APPENDIX C

Pump Selection

IP Riegelwood Landfill Leachate/Underdrain Pump and Force Main Model
Prepared by: Ben Latino
Software: Bentlely SewerGEMS V8
File: Riegelwood 2.swg

Assumptions:

Hazen C-value of 130 for all pipe
Existing leachate pump in cell 1 - GunnCo Sidesloper Model P2K-75.2 (see attached curve)
Proposed leachate pump in cell 2 - GunnCo Sidesloper Model P2K-85 (see attached curve)
Proposed underdrain pump in cell 2 - GunnCo Sidelsoper P3K Sump Pump (see attached curve)
Underdrain wetwell and piping based on Sheet 11 of 19, Liner System Drawings, 4/23/09
Underdrain wetwell piping changed from 2" HDPE to 2" Cast Iron
Cell 2 leachate pump and piping based on Sheet 14 of 19, Liner System Drawings, 4/23/09
Cell 1 leachate pump and piping based on provided elevations by LG, Pump el. 15.0', Pump off el. 16.0', Lead on el. 17.0', Lag on el. 18.5'
Cell 1 and 2 "wet wells" assumed to be 16' long by 10' wide by 4' deep above the pumps for purpose for providing an input into the model, i.e., sufficient collection of leachate to turn on all pumps.
Cell 1 hose length assumed to be identical to Cell 2.
Piping lengths based on Sheet 18 of 19, Liner System Drawings, 4/23/09

Analysis:

See attached model schematic.
Pumps and force main analyzed for the following scenarios:

1. All pumps at all three locations on simultaneously
2. One pump at each of the three locations on simultaneously
3. One existing leachate pump on only
4. One proposed leachate pump on only
5. One proposed underdrain pump on only
6. One proposed leachate and underdrain pump on simultaneously.

Results from SewerGEMS flex tables

1. All pumps at all three locations on simultaneously

Id	Label	Pumps	Elevation (ft)	Downstream Head (ft)	Pump Flow (gpm)	Pump Head (ft)	Upstream Head (ft)
20	Ex. P-1	<Collection: 1 it	15	60.9	64.22	42.9	19
21	Ex. P-2	<Collection: 1 it	15	60.9	64.31	42.8	19
22	Leach P-1	<Collection: 1 it	12.5	74.1	91.57	59.6	16.5
23	Leach P-2	<Collection: 1 it	12.5	74.1	91.67	59.5	16.5
24	Under P-1	<Collection: 1 it	0.2	61.9	29.29	57.6	5
25	Under P-2	<Collection: 1 it	0.2	61.9	29.74	57.5	5

Id	Label	Start-node Id	Stop-node Id	Diameter (in)	Material	Minor Loss Coefficient	Flow (gpm)	Hydraulic Grade (ft)	Maximum Flow (gpm)	Maximum Velocity (ft/s)	Velocity (ft/s)	User Defined Length (ft)
26	PP-2	20: Ex. P-1	16: PJ-1	3	Rubber Hose	4.77	64.63	61.4	98.77	4.48	2.93	72
27	PP-3	21: Ex. P-2	16: PJ-1	3	Rubber Hose	4.77	64.68	61.4	79.69	3.62	2.94	72
29	PP-4	22: Leach P-1	28: PJ-3	3	Rubber Hose	4.77	91.17	75.2	120.44	5.47	4.14	72
30	PP-5	23: Leach P-2	28: PJ-3	3	Rubber Hose	4.77	91.29	75.1	91.29	4.14	4.14	72
32	PP-6	16: PJ-1	31: PJ-4	6	HDPE	4.62	126.09	60.3	160.92	1.83	1.43	786.3
34	PP-8	28: PJ-3	31: PJ-4	3	HDPE	2.02	180.94	66.9	180.94	8.21	8.21	159
36	PP-9	24: Under P-1	35: PJ-5	2	Cast Iron	3.97	29.67	62.3	73.53	7.51	3.03	26
37	PP-10	25: Under P-2	35: PJ-5	2	Cast Iron	3.97	30.18	62.2	51.39	5.25	3.08	26
39	PP-11	31: PJ-4	38: PJ-6	6	HDPE	0.35	308.09	59.6	308.09	3.5	3.5	6.3
41	PP-13	35: PJ-5	38: PJ-6	2	HDPE	0.74	50.24	60.7	101.4	10.36	5.13	39
55	PP-16	38: PJ-6	19: OF-1	6	HDPE	1.00	359.06	47.8	360.72	4.09	4.07	2,161.80

