2023

Septic Designer In Training

Gabriel McGuire
Western Washington University

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# HUXLEY COLLEGE INTERNSHIP REPORT

## I. STUDENT/INTERN INFORMATION

<table>
<thead>
<tr>
<th>Name</th>
<th>Gabriel McGuire</th>
</tr>
</thead>
<tbody>
<tr>
<td>W#</td>
<td>W01365838</td>
</tr>
<tr>
<td>Major</td>
<td>Environmental Science</td>
</tr>
<tr>
<td>Concentration</td>
<td>N/A</td>
</tr>
<tr>
<td>Internship Title</td>
<td>Septic Designer in Training</td>
</tr>
<tr>
<td>Period of Internship</td>
<td>From September 20(^{th}), 2022 to March 3(^{rd}), 2023 (5 credits total)</td>
</tr>
<tr>
<td>Avg. Hours per Week</td>
<td>9</td>
</tr>
<tr>
<td>Total Hours Worked</td>
<td>163.25</td>
</tr>
</tbody>
</table>

## II. HOST INSTITUTION INFORMATION

<table>
<thead>
<tr>
<th>Institution Name</th>
<th>Mitchell Septic Inc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Institution Address</td>
<td>19712 E Conway Hill Lane Mount Vernon, WA 98274</td>
</tr>
<tr>
<td>Institution Mission</td>
<td>Mitchell Septic Inc. designs, evaluates, and consults within the septic-related field. They stand to provide a product that is in the client’s best interest and maintains the health of the environment (Mitchell and Mitchell, 2003).</td>
</tr>
<tr>
<td>Supervisor Name and Title</td>
<td>David Mitchell, Company Owner and Lead Designer</td>
</tr>
<tr>
<td>Supervisor Contact Information</td>
<td><a href="mailto:David@mitchellseptic.com">David@mitchellseptic.com</a> 3604213600</td>
</tr>
</tbody>
</table>
III. DESCRIPTION

Provide a brief description of the project or program on which you worked, the objectives of that project or program, and your role as an intern within that project or program:

As a septic designer trainee, I performed many of the tasks a certified septic designer would do. The objectives of this role consisted of two main components: fieldwork, and design work. The fieldwork included collecting data to design a septic system or evaluate the site given the parameters of the project. Soil quality, critical areas, setbacks from existing utilities, and available space were all important parameters to consider. The design element focused on drafting a septic system on computer software. Each design follows consistent rules and regulations put out by the Washington State Department of Health and each subsequent local (e.g., county) health jurisdictions. A design consisted of a system layout (i.e., tanks, transmission lines, and drain field) that included important features of the site. In addition, the design gave specifications of each component to be used in the design and classification of the vertical profile of soils throughout the site. As a designer, it was my job to follow these regulations to create a system that aids in protecting the integrity of the environment while also considering the client's best interest.

IV. DUTIES AND RESPONSIBILITIES

Provide a list of your specific duties and responsibilities as an intern:

- Arranged jobs by exchanging emails or phone calls with clients and gathering background information about sites
- Discussed with clients the area of work that needed to be done. This included a design for a new system or a repair, soil logging, design for drainage, or general consulting.
- Mapped out the parcel or property of the clients. This was done with a total station, compass, map, tape measure, and other additional geospatial information related to the site.
- Tested soils collecting data on color, type, structure, mottling, root depth, and water level.
- Designed septic systems suitable for the site established by soil suitability, the client’s interest, county regulations, and low environmental impact.
- Drafted designs using a CAD software
- Submitted septic designs or site evaluations to the applicable county in those counties' preferred format.
V. LEARNING OBJECTIVES

Describe what you learned from your internship and how this experience contributed to your educational goals:

This internship provided a hands-on experience that added to my education in environmental science and helped me to pursue my goal of bettering the environment. This internship brought into fruition the aspects of being able to live and interact in a place where our human waste goes. I learned about the many soil and microbial processes that take place to treat septage in order for it to safely be released into our environment. This included taking a class on soil parameters and talking about grain size and textural analysis, as well as the organisms that help treat the waste. I learned about the legal and regulatory standpoints of the trade and how specific rules are set in place that support the health of the environment, including the people that live in it. I was thankful that this internship opportunity allowed me to be a part of a process where you take toxic waste and through mechanical and biological processes produce something suitable to be released into the environment. I was able to see something through from start to finish and obtain positive results from my work, which I feel is a hard thing to do within any field.
VI. LITERATURE CITED
Provide reference information for all sources cited in your report:

APPENDIX I. SUPERVISOR LETTER
Attach a signed letter from your supervisor, on the host institution’s letterhead, stating that you have completed the internship according to the organization’s expectations and confirming the dates and number of hours of your internship work.
February 24, 2023

WWU College of the Environment
516 High Street, MS 9079
Bellingham, WA 98225

RE: Supervisor's letter supporting Internship Report – Septic Designer In Training Gabriel McGuire
WWU Environmental Science Fall/Winter 22/23

To whom it may concern:

Gabriel McGuire has completed the environmental science internship fall and winter quarter 22/23 as described in the internship report. I confirm that Gabriel worked 163.25 hours for 18 weeks from September 21st to March 17th.

As stated in the report, his activities included Site Evaluations and design Design related to on-site septic systems. Technical field skills developed included textural analysis of soils, data acquisition and site mapping using a total station and overall site evaluation for the purposes of wastewater treatment system permitting and construction. Gabriel completed a number of design projects integrating field data he generated with State and County On-site Septic System (OSS) regulations to formulate OSS designs. At least three projects were completed in their entirety from site review to permit approval. Gabriel also worked extensively reviewing and evaluating existing OSS in field operation.

Sincerely,
Mitchell Septic, Inc.

David B. Mitchell
Professional On-Site Wastewater Treatment System Designer
APPENDIX II. SUPPORTING DOCUMENTS
Attach copies of any reports, presentations or other deliverables that you produced during your internship, if applicable.
Septic Permit Application
Planning & Development Services · 1800 Continental Place · Mount Vernon WA 98273
voice 360-416-1320 · inspections 360-416-1330 · www.skagitcounty.net/planning

Septic permits are issued by Skagit County Public Health. Submit your application for processing at the Planning & Development Services permit counter, or by mail with the appropriate fee and attachments.

Project & Property Information
Tell us about your project and its proposed location.

<table>
<thead>
<tr>
<th>Site Address</th>
<th>City</th>
<th>Zip</th>
<th>Parcel No(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2135 Nulle Road</td>
<td>Skagit County</td>
<td>na</td>
<td>P47501</td>
</tr>
</tbody>
</table>

Attachments
- Design (if required)
- Soil Evaluation (if required)

Prerequisites
Unless one of the boxes below are checked, items 1-3 are required:
- Site evaluation with no design
- Repair with no expansion of footprint
- Permit inside city/town limits

Planning & Development Services staff are available to help you complete and explain these requirements.

1. **Lot of Record Certification** is required for all development. Check one of the boxes that applies below. If you do not have lot certification, apply for lot certification with Planning & Development Services.
   - Lot certification is recorded under Auditor’s File Number 200701260147 & 2001. Nothing further required.
   - The lot has an existing dwelling unit that was constructed prior to July 1, 1990, according to Assessor records, but lot certification was not recorded. Lot certification file number is ____________________.
   - The lot was properly platted and approved by Skagit County on or after March 1, 1965, and has no restriction barring future development, but lot certification was not recorded. Lot certification file number is ____________________.
   - The lot has an approved but unrecorded lot certification. Lot certification number ____________________.
   
   **Recording fee is required.**

2. **Critical Areas Review** is required for septic permits. If you have not previously completed critical areas review for your parcel, apply at Planning & Development Services and attach your approval letter. Your application will be rejected if critical areas review is not complete for your location. Critical Area File number PL02-0339.

3. **Ag-NRL Siting Criteria.** Is this project in the Agricultural-Natural Resource Land zone?
   - No. Nothing further required.
   - Yes. Please note:
     - Location of the septic system must comply with the siting criteria in SCC 14.16.400(6) and the Administrative Official Interpretation March 16, 2010.
     - On a parcel larger than 1 acre, you must demonstrate three years of income from your own commercial agricultural production on the parcel averaging at least $100 per acre per year for the last three years in order to construct a residence.

