Earth Strata Geotechnical Services, Inc.
Geotechnical, Environmental and Materials Testing Consultants

November 30, 2021

Project No. 213906-14A
Confirmation No. PR # 6761

Ms. Caroline Legrand
The Ridge Wellness Inc.
21352 Rambla Vista
Malibu, CA 90265

Subject: **Onsite Wastewater Treatment System Design and Feasibility Report, The Proposed "THE RIDGE" Wellness Development, Assessor's Parcel Number 568-070-021, Located at 56475 Apple Canyon Road, Mountain Center Area, Riverside County, California**

Earth Strata Geotechnical Services, Inc. is pleased to present this onsite wastewater treatment system (OWTS) report for the proposed development referenced above, located at 56475 Apple Canyon Road, Mountain Center, Riverside County, California. The purpose of our feasibility study is to determine the percolation rates and physical characteristics of the subsurface earth materials within the vicinity of the proposed dispersal field and the design of an advanced onsite wastewater treatment system. This evaluation is intended to provide adequate data to satisfy the requirements of the County of Riverside Local Agency Management Program (LAMP) guidelines for commercial approval and the Santa Ana Regional Water Quality Control Board, Region 8.

PROPERTY DESCRIPTION, LOCATION AND GENERAL CONSIDERATIONS

The subject property is located at 56475 Apple Canyon Road, Mountain Center, Riverside County, California, see Figure 1. The subject property consists of an undeveloped parcel of land with relatively flat terrain. The parcel is currently surrounded by Apple Canyon Road to the north, Hwy 74 to the west, and vacant private properties to the east and south. The parcel lies in a high groundwater area and a creek with a 100-year flood zone running through it (Attached CUP plans). Additionally, the site is in the vicinity of Lake Hemet, however, the proposed Advanced treatment system will be approximately 2500 feet from the lake high water mark. The Mountain Center area is at an elevation of 4,500 feet above sea level and prone to cold weather conditions.

PROPOSED CONSTRUCTION

Based on information provided by on the CUP documents, the proposed development includes a Wellness center, composed guest cabins, wellness basecamp, activity hub with lap pool, dining area, and health focused commercial kitchen. The Ridge Ranch project summary and description is attached in Appendix A.

The proposed development will utilize an advanced treatment system with Geoflow drip lines to mitigate for the high groundwater at the site. The treatment system and the drip fields will be located outside the 100-year flood zone.

Although The Ridge Wellness Center will be promoting healthy eating and non greasy foods, a grease interception will be required and sized per the 2019 CPC to protect the advanced treatment system from Fats Oil and Greases (FOGs). The grease interceptor is as shown on the plans and the calculation on Appendix I.

SUBSURFACE EXPLORATION AND PERCOLATION TESTING

SUBSURFACE EXPLORATION

Subsurface exploration of the subject site consisted of multiple deep exploratory borings for geotechnical analysis as well as deep borings for the evaluation of the onsite soils, conducted on September 2020, by PETRA GEOSCIENCES, INC. The deep exploratory test hole was excavated to interpret whether groundwater or impermeable soil layers were present. Earth materials encountered within the deep exploratory test hole were classified and logged using the guidelines of ASTM 2487. The approximate location of the deep exploratory test hole is shown on the attached Percolation Location Map, Plate 1. The exploratory log has been included within Appendix J.

PERCOLATION TESTING

A total of twelve (12) percolation tests were conducted on October 8, 2021 to evaluate the feasibility of utilizing Geoflow drip fields for advanced treatment systems. The percolation tests were performed in general accordance with the referenced guidelines.

The percolation tests were performed at the bottom of 1 foot deep, 8- inch diameter tests holes. The locations of the percolation test holes are indicated on the attached Percolation Location Map, Plate 1. The percolation test holes were located by property boundary measurements and by using geographic features. Percolation testing was performed per the referenced Riverside County Local Agency Management Program guidelines.

The final percolation test reading is summarized in the following table and the test data recorded in the field is included in Appendix B.

PERCOLATION TEST SUMMARY

TEST NUMBER	PERCOLATION HOLE DIAMETER (IN.)	HOLE DEPTH (FT.)	FINAL PERCOLATION RATE (MPI)	EARTH MATERIAL DESCRIPTION
*P-1	8	1	11	Silty SAND
P-2	8	1	17.2	Silty SAND
P-3	8	1	12	Silty SAND
P-4	8	1	12	Silty SAND
P-5	8	1	12	Silty SAND
P-6	8	1	15	Silty SAND
P-7	8	1	15	Silty SAND
P-8	8	1	17.2	Silty SAND
P-9	8	1	12	Silty SAND
P-10	8	1	11	Silty SAND
P-11	8	1	15	Silty SAND
P-12	8	1	17.2	Silty SAND

FINDINGS

EARTH MATERIALS

A general description of the earth materials observed on site is provided below:

Older Alluvium: The deposits consist of a dark brown silty sand. These materials were noted to be moist, dense and contains clay fragments and small gravel deposits.

GROUNDWATER

Groundwater was observed in the exploratory boring performed by PETRA GEOSCIENCES, INC. at 7 feet below grade.

It should be noted that the tanks will need to be secured in place and avoid displacement during high groundwater fluctuations. The minimum required separation between the bottom of the drip field and the groundwater is 2 feet.

100-Year Flood Zone

The county of Riverside Flood Control District shows that the majority of the site is subject to flooding, however, the hydrology study and the plans provided clearly illustrate the limits of the 100-year zone on the proposed plans. The system as proposed in its entirety will be outside the limits. Additional

precautions will be made to ensure that the proposed system is not be affected by fluctuation of groundwater.

PERCOLATION TEST RESULTS

The final measured percolation test design rate is 17.2 minutes per inch (mpi). A hydraulic rate of 0.7 gal/sq. ft/ day will be used for the design.

CONCLUSIONS AND RECOMMENDATIONS

GENERAL

Based on the data presented in this report and using the recommendations set forth, it is the judgment of this professional that there is sufficient area to support an 8,000 GPD Treatment system. As a precaution, the system will be designed for 9,800 GPD. The DELTA ECOPOD E800D STANDARD DESIGN FOR BOD REDUCTION advanced treatment sewage disposal system and the attached test results will meet the current standards of the Department of Environmental Health LAMP and the Regional Water Quality Control Board (RWQCB). The dispersal system shall be located in natural undisturbed soil at the depth of the tests performed. The natural occurring body of minerals and organic matter at the proposed wastewater disposal area contains earthen materials having more than 50% of its volume composed of particles smaller than 0.08 inches (2mm) in size.

Based on the data presented in this report and the testing information accumulated, it is the judgment of this professional that the groundwater table will not encroach within the current allowable limit set forth by Riverside County Department of Environmental health and State Waterboard requirements.

It must be noted that the proposed Delta ECOPOD E800D system has NSF 40 and NSF 245 certifications. The system details and expected performance are included in Appendix E.

The drip field must be located at a higher elevation than the pump chamber. This will allow the drip field to circulate the effluent not discharged back to the chamber and reduce the chance of freezing.

SEWAGE DISPOSAL DESIGN RECOMMENDATIONS

The proposed sewage disposal system will consist of a DELTA ECOPOD E800D Wastewater Treatment System along with shallow subsurface Geoflow drip field for the primary and expansion dispersal. The area for a primary system is required along with the expansion area and is outlined on Plate 1. Descriptions of the general design and construction of sewage disposal systems is provided below.

> **Septic Tank Capacity**: The minimum septic tank capacity for the advanced treatment unit is determined, in accordance with Riverside County Department of Environmental Health Guidelines and Appendix H201.1 of the 2019 CPC. The type of venue, the number of fixture counts, Guest cabins, facility type were considered per the above referenced guidelines. The estimated Waste flows are outlined in Appendix D.

Allowable Design Percolation Rate: To determine the approximate square footage for the Geoflow drip area, the most conservative percolation and loading rates for the proposed dispersal area that meets the requirements of Riverside County Department of Environmental Health Guidelines were used.

Primary System: Primary system will consist of a DELTA ECOPOD E800D Wastewater Treatment System, a 4,000-gallon pump chamber, and a GeoFlow drip field dispersal area. The drip lines are constructed within trenches excavated into native materials. The minimum leach field absorption area is based upon the proposed daily flow and the percolation (soil loading) rate of the near surface soils. The size of the drip field is noted on the attached plan and per the drip field Calculation sheets attached in Appendix C.

The design of the Delta for the proposed site is based upon the guidelines provided by Delta Treatment Systems, LLC. The treatment system standard details are included in Appendix E.

The calculations for dripline dispersal and pump size are presented in Appendix C. The pump size and details are included in Appendix C.

The drip field is designed per the GeoFlow Design Manual Recommendations. The details of the GeoFlow Drip Area are specified in the attached Appendix C. The Design Sheets include the proposed daily effluent, loading rates, type of drip lines, values, spacing of lines, emitters, friction losses, etc.

A pump chamber for the pressurized system will be installed to disperse the effluent through the GeoFlow drip lines in the drip field. The pump chamber will have a minimum capacity of 4,000 gallons above the alarm with duplex pumps.

An annual maintenance contract will be required between the property owner and an approved contractor. The San Diego Regional Quality Control Board effluent discharge testing and reporting requirements must be implemented. The system can be programmed to alert the maintenance contractor when a problem has occurred. This option should be implemented.

Expansion System: The expansion system is identical to the primary system and will follow the same guidelines if needed in the future.

GRADING PLAN REVIEW AND CONSTRUCTION SERVICES

This report has been prepared for the exclusive use of **The Ridge Wellness Inc.** and their authorized representative. It likely does not contain sufficient information for other parties or other uses. Earth Strata Geotechnical Services, Inc. should be engaged to review the final design plans and specifications prior to construction. This is to verify that the recommendations contained in this report have been properly incorporated into the project plans and specifications. Should Earth Strata Geotechnical Services, Inc. not be accorded the opportunity to review the project plans and specifications, we are not responsibility for misinterpretation of our recommendations.

We recommend that Earth Strata Geotechnical Services, Inc. be retained to provide geologic and geotechnical engineering services during grading and foundation excavation phases of the work. In order

to allow for design changes in the event that the subsurface conditions differ from those anticipated prior to construction.

Earth Strata Geotechnical Services, Inc. should review any changes in the project and modify and approve in writing the conclusions and recommendations of this report. This report and the drawings contained within are intended for design input purposes only and are not intended to act as construction drawings or specifications. In the event that conditions encountered during grading or construction operations appear to be different than those indicated in this report, this office should be notified immediately, as revisions may be required.

REPORT LIMITATIONS

Our services were performed using the degree of care and skill ordinarily exercised, under similar circumstances, by reputable soils engineers and geologists, practicing at the time and location this report was prepared. No other warranty, expressed or implied, is made as to the conclusions and professional advice included in this report.

Earth materials vary in type, strength, and other geotechnical properties between points of observation and exploration. Groundwater and moisture conditions can also vary due to natural processes or the works of man on this or adjacent properties. As a result, we do not and cannot have complete knowledge of the subsurface conditions beneath the subject property. The minimum required separation from groundwater and the drip filed is 2 feet. No practical study can completely eliminate uncertainty with regard to the anticipated geotechnical conditions in connection with a subject property.

The conclusions and recommendations within this report are based upon the findings at the points of observation and are subject to confirmation by Earth Strata Geotechnical Services, Inc. based on the conditions revealed during grading and construction.

This report was prepared with the understanding that it is the responsibility of the owner or their representative, to ensure that the conclusions and recommendations contained herein are brought to the attention of the other project consultants and are incorporated into the plans and specifications. The owners' contractor should properly implement the conclusions and recommendations during grading and construction, and notify the owner if they consider any of the recommendations presented herein to be unsafe or unsuitable.

Respectfully submitted,

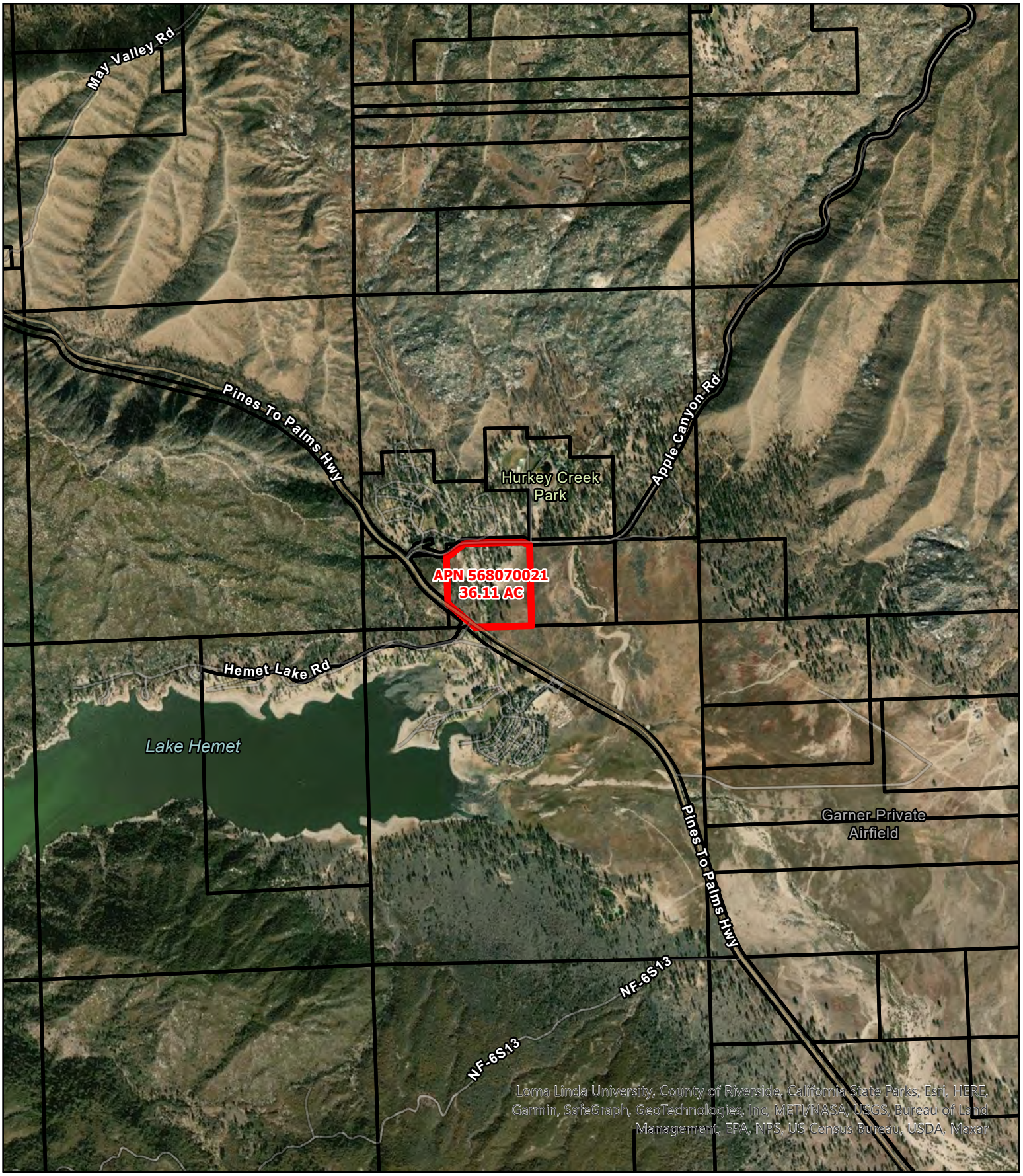
EARTH STRATA GEOTECHNICAL SERVICES, INC.

Stephen M. Poole, PE 40219
President
Principal Engineer

SMP/GW

Attachments: Figure 1 – Site Location Map
Plate 1 – OWTS Design and Layout *(Rear of Text)*
Proposed CUP plans (Rear of Text)

Appendix A – Proposed Plans, Project Description and Summary
Appendix B – Percolation Test Results
Appendix C – GeoFlow Drip Field Calculations
Appendix D – Waste flow Calculations
Appendix E – Advanced Wastewater Treatment System Details (DELTA ECOPOD E800D)
Appendix F – Regional Water Board Water Quality Objectives and Minimum Requirements
Appendix G – Proposed Treatment System Standards for NSF 40 and NSF 245
Appendix H – GEOFLOW, INC.: Design, Installation and Maintenance Guidelines
Appendix I – Grease Interceptor Details and Calculations
Appendix J – References



0 0.1 0.2 0.4 0.6 0.8 Miles

N

P.N. 213906- 11A
FIGURE 1

Earth Strata Geotechnical Services, Inc.
Geotechnical, Environmental and Materials Testing Consultants
www.ESGSINC.com (951) 397-8315

APPENDIX A

PROPOSED PLANS AND PROJECT DESCRIPTION

SHEET INDEX

SHEET INDEX

#	Sheet Name
01 GENERAL	
A00.00	COVER SHEET
05 CIVIL	
C01.00	TITLE SHEET-EXISTING SITE
C02.00	PROPOSED SITE PLAN
C03.00	PROPOSED SITE PLAN
C04.00	PROPOSED SITE GRADING AND UTILITY PLAN
C05.00	PROPOSED SITE GRADING AND UTILITY PLAN
06 LANDSCAPE	
L-1	COMPREHENSIVE LANDSCAPE PLAN
L-2	COMPREHENSIVE LANDSCAPE PLAN
07 ARCHITECTURAL	
A10.01	ALTA SURVEY
A10.02	TOPOGRAPHIC SURVEY
A10.04	MASTER PLAN
A10.06	ENLARGED SITE PLAN - INTERVENTION AREA
A10.07	ENLARGED SITE PLAN - PARKING AREAS
A21.01A	FLOOR PLAN - COMMON AREA
A21.01B	ROOF PLAN - COMMON AREA
A21.02	FLOOR & ROOF PLAN - GREEN HOUSE
A21.03	FLOOR & ROOF PLAN - ADMIN & STORAGE
A21.04A	FLOOR PLAN - WELLNESS CABINS
A21.04B	ROOF PLAN - WELLNESS CABINS
A21.05A	FLOOR PLAN - ACTIVITY HUB
A21.05B	ROOF PLAN - ACTIVITY HUB
A21.06	FLOOR & ROOF PLAN - WELLNESS BASECAMP
A21.07A	FLOOR PLAN - GUEST CABINS A
A21.07B	ROOF PLAN - GUEST CABINS A
A21.08A	FLOOR PLAN - GUEST CABINS B
A21.08B	ROOF PLAN - GUEST CABINS B
A21.09A	FLOOR PLAN - GUEST CABINS C
A21.09B	ROOF PLAN - GUEST CABINS C
A30.01A	EXTERIOR BUILDING ELEVATIONS - COMMON AREA
A30.01B	EXTERIOR BUILDING ELEVATIONS - COMMON AREA
A30.02	EXTERIOR BUILDING ELEVATIONS - GREEN HOUSE
A30.03	EXTERIOR BUILDING ELEVATIONS - ADMIN & STORAGE
A30.04	EXTERIOR BUILDING ELEVATIONS - WELLNESS CABINS
A30.05	EXTERIOR BUILDING ELEVATIONS - ACTIVITY HUB
A30.06	EXTERIOR BUILDING ELEVATIONS - WELLNESS BASECAMP
A30.07	EXTERIOR BUILDING ELEVATIONS - GUEST CABINS A
A30.08	EXTERIOR BUILDING ELEVATIONS - GUEST CABINS B
A30.09	EXTERIOR BUILDING ELEVATIONS - GUEST CABINS C
A40.01	BUILDING SECTIONS - COMMON AREA
A40.02	BUILDING SECTIONS - GREEN HOUSE
A40.03	BUILDING SECTIONS - ADMIN & STORAGE
A40.04	BUILDING SECTIONS - WELLNESS CABINS
A40.05	BUILDING SECTIONS - ACTIVITY HUB
A40.06	BUILDING SECTIONS - WELLNESS BASECAMP
A40.07	BUILDING SECTIONS - GUEST CABINS A
A50.01	EXTERIOR FINISH SCHEDULES

PROJECT DESCRIPTION

THE RIDGE WELLNESS PROPOSES AN ECO-CONSCIOUS PRIVATE GUEST RANCH ON 37.11 ACRES LOCATED AT 56475 APPLE CANYON RD IN THE COUNTY OF RIVERSIDE. THE PROJECT SITE WILL RETAIN ALL THE NATURAL VEGETATION AND ALL THE HISTORIC LARGE PINE TREES WITHIN ITS DESIGNS.

THE RIDGE WILL BE DESIGNED TO FACILITATE A FULL IMMERSION NATURE EXPERIENCE IN MOUNTAIN CENTER AND THE RANCH WILL OFFER A VARIETY OF SELF-DEVELOPMENT THERAPIES AND RECREATIONAL ACTIVITIES. RECREATIONAL ACTIVITIES SUCH AS NATURE HIKING, MOUNTAIN BIKING, HORSEBACK RIDING, ROCK CLIMBING, WATER-BASED ACTIVITIES AT LAKE HEMET, IN ADDITION TO CULTURAL AN ENVIRONMENTAL EDUCATION OF THE AREA WILL BE ALL PART OF THE EXPERIENCE AT THE RANCH.

THE PROJECT PROPOSES TO CONSTRUCT GUEST CABINS AND MANUFACTURED GUEST TENTS, WITH A WELLNESS CENTER, KITCHEN AND DINING ROOM, AND ACTIVITY HUB WITH LAP POOL, LARGE AGRICULTURAL SITE AND FOOD LAB FOR ALL GUESTS TO EXPERIENCE.

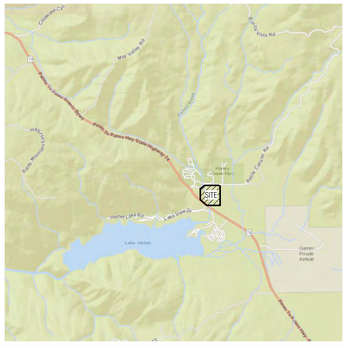
APPLICABLE CODES

2019 CALIFORNIA BUILDING CODE

2019 CALIFORNIA PLUMBING CODE
2019 CALIFORNIA MECHANICAL CODE
2019 CALIFORNIA ELECTRICAL CODE
2019 CALIFORNIA GREEN BUILDING STANDARDS CODE
2019 CALIFORNIA FIRE CODE
2019 CALIFORNIA GREEN BUILDING CODE

CONDITIONAL USE PERMIT APPLICATION
ISSUED: 2021/07/19

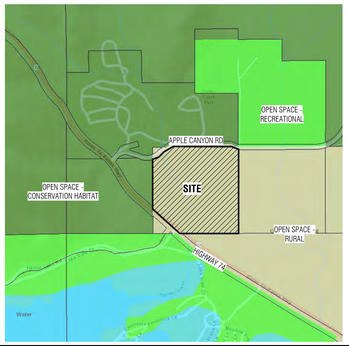
VICINITY MAP



ZONING MAP

AERIAL PHOTO

LAND USE MAP



BUILDING CODE INFORMATION

CONSTRUCTION TYPES: TYPE VA - 1 LEVEL, FULLY SPRINKLERED AND FIRE-RETARDANT TREATED (FRT)

OCCUPANCY:
R-1, RESIDENTIAL GROUP (CBC 310.2)
A-2, ASSEMBLY GROUP (CBC 303.3)
B, BUSINESS GROUP (CBC 304)
S-2, LOW-HAZARD STORAGE (CBC 311.3)
U, UTILITY & MISCHELLANEOUS GROUP (312.1.1)

MAX ALLOWABLE HEIGHT, STORIES AND AREA BY OCCUPANCY:
(TYPE VA, CBC TABLE 504.3, BUILDING EQUIPPED THROUGHOUT WITH SPRINKLER SYSTEM PER CBC 903.3.1.1)

OCCUPANCY	HEIGHT	STORIES	AREA
R-1:	50'-0"	3 STORIES	48,000 SF
A-2:	50'-0"	3 STORIES	46,000 SF
B:	70'-0"	4 STORIES	72,000 SF
S-2:	70'-0"	5 STORIES	84,000 SF
U:	70'-0"	3 STORIES	36,000 SF

PROPOSED BUILDING HEIGHT: HEIGHT IN FEET = 18'-3"
STORIES = 1 STORY

PROPOSED BUILDING AREA: GROSS AREA = 31,021 SF

BUILDING CODE ANALYSIS

AREA NAME	OCCUPANCY	CONSTRUCTION TYPE
ACTIVITY HUB		
ACTIVITY HUB	A-2	TYPE VA
STORAGE	S-2	TYPE VA
ADMIN & STORAGE		
ADMIN & STAFF AREAS	B	TYPE VA
STORAGE	S-2	TYPE VA
ARRIVAL & DINING		
ARRIVAL LOUNGE	A-2	TYPE VA
DINING AREA	A-2	TYPE VA
COMMERCIAL KITCHEN	A-2	TYPE VA
UTILITY ROOM	S-2	TYPE VA
GREENHOUSE		
GREENHOUSE	U	TYPE VA
GUEST CABINS		
GUEST CABINS	R-1	TYPE VA
UTILITY ROOM	S-2	TYPE VA
SUPPORT	S-2	TYPE VA
MANUFACTURED TENTS		
MANUFACTURED TENTS	R-1	TYPE VA
WELLNESS BASE CAMP		
WELLNESS BASE CAMP	A-2	TYPE VA
UTILITY ROOM	S-2	TYPE VA
SUPPORT	S-2	TYPE VA
WELLNESS CABINS		
GUEST CHECK-IN	B	TYPE VA
SOUND DOME	B	TYPE VA
TREATMENT ROOMS	B	TYPE VA
CHANGING ROOMS	B	TYPE VA
UTILITY ROOM	S-2	TYPE VA
SUPPORT	S-2	TYPE VA

ZONING INFORMATION

PROJECT INFO

PROJECT ADDRESS	56475 APPLE CANYON RD, IDYLLWILD CA 92549
APN	568-070-021
CURRENT ZONING	A-1-20 (LIGHT AGRICULTURE)
PROPOSED ZONING	N-A (NATURAL ASSETS)
CURRENT LAND USE	OPEN SPACE - RURAL
PROPOSED LAND USE	OPEN SPACE - RECREATIONAL LAND USE
LOT AREA	36.11 ACRES
FIRE HAZARD...	VERY HIGH
FIRE RESPONSIBILITY...	SRA
FAULT ZONE	SAN JACINTO FAULT ZONE

SETBACKS

FRONT	100'-0" (COUNTY OF RIVERSIZE ZONING ORDINANCE 17.152.020)
SIDE	50'-0" (COUNTY OF RIVERSIZE ZONING ORDINANCE 17.152.020)
REAR	50'-0" (COUNTY OF RIVERSIZE ZONING ORDINANCE 17.152.020)

PARKING REQUIREMENTS

	PARKING RATE	AREA/QTY	PARKING REQUIRED*
GUEST PARKING			
GUEST CABINS (30 TOTAL)	1 SPACE / ROOM + 2 SPACES / RESIDENT MANAGER	36 TOTAL ROOMS	38 STALLS
MANUF. TENTS (6 TOTAL)			
STAFF PARKING	1 SPACE / 2 EMPLOYEES	35 STAFF	18 STALLS
TOTAL REQUIRED			56 STALLS*

*NOTE:
PROJECT IS SUBJECT TO CONDITIONAL USE PERMIT REVIEW WHICH AIMS TO REDUCE THE NUMBER OF STALLS REQUIRED. THE PROPOSAL IS A PRIVATE GUEST RANCH CLOSED TO THE PUBLIC, WITH STAFF ACCESSING THE PROPERTY IN TIMED SHIFTS. THE FACILITIES ARE CONSIDERED NON-SIMULTANEOUS USE, AND ARE INTENDED FOR THE EXCLUSIVE USE OF THE MAX. 72 GUESTS CAPACITY (7 GUESTS PER EACH ACOMMODATION), PLUS A MAXIMUM SHIFT CAPACITY OF 35 STAFF AS NOTED IN THE PROJECT DESCRIPTION APPENDIX.

PARKING PROVIDED

	PARKING RATE	AREA/QTY	PARKING PROVIDED
GUEST PARKING			
GUEST CABINS (30 TOTAL)	1 SPACE / ROOM + 2 SPACES / RESIDENT MANAGER	36 TOTAL ROOMS	38 SPACES
MANUF TENTS (6 TOTAL)			
ADDITIONAL PARKING			1 SPACE
STAFF PARKING	1 SPACE / 2 EMPLOYEES	35 STAFF	18 SPACES
ACCESSIBLE PARKING SPACES	51-75 STALLS = 3 SPACES		3 SPACES
TOTAL			60 SPACES

EV PARKING REQUIREMENTS

	RATE	EV STALLS REQ'D	NOTES
TOTAL PARKING PROVIDED = 60 STALLS	25-49 SPACES	2 EV SPACES	
	50> SPACES	1 ADDTL EV SPACE PER EACH 50 STALLS	
TOTAL		3 EV SPACES	PER RIVERSIDE ZO 17.188.045 ALL EV SPACES SERVICED BY EVCS

BICYCLE PARKING REQUIRED

	RATE	SPACES	NOTES
EMPLOYEE	1 FOR EVERY 25 PARKING SPACES	1 SPACE	
GUEST	1 FOR EVERY 33 PARKING SPACES	2 SPACES	
TOTAL REQUIRED		4 SPACES*	(COR ZO 17.188.060.B.1.c REQ'S MIN. 4 SPACES)
TOTAL PROVIDED		4 SPACES	

*NOTE:
BICYCLE PARKING IS PROVIDED ADJACENT TO THE ACTIVITY HUB

SITE COVERAGE SUMMARY

	AREA (ACRES)	PERCENT OF GROSS SITE AREA
EXISTING AGRICULTURAL AREA	2.06 ACRES	6%
PARKING, DRIVEWAYS AND VEHICULAR CIRCULATION	2.04 ACRES	5%
BUILDING FOOTPRINT (GROSS COVERED INT&EXT AREA)	1.36 ACRES	4%
RECREATIONAL & OPEN SPACE AREA	30.65 ACRES	85%
GROSS SITE AREA	36.11 ACRES	100%

PROJECT AREA SUMMARY

AREA NAME	AREA
ACTIVITY HUB	
ACTIVITY HUB	1072 SF
STORAGE	17 SF
	1089 SF
ADMIN & STORAGE	
ADMIN & STAFF AREAS	758 SF
SUPPORT	531 SF
	1289 SF
ARRIVAL & DINING	
ARRIVAL LOUNGE	1088 SF
DINING AREA	1760 SF
COMMERCIAL KITCHEN	1386 SF
UTILITY ROOM	203 SF
	4436 SF
GREENHOUSE	
GREENHOUSE	948 SF
	948 SF
GUEST CABINS (ZONES A, B & C)	
GUEST CABINS	13814 SF
SUPPORT	516 SF
UTILITY ROOM	325 SF
	14654 SF
MANUFACTURED TENT AREA	
MANUFACTURED TENTS	1826 SF
	1826 SF
WELLNESS BASE CAMP	
WELLNESS BASE CAMP	3170 SF
SUPPORT	176 SF
UTILITY ROOM	63 SF
	3409 SF
WELLNESS CABINS	
GUEST CHECK-IN	190 SF
SOUND DOME	614 SF
TREATMENT ROOMS	1603 SF
CHANGING ROOMS	507 SF
STORAGE/STAFF	321 SF
UTILITY ROOM	135 SF
	3371 SF
TOTAL GROSS AREA	31021 SF

PROJECT TEAM

OWNER:
CAROLINE LEGRAND
21352 RAMBLA VISTA
MALIBU CA 90265
310 666 3623
LEGRAND.CAROLINE966@GOOGLEMAIL.COM

ARCHITECT OF RECORD:
OU DESIGN + ARCHITECTURE, INC.
4200 SEPULVEDA BOULEVARD, SUITE 104
CULVER CITY, CA 90230
310 730 6698

DESIGN ARCHITECT:
MANUEL CERVANTES ESTUDIO
PASEO DE LAS PALMAS, 820 5° PISO
COL. LOMAS DE CHAPULTEPEC, CDMX
52 (1) 55 5201 3508

STRUCTURAL ENGINEER:
HOLMES STRUCTURES
523 WEST 6TH ST, STE 1122
LOS ANGELES, CA 90014
213 481 5630

MECHANICAL, ELECTRICAL, PLUMBING ENGINEER:
INTEGRAL GROUP
15760 VENTURA BLVD, STE 1902
ENCINO, CA 91436
323 825 9955

CIVIL ENGINEER:
JCL ENGINEERING
41660 IVY ST, SUITE A
MURRIETA, CA 92562
951 304 9522

GEOTECHNICAL ENGINEER:
PETRA GEOSCIENCES
40980 COUNTY CENTER DR., SUITE M
TEMECULA, CA 92591
760 250 9747

LANDSCAPE ARCHITECT:
ALHAMBRA GROUP
41635 ENTERPRISE CIRCLE N. STE. C
TEMECULA, CA 92590
951 296 6802

DRY UTILITY CONSULTANT:
STRATEGIC CONNECTIONS
140 E. STETSON AVE #219
HEMET, CA 92543
951 442 4040

ARBORIST:
PRECISION TREE EXPERTS
PO BOX 2444
IDYLLWILD, CA 92549
951 288 5473

OFFICEUNTITLED

OFFICEUNTITLED — ARCHITECT OF RECORD
4200 SEPULVEDA BLVD, STE 104, CULVER CITY, CA 90230
P.310.730.6698

MANUEL CERVANTES ESTUDIO — DESIGN ARCHITECT
PASEO DE LAS PALMAS, 820 5TO PISO
COL. LOMAS DE CHAPULTEPEC, CDMX
P.52.1.55.5201.3508

HOLMES STRUCTURES — STRUCTURAL ENGINEER
523 WEST 6TH ST, STE 1122
LOS ANGELES, CA 90014
P.213.481.5630

INTEGRAL GROUP — MEP ENGINEER
15760 VENTURA BLVD, STE 1902
ENCINO, CA 91436
P.323.825.9955

ALHAMBRA GROUP — LANDSCAPE ARCHITECT
41635 ENTERPRISE CIRCLE N. STE. C
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MURRIETA, CA 92562
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THE RIDGE

56475 APPLE CANYON ROAD
MOUNTAIN CENTER, CA 92561

OU PROJECT NO: 21.010.000

#	DESCRIPTION	DATE
1.	CONDITIONAL USE PERMIT APPLICATION	21/07/19

LICENSED ARCHITECT
CHRISTIAN ROBERT
NO. C-XXXXX
REN. XX-XX-XX
STATE OF CALIFORNIA

SCALE: 6" = 1'-0"

NORTH

COVER SHEET

A00.00

FIXTURE UNIT CALCULATIONS FOR RESTROOM - COMMON AREA FLOOR PLAN, ADMIN/ STORAGE FLOOR PLAN, ACTIVITY HUB FLOOR PLAN

FIXTURE TYPE	QTY	DEMAND WEIGHT IN WSFU[1]						DRAINAGE[1]	
		COLD[2]	HOT[2]	FIXTURE DEMAND	TOTAL COLD WATER	TOTAL HOT WATER	TOTAL DEMAND	DFU	TOTAL
WATER CLOSET, FLUSHVALVE	1	5.0	0.0	5.0	5.0	0.0	5.0	4	4
LAVATORY (USE IWH)	1	1.00	0.00	1.0	1.00	0.00	1.0	1	1
FLOOR DRAIN	1	0.0	0.0	0.0	0.0	0.0	0.0	2	2
TOTAL FIXTURE UNITS					6.000	0.000	6.0		7
EQUIVALENT WATER DEMAND IN GPM[3]					23.0	1.0	23.0		
OTHER REQUIRED WATER OUTLETS IN GPM					0.0	0.0	0.0		
TOTAL WATER DEMAND IN GPM					23.0	1.0	23.0		
REQUIRED MINIMUM PIPE SIZE[4]					"	"	"		"

FIXTURE UNIT CALCULATIONS FOR STAFF AREA - ADMIN/ STORAGE FLOOR PLAN

FIXTURE TYPE	QTY	DEMAND WEIGHT IN WSFU[1]						DRAINAGE[1]	
		COLD[2]	HOT[2]	FIXTURE DEMAND	TOTAL COLD WATER	TOTAL HOT WATER	TOTAL DEMAND	DFU	TOTAL
KITCHEN SINK (USE IWH)	1	1.500	0.000	1.5	1.500	0.000	1.5	2	2
REFRIGERATOR W/ICE MAKER	1	0.0	0.0	0.0	0.0	0.0	0.0	0	0
TOTAL FIXTURE UNITS					1.500	0.000	1.5		2
EQUIVALENT WATER DEMAND IN GPM[3]					3.0	1.0	3.0		
OTHER REQUIRED WATER OUTLETS IN GPM					0.0	0.0	0.0		
TOTAL WATER DEMAND IN GPM					3.0	1.0	3.0		
REQUIRED MINIMUM PIPE SIZE[4]					"	"	"		"

FIXTURE UNIT CALCULATIONS FOR TREATMENT ROOM, INNER BEAUTY ROOM - WELLNESS CABINS FLOOR PLAN

FIXTURE TYPE	QTY	DEMAND WEIGHT IN WSFU[1]						DRAINAGE[1]	
		COLD[2]	HOT[2]	FIXTURE DEMAND	TOTAL COLD WATER	TOTAL HOT WATER	TOTAL DEMAND	DFU	TOTAL
LAVATORY (USE IWH)	1	1.00	0.00	1.0	1.00	0.00	1.0	1	1
TOTAL FIXTURE UNITS					1.000	0.000	1.0		1
EQUIVALENT WATER DEMAND IN GPM[3]					2.0	1.0	2.0		
OTHER REQUIRED WATER OUTLETS IN GPM					0.0	0.0	0.0		
TOTAL WATER DEMAND IN GPM					2.0	1.0	2.0		
REQUIRED MINIMUM PIPE SIZE[4]					"	"	"		"

FIXTURE UNIT CALCULATIONS FOR WOMENS ADA CHANGING AREAS, MENS ADA CHANGING AREAS - WELLNESS CABINS FLOOR PLAN

FIXTURE TYPE	QTY	DEMAND WEIGHT IN WSFU[1]						DRAINAGE[1]	
		COLD[2]	HOT[2]	FIXTURE DEMAND	TOTAL COLD WATER	TOTAL HOT WATER	TOTAL DEMAND	DFU	TOTAL
WATER CLOSET, FLUSHVALVE	1	5.0	0.0	5.0	5.0	0.0	5.0	4	4
SHOWER, PER HEAD (USE IWH)	1	2.0	0.0	2.0	2.0	0.0	2.0	2	2
LAVATORY (USE IWH)	3	1.00	0.00	1.0	3.00	0.00	3.0	1	3
FLOOR DRAIN	1	0.0	0.0	0.0	0.0	0.0	0.0	2	2
TOTAL FIXTURE UNITS					10.000	0.000	10.0		11
EQUIVALENT WATER DEMAND IN GPM[3]					27.0	1.0	27.0		
OTHER REQUIRED WATER OUTLETS IN GPM					0.0	0.0	0.0		
TOTAL WATER DEMAND IN GPM					27.0	1.0	27.0		
REQUIRED MINIMUM PIPE SIZE[4]					"	"	"		"

FIXTURE UNIT CALCULATIONS FOR HYDROTHERAPY ROOM - WELLNESS CABINS FLOOR PLAN

FIXTURE TYPE	QTY	DEMAND WEIGHT IN WSFU[1]						DRAINAGE[1]	
		COLD[2]	HOT[2]	FIXTURE DEMAND	TOTAL COLD WATER	TOTAL HOT WATER	TOTAL DEMAND	DFU	TOTAL
WATER CLOSET, FLUSHVALVE	1	5.0	0.0	5.0	5.0	0.0	5.0	4	4
LAVATORY (USE IWH)	1	1.00	0.00	1.0	1.00	0.00	1.0	1	1
FLOOR DRAIN	1	0.0	0.0	0.0	0.0	0.0	0.0	2	2
TOTAL FIXTURE UNITS					6.000	0.000	6.0		7
EQUIVALENT WATER DEMAND IN GPM[3]					23.0	1.0	23.0		
OTHER REQUIRED WATER OUTLETS IN GPM					0.0	0.0	0.0		
TOTAL WATER DEMAND IN GPM					23.0	1.0	23.0		
REQUIRED MINIMUM PIPE SIZE[4]					"	"	"		"

FIXTURE UNIT CALCULATIONS FOR UNITS: GUEST CABIN, ADA GUEST CABIN - GUEST CABIN A, B

FIXTURE TYPE	QTY	DEMAND WEIGHT IN WSFU[1]						DRAINAGE[1]	
		COLD[2]	HOT[2]	FIXTURE DEMAND	TOTAL COLD WATER	TOTAL HOT WATER	TOTAL DEMAND	DFU	TOTAL
WATER CLOSET, FLUSHTANK	1	2.5	0.0	2.5	2.5	0.0	2.5	3	3
LAVATORY	2	0.75	0.75	1.0	1.50	1.50	2.0	1	2
BATHTUB OR TUB-SHOWER COMBO	1	3.0	3.0	4.0	3.0	3.0	4.0	2	2
TOTAL FIXTURE UNITS					7.000	4.500	8.5		7
EQUIVALENT WATER DEMAND IN GPM[3]					6.0	5.0	8.0		
OTHER REQUIRED WATER OUTLETS IN GPM					0.0	0.0	0.0		
TOTAL WATER DEMAND IN GPM					6.0	5.0	8.0		
REQUIRED MINIMUM PIPE SIZE[4]					"	"	"		"

FIXTURE UNIT CALCULATIONS FOR UNITS: GUEST CABIN, ADA GUEST CABIN - GUEST CABIN C

FIXTURE TYPE	QTY	DEMAND WEIGHT IN WSFU[1]						DRAINAGE[1]	
		COLD[2]	HOT[2]	FIXTURE DEMAND	TOTAL COLD WATER	TOTAL HOT WATER	TOTAL DEMAND	DFU	TOTAL
WATER CLOSET, FLUSHTANK	1	2.5	0.0	2.5	2.5	0.0	2.5	3	3
LAVATORY	1	0.75	0.75	1.0	0.75	0.75	1.0	1	1
SHOWER, PER HEAD	1	1.5	1.5	2.0	1.5	1.5	2.0	2	2
BATHTUB OR TUB-SHOWER COMBO	1	3.0	3.0	4.0	3.0	3.0	4.0	2	2
TOTAL FIXTURE UNITS					7.750	5.250	9.5		8
EQUIVALENT WATER DEMAND IN GPM[3]					7.0	5.0	8.0		
OTHER REQUIRED WATER OUTLETS IN GPM					0.0	0.0	0.0		
TOTAL WATER DEMAND IN GPM					7.0	5.0	8.0		
REQUIRED MINIMUM PIPE SIZE[4]					"	"	"		"

1. FIXTURE UNITS ARE BASED ON CPC TABLE 610.3 FOR WATER AND TABLES 702.1 OR 702.2 FOR DRAINAGE.
2. SEPERATE HOT AND COLD WATER FIXTURE UNITS ARE TAKEN AS AT LEAST THREE-QUARTERS (3/4) OF TOTAL FIXTURE DEMAND, PER CPC TABLE 610.3, NOTE 3.
3. GPM EQUIVALENTS ARE BASED ON CPC CHARTS A 103.1.

FIXTURE UNIT CALCULATIONS FOR COMMON AREA

FIXTURE TYPE	QTY	DEMAND WEIGHT IN WSFU[1]						DRAINAGE[1]	
		COLD[2]	HOT[2]	FIXTURE DEMAND	TOTAL COLD WATER	TOTAL HOT WATER	TOTAL DEMAND	DFU	TOTAL
RESTROOM	3	6.0	0.0	6.0	18.0	0.0	18.0	7	21
MAIN KITCHEN	1	0.0	0.0	0.0	0.0	0.0	0.0	0	0
TOTAL FIXTURE UNITS					18.000	0.000	18.0		21
EQUIVALENT WATER DEMAND IN GPM[3]					34.0	1.0	34.0		
OTHER REQUIRED WATER OUTLETS IN GPM					0.0	0.0	0.0		
TOTAL WATER DEMAND IN GPM					34.0	1.0	34.0		
REQUIRED MINIMUM PIPE SIZE[4]					"	"	"		"

FIXTURE UNIT CALCULATIONS FOR ADMIN/ STORAGE

FIXTURE TYPE	QTY	DEMAND WEIGHT IN WSFU[1]						DRAINAGE[1]	
		COLD[2]	HOT[2]	FIXTURE DEMAND	TOTAL COLD WATER	TOTAL HOT WATER	TOTAL DEMAND	DFU	TOTAL
RESTROOM	1	6.0	0.0	6.0	6.0	0.0	6.0	7	7
STAFF AREA	1	1.5	0.0	1.5	1.5	0.0	1.5	2	2
TOTAL FIXTURE UNITS					7.500	0.000	7.5		9
EQUIVALENT WATER DEMAND IN GPM[3]					25.0	1.0	25.0		
OTHER REQUIRED WATER OUTLETS IN GPM					0.0	0.0	0.0		
TOTAL WATER DEMAND IN GPM					25.0	1.0	25.0		
REQUIRED MINIMUM PIPE SIZE[4]					"	"	"		"

FIXTURE UNIT CALCULATIONS FOR WELLNESS CABINS

FIXTURE TYPE	QTY	DEMAND WEIGHT IN WSFU[1]						DRAINAGE[1]	
		COLD[2]	HOT[2]	FIXTURE DEMAND	TOTAL COLD WATER	TOTAL HOT WATER	TOTAL DEMAND	DFU	TOTAL
TREATMENT ROOM	5	1.00	0.00	1.0	5.00	0.00	5.0	1	5
INNER BEAUTY ROOM	1	1.00	0.00	1.0	1.00	0.00	1.0	1	1
HYDROTHERAPY ROOM	1	6.0	0.0	6.0	6.0	0.0	6.0	7	7
WOMENS ADA CHANGING AREAS	1	10.0	0.0	10.0	10.0	0.0	10.0	11	11
MENS ADA CHANGING AREAS	1	10.0	0.0	10.0	10.0	0.0	10.0	11	11
BATHTUB (USE IWH)	1	4.0	0.0	4.0	4.0	0.0	4.0	2	2
SHOWER, PER HEAD (USE IWH)	1	2.0	0.0	2.0	2.0	0.0	2.0	2	2
TOTAL FIXTURE UNITS					38.000	0.000	38.0		39
EQUIVALENT WATER DEMAND IN GPM[3]					46.0	1.0	46.0		
OTHER REQUIRED WATER OUTLETS IN GPM					0.0	0.0	0.0		
TOTAL WATER DEMAND IN GPM					46.0	1.0	46.0		
REQUIRED MINIMUM PIPE SIZE[4]					"	"	"		"

FIXTURE UNIT CALCULATIONS FOR ACTIVITY HUB

FIXTURE TYPE	QTY	DEMAND WEIGHT IN WSFU[1]						DRAINAGE[1]	
		COLD[2]	HOT[2]	FIXTURE DEMAND	TOTAL COLD WATER	TOTAL HOT WATER	TOTAL DEMAND	DFU	TOTAL
RESTROOM	2	6.0	0.0	6.0	12.0	0.0	12.0	7	14
SINK (USE IWH)	3	1.500	0.000	1.5	4.500	0.000	4.5	2	6
SHOWER, PER HEAD (USE IWH)	1	2.0	0.0	2.0	2.0	0.0	2.0	2	2
TOTAL FIXTURE UNITS					18.500	0.000	18.500		22
EQUIVALENT WATER DEMAND IN GPM[3]					35.0	1.0	35.0		
OTHER REQUIRED WATER OUTLETS IN GPM					0.0	0.0	0.0		
TOTAL WATER DEMAND IN GPM					35.0	1.0	35.0		
REQUIRED MINIMUM PIPE SIZE[4]					"	"	"		"

FIXTURE UNIT CALCULATIONS FOR GUEST CABIN A

FIXTURE TYPE	QTY	DEMAND WEIGHT IN WSFU[1]						DRAINAGE[1]	
		COLD[2]	HOT[2]	FIXTURE DEMAND	TOTAL COLD WATER	TOTAL HOT WATER	TOTAL DEMAND	DFU	TOTAL
GUEST CABIN	9	7.0	4.5	8.5	63.0	40.5	76.5	7	63
ADA GUEST CABIN	1	7.0	4.5	8.5	7.000	4.500	8.5	7	7
TOTAL FIXTURE UNITS					70.000	45.000	85.000		70
EQUIVALENT WATER DEMAND IN GPM[3]					37.0	27.0	40.0		
OTHER REQUIRED WATER OUTLETS IN GPM					0.0	0.0	0.0		
TOTAL WATER DEMAND IN GPM					37.0	27.0	40.0		
REQUIRED MINIMUM PIPE SIZE[4]					"	"	"		"

FIXTURE UNIT CALCULATIONS FOR GUEST CABIN B

FIXTURE TYPE	QTY	DEMAND WEIGHT IN WSFU[1]						DRAINAGE[1]	
		COLD[2]	HOT[2]	FIXTURE DEMAND	TOTAL COLD WATER	TOTAL HOT WATER	TOTAL DEMAND	DFU	TOTAL
GUEST CABIN	11	7.0	4.5	8.5	77.0	49.5	93.5	7	77
ADA GUEST CABIN	1	7.0	4.5	8.5	7.000	4.500	8.5	7	7
TOTAL FIXTURE UNITS					84.000	54.000	102.000		84
EQUIVALENT WATER DEMAND IN GPM[3]					40.0	30.0	44.0		
OTHER REQUIRED WATER OUTLETS IN GPM					0.0	0.0	0.0		
TOTAL WATER DEMAND IN GPM					40.0	30.0	44.0		
REQUIRED MINIMUM PIPE SIZE[4]					"	"	"		"

FIXTURE UNIT CALCULATIONS FOR GUEST CABIN C

FIXTURE TYPE	QTY	DEMAND WEIGHT IN WSFU[1]						DRAINAGE[1]	
		COLD[2]	HOT[2]	FIXTURE DEMAND	TOTAL COLD WATER	TOTAL HOT WATER	TOTAL DEMAND	DFU	TOTAL
GUEST CABIN	7	7.75	5.25	9.5	54.25	36.75	66.5	8	56
ADA GUEST CABIN	1	7.75	5.25	9.5	7.750	5.250	9.5	8	8
TOTAL FIXTURE UNITS					62.000	42.000	76.000		64
EQUIVALENT WATER DEMAND IN GPM[3]					34.0	25.0	38.0		
OTHER REQUIRED WATER OUTLETS IN GPM					0.0	0.0	0.0		
TOTAL WATER DEMAND IN GPM					34.0	25.0	38.0		
REQUIRED MINIMUM PIPE SIZE[4]					"	"	"		"

TENTED GUEST ACCOMODATIONS

FIXTURE TYPE	QTY	DEMAND WEIGHT IN WSFU[1]						DRAINAGE[1]	
		COLD[2]	HOT[2]	FIXTURE DEMAND	TOTAL COLD WATER	TOTAL HOT WATER	TOTAL DEMAND	DFU	TOTAL
WATER CLOSET, FLUSHTANK	1	2.5	0.0	2.5	2.5	0.0	2.5	3	3
LAVATORY	1	0.75	0.75	1.0	0.75	0.75	1.0	1	1
SHOWER, PER HEAD	1	1.5	1.5	2.0	1.5	1.5	2.0	2	2
TOTAL FIXTURE UNITS					4.750	2.250	5.5		6
EQUIVALENT WATER DEMAND IN GPM[3]					5.0	3.0	5.0		
OTHER REQUIRED WATER OUTLETS IN GPM					0.0	0.0	0.0		
TOTAL WATER DEMAND IN GPM					5.0	3.0	5.0		
REQUIRED MINIMUM PIPE SIZE[4]					"	"	"		"

1. FIXTURE UNITS ARE BASED ON CPC TABLE 610.3 FOR WATER AND TABLES 702.1 OR 702.2 FOR DRAINAGE.
2. SEPERATE HOT AND COLD WATER FIXTURE UNITS ARE TAKEN AS AT LEAST THREE-QUARTERS (3/4) OF TOTAL FIXTURE DEMAND, PER CPC TABLE 610.3, NOTE 3.
3. GPM EQUIVALENTS ARE BASED ON CPC CHARTS A 103.1.