Id	Label	Elevation (ft)	Pressure (feet H2O)	HGL (ft)	Maximum Hydraulic Grade (ft)	Total Outflow (gpm)
16	PJ-1	34.4	26.5	60.9	61.2	126.09
28	PJ-3	36	38.1	74.1	75.1	180.94
31	PJ-4	26.2	33.4	59.6	59.9	308.09
35	PJ-5	26	35.9	61.9	62.5	50.24
38	PJ-6	26.2	33.3	59.5	59.8	359.06

2. One pump at each of the three locations on simultaneously

Id	Label	Pumps	Elevation (ft)	Downstream Head (ft)	Pump Flow (gpm)	Pump Head (ft)	Upstream Head (ft)
20	Ex. P-1	<Collection: 1 it	15	48.2	82.17	33.9	17
21	Ex. P-2	<Collection: 1 it	15	48.2	0	0	17
22	Leach P-1	<Collection: 1 it	12.5	53.9	108.31	44.5	13.8
23	Leach P-2	<Collection: 1 it	12.5	53.9	0	0	13.8
24	Under P-1	<Collection: 1 it	0.2	50.8	55.31	52.9	2.1
25	Under P-2	<Collection: 1 it	0.2	50.8	0	0	2.1

Id	Label	Start-node Id	Stop-node Id	Diameter (in)	Material	Minor Loss Coefficient	Flow (gpm)	Hydraulic Grade (ft)	Maximum Flow (gpm)	Maximum Velocity (ft/s)	Velocity (ft/s)	User Defined Length (ft)
26	PP-2	20: Ex. P-1	16: PJ-1	3	Rubber Hose	4.77	82.54	49.6	98.77	4.48	3.75	72
27	PP-3	21: Ex. P-2	16: PJ-1	3	Rubber Hose	4.77	0	48.2	79.69	3.62	0	72
29	PP-4	22: Leach P-1	28: PJ-3	3	Rubber Hose	4.77	107.89	56.2	120.44	5.47	4.9	72
30	PP-5	23: Leach P-2	28: PJ-3	3	Rubber Hose	4.77	0	53.9	91.29	4.14	0	72
32	PP-6	16: PJ-1	31: PJ-4	6	HDPE	4.62	82.54	47.9	160.92	1.83	0.94	786.3
34	PP-8	28: PJ-3	31: PJ-4	3	HDPE	2.02	107.89	50.8	180.94	8.21	4.9	159
36	PP-9	24: Under P-1	35: PJ-5	2	Cast Iron	3.97	55.59	53.1	73.53	7.51	5.68	26
37	PP-10	25: Under P-2	35: PJ-5	2	Cast Iron	3.97	0	50.8	51.39	5.25	0	26
39	PP-11	31: PJ-4	38: PJ-6	6	HDPE	0.35	190.46	47.6	308.09	3.5	2.16	6.3
41	PP-13	35: PJ-5	38: PJ-6	2	HDPE	0.74	55.59	49.2	101.4	10.36	5.68	39
55	PP-16	38: PJ-6	19: OF-1	6	HDPE	1	246.09	41.6	360.72	4.09	2.79	2,161.80

Id	Label	Elevation (ft)	Pressure (feet H2O)	HGL (ft)	Maximum Hydraulic Grade (ft)	Total Outflow (gpm)
16	PJ-1	34.4	13.8	48.2	61.2	82.54
28	PJ-3	36	17.9	53.9	75.1	107.89
31	PJ-4	26.2	21.4	47.6	59.9	190.46
35	PJ-5	26	24.8	50.8	62.5	55.59
38	PJ-6	26.2	21.3	47.5	59.8	246.09

3. One existing leachate pump on only

Id	Label	Pumps	Elevation (ft)	Downstream Head (ft)	Pump Flow (gpm)	Pump Head (ft)	Upstream Head (ft)
20	Ex. P-1	<Collection: 1 it	15	38.6	98.85	25.6	16.7
21	Ex. P-2	<Collection: 1 it	15	38.6	0	0	16.7
22	Leach P-1	<Collection: 1 it	12.5	37.7	0	0	14.4
23	Leach P-2	<Collection: 1 it	12.5	37.7	0	0	14.4
24	Under P-1	<Collection: 1 it	0.2	37.7	0	0	1.4
25	Under P-2	<Collection: 1 it	0.2	37.7	0	0	1.4

