



City of Oceanside  
Building Division  
300 N Coast Hwy  
Oceanside CA 92054  
Ph 760-435-3950  
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## Residential Sewage Ejection System for One Lot/Single Family Dwelling

The installation of a sewer ejection system must comply with the 2007 California Plumbing Code (see Article 710). Wherever practicable, ALL plumbing fixtures shall be drained to the public sewer or private sewage disposal system by gravity.

- 1) Provide three (3) sets of plans and specifications for the sewer ejection system to be installed. Include:
  - A. Manufacturer's installation instructions
  - B. Listings and cut sheet information
  - C. Show setback to property line
  - D. Location/elevation of pump/elevation at the point of connection to gravity drain.
  - E. Location of any required clean out(s).
- 2) Provide details relative to fittings to be used in discharge pipe and type of discharge pipe. Include:
  - A. Type and size of discharge pipe
  - B. Show details of the point of connection to the gravity drainage line
  - C. Show point of connection to the sump/tank, top or side
  - D. Material/specifications for backwater and gate valves
- 3) Show backfill material and masonry pit or other approved enclosure.
- 4) Provide complete details relative to venting.
- 5) Provide location of pump controller, source of power, wiring method used to provide power to the controller and the method of running cable from the pump to the controller.
- 6) Building drains or building sewers receiving discharge from any pump or ejector shall be adequately sized to prevent overloading. Two (2) fixture units shall be allowed for each gallon per minute flow.
  - A. Provide pump-sizing calculations
  - B. Provide the total amount of fixture units
  - C. Provide the system capacity based on fixture units served and the total dynamic head pressure (total dynamic head in feet is the total resistance in piping network, which one is pumping against). The pump must be capable of pumping to the highest vertical point in the system. Pumps receiving the discharge from water closets or urinals shall have a pump discharge capacity of not less than 20 gallons per minute.
  - D. Complete City of Oceanside Sewage System Sizing and Selection Worksheet, or if applicable the Grinder Pump Sizing and Selection Worksheet.
- 7) Provide details of the exact location of the installation on the property in relationship to the building. Note: Location of receptor and containment must be a sufficient distance from the building foundation to avoid any surcharge or designed to withstand such surcharge.



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## SEWAGE SYSTEM SIZING AND SELECTION WORKSHEET

PIPE MAT'L _____ SIZE _____		
FITTINGS	QTY.	SIZE
CHECK VALVE	_____	_____
90° ELBOW	_____	_____
45° ELBOW	_____	_____
GATE VALVE	_____	_____
TEE	_____	_____
OTHER	_____	_____

**CONTROLS**  
AUTOMATIC \_\_\_\_\_  
NONAUTO \_\_\_\_\_  
N-PAK \_\_\_\_\_  
E-PAK \_\_\_\_\_  
ALARM \_\_\_\_\_  
SINGLE FLT. SW. \_\_\_\_\_  
DOUBLE FLT. SW. \_\_\_\_\_  
OTHER \_\_\_\_\_

**COVER**  
SIMPLEX \_\_\_\_\_ DUPLEX \_\_\_\_\_  
VENT SIZE \_\_\_\_\_  
DISCHARGE SIZE \_\_\_\_\_  
INSPECTION PLATE \_\_\_\_\_

**PUMP MODEL** \_\_\_\_\_  
VOLTAGE \_\_\_\_\_  
PHASE \_\_\_\_\_  
CAST IRON \_\_\_\_\_  
PLASTIC \_\_\_\_\_  
BRASS \_\_\_\_\_  
CORD LG. \_\_\_\_\_ FT.  
OTHER \_\_\_\_\_

