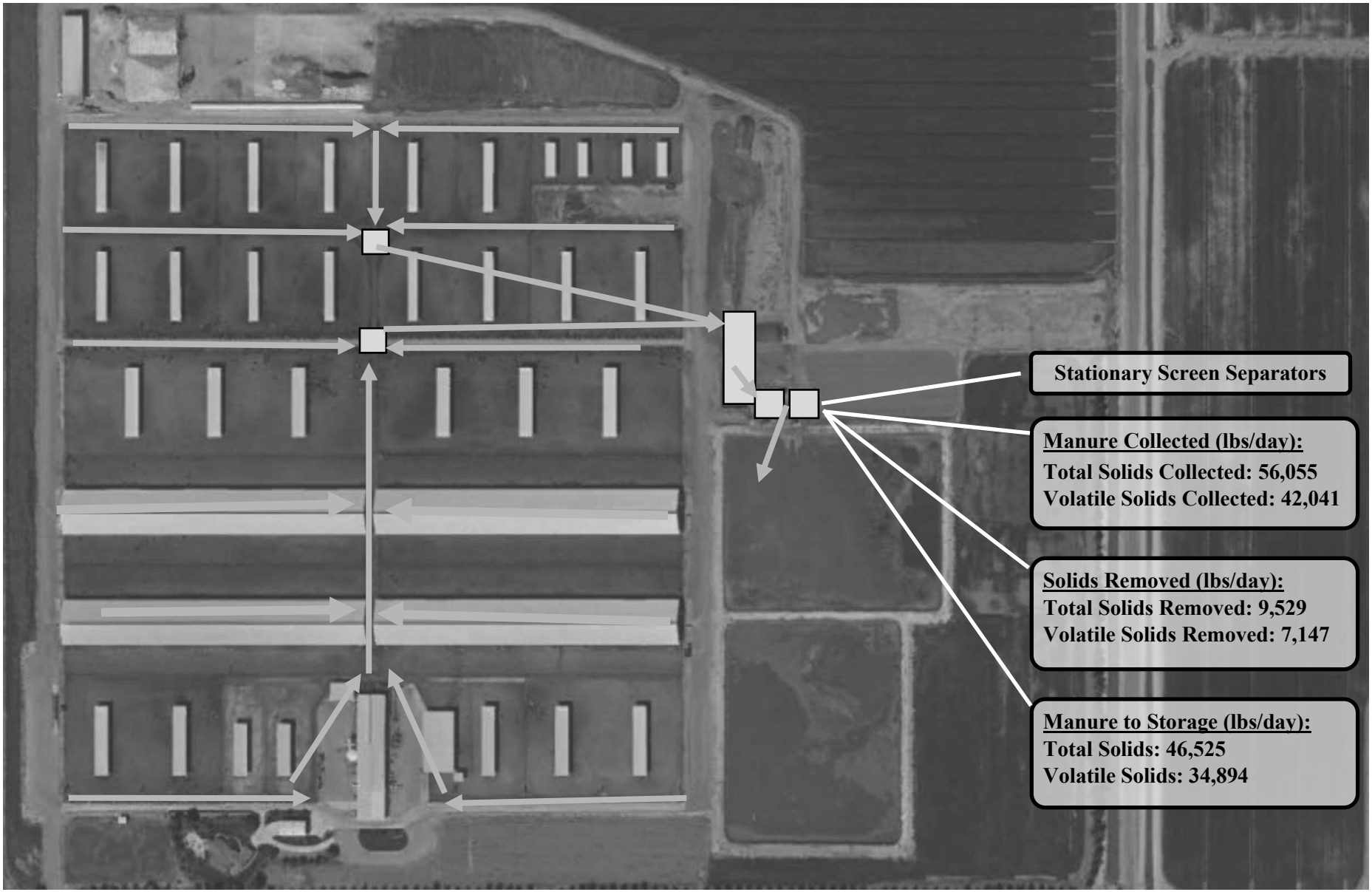
Annotated Manure Treatment Diagram (pre-project)



Lakeside Pipeline Dairy Digester Cluster

Double L Dairy - Digester 4

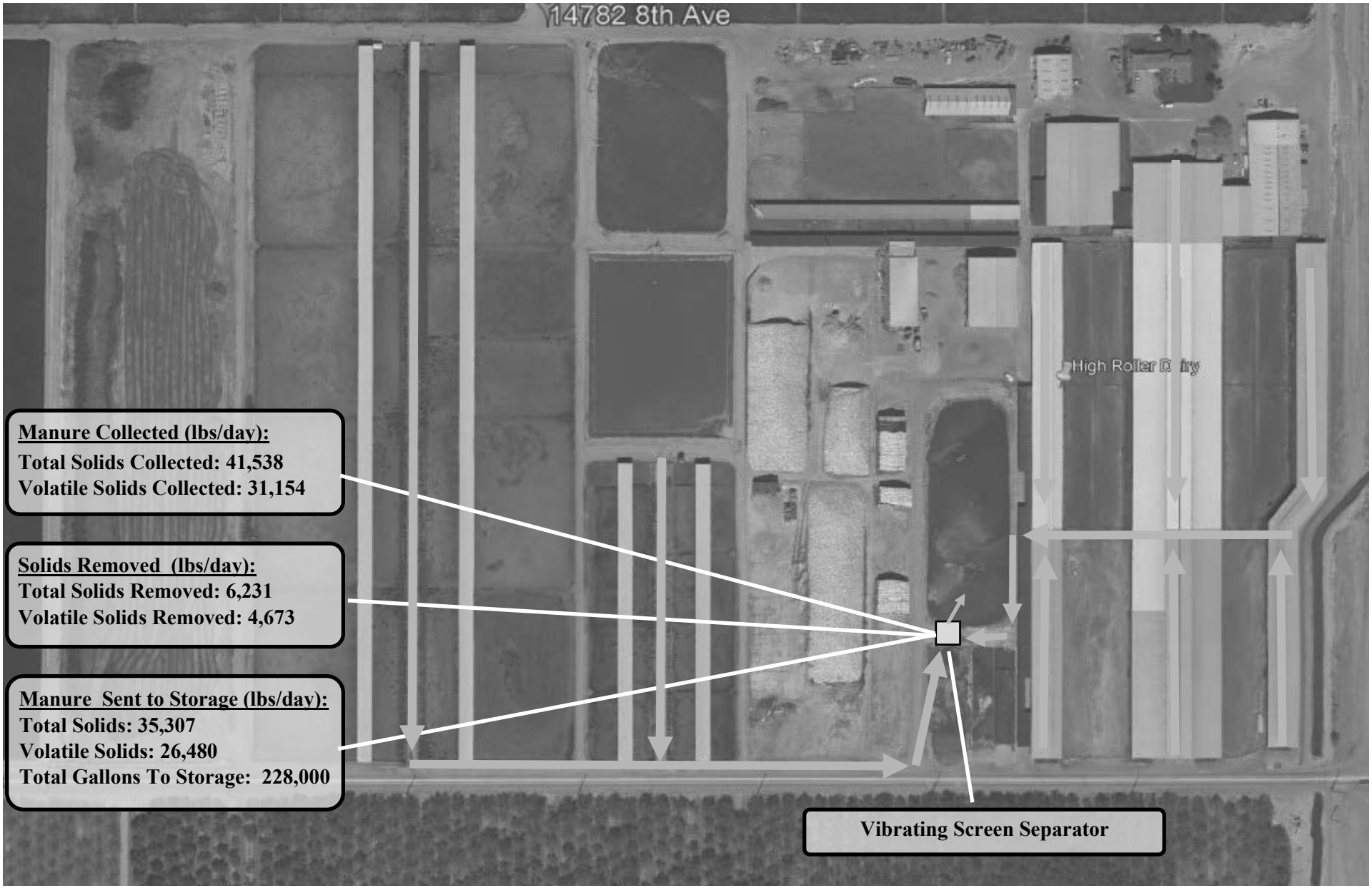
Annotated Manure Treatment Diagram (pre-project)



Lakeside Pipeline Dairy Digester Cluster

High Roller Dairy - Digester 5

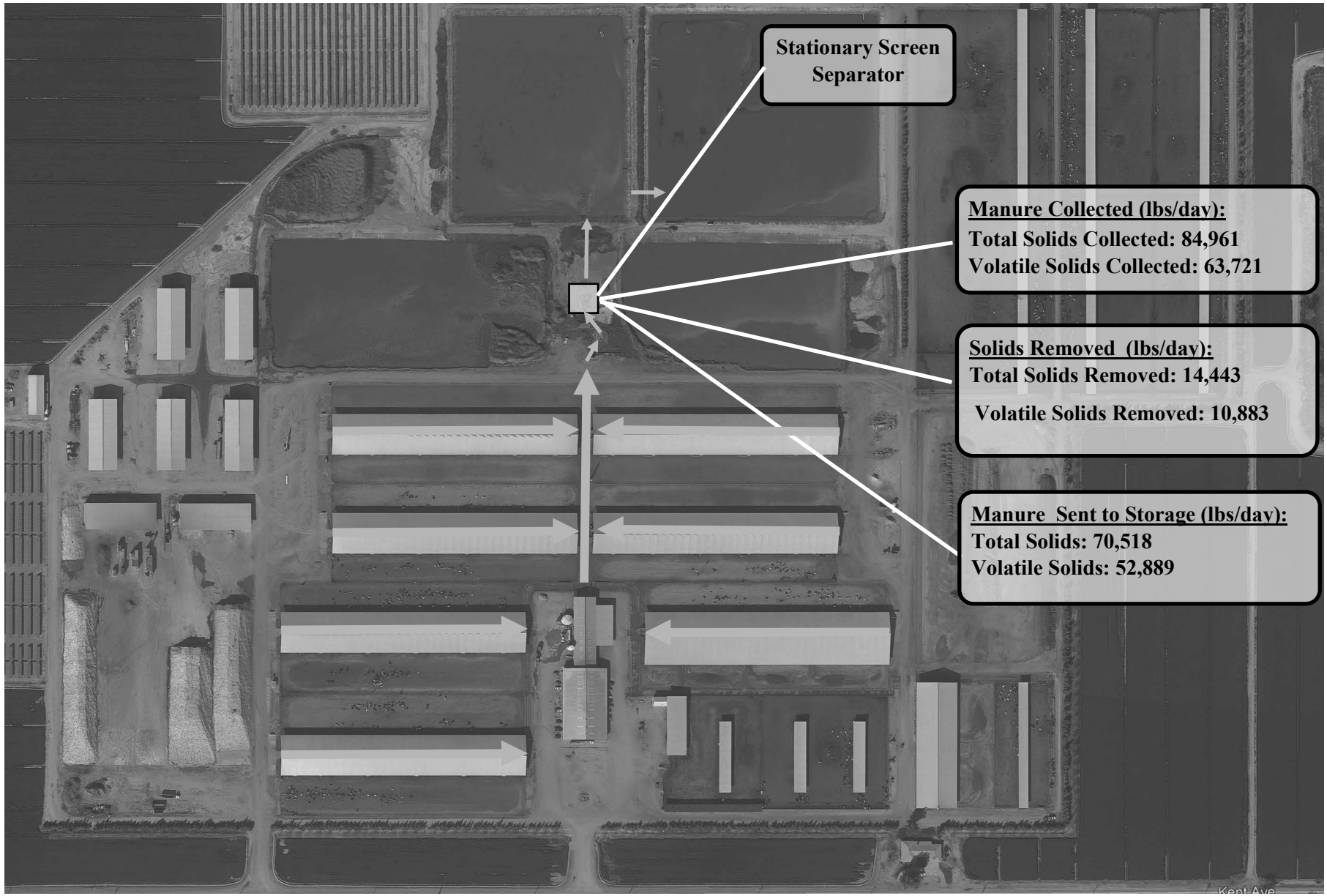
Annotated Manure Treatment Diagram (pre-project)



Lakeside Pipeline Dairy Digester Cluster

Lakeside Dairy - Digester 6

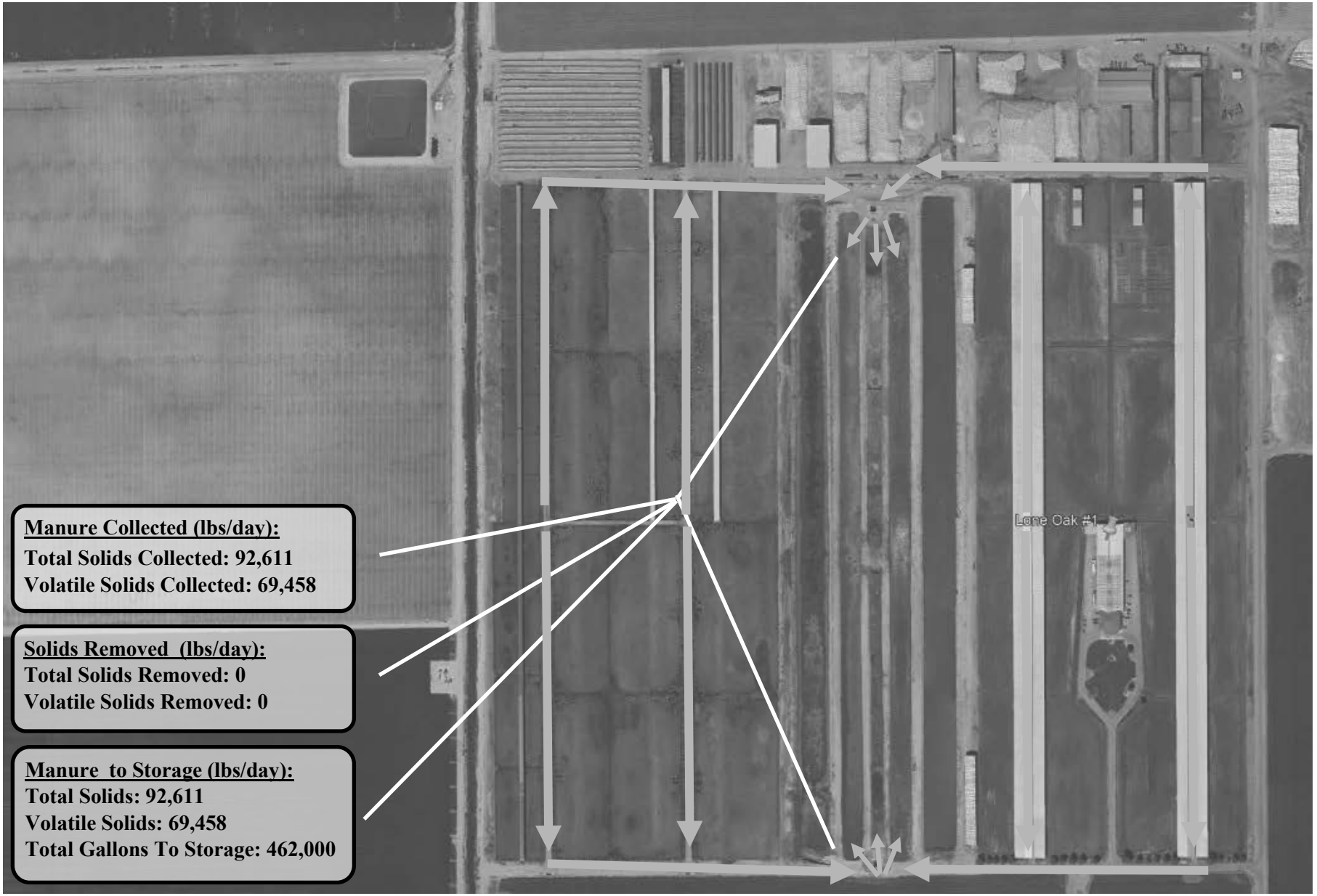
Annotated Manure Treatment Diagram (pre-project)



Lakeside Pipeline Dairy Digester Cluster

Lone Oak #1 Dairy - Digester 7

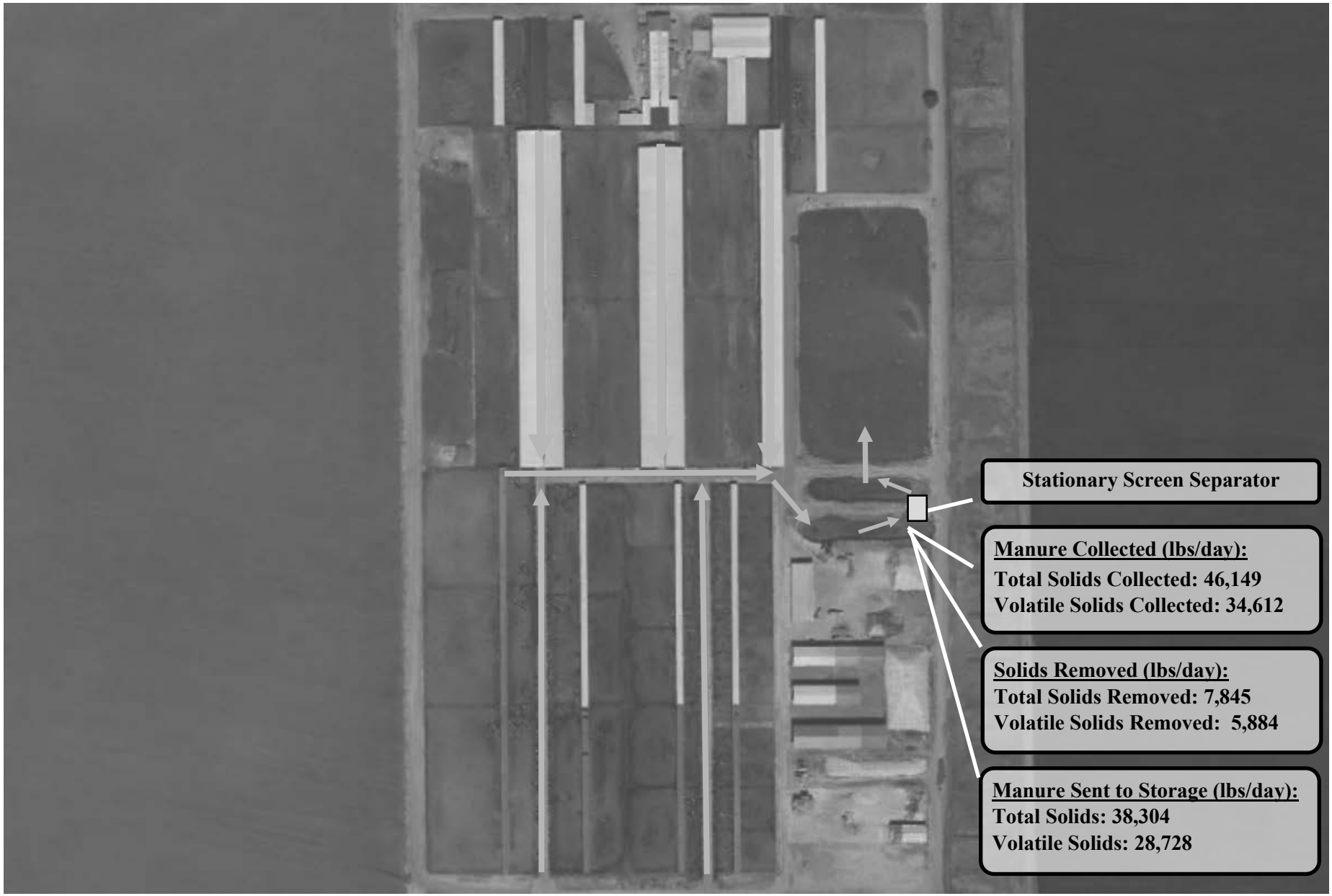
Annotated Manure Treatment Diagram (pre-project)



Lakeside Pipeline Digester Cluster

Poplar Lane Dairy - Digester 8

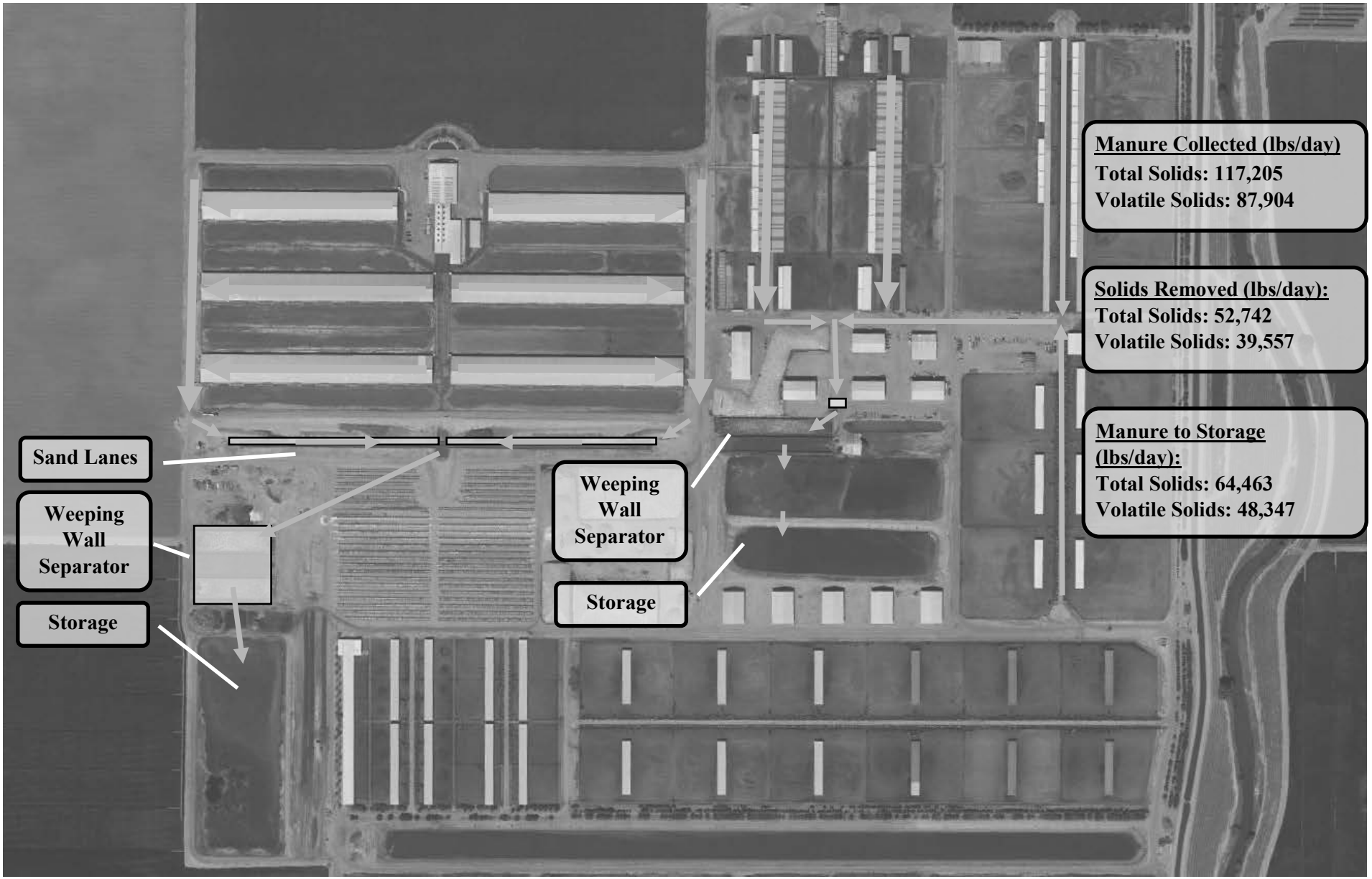
Annotated Manure Treatment Diagram (pre-project)



Lakeside Pipeline Dairy Digester Cluster

River Ranch Dairy - Digester 9

Annotated Manure Treatment Diagram (pre-project)



Lakeside Pipeline Cluster - Digester #1

Decade Centralized Dairy Digester Pipeline Project

Mass Balance Tables

BASELINE

Herd Information					Manure Excreted			Collection Rates		Collection Quantities		Solids Removal				To Storage		
Animal Type	Number of Animals	Breed	Housing	Animal Weight (kg)	Volatile Solids Excreted (kg / day / 1000kg mass)[1]	Volatile Solids (lbs/day)	Total Solids (lbs/day)[2]	% TS/VS Deposited on Land	% TS/VS Collected by Manure System	Pounds TS/ Day	Pounds VS/Day	Separation Type	TS/VS Separated (% of Gross Excreted)[3]	Total Solids Removed (lbs/day)	Volatile Solids Removed (lbs/day)	Total Solids (lbs/day)	Volatile Solids (lbs/day)	Total Fluid to Storage (gal/day)
Milk Cow - Decade Dairy	3,000	Holstein	Freestall	680	11.41	51,316	68,421	20%	80%	54,737	41,053	Weeping Wall	36.0%	24,632	18,474	30,105	22,579	
Dry Cow - Decade Dairy	300	Holstein	Open Lot	684	5.56	2,515	3,354	70%	30%	1,006	755	Weeping Wall	13.5%	453	340	553	415	
Heifer - Decade Dairy	1,400	Holstein	Open Lot	407	8.44	10,602	14,136	70%	30%	4,241	3,181	Weeping Wall	13.5%	1,908	1,431	2,333	1,749	
Milk Cow 1 - Richard Westra	1,500	Holstein	Freestall	680	11.41	25,658	34,210	20%	80%	27,368	20,526	None	0.0%	-	-	27,368	20,526	
Milk Cow 2 - Richard Westra	250	Holstein	Open Lot	680	11.41	4,276	5,702	70%	30%	1,711	1,283	None	0.0%	-	-	1,711	1,283	
Dry Cow - Richard Westra	250	Holstein	Open Lot	684	5.56	2,096	2,795	70%	30%	838	629	None	0.0%	-	-	838	629	
Heifer - Richard Westra	1,500	Holstein	Open Lot	407	8.44	11,360	15,146	70%	30%	4,544	3,408	None	0.0%	-	-	4,544	3,408	
	8,200					**107,823**	**143,764**			**94,445**	**70,834**			**26,993**	**20,245**	**67,452**	**50,589**	**522,500**

PROJECT

Herd Information					Manure Excreted			Collection Rates		Collection Quantities		Solids Removal			
Animal Type	Number of Animals	Breed	Housing	Animal Weight (kg)	Volatile Solids Excreted (kg / day / 1000kg mass)[1]	Volatile Solids (lbs/day)	Total Solids (lbs/day)[2]	% TS/VS Deposited on Land	TS/VS Collected (% of Gross Excreted)	Total Solids (lbs/day)	Volatile Solids (lbs/day)	Separation Type	TS/VS Separated (% of Gross Excreted)[3]	Total Solids Removed (lbs/day)	Volatile Solids Removed (lbs/day)
Milk Cow - Decade Dairy	3,000	Holstein	Freestall	680	11.41	51,316	68,421	20%	80%	54,737	41,053	Weeping Wall	36.0%	24,632	18,474
Dry Cow - Decade Dairy	300	Holstein	Open Lot	684	5.56	2,515	3,354	70%	30%	1,006	755	Weeping Wall	13.5%	453	340
Heifer - Decade Dairy	1,400	Holstein	Open Lot	407	8.44	10,602	14,136	70%	30%	4,241	3,181	Weeping Wall	13.5%	1,908	1,431
Milk Cow 1 - Richard Westra	1,500	Holstein	Freestall	680	11.41	25,658	34,210	20%	80%	27,368	20,526	Vibrating Screen	12.0%	4,105	3,079
Milk Cow 2 - Richard Westra	250	Holstein	Open Lot	680	11.41	4,276	5,702	70%	30%	1,711	1,283	Vibrating Screen	4.5%	257	192
Dry Cow - Richard Westra	250	Holstein	Open Lot	684	5.56	2,096	2,795	70%	30%	838	629	Vibrating Screen	4.5%	126	94
Heifer - Richard Westra	1,500	Holstein	Open Lot	407	8.44	11,360	15,146	70%	30%	4,544	3,408	Vibrating Screen	4.5%	682	511
	8,200					**107,823**	**143,764**			**94,445**	**70,834**			**32,162**	**24,121**

	Digester Influent				Digestion					Digester Effluent		
Animal Type	TS/VS Entering Digester (% of Gross Excreted)	TS Entering Digester (lbs/day)	VS Entering Digester (lbs/day)	Total Fluid Entering Digester (gal/day)	VS Destruction Rate[4]	VS Destroyed (lbs/day)	SCF Biogas / lbs VS Destroyed	Biogas Production (scf/day @ 60% CH4)	Biogas Production (MMBTU/yr)	TS Exiting Digester (lbs/day)	VS Exiting Digester (lbs/day)	Total Fluid Exiting Digester (gal/day)
Milk Cow - Decade Dairy	44.0%	30,105	22,579		42%	9,483	14.3	135,609	29,698	20,622	13,096	
Dry Cow - Decade Dairy	16.5%	553	415		42%	174	14.3	2,493	546	379	241	
Heifer - Decade Dairy	16.5%	2,333	1,749		42%	735	14.3	10,507	2,301	1,598	1,015	
Milk Cow 1 - Richard Westra	68.0%	23,263	17,447		42%	7,328	14.3	104,789	22,949	15,935	10,119	
Milk Cow 2 - Richard Westra	25.5%	1,454	1,090		42%	458	14.3	6,549	1,434	996	632	
Dry Cow - Richard Westra	25.5%	713	534		42%	224	14.3	3,210	703	488	310	
Heifer - Richard Westra	25.5%	3,862	2,897		42%	1,217	14.3	17,398	3,810	2,646	1,680	
		62,283	**46,712**	**522,500**		**19,619**		**280,554**	**61,441**	**42,664**	**27,093**	**520,148**

Separator Efficiency Table*

Type	VS Removal Rate (% of Gross Collected)
No Solid Separation	0%
Weeping Wall	45%
Stationary Screen	17%
Vibrating Screen	15%

*Per ARB's GHG Calculator

[1] Per ARB's GHG Calculator

[2] Assumes 75% of Totals Solids is Volatile

[3] TS/VS Separated shown as a "% of gross manure excreted" to match ARB's GHG Calculator. Separator efficiencies shown as a "% of gross manure collected" also referenced in the Separator Efficiency Table

[4] Calculated by Project Engineer, Craig Hartman of Hartman Engineering, based on site specific design and HRT

Lakeside Pipeline Cluster - Digester #2

Clear Lake Dairy Digester Pipeline Project

Mass Balance Tables

BASELINE																		
Herd Information					Manure Excreted			Collection Rates		Collection Quantities		Solids Removal				To Storage		
Animal Type	Number of Animals	Breed	Housing	Animal Weight (kg)	Volatile Solids Excreted (kg / day / 1000kg mass)[1]	Volatile Solids (lbs/day)	Total Solids (lbs/day)[2]	% TS/VS Deposited on Land	% TS/VS Collected by Manure System	Pounds TS/ Day	Pounds VS/Day	Separation Type	TS/VS Separated (% of Gross Excreted)[3]	Total Solids Removed (lbs/day)	Volatile Solids Removed (lbs/day)	Total Solids (lbs/day)	Volatile Solids (lbs/day)	Total Fluid to Storage (gal/day)
Milking Cow	2,050	Holstein	Freestall	680	11.41	35,066	46,754	20%	80%	37,403	28,053	Stationary Screen	13.6%	6,359	4,769	31,045	23,284	
Dry Cow	400	Holstein	Open Lot	684	5.56	3,354	4,472	70%	30%	1,341	1,006	Stationary Screen	5.1%	228	171	1,113	835	
Heifer	2,000	Holstein	Open Lot	407	8.44	15,146	20,195	70%	30%	6,058	4,544	Stationary Screen	5.1%	1,030	772	5,029	3,771	
	4,450					**53,566**	**71,421**			**44,803**	**33,603**			**7,617**	**5,712**	**37,187**	**27,890**	**266,500**

PROJECT															
Herd Information					Manure Excreted			Collection Rates		Collection Quantities		Solids Removal			
Animal Type	Number of Animals	Breed	Housing	Animal Weight (kg)	Volatile Solids Excreted (kg / day / 1000kg mass)[1]	Volatile Solids (lbs/day)	Total Solids (lbs/day)[2]	% TS/VS Deposited on Land	TS/VS Collected (% of Gross Excreted)	Total Solids (lbs/day)	Volatile Solids (lbs/day)	Separation Type	TS/VS Separated (% of Gross Excreted)[3]	Total Solids Removed (lbs/day)	Volatile Solids Removed (lbs/day)
Milking Cow	2,050	Holstein	Freestall	680	11.41	35,066	46,754	20%	80%	37,403	28,053	Stationary Screen	13.6%	6,359	4,769
Dry Cow	400	Holstein	Open Lot	684	5.56	3,354	4,472	70%	30%	1,341	1,006	Stationary Screen	5.1%	228	171
Heifer	2,000	Holstein	Open Lot	407	8.44	15,146	20,195	70%	30%	6,058	4,544	Stationary Screen	5.1%	1,030	772
						53,566	**71,421**			**44,803**	**33,603**			**7,617**	**5,712**

Digester Influent				Digestion					Digester Effluent		
TS/VS Entering Digester (% of Gross Excreted)	TS Entering Digester (lbs/day)	VS Entering Digester (lbs/day)	Total Fluid Entering Digester (gal/day)	VS Destruction Rate[4]	VS Destroyed (lbs/day)	SCF Biogas / lbs VS Destroyed	Biogas Production (scf/day @ 60% CH4)	Biogas Production (MMBTU/yr)	TS Exiting Digester (lbs/day)	VS Exiting Digester (lbs/day)	Total Fluid Exiting Digester (gal/day)
66.4%	31,045	23,284		38%	8,848	14.3	126,523	27,709	22,197	14,436	
24.9%	1,113	835		38%	317	14.3	4,538	994	796	518	
24.9%	5,029	3,771		38%	1,433	14.3	20,494	4,488	3,595	2,338	
	37,187	**27,890**	**266,500**		**10,598**		**151,555**	**33,190**	**26,589**	**17,292**	**265,229**

Separator Efficiency Table*	
Type	VS Removal Rate (% of Gross Collected)
No Solid Separation	0%
Weeping Wall	45%
Stationary Screen	17%
Vibrating Screen	15%

*Per ARB's GHG Calculator

[1] Per ARB's GHG Calculator

[2] Assumes 75% of Totals Solids is Volatile

[3] TS/VS Separated shown as a "% of gross manure excreted" to match ARB's GHG Calculator. Separator efficiencies shown as a "% of gross manure collected" also referenced in the Separator Efficiency Table

[4] Calculated by Project Engineer based on site specific design and HRT

Lakeside Pipeline Cluster - Digester #3

Dixie Creek Dairy Digester Pipeline Project

Mass Balance Tables

BASELINE																		
Herd Information					**Manure Excreted**			**Collection Rates**		**Collection Quantities**		**Solids Removal**				**To Storage**		
Animal Type	Number of Animals	Breed	Housing	Animal Weight (kg)	Volatile Solids Excreted (kg / day / 1000kg mass)[1]	Volatile Solids (lbs/day)	Total Solids (lbs/day)[2]	% TS/VS Deposited on Land	% TS/VS Collected by Manure System	Pounds TS/ Day	Pounds VS/Day	Separation Type	TS/VS Separated (% of Gross Excreted)[3]	Total Solids Removed (lbs/day)	Volatile Solids Removed (lbs/day)	Total Solids (lbs/day)	Volatile Solids (lbs/day)	Total Fluid to Storage (gal/day)
Milking Cow	4,600	Holstein	Freestall	680	11.41	78,684	104,912	20%	80%	83,930	62,947	Stationary Screen	13.6%	14,268	10,701	69,662	52,246	
Milking Cow	400	Holstein	Open Lot	680	11.41	6,842	9,123	70%	30%	2,737	2,053	Stationary Screen	5.1%	465	349	2,272	1,704	
Dry Cow	750	Holstein	Open Lot	684	5.56	6,288	8,384	70%	30%	2,515	1,886	Stationary Screen	5.1%	428	321	2,088	1,566	
Heifer	500	Holstein	Open Lot	407	8.44	3,787	5,049	70%	30%	1,515	1,136	Stationary Screen	5.1%	257	193	1,257	943	
						95,601	**127,468**			**90,696**	**68,022**			**15,418**	**11,564**	**75,278**	**56,458**	**750,000**

PROJECT															
Herd Information					**Manure Excreted**			**Collection Rates**		**Collection Quantities**		**Solids Removal**			
Animal Type	Number of Animals	Breed	Housing	Animal Weight (kg)	Volatile Solids Excreted (kg / day / 1000kg mass)[1]	Volatile Solids (lbs/day)	Total Solids (lbs/day)[2]	% TS/VS Deposited on Land	TS/VS Collected (% of Gross Excreted)	Total Solids (lbs/day)	Volatile Solids (lbs/day)	Separation Type	TS/VS Separated (% of Gross Excreted)[3]	Total Solids Removed (lbs/day)	Volatile Solids Removed (lbs/day)
Milking Cow	4,600	Holstein	Freestall	680	11.41	78,684	104,912	20%	80%	83,930	62,947	Stationary Screen	13.6%	14,268	10,701
Milking Cow	400	Holstein	Open Lot	680	11.41	6,842	9,123	70%	30%	2,737	2,053	Stationary Screen	5.1%	465	349
Dry Cow	750	Holstein	Open Lot	684	5.56	6,288	8,384	70%	30%	2,515	1,886	Stationary Screen	5.1%	428	321
Heifer	500	Holstein	Open Lot	407	8.44	3,787	5,049	70%	30%	1,515	1,136	Stationary Screen	5.1%	257	193
						95,601	**127,468**			**90,696**	**68,022**			**15,418**	**11,564**

Digester Influent				**Digestion**					**Digester Effluent**		
TS/VS Entering Digester (% of Gross Excreted)	TS Entering Digester (lbs/day)	VS Entering Digester (lbs/day)	Total Fluid Entering Digester (gal/day)	VS Destruction Rate[4]	VS Destroyed (lbs/day)	SCF Biogas / lbs VS Destroyed	Biogas Production (scf/day @ 60% CH4)	Biogas Production (MMBTU/yr)	TS Exiting Digester (lbs/day)	VS Exiting Digester (lbs/day)	Total Fluid Exiting Digester (gal/day)
66.4%	69,662	52,246		38%	19,854	14.3	283,906	62,175	49,808	32,393	
24.9%	2,272	1,704		38%	647	14.3	9,258	2,027	1,624	1,056	
24.9%	2,088	1,566		38%	595	14.3	8,508	1,863	1,493	971	
24.9%	1,257	943		38%	358	14.3	5,123	1,122	899	585	
	75,278	**56,458**	**750,000**		**21,454**		**306,795**	**67,188**	**53,824**	**35,004**	**747,428**

Separator Efficiency Table*	
Type	VS Removal Rate (% of Gross Collected)
No Solid Separation	0%
Weeping Wall	45%
Stationary Screen	17%
Vibrating Screen	15%

*Per ARB's GHG Calculator

[1] Per ARB's GHG Calculator

[2] Assumes 75% of Totals Solids is Volatile

[3] TS/VS Separated shown as a "% of gross manure excreted" to match ARB's GHG Calculator. Separator efficiencies shown as a "% of gross manure collected" also referenced in the Separator Efficiency Table

[4] Calculated by Project Engineer based on site specific design and HRT

Lakeside Pipeline Cluster - Digester #4

Double L Dairy Digester Pipeline Project

Mass Balance Tables

BASELINE																		
Herd Information					**Manure Excreted**			**Collection Rates**		**Collection Quantities**		**Solids Removal**				**To Storage**		
Animal Type	Number of Animals	Breed	Housing	Animal Weight (kg)	Volatile Solids Excreted (kg / day / 1000kg mass)[1]	Volatile Solids (lbs/day)	Total Solids (lbs/day)[2]	% TS/VS Deposited on Land	% TS/VS Collected by Manure System	Pounds TS/ Day	Pounds VS/Day	Separation Type	TS/VS Separated (% of Gross Excreted)[3]	Total Solids Removed (lbs/day)	Volatile Solids Removed (lbs/day)	Total Solids (lbs/day)	Volatile Solids (lbs/day)	Total Fluid to Storage (gal/day)
Milking Cow	2,590	Holstein	Freestall	680	11.41	44,303	59,070	20%	80%	47,256	35,442	Stationary Screen	13.6%	8,034	6,025	39,223	29,417	
Dry Cow	239	Holstein	Open Lot	684	5.56	2,004	2,672	70%	30%	802	601	Stationary Screen	5.1%	136	102	665	499	
Heifer	2,640	Holstein	Open Lot	407	8.44	19,993	26,657	70%	30%	7,997	5,998	Stationary Screen	5.1%	1,360	1,020	6,638	4,978	
						66,299	**88,399**			**56,055**	**42,041**			**9,529**	**7,147**	**46,525**	**34,894**	**388,500**

PROJECT															
Herd Information					**Manure Excreted**			**Collection Rates**		**Collection Quantities**		**Solids Removal**			
Animal Type	Number of Animals	Breed	Housing	Animal Weight (kg)	Volatile Solids Excreted (kg / day / 1000kg mass)[1]	Volatile Solids (lbs/day)	Total Solids (lbs/day)[2]	% TS/VS Deposited on Land	TS/VS Collected (% of Gross Excreted)	Total Solids (lbs/day)	Volatile Solids (lbs/day)	Separation Type	TS/VS Separated (% of Gross Excreted)[3]	Total Solids Removed (lbs/day)	Volatile Solids Removed (lbs/day)
Milking Cow	2,590	Holstein	Freestall	680	11.41	44,303	59,070	20%	80%	47,256	35,442	Stationary Screen	13.6%	8,034	6,025
Dry Cow	239	Holstein	Open Lot	684	5.56	2,004	2,672	70%	30%	802	601	Stationary Screen	5.1%	136	102
Heifer	2,640	Holstein	Open Lot	407	8.44	19,993	26,657	70%	30%	7,997	5,998	Stationary Screen	5.1%	1,360	1,020
						66,299	**88,399**			**56,055**	**42,041**			**9,529**	**7,147**

Digester Influent				**Digestion**					**Digester Effluent**		
TS/VS Entering Digester (% of Gross Excreted)	TS Entering Digester (lbs/day)	VS Entering Digester (lbs/day)	Total Fluid Entering Digester (gal/day)	VS Destruction Rate[4]	VS Destroyed (lbs/day)	SCF Biogas / lbs VS Destroyed	Biogas Production (scf/day @ 60% CH4)	Biogas Production (MMBTU/yr)	TS Exiting Digester (lbs/day)	VS Exiting Digester (lbs/day)	Total Fluid Exiting Digester (gal/day)
66.4%	39,223	29,417		54%	15,885	14.3	227,157	49,747	23,337	13,532	
24.9%	665	499		54%	269	14.3	3,853	844	396	230	
24.9%	6,638	4,978		54%	2,688	14.3	38,442	8,419	3,949	2,290	
	46,525	**34,894**	**388,500**		**18,843**		**269,452**	**59,010**	**27,683**	**16,051**	**386,241**

Separator Efficiency Table*	
Type	VS Removal Rate (% of Gross Collected)
No Solid Separation	0%
Weeping Wall	45%
Stationary Screen	17%
Vibrating Screen	15%

*Per ARB's GHG Calculator

[1] Per ARB's GHG Calculator

[2] Assumes 75% of Totals Solids is Volatile

[3] TS/VS Separated shown as a "% of gross manure excreted" to match ARB's GHG Calculator. Separator efficiencies shown as a "% of gross manure collected" also referenced in the Separator Efficiency Table

[4] Calculated by Project Engineer based on site specific design and HRT

Lakeside Pipeline Cluster - Digester #5

High Roller Dairy Digester Pipeline

Mass Balance Tables

BASELINE																		
Herd Information					**Manure Excreted**			**Collection Rates**		**Collection Quantities**		**Solids Removal**				**To Storage**		
Animal Type	Number of Animals	Breed	Housing	Animal Weight (kg)	Volatile Solids Excreted (kg / day / 1000kg mass)[1]	Volatile Solids (lbs/day)	Total Solids (lbs/day)[2]	% TS/VS Deposited on Land	% TS/VS Collected by Manure System	Pounds TS/ Day	Pounds VS/Day	Separation Type	TS/VS Separated (% of Gross Excreted)[3]	Total Solids Removed (lbs/day)	Volatile Solids Removed (lbs/day)	Total Solids (lbs/day)	Volatile Solids (lbs/day)	Total Fluid to Storage (gal/day)
Milking Cow	1,900	Jersey	Freestall	680	11.41	32,500	43,333	20%	80%	34,667	26,000	Vibrating Screen	12.0%	5,200	3,900	29,467	22,100	
Dry Cow	265	Jersey	Open Lot	684	5.56	2,222	2,962	70%	30%	889	667	Vibrating Screen	4.5%	133	100	755	567	
Heifer	1,975	Jersey	Open Lot	407	8.44	14,957	19,942	70%	30%	5,983	4,487	Vibrating Screen	4.5%	897	673	5,085	3,814	
						49,679	**66,238**			**41,538**	**31,154**			**6,231**	**4,673**	**35,307**	**26,480**	**228,000**

PROJECT															
Herd Information					**Manure Excreted**			**Collection Rates**		**Collection Quantities**		**Solids Removal**			
Animal Type	Number of Animals	Breed	Housing	Animal Weight (kg)	Volatile Solids Excreted (kg / day / 1000kg mass)[1]	Volatile Solids (lbs/day)	Total Solids (lbs/day)[2]	% TS/VS Deposited on Land	TS/VS Collected (% of Gross Excreted)	Total Solids (lbs/day)	Volatile Solids (lbs/day)	Separation Type	TS/VS Separated (% of Gross Excreted)[3]	Total Solids Removed (lbs/day)	Volatile Solids Removed (lbs/day)
Milking Cow	1,900	Jersey	Freestall	680	11.41	32,500	43,333	20%	80%	34,667	26,000	Vibrating Screen	12.0%	5,200	3,900
Dry Cow	265	Jersey	Open Lot	684	5.56	2,222	2,962	70%	30%	889	667	Vibrating Screen	4.5%	133	100
Heifer	1,975	Jersey	Open Lot	407	8.44	14,957	19,942	70%	30%	5,983	4,487	Vibrating Screen	4.5%	897	673
						49,679	**66,238**			**41,538**	**31,154**			**6,231**	**4,673**

Digester Influent				**Digestion**					**Digester Effluent**		
TS/VS Entering Digester (% of Gross Excreted)	TS Entering Digester (lbs/day)	VS Entering Digester (lbs/day)	Total Fluid Entering Digester (gal/day)	VS Destruction Rate[4]	VS Destroyed (lbs/day)	SCF Biogas / lbs VS Destroyed	Biogas Production (scf/day @ 60% CH4)	Biogas Production (MMBTU/yr)	TS Exiting Digester (lbs/day)	VS Exiting Digester (lbs/day)	Total Fluid Exiting Digester (gal/day)
68.0%	29,467	22,100		42%	9,282	14.3	132,732	29,068	20,185	12,818	
25.5%	755	567		42%	238	14.3	3,403	745	517	329	
25.5%	5,085	3,814		42%	1,602	14.3	22,907	5,017	3,483	2,212	
	35,307	**26,480**	**228,000**		**11,122**		**159,042**	**34,830**	**24,186**	**15,359**	**226,666**

Separator Efficiency Table*	
Type	VS Removal Rate (% of Gross Collected)
No Solid Separation	0%
Weeping Wall	45%
Stationary Screen	17%
Vibrating Screen	15%

*Per ARB's GHG Calculator

[1] Per ARB's GHG Calculator

[2] Assumes 75% of Totals Solids is Volatile

[3] TS/VS Separated shown as a "% of gross manure excreted" to match ARB's GHG Calculator. Separator efficiencies shown as a "% of gross manure collected" also referenced in the Separator Efficiency Table

[4] Calculated by Project Engineer based on site specific design and HRT

Lakeside Pipeline Cluster - Digester #6

Lakeside Dairy Digester Pipeline Project

Mass Balance Tables

BASELINE																		
Herd Information					**Manure Excreted**			**Collection Rates**		**Collection Quantities**		**Solids Removal**				**To Storage**		
Animal Type	Number of Animals	Breed	Housing	Animal Weight (kg)	Volatile Solids Excreted (kg / day / 1000kg mass)[1]	Volatile Solids (lbs/day)	Total Solids (lbs/day)[2]	% TS/VS Deposited on Land	% TS/VS Collected by Manure System	Pounds TS/ Day	Pounds VS/Day	Separation Type	TS/VS Separated (% of Gross Excreted)[3]	Total Solids Removed (lbs/day)	Volatile Solids Removed (lbs/day)	Total Solids (lbs/day)	Volatile Solids (lbs/day)	Total Fluid to Storage (gal/day)
Milking Cow	3,965	Holstein	Freestall	680	11.41	67,822	90,430	20%	80%	72,344	54,258	Stationary Screen	13.6%	12,298	9,224	60,045	45,034	
Dry Cow	442	Holstein	Open Lot	684	5.56	3,706	4,941	70%	30%	1,482	1,112	Stationary Screen	5.1%	252	189	1,230	923	
Heifer	3,676	Holstein	Open Lot	407	8.44	27,839	37,118	70%	30%	11,135	8,352	Stationary Screen	5.1%	1,893	1,420	9,242	6,932	
						99,367	**132,489**			**84,961**	**63,721**			**14,443**	**10,833**	**70,518**	**52,889**	**594,750**

PROJECT															
Herd Information					**Manure Excreted**			**Collection Rates**		**Collection Quantities**		**Solids Removal**			
Animal Type	Number of Animals	Breed	Housing	Animal Weight (kg)	Volatile Solids Excreted (kg / day / 1000kg mass)[1]	Volatile Solids (lbs/day)	Total Solids (lbs/day)[2]	% TS/VS Deposited on Land	TS/VS Collected (% of Gross Excreted)	Total Solids (lbs/day)	Volatile Solids (lbs/day)	Separation Type	TS/VS Separated (% of Gross Excreted)[3]	Total Solids Removed (lbs/day)	Volatile Solids Removed (lbs/day)
Milking Cow	3,965	Holstein	Freestall	680	11.41	67,822	90,430	20%	80%	72,344	54,258	Stationary Screen	13.6%	12,298	9,224
Dry Cow	442	Holstein	Open Lot	684	5.56	3,706	4,941	70%	30%	1,482	1,112	Stationary Screen	5.1%	252	189
Heifer	3,676	Holstein	Open Lot	407	8.44	27,839	37,118	70%	30%	11,135	8,352	Stationary Screen	5.1%	1,893	1,420
						99,367	**132,489**			**84,961**	**63,721**			**14,443**	**10,833**

Digester Influent				**Digestion**					**Digester Effluent**		
TS/VS Entering Digester (% of Gross Excreted)	TS Entering Digester (lbs/day)	VS Entering Digester (lbs/day)	Total Fluid Entering Digester (gal/day)	VS Destruction Rate[4]	VS Destroyed (lbs/day)	SCF Biogas / lbs VS Destroyed	Biogas Production (scf/day @ 60% CH4)	Biogas Production (MMBTU/yr)	TS Exiting Digester (lbs/day)	VS Exiting Digester (lbs/day)	Total Fluid Exiting Digester (gal/day)
66.4%	60,045	45,034		42%	18,914	14.3	270,474	59,234	41,131	26,120	
24.9%	1,230	923		42%	388	14.3	5,542	1,214	843	535	
24.9%	9,242	6,932		42%	2,911	14.3	41,632	9,117	6,331	4,020	
	70,518	**52,889**	**594,750**		**22,213**		**317,648**	**69,565**	**48,305**	**30,675**	**592,087**

Separator Efficiency Table*	
Type	VS Removal Rate (% of Gross Collected)
No Solid Separation	0%
Weeping Wall	45%
Stationary Screen	17%
Vibrating Screen	15%

*Per ARB's GHG Calculator

[1] Per ARB's GHG Calculator

[2] Assumes 75% of Totals Solids is Volatile

[3] TS/VS Separated shown as a "% of gross manure excreted" to match ARB's GHG Calculator. Separator efficiencies shown as a "% of gross manure collected" also referenced in the Separator Efficiency Table

[4] Calculated by Project Engineer based on site specific design and HRT

Lakeside Pipeline Cluster - Digester #7

Lone Oak #1 Dairy Digester Pipeline Project

Mass Balance Tables

BASELINE

Herd Information					Manure Excreted			Collection Rates		Collection Quantities		Solids Removal				To Storage		
Animal Type	Number of Animals	Breed	Housing	Animal Weight (kg)	Volatile Solids Excreted (kg / day / 1000kg mass)[1]	Volatile Solids (lbs/day)	Total Solids (lbs/day)[2]	% TS/VS Deposited on Land	% TS/VS Collected by Manure System	Pounds TS/ Day	Pounds VS/Day	Separation Type	TS/VS Separated (% of Gross Excreted)[3]	Total Solids Removed (lbs/day)	Volatile Solids Removed (lbs/day)	Total Solids (lbs/day)	Volatile Solids (lbs/day)	Total Fluid to Storage (gal/day)
Milking Cow	4,200	Holstein	Freestall	680	11.41	71,842	95,789	20%	80%	76,631	57,474	None	0.0%	-	-	76,631	57,474	
Dry Cow	700	Holstein	Open Lot	684	5.56	5,869	7,825	70%	30%	2,348	1,761	None	0.0%	-	-	2,348	1,761	
Heifer	4,500	Holstein	Open Lot	407	8.44	34,079	45,438	70%	30%	13,631	10,224	None	0.0%	-	-	13,631	10,224	
						111,790	**149,053**			**92,611**	**69,458**			**-**	**-**	**92,611**	**69,458**	**462,000**

PROJECT

Herd Information					Manure Excreted			Collection Rates		Collection Quantities		Solids Removal			
Animal Type	Number of Animals	Breed	Housing	Animal Weight (kg)	Volatile Solids Excreted (kg / day / 1000kg mass)[1]	Volatile Solids (lbs/day)	Total Solids (lbs/day)[2]	% TS/VS Deposited on Land	TS/VS Collected (% of Gross Excreted)	Total Solids (lbs/day)	Volatile Solids (lbs/day)	Separation Type	TS/VS Separated (% of Gross Excreted)[3]	Total Solids Removed (lbs/day)	Volatile Solids Removed (lbs/day)
Milking Cow	4,200	Holstein	Freestall	680	11.41	71,842	95,789	20%	80%	76,631	57,474	Vibrating Screen	12.0%	11,495	8,621
Dry Cow	700	Holstein	Open Lot	684	5.56	5,869	7,825	70%	30%	2,348	1,761	Vibrating Screen	4.5%	352	264
Heifer	4,500	Holstein	Open Lot	407	8.44	34,079	45,438	70%	30%	13,631	10,224	Vibrating Screen	4.5%	2,045	1,534
						111,790	**149,053**			**92,611**	**69,458**			**13,892**	**10,419**

Digester Influent				Digestion					Digester Effluent		
TS/VS Entering Digester (% of Gross Excreted)	TS Entering Digester (lbs/day)	VS Entering Digester (lbs/day)	Total Fluid Entering Digester (gal/day)	VS Destruction Rate[4]	VS Destroyed (lbs/day)	SCF Biogas / lbs VS Destroyed	Biogas Production (scf/day @ 60% CH4)	Biogas Production (MMBTU/yr)	TS Exiting Digester (lbs/day)	VS Exiting Digester (lbs/day)	Total Fluid Exiting Digester (gal/day)
68.0%	65,137	48,853		42%	20,518	14.3	293,408	64,256	44,619	28,334	
25.5%	1,995	1,497		42%	629	14.3	8,989	1,968	1,367	868	
25.5%	11,587	8,690		42%	3,650	14.3	52,193	11,430	7,937	5,040	
	78,719	**59,039**	**462,000**		**24,796**		**354,589**	**77,655**	**53,922**	**34,243**	**459,027**

Separator Efficiency Table*	
Type	VS Removal Rate (% of Gross Collected)
No Solid Separation	0%
Weeping Wall	45%
Stationary Screen	17%
Vibrating Screen	15%

*Per ARB's GHG Calculator

[1] Per ARB's GHG Calculator

[2] Assumes 75% of Totals Solids is Volatile

[3] TS/VS Separated shown as a "% of gross manure excreted" to match ARB's GHG Calculator. Separator efficiencies shown as a "% of gross manure collected" also referenced in the Separator Efficiency Table

[4] Calculated by Project Engineer based on site specific design and HRT

Lakeside Pipeline Cluster - Digester #8

Poplar Lane Dairy Digester Pipeline Project

Mass Balance Tables

BASELINE

Herd Information					Manure Excreted			Collection Rates		Collection Quantities		Solids Removal				To Storage		
Animal Type	Number of Animals	Breed	Housing	Animal Weight (kg)	Volatile Solids Excreted (kg / day / 1000kg mass)[1]	Volatile Solids (lbs/day)	Total Solids (lbs/day)[2]	% TS/VS Deposited on Land	% TS/VS Collected by Manure System	Pounds TS/ Day	Pounds VS/Day	Separation Type	TS/VS Separated (% of Gross Excreted)[3]	Total Solids Removed (lbs/day)	Volatile Solids Removed (lbs/day)	Total Solids (lbs/day)	Volatile Solids (lbs/day)	Total Fluid to Storage (gal/day)
Milking Cow	2,126	Holstein	Freestall	680	11.41	36,366	48,488	20%	80%	38,790	29,093	Stationary Screen	13.6%	6,594	4,946	32,196	24,147	
Dry Cow	284	Holstein	Open Lot	684	5.56	2,381	3,175	70%	30%	952	714	Stationary Screen	5.1%	162	121	791	593	
Heifer	2,115	Holstein	Open Lot	407	8.44	16,017	21,356	70%	30%	6,407	4,805	Stationary Screen	5.1%	1,089	817	5,318	3,988	
						54,764	**73,018**			**46,149**	**34,612**			**7,845**	**5,884**	**38,304**	**28,728**	**287,010**

PROJECT

Herd Information					Manure Excreted			Collection Rates		Collection Quantities		Solids Removal			
Animal Type	Number of Animals	Breed	Housing	Animal Weight (kg)	Volatile Solids Excreted (kg / day / 1000kg mass)[1]	Volatile Solids (lbs/day)	Total Solids (lbs/day)[2]	% TS/VS Deposited on Land	TS/VS Collected (% of Gross Excreted)	Total Solids (lbs/day)	Volatile Solids (lbs/day)	Separation Type	TS/VS Separated (% of Gross Excreted)[3]	Total Solids Removed (lbs/day)	Volatile Solids Removed (lbs/day)
Milking Cow	2,126	Holstein	Freestall	680	11.41	36,366	48,488	20%	80%	38,790	29,093	Stationary Screen	13.6%	6,594	4,946
Dry Cow	284	Holstein	Open Lot	684	5.56	2,381	3,175	70%	30%	952	714	Stationary Screen	5.1%	162	121
Heifer	2,115	Holstein	Open Lot	407	8.44	16,017	21,356	70%	30%	6,407	4,805	Stationary Screen	5.1%	1,089	817
						54,764	**73,018**			**46,149**	**34,612**			**7,845**	**5,884**

Digester Influent				Digestion					Digester Effluent		
TS/VS Entering Digester (% of Gross Excreted)	TS Entering Digester (lbs/day)	VS Entering Digester (lbs/day)	Total Fluid Entering Digester (gal/day)	VS Destruction Rate[4]	VS Destroyed (lbs/day)	SCF Biogas / lbs VS Destroyed	Biogas Production (scf/day @ 60% CH4)	Biogas Production (MMBTU/yr)	TS Exiting Digester (lbs/day)	VS Exiting Digester (lbs/day)	Total Fluid Exiting Digester (gal/day)
66.4%	32,196	24,147		54%	13,039	14.3	186,462	40,835	19,156	11,108	
24.9%	791	593		54%	320	14.3	4,578	1,003	470	273	
24.9%	5,318	3,988		54%	2,154	14.3	30,797	6,745	3,164	1,835	
	38,304	**28,728**	**287,010**		**15,513**		**221,837**	**48,582**	**22,791**	**13,215**	**285,150**

Separator Efficiency Table*	
Type	VS Removal Rate (% of Gross Collected)
No Solid Separation	0%
Weeping Wall	45%
Stationary Screen	17%
Vibrating Screen	15%

*Per ARB's GHG Calculator

[1] Per ARB's GHG Calculator

[2] Assumes 75% of Totals Solids is Volatile

[3] TS/VS Separated shown as a "% of gross manure excreted" to match ARB's GHG Calculator. Separator efficiencies shown as a "% of gross manure collected" also referenced in the Separator Efficiency Table

[4] Calculated by Project Engineer based on site specific design and HRT

Lakeside Pipeline Cluster - Digester #9

River Ranch Dairy Digester Pipeline

Mass Balance Tables

BASELINE

Herd Information					Manure Excreted			Collection Rates		Collection Quantities		Solids Removal				To Storage		
Animal Type	Number of Animals	Breed	Housing	Animal Weight (kg)	Volatile Solids Excreted (kg / day / 1000kg mass)[1]	Volatile Solids (lbs/day)	Total Solids (lbs/day)[2]	% TS/VS Deposited on Land	% TS/VS Collected by Manure System	Pounds TS/ Day	Pounds VS/Day	Separation Type	TS/VS Separated (% of Gross Excreted)[3]	Total Solids Removed (lbs/day)	Volatile Solids Removed (lbs/day)	Total Solids (lbs/day)	Volatile Solids (lbs/day)	Total Fluid to Storage (gal/day)
Milking Cow	5,258	Holstein	Freestall	680	11.41	89,939	119,919	20%	80%	95,935	71,951	Weeping Wall	36.0%	43,171	32,378	52,764	39,573	
Dry Cow	548	Holstein	Open Lot	684	5.56	4,595	6,126	70%	30%	1,838	1,378	Weeping Wall	13.5%	827	620	1,011	758	
Heifer	5,787	Holstein	Open Lot	407	8.44	43,825	58,434	70%	30%	17,530	13,148	Weeping Wall	13.5%	7,889	5,916	9,642	7,231	
						143,114	**190,819**			**117,205**	**87,904**			**52,742**	**39,557**	**64,463**	**48,347**	**830,400**

PROJECT

Herd Information					Manure Excreted			Collection Rates		Collection Quantities		Solids Removal			
Animal Type	Number of Animals	Breed	Housing	Animal Weight (kg)	Volatile Solids Excreted (kg / day / 1000kg mass)[1]	Volatile Solids (lbs/day)	Total Solids (lbs/day)[2]	% TS/VS Deposited on Land	TS/VS Collected (% of Gross Excreted)	Total Solids (lbs/day)	Volatile Solids (lbs/day)	Separation Type	TS/VS Separated (% of Gross Excreted)[3]	Total Solids Removed (lbs/day)	Volatile Solids Removed (lbs/day)
Milking Cow	5,258	Holstein	Freestall	680	11.41	89,939	119,919	20%	80%	95,935	71,951	Weeping Wall	36.0%	43,171	32,378
Dry Cow	548	Holstein	Open Lot	684	5.56	4,595	6,126	70%	30%	1,838	1,378	Weeping Wall	13.5%	827	620
Heifer	5,787	Holstein	Open Lot	407	8.44	43,825	58,434	70%	30%	17,530	13,148	Weeping Wall	13.5%	7,889	5,916
						143,114	**190,819**			**117,205**	**87,904**			**52,742**	**39,557**

Digester Influent				Digestion					Digester Effluent		
TS/VS Entering Digester (% of Gross Excreted)	TS Entering Digester (lbs/day)	VS Entering Digester (lbs/day)	Total Fluid Entering Digester (gal/day)	VS Destruction Rate[4]	VS Destroyed (lbs/day)	SCF Biogas / lbs VS Destroyed	Biogas Production (scf/day @ 60% CH4)	Biogas Production (MMBTU/yr)	TS Exiting Digester (lbs/day)	VS Exiting Digester (lbs/day)	Total Fluid Exiting Digester (gal/day)
44.0%	52,764	39,573		52%	20,578	14.3	294,267	64,444	32,186	18,995	
16.5%	1,011	758		52%	394	14.3	5,637	1,235	617	364	
16.5%	9,642	7,231		52%	3,760	14.3	53,771	11,776	5,881	3,471	
	64,463	**48,347**	**830,400**		**25,141**		**359,510**	**78,733**	**39,322**	**23,207**	**827,386**

Separator Efficiency Table*	
Type	VS Removal Rate (% of Gross Collected)
No Solid Separation	0%
Weeping Wall	45%
Stationary Screen	17%
Vibrating Screen	15%

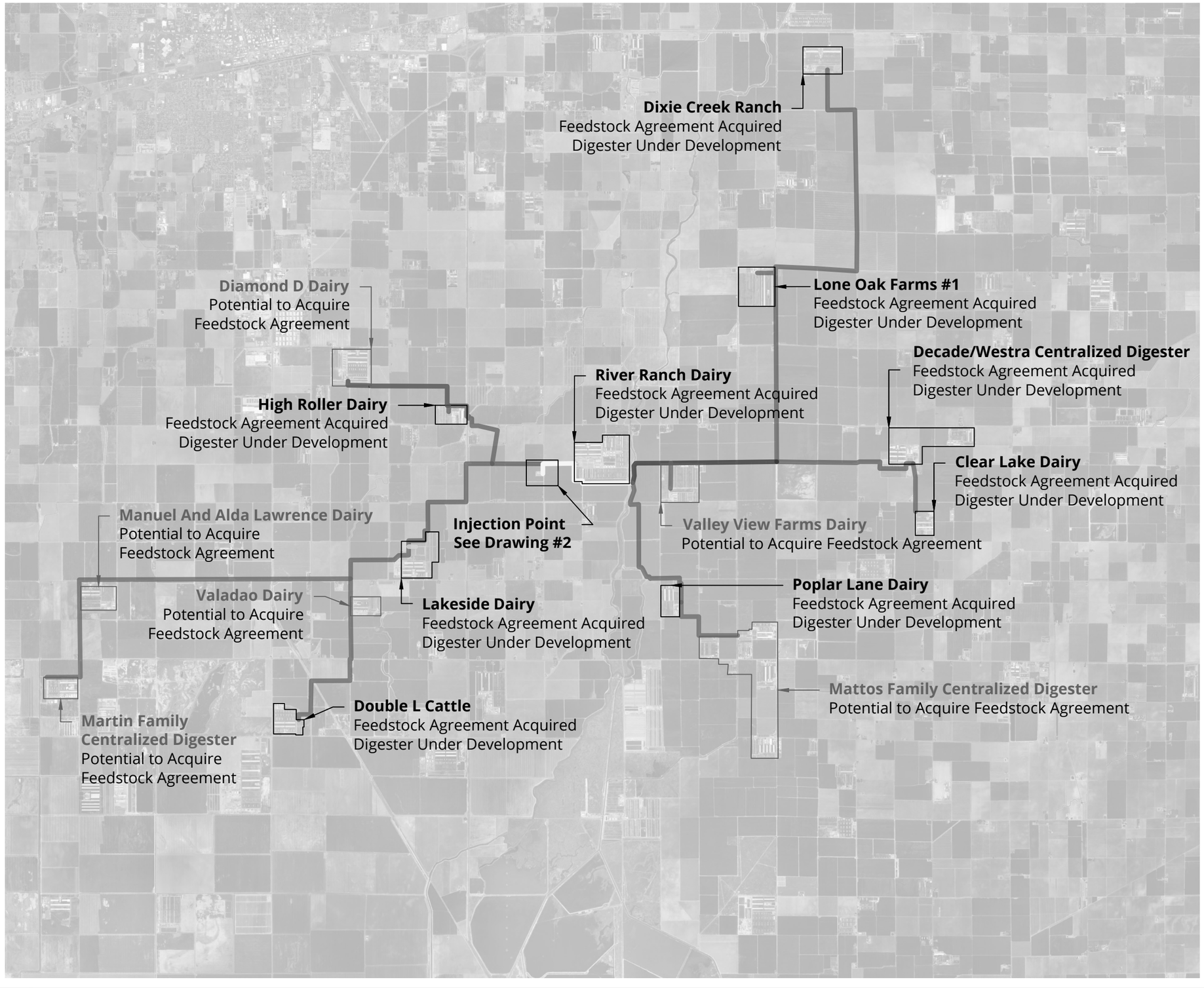
*Per ARB's GHG Calculator

[1] Per ARB's GHG Calculator

[2] Assumes 75% of Totals Solids is Volatile

[3] TS/VS Separated shown as a "% of gross manure excreted" to match ARB's GHG Calculator. Separator efficiencies shown as a "% of gross manure collected" also referenced in the Separator Efficiency Table

[4] Calculated by Project Engineer based on site specific design and HRT



General Notes

Attachment 2 - Drawing #1

All pipeline is within private property except certain Public Right of Way crossings marked by ○

HDPE SDR 21, 10", 9 PSI

HDPE SDR 21, 8", 10 PSI

HDPE SDR 21, 6", 11 PSI

HDPE SDR 21, 4", 13 PSI

Potential Future Expansions

Southern California Gas Company Pipeline

MAAS ENERGY WORKS

Firm Address

3711 Meadowview Dr.
Redding, CA, 96002

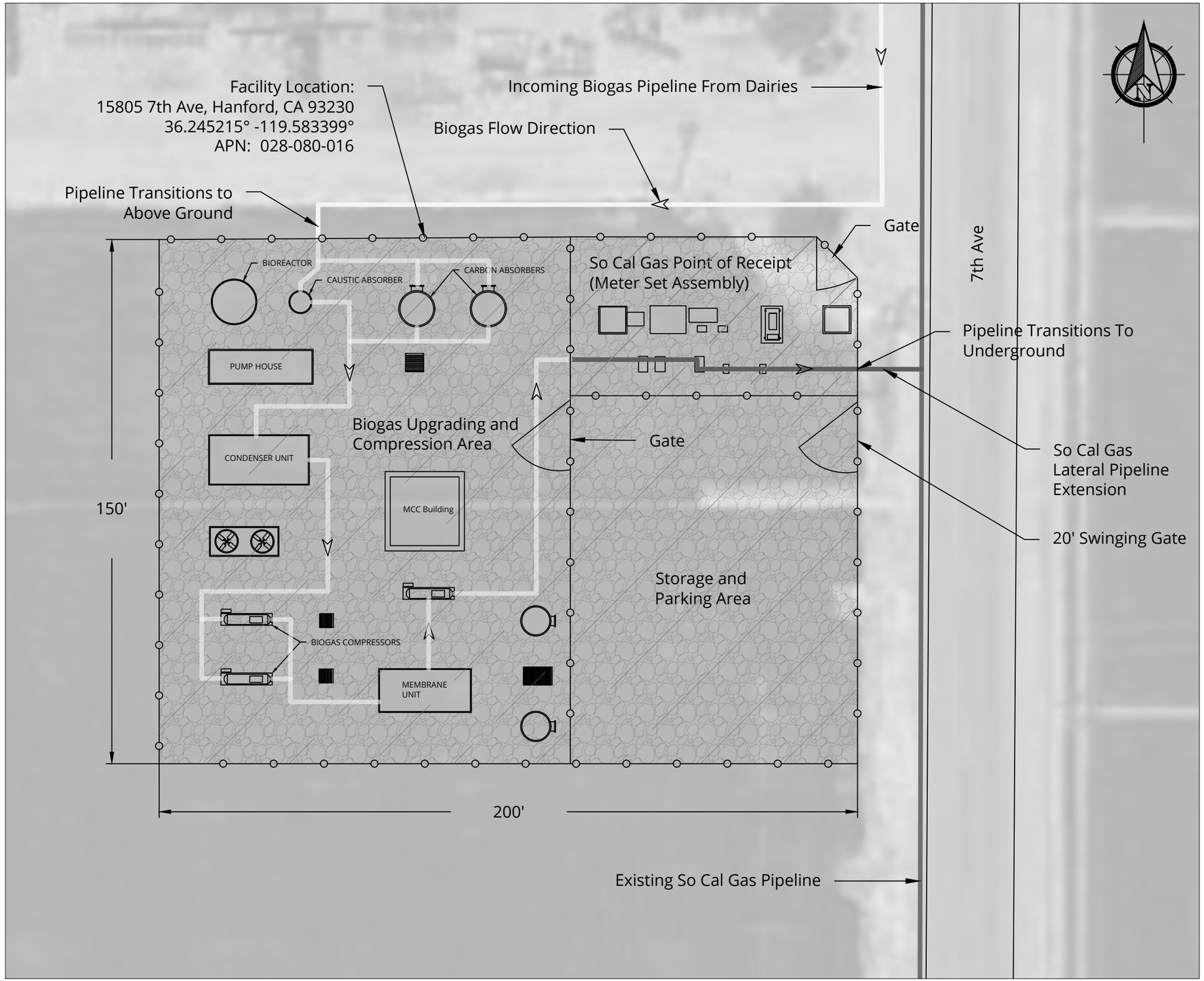
Project Name and Address

Lakeside Pipeline Project

Date: 6/8/18

Drawn By: Hudson Davis

Version: 2.7



General Notes

Attacment #2 - Drawing #2

Biogas Pipeline

Southern California Gas Transmission Line

Southern California Gas Pipeline Extension

Area Leased and Operated by Southern California Gas

Area Owned and Operated by Lakeside Pipeline, LLC

MAAS ENERGY WORKS

Firm Address

3711 Meadowview Dr.
Redding, CA, 96002

Project Name and Address

Lakeside Pipeline Point of Receipt and Clean Up Equipment Drawing

Date: 5/3/18

Version: 2.7

Drawn By: Nathan Nisly

DECADE
DAIRY DIGESTER

BENCHMARK

THE TOPOGRAPHIC SURVEY WAS PERFORMED UTILIZING GLOBAL POSITIONING SYSTEM OBSERVATIONS. DISTANCES AND NUMBERS SHOWN ARE TO BE CONSIDERED GROUND VALUES. BENCHMARK AND CONTROL SHOWN ON CONTROL PLAN SHEET. THE BENCHMARK AND VERTICAL ELEVATIONS WERE DERIVED FROM THE NGS ONLINE POSITIONING SERVICE (OPUS), AND IS SHOWN ON THE NAVD 88 DATUM UTILITIZING THE GEOID 09 AS THE VERTICAL MODEL.

PRESERVATION OF MONUMENTS

PURSUANT TO SECTIONS 8771(B) AND 8771(C) OF THE GOVERNMENT CODE, ANY MONUMENTS THAT CONTROL THE LOCATION OF BOUNDARIED, OR OTHERWISE PROVIDE HORIZONTAL OR VERTICAL SURVEY CONTROL WITHIN THE CONSTRUCTION AREA, SHALL BE LOCATED AND REFERENCED PRIOR TO CONSTRUCTION, AND A CORNER RECORD OR RECORD OF SURVEY OF THE REFERENCES SHALL BE FILED WITH THE COUNTY SURVEYOR.

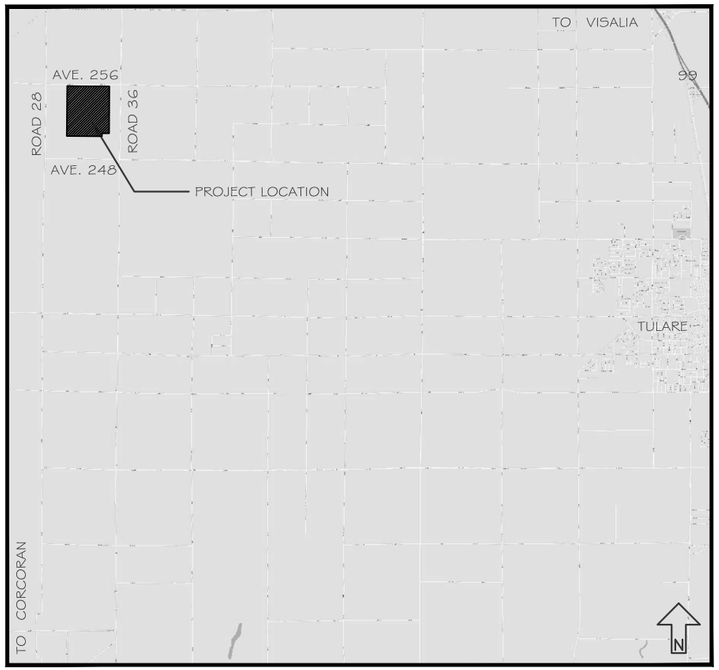
PERMANENT MONUMENTATION SHALL BE SET TO PERPETUATE THE LOCATION OF ANY MONUMENT WHICH COULD BE DAMAGED OR DESTROYED, AND A CORNER RECORD OR RECORD OF SURVEY SHALL BE FILED WITH THE COUNTY SURVEYOR PRIOR TO THE RECORDING OF A CERTIFICATE OF COMPLETION FOR THE PROJECT.

DUST CONTROL NOTES

CONTRACTOR IS REQUIRED TO COMPLY WITH PROJECT APPROVED DUST CONTROL PLAN

STORMWATER (SWPPP) NOTES

CONTRACTOR IS REQUIRED TO COMPLY WITH PROJECT APPROVED STORMWATER POLLUTION PREVENTION PLAN



VICINITY MAP
SCALE 1" : 2 MI

SHEET REFERENCE

SECTIONS:

SECTION NAME / SHEET NUMBER → B / C.3

DETAILS: B

DETAIL NAME / SHEET NUMBER → B / C.3

CONTACT INFO

ENGINEER:
CRAIG HARTMAN, RCE 73837
HARTMAN ENGINEERING, INC.
3121 W. CERES CT.
VISALIA, CA 93291
(559) 563-0181

DAIRY CONTACT:
ERIC WESTRA
3313 AVE 256
TULARE, CA 93274

SHEET INDEX

HARTMAN ENGINEERING
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REGISTERED PROFESSIONAL ENGINEER
CRAIG M. HARTMAN
NO. 73837
Exp. 06-30-19
CIVIL
STATE OF CALIFORNIA
1-8-18

PROJECT:
DECADE DAIRY DIGESTER

CLIENT:
DECADE DAIRY
3313 AVE 256
TULARE, CA 93274

COVER SHEET

REVISION LOG:

PLOT DATE:	01/08/18
JOB NO.:	17003
SCALE:	AS SHOWN
SHEET NO.:	A.1

Know what's below. Call before you dig.

SPECIFICATIONS FOR ENGINEERED FILL MATERIAL OF ABOVE GRADE EMBANKMENTS OR AS REQUIRED

TEST PARAMETER	TEST METHOD	FREQUENCY	ACCEPTANCE CRITERIA
Compaction Curves	ASTM D1557 (Modified Proctor)	Change in material	N/A
Grain Size Distribution	ASTM D422 (Sieve)	Change in material	At least 30% passing No. 200 U.S. Standard Sieve. Per Specifications (1)
Soil Classification	ASTM D2487 (USCS)	Change in material	Suitable for compaction [2,3]
Maximum Particle Size	ASTM D422 (Sieve)	Change in material	½ inch, ¼ top 6 inches
Maximum Water soluble Sulfate (SO_4) in Soil (Concrete Slab locations)	ASTM C1580	Change in material	0.2% by weight

Site Preparation Specifications:

1. Clearing: Prior to earthwork operations, the area to be developed should be stripped of vegetation, organic topsoil, and cleared of cow waste and miscellaneous debris from the proposed construction areas. Deeper clearing may be required in localized areas. The actual depth of clearing should be reviewed by a licensed Geotechnical Engineer at the time of construction. The limits of stripping and clearing should be at least five feet beyond the limits of construction.

2. Compaction: The scarified subgrade and subsequent fill placed at the site should be moisture conditioned to near optimum moisture content, and compacted to at least and 90 percent for 2:1 side slope pond of maximum dry density as determined by ASTM test method D1557.

3. Material for fill: Fill should consist of select material. Native soil, free from organic, vegetation, and rocks or cobbles larger than three inches, may be used as fill at the site. Import material must be reviewed by licensed Geotechnical Engineer prior to transport to the site.

4. Fill placement: Fill material should be moisture-conditioned to +/- 2% of the optimum moisture content prior to compaction. Fill material with excessive moisture should be allowed to dry prior to compaction or be mixed with dry soil to bring the fill to a workable moisture content. Fill should be placed in level lifts not exceeding a loose, uncompacted thickness of eight inches, and compacted as engineered fill.

Sub-grade requirements for fill only:

-Over Excavate for minimum 1 ft. to meet Engineered Fill Borrow Material Guidelines and Pond Liner Sub-grade requirements

-Well mixed soil

-6 in max lifts

-Upper 6 inches is of fine-finished soil particles no greater than ¼ in.+

Notes:

[1] Field tests shall not be required, but fill borrow material specifications must meet the acceptance criteria outlined in Table 1.

[2] Refer to Geotechnical Report

NOTES:

THE APPROVED WORK PLAN WHICH INCLUDES THE CONSTRUCTION QUALITY ASSURANCE PLAN, OPERATION, MAINTENANCE AND MONITORING PLAN, CONSTRUCTION DRAWINGS, AND SOILS REPORT TOGETHER AS A PACKAGE ARE THE COMPLETE SPECIFICATIONS REQUIRED FOR CONSTRUCTION OF THE POND AND LINER SYSTEM.

FILL TEST SPECIFICATIONS FOR SUB-GRADE

TEST PARAMETER	TEST METHOD [1]	FREQUENCY	ACCEPTANCE CRITERIA
Uncompacted Lift Thickness	Visual Observation	Continuous	8-in.[2]
Construction Oversight	Visual Observation	Continuous	Maximum particle size 1/2 inch.
In-Place Moisture Alternative Method	ASTM D2216 (Oven Dry)	1 per every 10 Nuclear tests	+/-2% of Optimum Moisture Content per ASTM D1557
In-Place Moisture Rapid Field Methods [3,5]	ASTM D6938 [3,5] (Nuclear Method)	3 per acre per lift, min. 2 per day	+/-2% of Optimum Moisture Content per ASTM D1557
In-Place Density Alternate Method	ASTM D2937(Drive Cylinder)	1 per every 10 Nuclear tests	90% of Maximum Dry Density per ASTM D1557
In-Place Density Rapid Field Methods [4]	ASTM D6938 [3,5] (Nuclear Method)	3 per acre per lift, min. 2 per day	90% of Maximum Dry Density per ASTM D1557
Subgrade Thickness	Surveying Measurement	At 50-foot centers	Minimum 1 ft.[5]
Clod Size	Visual Observation	Continuous	Per Specification

Notes:

See earthwork section for anchor trench, excavation, backfill, and compaction requirements.

[1] ASTM Test Method, unless otherwise noted. Results of all tests performed to be reported as per method reporting criteria.

[2] The sub-grade shall be scarified to a depth of 1 ft. lower than finished grade, compacted, and tested in accordance with the requirements of this table.

[3] Must be verified by ASTM D2216 (Oven) overnight method once every day or once per change in material

[4] Must be verified by ASTM D2937 (Dry Cylinder) twice per day or per change in material

[5] Calibration Procedure: ASTM D7013-04: Standard Guide for Nuclear Surface Moisture and Density Gauge Calibration Facility Set-up

POND SPECIFICATIONS FOR SUBGRADES CUT BELOW GROUND
(For Slopes 2:1 or shallower)

Side Slopes: The certified Civil Engineer/CQA Chief Officer shall walk final side slopes after cut by heavy equipment and confirm no SW or SP soils and no loose soils. All SW, SP, or soils that are not amenable to a firm and unyielding subgrade shall be removed and replaced down to a minimum 3 ft. below sloped surface. Any soils removed and replaced shall meet the Engineered Fill requirements in Table 1.

Pond Bottom: 1. An as-built survey of the pond bottom shall take place after subgrade construction to insure minimum slopes are achieved. Pond Bottom shall be tested per criteria below. Any soils not meeting the requirements below (i.e. that is not firm and unyielding) shall be removed and replaced down to a minimum 2 ft. Any soils removed and replaced shall meet the Engineered Fill requirements in Table 1. The Civil Engineer may make determination of soils meeting requirements or not based upon visual inspection which shall be included in the Subgrade Certification Report and signed and sealed by a Civil Engineer and CQA Officer.

TEST PARAMETER	TEST METHOD [1]	FREQUENCY	ACCEPTANCE CRITERIA
In-Place Density Rapid Field Methods [4]	ASTM D6938 [3,5] (Nuclear)	3 per acre	90% of Maximum Dry Density per ASTM D1557
In-Place Moisture Rapid Field Methods [3,5]	ASTM D6938 [3,5] (Nuclear Methods)	3 per acre per lift, min. 2 per day	+/-2% of Optimum Moisture Content per ASTM D1557
Construction Oversight	Visual Observation	Continuous	Maximum particle size 1/2 inch.
Subgrade Slope	Surveying Measurement	200 ft. maximum grid	Min 1%

60 MIL HDPE GEOMEMBRANE CONSTRUCTION QUALITY ASSURANCE (CQA)

TEST PARAMETER	TEST METHOD	FREQUENCY	ACCEPTANCE CRITERIA
Thickness (min. ave.) -Lowest individual for 8 out of 10 values -Lowest individual for any of the 10 values	ASTM D5994	1 per lot or 1 per 70,000 ft2, whichever is greater	Nom. (-5%) -10% -15%
Tensile Properties -yield strength -break strength -strain at yeild -break strength	ASTM D6693 Type IV	1 per lot or 1 per 70,000 ft2, whichever is greater	≥126 lb./in. ≥90 lb./in. ≥12% ≥100%
Puncture Resistance	ASTM D4833	1 per lot or 1 per 70,000 ft^2, whichever is greater	108 lb. (min.)
Tear Resistance	ASTM D1004, Die C	1 per lot or 1 per 70,000 ft2, whichever is greater	42 lb. (min.)
Interface Shear -60-mil HDPE/subgrade soil -Drainage geocomposite	ASTM D5321 ASTM D6243	2 tests or 1 per 200,000 ft2, whichever is greater	
Seam Shear	ASTM D6392	1 test per 500 lineal feet or per GRI GM-14 and 20.	95% of min. yield strength
Seam Peel -Extrusion -Fusion	ASTM D6392	1 test per 500 lineal feet or per GRI GM-14 and 20.	72% yield & ftb (1)
Non-destructive Seam Test	ASTM D5820 (Pressure Test)	Continuous	35 psi for 5 min.
	ASTM D5641 (Vacuum Box)		5 psi for 15 sec.
	ASTM D5641 (Spark Test)		No Spark
Electric Leak Location	ASTM D7002 (Water Puddle)	Once on constructed liner	Max 1 mm. diameter hole sensitivity
	ASTM D6747 (Selection Process)		
	ASTM D7007 (Water /Earth)		Max 6 mm. diameter hole sensitivity
	ASTM D7240 (Spark Test 2011)		

Notes:

[1] ftb: Film Tear Bond

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REGISTERED PROFESSIONAL ENGINEER CRAIG M. HARTMAN NO. 73837 Exp. 06-30-19 CIVIL STATE OF CALIFORNIA 1-8-18

PROJECT:

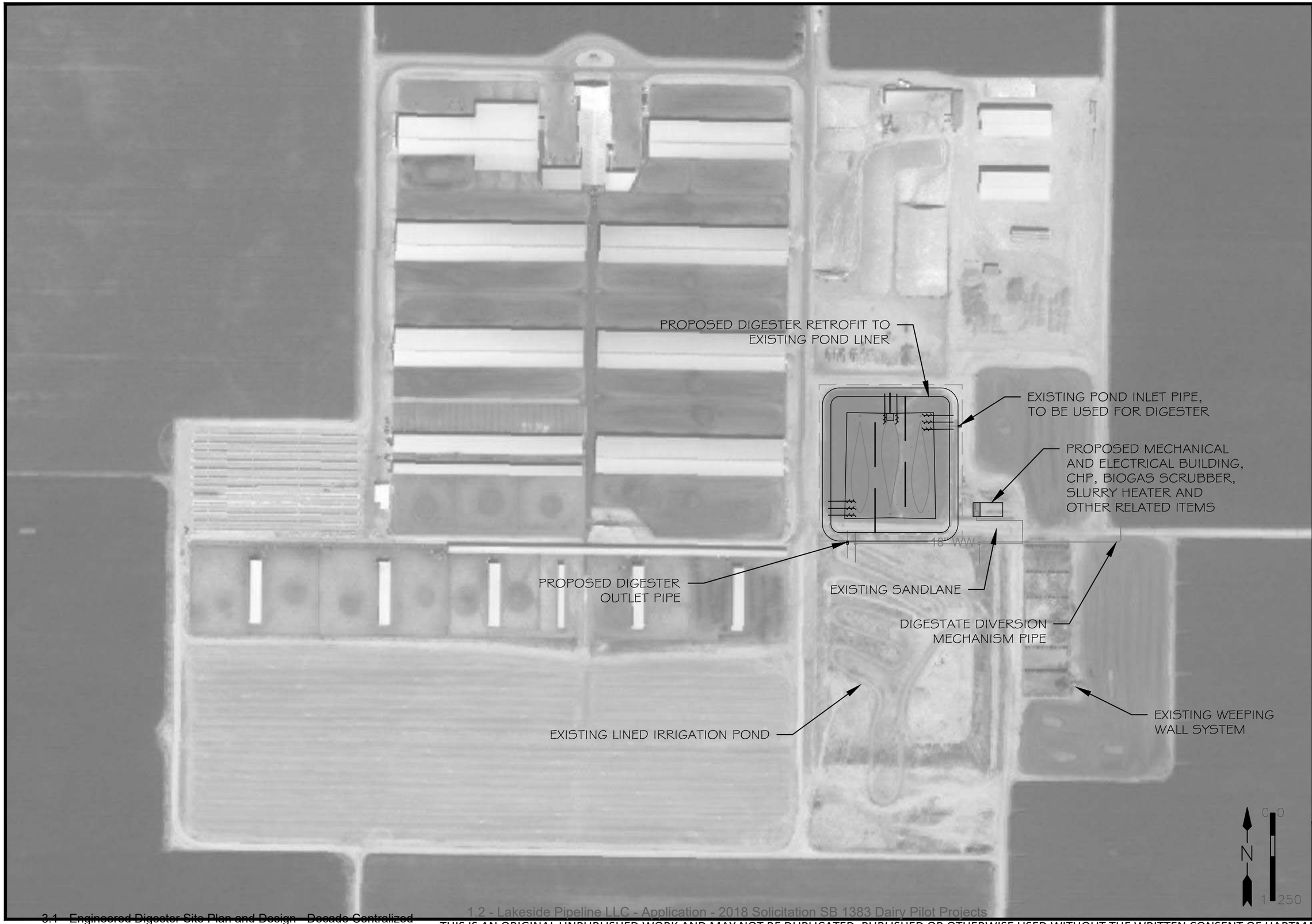
DECADE DAIRY DIGESTER

CLIENT:
DECADE DAIRY
3313 AVE 256
TULARE, CA 93274

GENERAL NOTES
CONSTRUCTION

REVISION LOG:

PLOT DATE:	01/08/18
JOB NO.:	17003
SCALE:	AS SHOWN
SHEET NO.:	A.2



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DECADE DAIRY DIGESTER

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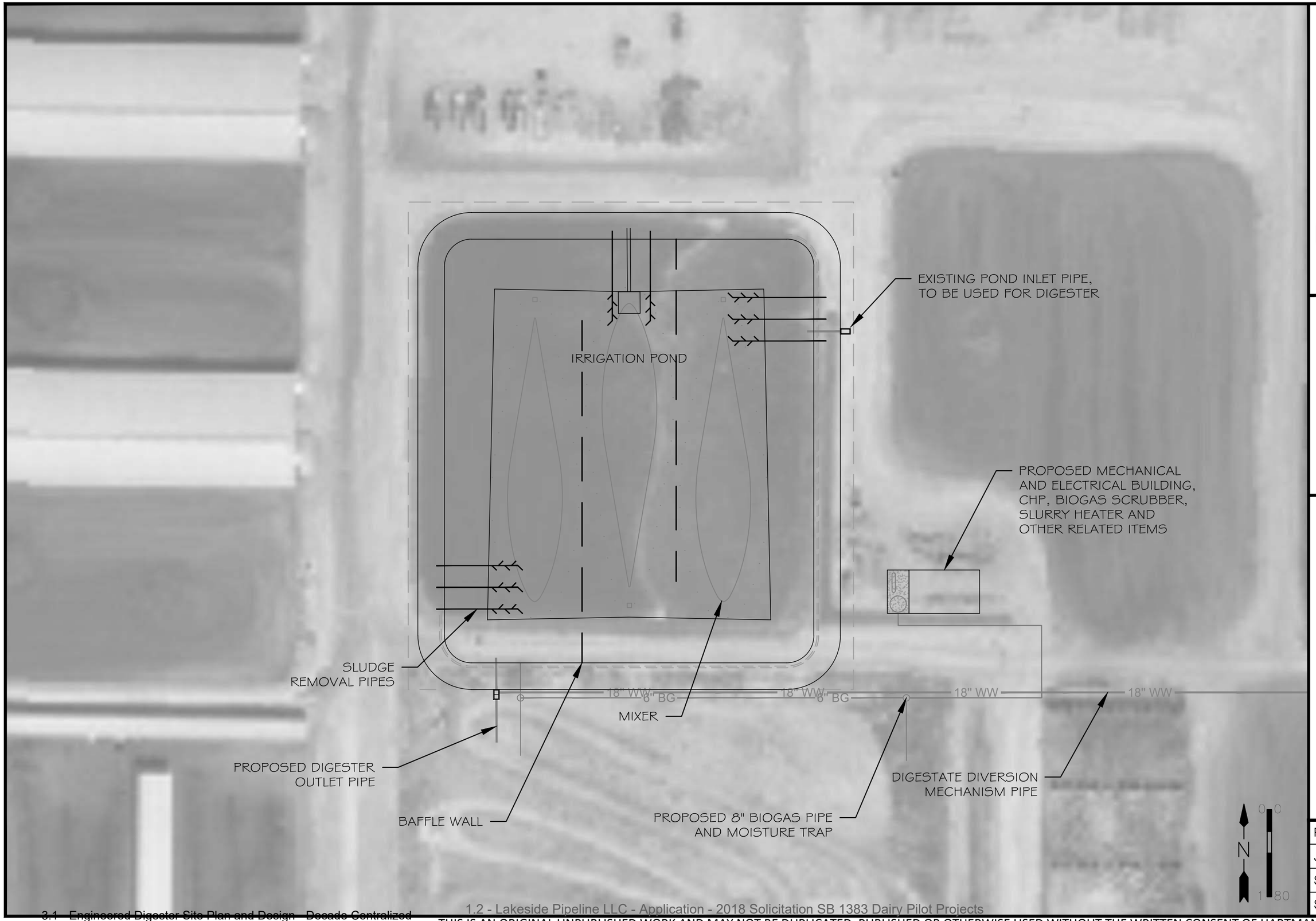
3313 AVE 256
TULARE, CA 93274

SITE PLAN
DAIRY

REVISION LOG:

PLOT DATE:	6/19/18
JOB NO.:	17003
SCALE:	AS SHOWN
SHEET NO.:	A.3



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1-8-18

PROJECT:

DECADE DAIRY DIGESTER

CLIENT:
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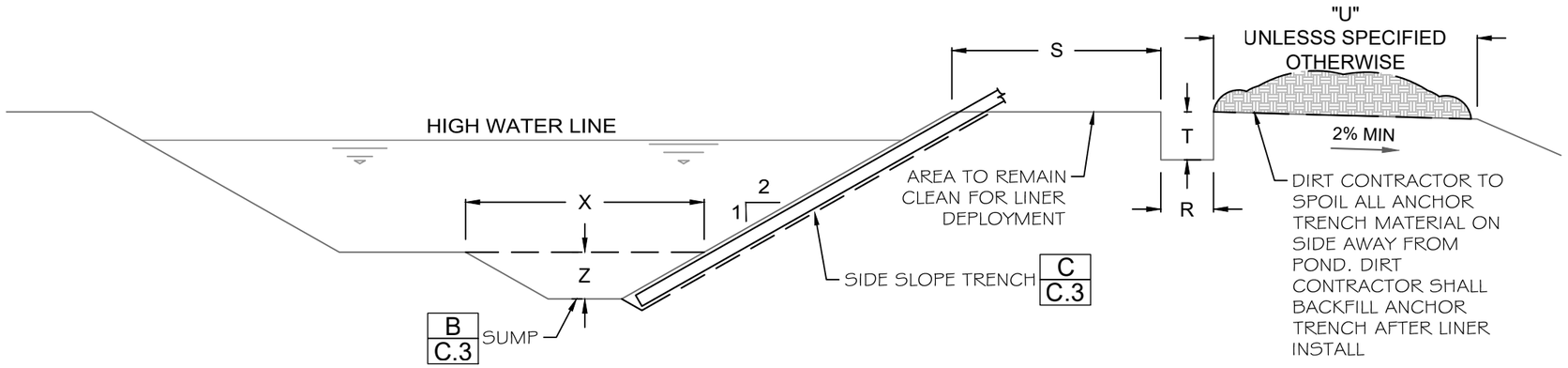
3313 AVE 256
TULARE, CA 93274

SITE PLAN

DIGESTER

REVISION LOG:

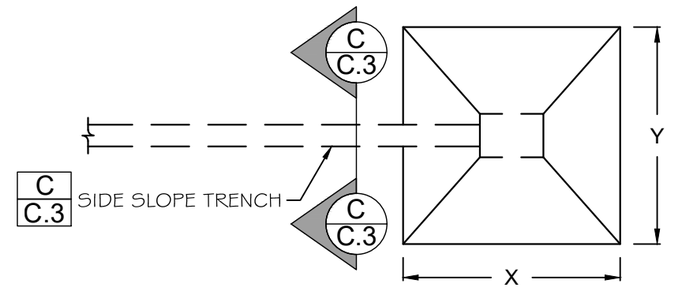
PLOT DATE:	01/08/18
JOB NO.:	17003
SCALE:	AS SHOWN
SHEET NO.:	A.4



A ANCHOR TRENCH / SUMP PROFILE VIEW

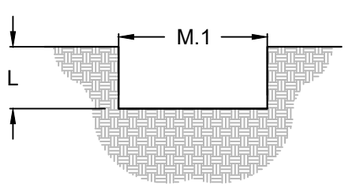
N.T.S.

