ASSOCIATED
LAND SURVEYORS
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Harbor View Estates

PUMP STATION
And
SPECIFICATIONS

ALSE JOB # 30147E

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HARBOR VIEW ESTATES

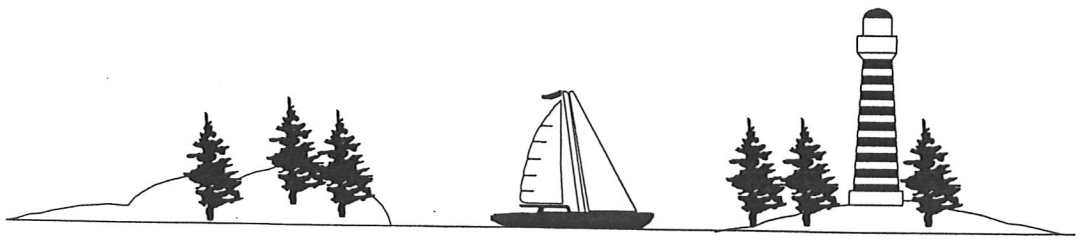
PUMP STATION
And
SPECIFICATIONS

ALSE JOB # 30147E

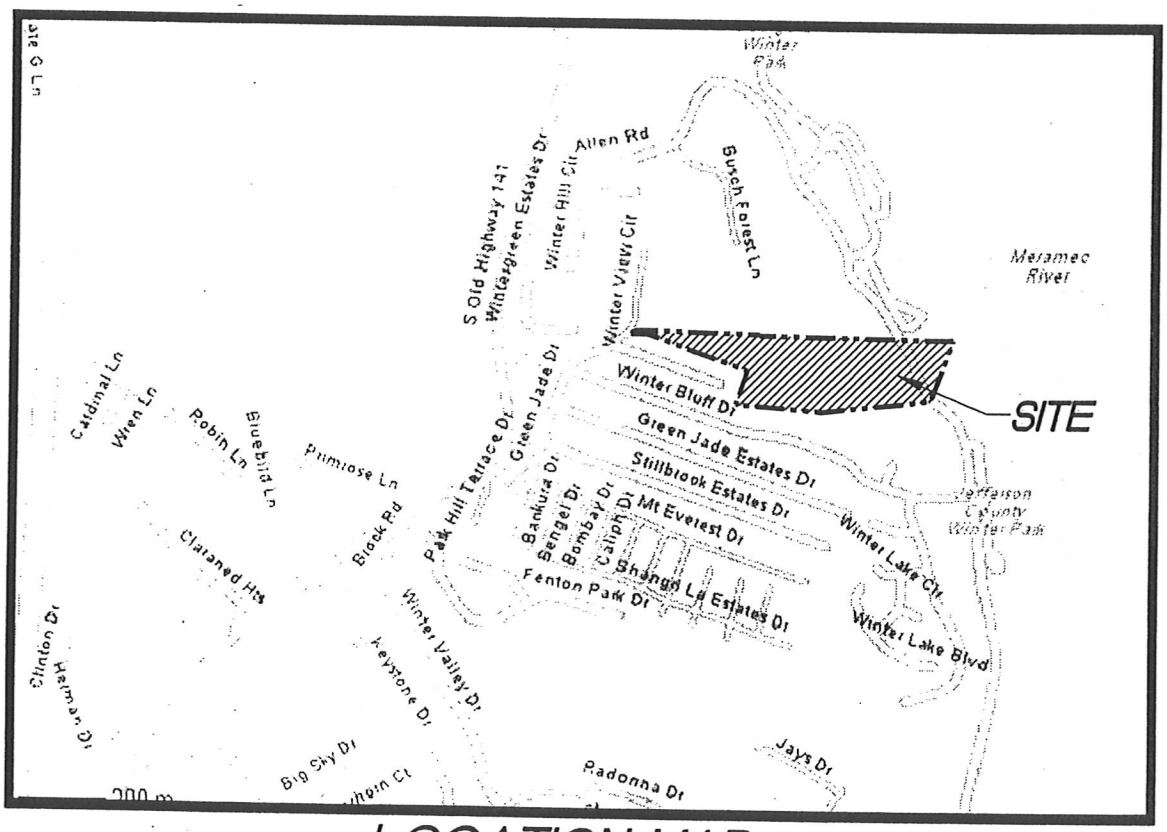
Date: September 26, 2007
Revised Date: December 27, 2007

Wintergreen Development
PO Box 1010
Fenton, MO 63026
(636) 343-9923

Prepared By:
Associated Land Surveyors and Engineers, Inc.
10550 Highway 21
Hillsboro, MO 63050
(636) 797-2283



HARBOR VIEW ESTATES



LOCATION MAP

1.1 SEWER SYSTEM INFORMATION

B. INTRODUCTION:

1 Introduction

The proposed Harbor View Estates Subdivision is a residential development consisting of 48 single family lots. The waste water of this subdivision is flowing to a lift station located within the development via a 3,147 lineal feet of 8 inch PVC gravity sewer. The pump station will convey sewage via a 3.0" PVC, schedule 40 force main to an existing manhole located in common ground near backyard of the proposed lot#40 of this development. This report will provide the engineering design and specifications necessary to construct this pump station and force main line.

2 Existing Sewer System

Existing manhole located in common ground near proposed lot#40 of this development.

3 Future Sanitary Sewer Services

There is no additional flow to this lift station.

