Pipe System Design

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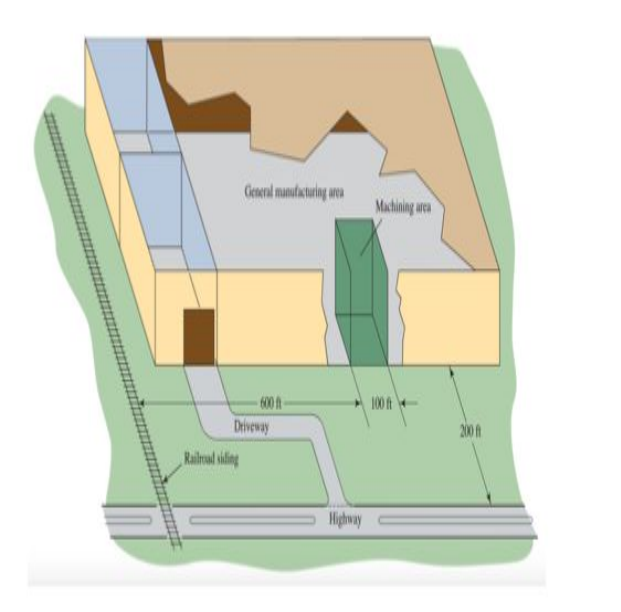
Job site Location

