

Cover Page

CALCULATIONS (New OWTS):

Proposed Bed & Breakfast with 5 Bedrooms

LTAR = 0.80 GPD/SF - Imported "Secondary" Sand Media

LTAR = 0.15 GPD/SF - USDA Soil Type 4A (TL1).

Linear Loading Rate = 5 GPD/LF - USDA Soil Type 4A

Groundwater Evidence Encountered at 22" & 36" Below Existing Grade.

$$Q = (5 \text{ BDRM})(150 \text{ GPD})$$

$$Q = 750.0 \text{ Gallons per Day (GPD)}$$

Adjustment Factor for Chambers = 0.7

$$Q = (750.0)(1.0)(0.7) = 525.0 \text{ GPD}$$

$$A = \frac{Q}{\text{LTAR}} = \frac{525.0 \text{ GPD}}{0.80 \text{ GPD/SF}} = 656.25 \text{ SF - Distribution Area}$$

$$A = \frac{Q}{\text{LTAR}} = \frac{525.0 \text{ GPD}}{0.15 \text{ GPD/SF}} = 3,500.0 \text{ SF - Basal Area}$$

Distribution Area: Chamber Bed System (Uniformly Pressure Dosed):

A (Min) = 656.25 SF

Infiltrator Systems Inc. Quick 4 Plus Low Profile Chambers

Chambers = SF RQD / 12.0 SF per Chamber

Chambers = 656.25 SF / 12.0 SF = Min. 55 Chambers

Install 1 Zone: 2 Rows x 28 Chambers Long

Chambers Provided = 56 Total

Total Contact Area Actual = 672.0 SF

Total Contact Area Required = 656.25 SF

Note: Use of Alternative Chambers is Acceptable.

For ARC 36 Low-Profile Chambers (15.0 SF / Chamber). Install 1 Zone with 2 Rows of 22 Chambers (44 Total). 660.0 SF Provided. Contact Engineer for Clarification.

Basal Area: Sand Media

A (Min) = 3,500.0 SF

Distribution Length = 110 FT

Distribution Width = 6 FT

Downslope Width = 28 FT

Upslope Width = 6 FT

End Slope Length = 11 FT

Treatment Length = 110 FT (Length of Distribution)

Treatment Width = 34 FT (Width of Distribution + Downslope)

A (Actual) = (Length) X (Width) - Treatment Dimensions

A (Actual) = (110 FT) X (34 FT)

A (Actual) = 3,740.0 SF

Tank Sizes:

Main Tank Size = New 2,000 Gallons (Two-Compartment)

Pump Chamber = New 500 Gallons (One-Compartment)

1,500 Gallon (2-Comp) Plus 1,250 Gallon (2-Comp) Concrete Tanks with Pump in Last Chamber is Acceptable

INSPECTIONS REQUIRED ARE AS FOLLOWS:

- 1.) Engineer to Inspect Excavation Prior to Placement of Approved Sand Fill.
- 2.) Engineer Will Inspect the Installation of All OWTS Components (i.e. All Plumbing, Tanks, Pump Chamber, STA, etc.) Prior to Backfill.
- 3.) Engineer to Inspect the Soil Treatment Area After Backfill to Insure Min. Cover and Proper Drainage Away from Soil Treatment Area. Please Notify this Office Min. 24 Hours Prior to Inspection.

IMPORTED SAND SPECIFICATION (See Page 3 and 4):

Sand for Soil Treatment Area Absorption Bed to be Imported

"Secondary" Sand Media:

Effective Size (D10) = 0.15-0.60 mm

Coefficient of Uniformity, Cu (D60/D10) \leq 7.0

Note: 100% Passing #4 Sieve

Less Than 3% Passing #200 Sieve

Note: ASTM C-33 w/ Less Than 3% Fines Generally Meets "Secondary" Sand Media Requirements. Gradation Curve of the Sand Media Used **MUST** be Provided to Engineer Prior to Installation. Gradation Must be Dated No More Than One Month Prior to Installation Date.

HOMEOWNER RESPONSIBILITY:

- Maintain Active Service Contract w/ Licensed Operation & Maintenance Contractor per EPCHD Regulations
 - Have OWTS Inspected Annually (Service Contract)
 - Clean Effluent Filter
 - Flush Laterals
 - Function Test Valve Assemblies
 - Check Water Levels in Inspection Ports
 - Have Septic Tank Pump Every 3-5 Years (or As Needed, Contact Licensed Pumper)
 - Plant Native Grass Over STA (No Plants with Roots or that Require Irrigation)
 - Don't Pour Chemicals Down Drain
 - Don't Throw Trash in Toilet (Minimize Toilet Paper Consumption)
 - Use of Garbage Disposal is Discouraged
 - Conserve Water and Repair Leaking Fixtures
- This is NOT a Complete List (Contact Local Health Department and EPA List of Septic "Do's and Don'ts")

GENERAL NOTES:

All Work per El Paso County Board of Health Regulations Chapter 8: On-Site Wastewater Treatment Systems (OWTS) Criteria.

