

# PUMP SIZING AND SELECTION RECOMMENDATIONS

## SUCTION LIFT PUMP STATION

### I. GENERAL INFORMATION

**DATE PRINTED:** 5/9/2024

**PROJECT:** New Castle County  
Port Saint Georges South PS  
New Castle, DE

**DESIGN ENGINEER:** Verdantas  
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**EQUIPMENT:** Suction Lift Duplex Pump Station

**PIPING SIZES:** 7.98 inch Force Main Piping  
6 inch Header Piping  
6 inch Suction Piping

**MANUFACTURER:** The Gorman-Rupp Company

**MANUFACTURER'S REPRESENTATIVE:** Envirep, Inc.  
3705 Trindle Road  
Camp Hill, PA 17011  
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Calculations by: Will Hesse

**COMMENTS:** FM - 8" PVC DR18  
0

#### DISCLAIMERS:

Recommendations contained herein are based upon information provided by the Design Engineer. They are for review and evaluation by the Design Engineer and for incorporation into the project design consistent with his/her best professional judgement.

Gravity sewers, upstream of pumping stations, should be designed such that pump station failures will not cause backflow into residential homes or commercial establishments.

## II. DESIGN INFORMATION

### A. ELEVATIONS

|                                              |          |
|----------------------------------------------|----------|
| Force Main Discharge Invert (High Point)     | 22.04 FT |
| Pump Suction Centerline                      | 29.03 FT |
| Pump Slab Elevation (Ground Level)           | 26.67 FT |
| Wet Well Influent Invert                     | 13.90 FT |
| Wet Well Bottom (for existing wet well only) | 7.90 FT  |

### B. SUCTION PIPING

|                                                           |         |
|-----------------------------------------------------------|---------|
| Pipe Diameter                                             | 6 IN    |
| Pipe Length                                               | 20 FT   |
| Inlet Opening Diameter                                    | 10 IN   |
| Distance between Wet Well Bottom and Inlet High Point     | 0.83 FT |
| Hazen & Williams C-Factors for Friction Loss Calculation: |         |
| High Roughness                                            | C= 100  |
| Design Roughness                                          | C= 120  |
| Low Roughness                                             | C= 140  |

| Standard Fittings      |          |
|------------------------|----------|
| Description            | Quantity |
| 90° Standard Bend      | 1        |
| 90° Long Radius Bend   | 0        |
| 45° Bend               | 0        |
| 22.5° Bend             | 0        |
| Plug Valve             | 0        |
| Swing Check valve      | 0        |
| Std Tee, Thru Flow     | 0        |
| Std Tee, Side Flow     | 0        |
| Gate Valve, Fully Open | 0        |
| Increaser 6 x 8        | 1        |
| Increaser 8 x 10       | 1        |
| Decreaser 6 x 4        | 0        |
| Decreaser 4 x 3        | 0        |

| Nonstandard Fittings |          |                   |
|----------------------|----------|-------------------|
| Description          | Quantity | Equivalent Length |
| Fitting #1           | 0        | 0 FT              |
| Fitting #2           | 0        | 0 FT              |
| Total Length         |          | 0 FT              |

### C. HEADER PIPING

|                                                            |        |
|------------------------------------------------------------|--------|
| Pipe Diameter                                              | 6 IN   |
| Pipe Length                                                | 10 FT  |
| Hazen & Williams C-Factors for Friction Loss Calculations: |        |
| High Roughness                                             | C= 100 |
| Design Roughness                                           | C= 120 |
| Low Roughness                                              | C= 140 |

| Standard Fittings |
|-------------------|
|-------------------|

| <i>Description</i>     | <i>Quantity</i> |
|------------------------|-----------------|
| 90° Standard Bend      | 2               |
| 90° Long Radius Bend   | 0               |
| 45° Bend               | 0               |
| 22.5° Bend             | 0               |
| Plug Valve             | 1               |
| Swing Check valve      | 0               |
| Std Tee, Thru Flow     | 1               |
| Std Tee, Side Flow     | 1               |
| Gate Valve, Fully Open | 2               |
| Increaser 6 x 8        | 1               |
| Increaser 8 x 10       | 0               |
| Decreaser 6 x 4        | 0               |
| Decreaser 4 x 3        | 0               |

**Nonstandard Fittings**

| <i>Description</i>                      | <i>Quantity</i> | <i>Equivalent Length</i> |
|-----------------------------------------|-----------------|--------------------------|
| 8" Piping between FM Iso Valve & PVC FM | 1               | 40 FT                    |
| Fitting #2                              | 0               | 0 FT                     |
| Total Length                            |                 | 40 FT                    |