DIMENSION TABLE (FT.)	
LETTER	POND
L	1.7'
M.1	2.7'
U	20'
R	1.5'
S	3'
T	3'
X	30'
Y	30'
Z	5.5'



B SUMP PLAN VIEW

N.T.S.



C SIDE SLOPE TRENCH

N.T.S.

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1-8-18

PROJECT:

DECADE DAIRY DIGESTER

CLIENT:
DECADE DAIRY
3313 AVE 256
TULARE, CA 93274

GRADING DETAIL
DIGESTER

REVISION LOG:

PLOT DATE:	01/08/18
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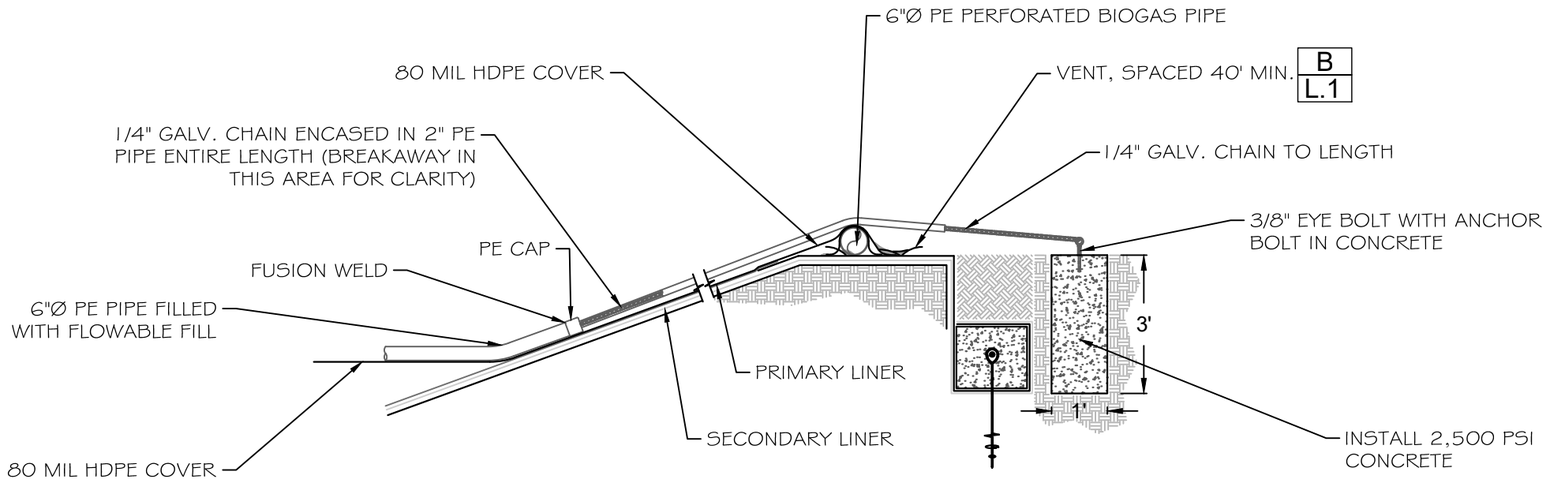
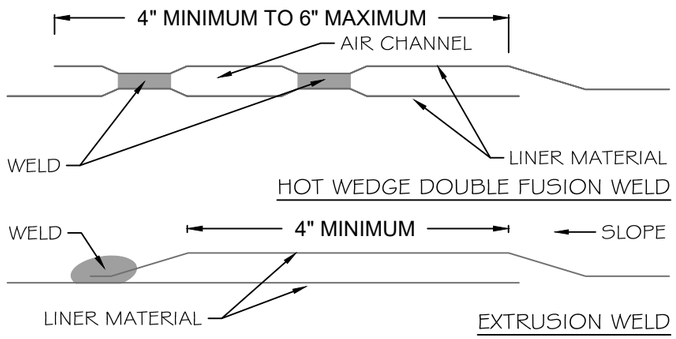
SHEET NO.:	C.1



A BALLAST TUBE DETAIL

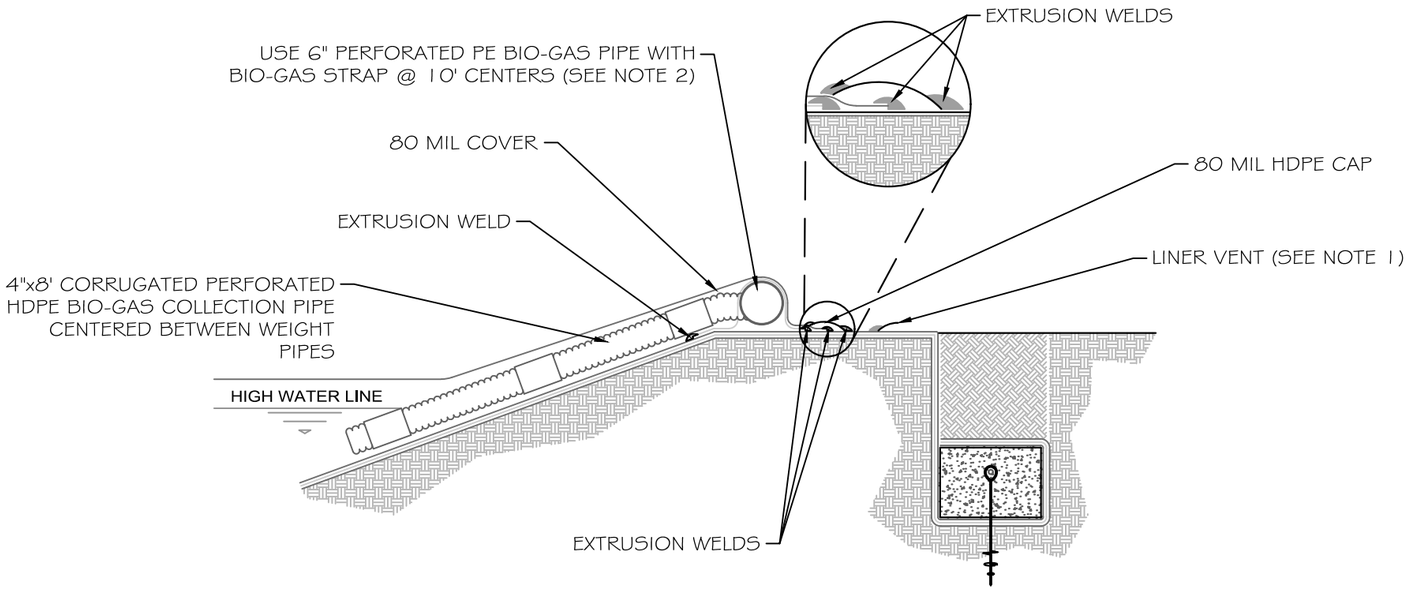
N.T.S.

DESCRIPTION	LOCATION	MATERAIL	THICKNESS (MIN)	TOP FINISH	BOTTOM FINISH
COVER	TOP	HDPE	80 MIL	SMOOTH	SMOOTH



C HDPE COVER-SMOOTH WELDS

N.T.S.



B BIO-GAS PIPING DETAIL

N.T.S.

NOTES:
1. GAS VENTS AROUND PERIPHERY OF LAGOON @ MAX. 40' O.C.
2. STRAP NOT WELDED TO BIO-GAS HEADER PIPE.
3. WRAP 60 MIL PRIMARY LINER OVER CONCRETE & EXTRUSION WELD.

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PROJECT:

DECADE DAIRY DIGESTER

CLIENT:
DECADE DAIRY
3313 AVE 256
TULARE, CA 93274

COVER SYSTEM
DIGESTER

REVISION LOG:

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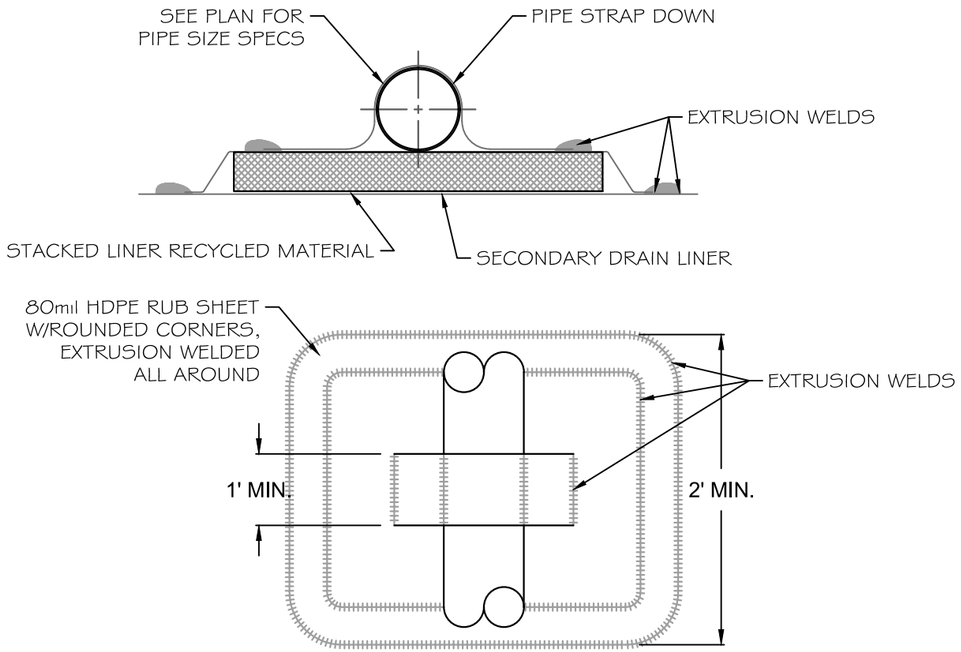
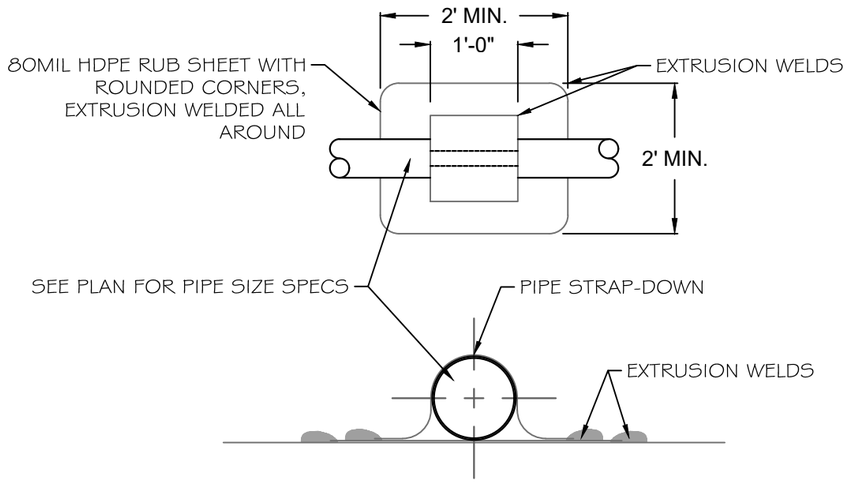
SHEET NO.:	D.1



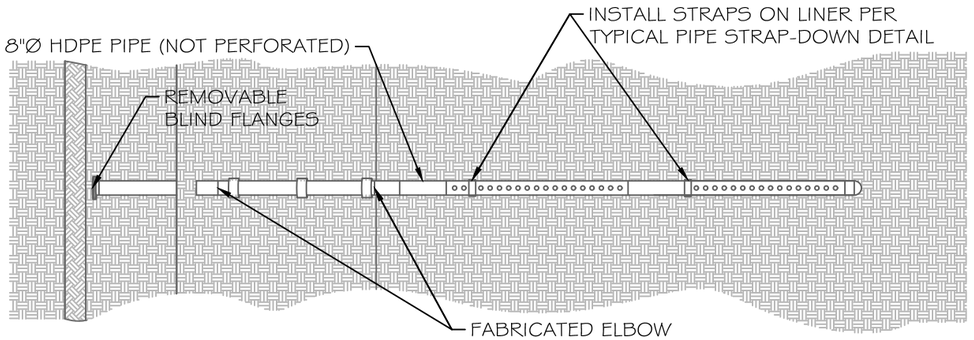
A SLUDGE REMOVAL PIPE ANCHOR DETAIL

NOTE: ANCHOR TO BE USED ON HORIZONTAL SURFACES ONLY, AT BOTTOM OF LAGOON N.T.S.



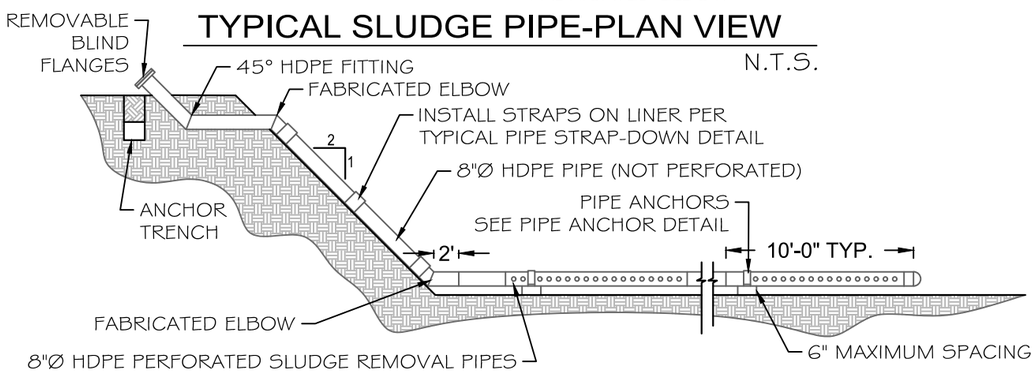
B TYPICAL PIPE STRAP-DOWN DETAIL

NOTE: MAXIMUM 10' O.C. SPACING BETWEEN PIPE STRAP-DOWNS, U.N.O. N.T.S.



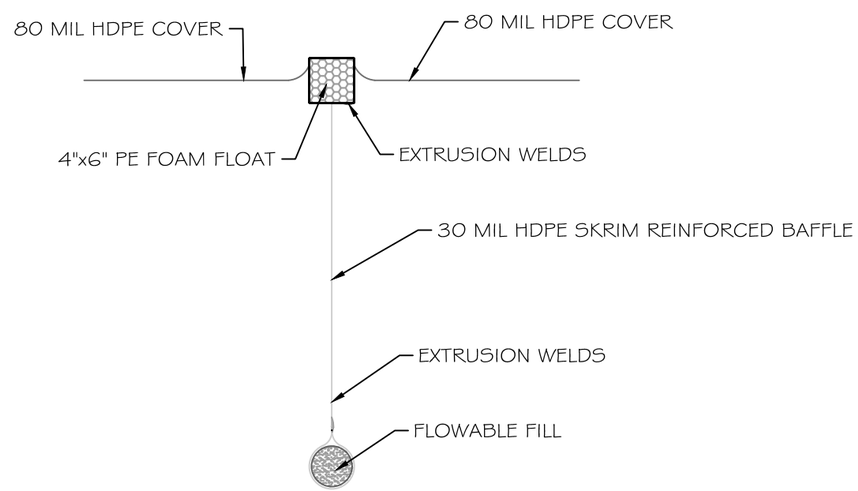
TYPICAL SLUDGE PIPE-PLAN VIEW

N.T.S.



C TYPICAL SLUDGE PIPE-PROFILE

N.T.S.



D BAFFLE SECTION

N.T.S.

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PROJECT:

DECADE DAIRY DIGESTER

CLIENT:
DECADE DAIRY
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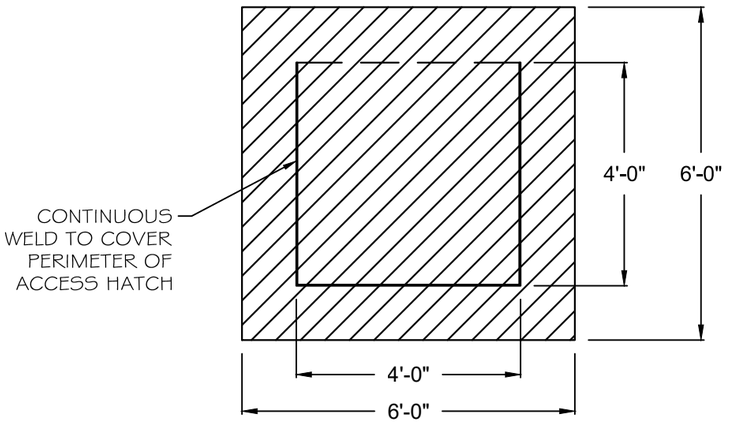
SLURRY REMOVAL SYSTEM
DIGESTER

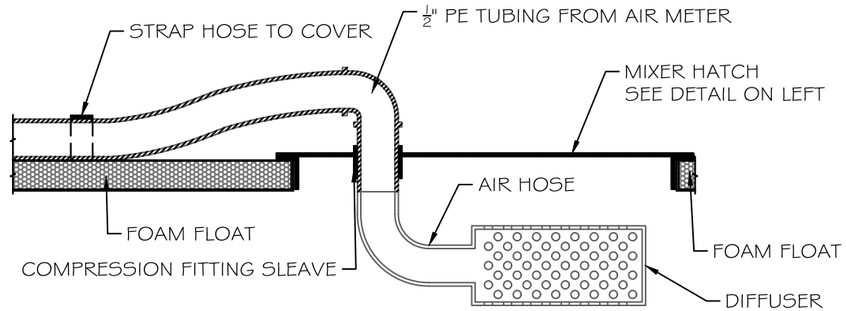
REVISION LOG:

PLOT DATE:	01/08/18
JOB NO.:	17003
SCALE:	AS SHOWN
SHEET NO.:	D.2



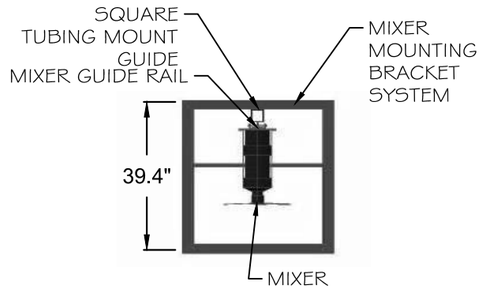
MIXER - HATCH

N.T.S.



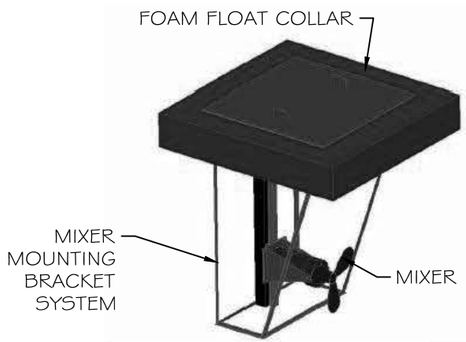
AIR INJECTION & MIXER HATCH

N.T.S.



MIXER - PLAN VIEW

N.T.S.



MIXER - ISOMETRIC W/FLOAT IN PLACE

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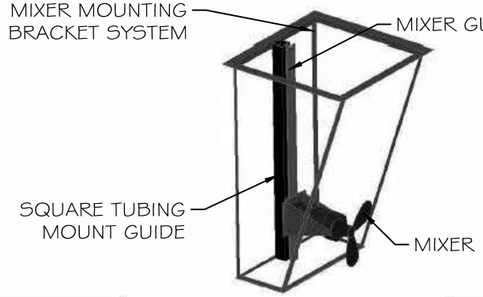

MIXER - ISOMETRIC

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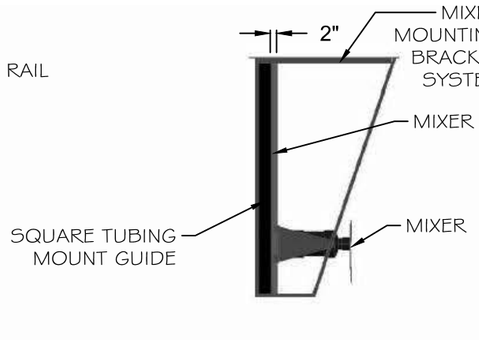

MIXER - SIDE VIEW

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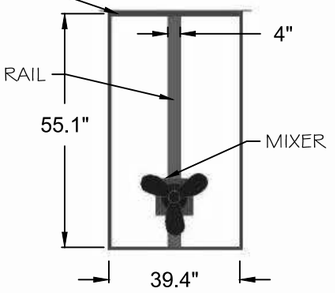

MIXER - FRONT VIEW

N.T.S.

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CRAIG M. HARTMAN
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STATE OF CALIFORNIA
1-8-18

PROJECT:

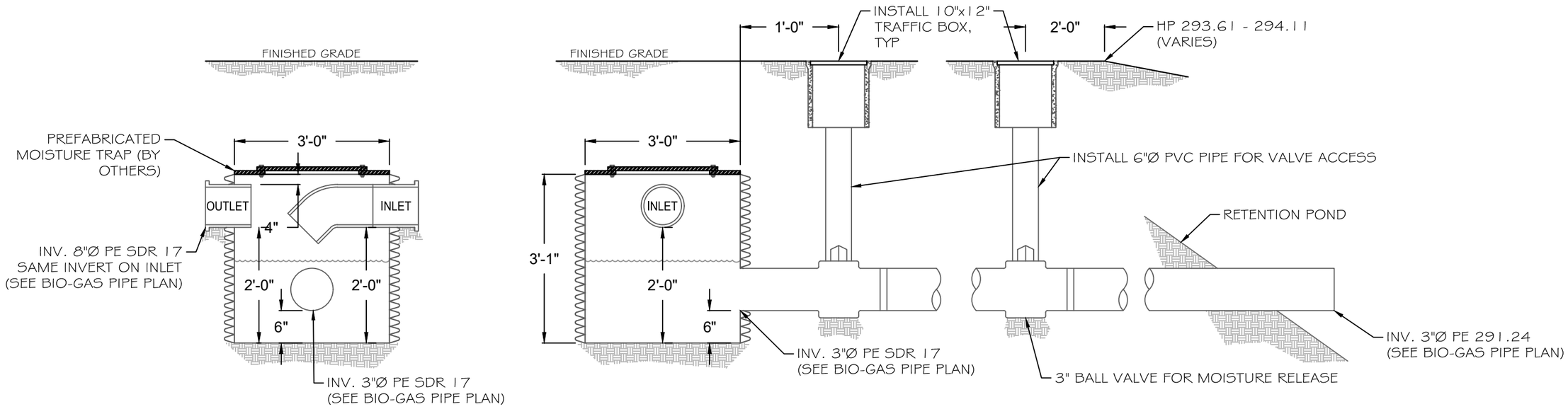
DECADE DAIRY DIGESTER

CLIENT:
DECADE DAIRY
3313 AVE 256
TULARE, CA 93274

MIXER DETAILS

REVISION LOG:

PLOT DATE:	01/08/18
JOB NO.:	17003
SCALE:	AS SHOWN
SHEET NO.:	D.3



MOISTURE TRAP DETAIL

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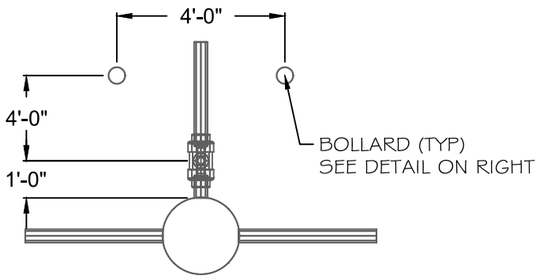
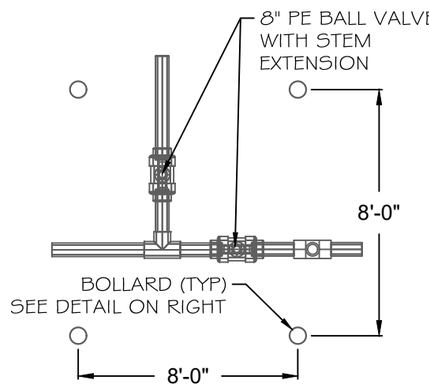


BIO-GAS VALVE

N.T.S.



BALL VALVE JUNCTION

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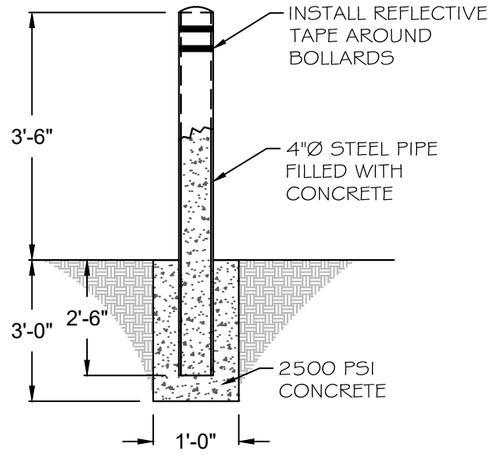

BOLLARD DETAIL

N.T.S.

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113 N. CHURCH ST, SUITE 521
VISALIA, CA 93291
(559) 563-0181

REGISTERED PROFESSIONAL ENGINEER CRAIG M. HARTMAN NO. 73837 Exp. 06-30-19 CIVIL STATE OF CALIFORNIA 1-8-18

PROJECT:

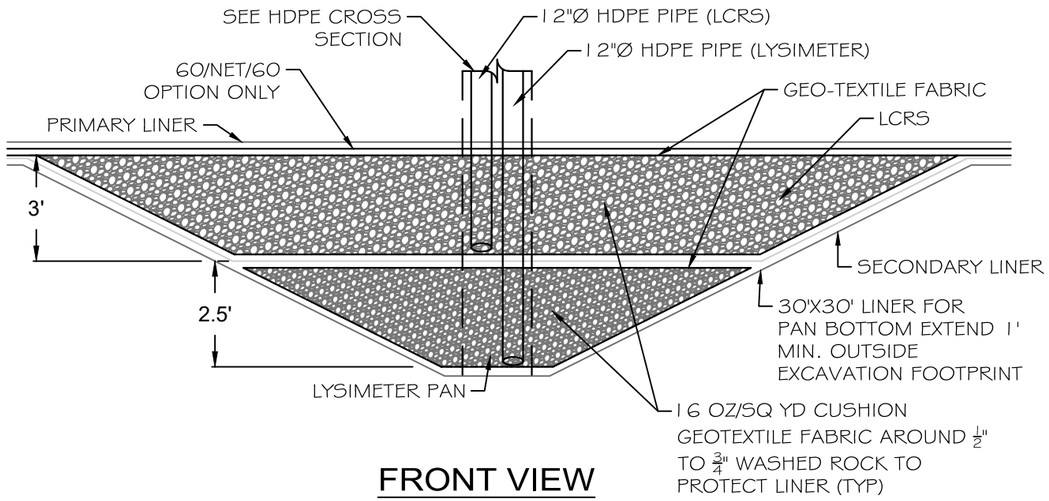
DECADE DAIRY DIGESTER

CLIENT:
DECADE DAIRY
3313 AVE 256
TULARE, CA 93274

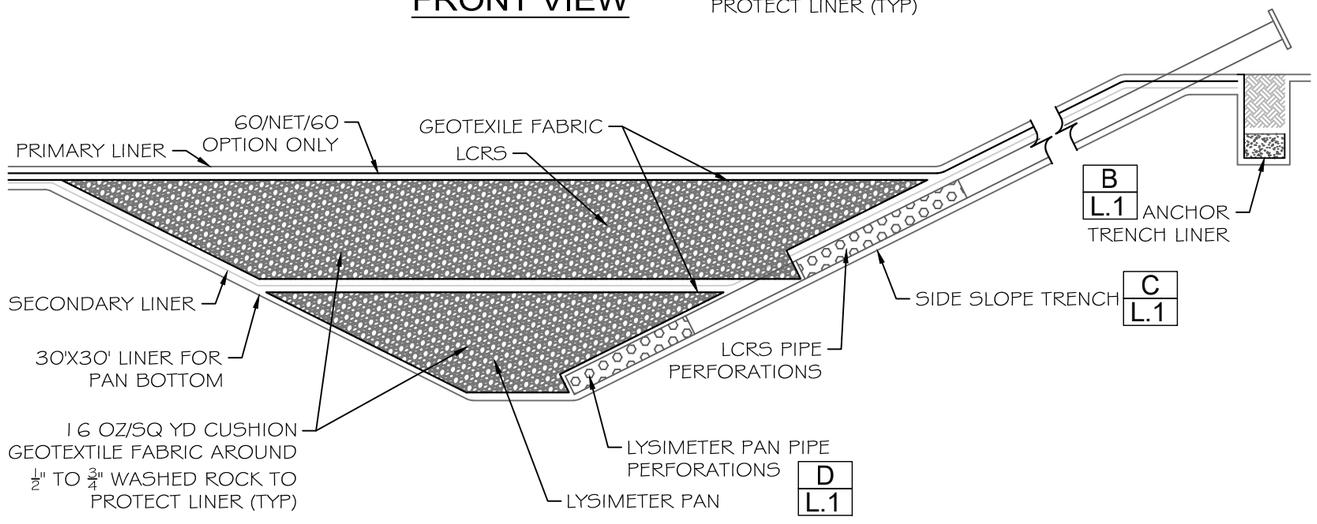
DETAILS

REVISION LOG:

PLOT DATE:	01/08/18
JOB NO.:	17003
SCALE:	AS SHOWN
SHEET NO.:	D.4



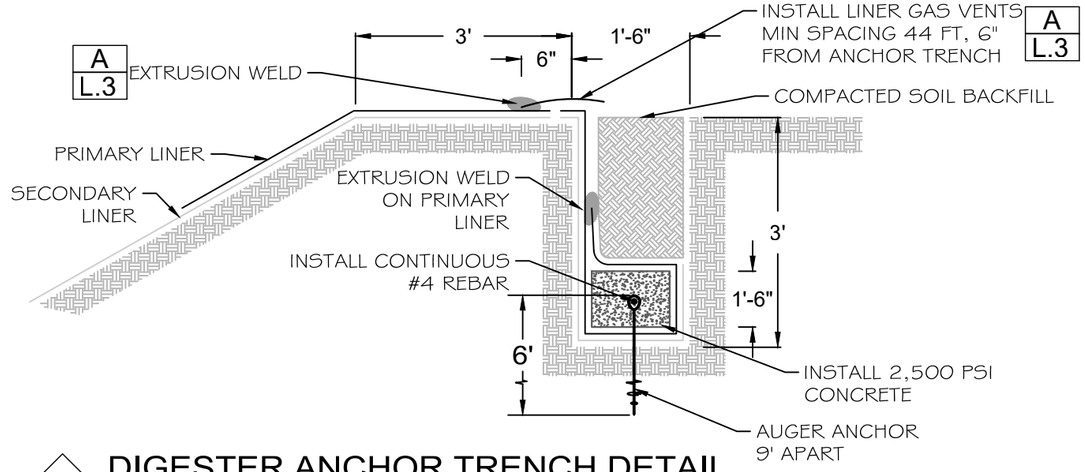
FRONT VIEW



SIDE VIEW

A LCRS, LYSIMETER AND DRAINAGE SUMP PROFILE

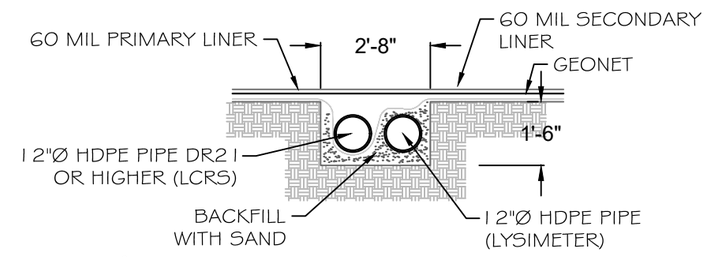
N.T.S.



B DIGESTER ANCHOR TRENCH DETAIL

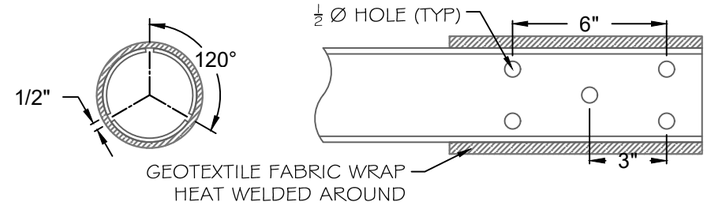
N.T.S.

NOTES: 1. CONTRACTOR TO USE ANCHOR SYSTEM OR PROVIDE DETAILS AND DESIGN FOR ALTERNATIVE TO BE APPROVED BY ENGINEER.



B HDPE CROSS SECTION

N.T.S.



C TYPICAL PERFORATION DETAIL

N.T.S.

1 H HARTMAN ENGINEERING
113 N. CHURCH ST, SUITE 521
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(559) 563-0181

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PROJECT:

DECADE DAIRY DIGESTER

CLIENT:
DECADE DAIRY
3313 AVE 256
TULARE, CA 93274

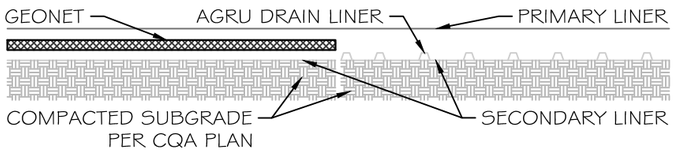
GENERAL NOTES
LINER DETAILS

REVISION LOG:

PLOT DATE:	01/08/18
JOB NO.:	17003
SCALE:	AS SHOWN
SHEET NO.:	L.1

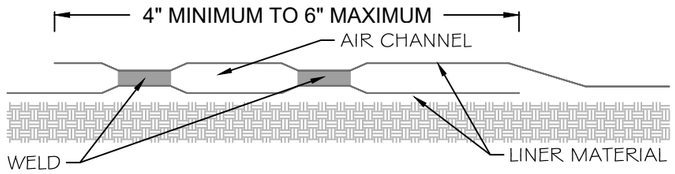
OPTIONAL TIER 1 DOUBLE LINER-LAYERING SYSTEM WITH DRAIN LINER VERIFY WITH OWNER

SMOOTH/STUDDED/ 60-NET-60 LINER LAYERS					
DESCRIPTION	LOCATION	MATERAIL	THICKNESS (MIN)	TOP FINISH	BOTTOM FINISH
PRIMARY LINER	TOP	HDPE	60 MIL	SMOOTH	SMOOTH CONDUCTIVE
DRAINAGE NET	MIDDLE	HDPE	200 MIL	N/A	N/A
SECONDARY LINER	BOTTOM	HDPE	60 MIL	SMOOTH	SMOOTH

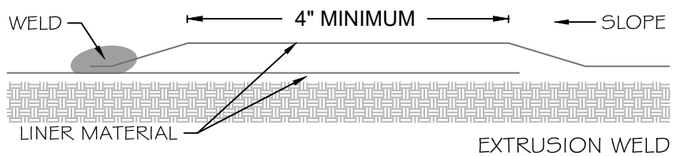


A DOUBLE LAYER 60-NET-60 DOUBLE LAYER WITH DRAIN LINER

N.T.S.



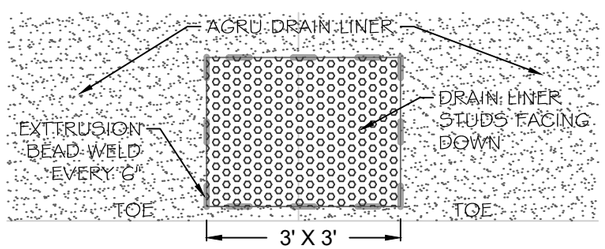
HOT WEDGE DOUBLE FUSION WELD



EXTRUSION WELD

B HDPE LINER-SMOOTH WELDS

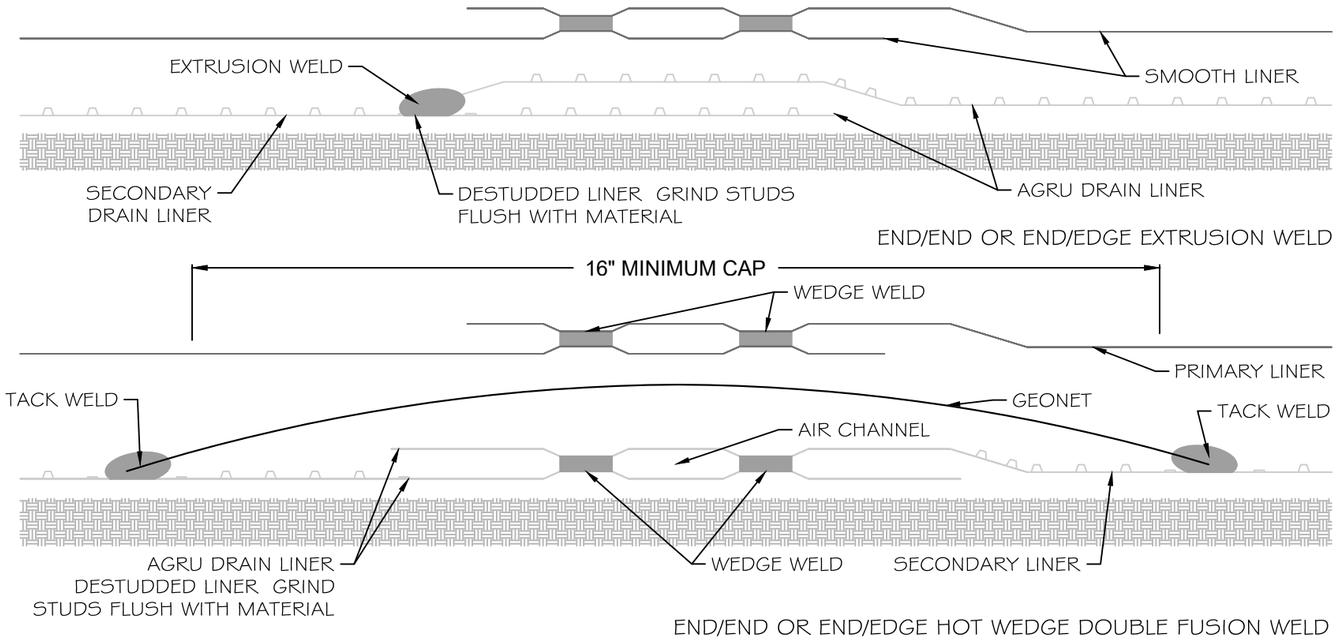
N.T.S.



DRAIN LINER SMOOTH END WELD PATCH

C 3'X3' DRAIN PATCH WELD

N.T.S.

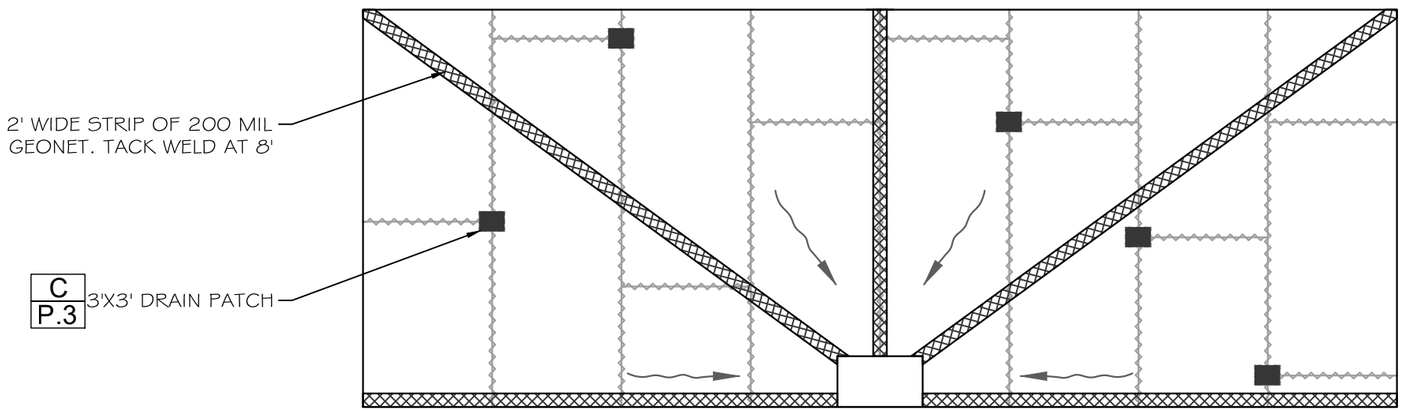


END/END OR END/EDGE EXTRUSION WELD

END/END OR END/EDGE HOT WEDGE DOUBLE FUSION WELD

D AGRU DRAIN LINER END/END WELD

NOTE: AGRU DRAIN LINER DOES NOT HAVE STUDS ALONG THE EDGE SO EDGE/EDGE SEAMS DO NOT REQUIRE DRINGING OR CAP. N.T.S.



NOTE: CQA OFFICER IS RESPONSIBLE TO ADD PATCHES AS NEEDED FOR FLOW

E AGRU DRAIN LINER CROSS SEAM NET PLAN VIEW

NOTE: TYPICAL OF ALL DRAIN LINERS N.T.S.

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PROJECT:

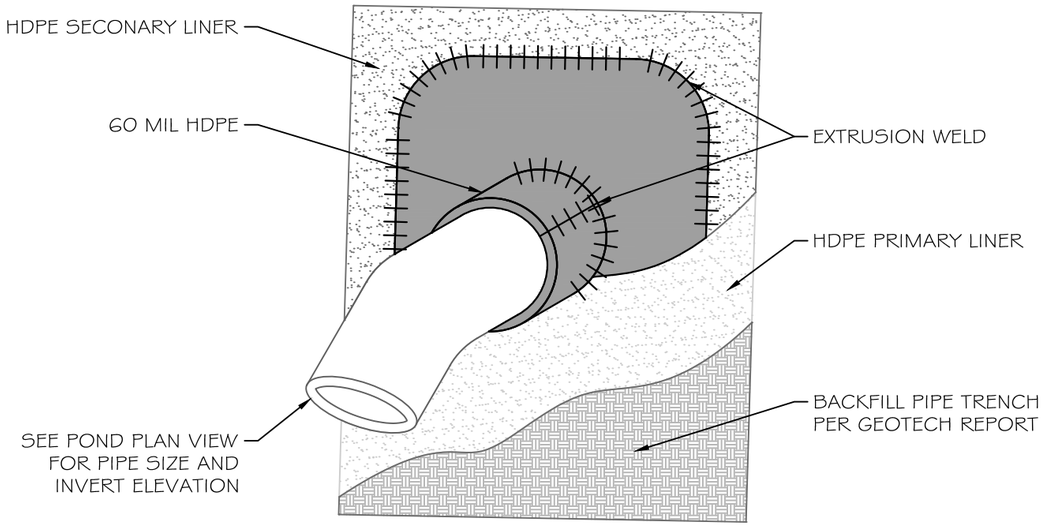
DECADE DAIRY DIGESTER

CLIENT:
DECADE DAIRY
3313 AVE 256
TULARE, CA 93274

LINER DETAILS

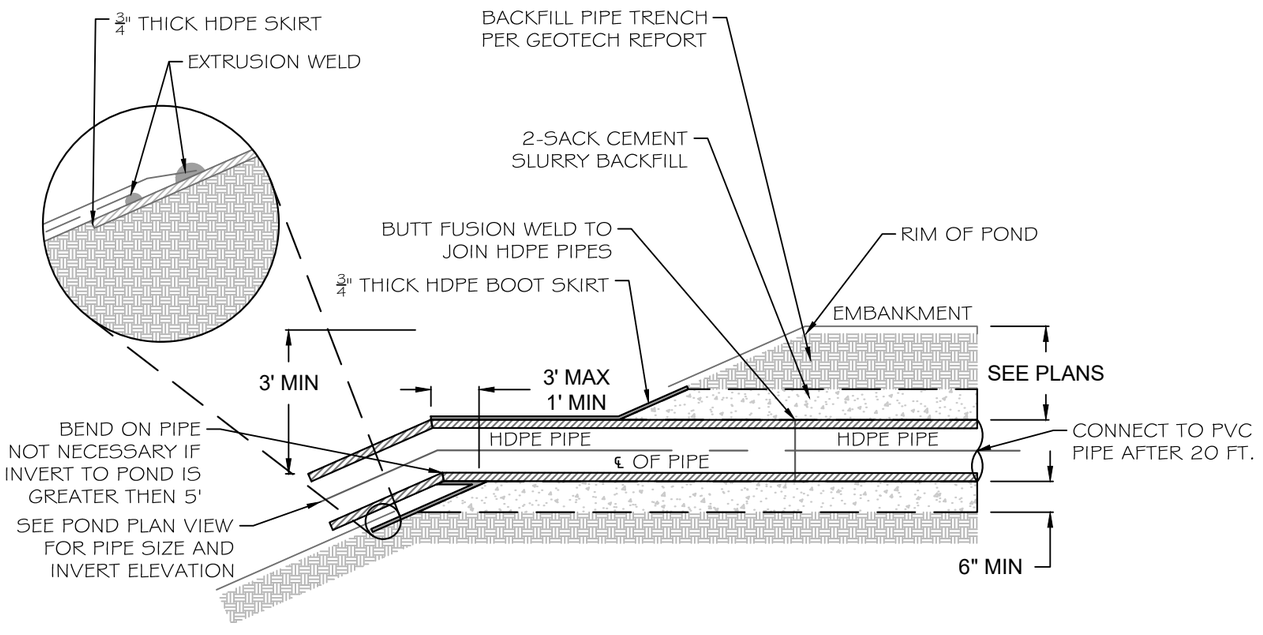
REVISION LOG:

PLOT DATE:	01/08/18
JOB NO.:	17003
SCALE:	AS SHOWN
SHEET NO.:	D.2



A BOOT SKIRT

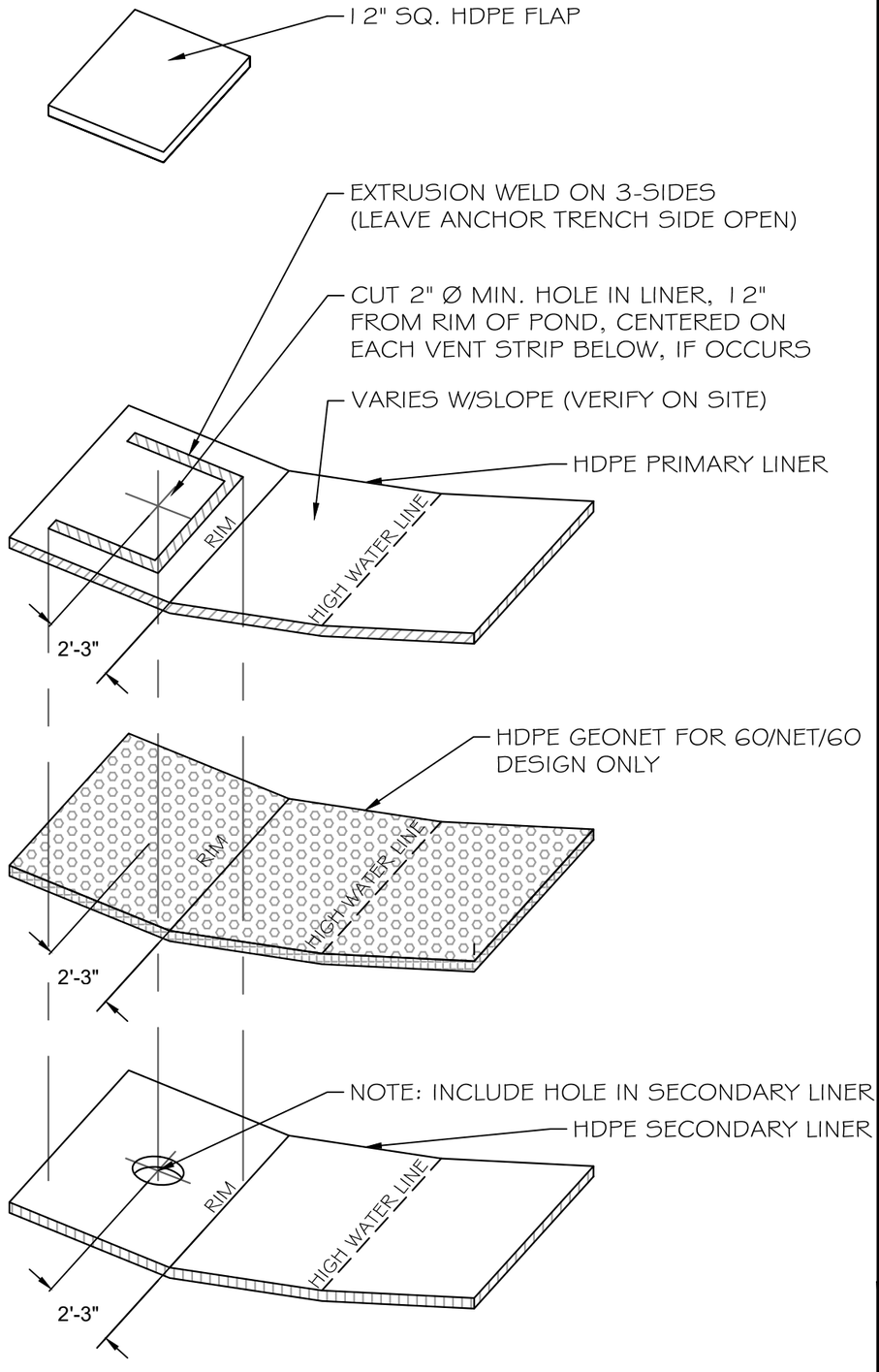
N.T.S.



B BOOTLESS PIPE PENETRATION

LINER FASTENING

N.T.S.



C VENT ORIFICE (ISOMETRIC VIEW)

N.T.S.

1
H
HARTMAN
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REGISTERED PROFESSIONAL ENGINEER
CRAIG M. HARTMAN
NO. 73837
Exp. 06-30-19
CIVIL
STATE OF CALIFORNIA
1-8-18

PROJECT:

DECADE DAIRY DIGESTER

CLIENT:
DECADE DAIRY
3313 AVE 256
TULARE, CA 93274

LINER DETAILS

REVISION LOG:

PLOT DATE:	01/08/18
JOB NO.:	17003
SCALE:	AS SHOWN
SHEET NO.:	L3

CLEAR LAKE
DAIRY DIGESTER

BENCHMARK

THE TOPOGRAPHIC SURVEY WAS PERFORMED UTILIZING GLOBAL POSITIONING SYSTEM OBSERVATIONS. DISTANCES AND NUMBERS SHOWN ARE TO BE CONSIDERED GROUND VALUES. BENCHMARK AND CONTROL SHOWN ON CONTROL PLAN SHEET. THE BENCHMARK AND VERTICAL ELEVATIONS WERE DERIVED FROM THE NGS ONLINE POSITIONING SERVICE (OPUS), AND IS SHOWN ON THE NAVD 88 DATUM UTILITIZING THE GEOID 09 AS THE VERTICAL MODEL.

PRESERVATION OF MONUMENTS

PURSUANT TO SECTIONS 8771(B) AND 8771(C) OF THE GOVERNMENT CODE, ANY MONUMENTS THAT CONTROL THE LOCATION OF BOUNDARIED, OR OTHERWISE PROVIDE HORIZONTAL OR VERTICAL SURVEY CONTROL WITHIN THE CONSTRUCTION AREA, SHALL BE LOCATED AND REFERENCED PRIOR TO CONSTRUCTION, AND A CORNER RECORD OR RECORD OF SURVEY OF THE REFERENCES SHALL BE FILED WITH THE COUNTY SURVEYOR.

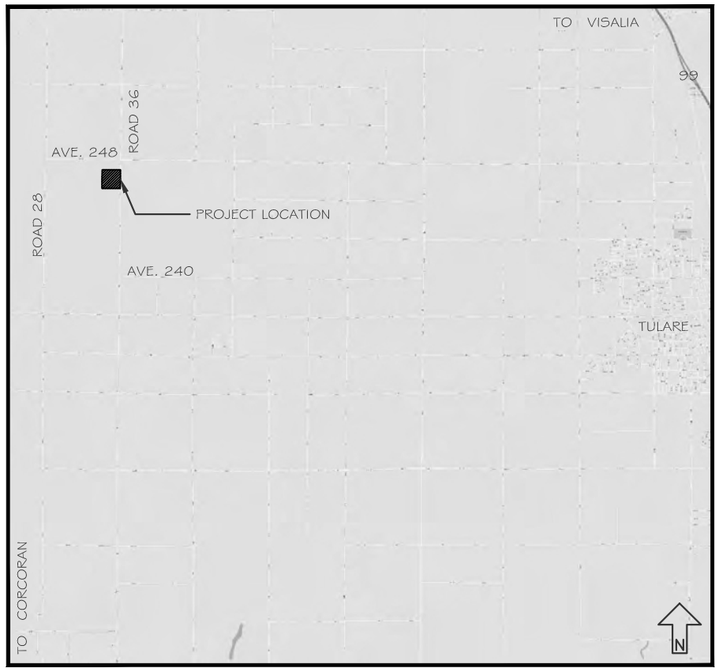
PERMANENT MONUMENTATION SHALL BE SET TO PERPETUATE THE LOCATION OF ANY MONUMENT WHICH COULD BE DAMAGED OR DESTROYED, AND A CORNER RECORD OR RECORD OF SURVEY SHALL BE FILED WITH THE COUNTY SURVEYOR PRIOR TO THE RECORDING OF A CERTIFICATE OF COMPLETION FOR THE PROJECT.

DUST CONTROL NOTES

CONTRACTOR IS REQUIRED TO COMPLY WITH PROJECT APPROVED DUST CONTROL PLAN

STORMWATER (SWPPP) NOTES

CONTRACTOR IS REQUIRED TO COMPLY WITH PROJECT APPROVED STORMWATER POLLUTION PREVENTION PLAN



VICINITY MAP

SCALE 1" : 2 MI

SHEET REFERENCE

SECTIONS:

SECTION NAME / SHEET NUMBER — B / C.3

DETAILS: B

DETAIL NAME / SHEET NUMBER — B / C.3

CONTACT INFO

ENGINEER:
CRAIG HARTMAN, RCE 73837
HARTMAN ENGINEERING, INC.
3121 W. CERES CT.
VISALIA, CA 93291
(559) 563-0181

SHEET INDEX

1 H HARTMAN ENGINEERING
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SUITE 521
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REGISTERED PROFESSIONAL ENGINEER — CRAIG M. HARTMAN — NO. 73837 — Exp. 06-30-19 — CIVIL — STATE OF CALIFORNIA — 6.15.18

PROJECT:

CLEAR LAKE DAIRY DIGESTER

CLIENT:
DECADE DAIRY
3313 AVE 256
TULARE, CA 93274

COVER SHEET

REVISION LOG:

PLOT DATE:	06/15/2018
JOB NO.:	17003
SCALE:	AS SHOWN
SHEET NO.:	A.1

811 Know what's below. Call before you dig.

SPECIFICATIONS FOR ENGINEERED FILL MATERIAL OF ABOVE GRADE EMBANKMENTS OR AS REQUIRED

TEST PARAMETER	TEST METHOD	FREQUENCY	ACCEPTANCE CRITERIA
Compaction Curves	ASTM D1557 (Modified Proctor)	Change in material	N/A
Grain Size Distribution	ASTM D422 (Sieve)	Change in material	At least 30% passing No. 200 U.S. Standard Sieve. Per Specifications (1)
Soil Classification	ASTM D2487 (USCS)	Change in material	Suitable for compaction
Maximum Particle Size	ASTM D422 (Sieve)	Change in material	½ inch, ¼ top 6 inches
Maximum Water soluble Sulfate (SO_4) in Soil (Concrete Slab locations)	ASTM C1580	Change in material	0.2% by weight

Site Preparation Specifications:

1. Clearing. Prior to earthwork operations, the area to be developed should be stripped of vegetation, organic topsoil, and cleared of cow waste and miscellaneous debris from the proposed construction areas. Deeper clearing may be required in localized areas. The actual depth of clearing should be reviewed by a licensed Geotechnical Engineer at the time of construction. The limits of stripping and clearing should be at least five feet beyond the limits of construction.

2. Compaction: The scarified subgrade and subsequent fill placed at the site should be moisture conditioned to near optimum moisture content, and compacted to at least and 90 percent for 2:1 side slope pond of maximum dry density as determined by ASTM test method D1557.

3. Material for fill: Fill should consist of select material. Native soil, free from organic, vegetation, and rocks or cobbles larger than three inches, may be used as fill at the site. Import material must be reviewed by licensed Geotechnical Engineer prior to transport to the site.

4. Fill placement. Fill material should be moisture-conditioned to +/- 2% of the optimum moisture content prior to compaction. Fill material with excessive moisture should be allowed to dry prior to compaction or be mixed with dry soil to bring the fill to a workable moisture content. Fill should be placed in level lifts not exceeding a loose, uncompacted thickness of eight inches, and compacted as engineered fill.

Sub-grade requirements for fill only:

-Over Excavate for minimum 1 ft. to meet Engineered Fill Borrow Material Guidelines and Pond Liner Sub-grade requirements

-Well mixed soil

-6 in max. lifts

-Upper 6 inches is of fine-finished soil particles no greater than ¼ in.+

Notes:

Field tests shall not be required, but fill borrow material specifications must meet the acceptance criteria outlined in Table 1.

Refer to Geotechnical Report

NOTES:

THE APPROVED WORK PLAN WHICH INCLUDES THE CONSTRUCTION QUALITY ASSURANCE PLAN, OPERATION, MAINTENANCE AND MONITORING PLAN, CONSTRUCTION DRAWINGS, AND SOILS REPORT TOGETHER AS A PACKAGE ARE THE COMPLETE SPECIFICATIONS REQUIRED FOR CONSTRUCTION OF THE POND AND LINER SYSTEM.

FILL TEST SPECIFICATIONS FOR SUB-GRADE

TEST PARAMETER	TEST METHOD	FREQUENCY	ACCEPTANCE CRITERIA
Uncompacted Lift Thickness	Visual Observation	Continuous	8-in.
Construction Oversight	Visual Observation	Continuous	Maximum particle size 1/2 inch.
In-Place Moisture Alternative Method	ASTM D2216 (Oven Dry)	1 per every 10 Nuclear tests	+/-2% of Optimum Moisture Content per ASTM D1557
In-Place Moisture Rapid Field Methods	ASTM D6938 (Nuclear Method)	3 per acre per lift, min. 2 per day	+/-2% of Optimum Moisture Content per ASTM D1557
In-Place Density Alternate Method	ASTM D2937(Drive Cylinder)	1 per every 10 Nuclear tests	90% of Maximum Dry Density per ASTM D1557
In-Place Density Rapid Field Methods	ASTM D6938 (Nuclear Method)	3 per acre per lift, min. 2 per day	90% of Maximum Dry Density per ASTM D1557
Subgrade Thickness	Surveying Measurement	At 50-foot centers	Minimum 1 ft.
Clod Size	Visual Observation	Continuous	Per Specification

Notes:

See earthwork section for anchor trench, excavation, backfill, and compaction requirements.

ASTM Test Method, unless otherwise noted. Results of all tests performed to be reported as per method reporting criteria.

The sub-grade shall be scarified to a depth of 1 ft. lower than finished grade, compacted, and tested in accordance with the requirements of this table.

Must be verified by ASTM D2216 (Oven) overnight method once every day or once per change in material

Must be verified by ASTM D2937 (Dry Cylinder) twice per day or per change in material

Calibration Procedure: ASTM D7013-04: Standard Guide for Nuclear Surface Moisture and Density Gauge Calibration Facility Set-up

POND SPECIFICATIONS FOR SUBGRADES CUT BELOW GROUND
(For Slopes 2:1 or shallower)

Side Slopes: The certified Civil Engineer/CQA Chief Officer shall walk final side slopes after cut by heavy equipment and confirm no SW or SP soils and no loose soils. All SW, SP, or soils that are not amenable to a firm and unyielding subgrade shall be removed and replaced down to a minimum 3 ft. below sloped surface. Any soils removed and replaced shall meet the Engineered Fill requirements in Table 1.

Pond Bottom: 1. An as-built survey of the pond bottom shall take place after subgrade construction to insure minimum slopes are achieved. Pond Bottom shall be tested per criteria below. Any soils not meeting the requirements below (i.e. that is not firm and unyielding) shall be removed and replaced down to a minimum 2 ft. Any soils removed and replaced shall meet the Engineered Fill requirements in Table 1. The Civil Engineer may make determination of soils meeting requirements or not based upon visual inspection which shall be included in the Subgrade Certification Report and signed and sealed by a Civil Engineer and CQA Officer.

TEST PARAMETER	TEST METHOD	FREQUENCY	ACCEPTANCE CRITERIA
In-Place Density Rapid Field Methods	ASTM D6938 (Nuclear)	3 per acre	90% of Maximum Dry Density per ASTM D1557
In-Place Moisture Rapid Field Methods	ASTM D6938 (Nuclear Methods)	3 per acre per lift, min. 2 per day	+/-2% of Optimum Moisture Content per ASTM D1557
Construction Oversight	Visual Observation	Continuous	Maximum particle size 1/2 inch.
Subgrade Slope	Surveying Measurement	200 ft. maximum grid	Min 1%

60 MIL HDPE GEOMEMBRANE CONSTRUCTION QUALITY ASSURANCE (CQA)

TEST PARAMETER	TEST METHOD	FREQUENCY	ACCEPTANCE CRITERIA
Thickness (min. ave.) -Lowest individual for 8 out of 10 values -Lowest individual for any of the 10 values	ASTM D5994	1 per lot or 1 per 70,000 ft2, whichever is greater	Nom. (-5%) -10% -15%
Tensile Properties -yield strength -break strength -strain at yeild -break strength	ASTM D6693 Type IV	1 per lot or 1 per 70,000 ft2, whichever is greater	≥126 lb./in. ≥90 lb./in. ≥12% ≥100%
Puncture Resistance	ASTM D4833	1 per lot or 1 per 70,000 ft^2, whichever is greater	108 lb. (min.)
Tear Resistance	ASTM D1004, Die C	1 per lot or 1 per 70,000 ft2, whichever is greater	42 lb. (min.)
Interface Shear -60-mil HDPE/subgrade soil -Drainage geocomposite	ASTM D5321 ASTM D6243	2 tests or 1 per 200,000 ft2, whichever is greater	
Seam Shear	ASTM D6392	1 test per 500 lineal feet or per GRI GM-14 and 20.	95% of min. yield strength
Seam Peel -Extrusion -Fusion	ASTM D6392	1 test per 500 lineal feet or per GRI GM-14 and 20.	72% yield & ftb (1)
Non-destructive Seam Test	ASTM D5820 (Pressure Test)	Continuous	35 psi for 5 min.
	ASTM D5641 (Vacuum Box)		5 psi for 15 sec.
	ASTM D5641 (Spark Test)		No Spark
Electric Leak Location	ASTM D7002 (Water Puddle)	Once on constructed liner	Max 1 mm. diameter hole sensitivity
	ASTM D6747 (Selection Process)		
	ASTM D7007 (Water /Earth)		Max 6 mm. diameter hole sensitivity
	ASTM D7240 (Spark Test 2011)		

Notes:

ftb: Film Tear Bond

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PROJECT:

CLEAR LAKE DAIRY DIGESTER

CLIENT:
DECADE DAIRY
3313 AVE 256
TULARE, CA 93274

GENERAL NOTES
CONSTRUCTION

REVISION LOG:

PLOT DATE:	06/15/2018
JOB NO.:	17003
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SHEET NO.:	A.2

1

H

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REGISTERED PROFESSIONAL ENGINEER
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STATE OF CALIFORNIA
6.15.18

PROJECT:

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SITE PLAN

DAIRY

REVISION LOG:

PLOT DATE:	06/15/2018
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SCALE:	AS SHOWN
SHEET NO.:	A.3

HARTMAN ENGINEERING

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SITE PLAN
DIGESTER

REVISION LOG:

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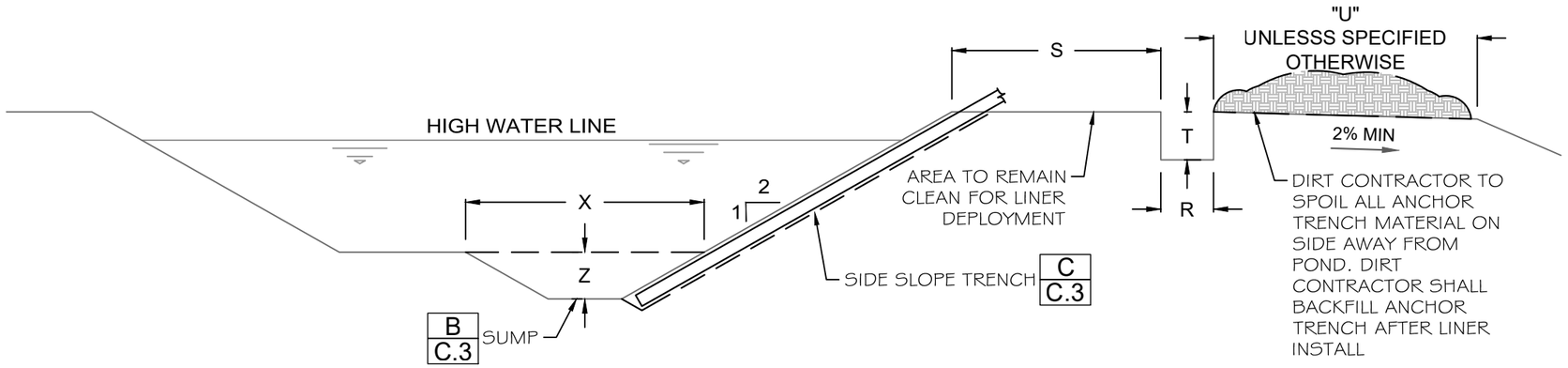
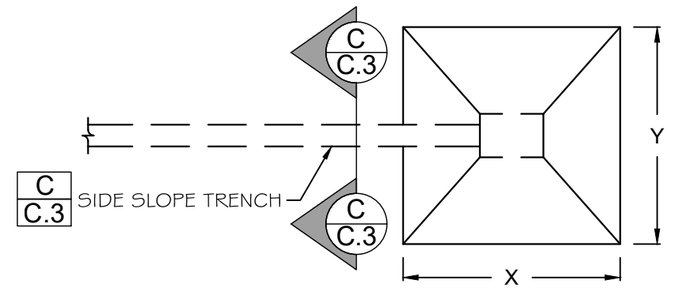
SCALE:	AS SHOWN
SHEET NO.:	A.4



A ANCHOR TRENCH / SUMP PROFILE VIEW

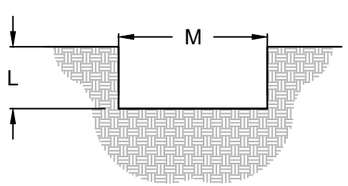
N.T.S.

DIMENSION TABLE (FT.)	
LETTER	POND
L	1.7'
M	2.7'
U	20'
R	1.5'
S	3'
T	3'
X	30'
Y	30'
Z	5.5'



B SUMP PLAN VIEW

N.T.S.



C SIDE SLOPE TRENCH

N.T.S.

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PROJECT:

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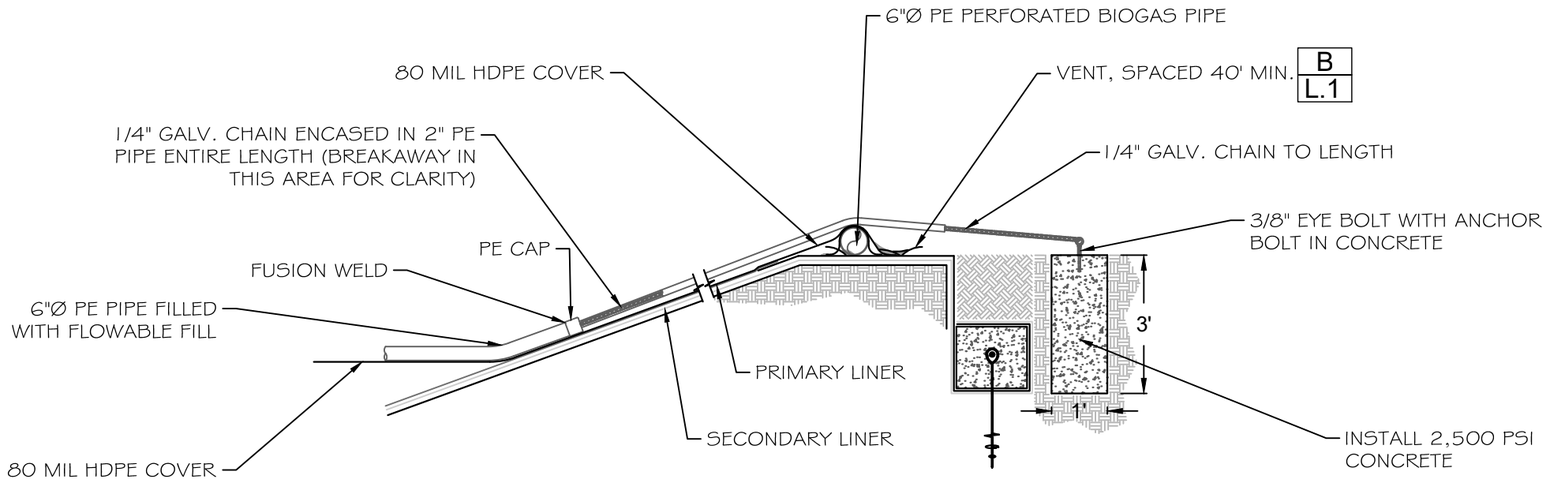
TULARE, CA 93274

GRADING DETAIL
DIGESTER

REVISION LOG:

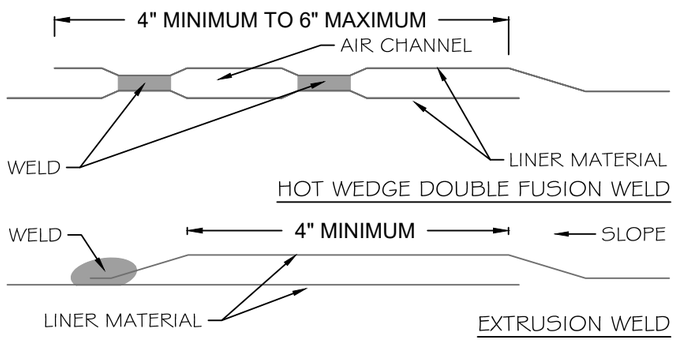
PLOT DATE:	06/15/2018
JOB NO.:	17003
SCALE:	AS SHOWN
SHEET NO.:	C.1



A BALLAST TUBE DETAIL

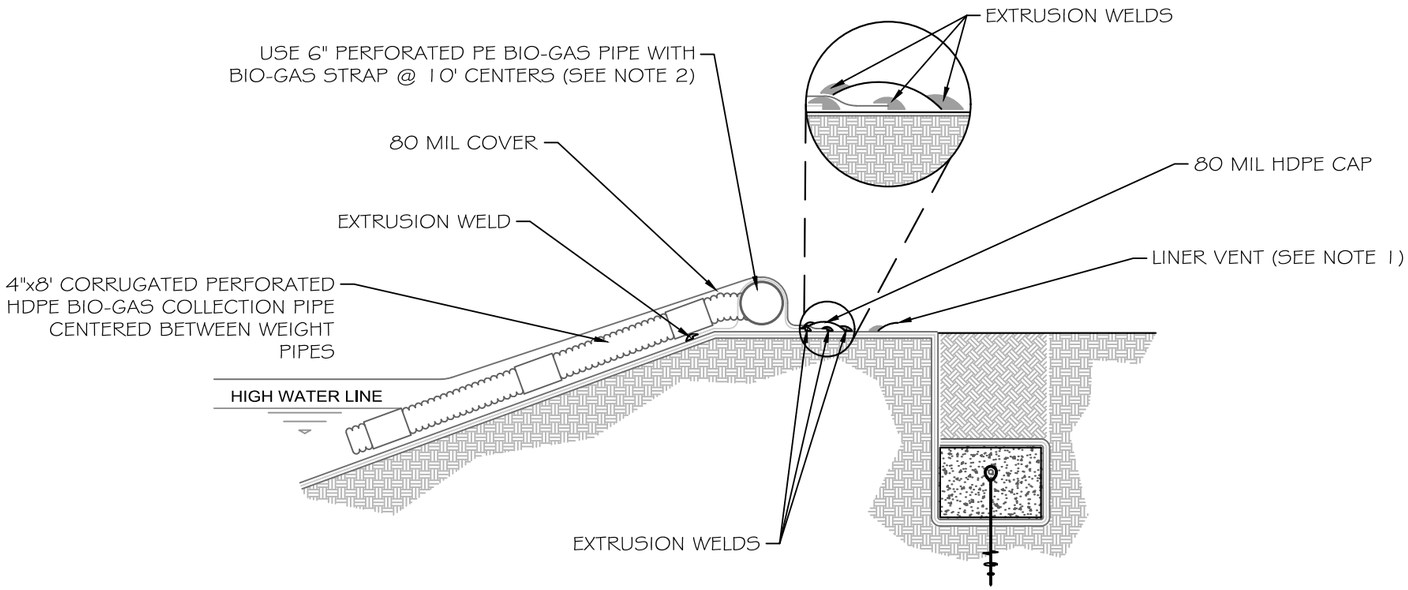
N.T.S.

DESCRIPTION	LOCATION	MATERAIL	THICKNESS (MIN)	TOP FINISH	BOTTOM FINISH
COVER	TOP	HDPE	80 MIL	SMOOTH	SMOOTH



C HDPE COVER-SMOOTH WELDS

N.T.S.



B BIO-GAS PIPING DETAIL

N.T.S.

NOTES:
1. GAS VENTS AROUND PERIPHERY OF LAGOON @ MAX. 40' O.C.
2. STRAP NOT WELDED TO BIO-GAS HEADER PIPE.
3. WRAP 60 MIL PRIMARY LINER OVER CONCRETE & EXTRUSION WELD.

HARTMAN ENGINEERING
113 N. CHURCH ST, SUITE 521
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(559) 563-0181

REGISTERED PROFESSIONAL ENGINEER
CRAIG M. HARTMAN
NO. 73837
Exp. 06-30-19
CIVIL
STATE OF CALIFORNIA
6.15.18

PROJECT:

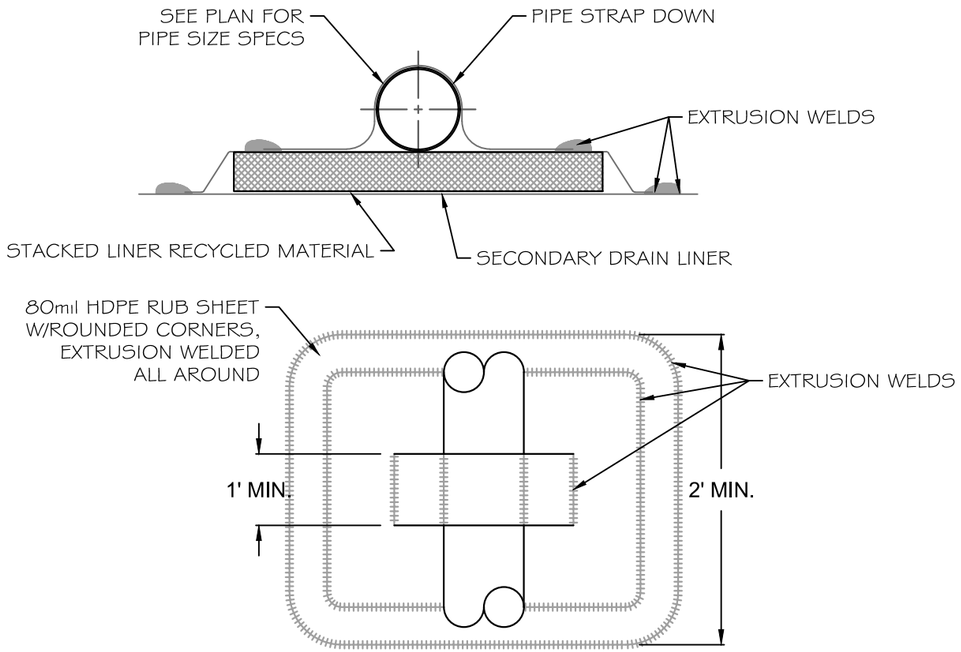
CLEAR LAKE DAIRY DIGESTER

CLIENT:
DECADE DAIRY
3313 AVE 256
TULARE, CA 93274

COVER SYSTEM
DIGESTER

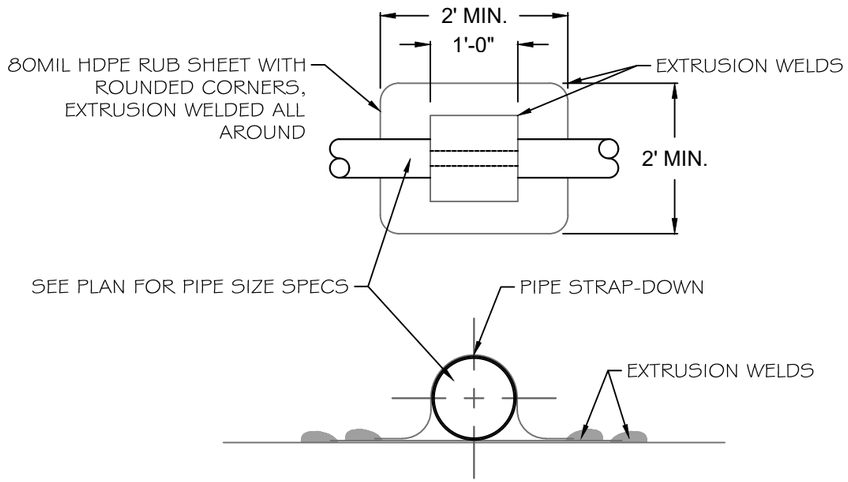
REVISION LOG:

PLOT DATE:	06/15/2018
JOB NO.:	17003
SCALE:	AS SHOWN
SHEET NO.:	D.1



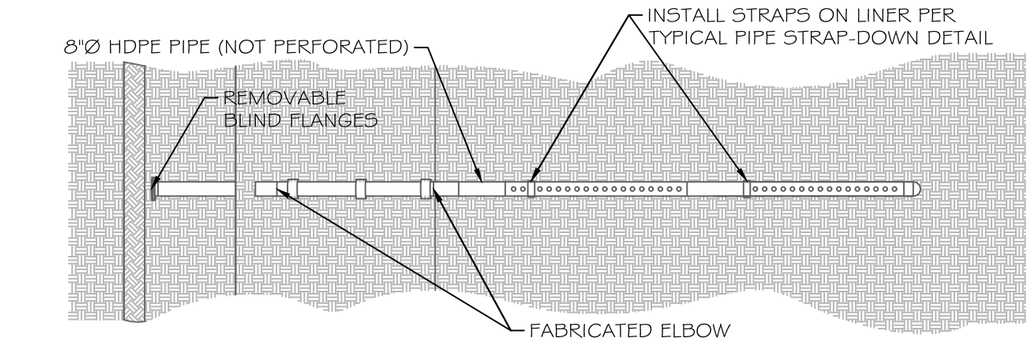
A SLUDGE REMOVAL PIPE ANCHOR DETAIL

NOTE: ANCHOR TO BE USED ON HORIZONTAL SURFACES ONLY, AT BOTTOM OF LAGOON N.T.S.



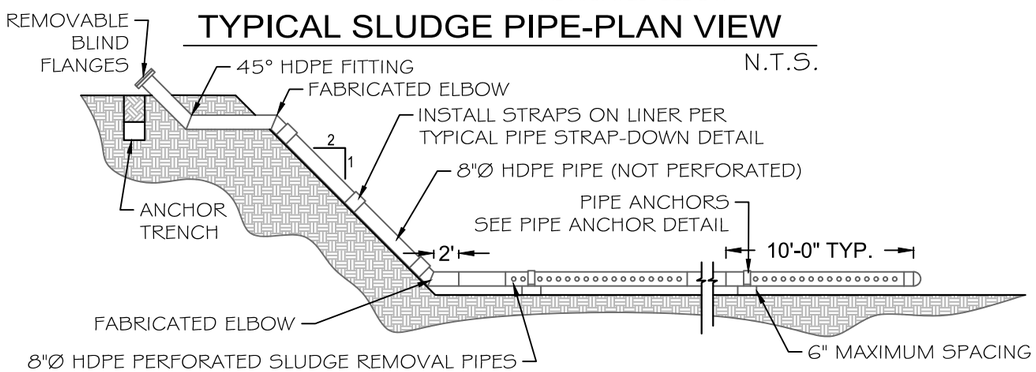
B TYPICAL PIPE STRAP-DOWN DETAIL

NOTE: MAXIMUM 10' O.C. SPACING BETWEEN PIPE STRAP-DOWNS, U.N.O. N.T.S.



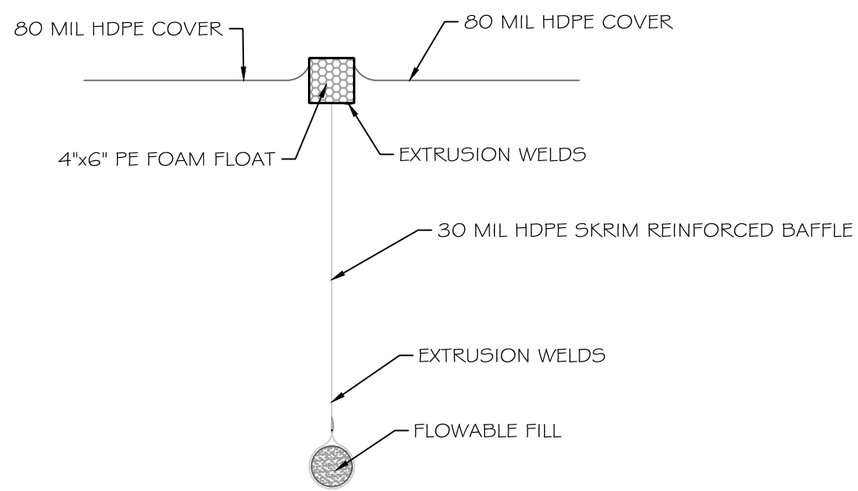
TYPICAL SLUDGE PIPE-PLAN VIEW

N.T.S.



C TYPICAL SLUDGE PIPE-PROFILE

N.T.S.



D BAFFLE SECTION

N.T.S.

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REGISTERED PROFESSIONAL ENGINEER CRAIG M. HARTMAN NO. 73837 Exp. 06-30-19 CIVIL STATE OF CALIFORNIA 6.15.18

PROJECT:

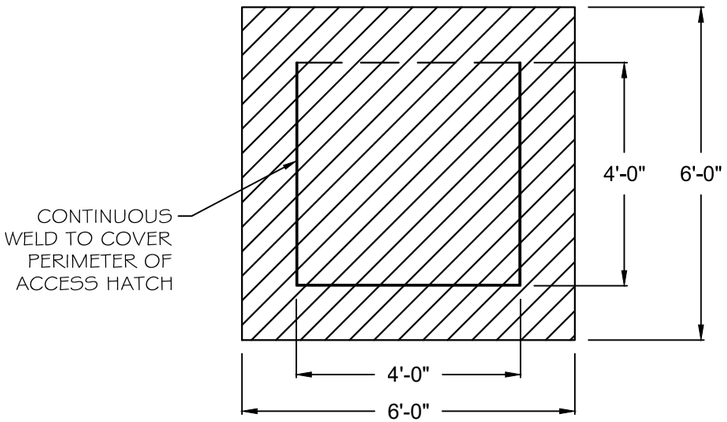
CLEAR LAKE DAIRY DIGESTER

CLIENT:
DECADE DAIRY
3313 AVE 256
TULARE, CA 93274

SLURRY REMOVAL
DIGESTER

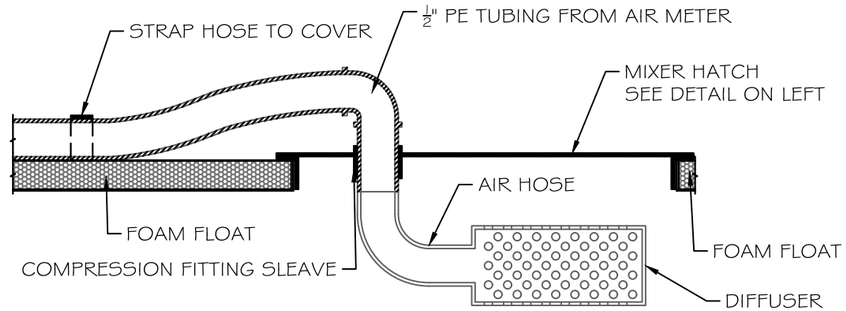
REVISION LOG:

PLOT DATE:	06/15/2018
JOB NO.:	17003
SCALE:	AS SHOWN
SHEET NO.:	D.2



MIXER - HATCH

N.T.S.



AIR INJECTION & MIXER HATCH

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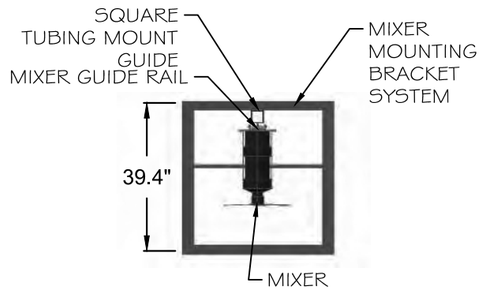
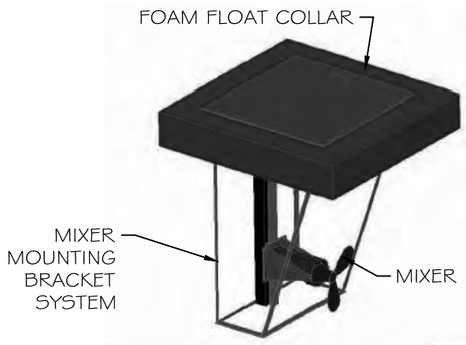


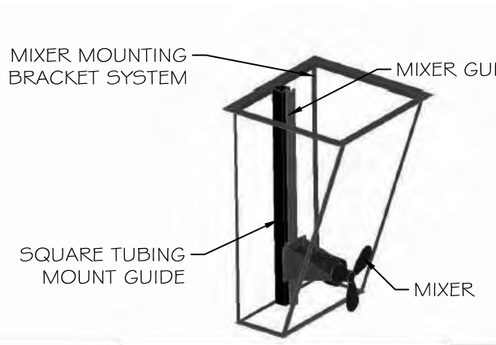
MIXER - PLAN VIEW

N.T.S.



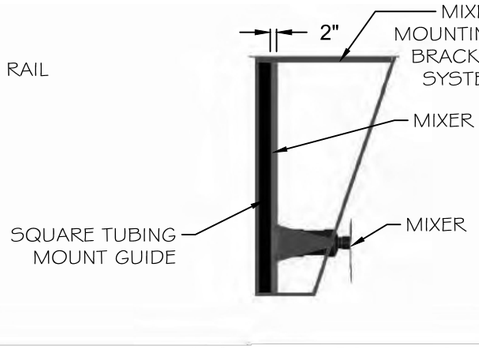
MIXER - ISOMETRIC W/FLOAT IN PLACE

N.T.S.



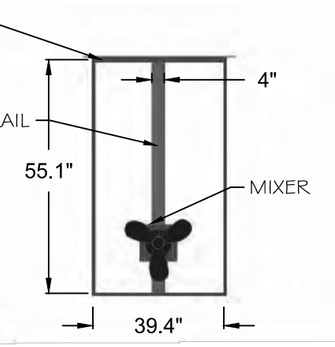
MIXER - ISOMETRIC

N.T.S.



MIXER - SIDE VIEW

N.T.S.



MIXER - FRONT VIEW

N.T.S.

1 HARTMAN ENGINEERING

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CRAIG M. HARTMAN
NO. 73837
Exp. 06-30-19
CIVIL
STATE OF CALIFORNIA
6.15.18

PROJECT:

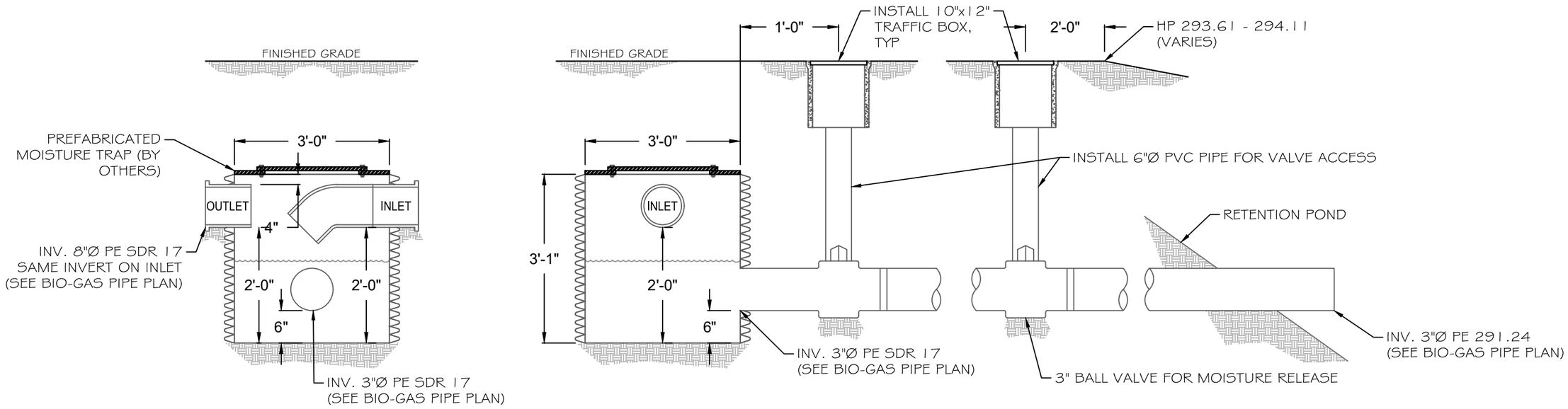
CLEAR LAKE DAIRY DIGESTER

CLIENT:
DECADE DAIRY
3313 AVE 256
TULARE, CA 93274

MIXER DETAILS

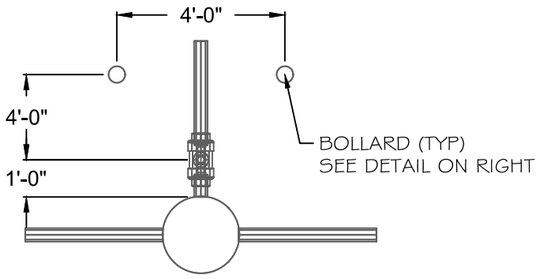
REVISION LOG:

PLOT DATE:	06/15/2018
JOB NO.:	17003
SCALE:	AS SHOWN
SHEET NO.:	D.3



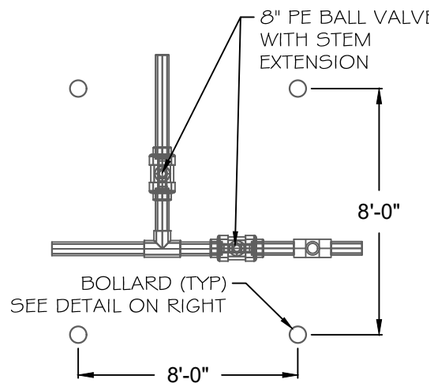
MOISTURE TRAP DETAIL

N.T.S.



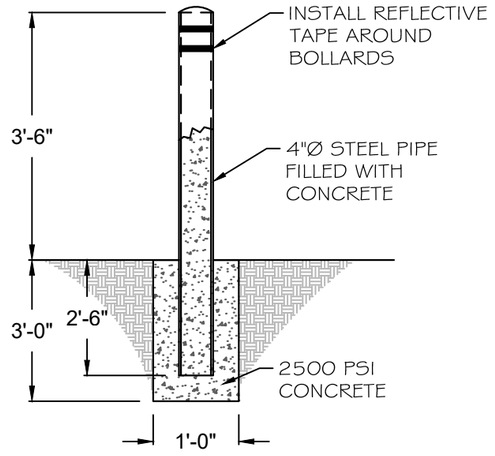
BIO-GAS VALVE

N.T.S.



BALL VALVE JUNCTION

N.T.S.



BOLLARD DETAIL

N.T.S.

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REGISTERED PROFESSIONAL ENGINEER CRAIG M. HARTMAN NO. 73837 Exp. 06-30-19 CIVIL STATE OF CALIFORNIA 6.15.18

PROJECT:

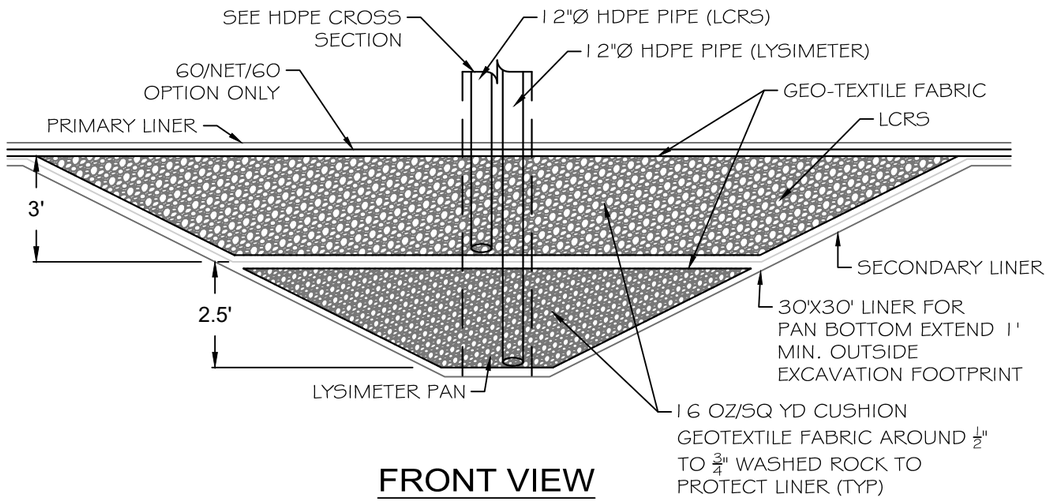
CLEAR LAKE DAIRY DIGESTER

CLIENT:
DECADE DAIRY
3313 AVE 256
TULARE, CA 93274

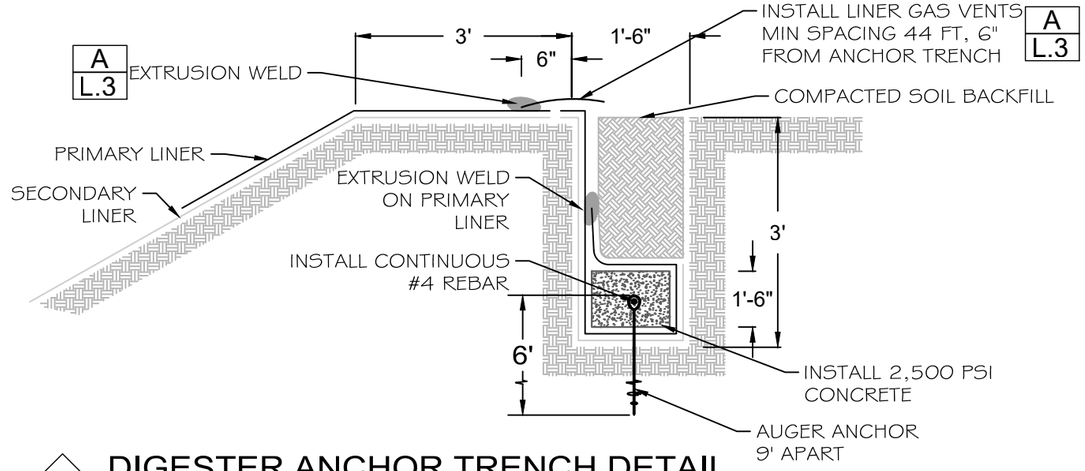
DETAILS

REVISION LOG:

PLOT DATE:	06/15/2018
JOB NO.:	17003
SCALE:	AS SHOWN
SHEET NO.:	D.4



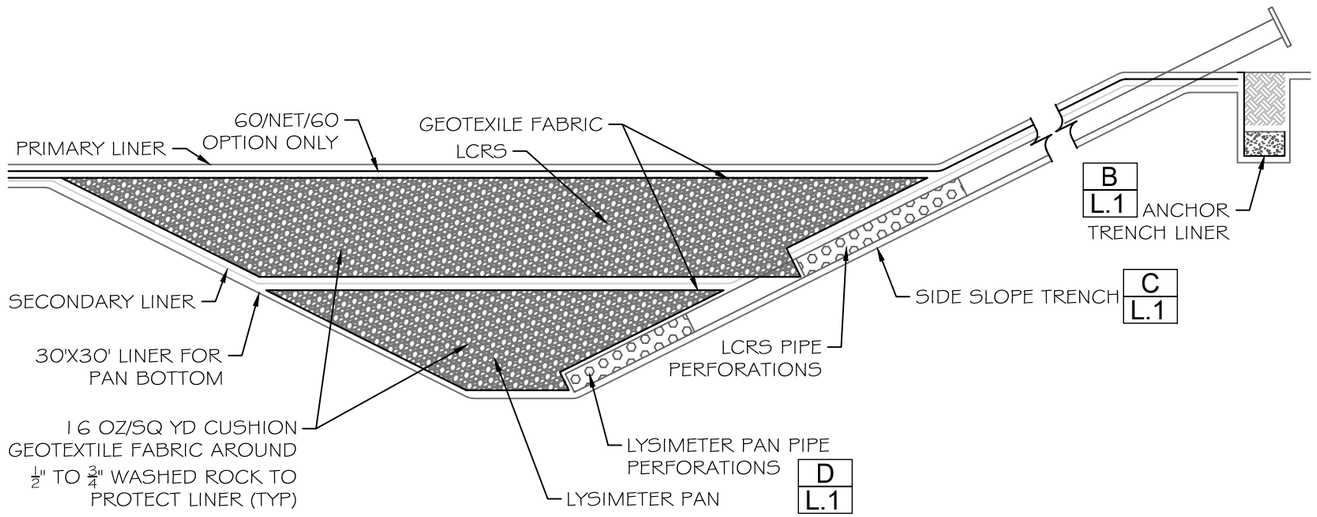
FRONT VIEW



B DIGESTER ANCHOR TRENCH DETAIL

N.T.S.

