Master Utility Design for

LIFT STATION ANALYSIS

Hillside Groves

FOR

Lennar Homes LLC

Date: April 2022

BY

Connelly & Wicker Inc.
Planning • Engineering • Landscape Architecture

1560 North Orange Ave.
Suite 210
Winter Park, FL 32789
CWI Job #: 18-04-0004
Certificate of Authorization No. 3650

Ryan R Blaida

Digitally signed by Ryan R Blaida
DN: c=US, o=CONNELLY AND WICKER INC., ou=A01410D00000177017283E200013904, cn=Ryan R Blaida
Date: 2022.04.01 09:51:27 -04'00'

RYAN BLAIDA LICENSE No. 61017 STATE OF FLORIDA PROFESSIONAL ENGINEER

Ryan Blaida, P.E.
FL PE #61017

This item has been electronically signed and sealed by Ryan Blaida on the date indicated here using SHA authentication code. Printed copies of this document are not considered signed and sealed and the SHA authentication code must be verified on any electronic copies.

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Tab 1: Introduction

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A. Introduction

1. Project Overview

Hillside Groves is a 375.2-acre single-family residential home project located north of State Road 19 and southwest of W. Central Ave. and S. Florida Ave. in Howey in the Hills, Lake County, Florida. It is situated in Section 35, Township 20S, Range 25E. Please see Location Map and Figure 2 Aerial Map, both under Tab 2 of this report.

Hillside Groves is a large PUD with supporting roads and infrastructure. The purpose of this report is to demonstrate the lift station design will be able to discharge the wastewater into the existing town system.

2. Utility Provider

The City of Howey in the Hills is the potable water provider for this project. This analysis takes into consideration City of Howey in the Hills design criteria. Where specific criteria are not set by the city, standards from nearby utility providers will be utilized.

B. Lift Station Design

1. Introduction

Sanitary sewer from the single- family homes will be collected via a gravity system, then routed to five separate on-site lift stations. Lift Station 4-1 will discharge into a proposed future manhole, which will discharge to Lift Station 1-1. !-1, 1-2 and 2-1 will manifold into a proposed 10" forcemian proposed with the boulevard within the project. This 10" forcemain will discharge to the existing City system in the Number 2 Road right of way. Lift station 3-1 will discharge to the existing forcemain within the SR 19 rigtht of way

The following calculations demonstrate this design.

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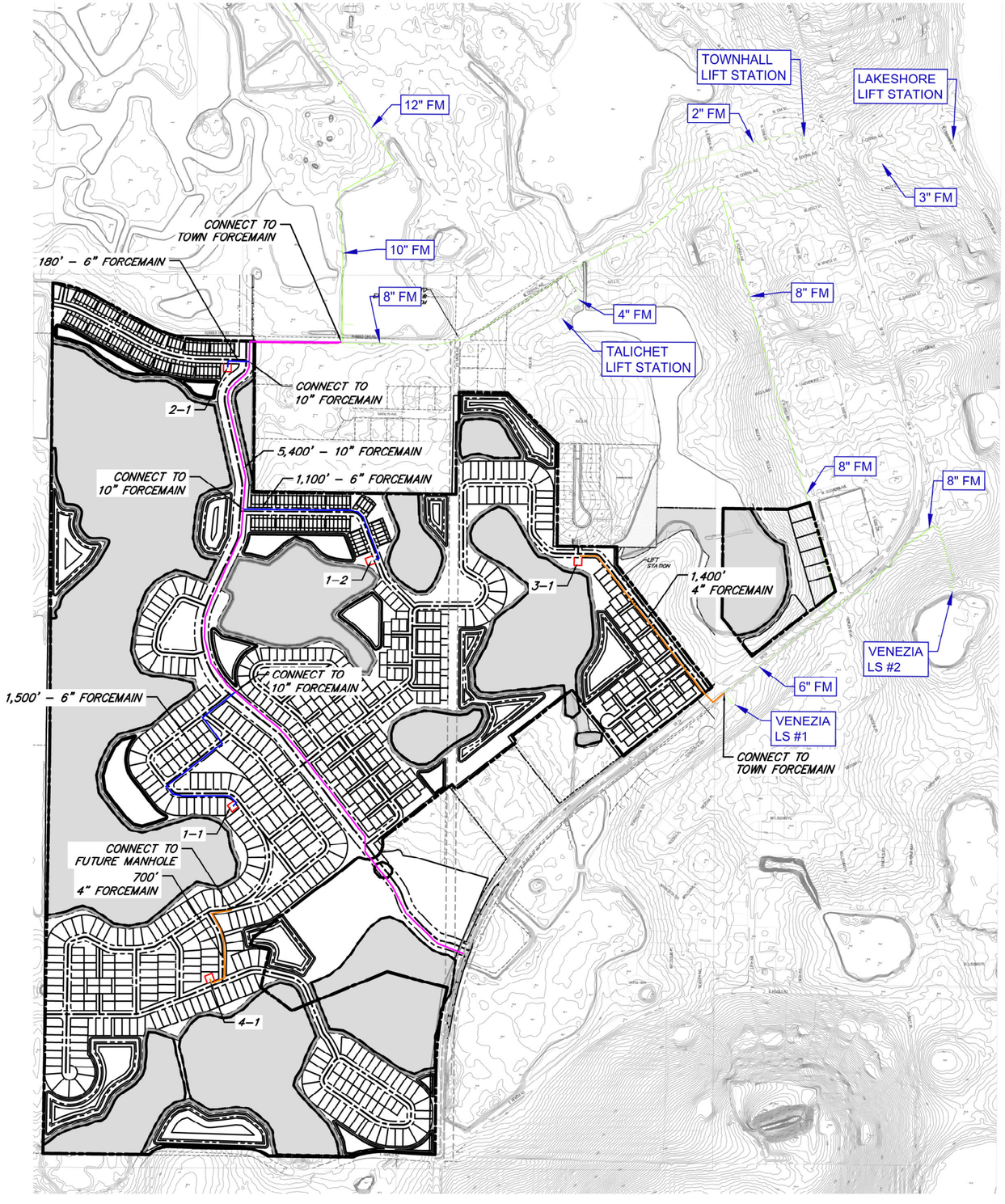

LEGEND

- 4" FORCEMAIN
- 6" FORCEMAIN
- 10" FORCEMAIN
- EXISTING FORCEMAIN

FORCEMAIN EXHIBIT

21-04-0008

MARCH 2022

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Tab 2: Lift Station 1-1 Design

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1560 North Orange Ave.| Suite 210 |Winter Park, Florida 32789
P: 407.261.3100 www.cwieng.com

Project: Howey
Table: 1 - Summary of Wastewater Demands
Engineer(s): SC\RB
Date: 3/28/2022 Revised: 3/31/2022
Job No.: 21-004-0008

TABLE 1 - SUMMARY OF WASTEWATER DEMANDS - LS 1-1

PHASE	LAND USE	QUANTITY	UNITS	DEMAND	UNITS	ADF		PEAK	MDF	
						(gpd)	(gpm)	FACTOR	(gpd)	(gpm)
1-1	SF Homes (actual)	146	UNITS	300	GPD/UNIT	43,800	30.4	2.5	109,500	76.0
4-1	SF Homes (additional)	177	UNITS	300	GPD/UNIT	53,100	36.9	2.5	132,750	92.2
TOTAL		**323**				**96,900**	**67.3**		**242,250**	**168.2**

Project: Howey
Table: 2 - Lift Station Design
Engineer(s): SC/RB
Date: 3/28/2022 Revised: 3/31/2022
Job No.: 21-004-0008

TABLE 2 - LIFT STATION DESIGN - LS 1-1

PUMP DATA

MANUFACTURER	Pentair	MODEL	Hydromatic-H4H
PUMP CURVE	SUB_S_E_AH_00021_B_4 Rev 2012-03-23	IMPELLER SIZE	8.88 IN, rated
PUMP HORSEPOWER	7.38 HP, rated	DESIGN SPEED	1750 RPM, rated

DESIGN FLOWS

ADF QIN	67.3 GPM	PDF QIN	168.2 GPM

HYDRAULIC MODEL RESULTS

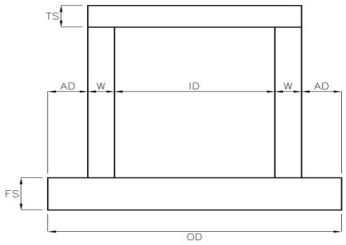
MAX PRESSURE	180.0 GPM OUTFLOW @	44.3	FT TDH
MIN PRESSURE	70 GPM OUTFLOW @	38.7	FT TDH

WET WELL STORAGE

Q	180	(GPM) FLOW OUT OF WET WELL PUMP DISCHARGE, ONE RUNNING
S	168	(GPM) WASTEWATER FLOW INTO WET WELL - PDF IN
T	20	(MIN) ASSUMED CYCLE TIME
V	220.0	(GAL) VOLUME REQUIRED BETWEEN LEAD PUMP ON AND BOTH PUMPS OFF
	29.4	(FT^3) VOLUME REQUIRED BETWEEN LEAD PUMP ON AND BOTH PUMPS OFF
STORAGE DEPTH	2.00	FT

WET WELL DESIGN

ELEVATION	63.00	SLAB TOP (WW INVERT)
ELEVATION	63.25	PUMP VOLUTE
ELEVATION	65.00	BOTH PUMPS OFF
ELEVATION	67.00	START LEAD
ELEVATION	68.00	START LAG
ELEVATION	69.00	HIGH LEVEL ALARM
ELEVATION	90.00	TOP OF WET WELL
ELEVATION	70	INFLUENT INVERT
TOTAL LIFT STATION DEPTH	27.00	FT



ID - INSIDE DIAMETER	8 FT	**FS** - FLOOR SLAB THICKNESS	12 IN
W - WALL THICKNESS	8 IN	**AD** - ADD SLAB DIAMETER	16 IN
TS - TOP SLAB THICKNESS	0 IN	**OD** - TOTAL SLAB DIAMETER	12.0 FT

NOTE: ASSUMES 20' DEPTH AT INVERT

CYCLE TIME EVALUATION

AVERAGE DAILY FLOW		**PEAK DAILY FLOW**	
TIME ON	1.95 MIN	TIME ON	18.69 MIN
TIME OFF	3.27 MIN	TIME OFF	1.31 MIN
TOTAL CYCLE TIME	5.22 MIN	TOTAL CYCLE TIME	20.00 MIN
STARTS PER HOUR	11	STARTS PER HOUR	3.0

DESIGN CHECKS

DEPTH FROM INFLUENT INVERT TO TOP OF SLAB (WET WELL INVERT)

REQUIRED	5 FT	PROVIDED	7.00 FT

TOTAL CYCLE TIME MINIMUM

REQUIRED	10 MIN	PROVIDED	5.22 MIN

DEPTH FROM HIGH LEVEL ALARM TO ALL PUMPS OFF

REQUIRED **3** FT PROVIDED 4.00 FT

WET WELL FLOATATION

ASSUMPTIONS

1) WEIGHT OF PUMPS, FITTINGS, ETC. NOT INCLUDED.

