



Oregon

Tina Kotek, Governor

Department of Environmental Quality

Eastern Region Bend Office

475 NE Bellevue Dr., Suite 110

Bend, OR 97701

(541) 388-6146

FAX (541) 388-8283

TTY 711

November 12, 2025

Richard and Sara Herman
12028 45th Ave CT NW
Gig Harbor, WA 98332

Re: WQ: Variance Approval: 248-25-000274-VAR: 17043 Elsinore Road; T.20S; R.10E; Sec. 12D;
Tax Lot 200 & 300; 1.01 Acres; Deschutes County.

Dear Richard and Sara Herman,

This correspondence verifies that a variance hearing provided for under Oregon Administrative Rules 340-071-0430, was held on the site at 8:30 am on September 30, 2025, for the subject property referenced above on Elsinore Road in Deschutes County. The purpose of the hearing was to provide a forum for the presentation of supportive facts to show that strict compliance with certain rules regulating onsite sewage disposal are inappropriate, or that special physical conditions at the site render strict compliance unreasonable, burdensome or impractical. The proposal and associated supporting information you provided with the application was presented during the recorded hearing.

Variance Decision:

Based on review and evaluation of the variance record and observations made during the variance hearing, I am pleased to inform you that the variance from the rules cited above is hereby granted. In my opinion, it would be unreasonable to prohibit this method of wastewater treatment by strictly following the administrative rules at this specific location at this time. It is my judgement that the proposed system is not likely to present a public health hazard risk or have any significant adverse impacts to groundwater or surface water quality if properly operated and maintained. This approval is contingent on the well within the 100' setback being decommissioned. This well has been shown as slated for decommission by submitting an active contact to DEQ; this contract also included a replacement well to serve the tax lot.

Justification for this decision:

- The proposed Orenco® AdvanTex AX20N-Mode 3B system is currently approved as a system meeting DEQ's Treatment Standard 2; OAR 340-071-0100(168) "Treatment Standard 2".
- On average, the AX20N-Mode 3B system is one of the best available technologies for Total Nitrogen treatment that has been approved for use in Oregon and is expected to treat residential wastewater to 20 mg/L Total Nitrogen, which is about two thirds of a reduction from that of a standard system and about half from a sand filter system in this climate.
- Treatment Standard 2, for the reduction of fecal coliform, will be met or exceeded with pre-treated effluent from the AX20N-Mode 3B unit (proposed w/o UV disinfection) and the RidNOx™ unit that will discharge into a 250 square foot bottomless sand filter with an

additional 13-inches of sand filter media (embedded 6-inches below ground surface) placed below the filter to meet or exceed the minimum 24-inch separation requirement to groundwater below. Note: The bottomless sand filter is assumed to meet Treatment Standard 2 criteria independently of the ATT, which is why UV disinfection is not included in the proposal.

- Overall Treatment: Treatment first occurs within the AX20N-Mode 3B system (w/o UV) for reductions in TSS, BOD₅ and Total Nitrogen (TN). The RidNOx™ unit is expected to further reduce TN (and Nitrate) as the effluent passes through and makes contact with the soluble carbon being released from the wood chip material. Final discharge will occur through the elevated bottomless sand filter, which may provide some additional reduction/treatment of BOD₅, TSS, Fecal Coliform and TN. It is expected that the final effluent being discharged shall meet or exceed that of the similar Nitrex unit, that was tested during the La Pine National Demonstration Project, which averaged a 96% reduction of TN. The final effluent Nitrate concentration is expected to be well under the EPA drinking water standard of 10 mg/L as well as local action levels set at 7 mg/L.
- The proposed system, with innovative technology, shall be required to be maintained by a certified maintenance provider for the life of the system. Additionally, the system shall be monitored and sampled at regular intervals to ensure that the system is performing as expected. The sampling, monitoring, and maintenance of the system shall be reported to Deschutes County on an annual basis.

Standards found in Oregon Administrative Rules Chapter 340, Division 071 & 073 have been developed to protect public health and the environment in Oregon. The variance officer's duty is to determine if in their professional judgement, the system proposed for this variance consideration is adequate to safeguard the public's health and the environment if variance from the standards noted above are granted. In my opinion, your proposal adequately addresses the limitations present at the site.

Other Considerations:

The effluent from the ATT and RidNOx™ system, discharging through a bottomless sand filter, will have a significant reduction in BOD, TSS, TN, and Fecal Coliform. In this proposal, treated ATT to RidNOx™ effluent will be discharged into a 250 square foot bottomless sand filter with an additional 10- inches of sand filter media embedded 6 - inches into the native soil that will be used to exceed the 24-inch separation from the shallowest water table depth standard by providing a total separation of 27- inches. The additional media will mitigate the lack of vertical separation from the bottom of the sand filter to the highest level of groundwater on site. The RidNOx™ unit is expected to provide a significant reduction of Total Nitrogen (and Nitrate) before the treated effluent enters the bottomless sand filter with a basal area intersecting the native soil and ultimately the groundwater below.

This variance approval is being granted on the condition that requirements contained in the enclosed schedules are met. Schedules A and B (attached) include requirements and specifications for the design and location of the system approved through this variance. Failure to meet these conditions may cause the variance approval to become null & void.

Site History & Variance Proposal:

Deschutes County conducted a site evaluation with 4 test pits within the subject property on May 23, 2025, where a denial was issued for the use of an onsite wastewater system on June 11, 2025. The primary reason for denial was due to the predicted depth to the seasonally high permanent water table being less than 24- inches below the ground surface. Observed conditions associated with saturation that are used to determine water table levels and site suitability were observed between 16- inches and 18-inches below ground surface (bgs), respectively.

The proposal to overcome the site limitations is by installing an Orenco® AdvanTex AX20N-Mode 3B Alternative Treatment Technology System followed by a RidNOx™ solid-phase carbon flow-through filter before discharging to a 250 sq. ft. elevated Bottomless Sand Filter system constructed on a 12-inch bed of sand filter media embedded 6 inches into the native soil. It is expected that the highest level of groundwater within the lowest point of the sand filter areas will come to 18- inches bgs. The proposal overcomes this limitation by providing additional sand filter media with 3- inches of extra vertical separation and providing a total 30-inch separation to the shallowest predicted groundwater depth. The rest of the sand filter will be “conventional” from there up, consisting of 6 inches of underdrain media, 24- inches of sand filter media, 6- inches of drain media (with the distribution laterals), filter fabric, and 6 to 9 inches deep of final backfill on top. The sand filter will be contained within a reinforced concrete container.

You are seeking a variance from the following Oregon Administrative Rules (OAR):

340-071-0135(1) – which addresses DEQ approval of new or innovative technologies, materials, or designs for onsite systems. **This rule is being varied from due to deviating from the approved design for the AX20N in Mode 3B by not requiring UV disinfection. Treatment Standard 2 will still be met or exceeded without the UV disinfection by discharging the treated effluent through a bottomless sand filter.**

340-071-071-0150(4)(a)(B) - which requires all criteria for approving a specific type or types of systems, as described in this division are satisfied.

340-071-0290(4)(d) which states: Bottomless Sand Filter. Sites may use a conventional bottomless sand filter if the site meets the criteria in this section and section (3) of this rule. (d) The water table is at least 24- inches below the ground surface throughout the year, and a minimum 24-inch separation is maintained between a water table and the bottom of the sand filter.

Should future ATT technologies for treatment of Total Nitrogen be approved for use in Oregon before issuance of a construction-installation permit for this site, Deschutes County may allow installation of equal or better technology instead of the type noted in this approval.

Conclusion:

The decision to grant your variance request is a Final Order of DEQ. Any person who is adversely affected or aggrieved by this Order is entitled to a contested case hearing before the Environmental Quality Commission. A request for a hearing must be received by DEQ within twenty days from the date of certified mailing of this Order. The request must specifically describe how the Order fails to meet the requirements of Oregon Revised Statutes 454.657 and 454.660, and include the technical basis that supports the petition. The appeal must be directed to the Environmental Quality

Commission, in care of Lindsay Trapp, EQC Assistant, Department of Environmental Quality, 700 NE Multnomah St., Suite 600, Portland, OR 97232-4100.

Deschutes County onsite staff is hereby authorized to issue a construction-installation permit, subject to all the conditions, upon their receipt of a complete permit application. The application must include a favorable land use compatibility statement issued by Deschutes County, a set of detailed plans and specifications for the onsite wastewater treatment system, a current maintenance service agreement and the appropriate application fee.

Please feel free to contact me if you have any questions concerning this decision. I can be reached by telephone at (541) 776-6130, or by email at david.hurley@deq.oregon.gov.

Sincerely,



David Hurley, REHS
Variance Officer – Onsite Wastewater Program

Encl: Schedule A- Special Conditions
Schedule B- Approved Plans
Approved Drawings / Schematics

cc: Todd Cleveland, REHS; Deschutes County Onsite Wastewater Division, 117 NW Lafayette Ave, Bend OR 97703
Brian T. Rabe, CPSS, WWS; Principal Soil Scientist, of Elkhorn Consulting LLC, 14833 Goodrich Creek Lane, Baker City, OR 97814
Reg Crossman 2019 Revocable Trust, 638 Madison Ave, Mesquite, NV 89027
Pamela Warren Trust, 4570 Thrush Drive NE, Salem, OR 97301
Ibrahim M Shehadeh Revocable Trust, 16894 Jacinto Road, Bend, OR 9777
Dean Scornaienchi, 17046 Elsinore Rd., Bend, OR 97707
JLA Investments LLC, PO box 2617, Eugene, OR 97402
Alfred L. Holman Jr Trust Et Al, PO Box 1896, Albany, OR 97321
Cody & Ashley Herman, 17042 Fontana Rd., Bend, OR 97707
Eike Properties LLC, 9830 SW McKENzie Street, Portland, OR 97223
RJQ Family Trust, 967 Moorea Dr., Roseburg, OR 97471

Schedule A – Herman
Variance Report - Special Conditions
T 20S, R 10E, Sec: 12D, TL 200 & 300

Special Conditions and requirements for the Orenco® AX20N-Mode 3B Alternative Treatment Technology unit with a RidNOx™ system followed by an elevated 250 square foot Bottomless Sand Filter at 17043 Elsinore; T.20S; R.10E; Sec. 12D; Tax Lot 200 & 300; 1.01 Acres; Deschutes County.

1. A person or business licensed by the Department of Environmental Quality in accordance with Oregon Revised Statutes, Chapter 454.695, must perform all work construction of this onsite wastewater treatment system.
2. Before starting with the actual construction of this system, the system installer shall submit, through a written statement to the Deschutes County Community Development Department, Onsite Wastewater Division (hereafter referred to as “County”) that acknowledges that they have thoroughly reviewed the conditions of this variance approval with technical staff in that office, and they understand and will comply with all conditions associated with this variance approval.
3. This system incorporates the use of Sand Filter Media and Underdrain media, as defined in Oregon Administrative Rules (OAR) 340-071-0100(124) and OAR 340-071-0100(170). Prior to delivery to the site, a current sieve analysis, using testing requirements required in rule for the respective material, must be submitted for review and approval to the County. Special handling of the respective media is to occur, during transport, site storage, and construction of the sand filter.
4. This onsite wastewater treatment system shall serve a single-family residence with up to four bedrooms. The projected daily sewage flow must not exceed 450 gallons per day, and the average daily flow must not exceed 225 gallons per day. Where practical, low water-use plumbing fixtures and appliances should be used within the dwelling in conjunction with water conservation practices. **Use of a garbage disposal is not recommended.**
5. All construction of this system shall only occur under optimum soil moisture conditions. The soils must be nearly dry and not frozen. Typically, the ideal construction period begins at the end of spring run-off season and ends prior to the onset of winter weather.
6. The setback to all wells from the initial or replacement bottomless sand filters is to be at least 100 feet.
7. The County shall inspect the installation of this system at those stages of construction they identify as appropriate to ensure proper construction.

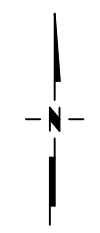
8. Except as specifically authorized, all requirements of the Oregon Administrative Rules (Chapter 340, Rules 071-0100 through 071-0650) must be met.
9. The permittee shall comply with all local planning, zoning and building ordinances.
10. A Certificate of Satisfactory Completion shall be issued for the completed installation only if all conditions of this variance approval are met.
11. Should the onsite wastewater treatment and disposal system, authorized through this variance fail, County staff may exercise professional discretion in effecting a repair, based upon an analysis of the possible causes of failure. An area next to the initial sand filter is to be designated for future repair or replacement and must be reserved for this use. The replacement system considered in this variance procedure is the installation of another sand filter.

TAX LOT 6200
NO RECORDS

TAX LOT 6100
DENIED (1991)

TAX LOT 6000
DENIED (2020)

TAX LOT 5900
DENIED (2018)



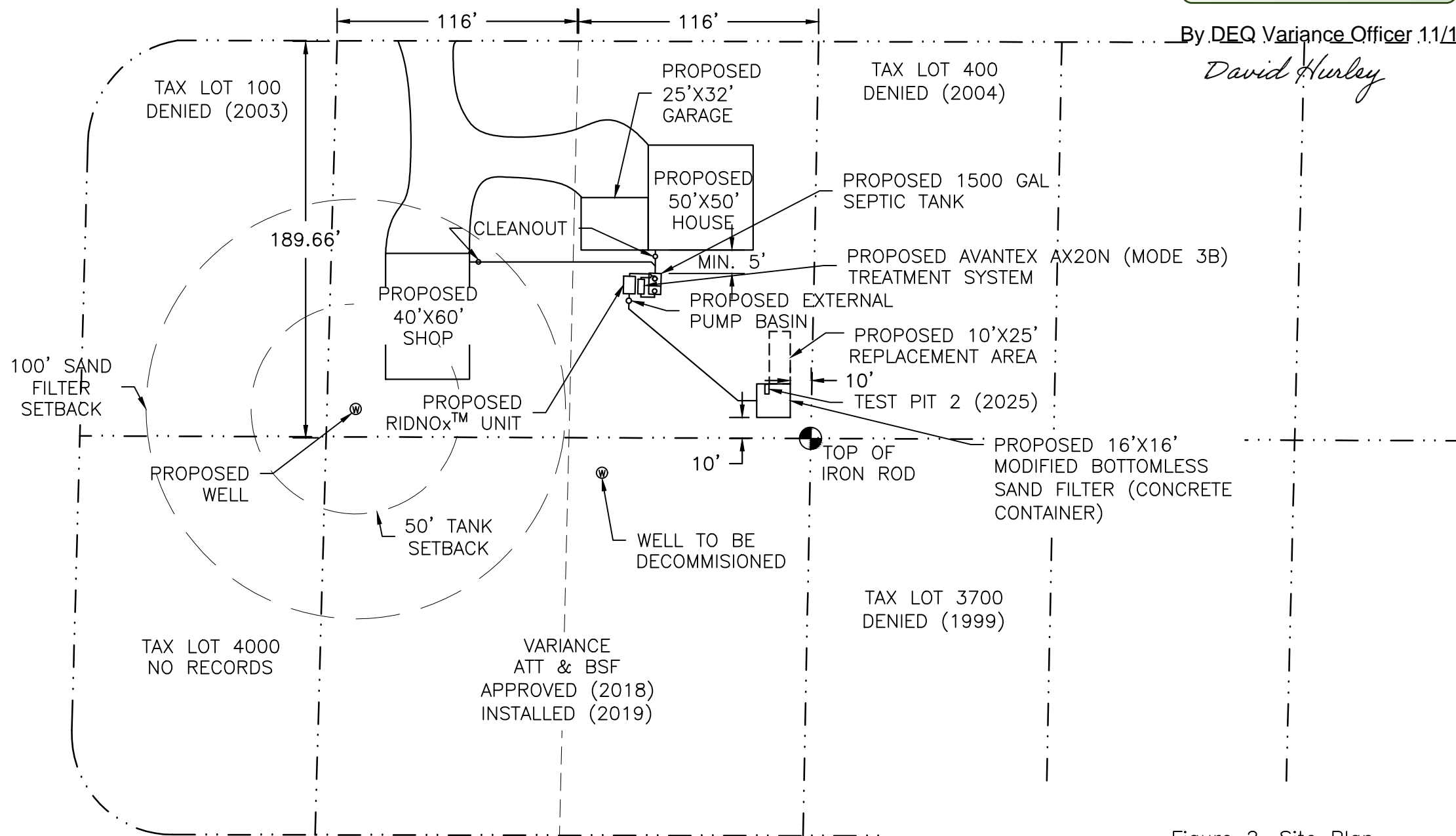
APPROVED

ELSINORE

17033 AND 17043 ELSINORE

By DEQ Variance Officer 11/12/2025

David Hurley



TAX LOT 4000
NO RECORDS

VARIANCE
ATT & BSF
APPROVED (2018)
INSTALLED (2019)

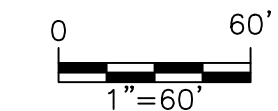
TAX LOT 3700
DENIED (1999)

TAX LOT 100
DENIED (2003)


TAX LOT 400
DENIED (2004)

FONTANA

Figure 2. Site Plan



(SCALE AND LOCATIONS
ARE APPROXIMATE)

PROJECT NUMBER: 2025015	Formal Variance
DATE: 8/12/2025	T20S, R10E, Section 12D, Tax Lots 200 & 300
DWG NO: 2025015 F1-6.DWG	Richard and Sara Herman
DWG BY: PROJECT MANAGER: DDR BRIAN RABE	17043 Elsinore Road
REVISED:	Bend, OR 97707
 ELKHORN CONSULTING LLC	

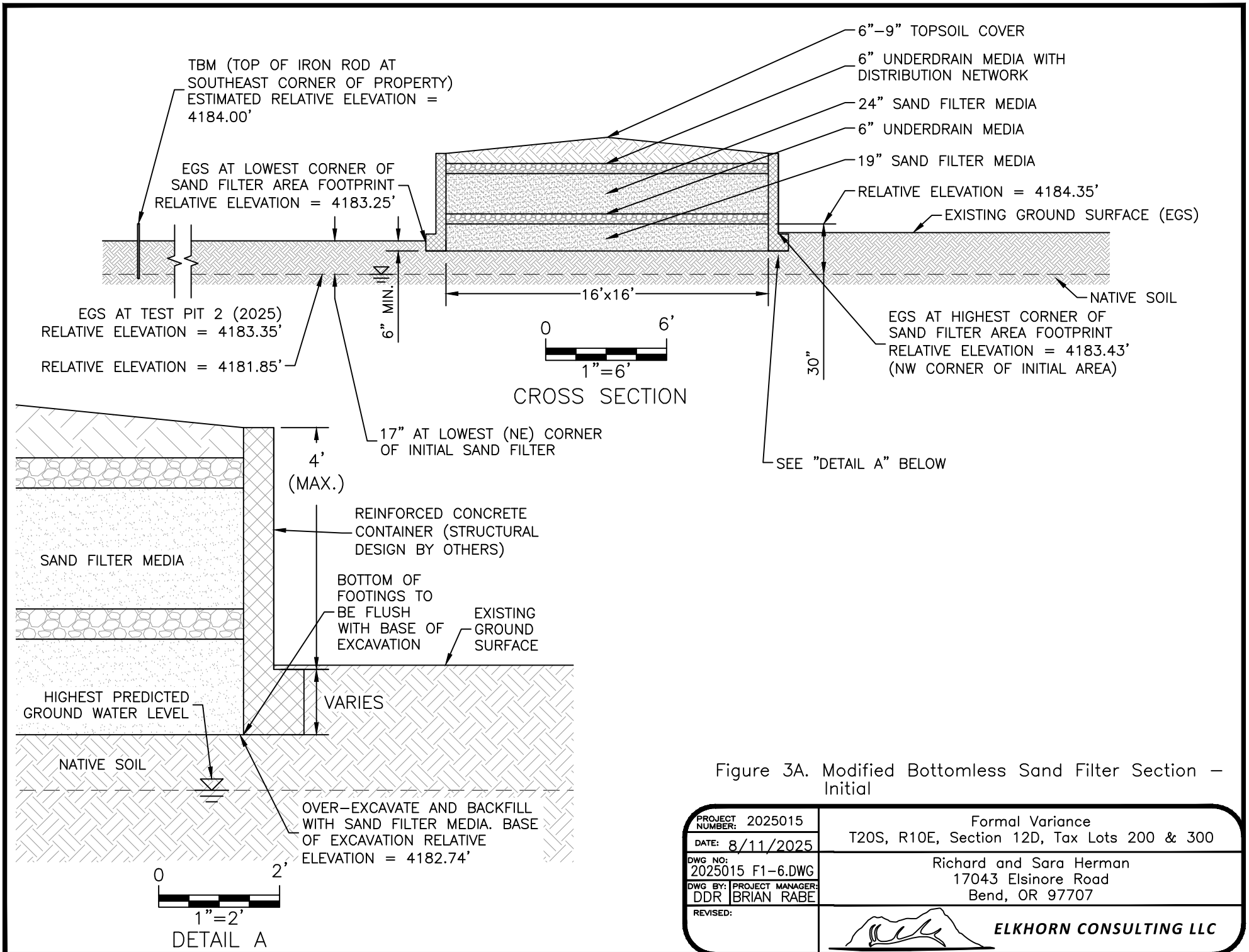



Figure 3A. Modified Bottomless Sand Filter Section – Initial

PROJECT NUMBER: 2025015	Formal Variance
DATE: 8/11/2025	T20S, R10E, Section 12D, Tax Lots 200 & 300
DWG NO: 2025015 F1-6.DWG	Richard and Sara Herman
DWG BY: DDR PROJECT MANAGER: BRIAN RABE	17043 Elsinore Road
REVISED:	Bend, OR 97707
	 ELKHORN CONSULTING LLC

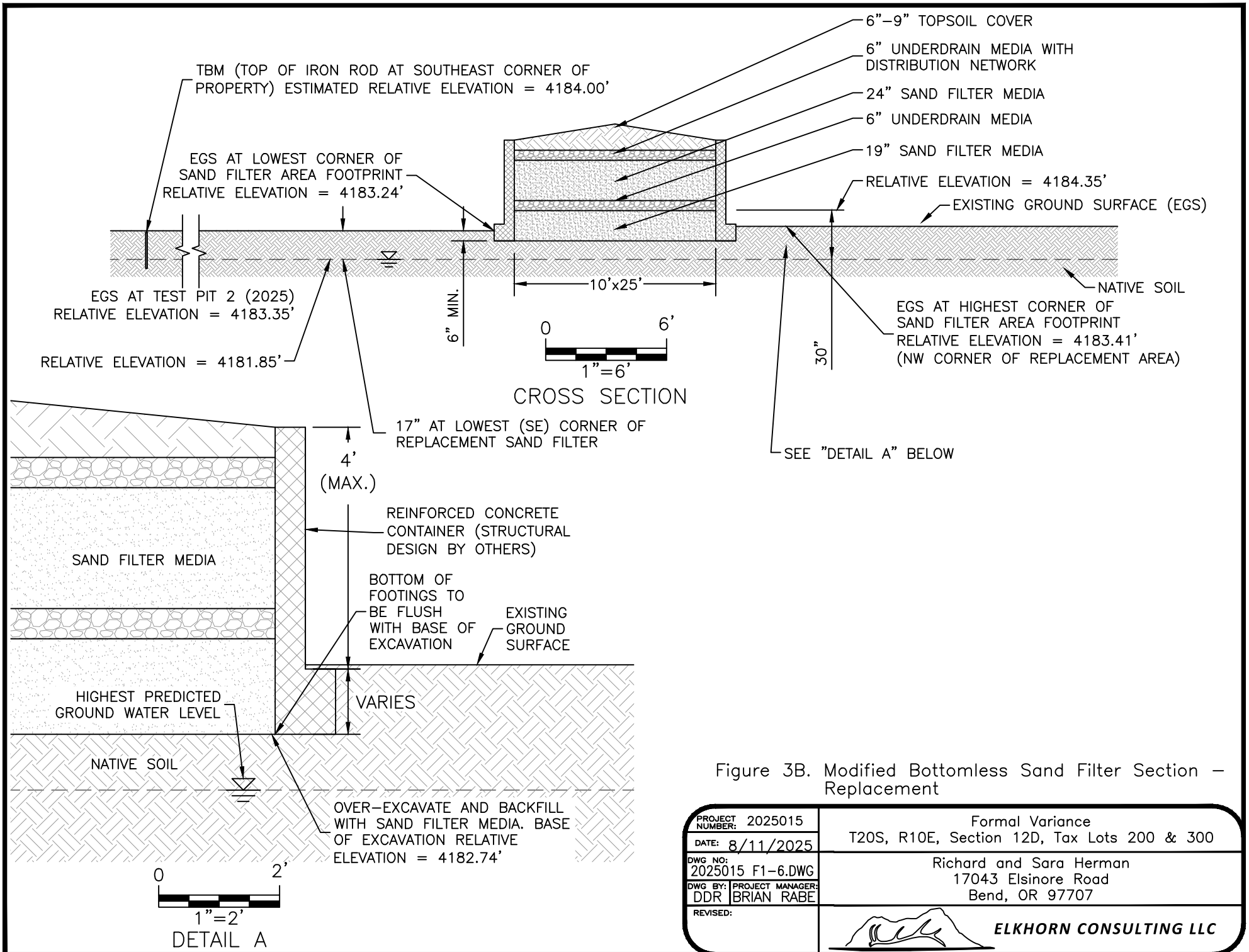

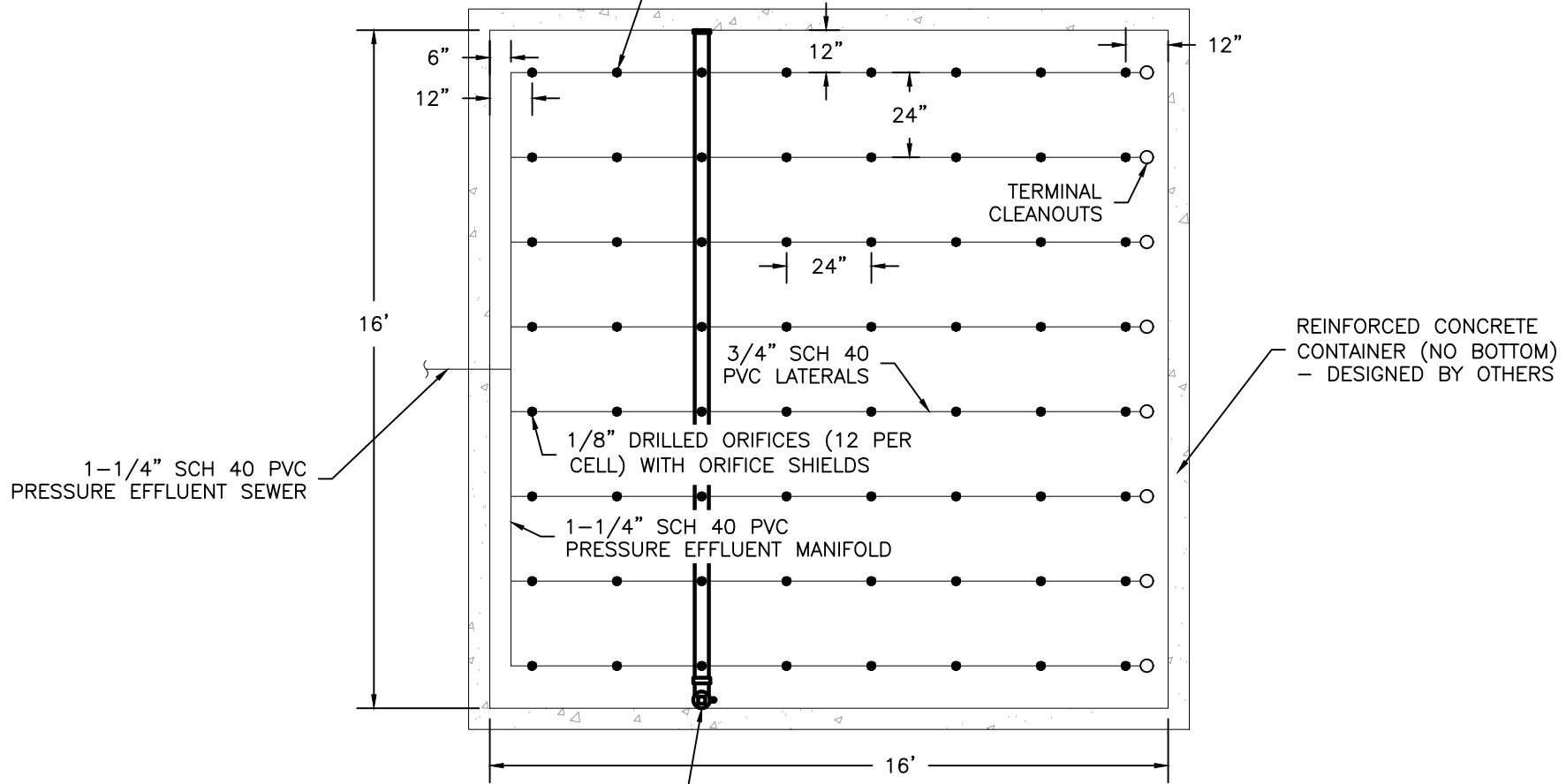


Figure 3B. Modified Bottomless Sand Filter Section – Replacement

PROJECT NUMBER: 2025015	Formal Variance
DATE: 8/11/2025	T20S, R10E, Section 12D, Tax Lots 200 & 300
DWG NO: 2025015 F1-6.DWG	Richard and Sara Herman
DWG BY: DDR PROJECT MANAGER: BRIAN RABE	17043 Elsinore Road
REVISED:	Bend, OR 97707
	 ELKHORN CONSULTING LLC

TOTAL OF 64 ORIFICES
 0.52 GALLONS PER MINUTE
 AT 7.1 FT RESIDUAL HEAD
 (33.1 GPM AT 45.5 FT TDH)
 RECOMMENDED PUMP PF3005

2nd AND 2nd TO LAST ORIFICE OF
 EACH LATERAL ORIENTED DOWN
 ALL OTHERS ORIENTED UP



EFFLUENT SAMPLE COLLECTION LYSIMETER
 (BELOW SAND FILTER MEDIA) - LOCATE
 IN ALIGNMENT DIRECTLY UNDER 3RD ROW
 OF ORIFICES.