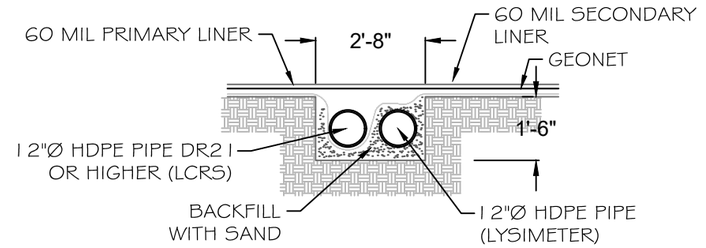
NOTES: 1. CONTRACTOR TO USE ANCHOR SYSTEM OR PROVIDE DETAILS AND DESIGN FOR ALTERNATIVE TO BE APPROVED BY ENGINEER.



SIDE VIEW

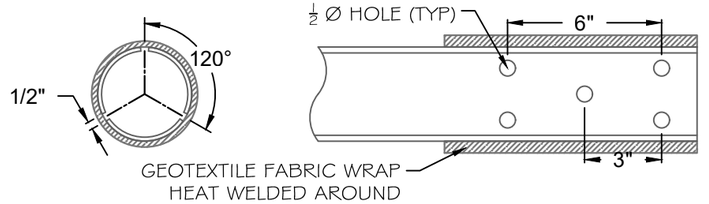
A LCRS, LYSIMETER AND DRAINAGE SUMP PROFILE

N.T.S.



C HDPE CROSS SECTION

N.T.S.



D TYPICAL PERFORATION DETAIL

N.T.S.

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PROJECT:

CLEAR LAKE DAIRY DIGESTER

CLIENT:
DECADE DAIRY
3313 AVE 256
TULARE, CA 93274

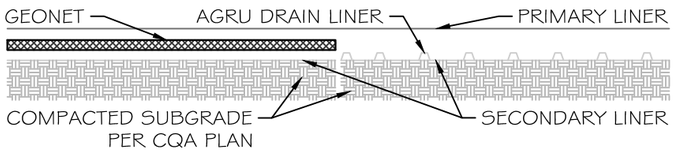
GENERAL NOTES
LINER DETAILS

REVISION LOG:

PLOT DATE:	06/15/2018
JOB NO.:	17003
SCALE:	AS SHOWN
SHEET NO.:	L.1

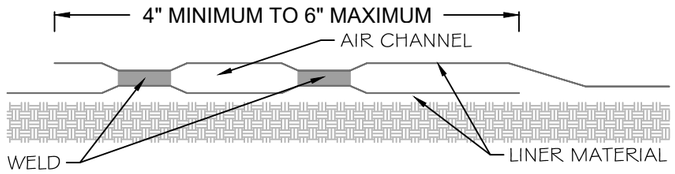
OPTIONAL TIER 1 DOUBLE LINER-LAYERING SYSTEM WITH DRAIN LINER VERIFY WITH OWNER

SMOOTH/STUDDED/ 60-NET-60 LINER LAYERS					
DESCRIPTION	LOCATION	MATERAIL	THICKNESS (MIN)	TOP FINISH	BOTTOM FINISH
PRIMARY LINER	TOP	HDPE	60 MIL	SMOOTH	SMOOTH CONDUCTIVE
DRAINAGE NET	MIDDLE	HDPE	200 MIL	N/A	N/A
SECONDARY LINER	BOTTOM	HDPE	60 MIL	SMOOTH	SMOOTH

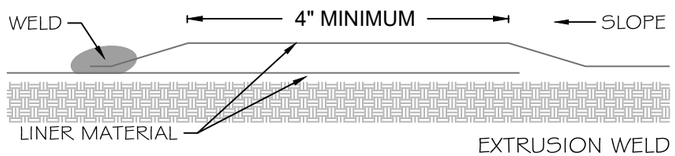


A DOUBLE LAYER 60-NET-60 DOUBLE LAYER WITH DRAIN LINER

N.T.S.



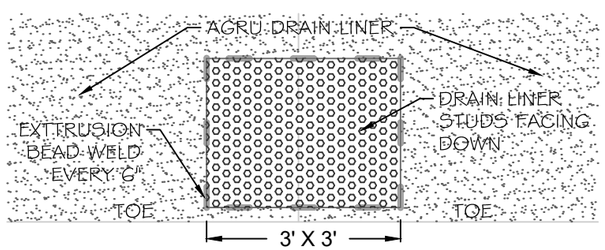
HOT WEDGE DOUBLE FUSION WELD



EXTRUSION WELD

B HDPE LINER-SMOOTH WELDS

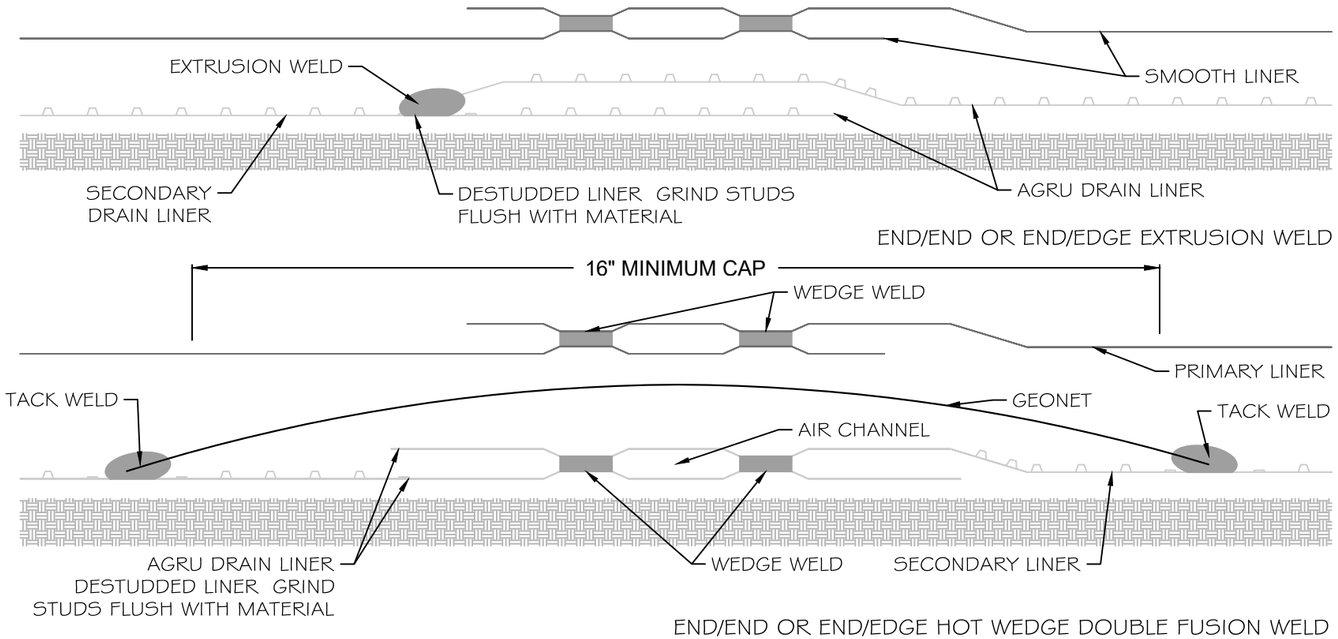
N.T.S.



DRAIN LINER SMOOTH END WELD PATCH

C 3'X3' DRAIN PATCH WELD

N.T.S.

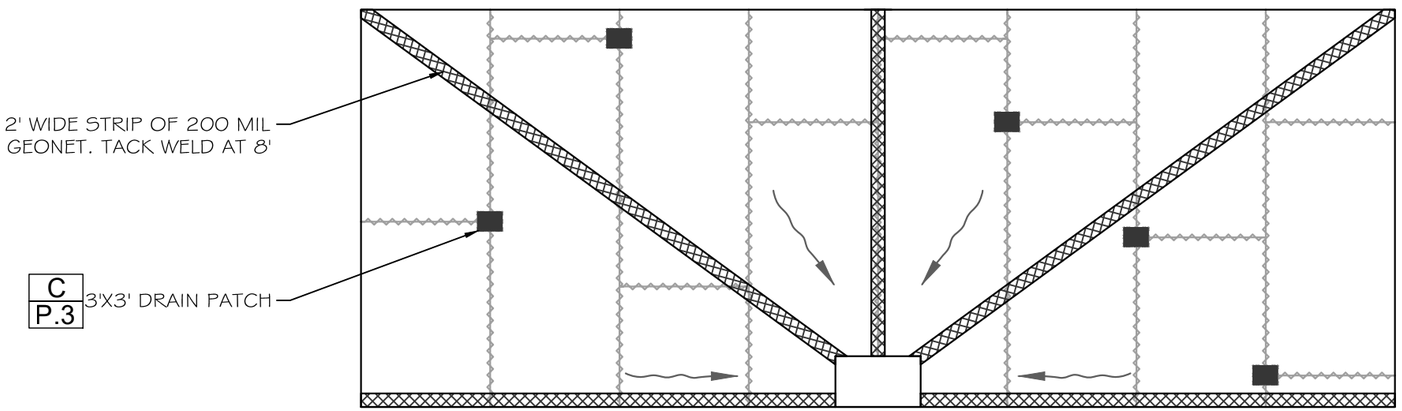


END/END OR END/EDGE EXTRUSION WELD

END/END OR END/EDGE HOT WEDGE DOUBLE FUSION WELD

D AGRU DRAIN LINER END/END WELD

NOTE: AGRU DRAIN LINER DOES NOT HAVE STUDS ALONG THE EDGE SO EDGE/EDGE SEAMS DO NOT REQUIRE DRINGING OR CAP. N.T.S.



NOTE: CQA OFFICER IS RESPONSIBLE TO ADD PATCHES AS NEEDED FOR FLOW

E AGRU DRAIN LINER CROSS SEAM NET PLAN VIEW

NOTE: TYPICAL OF ALL DRAIN LINERS N.T.S.

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REGISTERED PROFESSIONAL ENGINEER CRAIG M. HARTMAN NO. 73837 Exp. 06-30-19 CIVIL STATE OF CALIFORNIA 6.15.18

PROJECT:

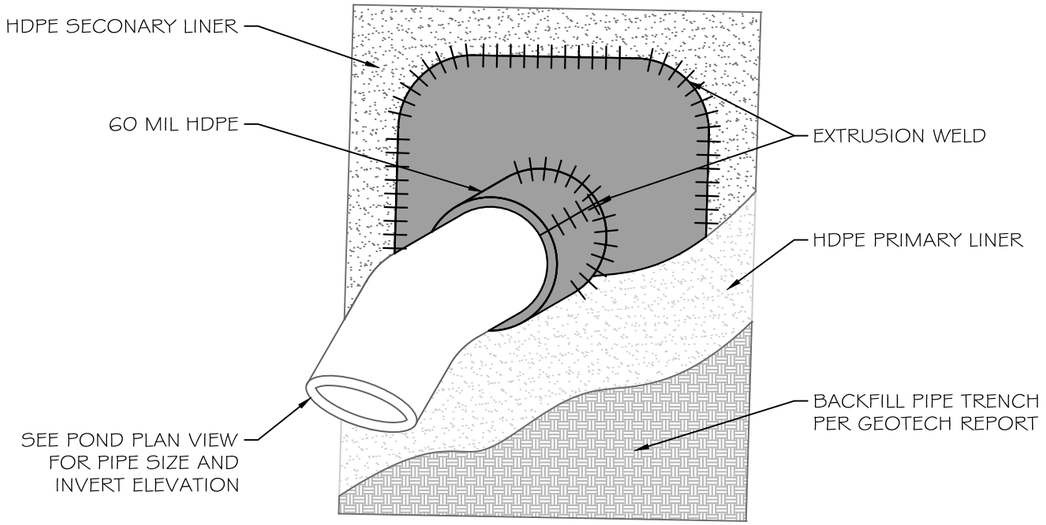
CLEAR LAKE DAIRY DIGESTER

CLIENT:
DECADE DAIRY
3313 AVE 256
TULARE, CA 93274

LINER DETAILS

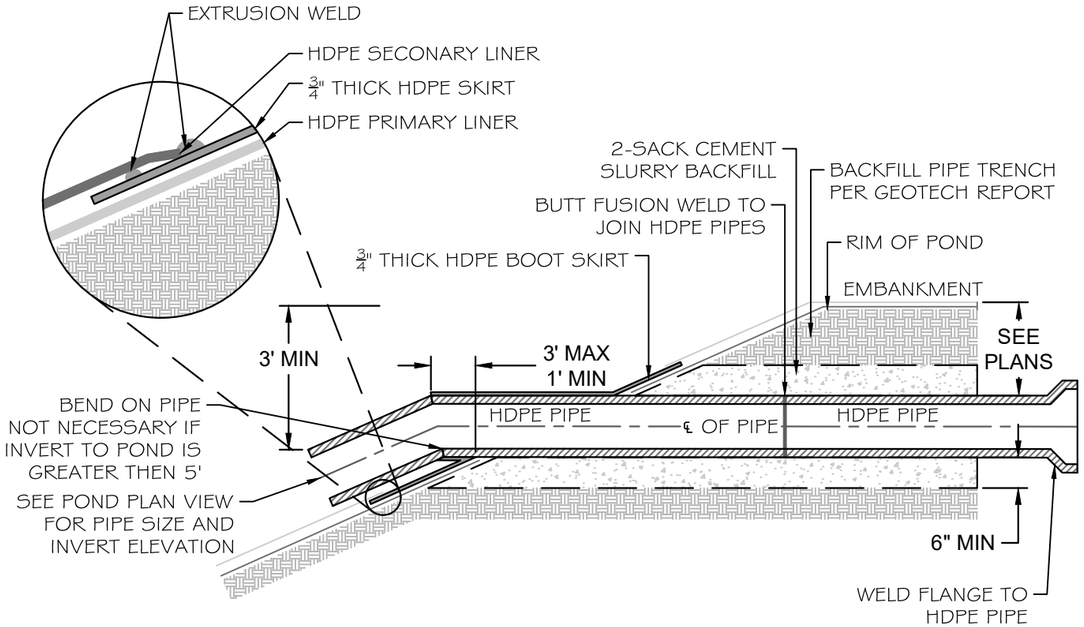
REVISION LOG:

PLOT DATE:	06/15/2018
JOB NO.:	17003
SCALE:	AS SHOWN
SHEET NO.:	D.2



A BOOT SKIRT

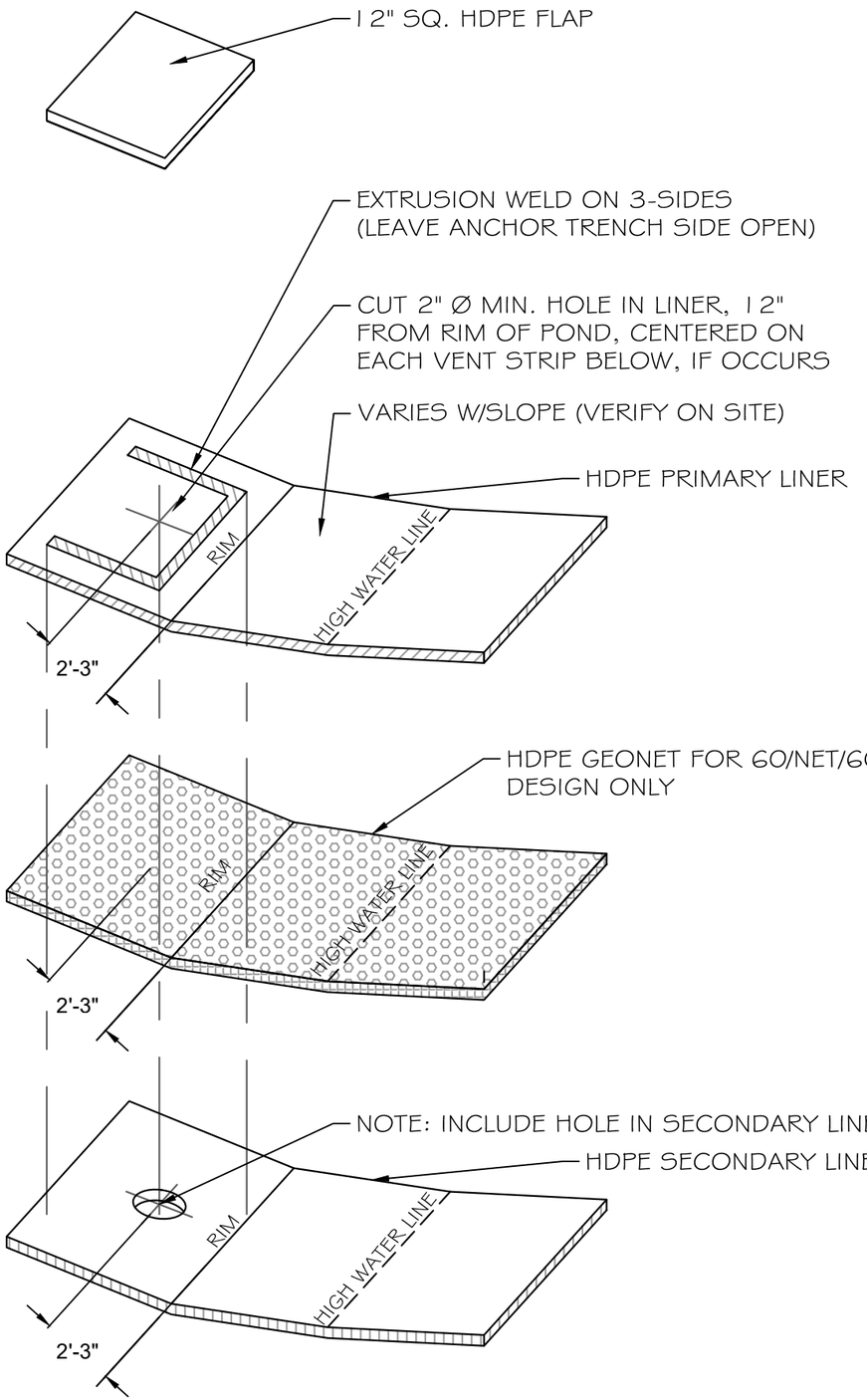
N.T.S.



B BOOTLESS PIPE PENETRATION

LINER FASTENING

N.T.S.



C VENT ORIFICE (ISOMETRIC VIEW)

N.T.S.

1
H
HARTMAN
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6.15.18

PROJECT:

CLEAR LAKE DAIRY DIGESTER

CLIENT:
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3313 AVE 256
TULARE, CA 93274

LINER DETAILS

REVISION LOG:

PLOT DATE:	06/15/2018
JOB NO.:	17003
SCALE:	AS SHOWN
SHEET NO.:	L3

DIXIE CREEK
DAIRY DIGESTER

BENCHMARK

THE TOPOGRAPHIC SURVEY WAS PERFORMED UTILIZING GLOBAL POSITIONING SYSTEM OBSERVATIONS. DISTANCES AND NUMBERS SHOWN ARE TO BE CONSIDERED GROUND VALUES. BENCHMARK AND CONTROL SHOWN ON CONTROL PLAN SHEET. THE BENCHMARK AND VERTICAL ELEVATIONS WERE DERIVED FROM THE NGS ONLINE POSITIONING SERVICE (OPUS), AND IS SHOWN ON THE NAVD 88 DATUM UTILITIZING THE GEOID 09 AS THE VERTICAL MODEL.

PRESERVATION OF MONUMENTS

PURSUANT TO SECTIONS 8771(B) AND 8771(C) OF THE GOVERNMENT CODE, ANY MONUMENTS THAT CONTROL THE LOCATION OF BOUNDARIED, OR OTHERWISE PROVIDE HORIZONTAL OR VERTICAL SURVEY CONTROL WITHIN THE CONSTRUCTION AREA, SHALL BE LOCATED AND REFERENCED PRIOR TO CONSTRUCTION, AND A CORNER RECORD OR RECORD OF SURVEY OF THE REFERENCES SHALL BE FILED WITH THE COUNTY SURVEYOR.

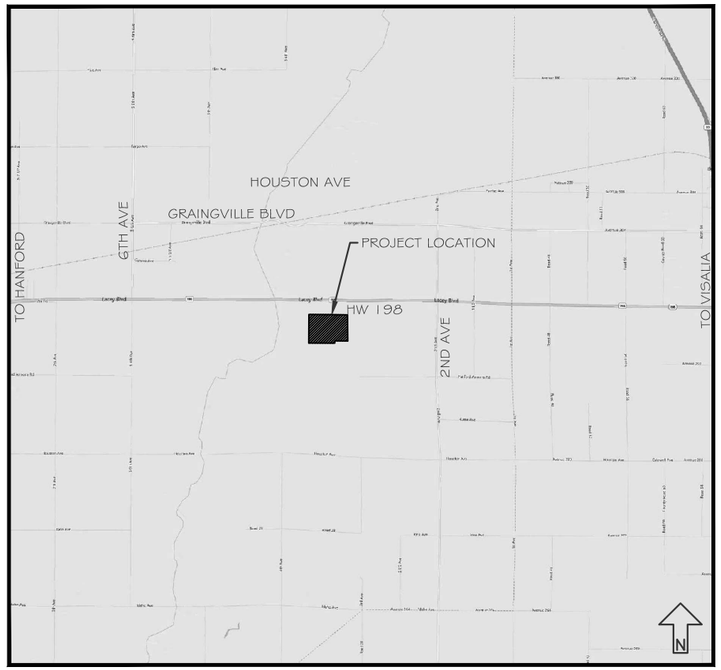
PERMANENT MONUMENTATION SHALL BE SET TO PERPETUATE THE LOCATION OF ANY MONUMENT WHICH COULD BE DAMAGED OR DESTROYED, AND A CORNER RECORD OR RECORD OF SURVEY SHALL BE FILED WITH THE COUNTY SURVEYOR PRIOR TO THE RECORDING OF A CERTIFICATE OF COMPLETION FOR THE PROJECT.

DUST CONTROL NOTES

CONTRACTOR IS REQUIRED TO COMPLY WITH GOOD HOUSE KEEPING PRACTICES

STORMWATER (SWPPP) NOTES

CONTRACTOR IS REQUIRED TO COMPLY WITH GOOD HOUSE KEEPING PRACTICES



VICINITY MAP
SCALE 1" : 2 MI

SHEET REFERENCE

SECTIONS:

SECTION NAME
SHEET NUMBER
B
C.3

DETAILS:
B

DETAIL NAME
SHEET NUMBER
B
C.3

CONTACT INFO

ENGINEER:
CRAIG HARTMAN, RCE 73837
HARTMAN ENGINEERING, INC.
3121 W. CERES CT.
VISALIA, CA 93291
(559) 563-0181

DAIRY CONTACT:
BERNARD TE VELDE JR
3601 CA-198
HANFORD, CA 93230

SHEET INDEX

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REGISTERED PROFESSIONAL ENGINEER
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NO. 73837
Exp. 06-30-19
CIVIL
STATE OF CALIFORNIA
1-8-18

PROJECT:
DIXIE CREEK
DAIRY DIGESTER

CLIENT:
BERNARD TE VELDE
3601 CA-198
HANFORD, CA 93230

REVISION LOG:

PLOT DATE:	01/08/18
JOB NO.:	17003
SCALE:	AS SHOWN
SHEET NO.:	A.1

SPECIFICATIONS FOR ENGINEERED FILL MATERIAL OF ABOVE GRADE EMBANKMENTS OR AS REQUIRED

TEST PARAMETER	TEST METHOD	FREQUENCY	ACCEPTANCE CRITERIA
Compaction Curves	ASTM D1557 (Modified Proctor)	Change in material	N/A
Grain Size Distribution	ASTM D422 (Sieve)	Change in material	At least 30% passing No. 200 U.S. Standard Sieve. Per Specifications (1)
Soil Classification	ASTM D2487 (USCS)	Change in material	Suitable for compaction [2,3]
Maximum Particle Size	ASTM D422 (Sieve)	Change in material	½ inch, ¼ top 6 inches
Maximum Water soluble Sulfate (SO_4) in Soil (Concrete Slab locations)	ASTM C1580	Change in material	0.2% by weight

Site Preparation Specifications:

1. Clearing: Prior to earthwork operations, the area to be developed should be stripped of vegetation, organic topsoil, and cleared of cow waste and miscellaneous debris from the proposed construction areas. Deeper clearing may be required in localized areas. The actual depth of clearing should be reviewed by a licensed Geotechnical Engineer at the time of construction. The limits of stripping and clearing should be at least five feet beyond the limits of construction.

2. Compaction: The scarified subgrade and subsequent fill placed at the site should be moisture conditioned to near optimum moisture content, and compacted to at least and 90 percent for 2:1 side slope pond of maximum dry density as determined by ASTM test method D1557.

3. Material for fill: Fill should consist of select material. Native soil, free from organic, vegetation, and rocks or cobbles larger than three inches, may be used as fill at the site. Import material must be reviewed by licensed Geotechnical Engineer prior to transport to the site.

4. Fill placement: Fill material should be moisture-conditioned to +/- 2% of the optimum moisture content prior to compaction. Fill material with excessive moisture should be allowed to dry prior to compaction or be mixed with dry soil to bring the fill to a workable moisture content. Fill should be placed in level lifts not exceeding a loose, uncompacted thickness of eight inches, and compacted as engineered fill.

Sub-grade requirements for fill only:

-Over Excavate for minimum 1 ft. to meet Engineered Fill Borrow Material Guidelines and Pond Liner Sub-grade requirements

-Well mixed soil

-6 in max lifts

-Upper 6 inches is of fine-finished soil particles no greater than ¼ in.+

Notes:

1. Field tests shall not be required, but fill borrow material specifications must meet the acceptance criteria outlined in Table 1.
2. Refer to Geotechnical Report

NOTES:

THE APPROVED WORK PLAN WHICH INCLUDES THE CONSTRUCTION QUALITY ASSURANCE PLAN, OPERATION, MAINTENANCE AND MONITORING PLAN, CONSTRUCTION DRAWINGS, AND SOILS REPORT TOGETHER AS A PACKAGE ARE THE COMPLETE SPECIFICATIONS REQUIRED FOR CONSTRUCTION OF THE POND AND LINER SYSTEM.

FILL TEST SPECIFICATIONS FOR SUB-GRADE

TEST PARAMETER	TEST METHOD [1]	FREQUENCY	ACCEPTANCE CRITERIA
Uncompacted Lift Thickness	Visual Observation	Continuous	8-in.[2,3]
Construction Oversight	Visual Observation	Continuous	Maximum particle size 1/2 inch.
In-Place Moisture Alternative Method	ASTM D2216 (Oven Dry)	1 per every 10 Nuclear tests	+/-2% of Optimum Moisture Content per ASTM D1557
In-Place Moisture Rapid Field Methods[3,5]	ASTM D6938[3,5] (Nuclear Method)	3 per acre per lift, min. 2 per day	+/-2% of Optimum Moisture Content per ASTM D1557
In-Place Density Alternate Method	ASTM D2937(Drive Cylinder)	1 per every 10 Nuclear tests	90% of Maximum Dry Density per ASTM D1557
In-Place Density Rapid Field Methods[4,5]	ASTM D6938[3,5] (Nuclear Method)	3 per acre per lift, min. 2 per day	90% of Maximum Dry Density per ASTM D1557
Subgrade Thickness	Surveying Measurement	At 50-foot centers	Minimum 1 ft.[4,5]
Clod Size	Visual Observation	Continuous	Per Specification

Notes:

See earthwork section for anchor trench, excavation, backfill, and compaction requirements.

[1] ASTM Test Method, unless otherwise noted. Results of all tests performed to be reported as per method reporting criteria.

[2] The sub-grade shall be scarified to a depth of 1 ft. lower than finished grade, compacted, and tested in accordance with the requirements of this table.

[3] Must be verified by ASTM D2216 (Oven) overnight method once every day or once per change in material

[4] Must be verified by ASTM D2937 (Dry Cylinder) twice per day or per change in material

[5] Calibration Procedure: ASTM D7013-04: Standard Guide for Nuclear Surface Moisture and Density Gauge Calibration Facility Set-up

POND SPECIFICATIONS FOR SUBGRADES CUT BELOW GROUND (For Slopes 2:1 or shallower)

Side Slopes: The certified Civil Engineer/CQA Chief Officer shall walk final side slopes after cut by heavy equipment and confirm no SW or SP soils and no loose soils. All SW, SP, or soils that are not amenable to a firm and unyielding subgrade shall be removed and replaced down to a minimum 3 ft. below sloped surface. Any soils removed and replaced shall meet the Engineered Fill requirements in Table 1.

Pond Bottom: 1. An as-built survey of the pond bottom shall take place after subgrade construction to insure minimum slopes are achieved. Pond Bottom shall be tested per criteria below. Any soils not meeting the requirements below (i.e. that is not firm and unyielding) shall be removed and replaced down to a minimum 2 ft. Any soils removed and replaced shall meet the Engineered Fill requirements in Table 1. The Civil Engineer may make determination of soils meeting requirements or not based upon visual inspection which shall be included in the Subgrade Certification Report and signed and sealed by a Civil Engineer and CQA Officer.

TEST PARAMETER	TEST METHOD [1,3]	FREQUENCY	ACCEPTANCE CRITERIA
In-Place Density Rapid Field Methods [1]	ASTM D6938[3,5] (Nuclear)	3 per acre	90% of Maximum Dry Density per ASTM D1557
In-Place Moisture Rapid Field Methods[3,5]	ASTM D6938[3,5] (Nuclear Methods)	3 per acre per lift, min. 2 per day	+/-2% of Optimum Moisture Content per ASTM D1557
Construction Oversight	Visual Observation	Continuous	Maximum particle size 1/2 inch.
Subgrade Slope	Surveying Measurement	200 ft. maximum grid	Min 1%

60 MIL HDPE GEOMEMBRANE CONSTRUCTION QUALITY ASSURANCE (CQA)

TEST PARAMETER	TEST METHOD	FREQUENCY	ACCEPTANCE CRITERIA
Thickness (min. ave.) -Lowest individual for 8 out of 10 values -Lowest individual for any of the 10 values	ASTM D5994	1 per lot or 1 per 70,000 ft2, whichever is greater	Nom. (-5%) -10% -15%
Tensile Properties -yield strength -break strength -strain at yeild -break strength	ASTM D6693 Type IV	1 per lot or 1 per 70,000 ft2, whichever is greater	≥126 lb./in. ≥90 lb./in. ≥12% ≥100%
Puncture Resistance	ASTM D4833	1 per lot or 1 per 70,000 ft^2, whichever is greater	108 lb. (min.)
Tear Resistance	ASTM D1004, Die C	1 per lot or 1 per 70,000 ft2, whichever is greater	42 lb. (min.)
Interface Shear -60-mil HDPE/subgrade soil -Drainage geocomposite	ASTM D5321 ASTM D6243	2 tests or 1 per 200,000 ft2, whichever is greater	
Seam Shear	ASTM D6392	1 test per 500 lineal feet or per GRI GM-14 and 20.	95% of min. yield strength
Seam Peel -Extrusion -Fusion	ASTM D6392	1 test per 500 lineal feet or per GRI GM-14 and 20.	72% yield & ftb (1)
Non-destructive Seam Test	ASTM D5820 (Pressure Test)	Continuous	35 psi for 5 min.
	ASTM D5641 (Vacuum Box)		5 psi for 15 sec.
	ASTM D5641 (Spark Test)		No Spark
Electric Leak Location	ASTM D7002 (Water Puddle)	Once on constructed liner	Max 1 mm. diameter hole sensitivity
	ASTM D6747 (Selection Process)		
	ASTM D7007 (Water /Earth)		Max 6 mm. diameter hole sensitivity
	ASTM D7240 (Spark Test 2011)		

Notes:

ftb: Film Tear Bond

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REGISTERED PROFESSIONAL ENGINEER CRAIG M. HARTMAN NO. 73837 Exp. 06-30-19 CIVIL STATE OF CALIFORNIA 1-8-18

PROJECT:

DIXIE CREEK DAIRY DIGESTER

CLIENT:
BERNARD TE VELDE
3601 CA-198
HANFORD, CA 93230

GENERAL NOTES
CONSTRUCTION

REVISION LOG:

PLOT DATE:	01/08/18
JOB NO.:	17003
SCALE:	AS SHOWN
SHEET NO.:	A.2

HW 198

PROPOSED DIGESTER

IRRIGATION POND

8" BG

IRRIGATION POND

8" BG

IRRIGATION POND

8" BG

IRRIGATION POND

8" BG

DIGESTATE DIVERSION MECHANISM PIPE

PROPOSED 8" BIOGAS PIPE, MOISTURE TRAP AND PAD

PROPOSED SANDLANE

EXISTING DUAL SLOPE SCREEN SEPARATOR, 4FT. PEDESTAL, FIBER STACKING SLAB AND PUSH WALL

N

0 150 300

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1-8-18

PROJECT:

DIXIE CREEK

DAIRY DIGESTER

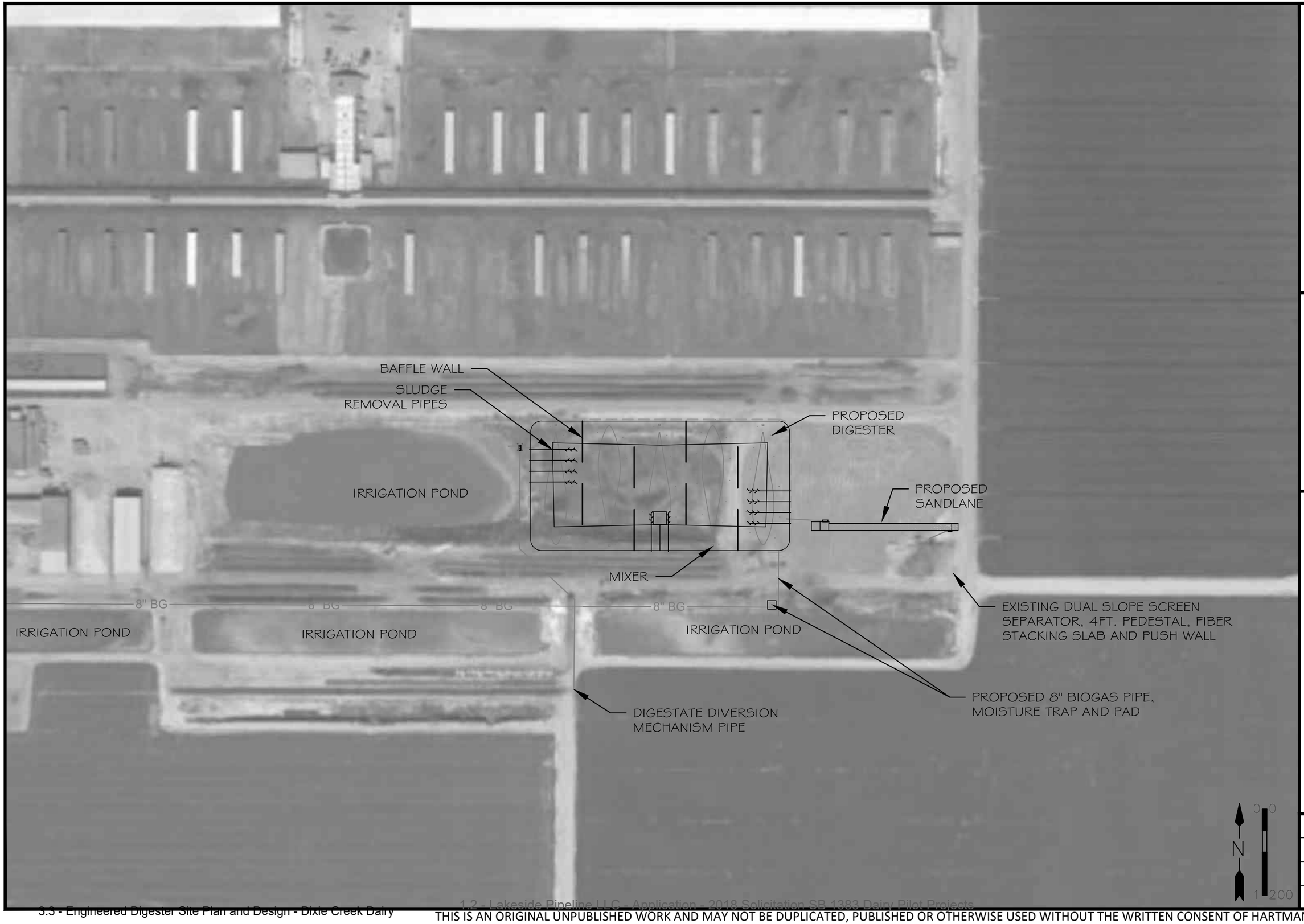
CLIENT:
BERNARD TE VELDE
3601 CA-198
HANFORD, CA 93230

SITE PLAN

DIGESTER

REVISION LOG:

PLOT DATE:	01/08/18
JOB NO.:	17003
SCALE:	AS SHOWN
SHEET NO.:	A.3



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1-8-18

PROJECT:

DIXIE CREEK

DAIRY DIGESTER

CLIENT:
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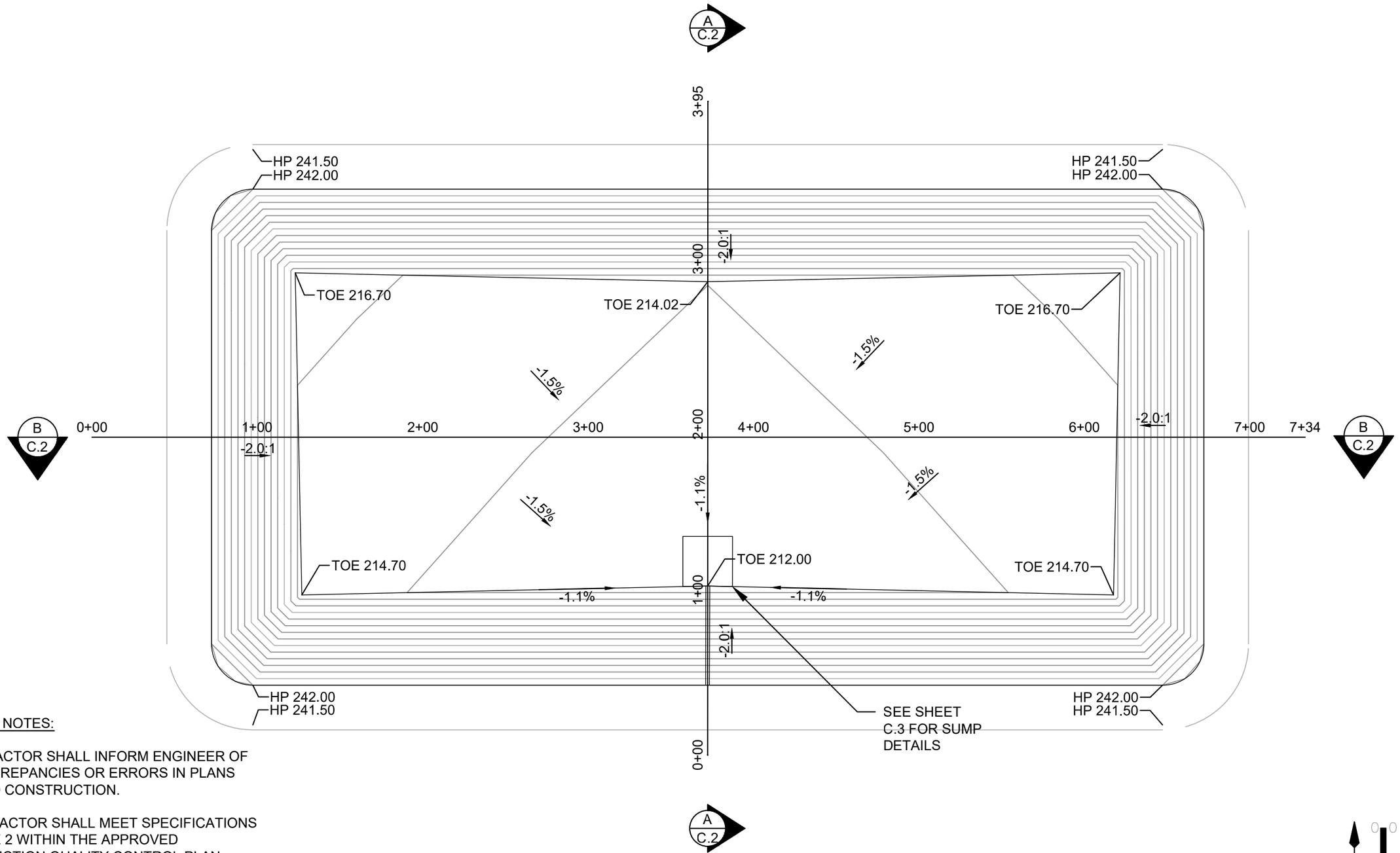
3601 CA-198
HANFORD, CA 93230

SITE PLAN

DAIRY

REVISION LOG:

PLOT DATE:	01/08/18
JOB NO.:	17003
SCALE:	AS SHOWN
SHEET NO.:	A.4



GRADING NOTES:

1.CONTRACTOR SHALL INFORM ENGINEER OF ANY DISCREPANCIES OR ERRORS IN PLANS PRIOR TO CONSTRUCTION.

2. CONTRACTOR SHALL MEET SPECIFICATIONS OF TABLE 2 WITHIN THE APPROVED CONSTRUCTION QUALITY CONTROL PLAN.

3. CONTRACTOR SHALL SMOOTH DRUM ROLL FINAL SURFACE AND REMOVE ANY ROCK OR MATERIAL GREATER THAN $\frac{1}{2}$ INCH.

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GRADING PLAN

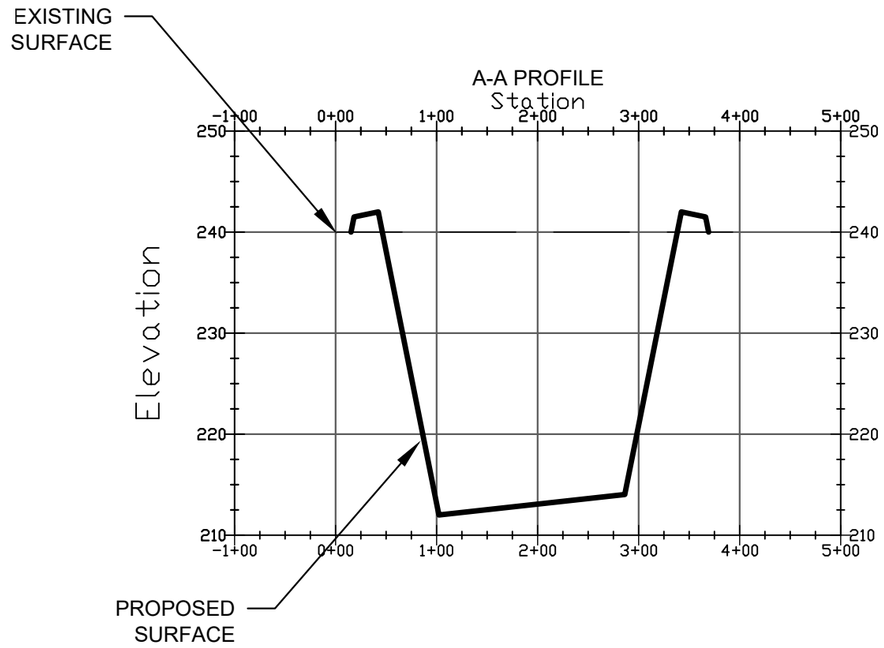
DIGESTER

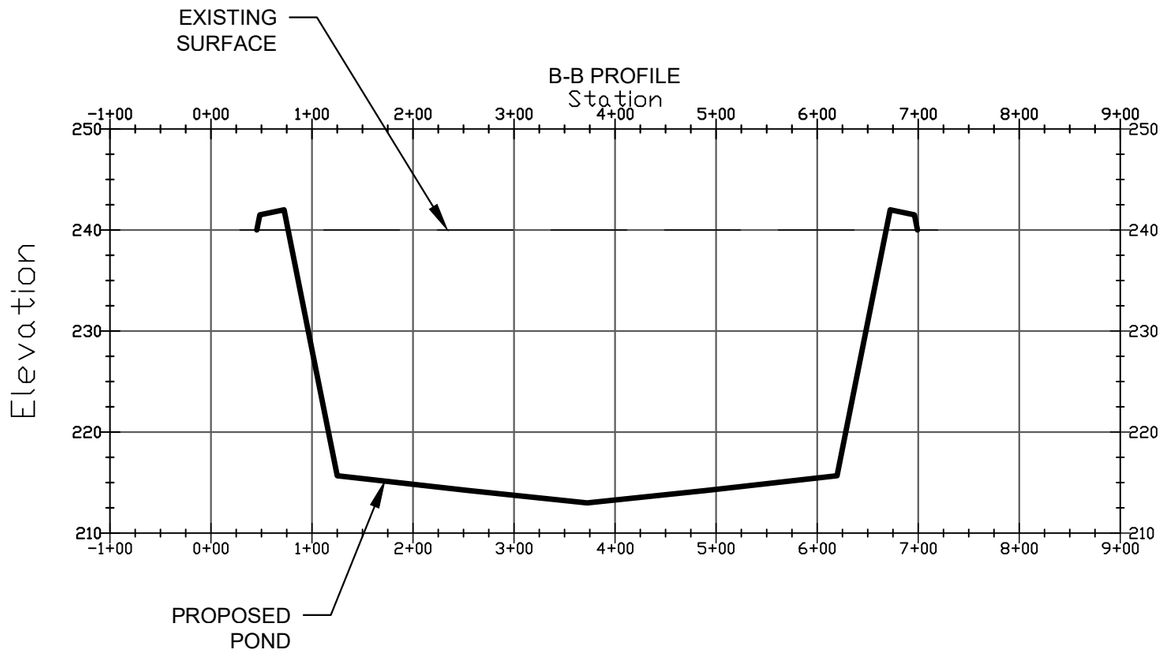
REVISION LOG:

PLOT DATE:	01/08/18
JOB NO.:	17003
SCALE:	AS SHOWN
SHEET NO.:	C.1

N

0 0
1 60





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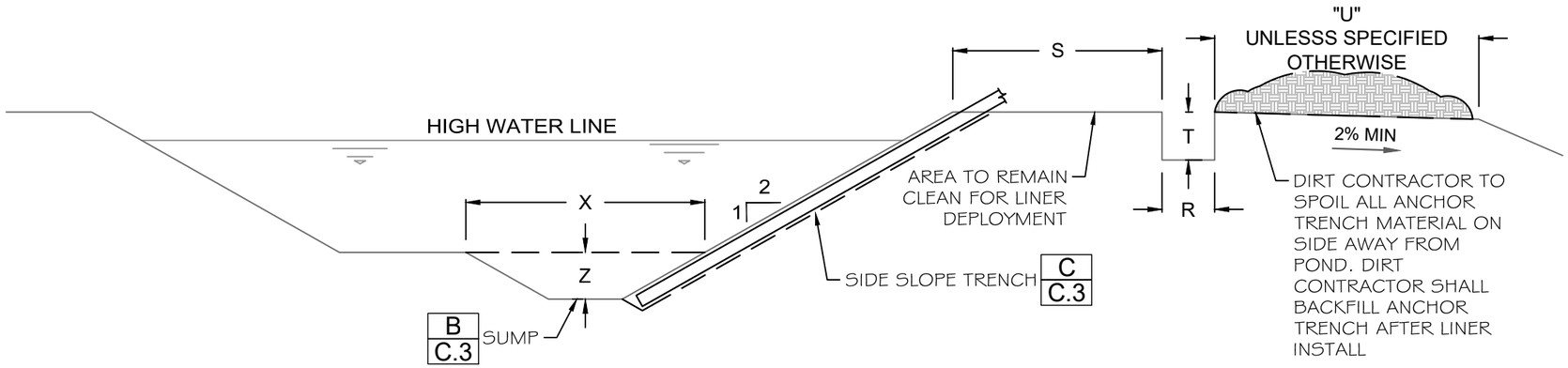
GRADING SECTIONS

DIGESTER

REVISION LOG:

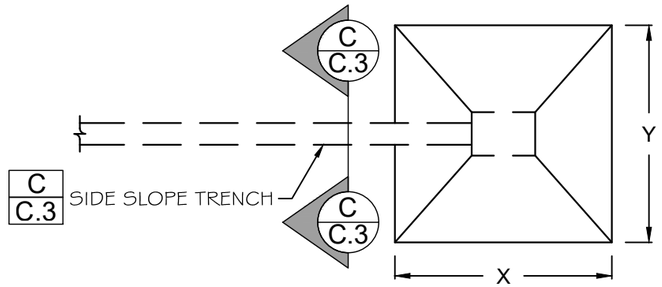
PLOT DATE:	01/08/18
JOB NO.:	17003
SCALE:	AS SHOWN
SHEET NO.:	C.2



A ANCHOR TRENCH / SUMP PROFILE VIEW

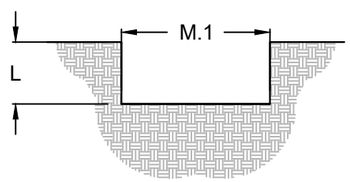
N.T.S.

DIMENSION TABLE (FT.)	
LETTER	POND
L	1.7'
M.1	2.7'
U	20'
R	1.5'
S	3'
T	3'
X	30'
Y	30'
Z	5.5'



B SUMP PLAN VIEW

N.T.S.



C SIDE SLOPE TRENCH

N.T.S.

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DAIRY DIGESTER

CLIENT:
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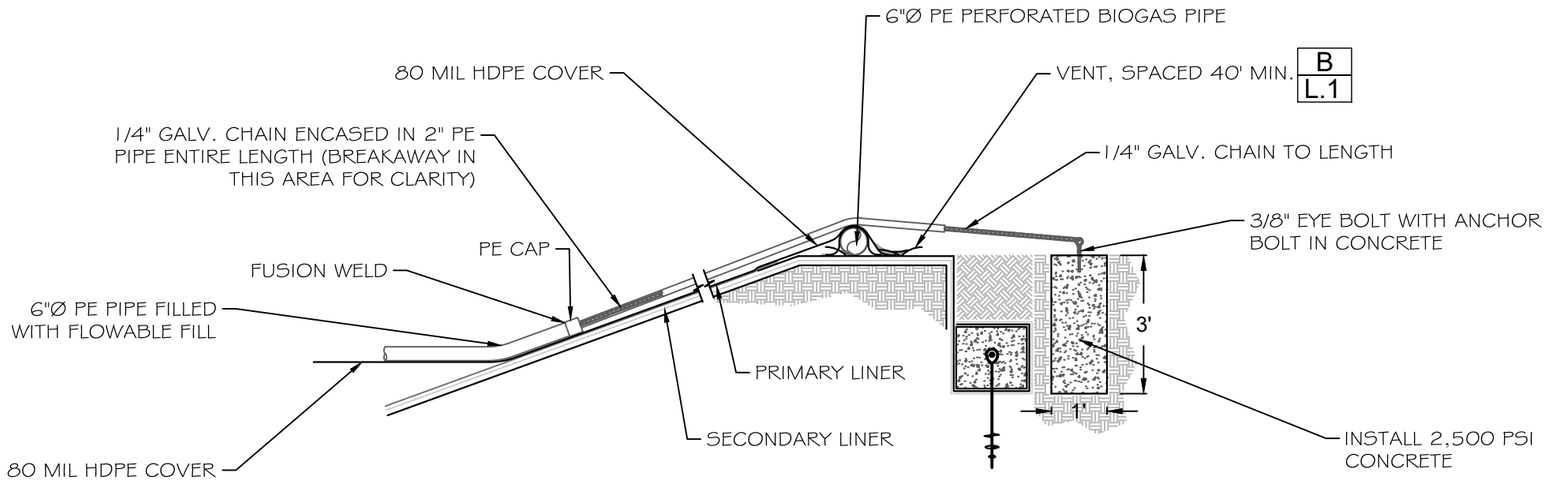
GRADING DETAIL
DIGESTER

REVISION LOG:

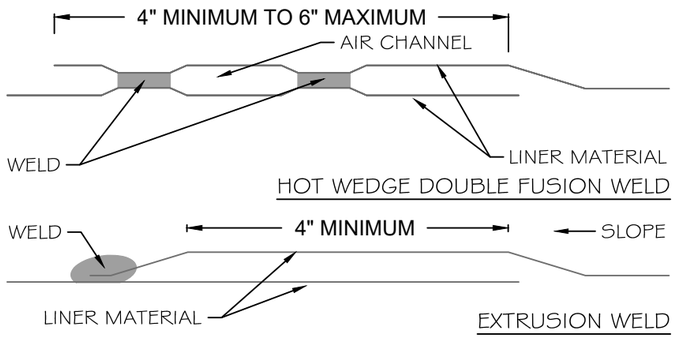
PLOT DATE:	01/08/18
JOB NO.:	17003
SCALE:	AS SHOWN
SHEET NO.:	C.3



A BALLAST TUBE DETAIL

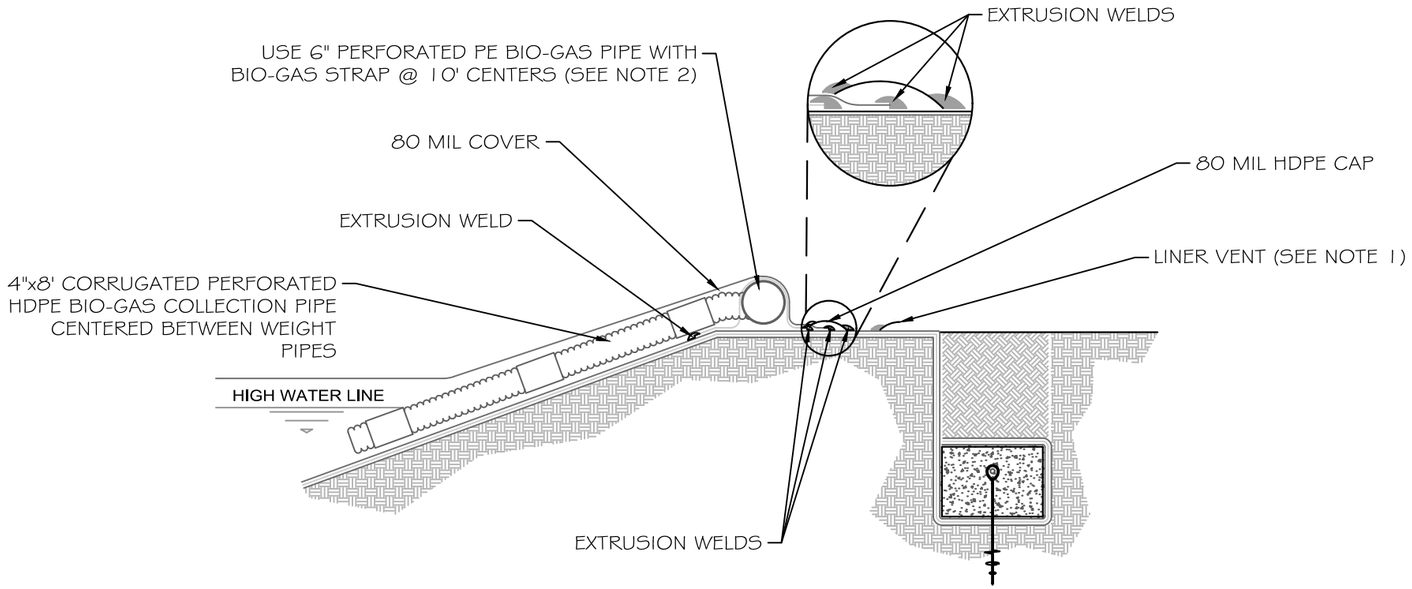
N.T.S.

DESCRIPTION	LOCATION	MATERAIL	THICKNESS (MIN)	TOP FINISH	BOTTOM FINISH
COVER	TOP	HDPE	80 MIL	SMOOTH	SMOOTH



C HDPE COVER-SMOOTH WELDS

N.T.S.



B BIO-GAS PIPING DETAIL

N.T.S.

NOTES:
1. GAS VENTS AROUND PERIPHERY OF LAGOON @ MAX. 40' O.C.
2. STRAP NOT WELDED TO BIO-GAS HEADER PIPE.
3. WRAP 60 MIL PRIMARY LINER OVER CONCRETE & EXTRUSION WELD.

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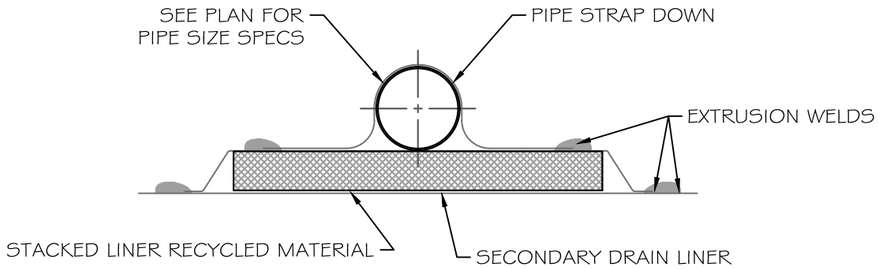
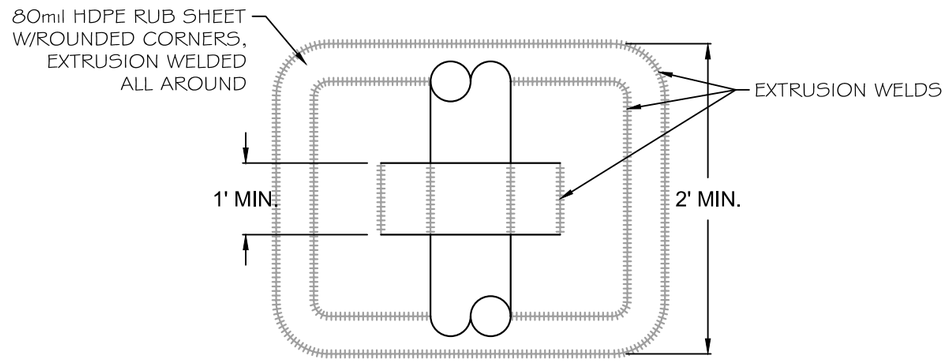
COVER SYSTEM
DIGESTER

REVISION LOG:

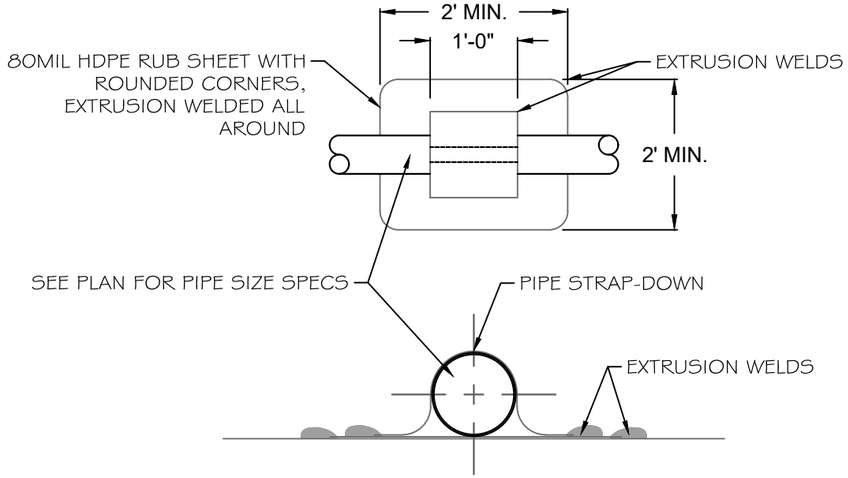
PLOT DATE:	01/08/18
JOB NO.:	17003
SCALE:	AS SHOWN
SHEET NO.:	D.1





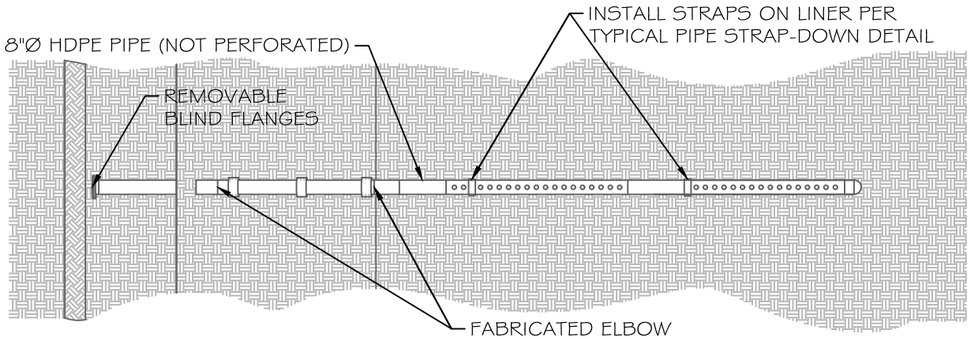
A SLUDGE REMOVAL PIPE ANCHOR DETAIL

NOTE: ANCHOR TO BE USED ON HORIZONTAL SURFACES ONLY, AT BOTTOM OF LAGOON N.T.S.



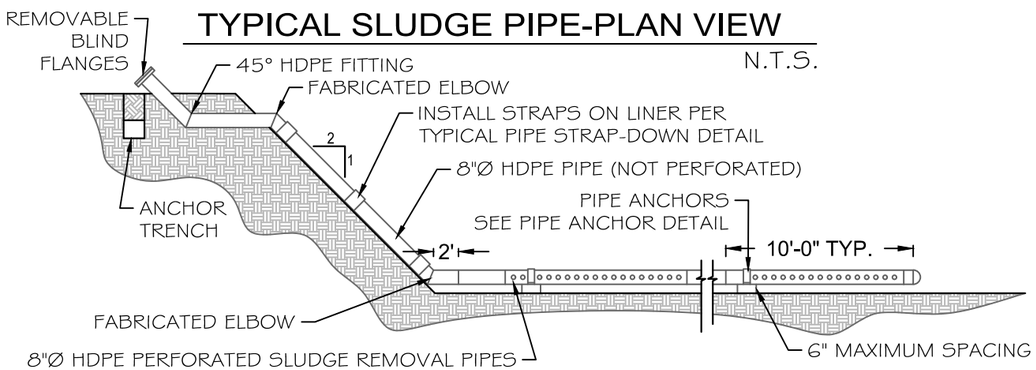
B TYPICAL PIPE STRAP-DOWN DETAIL

NOTE: MAXIMUM 10' O.C. SPACING BETWEEN PIPE STRAP-DOWNS, U.N.O. N.T.S.



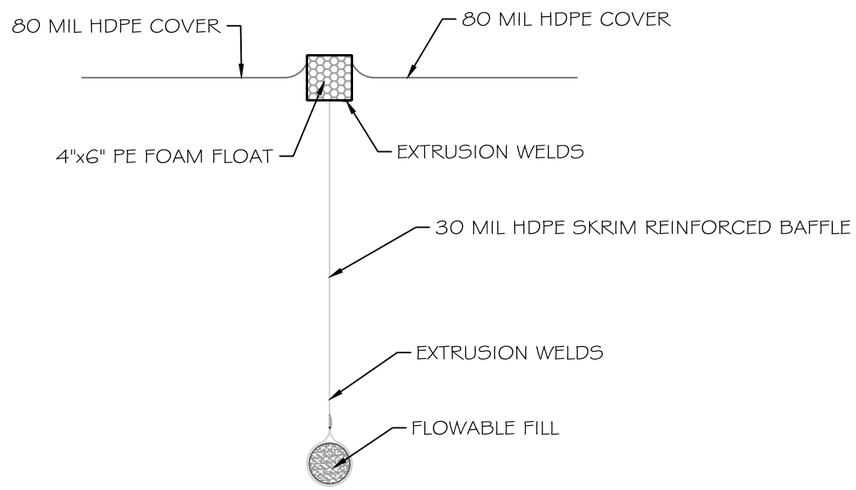
TYPICAL SLUDGE PIPE-PLAN VIEW

N.T.S.



C TYPICAL SLUDGE PIPE-PROFILE

N.T.S.



D BAFFLE SECTION

N.T.S.

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REGISTERED PROFESSIONAL ENGINEER CRAIG M. HARTMAN NO. 73837 Exp. 06-30-19 CIVIL STATE OF CALIFORNIA 1-8-18

PROJECT:

DIXIE CREEK DAIRY DIGESTER

CLIENT:
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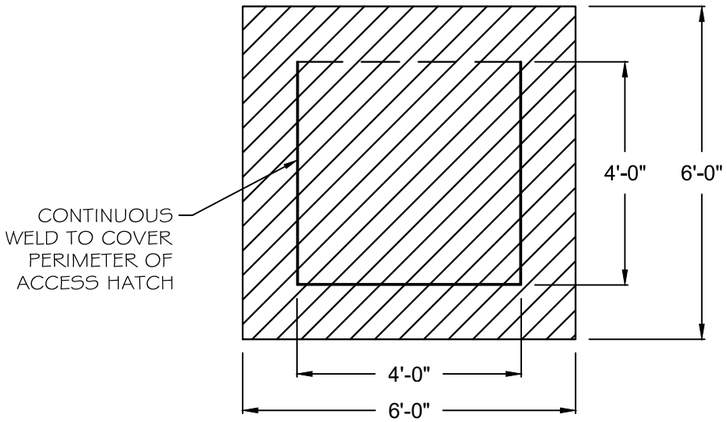
3601 CA-198
HANFORD, CA 93230

SLURRY REMOVAL SYSTEM
DIGESTER

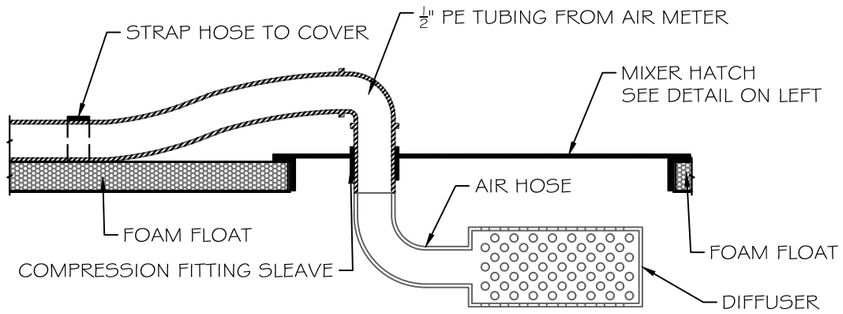
REVISION LOG:

PLOT DATE:	01/08/18
JOB NO.:	17003
SCALE:	AS SHOWN
SHEET NO.:	D.2



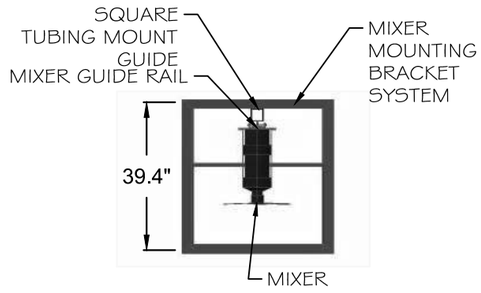
MIXER - HATCH

N.T.S.



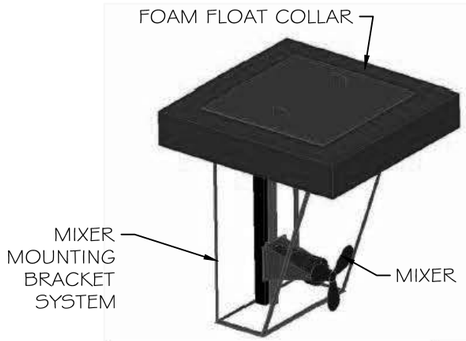
AIR INJECTION & MIXER HATCH

N.T.S.



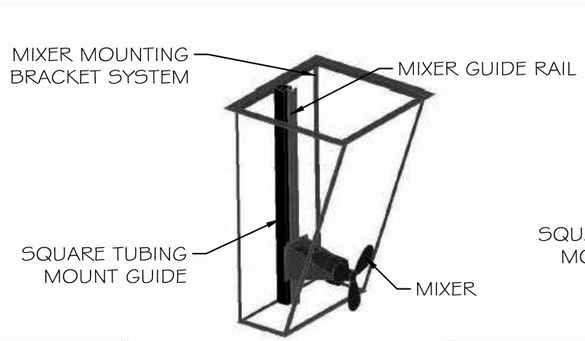
MIXER - PLAN VIEW

N.T.S.



MIXER - ISOMETRIC W/FLOAT IN PLACE

N.T.S.



MIXER - ISOMETRIC

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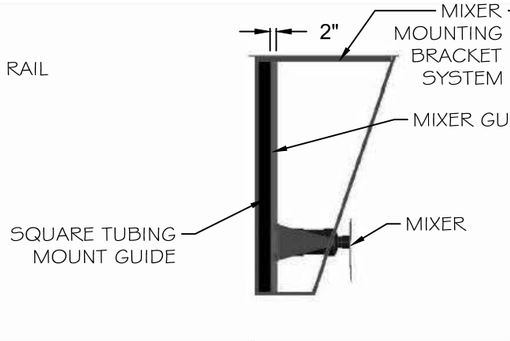
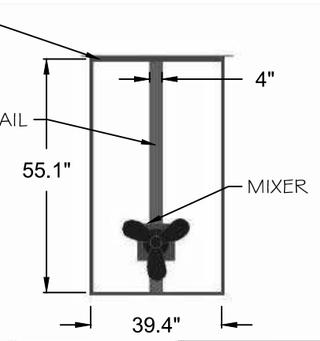


MIXER - SIDE VIEW

N.T.S.



MIXER - FRONT VIEW

N.T.S.

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1-8-18

PROJECT:

DIXIE CREEK

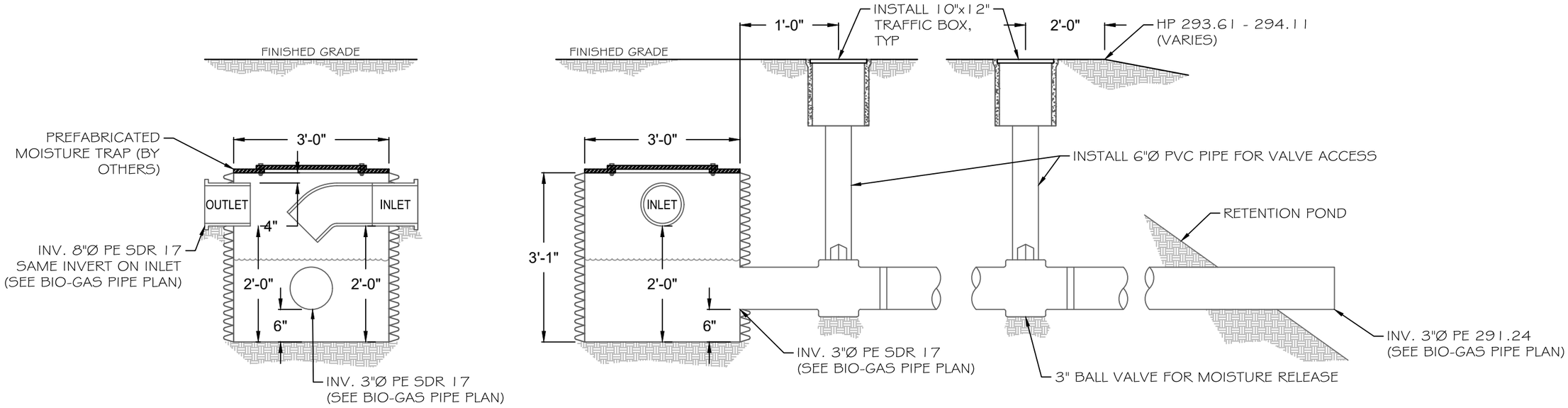
DAIRY DIGESTER

CLIENT:
BERNARD TE VELDE
3601 CA-198
HANFORD, CA 93230

MIXER DETAILS

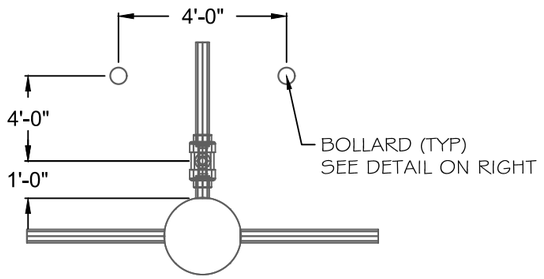
REVISION LOG:

PLOT DATE:	01/08/18
JOB NO.:	17003
SCALE:	AS SHOWN
SHEET NO.:	D.3



MOISTURE TRAP DETAIL

N.T.S.



BIO-GAS VALVE

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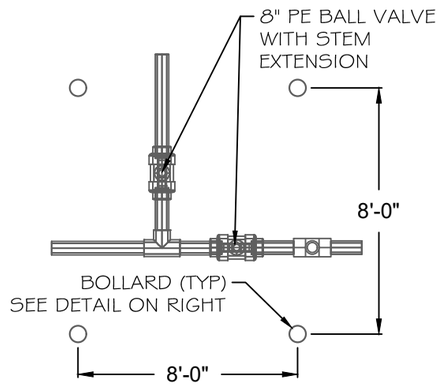

BALL VALVE JUNCTION

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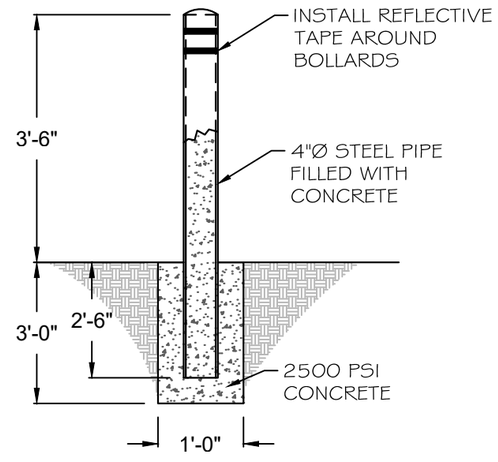

BOLLARD DETAIL

N.T.S.

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PROJECT:

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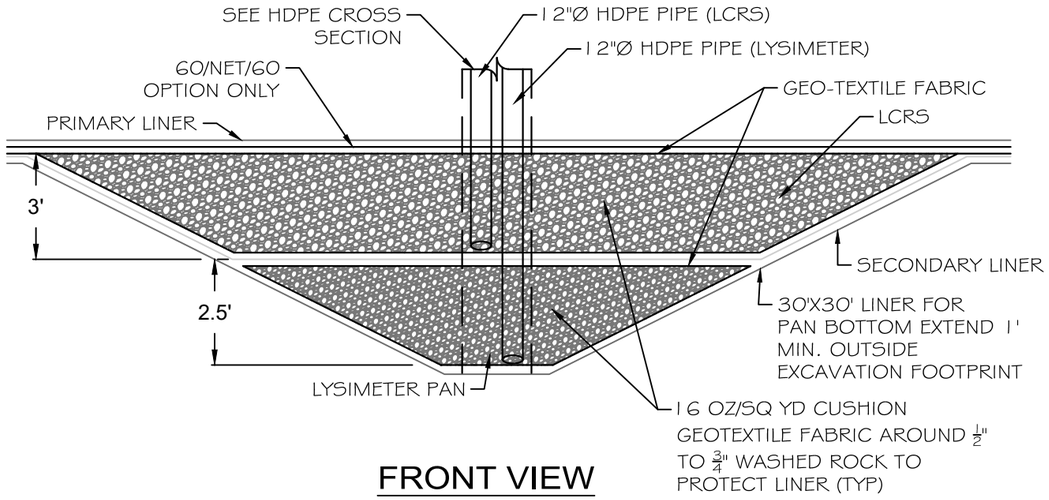
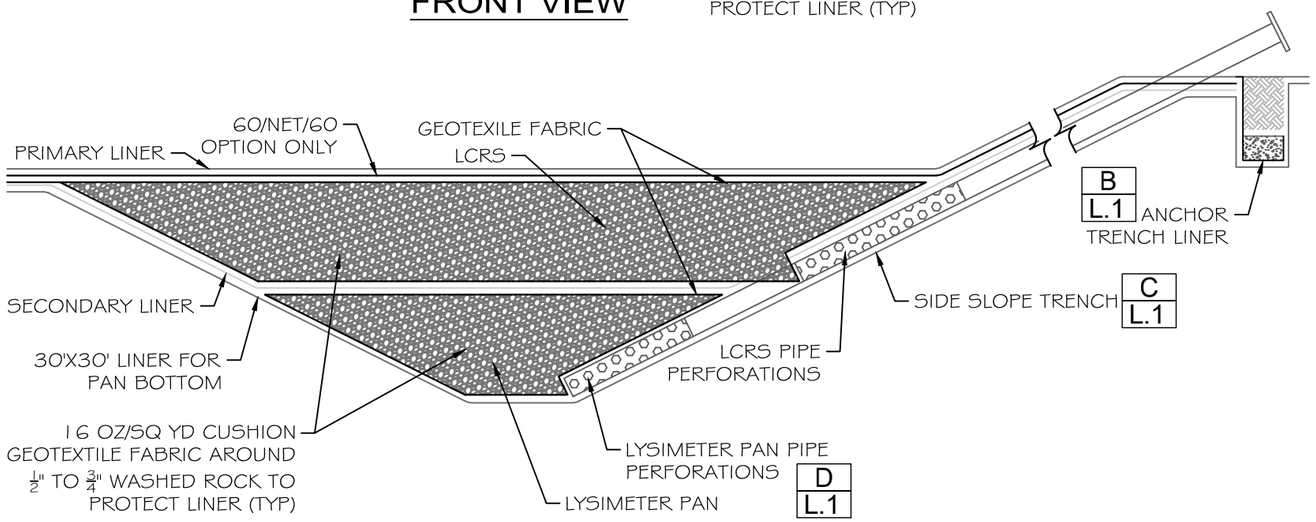
DETAILS

REVISION LOG:

PLOT DATE:	01/08/18
JOB NO.:	17003
SCALE:	AS SHOWN
SHEET NO.:	D.4



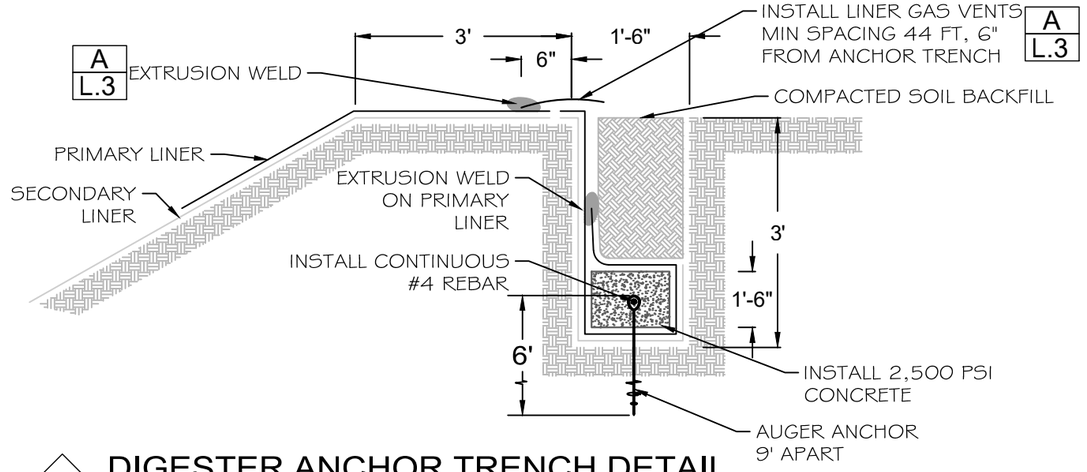
FRONT VIEW



SIDE VIEW

A LCRS, LYSIMETER AND DRAINAGE SUMP PROFILE

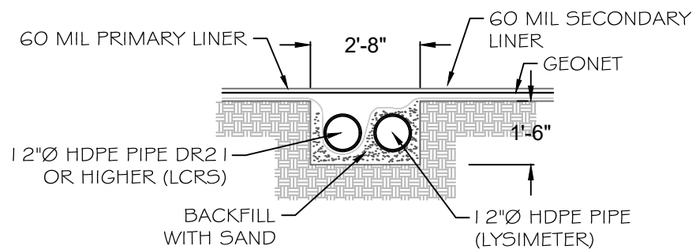
N.T.S.



B DIGESTER ANCHOR TRENCH DETAIL

N.T.S.

NOTES: 1. CONTRACTOR TO USE ANCHOR SYSTEM OR PROVIDE DETAILS AND DESIGN FOR ALTERNATIVE TO BE APPROVED BY ENGINEER.



B HDPE CROSS SECTION

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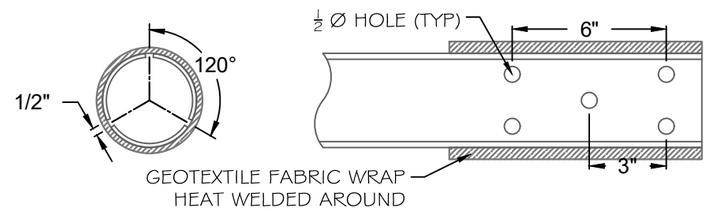

C TYPICAL PERFORATION DETAIL

N.T.S.

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(559) 563-0181

REGISTERED PROFESSIONAL ENGINEER CRAIG M. HARTMAN NO. 73837 Exp. 06-30-19 CIVIL STATE OF CALIFORNIA 1-8-18

PROJECT:

DIXIE CREEK

DAIRY DIGESTER

CLIENT:
BERNARD TE VELDE
3601 CA-198
HANFORD, CA 93230

GENERAL NOTES
LINER DETAILS

REVISION LOG:

PLOT DATE:	01/08/18
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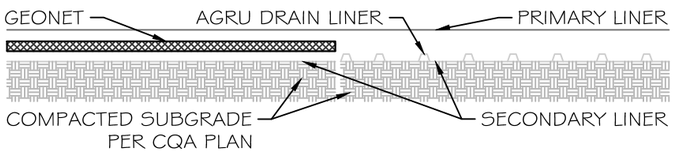
SCALE:	AS SHOWN
SHEET NO.:	L.1

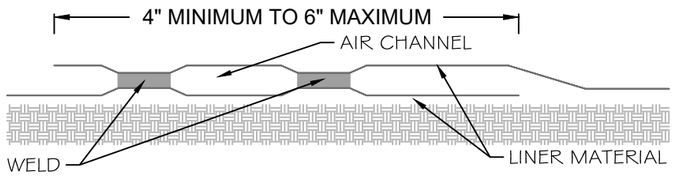
OPTIONAL TIER 1 DOUBLE LINER-LAYERING SYSTEM WITH DRAIN LINER VERIFY WITH OWNER

SMOOTH/STUDDED/ 60-NET-60 LINER LAYERS					
DESCRIPTION	LOCATION	MATERAIL	THICKNESS (MIN)	TOP FINISH	BOTTOM FINISH
PRIMARY LINER	TOP	HDPE	60 MIL	SMOOTH	SMOOTH CONDUCTIVE
DRAINAGE NET	MIDDLE	HDPE	200 MIL	N/A	N/A
SECONDARY LINER	BOTTOM	HDPE	60 MIL	SMOOTH	SMOOTH

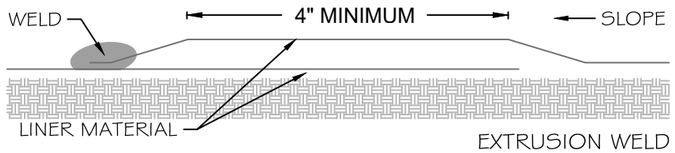


A DOUBLE LAYER 60-NET-60 DOUBLE LAYER WITH DRAIN LINER

N.T.S.



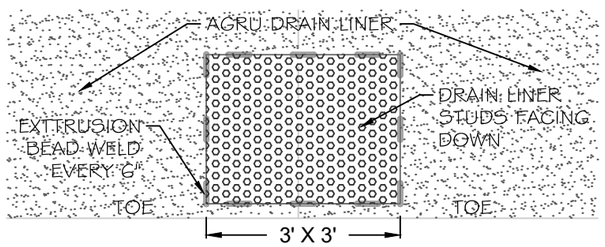
HOT WEDGE DOUBLE FUSION WELD



EXTRUSION WELD

B HDPE LINER-SMOOTH WELDS

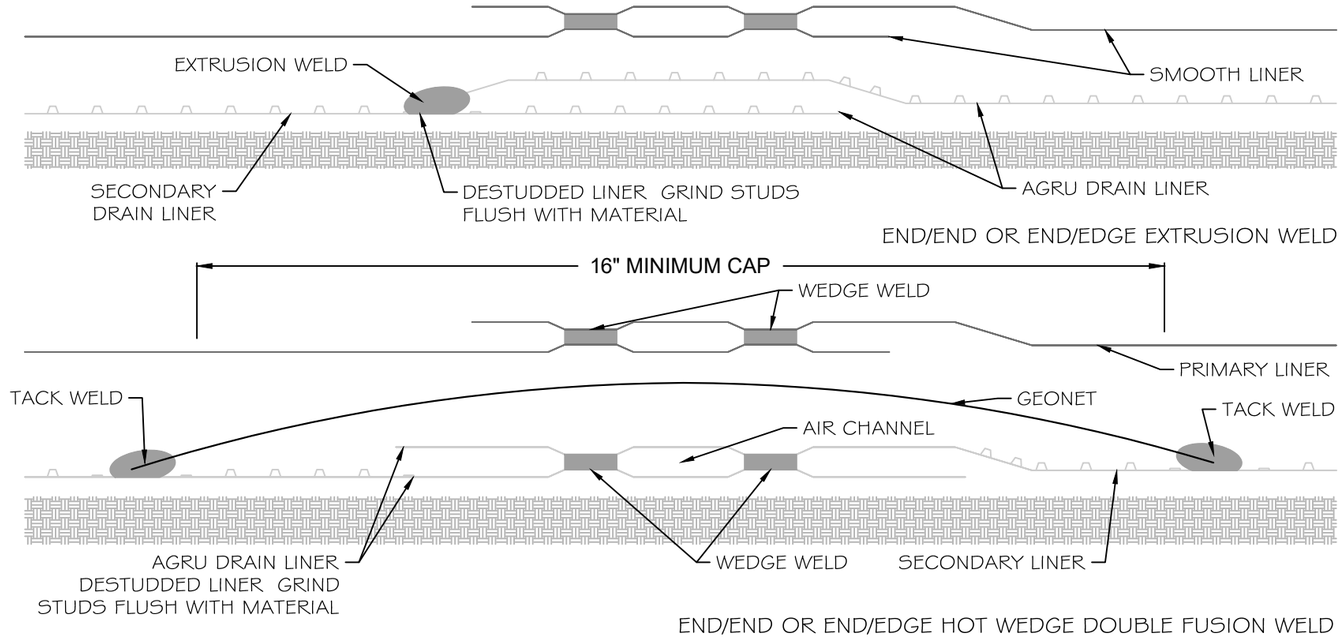
N.T.S.



DRAIN LINER SMOOTH END WELD PATCH

C 3'X3' DRAIN PATCH WELD

N.T.S.

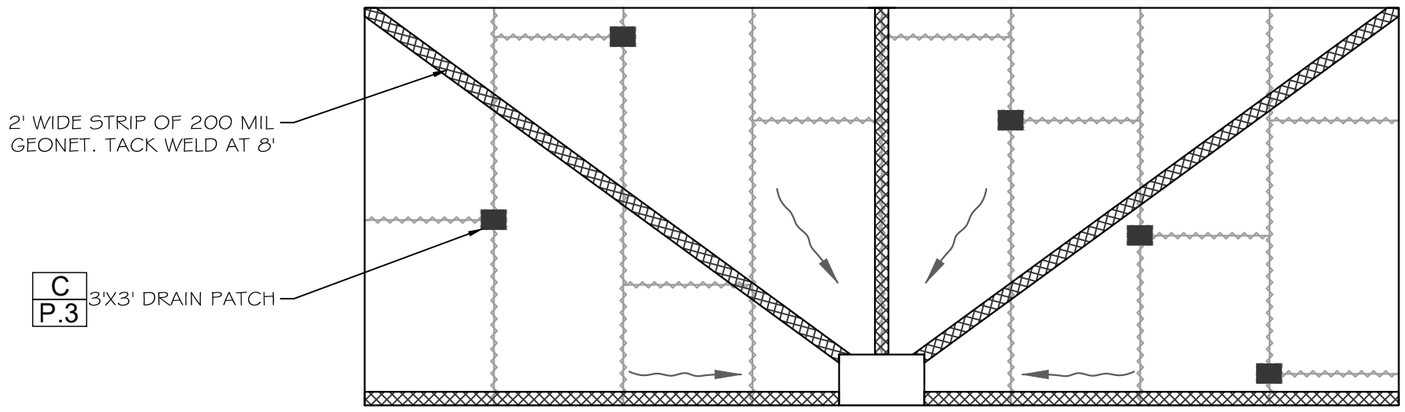


END/END OR END/EDGE EXTRUSION WELD

END/END OR END/EDGE HOT WEDGE DOUBLE FUSION WELD

D AGRU DRAIN LINER END/END WELD

NOTE: AGRU DRAIN LINER DOES NOT HAVE STUDS ALONG THE EDGE SO EDGE/EDGE SEAMS DO NOT REQUIRE DRINGING OR CAP. N.T.S.



NOTE: CQA OFFICER IS RESPONSIBLE TO ADD PATCHES AS NEEDED FOR FLOW

E AGRU DRAIN LINER CROSS SEAM NET PLAN VIEW

NOTE: TYPICAL OF ALL DRAIN LINERS N.T.S.

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PROJECT:

DIXIE CREEK

DAIRY DIGESTER

CLIENT:
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3601 CA-198
HANFORD, CA 93230

LINER DETAILS

REVISION LOG:

PLOT DATE:	01/08/18
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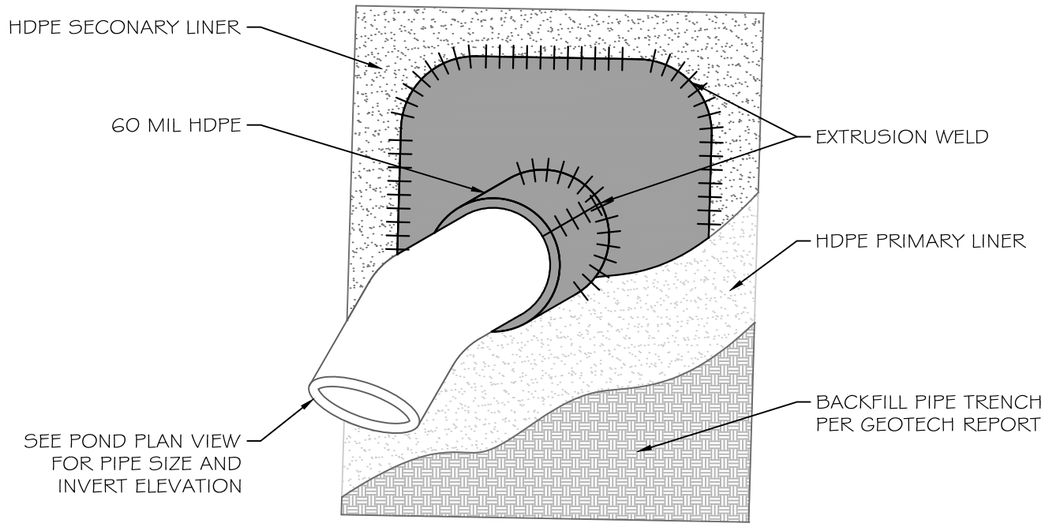
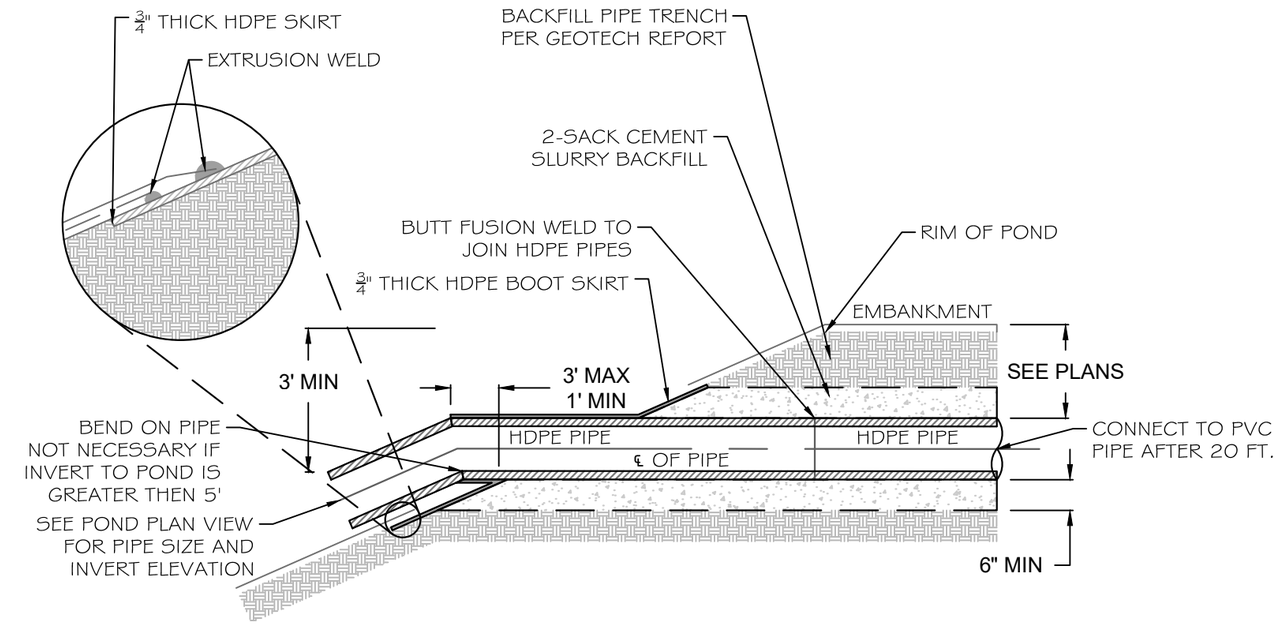
SCALE:	AS SHOWN
SHEET NO.:	L.2



A BOOT SKIRT

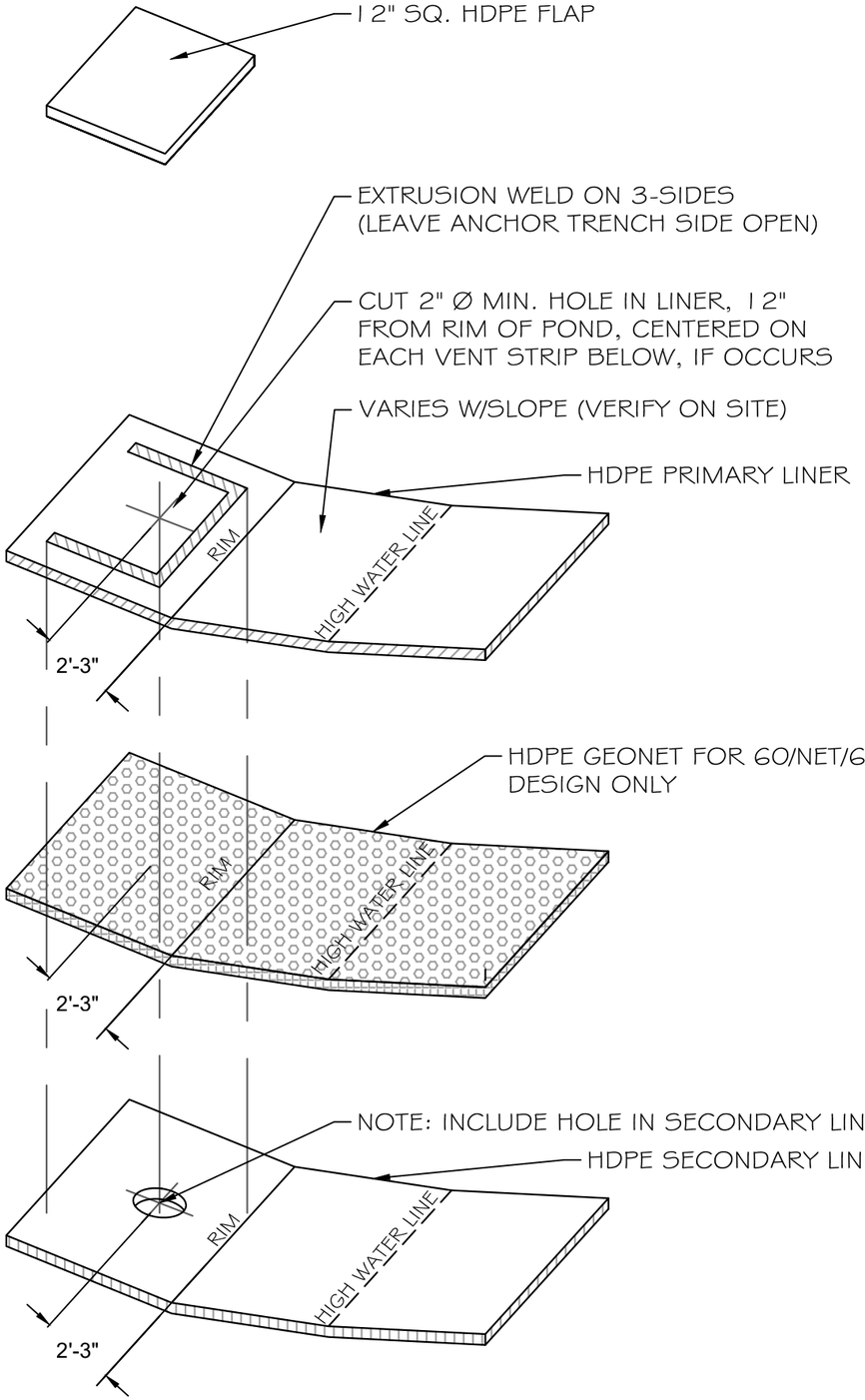
N.T.S.