2) WET WELL IS EMPTY - FLUID WEIGHT WITHIN STRUCTURE IS NOT CONSIDERED

3) GROUNDWATER LEVEL IS AT TOP OF WET WELL

4) SOIL FRICTION FORCE IS EXCLUDED, ONLY THE WEIGHT OF SOIL ON TOP OF BOTTON OF SLAB IS CONSIDERED

DOWNWARD FORCES

CONCRETE WALLS

CONCRETE WALLS	18.2	FT^2
	27.00	FT (DEPTH OF WALLS)
	490.1	FT^3
SLAB	113.1	FT^2
	1.0	FT (THICKNESS)
	113.1	FT^3
CONCRETE WEIGHT	**0.0**	CY - ADDITIONAL BALLAST
	603.2	FT^3
	150	LB/FT^3 (UNIT WEIGHT OF REENFORCED CONCRETE)
	90,478	LBS
SOIL WEIGHT	44.7	FT^2
	27.00	FT (DEPTH OF WALLS)
	47.6	LB/FT^3 (110 LB/FT^3 - 62.4 LB/FT^3 = WEIGHT OF SOIL - WEIGHT OF WATER)
	57,423	LBS

UPWARD FORCES (HYDROSTATIC)

CONCRETE WALLS

	68.4	FT^2
	27.00	FT (DEPTH OF WALLS)
	1847.3	FT^3

SLAB

	113.1	FT^2
	1.0	FT (THICKNESS)
	113.10	FT^3

WEIGHT OF WATER

	1960.4	FT^3
	62.4	LB/FT^3
	122,326	LBS

TOTAL FORCES SUMMARY

DOWNWARD FORCE	**147,901**	LBS
UPWARD FORCE	**122,326**	LBS
SAFETY FACTOR	**1.21**	

Project: Howey
Table: 3 - Lift Station System Curve
Engineer(s): SC/RB
Date: 3/28/2022 Revised: 3/31/2022
Job No.: 21-004-0008

TABLE 3 - LIFT STATION SYSTEM CURVE - LS 1-1

STATIC/ELEVATION HEAD

BOTH PUMPS OFF	65.00	FT	
HIGHPOINT ALONG FM	91.00	FT	
CONNECTION ELEVATION	84.00	FT	INVERT ELEVATION OF EXISTING FORCEMAIN
TOTAL STATIC LOSS	**26.0**	**FT**	
TOTAL STATIC LOSS	**26.0**	**FT**	

FRICTION HEAD

	LIFT STATION RISER PIPES		LIFT STATION TO CONNECTION		CONNECTION TO TO EXISTING FM	
DESIGN FLOW (Q)	180	GPM	180	GPM	180	GPM
PIPE DIAMETER (D)	4	IN	6	IN	10	IN
PIPE LENGTH (L)	20	FT	1510	FT	3100	FT
HAZEN WILLIAMS COEFF (C	120		120		120	
VELOCITY (V)	4.60	FT/S	2.04	FT/S	0.74	FT/S
FLOW AREA (A)	0.09	FT^2	0.20	FT^2	0.55	FT
FRICTION LOSS (HF)	0.52	FT	5.42	FT	0.92	FT
TOTAL FRICTION LOSS	**8.4**	**FT**				

CONNECTION/PRESSURE HEAD

CONNECTION PRESSURE (max)	15	PSI	CONNECTION PRESSURE (min)	5	PSI
TOTAL PRESSURE LOSS	**34.7**	**FT**	**TOTAL PRESSURE LOSS**	**11.6**	**FT**

MINOR HEAD LOSS 0

FITTING TYPE	K - VALUE	COUNT
DISCHARGE	0.6	1
90° BEND	0.3	2
VALVES	1.5	1
CHECK VALVES	2.0	2
TEE CONNECTION	0.4	1
OUTLET	1.0	1
USER DEFINED	0.0	0
TOTAL		**8.1**
TOTAL MINOR LOSS	**2.7**	**FT**

SYSTEM CURVE

Min Pressure

FLOW RATE GPM	TDH FT	INCREMENT 40.00
0	37.6	
40	38.0	
70	38.9	←SYSTEM PT
110	40.6	
150	43.1	
180	45.3	
220	48.8	
260	52.9	
300	57.6	
340	62.9	
380	68.8	
420	75.2	

Max Pressure

FLOW RATE GPM	TDH FT	INCREMENT 40.00
0	61.4	
40	61.8	
80	62.9	
120	64.7	
160	67.0	
180	68.4	←SYSTEM PT
220	71.5	
260	75.3	
300	79.5	
340	84.3	
380	89.7	
420	95.5	

Item number	: Default	Size	: Hydromatic - H4H
Service	:	Stages	: 1
Quantity	: 1	Based on curve number	: SUB_S_E_AH_00021_B_4 Rev 2012-03-23
Quote number	:	Date last saved	: 31 Mar 2022 8:24 AM

Operating Conditions

Flow, rated	: 180.0 USgpm
Differential head / pressure, rated (requested)	: 68.40 ft
Differential head / pressure, rated (actual)	: 71.34 ft
Suction pressure, rated / max	: 0.00 / 0.00 psi.g
NPSH available, rated	: Ample
Site Supply Frequency	: 60 Hz

Performance

Speed criteria	: Synchronous
Speed, rated	: 1750 rpm
Impeller diameter, rated	: 8.88 in
Impeller diameter, maximum	: 10.00 in
Impeller diameter, minimum	: 8.00 in
Efficiency	: 43.93 %
NPSH required / margin required	: - / 0.00 ft
nq (imp. eye flow) / S (imp. eye flow)	: 34 / - Metric units
Minimum Continuous Stable Flow	: 100.0 USgpm
Head, maximum, rated diameter	: 94.42 ft
Head rise to shutoff	: 32.35 %
Flow, best eff. point	: 462.3 USgpm
Flow ratio, rated / BEP	: 38.93 %
Diameter ratio (rated / max)	: 88.75 %
Head ratio (rated dia / max dia)	: 73.67 %
Cq/Ch/Ce/Cn [ANSI/HI 9.6.7-2010]	: 1.00 / 1.00 / 1.00 / 1.00
Selection status	: Acceptable

Liquid

Liquid type	: Water
Additional liquid description	:
Solids diameter, max	: 0.00 in
Solids diameter limit	: 3.00 in
Solids concentration, by volume	: 0.00 %
Temperature, max	: 68.00 deg F
Fluid density, rated / max	: 1.000 / 1.000 SG
Viscosity, rated	: 1.00 cP
Vapor pressure, rated	: 0.34 psi.a

Material

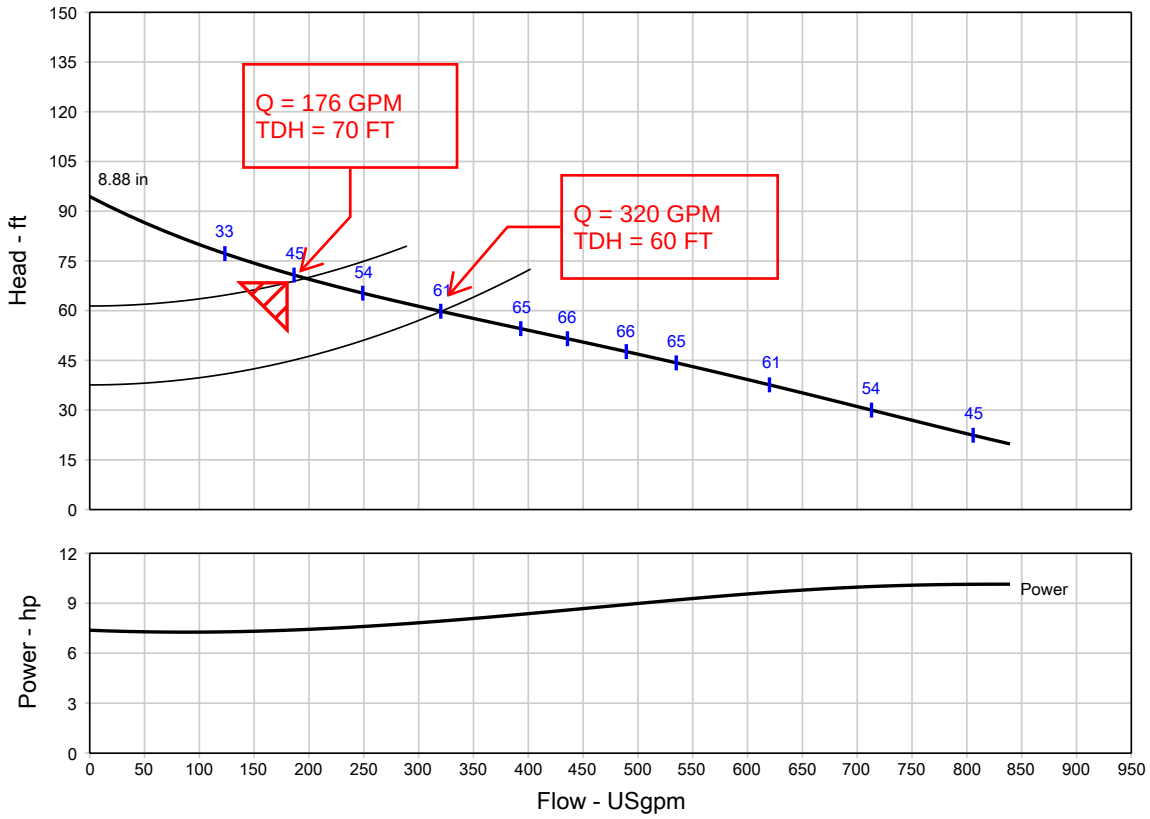
Material selected	: Standard

Pressure Data

Maximum working pressure	: 40.87 psi.g
Maximum allowable working pressure	: N/A
Maximum allowable suction pressure	: N/A
Hydrostatic test pressure	: N/A

Driver & Power Data (@Max density)

Driver sizing specification	: Maximum power
Margin over specification	: 0.00 %
Service factor	: 1.20 (used)
Power, hydraulic	: 3.24 hp
Power, rated	: 7.38 hp
Power, maximum, rated diameter	: 10.14 hp
Minimum recommended motor rating	: 10.00 hp / 7.46 kW



