

129 CAINS LANE CARBONDALE, CO 81623 970.309.5259 CARLA.OSTBERG@GMAIL.COM

March 8, 2023 Project No. C1792

Brent Lough blridgerunner@gmail.com

Subsurface Investigation and Onsite Wastewater Treatment System Design Thunder Ridge Business Center 6762 Hwy 82 Garfield County, Colorado

Brent,

CBO Inc. performed a subsurface investigation and completed an onsite wastewater treatment system (OWTS) design for the subject residence. The 42,250 square feet (0.97-acre) property is located outside of Glenwood Springs, in an area where OWTSs and wells are necessary.

Legal Description: Section: 1 Township: 7 Range: 89 TR IN LOT 8 42250 SQUARE FEET

Parcel ID: 2395-011-00-011

SITE CONDITIONS

The property is currently developed with four 2-bedroom residences. These residences are served by an existing OWTS. No records on the existing OWTS were available from Garfield County Community Development Department. The subject OWTS consists of two, two-compartment concrete septic tanks connected in series. Effluent gravity flows to a distribution box and then to three seepage pits. The former property owner provided a sketch (enclosed). We have estimated the location of the seepage pits on our drawings. The existing structures will be demolished and the existing OWTS components must be abandoned.

Two commercial office buildings (referenced as Building #1 and Building #2) are proposed. Each building will have four office spaces with a toilet and lavatory. With the potential for up to two 8-hour office employees per space, we are sizing the OWTS to accommodate up to sixteen 8-hour employees.

The property is served potable water from a private well on the property. The well is located near the northern property boundary. The well is located greater than 50-feet from the proposed septic tank and greater than 100-feet from the proposed soil treatment area (STA). The Division of Water Resources map of nearby wells does not show other wells within 100-feet of our proposed OWTS location.

The proposed soil treatment area (STA) location is in the existing driveway, which will be re-routed. Additionally, one of the three seepage pits is in the approximate STA location. We are proposing an over-excavated sand filter due to space constraints, the fact that the new STA is proposed in previously potentially compacted soils as an area subject to traffic, and the unknown proximity to the existing STA will require abandonment.

The OWTS is sized for domestic waste only.

SUBSURFACE

The subsurface was investigated on February 22, 2023 by digging one soil profile test pit excavation (Test Pit). Only one Test Pit was excavated because we did not want to disturb the existing driveway, which is still in use by tenants on the property, a known gas line was not located through the locate process, and one of the existing seepage pits was also in the approximate area. We dug the Test Pit in the most reasonable location to not disturb the existing infrastructure. A visual and tactile soil analysis was completed by Carla Ostberg at the time of excavation.¹

The materials encountered in Test Pit #1 consisted of road base and frozen topsoil to 1.5-feet, underlain by reddish brown sandy loam to a maximum depth explored of 7.0-feet. No bedrock or groundwater was encountered.

A sample of the soil was taken from Test Pit #1 at 3-feet below grade. Soil structure grade was moderate. The soil formed a ball and a ribbon less than 1-inch in length before breaking. Soil structure shape was blocky and consistence was friable. Soil texture was more gritty than smooth.

Soils are consistent with Soil Type 2, Sandy Loam, with moderate structure grade. An unlined, over-excavated sand filter is proposed with a minimum of 2-feet of sand filter material (Secondary Sand). A long-term acceptance rate (LTAR) of 0.8 gallons per square foot will be used to design the STA.





Frozen topsoil

¹ Carla Ostberg holds a Certificate of Attendance and Examination from the CPOW Visual and Tactile Evaluation of Soils Training.





Looking northwest

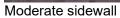






Easier digging below 2-feet











Backfill Looking east





Sieved sample

Ribbon less than 1-inch

DESIGN SPECIFICATIONS

The existing septic tanks will be abandoned by pumping the tanks and removing them. The existing seepage pits will be abandoned by pumping any liquid in the pits, removing the concrete infrastructure, and utilizing on-site or imported material, compacted in 1-foot lifts, to fill the remaining voids. If any portion of the new building slab will be placed over an existing seepage pit, we recommend a structural engineer for abandonment recommendations. The use of on-site material is preferred for backfill of the seepage pit closest in proximity to the proposed STA.

Design Calculations:

Average Design Flow = (16) 8-hour office employees x 15 GPD = 240 GPD Design Flow = 350 GPD LTAR = 0.8 GPD/SF 350 GPD / 0.8 GPD/SF = 437.5 SF

An average daily wastewater flow of 240 GPD is estimated based on the anticipated number of employees. We have based the OWTS design on a more conservative design flow of 350 GPD.

For the purposes of this OWTS design, Benchmark Elevation at grade 6027' has been established as 100' as Finished Floor (FF) or slab of Building #2. Building #1 FF is 105' (6032'). CBO Inc. should be notified of any discrepancies or problems with grade elevations of proposed components during installation of the OWTS.

OWTS Component	Minimum Elevation
Primary Tank Inlet Invert	Approximate horizontal distance from Building #1 208' / min. 2% fall / min. 52" fall
	Approximate horizontal distance from Building #2 32' / min. 2% fall / min. 8" fall
Infiltrative Surface	Approximate horizontal distance 16' / min. 1% RISE to STA for drain back / min. 2" rise

^{*}Elevations are based upon standard OWTS installation practices. Component elevations may change during installation due to site conditions. Minimum grade refers to piping between components.

A new 4-inch diameter Schedule 40 sewer line must be installed existing Building #1 with a double-sweep clean out and minimum 2% grade to the septic tank. This sewer line exceeds 100-feet in length and must have a clean out a minimum of every 100-feet.