Id	Label	Start-node Id	Stop-node Id	Diameter (in)	Material	Minor Loss Coefficient	Flow (gpm)	Hydraulic Grade (ft)	Maximum Flow (gpm)	Maximum Velocity (ft/s)	Velocity (ft/s)	User Defined Length (ft)
26	PP-2	20: Ex. P-1	16: PJ-1	3	Rubber Hose	4.77	98.44	40.5	98.77	4.48	4.47	72
27	PP-3	21: Ex. P-2	16: PJ-1	3	Rubber Hose	4.77	0	38.6	79.69	3.62	0	72
29	PP-4	22: Leach P-1	28: PJ-3	3	Rubber Hose	4.77	0	37.7	120.44	5.47	0	72
30	PP-5	23: Leach P-2	28: PJ-3	3	Rubber Hose	4.77	0	37.7	91.29	4.14	0	72
32	PP-6	16: PJ-1	31: PJ-4	6	HDPE	4.62	98.44	38.2	160.92	1.83	1.12	786.3
34	PP-8	28: PJ-3	31: PJ-4	3	HDPE	2.02	0	37.7	180.94	8.21	0	159
36	PP-9	24: Under P-1	35: PJ-5	2	Cast Iron	3.97	0	37.7	73.53	7.51	0	26
37	PP-10	25: Under P-2	35: PJ-5	2	Cast Iron	3.97	0	37.7	51.39	5.25	0	26
39	PP-11	31: PJ-4	38: PJ-6	6	HDPE	0.35	98.44	37.7	308.09	3.5	1.12	6.3
41	PP-13	35: PJ-5	38: PJ-6	2	HDPE	0.74	0	37.7	101.4	10.36	0	39
55	PP-16	38: PJ-6	19: OF-1	6	HDPE	1	98.44	36.6	360.72	4.09	1.12	2,161.80

Id	Label	Elevation (ft)	Pressure (feet H2O)	HGL (ft)	Maximum Hydraulic Grade (ft)	Total Outflow (gpm)
16	PJ-1	34.4	4.2	38.6	61.2	98.44
28	PJ-3	36	1.7	37.7	75.1	0
31	PJ-4	26.2	11.5	37.7	59.9	98.44
35	PJ-5	26	11.7	37.7	62.5	0
38	PJ-6	26.2	11.5	37.7	59.8	98.44

4. One proposed leachate pump on only

Id	Label	Pumps	Elevation (ft)	Downstream Head (ft)	Pump Flow (gpm)	Pump Head (ft)	Upstream Head (ft)
20	Ex. P-1	<Collection: 1 it	15	40.9	0	0	16.9
21	Ex. P-2	<Collection: 1 it	15	40.9	0	0	16.9
22	Leach P-1	<Collection: 1 it	12.5	47.9	114.76	38.7	14
23	Leach P-2	<Collection: 1 it	12.5	47.9	0	0	14
24	Under P-1	<Collection: 1 it	0.2	41.1	0	0	1.2
25	Under P-2	<Collection: 1 it	0.2	41.1	0	0	1.2

Id	Label	Start-node Id	Stop-node Id	Diameter (in)	Material	Minor Loss Coefficient	Flow (gpm)	Hydraulic Grade (ft)	Maximum Flow (gpm)	Maximum Velocity (ft/s)	Velocity (ft/s)	User Defined Length (ft)
26	PP-2	20: Ex. P-1	16: PJ-1	3	Rubber Hose	4.77	0	40.9	98.77	4.48	0	72
27	PP-3	21: Ex. P-2	16: PJ-1	3	Rubber Hose	4.77	0	40.9	79.69	3.62	0	72
29	PP-4	22: Leach P-1	28: PJ-3	3	Rubber Hose	4.77	114.34	50.4	120.44	5.47	5.19	72
30	PP-5	23: Leach P-2	28: PJ-3	3	Rubber Hose	4.77	0	47.9	91.29	4.14	0	72
32	PP-6	16: PJ-1	31: PJ-4	6	HDPE	4.62	0	40.9	160.92	1.83	0	786.3
34	PP-8	28: PJ-3	31: PJ-4	3	HDPE	2.02	114.34	44.4	180.94	8.21	5.19	159
36	PP-9	24: Under P-1	35: PJ-5	2	Cast Iron	3.97	0	41.1	73.53	7.51	0	26
37	PP-10	25: Under P-2	35: PJ-5	2	Cast Iron	3.97	0	41.1	51.39	5.25	0	26
39	PP-11	31: PJ-4	38: PJ-6	6	HDPE	0.35	111.3	40.9	308.09	3.5	1.26	6.3
41	PP-13	35: PJ-5	38: PJ-6	2	HDPE	0.74	0	41	101.4	10.36	0	39
55	PP-16	38: PJ-6	19: OF-1	6	HDPE	1	158.54	38.2	360.72	4.09	1.8	2,161.80