**LOCATION:**  
INDOOR \_\_\_\_\_  
OUTDOOR \_\_\_\_\_

**TOTAL PIPE LENGTH** \_\_\_\_\_ FT.

**CHECK VALVE** \_\_\_\_\_ IN.

**HUB SIZE** 4" STD.

**LOCATE HUB(S)** \_\_\_\_\_ IN.

**G.P.M. N** \_\_\_\_\_  
**-OR-**  
**F.U.** \_\_\_\_\_

**BASIN DIA.** \_\_\_\_\_ IN.

**BASIN DEPTH** \_\_\_\_\_ IN.

**SEWER PRESSURE** \_\_\_\_\_ P.S.I.

**TOTAL STATIC HEAD** \_\_\_\_\_ FT.

# SEWAGE SYSTEM SIZING AND PUMP SELECTION WORKSHEET

To begin, fill in the shaded areas on the front side. A calculator and additional sheet of paper may be required.

- STEP #1** Determine the type and quantity of each plumbing fixture. Multiply each by its fixture unit values in Figure "A", Sum these values \_\_\_\_\_ Determine GPM from Figure "B". \_\_\_\_\_ GPM (1)
- STEP #2** Refer to Figure "C". Based on the System's discharge piping size, determine the minimum GPM listed for that size. \_\_\_\_\_ GPM (2)
- STEP #3** Select the greater of the two GPM values in #1 & #2. This is your Design GPM. If greater than maximum GPM listed in figure, "B", contact factory. \_\_\_\_\_ GPM (3)
- STEP #4** Multiply each pipe fitting by its equivalent length value shown in figure "D" and sum. \_\_\_\_\_ Ft. (4)
- STEP #5** Total pipe length from front side. \_\_\_\_\_ Ft. (5)
- STEP #6** Add #4 & #5 [(4)+(5)=(6)] \_\_\_\_\_ Ft. (6)
- STEP #7** Divide #6 by 100 and multiply it by the associated friction value from Figure "E". This is the total Friction Head. \_\_\_\_\_ Ft. (7)
- STEP #8** Determine static head in Ft., as shown on front side, from minimum water level to the discharge point. \_\_\_\_\_ Ft. (8)
- STEP #9** Sewer Pressure, if any, expressed in feet (PSI x 2.31). \_\_\_\_\_ Ft. (9)
- STEP #10** Add #7, #8, #9, [(7)+(8)+(9)=(10)]. This is the system's Total Dynamic Head (TDH). \_\_\_\_\_ Ft. (10)
- STEP #11** Select the Pump:  
Determine solids handling requirement (2" and above)  
Select pump from curves shown on FM0269 & FM0995.  
Base selection on design values **[#3 & #10]**  
Required voltage source \_\_\_\_\_ (Model No.)  
\_\_\_\_\_ (Volts/Phase)
- STEP #12** Select type of contro:  
☐ Simplex ☐ Duplex  
If simplex:  
☐ Mechanical switch ☐ Single float switch  
☐ Dual float switch ☐ Alarm  
If duplex:  
☐ Mechanical Alternator ☐ Electrical Alternator
- STEP #13** Select Basin Size:  
Refer to Figure "F" and FM 0541 \_\_\_\_\_ in X \_\_\_\_\_ in  
(diam.) (Depth)
- STEP #14** Select Basin Cover:  
☐ One Pump ☐ Dual Pump  
Vent Pipe Size \_\_\_\_\_ in.  
Discharge Pipe Size \_\_\_\_\_ in.

Final Notes:

- 1) Consult Factory in any application where TDH is less than 5' **[#10]**.
- 2) Pump must be capable of providing the minimum required GPM for pipe size, Figure "C", at the calculated TDH **[#10]**.
- 3) Pump's lock valve must be greater than system's highest point.