Tented Guest locations added to total GPM and DFU.

FIXTURE UNIT CALCULATIONS FOR BUILDING

FIXTURE TYPE	QTY	DEMAND WEIGHT IN WSFU[1]						DRAINAGE[1]	
		COLD[2]	HOT[2]	FIXTURE DEMAND	TOTAL COLD WATER	TOTAL HOT WATER	TOTAL DEMAND	DFU	TOTAL
COMMON AREA	1	18.00	0.00	18.0	18.00	0.00	18.0	21	21
ADMIN/ STORAGE	1	6.00	0.00	6.0	6.00	0.00	6.0	7	7
WELLNESS CABINS	1	38.0	0.0	38.0	38.0	0.0	38.0	39	39
ACTIVITY HUB	1	18.5	0.0	18.5	18.5	0.0	18.5	22	22
GUEST CABIN A	1	70.0	45.0	85.0	70.0	45.0	85.0	70	70
GUEST CABIN B	1	84.0	54.0	102.0	84.0	54.0	102.0	84	84
GUEST CABIN C	1	62.0	42.0	76.0	62.0	42.0	76.0	64	64
TENTED GUEST	6	4.8	2.3	5.5	28.5	13.5	33.0	6	36
TOTAL FIXTURE UNITS					325.000	154.500	376.5		343
EQUIVALENT WATER DEMAND IN GPM[3]					115.0	82.0	125.0		
OTHER REQUIRED WATER OUTLETS IN GPM					0.0	0.0	0.0		
TOTAL WATER DEMAND IN GPM					115.0	82.0	125.0		
REQUIRED MINIMUM PIPE SIZE[4]					"	"	"		"

1. FIXTURE UNITS ARE BASED ON CPC TABLE 610.3 FOR WATER AND TABLES 702.1 OR 702.2 FOR DRAINAGE.
2. SEPERATE HOT AND COLD WATER FIXTURE UNITS ARE TAKEN AS AT LEAST THREE-QUARTERS (3/4) OF TOTAL FIXTURE DEMAND, PER CPC TABLE 610.3, NOTE 3.
3. GPM EQUIVALENTS ARE BASED ON CPC CHARTS A 103.1.

Total sewer DFU.

Total GPM demand will go up 20 GPM for pool and spa. Total would be 145.

bittoni architects

4909 West Jefferson Blvd
Los Angeles,CA 90016
t: 310-841-6857
bittoniarchitects.com

THE RIDGE

56475 APPLE CANYON ROAD
MOUNTAIN CENTER, 92561

DATE | DESCRIPTION

PROJECT NO: 211007

GREEN MEP
Engineering Consulting, Inc.
ORANGE COUNTY I HO CHI MINH CITY
20341 Irvine Ave. D3
Newport Beach, CA 92660
Tel: 949.232.1919
www.greenmep.com

SHEET NAME

PLUMBING SIZING TABLES & CALCULATIONS

PUBLISHED: 11/30/2021

P0.04

SHEET

GENERAL NOTES:

1. PROVIDE WATER HAMMER ARRESTERS AT ALL QUICK ACTION VALVES AS REQUIRED BY CPC SECTION 609.10.
2. FIRE SEAL ALL PENETRATIONS AS REQUIRED BY CODE.
3. ALL OVERHEAD PIPING SHALL BE INSTALLED AS HIGH AS POSIIBLE IN ORDER TO MAINTAIN MINIMUM HEAD CLEARANCES.
4. VENTS LESS THAN 6" ABOVE THE FLOOR LEVEL RIM OF THE FIXTURE SHALL BE INSTALLED WITH APPROVED DRAINAGE FITTINGS, MATERIAL, AND GRADE TO THE DRAIN (CPC 905.3).
5. PROVIDE HOT WATER THERMAL EXPANSION LOOPS PER MANUFACTURER'S INSTALLATION INSTRUCTIONS FOR ALL HOT WATER AND HOT WATER RETURN PIPING.
6. PROVIDE CLEANOUTS FOR ALL DRAINAGE SYSTEMS FOR EVERY 100' RUN AND AT EVERY 135 DEGREE CHANGE IN DIRECTION PER CPC.
7. REFERENCE STRUCTURAL PENETRATION DETAILS FOR LOCATIONS WHERE PIPING PENETRATES THROUGH FLOORS OR WALLS.

bittoni architects

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t: 310-841-6857
bittoniarchitects.com

THE RIDGE

56475 APPLE CANYON ROAD
MOUNTAIN CENTER, 92561

BENJAMIN B. ENTEMA
No. M27247
Exp. 06-30-23
REGISTERED PROFESSIONAL ENGINEER
MECHANICAL
STATE OF CALIFORNIA

DATE	DESCRIPTION

PROJECT NO: 211007

GREEN MEP
Engineering Consulting, Inc.
ORANGE COUNTY I HO CHI MINH CITY
20341 Irvine Ave. D3
Newport Beach, CA 92660
Tel: 949.232.1919
www.greenmep.com

SHEET NAME

PLUMBING SITE PLAN

PUBLISHED: 11/30/2021

P1.00

SHEET

SITE PLAN | 1

The Ridge Ranch

PROJECT DESCRIPTION

The Ridge Ranch ("The Ridge") will be a recreation and education based healing ranch with 36 guest accommodations whose main goal is to provide reconnection to nature, "re-wilding," and re-wiring guests. All its recreational activities (both active and passive) will be centered around being immersed in nature, communing with nature, engaging with nature, learning about nature, and going back to a more simplified active, mindful, and health enhancing way of life. The Ridge intends to provide a beautiful naturalistic platform to guests who wish to spend more time immersed in nature, learning skills engaging in recreational activities and reconnecting to childhood activities which they have long left behind.

The Ridge has chosen the Mountain Center location for its sheer beauty as well as for its proximity to Idyllwild's great community, rich with nature guides, health practitioners, nature lovers and stewards. We are excited to offer this community a platform to showcase their gifts and teach our guests a healthier and simpler way of life.

Site development

The vision is to develop a portion of the 38 acre site to accommodate a fully sustainable eco-friendly ranch rich with recreational wellness/healing amenities necessary to create a unique experience at The Ridge. An important aspect of the ranch is to be sustainable and to use 2 acres of the existing agriculture area to tend to permaculture. A genuine understanding of the community's history and respect for the environment is at the centre of the philosophy of The Ridge. Therefore, minimal land disruption and respect of the natural habitat will be a priority.

Proposed building improvements are approximately 28,086 SF over multiple small structures that comprise a floor area ratio (FAR) of just 1.7% of the total site. The structures themselves will be designed to maintain the environmental character in which they are located. The Ridge will pursue energy efficiency through thoughtful architecture and building orientation and incorporate, among other things, green building materials, solar power, water conservation techniques such as groundwater recharge basins, use of porous pavement, drought tolerant landscaping and water recycling as appropriate. The majority of the land will remain undeveloped and wild.

Proposed Structures	SF
(1) Guest Accommodations	14,586
• 30 rooms x 400 SF	
• 6 tents x 256 SF	
• Storage	
(2) Common Area Bldg	4,000
• Reception/Lounge	
• Kitchen/Dining (48 seats)	
• Outdoor Pool	
(3) Wellness Bldg	4,000

(4) Pool House Bldg	1,000
• Juice Bar Station	
• Outdoor Lap Pool (25 Meter)	
(5) Community / Yoga Dome	2,000
(6) Food Lab Bldg	1,500
• Farm-to Table Education Kitchen/Dining (12 seats)	
(7) Admin & Storage Bldg	1,000
Total	28,086

The proposed structures will consist of (7) areas:

Guest Accommodations

A total of 36 guest accommodations are proposed including 6 "glamping" tents. The ranch will cater to domestic and international guests. The average length of stay for international guests is estimated to be seven to nine nights and a minimum of three nights for domestic guests. The dynamics of the ranch relies on a group of guests, being together for enough time to engage in a myriad of recreational activities both indoors and outs, share experiences, feel refreshed, and to enjoy all the onsite and neighbouring activities planned at The Ridge.

Common Area Building / Reception and Dining

The reception building will include the main communal dining and communal reception area, a kitchen and a green house. There will also be an outside lounge, natural pool and dining area.

Wellness/Healing

Adjacent to the main dining/reception area is the building for the wellness/healing therapy rooms (7) as well as other amenities.

Community / Yoga Dome

The main indoor guest activity dome will be located close to the agricultural area. The dome will accommodate approximately 60 guests and will also double up as a space where talks, educational workshops, yoga classes, meditation, and other community activities may take place.

Pool House

Adjacent to the reception area the Pool House will incorporate a juice bar station, lounge, sun deck and outdoor 25 meter lap swimming pool.

Food Lab / Agricultural Interaction and Production

Agricultural production for guest's interaction will be located in an area of approximately 2 acres. The purpose of the food lab is to educate guests about sustainable farming practices through the on-site growing of fruits, vegetables, and herbs. Guests will participate in the process of crop harvesting and will learn healthy

cooking methods in a farm-to-table environment where the meals will be served in the communal dining.

All meals prepared at the facility will be vegan. Food waste will be combined with agricultural composting to emphasize sustainable farming and meal preparation practices. The consumption of alcohol will be prohibited at the recreational retreat.

Design & Architecture

The development will be designed on eco-friendly green principles and aim to achieve complete sustainability. The interior and exterior design of The Ridge will have its foundation in the surrounding nature. Natural elements; stone, rock, wood, foliage, earth, water and air will provide the canvas for The Ridge's home.

Landscape

Landscaping design improvements will be minimal utilizing drought tolerant plant material incorporating drought-conscious irrigations systems throughout the site.

Wellness Programming & Workshops

The Ridge will offer carefully curated modalities/treatments and physical activities which will be inspired by the ancient methodology of treating and healing the human being as a whole. A strong local community (Idyllwild) of therapists will enable The Ridge to be a success. The Re-Wilding and healing aspect of the guest ranch is based on outdoor activities like hiking, horse riding, rock climbing, walking meditation, yoga, swimming, hikes, forest bathing, yoga and a few water based activities.

Native American History

The retreat will honor and educate guests in the Cahuilla tribe's legacy. Including talks, archaeological site walks and plants/natural habitat walks.

Hours of Operation

24 hours per day / 7 days per wk / 365 days per yr

(47) Total Employees / (25) Max Employees On Site At Any Given Time

APPENDIX B

PERCOLATION TEST RESULTS

PROJECT NAME Apple Canyon Road PROJECT NO.: 213906-11A TEST TYPE (SP) (LL) (ATU)
DATE TESTED: 10/8/2021 TRACT: LOT NO.:
TESTED BY: JMR2

Test No. P-1 Depth 1'

Time	Time Interval	Initial	Final	Drop	MPI	
9:05 9:35	30	5	9	4.0	7.5	
9:36 10:06	30	5	8.75	3.8	8.0	
10:07 10:37	30	5	8.75	3.8	8.0	
10:38 11:08	30	4.5	7.75	3.3	9.3	
11:09 11:39	30	5	8.5	3.5	8.6	
11:40 12:10	30	5	8.25	3.3	9.3	
12:11 12:41	30	4	7.25	3.3	9.3	
12:42 13:12	30	4	7	3.0	10.0	
13:13 13:43	30	5	8	3.0	10.0	
13:44 14:14	30	4.5	7.25	2.8	11.0	
14:15 14:45	30	4.5	7.25	2.8	11.0	
14:46 15:16	30	4.5	7.25	2.8	11.0	

Test No. P-2 Depth 1'

Time	Time Interval	Initial	Final	Drop	MPI	
9:06 9:36	30	6	9.5	3.5	8.6	
9:37 10:07	30	5	8.5	3.5	8.6	
10:08 10:38	30	5	8.5	3.5	8.6	
10:39 11:09	30	4.5	7.75	3.3	9.3	
11:10 11:40	30	5	8	3.0	10.0	
11:41 12:11	30	5	7.75	2.8	11.0	
12:12 12:42	30	5	8	3.0	10.0	
12:43 13:13	30	4.5	7.25	2.8	11.0	
13:14 13:44	30	4.25	6.75	2.5	12.0	
13:45 14:15	30	4	6	2.0	15.0	
14:16 14:46	30	5	7	2.0	15.0	
14:47 15:17	30	4	5.75	1.8	17.2	

Test No. P-3 Depth 1'

Time	Time Interval	Initial	Final	Drop	MPI	
9:07 9:37	30	5.5	10.5	5.0	6.0	
9:38 10:08	30	5	9.5	4.5	6.7	
10:09 10:39	30	4.5	9	4.5	6.7	
10:40 11:10	30	4	7.75	3.8	8.0	
11:11 11:41	30	4	7.75	3.8	8.0	
11:42 12:12	30	3.75	7.725	4.0	7.6	
12:13 12:43	30	4	7.25	3.3	9.3	
12:44 13:14	30	4	7.25	3.3	9.3	
13:15 13:45	30	5	8	3.0	10.0	
13:46 14:16	30	4.5	7.25	2.8	11.0	
14:17 14:47	30	5	7.5	2.5	12.0	
14:48 15:18	30	4	6.5	2.5	12.0	

Test No. P-4 Depth 1'

Time	Time Interval	Initial	Final	Drop	MPI	
9:08 9:38	30	6.5	13	6.5	4.7	
9:39 10:09	30	5	10.5	5.5	5.5	
10:10 10:40	30	5	9.758	4.8	6.4	
10:41 11:11	30	4	8.5	4.5	6.7	
11:12 11:42	30	5	8.75	3.8	8.0	
11:43 12:13	30	5	8.75	3.8	8.0	
12:14 12:44	30	4	7.25	3.3	9.3	
12:45 13:15	30	5	8.25	3.3	9.3	
13:16 13:46	30	4.5	7.75	3.3	9.3	
13:47 14:17	30	5	7.75	2.8	11.0	
14:18 14:48	30	4	6.75	2.8	11.0	
14:49 15:19	30	6.75	9.25	2.5	12.0	

PROJECT NAME Apple Canyon Road PROJECT NO.: 213906-11A TEST TYPE (SP) (LL) (ATU)
DATE TESTED: 10/8/2021 TRACT: LOT NO.:
TESTED BY: JMR2

Test No. P-5 Depth 1'

Time	Time Interval	Initial	Final	Drop	MPI	
9:09 9:39	30	6	11.5	5.5	5.5	
9:40 10:10	30	5	10	5.0	6.0	
10:11 10:41	30	5	9.5	4.5	6.7	
10:42 11:12	30	6	10.25	4.3	7.1	
11:13 11:43	30	5	9	4.0	7.5	
11:44 12:14	30	6	10	4.0	7.5	
12:15 12:45	30	5.5	9.25	3.8	8.0	
12:46 13:16	30	4	7.25	3.3	9.3	
13:17 13:47	30	5	8	3.0	10.0	
13:48 14:18	30	4	7	3.0	10.0	
14:19 14:49	30	5	7.75	2.8	11.0	
14:50 15:20	30	4.5	7	2.5	12.0	

Test No. P-6 Depth 1'

Time	Time Interval	Initial	Final	Drop	MPI	
9:10 9:40	30	4	8.75	4.8	6.4	
9:41 10:11	30	4	8	4.0	7.5	
10:12 10:42	30	4	7.75	3.8	8.0	
10:43 11:13	30	3.75	7.25	3.5	8.6	
11:14 11:44	30	4	7.5	3.5	8.6	
11:45 12:15	30	4.5	7.75	3.3	9.3	
12:16 12:46	30	4	7.25	3.3	9.3	
12:47 13:17	30	5	7.75	2.8	11.0	
13:18 13:48	30	4	6.5	2.5	12.0	
13:49 14:19	30	6.5	8.75	2.3	13.4	
14:20 14:50	30	5	7.25	2.3	13.4	
14:51 15:21	30	4	6	2.0	15.0	

Test No. P-7 Depth 1'

Time	Time Interval	Initial	Final	Drop	MPI	
9:11 9:41	30	6	10.5	4.5	6.7	
9:42 10:12	30	5	9	4.0	7.5	
10:13 10:43	30	5.5	8.5	3.0	10.0	
10:44 11:14	30	4	7	3.0	10.0	
11:15 11:45	30	5	8	3.0	10.0	
11:46 12:16	30	5.5	8.25	2.8	11.0	
12:17 12:47	30	4	6.75	2.8	11.0	
12:48 13:18	30	4	6.5	2.5	12.0	
13:19 13:49	30	4	6.5	2.5	12.0	
13:50 14:20	30	4.5	7	2.5	12.0	
14:21 14:51	30	5	7.25	2.3	13.4	
14:52 15:22	30	5	7	2.0	15.0	

Test No. P-8 Depth 1'

Time	Time Interval	Initial	Final	Drop	MPI	
9:12 9:42	30	6.5	11.5	5.0	6.0	
9:43 10:13	30	5	9.25	4.3	7.1	
10:14 10:44	30	4	7.5	3.5	8.6	
10:45 11:15	30	4	7	3.0	10.0	
11:16 11:46	30	5	8	3.0	10.0	
11:47 12:17	30	4.5	7	2.5	12.0	
12:18 12:48	30	5	7.25	2.3	13.4	
12:49 13:19	30	5	7.25	2.3	13.4	
13:20 13:50	30	4	6.25	2.3	13.4	
13:51 14:21	30	5	7	2.0	15.0	
14:22 14:52	30	4	6	2.0	15.0	
14:53 15:23	30	4	5.75	1.8	17.2	

PROJECT NAME Apple Canyon Road PROJECT NO.: 213906-11A TEST TYPE (SP) (LL) (ATU)
DATE TESTED: 10/8/2021 TRACT: LOT NO.:
TESTED BY: JMR2

Test No. P-9 Depth 1'

Time	Time Interval	Initial	Final	Drop	MPI	
9:13 9:43	30	4.5	10	5.5	5.5	
9:44 10:14	30	4	8.5	4.5	6.7	
10:15 10:45	30	5	9	4.0	7.5	
10:46 11:16	30	5.5	9.25	3.8	8.0	
11:17 11:47	30	5	8.75	3.8	8.0	
11:48 12:18	30	4	7.25	3.3	9.3	
12:19 12:49	30	4	7.25	3.3	9.3	
12:50 13:20	30	5	8	3.0	10.0	
13:21 13:51	30	4	7	3.0	10.0	
13:52 14:22	30	5	7.75	2.8	11.0	
14:23 14:53	30	4	6.5	2.5	12.0	
14:54 15:24	30	5	7.5	2.5	12.0	

Test No. P-10 Depth 1'

Time	Time Interval	Initial	Final	Drop	MPI	
9:14 9:44	30	5	9.75	4.8	6.4	
9:45 10:15	30	6	10	4.0	7.5	
10:16 10:46	30	5	8.5	3.5	8.6	
10:47 11:17	30	6	9.5	3.5	8.6	
11:18 11:48	30	5	8.5	3.5	8.6	
11:49 12:19	30	4	7.25	3.3	9.3	
12:20 12:50	30	5	8.25	3.3	9.3	
12:51 13:21	30	4	7.75	3.8	8.0	
13:22 13:52	30	5	8	3.0	10.0	
13:53 14:23	30	4	6.75	2.8	11.0	
14:24 14:54	30	4	6.75	2.8	11.0	
14:55 15:25	30	4.5	7.25	2.8	11.0	

Test No. P-11 Depth 1'

Time	Time Interval	Initial	Final	Drop	MPI	
9:15 9:45	30	6.5	12	5.5	5.5	
9:46 10:16	30	6	10.5	4.5	6.7	
10:17 10:47	30	5	9.25	4.3	7.1	
10:48 11:18	30	4.5	8.25	3.8	8.0	
11:19 11:49	30	4	7.5	3.5	8.6	
11:50 12:20	30	4	7.25	3.3	9.3	
12:21 12:51	30	5	8.25	3.3	9.3	
12:52 13:22	30	4	7	3.0	10.0	
13:23 13:53	30	4	6.75	2.8	11.0	
13:54 14:24	30	5	7	2.0	15.0	
14:25 14:55	30	7	9	2.0	15.0	
14:56 15:26	30	5	7	2.0	15.0	

Test No. P-12 Depth 1'

Time	Time Interval	Initial	Final	Drop	MPI	
9:16 9:46	30	5.5	10.25	4.8	6.4	
9:47 10:17	30	4	8	4.0	7.5	
10:18 10:48	30	5	9	4.0	7.5	
10:49 11:19	30	5.5	8.75	3.3	9.3	
11:20 11:50	30	4	7.25	3.3	9.3	
11:51 12:21	30	5	8.25	3.3	9.3	
12:22 12:52	30	4	7	3.0	10.0	
12:53 13:23	30	4.5	7	2.5	12.0	
13:24 13:54	30	5	7.25	2.3	13.4	
13:55 14:25	30	4	6.25	2.3	13.4	
14:26 14:56	30	6.25	8.25	2.0	15.0	
14:57 15:27	30	5	6.75	1.8	17.2	

APPENDIX C

GEOFLOW DRIPFIELD CALCULATIONS

FIELD FLOW MULTIPLE PUMPS (PUMP 1)

Job Description:	*213906-14A*
Contact:	*GADALLA GADALLA*
Prepared by:	*JOSHUA GADALLA*
Date:	*10-Dec-21*

Please fill in the shaded areas and drop down menus:
This spreadsheet serves as a guide, and is not a complete hydraulic design.

Worksheet 1- Field Flow

Total field

	Total Quantity of effluent to be disposed per day	4,900	gallons / day
	Hydraulic loading rate	0.7	gallons / sq.ft. / day
	Minimum Dispersal Field Area	7,000	square ft.
	Total Dispersal Field Area	7,000	square ft.

Flow per zone

	Number of Zones	**4**	zone(s)
	Dispersal area per zone	1,750	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)	875	ft. per zone
	Total number of emitters per zone	438	emitters per zone
	Select Wasteflow dripline (16mm)	Wasteflow PC - 1 gph	dripline
	Pressure at the beginning of the dripfield	35	psi
	Feet of Head at the beginning of the dripfield	80.85	ft.
	What is the flow rate per emitter in gph?	1.02	gph
	Dose flow per zone	**7.44**	**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 or call 800-828

	If required, choose flush velocity	0.5	ft/sec
	How many lines of WASTEFLOW per zone?	8	lines
	Fill in the *actual* length of longest dripline lateral	109	ft.
	Flush flow required at the end of each dripline	0.37	gpm
	Total Flow required to achieve flushing velocity	2.96	gpm
	Total Flow per zone- worst case scenario	**10.40**	**gpm**

Select Filters and zone valves

	Select Filter Type	BioDisc Filter	
	Recommended Filter (item no.)	BioDisc-150	1.5" Disc Filter 0-30gpm
	Select Zone Valve Type	Electric Solenoid	-
	Recommended Zone Valve (item no.)	SVLVB-100	1-in. Solenoid valve

-

Dosing

	Number of doses per day / zone:	12	doses
	Timer ON. Pump run time per dose/zone:	13.44	mins:secs
	Timer OFF. Pump off time between doses	1:46	hrs:mins
	Per Zone - Pump run time per day/zone:	2:44	hrs:mins
	All Zones - Number of doses per day / all zones	48	doses / day

PUMP SIZING

Job Description:	213906-14A
Contact:	GADALLA GADALLA
Prepared by:	JOSHUA GADALLA
Date:	12/10/2021

Pressure losses may be grossly overstated, particularly if designing with WASTEFLOW Classic
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	7.44	gpm
Flow required to flush field	2.96	gpm
Flow required to dose & flush field	10.40	gpm
Filter	BioDisc-150	
No. of Zones	4	zones
Zone valve	SVLVB-100	
Dripline	Wasteflow PC - 1 gph	
Dripline longest lateral	109.38	ft.

Section 2	Ft of head	Pressure
A. Flush line - Losses through return line		
Size of flush line in inches	.5 inch	
Length of return line	200 ft.	
Equivalent length of fittings	5 ft.	
Elevation change. (if downhill enter 0)	**0** ft.	
Pressure loss in 100 ft of pipe	24.30 ft.	10.52 psi
Total pressure loss from end of dripline to return tank	*49.8 ft.*	21.57 psi
B. Dripline - Losses through Wasteflow dripline		
Length of longest dripline lateral	**109** ft.	
Minimum dosing pressure required at end of dripline	23.10 ft.	10.00 psi
Loss through dripline during flushing	9.49 ft.	4.11 psi
Total minimum required dripline pressure	*32.59 ft.*	4.11 *psi*
A+B. Minimum Pressure required at beginning of dripfield		
CALCULATED pressure required at beginning of dripfield	*82.41 ft.*	35.68 *psi*
SPECIFIED pressure at beginning of dripfield (from worksht 1)	**80.9 ft.**	35.00 *psi*
!!! Urgent revision required SPECIFIED pressure must be greater than CALCULATED pressure and lowe		
C. Drip components - Losses through headworks		
Filter	4.6 ft.	2.00 psi
Zone valve pressure loss (not in diagram)	0.92 ft.	0.40 psi
Flow meter pressure loss (not in diagram)	ft.	- psi
Other pressure losses	ft.	- psi
Total loss through drip components	**5.54 ft.**	2.40 psi
D. Supply line - Minimum Pressure head required to get from pump tank to top of dripfield		
Size of supply line in inches	1.25 inch	
Length of supply line	0 ft.	
Equivalent length of fittings	5 ft.	
Height from pump to tank outlet	5 ft.	
Elevation change. (if downhill enter 0)	0 ft.	
Pressure loss/gain in 100 ft. of pipe	2.88 ft.	1.25 psi
Total gain or loss from pump to field	***5.1 ft.***	2.23 psi
Total dynamic head	**91.5 ft.**	39.63 *psi*
Pump capacity *	**10.4 gpm**	
Pump Model Number		
Voltz / Hp / phase		

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

If you need assistance designing for this additional flow, please

a. See Geoflow flushing worksheet or

b. Contact Geoflow at 800-828-3388.

FIELD FLOW MULTIPLE PUMPS (PUMP 2)

Job Description:	*213906-14A*
Contact:	*GADALLA GADALLA*
Prepared by:	*JOSHUA GADALLA*
Date:	*10-Dec-21*

Please fill in the shaded areas and drop down menus:
This spreadsheet serves as a guide, and is not a complete hydraulic design.

Worksheet 1- Field Flow

Total field

	Total Quantity of effluent to be disposed per day	4,900	gallons / day
	Hydraulic loading rate	0.7	gallons / sq.ft. / day
	Minimum Dispersal Field Area	7,000	square ft.
	Total Dispersal Field Area	7,000	square ft.

Flow per zone

	Number of Zones	5	zone(s)
	Dispersal area per zone	1,400	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)	700	ft. per zone
	Total number of emitters per zone	350	emitters per zone
	Select Wasteflow dripline (16mm)	Wasteflow PC - 1 gph	dripline
	Pressure at the beginning of the dripfield	35	psi
	Feet of Head at the beginning of the dripfield	80.85	ft.
	What is the flow rate per emitter in gph?	1.02	gph
	Dose flow per zone	**5.95**	**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 or call 800-828

	If required, choose flush velocity	0.5	ft/sec
	How many lines of WASTEFLOW per zone?	8	lines
	Fill in the *actual* length of longest dripline lateral	88	ft.
	Flush flow required at the end of each dripline	0.37	gpm
	Total Flow required to achieve flushing velocity	2.96	gpm
	Total Flow per zone- worst case scenario	**8.91**	**gpm**

Select Filters and zone valves

	Select Filter Type	BioDisc Filter	
	Recommended Filter (item no.)	BioDisc-150	1.5" Disc Filter 0-30gpm
	Select Zone Valve Type	Electric Solenoid	-
	Recommended Zone Valve (item no.)	SVLVB-100	1-in. Solenoid valve

-

Dosing

	Number of doses per day / zone:	12	doses
	Timer ON. Pump run time per dose/zone:	13.44	mins:secs
	Timer OFF. Pump off time between doses	1:46	hrs:mins
	Per Zone - Pump run time per day/zone:	2:44	hrs:mins
	All Zones - Number of doses per day / all zones	60	doses / day

PUMP SIZING

Job Description:	213906-14A
Contact:	GADALLA GADALLA
Prepared by:	JOSHUA GADALLA
Date:	12/10/2021

Pressure losses may be grossly overstated, particularly if designing with WASTEFLOW Classic
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	5.95	gpm
Flow required to flush field	2.96	gpm
Flow required to dose & flush field	8.91	gpm
Filter	BioDisc-150	
No. of Zones	5	zones
Zone valve	SVLVB-100	
Dripline	Wasteflow PC - 1 gph	
Dripline longest lateral	87.50	ft.

Section 2	Ft of head	Pressure
A. Flush line - Losses through return line		
Size of flush line in inches	.5 inch	
Length of return line	200 ft.	
Equivalent length of fittings	5 ft.	
Elevation change. (if downhill enter 0)	**0** ft.	
Pressure loss in 100 ft of pipe	24.30 ft.	10.52 psi
Total pressure loss from end of dripline to return tank	*49.8 ft.*	21.57 psi
B. Dripline - Losses through Wasteflow dripline		
Length of longest dripline lateral	**88** ft.	
Minimum dosing pressure required at end of dripline	23.10 ft.	10.00 psi
Loss through dripline during flushing	4.13 ft.	1.79 psi
Total minimum required dripline pressure	*27.23 ft.*	1.79 *psi*
A+B. Minimum Pressure required at beginning of dripfield		
CALCULATED pressure required at beginning of dripfield	*77.06 ft.*	33.36 *psi*
SPECIFIED pressure at beginning of dripfield (from worksht 1)	**80.9 ft.**	35.00 *psi*
Great! SPECIFIED Pressure is greater than CALCULATED Pressure requirement. Go to next step		
C. Drip components - Losses through headworks		
Filter	4.6 ft.	2.00 psi
Zone valve pressure loss (not in diagram)	0.69 ft.	0.30 psi
Flow meter pressure loss (not in diagram)	ft.	- psi
Other pressure losses	ft.	- psi
Total loss through drip components	**5.31 ft.**	2.30 psi
D. Supply line - Minimum Pressure head required to get from pump tank to top of dripfield		
Size of supply line in inches	1 inch	
Length of supply line	0 ft.	
Equivalent length of fittings	5 ft.	
Height from pump to tank outlet	5 ft.	
Elevation change. (if downhill enter 0)	0 ft.	
Pressure loss/gain in 100 ft. of pipe	6.42 ft.	2.78 psi
Total gain or loss from pump to field	***5.3 ft.***	2.30 psi
Total dynamic head	**91.5 ft.**	39.60 *psi*
Pump capacity *	**8.9 gpm**	
Pump Model Number		
Voltz / Hp / phase		

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

If you need assistance designing for this additional flow, please

a. See Geoflow flushing worksheet or

b. Contact Geoflow at 800-828-3388.

APPENDIX D

WASTE FLOW CALCUALTIONS

APPENDIX E

ADVANCED WASTEWATER TREATMENT SYSTEM DETAILS (DELTA ECOPOD E800D)

ECOPOD Process Design Calculations

Project: **ECOPOD E800D, BOD Only**
0 - 1,000 ft AMSL

Design Influent Loadings:

Average Daily Flow =	**8000**	gpd		
Influent BOD5 =	**300**	mg/l =	20	ppd
Influent TKN =	**0**	mg/l =	0.00	ppd

Media Quantity:

Minimum Quantity of Media Blocks Required =	16	Blocks (rounded up to nearest whole number)
Reactor Block Quantity Multiplication Factor =	**1.00**	Based on wastewater type and tank depth
Selected Quantity of Media Blocks Required =	**16**	Blocks (rounded up to nearest whole number)
ECOPOD Equivalent:	8000	gpd size system at BOD of 300 mg/L

Reactor Volume:

Reactor Tank Volume Multiplication Factor =	**1.00**	Based on actual tank dimensions
Estimated Total Reactor Volume =	8000	gal
Ecopod Media Block Stack =	**2**	blocks
Minimum Sidewater Depth =	6.50	ft

ECOPOD Process Design Calculations

Project: **ECOPOD E800D, BOD Only**
0 - 1,000 ft AMSL

Operating Conditions:

Site Elevation (z) =	**1000**	ft		
Ambient Air Temperature ($T_{atm,max}$) =	**46**	°C	114.98 °F	574.7 °R
Max. Wastewater Temperature ($t_{WW,max}$) =	**20**	°C	68 °F	527.7 °R
Residual Dissolved Oxygen Conc (C_L) =	**2.0**	mg/L		
Equivalent MLSS (X) =	**2,500**	mg/L		

Diffused Aeration Criteria:

Diffuser (Bubble) Type =	**Coarse**		**Coarse or Fine**
Diffuser Submergence (z_{sub}) =	4.50	ft	
Pressure at Diffuser Release ($P_{z,sub}$) =	1.9	psig	$=z_{sub}/2.31$
Ambient Percent Oxygen by Weight (O_{atm}) =	23		
Mid-depth Correction Factor (d_e) =	**0.40**		Typical; Range 0.25-0.40.

Diffused Aeration Correction Data:

Gravitational Acceleration (g) =	32.2	ft/s^2	
Mole of Air (M) =	28.97	lb/lb-mol	
Universal Gas Constant (R) =	53.3	ft·lb/lb-air·ºR	
Ambient Elev/Temp Correction Factor (P_b/P_a) =	0.97		$=EXP[-z/RT]$
Ambient Pressure at Elev ($P_{atm,z}$) =	14.22	psi	$=14.69*P_b/P_a$
Specific Weight of Air at $T_{atm,max}$ ($\gamma_{a,T}$) =	0.067	lb/ft^3	$=P_{atm,z}/RT$
Clean Water (CW) DO Sat Conc at 20°C ($C_{s,20}$) =	9.092	mg/L	At STP
CW DO Sat Conc at $t_{WW,max}$ ($C_{s,t}$) =	9.092	mg/L	VLOOKUP Tables
Bulk Liquid Temperature Correction Factor (τ) =	1.00		$=C_{s,t}/C_{s,20}$
CW DO Sat Conc for Diff. Aer. at STP ($C_{s',20}$) =	9.574	mg/L	$=C_{s,20}*[1+d_e(P_{z,sub}/P_{atm,0)}]$
WW Oxygen Transfer Correction Factor (α) =	0.87		
Salinity Surface Tension Correction Factor (β) =	0.95		Typical; Range 0.95-0.98
Temperature Correction Factor (θ) =	1.024		Typical
Standard Oxygen Transfer Eff. (SOTE) =	1.8%		0.400% OTE per ft submergence
Diffuser Fouling Factor (F) =	1.0		Typical; Range 0.65-0.9.
AOR/SOR =	0.62		$=[(\tau\beta\{P_b/P_a\}C_{s',20}-C_L)/C_{s',20}][\theta^{t-20}](\alpha)(F)$

ECOPOD Process Design Calculations

Project: **ECOPOD E800D, BOD Only**
0 - 1,000 ft AMSL

Air Flow Requirements

BOD Removal Actual Oxygen Requirement =	**1.2**	lbs O_2 per lb Influent BOD5 oxidized	
Nitrification Actual Oxygen Requirement =	**4.6**	lbs O_2 per lb Influent TKN nitrified	
Actual Oxygen Requirement (AOR) =	24.02	lbO2/day	
Oxygen Uptake Rate =	15	mg/L/I	Should be less than 100 mg/L/Hr
Standard Airflow Requirement =	97	scfm	=AOR/((AOR/SOR)*SOTE*O_{atm}*$\gamma_{a,T}$)
Minimum Mixing Airflow Requirement =	**20**	scfm/1,000 cf	
Minimum Mixing Airflow Requirement =	22	scfm	Mixing req'd @ 20 SCFM per 1000 cf
Design Standard Airflow Requirement =	97	scfm	
Actual Airflow =	**116**	icfm	
Blower Model =	**K05-MS**	FPZ	
Motor Horsepower =	**3.0**	hp	

Blower Design Requirements

Number of Duty Blowers =	**1**		
Blower Inlet Airflow Required =	109	icfm	=SCFM/(P_b/P_a)*($T_{atm,max}$/T_{std})
Air Distribution Pipe Losses =	**0.2**	psig	Assumed losses.
Blower Inlet Losses =	**0.1**	psig	Assumed losses.
Blower Discharge Head Required =	2.2	psig	62.3 " W.C.

Air Distribution System:

Number of Headers per Reactor =	**1**		
Airflow per Header =	116	icfm	
Total Number of Diffuser Orifices per lateral =	**8**	per unstacked/stacked media block footprint	
Total Number of laterals per header =	8		
Total Number of Diffuser Orifices per Header =	64		
Airflow per Diffuser =	1.8	icfm	

FPZ BLOWER TECHNOLOGY

REGENERATIVE BLOWERS - PRESSURE

SCL K03 / K04 / K05 / K06

MS SERIES

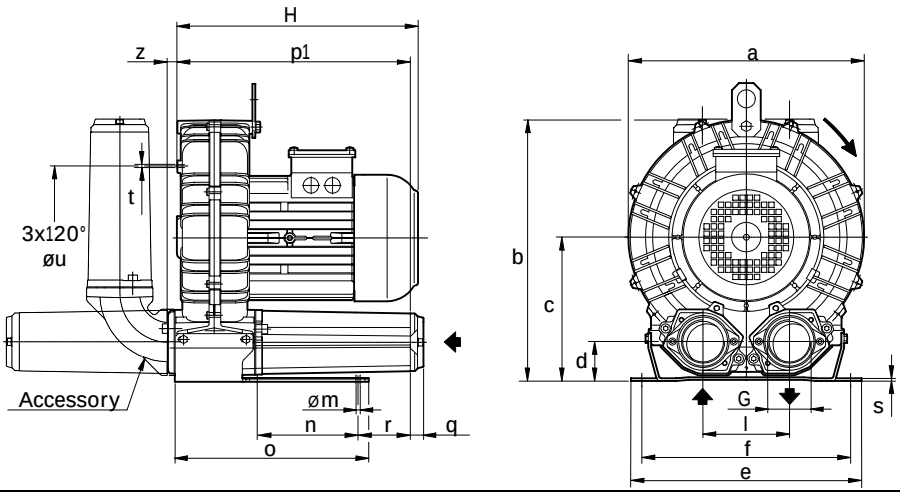
SN 1874-9 1/2

TECHNICAL CHARACTERISTICS
- Aluminium alloy construction
- Smooth operation
- High efficiency impeller
- Maintenance free
- Mountable in any position
- Recognized TEFC - cURus motor

OPTIONS
- Special voltages (IEC 38)
- Surface treatments

ACCESSORIES
- Inlet and/or inline filters
- Additional inlet/outlet silencers
- Safety valves
- Flow converting device
- Optional connectors

Dimensions in inches.
Dimension for reference only.



Model	a	b	c	d	e	f	G	l	m	n	o	p1	q	r	s	t	u	z
K03-MS	9.49	10.55	5.79	1.69	9.06	8.07	1"1/4 NPT	3.39	0.39	3.27	5.59	8.07	0.71	2.95	0.16	M6	5.51	0.47
K04-MS	11.22	12.40	6.77	1.93	10.04	8.86	1"1/2 NPT	4.02	0.47	3.74	6.73	8.74	0.71	2.76	0.16	M6	6.89	0.71
K05-MS	12.87	14.37	7 87	2.13	12.60	10.24	2" NPT	4.72	0.59	4.53	10.43	12.60	0.71	3.86	0.16	M8	7.87	0.75
K06-MS	14.80	15.47	8.07	2.13	12.80	11.42	2" NPT	4.92	0.59	5.51	10.71	13.15	0.71	3.35	0.16	M8	9.45	0.75

Model	Maximum flow Scfm 60 Hz 3500 rpm	Maximum flow Scfm 50 Hz 2900 rpm	Installed power Hp 60 Hz 3500 rpm	Installed power Hp 50 Hz 2900 rpm	Maximum differential pressure △p (In WG) 60 Hz 3500 rpm	Maximum differential pressure △p (In WG) 50 Hz 2900 rpm	Noise level Lp dB (A) (1) 60 Hz 3500 rpm	Noise level Lp dB (A) (1) 50 Hz 2900 rpm	Overall dimensions H Inches	Weight Lbs
K03-MS	52	43	3/4	3/4	64	60	62.0	60.0	10.43	24.30
			1	1	95	77	62.3	60.3	11.97	26.50
K04-MS	98	81	1 ½	1 ½	58	80	64.8	62.8	11.65	36.40
			2	2	85	100	65.0	63.0	13.78	43.00
			3	-	120	-	65.2	-	13.78	49.60
K05-MS	156	129	2	2	52	70	70.5	68.5	13.20	51.80
			3	3	90	110	70.8	68.8	13.20	58.40
			4	4	128	120	71.1	69.1	14.40	67.20
K06-MS	216	179	3	3	50	65	73.0	71.0	13.54	68.70
			4	4	75	95	73.3	71.3	14.17	71.65
			5 ½	5 ½	110	140	73.6	71.6	14.17	77.60
			6 1/5 (2)	-	132	-	73.9	-	14.45	77.60

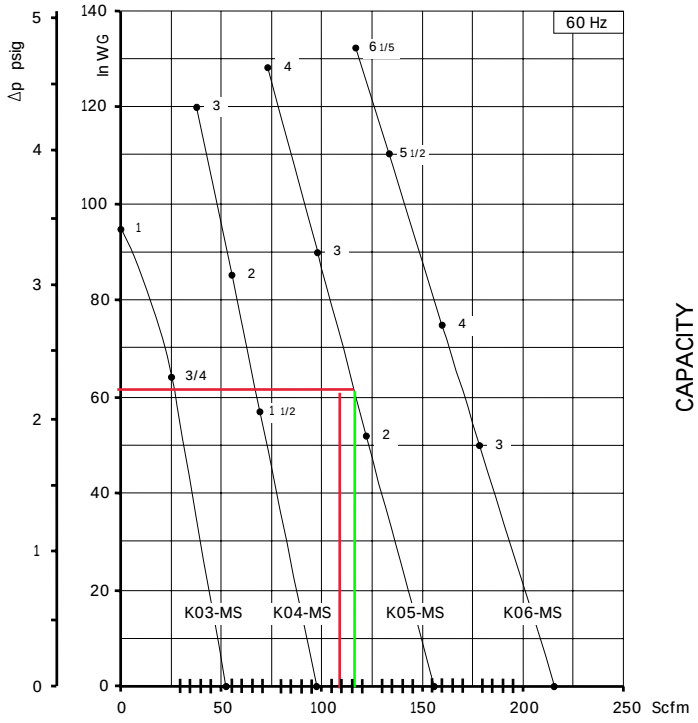
(1) Noise measured at 1 m distance with inlet and outlet ports piped, in accordance to ISO 3744.
(2) No cURus motor

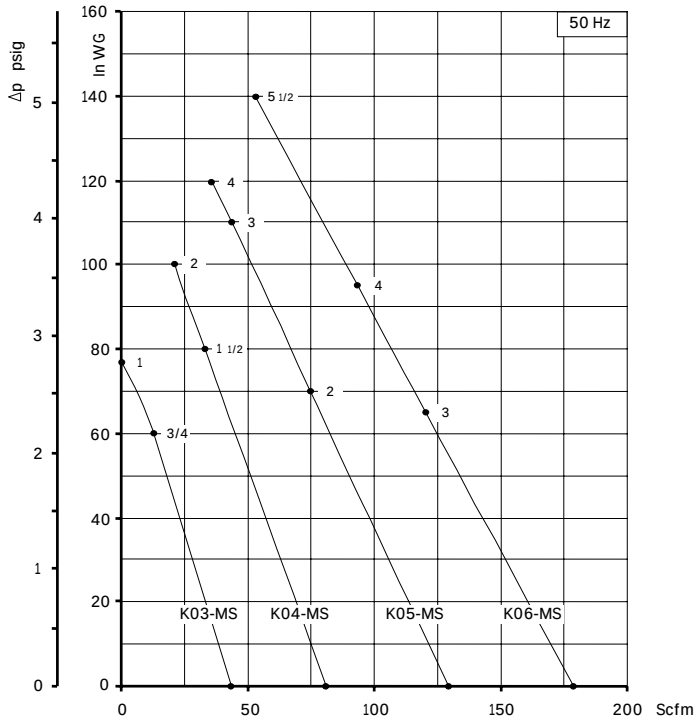
- For proper use, the blower should be equipped with inlet filter and safety valve; other accessories available on request.
- Ambient temperaturefrom +5° to +104°F.
- Specifications subject to change without notice.

SCL K03 / K04 / K05 / K06
MS SERIES

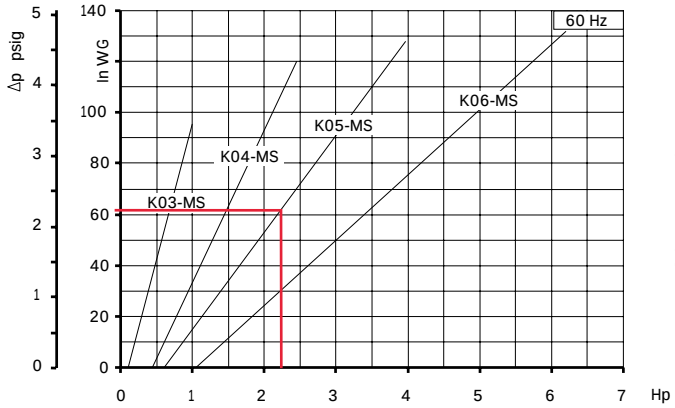
SN 1874-9 2/2

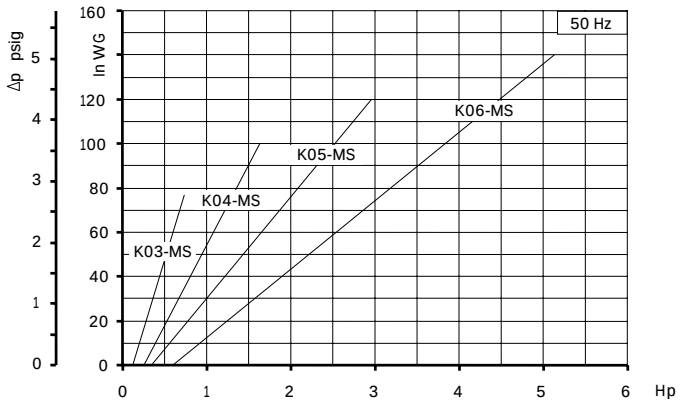
CAPACITY



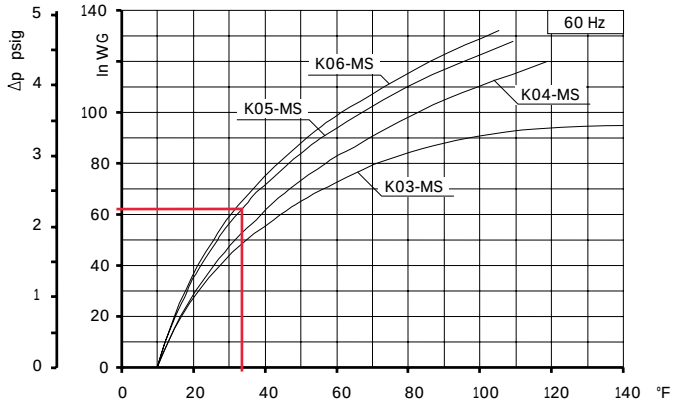


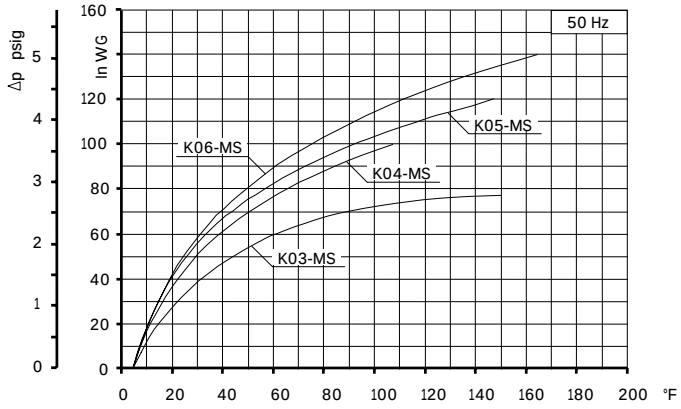
ABSORBED POWER





TEMPERATURE INCREASE





Curves refer to air at 68°F temperature and 29.92 In Hg atmospheric pressure (abs) measured at inlet port.
Values for flow, power consumption and temperature rise: +/- 10% tolerance.
Data subject to change without notice.