Id	Label	Elevation (ft)	Pressure (feet H2O)	HGL (ft)	Maximum Hydraulic Grade (ft)	Total Outflow (gpm)
16	PJ-1	34.4	6.5	40.9	61.2	0
28	PJ-3	36	11.9	47.9	75.1	114.34
31	PJ-4	26.2	14.7	40.9	59.9	111.3
35	PJ-5	26	15.1	41.1	62.5	0
38	PJ-6	26.2	14.6	40.8	59.8	158.54

5. One proposed underdrain pump on only

Id	Label	Pumps	Elevation (ft)	Downstream Head (ft)	Pump Flow (gpm)	Pump Head (ft)	Upstream Head (ft)
20	Ex. P-1	<Collection: 1 it	15	(N/A)	(N/A)	(N/A)	(N/A)
21	Ex. P-2	<Collection: 1 it	15	(N/A)	(N/A)	(N/A)	(N/A)
22	Leach P-1	<Collection: 1 it	12.5	36.8	0	0	14.5
23	Leach P-2	<Collection: 1 it	12.5	36.8	0	0	14.5
24	Under P-1	<Collection: 1 it	0.2	42.4	73.73	48.6	1.2
25	Under P-2	<Collection: 1 it	0.2	42.4	0	0	1.2

Id	Label	Start-node Id	Stop-node Id	Diameter (in)	Material	Minor Loss Coefficient	Flow (gpm)	Hydraulic Grade (ft)	Maximum Flow (gpm)	Maximum Velocity (ft/s)	Velocity (ft/s)	User Defined Length (ft)
26	PP-2	20: Ex. P-1	16: PJ-1	3	Rubber Hose	4.77	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)	72
27	PP-3	21: Ex. P-2	16: PJ-1	3	Rubber Hose	4.77	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)	72
29	PP-4	22: Leach P-1	28: PJ-3	3	Rubber Hose	4.77	0	36.8	119.41	5.42	0	72
30	PP-5	23: Leach P-2	28: PJ-3	3	Rubber Hose	4.77	0	36.8	97.46	4.42	0	72
32	PP-6	16: PJ-1	31: PJ-4	6	HDPE	4.62	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)	786.3
34	PP-8	28: PJ-3	31: PJ-4	3	HDPE	2.02	0	36.8	194.71	8.84	0	159
36	PP-9	24: Under P-1	35: PJ-5	2	Cast Iron	3.97	74.13	46.3	88.11	9	7.57	26
37	PP-10	25: Under P-2	35: PJ-5	2	Cast Iron	3.97	0	42.4	57.07	5.83	0	26
39	PP-11	31: PJ-4	38: PJ-6	6	HDPE	0.35	0	36.8	194.71	2.21	0	6.3
41	PP-13	35: PJ-5	38: PJ-6	2	HDPE	0.74	74.13	39.6	115.38	11.78	7.57	39
55	PP-16	38: PJ-6	19: OF-1	6	HDPE	1	74.29	36.1	285.64	3.24	0.84	2,161.80

Id	Label	Elevation (ft)	Pressure (feet H2O)	HGL (ft)	Maximum Hydraulic Grade (ft)	Total Outflow (gpm)
16	PJ-1	34.4	(N/A)	(N/A)	(N/A)	(N/A)
28	PJ-3	36	0.8	36.8	68.4	0
31	PJ-4	26.2	10.6	36.8	51.2	0
35	PJ-5	26	16.4	42.4	58.5	74.13
38	PJ-6	26.2	10.6	36.8	51.2	74.29

6. One proposed leachate and underdrain pump on simultaneously

Id	Label	Pumps	Elevation (ft)	Downstream Head (ft)	Pump Flow (gpm)	Pump Head (ft)	Upstream Head (ft)
20	Ex. P-1	<Collection: 1 it	15	(N/A)	(N/A)	(N/A)	(N/A)
21	Ex. P-2	<Collection: 1 it	15	(N/A)	(N/A)	(N/A)	(N/A)
22	Leach P-1	<Collection: 1 it	12.5	49.2	113	40.3	13.7
23	Leach P-2	<Collection: 1 it	12.5	49.2	0	0	13.7
24	Under P-1	<Collection: 1 it	0.2	46.8	66.57	50.4	2.5
25	Under P-2	<Collection: 1 it	0.2	46.8	0	0	2.5