E. DESIGN SUMMARY:

1 Average Daily Flow:

ADF = F + I where F = Population Equivalent Flow = Pe x 100
and I = Infiltration = Piping diameter (in.) x piping length (miles) x 200 (gal./in. dia./mi./day)

a) Average Daily Flow:

Pe =Nb x Np = 48 residential units x 3.7 persons per unit
Pe = 177.6 persons
F = 177.6 persons x 100 gallons/person/day = 17,760 gpd
I = 8in. X (3,147/5,280)mi. x 200 = 954 gpd
Total = 18,714 gpd
Or 13.00 gpm

2 Total Peak Daily Flow:

PDF = 4.0 x ADF = 4.0 x 18,714 gpd = 74,856 gpd
Or 51.98 gpm

3 Volume for 24 Hour Detention:

Not required for this project because a 50 KW natural gas electric generator will be installed as a second source of supplying power for this lift station.

4 Static Head:

The maximum elevation of the force main line = 494.00
The pump of shut off elevation = 410.45
Static Head = 494.00 – 410.45 = 83.55 (worst case)

5 Total Dynamic Head:

See Tables 5.1 and 5.2: Dynamic Head for best case and worst case conditions.

6 Selected Pump Manufacture's Information:

The pump selected is a Myers
Model WG50H-21-25, 5 HP, 6.00" Dia. Impeller
Submersible Grinder pump
Horsepower = 5.0 hp
3450 rpm
230 volt, 1phase
Optimum Discharge Rate
Worst case: 62 gpm @ 113 ft of head (1 pump)
77 gpm @ 126 ft of head (2 pumps)
Best case: 69 gpm @ 108 ft of head (1 pump)
92 gpm @ 121 ft of head (2 pumps)

7 Pump Cycle Times

Volume of wetwell (pump on – pump off) Vr = (25*3.14/4) (410.75-408.75)*7.481(gal/cf)
= 293.63 gal.

Flow Cycle Time of Worst Case of Average Daily Flow:
Tf (min) = Vr/ADF = 293.63/13.0 = 22.59 min.
Tp (min) = Vr/(CSR-ADF) = 293.63/(62.0-13.0) = 5.99 min.
Cycle Time = 2 (Tf+Tp) = 2 (22.59+5.99) = 57.16 min.

Flow Cycle Time of Worst Case of Peak Daily Flow:
Tf (min) = Vr/ADF = 293.63/51.98 = 5.65 min.
Tp (min) = Vr/(CSR-ADF) = 293.63/(62.0-51.98) = 29.30 min.
Cycle Time = 2 (Tf+Tp) = 2 (5.65+29.30) = 69.90 min.

8 Force Main Information

See Attached plan Sheets for plan and profile diagrammatic.

9 Buoyancy Calculations

See appendix for buoyancy calculations.

DESIGN SUMMARY

1 Total Average Daily Flow = 18,714 gpd

2 Total Peak Daily Flow = 51.98 gpm

3 Static Head Hsb 81.6' Hsw = 83.6'

4 Total Dynamic Head: TDHb = 108' TDHw= 113'

5 The pump selected is a Myers

Model WG50H-21-25, 5 HP, 6.00" Dia. Impeller
Submersible Grinder pump
Horsepower = 5.0 hp
3450 rpm
230volt, 1 phase
Optimum Discharge Rate
Worst case: 62 gpm @ 113 ft of head (1 pump)
Best case: 69 gpm @ 108 ft of head (1 pump)

6 Pump Cycle Times :

Average Daily Flow Cycle Time = 2 (Tf+Tp) = 2 (22.59+5.99) = 57.16 min.

Peak Daily Flow Cycle Time = 2 (Tf+Tp) = 2 (5.65+29.30) = 69.90 min.

7 Force Main Information:

See Attached plan sheets for Plan and Profile Diagram

8 Buoyancy Calculations:

See Appendix for buoyancy calculations.

TABLE 7.1 PUMP CYCLE TIMES

Harbor View Estates

Residential Pump Station Design Data.

Flows		
	ADF (gal/day)	18714
	or (gal/min)	13.00
	PDF (gal/min)	51.98
	case)	62
Elevations		
	Finished Floor Elevation	424.50
	Top Elevation	425.20
	Flowline Elevation In	416.20
	Flowline Elevation Out	421.78
	High Water Alarm	413.45
	Lag Pump On	412.95
	Lead Pump On	412.45
	Lead and Lag Pump Off	410.45
Volumes		
	Dia. of Pump Station (ft) (Equivalent	5.0000
	Storage per foot (gal)	146.81
	Normal Operating Volume (gal)	
	(Lead Pump On - Stop)	293.63
	Total Storage (Invert - Stop)(gal)	844.18
	Total Storage time at ADF (min.)	22.59
	Total Storage time at PDF (min.)	5.65
	Total Time - Alarm to overflow at PDF	33.19
Cycle Times		
	Flow (gpm)	13.00
	Pump on (min), Tp	5.99
	Pump off (min), Tf	22.59
	Cycle time (min) = 2*(Tp + Tf)	57.16
	Flow (gpm)	30.00
	Pump on (min), Tp	9.18
	Pump off (min), Tf	9.79
	Cycle time (min) = 2*(Tp + Tf)	37.93
	Flow (gpm)	40.00
	Pump on (min), Tp	13.35
	Pump off (min), Tf	7.34
	Cycle time (min) = 2*(Tp + Tf)	41.38
	Flow (gpm)	51.98
	Pump on (min), Tp	29.30
	Pump off (min), Tf	5.65
	Cycle time (min) = 2*(Tp + Tf)	69.91

Harbor View Estates

Residential Lift Station Design Data, Bouyancy Calculations

1 Ww = Weight of concrete wet well
2 Wf = Weight of concrete Bottom slab
3 We = Weight of earth backfill on footing
4 Wt = Ww + We + Wf (or weight of detention chambers and backfill overburden)
5 Ws = Weight of displaced water
6 Wt = Should be greater than Ws

1 Weight of Concrete Wet Well

Top Elevation =	425.20	
Bottom Elevation =	408.95	
Total Height	16.25	Ft.
Wt /Ft. of 5' Dia. Wet Wel	1,780.50	Lbs./Ft.
Wt. of 1 CY of Conc.	4,050.00	Lbs.
Wt. of Wet Well	32,983.13	Lbs.

