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517 West 5th Street, Suite 102
Pueblo, Colorado 81003

719-543-5300
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Principal
Robert E. Leverington, Jr.
Professional Engineer

Professional Land Surveyor

Board Certified Diplomate, Water Resources Engineer of the American Academy of Water Resources Engineers

Fellow/American Society of Civil Engineers

Project No. 19024

August 7, 2019

Ms. Lauren Leeper
Pearsons Ministries International
Post Office Box 340
Woodland Park, Colorado 80866

RE: OWTS Design Document for Church Facility
10460 West US Highway 24, Green Mountain Falls
A.P.N. 8305400020

Dear Ms. Leeper,

This letter is to serve as a design document for the proposed modifications to one of the existing On-Site Wastewater Treatment Systems (OWTS) at 10460 West US Highway 24 near Green Mountain Falls. This letter will present a description of the existing facility, as well as discuss assumptions and design procedures.

Project Description

The owner of this property desires to utilize the existing 30,765 square-foot building to host church worship services. Specifically, the owner desires to host 500 persons per worship service.

This existing building was constructed in 2003. This existing building is currently served with an existing OWTS (Permit No. ON0003830). The existing OWTS consists of four detention tanks with a combined capacity of 8,250 gallons, and 1,010 square-feet of soil treatment area.

The site is situated on the side of a hill. The site slopes gently toward the southwest.

Design Parameters

El Paso County Board of Health Chapter 8 On-Site Wastewater Treatment System Regulations require the OWTS to be sized for 3.5 gallons per day per person. This effluent will have a strength of 0.01 pounds of BOD_5 per day per person.

To better understand the characteristics of this soil a review of the Web Soil Survey, maintained by the United States Department of Agriculture, Natural Resources Conservation Service, was performed. The review indicates that this site is underlain with Sphinx, Warm-Rock Outcrop

Complex (47). The Sphinx, Warm is described as a gravelly course sandy loam. It is classified as a mixture of silty ravels, silty sands, and poorly graded gravels, (GM, SM, GP-GM). It is not plastic and a Liquid Limit ranging from 18%-31%. This soil is in Hydrologic Group D.

Underlying this Sphinx, Warm Complex is weathered bedrock at depths of 1-foot to 5-feet. Bedrock may be as deep as 5 feet with some outcroppings.

On July 24, 2019, Leverington & Associates bored three 4-foot deep boreholes and one five-foot deep borehole on the site. At a depth of 5-feet, we encountered bedrock. My classification of this soil is brown, silty sand with gravel (SM) from 0 to 4 feet in depth. Groundwater was not detected. Based upon Table 10-1 of El Paso County Board of Health Regulations, this is Soil Type 1, which has a percolation rate of 5-15 minutes per inch (MPI). This soil has a Long-Term Acceptance Rate (LTAR) of 0.80 gallons per day per square foot (GPD/SF).

On July 25, 2019, we conducted percolation tests in three holes at the site. In our Borehole No.1 we measured the percolation rate at 7 minutes per inch. In Borehole No. 2 we measured the percolation rate at 10 minutes per inch. In Borehole No. 3 we measured a percolation rate of 5 minutes per inch. These values have some variance but are consistent with the published values of Soil Type 1. For design purposes, the average percolation rate of 10 minutes per inch was used.

Design Method

In accordance with Section 8.10 of the El Paso County Board of Health Regulations, the required treatment area is found by dividing the LTAR into the design flow rate. The calculated design is as follows:

Load: 500 people x 3.5 GPD/person = 1,750 gallons per day generated

Requires 48 hours of detention in septic tanks: 2 x 1,750 = 3,500 gallons. There is an existing capacity of 8,250 gallons. No new tanks are required.

The percolation rate is 10 minutes per inch.

According to Table 10-1 of El Paso County Board of Health Chapter 8 OWTS Regulations this corresponds to a long-term acceptance rate (LTAR) of 0.80 GPD/ft^2.

Required soil treatment area is: design flow/LTAR = 1,750 GPD/0.80 GPD/ft^2 = 2,188 ft^2.

This required soil treatment area can be satisfied with two seepage beds of 12-feet wide by 100-feet in length, and one seepage bed of 12-feet wide by 20-feet in length. Using the seepage beds a size adjustment factor of 1.2 is required, so our required area becomes:

$$2{,}188\ ft^2 \times 1.2 = 2{,}626\ ft^2$$

Two 100-foot long beds will provide:

$$2(12\ ft \times 100\ ft) = 2{,}400\ ft^2$$

One 20-foot long bed will provide:

$$12\ ft \times 20\ ft = 240\ ft^2$$

This totals 2,640 ft^2 of soil treatment area. Which will satisfy the required soil treatment area. In fact, since this OWTS will have a soil treatment area of 2,640 ft^2. This will accommodate a design capacity of (2,640/1.2) x 0.80 = 1,760 GPD, or 1,760/3.5 = 502 people.

Because of the shallow depth from the proposed infiltrative surface to the underlying bedrock, a 3-foot deep sand layer is recommended.

To provide for a velocity inside the half-full pipe of at least 2 feet per second, a slope of 2.08% was selected.

Additionally, to equally distribute the flows to the three infiltration beds and minimize space requirements, a distribution box is recommended in lieu of a manifold.

Specifications

The proposed OWTS for this site will consist of the following components: pre-cast concrete septic tank, polyvinyl chloride (PVC) pipe, geo-fabric, and aggregate rock. The specifications for these items are as follows:

1. PVC pipe shall be 4-inch diameter Schedule 40. The bedding material for the pipe shall be clean sand, free from rocks, clods, frozen soil, or other deleterious materials. Bedding shall be moisture conditioned and mechanically compacted under the haunches of the pipe.
2. Geo-fabric shall be non-woven permeable geotextile fabric meeting a minimum thickness of rating of 2.0 ounces per square yard or approved equal. Mirafi 140N meets this requirement.
3. Sand for the sand layer shall have an effective size of 0.15-0.60mm, a uniformity coefficient of less than or equal to 7.0 and less than or equal to 3.0% fines passing #200 sieve.
4. Rock for the infiltration trench shall be 1-1/2" to 2-1/2" sized rock, free of fines. CDOT Coarse Aggregate No. 3 may be used to meet this requirement.

Maintenance

Periodic maintenance will be required for this system. For purposes of ease of maintenance, clean-outs are to be installed at each end of the infiltration beds. Maintenance may consist of dislodging clogs from the pipe using the clean-outs. Also, the septic tanks will need to be pumped out periodically to remove captured solids.

Colorado Water Quality Control Division Policy WQSA-6

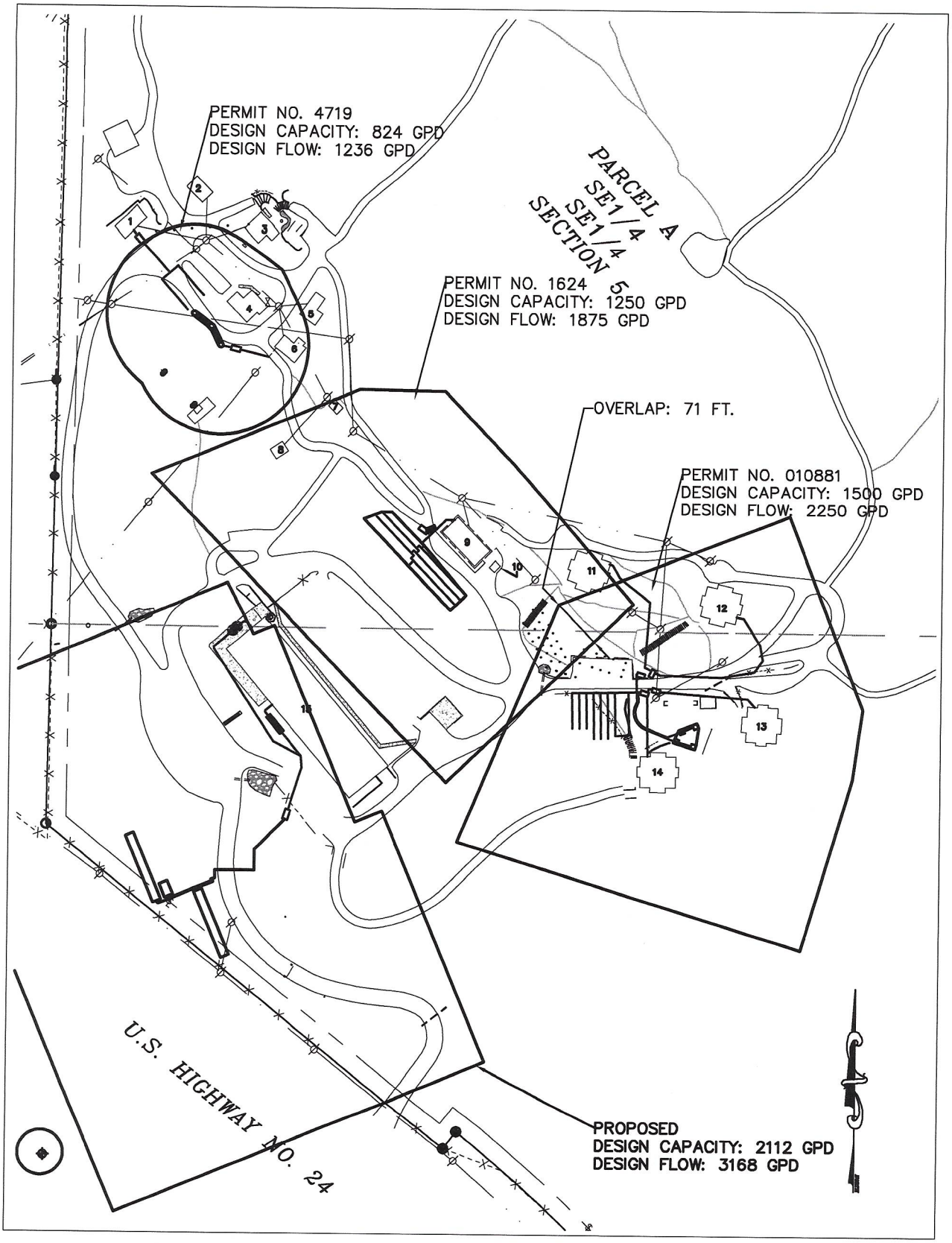
This property does meet the criteria for regulation under the Colorado Water Quality Control Division Water Quality Site Application Policy 6. This policy addresses the issue of multiple systems with a total design capacity of 2,000 GPD or greater. It appears that in addition to the currently proposed improvements to the OWTS serving the existing Kitchen/Gym Building, there are three existing OWTSs on this property all installed before 2007, when this policy went into effect. These four OWTSs will have a combined design capacity of 5,876 GPD.