**D. FORCE MAIN #1**

Pipe Diameter 7.98 IN

Pipe Length 2111 FT

Hazen & Williams C-Factors for Friction Loss Calculations:

High Roughness C= 100

Design Roughness C= 120

Low Roughness C= 140

**Standard Fittings**

| <i>Description</i>     | <i>Quantity</i> |
|------------------------|-----------------|
| 90° Standard Bend      | 0               |
| 90° Long Radius Bend   | 0               |
| 45° Bend               | 5               |
| 22.5° Bend             | 1               |
| Plug Valve             | 0               |
| Swing Check valve      | 0               |
| Std Tee, Thru Flow     | 0               |
| Std Tee, Side Flow     | 7               |
| Gate Valve, Fully Open | 0               |
| Increaser 7.98 x 10    | 0               |
| Increaser 10 x 12      | 0               |
| Decreaser 7.98 x 6     | 0               |
| Decreaser 6 x 4        | 0               |

**Nonstandard Fittings**

| <i>Description</i> | <i>Quantity</i> | <i>Equivalent Length</i> |
|--------------------|-----------------|--------------------------|
| Fitting #1         | 0               | 0 FT                     |
| Fitting #2         | 0               | 0 FT                     |
| Total Length       |                 | 0 FT                     |

## E. PUMPING RATE

Initial Design

600 GPM

Future Design

600 GPM

## F. SUCTION INLET OPENING CONFIGURATION

Inlet Opening Inside Diameter

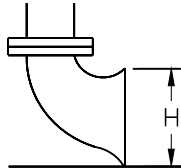
10 IN

Distance from Wet Well Bottom to Inlet Elevation (H)

0.83 FT

Configuration:

Vertical



## G. WET WELL SIZING

Circular

Diameter 10.00 FT

Distance Between Influent Sewer Invert and Alarm On  
(Recommend 0.0 FT Without Basket Strainer)  
(Recommend 1.0 FT With Basket Strainer)

0.00 FT

## H. PUMP CYCLE TIME

Cycle Time - Minimum Allowable Cycle Time

(Use 10 Minutes for 15 HP Motors and Less)

(Use 15 Minutes for 20 HP to 100 HP)

15 MINUTES

## I. NET POSITIVE SUCTION HEAD

Correction for Elevation Above Sea Level

(Use -1.0 FT For 0 FT To 800 FT Above Sea Level)

(Use -2.0 FT For 800 FT To 1500 FT Above Sea Level)

-1 FT

Vapor Pressure

(Use -1.0 FT For Municipal Wastewater)

-1 FT

Safety Factor

(Recommended -5.0 FT Minimum)

-5 FT

NPSH Req, Initial Pumping Rate (From Pump Curve)

6 FT

NPSH Req, Future Design Pumping Rate (From Pump Curve)

6 FT

## J. PUMP INFORMATION

Pump Model No.

T6A3S-B

Pump Size

6 IN

Number of Pumps:

2

Flow Rates for System Head Curves:

Minimum 0 GPM

Maximum 1400 GPM

### III. WET WELL SIZING

#### A. MINIMUM DEPTH

Determines the minimum distance between the wet well bottom and the pump off elevation to prevent vortexing. Design calculations are based on the future design pumping rate.

Determine velocity at inlet opening using  $V=Q/A$

Q = **Future** Design Pumping Rate

600.00 GPM

A = Area At Inlet Opening

Inlet Opening Diameter (D)

0.83 FT

Inlet Opening Area

0.545 SQ FT

V = Inlet Velocity at Diameter D

2.45 FPS

(Refer to Metcalf & Eddy, Wastewater Engineering, Table 9-3, page 360)

Minimum submergence (S)

2 FT

Bottom of wet well to inlet high point distance

0.83 FT

Minimum Depth (MD)

2.83 FT

|                                |         |
|--------------------------------|---------|
| RECOMMENDED MINIMUM DEPTH (MD) | 3.00 FT |
|--------------------------------|---------|

#### B. DRAWDOWN DEPTH

Determine minimum drawdown depth from the operating volume required to prevent short cycling of pumps

(Refer to Metcalf & Eddy, Wastewater Engineering, Equation 9-1, page 354)

$$V = (T * Q_d / 4) * f = (15 * 600 / 4) * 0.5$$

T = Minimum Allowable Time for One Pump Cycle

15.00 MIN

Q<sub>d</sub> = Future Design Pumping Rate, GAL/MIN

600.00 GPM

f = Factor for Identical Pumps with Alternation

0.50

V = Minimum Drawdown Volume = 1125.00 GAL / 7.481 =>

150.38 CU FT

Circular Diameter

10.00 FT

Vol/FT. of Elev.