Dayton, Ohio

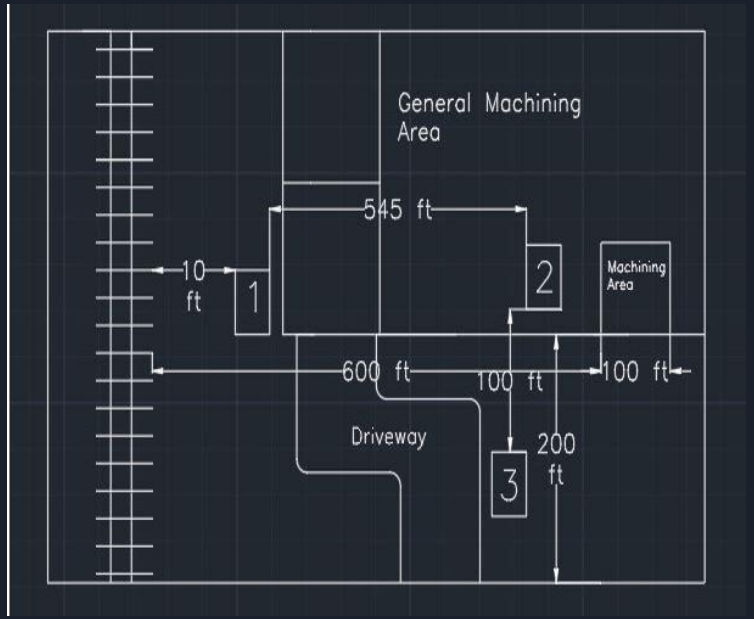


Location of The Tanks

Tank 1 located on the left near the train tracks

Tank 2 located inside general machining are

Tank 3 located next to driveway for easy access

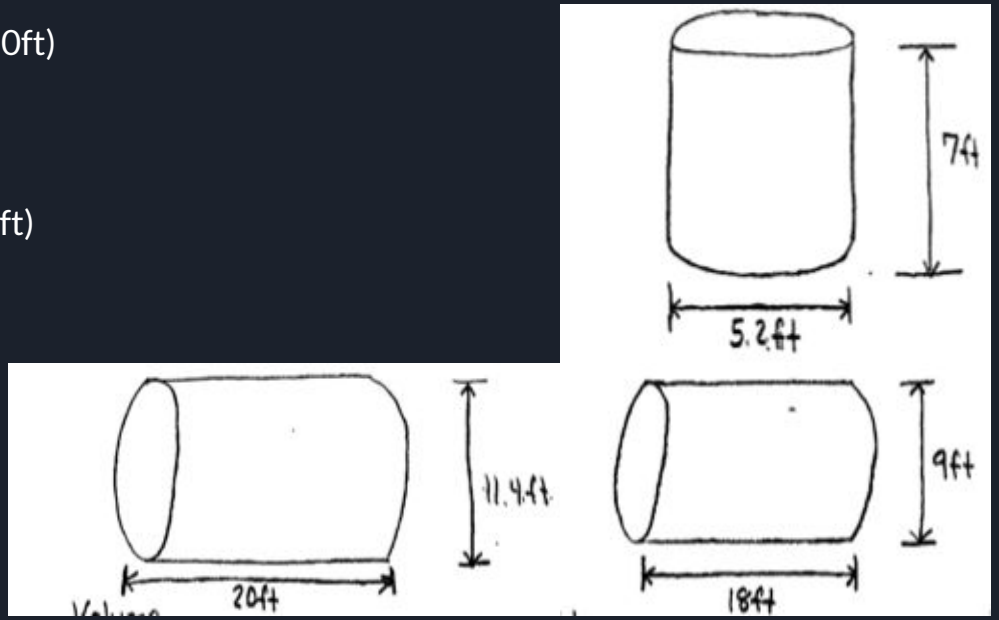


Tank Size

Tank 1 clean storage (11.4ft x 20ft)

Tank 2 reservoir (5.2 x 7ft)

Tank 3 Contamination (9ft x 18ft)



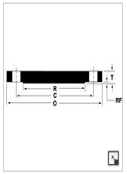
Blind Flange

Manufacturer- Coastal Precision Engineered Flanges

Located in clean storage tank, ½ foot from bottom

4 bolt holes

Thickness 0.94



- All dimensions are in inches.
- These flanges will be furnished with a 1/16" raised face unless otherwise specified.
- Flat face option available.

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SPECIFICATIONS

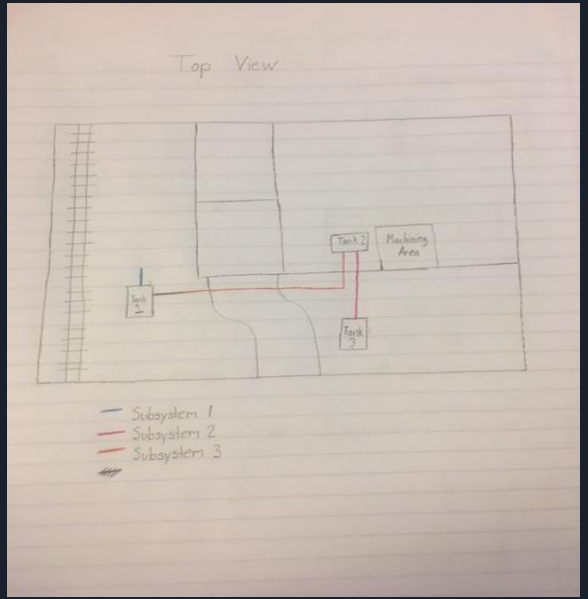
Flange Type	Blind
Nominal Pipe Size	3
Outside Diameter (O)	7.50
Thickness (T)	0.94
Raised Face Diameter (R)	5.00
Approximate Weight (lbs)	9
Bolt Circle (C)	6.00
Number of Holes	4
Diameter of Holes	0.75