All Setbacks Shall Conform to El Paso County Regulations (See Table 7-1 in the Regulations for Additional Information). Contractor/Homeowner Must Verify All Setbacks and Obtain Utility Clearances Prior to Construction.

Contractor/Homeowner is Responsible for Permit. Contractor/Homeowner Must Obtain Approval of Engineered OWTS from the El Paso County Health Department.

All Bends Limited to 45 Degree Ells or Long Sweep Quarter Bends. Areas Under Driveways Shall Be Protected as Per El Paso County Health Department Regulations.

Building Sewer Clean-Outs Shall Be Installed within 5 FT of the Structure and at Intervals Not to Exceed 100 FT in Straight Runs, Upstream at Each Change of Direction Greater Than 45°, and at Any Combination of Bends Greater Than 45° within a 40 FT Section of Building Sewer.

Grade Surrounding Area to Drain Away from the Soil Treatment Area (STA).

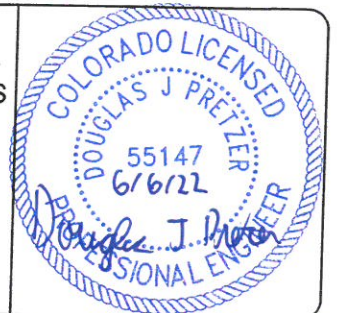
Paving, Planting of Trees/Shrubs, Irrigation, Vehicular Traffic or Hoofed Animal Traffic of Any Kind Over the STA may Cause Premature Failure and is Prohibited.

Refer to Sheet 2, 3, 4, and 5 for Additional Details and Information.

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Geoquest, LLC. has Provided this Design in Accordance with the Standards of Practice Common to the Area. However, as with All Underground Absorption Fields, Guarantee from Failure is Impossible. Even with Proper Installation, as Outlined for this Proposed Construction, There Can Remain Many Uncertainties, and Difficulties Can Still Arise in the Operation of the System in the Future. Proper Design, Construction, and Maintenance can Assist in Minimizing Uncertainties, but Cannot Entirely Eliminate Them. Homeowners Should be Advised of Maintenance and Special Considerations for Septic Systems. Refer to El Paso County Public Health Brochure: "Maintaining Your Septic System" for Additional Information. Due to the Possibility of Unknown Water Usage Factors, Geoquest, LLC. Provides No Warranty of this Design or Installation Against Failure or Damage of Any Type. Therefore, the Limits of Liability Extend Only to the Fee Rendered for the Professional Services Provided.

Project: 22-0190	Project Name and Address Amanda Williams 6765 Gun Club Trail, Lot #4, Block #1, Black Forest Country Club, Sch. No. 5207003001 El Paso County, Colorado
Sheet: 1 of 5	
Date: 6 June 2022	
Revised:	
Drawn by: djp	
Checked by: djp	

Distribution Area: Chamber Bed System (Uniformly Pressure Dosed):

A (Min) = 656.25 SF
 Infiltrator Systems Inc. Quick 4 Plus Low Profile Chambers
 # Chambers = SF RQD / 12.0 SF per Chamber
 # Chambers = 656.25 SF / 12.0 SF = Min. 55 Chambers
 Install 1 Zone: 2 Rows x 28 Chambers Long
 # Chambers Provided = 56 Total
 Total Contact Area Actual = 672.0 SF
 Total Contact Area Required = 656.25 SF
 Note: Use of Alternative Chambers is Acceptable.
 For ARC 36 Low-Profile Chambers (15.0 SF / Chamber). Install 1 Zone with 2 Rows of 22 Chambers (44 Total). 660.0 SF Provided. Contact Engineer for Clarification.

All Activities Relating to the Bed & Breakfast Operations Must Use Separate Water Fixtures Inside the B&B and Not Use the Main Residence Water / Sewer and Vice Versa. Includes but Not Limited to: Cooking, Cleaning, and Laundry.

OWTS to be Roped Off (Caution Tape or Temporary Construction Fencing is Acceptable) Prior To and During Construction to Prevent Construction Traffic from Compacting Surface Soils and Protect the STA from Traffic After Installation.

4" Ø Inspection Port / Vent (Typ. of 6). See Detail on Page 3 for Additional Information.

