



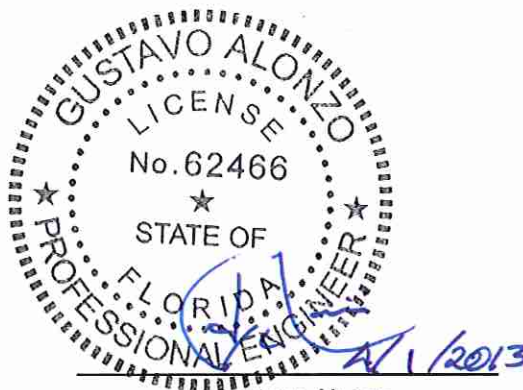
RESOURCE RECOVERY FACILITY PRIVATE LIFT STATION UPGRADE PROJECT.

Contract Number EDP-591947578-2014-A
BPO ID: ABCW1200556
PO #: PCPW1200328

CALCULATIONS REPORT

Miami-Dade Public Works and Waste Management Department
Miami, Florida

April 01, 2013
Rev. 0



Gustavo Alonzo
Licensed Engineer no. 62466
State of Florida

GENERAL

The Miami-Dade Public Works and Waste Management Department (PWWM) has proposed improvements to Lift Station #938, including.

CAS Engineering (CAS) final report complies with all pertinent codes and regulations including:

1. Florida Building Code 2010
2. 10 States Standard for Water Works
3. Miami-Dade County Water and Sewer Agreement Requirements
4. Technical Guidance for RCRA/CERCLA Final Covers. EPA

We have applied the basis of design our client approved in the Second Progress Report using the alternative of a new tank to replace existing tank and keeping the same operation scheme at the lift station.

1. CONTRIBUTING FLOWS ESTIMATION

The incoming flows to the lift station are from this sources:

- Ash Landfill underground drainage
- Plant sanitary Sewer
- Leachate runoff from some areas of the plant where polluted water is discharged to the sewer system

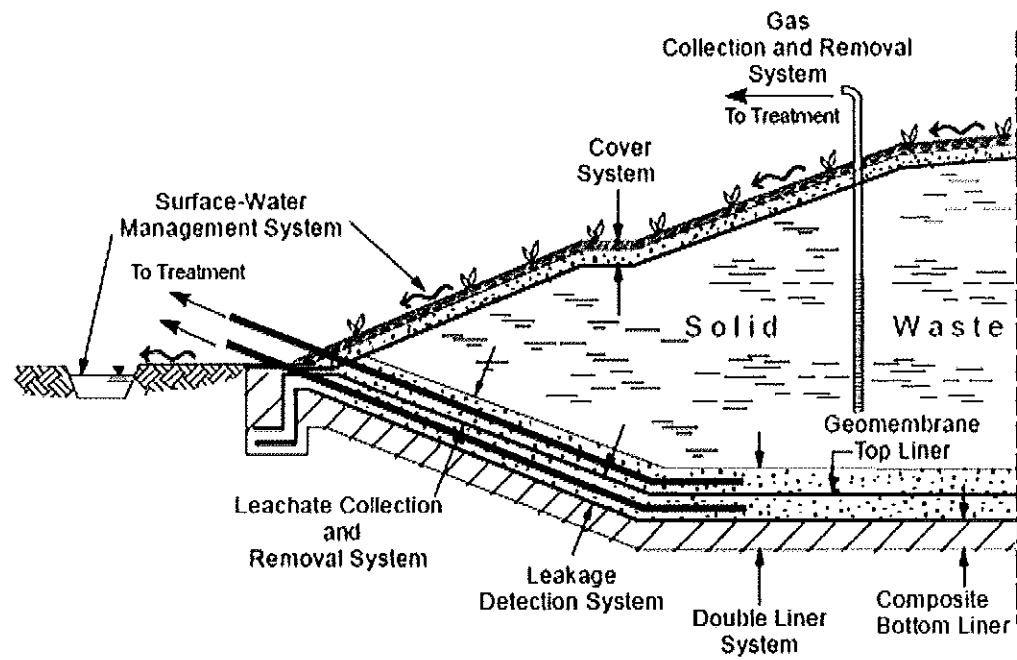
All these sources are combined and discharging by gravity to the lift station. This will be the design flow for the lift station.

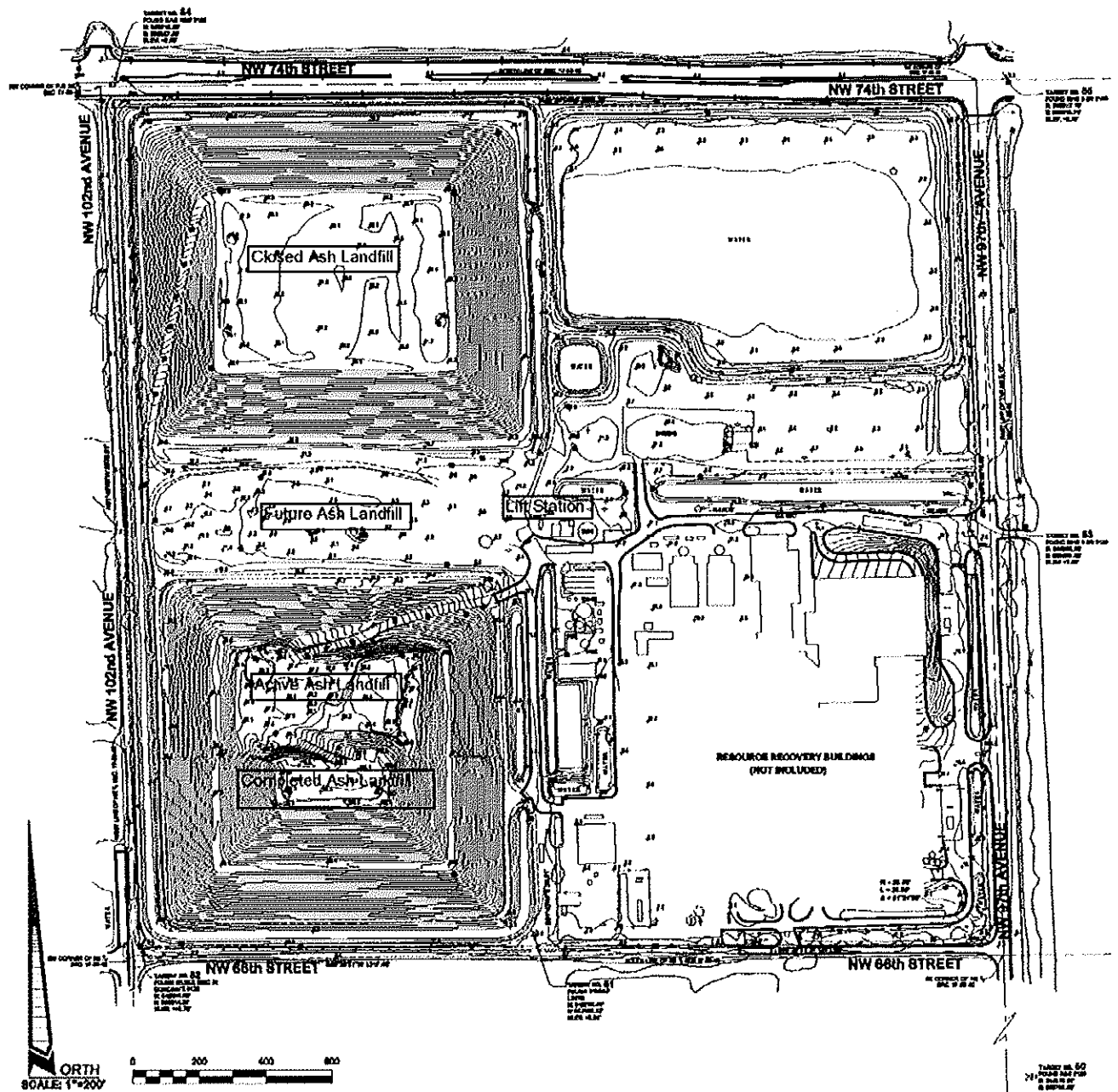
The following is a summary of the estimated flow from each source..

i. ASH LANDFILL

The existing land fill covers an area of 63.5 Acres. This area includes completed landfill, actual landfill in service and future areas. In all the areas the infiltrated flow is capture by underground drainage system discharging through pipes to the lift station.

During rain events, the runoff is captured at retention area around the ash landfill, the infiltrated water is contain by impervious membranes and discharge by lateral drain system.





Following EPA Technical Guide for Landfill Design we have estimated the peak lateral drainage flow using the water balance method of Koerner and Daniel (1997).

$PERC^* = P(1 - Cr)$ when $kcs \geq P(1 - Cr)$

$PERC^* = kcs$ when $kcs < P(1 - Cr)$

Where:

PERC is the percolation per square foot of field

Kcs is the hydraulic conductivity of the ash material = 0.01.

P is the precipitation

Cr is the runoff coefficient = 0.9. $\rightarrow (1-Cr)=0.1 > Kcs$ then $Q=Kcs \cdot I \cdot A$,

Where:

$I=\Delta h/L=1$ for vertical, most critical case

Q= peak flow at drainage system

Meaning the limit of the flow capture by the underground drainage is the percolation capacity of the material. The excess water will be uncontaminated runoff draining to retention areas

The total maximum or peak flow when ash land fill is saturated including future development is 19.2 gpm, see attached calculations.

ii. SANITARY SEWER

The estimated sanitary sewer is based on the water allocation per worker at a rate of 60 gallons per worker per day.

The peak factor used for this facility is 3.236 as recommended by the Miami Dade Water and Sewer Department.

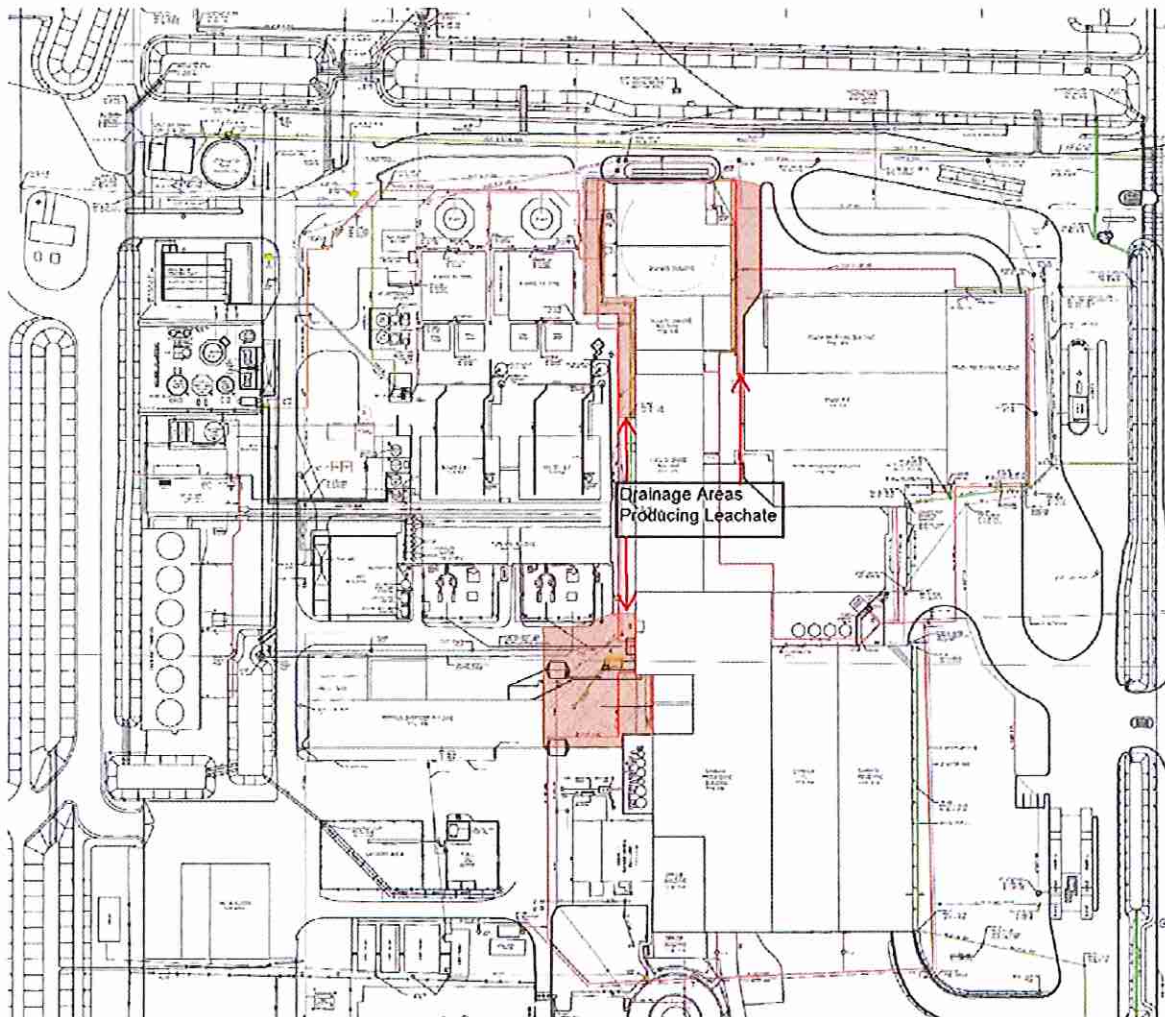
For 200 employees reported by the client the estimated peak flow is 26.97 gpm.

iii. PLANT LIMITED AREA DRAINAGE

The Resource Recovery Facility representative reported to CAS that two areas open to rain events are considered to produce leachate due to its operations handling solid waste. Both areas leachate drainage systems are connected to the plant sewer system discharging to the lift station.

The total contributing area is 1 Acre.

We have considered 3 rain events to estimate the leachate runoff contributing to the pump station. A 5 years return period storm is considered to estimate the normal peak flow, and a 25 years return period storm is analyzed to review sump tank capacity and/or ponding.



Our calculations show the following peak flows:

Rain Event	Runoff Volume for event at tc [CU.FT.]	Peak Flow [GPM]	PUMPED FLOW [GPM]
1 year 3 hours	2945	2203	946
5 year 3 hours	3666	2742	1486
25 year 3 hours	4419	3305	2049

tc: time of concentration

Storage at wet well: 1680 CUFT

Pumped flow = (Runoff Volume-Storage)/tc

iv. CONNECTION POINT CONDITIONS

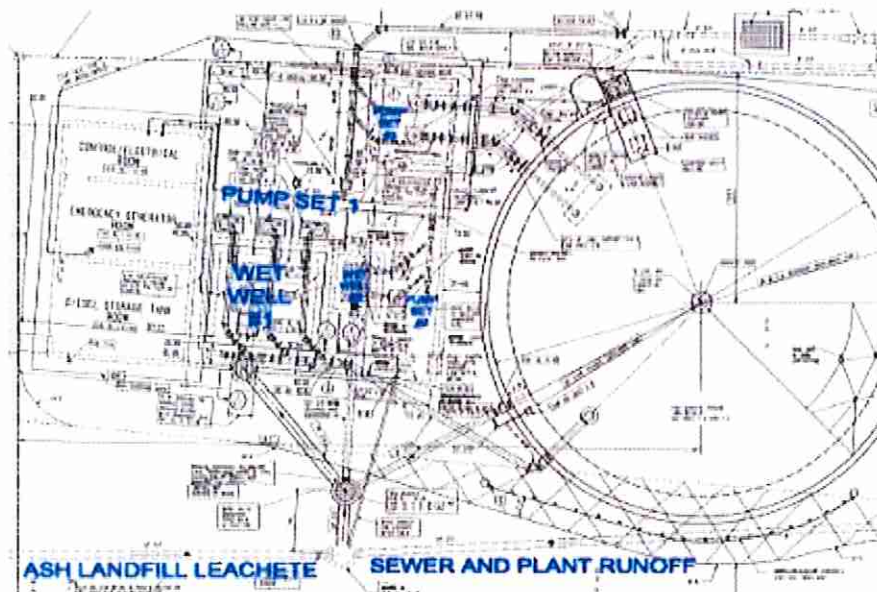
As reported on the first progress report WASD has indicated that the connection point for Lift Station #938 is a meter located online with the existing force main 40 ft east of the pump station. The pressure required at this point is 54 psi at 5 feet MSL (maximum design head) and 5 psi at 5 feet MSL (minimum design head). WASD letter also indicate the peak flow allocated for this lift station is 1,148 gpm.