B BOOTLESS PIPE PENETRATION

LINER FASTENING

N.T.S.



C VENT ORIFICE (ISOMETRIC VIEW)

N.T.S.

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LINER DETAILS

REVISION LOG:

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SCALE:	AS SHOWN
SHEET NO.:	L.3

DOUBLE L
DAIRY DIGESTER

BENCHMARK

THE TOPOGRAPHIC SURVEY WAS PERFORMED UTILIZING GLOBAL POSITIONING SYSTEM OBSERVATIONS. DISTANCES AND NUMBERS SHOWN ARE TO BE CONSIDERED GROUND VALUES. BENCHMARK AND CONTROL SHOWN ON CONTROL PLAN SHEET. THE BENCHMARK AND VERTICAL ELEVATIONS WERE DERIVED FROM THE NGS ONLINE POSITIONING SERVICE (OPUS), AND IS SHOWN ON THE NAVD 88 DATUM UTILITIZING THE GEOID 09 AS THE VERTICAL MODEL.

PRESERVATION OF MONUMENTS

PURSUANT TO SECTIONS 8771(B) AND 8771(C) OF THE GOVERNMENT CODE, ANY MONUMENTS THAT CONTROL THE LOCATION OF BOUNDARIED, OR OTHERWISE PROVIDE HORIZONTAL OR VERTICAL SURVEY CONTROL WITHIN THE CONSTRUCTION AREA, SHALL BE LOCATED AND REFERENCED PRIOR TO CONSTRUCTION, AND A CORNER RECORD OR RECORD OF SURVEY OF THE REFERENCES SHALL BE FILED WITH THE COUNTY SURVEYOR.

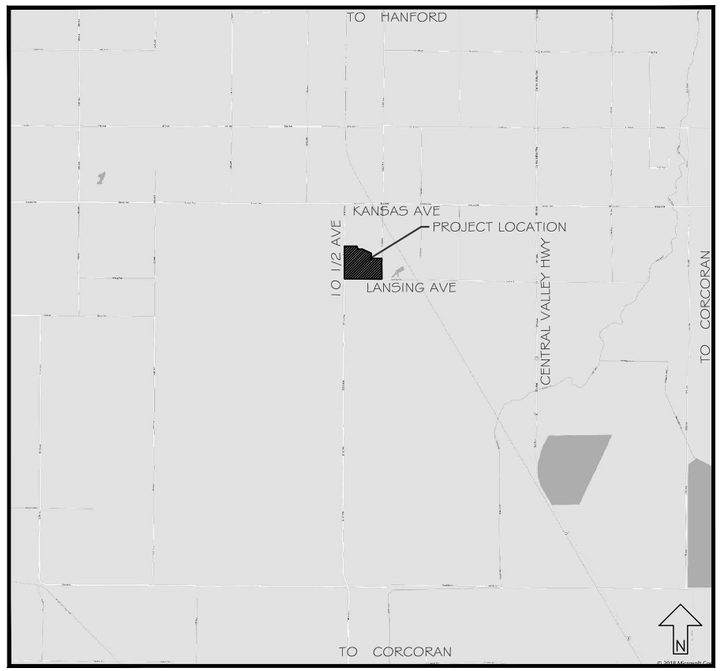
PERMANENT MONUMENTATION SHALL BE SET TO PERPETUATE THE LOCATION OF ANY MONUMENT WHICH COULD BE DAMAGED OR DESTROYED, AND A CORNER RECORD OR RECORD OF SURVEY SHALL BE FILED WITH THE COUNTY SURVEYOR PRIOR TO THE RECORDING OF A CERTIFICATE OF COMPLETION FOR THE PROJECT.

DUST CONTROL NOTES

CONTRACTOR IS REQUIRED TO COMPLY WITH GOOD HOUSE KEEPING PRACTICES

STORMWATER (SWPPP) NOTES

CONTRACTOR IS REQUIRED TO COMPLY WITH GOOD HOUSE KEEPING PRACTICES



VICINITY MAP
SCALE 1" : 2 MI

SHEET REFERENCE

SECTIONS:

SECTION NAME
SHEET NUMBER
B
C.3

DETAILS:

B

DETAIL NAME
SHEET NUMBER
B
C.3

CONTACT INFO

ENGINEER:
CRAIG HARTMAN, RCE 73837
HARTMAN ENGINEERING, INC.
3121 W. CERES CT.
VISALIA, CA 93291
(559) 563-0181

DAIRY CONTACT:
RON VANDERWEERD
10234 LANSING AVE
HANFORD, CA 93230

SHEET INDEX

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1-8-18

PROJECT:
DOUBLE L
DAIRY DIGESTER

CLIENT:
RON VANDERWEERD
10234 LANSING AVE
HANFORD, CA 93230

REVISION LOG:

PLOT DATE:	01/08/18
JOB NO.:	17003
SCALE:	AS SHOWN
SHEET NO.:	A.1

SPECIFICATIONS FOR ENGINEERED FILL MATERIAL OF ABOVE GRADE EMBANKMENTS OR AS REQUIRED

TEST PARAMETER	TEST METHOD	FREQUENCY	ACCEPTANCE CRITERIA
Compaction Curves	ASTM D1557 (Modified Proctor)	Change in material	N/A
Grain Size Distribution	ASTM D422 (Sieve)	Change in material	At least 30% passing No. 200 U.S. Standard Sieve. Per Specifications (1)
Soil Classification	ASTM D2487 (USCS)	Change in material	Suitable for compaction [2,3]
Maximum Particle Size	ASTM D422 (Sieve)	Change in material	½ inch, ¼ top 6 inches
Maximum Water soluble Sulfate (SO_4) in Soil (Concrete Slab locations)	ASTM C1580	Change in material	0.2% by weight

Site Preparation Specifications:

1. Clearing: Prior to earthwork operations, the area to be developed should be stripped of vegetation, organic topsoil, and cleared of cow waste and miscellaneous debris from the proposed construction areas. Deeper clearing may be required in localized areas. The actual depth of clearing should be reviewed by a licensed Geotechnical Engineer at the time of construction. The limits of stripping and clearing should be at least five feet beyond the limits of construction.

2. Compaction: The scarified subgrade and subsequent fill placed at the site should be moisture conditioned to near optimum moisture content, and compacted to at least and 90 percent for 2:1 side slope pond of maximum dry density as determined by ASTM test method D1557.

3. Material for fill: Fill should consist of select material. Native soil, free from organic, vegetation, and rocks or cobbles larger than three inches, may be used as fill at the site. Import material must be reviewed by licensed Geotechnical Engineer prior to transport to the site.

4. Fill placement: Fill material should be moisture-conditioned to +/- 2% of the optimum moisture content prior to compaction. Fill material with excessive moisture should be allowed to dry prior to compaction or be mixed with dry soil to bring the fill to a workable moisture content. Fill should be placed in level lifts not exceeding a loose, uncompacted thickness of eight inches, and compacted as engineered fill.

Sub-grade requirements for fill only:

-Over Excavate for minimum 1 ft. to meet Engineered Fill Borrow Material Guidelines and Pond Liner Sub-grade requirements

-Well mixed soil

-6 in max lifts

-Upper 6 inches is of fine-finished soil particles no greater than ¼ in.+

Notes:

[1] Field tests shall not be required, but fill borrow material specifications must meet the acceptance criteria outlined in Table 1.

[2] Refer to Geotechnical Report

NOTES:

THE APPROVED WORK PLAN WHICH INCLUDES THE CONSTRUCTION QUALITY ASSURANCE PLAN, OPERATION, MAINTENANCE AND MONITORING PLAN, CONSTRUCTION DRAWINGS, AND SOILS REPORT TOGETHER AS A PACKAGE ARE THE COMPLETE SPECIFICATIONS REQUIRED FOR CONSTRUCTION OF THE POND AND LINER SYSTEM.

FILL TEST SPECIFICATIONS FOR SUB-GRADE

TEST PARAMETER	TEST METHOD [1]	FREQUENCY	ACCEPTANCE CRITERIA
Uncompacted Lift Thickness	Visual Observation	Continuous	8-in.[2,3]
Construction Oversight	Visual Observation	Continuous	Maximum particle size 1/2 inch.
In-Place Moisture Alternative Method	ASTM D2216 (Oven Dry)	1 per every 10 Nuclear tests	+/-2% of Optimum Moisture Content per ASTM D1557
In-Place Moisture Rapid Field Methods[3,5]	ASTM D6938[3,5] (Nuclear Method)	3 per acre per lift, min. 2 per day	+/-2% of Optimum Moisture Content per ASTM D1557
In-Place Density Alternate Method	ASTM D2937(Drive Cylinder)	1 per every 10 Nuclear tests	90% of Maximum Dry Density per ASTM D1557
In-Place Density Rapid Field Methods[4,5]	ASTM D6938[3,5] (Nuclear Method)	3 per acre per lift, min. 2 per day	90% of Maximum Dry Density per ASTM D1557
Subgrade Thickness	Surveying Measurement	At 50-foot centers	Minimum 1 ft.[2,3]
Clod Size	Visual Observation	Continuous	Per Specification

Notes:

See earthwork section for anchor trench, excavation, backfill, and compaction requirements.

[1] ASTM Test Method, unless otherwise noted. Results of all tests performed to be reported as per method reporting criteria.

[2] The sub-grade shall be scarified to a depth of 1 ft. lower than finished grade, compacted, and tested in accordance with the requirements of this table.

[3] Must be verified by ASTM D2216 (Oven) overnight method once every day or once per change in material

[4] Must be verified by ASTM D2937 (Dry Cylinder) twice per day or per change in material

[5] Calibration Procedure: ASTM D7013-04: Standard Guide for Nuclear Surface Moisture and Density Gauge Calibration Facility Set-up

POND SPECIFICATIONS FOR SUBGRADES CUT BELOW GROUND
(For Slopes 2:1 or shallower)

Side Slopes: The certified Civil Engineer/CQA Chief Officer shall walk final side slopes after cut by heavy equipment and confirm no SW or SP soils and no loose soils. All SW, SP, or soils that are not amenable to a firm and unyielding subgrade shall be removed and replaced down to a minimum 3 ft. below sloped surface. Any soils removed and replaced shall meet the Engineered Fill requirements in Table 1.

Pond Bottom: 1. An as-built survey of the pond bottom shall take place after subgrade construction to insure minimum slopes are achieved. Pond Bottom shall be tested per criteria below. Any soils not meeting the requirements below (i.e. that is not firm and unyielding) shall be removed and replaced down to a minimum 2 ft. Any soils removed and replaced shall meet the Engineered Fill requirements in Table 1. The Civil Engineer may make determination of soils meeting requirements or not based upon visual inspection which shall be included in the Subgrade Certification Report and signed and sealed by a Civil Engineer and CQA Officer.

TEST PARAMETER	TEST METHOD [1,3]	FREQUENCY	ACCEPTANCE CRITERIA
In-Place Density Rapid Field Methods [4]	ASTM D6938[3,5] (Nuclear)	3 per acre	90% of Maximum Dry Density per ASTM D1557
In-Place Moisture Rapid Field Methods[3,5]	ASTM D6938[3,5] (Nuclear Methods)	3 per acre per lift, min. 2 per day	+/-2% of Optimum Moisture Content per ASTM D1557
Construction Oversight	Visual Observation	Continuous	Maximum particle size 1/2 inch.
Subgrade Slope	Surveying Measurement	200 ft. maximum grid	Min 1%

60 MIL HDPE GEOMEMBRANE CONSTRUCTION QUALITY ASSURANCE (CQA)

TEST PARAMETER	TEST METHOD	FREQUENCY	ACCEPTANCE CRITERIA
Thickness (min. ave.) -Lowest individual for 8 out of 10 values -Lowest individual for any of the 10 values	ASTM D5994	1 per lot or 1 per 70,000 ft2, whichever is greater	Nom. (-5%) -10% -15%
Tensile Properties -yield strength -break strength -strain at yeild -break strength	ASTM D6693 Type IV	1 per lot or 1 per 70,000 ft2, whichever is greater	≥126 lb./in. ≥90 lb./in. ≥12% ≥100%
Puncture Resistance	ASTM D4833	1 per lot or 1 per 70,000 ft^2, whichever is greater	108 lb. (min.)
Tear Resistance	ASTM D1004, Die C	1 per lot or 1 per 70,000 ft2, whichever is greater	42 lb. (min.)
Interface Shear -60-mil HDPE/subgrade soil -Drainage geocomposite	ASTM D5321 ASTM D6243	2 tests or 1 per 200,000 ft2, whichever is greater	
Seam Shear	ASTM D6392	1 test per 500 lineal feet or per GRI GM-14 and 20.	95% of min. yield strength
Seam Peel -Extrusion -Fusion	ASTM D6392	1 test per 500 lineal feet or per GRI GM-14 and 20.	72% yield & ftb (1)
Non-destructive Seam Test	ASTM D5820 (Pressure Test)	Continuous	35 psi for 5 min.
	ASTM D5641 (Vacuum Box)		5 psi for 15 sec.
	ASTM D5641 (Spark Test)		No Spark
Electric Leak Location	ASTM D7002 (Water Puddle)	Once on constructed liner	Max 1 mm. diameter hole sensitivity
	ASTM D6747 (Selection Process)		
	ASTM D7007 (Water /Earth)		Max 6 mm. diameter hole sensitivity
	ASTM D7240 (Spark Test 2011)		

Notes:

ftb: Film Tear Bond

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STATE OF CALIFORNIA
1-8-18

PROJECT:

DOUBLE L

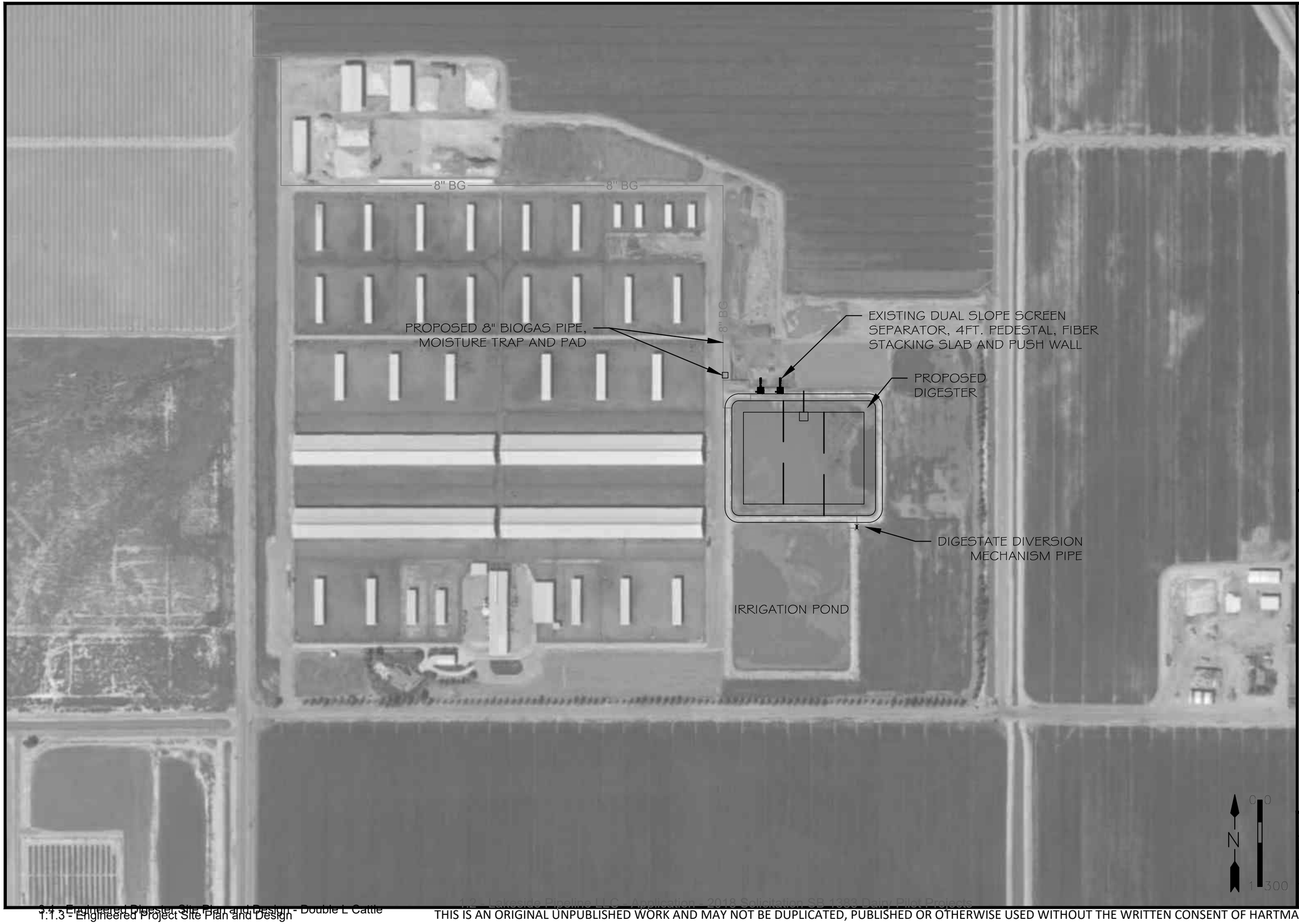
DAIRY DIGESTER

CLIENT:
RON VANDERWEERD
10234 LANSING AVE
HANFORD, CA 93230

GENERAL NOTES
CONSTRUCTION

REVISION LOG:

PLOT DATE:	01/08/18
JOB NO.:	17003
SCALE:	AS SHOWN
SHEET NO.:	A.2



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SITE PLAN

DIGESTER

REVISION LOG:

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1-8-18

PROJECT:

DOUBLE L

DAIRY DIGESTER

CLIENT:
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10234 LANSING AVE
HANFORD, CA 93230

SITE PLAN

DAIRY

REVISION LOG:

PLOT DATE:	01/08/18
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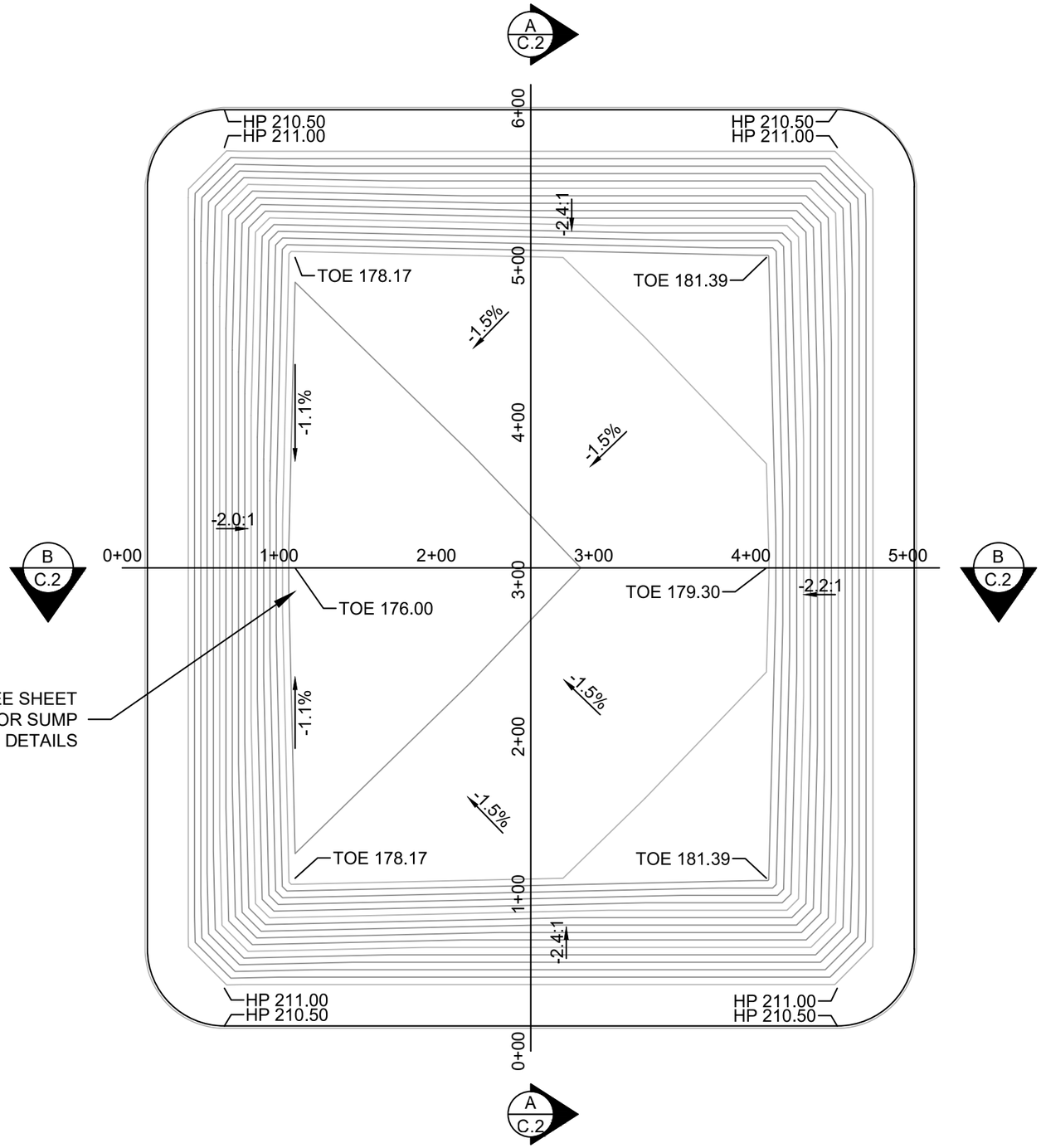
SCALE:	AS SHOWN
SHEET NO.:	A.4



GRADING NOTES:

1.CONTRACTOR SHALL INFORM ENGINEER OF ANY DISCREPANCIES OR ERRORS IN PLANS PRIOR TO CONSTRUCTION.

2. CONTRACTOR SHALL MEET SPECIFICATIONS OF TABLE 2 WITHIN THE APPROVED CONSTRUCTION QUALITY CONTROL PLAN.

3. CONTRACTOR SHALL SMOOTH DRUM ROLL FINAL SURFACE AND REMOVE ANY ROCK OR MATERIAL GREATER THAN $\frac{1}{2}$ INCH.

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1-8-18

PROJECT:

DOUBLE L

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CLIENT:
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HANFORD, CA 93230

GRADING PLAN

DIGESTER

REVISION LOG:

PLOT DATE:	01/08/18
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SCALE:	AS SHOWN
SHEET NO.:	C.1

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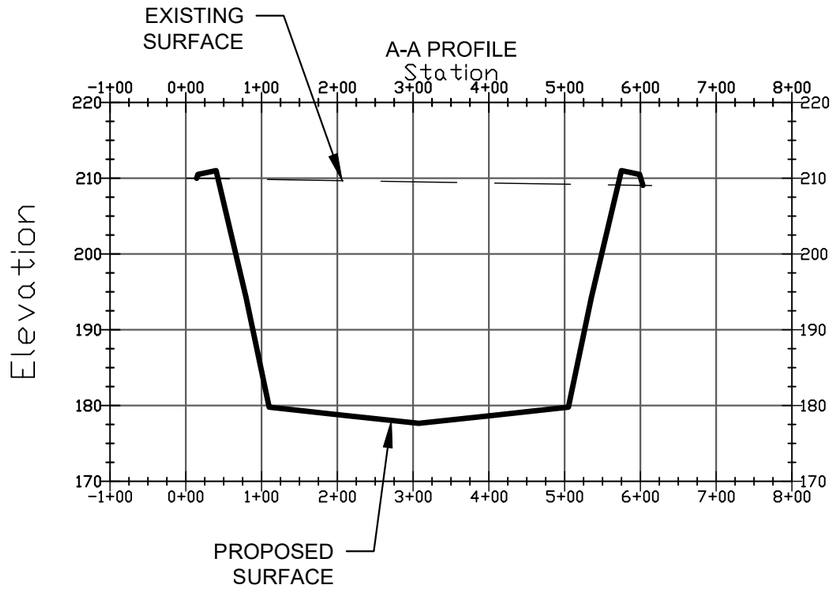

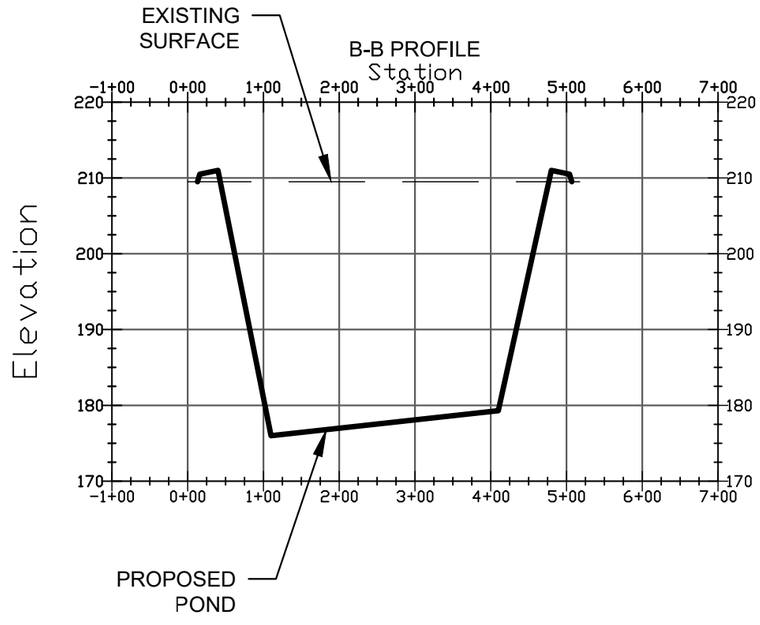

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H

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GRADING SECTIONS

DIGESTER

REVISION LOG:

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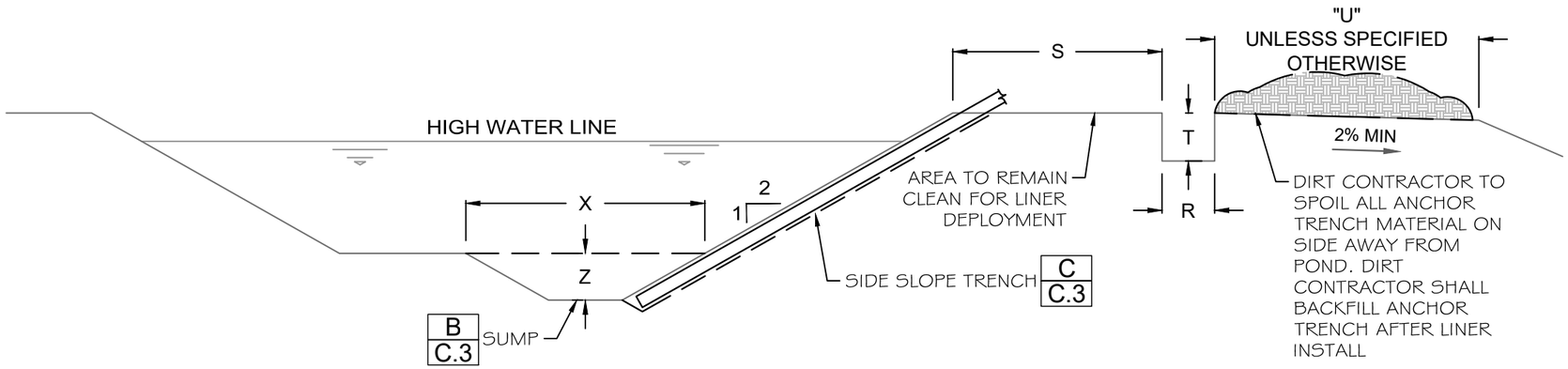
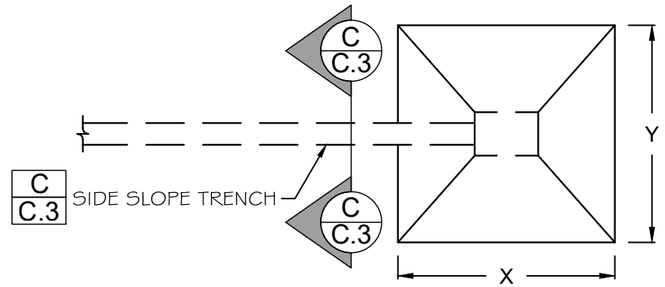
SHEET NO.:	C.2



A ANCHOR TRENCH / SUMP PROFILE VIEW

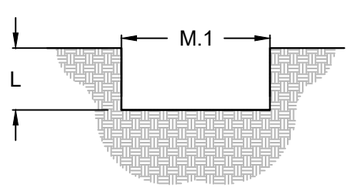
N.T.S.

DIMENSION TABLE (FT.)	
LETTER	POND
L	1.7'
M.1	2.7'
U	20'
R	1.5'
S	3'
T	3'
X	30'
Y	30'
Z	5.5'



B SUMP PLAN VIEW

N.T.S.



C SIDE SLOPE TRENCH

N.T.S.

1 H HARTMAN ENGINEERING
113 N. CHURCH ST,
SUITE 521
VISALIA, CA 93291
(559) 563-0181

REGISTERED PROFESSIONAL ENGINEER
CRAIG M. HARTMAN
NO. 73837
Exp. 06-30-19
CIVIL
STATE OF CALIFORNIA
1-8-18

PROJECT:

DOUBLE L

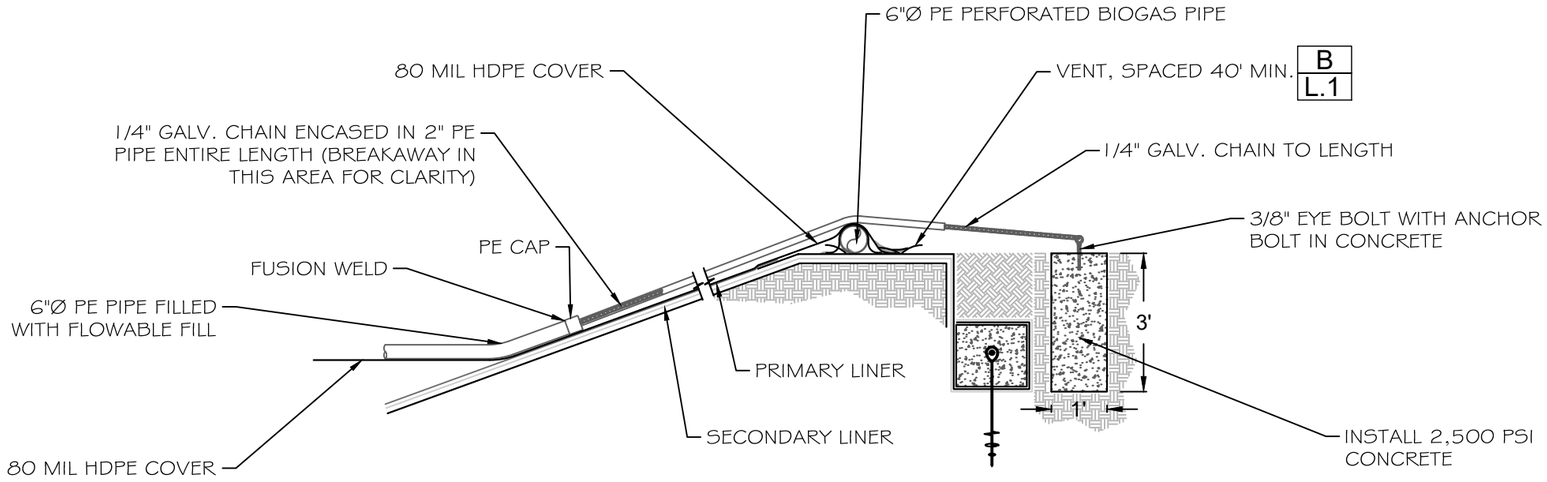
DAIRY DIGESTER

CLIENT:
RON VANDERWEERD
10234 LANSING AVE
HANFORD, CA 93230

GRADING DETAIL
DIGESTER

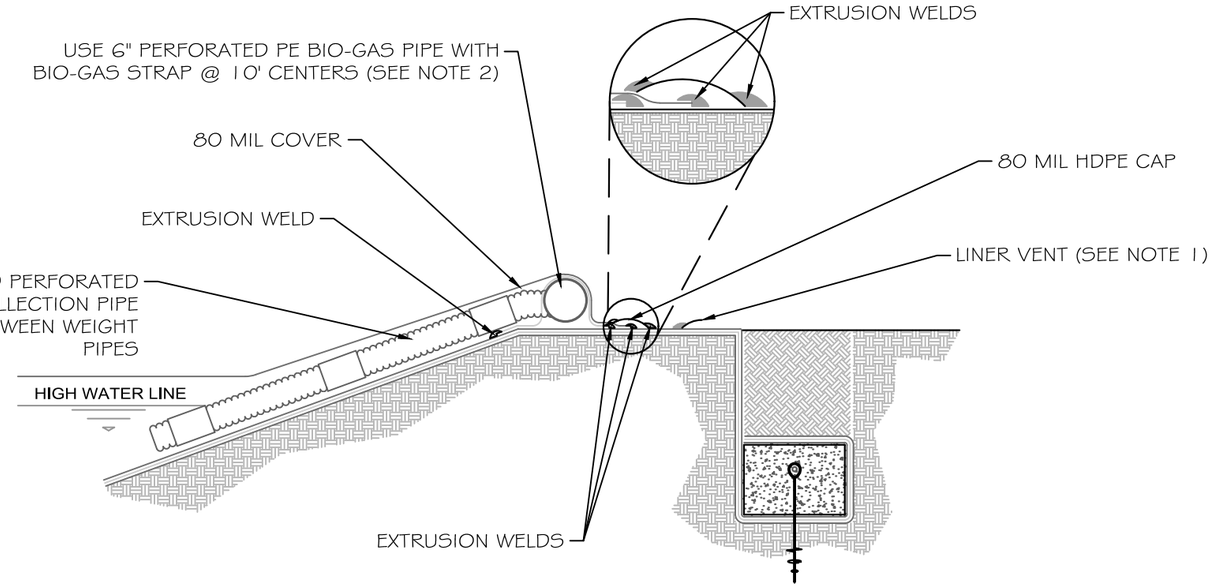
REVISION LOG:

PLOT DATE:	01/08/18
JOB NO.:	17003
SCALE:	AS SHOWN
SHEET NO.:	C.3



A BALLAST TUBE DETAIL

N.T.S.

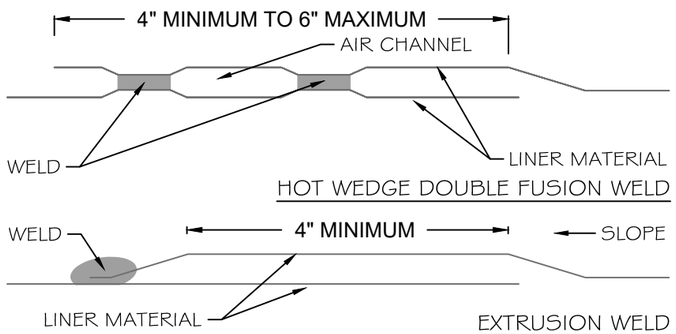


B BIO-GAS PIPING DETAIL

N.T.S.

NOTES:
1. GAS VENTS AROUND PERIPHERY OF LAGOON @ MAX. 40' O.C.
2. STRAP NOT WELDED TO BIO-GAS HEADER PIPE.
3. WRAP 60 MIL PRIMARY LINER OVER CONCRETE & EXTRUSION WELD.

DESCRIPTION	LOCATION	MATERAIL	THICKNESS (MIN)	TOP FINISH	BOTTOM FINISH
COVER	TOP	HDPE	80 MIL	SMOOTH	SMOOTH



C HDPE COVER-SMOOTH WELDS

N.T.S.

HARTMAN ENGINEERING
113 N. CHURCH ST,
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VISALIA, CA 93291
(559) 563-0181

REGISTERED PROFESSIONAL ENGINEER
CRAIG M. HARTMAN
NO. 73837
Exp. 06-30-19
CIVIL
STATE OF CALIFORNIA
1-8-18

PROJECT:

DOUBLE L

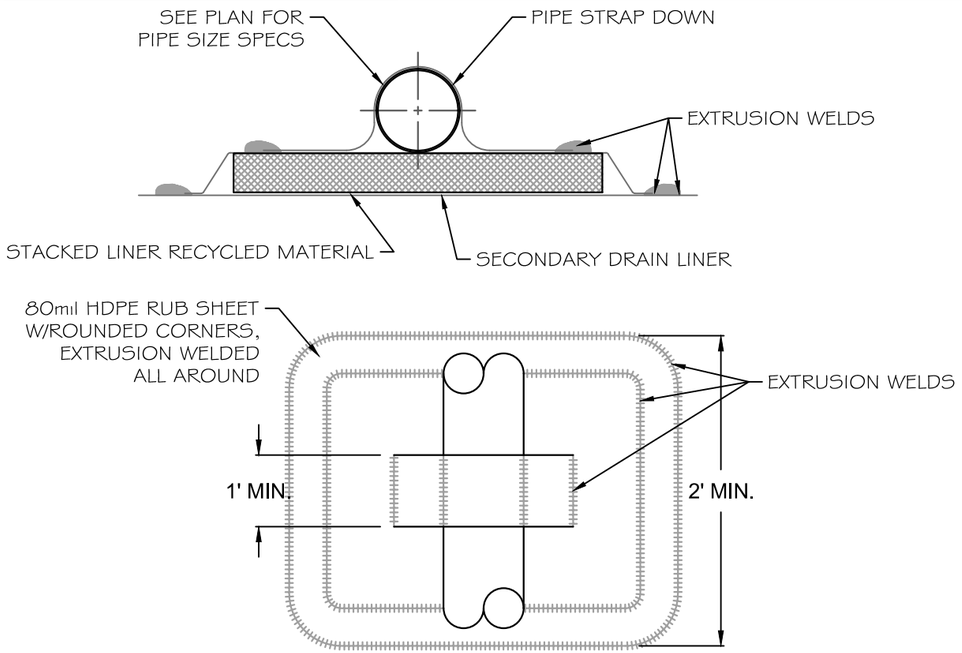
DAIRY DIGESTER

CLIENT:
RON VANDERWEERD
10234 LANSING AVE
HANFORD, CA 93230

COVER SYSTEM
DIGESTER

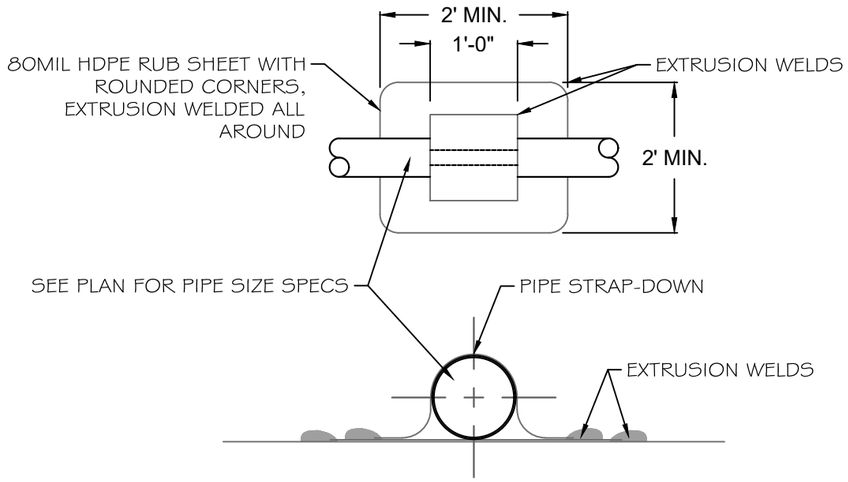
REVISION LOG:

PLOT DATE:	01/08/18
JOB NO.:	17003
SCALE:	AS SHOWN
SHEET NO.:	D.1



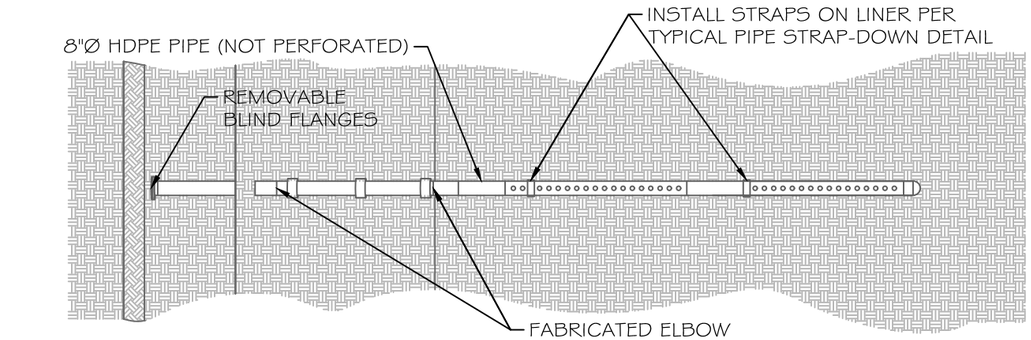
A SLUDGE REMOVAL PIPE ANCHOR DETAIL

NOTE: ANCHOR TO BE USED ON HORIZONTAL SURFACES ONLY, AT BOTTOM OF LAGOON N.T.S.



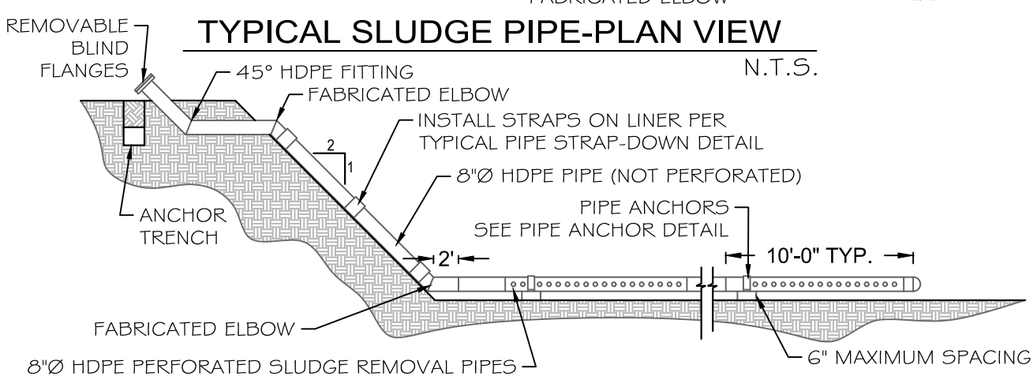
B TYPICAL PIPE STRAP-DOWN DETAIL

NOTE: MAXIMUM 10' O.C. SPACING BETWEEN PIPE STRAP-DOWNS, U.N.O. N.T.S.



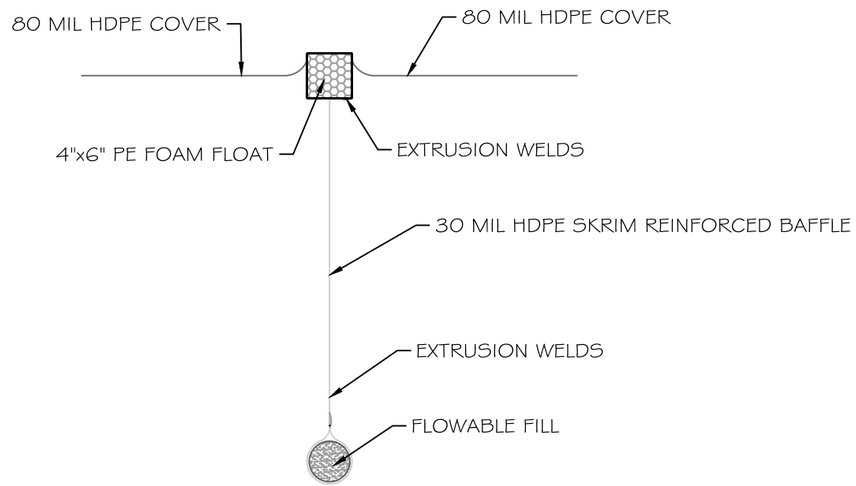
TYPICAL SLUDGE PIPE-PLAN VIEW

N.T.S.



C TYPICAL SLUDGE PIPE-PROFILE

N.T.S.



D BAFFLE SECTION

N.T.S.

HARTMAN ENGINEERING
113 N. CHURCH ST, SUITE 521
VISALIA, CA 93291
(559) 563-0181

REGISTERED PROFESSIONAL ENGINEER CRAIG M. HARTMAN NO. 73837 Exp. 06-30-19 CIVIL STATE OF CALIFORNIA 1-8-18

PROJECT:

DOUBLE L

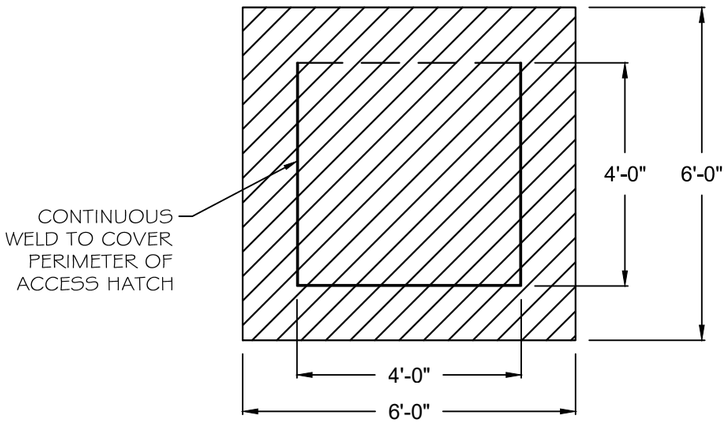
DAIRY DIGESTER

CLIENT:
RON VANDERWEERD
10234 LANSING AVE
HANFORD, CA 93230

SLURRY REMOVAL SYSTEM
DIGESTER

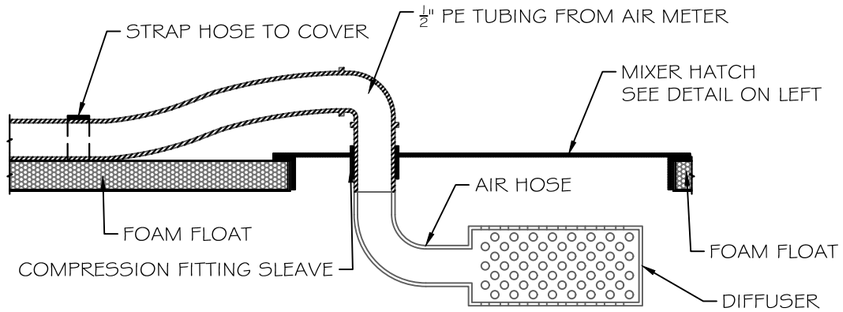
REVISION LOG:

PLOT DATE:	01/08/18
JOB NO.:	17003
SCALE:	AS SHOWN
SHEET NO.:	D.2



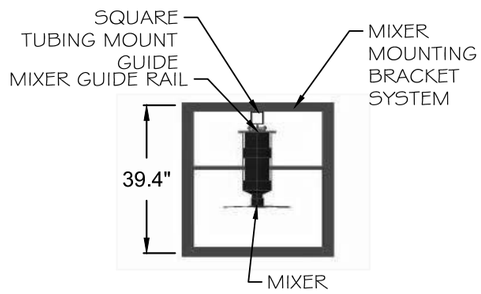
MIXER - HATCH

N.T.S.



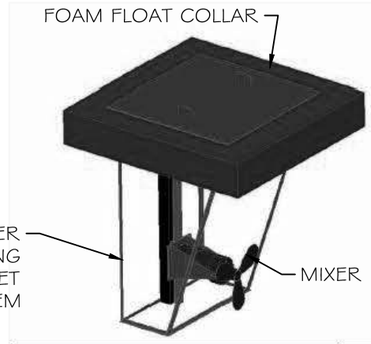
AIR INJECTION & MIXER HATCH

N.T.S.



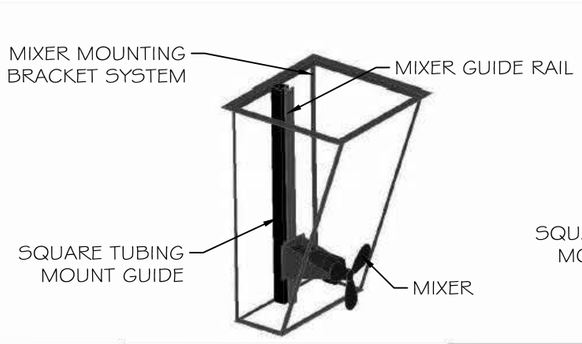
MIXER - PLAN VIEW

N.T.S.



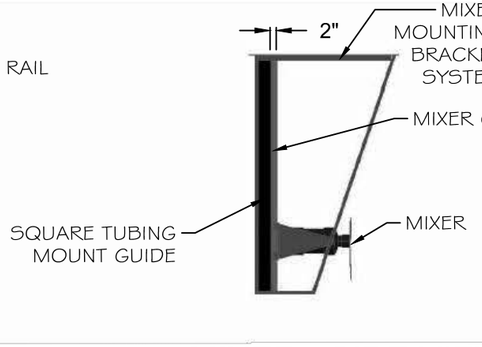
MIXER - ISOMETRIC W/FLOAT IN PLACE

N.T.S.



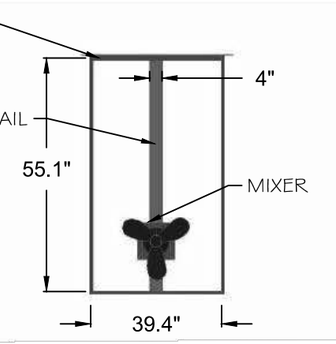
MIXER - ISOMETRIC

N.T.S.



MIXER - SIDE VIEW

N.T.S.



MIXER - FRONT VIEW

N.T.S.

HARTMAN ENGINEERING
113 N. CHURCH ST,
SUITE 521
VISALIA, CA 93291
(559) 563-0181

REGISTERED PROFESSIONAL ENGINEER
CRAIG M. HARTMAN
NO. 73837
Exp. 06-30-19
CIVIL
STATE OF CALIFORNIA
1-8-18

PROJECT:

DOUBLE L

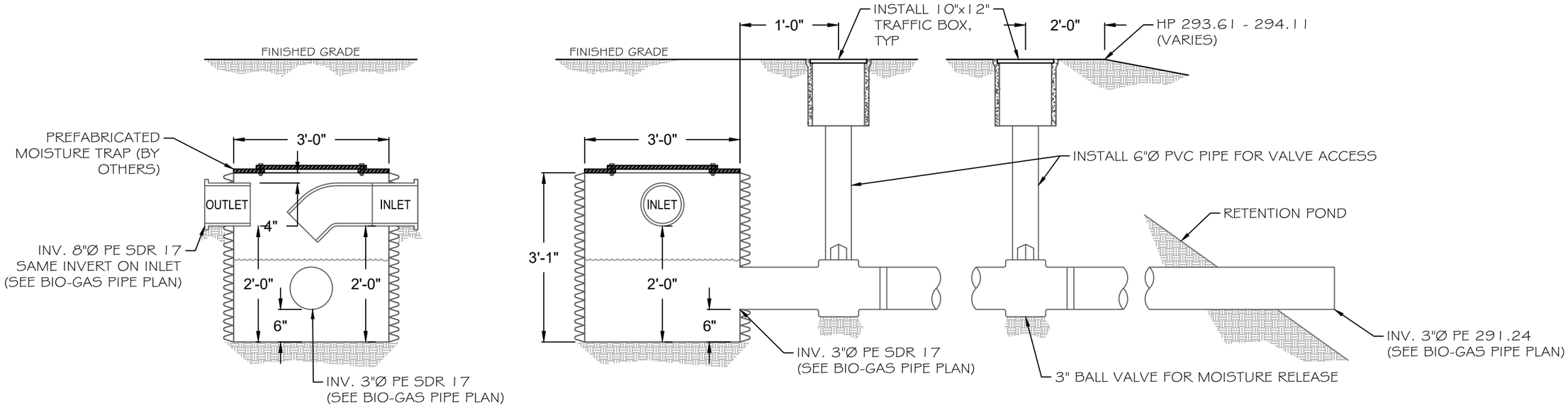
DAIRY DIGESTER

CLIENT:
RON VANDERWEERD
10234 LANSING AVE
HANFORD, CA 93230

MIXER DETAILS

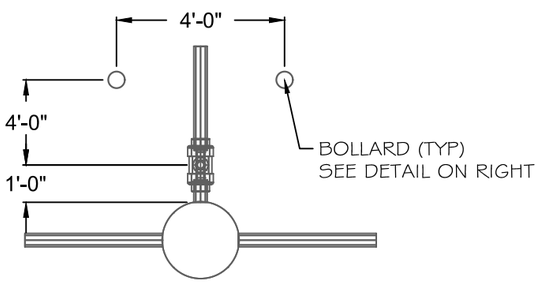
REVISION LOG:

PLOT DATE:	01/08/18
JOB NO.:	17003
SCALE:	AS SHOWN
SHEET NO.:	D.3



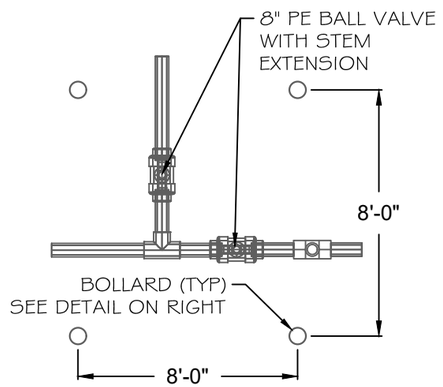
MOISTURE TRAP DETAIL

N.T.S.



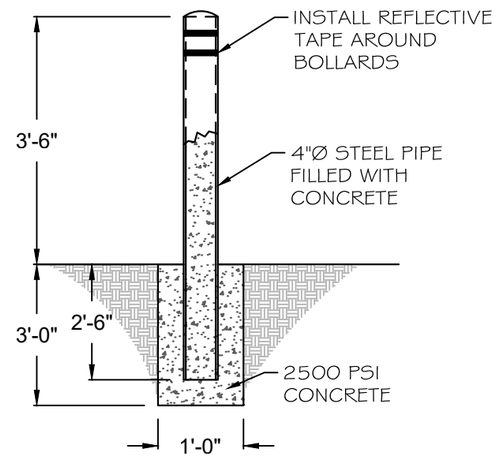
BIO-GAS VALVE

N.T.S.



BALL VALVE JUNCTION

N.T.S.



BOLLARD DETAIL

N.T.S.

HARTMAN ENGINEERING
113 N. CHURCH ST, SUITE 521
VISALIA, CA 93291
(559) 563-0181

REGISTERED PROFESSIONAL ENGINEER CRAIG M. HARTMAN NO. 73837 Exp. 06-30-19 CIVIL STATE OF CALIFORNIA 1-8-18

PROJECT:

DOUBLE L

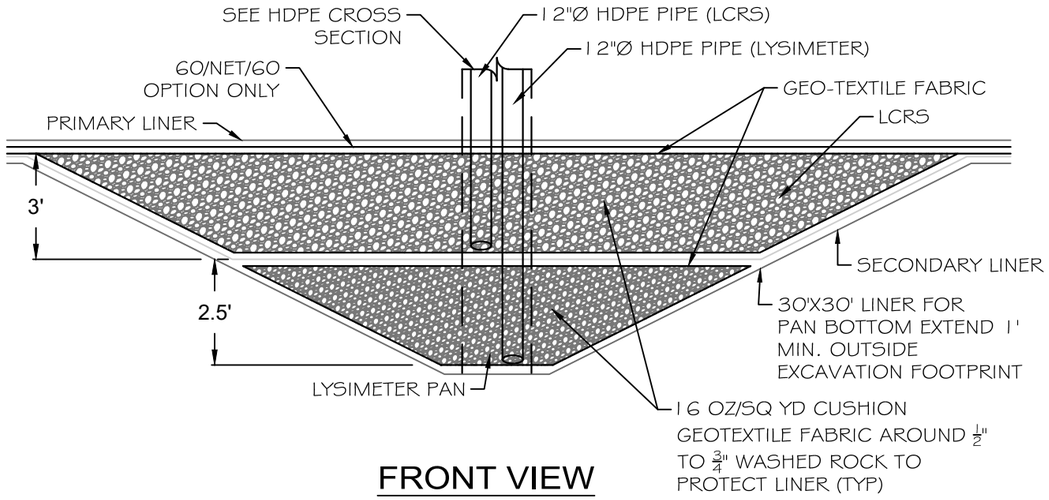
DAIRY DIGESTER

CLIENT:
RON VANDERWEERD
10234 LANSING AVE
HANFORD, CA 93230

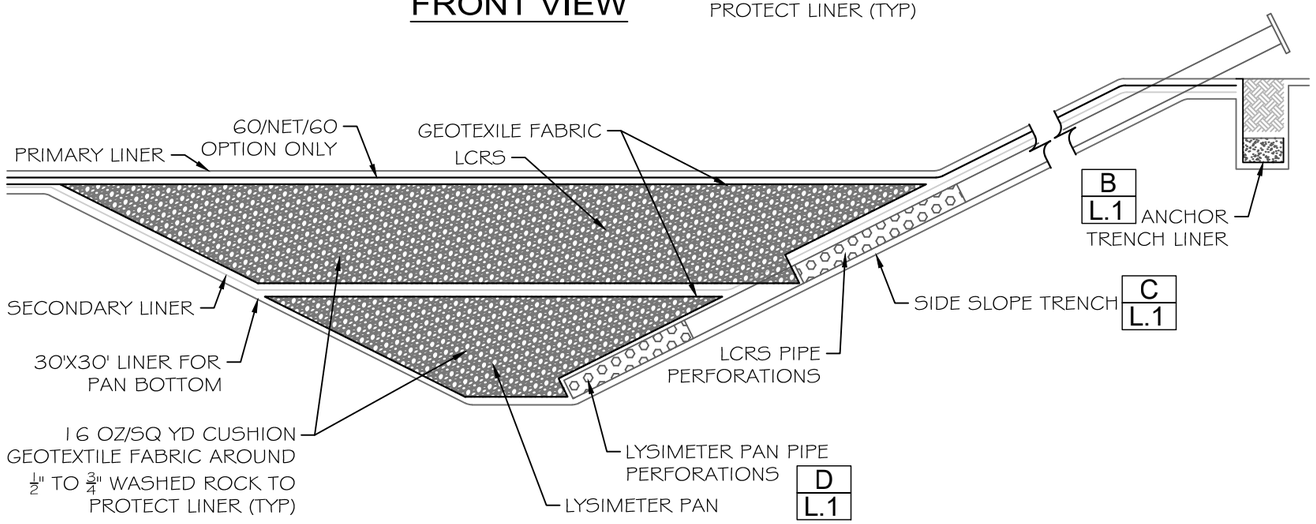
DETAILS

REVISION LOG:

PLOT DATE:	01/08/18
JOB NO.:	17003
SCALE:	AS SHOWN
SHEET NO.:	D.4



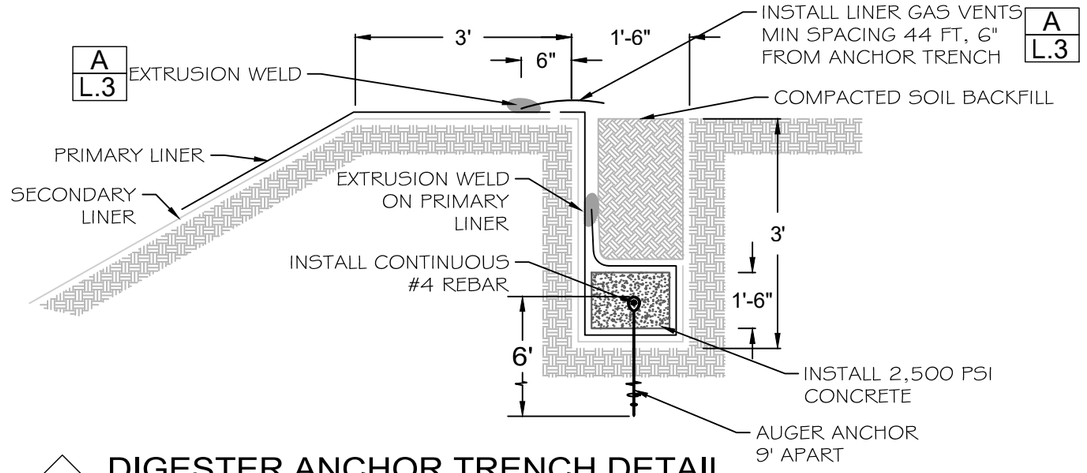
FRONT VIEW



SIDE VIEW

A LCRS, LYSIMETER AND DRAINAGE SUMP PROFILE

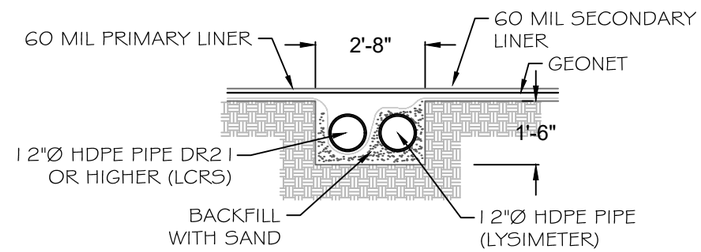
N.T.S.



B DIGESTER ANCHOR TRENCH DETAIL

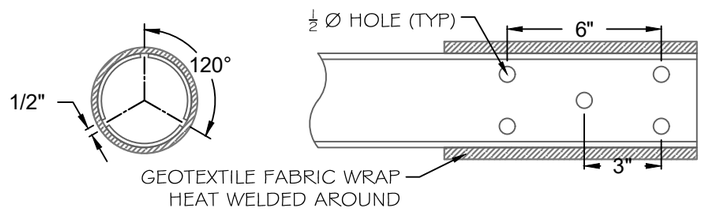
N.T.S.

NOTES: 1. CONTRACTOR TO USE ANCHOR SYSTEM OR PROVIDE DETAILS AND DESIGN FOR ALTERNATIVE TO BE APPROVED BY ENGINEER.



B HDPE CROSS SECTION

N.T.S.



C TYPICAL PERFORATION DETAIL

N.T.S.

HARTMAN ENGINEERING
113 N. CHURCH ST, SUITE 521
VISALIA, CA 93291
(559) 563-0181

REGISTERED PROFESSIONAL ENGINEER CRAIG M. HARTMAN NO. 73837 Exp. 06-30-19 CIVIL STATE OF CALIFORNIA 1-8-18

PROJECT:

DOUBLE L

DAIRY DIGESTER

CLIENT:
RON VANDERWEERD
10234 LANSING AVE
HANFORD, CA 93230

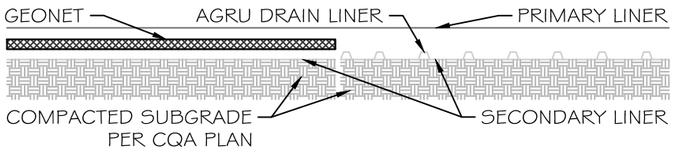
GENERAL NOTES
LINER DETAILS

REVISION LOG:

PLOT DATE:	01/08/18
JOB NO.:	17003
SCALE:	AS SHOWN
SHEET NO.:	L.1

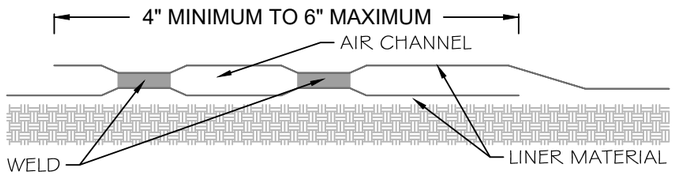
OPTIONAL TIER 1 DOUBLE LINER-LAYERING SYSTEM WITH DRAIN LINER VERIFY WITH OWNER

SMOOTH/STUDDED/ 60-NET-60 LINER LAYERS					
DESCRIPTION	LOCATION	MATERAIL	THICKNESS (MIN)	TOP FINISH	BOTTOM FINISH
PRIMARY LINER	TOP	HDPE	60 MIL	SMOOTH	SMOOTH CONDUCTIVE
DRAINAGE NET	MIDDLE	HDPE	200 MIL	N/A	N/A
SECONDARY LINER	BOTTOM	HDPE	60 MIL	SMOOTH	SMOOTH

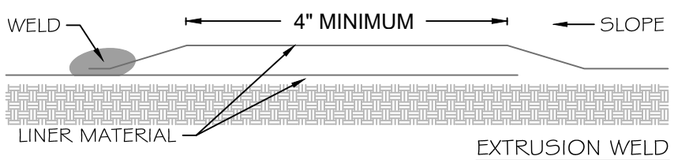


A DOUBLE LAYER 60-NET-60 DOUBLE LAYER WITH DRAIN LINER

N.T.S.



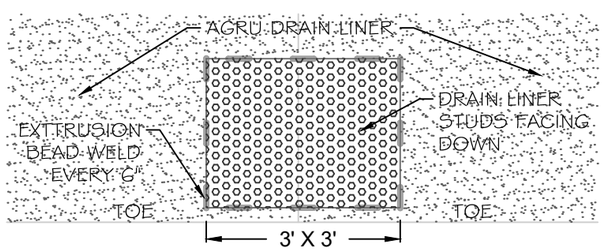
HOT WEDGE DOUBLE FUSION WELD



EXTRUSION WELD

B HDPE LINER-SMOOTH WELDS

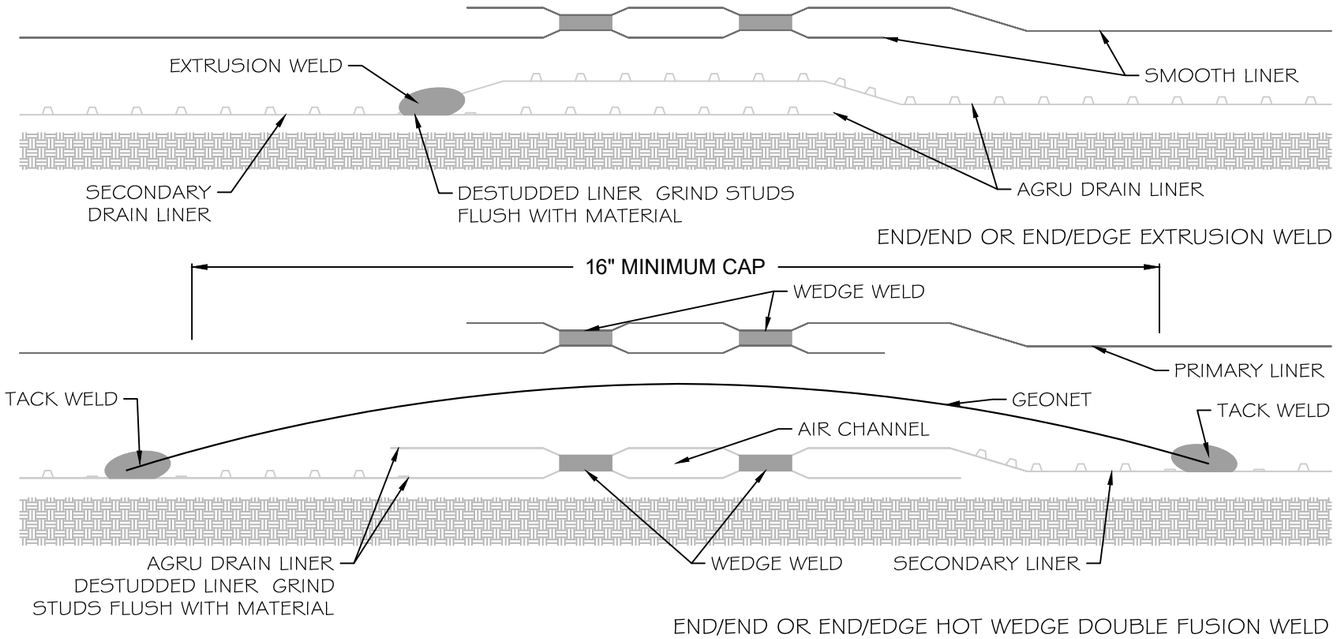
N.T.S.



DRAIN LINER SMOOTH END WELD PATCH

C 3'X3' DRAIN PATCH WELD

N.T.S.

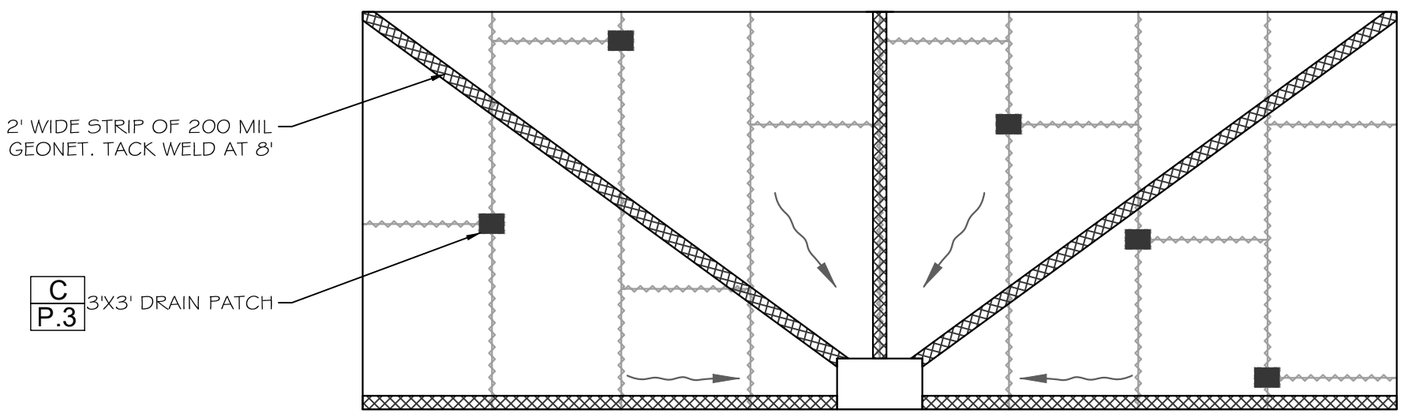


END/END OR END/EDGE EXTRUSION WELD

END/END OR END/EDGE HOT WEDGE DOUBLE FUSION WELD

D AGRU DRAIN LINER END/END WELD

NOTE: AGRU DRAIN LINER DOES NOT HAVE STUDS ALONG THE EDGE SO EDGE/EDGE SEAMS DO NOT REQUIRE DRINGING OR CAP. N.T.S.



NOTE: CQA OFFICER IS RESPONSIBLE TO ADD PATCHES AS NEEDED FOR FLOW

E AGRU DRAIN LINER CROSS SEAM NET PLAN VIEW

NOTE: TYPICAL OF ALL DRAIN LINERS N.T.S.

1

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REGISTERED PROFESSIONAL ENGINEER
CRAIG M. HARTMAN
NO. 73837
Exp. 06-30-19
CIVIL
STATE OF CALIFORNIA
1-8-18

PROJECT:

DOUBLE L

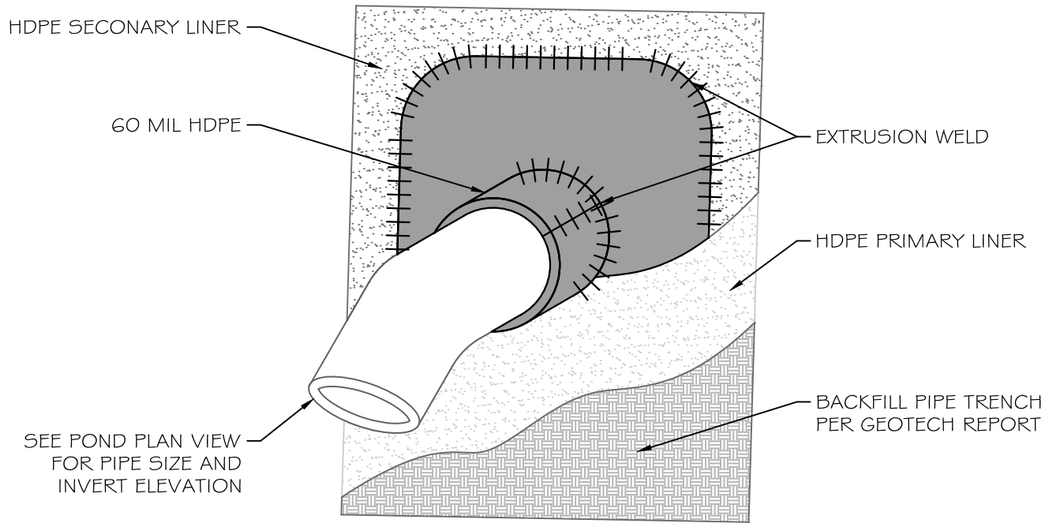
DAIRY DIGESTER

CLIENT:
RON VANDERWEERD
10234 LANSING AVE
HANFORD, CA 93230

LINER DETAILS

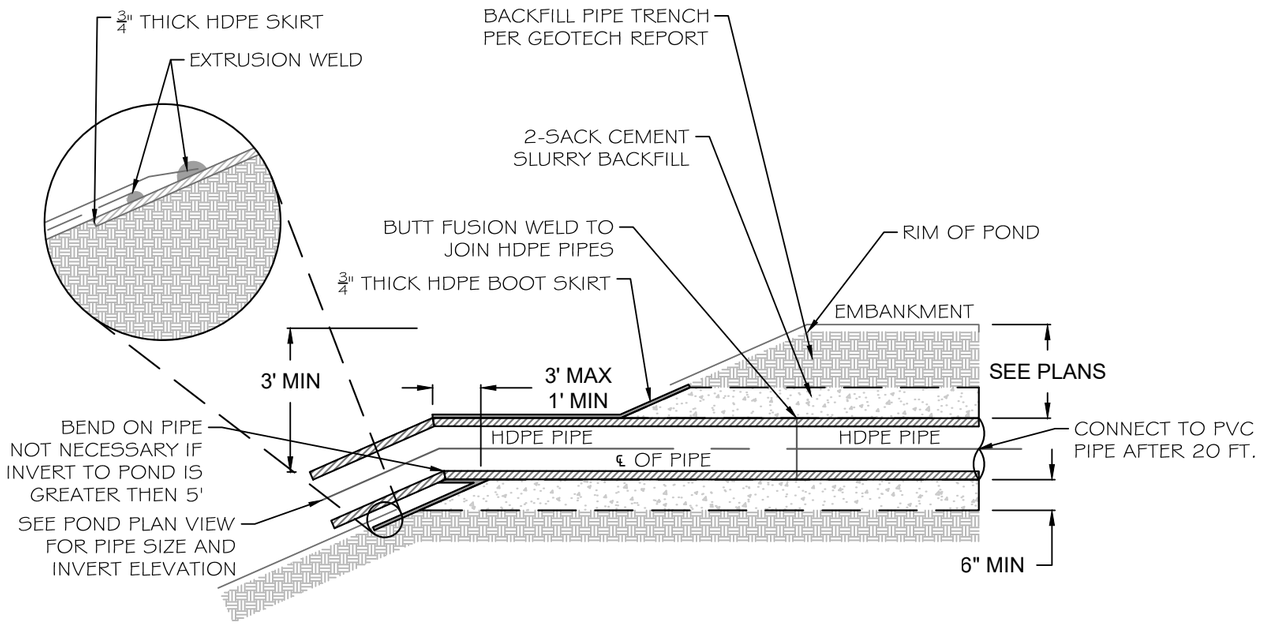
REVISION LOG:

PLOT DATE:	01/08/18
JOB NO.:	17003
SCALE:	AS SHOWN
SHEET NO.:	L.2



A BOOT SKIRT

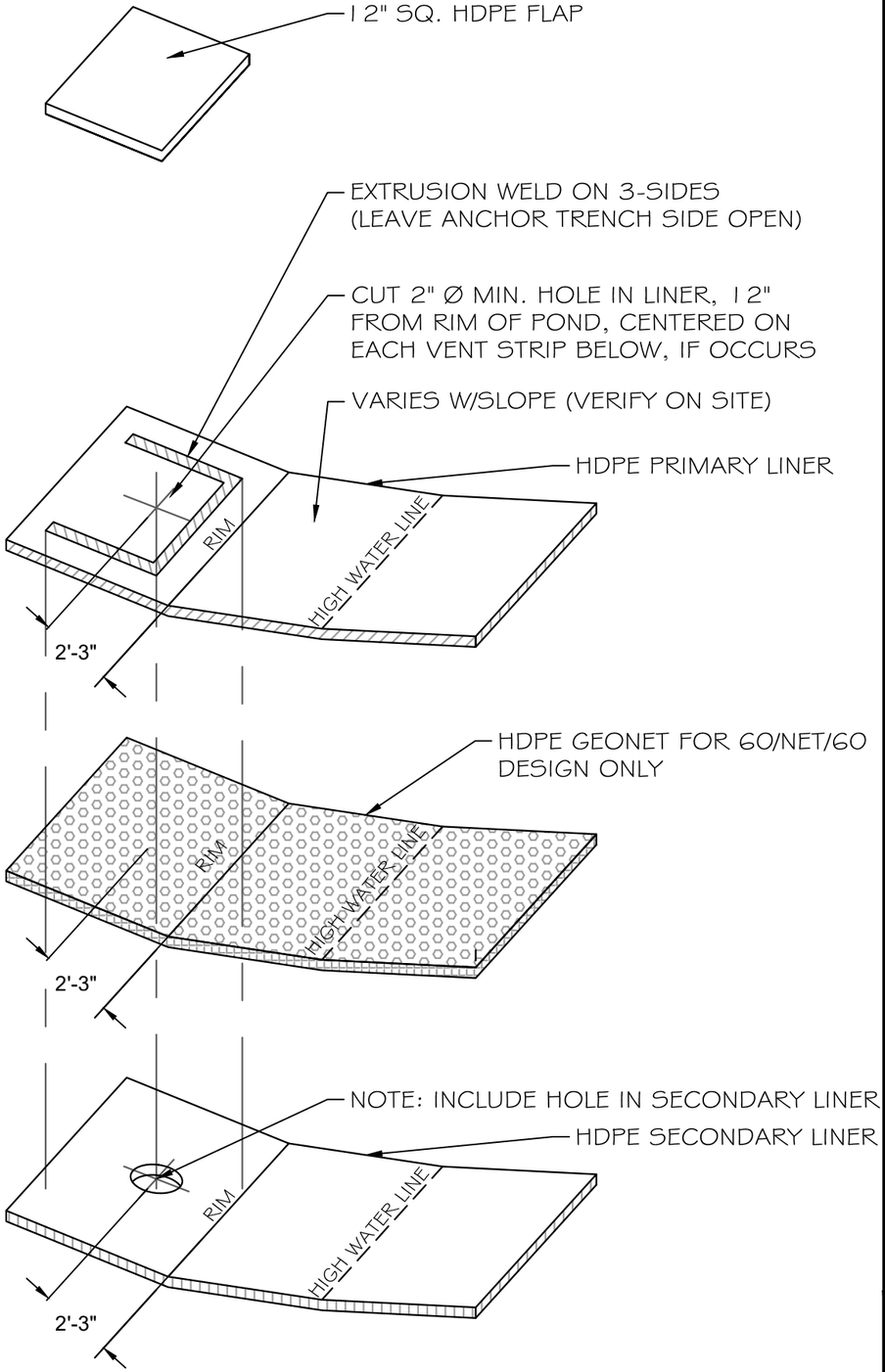
N.T.S.



B BOOTLESS PIPE PENETRATION

LINER FASTENING

N.T.S.



C VENT ORIFICE (ISOMETRIC VIEW)

N.T.S.

1 H HARTMAN ENGINEERING

113 N. CHURCH ST,
SUITE 521
VISALIA, CA 93291
(559) 563-0181

REGISTERED PROFESSIONAL ENGINEER
CRAIG M. HARTMAN
NO. 73837
Exp. 06-30-19
CIVIL
STATE OF CALIFORNIA
1-8-18

PROJECT:

DOUBLE L

DAIRY DIGESTER

CLIENT:
RON VANDERWEERD
10234 LANSING AVE
HANFORD, CA 93230

LINER DETAILS

REVISION LOG:

PLOT DATE:	01/08/18
JOB NO.:	17003
SCALE:	AS SHOWN
SHEET NO.:	L.3

HIGH ROLLER
DAIRY DIGESTER

BENCHMARK

THE TOPOGRAPHIC SURVEY WAS PERFORMED UTILIZING GLOBAL POSITIONING SYSTEM OBSERVATIONS. DISTANCES AND NUMBERS SHOWN ARE TO BE CONSIDERED GROUND VALUES. BENCHMARK AND CONTROL SHOWN ON CONTROL PLAN SHEET. THE BENCHMARK AND VERTICAL ELEVATIONS WERE DERIVED FROM THE NGS ONLINE POSITIONING SERVICE (OPUS), AND IS SHOWN ON THE NAVD 88 DATUM UTILITIZING THE GEOID 09 AS THE VERTICAL MODEL.

PRESERVATION OF MONUMENTS

PURSUANT TO SECTIONS 8771(B) AND 8771(C) OF THE GOVERNMENT CODE, ANY MONUMENTS THAT CONTROL THE LOCATION OF BOUNDARIED, OR OTHERWISE PROVIDE HORIZONTAL OR VERTICAL SURVEY CONTROL WITHIN THE CONSTRUCTION AREA, SHALL BE LOCATED AND REFERENCED PRIOR TO CONSTRUCTION, AND A CORNER RECORD OR RECORD OF SURVEY OF THE REFERENCES SHALL BE FILED WITH THE COUNTY SURVEYOR.

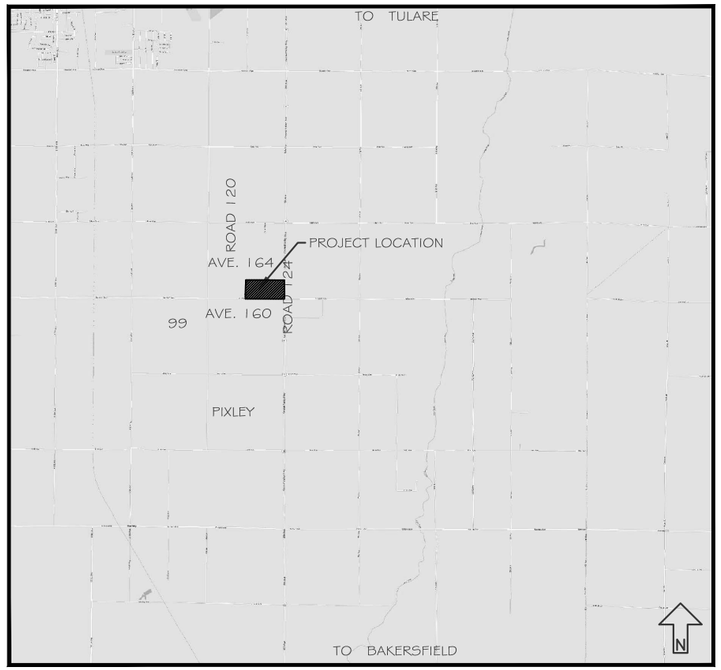
PERMANENT MONUMENTATION SHALL BE SET TO PERPETUATE THE LOCATION OF ANY MONUMENT WHICH COULD BE DAMAGED OR DESTROYED, AND A CORNER RECORD OR RECORD OF SURVEY SHALL BE FILED WITH THE COUNTY SURVEYOR PRIOR TO THE RECORDING OF A CERTIFICATE OF COMPLETION FOR THE PROJECT.

DUST CONTROL NOTES

CONTRACTOR IS REQUIRED TO COMPLY WITH GOOD HOUSE KEEPING PRACTICES

STORMWATER (SWPPP) NOTES

CONTRACTOR IS REQUIRED TO COMPLY WITH GOOD HOUSE KEEPING PRACTICES

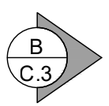


VICINITY MAP
SCALE 1" : 2 MI

SHEET REFERENCE

SECTIONS:

SECTION NAME
SHEET NUMBER



DETAILS:

DETAIL NAME
SHEET NUMBER

CONTACT INFO

ENGINEER:
CRAIG HARTMAN, RCE 73837
HARTMAN ENGINEERING, INC.
3121 W. CERES CT.
VISALIA, CA 93291
(559) 563-0181

DAIRY CONTACT:
JAKE DE JONG
14782 8TH AVE
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SHEET INDEX

HARTMAN ENGINEERING
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REGISTERED PROFESSIONAL ENGINEER
CRAIG M. HARTMAN
NO. 73837
Exp. 06-30-19
CIVIL
STATE OF CALIFORNIA
1-8-18

PROJECT:
HIGH ROLLER
DAIRY DIGESTER

CLIENT:
JAKE DE JONG
14782 8TH AVE
HANFORD, CA 93230

REVISION LOG:

PLOT DATE:	01/20/19
JOB NO.:	17003
SCALE:	AS SHOWN
SHEET NO.:	A.1

SPECIFICATIONS FOR ENGINEERED FILL MATERIAL OF ABOVE GRADE EMBANKMENTS OR AS REQUIRED

TEST PARAMETER	TEST METHOD	FREQUENCY	ACCEPTANCE CRITERIA
Compaction Curves	ASTM D1557 (Modified Proctor)	Change in material	N/A
Grain Size Distribution	ASTM D422 (Sieve)	Change in material	At least 30% passing No. 200 U.S. Standard Sieve. Per Specifications (1)
Soil Classification	ASTM D2487 (USCS)	Change in material	Suitable for compaction [2,3]
Maximum Particle Size	ASTM D422 (Sieve)	Change in material	½ inch, ¼ top 6 inches
Maximum Water soluble Sulfate (SO_4) in Soil (Concrete Slab locations)	ASTM C1580	Change in material	0.2% by weight

Site Preparation Specifications:

1. Clearing: Prior to earthwork operations, the area to be developed should be stripped of vegetation, organic topsoil, and cleared of cow waste and miscellaneous debris from the proposed construction areas. Deeper clearing may be required in localized areas. The actual depth of clearing should be reviewed by a licensed Geotechnical Engineer at the time of construction. The limits of stripping and clearing should be at least five feet beyond the limits of construction.

2. Compaction: The scarified subgrade and subsequent fill placed at the site should be moisture conditioned to near optimum moisture content, and compacted to at least and 90 percent for 2:1 side slope pond of maximum dry density as determined by ASTM test method D1557.

3. Material for fill: Fill should consist of select material. Native soil, free from organic, vegetation, and rocks or cobbles larger than three inches, may be used as fill at the site. Import material must be reviewed by licensed Geotechnical Engineer prior to transport to the site.

4. Fill placement: Fill material should be moisture-conditioned to +/- 2% of the optimum moisture content prior to compaction. Fill material with excessive moisture should be allowed to dry prior to compaction or be mixed with dry soil to bring the fill to a workable moisture content. Fill should be placed in level lifts not exceeding a loose, uncompacted thickness of eight inches, and compacted as engineered fill.

Sub-grade requirements for fill only:

-Over Excavate for minimum 1 ft. to meet Engineered Fill Borrow Material Guidelines and Pond Liner Sub-grade requirements

-Well mixed soil

-6 in max lifts

-Upper 6 inches is of fine-finished soil particles no greater than ¼ in.+

Notes:

1. Field tests shall not be required, but fill borrow material specifications must meet the acceptance criteria outlined in Table 1.
2. Refer to Geotechnical Report

NOTES:

THE APPROVED WORK PLAN WHICH INCLUDES THE CONSTRUCTION QUALITY ASSURANCE PLAN, OPERATION, MAINTENANCE AND MONITORING PLAN, CONSTRUCTION DRAWINGS, AND SOILS REPORT TOGETHER AS A PACKAGE ARE THE COMPLETE SPECIFICATIONS REQUIRED FOR CONSTRUCTION OF THE POND AND LINER SYSTEM.

FILL TEST SPECIFICATIONS FOR SUB-GRADE

TEST PARAMETER	TEST METHOD [1,1]	FREQUENCY	ACCEPTANCE CRITERIA
Uncompacted Lift Thickness	Visual Observation	Continuous	8-in.[1,2]
Construction Oversight	Visual Observation	Continuous	Maximum particle size 1/2 inch.
In-Place Moisture Alternative Method	ASTM D2216 (Oven Dry)	1 per every 10 Nuclear tests	+/-2% of Optimum Moisture Content per ASTM D1557
In-Place Moisture Rapid Field Methods[3,5]	ASTM D6938[3,5] (Nuclear Method)	3 per acre per lift, min. 2 per day	+/-2% of Optimum Moisture Content per ASTM D1557
In-Place Density Alternate Method	ASTM D2937(Drive Cylinder)	1 per every 10 Nuclear tests	90% of Maximum Dry Density per ASTM D1557
In-Place Density Rapid Field Methods[4,5]	ASTM D6938[4,5] (Nuclear Method)	3 per acre per lift, min. 2 per day	90% of Maximum Dry Density per ASTM D1557
Subgrade Thickness	Surveying Measurement	At 50-foot centers	Minimum 1 ft.[1,4]
Clod Size	Visual Observation	Continuous	Per Specification

Notes:

See earthwork section for anchor trench, excavation, backfill, and compaction requirements.

[1] ASTM Test Method, unless otherwise noted. Results of all tests performed to be reported as per method reporting criteria.

[2] The sub-grade shall be scarified to a depth of 1 ft. lower than finished grade, compacted, and tested in accordance with the requirements of this table.

[3] Must be verified by ASTM D2216 (Oven) overnight method once every day or once per change in material

[4] Must be verified by ASTM D2937 (Dry Cylinder) twice per day or per change in material

[5] Calibration Procedure: ASTM D7013-04: Standard Guide for Nuclear Surface Moisture and Density Gauge Calibration Facility Set-up

POND SPECIFICATIONS FOR SUBGRADES CUT BELOW GROUND
(For Slopes 2:1 or shallower)

Side Slopes: The certified Civil Engineer/CQA Chief Officer shall walk final side slopes after cut by heavy equipment and confirm no SW or SP soils and no loose soils. All SW, SP, or soils that are not amenable to a firm and unyielding subgrade shall be removed and replaced down to a minimum 3 ft. below sloped surface. Any soils removed and replaced shall meet the Engineered Fill requirements in Table 1.

Pond Bottom: 1. An as-built survey of the pond bottom shall take place after subgrade construction to insure minimum slopes are achieved. Pond Bottom shall be tested per criteria below. Any soils not meeting the requirements below (i.e. that is not firm and unyielding) shall be removed and replaced down to a minimum 2 ft. Any soils removed and replaced shall meet the Engineered Fill requirements in Table 1. The Civil Engineer may make determination of soils meeting requirements or not based upon visual inspection which shall be included in the Subgrade Certification Report and signed and sealed by a Civil Engineer and CQA Officer.

TEST PARAMETER	TEST METHOD [1,1]	FREQUENCY	ACCEPTANCE CRITERIA
In-Place Density Rapid Field Methods [1,1]	ASTM D6938[3,5] (Nuclear)	3 per acre	90% of Maximum Dry Density per ASTM D1557
In-Place Moisture Rapid Field Methods[3,5]	ASTM D6938[3,5] (Nuclear Methods)	3 per acre per lift, min. 2 per day	+/-2% of Optimum Moisture Content per ASTM D1557
Construction Oversight	Visual Observation	Continuous	Maximum particle size 1/2 inch.
Subgrade Slope	Surveying Measurement	200 ft. maximum grid	Min 1%

60 MIL HDPE GEOMEMBRANE CONSTRUCTION QUALITY ASSURANCE (CQA)

TEST PARAMETER	TEST METHOD	FREQUENCY	ACCEPTANCE CRITERIA
Thickness (min. ave.) -Lowest individual for 8 out of 10 values -Lowest individual for any of the 10 values	ASTM D5994	1 per lot or 1 per 70,000 ft2, whichever is greater	Nom. (-5%) -10% -15%
Tensile Properties -yield strength -break strength -strain at yeild -break strength	ASTM D6693 Type IV	1 per lot or 1 per 70,000 ft2, whichever is greater	≥126 lb./in. ≥90 lb./in. ≥12% ≥100%
Puncture Resistance	ASTM D4833	1 per lot or 1 per 70,000 ft^2, whichever is greater	108 lb. (min.)
Tear Resistance	ASTM D1004, Die C	1 per lot or 1 per 70,000 ft2, whichever is greater	42 lb. (min.)
Interface Shear -60-mil HDPE/subgrade soil -Drainage geocomposite	ASTM D5321 ASTM D6243	2 tests or 1 per 200,000 ft2, whichever is greater	
Seam Shear	ASTM D6392	1 test per 500 lineal feet or per GRI GM-14 and 20.	95% of min. yield strength
Seam Peel -Extrusion -Fusion	ASTM D6392	1 test per 500 lineal feet or per GRI GM-14 and 20.	72% yield & ftb (1)
Non-destructive Seam Test	ASTM D5820 (Pressure Test)	Continuous	35 psi for 5 min.
	ASTM D5641 (Vacuum Box)		5 psi for 15 sec.
	ASTM D5641 (Spark Test)		No Spark
Electric Leak Location	ASTM D7002 (Water Puddle)	Once on constructed liner	Max 1 mm. diameter hole sensitivity
	ASTM D6747 (Selection Process)		
	ASTM D7007 (Water /Earth)		Max 6 mm. diameter hole sensitivity
	ASTM D7240 (Spark Test 2011)		

Notes:

ftb: Film Tear Bond

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PROJECT:

HIGH ROLLER DAIRY DIGESTER

CLIENT:
JAKE DE JONG
14782 8TH AVE
HANFORD, CA 93230

GENERAL NOTES
CONSTRUCTION

REVISION LOG:

PLOT DATE:	01/20/19
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SCALE:	AS SHOWN
SHEET NO.:	A.2

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SITE PLAN

DIGESTER

REVISION LOG:

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HARTMAN ENGINEERING

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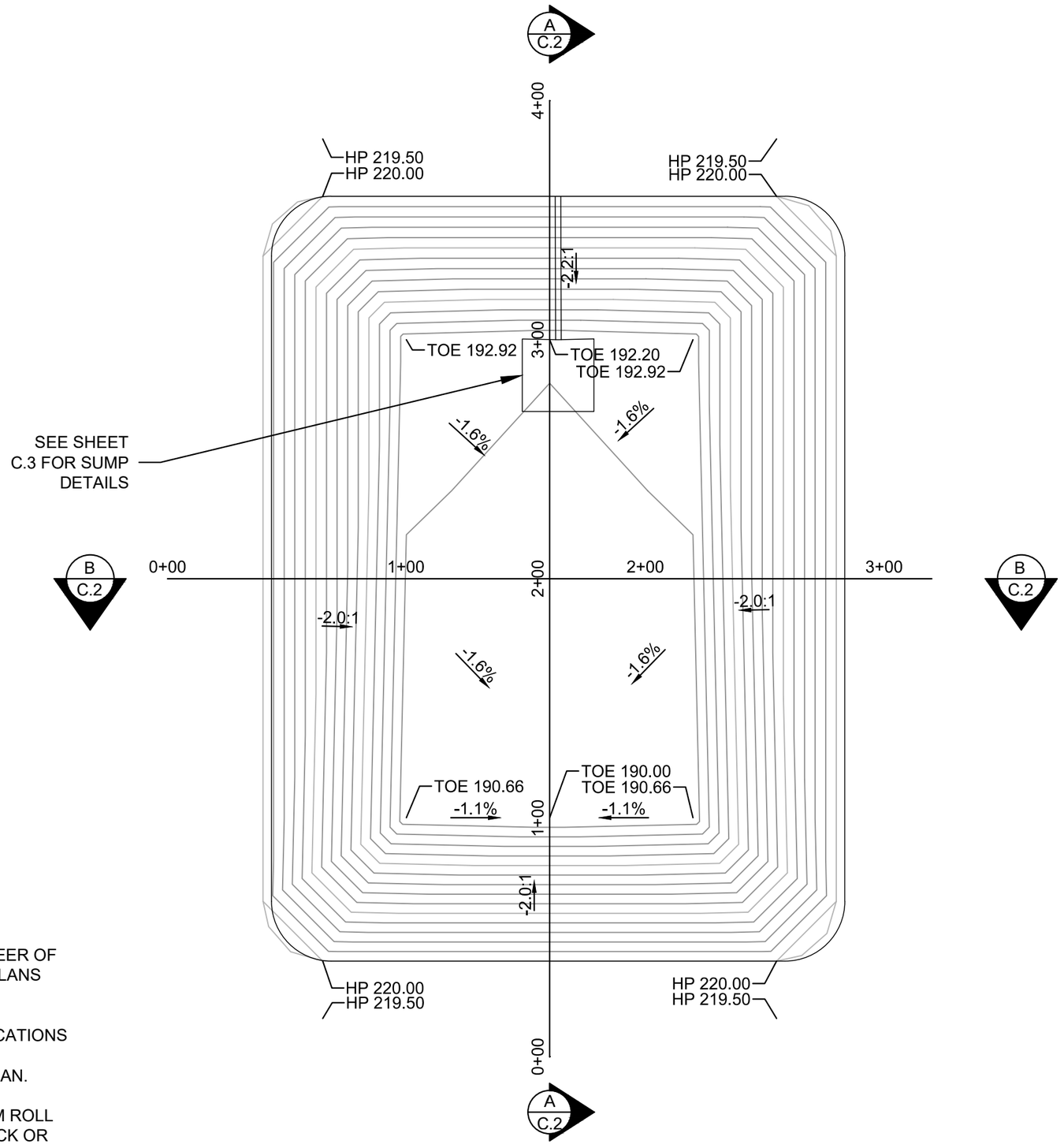
SITE PLAN

DAIRY

REVISION LOG:

PLOT DATE:	01/20/19
JOB NO.:	17003
SCALE:	AS SHOWN
SHEET NO.:	A.4



GRADING NOTES:

1.CONTRACTOR SHALL INFORM ENGINEER OF ANY DISCREPANCIES OR ERRORS IN PLANS PRIOR TO CONSTRUCTION.