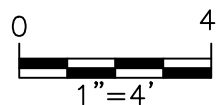



Figure 4A. Sand Filter Plan Detail - Initial

PROJECT NUMBER: 2025015	Formal Variance
DATE: 1/6/2025	T20S, R10E, Section 12D, Tax Lots 200 & 300
DWG NO: 2025015 F1-6.DWG	Richard and Sara Herman
DWG BY: DDR PROJECT MANAGER: BRIAN RABE	17043 Elsinore Road
REVISED:	Bend, OR 97707
	 ELKHORN CONSULTING LLC

TOTAL OF 60 ORIFICES
 0.56 GALLONS PER MINUTE
 AT 8.1 FT RESIDUAL HEAD
 (33.4 GPM AT 44.6 FT TDH)
 RECOMMENDED PUMP PF3005

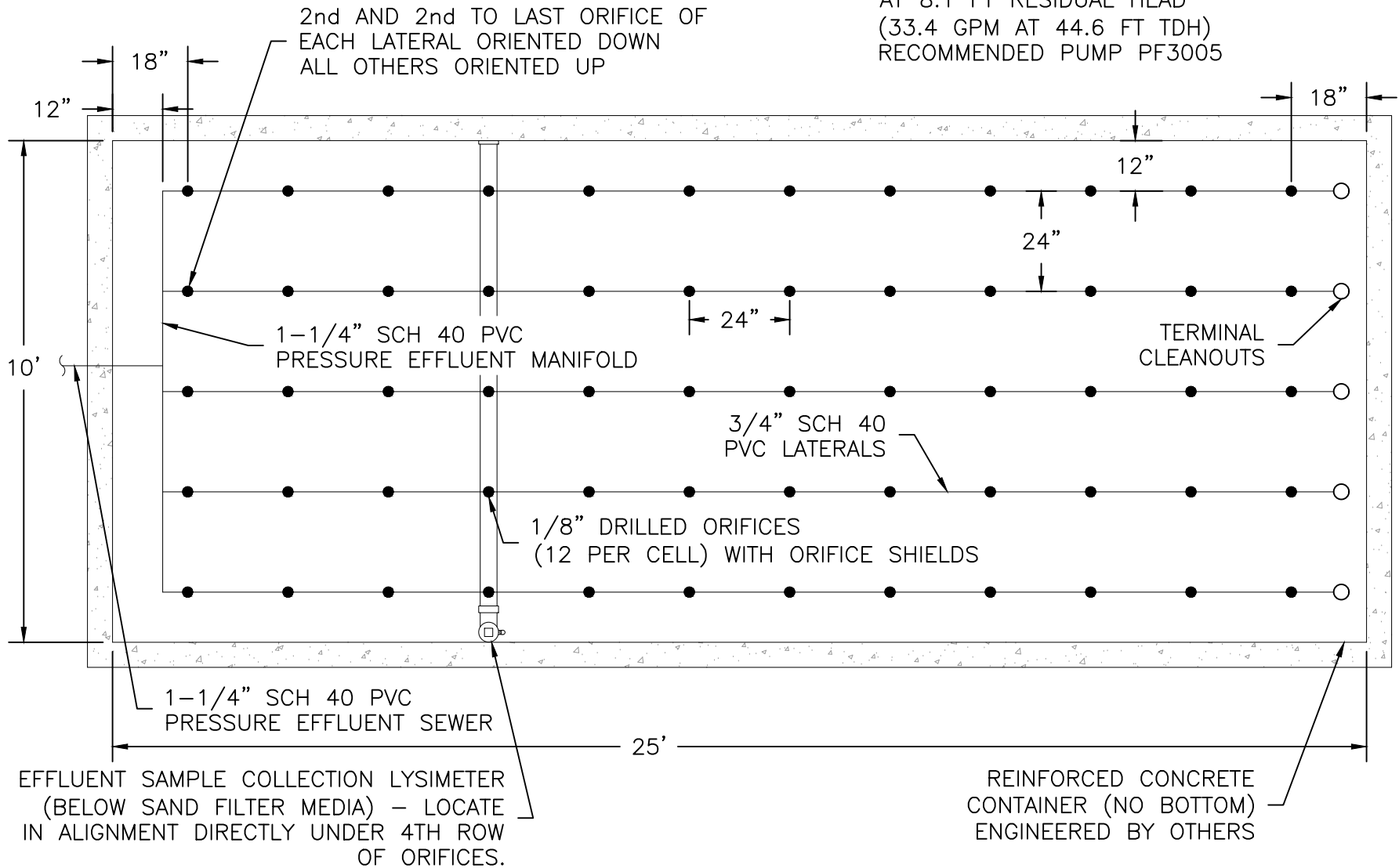



Figure 4B. Sand Filter Plan Detail – Replacement

PROJECT NUMBER: 2025015	Formal Variance
DATE: 1/6/2025	T20S, R10E, Section 12D, Tax Lots 200 & 300
DWG NO: 2025015 F1-6.DWG	Richard and Sara Herman
DWG BY: DDR PROJECT MANAGER: BRIAN RABE	17043 Elsinore Road
REVISED:	Bend, OR 97707
	 ELKHORN CONSULTING LLC



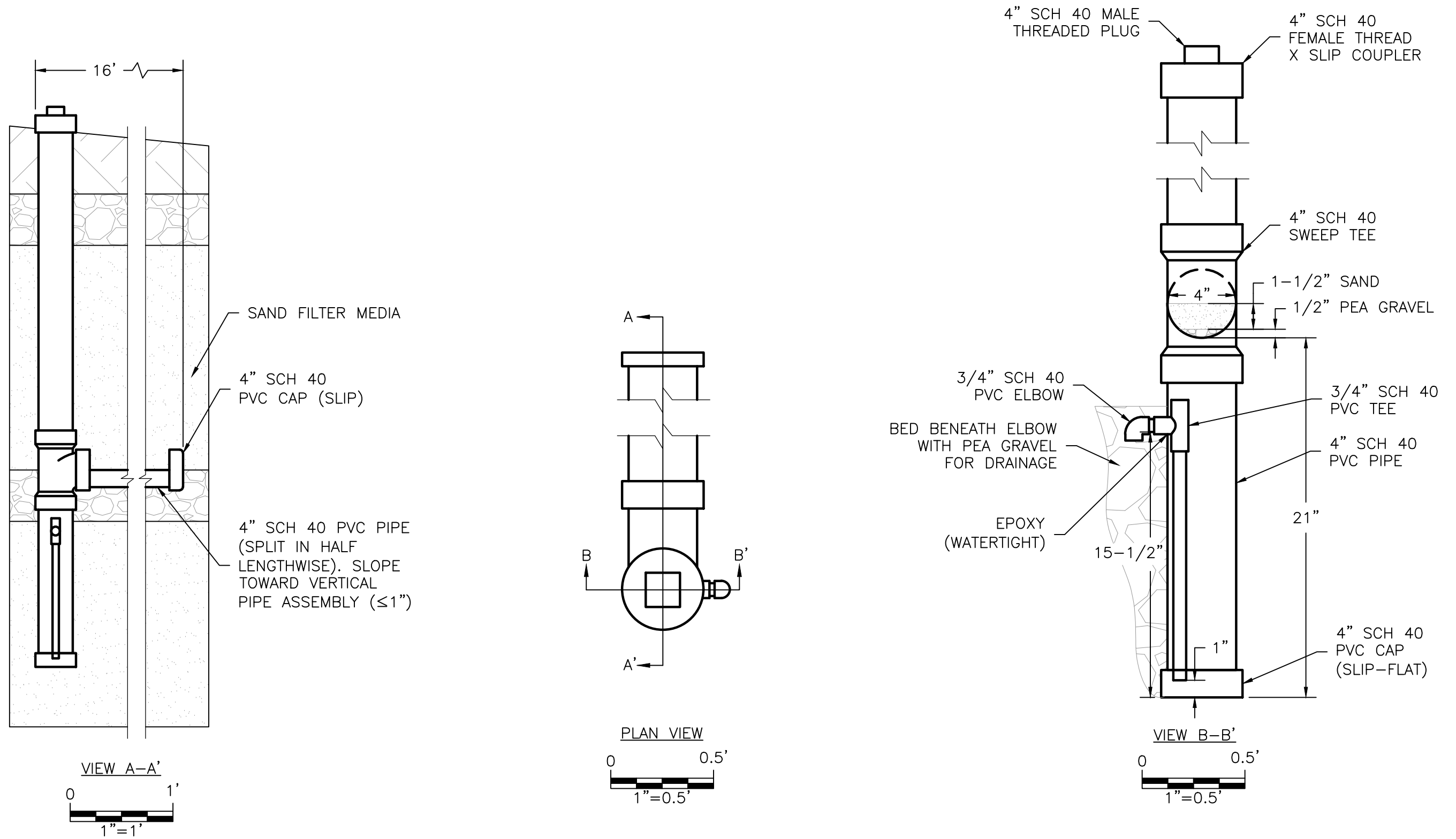

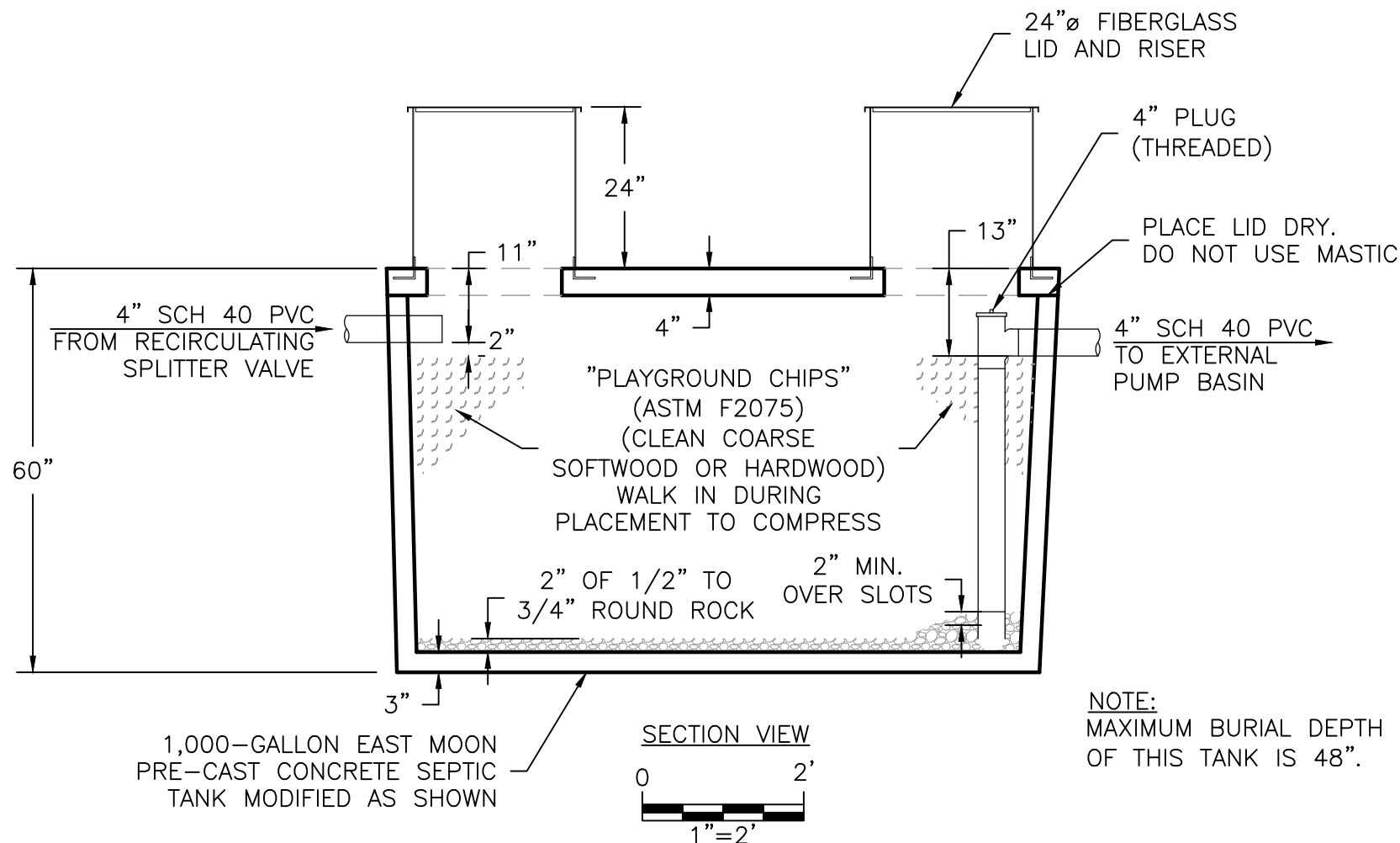
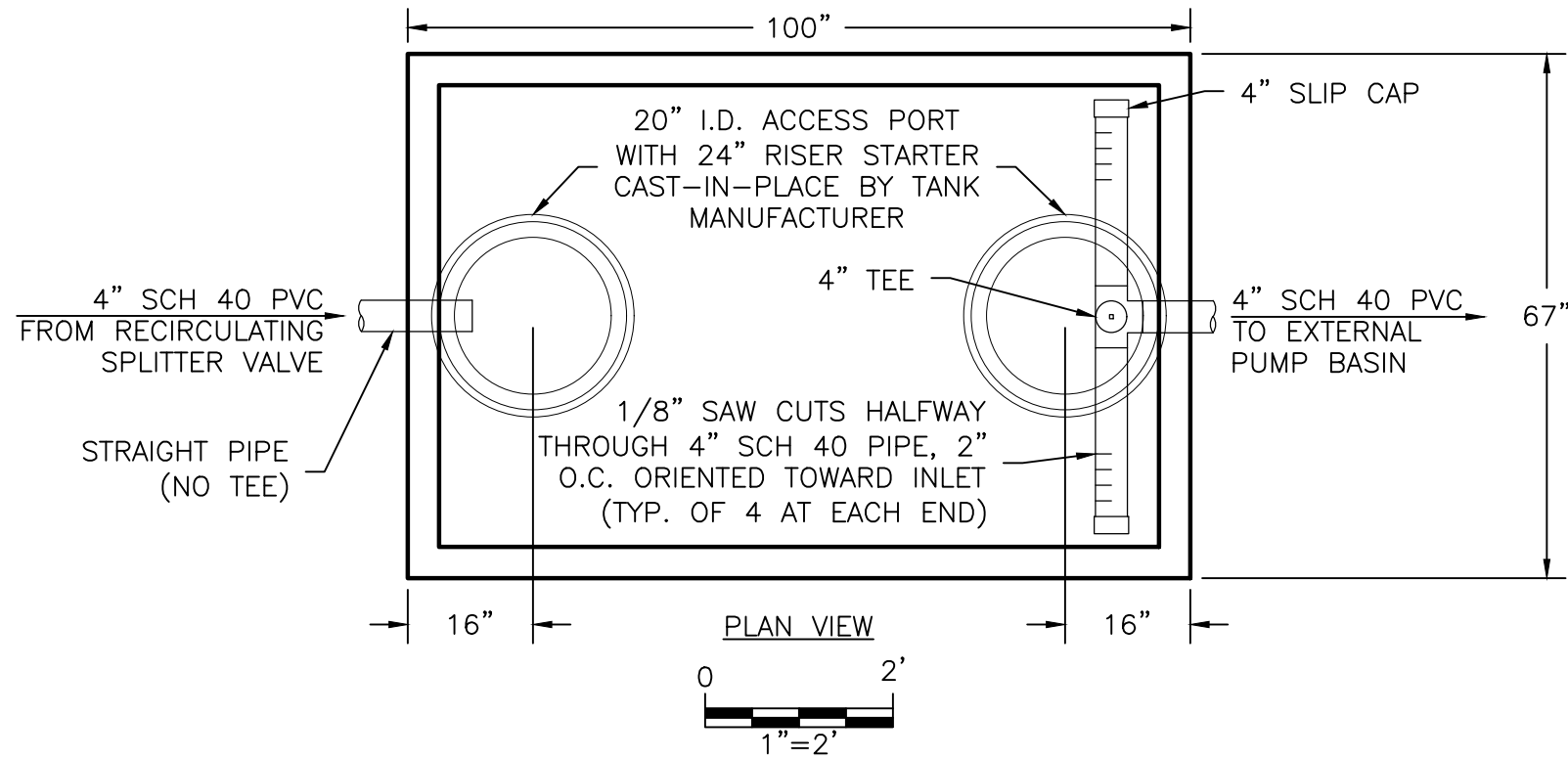


Figure 5. Lysimeter Details

PROJECT NUMBER: 2025015	Formal Variance
DATE: 1/6/2025	T20S, R10E, Section 12D, Tax Lots 200 & 300
DWG NO: 2025015 F1-6.DWG	Richard and Sara Herman
DWG BY: PROJECT MANAGER: DDR BRIAN RABE	17043 Elsinore Road
REVISED:	Bend, OR 97707
	 ELKHORN CONSULTING LLC



NOTE:
MAXIMUM BURIAL DEPTH OF THIS TANK IS 48".

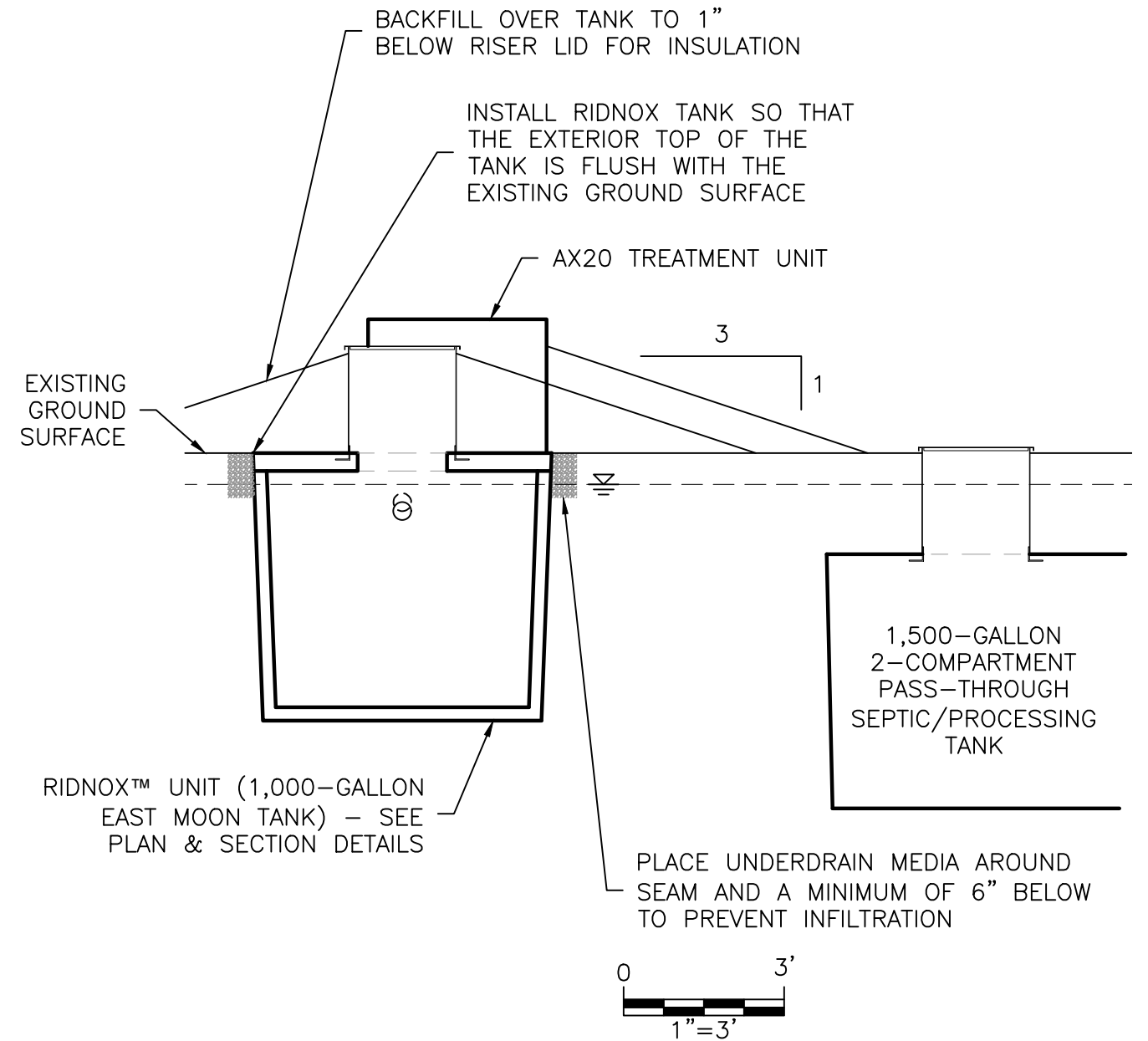



Figure 6. RidNOx™ Details

PROJECT NUMBER: 2025015	Formal Variance
DATE: 1/6/2025	T20S, R10E, Section 12D, Tax Lots 200 & 300
DWG NO: 2025015 F1-6.DWG	Richard and Sara Herman
DWG BY: PROJECT MANAGER: DDR BRIAN RABE	17043 Elsinore Road
REVISED:	Bend, OR 97707
 ELKHORN CONSULTING LLC	



MEMORANDUM

TO: Oregon Department of Environmental Quality Variance Officer

FROM: Peter Gutowsky, AICP, Director

DATE: September 30, 2025

SUBJECT: Onsite Septic System Variance Application / Groundwater Protection in Southern Deschutes County

I. REQUEST

The Community Development Department (CDD) is concerned about the implications of siting onsite septic systems in Southern Deschutes County through a variance process if future impacts to the aquifer cannot be mitigated. Variance approvals on naturally limited properties that do not meet minimum criteria undermine the goal of protecting a sole source aquifer. It also undercuts our collective efforts and public perception that Deschutes County and the Oregon Department of Environmental Quality (DEQ) are actively protecting the groundwater from nitrate loading.

If DEQ approves an onsite septic system variance for 17043 Elsinore Road, Bend, CDD respectfully requests documentation describing the basis for it, specifically in relation to Deputy Director Shannon Davis' recent letter to the Deschutes County Board of Commissioners (Board).

II. SITE EVALUATION REPORT

On June 11, 2025, Lindsey Holloway, Onsite Wastewater Specialist, issued a site evaluation report, denying a septic system proposal at 17043 Elsinore Road for the following reasons:

- Does not meet minimum separation from the permanent water table (OAR 340-071-0220, 0260, 0265, 0275, 0280, 0285, 0290, 0302).
- This property is in management area 1 and is in a documented area of groundwater concern. The Nitrate Loading Management Model indicates this area, Management Area 1, cannot sustain added loading from high groundwater lots if nitrate levels are to remain below the action level (Morgan, Hinkle, Weick. USGS. 2007). Additional loading from septic system is likely to contaminate the ground water and develop a public health hazard particularly on sites with severely shallow water table. (OAR 340-071-130(1))
- Groundwater shall be protected from pollution that could impair existing and future beneficial uses, including domestic drinking water from wells (OAR 340-040-0020) and as an agent of the Department of Environment Quality (DEQ), Deschutes County, may not authorize installation or use of a system that is likely to pollute public waters or create a public health hazard (OAR 340-071-0130(1)).

III. BACKGROUND

On December 19, 2023, Deputy Director, Shannon Davis provided a letter to the Board discussing groundwater pollution concerns from septic systems in Southern Deschutes County. It acknowledged:

- The Sunriver and La Pine area is vulnerable to nitrate contamination from septic systems and private wells are the primary drinking water source for most properties in this area.
- Conditions documented from past investigations and outlined in a U.S. Geological Survey (USGS) factsheet are still valid.
- Testing and research indicate most of the contamination in this region comes from septic systems. This means nutrients from septic systems are seeping into the area's porous, volcanic soil and the aquifer that is used as a primary drinking water source.
- Continued unrestricted development in the area will reach a tipping point that may be difficult or impossible to recover from due to groundwater contamination which will then require additional regulation and funding to address.
- Even with a septic design capable of producing high quality effluent, the treatment may not sufficiently minimize or eliminate nutrients and pathogens from the wastewater or future impacts to the aquifer system as outlined by a USGS model.
- Some parcels are not suitable for septic systems.
- DEQ still believes that conditions in South Deschutes County are a potential public health and ecological impact issue.

IV. DEQ VARIANCE PROCESS

As noted in a DEQ Fact Sheet, a variance officer will review the proposal and other application materials, conduct a site visit, consider site-specific conditions, and hold a public hearing. The variance hearing is not an opportunity to overturn the county agent's decision. It is an information gathering hearing. The decision to approve or deny a variance application is based on the information presented in the proposal and the requirements and purpose of DEQ's regulations. For this specific application, a variance officer must consider the cumulative impacts to approve a variance in relation to the conditions that exist in Southern Deschutes County, which as noted above, are at risk of contamination from onsite wastewater treatment systems. Factors include:

- Nitrogen loading from onsite wastewater treatment systems is the primary source of contamination; therefore, reducing loading from existing systems and limiting new additional sources is the simplest method to reduce loading to the aquifer. New loading from sites that do not meet minimum requirements for any system must be scrutinized to the greatest extent possible.