2 Weight of Bottom Slab

Area of Base	31.47	Ft^2.
Thickness of Base	8	In.
Wt. Of Conc.	150	Lbs./CF
Wt. Of Base	3,147	Lbs.

3 Weight of Earth on Base

Area of Base		Ft^2.
Outside Area of Wet Well		Ft^2.
Wt of Soil	110	Lbs./CF
Weight of Earth	0	Lbs.

4 Weight Total

Wt = Ww + We + Wf (or weight of detention chambers and backfill overburden)

Wt = 36,130 Lbs.

5 Force Bouyant

Volume Displaced	559.37	Cu. Ft.
Weight of Water	62.4	Lbs./Cu. Ft.
Bouyant Force	34905	

6 Check Bouyancy

Wt		Fb	
36,130.13	>	34,904.53	OK

7 Total Bearing

Total Wt. of Station	Total Area of Base	Lbs/Sq. Ft.	
71,035 Lbs.	31.47 Sq. Ft.	2257.218	<3000 OK

APPENDIX - D3

HARBOR VIEW ESTATES

SYSTEM HEAD CALCULATIONS AND CURVES

Lift Station Information		Recipient Manhole Information	
Top Elev.	425.20	Flowllne in Elev.	475.31
Flowline in Elev.	416.20	Flowline out Elev.	475.31
Flowline out Elev.	421.78		
Alarm on Elev.	413.45	max elev	494.00
Lag pump On El.	412.95		
Lead pump On El.	412.45	H-W Coeff. **(Worst Case)**	120
Pump off Elev.	410.45		

Head Loss Due to Station Piping (5ft/sec) 3.77

Friction losses (per 100') = $0.2083(100/C)^{1.85} x Q^{1.85}/D^{4.8655}$

Minor losses = $H_L = C_L(V^2/2g)$

Flow input into system From Subdivision

ADF= 18,714 gpd (or) = 13.0 gpm

PDF= 52.0 gpm

Pipe Dia. 3.068 in.

Q flow rate gpm	d pipe diameter inches	C H-W Coeff.	L Len. Pipe	V Velocity In Pipe	Minor Head Losses this length	F Friction Head this length	Total System Head	Static Head Elev Pump On	System Head Pump on	Static Head Elev Pump off	System Head Pump off
0	3.068	120	1862	0.00	0.000	0.00	3.77	81.6	85.3	83.6	87.3
20	3.068	120	1862	0.87	0.077	3.02	6.86	81.6	88.4	83.6	90.4
25	3.068	120	1862	1.08	0.121	4.57	8.45	81.6	90.0	83.6	92.0
30	3.068	120	1862	1.30	0.174	6.40	10.34	81.6	91.9	83.6	93.9
35	3.068	120	1862	1.52	0.236	8.51	12.51	81.6	94.1	83.6	96.1
40	3.068	120	1862	1.74	0.309	10.89	14.97	81.6	96.5	83.6	98.5
45	3.068	120	1862	1.95	0.391	13.55	17.70	81.6	99.3	83.6	101.3
50	3.068	120	1862	2.17	0.483	16.46	20.71	81.6	102.3	83.6	104.3
55	3.068	120	1862	2.39	0.584	19.64	23.99	81.6	105.5	83.6	107.5
60	3.068	120	1862	2.60	0.695	23.07	27.53	81.6	109.1	83.6	111.1
65	3.068	120	1862	2.82	0.816	26.75	31.33	81.6	112.9	83.6	114.9
70	3.068	120	1862	3.04	0.946	30.68	35.39	81.6	116.9	83.6	118.9
75	3.068	120	1862	3.25	1.086	34.85	39.71	81.6	121.3	83.6	123.3
80	3.068	120	1862	3.47	1.235	39.27	44.27	81.6	125.8	83.6	127.8
85	3.068	120	1862	3.69	1.395	43.94	49.10	81.6	130.6	83.6	132.6
90	3.068	120	1862	3.91	1.564	48.84	54.16	81.6	135.7	83.6	137.7
95	3.068	120	1862	4.12	1.742	53.97	59.48	81.6	141.0	83.6	143.0
100	3.068	120	1862	4.34	1.930	59.35	65.04	81.6	146.6	83.6	148.6
105	3.068	120	1862	4.56	2.128	64.95	70.85	81.6	152.4	83.6	154.4
110	3.068	120	1862	4.77	2.336	70.79	76.89	81.6	158.4	83.6	160.4
115	3.068	120	1862	4.99	2.553	76.86	83.17	81.6	164.7	83.6	166.7

APPENDIX - D3
HARBOR VIEW ESTATES
SYSTEM HEAD CALCULATIONS AND CURVES

Lift Station Information		Recipient Manhole Information	
Top Elev.	425.20	Flowlne in Elev.	475.31
Flowline in Elev.	416.20	Flowline out Elev.	475.31
Flowline out Elev.	421.78		
Alarm on Elev.	413.45	max elev	494.00
Lag pump On El.	412.95		
Lead pump On El.	412.45	H-W Coeff. (Best Case)	150.00
Pump off Elev.	410.45		