2. CONTRACTOR SHALL MEET SPECIFICATIONS OF TABLE 2 WITHIN THE APPROVED CONSTRUCTION QUALITY CONTROL PLAN.

3. CONTRACTOR SHALL SMOOTH DRUM ROLL FINAL SURFACE AND REMOVE ANY ROCK OR MATERIAL GREATER THAN $\frac{1}{2}$ INCH.

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GRADING PLAN

DIGESTER

REVISION LOG:

PLOT DATE:	01/20/19
JOB NO.:	17003
SCALE:	AS SHOWN
SHEET NO.:	C.1

N

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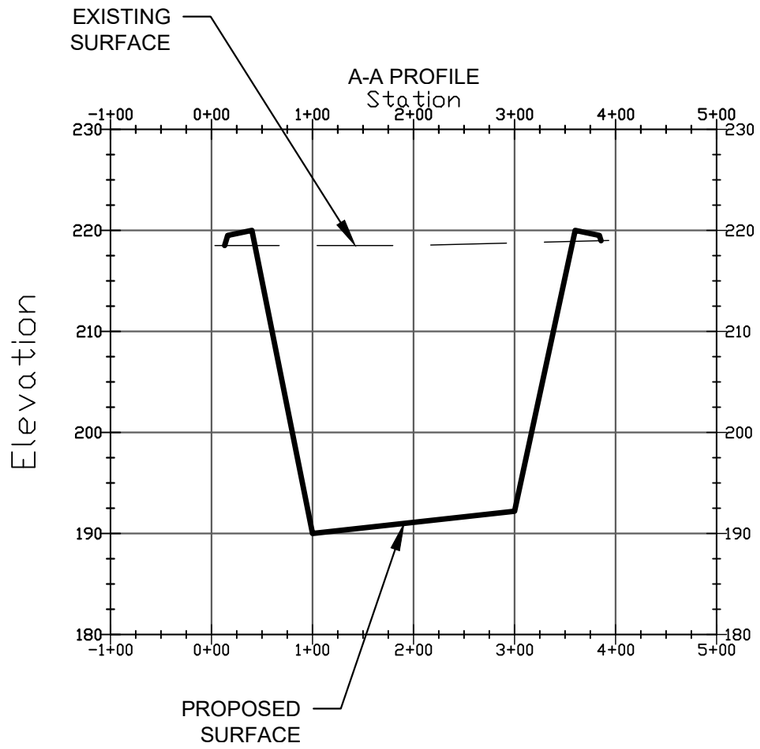

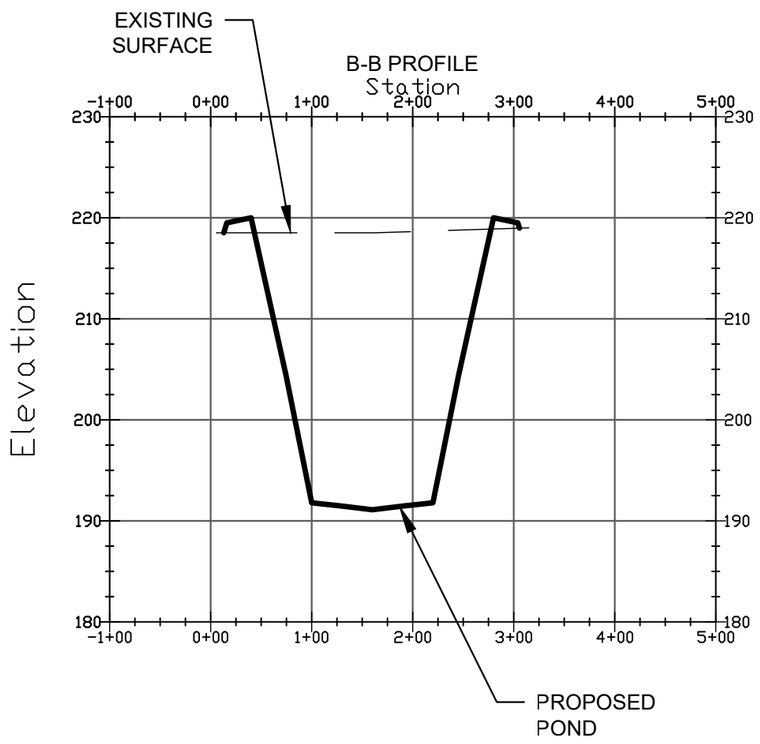

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GRADING SECTIONS

DIGESTER

REVISION LOG:

PLOT DATE:	01/20/19
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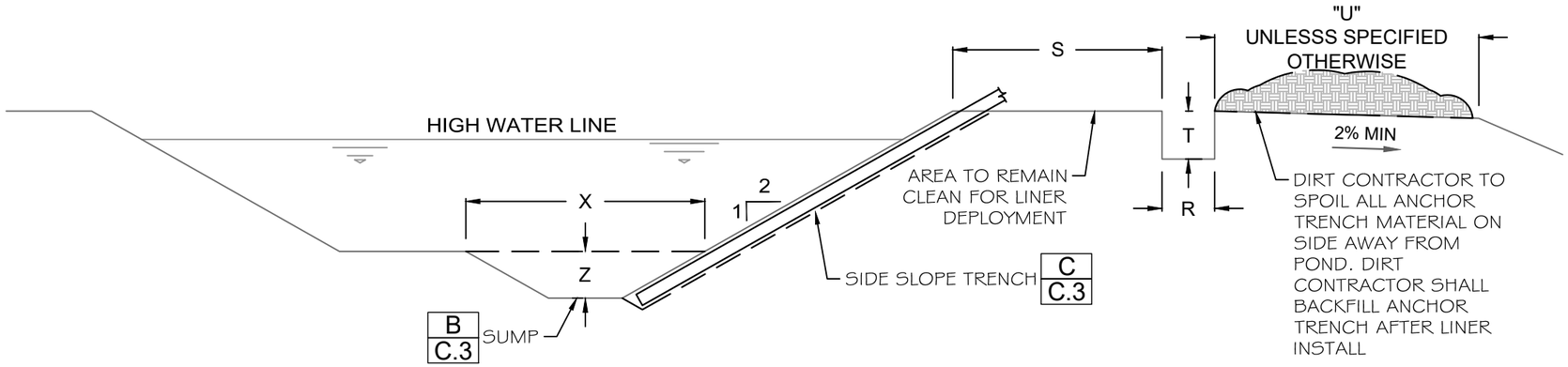
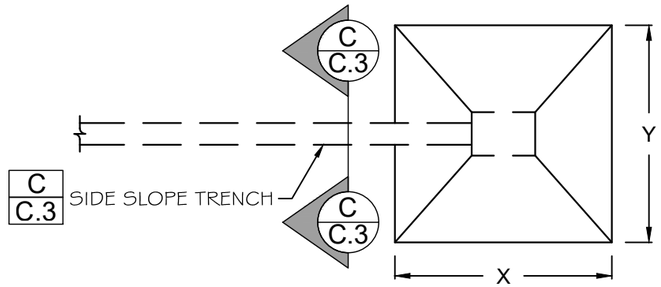
SCALE:	AS SHOWN
SHEET NO.:	C.2



A ANCHOR TRENCH / SUMP PROFILE VIEW

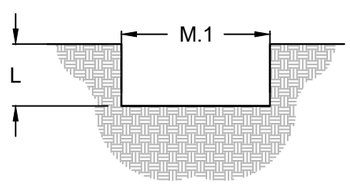
N.T.S.

DIMENSION TABLE (FT.)	
LETTER	POND
L	1.7'
M.1	2.7'
U	20'
R	1.5'
S	3'
T	3'
X	30'
Y	30'
Z	5.5'



B SUMP PLAN VIEW

N.T.S.



C SIDE SLOPE TRENCH

N.T.S.

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1-8-18

PROJECT:

HIGH ROLLER

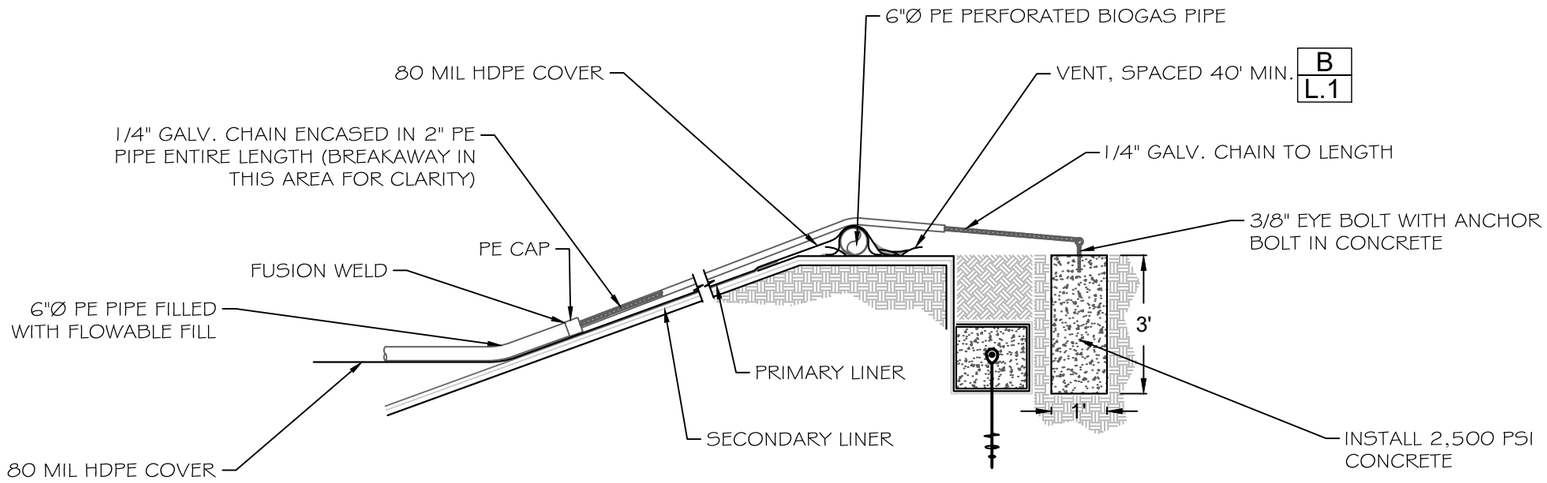
DAIRY
DIGESTER

CLIENT:
JAKE DE JONG
14782 8TH AVE
HANFORD, CA 93230

GRADING DETAIL
DIGESTER

REVISION LOG:

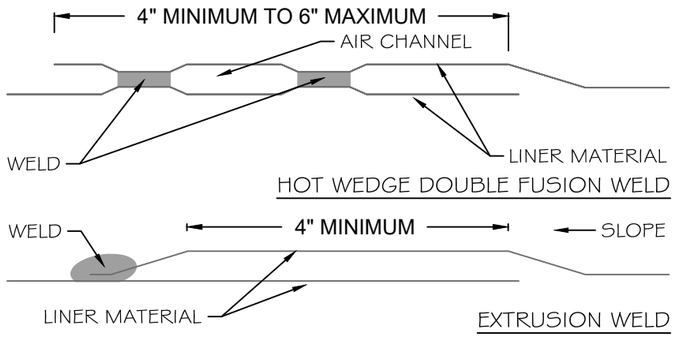
PLOT DATE:	01/20/19
JOB NO.:	17003
SCALE:	AS SHOWN
SHEET NO.:	C.3



A BALLAST TUBE DETAIL

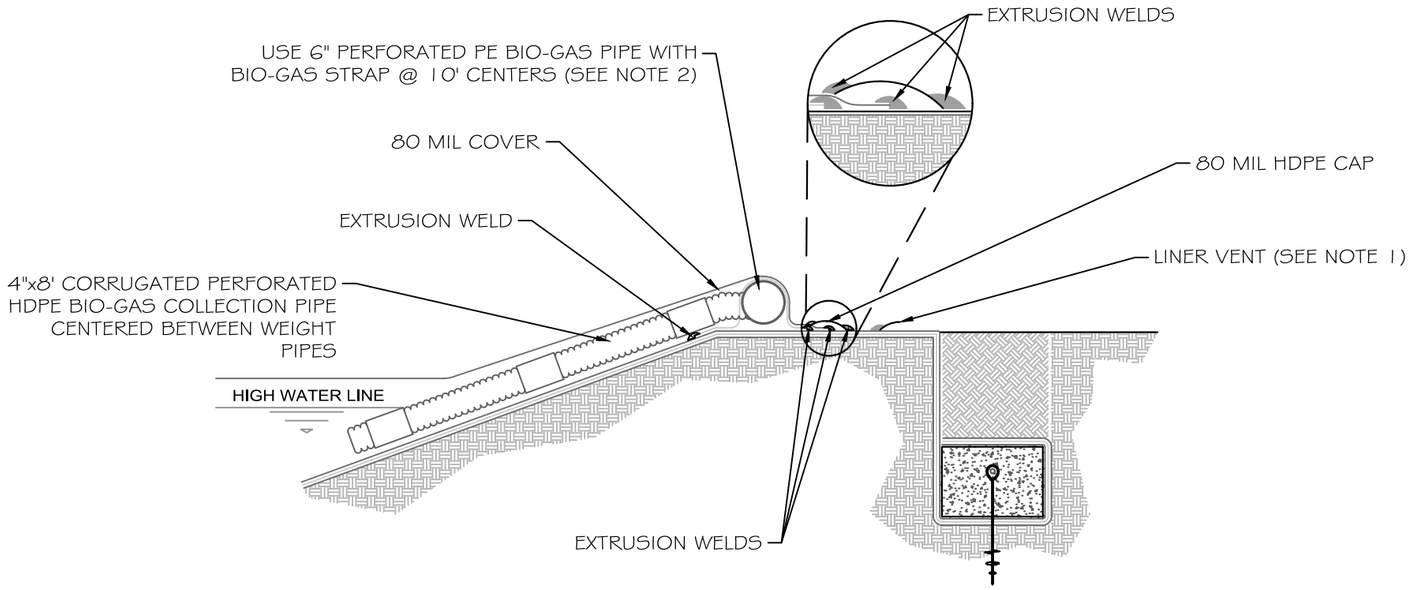
N.T.S.

DESCRIPTION	LOCATION	MATERAIL	THICKNESS (MIN)	TOP FINISH	BOTTOM FINISH
COVER	TOP	HDPE	80 MIL	SMOOTH	SMOOTH



C HDPE COVER-SMOOTH WELDS

N.T.S.



B BIO-GAS PIPING DETAIL

N.T.S.

NOTES:
1. GAS VENTS AROUND PERIPHERY OF LAGOON @ MAX. 40' O.C.
2. STRAP NOT WELDED TO BIO-GAS HEADER PIPE.
3. WRAP 60 MIL PRIMARY LINER OVER CONCRETE & EXTRUSION WELD.

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PROJECT:

HIGH ROLLER

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CLIENT:
JAKE DE JONG
14782 8TH AVE
HANFORD, CA 93230

COVER SYSTEM
DIGESTER

REVISION LOG:

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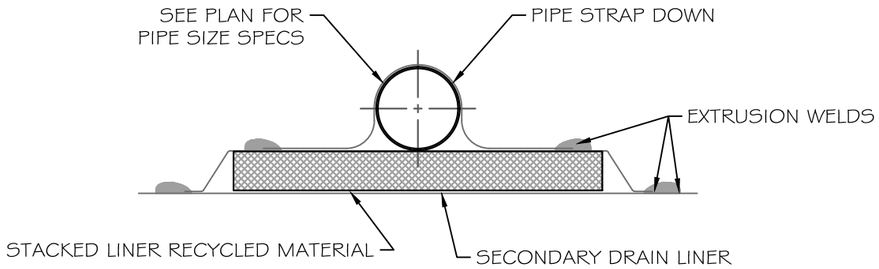
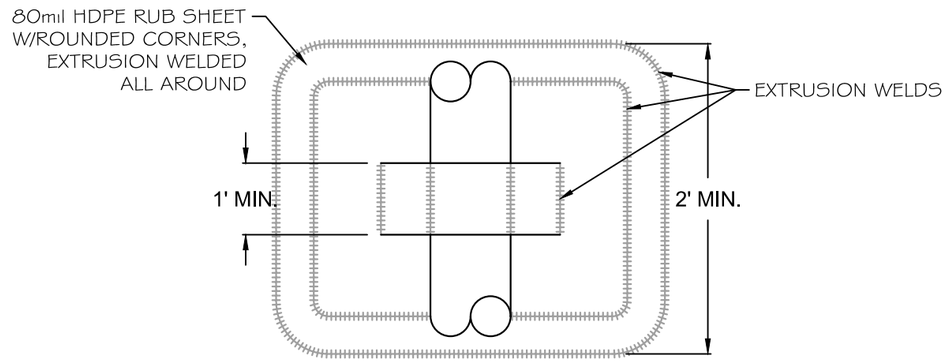
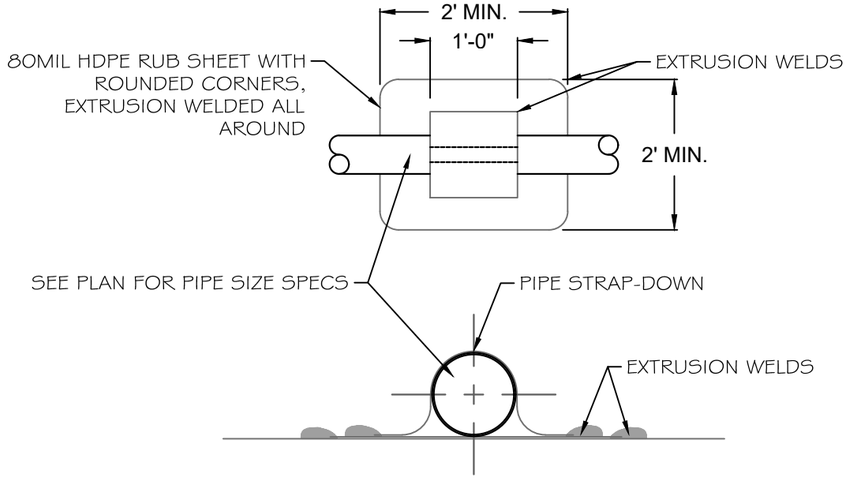
SCALE:	AS SHOWN
SHEET NO.:	D.1





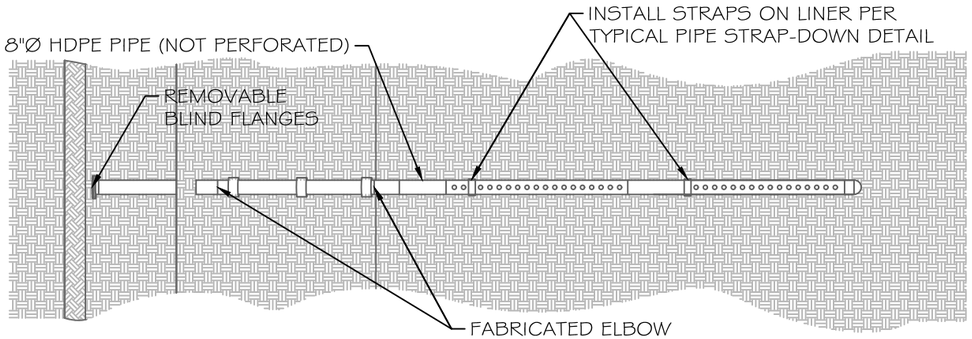
A SLUDGE REMOVAL PIPE ANCHOR DETAIL

NOTE: ANCHOR TO BE USED ON HORIZONTAL SURFACES ONLY, AT BOTTOM OF LAGOON N.T.S.



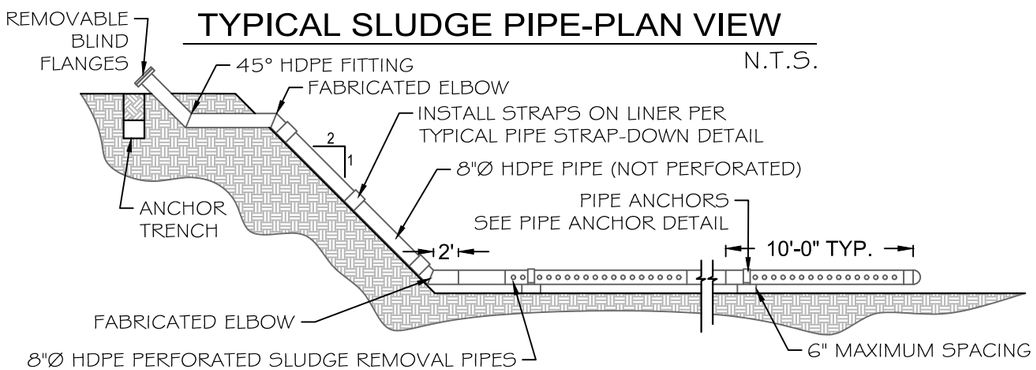
B TYPICAL PIPE STRAP-DOWN DETAIL

NOTE: MAXIMUM 10' O.C. SPACING BETWEEN PIPE STRAP-DOWNS, U.N.O. N.T.S.



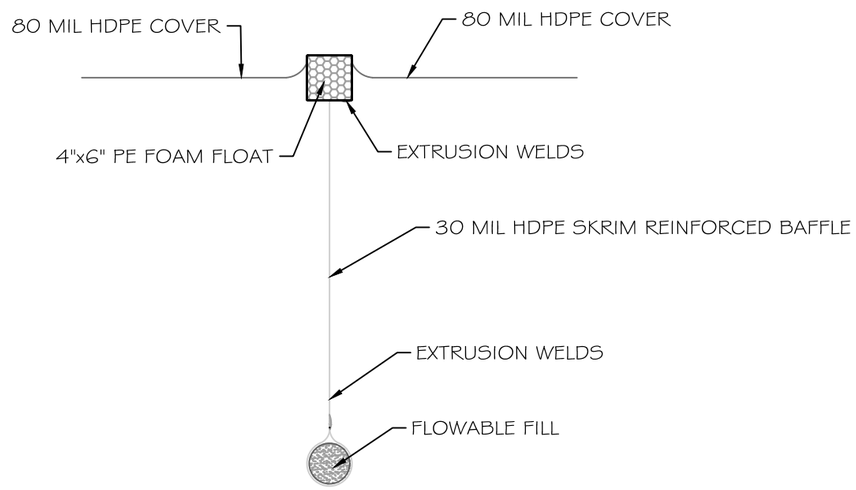
TYPICAL SLUDGE PIPE-PLAN VIEW

N.T.S.



C TYPICAL SLUDGE PIPE-PROFILE

N.T.S.



D BAFFLE SECTION

N.T.S.

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REGISTERED PROFESSIONAL ENGINEER CRAIG M. HARTMAN NO. 73837 Exp. 06-30-19 CIVIL STATE OF CALIFORNIA 1-8-18

PROJECT:

HIGH ROLLER DAIRY DIGESTER

CLIENT:
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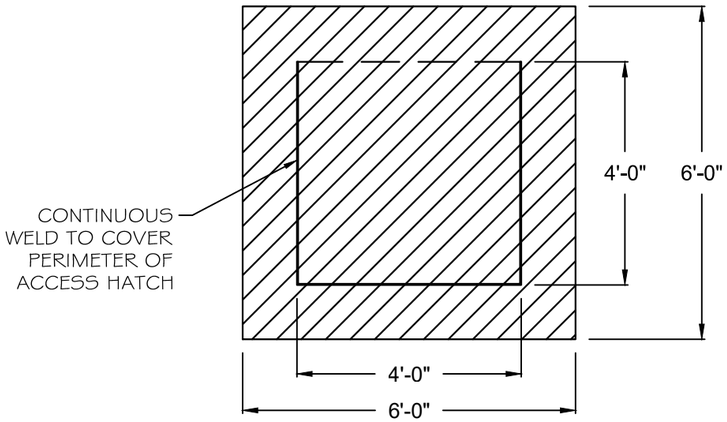
SLURRY REMOVAL SYSTEM
DIGESTER

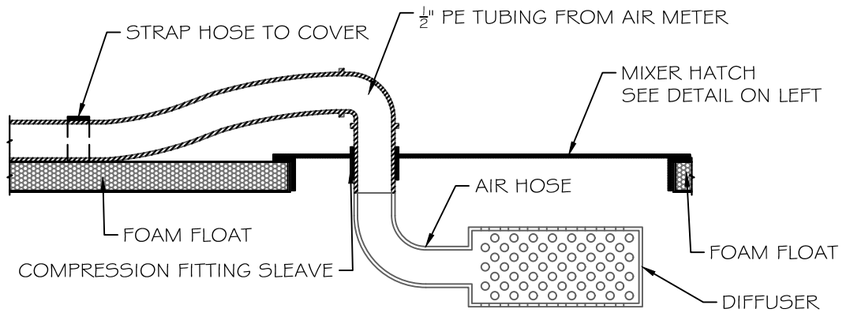
REVISION LOG:

PLOT DATE:	01/20/19
JOB NO.:	17003
SCALE:	AS SHOWN
SHEET NO.:	D.2



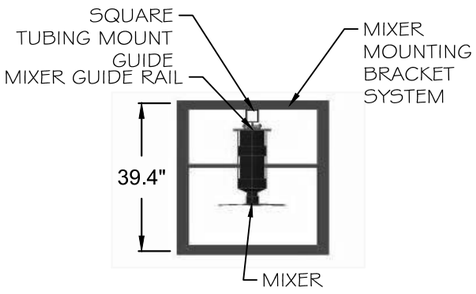
MIXER - HATCH

N.T.S.



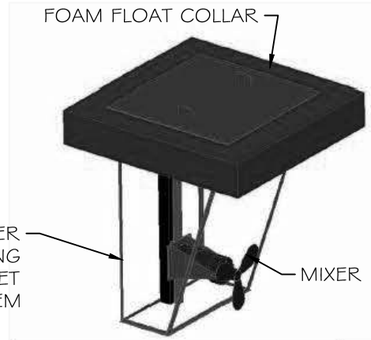
AIR INJECTION & MIXER HATCH

N.T.S.



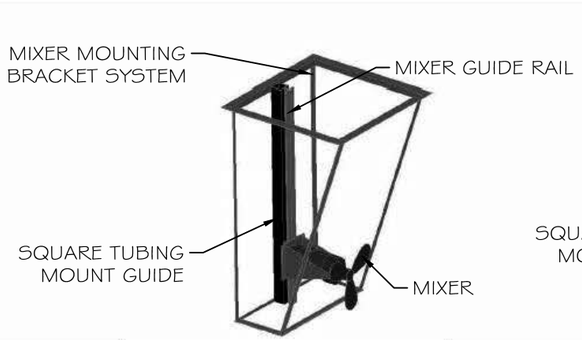
MIXER - PLAN VIEW

N.T.S.



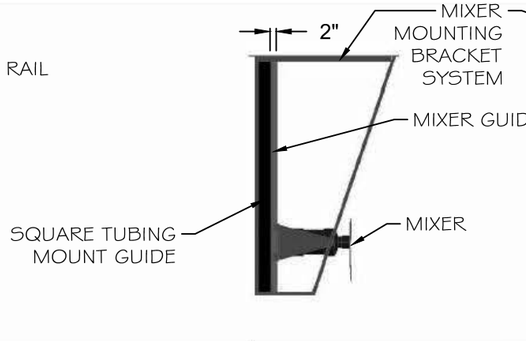
MIXER - ISOMETRIC W/FLOAT IN PLACE

N.T.S.



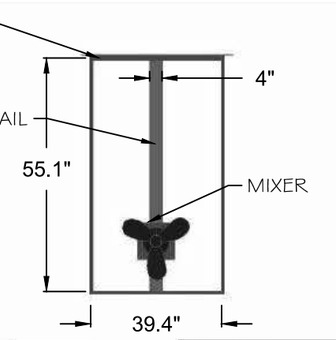
MIXER - ISOMETRIC

N.T.S.



MIXER - SIDE VIEW

N.T.S.



MIXER - FRONT VIEW

N.T.S.

HARTMAN ENGINEERING
113 N. CHURCH ST,
SUITE 521
VISALIA, CA 93291
(559) 563-0181

REGISTERED PROFESSIONAL ENGINEER
CRAIG M. HARTMAN
NO. 73837
Exp. 06-30-19
CIVIL
STATE OF CALIFORNIA
1-8-18

PROJECT:

HIGH ROLLER

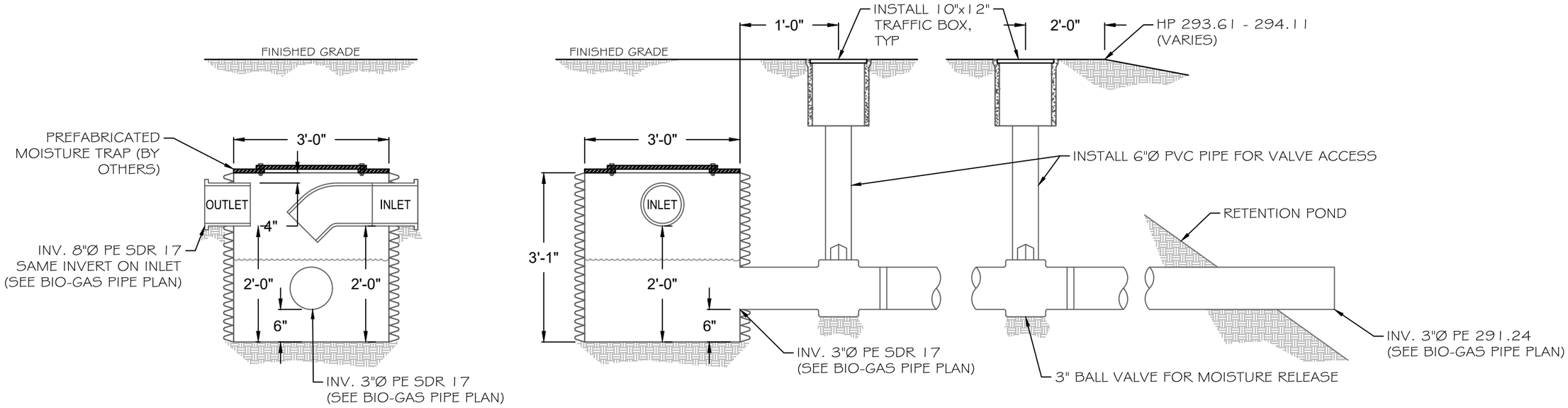
DAIRY DIGESTER

CLIENT:
JAKE DE JONG
14782 8TH AVE
HANFORD, CA 93230

MIXER DETAILS

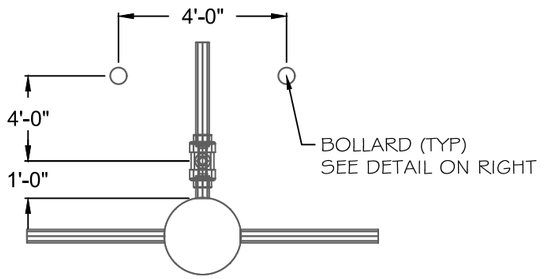
REVISION LOG:

PLOT DATE:	01/20/19
JOB NO.:	17003
SCALE:	AS SHOWN
SHEET NO.:	D.3



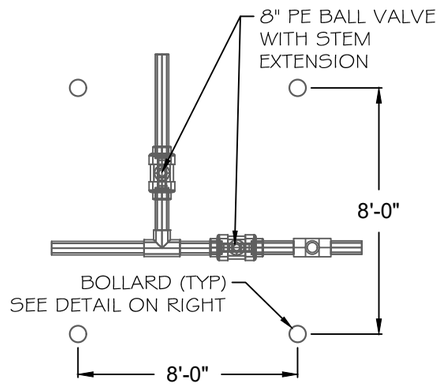
MOISTURE TRAP DETAIL

N.T.S.



BIO-GAS VALVE

N.T.S.



BALL VALVE JUNCTION

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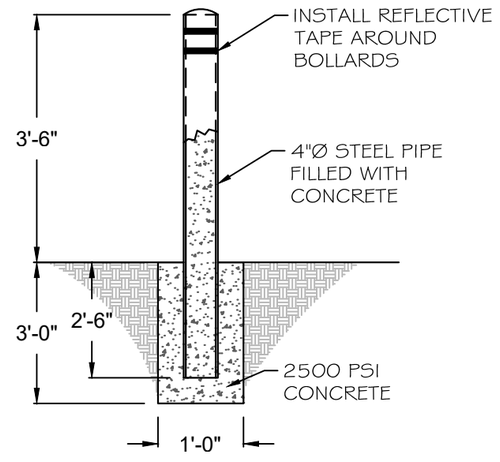

BOLLARD DETAIL

N.T.S.

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CRAIG M. HARTMAN
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Exp. 06-30-19
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STATE OF CALIFORNIA
1-8-18

PROJECT:

HIGH ROLLER

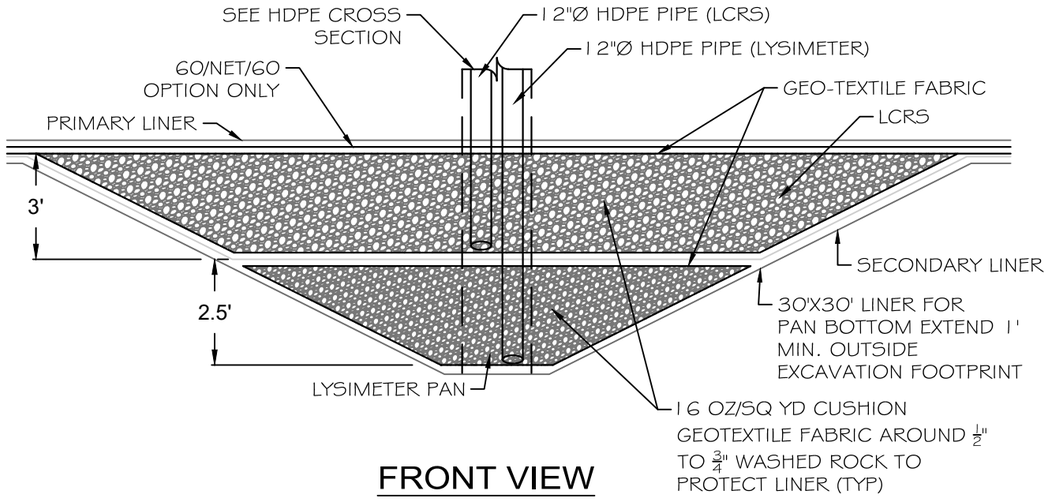
DAIRY DIGESTER

CLIENT:
JAKE DE JONG
14782 8TH AVE
HANFORD, CA 93230

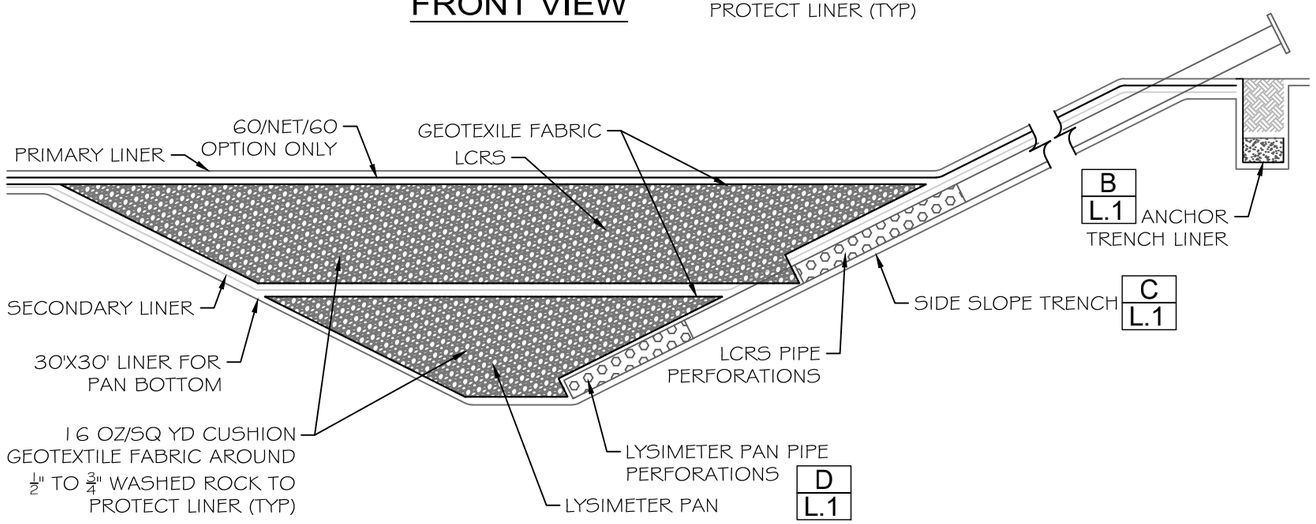
DETAILS

REVISION LOG:

PLOT DATE:	01/20/19
JOB NO.:	17003
SCALE:	AS SHOWN
SHEET NO.:	D.4



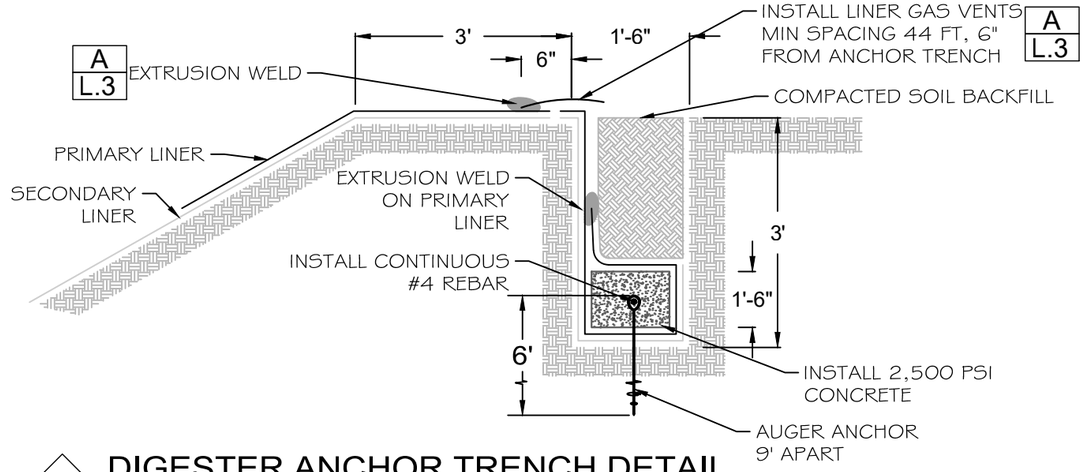
FRONT VIEW



SIDE VIEW

A LCRS, LYSIMETER AND DRAINAGE SUMP PROFILE

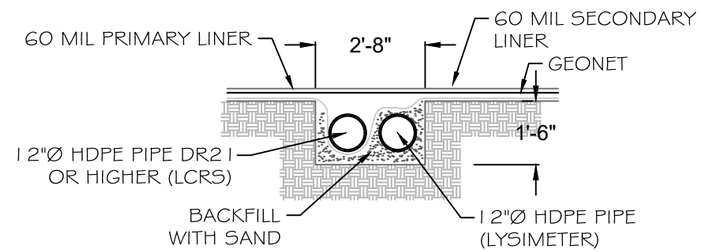
N.T.S.



B DIGESTER ANCHOR TRENCH DETAIL

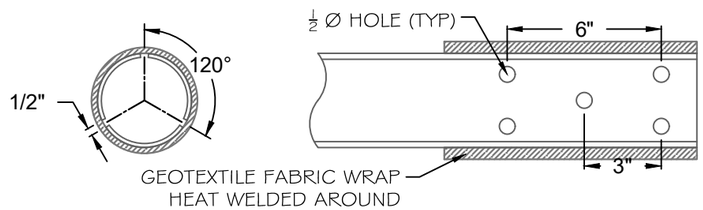
N.T.S.

NOTES: 1. CONTRACTOR TO USE ANCHOR SYSTEM OR PROVIDE DETAILS AND DESIGN FOR ALTERNATIVE TO BE APPROVED BY ENGINEER.



B HDPE CROSS SECTION

N.T.S.



C TYPICAL PERFORATION DETAIL

N.T.S.

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REGISTERED PROFESSIONAL ENGINEER CRAIG M. HARTMAN NO. 73837 Exp. 06-30-19 CIVIL STATE OF CALIFORNIA 1-8-18

PROJECT:

HIGH ROLLER

DAIRY DIGESTER

CLIENT:
JAKE DE JONG
14782 8TH AVE
HANFORD, CA 93230

GENERAL NOTES
LINER DETAILS

REVISION LOG:

PLOT DATE:	01/20/19
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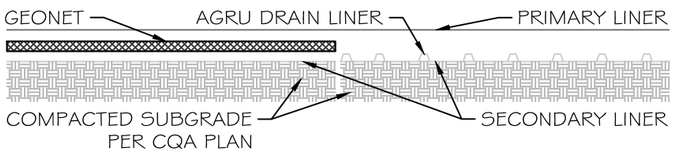
SCALE:	AS SHOWN
SHEET NO.:	L.1

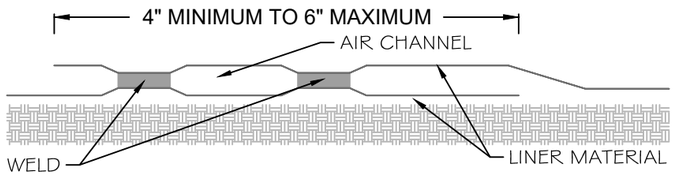
OPTIONAL TIER 1 DOUBLE LINER-LAYERING SYSTEM WITH DRAIN LINER VERIFY WITH OWNER

SMOOTH/STUDDED/ 60-NET-60 LINER LAYERS					
DESCRIPTION	LOCATION	MATERAIL	THICKNESS (MIN)	TOP FINISH	BOTTOM FINISH
PRIMARY LINER	TOP	HDPE	60 MIL	SMOOTH	SMOOTH CONDUCTIVE
DRAINAGE NET	MIDDLE	HDPE	200 MIL	N/A	N/A
SECONDARY LINER	BOTTOM	HDPE	60 MIL	SMOOTH	SMOOTH

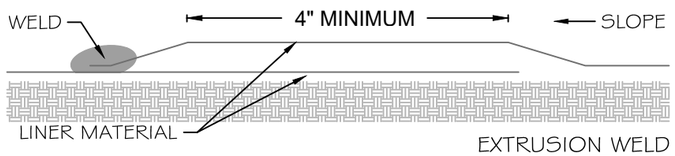


A DOUBLE LAYER 60-NET-60 DOUBLE LAYER WITH DRAIN LINER

N.T.S.



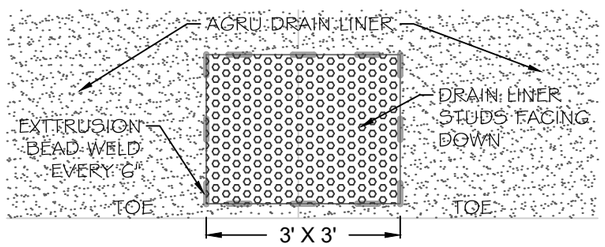
HOT WEDGE DOUBLE FUSION WELD



EXTRUSION WELD

B HDPE LINER-SMOOTH WELDS

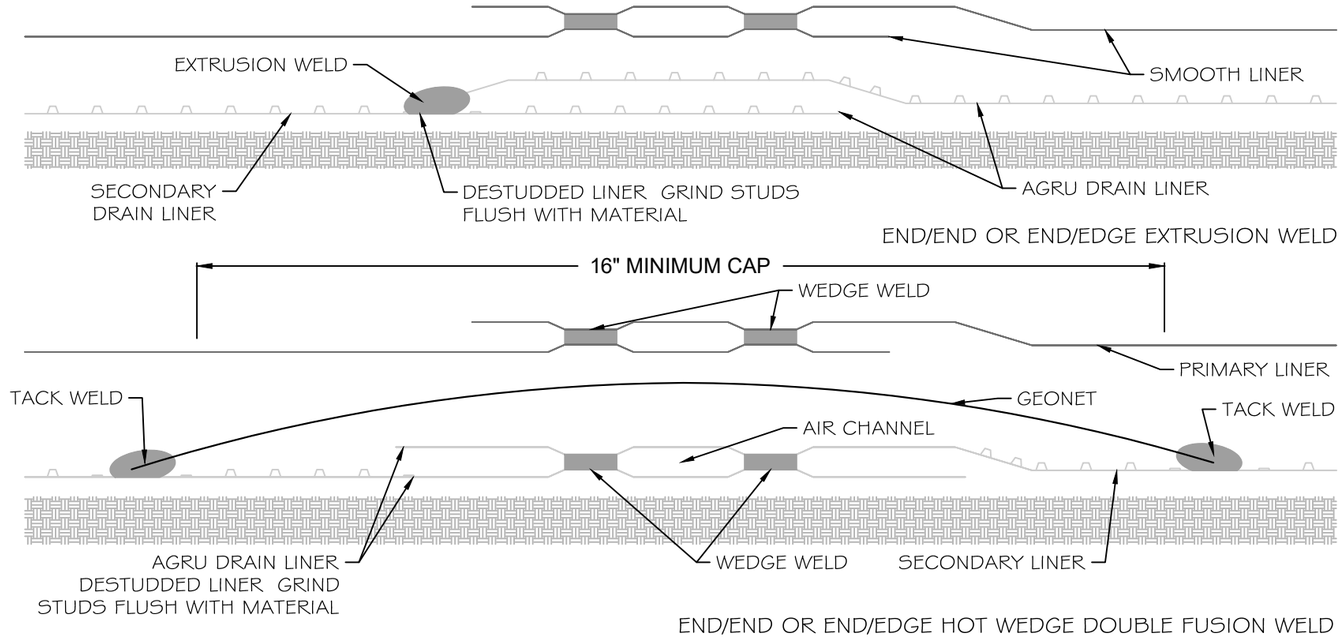
N.T.S.



DRAIN LINER SMOOTH END WELD PATCH

C 3'X3' DRAIN PATCH WELD

N.T.S.

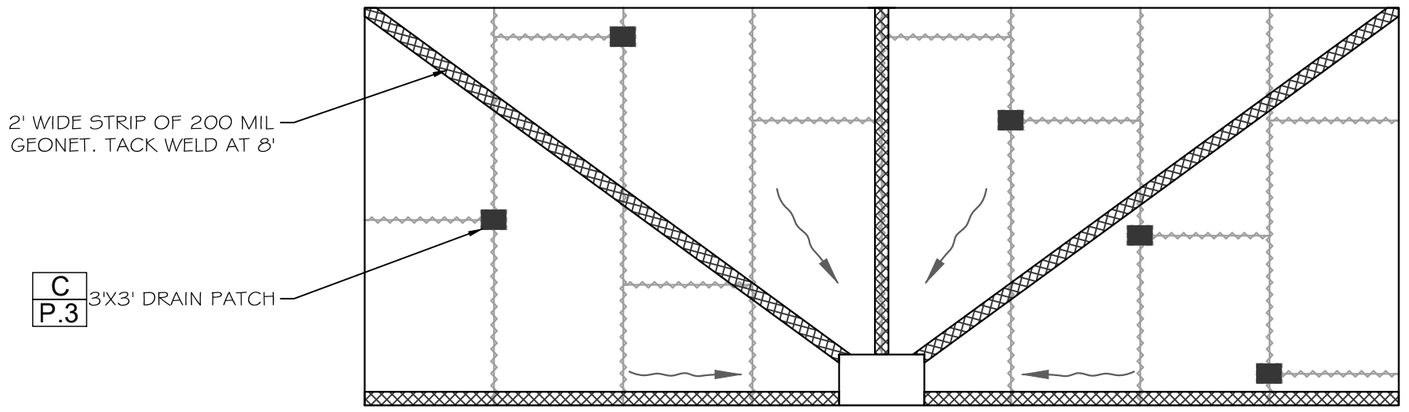


END/END OR END/EDGE EXTRUSION WELD

END/END OR END/EDGE HOT WEDGE DOUBLE FUSION WELD

D AGRU DRAIN LINER END/END WELD

NOTE: AGRU DRAIN LINER DOES NOT HAVE STUDS ALONG THE EDGE SO EDGE/EDGE SEAMS DO NOT REQUIRE DRINGING OR CAP. N.T.S.



NOTE: CQA OFFICER IS RESPONSIBLE TO ADD PATCHES AS NEEDED FOR FLOW

E AGRU DRAIN LINER CROSS SEAM NET PLAN VIEW

NOTE: TYPICAL OF ALL DRAIN LINERS N.T.S.

1
H
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REGISTERED PROFESSIONAL ENGINEER CRAIG M. HARTMAN NO. 73837 Exp. 06-30-19 CIVIL STATE OF CALIFORNIA 1-8-18

PROJECT:

HIGH ROLLER

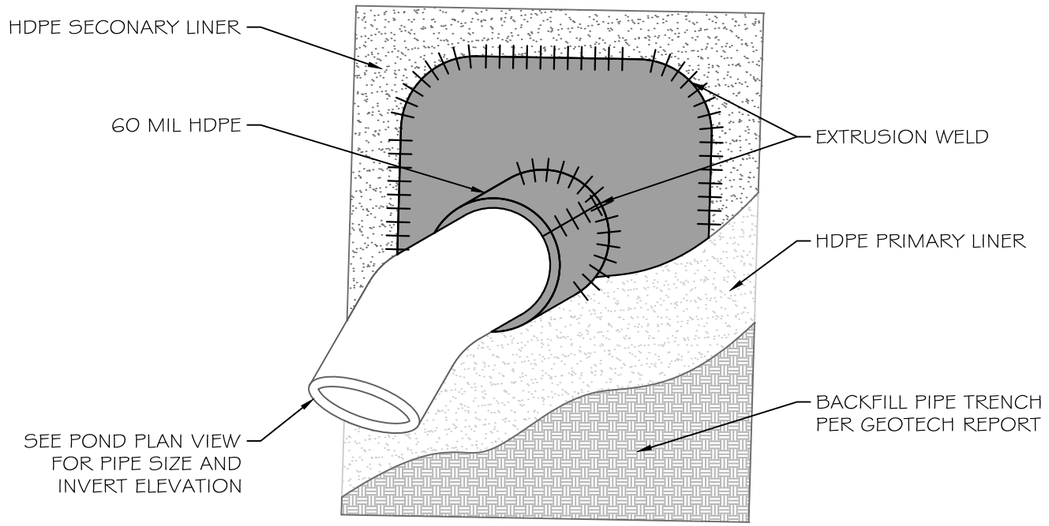
DAIRY DIGESTER

CLIENT:
JAKE DE JONG
14782 8TH AVE
HANFORD, CA 93230

LINER DETAILS

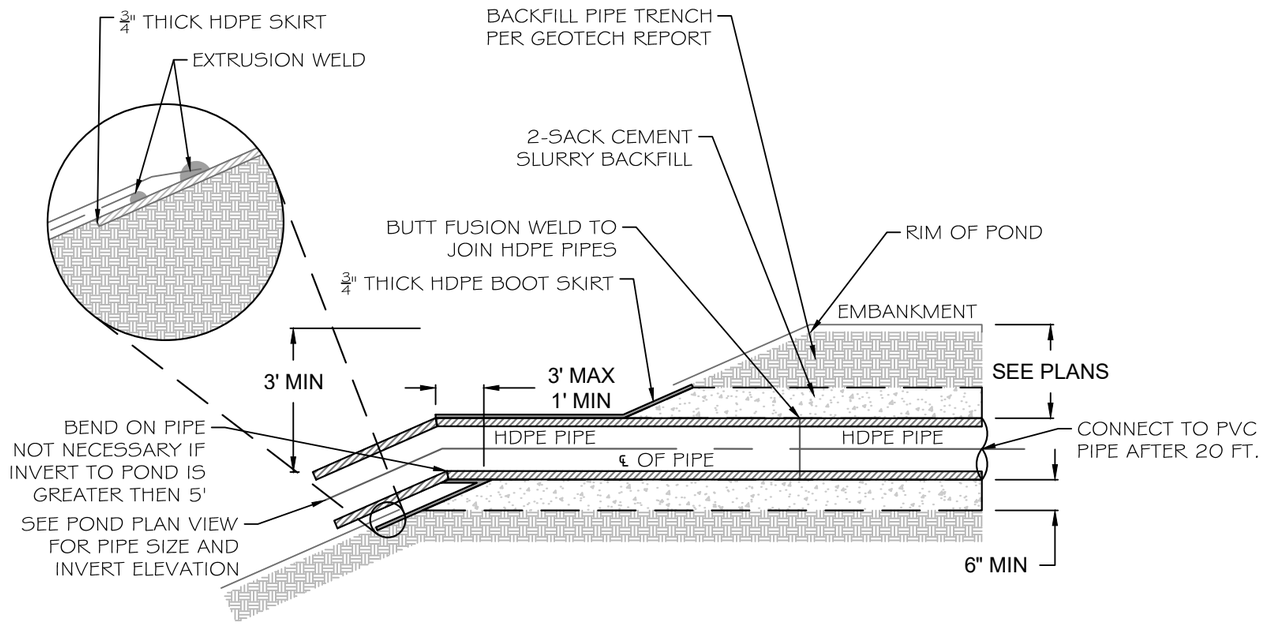
REVISION LOG:

PLOT DATE:	01/20/19
JOB NO.:	17003
SCALE:	AS SHOWN
SHEET NO.:	L.2



A BOOT SKIRT

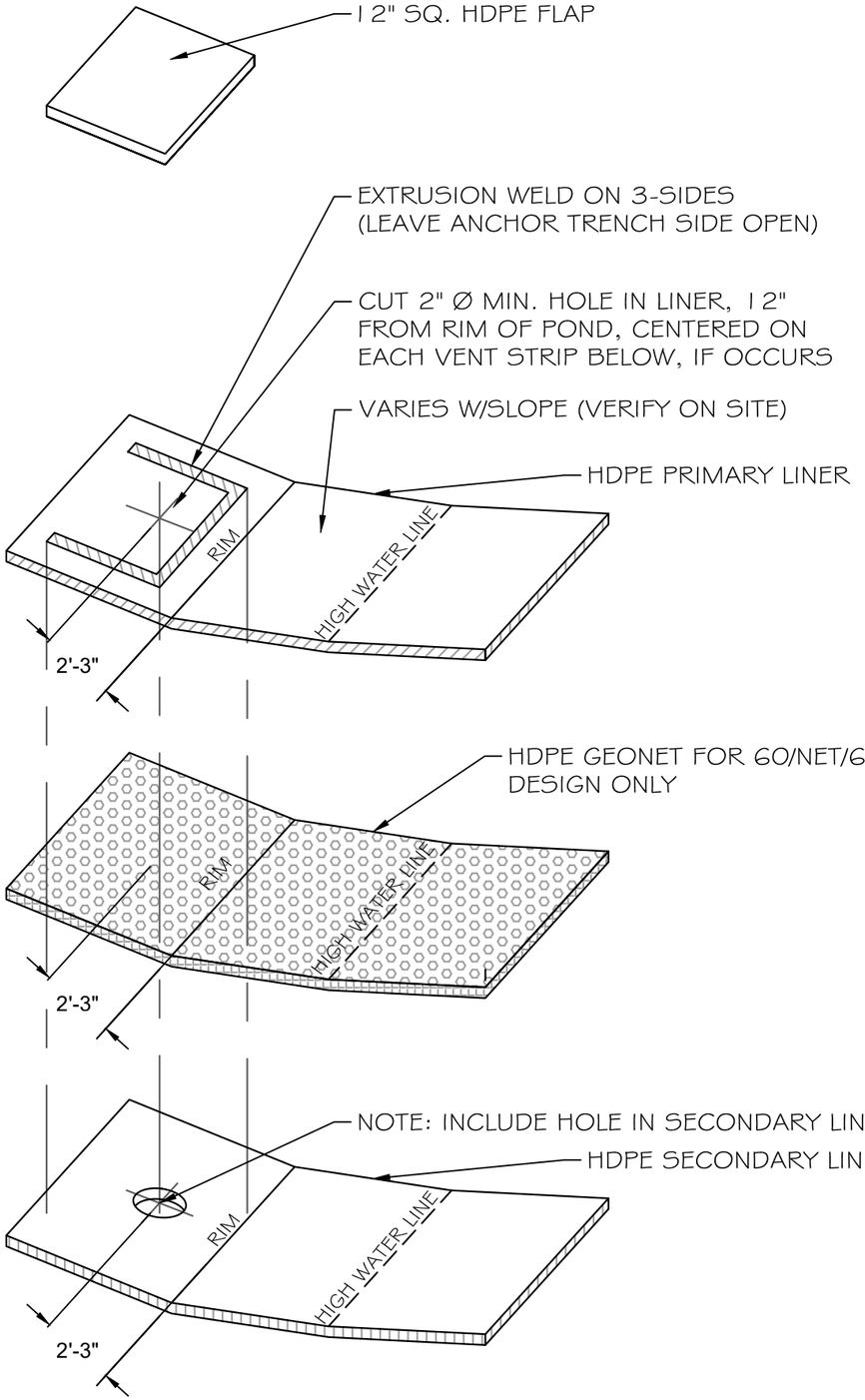
N.T.S.



B BOOTLESS PIPE PENETRATION

LINER FASTENING

N.T.S.



C VENT ORIFICE (ISOMETRIC VIEW)

N.T.S.

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VISALIA, CA 93291
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1-8-18

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HIGH ROLLER

DAIRY DIGESTER

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14782 8TH AVE
HANFORD, CA 93230

LINER DETAILS

REVISION LOG:

PLOT DATE:	01/20/19
JOB NO.:	17003
SCALE:	AS SHOWN
SHEET NO.:	L.3

LAKESIDE ENERGY DAIRY
DAIRY DIGESTER

BENCHMARK

THE TOPOGRAPHIC SURVEY WAS PERFORMED UTILIZING GLOBAL POSITIONING SYSTEM OBSERVATIONS. DISTANCES AND NUMBERS SHOWN ARE TO BE CONSIDERED GROUND VALUES. BENCHMARK AND CONTROL SHOWN ON CONTROL PLAN SHEET. THE BENCHMARK AND VERTICAL ELEVATIONS WERE DERIVED FROM THE NGS ONLINE POSITIONING SERVICE (OPUS), AND IS SHOWN ON THE NAVD 88 DATUM UTILITIZING THE GEOID 09 AS THE VERTICAL MODEL.

PRESERVATION OF MONUMENTS

PURSUANT TO SECTIONS 8771(B) AND 8771(C) OF THE GOVERNMENT CODE, ANY MONUMENTS THAT CONTROL THE LOCATION OF BOUNDARIED, OR OTHERWISE PROVIDE HORIZONTAL OR VERTICAL SURVEY CONTROL WITHIN THE CONSTRUCTION AREA, SHALL BE LOCATED AND REFERENCED PRIOR TO CONSTRUCTION, AND A CORNER RECORD OR RECORD OF SURVEY OF THE REFERENCES SHALL BE FILED WITH THE COUNTY SURVEYOR.

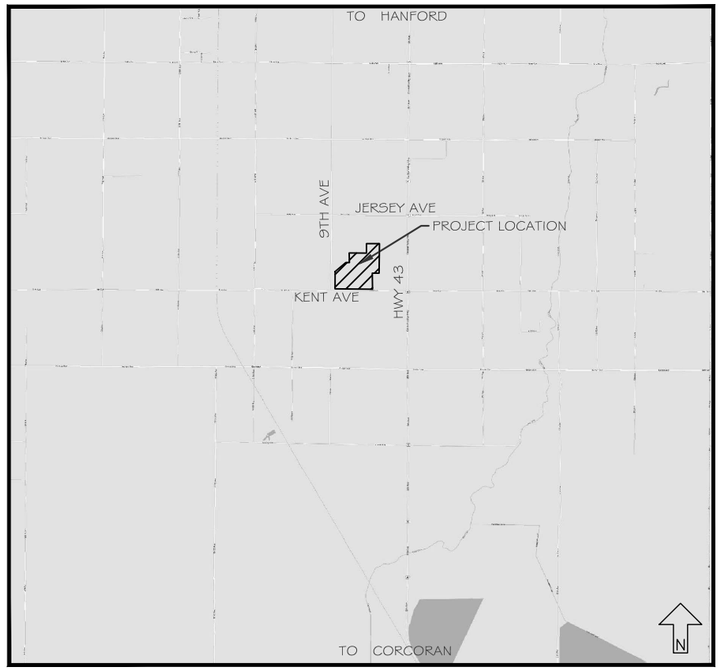
PERMANENT MONUMENTATION SHALL BE SET TO PERPETUATE THE LOCATION OF ANY MONUMENT WHICH COULD BE DAMAGED OR DESTROYED, AND A CORNER RECORD OR RECORD OF SURVEY SHALL BE FILED WITH THE COUNTY SURVEYOR PRIOR TO THE RECORDING OF A CERTIFICATE OF COMPLETION FOR THE PROJECT.

DUST CONTROL NOTES

CONTRACTOR IS REQUIRED TO COMPLY WITH GOOD HOUSE KEEPING PRACTICES

STORMWATER (SWPPP) NOTES

CONTRACTOR IS REQUIRED TO COMPLY WITH GOOD HOUSE KEEPING PRACTICES

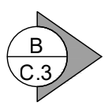


VICINITY MAP
SCALE 1" : 2 MI

SHEET REFERENCE

SECTIONS:

SECTION NAME
SHEET NUMBER



DETAILS:

DETAIL NAME
SHEET NUMBER

CONTACT INFO

ENGINEER:
CRAIG HARTMAN, RCE 73837
HARTMAN ENGINEERING, INC.
3121 W. CERES CT.
VISALIA, CA 93291
(559) 563-0181

DAIRY CONTACT:
MIKE MONTEIRO
8606 KENT AVE,
HANFORD, CA 93230

SHEET INDEX

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REGISTERED PROFESSIONAL ENGINEER
CRAIG M. HARTMAN
NO. [illegible]
Exp. 06-30-17
CIVIL
STATE OF CALIFORNIA
5/22/17

PROJECT:
LAKESIDE ENERGY
DAIRY DIGESTER

CLIENT:
MIKE MONTEIRO
8606 KENT AVE,
HANFORD, CA 93230

REVISION LOG:

PLOT DATE:	01/08/18
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SCALE:	AS SHOWN
SHEET NO.:	A.1

SPECIFICATIONS FOR ENGINEERED FILL MATERIAL OF ABOVE GRADE EMBANKMENTS OR AS REQUIRED

TEST PARAMETER	TEST METHOD	FREQUENCY	ACCEPTANCE CRITERIA
Compaction Curves	ASTM D1557 (Modified Proctor)	Change in material	N/A
Grain Size Distribution	ASTM D422 (Sieve)	Change in material	At least 30% passing No. 200 U.S. Standard Sieve. Per Specifications (1)
Soil Classification	ASTM D2487 (USCS)	Change in material	Suitable for compaction [2,3]
Maximum Particle Size	ASTM D422 (Sieve)	Change in material	½ inch, ¼ top 6 inches
Maximum Water soluble Sulfate (SO_4) in Soil (Concrete Slab locations)	ASTM C1580	Change in material	0.2% by weight

Site Preparation Specifications:

1. Clearing: Prior to earthwork operations, the area to be developed should be stripped of vegetation, organic topsoil, and cleared of cow waste and miscellaneous debris from the proposed construction areas. Deeper clearing may be required in localized areas. The actual depth of clearing should be reviewed by a licensed Geotechnical Engineer at the time of construction. The limits of stripping and clearing should be at least five feet beyond the limits of construction.

2. Compaction: The scarified subgrade and subsequent fill placed at the site should be moisture conditioned to near optimum moisture content, and compacted to at least and 90 percent for 2:1 side slope pond of maximum dry density as determined by ASTM test method D1557.

3. Material for fill: Fill should consist of select material. Native soil, free from organic, vegetation, and rocks or cobbles larger than three inches, may be used as fill at the site. Import material must be reviewed by licensed Geotechnical Engineer prior to transport to the site.

4. Fill placement: Fill material should be moisture-conditioned to +/- 2% of the optimum moisture content prior to compaction. Fill material with excessive moisture should be allowed to dry prior to compaction or be mixed with dry soil to bring the fill to a workable moisture content. Fill should be placed in level lifts not exceeding a loose, uncompacted thickness of eight inches, and compacted as engineered fill.

Sub-grade requirements for fill only:

-Over Excavate for minimum 1 ft. to meet Engineered Fill Borrow Material Guidelines and Pond Liner Sub-grade requirements

-Well mixed soil

-6 in max lifts

-Upper 6 inches is of fine-finished soil particles no greater than ¼ in.+

Notes:

[1] Field tests shall not be required, but fill borrow material specifications must meet the acceptance criteria outlined in Table 1.

[2] Refer to Geotechnical Report

NOTES:

THE APPROVED WORK PLAN WHICH INCLUDES THE CONSTRUCTION QUALITY ASSURANCE PLAN, OPERATION, MAINTENANCE AND MONITORING PLAN, CONSTRUCTION DRAWINGS, AND SOILS REPORT TOGETHER AS A PACKAGE ARE THE COMPLETE SPECIFICATIONS REQUIRED FOR CONSTRUCTION OF THE POND AND LINER SYSTEM.

FILL TEST SPECIFICATIONS FOR SUB-GRADE

TEST PARAMETER	TEST METHOD [1]	FREQUENCY	ACCEPTANCE CRITERIA
Uncompacted Lift Thickness	Visual Observation	Continuous	8-in.[2,3]
Construction Oversight	Visual Observation	Continuous	Maximum particle size 1/2 inch.
In-Place Moisture Alternative Method	ASTM D2216 (Oven Dry)	1 per every 10 Nuclear tests	+/-2% of Optimum Moisture Content per ASTM D1557
In-Place Moisture Rapid Field Methods[3,5]	ASTM D6938[3,5] (Nuclear Method)	3 per acre per lift, min. 2 per day	+/-2% of Optimum Moisture Content per ASTM D1557
In-Place Density Alternate Method	ASTM D2937(Drive Cylinder)	1 per every 10 Nuclear tests	90% of Maximum Dry Density per ASTM D1557
In-Place Density Rapid Field Methods[4,5]	ASTM D6938[3,5] (Nuclear Method)	3 per acre per lift, min. 2 per day	90% of Maximum Dry Density per ASTM D1557
Subgrade Thickness	Surveying Measurement	At 50-foot centers	Minimum 1 ft.[2,3]
Clod Size	Visual Observation	Continuous	Per Specification

Notes:

See earthwork section for anchor trench, excavation, backfill, and compaction requirements.

[1] ASTM Test Method, unless otherwise noted. Results of all tests performed to be reported as per method reporting criteria.

[2] The sub-grade shall be scarified to a depth of 1 ft. lower than finished grade, compacted, and tested in accordance with the requirements of this table.

[3] Must be verified by ASTM D2216 (Oven) overnight method once every day or once per change in material

[4] Must be verified by ASTM D2937 (Dry Cylinder) twice per day or per change in material

[5] Calibration Procedure: ASTM D7013-04: Standard Guide for Nuclear Surface Moisture and Density Gauge Calibration Facility Set-up

POND SPECIFICATIONS FOR SUBGRADES CUT BELOW GROUND
(For Slopes 2:1 or shallower)

Side Slopes: The certified Civil Engineer/CQA Chief Officer shall walk final side slopes after cut by heavy equipment and confirm no SW or SP soils and no loose soils. All SW, SP, or soils that are not amenable to a firm and unyielding subgrade shall be removed and replaced down to a minimum 3 ft. below sloped surface. Any soils removed and replaced shall meet the Engineered Fill requirements in Table 1.

Pond Bottom: 1. An as-built survey of the pond bottom shall take place after subgrade construction to insure minimum slopes are achieved. Pond Bottom shall be tested per criteria below. Any soils not meeting the requirements below (i.e. that is not firm and unyielding) shall be removed and replaced down to a minimum 2 ft. Any soils removed and replaced shall meet the Engineered Fill requirements in Table 1. The Civil Engineer may make determination of soils meeting requirements or not based upon visual inspection which shall be included in the Subgrade Certification Report and signed and sealed by a Civil Engineer and CQA Officer.

TEST PARAMETER	TEST METHOD [1,3]	FREQUENCY	ACCEPTANCE CRITERIA
In-Place Density Rapid Field Methods [4]	ASTM D6938[3,5] (Nuclear)	3 per acre	90% of Maximum Dry Density per ASTM D1557
In-Place Moisture Rapid Field Methods[3,5]	ASTM D6938[3,5] (Nuclear Methods)	3 per acre per lift, min. 2 per day	+/-2% of Optimum Moisture Content per ASTM D1557
Construction Oversight	Visual Observation	Continuous	Maximum particle size 1/2 inch.
Subgrade Slope	Surveying Measurement	200 ft. maximum grid	Min 1%

60 MIL HDPE GEOMEMBRANE CONSTRUCTION QUALITY ASSURANCE (CQA)

TEST PARAMETER	TEST METHOD	FREQUENCY	ACCEPTANCE CRITERIA
Thickness (min. ave.) -Lowest individual for 8 out of 10 values -Lowest individual for any of the 10 values	ASTM D5994	1 per lot or 1 per 70,000 ft2, whichever is greater	Nom. (-5%) -10% -15%
Tensile Properties -yield strength -break strength -strain at yeild -break strength	ASTM D6693 Type IV	1 per lot or 1 per 70,000 ft2, whichever is greater	≥126 lb./in. ≥90 lb./in. ≥12% ≥100%
Puncture Resistance	ASTM D4833	1 per lot or 1 per 70,000 ft^2, whichever is greater	108 lb. (min.)
Tear Resistance	ASTM D1004, Die C	1 per lot or 1 per 70,000 ft2, whichever is greater	42 lb. (min.)
Interface Shear -60-mil HDPE/subgrade soil -Drainage geocomposite	ASTM D5321 ASTM D6243	2 tests or 1 per 200,000 ft2, whichever is greater	
Seam Shear	ASTM D6392	1 test per 500 lineal feet or per GRI GM-14 and 20.	95% of min. yield strength
Seam Peel -Extrusion -Fusion	ASTM D6392	1 test per 500 lineal feet or per GRI GM-14 and 20.	72% yield & ftb (1)
Non-destructive Seam Test	ASTM D5820 (Pressure Test)	Continuous	35 psi for 5 min.
	ASTM D5641 (Vacuum Box)		5 psi for 15 sec.
	ASTM D5641 (Spark Test)		No Spark
Electric Leak Location	ASTM D7002 (Water Puddle)	Once on constructed liner	Max 1 mm. diameter hole sensitivity
	ASTM D6747 (Selection Process)		
	ASTM D7007 (Water /Earth)		Max 6 mm. diameter hole sensitivity
	ASTM D7240 (Spark Test 2011)		

Notes:

ftb: Film Tear Bond

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Exp. 06-30-17
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STATE OF CALIFORNIA
5/22/17

PROJECT:

LAKESIDE ENERGY

DAIRY DIGESTER

CLIENT:
MIKE MONTEIRO
8606 KENT AVE,
HANFORD, CA 93230

GENERAL NOTES
CONSTRUCTION

REVISION LOG:

PLOT DATE:	01/08/18
JOB NO.:	17003
SCALE:	AS SHOWN
SHEET NO.:	A.2

HARTMAN ENGINEERING

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Exp. 06-30-17
STATE OF CALIFORNIA

5/22/17

PROJECT:

LAKESIDE ENERGY

DAIRY DIGESTER

CLIENT:
MIKE MONTEIRO
8606 KENT AVE,
HANFORD, CA 93230

SITE PLAN
DIGESTER

REVISION LOG:

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SHEET NO.:	A.3

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STATE OF CALIFORNIA

5/22/17

PROJECT:

LAKESIDE ENERGY

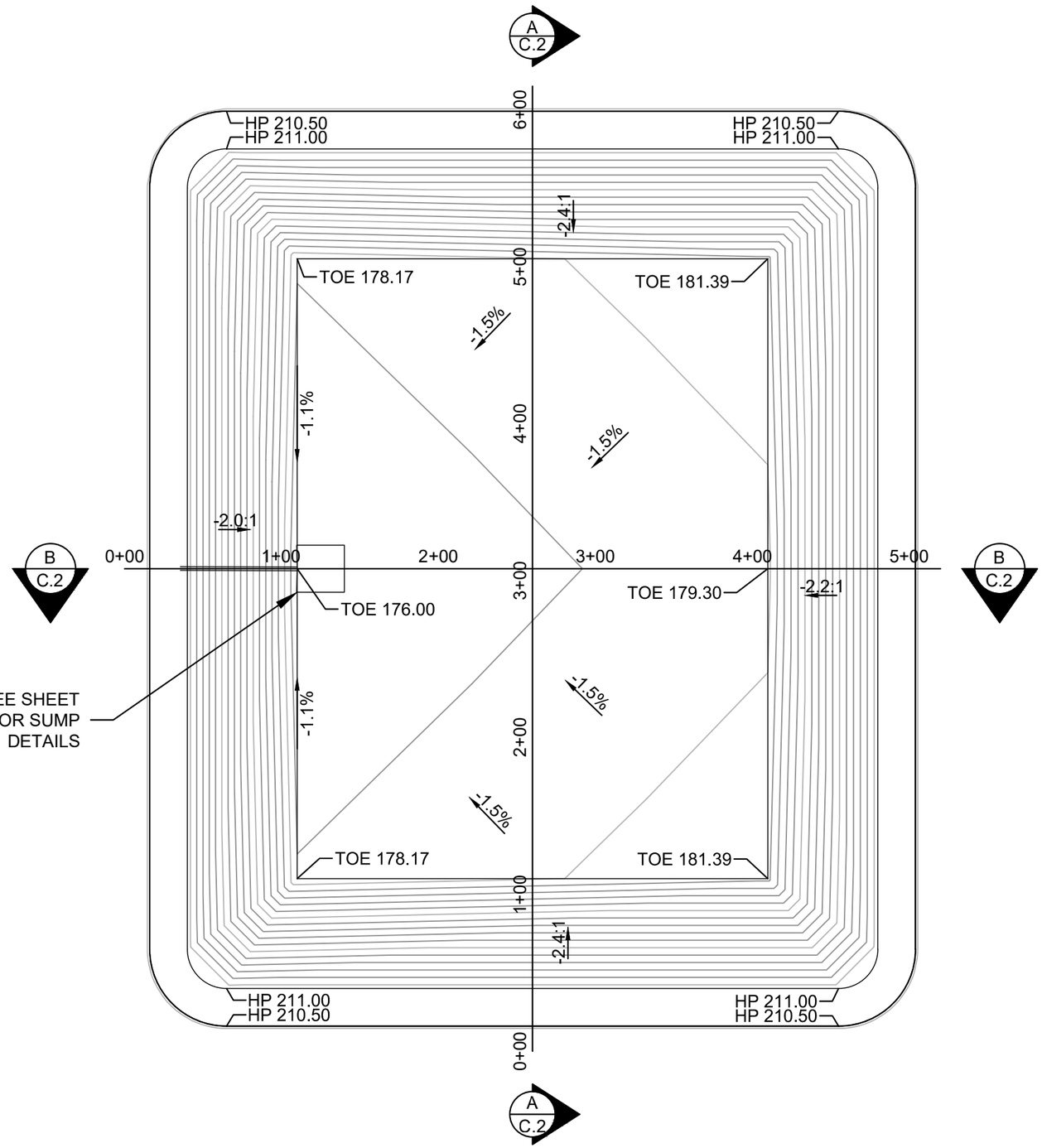
DAIRY DIGESTER

CLIENT:
MIKE MONTEIRO
8606 KENT AVE,
HANFORD, CA 93230

SITE PLAN
DAIRY

REVISION LOG:

PLOT DATE:	01/08/18
JOB NO.:	17003
SCALE:	AS SHOWN
SHEET NO.:	A.4



GRADING NOTES:

1.CONTRACTOR SHALL INFORM ENGINEER OF ANY DISCREPANCIES OR ERRORS IN PLANS PRIOR TO CONSTRUCTION.

2. CONTRACTOR SHALL MEET SPECIFICATIONS OF TABLE 2 WITHIN THE APPROVED CONSTRUCTION QUALITY CONTROL PLAN.

3. CONTRACTOR SHALL SMOOTH DRUM ROLL FINAL SURFACE AND REMOVE ANY ROCK OR MATERIAL GREATER THAN $\frac{1}{2}$ INCH.

HARTMAN ENGINEERING

113 N. CHURCH ST,
SUITE 521
VISALIA, CA 93291
(559) 563-0181

REGISTERED PROFESSIONAL ENGINEER
CRAIG M. HARTMAN
NO. [illegible]
Exp. 06-30-17
STATE OF CALIFORNIA

5/22/17

PROJECT:

LAKESIDE ENERGY

DAIRY DIGESTER

CLIENT:
MIKE MONTEIRO
8606 KENT AVE,
HANFORD, CA 93230

GRADING PLAN

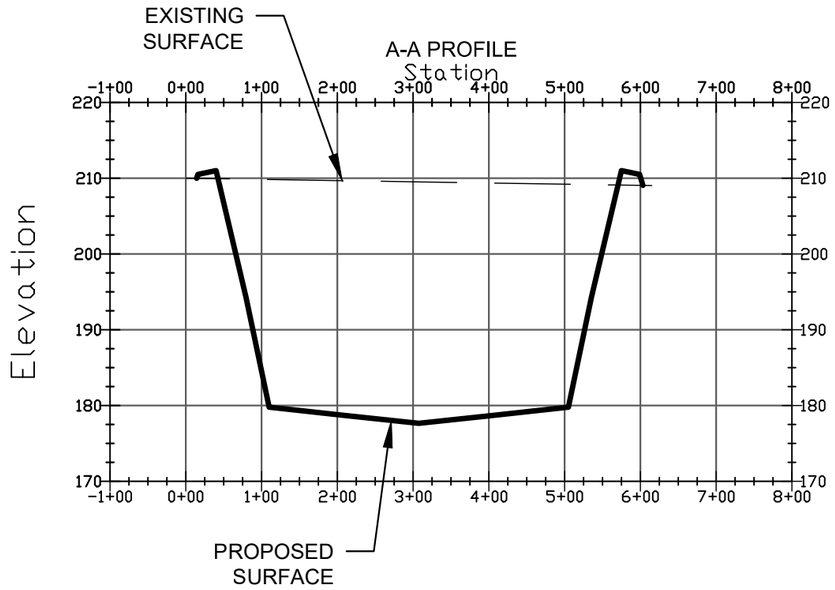
DIGESTER

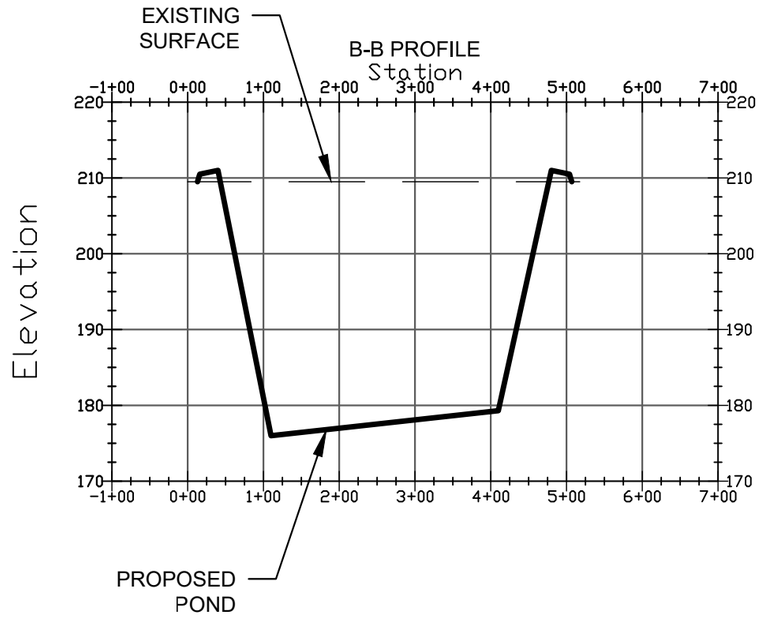
REVISION LOG:

PLOT DATE:	01/08/18
JOB NO.:	17003
SCALE:	AS SHOWN
SHEET NO.:	C.1

N

0 0
1 60





1

HARTMAN ENGINEERING

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CRAIG M. HARTMAN
NO. [illegible]
Exp. 06-30-17
STATE OF CALIFORNIA

5/22/17

PROJECT:

LAKESIDE ENERGY

DAIRY DIGESTER

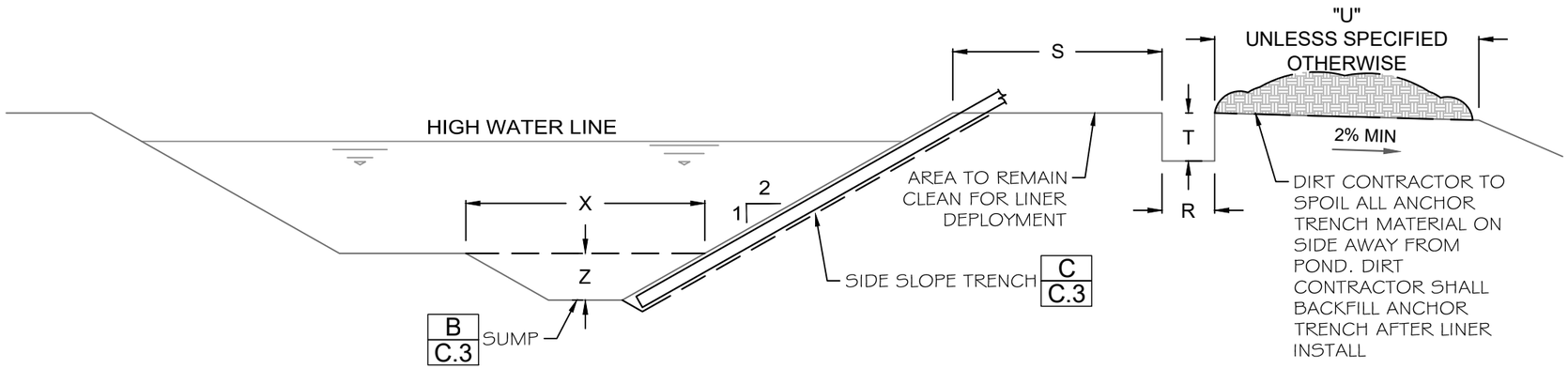
CLIENT:
MIKE MONTEIRO
8606 KENT AVE,
HANFORD, CA 93230

GRADING SECTIONS

DIGESTER

REVISION LOG:

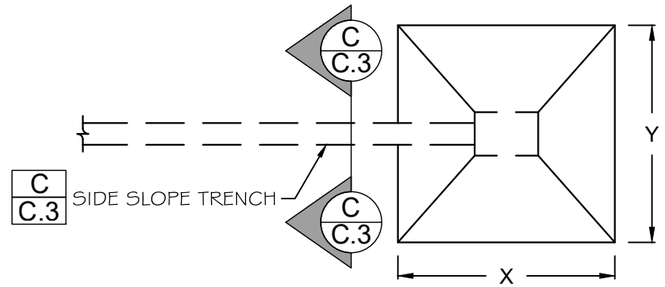
PLOT DATE:	01/08/18
JOB NO.:	17003
SCALE:	AS SHOWN
SHEET NO.:	C.2



A ANCHOR TRENCH / SUMP PROFILE VIEW

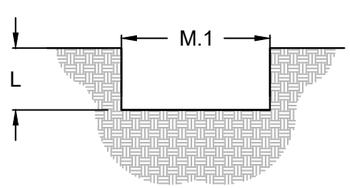
N.T.S.

DIMENSION TABLE (FT.)	
LETTER	POND
L	1.7'
M.1	2.7'
U	20'
R	1.5'
S	3'
T	3'
X	30'
Y	30'
Z	5.5'



B SUMP PLAN VIEW

N.T.S.



C SIDE SLOPE TRENCH

N.T.S.

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REGISTERED PROFESSIONAL ENGINEER
CRAIG M. HARTMAN
NO. [illegible]
Exp. 06-30-17
STATE OF CALIFORNIA
5/22/17

PROJECT:

LAKESIDE ENERGY

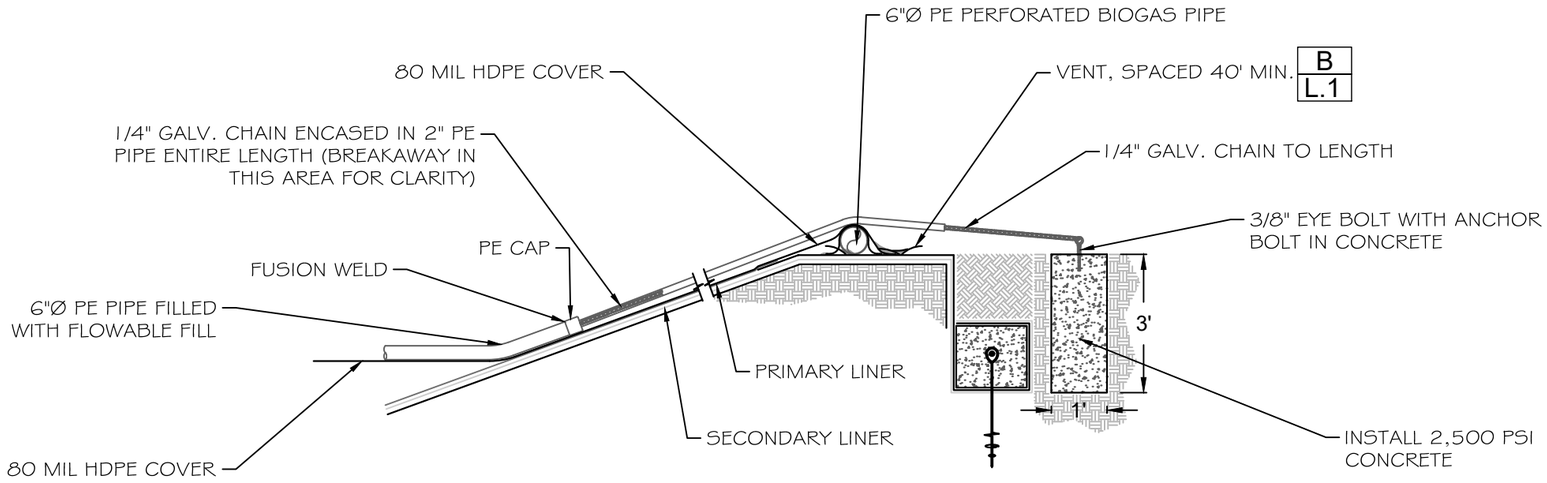
DAIRY DIGESTER

CLIENT:
MIKE MONTEIRO
8606 KENT AVE,
HANFORD, CA 93230

GRADING DETAIL
DIGESTER

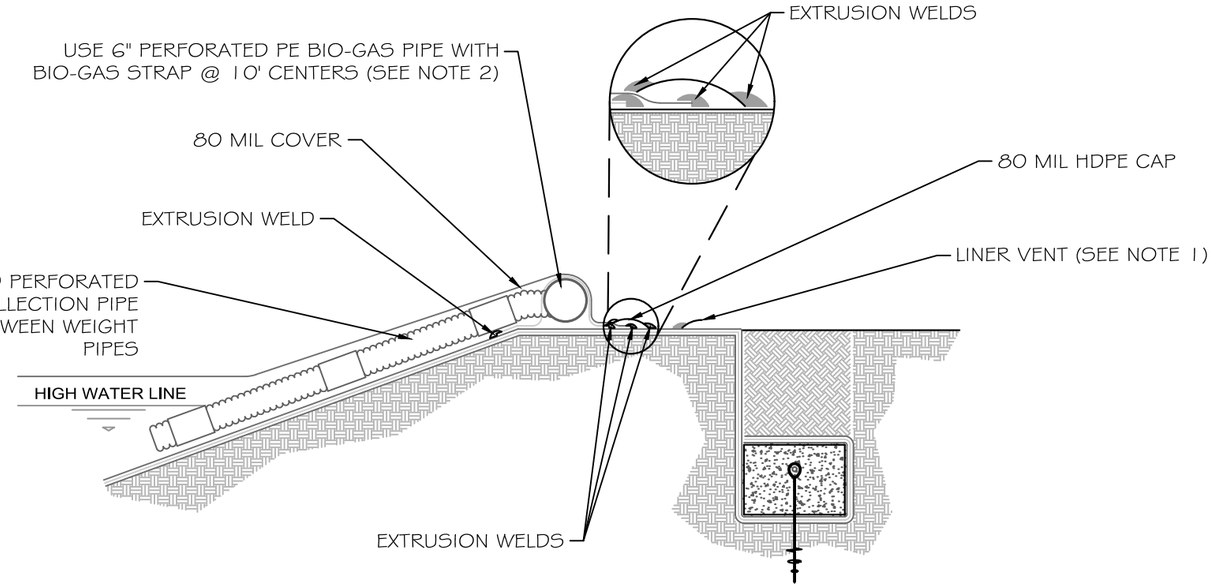
REVISION LOG:

PLOT DATE:	01/08/18
JOB NO.:	17003
SCALE:	AS SHOWN
SHEET NO.:	C.3



A BALLAST TUBE DETAIL

N.T.S.

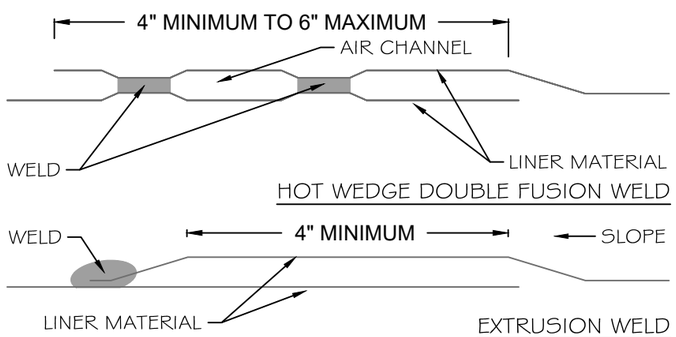


B BIO-GAS PIPING DETAIL

N.T.S.

NOTES:
1. GAS VENTS AROUND PERIPHERY OF LAGOON @ MAX. 40' O.C.
2. STRAP NOT WELDED TO BIO-GAS HEADER PIPE.
3. WRAP 60 MIL PRIMARY LINER OVER CONCRETE & EXTRUSION WELD.

DESCRIPTION	LOCATION	MATERAIL	THICKNESS (MIN)	TOP FINISH	BOTTOM FINISH
COVER	TOP	HDPE	80 MIL	SMOOTH	SMOOTH



C HDPE COVER-SMOOTH WELDS

N.T.S.

HARTMAN ENGINEERING
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(559) 563-0181

REGISTERED PROFESSIONAL ENGINEER
CRAIG M. HARTMAN
NO. [illegible]
Exp. 06-30-17
CIVIL
STATE OF CALIFORNIA
5/22/17

PROJECT:

LAKESIDE ENERGY

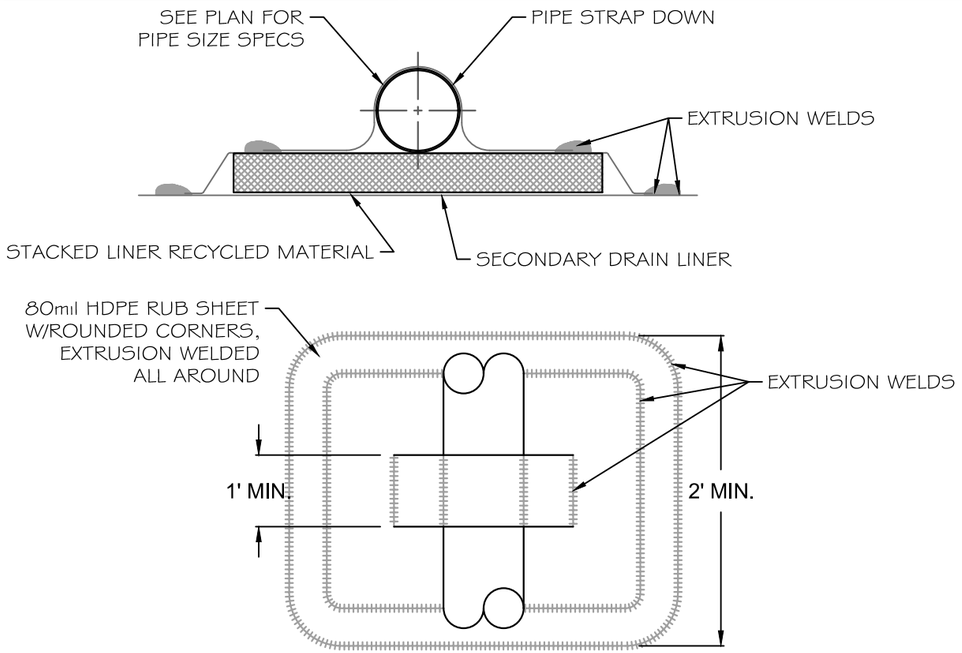
DAIRY DIGESTER

CLIENT:
MIKE MONTEIRO
8606 KENT AVE,
HANFORD, CA 93230

COVER SYSTEM
DIGESTER

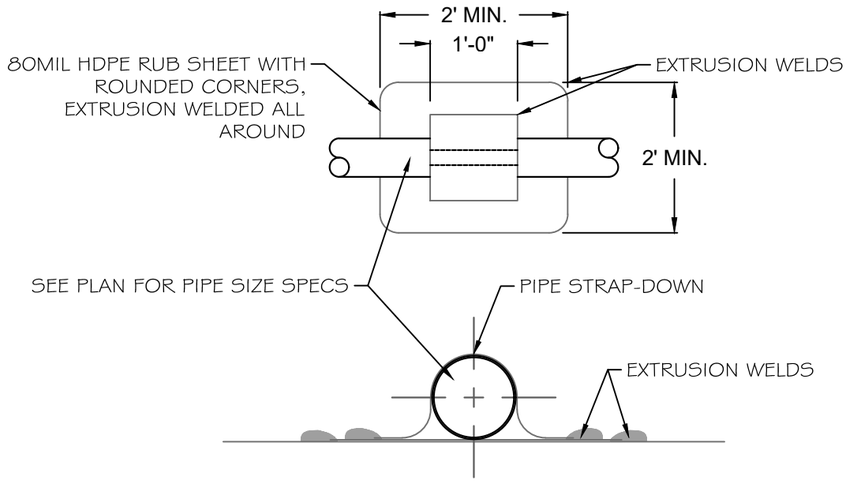
REVISION LOG:

PLOT DATE:	01/08/18
JOB NO.:	17003
SCALE:	AS SHOWN
SHEET NO.:	D.1



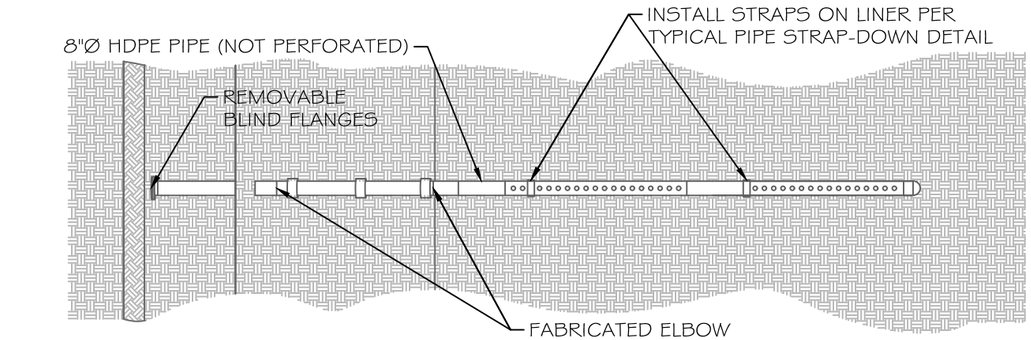
A SLUDGE REMOVAL PIPE ANCHOR DETAIL

NOTE: ANCHOR TO BE USED ON HORIZONTAL SURFACES ONLY, AT BOTTOM OF LAGOON N.T.S.



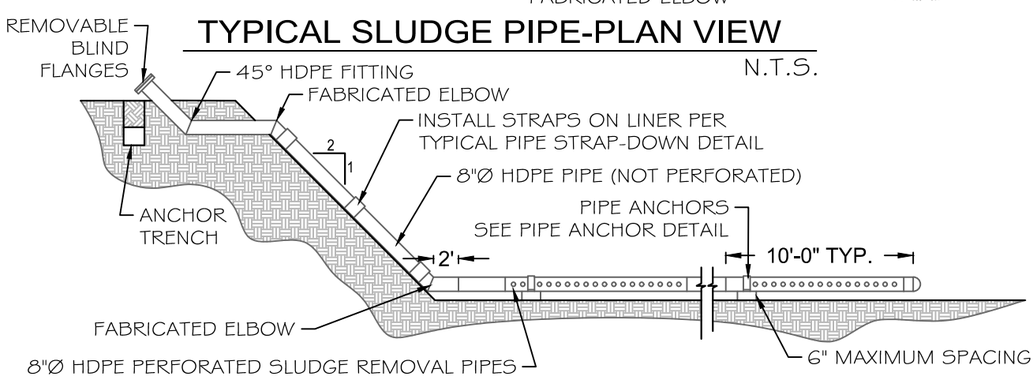
B TYPICAL PIPE STRAP-DOWN DETAIL

NOTE: MAXIMUM 10' O.C. SPACING BETWEEN PIPE STRAP-DOWNS, U.N.O. N.T.S.



