

TECHNICAL REPORT

On-site Wastewater Treatment System Feasibility Study 700 East School Way, Redwood Valley, California

May 17, 2019

Prepared for:
Ukiah Unified School District

Prepared By:
LACO Associates, Inc
776 South State Street, Suite 102A
Ukiah, California 95482
Project No. 7097.26

LACO

quality of life for
generations to come

Design
Planning
Engineering
Geology and Geotechnical
Environmental Science
Materials Testing
Survey

800 515-5054
www.lacoassociates.com
Eureka | Ukiah | Santa Rosa



Kelsey R. McLaughlin
Staff Geologist



Christopher J. Watt
CEG No. 2415; Exp 03/31/20



TABLE OF CONTENTS

1.0	Introduction	3
2.0	Setting	3
3.0	Site Assessment	4
4.0	Permitting Requirements	10
5.0	Basis for Design	15
6.0	conclusions and recommendations	17
7.0	Limitations	17
8.0	References	18

Figures:	Figure 1:	Location Map
	Figure 2:	Site Map

Appendices:	Appendix A:	<i>Drawing No A-1: Plot Plan & Details for the Redwood Valley Elementary School dated August 23, 1956</i>
	Appendix B:	Prior Evaluations Performed by LACO Regarding Site
	Appendix C:	Test Pit Logs
	Appendix D:	Laboratory Textural Analysis Results and Soil Suitability Charts
	Appendix E:	Percolation Test Data Sheets
	Appendix F:	Observation Well Logs
	Appendix G:	Observation Field Notes and Coyote Dam Precipitation Data
	Appendix H:	Observation Well Line Charts

1.0 INTRODUCTION

LACO Associates (LACO) was retained by the Ukiah Unified School District (Client) to perform a feasibility study for an on-site wastewater treatment system (OWTS) to serve future high-density residential development at the former Redwood Valley School (hereafter referred to as the "Site") located at 700 East School Way in Redwood Valley, California (Figure 1). This technical memorandum (TM) presents the results of field exploration, laboratory testing, and groundwater monitoring performed for a 1.5-acre portion of the Site ("Project Area") and includes the basis for design and permitting of an OWTS (Figure 2). Our Scope of Services was limited to the following:

- Install eight observation wells and collect period water level measurements within the observation wells for up to 60 days during the 2019 wet season;
- Field exploration with a backhoe to excavate 10 backhoe pits within the recommended disposal site area to a maximum depth of 8 feet;
- In the LACO materials testing laboratory, perform hydrometer analysis on up to 35 samples in accordance with Mendocino County standards for soil percolation suitability, of selected soil samples to determine sand, silt, and clay content;
- Perform up to 10 percolation tests in accordance with Mendocino County standards; and,
- Preparation of this TM, which includes a summarization of the results of work performed and the basis for designing and permitting an OWTS.

2.0 SETTING

The Site is an approximately 8.97-acre parcel (APN 163-060-15) which houses the former Redwood Elementary School. Redwood Valley, a census-designated place in the northern portion of the Ukiah Valley, has a moderate population density and is developed with primarily residential properties with some commercial, industrial, and agricultural businesses. This is reflected in adjoining parcels to the Site that are primarily residential in use with one industrial property to the southwest of the Site. The Russian River flows through the eastern adjoining vacant parcel which is owned by the District. There is no publicly owned treatment works for wastewater in Redwood Valley.

Site topography is defined by an upper bench on the western portion of the property and lower bench to the east that is separated by a 25-foot-high, 30 percent slope. The upper bench and lower bench are flat-lying and gently slope easterly toward the Russian River. The eastern Site boundary is defined by an over-steepened slope which descends to the Russian River. The Site is developed with school buildings, basketball, and tennis courts on the upper bench, and a baseball field, athletic field, and basketball/tennis courts on the lower bench. An inactive groundwater well is located at the southwest corner of the athletic field and an existing septic system leach field is located along the northwestern portion of the athletic field and under the basketball/tennis courts.

2.1 Prior Studies

The existing septic field was constructed in the 1950s and based on the *Drawing No. A-1: Plot Plan & Details* (Appendix A) for the Redwood Valley Elementary School dated August 23, 1956, the system consists of a 10,000-gallon septic tank and two distribution boxes that tie into 1,500 linear feet of leach line (15 leaching trenches with lengths of 100 feet). The leaching trenches are 3 feet wide with 1 foot of gravel beneath the leaching pipe. The area of the existing leach field is flat (less than 5 percent) and gently slopes to the east toward the Russian River. Previous evaluations performed by LACO determined an application rate of 0.8 gallons per day per square foot which would allow for a daily flow capacity of 6,000 gallons for the existing

system. Our prior evaluations which included borings, percolation testing, and laboratory analysis are presented in the following reports: *Percolation Testing of Existing Septic System Leach Field* dated April 9, 2018, *Flow Capacity of Septic System Leach Field* dated March 7, 2018; and, the *Technical Memorandum for Wastewater Evaluation* dated January 17, 2019 (Appendix B). The approximate location of the existing leach field is shown on Figure 2.

Supplementary testing in the existing leachfield area was performed during this evaluation utilizing test pits (TP5, TP8 through TP10), observation wells (OBS-4 through OBS-6 and OBS-8), and percolation holes (PP7, PP9 through PP11, OBS-3 and OBS-8). The existing leachfield construction was observed during test pit advancement of test pits TP8 and TP9. The existing leachfield construction was observed to consist of 1 to 3-inch diameter river run gravel used as the leachfield drain rock from 2.5 feet to 4 feet below ground surface (bgs). A 5.25-inch diameter terra cotta pipe in 1-foot lengths was encountered at 2.5 to 3 feet bgs that appeared clean with no staining in or around the pipe and surrounding material.

Soils observed and tested consisted of layered Sand (Zone 1), Sandy Loam (Zone 2A and 2B) and Loamy Sand (Zone 2A) deposits in the area of the existing leachfield. Along the western half of the athletic field, a Sandy Loam/Loamy Sand layer was 7.5 feet thick (TP8) that shallowed to 3 feet thick (TP10) towards the eastern extent of the existing leachfield. Underlying the Sandy Loam/Loamy Sand layer is a Sand (Zone 1) deposit with 7 to 8 percent fines and some Sandy Loam deposits layered intermittently between the Zone 1 deposit. Percolation rates along the western and northern extent ranged from 9.6 to 15.9 minutes per inch (data from percolation holes PP7, PP9 and PP11 were not used or performed because the existing leachfield may have influenced their tests). The percolation rate towards the eastern extent ranged from 1.4 to 3.1 MPI at 5 feet and 1.5 feet respectively. During the period of February 7, 2019, through April 4, 2019, groundwater was measured in observation wells and ranged from 6.14 to 9.73 feet bgs in the area of the existing leachfield.

Based on observations in the field, laboratory and percolation data, the existing septic leachfield does not meet the minimum vertical setback requirement to groundwater along the southern and eastern portions of the existing leachfield. A minimum of 3 feet of soil containing 15 percent fines and/or a percolation rate greater than five minutes per inch is required between the bottom of the leachfield and groundwater. In the southern and eastern extent of the existing leachfield a groundwater separation of 20 to 26 feet is required due only 7 to 8 percent fines being present in the Sand (Zone 1) material; however, a separation of only 2 to 2.75 feet is present.

3.0 SITE ASSESSMENT

The purpose of this assessment is to evaluate the feasibility an OWTS within the area defined by the setback established by the California Regional Water Quality Control Board and the County of Mendocino. The area of assessment comprises the area in and around the existing disposal field (Figure 2).

Setbacks from the FEMA Russian River Flood Zone, the on-site domestic well, the concrete line drainage channel, slopes, and property lines, resulted in a usable area of approximately 1.5-acres ("Project Area" - Figure 2). For purposes of our evaluation, we assumed the future development to be high-density residential with on-site laundry. This section describes the local geology, soils, and groundwater conditions located in the Project Area.

3.1 Local Geology

The geology of the Project Area is mapped as Quaternary-aged alluvium deposits that consist of unconsolidated lenticular deposits of clay, sand, and gravel (Cardwell, 1965). This is consistent with the observed soils that consisted of clay, sand, and gravel.

3.2 Soil Conditions

Subsurface explorations were performed in the Project Area by LACO Associates on March 30, 2018, February 22, 2019, March 21, 2019, and April 11, 2019, to evaluate soil and groundwater conditions. Prior to subsurface activity, LACO notified Underground Services Alert to mark utilities in the Project Area. Soil conditions were evaluated using test pits, laboratory analysis, and percolation tests.

3.2.1 Test Pits

LACO performed a soil exploration of the Project Area on February 22, 2019, utilizing 10 test pits (TP1 through TP10) advanced with a backhoe provided and operated by R&M Construction. Test pits were advanced to a total depth of 8 to 9 feet bgs. A LACO geologist observed and logged soils from each of the test pits and collected bulk soil samples from each layer to undergo laboratory testing. Following observations and sample collection, the test pits were backfilled to surrounding grade by the backhoe. Soil profile logs are enclosed in Appendix C.

Based on visual observations made in the field and confirmed by laboratory textural analysis, soils consist of layered deposits of Loamy Sand (Zone 2A), Sandy Loam (Zone 2A/2B), Sand (1) and minor Clay (Zone 3). On the western half of the Project Area, soils are finer grained and consist of layered deposits of Sandy Loam and Loamy Sand. On the eastern half of the Project Area, soils generally consisted of a layer of Loamy Sand (2 to 3 feet thick) underlain by a Sand (Zone 1) material with less than 15 percent fines.

With the exception of test pits TP7, TP8, and TP10, soil mottling was observed in all test pits starting at depths ranging from 2.75 to 8 feet bgs.

3.2.2 Laboratory Textural Analysis

Bulk soil samples were collected from each soil layer within the 10 test pits and analyzed in our materials testing laboratory for textural analysis by Mendocino County laboratory testing standards (County of Mendocino, 2018). Soils that were not classified as Sand, Sandy Loam, or Loamy Sand were subjected to the bulk density test. Laboratory textural analysis results and soil suitability charts are included in Appendix D. Results are additionally summarized on the soil profile logs enclosed in Appendix C.

3.2.3 Percolation Testing

A total of 11 percolation tests were performed by LACO in the Project Area on March 30, 2018, March 21, 2019, and April 11, 2019. Percolation testing was performed in accordance with Mendocino County percolation testing requirements during the wet weather season. Percolation testing was performed in boreholes that were advanced with hand augers that had diameters of 3 inches, 4 inches, and 5 inches. Following advancement, a 3-inch diameter slotted PVC pipe was inserted into the hole and clean pea gravel was used as the annular space fill material. Two additional percolation tests were also performed in observation wells OBS-3 and OBS-8 utilizing the existing 2-inch casing to perform the test. Percolation test data sheets are enclosed in Appendix E. Results from percolation testing in minutes per inch (MPI) are

summarized on the soil profile logs enclosed in Appendix C. A summary of the percolation test results is presented in Table A.

Table A: Summary of Percolation Testing Results

Percolation Test Designation	PP1	PP2	PP3	PP4	PP5	PP6	PP8	PP10	PP11	OBS-3	OBS-8
Depth Tested (inches)*	48.5 to 49.25	45 to 45.5	47 to 48	18.5 to 20.5	31 to 33	32 to 35	14 to 17	24.5 to 27.5	34 to 36	7.3 to 7.7 feet	5 to 5.6 feet
Minutes per Inch	2.0	13.3	15.9	2.7	1.5	13.5	3.1	9.6	0.3	1.9	1.4

*Depth tested in inches unless otherwise noted.

Percolation tests were attempted in percolation borehole designations PP7 and PP9; however, a hard gravel layer at the documented existing leachfield depth (approximately 2.5 feet bgs) was encountered during percolation borehole advancement. These percolation boreholes were subsequently abandoned as the percolation rates would mischaracterize the native soil conditions. This is reflected in percolation borehole PP11 which reported a percolation rate of 0.3 MPI. Since the soils observed in proximal test pits indicate that the soil encountered would be Sandy Loam or Loamy Sand, a lesser percolation rate consistent with other tests in the order of 1.9 to 15.9 MPI would be expected; however, because the percolation rate was less than 1 MPI, the existing leachfield trench was likely affecting the percolation rate in percolation borehole PP11.

Percolation rates were compared to soils encountered in test pits proximal to the percolation test location. Based on review of the percolation rates and soil conditions encountered, the Project Area can be divided into a western portion (defined as west of TP3, PP3, and TP7) and an eastern portion (defined as east of TP3, PP3, and TP7). A summary of soils encountered in the percolation test depth range and recommended application rates based on percolation rates is summarized in Table B.

Table B: Percolation Rates Compared to Adjacent Test Pit Soil Textures

Detail	Western Portion of Project Area	Eastern Portion of Project Area
Percolation Rate	9.6 to 15.9 MPI	1.5 to 3.1 MPI
Percolation Test Holes	PP2, PP3, PP6, PP10	PP4, PP5, PP8
Percolation Test Depth	24.5 to 48 inches bgs	14 to 33 inches bgs
Soil Texture and Zone	Sandy Loam (Zone 2A/2B) and Loamy Sand (Zone 2A)	Loamy Sand (Zone 2A)
Application Rate	0.8 G/SF/D	1.2 G/SF/D

Percolation testing was also performed in the Sand (Zone 1) material of observation wells OBS-3 and OBS-4 that generally underlays the Loamy Sand layer in the Eastern Portion of the Project Area. Rates in this layer ranged from 1.4 to 1.9 MPI and would, therefore, use an application rate of 1.2 G/SF/D.

Of the 11 percolation tests performed throughout the Project Area, only one test had a rate less than one minute per inch (PP11); however, that test is associated with being impacted from the existing leachfield trenches. Based on these rates, the soils are determined to be suitable using the above-referenced application rates.

3.3 Groundwater Conditions

Groundwater conditions at the Site were assessed using eight observation wells. Groundwater levels and precipitation amounts were collected for the period of February 7, 2019, through April 4, 2019. Groundwater monitoring was performed in accordance with Mendocino County Policy Number 910.6(M) for determining high groundwater utilizing the observation well methodology during the wet weather season (January 1 through April 15). A summary of the observation well installation, data collection, and analysis is presented below.

3.3.1 Observation Well Installation

To assess groundwater conditions at the Project Area, LACO observed the installation of eight observation wells on February 7, 2019, at the Site. Observation wells were installed by R&M Construction utilizing a backhoe fitted with a 6 and 9 inch diameter soil auger attachment. LACO logged the soils during the installation and constructed the wells in accordance with the well construction details presented in Table C. A copy of the observation well logs are enclosed in Appendix F.

Table C: Observation Well Construction Details

Observation Well Designation	Total Depth (feet bgs)	Casing Material and Diameter	Screen Interval of 0.010 slot PVC (feet)	Installation Method	Pea Gravel Interval (feet bgs)	Seal Material (feet bgs)	
OBS-1	10.5	2 inches Sch40 PVC	2.5 to 10	9 inch diameter solid stem auger on backhoe	2 to 10.5	soil	0 to 0.5
						bentonite	0.5 to 2
OBS-2	10.5	2 inches Sch40 PVC	2.5 to 10		2 to 10.5	soil	0 to 0.5
						bentonite	0.5 to 2
OBS-3	8	2 inches Sch40 PVC	2.5 to 7.5		2 to 8	soil	0 to 0.5
						bentonite	0.5 to 1.5
OBS-4	10.5	2 inches Sch40 PVC	2.8 to 10.3		2 to 10.5	soil	0 to 0.5
						bentonite	0.5 to 1.5
OBS-5	10.5	2 inches Sch40 PVC	2.5 to 10	6 inch diameter solid stem auger on backhoe	2 to 10.5	soil	0 to 0.5
						bentonite	0.5 to 1.5
OBS-6	10.5	2 inches Sch40 PVC	2.5 to 10		2 to 10.5	soil	0 to 0.5
						bentonite	0.5 to 2
OBS-7	10.5	2 inches Sch40 PVC	2.5 to 10		2 to 10.5	soil	0 to 0.5
						bentonite	0.5 to 2
OBS-8	7	2 inches Sch40 PVC	2.5 to 6.5		2 to 7	soil	0 to 0.5
						bentonite	0.5 to 2

On the same day as observation well installation, a rain gauge was installed at the Site to collect precipitation measurements and pressure transducers were installed at the bottom of each observation well to collect absolute pressure values hourly to every four hours per day.

3.3.2 Data Collection Period

Transducers data, depth to water measurements, and precipitation data were collected for a period of 56 days (February 7, 2019, through April 4, 2019) and during this time frame, three storm events that exceeded 1 inch in a 48-hour period were recorded. Daily precipitation data was downloaded from the Coyote Dam (CDWR, 2017) that is located approximately 3.8 miles southeast of the Site. During the monitoring period,

LACO made six site visits to observe depth to water measurements and read the on-site rain gauge. Field Notes and daily Coyote Dam precipitation measurements are enclosed in Appendix G and a table with a summary of depth to water measurement is provided in Table D.

Table D: Summary of Depth to Water Measurements

Observation Well Designation	Depth to Water Record (feet bgs)							
	OBS-1	OBS-2	OBS-3	OBS-4	OBS-5	OBS-6	OBS-7	OBS-8
Screen Interval (feet bgs)	2.5 to 10	2.8 to 10.3	2.5 to 7.5	2.8 to 10.3	2.5 to 10	2.5 to 10	2.5 to 10	2.5 to 6.5
Date								
02/07/2019	8.00	5.33	DRY	6.70	6.65	7.44	8.91	DRY
02/11/2019	7.62	7.01	DRY	7.61	8.39	9.44	DRY	DRY
02/22/2019	7.72	6.70	DRY	7.06	8.05	9.58	DRY	DRY
03/12/2019	7.12	6.73	DRY	6.14	7.52	9.56	9.87	6.47
03/21/2019	7.45	6.12	DRY	6.50	7.74	9.73	9.81	6.47
04/04/2019	7.29	5.91	DRY	6.27	7.65	9.61	DRY	DRY

3.3.3 Groundwater Data Analysis

At the end of the monitoring period, data from the pressure transducers was downloaded and converted to water pressure assuming a constant barometric pressure of 14.31 pounds per square inch (psi). The water pressure was then converted to depth to water and compared to depth to water measurements made in observation wells using an electronic tape measure. The pressure transducer data was plotted on a line graph with the Coyote Dam daily precipitation data. Three of the observation wells, OBS-3, OBS-7, and OBS-8 were dry or had some dry depth to water measurements during the monitoring period. The pressure transducer data for these wells are not considered accurate and representative because the transducer needs to be submerged in water to give representative readings; therefore, the depth to water is greater than the depth of the well and line graphs for these wells, with the exception of observation well OBS-3, are included for informational purposes only. A copy of the observation well line graphs are enclosed in Appendix H.

Observation well line graphs were reviewed to identify the highest groundwater level recorded at each observation well location. Per observation well location, the highest depth to water recorded in each well is as follows:

- OBS-1 at 4.7 feet bgs;
- OBS-2 at 4.1 feet bgs;
- OBS-3 was dry (groundwater greater than 7.5 feet bgs);
- OBS-4 at 4.6 feet bgs;
- OBS-5 at 6.7 feet bgs;
- OBS-6 at 6.7 feet bgs;
- OBS-7 at 8.91 feet bgs (based on manual depth to water measurement); and,
- OBS-8 at 6.47 feet bgs (based on manual depth to water measurement).

Peaks in the observation well line graphs that demonstrate higher groundwater levels generally follow storm events. The highest groundwater measurements were reported in observation wells OBS-1, OBS-2, and OBS-

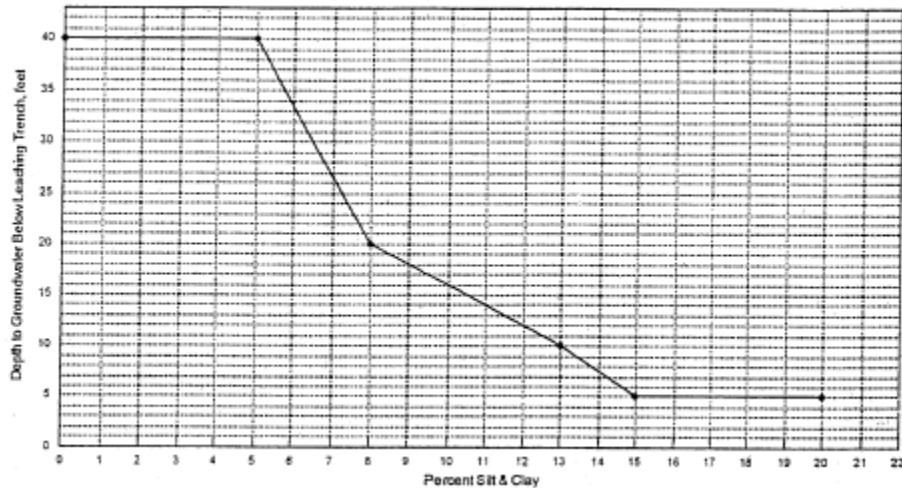
4 that are located on the southern half of the Project Area. Lower groundwater levels were encountered in the observation wells toward the northern and eastern extent of the explored area (OBS-3, OBS-7).

