



**COUNTY OF SAN DIEGO**  
**DEPARTMENT OF ENVIRONMENTAL HEALTH**  
**PERCOLATION TEST REPORT**

DEH Control #: \_\_\_\_\_

Date: \_\_\_\_\_

Activity Code: \_\_\_\_\_

Assessor's Parcel Number: 679-040-07-00 Map # \_\_\_\_\_ LOT \_\_\_\_\_

Site Address: 6 acres on Golden Eagle Trail in San Marcos, CA

Owner: Ben Williams Phone: 760-815-1400

Mailing Address: 5810 El Camino Real, Ste D, Carlsbad 92008 bwremx@gmail.com

| Test Hole # | Test Depth | Stabilized Rate | Test Hole # | Test Depth | Stabilized Rate | Average Perc Rate      |
|-------------|------------|-----------------|-------------|------------|-----------------|------------------------|
| 1           | 4ft        | 133             | A           | 1ft        | 17              | 4ft: 132mpi (unusable) |
| 2           | 4ft        | 128             | B           | 1ft        | 17              |                        |
| 3           | 4ft        | ng; gophers     | C           | 1ft        | 26              |                        |
| 4           | 4ft        | 134             |             |            |                 | 1ft: 20mpi             |

**TYPE OF SOIL:**

NE Corner Surface: surface through 22 feet, light brown sandy clayey silt

SW-facing slope: surface through 3 feet, brown sandy silt, rocky

Depth to Refusal: (none) Depth to Groundwater: 21.9 feet

**RECOMMENDATIONS:**

The 1200gallon septic tank volume requirement and additional, secondary treatment is provided by a Supplemental Treatment System (STS). The STS selected is a 750 GPD Norweco Singulair TNT. An oversized (1000gallon) pump/"dosing" tank, will exceed a full day's estimated flow, 600 gallons. (See attachments.) Pressurized drip release using automated timers and valving will take place over area per San Diego's Local Agency Management Program (LAMP): 20mpi dictates an application rate of 0.657gpd/sf; 4br's daily flow, 600gpd; required area is  $600/0.657 = 913\text{sf}$ , met with a 26x36ft rectangle and identical reserve adjoining.

Proposed Structure: 4br house

**WATER SUPPLY:**

Source of Potable Water: Vallecitos Water District

*I have reviewed this percolation data and design of the subsurface sewage disposal system for this parcel and find the data and design to be accurate and in compliance with state and local regulations, and good engineering practice.*

Registered CE, PE, Geologist, REHS: Marc Boogay, RCE, [marc@boogay.com](mailto:marc@boogay.com)  
1584 Whispering Palm Dr., Oceanside 760.407.4000 July 20, 2020



**FOR DEPARTMENT USE ONLY**

Approved: Yes \_\_\_ No \_\_\_ Date: \_\_\_\_\_

Specialist: \_\_\_\_\_

Building Plan Review: \_\_\_\_\_

Grading Inspection: \_\_\_\_\_

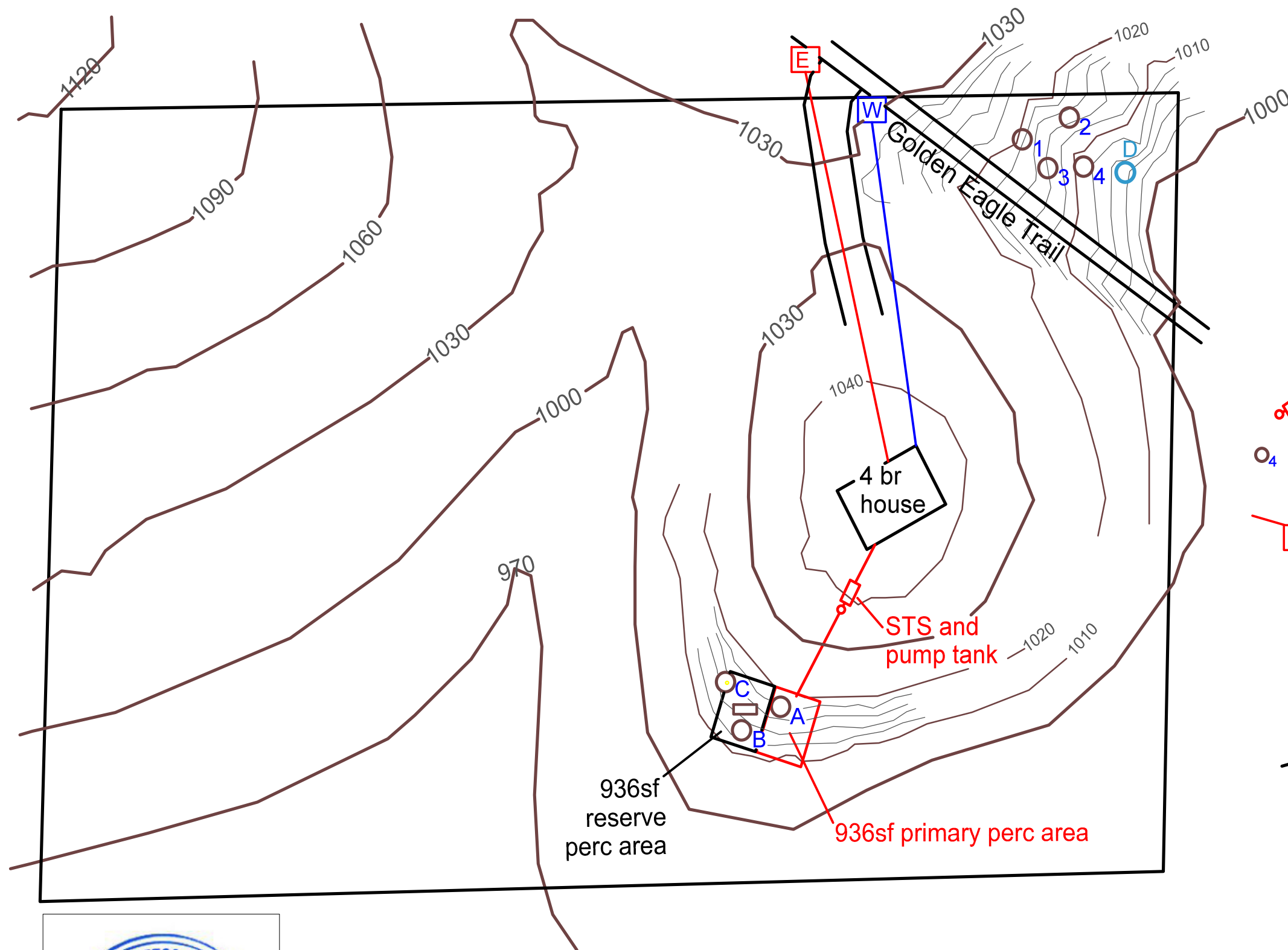
Water Sample Analysis Results: \_\_\_\_\_

