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Technical Memorandum

To:	SEHOA Executive Board	From:	Clint Brown, P.E.
Company:	Somerset Estates HOA	Date:	December 20, 2023
EA No.:	111402		
Re:	Somerset Pond Improvements, Feasibility Study Niwot, Colorado		

1.0 INTRODUCTION

Engineering Analytics, Inc. (EA) was tasked by Somerset Estates Homeowners Association (SEHOA) to provide engineering services for improvements to the ponds on Outlot D. In particular, the SEHOA is interested in the feasibility of installing alternative landscaping and water features in the location of Pond #3, installing a dissipation structure between Pond #2 and the waterfall, and installing a localized pump for the isolation and recirculation of the waterfall from a new vault just downstream of the waterfall. This technical memorandum provides EA's recommendations for the Somerset Ponds.

2.0 ANALYSES AND RECOMMENDATIONS

2.1 Repurposing Pond #3

SEHOA is considering repurposing Pond #3 as a park area containing stream conveyance features to the waterfall. Pond #3 is located between Pond #2 and the waterfall (see Figure 1 for a feature map). Based on conversations with SEHOA, Pond #3 is not viable for water storage (there is no outlet or pump to extract water for use) and is currently only a decorative feature. Based on the Subdivision Improvement Plans for Somerset Estates (JR Engineering 1993), Pond #2 and Pond #3 are not stormwater features. The alteration of Pond #3 should not influence stormwater drainage or water storage for the community.

The new channel should be lined with a synthetic liner to avoid the negative effects from channel seepage, EA recommends using a Polyurea liner like what has been used on other lining projects in the neighborhood. EA recommends that the new water conveyance feature have the capacity to match the existing capacity of the channel between Pond #2 and the other ponds and features in the system. EA has estimated the existing channel capacity at 25 cubic feet per second (cfs) however this should be confirmed with a survey prior to design. To achieve the current capacity

while minimizing erosion, the channel should have a slope of l percent with a channel depth of approximately 2 foot deep. The new conveyance channel should closely match the existing channel size with an estimated 8-foot bottom width and side slopes of 2:1 (Horizontal: Vertical). A typical section of the water conveyance feature, including landscaping vegetation and boulders, is presented in Figure 2. It should be noted that the final capacity of the conveyance channel could be reduced during design based on potential deliveries and stormwater overflows from Pond #2. The channel flow capacity should be evaluated by the design engineer during design.

The repurposing of Pond #3 will require earthwork involving the cut of material from a nearby area to place as fill in Pond #3. According to the 1997 irrigation map, Pond #3 has a volume of approximately 0.588 acre-feet (AF). EA estimates the Pond #3 improvements will consist of approximately 2000 cubic yards (CY) of earthwork. Earthwork should be planned around the potential of rock occurring near the ground surface on the east end of Pond #3. The depth to rock can be estimated based on visible rock outcroppings. Rock outcroppings can be seen on site along the hill to the east of Pond #3. The rock outcropping is likely to extend to the north and south while following a similar tilt.

Based on the potential for rock and the increases in costs for rock removal, EA recommends that the new stream conveyance feature and park avoid excavation. To facilitate construction the design should assume rock at the surface or approximately 1 foot below the surface. In addition to the depth to rock, the earthwork should consider the 10-inch pipe located along the northwestern edge of Pond 3. This pipeline should be located before design and construction. The alignment of the stream conveyance feature should follow the edge of the pond nearest the tennis courts, see Figure 3. The SEHOA should fill the pond by flattening the park slopes and relocating the park sidewalk. Based on the information provided, EA estimates the maximum depth of the pond to be approximately 8 feet, however this will need to be confirmed in the field, and the cut/fill should be planned according to field verifications.

SEHOA mentioned that there may be a need to install a dissipation structure between Pond #2 and the waterfall. If the stream conveyance features are at a mild slope (less than 1%), EA does not think a dissipation structure will be necessary. Based on GoogleEarth elevations, EA estimates that the conveyance structure will have a mild slope that is less than 1%. GoogleEarth shows Pond #2 at an elevation of 5310 ft and the waterfall pond at 5307 ft for a total loss of 3 feet and an approximate distance of 320 feet resulting in an approximate slope of .95%, the final elevations and distances should be confirmed by a licensed surveyor. If there is a significant elevation drop (more than 3-5 feet) between Pond #2 and the waterfall, a dissipation structure may be necessary. The dissipation structure would need to be located along the stream conveyance between Pond #2 and the water, and the structure would consist of a grouted rock section or a plunge pool that will drop the water elevation without causing erosion in the stream. An example dissipation structure is shown in Figure 4.

EA recommends using a landscape architect to layout the stream conveyance feature, this will help with the esthetics of the conveyance when water is not flowing. The stream conveyance feature should be designed to have gravel, cobbles, and boulders, similar to a natural mountain stream to aid in erosion control. To achieve the full capacity of the stream and maintain proper conveyance, cattails and other vegetation should be removed and maintained from within the water line. The

section of stream between Pond #2 and Pond #3 provides a good example of how the new conveyance could look. See Figure 3 for an illustration of the stream conveyance feature.

2.2 Waterfall Isolation and Recirculation

EA analyzed the installation of a new pump for recirculating the waterfall. It is our understanding that the waterfall was installed with two 800 gpm pumps, and currently only one of the pumps operates at a time and only at about half of the original flow rate (~400 gpm). These existing pumps are located in a vault downstream of Pond #7. SEHOA wants to understand the feasibility of isolating the waterfall from the downstream ponds. To isolate the waterfall feature, EA recommends utilizing a single 400 gpm submersible pump located near the waterfall. The pump would be housed in a lift station vault on the north side of the waterfall (Figure 5). Fountain water would flow from the lift station vault, to the top of the waterfall via a pipeline, down the waterfall, then into the small basin at the bottom of the waterfall. The small basin at the bottom of the waterfall would be connected to the lift station vault via a pipeline. EA estimates that there should be approximately 4000 gallons of storage volume in the lift station vault. To achieve this storage volume, we estimate an 8-ft-diameter, 10-ft-deep vault should be sufficient.

As an alternative that will match the existing pump's original flow, an 800-gpm submersible pump can be used. If the 800-gpm pump is selected, the vault and lower basin capacity should be adjusted to approximately 8000 gallons. The additional volume could be accounted for with a second 8-ft-diameter, 10-ft-deep vault or a rectangular vault with an access hatch. The two vaults would be connected with a large pipe, such as a 12-inch pipe, as to sufficiently connect the two vaults storing water. An example layout of this 800-gpm alternative is provided in Figure 6.