SINGLE PHASE DUAL VOLTAGE

GENERAL SPECIFICATIONS:

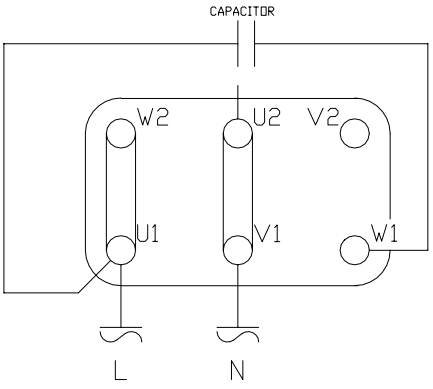
1. **Type: AC Motor IEC 60034**
2. **Marks: cURus, CE**
3. **Poles: 2**
4. **Insulation class: F**
5. **Frequency: 60 hz**
6. **Enclosure: TEFC**
7. **Protection IP55, Tropicalized**
8. **Thermal protector: Klixon 140 ^{O} C or 150 ^{O} C (R series)**
9. **Max. Ambient 40 ^{O} C**
10. **Duty: Continuous**
11. **Construction: aluminum frame**

POWER		SIZE	VOLTAGE (60 hz)	Full Load Amperage	Starting Current A	Power Factor	SF	Capacitor µF	Cable Entry
HP	KW								
0.33	0.25	63	115 / 208-230	3.5 / 1.7	12.3 / 6.0	0.97	1.0	16 - 400 V	M16
0.5	0.37	63	115 / 208-230	4.8 / 2.6	16.8 / 9.1	0.96	1.0	16 - 400 V	M16
0.75	0.55	71	115 / 208-230	9.8 / 4.9	46.1 / 23.0	0.95	1.0	20 - 400 V	M16
0.75	0.55	71	115 / 208-230	8.3 / 4.1-4.2	34.9 / 17.2	0.83	1.15	30 - 450 V	M20
1	0.75	80	115 / 208-230	13.0 / 7.2	49.4 / 24.7	0.77	1.0	31.5 - 400 V	M20
1	0.75	80	115 / 208-230	9.4 / 5.5-5.0	35.8 / 17.3	0.99	1.15	40 - 450 V	M20
1.5	1.1	80	115 / 208-230	13.6 / 7.3	54.4 / 29.2	0.97	1.0	50 - 400 V	M20
1.5	1.1	80	115 / 208-230	14.6 / 7.6-7.3	49.3 / 23.2	0.97	1.15	45 - 450 V	M20
1.5*	1.1	80	115 / 208-230	14.3 / 7.18	71.1 / 35	0.96	1.0	55 - 450 V	M20
2	1.5	90	115 / 208-230	24.0 / 12.0	79.2 / 39.6	0.90	1.0	70 - 400 V	M20
2	1.5	90	115 / 208-230	19.7 / 10.6-9.9	103 / 52.4	0.95	1.15	50 -450 V	M20
2*	1.5	80	115 / 208-230	19.4 / 9.8	96 / 48.2	0.89	1.0	55 - 450 V	M20
3	2.2	90	115 / 208-230	31.5 / 16.0	154.4 / 78.4	0.85	1.0	60 - 400 V	M20
3	2.2	90	115 / 208-230	29.4 / 16.6-14.8	119.8 / 61.8	0.91	1.15	45 - 450 V	M20
3*	2.2	90	115 / 208-230	26.2 / 13.1	152 / 76	0.95	1.0	70 - 450 V	M20

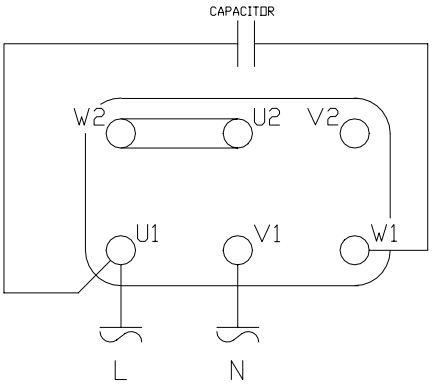
*** Applicable to R series ONLY.**

Shaded models to be discontinued.

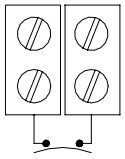
LOW VOLTAGE 115 V - 60 Hz



HIGH VOLTAGE 208-230 V - 60 Hz



THERMAL PROTECTION
NORMALLY CLOSED



THERMAL CUT-OFF

Specifications subject to change without notice. Alternate motor suppliers may be used.

THREE PHASE MOTOR

GENERAL SPECIFICATIONS:

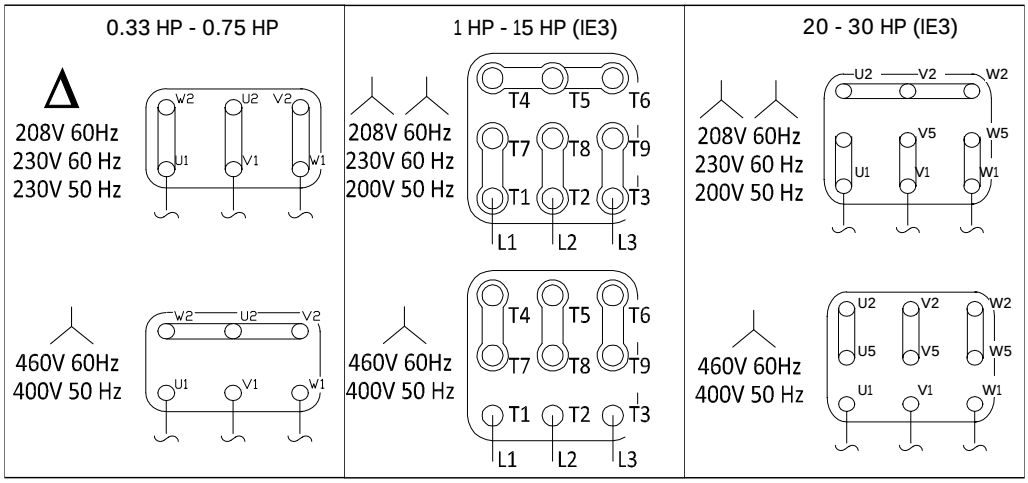
1. Type: 3-phase AC Motor IEC 60034
2. Marks: cURus, CE
3. Nema Premium Efficiency (IE3) - 1 HP AND LARGER (3 ph)
4. Poles: 2
5. Insulation class: F; F (B) for Premium efficient
6. Enclosure: TEFC
7. Protection IP55, Tropicalized
8. Thermal protector: Klixon 1400 C/150^{0} C
9. Service factor: 1.15 (60 hz)
10. Max. Ambient 40^{0} C
11. Duty: Continuous
12. Construction: aluminum frame

POWER		SIZE	60 HZ			50 HZ			60 hz Starting Current Ratio*	CABLE ENTRY 1 (cable gland incl.)	CABLE ENTRY 2
HP	KW		VOLTAGE	FLA 208-230 / 460 V	Efficiency	VOLTAGE	FLA 200/400 V	Efficiency			
0.33	0.25	63	208-230/460	1.5 / 0.7	59%	230/400	1.4 / 0.8	60.0%	3.9	M16	M20
0.5	0.37	63	208-230/460	2.3 / 1.0	59.2%	230/400	2.1 / 1.2	61.4%	3.6	M16	M20
0.75	0.55	71	208-230/460	2.7 / 1.2	68.8%	230/400	2.6 / 1.5	69.0%	3.8	M16	M20
0.75	0.55	71	208-230/460	2.3-2.2 / 1.3	74.5%	230/400	2.6 / 1.5	74.5%	6.8	M20	-
1	0.75	80	208-230/460	2.99-2.94 / 1.47	77.0%	200/400	3.28 / 1.64	80.7%	8.0	M25	M25
1.5	1.1	80	208-230/460	4.35-4.34 / 2.17	84.0%	200/400	4.92 / 2.46	82.8%	9.3	M25	M25
2	1.5	80**	208-230/460	5.91-5.96 / 2.98	85.5%	200/400	6.82 / 3.41	84.2%	8.7	M25	M25
		90	208-230/460	5.77-5.74 / 2.87	85.5%	200/400	6.58 / 3.29	84.2%	9.4	M25	M25
3	2.2	90	208-230/460	8.27-8.31 / 4.15	86.5%	200/400	9.6 / 4.8	85.9%	10.7	M25	M25
4	3	100	208-230/460	10.9-11.1 / 5.53	88.5%	200/400	12.86 / 6.38	87.1%	11.0	M25	M25
5.5	4	100	208-230/460	14.6-15.1 / 7.55	88.5%	200/400	17.7 / 8.86	88.1%	11.1	M25	M25
6.2	4.6	100	208-230/460	16.5-16.4 / 8.2	89.5%	200/400	19 / 9.5	88.6%	12.5	M25	M25
7.5	5.5	132	208-230/460	19.8-19.5 / 9.75	89.5%	200/400	22.2 / 11.1	89.2%	13.7	M25	M25
10	7.5	132	208-230/460	26.1-25 / 12.5	90.2%	200/400	28.6 / 14.3	90.1%	13.0	M25	M25
15	11	132	208-230/460	38.2-37.3 / 18.7	91.0%	200/400	43.4 / 21.7	91.0%	12.5	M25	M25
20	15	132	208-230/460	47.0 / 23.5	91.7%	200/400	52.4 / 26.2	91.9%	9.7	M32	M32
20***	15	160	208-230/460	48.8 / 24.4	91.0%	200/400	54.4 / 27.2	91.9%	10.7	M32	M32
25	18.5	160	208-230/460	62 / 31	91.7%	200/400	69 / 34.5	92.4%	12.5	M40	M40
30	22	160	208-230/460	71.6/35.8	91.7%	200/400	77.8 / 38.9	92.7%	10.6	M40	M40

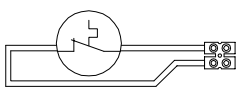
* FLA x starting current ratio = starting current ** 2 hp size 80 motors used on SCL R30-MD ONLY. *** TS / TD models ONLY.

Shaded models to be discontinued

WIRING DIAGRAMS



Thermal protection



V_N =250V , cosφ 0,6 , I_N = 1,6 A
V_N =250V , cosφ 1 , I_N = 2,5 A

Specifications subject to change without notice. Alternate motor suppliers may be used.

ECOPOD Process Design Calculations

Project: **ECOPOD E800D, BOD Only**
1,000 - 3,000 ft AMSL

Design Influent Loadings:

Average Daily Flow =	**8000**	gpd		
Influent BOD5 =	**300**	mg/l =	20	ppd
Influent TKN =	**0**	mg/l =	0.00	ppd

Media Quantity:

Minimum Quantity of Media Blocks Required = **16** Blocks (rounded up to nearest whole number)

Reactor Block Quantity Multiplication Factor = **1.00** Based on wastewater type and tank depth

Selected Quantity of Media Blocks Required = **16** Blocks (rounded up to nearest whole number)
ECOPOD Equivalent: 8000 gpd size system at BOD of 300 mg/L

Reactor Volume:

Reactor Tank Volume Multiplication Factor = **1.00** Based on actual tank dimensions
Estimated Total Reactor Volume = 8000 gal

Ecopod Media Block Stack = **2** blocks

Minimum Sidewater Depth = 6.50 ft

ECOPOD Process Design Calculations

Project: **ECOPOD E800D, BOD Only**
1,000 - 3,000 ft AMSL

Operating Conditions:

Site Elevation (z) =	**3000**	ft		
Ambient Air Temperature ($T_{atm,max}$) =	**46**	°C	114.98 °F	574.7 °R
Max. Wastewater Temperature ($t_{WW,max}$) =	**20**	°C	68 °F	527.7 °R
Residual Dissolved Oxygen Conc (C_L) =	**2.0**	mg/L		
Equivalent MLSS (X) =	**2,500**	mg/L		

Diffused Aeration Criteria:

Diffuser (Bubble) Type =	**Coarse**		**Coarse or Fine**
Diffuser Submergence (z_{sub}) =	4.50	ft	
Pressure at Diffuser Release ($P_{z,sub}$) =	1.9	psig	$=z_{sub}/2.31$
Ambient Percent Oxygen by Weight (O_{atm}) =	23		
Mid-depth Correction Factor (d_e) =	**0.40**		Typical; Range 0.25-0.40.

Diffused Aeration Correction Data:

Gravitational Acceleration (g) =	32.2	ft/s^2	
Mole of Air (M) =	28.97	lb/lb-mol	
Universal Gas Constant (R) =	53.3	ft·lb/lb-air·ºR	
Ambient Elev/Temp Correction Factor (P_b/P_a) =	0.91		$=EXP[-z/RT]$
Ambient Pressure at Elev ($P_{atm,z}$) =	13.32	psi	$=14.69*P_b/P_a$
Specific Weight of Air at $T_{atm,max}$ ($\gamma_{a,T}$) =	0.063	lb/ft^3	$=P_{atm,z}/RT$
Clean Water (CW) DO Sat Conc at 20°C ($C_{s,20}$) =	9.092	mg/L	At STP
CW DO Sat Conc at $t_{WW,max}$ ($C_{s,t}$) =	9.092	mg/L	VLOOKUP Tables
Bulk Liquid Temperature Correction Factor (τ) =	1.00		$=C_{s,t}/C_{s,20}$
CW DO Sat Conc for Diff. Aer. at STP ($C_{s',20}$) =	9.574	mg/L	$=C_{s,20}*[1+d_e(P_{z,sub}/P_{atm,0)}]$
WW Oxygen Transfer Correction Factor (α) =	0.87		
Salinity Surface Tension Correction Factor (β) =	0.95		Typical; Range 0.95-0.98
Temperature Correction Factor (θ) =	1.024		Typical
Standard Oxygen Transfer Eff. (SOTE) =	1.8%		0.400% OTE per ft submergence
Diffuser Fouling Factor (F) =	1.0		Typical; Range 0.65-0.9.
AOR/SOR =	0.57		$=[(\tau\beta\{P_b/P_a\}C_{s',20}-C_L)/C_{s',20}][\theta^{t-20}](\alpha)(F)$

ECOPOD Process Design Calculations

Project: **ECOPOD E800D, BOD Only**
1,000 - 3,000 ft AMSL

Air Flow Requirements

BOD Removal Actual Oxygen Requirement =	**1.2**	lbs O_2 per lb Influent BOD5 oxidized	
Nitrification Actual Oxygen Requirement =	**4.6**	lbs O_2 per lb Influent TKN nitrified	
Actual Oxygen Requirement (AOR) =	24.02	lbO2/day	
Oxygen Uptake Rate =	15	mg/L/l	Should be less than 100 mg/L/Hr
Standard Airflow Requirement =	113	scfm	=AOR/((AOR/SOR)*SOTE*O_{atm}*$\gamma_{a,T}$)
Minimum Mixing Airflow Requirement =	**20**	scfm/1,000 cf	
Minimum Mixing Airflow Requirement =	22	scfm	Mixing req'd @ 20 SCFM per 1000 cf
Design Standard Airflow Requirement =	113	scfm	
Actual Airflow =	**169**	icfm	
Blower Model =	**K06-MS**	FPZ	
Motor Horsepower =	**4.0**	hp	

Blower Design Requirements

Number of Duty Blowers =	**1**		
Blower Inlet Airflow Required =	136	icfm	=SCFM/(P_b/P_a)*($T_{atm,max}$/T_{std})
Air Distribution Pipe Losses =	**0.2**	psig	Assumed losses.
Blower Inlet Losses =	**0.1**	psig	Assumed losses.
Blower Discharge Head Required =	2.2	psig	62.3 " W.C.

Air Distribution System:

Number of Headers per Reactor =	**1**		
Airflow per Header =	169	icfm	
Total Number of Diffuser Orifices per lateral =	**12**	per unstacked/stacked media block footprint	
Total Number of laterals per header =	8		
Total Number of Diffuser Orifices per Header =	96		
Airflow per Diffuser =	1.8	icfm	

E800D Standard Blower
BOD Only
1,000 - 3,000 ft AMSL

REGENERATIVE BLOWERS - PRESSURE

SCL K03 / K04 / K05 / K06

MS SERIES

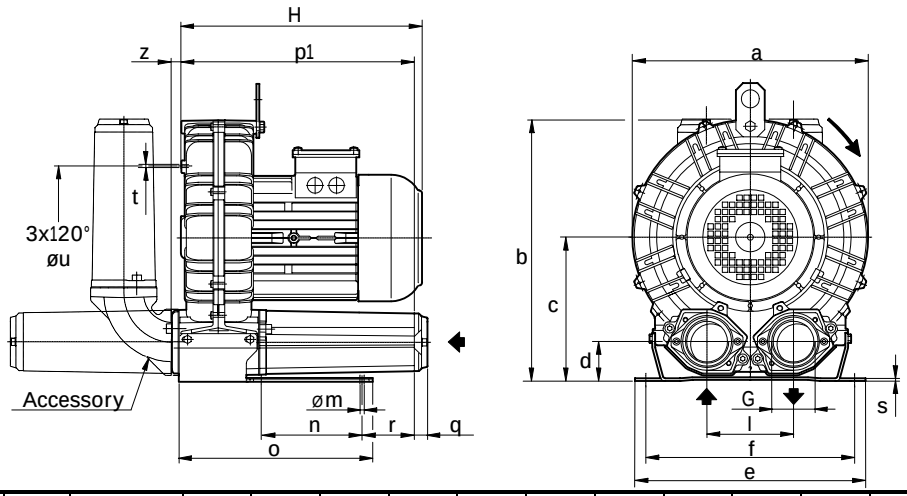
SN 1874-9 1/2

TECHNICAL CHARACTERISTICS
- Aluminium alloy construction
- Smooth operation
- High efficiency impeller
- Maintenance free
- Mountable in any position
- Recognized TEFC - cURus motor

OPTIONS
- Special voltages (IEC 38)
- Surface treatments

ACCESSORIES
- Inlet and/or inline filters
- Additional inlet/outlet silencers
- Safety valves
- Flow converting device
- Optional connectors

Dimensions in inches.
Dimension for reference only.



Model	a	b	c	d	e	f	G	l	m	n	o	p1	q	r	s	t	u	z
K03-MS	9.49	10.55	5.79	1.69	9.06	8.07	1"1/4 NPT	3.39	0.39	3.27	5.59	8.07	0.71	2.95	0.16	M6	5.51	0.47
K04-MS	11.22	12.40	6.77	1.93	10.04	8.86	1"1/2 NPT	4.02	0.47	3.74	6.73	8.74	0.71	2.76	0.16	M6	6.89	0.71
K05-MS	12.87	14.37	7 87	2.13	12.60	10.24	2" NPT	4.72	0.59	4.53	10.43	12.60	0.71	3.86	0.16	M8	7.87	0.75
K06-MS	14.80	15.47	8.07	2.13	12.80	11.42	2" NPT	4.92	0.59	5.51	10.71	13.15	0.71	3.35	0.16	M8	9.45	0.75

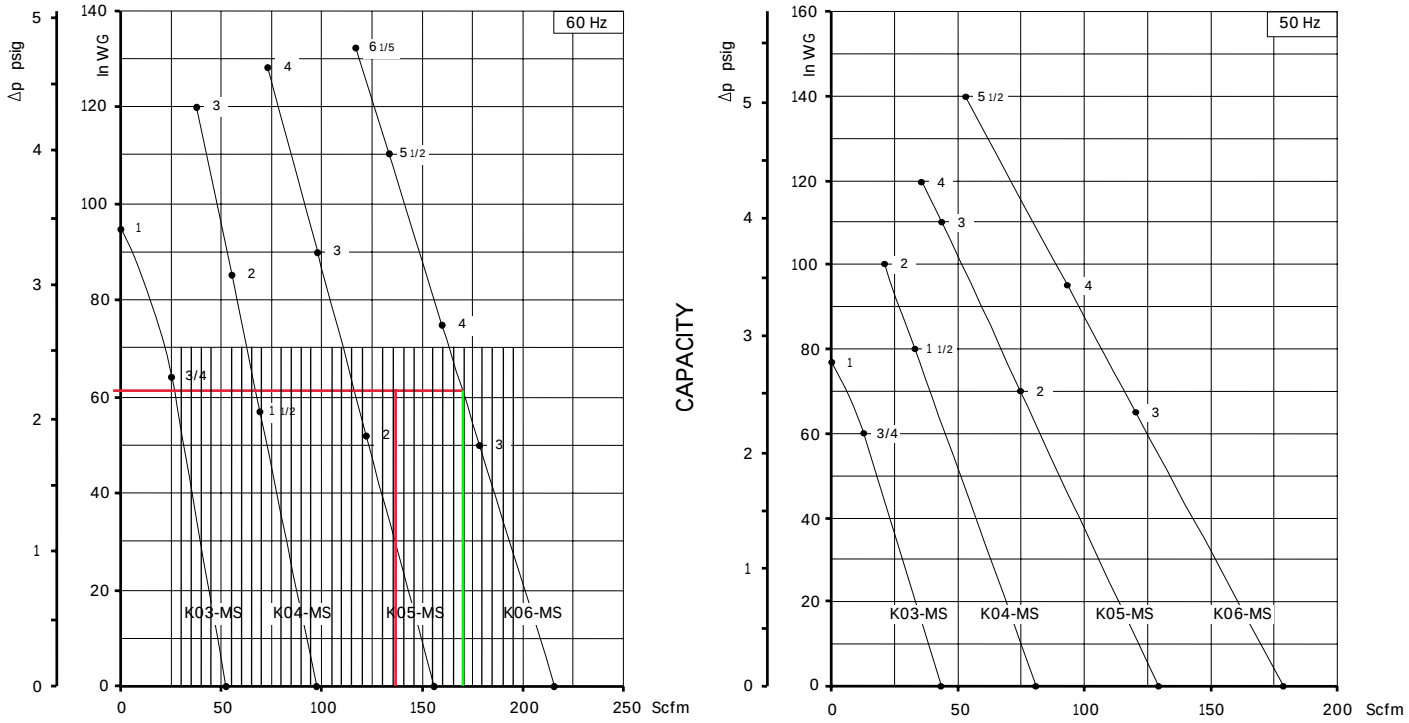
Model	Maximum flow Scfm 60 Hz 3500 rpm	Maximum flow Scfm 50 Hz 2900 rpm	Installed power Hp 60 Hz 3500 rpm	Installed power Hp 50 Hz 2900 rpm	Maximum differential pressure △p (In WG) 60 Hz 3500 rpm	Maximum differential pressure △p (In WG) 50 Hz 2900 rpm	Noise level Lp dB (A) (1) 60 Hz 3500 rpm	Noise level Lp dB (A) (1) 50 Hz 2900 rpm	Overall dimensions H Inches	Weight Lbs
K03-MS	52	43	3/4	3/4	64	60	62.0	60.0	10.43	24.30
			1	1	95	77	62.3	60.3	11.97	26.50
K04-MS	98	81	1 ½	1 ½	58	80	64.8	62.8	11.65	36.40
			2	2	85	100	65.0	63.0	13.78	43.00
			3	-	120	-	65.2	-	13.78	49.60
K05-MS	156	129	2	2	52	70	70.5	68.5	13.20	51.80
			3	3	90	110	70.8	68.8	13.20	58.40
			4	4	128	120	71.1	69.1	14.40	67.20
K06-MS	216	179	3	3	50	65	73.0	71.0	13.54	68.70
			4	4	75	95	73.3	71.3	14.17	71.65
			5 ½	5 ½	110	140	73.6	71.6	14.17	77.60
			6 1/5 (2)	-	132	-	73.9	-	14.45	77.60

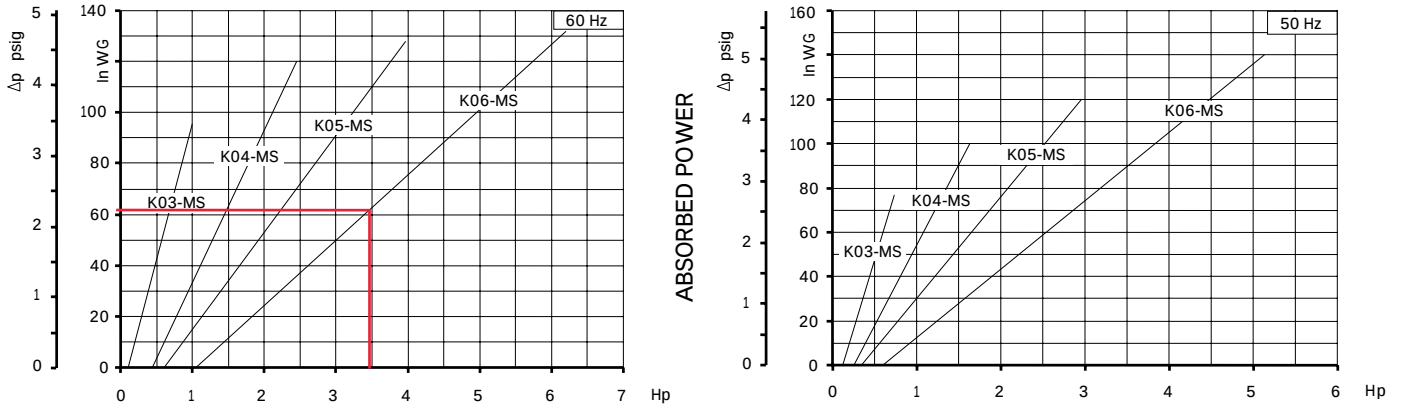
(1) Noise measured at 1 m distance with inlet and outlet ports piped, in accordance to ISO 3744.
(2) No cURus motor

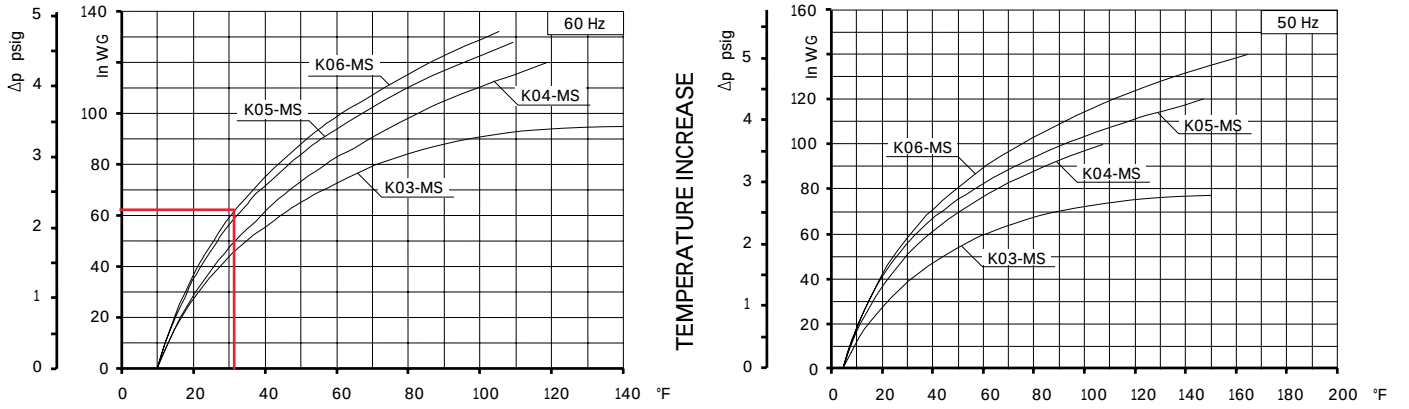
- For proper use, the blower should be equipped with inlet filter and safety valve; other accessories available on request.
- Ambient temperaturefrom +5° to +104°F.
- Specifications subject to change without notice.

SCL K03 / K04 / K05 / K06 MS SERIES

SN 1874-9 2/2







Curves refer to air at 68°F temperature and 29.92 In Hg atmospheric pressure (abs) measured at inlet port.
Values for flow, power consumption and temperature rise: +/- 10% tolerance.
Data subject to change without notice.

THREE PHASE MOTOR

GENERAL SPECIFICATIONS:

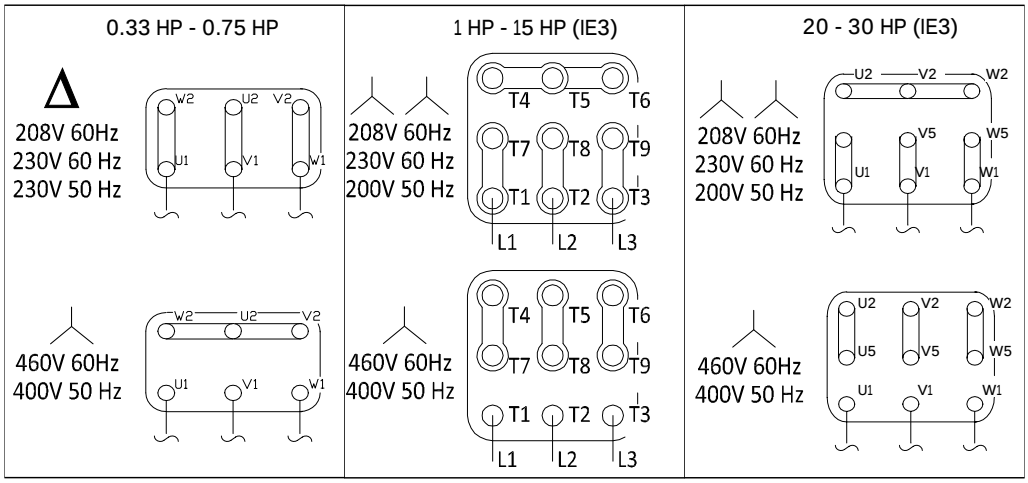
1. Type: 3-phase AC Motor IEC 60034
2. Marks: cURus, CE
3. Nema Premium Efficiency (IE3) - 1 HP AND LARGER (3 ph)
4. Poles: 2
5. Insulation class: F; F (B) for Premium efficient
6. Enclosure: TEFC
7. Protection IP55, Tropicalized
8. Thermal protector: Klixon 1400 C/150^{0} C
9. Service factor: 1.15 (60 hz)
10. Max. Ambient 40^{0} C
11. Duty: Continuous
12. Construction: aluminum frame

POWER		SIZE	60 HZ			50 HZ			60 hz Starting Current Ratio*	CABLE ENTRY 1 (cable gland incl.)	CABLE ENTRY 2
HP	KW		VOLTAGE	FLA 208-230 / 460 V	Efficiency	VOLTAGE	FLA 200/400 V	Efficiency			
0.33	0.25	63	208-230/460	1.5 / 0.7	59%	230/400	1.4 / 0.8	60.0%	3.9	M16	M20
0.5	0.37	63	208-230/460	2.3 / 1.0	59.2%	230/400	2.1 / 1.2	61.4%	3.6	M16	M20
0.75	0.55	71	208-230/460	2.7 / 1.2	68.8%	230/400	2.6 / 1.5	69.0%	3.8	M16	M20
0.75	0.55	71	208-230/460	2.3-2.2 / 1.3	74.5%	230/400	2.6 / 1.5	74.5%	6.8	M20	-
1	0.75	80	208-230/460	2.99-2.94 / 1.47	77.0%	200/400	3.28 / 1.64	80.7%	8.0	M25	M25
1.5	1.1	80	208-230/460	4.35-4.34 / 2.17	84.0%	200/400	4.92 / 2.46	82.8%	9.3	M25	M25
2	1.5	80**	208-230/460	5.91-5.96 / 2.98	85.5%	200/400	6.82 / 3.41	84.2%	8.7	M25	M25
		90	208-230/460	5.77-5.74 / 2.87	85.5%	200/400	6.58 / 3.29	84.2%	9.4	M25	M25
3	2.2	90	208-230/460	8.27-8.31 / 4.15	86.5%	200/400	9.6 / 4.8	85.9%	10.7	M25	M25
4	3	100	208-230/460	10.9-11.1 / 5.53	88.5%	200/400	12.86 / 6.38	87.1%	11.0	M25	M25
5.5	4	100	208-230/460	14.6-15.1 / 7.55	88.5%	200/400	17.7 / 8.86	88.1%	11.1	M25	M25
6.2	4.6	100	208-230/460	16.5-16.4 / 8.2	89.5%	200/400	19 / 9.5	88.6%	12.5	M25	M25
7.5	5.5	132	208-230/460	19.8-19.5 / 9.75	89.5%	200/400	22.2 / 11.1	89.2%	13.7	M25	M25
10	7.5	132	208-230/460	26.1-25 / 12.5	90.2%	200/400	28.6 / 14.3	90.1%	13.0	M25	M25
15	11	132	208-230/460	38.2-37.3 / 18.7	91.0%	200/400	43.4 / 21.7	91.0%	12.5	M25	M25
20	15	132	208-230/460	47.0 / 23.5	91.7%	200/400	52.4 / 26.2	91.9%	9.7	M32	M32
20***	15	160	208-230/460	48.8 / 24.4	91.0%	200/400	54.4 / 27.2	91.9%	10.7	M32	M32
25	18.5	160	208-230/460	62 / 31	91.7%	200/400	69 / 34.5	92.4%	12.5	M40	M40
30	22	160	208-230/460	71.6/35.8	91.7%	200/400	77.8 / 38.9	92.7%	10.6	M40	M40

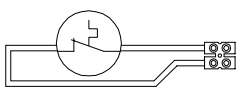
* FLA x starting current ratio = starting current ** 2 hp size 80 motors used on SCL R30-MD ONLY. *** TS / TD models ONLY.

Shaded models to be discontinued

WIRING DIAGRAMS



Thermal protection



V_N =250V , cosφ 0,6 , I_N = 1,6 A
V_N =250V , cosφ 1 , I_N = 2,5 A

Specifications subject to change without notice. Alternate motor suppliers may be used.

GENERAL NOTES
1. THE DRAWINGS DEPICTED HEREIN REPRESENT PRELIMINARY LAYOUTS OF A WASTEWATER TREATMENT SYSTEM CAPABLE OF TREATING THE DOMESTIC WASTE CONSTITUENTS NOTED IN TABLE 1.
2. ECOPOD REACTOR BOX SHALL BE CONSTRUCTED OF AISI 304/304L STAINLESS STEEL.
3. TANK MATERIAL OPTIONS:
   3.1. CARBON STEEL PER ASTM A36 w/COATING PER DELTA STANDARDS,
   3.2. FIBERGLASS REINFORCED PLASTIC (FRP) (NOT ALL MODELS),
   3.3. PRECAST CONCRETE PER ENGINEER OF RECORD REQUIREMENTS, BY OTHERS,
   3.4. CAST-IN-PLACE CONCRETE PER ENGINEER OF RECORD REQUIREMENTS, BY OTHERS.
4. BLOWERS, WEIRS, CONTROL PANELS, AND VARIOUS SMALL PARTS WILL BE SHIPPED UNASSEMBLED AND SECURELY PACKAGED, TO BE INSTALLED BY CONTRACTOR.
5. SEE INSTALLATION GUIDE FOR INSTALLATION DETAILS.
6. CONTACT AN IWT/DELTA REPRESENTATIVE REGARDING DEVIATIONS FROM THESE STANDARDS.

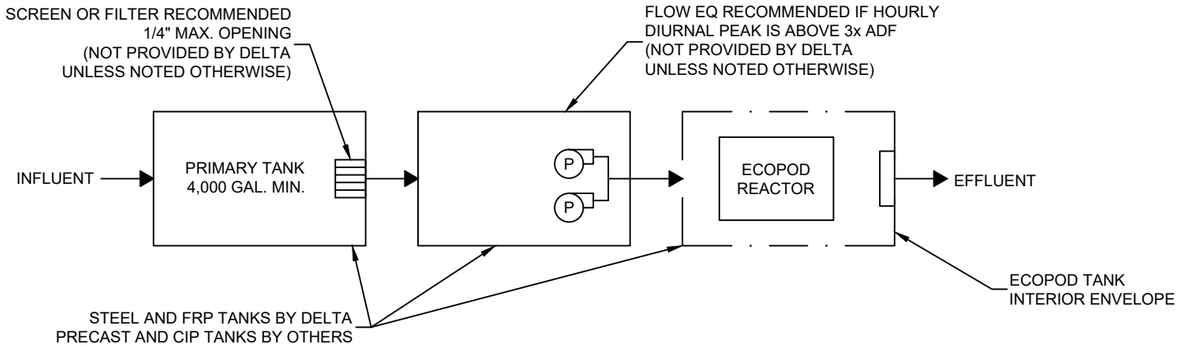
TABLE 1
PROCESS PARAMETERS
DELTA E800D BOD ONLY

PARAMETER	MINIMUM	MAXIMUM
AVERAGE DAILY FLOW	-	8,000 GPD
PEAK DAILY FLOW	-	12,000 GPD
INFLUENT BOD_5	-	20 LB/DAY
AIR TEMPERATURE	-	115 °F
WATER TEMPERATURE	68 °F	68 °F
RELATIVE HUMIDITY	10%	90%
SITE ELEVATION	0 FT AMSL	3,000 FT AMSL

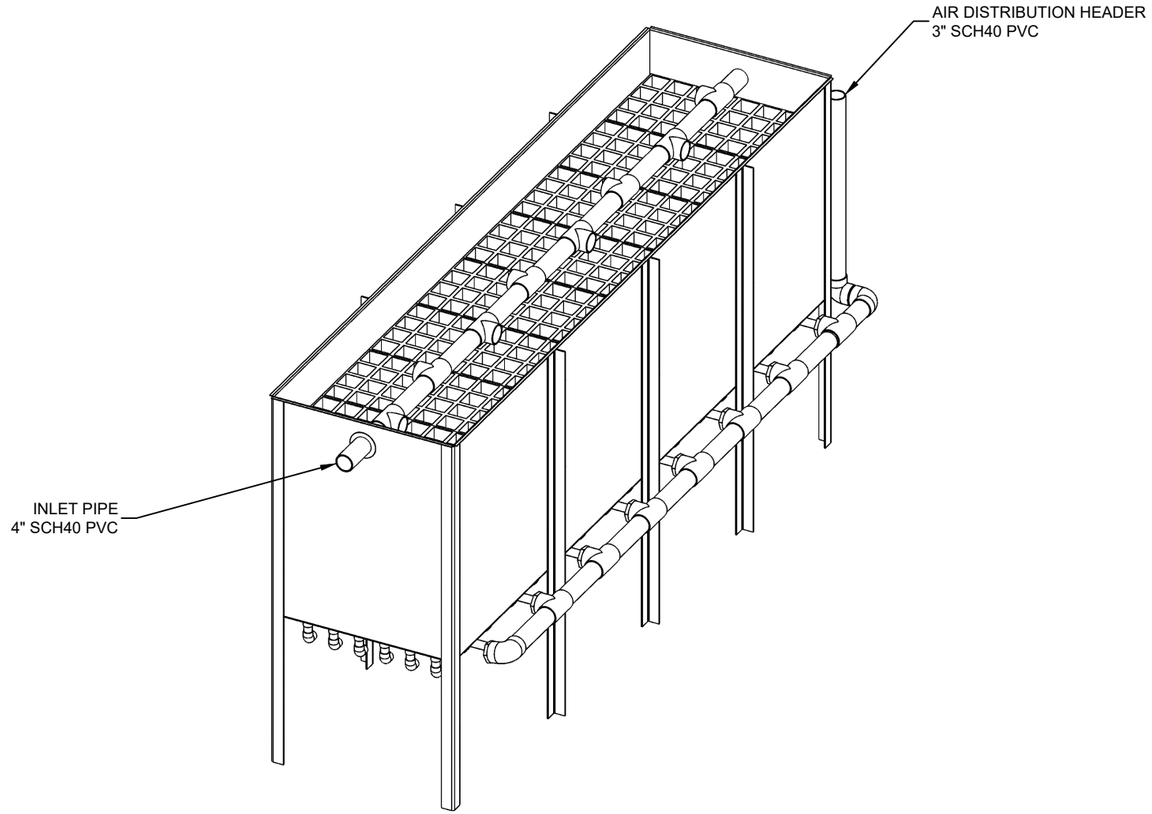
TABLE 2
AIR DEMAND

PARAMETER	UP TO 1,000 FT AMSL	1,000 TO 3,000 FT AMSL
STANDARD AIRFLOW	97 SCFM	113 SCFM
SITE AIR REQUIREMENT	109 ICFM	136 ICFM
BLOWER INLET AIR	116 ICFM	169 ICFM
AIR HEADER SIZE	3 IN	3 IN
MIN. TANK VENT X-SECT. AREA	47.7 IN^2 2 EA 6" OR 1 EA 8"	69.5 IN^2 2 EA 8" OR 1 EA 10"
BLOWER SELECTION	FPZ SCL K05-MS	FPZ SCL K06-MS
NOISE LEVEL	70.8 dB(A)	73.3 dB(A)
AIR TEMPERATURE RISE[1]	33 F (18.3 C)	32 F (17.8 C)
BLOWER INLET DIAMETER	2 IN NPT	2 IN NPT
BLOWER OUTLET DIAMETER	2 IN NPT	2 IN NPT
MOTOR POWER RATING[2]	3 HP	4 HP
OPERATING POWER	1.7 KW	2.6 KW

1. REVIEW BLOWER DISCHARGE AIR TEMPERATURE WHEN SPECIFYING AIR MAIN PIPING MATERIAL.
2. REVIEW BLOWER MANUFACTURER CUTSHEETS FOR ADDITIONAL ELECTRICAL INFORMATION.



TYPICAL PROCESS DIAGRAM



ECOPOD REACTOR
LAYOUT 1

TABLE 3
STANDARD EQUIPMENT LIST

DESCRIPTION	QTY	MAKE	MODEL
ECOPOD REACTOR	1	DELTA	E800D
BLOWER	1	FPZ	PER TABLE 2
CONTROL PANEL	1	DELTA	PER DESIGN
24" S.S. EFFLUENT WEIR	1	DELTA	TROUGH-3.0

NO.	DATE	INITIALS	DESCRIPTION
A	10/12/21	AOB	ADDED TRIMETRIC VIEW

Delta Treatment Systems, LLC

DELTA ECOPOD E800D
STANDARD DESIGN FOR BOD REDUCTION

GENERAL ARRANGEMENT
DESIGN OVERVIEW

HORIZ. SCALE	PROJECT NO.
N/A	N/A
VERT. SCALE	DATE
N/A	02/11/2021
DRAWN BY	DESIGNED BY
CGK	AOB
DRAWING NO.	SHEET NO.
C1.0	01 of 02

GENERAL NOTES
1. ECOPOD REACTOR BOX SHALL BE CONSTRUCTED OF AISI 304/304L STAINLESS STEEL.
2. TANK MATERIAL OPTIONS:
   2.1. CARBON STEEL PER ASTM A36 w/COATING PER DELTA STANDARDS,
   2.2. FIBERGLASS REINFORCED PLASTIC (FRP) (NOT ALL MODELS),
   2.3. PRECAST CONCRETE PER ENGINEER OF RECORD REQUIREMENTS, BY OTHERS,
   2.4. CAST-IN-PLACE CONCRETE PER ENGINEER OF RECORD REQUIREMENTS, BY OTHERS.
3. SEE INSTALLATION GUIDE FOR INSTALLATION DETAILS.
4. CONTACT AN IWT/DELTA REPRESENTATIVE REGARDING DEVIATIONS FROM THESE STANDARDS.

TABLE 4
MINIMUM ECOPOD REACTOR DIMENSIONS

SITE ELEVATION		LAYOUT ID	REACTOR WEIGHT		A OVERALL LENGTH		B OVERALL WIDTH		B1 AIR HEADER CL DIM	
FT	M		LB	KG	IN	CM	IN	CM	IN	CM
0-3,000	0-914	1	2,030	922	202	514	59	150	32	82
0-3,000	0-914	2	1,700	770	117	298	107	272	56	143
0-3,000	0-914	3	1,940	881	154	392	83	211	44	112

1. SOME REACTOR LAYOUTS NOT AVAILABLE IN FIBERGLASS TANKS. CONTACT AN IWT/DELTA REPRESENTATIVE FOR DETAILS.

TABLE 5
RECOMMENDED ECOPOD TANK INTERIOR ENVELOPE DIMENSIONS

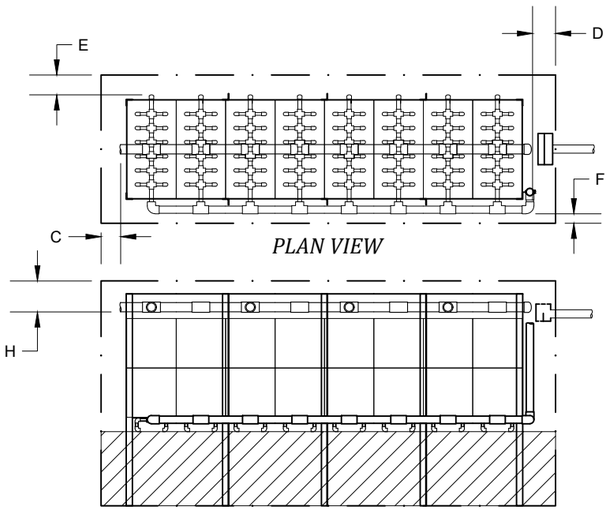
DIMENSION	IN	CM
C VESSEL FRONT SPACE	12	30
D VESSEL REAR SPACE	18	46
E AIR HEADER SIDE INSIDE SPACE	6	15
F NO HEADER SIDE INSIDE SPACE	6	15

1: ADDITIONAL ACCESS HATCHES RECOMMENDED FOR SOLIDS REMOVAL ALONG VESSEL SIDES.

TABLE 6
REQUIRED ECOPOD TANK INTERIOR ENVELOPE MINIMUM DIMENSIONS

DIMENSION	IN	CM
G INLET INVERT	92	234
H PLENUM SPACE ABOVE INLET INVERT	10	25
J MEDIA REACTOR HEIGHT	101	257
K OUTLET INVERT	89	226

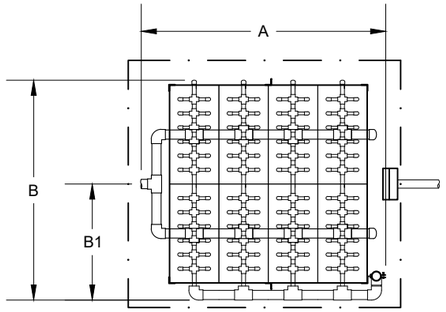
1. ONE (1 EA.) INLET AND ONE (1 EA.) OUTLET ACCESS HATCH REQUIRED, 24" DIA MINIMUM.