Final Map Required: Yes \_\_\_ No \_\_\_

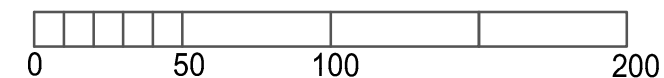
Date: \_\_\_\_\_

Date: \_\_\_\_\_

Date: \_\_\_\_\_



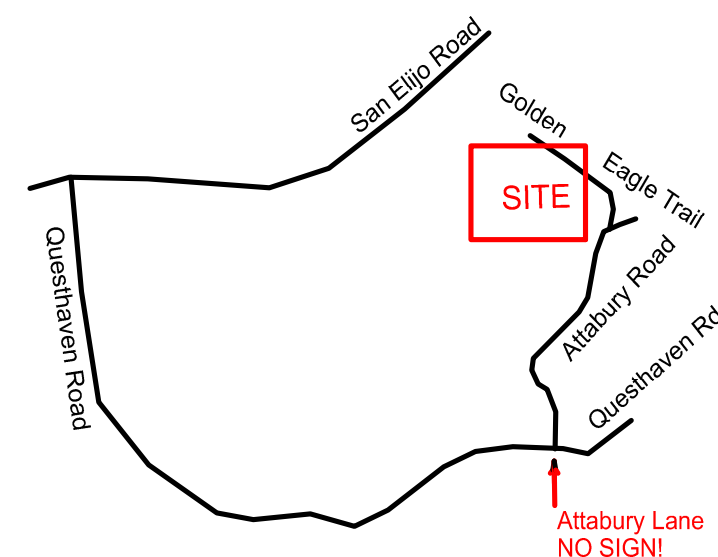
issued as .pdf  
1in = 60ft if  
printed 11x17,  
landscape-orientation



## LEGEND

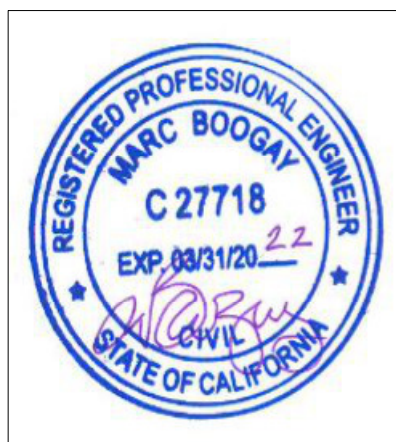
-  perc test hole / deep hole
-  3ft pit hand dug to verify soil thickness
-   electrical supply, water supply

## VICINITY MAP



## SOURCES, OTHER NOTES:

Topo, aboveground features per Client; no DEH file found.



## PERC TEST POINTS, SEPTIC LAYOUTS

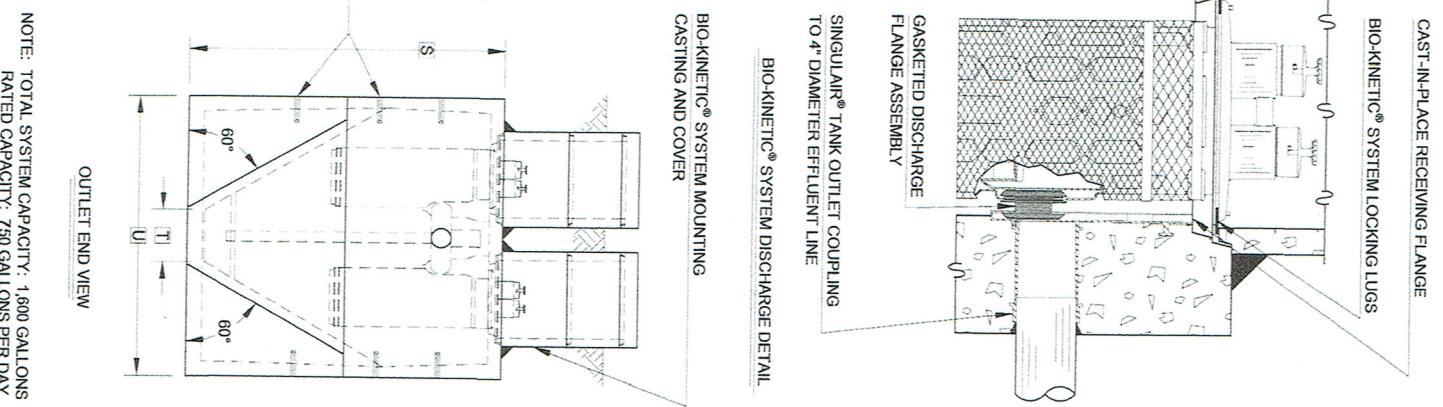
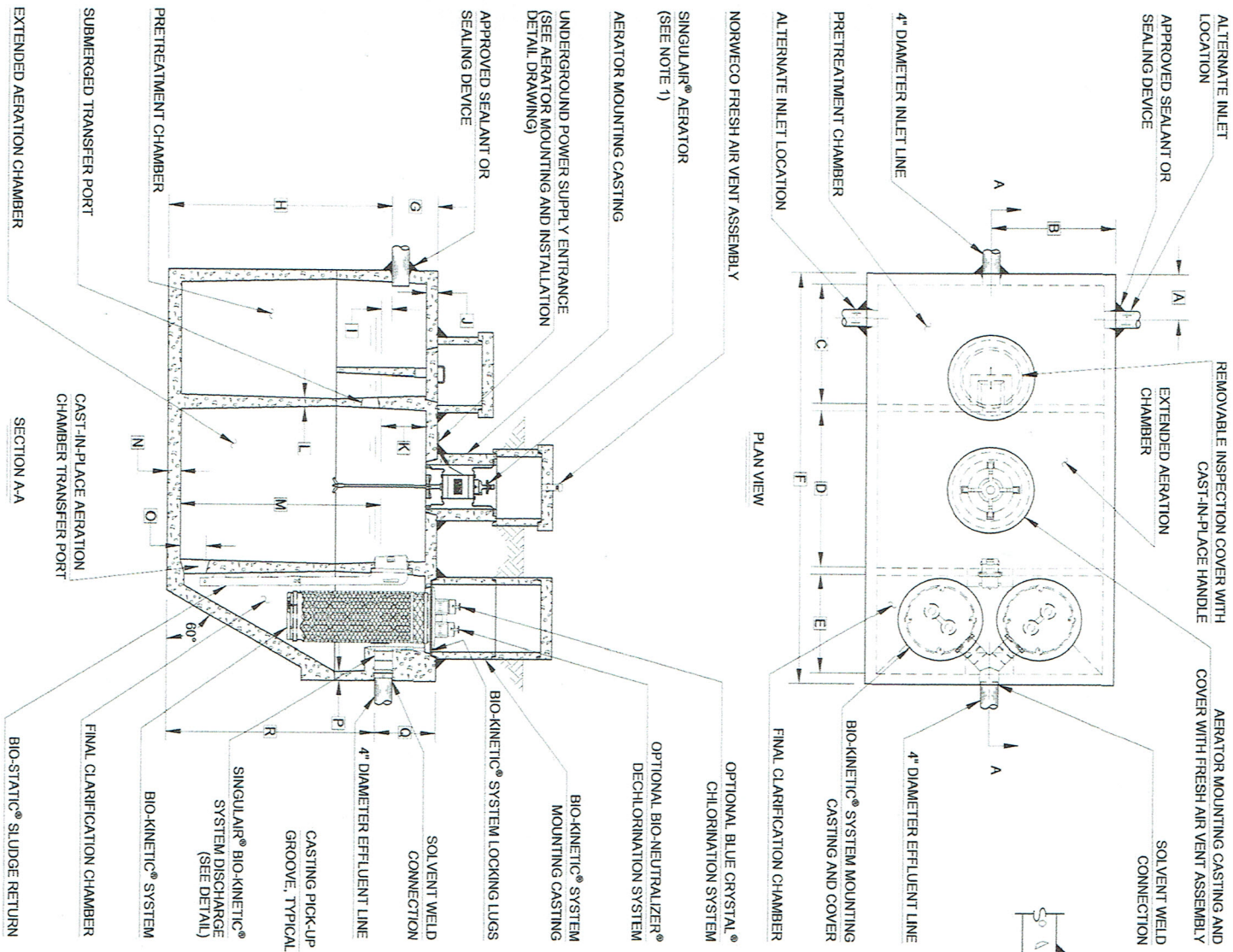
### Golden Eagle Trl 6-acres, APN 679-040-07-00