Tab 3: Lift Station 1-2 Design

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Project: Howey
Table: 1 - Summary of Wastewater Demands
Engineer(s): SC\RB
Date: 3/28/2022 Revised: 3/31/2022
Job No.: 21-004-0008

TABLE 1 - SUMMARY OF WASTEWATER DEMANDS - LS 1-2

PHASE	LAND USE	QUANTITY	UNITS	DEMAND	UNITS	ADF		PEAK FACTOR	MDF	
						(gpd)	(gpm)		(gpd)	(gpm)
ER	SF Homes (actual)	161	UNITS	300	GPD/UNIT	48,300	33.5	2.5	120,750	83.9
ER	SF Homes (additional)		UNITS	300	GPD/UNIT	0	0.0	2.5	0	0.0
TOTAL		**161**				**48,300**	**33.5**		**120,750**	**83.9**

Project: Howey
Table: 2 - Lift Station Design (1-2)
Engineer(s): SC/RB
Date: 3/28/2022 Revised: 3/31/2022
Job No.: 21-004-0008

TABLE 2 - LIFT STATION DESIGN - LS 1-2

PUMP DATA

MANUFACTURER	Pentair	MODEL	Hydromatic-S4K
PUMP CURVE	SUB_S_E_AH_00011_E_4 Rev 2012-03-23	IMPELLER SIZE	9.5 IN, rated
PUMP HORSEPOWER	7.9 HP, rated	DESIGN SPEED	1750 RPM, rated

DESIGN FLOWS

ADF QIN	33.5 GPM	PDF QIN	83.9 GPM

HYDRAULIC MODEL RESULTS

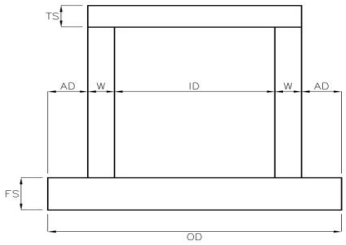
MAX PRESSURE	85.0 GPM OUTFLOW @	96.5	FT TDH
MIN PRESSURE	36 GPM OUTFLOW @	49.4	FT TDH

WET WELL STORAGE

Q	85	(GPM) FLOW OUT OF WET WELL PUMP DISCHARGE, ONE RUNNING
S	84	(GPM) WASTEWATER FLOW INTO WET WELL - PDF IN
T	20	(MIN) ASSUMED CYCLE TIME
V	22.6	(GAL) VOLUME REQUIRED BETWEEN LEAD PUMP ON AND BOTH PUMPS OFF
	3.0	(FT^3) VOLUME REQUIRED BETWEEN LEAD PUMP ON AND BOTH PUMPS OFF
STORAGE DEPTH	2.00	FT

WET WELL DESIGN

ELEVATION	63.00	SLAB TOP (WW INVERT)
ELEVATION	63.25	PUMP VOLUTE
ELEVATION	65.00	BOTH PUMPS OFF
ELEVATION	67.00	START LEAD
ELEVATION	68.00	START LAG
ELEVATION	69.00	HIGH LEVEL ALARM
ELEVATION	90.00	TOP OF WET WELL
ELEVATION	70	INFLUENT INVERT
TOTAL LIFT STATION DEPTH	27.00	FT



ID - INSIDE DIAMETER	8 FT	**FS** - FLOOR SLAB THICKNESS	12 IN
W - WALL THICKNESS	8 IN	**AD** - ADD SLAB DIAMETER	16 IN
TS - TOP SLAB THICKNESS	0 IN	**OD** - TOTAL SLAB DIAMETER	12.0 FT

CYCLE TIME EVALUATION

AVERAGE DAILY FLOW		PEAK DAILY FLOW	
TIME ON	0.44 MIN	TIME ON	19.73 MIN
TIME OFF	0.67 MIN	TIME OFF	0.27 MIN
TOTAL CYCLE TIME	1.11 MIN	TOTAL CYCLE TIME	20.00 MIN
STARTS PER HOUR	54	STARTS PER HOUR	3.0

DESIGN CHECKS

DEPTH FROM INFLUENT INVERT TO TOP OF SLAB (WET WELL INVERT)

REQUIRED	5 FT	PROVIDED	7.00 FT

TOTAL CYCLE TIME MINIMUM

REQUIRED	10 MIN	PROVIDED	1.11 MIN

DEPTH FROM HIGH LEVEL ALARM TO ALL PUMPS OFF

REQUIRED **3** FT PROVIDED 4.00 FT

WET WELL FLOATATION

ASSUMPTIONS

1) WEIGHT OF PUMPS, FITTINGS, ETC. NOT INCLUDED.

2) WET WELL IS EMPTY - FLUID WEIGHT WITHIN STRUCTURE IS NOT CONSIDERED

3) GROUNDWATER LEVEL IS AT TOP OF WET WELL

4) SOIL FRICTION FORCE IS EXCLUDED, ONLY THE WEIGHT OF SOIL ON TOP OF BOTTON OF SLAB IS CONSIDERED

DOWNWARD FORCES

CONCRETE WALLS

CONCRETE WALLS	18.2	FT^2
	27.00	FT (DEPTH OF WALLS)
	490.1	FT^3
SLAB	113.1	FT^2
	1.0	FT (THICKNESS)
	113.1	FT^3
CONCRETE WEIGHT	**0.0**	CY - ADDITIONAL BALLAST
	603.2	FT^3
	150	LB/FT^3 (UNIT WEIGHT OF REENFORCED CONCRETE)
	90,478	LBS
SOIL WEIGHT	44.7	FT^2
	27.00	FT (DEPTH OF WALLS)
	47.6	LB/FT^3 (110 LB/FT^3 - 62.4 LB/FT^3 = WEIGHT OF SOIL - WEIGHT OF WATER)
	57,423	LBS

UPWARD FORCES (HYDROSTATIC)

CONCRETE WALLS

	68.4	FT^2
	27.00	FT (DEPTH OF WALLS)
	1847.3	FT^3

SLAB

	113.1	FT^2
	1.0	FT (THICKNESS)
	113.10	FT^3

WEIGHT OF WATER

	1960.4	FT^3
	62.4	LB/FT^3
	122,326	LBS

TOTAL FORCES SUMMARY

DOWNWARD FORCE	**147,901**	LBS
UPWARD FORCE	**122,326**	LBS
SAFETY FACTOR	**1.21**	

Project: Howey
Table: 3 - Lift Station System Curve
Engineer(s): SC/RB
Date: 3/28/2022 Revised: 3/31/2022
Job No.: 21-004-0008

TABLE 3 - LIFT STATION SYSTEM CURVE - LS 1-2

STATIC/ELEVATION HEAD

BOTH PUMPS OFF	**65.00**	FT	
HIGHPOINT ALONG FM	**91.00**	FT	
CONNECTION ELEVATION	**84.00**	FT	**INVERT ELEVATION OF EXISTING FORCEMAIN**
TOTAL STATIC LOSS	**26.0**	**FT**	
TOTAL STATIC LOSS	**26.0**	**FT**	

FRICTION HEAD

	LIFT STATION RISER PIPES		LIFT STATION TO CONNECTION		CONNECTION TO TO EXISTING FM	
DESIGN FLOW (Q)	**85**	GPM	**85**	GPM	**85**	GPM
PIPE DIAMETER (D)	**4**	IN	**6**	IN	**10**	IN
PIPE LENGTH (L)	**20**	FT	**1128**	FT	**2000**	FT
HAZEN WILLIAMS COEFF (C	**120**		**120**		**120**	
VELOCITY (V)	2.17	FT/S	0.96	FT/S	0.35	FT/S
FLOW AREA (A)	0.09	FT^2	0.20	FT^2	0.55	FT
FRICTION LOSS (HF)	0.13	FT	1.01	FT	0.15	FT
TOTAL FRICTION LOSS	**1.7**	**FT**				

CONNECTION/PRESSURE HEAD

CONNECTION PRESSURE (max)	**30**	PSI	CONNECTION PRESSURE (min)	**10**	PSI
TOTAL PRESSURE LOSS	**69.3**	**FT**	**TOTAL PRESSURE LOSS**	**23.1**	**FT**

MINOR HEAD LOSS 0

FITTING TYPE	K - VALUE	COUNT
DISCHARGE	0.6	1
90° BEND	0.3	2
VALVES	1.5	1
CHECK VALVES	2.0	2
TEE CONNECTION	0.4	1
OUTLET	1.0	1
USER DEFINED	0.0	0
TOTAL		**8.1**

TOTAL MINOR LOSS **0.6** **FT**

SYSTEM CURVE

Min Pressure

FLOW RATE GPM	TDH FT	INCREMENT 18.00
0	49.1	
18	49.2	
36	**49.4**	**←SYSTEM PT**
54	49.7	
72	50.1	
90	50.6	
108	51.2	
126	51.9	
144	52.6	
162	53.5	
180	54.5	
198	55.5	

Max Pressure

FLOW RATE GPM	TDH FT	INCREMENT 17.00
0	95.3	
17	95.4	
34	95.5	
51	95.8	
68	96.1	
85	**96.5**	**←SYSTEM PT**
102	97.0	
119	97.5	
136	98.1	
153	98.8	
170	99.6	
187	100.4	

Item number	: Default	Size	: Hydromatic - S4K
Service	:	Stages	: 1
Quantity	: 1	Based on curve number	: SUB_S_E_AH_00011_E_4 Rev 2012-03-23
Quote number	:	Date last saved	: 31 Mar 2022 8:35 AM

Operating Conditions

Flow, rated	: 85.00 USgpm
Differential head / pressure, rated (requested)	: 96.50 ft
Differential head / pressure, rated (actual)	: 96.82 ft
Suction pressure, rated / max	: 0.00 / 0.00 psi.g
NPSH available, rated	: Ample
Site Supply Frequency	: 60 Hz

Performance

Speed criteria	: Synchronous
Speed, rated	: 1750 rpm
Impeller diameter, rated	: 9.50 in
Impeller diameter, maximum	: 12.00 in
Impeller diameter, minimum	: 8.50 in
Efficiency	: 26.29 %
NPSH required / margin required	: - / 0.00 ft
nq (imp. eye flow) / S (imp. eye flow)	: 28 / - Metric units
Minimum Continuous Stable Flow	: 128.6 USgpm
Head, maximum, rated diameter	: 103.0 ft
Head rise to shutoff	: 6.41 %
Flow, best eff. point	: 592.4 USgpm
Flow ratio, rated / BEP	: 14.35 %
Diameter ratio (rated / max)	: 79.17 %
Head ratio (rated dia / max dia)	: 58.34 %
Cq/Ch/Ce/Cn [ANSI/HI 9.6.7-2010]	: 1.00 / 1.00 / 1.00 / 1.00