Fees

<table>
<thead>
<tr>
<th>Site evaluation</th>
<th>Additional evaluations at same site ($100 x __ additional evaluations)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design review</td>
<td>New design ($500) New tank ($240) Repair ($300) Redesign ($200) Renewal ($200) Table 9 Repair ($300)</td>
</tr>
<tr>
<td>Recording fees</td>
<td>Lot certification ($104.50) O&amp;M&amp;M for Proprietary Systems ($103.50)</td>
</tr>
</tbody>
</table>

Total fees submitted $785

Make check payable to Skagit County Planning & Development Services

Updated 04/19/2022
**Permit Details**

**History**

- Any previous site evaluations or designs for this site? No Yes, describe:

- What year was work done? 2006
- Name or project file number: SW06-0749

**Site evaluation**

- Existing lot
- Proposed lot

**Design type**

- Aerobic/Drip
- Aerobic/Mound
- Aerobic/Pressure
- Conventional/Gravity
- Mound
- Conventional/Pressure
- Oscar
- Glendon
- Gravel Filter
- Gravity with Pump
- Other, describe:

**System use NA**

- Residential → # of bedrooms: 3
- Non-residential → # of occupants: # gal/day/bedroom: total daily flow: 360

**Proposed subdivision**

- No subdivision proposed
- Short subdivision (2-4 lots)
- Long subdivision (5 or more lots); lot # of ___ lots

Proposed subdivision name:
Lot size (acres):

**Staff Use Only Below This Line**

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**Inspections**

- Site evaluation
- Soil/site preparation
- Open trenches
- Self-inspection
- Final inspection

Design review
- Above/below ground devices
- Pressure test
- Installed as designed

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1 SCC 14.06.090(1)(b)
Contact Information & Signature Form
Planning & Development Services · 1800 Continental Place · Mount Vernon WA 98273
voice 360-416-1320 · inspections 360-416-1330 · www.skagitcounty.net/planning

Attach this form to an application that requires it. An application will not be accepted without this form.

By signing this form, the undersigned certifies that the statements, answers, and information both on this form and the remainder of this permit application are true and correct to the best of his or her knowledge and belief.

### Applicant/Contact

<table>
<thead>
<tr>
<th>Name</th>
<th>Seth &amp; Cecelia Carson</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mailing Address</td>
<td>P.O. Bopx 28434</td>
</tr>
<tr>
<td>City, State</td>
<td>Bellingham, WA</td>
</tr>
<tr>
<td>Zip</td>
<td>98228</td>
</tr>
<tr>
<td>Phone</td>
<td>425-232-9006</td>
</tr>
</tbody>
</table>

Email: cecelia@realestatewa.biz

### Property Owner

- [ ] Same as applicant
- [ ] Multiple owners (attach additional page)

<table>
<thead>
<tr>
<th>Name</th>
<th>Mailing Address</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>City, State</td>
<td>Zip</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Email</td>
<td></td>
</tr>
</tbody>
</table>

### Contractor/Designer/Installer

- [ ] None
- [ ] Same as applicant
- [ ] Same as property owner

<table>
<thead>
<tr>
<th>Name</th>
<th>David Mitchell</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mailing Address</td>
<td>19712 E Conway Hill Ln</td>
</tr>
<tr>
<td>City, State</td>
<td>Mount Vernon, WA</td>
</tr>
<tr>
<td>Zip</td>
<td>98274</td>
</tr>
<tr>
<td>Phone</td>
<td>(360) 421-3600</td>
</tr>
<tr>
<td>License #</td>
<td>5100137</td>
</tr>
<tr>
<td>Expires</td>
<td>3.18.2024</td>
</tr>
</tbody>
</table>

Email: mitchell@wavecable.com

### Financing

- [ ] None
- [ ] Lender below is providing construction financing
- [ ] Firm below has issued payment bond

<table>
<thead>
<tr>
<th>Name</th>
<th>Mailing Address</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>City, State</td>
<td>Zip</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Email</td>
<td></td>
</tr>
</tbody>
</table>

### Signature

- [ ] I am the owner of the subject property and I grant permission to field staff to enter the site to verify the presence or absence of critical areas and perform inspections of work proposed by this application; OR
- [ ] This is a fire suppression permit, mechanical/plumbing permit, or pre-development/pre-app meeting request; the property owner’s authorization is not required.

Signature(s):

[Signature]

Printed Name: Cecelia Carson
Title: OWNER
Company:

Date: 10.3.22

1 Required by RCW 19.27.095(2)(d) for building permit applications.

Septic Permit Application Updated 04/19/2022 Page 3 of 3
Section Map

SUBJECT PROPERTY
63 Lake Samish

- Section map source: Skagit County GIS Department. Accuracy is not guaranteed.
- All bearings, dimensions and locations are approximate.
- Map is intended to show parcel in context of neighboring properties and to assist in site location.
- See attached sheets for additional details.
Site Overview

THIS IS NOT A SURVEY.

- This document is NOT a survey and is not intended as such. Property corner, boundary, topography, and all other site features are derived from field measurements, client representation, and public documents. This drawing is intended ONLY for the evaluation, review, and/or approval of an on-site septic system pursuant to WAC 246-272 and Local Health Jurisdiction regulations. This drawing should not be utilized for any other purpose.

- All bearings, dimensions, and locations are approximate.

Methods and Equipment:

- Field measurements performed using a Leica 1055 R93 robotic total station and Allegro CX data collector with Carlson SurvCE data collection software.

General Notes:

- Grading, clearing, or other soil alteration/movement in the drain field area can destroy the site's ability to support an on-site septic system. Clearing in a drain field area shall be performed in consultation with a licensed designer or tester of record.
- Minimum County and Washington State code requirements shall be met whether described in this document or not.
- Call the Washington Utilities Coordination Council BEFORE YOU DIG at 1-800-434-5555. This service is free and requires 48 hour notice.
- Waste water entering the system is expected to have the consistency and strength typical of domestic household ("AKA residential sewage") with septic tank effluent parameters not to exceed the following ranges: BOD5: 130-200 mg/L, COD: 130-191 mg/L, TSS: 45-150 mg/L, Oil and Grease: 5-20 mg/L.

0 = Soil log hole - see attached sheet for descriptions.

- IMPORTANT: REFER TO ATTACHED DESIGN COMMENTARY
# Soil Log Detail

**EXAMINATION DATE:** SEP 12TH, 2022  
**PREVIOUS WEEK PRECIPITATION:** NONE  
**DOMINANT VEGETATION:** AR, RS  
**EXPECTED WATER TABLE CONDITIONS:** LOW

<table>
<thead>
<tr>
<th>HORIZON DEPTH</th>
<th>COLOR, MODIFIER</th>
<th>APP.</th>
<th>TEXTURE</th>
<th>RATE</th>
<th>TYPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 TO 4 INCHES</td>
<td>BRN</td>
<td>L</td>
<td>0.60</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>4 TO 15 INCHES</td>
<td>RD BRN</td>
<td>SL</td>
<td>0.60</td>
<td>4</td>
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<tr>
<td>15 TO 24 INCHES</td>
<td>GRY</td>
<td>SL</td>
<td>0.60</td>
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<tr>
<td>24+ INCHES</td>
<td>GRY</td>
<td>SCL</td>
<td>0.20</td>
<td>N/A</td>
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**MAX. ROOT DEPTH:** 21  
**SYSTEM TYPE:** PRESSURIZED

**MIN. MOTTLING DEPTH:** NONE  
**DEPTH TO STANDING WATER:** NONE  
**UPPER HORIZONS EXHIBIT MODERATE TO STRONG GRANULAR STRUCTURE**

<table>
<thead>
<tr>
<th>HORIZON DEPTH</th>
<th>COLOR, MODIFIER</th>
<th>APP.</th>
<th>TEXTURE</th>
<th>RATE</th>
<th>TYPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 TO 6 INCHES</td>
<td>LT BRN</td>
<td>L</td>
<td>0.60</td>
<td>4</td>
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</tr>
<tr>
<td>6 TO 22 INCHES</td>
<td>LT BRN</td>
<td>SL</td>
<td>0.60</td>
<td>4</td>
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<tr>
<td>22+ INCHES</td>
<td>BRN GRY</td>
<td>SCL</td>
<td>N/A</td>
<td>N/A</td>
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**MAX. ROOT DEPTH:** 14  
**SYSTEM TYPE:** PRESSURIZED

**MIN. MOTTLING DEPTH:** NONE  
**DEPTH TO STANDING WATER:** NONE  
**UPPER HORIZONS EXHIBIT MODERATE TO STRONG GRANULAR STRUCTURE**