TABLE 1 – Policy 6 Analysis

Permit No.	Tank Volume (Gal)	Tank Capacity (Gal)	LTAR (GPD/ft^2)	Soil Treatment Area (ft^2)	Soil Capacity (GPD)	Design Capacity (GPD)	Design Flow (GPD)	Horizontal Influence (ft)
1624	2500	1250	0.8	1950	1560	1250	1875	170
4719	3000	1500	0.8	1030	824	824	1236	119
010881	6000	3000	0.8	2112	1690	1690	2535	223
~~ON0003830~~	~~9000~~	~~4500~~	~~0.6~~	~~1010~~	~~606~~	~~606~~	~~909~~	~~93~~
Proposed	9000	4500	0.8	2640	2112	2112	3168	273

The policy has six conditions:

1) With the exception of the Kitchen/Gym and the Church Youth Building, all of the other OWTSs serve multiple occupied structures.
2) The setbacks were calculated in Table 1 and are mapped on Figure 1.
3) No, the proposed infiltration beds will not create any overlaps. There is one existing overlap of 71 feet with the OWTS on Permit No. 1624 and OWTS Permit No. 010881. This overlap was created prior to Policy WQSA-6.
4) There are no known records of any of the existing OWTS being interconnected.
5) The property is situated on a mountain side, well above the mapped 100-year floodplain and greater than streams or rivers.
6) The El Paso County Public Health Department is not likely to determine that site location and plans and specifications reviews are warranted.



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517 WEST 5TH STREET, STE 102
PUEBLO, COLORADO 81003
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Scale: 1"=200'

FIGURE 1

Closing

Ms. Leeper, I sincerely appreciate your assistance with this proposed project for at 10460 West US Highway 24 near Green Mountain Falls. If you have any questions, please do not hesitate to call me. Thank you.

Sincerely,
LEVERINGTON & ASSOCIATES, Inc.

Robert E. Leverington, Jr.
Principal Engineer

Cc: Project file

Attachments:
Plan for Proposed Septic System
Percolation Test Sheets

PERCOLATION TEST RESULT FORM

HOLE #: 1

PERSONEL: JDL

DATE DRILLED: July 24, 2019

DATE PRE-SOAK: July 24, 2019

DATE TESTED: July 25, 2019

TIME	HOLE DEPTH (in.)	HOLE DIAMETER (in.)	LENGTH OF INTERVAL (min.)	WATER DEPTH @ START OF INTERVAL (in.)	WATER DEPTH @ END OF INTERVAL (in.)	DROP IN LEVEL (in.)	PERCOLATION RATE @ FINAL INTERVAL (min./in.)
Begin	42	8 in.	30 min.	6	0	6	5
30 min. (½ hr.)	42	8 in.	30 min.	6	1-1/2	4-1/2	6.7
60 min. (1 hour)	42	8 in.	30 min.	6	2	4	7.5
90 min. (1-1/2 hr.)	42	8 in.	30 min.	6	2	4	7.5
120 min. (2 hr.)	42	8 in.	30 min.	6	2	4	7.5
150 min. (2-1/2 hr.)		8 in.	30 min.				
180 min. (3-hr.)		8 in.	30 min.				
210 min. (3-1/2 hr.)		8 in.	30 min.				
240 min. (4-hr.)		8 in.	30 min.				

NOTE:

A four (4) hour test must be conducted unless:

a) Water remains in the hole after the presoak in which case one 30-minute interval is sufficient,
b) The first 6 inches of water seeps away in less than 30 minutes in which case a 1-hour test consisting of six 10-minute time intervals may be used,
c) The test is being conducted in sandy soils in which case a 1-hour test consisting of six 10-minute time intervals may be used,
d) Three successive water level drops do not vary by more than 1/16 inch in which case a two-hour test may be conducted,
e) Test is in Dawson Arkose soil, in which case the test must be run a minimum of four hours until the last three successive water level drops vary by less than 1/16-inch.

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PERCOLATION TEST RESULT FORM

HOLE #: 2

PERSONEL: JDL

DATE DRILLED: July 24, 2019

DATE PRE-SOAK: July 24, 2019

DATE TESTED: July 25, 2019

TIME	HOLE DEPTH (in.)	HOLE DIAMETER (in.)	LENGTH OF INTERVAL (min.)	WATER DEPTH @ START OF INTERVAL (in.)	WATER DEPTH @ END OF INTERVAL (in.)	DROP IN LEVEL (in.)	PERCOLATION RATE @ FINAL INTERVAL (min./in.)
Begin	41	8 in.	30 min.	6	2-1/2	3-1/2	8.6
30 min. (½ hr.)	41	8 in.	30 min.	6	3	3	10
60 min. (1 hour)	41	8 in.	30 min.	6	3	3	10
90 min. (1-1/2 hr.)	41	8 in.	30 min.	6	3	3	10
120 min. (2 hr.)	41	8 in.	30 min.	6	3	3	10
150 min. (2-1/2 hr.)		8 in.	30 min.				
180 min. (3-hr.)		8 in.	30 min.				
210 min. (3-1/2 hr.)		8 in.	30 min.				
240 min. (4-hr.)		8 in.	30 min.				

NOTE:

A four (4) hour test must be conducted unless:

a) Water remains in the hole after the presoak in which case one 30-minute interval is sufficient,
b) The first 6 inches of water seeps away in less than 30 minutes in which case a 1-hour test consisting of six 10-minute time intervals may be used,
c) The test is being conducted in sandy soils in which case a 1-hour test consisting of six 10-minute time intervals may be used,
d) Three successive water level drops do not vary by more than 1/16 inch in which case a two-hour test may be conducted,
e) Test is in Dawson Arkose soil, in which case the test must be run a minimum of four hours until the last three successive water level drops vary by less than 1/16-inch.

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PERCOLATION TEST RESULT FORM

HOLE #: 3

PERSONEL: JDL

DATE DRILLED: July 24, 2019

DATE PRE-SOAK: July 24, 2019

DATE TESTED: July 25, 2019

TIME	HOLE DEPTH (in.)	HOLE DIAMETER (in.)	LENGTH OF INTERVAL (min.)	WATER DEPTH @ START OF INTERVAL (in.)	WATER DEPTH @ END OF INTERVAL (in.)	DROP IN LEVEL (in.)	PERCOLATION RATE @ FINAL INTERVAL (min./in.)
Begin	43	8 in.	30 min.	6	0	6	5
30 min. (½ hr.)	43	8 in.	30 min.	6	0	6	5
60 min. (1 hour)	43	8 in.	30 min.	6	0	6	5
90 min. (1-1/2 hr.)	43	8 in.	30 min.	6	0	6	5
120 min. (2 hr.)		8 in.	30 min.				
150 min. (2-1/2 hr.)		8 in.	30 min.				
180 min. (3-hr.)		8 in.	30 min.				
210 min. (3-1/2 hr.)		8 in.	30 min.				
240 min. (4-hr.)		8 in.	30 min.				

NOTE:

A four (4) hour test must be conducted unless:

a) Water remains in the hole after the presoak in which case one 30-minute interval is sufficient,
b) The first 6 inches of water seeps away in less than 30 minutes in which case a 1-hour test consisting of six 10-minute time intervals may be used,
c) The test is being conducted in sandy soils in which case a 1-hour test consisting of six 10-minute time intervals may be used,
d) Three successive water level drops do not vary by more than 1/16 inch in which case a two-hour test may be conducted,
e) Test is in Dawson Arkose soil, in which case the test must be run a minimum of four hours until the last three successive water level drops vary by less than 1/16-inch.