for San Diego DEH  
Marc Boogay Consulting Engineer RCE27718 July 20, 2020

perc tests; holes drilled & presoaked. date July 8 time 12noon Golden Eagle Trail  
holes flooded and set with calibrated release from 5-gallon pails design for 4 bedroom house  
perc test performed July 9, 10 am; bottles empty, no water present in holes  
holes refilled over 4-hour period beginning 22.5 hrs after start of presoak  
Sandy clayey silty med. brown, full depth of all holes; rocks prevented drilling beyond 22ft (refusal)

|                                           |     |                           |        |     |    |    |    |
|-------------------------------------------|-----|---------------------------|--------|-----|----|----|----|
| depth, feet                               | 4   | 4                         | 4      | 4   | 1  | 1  | 1  |
| test hole name                            | 1   | 2                         | 3      | 4   | A  | B  | C  |
| terminal percolation rate                 | 133 | 128 ng, gophers           |        | 134 | 17 | 17 | 26 |
| AVERAGE PERCOLATION RATE for 4-ft holes   |     | 132 min/in                | (fail) |     |    |    |    |
| for 1-ft holes                            |     | 20 min/in                 |        |     |    |    |    |
| 20mpi chosen for app rate per lamps chart |     | 0.657 gal/day/square-foot |        |     |    |    |    |
| 600gpd/0.657gpd/sf=                       |     | 913 square feet           |        |     |    |    |    |
| selected as a rectangle,                  |     | 26x36 feet                |        |     |    |    |    |
| septic tank                               |     | 1200.0 gallon             |        |     |    |    |    |

Refusal @ 22' for groundwater hole  
groundwater at 21.9ft



- GENERAL NOTES:**
1. SINGULAR® AERATOR, AS TESTED AND ACCEPTED BY NSF, OPERATING 60 MINUTES ON / 60 MINUTES OFF.
  2. FALL THROUGH SINGULAR® PLANT FROM INLET INVERT TO OUTLET INVERT IS FOUR INCHES. INLET INVERT IS TWELVE INCHES BELOW TANK TOP.
  3. ON DEEPER INSTALLATIONS, PRECAST RISERS MUST BE USED TO EXTEND AERATOR MOUNTING CASTING AND BIO-KINETIC® SYSTEM MOUNTING CASTING TO GRADE. INSPECTION COVER ON PRETREATMENT CHAMBER MUST BE DEVELOPED TO WITHIN TWELVE INCHES OF GRADE.
  4. TANK REINFORCED PER ACI STD. 318.
  5. REMOVABLE COVERS ON RISERS WEIGH IN EXCESS OF SEVENTY-FIVE POUNDS EACH TO PREVENT UNAUTHORIZED ACCESS.
  6. CONTACT THE LOCAL, LICENSED SINGULAR® DISTRIBUTOR FOR ELECTRICAL REQUIREMENTS.

**PROJECT ENGINEER'S APPROVAL:**  
I (WE) HEREBY CERTIFY THAT THIS DRAWING HAS BEEN CHECKED AND IS APPROVED FOR USE IN CONFORMITY WITH THE CONTRACT DOCUMENTS.

DATE: \_\_\_\_\_

NAME: \_\_\_\_\_

**CONTRACTOR'S CERTIFICATION:**  
I (WE) HEREBY CERTIFY THAT THIS DRAWING HAS BEEN CHECKED AND IS APPROVED FOR USE IN CONFORMITY WITH THE CONTRACT DOCUMENTS.

DATE: \_\_\_\_\_

NAME: \_\_\_\_\_

| CRITICAL DIMENSIONS |              |
|---------------------|--------------|
| A) 1'-0"            | N) 0'-3"     |
| B) 2'-9"            | O) 0'-6"     |
| C) 2'-8"            | P) 0'-2 1/2" |
| D) 3'-7"            | Q) 1'-4"     |
| E) 2'-3"            | R) 5'-8"     |
| F) 9'-3"            | S) 7'-0"     |
| G) 1'-0"            | T) 1'-0"     |
| H) 6'-0"            | U) 5'-6"     |
| I) 0'-3"            | V) _____     |
| J) 0'-3"            | W) _____     |
| K) 1'-0"            | X) _____     |
| L) 0'-2"            | Y) _____     |
| M) 5'-6"            | Z) _____     |