3.3.4 Groundwater Separation

As discussed in the previous section, the highest groundwater level in the Project Area was recorded at 4.1 feet bgs. In order to meet standard groundwater separation per the local agency management program (LAMP) requirements, a minimum of 5 feet of separation between the bottom of a standard leachfield trench to the anticipated highest level of groundwater is required. The 5-foot separation applies to soils that have greater than or equal to 15 percent fines (Silt + Clay), as recorded on the soil texture suitability chart (Appendix D), to provide adequate effluent filtration; however, greater separation distances are required for soils that have less than 15 percent fines. The 5-foot separation may be waived to 3-foot separation at the discretion of the regulatory agency if there is at least 3 feet of soils with 15 percent fines below a leaching trench.

The bottom of the trench in the existing leachfield is at 4 feet bgs. Since soils in the existing leachfield area typically have greater than 15 percent fines (TP8 and TP9), the highest groundwater level should be able to meet requirements would be 7 or 9 feet bgs (depending on 3-foot or 5-foot separation requirement). Since observation wells in the existing leachfield area (OBS-4 and OBS-6) recorded the highest groundwater at 4.6 and 6.7 feet bgs, respectively, the minimum separation requirement for the existing leachfield is not met.

Greater separation to groundwater is required in soils that have less than 15 percent fines as generally encountered in the Sand (Zone 1) soils observed in the southern and eastern portion of the Project Area (TP2, TP5, TP6, and TP10). Based on the soil suitability charts for test pits TP2, TP5, TP6 and TP10, only 3 to 8 percent of fines are present in Zone 1 which will require a groundwater separation of 20 to 40 feet in accordance with Figure 4-1 of the Water Quality Control Plan for the North Coast Region (NCRWQCB 2011) and the County of Mendocino's LAMP (County of Mendocino 2018). A leaching trench in these areas would not meet separation requirements. A copy of Figure 4-1 is provided below:



Under the Water Quality Control Plan (NCRWQCB, 2011), an alternative system can reduce the requirement of groundwater separation to 2 feet if approved under the alternative system program but would be subject to a monitoring program and further analysis such as groundwater mounding and nitrate

loading. This Project Area could meet requirements under the alternative systems program as the upper 3 feet of soil (with the exception of TP2) in the Project Area consists of Loamy Sands to Sandy Loams that have greater than or equal to 15 percent fines, and the highest groundwater level was recorded at 4.1 feet bgs. Examples of potential alternative systems would include mound systems, pressure distributions systems and at-grade systems (36 inches separation from bottom of trench to highest groundwater level is required).

4.0 PERMITTING REQUIREMENTS

4.1 Background

The primary responsibility for the protection of water quality in California has been assigned by the California legislature to the State Water Resources Control Board (SWRCB) and the nine regional water quality control boards. The SWRCB has adopted the Water Quality Control Policy for Siting, Design, Operation, and Maintenance of On-site Wastewater Treatment Systems (OWTS Policy)¹ and developed the General Waste Discharge Requirements for Small Domestic Wastewater Treatment Systems (General Order).

Small domestic systems with a monthly average flow rate of 100,000 gallons per day (gpd) or less that discharge to land are eligible for coverage under the General Order and are regulated by the Regional Water Boards. Small domestic systems that use subsurface disposal may be regulated by a local agency rather than a Regional Water Board, consistent with the OWTS Policy.²

The OWTS Policy establishes a statewide, risk-based, tier-based approach for the regulation and management of OWTS installations and replacements and sets the level of performance and protection expected from OWTS.³ Local agencies (e.g., county and city departments and independent districts) have the opportunity to implement local agency management programs (LAMPS) if approved by the applicable regional water quality control board. OWTS that conform to the requirements of an approved LAMP are classified as Tier 2 and regulated by that agency. LAMPs, including that of the County of Mendocino,⁴ may only authorize OWTS with projected flows less than 10,000 gallons per day (gpd).^{5,6}

¹ Adopted June 19, 2012 via Resolution No. 2012-0032

² General Order, accessed via

https://www.waterboards.ca.gov/board_decisions/adopted_orders/water_quality/2014/wqo2014_0153_d_wq.pdf, May 2019, p1.

³ OWTS Policy, p1, accessed via

https://www.waterboards.ca.gov/water_issues/programs/owts/docs/owts_policy.pdf, May 2019.

⁴ The County of Mendocino developed a Local Agency Management Program (LAMP) OWTS Policy, which was approved on November 4, 2018, under Resolution R1-2018-0052.

⁵ OWTS Policy, p32.

⁶ County of Mendocino Local Agency Management Plan (LAMP), p4, accessed via

https://www.waterboards.ca.gov/northcoast/water_issues/programs/owts/190415/LAMP_and_TechStdsManual.pdf, accessed May 2019.

OWTS with flows between 10,000 and 100,000 gpd are regulated separately by the California Regional Water Quality Control Boards on a case by case basis. While the Regional Board has authority of approval of a system, they typically use the criteria of the Mendocino County LAMP OWTS as a standard for evaluating the suitability of the Site. Alternatively, the Water Quality Control Boards may defer to the County entirely.⁷

4.1.1 Site-Specific Background

Special restrictions apply for systems located on sites near impaired water bodies. Such systems are classified as Tier 3, and regulated by the Regional Water Quality Board, regardless of size. The Tier 3 classification applies to systems subject to a Total Maximum Daily Load Implementation Program, special provisions in a LAMP, or those within 600 feet of a water body listed as impaired for pathogens or nitrogen under the Clean Water Act 303(d) Lists and deemed by the State Water Board to be of concern.

The adjacent section of the Russian River is designated Forsythe Creek Hydrologic Sub Area (HSA).⁸ In the 2014/2016 Clean Water Act 303(d) Lists,⁹ it is classified as impaired for temperature and sediment, but not for nitrogen or pathogens. Further, while NCRWQB has developed a draft Action Plan for the Russian River Watershed pathogen TMDL (Action Plan), the Forsythe Creek HSA is not included.¹⁰

Given the proximity to the Russian River, it is possible that systems at this site will be reclassified as Tier 3, following updates to the Clean Water Act 303(d) Lists, future TMDL plans, or updated local agency requirements. If systems are to be designed for this possibility, they should be consistent with requirements in the draft TMDL Action Plan.

4.2 Applicable Regulations

Applicable regulations are governed by the size of the system and the impairment status of the adjacent section of the Russian River.

- Any subsurface disposal system for at least 20 people constitutes a Class V well by the USEPA. As such, it must comply with USEPA Underground Injection Control requirements (USEPA UIC) and must be registered with the USEPA.¹¹
- On-site Water Treatment Systems at this site with flows less than 10,000 gpd¹² will be regulated by the County of Mendocino and subject to the County's LAMP requirements.

⁷ LAMP, p4, states: "The County reserves the right to accept projects on a case by case basis while working with the NCRWQCB."

⁸ Russian River HU, Upper Russian River HA, Forsythe Creek HSA, as determined by the SWRCB website map tool: https://www.waterboards.ca.gov/water_issues/programs/tmdl/integrated2014_2016.shtml.

⁹ 2014/2016 is the most recent finalized list, available here: https://www.waterboards.ca.gov/water_issues/programs/tmdl/integrated2014_2016.shtml. The 2018 list is in progress.

¹⁰ Action Plan, p9, accessed via https://www.waterboards.ca.gov/northcoast/water_issues/programs/tmdls/russian_river/pdf/190509/Basin%20Plan%20Amendment.pdf, May 2019.

¹¹ General Order, p25.

- OWTS projects with projected flows greater than 10,000 gpd may be regulated by the North Coast Regional Water Quality Control Board (NCRWQCB) and will be subject to the State Water Resources Control Board OWTS Policy and General Order, the NCRWQCB Basin Plan, and functionally, the County of Mendocino's LAMP. OWTS proposals for dwellings involving five or more family units will also be reviewed by the RWQCB, which may then choose to retain jurisdiction over the OWTS.¹³
- In the future, if the adjacent section of the Russian River is classified as impaired for pathogens, OWTS at this site may be reclassified as Tier 3¹⁴, requiring compliance with the NCRWQCB draft Action Plan or similar.

In the following subsections, we outline the requirements of each regulation, focusing on setback and depth-to-groundwater requirements.

4.3 USEPA Underground Injection Control requirements (all systems serving 20+ people):

The USEPA requirements stem from the Safe Drinking Water Act and focus on preventing movement of primary drinking water contaminants into water sources. The statute states:

No owner or operator shall construct, operate, maintain, convert, plug, abandon, or conduct any other injection activity in a manner that allows the movement of fluid containing any contaminant into underground sources of drinking water, if the presence of that contaminant may cause a violation of any primary drinking water regulation under 40 CFR part 142 or may otherwise adversely affect the health of persons. The applicant for a permit shall have the burden of showing that the requirements of this paragraph are met.¹⁵

As California is a "Direct Implementation" state,¹⁶ where EPA runs the Class V UIC Program, any Class V well must also be registered the USEPA prior to constructing the system. This can be done either by completing the online form at: <http://www.epa.gov/region09/water/groundwater/injection-wells-register.html>, or by completing and submitting Form 7520-16: Inventory of Injection Wells. Form 7520-16 is available at: <http://epa.gov/region09/water/groundwater/uic-pdfs/7520-16.pdf>.¹⁷

¹² The USGS estimates each resident uses 80-100 gpd, making the 10,000 gpd equivalent to roughly 100-125 people. The County of Mendocino LAMP estimates 120 gpd for the first apartment bedroom and 60 gpd for each subsequent bedroom, excluding laundry facilities.

¹³ NCRWQCB Basin Plan, p.4-23.00, accessed via https://www.waterboards.ca.gov/northcoast/water_issues/programs/basin_plan/160802/owts/R1-2014-0009_OWTSPolicy_BPChapter4.pdf, accessed May 2019.

¹⁴ As described in the OWTS Policy.

¹⁵ Title 40, Chapter I, Subchapter D, Part 144, Subpart B, Section 144.12(a), accessed via <https://www.law.cornell.edu/cfr/text/40/144.12#a>, May 2019.

¹⁶ Title 40, Chapter I, Subchapter D, Part 144, Subpart G.43, Section 144.83, accessed via <https://www.law.cornell.edu/cfr/text/40/144.83>, May 2019.

¹⁷ General Order, p25.

While required for any subsurface disposal system with the capacity to serve more than 20 people, these requirements do not prescribe specific design criteria.

4.4 Mendocino County LAMP (all systems)

Mendocino County policies set forth county-wide criteria and guidelines to protect water quality and to preclude health hazards and nuisance conditions arising from the subsurface discharge of waste from on-site waste treatment and disposal systems. There are two types of systems covered in the policies: standard and non-standard systems. A standard OWTS includes a treatment unit and a gravity absorption field. A non-standard OWTS is used on sites that cannot meet standard criteria during the Site evaluation reprocess due to site constraints. The standard criteria include lateral and vertical setbacks from manmade and natural features, groundwater and surface water resources, and meeting 100 percent reserve area requirements. A summary of standard criteria setback requirements are as follows:

1. For buildings, foundations, or structures, including porches, steps, breezeways, patios, carports, walkways, driveways, and other similar structures or appurtenances, the setback is 5 feet to the septic tank and 8 feet to the leach field. Property line setback is 5 feet.
2. For wells, whether used for domestic or irrigation purposes, and whether used or unused, the setback is 50 feet from septic tank and 100 feet from a leach field.
3. For streams which run continuously or a major portion of the year, the setback is 100 feet, as measured from the Flood Hazard Zone on a stream where a Federal Emergency Management Agency (FEMA) study has been made.
4. For seasonal/intermittent streams and drains, the setback is 50 feet and is measured from the edge of the watercourse. If the stream has been mapped in a FEMA Flood Hazard Zone study, then the 100 feet setback to the applies whether the stream is considered seasonal, intermittent, or continuously flowing.
5. For ocean, lakes, ponds, reservoirs, springs or spring developments, the setback is 100 feet. For the ocean, the setback is from mean high tide.
6. For cliffs, cut banks, sharp breaks in slope, the setback is 25 feet. If groundwater or soil depth beneath the trench is less than 5 feet, then a 50-foot setback is required.
7. A sewage system may not be installed on a slope steeper than 30 percent unless the Site qualifies for a variance.
8. Distribution box setback is 5 feet from the septic tank.
9. Ground water intercept drains (also known as curtain or French Drains) must be sited no less than 15 feet up gradient and 50 feet laterally from any absorption field, and 25 feet from any property line.
10. A variance of setback requirements may be allowed if other criteria meet the Mendocino County LAMP, and in the opinion of the Environmental Health.

4.5 State Water Resources Control Board WRCB General Order (systems greater than 10,000 gpd)

The Report of Waste Discharge (RWD/ROWD) will be a comprehensive document that will include results from the soil and groundwater data presented in this document. The RWD will also include information required in the State Water Board Form 200. In summary, the RWD will include the following components:

- A description of soil and groundwater conditions at the Project Area;
- A description of the source and quantity of wastewater generated by the proposed project;
- A description of the proposed treatment and disposal system; and,
- An assessment of the potential impacts to surface and groundwater quality.

4.6 North Coast Regional Water Quality Control Board Basin Plan (systems greater than 10,000 gpm)

The NCRWQCB Basin Plan contains the regulations adopted by the NCRWQCB to control the discharge of waste and other controllable factors affecting the quality of waters of the state within the boundaries of the North Coast Region. The Basin Plan is also used by other agencies, such as the County of Mendocino, in their permitting and resource management activities. The NCRWQCB has incorporated the statewide OWTS Policy, with modification into its Basin Plan.¹⁸

Setbacks are either equal to or less restrictive than those included in the County LAMP, or not applicable to this site, except:¹⁹

- For wells, the setback is 100 feet from septic tank/sump or leaching field.
- For perennially flowing streams, the setback is 50 feet from septic tank/sump and 100 feet from leaching field, measured from the line which defines the line of 10-year frequency flood.
- For unstable land forms, the setback is 50 feet from septic tank/sump or leaching field.

Depth to groundwater requirements are those discussed in Section 3.3.4 of this TM, leading to the applicability of alternative systems.

The Basin Plan includes several alternative systems that may be appropriate for shallow groundwater, namely pressure distribution systems, and at-grade-systems. Though not listed, a subsurface drip system may also prove appropriate and would be evaluated jointly by the County and the NCRWQCB.²⁰

4.6.1 Report of Waste Discharge

Systems with proposed flows greater than 10,000 gpd will require a RWD will be prepared and submitted to the NCRWQCB. The RWD will be a comprehensive document that will include results from the soil and groundwater data presented in this document. The RWD will also include information required in the State Water Board Form 200. In summary, the RWD will include the following components:

- A description of soil and groundwater conditions at the Project Area;
- A description of the source and quantity of wastewater generated by the proposed project;
- A description of the proposed treatment and disposal system; and,
- An assessment of the potential impacts to surface and groundwater quality.

4.7 Tier 3 Considerations (possible future classification)

OWTS near specific waterbodies, including sections of the Russian River listed as impaired for pathogens, are classified as Tier 3. Though the adjacent section of the River is not currently listed as impaired for

¹⁸ Amendment approved by SWRCB June 2, 2015 via resolution 2015-0036, approved by NCRWQCB June 18, 2015 via resolution R1-2014-0009, and approved by the Office of Administrative Law July 18, 2016.

¹⁹ NCRWQCB Basin Plan, p4-14.00, 4-15.00, accessed via https://www.waterboards.ca.gov/northcoast/water_issues/programs/basin_plan/160802/owts/R1-2014-0009_OWTSPolicy_BPChapter4.pdf, accessed May 2019.

²⁰ Basin Plan, p4-20.00, 4-21.00.

pathogens, design compatible with Tier 3 requirements may immunize the project against modification if this section of the River so listed in the future.

4.7.1 Tier 3 requirements in the draft TMDL Action Plan

Specifically, the draft Action Plan requires supplemental treatment components for OWTS to remove pathogens and/or enhanced effluent dispersal systems for circumstances that would be met at the Site. Exceptions to these supplemental treatment requirements require percolation rates between 30 and 120 minutes per inch for systems within 600 feet of the waterbody,²¹ slower than those observed at the Site.

4.7.2 Tier 3 requirements in the OWTS Policy:

Supplemental treatment requirements:²²

- Supplemental treatment components must provide effluent with:
 - 30-day average TSS of 30 mg/L or less
 - Fecal coliform bacteria less than or equal to 200 (MPN) per 100 mL.
- Supplemental treatment components shall require visual or audible alarm as well as a telemetric alarm that alerts the owner and service provider in the event of system malfunction.

Dispersal system requirements:²³

- Minimum soil depth and the minimum depth to the anticipated highest level of groundwater below the bottom of the dispersal system shall not be less than 3 feet. All dispersal systems shall have at least 12 inches of cover.

Setback requirements (included when more stringent than those in the County LAMP):²⁴

- 100 feet from water wells and monitoring wells, unless regulatory or legitimate data requirements necessitate that monitoring wells be located closer.
- 100 feet from any unstable land mass.

5.0 BASIS FOR DESIGN

5.1 Design Parameters

The Project Area is approximately 1.5 acres and was outlined in accordance with LACO's review of required and anticipated setbacks (Figure 2). After exploration and review of the soils, this Project Area can further be split into a western and eastern area that would serve a proposed primary and 100 percent reserve, respectively. Both areas are approximately 0.6 acres and are separated by designations TP7, PP3, and just east TP3. Based on laboratory textural analysis and percolation testing, the western area would have an application rate of 0.8 gallons per square foot per day (G/SF/D) in the upper 5 feet, and the eastern area would have an application rate of 1.2 G/SF/D in the upper 3 feet. A summary of details for the proposed primary area (western area) and 100 percent reserve area (eastern area) is provided in Table E.

²¹ Draft Action Plan, p.13.

²² OWTS Policy, p38-39.

²³ OWTS Policy, p39.

²⁴ OWTS Policy, p20-21.

Table E: Summary of Proposed Primary and 100 Percent Reserve Details

DETAIL	PROPOSED PRIMARY	PROPOSED 100 PERCENT RESERVE
Location Designation	Western Portion of Project Area	Eastern Portion of Project Area
Area Available	0.6 acres (26,136 ft ²)	0.6 acres
Disposal Area	17,550 ft ² to 26,136 ft ²	16,500 ft ² to 26,136 ft ²
Soil Texture and Zone	Sandy Loam (Zone 2A/2B) and Loamy Sand (Zone 2A)	Loamy Sand (Zone 2A)
Soil Depth	5 feet bgs	3 feet bgs
Test Pits	TP3, TP7, TP8, TP9	TP1, TP5, TP10
Percolation Rates (Depth Range)	9.6 to 15.9 MPI	1.5 to 3.1 MPI
Percolation Test Holes	PP2, PP3, PP6, PP10	PP4, PP5, PP8
Highest Groundwater	4.6 to 8.9 feet bgs	4.1 to 6.7 feet bgs
Observation Wells	OBS-4, OBS-6, OBS-7	OBS-1, OBS-2, OBS-5, OBS-8
Application Rate	0.8 G/SF/D	1.2 G/SF/D

We estimated the maximum potential capacity for disposal in the proposed Project Area, using the more conservative application rate of 0.8 G/SF/D. A subsurface disposal system using the maximum area of 0.6 acres, with a factor of effective use between 0.8 and 1.0 (depending on alternative system type), could handle effective flows of 16,000 to 20,000 gpd for each area (Primary and 100 Percent Reserve).

5.2 Alternative System Class

Based on depth to groundwater requirements, an OWTS at this site would be an alternative system. The discussion below is based on a shallow pressure distribution system, though at-grade systems and subsurface drip systems may be viable alternatives.

Based on groundwater data collected from observations wells OBS-1 through OBS-8 from February 7, 2019, through April 4, 2019, the highest measured groundwater level in the project area was reported at 4.1 feet bgs. Using a 12-inch depth, for example, would maintain 37 inches of separation above the highest anticipated groundwater (greater than the 24-inch minimum for such systems) and nearly 12 inches of cover above the line (greater than the 6-inch minimum required for pressure systems).

5.3 Tier 3 and Supplemental Treatment

If the Forsythe HSA is classified as impaired for pathogens, OWTS In the Project Area will require additional treatment, including to reduce total suspended solids (filtration, settling) and fecal coliform bacteria (disinfection). It would also require alarm systems if these systems became impaired. We recommend systems be designed with the potential for such upgrades to be made, should they become necessary.

5.4 Other Design Notes

5.4.1 Communications Line

The Site includes a communications line, which runs through the proposed Project Area. This is noted in orange on Figure 2. Designs should be informed by that line, either built in other areas or including plans to move it.

5.4.2 Mounding and Nitrogen Analyses

Based on our present understanding of the groundwater conditions in the Project Area, we conclude the groundwater mounding beneath subsurface disposal will not occur to an extent that would impair proper functioning or reduce water-to-system distance below the required 24 inches. Likewise, we do not expect a substantive threat of nitrate loading. The NCRWQCB, however, may require cumulative impact assessments of an OWTS, to determine so formally.²⁵

6.0 CONCLUSIONS AND RECOMMENDATIONS

Results from our analysis indicated that the Project Area has coarse materials (Zone 1) with less than 15 percent fines that would require greater separation to groundwater. Additionally, high groundwater conditions exist in the Project Area that were measured up to 4.1 feet bgs at highest. Due to the nature of the soils and the high groundwater conditions, the minimum separation to groundwater requirements for standard systems cannot be achieved. Therefore, an alternative system would be required. Specifically, we recommend a shallow pressure distribution system for its compatibility with shallow depth to groundwater.