Liquid

Liquid type	: Water
Additional liquid description	:
Solids diameter, max	: 0.00 in
Solids diameter limit	: 3.00 in
Solids concentration, by volume	: 0.00 %
Temperature, max	: 68.00 deg F
Fluid density, rated / max	: 1.000 / 1.000 SG
Viscosity, rated	: 1.00 cP
Vapor pressure, rated	: 0.34 psi.a

Material

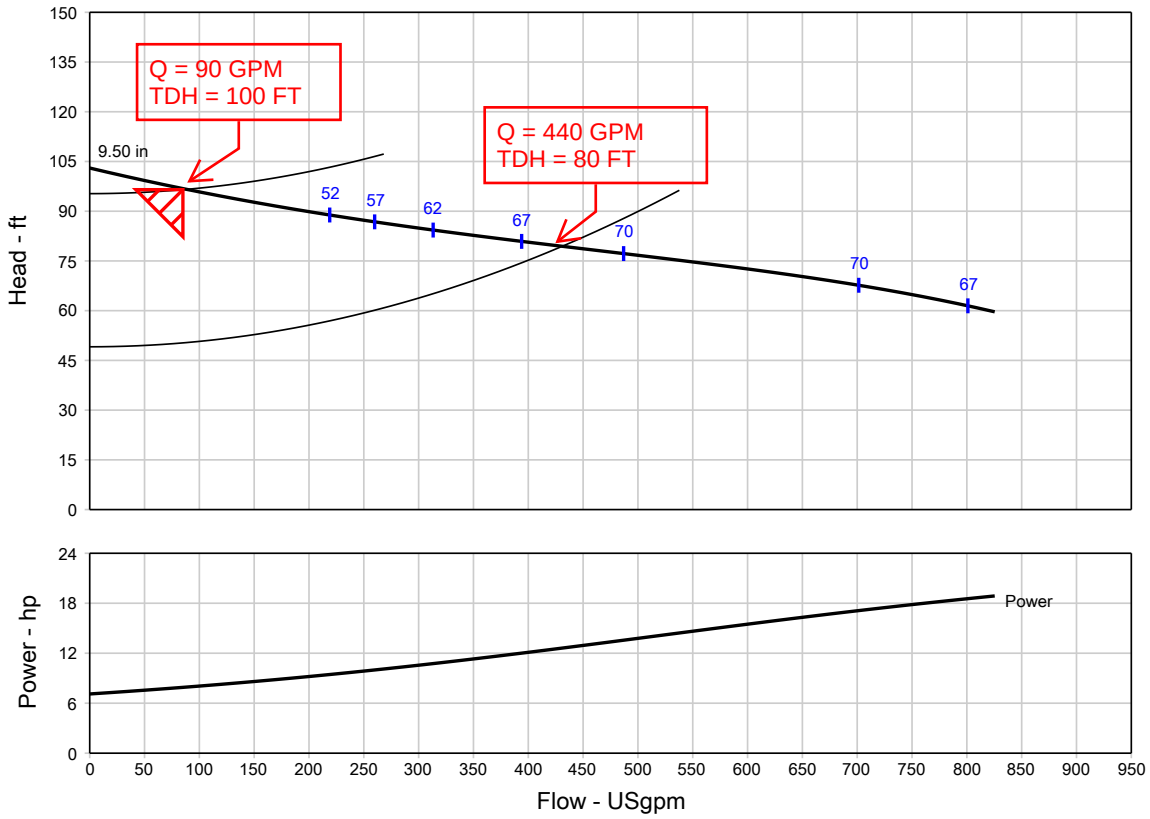
Material selected	: Standard

Pressure Data

Maximum working pressure	: 44.59 psi.g
Maximum allowable working pressure	: N/A
Maximum allowable suction pressure	: N/A
Hydrostatic test pressure	: N/A

Driver & Power Data (@Max density)

Driver sizing specification	: Maximum power
Margin over specification	: 0.00 %
Service factor	: 1.00
Power, hydraulic	: 2.08 hp
Power, rated	: 7.90 hp
Power, maximum, rated diameter	: 18.88 hp
Minimum recommended motor rating	: 20.00 hp / 14.91 kW



Tab 4: Lift Station 2-1 Design

Connelly & Wicker Inc.
Planning • Engineering • Landscape Architecture
1560 North Orange Ave.| Suite 210 |Winter Park, Florida 32789
P: 407.261.3100 www.cwieng.com

Project: Howey
Table: 1 - Summary of Wastewater Demands
Engineer(s): SC\RB
Date: 3/28/2022 Revised: 3/31/2022
Job No.: 21-004-0008

TABLE 1 - SUMMARY OF WASTEWATER DEMANDS - LS 3-1

PHASE	LAND USE	QUANTITY	UNITS	DEMAND	UNITS	ADF		PEAK	MDF	
						(gpd)	(gpm)	FACTOR	(gpd)	(gpm)
ER	SF Homes (actual)	80	UNITS	300	GPD/UNIT	24,000	16.7	2.5	60,000	41.7
ER	SF Homes (additional)		UNITS	300	GPD/UNIT	0	0.0	2.5	0	0.0
TOTAL		**80**				**24,000**	**16.7**		**60,000**	**41.7**

Project: Howey
Table: 2 - Lift Station Design
Engineer(s): SC/RB
Date: 3/28/2022 Revised: 3/31/2022
Job No.: 21-004-0008

TABLE 2 - LIFT STATION DESIGN - LS 2-1

PUMP DATA

MANUFACTURER	Pentair	MODEL	Hydromatic-S4K
PUMP CURVE	SUB_S_E_AH_00011_E_4 Rev 2012-03-23	IMPELLER SIZE	9.5 IN, rated
PUMP HORSEPOWER	7.9 HP, rated	DESIGN SPEED	1750 RPM, rated

DESIGN FLOWS

ADF QIN	16.7 GPM	PDF QIN	41.7 GPM

HYDRAULIC MODEL RESULTS

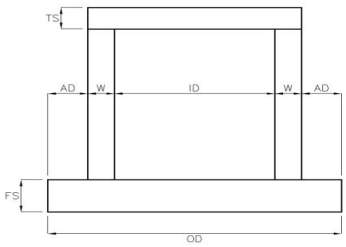
MAX PRESSURE	45.0 GPM OUTFLOW @	95.5	FT TDH
MIN PRESSURE	18 GPM OUTFLOW @	49.1	FT TDH

WET WELL STORAGE

Q	45	(GPM) FLOW OUT OF WET WELL PUMP DISCHARGE, ONE RUNNING
S	42	(GPM) WASTEWATER FLOW INTO WET WELL - PDF IN
T	20	(MIN) ASSUMED CYCLE TIME
V	61.7	(GAL) VOLUME REQUIRED BETWEEN LEAD PUMP ON AND BOTH PUMPS OFF
	8.3	(FT^3) VOLUME REQUIRED BETWEEN LEAD PUMP ON AND BOTH PUMPS OFF
STORAGE DEPTH	2.00	FT

WET WELL DESIGN

ELEVATION	63.00	SLAB TOP (WW INVERT)
ELEVATION	63.25	PUMP VOLUTE
ELEVATION	65.00	BOTH PUMPS OFF
ELEVATION	67.00	START LEAD
ELEVATION	68.00	START LAG
ELEVATION	69.00	HIGH LEVEL ALARM
ELEVATION	90.00	TOP OF WET WELL
ELEVATION	70	INFLUENT INVERT
TOTAL LIFT STATION DEPTH	27.00	FT



ID - INSIDE DIAMETER	8 FT	**FS** - FLOOR SLAB THICKNESS	12 IN
W - WALL THICKNESS	8 IN	**AD** - ADD SLAB DIAMETER	16 IN
TS - TOP SLAB THICKNESS	0 IN	**OD** - TOTAL SLAB DIAMETER	12.0 FT

CYCLE TIME EVALUATION

AVERAGE DAILY FLOW		PEAK DAILY FLOW	
TIME ON	2.18 MIN	TIME ON	18.52 MIN
TIME OFF	3.70 MIN	TIME OFF	1.48 MIN
TOTAL CYCLE TIME	5.88 MIN	TOTAL CYCLE TIME	20.00 MIN
STARTS PER HOUR	10	STARTS PER HOUR	3.0

DESIGN CHECKS

DEPTH FROM INFLUENT INVERT TO TOP OF SLAB (WET WELL INVERT)

REQUIRED	5 FT	PROVIDED	7.00 FT

TOTAL CYCLE TIME MINIMUM

REQUIRED	10 MIN	PROVIDED	5.88 MIN

DEPTH FROM HIGH LEVEL ALARM TO ALL PUMPS OFF

REQUIRED **3** FT PROVIDED 4.00 FT

WET WELL FLOATATION

ASSUMPTIONS

1) WEIGHT OF PUMPS, FITTINGS, ETC. NOT INCLUDED.

2) WET WELL IS EMPTY - FLUID WEIGHT WITHIN STRUCTURE IS NOT CONSIDERED

3) GROUNDWATER LEVEL IS AT TOP OF WET WELL

4) SOIL FRICTION FORCE IS EXCLUDED, ONLY THE WEIGHT OF SOIL ON TOP OF BOTTON OF SLAB IS CONSIDERED

DOWNWARD FORCES

CONCRETE WALLS

CONCRETE WALLS	18.2	FT^2
	27.00	FT (DEPTH OF WALLS)
	490.1	FT^3
SLAB	113.1	FT^2
	1.0	FT (THICKNESS)
	113.1	FT^3
CONCRETE WEIGHT	**0.0**	CY - ADDITIONAL BALLAST
	603.2	FT^3
	150	LB/FT^3 (UNIT WEIGHT OF REENFORCED CONCRETE)
	90,478	LBS
SOIL WEIGHT	44.7	FT^2
	27.00	FT (DEPTH OF WALLS)
	47.6	LB/FT^3 (110 LB/FT^3 - 62.4 LB/FT^3 = WEIGHT OF SOIL - WEIGHT OF WATER)
	57,423	LBS

UPWARD FORCES (HYDROSTATIC)

CONCRETE WALLS

	68.4	FT^2
	27.00	FT (DEPTH OF WALLS)
	1847.3	FT^3

SLAB

	113.1	FT^2
	1.0	FT (THICKNESS)
	113.10	FT^3

WEIGHT OF WATER

	1960.4	FT^3
	62.4	LB/FT^3
	122,326	LBS

TOTAL FORCES SUMMARY

DOWNWARD FORCE	**147,901**	LBS
UPWARD FORCE	**122,326**	LBS
SAFETY FACTOR	**1.21**	

Project: Howey
Table: 3 - Lift Station System Curve
Engineer(s): SC/RB
Date: 3/28/2022 Revised: 3/31/2022
Job No.: 21-004-0008