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Project No. 19024

July 3, 2019

Ms. Lauren Leeper
Pearsons Ministries International
Post Office Box 340
Woodland Park, Colorado 80866

Re: Analysis of Existing On-Site Wastewater Treatment Systems
10460 West US Highway 24, Green Mountain Falls
A.P.N. 8305400020

Dear Ms. Leeper,

This letter is to discuss the methods, analysis and findings of an analysis of the multiple On-Site Wastewater Treatment Systems (OWTS) situated on the property at 10460 West US Highway 24 in Green Mountain Falls. It is my understanding that you desire to utilize the existing facilities, specifically:

- the existing Kitchen/Gym (Building #15), for worship services (500 seats).
- The existing dormitories (Buildings #11 - #14) for office/studio.
- One cabin (Building #5) for parsonage.

Executive Summary

During this study five OWTSs were identified from the records. One of these OWTS has likely been abandoned. After a review of records provided and recent inspections, I conducted a careful analysis. Of the three OWTSs analyzed for adequacy to perform the proposes uses, only one was found to be inadequate. Specifically, the existing Kitchen/Gym was found to possess only 1,010 ft^2 of the required 2,917 ft^2 of soil treatment. An additional 1,907 ft^2 will be required for the proposed use.

As a result of this analysis, I hold the following professional opinions:

- OWTS serving Building #15 (Permit No. ON0003830) is NOT ADEQUATE for the proposed use.
- OWTS serving Buildings #11 - #14 (Permit No. 010881) is ADEQUATE for the proposed use.
- OWTS serving Buildings #4 - #6 (Permit No. 04719) is ADEQUATE for the proposed use.

Specifically, this letter will attempt to address the concerns listed in the communique from Mr. Aaron Doussett, El Paso County Public Health, dated May 8, 2019. These items include the following:

- *The engineer to provide documentation of what is in the ground mathematically (tank size in gallons and soil treatment area in square footage).*
- *What will be generated by the structures in total gallons per day.*
- *What structures will feed into which system (if there are several systems).*
- *A narrative in the cover page from the engineer that the current systems are adequate, addressing both the math as well as system functionality.*
- *If applicable, addressing Colorado OWTS Policy 6.*
- *This would need to be completed by a Professional Engineer from Colorado and stamped by that PE.*

Existing Records

A review of existing records, provided by you, was performed to understand the complexity of the systems installed. First a review of the following maps was conducted:

- Special Use Plan by Rampart Surveys, Inc., dated May 30, 2013. This map shows a key to the use for each of the fifteen (15) existing buildings on site.
- A.L.T.A. Survey Plat by Rampart Surveys, LLC., dated July 17, 2018. This map shows the found septic tank lid covers and clean outs. Septic tank lid covers were located near Buildings 1, 4, 8, 11-14, and 15.

The following items, believed to be of public record were reviewed:

- 10460 W. Hwy 24 – 1E (February 16, 1972)
- 10460 W. Hwy 24 – 1P (July 19, 1972)
- 10460 W. Hwy 24 – C Eng. (January 10, 1978)
- 10460 W. Hwy 24 – 1B Eng. (December 10, 1996)
- 10460 W. Hwy 24 – A Eng. (December 10, 1996)
- 10460 W. Hwy 24 – A Permit and Application (January 6, 1997)
- 10460 W. Hwy 24 – C Permit and Application (January 17, 1997)
- 10460 W. Hwy 24 – D Permit and Application (May 18, 2004)
- 10460 W. Hwy 24 – D Eng. (January 18, 2005)

Also, summaries of recent inspections were reviewed:

- Discussion of Inspection by Max at Arrowhead Septic, by Destiny Owens, dated April 18, 2019.
- Summary of Inspection by Ampro Inspections, dated April 22, 2019.

And, the following items from the El Paso County Health Department were reviewed:

- Acceptance Document for Onsite Wastewater Treatment System – Transfer of Title, dated May 30, 2019. This document addresses D - Kitchen and Gym (Building # 15).
- Acceptance Document for Onsite Wastewater Treatment System – Transfer of Title, dated May 30, 2019. This document addresses B - East Cabins (Buildings #13 and #14).

We reviewed the following documents, not provided by you, but obtained from www.onlineRME.com:

- On-Site Wastewater Treatment System Inspection Report for A-Laundry Dorm Old Kitchen, Arrowhead Septic, dated April 29, 2019 (Building #1)
- On-Site Wastewater Treatment System Inspection Report for C-North Cabins, Arrowhead Septic, dated April 29, 2019 (Buildings #11 and #12)
- On-Site Wastewater Treatment System Inspection Report for E-Original Kitchen, Arrowhead Septic, dated April 29, 2019 (Building #9)

Existing Site Conditions

The site is situated in mountainous terrain. The site is moderately forested and generally slopes toward the south. The site is improved with fifteen existing buildings, roadways, parking areas, and assorted recreational facilities. Figure 1 is a sketch of the site showing the existing buildings, paved areas, and areas of the existing OWTS

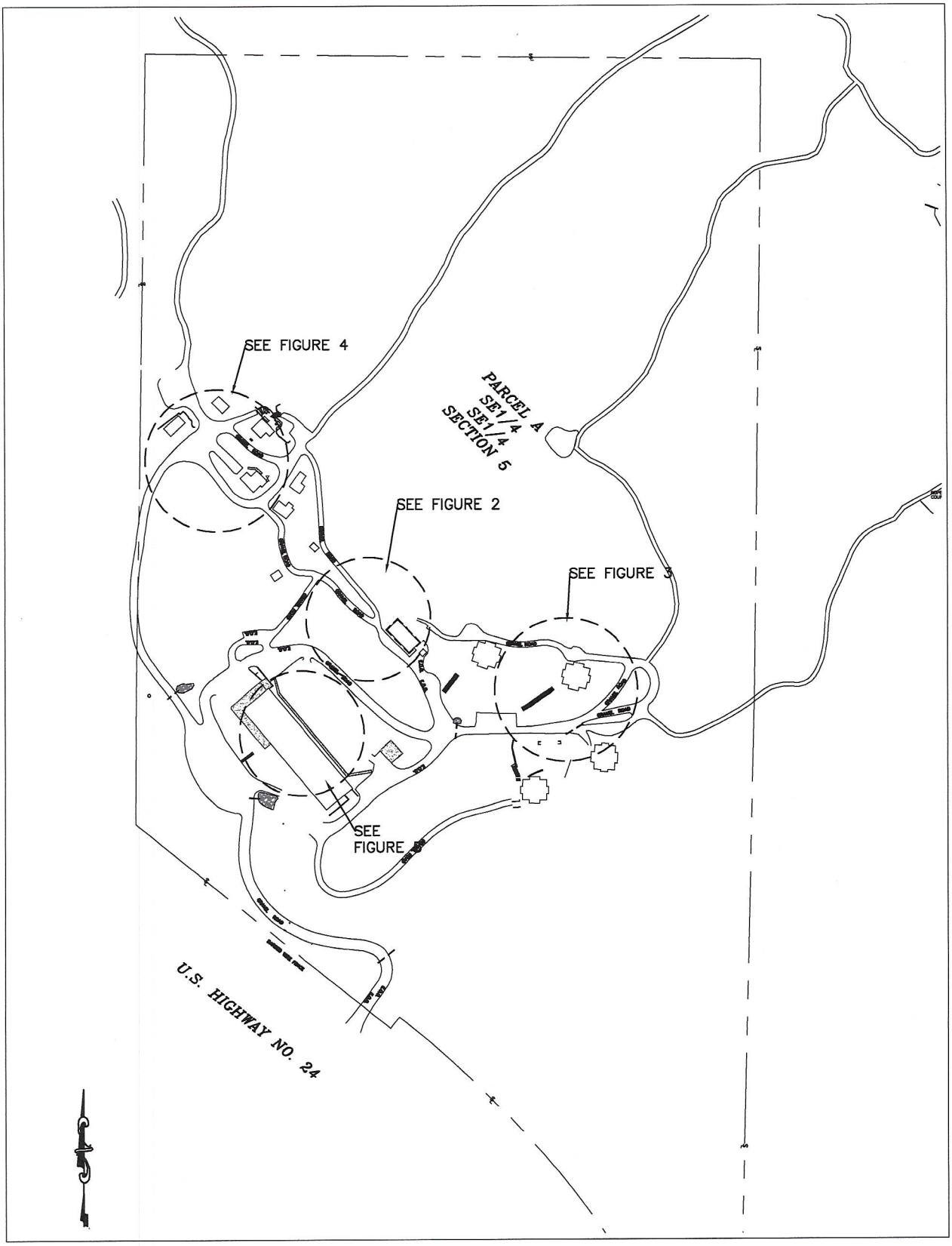
To better understand the characteristics of this soil a review of the Web Soil Survey, maintained by the United States Department of Agriculture, Natural Resources Conservation Service, was performed. The review indicates that this site is underlain with Sphinx, Warm-Rock Outcrop Complex (47). The Sphinx, Warm is described as a gravelly course sandy loam. It is classified as a mixture of silty ravels, silty sands, and poorly graded gravels, (GM, SM, GP-GM). It is not plastic and a Liquid Limit ranging from 18%-31%. This soil is in Hydrologic Group D.

Underlying this Sphinx, Warm Complex is weathered bedrock at depths of 1-foot to 5-feet. Bedrock may be as deep as 5 feet with some outcroppings.