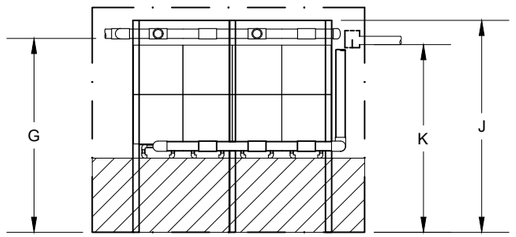
PLAN VIEW

ELEVATION VIEW

LAYOUT 1

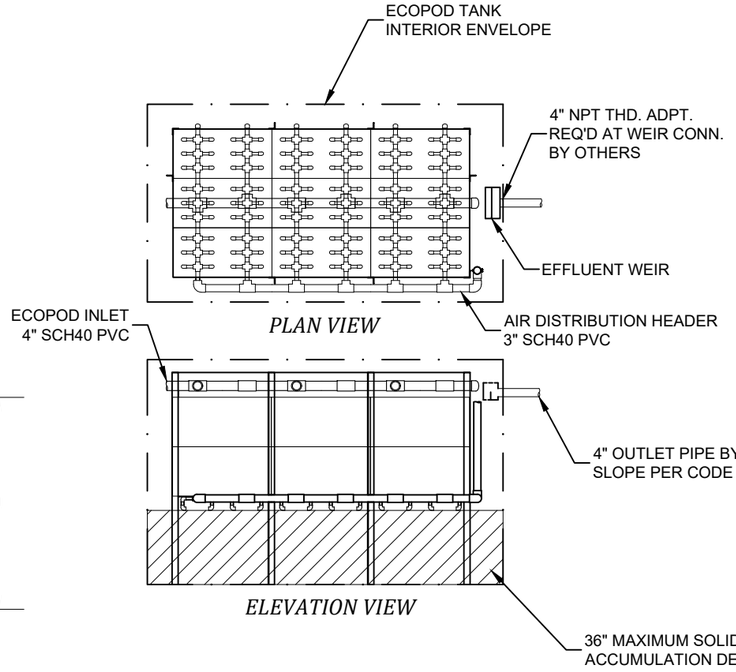


PLAN VIEW



ELEVATION VIEW

LAYOUT 2



PLAN VIEW

ELEVATION VIEW

LAYOUT 3

NO.	DATE	INITIALS	DESCRIPTION

Delta Treatment Systems, LLC

DELTA ECOPOD E800D
STANDARD DESIGN FOR BOD REDUCTION

GENERAL ARRANGEMENT
LAYOUT DIMENSIONS

HORIZ. SCALE	PROJECT NO.
N/A	N/A
VERT. SCALE	DATE
N/A	05/19/2021
DRAWN BY	DESIGNED BY
CGK	AOB
DRAWING NO.	SHEET NO.
C1.1	02 of 02

APPENDIX F

RWQCB OBJECTIVES AND MINIMUM REQUIREMENTS

State OWTS Policy

Water Quality Control Policy for Siting, Design, Operation and Maintenance of Onsite Wastewater Treatment Systems (OWTS) Policy

Santa Ana River Basin Plan

APPENDIX G

OWTS NSF 40 AND 245

EXECUTIVE SUMMARY

Testing of the Delta ECOPOD E50-N was conducted under the provisions of NSF/ANSI Standard 245 for Wastewater Treatment Systems – Nitrogen Reduction (March 2007). NSF/ANSI Standard 245 was developed by the NSF Joint Committee on Wastewater Technology.

The performance evaluation was conducted at the Gulf Coast Test Facility located in Baton Rouge, Louisiana, using wastewater diverted from a lift station servicing a residential neighborhood in Ascension Parish. The evaluation consisted of sixteen weeks of dosing at design flow, seven and one half weeks of stress testing, and two and one half weeks of dosing at design flow. Dosing was initiated on August 4, 2008. After a three-week start up period, test site operations were temporarily shut down due to a power outage caused by a hurricane. After power at the test site was restored and dosing of the system resumed, the test was officially started on September 17, 2008. Sampling started in the summer and continued through the winter, covering a range of operating temperatures.

Over the course of the evaluation, the average influent total nitrogen was 43 mg/L, ranging between 29 and 98 mg/L. The ECOPOD E50-N produced an average effluent total nitrogen of 20 mg/L, which resulted in a 53 percent reduction in the influent total nitrogen.

The ECOPOD E50-N was previously certified as an NSF/ANSI Standard 40 Class I system, producing an average effluent $CBOD_5$ of 9 mg/L (ranging between 4 and 20 mg/L) and the average effluent total suspended solids was 8 mg/L (ranging between <2 mg/L and 30 mg/L). The effluent successfully met the performance requirements established by NSF/ANSI Standard 40 for Class I effluent.

The maximum 7-day arithmetic mean was 15 mg/L for $CBOD_5$ and 24 mg/L for total suspended solids, both below the allowed maximums of 40 and 45 mg/L respectively. The maximum 30-day arithmetic mean was 9 mg/L for $CBOD_5$ and 13 mg/L for total suspended solids, both below the allowed maximums of 25 mg/L and 30 mg/L respectively. The effluent pH during the entire evaluation ranged between 6.7 and 7.7, within the required range of 6.0 to 9.0. The ECOPOD E50-N met the requirements for noise levels (less than 60 dbA at a distance of 20 feet), color, threshold odor, oily film and foam.

Over the course of the Standard 245 evaluation the influent averaged 200 mg/L BOD_5, 170 mg/L TSS, 43 mg/L total nitrogen, 290 mg/L alkalinity, and 20°C, with a median pH of 7.2, meeting the requirements of the Standard. The effluent averages over the course of the test were 9 mg/L $CBOD_5$, 8 mg/L TSS, and 20 mg/L total nitrogen, and the effluent pH ranged between 6.7 and 7.7 S.U. The effluent values met the requirements of the Standard.

NSF International

July 15, 2013

Mr. Mike Catanzaro
Delta Environmental Products
8263 Florida Boulevard East
Denham Springs, LA 70726

Dear Mike:

I understand from our correspondence that Delta Environmental Products is seeking approval for the use of NSF Standard 40 certified residential wastewater treatment systems in applications that require treatment capacities exceeding the upper limit of Standard 40 (i.e., greater than 1,500 gallons per day (gpd)). As part of your request, I understand that the intent is to use more than one certified system, operating within their rated capacity and in parallel, for applications where the total daily flow exceeds the scope of Standard 40. If (1) the rated capacity of the certified system is not exceeded, (2) the wastewater is residential strength, and (3) the loading of the system is maintained consistent with your design, then the certification of the systems in this application remains valid.

I understand that, for the sake of design simplification, the above applications may use a single primary tank from which the flow is then divided before being dosed to the multiple, individual systems, ensuring the systems do not receive more than the certified rated capacity. If the local regulatory authority accepts the single primary tank design, and the retention time in the primary tank is consistent with the retention time of the system as certified, then the certification of the systems for this application also remain valid.

Please let me know if we can be of any further assistance.

Best Regards,

Sharon Steiner

Sharon Steiner
Business Unit Manager
Wastewater Treatment Unit Program

734-827-6846 (Voice)
734-827-7790 (Fax)
steiner@nsf.org (E-mail)

cc: Corporate correspondence (12940)

NSF International

September 28, 2020

Sheryl Ervin
Delta Treatment Systems, LLC, an Infiltrator Water Technologies, LLC Subsidiary
125 Comar Drive
Louisiana Walker, 70785, United States

Re: Delta Treatment Systems, LLC – Scale up request for models E350-N CA and E400-N CA, NSF Workorder W0638117

Dear Sheryl,

Thank you for providing the information regarding the request of also upsizing the ECOPOD Models E350-N CA and E400-N CA wastewater treatment systems:

- Determining whether the requirements of NSF/ANSI Standard 40 (2019) will continue to be met.
- Determining whether the requirements of NSF/ANSI Standard 245 (2019) will continue to be met
- Determining whether the requirements of the NSF Certification Policies for Wastewater Treatment Devices will continue to be met.

Based on this review, NSF International can authorize the upscale versions of 3500 GPD and 4000 GPD for the E350-N CA and E400-N CA models, respectively, even though these capacities exceed the Standard 40 and Standard 245 range. For this request against Standard 245, it is vital that adequate alkalinity will be provided to these systems to facilitate denitrification reactions to meet the requirement of 50% Nitrogen removal. It was concluded that the E350-N CA and E400-N CA models with be proportionally equivalent to the previously certified ECOPOD at 500 GPD against NSF/ANSI Standard 40 and 245.

If you have any questions, please contact me directly.

Sincerely,

Sharon Steiner

Sharon Steiner
Business Unit Manager
Wastewater Treatment Unit Program

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APPENDIX H

GEOFLOW, INC.

DESIGN, INSTALLATION AND MAINTENANCE GUIDELINES

WASTEFLOW PC SD 1gph

SD = Slow Drain Anti-siphon

Features

Ideal for undulating terrain where vacuum relief is tricky, Geoflow's anti-siphon dripline features a slow drain dripper. Slow to release water when not pressurized, WASTEFLOW PC SD reduces suction of soil into the dripline. We carefully selected the slow release rather than the non release option for wastewater applications for 2 reasons: reduction of biological growth and freezing. Emptying the dripline slowly will avoid pipes from bursting in freezing zones, or plugging from biological growth that may occur when wastewater sits in dripline for long periods of time. Ultimately WASTEFLOW PC SD reduces suction of soil into the drippers without compromising freezing or internal clogging.

Alternative spacing & flow rates available upon request.

Flow Rate vs. Pressure

Pressure	Head	ALL WASTEFLOW PC 1 gph dripline
7-60 psi	16-139 ft.	1.02 gph

WASTEFLOW PC SD 1 gph Specification

The dripline shall consist of nominal sized one-half inch linear low density polyethylene tubing, with slow draining anti siphon, 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 .64-inches and an inside diameter (I.D.) of approximately .55-inches. The tubing shall consist of three layers; the inside layer shall be *Geoshield*® protection, the middle layer shall be black and the outside layer shall be purple striped for easy identification. The dripline shall have emitters regularly spaced 24" (or 12") apart. The pressure compensating emitters shall be molded from virgin polyethylene resin with a silicone rubber diaphragm. The pressure compensating emitters shall have nominal discharge rates of 1.02 gallons per hour. The emitters shall be impregnated with Treflan® to inhibit root intrusion for a minimum period of fifteen years and shall be guaranteed by the manufacturer to inhibit root intrusion for this period. 1.02 gph WASTEFLOW PC slow drain pressure compensating dripline shall be Geoflow model number WFPCsd16-4-24 or WFPCsd16-4-12.

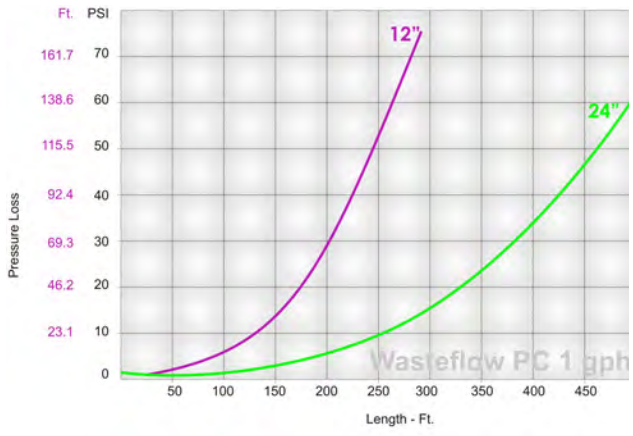
Maximum Length of Run vs. Pressure

Allows a minimum of 10 psi in the line.
Recommended operating pressure 10-45 psi.

Pressure psi	Pressure ft.	Emitter Spacing 12"	Emitter Spacing 24"
10 psi	23.10 ft.	95'	175'
15 psi	34.65 ft.	115'	211'
20 psi	46.20 ft.	146'	265'
25 psi	57.75 ft.	171'	315'
30 psi	69.30 ft.	180'	335'
35 psi	80.85 ft.	199'	379'
40 psi	92.40 ft.	211'	385'
45 psi	103.95 ft.	222'	429'
50 psi	115.5 ft.	232'	431'

Note: For typical wastewater applications maximum lengths of run should not exceed 300 ft. This is to maintain uniformity in the dripfield with short run cycles typical of onsite wastewater dispersal.
Kd = 2.070

Pressure Loss vs. Length of Run



- Slow Drain Anti Syphon is manufactured under US Patent 7445168BC.
- WASTEFLOW is manufactured under US Patents 5332160,5116414 and Foreign equivalents.
- **Geoshield**® and WASTEFLOW® are registered trademark of A.I.Innovations

GEOFLOW
SUBSURFACE DRIP
www.geoflow.com
800-828-3388

WASTEFLOW PC SD 1/2 gph

SD = slow drain anti-siphon dripline

Features

Ideal for undulating terrain where vacuum relief is tricky, Geoflow's slow drain anti-siphon dripline features a slow drain dripper. Slow to release water when not pressurized, WASTEFLOW PC SD reduces suction of soil into the dripline. We carefully selected the slow drain rather than the non drain option for wastewater applications for 2 reasons: reduction of biological growth and freezing. Emptying the dripline slowly will avoid pipes from bursting in freezing zones, or plugging from biological growth that may occur when wastewater sits in dripline for long periods of time. Ultimately WASTEFLOW PC SD reduces suction of soil into the drippers without compromising freezing or internal clogging.

Kd = 2.070

Flow Rate vs. Pressure

Pressure	Head	ALL WASTEFLOW PC 1/2 gph dripline
7-60 psi	16-139 ft.	0.53 gph

Maximum Length of Run vs. Pressure

Allows a minimum of 10 psi in the line.
Recommended operating pressure 10-45 psi.

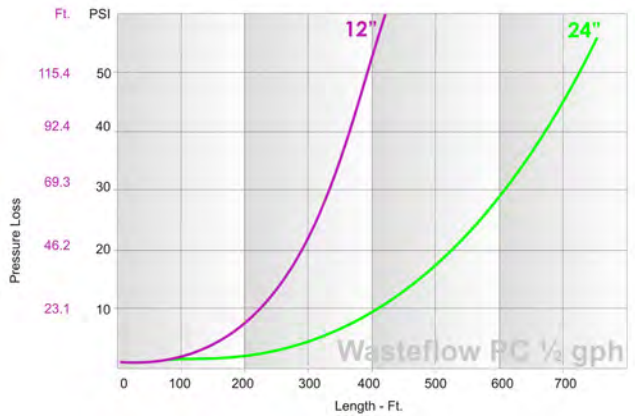
Pressure		Emitter Spacing	
psi	ft.	12"	24"
15 psi	34.65 ft.	174'	321'
20 psi	46.20 ft.	229'	424'
25 psi	57.75 ft.	260'	478'
30 psi	69.30 ft.	288'	535'
35 psi	80.85 ft.	313'	576'
40 psi	92.40 ft.	330'	612'
45 psi	103.95 ft.	354'	651'
50 psi	115.5 ft.	363'	675'

Note: For typical wastewater applications maximum lengths of run should not exceed 300 ft. This is to maintain uniformity in the dripfield with short run cycles typical of onsite wastewater dispersal.

WASTEFLOW PC SD ½ gph Specification

The dripline shall consist of nominal sized one-half inch linear low density polyethylene tubing, with turbulent flow slow draining anti siphon 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 .64-inches and an inside diameter (I.D.) of approximately .55-inches. The tubing shall consist of three layers; the inside layer shall be a *Geoshield*® 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. The pressure compensating emitters shall have nominal discharge rates of 0.53 gallons per hour. The emitters shall be impregnated with Treflan® to inhibit root intrusion for a minimum period of fifteen years and shall be guaranteed by the manufacturer to inhibit root intrusion for this period. Dripline shall be Geoflow model number WFPCSD16-2-12, WFPCSD16-2-18 or WFPCSD16-2-24

Pressure Loss vs. Length of Run



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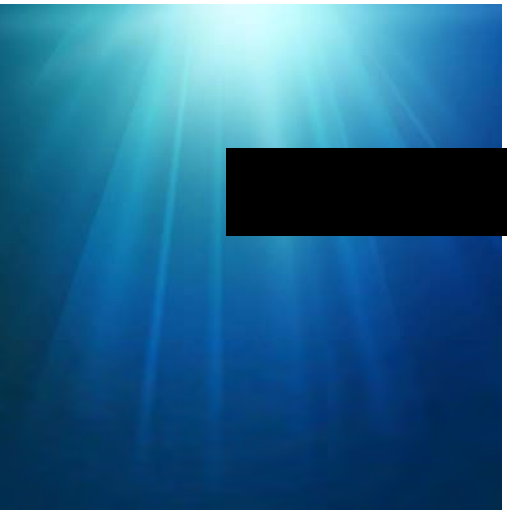

Subsurface Drip Dispersal and Reuse

Design, Installation and Maintenance Guidelines

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September 2007
VIII

CONTENTS

INTRODUCTION

Geoflow's WASTEFLOW®[1] drip disperses effluent below ground surface through ½" pressurized pipes. It is designed using the grid concept with supply and flush manifolds at each end of the dripline creating a closed loop system. The grid design provides a complete subsurface wetted area.

The objective with effluent dispersal is usually to disperse the effluent using the minimum area as quickly and safely as possible at an approximately uniform rate throughout the year. If the main purpose of the Geoflow system is to irrigate, then please use the standard irrigation manual for landscape available from Geoflow, Inc.

Subsurface drip is a highly efficient method to dispose of effluent. Small, precise amounts of water are uniformly applied under the soil surface from multiple points.

The main advantages of Geoflow's subsurface drip system for effluent dispersal are:

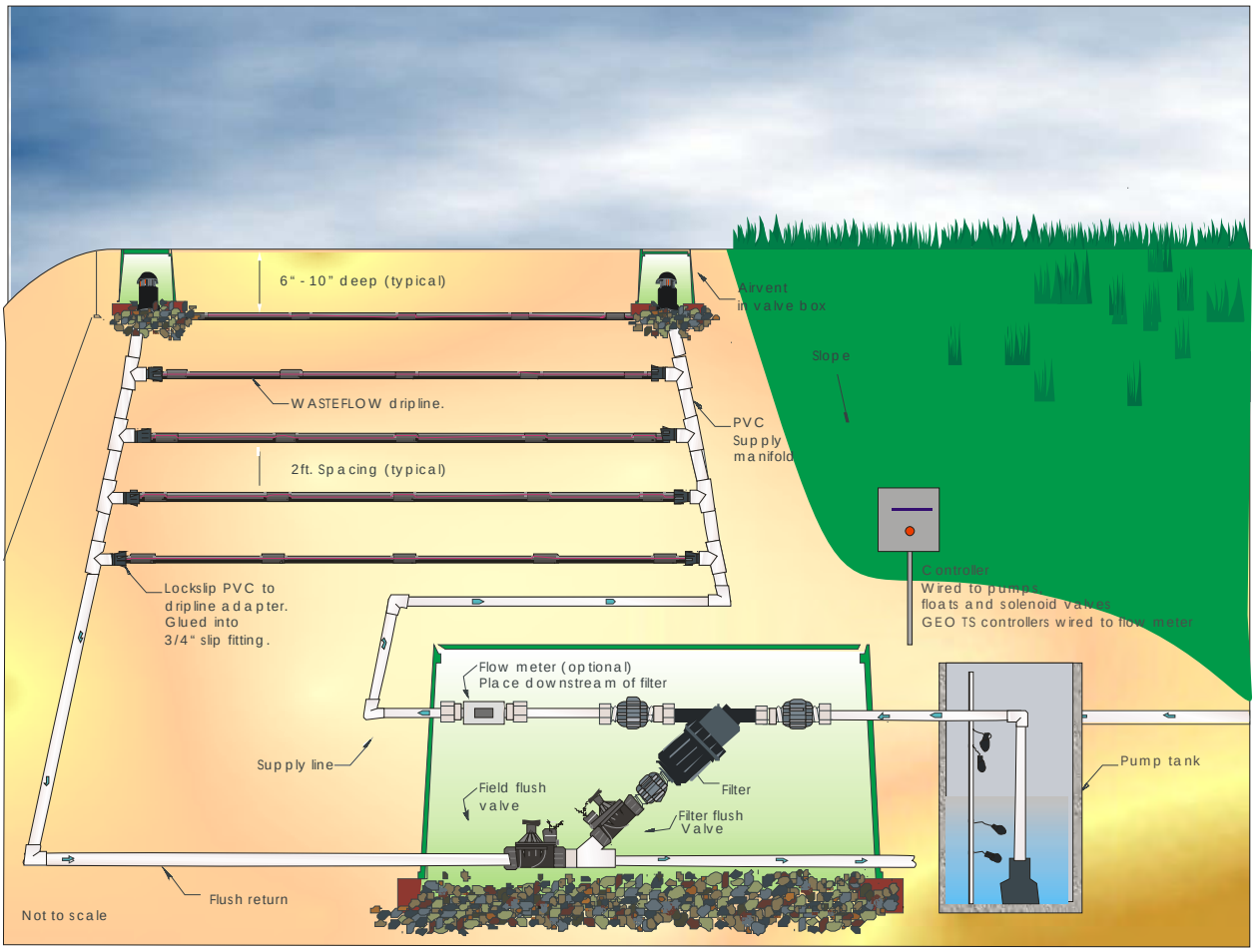
- Human and animal contact with effluent is minimized, reducing health risks.
- Correctly designed systems will not cause puddling or runoff.
- It can be used under difficult circumstances of high water tables, tight soils, rocky terrain, steep slopes, around existing buildings, trees or other vegetation, and on windy sites.
- Disposal of water is maximized by means of evapotranspiration.
- The system requires no gravel. It is easy to install directly into indigenous soils and the natural landscape can be maintained.
- Minimizes deep percolation.
- Consumption of nitrates by the plant material is increased.
- Invisible and vandal proof installations.
- Ten-year warranty for root intrusion, workmanship and materials. Systems are durable with a long expected life of approximately 30 years.
- Non intrusive. It allows use of the space while operating.
- Easily automated.
- Effluent can be re-used for irrigation.

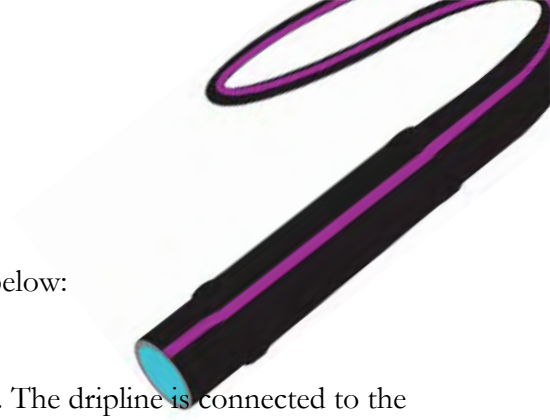
NOTES

- These guidelines are geared towards single family homes with secondary treated effluent. When using primary treated effluent, Geoflow recommends automating all the self flushing valves, and increasing the number of emission points in the dispersal field. For more information on septic tank dispersal, please check our website at www.geoflow.com or telephone Geoflow at 800-828-3388.
- Systems with periodic use need special attention not covered in this guideline.
- Please follow your State and County Regulations for onsite wastewater dispersal. These guidelines are intended to be a guide to users of the Geoflow drip system and should be used only as a supplement to your local regulations.
- Occasionally, in forested area, the dripline is placed on the surface and covered with mulch.

[1] WASTEFLOW® is a registered trademark of A.I.Innovations.

DIAGRAM 1: TYPICAL DRIPFIELD LAYOUT
Single Family Home





SYSTEM COMPONENTS:

See Diagram 1 on page 4.

A typical drip system installation will consist of the elements listed below:

1. WASTEFLOW® DRIPLINE

WASTEFLOW dripline carries the water into the dispersal/reuse area. The dripline is connected to the supply and return manifolds with Compression or Lockslip fittings. Typical spacing between each dripline and between drip emitters is 24" on center.

Twelve-inch spacing is used regularly for soils with very low or high permeability. Dripline is usually buried 6"-10" below ground. Standard coil length is 500-ft. Rolls of alternative lengths, diameters and dripper spacing's may be special ordered.

WASTEFLOW dripline features:

a) nano-ROOTGUARD®[2]

Wasteflow dripline has nano-ROOTGUARD®. The risk of root intrusion with an emitter slowly releasing nutrient rich effluent directly into the soil is well known to anyone who has observed a leaking sewer pipe. All Geoflow drip emitters are guaranteed to be protected against root intrusion with nano-ROOTGUARD. This patented process fuses the root-growth inhibitor, TREFLAN®[3] into each drip emitter during manufacturing. Treflan is registered with the United States EPA for this application. The nano-ROOTGUARD technology holds Treflan for extended time inside the plastic, slowly releasing it in minute quantities to prevent root cells from dividing and growing into the barrier zone. It is chemically degradable, non-systemic, and virtually insoluble in water (0.3 ppm). With an expected life of 30 yearS, nano-ROOTGUARD carries a 15-year warranty against root intrusion.

b) *Geoshield™*[4] protection

Geoflow's WASTEFLOW has an inner lining impregnated with an antimicrobial, Tributyl tin maleate, to inhibit adhesion of biological growth on the inside walls of the tube and on the emitters. It does not have any measurable biological effect on the effluent passing through the tube. This minimizes the velocity required to flush WASTEFLOW dripline. The velocity only needs to move out the fine particles that pass through the 130 micron filter that, if not flushed, will ultimately accumulate at the distal end of each lateral. It is not necessary to scour growth off the inside wall of WASTEFLOW tubing. Since all pumps deliver more volume given less resistance to flow, just opening the flush valve will usually achieve this degree of flushing. When a minimum flushing velocity is requested by regulators, 0.5 feet per second is used with Wasteflow dripline to get the settled particles at the bottom of the pipe back into suspension. This equates to 0.375 gpm per dripline when using standard WASTEFLOW dripline (0.55"ID)

c) Turbulent Flow Path

WASTEFLOW drip emitters are pre-inserted in the tube usually spaced 6", 12", 18", or 24" apart with 24" being the most popular. Angles in the emitter flow path are designed to cause turbulence in order to equalize flow between emitters and keep the emitters clean. Geoflow emitters boast large flow paths, which, coupled with turbulent flow, have proven over the years to be extremely reliable and dependable.

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[2] NANOROOTGUARD is a registered trademark of A.I.Innovations
[3] Treflan is a registered trademark of Dow Agro Sciences
[4] Geoshield is a registered trademark of A.I.Innovations

d) WASTEFLOW Classic and WASTEFLOW PC Dripline
Both WASTEFLOW Classic and WASTEFLOW PC have turbulent flow path emitters with nano-ROOTGUARD and *Geoshield* protection.

The WASTEFLOW PC has the added element of a silicone rubber diaphragm that moves up and down over the emitter outlet to equalize flows regardless of pressure between 7 and 60 psi. To ensure a long life the recommended operating range is 10 to 45 psi.
For WASTEFLOW Classic, the flow rate delivered by the emitter is a function of the pressure at the emitter. The Classic dripline has the advantage of no moving parts or rubber that may degrade over time. Also, when minimum flushing velocities are required, the flows during a dosing cycle and flushing cycle are very similar with the Wasteflow Classic because when the flush valve is opened; the pressure is reduced, causing the flows from the emitters to decline. PC dripline requires significantly higher flow for flushing than dosing as the emitter flow does not go down during the flushing cycle.
We generally recommend using WASTEFLOW Classic, unless the economic advantages to using PC is substantial.

i) WASTEFLOW PC can run longer distances than WASTEFLOW Classic.
ii) Steep slopes. Systems should be designed for the dripline lateral to follow the contour. When this is practical, the extra cost of installing pressure regulators required for WASTEFLOW Classic would likely be less than the incremental cost of WASTEFLOW PC.
iii) Rolling terrain. If the difference in height from trough to peak exceeds six feet then WASTEFLOW PC should be used. Vacuum relief valves must be placed at the top of each rise.

2. CONTROLLERS

Controllers are used for time dosing and time flushing of the filter and dripfields. GEO controllers include a programmable logic controller to increase flexibility and reliability in the field. They can be used on systems ranging in size from one to eight zones at the time this manual was printed. All controllers include a surge arrestor, elapsed time meter and counter. The choice as to which controller best supports your personal preference, capability and price.

3. PUMPS, PUMP TANKS & FLOATS

WASTEFLOW dripfields depend on pumps to dose effluent under pressure to the field. These must be sized according to flow and pressure requirements. Look for submersible effluent pumps from a dependable source. Geoflow does not endorse a single manufacturer, but does advocate you use a pump that is readily serviced in your area. Two (duplex) pumps may be used. These will normally alternate at each signal from the control panel and are often used on commercial or large drip systems.

Pump tanks are an important part of an onsite system design and serve to equalize flow, settle solids and even continue oxidation in some instances. All treatment systems will have occasional upsets, and an adequately sized pump tank will help increase the time between filter cleaning. Pump tanks should be sized according to your local rules and regulations. We recommend pump tanks for single family homes be at least 1.5 times daily flow. Remember a 500 gallon pump tank may not actually hold 500 gallons because of the loss of useable areal below the pump intake and above the high water cutoff level. Geoflow controllers are set-up for 4 floats with the lowest one in the tank being the *redundant off float.* The *primary timer on/off float* is second from the bottom, followed by the *secondary timer float* third from the bottom and the *high level alarm float* on the top.

4. FILTERS

Geoflow systems require 120 mesh or 130 micron filtration to keep any oversized upstream contaminants from entering the dripline. Geoflow offers a full range of drip filters, with the tried and true Vortex screen filters for small commercial and residential systems; disc filters with anti bacterial protection, and GeoVac suction cleaning filters for larger commercial and industrial systems. We recommend minimum filter size of 1.5inch.

5. SUPPLY MANIFOLD AND LINE

This carries the water from the dosing tank to the dispersal area. Rigid PVC schedule 40 is usually used. Schedule 80 is at times used to either avoid dips in the line that can collect water and freeze, or if pressure of at least 200 psi is required to pump water from the dose tank to the dripfield. To prevent water from freezing, the pipes should slope back to the pump tank, be buried below frost depth and/or be insulated. Refer to the PVC pipe sizing chart in the appendix to determine the best diameter for your application.

6. RETURN MANIFOLD AND LINE

In order to help clean the system, the ends of the drip lines are connected together into a common return line, most often made of rigid PVC. This line will help equalize pressures in the system. Flushing should be done frequently during the installation period. Periodic flushing during operation will help to keep the manifolds clean. Best option is to return flush water to the inlet of the treatment stream. If this is not possible, a two compartment pump tank with diffuser is recommended with pump in separate chamber. To prevent water from freezing, the pipes should slope back to the pump tank, be buried below frost depth and/or be insulated.

7. PRESSURE REGULATOR

Pressure regulators fix the inlet pressure at a given rate. Under normal operating conditions, pressure in the drip lines should be 10 psi to 45 psi. With WASTEFLOW Classic it helps to know exactly what the pressure is in the dripline, so system flow can be easily calculated. With all dripline it is prudent to have a pressure regulator to avoid oversized pumps from blowing out fittings.

8. AIR VACUUM BREAKER

Air vacuum breakers are installed at the high points, above dripline and below grade to keep soil from being sucked into the emitters due to back siphoning or backpressure. This is an absolute necessity with underground drip systems. They are also used for proper draining of the supply and return manifolds in sloping conditions. One is used on the high end of the supply manifold and one on the high point of the return manifold. Additional air vents may be required in undulating terrain. Freezing conditions require the air vacuum breaker be protected with insulation.

9. FILTER FLUSH VALVES

Used to flush debris from the filter cleanout port back to the pretreatment or dosing tank, this can be an electronically activated solenoid valve or a manual valve. If manual, it should be opened for a full flushing at least every six months and left cracked open slightly to flush continuously. Certain States may require automated electronic flushing. Please refer to your State codes.

10. FIELD FLUSH VALVES.

Used to flush out fine particles that have passed through the filter and accumulated on the bottom of the tube at the end of each lateral, the field flush valve can be manual (continuous) or electronic (automatic). Geoflow recommends automatic flush. Continuous flush requires the valve be left cracked open slightly during operation and must be carefully designed and operated to work without increasing the risk of treatment plant upsets (if placed upstream of treatment) or reducing the effectiveness of the pump tank (if placed in drip pump tank). Certain States do require automated electronic flushing. Please refer to your State codes.

11. ZONE VALVES

Used to divide single dispersal fields into multiple zones, these can be hydraulically activated index valves or electrical solenoid valves. Index valves are hydraulically operated, while solenoids use electricity.

12. WASTEFLOW HEADWORKS

WASTEFLOW Headworks is a pre-assembled unit including the filter, valves and pressure gauge in a box or on a skid. It is installed between the pump and the field. Be sure to insulate the box in freezing climates.

DESIGN PARAMETERS:

1. SELECT AREA

Select the area with careful consideration of the soil, the terrain and your State and County regulations. Be sure the field is not in a flood plain or bottom of a slope where excessive water may collect after rain. Surface water should be directed away from the proposed field area. Consider:

- Setbacks from water bodies, driveways, neighbors, wells….
- Restrictive limiting layers? Rock/Clay Shallow ground water? Seasonal high water?
- Is dripfield located at lowest point in the area? Check surrounding hills and valleys
- Is there any surface water coming in form neighbors?
- Is there any construction debris at the site?

2. WATER QUALITY

The source of sewage should be assessed for flow and constituents.

Maximum daily flows should be used for design flow rates and should include peak/safety factors. Pre-treatment facilities may be designed with flow equalization for situations with inconsistent flow characteristics.

Sewage with BOD, TSS or Oils and Grease levels in excess of normal residential sewage must be pre-treated to reduce effluent values for these constituents to residential levels prior to dispersal or custom design of loading rates will be necessary. Sources with very high levels of minerals or other abnormal chemical or physical characteristics require special consideration and custom design. If iron or iron bacteria are prevalent, please be sure to eliminate it upstream of the drip system with ozone, ultraviolet or chemical treatment.

3. SOIL APPLICATION DESIGN

Soil loading rates, as expressed in gallons per day per square ft., should take both percolation tests and soil and site evaluations into consideration. Soils classification date provided by USDA-NRCS can be used as a guideline, but these do not consider site specific variables. Soil loading charts are often provided by State and local health departments. We encourage you to be most conservative in estimating the soil loading rates. Non residential systems with multiple zones need to be more conservative due to the edge effect and larger actual daily flows being used in design rather than inflated flows that are most frequently used in single family home designs.

Note: This section is based on Subsurface Trickle Irrigation System for On-Site Wastewater Disposal And Reuse by B. L. Carlile and A. Sanjines. The basis of the information is from the Texas Health Department regulations. The rules in your County and State may vary.

The instantaneous water application rate of the system must not exceed the water absorption capacity of the soil. A determination of the instantaneous water absorption capacity of the soil is difficult, however, since the value varies with the water content of the soil. As the soil approaches saturation with water, the absorption rate reduces to an equilibrium rate called the "saturated hydraulic conductivity." Wastewater application rates should be less than 10 percent of this saturated equilibrium.

Even though the trickle irrigation system maximizes the soil absorption rate through the low rate of application, thus keeping the soil below saturation, there will be times when the soil is at or near saturation from rainfall events. The design must account for these periods and assume the worst case condition of soil saturation. By designing for a safety factor of 10 or 12, based on the saturated hydraulic conductivity, the system will be under-loaded most of the time but should function without surface failure during extreme wet periods.

By applying wastewater slowly for a few hours daily, particularly if applied in "pulses" or short doses several times per day near the soil surface where the soil dries the quickest would keep the soil absorption rate at the highest value and minimize the potential of water surfacing in poor soil conditions.

As stated previously, this design criterion will under-load the system at all times except when the soil is at or near saturation from rainfall. If designing for an efficient irrigation system, the water supply may not be sufficient to meet the demands of a lawn or landscaped area during peak water demand months. This problem can be overcome by either of two solutions: add additional fresh-water make-up to the system during the growing season to supply the needed water for plants in question; or split the system into two or more fields with necessary valves and only use one of the fields during the peak water demand months and alternate the fields during winter months or extremely wet periods, or use both fields simultaneously if the pump capacity will so allow.

NOTES:

- The chart below is provided as a guide only. States and Counties may have regulations that are different. Check your State guidelines and consult with your local health department.
- Problems with drip dispersal fields occur when soils are misinterpreted. If in doubt, choose the more restrictive soil type from the table above.
- "Soil type" should be based on the most restrictive layer within two feet of the dripline. In many soils 1-ft. vertical separation from the limiting layer has proven successful with secondary treated effluent. Geoflow recommends you follow State and Local guidelines.

TABLE 1

DRIP LOADING RATES CONSIDERING SOIL STRUCTURE.

Table 1 is taken from the State of Wisconsin code and was prepared by Jerry Tyler.
Provided for guidelines and budgeting purposes. Refer to your local regulations and qualified soil scientists to determine best loading rates.

Soil Textures	**Soil Structure**	Maximum Monthly Average **BOD_5<30mg/L TSS<30mg/L** (gallons/ft^2/day)	Maximum Monthly Average **BOD_5>30mg/L TSS>30mg/L** (gallons/ft^2/day)
Course sand or coarser	N/A	1.6	0.4
Loamy coarse sand	N/A	1.4	0.3
Sand	N/A	1.2	0.3
Loamy sand	Weak to strong	1.2	0.3
Loamy sand	Massive	0.7	0.2
Fine sand	Moderate to strong	0.9	0.3
Fine sand	Massive or weak	0.6	0.2
Loamy fine sand	Moderate to strong	0.9	0.3
Loamy fine sand	Massive or weak	0.6	0.2
Very fine sand	N/A	0.6	0.2
Loamy very fine sand	N/A	0.6	0.2
Sandy loam	Moderate to strong	0.9	0.2
Sandy loam	Weak, weak platy	0.6	0.2
Sandy loam	Massive	0.5	0.1
Loam	Moderate to strong	0.8	0.2
Loam	Weak, weak platy	0.6	0.2
Loam	Massive	0.5	0.1
Silt loam	Moderate to strong	0.8	0.2
Silt loam	Weak, weak platy	0.3	0.1
Silt loam	Massive	0.2	0.0
Sandy clay loam	Moderate to strong	0.6	0.2
Sandy clay loam	Weak, weak platy	0.3	0.1
Sandy clay loam	Massive	0.0	0.0
Clay loam	Moderate to strong	0.6	0.2
Clay loam	Weak, weak platy	0.3	0.1
Clay loam	Massive	0.0	0.0
Silty clay loam	Moderate to strong	0.6	0.2
Silty clay loam	Weak, weak platy	0.3	0.1
Silty clay loam	Massive	0.0	0.0
Sandy clay	Moderate to strong	0.3	0.1
Sandy clay	Massive to weak	0.0	0.0
Clay	Moderate to strong	0.3	0.1
Clay	Massive to weak	0.0	0.0
Silty clay	Moderate to strong	0.3	0.1
Silty clay	Massive to weak	0.0	0.0

4. Depth and Spacing

WASTEFLOW systems usually have emitter lines placed on 2 foot (600 mm) centers with a 2 foot emitter spacing such that each emitter supplies a 4 sq. ft (0.36 m^2) area. These lines are best placed at depths of 6-10 inches (150 - 250 mm) below the surface. This is a typical design for systems in sandy and loamy soils with a cover crop of lawn grass. Closer line and/or emitter spacing of 12 inches is used on heavy clay soils or very coarse sands where lateral movement of water is restricted. Using closer spacing should not reduce the size of the field.

5. Soil Layers and Types

The shallow depth of installation is an advantage of the subsurface dripfield since the topsoil or surface soil is generally the most biologically active and permeable soil for accepting effluent. The topsoil also dries the fastest after a rainfall event and will maintain the highest water absorption rate. The quality and homogeneity of the soil may present a problem. If the soil was not properly prepared and there are pieces of construction debris, rocks and non-uniform soils, it is very difficult to obtain uniform water spread. In many cases, particularly if the soil is compacted, soil properties can be greatly improved by ripping and disking.

6. Adding Fill to the Dispersal Field

Some dispersal sites require additional soil be brought in for agronomic reasons or to increase separation distances from the restrictive layer. Restrictive layers stop or greatly reduce the rate of downward water movement, as a result surfacing may occur during part of the year. In soils with high water tables treatment is minimized due to a lack of oxygen.

Placing drip lines in selected fill material above the natural soil provides an aerated zone for treatment. Dispersal however still occurs in the natural soil and the field size must be based on the hydraulic capability of the natural soil to prevent hydraulic overload.

Any time fill material is to be used, the area to receive the fill should have all surface grasses and other organic material removed or it must be incorporated into the natural soil to prevent an organic layer from forming and restricting downward water movement. Removal must be performed under dry conditions. Divert surface and subsurface water prior to adding fill.

Soils to be used should be determined by a soils expert. Uniform soil material with good structure should be chosen. Avoid platy or massive materials with no structure.

The fill material should be applied in shallow layers with the first 4 to 6 inches incorporated into the natural soil to prevent an abrupt textural interface. Placement of fill should be uniform so preferential bypass flows do not occur. Soil should not be compacted. Continue this process until all fill has been incorporated.

The fill area should be left crowned to shed surface water and may need diversion ditches or some other devices to prevent surface water from infiltrating. The entire fill area should have a vegetative cover to prevent erosion. If possible, allow the fill to set at least seven to ten days before installing WASTEFLOW dripline.

It is generally agreed that fill should not be used on slopes greater than 20% unless means for controlling erosion, such as netting, are used. Consult a soils engineer on a case by case basis.

7. SLOPES OR HILLY SITES

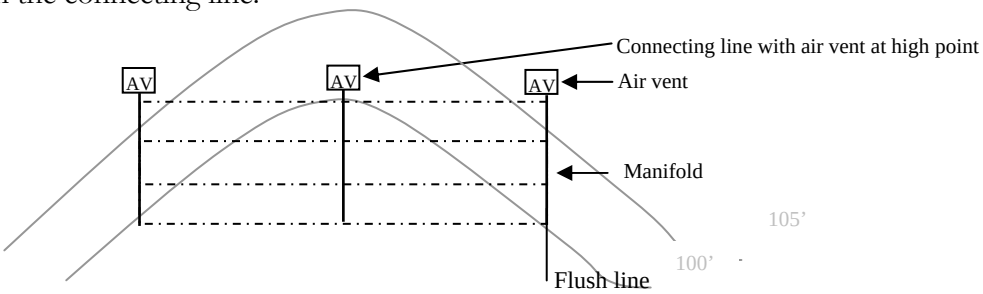
A. High Points and siphoning

A potential problem with buried drip lines is siphoning dirt into the emitters when the pump is switched off. For this reason:

i) At least one vacuum breaker should be installed at the highest point in each zone. It is best practice to install one at the high point of the supply and one at the high point of the return manifold.

ii) Drip lines should be connected at the end to a common return line with a flush valve.

iii) Run dripline along a contour if at all possible. Avoid installing lines along rolling hills where you have high and low points more than 3 ft. off contour along the same line. If the dripline is installed over a ridge, as shown below, connect all the high points together and install a vacuum breaker on the connecting line.



B. Dripline Pressure Tolerances

As water travels through a manifold or uphill, pressure decreases, or conversely, if water moves downhill pressure increases, which can affect the flow variation between the first dripline and the last dripline on the manifold.

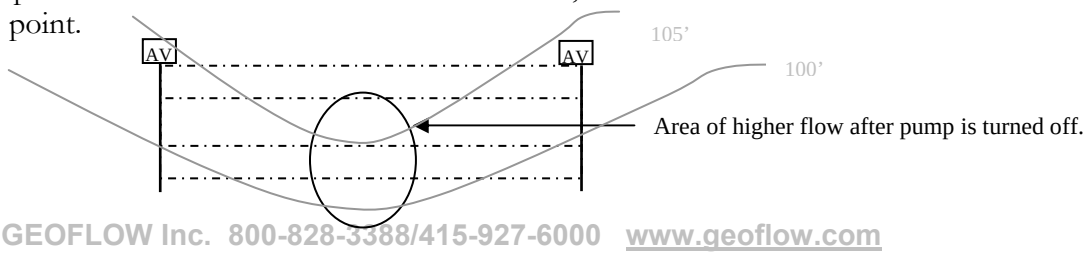
WASTEFLOW Classic: The Classic dripline can be operated in a range of 10 to 45 psi, however too wide a variance in the pressure in a single field will result in too high a variance in flow within that field. As a rule of thumb, if the level variation within a WASTEFLOW Classic zone exceeds six feet, individual pressure regulators should be placed for each six-foot interval.

WASTEFLOW PC: PC dripline can tolerate very large height variations provided the pressure remains within the 7 to 60 psi range, and preferably within 10 to 45 psi.

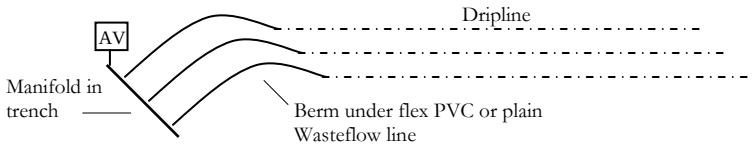
C. Low Head Drainage

At the end of each dosing cycle, consideration must be taken for gravity. Where is the water going to drain when the pump shuts off? Water in the dripline will flow down to the lowest point within the drip zone. This is called "low head drainage." Use the following precautions to mitigate low head drainage.

i. The dripline should run along the contour if at all possible because water will run to the lowest point of the line every time the pump is turned off. If the lowest point in the line is in the middle of the lateral, there will be excess flow at this point.



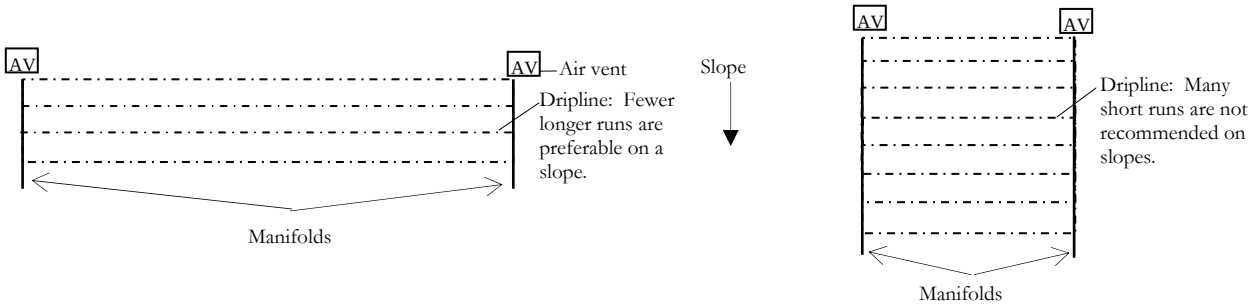
ii Have the dripline pass over an elevated berm between the manifold and beginning of the tubing to reduce gravity flow out of the lateral. In looped systems, elevating the loop will keep the effluent in its respective run.



iii. Use check valves or multiple zones to isolate the drip laterals. Check valves should only be used if there is no risk of freezing in the manifolds. They are placed on the supply and return manifolds coupled with an airvent on the downhill side. If unsure, as a rule of thumb, use a maximum of 1500 ft of Geoflow dripline within each zone or section.

iv. Install short manifolds with fewer longer dripline runs.

v. Slope the supply and return manifolds down to the pump tank so the effluent drains back down to the tank when the pump is turned off. Open the zone valves fully to drain the lines quickly.



Concentrate drip lines at the top of the hill with wider spacing towards the bottom. In the case of compound slopes consult a professional irrigation designer or engineer.

8. MULTIPLE ZONES

Drip dispersal fields can be divided into multiple zones or sections with solenoid valves or index valves for the following reasons:

- Steep slopes with a risk of low head drainage can be subdivided to distribute the water at system shut-down more uniformly in the field.
- Smaller zones reduce the required flow per minute which consequently reduces the size of the pump , valves, filters, supply and return lines.

- Subdividing the field is a tool used to achieve the optimum ranges required to efficiently operate the pumps, filters and valves.
- If the dispersal field is located in multiple areas on the property.
- To accommodate varying soils or vegetation on a single site.

Note. On multiple zones, a single Wasteflow Headworks can be used for filtration and flushing by placing zone valves downstream of the Headworks box. All zones would require a check valve on the individual flush lines upstream of each line joining a common flush line to keep flush water from one zone entering any other zone during the flush cycle. (See Geoflow Design Detail No. 588)

If the effluent has not been through secondary treatment, then each zone should have a dedicated filter or Wasteflow Headworks.

9. FLUSHING DESIGN

Proper flushing of the drip system is critical for proper long term operation. Manual flushing of mains should be facilitated by provision of cleanouts to allow sequential flushing from the pump outward. For the Dripfield Automatic flushing is recommended and should be designed considering the following key points:

- Geoflow's Wasteflow dripline includes GeoShield, a biocide lining to prevent slime accumulation, and the system should be designed to flush at minimum 0.5 fps flow velocity.
- Minimum volume flushed should be 1 volume of dose mains, dose manifold and Dripline.
- Flush time should allow for system pressurization prior to flushing, or add time for pressurization to flush time.
- The flush return should be in a visible location. One option is to position the return over the septic tank inlet tee.
- Ideal location to return field flush flow is to the upstream side of a two compartment drip pump tank. Drip pumps would be in the downstream side of the tank. Flush return flows must not adversely impact treatment system performance; minimize disturbance in the return tank and be sure to not overload secondary treatment.
- Flush frequency at average flows should be minimum 1 per day.

10. WINTERIZATION

Buried drip systems can be safely used in cold climates. However, where severe freezing conditions may be an issue the designer should exercise special care, and some key requirements must be met:

- The dripline itself is made of polyethylene and not susceptible to freezing. It drains through the emitters so it will not be full of water after pumps are turned off.
- All Manifolds and mains must be laid to drain rapidly, and/or buried below frost depth and/or insulated. Be sure drain valve on flush line remains open long enough for entire field to drain. Control system must adequately control drain back
- Remove the check valve at the pump.
- Insulate equipment boxes, including Headworks box or filter and field flush valve boxes as well as zone dosing valves, pressure regulator and air vacuum relief valves. Use closed-cell insulation such as Perlite in a plastic bag. Place metal pins near, or in, the boxes to help locate them when under snow.
- In severe freezing conditions use heat tape or small heaters on PVC and PVC parts.