78.54 CU FT/FT

Calculated Drawdown Depth

1.91 FT

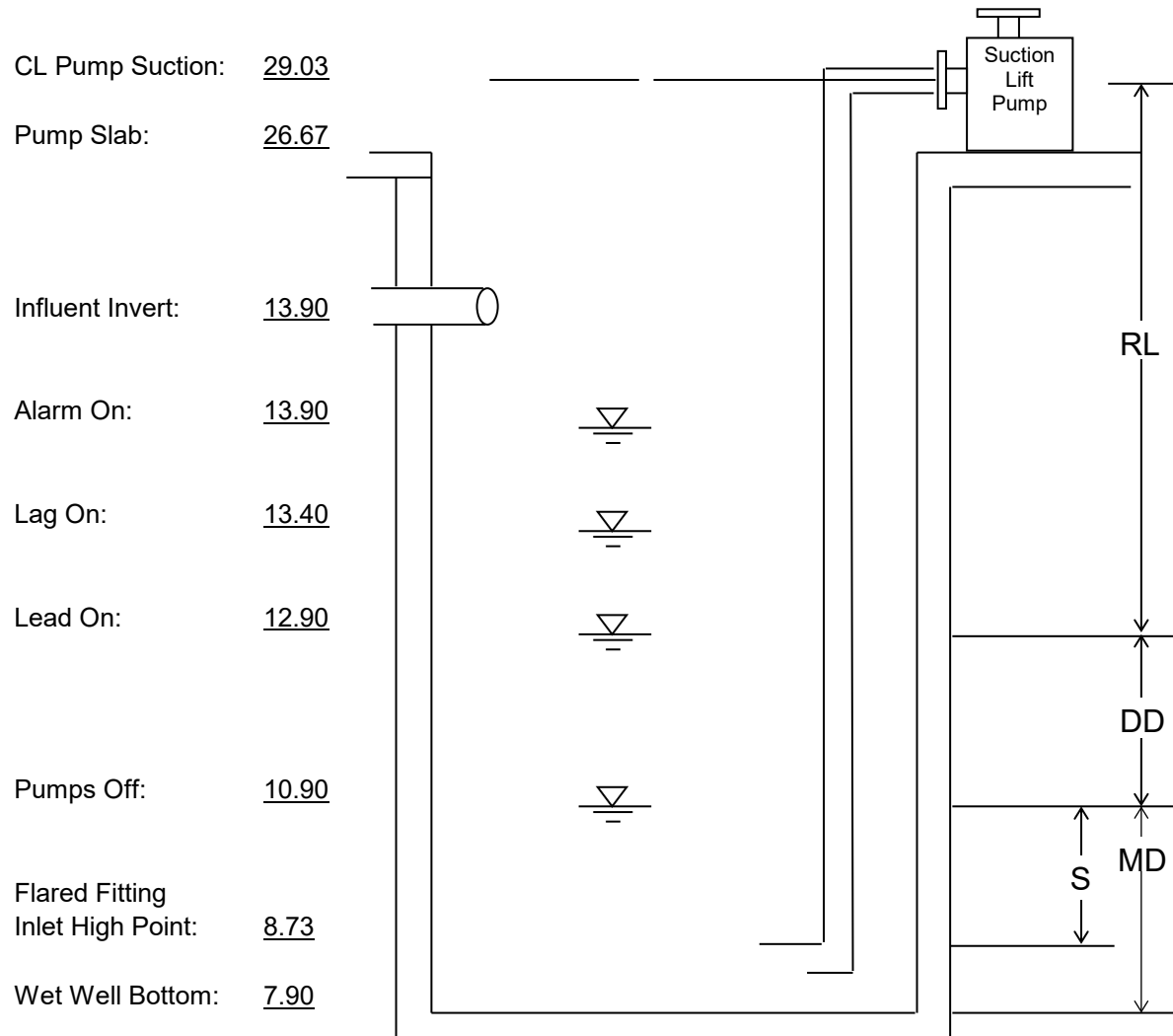
|                                 |         |
|---------------------------------|---------|
| RECOMMENDED DRAWDOWN DEPTH (DD) | 2.00 FT |
|---------------------------------|---------|

Effective Drawdown Volume

157.08 CU FT

1175.11 GAL

## C. WET WELL ELEVATION DIAGRAM



### Legend:

|                                         |          |
|-----------------------------------------|----------|
| Minimum depth based on submergence (MD) | 3.00 FT  |
| Submergence (S)                         | 2.17 FT  |
| Drawdown depth (DD)                     | 2.00 FT  |
| Reprime lift (RL)                       | 16.13 FT |