Document Review

A review of the documents listed above was undertaken. Figure 1 is an overall site plan that shows the relationships of the various buildings on the property. A short description of each document is provided below:

10460 W. Hwy 24 – 1E (February 16, 1972) – This document records a percolation test that was conducted on January 26, 1972. This test was conducted by Lincoln-DeVore Testing Laboratory. The soil was classified as clayey-sand and clayey-



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517 WEST 5TH STREET, STE 102
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719.543.5300 – 719.543.5301(FAX)
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FIGURE 1

sand. The percolation test indicated a percolation rate of 2 minutes per inch. This document also includes a plan for a leaching field, 2,500 gallon septic tank, three distribution boxes and 640 linear feet of trench. It is not readily apparent which building(s) this system serves.

10460 W. Hwy 24 – 1P (July 19, 1972) – This document is a Sewage Disposal Inspection Form and associated Permit No. 1624. Permit No. 1624 was issued on February 16, 1972. The Inspection Form shows a 2,500 gallon septic tank and a leaching field consisting of 650 linear feet of trench. The inspection form shows this system serving the "kitchen". This system was installed by K.W. Quinn Construction, which is the same company listed as the client for the percolation test conducted in January 1972.

This system is likely the same on described above in Document 1E. The "kitchen" described appears to be Building #9 as shown on the Special Use Plan. Figure 2 shows the layout of this OWTS and Building #9. According to records from the El Paso County Assessor's Office, Building #9 appears to have been constructed in 1972.

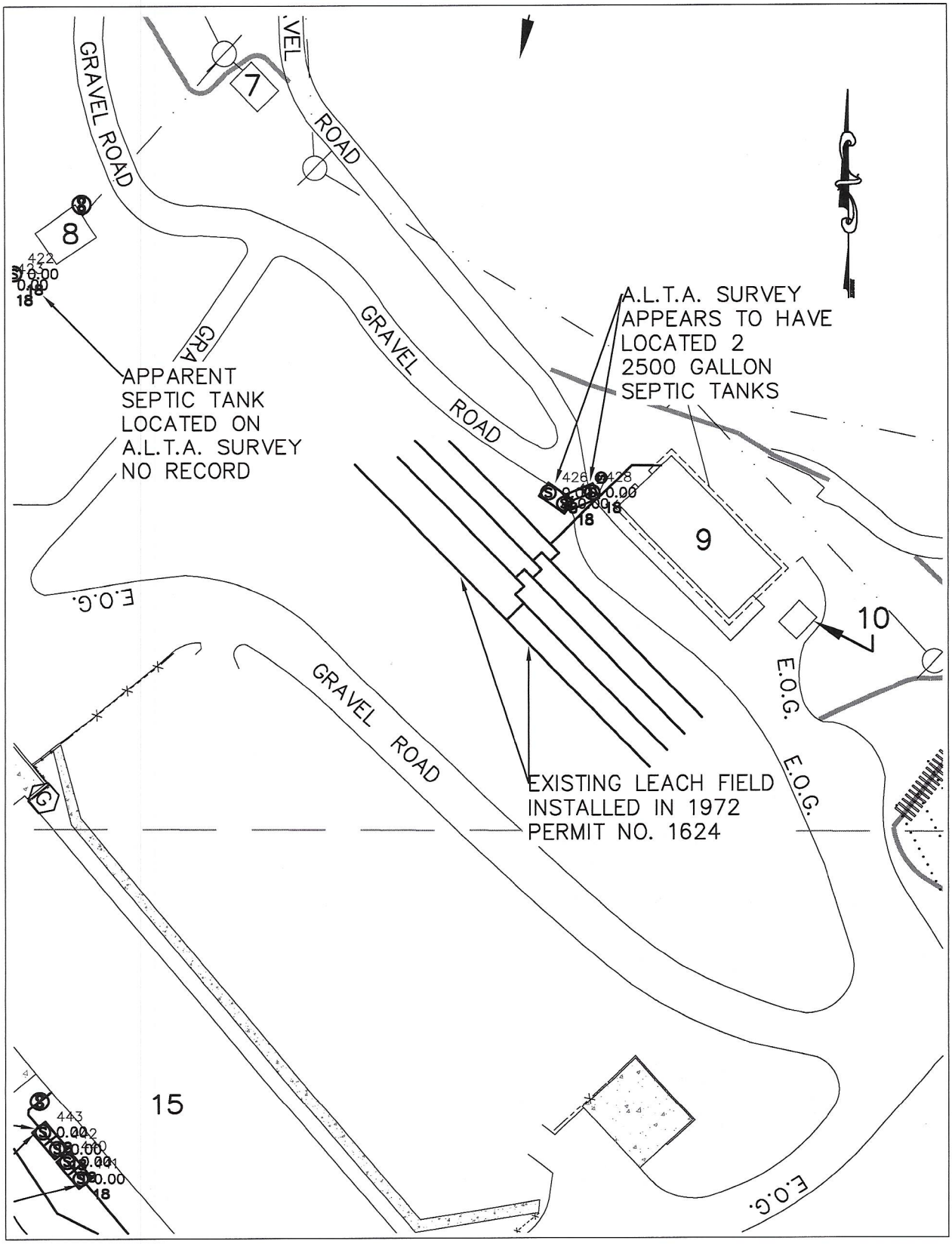
10460 W. Hwy 24 – C Eng. (January 10, 1978) – This packet of documents includes:

a. Cover Letter, dated January 10, 1978
b. Percolation Test, dated January 5, 1978
c. Percolation Test, dated June 12, 1975
d. Application, dated February 7, 1978
e. Sewage Disposal Inspection Form, dated November 15, 1978
f. Permits No. 05121 and No. 05122 for two individual systems, dated February 7, 1978

The cover letter and the percolation tests were prepared by Lincoln-DeVore Testing Laboratory. The cover letter discusses the rapid percolation rate of 2.5 minutes per inch and the need for a sand filter below the leaching field. The cover letter prescribes a gradation for the sand filter. The percolation test, dated June 12 1975, is likely for the system install near Building #1 (Permit No. 4169). See Figure 4.

The Percolation Test Field Data Sheets classify the soil as decomposed granite and clayey gravel. The plan shows two OWTS systems. Each system serves two of the dormitories, which according to records from the El Paso County Assessor's Office, were built in 1978 (Buildings #11 through #14). Figure 3 shows the layout of these two OWTSs and Buildings #11 through #14. Each of these systems consist of one 1,500 gallon septic tank and 1,220 square feet of seepage beds.

10460 W. Hwy 24 – 1B Eng. (December 10, 1996) – This packet of documents includes a cover letter, calculations, and a plan, prepared by Michael T. Orsillo, PE. These documents were for the refurbishment of the system installed 1978 to serve Building #11 and Building #12. These are dormitories. It appears that the leaching



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517 WEST 5TH STREET, STE 102
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719.543.5300 – 719.543.5301(FAX)
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FIGURE 2