The design total dynamic head (TDH) of the pump is dependent on the system piping and vault layout. Therefore, EA recommends consulting with a design engineer and pump provider prior to selecting a pump and pipe size. Prior to selecting a pump an electrician or electrical engineer should be consulted to recommend a pump voltage based on locally available power sources.

As part of the waterfall isolation the flow of water could be disconnected from the delivery system that currently travels under Somerset Drive. The connection between the waterfall and Ponds 4-7 is only for delivering water as part of the decorative design of Ponds 4-7 as shown on the Subdivision Improvement Plans for Somerset Estates (JR Engineering 1993). Because the water delivery system is not a stormwater feature the current stormwater design should be able to handle the rainfall overflow on the waterfall structure without the connection to Ponds 4-7. To handle overflow from the waterfall, a section of the waterfall pond should be designed to overflow into the current stormwater system as safety feature.

3.0 COSTS

EA has developed preliminary cost estimates for repurposing Pond #3 and alternatives for either a 400-gpm system or an 800-gpm system. The 400-gpm system (Table 1) and 800-gpm system (Table 2) include costs for a contractor to mobilize and deliver material to the Somerset ponds. Costs include surveying, which is necessary to obtain the correct slopes and grades of the stream conveyance feature, vault, pipeline and earthwork. Clearing, stripping and grubbing is included

and may be necessary in areas where earthwork occurs. EA assumed dewatering will be needed to perform the earthwork and install features and structures. We have included $35,000 for landscaping, which may include seeding, vegetation, boulders, benches, etc. We have also included $24,000 for lining the conveyance canal using a Polyurea liner similar what was used on other lining projects in the neighborhood.

The vault/lift station is estimated to cost $15,000 each. Only one vault/lift station is needed for the 400-gpm system, while two are needed for the 800-gpm system. The 400-gpm pump is estimated to cost $5,000, and the 800-gpm pump is estimated to cost $11,000. Examples of the pumps and lift station/vault are included as attachments. EA has included costs for electrical work including supplying power to the new pump location near the waterfall.

The costs include a 20% contingency to account for unknown and minor costs. The 400-gpm system is estimated to cost $223,000 and is presented in Table 1. The 800-gpm system is estimated to cost $254,000 and is presented in Table 2.

4.0 CONCLUSIONS

EA has provided feasible recommendations and costs for installing alternative landscaping and water features in the location of Pond #3 and installing a localized pump for the isolation and recirculation of the waterfall from a new vault just downstream of the waterfall. Pond #3 lacks the means to provide storage releases for water deliveries and was not included as a stormwater feature for the design of Somerset Estates. Therefore, Pond #3 is considered a decorative landscape feature, and modifications to Pond #3 would remain a decorative landscape feature. The removal of the pond will not influence the stormwater design for Somerset Estates or result in a loss of water storage capability. The new conveyance channel will feasibly replace Pond #3, and maintain the operations of Pond #3 as a decorative feature that transmits water from Pond #2 to the waterfall and Ponds 4-7.

Based on the current conditions and our review of the available data we have concluded that both a 400 gpm and 800 gpm isolated waterfall options are feasible and can be constructed. EA estimates that the General Construction items will cost approximately $12,000, repurposing Pond #3 will cost around $91,000 and isolating and recirculating the waterfall will cost between $45,000 (400 gpm) and $66,000 (800 gpm). When including the costs for engineering, permitting and contingency EA estimates the total cost for the project to be between $223,000 and $254,000.

5.0 STANDARD OF CARE

The information contained in this report represents our findings at the time and location as indicated in this report. The methods utilized are in accordance with currently accepted engineering and testing procedures and other than this, no warranty, either expressed or implied, is intended.

LIST OF TABLES

LIST OF FIGURES

TABLES

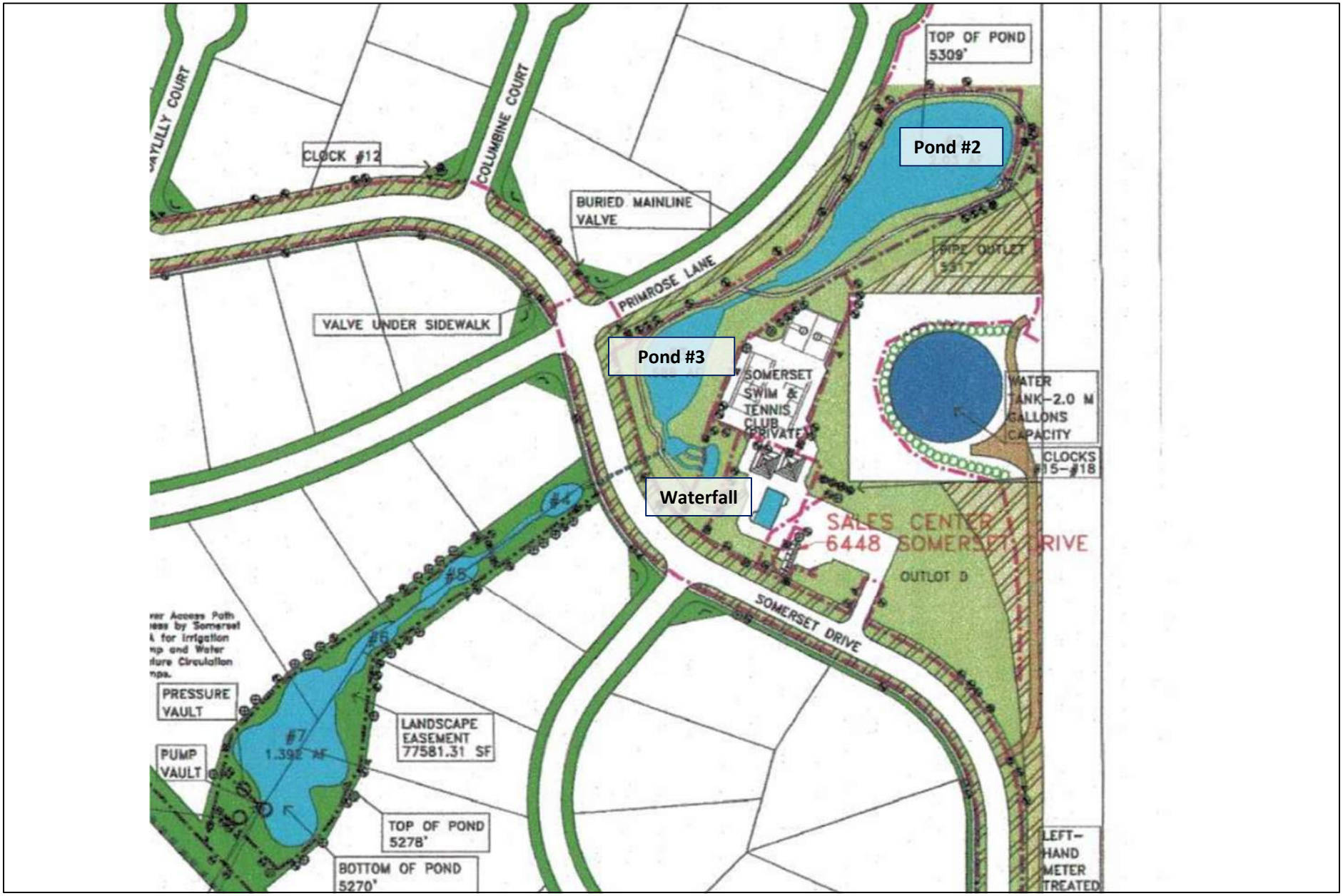
Table 1. Cost Estimate for the 400 gpm system