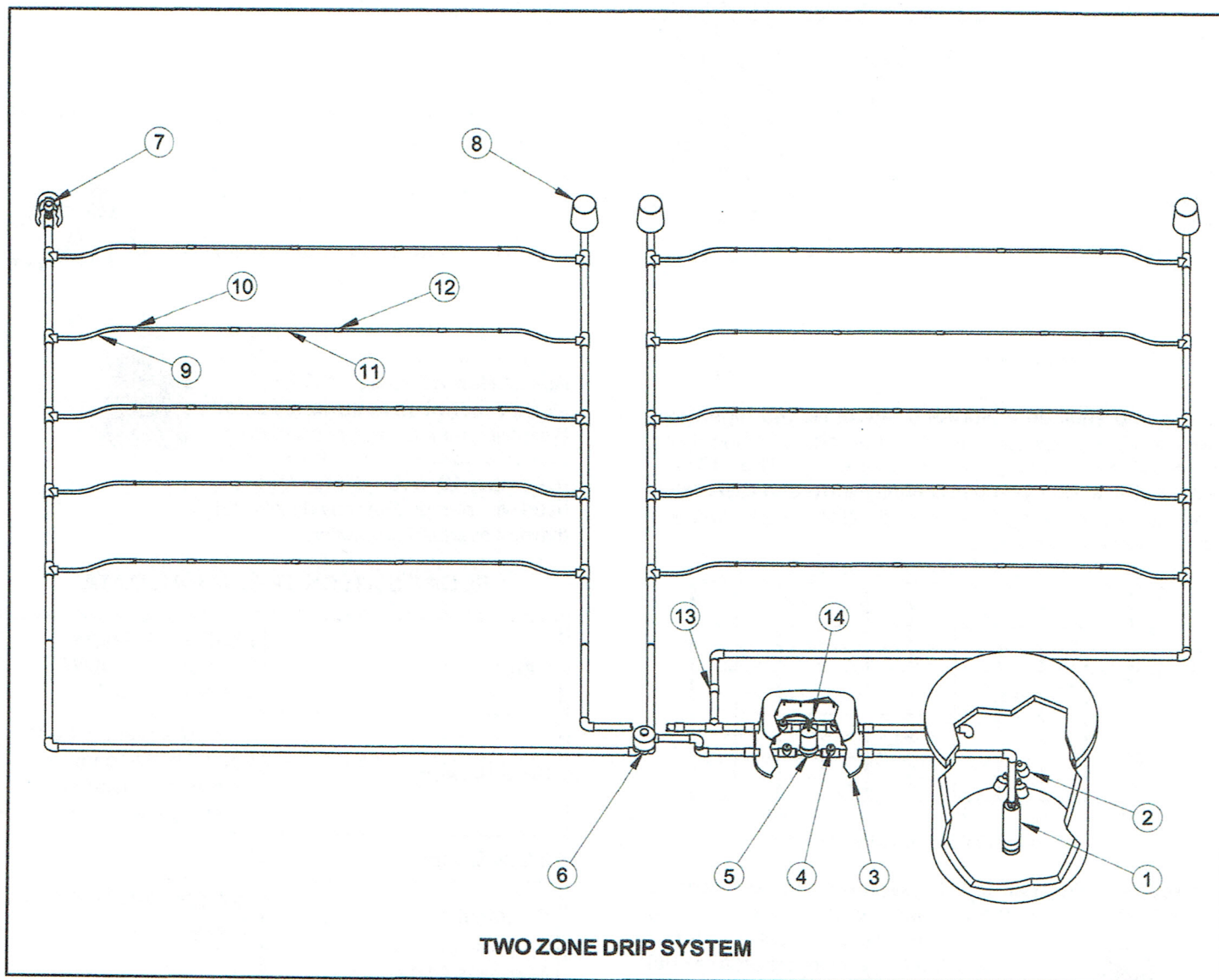
**norweco®** 6-25-07 B  
FOREIGN PATENTS PENDING  
SINGULAR® BIO-KINETIC® WASTEWATER TREATMENT SYSTEM  
MODEL: TMI - 750 GPD  
DATE: 2-19-08  
NTS  
FC-5-7065

NOTE: TOTAL SYSTEM CAPACITY: 1,600 GALLONS  
RATED CAPACITY: 750 GALLONS PER DAY

# ***norweco***® **SINGULAIR**®

## **SUBSURFACE DRIP DISPOSAL SYSTEMS**

### **PRE-ENGINEERED DESIGNS PARTS LIST**



|   |                                 |    |                                    |
|---|---------------------------------|----|------------------------------------|
| 1 | HB105 Submersible Effluent Pump | 8  | Relief Valve Enclosure             |
| 2 | Pump Float Switches             | 9  | Flexible PVC Hose                  |
| 3 | Headworks Enclosure             | 10 | Compression Fitting                |
| 4 | Schrader Valve                  | 11 | Drip Emitter Tubing                |
| 5 | 1" Disc Filter                  | 12 | Pressure Compensating Drip Emitter |
| 6 | Zone Indexing Valve             | 13 | PVC Check Valve                    |
| 7 | Air/Vacuum Relief Valve         | 14 | PVC Flush Valve                    |

## PRE-ENGINEERED DESIGNS PARTS LIST (Page 2 of 4)

### INTEGRATED SYSTEM CONTROLS

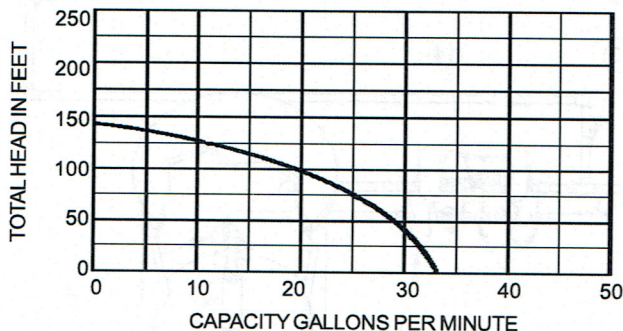
Integrated system controls (ISC) by Norweco eliminate the need to install and maintain separate controls for different components of the treatment system. One control center manages it all.

Certified and listed by NSF and CSA, ISC control centers bring together into one enclosure alarm/pump test switches, alarm silence switches, audible/visual alarms, failsafe features, remote monitoring, telemetry and aerator/pump timers.



### EFFLUENT PUMP SPECIFICATIONS

The pump shall be a Norweco Model HB105 high head submersible pump, designed to handle filtered effluent and be capable of passing 1/16" spherical solids. The 115 volt, single phase, 60 cycle pump shall be UL and CSA listed and capable of running dry for short durations without damage to the motor or pump end.



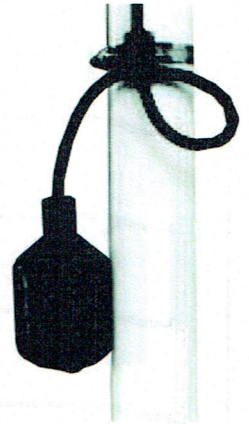
The pump motor shall be 1/2 horsepower rated and operate at 3450 RPM. The motor assembly shall have corrosion resistant stainless steel exterior construction and incorporate a dual action starting switch to provide automatic torque reversal. Electrical surge protection shall be provided. Automatic motor overload protection shall be included at the top end of the motor windings and shall be wired in series to automatically cease operation when the motor winding temperature reaches 266° F. The 10 foot long motor power cord shall be 14-3, jacketed, type SJOW. The power cord shall be sealed at the motor entrance by means of a rubber grommet and stainless steel



compression plate. The pump impeller shall be of the six vane enclosed type, constructed of engineered thermoplastic. The impeller shall have a hexagonal I.D. and be positively driven by a hexagonal 300 series stainless steel pump shaft. The pump shall be warranted by the manufacturer against defects in material and workmanship for a period of one year under normal use and service.

### FLOAT SWITCH

The mechanically-activated, wide-angle pump control switch provides automatic operation of the effluent dosing pump. This commercial duty float switch is not sensitive to rotation or turbulence, allowing it to be used in both calm and turbulent applications. Float switch features consist of UL recognition, NSF Standard 61 listing, CSA certification and Water Quality Association approval. **NOTE:** This switch is not recommended for controlling non-arcing electric loads or electric loads less than <100 milliamps, 12 VAC. Switch must be used with pumps that provide integral thermal overload protection.



### FLOAT SWITCH TECHNICAL DATA

|                               |                                                                              |
|-------------------------------|------------------------------------------------------------------------------|
| Cable                         | Flexible 16 Gauge, 2 Conductor SJOW, Water Resistant                         |
| Float Housing                 | 2.74" Diameter x 4.83" Long, High Impact, Corrosion Resistant, Polypropylene |
| Water Depth                   | 30 Feet                                                                      |
| Electrical                    | 120/125 VAC 50/60 Hz Single Phase                                            |
| Maximum Pump Starting Current | 78 Amps                                                                      |
| Maximum Pump Running Current  | 13 Amps                                                                      |
| Maximum Pump HP               | 1/2 HP                                                                       |

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Engineering the future of water and wastewater treatment

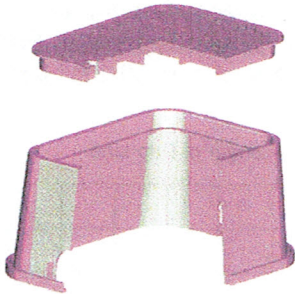
**NORWECO, INC.**  
NORWALK, OHIO  
U.S.A. 44857

[www.norweco.com](http://www.norweco.com)

## PRE-ENGINEERED DESIGNS PARTS LIST (Page 3 of 4)

### HEADWORKS ENCLOSURE

The headworks enclosure is purple in color and rectangular in shape. Green enclosures are available if state and local regulations permit. All hydraulic system control components are contained within this open bottom enclosure. Components are conveniently arranged so that all necessary connections can be accessed from grade during routine service.