Id	Label	Start-node Id	Stop-node Id	Diameter (in)	Material	Minor Loss Coefficient	Flow (gpm)	Hydraulic Grade (ft)	Maximum Flow (gpm)	Maximum Velocity (ft/s)	Velocity (ft/s)	User Defined Length (ft)
26	PP-2	20: Ex. P-1	16: PJ-1	3	Rubber Hose	4.77	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)	72
27	PP-3	21: Ex. P-2	16: PJ-1	3	Rubber Hose	4.77	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)	72
29	PP-4	22: Leach P-1	28: PJ-3	3	Rubber Hose	4.77	112.6	51.7	119.41	5.42	5.11	72
30	PP-5	23: Leach P-2	28: PJ-3	3	Rubber Hose	4.77	0	49.2	97.46	4.42	0	72
32	PP-6	16: PJ-1	31: PJ-4	6	HDPE	4.62	(N/A)	(N/A)	(N/A)	(N/A)	(N/A)	786.3
34	PP-8	28: PJ-3	31: PJ-4	3	HDPE	2.02	112.6	45.8	194.71	8.84	5.11	159
36	PP-9	24: Under P-1	35: PJ-5	2	Cast Iron	3.97	66.96	50.1	88.11	9	6.84	26
37	PP-10	25: Under P-2	35: PJ-5	2	Cast Iron	3.97	0	46.8	57.07	5.83	0	26
39	PP-11	31: PJ-4	38: PJ-6	6	HDPE	0.35	112.6	42.2	194.71	2.21	1.28	6.3
41	PP-13	35: PJ-5	38: PJ-6	2	HDPE	0.74	66.96	44.5	115.38	11.78	6.84	39
55	PP-16	38: PJ-6	19: OF-1	6	HDPE	1	179.66	38.9	285.64	3.24	2.04	2,161.80

Id	Label	Elevation (ft)	Pressure (feet H2O)	HGL (ft)	Maximum Hydraulic Grade (ft)	Total Outflow (gpm)
16	PJ-1	34.4	(N/A)	(N/A)	(N/A)	(N/A)
28	PJ-3	36	13.2	49.2	68.4	112.6
31	PJ-4	26.2	16	42.2	51.2	112.6
35	PJ-5	26	20.8	46.8	58.5	66.96
38	PJ-6	26.2	16	42.2	51.2	179.66

URS

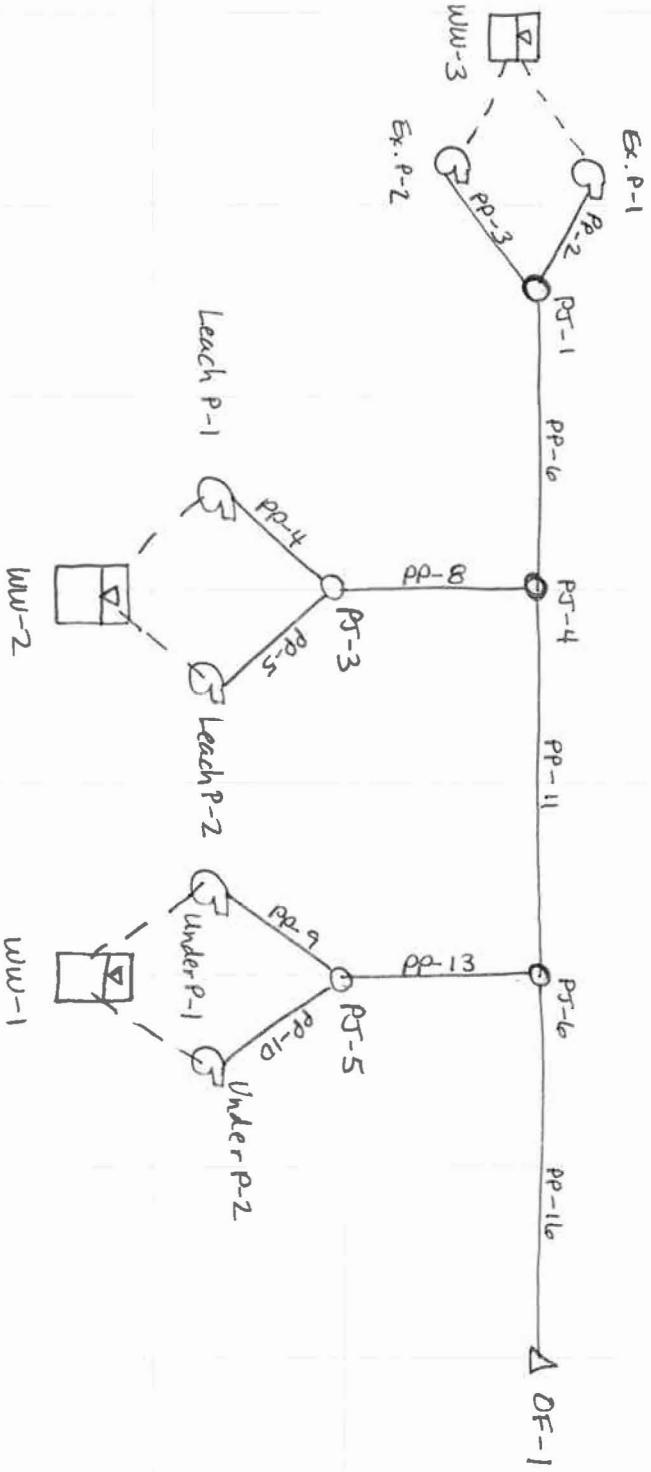
Page ____ of ____

Job I.P Riegelwood | Project No. ____ | Sheet 5 of 8

Description Underdrain/Leachate Pump Model Schematic | Computed by ____ | Date ____