Head Loss Due to Station Piping (5ft/sec 3.77

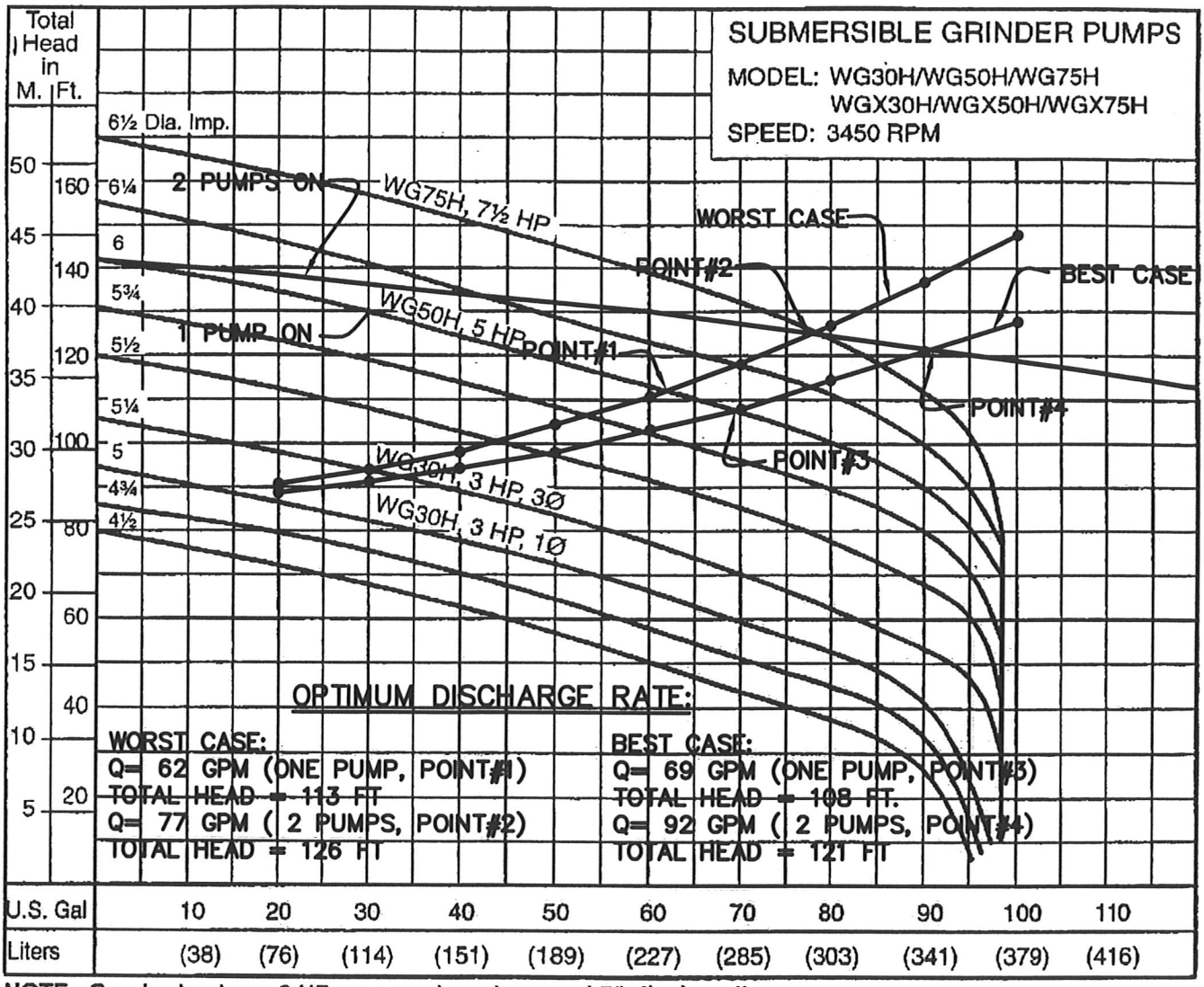
Friction losses (per 100') = $0.2083(100/C)^{1.85} x Q^{1.85}/D^{4.8655}$

Minor losses = $H_L = C_L(V^2/2g)$

Flow input into system
From
Subdivision
ADF= 18,714 gpd
PDF= 52.0 gpm
Pipe Dia. 3.068 in.