A new 4-inch diameter Schedule 40 sewer line must be installed existing Building #2 with a double-sweep clean out and minimum 2% grade to the septic tank. This sewer line should tie into the sewer line from Building #1 with a wye fitting prior to entering the septic tank.

The system installation will include a 1000-gallon, two-compartment Valley Precast concrete septic tank with an Orenco® Biotube Pump Vault and an **Orenco® PF3005 pump** in the second compartment of the septic tank. The floats should be set to dose approximately **74 gallons each pump cycle, allowing approximately 2 gallons of drain back**. The control panel for the pump must be located within line of sight of the septic tank. We recommend Valley Precast out of Buena Vista be contracted for start-up of the pumping system.

Pump Table

Dose Range	Max = 89.5 gal. (350 GPD x 25%	Min. 70 gal. (17 gal x 4) + 2 gal
	+ 2 gal drain back)	drain back
Dose Setting	74 gallons/dose	2 gallons drain back (16' / 1.5"
_	_	diameter pump line)
Float Separation	1000 gallon 2-compartment	11" on/off float separation
·	Valley Precast concrete septic	6.7 gallons / inch
	tank	
Pump Criteria	24.4 gallons per minute (GPM)	9.5 feet total dynamic head
-	,	(TDH)

Effluent will be pressure dosed to through 1.5-inch diameter pump line to the level, 1.5-inch diameter manifold. The connection between the pump line and manifold should be the high point of the system. The over-excavated, unlined sand filter must be 12' x 37'. A minimum of 2-feet of sand filter material will be installed in the over-excavated footprint. Sand filter material must be clean, coarse sand, all passing a screen having four meshes to the inch. The sand must have an effective size between 0.15 and 0.60 mm. The uniformity coefficient must be 7.0 or less. Material meeting ASTM 33, for concrete sand, with three percent or less fines passing 200 mesh sieve may be used. A gradation of the sand media must be submitted to this office prior to obtaining the sand.

Laterals used to disperse the effluent must be surrounded by washed coarse screened gravel or crushed stone (minimum 6-inches below and minimum 2-inches above laterals). All of the gravel or stone must pass a 2 ½-inch screen and must be retained on a ¾-inch screen. Laterals must be 1.5-inches in diameter with 5/32-inch diameter orifices facing down, spaced 3-feet on center (OC). We recommend Orenco® Orifice Shields be installed on the laterals under each orifice. Laterals will begin 2-feet from the edges of the filter, with 4-feet between the middle and outer laterals. Each 1.5-inch diameter lateral must end in a sweeping ell facing up with a ball valve for flushing. A soil separation fabric should be placed over the gravel layer followed by approximately 1-foot of topsoil or other suitable soil able to support vegetative growth. Inspection ports must be placed in each corner of the bed.

COMPONENT SPECIFICATIONS

The component manufacturers are typical of applications used by contractors and engineers in this area. CBO Inc. must approve alternative components prior to installation of the OWTS. Requests must be submitted, in writing, to our office for approval prior to installation. Component technical data sheets are available upon request.

COMPONENT	MANUFACTURER	MODEL NO.	COMMENTS
Septic Tank	Valley Precast	Item # 1000T-2CP-HH	2-compartment concrete septic tank with high head pump
Pump	Orenco®	PF300511 ½ HP 120 Volt	
Biotube ProPak Pump Package	Orenco®	BPP30DD	Vault, Filter, Control Panel (demand dose)
Tank Risers and Lids	Orenco®		Double-walled PVC Risers and Lids (24" diameter)
Orifice Shields	Orenco®	OS150	1.5 inch diameter (33 total)
Flushing Assembly	Orenco®	1.5" diameter	(2) 45° or 90° long sweep only (3 total)

Construction must be according to the jurisdiction's adopted On-Site Wastewater Treatment System Regulations, the OWTS Permit, and this design.

PERMIT APPLICATION INSTRUCTIONS

An OWTS Permit Application must be submitted to Garfield County Environmental Health Department. https://www.garfield-county.com/environmental-health/filesgcco/sites/16/OWTS-Application-Complete-Packet-Dec.-2019.pdf. If the OWTS Permit Application will be submitted with a Building Permit Application, it should be submitted directly to Garfield County Building Department.

All questions regarding permit submission can be directed to Garfield County Environmental Health Department, 970-945-6614 x8150.

INSTALLATION CONTRACTOR

CBO Inc. expects that the installer be experienced and qualified to perform the scope of work outlined in this design. The installer must review this design thoroughly and coordinate with our office in advance of installation. Any additional conditions in this design or county permit must be completed and documented prior to final approval of the OWTS installation. Communication between the installer and this office is expected throughout the installation.

INSTALLATION OBSERVATIONS

CBO Inc. must view the OWTS during construction. The OWTS observation should be performed before backfill, after placement of OWTS components. Septic tanks, distribution devices, pumps, dosing siphons, and other plumbing, as applicable, must also be observed. CBO Inc. should be notified 48 hours in advance to observe the installation.

In an effort to improve the accuracy of the record drawing, we request that the installer provide a sketch of the installation, including path of the sewer lines, water line installation (if applicable), septic tank location, STA location, and measurements from building corners or another fixed objects on the property. This sketch is most easily provided on Sheet W2.0 of the OWTS Design Packet. Photographs of the installation and final cover are also requested to supplement our installation documentation.

REVEGETATION REQUIREMENTS

An adequate layer of good quality topsoil capable of supporting revegetation shall be placed over the entire disturbed area of the OWTS installation. A mixture of native grass seed that has good soil stabilizing characteristics (but without taproots), provides a maximum transpiration rate, and competes well with successional species. No trees or shrubs, or any vegetation requiring regular irrigation shall be placed over the STA. Until vegetation is reestablished, erosion and sediment control measures shall be implemented and maintained on site. The owner of the OWTS shall be responsible for maintaining proper vegetation cover.