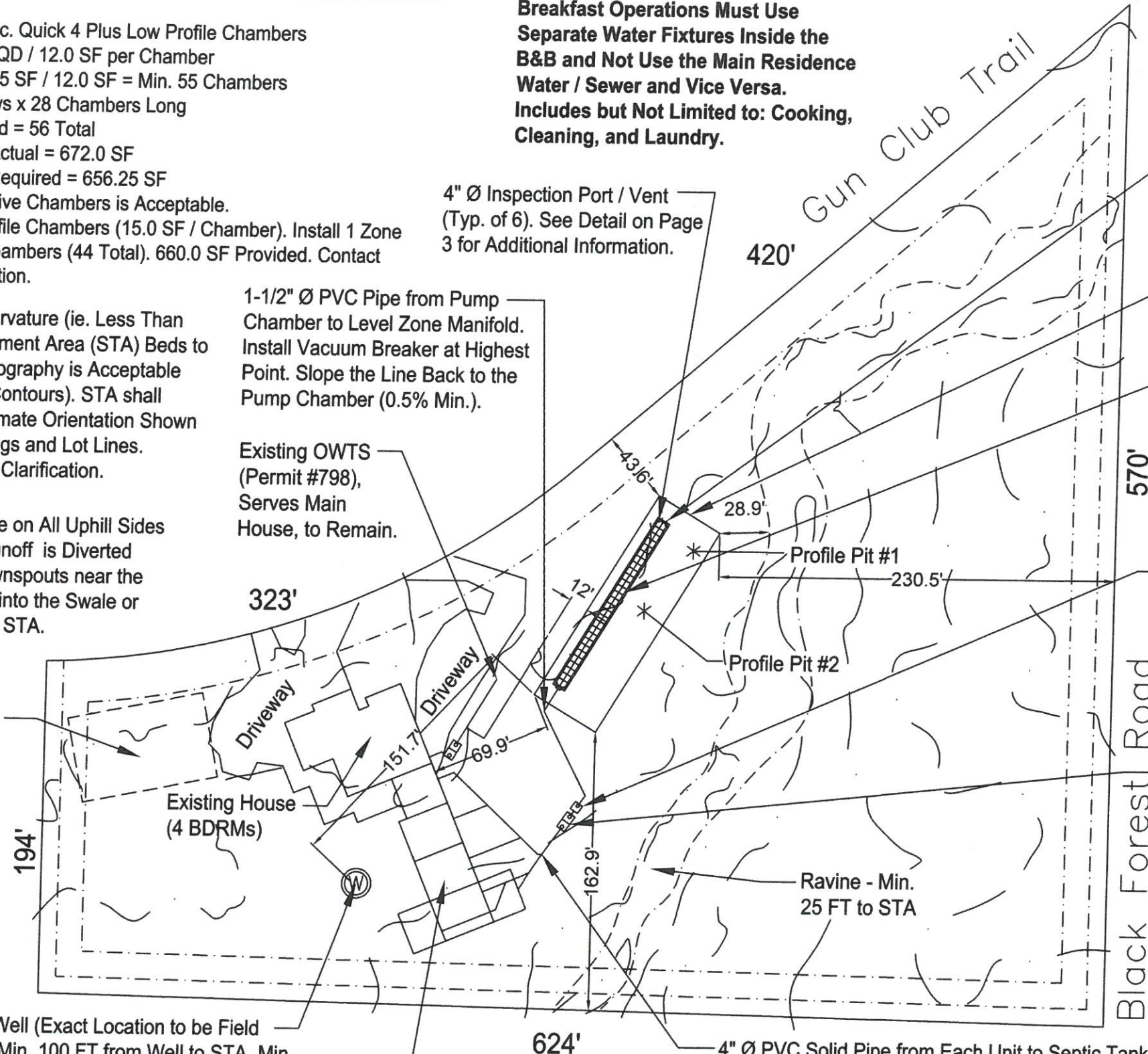
1-1/2" Ø PVC Pipe from Pump Chamber to Level Zone Manifold. Install Vacuum Breaker at Highest Point. Slope the Line Back to the Pump Chamber (0.5% Min.).

Existing OWTS (Permit #798), Serves Main House, to Remain.

Minor Rotation or Curvature (ie. Less Than 15°) of the Soil Treatment Area (STA) Beds to Best Fit the Site Topography is Acceptable (i.e. Parallel to Site Contours). STA shall Maintain the Approximate Orientation Shown w/ Respect to Buildings and Lot Lines. Contact Engineer for Clarification.

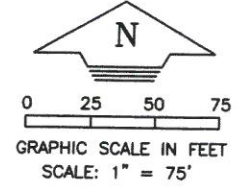
Install Drainage Swale on All Uphill Sides to Ensure Surface Runoff is Diverted Around the STA. Downspouts near the STA Shall Discharge into the Swale or Extended Beyond the STA.

Primary Alternate Soil Treatment Area (STA) Location. Alternate STA Location Must be Protected and Preserved for Future STA Use.



Flushing Valve (Typ. of 2). See Detail on Page 3 for Additional Information.

Bottom of Sand Dimension: 42'x134'. See Page 3 and 4 for Additional Information Related to Sand Dimensions. Follow County Setback.



Quick4 Plus Low Profile Chamber Modulus
 34" W x 48" L x 8" H Each (Typ.)
 1 Zones: 2 Rows of 28 Chambers (56 Total). See STA Layout and Cross-Section for Additional Detail and Clarification. Full Length 1-1/2" Ø Sch. 40 PVC Pipe Suspended from the Top of Chambers per Manufacturers Recommendations (Typ. Each Lateral); Drill 1/8" Ø Holes @ 36" O.C. (Top of Pipe Typ. and Every Third on Bottom).

Min. 500 Gal. Precast Concrete Pump Chamber per County Health Department Regulations (Use of Two Compartment 1,250 Gal. Septic Tank w/ Pump in Second Compartment is an Acceptable Alternative for the Pump Chamber. See Pump Chamber Detail on Page 5 for Additional Information). Pump Chamber Inlet Approx. 30" Below Existing Grade. Risers to Grade with Secure Access Cover (Min. 3" Above Finish Grade, Water Tight, Typ. All Septic Tank Access Locations). Exact Locations to be Field Determined.