Q flow rate gpm	d pipe diameter inches	C H-W Coeff.	L Len. Pipe	V Velocity In Pipe	Minor Head Losses this length	F Friction Head this length	Total System Head	Static Head Elev Pump On	System Head Pump on	Static Head Elev Pump off	System Head Pump off
0	3.068	150	1862	0.00	0.000	0.00	3.77	81.6	85.3	83.6	87.3
20	3.068	150	1862	0.87	0.077	2.00	5.84	81.6	87.4	83.6	89.4
25	3.068	150	1862	1.08	0.121	3.02	6.91	81.6	88.5	83.6	90.5
30	3.068	150	1862	1.30	0.174	4.23	8.17	81.6	89.7	83.6	91.7
35	3.068	150	1862	1.52	0.236	5.63	9.63	81.6	91.2	83.6	93.2
40	3.068	150	1862	1.74	0.309	7.21	11.28	81.6	92.8	83.6	94.8
45	3.068	150	1862	1.95	0.391	8.96	13.12	81.6	94.7	83.6	96.7
50	3.068	150	1862	2.17	0.483	10.89	15.14	81.6	96.7	83.6	98.7
55	3.068	150	1862	2.39	0.584	13.00	17.34	81.6	98.9	83.6	100.9
60	3.068	150	1862	2.60	0.695	15.26	19.73	81.6	101.3	83.6	103.3
65	3.068	150	1862	2.82	0.816	17.70	22.28	81.6	103.8	83.6	105.8
70	3.068	150	1862	3.04	0.946	20.30	25.01	81.6	106.6	83.6	108.6
75	3.068	150	1862	3.25	1.086	23.07	27.92	81.6	109.5	83.6	111.5
80	3.068	150	1862	3.47	1.235	25.99	30.99	81.6	112.5	83.6	114.5
85	3.068	150	1862	3.69	1.395	29.08	34.24	81.6	115.8	83.6	117.8
90	3.068	150	1862	3.91	1.564	32.32	37.65	81.6	119.2	83.6	121.2
95	3.068	150	1862	4.12	1.742	35.72	41.23	81.6	122.8	83.6	124.8
100	3.068	150	1862	4.34	1.930	39.27	44.97	81.6	126.5	83.6	128.5
105	3.068	150	1862	4.56	2.128	42.98	48.88	81.6	130.4	83.6	132.4
110	3.068	150	1862	4.77	2.336	46.85	52.95	81.6	134.5	83.6	136.5
115	3.068	150	1862	4.99	2.553	50.86	57.18	81.6	138.7	83.6	140.7

Pump Performance



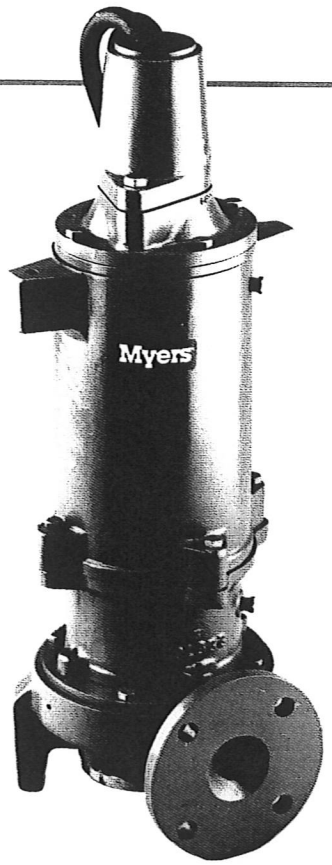
NOTE: On single phase 3 HP pumps, do not exceed 5" dia. impeller.

Available Models		Motor Electrical Data										
Standard	Explosion Proof	HP	Volts	Phase	Hertz	Start Amps	Run Amps	Run KW	Start KVA	Run KVA	NEC Code Letter	Service Factor
WG30H-21-25	WGX30H-21-25	3	230	1	60	82	21.0	4.3	41.9	4.8	G	1.4
WG30H-03-25	WGX30H-03-25	3	200	3	60	69	15.0	4.3	23.9	5.2	J	1.4
WG30H-23-25	WGX30H-23-25	3	230	3	60	53	13.0	4.3	21.1	5.2	H	1.4
WG30H-43-25	WGX30H-43-25	3	460	3	60	26	6.5	4.3	20.7	5.2	H	1.4
WG30H-53-25	WGX30H-53-25	3	575	3	60	21	5.2	4.3	21.0	5.2	H	1.4
WG50H-21-25	WGX50H-21-25	5	230	1	60	122	32	6.3	28.1	7.4	G	1.7
WG50H-03-25	WGX50H-03-25	5	200	3	60	90	21.6	6.3	31.1	7.5	G	1.7
WG50H-23-25	WGX50H-23-25	5	230	3	60	78	18.8	6.3	27.0	7.5	G	1.7
WG50H-43-25	WGX50H-43-25	5	460	3	60	39	9.4	6.3	31.0	7.5	G	1.7
WG50H-53-25	WGX50H-53-25	5	575	3	60	31	7.5	6.3	31.0	7.5	G	1.7
WG75H-03-25	WGX75H-03-25	7.5	200	3	60	90	25.8	7.9	31.1	8.9	D	1.15
WG75H-23-25	WGX75H-23-25	7.5	230	3	60	78	22.4	7.9	27.0	8.9	D	1.15
WG75H-43-25	WGX75H-43-25	7.5	460	3	60	39	11.2	7.9	31.0	8.9	D	1.15
WG75H-53-25	WGX75H-53-25	7.5	575	3	60	31	9.0	7.9	31.0	8.9	D	1.15

F. MANUFACTURES SPECIFICATIONS AND CUT-SHEETS.

WG30H-75H and WGX30H-75H

Standard (WG30H-75H) and
Explosion-proof (WGX30H-75H)
3-7½ HP, High-Head
Submersible Grinder Pumps



(WGX30H-75H only)

MYERS WG30H-75H ARE RUGGED 3-7½ HORSEPOWER SUBMERSIBLE CENTRIFUGAL GRINDER PUMPS DESIGNED FOR RESIDENTIAL, COMMERCIAL OR INDUSTRIAL APPLICATIONS. They are especially suited for use in pressure sewer applications or in systems with long discharge runs or high static heads. The WG30H-75H feature a heavy-duty cutter mechanism and recessed impeller design to efficiently grind typical sewage solids into a fine slurry.

The WG30H-75H grinder pumps are available in standard and U.L. Listed explosion-proof (WGX30H-75H), construction for use in Class 1, Group D hazardous locations.

WG30H-75H grinder pumps can be installed in a variety of packaged systems. Factory-assembled simplex or duplex packages with guide rail systems are available. Individual rail components are also available for installation in on-site concrete systems. F.E. Myers offers a complete line of submersible sump, sewage, effluent, grinder, non-clog wastewater pumps, controls, basins and accessories. For additional information, please contact your local Myers representative or the Myers Ashland, Ohio sales office at 419/289-1144.