ELKHORN CONSULTING LLC

14833 Goodrich Creek Lane
Baker City, OR 97814 • 503-881-1604
elkhornconsultingllc@gmail.com

August 18, 2025

Variance Officer
Onsite Variance Program
DEQ - Eastern Region Water Quality
475 NE Bellevue, Ste. 110
Bend, Oregon 97701

**SUBJECT: Formal Variance Request –Richard and Sara Herman – T20S, R10E, Section 12D
Tax Lots 200 and 300 (1.01 acres), Deschutes County, South of Bend, Oregon.**

Dear Variance Officer:

A formal variance from selected onsite rules is hereby requested under the provisions of Oregon Administrative Rules, Chapter 340, Division 071, Section 0415 (OAR 340-071-0415).¹ The property is located at 17043 Elsinore Road, south of Bend in Deschutes County, Oregon (Site) (Figure 1) and, combined with 17033 Elsinore Road, consists of 1.01 acres. A Tax Lot map is attached in Appendix A and a copy of the Deed is attached in Appendix B.

Background

Deschutes County conducted a site evaluation on May 23, 2025, and issued a denial on June 11, 2025. The denial was based on conditions associated with saturation noted at 16 to 18 inches below the ground surface in 4 test pits. Test Pits 2 and 3 represented the best conditions and were near the southwest and southeast corners of the lot. The other test pits were along the eastern and western boundaries of the lot. The primary reasons cited for the denial were the predicted depth to the highest level attained by a fluctuating permanent water table and the risk to groundwater quality that could result from increased nitrogen loading to the underlying aquifer. A copy of the site evaluation documentation from Deschutes County is attached in Appendix C.

Tax Lot 200 to the west was denied for a previous owner through the variance process in 2021 after being denied earlier in 2021 by Deschutes County. Tax Lot 200 is slightly lower than Tax Lot 300 and the highest ground on Tax Lot 300 is partially within the 100-foot well setback for the existing well on the adjacent parcel to the south, owned by the applicant's son and daughter-in-law. This well will be decommissioned and replaced with a new well more than 100 feet away from the proposed sand filters if this variance request is approved.

Southern Deschutes County has a shallow water table that is typically unconfined in porous pumice soils and is susceptible to contamination from soluble and mobile constituents. The most common constituent of concern is nitrate-nitrogen from septic systems. The onsite rules require a minimum of 24 inches of separation from the upper limit of the water table to the bottom of a bottomless sand filter as well as being 24 inches below the ground surface.

¹ Onsite wastewater treatment systems, 340 OAR § 340.71. (2020).



Soils

The web soil survey shows the location of the Site and a copy of the output from the web soil survey is provided in Appendix D. The entire parcel is shown within a delineation of Map Unit 144A, Sunriver sandy loam 0 to 3 percent slopes. Sunriver soils are described as very deep, somewhat poorly drained soils that formed on pumice mantled stream terraces. The typical profile generally consists of the following:

- Up to 2 inches of organic material underlain by,
- 5 inches of very dark gray ashy sandy loam underlain by,
- 15 inches of dark gray ashy loamy coarse sand underlain by,
- 9 inches of light brownish gray ashy coarse sand underlain by,
- 31 inches of very dark gray sandy loam.

The Sunriver series is described as having a water table that rises to about 2 to 4 feet below the surface from April to June.

The characteristics observed at the Site are reasonably similar to the Sunriver series. The primary differences between the conditions noted in the 2025 soil notes and the conditions typical for the Sunriver series are related primarily to coloration (brownier colors) that are more indicative of the Shanahan series.

Preliminary Assessment

The Site was reviewed by Brian Rabe, CPSS, WWS, on July 21, 2025. The purpose was to review the Site conditions and assess the potential to design a modified bottomless sand filter that incorporates additional fill to create adequate separation from the underlying water table following advanced secondary treatment meeting the criteria for Treatment Standard 2 (TS2). The proposed bottomless sand filter area is located on this highest ground, represented by Test Pit 3 in the 2024 site evaluation (southeastern part of the lot - see Figure 2 and Appendix C).

Other Considerations

This parcel and developed parcels in the surrounding area are served by individual private wells. A search of the database of the Oregon Department of Water Resources was conducted for the section that the subject property lies within (Section 12 of Township 20 South, Range 10 East of the Willamette Meridian). There are about 524 records on file for this section. A total of 16 water well records (well logs) were identified in Section 12 that could be tied to specific parcels within about one-eighth of a mile of the subject property (Appendix E).

The closest existing well is on Tax Lot 3800, owned by the applicant's son and daughter-in-law. This well is 90 feet west southwest of the proposed bottomless sand filter area and will be decommissioned and replaced with a new well more than 100 feet away if this variance request is approved. The well was completed on June 27, 2019, to a depth of 28 feet. Water was described as being first found at a depth of 11 feet in a layer of "coarse black sand" and had a static water level of 7 feet bgs on the date



of completion with a reported yield of 22 gallons per minute (gpm) with 6 feet of drawdown after 1 hour with a pump.

The next closest existing well is on Tax Lot 200 and is about 160 feet west of the proposed bottomless sand filter area. This well was completed on October 12, 2022, to a depth of 24 feet. Water was described as being first found at a depth of 10 feet in a layer of “coarse fine black sand” and had a static water level of 10 feet bgs on the date of completion with a reported yield of 20 gpm after 1 hour with a pump.

The next closest existing well is on Tax Lot 100, at least 200 feet west-northwest of the proposed bottomless sand filter area. This well was completed on October 18, 2022, to a depth of 24 feet. Water was described as being first found at a depth of 8 feet in a layer of “coarse black sand” and had a static water level of 8 feet bgs on the date of completion with a reported yield of 20 gpm after 1 hour with a pump.

The next closest existing well is on Tax Lot 3600, about 210 feet east-southeast of the proposed bottomless sand filter area. This well was completed on October 14, 2022, to a depth of 30 feet. Water was described as being first found at a depth of 7 feet in a layer of “brown sand and gravel” and had a static water level of 9 feet bgs on the date of completion with a reported yield of 15 gpm with 3.6 feet of drawdown after 2 hours with a pump.

The well on Tax Lot 6000 is about 300 feet north of the proposed bottomless sand filter area. This well was completed on August 13, 2020, to a depth of 24 feet. Water was described as being first found at a depth of 10 feet in a layer of “coarse black sand” and had a static water level of 10 feet bgs on the date of completion with a reported yield of 22 gpm after 1 hour with a pump.

The well for Tax Lot 4400 is about 340 feet south of the proposed bottomless sand filter area. This well was completed on August 16, 2017, to a depth of 29 feet. Water was described as being first found at a depth of 10 feet in a layer of “very coarse sand” and had a static water level of 8 feet bgs on the date of completion with a reported yield of 20 gpm with 2 feet of drawdown after 1 hour with a pump.

The well for Tax Lot 3400 is more than 380 feet east-southeast of the proposed bottomless sand filter area. This well was completed on October 19, 1993, to a depth of 75 feet. Water was described as being first found at a depth of 65 feet in a layer of “cinders” and had a static water level of 22 feet bgs on the date of completion with a reported yield of 15 gpm with 11 feet of drawdown after 4 hours with a pump.

The well for Tax Lot 800 is more than 490 feet east of the proposed bottomless sand filter area. This well was completed on September 25, 2020, to a depth of 88 feet. Water was described as being first found at a depth of 18 feet in a layer of “Green clay sands” and had a static water level of 18 feet bgs on the date of completion with a reported yield of 10 gpm with 18 feet of drawdown after 4 hours with a pump.

The well for Tax Lot 4300 is more than 510 feet west of the proposed bottomless sand filter area. This well was completed on December 8, 2014, to a depth of 23 feet. Water was described as being first found at a depth of 15 feet in a layer of “black sand with clay strips” and had a static water level of 3



feet bgs on the date of completion with a reported yield of 3 gpm with 18 feet of drawdown after 1 hour with a pump.

The well for Tax Lot 5500 is more than 540 feet northeast of the proposed bottomless sand filter area. This well was completed on October 11, 1993, to a depth of 80 feet. Water was described as being first found at a depth of 70 feet in a layer of “cinders” and had a static water level of 17 feet bgs on the date of completion with a reported yield of 15 gpm with 5 feet of drawdown after 12 hours with a pump.

The well for Tax Lot 4500 is about 550 feet southwest of the proposed bottomless sand filter area. This well was completed on August 22, 2006, to a depth of 25 feet. Water was described as being first found at a depth of 10 feet in a layer of “black sand” and had a static water level of 3 feet bgs on the date of completion with a reported yield of 20 gpm with 5 feet of drawdown after 1 hour with a pump.

The well for Tax Lot 8000 is about 570 feet southwest of the proposed bottomless sand filter area. This well was completed on October 22, 2004, to a depth of 35 feet. Water was described as being first found at a depth of 21 feet in a layer of “black sand” and had a static water level of 10 feet bgs on the date of completion with a reported yield of 20 gpm with 11 feet of drawdown after 4 hours with a pump.

The well for Tax Lot 7400 is more than 600 feet southeast of the proposed bottomless sand filter area. This well was completed on October 4, 1995, to a depth of 68 feet. Water was described as being first found at a depth of 64 feet in a layer of “Broken Rock” and had a static water level of 18 feet bgs on the date of completion with a reported yield of 18 gpm with 10 feet of drawdown after 24 hours with a pump.

The well for Tax Lot 7800 is about 640 feet south-southwest of the proposed bottomless sand filter area. This well was completed on September 29, 1999, to a depth of 35 feet. Water was described as being first found at a depth of 15 feet in a layer of “Blk Sand” and had a static water level of 15 feet bgs on the date of completion with a reported yield of 25 gpm with one foot of drawdown after 1 hour with a pump.

The well for Tax Lot 7900 is about 650 feet south-southwest of the proposed bottomless sand filter area. This well was completed on November 15, 2002, to a depth of 35 feet. Water was described as being first found at a depth of 12 feet in a layer of “Clay & Gravel” and had a static water level of 12 feet bgs on the date of completion with a reported yield of 10 gpm with 20 feet of drawdown after 4 hours with a pump.

The regional groundwater gradient, as indicated in a study published by the U.S. Geological Survey, is to the east-northeast toward the Deschutes River (Morgan & Hinkle, 2007)². The subject property is located within Management Area 1, which recommends a 79 to 100 percent reduction from the base scenario loading (standard systems) for both existing homes and future homes. The results of the Nitrate Loading Management Model within the study (Figures 25 and 26) suggest that this area represents a high risk to adversely impact groundwater quality. According to the interactive map for

² Morgan, D. S., & Hinkle, R. S. (2007). *Evaluation of approaches for managing nitrate loading from on-site wastewater systems near La Pine, Oregon*, (Scientific Investigations Report 2007-5237). Reston, VA: U.S. Geologic Survey.



Oregon Domestic Well Testing, this part of Deschutes County has an average nitrate-nitrogen concentration in domestic wells of 0.51 milligrams per liter (mg/L) with 7.58% exceeding 3 mg/L and none exceeding 10 mg/L (based on 211 test results, viewed on August 11, 2025).³

Formal Variance Request

Variance is requested from the following rules:

1. OAR 340-071-0135(1) – which addresses Department of Environmental Quality (DEQ) approval of new or innovative technologies, materials, or designs for onsite systems.¹
2. OAR 340-071-0150(4)(a)(B) – which requires all criteria for approval shall be met.¹
3. OAR 340-071-0290(4)(d) – which states that the water table is at least 24 inches bgs throughout the year.¹

This request seeks to overcome the limitations of this Site by treating the sewage using a recirculating textile filter system (AdvanTex® AX20N-Mode 3B) prior to discharge into an elevated bottomless sand filter. AdvanTex units do an effective job of reducing five-day biochemical oxygen demand and total suspended solids to below 10 mg/L. Nitrogen is often fully converted from ammonia-nitrogen to nitrate-nitrogen (greater than 90%). Operating in Mode 3, the AdvanTex unit reduces total nitrogen sufficiently to meet TS2 (less than 30 mg/L). The DEQ approval of the AX20N in Mode 3B includes an ultraviolet light to satisfy the pathogen reduction requirements of TS2. However, this request includes the use of a modified bottomless sand filter to achieve the pathogen reduction requirements of TS2 instead of an ultraviolet light and, therefore, this configuration does not have (or need) an ultraviolet disinfection unit. The “B” designation indicates the AdvanTex unit is configured with the second pump for the final discharge to the modified bottomless sand filter. A post-anoxic treatment process (RidNOx™) is proposed to reduce the total nitrogen concentration in the final effluent pumped to the modified bottomless sand filter to less than 2 mg/L.

The AX20 systems in the La Pine project produced effluent with an average total nitrogen (TN) concentration of 17 mg/L. A post-anoxic process similar to what is proposed, referred to at the time as Nitrex, was tested following treatment through a lined intermittent sand filter. The Nitrex unit consisted of a 2-compartment concrete tank filled with what was described as a proprietary carbon media (wood chips).

The sand filters produced an average TN of about 50 mg/L and the final effluent from the Nitrex units had an average TN of 2.4 mg/L, representing a 96% reduction from the 60 mg/L average TN concentration in the septic tank effluent. So long as there is sufficient soluble carbon being released from the wood chips, and the hydraulic loading rate is low enough to allow the dissolved oxygen in the effluent to approach zero, the NO₃-N concentration will typically be below the method detection limit. What nitrogen remains in the effluent will often be organic, as measured by the Total Kjeldahl Nitrogen (TKN) method. The organic nitrogen may be subsequently oxidized in the bottomless sand filter but is just as likely to be retained or recycled in the biomass that develops in the sand filter media.

³ ARC GIS Online. (n.d.). Oregon domestic well testing, [Data file]. Retrieved August 11, 2025, from ARC GIS Online: <https://www.arcgis.com/apps/MapSeries/index.html?appid=c0d7daea497049c1a686d07dab7106e5>



Therefore, the concentration of nitrogen leaving the bottomless sand filter after treatment through both the AX20 and the RidNOx unit is expected to be even lower than the results from the La Pine project.

The RidNOx unit described in this proposal is configured similar to larger units used on several systems permitted under Water Pollution Control Facilities (WPCF) permits and monitored on a regular basis. Some of these units have been in tanks and some have been in lined basins. Typical results from the post-anoxic process (prior to discharge, typically to a soil absorption system) include NO₃-N concentrations near or below the method detection limit and TKN concentrations between 1 and 3 mg/L.

A recent test result (August 2022) from a similarly configured system (predominantly residential sources using AdvanTex treatment with Mode 3-style pre-anoxic denitrification, followed by post-anoxic treatment in tanks filled with wood chips) produced a TKN concentration of 0.68 mg/L and a NO₃-N concentration of 0.13 mg/L for a TN of 0.81 mg/L.

A recent test result (July 2022) from a high-nitrogen source (150 mg/L TKN treated by AdvanTex with alkalinity augmentation to support full nitrification, configured in a Mode 3-style pre-anoxic process, followed by post-anoxic treatment in lined wood-chip beds) produced a TKN concentration of 0.99 mg/L and a NO₃-N concentration of 0.05 mg/L for a TN of 1.04 mg/L.

Assuming a maximum 65 to 75% reduction from the starting concentration, the NO₃-N concentration entering the post-anoxic process is expected range between 40 and 45 mg/L, similar to the sand filter effluent from the La Pine Project and higher than what is expected from the AX20 in a residential scenario. Based on the performance of the commercial systems described above, and a typical residential total nitrogen concentration of 60 mg/L, the typical reduction from the base scenario presented in the groundwater study cited previously would be approximately 98 percent.

The initial and replacement bottomless sand filter areas are proposed on the highest ground near the southeastern corner of the parcel. This represents an area with the appropriate spatial footprint and meets all required horizontal setback requirements.

Test Pit 2 (2025) was described as:

- Dark brown (10YR 3/3) loamy sand from 0 to 7 inches with moderate medium subangular blocky structure and friable consistence; many very fine, common fine and medium, and few coarse roots; underlain by
- Dark brown (10YR 3/3) loamy coarse sand from 7 to 20 inches with weak medium subangular structure and friable consistence; with few very fine, fine, and medium roots; with redoximorphic features (stripping and staining) described beginning at 18 inches; underlain by
- Very dark grayish brown (10YR 3/2) sandy loam from 20 to 47 inches with strong coarse subangular blocky structure and friable consistence; few roots; with redoximorphic features (iron concentrations) throughout; underlain by
- Black (10YR 2/1) gravelly sand from 47 to 51 inches, structureless (single grain), no roots, and redoximorphic features throughout.



Relative elevation measurements were made at all 4 corners of both the proposed initial and replacement bottomless sand filters as well as at the existing ground surface adjacent to the described profile for both Test Pit 2 (2025). The highest level of the water table is expected to be 17 inches below the existing ground surface at the lowest point within the area proposed for the initial and replacement sand filters based on a depth of 18 inches to the redoximorphic features described in Test Pit 2 (2025).

The proposed system seeks to overcome this limitation by elevating the modified bottomless sand filter in a manner that provides an additional 6 inches of separation (Figures 3A and 3B). The sod and underlying sandy soil to a depth of 6 inches within the footprint of the sand filter and replaced with sand filter media. An additional 13 inches of sand filter media (total of 19 inches) will be used to exceed the 24-inch separation from shallowest water table depth standard by providing a total separation of 30 inches. In order to optimize the use of the highest available ground and maximize separation from the underlying water table, the sand filters are proposed in a reinforced concrete container with inside dimensions of 16 feet by 16 feet (initial) and 10 feet by 25 feet (replacement) with the north wall of the initial sand filter intended to serve as the south wall of the replacement sand filter at such time as it needs to be installed. The rest of the sand filter will be “conventional” from there up, consisting of 6 inches of underdrain media, 24 inches of sand filter media, 6 inches of drain media (with the distribution laterals), filter fabric, and 6 to 9 inches of backfill. The additional 6 inches of separation is intended to account for any potential mounding that may occur within the concrete container during an extreme weather event in conjunction with the highest predicted rise of the water table.

Brian Rabe will need to be involved during the construction of this system to install the lysimeter in the sand filter and oversee the installation of the RidNOx unit. Additional information regarding the installation of the RidNOx unit and the lysimeter, as well as sampling instructions, are described in Appendix F and shown in Figures 4A, 4B, 5, and 6. The owner agrees to facilitate sampling of the RidNOx effluent in conjunction with routine service visits (twice per year for the first 2 years and annually thereafter) to monitor the performance. Samples will be collected from the pump basin between the RidNOx unit and the sand filter. When the media begins to show signs of depletion (as indicated by average nitrogen concentrations climbing to above 7 mg/L nitrate-nitrogen or 10 mg/L total nitrogen), the owner will schedule media replacement for the following summer when the water table is at least 30 inches below the top of the tank (to prevent displacement of the empty tank by buoyant forces). If this request is approved, a condition of approval will require access be allowed to the treatment system and sand filter by current and future property owners for periodic sampling.

In addition to the high level of treatment achieved by the AdvanTex treatment system and post-anoxic denitrification process, further treatment of the effluent will occur with predominantly unsaturated flow within the imported sand and native sandy soil beneath the bottomless sand filter (minimum of 24 inches above the highest predicted level of the underlying fluctuating water table). Small doses, coupled with substantial resting periods achieved with pressure distribution (see recommended sand filter plan detail in Figures 4A and 4B), will ensure unsaturated, thin-film flow through the soils above the water table. This will further reduce pathogens and other residual contaminants. The subsoil found beneath the sandy surface soils include evidence of both oxidation and reduction of iron. Conditions that support the reduction of iron will reduce nitrate-nitrogen to nitrogen gas since nitrate ions are used



as electron acceptors preferentially over iron compounds. This will facilitate additional reduction of nitrate-nitrogen as the highly treated effluent is assimilated into the environment.

Additional Considerations for No Net Impact to Groundwater Nitrate Contribution

A letter from the Deputy Director of the Oregon Department of Environmental Quality dated December 19, 2023, to the Deschutes County Commissioners formally focused additional attention on the potential impacts to water quality in southern Deschutes County from onsite sewage treatment systems. It is important to consider a number of very conservative assumptions that were made in the USGS groundwater modeling effort that likely overestimated the potential impacts. The following addresses a few specific examples.

Plant Uptake of Nitrogen

The model specifically assumes no nitrogen removal from plant uptake. This may be appropriate for shallow rooted grasses, forbes, and other understory vegetation (e.g., bitterbrush). However, this is not appropriate for the overstory vegetation which is primarily lodgepole and ponderosa pine. These tree species have deeper root systems that can withstand periodic saturation. The model accounted for the impact of transpiration in the water balance but did not account for the impact of nutrient removal and storage in the nitrogen balance. The study concluded that there would be a concentration effect as a result. However, this is not realistic. Plants do not take up water without taking up nutrients that they need, if they are present.

Although studies of nutrient removal by lodgepole pine are limited, there are data available from peer-reviewed journal articles. One such article (T.J. Fahey, 1985)⁴ documented total nitrogen uptake of 1.25 grams per square meter (g/m^2) with root turnover of 0.37 g/m^2 for a net uptake of 0.88 g/m^2 . This corresponds to 7.85 pounds of nitrogen uptake per acre per year.

Another data source is a chapter from a publication by the United States Forest Service (USFS) which states that the pumice soils in the area are “very severely deficient” in nitrogen (Shainsky, 1992)⁵. Table 4 of that publication lists the average nitrogen concentrations for several components of the tree. Since yield estimates in the published soil survey are focused on the volume of merchantable wood produced over the typical rotation of a stand of timber, only the concentrations of the bolewood (0.06% N) and bark (0.25% N) are accounted for (the parts removed during harvest). The crowns, stumps, and roots are not removed during harvest and would contribute to nutrient cycling on site. The estimated yield of lodgepole pine for Shanahan soils in the published soil survey is 65 cubic feet per acre per year ($\text{ft}^3/\text{ac}/\text{yr}$). The dry density of lodgepole pine ranges from 22 to 53 pounds per cubic foot (lb/ft^3). For the purpose of calculation, an average of $37.5 \text{ lb}/\text{ft}^3$ will be used.

The smallest lots eligible for development in southern Deschutes County are about 0.5 acres in size. Assuming two thirds of the lot is developed (home, outbuildings, driveway, yard, etc.) the other third is typically maintained with native trees (lodgepole and/or ponderosa pine). Assuming one

⁴ T.J. Fahey, e. a. (1985). The Nitrogen Cycle in Lodgepole Pine Forests, Southeast Wyoming. *Biogeochemistry*

⁵ Shainsky, S. N. (1992). *Distribution of Biomass and Nutrients in Lodgepole Pine/Bitterbrush Ecosystems in Central Oregon*. USFS Deschutes National Forest.



third the average annual growth (21.5 ft³/ac/yr), an average density of 37.5 lb/ft³, and the nitrogen content described previously, the annual amount of N taken up and stored in standing wood biomass on 0.17 acres (on third of a half-acre lot) is 0.8 pounds. Since this proposal includes combining 2 adjacent parcels with a total area of 1.01 acres, these uptake and sequestration values would be double what has been estimated for a single half-acre lot.

As described in the variance proposal, the proposed system represents the best currently available technology (AdvanTex + RidNOx + MBSF), which is expected to be comparable or better than the best system studied in the La Pine Demonstration Project (Sand Filter + Nitrex + Drainfield). Using expected average total nitrogen concentrations in the effluent leaving the bottomless sand filter after secondary treatment through AdvanTex unit in Mode 3B, followed by tertiary treatment through the RidNOx unit, and the data presented in the USGS groundwater loading and modeling study, the annual mass load to groundwater would be 0.7 lb N/yr (2 mg/L x 2.55 people per home x 45 gallons per person per day x 365 days per year). Even the conservative nitrogen uptake and retention from residual trees on this lot is greater than the contribution from the proposed system. Therefore, approval of this lot utilizing this treatment approach is not likely to make an additive contribution of nitrogen to groundwater.

Hydraulic Loading

The annual hydraulic contribution to groundwater (precipitation minus evapotranspiration) is based on the natural condition. As development occurs, the transpiration component is reduced by the amount of area covered in roofs, driveways, and other impervious or non-vegetated areas. Runoff is limited in these soils so a higher proportion of precipitation contributes to recharge on developed lots than was assumed in the model. This would have a slight positive impact on resulting concentrations.

The letter from the Deputy Director states that the credibility of the state and county could be called into question regarding protection of water quality if more variances are approved. I respectfully disagree, based on the data provided in the previous paragraphs. Use of systems that further reduce the contribution to groundwater, with some systems under certain conditions representing a net zero contribution in most situations, and a net negative contribution in areas with slightly elevated (or higher) nitrate concentrations, are protective of groundwater quality and public health. These systems are only currently available through the variance process.

Conclusions

As described, the proposed combination of treatment components is expected to produce a final effluent with very high quality and a low potential to impact water quality, human health, or the environment. Given the unique circumstances at this Site, strict compliance with the rules is considered to be unreasonable.

It is acknowledged that detailed plans and specifications will need to be submitted and approved before any construction can take place. It is also understood that if this request is approved, there will be language included that allows the county to allow or require a prescriptive system that is demonstrated to perform equal to or better than what is described in this proposal.



Directions to the Site as well as a map showing the ownership of adjacent parcels along with a list of names and addresses are attached in Appendix G. If you have any questions or comments, please do not hesitate to contact me directly at (503) 881-1604.