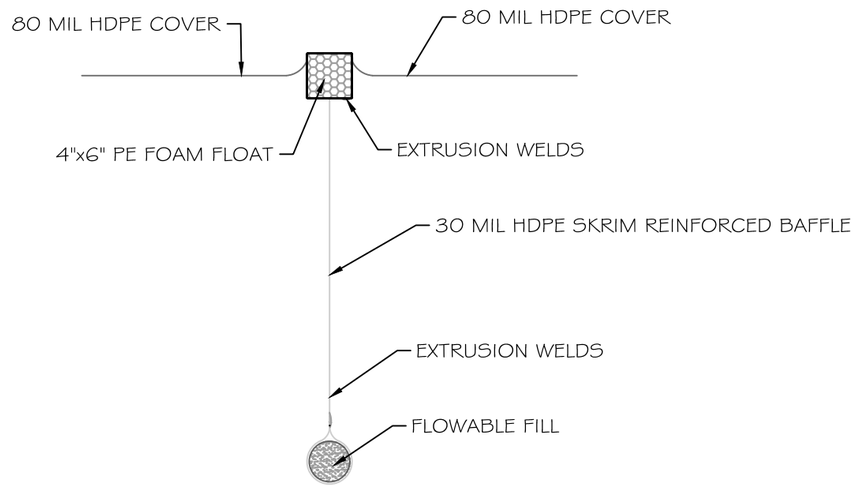
TYPICAL SLUDGE PIPE-PLAN VIEW

N.T.S.



C TYPICAL SLUDGE PIPE-PROFILE

N.T.S.



D BAFFLE SECTION

N.T.S.

HARTMAN ENGINEERING
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(559) 563-0181

REGISTERED PROFESSIONAL ENGINEER — CRAIG M. HARTMAN — NO. [illegible] — Exp. 06-30-17 — STATE OF CALIFORNIA

5/22/17

PROJECT:

LAKESIDE ENERGY

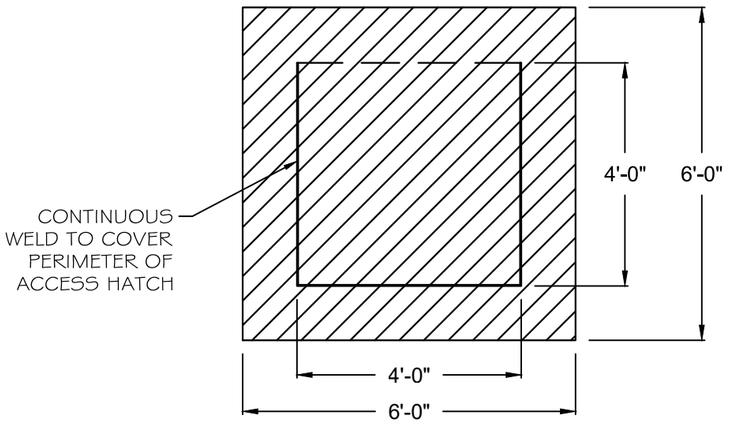
DAIRY DIGESTER

CLIENT:
MIKE MONTEIRO
8606 KENT AVE,
HANFORD, CA 93230

SLURRY REMOVAL SYSTEM
DIGESTER

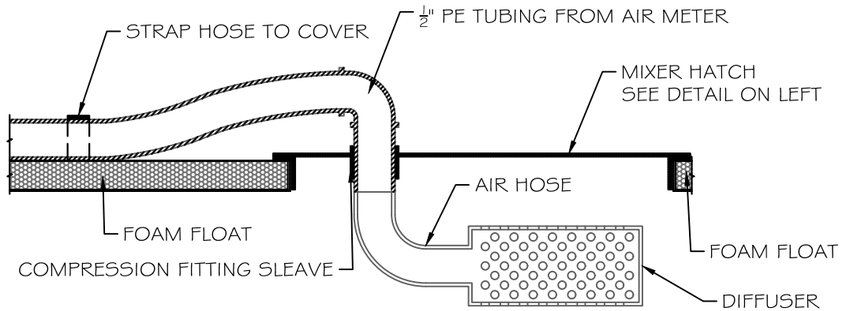
REVISION LOG:

PLOT DATE:	01/08/18
JOB NO.:	17003
SCALE:	AS SHOWN
SHEET NO.:	D.2



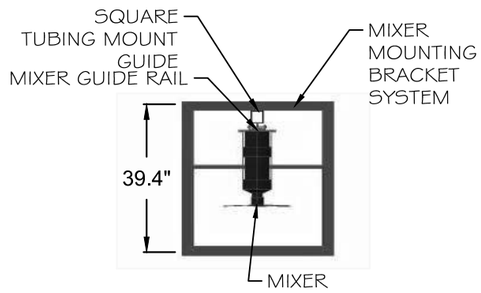
MIXER - HATCH

N.T.S.



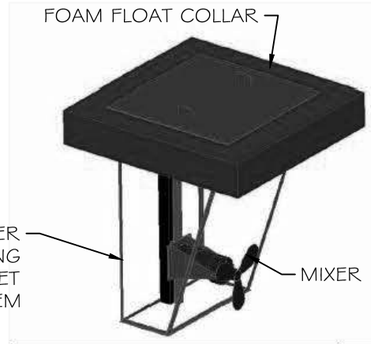
AIR INJECTION & MIXER HATCH

N.T.S.



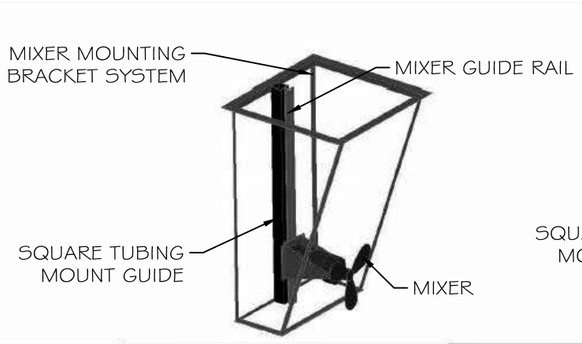
MIXER - PLAN VIEW

N.T.S.



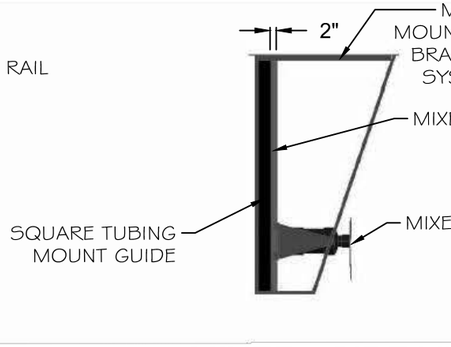
MIXER - ISOMETRIC W/FLOAT IN PLACE

N.T.S.



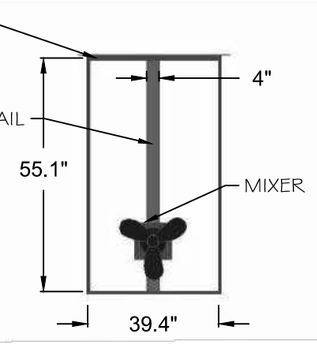
MIXER - ISOMETRIC

N.T.S.



MIXER - SIDE VIEW

N.T.S.



MIXER - FRONT VIEW

N.T.S.

HARTMAN ENGINEERING
113 N. CHURCH ST,
SUITE 521
VISALIA, CA 93291
(559) 563-0181

REGISTERED PROFESSIONAL ENGINEER
CRAIG M. HARTMAN
NO. C
Exp. 06-30-17
STATE OF CALIFORNIA
5/22/17

PROJECT:

LAKESIDE ENERGY

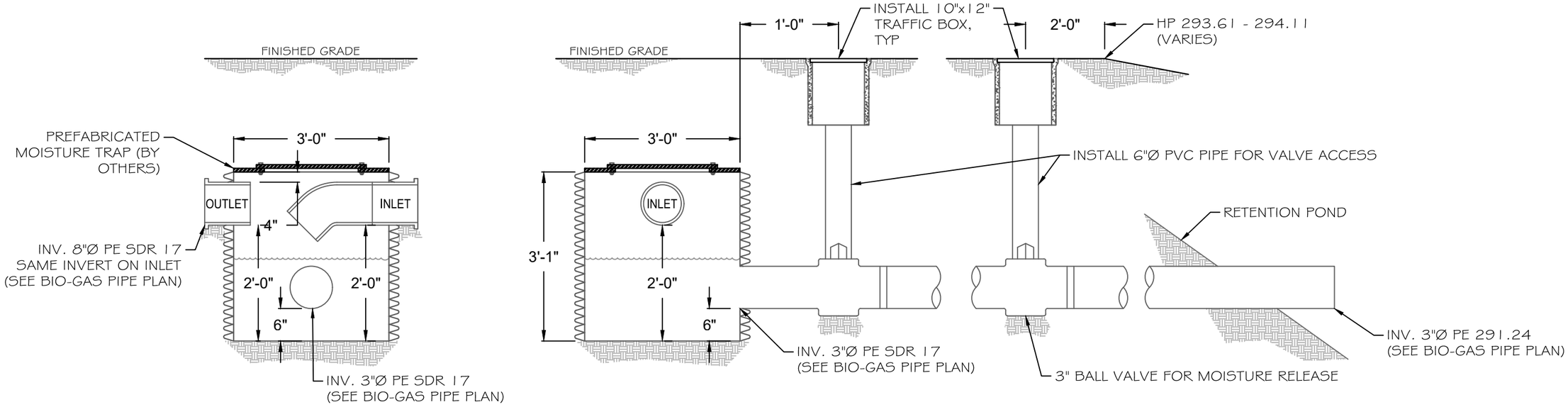
DAIRY DIGESTER

CLIENT:
MIKE MONTEIRO
8606 KENT AVE,
HANFORD, CA 93230

MIXER DETAILS

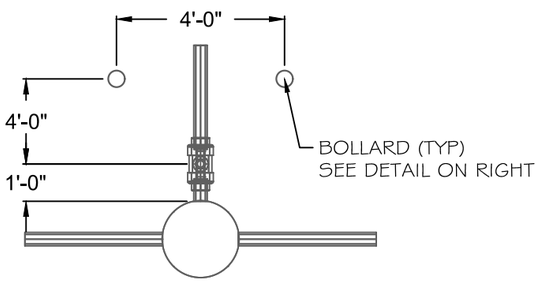
REVISION LOG:

PLOT DATE:	01/08/18
JOB NO.:	17003
SCALE:	AS SHOWN
SHEET NO.:	D.3



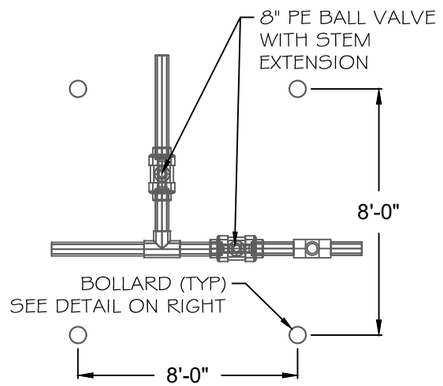
MOISTURE TRAP DETAIL

N.T.S.



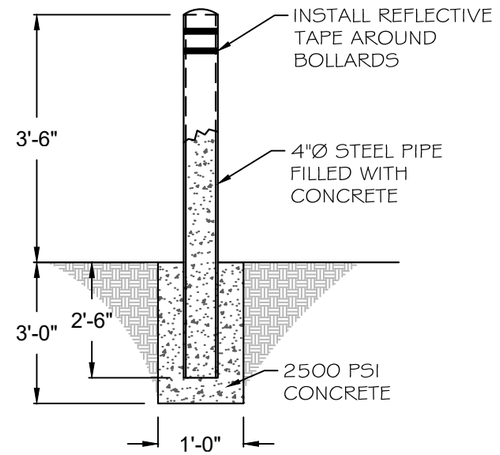
BIO-GAS VALVE

N.T.S.



BALL VALVE JUNCTION

N.T.S.



BOLLARD DETAIL

N.T.S.

HARTMAN ENGINEERING
113 N. CHURCH ST, SUITE 521
VISALIA, CA 93291
(559) 563-0181

REGISTERED PROFESSIONAL ENGINEER CRAIG M. HARTMAN NO. [illegible] Exp. 06-30-17 CIVIL STATE OF CALIFORNIA

5/22/17

PROJECT:

LAKESIDE ENERGY

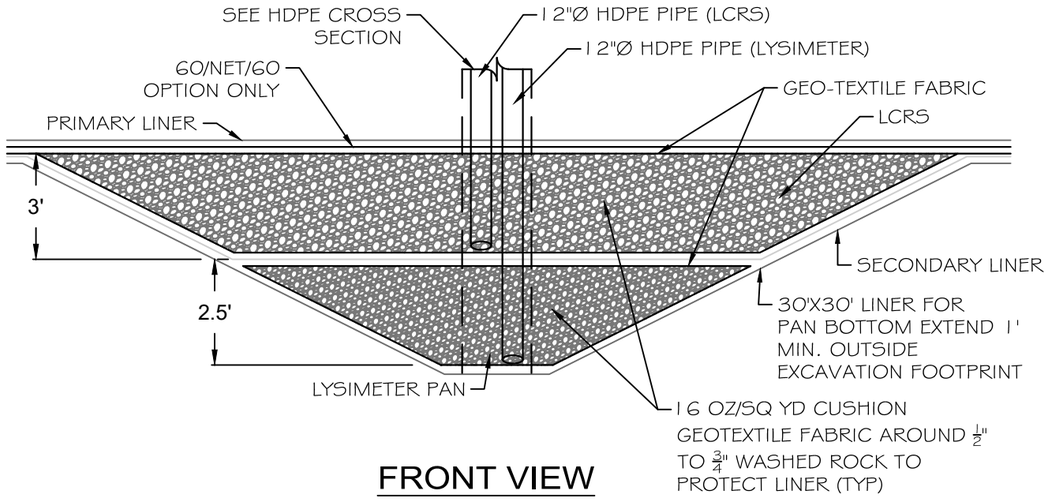
DAIRY DIGESTER

CLIENT:
MIKE MONTEIRO
8606 KENT AVE,
HANFORD, CA 93230

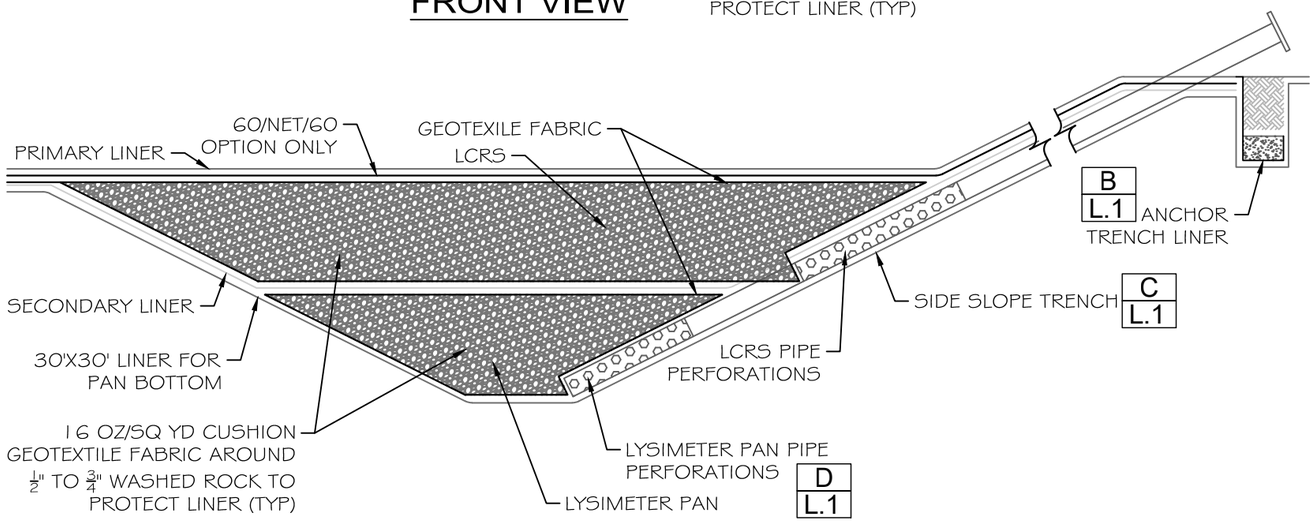
DETAILS

REVISION LOG:

PLOT DATE:	01/08/18
JOB NO.:	17003
SCALE:	AS SHOWN
SHEET NO.:	D.4



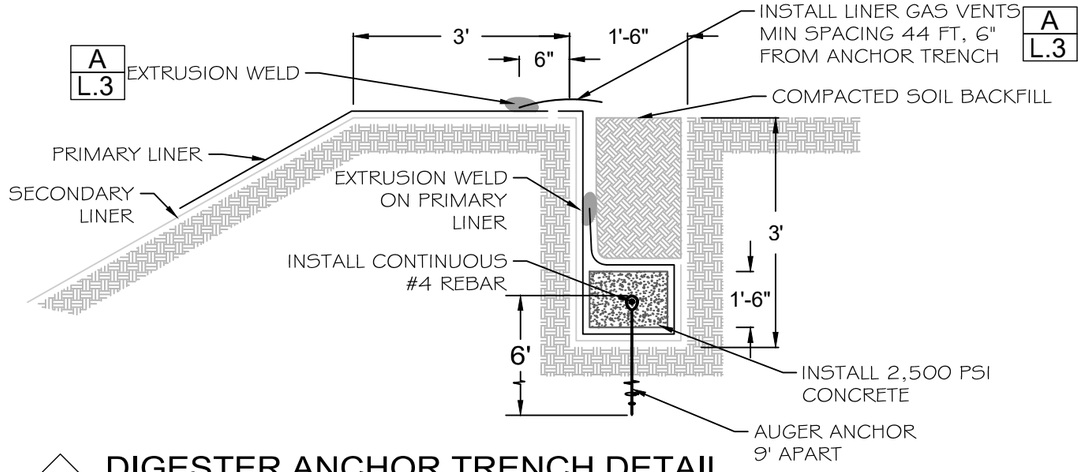
FRONT VIEW



SIDE VIEW

A LCRS, LYSIMETER AND DRAINAGE SUMP PROFILE

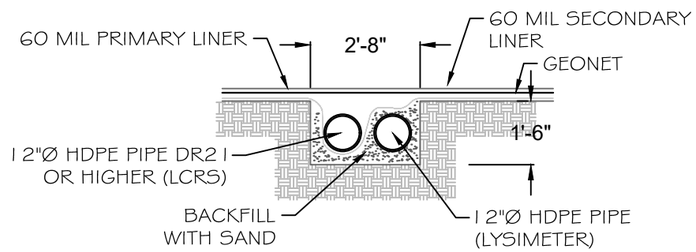
N.T.S.



B DIGESTER ANCHOR TRENCH DETAIL

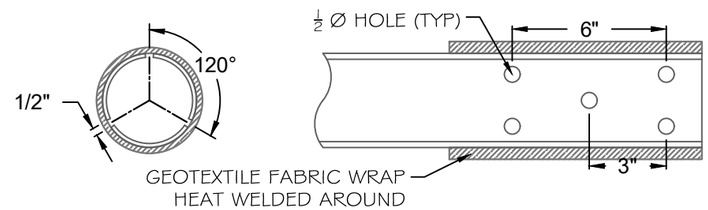
N.T.S.

NOTES: 1. CONTRACTOR TO USE ANCHOR SYSTEM OR PROVIDE DETAILS AND DESIGN FOR ALTERNATIVE TO BE APPROVED BY ENGINEER.



B HDPE CROSS SECTION

N.T.S.



C TYPICAL PERFORATION DETAIL

N.T.S.

1 H HARTMAN ENGINEERING
113 N. CHURCH ST, SUITE 521
VISALIA, CA 93291
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REGISTERED PROFESSIONAL ENGINEER CRAIG M. HARTMAN NO. Exp. 06-30-17 STATE OF CALIFORNIA

5/22/17

PROJECT:

LAKESIDE ENERGY

DAIRY DIGESTER

CLIENT:
MIKE MONTEIRO
8606 KENT AVE,
HANFORD, CA 93230

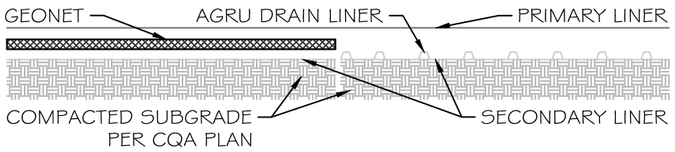
GENERAL NOTES
LINER DETAILS

REVISION LOG:

PLOT DATE:	01/08/18
JOB NO.:	17003
SCALE:	AS SHOWN
SHEET NO.:	L.1

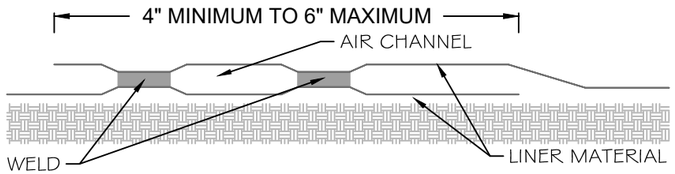
OPTIONAL TIER 1 DOUBLE LINER-LAYERING SYSTEM WITH DRAIN LINER VERIFY WITH OWNER

SMOOTH/STUDDED/ 60-NET-60 LINER LAYERS					
DESCRIPTION	LOCATION	MATERAIL	THICKNESS (MIN)	TOP FINISH	BOTTOM FINISH
PRIMARY LINER	TOP	HDPE	60 MIL	SMOOTH	SMOOTH CONDUCTIVE
DRAINAGE NET	MIDDLE	HDPE	200 MIL	N/A	N/A
SECONDARY LINER	BOTTOM	HDPE	60 MIL	SMOOTH	SMOOTH

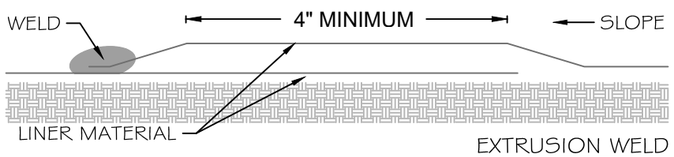


A DOUBLE LAYER 60-NET-60 DOUBLE LAYER WITH DRAIN LINER

N.T.S.



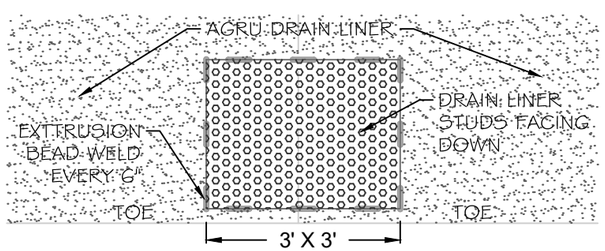
HOT WEDGE DOUBLE FUSION WELD



EXTRUSION WELD

B HDPE LINER-SMOOTH WELDS

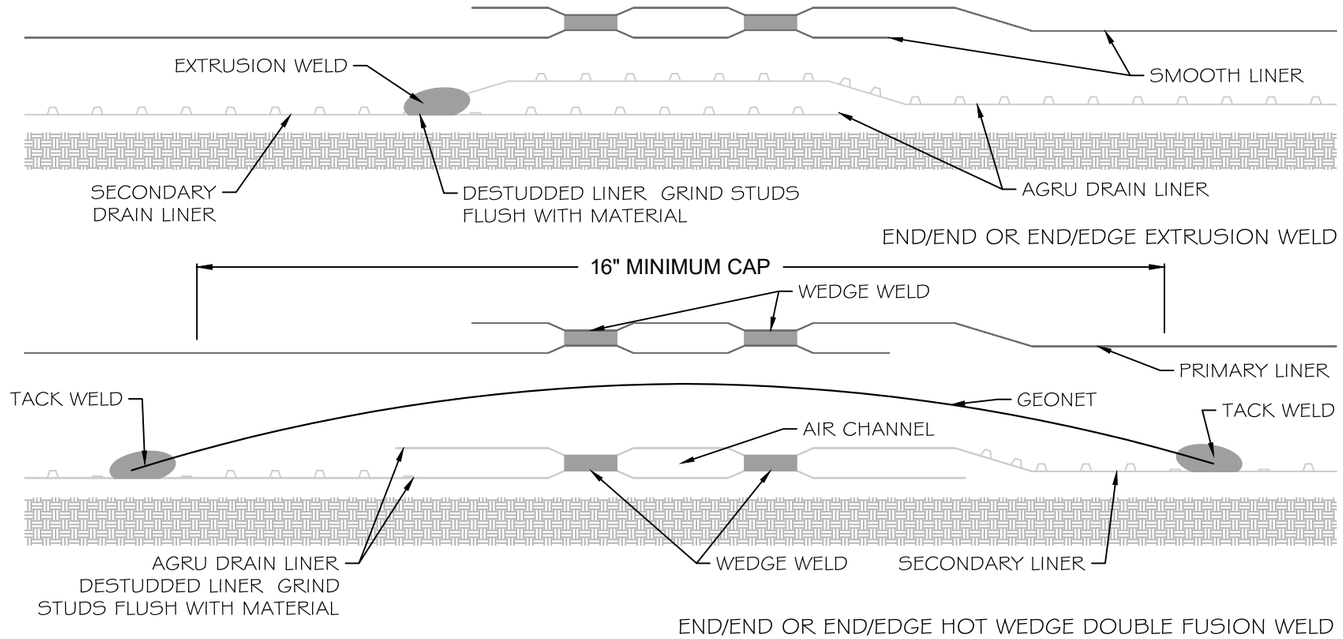
N.T.S.



DRAIN LINER SMOOTH END WELD PATCH

C 3'X3' DRAIN PATCH WELD

N.T.S.

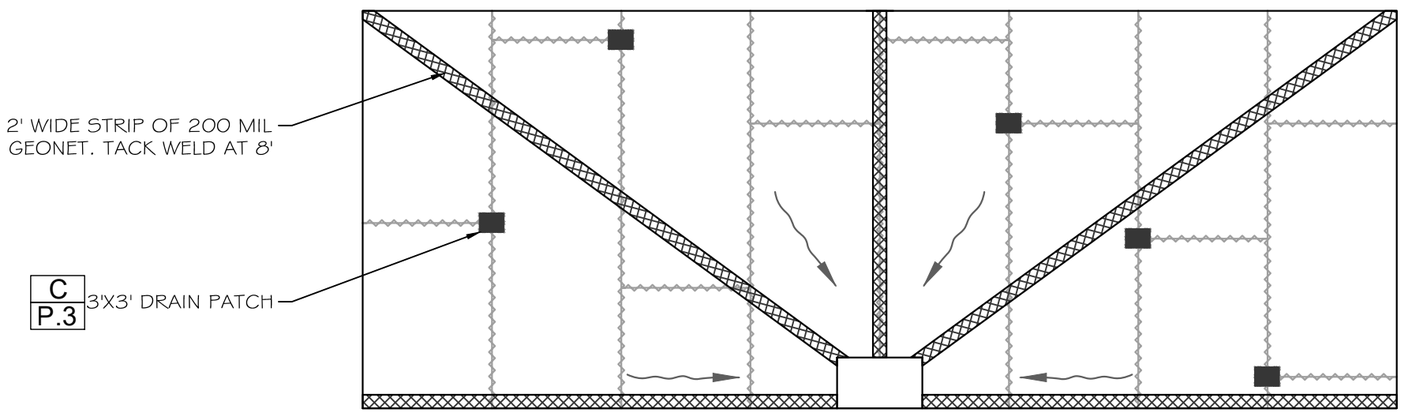


END/END OR END/EDGE EXTRUSION WELD

END/END OR END/EDGE HOT WEDGE DOUBLE FUSION WELD

D AGRU DRAIN LINER END/END WELD

NOTE: AGRU DRAIN LINER DOES NOT HAVE STUDS ALONG THE EDGE SO EDGE/EDGE SEAMS DO NOT REQUIRE DRINGING OR CAP. N.T.S.



NOTE: CQA OFFICER IS RESPONSIBLE TO ADD PATCHES AS NEEDED FOR FLOW

E AGRU DRAIN LINER CROSS SEAM NET PLAN VIEW

NOTE: TYPICAL OF ALL DRAIN LINERS N.T.S.

1 H HARTMAN ENGINEERING
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REGISTERED PROFESSIONAL ENGINEER CRAIG M. HARTMAN NO. C Exp. 06-30-17 STATE OF CALIFORNIA

5/22/17

PROJECT:

LAKESIDE ENERGY

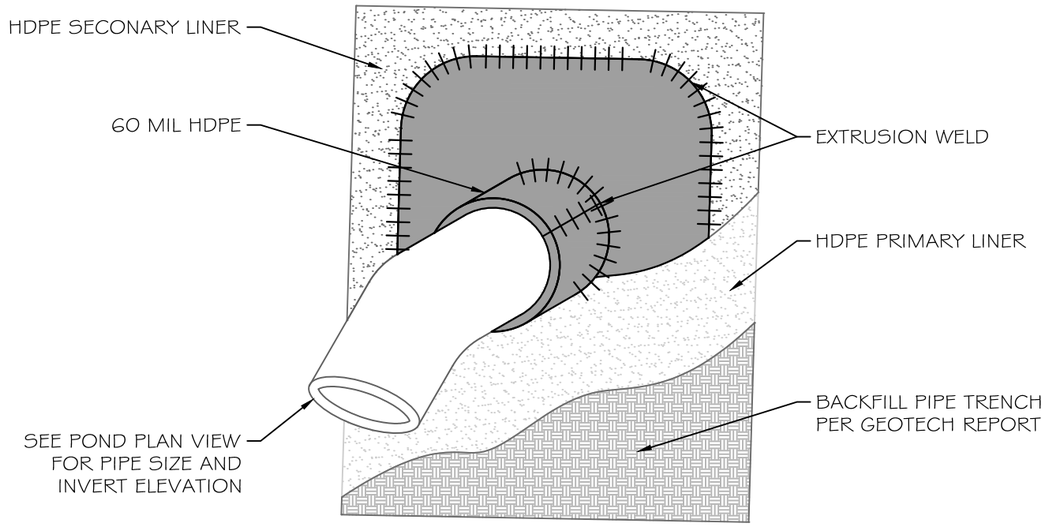
DAIRY DIGESTER

CLIENT:
MIKE MONTEIRO
8606 KENT AVE,
HANFORD, CA 93230

LINER DETAILS

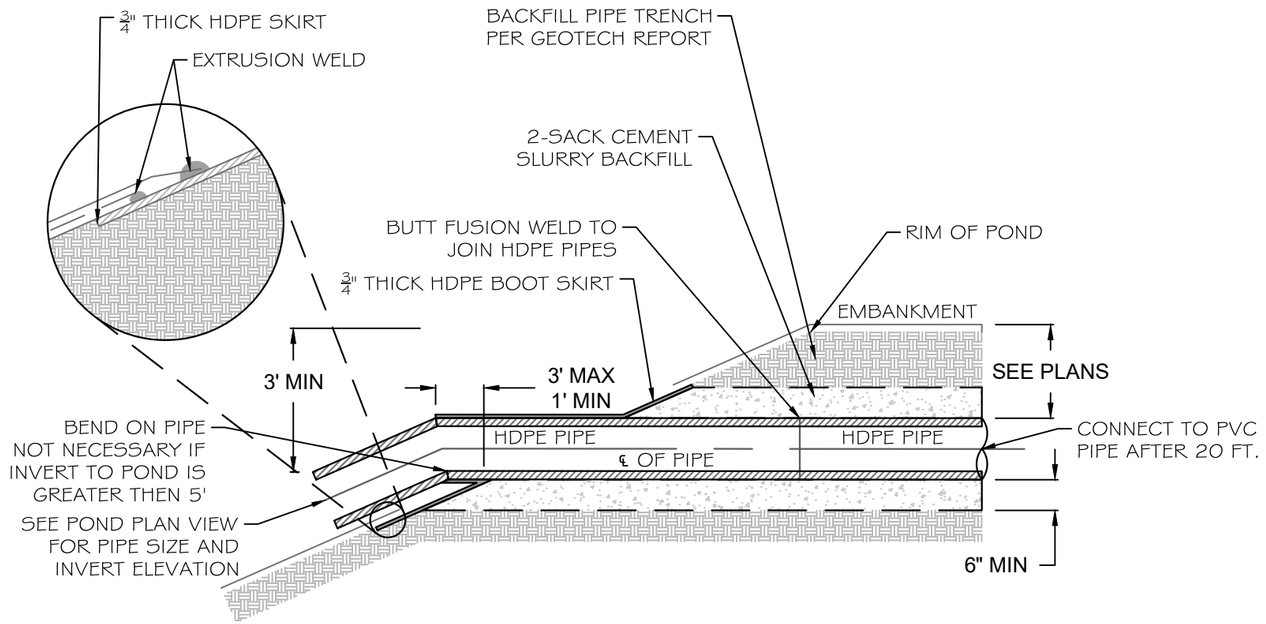
REVISION LOG:

PLOT DATE:	01/08/18
JOB NO.:	17003
SCALE:	AS SHOWN
SHEET NO.:	L.2



A BOOT SKIRT

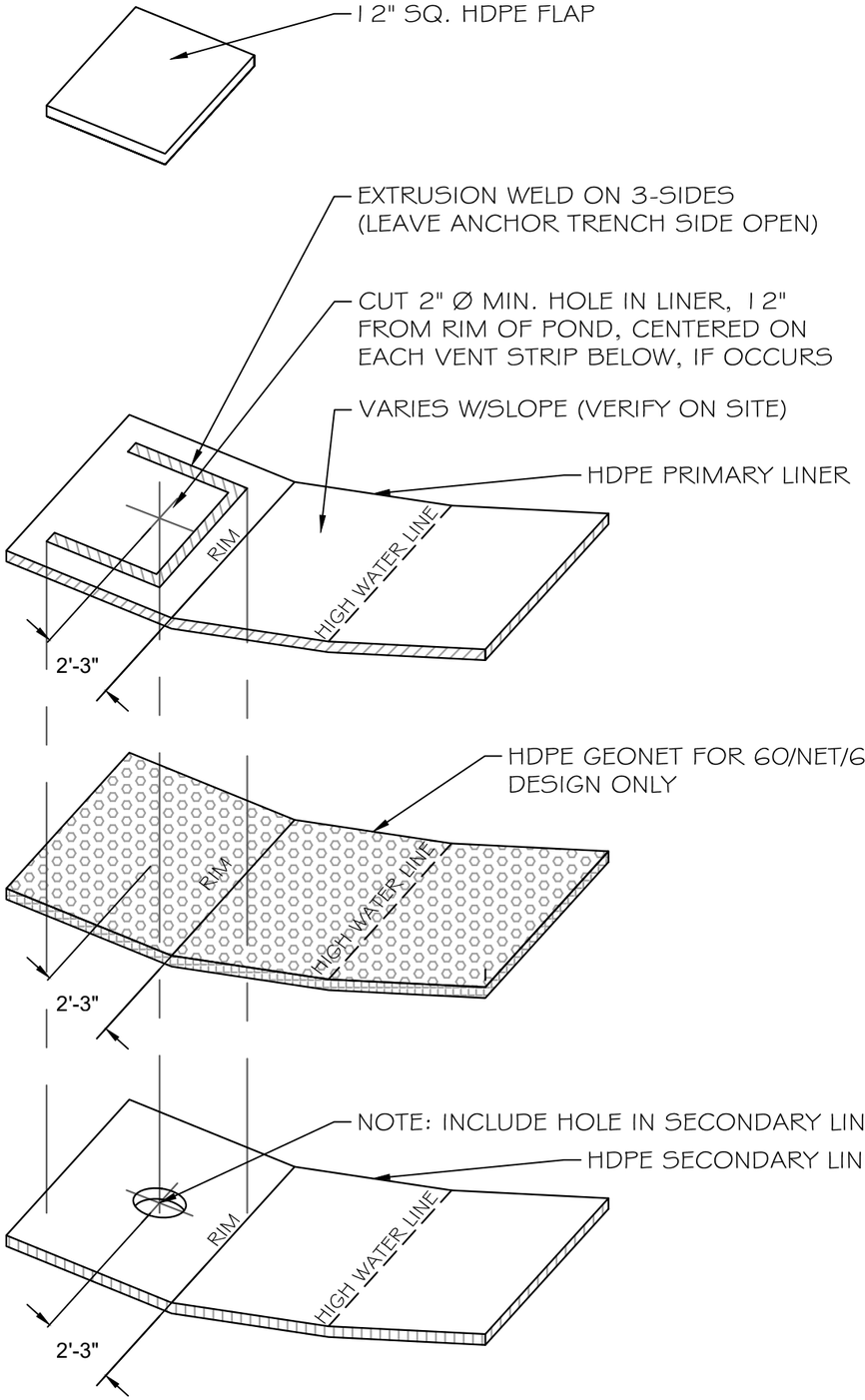
N.T.S.



B BOOTLESS PIPE PENETRATION

LINER FASTENING

N.T.S.



C VENT ORIFICE (ISOMETRIC VIEW)

N.T.S.

1
H
HARTMAN
ENGINEERING
113 N. CHURCH ST,
SUITE 521
VISALIA, CA 93291
(559) 563-0181

REGISTERED PROFESSIONAL ENGINEER
CRAIG M. HARTMAN
NO. C
Exp. 06-30-17
STATE OF CALIFORNIA
5/22/17

PROJECT:

LAKESIDE ENERGY

DAIRY
DIGESTER

CLIENT:
MIKE MONTEIRO
8606 KENT AVE,
HANFORD, CA 93230

LINER DETAILS

REVISION LOG:

PLOT DATE:	01/08/18
JOB NO.:	17003
SCALE:	AS SHOWN
SHEET NO.:	L.3

LONE OAK #1
DAIRY DIGESTER

BENCHMARK

THE TOPOGRAPHIC SURVEY WAS PERFORMED UTILIZING GLOBAL POSITIONING SYSTEM OBSERVATIONS. DISTANCES AND NUMBERS SHOWN ARE TO BE CONSIDERED GROUND VALUES. BENCHMARK AND CONTROL SHOWN ON CONTROL PLAN SHEET. THE BENCHMARK AND VERTICAL ELEVATIONS WERE DERIVED FROM THE NGS ONLINE POSITIONING SERVICE (OPUS), AND IS SHOWN ON THE NAVD 88 DATUM UTILITIZING THE GEOID 09 AS THE VERTICAL MODEL.

PRESERVATION OF MONUMENTS

PURSUANT TO SECTIONS 8771(B) AND 8771(C) OF THE GOVERNMENT CODE, ANY MONUMENTS THAT CONTROL THE LOCATION OF BOUNDARIED, OR OTHERWISE PROVIDE HORIZONTAL OR VERTICAL SURVEY CONTROL WITHIN THE CONSTRUCTION AREA, SHALL BE LOCATED AND REFERENCED PRIOR TO CONSTRUCTION, AND A CORNER RECORD OR RECORD OF SURVEY OF THE REFERENCES SHALL BE FILED WITH THE COUNTY SURVEYOR.

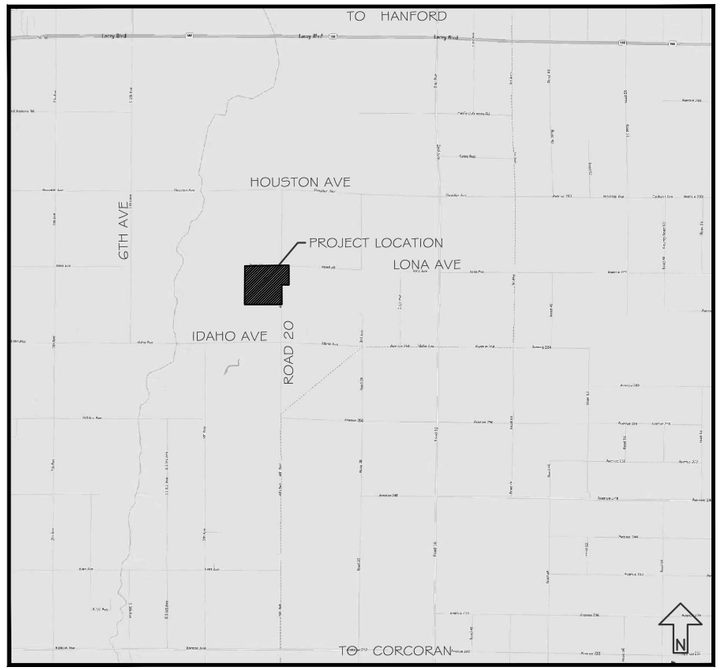
PERMANENT MONUMENTATION SHALL BE SET TO PERPETUATE THE LOCATION OF ANY MONUMENT WHICH COULD BE DAMAGED OR DESTROYED, AND A CORNER RECORD OR RECORD OF SURVEY SHALL BE FILED WITH THE COUNTY SURVEYOR PRIOR TO THE RECORDING OF A CERTIFICATE OF COMPLETION FOR THE PROJECT.

DUST CONTROL NOTES

CONTRACTOR IS REQUIRED TO COMPLY WITH GOOD HOUSE KEEPING PRACTICES

STORMWATER (SWPPP) NOTES

CONTRACTOR IS REQUIRED TO COMPLY WITH GOOD HOUSE KEEPING PRACTICES

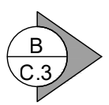


VICINITY MAP
SCALE 1" : 2 MI

SHEET REFERENCE

SECTIONS:

SECTION NAME
SHEET NUMBER



DETAILS:

DETAIL NAME
SHEET NUMBER

CONTACT INFO

ENGINEER:
CRAIG HARTMAN, RCE 73837
HARTMAN ENGINEERING, INC.
3121 W. CERES CT.
VISALIA, CA 93291
(559) 563-0181

DAIRY CONTACT:
BERNARD TE VELDE
13866 4TH AVE
HANFORD, CA 93230

SHEET INDEX

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REGISTERED PROFESSIONAL ENGINEER
CRAIG M. HARTMAN
NO. 73837
Exp. 06-30-19
CIVIL
STATE OF CALIFORNIA
1-8-18

PROJECT:
LONE OAK #1

DAIRY DIGESTER

CLIENT:
BERNARD TE VELDE
13866 4TH AVE
HANFORD, CA 93230

REVISION LOG:

PLOT DATE:	01/08/18
JOB NO.:	17003
SCALE:	AS SHOWN
SHEET NO.:	A.1

SPECIFICATIONS FOR ENGINEERED FILL MATERIAL OF ABOVE GRADE EMBANKMENTS OR AS REQUIRED

TEST PARAMETER	TEST METHOD	FREQUENCY	ACCEPTANCE CRITERIA
Compaction Curves	ASTM D1557 (Modified Proctor)	Change in material	N/A
Grain Size Distribution	ASTM D422 (Sieve)	Change in material	At least 30% passing No. 200 U.S. Standard Sieve. Per Specifications (1)
Soil Classification	ASTM D2487 (USCS)	Change in material	Suitable for compaction [2,3]
Maximum Particle Size	ASTM D422 (Sieve)	Change in material	½ inch, ¼ top 6 inches
Maximum Water soluble Sulfate (SO_4) in Soil (Concrete Slab locations)	ASTM C1580	Change in material	0.2% by weight

Site Preparation Specifications:

1. Clearing: Prior to earthwork operations, the area to be developed should be stripped of vegetation, organic topsoil, and cleared of cow waste and miscellaneous debris from the proposed construction areas. Deeper clearing may be required in localized areas. The actual depth of clearing should be reviewed by a licensed Geotechnical Engineer at the time of construction. The limits of stripping and clearing should be at least five feet beyond the limits of construction.

2. Compaction: The scarified subgrade and subsequent fill placed at the site should be moisture conditioned to near optimum moisture content, and compacted to at least and 90 percent for 2:1 side slope pond of maximum dry density as determined by ASTM test method D1557.

3. Material for fill: Fill should consist of select material. Native soil, free from organic, vegetation, and rocks or cobbles larger than three inches, may be used as fill at the site. Import material must be reviewed by licensed Geotechnical Engineer prior to transport to the site.

4. Fill placement: Fill material should be moisture-conditioned to +/- 2% of the optimum moisture content prior to compaction. Fill material with excessive moisture should be allowed to dry prior to compaction or be mixed with dry soil to bring the fill to a workable moisture content. Fill should be placed in level lifts not exceeding a loose, uncompacted thickness of eight inches, and compacted as engineered fill.

Sub-grade requirements for fill only:

-Over Excavate for minimum 1 ft. to meet Engineered Fill Borrow Material Guidelines and Pond Liner Sub-grade requirements

-Well mixed soil

-6 in max lifts

-Upper 6 inches is of fine-finished soil particles no greater than ¼ in.+

Notes:

1. Field tests shall not be required, but fill borrow material specifications must meet the acceptance criteria outlined in Table 1.
2. Refer to Geotechnical Report

NOTES:

THE APPROVED WORK PLAN WHICH INCLUDES THE CONSTRUCTION QUALITY ASSURANCE PLAN, OPERATION, MAINTENANCE AND MONITORING PLAN, CONSTRUCTION DRAWINGS, AND SOILS REPORT TOGETHER AS A PACKAGE ARE THE COMPLETE SPECIFICATIONS REQUIRED FOR CONSTRUCTION OF THE POND AND LINER SYSTEM.

FILL TEST SPECIFICATIONS FOR SUB-GRADE

TEST PARAMETER	TEST METHOD [1]	FREQUENCY	ACCEPTANCE CRITERIA
Uncompacted Lift Thickness	Visual Observation	Continuous	8-in.[2]
Construction Oversight	Visual Observation	Continuous	Maximum particle size 1/2 inch.
In-Place Moisture Alternative Method	ASTM D2216 (Oven Dry)	1 per every 10 Nuclear tests	+/-2% of Optimum Moisture Content per ASTM D1557
In-Place Moisture Rapid Field Methods[3,5]	ASTM D6938[3,5] (Nuclear Method)	3 per acre per lift, min. 2 per day	+/-2% of Optimum Moisture Content per ASTM D1557
In-Place Density Alternate Method	ASTM D2937(Drive Cylinder)	1 per every 10 Nuclear tests	90% of Maximum Dry Density per ASTM D1557
In-Place Density Rapid Field Methods[4,5]	ASTM D6938[3,5] (Nuclear Method)	3 per acre per lift, min. 2 per day	90% of Maximum Dry Density per ASTM D1557
Subgrade Thickness	Surveying Measurement	At 50-foot centers	Minimum 1 ft.[4]
Clod Size	Visual Observation	Continuous	Per Specification

Notes:

See earthwork section for anchor trench, excavation, backfill, and compaction requirements.

[1] ASTM Test Method, unless otherwise noted. Results of all tests performed to be reported as per method reporting criteria.

[2] The sub-grade shall be scarified to a depth of 1 ft. lower than finished grade, compacted, and tested in accordance with the requirements of this table.

[3] Must be verified by ASTM D2216 (Oven) overnight method once every day or once per change in material

[4] Must be verified by ASTM D2937 (Dry Cylinder) twice per day or per change in material

[5] Calibration Procedure: ASTM D7013-04: Standard Guide for Nuclear Surface Moisture and Density Gauge Calibration Facility Set-up

POND SPECIFICATIONS FOR SUBGRADES CUT BELOW GROUND
(For Slopes 2:1 or shallower)

Side Slopes: The certified Civil Engineer/CQA Chief Officer shall walk final side slopes after cut by heavy equipment and confirm no SW or SP soils and no loose soils. All SW, SP, or soils that are not amenable to a firm and unyielding subgrade shall be removed and replaced down to a minimum 3 ft. below sloped surface. Any soils removed and replaced shall meet the Engineered Fill requirements in Table 1.

Pond Bottom: 1. An as-built survey of the pond bottom shall take place after subgrade construction to insure minimum slopes are achieved. Pond Bottom shall be tested per criteria below. Any soils not meeting the requirements below (i.e. that is not firm and unyielding) shall be removed and replaced down to a minimum 2 ft. Any soils removed and replaced shall meet the Engineered Fill requirements in Table 1. The Civil Engineer may make determination of soils meeting requirements or not based upon visual inspection which shall be included in the Subgrade Certification Report and signed and sealed by a Civil Engineer and CQA Officer.

TEST PARAMETER	TEST METHOD [1,5]	FREQUENCY	ACCEPTANCE CRITERIA
In-Place Density Rapid Field Methods [1]	ASTM D6938[3,5] (Nuclear)	3 per acre	90% of Maximum Dry Density per ASTM D1557
In-Place Moisture Rapid Field Methods[3,5]	ASTM D6938[3,5] (Nuclear Methods)	3 per acre per lift, min. 2 per day	+/-2% of Optimum Moisture Content per ASTM D1557
Construction Oversight	Visual Observation	Continuous	Maximum particle size 1/2 inch.
Subgrade Slope	Surveying Measurement	200 ft. maximum grid	Min 1%

60 MIL HDPE GEOMEMBRANE CONSTRUCTION QUALITY ASSURANCE (CQA)

TEST PARAMETER	TEST METHOD	FREQUENCY	ACCEPTANCE CRITERIA
Thickness (min. ave.) -Lowest individual for 8 out of 10 values -Lowest individual for any of the 10 values	ASTM D5994	1 per lot or 1 per 70,000 ft2, whichever is greater	Nom. (-5%) -10% -15%
Tensile Properties -yield strength -break strength -strain at yeild -break strength	ASTM D6693 Type IV	1 per lot or 1 per 70,000 ft2, whichever is greater	≥126 lb./in. ≥90 lb./in. ≥12% ≥100%
Puncture Resistance	ASTM D4833	1 per lot or 1 per 70,000 ft^2, whichever is greater	108 lb. (min.)
Tear Resistance	ASTM D1004, Die C	1 per lot or 1 per 70,000 ft2, whichever is greater	42 lb. (min.)
Interface Shear -60-mil HDPE/subgrade soil -Drainage geocomposite	ASTM D5321 ASTM D6243	2 tests or 1 per 200,000 ft2, whichever is greater	
Seam Shear	ASTM D6392	1 test per 500 lineal feet or per GRI GM-14 and 20.	95% of min. yield strength
Seam Peel -Extrusion -Fusion	ASTM D6392	1 test per 500 lineal feet or per GRI GM-14 and 20.	72% yield & ftb (1)
Non-destructive Seam Test	ASTM D5820 (Pressure Test)	Continuous	35 psi for 5 min.
	ASTM D5641 (Vacuum Box)		5 psi for 15 sec.
	ASTM D5641 (Spark Test)		No Spark
Electric Leak Location	ASTM D7002 (Water Puddle)	Once on constructed liner	Max 1 mm. diameter hole sensitivity
	ASTM D6747 (Selection Process)		
	ASTM D7007 (Water /Earth)		Max 6 mm. diameter hole sensitivity
	ASTM D7240 (Spark Test 2011)		

Notes:

ftb: Film Tear Bond

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REGISTERED PROFESSIONAL ENGINEER CRAIG M. HARTMAN NO. 73837 Exp. 06-30-19 CIVIL STATE OF CALIFORNIA 1-8-18

PROJECT:

LONE OAK #1

DAIRY DIGESTER

CLIENT:
BERNARD TE VELDE
13866 4TH AVE
HANFORD, CA 93230

GENERAL NOTES
CONSTRUCTION

REVISION LOG:

PLOT DATE:	01/08/18
JOB NO.:	17003
SCALE:	AS SHOWN
SHEET NO.:	A.2

HARTMAN ENGINEERING

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CIVIL
STATE OF CALIFORNIA
1-8-18

PROJECT:

LONE OAK #1

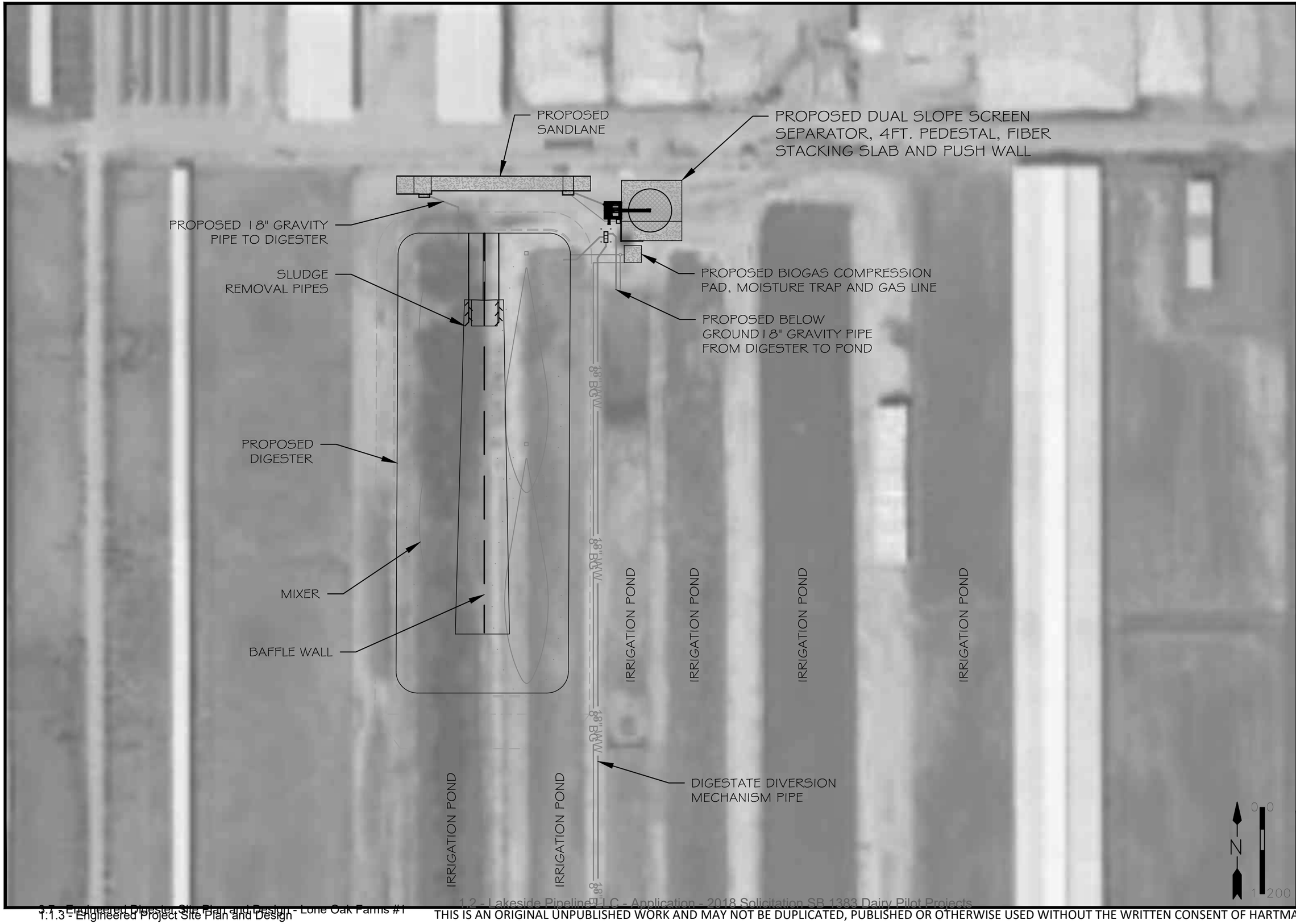
DAIRY DIGESTER

CLIENT:
BERNARD TE VELDE
13866 4TH AVE
HANFORD, CA 93230

SITE PLAN
DIGESTER

REVISION LOG:

PLOT DATE:	01/08/18
JOB NO.:	17003
SCALE:	AS SHOWN
SHEET NO.:	A.3



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Exp. 06-30-19
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STATE OF CALIFORNIA
1-8-18

PROJECT:

LONE OAK #1

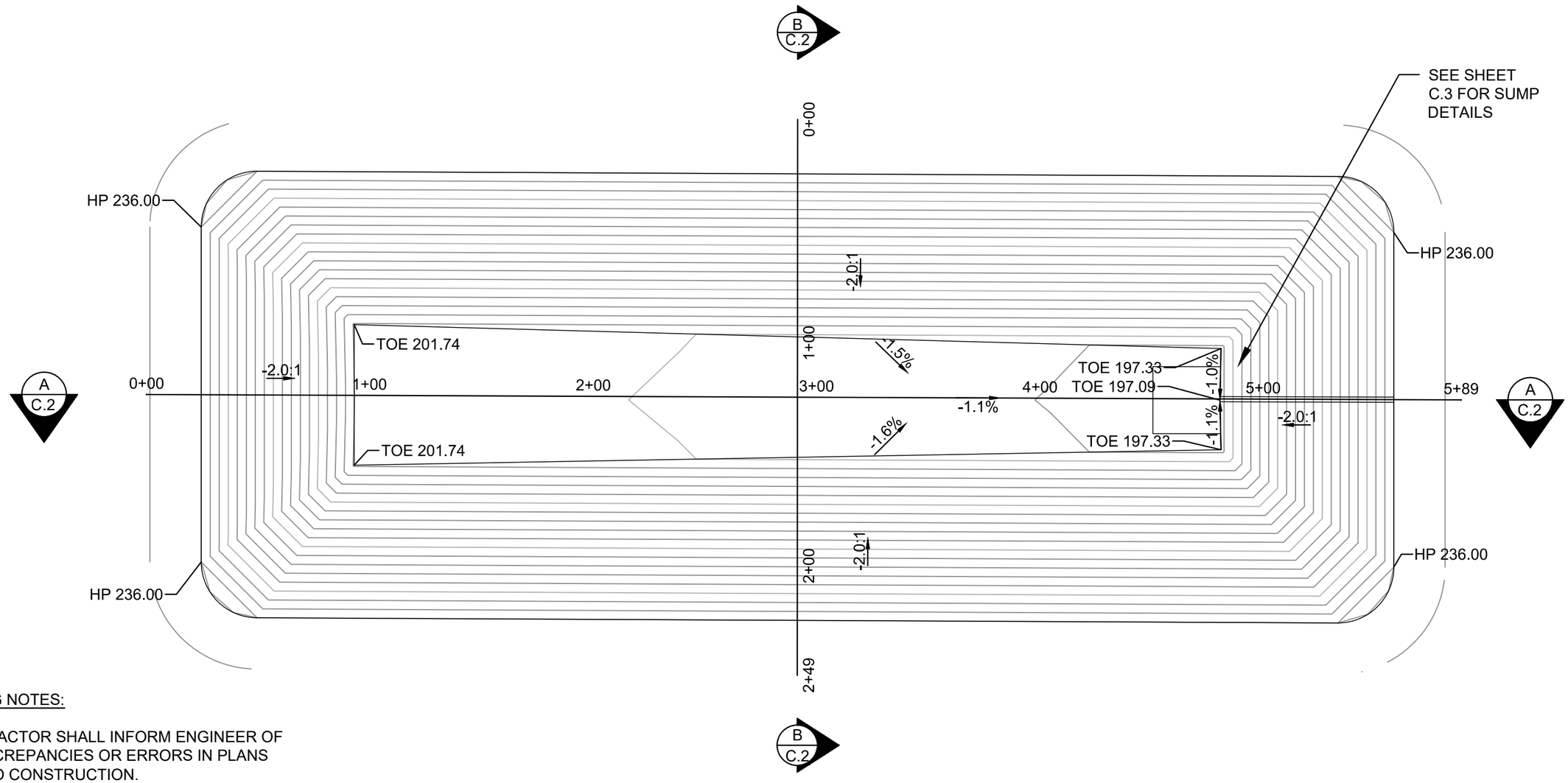
DAIRY DIGESTER

CLIENT:
BERNARD TE VELDE
13866 4TH AVE
HANFORD, CA 93230

SITE PLAN
DAIRY

REVISION LOG:

PLOT DATE:	01/08/18
JOB NO.:	17003
SCALE:	AS SHOWN
SHEET NO.:	A.4



GRADING NOTES:

1.CONTRACTOR SHALL INFORM ENGINEER OF ANY DISCREPANCIES OR ERRORS IN PLANS PRIOR TO CONSTRUCTION.

2. CONTRACTOR SHALL MEET SPECIFICATIONS OF TABLE 2 WITHIN THE APPROVED CONSTRUCTION QUALITY CONTROL PLAN.

3. CONTRACTOR SHALL SMOOTH DRUM ROLL FINAL SURFACE AND REMOVE ANY ROCK OR MATERIAL GREATER THAN $\frac{1}{2}$ INCH.

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NO. 73837
Exp. 06-30-19
CIVIL
STATE OF CALIFORNIA
1-8-18

PROJECT:

LONE OAK #1

DAIRY DIGESTER

CLIENT:
BERNARD TE VELDE
13866 4TH AVE
HANFORD, CA 93230

GRADING PLAN

DIGESTER

REVISION LOG:

PLOT DATE:	01/08/18
JOB NO.:	17003
SCALE:	AS SHOWN
SHEET NO.:	C.1

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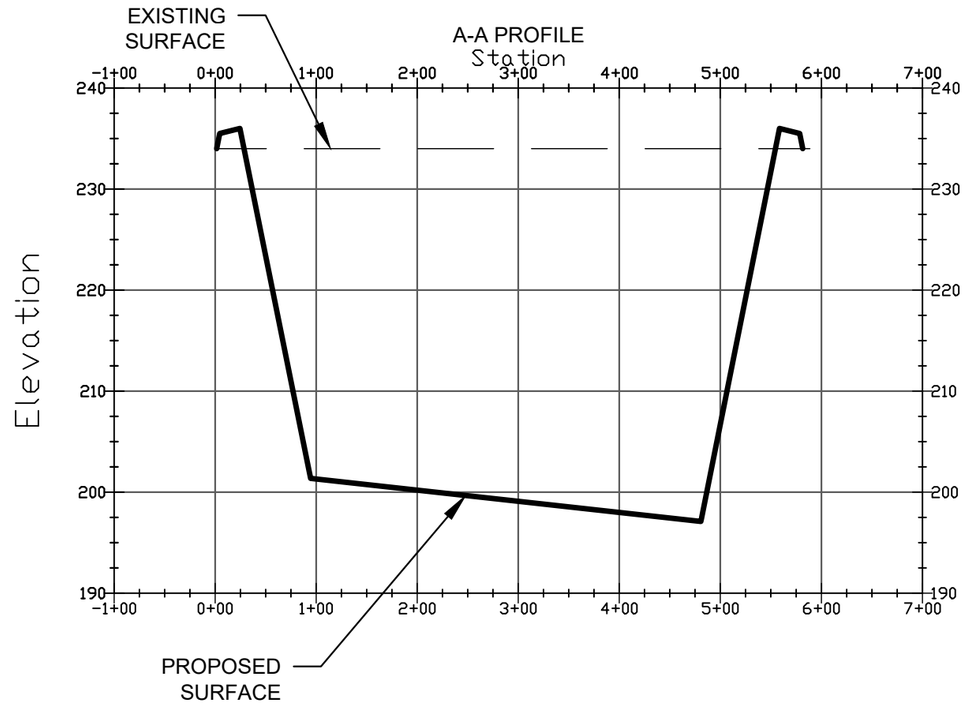

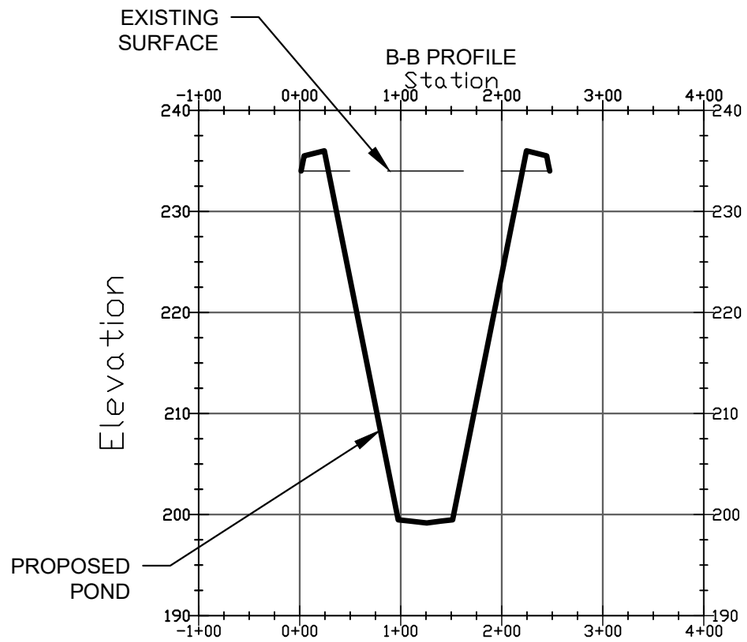

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CIVIL
STATE OF CALIFORNIA
1-8-18

PROJECT:

LONE OAK #1

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CLIENT:
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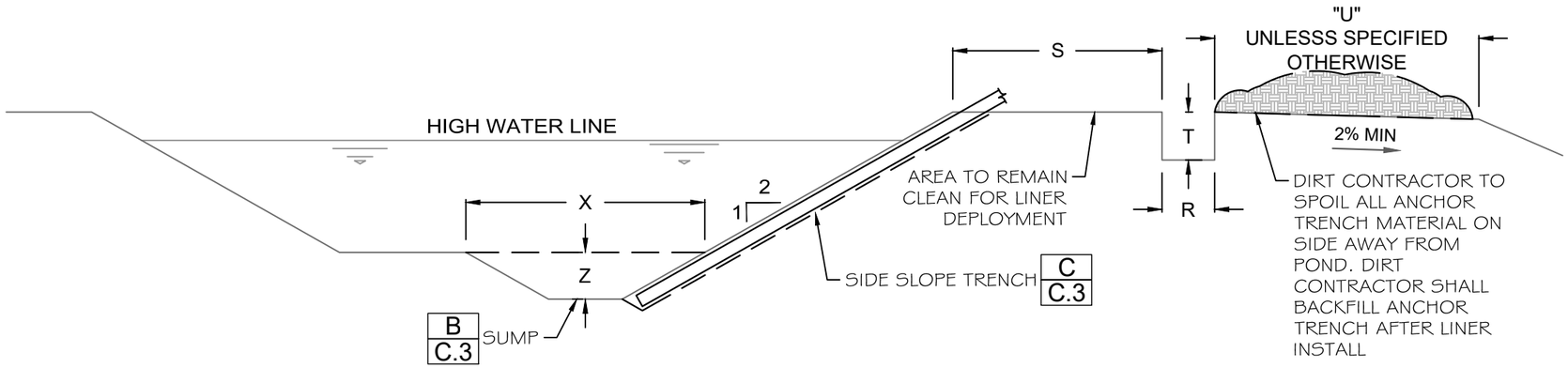
13866 4TH AVE
HANFORD, CA 93230

GRADING SECTIONS

DIGESTER

REVISION LOG:

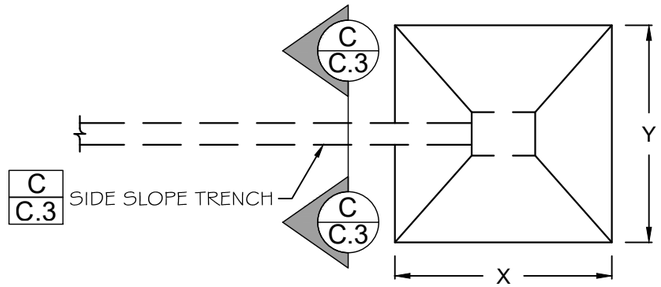
PLOT DATE:	01/08/18
JOB NO.:	17003
SCALE:	AS SHOWN
SHEET NO.:	C.2



A ANCHOR TRENCH / SUMP PROFILE VIEW

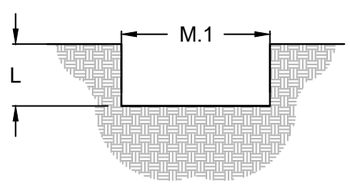
N.T.S.

DIMENSION TABLE (FT.)	
LETTER	POND
L	1.7'
M.1	2.7'
U	20'
R	1.5'
S	3'
T	3'
X	30'
Y	30'
Z	5.5'



B SUMP PLAN VIEW

N.T.S.



C SIDE SLOPE TRENCH

N.T.S.

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CRAIG M. HARTMAN
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Exp. 06-30-19
CIVIL
STATE OF CALIFORNIA
1-8-18

PROJECT:

LONE OAK #1

DAIRY DIGESTER

CLIENT:
BERNARD TE VELDE
13866 4TH AVE
HANFORD, CA 93230

GRADING DETAIL
DIGESTER

REVISION LOG:

PLOT DATE:	01/08/18
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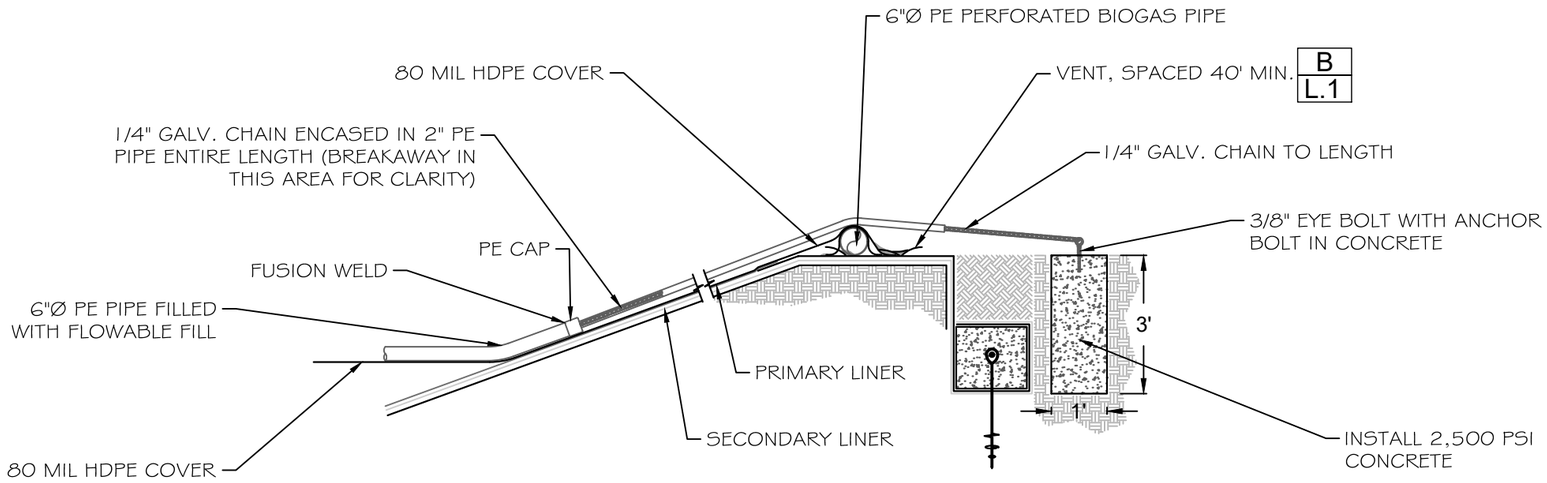
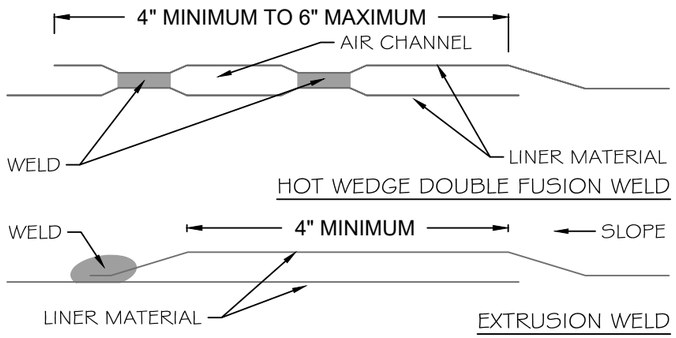


A BALLAST TUBE DETAIL

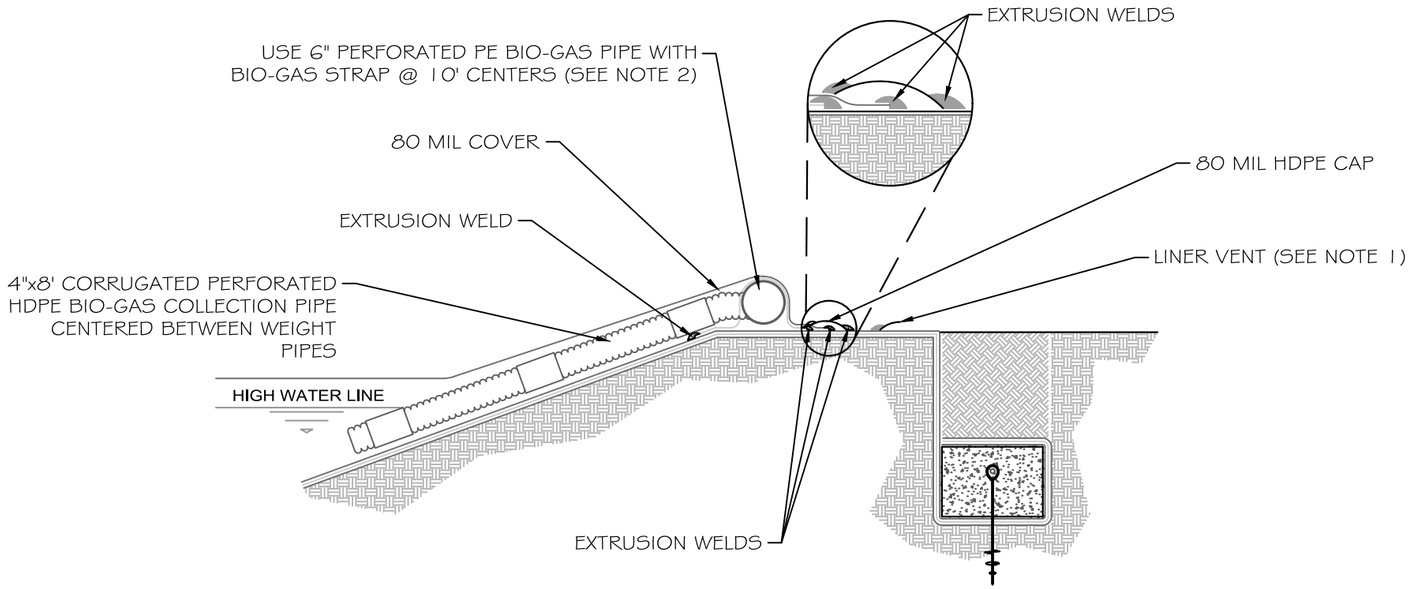
N.T.S.

DESCRIPTION	LOCATION	MATERAIL	THICKNESS (MIN)	TOP FINISH	BOTTOM FINISH
COVER	TOP	HDPE	80 MIL	SMOOTH	SMOOTH



C HDPE COVER-SMOOTH WELDS

N.T.S.



B BIO-GAS PIPING DETAIL

N.T.S.

NOTES:
1. GAS VENTS AROUND PERIPHERY OF LAGOON @ MAX. 40' O.C.
2. STRAP NOT WELDED TO BIO-GAS HEADER PIPE.
3. WRAP 60 MIL PRIMARY LINER OVER CONCRETE & EXTRUSION WELD.

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REGISTERED PROFESSIONAL ENGINEER CRAIG M. HARTMAN NO. 73837 Exp. 06-30-19 CIVIL STATE OF CALIFORNIA 1-8-18

PROJECT:

LONE OAK #1

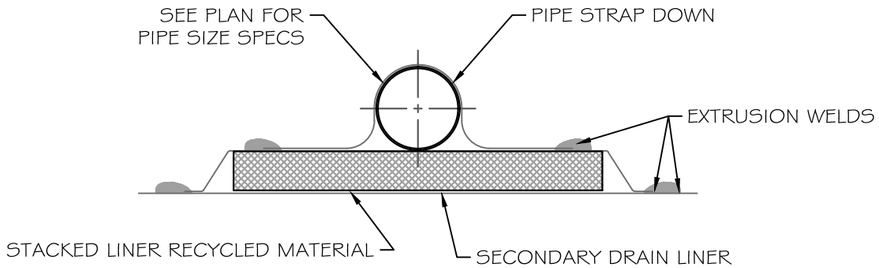
DAIRY DIGESTER

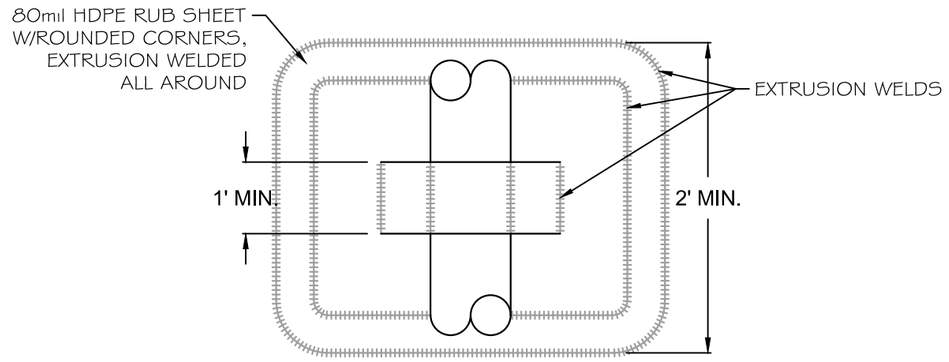
CLIENT:
BERNARD TE VELDE
13866 4TH AVE
HANFORD, CA 93230

COVER SYSTEM
DIGESTER

REVISION LOG:

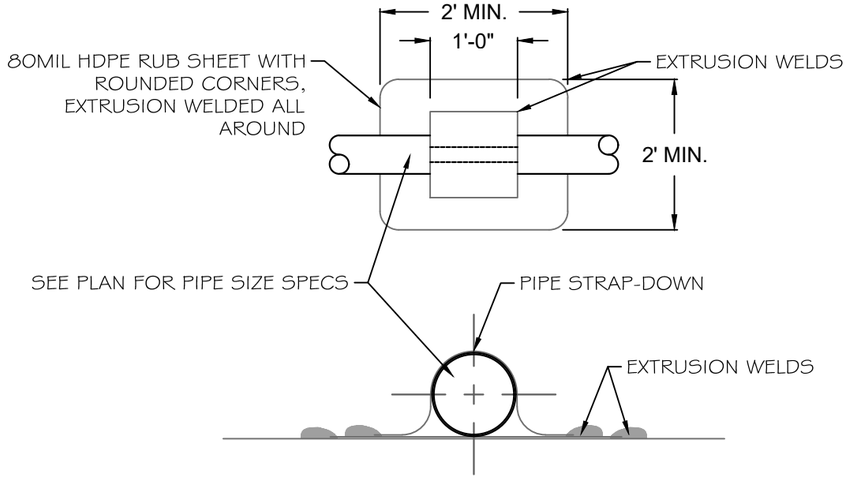
PLOT DATE:	01/08/18
JOB NO.:	17003
SCALE:	AS SHOWN
SHEET NO.:	D.1





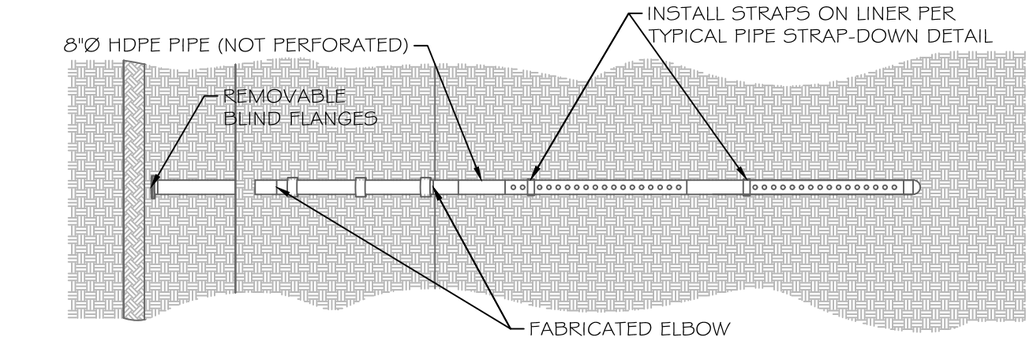
A SLUDGE REMOVAL PIPE ANCHOR DETAIL

NOTE: ANCHOR TO BE USED ON HORIZONTAL SURFACES ONLY, AT BOTTOM OF LAGOON N.T.S.



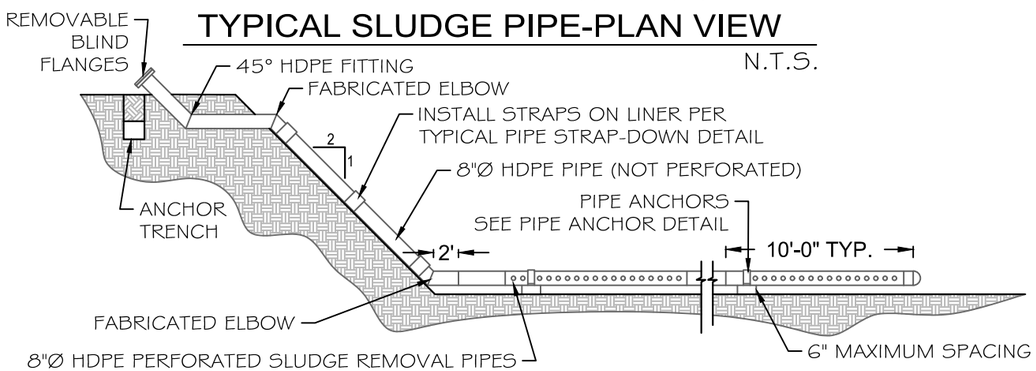
B TYPICAL PIPE STRAP-DOWN DETAIL

NOTE: MAXIMUM 10' O.C. SPACING BETWEEN PIPE STRAP-DOWNS, U.N.O. N.T.S.



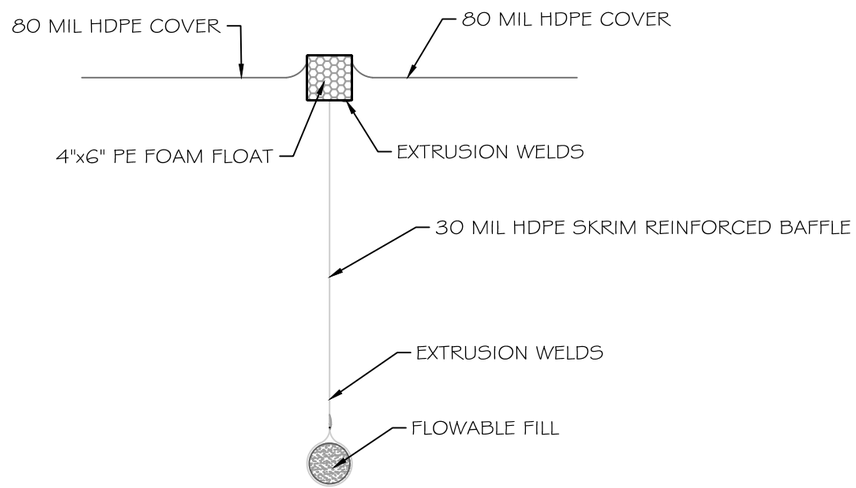
TYPICAL SLUDGE PIPE-PLAN VIEW

N.T.S.



C TYPICAL SLUDGE PIPE-PROFILE

N.T.S.



D BAFFLE SECTION

N.T.S.

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(559) 563-0181

REGISTERED PROFESSIONAL ENGINEER CRAIG M. HARTMAN NO. 73837 Exp. 06-30-19 CIVIL STATE OF CALIFORNIA 1-8-18

PROJECT:

LONE OAK #1

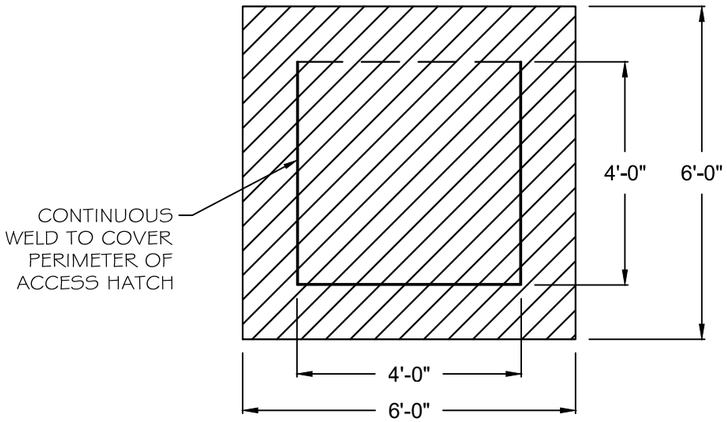
DAIRY DIGESTER

CLIENT:
BERNARD TE VELDE
13866 4TH AVE
HANFORD, CA 93230

SLURRY REMOVAL SYSTEM
DIGESTER

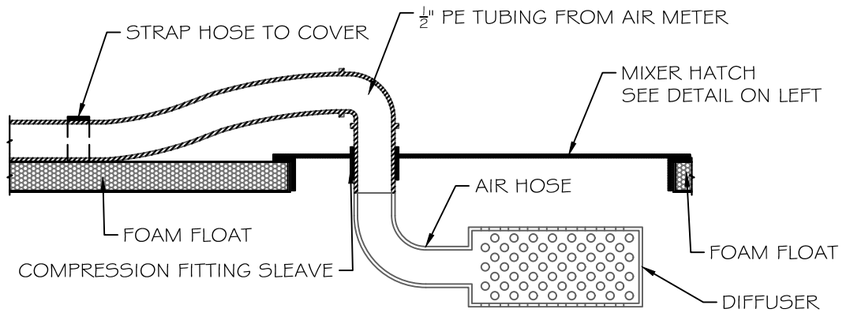
REVISION LOG:

PLOT DATE:	01/08/18
JOB NO.:	17003
SCALE:	AS SHOWN
SHEET NO.:	D.2



MIXER - HATCH

N.T.S.



AIR INJECTION & MIXER HATCH

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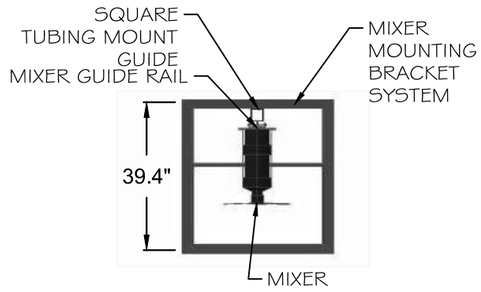
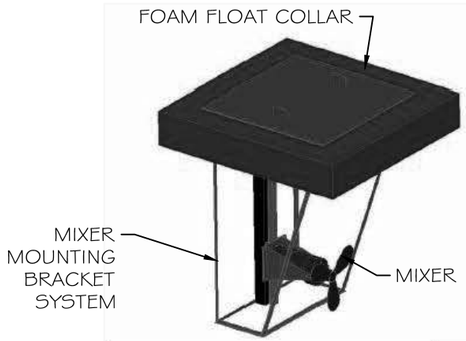


MIXER - PLAN VIEW

N.T.S.



MIXER - ISOMETRIC W/FLOAT IN PLACE

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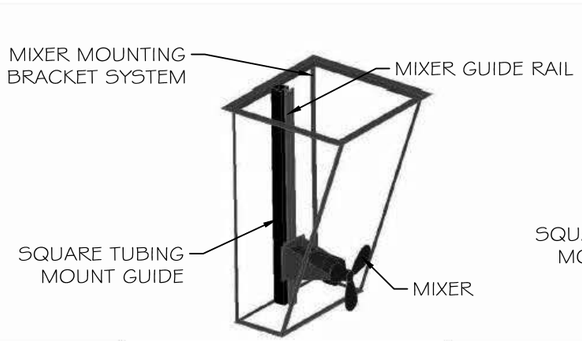

MIXER - ISOMETRIC

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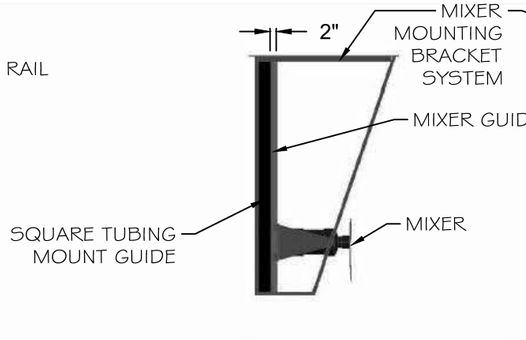
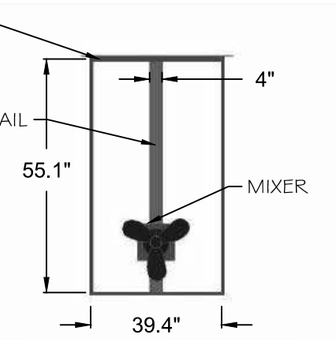


MIXER - SIDE VIEW

N.T.S.



MIXER - FRONT VIEW

N.T.S.

HARTMAN ENGINEERING
113 N. CHURCH ST,
SUITE 521
VISALIA, CA 93291
(559) 563-0181

REGISTERED PROFESSIONAL ENGINEER
CRAIG M. HARTMAN
NO. 73837
Exp. 06-30-19
CIVIL
STATE OF CALIFORNIA
1-8-18

PROJECT:

LONE OAK #1

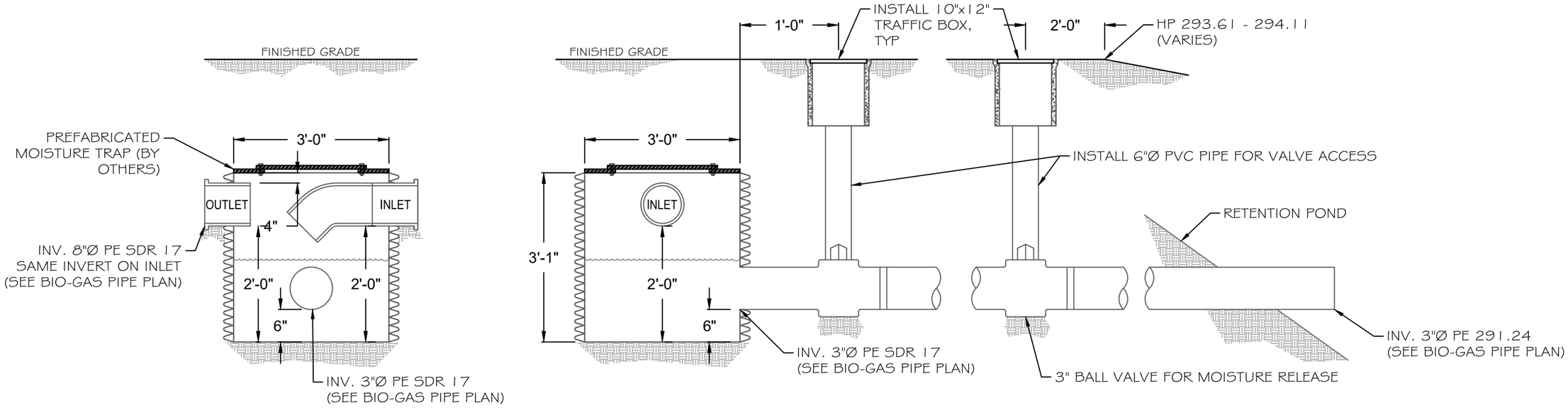
DAIRY DIGESTER

CLIENT:
BERNARD TE VELDE
13866 4TH AVE
HANFORD, CA 93230

MIXER DETAILS

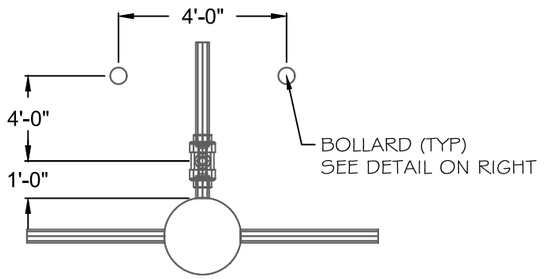
REVISION LOG:

PLOT DATE:	01/08/18
JOB NO.:	17003
SCALE:	AS SHOWN
SHEET NO.:	D.3



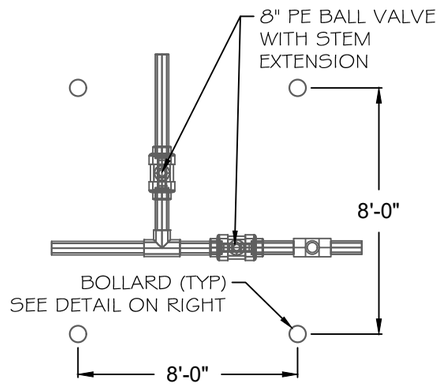
MOISTURE TRAP DETAIL

N.T.S.



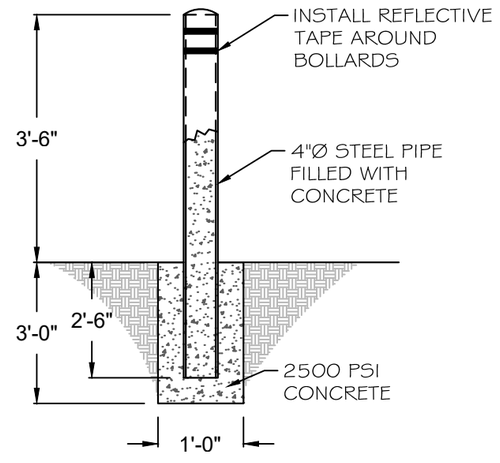
BIO-GAS VALVE

N.T.S.



BALL VALVE JUNCTION

N.T.S.



BOLLARD DETAIL

N.T.S.

HARTMAN ENGINEERING
113 N. CHURCH ST, SUITE 521
VISALIA, CA 93291
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REGISTERED PROFESSIONAL ENGINEER
CRAIG M. HARTMAN
NO. 73837
Exp. 06-30-19
CIVIL
STATE OF CALIFORNIA
1-8-18

PROJECT:

LONE OAK #1

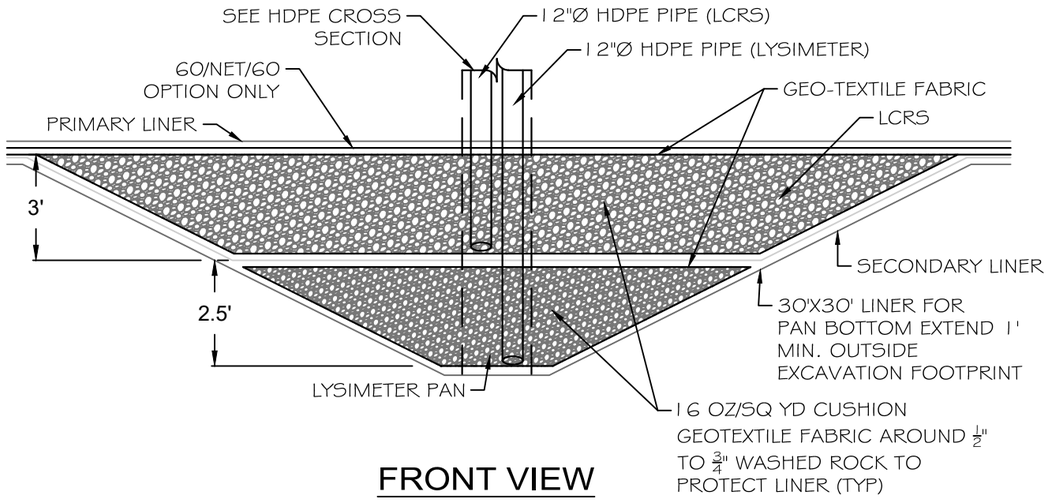
DAIRY DIGESTER

CLIENT:
BERNARD TE VELDE
13866 4TH AVE
HANFORD, CA 93230

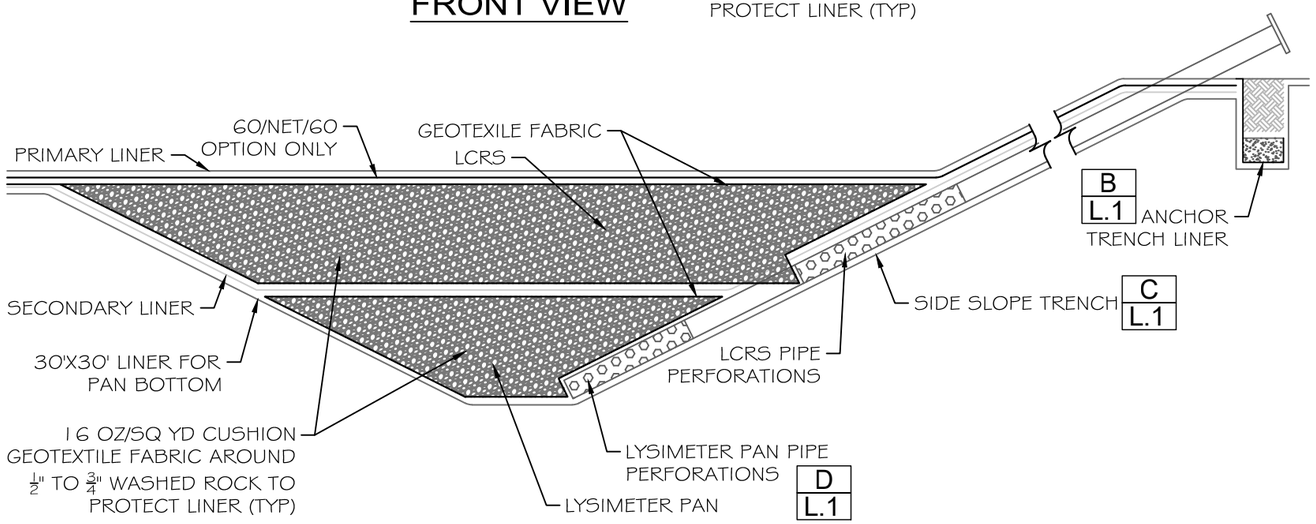
DETAILS

REVISION LOG:

PLOT DATE:	01/08/18
JOB NO.:	17003
SCALE:	AS SHOWN
SHEET NO.:	D.4



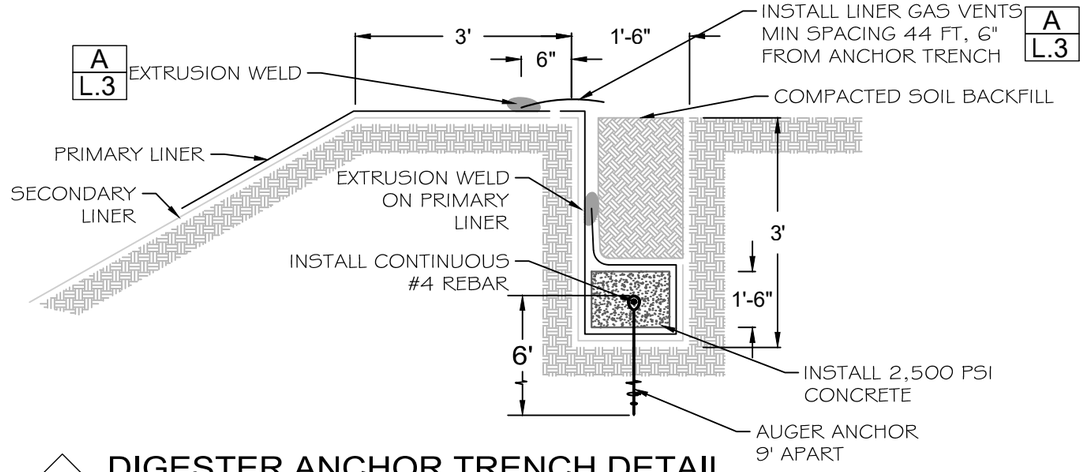
FRONT VIEW



SIDE VIEW

A LCRS, LYSIMETER AND DRAINAGE SUMP PROFILE

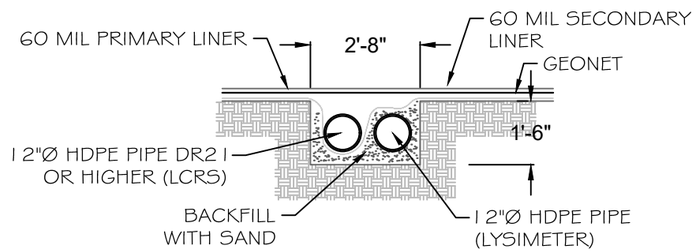
N.T.S.