ADVANTAGES BY DESIGN

IDEAL FOR USE IN PRESSURE SEWER SYSTEMS.

- Recessed impeller provides steep non-overloading operating curve.

DURABLE MOTOR WILL DELIVER MANY YEARS OF RELIABLE SERVICE.

- Oil-filled motor for maximum heat dissipation and constant bearing lubrication.
- Recessed impeller reduces radial bearing loads; increases bearing life.
- High-torque capacitor start single phase or three phase motors for assured starting under heavy load.
- Seal leak probes and on-winding heat sensors warn of seal leak condition, and stop motor if motor over heats. Helps prevent costly motor damage.

THE WG30H-75H ARE DESIGNED FOR EASY MAINTENANCE.

- Shredding ring and grinder impeller are replaceable without dismantling pump or motor.

PRODUCT CAPABILITIES

Capacities To	98 GPM	367 LPM
Heads To	170 ft.	52.0 m
Liquids Handling	domestic raw sewage	
Intermittent Liquid Temp.	up to 140°F	up to 60°C
Winding Insulation Temp. (Class F)	311°F	155°C
Motor Electrical Data (Single phase motors are capacitor start type. Myers control panels or panels or capacitor kits are required for proper operation and warranty.)	3450 RPM, 60 Hz 3-5 HP: 230V, 1 Ph 3-7½ HP: 208, 230, 460V, 3 Ph	
Std. Third Party Approvals Optional Approvals	CSA UL Class 1, Group D (WGX30H-75H only) file E68118	
Acceptable pH Range	6-9	
Specific Gravity	.9-1.1	
Viscosity	28-35 SSU	
Discharge (Flange Dim.)	2-1/2 in.	63.5 mm
Min. Sump Dia. (Simplex) (Duplex)	36 in. 48 in.	91.4 cm 121.9 cm

NOTE: Consult factory for applications outside of these recommendations.

Construction Materials	
Motor Housing, Seal Housing Cord Cap and Volute Case	cast iron, Class 30 ASTM A48
Impeller	recessed, bronze
Power Cord	25 ft. SOW/SOW-A
Control Cord	25 ft. SOW/SOWA
Mechanical Seals Standard Optional	double tandem, carbon and ceramic lower tungsten carbide
Pump, Motor Shaft	416 SST
Fasteners	300 Series SST
Shredding Ring and Grinder Impeller	440 SST, 58-60 Rockwell

WHERE INNOVATION MEETS TRADITION

ISO 9001 Registered Quality System

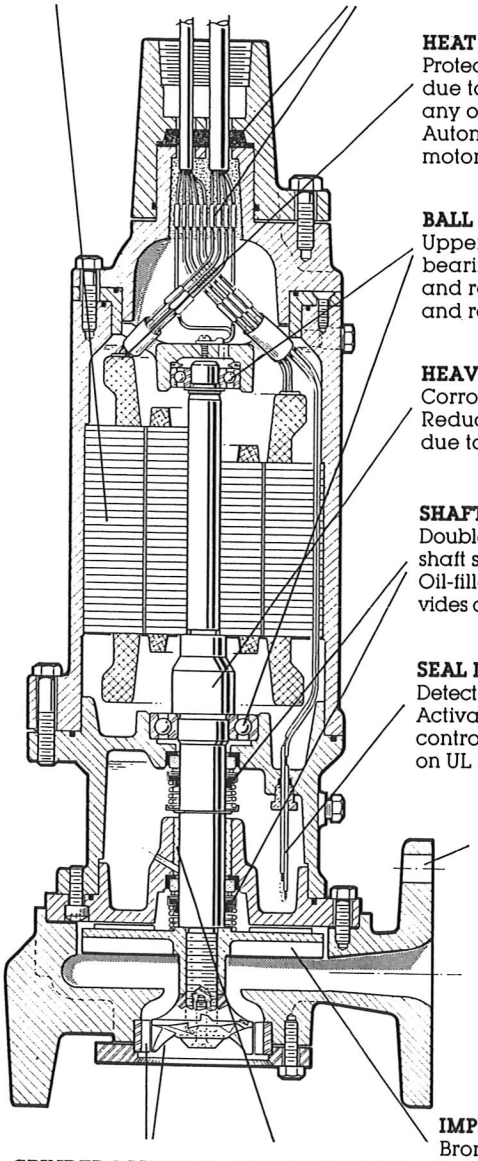
Myers®
Pentair Pump Group

WG30H-75H and WGX30H-75H

Standard (WG30H-75H) and
Explosion-proof (WGX30H-75H)
3-7 1/2 HP, High-Head
Submersible Grinder Pumps

STATOR
3450 RPM, 1 and 3 phase. Press fit for perfect alignment and best heat transfer. Oil-filled motor conducts heat and lubricates bearings.

CABLE ENTRY SYSTEM
Provides double seal protection. Cable jacket sealed by compression grommet. Individual wires sealed by epoxy potting.



HEAT SENSOR
Protects motor from burnout due to excessive heat from any overload condition. Automatically resets when motor has cooled.

BALL BEARINGS
Upper and lower ball bearings support shaft and rotor and take axial and radial loads.

HEAVY 416 SST SHAFT
Corrosion resistant. Reduces shaft deflection due to grinding loads.

SHAFT SEALS
Double tandem mechanical shaft seals protect motor. Oil-filled seal chamber provides continuous lubrication.

SEAL LEAK PROBES
Detect water in seal housing. Activates warning light in control panel. (Test resistor on UL Listed models.)