2. PROPOSED UPGRADES

The peak flow calculations from precedent section show the condition of normal operations flow is coming from the ash field and sewer from the plant for a total of 46.7 gpm during a sewer peak flow hours.

This figures contrast in order of magnitude with the incoming flow in case of rain events a 5 years rain event will produce a peak flow of 2750 gpm to be handled by the lift station. Therefore the most efficient way to handle the storm event produced leachate is by providing a storage tank for temporary holding of peak flows. This approach follows the original design and confirms the need for a storage tank.

The plant runoff and sewer flows come from the east combined in a single 18" pipe, while the leachate flow from the ash landfill comes from the west in a 12" pipe. The flows are now combined in a man hole and discharge to the wet well #1.



The upgrade consist of a new reduced size storage tank. The actual drainage flow to the lift station has been reduced when some of the process water was

This technical drawing illustrates a water supply system layout. The central feature is a large circular 'NEW TANK' on the right, which is connected to a central area containing a 'PUMP SET', 'WET WELL', and 'DIESEL STORAGE TANK'. To the left of the pump set are the 'CONTROL/ELECTRICAL ROOM' and 'EMERGENCY GENERATOR ROOM'. The drawing includes numerous annotations, dimensions, and a north arrow. The layout shows a complex network of pipes and valves, with various rooms and structures labeled throughout the site.

- Demolition of storage tank
- Construction of new storage tank on the salvaged foundation
- Upgrade of pump set #3 and #2



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CALCULATIONS

DISCHARGE TANK- PUMP STATION

STATIC HEAD (POSITIVE)

FORCE MAIN CENTER LINE ELEVATION = 5.0 FT
TANK HIGH WATER LEVEL ELEVATION = TANK H.W.L. 40 FT
TANK LOW WATER LEVEL ELEVATION = TANK L.W.L. 13.5 FT
MIN. POSITIVE STATIC HEAD = TANK L.W.L. ELEV. - F. M. CENTER LINE ELEV. =
MIN. POSITIVE STATIC HEAD = 13.50 - 5.00 = 8.5 FT.
MAX. POSITIVE STATIC HEAD = TANK H.W.L. ELEV. - F.M. CENTER LINE ELEV.
MAXIMUM POSITIVE HEAD = 40.00 - 5.00 35 FT.

SYSTEM PRESSURE AT CONNECTION POINT

HIGH PRESSURE = 54 P.S.I. = 124.74 FT
LOW PRESSURE = 5 P.S.I. = 11.55 FT

HEAD LOSS CALCULATIONS

DESIGN FLOW = 500 GPM

THE FRICTION LOSSES WERE OBTAINED USING HAZEN-WILLIAMS FORMULA:

$$hf = (4.727 / D^{4.87}) \times L \times (Q / \text{WHERE:}$$

hf = FRICTION LOSSES, FT.

D = DIAMETER OF PIPE, FT

Q = DISCHARGE, CFS

C = ROUGHNESS COEFF. = 130

L = LENGTH OF 4-INCH PIPE 10 FT

L = LENGTH OF 6-INCH PIPE 101 FT

L = LENGTH OF 8-INCH PIPE 174 FT



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CALCULATIONS

DISCHARGE TANK- PUMP STATION

SYSTEM CURVE AT HIGH PRESSURE AND MAXIMUM POSITIVE HEAD

FLOW, GPM	MAXIMUM POSITIVE HEAD FT	4-INCH PIPE EQUIVALENT LENGTH, LF	HEAD LOSS THRU 4-INCH PIPE, FT.	6-INCH PIPE EQUIVALENT LENGTH, LF	HEAD LOSS THRU 6-INCH PIPE, FT	8-INCH PIPE EQUIVALENT LENGTH, LF	HEAD LOSS THRU 8-INCH PIPE, FT	HIGH PRESSURE AT CONNECTION POINT, FT	TOTAL PRESSURE, FT
0	35.00	7	0.00	101	0.0	174	0.0	124.74	89.74
50	35.00	7	0.02	101	0.0	174	0.0	124.74	89.79
100	35.00	7	0.06	101	0.1	174	0.0	124.74	89.90
150	35.00	7	0.12	101	0.2	174	0.1	124.74	90.08
200	35.00	7	0.20	101	0.4	174	0.2	124.74	90.33
250	35.00	7	0.30	101	0.6	174	0.2	124.74	90.63
300	35.00	7	0.43	101	0.8	174	0.3	124.74	90.98
350	35.00	7	0.57	101	1.1	174	0.4	124.74	91.39
400	35.00	7	0.73	101	1.4	174	0.6	124.74	91.85
450	35.00	7	0.90	101	1.7	174	0.7	124.74	92.37
500	35.00	7	1.10	101	2.1	174	0.9	124.74	92.93
550	35.00	7	1.31	101	2.5	174.0	1.0	124.74	93.55
600	35.00	7	1.54	101	2.9	174.0	1.2	124.74	94.21
650	35.00	7	1.78	101	3.4	174.0	1.4	124.74	94.92
700	35.00	7	2.05	101	3.9	174.0	1.6	124.74	95.69
750	35.00	7	2.32	101	4.4	174.0	1.8	124.74	96.50
800	35.00	7	2.62	101	5.0	174.0	2.1	124.74	97.35
850	35.00	7	2.93	101	5.6	174.0	2.3	124.74	98.26
900	35.00	7	3.26	101	6.2	174.0	2.6	124.74	99.21
950	35.00	7	3.60	101	6.9	174.0	2.8	124.74	100.20
1000	35.00	7	3.96	101	7.5	174.0	3.1	124.74	101.24



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DISCHARGE TANK- PUMP STATION

SYSTEM CURVE AT LOW PRESSURE AND MAXIMUM POSITIVE HEAD

FLOW, GPM	MAXIMUM POSITIVE HEAD FT	4-INCH PIPE EQUIVALENT LENGTH, LF	HEAD LOSS THRU 4-INCH PIPE, FT.	6-INCH PIPE EQUIVALENT LENGTH, LF	HEAD LOSS THRU 6-INCH PIPE, FT	8-INCH PIPE EQUIVALENT LENGTH, LF	HEAD LOSS THRU 8-INCH PIPE, FT	LOW PRESSURE AT CONNECTION POINT FT	TOTAL PRESSURE, FT
0	35.00	7	0.00	101	0.0	174	0.0	11.55	-23.45
50	35.00	7	0.02	101	0.0	174	0.0	11.55	-23.40
100	35.00	7	0.06	101	0.1	174	0.0	11.55	-23.29
150	35.00	7	0.12	101	0.2	174	0.1	11.55	-23.11
200	35.00	7	0.20	101	0.4	174	0.2	11.55	-22.86
250	35.00	7	0.30	101	0.6	174	0.2	11.55	-22.56
300	35.00	7	0.43	101	0.8	174	0.3	11.55	-22.21
350	35.00	7	0.57	101	1.1	174	0.4	11.55	-21.80
400	35.00	7	0.73	101	1.4	174	0.6	11.55	-21.34
450	35.00	7	0.90	101	1.7	174	0.7	11.55	-20.82
500	35.00	7	1.10	101	2.1	174	0.9	11.55	-20.26
550	35.00	7	1.31	101	2.5	174	1.0	11.55	-19.64
600	35.00	7	1.54	101	2.9	174	1.2	11.55	-18.98
650	35.00	7	1.78	101	3.4	174	1.4	11.55	-18.27
700	35.00	7	2.05	101	3.9	174	1.6	11.55	-17.50
750	35.00	7	2.32	101	4.4	174	1.8	11.55	-16.69
800	35.00	7	2.62	101	5.0	174	2.1	11.55	-15.84
850	35.00	7	2.93	101	5.6	174	2.3	11.55	-14.93
900	35.00	7	3.26	101	6.2	174	2.6	11.55	-13.98
950	35.00	7	3.60	101	6.9	174	2.8	11.55	-12.99
1000	35.00	7	3.96	101	7.5	174	3.1	11.55	-11.95



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DISCHARGE TANK- PUMP STATION

SYSTEM CURVE AT HIGH PRESSURE AND MINIMUM POSITIVE HEAD

FLOW, GPM	MAXIMUM POSITIVE HEAD, FT	4-INCH PIPE EQUIVALENT LENGTH, LF	HEAD LOSS THRU 4-INCH PIPE, FT.	6-INCH PIPE EQUIVALENT LENGTH, LF	HEAD LOSS THRU 6-INCH PIPE, FT	8-INCH PIPE EQUIVALENT LENGTH, LF	HEAD LOSS THRU 8-INCH PIPE, FT	LOW PRESSURE AT CONNECTION POINT FT	TOTAL PRESSURE, FT
0	8.50	7	0.00	101	0.0	174	0.0	124.74	116.24
50	8.50	7	0.02	101	0.0	174	0.0	124.74	116.29
100	8.50	7	0.06	101	0.1	174	0.0	124.74	116.40
150	8.50	7	0.12	101	0.2	174	0.1	124.74	116.58
200	8.50	7	0.20	101	0.4	174	0.2	124.74	116.83
250	8.50	7	0.30	101	0.6	174	0.2	124.74	117.13
300	8.50	7	0.43	101	0.8	174	0.3	124.74	117.48
350	8.50	7	0.57	101	1.1	174	0.4	124.74	117.89
400	8.50	7	0.73	101	1.4	174	0.6	124.74	118.35
450	8.50	7	0.90	101	1.7	174	0.7	124.74	118.87
500	8.50	7	1.10	101	2.1	174	0.9	124.74	119.43
550	8.50	7	1.31	101	2.5	174	1.0	124.74	120.05
600	8.50	7	1.54	101	2.9	174	1.2	124.74	120.71
650	8.50	7	1.78	101	3.4	174	1.4	124.74	121.42
700	8.50	7	2.05	101	3.9	174	1.6	124.74	122.19
750	8.50	7	2.32	101	4.4	174	1.8	124.74	123.00
800	8.50	7	2.62	101	5.0	174	2.1	124.74	123.85
850	8.50	7	2.93	101	5.6	174	2.3	124.74	124.76
900	8.50	7	3.26	101	6.2	174	2.6	124.74	125.71
950	8.50	7	3.60	101	6.9	174	2.8	124.74	126.70
1000	8.50	7	3.96	101	7.5	174	3.1	124.74	127.74



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DISCHARGE TANK- PUMP STATION

SYSTEM CURVE AT LOW PRESSURE AND MINIMUM . POSITIVE HEAD

FLOW, GPM	MINIMUM POSITIVE HEAD FT	4-INCH PIPE EQUIVALENT LENGTH, LF	HEAD LOSS THRU 4-INCH PIPE, FT.	6-INCH PIPE EQUIVALENT LENGTH, LF	HEAD LOSS THRU 6-INCH PIPE, FT	8-INCH PIPE EQUIVALENT LENGTH, LF	HEAD LOSS THRU 8-INCH PIPE, FT	LOW PRESSURE AT CONNECTION POINT FT	TOTAL PRESSURE, FT
0	8.50	7	0.00	101	0.0	174	0.0	11.55	3.05
50	8.50	7	0.02	101	0.0	174	0.0	11.55	3.10
100	8.50	7	0.06	101	0.1	174	0.0	11.55	3.21
150	8.50	7	0.12	101	0.2	174	0.1	11.55	3.39
200	8.50	7	0.20	101	0.4	174	0.2	11.55	3.64
250	8.50	7	0.30	101	0.6	174	0.2	11.55	3.94
300	8.50	7	0.43	101	0.8	174	0.3	11.55	4.29
350	8.50	7	0.57	101	1.1	174	0.4	11.55	4.70
400	8.50	7	0.73	101	1.4	174	0.6	11.55	5.16
450	8.50	7	0.90	101	1.7	174	0.7	11.55	5.68
500	8.50	7	1.10	101	2.1	174	0.9	11.55	6.24
550	8.50	7	1.31	101	2.5	174	1.0	11.55	6.86
600	8.50	7	1.54	101	2.9	174	1.2	11.55	7.52
650	8.50	7	1.78	101	3.4	174	1.4	11.55	8.23
700	8.50	7	2.05	101	3.9	174	1.6	11.55	9.00
750	8.50	7	2.32	101	4.4	174	1.8	11.55	9.81
800	8.50	7	2.62	101	5.0	174	2.1	11.55	10.66
850	8.50	7	2.93	101	5.6	174	2.3	11.55	11.57
900	8.50	7	3.26	101	6.2	174	2.6	11.55	12.52
950	8.50	7	3.60	101	6.9	174	2.8	11.55	13.51
1000	8.50	7	3.96	101	7.5	174	3.1	11.55	14.55



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DISCHARGE TANK- PUMP STATION

SYSTEM CURVE AT HIGH PRESSURE AND 14.50 FT POSITIVE HEAD (ELEV. 19.50 FT NGVD)

FLOW, GPM	POSITIVE HEAD FT	4-INCH PIPE EQUIVALENT LENGTH, LF	HEAD LOSS THRU 4-INCH PIPE, FT.	6-INCH PIPE EQUIVALENT LENGTH, LF	HEAD LOSS THRU 6-INCH PIPE, FT	8-INCH PIPE EQUIVALENT LENGTH, LF	HEAD LOSS THRU 8-INCH PIPE, FT	HIGH PRESSURE AT CONNECTION POINT FT	TOTAL PRESSURE, FT
0	14.50	7	0.00	101	0.0	174	0.0	124.74	110.24
50	14.50	7	0.02	101	0.0	174	0.0	124.74	110.29
100	14.50	7	0.06	101	0.1	174	0.0	124.74	110.40
150	14.50	7	0.12	101	0.2	174	0.1	124.74	110.58
200	14.50	7	0.20	101	0.4	174	0.2	124.74	110.83
250	14.50	7	0.30	101	0.6	174	0.2	124.74	111.13
300	14.50	7	0.43	101	0.8	174	0.3	124.74	111.48
350	14.50	7	0.57	101	1.1	174	0.4	124.74	111.89
400	14.50	7	0.73	101	1.4	174	0.6	124.74	112.35
450	14.50	7	0.90	101	1.7	174	0.7	124.74	112.87
500	14.50	7	1.10	101	2.1	174	0.9	124.74	113.43
550	14.50	7	1.31	101	2.5	174	1.0	124.74	114.05
600	14.50	7	1.54	101	2.9	174	1.2	124.74	114.71
650	14.50	7	1.78	101	3.4	174	1.4	124.74	115.42
700	14.50	7	2.05	101	3.9	174	1.6	124.74	116.19
750	14.50	7	2.32	101	4.4	174	1.8	124.74	117.00
800	14.50	7	2.62	101	5.0	174	2.1	124.74	117.85
850	14.50	7	2.93	101	5.6	174	2.3	124.74	118.76
900	14.50	7	3.26	101	6.2	174	2.6	124.74	119.71
950	14.50	7	3.60	101	6.9	174	2.8	124.74	120.70
1000	14.50	7	3.96	101	7.5	174	3.1	124.74	121.74



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DISCHARGE TANK- PUMP STATION

SYSTEM CURVE AT HIGH PRESSURE AND 21 FT POSITIVE HEAD (ELEV. 26 FT NGVD)

FLOW, GPM	POSITIVE HEAD FT	4-INCH PIPE EQUIVALENT LENGTH, LF	HEAD LOSS THRU 4-INCH PIPE, FT.	6-INCH PIPE EQUIVALENT LENGTH, LF	HEAD LOSS THRU 6-INCH PIPE, FT	8-INCH PIPE EQUIVALENT LENGTH, LF	HEAD LOSS THRU 8-INCH PIPE, FT	HIGH PRESSURE AT CONNECTION POINT FT	TOTAL PRESSURE, FT
0	21.00	7	0.00	101	0.0	174	0.0	124.75	103.75
50	21.00	7	0.02	101	0.0	174	0.0	124.75	103.80
100	21.00	7	0.06	101	0.1	174	0.0	124.75	103.91
150	21.00	7	0.12	101	0.2	174	0.1	124.75	104.09
200	21.00	7	0.20	101	0.4	174	0.2	124.75	104.34
250	21.00	7	0.30	101	0.6	174	0.2	124.75	104.64
300	21.00	7	0.43	101	0.8	174	0.3	124.75	104.99
350	21.00	7	0.57	101	1.1	174	0.4	124.75	105.40
400	21.00	7	0.73	101	1.4	174	0.6	124.75	105.86
450	21.00	7	0.90	101	1.7	174	0.7	124.75	106.38
500	21.00	7	1.10	101	2.1	174	0.9	124.75	106.94
550	21.00	7	1.31	101	2.5	174	1.0	124.75	107.56
600	21.00	7	1.54	101	2.9	174	1.2	124.75	108.22
650	21.00	7	1.78	101	3.4	174	1.4	124.75	108.93
700	21.00	7	2.05	101	3.9	174	1.6	124.75	109.70
750	21.00	7	2.32	101	4.4	174	1.8	124.75	110.51
800	21.00	7	2.62	101	5.0	174	2.1	124.75	111.36
850	21.00	7	2.93	101	5.6	174	2.3	124.75	112.27
900	21.00	7	3.26	101	6.2	174	2.6	124.75	113.22
950	21.00	7	3.60	101	6.9	174	2.8	124.75	114.21
1000	21.00	7	3.96	101	7.5	174	3.1	124.75	115.25