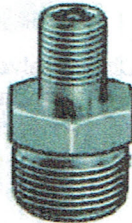


### HEADWORKS ENCLOSURE TECHNICAL DATA

|                            |        |
|----------------------------|--------|
| Enclosure Length           | 15"    |
| Enclosure Width            | 21"    |
| Enclosure Depth            | 12"    |
| Enclosure Color (Standard) | Purple |

### SCHRADER VALVE

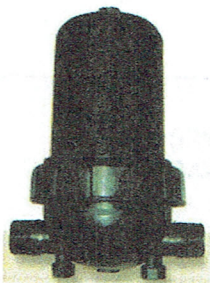
Schrader valves are manufactured with viton and PTFE threaded seals and are used with a liquid pressure gauge to accurately monitor system operating pressure. Located upstream and downstream of the disc filter and upstream of the flush valve.



### SCHRADER VALVE TECHNICAL DATA

|                   |                 |
|-------------------|-----------------|
| Connection        | 1/4" NPT        |
| Maximum Pressure  | 200 PSI         |
| Temperature Range | 40° F to 300° F |
| Thread Size       | 0.305" - 32     |

### 1" DISC FILTER



The disc filter is completely corrosion resistant and designed to capture and retain effluent suspended solids. 1" disc filters are manufactured specially for small flow applications. A built-in tap allows for continuous flushing of filtered solids to the return line. Operation is automatic and requires no special tools.

### 1" DISC FILTER TECHNICAL DATA

|                              | Metric              | Imperial           |
|------------------------------|---------------------|--------------------|
| Maximum Pressure             | 10 Bar              | 145 PSI            |
| Flow Rate                    | 6 m <sup>3</sup> /h | 26 GPM             |
| Flow Rate                    | 4 m <sup>3</sup> /h | 18 GPM             |
| Filtration Surface Area      | 316 cm <sup>2</sup> | 49 in <sup>2</sup> |
| Filtration Volume            | 440 cm <sup>3</sup> | 27 in <sup>3</sup> |
| Filter Length                | 237 mm              | 9 11/32"           |
| Filter Width                 | 158 mm              | 6 7/32"            |
| Distance Between Connections | 158 mm              | 6 7/32"            |
| Weight                       | 1 kg                | 2.2 lbs.           |

### ZONE INDEXING VALVE

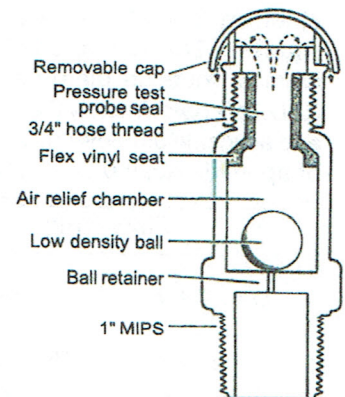
Zone indexing valves offer a reliable and economical way to automate multiple zoned residential and small commercial effluent drip disposal systems. Indexing valves are constructed of high strength, noncorrosive ABS polymer for long service life. Available in four and six outlet models, these valves make it easy to change from two to six disposal zones. Valves are easily maintained and serviced for long product life due the simplicity of the design. Reliably automates multiple zoned residential and small commercial effluent disposal systems with flows as low as 10 GPM and pressures of 25-75 PSI.



### AIR/VACUUM RELIEF VALVE

Air/vacuum relief valves are installed at the high points of the drip field to keep soil from being pulled into the drip emitters due to back siphoning or back pressure. They are also used for proper draining of the supply and return lines in freezing conditions.

The air/vacuum relief valve provides instant and continuous vacuum relief and noncontinuous air relief. Both the body and the removable cover shall be constructed of molded plastic. The body and the cover shall be connected with a 3/4" hose thread.



## PRE-ENGINEERED DESIGNS PARTS LIST (Page 4 of 4)



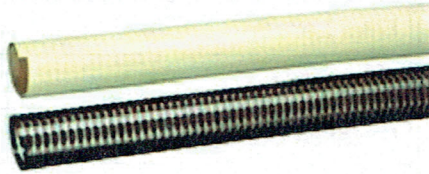
### RELIEF VALVE ENCLOSURE

Manufactured from low density polymer resin, this 6" round enclosure provides a secure housing for the relief valve.

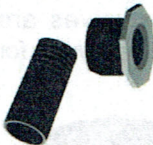


### FLEXIBLE PVC HOSE

Designed to be glued into Schedule 40 PVC fittings, this flexible hose is used to connect drip tubing to supply and return lines. The hose is also used in single trench disposal zones to make loops in the drip tubing. Saves time and labor. Requires fewer fittings than rigid pipe. Smooth bore construction allows unrestricted flow. Use with recommended PVC primer and cement.



### COMPRESSION FITTING



Compression fittings and adapters are specifically designed for use in subsurface effluent drip disposal systems. Manufactured from high strength polymer resin, these fittings simplify the installation of the emitter tubing.

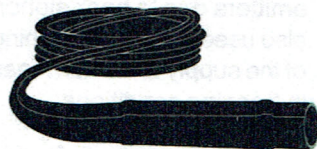
### COMPRESSION FITTING TECHNICAL DATA

1/2" Slip x 1/2" Drip Line

Weight: 0.005 lbs.

### DRIP EMITTER TUBING

The drip tubing shall consist of nominal sized 1/2" linear low density, polyethylene tubing with turbulent flow drip emitters bonded to the inside wall. The drip emitter flow passage shall be 0.032" x 0.045" square. The tubing shall have an outside diameter (O.D.) of approximately 0.64" and an inside diameter (I.D.) of approximately 0.55". The tubing shall consist of three

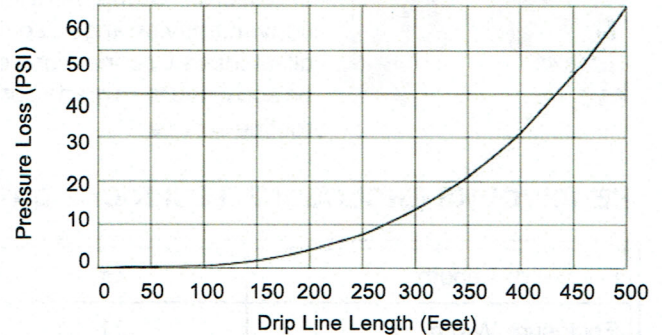


### Flow Rate vs. Pressure / TDH

| Drip Tubing | Head          | Pressure   |
|-------------|---------------|------------|
| 1.02 GPH    | 16 - 139 Feet | 7 - 60 PSI |

layers; the inside layer shall be a bactericide protection, the middle layer shall be black and the outside layer shall be purple striped for easy identification. The pressure compensating emitters shall be molded from virgin polyethylene resin with a silicone rubber diaphragm and shall have a nominal discharge rate of 1.02 gallons per hour. Each emitter shall be impregnated with a root growth inhibitor to protect against root intrusion.