Item No.	Description	Est. Qty.	Units	Unit Price	Amount
	General Costruction Items			**Subtotal**	**$12,000**
1	Mobilization, Insurance, Bonds	1	L.S.	$5,000	$5,000
2	Surveying	1	L.S.	$3,000	$3,000
3	Clearing, Stripping and Grubbing	0.5	Acre	$3,000	$1,500
4	Dewatering	1	L.S.	$500	$500
5	Storm Water and Erosion Control	1	L.S.	$2,000	$2,000
	Pond #3 Repurposing			**Subtotal**	$91,000
6	Earthwork	1	L.S.	$20,000	$20,000
7	Landscaping	1	L.S.	$35,000	$35,000
8	Sidewalk Replacement	1000	S.F.	$12	$12,000
9	Channel Lining (Polyurea)	4000	S.F.	$6	$24,000
	Waterfall Isolation and Recirculation			**Subtotal**	$45,000
10	Vault / Lift Station (8 ft Dia.)	1	EA.	$15,000	$15,000
11	Pump (800 GPM)	1	LS	$5,000	$5,000
12	Electrical	1	LS	$15,000	$15,000
13	Pipeline	1	LS	$10,000	$10,000
				Subtotal Construction Cost	**$148,000**
				Contingency (20%)	**$30,000**
				Engieering/Permitting	**$45,000**
				Total Cost	**$223,000**

Table 2. Cost Estimate for the 800 gpm system

Item No.	Description	Est. Qty.	Units	Unit Price	Amount
	General Costruction Items			**Subtotal**	**$12,000**
1	Mobilization, Insurance, Bonds	1	L.S.	$5,000	$5,000
2	Surveying	1	L.S.	$3,000	$3,000
3	Clearing, Stripping and Grubbing	0.5	Acre	$3,000	$1,500
4	Dewatering	1	L.S.	$500	$500
5	Storm Water and Erosion Control	1	L.S.	$2,000	$2,000
	Pond #3 Repurposing			**Subtotal**	$91,000
6	Earthwork	1	L.S.	$20,000	$20,000
7	Landscaping	1	L.S.	$35,000	$35,000
8	Sidewalk Replacement	1000	S.F.	$12	$12,000
9	Channel Lining (Polyurea)	4000	S.F.	$6	$24,000
	Waterfall Isolation and Recirculation			**Subtotal**	$66,000
10	Vault / Lift Station (8 ft Dia.)	2	EA.	$15,000	$30,000
11	Pump (800 GPM)	1	LS	$11,000	$11,000
12	Electrical	1	LS	$15,000	$15,000
13	Pipeline	1	LS	$10,000	$10,000
				Subtotal Construction Cost	**$169,000**
				Contingency (20%)	**$34,000**
				Engieering/Permitting	**$51,000**
				Total Cost	**$254,000**

FIGURES



Project No. 110402

December 2023

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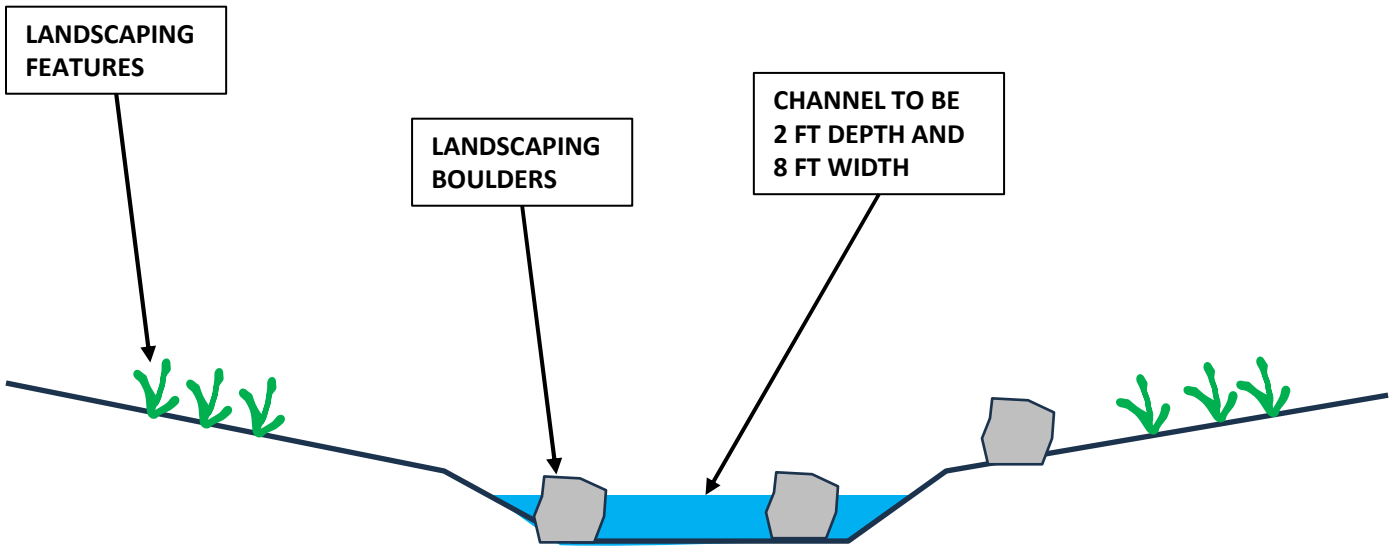
FIGURE 1
FEATURE MAP
SOMERSET PONDS IMPROVEMENTS



Project No. 110402

December 2023

Engineering Analytics, Inc.