Checked by ____ | Date ____

Reference



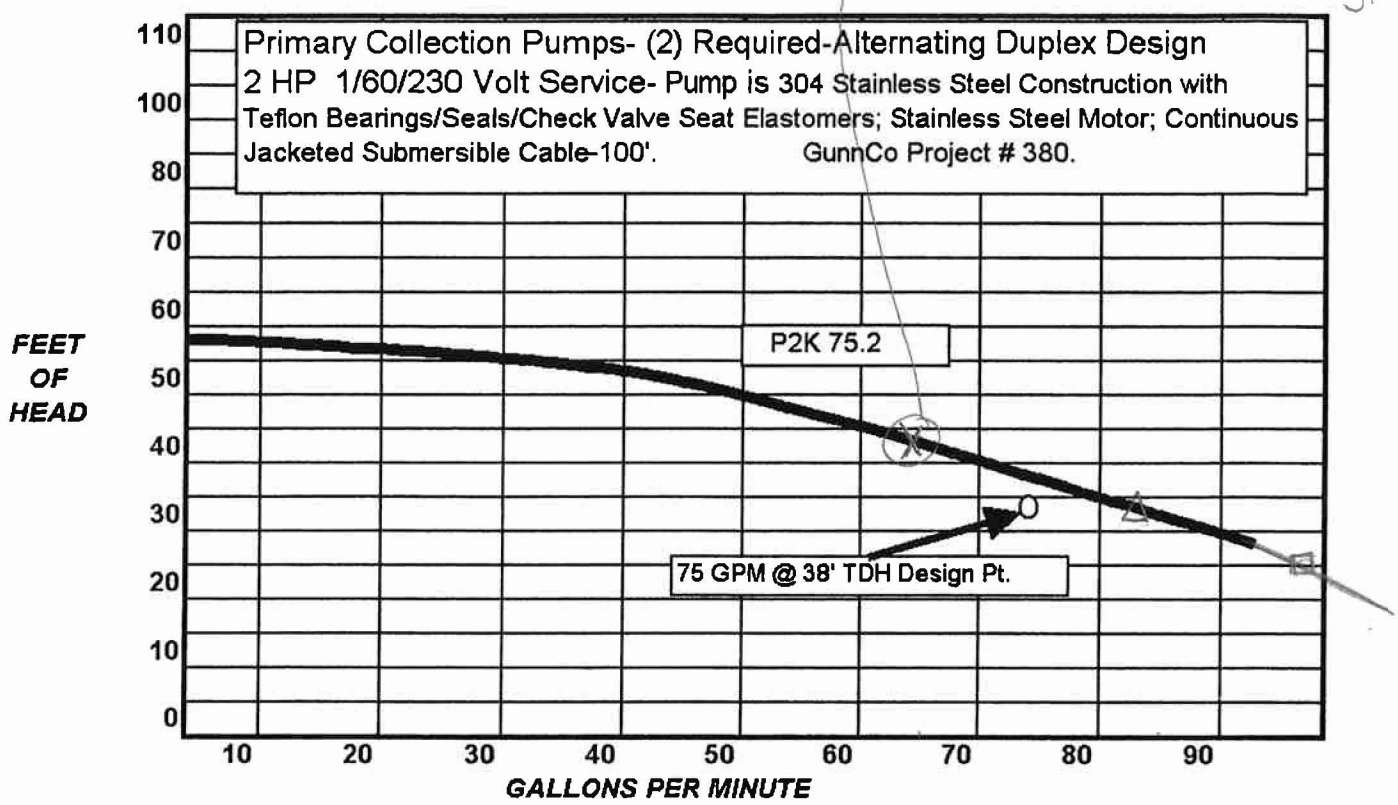
Existing LEACHATE

GunnCo Sidesloper ™ Pump

75 GALLONS PER MINUTE NOMINAL FLOW PUMP **P2K-75.2**

MULTI-STAGE TURBINE SIDE SLOPE EXTRACTION PUMP 1.03

NOTE: ON PARALLEL CURVE Q= 128 gpm



PUMP	MODEL	H.P.	"L"
P2K	75-1	1.0	36"
P2K	75-2	1.5	36"
P2K	75-3	2.0	36"
P2K	75-4	3.0	42"
P2K	75-5	3.0	42"

All pumps include wheeled carrier and are designed for application in 18" SDR 11 to 17 HDPE pipe.