<table>
<thead>
<tr>
<th>HORIZON DEPTH</th>
<th>COLOR, MODIFIER</th>
<th>APP.</th>
<th>TEXTURE</th>
<th>RATE</th>
<th>TYPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 TO 4 INCHES</td>
<td>LT BRN</td>
<td>L</td>
<td>0.60</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>4 TO 8 INCHES</td>
<td>BRN GRY</td>
<td>SL</td>
<td>0.60</td>
<td>4</td>
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<tr>
<td>8 TO 19 INCHES</td>
<td>BRN</td>
<td>SL</td>
<td>0.60</td>
<td>4</td>
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<tr>
<td>19+ INCHES</td>
<td>GRY</td>
<td>SCL</td>
<td>--</td>
<td>N/A</td>
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**MAX. ROOT DEPTH:** 16  
**SYSTEM TYPE:** PRESSURIZED

**MIN. MOTTLING DEPTH:** NONE  
**DEPTH TO STANDING WATER:** NONE  
**UPPER HORIZONS EXHIBIT MODERATE TO STRONG GRANULAR STRUCTURE**

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**BCS DESIGNATION:** NOT DETERMINED

**KEY TO ABBREVIATIONS:**  
- C = CLAY  
- CL = CLAY LOAM  
- CSL = COARSE SAND LOAM  
- FS = FINEMODED SAND  
- LL = LOAM  
- LFS = LOAMY FINE SAND  
- M = MEDIUM SAND  
- O = ORGANIC MATERIAL  
- SL = SILENT CLAY LOAM  
- SCL = SILTY CLAY LOAM  
- SLS = SANDY LOAM  
- B = BROWN  
- R = RED  
- D = DARK  
- G = GRY  
- W = WHITE  
- O = OLIVE  
- C = CHERRY  
- ORG = ORANGE  
- B = BROWN  
- CEM = CEMENTED  
- CM = CENTRAL  
- CPR = COMPACT  
- GRV = GRAVELLY  
- HP = HARD PAN  
- MT = MOTTLED  
- PERF = PERFECTLY  
- VV = VERY  
- X = EXTREMELY  

**PM = DOUGLAS FIR  
TP = WESTERN RED CEDAR  
TH = WESTERN HEMLOCK  
AR = RED ALDER  
AM = BIG LEAF MAPLE  
PB = COTTONWOOD  
RS = SALMONBERRY  
OG = INDIAN PLUM  
GS = SALTAL  
SW = SWORD FERN**

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* Soil logs, as described, support the specification of drain field depth and loading rate requirements pursuant to WAC 246-272A and King County Health Department regulations.  
* DO NOT alter soil conditions in designated drain field or reserve area including by vegetation removal.  
* Grading, clearing, compaction, or other soils alteration/movement in the drain field area can destroy the soil's ability to support an on-site septic system.  
* Drain field site preparation shall be performed only under the direction of the designer or licensed installer of record.  
* Application Rate is expressed in gallons/square foot/day

---

**EXPIRES 03/10/2024**
Design Commentary

Proposal: on-site septic system permit to support a building permit for the construction of a new, 3 bedroom single family residence.
Note: A Site/Soil Evaluation was completed previously for this parcel under SW06—0749

Install New:
Gravity transmission line using 4" 3034 PVC sewer pipe connecting house to new 1000 gallon septic tank.
- Install cleanup in line within 2' of house as indicated on Septic Tank detail

Septic Tank:
- New 1000 gallon, concrete, 2 compartment tank
- Fit outlet with Zabel A100-8 filter or equivalent
- Fit with 24" diameter risers extending to finished grade
- feeds, via 4" PVC 3034:

Pump chamber:
- New 1000 gallon, concrete, single compartment tank
- Fit with 24" diameter riser extending to finished grade
- Install control valve in pump chamber use to adjust squirt height in mound to 60"
- Houses floats and pump

Pump: Orenco High Head Effluent Pump Model P300511-20 or equivalent based on location of house shown;
Control Panel: Rhombus IFS11W914H4D8AC or approved better. Panel includes high water alarm, dose timing, event counter and elapsed time meter.
- Theoretical timer settings are shown on attached pressure distribution analysis
- Actual settings are determined by on-site drawdown test not to exceed daily design flow
- Avoid placement of panel on exterior bedroom walls

1.5" sch 40 PVC transmission line:
- Approximately 70 linear feet required; connects pump to new

Mound: sized for 3 bedrooms:
- basal area as shown on attached drawing
Mound Bed 7.5' wide x 48' long:
- 3 x 1.25 inch center fed PVC laterals.
- Each lateral is ~47 feet long and each has 20, 1/8 inch diameter orifices
- Adjust squirt height to 60" using valve in pump chamber.
- Observation/Maintenance port at distal end of each lateral (6 total).
- Use clean drain rock in bed.
- Orient orifices to 12 o'clock position. Install orifice shields prior to backfill.

Mound: sized for 3 bedrooms
- 7.5'L x 48'W bed with 3 center fed laterals
- Use clean drain rock in bed
- Orient orifices to 12 o'clock position. Install orifice shields prior to backfill

Fittings: PVC Fittings Sch 40 per ASTM D-2466.
Piping: Gravity sewer: 4" PVC D-3034 ; Pressurized pipe: PVC Pipe Sch 40 per ASTM D-1785.

TANKS:
- TANKS SHALL BE PLACED DOWNHILL OF THE PROPOSED RESIDENCE OR SUCH THAT:
- TANKS SHALL BE INSTALLED <=12" DEEP WHILE MAINTAINING 1/4" FALL BETWEEN HOUSE PLUMBING STUB AND TANK INLET

Reserve: 900 SQ FT drip drain field as shown
NOTE:
- It is the Licensed Installer’s responsibility to supply the pump, floats, and alarm panel and plumb the pump and floats. Wiring the pump, floats, and alarm panel is the responsibility of a Licensed Electrician. All bid documents should reflect consideration of necessary wiring work.
OSS Layout

TANKS:
- TANKS SHALL BE PLACED DOWNHILL OF THE PROPOSED RESIDENCE OR SUCH THAT:
- TANKS SHALL BE INSTALLED <=12" DEEP WHILE MAINTAINING 1/4" FALL BETWEEN HOUSE PLUMBING STUB AND TANK INLET

WATER LINE - MAINTAIN 10' HORIZ. SEPARATION TO SEPTIC SYSTEM COMPONENTS - IF WATER LINE ALREADY EXISTS, IT WILL NEED TO BE REROUTED AND ABDONED

MOUND TO BE CONSTRUCTED PARALLEL TO CONTOURS

THIS IS NOT A SURVEY:
- All dimensions are in "to the nearest foot" and are not intended as such. Property corners, boundaries, and other site features are not indicated on this drawing. Client representation, and public documents. This drawing is intended ONLY for the evaluation, review, and approval of an onsite septic system pursuant to VA Code 24.2-272 and local health jurisdiction regulations. The drawing should not be used for any other purpose.
- All elevations, dimensions, and locations are approximate.

Methods and Equipment:
- Field measurements performed using a Leica 1030 RSC robotic total station and Maga CR data collector with Catch Field CE data collection software
- General Notes:
  - Driveway clearing in the proposed system area is necessary to support an on-site septic system. Clearing in the shaded area shall be performed in consultation with a licensed designer or investigator of record.
  - Stafford County and Washington County code requirements should be met. All requirements stated in this document are not.
  - Call the Washington Utilization Coordinating Council (UCC: 1-800-222-5200) at 1-800-222-5200. This service is free and requires 48-hour notice. 
  - Wells in dry weather, the system is unprotected from the possibility of pumping hazardous, (VAF "substantial savings") for wet septic tank effluent parameters (example: sewage from highly contaminated sources) (see Washington Utilization Coordinating Council, "Wellhead Protection Program Manual," 2000).

EXPIRES 03/18/2024

- IMPORTANT: REFER TO ATTACHED DESIGN COMMENTARY

- Soil test - see attached sheet for descriptions.
General Specifications and Installation Instructions for Pre-cast Concrete Tanks

1. PERMITTING
   - A permit is required from the Local Health Jurisdiction (LHJ) to install a septic tank as part of an on-site septic system (OSS) installation.
   - Tank installation shall be performed by an installer licensed by the LHJ.
   - The tank must be on the Washington state Department of Health approved list (http://www.doh.wa.gov/CommunityAndEnvironment/WastewaterManagement/FormsPublications).