FIGURE 2
STREAM CONVEYANCE FEATURE SECTION
SOMERSET PONDS IMPROVEMENTS

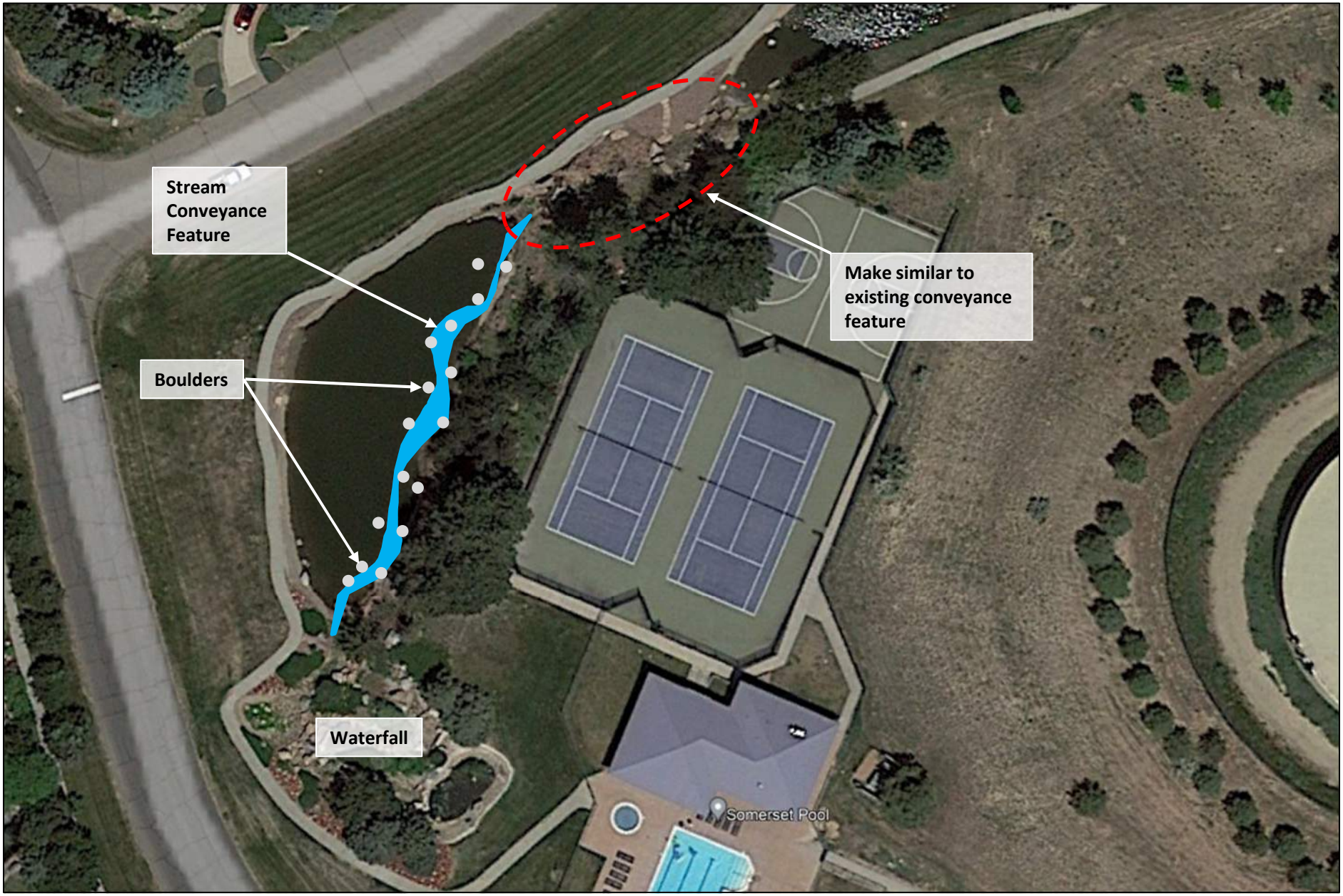


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FIGURE 3
STREAM CONVEYANCE FEATURE
SOMERSET PONDS IMPROVEMENTS

Image from https://streamhandbook.org/

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FIGURE 4
EXAMPLE DISSIPATION STRUCTURE
SOMERSET PONDS IMPROVEMENTS

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FIGURE 5
VAULT LOCATION MAP FOR 400-GPM SYSTEM
SOMERSET PONDS IMPROVEMENTS