- When installing PVC supply and return lines and manifolds be sure there are no dips in the lines. This can be avoided by using large diameter pipes (over 2") or by using schedule 80 pipe.
- Air valves must be installed in insulated sealed valve boxes with drain rock sump extending below frost line. The top of air vacuum relief valves must be no higher than soil surface.
- If using an index valve to split field zones, be sure it is capable of self-draining.
- WASTEFLOW lines will self-drain through the emitters into the soil. If the cover crop over the dripfield is not yet adequately established, add hay or straw over the field for insulation.
- Mark the valve box with a metal pin so you can find it in the winter when covered in snow.
- If using manual filter flush valves or manual field flush valves, they should be left cracked open slightly to provide for rapid drainage of the flush line in freezing conditions.
- Fields dosed with relatively small quantities of effluent are more likely to freeze than those dosed with design quantities. If winter use is less than summer use, then only use proportional number of fields to maintain water application rates in the field being dosed.
- Install Dripline with minimum 20cm (8") cover.
- Maintain forest or shrub vegetation in dripfield wherever possible.
- Maintain organic soil cover, where occurring.
- Use organic material to assist in insulation of dispersal area for first winter.
- Trap snow over system, and do not allow packing of snow.
- Do not install near roads or driveways etc.
- Keep effluent warm:
- Install all tanks in insulated "heat island" at house or other location.
- Do not use continuous flush systems.
- Use effluent heaters where seasonal use or cold water use is problematic.

11. LIGHTNING PROTECTION

A direct lightning strike on your valve, controller or wire is going to cause unpreventable damage. It is apparently very difficult to completely prevent electricity from spreading as it jumps across air, runs along electrical wires and may even travel along your water pipes. Power fluctuations can be prevented. The controllers are built to take some electrical surge and pass it through to the ground without damage. This requires a ground wire connected to a grounding stake driven deep into the ground. The best protection would be to use a separate ground wire or rod, not the third ground wire in the building's electrical wiring circuits. If you are installing this system in an area with frequent lightning storms, we advise you to install a separate grounding rod for each field controller installed according to the current version of the National electric Code or as prescribed by local zoning ordinances

12. REUSE FOR IRRIGATION

A good vegetative cover is an advantage to prevent erosion from the field and utilize water applied to the rooting zone. Sites should be planted or seeded immediately after installation. Grasses are particularly suitable for this application. Most lawn grasses will use 0.25" to 0.35" (6.3-8.9mm) of water per day during the peak growing season. This calculates to be about 0.16 to 0.22 gal/ft^2/day. By over-seeding lawns with winter ryegrass, this use efficiency can be continued through much of the

year. For vegetation using 0.16 to 0.22 gal/ft^2/day by evapotranspiration, a sewage flow of 1000 gallons per day would supply the water needs of a landscaped area of 4600 to 6400 sq. ft. without having to add fresh water. For areas larger than this, the plants will suffer water stress during the hot months unless additional fresh water is applied.

13. WATER APPLICATION FORMULA

To determine the rate of application for various drip irrigation designs, use the following formula:

Water application (inches per hour) = (231 x (emitter flow rate gph)) / ((Emitter spacing inches) x (dripline spacing inches))

Example: Dripline with 1.3 gph flow rate emitters spaced 24" apart and dripline spaced 24" apart.

Water application = (231x1.3)/(24x24) = 0.52 inches of water per hour.

WORKSHEET:

The following worksheet is a simplistic guideline and is available as an Excel spreadsheet. It can be downloaded from Geoflow's homepage at www.geoflow.com. To calculate the area required for your drip dispersal system you must know:

1. the quantity of effluent to be disposed of (in gallons per day) and
2. the soil acceptance rate (i.e. gallons per day per square foot).

Make a sketch of the dispersal area with contour lines.

WORKSHEET 1 - DISPERSAL FIELD DESIGN FOR SINGLE ZONE

Worksheet Dispersal Field	Formula
A. Quantity of effluent to be dispersed per day _____ *gpd*	
B. Soil type or hydraulic loading rate _____ *loading rate (gal/sq. ft./day)*	*Based on soil analysis* *Refer to State or Local regulations. If none, refer to Table 2 on page 10*
C. Determine the total area required _____ *square ft*	*Divide gpd by loading rate.* *A/B*
D. Choose the spacing between each WASTEFLOW line and each WASTEFLOW emitter *i)*_____ *ft. between WASTEFLOW lines* *ii)*_____ *ft. between WASTEFLOW emitters*	*Standard spacing is 2 ft.*
E. How many linear feet of dripline in the total area?_____ *ft.*	*(Area / 2) for 2ft. line spacing.* *C/2.0 or* *(Area / 1) for 1 ft. line spacing..* *C/1.0 or* *(Area / 1.5) for 1.5ft line spacing.* *C/1.5*
F. Calculate the number of emitters _____ *emitters*	*(Linear ft. of dripline / 2) for 2 ft emitter spacing.* E/2 *or* *(Linear ft. of dripline / 1) for 1 ft emitter spacing.* E/1 *or* *(Linear ft. of dripline /1.5) for 1.5 ft emitter spacing* E/1.5
G. Choose pressure compensating or Classic dripline _____ *WASTEFLOW Classic dripline or* _____ *WASTEFLOW PC ½ gph dripline* _____ *WASTEFLOW PC 1 gph dripline*	*See page 4 and Appendix 1 for details*

Sketch a layout of the WASTEFLOW lines in the dispersal plot to make sure that the maximum lateral length of each WASTEFLOW line is not exceeded. Count number of laterals for use in flushing velocity below.	*See Maximum Length of Run table in Appendix 1.*
H. Determine dripfield pressure _____ *psi*	*Standard pressure is 20 psi.* *WASTEFLOW Classic systems need between 15 and 45 psi (34.7 and 104 ft.) at the start of the dripfield.* *WASTEFLOW PC systems need between 10 and 45 psi* *(23.1 ft. to 104 ft.) at the start of the dripfield.*
I. Determine feet of head required at dripfield _____ *ft. of head*	*Multiply pressure by 2.31 to get head required.* *H x 2.31*
J. What is the flow rate per emitter? _____ gph / emitter	*See WASTEFLOW flow rates in Appendix 1.*
K. Determine total dose flow for the area _____ *gph* _____*gpm*	*Number of emitters multiplied by the emitter flow rate at the design pressure.* *Gph = No of emitters (F) x gph per emitter (J)* *Gpm = gph/60*
L. Count dripline laterals in the zone _____ *laterals*	*1 lateral = connection form supply line to return line regardless of the number of loops*
M. Determine additional flow required to flush the zone _____ flush velocity _____ *gph* _____*gpm*	*Number of dripline laterals (L) multiplied by flush velocity multiplier:* *Flush Velocity* *Multiplier* *½ ft/sec.* *0.37* *1 ft/sec* *0.74* *2 ft/sec* *1.48*
N. Total Flow required to flush zone _____ gpm	*M + K in gpm*

PSI = Ft. of head divided by 2.31

WORKSHEET 2 - FRICTION LOSS

Worksheet – Friction Losses

Friction Loss from dose enable float through Hydraulic Unit

Total flow rate for the zone (see N above)	_____ gpm
Headloss across headworks / filter (ft.)	_____ ft.
Diameter of supply line (inches)	_____ inches
Length of supply line from pump to hydraulic unit (ft.)	_____ ft.
Supply line equivalent fitting length (ft)	_____ ft.
Supply line friction loss(ft) See PVC friction loss chart in Appendix	_____ ft.
Static head loss from the dose enable float to headworks (ft)	_____ ft.
Total Ft of headloss from pump through hydraulic unit	_____ ft.

Supply lines Friction Losses

Total Drip line flush flow rate for zone (see N above)	_____ gpm
Size of supply line (inches)	_____ in
Length of supply line (ft)	_____ ft.
Vertical Lift from headworks to dripfield	_____ ft.
Total Supply line friction loss	_____ ft. _____ psi.
Minimum pressure required at beginning of dripfield	_____ ft.

Headloss in Dripline during flushing

Length of dripline lateral _____ ft.

Headloss through dripline lateral (See dripline cut sheets in Appendix)	_____ ft.
Pressure at distal end of dripline lateral	_____ ft.

Return lines Friction Losses

Zone flush flow rate in gpm (see M above)	_____ gpm
Size of return line (inches)	_____ in
Length of return line (ft)	_____ ft.
Vertical Lift from headworks to dripfield	
Total Return line friction loss	_____ ft.

Total Headloss	_____ ft

Note: Pressure from pump to dripfield must be added to pressure required at dripfield.
Note: Return line losses must be greater than pressure at distal end of dripline laterals.

Size of Pump
Flow rate in gpm (N above) (highest flow rate for any zone)
pump model
volts/hp/phase

SYSTEM INSTALLATION

1. INSTALLATION GUIDELINES

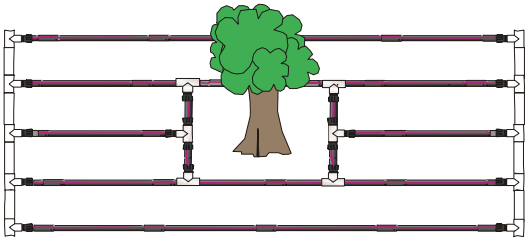
All Geoflow drip systems require:

- - Filtration with 120 mesh/130 micron
- - Filter flush valve
- - Field flush valve
- - 2 Air vents in each zone

All Wasteflow Classic drip systems requires pressure regulation

Handle your dripline and components with care. nano-ROOTGUARD® is temperature sensitive. To assure a long life, store the dripline out of direct sunlight in a cool place.

- All dripfield construction shall be done in accordance with Local rules and regulations.
- Protect the site prior to installation. Construction traffic and material stockpiling can change the soil profile. Fence off entire dripfield prior to any construction. No utilities, cable wire, drain tile, etc shall be located in dripfield.
- System is not to be installed when ground is wet or frozen. When the moisture in the soil is near the plastic limit (soils will ribbon and not easily crumble), it will be prone to smearing.
- Prior to construction note if any water is accessing the location of the dripfield. Dripfield should not be located at the low point of a site. Divert all downspouts and surface waters away from dripfield. If a curtain drain is to be used be sure it is serviceable and properly screened.
- Excavation, filling and grading should have been finished prior to installation of the subsurface drip system. Be sure to minimize soil disturbance when clearing and grubbing the dripfield. Preserve as many trees as possible. Use light track equipment for tree removal and grind out roots to below dripline depth rather than fully removing the entire root.
- Be sure you have everything required for the installation before opening trenches. Pre-assemble as many sets of components as practical above ground and in a comfortable place. Compression or Lockslip adapters should be glued to PVC tees, riser units should be pre-assembled, and the sub-main manifold with tees can be pre-assembled and used to mark the beginning and end of WASTEFLOW lines.



Loop dripline around trees

- For particularly tough soil conditions, soil moisture the day before opening trenches or installing WASTEFLOW. Remember it is much easier to install the system in moist soil. The soil should be moist but still allow the proper operation of the installation equipment and not cause smearing in the trenches. The soil surface should be dry so that the installation equipment maintains traction.
- Mark the four corners of the field. The top two corners should be at the same elevation and the bottom two corners should be at a lower elevation. In freezing conditions the bottom dripline must be higher than the supply and return line elevation at the dosing tank.
- Install the dosing tank. It is critical that the tank is waterproof. If installing a riser, check that it is watertight, and the entry and exit ports are completely sealed. In freezing conditions the

dosing tank should be at the lowest elevation of the entire system. Lid should be placed at grade and water should be able to shed over it.

- Install zone valves; solenoid or hydraulic index valves.
- Install the PVC supply line from the dosing tank, up hill through one lower and one upper corner stake of the dispersal field. Please refer to your State guidelines for depth of burial.
- Paint a line between the two remaining corner stakes.
- Install the Geoflow WASTEFLOW dripline from the supply line trench to the painted line, approximately 6" to 10" deep as specified. Upon reaching the painted line, pull the plow out of the ground and cut the dripline 1' above the ground. Tape the end of the dripline to prevent debris from entering. The tubing expands in warm temperatures and contracts in cold temperatures. If installing during the warmer months, be sure to allow some play in the tubing so it will not pull out of the fittings when it gets cold. Continue this process until the required footage of pipe is installed. Geoflow dripline must be spaced according to specification (2 ft. is standard). Depth of burial of dripline must be consistent throughout the field. Take care not to get dirt into the lines.
- If the system is looped, install the looped ends with Geoflow plain tubing or flex PVC. If in a cold climate be sure to pitch these slightly so they do not hold water and freeze. The loops are to be installed on the outside of the measured field.
- Install the supply header with tees lined up at each Geoflow line. Hook up the Geoflow lines to the supply header. Do not glue WASTEFLOW dripline.

  Lockslip Fittings Installations

  i) Hold the fitting in one hand and position the tubing with the other hand.
  ii) Move the sleeve back, and push the tubing onto the exposed stem as far as possible.
  iii) Push the sleeve out over the tubing and thread the sleeve onto tubing, as though tightening a nut to a bolt. Hand tighten. Do not use tools.
  iv) Test the connection to make sure the sleeve threads have gripped the tubing tightly.
- Install the filter headworks between the field and the pump tank on the supply line. Insulate the box in freezing conditions. When using an open bottom headworks box, place a rodent barrier down first. This can be made from bricks, paving stones, chicken wire, 3 layers of filter fabric or a 6" minimum depth of 1" gravel. Support the pipes entering and exiting the headworks with gravel.
- If using a pressure regulator, install it downstream of the filter headworks, just ahead of the dispersal field, on the supply line. Although the pressure regulator can be buried directly into the soil, it is preferable to install it inside a small valve box for easy access. *Insulate the box in freezing conditions.
- Install the floats in the dosing tank and wire up to the timer control. The timer control should be set to pump no more than the design flow, do not set to match the treatment capacity.
- Install the pump. Fill the dosing tank with fresh water and turn on the pump. Check for flow out the ends of all of the Geoflow lines. Let the pump run for about five minutes to flush out any dirt. Shut off the pump and tape the ends of the lines.
- Dig the return header ditch along the line painted on the ground and back to the pre-treatment tank. Start the return header at the farthest end from the dosing tank. The return line must have slope back to the treatment tank, septic tank or pump tank.

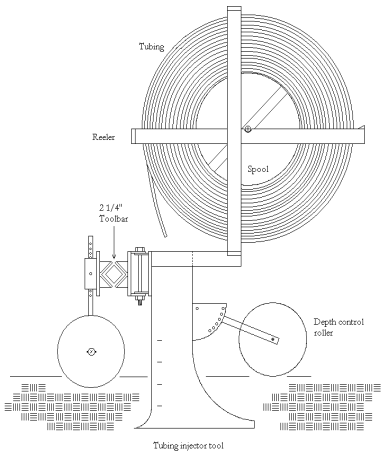
- Install the return header and connect all of the Geoflow lines. Care must be taken not to kink the dripline.
- Install air vacuum breakers at the highest points in the dispersal field. Use pipe dope or Teflon tape and hand tighten. Use a 6" minimum depth of 1" gravel below the boxes to keep rodents out. Insulate in freezing climates.
- Install a ball or solenoid field flush valve on the return line to the pretreatment or pump tank unless a pre-assembled Wasteflow Headworks is being used. If a Headworks was installed on the supply line, connect the return line back through the Headworks box. Support the return pipe before it enters the Headworks with gravel. If using electric solenoid valves, connect the valve common and an individual output wire to the solenoid leads using watertight electrical connectors.
- Allow glue fittings 1 – 2 hours to set. Open the field flush valve and turn on the pump to flush lines then close the valve and check the field and all piping and connections for leaks. Turn off the system
- Check filters and valves for construction debris.
- Turn on the pump and check:
    - Pressure at the air vacuum breaker(s) against design pressure.
    - Check the pressure in the WASTEFLOW Headworks. It should be five psi or higher.
    - If pressure gauges are on each side of the filter, note these for benchmark differential pressure across the filter. If using a manual valve for field flushing, crack it open until at least one PSI is lost or design pressure is reached and leave in that position.
- Flow rates from flow meter or draw down on tank. Compare to design flow.
- Wet spots in the field. If any sections are particularly wet, determine if they are caused by faulty connections, drippers or shallow burial.
- Check that solenoid valves are functioning. Close the internal manual bleed after flushing the system. If solenoid will not close, first clean the solenoid with caution not to lose small spring, and if this fails, open the bonnet and clean the inside.
- Establish vegetation cover as specified.
- Provide owner with final as-built diagrams flow, measurements and pressure readings at startup.
- Provide controller records at startup, including elapsed time meter, pump counts, secondary override counts, high water counts and primary float counts.
- *Solenoid Valve Installation and Operation*
    - Wrap male adapters with 2 wraps of Teflon tape and thread the adapters into the valve inlet and outlet 1 turn past hand tight. CAUTION: over tightening may cause damage to the valve. The solenoid is located on the downstream side of the valve.
    - Flush the laterals by opening the internal manual bleed lever on the downstream side of the solenoid. Turn the flow control stem fully open (counterclockwise) for flow control models.
    - Check that solenoid valves are functioning.

TABLE 2. SUBSURFACE DRIP INSTALLATION METHODS

NOTE: Disturbing the soil may affect the pore structure of the soil and create hydraulic conductivity problems. Please consult with your soil scientist or professional engineer before making the installation technique decision.

INSTALLATION METHOD *	ADVANTAGES	DISADVANTAGES
a) Hand Trenching*	• Handles severe slopes and confined areas • Uniform depth	• Slow • Labor intensive • Disrupts existing turf and ground • Back fill required
b) Oscillating or vibrating plow . Use the type that inserts the dripline directly in place, not one that pulls the dripline through the soil.	• Fast in small to medium installations • Minimal ground disturbance • No need to back fill the trench	• Depth has to be monitored closely • Cannot be used on steeper slopes(>20%) • Requires practice to set and operate adequately • Tends to "stretch" pipe. Shorter runs are required
c) Trenching machine: Ground Hog, Kwik-Trench, E-Z Trench*	• Faster than hand trenching • May use the 1" blade for most installations • Uniform depth	• Slower, requires labor • Disrupts surface of existing turf • Back fill required
d) Tractor with dripline insertion tool - see diagram 2.	• Fast • Little damage to existing turf because of the turf knife • Minimal ground disturbance • Does not stretch drip line • Adaptable to any tractor	• The installation tool is designed specifically for this purpose.
e)Tractor mounted 3-point hitch insertion implement	• Fastest. Up to four plow attachments with reels • A packer roller dumps back soil on top of the pipe	• Suitable for large installations only

* Installation methods are left to the discretion of the contractor and/or the engineer. Other installation methods may be used as long as care is taken to protect the tubing and the soil.



Diag. 2 Installation Tool

WORKSHEET 3 - AS BUILT SYSTEM DESCRIPTION.

1. Site name: _____
2. Site address including State: _____
3. Dripfield designed by: _____
4. Dripfield installed by: _____
5. Date of installation: _____
6. Daily design flow: _____ gpd.
7. Soil loading rate: _____
8. Is there secondary treatment on this job site? _____Yes _____No

   If "Yes" to question 8 above, please name manufacturer and model number:_____
9. Number of zones in dripfield: _____ If more than 1 zone, circle the valve used Hydraulic or Solenoid
10. Amount of dripline installed in each zone:

    Zone 1_____ ft. Zone 2_____ ft. Zone 3_____ ft. Zone 4_____ ft.
11. Wasteflow dripline model number &/or description: _____
12. Flow rate per zone:

    Zone 1_____ gpm. Zone 2_____ gpm. Zone 3_____ gpm. Zone 4_____ gpm.
13. Depth dripline installed below grade: _____ inches
14. Pump manufacturer, model number and number of pumps:_____
15. Filter or Headworks model number &/or description:_____
16. Pressure in each zone:

    Zone 1_____ psi Location pressure measured:_____

    Zone 2_____ psi Location pressure measured:_____

    Zone 3_____ psi Location pressure measured:_____

    Zone 4_____ psi Location pressure measured:_____
17. Size of filter flush valve: _____ inches. Is the filter flush valve manual or automatic? _____
18. Size of field flush valve: _____ inches. Is the field flush valve manual or automatic?_____

    If more than 1 zone, do the zones (a) share 1 flush valve or (b) does each zone have its own flush valve?
19. Was any fill material supplied on the dripfield? _____

    If "yes" to 18 above describe fill quality and quantity added. _____

    _____
20. Please provide owner with as-built drawings, including but not limited to direction of drip lines, location of air vents, pressure regulators if applicable, Headworks (filter and valves) and pump tank.
21. Startup Controller readings:

    ETM____ Pump ct.____ Secondary timer ct.____ High alarm ct.____ Primary ct.____
22. Note how long it takes to drain return line in freezing climates, and set controller

SYSTEM MAINTENANCE

The best way to assure years of trouble free life from your system is to continuously monitor the system and to perform regular maintenance functions. For large systems or systems with a BOD > 30 mg/l automation of maintenance is essential. Inspection and maintenance should be performed every six months.

ROUTINE AND PREVENTATIVE MAINTENANCE

- Clean the filter cartridge. This may be done with a pressure hose. Vortex screen filter cartridge should be cleaned from the outside inwards, while the discs in the disc filter cartridge should be separated and then cleaned. If bacteria buildup is a problem, we advise first trying lye, and if the problem persists, soak the filter cartridge in a chlorine bath - a mixture of 50% bleach and 50% water.
- Open the field flush valve and flush the field for 3-5 minutes by activating the pump in "manual" position. Close the flush valve. On automatic solenoid valves the manual bleed lever should always be in the closed position and the dial on top should be free spinning. This allows it to open when pulsed electrically. Clockwise rotation closes valve.
- With the pump in the "manual" position, check the pressure in the drip field by using a pressure gauge on the Schrader valve located on the air vents and by reading the pressure gauge located in the Wasteflow Headworks box. The pressure should be the same as shown on the initial installation records. On systems with manual flush valves, close the field flush valve completely and then open the valve slightly until there is a 1-2 psi drop or design pressure is reached. This will allow the field to drain after each dose to prevent the manifold lines from freezing.
- Remove the lids on the vacuum breaker and check for proper operation. If water is seen leaking from the top of the vacuum breaker, remove the cap of the vacuum breaker and press down on the ball to allow any debris to be flushed out. Be careful not to come in contact with the effluent.
- Turn off the pump and reset the controller for auto mode.
- Periodically remove and clean the air vents, field flush and filter flush valves.
- Visually check and report the condition of the drip field, including any noticeable wetness.
- Treatment and distribution tanks are to be inspected routinely and maintained when necessary in accordance with their approvals.
- Record the elapsed time meter, pump counter, override counter, high-level alarm and power failures. This information can be obtained from the controller.

HOME OWNERS GUIDE FOR CARE AND MAINTENANCE OF GEOFLOW DRIP DISPERSAL FIELD

A drip dispersal system has been installed on your property for the subsurface dispersal of the effluent from your home.

The drip dispersal system consists of a series of ½" diameter drip tubing installed at a shallow depth of 6-10" below the ground surface. It is designed to effectively disperse the treated effluent in the ground with a combination of soil absorption and plant uptake. Your drip dispersal system will function for many years with only minimal maintenance being required, provided the following recommendations are followed:

- Establish landscaping (preferably a grass cover) immediately. This will stabilize the soil and allow for the grass to take up the water.
- Do not discharge sump pumps, footing drains or other sources of clear water to the system, except for the effluent discharge from your treatment system.
- Maintain all plumbing fixtures to prevent excess water from entering the dispersal system.
- Do not drive cars, trucks or other heavy equipment over the drip dispersal field. This can damage the drip components or the soil and cause the system to malfunction. Lawn mowers, rubber wheeled garden tractors and light equipment can be driven over the drip field.
- Do not drive tent stakes, golf putting holes, croquet hoops etc., into the dispersal field
- Contact your service company if your high water alarm should sound. The pump chamber is sized to allow additional storage after the high water alarm sounds but you should refrain from excessive water usage (i.e., laundry) until the system has been checked.
- After a temporary shut down due to a vacation or other reason, the treatment plant ahead of the drip field filter initially may not function effectively, resulting in the filter blocking. Refer to maintenance guidelines above to clean the filter.

Contact your service company if you notice any areas of excessive wetness in the field. In most cases, this is usually caused by a loose fitting or a nicked dripline and can be easily repaired. Note: There may be some initial wetness over the dripline following the system's installation. This should cease once the ground has settled and a grass cover is established

SITE INSPECTION LIST:

Contractor _____

Site Address _____

Date _____

Site observations

1 Is dripfield located at the lowest point in the site where all waters may pond?
2 Is there any water coming in from neighbors? Downspouts? Irrigation?
3 Construction debris anywhere near the site, or compaction from construction or other causes?
4 How wet is the field before digging?
5 Will effluent drain back to tank in freezing climates? If not, is equipment insulated from freezing?

Pump tank

1 Watertight?
2 At grade. Allow surface water to run off
3 Inlet and outlet lines to be laid in gravel or compacted soils.
4 Float tree designed for easy removal for service and adjustment
5 Float settings correct to design?
6 Pump set a few inches up from the bottom of the tank
7 Waterproof wire nuts used to wire pump junction box

Headworks - Filter and flush valves

1 Waterproof wire nuts used in wiring solenoid valves
2 Is filter large enough to handle flow? Is it appropriate for the treatment unit?
3 Clean filter and valves after construction.
4 Check filter every time system is serviced and clean filter element
5 Clean valves if they do not close properly. See if different valves have different toggles.
6 Insulate in freezing climates
7 Have minimum of 1/2ft depth of 1" gravel under the Headworks for drainage and to keep gophers out
8 Check pressure - across filter (if available)
9 Check pressure - on return line pressure should be as designed. Lower than 5 psi may be too low.

Zone valves

1 Index valves - Requires 10 gpm min. flow, needs to self drain in freezing climate
2 Solenoids - Clean after installation if they do not close properly.

Supply and return lines

1 Make sure they are supported going into and out of the Headworks.
2 No dips
3 Make sure water from dripline does not flow back into supply and return trenches

Dripline

1 On contour
2 Burial depth
3 Check for kinking and local undulations (low areas) in installed dripline
4 Flush lines during construction
5 Is there ponding on surface?
6 Cover crop over field?

Airvents

1 Point of pressure measurement
2 Insulate in freezing climates
3 Make sure they are not in a position for surface or subsurface water to enter the system
4 Check pressure at airvents. Should be as designed. Less than 7psi may be too low.

Return to?

1 Pump tank? Don't churn the tank on return
2 Pretreatment? Can the equipment handle the additional flow?

Controller

1 Check field programmable settings against design
2 Proper wiring of controller….wire floats and valves
3 Keep moisture from running up wire into controller

Notes

1 Use sheet for "As built" in Design Guidelines.
2 Keep a record of start-up pressures and system data screens

Comments:

TROUBLE SHOOTING GUIDE:

Symptom: High water alarm activates periodically (1-2 times/week). During other times the water level in the pump chamber is at a normal level

Possible cause: Peak water usage (frequently laundry day) is causing a temporary high water condition to occur.

Remedy: Set timer to activate the pump more frequently. Be sure to not exceed the total design flow. To avoid this, reduce the duration of each dose.

Remedy: Provide a larger pump tank to accommodate the peak flow periods.

Symptom: High water alarm activates during or shortly after periods of heavy rainfall.

Possible cause: Infiltration of ground/surface water into system.

Remedy: Identify sources of infiltration, such as tank seams, pipe connections, risers, etc. Repair as required.

Symptom: High water alarm activates intermittently, including times when it is not raining or when laundry is not being done.

Possible cause: A toilet or other plumbing fixture may be leaking sporadically but not continuously. Check water meter readings for 1-2 weeks to determine if water usage is unusually high for the number of occupants and their lifestyle. Also determine if water usage is within design range.

Remedy: Identify and repair fixture**.**

Symptom: High water alarm activates continuously on a new installation (less than 3 months of operation). Inspection of the filter indicates it is plugged with a gray colored growth. Water usage is normal.

Possible cause: Slow start-up of treatment plant resulting in the presence of nutrient in the effluent sufficient to cause a biological growth on the filter. This is typical of lightly loaded treatment plants that receive a high percentage of gray water (i.e., from showers and laundry),

Remedy: Remove and clean filter cartridge in a bleach solution. Add a gallon of household bleach to pump tank to oxidize organics. Contact treatment plant manufacturer for advice on speeding up the treatment process possibly by "seeding" the plant with fresh activated sludge from another treatment plant.

Symptom: Water surfaces continuously at one or more isolated spots, each one foot or more in diameter.

Possible cause: Damaged drip line or a loose connection is allowing water be discharged under pressure and therefore at a much greater volume than intended.

Remedy: Dig up drip line. Activate pump and locate leak. Repair as required.

Possible cause: If water is at base of slope, can be caused by low-head drainage.

Remedy: Install check valves and airvents in the manifolds to redistribute water in the system after pump is turned off. This is not advised for freezing climates where manifold drainage is required.

Symptom: A portion of the drip field closest to the feed manifold is saturated while the rest of the field is dry.

Possible cause: Insufficient pump pressure. A pressure check at the return manifold indicates pressure of less than 10 psi.
Remedy: Check filter and pump intake to insure they are not plugged. If they are, clean as require.
Remedy: Leaks in the system may be resulting in loss of pressure. Check for water leaks in connections and fittings or wet spots in the field. Also check air vents to insure they are closing properly. Repair as necessary.
Remedy: Pump is worn or improperly sized. Pressure at feed manifold is less than 15 psi. Verify pressure requirements of system and provide a new or larger pump. As an alternate approach, the drip field may need to be divided into two or more zones.
Possible cause: The duration of each dose is of insufficient length to allow the drip field to become pressurized before the pump shuts off (or runs for only a brief time before turning off).
Remedy: Increase the pump run time and decrease the frequency of doses. Always calculate (or observe during field operation) how long the system takes to fully pressurize and add this time to the design dosing duration.

Symptom: High water alarm begins to activate continuously after a long period (1-2 years) of normal operation. Inspection of the filter indicates it is plugged with a heavy accumulation of sludge.
Possible cause: A buildup of solids in the pump tank due to carryover from the treatment plant.
Remedy: Replace the filter cartridge with a clean cartridge. Check the pump tank and if an accumulation of solids is noted, pump the solids out of the pump tank. Also, check the operation of the treatment plant to insure it is operating properly.

Symptom: Water surfaces at several spots in drip field during dosing periods. Installation is recent, less than 6 months of usage and the soil is a moderate to heavy clay. Possibly, the installation was completed using a non-vibratory plow.
Possible cause: Smearing of the soil may have occurred during installation of drip line. Also, the "cut" resulting from the installation allows an easy path for the water to surface during dosing.
Remedy: In most cases the sod will compact naturally around the drip line and the surfacing will diminish and ultimately cease. To help, reduce the duration of each dose and increase the number of doses/day. Also, it will help to seed the area to encourage the development of a good root zone.

Symptom: Entire area of drip field is wet, soft and spongy. It appears to be totally saturated with water. Situation occurs during dry season when there is little rainfall.
Possible cause: Water being discharged to drip field exceeds design. Excess water may be a result of infiltration, plumbing leaks or excessive water usage.
Remedy: Check water meter, elapsed time meter, pump counter, override counter or high level alarm counter to determine if water usage is in excess of design. Check for leaks or infiltration. Repair leaks as required. Reduce water usage by installing water saving fixture.
Remedy: If water usage cannot be reduced, enlarge drip field as required.
Possible cause: Area of drip field was inadequately sized and is too small.
Remedy: Provide additional soil analysis to verify sizing and enlarge as required.

Valve Troubleshooting

Symptom: Valve will not open manually

Check water supply and any possible master or gate valves to insure they are open.
Check that the valve is installed with the arrow pointing in the downstream direction
Check that the flow control is fully open, counterclockwise.
Turn off the water supply. Remove the solenoid and check for debris blocking the exhaust port.
Turn off the water supply. Remove the cover. Inspect the diaphragm for damage and replace if necessary.

Symptom: Valve will not open electrically

Check voltage at controller for 24 VAC station.
Check voltage across the solenoid lead wires for minimum 21 VAC.
Make sure handle on top of valve is free spinning. Not all the way open or all the way closed.
If the valve still does not operate, electrically replace the solenoid.

Symptom: Valve will not close

Insure the manual bleed lever is in the closed position.
Check for leaks around the flow control, solenoid or between valve cover and body.
Turn off the water supply. Remove the solenoid and check for debris or damage to the exhaust port.
Turn off the water supply. Remove valve cover and inspect for debris under diaphragm or debris in diaphragm ports.

Symptom: Slow leak

Check for dirt or gravel embedded in the diaphragm seat.
Check actuator and exhaust fitting for proper seating.

SUBSURFACE DRIP DISPERSAL KEY COMPONENTS MINIMUM STANDARDS

Component	Standard	Notes
Dripline and blank Dripline	Designed specifically for wastewater use, with purple stripe and a turquoise inner lining or purple color	Do not use non-wastewater tubing or emitters.
	Biocide lining	Required to permit 0.5 fps flushing velocity
	Emitters impregnated with Treflan® or OBPA	Required to prevent root intrusion
Dripline installation depth	6" to 12" (15-30cm)	6" (15cm) standard.
Dripline minimum pressure	10 psi during dosing	Minimum pressure required to get flush water back to flush tank.
Dripline fittings	Lockslip fittings. Using barb couplings if Lockslip does not fit through installation shank.	Reduces risk of tubing splitting.
Flexible pipe for loops	1/2" IPS flexible PVC pipe	To avoid kinking
Air valves	1" for any drip area under 2500 emitters.	To assist in rapid pressurization, siphon break and to prevent suction of fines into emitters. Install in valve box with drain rock or pea gravel base. Install with no high or low points between valve and Dripline.
Supply mains	Design at 2-5 fps velocity for dosing flushing	
Pressure test ports	At manifolds, filter outlet, flush valve inlet.	
Check valves (if used)	To prevent back feed of sub areas from flush main, or to prevent drain down of one area to another.	Preferably ball style check valves provided with unions for service.
Control valves/flush valve	Contamination resistant solenoid operated hydraulic diaphragm valves	Three way solenoid with external piloting and filtration recommended for larger systems.
	Motorized ball valves	Installed above any water level. Preferred for freezing conditions.
Flush return	Preferred, to septic tank inlet tee with air gap for observation.	Must not cause scouring or disturbance in tank. May be returned to treatment plant inlet if appropriate.
Indexing valve (if used)	Install at high point of system or use check valves.	Consider minimum switching flow rate and head loss in hydraulic design.
Filter	Maximum aperture size 130 microns	
	Screen filters, maximum differential of 2 psi at peak flow rate	For small residential systems with STE do not use screen filters smaller than 1.5" to avoid excessive differential

Component	Standard	Notes
	Disc filters to include biocide impregnation in disc material.	To prevent grow through of slime.
	Manual clean disc filters to be sized to allow typical minimum one year operation between cleaning.	Screen filters should be self-flushing or self-cleaning.
	Differential pressure alarm/gage, set point 2psi	Optional. May be replaced by pressure test ports.
Pump relief valve	Pressure Sustaining or Relief valve designed to keep pressure within maximum for headworks and achieve pump cooling flow. To be used where pump maximum pressure in excess of 100 psi.	
Pump chamber	To meet minimum timed dose standards.	
Control panel	Timed dosing, with main dose at average flow, override at design flow and alarm for high level.	No dosing in excess of the Design flow.
	Alarm, audible and visual	For high level (optionally for filter differential)
	Low level cut off and alarm	To protect pump, with alarm.
	Drain down capability	For freezing conditions.
	Automatic flush capability.	Continuous flush is not recommended.
	Data logging capability	Record of events with time, day, date stamp.
Septic Tank treatment	To consistently achieve maximum BOD5 of 150 mg/L, TSS of 50 mg/L Oil and Grease of 15 mg/L	Must be provided with outlet barrier filter to 1/16". Recommended tank size 4 x design flow, minimum 3 x design flow.
Secondary treatment facility	To consistently achieve maximum BOD5 of 30 mg/L, TSS of 30 mg/L Oil and Grease of 15 mg/L	Must be provided with outlet barrier filter to 1/16" if there is risk of sludge escaping from plant.
Tanks	Meeting local and national regulatory standards. Watertight tested, with waterproof risers to grade.	Installed to meet standard practice.
Pipe and plumbing components	Designed and manufactured to resist the corrosive effects of wastewater and common household chemicals, and meet applicable ASTM standards.	
Valve boxes	Provide valve boxes for all valves and pressure test points. With pea gravel or gravel base and positive drainage. Frost protected where necessary. Mark valve box locations.	
Electrical components	Should comply with appropriate local and national regulatory requirements. The installation of all electrical components must comply with local Electrical Code. Control valves must be wired to manufacturer standards.	

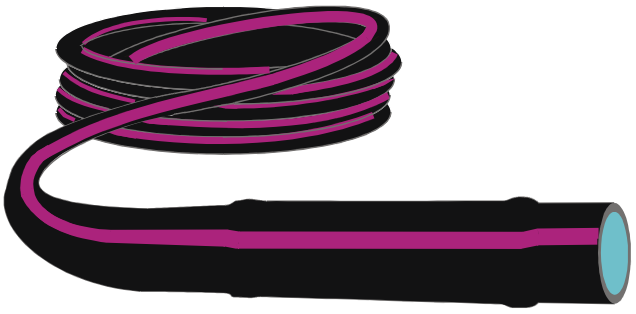
PRODUCT SHEETS

GEOFLOW SUBSURFACE DRIP

WASTEFLOW DRIPLINE

Description

The flexible 1/2" polyethylene dripline has large emitters regularly spaced in the line. With the dripline hidden about six inches below ground, effluent is distributed slowly and uniformly, reducing ponding, even in difficult soils and hilly terrain.



WASTEFLOW is built to last. It is guaranteed to be trouble-free from root intrusion with built-in nano-ROOTGUARD® protection, and the dripline wall is protected from organic growth with the *Geoshield* lining. WASTEFLOW provides uniform distribution. The emitters have a Coefficient of variation of less than .05.

Different flow rates, dripline diameters and emitter spacings can be special ordered.

Use 600 series compression adapters or lockslip fittings to connect the dripline to PVC pipe.

nano-ROOTGUARD® Protection

WASTEFLOW dripline features patented nano-ROOTGUARD technology to prevent roots from clogging the emission points. The pre-emergent, Treflan®, is bound into WASTEFLOW emitters when they are molded to divert roots from growing into the emitter outlet. The system is guaranteed against root intrusion for 15 years.

An Ti BAc Te RiAl Protection

Geoshield® is incorporated into the inner lining and emitters of WASTEFLOW dripline to prevent bacteria from growing on the walls of the tubing and emitters. It eliminates the need to scour the tubing. It is a tin based formula that defeats the energy system of microbial cells. This means smaller pumps or larger zones can be used with WASTEFLOW dripline than unprotected dripline.

Pc vs. cl ASSic

Geoflow, Inc. offers WASTEFLOW dripline in both pressure compensating (WASTEFLOW PC) and non-compensating (WASTEFLOW Classic) models.

We recommend that WASTEFLOW PC be used when the advantages are of substantial economic value.

a) Very long runs.

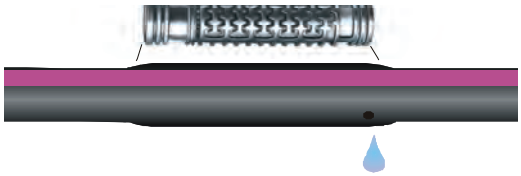
b) Steep slopes. Systems should be designed for the dripline lateral to follow the contour. If this is possible, the extra cost of pressure regulators required for WASTEFLOW Classic would likely be less than the incremental cost of WASTEFLOW PC.

c) Rolling terrain. If the difference in height from trough to peak exceeds six feet then WASTEFLOW PC should be used. Vacuum relief valves must be placed at the top of each rise.

WASTEFLOW PC and WASTEFLOW Classic can be interchanged to meet filter and zone flow requirements.

Look for the **Genuine Geoflow** stamp of quality

Geoflow, Inc. **Tel 415-927-6000 / 800-828-3388** **Fax 415-927-0120** **www.geoflow.com**



Available in 2 standard models

WF16-4-24 WASTEFLOW Classic 24"/1.3gph
WF16-4-12 WASTEFLOW Classic 12"/1.3gph
Alternate flow rates, diameters and spacing available upon request.

Flow Rate vs. Pressure

Pressure psi	Head ft.	ALL WASTEFLOW Classic Dripline
10 psi	23.10 ft.	.81 gph
15 psi	34.65 ft.	1.00 gph
20 psi	46.20 ft.	1.16 gph
25 psi	57.75 ft.	1.31 gph
30 psi	69.30 ft.	1.44 gph
35 psi	80.85 ft.	1.57 gph
40 psi	92.40 ft.	1.68 gph
45 psi	103.95	1.80 gph

Maximum l ength of Run vs. Pressure

Flow variation +/- 5%

Pressure psi	Head ft.	Emitter Spacing 24"	18"	12"
10 psi	23.10 ft.	170'	165'	100'
15 psi	34.65 ft.	170'	165'	100'
20 psi	46.20 ft.	170'	165'	100'
25 psi	57.75 ft.	170'	165'	100'
30 psi	69.30 ft.	170'	165'	100'
35 psi	80.85 ft.	170'	165'	100'
40 psi	92.40 ft.	170'	165'	100'
45 psi	103.95 ft.	170'	165'	100'

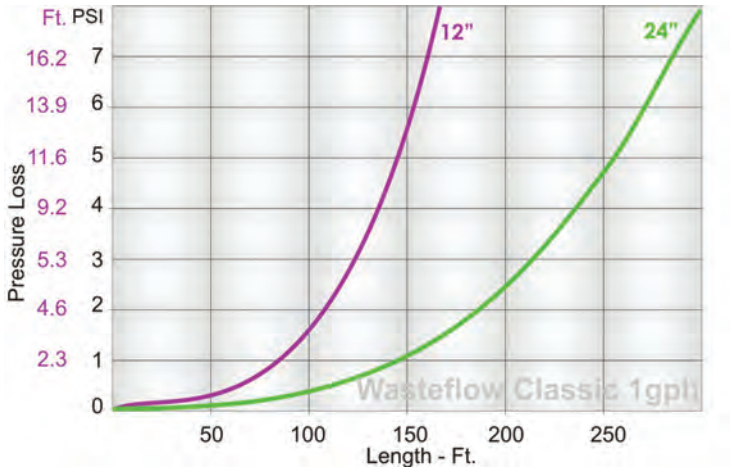
Kd=0.9 Cv < .05

NOTE:
For rolling terrain use Geoflow's WASTEFLOW PC-SD, our slow drain anti-siphon dripline

WASTEFLOW Classic Specification

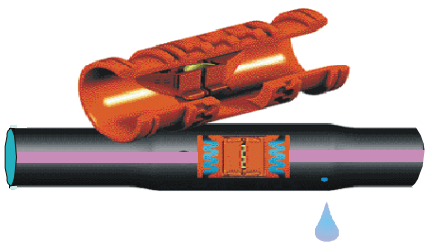
The dripline shall consist of nominal sized one-half inch linear low density polyethylene tubing, with turbulent flow drip emitters bonded to the inside wall. The drip emitter flow passage shall be 0.053" x 0.053" square. The tubing shall have an outside diameter (O.D.) of approximately .64-inches and an inside diameter (I.D.) of approximately .55-inches. The tubing shall consist of three layers; the inside layer shall be *Geoshield*® protection, the middle layer shall be black and the outside layer shall be purple striped for easy identification. The dripline shall have emitters regularly spaced 24" (or 12") apart. The turbulent flow emitters shall be molded from virgin polyethylene resin. The turbulent flow emitters shall have nominal discharge rates of 1.16 gallons per hour at 20 psi. The emitters shall be impregnated with Treflan® to inhibit root intrusion for a minimum period of fifteen years and shall be guaranteed by the manufacturer to inhibit root intrusion for this period. WASTEFLOW Classic dripline shall be Geoflow model number WF16-4-24 (or WF16-4-12).

Pressure l oss vs. l ength of Run



Look for the Genuine Geoflow stamp of quality

WASTeFl OW Pc 1/2 gph



Standard products:

WFPC16-2-24 WASTEFLOW PC 24”/.53gph or 2lph
WFPC16-2-18 WASTEFLOW PC 18”/.53gph or 2lph
WFPC16-2-12 WASTEFLOW PC 12”/.53gph or 2lph
Alternative spacing, flow rates and diameters available upon request.

Flow Rate vs. Pressure

Pressure	Head	ALL WASTEFLOW PC 1/2 gph dripline
7-60 psi	16-139 ft.	0.53 gph

Maximum l ength of Run vs. Pressure

Allows a minimum of 10 psi in the line.
Recommended operating pressure 10-45 psi.

Pressure		Emitter Spacing			
psi	ft.	6”	12”	18”	24”
10 psi	23.10 ft.				
15 psi	34.65 ft.		174’	260’	321’
20 psi	46.20 ft.	120’	229’	330’	424’
25 psi	57.75 ft.		260’	377’	478’
30 psi	69.30 ft.	150’	288’	415’	535’
35 psi	80.85 ft.		313’	448’	576’
40 psi	92.40 ft.	172’	330’	475’	612’
45 psi	103.95 ft.		354’	501’	651’
50 psi	115.5 ft.		363’	523’	675’
55 psi	127.05 ft.		377’	544’	700’
60 psi	138.6 ft.		403’	563’	727’

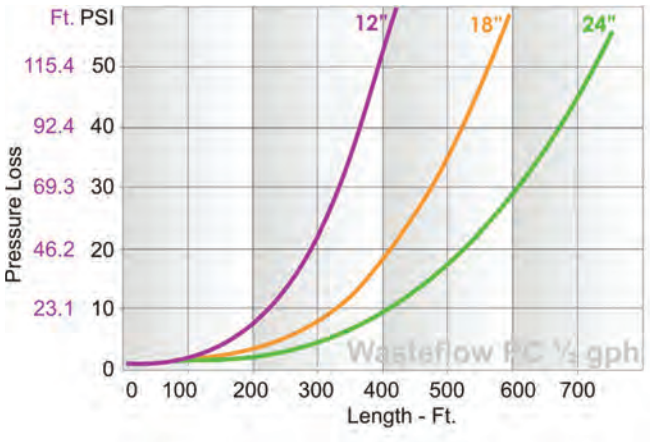
Kd = 2.070

NOTE:
For rolling terrain use Geoflow’s WASTEFLOW PC SD, our slow drain anti-siphon dripline

WASTEFLOW PC ½ gph PC Specification

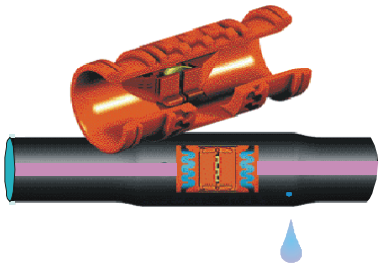
The dripline shall consist of nominal sized one-half inch linear low density polyethylene tubing, with turbulent flow drip emitters bonded to the inside wall. The drip emitter flow passage shall be 0.032” x 0.045” square. The tubing shall have an outside diameter (O.D.) of approximately .64-inches and an inside diameter (I.D.) of approximately .55-inches. The tubing shall consist of three layers; the inside layer shall be a *Geoshield*® protection, the middle layer shall be black and the outside layer shall be purple striped for easy identification. The dripline shall have emitters regularly spaced 24” (or 18” or 12”) apart. The pressure compensating emitters shall be molded from virgin polyethylene resin with a silicone rubber diaphragm. The pressure compensating emitters shall have nominal discharge rates of 0.53 gallons per hour. The emitters shall be impregnated with Treflan® to inhibit root intrusion for a minimum period of fifteen years and shall be guaranteed by the manufacturer to inhibit root intrusion for this period. 0.53 gph WASTEFLOW PC pressure compensating dripline shall be Geoflow model no. WFPC16-2-24 or WFPC16-2-18 or WFPC16-2-12.

Pressure l oss vs. l ength of Run



Look for the Genuine Geoflow stamp of quality

WASTeFl OW Pc 1 gph



Standard Products:

WFPC16-4-24 WASTEFLOW PC 24”/1.02 gph or 4lph
WFPC16-4-18 WASTEFLOW PC 18”/1.02 gph or 4lph
WFPC16-4-12 WASTEFLOW PC 12”/1.02 gph or 4lph
Alternative spacing, flow rates and diameters available upon request.

Flow Rate vs. Pressure

Pressure	Head	ALL WASTEFLOW PC 1 gph dripline
7-60 psi	16-139 ft.	1.02 gph

Maximum I ength of Run vs. Pressure

Allows a minimum of 10 psi in the line.
Recommended operating pressure 10-45 psi.