## IV. PIPING SYSTEM

### A. SYSTEM HEAD CURVE

#### 1. STATIC SUCTION LIFT:

|                                    |                  |
|------------------------------------|------------------|
| Pump Off Elevation                 | 10.90 FT         |
| Pump Suction Center Line Elevation | <u>-29.03 FT</u> |
| Static Suction Lift                | -18.13 FT        |

#### 2. SUCTION PIPING, EQUIVALENT LENGTH OF PIPE:

Pipe Diameter 6 IN

|                                | Number<br>Needed | Eq Len/<br>Fitting<br>FT | Safety<br>Factor<br>1.25 | Total<br>Eq Len<br>FT |
|--------------------------------|------------------|--------------------------|--------------------------|-----------------------|
| Length of Pipe                 |                  |                          |                          | 20.00                 |
| <b>Standard</b>                |                  |                          |                          |                       |
| 90° Standard Bend              | 1                | 16                       | x 1.25                   | 20.00                 |
| 90° Long Radius Bend           | 0                | 10                       | x 1.25                   | 0.00                  |
| 45° Bend                       | 0                | 7                        | x 1.25                   | 0.00                  |
| 22.5° Bend                     | 0                | 4                        | x 1.25                   | 0.00                  |
| Plug Valve                     | 0                | 50                       | x 1.25                   | 0.00                  |
| Swing Check valve              | 0                | 40                       | x 1.25                   | 0.00                  |
| Std Tee, Thru Flow             | 0                | 11                       | x 1.25                   | 0.00                  |
| Std Tee, Side Flow             | 0                | 33                       | x 1.25                   | 0.00                  |
| Gate Valve, Fully Open         | 0                | 4                        | x 1.25                   | 0.00                  |
| Increaser 6 x 8                | 1                | 4                        | x 1.25                   | 5.00                  |
| Increaser 8 x 10               | 1                | 4                        | x 1.25                   | 5.00                  |
| Reducer 6 x 4                  | 0                | 4                        | x 1.25                   | 0.00                  |
| Reducer 4 x 3                  | 0                | 4                        | x 1.25                   | 0.00                  |
| <b>Non-standard</b>            |                  |                          |                          |                       |
| Fitting #1                     | 0                | 0 FT                     | x 1.25                   | 0.00                  |
| Fitting #2                     | 0                | 0 FT                     | x 1.25                   | 0.00                  |
| <b>TOTAL EQUIVALENT LENGTH</b> |                  |                          |                          | <b>50</b>             |

#### 3. STATIC DISCHARGE HEAD:

|                                               |                  |
|-----------------------------------------------|------------------|
| Force Main Discharge Invert. Elev. (High Pt.) | 22.04 FT         |
| Pump Suction Centerline Elevation             | <u>-29.03 FT</u> |
| Static Discharge Head                         | -6.99 FT         |

#### 4. DISCHARGE HEADER PIPING, EQUIVALENT LENGTH OF PIPE:

Pipe Diameter 6 IN

|                      | Number<br>Needed | Eq Len/<br>Fitting<br>FT | Safety<br>Factor<br>1.25 | Total<br>Eq Len<br>FT |
|----------------------|------------------|--------------------------|--------------------------|-----------------------|
| Length of Pipe       |                  |                          |                          | 10.00                 |
| <b>Standard</b>      |                  |                          |                          |                       |
| 90° Standard Bend    | 2                | 16                       | x 1.25                   | 40.00                 |
| 90° Long Radius Bend | 0                | 10                       | x 1.25                   | 0.00                  |

|                                |   |       |        |            |
|--------------------------------|---|-------|--------|------------|
| 45° Bend                       | 0 | 7     | x 1.25 | 0.00       |
| 22.5° Bend                     | 0 | 4     | x 1.25 | 0.00       |
| Plug Valve                     | 1 | 50    | x 1.25 | 62.50      |
| Swing Check valve              | 0 | 40    | x 1.25 | 0.00       |
| Std Tee, Thru Flow             | 1 | 11    | x 1.25 | 13.75      |
| Std Tee, Side Flow             | 1 | 33    | x 1.25 | 41.25      |
| Gate Valve, Fully Open         | 2 | 4     | x 1.25 | 10.00      |
| Increaser 6 x 8                | 1 | 4     | x 1.25 | 5.00       |
| Increaser 8 x 10               | 0 | 4     | x 1.25 | 0.00       |
| Reducer 6 x 4                  | 0 | 4     | x 1.25 | 0.00       |
| Reducer 4 x 3                  | 0 | 4     | x 1.25 | 0.00       |
| <b>Non-standard</b>            |   |       |        |            |
| 8" Piping between FM Is        | 1 | 40 FT | x 1.25 | 50.00      |
| Fitting #2                     | 0 | 0 FT  | x 1.25 | 0.00       |
| <b>TOTAL EQUIVALENT LENGTH</b> |   |       |        | <b>233</b> |