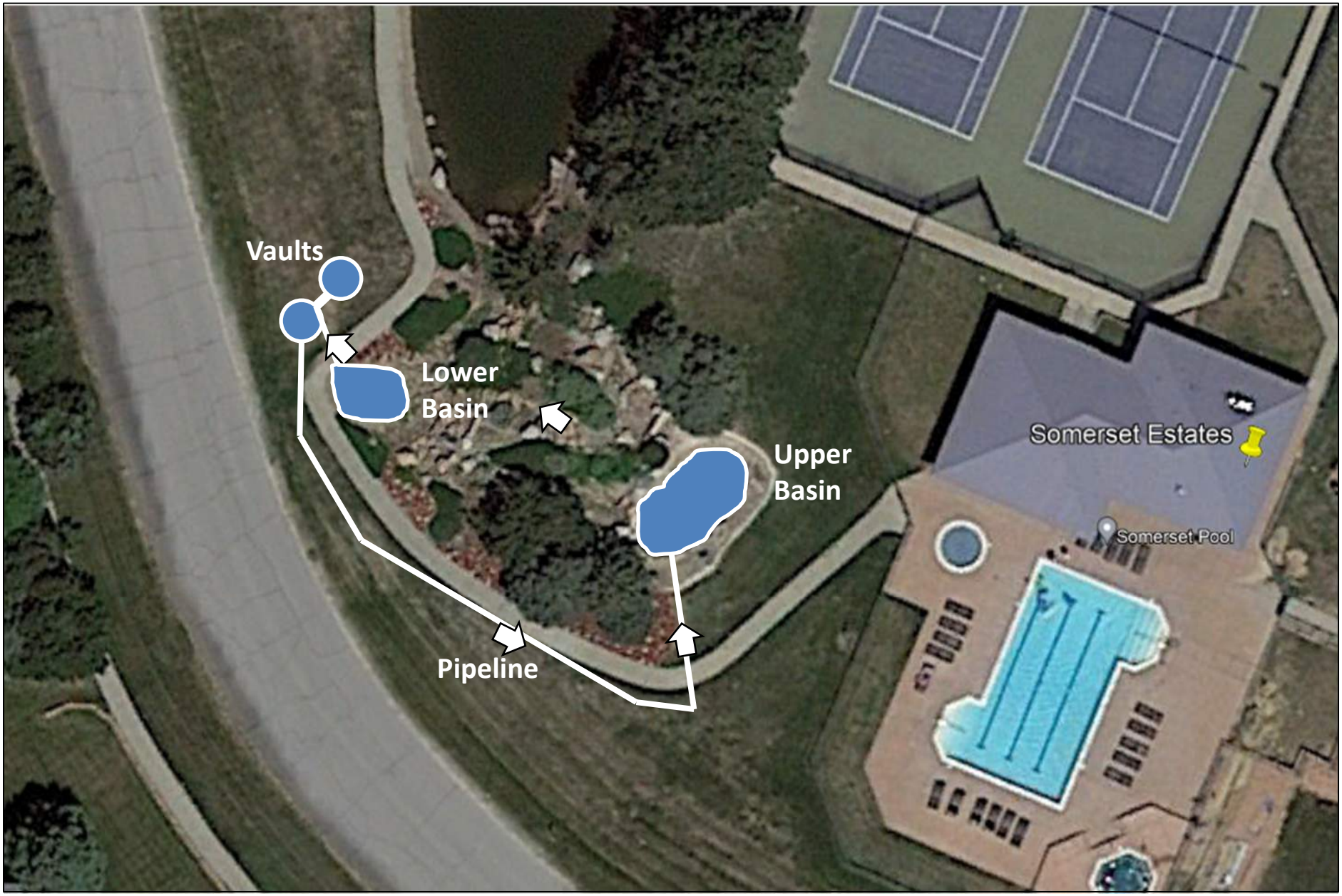

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FIGURE 6
VAULT LOCATION MAP FOR 800-GPM SYSTEM
SOMERSET PONDS IMPROVEMENTS

PRODUCT EXAMPLES

Goulds WS1512D4, Model 3888D4, WS_D4 Series, Sewage Pump, 1-1/2 HP, 230 Volts, 1 Phase, 4" Flanged Horizontal Discharge, 395 GPM Max, 28 ft Max Head, 20 ft Cord, Manual

SKU #: WS1512D4 **Brand: Goulds**

In Stock! (Ships Today !)

Free Shipping

Price:

MAP

LIST PRICE 4,346.30

Disclaimer: "See final price in cart"

Call Sales Counter !

Calculate Shipping

Ship Weight (208.00 lbs)

DESCRIPTION

FEATURES

Goulds 3888D4 Submersible Sewage Pump

This pump is designed for use on guide rail systems and base elbow disconnect systems fitted with vertical 125# ANSI flanges for horizontal discharge. It is capable of handling sewage containing non-abrasive 3 inch maximum solids.

Features

- Cast iron, two vane semi-iron, non-clog impeller with pump-out vanes for mechanical seal protection
- Heavy duty cast iron, volute type casing for maximum efficiency
- Volute type casing with 4", 125#, ANSI flanged, horizontal discharge. Compatible with A10-40 cast iron or A10-40B cast iron and brass (non-sparking) guide rail assembly
- Dual mechanical seals: silicon carbide vs. silicon carbide outer seal and ceramic vs. carbon inner seal, stainless steel metal parts, BUNA-N elastomers
- 300 series stainless steel shaft with keyed design
- 300 series stainless steel fasteners
- Capable of running dry temporarily without damage to seals or motor
- Built-in thermal overloads with automatic reset
- Built-in capacitor

Applications

Used in a variety of residential, commercial and industrial applications such as:

- Sewage systems
- Flood and pollution control
- Dewatering/effluent
- Farms
- Hospitals

- Trailer courts
- Motels

COMPATIBILITY

MANUALS

Goulds WS-D4 Series Submersible Sewage Pump Specifications.pdf

Goulds WS-D4 Series Submersible Sewage Pump Repair Parts.pdf

Goulds WS-D4 Series Submersible Sewage Pump Instructions.pdf

Goulds WS-D4 Series Submersible Sewage Pump Brochure.pdf

SPECIFICATIONS

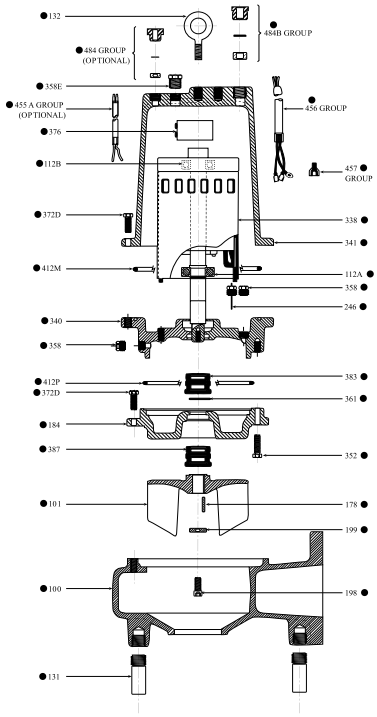
Brand	Goulds
Mfg. Number	WS1512D4
Model Number	3888D4
Series	WS D4
Product Type	Sewage pump
Application	Effluent/Sewage/Wastewater
Operation	Manual
Horsepower	1-1/2 HP
Voltage	230 Volts
Phase	1
Frequency	60 Hz
Speed	1750 RPM
Pump Casing	Cast iron
Impeller Type	Two vane, semi-open; non-clog
Impeller Diameter	6.25"
Discharge Size	4" 125# ANSI flange 8 bolt horizontal

Maximum Flow	395 GPM
Maximum Head	28 ft
Flow at 10 ft	395 GPM
Maximum Solids Handling	3"
Thermal Protection	Yes
Flow at 15 ft	320 GPM
Flow at 20 ft	230 GPM
Power Cord Length	20 ft
Flow at 25 ft	120 GPM
Locked Rotor Current	29.5 Amps
Maximum Working Pressure	30 PSI
Maximum Submergence	50 ft
Maximum Current	14.7 Amps
KVA Code	E
Full Load Motor Efficiency	70%
Resistance Start / Line-Line	1.4 / 1.8
Maximum Temperature (Continuos)	104°F
Maximum Temperature (Intermittent)	140°F

REPAIR PARTS

Repair Parts For:WS1512D4

VIEW PARTS MANUAL



REPAIR DIAGRAM

Goulds_Sewage_Pumps_WS_D4_Series_Repair_Parts.pdf

BUYERS GUIDES

The Goulds WS_D4 sewage pumps are sewage pumps designed to be used in conjunction with a guide rail 30B) or a base elbow disconnect system with 125# ANSI system flanges for horizontal discharge. Each of these to 3" maximum waste solids. These pumps are ideal for general sewage systems, flood and pollution control, fa courts and motels. General dewatering and effluent applications can also use this pump. These Goulds series pumps are used at a variety of application levels, including residential, commercial or industrial levels. This series is similar its cousin the Goulds WS_D3 series, except that the WS_D4 series can handle larger diameter waste solids. Each pump volute is made of heavy duty cast iron, while the shaft and fasteners are 300 series stainless steel. While these pumps are capable of running dry intermittently they perform best

while continuously submerged. The motor includes built-in thermal overloads with automatic reset and a built-in capacitor. Dual silicon carbide vs. silicon carbide seal faces, BUNA-N elastomers and an O-Ring ensure protection against leaks and contaminants. All in all, this is a well constructed and versatile sewage pump. All models listed below operate manually and include a 20 ft. power cord.