Systems with flows greater than 10,000 gpd would be regulated by the NCRWQCB and would require an RWD including Form 200 to be prepared and submitted. Additional evaluation requirements needed when preparing the RWD and Form 200 will be the following:

- A description of the source and quantity of wastewater generated by the proposed project;
- A description of the proposed treatment and disposal system; and,
- An assessment of the potential impacts to surface and groundwater quality.

7.0 LIMITATIONS

This TM has been prepared for the exclusive use of the Ukiah Unified School District, their agents, contractors, and consultants, and appropriate public authorities for specific application to development of the Site. LACO has exercised a standard of care equal to that generated for this industry to ensure that the information contained in this TM is current and accurate. The opinions presented in this TM are based upon information obtained from subsurface excavations, a Site reconnaissance, review of geologic maps and data available to us, and upon local experience and engineering judgment, and the opinions have been formulated in accordance with generally-accepted geotechnical engineering practices that exist in California at the time this TM was prepared. In addition, geotechnical issues may arise that are not apparent at this time. No other warranty, expressed or implied, is made or should be inferred.

²⁵ Basin Plan, p4-21.00

Data generated for this TM represent information gathered at that time and at the widely spaced locations indicated. Subsurface conditions may be highly variable and difficult to predict. As such, the recommendations included in this TM are based, in part, on assumptions about subsurface conditions that may only be observed and/or tested during subsequent project earthwork. Accordingly, the validity of these recommendations is contingent upon review of the subsurface conditions exposed during construction in order to check that they are consistent with those characterized in this TM. Upon request, LACO can discuss the extent of (and fee for) observations and tests required to check the validity of the recommendations presented herein.

The opinions presented in this TM are valid as of the present date for the property evaluated. Changes in the condition of the property can occur over time, whether due to natural processes or the works of people, on this or adjacent properties. In addition, changes in applicable standards of practice can occur, whether from legislation or the broadening of knowledge. Accordingly, the opinions presented in this TM may be invalidated, wholly or partially, by changes outside our control. Therefore, this TM is subject to review and should not be relied upon after a period of three years, nor should it be used, or is it applicable, for any property other than that evaluated. This TM is valid solely for the purpose, Site, and project described in this document. Any alteration, unauthorized distribution, or deviation from this description will invalidate this TM. LACO assumes no responsibility for any third-party reliance on the data presented. Additionally, the data presented should not be utilized by any third-party to represent data for any other time or location.

8.0 REFERENCES

- California Data Exchange Center. *Coyote (Lake Mendocino) COY*. California Department of Water Resources; 2017. <http://cdec.water.ca.gov/river/res_COY.html>.
- Cardwell, GT. 1965. *Geology and Ground Water in Russian River Valley Areas and in Round, Laytonville and Little Lake Valleys, Sonoma and Mendocino Counties, California*. USGS Water Supply Paper 1548.
- County of Mendocino, 2018. *Local Agency Management Plan*. <https://www.waterboards.ca.gov/northcoast/water_issues/programs/owts/190415/LAMP_and_TechStdsManual.pdf>.
- North Coast Regional Water Quality Control Board, 2011. *Water Quality Control Plan for the North Coast Region*. May 2011. Web. <https://www.waterboards.ca.gov/northcoast/water_issues/programs/basin_plan/083105-bp/basin_plan.pdf>.

FIGURES

Figure 1 **Location Map**

Figure 2 **Site Map**

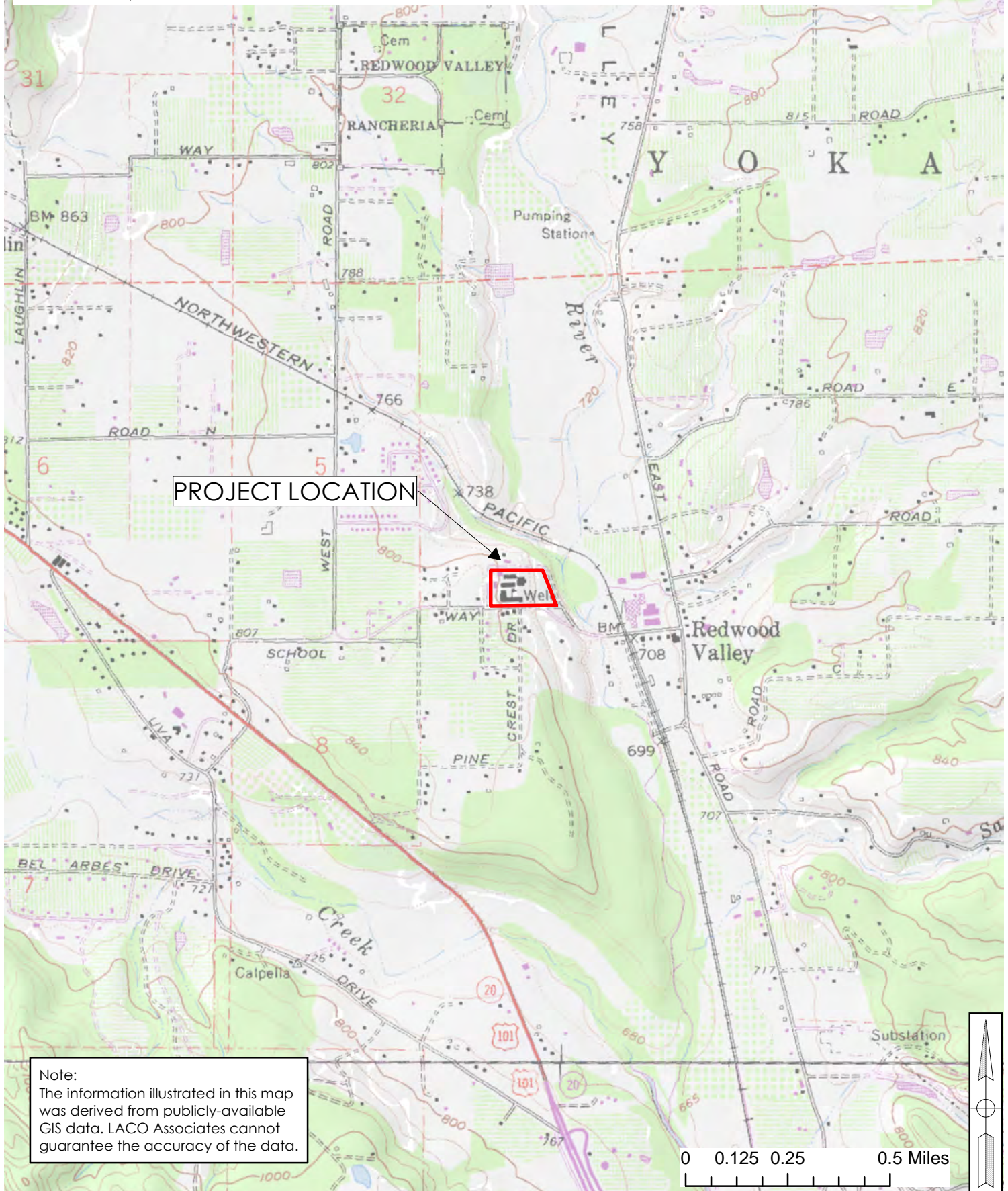
LACO

EUREKA • UKIAH • SANTA ROSA

1-800-515-5054 www.lacoassociates.com

PROJECT	ON-SITE WASTEWATER SOILS SUITABILITY EXPLORATION	BY	AAA	FIGURE	1
CLIENT	UKIAH UNIFIED SCHOOL DISTRICT	CHECK	KRM		
LOCATION	700 EAST SCHOOL WAY, REDWOOD VALLEY, CA	DATE	05/07/2019	JOB NO.	7097.26
LOCATION MAP					

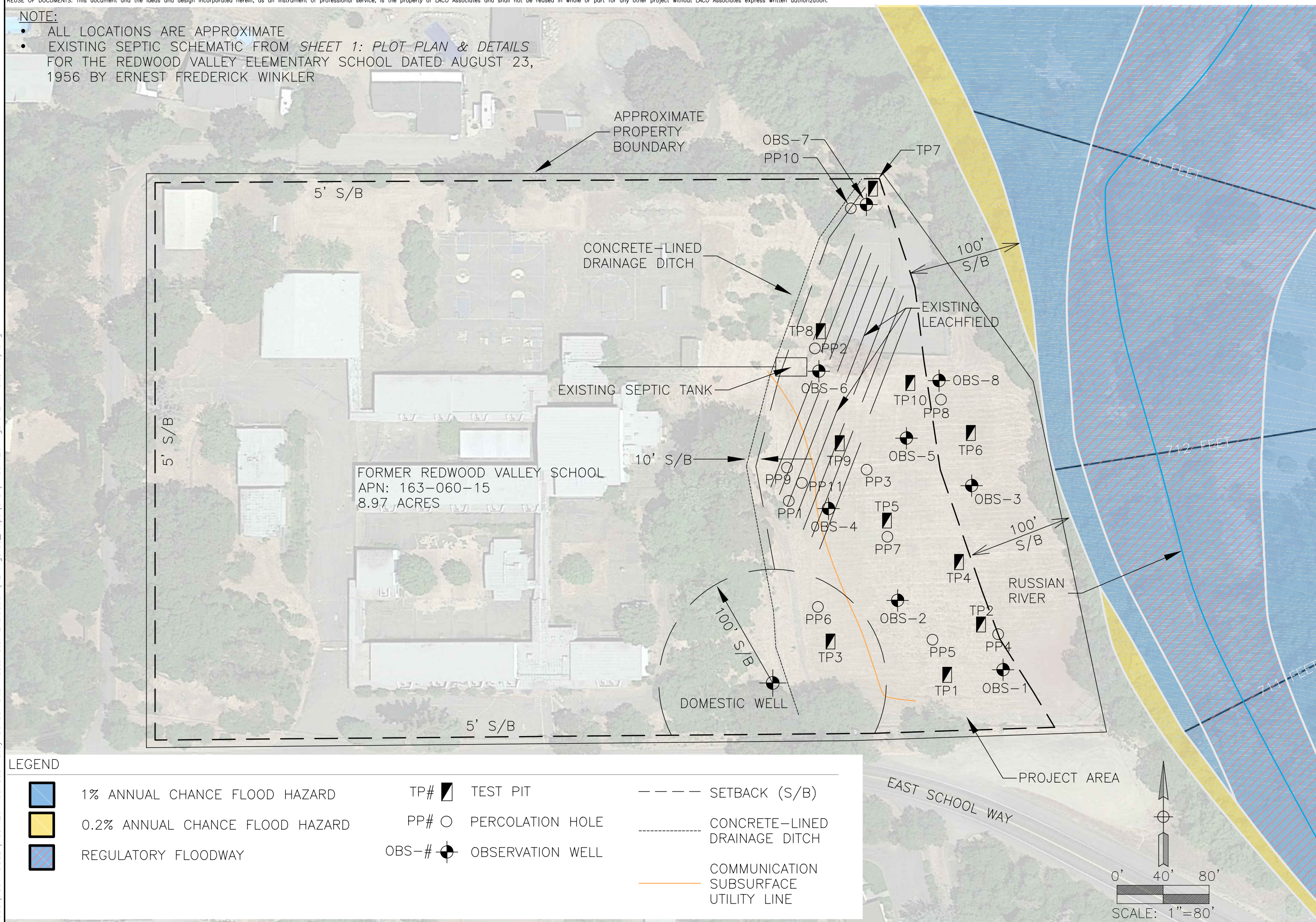
REUSE OF DOCUMENTS: This document and the ideas and design incorporated herein, as an instrument of professional service, is the property of LACO Associates and shall not be reused in whole or part for any other project without LACO Associates express written authorization.



NOTE:

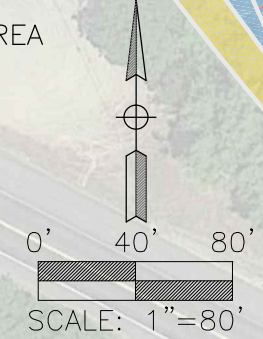
- ALL LOCATIONS ARE APPROXIMATE
- EXISTING SEPTIC SCHEMATIC FROM SHEET 1: PLOT PLAN & DETAILS FOR THE REDWOOD VALLEY ELEMENTARY SCHOOL DATED AUGUST 23, 1956 BY ERNEST FREDERICK WINKLER

May 09, 2019--12:23pm P:\7000\7097 UUSD\7097.26 Redwood Valley School Site Wastewater Evaluation\12 Figures_Maps\CAD\ 7097.26 Figure 2 - Site Map.dwg



LEGEND

- | | | | | | |
|--|---------------------------------|-------|------------------|-----------|---------------------------------------|
| | 1% ANNUAL CHANCE FLOOD HAZARD | TP# | TEST PIT | --- | SETBACK (S/B) |
| | 0.2% ANNUAL CHANCE FLOOD HAZARD | PP# | PERCOLATION HOLE | - - - - - | CONCRETE-LINED DRAINAGE DITCH |
| | REGULATORY FLOODWAY | OBS-# | OBSERVATION WELL | — | COMMUNICATION SUBSURFACE UTILITY LINE |



LACO
EUREKA • UKIAH • SANTA ROSA
1-800-515-5054 www.lacoassociates.com

NO.	HISTORY / REVISION	BY	CHK.	DATE

**ON-SITE WASTEWATER SOILS SUITABILITY EXPLORATION
SITE MAP**

UKIAH UNIFIED SCHOOL DISTRICT
700 EAST SCHOOL WAY, REDWOOD VALLEY, CA

DRAWN	AAA
CHECK	KRM
APPROVED	KRM
DATE	05/07/2019
JOB NUMBER	7079.26
FIGURE	2

APPENDIX A

Drawing No A-1: Plot Plan & Details for the Redwood Valley Elementary School dated August 23, 1956

APPENDIX B

Prior Evaluations Performed by LACO Regarding Site

TECHNICAL MEMORANDUM

Wastewater Evaluation
Redwood Valley School
Redwood Valley, California
APN 163-060-15

Date: December 20, 2018
Project No.: 7097.24

Prepared For: Ukiah Unified School District
c/o Scott Sheldon
TERRA Realty Advisors, Inc.

Prepared By: Kelsey McLaughlin



Reviewed By: Christopher J Watt



CC: Kevin Doble

Attachments: Appendix 1: Figure 1: Site Map with Potential Disposal Area

1.0 INTRODUCTION

This letter presents our evaluation of the maximum potential daily flows for onsite disposal of domestic wastewater to the lower field at the former Redwood Valley Elementary School (hereafter referred to as the "Site").

2.0 PRIOR STUDIES

Based on the *Plot Plan & Details* (Sheet 1) for the Redwood Valley Elementary School dated August 23, 1995, we understand an existing onsite wastewater disposal system is located in the field west of the existing and former elementary school classroom buildings and is partially covered by basketball/tennis courts. Sheet 1 indicates the system consists of a 10,000-gallon septic tank and two distribution boxes that tie into 1,500 linear feet of leach line (15 leaching trenches with lengths of 100 feet). The leaching trenches are identified as being 3 feet wide with 1 foot of gravel beneath the leaching pipe. The area of the existing leach field is flat (less than 5 percent) and gently slopes to the east toward the Russian River, located along the eastern

perimeter of the Site parcel. Previous evaluations performed by LACO determined an application rate of 0.8 gallons per day per square foot which would allow for a total flow capacity of 6,000 gallons per day for the existing system. Our prior evaluations which included borings, percolation testing, and laboratory analysis are presented in the following reports: *Percolation Testing of Existing Septic System Leach Field* dated April 9, 2018, and *Flow Capacity of Septic System Leach Field* dated March 7, 2018.

3.0 DISPOSAL AREA

A disposal area to possibly support future development at the Site is the field where the existing system is presently located. A potential disposal area was outlined in accordance with required/anticipated setbacks (Figure 1). Within the remaining area, assuming a uniform absorption area, an application rate of 0.8 gallons per square foot per day, and shallow subsurface drip style disposal system, we estimate a total disposal capacity of between 16,000 to 20,000 gallons per day (GPD).

4.0 DESIGN AND PERMITTING

Designing and permitting an onsite wastewater treatment system will be subject to either County or State jurisdiction depending on the daily flow rates. For this letter, we assumed flows from future development would exceed the 10,000 GPD and would, therefore, be subject to the jurisdiction of the North Coast Regional Water Quality Control Board (NCRWQCB). As part of developing a basis of design report, more detailed site characterization is necessary given the limited and focused nature of prior studies. At a minimum this would consist of the following:




- Wet season percolation testing (January 1 through April 15).
- Advancing test pits throughout the available area to a minimum depth of 8 feet below existing grade to observe subsurface conditions. Observations of high groundwater, evidence of high groundwater, and/or other restrictive conditions such as hardpan, will inform the basis of system design.

The maximum potential capacity of the disposal area is between 16,000 to 20,000 GPD and is considered a preliminary estimate assuming the following: (1) uniformity in site conditions; (2) a percolation rate ranging between 5 and 30 minutes per inches; (3) groundwater and/or soil mottling begins more than 5 feet below the bottom of the disposal field; and (4) a pressure distribution system is installed.

FIGURES

Figure 1 Site Map with Potential Disposal Area

LEGEND

-  1% ANNUAL CHANCE FLOOD HAZARD
-  0.2% ANNUAL CHANCE FLOOD HAZARD
-  REGULATORY FLOODWAY



LACO
EUREKA • UKIAH • SANTA ROSA
1-800-515-5054 www.lacoassociates.com

UKIAH UNIFIED SCHOOL DISTRICT
511 SOUTH ORCHARD AVENUE
UKIAH, CALIFORNIA, 95482



March 7, 2018

7746.15

Ukiah Unified School District
511 S. Orchard Ave
Ukiah, California 95482

Attention: Mr. Gabriel Sherman

Subject: Flow Capacity of Existing Septic System Leach Field
HUD Redwood Valley Elementary School Conversion
700 East School Way, Redwood Valley, CA; APN 163-060-15

Dear Mr. Sherman:

LACO Associates (LACO) is pleased to present the results of our evaluation of the existing leach field at the former Redwood Valley Elementary School. The extent of our evaluation was limited to soil profiles/analysis and review of as-built drawings.

PROJECT UNDERSTANDING

Based on the *Plot Plan & Details* (Sheet 1) for the Redwood Valley Elementary School dated August 23, 1995, we understand the existing leach field is located in the field west of the existing and former elementary school classroom buildings and is partially covered by basketball/tennis courts. The Plot Plan & Details sheet indicates the existing septic system consists of a 10,000-gallon septic tank and two distribution boxes that tie into 1,500 linear feet of leach line (15 leaching trenches with lengths of 100 feet). The leaching trenches are identified as being 3 feet wide with 1 foot of gravel beneath the leaching pipe. The area of the existing leach field is flat (less than 5 percent) and gently slopes to the east toward the Russian River, located along the eastern perimeter of the Site parcel.

SOIL AND GROUNDWATER CONDITIONS

A limited site exploration was performed by LACO on January 17, 2018, to evaluate soil and groundwater conditions within the vicinity of the existing leaching trenches. Three hand auger borings (B1, B2, and B3) were advanced to a total depth of 5 feet below ground surface (bgs). A field map showing borings locations is enclosed.

1.1 Soil conditions

Based on visual observation made in the field and laboratory textural analysis on select soil samples, suitable soils conditions were observed in the borings. Soils consisted of top soil in the upper foot, underlain by Sandy Loam (Zone 2B) in the area of borings B1 and B2, and Sandy Loam to Loamy Sand (Zone 2A) in the area of boring B3 from 1 to 5 feet bgs.

1.2 Groundwater Conditions

Neither groundwater nor evidence of groundwater was observed to the total depth of the borings (5 feet bgs).

21 W. 4th Street, Eureka, California 95501 707 443-5054 Fax 707 443-0553
311 S. Main Street, Ukiah, California 95482 707 462-0222 Fax 707 462-0223
3450 Regional Parkway, Suite B2, Santa Rosa, California 95403 707 525-1222

Toll Free 800 515-5054 www.lacoassociates.com

LABORATORY TEXTURAL ANALYSIS

Bulk soil samples were collected from each soil layer within the anticipated leaching zone down to 5 feet bgs for textural analysis in LACO's laboratory. Laboratory textural analysis results and soil suitability charts are enclosed. A summary of laboratory textural analysis results for samples collected from borings B1 through B3 are as follows.

- Boring 1 (B1), two samples:
 - Sample collected at 1 to 3 feet bgs. Sandy Loam (Zone 2B)
 - Sample collected at 3.5 to 5 feet bgs. Sandy Loam (Zone 2B)
- Boring 2 (B2), two samples:
 - Sample collected at 2.5 to 4 feet bgs. Sandy Loam (Zone 2B)
 - Sample collected at 4 to 5 feet bgs. Sandy Loam (Zone 2B)
- Boring 3 (B3), two samples:
 - Sample collected at 2.5 to 3.5 feet bgs. Sandy Loam (Zone 2A)
 - Sample collected at 3.5 to 5 feet bgs. Loamy Sand (Zone 2A)

EXISTING SYSTEM DESIGN CAPACITY

The details provided in the 1995 *Plot Plan & Details* for the Redwood Valley Elementary School indicated a total of 1,500 linear feet in leaching trench with 1 foot of gravel below the leaching pipe and 3-foot wide trenches. Results from laboratory testing of select soil samples within the leaching zone from our limited site exploration on January 17, 2018, indicate an application rate of 0.7 gallons per day per square foot. Based on the reported dimensions and laboratory results, the existing leach field is estimated to have a flow capacity of 5,250 gallons per day.