**5. FORCE MAIN PIPING, EQUIVALENT LENGTH OF PIPE:**Pipe Diameter 8 IN

|                                | Number<br>Needed | Eq Len/<br>Fitting<br>FT | Safety<br>Factor<br>1.25 | Total<br>Eq Len<br>FT |
|--------------------------------|------------------|--------------------------|--------------------------|-----------------------|
| Length of Pipe                 |                  |                          |                          | 2111.00               |
| <b>Standard</b>                |                  |                          |                          |                       |
| 90° Standard Bend              | 0                | 20                       | x 1.25                   | 0.00                  |
| 90° Long Radius Bend           | 0                | 15                       | x 1.25                   | 0.00                  |
| 45° Bend                       | 5                | 10                       | x 1.25                   | 62.50                 |
| 22.5° Bend                     | 1                | 5                        | x 1.25                   | 6.25                  |
| Plug Valve                     | 0                | 60                       | x 1.25                   | 0.00                  |
| Swing Check valve              | 0                | 55                       | x 1.25                   | 0.00                  |
| Std Tee, Thru Flow             | 0                | 14                       | x 1.25                   | 0.00                  |
| Std Tee, Side Flow             | 7                | 42                       | x 1.25                   | 367.50                |
| Gate Valve, Fully Open         | 0                | 5                        | x 1.25                   | 0.00                  |
| Increaser 7.98 x 10            | 0                | 5                        | x 1.25                   | 0.00                  |
| Increaser 10 x 12              | 0                | 5                        | x 1.25                   | 0.00                  |
| Reducer 7.98 x 6               | 0                | 5                        | x 1.25                   | 0.00                  |
| Reducer 6 x 4                  | 0                | 5                        | x 1.25                   | 0.00                  |
| <b>Non-standard</b>            |                  |                          |                          |                       |
| Fitting #1                     | 0                | 0 FT                     | x 1.25                   | 0.00                  |
| Fitting #2                     | 0                | 0 FT                     | x 1.25                   | 0.00                  |
| <b>TOTAL EQUIVALENT LENGTH</b> |                  |                          |                          | <b>2547</b>           |

**B. PIPE VELOCITIES**

|                        | Initial | Design   |
|------------------------|---------|----------|
| Suction Piping         | 6.81    | 6.81 FPS |
| Header Piping          | 6.81    | 6.81 FPS |
| Force Main Piping      | 3.85    | 3.85 FPS |
| Interconnection Piping | N/A     | N/A FPS  |

## V. SYSTEM HEAD CALCULATION TABLE

Note: Uses Cameron Hydraulic Data Hazen and Williams Equation (page 27) to calculate friction losses in pipes carrying water

$$f = .2083 \left( \frac{100}{C} \right)^{1.85} \left( \frac{q^{1.85}}{d^{4.8655}} \right) \left( \frac{L}{100} \right)$$

$f$  = Friction head in feet of water  
 $C$  = Constant accounting for surface roughness  
 $d$  = Inside diameter of pipe in inches  
 $q$  = Flow in gallons per minute  
 $L$  = Equivalent length of pipe in feet