B DIGESTER ANCHOR TRENCH DETAIL

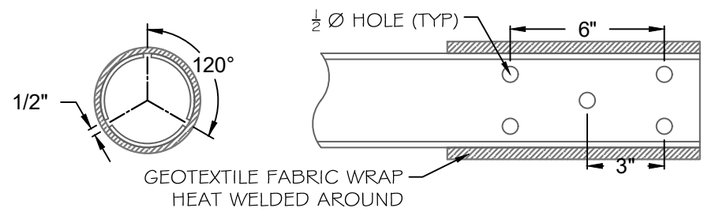
N.T.S.

NOTES: 1. CONTRACTOR TO USE ANCHOR SYSTEM OR PROVIDE DETAILS AND DESIGN FOR ALTERNATIVE TO BE APPROVED BY ENGINEER.



B HDPE CROSS SECTION

N.T.S.



C TYPICAL PERFORATION DETAIL

N.T.S.

1 H HARTMAN ENGINEERING
113 N. CHURCH ST, SUITE 521
VISALIA, CA 93291
(559) 563-0181

REGISTERED PROFESSIONAL ENGINEER CRAIG M. HARTMAN NO. 73837 Exp. 06-30-19 CIVIL STATE OF CALIFORNIA 1-8-18

PROJECT:

LONE OAK #1

DAIRY DIGESTER

CLIENT:
BERNARD TE VELDE
13866 4TH AVE
HANFORD, CA 93230

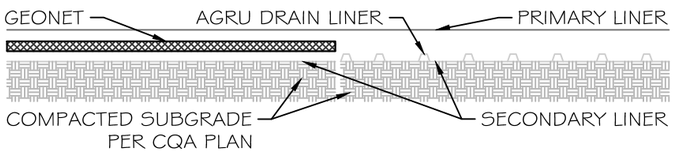
GENERAL NOTES
LINER DETAILS

REVISION LOG:

PLOT DATE:	01/08/18
JOB NO.:	17003
SCALE:	AS SHOWN
SHEET NO.:	L.1

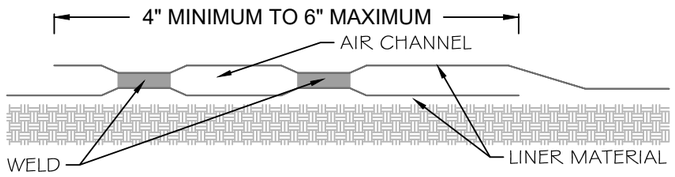
OPTIONAL TIER 1 DOUBLE LINER-LAYERING SYSTEM WITH DRAIN LINER VERIFY WITH OWNER

SMOOTH/STUDDED/ 60-NET-60 LINER LAYERS					
DESCRIPTION	LOCATION	MATERAIL	THICKNESS (MIN)	TOP FINISH	BOTTOM FINISH
PRIMARY LINER	TOP	HDPE	60 MIL	SMOOTH	SMOOTH CONDUCTIVE
DRAINAGE NET	MIDDLE	HDPE	200 MIL	N/A	N/A
SECONDARY LINER	BOTTOM	HDPE	60 MIL	SMOOTH	SMOOTH

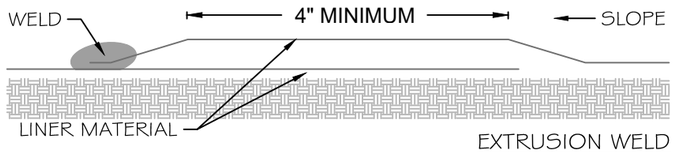


A DOUBLE LAYER 60-NET-60 DOUBLE LAYER WITH DRAIN LINER

N.T.S.



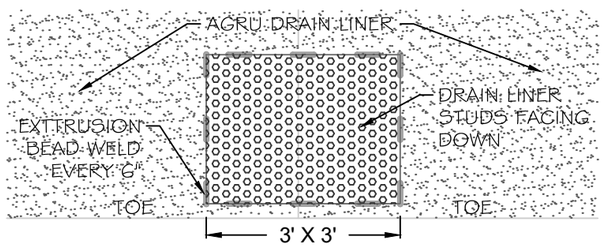
HOT WEDGE DOUBLE FUSION WELD



EXTRUSION WELD

B HDPE LINER-SMOOTH WELDS

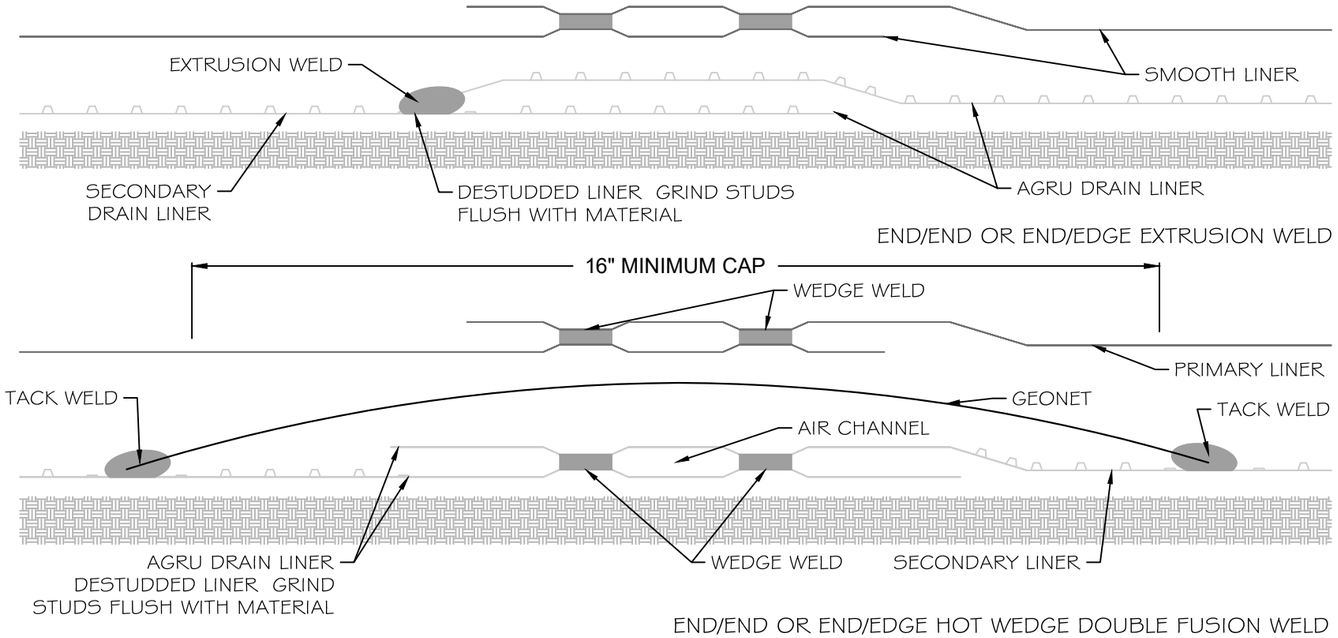
N.T.S.



DRAIN LINER SMOOTH END WELD PATCH

C 3'X3' DRAIN PATCH WELD

N.T.S.

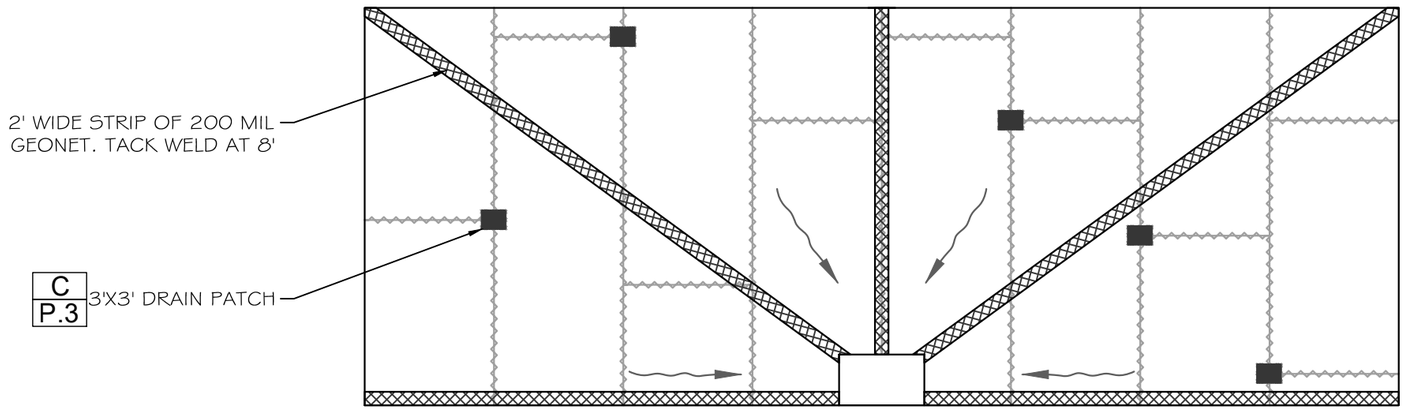


END/END OR END/EDGE EXTRUSION WELD

END/END OR END/EDGE HOT WEDGE DOUBLE FUSION WELD

D AGRU DRAIN LINER END/END WELD

NOTE: AGRU DRAIN LINER DOES NOT HAVE STUDS ALONG THE EDGE SO EDGE/EDGE SEAMS DO NOT REQUIRE DRINGING OR CAP. N.T.S.



NOTE: CQA OFFICER IS RESPONSIBLE TO ADD PATCHES AS NEEDED FOR FLOW

E AGRU DRAIN LINER CROSS SEAM NET PLAN VIEW

NOTE: TYPICAL OF ALL DRAIN LINERS N.T.S.

1
H
HARTMAN ENGINEERING
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(559) 563-0181

REGISTERED PROFESSIONAL ENGINEER CRAIG M. HARTMAN NO. 73837 Exp. 06-30-19 CIVIL STATE OF CALIFORNIA 1-8-18

PROJECT:

LONE OAK #1

DAIRY DIGESTER

CLIENT:
BERNARD TE VELDE
13866 4TH AVE
HANFORD, CA 93230

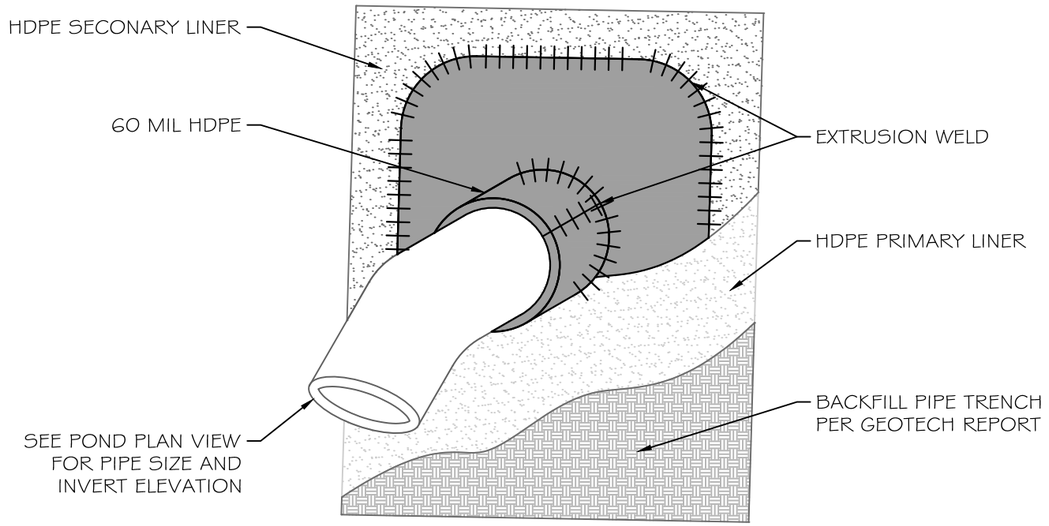
LINER DETAILS

REVISION LOG:

PLOT DATE:	01/08/18
JOB NO.:	17003
SCALE:	AS SHOWN
SHEET NO.:	L.2

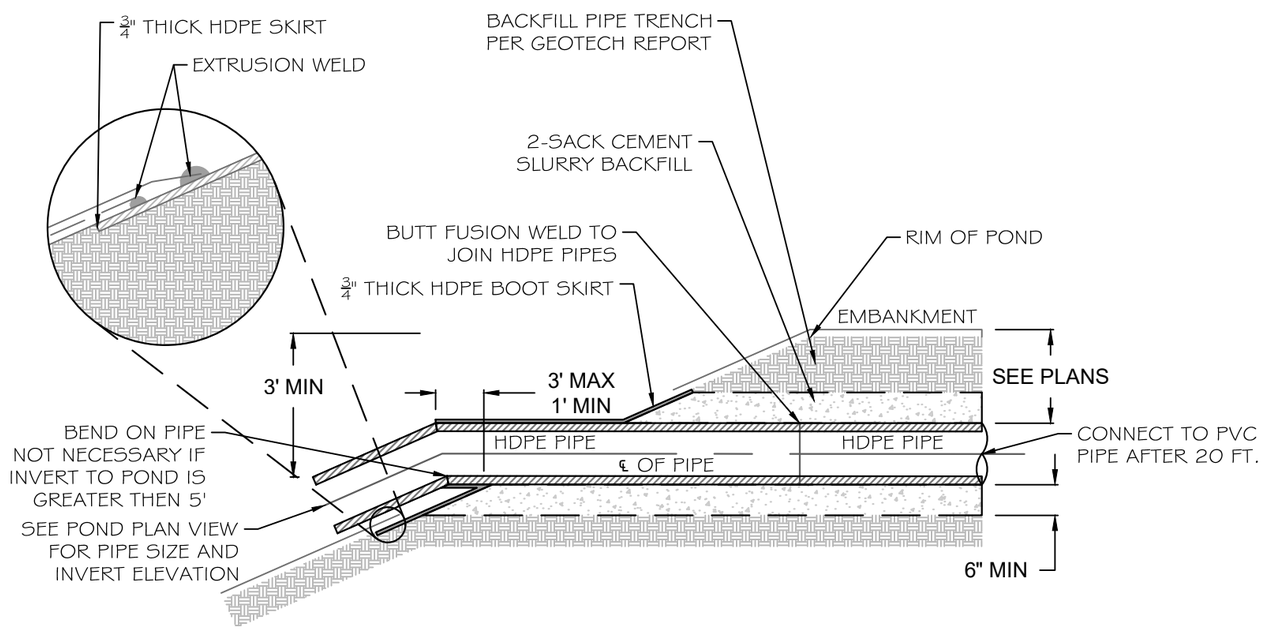
1.1.3 - Engineered Project Site Plan and Design

1.2 - Lakeside Pipeline LLC - Application - 2018 Solicitation SB 1383 Dairy Pilot Projects



A BOOT SKIRT

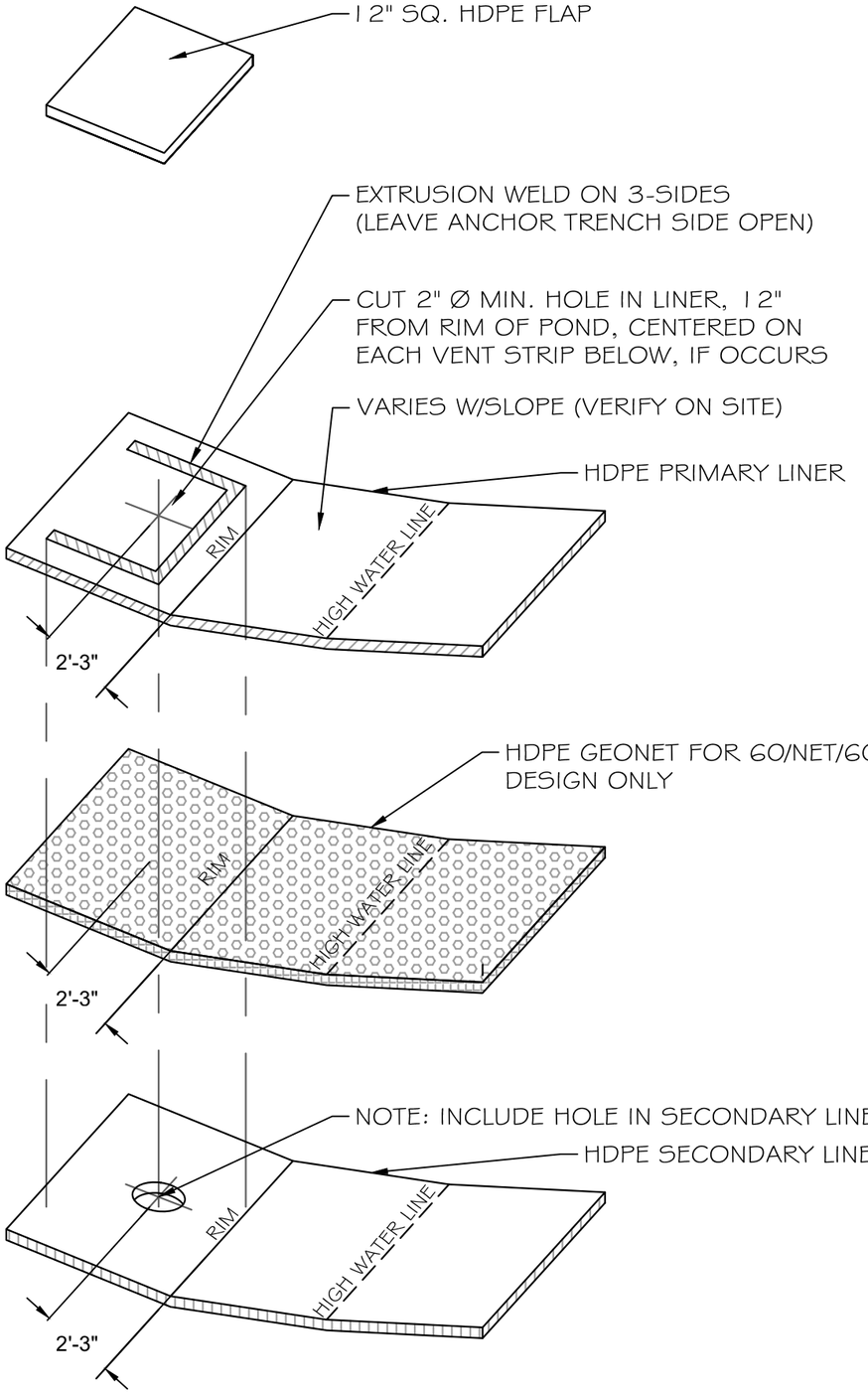
N.T.S.



B BOOTLESS PIPE PENETRATION

LINER FASTENING

N.T.S.



C VENT ORIFICE (ISOMETRIC VIEW)

N.T.S.

1 H HARTMAN ENGINEERING

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VISALIA, CA 93291
(559) 563-0181

REGISTERED PROFESSIONAL ENGINEER
CRAIG M. HARTMAN
NO. 73837
Exp. 06-30-19
CIVIL
STATE OF CALIFORNIA
1-8-18

PROJECT:

LONE OAK #1

DAIRY DIGESTER

CLIENT:
BERNARD TE VELDE
13866 4TH AVE
HANFORD, CA 93230

LINER DETAILS

REVISION LOG:

PLOT DATE:	01/08/18
JOB NO.:	17003
SCALE:	AS SHOWN
SHEET NO.:	L.3

POPLAR LANE
DAIRY DIGESTER

BENCHMARK

THE TOPOGRAPHIC SURVEY WAS PERFORMED UTILIZING GLOBAL POSITIONING SYSTEM OBSERVATIONS. DISTANCES AND NUMBERS SHOWN ARE TO BE CONSIDERED GROUND VALUES. BENCHMARK AND CONTROL SHOWN ON CONTROL PLAN SHEET. THE BENCHMARK AND VERTICAL ELEVATIONS WERE DERIVED FROM THE NGS ONLINE POSITIONING SERVICE (OPUS), AND IS SHOWN ON THE NAVD 88 DATUM UTILITIZING THE GEOID 09 AS THE VERTICAL MODEL.

PRESERVATION OF MONUMENTS

PURSUANT TO SECTIONS 8771(B) AND 8771(C) OF THE GOVERNMENT CODE, ANY MONUMENTS THAT CONTROL THE LOCATION OF BOUNDARIED, OR OTHERWISE PROVIDE HORIZONTAL OR VERTICAL SURVEY CONTROL WITHIN THE CONSTRUCTION AREA, SHALL BE LOCATED AND REFERENCED PRIOR TO CONSTRUCTION, AND A CORNER RECORD OR RECORD OF SURVEY OF THE REFERENCES SHALL BE FILED WITH THE COUNTY SURVEYOR.

PERMANENT MONUMENTATION SHALL BE SET TO PERPETUATE THE LOCATION OF ANY MONUMENT WHICH COULD BE DAMAGED OR DESTROYED, AND A CORNER RECORD OR RECORD OF SURVEY SHALL BE FILED WITH THE COUNTY SURVEYOR PRIOR TO THE RECORDING OF A CERTIFICATE OF COMPLETION FOR THE PROJECT.

DUST CONTROL NOTES

CONTRACTOR IS REQUIRED TO COMPLY WITH GOOD HOUSE KEEPING PRACTICES

STORMWATER (SWPPP) NOTES

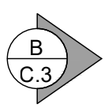
CONTRACTOR IS REQUIRED TO COMPLY WITH GOOD HOUSE KEEPING PRACTICES

VICINITY MAP
SCALE 1" : 2 MI

SHEET REFERENCE

SECTIONS:

SECTION NAME
SHEET NUMBER



DETAILS: B

DETAIL NAME
SHEET NUMBER

CONTACT INFO

ENGINEER:
CRAIG HARTMAN, RCE 73837
HARTMAN ENGINEERING, INC.
3121 W. CERES CT.
VISALIA, CA 93291
(559) 563-0181

DAIRY CONTACT:
BERNARD TE VELDE SR.
5387 KENT AVE
HANFORD, CA 93230

SHEET INDEX

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VISALIA, CA 93291
(559) 563-0181

REGISTERED PROFESSIONAL ENGINEER
CRAIG M. HARTMAN
NO. 73837
Exp. 06-30-19
CIVIL
STATE OF CALIFORNIA
1-8-18

PROJECT:
POPLAR LANE
DAIRY DIGESTER

CLIENT:
BERNARD TE VELDE SR
5387 KENT AVE
HANFORD, CA 93280

REVISION LOG:

PLOT DATE:	01/08/18
JOB NO.:	17003
SCALE:	AS SHOWN
SHEET NO.:	A.1

SPECIFICATIONS FOR ENGINEERED FILL MATERIAL OF ABOVE GRADE EMBANKMENTS OR AS REQUIRED

TEST PARAMETER	TEST METHOD	FREQUENCY	ACCEPTANCE CRITERIA
Compaction Curves	ASTM D1557 (Modified Proctor)	Change in material	N/A
Grain Size Distribution	ASTM D422 (Sieve)	Change in material	At least 30% passing No. 200 U.S. Standard Sieve. Per Specifications (1)
Soil Classification	ASTM D2487 (USCS)	Change in material	Suitable for compaction [2,3]
Maximum Particle Size	ASTM D422 (Sieve)	Change in material	½ inch, ¼ top 6 inches
Maximum Water soluble Sulfate (SO_4) in Soil (Concrete Slab locations)	ASTM C1580	Change in material	0.2% by weight

Site Preparation Specifications:

1. Clearing: Prior to earthwork operations, the area to be developed should be stripped of vegetation, organic topsoil, and cleared of cow waste and miscellaneous debris from the proposed construction areas. Deeper clearing may be required in localized areas. The actual depth of clearing should be reviewed by a licensed Geotechnical Engineer at the time of construction. The limits of stripping and clearing should be at least five feet beyond the limits of construction.

2. Compaction: The scarified subgrade and subsequent fill placed at the site should be moisture conditioned to near optimum moisture content, and compacted to at least and 90 percent for 2:1 side slope pond of maximum dry density as determined by ASTM test method D1557.

3. Material for fill: Fill should consist of select material. Native soil, free from organic, vegetation, and rocks or cobbles larger than three inches, may be used as fill at the site. Import material must be reviewed by licensed Geotechnical Engineer prior to transport to the site.

4. Fill placement: Fill material should be moisture-conditioned to +/- 2% of the optimum moisture content prior to compaction. Fill material with excessive moisture should be allowed to dry prior to compaction or be mixed with dry soil to bring the fill to a workable moisture content. Fill should be placed in level lifts not exceeding a loose, uncompacted thickness of eight inches, and compacted as engineered fill.

Sub-grade requirements for fill only:

-Over Excavate for minimum 1 ft. to meet Engineered Fill Borrow Material Guidelines and Pond Liner Sub-grade requirements

-Well mixed soil

-6 in max lifts

-Upper 6 inches is of fine-finished soil particles no greater than ¼ in.+

Notes:

1. Field tests shall not be required, but fill borrow material specifications must meet the acceptance criteria outlined in Table 1.
2. Refer to Geotechnical Report

NOTES:

THE APPROVED WORK PLAN WHICH INCLUDES THE CONSTRUCTION QUALITY ASSURANCE PLAN, OPERATION, MAINTENANCE AND MONITORING PLAN, CONSTRUCTION DRAWINGS, AND SOILS REPORT TOGETHER AS A PACKAGE ARE THE COMPLETE SPECIFICATIONS REQUIRED FOR CONSTRUCTION OF THE POND AND LINER SYSTEM.

FILL TEST SPECIFICATIONS FOR SUB-GRADE

TEST PARAMETER	TEST METHOD [1,1]	FREQUENCY	ACCEPTANCE CRITERIA
Uncompacted Lift Thickness	Visual Observation	Continuous	8-in.[1,2]
Construction Oversight	Visual Observation	Continuous	Maximum particle size 1/2 inch.
In-Place Moisture Alternative Method	ASTM D2216 (Oven Dry)	1 per every 10 Nuclear tests	+/-2% of Optimum Moisture Content per ASTM D1557
In-Place Moisture Rapid Field Methods[3,5]	ASTM D6938[3,5] (Nuclear Method)	3 per acre per lift, min. 2 per day	+/-2% of Optimum Moisture Content per ASTM D1557
In-Place Density Alternate Method	ASTM D2937(Drive Cylinder)	1 per every 10 Nuclear tests	90% of Maximum Dry Density per ASTM D1557
In-Place Density Rapid Field Methods[4,5]	ASTM D6938[3,5] (Nuclear Method)	3 per acre per lift, min. 2 per day	90% of Maximum Dry Density per ASTM D1557
Subgrade Thickness	Surveying Measurement	At 50-foot centers	Minimum 1 ft.[1,4]
Clod Size	Visual Observation	Continuous	Per Specification

Notes:

See earthwork section for anchor trench, excavation, backfill, and compaction requirements.

[1] ASTM Test Method, unless otherwise noted. Results of all tests performed to be reported as per method reporting criteria.

[2] The sub-grade shall be scarified to a depth of 1 ft. lower than finished grade, compacted, and tested in accordance with the requirements of this table.

[3] Must be verified by ASTM D2216 (Oven) overnight method once every day or once per change in material

[4] Must be verified by ASTM D2937 (Dry Cylinder) twice per day or per change in material

[5] Calibration Procedure: ASTM D7013-04: Standard Guide for Nuclear Surface Moisture and Density Gauge Calibration Facility Set-up

POND SPECIFICATIONS FOR SUBGRADES CUT BELOW GROUND
(For Slopes 2:1 or shallower)

Side Slopes: The certified Civil Engineer/CQA Chief Officer shall walk final side slopes after cut by heavy equipment and confirm no SW or SP soils and no loose soils. All SW, SP, or soils that are not amenable to a firm and unyielding subgrade shall be removed and replaced down to a minimum 3 ft. below sloped surface. Any soils removed and replaced shall meet the Engineered Fill requirements in Table 1.

Pond Bottom: 1. An as-built survey of the pond bottom shall take place after subgrade construction to insure minimum slopes are achieved. Pond Bottom shall be tested per criteria below. Any soils not meeting the requirements below (i.e. that is not firm and unyielding) shall be removed and replaced down to a minimum 2 ft. Any soils removed and replaced shall meet the Engineered Fill requirements in Table 1. The Civil Engineer may make determination of soils meeting requirements or not based upon visual inspection which shall be included in the Subgrade Certification Report and signed and sealed by a Civil Engineer and CQA Officer.

TEST PARAMETER	TEST METHOD [1,1]	FREQUENCY	ACCEPTANCE CRITERIA
In-Place Density Rapid Field Methods [1]	ASTM D6938[3,5] (Nuclear)	3 per acre	90% of Maximum Dry Density per ASTM D1557
In-Place Moisture Rapid Field Methods[3,5]	ASTM D6938[3,5] (Nuclear Methods)	3 per acre per lift, min. 2 per day	+/-2% of Optimum Moisture Content per ASTM D1557
Construction Oversight	Visual Observation	Continuous	Maximum particle size 1/2 inch.
Subgrade Slope	Surveying Measurement	200 ft. maximum grid	Min 1%

60 MIL HDPE GEOMEMBRANE CONSTRUCTION QUALITY ASSURANCE (CQA)

TEST PARAMETER	TEST METHOD	FREQUENCY	ACCEPTANCE CRITERIA
Thickness (min. ave.) -Lowest individual for 8 out of 10 values -Lowest individual for any of the 10 values	ASTM D5994	1 per lot or 1 per 70,000 ft2, whichever is greater	Nom. (-5%) -10% -15%
Tensile Properties -yield strength -break strength -strain at yeild -break strength	ASTM D6693 Type IV	1 per lot or 1 per 70,000 ft2, whichever is greater	≥126 lb./in. ≥90 lb./in. ≥12% ≥100%
Puncture Resistance	ASTM D4833	1 per lot or 1 per 70,000 ft^2, whichever is greater	108 lb. (min.)
Tear Resistance	ASTM D1004, Die C	1 per lot or 1 per 70,000 ft2, whichever is greater	42 lb. (min.)
Interface Shear -60-mil HDPE/subgrade soil -Drainage geocomposite	ASTM D5321 ASTM D6243	2 tests or 1 per 200,000 ft2, whichever is greater	
Seam Shear	ASTM D6392	1 test per 500 lineal feet or per GRI GM-14 and 20.	95% of min. yield strength
Seam Peel -Extrusion -Fusion	ASTM D6392	1 test per 500 lineal feet or per GRI GM-14 and 20.	72% yield & ftb (1)
Non-destructive Seam Test	ASTM D5820 (Pressure Test)	Continuous	35 psi for 5 min.
	ASTM D5641 (Vacuum Box)		5 psi for 15 sec.
	ASTM D5641 (Spark Test)		No Spark
Electric Leak Location	ASTM D7002 (Water Puddle)	Once on constructed liner	Max 1 mm. diameter hole sensitivity
	ASTM D6747 (Selection Process)		
	ASTM D7007 (Water /Earth)		Max 6 mm. diameter hole sensitivity
	ASTM D7240 (Spark Test 2011)		

Notes:

ftb: Film Tear Bond

1 HARTMAN ENGINEERING
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REGISTERED PROFESSIONAL ENGINEER CRAIG M. HARTMAN NO. 73837 Exp. 06-30-19 CIVIL STATE OF CALIFORNIA 1-8-18

PROJECT:

POPLAR LANE

DAIRY DIGESTER

CLIENT:
BERNARD TE VELDE SR
5387 KENT AVE
HANFORD, CA 93280

GENERAL NOTES
CONSTRUCTION

REVISION LOG:

PLOT DATE:	01/08/18
JOB NO.:	17003
SCALE:	AS SHOWN
SHEET NO.:	A.2

HARTMAN ENGINEERING

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SITE PLAN
DIGESTER

REVISION LOG:

PLOT DATE:	01/08/18
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SHEET NO.:	A.3

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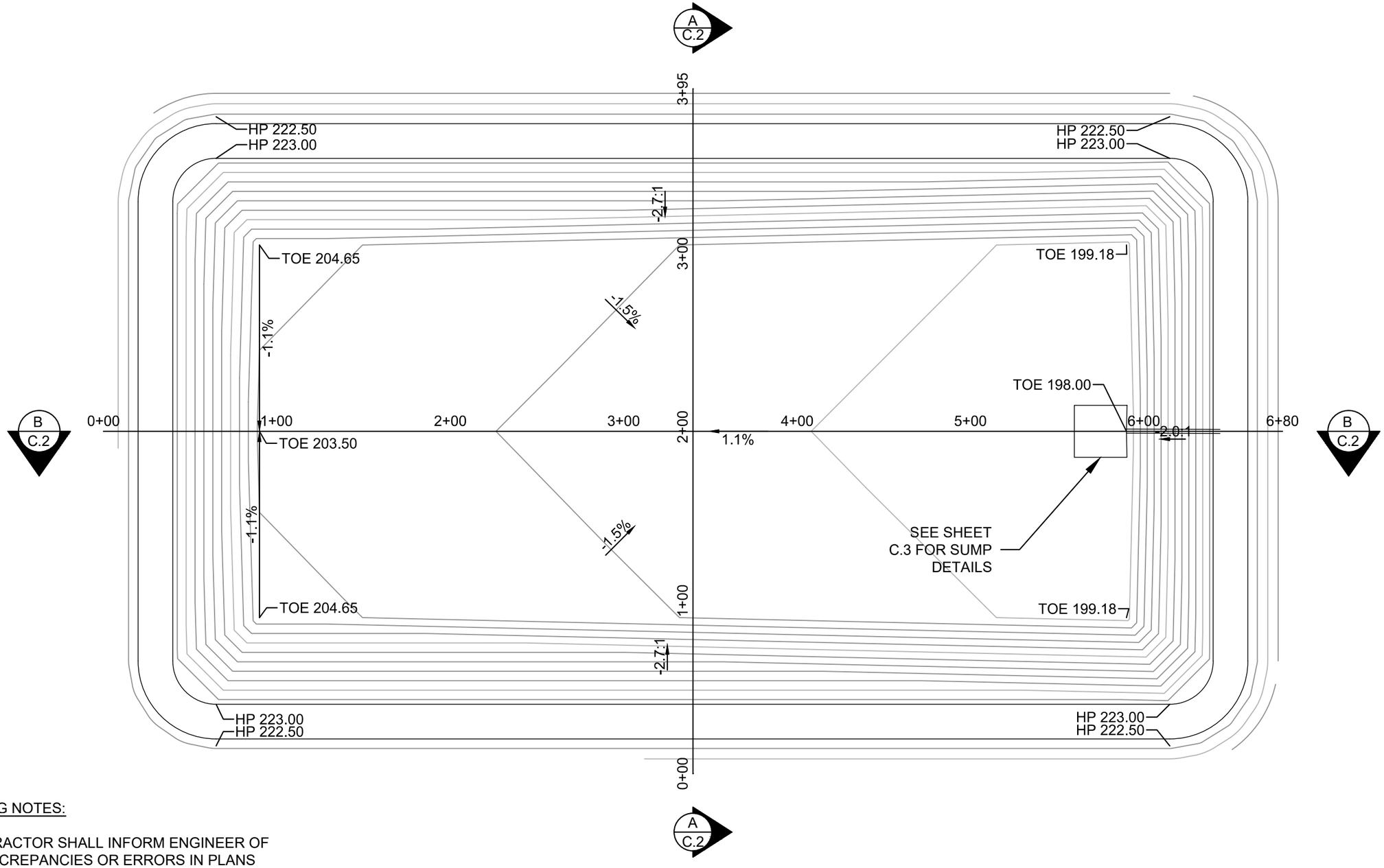
SITE PLAN
DAIRY

REVISION LOG:

PLOT DATE:	01/08/18
JOB NO.:	17003
SCALE:	AS SHOWN
SHEET NO.:	A.4



GRADING NOTES:

1.CONTRACTOR SHALL INFORM ENGINEER OF ANY DISCREPANCIES OR ERRORS IN PLANS PRIOR TO CONSTRUCTION.

2. CONTRACTOR SHALL MEET SPECIFICATIONS OF TABLE 2 WITHIN THE APPROVED CONSTRUCTION QUALITY CONTROL PLAN.

3. CONTRACTOR SHALL SMOOTH DRUM ROLL FINAL SURFACE AND REMOVE ANY ROCK OR MATERIAL GREATER THAN $\frac{1}{2}$ INCH.

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5387 KENT AVE
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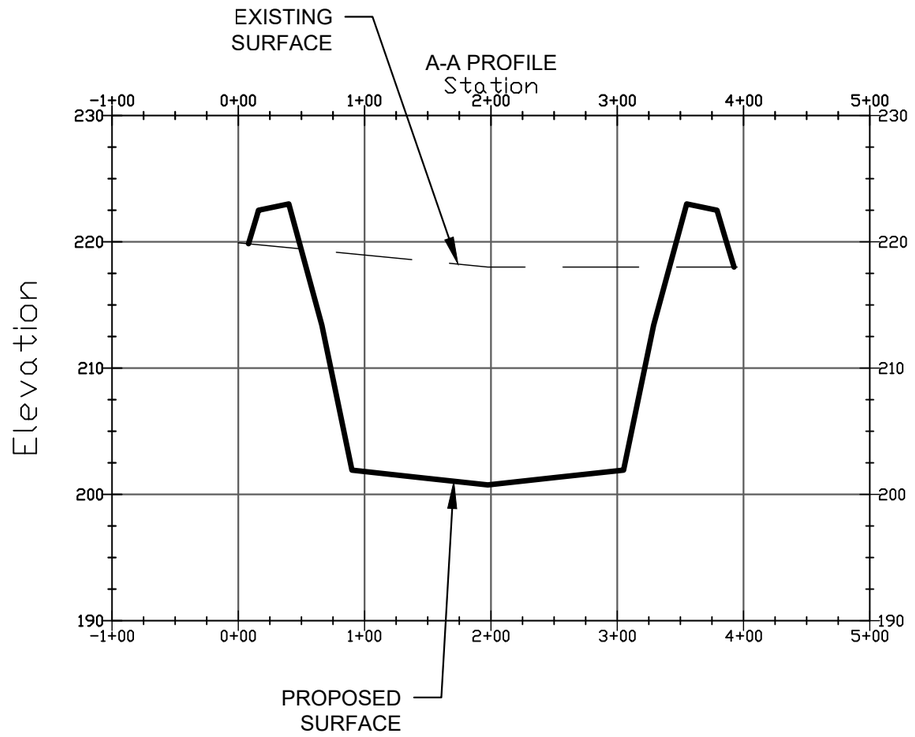
GRADING PLAN

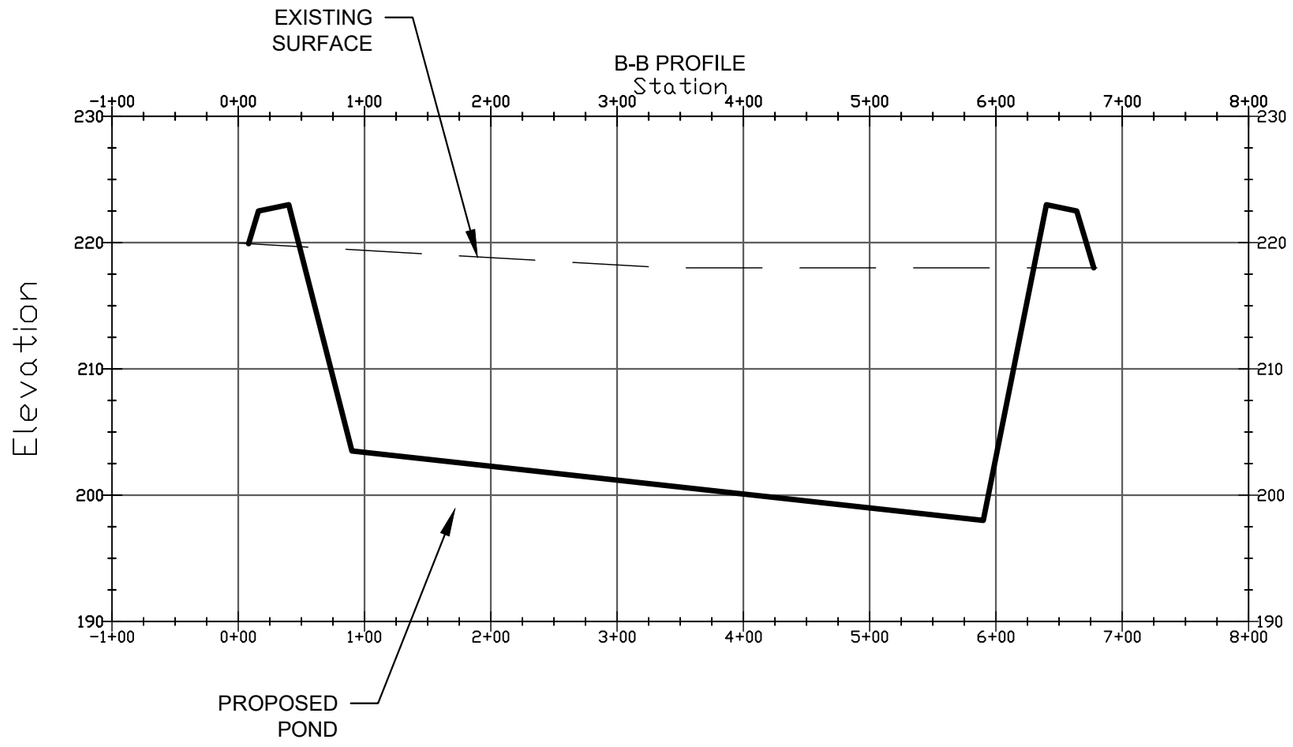
DIGESTER

REVISION LOG:

PLOT DATE:	01/08/18
JOB NO.:	17003
SCALE:	AS SHOWN
SHEET NO.:	C.1

0 60
0 1
N





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PROJECT:

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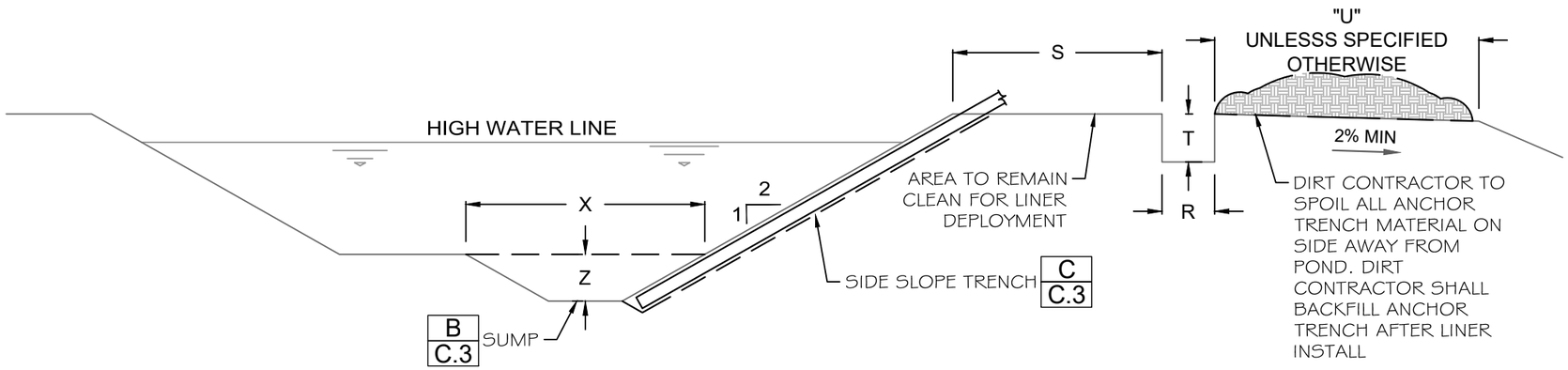
GRADING SECTIONS

DIGESTER

REVISION LOG:

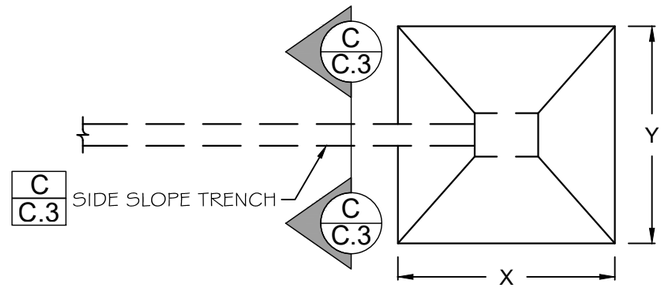
PLOT DATE:	01/08/18
JOB NO.:	17003
SCALE:	AS SHOWN
SHEET NO.:	C.2



A ANCHOR TRENCH / SUMP PROFILE VIEW

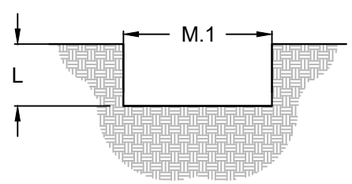
N.T.S.

DIMENSION TABLE (FT.)	
LETTER	POND
L	1.7'
M.1	2.7'
U	20'
R	1.5'
S	3'
T	3'
X	30'
Y	30'
Z	5.5'



B SUMP PLAN VIEW

N.T.S.



C SIDE SLOPE TRENCH

N.T.S.

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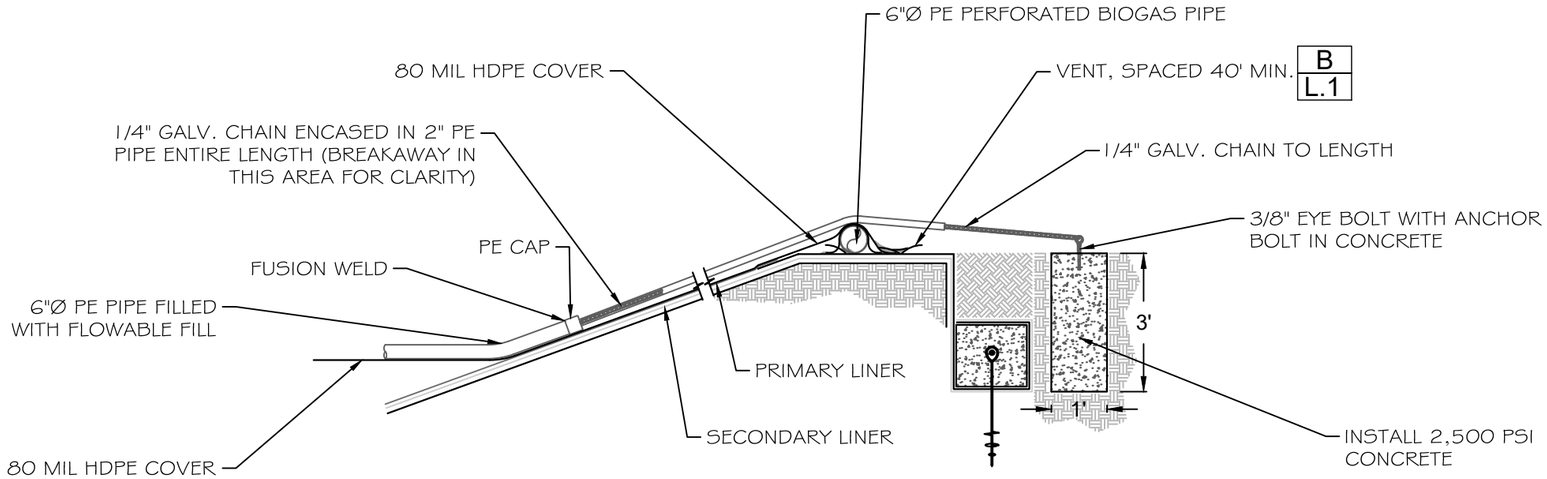
GRADING DETAIL
DIGESTER

REVISION LOG:

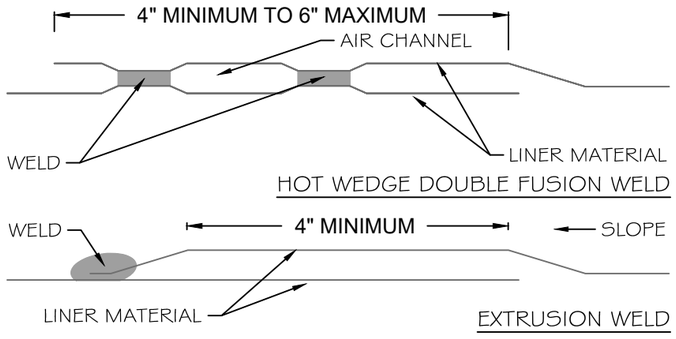
PLOT DATE:	01/08/18
JOB NO.:	17003
SCALE:	AS SHOWN
SHEET NO.:	C.3



A BALLAST TUBE DETAIL

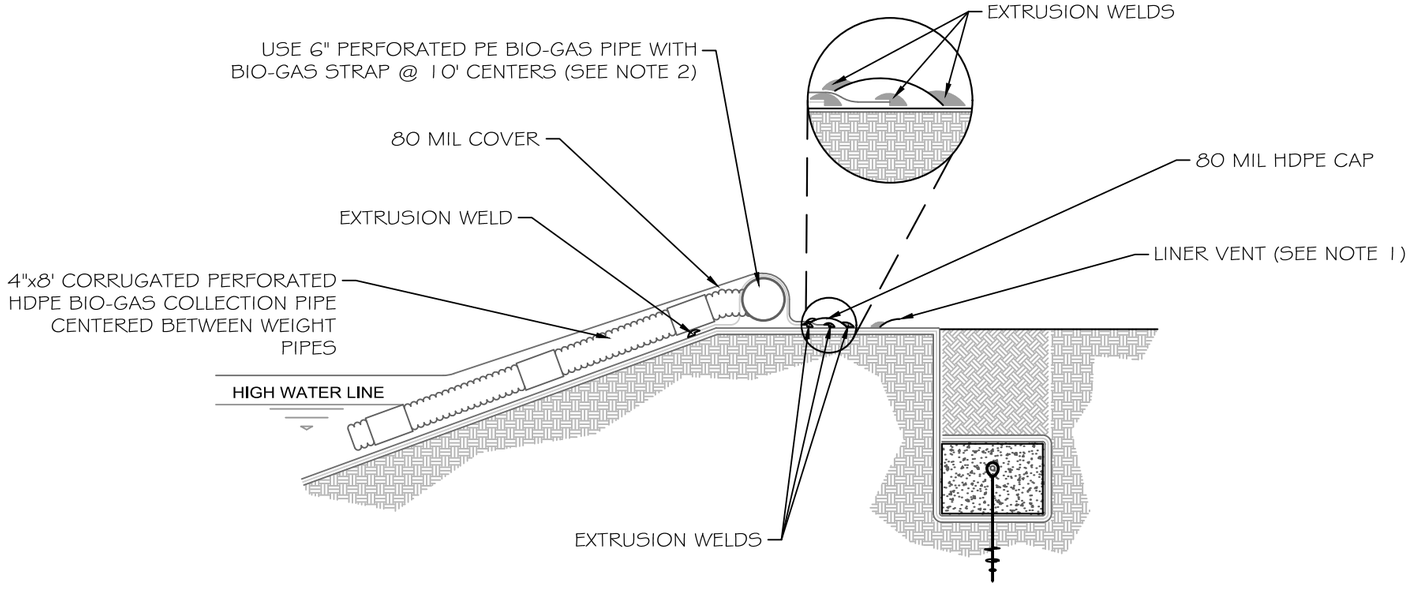
N.T.S.

DESCRIPTION	LOCATION	MATERAIL	THICKNESS (MIN)	TOP FINISH	BOTTOM FINISH
COVER	TOP	HDPE	80 MIL	SMOOTH	SMOOTH



C HDPE COVER-SMOOTH WELDS

N.T.S.



B BIO-GAS PIPING DETAIL

N.T.S.

NOTES:
1. GAS VENTS AROUND PERIPHERY OF LAGOON @ MAX. 40' O.C.
2. STRAP NOT WELDED TO BIO-GAS HEADER PIPE.
3. WRAP 60 MIL PRIMARY LINER OVER CONCRETE & EXTRUSION WELD.

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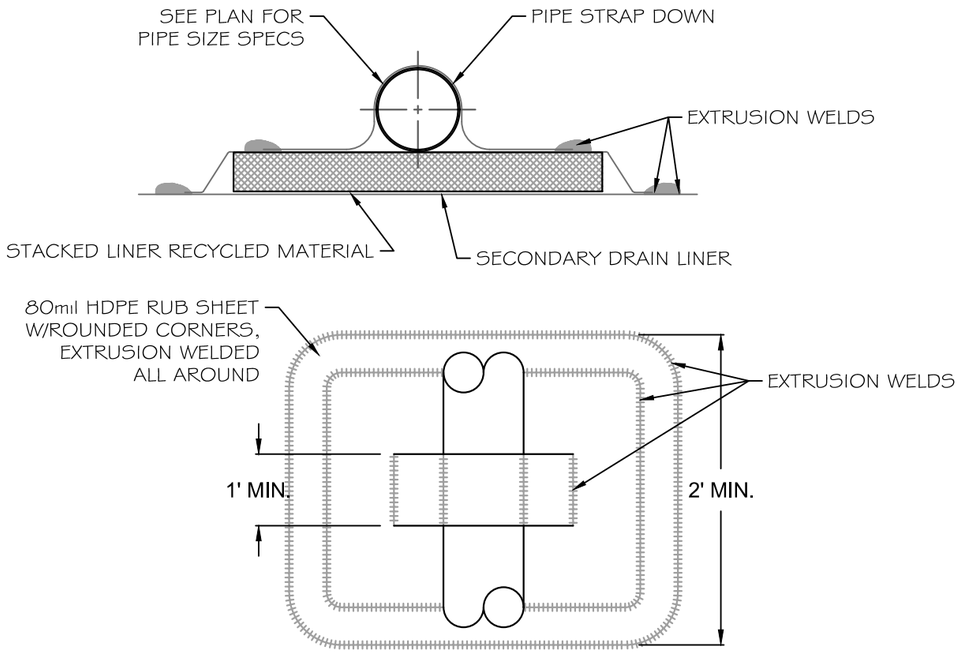
HANFORD, CA 93280

COVER SYSTEM
DIGESTER

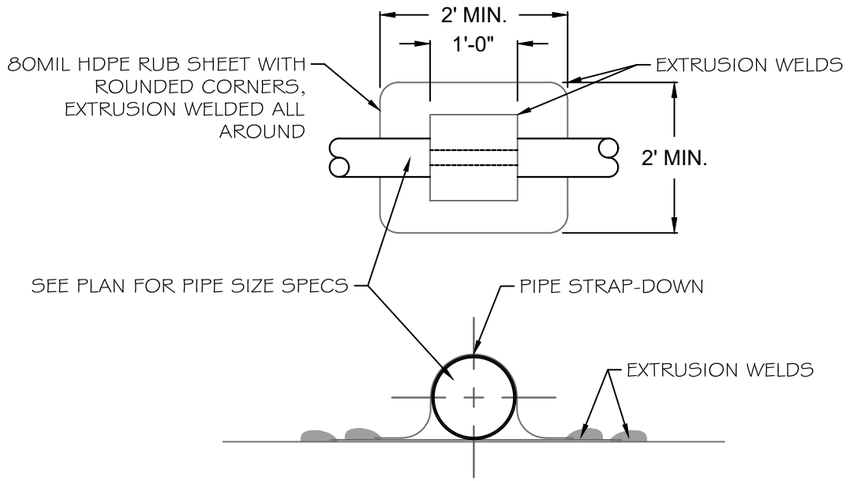
REVISION LOG:

PLOT DATE:	01/08/18
JOB NO.:	17003
SCALE:	AS SHOWN
SHEET NO.:	D.1



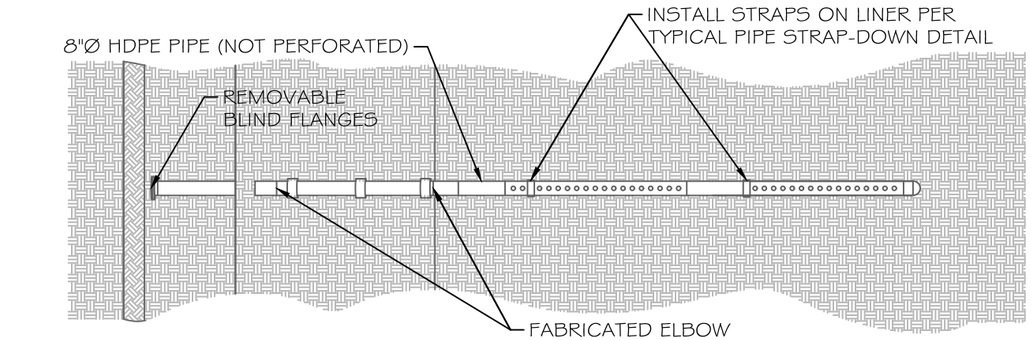
A SLUDGE REMOVAL PIPE ANCHOR DETAIL

NOTE: ANCHOR TO BE USED ON HORIZONTAL SURFACES ONLY, AT BOTTOM OF LAGOON N.T.S.



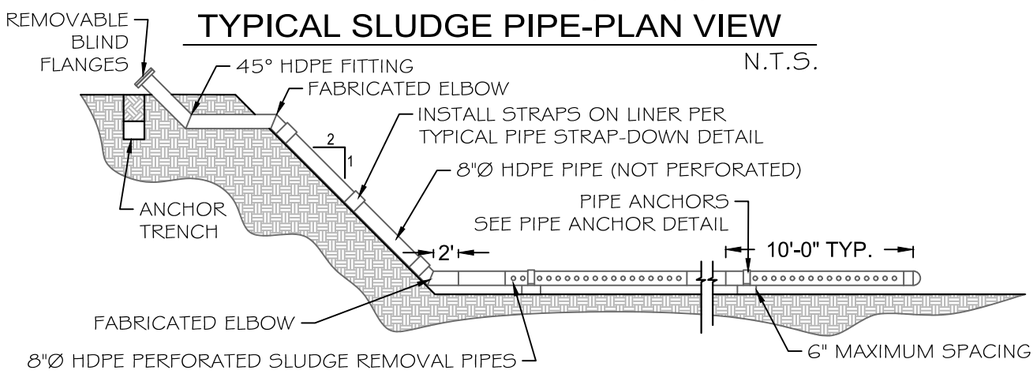
B TYPICAL PIPE STRAP-DOWN DETAIL

NOTE: MAXIMUM 10' O.C. SPACING BETWEEN PIPE STRAP-DOWNS, U.N.O. N.T.S.



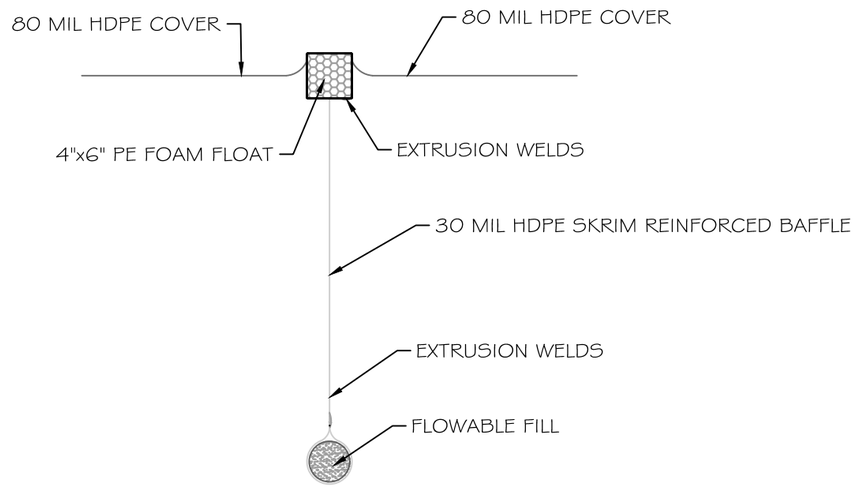
TYPICAL SLUDGE PIPE-PLAN VIEW

N.T.S.



C TYPICAL SLUDGE PIPE-PROFILE

N.T.S.



D BAFFLE SECTION

N.T.S.

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PROJECT:

POPLAR LANE

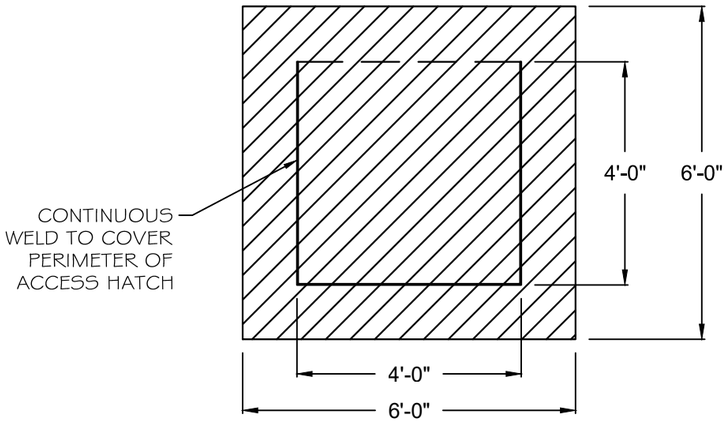
DAIRY DIGESTER

CLIENT:
BERNARD TE VELDE SR
5387 KENT AVE
HANFORD, CA 93280

SLURRY REMOVAL SYSTEM
DIGESTER

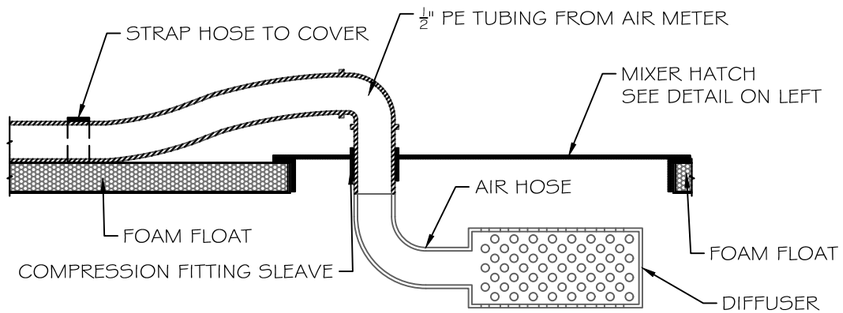
REVISION LOG:

PLOT DATE:	01/08/18
JOB NO.:	17003
SCALE:	AS SHOWN
SHEET NO.:	D.2



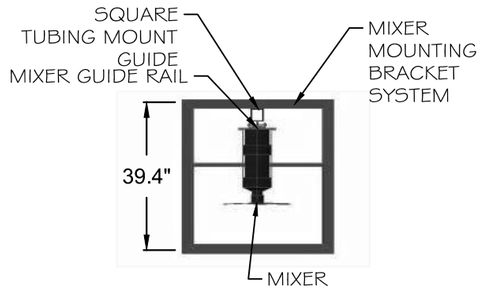
MIXER - HATCH

N.T.S.



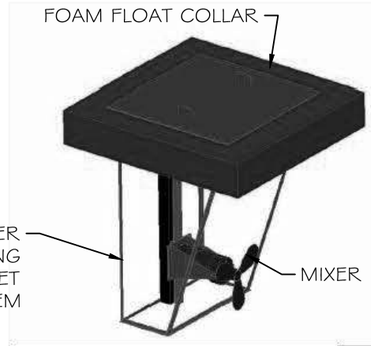
AIR INJECTION & MIXER HATCH

N.T.S.



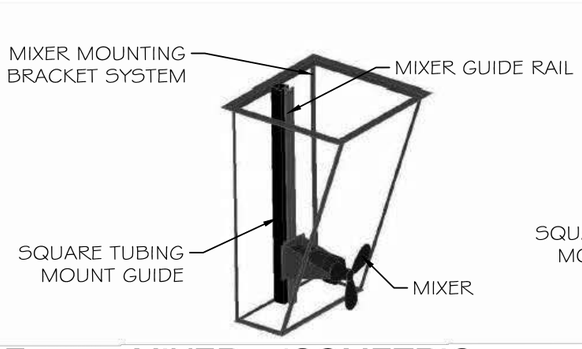
MIXER - PLAN VIEW

N.T.S.



MIXER - ISOMETRIC W/FLOAT IN PLACE

N.T.S.



MIXER - ISOMETRIC

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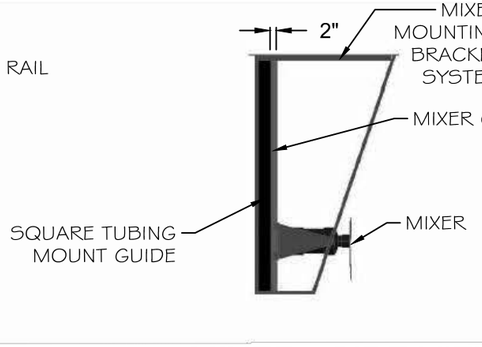
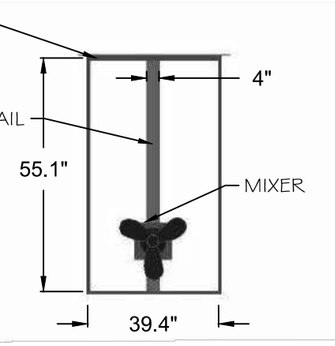


MIXER - SIDE VIEW

N.T.S.



MIXER - FRONT VIEW

N.T.S.

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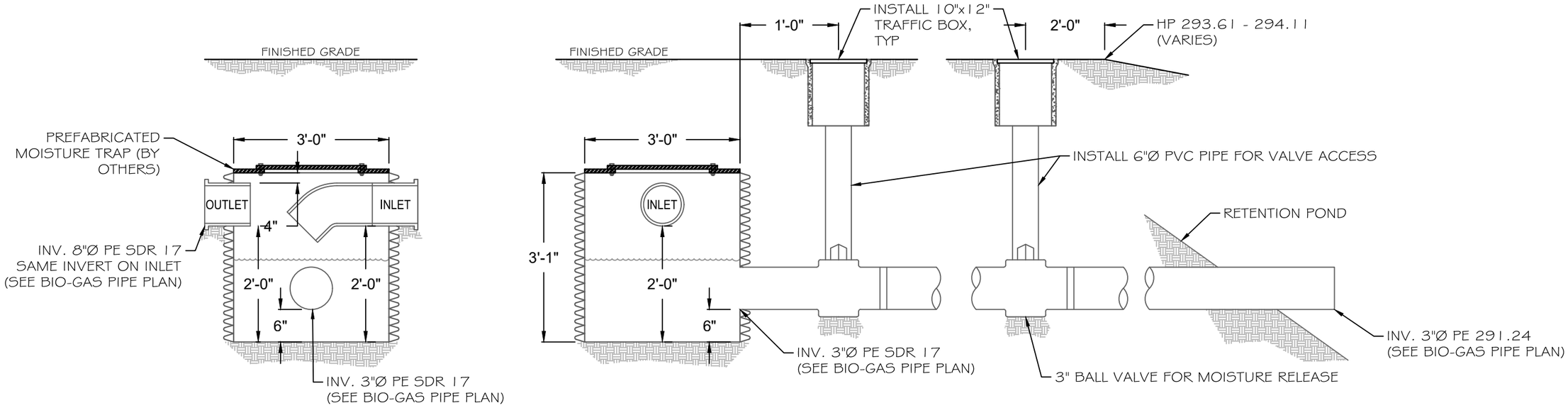
MIXER DETAILS

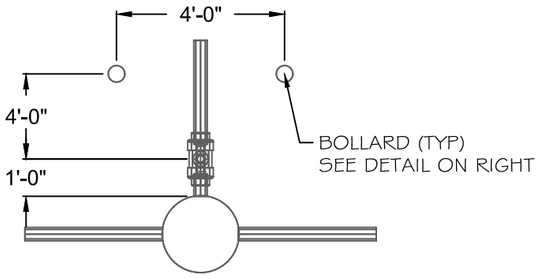
REVISION LOG:

PLOT DATE:	01/08/18
JOB NO.:	17003
SCALE:	AS SHOWN
SHEET NO.:	D.3



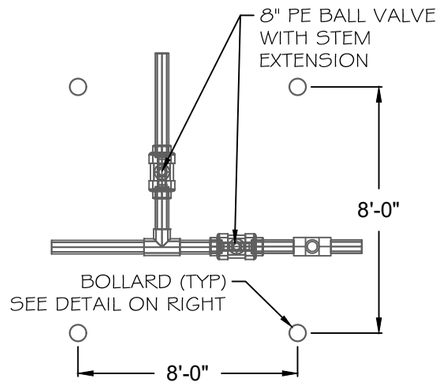
MOISTURE TRAP DETAIL

N.T.S.



BIO-GAS VALVE

N.T.S.



BALL VALVE JUNCTION

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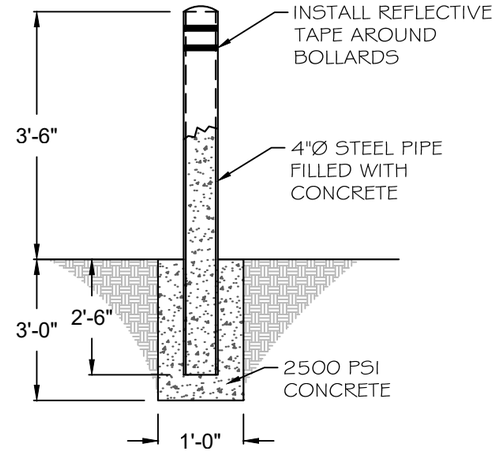

BOLLARD DETAIL

N.T.S.

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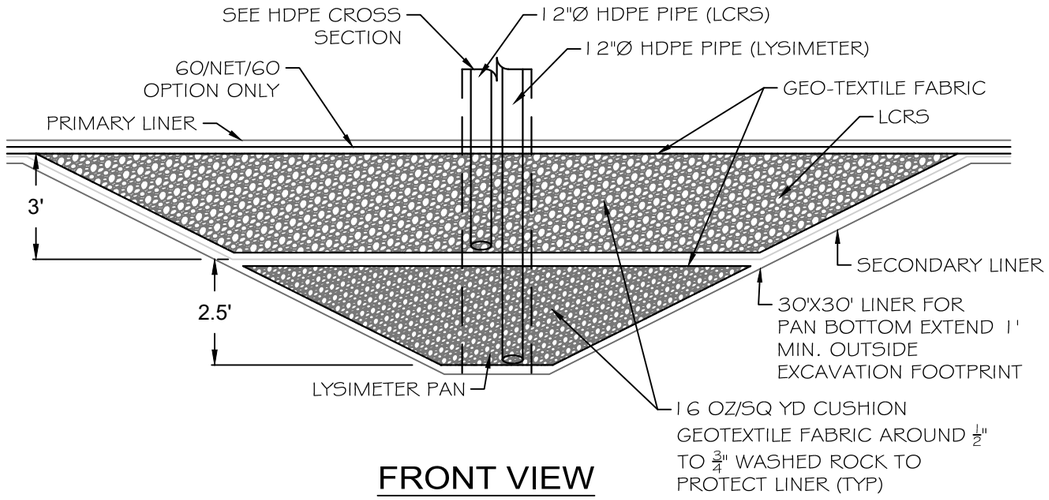
HANFORD, CA 93280

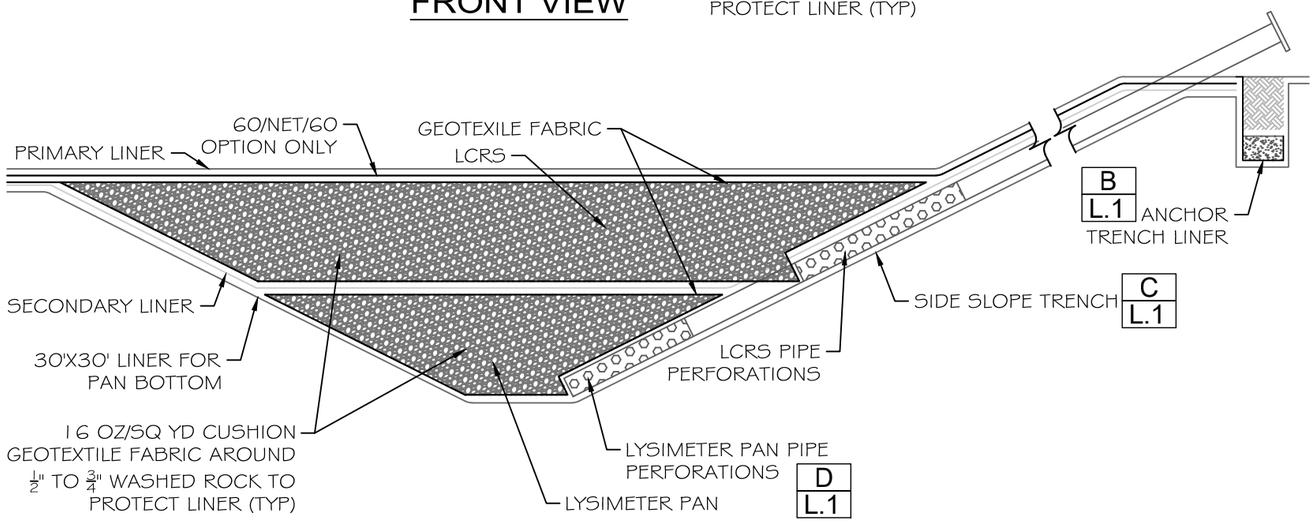
DETAILS

REVISION LOG:

PLOT DATE:	01/08/18
JOB NO.:	17003
SCALE:	AS SHOWN
SHEET NO.:	C.3



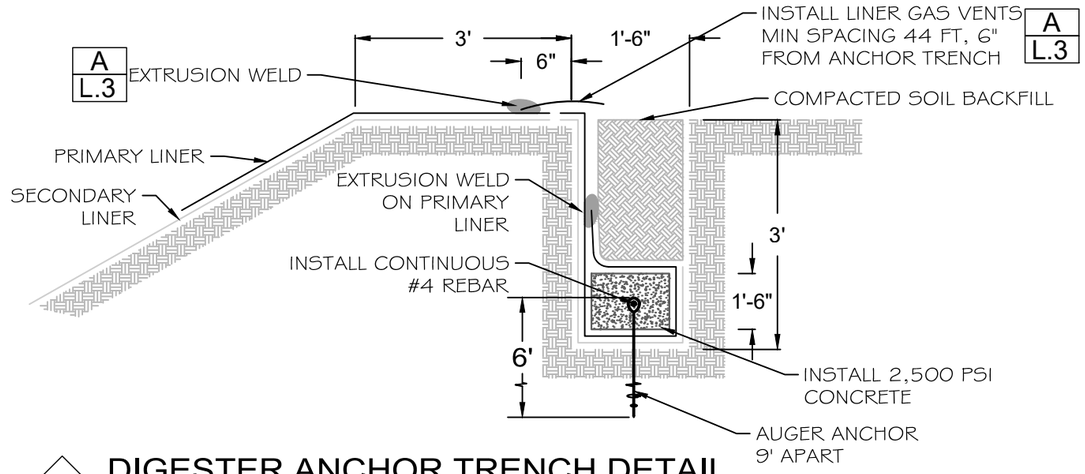
FRONT VIEW



SIDE VIEW

A LCRS, LYSIMETER AND DRAINAGE SUMP PROFILE

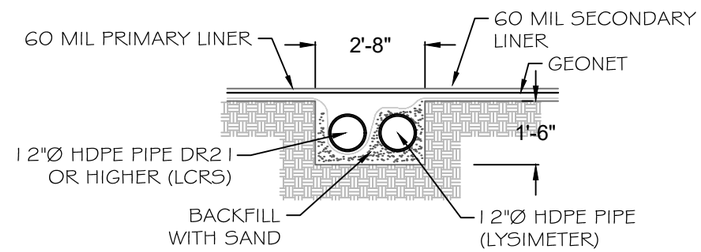
N.T.S.



B DIGESTER ANCHOR TRENCH DETAIL

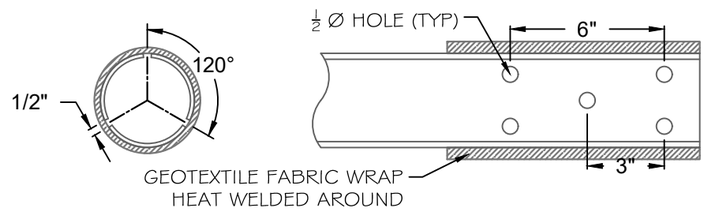
N.T.S.

NOTES: 1. CONTRACTOR TO USE ANCHOR SYSTEM OR PROVIDE DETAILS AND DESIGN FOR ALTERNATIVE TO BE APPROVED BY ENGINEER.



B HDPE CROSS SECTION

N.T.S.



C TYPICAL PERFORATION DETAIL

N.T.S.

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PROJECT:

POPLAR LANE

DAIRY DIGESTER

CLIENT:
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5387 KENT AVE
HANFORD, CA 93280

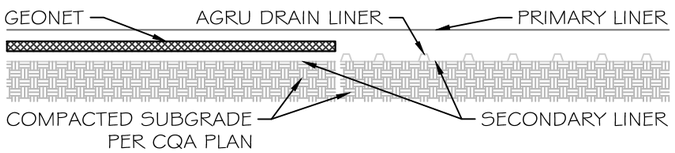
GENERAL NOTES
LINER DETAILS

REVISION LOG:

PLOT DATE:	01/08/18
JOB NO.:	17003
SCALE:	AS SHOWN
SHEET NO.:	L.1

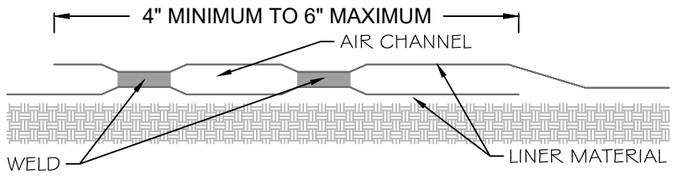
OPTIONAL TIER 1 DOUBLE LINER-LAYERING SYSTEM WITH DRAIN LINER VERIFY WITH OWNER

SMOOTH/STUDDED/ 60-NET-60 LINER LAYERS					
DESCRIPTION	LOCATION	MATERAIL	THICKNESS (MIN)	TOP FINISH	BOTTOM FINISH
PRIMARY LINER	TOP	HDPE	60 MIL	SMOOTH	SMOOTH CONDUCTIVE
DRAINAGE NET	MIDDLE	HDPE	200 MIL	N/A	N/A
SECONDARY LINER	BOTTOM	HDPE	60 MIL	SMOOTH	SMOOTH

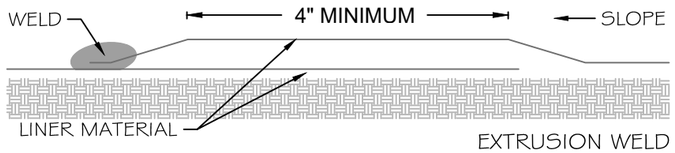


A DOUBLE LAYER 60-NET-60 DOUBLE LAYER WITH DRAIN LINER

N.T.S.



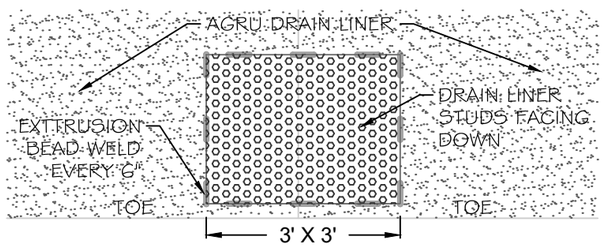
HOT WEDGE DOUBLE FUSION WELD



EXTRUSION WELD

B HDPE LINER-SMOOTH WELDS

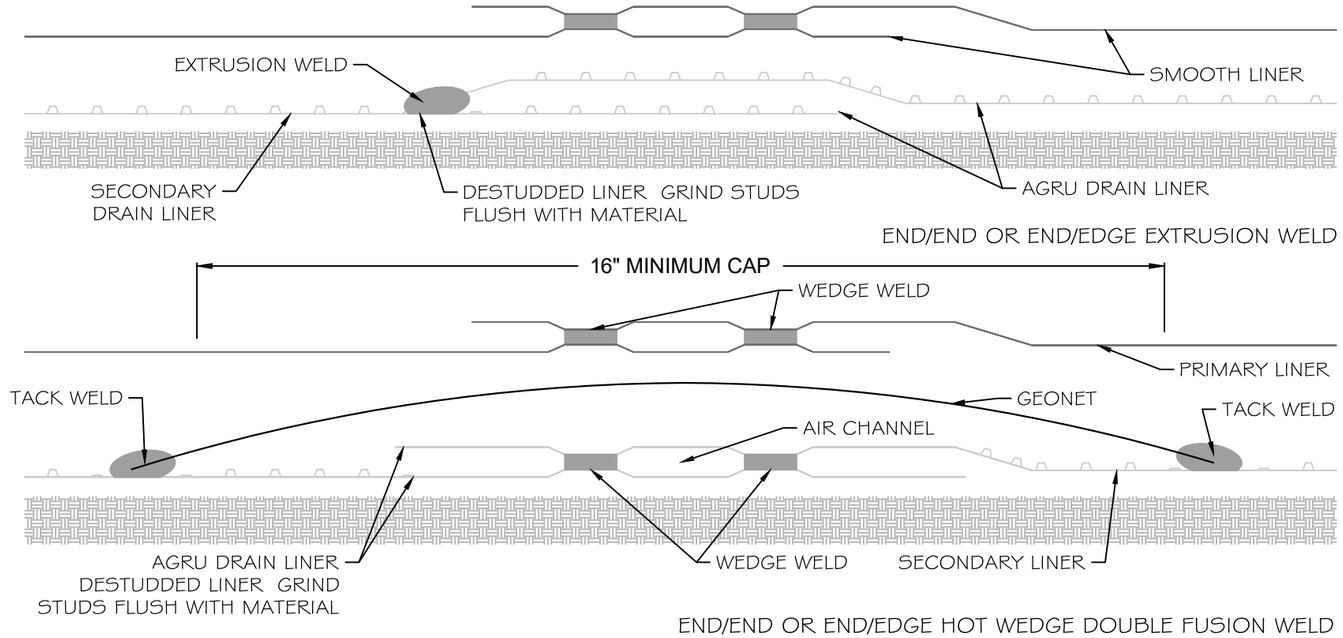
N.T.S.



DRAIN LINER SMOOTH END WELD PATCH

C 3'X3' DRAIN PATCH WELD

N.T.S.

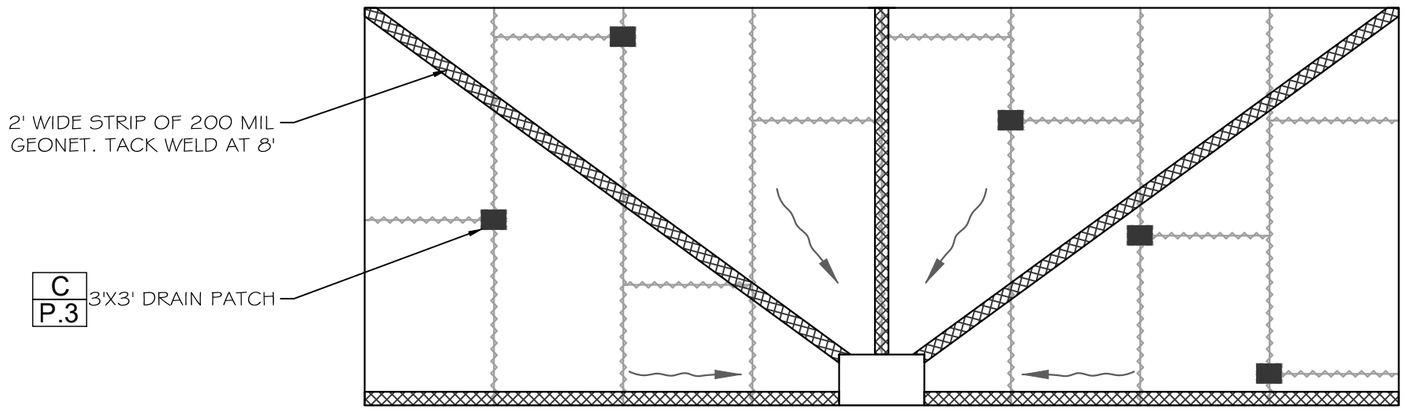


END/END OR END/EDGE EXTRUSION WELD

END/END OR END/EDGE HOT WEDGE DOUBLE FUSION WELD

D AGRU DRAIN LINER END/END WELD

NOTE: AGRU DRAIN LINER DOES NOT HAVE STUDS ALONG THE EDGE SO EDGE/EDGE SEAMS DO NOT REQUIRE DRINGING OR CAP. N.T.S.



NOTE: CQA OFFICER IS RESPONSIBLE TO ADD PATCHES AS NEEDED FOR FLOW

E AGRU DRAIN LINER CROSS SEAM NET PLAN VIEW

NOTE: TYPICAL OF ALL DRAIN LINERS N.T.S.

HARTMAN ENGINEERING
113 N. CHURCH ST, SUITE 521
VISALIA, CA 93291
(559) 563-0181

REGISTERED PROFESSIONAL ENGINEER CRAIG M. HARTMAN NO. 73837 Exp. 06-30-19 CIVIL STATE OF CALIFORNIA 1-8-18

PROJECT:

POPLAR LANE

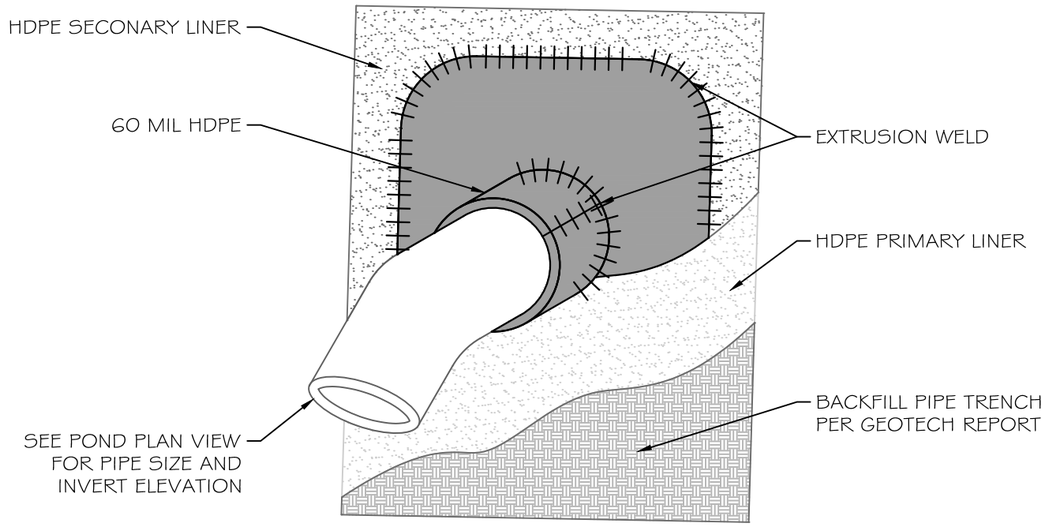
DAIRY DIGESTER

CLIENT:
BERNARD TE VELDE SR
5387 KENT AVE
HANFORD, CA 93280

LINER DETAILS

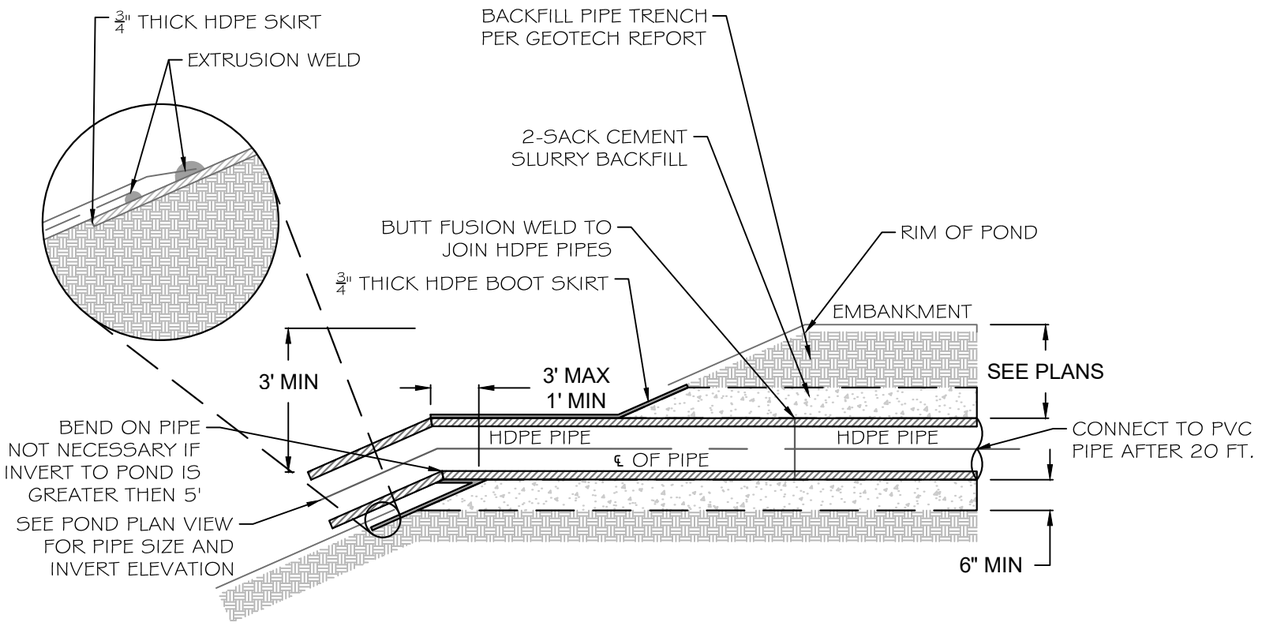
REVISION LOG:

PLOT DATE:	01/08/18
JOB NO.:	17003
SCALE:	AS SHOWN
SHEET NO.:	L.2



A BOOT SKIRT

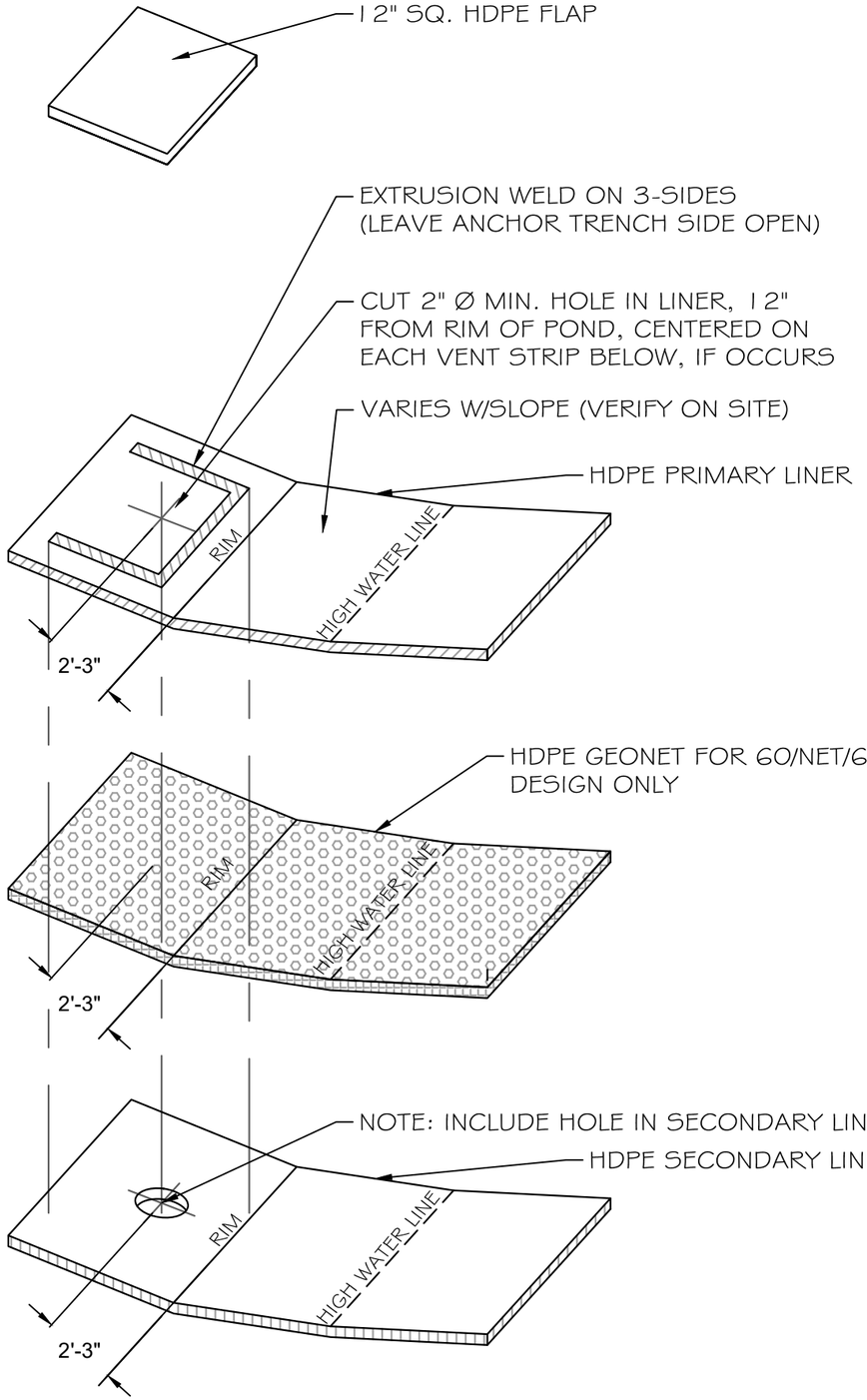
N.T.S.



B BOOTLESS PIPE PENETRATION

LINER FASTENING

N.T.S.



C VENT ORIFICE (ISOMETRIC VIEW)

N.T.S.

1 H HARTMAN ENGINEERING

113 N. CHURCH ST,
SUITE 521
VISALIA, CA 93291
(559) 563-0181

REGISTERED PROFESSIONAL ENGINEER
CRAIG M. HARTMAN
NO. 73837
Exp. 06-30-19
CIVIL
STATE OF CALIFORNIA
1-8-18

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HANFORD, CA 93280

LINER DETAILS

REVISION LOG:

PLOT DATE:	01/08/18
JOB NO.:	17003
SCALE:	AS SHOWN
SHEET NO.:	L.3

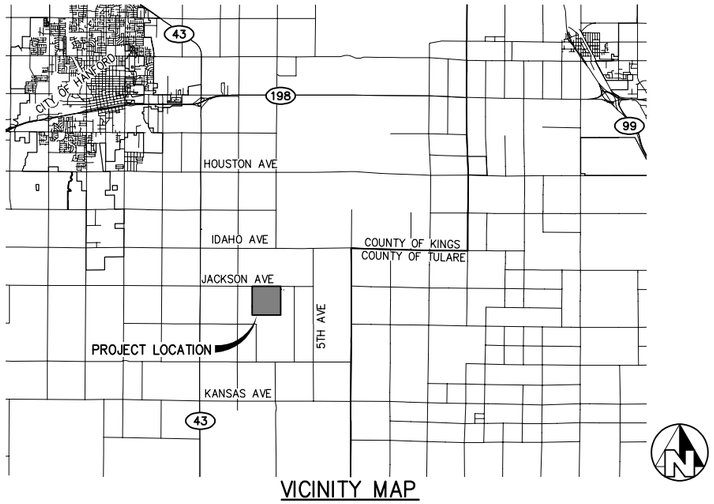
811 Know what's below. Call before you dig.