Pipe Layout

Sub system 1 - railroad tank to tank 1

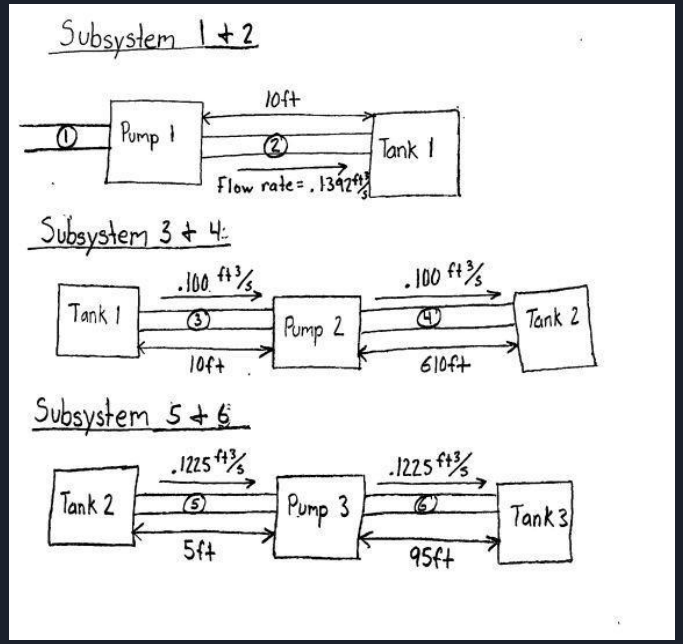
Sub system 2 - tank 1 to tank 2

Sub system 3 - tank 2 to tank 3



Pipe Sizing & Velocity

- Subsystem 1
  - Pipe Dia. - 1 ½ in
  - Velocity - 9.844 ft/s
  - Flow Rate - .1392 ft3/s
- Subsystem 2 & 3
  - Pipe Dia. - 1 in.
  - Velocity - 9.624 ft/s
  - Flow Rate - .100 ft3/s
- Subsystem 4 & 5
  - Pipe Dia. - 1 ½ in
  - Velocity - 8.6633 ft/s
  - Flow Rate - .1225 ft3/s



Fittings

1 - Check Valve (1-½ in)

1 - Gate Valve (1in)

1 - Check Valve (1 in)

5 - 90 degree long elbow (1in)

1 - Gate Valve (1in)

1 - Gate Valve (1-½ in)

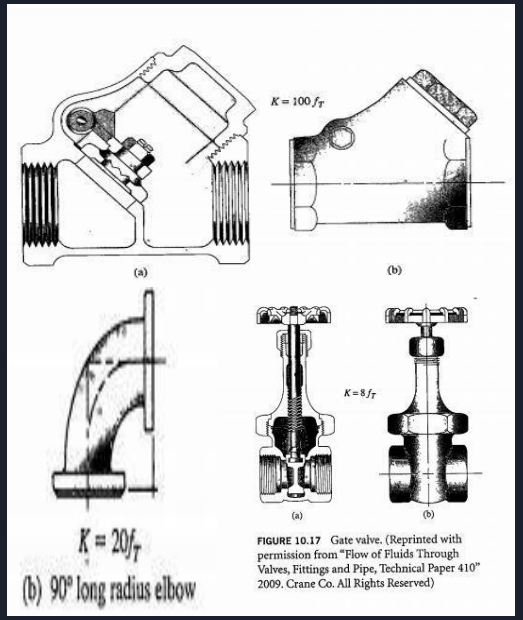
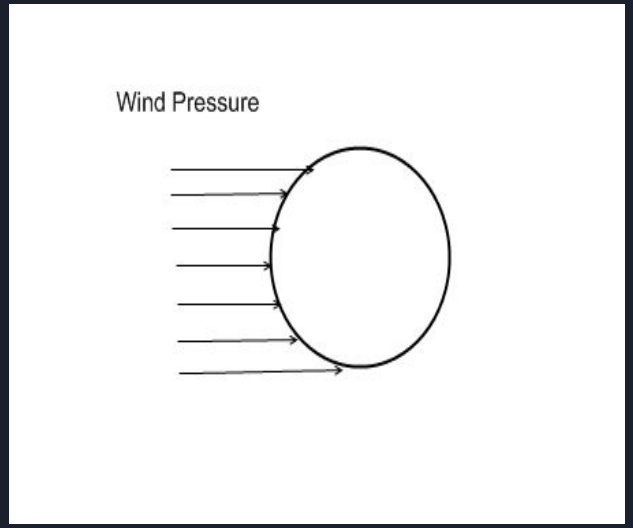


FIGURE 10.17 Gate valve. (Reprinted with permission from "Flow of Fluids Through Valves, Fittings and Pipe, Technical Paper 410" 2009. Crane Co. All Rights Reserved)

Wind Load

- Average Wind Speed - 9.2 mi/hr or 13.4933 ft/s
- Windiest Day on Average - 60 mi/hr
  - Tank 1
    - Weight - 135,333.036 lbs.
    - Wind load - 3151.87
  - Tank 3
    - Weight - 8232.95616 lbs.
    - Wind load - 2239.488