CAS engineering, inc.
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RESOURCE RECOVERY LIFT STATION
DISCHARGE TANK- PUMP STATION

1201

RL

GA

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DATE: 1/29/2013

DATE: 1/29/2013

DISCHARGE TANK- PUMP STATION

SYSTEM CURVE AT HIGH PRESSURE AND 30 FT. POSITIVE HEAD (ELEV.35 FT. NGVD)

FLOW, GPM	POSITIVE HEAD FT	4-INCH PIPE EQUIVALENT LENGTH, LF	HEAD LOSS THRU 4-INCH PIPE, FT.	6-INCH PIPE EQUIVALENT LENGTH, LF	HEAD LOSS THRU 6-INCH PIPE, FT	8-INCH PIPE EQUIVALENT LENGTH, LF	HEAD LOSS THRU 8-INCH PIPE, FT	HIGH PRESSURE AT CONNECTION POINT, FT	TOTAL PRESSURE, FT
0	30.00	7	0.00	101	0.0	174	0.0	124.74	94.74
50	30.00	7	0.02	101	0.0	174	0.0	124.74	94.79
100	30.00	7	0.06	101	0.1	174	0.0	124.74	94.90
150	30.00	7	0.12	101	0.2	174	0.1	124.74	95.08
200	30.00	7	0.20	101	0.4	174	0.2	124.74	95.33
250	30.00	7	0.30	101	0.6	174	0.2	124.74	95.63
300	30.00	7	0.43	101	0.8	174	0.3	124.74	95.98
350	30.00	7	0.57	101	1.1	174	0.4	124.74	96.39
400	30.00	7	0.73	101	1.4	174	0.6	124.74	96.85
450	30.00	7	0.90	101	1.7	174	0.7	124.74	97.37
500	30.00	7	1.10	101	2.1	174	0.9	124.74	97.93
550	30.00	7	1.31	101	2.5	174	1.0	124.74	98.55
600	30.00	7	1.54	101	2.9	174	1.2	124.74	99.21
650	30.00	7	1.78	101	3.4	174	1.4	124.74	99.92
700	30.00	7	2.05	101	3.9	174	1.6	124.74	100.69
750	30.00	7	2.32	101	4.4	174	1.8	124.74	101.50
800	30.00	7	2.62	101	5.0	174	2.1	124.74	102.35
850	30.00	7	2.93	101	5.6	174	2.3	124.74	103.26
900	30.00	7	3.26	101	6.2	174	2.6	124.74	104.21
950	30.00	7	3.60	101	6.9	174	2.8	124.74	105.20
1000	30.00	7	3.96	101	7.5	174	3.1	124.74	106.24



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DISCHARGE TANK- PUMP STATION

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DATE: 1/29/2013

DATE: 1/29/2013

DISCHARGE TANK- PUMP STATION

SYSTEM CURVE AT AVE. PRESSURE AND MAX. POSITIVE HEAD

FLOW, GPM	POSITIVE HEAD FT	4-INCH PIPE EQUIVALENT LENGTH, LF	HEAD LOSS THRU 4-INCH PIPE, FT.	6-INCH PIPE EQUIVALENT LENGTH, LF	HEAD LOSS THRU 8-INCH PIPE, FT	8-INCH PIPE EQUIVALENT LENGTH, LF	HEAD LOSS THRU 8-INCH PIPE, FT	HIGH PRESSURE AT CONNECTION POINT, FT	TOTAL PRESSURE, FT
0	35.00	7	0.00	101	0.0	174	0.0	68.15	33.15
50	35.00	7	0.02	101	0.0	174	0.0	68.15	33.20
100	35.00	7	0.06	101	0.1	174	0.0	68.15	33.31
150	35.00	7	0.12	101	0.2	174	0.1	68.15	33.49
200	35.00	7	0.20	101	0.4	174	0.2	68.15	33.74
250	35.00	7	0.30	101	0.6	174	0.2	68.15	34.04
300	35.00	7	0.43	101	0.8	174	0.3	68.15	34.39
350	35.00	7	0.57	101	1.1	174	0.4	68.15	34.80
400	35.00	7	0.73	101	1.4	174	0.6	68.15	35.26
450	35.00	7	0.90	101	1.7	174	0.7	68.15	35.78
500	35.00	7	1.10	101	2.1	174	0.9	68.15	36.34
550	35.00	7	1.31	101	2.5	174	1.0	68.15	36.96
600	35.00	7	1.54	101	2.9	174	1.2	68.15	37.62
650	35.00	7	1.78	101	3.4	174	1.4	68.15	38.33
700	35.00	7	2.05	101	3.9	174	1.6	68.15	39.10
750	35.00	7	2.32	101	4.4	174	1.8	68.15	39.91
800	35.00	7	2.62	101	5.0	174	2.1	68.15	40.76
850	35.00	7	2.93	101	5.6	174	2.3	68.15	41.67
900	35.00	7	3.26	101	6.2	174	2.6	68.15	42.62
950	35.00	7	3.60	101	6.9	174	2.8	68.15	43.61
1000	35.00	7	3.96	101	7.5	174	3.1	68.15	44.65



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RESOURCE RECOVERY LIFT STATION
DISCHARGE TANK- PUMP STATION
1201

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DISCHARGE TANK- PUMP STATION

SYSTEM CURVE AT AVE. PRESSURE AND 14.50 FT. POSITIVE HEAD (ELEV.19.50 FT. NGVD)

FLOW, GPM	POSITIVE HEAD FT	4-INCH PIPE EQUIVALENT LENGTH, LF	HEAD LOSS THRU 4-INCH PIPE, FT.	6-INCH PIPE EQUIVALENT LENGTH, LF	HEAD LOSS THRU 6-INCH PIPE, FT	8-INCH PIPE EQUIVALENT LENGTH, LF	HEAD LOSS THRU 8-INCH PIPE, FT	AVE. PRESSURE AT CONNECTION POINT, FT	TOTAL PRESSURE, FT
0	14.50	7	0.00	101	0.0	174	0.0	68.15	53.65
50	14.50	7	0.02	101	0.0	174	0.0	68.15	53.70
100	14.50	7	0.06	101	0.1	174	0.0	68.15	53.81
150	14.50	7	0.12	101	0.2	174	0.1	68.15	53.99
200	14.50	7	0.20	101	0.4	174	0.2	68.15	54.24
250	14.50	7	0.30	101	0.6	174	0.2	68.15	54.54
300	14.50	7	0.43	101	0.8	174	0.3	68.15	54.89
350	14.50	7	0.57	101	1.1	174	0.4	68.15	55.30
400	14.50	7	0.73	101	1.4	174	0.6	68.15	55.76
450	14.50	7	0.90	101	1.7	174	0.7	68.15	56.28
500	14.50	7	1.10	101	2.1	174	0.9	68.15	56.84
550	14.50	7	1.31	101	2.5	174	1.0	68.15	57.46
600	14.50	7	1.54	101	2.9	174	1.2	68.15	58.12
650	14.50	7	1.78	101	3.4	174	1.4	68.15	58.83
700	14.50	7	2.05	101	3.9	174	1.6	68.15	59.60
750	14.50	7	2.32	101	4.4	174	1.8	68.15	60.41
800	14.50	7	2.62	101	5.0	174	2.1	68.15	61.26
850	14.50	7	2.93	101	5.6	174	2.3	68.15	62.17
900	14.50	7	3.26	101	6.2	174	2.6	68.15	63.12
950	14.50	7	3.60	101	6.9	174	2.8	68.15	64.11
1000	14.50	7	3.96	101	7.5	174	3.1	68.15	65.15



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RESOURCE RECOVERY LIFT STATION
 DISCHARGE TANK- PUMP STATION

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DISCHARGE TANK- PUMP STATION

SYSTEM CURVE AT AVE. PRESSURE AND 21 FT. POSITIVE HEAD (ELEV. 26 FT. NGVD)

FLOW, GPM	POSITIVE HEAD FT	4-INCH PIPE EQUIVALENT LENGTH, LF	HEAD LOSS THRU 4-INCH PIPE, FT.	6-INCH PIPE EQUIVALENT LENGTH, LF	HEAD LOSS THRU 6-INCH PIPE, FT	8-INCH PIPE EQUIVALENT LENGTH, LF	HEAD LOSS THRU 8-INCH PIPE, FT	AVE. PRESSURE AT CONNECTION POINT FT	TOTAL PRESSURE, FT
0	21.00	7	0.00	101	0.0	174	0.0	68.15	47.15
50	21.00	7	0.02	101	0.0	174	0.0	68.15	47.20
100	21.00	7	0.06	101	0.1	174	0.0	68.15	47.31
150	21.00	7	0.12	101	0.2	174	0.1	68.15	47.49
200	21.00	7	0.20	101	0.4	174	0.2	68.15	47.74
250	21.00	7	0.30	101	0.6	174	0.2	68.15	48.04
300	21.00	7	0.43	101	0.8	174	0.3	68.15	48.39
350	21.00	7	0.57	101	1.1	174	0.4	68.15	48.80
400	21.00	7	0.73	101	1.4	174	0.6	68.15	49.26
450	21.00	7	0.90	101	1.7	174	0.7	68.15	49.78
500	21.00	7	1.10	101	2.1	174	0.9	68.15	50.34
550	21.00	7	1.31	101	2.5	174	1.0	68.15	50.96
600	21.00	7	1.54	101	2.9	174	1.2	68.15	51.62
650	21.00	7	1.78	101	3.4	174	1.4	68.15	52.33
700	21.00	7	2.05	101	3.9	174	1.6	68.15	53.10
750	21.00	7	2.32	101	4.4	174	1.8	68.15	53.91
800	21.00	7	2.62	101	5.0	174	2.1	68.15	54.76
850	21.00	7	2.93	101	5.6	174	2.3	68.15	55.67
900	21.00	7	3.26	101	6.2	174	2.6	68.15	56.62
950	21.00	7	3.60	101	6.9	174	2.8	68.15	57.61
1000	21.00	7	3.96	101	7.5	174	3.1	68.15	58.65



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DISCHARGE TANK- PUMP STATION

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DISCHARGE TANK- PUMP STATION

SYSTEM CURVE AT AVE. PRESSURE AND 30 FT. POSITIVE HEAD (ELEV. 35 FT. NGVD)

FLOW, GPM	ONE HALF POSITIVE HEAD FT	4-INCH PIPE EQUIVALENT LENGTH, LF	HEAD LOSS THRU 4-INCH PIPE, FT.	6-INCH PIPE EQUIVALENT LENGTH, LF	HEAD LOSS THRU 6-INCH PIPE, FT	8-INCH PIPE EQUIVALENT LENGTH, LF	HEAD LOSS THRU 8-INCH PIPE, FT	AVE. PRESSURE AT CONNECTION POINT FT	TOTAL PRESSURE, FT
0	30.00	7	0.00	101	0.0	174	0.0	68.15	38.15
50	30.00	7	0.02	101	0.0	174	0.0	68.15	38.20
100	30.00	7	0.06	101	0.1	174	0.0	68.15	38.31
150	30.00	7	0.12	101	0.2	174	0.1	68.15	38.49
200	30.00	7	0.20	101	0.4	174	0.2	68.15	38.74
250	30.00	7	0.30	101	0.6	174	0.2	68.15	39.04
300	30.00	7	0.43	101	0.8	174	0.3	68.15	39.39
350	30.00	7	0.57	101	1.1	174	0.4	68.15	39.80
400	30.00	7	0.73	101	1.4	174	0.6	68.15	40.26
450	30.00	7	0.90	101	1.7	174	0.7	68.15	40.78
500	30.00	7	1.10	101	2.1	174	0.9	68.15	41.34
550	30.00	7	1.31	101	2.5	174	1.0	68.15	41.96
600	30.00	7	1.54	101	2.9	174	1.2	68.15	42.62
650	30.00	7	1.78	101	3.4	174	1.4	68.15	43.33
700	30.00	7	2.05	101	3.9	174	1.6	68.15	44.10
750	30.00	7	2.32	101	4.4	174	1.8	68.15	44.91
800	30.00	7	2.62	101	5.0	174	2.1	68.15	45.76
850	30.00	7	2.93	101	5.6	174	2.3	68.15	46.67
900	30.00	7	3.26	101	6.2	174	2.6	68.15	47.62
950	30.00	7	3.60	101	6.9	174	2.8	68.15	48.61
1000	30.00	7	3.96	101	7.5	174	3.1	68.15	49.65



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RESOURCE RECOVERY LIFT STATION

DISCHARGE TANK- PUMP STATION

1201

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DATE: 1/29/2013

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DISCHARGE TANK- PUMP STATION

SELECTION PUMP

MANUFACTURER	GORMAN- RUPP
SERIE	ULTRA V
Model	V4A60-3
SIZE	6" X 4"
IMPELLER:	38615-104
HORSE POWER:	30
RPM:	1860

VELOCITY CALCULATIONS:

Q = V x A	Q =	500	GPM =	1.11	CFS	A = $\pi \times D^2 / 4$
DIAMETER	A (SQ.FT.)	Q (CFS)	V (FT/SEC)			
8	0.35	1.11	3.19			
6	0.20	1.11	5.67			

PUMP CYCLE TIME

WHEN THE WATER ELEVATION INTO THE TANK IS BETWEEN 13.00(NGVD) AND 26.00(NGVD):
IF FM PRESSURE > 125 FT (54 PSI) - TWO "TDP" ON
IF FM PRESSURE < 125 FT (54 PSI) - ONE "TDP" ON

WHEN THE WATER ELEVATION INTO THE TANK IS BETWEEN 26.00(NGVD) AND 40.00(NGVD):
ONE "TDP" ON

HIGH LEVEL ALARM ELEV.
ALL "TDP" PUMP OFF ELEV = 41.00 FT. (NGVD)
12" INFLOW PIPE CENTER LINE ELEV. 13.50 FT. (NGVD)
40.00 FT. (NGVD)

NET POSITIVE SUCTION HEAD CALCULATIONS

NPSH AVAILABLE = ATMOSPHERIC PRESSURE - VAPOR PRESSURE+ SUCTION LIFT - SUCTION FRICTION LOSS

ATMOSPHERIC PRESURE = 33.9 FT
VAPOR PRESSURE AT 74 D.F. = 1.0 FT
SUCTION LIFT = 0.0 FT
SUCTION FRICTION LOSS = 0.0 FT
NPSH AVAILABLE = 33.9 - 1.0 - 0.0 - 0.0 = 32.9 FT
NPSH REQUIRED = 8.13 (NPSH CURVE)
NPSH EXCESS AVAILABLE=32.9 - 8.13 = 24.77