WARNING
POWER LINES OVERHEAD

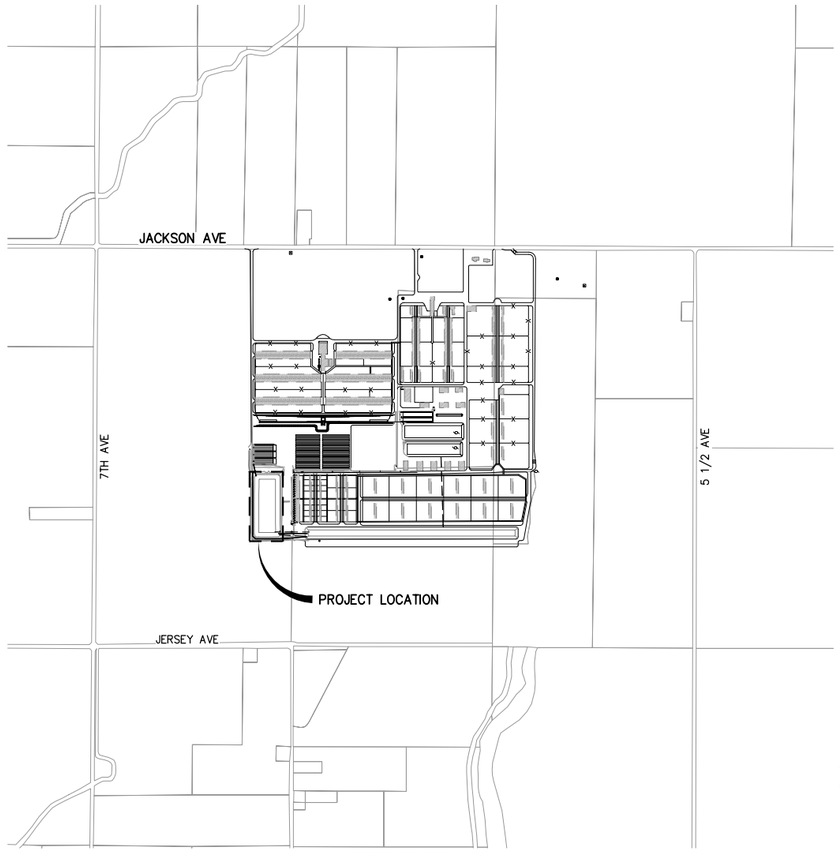
RIVER RANCH DAIRY

KINGS COUNTY

LAGOON DIGESTER



VICINITY MAP
NOT TO SCALE



SITE MAP
NOT TO SCALE

GENERAL NOTES

1. USED MATERIAL, REJECTS, MISFITS, OR SECONDS, ETC. ARE NOT ACCEPTABLE FOR CONSTRUCTION OF THE PROPOSED FACILITIES.
2. ALL CONSTRUCTION SHALL BE IN CONFORMANCE WITH THESE PLANS, AND PROJECT SPECIFICATIONS.
3. CONTRACTOR SHALL FIELD VERIFY THE HORIZONTAL AND VERTICAL LOCATIONS OF ALL EXISTING FACILITIES PRIOR TO COMMENCING WORK. CALL UNDERGROUND SERVICE ALERT (USA) AT 8-1-1. CONTRACTOR SHALL MAKE ENGINEER AWARE OF ANY DISCREPANCIES.
4. THRUST RESTRAINTS TO BE PROVIDED AT ALL PIPELINE BENDS, WHETHER OR NOT SHOWN ON THE PLANS.
5. ALL CONSTRUCTION SHALL BE PERFORMED IN ACCORDANCE WITH APPLICABLE HEALTH AND SAFETY LAWS OF THE STATE OF CALIFORNIA AND CAL/OSHA STANDARDS.
6. TRENCH BACKFILL AND RESERVOIR EMBANKMENTS SHALL BE COMPACTED IN ACCORDANCE WITH THE SPECIFICATIONS AND THE GEOTECHNICAL REPORT CONTAINED IN THE SPECIFICATIONS.
7. CONTRACTOR WILL BE RESPONSIBLE FOR THE REPAIR OF ALL PIPELINE CRACKS, WHICH DEVELOP DURING CONSTRUCTION OF IMPROVEMENTS AFFECTING EXISTING FACILITIES.
8. ALL EXCESS MATERIAL AND/OR DEBRIS SHALL BE REMOVED UPON COMPLETION OF INSTALLATION.
9. CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING ADEQUATE DUST CONTROL AT ALL TIMES.

SPECIAL NOTE

WHERE UNDERGROUND AND SURFACE STRUCTURES ARE SHOWN ON THE PLANS, THE LOCATIONS, DEPTH AND DIMENSIONS OF STRUCTURES ARE BELIEVED TO BE REASONABLY CORRECT, BUT ARE NOT GUARANTEED. SUCH STRUCTURES ARE SHOWN FOR THE INFORMATION OF THE CONTRACTOR, BUT INFORMATION SO GIVEN IS NOT TO BE CONSTRUED AS A REPRESENTATION THAT SUCH STRUCTURES WILL, IN ALL CASES, BE FOUND WHERE SHOWN, OR THAT THEY REPRESENT ALL OF THE STRUCTURES WHICH MAY BE ENCOUNTERED.

SITE SAFETY AND PROTECTION NOTES

THE DUTY OF THE ENGINEER, OWNER OR ITS AGENTS TO CONDUCT CONSTRUCTION REVIEW OF THE CONTRACTOR'S PERFORMANCE AND THE UNDERTAKING OF INSPECTIONS OR THE GIVING OF INSTRUCTIONS AS AUTHORIZED HEREIN IS NOT INTENDED TO INCLUDE REVIEW OF THE ADEQUACY OF THE CONTRACTOR'S SAFETY MEASURES IN, ON, OR NEAR THE CONSTRUCTION SITE AND SHALL NOT BE CONSTRUED AS SUPERVISION OF THE ACTUAL CONSTRUCTION NOR MAKE THE ENGINEER, OWNER OR ITS AGENTS RESPONSIBLE FOR PROVIDING A SAFE PLACE FOR THE PERFORMANCE OF WORK BY THE CONTRACTOR, SUBCONTRACTORS, OR SUPPLIERS, OR FOR ACCESS, VISITS, USE, WORK, TRAVEL OR OCCUPANCY BY ANY PERSON.

THE CONTRACTOR SHALL HAVE AT THE WORK SITE, COPIES OR SUITABLE EXTRACTS OF CONSTRUCTION SAFETY ORDERS, ISSUED BY CAL-OSHA. CONTRACTOR SHALL COMPLY WITH PROVISIONS OF THESE AND ALL OTHER APPLICABLE LAWS, ORDINANCES AND REGULATIONS. THE CONTRACTOR MUST COMPLY WITH PROVISIONS OF THE SAFETY AND HEALTH REGULATIONS FOR CONSTRUCTION, PROMULGATED BY THE SECRETARY OF LABOR UNDER SECTION 107 OF THE CONTRACT WORK HOURS AND SAFETY STANDARDS ACT, AS SET FORTH IN TITLE 29 C.F.R.

TO PROTECT THE LIVES AND HEALTH OF CONTRACTOR'S EMPLOYEES UNDER THE CONTRACT, THE CONTRACTOR SHALL COMPLY WITH ALL PERTINENT PROVISIONS OF THE "MANUAL OF ACCIDENT PREVENTION IN CONSTRUCTION" ISSUED BY THE ASSOCIATED GENERAL CONTRACTORS OF AMERICA, INC., AND SHALL MAINTAIN AN ACCURATE RECORD OF ALL CASES OF DEATH, OCCUPATIONAL DISEASE, AND INJURY REQUIRING MEDICAL ATTENTION OR CAUSING LOSS OF TIME FROM WORK, ARISING OUT OF AND IN THE COURSE OF EMPLOYMENT OR WORK UNDER THE CONTRACT.

THE CONTRACTOR ALONE SHALL BE RESPONSIBLE FOR THE SAFETY, EFFICIENCY, AND ADEQUACY OF CONTRACTOR'S FACILITIES, APPLIANCES, AND METHODS AND FOR ANY DAMAGE, WHICH MAY RESULT FROM THEIR FAILURE OR THEIR IMPROPER CONSTRUCTION, MAINTENANCE OR OPERATION.

THE CONTRACTOR AGREES THAT IT SHALL ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THIS PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY; THAT THIS REQUIREMENT SHALL APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS; AND THAT THE CONTRACTOR SHALL DEFEND, INDEMNIFY AND HOLD THE OWNER, PROVOST & PRITCHARD CONSULTING GROUP, AND THEIR RESPECTIVE AGENTS HARMLESS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT, EXCEPTING FOR LIABILITY ARISING FROM THE SOLE NEGLIGENCE OF OWNER, ENGINEER, OR THEIR RESPECTIVE AGENTS.

THE OWNER AND ITS AGENTS' SITE RESPONSIBILITIES ARE LIMITED SOLELY TO THE ACTIVITIES OF THEIR EMPLOYEES ON SITE. THESE RESPONSIBILITIES SHALL NOT BE INFERRED BY ANY PARTY TO MEAN THAT THE OWNER OR ITS AGENTS HAVE RESPONSIBILITY FOR SITE SAFETY. SAFETY IN, ON, OR ABOUT THE SITE IS THE SOLE AND EXCLUSIVE RESPONSIBILITY OF THE CONTRACTOR ALONE. THE CONTRACTOR'S METHODS OF WORK PERFORMANCE, SUPERINTENDENCE AND THE CONTRACTOR'S EMPLOYEES, AND SEQUENCING OF CONSTRUCTION ARE ALSO THE SOLE AND EXCLUSIVE RESPONSIBILITIES OF THE CONTRACTOR ALONE.

PROJECT BENCHMARK
XXXX

ELEVATION = XXX.XX' NAVD88 DATUM

ONSITE BENCHMARK
XXXX

ELEVATION = XXX.XX' NAVD88 DATUM

GPS GRADING CONTROL POINTS
FOUR POINTS WILL BE SET OUTSIDE THE FOUR CORNERS OF THE PROPOSED LAGOON FOR GPS MACHINE CONTROL GRADING.

SHEET INDEX

SHEET NO.	DESCRIPTION
LL1	COVER
LL2	PLAN
LL3	CROSS SECTIONS
LL4	DETAILS 1
LL5	DETAILS 2
LL6	DETAILS 3
LL7	CUT FILL MAP

PRELIMINARY
NOT FOR CONSTRUCTION
5/22/17

No.	REVISION	BY	DATE

FOR REVIEW ONLY

LAGOON DIGESTER
RIVER RANCH DAIRY
KINGS COUNTY
LAGOON DESIGN
COVER

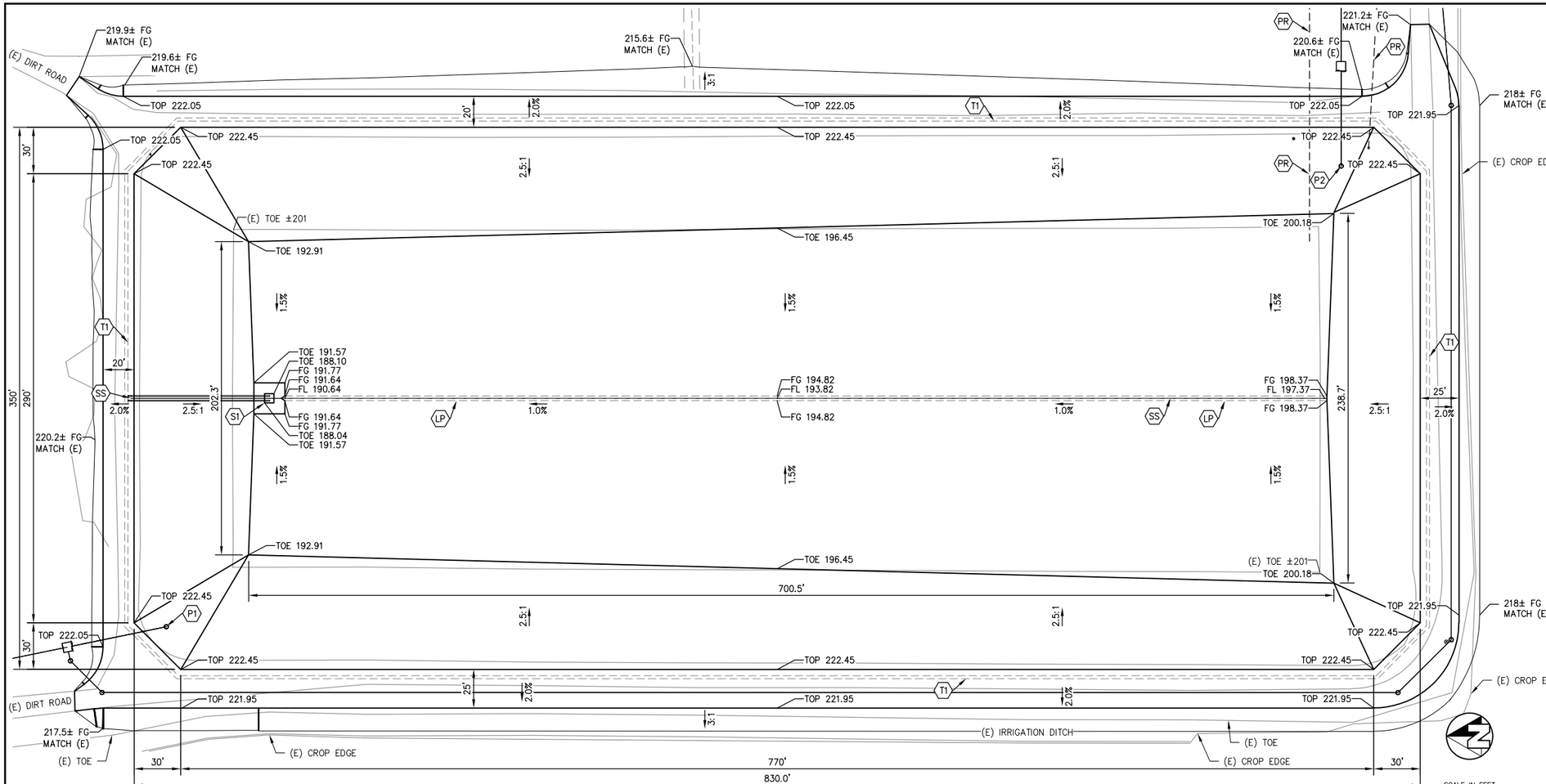
PROVOST & PRITCHARD CONSULTING GROUP
EST 1968
An Employee Owned Company
286 WEST CROMWELL AVENUE
FRESNO, CALIFORNIA 93711-6162
559/449-2700 FAX 559/449-2715
www.ppeng.com

DESIGN ENGINEER: GABRIEL DO-REYNOSO
LICENSE NO: 81090
DRAFTED BY: P&P
CHECKED BY: SCB
DATE: 5/3/17
JOB NO: 301717001
PROJECT NO:
PHASE:

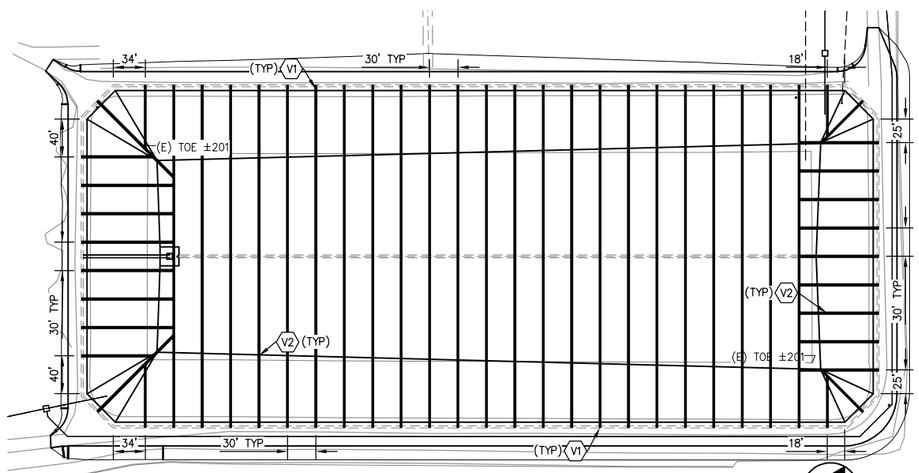
0 1"
ORIGINAL SCALE SHOWN IS ONE INCH. ADJUST SCALE FOR REDUCED OR ENLARGED PLANS.

SHEET LL1
OF 7

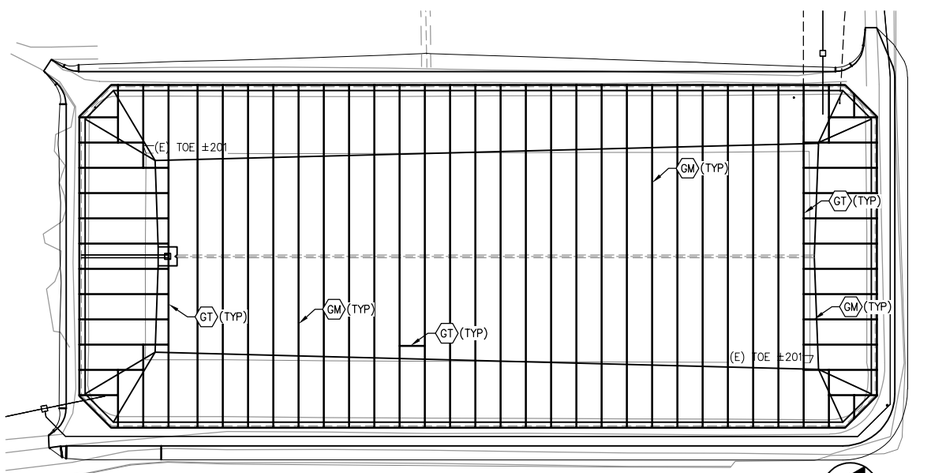
5/22/2017 1:25 PM G:\de Jong_Jack-3017\3017-River Ranch Dairy-6155 Jackson Ave Hanford CA\301717001-Digester Project\DWG\SHEET\LAGOON\LL1 COVER.dwg -Gabriel Do Reynoso



POND PLAN VIEW



VENT STRIP PLAN



GEONET LAYOUT PLAN

DIGESTER LAGOON DIMENSIONS

THE DIGESTER LAGOON IS 830 FEET LONG BY 350 FEET WIDE BY 26 FEET DEEP. THERE IS 2 FEET OF FREEBOARD SO THE NOMINAL DEPTH IS 24 FEET (SEE SECTION AT STA 6+00 ON SHEET LL3). INTERIOR SIDE SLOPES ARE 2.5:1. TOP OF BANK WIDTH IS 20 FEET (NORTH AND EAST BANK) AND 25 FEET (WEST AND SOUTH BANK). EXTERIOR SIDE SLOPES ARE 3:1.

CONSTRUCTION LEGEND

GM	OVERLAP GEONET EDGES A MINIMUM OF 3 INCHES. INSTALL PLASTIC CABLE TIES EVERY 5 FEET.	
GT	OVERLAP GEONET ENDS OR END TO EDGE WITH MATERIALS SHINGLED DOWN A MINIMUM 5 FEET FROM THE TOE OF POND IN THE DIRECTION OF THE SLOPE A MINIMUM OF 12 INCHES. INSTALL PLASTIC CABLE TIES EVERY 12 INCHES.	
LP	LEAKAGE PIPE TRENCH	3 / LL5
P1	INLET PIPE	2 / LL6
P2	OUTLET PIPE	1 / LL6
PR	REMOVE EXISTING PIPE	
S1	LCRS/LYSIMETER SUMPS	4 / LL5
SS	1/8" STAINLESS STEEL CABLE LOCATED AT TOE OF SLOPE AND EXITS AT SURFACE.	4 / LL5
T1	ANCHOR TRENCH (TYPICAL AROUND PERIMETER OF POND)	3 / LL4
V1	VENT ORIFICE	4 / LL4 and 7 / LL4
V2	2' WIDE DOUBLE FACED 160ML MINIMUM GEOCOMPOSITE VENT STRIPS. (MATERIAL TO BE APPROVED BY ENGINEER)	

NOTES

1. POND SUBGRADE AND LINER SHALL BE INSTALLED IN ACCORDANCE WITH THE POND DESIGN WORK PLAN THAT HAS BEEN APPROVED BY THE REGIONAL WATER QUALITY CONTROL BOARD.
2. HIGH WATER LINE (HWL) IS THE FREEBOARD LEVEL.
3. POINTS WILL BE GIVEN FOR GPS LOCATION OF GRADING EQUIPMENT.

WARNING
POWER LINES OVERHEAD

811 Know what's below. Call before you dig.

PRELIMINARY
NOT FOR CONSTRUCTION
5/22/17

No.	REVISION	BY	DATE

FOR REVIEW ONLY

LAGOON DIGESTER
RIVER RANCH DAIRY
KINGS COUNTY
LAGOON DESIGN
PLAN

PROVOST & PRITCHARD CONSULTING GROUP
EST. 1968
An Employee Owned Company
286 WEST CROMWELL AVENUE
FRESNO, CALIFORNIA 93711-6162
559/449-2700 FAX 559/449-2715
www.ppeng.com
6155 Jackson Ave Hanford CA

DESIGN ENGINEER: GABRIEL DO-REYNOSO
LICENSE NO: 81090
DRAFTED BY: P&P
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DATE: 5/3/17
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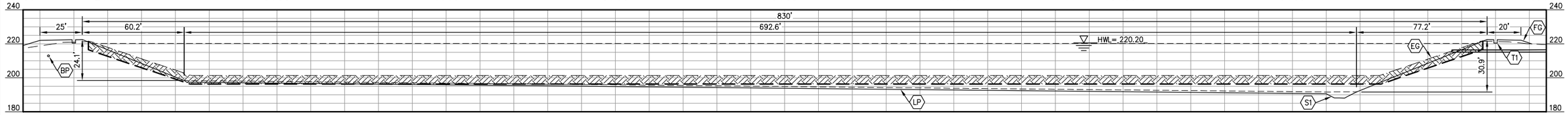
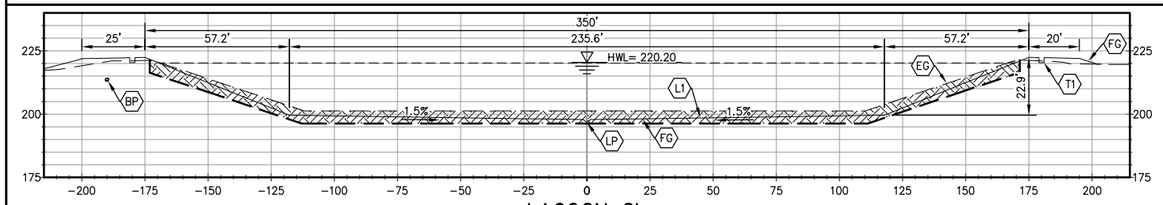
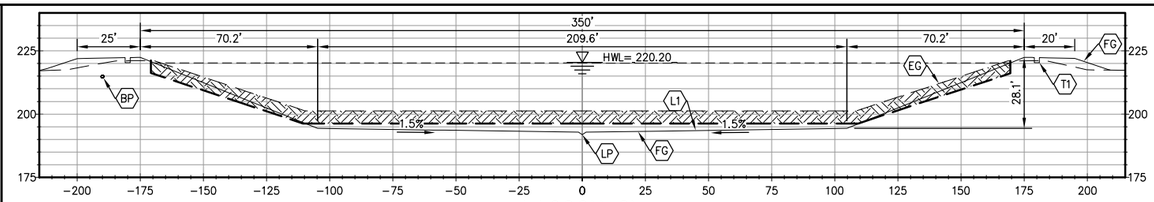
PHASE:
0 1"
ORIGINAL SCALE SHOWN IS ONE INCH. ADJUST SCALE FOR REDUCED OR ENLARGED PLANS.
SHEET LL2
OF 7

5/22/2017 1:25 PM G:\de Jong_Jack-3017\3017-River Ranch Dairy-Digester Project\DWG\SHEET\LAGOON\LL2 PLAN.dwg -Gabriel Do Reynoso





LAGOON CL
STA 3+00



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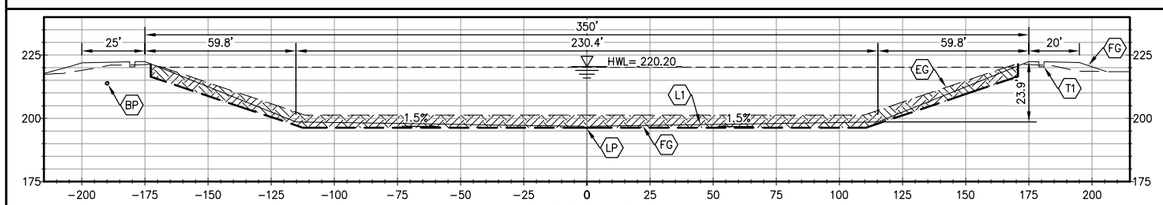

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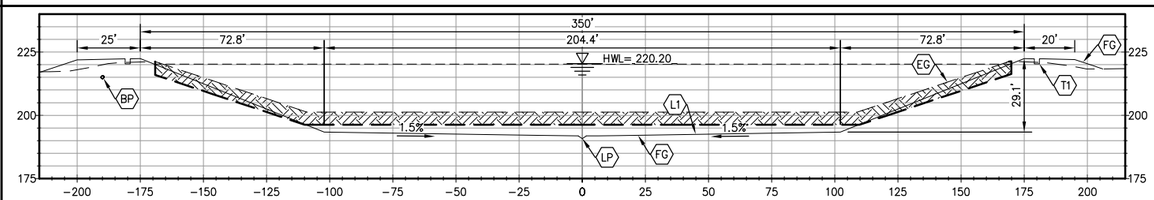

LAGOON CL
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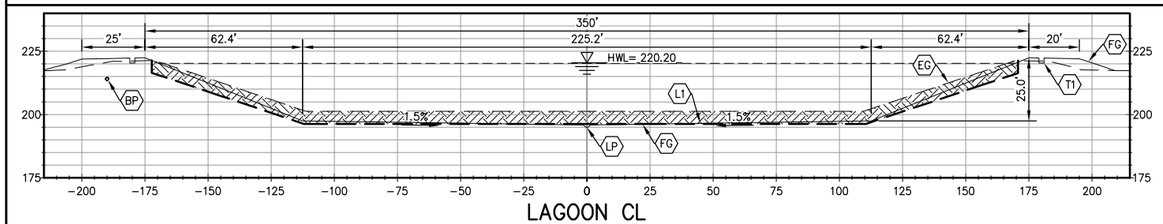

LAGOON CL
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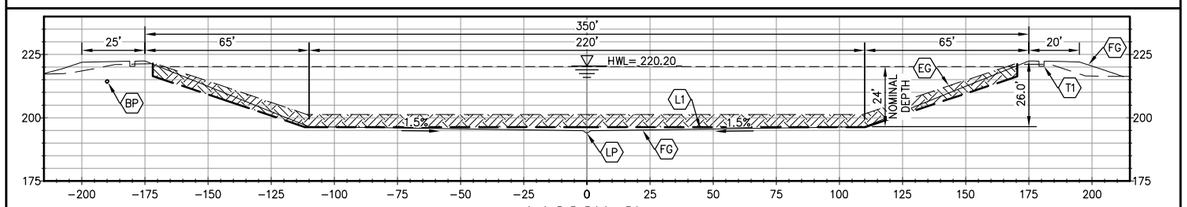

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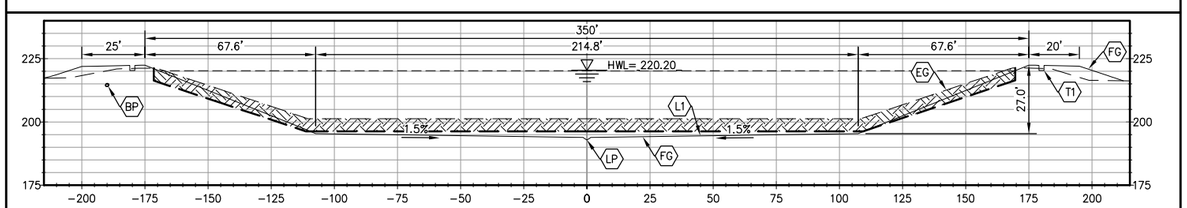
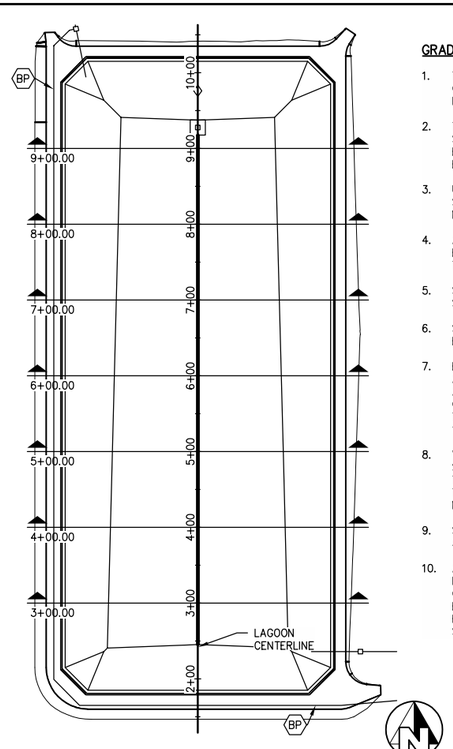


LAGOON CL
STA 7+00



CROSS SECTION KEY

GRADING NOTES (SEE GEOTECHNICAL INVESTIGATION REPORT)

1. THE UPPER SITE SOILS CONTAINING VEGETATION AND OBJECTIONAL ORGANIC MATTER SHOULD BE STRIPPED AND REMOVED FROM THE LAGOON AREA.
2. THE EXISTING LAGOON WILL BE DRAINED AND THE BOTTOM AND SIDES WILL BE OVER EXCAVATED APPROXIMATELY 5 FEET. SOIL WILL BE STOCKPILED AT SITE DESIGNATED BY OWNER. SOIL SUITABLE FOR BACKFILL WILL BE SEPARATED AND STOCKPILED.
3. UPON EXCAVATING THE LAGOON TO THE DESIGN DEPTH, ADDITIONAL STRIPPING MAY BE REQUIRED FOR LOCALIZED AREAS OF ORGANIC MATTER AND SOFT SOILS.
4. ALL EXCAVATIONS, DEPRESSIONS, OR SOFT AND PLIANT AREAS EXTENDING BELOW FINISHED SUBGRADE LEVELS SHOULD BE CLEANED TO FIRM, UNDISTURBED SOIL AND BACKFILLED WITH ENGINEERED FILL.
5. SANDY SOILS, IF ENCOUNTERED AT THE BOTTOM OF THE EXCAVATION SHOULD BE OVER EXCAVATED A MINIMUM OF 2 FEET.
6. SANDY SOILS, IF ENCOUNTERED WITHIN THE SIDE SLOPES OF THE EXCAVATION SHOULD BE OVER EXCAVATED A MINIMUM OF 3 FEET.
7. ENGINEERED FILL SHOULD CONTAIN AT LEAST 30 PERCENT PASSING A NO. 200 SIEVE. FILL SOILS SHOULD BE PLACED IN LIFTS OF ABOUT 6 INCHES THICK, MOISTURE CONDITIONED TO WITHIN 2 OF OPTIMUM AND COMPACTED TO ACHIEVE AT LEAST 90 PERCENT OF THE MAXIMUM DRY DENSITY AS DETERMINED BY ASTM TEST METHOD 1557.
8. WTHIN THE EXCAVATED AREAS, THE EXPOSED SURFACE SHOULD BE SCARIFIED TO A DEPTH OF ABOUT 8 INCHES, MOISTURE CONDITIONED TO NEAR OPTIMUM AND COMPACT TO AT LEAST 90 PERCENT OF THE MAXIMUM DRY DENSITY AS DETERMINED BY ASTM TEST METHOD D1557.
9. SOILS CONTAINING CLODS OR CEMENTED PARTICLES LARGER THAN 3/8", SHOULD BE BROKEN OR PULVERIZED PRIOR TO COMPACTION.
10. A REPRESENTATIVE OF THE FIRM WHO PREPARED THE GEOTECHNICAL INVESTIGATION REPORT SHOULD BE PRESENT DURING ALL SITE CLEARING AND GRADING OPERATIONS TO TEST AND OBSERVE EARTHWORK CONSTRUCTION. THE GEOTECHNICAL ENGINEER MAY REJECT ANY MATERIAL THAT DOES NOT MEET COMPACTION AND STABILITY REQUIREMENTS SET FORTH IN THE GEOTECHNICAL REPORT.

CONSTRUCTION LEGEND

- BP — EXISTING 15" BYPASS LINE
- EG — EXISTING GRADE
- FG — FINIHSED GRADE (1 / LL4)
- L1 — DOUBLE LINER LAYERING (3 / LL5)
- LP — LEAKAGE PIPE TRENCH (4 / LL5)
- S1 — LCRS/LYSIMETER SUMPS (3 / LL4)
- T1 — ANCHOR TRENCH (TYPICAL AROUND PERIMETER OF POND)

HATCH LEGEND

APPROXIMATELY 5 FEET OF SOIL WILL BE REMOVED FROM POND BOTTOM AND SIDES AND STOCKPILED AT LOCATION DESIGNATED BY OWNER.

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LAGOON DIGESTER
RIVER RANCH DAIRY
KINGS COUNTY
LAGOON DESIGN

CROSS SECTIONS

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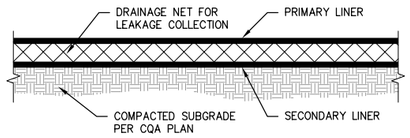
SHEET LL3
OF 7

5/22/2017 1:25 PM G:\de Jong_Jack-3017\3017-River Ranch Dairy-6155 Jackson Ave Hanford CA\301717001-Digester Project\DWG\SHEET\LAGOON\LL3 CROSS SECTIONS.dwg -Gabriel Do Reynoso

PC-0213

LINER LAYERS					
DESCRIPTION	LOCATION	MATERAIL	THICKNESS (MINIMUM)	TOP FINISH	BOTTOM FINISH
PRIMARY LINER	TOP	HDPE CONDUCTIVE	60 MIL	SMOOTH	SMOOTH
DRAINAGE NET	MIDDLE	HDPE	175 MIL	N/A	N/A
SECONDARY LINER	BOTTOM	HDPE CONDUCTIVE	60 MIL	SMOOTH	SMOOTH

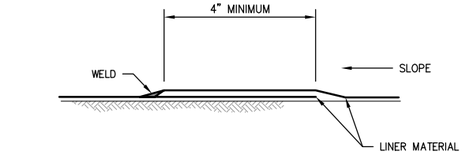


NOT TO SCALE

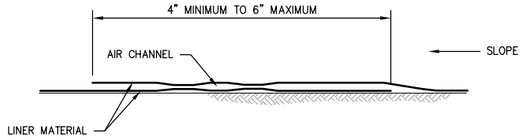
1 / LL4

DOUBLE LINER LAYERING

PC-0205



EXTRUSION WELD



HOT WEDGE DOUBLE FUSION WELD

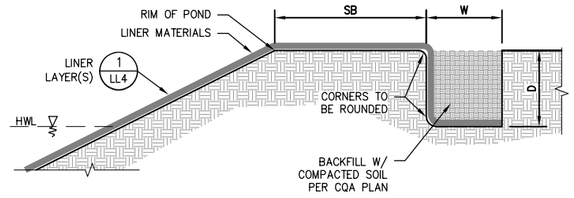
NOT TO SCALE

2 / LL4

HDPE WELDS

PC-0210

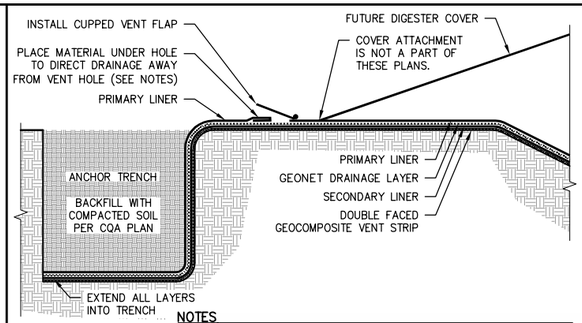
ANCHOR TRENCH LAYOUT			
LOCATION	SB=(SETBACK)	W=(WIDTH)	D=(DEPTH)
STORAGE POND	48"	24"	24"



NOT TO SCALE

3 / LL4

ANCHOR TRENCH



NOTES

1. LOCATE VENT HOLE OPENINGS DIRECTLY OVER VENT STRIPS PLACED BELOW SECONDARY LINER.
2. THE VENT HOLES SHOULD NOT BE COVERED BY THE DIGESTER COVER. IN THE CASE THAT THE VENTS ARE COVERED, BIOGAS CAN MIGRATE INTO THE SOIL BELOW THE SECONDARY LINER AND BETWEEN THE PRIMARY AND SECONDARY LINERS LEADING INTO THE LRCS SUMP AND POTENTIALLY INTO THE LYSIMETER PAN. THIS COULD LEAD TO A POTENTIALLY EXPLOSIVE ENVIRONMENT IF LRCS AND LYSIMETER PUMPS ARE NOT EXPLOSION PROOF.

NOT TO SCALE

4 / LL4

LINER LAYERS AT ANCHOR TRENCH

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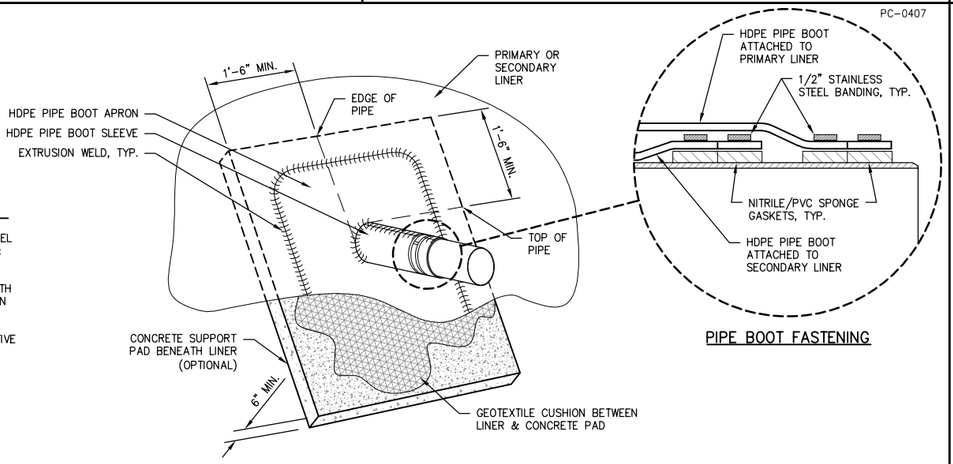
PC-0407



PIPE BOOT FASTENING

NOTES

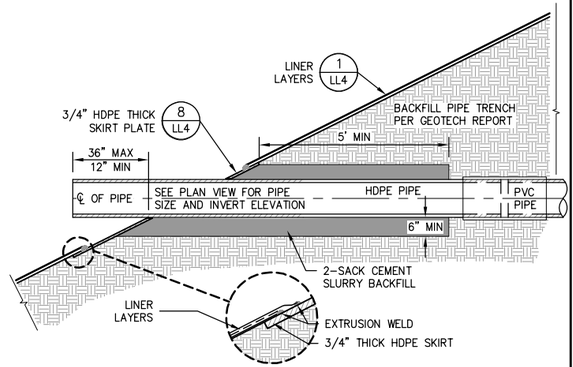
1. CONCRETE SURFACES TO BE STEEL TROWEL FINISH WITH ROUNDED & SMOOTHED EDGES.
2. 4000PSI MIN. CONCRETE STRENGTH OR AS APPROVED BY THE DESIGN ENGINEER.
3. INSTALLER TO PROVIDE CONDUCTIVE MATERIALS AS NECESSARY TO PERFORM SPARK TESTS IN ALL SEAM AREAS BELOW THE HIGH WATER LINE THAT ARE NOT ACCESSIBLE BY VACUUM BOX.

NOT TO SCALE

5 / LL4

BOOT PIPE PENETRATION

PC-0415



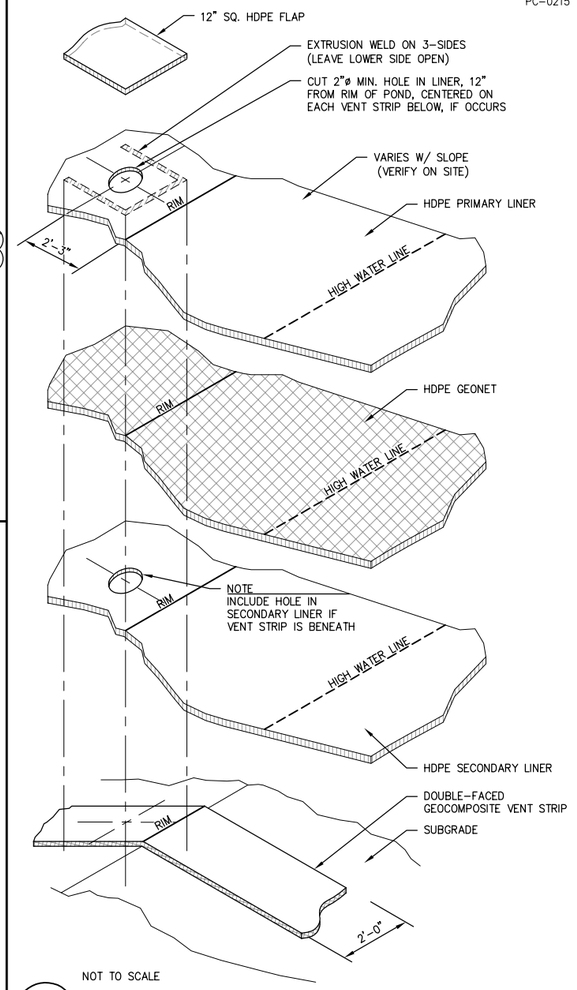
LINER FASTENING

NOT TO SCALE

6 / LL4

BOOTLESS PIPE PENETRATION

PC-0215

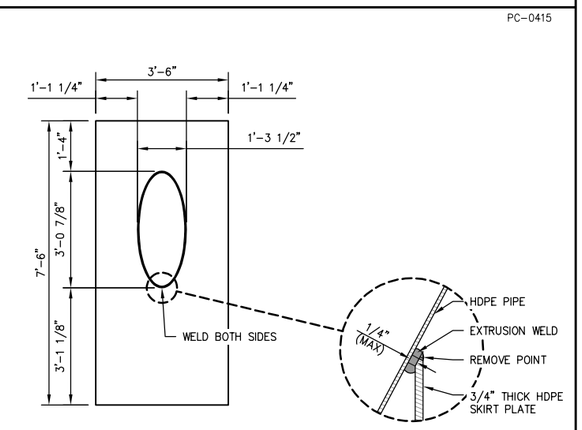


NOT TO SCALE

7 / LL4

VENT ORIFICE (ISOMETRIC VIEW)

PC-0415



NOT TO SCALE

8 / LL4

HDPE PIPE TO HDPE SKIRT PLATE WELD FOR BOOTLESS PENETRATION

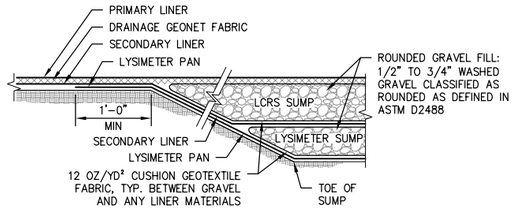
LAGOON DIGESTER
RIVER RANCH DAIRY
KINGS COUNTY
LAGOON DESIGN
DETAILS 1

PROVOST & PRITCHARD CONSULTING GROUP
EST. 1968
An Employee Owned Company
286 WEST CROMWELL AVENUE
FRESNO, CALIFORNIA 93711-6162
559/449-2700 FAX 559/449-2715
www.ppeng.com

DESIGN ENGINEER: GABRIEL DO-REYNOSO
LICENSE NO: 81090
DRAFTED BY: P&P | CHECKED BY: SCB
DATE: 5/3/17
JOB NO: 301717001
PROJECT NO:
PHASE:
0 1"
ORIGINAL SCALE SHOWN IS ONE INCH. ADJUST SCALE FOR REDUCED OR ENLARGED PLANS.
SHEET LL4
OF 7

5/22/2017 1:26 PM G:\de Jong_Jack-3017\3017-River Ranch Dairy-6155 Jackson Ave Hanford CA\301717001-Digester Project\DWG\SHEET\LAGOON\LL4 DETAILS 1.dwg -Gabriel Do Reynoso

PC-0212



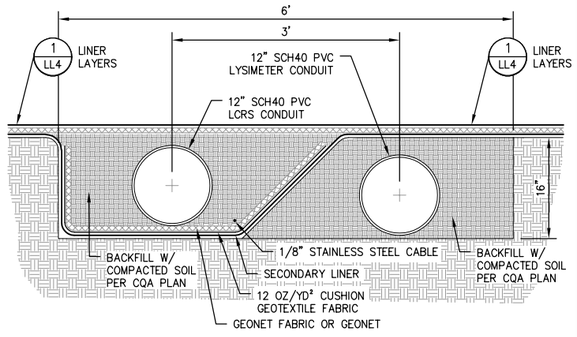
NOT TO SCALE

1 / LL5

TYPICAL LINER LAYERS AT SUMP

NOTES

1. 12" SCH 40 CAN BE SUBSTITUTED W/ CLASS 125

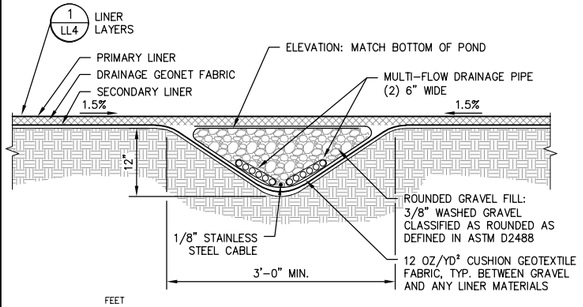


NOT TO SCALE

2 / LL5

LINER LAYERS AT LCRS & LYSIMETER PIPES

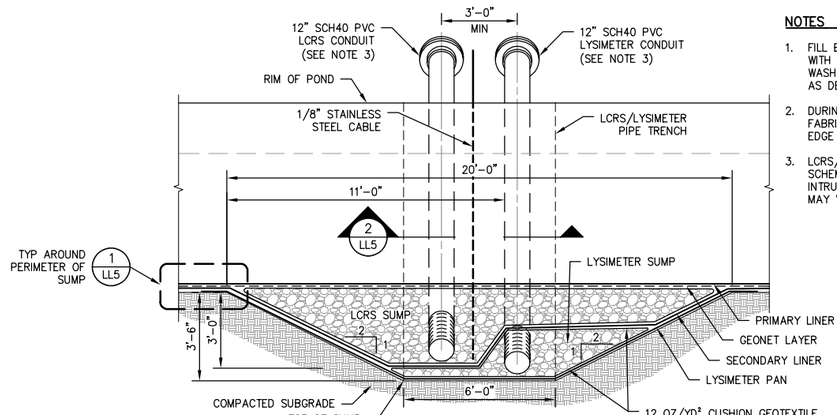
PC-0404



3 / LL5

LEAKAGE PIPE–DOUBLE LINER

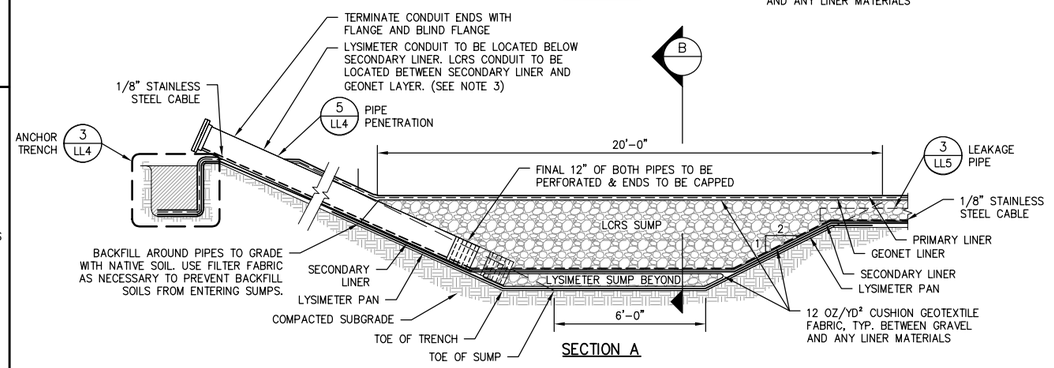
PC-0403



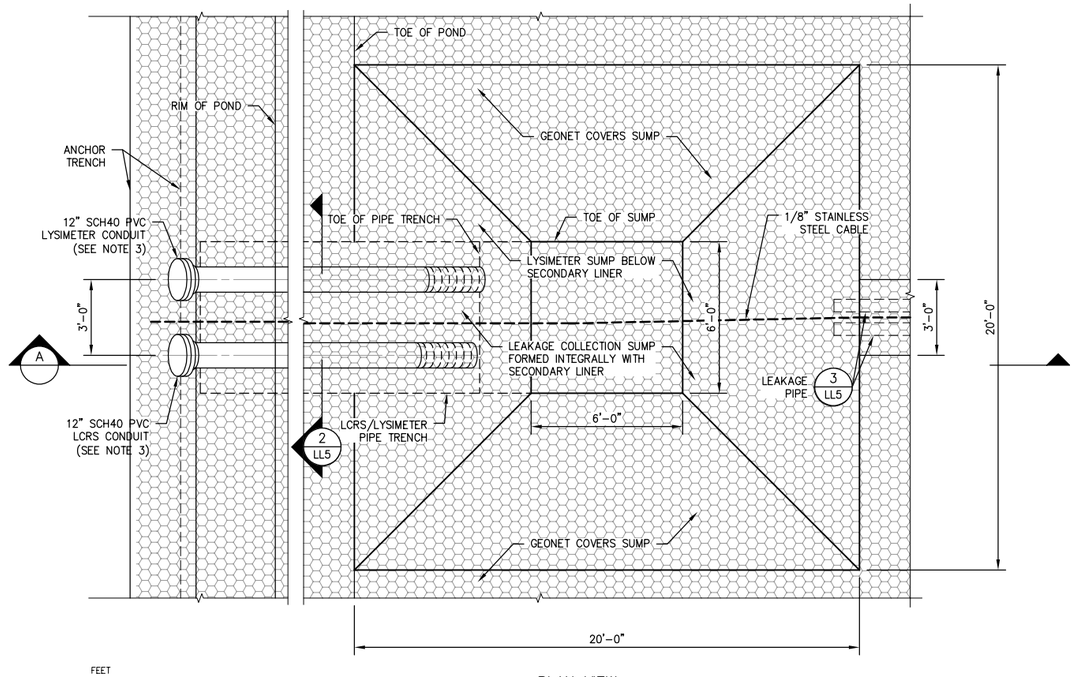
NOTES

1. FILL BOTH LYSIMETER AND LCRS SUMPS WITH ROUNDED GRAVEL. 1/2" TO 3/4" WASHED GRAVEL CLASSIFIED AS ROUNDED AS DEFINED IN ASTM D2488.
2. DURING CONSTRUCTION GEOTEXTILE FABRIC SHALL EXTEND 2 FT BEYOND EDGE OF LINER.
3. LCRS/LYSIMETER PIPE LAYOUT IS SCHEMATIC DUE TO ANGLE OF PIPE INTRUSION INTO THE SUMP. DIMENSIONS MAY VARY.

SECTION B



SECTION A



PLAN VIEW

4 / LL5

LCRS & LYSIMETER DRAINAGE SUMPS

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5/22/17

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LAGOON DIGESTER
RIVER RANCH DAIRY
KINGS COUNTY
LAGOON DESIGN

DETAILS 2

PROVOST & PRITCHARD
EST. 1962
CONSULTING GROUP
An Employee Owned Company
286 WEST CROMWELL AVENUE
FRESNO, CALIFORNIA 93711-6162
559/449-2700 FAX 559/449-2715
www.ppeng.com

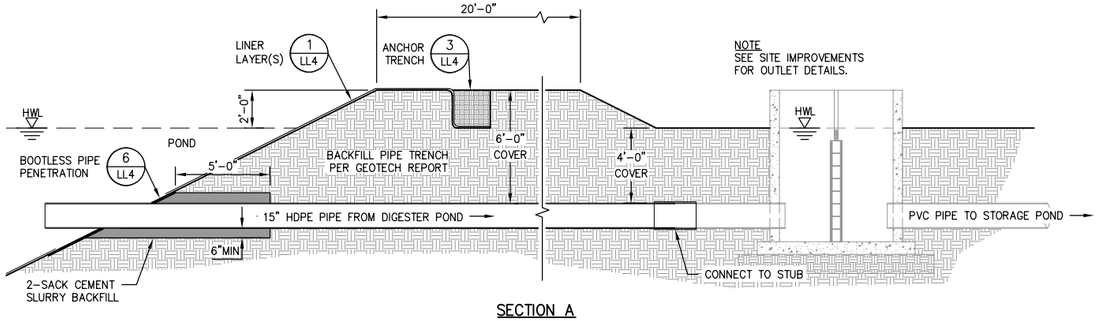
DESIGN ENGINEER: GABRIEL DO-REYNOSO
LICENSE NO: 81090
DRAFTED BY: P&P
CHECKED BY: SCB
DATE: 5/3/17
JOB NO: 301717001
PROJECT NO:
PHASE:

0 1"
ORIGINAL SCALE SHOWN IS ONE INCH. ADJUST SCALE FOR REDUCED OR ENLARGED PLANS.

SHEET LL5
OF 7

5/22/2017 1:26 PM G:\de Jong_Jack-3017\3017-River Ranch Dairy-6155 Jackson Ave Hanford CA\301717001-Digester Project\DWG\SHEET\LAGOON\LL5 DETAILS 2.dwg -Gabriel Do Reynoso

PC-0412



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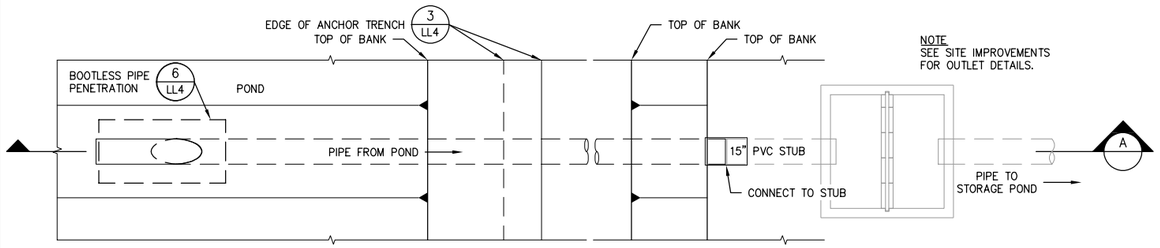
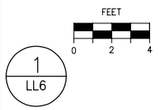


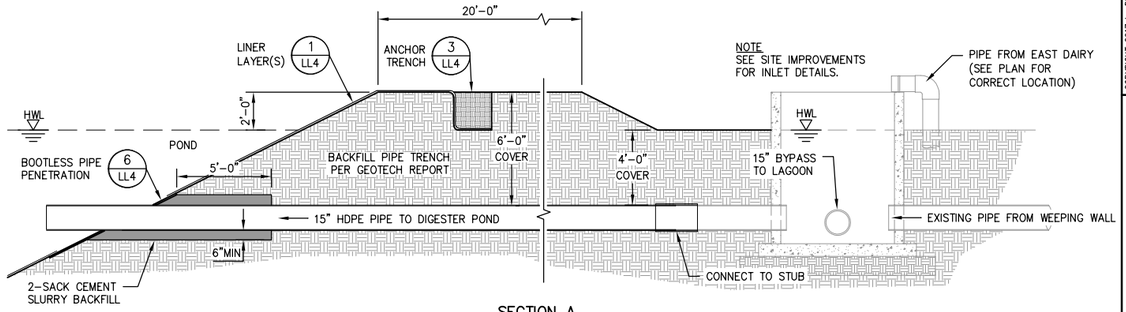
PLAN VIEW



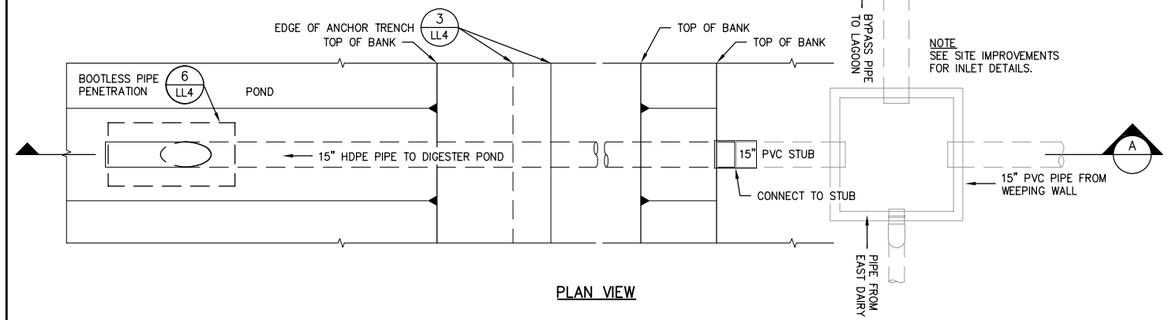
1 LL6

DIGESTER OUTLET WEIR BOX

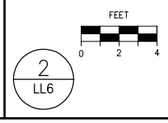
PC-0412



SECTION A



PLAN VIEW



2 LL6

DIGESTER INLET BOX

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5/22/17

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LAGOON DIGESTER
RIVER RANCH DAIRY
KINGS COUNTY
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DETAILS 3

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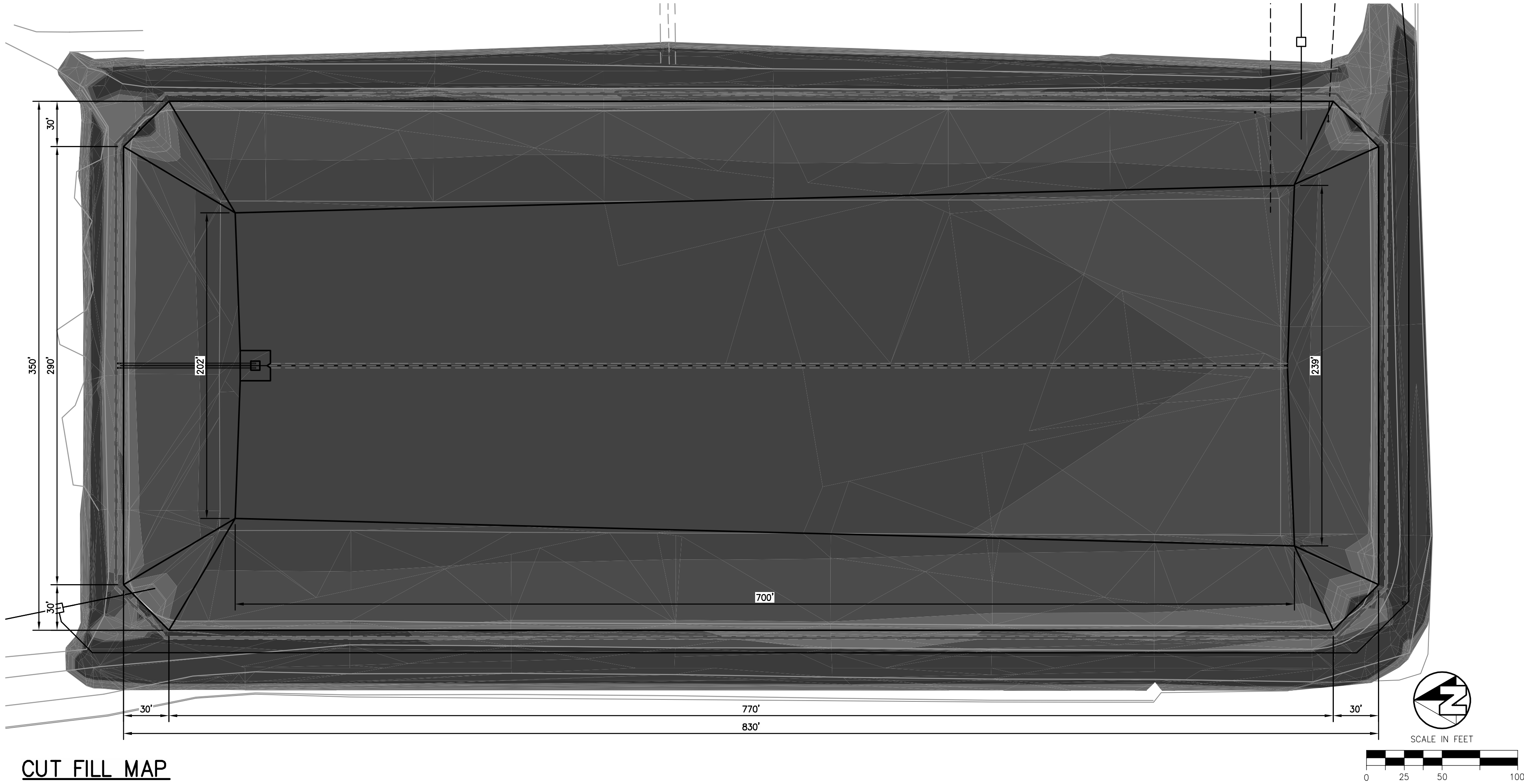
SHEET LL6
OF 7

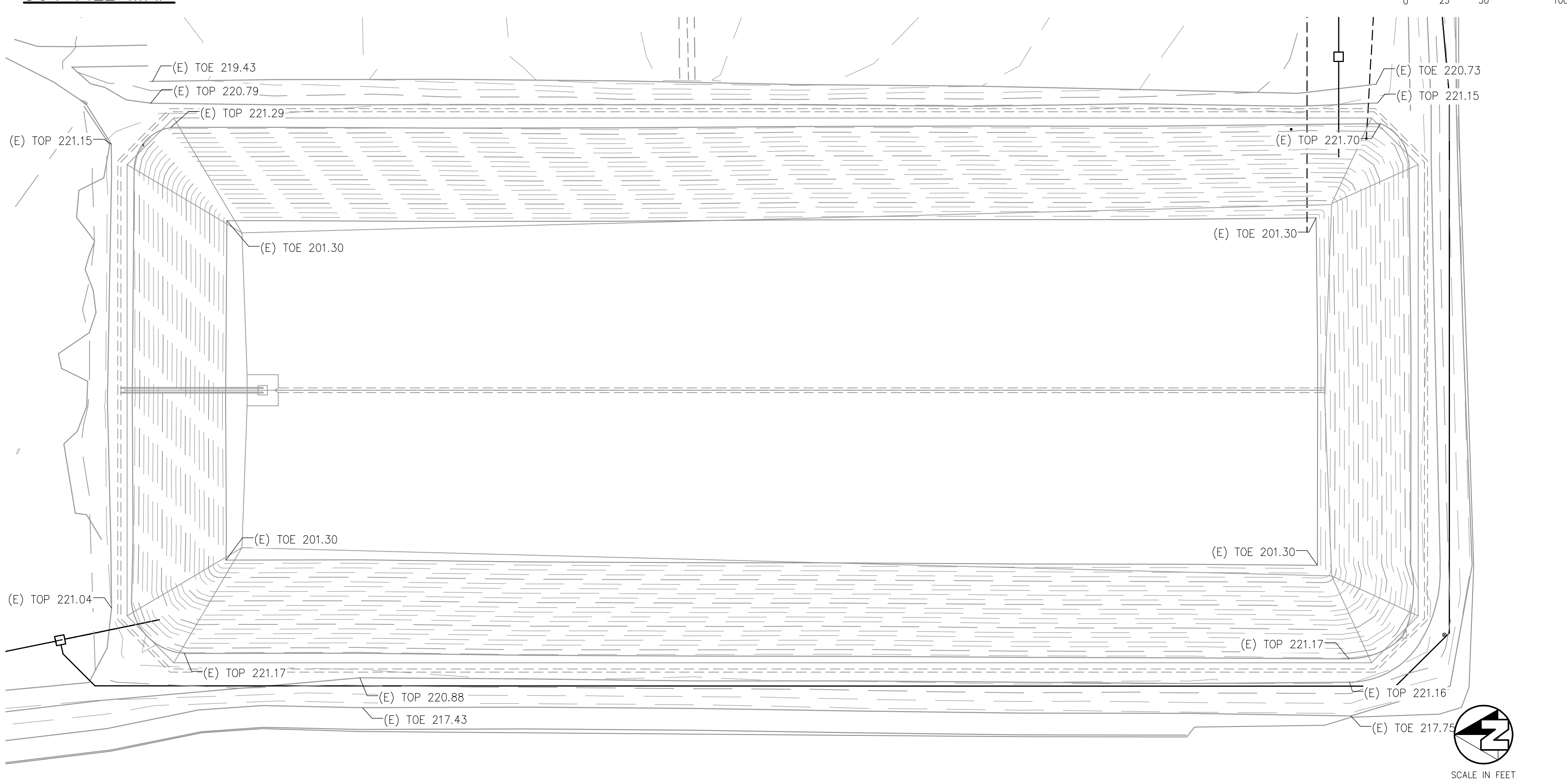
5/22/2017 1:26 PM G:\de Jong_Jack-3017\3017-River Ranch Dairy-6155 Jackson Ave Hanford CA\301717001-Digester Project\DWG\SHEET\LAGOON\LL6 DETAILS 3.dwg -Gabriel Do Reynoso

WARNING
POWER LINES OVERHEAD

811 Know what's below. Call before you dig.



CUT FILL MAP



EXISTING TOPOGRAPHY

ELEVATION TABLE					
NUMBER	MINIMUM ELEVATION	MAXIMUM ELEVATION	2D AREA	3D AREA	COLOR
1	−13.26	−3.40	164108.14	165168.65	
2	−3.40	−0.75	109848.56	110467.69	
3	−0.75	0.00	11180.51	14697.84	
4	0.00	0.05	1268.20	1532.34	
5	0.05	0.40	4972.40	6832.90	
6	0.40	0.90	8012.39	10666.36	
7	0.90	1.20	12931.65	14461.39	
8	1.20	1.30	10239.21	10519.21	
9	1.30	1.80	19028.65	19405.76	
10	1.80	4.88	34608.32	35295.26	

NOTES

1. POINTS WILL BE GIVEN FOR GPS LOCATION OF GRADING EQUIPMENT.
2. EXISTING LAGOON IS ASSUMED TO BE 20 FEET DEEP.

GRADING QUANTITIES

CUT: ±44,353 CY
FILL: ±5,768 CY
NET CUT: ±38585 CY
CUT FACTOR: =1
FILL FACTOR: =1

QUANTITIES ARE APPROXIMATE AND ARE BASED ON SURVEY DATA POINTS.

PRELIMINARY
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5/22/17

No.	REVISION	BY	DATE

FOR REVIEW ONLY

LAGOON DIGESTER
RIVER RANCH DAIRY
KINGS COUNTY
LAGOON DESIGN
CUT FILL MAP

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PHASE:

ORIGINAL SCALE SHOWN IS ONE INCH. ADJUST SCALE FOR REDUCED OR ENLARGED PLANS.

SHEET LL7

Lakeside Pipeline Dairy Digester Cluster

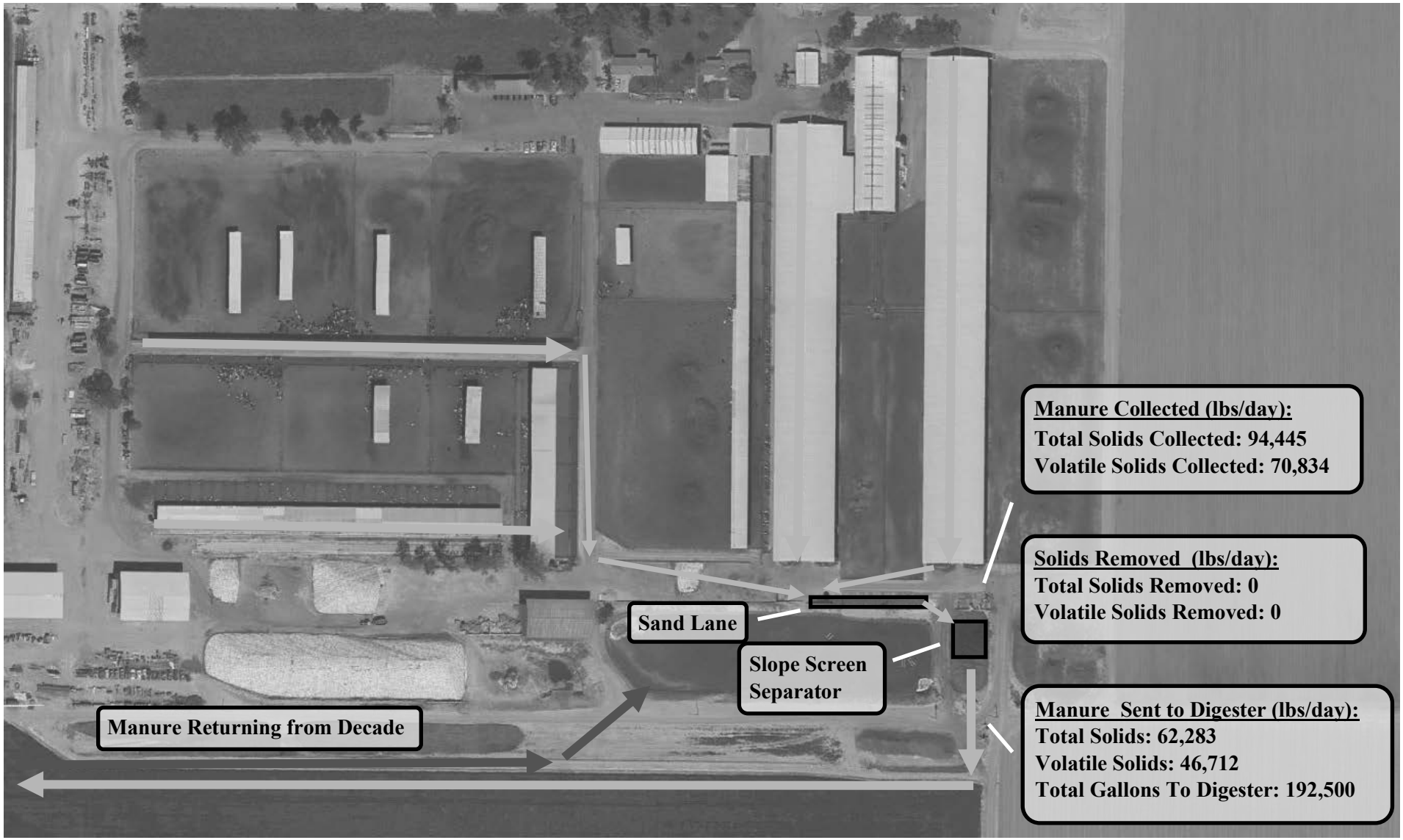
Decade Centralized Dairy - Digester 1

Mass Balance Diagram (Richard Westra Dairy Connected to Decade Centralized Digester)

Lakeside Pipeline Dairy Digester Cluster

Decade Centralized Dairy - Digester 1

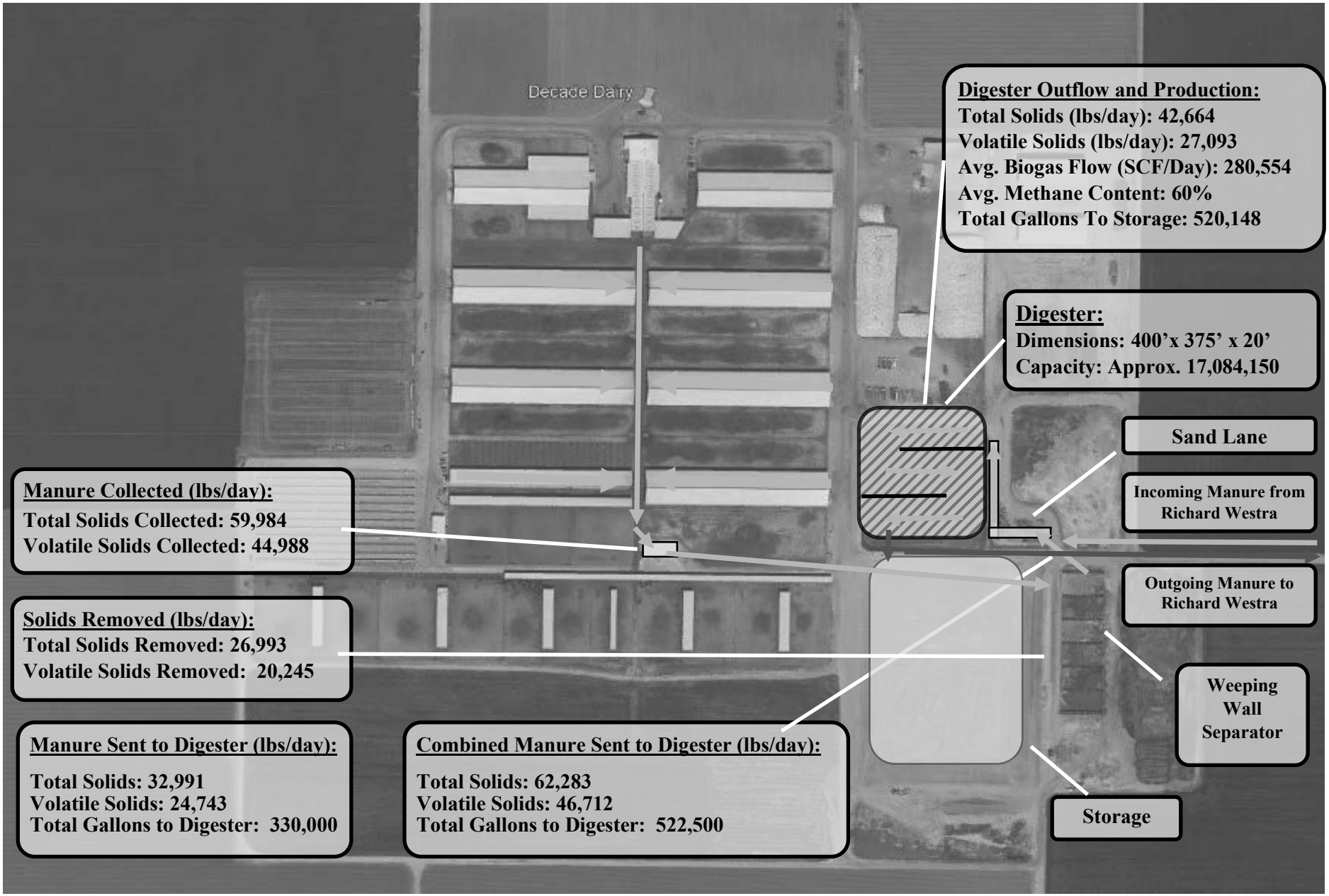
Mass Balance Diagram (Richard Westra Dairy—post-project)



Lakeside Pipeline Dairy Digester Cluster

Decade Centralized Dairy - Digester 1

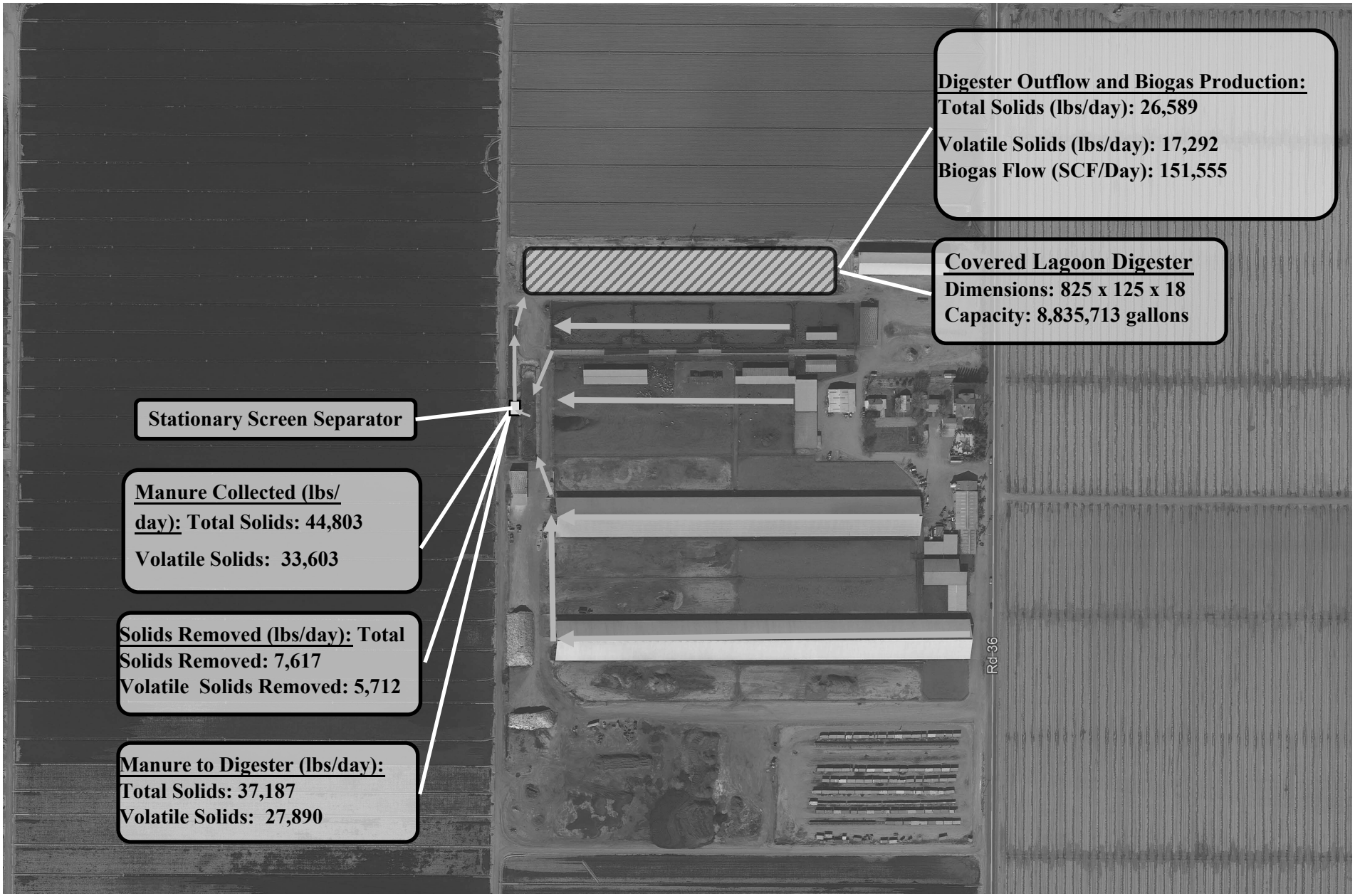
Mass Balance Diagram (Decade Dairy—post-project)



Lakeside Pipeline Dairy Digester Cluster

Clear Lake Dairy - Digester 2

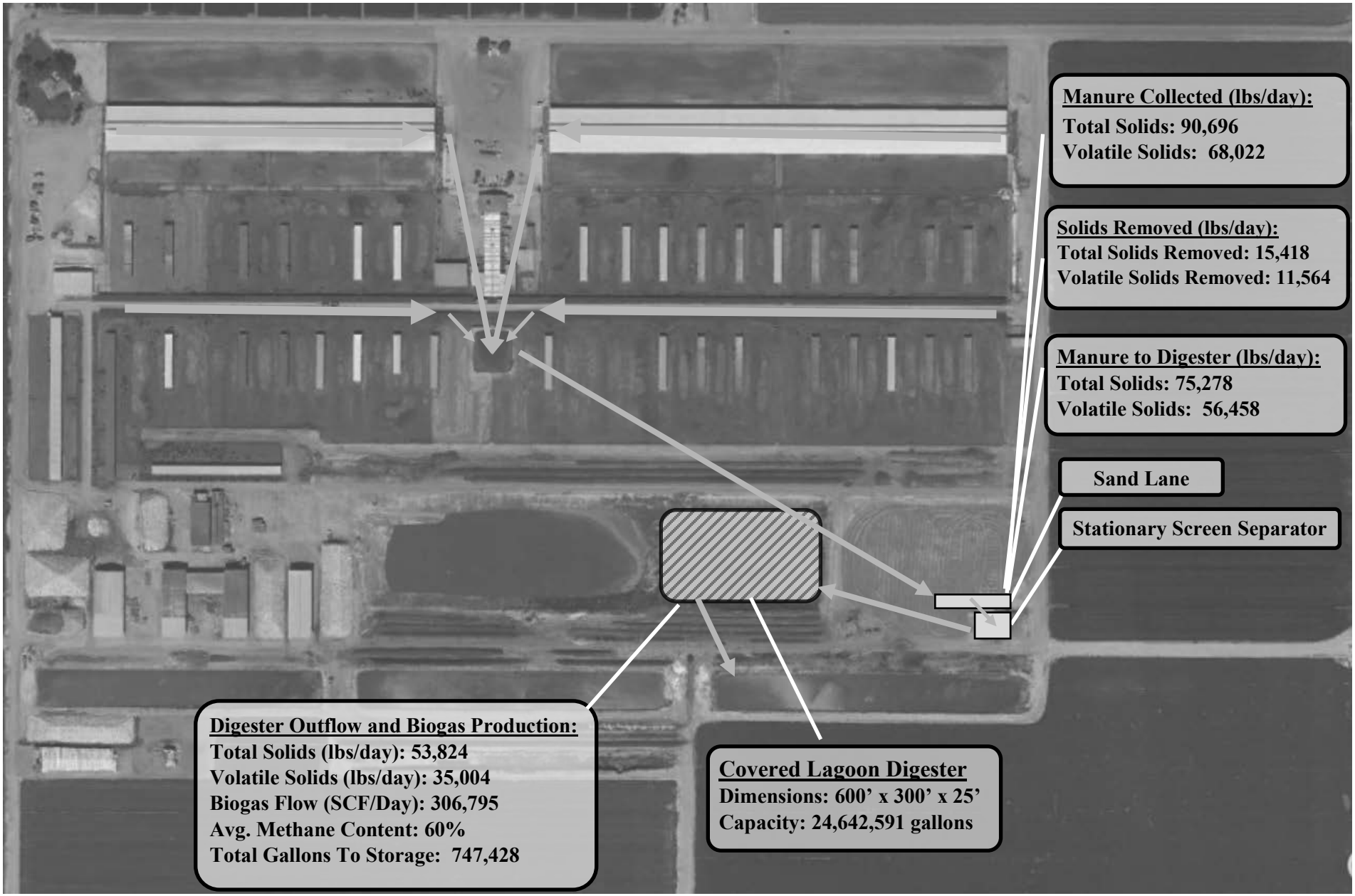
Mass Balance Diagram (post-project)



Lakeside Pipeline Dairy Digester Cluster

Dixie Creek Dairy - Digester 3

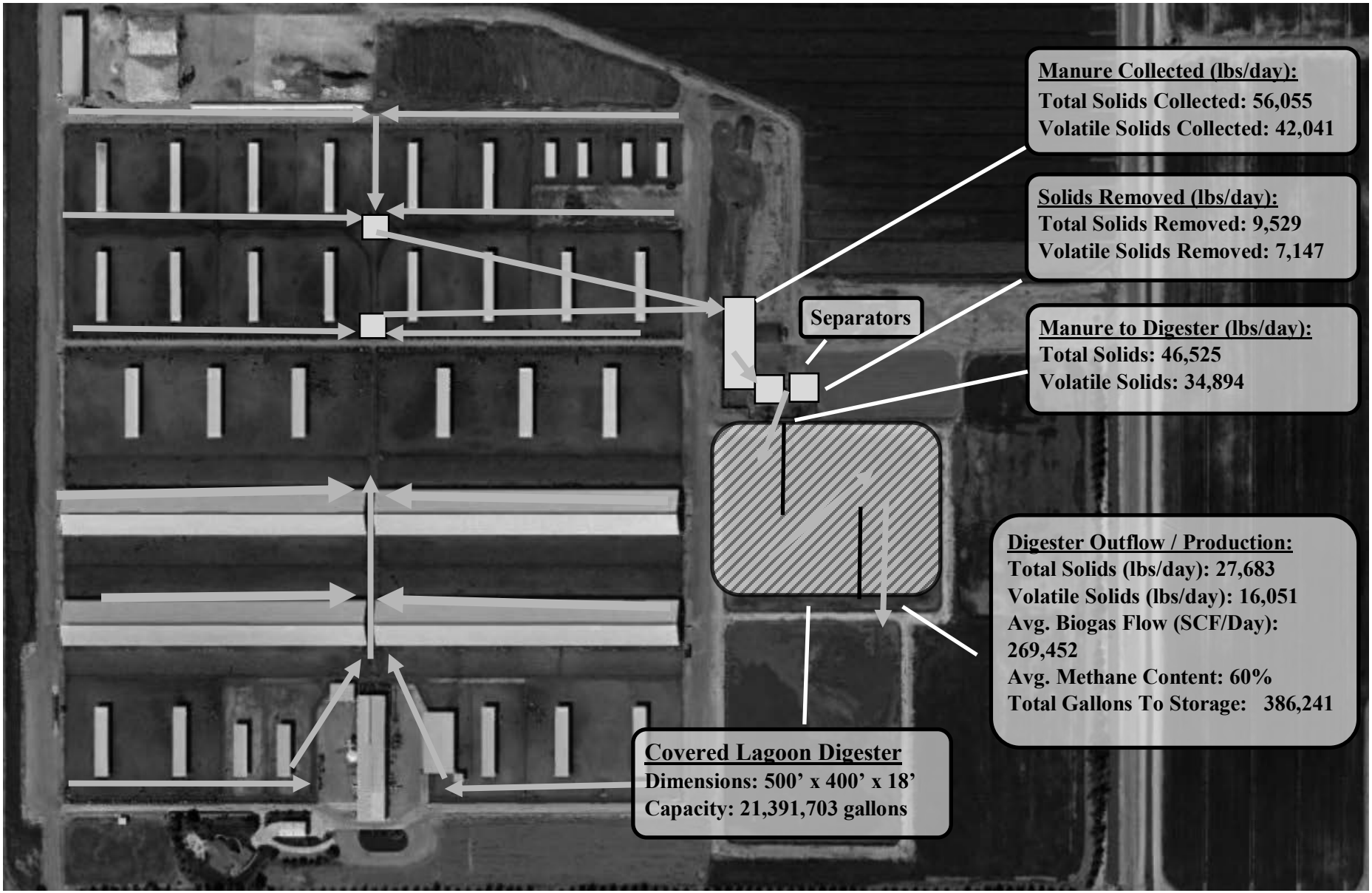
Mass Balance Diagram (post-project)



Lakeside Pipeline Dairy Digester Cluster

Double L Cattle - Digester #4

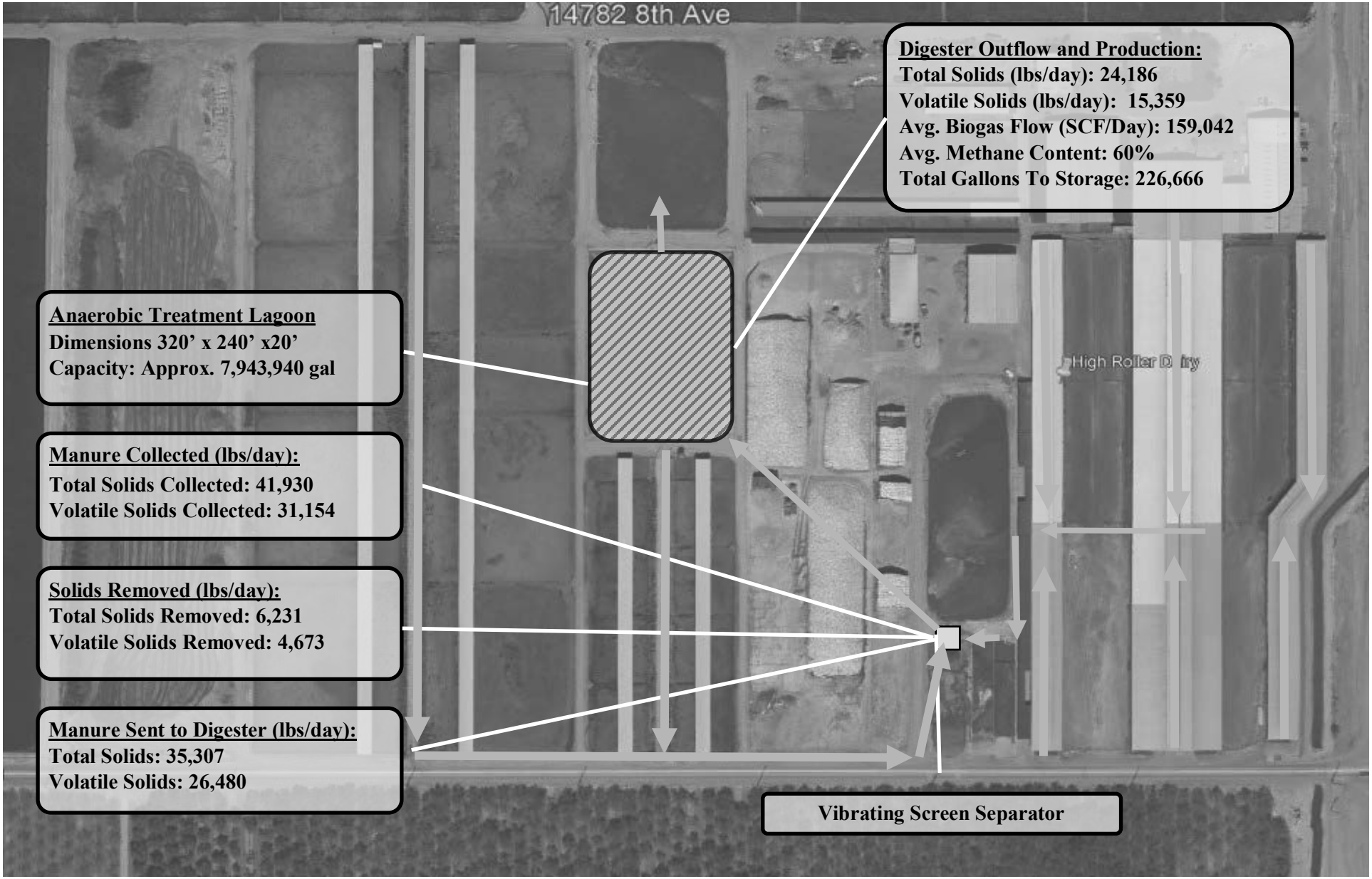
Mass Balance Diagram (post-project)



Lakeside Pipeline Dairy Digester Cluster

High Roller Dairy - Digester #5

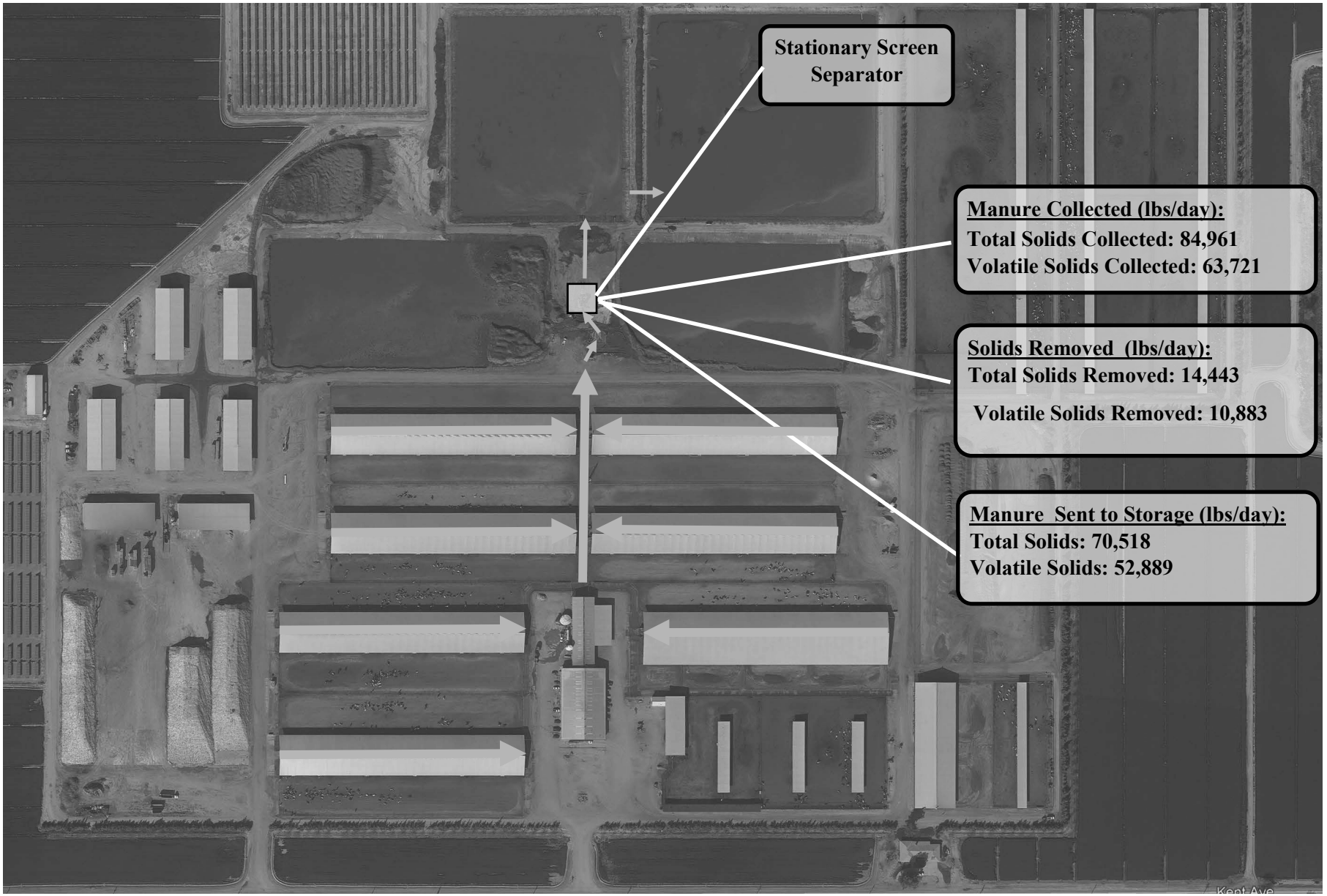
Mass Balance Diagram (post-project)



Lakeside Pipeline Dairy Digester Cluster

Lakeside Dairy - Digester 6

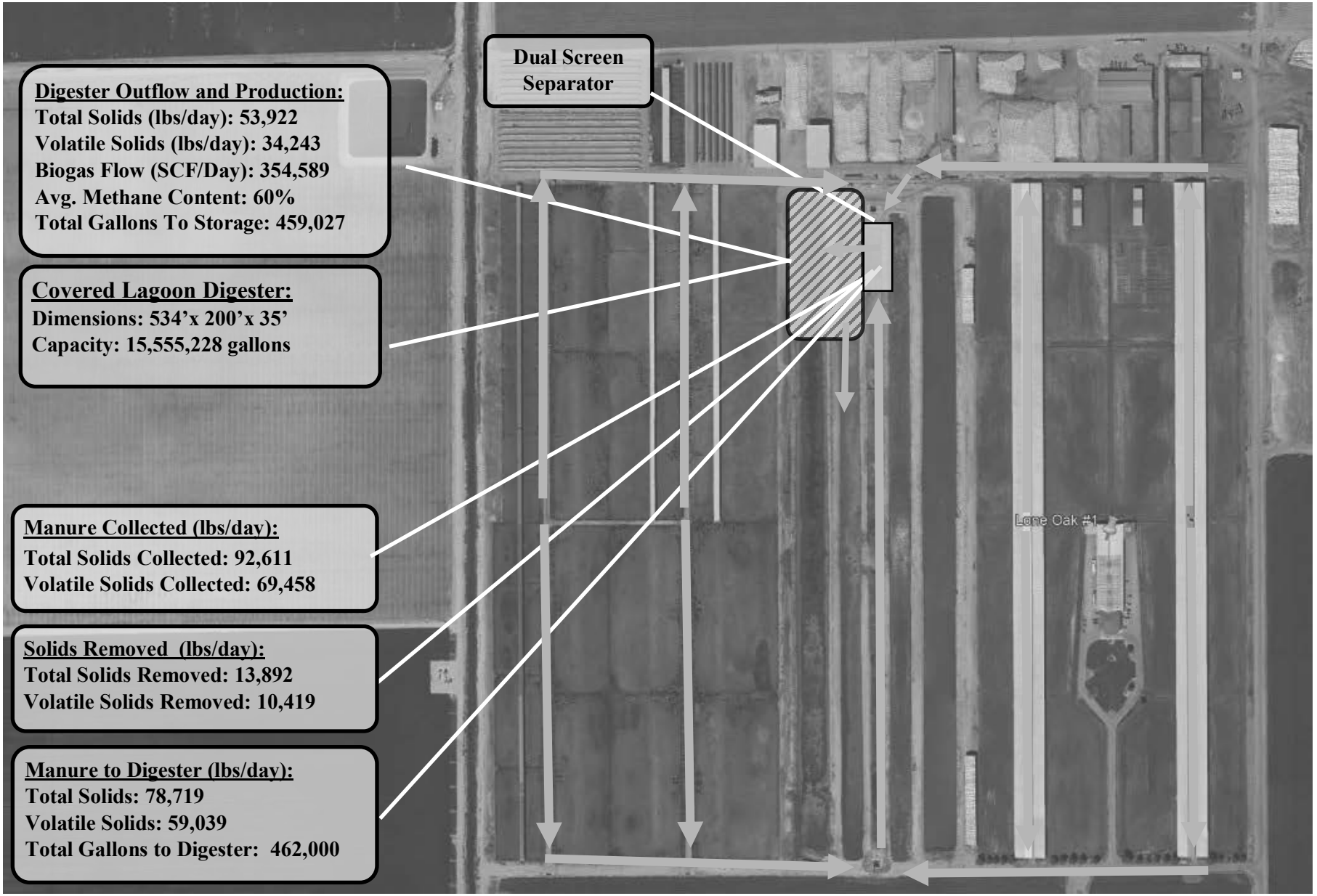
Annotated Manure Treatment Diagram (pre-project)



Lakeside Pipeline Dairy Digester Cluster

Lone Oak Farms #1 - Digester #7

Mass Balance Diagram (post-project)



Lakeside Pipeline Dairy Digest Cluster

Poplar Lane Dairy - Digester 8

Mass Balance Diagram (post-project)