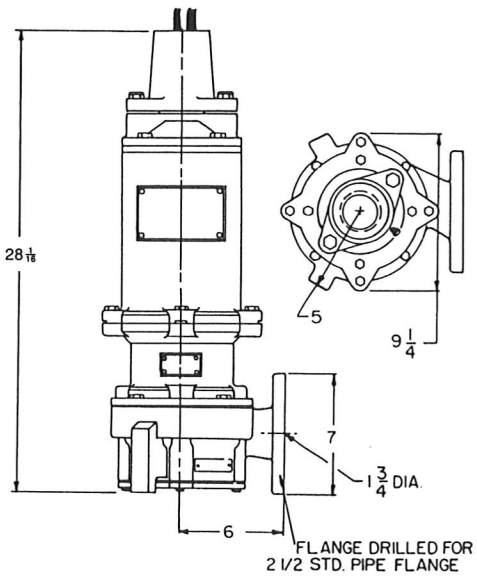
VOLUTE CASE
Cast iron; horizontal discharge. (Drilled for 2 1/2" pipe flange.

GRINDER ASSEMBLY
Grinder impeller and shredding ring are replaceable without dismantling pump. Constructed of 440 SST hardened to 56-60 Rockwell.

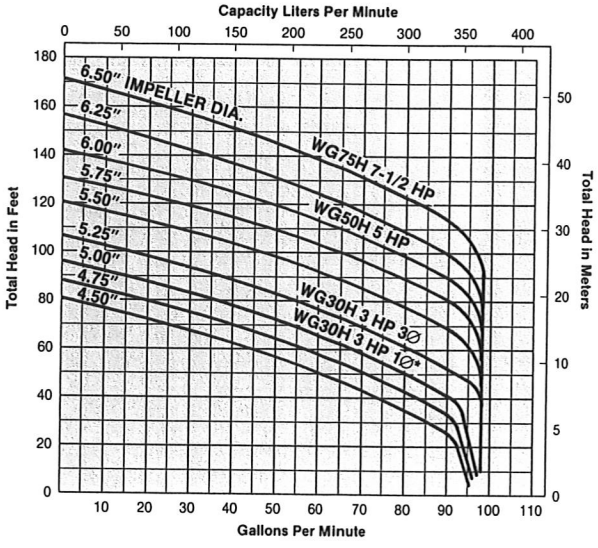
SLEEVE BEARING
Takes radial load; provides flame path. (UL listed pumps only.)

IMPELLER
Bronze recessed impeller handles ground slurry without clogging or binding. Provides unobstructed flow passage. Reduces radial loads. Pumpout vanes help keep trash from seal; reduces pressure at seal faces.

DIMENSIONS



PERFORMANCE CURVE



NOTE: On single phase 3 HP pumps do not exceed 5" diameter impeller.

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Pentair Pump Group

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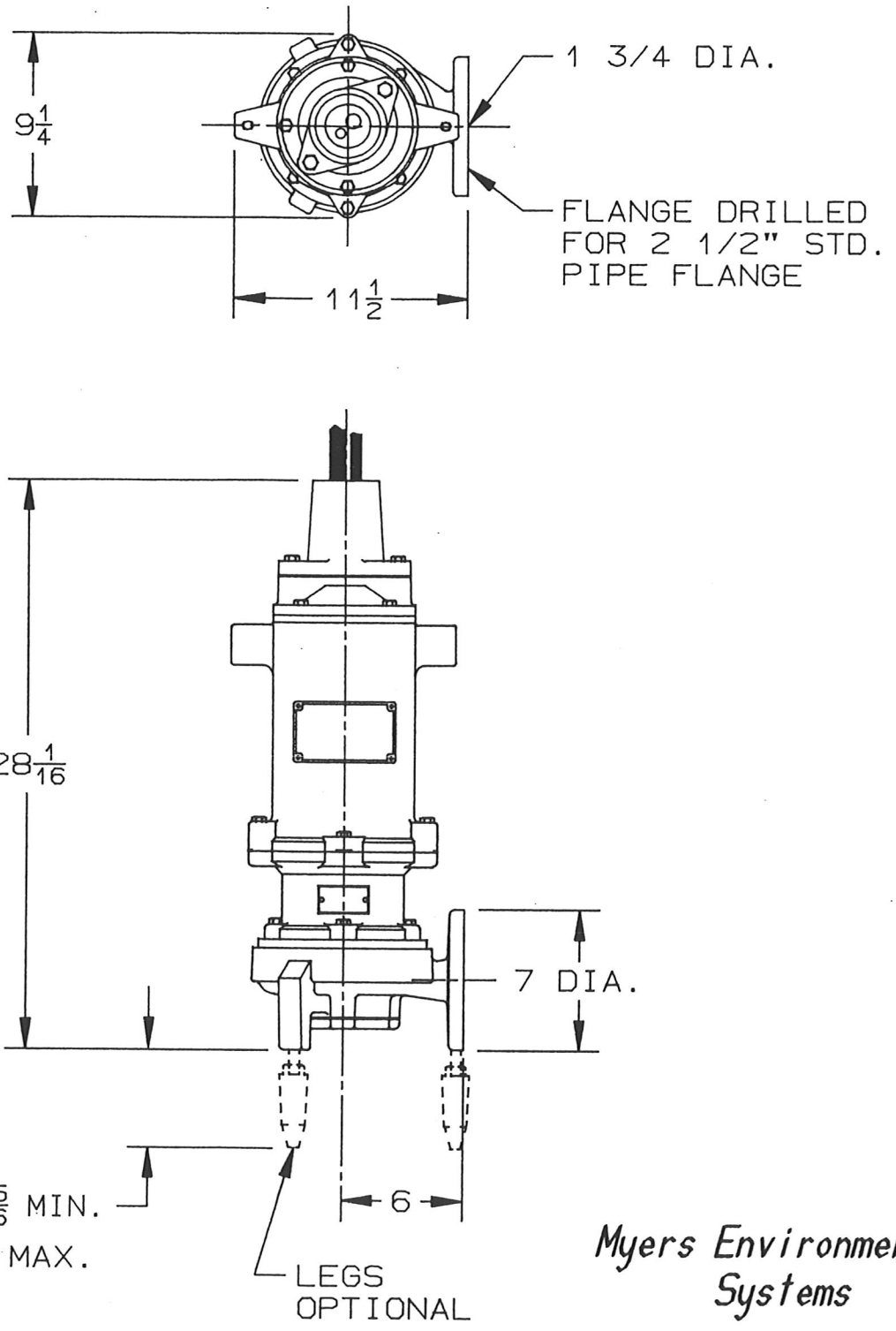