OPERATION INFORMATION AND MAINTENANCE

The property owner shall be responsible for the operation and maintenance of each OWTS servicing the property. The property owner is responsible for maintaining service contracts for manufactured units, alternating STAs, and any other components needing maintenance.

Geo-fabrics or plastics should not be used over the STA. No heavy equipment, machinery, or materials should be placed on the backfilled STA. Machines with tracks (not wheels) should be used during construction of the STA for better weight distribution. Livestock should not graze on the STA. Plumbing fixtures should be checked to ensure that no additional water is being discharged to OWTS. For example, a running toilet or leaky faucet can discharge hundreds of gallons of water a day and harm a STA.

If an effluent filter or screen has been installed in the OWTS, we recommend this filter or screen be cleaned annually, or as needed. If the OWTS consists of a pressurized pump system, we recommend the laterals be flushed annually, or as needed.

The homeowner should pump the septic tank every two years, or as needed gauged by measurement of solids in the tank. Garbage disposal use should be minimized, and non-biodegradable materials should not be placed into the OWTS. Grease should not be placed in household drains. Loading from a water softener should not be discharged into the OWTS. No hazardous wastes should be directed into the OWTS. Mechanical room drains should not discharge into the OWTS. The OWTS is engineered for domestic waste only.

ADDITIONAL CONSTRUCTION NOTES

If design includes a pump, weep holes must be installed to allow pump lines to drain to minimize risk of freezing. The pump shall have an audible and visual alarm notification in the event of excessively highwater conditions and shall be connected to a control breaker separate from the high-water alarm breaker and from any other control system circuits. The pump system shall have a switch so the pump can be manually operated.

Excavation equipment must not drive in the excavation of the STA due to the potential to compact soil. Extensions should be placed on all septic tank components to allow access to them from existing grade. Backfill over the STA must be uniform and granular with no material greater than minus 3-inch.

LIMITS:

The design is based on information submitted. If soil conditions encountered are different from conditions described in report, CBO Inc. should be notified. All OWTS construction must be according to the county regulations. Requirements not specified in this report must follow applicable county regulations. The contractor should have documented and demonstrated knowledge of the requirements and regulations of the county in which they are working. Licensing of Systems Contractors may be required by county regulation.

Please call with questions.

Sincerely,

CBO Inc.

Carla Ostberg, MPH, REHS

Carla Ostberg

CC/ ENGINEERING
Cronk Construction Inc.

1131 -24- Road Grand Junction, CO 81505 970-250-0572

Reviewed Solven Reviewed Solve

Kachayla Cronk, P.E. Colorado License No. 61140

Pump Selection for a Pressurized System - Single Family Residence Project

6762 Hwy 82

Р	ar	a	m	e	te	r	١
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Discharge Assembly Size	1.50	inches
Transport Length	16	feet
Transport Pipe Class	40	
Transport Line Size	1.50	inches
Distributing Valve Model	None	
Max Elevation Lift	2	feet
Manifold Length	8	feet
Manifold Pipe Class	40	
Manifold Pipe Size	1.50	inches
Number of Laterals per Cell	3	
Lateral Length	35	feet
Lateral Pipe Class	40	
Lateral Pipe Size	1.50	inches
Orifice Size	5/32	inches
Orifice Spacing	3	feet
Residual Head	5	feet
Flow Meter	None	inches
'Add-on' Friction Losses	0	feet

Calculations

Minimum Flow Rate per Orifice	0.68	gpm
Number of Orifices per Zone	36	
Total Flow Rate per Zone	24.4	gpm
Number of Laterals per Zone	3	
% Flow Differential 1st/Last Orifice	0.5	%
Transport Velocity	3.9	fps

Frictional Head Losses

Loss through Discharge	1.8	feet
Loss in Transport	0.6	feet
Loss through Valve	0.0	feet
Loss in Manifold	0.1	feet
Loss in Laterals	0.1	feet
Loss through Flowmeter	0.0	feet
'Add-on' Friction Losses	0.0	feet

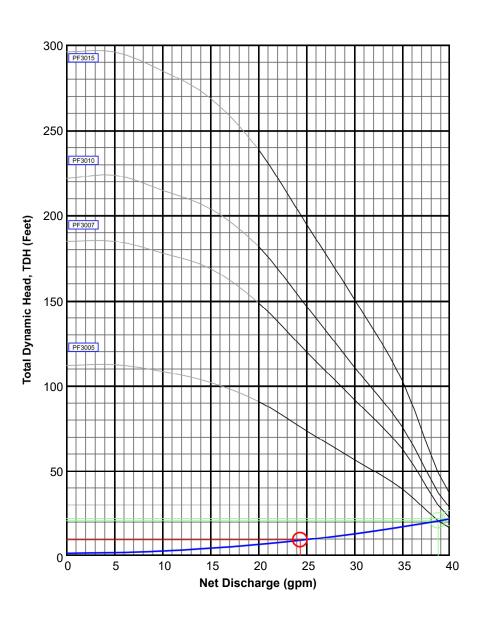
Pipe Volumes

Vol of Transport Line	1.7	gals
Vol of Manifold	8.0	gals
Vol of Laterals per Zone	11.1	gals
Total Volume	13.6	gals

Minimum Pump Requirements

Design Flow Rate	24.4	gpm
Total Dynamic Head	9.5	feet





PumpData

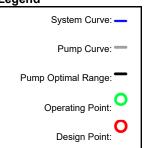
PF3005 High Head Effluent Pump 30 GPM, 1/2HP 115/230V 1Ø 60Hz, 200V 3Ø 60Hz