Min. 2,000 Gal. Precast Concrete Two Compartment Septic Tank w/ EPCPH Approved Effluent Filter (Requires Regular Maintenance) on Outlet. Main Tank Inlet Approx. 24" Below Existing Grade. Risers to Grade with Secure Access Cover (Min. 3" Above Finish Grade, Water Tight, Typ. All Septic Tank Access Locations). Exact Locations to be Field Determined.

Existing Well (Exact Location to be Field Verified) Min. 100 FT from Well to STA. Min 50 FT from Well to Septic Tanks.

Proposed Bed & Breakfast (5 Bedroom + Common Laundry and Kitchen)

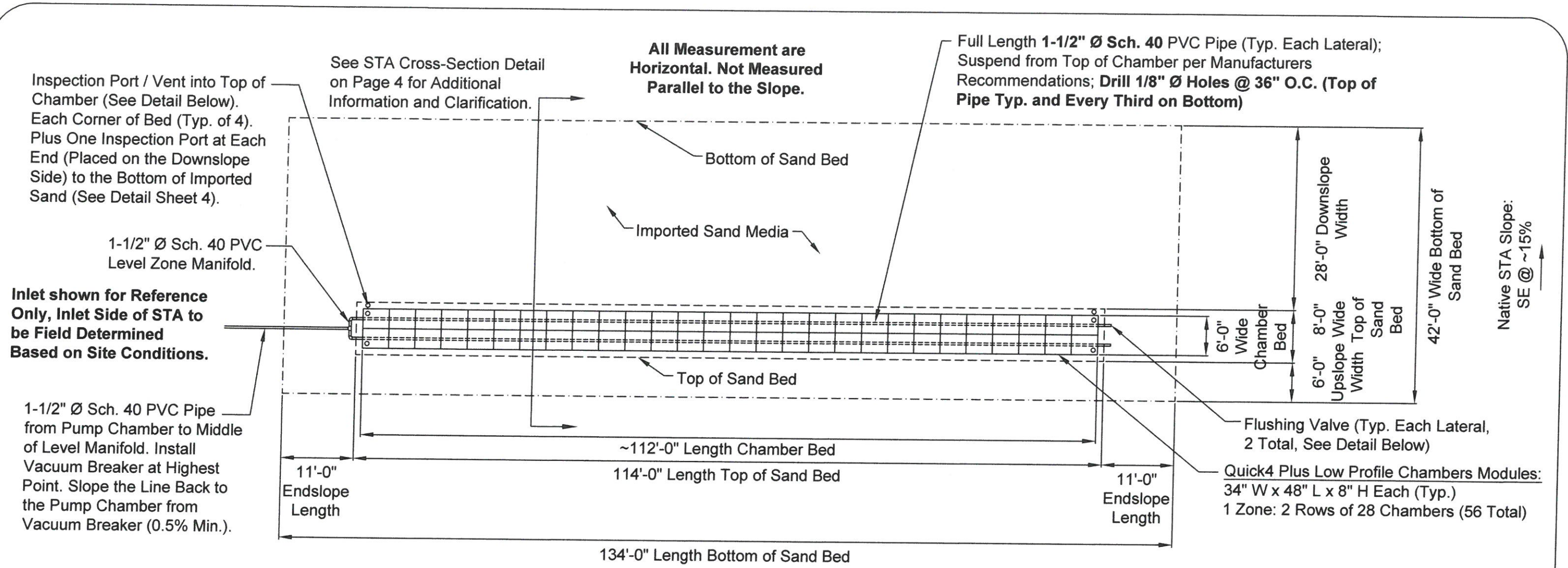
4" Ø PVC Solid Pipe from Each Unit to Septic Tank, Install a Cleanout within 5 FT of Building on Each Line and at Intervals Not to Exceed 100 FT in Straight Runs, Upstream at Each Change of Direction Greater Than 45°, and at Any Combination of Bends Greater Than 45° within a 40 FT Section of Building Sewer. Maintain 2.0% Min. Grade on Pipe Feeding the Septic Tank. Exact Location of the Discharge Line from the Building per Plumbing Design by Others.

Site Plan

*Indicates Geoquest, LLC. Profile Pit Test Locations
 Location from Northeast Lot Corner to Profile Pit #1: S. 38° W. - 406'
 Location from Profile Pit #1 to Profile Pit #2: S. 38° W. - 45'
 GPS Coordinates Profile Pit #1: N. 39° 01' 27.6" , W. 104° 42' 5.4"
 GPS Coordinates Profile Pit #2: N. 39° 01' 27.3" , W. 104° 42' 5.7"