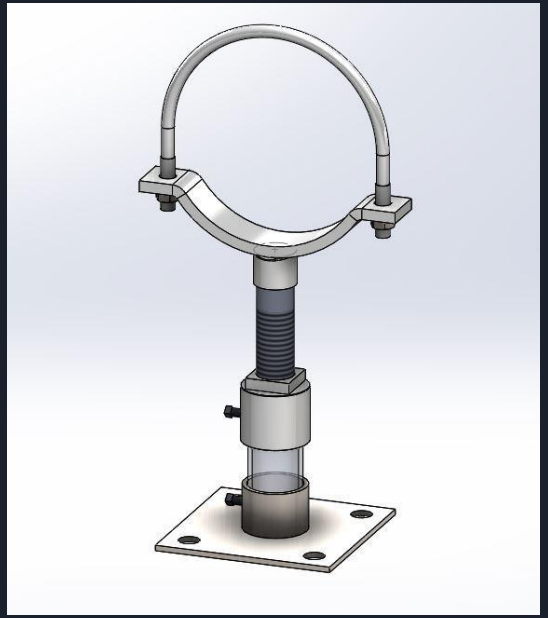
Pipeline Support

U-bolt saddle support

Mounted in the ground

Steel

Spaced 2.75 ft apart

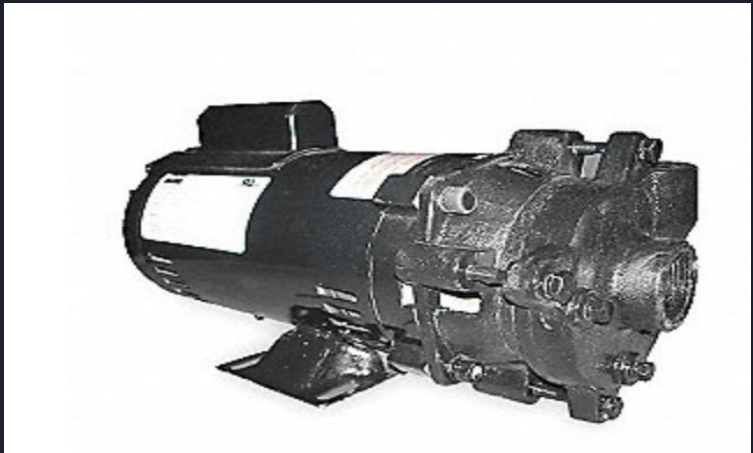


Open Channel

- Rectangular Channel
  - Depth - .5 ft
  - Width - .75 ft
- Channel goes to a drainage reservoir behind the plant

Types of pumps

- Pump 1: Open Drip-proof Centrifugal Pump, 1-Phrase
- Pump 2: Vertical In-Line (6) multistage pump
- Pump 3: Open Drip-proof Centrifugal Pump, 1-Phrase



Pump Size and Weight

Pump #	Frame	Length	Width	Height	Weight (lbs)
1	56J	13-½”	6-⅝”	5-⅞”	34.5
2	184TC	21.71”	6.87”	6”	119
3	56J	13-½”	6-⅝”	5-⅞”	35

Specification Sheets

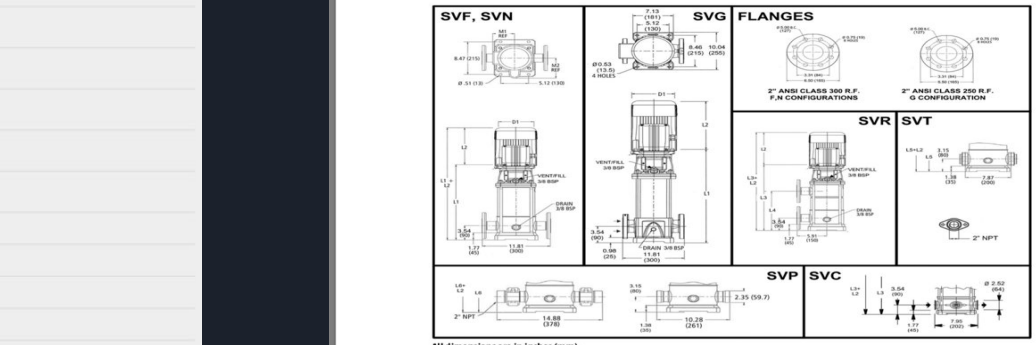
Item	**Centrifugal Pump**
Item - Straight Centrifugal Pumps	**Straight Centrifugal High Flow Pump**
HP - Pumps	**3/4**
Voltage - Pumps	**120/240VAC**
Phase - Pumps	**1**
Housing Material - Pumps	**Cast Iron**
Inlet Size - Pumps	**1-1/4" NPT**
Outlet Size - Pumps	**1" NPT**
Max. Pressure - Pumps	**24 psi**
Max. Head	**55**
Motor Enclosure - Pumps	**Open Dripproof**
Best Efficiency Range GPM @ Head	**35 to 63 gpm @ 45 to 20 ft.**
Amps	**11.3/5.6**
Impeller Type	**Semi Open**
Impeller Material	**Cast Iron**
GPM of Water @ 10 Ft. of Head	**72**
GPM of Water @ 15 Ft. of Head	**67**
Seal Material	**Buna-N, Carbon, Ceramic, Stainless Steel**
Length	**13-1/2"**
Width	**6-5/8"**
Height	**5-7/8"**
Motor RPM	**3450**