PF3007 High Head Effluent Pump 30 GPM, 3/4HP 230V 1Ø 60Hz, 200/460V 3Ø 60Hz

PF3010 High Head Effluent Pump 30 GPM, 1HP 230V 1Ø 60Hz, 200/460V 3Ø 60Hz

PF3015 High Head Effluent Pump 30 GPM, 1-1/2HP 230V 1Ø 60Hz, 200/230/460V 3Ø 60Hz

Legend



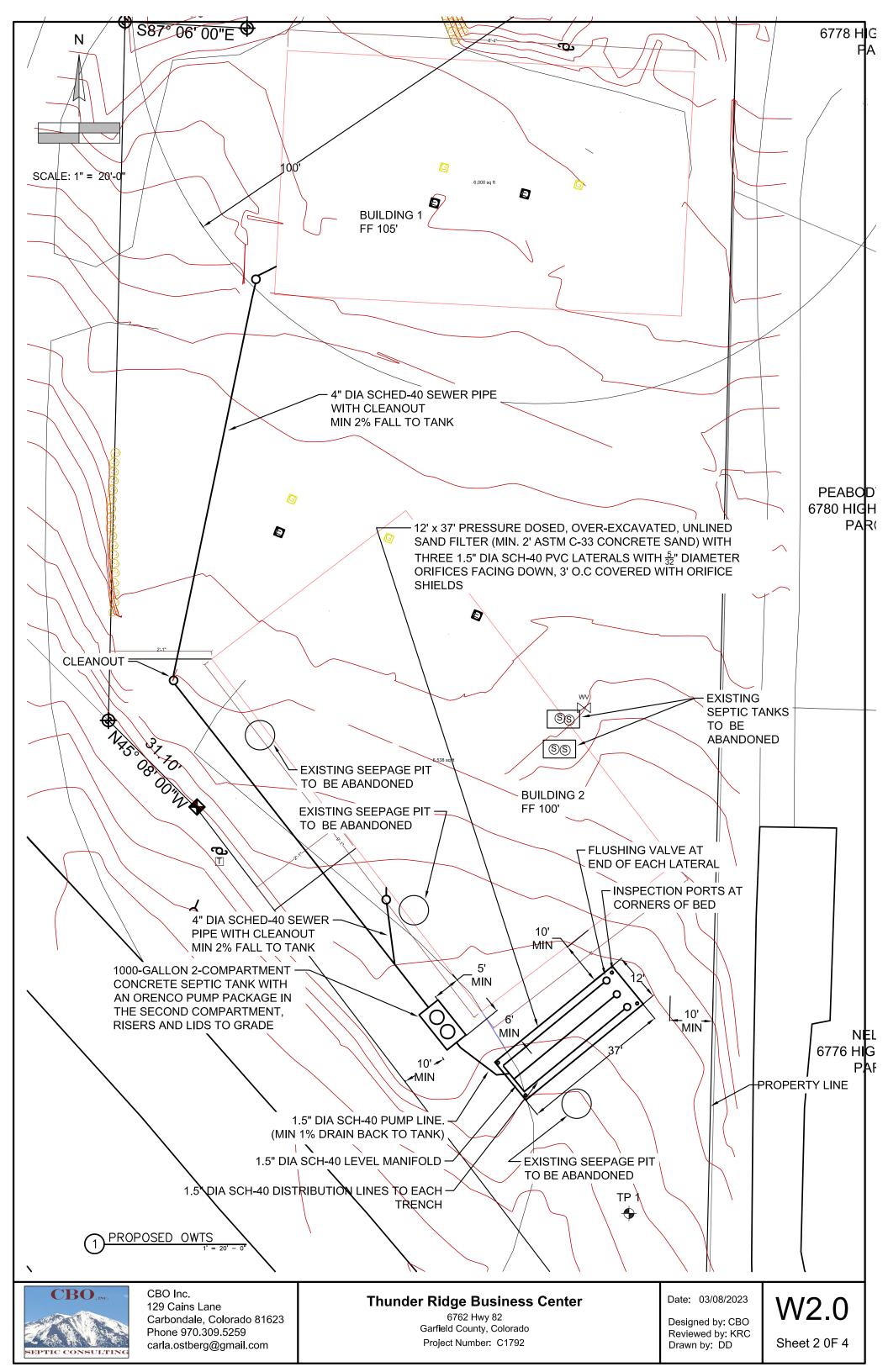


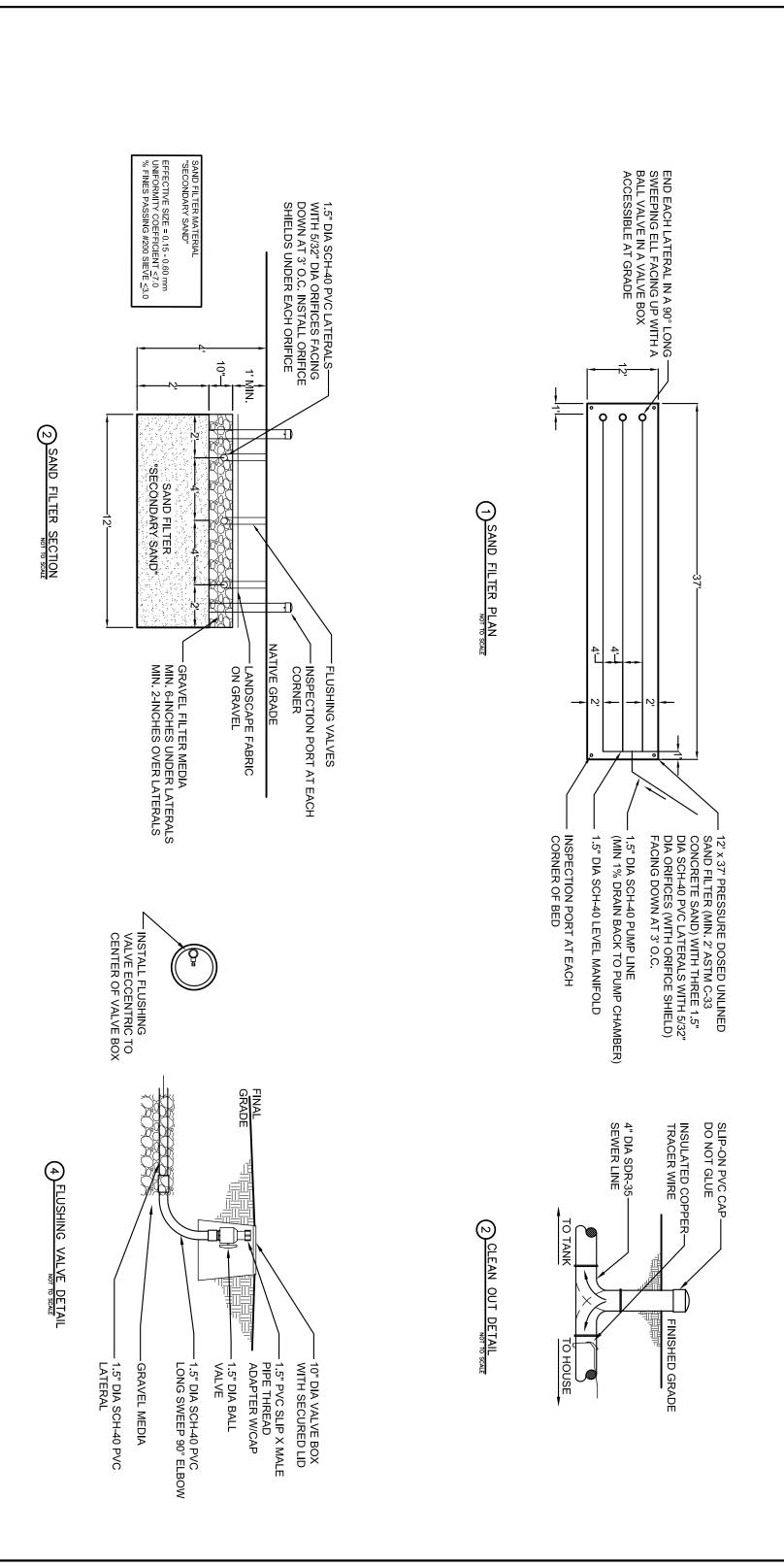
carla.ostberg@gmail.com

Project Number: C1792

Designed by: CBO Reviewed by: KRC Drawn by: DD

Sheet 1 0F 4







129 Cains Lane

carla.ostberg@gmail.com

Thunder Ridge Business Center

Garfield County, Colorado Project Number: C1792 6762 Hwy 82

Designed by: CBO Reviewed by: KRC Drawn by: DD

Date: 03/08/2023

DESIGN

(2) COMMERCIAL OFFICE BUILDINGS TOTAL 16 POTENTIAL 8-HOUR OFFICE EMPLOYEES 16 EMPLOYEES × 15 GPD = 240 GPD ESTIMATED WASTEWATER FLOW DESIGN WASTEWATER FLOW = 350 GPD

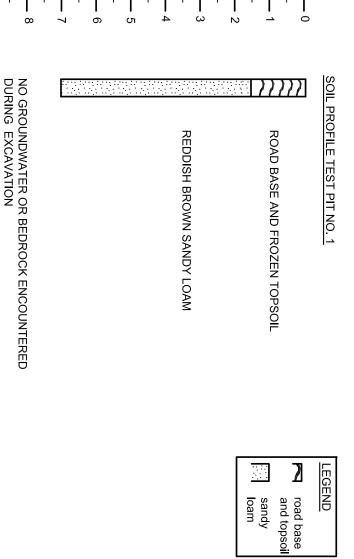
TANK

MIN. 1000 GALLONS
USE 1000-GALLON, TWO-COMPARTMENT CONCRETE SEPTIC TANK WITH AN ORENCO PUMPING SYSTEM IN THE SECOND COMPARTMENT