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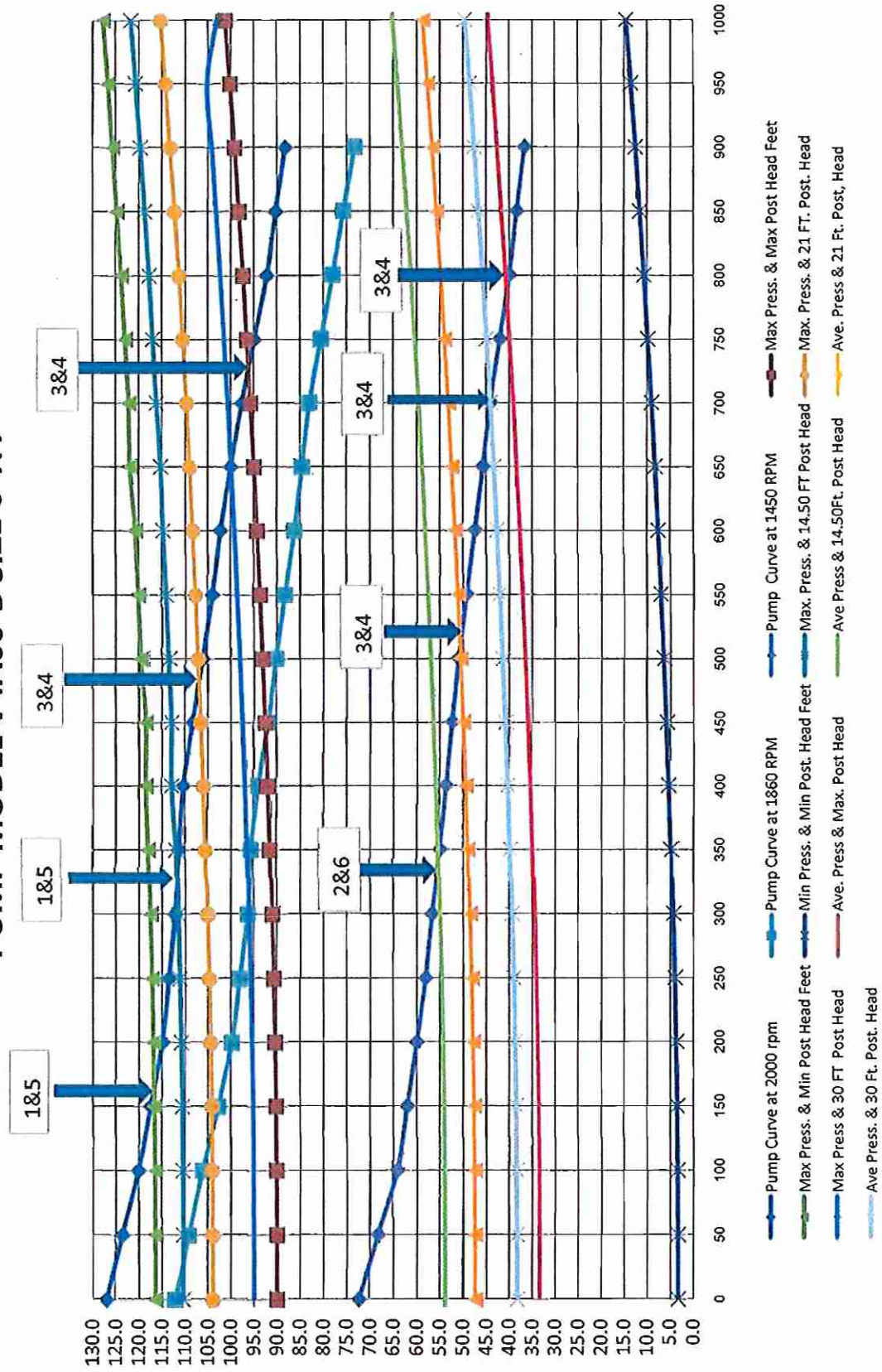
RESOURCE RECOVERY LIFT STATION
DISCHARGE TANK PUMP STATION

DATE: 1/29/2013
 DATE: 1/29/2013

PUMP CURVE VS SYSTEM CURVE

Flow Q	System 2000 RPM	System 1860 RPM	System 1450 RPM	Max. Press. & Max Positive Head	Max. Press. & Min. Positive Head	Min. Press. & Min Positive Head	Max Press. &14.50 Ft Pos. Head 19.50 Ft (NGVD)	Max Press. &21.00 Ft Pos. Head 26.00 Ft (NGVD)	Max Press. &30.00 Ft Pos. Head 35.00 Ft (NGVD)	Ave Press. & Max Pos Head	Ave Press. &14.50 Ft Post. Head 19.50 Ft (NGVD)	Ave Press. &21.00 Ft Post. Head 26.00 Ft (NGVD)	Ave Press. &30.00 Ft Post. Head 35.00 Ft (NGVD)
GPM	FEET	FEET	FEET	FEET	FEET	FEET	FEET	FEET	FEET	FEET	FEET	FEET	FEET
0	126.8	112.0	72.2	89.74	116.24	3.05	110.24	103.75	94.74	33.15	53.65	47.15	38.15
50	123.4	109.0	68.1	89.78	116.29	3.10	110.29	103.80	94.79	33.20	53.70	47.20	38.20
100	120.0	106.0	64.0	89.90	116.40	3.21	110.40	103.91	94.90	33.31	53.81	47.31	38.31
150	117.4	102.8	62.0	90.08	116.58	3.39	110.58	104.09	95.08	33.49	53.99	47.49	38.48
200	114.9	99.8	60.0	90.33	116.83	3.64	110.83	104.34	95.33	33.74	54.24	47.74	38.74
250	113.5	98.1	58.1	90.63	117.13	3.94	111.13	104.64	95.63	34.04	54.54	48.04	39.04
300	112.2	96.4	56.7	90.98	117.48	4.29	111.48	104.99	95.98	34.39	54.89	48.39	39.39
350	111.3	95.5	54.9	91.39	117.89	4.70	111.89	105.40	96.39	34.80	55.30	48.80	39.80
400	110.3	93.9	53.5	91.85	118.35	5.16	112.85	105.86	96.85	35.26	55.76	49.26	40.26
450	108.2	91.8	52.2	92.37	118.37	5.68	112.87	106.38	97.37	35.78	56.28	49.78	40.78
500	106.0	90.1	50.8	92.93	119.43	6.24	113.43	106.94	97.93	36.34	56.84	50.34	41.34
550	104.0	88.2	49.1	93.55	120.05	6.86	114.05	107.56	98.55	36.96	57.46	50.96	41.96
600	102.2	86.2	47.3	94.21	120.71	7.52	114.71	108.22	99.21	37.62	58.12	51.62	42.62
650	100.0	84.6	45.7	94.92	121.92	8.23	115.24	108.93	99.92	38.33	58.83	52.33	43.33
700	97.6	83.0	44.1	95.69	122.19	9.00	116.19	109.70	100.69	39.10	59.60	53.10	44.10
750	94.9	80.5	42.0	96.50	123.00	9.81	117.00	110.51	101.50	39.91	60.41	53.91	44.91
800	92.2	78.0	40.0	97.35	123.85	10.66	117.85	111.36	102.35	40.76	61.26	54.76	45.76
850	90.3	75.7	38.4	98.26	124.76	11.57	118.76	112.27	103.26	41.67	62.17	55.67	46.67
900	88.3	73.3	36.7	99.21	125.71	12.52	119.71	113.22	104.21	42.62	63.12	56.62	47.62
950				100.20	126.70	13.51	120.70	114.21	105.20	43.61	64.11	57.61	48.61
1000				101.24	127.74	14.55	121.74	115.25	106.24	44.65	65.15	58.65	49.65

PUMP CURVE VS SYSTEM CURVE PUMP MODEL V4A60-B SIZE 6"X4"





CONTRACTOR SHALL SUBMIT TANK SHOP DRAWINGS FOR APPROVAL BEFORE STARTING ANY FIELD WORK.

PROJECT NAME
RESOURCE RECOVERY LIFT STATION

6990 N.W. 97TH AVENUE
MIAMI, FL 33178

DATE
1/1/11

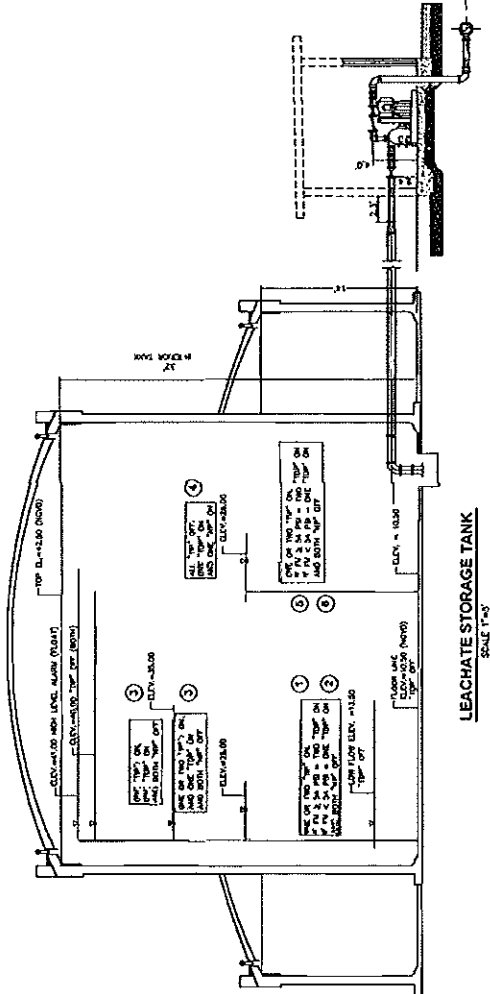
REVISION
A. REVISED FOR PERMIT

SCALE
AS SHOWN

CONTROL
LEVEL
SCHEDULE
FOR PUMP
ON-OFF

PROJECT NUMBER
M-3

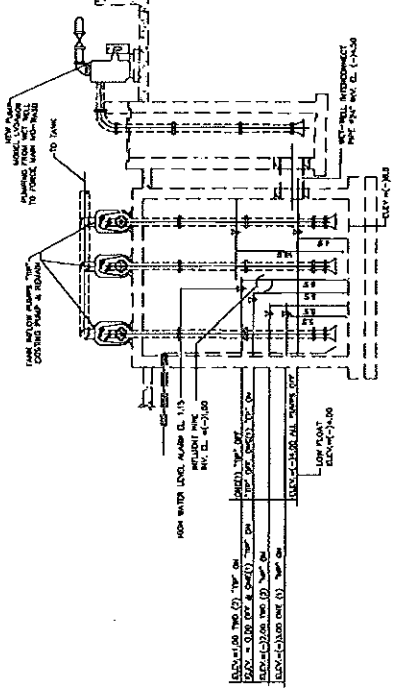
USE ONLY FOR PERMIT



LEGEND
"TOP" = TANK HIGH-LEVEL PUMP (EXISTING)
"TOP" = TANK OVERFLOW PUMP

NOTES:

1. DURING HIGH LOW LEVEL PERIODS, THE NUMBER OF ACTIVE TANK PUMPS, "TOP" AND "WET PUMPS" TO BE USED TO MAINTAIN TANK LEVELS WILL BE DETERMINED BY FORCE MAIN PRESSURE. IF FORCE MAIN PRESSURE IS 433 FT (14 PSI) - ONE "TOP" ON. IF FORCE MAIN PRESSURE IS 438 FT (14 PSI) - TWO "TOP" ON.
2. DURING TANK HIGH LEVEL PERIODS, THE NUMBER OF ACTIVE TANK PUMPS, "TOP" AND "WET PUMPS" TO BE USED TO MAINTAIN TANK LEVELS WILL BE DETERMINED BY FORCE MAIN PRESSURE. IF FORCE MAIN PRESSURE IS 433 FT (14 PSI) - ONE "TOP" ON. IF FORCE MAIN PRESSURE IS 438 FT (14 PSI) - TWO "TOP" ON.
3. "WET WELL" PUMP LEVEL CONTROL OVERSIGHT IS 3.00. "WET WELL" PUMP LEVEL CONTROL IS 3.00. "WET WELL" PUMP LEVEL CONTROL IS 3.00. "WET WELL" PUMP LEVEL CONTROL IS 3.00.
4. "WET WELL" PUMP LEVEL CONTROL IS 3.00. "WET WELL" PUMP LEVEL CONTROL IS 3.00. "WET WELL" PUMP LEVEL CONTROL IS 3.00. "WET WELL" PUMP LEVEL CONTROL IS 3.00.
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6. "WET WELL" PUMP LEVEL CONTROL IS 3.00. "WET WELL" PUMP LEVEL CONTROL IS 3.00. "WET WELL" PUMP LEVEL CONTROL IS 3.00. "WET WELL" PUMP LEVEL CONTROL IS 3.00.
7. "WET WELL" PUMP LEVEL CONTROL IS 3.00. "WET WELL" PUMP LEVEL CONTROL IS 3.00. "WET WELL" PUMP LEVEL CONTROL IS 3.00. "WET WELL" PUMP LEVEL CONTROL IS 3.00.



CONTRACTOR SHALL SUBMIT TANK SHOP DRAWINGS FOR APPROVAL BEFORE STARTING ANY FIELD WORK.

CDSW

Ultra V Series® Basic Pump

Self Priming Centrifugal Pump



VARIOUS PATENTS APPLY

Model V4A60-B

Size 6" x 4"



PUMP SPECIFICATIONS

Size: 6" x 4" (152 mm x 102 mm).**

Casing: Gray Iron 30.

Maximum Operating Pressure 118 psi (814 kPa).*

Semi-Open Type, Two Vane Impeller: Ductile Iron 65-45-12.

Handles 3" (76.2 mm) Diameter Spherical Solids.

Impeller Shaft: Alloy Steel 4150.

Self-Cleaning Replaceable Wear Plate: Carbon Steel 1015.

Shimless Adjustable Cover Plate: Gray Iron 30.

Externally Removable Flap Valve: Neoprene[®]/Nylon and Steel Reinforcing.

Suction Flange/Flap Valve Seat: Gray Iron 30.

Bearing Housing: Gray Iron 30.

Seal Plate: Gray Iron 30.

Shaft Sleeve: Alloy Steel 4130.

Radial and Thrust Bearings: Open Single Row Ball.

Bearing and Seal Cavity Lubrication: SAE 30 Non-Detergent Oil.

Gaskets: Buna-N, Compressed Synthetic Fibers, Vegetable Fiber, PTFE, Cork, and Rubber.

O-Rings: Buna-N.

Hardware: Standard Plated Steel.

Brass Pressure Relief Valve.

Bearing and Seal Oil Level Sight Gauges.

Optional Equipment: Automatic Air Release Valve. High Pump Temperature Shutdown Kit. Stainless Steel/G-R Hard Iron Impeller and Wear Plate. 120/240 Volt Casing Heater.

** Optional Gray Iron 30 Flange Kits Available as Follows (See Price Sheets):

4" 125# Female NPT Discharge Flange Kit.

6" and 4" ASA Suction/Discharge Spool Flange Kits.

150 mm and 100 mm DIN 2527 (PN 16) Suction/Discharge

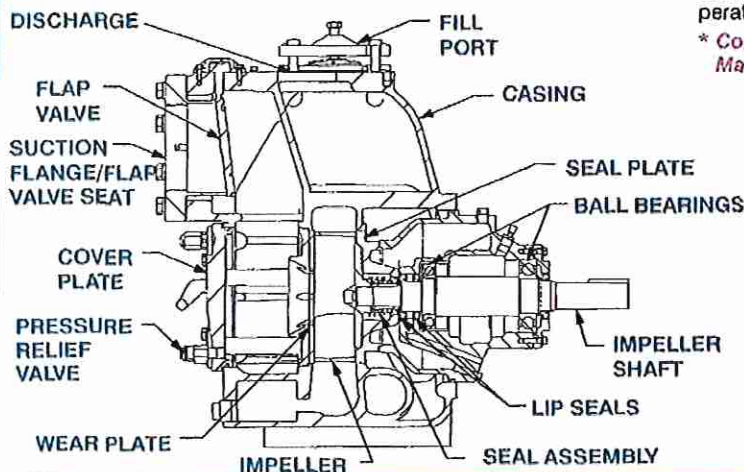
Spool Flange Kits.



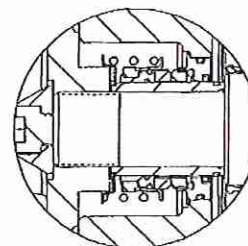
SEAL SPECIFICATIONS

Cartridge Type, Mechanical, Oil-Lubricated, Double Floating, Self-Aligning. Silicon Carbide Rotating and Stationary Faces. Stainless Steel 316 Stationary Seat. Fluorocarbon Elastomers (DuPont Viton[®] or Equivalent). Stainless Steel 18-8 Cage and Spring. Maximum Temperature of Liquid Pumped, 160°F (71°C).*

* Consult Factory for Applications Exceeding Maximum Pressure and/or Temperature Indicated.