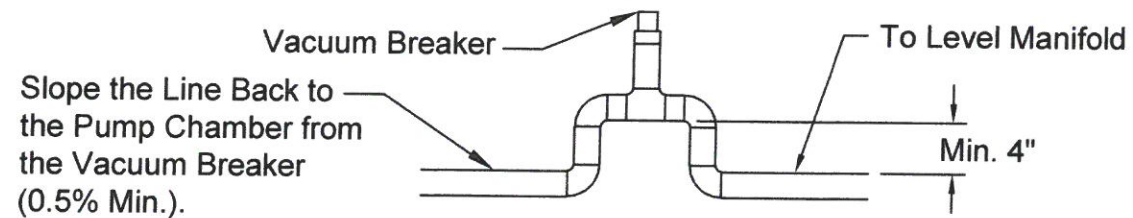
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 6825 SILVER PONDS HEIGHTS SUITE 102
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Project: 22-0190	Project Name and Address
Sheet: 2 of 5	Amanda Williams
Date: 6 June 2022	6765 Gun Club Trail,
Revised:	Lot #4, Block #1,
Drawn by: djp	Black Forest Country Club,
Checked by: djp	Sch. No. 5207003001
	El Paso County, Colorado



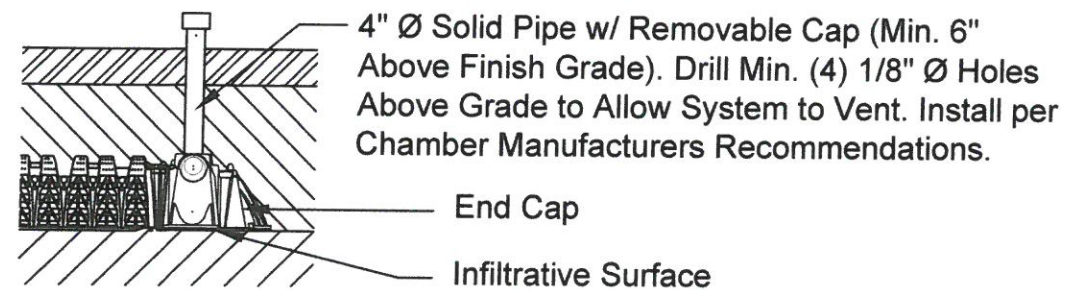
Soil Treatment Area (STA) Layout (Uniformly Pressure Dosed Chamber Beds)

SCALE: 1" = 15'



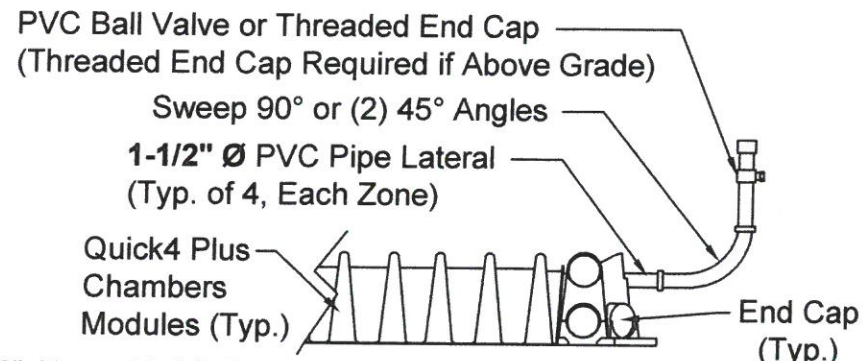
Vacuum Breaker Detail

Not to Scale



Corner Inspection Port / Vent Detail

Not to Scale



Min. 6" Above Finish Grade or May be Placed in Small Valve Box if Desired. This Will Provide Access to Flush Each Lateral, Allowing for Removal of the Build-Up of Organics (System Maintenance).

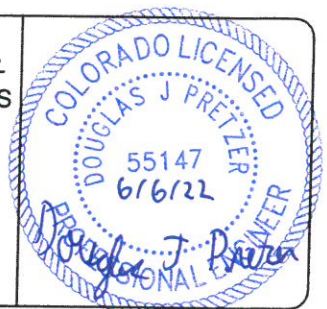
Flushing Valve Detail

Not to Scale

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Sheet: 3 of 5

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Revised:

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Checked by: djp

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6765 Gun Club Trail,
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Black Forest Country Club,
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El Paso County, Colorado

Inspection Port / Vent into Top of Chamber (See Detail Sheet 3). Each Corner of Bed (Typ. of 4). Plus One Inspection Port at Each End to Bottom of Imported Sand (See Detail Below).

Approx. 26" Imported Sand Media (As Measured on the Downhill Side of Sand Bed). Sand Thickness As Necessary to Maintain Sand Depth on Uphill Side.

42'-0" Wide Bottom of Sand Bed

28'-0" Downslope Width

8'-0" Wide Top of Sand Bed

6'-0" Upslope Width

Provide Min. 12" (36" Max.) Cover Over Top of Chambers with Min. 6" Topsoil. Install a Continuous Crowned Slope Over All Chamber Beds to Prevent Ponding of Precipitation. Mound to Extend 12" Past Edge of Chamber Before Sloping Down.

Install Positive Drainage Swale on All Uphill Sides of the STA to Divert Surface Runoff Around STA (Min. 2% Grade).

Plant w/ Native Grasses and Maintain (See Notes)

Min. 14" Imported Sand Media (As Measured on the Uphill Side of Sand Bed). Sand Media per County Spec on Page 1.