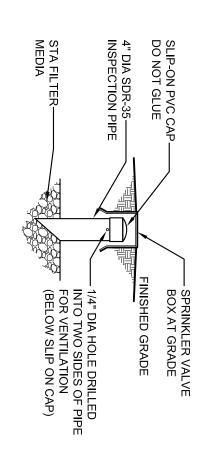
SOIL TREATMENT AREA (STA):
LONG TERM ACCEPTANCE RATE (LTAR) = 0.8 GAL/ SF
CALCULATED STA = Q/LTAR = 350 / 0.8 = 437.5 SF
12' x 37' OVER-EXCAVATED, UNLINED SAND FILTER WITH MIN. 2' SAND FILTER MATERIAL

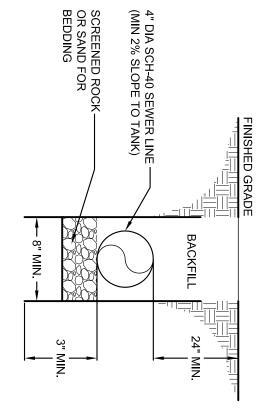
N/A	100'	STA TO WATER COURSE
236'	100'	STA TO WELL
11'	10'	STA TO BUILDING #2 SLAB
N/A	100'	SEPTIC TANK TO WATER COURSE
246'	50'	SEPTIC TANK TO WELL
6'	5	SEPTIC TANK TO BUILDING #2
APPROXIMATE PROPOSED SETBACK	MINIMUM REQUIRED SETBACK	OWTS COMPONENTS AND PHYSICAL FEATURES

SETBACK CHART



DEPTH - FEET





TRENCH DETAIL
NOT TO SCALE

Designed by: CBO Reviewed by: KRC Drawn by: DD

Date: 03/08/2023

Thunder Ridge Business Center

Garfield County, Colorado Project Number: C1792 6762 Hwy 82

SEPTIC CONSULTING

carla.ostberg@gmail.com

129 Cains Lane Carbondale, Colorado 81623 Phone 970.309.5259

CBO.