2. TANK SPECIFICATIONS:
   2.1 Dimensions:
      - The dimensions and detail shown in the attached tank section drawing(s) represent the tank produced by Berg Vault Company (360-424-4996).
   2.2 Piping and Fittings:
      - Gravity piping interior and exterior to tank shall be 4 inch PVC per ASTM D-3034 SDR 35. Fittings shall be 4 inch injection molded solvent weld SDR 35 sewer fittings manufactured in accordance with ASTM D-3034.
      - The tank must be fitted with PVC baffle tees at the inlet, inter-compartmental wall, and outlet as indicated in the tank cross-section drawing. Baffle pipe shall extend into the clarified zone, typically 40% of the liquid depth.
      - The outlet of the septic tank may be fitted with an outlet baffle filter as specified in the tank cross-section drawing.
      - The outlet filter so that it can be readily removed by a technician standing at finish grade.
   2.3 Tank Accesses and Risers:
      - Risers are to be installed by the tank manufacturer and shall be a minimum of 24 inch diameter consisting of Ultra-Rib™ Storm Sewer PVC pipe (or approved equal) cast into tank.
      - Risers shall attach to the top of the septic tank in a manner that prevents leaking between the riser in the top of the septic tank.
      - Risers shall be ordered such that they extend to at or above final grade and should be covered with a secured lid as illustrated.
   2.4 Scale and gasket for inlet and outlet:
      - Seals meeting ASTM C-1544 or equivalent must be used at the tank wall-to-PVC piping interface to prevent leakage.

3. LOCATION, EXCAVATION, PLACEMENT, WATER TESTING, AND BACKFILL REQUIREMENTS:
   3.1 Locate the tank and verify setbacks:
      - The Washington Administrative Code (WAC) 246-272A-0210 - Table IV specifies minimum horizontal setbacks related to tank placement. The LHJ or design may require greater setbacks.
   3.2 Excavation and tank placement:
      - Establish tank bottom elevation based on design specifications, tank inlet & out heights, plumbing stub elevation, transmission line length and required fall in sewage transmission line.
      - Tank burial depth of 12 inches is specified unless the design or water table conditions suggest higher placement.
      - Add 6 inches to excavation depth elevation if bedding materials are used.
      - Excavate tank hole with dimensions 2 feet larger than tank.
      - Bottom of excavation shall be level ± 1/2 inch.
      - If large or sharp rocks are present at the bottom of the excavation, or noted in the design, place a 6 inch lift the bedding material (sand, peak gravel, 5:1 inch minus crushed rock or approved equal) and level.
      - Compact and level bedding material to ± 1/2 inch.
      - Place tank on compacted bedding and center of hole, keep minimum 1 foot void space on all sides. The tank shall be installed level ± 1/2 inch.
      - It is the licensed installer's responsibility to construct the excavation such that it meets project specifications and WAC 296-155-657 (Requirements for protective systems).
   3.3 Tank water tightness/ Hydrostatic testing:
      - Tank shall be designed, constructed, and installed to be watertight to prevent the entrance of surface drainage or ground water into the tank.
      - A water test of the septic tank in situ is required if the septic tank feeds a pump chamber housing a pump controlled by a timer.
      - Hydrostatic testing shall be witnessed by the local health officer or by an individual, such as the project manager, OSS designer, or as designated by the local health officer.
      - Hydrostatic testing procedure:
        - Seal empty tank.
        - Seal access openings, risers and inlet and outlet.
        - Fill the empty tank with water to a point at least 2 inches above the point of Riser connection to the top of the tank. What the tanks stand for one hour. If there is a measurable drop in the tank surface elevation, refill the tank and let the tank stand for one hour. The tank passes the water tightness test when the water level is held for one hour without any measurable loss. Thanks shall not be rejected for damp spots on the exterior concrete surface.
        - When leakage occurs, if the tank is not rejected by the LHJ, an additional water tightness test should be made on the tank after repairs have been completed. The test must be completed in accordance with this section.
        - After testing, remove water tank only to the elevation of the outlet invert.
   3.4 Tank backfill and connections:
      - Backfill tank excavation in even 6 inch lifts using native soil free of organic material and rocks greater than 1 inch diameter or as approved by the LHJ or designer of record. Hand tamp - do not use mechanical compaction.
      - No voids should remain between the tank walls in the native, undisturbed soil.
      - Backfill to the level of the tank inlet and outlet piping then remove seals using water testing and install 4 inch PVC sewer inlet and outlet piping.
      - Continue backfill in 6 inch lift to final grade.
      - Contour final grade to direct surface water away from tank lids.

4. LICENSED INSTALLER'S RESPONSIBILITIES:
   - The Licensed Installer shall:
     - Be responsible for maintaining compliance with all local and State rules governing installation whether detailed in this document or not.
     - Determine the inspection requirements of both the LHJ and the designer record.
     - Coordinate and pay for inspections.
     - Confirm tank dimensions with manufacturer prior to installation.

EXPIRES 03/18/2024
## Septic Tank Outlet Filter

### Zabel Model A100-8™

**A100/300™-8” Series**

A smaller version of the original ZABEL Disc Dam Filter, the A100/300-8™ Series is becoming a popular choice for applications where increased effluent quality is desired.

### A100-8™ Series

The A100-8 is ideal for single and multi-family residential applications or light commercial settings where increased flows or higher quality effluent are required. The A100-8 is sized to handle flow rates from 1200 to 2400 gpd and is available in three different lengths. Every A100-8 is housed in ZABEL's Versa-Case to provide ease of installation with features such as a dual hub that solvent welds to either 4" or 6" SCH 40 pipe, reducer built into the bottom of the case, and optional supplemental filtering slots on the outlet to prevent solids carryover during servicing.

**1/16” Filtration**  
Available lengths 18”, 26” & 32”

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<tr>
<td>Filtration</td>
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<tr>
<td>Gallons Per Day</td>
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<td>Linear Feet of Filtration</td>
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<td>Installed in Multiples for Larger Flows</td>
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<td>High TSS Removal</td>
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<td>Benefits</td>
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<td>Extends Life of Leaching Fields</td>
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<tr>
<td>Keeps Solids in Septic Tank</td>
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Pump Chamber Electronics

CONTROL PANEL: IFS11W914HD48AC
INSTALLED FRIENDLY SERIES - IFS Single Phase Simplex

Single phase, simplex demand rate or Stand alone, fixed or G-Lite™ controlled variables for pump control and system monitoring.

The R08B control panel is being supplied with 12V, 10A, 150Vac single power feed to the panel. The panel electronics are controlled from 30VDC output on the line that is for energizing the control panel. The panel is controlled from this 30VDC output by a relay that is energized from the system. The power feed from the system is controlled by a relay that is energized from the system.

The offered G-Lite™ control panel is a ground level solution that makes this pump break fast and stand in your panel. The G-Lite™ control panel is designed for the 120Vac panel to be used as a separate panel. The G-Lite™ control panel is designed for the 120Vac panel to be used as a separate panel.

TOUGH HAD FEATURES
A. Level Switch Indications: Neutral voltage levels are protected from electrical and mechanical damage.
B. IFSA (Stand-Off Automatic) Solenoids control pump, water, and water tanks for automatic irrigation cycles.
C. Pump Dwell Indications: when pump is on, it is called on.
D. LED Displays: show water levels, information, and control.
E. Remote Push-Button Solenoids: when pump is on, it is called off.

PANEL COMPONENTS
2. Red Alert Switch: provides 4000 acoustical alarm from control panels.

High Head Effluent Pump
Model PF300511-20

Applications
Our series of high head Effluent Pumps are designed for demanding applications requiring high pressure and/or high heads. Pumps are available in a variety of configurations to meet specific needs. Pumps are available in a variety of configurations to meet specific needs.

Technical Data Sheet
PF Series High-Head Effluent Pumps

Features & Specifications
To specify the pump for your installation, require the following:
- Max. Flow - specify the maximum flow rate of the pump in gallons per minute (GPM) or liters per minute (LPM).
- Max. Head - specify the maximum head (or pressure) in feet (ft) or meters (m).
- Material - specify the material of the pump, such as stainless steel or carbon steel.
- Pump Type - specify the type of pump, such as horizontal or vertical.
- Pump Size - specify the size of the pump, such as 1 in. or 2 in.