|                     |                           | d = 6 INCH<br>SUCTION PIPING<br>L = 50 FT |                                     |                             |                                        | d = 6 INCH<br>HEADER PIPING<br>L = 233 FT     | d = 7.98 INCH<br>FORCE MAIN PIPING<br>L = 2547 FT |                          |       |
|---------------------|---------------------------|-------------------------------------------|-------------------------------------|-----------------------------|----------------------------------------|-----------------------------------------------|---------------------------------------------------|--------------------------|-------|
| FLOW<br>RATE        | STATIC<br>SUCTION<br>LIFT | SUCTION<br>PIPING<br>FRICTION<br>LOSSES   | TOTAL<br>DYNAMIC<br>SUCTION<br>LIFT | STATIC<br>DISCHARGE<br>HEAD | HEADER<br>PIPING<br>FRICTION<br>LOSSES | FORCE<br>MAIN<br>PIPING<br>FRICTION<br>LOSSES | TOTAL<br>DYNAMIC<br>DISCHARGE<br>HEAD             | TOTAL<br>DYNAMIC<br>HEAD |       |
| q = GPM             | FT                        | f = FT                                    | FT                                  | FT                          | f = FT                                 | f = FT                                        | FT                                                | FT                       |       |
|                     |                           | C= 100                                    |                                     |                             | C= 100                                 | C= 100                                        |                                                   |                          |       |
| High<br>Roughness   | 0                         | -18.13                                    | 0.00                                | -18.13                      | -6.99                                  | 0.00                                          | 0.00                                              | -6.99                    | 11.1  |
|                     | 100                       | -18.13                                    | -0.09                               | -18.22                      | -6.99                                  | 0.40                                          | 1.09                                              | -5.51                    | 12.7  |
|                     | 300                       | -18.13                                    | -0.65                               | -18.78                      | -6.99                                  | 3.04                                          | 8.29                                              | 4.34                     | 23.1  |
|                     | 400                       | -18.13                                    | -1.11                               | -19.24                      | -6.99                                  | 5.17                                          | 14.12                                             | 12.30                    | 31.5  |
|                     | 500                       | -18.13                                    | -1.68                               | -19.81                      | -6.99                                  | 7.82                                          | 21.34                                             | 22.16                    | 42.0  |
|                     | 600                       | -18.13                                    | -2.35                               | -20.48                      | -6.99                                  | 10.95                                         | 29.90                                             | 33.86                    | 54.3  |
|                     | 800                       | -18.13                                    | -4.00                               | -22.13                      | -6.99                                  | 18.65                                         | 50.90                                             | 62.56                    | 84.7  |
|                     | 900                       | -18.13                                    | -4.98                               | -23.11                      | -6.99                                  | 23.19                                         | 63.30                                             | 79.50                    | 102.6 |
|                     | 1000                      | -18.13                                    | -6.05                               | -24.18                      | -6.99                                  | 28.18                                         | 76.92                                             | 98.11                    | 122.3 |
|                     | 1100                      | -18.13                                    | -7.21                               | -25.34                      | -6.99                                  | 33.61                                         | 91.75                                             | 118.37                   | 143.7 |
|                     | 1300                      | -18.13                                    | -9.83                               | -27.96                      | -6.99                                  | 45.79                                         | 124.97                                            | 163.77                   | 191.7 |
|                     | 1400                      | -18.13                                    | -11.27                              | -29.40                      | -6.99                                  | 52.52                                         | 143.34                                            | 188.86                   | 218.3 |
|                     |                           | C= 120                                    |                                     |                             | C= 120                                 | C= 120                                        |                                                   |                          |       |
| Design<br>Roughness | 0                         | -18.13                                    | 0.00                                | -18.13                      | -6.99                                  | 0.00                                          | 0.00                                              | -6.99                    | 11.1  |
|                     | 100                       | -18.13                                    | -0.06                               | -18.19                      | -6.99                                  | 0.28                                          | 0.78                                              | -5.93                    | 12.3  |
|                     | 300                       | -18.13                                    | -0.47                               | -18.60                      | -6.99                                  | 2.17                                          | 5.92                                              | 1.10                     | 19.7  |
|                     | 400                       | -18.13                                    | -0.79                               | -18.92                      | -6.99                                  | 3.69                                          | 10.08                                             | 6.78                     | 25.7  |
|                     | 500                       | -18.13                                    | -1.20                               | -19.33                      | -6.99                                  | 5.58                                          | 15.23                                             | 13.82                    | 33.1  |
|                     | 600                       | -18.13                                    | -1.68                               | -19.81                      | -6.99                                  | 7.82                                          | 21.34                                             | 22.16                    | 42.0  |
|                     | 800                       | -18.13                                    | -2.86                               | -20.99                      | -6.99                                  | 13.31                                         | 36.33                                             | 42.65                    | 63.6  |
|                     | 900                       | -18.13                                    | -3.55                               | -21.68                      | -6.99                                  | 16.55                                         | 45.17                                             | 54.73                    | 76.4  |
|                     | 1000                      | -18.13                                    | -4.32                               | -22.45                      | -6.99                                  | 20.11                                         | 54.90                                             | 68.02                    | 90.5  |
|                     | 1100                      | -18.13                                    | -5.15                               | -23.28                      | -6.99                                  | 23.99                                         | 65.48                                             | 82.48                    | 105.8 |
|                     | 1300                      | -18.13                                    | -7.01                               | -25.14                      | -6.99                                  | 32.68                                         | 89.19                                             | 114.88                   | 140.0 |
|                     | 1400                      | -18.13                                    | -8.04                               | -26.17                      | -6.99                                  | 37.48                                         | 102.30                                            | 132.79                   | 159.0 |
|                     |                           | C= 140                                    |                                     |                             | C= 140                                 | C= 140                                        |                                                   |                          |       |
| Low<br>Roughness    | 0                         | -18.13                                    | 0.00                                | -18.13                      | -6.99                                  | 0.00                                          | 0.00                                              | -6.99                    | 11.1  |
|                     | 100                       | -18.13                                    | -0.05                               | -18.18                      | -6.99                                  | 0.21                                          | 0.58                                              | -6.19                    | 12.0  |
|                     | 300                       | -18.13                                    | -0.35                               | -18.48                      | -6.99                                  | 1.63                                          | 4.45                                              | -0.91                    | 17.6  |
|                     | 400                       | -18.13                                    | -0.60                               | -18.73                      | -6.99                                  | 2.78                                          | 7.58                                              | 3.36                     | 22.1  |
|                     | 500                       | -18.13                                    | -0.90                               | -19.03                      | -6.99                                  | 4.19                                          | 11.45                                             | 8.65                     | 27.7  |
|                     | 600                       | -18.13                                    | -1.26                               | -19.39                      | -6.99                                  | 5.88                                          | 16.04                                             | 14.93                    | 34.3  |
|                     | 800                       | -18.13                                    | -2.15                               | -20.28                      | -6.99                                  | 10.01                                         | 27.32                                             | 30.33                    | 50.6  |
|                     | 900                       | -18.13                                    | -2.67                               | -20.80                      | -6.99                                  | 12.44                                         | 33.97                                             | 39.42                    | 60.2  |
|                     | 1000                      | -18.13                                    | -3.25                               | -21.38                      | -6.99                                  | 15.12                                         | 41.27                                             | 49.41                    | 70.8  |
|                     | 1100                      | -18.13                                    | -3.87                               | -22.00                      | -6.99                                  | 18.04                                         | 49.23                                             | 60.28                    | 82.3  |
|                     | 1300                      | -18.13                                    | -5.27                               | -23.40                      | -6.99                                  | 24.57                                         | 67.06                                             | 84.64                    | 108.0 |
|                     | 1400                      | -18.13                                    | -6.05                               | -24.18                      | -6.99                                  | 28.18                                         | 76.92                                             | 98.11                    | 122.3 |