CBO Inc.

NOT TO SCALE

3 INSPECTION PORT DETAIL

Sheet 4 0F 4



Map Viewer





- Well Constructed
- Final Permit
- County

Location

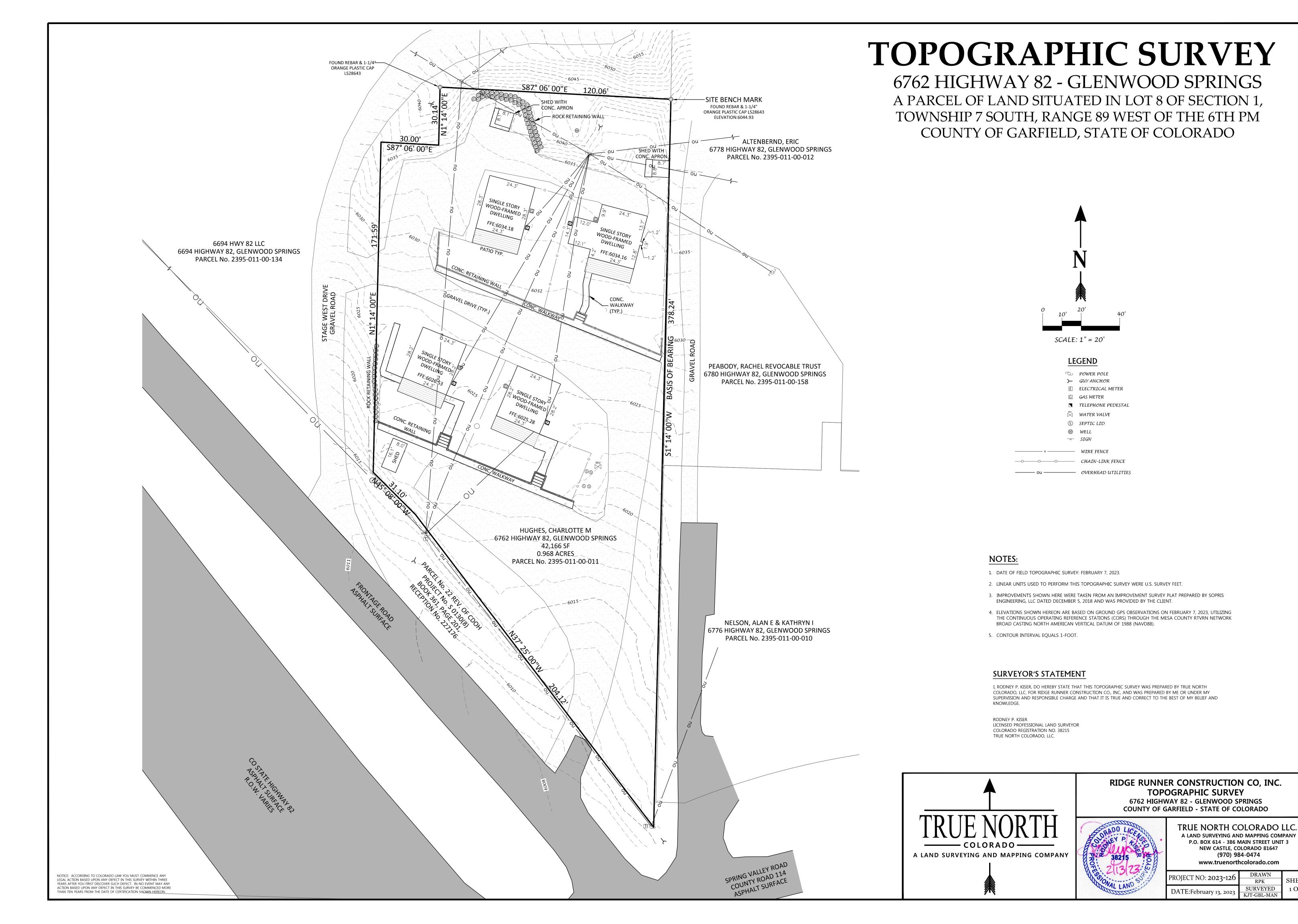


Notes





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SHEET

1 OF 1

Summary

Account R011274 Parcel 239501100011

Property Address 6762 82 HWY, GLENWOOD SPRINGS, CO 81601

Legal Description Section: 1 Township: 7 Range: 89 TR IN LOT 8 42250 SQUARE FEET

 Acres
 0

 Land SqFt
 42,250

 Tax Area
 11

 Mill Levy
 81.0290

Subdivision



View Map

Owner

THUNDER RIDGE BUSINESS CENTER 1655 CR 109 GLENWOOD SPRINGS CO 81601

Land

Unit Type SINGLE FAM.RES.-LAND - 1112 (RESIDENTIAL PROPERTY)

Square Feet 42,250

Buildings

Building# 1
Units 1
Building Type SFR

Abstract Codes / (Property Type) SINGLE FAM.RES-IMPROVEMTS-1212 (RESIDENTIAL PROPERTY)