TABLE 3 - LIFT STATION SYSTEM CURVE - LS 2-1

STATIC/ELEVATION HEAD

BOTH PUMPS OFF	**65.00**	FT	
HIGHPOINT ALONG FM	**91.00**	FT	
CONNECTION ELEVATION	**84.00**	FT	**INVERT ELEVATION OF EXISTING FORCEMAIN**
TOTAL STATIC LOSS	**26.0**	**FT**	
TOTAL STATIC LOSS	**26.0**	**FT**	

FRICTION HEAD

	LIFT STATION RISER PIPES		LIFT STATION TO CONNECTION		CONNECTION TO TO EXISTING FM	
DESIGN FLOW (Q)	**45**	GPM	**45**	GPM	**45**	GPM
PIPE DIAMETER (D)	**4**	IN	**6**	IN	**10**	IN
PIPE LENGTH (L)	**20**	FT	**100**	FT	**1000**	FT
HAZEN WILLIAMS COEFF (C	**120**		**120**		**120**	
VELOCITY (V)	1.15	FT/S	0.51	FT/S	0.18	FT/S
FLOW AREA (A)	0.09	FT^2	0.20	FT^2	0.55	FT
FRICTION LOSS (HF)	0.04	FT	0.03	FT	0.02	FT
TOTAL FRICTION LOSS	**0.2**	**FT**				

CONNECTION/PRESSURE HEAD

CONNECTION PRESSURE (max)	**30**	PSI	CONNECTION PRESSURE (min)	**10**	PSI
TOTAL PRESSURE LOSS	**69.3**	**FT**	**TOTAL PRESSURE LOSS**	**23.1**	**FT**

MINOR HEAD LOSS 0

FITTING TYPE	K - VALUE	COUNT
DISCHARGE	0.6	1
90° BEND	0.3	2
VALVES	1.5	1
CHECK VALVES	2.0	2
TEE CONNECTION	0.4	1
OUTLET	1.0	1
USER DEFINED	0.0	0
TOTAL		**8.1**

TOTAL MINOR LOSS **0.2** **FT**

SYSTEM CURVE

Min Pressure

FLOW RATE GPM	TDH FT	INCREMENT 9.00
0	49.1	
9	49.1	
18	**49.1**	**←SYSTEM PT**
27	49.1	
36	49.2	
22	49.1	
31	49.1	
40	49.2	
49	49.2	
58	49.3	
67	49.3	
76	49.3	

Max Pressure

FLOW RATE GPM	TDH FT	INCREMENT 10.00
0	95.4	
10	95.4	
20	95.4	
30	95.4	
40	95.5	
45	**95.5**	**←SYSTEM PT**
55	95.5	
65	95.6	
75	95.6	
85	95.6	
95	95.7	
105	95.8	

Item number	: Default	Size	: Hydromatic - S4K
Service	:	Stages	: 1
Quantity	: 1	Based on curve number	: SUB_S_E_AH_00011_E_4 Rev 2012-03-23
Quote number	:	Date last saved	: 31 Mar 2022 8:30 AM

Operating Conditions

Flow, rated	: 85.00 USgpm
Differential head / pressure, rated (requested)	: 95.60 ft
Differential head / pressure, rated (actual)	: 96.82 ft
Suction pressure, rated / max	: 0.00 / 0.00 psi.g
NPSH available, rated	: Ample
Site Supply Frequency	: 60 Hz

Performance

Speed criteria	: Synchronous
Speed, rated	: 1750 rpm
Impeller diameter, rated	: 9.50 in
Impeller diameter, maximum	: 12.00 in
Impeller diameter, minimum	: 8.50 in
Efficiency	: 26.29 %
NPSH required / margin required	: - / 0.00 ft
nq (imp. eye flow) / S (imp. eye flow)	: 28 / - Metric units
Minimum Continuous Stable Flow	: 128.6 USgpm
Head, maximum, rated diameter	: 103.0 ft
Head rise to shutoff	: 6.41 %
Flow, best eff. point	: 592.4 USgpm
Flow ratio, rated / BEP	: 14.35 %
Diameter ratio (rated / max)	: 79.17 %
Head ratio (rated dia / max dia)	: 58.34 %
Cq/Ch/Ce/Cn [ANSI/HI 9.6.7-2010]	: 1.00 / 1.00 / 1.00 / 1.00

Liquid

Liquid type	: Water
Additional liquid description	:
Solids diameter, max	: 0.00 in
Solids diameter limit	: 3.00 in
Solids concentration, by volume	: 0.00 %
Temperature, max	: 68.00 deg F
Fluid density, rated / max	: 1.000 / 1.000 SG
Viscosity, rated	: 1.00 cP
Vapor pressure, rated	: 0.34 psi.a

Material

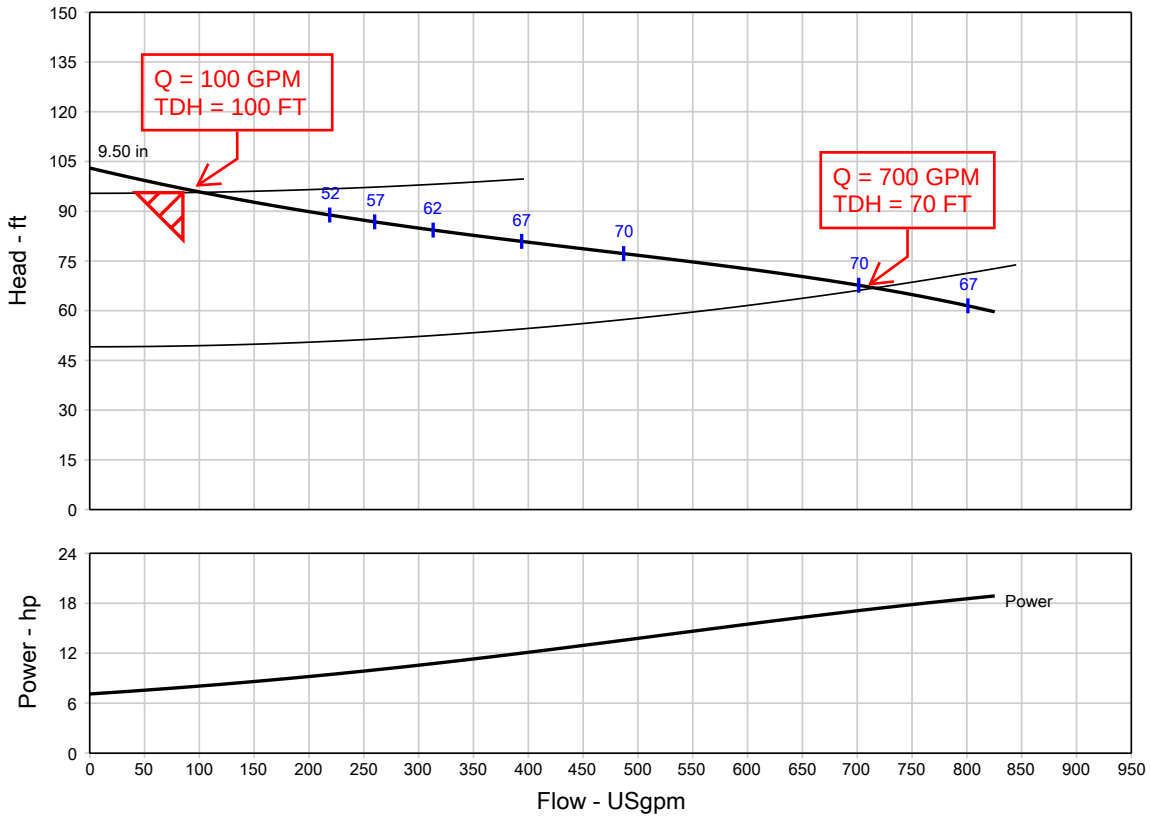
Material selected	: Standard

Pressure Data

Maximum working pressure	: 44.59 psi.g
Maximum allowable working pressure	: N/A
Maximum allowable suction pressure	: N/A
Hydrostatic test pressure	: N/A

Driver & Power Data (@Max density)

Driver sizing specification	: Maximum power
Margin over specification	: 0.00 %
Service factor	: 1.00
Power, hydraulic	: 2.08 hp
Power, rated	: 7.90 hp
Power, maximum, rated diameter	: 18.88 hp
Minimum recommended motor rating	: 20.00 hp / 14.91 kW



Tab 5: Lift Station 3-1 Design

Connelly & Wicker Inc.
Planning • Engineering • Landscape Architecture
1560 North Orange Ave.| Suite 210 |Winter Park, Florida 32789
P: 407.261.3100 www.cwieng.com

Project: Howey
Table: 1 - Summary of Wastewater Demands
Engineer(s): SC\RB
Date: 3/28/2022 Revised: 3/31/2022
Job No.: 21-004-0008

TABLE 1 - SUMMARY OF WASTEWATER DEMANDS - LS 3-1

PHASE	LAND USE	QUANTITY	UNITS	DEMAND	UNITS	ADF		PEAK	MDF	
						(gpd)	(gpm)	FACTOR	(gpd)	(gpm)
ER	SF Homes (actual)	73	UNITS	300	GPD/UNIT	21,900	15.2	2.5	54,750	38.0
ER	SF Homes (additional)		UNITS	300	GPD/UNIT	0	0.0	2.5	0	0.0
TOTAL		**73**				**21,900**	**15.2**		**54,750**	**38.0**

Project: Howey
Table: 2 - Lift Station Design
Engineer(s): SC/RB
Date: 3/28/2022 Revised: 3/31/2022
Job No.: 21-004-0008

TABLE 2 - LIFT STATION DESIGN - LS 3-1

PUMP DATA

MANUFACTURER	Pentair	MODEL	Hydromatic-S4K
PUMP CURVE	SUB_S_E_AH_00011_E_4 Rev 2012-03-23	IMPELLER SIZE	10.13 IN, rated
PUMP HORSEPOWER	10.19 HP, rated	DESIGN SPEED	1750 RPM, rated

DESIGN FLOWS

ADF QIN	15.2 GPM	PDF QIN	38.0 GPM

HYDRAULIC MODEL RESULTS

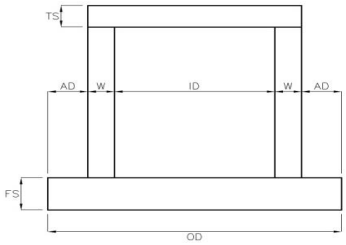
MAX PRESSURE	38.0	GPM OUTFLOW @	98.9	FT TDH
MIN PRESSURE	16	GPM OUTFLOW @	106.2	FT TDH