Motor Type	**Capacitor Start**
Wetted Materials	**Cast Iron, Buna-N, Carbon, Ceramic, Stainless Steel**
Max. Liquid Temp.	**200 Degrees F**
GPM of Water @ 20 Ft. of Head	**63**
GPM of Water @ 25 Ft. of Head	**58**
GPM of Water @ 30 Ft. of Head	**53**
GPM of Water @ 40 Ft. of Head	**41**
GPM of Water @ 50 Ft. of Head	**22**
Max. Specific Gravity	**1.0**
Max. Case Pressure	**200 psi**
Inlet Pressure	**200 psi**
Bearing Type	**Ball**
Max. Dia. Solids	**1/2"**
Manufacturers Warranty Length	**1 yr.**
Includes	**Manual**
Agency Compliance	**c UL us**
Duty	**Continuous**
Frame	**56J**
Port Rotation	**4 Position Increments**
Max. GPM @ Head	**72 gpm @ 10 ft.**
Best Efficiency GPM @ Head	**47 gpm @ 36 ft.**

Goulds Water Technology

Commercial Water

Dimensions and Weights **10SV Series 3500 RPM** **60 Hz**



All dimensions are in inches (mm).

10SV SERIES – 60Hz, 3500 RPM ODP/TEFC Enclosures

Pump Type Stages	Motor HP	Motor NEMA Frame ODP 1Ø	Motor NEMA Frame TEFC 1Ø	Motor NEMA Frame ODP 3Ø	Motor NEMA Frame TEFC 3Ø	Dimensions (in) L1	L2 ODP 1Ø	L2 TEFC 1Ø	L2 ODP 3Ø	L2 TEFC 3Ø	L3	L4	L5	L6	M (Ref.)	D1 (max.) ODP 1Ø	D1 (max.) TEFC 1Ø	D1 (max.) ODP 3Ø	D1 (max.) TEFC 3Ø	D2	Weight (lbs.) Pump Only	Motor ODP 1Ø	Motor TEFC 1Ø	Motor ODP 3Ø	Motor TEFC 3Ø	Pump/Motor ODP 1Ø	Pump/Motor TEFC 1Ø	Pump/Motor ODP 3Ø	Pump/Motor TEFC 3Ø
10SV-01	0.75	56C				16.56	10.79	9.91	9.16	9.29	-	-	16.17	16.17	5.19	6.19	6.19	6.19	6.19	4.13	36	27	29	21	21	63	65	57	57
10SV-02	2					16.56	11.18	12.06	11.16	10.79	-	-	16.17	16.17	5.74	7.19	7.19	6.19	6.19	4.72	38	43	51	32	33	81	89	70	71
10SV-03	3					17.82	11.57	13.44	11.18	11.16	-	-	17.43	17.43	5.75	6.50	7.19	7.16	7.19	5.51	40	49	64	41	44	89	104	81	84
10SV-04		184TC	182TC	184TC		19.58	13.93	15.43	12.55	13.93	-	-	19.19	19.19	6.87	8.88	8.86	9.02	8.86	5.51	46	81	92	62	69	127	138	108	115
10SV-05	5					20.84	13.93	15.43	12.55	13.93	20.84	10.20	20.45	20.45	6.87	8.88	8.86	9.02	8.86	5.51	48	81	92	62	69	129	140	110	117