Standard Models
Our series of high head Effluent Pumps are designed for demanding applications requiring high pressure and/or high heads. Pumps are available in a variety of configurations to meet specific needs.

Nonmetallic
PF Series High-Head Effluent Pumps (nonmetallic)
Mound Sizing Calculations:

- **Gal/day/bedroom**: 120 gal/day/BR
  - **Number of bedrooms**: 3
  - **GPD (gallons per day)**: 360 gal/day
  - **Loading rate**: 1.0 gal/kg ft. day

- **Bed Width (A) ft.**: 7.5 feet
  - **Function of soil depth**: (D)
  - **Inches of sand under bed upslope (D)**: 12 inches
  - **Depth of rock inches (F)**: 10 inches
  - **Slope in %**: 6%

- **Bed Length (B)**: 48.0 feet GPD/A

- **Depth of fill at downslope (E)**: 17.4 feet

- **End slope width (K)**: 9.2 feet

- **Uplapse width (J)**: 7.2 feet

- **Downslope width (I)**: 12.0 feet

- **Total length (L)**: 66.4 feet

- **Total width (W)**: 28.7 feet

Mound bed/lateral/orifice calculations:

- **Bed square footage**: 360 sq. ft.
  - **Width of "bed" (A)**: 7.5 feet
  - **Length of "bed" (B)**: 48.0 feet
  - **Minimum # orifices (C)**: 60
  - **# laterals (D)**: 3

- **Lateral diameter (E)**: 1 inch

- **Orifices / lateral (F)**: 20

- **Orifice diameter (G)**: 0.125 (1/8"

- **Dynamic residual head (squirt height) (H)**: 60 inches

- **Total orifices (I)**: 60

- **Orifice discharge** given C and D: 0.41 gal/min

- **Total flow**: 24.6 gal/min

- **Lateral length**: 47.0 (remove .5 from both ends)

- **Orifice spacing**: 28.20 inches

- **Lateral spacing (function of bed width)**: 30 inches

Pressure Distribution Detail:

3 laterals center fed by a mainfold adjusted to 60 inches dynamic residual head. Spacing between orifices is 28.2 inches which implies 20, 0.125 (1/8") inch orifices per lateral.

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<thead>
<tr>
<th># orifices</th>
<th>Pipe Dia (in.)</th>
<th>Pipe Class</th>
<th>Pipe Length (ft)</th>
<th>Flow (gpm)</th>
<th>Head Loss (ft*)</th>
<th>Elevation Difference</th>
<th>Cum. Head</th>
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<tr>
<td>Pump to Manifold</td>
<td>1.5</td>
<td>sch 40</td>
<td>110</td>
<td>24.6</td>
<td>4.00</td>
<td>15</td>
<td>19.00</td>
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<tr>
<td>Lateral 1</td>
<td>20</td>
<td>1</td>
<td>sch 40</td>
<td>47.0</td>
<td>8.20</td>
<td>1.80</td>
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<td>Lateral 2</td>
<td>20</td>
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</tr>
<tr>
<td>Lateral 3</td>
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<td>1</td>
<td>sch 40</td>
<td>47.0</td>
<td>8.20</td>
<td>1.80</td>
<td>0</td>
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<tr>
<td>Residual Head</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td>5.00</td>
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<tr>
<td><strong>Totals</strong></td>
<td></td>
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<td></td>
<td></td>
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<td><strong>29.40</strong></td>
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Pump Specification:

Use OSI P3005 or equivalent to meet pressure distribution requirements of 24.6 gpm at 29.4 feet head.

Theoretical Timer Settings:

- *set timer based on actual performance to drain field*

  - Normal time regime
    - **assumed usage per day**: 180 gal/day
    - **flow to drain field**: 24.6 gal/min
    - **total minutes on to DF per day**: 7.32 min/day
  - **on time**: 0.91 minutes
  - **dose volume**: 22.5 gal
  - **cycles / day**: 8
  - **off time**: 3.00 hours

  - Veto time regime
    - **assumed usage per day**: 360 gal/day
    - **flow to drain field**: 24.6 gal/min
    - **total minutes on to DF per day**: 14.63 min/day
  - **on time**: 1.22 minutes
  - **dose volume**: 30.0 gal
  - **cycles / day**: 12
  - **off time**: 2.00 hours

EXPIRES 03/18/2024
Mound Layout Detail

Plan View

- 1.25" SCH 40 PVC TRANSMISSION LINE FROM PUMP CHAMBER

- 12" washed drain rock
- 12" imported cover soil at peak
- 12" imported cover soil on top of drain rock
- ASTM C-33 sand

Cross Section

- Approx. 8% slope
- Down slope monitoring port
  4" perf. 27/29 with slip cap
- Terminate at original grade
Mound Bed Details

1/8" orifices spaced at 28.2" 20 orifices per lateral, 60 orifices total

1.5" sch 40 pvc transmission line from pump chamber

1" sch 40 pvc lateral  clean out to grade (four total)

typar 3201 filter fabric on top of drain rock
cleanout extending to grade (only one of three at this end shown) - see detail

SECTION A - BED END VIEW - SAND AND COVER SOIL NOT SHOWN

install valve box over cleanout assembly make lid flush with final ground level

All pressure fittings shall be schedule 40

SECTION B - CLEANOUT END VIEW
# Application For An On-Site Sewage System Permit

## GENERAL APPLICATION INFORMATION

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<th>Lot #:</th>
<th>29-30</th>
<th>Sec: 34</th>
<th>Twp: 31</th>
<th>Rg: 04</th>
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<td>Expedited</td>
<td>☐</td>
<td>Renewal</td>
<td>☐</td>
<td>Redesign</td>
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<tr>
<th>Applicant Name:</th>
<th>WALANI HARRIS</th>
<th>Plat / SP Name:</th>
<th>GOODWIN WATERFRONT TRACTS</th>
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<th>Mailing Address:</th>
<th>2219 SAWDUST ROAD, SUITE 805</th>
<th>City:</th>
<th>THE WOODLANDS</th>
<th>State:</th>
<th>TX</th>
<th>Zip:</th>
<th>77380</th>
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<table>
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<tr>
<th>Applicant Phone:</th>
<th>281-825-6110</th>
<th>Applicant Email:</th>
<th><a href="mailto:ARON@WESTCOPM.COM">ARON@WESTCOPM.COM</a></th>
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<tr>
<th>Installation Address:</th>
<th>1500 39TH AVE NW</th>
<th>Installation City:</th>
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<th>Water Supply:</th>
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## SEWAGE DISPOSAL SYSTEM DESIGN INFORMATION

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<th>☐ Existing</th>
<th>☐ SFR</th>
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<th>☐ Commercial</th>
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<th>☐ SSD</th>
<th>☐ Mound</th>
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<th>Design Flow:</th>
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<th>% Slope in Drainfield Area:</th>
<th>10%</th>
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<th>Depth to Water Table/Restrictive Layer:</th>
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<th>Application Rate:</th>
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<tr>
<th>Absorption Area:</th>
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## DESIGNER INFORMATION

<table>
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<th>Designer Name (Printed):</th>
<th>David Mitchell</th>
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<th>Designer Signature:</th>
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<table>
<thead>
<tr>
<th>Address:</th>
<th>19712 E. Conway Hill Lane / Mount Vernon / WA / 98274</th>
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<tr>
<th>License Number:</th>
<th>5100137</th>
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<tr>
<th>Email:</th>
<th><a href="mailto:david@mitchellsptic.com">david@mitchellsptic.com</a></th>
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<tr>
<th>Fee Simple Owner, Contract Purchaser or Owner's Authorized Agent's Name (Printed):</th>
<th>David Mitchell</th>
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<th>Fee Simple Owner, Contract Purchaser or Owner's Authorized Agent's Signature:</th>
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<th>Designer Comments:</th>
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## HEALTH DISTRICT USE ONLY

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Section Map

- Section map source: Snohomish County Assessor's GIS office. Accuracy is not guaranteed.
- All bearings, dimensions and locations are approximate.
- Map is intended to show parcel in context of neighboring properties and to assist in site location.
NOTES