Goulds WS_D4 Sewage Pumps

Model Comparison Chart

Model Number	Discharge	Horsepower	Voltage	Phase	GPM	Max. Head
WS1512D4	4" Flanged Horiz.	1.5	230	1	395	28
WS1512D4M	4" Flanged Horiz.	1.5	230	1	360	18
WS1518D4M	4" Flanged Horiz.	1.5	208	1	360	18
WS1518D4	4" Flanged Horiz.	1.5	208	1	395	28
WS1532D4	4" Flanged Horiz.	1.5	230	3	395	28
WS1534D4M	4" Flanged Horiz.	1.5	460	3	360	18
WS1532D4M	4" Flanged Horiz.	1.5	230	3	360	18
WS1534D4	4" Flanged Horiz.	1.5	460	3	395	28
WS1538D4M	4" Flanged Horiz.	1.5	200	3	360	18
WS1538D4	4" Flanged Horiz.	1.5	200	3	395	28
WS2034D4	4" Flanged Horiz.	2	460	3	415	34
WS2032D4	4" Flanged Horiz.	2	230	3	415	
WS2038D4	4" Flanged Horiz.	2	200	3	415	
WS2012D4	4" Flanged Horiz.	2	230	1	415	
WS2018D4	4" Flanged Horiz.	2	208	1	415	

Performance Curve

Goulds 4NS13K3DC, 4NS Series, Sewage Pump, 7-1/2 HP, 230 Volts, 3 Phase, 4" Flanged Horizontal Discharge, 800 GPM Max, 51 ft Max Head, 25 ft Cord, Manual

SKU #: 4NS13K3DC **Brand: Goulds**

Available For Order! ((Usually Ships 3-5 Days))

Free Shipping

Price:

MAP

LIST PRICE 11,825.10

Disclaimer: "See final price in cart"

Call Sales Counter !

Calculate Shipping

Ship Weight (570.00 lbs)

DESCRIPTION

FEATURES

Goulds 4" Submersible Non-Clog Sewage Pump

This pump can handle sewage containing non-abrasive 3 inch maximum solids. Designed with a 4" 125# ANSI flanged discharge, this model is capable of bolting to a 4-inch wet pit guide rail or to a 4 x 6 guide rail connection.

Pump Features

- Cast iron, two vane closed design impeller for high efficiency and maximum wear life. Optional bronze impeller available
- Replaceable bronze wear ring to renew the running clearances and efficiencies to original conditions
- Heavy duty cast iron, volute type casing for maximum efficiency
- Designed for continuous operation
- Dual mechanical seal with 304 stainless steel metal parts, BUNA-N elastomers with carbon/rotary and ceramic/stationary faces standard for upper and lower seals
- 300 series stainless steel fasteners

Motor Features

- CSA certified motors (Canadian Standards Association)
- Motor shaft is a one-piece design of high strength 416 stainless steel
- Motors is air-filled and designed for continuous duty when fully submerged or for up to 15 minutes operation in air
- NEMA design "B" with copper windings
- Class "F" stator winding designed for inverter duty
- Two wire dual probe monitoring system constantly monitors seal oil chamber and stator housing for moisture. (C alarm circuit and alarm device)
- Two (2) normally-closed, automatic reset thermostats connected in series and embedded in adjoining phases
- Power and sensor cord is 25 feet standard length
- Motors conform to the latest applicable requirements of NEMA, IEEE, ANSI and NEC standards

- Class 10 quick trip overload protection must be provided in control panel

Applications

Heavy duty design makes this pump suitable for a wide range of commercial and industrial applications such as:

- Sewage systems
- Flood and pollution control
- Industrial dewatering
- Wastewater treatment plants
- Municipal and subdivision lift stations

COMPATIBILITY

MANUALS

Series NS-XD-SDX Five-Year Limited Warranty & Terms.pdf

4NS Submersible 4 Non-Clog Sewage Pump Engineering Data.pdf

4NS Submersible 4 Non-Clog Sewage Pump Brochure.pdf

Wastewater Pumps Dewatering, Effluent and Sewage Installation-Operation Manual.pdf

4NS Submersible Sewage Pumps Specifications.pdf

Sump, Effluent and Sewage Pump Repair Parts.pdf

4NS Sewage Pump Curve.pdf

SPECIFICATIONS

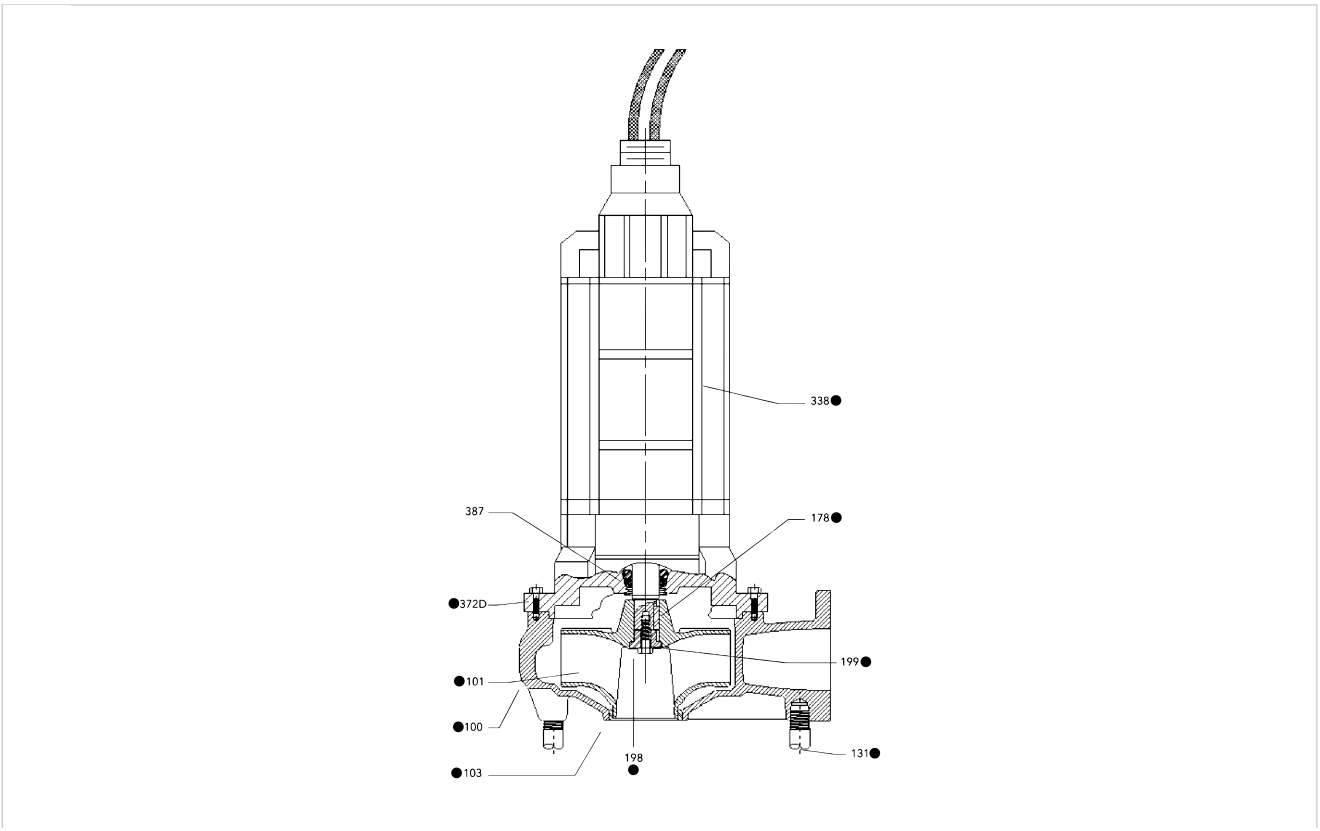
Brand	Goulds
Mfg. Number	4NS13K3DC
Series	4NS
Product Type	Sewage pump
Application	Commercial/Industrial sewage
Operation	Manual
Horsepower	7-1/2 HP