**FIGURE A**  
**PLUMBING FIXTURE UNIT VALUES\***

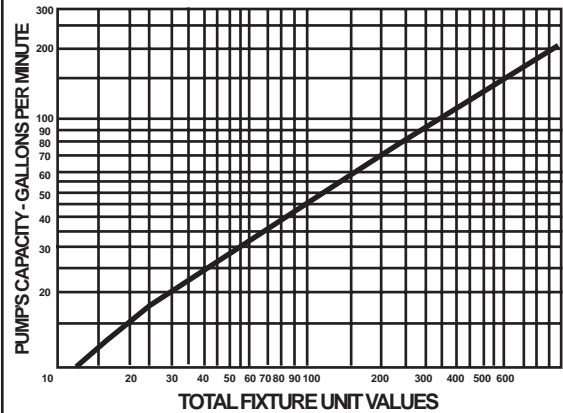
Fixture Description	Fixture Unit Valve	Fixture Description	Fixture Unit Valve
Bathtub, 1-1/2" trap	2	Sink, service type	3
Bathtub, 2" trap	3	Sink, scultery	4
Bidet, 1-1/2" trap	3	Sink, surgeons	3
Dental unit or cuspidor	1	Swimming pool (per 100 gallons)	1
Drinking fountain	1	Urinal	4****
Dishwasher, domestic	2	Washing machine	2
Kitchen sink	2	Water closet	3****
Kitchen sink with disposal	3	Water softener	4
Lavatory, 1-1/2" trap	1	Unlisted fixture, 1-1/4" trap	2
Lavatory, barbar/beautician	2	Unlisted fixture, 1-1/2" trap	3
Laundry tray	2	Unlisted fixture, 2" trap	4
Shower	2	Unlisted fixture, 2-1/2" trap	5
Shower, group (per head)	3	Unlisted fixture, 3" trap	6
Bathroom group consisting of lavatory, bathtub or shower and water closet			6****

Graph data is taken from ASPE Handbook, Uniform Plumbing Code, Cameron Hydraulic Data and Platic Pipe Institute.

\*\*Add 4 fixture units for each flush valve fixture

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**FIGURE B**  
**PUMP CAPACITY based on total Fixture Units\***



**FIGURE C\***

Pipe Size	Minimum GPM
2"	21
2 1/2"	30
3"	46
4"	78

**FIGURE D\***

Friction factors for pipe fittings in terms of equivalent feet of straight pipe

Nominal Pipe Size	90 Elbow	45 Elbow	Tee (Thru-flow)	Tee Branch flow	Swing Check Valve	Gate Valve
2"	5.2	2.8	3.5	10.3	17.2	1.4
2 1/2"	6.2	3.3	4.1	12.3	20.6	1.7
3"	7.7	4.1	5.1	15.3	25.5	2.0
4"	10.0	5.0	7.0	22.0	33.0	2.3

**FIGURE E\***

**FRICITION HEAD IN FEET PER 100 OF SCHEDULE 40 PIPE**

	2"		2 1/2"		3"		4"	
GPM	Plastic	Steel	Plastic	Steel	Plastic	Steel	Plastic	Steel
20	0.73	1.55	0.31	0.65				
25	1.10	2.34	0.47	0.99				
30	1.55	3.28	0.65	1.38				
35	2.06	4.37	0.87	1.84	0.30	0.64		
40	2.64	5.59	1.11	2.35	0.39	0.82		
45	3.28	6.95	1.38	2.93	0.48	1.02		
50	3.99	8.45	1.66	3.56	0.58	1.24		
60	5.59	11.8	2.35	4.99	0.82	1.73		
70	7.44	15.8	3.13	6.64	1.09	2.31	0.29	0.70
80	9.52	20.2	4.01	8.50	1.38	2.95	0.37	0.79
90			4.99	10.8	1.73	3.67	0.46	0.98
100			6.06	12.8	2.11	4.47	0.56	1.19
125			9.18	19.5	3.19	6.75	0.85	1.80
150					4.47	9.46	1.19	2.52
175					5.95	12.3	1.58	3.36
200							2.30	4.30
225							2.56	5.35
250							3.07	6.50
300							4.30	9.11