Pumps may be ordered for use in 24" or other custom pipe sizes.

Pump construction is 304 stainless steel with bearings and seals of Teflon material.

X - ALL PUMPS ON

△ - ONE PUMP EACH ON

□ - ONLY EXISTING ON

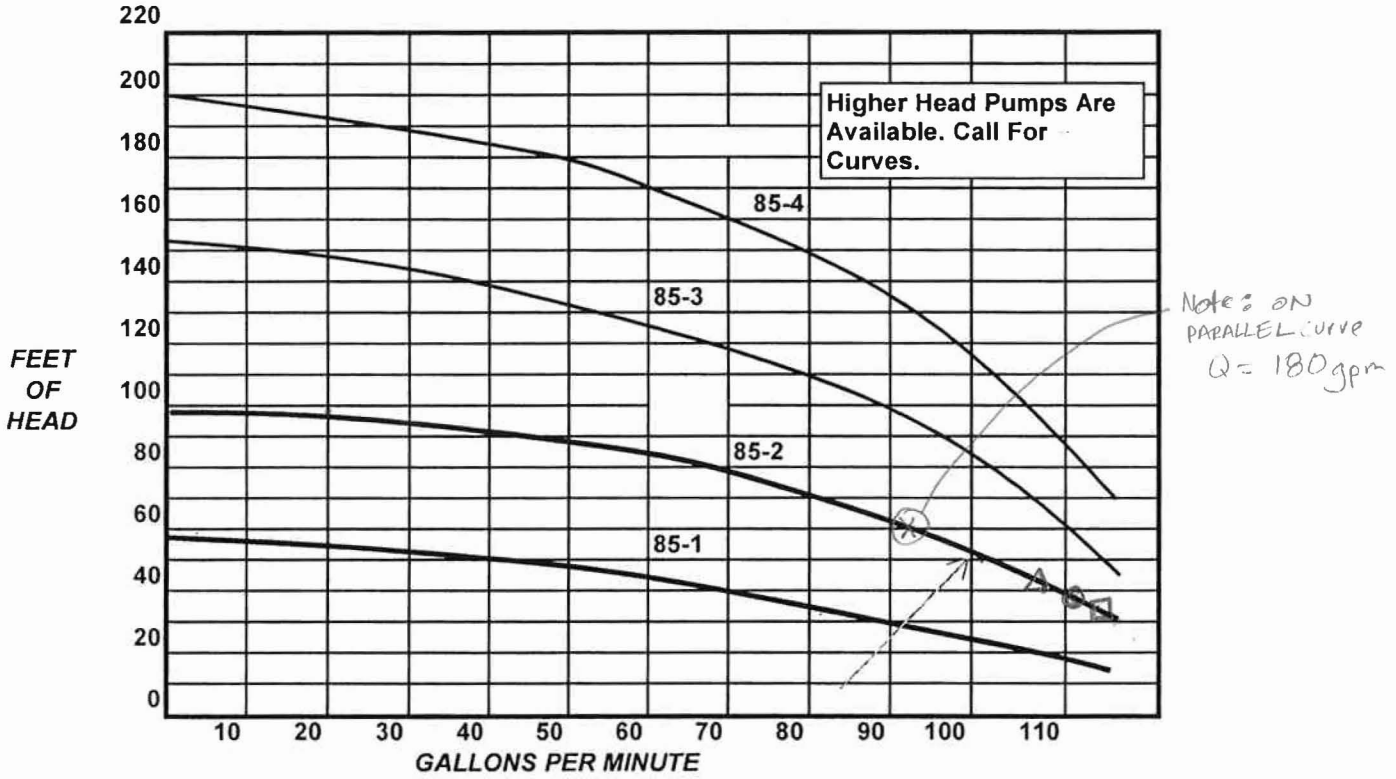
85 —

Proposed Primary
LEACHATE PUMP

GunnCo.....Sidesloper™ Pump

85 GALLONS PER MINUTE NOMINAL FLOW PUMP P2K-85

MULTI-STAGE TURBINE SIDE SLOPE EXTRACTION PUMP



PUMP	MODEL	H.P.	* "L"
P2K	85-1	1.5	36"
P2K	85-2	3.0	46"
P2K	85-3	5.0	55"
P2K	85-4	5.0	55"

* "L" Represents maximum length
Consult GunnCo for actual "L" dimension.