PROPOSED SYSTEM DESIGN FLOWS

A summary of the proposed facilities and flows is presented below in Table A. Flow estimates are based on the values presented in Mendocino County Division of Environmental Health *Form No. 42.28* dated June 1998, and 1991 *Uniform Plumbing Code for Private Sewage Disposal Systems*.

Table A: Summary of Proposed Facilities and Estimated Flows

Facility	Number of Units	Number of bedrooms	GPD/Unit	GPD
2 bedroom apartments	20	2	180	3600
3 bedroom apartments	5	3	240	1200
	Number of employees	GPD/employee	GPD/sq.ft	GPD
Manager's office	3	20	0.15	3
	Number of Units	Number of machines	GPD/Unit	GPD
Laundry	2	2	400	1600
	Number of Units	Max Occupancy	GPD/Unit	GPD
Learning Center	1	50	5	250
Community Center with Kitchen	1	50	12	600

TOTAL GALLONS PER DAY 7253

GPD: gallons per day
 Sq.ft: square feet

CONCLUSION

Using a conservative application rate of 0.7 gallons per day per square foot, the existing system is conservatively estimated to have a flow capacity of 5,250 gallons per day. Flows from the proposed development are estimated to be 7,253 gallons per day. Percolation testing can be performed to determine if a higher application rate is possible. Percolation testing should be performed during the Wet Season (January 1st through April 15th). In the absence of a higher application rate based on percolation testing, in order to service the proposed development, the leach field would need to be expanded by an additional 572 linear feet. Expansion system design calculations are enclosed.

Other considerations include:

- A water tightness test of the existing 10,000 gallon septic tank.
- Verification of seasonal high groundwater levels down to a depth of 8 feet.
- Performing a video inspection to confirm the leach lines are intact.
- Design of a 100 Percent Reserve system to be located 100 feet from the Russian River and 100 feet from any water wells.

Please call me directly at (707) 462-0222 should you have questions.

Sincerely,
LACO Associates

A handwritten signature in blue ink, appearing to read "Christopher Watt".

Christopher Watt, CEG, CHG
Vice President

KRM:krm;jlm

Site Map with boring locations

Legend

- ⊙ Hand Auger Boring Location



Soil Profile Description

Owner Name: Redwood Valley Elementary School Test Date: 1/17/2018
 Site Address: 700 E School Way, Redwood Valley Recorded by: Morgan Jones
 APN: Slope: Flat
 Subdivision #: Profile #: B1

LEGEND



textural analysis sample
 depth to groundwater

horizon depth range / texture / (texture zone) / color / mottles / structure / moisture / consistence / roots / pores / boundary / [sample depth / lab results / % coarse particles >2mm] / Avg. perc rate at this depth

Soil depiction Trench depiction

0 ft below ground surface (bgs)

1	Estimated Sand (estimated Zone 1)	<p>0 to 1 feet below ground surface Est. Loamy Sand (Est. Zone 2A), brown (10YR 4/3), no mottles, no gravel, single-grained, loose, fine roots, glass and concrete fragments.</p>
2	Sandy Loam (Zone 2B)	<p>1 to 3.5 feet below ground surface Sandy Loam (Zone 2B), dark yellowish brown (10YR 3/4), no mottles, moist, blocky, medium dense/soft, no roots, fine pores. [Textural analysis on sample collected from B1 at 1 to 3 feet [63.7% sand, 14.7% clay, and 21.6% silt). 30.7% coarse particles >2mm (fine to 3/4 inch).]</p>
3		
4	Sandy Loam (Zone 2B)	<p>3.5 to 5 feet below ground surface Sandy Loam (Zone 2B), strong brown (7.5YR), no mottles, moist, increasing gravel (estimated 15%). [Textural analysis on sample collected from B1 at 3.5 to 5 feet [61.8% sand, 11.8% clay, and 26.4% silt). 33.0% coarse particles >2mm (fine to 1.5 inches).]</p>
5		
6		<p><i>Total Depth of boring = 5 feet bgs; no groundwater observed</i></p>
7		
8		
9		
10		

21 W. 4th Street, Eureka, California 95501 707 443-5054 Fax 707 443-0553
 311 S. Main Street, Ukiah, California 95482 707 462-0222 Fax 707 462-0223
 3450 Regional Parkway, Suite B2, Santa Rosa, California 95403 707 525-1222

Toll Free 800 515-5054 www.lacoassociates.com

Soil Profile Description

Owner Name: Redwood Valley Elementary School Test Date: 1/17/2018
 Site Address: 700 E School Way, Redwood Valley Recorded by: Morgan Jones
 APN: Slope: <3%
 Subdivision #: Profile #: B2

LEGEND



textural analysis sample
 depth to groundwater

horizon depth range / texture / (texture zone) / color / mottles / structure / moisture / consistence / roots / pores / boundary / [sample depth / lab results / % coarse particles >2mm] / Avg. perc rate at this depth

Soil depiction Trench depiction

0 ft below ground surface (bgs)

1	Est. Loam (est. Zone 2C)	0 to 1 feet below ground surface Est. Loam (Est. Zone 2C), dark yellowish brown (10YR 3/4), no mottles, estimated 15% fine to coarse grained gravel up to 1 inch diameter, blocky, soft, fine roots, fine pores.
2	Est. Sandy Loam (est. Zone 2B)	1 to 2 feet below ground surface Est. Sandy Loam (Est. Zone 2B), dark yellowish brown (10YR 4/6), no mottles, moist, estimated 15% fine grained gravel, blocky, soft, medium roots, fine pores.
3	Sandy Loam (Zone 2B)	2 to 2.5 feet below ground surface Increasing gravel estimated 20%, up to 1.5 inch diameter, stiff.
4	Sandy Loam (Zone 2B)	2.5 to 4 feet below ground surface Sandy Loam (Zone 2B), dark yellowish brown (10YR 4/6), no mottles, moist, fine to coarse grained subrounded gravel, blocky, stiff, no roots, fine pores. [Textural analysis on sample collected from B2 at 2.5 to 4 feet [60.5% sand, 16.9% clay, and 22.6% silt). 29.3% coarse particles >2mm.]
5		4 to 5 feet below ground surface Sandy Loam (Zone 2B), dark yellowish brown (10YR 4/6), no mottles, moist, single grained, soft, no roots, no visible pores. [Textural analysis on sample collected from B2 at 4 to 5 feet [54.8% sand, 15.0% clay, and 30.3% silt). 13.2% coarse particles >2mm.]
6		
7		<i>Total Depth of boring = 5 feet bgs; no groundwater observed</i>
8		
9		
10		

21 W. 4th Street, Eureka, California 95501 707 443-5054 Fax 707 443-0553
 311 S. Main Street, Ukiah, California 95482 707 462-0222 Fax 707 462-0223
 3450 Regional Parkway, Suite B2, Santa Rosa, California 95403 707 525-1222

Toll Free 800 515-5054 www.lacoassociates.com

Soil Profile Description

Owner Name: Redwood Valley Elementary School Test Date: 1/17/2018
 Site Address: 700 E School Way, Redwood Valley Recorded by: Morgan Jones
 APN: Slope: Flat
 Subdivision #: Profile #: B3

LEGEND



textural analysis sample
 depth to groundwater

horizon depth range / texture / (texture zone) / color / mottles / structure / moisture / consistence / roots / pores / boundary / [sample depth / lab results / % coarse particles >2mm] / Avg. perc rate at this depth

Soil depiction Trench depiction

0 ft below ground surface (bgs)

1	Est. Loam (est. Zone 2C)	0 to 1 feet below ground surface Est. Loam (Est. Zone 2C), dark brown (10YR 3/3), no mottles, estimated 20 % fine to coarse grained gravel up to 2 inch diameter, single grained, soft fine roots (grass).
2	Est. Sandy Loam (est. Zone 2B)	1 to 2.5 feet below ground surface Est. Sandy Loam (Est. Zone 2B), dark yellowish brown (10YR 4/6), no mottles, moist, estimated 15% fine grained gravel, blocky, soft, medium roots, fine pores.
3	Sandy Loam (Zone 2A)	2.5 to 3.5 feet below ground surface Sandy Loam (Zone 2A), dark yellowish brown (10YR 4/6), no mottles, moist. [Textural analysis on sample collected from B3 at 2.5 to 3.5 feet [66.6% sand, 13.6% clay, and 19.8% silt). 58.5% coarse particles >2mm (fine to 2 inch).]
4	Loamy Sand (Zone 2A)	3.5 to 5 feet below ground surface Loamy Sand (Zone 2A), dark yellowish brown (10YR 4/6), no mottles, moist, decreasing gravel. [Textural analysis on sample collected from B3 at 3.5 to 5 feet [74.4% sand, 10.5% clay, and 15.2% silt). 46.2% coarse particles >2mm (fine to 3/4 inch).]
5		Total Depth of boring = 5 feet bgs; no groundwater observed
6		
7		
8		
9		
10		

21 W. 4th Street, Eureka, California 95501 707 443-5054 Fax 707 443-0553
 311 S. Main Street, Ukiah, California 95482 707 462-0222 Fax 707 462-0223
 3450 Regional Parkway, Suite B2, Santa Rosa, California 95403 707 525-1222

Toll Free 800 515-5054 www.lacoassociates.com

Existing System Design Flow Calculations:

- APPLICATION RATE: **0.70 GPD/ft²** (based on soil suitability chart for Zone 2B)
- ABSORPTION AREA: **5 ft²/ft** (based on the Aug. 23, 1956 Plat Plan & Details, Sheet 1).
- ABSORPTION TRENCH LENGTH = 1500 feet (15 trenches of 100 feet for total of 1500 feet)
- GALLONS PER DAY:

$$1500 \text{ feet} \times 5 \text{ ft}^2/\text{ft} = 7500 \text{ ft}^2$$

$$7500 \text{ ft}^2 \times 0.70 \text{ GPD}/\text{ft}^2 = 5250 \text{ GPD}$$

5,250 Gallons per Day

Expansion of Existing System Design Calculations:

- APPLICATION RATE: **0.70 GPD/ft²** (based on soil suitability chart for Zone 2B)
- ABSORPTION AREA: **5 ft²/ft** (based on the Aug. 23, 1956 Plat Plan & Details, Sheet 1).
- GALLONS PER DAY: 7,253 GPD (Proposed) – 5,250 GPD (Existing) = **2,003 GPD**
- ADDITIONAL LEACHING TRENCH NEEDED (ft):

$$2,003 \text{ GPD} \div 0.70 \text{ GPD}/\text{ft}^2 = 2,861.4 \text{ ft}^2$$

$$2,861.4 \div 5 \text{ ft}^2/\text{ft} = \mathbf{572.3 \text{ feet}}$$

Additional 572.3 feet of leaching trench needed

Hydrometer Test Worksheet

Site Address:	700 East School Way, Redwood Valley			Lab Test Date:	1/25/2018	
APN:	163-060-15			Project No.:	7746.15	
Project Name:	HUD RV Elem School Conversion			Site Evaluator:	Morgan Jones	
HYDROMETER TEST						
Sample ID Number	B1	B1	B2	B2	B3	B3
Sample Depth (feet)	1-3	3.5-5	2.5-4	4.5	2.5-3.5	3.5-5
Slake Test (pass or fail)	Pass	Pass	Pass	Pass	Pass	Pass
A. Oven dry wt. (gm)	65.8	65.2	65.5	66.1	65.6	66
B. Start Time	12:00 AM	1:00 AM	2:00 AM	3:00 AM	4:00 AM	5:00 AM
C. Temp @ 40 sec (°F)	59.4	59.9	60.3	60.5	60.9	60.7
D. Hydrometer reading @ 40 sec (gm/l)	32	33	34	38	30	25
E. Composite correction (gm/l)	8.1	8.1	8.1	8.1	8.1	8.1
F. True Density @ 40 sec (gm/l)	23.9	24.9	25.9	29.9	21.9	16.9
G. Temp @ 2 hrs. (°F.)	64.3	64.9	66.0	65.4	65.9	65.9
H. Hydrometer reading @ 2 hrs. (gm/l)	17	15	18	17	16	14
I. Composite correction (gm/l)	7.3	7.3	6.9	7.1	7.1	7.1
J. True Density @ 2 hrs. (gm/l)	9.7	7.7	11.1	9.9	8.9	6.9
K. %Sand = [(F ÷ A) x 100]	63.7	61.8	60.5	54.8	66.6	74.4
L. %Clay = (J ÷ A) x 100	14.7	11.8	16.9	15.0	13.6	10.5
M. %Silt = 100 - (K + L)	21.6	26.4	22.6	30.3	19.8	15.2
Coarse Particles						
N. Wt. Coarse particles retained (gm)	418.2	394.4	290.9	105.1	814.8	744.4
N ₂ . Wt.-10 particles (gm)	941.9	801.8	700.8	692.3	578.8	867.4
O. Wt of total sample (gm)	1360.1	1196.2	991.7	797.4	1393.6	1611.8
P. % Coarse particles = (N ÷ O) x 100	30.7%	33.0%	29.3%	13.2%	58.5%	46.2%
Bulk Density Needed Y/N						
Q. Total sample wt (gm)	-	-	-	-	-	-
R. Coarse particles wt. (gm)	-	-	-	-	-	-
S. Total sample vol. (cc)	-	-	-	-	-	-
T. Coarse particles vol. (cc)	-	-	-	-	-	-
U. Bulk Density = [(Q - R) ÷ (S - T)] (gm/cc)	-	-	-	-	-	-
W. Adjusted Sand (%)	6.1%	6.6%	5.9%	2.6%	11.7%	9.2%
X. Adjusted Clay (%)	0%	0%	0%	0%	0%	0%
Y. Adjusted Silt (%)	-	-	-	-	-	-
Z. Soil Suitability Zone	2B	2B	2B	2B	2A	2A
Texture	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Loamy sand

I certify the test was carried out by the procedures specified by the Mendocino County Division of Environmental Health. I declare under penalty that the foregoing is true and correct.

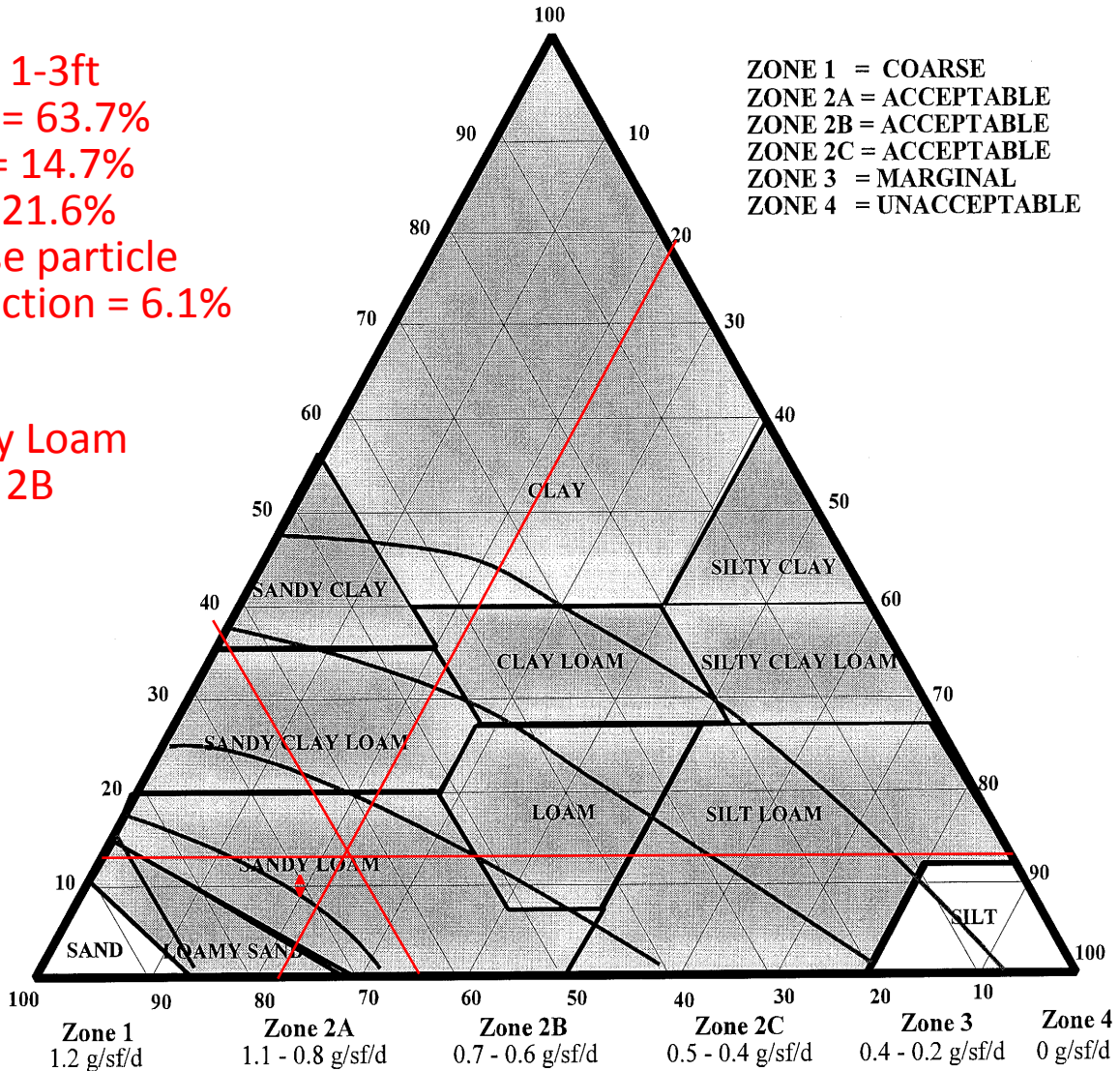
Signed: 

Soil Texture Suitability Chart

B1 at 1-3ft
 sand = 63.7%
 clay = 14.7%
 silt = 21.6%
 coarse particle
 correction = 6.1%

Sandy Loam
 Zone 2B

ZONE 1 = COARSE
 ZONE 2A = ACCEPTABLE
 ZONE 2B = ACCEPTABLE
 ZONE 2C = ACCEPTABLE
 ZONE 3 = MARGINAL
 ZONE 4 = UNACCEPTABLE



INSTRUCTIONS:

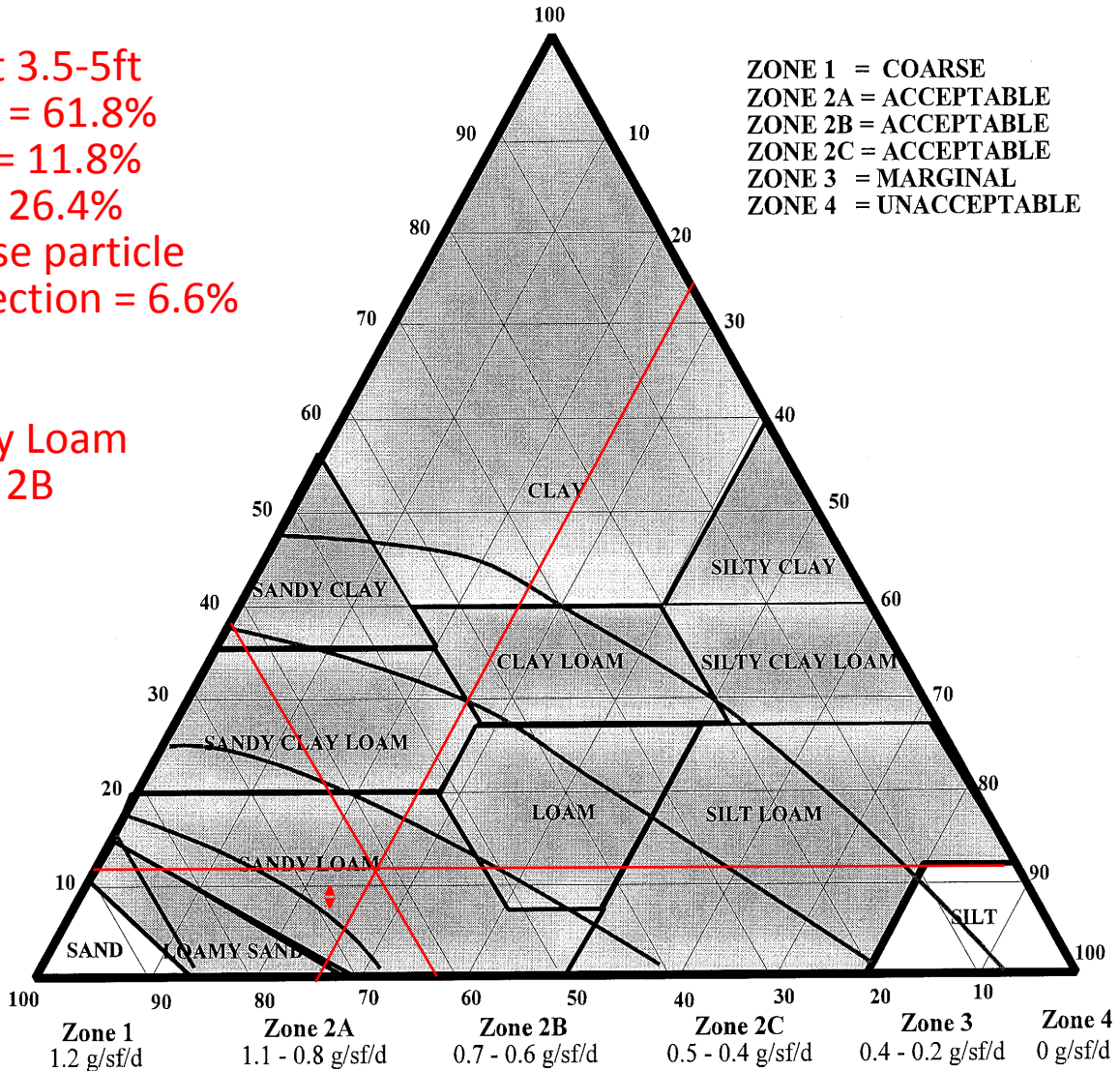
1. Plot texture on triangle based on percent sand, silt, and clay as determined by hydrometer analysis.
2. Adjust for coarse particles (gravel not fractured rock) by moving the plotted point in the sand direction an additional 2% for each 10% by volume of gravels greater than 2 mm in diameter.
3. Adjust for compactness of the soil by moving the plotted point in the clay direction an additional 15% for soils having a bulk-density greater than 1.7 gm/cc.