- SPECIFIED CONTROL PANEL IS 220V AND HIGH HEAD PUMP IS 220V 1.5 HP
- USE 60 PVC FITTINGS INSIDE PUMP CHAMBER
- CONCRETE TANKS SHOWN; POLYETHYLENE TANKS OF EQUIVALENT SIZE ARE ACCEPTABLE WHERE INSTALLATION HONORS SHORELINE SETBACK
- TANK INSTALLATION TO BE CAREFULLY COORDINATED WITH EX. HOUSE DEMOLITION AND NEW FOUNDATION CONSTRUCTION.
- TANK INSTALLATION PRIOR TO FOUNDATION CONSTRUCTION LIKELY REQUIRED
- INVERT OF PLUMBING STUB SHALL NOT BE GREATER THAN 23° BELOW FINISHED GRADE AT STUBOUT
- IMPORTANT: REFER TO ATTACHED DESIGN COMMENTARY

1= Soil log hole - see attached sheet for soil descriptions
- Site features and relative elevations established using a Leica TCRA 1103 Total Station and Allegro CX Data Collector
- This document is NOT A SURVEY and is not intended as such. Property corner, boundary, topography, and site feature depictions are derived from field measurements, client representation, and public documents. This drawing is intended ONLY for the evaluation, review, and/or approval of an on-site septic system and should not be relied on for other purposes.
- All bearings, dimensions, and locations are approximate.
- Call the Washington Utilities Coordinating Council BEFORE YOU DIG at 1-800-424-6565. This service is free and requires 48 hour notice.
- Grading, clearing or other soil alteration movement in the drain field area can destroy the site's ability to support an on-site septic system. Clearing shall be performed only after consultation with a licensed designer or installer.
- Minimum County and State code requirements shall be met whether described in this document or not.
- Wastewater entering this system is expected to have the consistency and strength typical of domestic households (aka "Residential sewage") with Septic Tank Effluent parameters not exceeding the following ranges: BOD5: 120-200 mg/L, CBOD5: 100-181 mg/L, TSS: 40-160 mg/L, Oil and Grease: 10-25 mg/L.
## Soil Log Detail

### Horizon Depth, Color, Modifier, Texture, Rate Type

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<th>Color, Modifier</th>
<th>Texture</th>
<th>Rate</th>
<th>Type</th>
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<td>0</td>
<td>BRN</td>
<td>0.60</td>
<td>4</td>
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<tr>
<td>3 to 24 inches</td>
<td>ORG BRN</td>
<td>SL</td>
<td>0.60</td>
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<td>24 to 40 inches</td>
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<td>40+ inches</td>
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<td>SCL</td>
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### Soil Log 2

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</thead>
<tbody>
<tr>
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</tr>
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<td>LFS</td>
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### Soil Log 3

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<td>4 to 25 inches</td>
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<td>25 to 43 inches</td>
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<td>20 to 40 inches</td>
<td>CL</td>
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<td>40+ inches</td>
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### Soil Log 5

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<td>4</td>
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<tr>
<td>20+ inches</td>
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<tr>
<td>0 to 4 inches</td>
<td>0</td>
<td>BRN</td>
<td>0.60</td>
<td>4</td>
</tr>
<tr>
<td>4 to 24 inches</td>
<td>ORG BRN</td>
<td>SL</td>
<td>0.60</td>
<td>4</td>
</tr>
<tr>
<td>24 to 44 inches</td>
<td>CL</td>
<td>LFS</td>
<td>0.60</td>
<td>4</td>
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<tr>
<td>44+ inches</td>
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### Soil Log 7

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<th>Type</th>
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</thead>
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<td>L</td>
<td>0.60</td>
<td>4</td>
</tr>
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<td>5 to 22 inches</td>
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<td>22 to 46 inches</td>
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<td>4</td>
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<td>46+ inches</td>
<td>BRN GRY</td>
<td>HP</td>
<td>--</td>
<td>6</td>
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</table>
Design Commentary

Project Description: On-site septic system to support a building permit for a 5 bedroom single family residence:

Install New:
- 4" 3034 PVC gravity line:
  - Connect residence to tank using 4" 3034 PVC per SDR 35 maintaining 1/4"/foot minimum fall between building and septic tank inlet and such that new tanks are no greater than 12" deep. See notes on Tank layout.
  - Install cleanout as indicated on attached detail.
- Septic Tank:
  - 1750 gallon, two compartment concrete tank approved for use in Washington State.
  - Install tanks +/- 3 feet from house outside of shoreline buffer as indicated on attached detailed sheet.
  - Tank to have 24" (min.) diameter, cast in place risers with gasketed lids extending to finished grade.
  - Fit outlet with Zabel A100-8 outlet baffle filter or approved equivalent.
  - Tank elevation shall be carefully established prior to digging the tank hole. See notes on Tank layout.
- Gravity feeds, via 4" 3034 PVC with 1/8"/foot minimum fall:
  - Pump chamber:
    - concrete, 1750 gallon, single compartment tank with risers to grade.
    - feeds via 1.5" PVC Sch 40 transport line.
    - USE Sch 80 PVC fittings inside pump chamber.
    - Install tanks less than 5 feet from house outside of shoreline buffer. See notes on Tank layout.
- Valve Assembly: 1.5" header feeding 1.25 inch dia. laterals.
- Fit lines with ball valves. Use ball valves to adjust residual dynamic head to 60" in each trench.
- Extend access to grade.
- Pressure drain field:
  - Designed for 5 bedroom x 120 gallons/bedroom/day equals peak loading of 600 gallons per day/.6 gal/sq ft/day = 1000 square feet.
  - Configure as 6 pressurized trenches, each 3 feet wide, lengths as shown, totaling 335 lineal feet.
  - Spacing between 1/8 inch orifices shall be 60" which implies a total of 56 orifices.
  - Orient orifices at 12 o’clock position and install orifice shields.
  - 4.5’ minimum wall to wall spacing.
  - Install using Low-Profile gravel-less vaults.
  - NO DRAIN FIELD SIZE REDUCTION SHALL BE TAKEN.
  - TANEX Cintoflex E mesh required on trench bottom prior to placing gravel-less vault to act as rodent barrier.
  - Install clean out at distal end of each lateral (6 total).
- Pump: OSI high head PF3015 (220V, 1.5 Horse power) or pre-approved equivalent.
- Controls: Rhombus IFS11W/11H4D8AC (220V) panel with timer, elapsed time meter and high water alarm or approved better.
- Theoretical timer on attached sheet.
- Set timer based on draw-down test at time of installation.
- MOUNT PANEL IN LOCATION WHERE NOISE FROM MOTOR CONTRACTOR WILL NOT DISTURB OCCUPANTS OF RESIDENCE.

Site specific notes:
- SPECIFIED CONTROL PANEL IS 220V AND HIGH HEAD PUMP IS 220V 1.5 HP.
- USE 80 PVC FITTINGS INSIDE PUMP CHAMBER.
- CONCRETE TANKS SHOWN; POLYETHYLENE TANKS OF EQUIVALENT SIZE ARE ACCEPTABLE WHERE INSTALLATION HONORS SHORELINE SETBACK.
- TANK INSTALLATION TO BE CAREFULLY COORDINATED WITH EX. HOUSE DEMOLITION AND NEW FOUNDATION CONSTRUCTION.
- TANK INSTALLATION PRIOR TO FOUNDATION CONSTRUCTION LIKELY REQUIRED.
- INVERT OF PLUMBING STUB SHALL NOT BE GREATER THAN 23" BELOW FINISHED GRADE AT STUBOUT.

Reserve: ALT system area shown.
- Pressure Fittings: PVC Fittings Sch 40 per ASTM D-2466 and PVC Sch 80.
- Piping: Gravity sewer: 4" PVC D-3034; Pressurized pipe: PVC Pipe Sch 40 per ASTM D-1785.
- Encasing: Water lines shall maintain a minimum horizontal separation of 10' from septic system components.
- SPECIFIED CONTROL PANEL IS 220V AND HIGH HEAD PUMP IS 220V 1.5 HP.
- TANK INSTALLATION TO BE CAREFULLY COORDINATED WITH EX. HOUSE DEMOLITION AND NEW FOUNDATION CONSTRUCTION.
- TANK INSTALLATION PRIOR TO FOUNDATION CONSTRUCTION LIKELY REQUIRED.
- INVERT OF PLUMBING STUB SHALL NOT BE GREATER THAN 23" BELOW FINISHED GRADE AT STUBOUT.