Pressure Loss vs. Length of Drip Line



### CHECK VALVE

PVC (Polyvinyl Chloride) check valves prevent effluent from flowing into resting disposal zones when active zones are being dosed. The check valves also allow maintenance to be performed without losing pressure in the system ahead of the maintenance.



Check valves are a vital component in multi-zone effluent drip disposal systems. The check valves are available as a union check valve combination, allowing a convenient connect/disconnect location anywhere in the system.

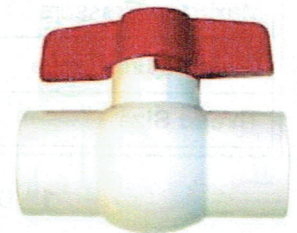
### FLUSH VALVE

The flush valve is used to establish system operating pressure, allowing a continuous flow through the disposal field.

### FLUSH VALVE TECHNICAL DATA

Size: 1 1/4" PVC Ball Valve (Standard)

Rated for 150 PSI at 73° F



### MANUFACTURED BY

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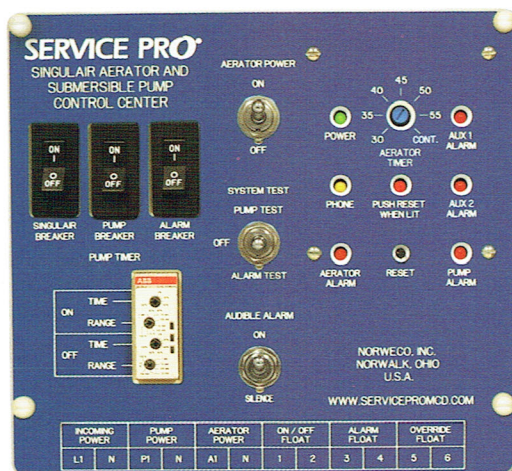
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***norweco***<sup>®</sup>  
SUBSURFACE DRIP  
DISPOSAL SYSTEM

# SUBSURFACE DRIP



## INCREASE EFFLUENT DISPOSAL OPTIONS WITH PROVEN PERFORMANCE...

Now even properties with marginal soils can be economically developed using Norweco wastewater treatment systems and drip disposal technology. Engineered to uniformly apply treated effluent below the surface of the ground, drip distribution relies on proven techniques originally developed for agricultural irrigation. This method of pressure distribution is well suited for all types of subsurface wastewater disposal systems, as treated effluent is delivered directly to the infiltration surface. The unique features of drip disposal increase the options available for onsite treatment system design. USEPA and environmental protection agencies throughout the world have determined that subsurface drip disposal is a reliable and efficient method of effluent distribution. Even the most difficult sites can be utilized by taking advantage of gradual soil absorption, nutrient uptake by vegetation and evapotranspiration.

## ONE INTEGRATED CONTROL CENTER, PRE-WIRED FOR AUTOMATIC OPERATION OF ALL SYSTEM COMPONENTS...

All system controls are integrated to combine breakers, alarms, timers, aerator circuitry, pump wiring and control switches into one lockable, weatherproof enclosure. Consolidating all electrical controls into a single UL listed enclosure eliminates the need for separate control panels and simplifies installation. Aerator and pump timers provide maximum flexibility for system operation, while audible and visual alarms clearly identify high water conditions. Operation of the pump is controlled throughout the day by an electronic timer that insures a precise amount of effluent is evenly dosed to the drip field. Timed dosing fully utilizes the hydraulic conductivity of the soil and is critical to the proper operation of a drip disposal system.

## RELIABLE HB105 PUMP DESIGNED SPECIFICALLY FOR HIGH PRESSURE APPLICATIONS...

Manufactured from the finest materials and electrical components, the Norweco Model HB105 pump is designed to handle treated wastewater in high head effluent disposal applications. UL and CSA listed, this 1/2 horsepower, 3450 RPM submersible pump operates on 115 volt, single phase electrical power and is able to deliver 20 gallons per minute (GPM) at 30 pounds per square inch (psi). The stainless steel motor housing resists rust and corrosion, assuring exceptional operating life in a demanding environment. A dual action start switch provides automatic torque reversal to clear the impeller, while an electrical overload protector causes the pump to cease operation should an overload condition occur. The pump is equipped with a 10 foot long, 14-3, jacketed, type SJOW motor power cord.



## FEATURES AND ADVANTAGES OF DRIP DISPOSAL

### Homeowner or User

- Reliable and economical
- Installation does not harm trees or landscaping
- No unsightly mounds in yard
- Pump and alarm test switches simplify service

### Engineer or Designer

- Solves limited area and soil problems
- Can be used in freezing conditions
- Reduced footprint over gravity drainfields
- Allows development of marginal lots
- Single home, community or commercial systems
- Design calculations and drawings available

### Professional Contractor

- Flexible and easy to install
- Adaptable to lot shape and ground contours
- No hauling of sand or gravel
- Easily programmed for automatic operation
- Installation by trenching machine or vibratory plow

### Health Officials and Community

- Works better than conventional disposal systems
- Pressure compensating emitters for uniform distribution
- Allows effluent re-use for landscape irrigation
- Optimum conditions for groundwater recharge
- Installation and service by factory-trained experts

# DISPOSAL SYSTEM

## Headworks Assembly



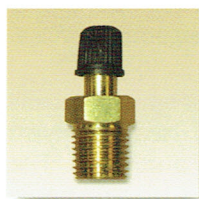
The headworks assembly includes an enclosure, lid, supply and return line connections, disc filter, three pressure monitoring valves and a flush valve. The enclosure and lid are manufactured from synthetic polymer that includes UV inhibitors to protect structural integrity. Designed for direct burial at grade, the enclosure can safely handle a 500 pound live wheel load. Schrader valves are installed upstream and downstream of the disc filter to indicate when filter service is required. A third Schrader valve is installed upstream of the flush valve to monitor operating pressure. The flush valve is installed in the return line for operational adjustments and routine service of the system.

## Disc Filter



The disc filter contains 100 micron grooved rings that screen out debris and protect the drip field from any solids remaining in the effluent. Capable of handling flows up to 22 gallons per minute, the filter cartridge can be easily removed, cleaned and reinstalled when service is required.