 Architectural Style
 1-STORY

 Stories
 1

 Frame
 WOOD FRAME

 Heating Type
 WALL&FLOOR

 Air Conditioning
 CENTRAL

 Roof Type
 WOOD TRUSS

 Roof Cover
 BUILT-UP

Building # 2
Units 1
Building Type SFR

Abstract Codes / (Property Type) SINGLE FAM.RES-IMPROVEMTS-1212 (RESIDENTIAL PROPERTY)

Architectural Style 1-STORY
Stories 1

Frame WOOD FRAME

 Actual Year Built
 1965

 Gross Living Area
 672

 Total Heated SqFt
 672

 Bedrooms
 2

 Baths
 1

 Heating Fuel
 GAS

Heating Type WALL&FLOOR
Air Conditioning CENTRAL
Roof Type WOOD TRUSS
Roof Cover BUILT-UP

Building#3Units1Building TypeSFR

Abstract Codes / (Property Type) SINGLE FAM.RES-IMPROVEMTS-1212 (RESIDENTIAL PROPERTY)

Architectural Style 1-STORY Stories 1

Frame WOOD FRAME

 Actual Year Built
 1965

 Gross Living Area
 672

 Total Heated SqFt
 672

 Bedrooms
 2

 Baths
 1

 Heating Fuel
 GAS

Heating TypeWALL&FLOORAir ConditioningCENTRALRoof TypeWOOD TRUSSRoof CoverBUILT-UP

Building # 4
Units 1
Building Type SFF

Abstract Codes / (Property Type) SINGLE FAM.RES-IMPROVEMTS-1212 (RESIDENTIAL PROPERTY)

BUILT-UP

Architectural Style 1-STORY Stories 1

Frame WOOD FRAME

1965 **Actual Year Built** 672 **Gross Living Area** Total Heated SgFt 672 Bedrooms 2 Baths 1 **Heating Fuel** GAS WALL&FLOOR **Heating Type** Air Conditioning CENTRAL WOOD TRUSS Roof Type

Roof Cover Actual Values

Assessed Year	2022	2021
Land Actual	\$320,000.00	\$320,000.00
Improvement Actual	\$314,490.00	\$314,490.00
Total Actual	\$634,490.00	\$634,490.00

Assessed Values

Assessed Year	2022	2021
Land Assessed	\$21,760.00	\$22,880.00
Improvement Assessed	\$21,390.00	\$22,490.00
Total Assessed	\$43,150.00	\$45,370.00

Tax History

Tax Year	2022	2021	2020	2019	2018
Taxes Billed	\$3,496.40	\$3,619.44	\$2,633.24	\$2,656.64	\$3,220.96

Click here to view the tax information for this parcel on the Garfield County Treasurer's website.

Transfers

Sale Date	Deed Type	Reception Number	Book - Page	Sale Price
2/3/2022	QUIT CLAIM DEED	<u>970521</u>		\$0
2/3/2022	STATEMENT OF AUTHORITY	<u>970520</u>		\$0
4/21/2020	STATEMENT OF AUTHORITY	<u>934813</u>		\$0
4/16/2020	PERSONAL REP DEED	<u>934402</u>		\$620,000
1/16/2019	SUPPLEMENTAL AFFIDAVIT	<u>916562</u>		\$0
11/13/2017	LETTERS	<u>904638</u>		\$0
1/8/2014	DEATH CERTIFICATE	<u>850812</u>		\$0
12/29/1975	WARRANTY DEED	<u>270767</u>	0481-0640	\$0

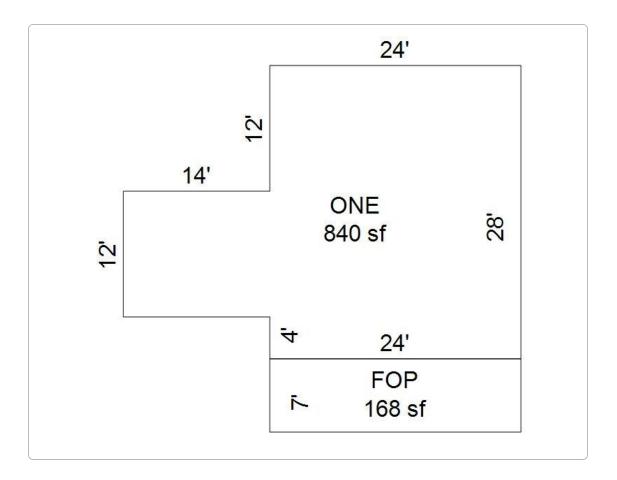
Property Related Public Documents

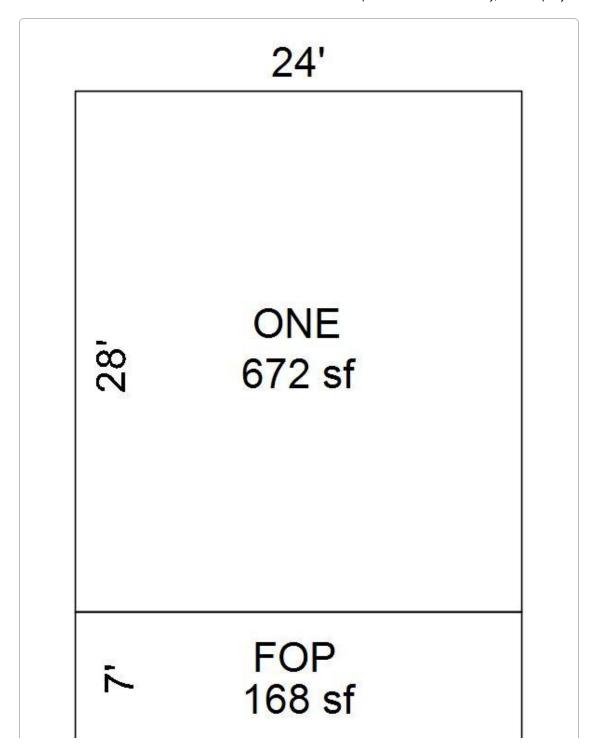
Click here to view Property Related Public Documents