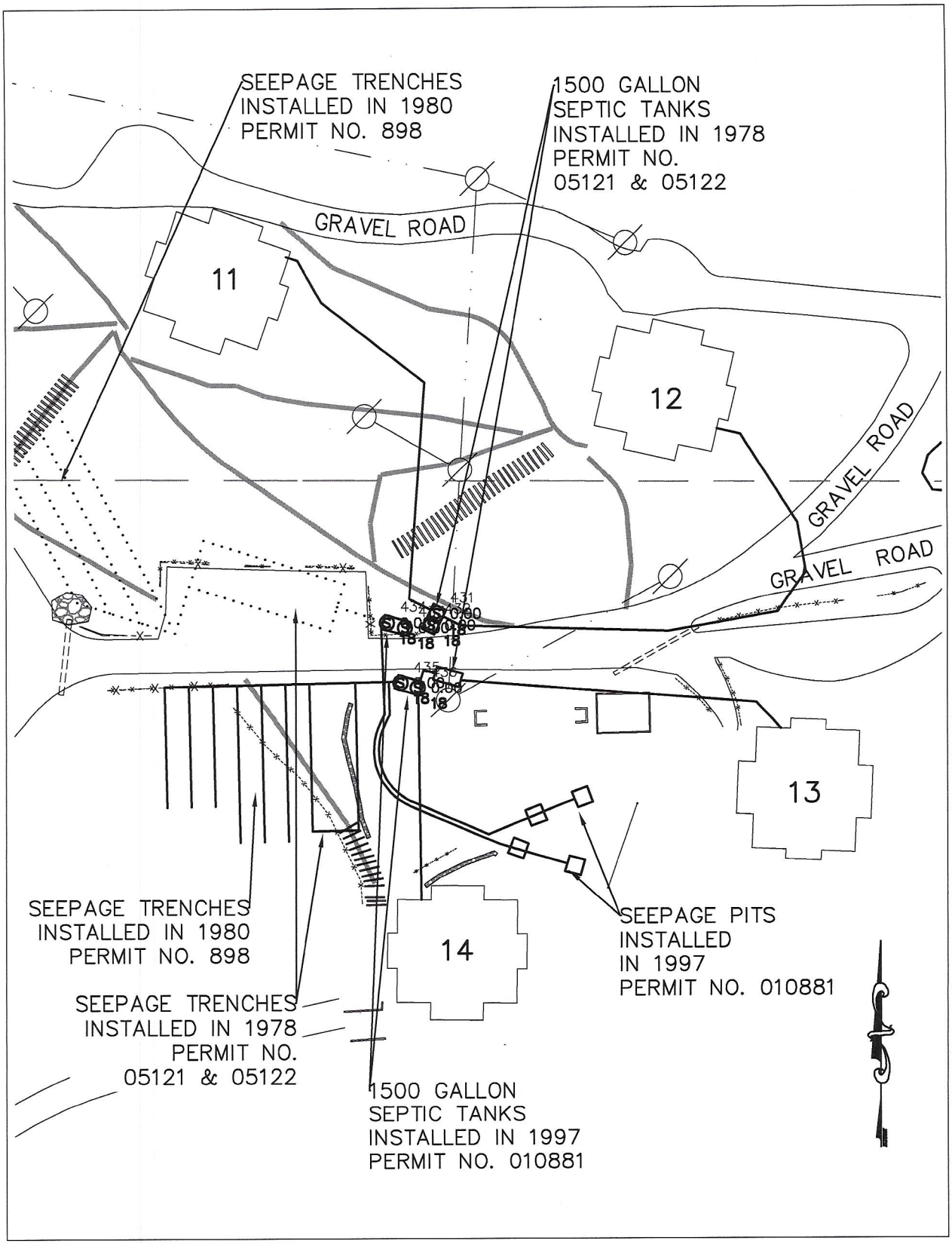

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FIGURE 3

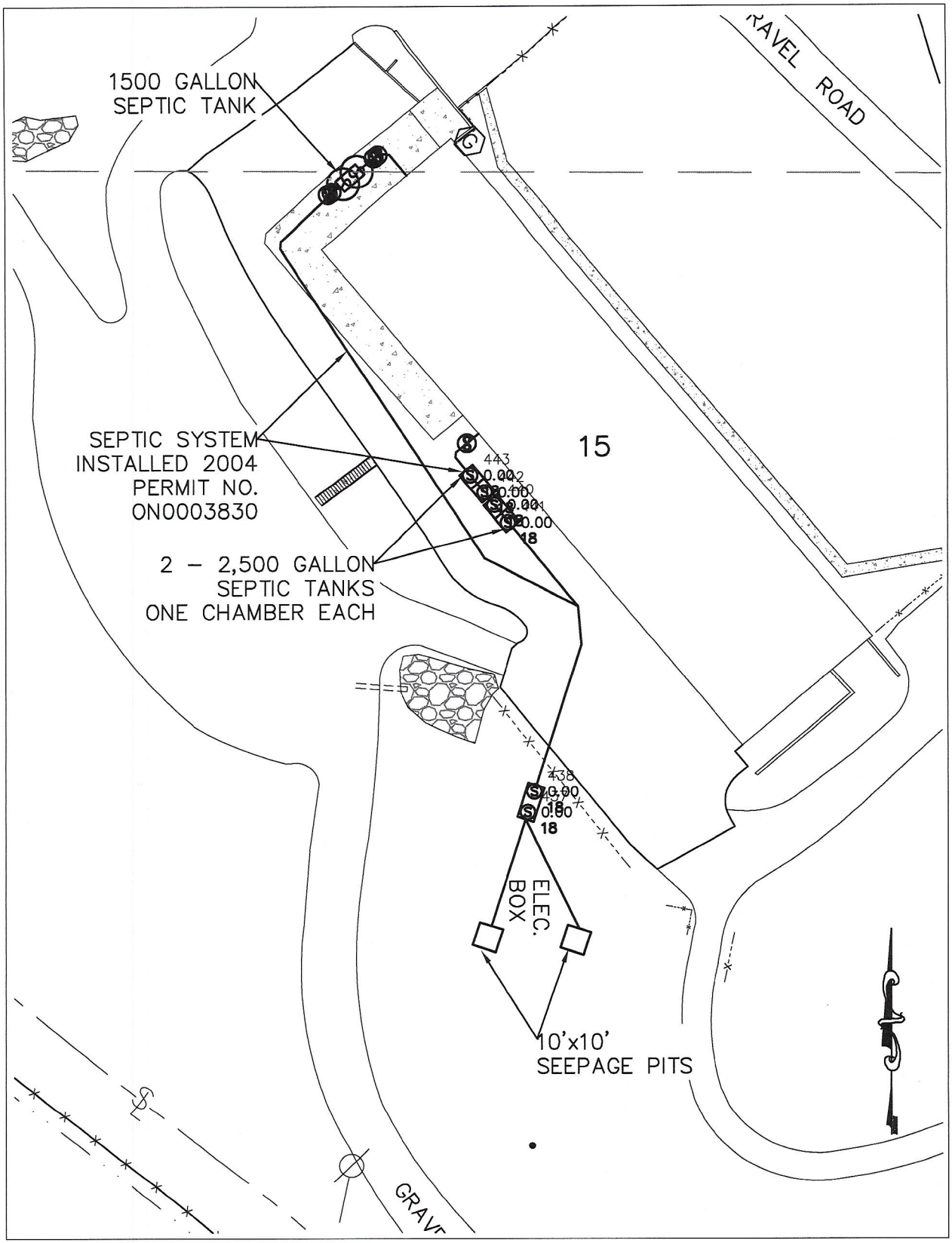

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FIGURE 4

bed installed had failed. It is not clear if the refurbishment was made as there is no permit. The plan refers to the existing septic system serving Building #9, which was installed in 1972.

10460 W. Hwy 24 – A Eng. (December 10, 1996) – This is a packet of documents that consist of the following:

a. Cover letter by Michael T. Orsillo, PE, dated December 10, 1996. This appears to be the very same cover letter discussed above in Packet 1B Eng.
b. Soil Percolation Data Sheet, dated September 9, 1983. The soil is classified as decomposed granite. The data sheet depicts that 4 holes were bored. The percolation rate was determined to be 5 minutes per inch.
c. Percolation Test Location Diagram, by Lincoln-Devore Testing Laboratory. This diagram shows four holes bored and a "tennis court", a "water faucet", and two buildings. All these features are not in the vicinity of the dormitories, (Buildings #11 through #14), but rather on the west side of the campus.
d. Calculations performed by Oliver E. Watts, Consulting Engineer, dated July 29, 1980.
e. Plan for On-Site Sewage Disposal System, by Oliver E. Watts, dated August 6, 1980. This plan shows additional trenches added to the existing seepage beds serving the four dormitories (Buildings #11 through #14).
f. Letter to El Paso County Health Department, by Oliver E. Watts, dated October 1, 1980. This letter certifies that the installation of the system designed by him was in accordance with established criteria and the permit.
g. Letter to Brockhurst Boys Ranch, from El Paso County Health Department, dated June 3, 1980. This letter states that the septic system serving the four dormitories (Buildings #11 through #14) had failed as effluent was observed flowing down the hill from each of the leaching beds. The letter goes on to order the abatement of the nuisance.
h. Letter to Brockhurst Boys Ranch, by Lincoln-DeVore Testing Laboratory, dated June 12, 1975. This letter discusses the rapid percolation rate and the need for a sand filter below the leaching field. This letter prescribes a gradation for the sand filter.
i. Two sketches of an OWTS. One of these sketches was prepared by Lincoln-DeVore Testing Laboratory. This particular sketch shows the layout of the percolation testing, which appears to be the same as shown on the Percolation Test Location Diagram listed above in Item c. Both sketches show a "school" and "office". These sketches appear to correspond with Building #2 and Building #3.
j. Permit No.898 dated August 8, 1980.
k. Application to remodel a Sewage Disposal System, dated August 8, 1980.

The dates of the documents in this packet range from 1975 to 1996. It is helpful to understand the chronological order of the documents and actions taken. The following timeline is presented:

- June 12, 1975 letter (h) from Lincoln-DeVore specifying sand filter.
- June 30, 1980 letter from El Paso County (g) ordering abatement of nuisance.
- July 29, 1980 calculations (d) by Oliver Watts, PE-LS
- August 6, 1980 plan (e) by Oliver Watts, PE-LS
- August 8, 1980 application (k) for permit
- August 8, 1980 permit (j) issued
- October 1, 1980 letter (f) by Oliver Watts, PE-LS
- September 9, 1983 soil percolation data sheet (b)

The letter dated June 12, 1975 is curious. It does not appear to be relevant to the abatement of the nuisance cited on June 30, 1980.

All the actions in 1980 were to abate the nuisance created by the failed seepage beds which, were installed in 1978 to serve the dormitories (Buildings #11 through #14).

The soil percolation test on September 9, 1983 is curious. It does not appear to be relevant to the abatement of the nuisance cited on June 30, 1980.

Items b, c, and i appear to be unrelated to the abatement of the nuisance cited on June 30, 1980. These items appear to be for an OWTS that was installed to serve Buildings #2 and #3, which may have been installed in 1975.

10460 W. Hwy 24 – A Permit and Application (January 6, 1997) – This packet contains and Individual Sewage Disposal System Inspection Form, dated January 6, 1997, a sketch depicting improvements to the systems installed 1978 and rehabilitated in 1980, and an application for a permit. There is no permit in this packet, so there is no reason to believe this was installed.