Pressure		Emitter Spacing		
psi	ft.	12”	18”	24”
10 psi	23.10 ft.	95’	140’	175’
15 psi	34.65 ft.	115’	172’	211’
20 psi	46.20 ft.	146’	210’	265’
25 psi	57.75 ft.	171’	242’	315’
30 psi	69.30 ft.	180’	266’	335’
35 psi	80.85 ft.	199’	287’	379’
40 psi	92.40 ft.	211’	305’	385’
45 psi	103.95 ft.	222’	321’	429’
50 psi	115.5 ft.	232’	334’	431’
55 psi	127.05 ft.	240’	347’	449’
60 psi	138.6 ft.	249’	360’	465’

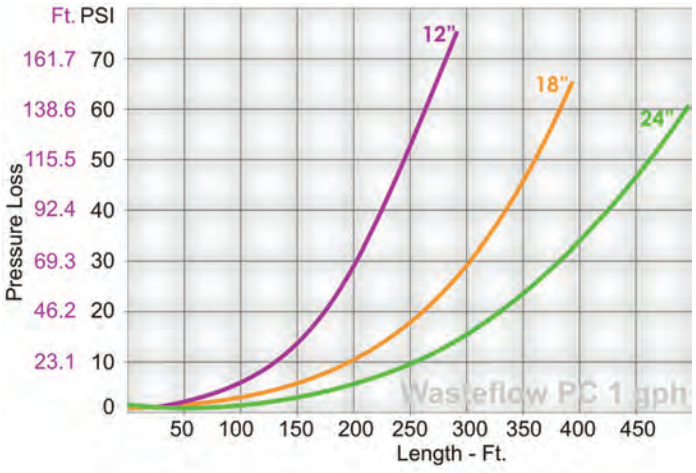
Kd = 2.070

NOTE:
For rolling terrain use Geoflow’s WASTEFLOW PC-SD, our slow drain anti-siphon dripline

WASTEFLOW PC 1 gph PC Specification

The dripline shall consist of nominal sized one-half inch 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 .64-inches and an inside diameter (I.D.) of approximately .55-inches. The tubing shall consist of three layers; the inside layer shall be *Geoshield*® protection, the middle layer shall be black and the outside layer shall be purple striped for easy identification. The dripline shall have emitters regularly spaced 24” (or 18” or 12”) apart. The pressure compensating emitters shall be molded from virgin polyethylene resin with a silicone rubber diaphragm. The pressure compensating emitters shall have nominal discharge rates of 1.02 gallons per hour. The emitters shall be impregnated with Treflan® to inhibit root intrusion for a minimum period of fifteen years and shall be guaranteed by the manufacturer to inhibit root intrusion for this period. 1.02 gph WASTEFLOW PC pressure compensating dripline shall be Geoflow model number WFPC16-4-24 (or WFPC16-4-18 or WFPC16-4-12) .

Pressure I oss vs. I ength of Run

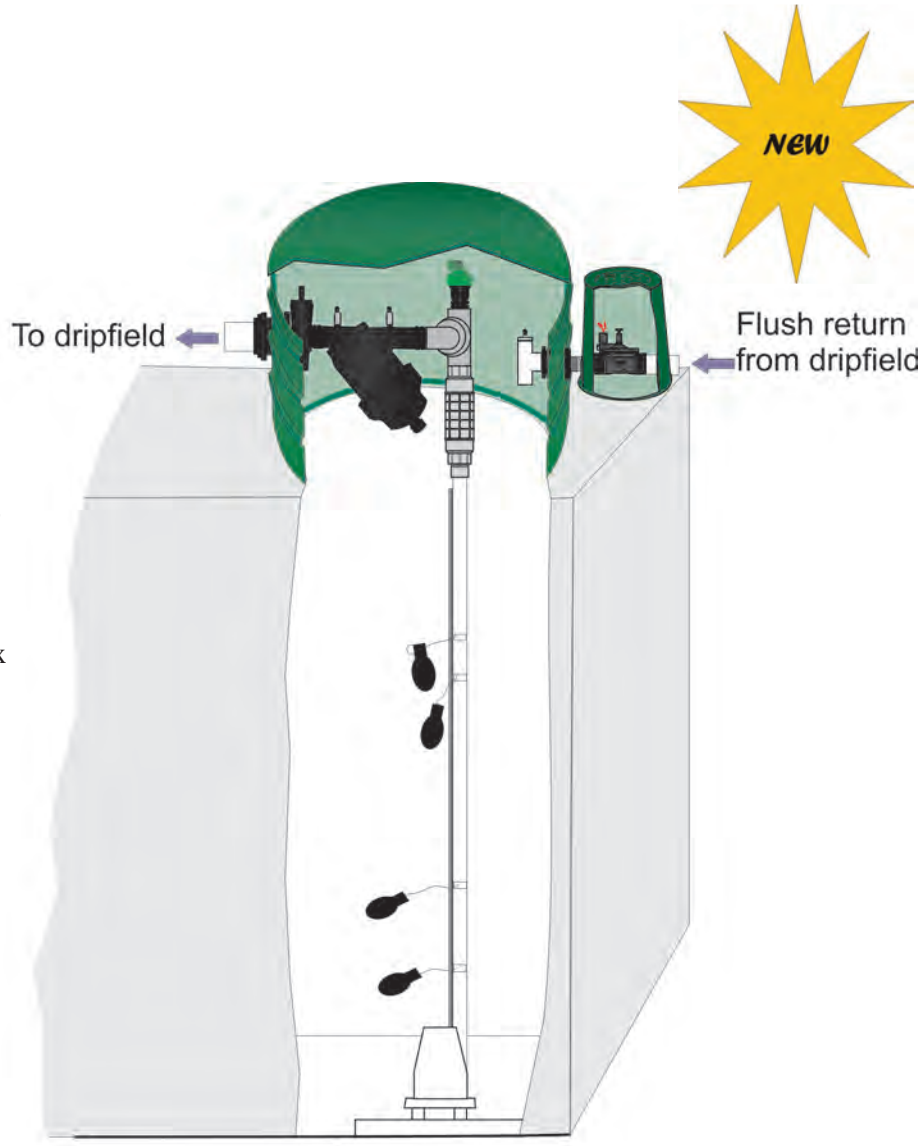


Look for the **Genuine Geoflow** stamp of quality

Geoflow, Inc. **Tel 415-927-6000 / 800-828-3388** **Fax 415-927-0120** **www.geoflow.com**

GEOFLOW SUBSURFACE DRIP

InTank Headworks



Description

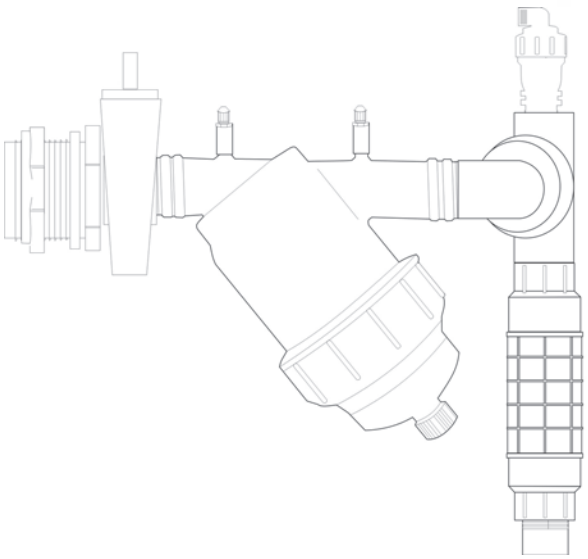
Designed to fit inside the pump tank riser with a quick disconnect fitting for easy removal and servicing. No need to maintain the filter, and flush valve on your hands and knees. The entire filter and pump come out together.

Available with either Geoflow's BioDisc or Vortex Screen filter.

No need to bury a headworks box in the ground.

No animals and flooding damage.

Reduces freezing as it stays warmer inside the pump tank.



Design patent pending

Product Sheets-2011 InTankDripHeadworks 13B18.indd

Geoflow, Inc. **Tel 415-927-6000 / 800-828-3388** **Fax 415-927-0120** **www.geoflow.com**

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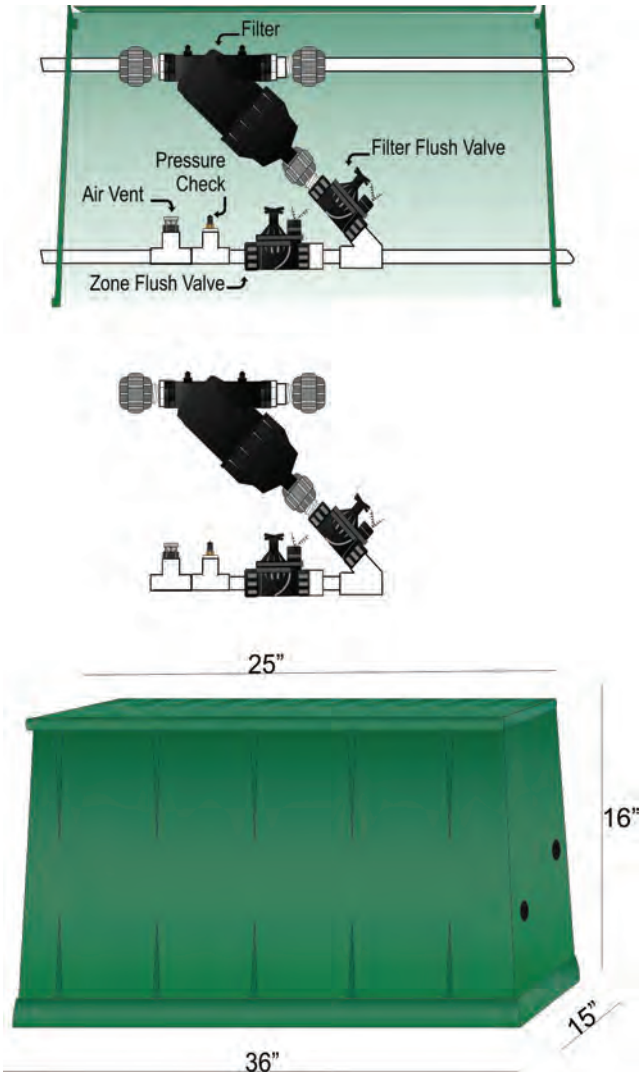
WHW Sporty Headworks - Disc
In-Ground

Description
The Wasteflow Headwork is a pre-assembled unit including filters, valves, fittings and pressure gauges mounted inside a box for direct burial, or inside a pump tank risier. It is installed between the pump and the field to filter out fine particles from entering the treatment field, and to flush fine particles that may collect in the dripfield. recommended for maximum flow rate of 30gallons per minute and 600 gallons per day.



Process
During a *dosing cycle*, the wastewater exits the pump chamber and enters the inlet fitting of the Sporty Headworks. It passes through the filter before exiting the box and going to the dripfield zone that is open. Both the field flush valve and zone flush valves are closed at this time.

The water enters back into the Headworks through the return line, goes past the point to measure pressure and stops at the field flush valve.

During a *field flush* cycle, water enters the Headworks as above, the filter flush valve remains closed, but the field flush valve opens to allow water to circulate through the dripfield and return back into the return fitting of the headworks, past the pressure gage and through the field flush valve at an increased velocity than during normal dosing. The water passes through the field flush valve and down the flush line in the headworks to exit the headworks for return to the pump tank or pretreatment tank.

When *filter flushing*, the filter valve opens and the field flush valve is closed. While water passes through the filter to the field, part of the water is directed to the base of the filter, pushing solids down the screen, out of the filter, through the open filter flush valve, into the flush line in the ultra headworks to exit the headworks for return to the pump tank or pretreatment tank.

Geoflow, Inc. **Tel 415-927-6000 / 800-828-3388** **Fax 415-927-0120** **www.geoflow.com**

Components Specification:

Enclosure: The Wasteflow Headworks Sporty enclosure shall be injection molded of structural foam polyethylene with a melt index of 10-12. The box shall be tapered with a top measurement of 25" x 16" and a bottom measurement of 33"x 23". The height shall be a minimum of 15" tall with a minimum wall thickness of 0.320". The body shall have a double wall at the top to cover seat area with a minimum thickness of 0.320". The cover seat area shall have structural support ribs on the underside of the seat. The bottom of the body shall have a 1.0" flange. The cover shall have an average thickness of 0.350".

Pressure Gauges: There shall be 3 points to measure pressure on the Sporty Wasteflow Headworks; one on each side of the filter and one on the return line. The pressure gauge is oil-filled and capable of registering pressure between 0-80 psi.

BioDisc filter (APBIODISC-150): The APBIODISC-150 filter body and discs shall be molded of polyethylene resins. The disc shall include **Geoshield®** anti-bacterial compound to protect the filter element against slime build-up. Filtration shall be 150 mesh/100 micron. The two piece body shall be capable of being serviced by untwisting and shall include an O-ring seal. The seals shall be manufactured from Nitrilo rubber. The inlet and outlet shall be 1.5 inch MPT. The UF disc filter shall be part number APBIODISC-150 as supplied by Geoflow, Inc.

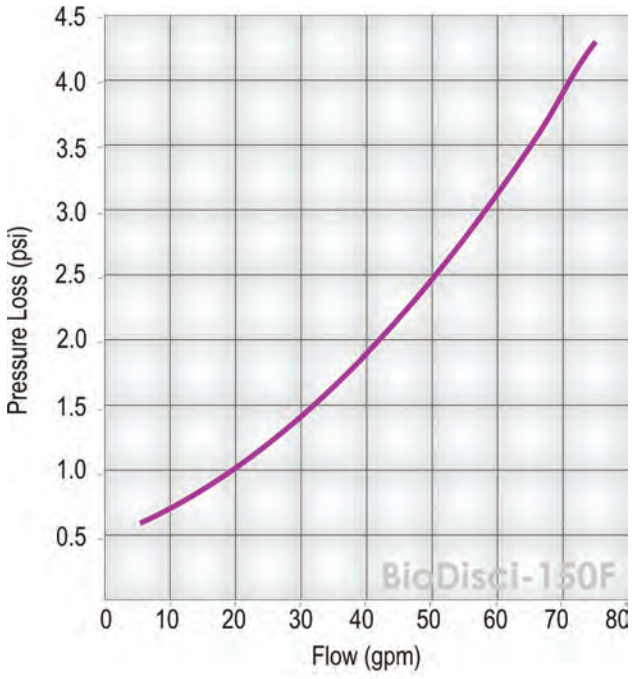
Filter Flush Valve (SVLV-075): The solenoid valve shall be an electrically operated, normally closed, hydraulic valve with a 3/4" FIPT inlet and outlet. The globe shaped valve body is constructed of nylon reinforced molded epoxy resin and is waterproof, with an O-ring seal, and complies with NFC Class II circuit requirements for 24V a.c. operation. Metal parts shall be constructed of stainless steel, and the diaphragm shall be molded of natural rubber. The recommended operating pressure range is between 10-150 psi. Also available with manual flush where approved.

Field Flush Valve (SVLV-100 or SVLV-150):
The solenoid valve shall be an electrically operated, normally closed, hydraulic valve with a 1" FIPT inlet and outlet. The globe shaped valve body is constructed of nylon reinforced molded epoxy resin and is waterproof, with an O-ring seal, and complies with NFC Class II circuit requirements for 24V a.c. operation. Metal parts shall be constructed of stainless steel, and the diaphragm shall be molded of natural rubber. The recommended operating pressure range is between 10-150 psi. Also available with manual flush where approved.

½" Air Relief Valve (ARV-05): Molded plastic air vent with rubber ring shall be used on flush end of the Headworks. It shall be capable of allowing air in at 5 gpm.

Piping, Unions and Fittings shall be schedule 40 or schedule 80 grade PVC.

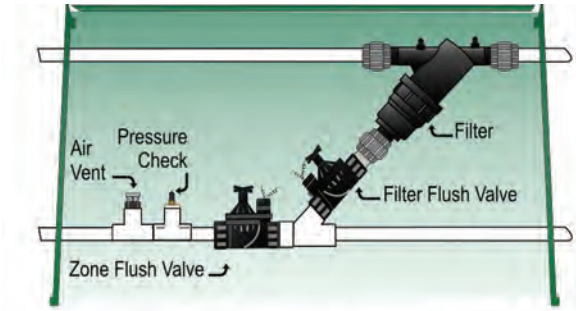
Flow vs. Pressure

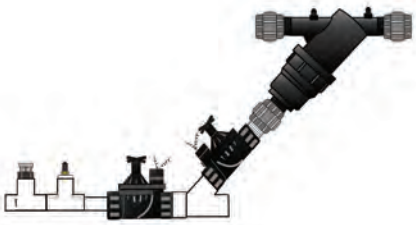


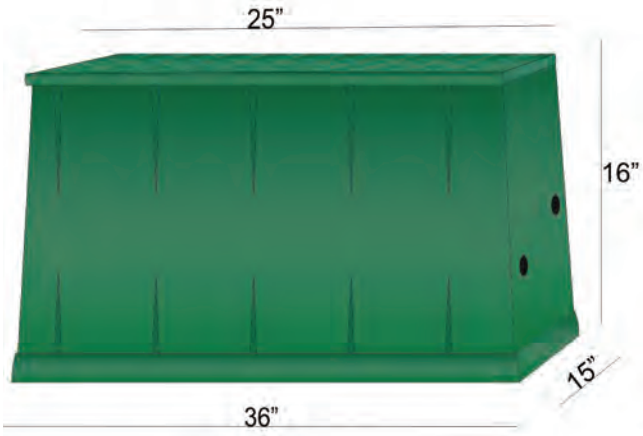
GEOFLOW SUBSURFACE DRIP

WHW Sporty Headworks - Screen
In-Ground

Description
The Wasteflow Headwork is a pre-assembled unit including filters, valves, fittings and pressure gauges mounted inside a box for direct burial, or inside a pump tank risier. It is installed between the pump and the field to filter out fine particles from entering the treatment field, and to flush fine particles that may collect in the dripfield. Recommended for maximum flow rate of 30gallons per minute and 600 gallons per day.







Process
During a *dosing cycle*, the wastewater exits the pump chamber and enters the inlet fitting of the Sporty Headworks. It passes through the filter before exiting the box and going to the dripfield zone that is open. Both the field flush valve and zone flush valves are closed at this time.

The water enters back into the Headworks through the return line, goes past the point to measure pressure and stops at the field flush valve.

During a *field flush* cycle, water enters the Headworks as above, the filter flush valve remains closed, but the field flush valve opens to allow water to circulate through the dripfield and return back into the return fitting of the headworks, past the pressure gage and through the field flush valve at an increased velocity than during normal dosing. The water passes through the field flush valve and down the flush line in the headworks to exit the headworks for return to the pump tank or pretreatment tank.

When *filter flushing*, the filter valve opens and the field flush valve is closed. While water passes through the filter to the field, part of the water is directed to the base of the filter, pushing solids down the screen, out of the filter, through the open filter flush valve, into the flush line in the ultra headworks to exit the headworks for return to the pump tank or pretreatment tank.

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Components Specification:

Enclosure: The Wasteflow Headworks Sporty enclosure shall be injection molded of structural foam polyethylene with a melt index of 10-12. The box shall be tapered with a top measurement of 25" x 16" and a bottom measurement of 33"x 23". The height shall be a minimum of 15" tall with a minimum wall thickness of 0.320". The body shall have a double wall at the top to cover seat area with a minimum thickness of 0.320". The cover seat area shall have structural support ribs on the underside of the seat. The bottom of the body shall have a 1.0" flange. The cover shall have an average thickness of 0.350".

Pressure Gauges: There shall be 3 points to measure pressure on the Sporty Wasteflow Headworks; one on each side of the filter and one on the return line. The pressure gauge is oil-filled and capable of registering pressure between 0-80 psi.

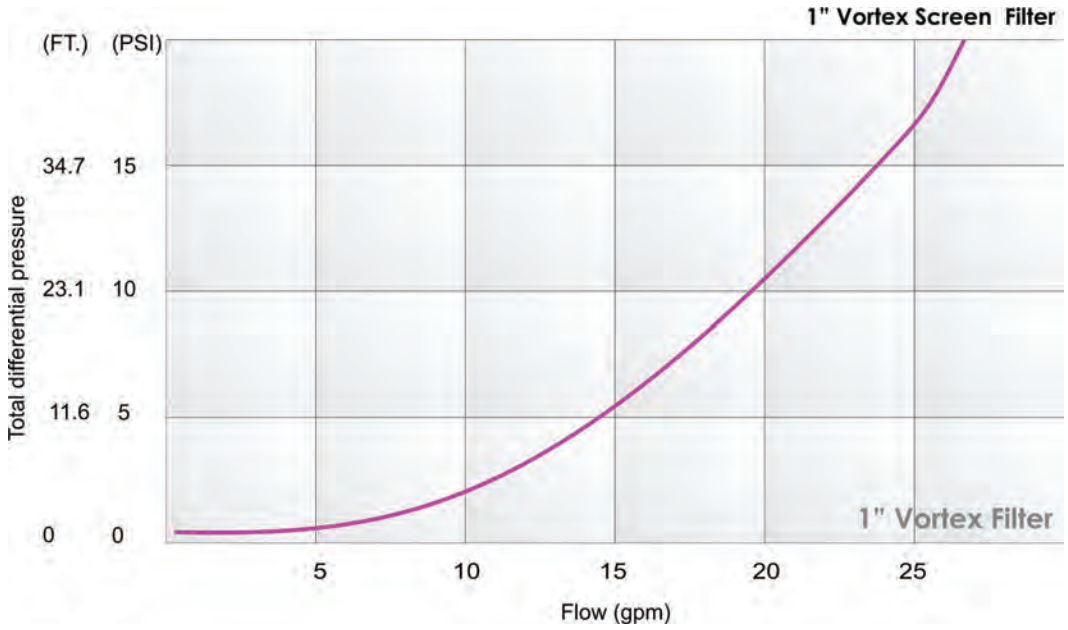
Vortex Screen Filter (AP4E-1F or AP4E1.5F or AP4E2F): The Y filter body shall be molded from glass reinforced engineering grade black plastic with a (*1 or 1.5 or 2 inch*) male pipe thread (MIPT) inlet and outlet. The two piece body shall be capable of being serviced by untwisting and shall include an O-ring seal. An additional ¾ inch MIPT outlet shall be capable of periodic flushing. The 150 mesh filter screen is all stainless steel, providing a filtration area of (*28.4 square inch for AP4E-1F, 60.8 square inch for AP4E-1.5F, 60.8 square inch for AP4E-2F*) . The screen collar shall be molded from vinyl. The filter shall be Geoflow Vortex Screen Filter model number (*AP4E-1F or AP4E1.5F or AP4E2F).*

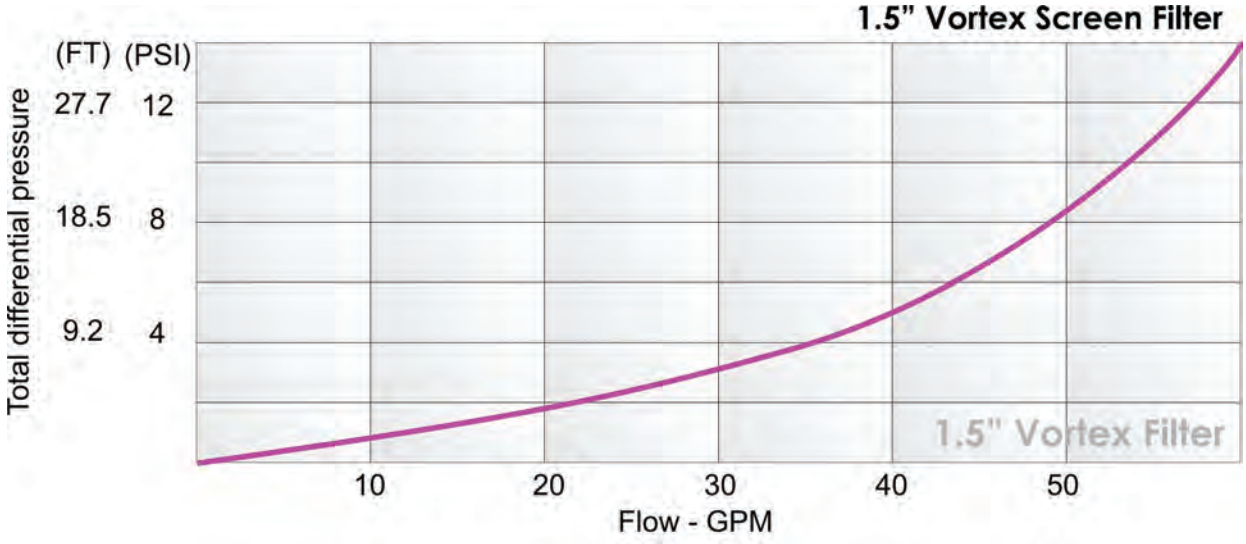
Filter Flush Valve (SVLV-075): The solenoid valve shall be an electrically operated, normally closed, hydraulic valve with a 3/4" FIPT inlet and outlet. The globe shaped valve body is constructed of nylon reinforced molded epoxy resin and is waterproof, with an O-ring seal, and complies with NFC Class II circuit requirements for 24V a.c. operation. Metal parts shall be constructed of stainless steel, and the diaphragm shall be molded of natural rubber. The recommended operating pressure range is between 10-150 psi. Also available with manual flush where approved.

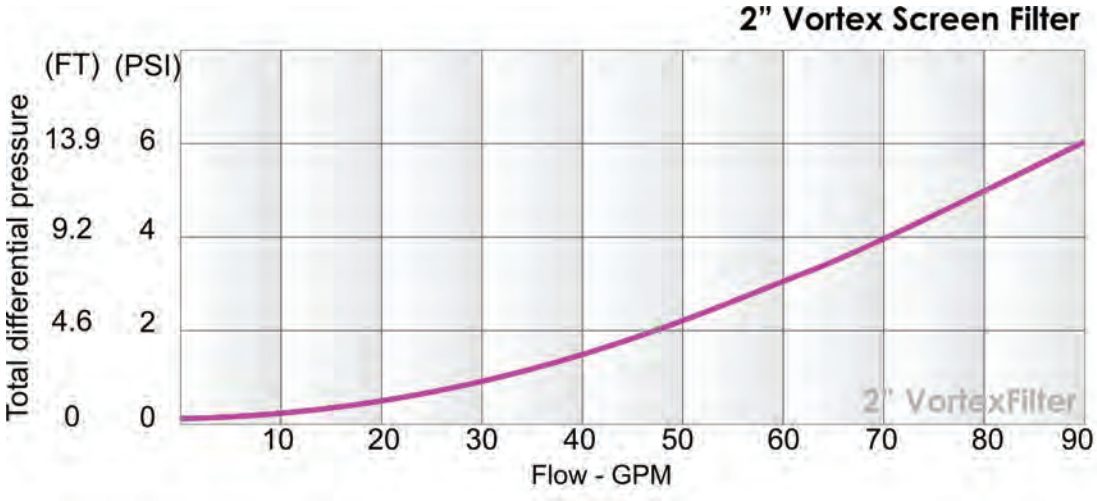
Field Flush Valve (SVLV-100 or SVLV-150): The solenoid valve shall be an electrically operated, normally closed, hydraulic valve with a 1" FIPT inlet and outlet. The globe shaped valve body is constructed of nylon reinforced molded epoxy resin and is waterproof, with an O-ring seal, and complies with NFC Class II circuit requirements for 24V a.c. operation. Metal parts shall be constructed of stainless steel, and the diaphragm shall be molded of natural rubber. The recommended operating pressure range is between 10-150 psi. Also available with manual flush where approved.

½" Air Relief Valve (ARV-05): Molded plastic air vent with rubber ring shall be used on flush end of the Headworks. It shall be capable of allowing air in at 5 gpm. Piping, Unions and Fittings shall be schedule 40 or schedule 80 grade PVC.

Pressure Loss:







GEOFLOW SUBSURFACE DRIP

Pressure Regulators

Description

The regulators are preset to regulate pressure in the field. These are recommended with Wasteflow Classic and optional with Wasteflow PC. Under normal operating conditions the pressure in the dripline should be:
10 - 45 psi for Wsteflow Classic and Wasteflow PC

Pressure Regulator Specification

Geoflows pressure regulator shall be designed to handle steady inlet pressures of ___ psi and withstand severe water hammer extremes. It shall handle flow rates between ___ gpm and ___ gpm. Flow restriction shall be negligible until the factory preset pressure is reached. Regulatory accuracy shall be within +/- 6%. Inlet and outlet size shall be ¾" FIPT. The body shall be constructed of high impact engineering grade thermoplastics. Regulation shall be accomplished by a fixed stainless steel compression spring enclosed in a chamber separate from the normal water passage. Each regulator shall be water tested for accuracy. Pressure regulator shall be Geoflow model number PMR- ____ - _ F

Low, Medium and High Flow Regulator

Extra flow regulator- Flows up to 90 gpm

Item No.	Outlet Pressure	Flow Range	Max. Inlet Pressure	Inlet / Outlet
PMR-20-LF	20 psi	1/8-8 gpm	150 psi / 347ft	¾" / ¾" fipt
PMR-20MF	20 psi	2-20 gpm	150 psi / 347ft	1" / 1" fipt
PMR-20-HF	20 psi	10-32 gpm	100 psi / 231ft	1.25" / 1" fipt
PMR-20-XF	20 psi	20-90 gpm	90 psi / 208 ft	3" / 3" ID slip
PMR-30-LF	30 psi	1/8-8 gpm	150 psi / 347 ft	¾" / ¾" fipt
PMR-30MF	30 psi	2-20 gpm	150 psi / 347 ft	1" / 1" fipt
PMR-30-HF	30 psi	10-32 gpm	100 psi / 231 ft	1.25" / 1" fipt
PMR-30-XF	30 psi	20-90 gpm	100 psi / 231 ft	3" / 3" ID slip
PMR-40-LF	40 psi	1/8-8 gpm	150 psi / 347 ft	¾" / ¾" fipt
PMR-40-MF	40 psi	2-20 gpm	150 psi / 347 ft	1" / 1" fipt
PMR-40-HF	40 psi	10-32 gpm	100 psi / 231 ft	1.25" / 1" fipt
PMR-40-XF	40 psi	20-90 gpm	125 psi / 289 ft	3" / 3"ID slip
PMR-50-MF	50 psi	2-20 gpm	150 psi / 347 ft	1" / 1" fipt
PMR-50-HF	50 psi	10-32 gpm	100 psi / 231 ft	1.25" / 1" fipt
PMR-50-XF	50 psi	20-90 gpm	125 psi / 289 ft	3" / 3" ID slip

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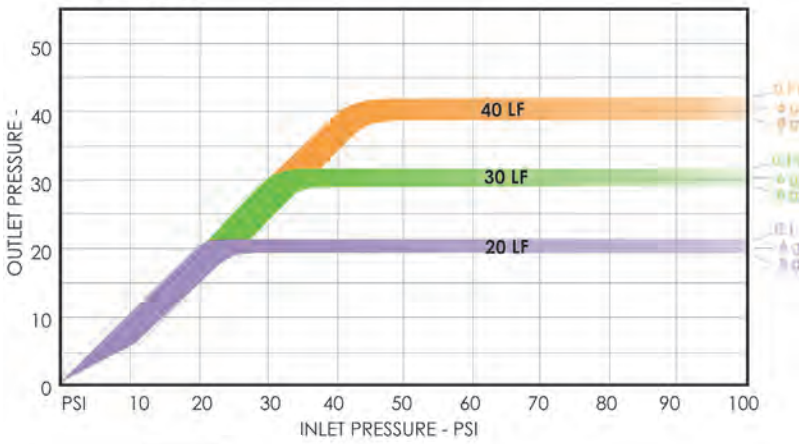
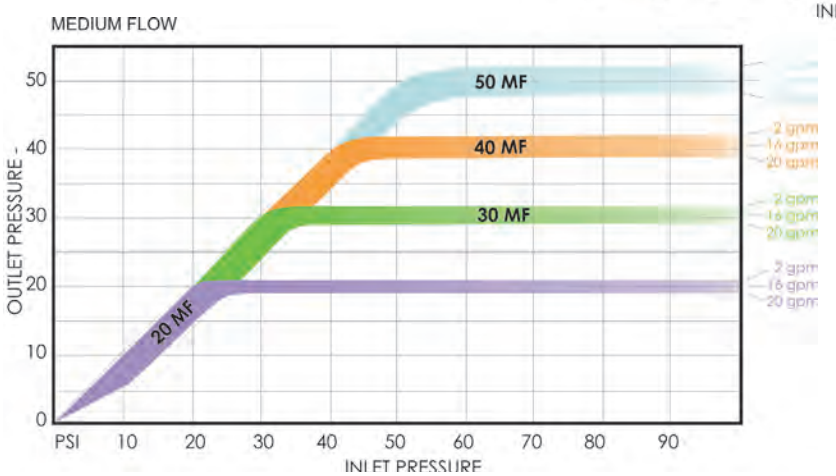
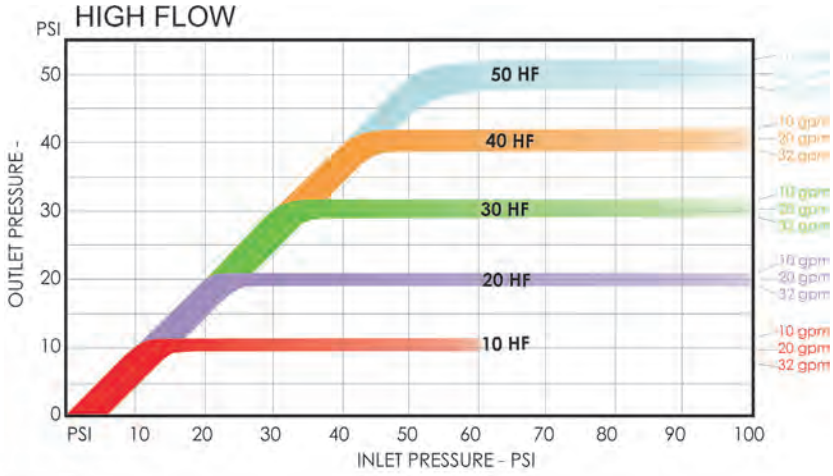
LOW FLOW



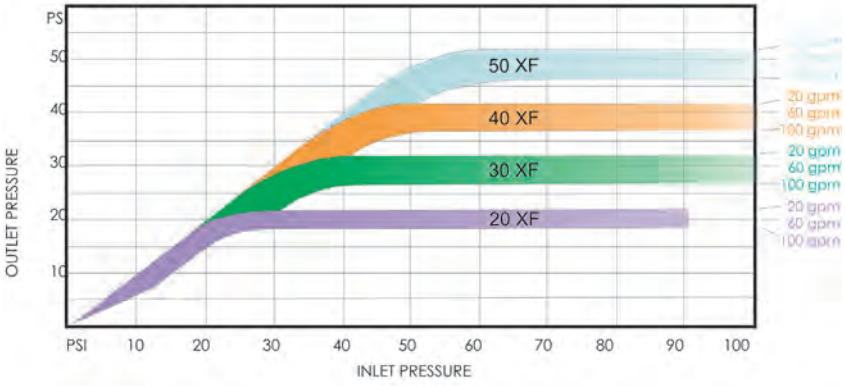
MEDIUM FLOW



HIGH FLOW



EXTRA FLOW



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GEOFLOW SUBSURFACE DRIP

Lockslip Drip Fittings

Lockslip Fittings

The lockslip fittings shall be molded of high grade plastic. Wasteflow drip tubing shall be pushed over a barb end, then secured with a locking nut. The fitting shall have the ability to be removed and reapplied with the locking nut. The fitting shall be sized to match Geoflow Wasteflow tube. Standard size is 16mm and standard adapters are 600 series.
Available preassembled on 18" flexible PVC riser (LTFLEXR-18) and flexible PVC loop (LTFLEXL-36).

Lockslip Slip Adapters

The slip adapter is used to connect Wasteflow drip tubing to a PVC fitting. The adapter glues into a 3/4" slip fitting. The drip tubing end requires no glue. The lockslip adapter shall be Geoflow part number LTSLIP-600

Lockslip Threaded Adapters

The threaded adapter is used to connect Wasteflow drip tubing to a PVC fitting. The adapter has 3/4" MPT fitting on one side a dripline adapter on the other side. This fitting requires no glue. The lockslip adapter shall be Geoflow part number LTMPT-600

Lockslip Couplings

The coupling is used to connect Wasteflow drip lines together. The adapter glues into a 3/4" slip fitting. This fitting requires no glue. The lockslip coupling shall be Geoflow part number LTC-600

Lockslip Elbows

The elbow is used to connect Wasteflow drip lines or Wasteflow plain tube together in a 90 degree configuration. This fitting requires no glue. The lockslip elbow shall be Geoflow part number LTEL-600

Lockslip Tees

The tee is used to connect Wasteflow drip lines or Wasteflow plain tube together in a tee degree configuration. This fitting requires no glue. The lockslip tee shall be Geoflow part number LTTEE-600

The PVC Glue / Cement:

Saddle to PVC manifold	IPS # 719
Flex PVC to Saddle or Fitting	IPS # 795
If the fitting is made of PVC	IPS # 711
ABS fittings into PVC Fittings (i.e. compression adapters)	IPS # 793

Instructions for solvent welding PVC fittings please visit http://www.weldon.com/howtovideo

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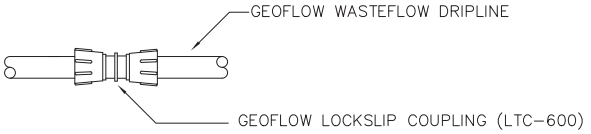
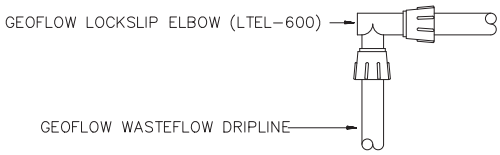
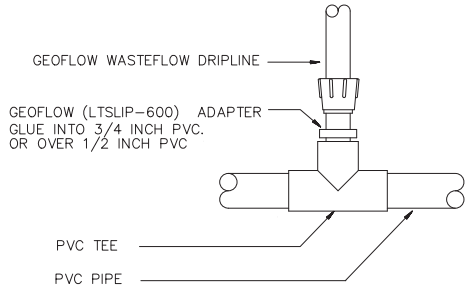


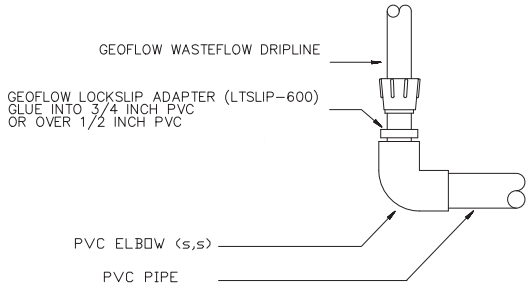
501LS GEOFLOW LOCKSLIP COUPLING (LTC-600)
SECTION
Not To Scale
06-08 GEOFLOW ?



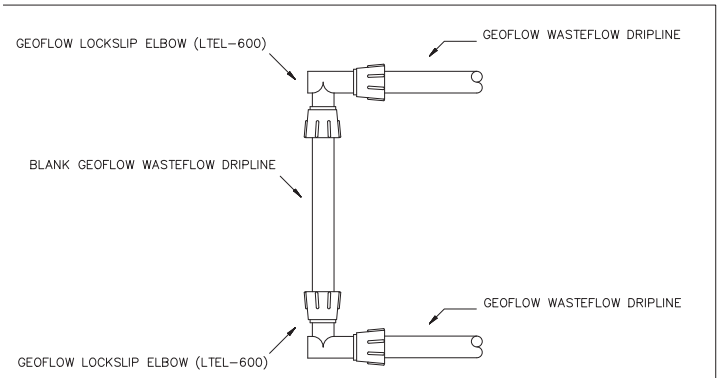
502LS GEOFLOW LOCKSLIP ELBOW (LTEL-600)
SECTION
Not To Scale
06-08 GEOFLOW ?



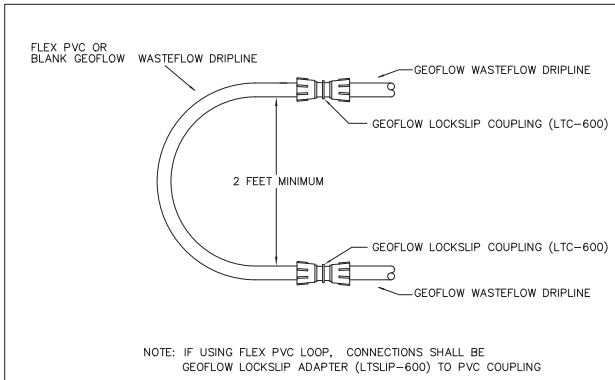
504LS GEOFLOW MANIFOLD CONNECTION (PVC TO ADAPTER)
SECTION
Not To Scale
06-08 GEOFLOW ?



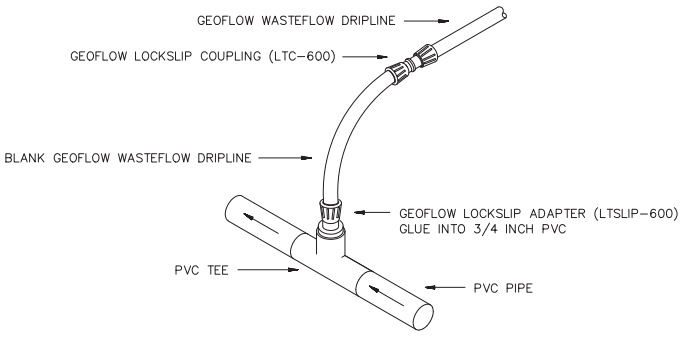
506LS GEOFLOW MANIFOLD CONNECTION (PVC TO ADAPTER)
SECTION
Not To Scale
06-08 GEOFLOW ?



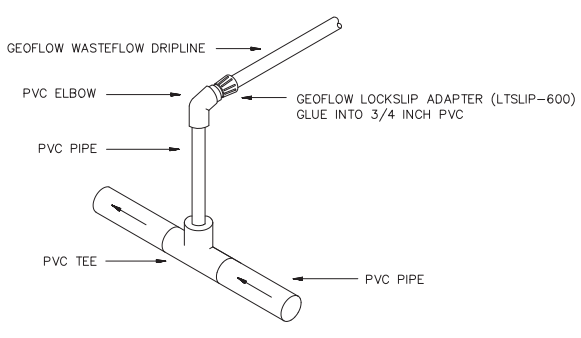
507LS A GEOFLOW LOCKSLIP ELBOW LOOP
SECTION
Not To Scale
06-08 GEOFLOW ?



507LS B GEOFLOW LOCKSLIP COUPLING LOOP
SECTION
Not To Scale
06-08 GEOFLOW ?



511 GEOFLOW MANIFOLD CONNECTION (END FEED)
SECTION
BLANK GEOFLOW WASTEFLOW DRIPLINE RISER
Not To Scale
06-08 GEOFLOW ?



512 GEOFLOW MANIFOLD CONNECTION (END FEED)
SECTION
PVC RISER
Not To Scale
06-08 GEOFLOW ?

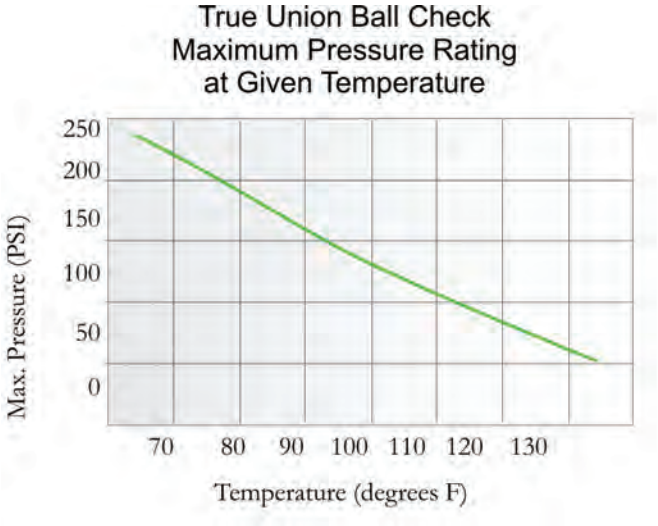
GEOFLOW SUBSURFACE DRIP

Ball Check

Description

The Ball Check valves prevent backfl ow or drain down in the system. The true union provides easy access for inline installation and servicing. The true union ball check is designed for quick positive sealing with minimum turbulence, low restriction, and efficient fluid transfer. It can be installed vertically or horizontally. System pressure will unseat the ball, allowing flow. Backflow or head pressure of 30" or 1 to 2 psi will seat the ball and stop back fl ow. Each check valve ships with female thread and socket adapters. This valve is manufactured 100% from thermolastic materials, making is less suseptable to corrosion.

Model No.	Inlet/ Outlet (FPT or socket)	Length (inches)	Height (inches)	Max Temp (F)	Weight (lbs.)
CV-B-05	0.5"	3.50"	2.00"	140 °	0.75
CV-B-10	1.0"	5.09"	2.31"	140 °	1.1
CV-B-15	1.5"	6.59"	3.81"	140 °	2.2
CV-B-20	2.0"	7.53"	4.22"	140 °	3.0



Specification

All thermoplastic check valves shall be True Union Ball type constructed from PVC Type I Cell Classifi cation 12454. Socket end connections are manufactured to ASTM D2467-94. Threaded connections are manufactured to ASTM D2464-88.

The O-Ring seat shall be Viton®. All valve components shall be replaceable. The check valve shall be pressure rated at 235 psi, non-shock water at 73° F. The ball check valve shall be Geoflow part number CV-B-X.

Geoflow, Inc. **Tel 415-927-6000 / 800-828-3388** **Fax 415-927-0120** **www.geoflow.com**

INSTALLATION, OPERATION & MAINTENANCE

- Systems should always be depressurized and drained prior to installing or maintaining your True Union Ball Check Valves.
- Temperature effect on piping systems should always be considered when the systems are initially designed. Piping systems must be designed and supported to prevent excess mechanical loading on valve equipment due to system misalignment, weight, shock, vibration, and the effects of thermal expansion and contraction.
- Because PVC and CPVC plastic products become brittle below 40ºF, Geoflow recommends caution in their installation and use below this temperature.
- Due to differential thermal expansion rates between metal and plastic, transmittal of pipe vibration, and pipe loading forces DIRECT INSTALLATION OF METAL PIPE INTO PLASTIC CONNECTIONS IS NOT RECOMMENDED. Wherever installation of plastic valves into metal piping systems is necessary, it is recommended that at least 10 pipe diameter in length of plastic pipe be installed upstream and downstream of the plastic valve to compensate for the factors mentioned above.

- SOCKET CONNECTION: Socket end connections are manufactured to ASTM D2467 (PVC) and F-439 (CPVC). Solvent cementing of socket end connections to pipe should be performed per ASTM specifications D2855-87. Cut pipe square. Chamfer and deburr pipe. Surfaces must be cleaned and free of moisture, oil, dirt and other foreign material. Remove Union-nuts and end connectors from valve body. Slide Union-nuts, with threads facing valve, onto pipe to which the end connector is to be cemented. Apply primer to inside socket surface of end connector. Never allow primer or cement to contact valve ball or end connector o-ring sealing surfaces, as leaking may result. Use a scrubbing motion. Repeat applications may be necessary to soften the surface of the socket. Next, liberally apply primer to the male end of the pipe to the length of the socket depth. Again apply to the socket, and without delay apply cement to the pipe while the surface is still wet with primer. Next apply cement lightly, but uniformly to the inside of the socket. Apply a second coat of cement to the pipe, and assemble end connector to the pipe, rotating the end connector 1/4 turn in one direction as it is slipped to full depth on to the pipe. The end connector should be held in position for approx. 30 seconds to allow the connection to "set". After assembly wipe off excess cement. Follow cement manufacturers guidelines for proper "cure-time", based on the pipe size that you are joining.

- THREADED CONNECTION: Threaded end connections are manufactured to ASTM specifications D2464. F437 and ANSI B1.20.1. Due to the variable quality and tolerances of plastic male threaded nipples, Colonial no longer recommends the use of PTFE (Teflon®) tape. We recommend using the following thread sealant: IPS WELD-ON All Seal™. To provide a leak proof joint, the pipe should be threaded into the end connection "hand tight". A strap wrench may be used to tighten the joint an additional 1/2 turn past hand tight. Tightening beyond this point may induce excessive stress that could cause failure.

GEOFLOW SUBSURFACE DRIP

Air Vent / Vacuum Relief Valve

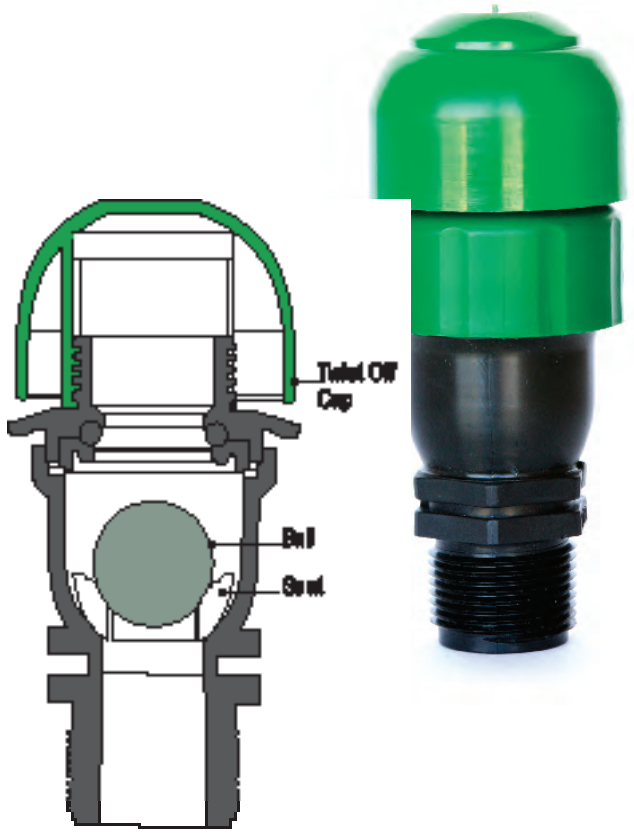
UPDATED

Description

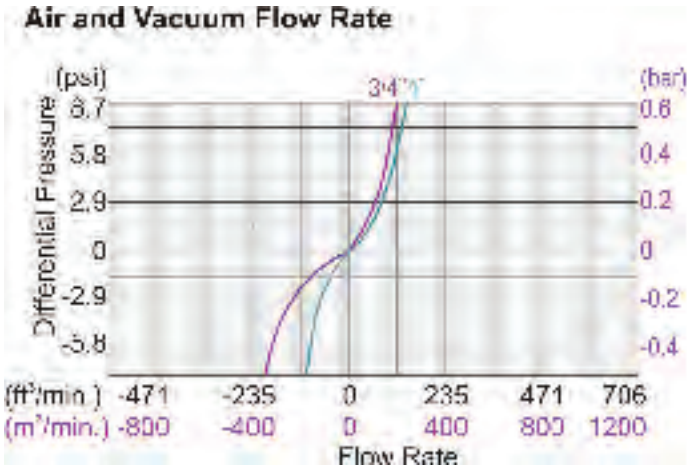
Air release occurs when air escape the system at startup and vacuum relief allows air to enter during shutdown. The air vent vacuum breakers are installed at the highest points in the drip field to keep soil from being sucked into the emitters due to back siphoning and back pressure. This is an absolute necessity with underground drip systems. They are also used for proper drainage of the supply and return manifolds. Use one on the high point of the supply manifold and one on the high point of the return manifold and any high points of the system.