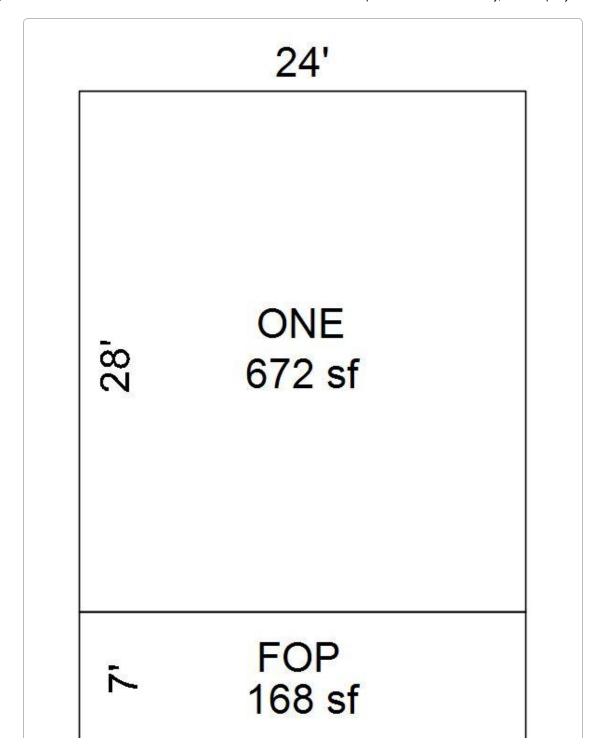
Photos

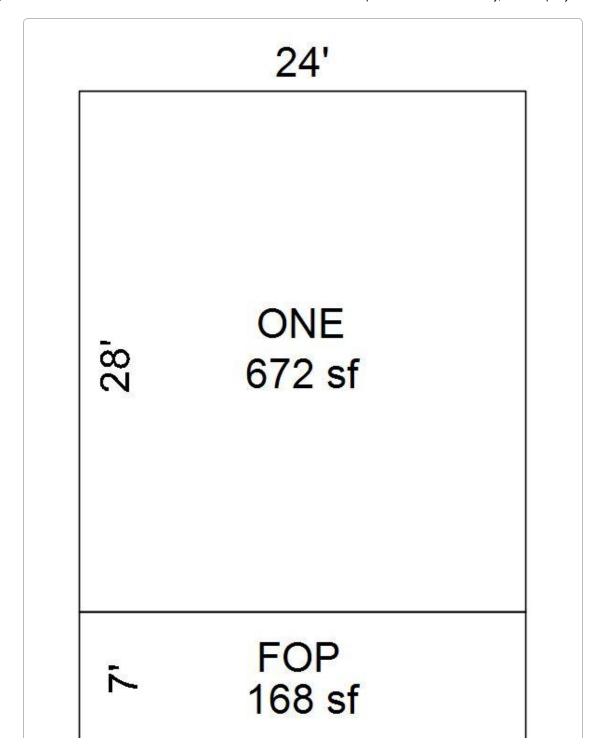


Sketches









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<u>User Privacy Policy</u>

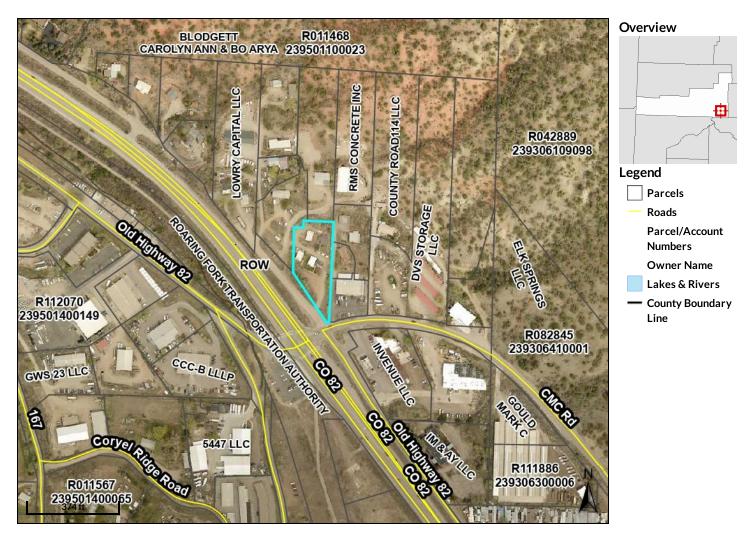
Schneider GEOSPATIAL

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Version 2.3.250

QPublic.net Garfield County, CO



Account	R011274	Physical	6762 82 HWY		2019 Total Actual	\$634,490	Last 2 Sales	
Number		Address			Value		Date	Price
Parcel	239501100011		GLENWOOD SPRINGS	81601			2/3/2022	\$0
Number		Owner Address	THUNDER RIDGE BUSINESS				2/3/2022	\$0
Acres	0		CENTER					
Land SqFt	42,250		1655 CR 109					
Tax Area	011		GLENWOOD SPRINGS CO 81601					

Date created: 3/8/2023 Last Data Uploaded: 3/8/2023 3:16:44 AM

2019 Mill Levy 81.0290