## VI. PUMP SELECTION

### A. NET POSITIVE SUCTION HEAD

|                                                   | Initial Design | Future Design |           |
|---------------------------------------------------|----------------|---------------|-----------|
| <b>Pumping Rate=</b>                              | <b>600</b>     | 600           | GPM       |
| Atmospheric Pressure at Sea Level                 |                | 33.90         | FT        |
| Correction For Elev. Above Sea Level              |                | -1.00         | FT        |
| Static Suction Lift                               |                | -18.13        | FT        |
| Suction Piping Friction Losses (Design Roughness) |                | -1.68         | FT        |
| Vapor Pressure                                    |                | -1.00         | FT        |
| Safety Factor                                     |                | -5.00         | FT        |
| NPSH Available                                    |                | 7.09          | FT        |
| NPSH Required                                     |                | 6.00          | FT        |
| NPSH Excess Available                             |                | <b>1.09</b>   | <b>FT</b> |

### B. REPRIME LIFT

|                             |             |    |
|-----------------------------|-------------|----|
| Center Line of Pump Suction | 29.03       | FT |
| Lead Pump on Elevation      | 12.90       | FT |
| Reprime Lift                | <u>16.1</u> | FT |

### C. PUMPING CONDITIONS

|                    | Initial Design | Future Design |
|--------------------|----------------|---------------|
| Pump Capacity      | 600            | 600 GPM       |
| Total Dynamic Head | 42.0           | 42.0 FT       |

### D. EQUIPMENT RECOMMENDATION

|                         | Initial Design | Future Design |
|-------------------------|----------------|---------------|
| Pump Model              | T6A3S-B        | T6A3S-B       |
| Pump Size               | 6              | 6 IN          |
| Pump Speed              | 1050           | 1050 RPM      |
| Reprime Lift Capability | 18             | 18 FT         |
| Motor Horsepower        | 20             | 20 HP         |
| Motor Speed             | 1750           | 1750 RPM      |

# TOTAL HEAD

M PSI FT

44 60 140

40 56 130

36 52 120

48 110

32 44 100

28 40 90

24 36 80

20 32 70

16 28 60

12 24 50

8 20 40

4 16 30

0 12 20

0 8 10

0 4 10

0 0 10

U.S. GALLONS PER MINUTE X 100

LITRES PER SECOND X 10

CUBIC METRES PER HOUR X 10

## REPRIMING LIFTS

| RPM    | 650 | 750 | 850 | 950 | 1050 | 1150 | 1250 | 1350 | 1450 | 1550 |
|--------|-----|-----|-----|-----|------|------|------|------|------|------|
| FEET   | 8   | 9   | 12  | 14  | 18   | 21   | 22   | 23   | 25   |      |
| METERS | 2,4 | 2,7 | 3,7 | 4,3 | 5,5  | 6,4  | 6,7  | 7,0  | 7,6  |      |