Native STA Slope: SE @ ~15%

Groundwater Evidence at 22" Below Existing Grade.






Imported "Secondary" Sand Fill per Sand Specifications on Page 1. **Min. 10" Thick As Measured on the Uphill Side of the Bed and ~ 18" Thick As Measured on the Downhill Side.** Sand Dimensions per Above and Sheet 3.

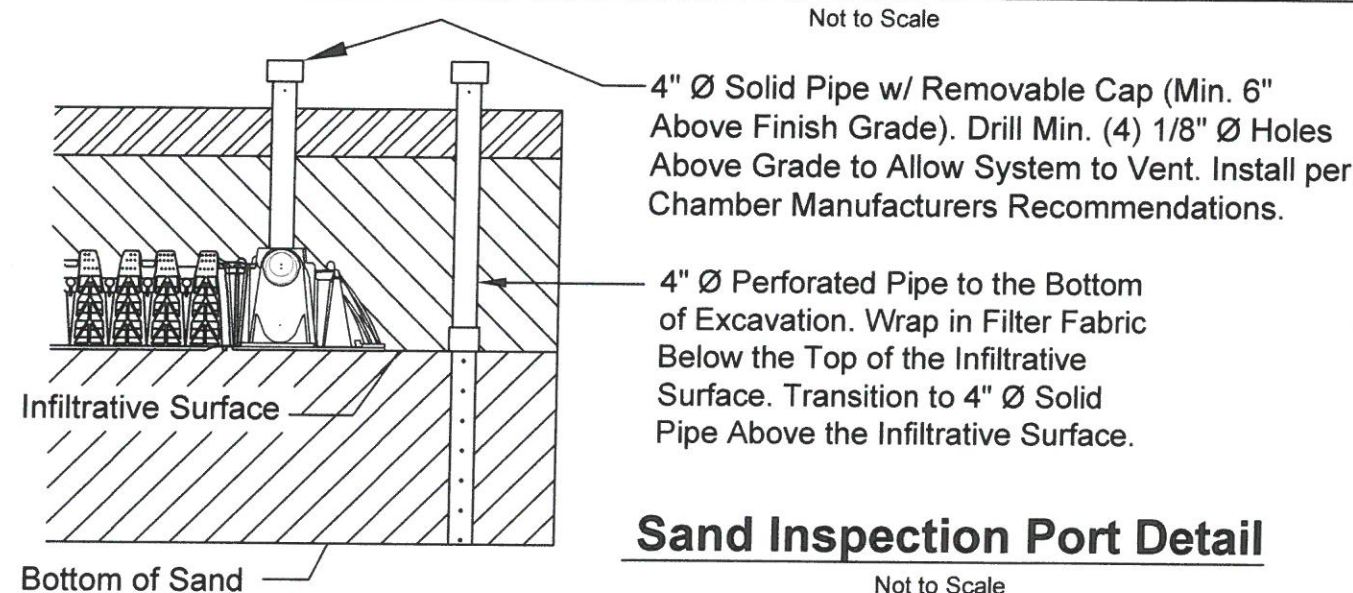
Mow Any Native Grasses and Remove All Trees in the Soil Treatment Area (Ground Stumps). Do Not Remove Topsoil. **Scarify Existing Ground Surface (Prior to Placing Imported Sand)**

Quick4 Plus Low Profile Chambers Modules: 34" W x 48" L x 8" H Each (Typ.)
1 Zone: 2 Rows of 28 Chambers (56 Total)

Full Length 1-1/2" Ø Sch. 40 PVC Pipe (Typ. Each Lateral); Suspend from Top of Chamber per Manufacturers Recommendations; Drill 1/8" Ø Holes @ 36" O.C. (Top of Pipe Typ. and Every Third on Bottom). See STA Layout for Additional Information.

Soil Treatment Area (STA) Cross Section (Uniformly Pressure Dosed Chamber Beds)