10SV-06						22.10	13.93	15.43	12.55	13.93	22.10	11.46	21.71	21.71	6.87	8.88	8.86	9.02	8.86	5.51	50	81	92	62	69	131	142	112	119
10SV-07				184TC		23.36	13.88	15.53	13.93	15.43	23.36	12.72	22.97	22.97	8.05	8.89	10.62	8.88	8.86	5.51	52	100	120	75	85	152	172	127	137
10SV-08	7.5	213TC				24.62	13.88	15.53	13.93	15.43	24.62	13.98	24.22	24.22	8.05	8.89	10.62	8.88	8.86	5.51	54	100	120	75	85	154	174	129	139
10SV-09			184TC	213TC*		25.88	13.88	15.53	13.93	15.43	25.88	15.24	25.48	25.48	8.05	8.89	10.62	8.88	8.86	5.51	56	100	120	75	85	156	176	131	141
10SV-10						27.71	16.63	16.68	15.55	15.51	27.71	16.50	-	27.31	8.77	10.62	10.18	10.18	10.28	5.51	66	132	145	107	122	198	211	173	188
10SV-11						28.97	16.63	16.68	15.55	15.51	28.97	17.76	-	28.57	8.77	10.62	10.18	10.18	10.28	5.51	68	132	145	107	122	200	213	175	190
10SV-12	10	215TC	213TC	215TC		29.44	16.63	16.68	15.55	15.51	29.44	19.02	-	29.05	8.77	10.62	10.18	10.18	10.28	5.51	70	132	145	107	122	202	215	177	192
10SV-13						31.51	16.63	16.68	15.55	15.51	31.51	20.28	-	31.11	8.77	10.62	10.18	10.18	10.28	5.51	75	132	145	107	122	207	220	182	197
10SV-14						32.85	16.63	16.68	15.55	15.51	32.85	21.54	-	32.45	8.77	10.62	10.18	10.18	10.28	5.51	77	132	145	107	122	209	222	184	199
10SV-15						34.66	-	-	15.55	16.57	-	-	-	34.26	9.22	-	-	10.18	10.28	5.51	84	-	-	125	195	-	-	209	279
10SV-16						35.92	-	-	15.55	16.57	-	-	-	35.52	9.22	-	-	10.18	10.28	5.51	86	-	-	125	195	-	-	211	281
10SV-17	15	-	215TC	254TC	254TC	37.18	-	-	15.55	16.57	-	-	-	36.78	9.22	-	-	10.18	10.28	5.51	88	-	-	125	195	-	-	213	283
10SV-18						38.44	-	-	15.55	16.57	-	-	-	38.04	9.22	-	-	10.18	10.28	5.51	90	-	-	125	195	-	-	215	285
10SV-19						39.78	-	-	15.55	16.57	-	-	-	39.38	9.22	-	-	10.18	10.28	5.51	92	-	-	125	195	-	-	217	287
10SV-20	20		254TC	256TC		40.96	-	-	16.66	20.08	-	-	-	40.56	9.5	-	-	10.18	13.13	5.51	94	-	-	144	285	-	-	238	379