Voltage	230 Volts
Phase	3
Frequency	60 Hz
Speed	1150 RPM
Minimum Flow	100 GPM
Pump Casing	Cast iron
Impeller Type	Two vane; closed
Discharge Connection	4" 125# ANSI flanged 8 bolt
Impeller Diameter	10.12"
Impeller Material	Cast iron
Minimum Casing Thickness	5/16"
Casing Corrosion Allowance	1/8"
Maximum Flow	800 GPM
Maximum Head	51 ft
Maximum Solids Handling	3"
Thermal Protection	Control panel required
Impeller Code	D
Motor Enclosure	Cast iron
Service Factor	1.15
Full Load Current	23.0 Amps
Motor Shaft	416 stainless steel
Locked Rotor Current	114.4 Amps
Service Factor Current	26.4 Amps
Maximum Working Pressure	100 PSI
Motor Insulation Rating	Class "F"
Maximum Submergence	200 ft
KVA Code	G
Full Load Motor Efficiency	80.6%
Winding Resistance	0.513
Sensor Cable Size	18/5
Frame Size	210TY
Maximum Environment Temperature	104°F
Chord Length	25 ft
Power Cable Size	10/4

REPAIR PARTS

Repair Parts For:4NS13K3DC

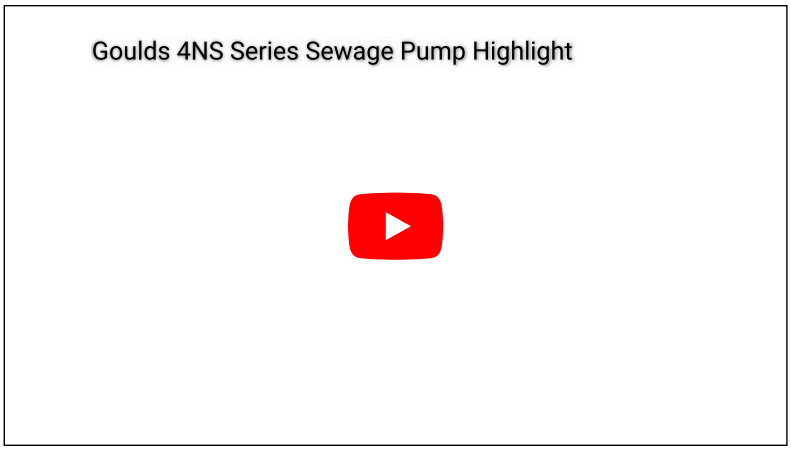
VIEW PARTS MANUAL



REPAIR DIAGRAM

Goulds_Sewage_Pumps_4NS_Series_Repair_Parts_6.pdf

BUYERS GUIDES



Pump Products is now carrying the Goulds 4NS series submersible non-clog sewage pumps. These sewage pumps have a 4" 125# ANSI flanged discharge which allows the pump to pass wastewater containing up to 3" non abrasive waste solids. This pump can also be connected to a 4" wet pit guide rail or to a 4 x 6 guide rail connection. These 4NS series heavy duty pumps can reach high capacities and high heads and are specifically designed for a wide range of commercial and industrial level applications, such as in sewage systems, industrial dewatering systems, wastewater treatment plants, municipal lift stations and flood control. This is accomplished by pairing a ruggedly constructed pump with a powerful high performance motor. The pump itself is cast iron with two vane closed impeller with a a replaceable bronze wear ring. A dual mechanical seal with 305 series stainless steel metal components, BUNA-N elastomers and carbon/rotary vs. ceramic/stationary faces ensures leak free performance. The motor is CSA certified one-piece shaft made of 416 stainless steel. Each motor is air-filled and designed for continuous duty when fully submerged but can also operate up to 15 minutes in the air. All pumps listed below operate manually and include a 25 ft. power cord.

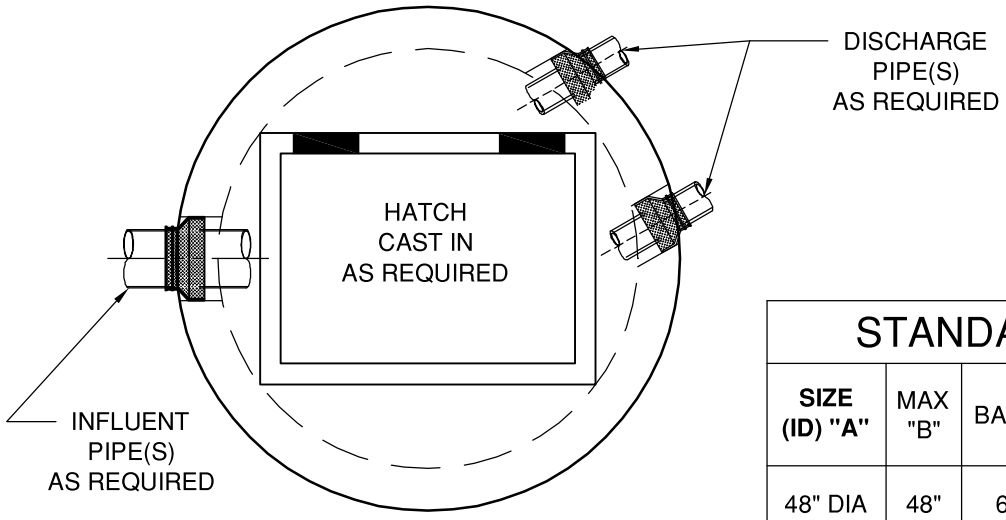
Goulds 4NS Series Sewage Pumps

Model Comparison Chart

Model	Discharge	Horsepower	Voltage	Phase	GPM	Max. Head
4NS12K4MC	4" Fl. Horiz.	7.5	460	3	900	55'
4NS12K3MC	4" Fl. Horiz.	7.5	230	3	900	55'
4NS12K2MC	4" Fl. Horiz.	7.5	200	3	900	
4NS12L3KC	4" Fl. Horiz.	10	230	3	950	
4NS12L4KC	4" Fl. Horiz.	10	460	3	950	
4NS12L2KC	4" Fl. Horiz.	10	200	3	950	67'