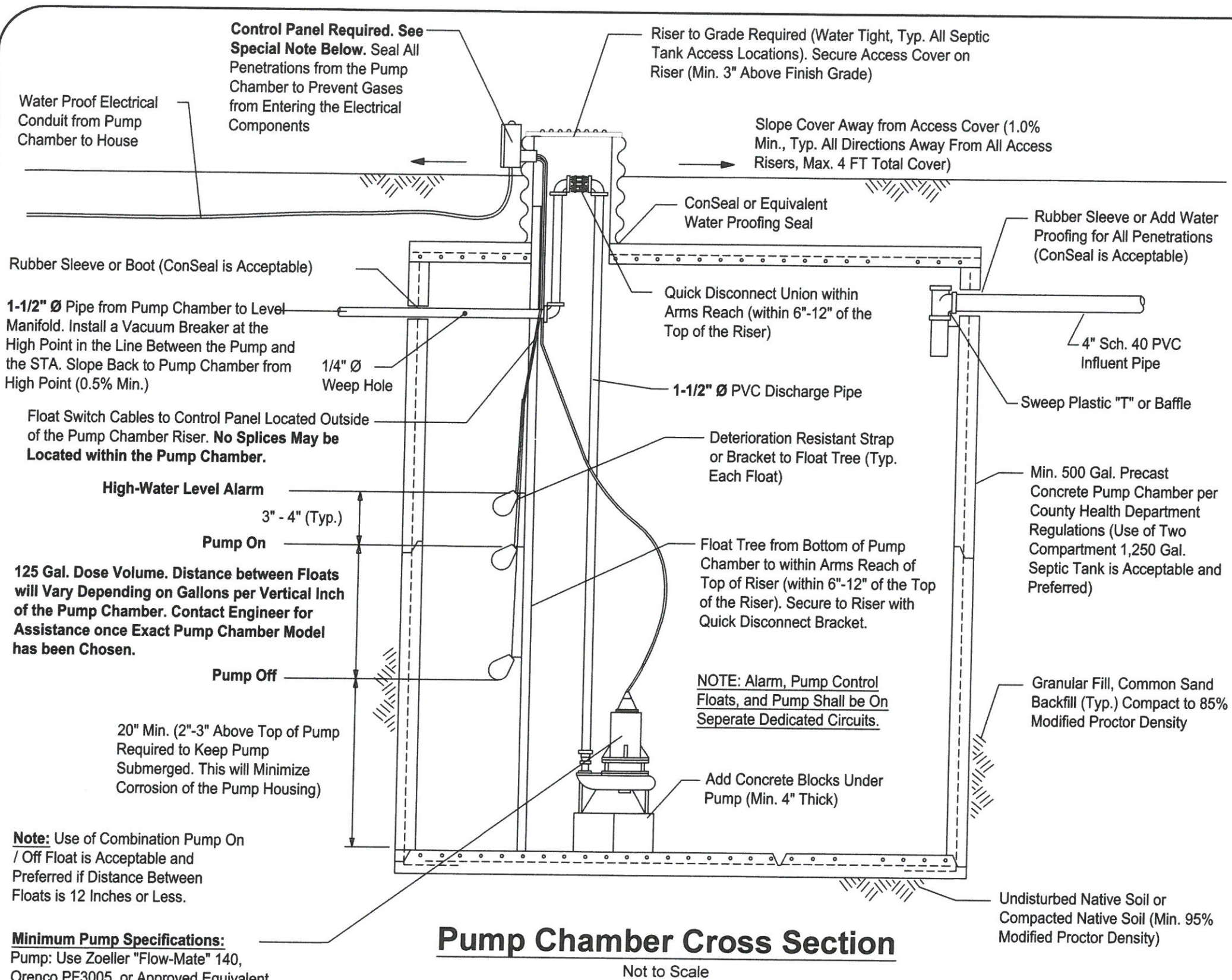
-  Topsoil (Min. 6" on Final Cover). Native Topsoil (Approx. 2")
-  Approved Granular Material to Provide Cover (Min. 12", Max. 36" Total, Including Topsoil)
-  Native Soil - Sandy Clay (USDA 4A, Approx. 2" - 22" Below Existing Grade)
-  Native Soil - Sandy Clay (USDA 4A, Approx. 22" - 8' Below Existing Grade)
-  Imported "Secondary" Sand Fill Under Chamber Bed per EPCPH Specifications Page 1 (Min. 14").



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Pump Chamber Cross Section
Not to Scale

Control Panel Required. See Special Note Below. Seal All Penetrations from the Pump Chamber to Prevent Gases from Entering the Electrical Components

Water Proof Electrical Conduit from Pump Chamber to House

Rubber Sleeve or Boot (ConSeal is Acceptable)

1-1/2" Ø Pipe from Pump Chamber to Level Manifold. Install a Vacuum Breaker at the High Point in the Line Between the Pump and the STA. Slope Back to Pump Chamber from High Point (0.5% Min.)

1/4" Ø Weep Hole

Float Switch Cables to Control Panel Located Outside of the Pump Chamber Riser. **No Splices May be Located within the Pump Chamber.**

High-Water Level Alarm

3" - 4" (Typ.)

Pump On

125 Gal. Dose Volume. Distance between Floats will Vary Depending on Gallons per Vertical Inch of the Pump Chamber. Contact Engineer for Assistance once Exact Pump Chamber Model has been Chosen.

Pump Off

20" Min. (2"-3" Above Top of Pump Required to Keep Pump Submerged. This will Minimize Corrosion of the Pump Housing)

Note: Use of Combination Pump On / Off Float is Acceptable and Preferred if Distance Between Floats is 12 Inches or Less.

Minimum Pump Specifications:
 Pump: Use Zoeller "Flow-Mate" 140, Orenco PF3005, or Approved Equivalent Effluent Pump Prior to Installation (May be Revised Once System has Been Plumbed and Exact Site Conditions are Verified)
Design Flow Rate = Min. 33.5 GPM
Total Dynamic Head (TDH) = Approx. 32.6 ft
 Operating (Residual) Head = 5 FT
 Dose Volume = 125 Gallon

Riser to Grade Required (Water Tight, Typ. All Septic Tank Access Locations). Secure Access Cover on Riser (Min. 3" Above Finish Grade)

Slope Cover Away from Access Cover (1.0% Min., Typ. All Directions Away From All Access Risers, Max. 4 FT Total Cover)

ConSeal or Equivalent Water Proofing Seal

Rubber Sleeve or Add Water Proofing for All Penetrations (ConSeal is Acceptable)

Quick Disconnect Union within Arms Reach (within 6"-12" of the Top of the Riser)

1-1/2" Ø PVC Discharge Pipe

Deterioration Resistant Strap or Bracket to Float Tree (Typ. Each Float)

Float Tree from Bottom of Pump Chamber to within Arms Reach of Top of Riser (within 6"-12" of the Top of the Riser). Secure to Riser with Quick Disconnect Bracket.