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

3.00"/[76,2 MM] DIA. MAX. SPHERICAL SOLIDS

## PERFORMANCE CURVE

VOLUTE 10957E 10957C CURVE T6A-B-4

IMPELLER 38615-087 10958 MODEL T6A-B

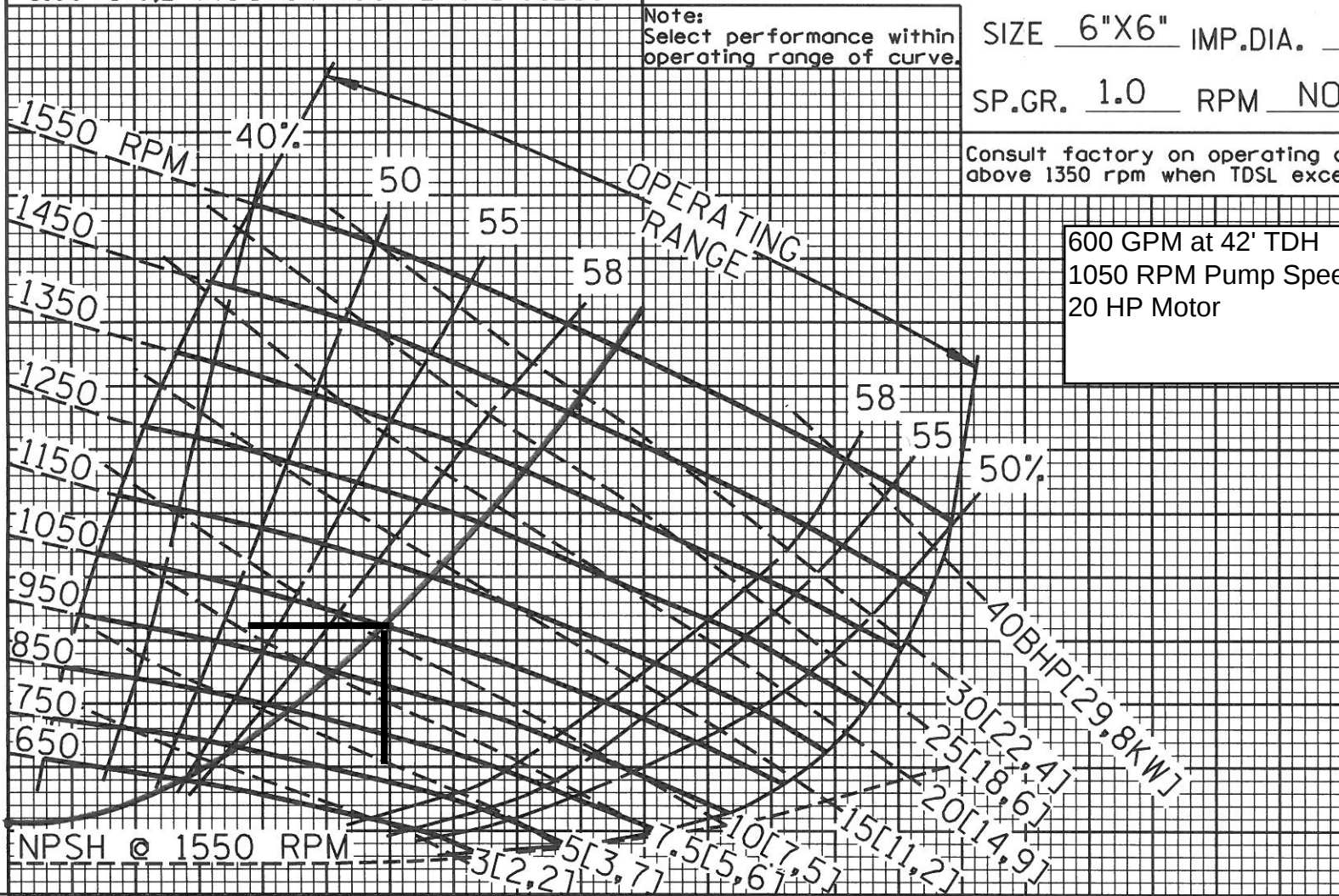
SIZE 6"X6" IMP.DIA. 12.38"

SP.GR. 1.0 RPM NOTED

Consult factory on operating conditions above 1350 rpm when TDSL exceeds 20 ft.

Note:  
Select performance within operating range of curve.

600 GPM at 42' TDH  
1050 RPM Pump Speed  
20 HP Motor



NPSH

FT M

30 10

20 8

10 6

0 4

0 2

0 0