NOTE: For soils falling in sand, loamy sand or sandy loam texture classification, the bulk density analysis will generally not affect suitability and analysis not be necessary.

Soil Texture Suitability Chart

B1 at 3.5-5ft
 sand = 61.8%
 clay = 11.8%
 silt = 26.4%
 coarse particle
 correction = 6.6%

Sandy Loam
 Zone 2B



INSTRUCTIONS:

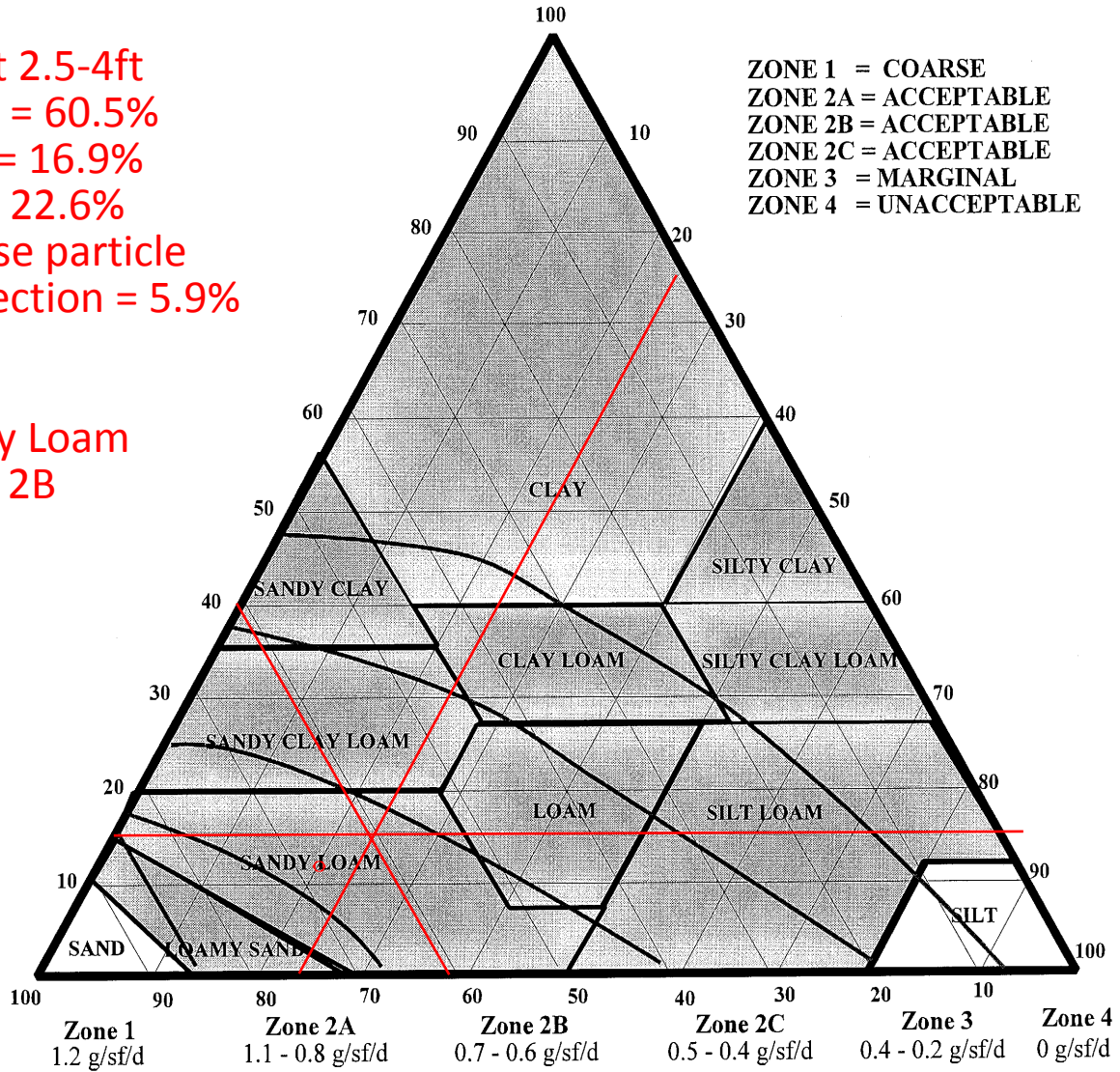
1. Plot texture on triangle based on percent sand, silt, and clay as determined by hydrometer analysis.
2. Adjust for coarse particles (gravel not fractured rock) by moving the plotted point in the sand direction an additional 2% for each 10% by volume of gravels greater than 2 mm in diameter.
3. Adjust for compactness of the soil by moving the plotted point in the clay direction an additional 15% for soils having a bulk-density greater than 1.7 gm/cc.

NOTE: For soils falling in sand, loamy sand or sandy loam texture classification, the bulk density analysis will generally not affect suitability and analysis not be necessary.

Soil Texture Suitability Chart

B2 at 2.5-4ft
 sand = 60.5%
 clay = 16.9%
 silt = 22.6%
 coarse particle
 correction = 5.9%

Sandy Loam
 Zone 2B



INSTRUCTIONS:

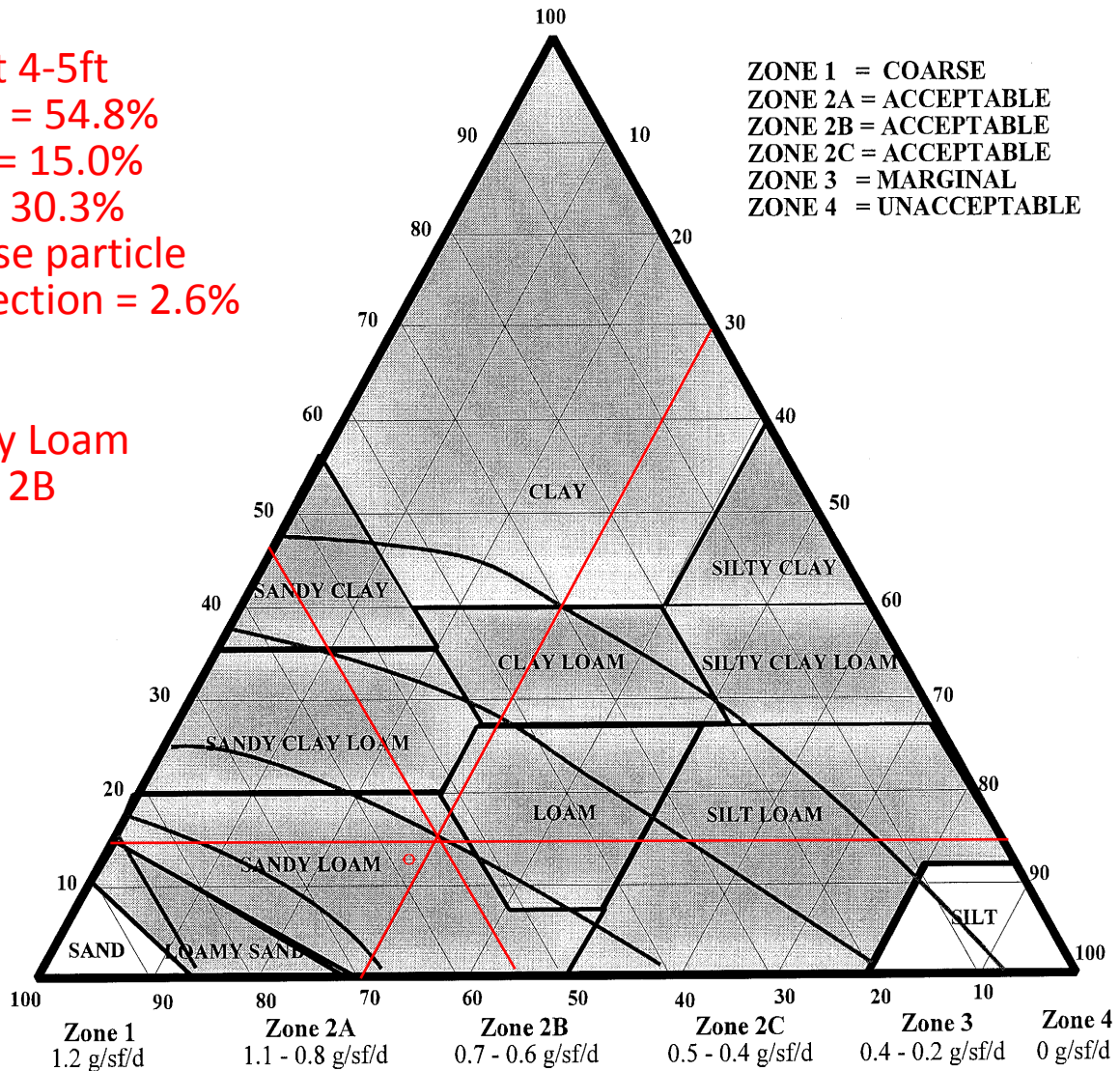
1. Plot texture on triangle based on percent sand, silt, and clay as determined by hydrometer analysis.
2. Adjust for coarse particles (gravel not fractured rock) by moving the plotted point in the sand direction an additional 2% for each 10% by volume of gravels greater than 2 mm in diameter.
3. Adjust for compactness of the soil by moving the plotted point in the clay direction an additional 15% for soils having a bulk-density greater than 1.7 gm/cc.

NOTE: For soils falling in sand, loamy sand or sandy loam texture classification, the bulk density analysis will generally not affect suitability and analysis not be necessary.

Soil Texture Suitability Chart

B2 at 4-5ft
 sand = 54.8%
 clay = 15.0%
 silt = 30.3%
 coarse particle
 correction = 2.6%

Sandy Loam
 Zone 2B



INSTRUCTIONS:

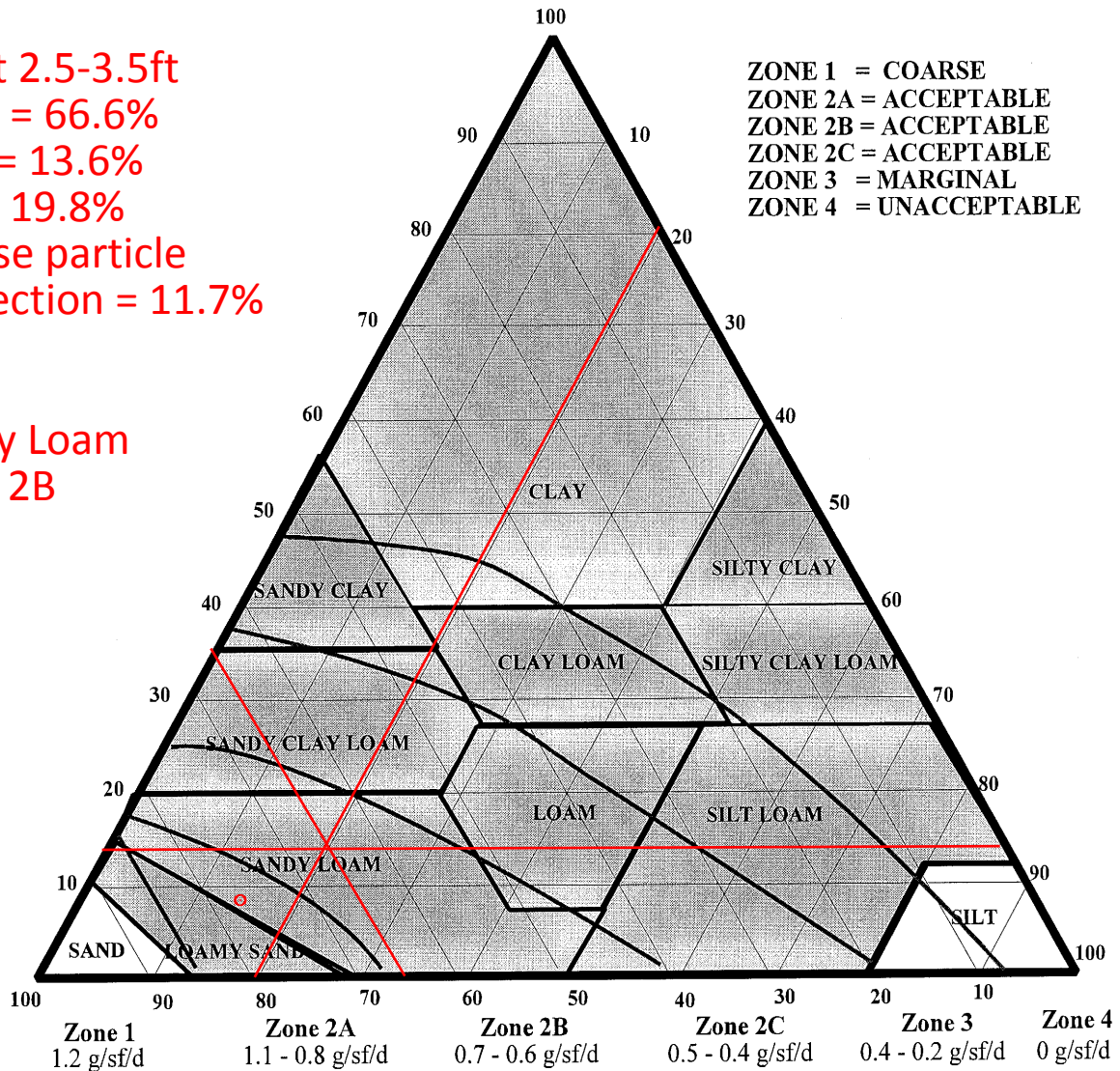
1. Plot texture on triangle based on percent sand, silt, and clay as determined by hydrometer analysis.
2. Adjust for coarse particles (gravel not fractured rock) by moving the plotted point in the sand direction an additional 2% for each 10% by volume of gravels greater than 2 mm in diameter.
3. Adjust for compactness of the soil by moving the plotted point in the clay direction an additional 15% for soils having a bulk-density greater than 1.7 gm/cc.

NOTE: For soils falling in sand, loamy sand or sandy loam texture classification, the bulk density analysis will generally not affect suitability and analysis not be necessary.

Soil Texture Suitability Chart

B3 at 2.5-3.5ft
 sand = 66.6%
 clay = 13.6%
 silt = 19.8%
 coarse particle
 correction = 11.7%

Sandy Loam
 Zone 2B



INSTRUCTIONS:

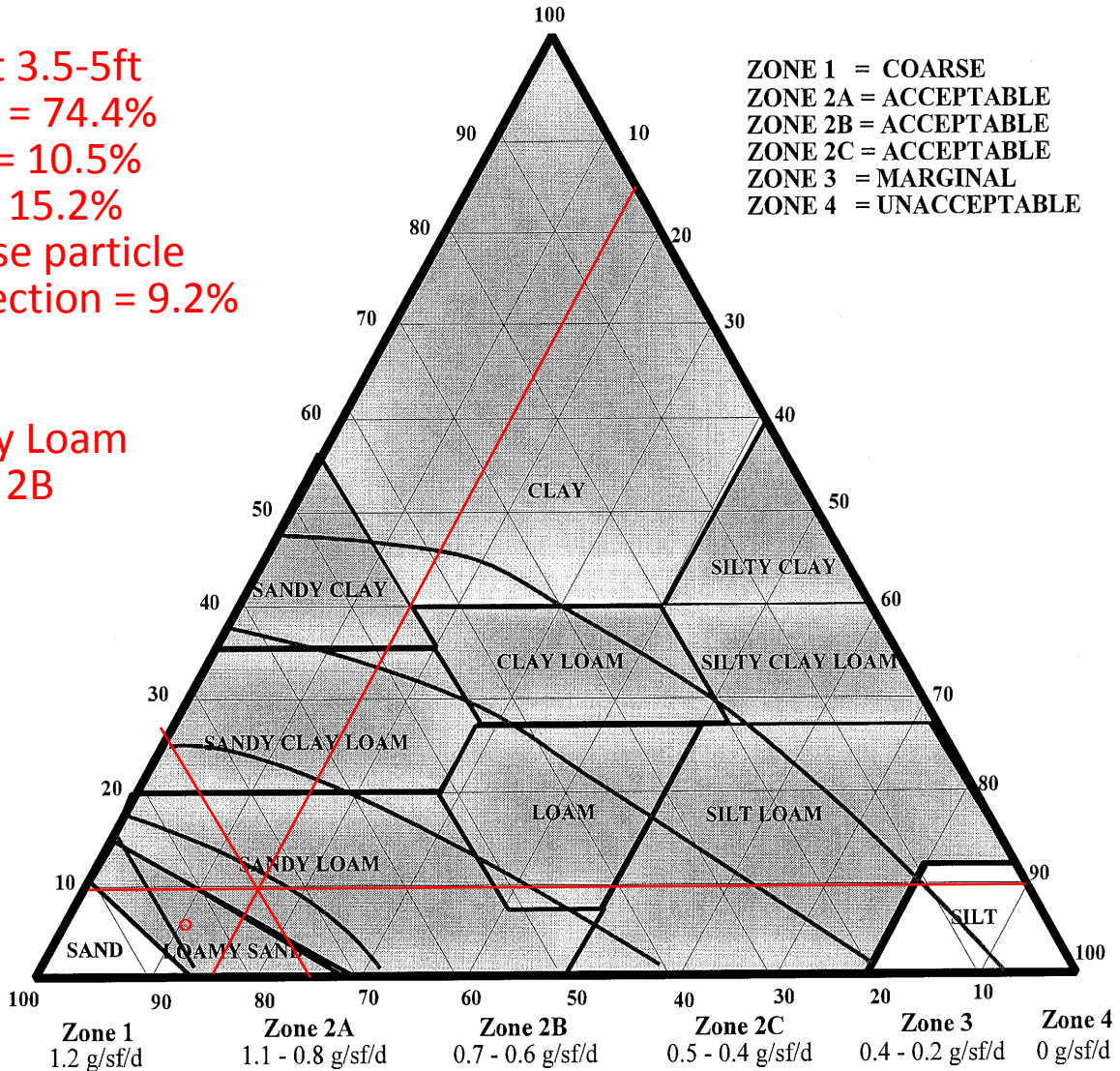
1. Plot texture on triangle based on percent sand, silt, and clay as determined by hydrometer analysis.
2. Adjust for coarse particles (gravel not fractured rock) by moving the plotted point in the sand direction an additional 2% for each 10% by volume of gravels greater than 2 mm in diameter.
3. Adjust for compactness of the soil by moving the plotted point in the clay direction an additional 15% for soils having a bulk-density greater than 1.7 gm/cc.

NOTE: For soils falling in sand, loamy sand or sandy loam texture classification, the bulk density analysis will generally not affect suitability and analysis not be necessary.

Soil Texture Suitability Chart

B3 at 3.5-5ft
 sand = 74.4%
 clay = 10.5%
 silt = 15.2%
 coarse particle
 correction = 9.2%

Sandy Loam
 Zone 2B



ZONE 1 = COARSE
 ZONE 2A = ACCEPTABLE
 ZONE 2B = ACCEPTABLE
 ZONE 2C = ACCEPTABLE
 ZONE 3 = MARGINAL
 ZONE 4 = UNACCEPTABLE

INSTRUCTIONS:

1. Plot texture on triangle based on percent sand, silt, and clay as determined by hydrometer analysis.
2. Adjust for coarse particles (gravel not fractured rock) by moving the plotted point in the sand direction an additional 2% for each 10% by volume of gravels greater than 2 mm in diameter.
3. Adjust for compactness of the soil by moving the plotted point in the clay direction an additional 15% for soils having a bulk-density greater than 1.7 gm/cc.

NOTE: For soils falling in sand, loamy sand or sandy loam texture classification, the bulk density analysis will generally not affect suitability and analysis not be necessary.



April 9, 2018

7746.15

Ukiah Unified School District
511 S. Orchard Ave
Ukiah, California 95482

Attention: Mr. Gabriel Sherman

Subject: Percolation Testing of Existing Septic System Leach Field
HUD Redwood Valley Elementary School Conversion
700 East School Way, Redwood Valley, CA; APN 163-060-15

Dear Mr. Sherman:

LACO Associates (LACO) presents results from percolation testing in the area of the existing leach field at the former Redwood Valley Elementary School. This testing was performed based on the results and recommendations provided in LACO's memo entitled *Flow Capacity of Existing System Leach Field* memo and dated March 5, 2018.

On March 30, 2018, LACO performed percolation testing in three holes in the area of the existing leach field. Percolation testing was performed at a depth of 4 feet below ground surface (bgs) which is the depth the existing leach field bottom is believed to be located. The existing leachfield location and construction information is based on detail provided in the *Plot Plan & Details* (Sheet 1) for the Redwood Valley Elementary School dated August 23, 1995.