Sincerely,
ELKHORN CONSULTING LLC

Brian T. Rabe, CPSS, WWS
Principal Soil Scientist

BTR/ddr
Enc: Figures 1-6, Appendices A-G
c: Richard and Sara Herman
Todd Cleveland, REHS – Deschutes County



Certified Professional
Soil Scientist
BRIAN T. RABE
15239 Exp. 31DEC25
Registered Wastewater Specialist
No. EH-W-448430 Exp. 30SEP25

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FIGURES

- Figure 1. Vicinity Map**
- Figure 2. Site Plan**
- Figure 3. Modified Bottomless Sand**
- Figure 4. Sand Filter Plan**
- Figure 5. Lysimeter Details**
- Figure 6. RidNOx™ Details**

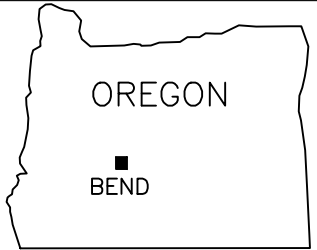
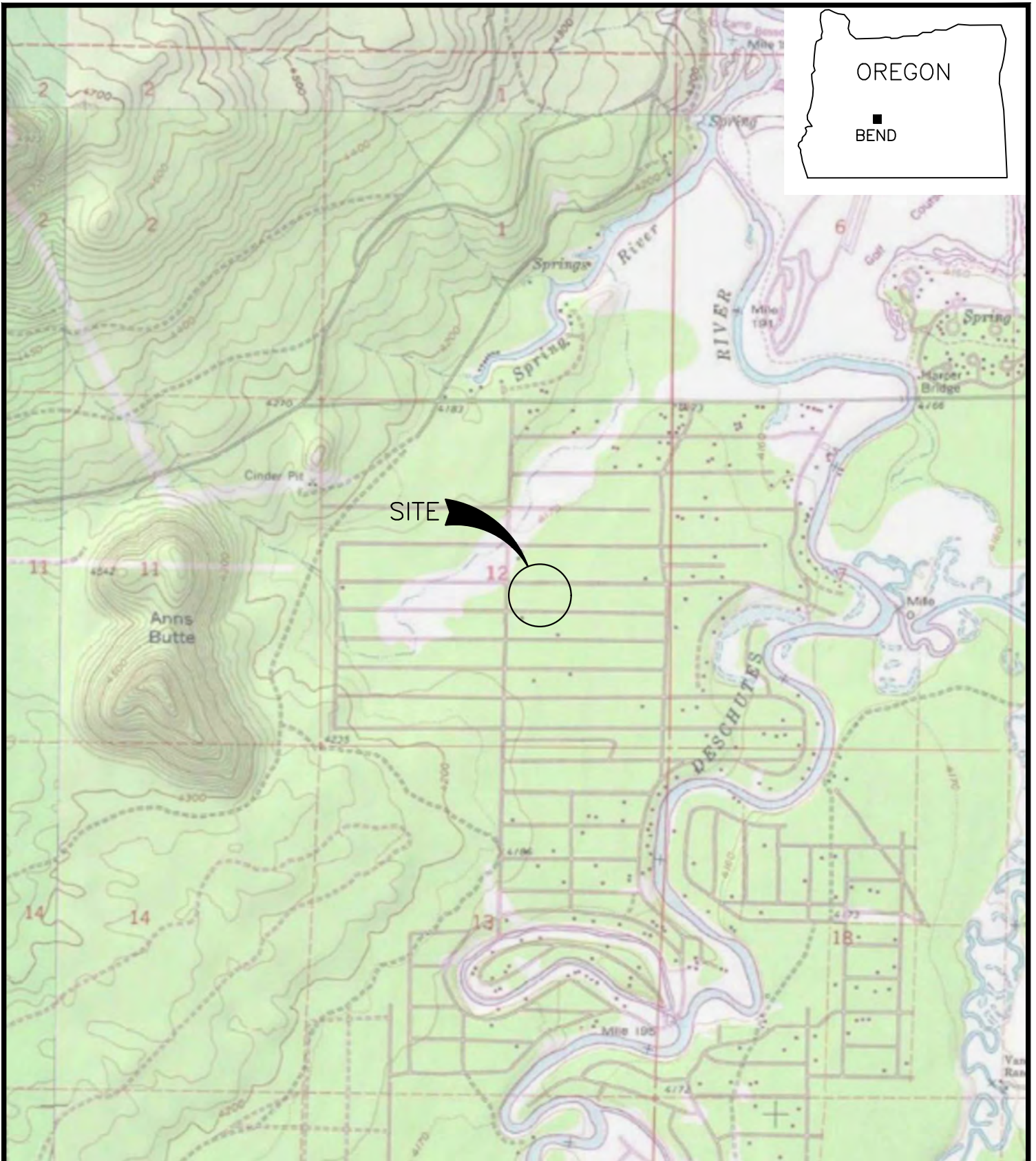
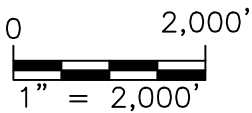



Figure 1. Vicinity Map



(LOCATIONS AND SCALE ARE APPROXIMATE)

PROJECT NUMBER:	2025015	Formal Variance
DATE:	8/11/2025	T20S, R10E, Section 12D, Tax Lots 200 & 300
DWG NO:	2025015 F1-6.DWG	Richard and Sara Herman
DWG BY:	PROJECT MANAGER: DDR BRIAN RABE	17043 Elsinore Road
REVISED:		Bend, OR 97707
		 ELKHORN CONSULTING LLC

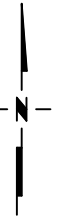
(SOURCE: ©2013 National Geographic Society, i-cubed)

TAX LOT 6200
NO RECORDS

TAX LOT 6100
DENIED (1991)

TAX LOT 6000
DENIED (2020)

TAX LOT 5900
DENIED (2018)



ELSINORE

17033 AND 17043 ELSINORE

116'

116'

TAX LOT 100
DENIED (2003)

PROPOSED
25'X32'
GARAGE

TAX LOT 400
DENIED (2004)

PROPOSED
50'X50'
HOUSE

PROPOSED 1500 GAL
SEPTIC TANK

189.66'

CLEANOUT

PROPOSED AVANTEX AX20N (MODE 3B)
TREATMENT SYSTEM

100' SAND
FILTER
SETBACK

PROPOSED
40'X60'
SHOP

MIN. 5'

PROPOSED EXTERNAL
PUMP BASIN

PROPOSED 10'X25'
REPLACEMENT AREA

PROPOSED
WELL

PROPOSED
RIDNOX™
UNIT

10'
TEST PIT 2 (2025)

50' TANK
SETBACK

WELL TO BE
DECOMMISSIONED

TOP OF
IRON ROD

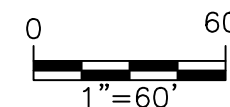
PROPOSED 16'X16'
MODIFIED BOTTOMLESS
SAND FILTER (CONCRETE
CONTAINER)

TAX LOT 4000
NO RECORDS

VARIANCE
ATT & BSF
APPROVED (2018)
INSTALLED (2019)


TAX LOT 3700
DENIED (1999)

FONTANA



(SCALE AND LOCATIONS
ARE APPROXIMATE)

Figure 2. Site Plan

PROJECT NUMBER: 2025015	Formal Variance
DATE: 8/12/2025	T20S, R10E, Section 12D, Tax Lots 200 & 300
DWG NO: 2025015 F1-6.DWG	Richard and Sara Herman
DWG BY: PROJECT MANAGER: DDR BRIAN RABE	17043 Elsinore Road
REVISED:	Bend, OR 97707
 ELKHORN CONSULTING LLC	

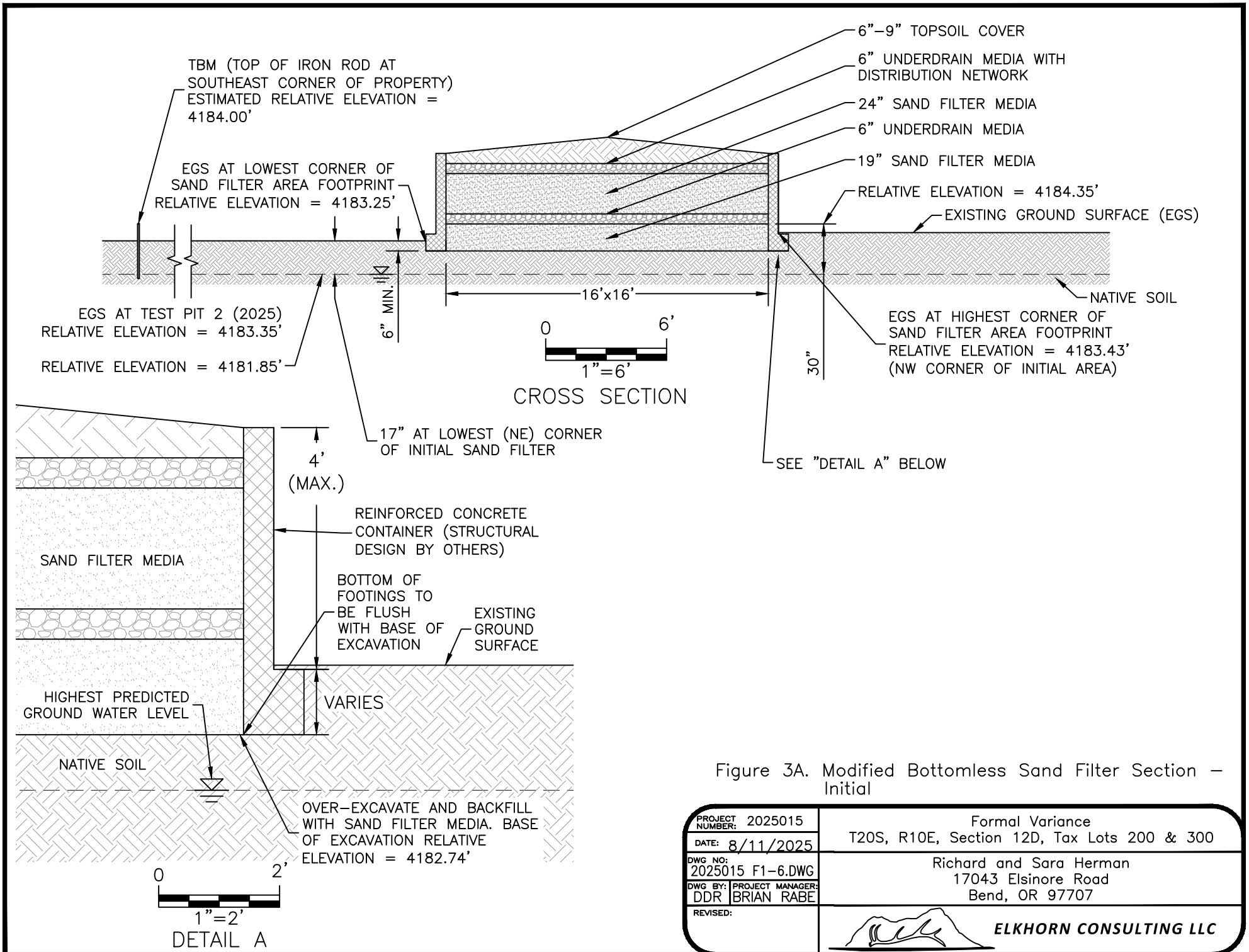



Figure 3A. Modified Bottomless Sand Filter Section – Initial

PROJECT NUMBER: 2025015	Formal Variance
DATE: 8/11/2025	T20S, R10E, Section 12D, Tax Lots 200 & 300
DWG NO: 2025015 F1-6.DWG	Richard and Sara Herman 17043 Elsinore Road Bend, OR 97707
DWG BY: DDR PROJECT MANAGER: BRIAN RABE	
REVISED:	 ELKHORN CONSULTING LLC

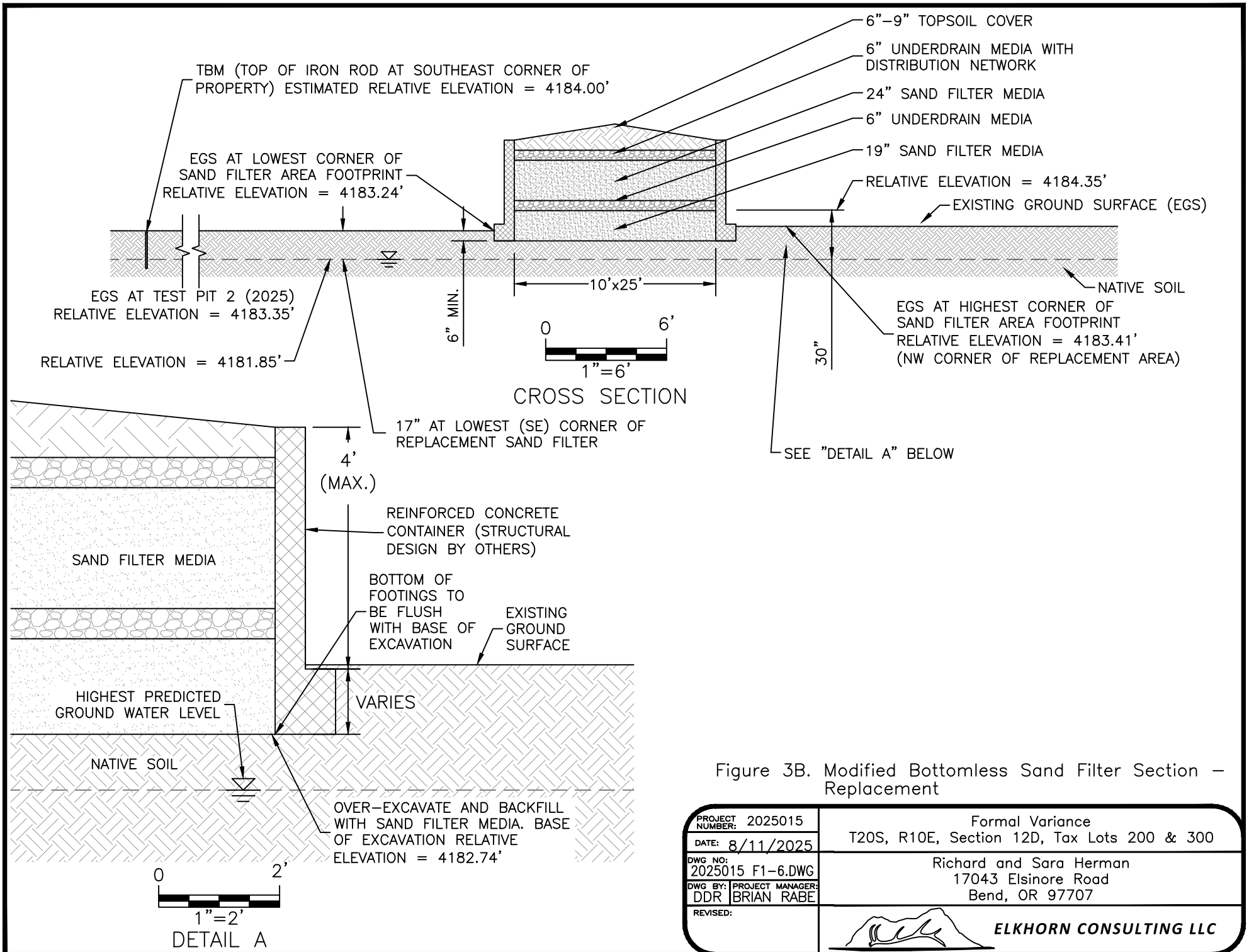

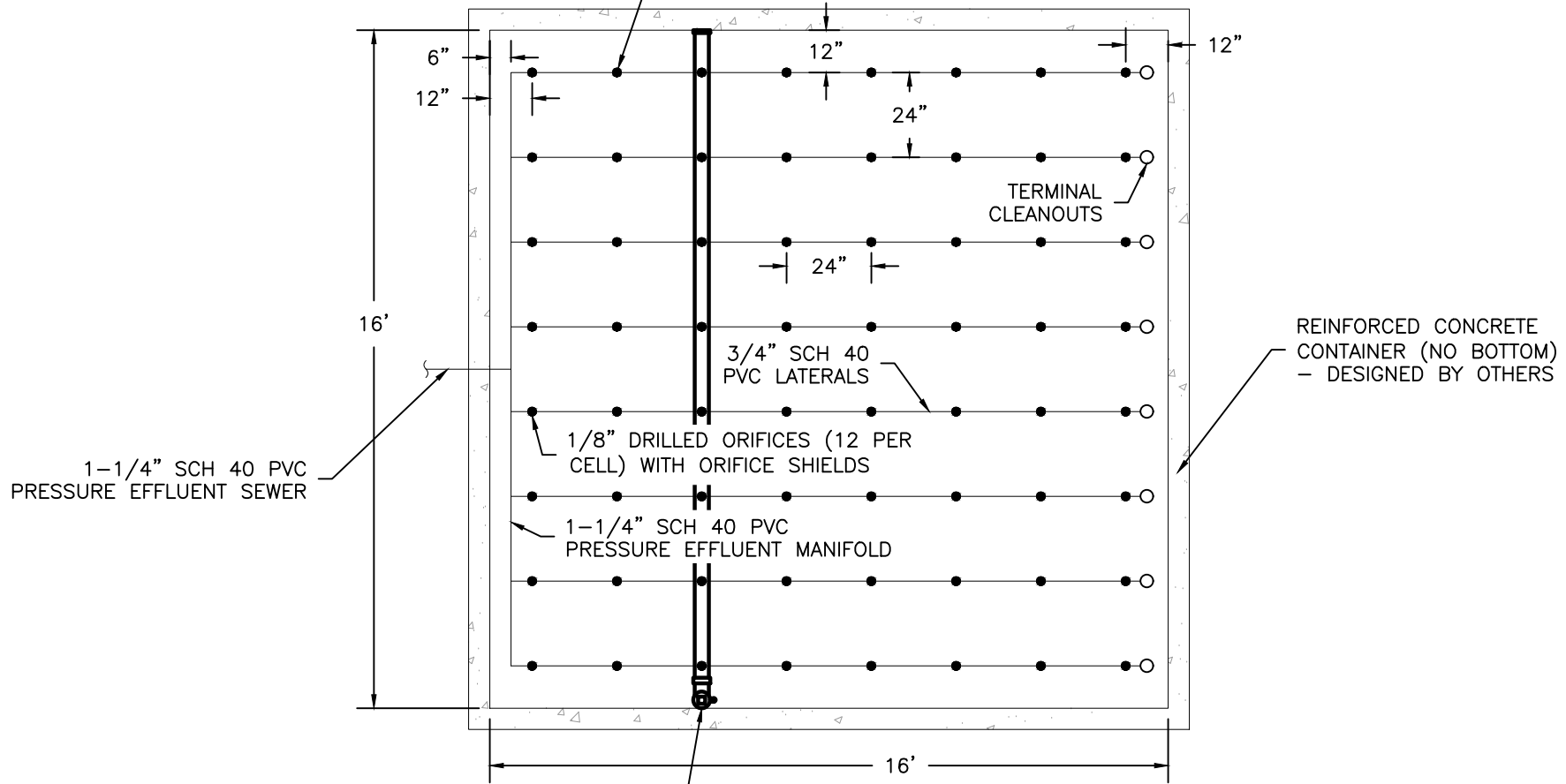


Figure 3B. Modified Bottomless Sand Filter Section – Replacement

PROJECT NUMBER: 2025015	Formal Variance
DATE: 8/11/2025	T20S, R10E, Section 12D, Tax Lots 200 & 300
DWG NO: 2025015 F1-6.DWG	Richard and Sara Herman
DWG BY: DDR	17043 Elsinore Road
PROJECT MANAGER: BRIAN RABE	Bend, OR 97707
REVISED:	 ELKHORN CONSULTING LLC

TOTAL OF 64 ORIFICES
 0.52 GALLONS PER MINUTE
 AT 7.1 FT RESIDUAL HEAD
 (33.1 GPM AT 45.5 FT TDH)
 RECOMMENDED PUMP PF3005

2nd AND 2nd TO LAST ORIFICE OF
 EACH LATERAL ORIENTED DOWN
 ALL OTHERS ORIENTED UP



EFFLUENT SAMPLE COLLECTION LYSIMETER
 (BELOW SAND FILTER MEDIA) - LOCATE
 IN ALIGNMENT DIRECTLY UNDER 3RD ROW
 OF ORIFICES.

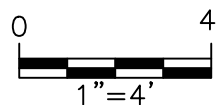



Figure 4A. Sand Filter Plan Detail - Initial

PROJECT NUMBER: 2025015	Formal Variance
DATE: 1/6/2025	T20S, R10E, Section 12D, Tax Lots 200 & 300
DWG NO: 2025015 F1-6.DWG	Richard and Sara Herman
DWG BY: DDR PROJECT MANAGER: BRIAN RABE	17043 Elsinore Road
REVISED:	Bend, OR 97707
 ELKHORN CONSULTING LLC	

TOTAL OF 60 ORIFICES
 0.56 GALLONS PER MINUTE
 AT 8.1 FT RESIDUAL HEAD
 (33.4 GPM AT 44.6 FT TDH)
 RECOMMENDED PUMP PF3005

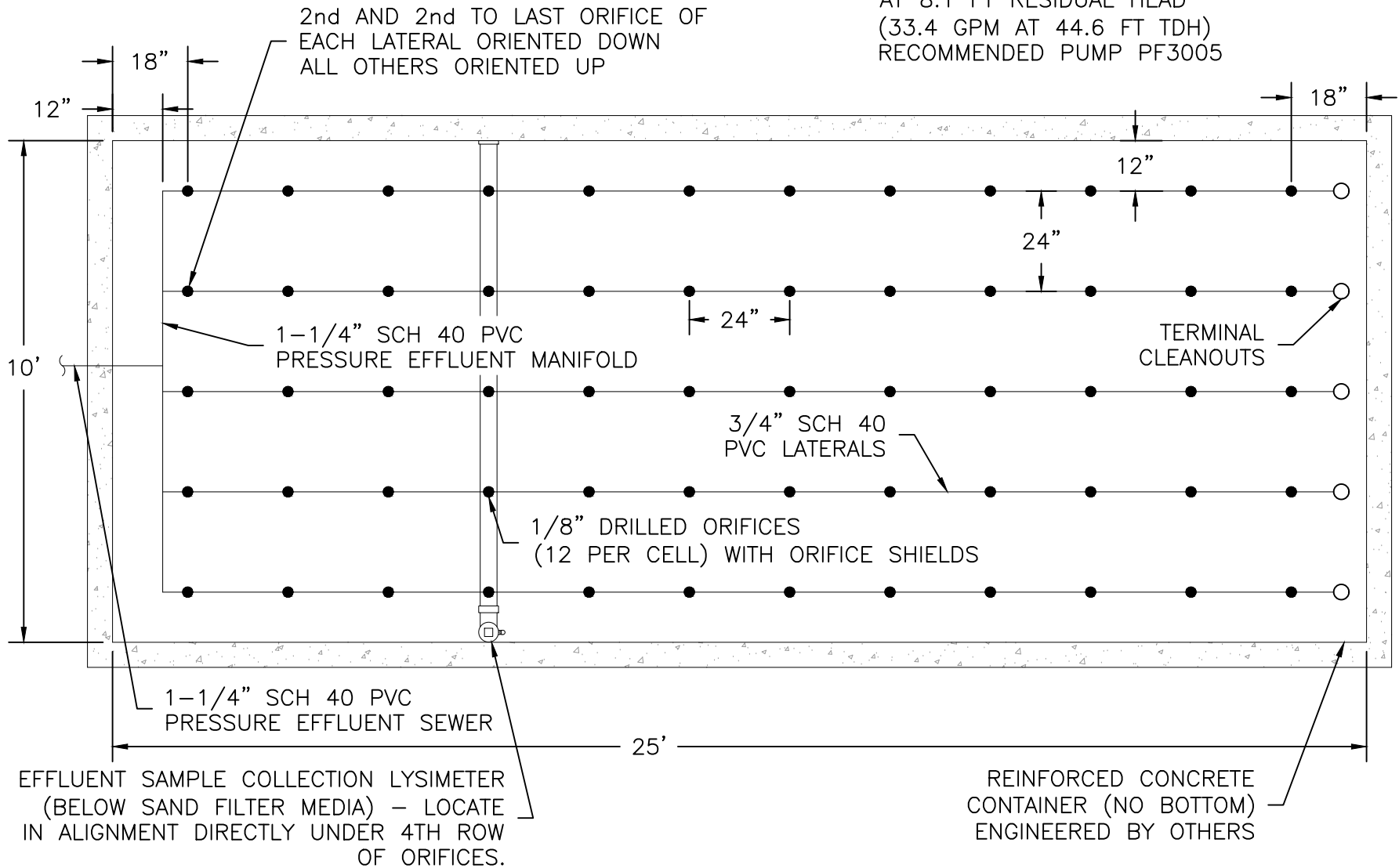



Figure 4B. Sand Filter Plan Detail – Replacement

PROJECT NUMBER: 2025015	Formal Variance
DATE: 1/6/2025	T20S, R10E, Section 12D, Tax Lots 200 & 300
DWG NO: 2025015 F1-6.DWG	Richard and Sara Herman
DWG BY: DDR PROJECT MANAGER: BRIAN RABE	17043 Elsinore Road
REVISED:	Bend, OR 97707
	 ELKHORN CONSULTING LLC