## Schrader Valves

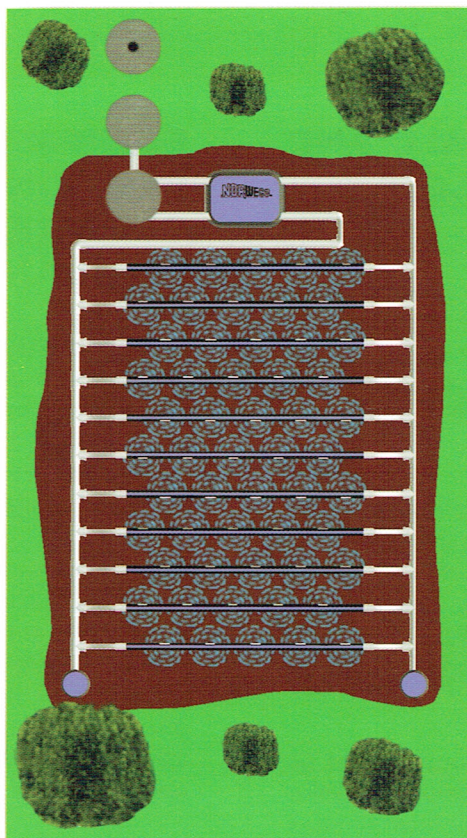


Designed to be connected to a liquid pressure gauge during system start-up and service, the Schrader valves allow system operating pressure to be accurately monitored.

## Drip Emitter Tubing



At the heart of the drip disposal system, this linear low density polyethylene tubing delivers treated effluent to the disposal area. Turbulent flow emitters, bonded to the inside wall, are spaced 24 inches apart for consistent effluent dosing to the disposal field. The interior of the tubing is coated with an antimicrobial agent that inhibits biological growth and extends system life.



## Drip Field Valve Enclosure

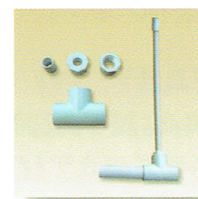
The drip field valve enclosure is used in each supply line and return line to provide a secure housing for the air/vacuum relief valves. The enclosure can also be used to house an optional zone indexing valve. Suitable for burial at grade, the drip field valve enclosure and lid are manufactured from low density polymer resin that includes UV inhibitors to protect structural integrity. This open-bottom enclosure and matching lid are available in six inch and ten inch diameter, and are colored purple if required, designating a source of non-potable water. When extreme cold weather conditions are anticipated, the drip field valve enclosure can be insulated to protect the air/vacuum relief valve or zone indexing valve from freezing.

## Effluent Emitter



Turbulent flow path emitters assure uniform distribution by delivering 1.0 gallons per hour per emitter to the soil. The pressure compensating design equalizes flow even on sloped or rolling terrain.

## Drip Disposal Fittings

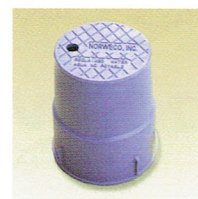


All fittings and connectors are specifically designed for use with drip emitter tubing and are molded from high strength polymer resin. The flexible connectors simplify tubing connections and drip field assembly.

## Air/Vacuum Relief Valves



One relief valve is installed in the drip field at the highest point in the supply line and one relief valve is installed at the highest point in the return line. The valves provide temporary air relief during field pressurization and continuous vacuum relief during field evacuation.





## OTHER EQUIPMENT FROM NORWECO

### SINGULAIR® HOME TREATMENT PLANTS

Individual home wastewater treatment systems for use in non-sewered suburban and rural areas. Norweco SINGULAIR plants automatically reduce all household wastewater to a clear, odorless effluent in just 24 hours. Treatment capacities up to 1,500 GPD.

### MODULAIR® WASTEWATER TREATMENT PLANTS

For semi-commercial applications - 1,500 to 100,000 GPD. Tanks are precast concrete covered with galvanized metal grating. MODULAIR equipment is factory assembled and tested. Ideal for small subdivisions, factories, schools, shopping centers, etc.

### TRAVALAIR® WASTEWATER TREATMENT PLANTS

Featuring Norweco's exclusive TRAVALAIR sludge return and surface skimming system. Flexible in design - capable of serving communities of 10,000 people. Automatic sludge collection and return completely eliminate hopper scraping.

### BIO-KINETIC® WASTEWATER MANAGEMENT SYSTEM

The solution to managing onsite treatment system performance that makes any septic system, tile field or filter bed work better and last longer. Protects sand filters, mounds, irrigation systems, constructed wetlands or any effluent disposal device. Treatment capacities up to 2,000 GPD.

## EASY TO DESIGN, INSTALL AND MAINTAIN FOR RELIABLE OPERATION...

Subsurface drip disposal systems are specifically engineered for each site by a design professional and are constructed in compliance with local rules and regulations. Drip emitter tubing is installed in shallow, narrow excavations using a trenching machine or vibratory plow so that existing trees and vegetation are not disturbed.

Drip disposal fields are adaptable to irregularly shaped lots or difficult site constraints. The shallow depth at which the drip emitter tubing is installed allows more of the soil to be used for treatment. The controlled manner in which effluent is distributed allows the use of marginal soils and land that would not be suitable for development using conventional wastewater disposal methods.

Distribution systems using drip technology should be maintained by a trained service technician. Performing routine service insures that all components operate at peak efficiency. Norweco treatment and drip disposal systems provide advanced wastewater treatment and effluent distribution for applications up to 1,500 gallons per day.

## EQUIPMENT PACKAGE AND COMPONENTS BACKED BY A COMPREHENSIVE LIMITED WARRANTY...

Norweco drip disposal equipment is designed, manufactured and tested to provide the most effective performance for domestic wastewater applications. System owners, installing contractors and service providers can be assured that all components are constructed to maximize the operational life of each system and provide years of trouble-free service.

Drip disposal system equipment is warranted against defects in material and workmanship under normal use and service for a period of two years from the date of purchase. The Norweco limited warranty provides secure, single-source protection and covers all components of the subsurface drip disposal system, including headworks assembly, disc filter, valves, pump, integrated system controls, drip tubing, fittings and enclosures.

Detailed warranty and service information are available from your licensed, factory-trained Norweco distributor, authorized dealer or service provider.

***norweco***®

*Engineering the future of water  
and wastewater treatment*

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**PROGRESS THROUGH SERVICE SINCE 1906**

## FIELD FLOW

|                  |                                                                |
|------------------|----------------------------------------------------------------|
| Job Description: | Golden Eagle Trail, APN 679-040-07-00                          |
| Contact:         | Ben Williams                                                   |
| Prepared by:     | Marc Boogay Consulting Engineer, marc@boogay.com, 760-407-4000 |
| Date:            | 20-Jul-20                                                      |

Please fill in the shaded areas and drop down menus:

This spreadsheet is a guide for small systems with residential waste & is not a contract

## Worksheet 1- Field Flow

### Total field

|                                                   |       |                        |
|---------------------------------------------------|-------|------------------------|
| Total Quantity of effluent to be disposed per day | 600   | gallons / day          |
| Hydraulic loading rate                            | 0.657 | gallons / sq.ft. / day |
| Minimum Dispersal Field Area                      | 913   | square ft.             |
| Total Dispersal Field Area                        | 936   | square ft.             |

### Flow per zone

|                                                   |                       |                   |
|---------------------------------------------------|-----------------------|-------------------|
| Number of Zones                                   | 1                     | zone(s)           |
| Dispersal area per zone                           | 936                   | square ft.        |
| Choose line spacing between WASTEFLOW lines       | 2                     | ft.               |
| Choose emitter spacing between WASTEFLOW emitters | 2                     | ft.               |
| Total linear ft. per zone (minimum required)      | 468                   | ft. per zone      |
| Total number of emitters per zone                 | 234                   | emitters per zone |
| Select Wasteflow dripline (16mm)                  | Wasteflow PC - 1 gph  | dripline          |
|                                                   | Wasteflow Classic     |                   |
|                                                   | Wasteflow PC - 1/2gph |                   |
|                                                   | Wasteflow PC - 1 gph  |                   |
| Pressure at the beginning of the dripfield        | 25                    | psi               |
| Feet of Head at the beginning of the dripfield    | 57.75                 | ft.               |
| What is the flow rate per emitter in gph?         | 1.02                  | gph               |
| Dose flow per zone                                | 3.98                  | gpm               |

Note: A few States or Counties require additional flow for flushing. Please check your local regulations.