Results of percolation testing indicate that soils at the existing trench bottom have a percolation rate ranging from 2.0 to 15.9 minutes per inch. This would allow for an application rate of 0.8 gallons per day per square foot based on Table 4-2 provided in the *Policy of Control of Water Quality with Respect to On-Site Waste Treatment and Disposal Practices* prepared by the North Coast Regional Water Board and adopted on March 20, 1975. Using the application rate of 0.8 gallons per day per square foot, the existing system is estimated to have a flow capacity of 6,000 gallons per day.

Flows from the proposed development are estimated to be 7,253 gallons per day. Based on the results of percolation testing and the higher application rate, in order to service the proposed development the leach field would need to be expanded by an additional 313.25 linear feet. Expansion system design calculations are enclosed.

Other considerations include:

- A water tightness test of the existing 10,000 gallon septic tank.
- Verification of seasonal high groundwater levels down to a depth of 8 feet.
- Performing a video inspection to confirm the leach lines are intact.
- Design of a 100 Percent Reserve system to be located 100 feet from the Russian River and 100 feet from any water wells.

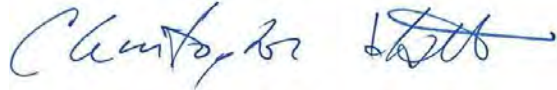
21 W. 4th Street, Eureka, California 95501 707 443-5054 Fax 707 443-0553
311 S. Main Street, Ukiah, California 95482 707 462-0222 Fax 707 462-0223
3450 Regional Parkway, Suite B2, Santa Rosa, California 95403 707 525-1222

Toll Free 800 515-5054 www.lacoassociates.com

Septic Flow Capacity of Existing Septic System
700 East School Way, Redwood Valley, California
Ukiah Unified School District; LACO Project No. 7746.15
April 9, 2018
Page 2

Please call me directly at (707) 462-0222 should you have questions.

Sincerely,
LACO Associates

A handwritten signature in blue ink, appearing to read "Christopher Watt". The signature is fluid and cursive, with a long horizontal stroke at the end.

Christopher Watt, CEG, CHG
Vice President

KRM:krm

P:\7700\7746 County of Mendocino Planning\7746.15 Redwood Fire Recovery Effort\Geology\RVES Septic - Revised (2) with
perc\7746.15 RVES Septic.docx

SOILS PERCOLATION TEST DATA SHEET

CLIENT: UUSD
 JOB NO.: BD

DATE: March 30, 2018
 A.P.N.: 163-060-15

TEST PIT NO.: #1 PPI

TESTED BY KAS/DBS

DEPTH TESTED:		DIA (d _b):		Pipe (d _p):		Adj:	
---------------	--	------------------------	--	-------------------------	--	------	--

DEPTH TO GW = N/A

PRESOAK: Four complete refills 12 hour presoak

Reading No.	Start Time (T _s)	Start Level (W _s)	Read Time (T _r)	▲ Time (T _s - T _r) <i>Circle T_r 61.50</i>	▲ Level (W _s - W _r)	in/hr	MPI	Adj. MPI
1	0	11 inch	0	0	0			
2	0	10.5	25 sec	0.5833	0.5"		1.164	
3	0	10	45 sec	0.750	0.5"		1.5	
4	0	9.5	50 sec	0.8333	0.5"		1.67	
5	0	9	35 sec	0.5933	0.5"		1.164	
6	0	8.5	35 sec	0.5833	0.5"		1.164	
7	0	8	40 sec	0.6667	0.5"		1.334	
8	0	7.5	45 sec	0.750	0.5"		1.5	

STABILIZED RATE = 0

TEST PIT NO.: PPI

TESTED BY KAS/DBS

DEPTH TESTED:	<u>48.5-49.25"</u>	DIA (d _b):	<u>3"</u>	Pipe (d _p):	<u>3"</u>	Adj:	
---------------	--------------------	------------------------	-----------	-------------------------	-----------	------	--

DEPTH TO GW = N/A

PRESOAK: Four complete refills 12 hour presoak

Reading No.	Start Time (T _s)	Start Level (W _s)	Read Time (T _r)	▲ Time (T _s - T _r) min	▲ Level (W _s - W _r)	in/hr	MPI	Adj. MPI
1	0	14.5	0	0	0			
2	0	14.25	30 sec	0.500	0.25"		2	
3	0	14.00	30 sec	0.500	0.25"		2	
4	0	13.75	31 sec	0.517	0.25"		2.07	
5								
6								
7								
8								

STABILIZED RATE = 2.02 MPI

TEST PIT NO.: PP2

TESTED BY KAS/DBS

DEPTH TESTED:	<u>45-45.5"</u>	DIA (d _b):	<u>3"</u>	Pipe (d _p):	<u>3"</u>	Adj:	
---------------	-----------------	------------------------	-----------	-------------------------	-----------	------	--

DEPTH TO GW =

PRESOAK: Four complete refills 12 hour presoak

Reading No.	Start Time (T _s)	Start Level (W _s)	Read Time (T _r)(min)	▲ Time (T _s - T _r)	▲ Level (W _s - W _r)	in/hr	MPI	Adj. MPI
1	0	18.00	0	0	1/8"		13.34	
2	0	17 7/8	1.40	1.667	↓		12.94	
3	0	17 7/8"	1.37	1.617	↓		13.47	
4	0	17 5/8"	1.41	1.603	↓		13.46	
5	0	17 1/2"	1.41	1.603	↓		13.46	
6								
7								
8								

STABILIZED RATE = 13.3

21 W. 4th Street, Eureka, California 95501 707 443-5054 Fax 707 443-0553
 311 S. Main Street, Ukiah, California 95482 707 462-0222 Fax 707 462-0223
 3450 Regional Parkway, Suite B2, Santa Rosa, California 95403 707 525-1222

Toll Free 800 515-5054 www.lacoassociates.com

SOILS PERCOLATION TEST DATA SHEET

CLIENT: UUSD
 JOB NO.: BD

DATE: March 30, 2018
 A.P.N.: 163-060-15

TEST PIT NO.: PP3 TESTED BY

DEPTH TESTED :	<u>47-48"</u>	DIA (d _b) :	<u>3"</u>	Pipe (d _p):	<u>3"</u>	Adj :	
----------------	---------------	-------------------------	-----------	-------------------------	-----------	-------	--

DEPTH TO GW = N/A

PRESOAK: Four complete refills 12 hour presoak

Reading No.	Start Time (T _s)	Start Level (W _s)	Read Time (T _r)	▲ Time (T _s - T _r) <i>Divide Tr by 60</i>	▲ Level (W _s - W _r)	in/hr	MPI	Adj. MPI
1	0	15 1/2"	0	0	1/8"		0	
2	0	15 3/8"	120 sec	2.00	↓		16.00	
3	0	15 2/8"	119 sec	1.983		15.86		
4	0	15 1/8"	120 sec	2		16.00		
5	0	15"	119 sec	1.983		15.86		
6								
7								
8								

STABILIZED RATE = (15.9) MPI

TEST PIT NO.: TESTED BY

DEPTH TESTED :		DIA (d _b) :		Pipe (d _p):		Adj :	
----------------	--	-------------------------	--	-------------------------	--	-------	--

DEPTH TO GW =

PRESOAK: Four complete refills 12 hour presoak

Reading No.	Start Time (T _s)	Start Level (W _s)	Read Time (T _r)	▲ Time (T _s - T _r)	▲ Level (W _s - W _r)	in/hr	MPI	Adj. MPI
1								
2								
3								
4								
5								
6								
7								
8								

STABILIZED RATE =

TEST PIT NO.: TESTED BY

DEPTH TESTED :		DIA (d _b) :		Pipe (d _p):		Adj :	
----------------	--	-------------------------	--	-------------------------	--	-------	--

DEPTH TO GW =

PRESOAK: Four complete refills 12 hour presoak

Reading No.	Start Time (T _s)	Start Level (W _s)	Read Time (T _r)	▲ Time (T _s - T _r)	▲ Level (W _s - W _r)	in/hr	MPI	Adj. MPI
1								
2								
3								
4								
5								
6								
7								
8								

STABILIZED RATE =

21 W. 4th Street, Eureka, California 95501 707 443-5054 Fax 707 443-0553
 311 S. Main Street, Ukiah, California 95482 707 462-0222 Fax 707 462-0223
 3450 Regional Parkway, Suite B2, Santa Rosa, California 95403 707 525-1222

Toll Free 800 515-5054 www.lacoassociates.com

Site Map with boring locations

- Legend**
- Hand Auger Boring Location



Google Earth

© 2018 Google

Existing System Design Flow Calculations:

- APPLICATION RATE: **0.80 GPD/ft²** (based on percolation testing)
- ABSORPTION AREA: **5 ft²/ft** (based on the Aug. 23, 1956 Plat Plan & Details, Sheet 1).
- ABSORPTION TRENCH LENGTH = 1500 feet (15 trenches of 100 feet for total of 1500 feet)
- GALLONS PER DAY:

$$1,500 \text{ feet} \times 5 \text{ ft}^2/\text{ft} = 7,500 \text{ ft}^2$$

$$7,500 \text{ ft}^2 \times 0.80 \text{ GPD}/\text{ft}^2 = 6,000 \text{ GPD}$$

6,000 Gallons per Day

Expansion of Existing System Design Calculations:

- APPLICATION RATE: **0.80 GPD/ft²** (based on percolation testing)
- ABSORPTION AREA: **5 ft²/ft** (based on the Aug. 23, 1956 Plat Plan & Details, Sheet 1).
 - GALLONS PER DAY: 7,253 GPD (Proposed) – 6,000 GPD (Existing) = **1,253 GPD**
- ADDITIONAL LEACHING TRENCH NEEDED (ft):

$$1,253 \text{ GPD} \div 0.80 \text{ GPD}/\text{ft}^2 = 1,566.25 \text{ ft}^2$$

$$1,566.25 \div 5 \text{ ft}^2/\text{ft} = \mathbf{313.25 \text{ feet}}$$

Additional 313.25 feet of leaching trench needed

APPENDIX C

Test Pit Logs

Soil Profile Description

Owner Name	Ukiah Unified School District	Test Date	2/22/2019
Site Address	700 East School Way, Redwood Valley	Recorded by	KRM
APN	163-060-15	Slope	0 - 5%
Subdivision #	not applicable	Profile #	TP1

LEGEND



textural analysis sample



depth to groundwater



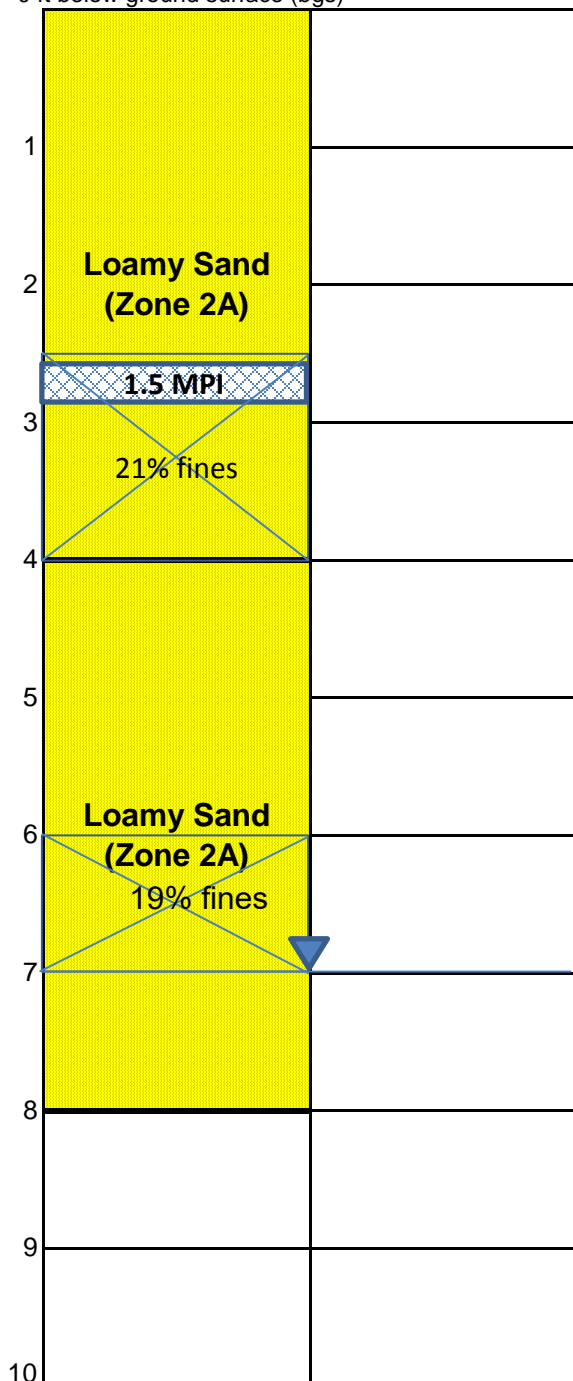
percolation test

Soil depiction

Trench depiction

horizon depth range / texture / (texture zone) / color / mottles / structure / moisture / consistence / roots / pores / boundary / [sample depth / lab results / % coarse particles >2mm] / Avg. perc rate at this depth

0 ft below ground surface (bgs)



0 to 4 feet below ground surface

Loamy Sand (Zone 2A), brown (10YR 5/4), no mottles, subangular blocky, moist, few fine roots, medium pores, sharp boundary. [Textural analysis on sample collected from TP1 at 2.5 to 4 feet [(72.7% sand, 9.6% clay, and 17.6% silt). 30.6% coarse particles >2mm (fine to 2 inches).]

Percolation test performed in PP5 at 31 to 33 inches bgs. Average percolation rate = 1.5 minutes per inch.

4 to 8 feet below ground surface




Loamy Sand (Zone 2A), yellow (10YR 7/6) mottled with strong brown (7.5YR 4/6), mottled, single grain, moist to saturated at 7 feet, no roots, medium to large pores, sharp boundary. [Textural analysis on sample collected from TP1 at 6 to 7 feet [(70.2% sand, 12.9% clay, and 16.9% silt). 58.4% coarse particles >2mm (fine to 4 inches).]

Total depth = 8 feet below ground surface.
Groundwater observed at 7 feet below ground surface.

Soil Profile Description

Owner Name	Ukiah Unified School District	Test Date	2/22/2019
Site Address	700 East School Way, Redwood Valley	Recorded by	KRM
APN	163-060-15	Slope	0 - 5%
Subdivision #	not applicable	Profile #	TP2

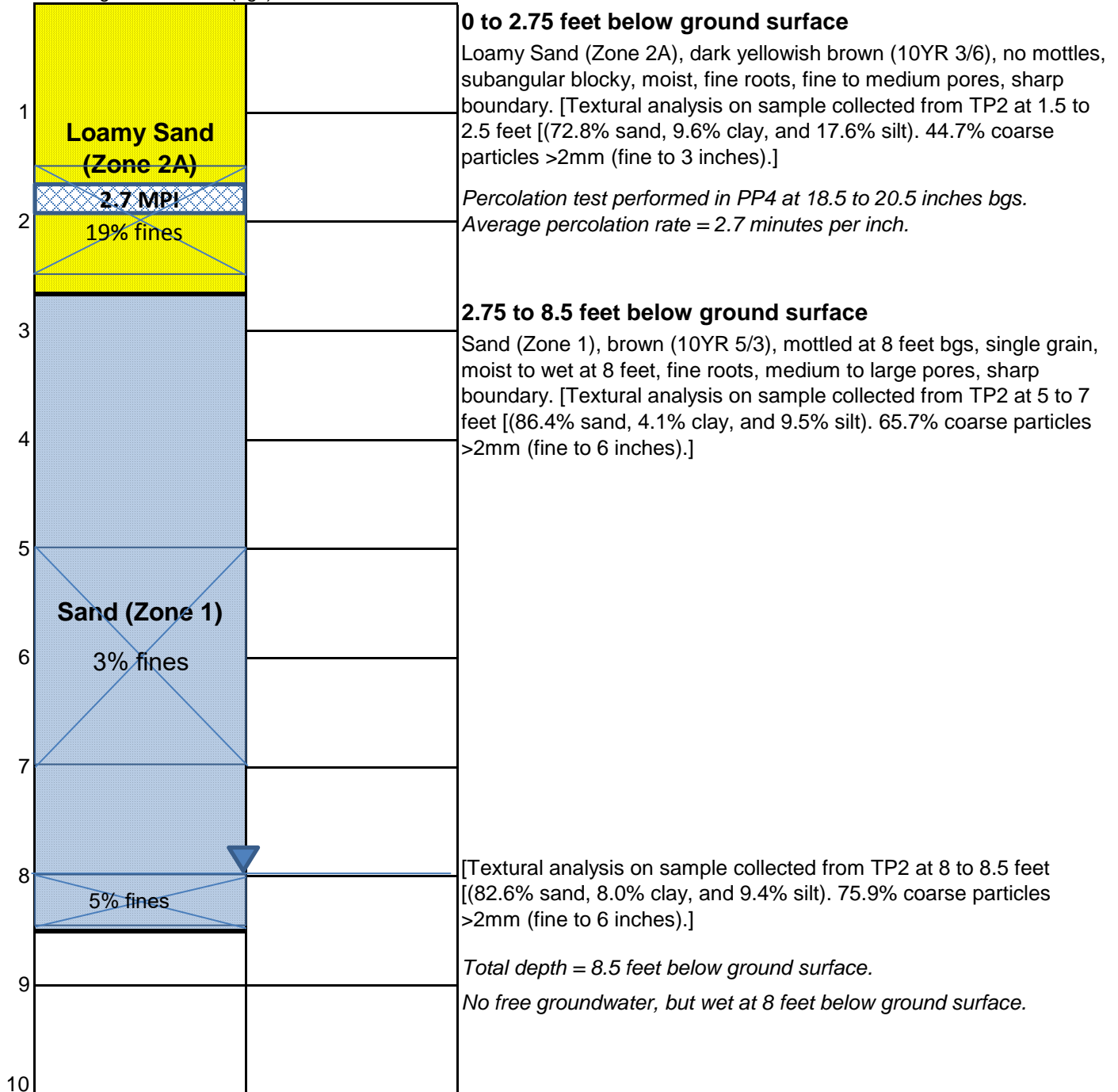
LEGEND

 textural analysis sample
 depth to groundwater
 percolation test

horizon depth range / texture / (texture zone) / color / mottles / structure / moisture / consistence / roots / pores / boundary / [sample depth / lab results / % coarse particles >2mm] / Avg. perc rate at this depth

Soil depiction **Trench depiction**




0 ft below ground surface (bgs)



Soil Profile Description

Owner Name	Ukiah Unified School District	Test Date	2/22/2019
Site Address	700 East School Way, Redwood Valley	Recorded by	KRM
APN	163-060-15	Slope	0 - 5%
Subdivision #	not applicable	Profile #	TP3

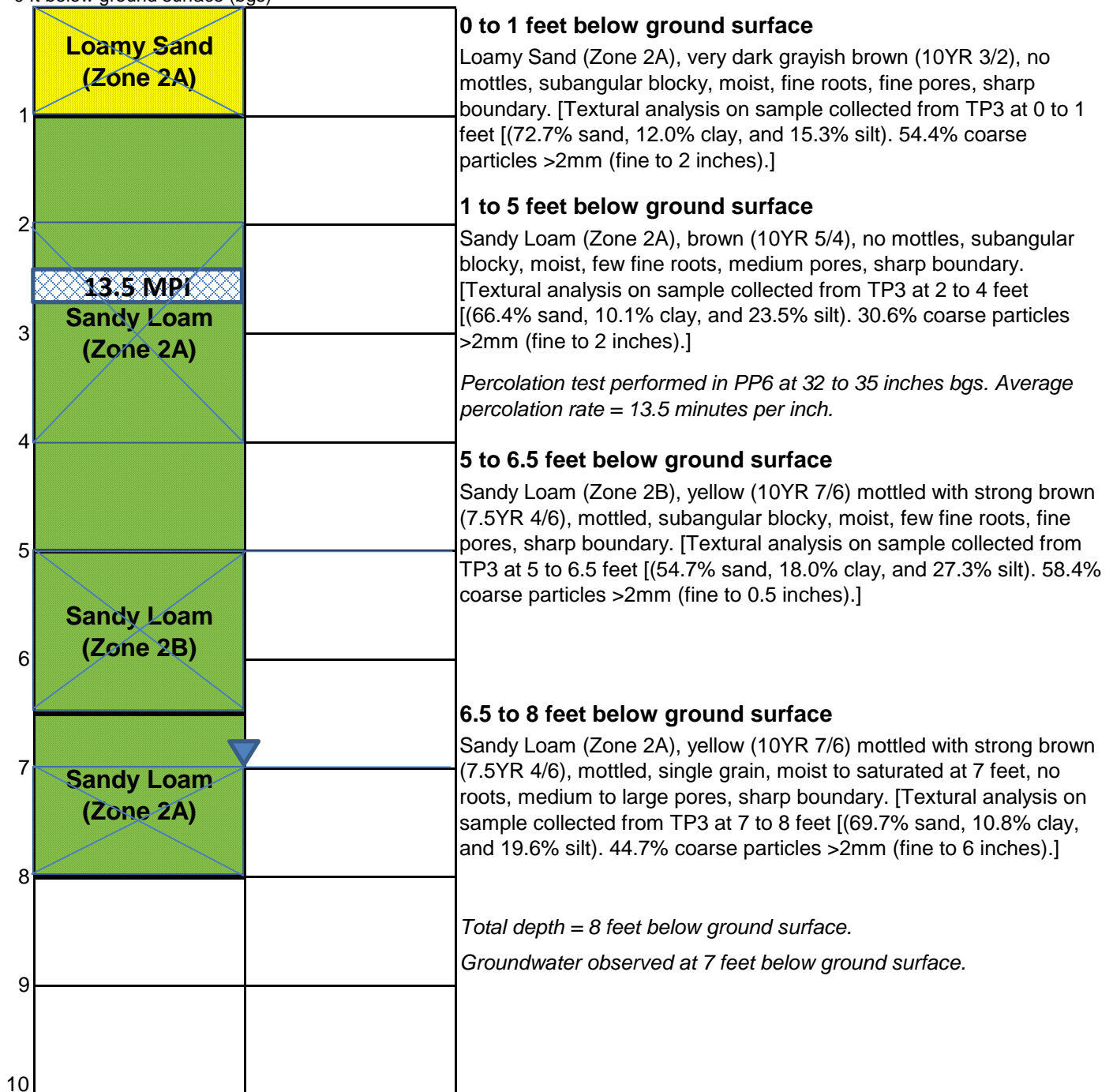
LEGEND

 textural analysis sample
 depth to groundwater
 percolation test

horizon depth range / texture / (texture zone) / color / mottles / structure / moisture / consistence / roots / pores / boundary / [sample depth / lab results / % coarse particles >2mm] / Avg. perc rate at this depth