SEAL DETAIL



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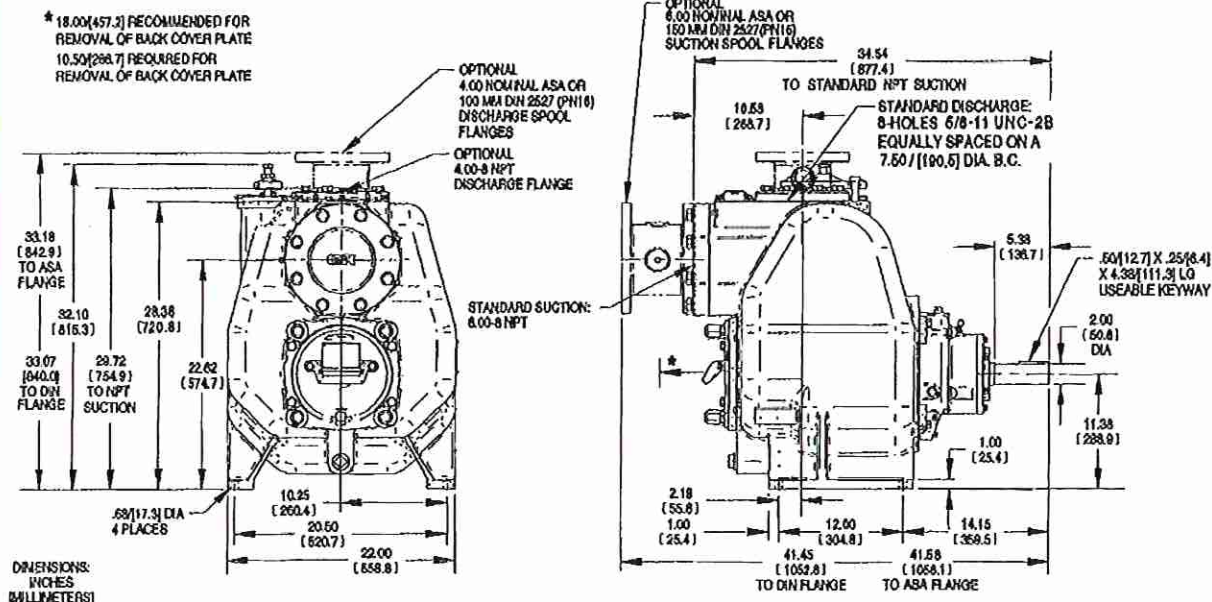
Specifications Subject to Change Without Notice

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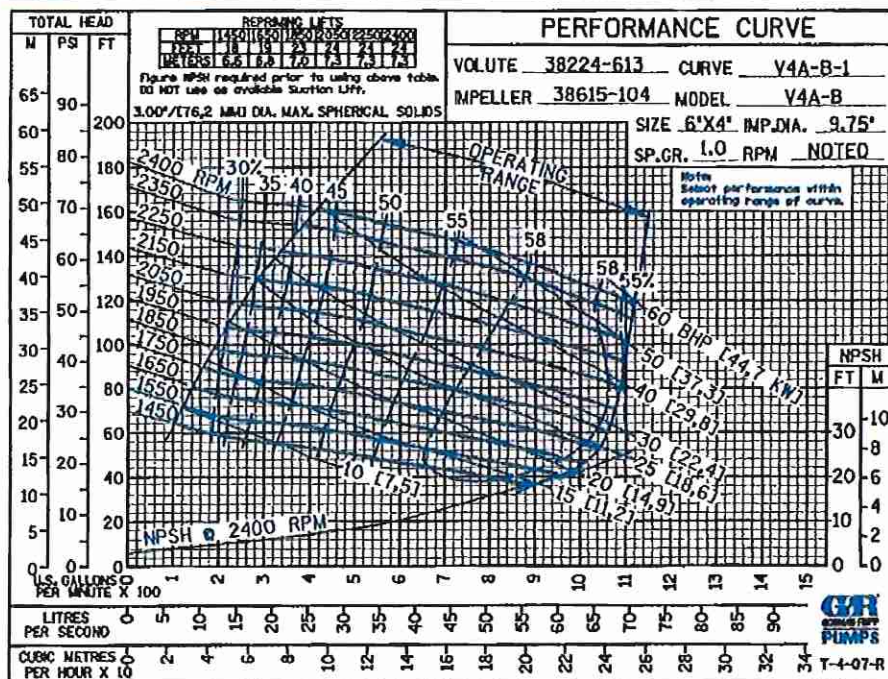
SECTION 55, PAGE 2600

NET WEIGHT:	877 LBS.	(398 KG.)*
SHIPPING WEIGHT:	955 LBS.	(433 KG.)*
EXPORT CRATE:	18 CU. FT.	(0,5 CU. M.)

***WEIGHTS DO NOT INCLUDE OPTIONAL FLANGE KITS.**



OPTIONAL SUCTION & DISCHARGE FLANGES SHOWN IN PHANTOM



GORMAN-RUPP OF CANADA LIMITED • ST. THOMAS, ONTARIO, CANADA

Specifications Subject to Change Without Notice

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Pump Data Sheet - Gorman-Rupp ES 60Hz

Company: CAS Engineering
Name: Ramon Lopez
Date: 12/4/2012

Miami-Dade Leachate Pumps
500 GPM @ 90' TDH



Pump:

Size: V4A-B-1
Type: V&VS-SERIES
Synch speed: Adjustable
Curve: V4A-B-1
Specific Speeds:
Dimensions:

Speed: 1860 rpm
Dia: 9.75 in
Impeller: 38815-104
Ns: ---
Nss: ---
Suction: 6 in
Discharge: 4 in

Search Criteria:

Flow: 500 US gpm Head: 90 ft

Fluid:

Water
SG: 1
Viscosity: 1.105 cP
NPSHa: ---

Temperature: 60 °F
Vapor pressure: 0.2563 psi a
Atm pressure: 14.7 psi a

Motor:

Standard: NEMA
Enclosure: TEFC

Speed: ---
Frame: ---

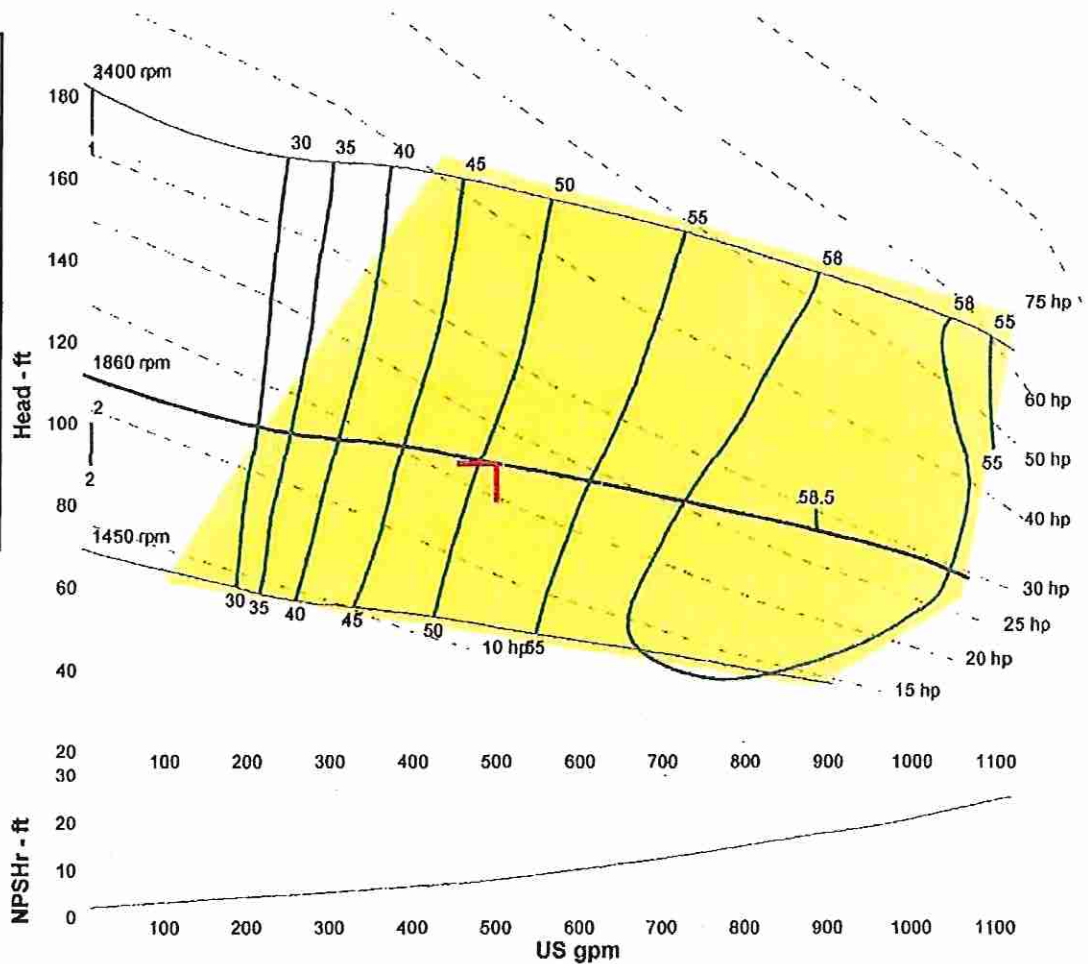
Sizing criteria: Max Power on Design Curve

Pump Limits:

Temperature: ---
Pressure: ---
Sphere size: 3 in

Power: ---
Eye area: ---

--- Data Point ---	
Flow:	500 US gpm
Head:	90.1 ft
Eff:	51%
Power:	22.3 hp
NPSHr:	8.13 ft
--- Design Curve ---	
Shutoff head:	112 ft
Shutoff dP:	48.4 psi
Min flow:	---
BEP:	58% @ 885 US gpm
NOL power:	29.3 hp @ 1066 US gpm
-- Max Curve --	
Max power:	62.3 hp @ 1119 US gpm



Performance Evaluation:

Flow US gpm	Speed rpm	Head ft	Efficiency %	Power hp	NPSHr ft
600	1860	86.2	55	23.9	10.3
500	1860	90.1	51	22.3	8.13
400	1860	93.9	46	20.7	6.59
300	1860	96.4	39	18.6	5.35
200	1860	99.8	28	17.5	4.29

Curve Data

Sec. 55

PAGE 2600.1

JULY 2007

CDSW

PERFORMANCE CURVE

VOLUTE 38224-613 CURVE V4A-B-1

IMPELLER 38615-104 MODEL V4A-B

SIZE 6"X4" IMP.DIA. 9.75"

SP.GR. 1.0 RPM NOTED

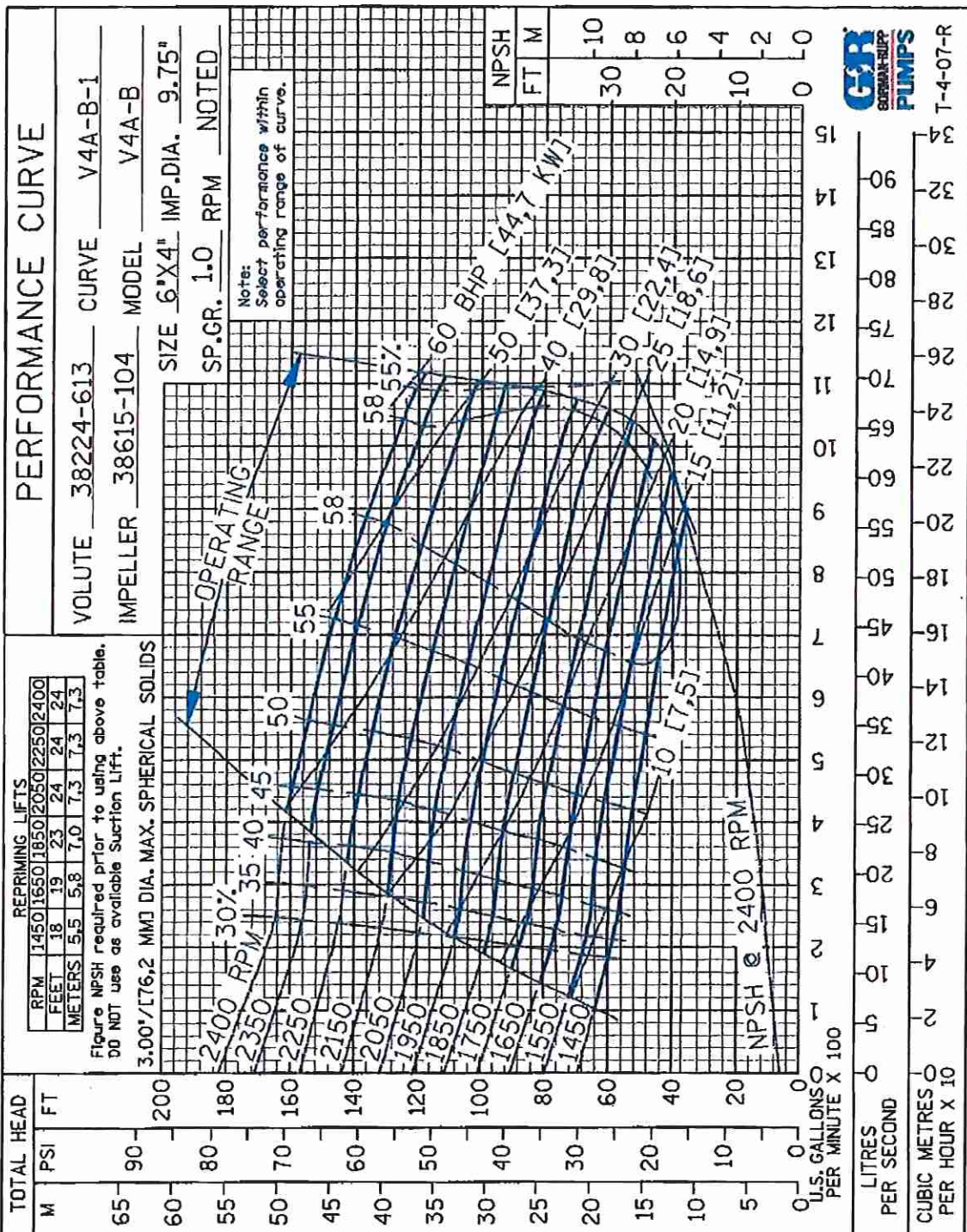
REPRIMING LIFTS

RPM	1450	1650	1850	2050	2250	2400
FEET	18	19	23	24	24	24
METERS	5.5	5.8	7.0	7.3	7.3	7.3

Figure NPSH required prior to using above table.
DO NOT use as available Suction Lift.

3.00"/[76.2 MM] DIA. MAX. SPHERICAL SOLIDS

Note:
Select performance within
operating range of curve.



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CAS engineering, inc.
3155 N.W. 82nd AVENUE
MIAMI, FLORIDA 33122
TEL: (305) 262-5151
FAX: (305) 264-8950

PROJECT: RESOURCE RECOVERY STATION
LEACHATE AND SAN. SEWER PUMP STATION

PROJECT NO.: 1201

CALCULATED BY: R.L.

CHECKED BY: GA

PAGE 1 OF 6

DATE: 1/29/2013

DATE: 1/29/2013

CALCULATIONS

RESOURCE RECOVERY STATION

DOMESTIC FLOW

ZONING	PERSONS PER UNIT	UNIT	FLOW /PERSONS GPD	TOTAL FLOW. GPD	TOTAL DOMESTIC FLOW. GPM	ADJUSTMENT FOR NIGHT FLOW	TOTAL ADJUSTED FLOW. GPM	TOTAL POPULATION
SANITARY SEWER	200	1	60	12000	8.33		9.00	200
LEACHATE				27660	19.21		19.00	0
TOTAL		0		39660	27.54		28.00	0

TOTAL AVERAGE FLOW = TOTAL ADJUSTED DOMESTIC FLOW

28.0 GPM

USED =

28 GPM

PEAK FACTOR

PEAK FACTOR (PER MD-WASD) =

3.23

PEAK FLOW = (PEAK FACTOR x SAN. Sewer FLOW) + LEACHATE FLOW = 3.236 X9 +19 =

48 GPM

FLOW FOR 9 HOURS RUN TIME = TOTAL AVERAGE FLOW x 1440 / MAXIMUM RUN TIME =

FLOW FOR 9 HOURS RUN TIME = 28 X 1440 / 540 =

75 GPM
75 GPM

DESIGN FLOW = GREATER OF PEAK FLOW OR 9 HOUR FLOW =

USED =



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PAGE 2 OF 6

DATE: 1/29/2013

DATE: 1/29/2013

CALCULATIONS

RESOURCE RECOVERY STATION

STATIC LIFT

STATIC LIFT = ELEVATION CENTER LINE OF FORCE MAIN - L.W.L.