All pumps include wheeled carrier and are designed for application in 24" SDR 11 to 22 HDPE pipe.

Pumps may be ordered for use in 18" or other custom pipe sizes.

Pump construction is 304 stainless steel with bearings and seals of Teflon material.
Motor construction 304 S/S
Carrier construction 304 S/S

X - ALL PUMPS ON

Δ - ONE PUMP EACH ON

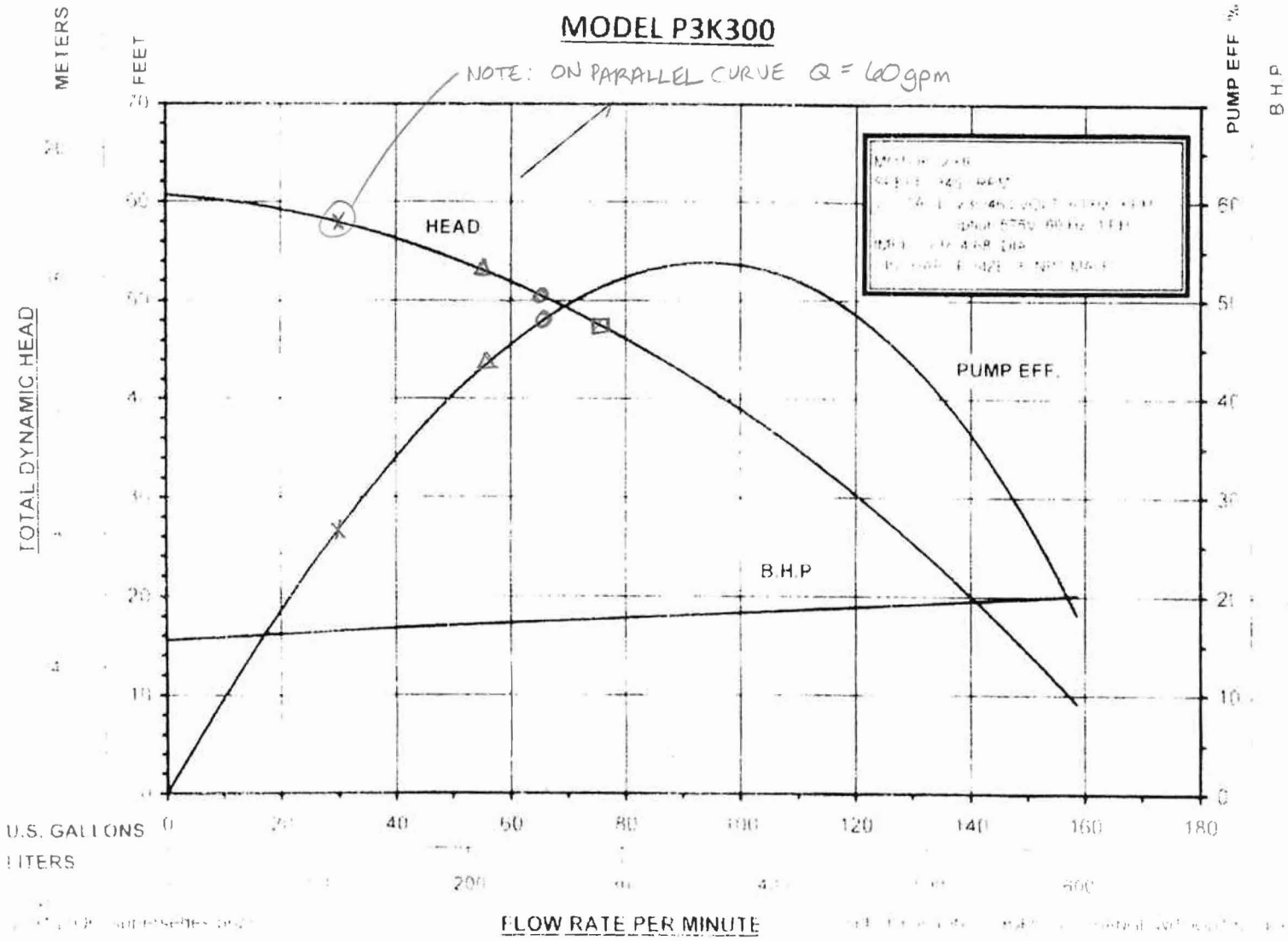
O - ONE PUMP LEACHATE/UNDERDRAIN ONLY

□ - ONLY LEACHATE

7

PROPOSED UNDERDRAIN SUBMERSIBLE PUMP

X - ALL PUMPS ON
Δ - ONE PUMP EACH ON
O - ONE PUMP LEACHATE/UNDER ONLY
□ - ONLY UNDERDRAIN



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