WET WELL STORAGE

Q	38	(GPM) FLOW OUT OF WET WELL PUMP DISCHARGE, ONE RUNNING
S	38	(GPM) WASTEWATER FLOW INTO WET WELL - PDF IN
T	20	(MIN) ASSUMED CYCLE TIME
V	-0.4	(GAL) VOLUME REQUIRED BETWEEN LEAD PUMP ON AND BOTH PUMPS OFF
	-0.1	(FT^3) VOLUME REQUIRED BETWEEN LEAD PUMP ON AND BOTH PUMPS OFF
STORAGE DEPTH	2.00	FT

WET WELL DESIGN

ELEVATION	58.00	SLAB TOP (WW INVERT)
ELEVATION	58.25	PUMP VOLUTE
ELEVATION	60.00	BOTH PUMPS OFF
ELEVATION	62.00	START LEAD
ELEVATION	63.00	START LAG
ELEVATION	64.00	HIGH LEVEL ALARM
ELEVATION	85.00	TOP OF WET WELL
ELEVATION	65	INFLUENT INVERT
TOTAL LIFT STATION DEPTH	27.00	FT



ID - INSIDE DIAMETER	8 FT	**FS** - FLOOR SLAB THICKNESS	12 IN
W - WALL THICKNESS	8 IN	**AD** - ADD SLAB DIAMETER	16 IN
TS - TOP SLAB THICKNESS	0 IN	**OD** - TOTAL SLAB DIAMETER	12.0 FT

CYCLE TIME EVALUATION

AVERAGE DAILY FLOW			PEAK DAILY FLOW		
TIME ON	-0.02	MIN	TIME ON	20.01	MIN
TIME OFF	-0.03	MIN	TIME OFF	-0.01	MIN
TOTAL CYCLE TIME	-0.05	MIN	TOTAL CYCLE TIME	20.00	MIN
STARTS PER HOUR	-1313		STARTS PER HOUR	3.0	

DESIGN CHECKS

DEPTH FROM INFLUENT INVERT TO TOP OF SLAB (WET WELL INVERT)

REQUIRED	5	FT	PROVIDED	7.00 FT

TOTAL CYCLE TIME MINIMUM

REQUIRED	10	MIN	PROVIDED	(0.05) MIN

DEPTH FROM HIGH LEVEL ALARM TO ALL PUMPS OFF

REQUIRED **3** FT PROVIDED 4.00 FT

WET WELL FLOATATION

ASSUMPTIONS

1) WEIGHT OF PUMPS, FITTINGS, ETC. NOT INCLUDED.

2) WET WELL IS EMPTY - FLUID WEIGHT WITHIN STRUCTURE IS NOT CONSIDERED

3) GROUNDWATER LEVEL IS AT TOP OF WET WELL

4) SOIL FRICTION FORCE IS EXCLUDED, ONLY THE WEIGHT OF SOIL ON TOP OF BOTTON OF SLAB IS CONSIDERED

DOWNWARD FORCES

CONCRETE WALLS

CONCRETE WALLS	18.2	FT^2
	27.00	FT (DEPTH OF WALLS)
	490.1	FT^3
SLAB	113.1	FT^2
	1.0	FT (THICKNESS)
	113.1	FT^3
CONCRETE WEIGHT	**0.0**	CY - ADDITIONAL BALLAST
	603.2	FT^3
	150	LB/FT^3 (UNIT WEIGHT OF REENFORCED CONCRETE)
	90,478	LBS
SOIL WEIGHT	44.7	FT^2
	27.00	FT (DEPTH OF WALLS)
	47.6	LB/FT^3 (110 LB/FT^3 - 62.4 LB/FT^3 = WEIGHT OF SOIL - WEIGHT OF WATER)
	57,423	LBS

UPWARD FORCES (HYDROSTATIC)

CONCRETE WALLS

	68.4	FT^2
	27.00	FT (DEPTH OF WALLS)
	1847.3	FT^3

SLAB

	113.1	FT^2
	1.0	FT (THICKNESS)
	113.10	FT^3

WEIGHT OF WATER

	1960.4	FT^3
	62.4	LB/FT^3
	122,326	LBS

TOTAL FORCES SUMMARY

DOWNWARD FORCE	**147,901**	LBS
UPWARD FORCE	**122,326**	LBS
SAFETY FACTOR	**1.21**	

Project: Howey
Table: 3 - Lift Station System Curve
Engineer(s): SC/RB
Date: 3/28/2022 Revised: 3/31/2022
Job No.: 21-004-0008

TABLE 3 - LIFT STATION SYSTEM CURVE - LS 3-1

STATIC/ELEVATION HEAD

BOTH PUMPS OFF	**60.00**	FT	
HIGHPOINT ALONG FM	**95.00**	FT	
CONNECTION ELEVATION	**95.00**	FT	**INVERT ELEVATION OF EXISTING FORCEMAIN**
TOTAL STATIC LOSS	**35.0**	**FT**	
TOTAL STATIC LOSS	**35.0**	**FT**	

FRICTION HEAD

	LIFT STATION RISER PIPES		LIFT STATION TO CONNECTION	
DESIGN FLOW (Q)	**38**	GPM	**38**	GPM
PIPE DIAMETER (D)	**4**	IN	**4**	IN
PIPE LENGTH (L)	**20**	FT	**1285**	FT
HAZEN WILLIAMS COEFF (C	**120**		**120**	
VELOCITY (V)	0.97	FT/S	0.97	FT/S
FLOW AREA (A)	0.09	FT^2	0.09	FT^2
FRICTION LOSS (HF)	0.03	FT	1.87	FT
TOTAL FRICTION LOSS	**2.2**	**FT**		

CONNECTION/PRESSURE HEAD

CONNECTION PRESSURE (max)	**30**	PSI	CONNECTION PRESSURE (min)	**10**	PSI
TOTAL PRESSURE LOSS	**69.3**	**FT**	**TOTAL PRESSURE LOSS**	**23.1**	**FT**

MINOR HEAD LOSS 0

FITTING TYPE	K - VALUE	COUNT
DISCHARGE	0.6	1
90° BEND	0.3	2
VALVES	1.5	1
CHECK VALVES	2.0	2
TEE CONNECTION	0.4	1
OUTLET	1.0	1
USER DEFINED	0.0	0
TOTAL		**8.1**
TOTAL MINOR LOSS	**0.1**	**FT**

SYSTEM CURVE

Min Pressure

FLOW RATE GPM	TDH FT	INCREMENT 8.00
0	58.1	
8	58.2	
16	**58.5**	**←SYSTEM PT**
24	58.9	
32	59.5	
85	66.5	
93	68.1	
101	69.7	
109	71.5	
117	73.3	
125	75.3	
133	77.4	

Max Pressure

FLOW RATE GPM	TDH FT	INCREMENT 8.00
0	104.3	
8	104.4	
16	104.7	
24	105.1	
32	105.7	
38	**106.2**	**←SYSTEM PT**
46	107.0	
54	107.9	
62	109.0	
70	110.2	
78	111.5	
86	112.9	

PENTAIR

Customer :
Project name : LS 3-1

Pump Performance Datasheet

Encompass 2.0 - 22.0.0

Item number	: Default	Size	: Hydromatic - S4K
Service	:	Stages	: 1
Quantity	: 1	Based on curve number	: SUB_S_E_AH_00011_E_4 Rev 2012-03-23
Quote number	:	Date last saved	: 31 Mar 2022 8:28 AM

Operating Conditions

Flow, rated	: 80.00 USgpm
Differential head / pressure, rated (requested)	: 112.0 ft
Differential head / pressure, rated (actual)	: 113.2 ft
Suction pressure, rated / max	: 0.00 / 0.00 psi.g
NPSH available, rated	: Ample
Site Supply Frequency	: 60 Hz

Performance

Speed criteria	: Synchronous
Speed, rated	: 1750 rpm
Impeller diameter, rated	: 10.13 in
Impeller diameter, maximum	: 12.00 in
Impeller diameter, minimum	: 8.50 in
Efficiency	: 22.20 %
NPSH required / margin required	: - / 0.00 ft
nq (imp. eye flow) / S (imp. eye flow)	: 28 / - Metric units
Minimum Continuous Stable Flow	: 145.2 USgpm
Head, maximum, rated diameter	: 118.8 ft
Head rise to shutoff	: 6.03 %
Flow, best eff. point	: 671.2 USgpm
Flow ratio, rated / BEP	: 11.92 %
Diameter ratio (rated / max)	: 84.38 %
Head ratio (rated dia / max dia)	: 67.34 %
Cq/Ch/Ce/Cn [ANSI/HI 9.6.7-2010]	: 1.00 / 1.00 / 1.00 / 1.00

Liquid

Liquid type	: Water
Additional liquid description	:
Solids diameter, max	: 0.00 in
Solids diameter limit	: 3.00 in
Solids concentration, by volume	: 0.00 %
Temperature, max	: 68.00 deg F
Fluid density, rated / max	: 1.000 / 1.000 SG
Viscosity, rated	: 1.00 cP
Vapor pressure, rated	: 0.34 psi.a

Material

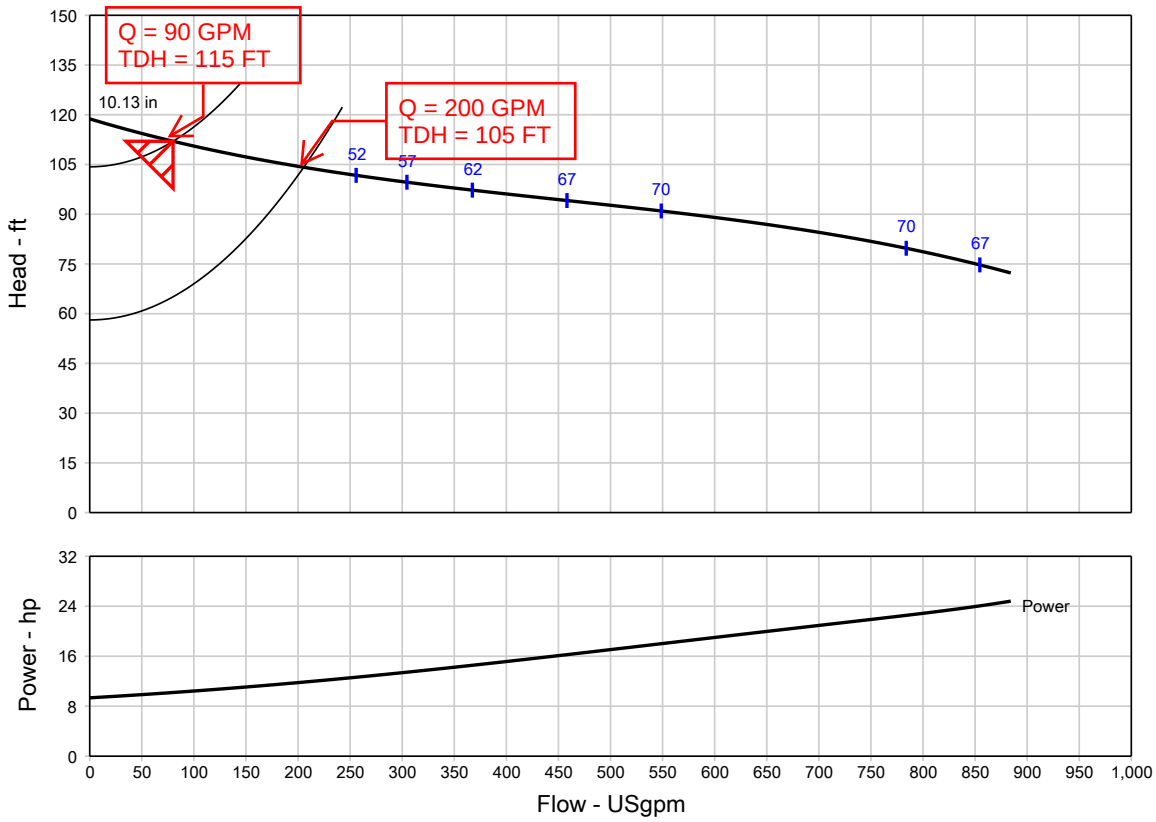
Material selected	: Standard

Pressure Data

Maximum working pressure	: 51.40 psi.g
Maximum allowable working pressure	: N/A
Maximum allowable suction pressure	: N/A
Hydrostatic test pressure	: N/A