* Please refer to motor table for frame size

Electrical Motor

Pump #	Hp	Phase
1	¾ Hp	1-Phase
2	0.5 Hp- 75 Hp	Multistage 6-phase
3	½ Hp	1-Phase

Max Pump Flow Rate and Max Head Requirements

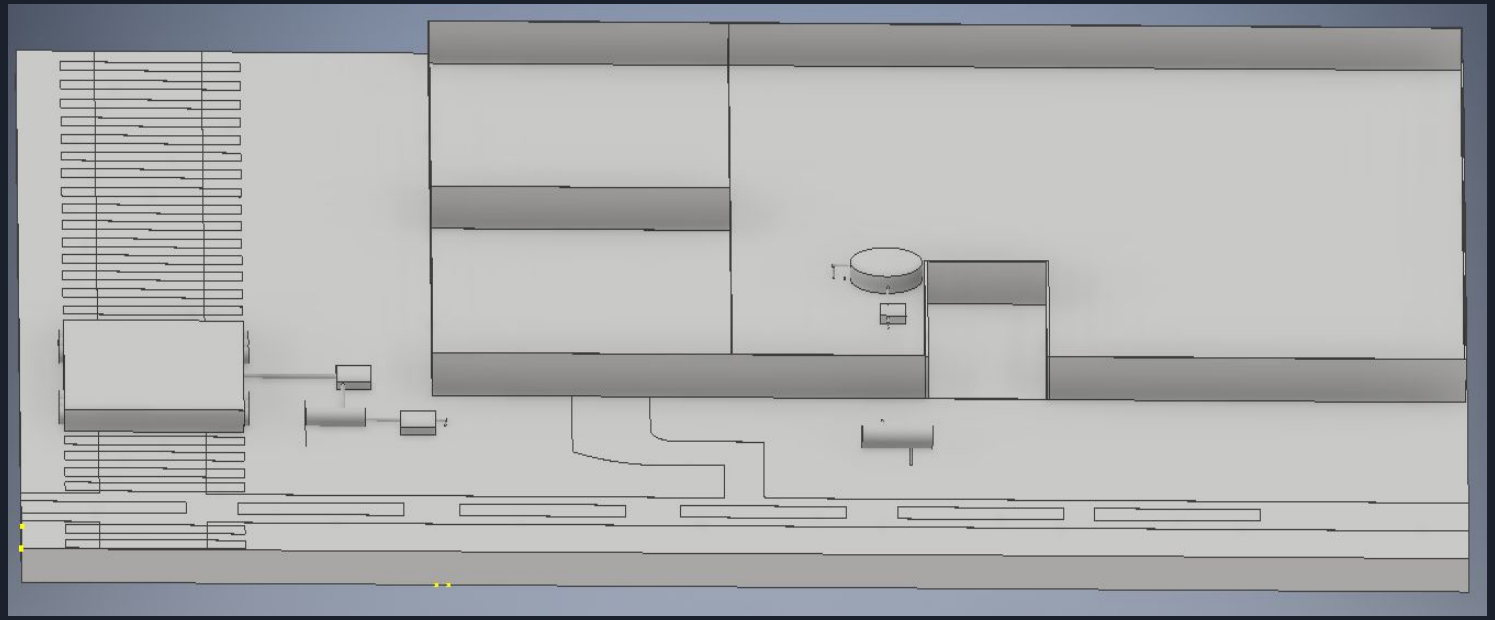
FLOW RATES:

- Pump 1: Max. is 72 gpm / Min. is 22 gpm
- Pump 2: Max. is Max. is 75 gpm / Min. is 9 gpm
- Pump 3: Max. is 67 gpm / Min. is 10 gpm

HEAD REQUIREMENTS:

- Pump 1: Max head is 55 feet.
- Pump 2: Max head is 1150 feet.
- Pump 3: Max head is 44 feet.

3-D Design



Bill of Materials

Nomenclature	Manufacturer	Rating	Material	Qty
Tank 1	Southern Tanks	15,310 gal	Carbon Steel	1
Tank 2	Southern Tanks	1,128 gal	Carbon Steel	1
Tank 3	Southern Tanks	8,626 gal	Carbon Steel	1
Blind Flange	Coastal Precision Engineered Flanges		ANSI B16.5 Class 150	1
Bolts	Fastenal	33,000 psi	Grade 2	4
Nuts	Fastenal	33,000 psi	Grade 2	4
Washers	Fastenal	33,000 psi	Grade 2	8
System Piping	BMG Metals		1-1/2in Schedule 40 Steel Pipe	7
System Piping	BMG Metals		1in Schedule 40 Steel Pipe	6
90° long radius elbow 1-1/2in	Grainger, Inc.		Schedule 40 Steel	5
90° long radius elbow 1in	Grainger, Inc.		Schedule 40 Steel	5
Gate valve 1in	Powell Valves		Schedule 40 Steel	3
Gate valve 1-1/2in	Powell Valves		Schedule 40 Steel	1
Pump 1	Sulzer		N/A	1
Pump 2	Sulzer		N/A	1
Pump 3	Sulzer		N/A	1
Pump 4	Sulzer		N/A	1

Sources

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