Features

Geoflow's new kinetic air vacuum breakers have a twist off cap that is easy to take apart for cleaning. No need to remove the valve to maintain it. The large clear passageway allows lots of air to flow in and out easily. The protected mushroom cap is ideal for wastewater, directing spray downward.



Part No.	APVBK75m	APVBK100m
Inlet	3/4"	1"
Max. Flow Rate	30 gpm	
Max Pressure	80 psi/185 ft.	80 psi/185 ft.
Max Temp	140 oF	140 oF
Height	5"	5.5"
Weight	1 oz.	1.2 oz.



Specification

The Air Vacuum Breaker bady and ball shall be made of molded plastic. The ball shall be removable for easy cleaning. The Air Vacuum Breaker shall be part number APVBK75m or APVBK100m as supplied by Geoflow, Inc.

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GEOFLOW SUBSURFACE DRIP

Air Vent / Vacuum Relief Valve

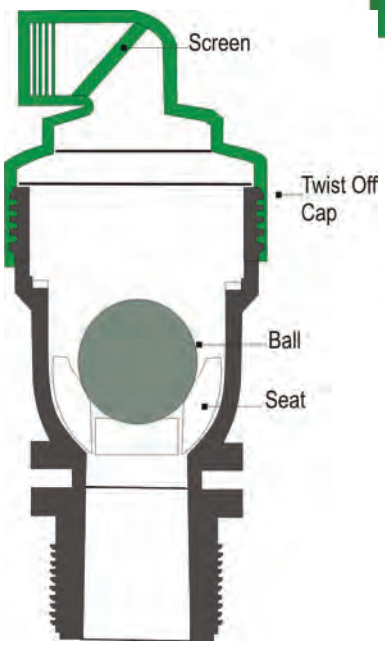
UPDATED MODEL

Description

Air release occurs when air escape the system at startup and vacuum relief allows air to enter during shutdown. The air vent vacuum breakers are installed at the highest points in the drip field to keep soil from being sucked into the emitters due to back siphoning and back pressure. This is an absolute necessity with underground drip systems. They are also used for proper drainage of the supply and return manifolds. Use one on the high point of the supply manifold and one on the high point of the return manifold and any high points of the system.

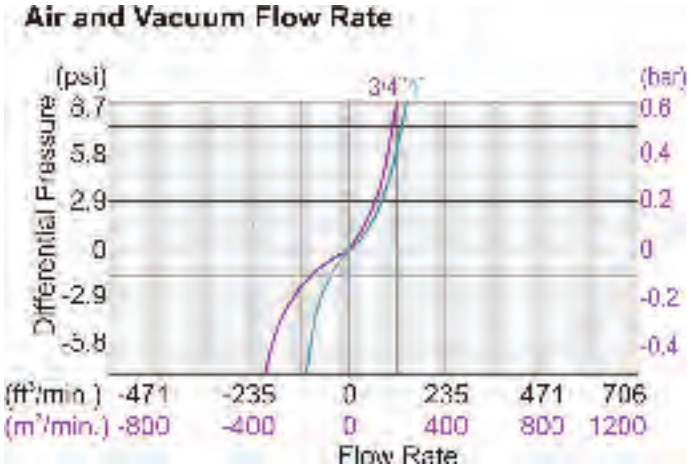
Features

Geoflow's new kinetic air vacuum breakers have a twist off cap that is easy to take apart for cleaning. The large clear passageway allows lots of air to flow in and out easily. The elbow cap design is ideal for directing wastewater spray, directing spray downward. With the ball removed, these airvents can easily be used as a flush port.



Part No.	APVBK75L	APVBK100L
Inlet	3/4"	1"
Max Pressure	80 psi/185 ft.	80 psi/185 ft.
Max Temp	140 oF	140 oF
Height	5"	5.5"
Weight	1 oz.	1.2 oz.

Available in drip packages or sold separately.



Specification

The Air Vacuum Breaker shall provide instant and continuous vacuum relief and non-continuous air relief. Both the body and the ball shall be made of molded plastic. The ball shall be removable for easy cleaning. The air vacuum breaker shall be part number APVBK75L or APVBK100L as supplied by Geoflow, Inc.

Product Sheets-2011 AirVentVacuumRelief(ir) 11E05.indd

GEOFLOW SUBSURFACE DRIP

Solenoid Valves

Description

The Solenoid Valve is used to flush field and filters and as zone valves. It is electrically operated. It is normally closed, and in the event of a power failure the valve will close.

Geoflow's automatic water control valves are designed for vertical or horizontal installation. The Wye 'Y' valve body design includes a full bore seat with unobstructed flow path, free of any in-line ribs, supporting cage, or shafts.
Its unitized Flexible Super Travel (FST) diaphragm and guided plug provide a significantly 'look through' passage from end to end resulting in ultra-high flow capacity with minimal pressure loss.
The combination of a long travel guided valve plug, peripherally supported diaphragm, and replaceable valve seal provides:

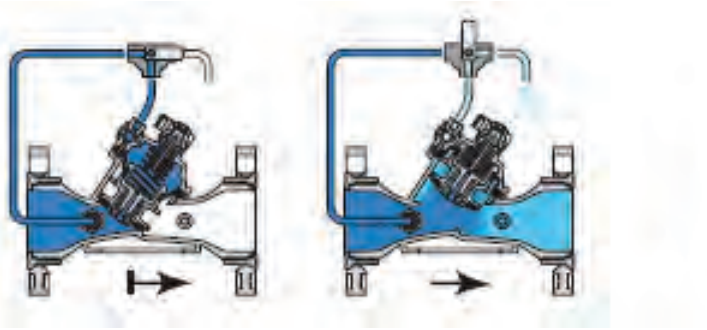
- No chattering or slamming closed
- Accurate and stable regulation with smooth motion
- Low operating pressure requirements
- No diaphragm erosion and distortion
- Chemical resistant

SVLVB 100 and SVLVB 150

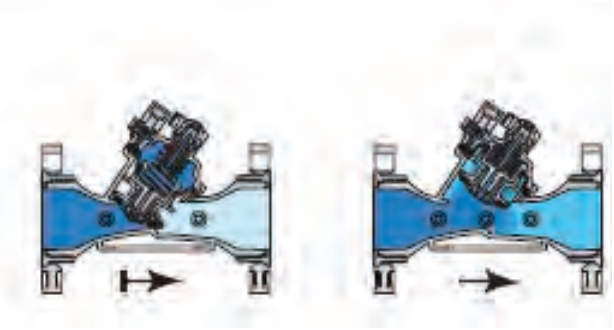
SVLVB200 and SVLVB 300

	SVLVB-100	SVLVB 150	SVLVB 200	SVLVB 300
Inlet/Outlet Size (FNPT)	1"	1.5"	2"	3"
Length (L)	4.3"	6.3"	9.0"	12.2"
Height (H)	4.5"	7.2"	7.4"	11.0"
Width (W)	3.0"	5.0"	5.4"	
R	7/8"	1-3/8"	1-5/8"	4.0"
Weight	12.5 oz	2.2 lbs.	2.97 lbs.	8.8 lbs
Valve pattern	Globe	Globe	Wye 'Y'	Wye 'Y'
Operating range	10 - 150 psi	10 - 150 psi	7 - 140 psi	7 - 140 psi
Max pressure	180 deg F	180 deg F	180 deg F	180 deg F
Materials				
Body & cover	Nylon reinforced	Nylon reinforced	Glass filled nylon	Glass filled nylon
Metal parts	Stainless steel	Stainless steel	Stainless steel	Stainless steel
Diaphragm	Natural rubber	Natural rubber	NBR (Buna-N), nylon reinforced fabric	NBR (Buna-N), nylon reinforced fabric
Seals	NBR & NR	NBR & NR	NBR (Buna-N)	NBR (Buna-N)

On/Off Modes



3-Way Control
Line pressure applied to the control chamber of the valve creates a hydraulic force that moves the valve to the closed position and provides drip tight sealing. Discharging pressure from the control chamber to the atmosphere causes the line pressure under the plug to open the valve.



2-Way Internal Control
Line pressure enters the control chamber through the internal restriction. The closed solenoid causes pressure to accumulate in the control chamber, thereby shutting the valve. Opening the Solenoid releases more flow from the control chamber than the restriction can allow in. This causes pressure in the control chamber to drop, allowing the valve to open.

Installation

The manual bleed lever should always be in the VERTICAL position and the dial on top should be free spinning. Clockwise rotation closes valve.
Pressure Loss through valves (in psi)
Recommended minimum pressure differential: 7 psi

Electrical data:

Wiring requires a single lead from the controller to each solenoid valve, plus a common neutral to all solenoids. Type UF wire, UL listed, is recommended for all hookups.
Standard 24V ACV (50-60Hz)
Current Holding 0.24A 5.76 VA
Current Inrush 0.46A 11.04VA
Maximum allowable loss 4.8 Volts for the 24V AC system
Contact Geoflow for optional voltages or larger valves

Maximum Length of wire run – Controller to Valve

# Wire	Resistance Ohm / 1000'	Maximum Run
#18	6.39	800 Ft.
#16	4.02	1,275 Ft.
#14	2.58	2,000 Ft.
#12	1.62	3,200 Ft.
#10	1.02	5,100 Ft.
#8	0.641	8,000 Ft.
#6	0.403	12,750 Ft.
#4	0.253	20,500 Ft.
#2	0.158	32,500 Ft.

Maximum Voltage loss with a valve with a three way Solenoid is 4.8 Volts

[1] Cover Ring
The cover ring fastens valve cover to body, stiffening and strengthening the valve body, enabling simple maintenance. A cover ring key is available.

[2] Pilot Adaptor
The pilot adaptor allows us to connect the mini-pilot valve or the Galit hydraulic relay to the valve body.

[3] Valve Cover
The cover's strong construction meets rough service conditions. Optional cover types (3"; DN80 and smaller valves) are capable of accepting a Flow Stem, a Flow Stem + Position Indicator, and a 2-Way Solenoid (2W-N1 Electric Type).

[4] Auxiliary Closing Spring
One single high grade stainless steel spring provides a wide operation range, ensuring low opening pressure and secured closing.

[5] Plug Assembly
The unitized Flexible Super Travel (FST) plug assembly combines a long travel guided valve plug, peripherally supported diaphragm, and replaceable diaphragm and valve seal. The diaphragm fully meets the valve's operating pressure range requirements.
[5.1] Diaphragm Holder
[5.2] Diaphragm
[5.3] Plug
[5.4] Plug Seal

[6] hYflow 'Y' Valve Body
Glass-filled nylon construction meets rough service conditions with high chemical and cavitation resistance.
End-to-end "look-through" design and full bore seat with unobstructed flow path, free of any in-line ribs, supporting cage, or shafts, enables ultra-high flow capacity with minimal pressure loss.

[7] End Connections
Adaptable on-site to a wide range of end connection types and sizes:
[7.1] Flanges: Plastic or metal "Corona" with elongated slots enable meeting diverse flange standards ISO, ANSI and JIS.
[7.2] Flange adaptor external thread
[7.3] Internal threads

[8] Flange Adapter
Articulated flange connections isolate the valve from line bending and pressure stresses.

[9] Valve Legs
Stabilize the valve and serve also as mounting brackets.

PVC 40 FRICTION LOSS CHART

	½”		¾”		1”		1 ¼”		1 ½”	
Flow GPM	Velocity FPS	Pressure Drop PSI	Velocity FPS	Pressure Drop PSI	*Velocity* FPS	Pressure Drop PSI	Velocity FPS	Pressure Drop PSI	Velocity FPS	Pressure Drop PSI
1	1.05	0.43	0.60	0.11	0.37	0.03				
2	2.11	1.55	1.2	0.39	0.74	0.12	0.43	0.03		
3	3.17	3.27	1.8	0.83	1.11	0.26	0.64	0.07	0.47	0.03
4	4.22	5.57	2.41	1.42	1.48	0.44	0.86	0.11	0.63	0.05
5	5.28	8.42	3.01	2.15	1.86	0.66	1.07	0.17	0.79	0.08
6	6.33	11.81	3.61	3.01	2.23	0.93	1.29	0.24	0.95	0.11
8	8.44	20.10	4.81	5.12	2.97	1.58	1.72	0.42	1.26	0.20
10	10.55	30.37	6.02	7.73	3.71	2.39	2.15	0.63	1.58	0.30
15			9.02	16.37	5.57	5.06	3.22	1.33	2.36	0.63
20					7.42	8.61	4.29	2.27	3.15	1.07
25					9.28	13.01	5.36	3.42	3.94	1.63
30					11.14	18.22	6.43	4.80	4.73	2.27
35							7.51	6.38	5.52	3.01
40							8.58	8.17	6.30	3.88
45							9.65	10.16	7.09	4.80
50							10.72	12.35	7.88	5.83
60									9.46	8.17
70									11.03	10.87

	2” pipe		2 ½” pipe		3” pipe		4” pipe		6” pipe	
Flow GPM	Velocity FPS	Pressure Drop PSI	Velocity FPS	Pressure Drop PSI	Velocity FPS	Pressure Drop PSI	Velocity FPS	Pressure Drop PSI	Velocity FPS	Pressure Drop PSI
6	0.57	0.03								
8	0.76	0.06	0.54	0.02						
10	0.96	0.09	0.67	0.04						
15	1.43	0.19	1.01	0.08	0.65	0.03				
20	1.91	0.32	1.34	0.13	0.87	0.05				
25	2.39	0.48	1.67	0.20	1.08	0.07				
30	2.87	0.67	2.01	0.28	1.30	0.10				
35	3.35	0.89	2.35	0.38	1.52	0.13	0.88	0.03		
40	3.82	1.14	2.64	0.48	1.73	0.17	1.01	0.04		
45	4.30	1.42	3.01	0.60	1.95	0.21	1.13	0.05		
50	4.78	1.73	3.35	0.73	2.17	0.25	1.26	0.07		
60	5.74	2.42	4.02	1.02	2.60	0.35	1.51	0.09		
70	6.69	3.22	4.69	1.36	3.04	0.47	1.76	0.12		
80	7.65	4.13	5.36	1.74	3.47	0.60	2.02	0.16		
90	8.60	5.13	6.03	2.16	3.91	0.75	2.27	0.20		
100	9.56	6.23	6.70	2.63	4.34	0.91	2.52	0.24	1.11	0.03
125	11.95	9.42	8.38	3.97	5.42	1.38	3.15	0.37	1.39	0.05
150			10.05	5.56	6.51	1.93	3.78	0.51	1.67	0.07
175					7.59	2.57	4.41	0.68	1.94	0.09
200					8.68	3.40	5.04	0.90	2.22	0.12


Geoflow GEO Control Panels

GEOFLOW
SUBSURFACE DRIP SYSTEMS

Follow the Slides

- Install Your Geoflow control Panel
- Wiring Diagrams
- Enter Field Settings)
- Basic Troubleshooting

Installing your Geoflow Control Panel

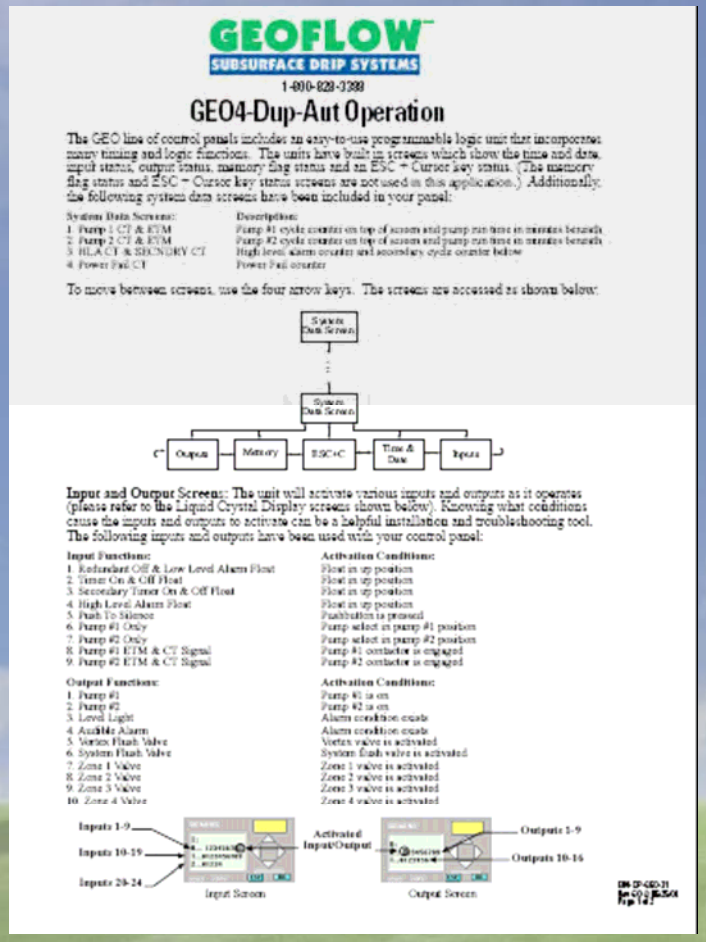
Step 1: Location, Location and Location…

- Easy to Access for installation & maintenance
- Ground panel

GEOFLOW
SUBSURFACE DRIP SYSTEMS

Installing your Geoflow Control Panel

Step 2: Read your Documentation (instructions & Diagrams)



GEOFLOW
SUBSURFACE DRIP SYSTEMS
1-800-828-3388

GEO4-Dup-Aut Operation

The GEO line of control panels includes an easy-to-use programmable logic unit that incorporates many timing and logic functions. The units have built in screens which show the time and date, input status, output status, memory flag status and an ESC + Cursor key status. (The memory flag status and ESC + Cursor key status screens are not used in this application.) Additionally, the following system data screens have been included in your panel:

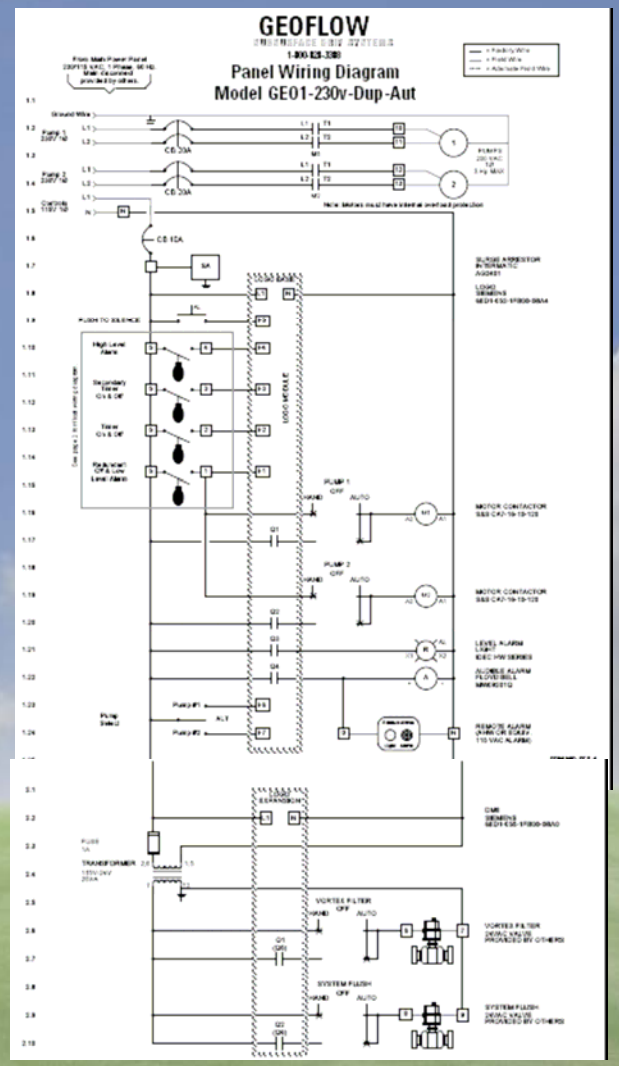
System Data Screens:	Descriptions:
1. Pump 1 CT & ETM	Pump #1 cycle counter on top of screen and pump run time in minutes beneath
2. Pump 2 CT & ETM	Pump #2 cycle counter on top of screen and pump run time in minutes beneath
3. HLA CT & SECONDRY CT	High level alarm counter and secondary cycle counter below
4. Power Fail CT	Power Fail counter

To move between screens, use the four arrow keys. The screens are accessed as shown below:

Input and Output Screens: The unit will activate various inputs and outputs as it operates (please refer to the Liquid Crystal Display screens shown below). Knowing what conditions cause the inputs and outputs to activate can be a helpful installation and troubleshooting tool. The following inputs and outputs have been used with your control panel:

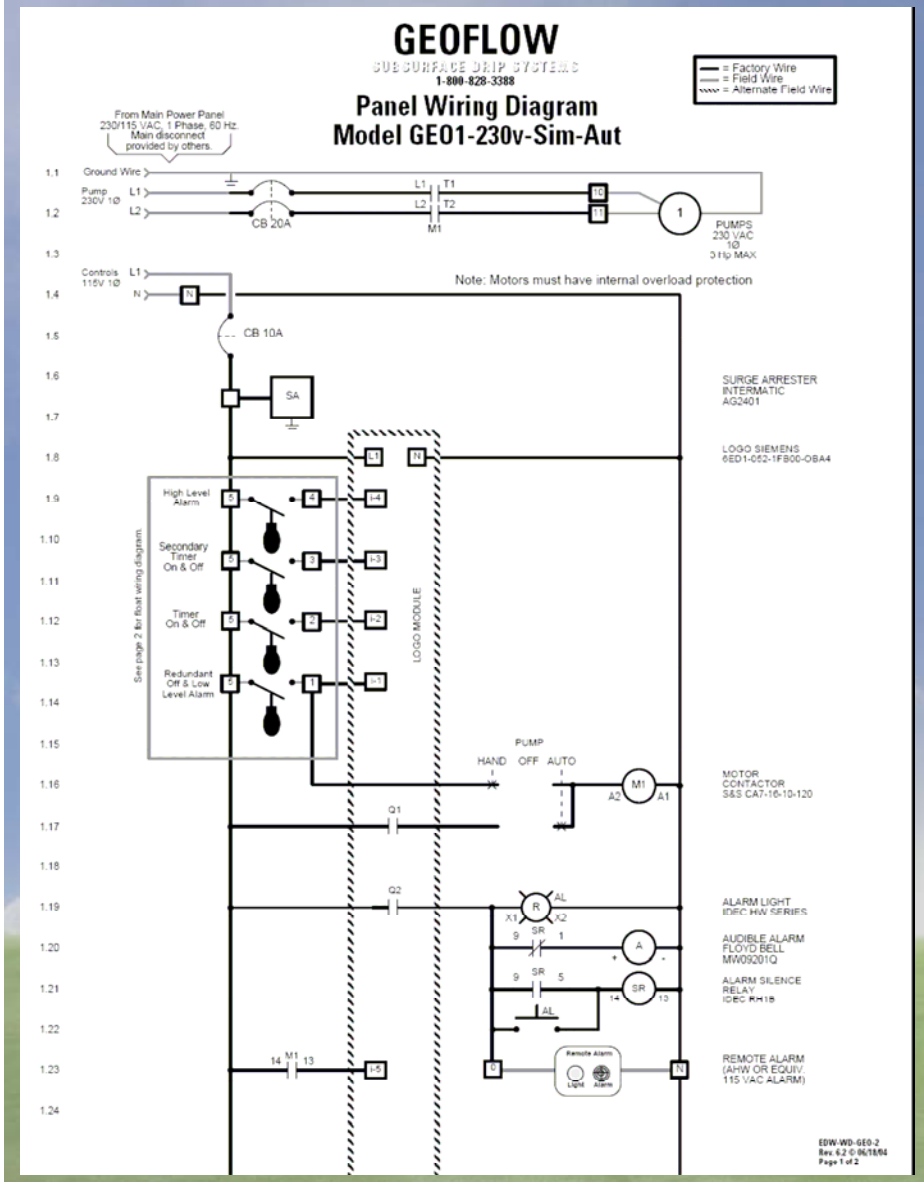
Input Functions:	Activation Conditions:
1. Redundant Off & Low Level Alarm Float	Float in up position
2. Timer On & Off Float	Float in up position
3. Secondary Timer On & Off Float	Float in up position
4. High Level Alarm Float	Float in up position
5. Push To Silence	Pushbutton is pressed
6. Pump #1 Only	Pump select in pump #1 position
7. Pump #2 Only	Pump select in pump #2 position
8. Pump #1 ETM & CT Signal	Pump #1 contactor is engaged
9. Pump #2 ETM & CT Signal	Pump #2 contactor is engaged

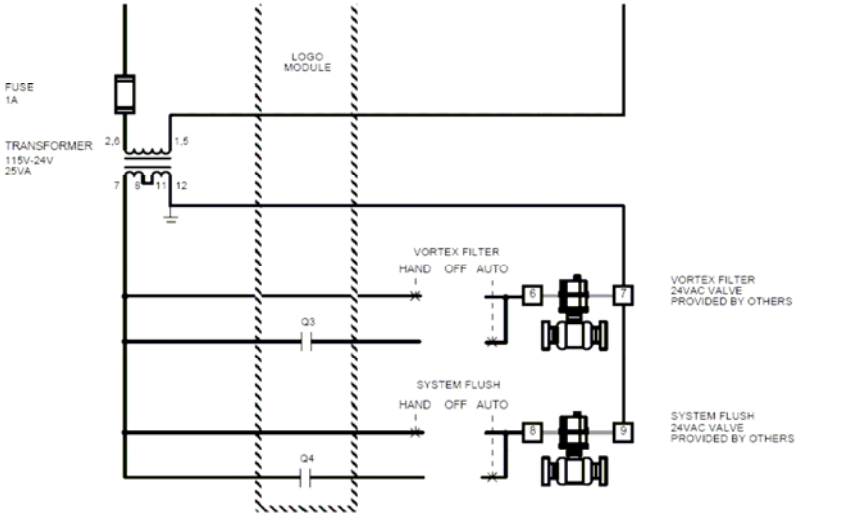
Output Functions:	Activation Conditions:
1. Pump #1	Pump #1 is on
2. Pump #2	Pump #2 is on
3. Level Light	Alarm condition exists
4. Audible Alarm	Alarm condition exists
5. Vortex Flush Valve	Vortex valve is activated
6. System Flush Valve	System flush valve is activated
7. Zone 1 Valve	Zone 1 valve is activated
8. Zone 2 Valve	Zone 2 valve is activated
9. Zone 3 Valve	Zone 3 valve is activated
10. Zone 4 Valve	Zone 4 valve is activated

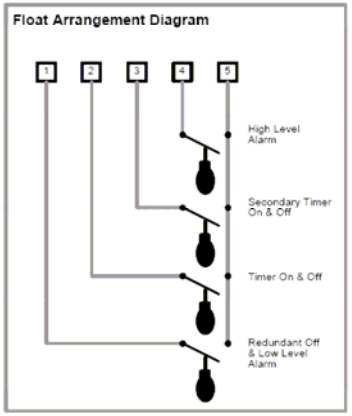


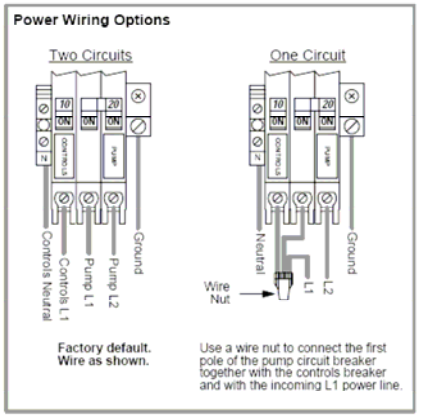
GEOFLOW
SUBSURFACE DRIP SYSTEMS

Installing your Geoflow Control Panel









Installing your Geoflow Control Panel

Step 3: Run your field wires and Identify them

Color wire

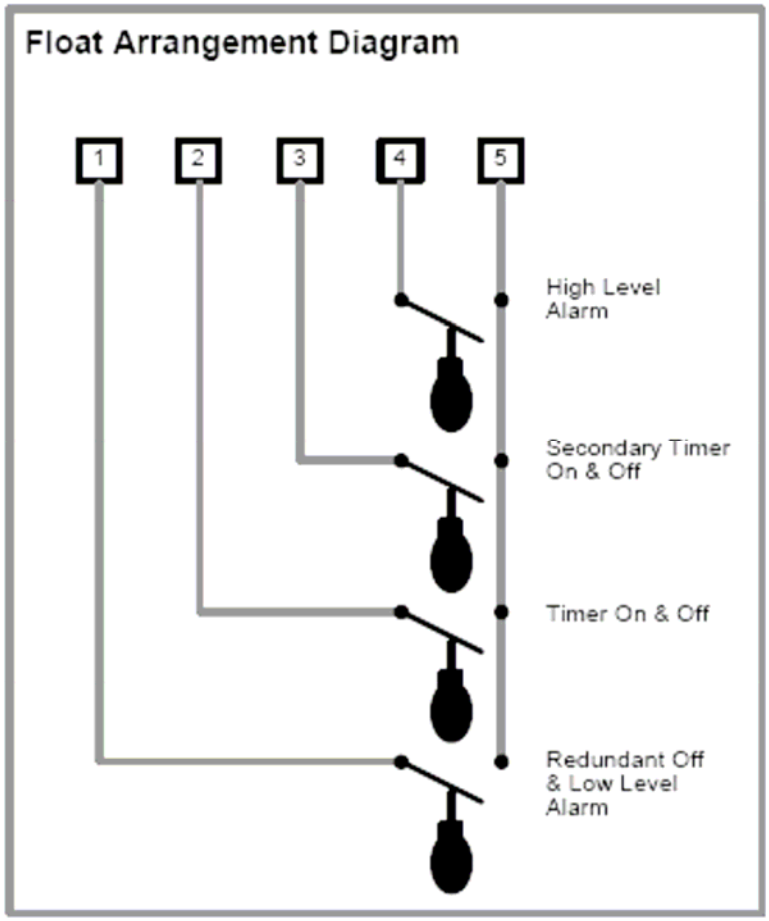
Good

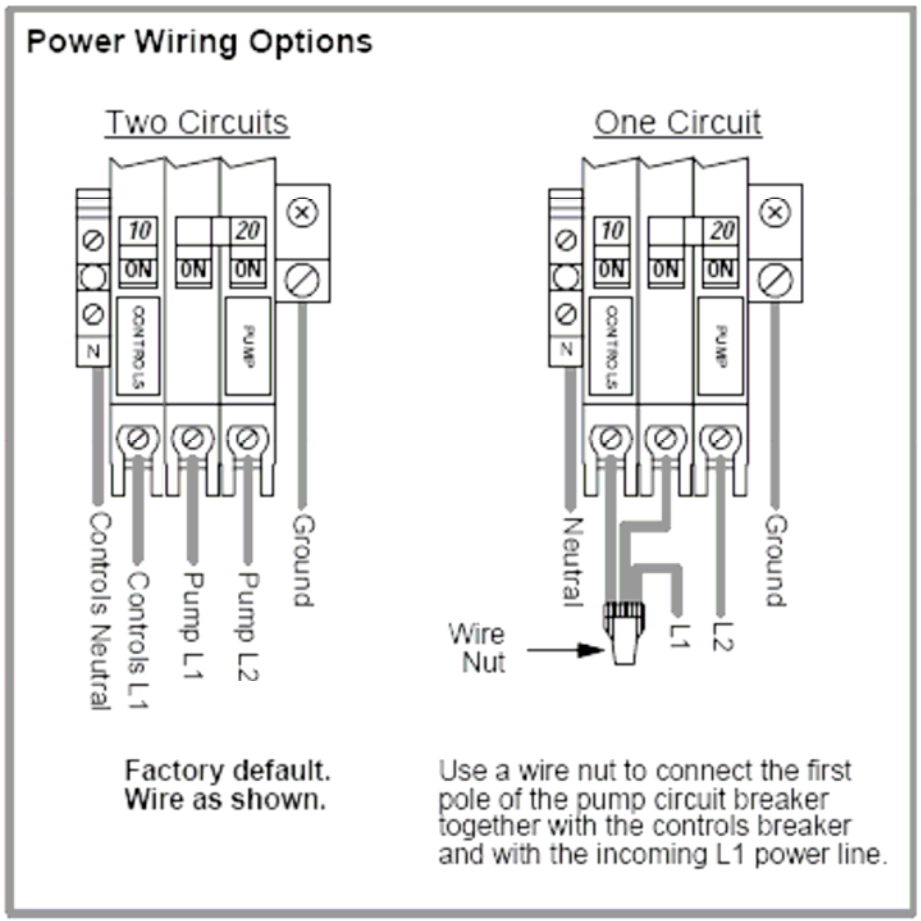
Numbered Wire

Better

GEOFLOW
SUBSURFACE DRIP SYSTEMS

Installing your Geoflow Control Panel





GEOFLOW
SUBSURFACE DRIP SYSTEMS

Installing your Geoflow Control Panel

- **Wire Sizing**

Figure 1. Recommended Breaker & Wire Size

Pump Motor Size	Breaker size	Wire Size	Max Distance*
115 VAC 1/3 hp	20 amp	12 AWG	210 ft
1/2 hp	20 amp	12 AWG	160 ft
230 VAC 1/2 hp	15 amp	14 AWG	400 ft
1 hp	20 amp	12 AWG	400 ft
1 1/2 hp	20 amp	12 AWG	310 ft

* This is the maximum distance from the main power panel to the pump motor for the recommended wire size. If actual distance is greater than the listed maximum, or more than one pump is on the circuit, then a larger gauge of wire must be used. If the actual distance is close to the maximum distance, then it is recommended that the next larger gauge wire be used.

GEOFLOW
SUBSURFACE DRIP SYSTEMS

Installing your Geoflow Control Panel

- **Wire Sizing**

Wire Sizing Chart 24 Volt System

Maximum one-way distance (feet) for 5% voltage loss in 24 volt systems. Wire Size (AWG)

Amps	14	12	10	8	6	4	2	1	0	00	000	0000
1	213	338	537	854	1359	2160	3434	4332	5460	6887	8684	10951
2	106	169	269	427	679	1080	1717	2166	2730	3444	4342	5475
4	53	85	134	214	340	540	859	1083	1365	1722	2171	2738
6	35	56	90	142	226	360	572	722	910	1148	1447	1825
8	27	42	67	107	170	270	429	542	682	861	1086	1369
10	21	34	54	85	136	216	343	433	546	689	868	1095
15	14	23	36	57	91	144	229	289	364	459	579	730
20	–	17	27	43	68	108	172	217	273	344	434	548
25	–	–	21	34	54	86	137	173	218	275	347	438
30	–	–	18	28	45	72	114	144	182	230	289	365
35	–	–	–	24	39	62	98	124	156	197	248	313
40	–	–	–	–	34	54	86	108	136	172	217	274
45	–	–	–	–	30	48	76	96	121	153	193	243
50	–	–	–	–	27	43	69	87	109	138	174	219

GEOFLOW
SUBSURFACE DRIP SYSTEMS

Enter Field Settings

DATE AND TIME SCREEN IS HOME BASE

GEOFLOW
SUBSURFACE DRIP SYSTEMS

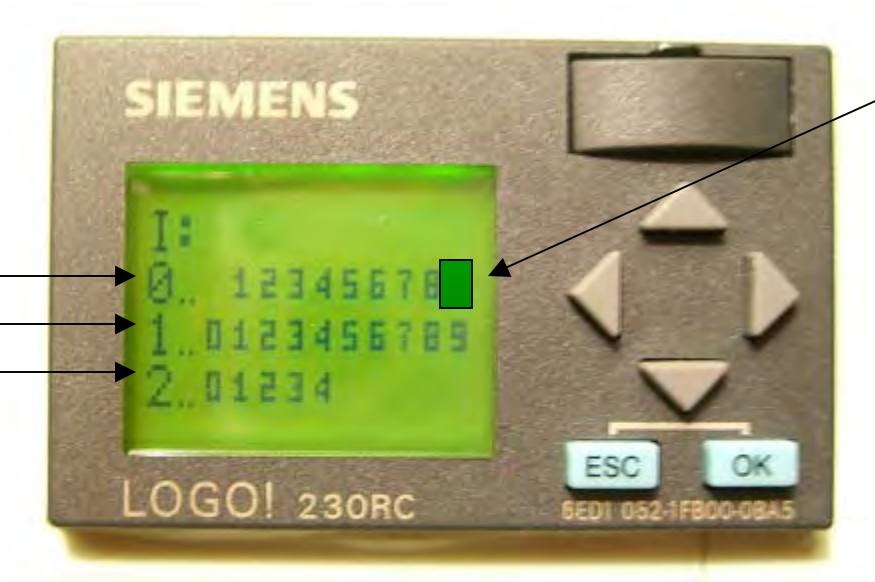
Enter Field Settings

>>

- **Press “ >” (Right Arrow Key)**

GEOFLOW
SUBSURFACE DRIP SYSTEMS

Field Settings
I = Input Screen



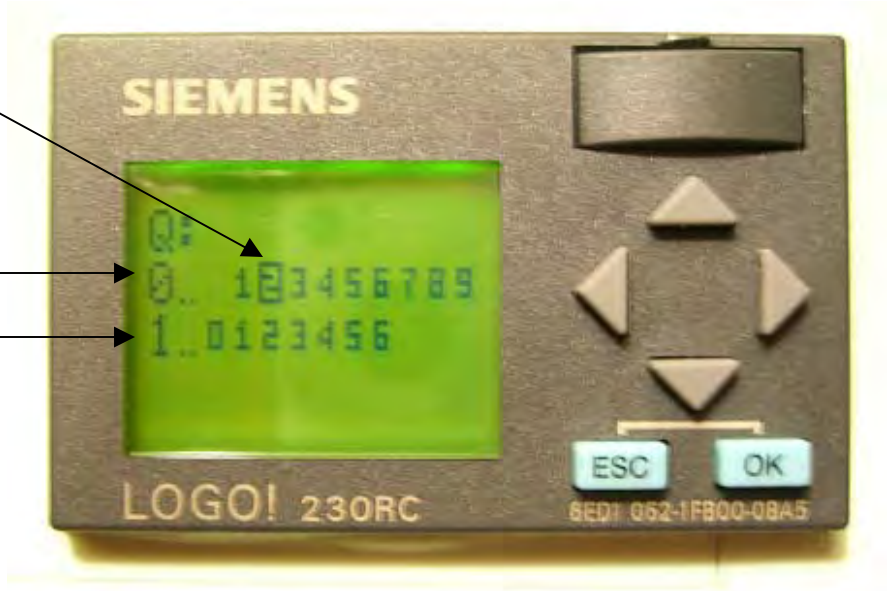
>>

LOGO Input Screen	Activation Condition
1 = Low Water Alarm float	Float up
2 = Primary Timer on & off float	Float up
3 = Secondary Timer on & off float	Float up
4 = High Water Alarm float	Float up

GEOFLOW
SUBSURFACE DRIP SYSTEMS

Field Settings
Q = Output Screen

If highlighted, Output is activated



Output 1-9
Output 10-16

>>

LOGO Output Screen	Conditions for Activation
1 = Pump	Pump is on
2 = General alarm	Alarm condition exists
3 = Filter flush	Filter flush valve is activated
4 = Dripfield flush	Dripfield flush valve is activated

GEOFLOW
SUBSURFACE DRIP SYSTEMS

Enter Field Settings

- **Everyone go back to home Base (<<,<<,)**

Lets start Entering Field Data Press “ESC” (Escape)

GEOFLOW
SUBSURFACE DRIP SYSTEMS

Enter Field Settings

Use the down key Select
“Set Param” press “OK” to enter

GEOFLOW
SUBSURFACE DRIP SYSTEMS

Enter Field Settings

Off Time

T = Primary Off Timer (Pump rest time between doses).
Ta = Elapsed time for cycle currently in progress. Not programmable

NOTE
01:55h = HH:MM
01:55m = MM:SS
01:55s = SS:1/10s

To change settings press “ok” and use directional < > to navigate
Use Up and Down to Increase and Decrease value.
Press “ok” When desired changes are made.

Primary off time varies for each drip site. Please check the design provided.

GEOFLOW
SUBSURFACE DRIP SYSTEMS

Enter Field Settings

On Time

T = Primary On Timer (Pump run time or Dose Time)
Ta = Elapsed time for cycle currently in progress. Not programmable.

NOTE
01:55h = HH:MM
01:55m = MM:SS
01:55s = SS:1/10s

To change settings press “ok” and use directional < > to navigate
Use Up and Down to Increase and Decrease value.
Press “ok” When desired changes are made.

Primary On time varies for each drip site. Please check the design provided.

GEOFLOW
SUBSURFACE DRIP SYSTEMS

Enter Field Settings

Off Time 2

T = Secondary/ Override Off Timer (Rest Time between Dose's when 3rd float is up and timer is in override mode)
Ta = Elapsed time for cycle currently in progress. Not programmable

NOTE
01:55h = HH:MM
01:55m = MM:SS
01:55s = SS:1/10s

To change settings press "ok" and use directional < > to navigate
Use Up and Down to Increase and Decrease value.
Press "ok" When desired changes are made.

Secondary Off time varies for each site. Usually half of Primary Rest Time

GEOFLOW
SUBSURFACE DRIP SYSTEMS

Enter Field Settings

On Time 2

T = Secondary/ Override On Timer (Dose Time when 3rd float is up and timer is in override mode)
Elapsed time for cycle currently in progress. Not programmable

NOTE
01:55h = HH:MM
01:55m = MM:SS
01:55s = SS:1/10s

To change settings press “ok” and use directional < > to navigate
Use Up and Down to Increase and Decrease value.
Press “ok” When desired changes are made.

Secondary On time varies for each drip site. If secondary off time is half of primary off time, then secondary on time is the same as primary on time

GEOFLOW
SUBSURFACE DRIP SYSTEMS

Enter Field Settings

Filter Flush

T = Filter Flush Time Settings (amount of time the filter will flush for)
Ta = Elapsed time for cycle currently in progress. Not programmable

NOTE
01:55h = HH:MM
01:55m = MM:SS
01:55s = SS:1/10s

To change settings press “ok” and use directional < > to navigate
Use Up and Down to Increase and Decrease value.
Press “ok” When desired changes are made.
Usually set between 15 seconds and 1 minute

GEOFLOW
SUBSURFACE DRIP SYSTEMS

Enter Field Settings

Pump Delay

T = Pump Delay Time (Primary Float De-bounce timer)
Ta = Elapsed time for cycle currently in progress. Not programmable

NOTE
01:55h = HH:MM
01:55m = MM:SS
01:55s = SS:1/10s

To change settings press “ok” and use directional < > to navigate
Use Up and Down to Increase and Decrease value.
Press “ok” When desired changes are made.
Usually not changed in field from factory setting

GEOFLOW
SUBSURFACE DRIP SYSTEMS

Enter Field Settings

Drain Timer

T = Drain Timer (Opens valves to drain system at the end of each cycle)
Ta = Elapsed time for cycle currently in progress. Not programmable

NOTE
01:55h = HH:MM
01:55m = MM:SS
01:55s = SS:1/10s

To change settings press “ok” and use directional < > to navigate
Use Up and Down to Increase and Decrease value.
Press “ok” When desired changes are made.

If system is not required to drain at the end of each dose, i.e. non-freezing conditions, then set to 1 second (00:01).

GEOFLOW
SUBSURFACE DRIP SYSTEMS

Enter Field Settings

Field Flush

T = Field Flush Timer (Drip field flush)
Ta = Elapsed time for cycle currently in progress. Not programmable

NOTE
01:55h = HH:MM
01:55m = MM:SS
01:55s = SS:1/10s

To change settings press “ok” and use directional < > to navigate
Use Up and Down to Increase and Decrease value.
Press “ok” When desired changes are made.

GEOFLOW
SUBSURFACE DRIP SYSTEMS

Enter Field Settings

Flush Cycle Counter

On = Frequency of Cycles between Flushing
Cnt = Number of counts it has left to next flush

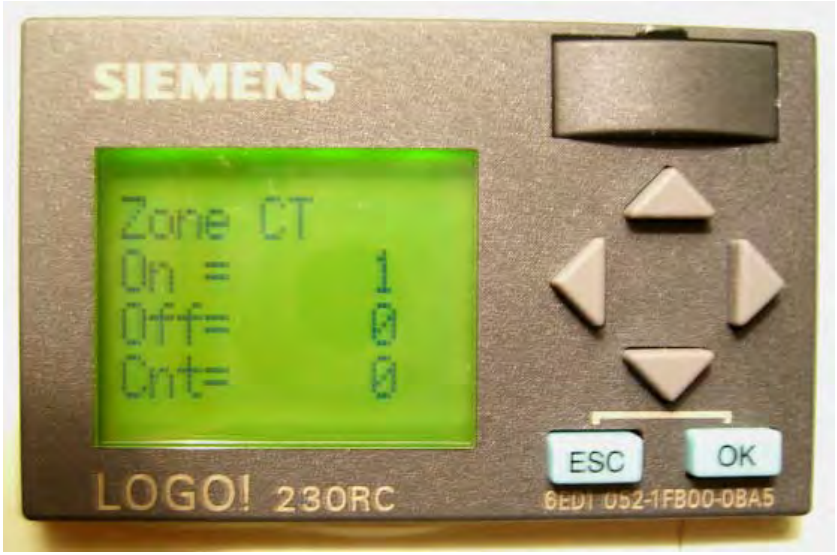
To change settings press “ok” and use directional < > to navigate
Use Up and Down to Increase and Decrease value.
Press “ok” When desired changes are made.

GEOFLOW
SUBSURFACE DRIP SYSTEMS

Enter Field Settings

Zone Count

On = Number of zones serviced by this controller so each zone is flushed. With a Geo1 the default is 1, but if using an index (hydraulic) valve, this number should be changed to reflect the number of zones after the index valve



To change settings press “ok” and use directional < > to navigate
Use Up and Down to Increase and Decrease value.
Press “ok” When desired changes are made.

Field Settings Completed Press “ESC”

GEOFLOW
SUBSURFACE DRIP SYSTEMS

Timers and Counter in Geoflow Controllers

Block Names	Description	Factory Default	Time Range	Block Type
Off Time	Primary timer off	1 hr 55 min	HH:MM	Timer
On Time	Primary timer on	5 min	MM:SS	Timer
Off Time 2	Secondary timer off	55 min	HH:MM	Timer
On Time 2	Secondary timer on	5 min	MM:SS	Timer
FltrFlsh	Filter flush timer	15 sec	MM:SS	Timer
PmpDlyTm	Pump off delay	5 sec	MM:SS	Timer
DrainTmr*	System drain Timer	5 min	MM:SS	Timer
FlshTmr	System flush timer	5 min	MM:SS	Timer
Flsh CT	System flush counter	10 cycles		Counter
Zone CT	System zone counter	1 zone		Counter

* Set to 00:01 (1 second) if there is no risk of freezing

GEOFLOW
SUBSURFACE DRIP SYSTEMS

Entering Time & Date

Use the down key Select
“Set..” press “OK” to enter

GEOFLOW
SUBSURFACE DRIP SYSTEMS

Entering Time & Date

Use the down key Select
“Clock” press “OK” to enter

GEOFLOW
SUBSURFACE DRIP SYSTEMS

Entering Time & Date

To change settings press “ok” and use directional < > to navigate
Use Up and Down to Increase and Decrease value.
Push right arrow to get to year.
Press “ok” When desired changes are made.

GEOFLOW
SUBSURFACE DRIP SYSTEMS

Entering Time & Date

Use the ESC to Return to the Main Menu

GEOFLOW
SUBSURFACE DRIP SYSTEMS

Field Settings Complete.