**FIGURE F\* (Check Fm0541 for Simplex & Duplex Information)**

	Recommended BASIN Diameters				
GPM	18"	24"	30"	36"	48"
20					
25					
30					
35					
40					
45					
50					
60					
70					
80					
90					
100					
125					
150					
175					
200					
225					
250					

# GRINDER PUMP SIZING AND SELECTION WORKSHEET

CONTROLS (840 ONLY)	
	SIMPLEX    DUPLEX
AUTO REVERSING	<input type="checkbox"/> <input type="checkbox"/>
MANUAL REVERSING	<input type="checkbox"/> <input type="checkbox"/>
NON-REVERSING	<input type="checkbox"/> <input type="checkbox"/>

PIPE MAT'L	SIZE
FITTINGS	QTY.    SIZE
CHECK VALVE	_____
90° ELBOW	_____
45° ELBOW	_____
GATE VALVE	_____
TEE	_____
OTHER	_____

ASSEMBLY TYPE	INDOOR	OUTDOOR
PRE-PACKAGED	<input type="checkbox"/>	<input type="checkbox"/>
FIELD ASSEMBLED	<input type="checkbox"/>	<input type="checkbox"/>

Diagram illustrating the grinder pump system components and dimensions:

- LOCATE HUB(S)**: \_\_\_\_\_ IN.
- G.P.M. N** \_\_\_\_\_  
**-OR-**  
**F.U.** \_\_\_\_\_
- PUMP MODEL 820**  
Automatic ☐  
Nonautomatic ☐
- ALARM** ☐
- PUMP MODEL 840** ☐
- VOLTAGE** \_\_\_\_\_
- PHASE** \_\_\_\_\_
- TOTAL PIPE LENGTH** \_\_\_\_\_ FT.
- SEWER PRESSURE** \_\_\_\_\_ P.S.I.
- TOTAL STATIC HEAD** \_\_\_\_\_ FT.
- BASIN DEPTH** \_\_\_\_\_ IN.
- OFF POINT**
- BASIN DIA.** \_\_\_\_\_ IN.

## GRINDER PUMP SIZING AND SELECTION WORKSHEET

To begin, fill in the shaded areas on the front side. A calculator and additional sheet of paper may be required.

- STEP #1** Determine the type and quantity of each plumbing fixture. Multiply each by its fixture unit values in Figure "A".  
Sum these values \_\_\_\_\_.
- STEP #2** Determine GPM from Figure "B". \_\_\_\_\_ GPM (1)
- STEP #3** Refer to Figure "C". Based on the System's discharge piping size, determine the minimum GPM listed for that size. \_\_\_\_\_ GPM (2)
- STEP #4** Select the greater of the two GPM values in #1 & #2. This is your design GPM. If greater than maximum GPM listed in Figure "B", contact factory. \_\_\_\_\_ GPM (3)
- STEP #5** Multiply each pipe fitting by its equivalent length value shown in Figure "D" and sum. \_\_\_\_\_ Ft. (4)
- STEP #6** Total pipe length from front side. \_\_\_\_\_ Ft. (5)
- STEP #7** Add #4 & #5. [(4)+(5)=(6)] \_\_\_\_\_ Ft. (6)
- STEP #8** Divide #6 by 100 and multiply it by the associated friction value from Figure "E". This is the total Friction Head. \_\_\_\_\_ Ft. (7)
- STEP #9** Determine static head in Ft., as shown on front side, from minimum water level to the discharge point. \_\_\_\_\_ Ft. (8)
- STEP #10** Sewer Pressure, if any, expressed in feet (PSI x 2.31). \_\_\_\_\_ Ft. (9)
- STEP #11** Add #7, #8, & #9. [(7)+(8)+(9)=(10)]. This is the system's Total Dynamic Head. (TDH) \_\_\_\_\_ Ft. (10)
- STEP #12** Select the Grinder Pump:  
Select grinder pump from FM1478 (820) or FM1232 (840).  
Base selection on design values, #3 & #10. \_\_\_\_\_ (Part No.)  
Required voltage source. \_\_\_\_\_ (Volts/Phase)
- STEP #13** Select type of control, basin size, and type of assembly from FM1232