10460 W. Hwy 24 – C Permit and Application (January 17, 1997) – This packet contains and Individual Sewage Disposal System Inspection Form, dated January 17, 1997, an application for a permit, and Permit No. 010881, dated December 19, 1996. The sketch on the Inspection Form depicts improvements to the systems installed 1978 and rehabilitated in 1980. The improvements include the following:

- The installation of an additional 1,500 gallon septic tank to each system
- The installation of two (2) seepage pits (12' x 12") for each system

This packet appears to have superseded the one dated January 6, 1997.

10460 W. Hwy 24 – D Permit and Application (May 18, 2004) – This packet contains the following items:

a. Individual Sewage Disposal System Inspection Form, dated May 18, 2004
b. Sketch showing the layout of the system
c. Permit No. ON0003830, dated June 17, 2003
d. Application for an On-Site Treatment System, dated February 4, 2002

This OWTS appears to have been installed to serve the Building #15 as shown on the Special Use Plan. Figure 4 shows the layout of this OWTS and Building #15. According to records from the El Paso County Assessor's Office, Building #15 appears to have been constructed in 2003.

The system consists of three (3) 2,500 gallon septic tanks, one (1) 1,500 gallon septic tank, and two seepage pits (10' x 10'). One of the 2,500 gallon septic tanks has a pump to lift the sewage to the two seepage pits. This OWTS was installed and the final inspection occurred on May 18, 2004.

10460 W. Hwy 24 – D Eng. (January 18, 2005) – This packet contains the following items:

a. Letter to El Paso County Department of Health, dated January 18, 2005, from Colorado Engineering & Geotechnical Group, Inc. This letter is requesting final certification.
b. Letter to Colorado Commercial Builders, dated May 18, 2004, from Colorado Engineering & Geotechnical Group, Inc. This letter responds to an apparent review regarding inspection of open excavations of the seepage pits.
c. Cover letter to Colorado Commercial Builders, dated December 28, 2001, from Colorado Engineering & Geotechnical Group, Inc. This letter is regarding percolation testing.
d. Results of percolation testing performed by Colorado Engineering & Geotechnical Group, Inc. on December 27, 2001. The soil at this location was classified as silty-sand and gravelly-sand. The percolation test indicated a percolation rate of 20 minutes per inch.
e. Sketch by Colorado Engineering & Geotechnical Group, Inc., dated December 21, 2001. This sketch depicts four (4) boreholes. These are likely the ones used for the percolation test (d) on December 27, 2001. This sketch shows the borings to be just west of the "Children's Ark Entrance Road". It should be noted that the alignment of this road does not match the current alignment as shown on the A.L.T.A. Survey Plat by Rampart Surveys, LLC., dated July 17, 2018.
f. Sewage Disposal Inspection Form, dated April 24, 1977. This form has a sketch that shows an OWTS that serves "Laundry & Offices", and "Dormitory". This OWTS consists of 3,000 gallon septic tank and three (3) seepage pits, each seven (7) feet in diameter. The seepage pits are south of the "Old Kitchen".
g. Permit No. 04719, dated March 2, 1977.

h. Application for permit, dated March 1, 1977
l. Letter to Brockhurst Boys Ranch, by Lincoln-DeVore Testing Laboratory, dated February 4, 1977. This letter discusses the rapid percolation rate and the need for a sand filter below the leaching field. This letter prescribes a gradation for the sand filter.
m. Soil Percolation Data Sheet, by Lincoln-DeVore Testing Laboratory, dated February 3, 1977. The soil is classified as decomposed granite. The data sheet depicts that three (3) holes were bored. The percolation rate was determined to be 2.5 minutes per inch.
i. Permit No. 4169, dated June 23, 1975. This permit is to install a 2,500 gallon septic tank with two (2) trenches, each 55 feet in length.
j. Application for permit, dated June 23, 1975.

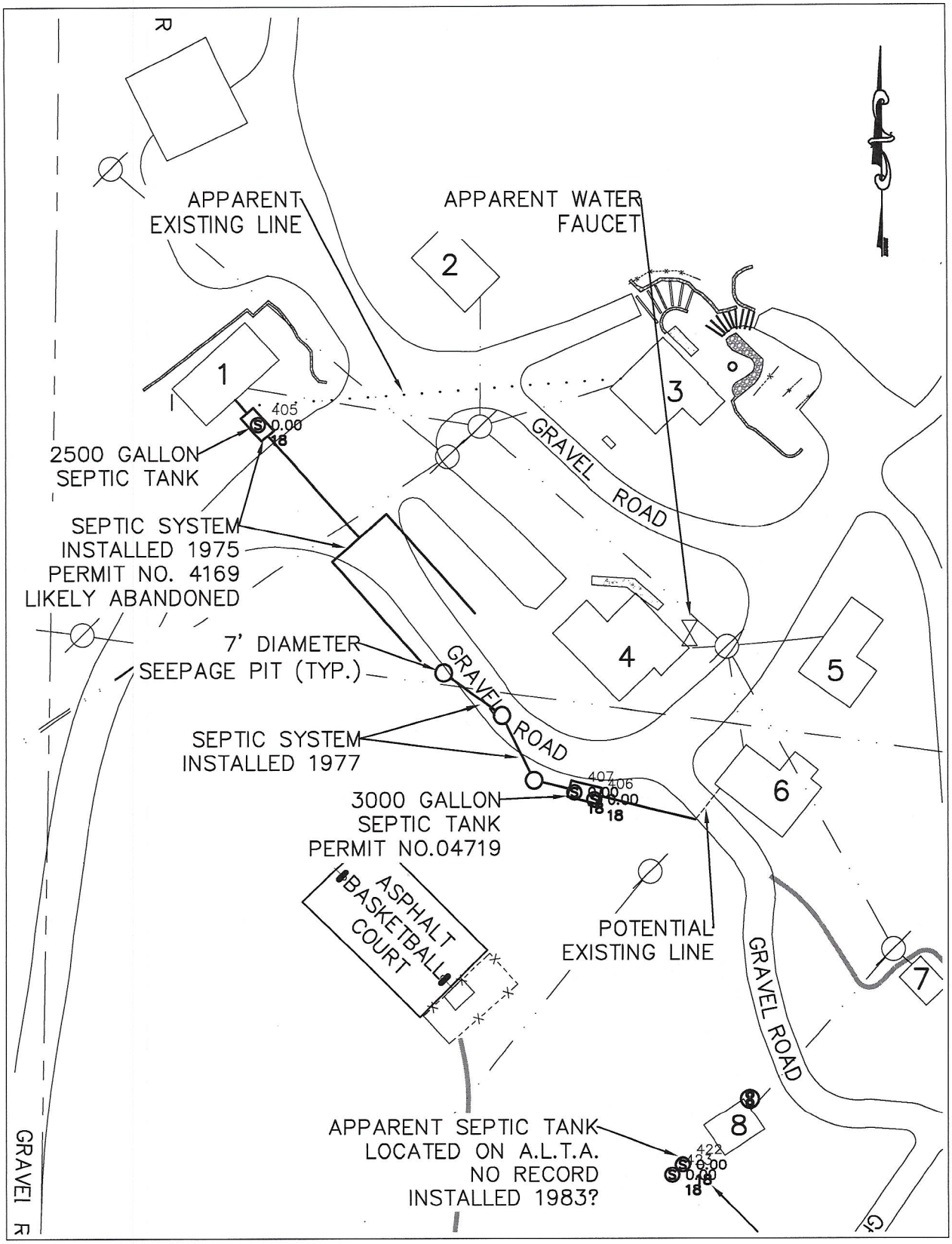
The dates of the documents in this packet range from 1975 to 2005. It is helpful to understand the chronological order of the documents and actions taken. The following timeline is presented:

- June 23, 1975 Application for Permit (j).
- June 23, 1975 Permit No. 4169 (i) issued.
- February 3, 1977 soil percolation data sheet (m)
- February 4, 1977 letter (l) from Lincoln-DeVore specifying sand filter.
- March 1, 1977 Application for Permit (h).
- March 2, 1977 Permit No. 04719 (g).
- April 24, 1977 Sewage Disposal Inspection Form (f).
- December 28, 2001 Letter by Colorado Engineering Group (c) with sketch (e), and test results (d).
- May 18, 2004 Letter (b) regarding percolation test
- January 18, 2005 Letter (a) requesting final certification.

Figure 5 shows the layout of two OWTSs serving Buildings #1 through #8.

<u>Discussion of Inspection by Max at Arrowhead Septic, by Destiny Owens, dated April 18, 2019.</u>
Apparently, Max Tallent of Arrowhead Septic performed an inspection of the systems on this property. Ms. Owens indicates that there are five existing septic systems on this property; one of which is abandoned. Four of these systems have two septic tanks. There is no mention of which one is abandoned. However, it appears that it may be the OWTS under Permit No. 4169. There are some photos in this communique, one is of these appears to be of Building #1 (Old Office Building).

<u>Summary of Inspection by Ampro Inspections, dated April 22, 2019.</u>
Apparently, some underground pipe was televised. There are several phots of this. There is no description of where this pipe was televised.