Myers Environmental Systems

WG30H, WG50H, WG75H, WGX30H, WGX50H, WGX75H GRINDER PUMPS

SE	2-95		ES-224

WG30-75H GRINDER PUMP SPECIFICATIONS

PUMP MODEL - Pump shall be of the centrifugal type Myers model WG50H or equal with an integrally built in grinder unit and submersible type motor. The grinder unit shall be capable of macerating all material in normal domestic and commercial sewage including reasonable amounts of foreign objects such as small wood, sticks, plastic, thin rubber, sanitary napkins, disposable diapers and the like to a fine slurry that will pass freely through the pump and 2" discharge pipe. Discharge shall be standard 2½" flange.

OPERATING CONDITIONS - Pump shall have a capacity of 67 GPM at a total head of 109 feet and shall use a 5 HP motor operating at 3450 RPM.

MOTOR - Pump motor shall be of the totally enclosed, submersible, squirrel cage induction type rated 5 horsepower at 3450 RPM, 60 Hz.

Motor shall be for single phase 230 volts X or three phase 200 volts_____, 230 volts_____, 460 volts_____ or 575 volts_____. Single phase motors shall be of capacitor start, capacitor run, NEMA L type. Three phase motors shall be NEMA B type.

Stator winding shall be of the open type with Class F insulation good for 155°C (311°F) maximum operating temperature. Winding housing shall be filled with a clean high dielectric oil that lubricates bearings and seals and transfers heat from windings and rotor to outer shell. Air-filled motors which do not have the superior heat dissipating capabilities of oil-filled motors shall not be considered equal.

Motor shall have two heavy duty ball bearings to support pump shaft and take radial and thrust loads and a sleeve guide bushing directly above the lower seal to take radial load and act as flame path for seal chamber. Ball bearings shall be designed for 50,000 hours B-10 life. Stator shall be heat shrunk into motor housing.

A heat sensor thermostat shall be attached to top end of motor winding and shall be connected in series with the magnetic contactor coil in control box to stop motor if motor winding temperature reaches 221°F. Thermostat to reset automatically when motor cools. Three heat sensors shall be used on 3 phase motors.

The common motor pump and grinder shaft shall be of #416 stainless steel threaded to take pump impeller and grinder impeller.

SEALS - Motor shall be protected by two mechanical seals mounted in tandem with a seal chamber between the seals. Seal chamber shall be oil filled to lubricate seal face and to transmit heat from shaft to outer shell.

Seal face shall be carbon and ceramic and lapped to a flatness of one light band. Lower seal faces shall be _____ carbide (optional).

A double electrode shall be mounted in the seal chamber to detect any water entering the chamber through the lower seal. Water in the chamber shall cause a red light to turn on at the control box. This signal shall not stop motor but shall act as a warning only, indicating service is required.

PUMP IMPELLER - The pump impeller shall be of the recessed Myers type to provide an open unobstructed passage through the volute for the ground solids. Impeller shall be of 85-5-5-5 bronze and shall be threaded onto stainless steel shaft. Enclosed or semi-open pump impellers which might become obstructed during grinding or add excessive radial loads shall not be considered as equal.

GRINDER CONSTRUCTION - Grinder assembly shall consist of a single rotating grinder impeller and a single stationary shredding ring mounted directly below pump volute inlet. Grinder impeller shall thread onto shaft and shall be locked with a screw and washer. Shredding ring shall be held in place by a steel retaining clamp. Both shredding ring and grinder impeller shall be removable without dismantling pump. No adjustment of grinder assembly shall be necessary for proper grinder operation. Multiple grinder impeller assemblies requiring initial or periodic axial adjustment for proper operation shall not be considered equal. Grinder impeller and shredding ring shall be made of 440C stainless steel hardened to 58-60 Rockwell.

CORROSION PROTECTION - All iron castings shall be pre-treated with phosphate and chromic rinse and to be painted before machining and all machined surfaces exposed to the sewage water to be re-painted. All fasteners to be 302 stainless steel.

BEARING END CAP - Upper motor bearing cap shall be a separate casting for easy mounting and replacement.

POWER CABLES - Power cord and control cord shall be double sealed. The power and control conductor shall be single strand sealed with epoxy potting compound and then clamped in place with rubber seal bushing to seal outer jacket against leakage and to provide for strain pull. Cords shall withstand a pull of 300 pounds to meet U.L. requirements.

Insulation of power and control cords shall be type SOOW. Both control and power cords shall have a green carrier ground conductor that attaches to motor frame.