ELEVATION CENTER LINE OF FORCE MAIN = 5.0 FT

LOW WATER LEVEL ELEVATION = (-)4.0 FT

STATIC LIFT = 9.00 FT USED= 9.0 FT.

SYSTEM PRESSURE AT CONNECTION POINT

HIGH PRESSURE = 54 PSI

AVERAGE PRESSURE = 29.5 PSI

LOW PRESSURE = 5 PSI

HEAD LOSS CALCULATIONS

DESIGN FLOW = 75 GPM

THE FRICTION LOSSES WERE OBTAINED USING HAZEN-WILLIAMS FORMULA:

$h_f = (4.727 / D^{4.87}) \times L$ WHERE:

h_f = FRICTION LOSSES, FT.

D = DIAMETER OF PIPE, FT

Q = DISCHARGE, CFS

C = ROUGHNESS COEFFICIENT 130

L = LENGTH OF 6-INCH PIPE 17 FT

L = LENGTH OF 6-INCH PIPE 37 FT

L = LENGTH OF 8-INCH PIPE 178 FT



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PROJECT: RESOURCE RECOVERY STATION

LEACHETE AND SAN. SEWER PUMP STATION

PROJECT NO.: 1201

CALCULATED BY: R.L.

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PAGE 3 OF 16

DATE: 1/29/2013

DATE: 1/29/2013

CALCULATIONS

LEACHETE AND SAN. SEWER PUMP STATION

SYSTEM CURVE AT MAXIMUM PRESSURE

FLOW, GPM	STATIC LIFT, FT	4-INCH SUCTION PIPE PIPE EQUIVALENT LENGTH, LF	HEAD LOSS THRU 4-INCH SUCTION PIPE, FT	6-INCH SUCTION PIPE PIPE EQUIVALENT LENGTH, LF	HEAD LOSS THRU 6-INCH SUCTION PIPE, FT.	8-INCH DISCHARGE AND FORCE MAIN PIPE EQUIVALENT	HEAD LOSS THRU 8-INCH PIPE, FT	HIGH PRESSURE AT CONNECTION POINT FT	TOTAL PRESSURE, FT
0	9.00	17	0.00	37	0.00	178	0.0	124.75	133.75
50	9.00	17	0.00	37	0.01	178	0.0	124.75	133.78
100	9.00	17	0.02	37	0.04	178	0.0	124.75	133.85
150	9.00	17	0.04	37	0.08	178	0.1	124.75	133.97
200	9.00	17	0.06	37	0.14	178	0.2	124.75	134.12
250	9.00	17	0.10	37	0.21	178	0.2	124.75	134.31
300	9.00	17	0.14	37	0.30	178	0.3	124.75	134.53
350	9.00	17	0.18	37	0.40	178	0.5	124.75	134.79
400	9.00	17	0.23	37	0.51	178	0.6	124.75	135.08
450	9.00	17	0.29	37	0.63	178	0.7	124.75	135.40
500	9.00	17	0.35	37	0.77	178	0.9	124.75	135.76
550	9.00	17	0.42	37	0.91	178	1.1	124.75	136.14
600	9.00	17	0.49	37	1.07	178	1.2	124.75	136.56
650	9.00	17	0.57	37	1.25	178	1.4	124.75	137.01
700	9.00	17	0.66	37	1.43	178	1.7	124.75	137.49
750	9.00	17	0.75	37	1.62	178	1.9	124.75	138.00
800	9.00	17	0.84	37	1.83	178	2.1	124.75	138.54
850	9.00	17	0.94	37	2.05	178	2.4	124.75	139.10



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PROJECT: RESOURCE RECOVERY STATION

LEACHATE AND SAN. SEWER PUMP STATION

PROJECT NO.: 1201

CALCULATED BY: R.L.

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PAGE 4 OF F6

DATE: 1/0/1900

DATE: 1/0/1900

CALCULATIONS

RESOURCE RECOVERY STATION

SYSTEM CURVE AT AVERAGE PRESSURE

FLOW, GPM	STATIC LIFT, FT	4-INCH SUCTION PIPE EQUIVALENT LENGTH, LF	HEAD LOSS THRU 4-INCH SUCTION PIPE, FT	6-INCH SUCTION PIPE EQUIVALENT LENGTH, LF	HEAD LOSS THRU 6-INCH SUCTION PIPE, FT	8-INCH DISCHARGE AND FORCE MAIN PIPE EQUIVALENT	HEAD LOSS THRU 8-INCH PIPE, FT	HIGH PRESSURE AT CONNECTION POINT, FT	TOTAL PRESSURE, FT
0	9.00	17	0.00	37	0.00	178	0.0	68.15	77.15
50	9.00	17	0.00	37	0.01	178	0.0	68.15	77.18
100	9.00	17	0.02	37	0.04	178	0.0	68.15	77.25
150	9.00	17	0.04	37	0.08	178	0.1	68.15	77.37
200	9.00	17	0.06	37	0.14	178	0.2	68.15	77.52
250	9.00	17	0.10	37	0.21	178	0.2	68.15	77.71
300	9.00	17	0.14	37	0.30	178	0.3	68.15	77.93
350	9.00	17	0.18	37	0.40	178	0.5	68.15	78.19
400	9.00	17	0.23	37	0.51	178	0.6	68.15	78.48
450	9.00	17	0.29	37	0.63	178	0.7	68.15	78.80
500	9.00	17	0.35	37	0.77	178	0.9	68.15	79.16
550	9.00	17	0.42	37	0.91	178	1.1	68.15	79.54
600	9.00	17	0.49	37	1.07	178	1.2	68.15	79.96
650	9.00	17	0.57	37	1.25	178	1.4	68.15	80.41
700	9.00	17	0.66	37	1.43	178	1.7	68.15	80.89
750	9.00	17	0.75	37	1.62	178	1.9	68.15	81.40
800	9.00	17	0.84	37	1.83	178	2.1	68.15	81.94
850	9.00	17	0.94	37	2.05	178	2.4	68.15	82.50



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RESOURCE RECOVERY STATION

LEACHETE AND SAN. SEWER PUMP STATION

PROJECT:

PROJECT NO.: 1201

CALCULATED BY: R.L.

CHECKED BY: GA

DATE: 1/30/2013

DATE: 1/30/2013

CALCULATIONS

LEACHETE AND SAN. SEWER PUMP STATION

SYSTEM CURVE AT LOW PRESSURE

FLOW, GPM	STATIC LIFT, FT	4-INCH SUCTION PIPE PIPE EQUIVALENT LENGTH, LF	HEAD LOSS THRU 6-INCH SUCTION PIPE, FT	6-INCH SUCTION PIPE PIPE EQUIVALENT LENGTH, LF	HEAD LOSS THRU 6-INCH SUCTION PIPE, FT.	8-INCH DISCHARGE AND FORCE MAIN PIPE EQUIVALENT	HEAD LOSS THRU 8-INCH PIPE, FT	HIGH PRESSURE AT CONNECTION POINT FT	TOTAL PRESSURE, FT
0	9.00	17	0.00	37	0.00	178	0.0	11.55	20.55
50	9.00	17	0.00	37	0.01	178	0.0	11.55	20.58
100	9.00	17	0.02	37	0.04	178	0.0	11.55	20.65
150	9.00	17	0.04	37	0.08	178	0.1	11.55	20.77
200	9.00	17	0.06	37	0.14	178	0.2	11.55	20.92
250	9.00	17	0.10	37	0.21	178	0.2	11.55	21.11
300	9.00	17	0.14	37	0.30	178	0.3	11.55	21.33
350	9.00	17	0.18	37	0.40	178	0.5	11.55	21.59
400	9.00	17	0.23	37	0.51	178	0.6	11.55	21.88
450	9.00	17	0.29	37	0.63	178	0.7	11.55	22.20
500	9.00	17	0.35	37	0.77	178	0.9	11.55	22.56
550	9.00	17	0.42	37	0.91	178	1.1	11.55	22.94
600	9.00	17	0.49	37	1.07	178	1.2	11.55	23.36
650	9.00	17	0.57	37	1.25	178	1.4	11.55	23.81
700	9.00	17	0.66	37	1.43	178	1.7	11.55	24.29
750	9.00	17	0.75	37	1.62	178	1.9	11.55	24.80
800	9.00	17	0.84	37	1.83	178	2.1	11.55	25.34
750	9.00	17	0.75	37	1.62	178	1.9	11.55	24.80

SELECTION PUMP

MANUFACTURER:	GORMAN-RUPP
MODEL:	V3A60-B
SIZE	4" X 3"
IMPELLER DIAMETER	38615-103
HORSE POWER:	40
RPM:	2420

VELOCITY CALCULATIONS:

$Q = V \times A$

$Q =$

300

GPM =

0.67

CFS

$A = \pi \times D^2 / 4$

DIAMETER	A (SQ.FT.)	Q (CFS)	V (FT/SEC)
6	0.20	0.67	3.40
8	0.35	0.17	0.49



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PROJECT:

RESOURCE RECOVERY STATION

LEACHETE AND SAN. SEWER PUMP STATION

PROJECT NO.:

1201

CALCULATED BY:

R.L

CHECKED BY:

GA

PAGE 6 OF 6

DATE: 1/30/2013

DATE: 1/30/2013

CALCULATIONS

LEACHETE AND SAN. SEWER PUMP STATION

PUMP CYCLE TIME CALCULATIONS (T)

$$T = (V/Q-S) + (V/S)$$

V = EFFECTIVE VOLUME (THE VOLUME BETWEEN START LEVEL AND STOP LEVEL)

$$\text{WELL \#1 AREA} = 6.0 \text{ FT} \times 4.0 \text{ FT} = 24 \text{ SF}$$

$$\text{WELL \#2 AREA} = 14.0 \text{ FT} \times 12.0 \text{ FT} = 168 \text{ SF}$$

$$\text{DISTANCE BETWEEN PUMP ON / OFF} = (-)3.00 - (-)4.00 = 1.00 \text{ FT}$$

$$24" \text{ PIPE AREA} = \pi R^2 = 2(0.6142R^2) = (3.1416 \times 1) - 2(0.6142 \times 1) = 1.91 \text{ SF}$$

$$\text{LENGTH } 24" \text{ PIPE} = 4.0 \text{ FT}$$

$$V = \text{VOLUME WELL \#1} + \text{VOLUME WET WELL \#2} + \text{VOLUME } 24" \text{ PIPE}$$

$$V = 24 \times 1.00 + 168 \times 1.00 + 1.91 \times 4 = 199.64 \text{ CF}$$

$$1493 \text{ GALLONS}$$

$$Q = \text{PUMP RATE}$$

$$75 \text{ G.P.M.}$$

$$S = \text{INFLOW}$$

$$28 \text{ GPM}$$

$$T = 1493 / (75 - 28) + 1493 / 28 = 31.8 + 53.3 = 85.1$$

$$85 \text{ MINUTES}$$

NEW PUMP RATE

$$T = 1493 / (300 - 28) + 1493 / 28 = 5.5 + 53.3 = 58.8$$

$$59 \text{ MINUTES}$$

$$\text{PUMP RUN BY } 32 \text{ MIN.}$$

$$300 \text{ G.P.M}$$

$$\text{HIGH LEVEL ALARM ELEV.} =$$

$$18" \text{ INFLOW PIPE INV. ELEV.} =$$

$$\text{ALL EP (NEW) PUMP OFF ELEV} =$$

$$\text{SECOND EP (NEW) PUMP NELEV} =$$

$$\text{ONE EP (NEW) PUMP ON ELEV} =$$

$$\text{ALL PUMP OFF ELEV} =$$

$$\text{LOW LEVEL ALARM ELEV.}$$

$$0.00 \text{ FT}$$

$$1.50 \text{ FT}$$

$$0.00 \text{ FT}$$

$$(-)2.00 \text{ FT}$$

$$(-)3.00 \text{ FT}$$

$$(-)4.00 \text{ FT}$$

$$(-)4.50 \text{ FT}$$

NET POSITIVE SUCTION HEAD CALCULATIONS

$$\text{NPSH AVAILABLE} = \text{ATMOSPHERIC PRESSURE} - \text{VAPOR PRESSURE} + \text{SUCTION LIFT} - \text{SUCTION FRICTION LOSS}$$

$$\text{ATMOSPHERIC PRESSURE} =$$

$$\text{VAPOR PRESSURE AT } 74 \text{ D.F.} =$$

$$\text{SUCTION LIFT} = 14.50 - (-4.00) =$$

$$\text{SUCTION FRICTION LOSS} =$$

$$\text{NPSH AVAILABLE} = 33.9 - 1.0 - 18.50 - 0.14 =$$

$$\text{NPSH REQUIRED} =$$

$$\text{NPSH EXCESS AVAILABLE} = 14.26 - 7.15 =$$

$$33.9 \text{ FT}$$

$$1.00 \text{ FT}$$

$$18.5 \text{ FT}$$

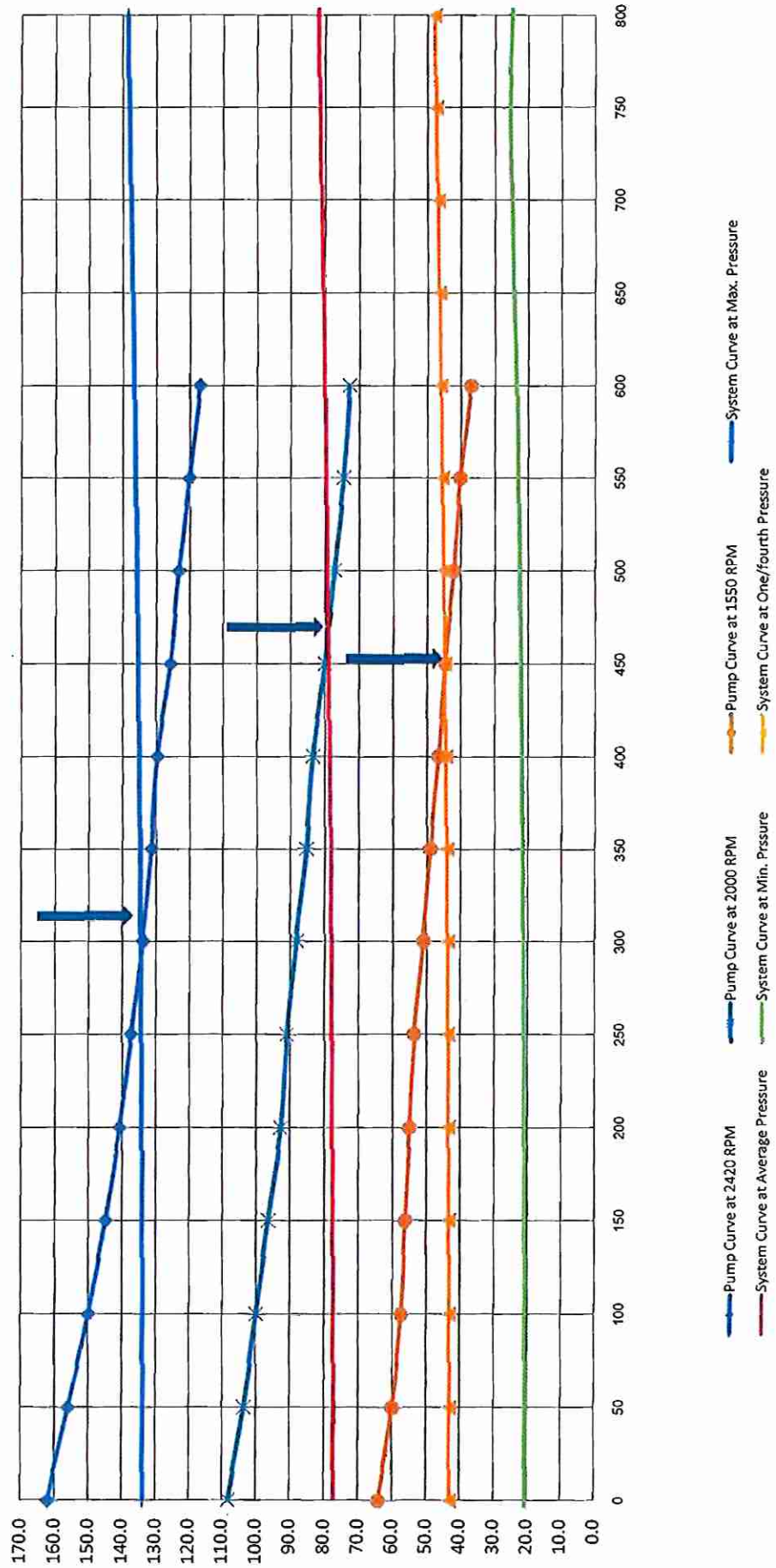
$$0.14 \text{ FT}$$

$$14.26$$

$$3.31 \text{ FT (NPSH CURVE)}$$

$$10.95 \text{ FT}$$

PUMP CURVE VS SYSTEM CURVE PUMP MODEL V3A60-B SIZE 4"X3"