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LEVERINGTON & ASSOCIATES, INC.
CIVIL & GEOMATICS ENGINEERS
517 WEST 5TH STREET, STE 102
PUEBLO, COLORADO 81003
719.543.5300 – 719.543.5301(FAX)
www.leveringtonassociates.net

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Scale: 1"=60'

FIGURE 5

Acceptance Document for Onsite Wastewater Treatment System – Transfer of Title, dated May 30, 2019. The El Paso County Public Health Department, Environmental Health Division, accepted an inspection: On-Site Wastewater Treatment System Inspection Report for D – Kitchen and Gym, Arrowhead Septic, dated April 29, 2019 This is commonly known as Building # 15. This system was inspected by Max Tallent of Arrowhead Septic on April 19, 2019. The system was fully inspected, and three septic tanks were verified to be:

- 1,500 gallons (two chambers) (used as grease trap)
- Two each 2,250 gallons (single chamber) (in succession)

The following deficiencies were noted:

- Tanks needed to be pumped. This was done.
- Septic Tank lid covers were found to be below the existing grade. The lids need to be elevated to ground level.

Acceptance Document for Onsite Wastewater Treatment System – Transfer of Title, dated May 30, 2019. The El Paso County Public Health Department, Environmental Health Division accepted an inspection: On-Site Wastewater Treatment System Inspection Report for B – East Cabins, Arrowhead Septic, dated April 29, 2019 This is commonly known as Buildings # 13 and #14. This system was inspected by Max Tallent of Arrowhead Septic on April 19, 2019. The system was fully inspected, and two septic tanks were verified to be:

- 1,500 gallons (two chambers)

The following deficiencies were noted:

- Tanks needed to be pumped. This was done.
- Site maintenance is required.
    - Erosion has occurred and partially buried three of four septic tank lid covers. Some of the tanks have been partially filled with soil.
    - The second compartment of the second tank has subsided about 5 inches.

On-Site Wastewater Treatment System Inspection Report for A-Laundry Dorm Old Kitchen, Arrowhead Septic, dated April 29, 2019

This is commonly known as Buildings # 4, #5, and #6. This system was inspected by Max Tallent of Arrowhead Septic on April 19, 2019. The system was fully inspected, and two septic tanks were verified to be:

- 3,000 gallons (two chambers)
- 1,500 gallons (two chambers)

The following deficiencies were noted:

- Tanks needed to be pumped. This was done.
- Site maintenance is required.
- Discharge tee missing.

It was noted that there is a tank sitting adjacent to the old office. This may be a component of the OWTS under Permit No. 4169.

On-Site Wastewater Treatment System Inspection Report for C-North Cabins, Arrowhead Septic, dated April 29, 2019

This is commonly known as Buildings # 11 and #12. This system was inspected by Max Tallent of Arrowhead Septic on April 19, 2019. The system was fully inspected, and two septic tanks were verified to be:

- 1,500 gallons (two chambers)
- 1,500 gallons (two chambers)

The following deficiencies were noted:

- Tanks needed to be pumped. This was done.
- Advanced acid deterioration in second compartment of second tank.
- Tee deficient.

On-Site Wastewater Treatment System Inspection Report for E-Original Kitchen, Arrowhead Septic, dated April 29, 2019

This is commonly known as Building # 9. This system was inspected by Max Tallent of Arrowhead Septic on April 19, 2019. The system was fully inspected, and one septic tank was verified to be:

- 2,500 gallons (two chambers)

The following deficiencies were noted:

- Tank needs to be pumped. This was done.
- Large ground mole colony on leach field.

Analysis

Since 1972 a total of eight permits for six Onsite Wastewater Treatment Systems (OWTS) have been granted. Two of the permits were for the remediation of two systems. Table 1 shows the permits along with the dates of issue, tank volumes, and the adjacent buildings. Of the six OWTSs identified from the records, five were recently inspected in April by Arrowhead Septic. Perhaps one of the OWTS was abandoned (Permit No. 4169), a record of this was not found.

Also, during this time a total of five percolation test have been conducted on this property. Table 2 shows the percolation test dates, infiltration rates, corresponding Permit numbers, and adjacent buildings.

TABLE 1 – Permits Issued

Permit No.	Date Issued	Tank Volume	Treatment Area	Adjacent Building	Inspected	Remarks
		(gallons)	(ft^2)			
1624	2/16/72	2,500	1,950	9	4/29/19	Original Kitchen
4169	6/23/75	2,500	110	1		Likely Abandoned
04719	3/2/77	3,000	1,030	4,5,6	4/29/19	Laundry Dorm Old Kitchen
05121	2/7/78	1,500	1,159	11-12		North Cabins
05122	2/7/78	1,500	1,159	13-14		East Cabins
898	8/8/80			11-14		Remediate Leaching Fields:05121 & 05122
Unknown	Unknown	Unknown		8		Tank Located
010881	12/19/96	2-1,500	2,112 (1,056 each OWTS)	11-14	4/29/19	Additional Tanks-Leaching Pits:05121 & 05122
ON0003830	6/17/03	1,500 and 3-2,500	1,010	15	4/29/19	Kitchen & Gym

There was one percolation test in 1983, which doesn't appear to correspond with any of the issued permits. This test was conducted in the vicinity of Building #8 The A.L.T.A. survey located a septic tank near Building #8, however, no records of an OWTS were found.

I understand that you desire to conduct worship services in Building #15. This would be two services on Sundays and one on Wednesday each week. It is expected that approximately 500 people will attend each service.

Additionally, I understand that you desire to use the cabins (Buildings #11 through #14) for offices and studios.

Lastly, I understand that you desire to use one cabin (Building #5) on the east side of the campus for a parsonage.

TABLE 2 – Percolation Tests

Permit No.	Perc. Test Date	Rate	Adjacent Building	Inspected	Remarks
		(min./in)			
1624	1/26/72	2	9	4/29/19	Original Kitchen
4169	6/12/75	2.5	1		Likely Abandoned
04719	2/3/77	2.5	4,5,6	4/29/19	Laundry Dorm Old Kitchen
05121	1/5/78	2.5	11-12	4/29/19	North Cabins
05122	1/5/78	2.5	13-14	4/29/19	East Cabins
Unk.	9/9/83	5	8		Tank Located
ON0003830	12/27/01	20	15	4/29/19	Kitchen & Gym

To verify the adequacy of the proposed uses, I calculated the volumes of sewage generated for each OWTS and the capacity of each OWTS to accept this sewage.

OWTS PERMIT No. ON0003830 (Building #15)

Load: 500 people x 3.5 GPD/person = 1750 gallons per day generated

Requires 48 hours of detention in septic tanks: 2 x 1750 = 3,500 gallons

This OWTS has a percolation rate of 20 minutes per inch.

According to Table 10-1 of El Paso County Board of Health Chapter 8 OWTS Regulations this corresponds to a long-term acceptance rate (LTAR) of 0.60 GPD/ft^2.

Required soil treatment area is: design flow/LTAR = 1750 GPD/0.60 GPD/ft^2 = 2,917 ft^2.

Existing OWTS has detention capacity of: 3 x 2,250 + 1,500 = 8,250 gallons. This is ADEQUATE for the load.

Existing OWTS has a soil treatment area of 1,010 ft^2. This is NOT ADEQUATE for the load. To improve this system to accommodate the load, an additional 1,907 ft^2 of soil treatment are will be required (2,917 ft^2 – 1,010 ft^2 = 1,907 ft^2).

This OWTS is NOT ADEQUATE for the desired use.

Currently this OWTS has a soil treatment area of 1,010 ft^2. This will accommodate a design capacity of 606 GPD, or 606/3.5 = 173 people.

OWTS PERMIT No. 010881 (Buildings #11 through #14)
Load: Assume twenty employees: 20 x 15 GPD = 300 gallons per day generated

Requires 48 hours of detention in septic tanks: 2 x 300 = 600 gallons

This OWTS has a percolation rate of 2.5 minutes per inch, which requires a sand filter to bring the infiltration rate to 5 minutes per inch.

According to Table 10-1 of El Paso County Board of Health Chapter 8 OWTS Regulations this corresponds to a long-term acceptance rate (LTAR) of 0.80 GPD/ft^2.

Required soil treatment area is: design flow/LTAR = 300 GPD/0.80 GPD/ft^2 = 375 ft^2.

Existing OWTS has detention capacity of: 4 x 1,500 = 6,000 gallons. This is ADEQUATE for the load.

Existing OWTS has a soil treatment area of 2,112 ft^2. This is ADEQUATE for the load. This OWTS is ADEQUATE for the desired use.

OWTS PERMIT No. 04719 (Buildings #4 through #6)
Load: Two bedrooms & one bathroom. Single Family = 300 gallons per day generated

Requires 48 hours of detention in septic tanks: 2 x 300 = 600 gallons

This OWTS has a percolation rate of 2.5 minutes per inch, which requires a sand filter to bring the infiltration rate to 5 minutes per inch.

According to Table 10-1 of El Paso County Board of Health Chapter 8 OWTS Regulations this corresponds to a long-term acceptance rate (LTAR) of 0.80 GPD/ft^2.

Required soil treatment area is: design flow/LTAR = 300 GPD/0.80 GPD/ft^2 = 375 ft^2.

Existing OWTS has detention capacity of 3,000 gallons. This is ADEQUATE for the load.

Existing OWTS has a soil treatment area of 1,030 ft^2. This is ADEQUATE for the load. This OWTS is ADEQUATE for the desired use.