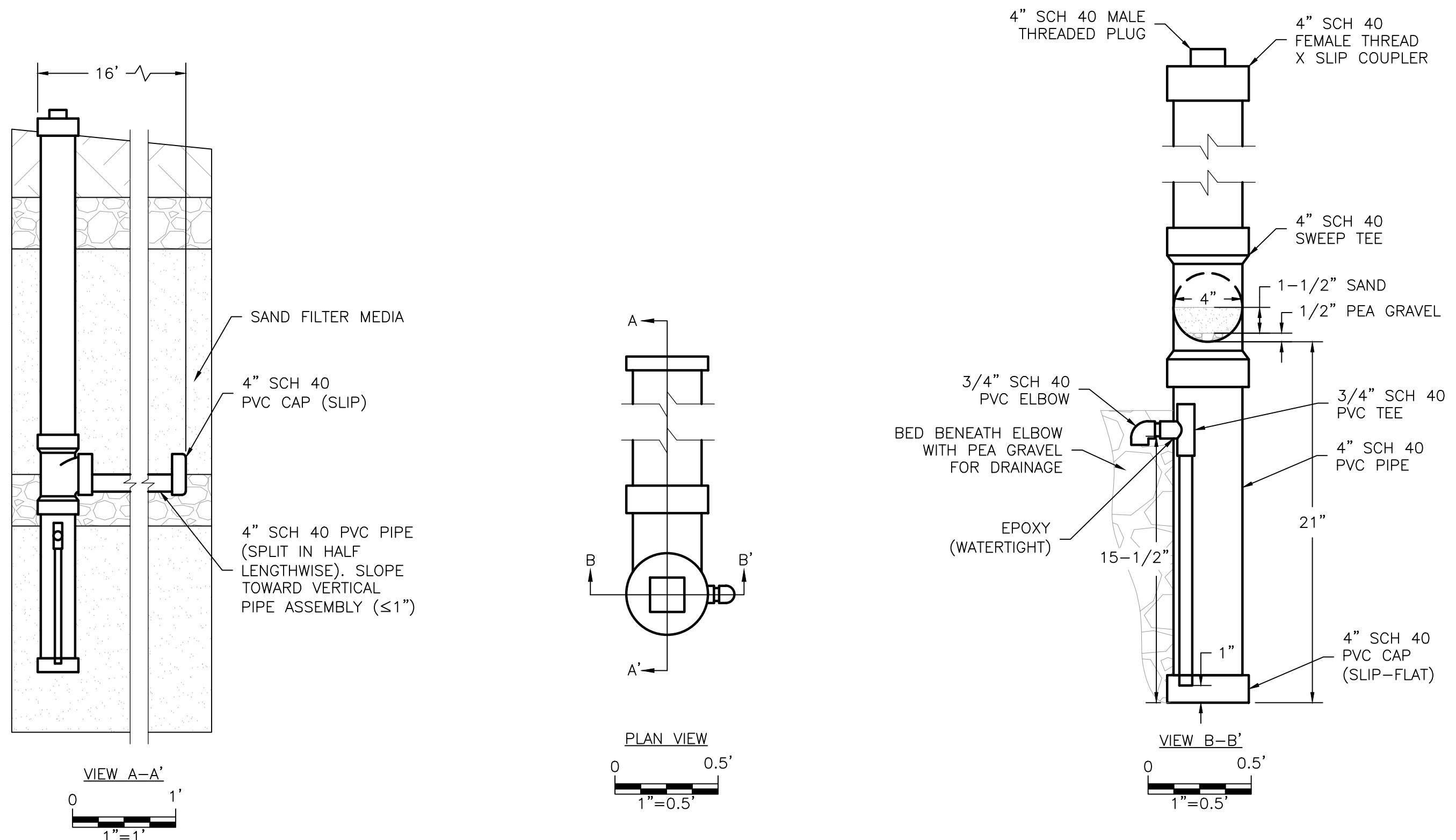

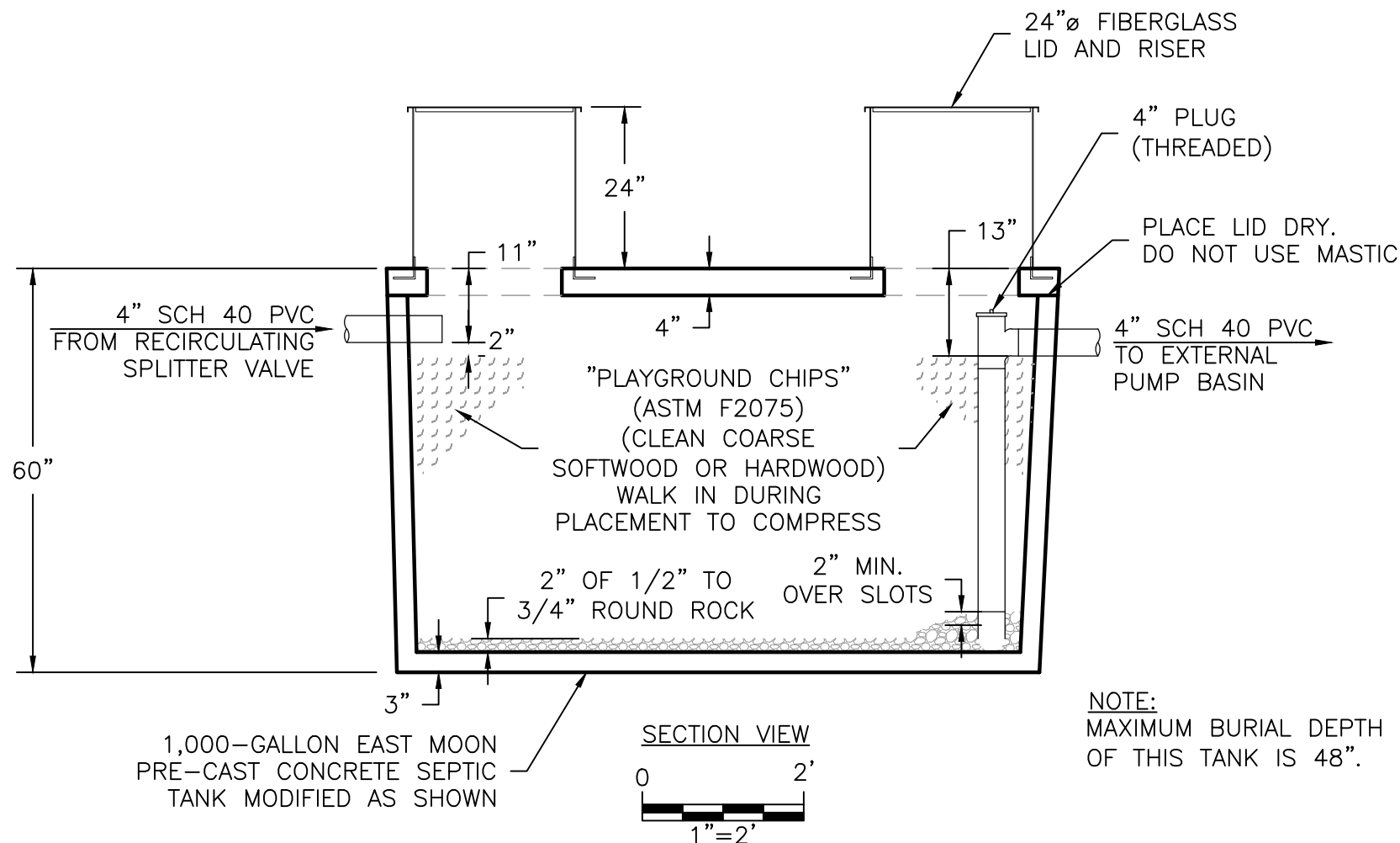
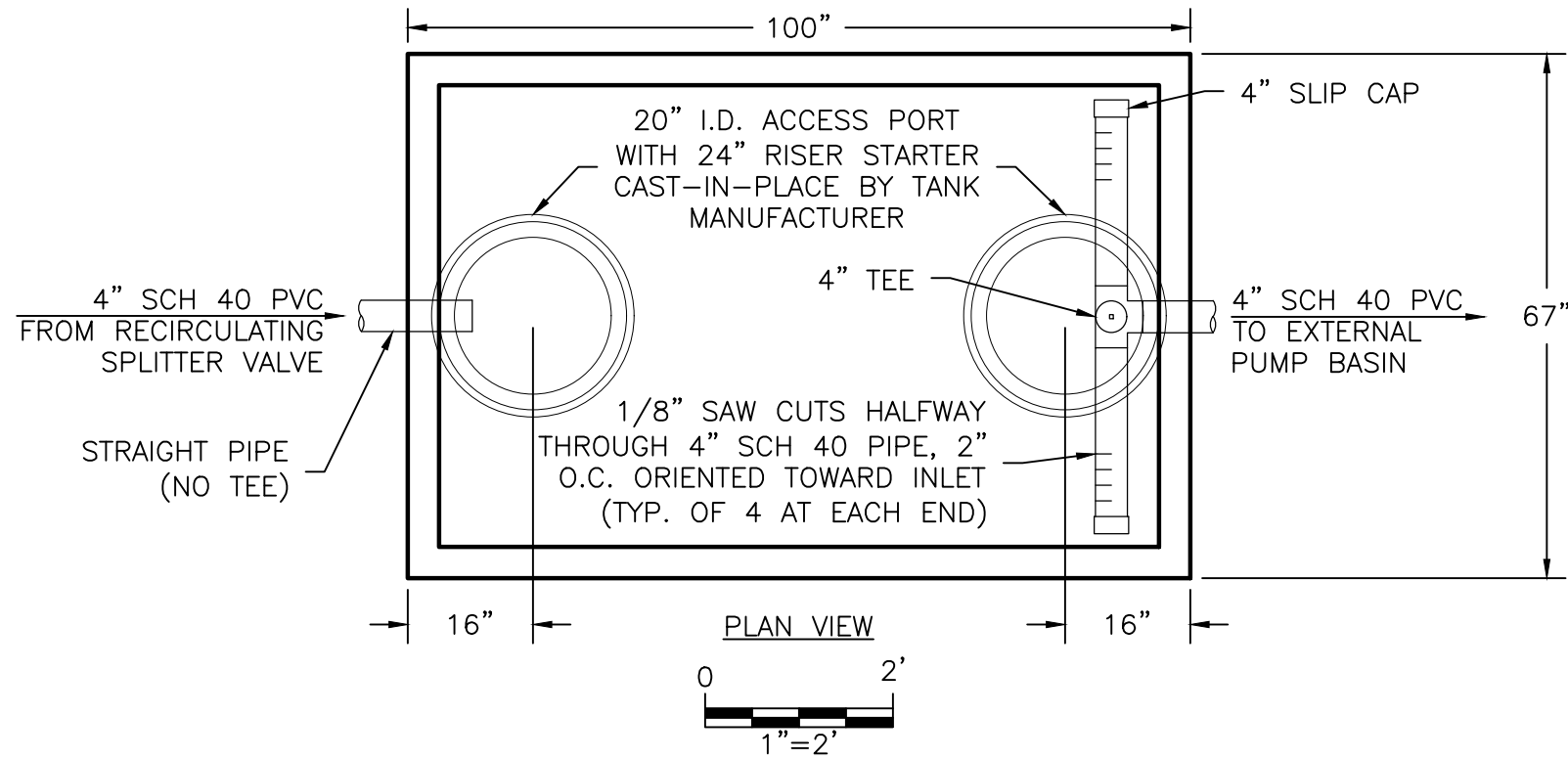


Figure 5. Lysimeter Details

PROJECT NUMBER: 2025015	Formal Variance
DATE: 1/6/2025	T20S, R10E, Section 12D, Tax Lots 200 & 300
DWG NO: 2025015 F1-6.DWG	Richard and Sara Herman
DWG BY: PROJECT MANAGER: DDR BRIAN RABE	17043 Elsinore Road
REVISED:	Bend, OR 97707
	 ELKHORN CONSULTING LLC



NOTE:
MAXIMUM BURIAL DEPTH OF THIS TANK IS 48".

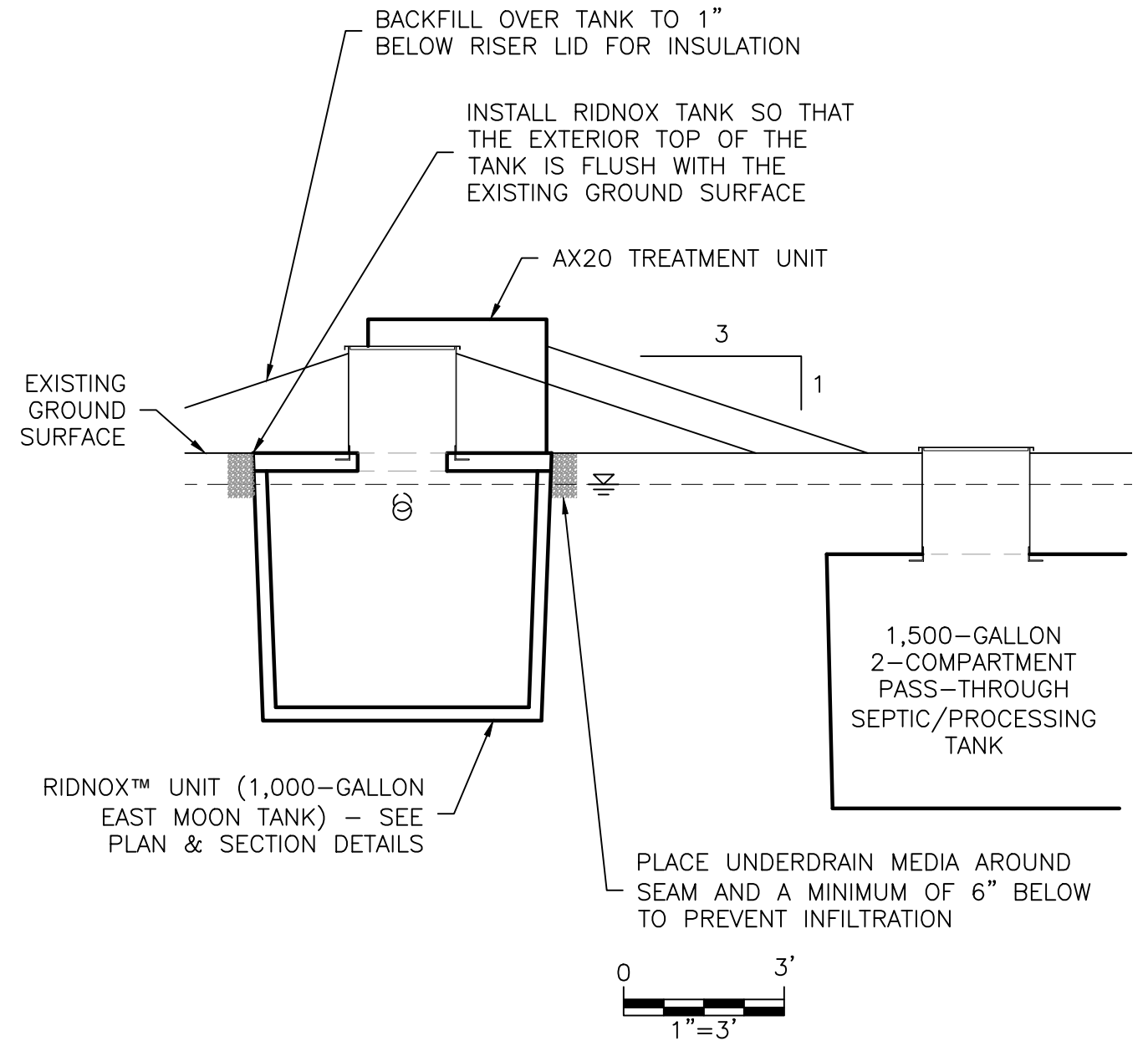



Figure 6. RidNOx™ Details

PROJECT NUMBER: 2025015	Formal Variance
DATE: 1/6/2025	T20S, R10E, Section 12D, Tax Lots 200 & 300
DWG NO: 2025015 F1-6.DWG	Richard and Sara Herman
DWG BY: PROJECT MANAGER: DDR BRIAN RABE	17043 Elsinore Road
REVISED:	Bend, OR 97707
 ELKHORN CONSULTING LLC	

APPENDICES

- Appendix A. Tax Lot Map**
- Appendix B. Deed**
- Appendix C. Site Evaluation Reports**
- Appendix D. NRCS Soil Report**
- Appendix E. Water Well Reports**
- Appendix F. RidNOxTM and Lysimeter Installation
and Sampling Instructions**
- Appendix G. Directions to Site, List of Names and Addresses
for Neighboring Property Owners**

Appendix A.

Tax Lot Map

THIS MAP WAS PREPARED FOR ASSESSMENT PURPOSE ONLY

S.E. 1/4 SEC. 12 T.20S. R.10E. W.M.
DESCHUTES COUNTY
1" = 200'

20 10 12D0

7/24/2024



Cancelled Nos.
 4100
 5200
 7700
 8700
 10700
 18200
 12500
 19900

20 10 12D0

Appendix B.

Deed

File No.: 21-309295

Grantor
Rex Isfeld and Virginia Isfeld
Grantee
Richard P. Herman and Sara B. Herman
After recording return to
Richard P. Herman and Sara B. Herman 12028 45th Ave Court NW Gig Harbor, WA 98332
Until requested, all tax statements shall be sent to
SAME AS ABOVE

Deschutes County Official Records	2021-69282
D-D	12/17/2021 09:09 AM
Stn=1 BN	
\$15.00 \$11.00 \$10.00 \$61.00 \$6.00	\$103.00
<small>I, Steve Dennison, County Clerk for Deschutes County, Oregon, certify that the instrument identified herein was recorded in the Official Records.</small>	
Steve Dennison - County Clerk	

Reserved for Recorder's Use

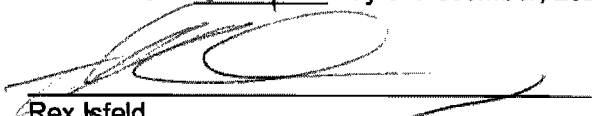
STATUTORY WARRANTY DEED

Rex Isfeld and Virginia Isfeld, as tenants by the entirety, Grantor(s) convey and warrant to Richard P. Herman and Sara B. Herman, as tenants by the entirety, as tenants by the entirety, Grantee(s), the real property described in the attached Exhibit A, free of encumbrances EXCEPT covenants, conditions, restrictions, easements, and encumbrances of record as of the date hereof.

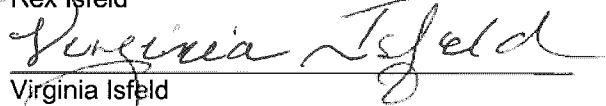
The true consideration for this conveyance is **\$150,000.00**. (Here comply with requirements of ORS 93.030)

BEFORE SIGNING OR ACCEPTING THIS INSTRUMENT, THE PERSON TRANSFERRING FEE TITLE SHOULD INQUIRE ABOUT THE PERSON'S RIGHTS, IF ANY, UNDER ORS 195.300, 195.301 AND 195.305 TO 195.336 AND SECTIONS 5 TO 11, CHAPTER 424, OREGON LAWS 2007, SECTIONS 2 TO 9 AND 17, CHAPTER 855, OREGON LAWS 2009, AND SECTIONS 2 TO 7, CHAPTER 8, OREGON LAWS 2010. THIS INSTRUMENT DOES NOT ALLOW USE OF THE PROPERTY DESCRIBED IN THIS INSTRUMENT IN VIOLATION OF APPLICABLE LAND USE LAWS AND REGULATIONS. BEFORE SIGNING OR ACCEPTING THIS INSTRUMENT, THE PERSON ACQUIRING FEE TITLE TO THE PROPERTY SHOULD CHECK WITH THE APPROPRIATE CITY OR COUNTY PLANNING DEPARTMENT TO VERIFY THAT THE UNIT OF LAND BEING TRANSFERRED IS A LAWFULLY ESTABLISHED LOT OR PARCEL, AS DEFINED IN ORS 92.010 OR 215.010, TO VERIFY THE APPROVED USES OF THE LOT OR PARCEL, TO DETERMINE ANY LIMITS ON LAWSUITS AGAINST FARMING OR FOREST PRACTICES, AS DEFINED IN ORS 30.930, AND TO INQUIRE ABOUT THE RIGHTS OF NEIGHBORING PROPERTY OWNERS, IF ANY, UNDER ORS 195.300, 195.301 AND 195.305 TO 195.336 AND SECTIONS 5 TO 11, CHAPTER 424, OREGON LAWS 2007, SECTIONS 2 TO 9 AND 17, CHAPTER 855, OREGON LAWS 2009 AND SECTIONS 2 TO 7, CHAPTER 8, OREGON LAWS 2010.

Executed this 14 day of December, 2021



Rex Isfeld

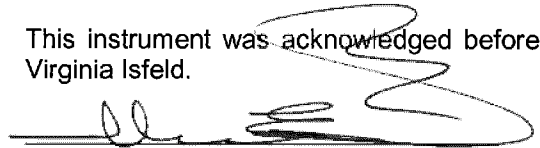


Virginia Isfeld

STATE OF OREGON

COUNTY OF Clackamas

This instrument was acknowledged before me this 14 day of December, 2021 by Rex Isfeld and Virginia Isfeld.



Notary Public for Oregon

My Commission Expires: 2/12/2023

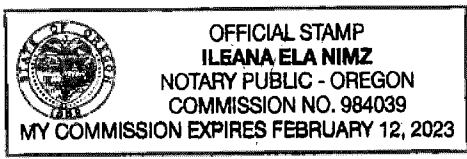
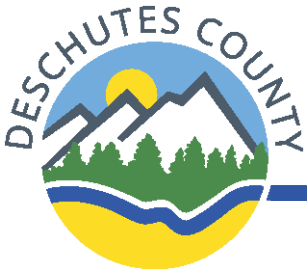


EXHIBIT "A"
LEGAL DESCRIPTION

Lots 2 & 3, Block 32, DESCHUTES RIVER RECREATION HOMESITES INC., recorded August 7, 1963, in Cabinet A, Page 108, Deschutes County, Oregon.

Appendix C.

Site Evaluation Reports



June 11, 2025

HERMAN, RICHARD P & SARA B
12028 45TH AVE CT NW
GIG HARBOR, WA 98332

RE: 247-25-000248-EVAL
17043 ELSINORE RD, BEND, OR 97707

A site evaluation for an onsite wastewater treatment system for a single family dwelling was recently completed at the property noted above. Test pits were evaluated on 5/23/2025. Part of the evaluation is to determine the level to which the groundwater rises during the wet season of a normal weather year. Permanent water tables are present throughout the year although they may fluctuate in elevation seasonally. The soil indicators used to determine the level to which the water table rises are gray soils and mottling (discoloration of the soil).

In the test pits on the property the indicators suggest the water table may rise within 16-18" inches of the ground surface. Past observations and site evaluations in the surrounding area also verify the presence of a high water table. Extensive study and modeling of the groundwater in south Deschutes County has demonstrated that this area is sensitive to added loading from areas that do not meet separation to groundwater. Installation of an onsite wastewater system in the area evaluated will likely lead to nitrate pollution of public waters. The Nitrate Loading Management Model indicates this area, Management Area 1, cannot sustain added loading from high groundwater lots if nitrate levels are to remain below the action level (Morgan, Hinkle, Weick. USGS. 2007). Groundwater shall be protected from pollution that could impair existing and future beneficial uses, including domestic drinking water from wells (OAR 340-040-0020) and as an agent of the Department of Environment Quality (DEQ), Deschutes County, may not authorize installation or use of a system that is likely to pollute public waters or create a public health hazard (OAR 340-071-0130(1)).

The site is denied based on the following:

- OAR 340-071-0290(2)(b)(A)(i)- does not meet minimum separation requirements from the permanent water table.
- OAR 340-071-0130(1)- installation of a system in the area evaluated will likely lead to pollution of public waters.
- OAR 340-040-0020(2),(3)- Groundwater quality protection
- OAR 340-071-0100(33)(g)- Conditions associated with saturation
- OAR 340-071-0220 Table 1- minimum separation distance to wells

You have 90 days from the initial site visit to provide additional test pits for evaluation at no additional fee. However, it appears that other areas on the property would not be suitable due to the lack of topographical changes.

REVIEW AVAILABLE

Pursuant to Oregon Administrative rules (OAR 340-071). You may request a site evaluation report review if you believe this report to be in violation of the rules. The Oregon DEQ conducts report reviews upon submission of the appropriate application materials including: a written request that includes all information you have received from Deschutes County, the reason the report is in error including the specific Oregon Administrative Rules that conflict with the report, and the application fee. The DEQ will review the county's report and visit the site to determine the report's compliance with the appropriate rules.

Also pursuant to this rule, you may request a variance from these rules. The Oregon DEQ reviews variance requests upon application. This is not an automatic variance. You must provide technical justification that demonstrates your proposed system will operate over an extended period of time, will not degrade the environment, and will provide public health protection.

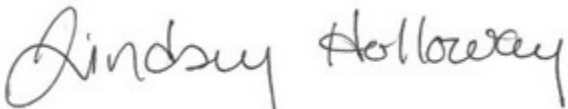
An application, application fee, justification and exhibits, including this report, a land use compatibility statement and detailed plans of your proposed system are required for the application. Technical advice from a knowledgeable consultant is recommended. A Variance Officer from DEQ will review your application and the property and issue a written determination following an informational hearing.

Deschutes County recognizes your right to a variance request. This property, however, has severe limitations for onsite wastewater treatment as noted above. Unless public health and environmental protection can be assured, a variance request cannot be supported by the Deschutes County Onsite Wastewater Division and will not likely be approved by DEQ.

For further information regarding a report review for a variance request, please contact the Oregon Department of Environmental Quality at 471 NE Bellevue Dr., #110, Bend, OR 97701, phone 541-388-6146.

If you have any questions, please do not hesitate to call this office at 541-388-6519.

Sincerely,
Onsite Wastewater Division



Lindsey Holloway, REHS
Onsite Wastewater Specialist II



SITE EVALUATION FIELD INSPECTION FORM

Applicant: Richard + Sara Herman Site Evaluation # 247-25-000248-EVAL

Evaluator: Lindsey Holloway Date: 5/23/25 Parcel Size: .48 acre

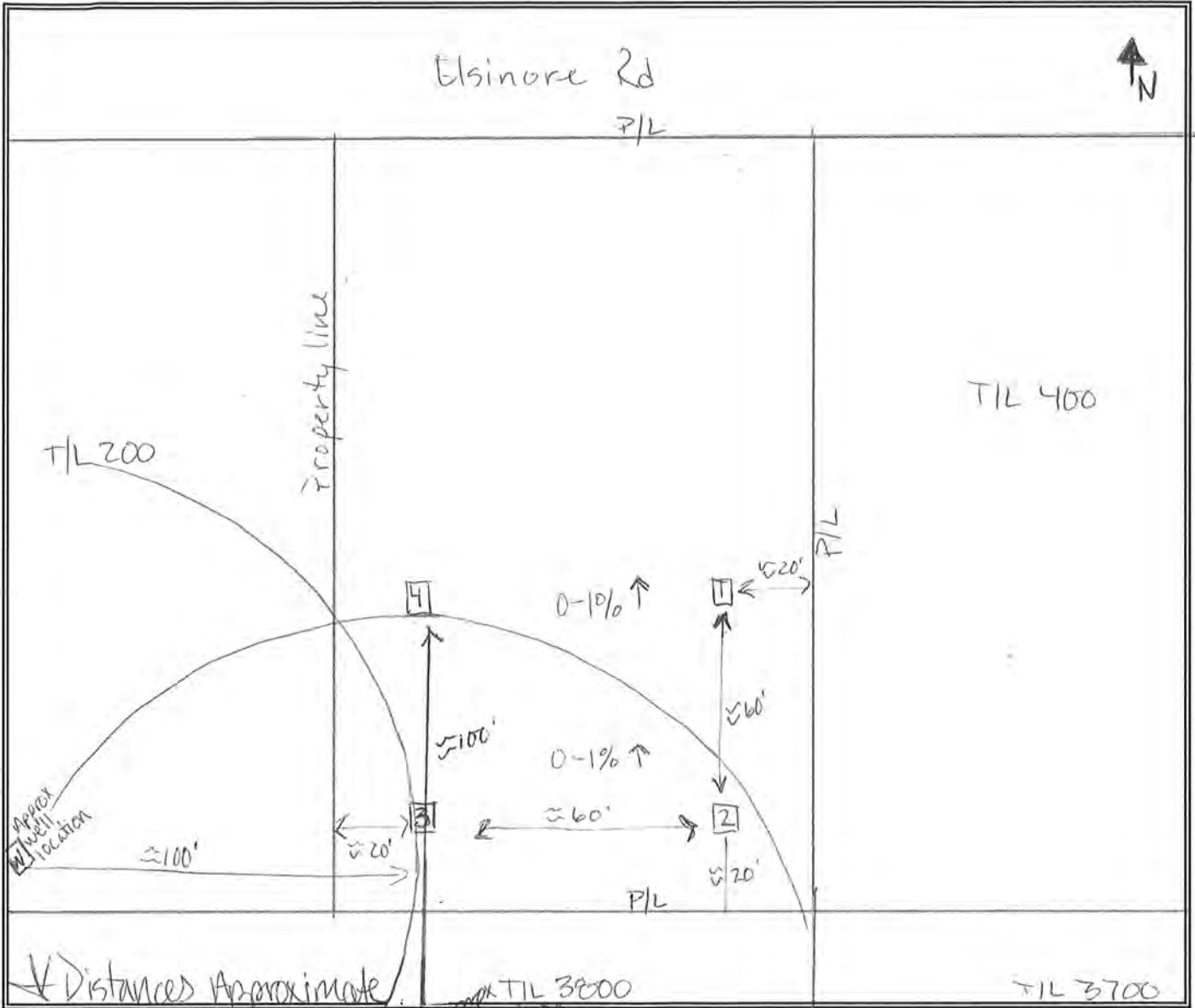
Subdivision: Deschutes River Recreation T 20 R 10 S 120 TL 300 L 3 B 32

Suitable

Homesites Inc with

Sketch/Not to Scale

Unsuitable



*systems approved are the **minimum** to meet current DEQ rules and are not design specifications

System type approved: _____

Absorption facility:

Initial _____

Min. Size _____ Max. Depth _____ Min. Depth _____

Replacement _____

Min. Size _____ Max. Depth _____ Min. Depth _____

Tank Size _____

Sewage Flow _____

Special Conditions: _____

Denied



SITE EVALUATION FIELD INSPECTION FORM

Applicant: _____ Site Evaluation # 247-25-000248-EVAL
 Evaluator: _____ Date: _____ Parcel Size: _____
 Subdivision: _____ T _____ R _____ S _____ TL _____ L _____ B _____

DEPTH	TEXTURE	COLOR	Notes on roots, structure, rock frag, redox, limiting layer type & depth
-------	---------	-------	--

1	0-8	ls	10yr 3/3	3rf 2f 2m 10 2 msbk fr
	8-24	lcos	10yr 3/3	lf lf m 1msbk fr (stripping 10yr 6/2) + (staining 10yr 5/6) at 17"
	24-46	sl	10yr 3/2	few roots, 3csbk fr redox throughout (10yr 5/6)
	46-55	grs	10yr 2/1	no roots sg redox throughout

2	0-7			Similar to pit 1
	7-20			stripping + staining at 18"
	20-47			
	47-51			

3	0-6			Similar to pit 1 (no 4th)
	6-23			stripping + staining at 18"
	23-53			

4	0-7			Similar to pit 3
	7-22			stripping + staining at 16"
	22-50			

5				

6				

7				

Landscape Note: lodgepole pine, idaho fescue, Bitter brush, Broadleaf Strawberry
 Slope: 0-1% Aspect: _____ Groundwater: perm. Baltic nsh
 Other site notes: _____

Comments: conditions associated with Saturation

Reason for Unsuitability: (Include Rule Reference)
OR 340-071-0290(2)(b)(A)(i), OR 340-071-0130(1),
OR 340-071-0220 TABLE 1 - well setback pits 2+3, OR 340-071-0100(33)(5);
OR 340-040-0020(2)(3)

Appendix D.
NRCS Soil Report



A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Upper Deschutes River Area, Oregon, Parts of Deschutes, Jefferson, and Klamath Counties

17033 and 17043 Elsinore



Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (<http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/>) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (<https://offices.sc.egov.usda.gov/locator/app?agency=nrcs>) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

Custom Soil Resource Report

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

Custom Soil Resource Report

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report Soil Map (17033 and 17043 Elsinore)



Map Scale: 1:497 if printed on A landscape (11" x 8.5") sheet.