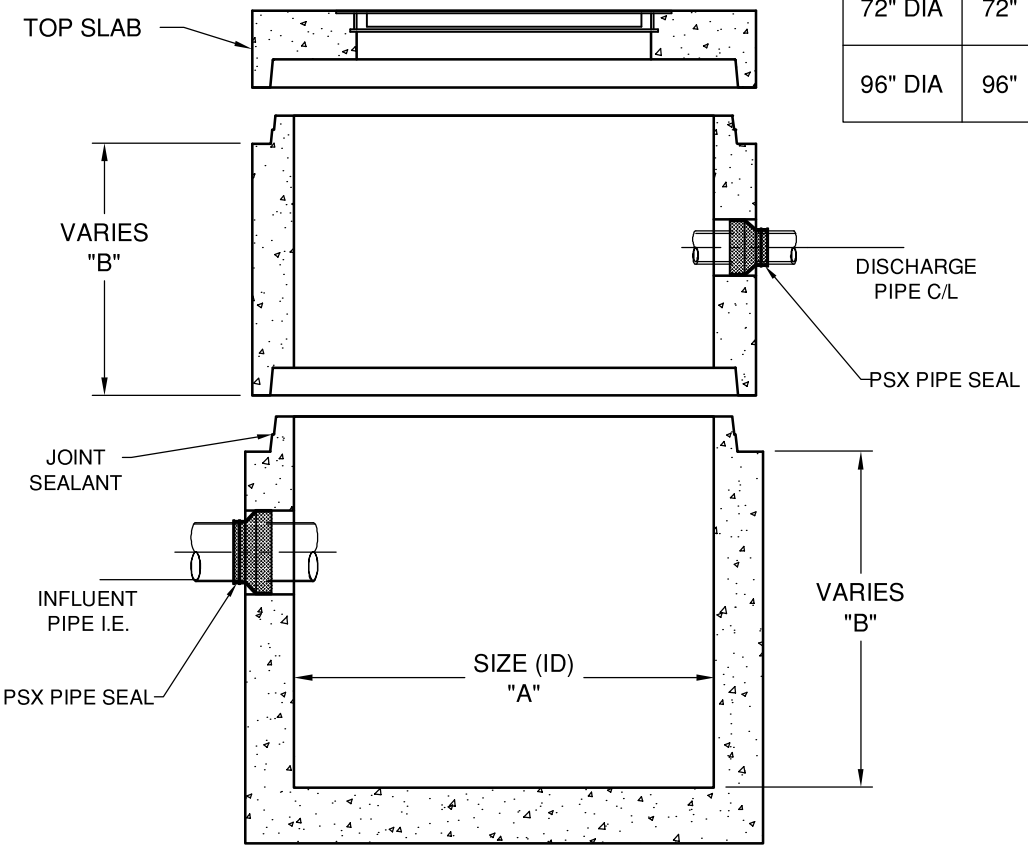
4NS13K3DC	4" Fl. Horiz.	7.5	230	3	800	51'
4NS13K4DC	4" Fl. Horiz.	7.5	460	3	800	51'
4NS13K2DC	4" Fl. Horiz.	7.5	200	3	800	51'
4NS13L4AC	4" Fl. Horiz.	10	460	3	930	62'
4NS13L3AC	4" Fl. Horiz.	10	230	3	930	62'
4NS13L2AC	4" Fl. Horiz.	10	200	3	930	62'
4NS12M3GC	4" Fl. Horiz.	15	230	3	1050	90'
4NS12M4GC	4" Fl. Horiz.	15	460	3	1050	90'
4NS12M2GC	4" Fl. Horiz.	15	200	3	1050	90'
4NS12N4EC	4" Fl. Horiz.	20	460	3	1100	105'
4NS12N3EC	4" Fl. Horiz.	20	230	3	1100	105'
4NS12N2EC	4" Fl. Horiz.	20	200	3	1100	105'
4NS12P4CC	4" Fl. Horiz.	25	460	3	1130	122'
4NS12P3CC	4" Fl. Horiz.	25	230	3	1130	122'
4NS12P2CC	4" Fl. Horiz.	25	200	3	1130	122'
4NS12Q4BC	4" Fl. Horiz.	30	460	3	1150	134'
4NS12Q3BC	4" Fl. Horiz.	30	230	3	1150	134'
4NS12Q2BC	4" Fl. Horiz.	30	200	3	1150	134'
4NS12R3AC	4" Fl. Horiz.	40	230	3	1160	140'
4NS12R2AC	4" Fl. Horiz.	40	200	3	1160	
4NS12R4AC	4" Fl. Horiz.	40	460	3	1160	

PERFORMANCE CURVES



PLAN VIEW

STANDARD SIZES				
SIZE (ID) "A"	MAX "B"	BASE	WALL	**MAX BASE WEIGHT**
48" DIA	48"	6"	5"	4,983# (866#/VF)
60" DIA	60"	7"	6"	9,212# (1,300#/VF)
72" DIA	72"	8"	7"	15,240# (1,800#/VF)
96" DIA	96"	12"	9"	36,000# (3,093#/VF)



SECTION VIEW

S & M PRECAST, INC.

"NPCA" CERTIFIED PLANT
16700 SIMA GRAY RD, HENRYVILLE, IN 47126
Phone: (812) 246-6258 Fax: (812) 294-4862

SPECIFICATIONS
CONCRETE: 4500 PSI @ 28 DAYS
REINFORCEMENT: ASTM A-615, GR 60
DESIGN LOAD: AASHTO HS-20 (HATCH PER SPECS)
DESIGN SPECIFICATION: ASTM C-478

WEIGHT: See Chart

LIFT STATION
4' DIA - 8' DIA

DATE: 1-20-16 DWG #LS-48-96