Driver & Power Data (@Max density)

Driver sizing specification	: Maximum power
Margin over specification	: 0.00 %
Service factor	: 1.00
Power, hydraulic	: 2.26 hp
Power, rated	: 10.19 hp
Power, maximum, rated diameter	: 24.81 hp
Minimum recommended motor rating	: 25.00 hp / 18.64 kW



Tab 6: Lift Station 4-1 Design

Connelly & Wicker Inc.
Planning • Engineering • Landscape Architecture
1560 North Orange Ave.| Suite 210 |Winter Park, Florida 32789
P: 407.261.3100 www.cwieng.com

Project: Howey
Table: 1 - Summary of Wastewater Demands
Engineer(s): SC\RB
Date: 3/28/2022 Revised: 3/31/2022
Job No.: 21-004-0008

TABLE 1 - SUMMARY OF WASTEWATER DEMANDS - LS 4-1

PHASE	LAND USE	QUANTITY	UNITS	DEMAND	UNITS	ADF		PEAK	MDF	
						(gpd)	(gpm)	FACTOR	(gpd)	(gpm)
ER	SF Homes (actual)	177	UNITS	300	GPD/UNIT	53,100	36.9	2.5	132,750	92.2
ER	SF Homes (additional)		UNITS	300	GPD/UNIT	0	0.0	2.5	0	0.0
TOTAL		**177**				**53,100**	**36.9**		**132,750**	**92.2**

Project: Howey
Table: 2 - Lift Station Design
Engineer(s): SC/RB
Date: 3/28/2022 Revised: 3/31/2022
Job No.: 21-004-0008

TABLE 2 - LIFT STATION DESIGN - LS 4-1

PUMP DATA

MANUFACTURER	Pentair	MODEL	Hydromatic-S4NRC/S4NVX
PUMP CURVE	SUB_S_V_AH_00003_B_4 Rev 2012-03-23	IMPELLER SIZE	6.5 IN, rated
PUMP HORSEPOWER	2.77 HP, rated	DESIGN SPEED	1750 RPM, rated

DESIGN FLOWS

ADF QIN	36.9 GPM	PDF QIN	92.2 GPM

HYDRAULIC MODEL RESULTS

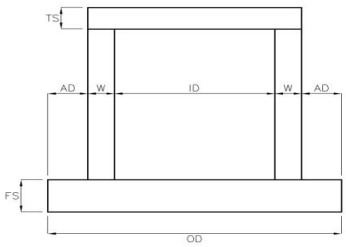
MAX PRESSURE	95.0 GPM OUTFLOW @	98.9	FT TDH

WET WELL STORAGE

Q	95	(GPM) FLOW OUT OF WET WELL PUMP DISCHARGE, ONE RUNNING
S	92	(GPM) WASTEWATER FLOW INTO WET WELL - PDF IN
T	20	(MIN) ASSUMED CYCLE TIME
V	54.6	(GAL) VOLUME REQUIRED BETWEEN LEAD PUMP ON AND BOTH PUMPS OFF
	7.3	(FT^3) VOLUME REQUIRED BETWEEN LEAD PUMP ON AND BOTH PUMPS OFF
STORAGE DEPTH	2.00	FT

WET WELL DESIGN

ELEVATION	63.00	SLAB TOP (WW INVERT)
ELEVATION	63.25	PUMP VOLUTE
ELEVATION	65.00	BOTH PUMPS OFF
ELEVATION	67.00	START LEAD
ELEVATION	68.00	START LAG
ELEVATION	69.00	HIGH LEVEL ALARM
ELEVATION	90.00	TOP OF WET WELL
ELEVATION	70	INFLUENT INVERT
TOTAL LIFT STATION DEPTH	27.00	FT



ID - INSIDE DIAMETER	8 FT	**FS** - FLOOR SLAB THICKNESS	12 IN
W - WALL THICKNESS	8 IN	**AD** - ADD SLAB DIAMETER	16 IN
TS - TOP SLAB THICKNESS	0 IN	**OD** - TOTAL SLAB DIAMETER	**12.0** FT

CYCLE TIME EVALUATION

AVERAGE DAILY FLOW		**PEAK DAILY FLOW**	
TIME ON	0.94 MIN	TIME ON	19.41 MIN
TIME OFF	1.48 MIN	TIME OFF	0.59 MIN
TOTAL CYCLE TIME	2.42 MIN	TOTAL CYCLE TIME	20.00 MIN
STARTS PER HOUR	25	STARTS PER HOUR	3.0

DESIGN CHECKS

DEPTH FROM INFLUENT INVERT TO TOP OF SLAB (WET WELL INVERT)

REQUIRED	5 FT	PROVIDED	7.00 FT

TOTAL CYCLE TIME MINIMUM

REQUIRED	10 MIN	PROVIDED	2.42 MIN

DEPTH FROM HIGH LEVEL ALARM TO ALL PUMPS OFF

REQUIRED **3** FT PROVIDED 4.00 FT

WET WELL FLOATATION

ASSUMPTIONS

1) WEIGHT OF PUMPS, FITTINGS, ETC. NOT INCLUDED.

2) WET WELL IS EMPTY - FLUID WEIGHT WITHIN STRUCTURE IS NOT CONSIDERED

3) GROUNDWATER LEVEL IS AT TOP OF WET WELL

4) SOIL FRICTION FORCE IS EXCLUDED, ONLY THE WEIGHT OF SOIL ON TOP OF BOTTON OF SLAB IS CONSIDERED

DOWNWARD FORCES

CONCRETE WALLS

CONCRETE WALLS	18.2	FT^2
	27.00	FT (DEPTH OF WALLS)
	490.1	FT^3
SLAB	113.1	FT^2
	1.0	FT (THICKNESS)
	113.1	FT^3
CONCRETE WEIGHT	**0.0**	CY - ADDITIONAL BALLAST
	603.2	FT^3
	150	LB/FT^3 (UNIT WEIGHT OF REENFORCED CONCRETE)
	90,478	LBS
SOIL WEIGHT	44.7	FT^2
	27.00	FT (DEPTH OF WALLS)
	47.6	LB/FT^3 (110 LB/FT^3 - 62.4 LB/FT^3 = WEIGHT OF SOIL - WEIGHT OF WATER)
	57,423	LBS

UPWARD FORCES (HYDROSTATIC)

CONCRETE WALLS

	68.4	FT^2
	27.00	FT (DEPTH OF WALLS)
	1847.3	FT^3

SLAB

	113.1	FT^2
	1.0	FT (THICKNESS)
	113.10	FT^3

WEIGHT OF WATER

	1960.4	FT^3
	62.4	LB/FT^3
	122,326	LBS

TOTAL FORCES SUMMARY

DOWNWARD FORCE	**147,901**	LBS
UPWARD FORCE	**122,326**	LBS
SAFETY FACTOR	**1.21**	

Project: Howey
Table: 3 - Lift Station System Curve (4-1)
Engineer(s): SC/RB
Date: 3/28/2022 Revised: 3/31/2022
Job No.: 21-004-0008

TABLE 3 - LIFT STATION SYSTEM CURVE - LS 4-1

STATIC/ELEVATION HEAD

BOTH PUMPS OFF	**65.00**	FT	
HIGHPOINT ALONG FM	**91.00**	FT	
CONNECTION ELEVATION	**90.00**	FT	**INVERT ELEVATION OF MANHOLE**
TOTAL STATIC LOSS	**26.0**	**FT**	
TOTAL STATIC LOSS	**26.0**	**FT**	

FRICTION HEAD

	LIFT STATION RISER PIPES		LIFT STATION TO CONNECTION	
DESIGN FLOW (Q)	**95**	GPM	**95**	GPM
PIPE DIAMETER (D)	**4**	IN	**4**	IN
PIPE LENGTH (L)	**20**	FT	**769**	FT
HAZEN WILLIAMS COEFF (C	**120**		**120**	
VELOCITY (V)	2.43	FT/S	2.43	FT/S
FLOW AREA (A)	0.09	FT^2	0.09	FT^2
FRICTION LOSS (HF)	0.16	FT	6.09	FT
TOTAL FRICTION LOSS	**7.9**	**FT**		

CONNECTION/PRESSURE HEAD

CONNECTION PRESSURE (max)	**0**	PSI	CONNECTION PRESSURE (min)	**0**	PSI
TOTAL PRESSURE LOSS	**0.0**	**FT**	**TOTAL PRESSURE LOSS**	**0.0**	**FT**

MINOR HEAD LOSS 0

FITTING TYPE	K - VALUE	COUNT
DISCHARGE	0.6	1
90° BEND	0.3	2
VALVES	1.5	1
CHECK VALVES	2.0	2
TEE CONNECTION	0.4	1
OUTLET	1.0	1
USER DEFINED	0.0	0
TOTAL		**8.1**

TOTAL MINOR LOSS **0.7** **FT**

SYSTEM CURVE

Min Pressure

FLOW RATE	TDH	INCREMENT
GPM	**FT**	20.00
0	26.0	
20	26.4	
40	27.3	
60	28.7	
80	30.6	
95	**32.3**	**←SYSTEM PT**
112	34.6	
129	37.1	
146	40.0	
163	43.2	
180	46.6	
197	50.4	