0 5 10 20 30 Meters

0 20 40 80 120 Feet


Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)




















Soils







 Soil Map Unit Polygons

 Soil Map Unit Lines


 Soil Map Unit Points

Special Point Features






-  Blowout
-  Borrow Pit
-  Clay Spot
-  Closed Depression
-  Gravel Pit
-  Gravelly Spot
-  Landfill
-  Lava Flow
-  Marsh or swamp
-  Mine or Quarry
-  Miscellaneous Water
-  Perennial Water
-  Rock Outcrop
-  Saline Spot
-  Sandy Spot
-  Severely Eroded Spot
-  Sinkhole
-  Slide or Slip
-  Sodic Spot

-  Spoil Area
-  Stony Spot
-  Very Stony Spot
-  Wet Spot
-  Other
-  Special Line Features


Water Features

 Streams and Canals

Transportation

-  Rails
-  Interstate Highways
-  US Routes
-  Major Roads
-  Local Roads

Background

 Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
 Web Soil Survey URL:
 Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Upper Deschutes River Area, Oregon, Parts of Deschutes, Jefferson, and Klamath Counties
 Survey Area Data: Version 22, Aug 30, 2024

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Nov 1, 2019—Nov 4, 2019

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background

MAP LEGEND

MAP INFORMATION

imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend (17033 and 17043 Elsinore)

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
144A	Sunriver sandy loam, 0 to 3 percent slopes	1.0	100.0%
Totals for Area of Interest		1.0	100.0%

Map Unit Descriptions (17033 and 17043 Elsinore)

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The

Custom Soil Resource Report

delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Upper Deschutes River Area, Oregon, Parts of Deschutes, Jefferson, and Klamath Counties

144A—Sunriver sandy loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2411

Elevation: 4,000 to 4,300 feet

Mean annual precipitation: 18 to 25 inches

Mean annual air temperature: 40 to 44 degrees F

Frost-free period: 10 to 50 days

Farmland classification: Farmland of statewide importance

Map Unit Composition

Sunriver and similar soils: 85 percent

Minor components: 8 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Sunriver

Setting

Landform: Stream terraces

Landform position (three-dimensional): Tread

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Volcanic ash over old alluvium

Typical profile

H1 - 0 to 5 inches: sandy loam

H2 - 5 to 20 inches: loamy coarse sand

H3 - 20 to 29 inches: coarse sand

H4 - 29 to 60 inches: sandy loam

Properties and qualities

Slope: 0 to 3 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Somewhat poorly drained

Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)

Depth to water table: About 24 to 48 inches

Frequency of flooding: None

Frequency of ponding: None

Available water supply, 0 to 60 inches: Moderate (about 7.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 6c

Hydrologic Soil Group: B

Ecological site: F006XE807OR - Cryic Aquic Pumice Basins (PICO/SPDO-VAUL)

Other vegetative classification: Pinus contorta/Vaccinium uliginosum/forb (CLM311)

Hydric soil rating: No

Custom Soil Resource Report

Minor Components

Cryaquolls

Percent of map unit: 8 percent

Landform: Mountains

Ecological site: R006XB102OR - Cold Wet Meadow

Hydric soil rating: Yes

References

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Custom Soil Resource Report

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

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Appendix E.

Water Well Reports

STATE OF OREGON WATER SUPPLY WELL REPORT

DESC 63724

WELL I.D. LABEL# L

149499

START CARD #

1058863

ORIGINAL LOG #

(as required by ORS 537.545 & 537.765 and OAR 690-205-0210)

10/13/2022

(1) LAND OWNER

Owner Well I.D.

First Name RICHARD Last Name HERMAN
Company
Address 120228 45THAVECT NW
City GIG HARBOR State WA Zip 98332

(2) TYPE OF WORK

[X] New Well [] Deepening [] Conversion
[] Alteration (complete 2a & 10) [] Abandonment(complete 5a)

(2a) PRE-ALTERATION

Casing: Dia + From To Gauge Stl Plstc Wld Thrld
Material From To Amt sacks/lbs
Seal:

(3) DRILL METHOD

[] Rotary Air [] Rotary Mud [] Cable [X] Auger [] Cable Mud
[] Reverse Rotary [] Other

(4) PROPOSED USE

[X] Domestic [] Irrigation [] Community
[] Industrial/ Commercial [] Livestock [] Dewatering
[] Thermal [] Injection [] Other

(5) BORE HOLE CONSTRUCTION

Special Standard [] (Attach copy)

Depth of Completed Well 24.00 ft.

Table with columns: Dia, From, To, Material, SEAL, Amt, sacks/lbs. Row 1: 10, 0, 24, Bentonite Chips, 0, 18, 12, S, 10.

How was seal placed: Method [] A [] B [] C [] D [] E

[X] Other POURED

Backfill placed from 18 ft. to 19 ft. Material SAND

Filter pack from 19 ft. to 24 ft. Material FILTER SAND Size 10/20

Explosives used: [] Yes Type Amount

(5a) ABANDONMENT USING UNHYDRATED BENTONITE

Proposed Amount Actual Amount

(6) CASING/LINER

Table with columns: Casing, Liner, Dia, From, To, Gauge, Stl, Plstc, Wld, Thrld. Row 1: [X], [], 4, 1.5, 19, 160, [], [], [X], [].

Shoe [] Inside [] Outside [] Other Location of shoe(s)

Temp casing [] Yes Dia From + To

(7) PERFORATIONS/SCREENS

Perforations Method

Screens Type slotted Material pvc

Table with columns: Perf/ Screen, Casing/ Liner, Dia, From, To, Scrn/slot width, Slot length, # of slots, Tele/ pipe size. Row 1: Screen, Liner, 4, 19, 24, .1, length, 1750, pipe size.

(8) WELL TESTS: Minimum testing time is 1 hour

[X] Pump [] Bailer [] Air [] Flowing Artesian

Table with columns: Yield gal/min, Drawdown, Drill stem/Pump depth, Duration (hr). Row 1: 20, , 19, 1.

Temperature 52 °F Lab analysis [] Yes By

Water quality concerns? [] Yes (describe below) TDS amount 70 ppm

Table with columns: From, To, Description, Amount, Units.

(9) LOCATION OF WELL (legal description)

County DESCHUTES Twp 20.00 S N/S Range 10.00 E E/W WM

Sec 12 NW 1/4 of the SE 1/4 Tax Lot 200

Tax Map Number Lot

Lat " or 43.85473421 DMS or DD

Long " or -121.47469147 DMS or DD

[X] Street address of well [] Nearest address

17033 ELSINORE THREE RIVERS

(10) STATIC WATER LEVEL

Table with columns: Existing Well / Pre-Alteration, Date, SWL(psi), SWL(ft). Row 1: Completed Well, 10/12/2022, , 10.

Flowing Artesian? [] Dry Hole? []

WATER BEARING ZONES

Depth water was first found 10.00

SWL Date From To Est Flow SWL(psi) + SWL(ft)

Table with columns: SWL Date, From, To, Est Flow, SWL(psi), SWL(ft). Row 1: 10/12/2022, 10, 24, 20, , 10.

(11) WELL LOG

Ground Elevation

Table with columns: Material, From, To. Row 1: soil and pumice, 0, 4. Row 2: clay and gravel, 4, 10. Row 3: coarse fine black sand, 10, 24.

Date Started 10/12/2022 Completed 10/12/2022

(unbonded) Water Well Constructor Certification

I certify that the work I performed on the construction, deepening, alteration, or abandonment of this well is in compliance with Oregon water supply well construction standards. Materials used and information reported above are true to the best of my knowledge and belief.

License Number Date

Signed

(bonded) Water Well Constructor Certification

I accept responsibility for the construction, deepening, alteration, or abandonment work performed on this well during the construction dates reported above. All work performed during this time is in compliance with Oregon water supply well construction standards. This report is true to the best of my knowledge and belief.

License Number 1528 Date 10/13/2022

Signed STEVE MATHERS (E-filed)

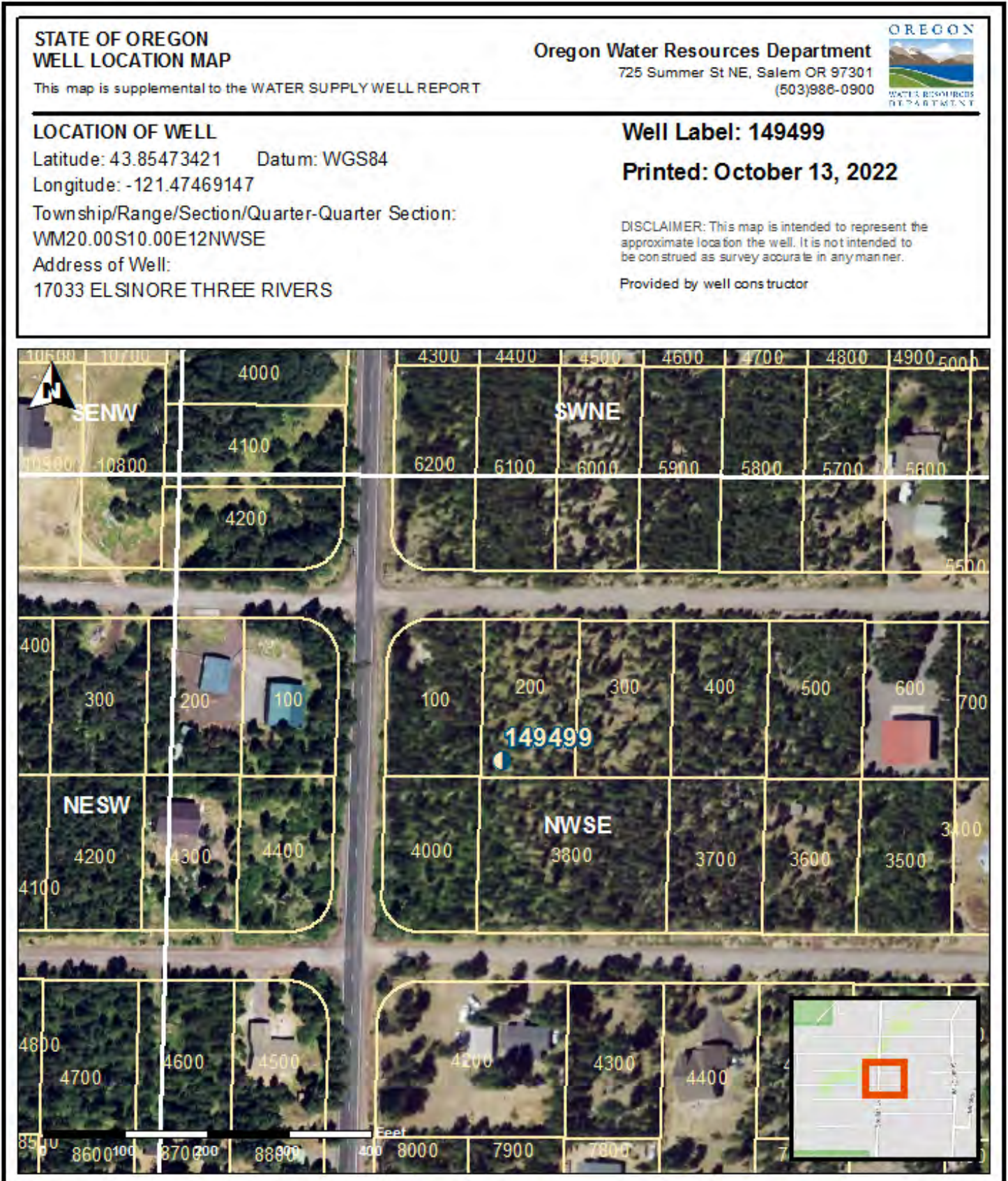
Contact Info (optional) 541 389 0743

WATER SUPPLY WELL REPORT - Map with location identified must be attached and shall include an approximate scale and north arrow

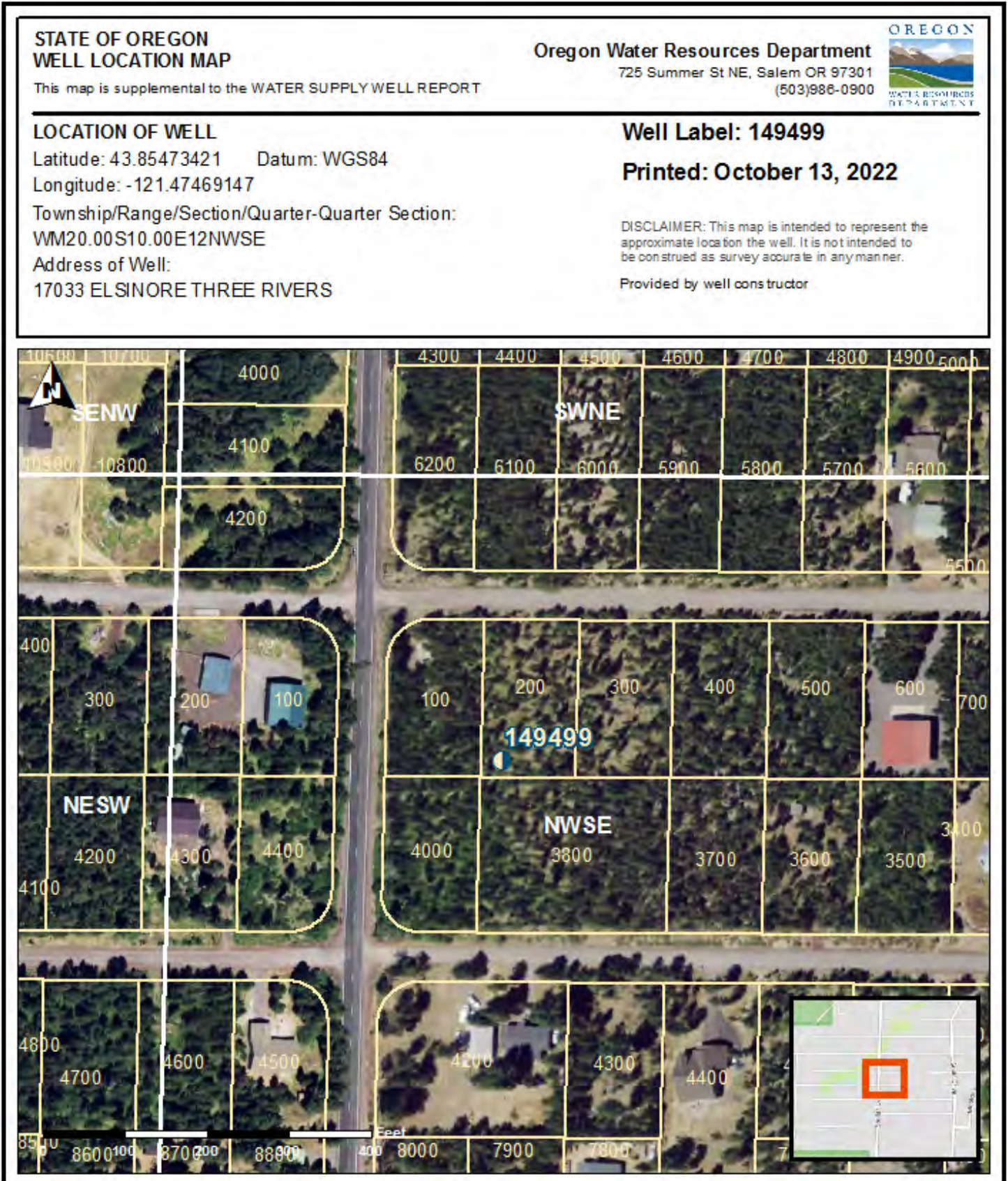
DESC 63724

10/13/2022

Map of Hole



Map of Hole



STATE OF OREGON WATER SUPPLY WELL REPORT

DESC 63733

WELL I.D. LABEL# L

149497

START CARD #

1058960

ORIGINAL LOG #

(as required by ORS 537.545 & 537.765 and OAR 690-205-0210)

10/18/2022

(1) LAND OWNER

Owner Well I.D. _____

First Name RICHARD Last Name QUAAS

Company _____

Address 5155 N.UMPGUA HWY

City ROSEBURG State OR Zip 97470

(2) TYPE OF WORK

New Well Deepening Conversion

Alteration (complete 2a & 10) Abandonment(complete 5a)

(2a) PRE-ALTERATION

Dia + From To Gauge Stl Plstc Wld Thrld

Casing: _____

Material From To Amt sacks/lbs

Seal: _____

(3) DRILL METHOD

Rotary Air Rotary Mud Cable Auger Cable Mud

Reverse Rotary Other _____

(4) PROPOSED USE

Domestic Irrigation Community

Industrial/ Commercial Livestock Dewatering

Thermal Injection Other _____

(5) BORE HOLE CONSTRUCTION

Special Standard (Attach copy)

Depth of Completed Well 24.00 ft.

BORE HOLE

Dia From To Material From To Amt sacks/lbs

10 0 24 Bentonite Chips 0 18 12 S

Calculated 8.4

Calculated _____

How was seal placed: Method A B C D E

Other POURED

Backfill placed from 18 ft. to 19 ft. Material SAND

Filter pack from 19 ft. to 24 ft. Material FILTER SAND Size 10/20

Explosives used: Yes Type _____ Amount _____

(5a) ABANDONMENT USING UNHYDRATED BENTONITE

Proposed Amount Actual Amount

(6) CASING/LINER

Casing Liner Dia + From To Gauge Stl Plstc Wld Thrld

4 1 19 160

Shoe Inside Outside Other Location of shoe(s) _____

Temp casing Yes Dia From + _____ To _____

(7) PERFORATIONS/SCREENS

Perforations Method _____

Screens Type slotted Material pvc

Perf/ Casing/ Screen Dia From To Scrn/slot Slot # of Tele/

Screen Liner Dia From To width length slots pipe size

Screen Casing 4 19 24 .1 1750

(8) WELL TESTS: Minimum testing time is 1 hour

Pump Bailer Air Flowing Artesian

Yield gal/min Drawdown Drill stem/Pump depth Duration (hr)

20 _____ 23 1

Temperature 50 °F Lab analysis Yes By _____

Water quality concerns? Yes (describe below) TDS amount 66 ppm

From To Description Amount Units

(9) LOCATION OF WELL (legal description)

County DESCHUTES Twp 20.00 S N/S Range 10.00 E E/W WM

Sec 12 NW 1/4 of the SE 1/4 Tax Lot 100

Tax Map Number _____ Lot _____

Lat _____ " or 43.85482705 DMS or DD

Long _____ " or -121.47491141 DMS or DD

Street address of well Nearest address

17023 ELSINORE THREE RIVERS

(10) STATIC WATER LEVEL

Date SWL(psi) + SWL(ft)

Existing Well / Pre-Alteration _____

Completed Well 10/18/2022 8

Flowing Artesian? Dry Hole?

WATER BEARING ZONES

Depth water was first found 8.00

SWL Date From To Est Flow SWL(psi) + SWL(ft)

10/18/2022 8 23.5 20 8

(11) WELL LOG

Ground Elevation _____

Material From To

soil and pumice 0 2

clay and gravel 2 8

coarse black sand 8 23.5

green diatomite 23.5 24

Date Started 10/18/2022 Completed 10/18/2022

(unbonded) Water Well Constructor Certification

I certify that the work I performed on the construction, deepening, alteration, or abandonment of this well is in compliance with Oregon water supply well construction standards. Materials used and information reported above are true to the best of my knowledge and belief.

License Number _____ Date _____

Signed _____

(bonded) Water Well Constructor Certification

I accept responsibility for the construction, deepening, alteration, or abandonment work performed on this well during the construction dates reported above. All work performed during this time is in compliance with Oregon water supply well construction standards. This report is true to the best of my knowledge and belief.

License Number 1528 Date 10/18/2022

Signed STEVE MATHERS (E-filed)

Contact Info (optional) 541 389 0743

WATER SUPPLY WELL REPORT - Map with location identified must be attached and shall include an approximate scale and north arrow

DESC 63733

10/18/2022

Map of Hole



STATE OF OREGON WATER SUPPLY WELL REPORT

DESC 63875

WELL I.D. LABEL# L

145615

START CARD #

1058823

ORIGINAL LOG #

12/13/2022

(as required by ORS 537.545 & 537.765 and OAR 690-205-0210)

(1) LAND OWNER

Owner Well I.D.

First Name KURT Last Name MORTLAND
Company
Address PO BOX 1691
City BEND State OR Zip 97701

(2) TYPE OF WORK

[X] New Well [] Deepening [] Conversion

[] Alteration (complete 2a & 10) [] Abandonment (complete 5a)

(2a) PRE-ALTERATION

Casing: Dia + From To Gauge Stl Plstc Wld Thrd
Material From To Amt sacks/lbs
Seal:

(3) DRILL METHOD

[] Rotary Air [] Rotary Mud [X] Cable [] Auger [] Cable Mud
[] Reverse Rotary [] Other

(4) PROPOSED USE

[X] Domestic [] Irrigation [] Community
[] Industrial/ Commercial [] Livestock [] Dewatering
[] Thermal [] Injection [] Other

(5) BORE HOLE CONSTRUCTION

Special Standard [] (Attach copy)

Depth of Completed Well 30.00 ft.

Table with columns: Dia, From, To, Material, From, To, Amt, lbs. Rows include Bentonite Chips and Calculated values.

How was seal placed: Method [] A [] B [] C [] D [] E

[X] Other BENTONITE CHIPS

Backfill placed from ft. to ft. Material

Filter pack from ft. to ft. Material Size

Explosives used: [] Yes Type Amount

(5a) ABANDONMENT USING UNHYDRATED BENTONITE

Proposed Amount Actual Amount

(6) CASING/LINER

Table with columns: Casing, Liner, Dia, +, From, To, Gauge, Stl, Plstc, Wld, Thrd. Includes rows for 6 inch and 4.5 inch casings.

Shoe [] Inside [] Outside [] Other Location of shoe(s)

Temp casing [] Yes Dia From + To

(7) PERFORATIONS/SCREENS

Perforations Method

Screens Type saw cut Material pvc

Table with columns: Perf/ Screen, Casing/ Liner, Dia, From, To, Scrn/slot width, Slot length, # of slots, Tele/ pipe size.

(8) WELL TESTS: Minimum testing time is 1 hour

[X] Pump [] Bailer [] Air [] Flowing Artesian

Table with columns: Yield gal/min, Drawdown, Drill stem/Pump depth, Duration (hr). Row 1: 15, 3.6, 12, 2.

Temperature 42 °F Lab analysis [] Yes By

Water quality concerns? [] Yes (describe below) TDS amount 48 ppm

Table with columns: From, To, Description, Amount, Units.

(9) LOCATION OF WELL (legal description)

County DESCHUTES Twp 20.00 S N/S Range 10.00 E E/W WM

Sec 12 NW 1/4 of the SE 1/4 Tax Lot 3600

Tax Map Number Lot

Lat " or 43.85455000 DMS or DD

Long " or -121.47322000 DMS or DD

[X] Street address of well [] Nearest address

17060 FONTANNA

(10) STATIC WATER LEVEL

Date SWL(psi) + SWL(ft)

Table with columns: Existing Well / Pre-Alteration, Completed Well, Date, SWL(psi), SWL(ft). Row 1: 10/14/2022, 9.

Flowing Artesian? [] Dry Hole? []

WATER BEARING ZONES

Depth water was first found 9.00

SWL Date From To Est Flow SWL(psi) + SWL(ft)

Table with columns: SWL Date, From, To, Est Flow, SWL(psi), SWL(ft). Row 1: 10/14/2022, 7, 30, 15, 9.

(11) WELL LOG

Ground Elevation

Table with columns: Material, From, To. Rows include pummy clay mix, brown sand and gravel, Helper: Zane Naylor.

Date Started 10/10/2022 Completed 10/14/2022

(unbonded) Water Well Constructor Certification

I certify that the work I performed on the construction, deepening, alteration, or abandonment of this well is in compliance with Oregon water supply well construction standards.

License Number Date

Signed

(bonded) Water Well Constructor Certification

I accept responsibility for the construction, deepening, alteration, or abandonment work performed on this well during the construction dates reported above.

License Number 1614 Date 10/28/2022

Signed SAM OLSON (E-filed)

Contact Info (optional) 5415365339

WATER SUPPLY WELL REPORT - Map with location identified must be attached and shall include an approximate scale and north arrow

DESC 63875

12/13/2022

Map of Hole



STATE OF OREGON
WATER SUPPLY WELL REPORT
(as required by ORS 537.765 & OAR 690-205-0210)

DESC 62173

WELL I.D. LABEL# L

139170

START CARD #

1048577

8/16/2020

ORIGINAL LOG #

(1) LAND OWNER

Owner Well I.D.

First Name MIKE Last Name SHEHADEH
Company
Address 16894 JACINTO
City BEND State OR Zip 97707

(2) TYPE OF WORK

[X] New Well [] Deepening [] Conversion

[] Alteration (complete 2a & 10) [] Abandonment (complete 5a)

(2a) PRE-ALTERATION

Casing: Dia + From To Gauge Stl Plstc Wld Thrld
Material From To Amt sacks/lbs
Seal:

(3) DRILL METHOD

[] Rotary Air [] Rotary Mud [] Cable [X] Auger [] Cable Mud
[] Reverse Rotary [] Other

(4) PROPOSED USE

[X] Domestic [] Irrigation [] Community

[] Industrial/ Commercial [] Livestock [] Dewatering
[] Thermal [] Injection [] Other

(5) BORE HOLE CONSTRUCTION

Special Standard [] (Attach copy)

Depth of Completed Well 24.00 ft.

Table with columns: Dia, From, To, Material, From, To, Amt, sacks/lbs. Row 1: 10, 0, 24, Bentonite Chips, 0, 18, 14, S. Row 2: Calculated, 11.

How was seal placed: Method [] A [] B [] C [] D [] E

[X] Other POURED

Backfill placed from ft. to ft. Material

Filter pack from 18 ft. to 24 ft. Material FILTER SAND Size 10/20

Explosives used: [] Yes Type Amount

(5a) ABANDONMENT USING UNHYDRATED BENTONITE

Proposed Amount Actual Amount

(6) CASING/LINER

Table with columns: Casing, Liner, Dia, +, From, To, Gauge, Stl, Plstc, Wld, Thrld. Row 1: [X], [X], 6, [X], 1, 4, 160, [X], [X], [X], [X]. Row 2: [X], [X], 4, [X], 4, 18, 160, [X], [X], [X], [X].

Shoe [] Inside [] Outside [] Other Location of shoe(s)

Temp casing [] Yes Dia From + To

(7) PERFORATIONS/SCREENS

Perforations Method

Screens Type slotted Material pvc

Table with columns: Perf/ Screen, Casing/ Liner, Dia, From, To, Scrm/slot width, Slot length, # of slots, Tele/ pipe size. Row 1: Screen, Casing, 4, 18, 24, .1, length, 2100, pipe size.

(8) WELL TESTS: Minimum testing time is 1 hour

[X] Pump [] Bailer [] Air [] Flowing Artesian

Table with columns: Yield gal/min, Drawdown, Drill stem/Pump depth, Duration (hr). Row 1: 22, , 23, 1.

Temperature 39 °F Lab analysis [] Yes By

Water quality concerns? [] Yes (describe below) TDS amount 84 ppm

Table with columns: From, To, Description, Amount, Units.