Colorado Water Quality Control Division Policy WQSA-6

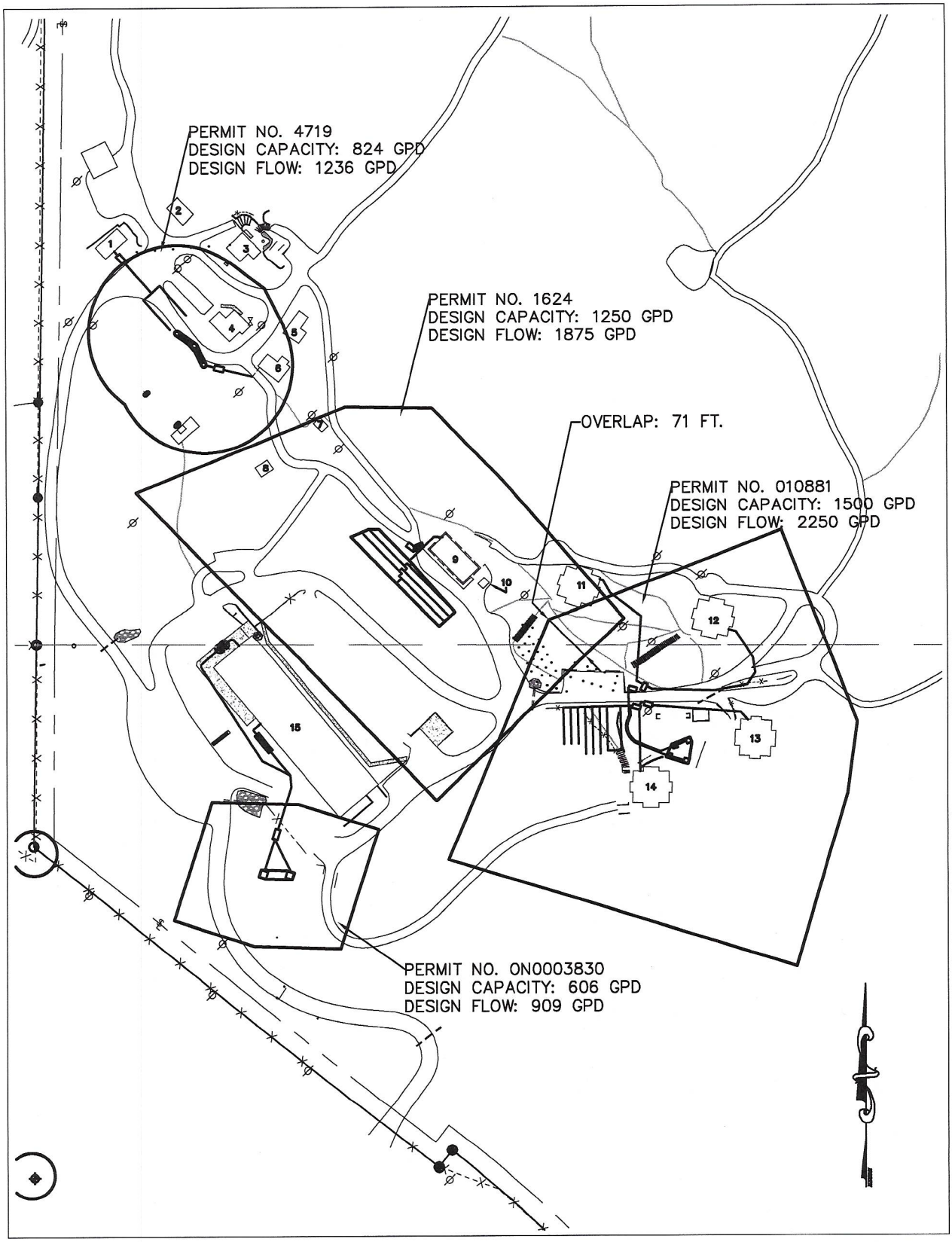
This property does meet the criteria for regulation under the Colorado Water Quality Control Division Water Quality Site Application Policy 6. This policy addresses the issue of multiple systems with a total design capacity of 2,000 GPD or greater. It appears that there are four existing OWTSs on this property all installed before 2007, when this policy went into effect. These four OWTSs have a combined design capacity of 4,370 GPD.

TABLE 3 – Policy 6 Analysis

Permit No.	Tank Volume (Gal)	Tank Capacity (Gal)	LTAR (GPD/ft^2)	Soil Treatment Area (ft^2)	Soil Capacity (GPD)	Design Capacity (GPD)	Design Flow (GPD)	Horizontal Influence (ft)
1624	2500	1250	0.8	1950	1560	1250	1875	170
4719	3000	1500	0.8	1030	824	824	1236	119
010881	6000	3000	0.8	2112	1690	1690	2535	223
ON0003830	9000	4500	0.6	1010	606	606	909	93

The policy has six conditions:

1) With the exception of the Kitchen/Gym (Building #15) and the Church Youth Building (Building #9), all of the other OWTSs serve multiple occupied structures.
2) The setbacks were calculated in Table 3 and are mapped on Figure 6.
3) Yes, there is one overlap of 71 feet with the OWTS on Permit No. 1624 and OWTS Permit No. 010881.
4) There are no known records of any of the OWTS being interconnected.
5) The property is situated on a mountain side, well above the mapped 100-year floodplain and greater than streams or rivers.
6) The El Paso County Public Health Department may determine that site location and plans and specifications reviews are warranted. However, this is unlikely at this time as the systems were installed prior to 2007. Should any of these OWTSs be improved to accommodate additional flows, then such a review may be required.



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Engineers ⌖ Surveyors

LEVERINGTON & ASSOCIATES, INC.
CIVIL & GEOMATICS ENGINEERS
517 WEST 5TH STREET, STE 102
PUEBLO, COLORADO 81003
719.543.5300 – 719.543.5301(FAX)
www.leveringtonassociates.net

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FIGURE 6

Discussion

To summarize, the four existing OWTSs on this property have the capacity to serve all desired purposes with the exception of the Kitchen/Gym, Building #15. This OWTS can only serve 173 people per day. To accommodate the desired 575 people per day, this OWTS will I need an additional 2,345 square feet of treatment area.

To address the concerns listed in the communique from Mr. Aaron Doussett, El Paso County Public Health, dated May 8, 2019, I have the following responses:

- *The engineer to provide documentation of what is in the ground mathematically (tank size in gallons and soil treatment area in square footage).* This is complete. See Tables 1 and 2.
- *What will be generated by the structures in total gallons per day.*
  1) Building #15: 2,012.5 gallons per day generated.
  2) Buildings #11 - #14: 1,500 gallons per day generated.
  3) Buildings #4 - #6: 300 gallons per day generated.
- *What structures will feed into which system (if there are several systems).*
  1) Building #15 is served by OWTS Permit No. ON0003830.
  2) Buildings #11 - #14 are served by OWTS Permit No. 010881.
  3) Buildings #4 - #6 are served by OWTS Permit No. 04719.
- *A narrative in the cover page from the engineer that the current systems are adequate, addressing both the math as well as system functionality.* See the Executive Summary on first page.
- *If applicable, addressing Colorado OWTS Policy 6.* WQSA-6, dated January 29, 2007 addresses Multiple Individual Sewage Disposal Systems, with a total design capacity of 2,000 GPD or more serving a single property. This property clearly falls under Policy 6 as there are five permits for OWTSs, four of which are confirmed as operational. See discussion above.
- *This would need to be completed by a Professional Engineer from Colorado and stamped by that PE.* See below.

Conclusions

After reviewing the documents provided, analyzing their relevance, and assessing the adequacy of the existing OWTSs. I have developed the following conclusions:

- Five OWTSs were identified from the records.
  - Permit No. 1624, installed 1972, serves Building #9
  - Permit No. 4169, installed 1975, likely abandoned
  - Permit No. 04719, Installed 1977, serves Buildings #4 through #6
  - Permit No. 010881, installed 1996, serves Buildings #11 through #14
  - Permit No. ON0003830, installed 2003, serves Building #15
- One of these OWTS (4169) has likely been abandoned.

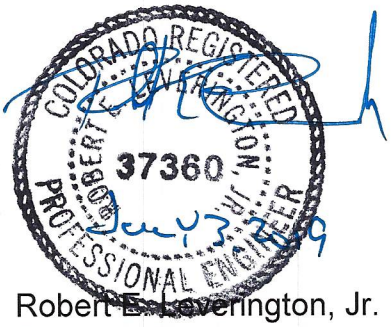
As a result of this analysis, I hold the following professional opinions:

- OWTS serving Building #15 (Permit No. ON0003830) is NOT ADEQUATE for the proposed use for worship services of 500 seats.
- OWTS serving Buildings #11 - #14 (Permit No. 010881) is ADEQUATE for the proposed use as office/studio.
- OWTS serving Buildings #4 - #6 (Permit No. 04719) is ADEQUATE for the proposed use as a parsonage (Building #5).

Closing

Ms. Leeper, I sincerely appreciate your assistance with this proposed project for at 10460 West US Highway 24 in Green Mountain Falls. If you have any questions, please do not hesitate to call me. Thank you.

Sincerely,
LEVERINGTON & ASSOCIATES, Inc.



Robert E. Leverington, Jr.
Principal Engineer