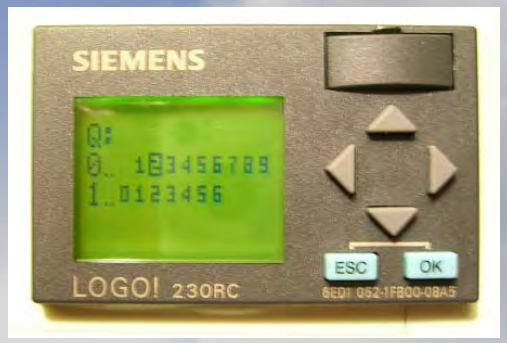
Use the “ESC” key Select
To Exit Screen

GEOFLOW
SUBSURFACE DRIP SYSTEMS

Basic Trouble Shooting

Tools OF the Trade

- Volt Meter with amp Probe and Ohms settings.
- Wiring Diagram Of Panel
- Jumper Wire
- Input/Output Screen of your PLC
- Set of eye balls

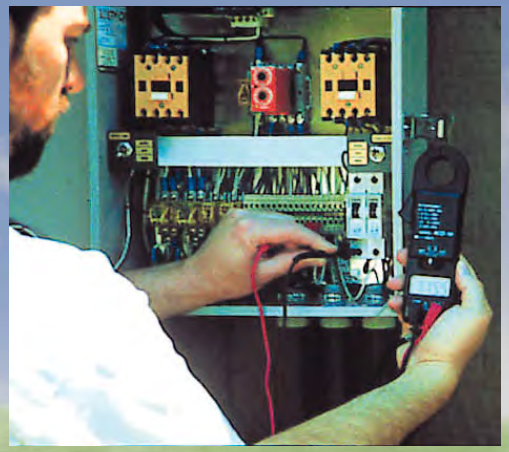


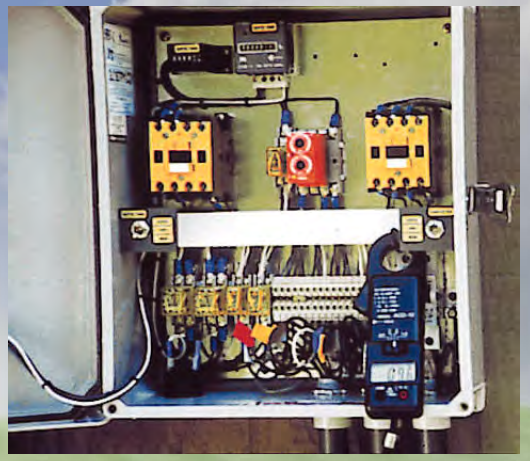
The above is the bailing wire and duct tape of Control Panels

GEOFLOW
SUBSURFACE DRIP SYSTEMS

Basic Trouble Shooting

- Open Pump Chamber and compare Floats with PLC Inputs lights
- Use HOA switches to determent if equipment is working
- Use amp Probe to confirm Signals, Current & Amps on field Equipment
- Check continuity Between I/O and Panel Components.

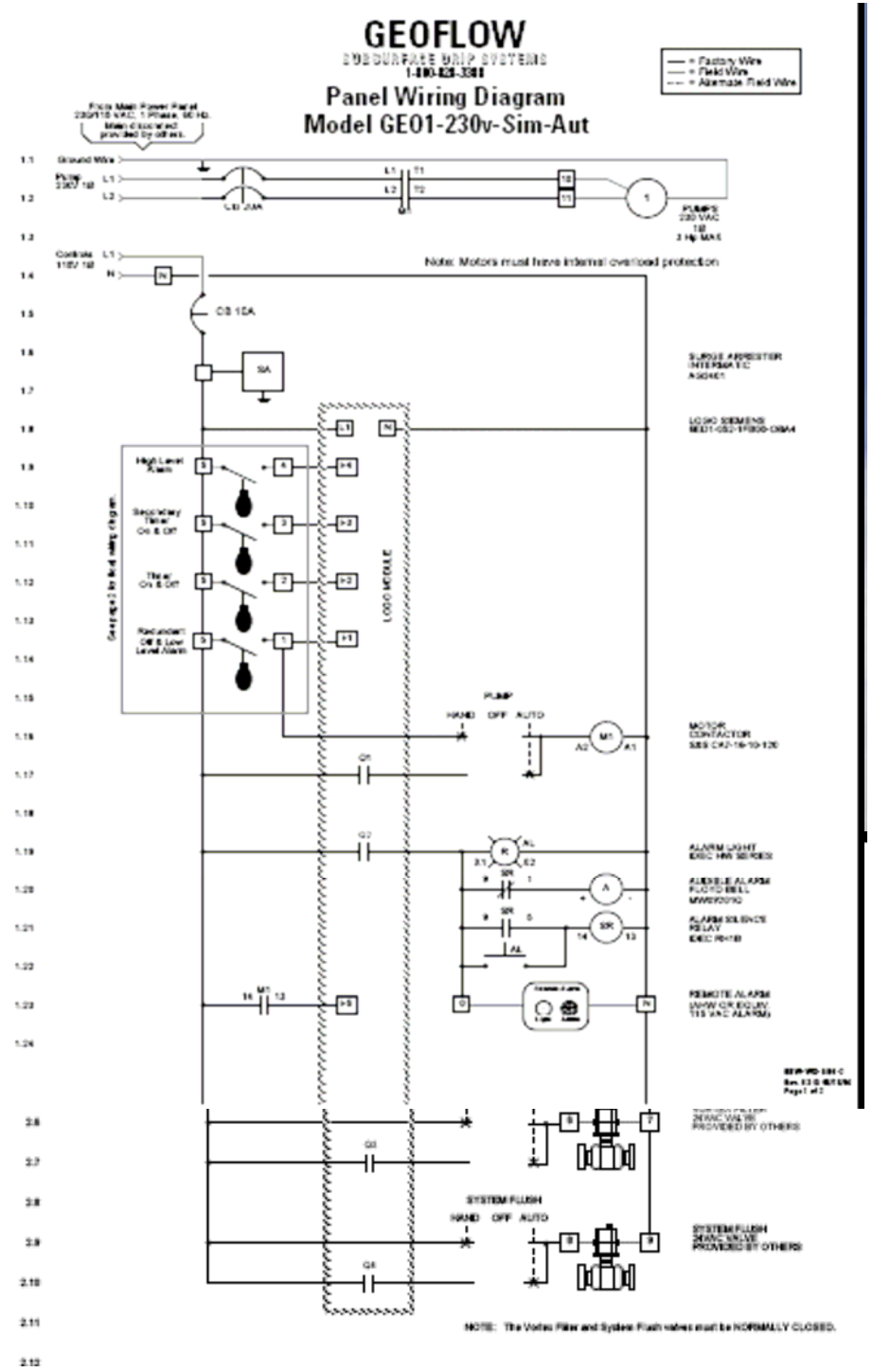




GEOFLOW
SUBSURFACE DRIP SYSTEMS

- Use wiring Diagram to locate possible Cause
- Call For Technical Support
- Turn off power for 10 Seconds
- ~~Whack it with your shoe…~~.

GEOFLOW
SUBSURFACE DRIP SYSTEMS



APPENDIX I

GREASE INTERCEPTOR DETAILS AND SPECIFICATIONS

APPENDIX J

BORING LOGS

APPENDIX K
REFERENCES

References

County of Riverside, Community Health Agency, Department of Environmental Health, *Onsite Wastewater Treatment Systems, Technical Guidance Manual*, Version A, undated.

County of Riverside, Department of Environmental Health, Environmental Protection and Oversight Division, Land Use and Water Resources Program, 2016, *Local Agency Management Program for Onsite Wastewater Treatment Systems,* dated October 5.

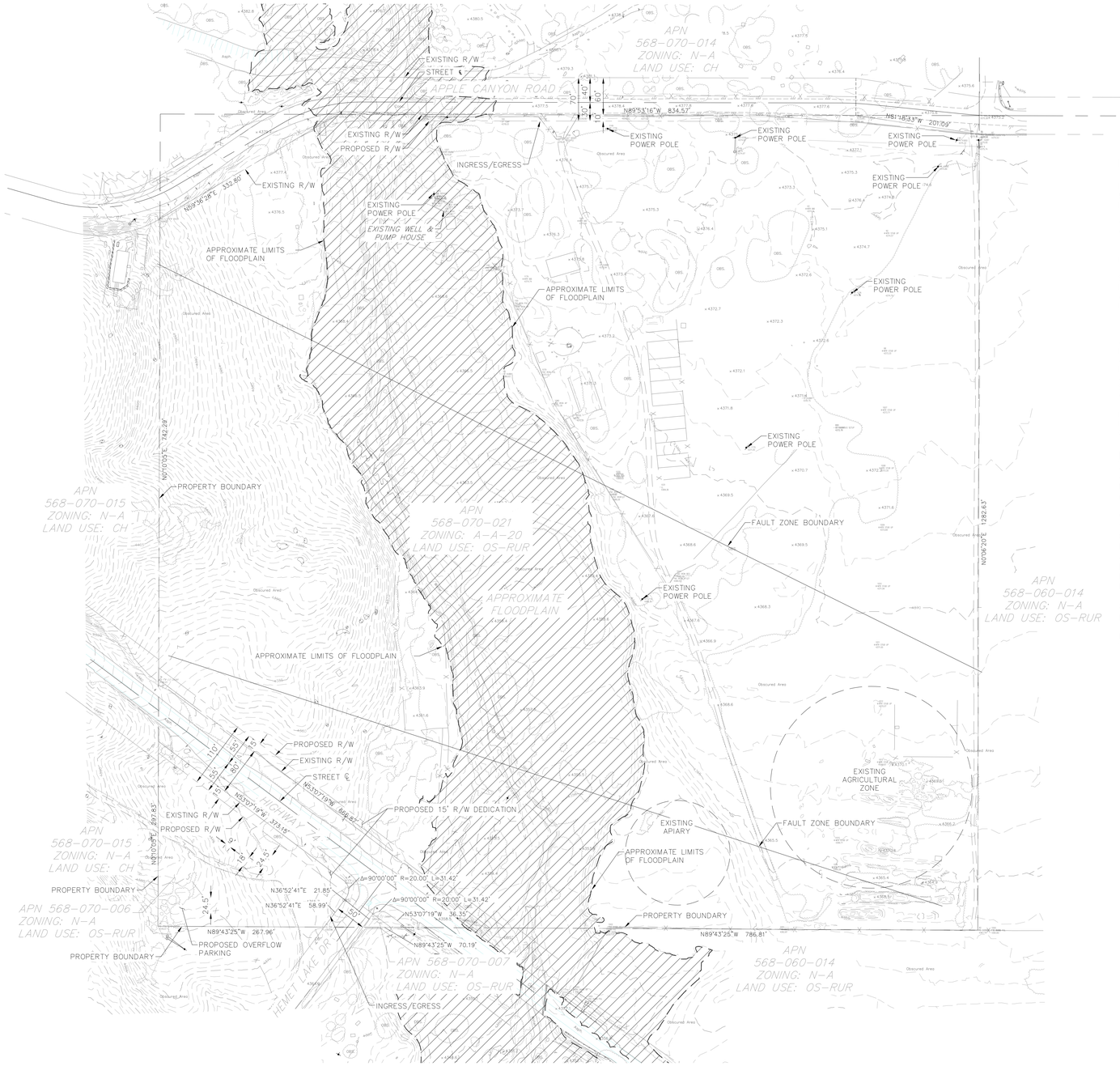
Geoflow Subsurface Drip Systems, 2007, *Design Installation and Maintenance Guidelines*, Version 2, October.

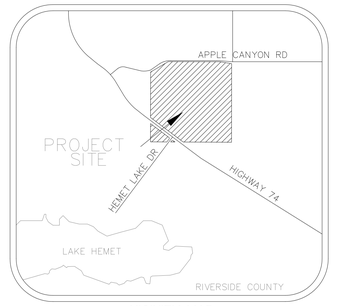
Delta. 2020, Treatment Systems An Infiltrator Water Technologies Company, Model, DELTA ECOPOD E800D STANDARD DESIGN FOR BOD REDUCTION.

State Water Resources Control Board, Regional Water Quality Control Boards, OWTS Policy. 2012, Water Quality Control Policy for Siting, Design, Operation, and Maintenance of Onsite Wastewater Treatment Systems, June 19,

Petra Geosciences, Inc. 2020, The Ridge Wellness Center, Lake Hemet California, Figure 1, Perc Test Location Map, Dated September.

COUNTY OF RIVERSIDE C.U.P.
THE RIDGE
56475 APPLE CANYON ROAD MOUNTAIN CENTER, CA
SECTION 4, TOWNSHIP 6 SOUTH, RANGE 3 EAST





VICINITY MAP
NO SCALE

PROJECT DESCRIPTION

THE RIDGE WELLNESS PROPOSES AN ECO-CONSCIOUS PRIVATE GUEST RANCH ON 36.11 ACRES (APN 568-070-021) LOCATED AT 56475 APPLE CANYON ROAD, MOUNTAIN CENTER IN THE COUNTY OF RIVERSIDE. THE PROJECT SITE WILL RETAIN ALL THE NATURAL VEGETATION AND ALL THE EXISTING LARGE PINE TREES WITHIN ITS DESIGNS.

THE RIDGE WILL BE DESIGNED TO FACILITATE A FULL IMMERSION NATURE EXPERIENCE IN MOUNTAIN CENTER. THE RANCH WILL OFFER A VARIETY OF SELF-DEVELOPMENT THERAPIES AND EXTENSIVE RECREATIONAL ACTIVITIES. IN ADDITION, GUESTS WILL BE ABLE TO PARTICIPATE IN CULTURAL AND ENVIRONMENTAL EDUCATIONAL ACTIVITIES AS PART OF THE EXPERIENCE AT THE RANCH.

THE PROJECT PROPOSES TO CONSTRUCT GUEST CABINS AND GUEST TENTS, WELLNESS CABINS, WELLNESS BASECAMP, ACTIVITY HUB WITH LAP POOL, DINING AREA, AND HEALTH-FOCUSED COMMERCIAL KITCHEN. EXISTING LARGE AGRICULTURAL SITE AND WORKING GREENHOUSE, APIARY AND FRUIT TREES WILL CONTRIBUTE TO A FULLY SUSTAINABLE FACILITY FOR GUESTS TO USE AND ENJOY WITHIN THE NATURAL SETTING OF THE PROPERTY.

PLEASE REVIEW OUR DETAILED PROJECT DESCRIPTION & RECREATIONAL ACTIVITIES EXHIBIT FOR A FULL SUMMARY OF THE THIS UNIQUE SUSTAINABLE PROJECT.

ENGINEER/REPRESENTATIVE

JLC ENGINEERING & CONSULTING, INC.
41660 IVY STREET, SUITE D
MURRIETA, CALIFORNIA 92562
(951)-304-9552

OWNER/APPLICANT

THE RIDGE
8407 WYNDHAM ROAD
LOS ANGELES, CA 90046
ATT: CAROLINE LEGRAND
PHONE: (310) 666-3623
EMAIL:
LEGRAND.CAROLINE@GOOGLEMAIL.COM

SCHOOL DISTRICTS

HEMET UNIFIED

UTILITIES:

CABLE T.V.:	DIRECT TV 1-(855)-842-4388
ELECTRIC:	ANZA ELECTRIC COOPERATIVE, INC 1-(951)-763-4333
GAS:	PROPANE ON SITE
SEWER:	ATU SEPTIC ON SITE
WATER:	WELL ON SITE
INTERNET:	FRONTIER 1-(800)-921-8101 VERIZON 1-(800)-225-5499

LAND AREA

36.11 AC GROSS

TOPOGRAPHY

INLAND AERIAL SURVEYS, INC.
7117 ARLINGTON AVENUE SUITE A
RIVERSIDE, CA 92503
PHONE: (951) 687 - 4252
DATED: 07-13-2020

LEGAL DISCRIPTION

THE SOUTHEAST QUARTER OF THE SOUTHWEST QUARTER OF SECTION 4, TOWNSHIP 6 SOUTH, RANGE 3 EAST, SAN BERNARDINO BASE AND MERIDIAN, AS SHOWN BY UNITED STATES GOVERNMENT SURVEY.

EXCEPTING THEREFROM ANY PORTION THEREOF LYING WITHIN STATE HIGHWAY 74, LAKE HEMET DRIVE AND APPLE CANYON ROAD;

ALSO EXCEPTING THEREFROM THAT PORTION CONVEYED TO THE COUNTY OF RIVERSIDE BY DEED RECORDED NOVEMBER 8, 1955 IN BOOK 1817 PAGE 296 OF OFFICIAL RECORDS OF RIVERSIDE COUNTY, CALIFORNIA.

GENERAL NOTES:

1. ASSESSORS PARCEL NOS.: 568-070-021

2. CURRENT ZONING: A-1-20 (LIGHT AGRICULTURE),
N-A (NATURAL ASSETS)

3. PROPOSED ZONING: N-A (NATURAL ASSETS)

4. SURROUNDING ZONING:
NORTH - M-SC
SOUTH - M-SC
WEST - M-SC
EAST - M-SC

5. ADJACENT GENERAL PLAN LAND USE: NOT IN A GENERAL PLAN POLICY OVERLAY AREA.

6. EXISTING GENERAL PLAN LAND USE: OS-RUR (OPEN SPACE-RURAL)

7. PROPOSED GENERAL PLAN LAND USE: OS-RUR (OPEN SPACE-RURAL)

8. PUBLIC STREET IMPROVEMENTS: PER COUNTY OF RIVERSIDE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION.

9. SUBSURFACE SEPTIC DISPOSAL PROPOSED.

BASIS OF BEARINGS

THE BASIS OF BEARINGS FOR THIS SURVEY IS THE CALIFORNIA STATE PLANE COORDINATE SYSTEM, CCS83, ZONE 6, BASED LOCALLY ON CONTROL STATIONS "DSSC" AND "P584", NAD 83 (NSRS2011) AS SHOWN HEREON. ALL BEARINGS SHOWN ON THIS MAP ARE GRID. QUOTED BEARINGS AND DISTANCES FROM REFERENCE MAPS OR DEEDS ARE AS SHOWN PER THAT RECORD REFERENCE. ALL DISTANCES SHOWN ARE GROUND DISTANCES UNLESS SPECIFIED OTHERWISE. GRID DISTANCES, MAY BE OBTAINED BY MULTIPLYING THE GROUND DISTANCE BY A COMBINATION FACTOR OF 0.999767615. CALCULATIONS ARE MADE AT POINT #1 WITH COORDINATES OF N:2189110.605, E:6431632.718, USING AN ELEVATION OF 4367.894 FEET. THE CONVERGENCE ANGLE AT POINT #1 IS -000°14'05.51".

PROJECT BENCHMARK

RIVERSIDE COUNTY BM #I-30
ELEVATION = 4444.129' (NGVD 29)

NORTHWEST ALONG HIGHWAY 74 TOWARD MOUNTAIN CENTER TO THE "I" INTERSECTION OF MCCALL PARK ROAD AND HIGHWAY 74, 220.0 FEET NORTH OF THE INTERSECTION ALONG MCCALL PARK ROAD, 12.0 FEET EAST OF THE CENTERLINE OF MCCALL PARK ROAD, NEAR AN ANGLE POINT IN A FENCE LINE.

EARTHWORK QUANTITY ESTIMATE

CUT: 20,500 CY FILL: 20,500 CY

SHEET INDEX

WASTE DISPOSAL SYSTEM

ONSITE ATU SEPTIC SYSTEM

ONSITE WATER NOTE

WATER FOR DOMESTIC, IRRIGATION, AND FIRE USES SHALL BE PROVIDED BY ONSITE WELLS.

THE PRIVATE ENGINEER SIGNING THESE PLANS IS RESPONSIBLE FOR ASSURING THE ACCURACY AND ACCEPTIBILITY OF THE DESIGN HEREON. IN THE EVENT OF DISCREPANCIES AFTER COUNTY APPROVAL OR DURING CONSTRUCTION, THE PRIVATE ENGINEER SHALL BE RESPONSIBLE FOR DETERMINING AN ACCEPTABLE SOLUTION AND REVISING THE PLANS FOR APPROVAL BY THE COUNTY.

WORK CONTAINED WITHIN THESE PLANS SHALL NOT COMMENCE UNTIL AN ENCROACHMENT PERMIT AND/OR GRADING PERMIT HAS BEEN ISSUED.

OFFICEUNTITLED ARCHITECT OF RECORD
4200 SEPULVEDA BLVD. STE 104, CULVER CITY, CA 90230
P.310.730.6698

MANUEL CERVANTES ESTUDIO DESIGN ARCHITECT PASEO DE LAS PALMAS, 829 5TO PISO COL. LOMAS DE CHAPULTEPEC, CDMX P.52.1.55.5291.3508
HOLMES STRUCTURES STRUCTURAL ENGINEER 523 WEST 6TH ST, STE 1123 LOS ANGELES, CA 90014 P.213.481.5638
INTEGRAL GROUP MEP ENGINEER 15760 VENTURA BLVD, STE 1902 ENCINO, CA 91436 P.323.825.9655
ALHAMBRA GROUP LANDSCAPE ARCHITECT 41635 ENTERPRISE CIRCLE N. STE. C TEMECULA, CA 92591 P.951.269.6802
JLC ENGINEERING CIVIL ENGINEER 41660 IVY STREET, STE A MURRIETA, CA 92562 P.951.304.9552

THE RIDGE
56475 APPLE CANYON ROAD IDULLWILD, CA 92549

OU PROJECT NO: 21.010.000

#	DESCRIPTION	DATE
1	Revision 1	Date 1

SCALE:
1 inch = 50 ft.

NORTH

TITLE SHEET-EXISTING SITE

C01.00

APPLE CANYON ROAD

N89°53'16"W 834.57'

N81°18'33"W 201.09'

N59°36'28"E 332.80'

N0°10'05"E 742.29'

N0°06'20"E 1282.63'

TRASH ENCLOSURE

PARKING AREA 1

PARKING AREA 2

EXISTING WELL & PUMP HOUSE

DELIVERY & LOADING ZONE

GREEN HOUSE

MECHANICAL YARD

MANUFACTURED, PERMANENT TENT STRUCTURES ON RAISED PLATFORMS

PRE-ARRIVAL

MECHANICAL YARD

WELLNESS CABINS

ADMIN & STORAGE

ARRIVAL & LOUNGE

COMMERCIAL KITCHEN

CONNECT STRUCTURE

DINNING

APN
568-070-021
ZONING: A-A-20
LAND USE: OS-RUR

WELLNESS BASECAMP

MECHANICAL YARD

GUEST CABINS ZONE "C"

OUTDOOR FIRE PIT

APPROXIMATE FLOODPLAIN

ACTIVITY HUB

GUEST CABINS ZONE "A"

GUEST CABINS ZONE "B"

SELF RETAINING BASIN 2

BASIN 1

REMOVE GATE

Obscured Area

Conc.

Asph.

Water

MATCH LINE SEE SHEET 3

OFFICEUNTITLED — ARCHITECT OF RECORD
4200 SEPULVEDA BLVD, STE 104, CULVER CITY, CA 90230
P.310.730.6698

MANUEL CERVANTES ESTUDIO DESIGN ARCHITECT *PASEO DE LAS PALMAS, 820 5TO PISO COL. LOMAS DE CHAPULITEPEC, CDMX P.52.1.55.5201.3508*
HOLMES STRUCTURES STRUCTURAL ENGINEER *523 WEST 6TH ST, STE 1122 LOS ANGELES, CA 90014 P.213.481.5630*
INTEGRAL GROUP MEP ENGINEER *15760 VENTURA BLVD, STE 1902 ENCINO, CA 91436 P.323.825.9955*
ALHAMBRA GROUP LANDSCAPE ARCHITECT *41635 ENTERPRISE CIRCLE N. STE. C TEMECULA, CA 92591 P.951.269.6802*
JLC ENGINEERING CIVIL ENGINEER *41660 IVY STREET, STE A MURRIETA, CA 92562 P.951.304.9552*

THE RIDGE
56475 APPLE CANYON ROAD IDULLWILD, CA 92549

OU PROJECT NO: 21.010.000

#	DESCRIPTION	DATE
1	Revision 1	Date 1

SCALE: 1 inch = 40 ft.

NORTH

PROPOSED SITE PLAN

C02.00

MATCH LINE SEE SHEET 2

APN
568-070-021
ZONING: A-A-20
LAND USE: OS-RUR

APPROXIMATE FLOODPLAIN

GUEST CABINS ZONE "A"

GUEST CABINS ZONE "B"

SELF RETAINING BASIN 2

BASIN 1

REMOVE GATE

ATU SEWER AERATION AREA=21,000 SF

ATU SEWER EXPANSION AREA=21,000 SF

PERMACULTURE

EXISTING AGRICULTURAL ZONE

COMPOST STATION

BASIN 3

BASIN 3

ATU SEWER SYSTEM

SOLAR PANELS

EXISTING APIARY

HIGHWAY 74

HEMET LAKE DR

N0°10'05"E 742.29'

N0°10'05"E 297.83'

N0°06'20"E 1282.63'

N53°07'19"W 666.87'

N53°07'19"W 373.15'

Δ=90°00'00" R=20.00' L=31.42'

N36°52'41"E 21.85'

N36°52'41"E 58.99'

Δ=90°00'00" R=20.00' L=31.42'

N53°07'19"W 36.35'

N89°43'25"W 267.96'

N89°43'25"W 70.19'

N89°43'25"W 786.81'

Obscured Area

OBS

OFFICEUNTITLED ARCHITECT OF RECORD
4200 SEPULVEDA BLVD, STE 104, CULVER CITY, CA 90230
P.310.730.6698

MANUEL CERVANTES ESTUDIO DESIGN ARCHITECT PASEO DE LAS PALMAS, 820 5TO PISO COL. LOMAS DE CHAPULITEPEC, CDMX P.52.1.55.5201.3508

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ALHAMBRA GROUP LANDSCAPE ARCHITECT 41635 ENTERPRISE CIRCLE N. STE. C TEMECULA, CA 92591 P.951.269.6802

JLC ENGINEERING CIVIL ENGINEER 41660 IVY STREET, STE A MURRIETA, CA 92562 P.951.304.9552

THE RIDGE
56475 APPLE CANYON ROAD IDULLWILD, CA 92549

OU PROJECT NO: 21.010.000

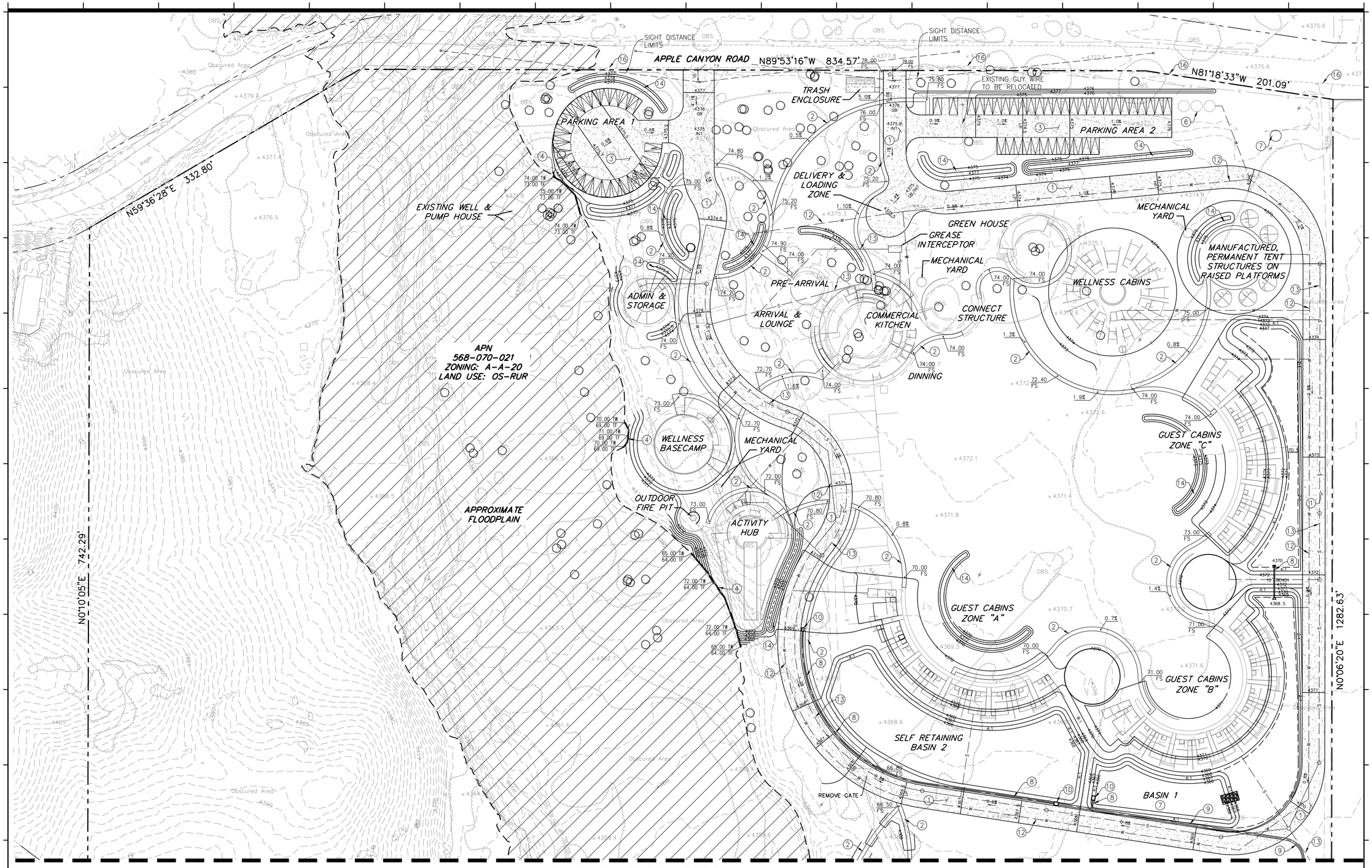
#	DESCRIPTION	DATE
1	Revision 1	Date 1

SCALE: 1 inch = 40 ft.

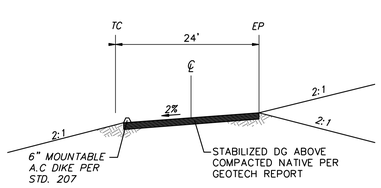
NORTH

PROPOSED SITE PLAN

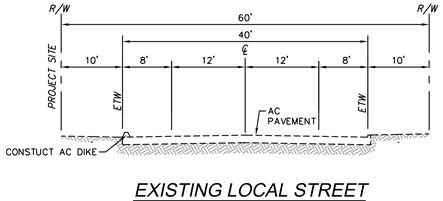
C03.00



MATCH LINE SEE SHEET 5



PRIVATE DRIVE
NTS



EXISTING LOCAL STREET
60' R/W APPLE CANYON ROAD
NTS

LEGEND

EXISTING PINE TREE

CONSTRUCTION NOTES

1. STABILIZED DG DRIVE AISLE ABOVE COMPACTED NATIVE PER GEOTECH REPORT.
2. STABILIZED DG PEDESTRIAN ACCESSIBLE WALKWAYS ABOVE COMPACTED NATIVE PER GEOTECH REPORT
3. STABILIZED DG PARKING AREA ABOVE COMPACTED NATIVE PER GEOTECH REPORT
4. PROPOSED RETAINING WALL.
5. PROPOSED WATER TANKS FOR DOMESTIC AND FIRE USE.
6. PROPOSED WATER WELL FOR DOMESTIC AND FIRE USE.
7. BIORETENTION SOIL MEDIA SECTION PER WQMP. GUIDANCE MANUAL. 18" OF ENGINEERED SOIL MEDIA OVER A MINIMUM 12" OF GRAVEL WITH 6" PERFORATED DRAIN PIPE.
8. PROPOSED 18" RCP SD.
9. PROPOSED 24" RCP SD.
10. PROPOSED CALTRANS D73B G1 INLET.
12. PROPOSED PVC C900 WATER.
13. PROPOSED SDR 35 SEWER.
14. VEGETATED BERMS PER LANDSCAPE PLANS.
16. PROPOSED 6" MOUNTABLE A.C DIKE PER STD. 207

OFFICEUNTITLED ARCHITECT OF RECORD
4200 SEPULVEDA BLVD, STE 104, CULVER CITY, CA 90230
P.310.730.6698

MANUEL CERVANTES ESTUDIO DESIGN ARCHITECT *PASEO DE LAS PALMAS, 820 570 PISO COL. LOMAS DE CHAPULTEPEC, CDMX P.52.1.55.5201.3508*
HOLMES STRUCTURES STRUCTURAL ENGINEER *523 WEST 6TH ST, STE 1123 LOS ANGELES, CA 90014 P.213.481.5630*
INTEGRAL GROUP MEP ENGINEER *15760 VENTURA BLVD, STE 1902 ENCINO, CA 91436 P.323.825.9955*
ALHAMBRA GROUP LANDSCAPE ARCHITECT *41635 ENTERPRISE CIRCLE N. STE. C TEMECULA, CA 92591 P.951.269.6802*
JLC ENGINEERING CIVIL ENGINEER *41660 IVY STREET, STE A MURRIETA, CA 92562 P.951.304.9552*

THE RIDGE
56475 APPLE CANYON ROAD IDULLWILD, CA 92549

OU PROJECT NO: 21.010.000

#	DESCRIPTION	DATE
1	Revision 1	Date 1

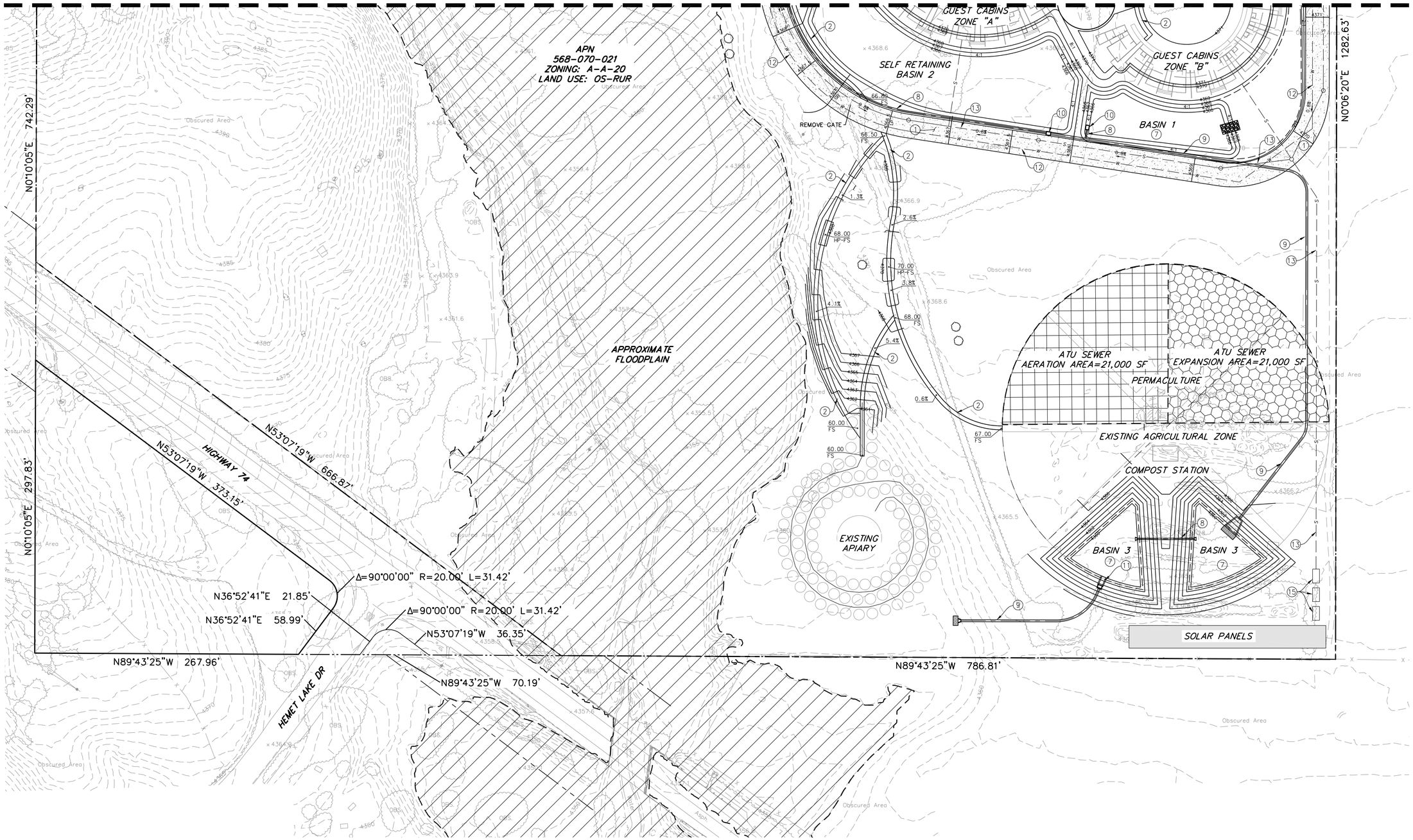
SCALE: 1 inch = 40 ft.

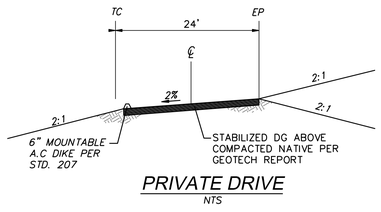
NORTH

PROPOSED SITE GRADING AND UTILITY PLAN

C04.00

MATCH LINE SEE SHEET 4





PRIVATE DRIVE
NTS

LEGEND

EXISTING PINE TREE

CONSTRUCTION NOTES

1. STABILIZED DG DRIVE AISLE ABOVE COMPACTED NATIVE PER GEOTECH REPORT.
2. STABILIZED DG PEDESTRIAN ACCESSIBLE WALKWAYS ABOVE COMPACTED NATIVE PER GEOTECH REPORT
7. BIORETENTION SOIL MEDIA SECTION PER WQMP. GUIDANCE MANUAL. 18" OF ENGINEERED SOIL MEDIA OVER A MINIMUM 12" OF GRAVEL WITH 6" PERFORATED DRAIN PIPE.
8. PROPOSED 18" RCP SD.
9. PROPOSED 24" RCP SD.
10. PROPOSED CALTRANS D73B G1 INLET.
11. RCFC&WCD CB110 DROP INLET
12. PROPOSED PVC C900 WATER.
13. PROPOSED SDR 35 SEWER.
15. PROPOSED ATU SEWER TANKS.

OFFICEUNTITLED ARCHITECT OF RECORD
4200 SEPULVEDA BLVD, STE 104, CULVER CITY, CA 90230
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THE RIDGE
56475 APPLE CANYON ROAD IDULLWILD, CA 92549

OU PROJECT NO: 21.010.000

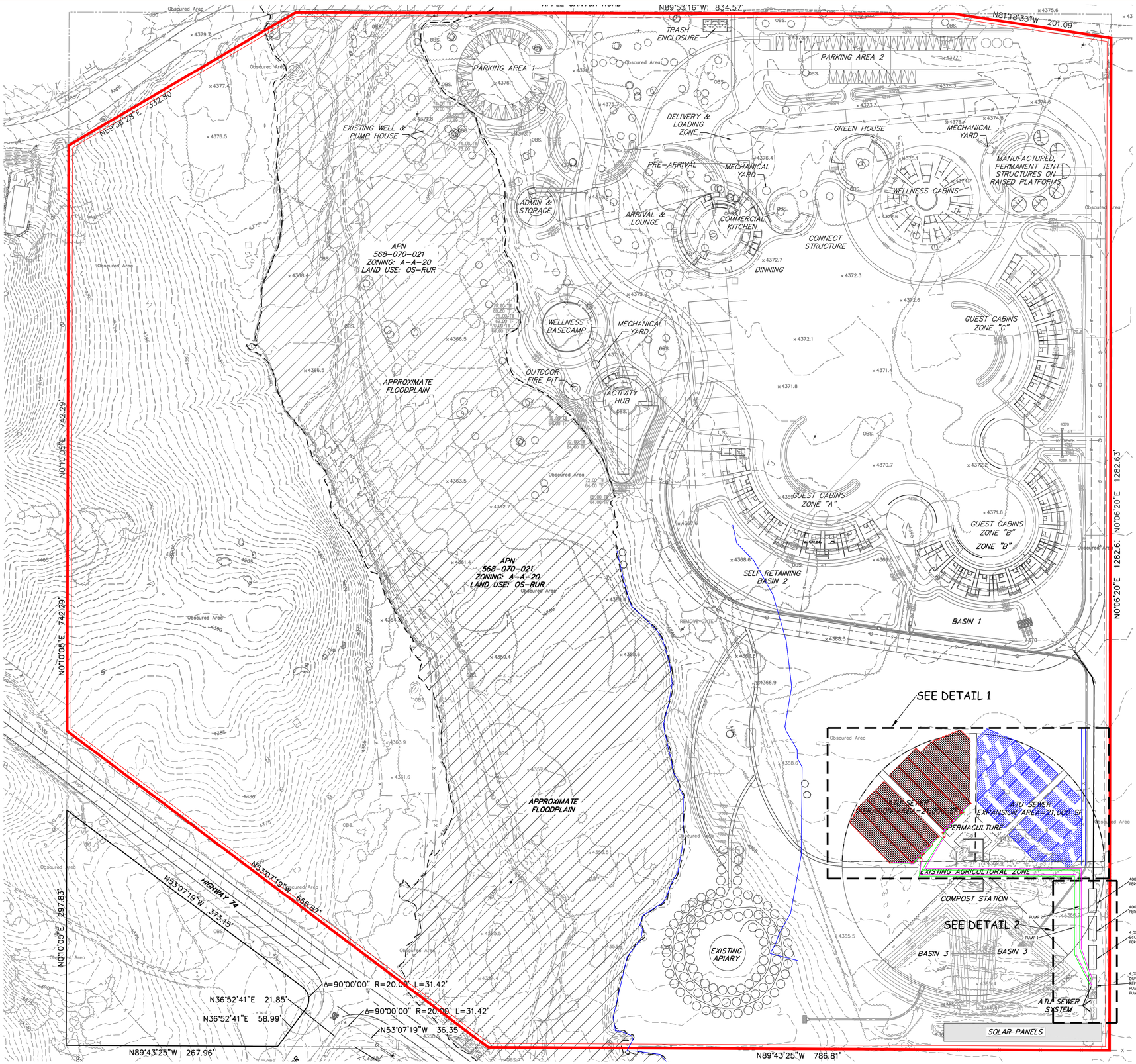
#	DESCRIPTION	DATE
1	Revision 1	Date 1

SCALE: 1 inch = 40 ft.

NORTH

PROPOSED SITE GRADING AND UTILITY PLAN

C05.00



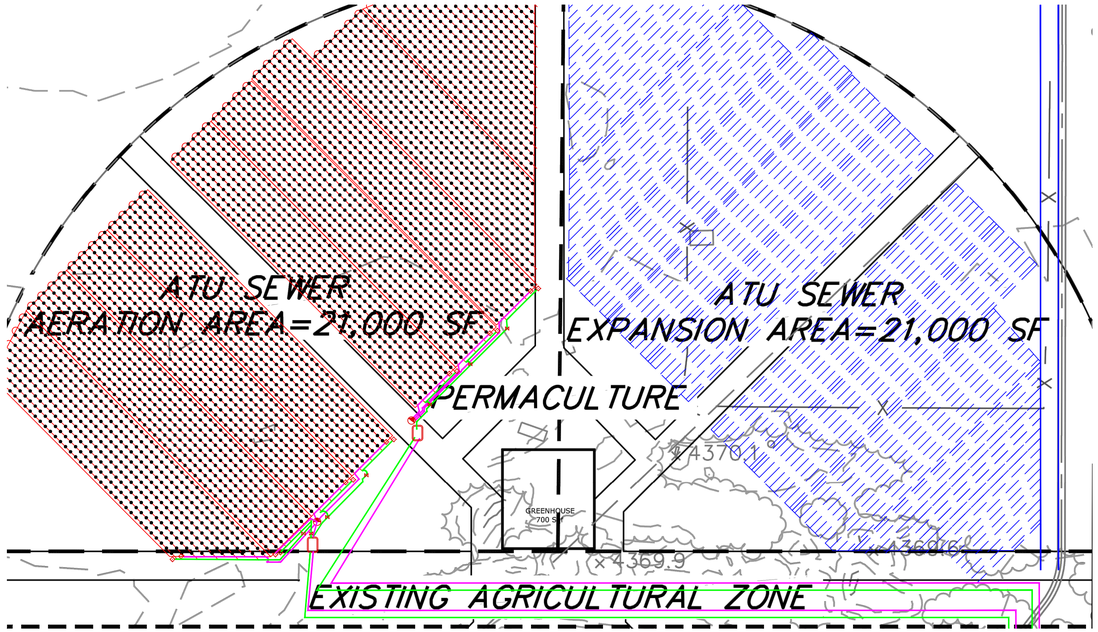
OVERALL SITE MAP

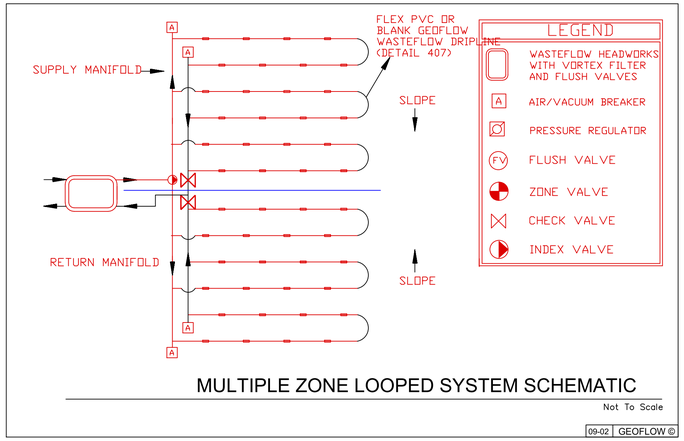
LOCATED AT 56475 APPLE CANYON ROAD
MOUNTAIN CENTER AREA, RIVERSIDE COUNTY, CALIFORNIA
APN 568-070-021

PROJECT	THE RIDGE WELLNESS INC.		
CLIENT	MS. CAROLINE LEGRAND		
PROJECT NO.	213906-14A		
DATE	DECEMBER 2021		
SCALE	1:60		
DWG XREFS			
REVISION			
DRAWN BY	JDG	PLATE	1 OF 2

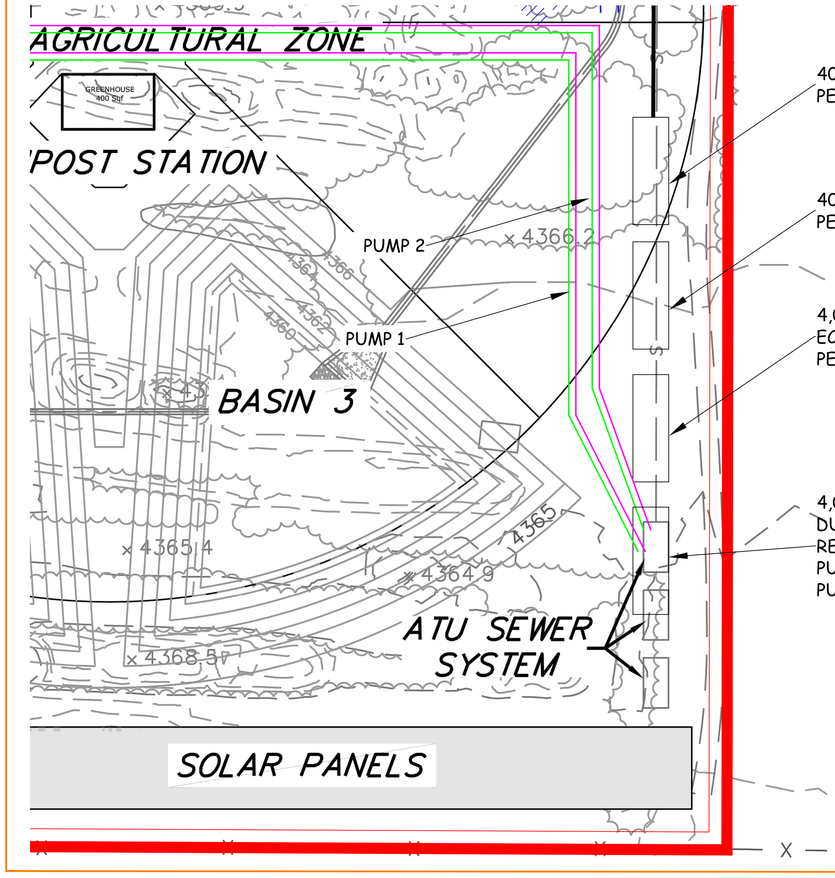
Earth Strata Geotechnical Services, Inc.
Geotechnical, Environmental and Materials Testing Consultants
www.ESGSINC.com (951) 397-8315

DETAIL 1





DETAIL 2



ATU SYSTEM DETAILS

LOCATED AT 56475 APPLE CANYON ROAD
MOUNTAIN CENTER AREA, RIVERSIDE COUNTY, CALIFORNIA
APN 568-070-021

PROJECT	*THE RIDGE WELLNESS INC.*		
CLIENT	*MS. CAROLINE LEGRAND*		
PROJECT NO.	*213906-14A*		
DATE	*DECEMBER 2021*		
SCALE	*1:20*		
DWG XREFS			
REVISION			
DRAWN BY	*JDG*	*PLATE*	*2 OF 2*

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