Soil depiction **Trench depiction**




0 ft below ground surface (bgs)



Soil Profile Description

Owner Name	Ukiah Unified School District	Test Date	2/22/2019
Site Address	700 East School Way, Redwood Valley	Recorded by	KRM
APN	163-060-15	Slope	0 - 5%
Subdivision #	not applicable	Profile #	TP4

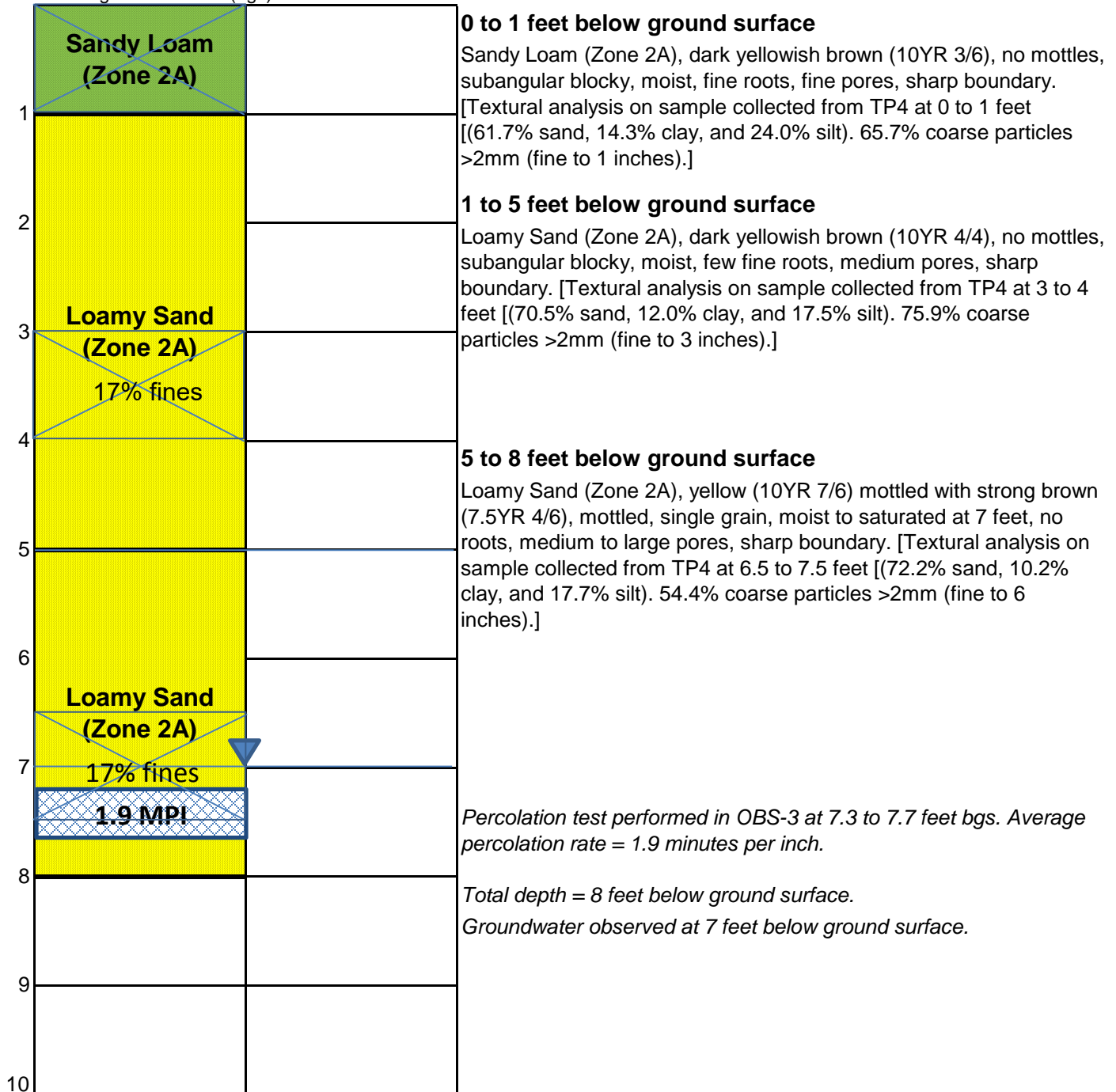
LEGEND

-  textural analysis sample
-  depth to groundwater
-  percolation test

horizon depth range / texture / (texture zone) / color / mottles / structure / moisture / consistence / roots / pores / boundary / [sample depth / lab results / % coarse particles >2mm] / Avg. perc rate at this depth

Soil depiction Trench depiction

0 ft below ground surface (bgs)



Soil Profile Description

Owner Name	Ukiah Unified School District	Test Date	2/22/2019
Site Address	700 East School Way, Redwood Valley	Recorded by	KRM
APN	163-060-15	Slope	0 - 5%
Subdivision #	not applicable	Profile #	TP5

LEGEND



textural analysis sample



depth to groundwater



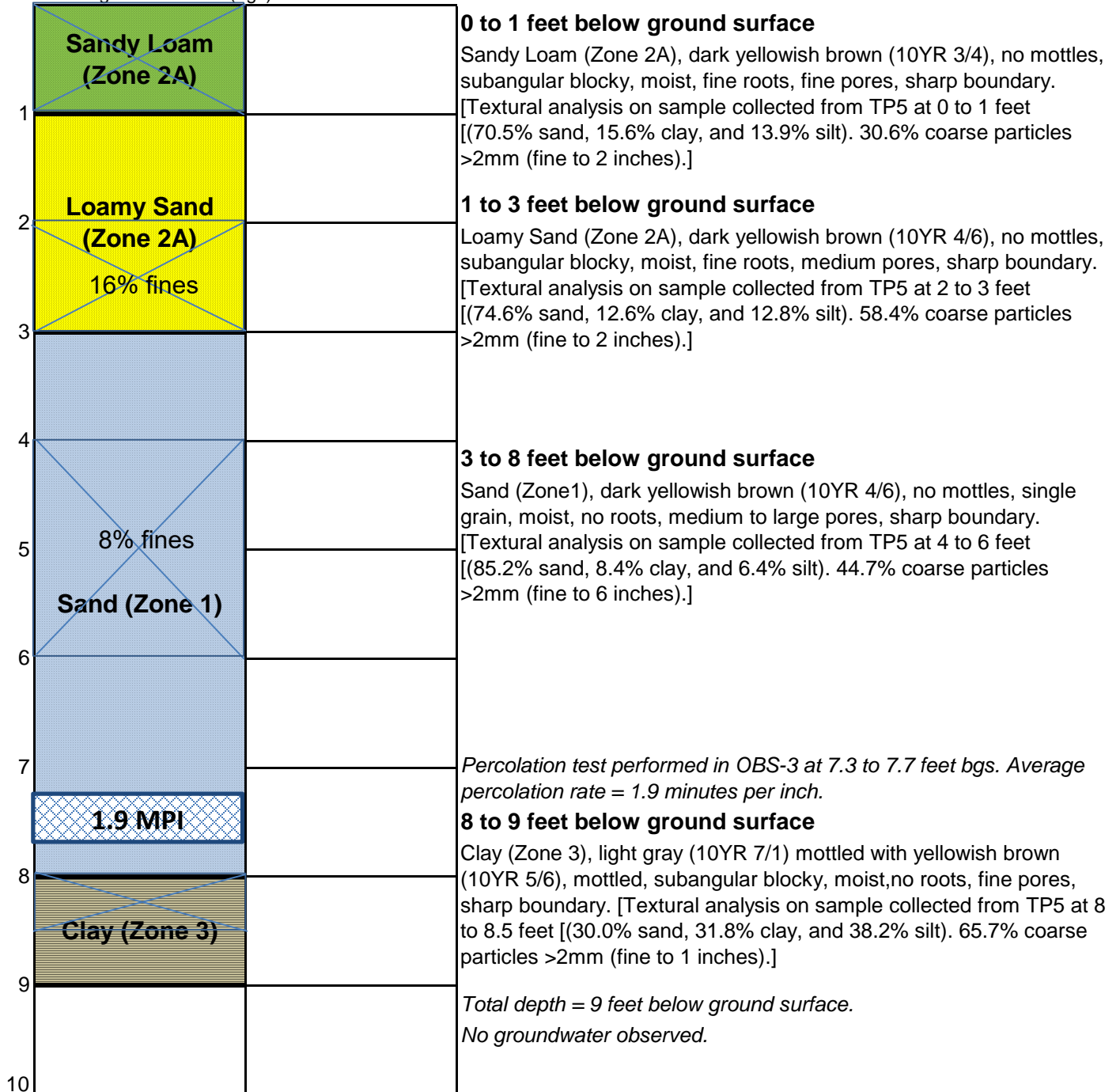
percolation test

horizon depth range / texture / (texture zone) / color / mottles / structure / moisture / consistence / roots / pores / boundary / [sample depth / lab results / % coarse particles >2mm] / Avg. perc rate at this depth

Soil depiction

Trench depiction

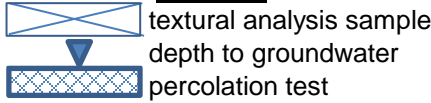
0 ft below ground surface (bgs)



Soil Profile Description

Owner Name	Ukiah Unified School District	Test Date	2/22/2019
Site Address	700 East School Way, Redwood Valley	Recorded by	KRM
APN	163-060-15	Slope	0 - 5%
Subdivision #	not applicable	Profile #	TP6

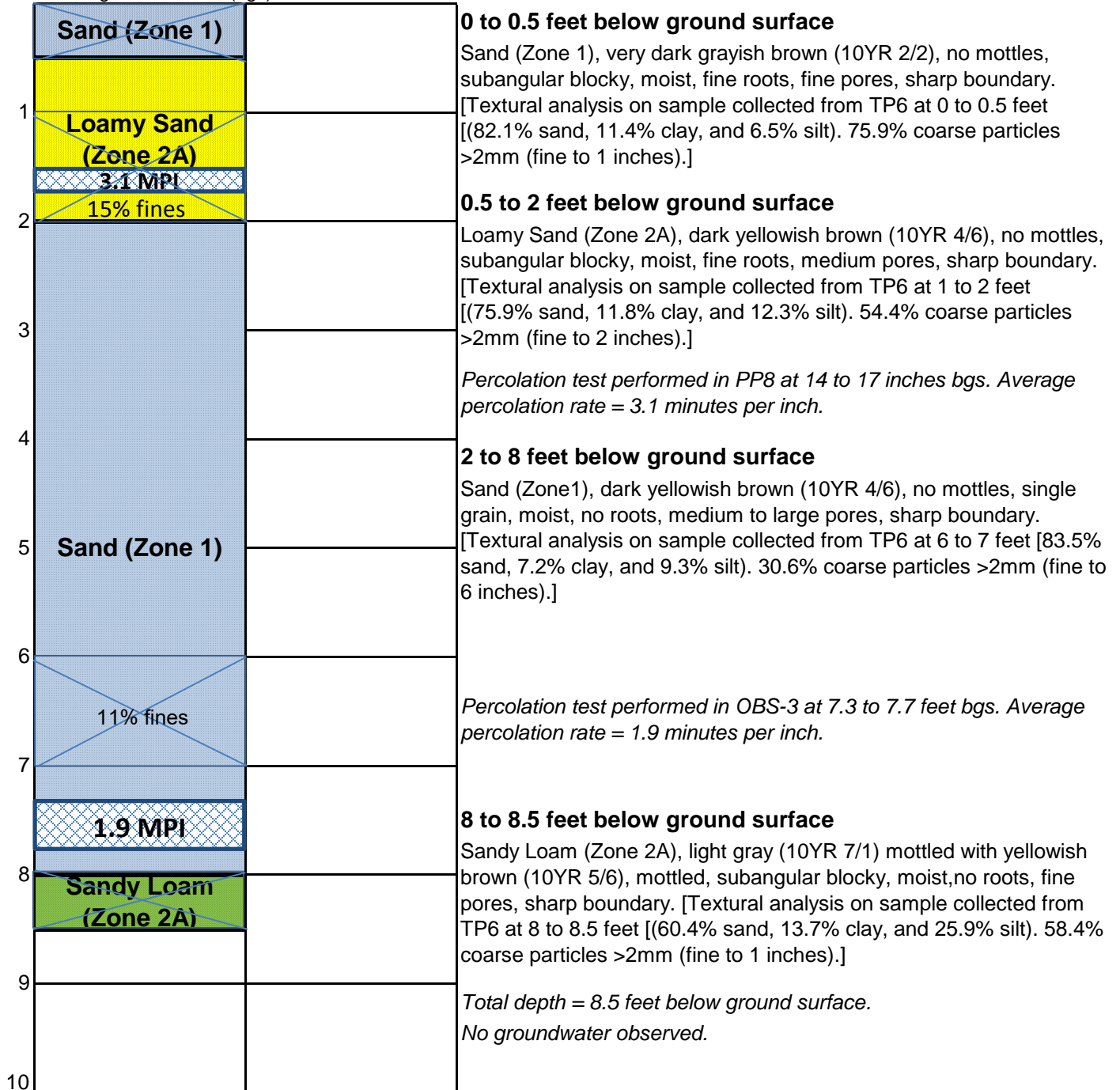
LEGEND



horizon depth range / texture / (texture zone) / color / mottles / structure / moisture / consistence / roots / pores / boundary / [sample depth / lab results / % coarse particles >2mm] / Avg. perc rate at this depth

Soil depiction Trench depiction

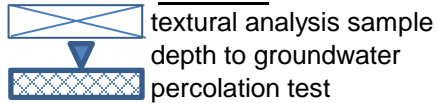
0 ft below ground surface (bgs)



Soil Profile Description

Owner Name	Ukiah Unified School District	Test Date	2/22/2019
Site Address	700 East School Way, Redwood Valley	Recorded by	KRM
APN	163-060-15	Slope	0 - 5%
Subdivision #	not applicable	Profile #	TP7

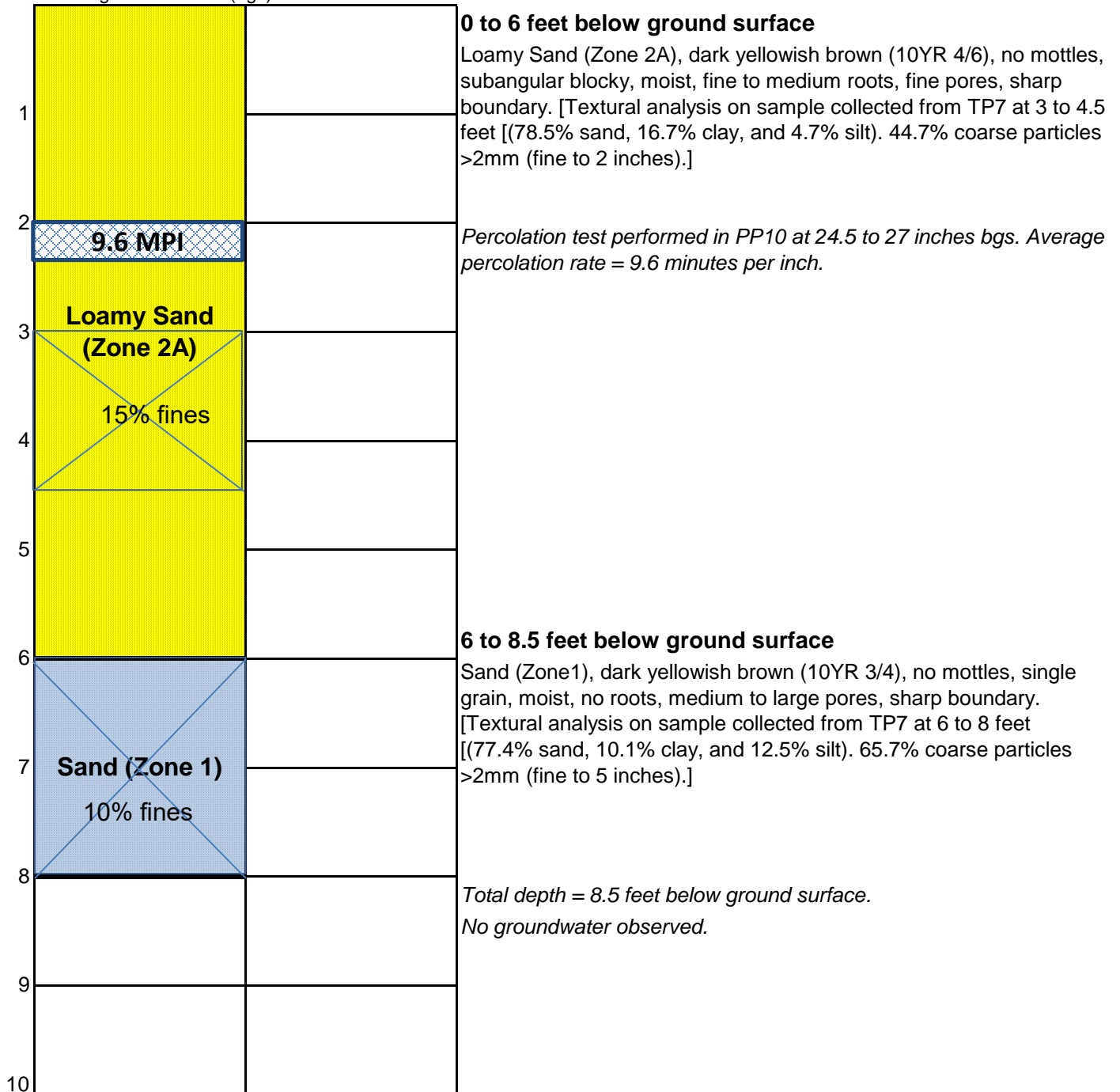
LEGEND



horizon depth range / texture / (texture zone) / color / mottles / structure / moisture / consistence / roots / pores / boundary / [sample depth / lab results / % coarse particles >2mm] / Avg. perc rate at this depth

Soil depiction Trench depiction

0 ft below ground surface (bgs)



Soil Profile Description

Owner Name	Ukiah Unified School District	Test Date	2/22/2019
Site Address	700 East School Way, Redwood Valley	Recorded by	KRM
APN	163-060-15	Slope	0 - 5%
Subdivision #	not applicable	Profile #	TP8

LEGEND



textural analysis sample



depth to groundwater



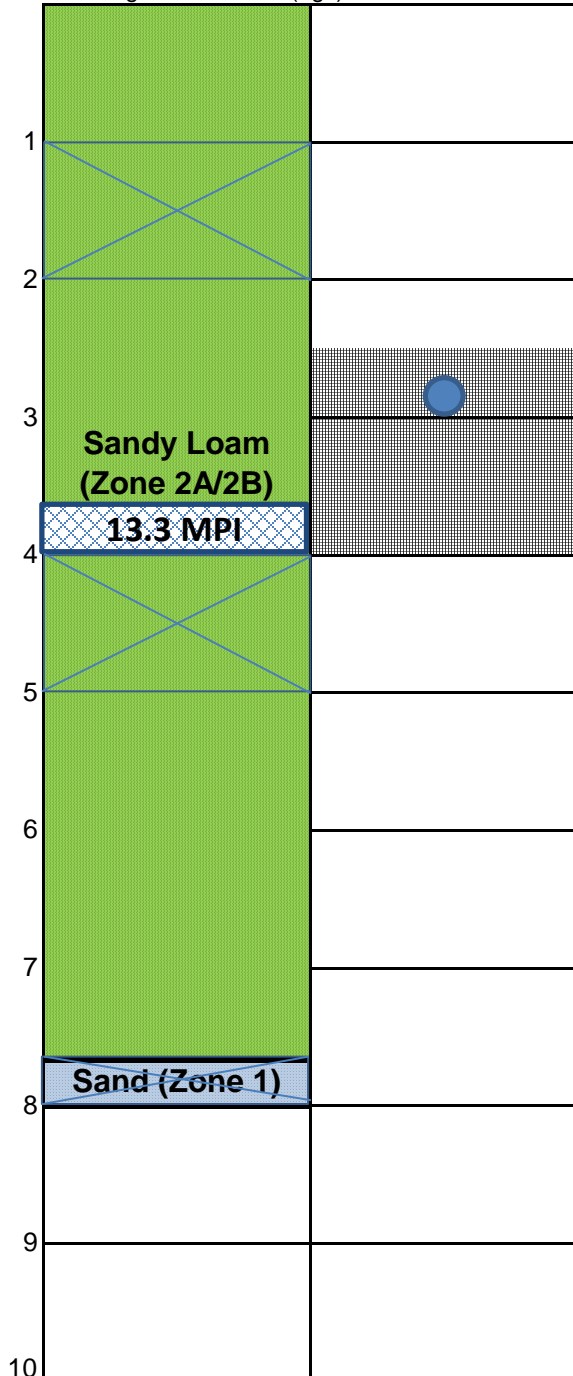
percolation test

horizon depth range / texture / (texture zone) / color / mottles / structure / moisture / consistence / roots / pores / boundary / [sample depth / lab results / % coarse particles >2mm] / Avg. perc rate at this depth

Soil depiction

Trench depiction

0 ft below ground surface (bgs)



0 to 7.75 feet below ground surface

Sandy Loam (Zone 2A), dark yellowish brown (10YR 4/6), no mottles, subangular blocky, moist, fine to medium roots, fine pores, sharp boundary. [Textural analysis on sample collected from TP8 at 1 to 2 feet [(61.1% sand, 14.3% clay, and 24.7% silt). 75.9% coarse particles >2mm (fine to 2 inches).]