NOTE: Alarm, Pump Control Floats, and Pump Shall be on Separate Dedicated Circuits.

Add Concrete Blocks Under Pump (Min. 4" Thick)

4" Sch. 40 PVC Influent Pipe

Sweep Plastic "T" or Baffle

Min. 500 Gal. Precast Concrete Pump Chamber per County Health Department Regulations (Use of Two Compartment 1,250 Gal. Septic Tank is Acceptable and Preferred)

Granular Fill, Common Sand Backfill (Typ.) Compact to 85% Modified Proctor Density

Undisturbed Native Soil or Compacted Native Soil (Min. 95% Modified Proctor Density)

Special Note: Per El Paso County Board of Health Regulations Chapter 8: On-Site Wastewater Treatment Systems (OWTS) Criteria, the Pump System Shall have a Mechanism for Tracking Both the Amount of Time the Pump Runs (Pump Run Counter) and the Number of Cycles the Pump Operates (Event Counter). A Manual Pump Run Switch is Required. A Control Panel is the Most Common Device to Fulfill these Requirements (as well as the Alarm System).

We Recommend the use of the Orenco MVP, Aquaworkx IPC, SJE-Rhombus or Approved Equivalent Control Panel Equipped with a Manual Pump Run Switch, Pump Run Counter, and Event Counter. Engineer to Approve Prior to Installation.

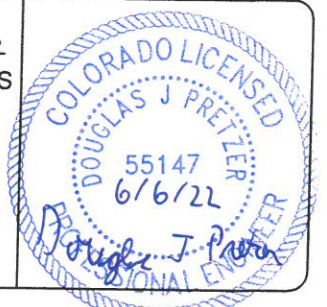
Electrical Code Requirements: All Electrical Work, Equipment, and Material Shall Comply with the Requirements of the Currently Applicable National Electrical Code as Designated by the State Electrical Board Rules and Regulations (3 CCR 710-1) on the Date of the Permit. The Electrical Installer Shall Contact the Electrical Inspector for the Location where the OWTS is Constructed. All Electrical Components Shall be Protected from Moisture and Corrosive Gases. Special Care Shall be Taken to Ensure the Electrical Requirements of Each Component Meet Manufacturer Specifications (i.e. Voltage and Amperage).

1. All Wire Splices Shall be Enclosed in the Control Panel. The Control Panel Shall be Placed in an Accessible Location Positioned Outside of the Tank Riser.
2. All Wires Shall be Spliced with Corrosion-Resistant, Watertight Connectors. **NO WIRE SPLICES ARE ALLOWED WITHIN THE PUMP CHAMBER OR RISER.**
3. Conduits Shall be Sealed to Prevent Gases from Entering the Control Panel and Electrical panel.
4. A Means to Disconnect the House Power Supply to OWTS Components Shall be Provided at the Control Panel.
5. The Branch Circuit Wire from the Building to the Control Panel Shall be a Minimum of 24" Below the Ground Surface. Lines Buried Less than 24" are Allowed, but Will be Required to be in Conduit or have Ground Fault Protection on the Circuit. Conduit from the Control Panel to the House is Strongly Recommended for All Wiring.
6. Conduit Risers for Physical Protection Must Extend Min. 18" Below Finish Grade.

Best Practices Guidelines: The Following "Best Practices" are Intended to Facilitate Maintenance and Servicing of the Electrical Components Associated with Lift Stations, Dosing Systems, and Treatment Units that are Part of an OWTS.

1. The "Quick Disconnect" for the Pump Discharge pipe (i.e. Union) Shall be Located within 6"-12" of the Top of the Riser(s). Electrical Lines at the Septic Tank, Dosing Tank, or Treatment Unit Must be Placed in such a Manner as to Protect them from Damage During Backfill. Conduit from the Control Panel to the House is Strongly Recommended for All Wiring.
2. The Floats Shall be Secured to a Separate Float Tree with Approved Connecting Straps or Brackets that will Remain Secure Underwater and Not Deteriorate. Electrical Tape is Not Acceptable. Top of Float Tree to be within 6" - 12" of the Top of the Riser.
3. The Risers Shall be Secured to the Tank to Maintain the Riser in an Upright and Plumb Position. Special Care Shall be Taken During Backfill to Ensure Riser Maintains Upright and Plumb Position.
4. Control Panel Shall be Placed within "Line of Sight" of the Pump.
5. The Alarm, Pump Control Floats, and Pump Shall be Placed on a Separate Dedicated Circuits

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