NOTES:
- Both tanks are to be water tested prior to backfill. All tanks to have risers to finished grade.
- It is the Licensed Installer’s responsibility to supply the pump, floats, and alarm panel and plumb the pump and floats. Wiring the pump, floats, and alarm panel is the responsibility of a Licensed Electrician. All bid documents should reflect consideration of necessary wiring work.
NOTES
- SPECIFIED CONTROL PANEL IS 220V AND HIGH HEAD PUMP IS 220V 1.5 HP
- USE 80 PVC FITTINGS INSIDE PUMP CHAMBER
- CONCRETE TANKS SHOWN; POLYETHYLENE TANKS OF EQUIVALENT SIZE ARE ACCEPTABLE WHERE INSTALLATION HONORS SHORELINE SETBACK
- TANK INSTALLATION TO BE CAREFULLY COORDINATED WITH EX. HOUSE DEMOLITION AND NEW FOUNDATION CONSTRUCTION.
- TANK INSTALLATION PRIOR TO FOUNDATION CONSTRUCTION LIKELY REQUIRED
- INVERT OF PLUMBING STUB SHALL NOT BE GREATER THAN 23" BELOW FINISHED GRADE AT STUBOUT
- IMPORTANT: REFER TO ATTACHED DESIGN COMMENTARY

1. Soil log hole - see attached sheet for soil descriptions.
2. Site features and relative elevations established using a Leica TCRA 1103 Total Station and Allegro CX Data Collector
3. This document is NOT A SURVEY and is not intended as such. Property corner, boundary, topography, and site feature descriptions are derived from field measurements, client representation, and public documents. This drawing is intended only for the evaluation, review, and/or approval of an on-site septic system and should not be relied on for other purposes.
4. All bearings, dimensions, and locations are approximate.
5. Call the Washington Utilities Coordinating Council BEFORE YOU DIG at 1-800-424-5555. This service is free and requires 48 hour notice.
6. Grading, clearing, or other soil alteration in the drain field area can destroy the site's ability to support an on-site septic system. Clearing shall be performed only after consultation with a licensed designer or installer.
7. Minimum County and State code requirements shall be met whether described in this document or not.
8. Wastewater entering this system is expected to have the consistency and strength typical of domestic households (i.e., "Residential sewage") with Septic Tank Effluent parameters not exceeding the following ranges: BOD: 100-200 mg/L, COD: 100-191 mg/L, TSS: 40-150 mg/L, Oil and Grease: 10-25 mg/L.

System Detail: Tanks

0'  15'  30'
SCALE 1" = 30'
System Detail: Reserve Area

- Reserve Area 1500 SQ FT
- Drip Drain Field 5 BRD, Meeting Treatment Level E

Legend:
- Soil test hole - see attached sheet for soil descriptions.
- Site features and relative elevations established using Leica TCRA 1103 Total Station and Allegro CX Data Collector.
- This document is NOT A SURVEY and is not intended as such. Property corner, boundary, topography, and soil feature depictions are derived from field measurements, client representation, and public documents. This drawing is intended ONLY for the evaluation, review, and/or approval of an on-site septic system and should not be relied on for other purposes.
- All bearings, dimensions, and locations are approximate.
- Call the Washington Utilities Coordinating Council BEFORE YOU DIG at 1-800-424-6668. This service is free and requires 48 hour notice.
- Grading, clearing, or other soil alteration/movement in the drain field area can destroy the site's ability to support an on-site septic system. Grading shall be performed only after consultation with a licensed designer or installer.
- Minimum County and State code requirements shall be met whether described in this document or not.
- Wastewater entering this system is expected to have the consistency and strength typical of domestic households (aka "Residential sewage") with Septic Tank Effluent parameters not exceeding the following ranges: BOD5 100-200 mg/L, COD 100-191 mg/L, TSS 49-150 mg/L, Oil and Grease 10.05 mg/L.
System Detail: Drainfield

TREE REMOVAL
NEEDED BEFORE
INSTALLATION

VALVE ASSEMBLY
(INCLUDE CHECK
VALVES)

CLEAN-OUTS TO
GRADE (6 TOTAL)

PRESSURIZED DRAIN
FIELD FOR 600
GALLONS PER DAY

WATER METER (7 LAKES)

Important: refer to attached Design Commentary

- Soil test hole - see attached sheet for soil descriptions.
- Site features and relative elevations established using a Leica TCRA 1103 Total Station and Allegro CX Data Collector.
- This document is NOT A SURVEY and is not intended as such.
- Property corner, boundary, topography, and site feature depictions are derived from field measurements, client representation, and public documents.
- This drawing is intended ONLY for the evaluation, review, and/or approval of an on-site septic system and should not be relied on for other purposes.
- All bearings, dimensions, and locations are approximations.
- Call the Washington Utilities Coordinating Council BEFORE YOU DIG at 1-800-424-6655. This service is free and requires 48 hour notice.
- Grading, clearing or other soil alteration/movement in the drain field area can destroy the site's ability to support an on-site septic system. Clearing shall be performed only after consultation with a licensed designer or installer.
- Minimum County and State code requirements shall be met whether described in this document or not.
- Wastewater entering this system is expected to having the consistency and strength typical of domestic households, (aka "Residential sewage") with Septic Tank Effluent parameters not exceeding the following ranges: BOD5: 130-200 mg/L, CBOD5: 100-191 mg/L, TSS: 49-150 mg/L, Oil and Grease: 10-25 mg/L.
OPTION 1 -
Glendon BioFilter

Septic Tank Outlet Filter
Zabel Model A100-8™

A smaller version of the original ZABEL Disc Dam Filter, the A100/300-8™ Series is becoming a popular choice for applications where increased effluent quality is desired.

A100-8™ Series

The A100-8 is ideal for single and multi-family residential applications or light commercial settings where increased flows or higher quality effluent are required. The A100-8 is sized to handle flow rates from 1200 to 2400 gpd and is available in three different lengths. Every A100-8 is housed in ZABEL's Versa-Case to provide ease of installation with features such as a dual hub that solvent welds to either 4" or 6" SCH 40 pipe, reducer built into the bottom of the case, and optional supplemental filtering slots on the outlet to prevent solids carryover during servicing.

1/16" Filtration
Available lengths 18", 26" & 32"

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<td>78 - 338</td>
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<td>Available Filter Dimensions</td>
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<td>12x20, 12x28, 12x36</td>
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<td>Disc Dam Technology</td>
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<tr>
<td>Installed in Multiples for Larger Flows</td>
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<td>High TSS Removal</td>
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<td>Benefits</td>
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<tr>
<td>Extends Life of Leaching Fields</td>
<td>x</td>
</tr>
<tr>
<td>Keeps Solids in Septic Tank</td>
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</table>
1750 Gallon Pre-cast Concrete
Single Compartment Pump Chamber

SPECIFIED CONTROL PANEL IS 220V AND HIGH HEAD PUMP IS 220V 1.5 HP

NOTES:
- Confirm dimensions with tank manufacturer prior to installation.
- Piping & fittings B in and around tank shall be 4" PVC sewer per ASTM D3034.
- Tank shall be water tight as installed.
- Call the Washington Utilities Coordination Council before you dig at 1-800-444-5555.

This service is free and requires 48-hour notice.
- Wastewater entering this system is expected to have the consistency and strength typical of domestic households, i.e., residential, sewage. With septictank effluent parameters not exceeding the following ranges: BOD 100-200 ppm, COD: 100-150 ppm, TSS: 200-400 ppm, and grease 25-50 ppm.

Designate direction of liquid waste flow.

THE DIMENSIONS SHOWN IN THIS DRAWING REPRESENT A TANK PRODUCED BY BERG VAILT COMPANY (360-433-4599). A SAFETY VOLUME 002 CONCRETE (360-433-5531). WATER TIGHT SEPTIC TANK IS AN ACCEPTABLE ALTERNATIVE.

© 2022 Mitchell Septic, Inc.
NOTE: The septic tank shall be water tight as installed.

1. **Obtain a permit**: A permit is required from the Snohomish Health District to install a septic tank. In addition to the permit, the Health District will require certain inspections during the construction process.

2. **Locate the tank**: The tank does not need to be placed in the exact location specified in the drawing. Generally tanks should be: a. downhill of the building and as close to ground level (i.e. shallow) as possible. 12" depth to the top of the tanks is preferred unless water table conditions suggest higher placement.