(9) LOCATION OF WELL (legal description)

County DESCHUTES Twp 20.00 S N/S Range 10.00 E E/W WM

Sec 12 NW 1/4 of the SE 1/4 Tax Lot 6000

Tax Map Number Lot

Lat " or " DMS or DD

Long " or " DMS or DD

[X] Street address of well [] Nearest address

17040 ELSINORE

(10) STATIC WATER LEVEL

Date SWL(psi) + SWL(ft)

Table with columns: Existing Well / Pre-Alteration, Date, SWL(psi), +, SWL(ft). Row 1: Completed Well, 8/13/2020, , 10.

Flowing Artesian? [] Dry Hole? []

WATER BEARING ZONES

Depth water was first found 10.00

SWL Date From To Est Flow SWL(psi) + SWL(ft)

Table with columns: SWL Date, From, To, Est Flow, SWL(psi), +, SWL(ft). Row 1: 8/13/2020, 10, 24, 40, , 10.

(11) WELL LOG

Ground Elevation

Table with columns: Material, From, To. Row 1: soil and pumice, 0, 4. Row 2: clay and gravel, 4, 10. Row 3: coarse black sand, 10, 16. Row 4: medium fine black sand, 16, 24.

Date Started 8/13/2020 Completed 8/13/2020

(unbonded) Water Well Constructor Certification

I certify that the work I performed on the construction, deepening, alteration, or abandonment of this well is in compliance with Oregon water supply well construction standards. Materials used and information reported above are true to the best of my knowledge and belief.

License Number Date

Signed

(bonded) Water Well Constructor Certification

I accept responsibility for the construction, deepening, alteration, or abandonment work performed on this well during the construction dates reported above. All work performed during this time is in compliance with Oregon water supply well construction standards. This report is true to the best of my knowledge and belief.

License Number 1528 Date 8/16/2020

Signed STEVE MATHERS (E-filed)

Contact Info (optional) 541 389 0743

STATE OF OREGON
WATER SUPPLY WELL REPORT
(as required by ORS 537.765 & OAR 690-205-0210)

DESC 60988

WELL I.D. LABEL# L 126786
START CARD # 1035828
ORIGINAL LOG #

8/17/2017

(1) LAND OWNER

Owner Well I.D.
First Name Last Name
Company PINE RIVER HOMES
Address PO BOX 3033
City SUNRIVER State OR Zip 97707

(2) TYPE OF WORK

[X] New Well [] Deepening [] Conversion
[] Alteration (complete 2a & 10) [] Abandonment (complete 5a)

(2a) PRE-ALTERATION

Casing: Dia + From To Gauge Stl Plstc Wld Thrd
Material From To Amt sacks/lbs
Seal:

(3) DRILL METHOD

[] Rotary Air [] Rotary Mud [] Cable [X] Auger [] Cable Mud
[] Reverse Rotary [] Other

(4) PROPOSED USE

[X] Domestic [] Irrigation [] Community
[] Industrial/ Commercial [] Livestock [] Dewatering
[] Thermal [] Injection [] Other

(5) BORE HOLE CONSTRUCTION

Depth of Completed Well 29.00 ft. Special Standard [] (Attach copy)

Table with columns: Dia, From, To, Material, From, To, Amt, sacks/lbs. Row 1: 11, 0, 29, Bentonite Chips, 0, 18, 14, S. Row 2: Calculated, 12.

How was seal placed: Method [] A [] B [] C [] D [] E

[X] Other POURED

Backfill placed from 0 ft. to 18 ft. Material SAND

Filter pack from 24 ft. to 29 ft. Material COLORAD Size 10/20

Explosives used: [] Yes Type Amount

(5a) ABANDONMENT USING UNHYDRATED BENTONITE

Proposed Amount Actual Amount

(6) CASING/LINER

Table with columns: Casing, Liner, Dia, +, From, To, Gauge, Stl, Plstc, Wld, Thrd. Row 1: [X], [], 6, [X], 1, 4, 160, [], [], [X], [].

Shoe [] Inside [] Outside [] Other Location of shoe(s)

Temp casing [] Yes Dia From + To

(7) PERFORATIONS/SCREENS

Perforations Method

Screens Type factory Material pvc

Table with columns: Perf/ Screen, Casing/ Liner, Dia, From, To, Scrn/slot width, Slot length, # of slots, Tele/ pipe size. Row 1: Screen, Casing, 4, 24, 29, .1, length, 1750.

(8) WELL TESTS: Minimum testing time is 1 hour

[X] Pump [] Bailer [] Air [] Flowing Artesian

Table with columns: Yield gal/min, Drawdown, Drill stem/Pump depth, Duration (hr). Row 1: 20, 2, 28, 1.

Temperature 50 °F Lab analysis [] Yes By

Water quality concerns? [] Yes (describe below) TDS amount 78 ppm

Table with columns: From, To, Description, Amount, Units.

(9) LOCATION OF WELL (legal description)

County DESCHUTES Twp 20.00 S N/S Range 10.00 E E/W WM
Sec 12 1/4 of the 1/4 Tax Lot 4400
Tax Map Number Lot
Lat " or 43.85373800 DMS or DD
Long " or -121.47372600 DMS or DD
[] Street address of well [X] Nearest address

17055 FONTANA SUNRIVER OR 97707

(10) STATIC WATER LEVEL

Table with columns: Existing Well / Pre-Alteration, Date, SWL(psi), +, SWL(ft). Row 1: Completed Well, 8/16/2017, 8.

Flowing Artesian? [] Dry Hole? []

WATER BEARING ZONES

Depth water was first found 10.00

Table with columns: SWL Date, From, To, Est Flow, SWL(psi), +, SWL(ft). Row 1: 8/16/2017, 10, 29, 50, 8.

(11) WELL LOG

Ground Elevation

Table with columns: Material, From, To. Row 1: soil and pumice, 0, 3. Row 2: clay and gravel, 3, 10. Row 3: very coarse sand, 10, 29.

Date Started 8/15/2017 Completed 8/16/2017

(unbonded) Water Well Constructor Certification

I certify that the work I performed on the construction, deepening, alteration, or abandonment of this well is in compliance with Oregon water supply well construction standards. Materials used and information reported above are true to the best of my knowledge and belief.

License Number Date

Signed

(bonded) Water Well Constructor Certification

I accept responsibility for the construction, deepening, alteration, or abandonment work performed on this well during the construction dates reported above. All work performed during this time is in compliance with Oregon water supply well construction standards. This report is true to the best of my knowledge and belief.

License Number 1528 Date 8/17/2017

Signed STEVE W MATHERS (E-filed)

Contact Info (optional) 541 389 0743

WATER SUPPLY WELL REPORT - continuation page

DESC 60988

WELL I.D. LABEL# L

126786

















































































































































































































































START CARD #

1035828

8/17/2017

ORIGINAL LOG #

(2a) PRE-ALTERATION

Dia	+	From	To	Gauge	Stl	Plstc	Wld	Thrd
								
								
								
								
								
								
								
								
								
								
								
								
								
								
								
								
								
								
								
								
								
								
								
								
								
								
								
								
								
								
								
								
								
								
								
								
								
								
								
								
								
								
								
								
								
								
								
								
								
								
								
								
								
								
								
								
								
								
								
								

Material From To Amt sacks/lbs
































(5) BORE HOLE CONSTRUCTION

BORE HOLE				SEAL				
Dia	From	To	Material	From	To	Amt	sacks/lbs	
						Calculated		
						Calculated		
						Calculated		
						Calculated		
						Calculated		

FILTER PACK

From	To	Material	Size

(6) CASING/LINER

Casing Liner	Dia	+	From	To	Gauge	Stl	Plstc	Wld	Thrd
									
									
									
									
									
									
									

STATE OF OREGON
WATER WELL REPORT
 (as required by ORS 537.765)

DESC 8609

RECEIVED

OCT 29 1993

20s/10e/12db
 W56445

WATER RESOURCES DEPT.

(START CARD) #

(1) OWNER: Well Number SALEM, OREGON
 Name ALVIN C. ELLENWOOD III
 Address 9715 INDEPENDENCE DRIVE NE 303
 City ANCHORAGE State AK Zip 99507

(9) LOCATION OF WELL by legal description:
 County DESCATIOZ Latitude Longitude
 Township 20-S N or S. Range 10-E E or W. WM.
 Section 12.0 N.W. 1/4 S.E. 1/4
 Tax Lot 3400 Lot Block Subdivision
 Street Address of Well (or nearest address) 17078 fontana
 BEND OR 97707

(2) TYPE OF WORK:
 New Well Deepen Recondition Abandon

(3) DRILL METHOD:
 Rotary Air Rotary Mud Cable
 Other

(4) PROPOSED USE:
 Domestic Community Industrial Irrigation
 Thermal Injection Other

(5) BORE HOLE CONSTRUCTION:
 Special Construction approval Yes No Depth of Completed Well 75 ft.
 Explosives used Yes No Type Amount

HOLE			SEAL			Amount sacks or pounds
Diameter	From	To	Material	From	To	
10	0	18	CEMENT	0	18	5 sacks
6	18	75				

How was seal placed: Method A B C D E
 Other

Backfill placed from _____ ft. to _____ ft. Material _____
 Gravel placed from _____ ft. to _____ ft. Size of gravel _____

(6) CASING/LINER:

Casing:	Diameter	From	To	Gauge	Steel	Plastic	Welded	Threaded
	6	11	75	250	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Liner:					<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Final location of shoe(s) _____

(7) PERFORATIONS/SCREENS:
 Perforations Method TOUCH-CUT
 Screens Type 250 Material STEEL

From	To	Slot size	Number	Diameter	Tele/pipe size	Casing	Liner
65	75	1/2	20	6		<input checked="" type="checkbox"/>	<input type="checkbox"/>

(8) WELL TESTS: Minimum testing time is 1 hour

Yield gal/min	Drawdown	Drill stem at	Time
15	11		4 hr.

Temperature of Water 44 Depth Artesian Flow Found _____
 Was a water analysis done? Yes By whom _____
 Did any strata contain water not suitable for intended use? Too little
 Salty Muddy Odor Colored Other NO
 Depth of strata: _____

(10) STATIC WATER LEVEL:
 22 ft. below land surface. Date OCT-19-93
 Artesian pressure _____ lb. per square inch. Date _____

(11) WATER BEARING ZONES:

Depth at which water was first found 65

From	To	Estimated Flow Rate	SWL
65	75	20	22

(12) WELL LOG:
 Ground elevation _____

Material	From	To	SWL
PUMICE	0	2	
CLAY SAND	2	9	
CINDERS	9	11	
CLAY	11	65	
CINDERS	65	75	22

Date started OCT 19-93 Completed OCT 19-93

(unbonded) Water Well Constructor Certification:
 I certify that the work I performed on the construction, alteration, or abandonment of this well is in compliance with Oregon well construction standards. Materials used and information reported above are true to my best knowledge and belief.
 Signed _____ WWC Number _____
 Date _____

(bonded) Water Well Constructor Certification:
 I accept responsibility for the construction, alteration, or abandonment work performed on this well during the construction dates reported above. All work performed during this time is in compliance with Oregon well construction standards. This report is true to the best of my knowledge and belief.
 Signed James B. Palmer WWC Number 1525
 Date OCT 20-93

STATE OF OREGON
WATER SUPPLY WELL REPORT
(as required by ORS 537.765 & OAR 690-205-0210)

DESC 62269

WELL I.D. LABEL# L 139818
START CARD # 1049096
ORIGINAL LOG #

10/7/2020

(1) LAND OWNER

Owner Well I.D.
First Name JOHN Last Name STOVER
Company
Address 28568 SANTA CATARINA RD
City SANTA CLARIDA State CA Zip 91350

(2) TYPE OF WORK

New Well Deepening Conversion
Alteration (complete 2a & 10) Abandonment(complete 5a)

(2a) PRE-ALTERATION

Casing: Dia + From To Gauge Stl Plstc Wld Thrld
Material From To Amt sacks/lbs
Seal:

(3) DRILL METHOD

Rotary Air Rotary Mud Cable Auger Cable Mud
Reverse Rotary Other

(4) PROPOSED USE

Domestic Irrigation Community
Industrial/ Commercial Livestock Dewatering
Thermal Injection Other

(5) BORE HOLE CONSTRUCTION

Special Standard (Attach copy)
Depth of Completed Well 87.00 ft.

Table with columns: Dia, From, To, Material, SEAL, Amt, sacks/lbs. Includes rows for Bentonite and Calculated values.

How was seal placed: Method A B C D E

Other BENTONITE DRY

Backfill placed from ft. to ft. Material

Filter pack from ft. to ft. Material Size

Explosives used: Yes Type Amount

(5a) ABANDONMENT USING UNHYDRATED BENTONITE

Proposed Amount Actual Amount

(6) CASING/LINER

Table with columns: Casing, Liner, Dia, From, To, Gauge, Stl, Plstc, Wld, Thrld. Includes rows for 8" and 5" diameters.

Shoe Inside Outside Other Location of shoe(s)

Temp casing Yes Dia From + To

(7) PERFORATIONS/SCREENS

Perforations Method

Screens Type pvc Material Pvc screens

Table with columns: Perf/ Screen, Casing/ Liner, Dia, From, To, Scrm/slot width, Slot length, # of slots, Tel/ pipe size. Includes row for 5" dia screen.

(8) WELL TESTS: Minimum testing time is 1 hour

Pump Bailer Air Flowing Artesian

Table with columns: Yield gal/min, Drawdown, Drill stem/Pump depth, Duration (hr). Includes row for 10 gal/min yield.

Temperature 48 °F Lab analysis Yes By

Water quality concerns? Yes (describe below) TDS amount 35 ppm

Table with columns: From, To, Description, Amount, Units.

(9) LOCATION OF WELL (legal description)

County DESCHUTES Twp 20.00 S N/S Range 10.00 E E/W WM
Sec 12 NW 1/4 of the SE 1/4 Tax Lot 800
Tax Map Number Lot
Lat " or 43.85511910 DMS or DD
Long " or -121.47204145 DMS or DD
Street address of well Nearest address

17089 ELINORE RD SUNRIVER OR

(10) STATIC WATER LEVEL

Table with columns: Existing Well / Pre-Alteration, Date, SWL(psi), SWL(ft). Includes row for 9/23/2020 with SWL of 18.

Flowing Artesian? Dry Hole?

WATER BEARING ZONES

Depth water was first found 18.00

Table with columns: SWL Date, From, To, Est Flow, SWL(psi), SWL(ft). Includes row for 9/25/2020 with SWL of 18.

(11) WELL LOG

Ground Elevation

Table with columns: Material, From, To. Includes rows for Sand and Pumice, Gravel congl, Green clay sands, sand gravels black brown with clay, lava gravel congl.

Date Started 9/23/2020 Completed 9/25/2020

(unbonded) Water Well Constructor Certification

I certify that the work I performed on the construction, deepening, alteration, or abandonment of this well is in compliance with Oregon water supply well construction standards. Materials used and information reported above are true to the best of my knowledge and belief.

License Number 2025 Date 10/7/2020

Signed SHAUN ALEXANDER (E-filed)

(bonded) Water Well Constructor Certification

I accept responsibility for the construction, deepening, alteration, or abandonment work performed on this well during the construction dates reported above. All work performed during this time is in compliance with Oregon water supply well construction standards. This report is true to the best of my knowledge and belief.

License Number 1970 Date 10/7/2020

Signed NEIL FAGEN (E-filed)

Contact Info (optional) 541-548-1245

WATER SUPPLY WELL REPORT - Map with location identified must be attached and shall include an approximate scale and north arrow

DESC 62269

10/7/2020

Map of Hole



STATE OF OREGON

WATER SUPPLY WELL REPORT

(as required by ORS 537.765 & OAR 690-205-0210)

12/8/2014

WELL I.D. LABEL# L

116406

START CARD #

1025071

ORIGINAL LOG #

(1) LAND OWNER

Owner Well I.D.
First Name KEVIN Last Name MCADAMS
Company
Address 6453 CERROS GRANDES DR.
City SANTA FE State NM Zip 87507

(2) TYPE OF WORK

[X] New Well [] Deepening [] Conversion
[] Alteration (complete 2a & 10) [] Abandonment (complete 5a)

(2a) PRE-ALTERATION

Casing: Dia + From To Gauge Stl Plstc Wld Thrd
Material From To Amt sacks/lbs
Seal:

(3) DRILL METHOD

[] Rotary Air [] Rotary Mud [] Cable [X] Auger [] Cable Mud
[] Reverse Rotary [] Other

(4) PROPOSED USE

[X] Domestic [] Irrigation [] Community
[] Industrial/ Commercial [] Livestock [] Dewatering
[] Thermal [] Injection [] Other

(5) BORE HOLE CONSTRUCTION

Depth of Completed Well 23.00 ft. Special Standard [] (Attach copy)

Table with columns: Dia, From, To, Material, SEAL, To, Amt, lbs. Row 1: 12, 0, 23, Bentonite Chips, 0, 18, 10, S

How was seal placed: Method [] A [] B [] C [] D [] E

[X] Other POURED

Backfill placed from ft. to ft. Material

Filter pack from 18 ft. to 23 ft. Material GRAVEL Size 10/20

Explosives used: [] Yes Type Amount

(5a) ABANDONMENT USING UNHYDRATED BENTONITE

Proposed Amount Actual Amount

(6) CASING/LINER

Table with columns: Casing, Liner, Dia, +, From, To, Gauge, Stl, Plstc, Wld, Thrd. Row 1: 6, 1, 4, 160, 1, 4, 10, 160

Shoe [] Inside [] Outside [] Other Location of shoe(s)

Temp casing [] Yes Dia From To

(7) PERFORATIONS/SCREENS

Perforations Method
Screens Type slotted Material pvc

Table with columns: Perf/Screen, Casing/Liner, Dia, From, To, Scrn/slot width, Slot length, # of slots, Tele/pipe size. Row 1: Screen, Casing, 4, 18, 23, .1, 1750, 4

(8) WELL TESTS: Minimum testing time is 1 hour

[X] Pump [] Bailer [] Air [] Flowing Artesian

Table with columns: Yield gal/min, Drawdown, Drill stem/Pump depth, Duration (hr). Row 1: 3, 18, 22, 1

Temperature 51 °F Lab analysis [] Yes By

Water quality concerns? [] Yes (describe below) TDS amount

Table with columns: From, To, Description, Amount, Units

(9) LOCATION OF WELL (legal description)

County DESCHUTES Twp 20.00 S N/S Range 10.00 E E/W WM
Sec 12 NE 1/4 of the SW 1/4 Tax Lot 4300
Tax Map Number Lot
Lat " or DMS or DD
Long " or DMS or DD
[] Street address of well [] Nearest address

17002 BOWMAN SUNRIVER Fontana

(10) STATIC WATER LEVEL

Table with columns: Date, SWL(psi), + SWL(ft). Row 1: 12/8/2014, 3

Flowing Artesian? [] Dry Hole? []

WATER BEARING ZONES Depth water was first found 15.00

SWL Date From To Est Flow SWL(psi) + SWL(ft)

Table with columns: Date, From, To, Est Flow, SWL(psi), + SWL(ft). Row 1: 12/8/2014, 15, 23, 3, 3

(11) WELL LOG

Ground Elevation

Table with columns: Material, From, To. Rows: soil and pumice (0-3), white ash (3-6), gray clay (6-15), black sand with clay strips (15-23)

Date Started 11/25/2014 Completed 12/8/2014

(unbonded) Water Well Constructor Certification

I certify that the work I performed on the construction, deepening, alteration, or abandonment of this well is in compliance with Oregon water supply well construction standards. Materials used and information reported above are true to the best of my knowledge and belief.

License Number Date

Signed

(bonded) Water Well Constructor Certification

I accept responsibility for the construction, deepening, alteration, or abandonment work performed on this well during the construction dates reported above. All work performed during this time is in compliance with Oregon water supply well construction standards. This report is true to the best of my knowledge and belief.

License Number 1528 Date 12/8/2014

Signed STEVE W MATHERS (E-filed)

Contact Info (optional) 541 389 0743

STATE OF OREGON
WATER WELL REPORT
 (as required by ORS 537.765)

DESC 8583

RECEIVED
 DESC 8583
 OCT 18 1993

RECEIVED
 NOV 17 1993

20S/10E/12a
 455882

WATER RESOURCES DEPARTMENT

(1) OWNER: Well Number SALEM, OREGON
 Name DENALI CONSTRUCTION
 Address 604 N.E. 20th
 City Portland State OR Zip 97232

(2) TYPE OF WORK:
 New Well Deepen Recondition Abandon

(3) DRILL METHOD:
 Rotary Air Rotary Mud Cable
 Other

(4) PROPOSED USE:
 Domestic Community Industrial Irrigation
 Thermal Injection Other

(5) BORE HOLE CONSTRUCTION:
 Special Construction approval Yes No Depth of Completed Well 80 ft.
 Explosives used Yes No Type Amount

HOLE			SEAL			Amount sacks or pounds
Diameter	From	To	Material	From	To	
10	0	18	CEMENT	0	18	5 sacks
6	18	80				

How was seal placed: Method A B C D E
 Other

Backfill placed from _____ ft. to _____ ft. Material _____
 Gravel placed from _____ ft. to _____ ft. Size of gravel _____

(6) CASING/LINER:

Casing/Liner	Diameter	From	To	Gauge	Material			
					Steel	Plastic	Welded	Threaded
Casing	6	11	80	250	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Liner					<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Final location of shoe(s) _____

(7) PERFORATIONS/SCREENS:
 Perforations Method Touch cut
 Screens Type 250 Material steel

From	To	Slot size	Number	Diameter	Tele/pipe size	Casing	Liner
69	79	1/2	20	6		<input checked="" type="checkbox"/>	<input type="checkbox"/>

(8) WELL TESTS: Minimum testing time is 1 hour

Yield gal/mln	Drawdown	Drill stem at	Time
15	5'		12 hr.

Pump Bailer Air Flowing Artesian

Temperature of Water 44 Depth Artesian Flow Found _____
 Was a water analysis done? Yes By whom _____
 Did any strata contain water not suitable for intended use? Too little
 Salty Muddy Odor Colored Other No
 Depth of strata: _____

(9) LOCATION OF WELL by legal description:
 County DESCHUTES Latitude _____ Longitude _____
 Township 20S N or S. Range 10-E E or W. WM. _____
 Section 12A0 NE 1/4 NE 1/4
 Tax Lot 22800 Lot _____ Block _____ Subdivision _____
 Street Address of Well (or nearest address) 17084 ELKINORE
 BEND OR 97702

(10) STATIC WATER LEVEL:
 _____ ft. below land surface. Date Oct 11-93
 Artesian pressure _____ lb. per square inch. Date _____

(11) WATER BEARING ZONES:
 Depth at which water was first found 20'

From	To	Estimated Flow Rate	SWL
20	80	25	17

(12) WELL LOG:
 Ground elevation _____

Material	From	To	SWL
PIG LIME	0	3	
clay PIG LIME	3	12	
clay SAND	12	14	
clay	14	20	17
CINDERS	20	80	

Date started Oct 7-93 Completed Oct 11-93

(unbonded) Water Well Constructor Certification:
 I certify that the work I performed on the construction, alteration, or abandonment of this well is in compliance with Oregon well construction standards. Materials used and information reported above are true to my best knowledge and belief.
 Signed _____ WWC Number _____
 Date _____

(bonded) Water Well Constructor Certification:
 I accept responsibility for the construction, alteration, or abandonment work performed on this well during the construction dates reported above. All work performed during this time is in compliance with Oregon well construction standards. This report is true to the best of my knowledge and belief.
 Signed _____ WWC Number 1525
 Date Oct 12-93

WELL IDENTIFICATION FORM

Owner's Well Number: _____

CURRENT WELL OWNER:

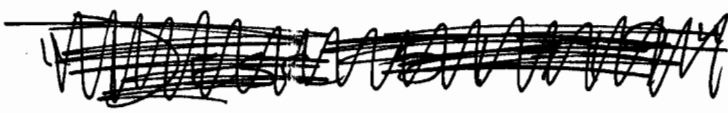
Phone 541-593-1246

Name: Howard and Anita Blankley

Mailing Address: 17084 Elsinore Rd

City: Bend State: OR Zip: 97707

WELL LOCATION:



County: Deschutes Latitude: _____ Longitude: _____

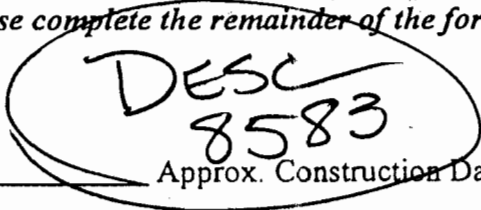
Township: 20 N or (S) Range: 10 (E) or W Section: 12 NE 1/4 NE 1/4

Tax Lot Number: 22800

Street Address of Well (if different from above): _____

If a well report is available for this well, please attach a copy of it to this form and return. It is not necessary for you to complete the remainder of the form if the well report is attached. If a well report is not available, please complete the remainder of the form to the best of your ability.

WELL INFORMATION:



Start Card Number: _____ Approx. Construction Date: _____

Well Constructor: _____

Name of Owner at Time of Construction: _____

Well Depth (in feet): _____ Static Water Level (in feet): _____

Diameter of Exposed Well Casing (in inches): _____

Does this well have a formal water right associated with it? Yes: _____ No: _____ If yes:

Application #: _____ Permit #: _____ Certificate #: _____

Please Return Completed Form to: **Oregon Water Resources Department
158 12th Street NE
Salem, OR 97310**

(Office use only)

Well Identification Number: _____

26171

WATER RESOURCES DEPT.
SALEM, OREGON

JUN - 3 1998

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OCT 25 2004

STATE OF OREGON
WATER SUPPLY WELL REPORT
(as required by ORS 537.765)

WATER RESOURCES DEPT
SALEM, OREGON

WELL I.D. # L 74876
START CARD # W157407

Instructions for completing this report are on the back of this form.

(1) LAND OWNER: Name Jim Atwood Well Number _____
Address P.O. Box 8213
City Bend State OR Zip 97708

(2) TYPE OF WORK:
 New Well Deepening Alteration (repair/recondition) Abandonment

(3) DRILL METHOD:
 Rotary Air Rotary Mud Cable Auger
 Other _____

(4) PROPOSED USE:
 Domestic Community Industrial Irrigation
 Thermal Injection Livestock Other _____

(5) BORE HOLE CONSTRUCTION:
Special Construction approval Yes No Depth of Completed Well 35 ft.
Explosives used Yes No Type _____ Amount _____

HOLE			SEAL			Sacks or pounds
Diameter	From	To	Material	From	To	
10"	0'	20'	bestmix	0'	20'	12 sacks
6"	20'	35'				

How was seal placed: Method A B C D E
 Other pooured Dry
Backfill placed from _____ ft. to _____ ft. Material _____
Gravel placed from 30 ft. to 35 ft. Size of gravel 8x12

(6) CASING/LINER:

Diameter	From	To	Gauge	Steel	Plastic	Welded	Threaded
Casing: 6"	0'	35'	250	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Liner: 4"	0'	30'		<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Drive Shoe used Inside Outside None
Final location of shoe(s) _____

(7) PERFORATIONS/SCREENS:

Perforations Method Torch
 Screens Type Monoflex Material PVC

From	To	Slot size	Number	Diameter	Tele/pipe size	Casing	Liner
20'	25'	6"	10	48"	6"	<input checked="" type="checkbox"/>	<input type="checkbox"/>
20'	30'	2"	3500	.010	4"	<input type="checkbox"/>	<input checked="" type="checkbox"/>

(8) WELL TESTS: Minimum testing time is 1 hour

Yield gal/min	Drawdown	Drill stem at	Flowing Time
<u>20</u>	<u>11 ft.</u>		<u>4 hrs</u>

Temperature of water 440 Depth Artesian Flow Found _____
Was a water analysis done? Yes By whom _____
Did any strata contain water not suitable for intended use? Too little
 Salty Muddy Odor Colored Other _____
Depth of strata: _____

(9) LOCATION OF WELL by legal description:
County Deschutes Latitude _____ Longitude _____
Township 20 N or S Range 10 E or W. WM.
Section 12 D 1/4 NW 1/4 SE
Tax Lot 8000 Lot _____ Block _____ Subdivision _____
Street Address of Well (or nearest address) 17020 Glendale rd.