Flush velocity calculation below is for PC dripline. Classic dripline requires less flow to flush than PC.

Please refer to Geoflow's spreadsheet "Design Flow and Flush Curves" at [www.geoflow.com](http://www.geoflow.com) or call 760-407-4000.

|                                                       |      |        |
|-------------------------------------------------------|------|--------|
| If required, choose flush velocity                    | 0.5  | ft/sec |
| How many lines of WASTEFLOW per zone?                 | 11   | lines  |
| Fill in the actual length of longest dripline lateral | 36   | ft.    |
| Flush flow required at the end of each dripline       | 0.37 | gpm    |
| Total Flow required to achieve flushing velocity      | 4.07 | gpm    |
| Total Flow per zone- worst case scenario              | 8.05 | gpm    |

### Select Filters and zone valves

|                                   |                    |                |
|-----------------------------------|--------------------|----------------|
| Select Filter Type                | BioDisc Filter     |                |
| Recommended Filter (item no.)     | BioDisc Filter-150 | 1.5in < 30 gpm |
| Select Zone Valve Type            | None               | -              |
| Recommended Zone Valve (item no.) | 0                  | 0              |

### Dosing

|                                                 |       |             |
|-------------------------------------------------|-------|-------------|
| Number of doses per day / zone:                 | 12    | doses       |
| Timer ON. Pump run time per dose/zone:          | 12.34 | mins:secs   |
| Timer OFF. Pump off time between doses          | 1:47  | hrs:mins    |
| Per Zone - Pump run time per day/zone:          | 2:30  | hrs:mins    |
| All Zones - Number of doses per day / all zones | 12    | doses / day |

| PUMP SIZING      |                                    |
|------------------|------------------------------------|
| Job Description: | Golden Eagle Trail AP679-040-07-00 |
| Contact:         | Ben Williams                       |
| Prepared by:     | Marc Boogay marc@boogay.com        |
| Date:            | 2020-07-20                         |

Please fill in the shaded areas and drop down menus:

This spreadsheet is a guide for small systems with residential waste & is n

Pressure losses may be grossly overstated, particularly if designing with v

The letters on the diagram(right) match the letters in section 2 below.

## Worksheet - Pump Sizing

| Section 1 - Summary from Worksheet 1 |                      |       |
|--------------------------------------|----------------------|-------|
| Flow required to dose field          | 3.98                 | gpm   |
| Flow required to flush field         | 4.07                 | gpm   |
| Flow required to dose & flush field  | 8.05                 | gpm   |
| Filter                               | BioDisc Filter-150   |       |
| No. of Zones                         | 1                    | zones |
| Zone valve                           | -                    |       |
| Dripline                             | Wasteflow PC - 1 gph |       |
| Dripline longest lateral             | 36.00                | ft.   |

| Section 2                                                                                       |                 | Ft of head | Pressure |
|-------------------------------------------------------------------------------------------------|-----------------|------------|----------|
| <b>A. Flush line - Losses through return line</b>                                               |                 |            |          |
| Select Pipe from dropdown menu                                                                  | PVC schedule 40 |            |          |
| Select Flush Line Diameter                                                                      | 1/2" inch       |            |          |
| Length of return line                                                                           | 60 ft.          |            |          |
| Equivalent length of fittings                                                                   | 5 ft.           |            |          |
| Elevation change. (if downhill enter 0)                                                         | 12 ft.          |            |          |
| Pressure loss in 100 ft of pipe                                                                 | 15.15 ft.       | 6.56       | psi      |
| Total pressure loss from end of dripline to                                                     | 21.8 ft.        | 9.46       | psi      |
| <b>B. Dripline - Losses through Wasteflow dripline</b>                                          |                 |            |          |
| Length of longest dripline lateral                                                              | 36 ft.          |            |          |
| Minimum dosing pressure required at end                                                         | 23.10 ft.       | 10.00      | psi      |
| Loss through dripline during flushing                                                           | 0.23 ft.        | 0.1        | psi      |
| Total minimum required dripline pressure                                                        | 23.33 ft.       | 10.10      | psi      |
| <b>A+B. Minimum Pressure required at beginning of dripline</b>                                  |                 |            |          |
| CALCULATED pressure required at begi                                                            | 45.18 ft.       | 19.56      | psi      |
| SPECIFIED pressure at beginning of drip                                                         | 57.8 ft.        | 25.00      | psi      |
| Great! SPECIFIED Pressure is greater than CALCULATED Pressure requirement. Go to                |                 |            |          |
| <b>C. Drip components - Losses through headworks</b>                                            |                 |            |          |
| Filter                                                                                          | 11.6 ft.        | 5.00       | psi      |
| Zone valve pressure loss (not in diagram)                                                       | - ft.           | -          | psi      |
| Flow meter pressure loss (not in diagram)                                                       | ft.             | -          | psi      |
| Other pressure losses                                                                           | ft.             | -          | psi      |
| Total loss through drip components                                                              | 11.55 ft.       | 5.00       | psi      |
| <b>D. Supply line - Minimum Pressure head required to get from pump tank to top of dripline</b> |                 |            |          |
| Select Pipe from dropdown menu                                                                  | PVC schedule 40 |            |          |
| Select Supply line diameter                                                                     | 1-1/2" inch     |            |          |
| Length of supply line                                                                           | 200 ft.         |            |          |
| Equivalent length of fittings                                                                   | 5 ft.           |            |          |
| Height from pump to tank outlet                                                                 | 5 ft.           |            |          |
| Elevation change. (if downhill enter 0)                                                         | -12 ft.         |            |          |
| Pressure loss/gain in 100 ft. of pipe                                                           | 0.52 ft.        | 0.23       | psi      |
| Total gain or loss from pump to field                                                           | (5.9) ft.       | (2.57)     | psi      |
| Total dynamic head                                                                              | 63.4 ft.        | 27.43      | psi      |
| Pump capacity * - Field Flush Flow                                                              | 8.0 gpm         | 27.43      | psi      |
| - Field Dose Flow                                                                               | 4.0 gpm         |            |          |
| - Filter Flush Flow                                                                             | - gpm           | -          | psi      |
| Pump Model Number                                                                               | see attached    |            |          |
| Voltz / Hp / phase                                                                              |                 |            |          |

\* Note: Pump capacity flow assumes flow in dripline does not change during a dose cycle. With For more accurate flows please see Geoflow's **Flushing worksheet**.

If you need assistance designing for this additional flow, please

- See Geoflow flushing worksheet or
- Contact Geoflow at 800-828-3388.