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Miami, Florida 33122

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PROJECT:

PROJECT NO.:

CALC. BY:

CHECKED BY:

RESOURCE RECOVERY LIFT STATION

DISCHARGE TANK PUMP STATION

1201

R.L

GA

DATE: 1/30/2013

DATE: 1/30/2013

PUMP CURVE VS SYSTEM CURVE

Flow Q	System 2420 RPM	System 2000 RPM	System 1550 RPM	MAXIMUM PRESSURE (54 PSI)	AVERAGE PRESSURE (29.5 PSI)	ONE/ FOURTH PRESSURE (14.75 PSI)	MINIMUM PRESSURE (5 PSI)
GPM	FEET	FEET	FEET	FEET	FEET	FEET	FEET
0	162.0	108.2	64.0	133.75	77.15	43.00	20.55
50	156.1	103.6	60.0	133.78	77.18	43.03	20.58
100	150.0	100.0	57.4	133.85	77.25	43.10	20.65
150	145.0	96.4	56.1	133.97	77.37	43.22	20.77
200	140.7	92.7	54.8	134.12	77.52	43.37	20.92
250	137.3	90.9	53.5	134.31	77.71	43.56	21.11
300	134.0	88.2	51.0	134.53	77.93	43.78	21.33
350	131.5	85.45	49.0	134.79	78.19	44.04	21.59
400	129.7	83.6	46.5	135.08	78.48	44.33	21.88
450	125.8	80	44.5	135.40	78.80	44.65	22.20
500	123.2	77.2	42.0	135.76	79.16	45.01	22.56
550	120.0	74.5	40.0	136.14	79.54	45.39	22.94
600	116.8	72.7	36.8	136.56	79.96	45.81	23.36
650				137.01	80.41	46.26	24.29
700				137.49	80.89	46.74	24.80
750				138.00	81.40	47.25	25.34
800				138.54	81.94	47.79	24.80

CDSW

Ultra V Series® Basic Pump

Self Priming Centrifugal Pump



VARIOUS PATENTS APPLY

Model V3A60-B

Size 4" x 3"



PUMP SPECIFICATIONS

Size: 4" x 3" (102 mm x 76 mm).^{*,**}

Pump Casing: Gray Iron 30.

Maximum Operating Pressure 120 psi (827 kPa).*

Semi-Open Type, Two Vane Impeller: Ductile Iron 65-45-12.

Handles 2-1/2" (63.5 mm) Diameter Spherical Solids.

Impeller Shaft: Alloy Steel 4150.

Self-Cleaning Replaceable Wear Plate: Carbon Steel 1015.

Shimless Adjustable Cover Plate: Gray Iron 30.

Externally Removable Flap Valve: Neoprene w/Nylon and Steel Reinforcing.

Suction Flange/Flap Valve Seat: Gray Iron 30.

Bearing Housing: Gray Iron 30.

Seal Plate: Gray Iron 30.

Shaft Sleeve: Alloy Steel 4130.

Radial Bearing: Open Single Row Ball.

Thrust Bearing: Open Double Row Ball.

Bearing and Seal Cavity Lubrication: SAE 30 Non-Detergent Oil.

Gaskets: Buna-N, Compressed Synthetic Fibers, Vegetable Fiber, PTFE, Cork, and Rubber.

O-Rings: Buna-N.

Hardware: Standard Plated Steel.

Brass Pressure Relief Valve.

Bearing and Seal Cavity Oil Level Sight Gauges.

Optional Equipment: Automatic Air Release Valve. High Pump Temperature Shutdown Kit. Stainless Steel/G-R Hard Iron Impeller and Wear Plate. 120/240 Volt Casing Heater.

** Optional Gray Iron 30 Flanges Available as Follows
(See Price Sheets):

3" 125# Female NPT Discharge Flange Kit.

4" and 3" ASA Suction/Discharge Spool Flange Kits.

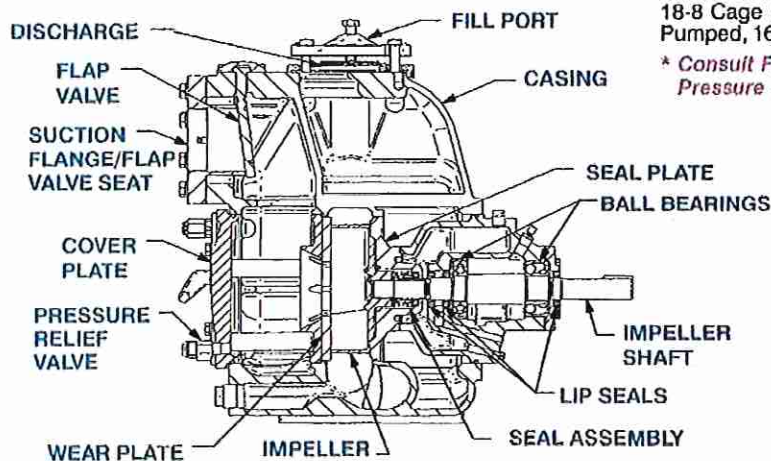
100 mm and 80 mm DIN 2527 (PN 16) Suction/Discharge Spool Flange Kits.



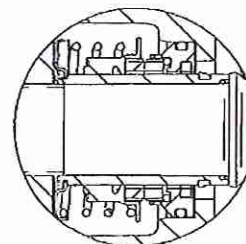
SEAL SPECIFICATIONS

Cartridge Type, Mechanical, Oil-Lubricated, Double Floating, Self-Aligning. Silicon Carbide Rotating and Stationary Faces. Stainless Steel 316 Stationary Seat. Fluorocarbon Elastomers (DuPont Viton® or Equivalent). Stainless Steel 18-8 Cage and Spring. Maximum Temperature of Liquid Pumped, 160°F (71°C).*

* Consult Factory for Applications Exceeding Maximum Pressure and/or Temperature Indicated.



SEAL DETAIL



THE GORMAN-RUPP COMPANY • MANSFIELD, OHIO

GORMAN-RUPP OF CANADA LIMITED • ST. THOMAS, ONTARIO, CANADA

www.grpumps.com

Specifications Subject to Change Without Notice

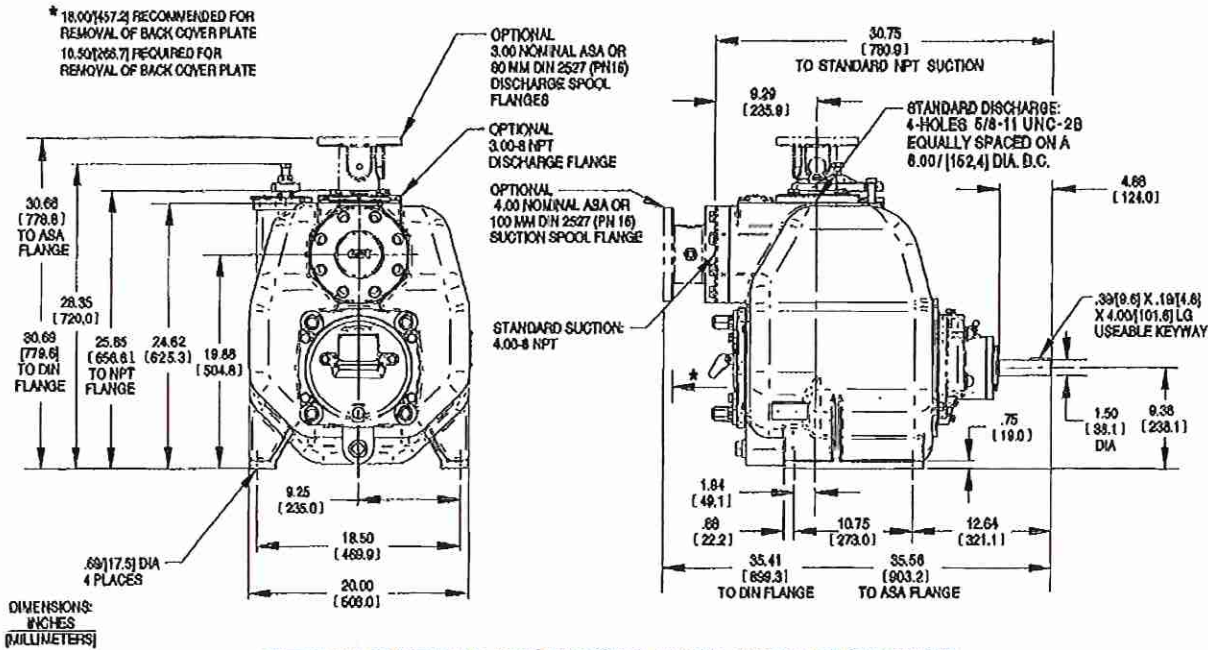
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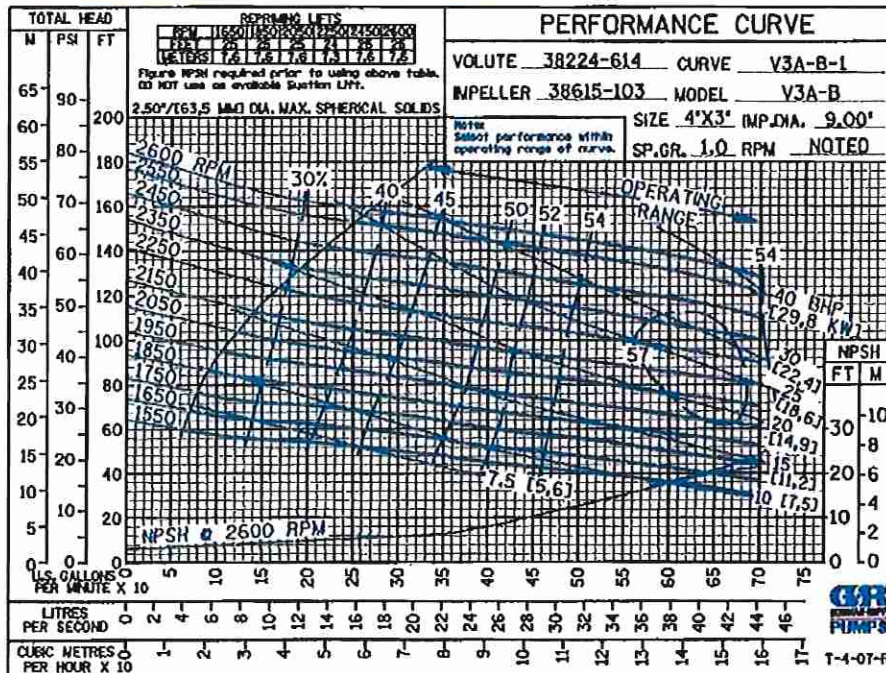
SECTION 55, PAGE 2500

APPROXIMATE DIMENSIONS and WEIGHTS

NET WEIGHT: 650 LBS. (295 KG.)*
SHIPPING WEIGHT: 700 LBS. (317 KG.)*
EXPORT CRATE: 13.5 CU. FT. (0.38 CU. M.)
*WEIGHTS DO NOT INCLUDE OPTIONAL FLANGE KITS.



OPTIONAL SUCTION & DISCHARGE FLANGES SHOWN IN PHANTOM



THE GORMAN-RUPP COMPANY • MANSFIELD, OHIO

GORMAN-RUPP OF CANADA LIMITED • ST. THOMAS, ONTARIO, CANADA

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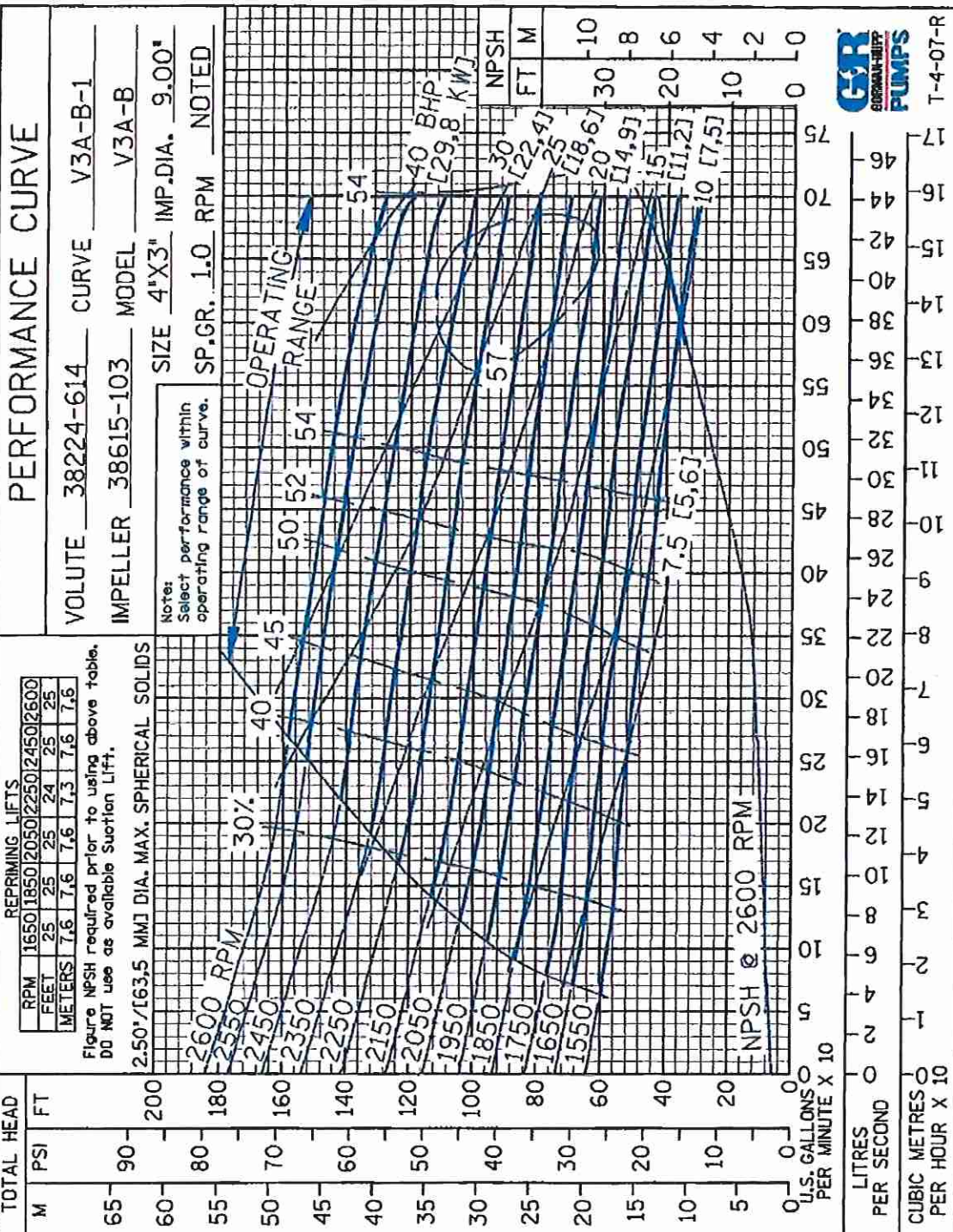
Curve Data

Sec. 55

PAGE 2500.1

NOVEMBER 2008

CDSW



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Pump Data Sheet - Gorman-Rupp ES 60Hz

Company: CAS Engineering
Name: Ramon Lopez
Date: 12/10/2012

Miami-Dade Leachate Pumps
300 GPM @ 134' TDH



Pump:

Size: V3A-B-1
Type: V&VS-SERIES
Synch speed: Adjustable
Curve: V3A-B-1
Specific Speeds:

Dimensions:

Pump Limits:

Temperature: ---
Pressure: ---
Sphere size: 2.5 in

Search Criteria:

Flow: 300 US gpm Head: 134 ft

Fluid:

Water
SG: 1
Viscosity: 1.105 cP
NPSHa: ---
Temperature: 60 °F
Vapor pressure: 0.2563 psi a
Atm pressure: 14.7 psi a