Item number	: Default	Size	: Hydromatic - S4NRC/S4NVX
Service	:	Stages	: 1
Quantity	: 1	Based on curve number	: SUB_S_V_AH_00003_B_4 Rev 2012-03-23
Quote number	:	Date last saved	: 31 Mar 2022 8:33 AM

Operating Conditions

Flow, rated	: 95.00 USgpm
Differential head / pressure, rated (requested)	: 32.30 ft
Differential head / pressure, rated (actual)	: 34.45 ft
Suction pressure, rated / max	: 0.00 / 0.00 psi.g
NPSH available, rated	: Ample
Site Supply Frequency	: 60 Hz

Performance

Speed criteria	: Synchronous
Speed, rated	: 1750 rpm
Impeller diameter, rated	: 6.50 in
Impeller diameter, maximum	: 8.00 in
Impeller diameter, minimum	: 5.50 in
Efficiency	: 29.88 %
NPSH required / margin required	: - / 0.00 ft
nq (imp. eye flow) / S (imp. eye flow)	: 30 / - Metric units
Minimum Continuous Stable Flow	: 52.80 USgpm
Head, maximum, rated diameter	: 39.60 ft
Head rise to shutoff	: 14.96 %
Flow, best eff. point	: 179.7 USgpm
Flow ratio, rated / BEP	: 52.86 %
Diameter ratio (rated / max)	: 81.25 %
Head ratio (rated dia / max dia)	: 66.24 %
Cq/Ch/Ce/Cn [ANSI/HI 9.6.7-2010]	: 1.00 / 1.00 / 1.00 / 1.00
Selection status	: Acceptable

Liquid

Liquid type	: Water
Additional liquid description	:
Solids diameter, max	: 0.00 in
Solids diameter limit	: 3.00 in
Solids concentration, by volume	: 0.00 %
Temperature, max	: 68.00 deg F
Fluid density, rated / max	: 1.000 / 1.000 SG
Viscosity, rated	: 1.00 cP
Vapor pressure, rated	: 0.34 psi.a

Material

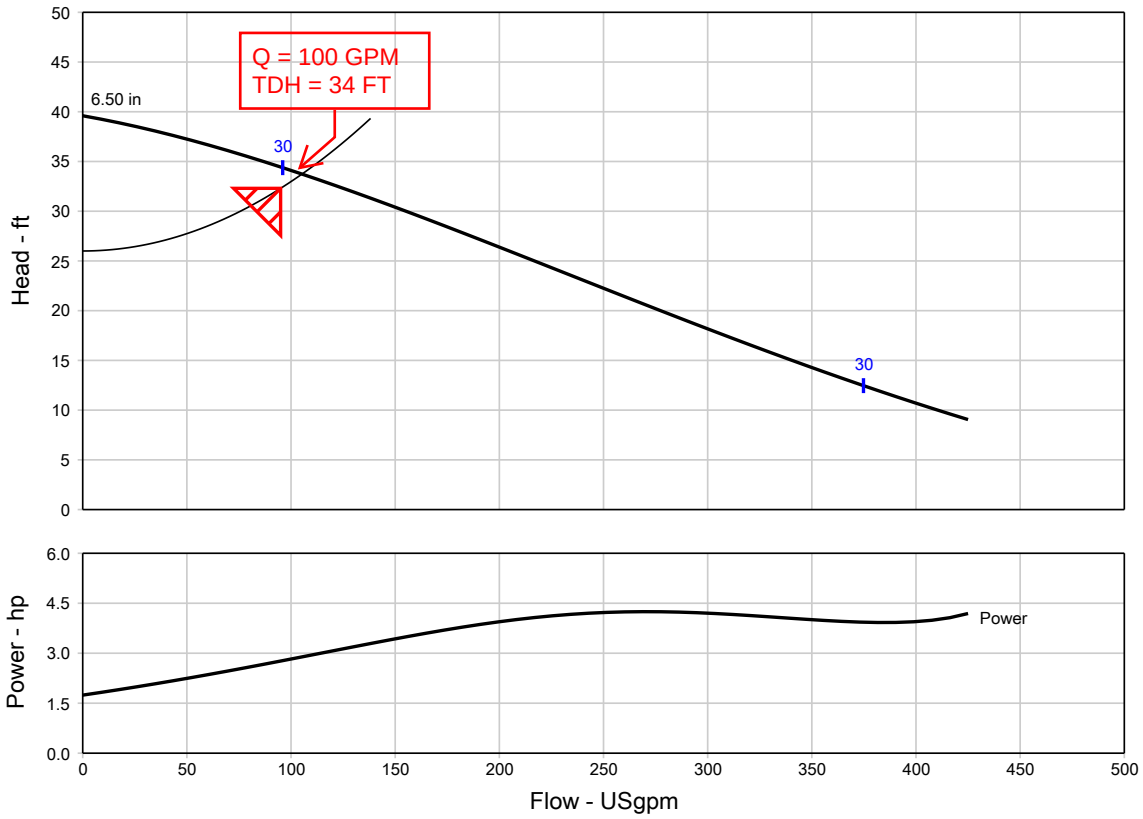
Material selected	: Standard

Pressure Data

Maximum working pressure	: 17.14 psi.g
Maximum allowable working pressure	: N/A
Maximum allowable suction pressure	: N/A
Hydrostatic test pressure	: N/A

Driver & Power Data (@Max density)

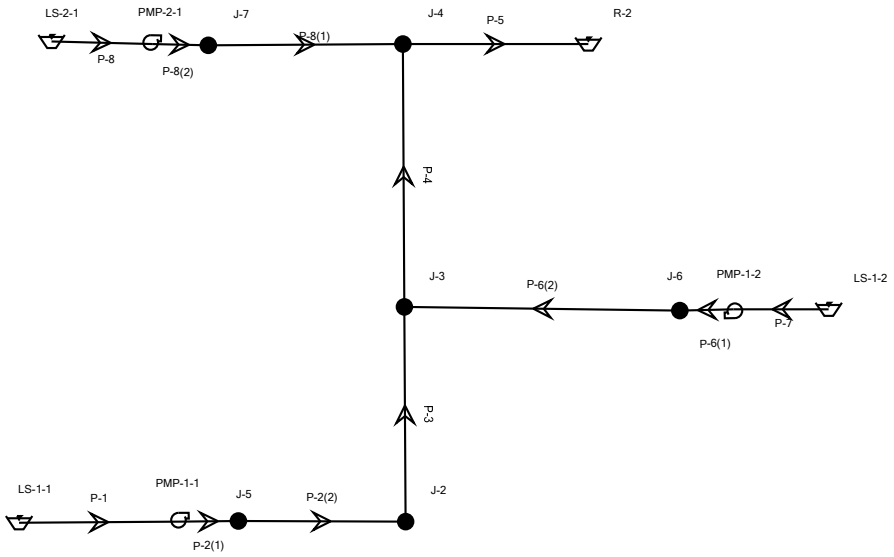
Driver sizing specification	: Maximum power
Margin over specification	: 0.00 %
Service factor	: 1.00
Power, hydraulic	: 0.83 hp
Power, rated	: 2.77 hp
Power, maximum, rated diameter	: 4.25 hp
Minimum recommended motor rating	: 5.00 hp / 3.73 kW



Tab 7: Hydraulic Model of Manifolded System

Connelly & Wicker Inc.
Planning • Engineering • Landscape Architecture
1560 North Orange Ave.| Suite 210 |Winter Park, Florida 32789
P: 407.261.3100 www.cwieng.com

Scenario: Base



FlexTable: Reservoir Table

ID	Label	Elevation (ft)	Zone	Flow (Out net) (gpm)	Hydraulic Grade (ft)
31	LS-1-1	70.00	<None>	180	70.00
40	R-2	120.00	<None>	-1,248	120.00
42	LS-1-2	70.00	<None>	391	70.00
47	LS-2-1	70.00	<None>	677	70.00

FlexTable: Pump Table

ID	Label	Elevation (ft)	Pump Definition	Status (Initial)	Hydraulic Grade (Suction) (ft)	Hydraulic Grade (Discharge) (ft)	Flow (Total) (gpm)	Pump Head (ft)
32	PMP-1-1	70.00	Pump Definition - 1-1	On	69.97	139.58	180	69.61
44	PMP-1-2	70.00	Pump Definition - 1-2	On	69.89	152.49	391	82.60
49	PMP-2-1	70.00	Pump Definition - 2-1	On	69.70	140.95	677	71.25

FlexTable: Pipe Table

FlexTable: Pipe Table

ID	Label	Length (Scaled) (ft)	Start Node	Stop Node	Diameter (in)	Material	Hazen-Williams C	Has Check Valve?	Minor Loss Coefficient (Local)	Flow (gpm)	Velocity (ft/s)	Headloss Gradient (ft/ft)	Has User Defined Length?	Length (User Defined) (ft)
33	P-1	55	LS-1-1	PMP-1-1	4.0	PVC	120.0	False	0.000	180	4.60	0.026	True	1
37	P-3	73	J-2	J-3	10.0	PVC	120.0	False	0.000	180	0.74	0.000	True	1,100
39	P-4	90	J-3	J-4	10.0	PVC	120.0	False	0.000	571	2.33	0.003	True	1,000
41	P-5	63	J-4	R-2	10.0	PVC	120.0	False	0.000	1,248	5.10	0.011	True	1,000
45	P-7	33	LS-1-2	PMP-1-2	4.0	PVC	120.0	False	0.000	391	9.98	0.109	True	1
51	P-8	34	PMP-2-1	LS-2-1	4.0	PVC	120.0	False	0.000	-677	17.27	0.301	True	1
55	P-2(1)	20	PMP-1-1	J-5	4.0	PVC	120.0	False	0.000	180	4.60	0.026	True	20
56	P-2(2)	57	J-5	J-2	6.0	PVC	120.0	False	0.000	180	2.05	0.004	True	1,510
58	P-6(1)	18	PMP-1-2	J-6	4.0	PVC	120.0	False	0.000	391	9.98	0.109	True	20
59	P-6(2)	94	J-6	J-3	6.0	PVC	120.0	False	0.000	391	4.43	0.015	True	1,128
61	P-8(1)	67	J-4	J-7	6.0	PVC	120.0	False	0.000	-677	7.68	0.042	True	100
62	P-8(2)	19	J-7	PMP-2-1	4.0	PVC	120.0	False	0.000	-677	17.27	0.301	True	20

FlexTable: Junction Table

ID	Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
34	J-2	90.00	0	133.62	19
36	J-3	90.00	0	133.29	19
38	J-4	88.00	0	130.76	19
54	J-5	90.00	0	139.06	21
57	J-6	90.00	0	150.31	26
60	J-7	90.00	0	134.93	19