3. **Verify the setbacks**:
   3.1 Stake out the septic tank area on the ground in the location shown on the site plan. Measure from the edge of the septic tank to the various site features having setback requirements. The installer is responsible for maintaining compliance with all local rules. Check the setbacks. If the septic tank does not meet the set backs, then: a. STOP. b.) contact the Designer of Record or Health District Inspector before proceeding.
   3.2 Washington Administrative Code 246-272A-0210 Table IV specifies minimum set backs to site features. The Health District may require greater set backs in which case they would take precedent.

4. **Regulatory requirements of the design**: The septic tank must be approved by the Health District.

5. **Details**: The dimensions shown in the drawing represent the tank produced by Berg Vault Company (360-424-4999). It is the Installer's responsibility to confirm tank dimensions with the manufacturer prior to installation.

   5.1 The septic tank must be installed level plus minus 1/2 inch. If the septic tank is set so that the outlet is less than 1 inch below the inlet, then it is unacceptable and will have to be reset. 3" of sand or pea gravel bedding is required if large (>3") or sharp rocks are exposed at the bottom of the excavation.

   5.2 The inlet pipe outlet pipe and seam formed by the wall and lid of the tank should be grouted with Custom Plug Hydraulic Patching or equivalent to assure the water tightness of the tank.

   5.3 A water test of the septic tank is required if the tank feeds a pump chamber containing a pump controlled by a timer panel.

6. **Piping**:
   6.2. Interior: 4" PVC sewer per ASTM D-2729.
   6.3. Slope: from house connection to tank: minimum slope of 1/4" per foot.

7. **Clean out**: Between the house and the septic tank install a clean out using a 4" PVC sweep tee (a wye and 1/4 bend may be substituted). Terminate the inlet of the clean out at or above finished grade with a female adapter and a threaded plug. Grease the threads of the plug so it can be removed later. A clean out shall be installed up stream of any 90 degree bend or every 100 feet in a transmission line carrying untreated sewage. A detail of the clean out is shown on the tank drawing.

8. **Fittings**: inside the septic tank shall be glued in place.
   8.1 Install tees at the inlet and outlet and intercompartmental wall. Extend into the clarified zone, typically 40% of the liquid depth. All fittings must be 4" PVC sewer D-2729.

9. **Outlet baffle filter**: The outlet of the septic tank shall be fitted with a filter as indicated in the tank cross section.

10. **Risers**:
    10.1 Risers are to be a minimum of 24 inches diameter and lids are to be at or above final grade. Consult with the tank manufacturer about adjusting riser heights to final grade.
    10.2 Risers shall attach risers to the top of the septic tank in a manner that prevents the riser and the top of the septic tank.

11. **Inspection**: It is the licensed installer's responsibility to determine which inspections the regulatory authorities and the Designer of Record before installation. Inspections are requesting inspections you are agreeing to pay for them.
# Pump Specification and Pressure Distribution and Timer Settings Calculations

## Specified Control Panel is 220V and High Head Pump is 220V 1.5 HP

### Parameters

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<td>Max Elevation Lift</td>
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<td>Manifold Pipe Class</td>
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<td>Manifold Pipe Size</td>
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<tr>
<td>Number of Laterals/Per Cell</td>
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<tr>
<td>Lateral Length</td>
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<tr>
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<td>Residual Head</td>
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<td>Flow Meter</td>
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<tr>
<td>'Add-on' Friction Losses</td>
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</tbody>
</table>

### Calculations

- Minimum Flow Rate per Orifice: 0.43 gpm
- Number of Orifices per Zone: 72
- Total Flow Rate per Zone: 31.2 gpm
- Number of Laterals per Zone: 6
- % Flow Differential 1st/Last Orifice: 0.8%
- Transport Velocity: 4.9 fps

### Frictional Head Losses

- Loss through Discharge: 2.9 feet
- Loss in Transport: 24.8 feet
- Loss through Valve: 0.0 feet
- Loss in Manifold: 0.7 feet
- Loss in Laterals: 0.1 feet
- Loss through Flowmeter: 0.0 feet
- 'Add-on' Friction Losses: 0.0 feet

### Pipe Volumes

<table>
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<th>Volume</th>
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<tr>
<td>Vol of Transport Line</td>
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<tr>
<td>Vol of Manifold</td>
<td>1.6 gals</td>
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<tr>
<td>Vol of Laterals per Zone</td>
<td>36.1 gals</td>
</tr>
<tr>
<td>Total Volume</td>
<td>74.2 gals</td>
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</tbody>
</table>

### Minimum Pump Requirements

- Design Flow Rate: 31.2 gpm
- Total Dynamic Head: 106.5 feet

---

### Theoretical Timer Settings

- \textit{'normal' time regime}:
  - assumed usage per day: 600 gal/day
  - flow to drain field: 31.2 gal/min
  - total minutes on to DFS per day: 19.3 min/day
  - on time: 4.0 minutes
dose volume:
  - cycles / day: 125 gal

- off time: 4.7 HR. (282 MINUTES)

\[ \text{NOTE: set timer based on actual performance to drain field} \]

--

### Pump Data

- PF3005 High Head Effluent Pump
  - 30 GPM, 1/2 HP
  - 115/230V 60Hz, 200V 30 60Hz

- PF3007 High Head Effluent Pump
  - 30 GPM, 3/4 HP
  - 230V 60Hz, 200V 30 60Hz

- PF3010 High Head Effluent Pump
  - 30 GPM, 1 HP
  - 230V 60Hz, 200V 30 60Hz

- PF3015 High Head Effluent Pump
  - 30 GPM, 1-1/2 HP
  - 230V 60Hz, 200V 30 60Hz

\[ \text{PD calculations and curve source: Orenco Systems, Inc. PumpSelectTM v2.14 2009} \]

---

**Legend**

- System Curve: **—**
- Pump Curve: **—**
- Pump Optimal Range: **—**
- Operating Point: \( \bigcirc \)
- Design Point: \( \bigcirc \)

---

**SP: 03/16/2023**

**David D. Mitchell**

**LICENSED DESIGNER**

**EXPIRES** 03/18/2024
Pump Chamber Electronics

CONTROL PANEL: IFS11W914H4D8AC

FEATURES:
- Installation Friendly Series - IFS Single Phase Simplex
- Single phase, simple, installable, ready-to-install, 4 x 8A control panel
- The 4A control panel is designed to control one 230, 460, 240VAC single phase pump
- Includes a manual reset button and a test button
- The control panel can be mounted on a wall or a panel
- Touch Pad Features
  - Easy-to-read labels
  - Touch-sensitive interface
  - Control panel is easy to install and use

CONTROL PANEL: 240 VOLT RHOMBUS IFS11W114H8AC OR APPROVED BETTER. PANEL INCLUDES HIGH WATER ALARM, DOSE TIMING, EVENT COUNTER AND ELAPSED TIME METER.

THEORETICAL TIMER SETTINGS ARE SHOWN ON ATTACHED PRESSURE DISTRIBUTION ANALYSIS.

ACTUAL SETTINGS ARE DETERMINED BY ON-SITE DRAWDOWN TEST NOT TO EXCEED DAILY DESIGN FLOW.

AVOID PLACEMENT OF PANEL ON EXTERIOR WALL BEDS

High Head Effluent Pump
Model PF301512-20

Technical Data Sheet
PF Series High-Head Effluent Pumps

Applications:
- The PF Series High-Head Effluent Pumps are designed to handle effluent from residential, commercial, and agricultural applications requiring high head and flow rates.
- Ideal for applications such as septic systems, irrigation systems, and industrial effluent systems.
- Engineered to handle demanding conditions, ensuring reliable performance and long-lasting durability.

Nomenclature:
- PF Series: PF301512-20
- HP: 1.5 HP
- Voltage: 220V
- Flow Rate: 1,500 gallons per hour (GPH)
- Head: 120 feet

Features/Specifications:
- **Engineered Design:** The PF Series pumps are designed for maximum efficiency and reliability, ensuring years of trouble-free operation.
- **High-Head Performance:** Designed to handle high head applications with ease, providing superior performance in challenging environments.
- **Low Maintenance:** Built to last, with minimal moving parts and a sealed motor for reduced maintenance and extended life.
- **Versatile Applications:** Suitable for a wide range of applications, including septic systems, irrigation, and industrial effluent systems.

Standard Models:
- PF301512-20 (220V, 1.5 HP)

For more information, please visit our website or contact our sales team.
Barrier - place on bottom of trench excavation prior to placing gravel-less vault. Extend/wrap excess material around sides of vault

TANEX Cintoflex E
Available at BERG VAULT 360-424-4999