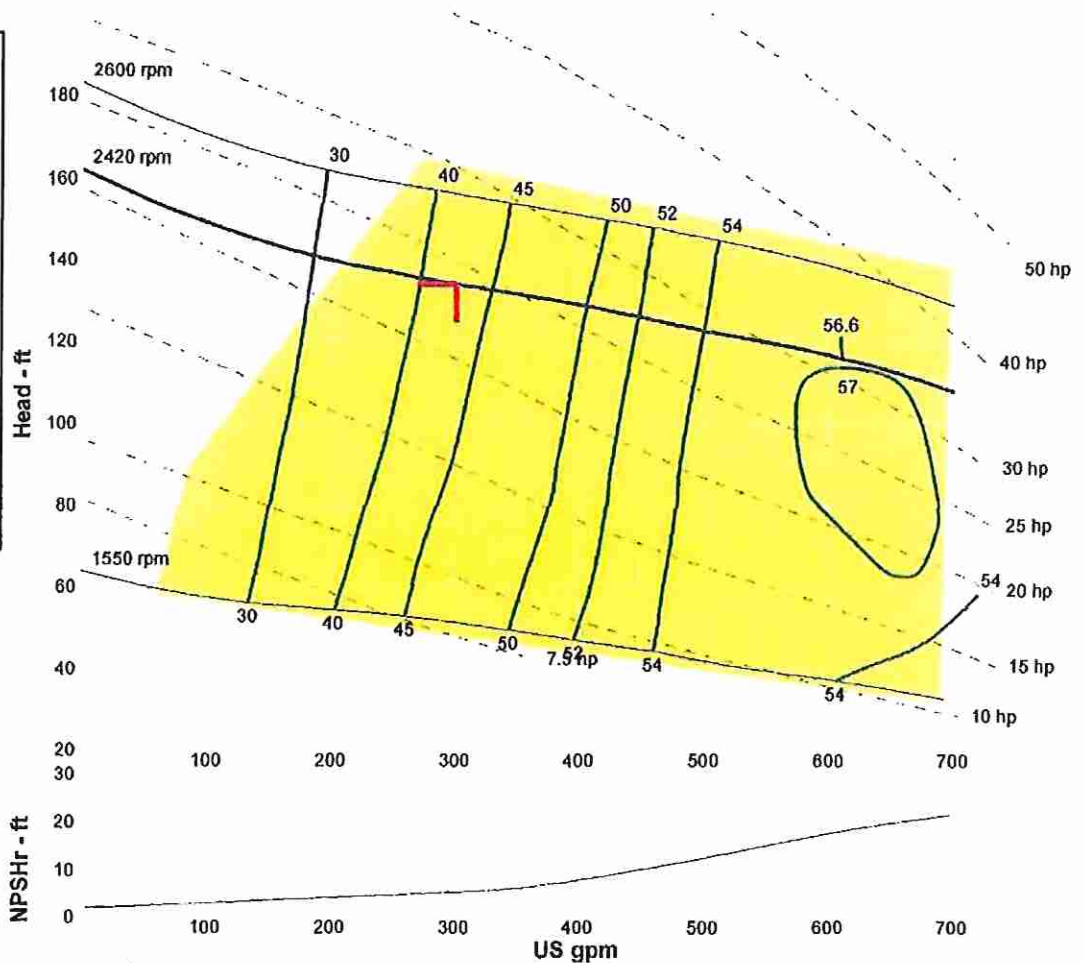
Motor:

Standard: NEMA
Enclosure: TEFC
Speed: ---
Frame: ---
Sizing criteria: Max Power on Design Curve

--- Data Point ---
Flow: 300 US gpm
Head: 134 ft
Eff: 43%
Power: 23.8 hp
NPSHr: 5.35 ft

--- Design Curve ---
Shutoff head: 162 ft
Shutoff dP: 70.1 psi
Min flow: ---
BEP: 57% @ 608 US gpm
NOL power:
34.8 hp @ 700 US gpm

--- Max Curve ---
Max power:
42 hp @ 699 US gpm



Performance Evaluation:

Flow US gpm	Speed rpm	Head ft	Efficiency %	Power hp	NPSHr ft
360	2420	131	47	25.2	6.54
300	2420	134	43	23.8	5.35
240	2420	138	36	22.7	4.63
180	2420	142	29	21.9	3.97
120	2420	148	20	21.5	3.3

CAS engineering, inc.

3155 N.W. 82nd AVENUE
MIAMI, FLORIDA 33122
TEL: (305) 262-5151
FAX: (305) 264-8950

PROJECT: Resource Recovery Lift Station

PROJECT NO.: 1201

EXCEL FILE:

COMPUTED BY: RL

DATE: 01/29/13

CHECKED BY: GA

DATE: 01/29/13

TANK CALCULATIONS**GIVEN:****BASIN A**

RAINFALL FREQUENCY	25	[YEARS]
TOTAL AREA	1.00	[ACRES]
IMPERVIOUS AREA	1.00	[ACRES]
PERVIOUS AREA	0.00	[ACRES]
IMPERV. COEFFICIENT	0.90	[CONST]
PERVIOUS COEFFICIENT	0.20	[CONST]
RUNOFF COEFFICIENT (C)	0.90	[CONST]

SUMP TANK 1 DIMENSION

LENGTH	14.00	[FT.]
WIDTH	12.00	[FT.]
	168.00	
MIN. ELEV.	-4.00	[NGVD]
MAX. ELEV.	10.00	[NGVD]

SUMP TANK 2 DIMENSION

LENGTH	6.00	[FT.]
WIDTH	4.00	[FT.]
	24.00	
MIN. ELEV.	-4.00	[NGVD]
MAX. ELEV.	10.00	[NGVD]

OTHER STORAGE

PIPE DIAM.	1	[FT.]
PIPE LENGTH	205	[FT.]
BOP ELEV.	-1	[NGVD]

PIPE DIAM.	1.5	[FT.]
PIPE LENGTH	135	[FT.]
BOP ELEV.	-1	[NGVD]

MANHOLE DIAM.	4	[FT.]
BOTTOM ELEV.	0	[NGVD]
QTY. OF MH	5	

PIPE Vol	399.57	[CU.FT.]
MANHOLE AREA	12.57	[SQ.FT.]

PUMP 1

Q1	500	[GPM]
	1.11	[CFS]
START ELEV	-1.5	[NGVD]
SHUT OFF		[NGVD]

PUMP 2

Q2	1100	[GPM]
	2.45	[CFS]
START ELEV	0	[NGVD]
SHUT OFF		[NGVD]

PUMP 3

Q3	1100	[GPM]
	2.45	[CFS]
START ELEV	1	[NGVD]
SHUT OFF		[NGVD]

TIME-STOARGE CALCULATIONS FOR DESIGN STORM

STORAGE TANK ALTERNATIVE # 3

TIME	INTENSITY	INFLOW	Inflow	INFLOW	PUMPED	PUMPED	STORAGED	TANK
[MIN]	[IN/HR]	[CFS]	Vol in Dt	CUMULATIVE	[CFS]	VOL	VOLUME	ELEV FT
(t)	(i)	(Q=CIA)	CUFT	[CU. FT.]	(Qp)	[CU. FT.]	[CU. FT.]	
			Q*Dt			(Qp*Dt)		
0	0.00	0.00		0			0	
0.5	8.95	8.06	241.71	242		33.42	208	0.2
2	8.69	7.82	703.53	945		100.26	812	0.6
5	8.20	7.38	1,327.95	2273		200.52	1939	1.5
10	7.50	6.75	2,023.66	4297		334.20	3628	2.9
15	6.90	6.21	1,863.98	6161		334.20	5158	4.1
20	6.40	5.76	1,727.65	7888		334.20	6552	5.2
25	5.96	5.37	1,609.91	9498		334.20	7827	6.2
30	5.58	5.02	1,507.20	11006		334.20	9000	7.2
35	5.25	4.72	1,416.80	12422		334.20	10083	8.0
40	4.95	4.46	1,336.63	13759		334.20	11085	8.8
45	4.69	4.22	1,265.05	15024		334.20	12016	9.6
50	4.45	4.00	1,200.75	16225		334.20	12883	10.3
55	4.23	3.81	1,142.67	17367		334.20	13691	10.9
60	4.04	3.63	1,089.95	18457		334.20	14447	11.5
75	3.55	3.19	2,872.26	21330		1002.61	16317	13.0
90	3.16	2.85	2,560.88	23891		1002.61	17875	14.2
105	2.85	2.57	2,310.42	26201		1002.61	19183	15.3
120	2.60	2.34	2,104.58	28306		1002.61	20285	16.2
135	2.39	2.15	1,932.42	30238		1002.61	21215	16.9
150	2.21	1.98	1,786.29	32024		1002.61	21998	17.5
165	2.05	1.85	1,660.71	33685		1002.61	22656	18.0
180	1.92	1.72	1,551.63	35237		1002.61	23205	18.5
195	1.80	1.62	1,455.99	36693		1002.61	23659	18.8
210	1.69	1.52	1,371.46	38064		1002.61	24028	19.1
225	1.60	1.44	1,296.21	39360		1002.61	24321	19.4
240	1.52	1.37	1,228.78	40589		1002.61	24547	19.5
255	1.44	1.30	1,168.03	41757		1002.61	24713	19.7
270	1.37	1.24	1,112.99	42870		1002.61	24823	19.8
285	1.31	1.18	1,062.91	43933		1002.61	24883	19.8
300	1.26	1.13	1,017.15	44950		1002.61	24898	19.8
315	1.20	1.08	975.16	45925		1002.61	24871	19.8
330	1.16	1.04	936.50	46862		1002.61	24804	19.7
345	1.11	1.00	900.79	47763		1002.61	24703	19.7
360	1.07	0.96	867.70	48630		1002.61	24568	19.6
375	1.03	0.93	836.96	49467		1002.61	24402	19.4
390	1.00	0.90	808.32	50276		1002.61	24208	19.3
405	0.96	0.87	781.58	51057		1002.61	23987	19.1
420	0.93	0.84	756.54	51814		1002.61	23741	18.9
435	0.91	0.81	733.07	52547		1002.61	23471	18.7
450	0.88	0.79	711.00	53258		1002.61	23180	18.5
465	0.85	0.77	690.23	53948		1002.61	22867	18.2
480	0.83	0.75	670.63	54619		1002.61	22535	17.9
495	0.81	0.72	652.12	55271		1002.61	22185	17.7
510	0.78	0.71	634.60	55905		1002.61	21817	17.4

CAS engineering, inc.

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 TEL: (305) 262-5151
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PROJECT: Resource Recovery Lift Station
 PROJECT NO.: 1201
 EXCEL FILE:
 COMPUTED BY: RL DATE: 08/10/12
 CHECKED BY: GA DATE: 08/17/12

TANKS CALCULATIONS

GIVEN:

BASIN A

RAINFALL FREQUENCY	100 [YEARS]
TOTAL AREA	1.00 [ACRES]
IMPERVIOUS AREA	1.00 [ACRES]
PERVIOUS AREA	0.00 [ACRES]
IMPERV. COEFFICIENT	0.90 [CONST]
PERVIOUS COEFFICIENT	0.20 [CONST]
RUNOFF COEFFICIENT (C)	0.90 [CONST]

SUMP TANK 1 DIMENSION

LENGTH	14.00 [FT.]
WIDTH	12.00 [FT.]
	168.00
MIN. ELEV.	-4.00 [NGVD]
MAX. ELEV.	10.00 [NGVD]

SUMP TANK 2 DIMENSION

LENGTH	6.00 [FT.]
WIDTH	4.00 [FT.]
	24.00
MIN. ELEV.	-4.00 [NGVD]
MAX. ELEV.	10.00 [NGVD]

OTHER STORAGE

PIPE DIAM.	1 [FT.]
PIPE LENGTH	205 [FT.]
BOP ELEV.	-1 [NGVD]

PIPE DIAM.

PIPE LENGTH	1.5 [FT.]
BOP ELEV.	135 [FT.]
	-1 [NGVD]

MANHOLE DIAM.

BOTTOM ELEV.	4 [FT.]
QTY. OF MH	0 [NGVD]
	5

PIPE Vol

MANHOLE AREA	399.57 [CU.FT.]
	12.57 [SQ.FT.]

PUMP 1

Q1	500 [GPM]
	1.11 [CFS]
START ELEV	-1.5 [NGVD]
SHUT OFF	[NGVD]

PUMP 2

Q2	1100 [GPM]
	2.45 [CFS]
START ELEV	0 [NGVD]
SHUT OFF	[NGVD]

PUMP 3

Q3	1100 [GPM]
	2.45 [CFS]
START ELEV	1 [NGVD]
SHUT OFF	[NGVD]

TIME-STOARGE CALCULATIONS FOR DESIGN STORM

STORAGE TANK ALTERNATIVE # 3

TIME [MIN] (t)	INTENSITY [IN/HR] (i)	INFLOW [CFS] (Q=CiA)	inflow Vol in Dt CUFT Q*Dt	INFLOW CUMULATIVE [CU. FT.]	PUMPED [CFS] (Qp)	PUMPED VOL [CU. FT.] (Qp*Dt)	STORAGED VOLUME [CU. FT.]	TANK ELEV ft NGVD
0	0.00	0.00		0			0	
0.5	10.42	9.38	281.38	281		33.42	248	1855
2	10.10	9.09	817.83	1099		100.26	966	7222
5	9.50	8.55	1,539.63	2639		200.52	2305	17239
10	8.66	7.79	2,337.35	4976		334.20	4308	32222
15	7.95	7.15	2,146.09	7122		334.20	6120	45775
20	7.35	6.61	1,983.75	9106		334.20	7769	58114
25	6.83	6.15	1,844.25	10950		334.20	9279	69409
30	6.38	5.74	1,723.08	12673		334.20	10668	79798
35	5.99	5.39	1,616.85	14290		334.20	11951	89392
40	5.64	5.08	1,522.96	15813		334.20	13140	98284
45	5.33	4.80	1,439.38	17253		334.20	14245	106551
50	5.05	4.55	1,364.49	18617		334.20	15275	114257
55	4.80	4.32	1,297.01	19914		334.20	16238	121459
60	4.58	4.12	1,235.89	21150		334.20	17140	128204
75	4.01	3.61	3,248.42	24398		1002.61	19385	145002
90	3.57	3.21	2,890.41	27289		1002.61	21273	159123
105	3.21	2.89	2,603.48	29892		1002.61	22874	171098
120	2.92	2.63	2,368.37	32261		1002.61	24240	181313
135	2.68	2.41	2,172.20	34433		1002.61	25409	190062
150	2.48	2.23	2,006.05	36439		1002.61	26413	197568
165	2.30	2.07	1,863.51	38302		1002.61	27274	204007
180	2.15	1.93	1,739.88	40042		1002.61	28011	209522
195	2.01	1.81	1,631.63	41674		1002.61	28640	214227
210	1.90	1.71	1,536.07	43210		1002.61	29173	218217
225	1.79	1.61	1,451.08	44661		1002.61	29622	221572
240	1.70	1.53	1,375.00	46036		1002.61	29994	224358
255	1.61	1.45	1,306.50	47343		1002.61	30298	226631
270	1.54	1.38	1,244.50	48587		1002.61	30540	228440
285	1.47	1.32	1,188.12	49775		1002.61	30726	229828
300	1.40	1.26	1,136.63	50912		1002.61	30860	230830
315	1.34	1.21	1,089.42	52001		1002.61	30946	231480
330	1.29	1.16	1,045.97	53047		1002.61	30990	231804
345	1.24	1.12	1,005.85	54053		1002.61	30993	231828
360	1.20	1.08	968.70	55022		1002.61	30959	231575
375	1.15	1.04	934.19	55956		1002.61	30891	231063
390	1.11	1.00	902.06	56858		1002.61	30790	230311
405	1.08	0.97	872.07	57730		1002.61	30660	229334
420	1.04	0.94	844.00	58574		1002.61	30501	228148
435	1.01	0.91	817.69	59392		1002.61	30316	226765
450	0.98	0.88	792.96	60185		1002.61	30106	225197
465	0.95	0.86	769.69	60954		1002.61	29874	223454
480	0.92	0.83	747.75	61702		1002.61	29619	221548
495	0.90	0.81	727.02	62429		1002.61	29343	219487
510	0.87	0.79	707.41	63137		1002.61	29048	217278