Final Notes:

- 1) Consult factory in any application where TDH is less than 5' #10.
- 2) Consult factory in those applications where the performance requirement exceeds the capability of the Model 840 Grinder.
- 3) Pump must be capable of providing the minimum required GPM for pipe size, Figure "C", at the calculated TDH #10.
- 4) Pump's lock valve must be greater than system's highest point.

**FIGURE A**

### PLUMBING FIXTURE UNIT VALUES\*

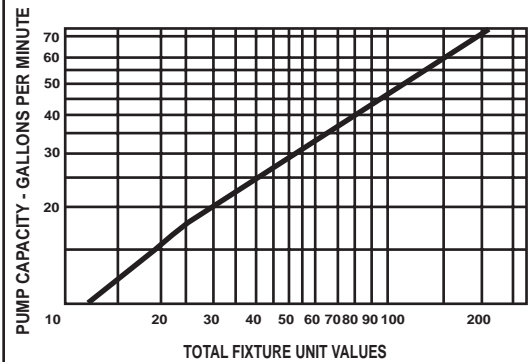
Fixture Description	Fixture Unit Valve	Fixture Description	Fixture Unit Valve
Bathtub, 1-1/2" trap	2	Sink, service type	3
Bathtub, 2" trap	3	Sink, scultery	4
Bidet, 1-1/2" trap	3	Sink, surgeons	3
Dental unit or cuspidor	1	Swimming pool (per 100 gallons)	1
Drinking fountain	1	Urinal	4****
Dsiwasher, domestic	2	Washing machine	2
Kitchen sink	2	Water closet	3****
Kitchen sink with disposal	3	Water softener	4
Lavatory, 1-1/2" tray	1	Unlisted fixture, 1-1/4" trap	2
Lavatory, barbar/beautician	2	Unlisted fixture, 1-1/2" trap	3
Laundry tray	2	Unlisted fixture, 2" trap	4
Shower	2	Unlisted fixture, 2-1/2" trap	5
Shower, group (per head)	3	Unlisted fixture, 3" trap	6
Bathroom group consisting of lavatory, bathtub or shower and water closet	6****		

Graph data is taken from ASPE Handbook, Uniform Plumbing Code, Cameron Hydraulic Data and Platic Pipe Institute.

\*\*Add 4 fixture units for each flush valve fixture

**FIGURE B**

### PUMP CAPACITY based on total Fixture Units\*



**FIGURE C\***

Pipe Size	Minimum GPM
1 1/4"	10
1 1/2"	13
2"	21

**FIGURE D\***

### FRICTION FACTORS FOR PIPE FITTINGS IN TERMS OF EQUIVALENT FEET OF STRAIGHT PIPE

Nominal Pipe Size	90 Elbow	45 Elbow	Tee Branch flow	Swing Check Valve	Gate Valve
1 1/4"	3.5	1.8	6.9	11.5	0.9
1 1/2"	4.0	2.2	2.7	13.4	1.1
2"	5.2	2.8	10.3	17.2	1.4

**FIGURE E\***

### FRICTION HEAD IN FEET PER 100' OF SCHEDULE 40 PLASTIC PIPE

	1 1/4"	1 1/2"	2"
GPM	Plastic	Plastic	Plastic
10	1.45	0.68	0.20
12	2.03	0.96	0.28
15	3.06	1.45	0.43
18	4.29	2.03	0.60
21	5.75	2.71	0.80
25	7.89	3.73	1.10
30	11.1	5.22	1.55
35	14.7	6.95	2.06
40	---	8.90	2.64
45	---	11.1	3.28
50	---	13.45	3.99
60	---	---	5.59
70	---	---	7.44