(10) STATIC WATER LEVEL:
10 ft. below land surface. Date 10-22-04
Artesian pressure _____ lb. per square inch Date _____

(11) WATER BEARING ZONES:
Depth at which water was first found 21 ft.

From	To	Estimated Flow Rate	SWL
<u>21 ft.</u>	<u>35 ft.</u>	<u>20 GPM</u>	<u>10 ft.</u>

(12) WELL LOG:
Ground Elevation APPROX. 4,200 FT.

Material	From	To	SWL
<u>Humic top soil</u>	<u>0'</u>	<u>4'</u>	
<u>tan sand mixed w/ clay</u>	<u>4'</u>	<u>9'</u>	
<u>Gravel & Ben sand</u>	<u>9'</u>	<u>14'</u>	
<u>Clay & Black sand</u>	<u>14'</u>	<u>21'</u>	
<u>Black sand</u>	<u>21'</u>	<u>31'</u>	
<u>fine Black sand</u>	<u>31'</u>	<u>35'</u>	

Date started 10-20-04 Completed 10-22-04

(unbonded) Water Well Constructor Certification:
I certify that the work I performed on the construction, alteration, or abandonment of this well is in compliance with Oregon water supply well construction standards. Materials used and information reported above are true to the best of my knowledge and belief.
WVC Number _____
Signed _____ Date _____

(bonded) Water Well Constructor Certification:
I accept responsibility for the construction, alteration, or abandonment work performed on this well during the construction dates reported above. All work performed during this time is in compliance with Oregon water supply well construction standards. This report is true to the best of my knowledge and belief.
WVC Number 1761
Signed Richard Brogdon Date 10-22-04

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20S/108/12

STATE OF OREGON NOV - 6 1995 WATER SUPPLY WELL REPORT

OCT 11 1995

(START CARD) # U-80794

SALEM, OREGON WATER RESOURCES DEPT.

(1) OWNER: Well Number

Name Ewell Kennedy Address 17078 Glendale Rd. City Bend State OR Zip 97707

(2) TYPE OF WORK: New Well Deepening Alteration (repair/recondition) Abandonment

(3) DRILL METHOD: Rotary Air Rotary Mud Cable Auger Other

(4) PROPOSED USE: Domestic Community Industrial Irrigation Thermal Injection Livestock Other

(5) BORE HOLE CONSTRUCTION: Special Construction approval Yes No Depth of Completed Well 68 ft. Explosives used Yes No Type Amount

Table with columns: HOLE Diameter, SEAL From, To, Material, From, To, Sacks or pounds. Includes handwritten entries for hole plug and seal material.

How was seal placed: Method A B C D E Backfill placed from ft. to ft. Material Gravel placed from ft. to ft. Size of gravel

(6) CASING/LINER: Table with columns: Diameter, From, To, Gauge, Steel, Plastic, Welded, Threaded. Includes handwritten entries for casing and liner specifications.

Final location of shoe(s)

(7) PERFORATIONS/SCREENS: Table with columns: From, To, Slot size, Number, Diameter, Tele/pipe size, Casing, Liner. Includes handwritten entries for perforation details.

(8) WELL TESTS: Minimum testing time is 1 hour. Includes checkboxes for Pump, Bailer, Air, Artesian and a table for Yield, Drawdown, Drill stem at, Time.

Temperature of water 43 Depth Artesian Flow Found Was a water analysis done? Yes By whom Did any strata contain water not suitable for intended use? Too little Salty Muddy Odor Colored Other No Depth of strata:

(9) LOCATION OF WELL by legal description: County Deschutes Latitude Longitude Township 20-S N or S Range 10-E E or W. WM. Section 12 0 NW 1/4 SE 1/4 Tax Lot 7400 Lot Block Subdivision Street Address of Well (or nearest address) SAME

(10) STATIC WATER LEVEL: 18 ft. below land surface. Date 10-4-95 Artesian pressure lb. per square inch. Date

(11) WATER BEARING ZONES: Depth at which water was first found 7

Table with columns: From, To, Estimated Flow Rate, SWL. Includes handwritten entries for water bearing zones.

(12) WELL LOG: Ground Elevation

Table with columns: Material, From, To, SWL. Includes handwritten entries for well log materials like pumice soil, clay gravel, gravel cinders, brown clay, green clay, tan clay, broken rock.

Date started 10-3-95 Completed 10-4-95

(unbonded) Water Well Constructor Certification: I certify that the work I performed on the construction, alteration, or abandonment of this well is in compliance with Oregon water supply well construction standards. Materials used and information reported above are true to the best of my knowledge and belief. WWC Number Signed Date

(bonded) Water Well Constructor Certification: I accept responsibility for the construction, alteration, or abandonment work performed on this well during the construction dates reported above. All work performed during this time is in compliance with Oregon water supply well construction standards. This report is true to the best of my knowledge and belief. WWC Number 1559 Signed Date 10-6-95

STATE OF OREGON
WATER SUPPLY WELL REPORT

(as required by ORS 537.765)

WELL I.D. # L 55439
START CARD # W146667

Instructions for completing this report are on the last page of this form.

(1) LAND OWNER Jim Atwood Well Number _____
Name _____
Address P.O. Box 8213
City Bend State OR Zip 97708

(2) TYPE OF WORK
 New Well Deepening Alteration (repair/recondition) Abandonment

(3) DRILL METHOD:
 Rotary Air Rotary Mud Cable Auger
 Other _____

(4) PROPOSED USE:
 Domestic Community Industrial Irrigation
 Thermal Injection Livestock Other _____

(5) BORE HOLE CONSTRUCTION:
Special Construction approval Yes No Depth of Completed Well 35 ft.
Explosives used Yes No Type _____ Amount _____

HOLE			SEAL			
Diameter	From	To	Material	From	To	Sacks or pounds
10"	0'	20'	Bentonite	0'	20'	9 Sacks
6"	20'	35'				

How was seal placed: Method A B C D E
 Other poured dry
Backfill placed from _____ ft. to _____ ft. Material _____
Gravel placed from _____ ft. to _____ ft. Size of gravel _____

(6) CASING/LINER:

Diameter	From	To	Gauge	Steel	Plastic	Welded	Threaded
Casing: 6"	18'	35'	250	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Liner: 4"	12'	35'	160	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Drive Shoe used Inside Outside None
Final location of shoe(s) _____

(7) PERFORATIONS/SCREENS:
 Perforations Method Torch
 Screens Type monolex Material PVC

From	To	Slot size	Number	Diameter	Tele/pipe size	Casing	Liner
30	35	6"	18	18	6"	<input checked="" type="checkbox"/>	<input type="checkbox"/>
25	35	2 1/2"	3580	1010	4"	<input type="checkbox"/>	<input checked="" type="checkbox"/>

(8) WELL TESTS: Minimum testing time is 1 hour

<input checked="" type="checkbox"/> Pump	<input type="checkbox"/> Bailer	<input type="checkbox"/> Air	<input type="checkbox"/> Flowing
Yield gal/min	Drawdown	Drill stem at	Artesian Time
10	20 FT		4 HRS.

Temperature of water 44° Depth Artesian Flow Found _____
Was a water analysis done? Yes By whom _____
Did any strata contain water not suitable for intended use? Too little
 Salty Muddy Odor Colored Other _____
Depth of strata: _____

(9) LOCATION OF WELL by legal description:
County Deschutes Latitude _____ Longitude _____
Township 20 N or S Range 10 E or W. WM.
Section 12 d 1/4 NW 1/4 SE
Tax Lot 7900 Lot _____ Block _____ Subdivision _____
Street Address of Well (or nearest address) 17036 Glendale

(10) STATIC WATER LEVEL:
12 ft. below land surface. Date 11-15-02
Artesian pressure _____ lb. per square inch Date _____

(11) WATER BEARING ZONES:
Depth at which water was first found 12 FT.

From	To	Estimated Flow Rate	SWL
12'	35'	10 GPM	12

(12) WELL LOG:
Ground Elevation 4,300

Material	From	To	SWL
Top soil	0'	4'	
Clay & Ben sand	4'	11'	
Clay & Gravel	11'	21'	12
Black sand	21'	30'	12
Black sand & Gravel	30'	35'	12

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NOV 18 2002
WATER RESOURCES DEPT.
SALEM, OREGON

Date started 11-14-02 Completed 11-15-02

(unbonded) Water Well Constructor Certification:
I certify that the work I performed on the construction, alteration, or abandonment of this well is in compliance with Oregon water supply well construction standards. Materials used and information reported above are true to the best of my knowledge and belief.
Signed _____ WWC Number _____ Date _____

(bonded) Water Well Constructor Certification:
I accept responsibility for the construction, alteration, or abandonment work performed on this well during the construction dates reported above. All work performed during this time is in compliance with Oregon water supply well construction standards. This report is true to the best of my knowledge and belief.
Signed Richard Progen WWC Number 1761 Date 11-15-02

Appendix F.

**RidNOx™ and
Lysimeter Installation,
and Sampling Instructions**



ELKHORN CONSULTING LLC

14833 Goodrich Creek Lane
Baker City, OR 97814 • 503-881-1604
elkhornconsultingllc@gmail.com

RidNOx Installation Instructions

RidNOx Installation

1. Excavate to a depth that will result in the top of the RidNOx tank being at the same elevation as the existing ground surface.
2. Prepare a level, stable base.
3. Set the body of the tank in the hole.
4. Prepare and install inlet and outlet fittings as shown on the approved plans.
5. Place a 2-inch layer of $\frac{1}{2}$ to $\frac{3}{4}$ -inch round rock on the floor of the tank.
6. Cover the slotted outlet pipe with the same rock to a minimum depth of 2 inches.
7. Install the clean wood media (playground chips meeting ASTM F2075) in 6 inch lifts, walking in each lift to compress the media, to the bottom of the outlet fitting.
8. Set the lid on the tank. **Do not use mastic.**
9. Backfill the tank to 6 inches below the seam between the body and the lid.
10. Place underdrain media to the top of the tank.
11. Backfill over the tank with native soil after the risers are attached.

Media Replacement

- Pothole near tank to make sure the water table is at least 30" below the top of the tank to prevent buoyancy during replacement operations.
- Carefully remove the soil cover from over and around the tank to a level below the seam.
- Carefully remove the lid from the tank.
- Use a sump pump to transfer free water from the media to the pump basin.
- Scoop the media from the tank being careful not to damage the inlet and outlet piping or the underdrain media.
- After the excess moisture drains from the spent media, it can be loaded into a dump truck and hauled to a sanitary landfill.
- Install fresh media and re-install the lid as described in steps 7 through 11 above.



Lysimeter Installation Instructions

Lysimeter Installation in a Bottomless Sand Filter

- Remove duff and surface soil layer (typically 6 inches) to provide an infiltrative surface free of roots.
- When installing sampling devices (trough lysimeters), carefully mark the location of the orifice positions on each side of the sand filter container.
- Also mark the target elevations for each layer on the walls.
- Install the lower layer of medium sand and the underdrain media.
- Remove enough underdrain media from a 4-inch wide strip (trough) across the bottom aligned with a row of orifices (typically the 4th row from either end).
- With an auger or a tile spade, dig a hole at one end of the trough large enough and deep enough to set the vertical part of the lysimeter against the wall.
- Fine-grade the placement of the body of the lysimeter with the horizontal fitting of the sanitary tee aligned with the trough.
- Bed the half pipe with a slight slope (no more than 1 inch in 10 feet) toward the body of the lysimeter.
- Glue one end of the half pipe into the coupler extending from the sanitary tee with a cap glued at the opposite end.
- Place about one-half inch of underdrain media (pea gravel) in the bottom of the trough with enough ramped up inside the sanitary tee to cover the drilled holes in the debris cap.
- Backfill around the lysimeter with pea gravel to provide drainage from the self-emptying port.
- Secure the body of the lysimeter to the wall with a metal strap or other device to stabilize it during the placement of the various layers of media.
- The rest of the sand filter will be constructed in a customary fashion.



RidNOx and Bottomless Sand Filter Sampling Instructions

General

- Contact the laboratory to coordinate scheduling and acquire sample containers,
- Target parameters are total Kjeldahl nitrogen (TKN) and nitrate-nitrogen (NO₃-N).
- Make sure you have the proper sampling equipment, chain-of-custody forms, and a cooler with ice.
- Label all sample bottles in advance.

RidNOx Sampling Procedures

- Remove the lid from the pump basin.
- Use a bailer, peristaltic pump, or other appropriate sampler, to carefully collect a sample from the pump basin without disturbing and attached growth on the surfaces of pipes, floats, etc.
- Transfer sample into sample bottles.
- Repeat as necessary until all bottles are filled.
- Secure the caps on each bottle and place them immediately in a cooler with ice.
- Deliver samples to the laboratory (nitrate-nitrogen samples need to be analyzed within **48 hours** of sample collection).

Lysimeter Sampling Procedures (if/when desired)

- Loosen the square nut plug on the lysimeter.
- Shine a flashlight down the pipe to confirm the presence of filtrate.
- Use a bailer (disposable or cleaned) on a string to collect sample from the body of the lysimeter.
- Transfer sample into sample bottles.
- Repeat as necessary until all bottles are filled.
- Secure the caps on each bottle and place them immediately in a cooler with ice.
- Replace the square nut plug.
- If funding allows, collect sample of the AdvanTex-treated effluent as it flows into the RidNOx unit at the inlet of the tank.
- Deliver samples to the laboratory (nitrate-nitrogen samples need to be analyzed within **48 hours** of sample collection).

Appendix G.

**Directions to Site, List of Names and
Addresses for Neighboring Property Owners**



Department of Environmental Quality, Bend office, 475 NE Bellevue Dr # 110, Bend, OR 97701 to 17043 Elsinore Rd, Bend, OR 97707 Drive 21.6 miles, 33 min

Department of Environmental Quality, Bend office
475 NE Bellevue Dr # 110, Bend, OR 97701

Take NE Bellevue Dr and NE Dalton St to US-20

- 1 min (0.2 mi)
↑ 1. Head southwest toward NE Bellevue Dr
43 ft
- ↪ 2. Turn right toward NE Bellevue Dr
46 ft
- ↪ 3. Turn right toward NE Bellevue Dr
233 ft
- ↪ 4. Turn right onto NE Bellevue Dr
240 ft
- ↪ 5. Turn right onto NE Dalton St
367 ft
- ↪ 6. Turn right onto US-20
50 sec (0.2 mi)

Continue on SE 27th St. Take SE Reed Market Rd, SE 15th St and Murphy Rd to US-97 S

- 12 min (5.7 mi)
↶ 7. Turn left onto SE 27th St
1.2 mi
- ↪ 8. Turn right onto SE Reed Market Rd
1.0 mi
- 🌀 9. At the traffic circle, take the 3rd exit onto SE 15th St
1.2 mi
- 🌀 10. At the traffic circle, take the 1st exit onto Murphy Rd
0.5 mi
- 🌀 11. At the traffic circle, continue straight to stay on Murphy Rd
0.5 mi
- 🌀 12. At the traffic circle, take the 2nd exit and stay on Murphy Rd
0.5 mi
- 🌀 13. At the traffic circle, continue straight to stay on Murphy Rd
0.2 mi

- 🌀 14. At the traffic circle, take the 3rd exit onto S Hwy 97
0.6 mi

Follow US-97 S to S Century Dr/Lava Cast Forest Rd/NF-9720. Take exit 153 from US-97 S

- 10 min (11.1 mi)
↑ 15. Merge onto US-97 S
10.9 mi
- ↪ 16. Take exit 153 for S Century Dr toward Sunriver
0.2 mi

Continue on S Century Dr. Take Spring River Rd to Elsinore Rd in Three Rivers

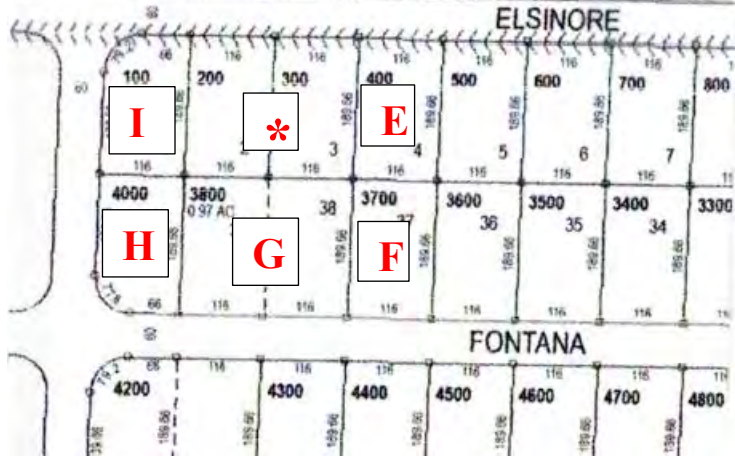
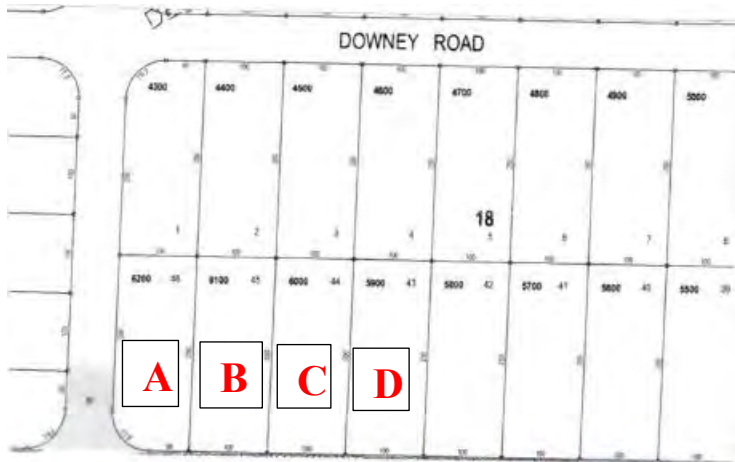
- 7 min (4.5 mi)
↪ 17. Turn right onto S Century Dr/Lava Cast Forest Rd/NF-9720 (signs for Sunriver/Mt Bachelor)
● Continue to follow S Century Dr
1.5 mi
- 🌀 18. At the traffic circle, take the 2nd exit and stay on S Century Dr
0.6 mi
- ↑ 19. Continue onto Spring River Rd
1.7 mi
- ↶ 20. Turn left onto Stellar Dr
0.5 mi
- ↶ 21. Turn left onto Elsinore Rd
● Destination will be on the right
312 ft

17043 Elsinore Rd
Bend, OR 97707

Adjacent Parcels Property Owners

17043 Elsinore Road, Bend, Oregon
(T20S, R10E, Section 12D, Tax Lots 200 and 300, 1.01 acres)

* Tax Lots	200 and 300	Herman, Richard P & Sara B 12028 45 th Ave CT NW Gig Harbor, WA 98332
A. Tax Lot	6200	Reg Crossan 2019 Revocable Trust 638 Madison Ave Mesquite, NV 89027
B. Tax Lot	6100	Pamela Warren Trust 4570 Thrush Drive NE Salem, OR 97301
C. Tax Lot	6000	Ibrahim M Shehadeh Revocable Trust 16894 Jacinto Road Bend, OR 97707
D. Tax Lot	5900	Scornaienchi, Dean 17046 Elsinore Road Bend, OR 97707
E. Tax Lot	400	JLA Investments LLC PO Box 2617 Eugene, OR 97402
F. Tax Lot	3700	Alfred L Holman Jr Trust Et Al PO Box 1896 Albany, OR 97321
G. Tax Lot	3800	Herman, Cody K & Ashley M 17042 Fontana Road Bend, OR 97707
H. Tax Lot	4000	Eike Properties LLC 9830 SW McKenzie Street Portland, OR 97223
I. Tax Lot	100	RJQ Family Trust 967 Moorea Drive Roseburg, OR 97471





Variance Application from Oregon Administrative Rules Regulating Onsite Wastewater Treatment Systems

Western and Northwest Regions:

Oregon Department of Environmental Quality
Onsite Program
165 East Seventh Ave, Ste 100
Eugene, Oregon 97401

Eastern Region:

Oregon Department of Environmental Quality
Onsite Program
475 NE Bellevue Dr, Ste 110
Bend, OR 97701

RECEIVED

AUG 22 2025

DEQ
Eastern Region Bend

Please complete this application form and submit it with the fee and required attachments to one of the addresses above. The fees can be found in the current rule tables on DEQ's website here:
<https://ordeq.org/variancefees>

Please note: Variance approval is not guaranteed, and fees are non-refundable. Learn more about the variance process at <https://ordeq.org/septicvariance>

Owner Information - Please Print:

Owner Name(s) (Last, First) Herman, Richard P. & Sara B.

Mailing Address 12028 45th Ave CT NW

City, State, Zip Gig Harbor, WA 98332

Phone (503) 789-7522 Email rick@rpherman.com

Property Information:

County Deschutes

Township, Range, Section, Tax Lot T20S R10E S12D Tax Lot 300

Lot and Block Number Lot 3, Block 32 Subdivision Name Deschutes River Recreation Homesites Inc Unit 4

Provide the Following Attachments:

1. A locator map showing accurate directions to the property. List the property's street address if the street address is known.
2. **Two copies** of the parcel's legal description (metes and bounds, warranty deed, sales contract or approved subdivision plat). Include copies of the protective covenants, deed restrictions and easements applicable to the property.
3. **Two copies** of the assessor's tax lot map showing the property or a surveyor's plat map.
4. **Two copies** of a land use compatibility statement from the appropriate land use authority that your proposed land use is compatible with the Land Conservation and Development Commission's acknowledged comprehensive plan or statewide planning goals.
5. **One copy** of the DEQ (or county agent) site evaluation report, field notes, and other correspondence relating to past evaluations for septic system development.

6. **Two copies** of a narrative description for your variance proposal, including system construction specifications and the step-by-step procedures you propose to follow when installing the system. You must clearly describe how your proposal will overcome the limitations cited by DEQ or the county in the original denial.
7. **Two copies** of a plot plan drawn with the location and dimensions of all components of the proposed system. Use a defined scale that is not smaller than one-inch equals 30 feet. Also, be sure to include the replacement absorption facility in the plot plan drawing. Indicate separation distances between disposal trenches, springs, water courses, agricultural drainage tile, ditches, drainage ways, water lines, buildings, roads, embankments, and other identifying features, which help demonstrate parcel-to-drainfield relationships. Locate all wells within 200 feet of the proposed system and the replacement system.
8. The names and mailing addresses of all adjacent property owners and other known interested persons, for hearing notice.
9. The variance officer will request additional items be provided, if found necessary for the variance. The application will be deemed incomplete until the requested items are provided.

A minimum of two test pits must be provided within the specific area where the variance system is proposed, and should be approximately two feet wide, four feet long, and excavated to either bedrock or to a depth of five feet. Similar pits must be provided in the area of the repair system. The variance officer may require the proposed drainfield and the future replacement drainfield to be staked out.

Hardship Variances:

Hardship variances may be considered in cases of extreme and unusual hardship. The following factors may be considered: advanced age or bad health of applicant, need of applicant to care for aged, incapacitated or disabled relative, and the hardship variance will have relative, insignificant environmental impact. Documentation of hardship must be provided.

MARK THIS BOX FOR HARDSHIP CONSIDERATION

By my (our) signature(s), I (we) request DEQ act on this application and hereby grant permission to enter onto the above-described property. I (we) also acknowledge that I (we) have read the Variance Process Fact Sheet found here: <https://ordeq.org/septicvariance>

7/29/25 *Michael P. Heenan* _____
 Date Owner Signature

7/29/2025 *Sara B. Ahn* _____
 Date Owner Signature

NOTE: All owners must sign this application form. If there are more than two owners, have them sign additional duplicate applications and include them with submittal.

* Pursuant to ORS 454.662, the applicant is not required to submit the application fee if, at the time of filing the application, the applicant is 65 years of age or older, is a resident of the State of Oregon, and has an annual household income, as defined in ORS 310.630, of \$15,000 or less. Appropriate documentation must be submitted with the application.



ELKHORN CONSULTING LLC

14833 Goodrich Creek Lane
Baker City, OR 97814 • 503-881-1604
elkhornconsultingllc@gmail.com

August 18, 2025

Variance Officer
Onsite Variance Program
DEQ - Eastern Region Water Quality
475 NE Bellevue, Ste. 110
Bend, Oregon 97701

**SUBJECT: Formal Variance Request –Richard and Sara Herman – T20S, R10E, Section 12D
Tax Lots 200 and 300 (1.01 acres), Deschutes County, South of Bend, Oregon.**

Dear Variance Officer:

A formal variance from selected onsite rules is hereby requested under the provisions of Oregon Administrative Rules, Chapter 340, Division 071, Section 0415 (OAR 340-071-0415).¹ The property is located at 17043 Elsinore Road, south of Bend in Deschutes County, Oregon (Site) (Figure 1) and, combined with 17033 Elsinore Road, consists of 1.01 acres. A Tax Lot map is attached in Appendix A and a copy of the Deed is attached in Appendix B.

Background

Deschutes County conducted a site evaluation on May 23, 2025, and issued a denial on June 11, 2025. The denial was based on conditions associated with saturation noted at 16 to 18 inches below the ground surface in 4 test pits. Test Pits 2 and 3 represented the best conditions and were near the southwest and southeast corners of the lot. The other test pits were along the eastern and western boundaries of the lot. The primary reasons cited for the denial were the predicted depth to the highest level attained by a fluctuating permanent water table and the risk to groundwater quality that could result from increased nitrogen loading to the underlying aquifer. A copy of the site evaluation documentation from Deschutes County is attached in Appendix C.

Tax Lot 200 to the west was denied for a previous owner through the variance process in 2021 after being denied earlier in 2021 by Deschutes County. Tax Lot 200 is slightly lower than Tax Lot 300 and the highest ground on Tax Lot 300 is partially within the 100-foot well setback for the existing well on the adjacent parcel to the south, owned by the applicant's son and daughter-in-law. This well will be decommissioned and replaced with a new well more than 100 feet away from the proposed sand filters if this variance request is approved.

Southern Deschutes County has a shallow water table that is typically unconfined in porous pumice soils and is susceptible to contamination from soluble and mobile constituents. The most common constituent of concern is nitrate-nitrogen from septic systems. The onsite rules require a minimum of 24 inches of separation from the upper limit of the water table to the bottom of a bottomless sand filter as well as being 24 inches below the ground surface.

¹ Onsite wastewater treatment systems, 340 OAR § 340.71. (2020).



Onsite Variance
Application Verification
248-25-000274-VAR

DEQ Medford Office
221 Stewart Avenue
Suite 201
Medford, OR 97501
541-776-6010
OnsiteMedford@deq.state.or.us
Website: oregon.gov/deq

Application created: 8/25/25
Parcel Nbr: 201012D000200
Site Address: 17033 Elsinore RD, Bend, OR 97707
Owner: RICHARD & SARA
HERMAN
(503) 789-7522
Applicant: Elkhorn Consulting LLC - Elkhorn Consulting LLC
14833 Goodrich Creek Ln.
Baker City, OR 97814
Phone: (503) 881-1604
Email: elkhornconsultingllc@gmail.com

Licensed Professional(s):
No Licensed Professionals Designated

Site Ready for Inspection:

Site Ready for Inspection:

Attached Documents:
No Documents have been attached.