Encountered old leach field with 5.25 inch diameter, one foot lengths, terra cotta pipe. Drain rock appeared to be 1 to 3 inch river run. Leachfield encountered at 2.5 to 4 feet bgs. Did not appear used (no staining within pipe or surrounding material).

Percolation test performed in PP2 at 45 to 45.5 inches bgs. Average percolation rate = 13.3 minutes per inch.

Sandy Loam (Zone 2B), same as above but less coarse particles. [Textural analysis on sample collected from TP8 at 4 to 5 feet [(57.9% sand, 15.3% clay, and 26.8% silt). 54.4% coarse particles >2mm (fine to 2 inches).]

7.5 to 8 feet below ground surface

Sand (Zone 1), dark yellowish brown (10YR 3/4), no mottles, single grain, moist, no roots, medium to large pores, sharp boundary. [Textural analysis on sample collected from TP8 at 7.75 to 8 feet [(93.3% sand, 4.3% clay, and 2.4% silt). 30.6% coarse particles >2mm (fine to 5 inches).]




Total depth = 8 feet below ground surface.

No groundwater observed.

Soil Profile Description

Owner Name	Ukiah Unified School District	Test Date	2/22/2019
Site Address	700 East School Way, Redwood Valley	Recorded by	KRM
APN	163-060-15	Slope	0 - 5%
Subdivision #	not applicable	Profile #	TP9

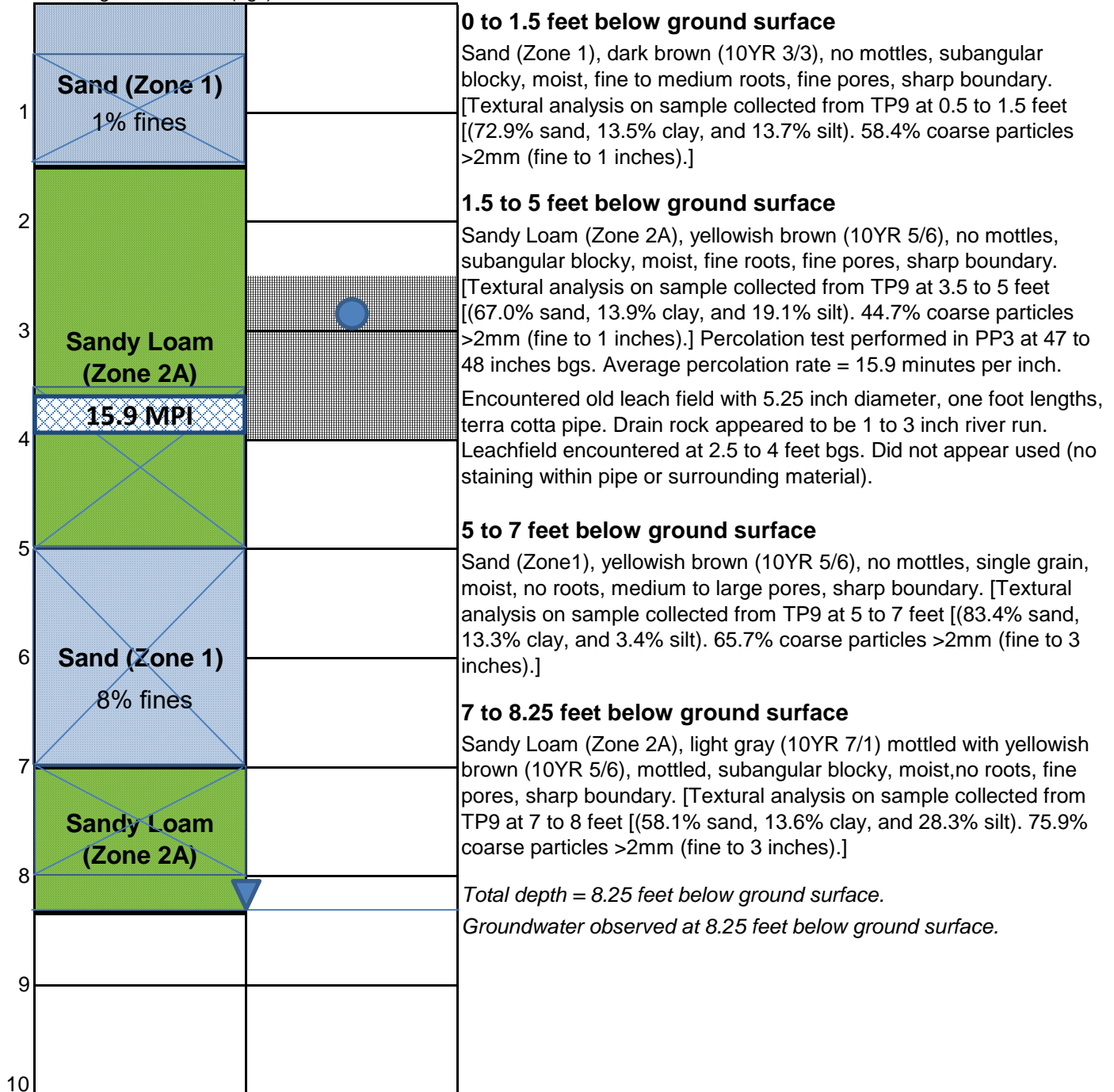
LEGEND

 textural analysis sample
 depth to groundwater
 percolation test

horizon depth range / texture / (texture zone) / color / mottles / structure / moisture / consistence / roots / pores / boundary / [sample depth / lab results / % coarse particles >2mm] / Avg. perc rate at this depth

Soil depiction **Trench depiction**

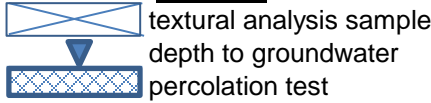
0 ft below ground surface (bgs)



Soil Profile Description

Owner Name	Ukiah Unified School District	Test Date	2/22/2019
Site Address	700 East School Way, Redwood Valley	Recorded by	KRM
APN	163-060-15	Slope	0 - 5%
Subdivision #	not applicable	Profile #	TP10

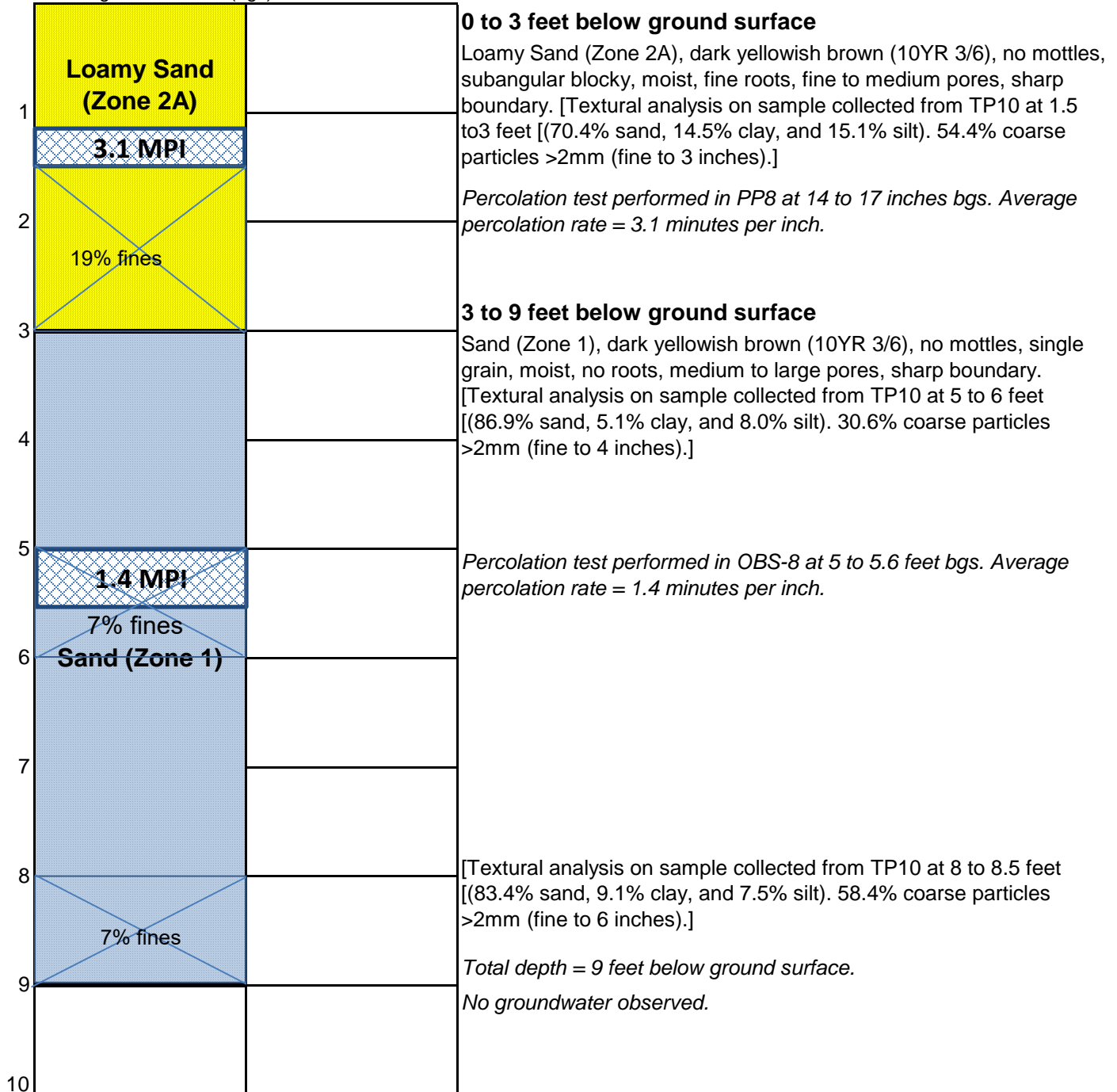
LEGEND



horizon depth range / texture / (texture zone) / color / mottles / structure / moisture / consistence / roots / pores / boundary / [sample depth / lab results / % coarse particles >2mm] / Avg. perc rate at this depth

Soil depiction Trench depiction

0 ft below ground surface (bgs)



APPENDIX D

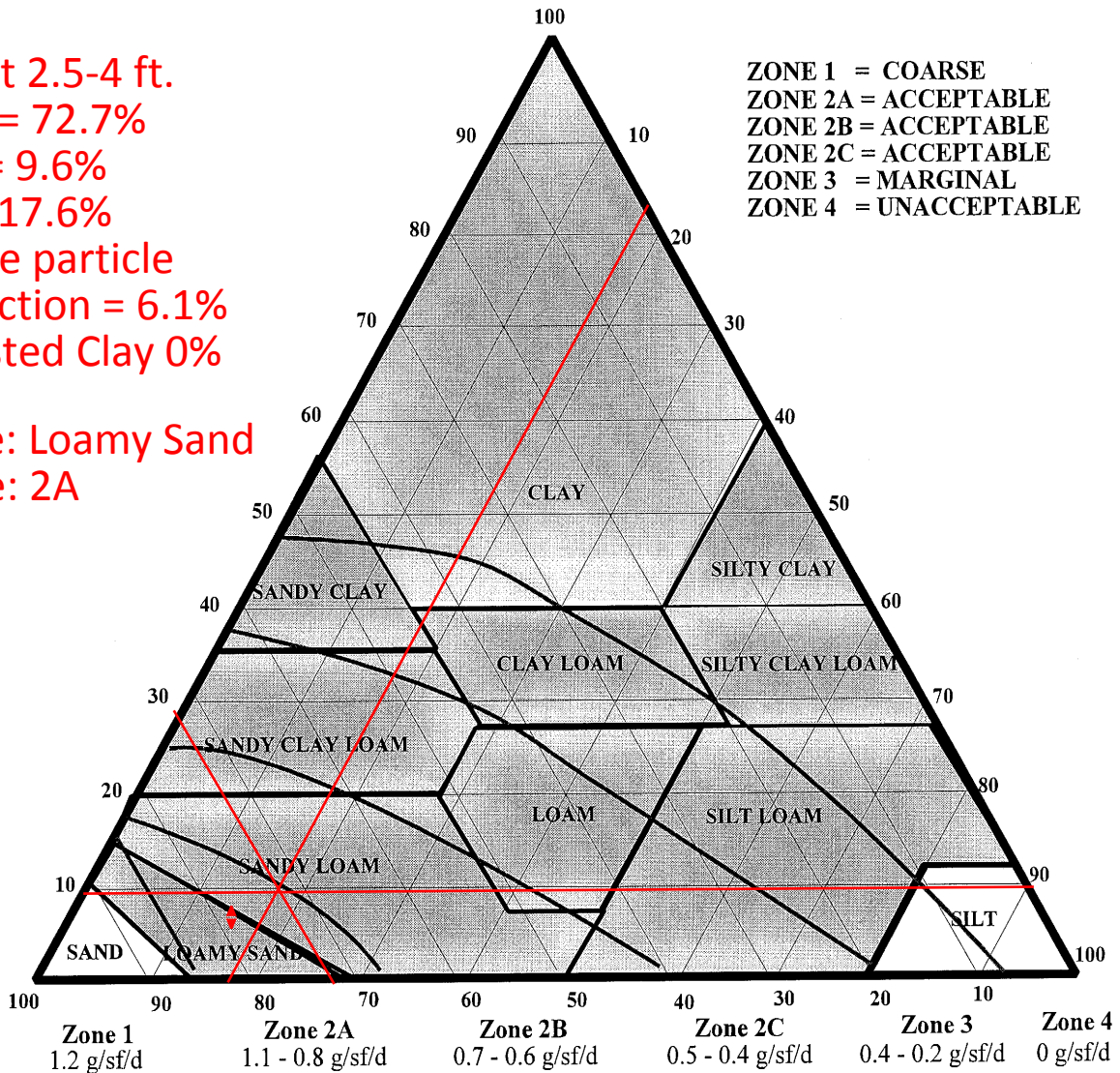
Laboratory Textural Analysis Results and Soil Suitability Charts

Soil Texture Suitability Chart

TP1 at 2.5-4 ft.
 sand = 72.7%
 clay = 9.6%
 silt = 17.6%
 coarse particle
 correction = 6.1%
 Adjusted Clay 0%

ZONE 1 = COARSE
 ZONE 2A = ACCEPTABLE
 ZONE 2B = ACCEPTABLE
 ZONE 2C = ACCEPTABLE
 ZONE 3 = MARGINAL
 ZONE 4 = UNACCEPTABLE

Texture: Loamy Sand
 Zone: 2A



INSTRUCTIONS:

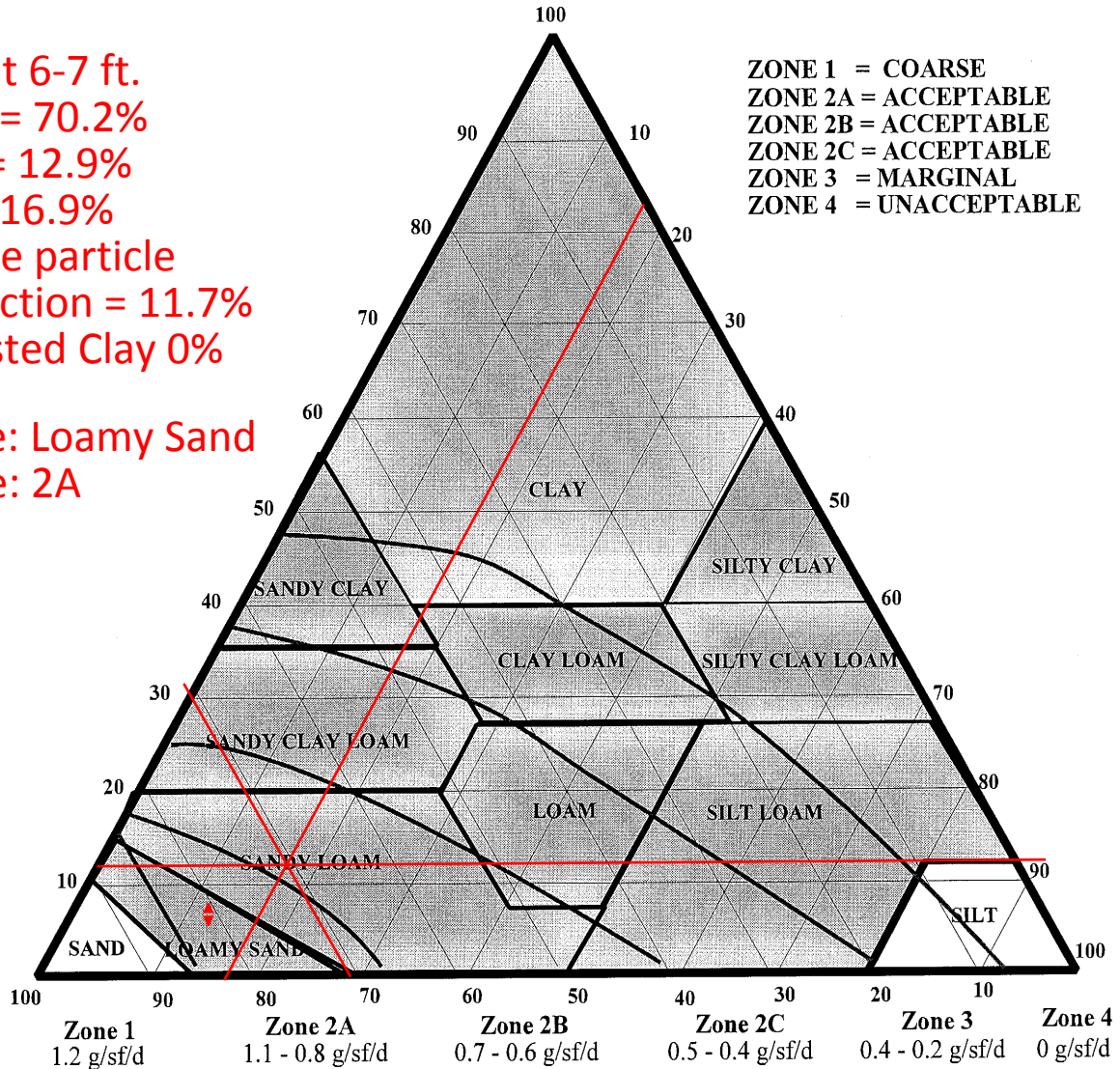
1. Plot texture on triangle based on percent sand, silt, and clay as determined by hydrometer analysis.
2. Adjust for coarse particles (gravel not fractured rock) by moving the plotted point in the sand direction an additional 2% for each 10% by volume of gravels greater than 2 mm in diameter.
3. Adjust for compactness of the soil by moving the plotted point in the clay direction an additional 15% for soils having a bulk-density greater than 1.7 gm/cc.

NOTE: For soils falling in sand, loamy sand or sandy loam texture classification, the bulk density analysis will generally not affect suitability and analysis not be necessary.

Soil Texture Suitability Chart

TP1 at 6-7 ft.
 sand = 70.2%
 clay = 12.9%
 silt = 16.9%
 coarse particle
 correction = 11.7%
 Adjusted Clay 0%

Texture: Loamy Sand
 Zone: 2A



ZONE 1 = COARSE
 ZONE 2A = ACCEPTABLE
 ZONE 2B = ACCEPTABLE
 ZONE 2C = ACCEPTABLE
 ZONE 3 = MARGINAL
 ZONE 4 = UNACCEPTABLE

INSTRUCTIONS:

1. Plot texture on triangle based on percent sand, silt, and clay as determined by hydrometer analysis.
2. Adjust for coarse particles (gravel not fractured rock) by moving the plotted point in the sand direction an additional 2% for each 10% by volume of gravels greater than 2 mm in diameter.
3. Adjust for compactness of the soil by moving the plotted point in the clay direction an additional 15% for soils having a bulk-density greater than 1.7 gm/cc.

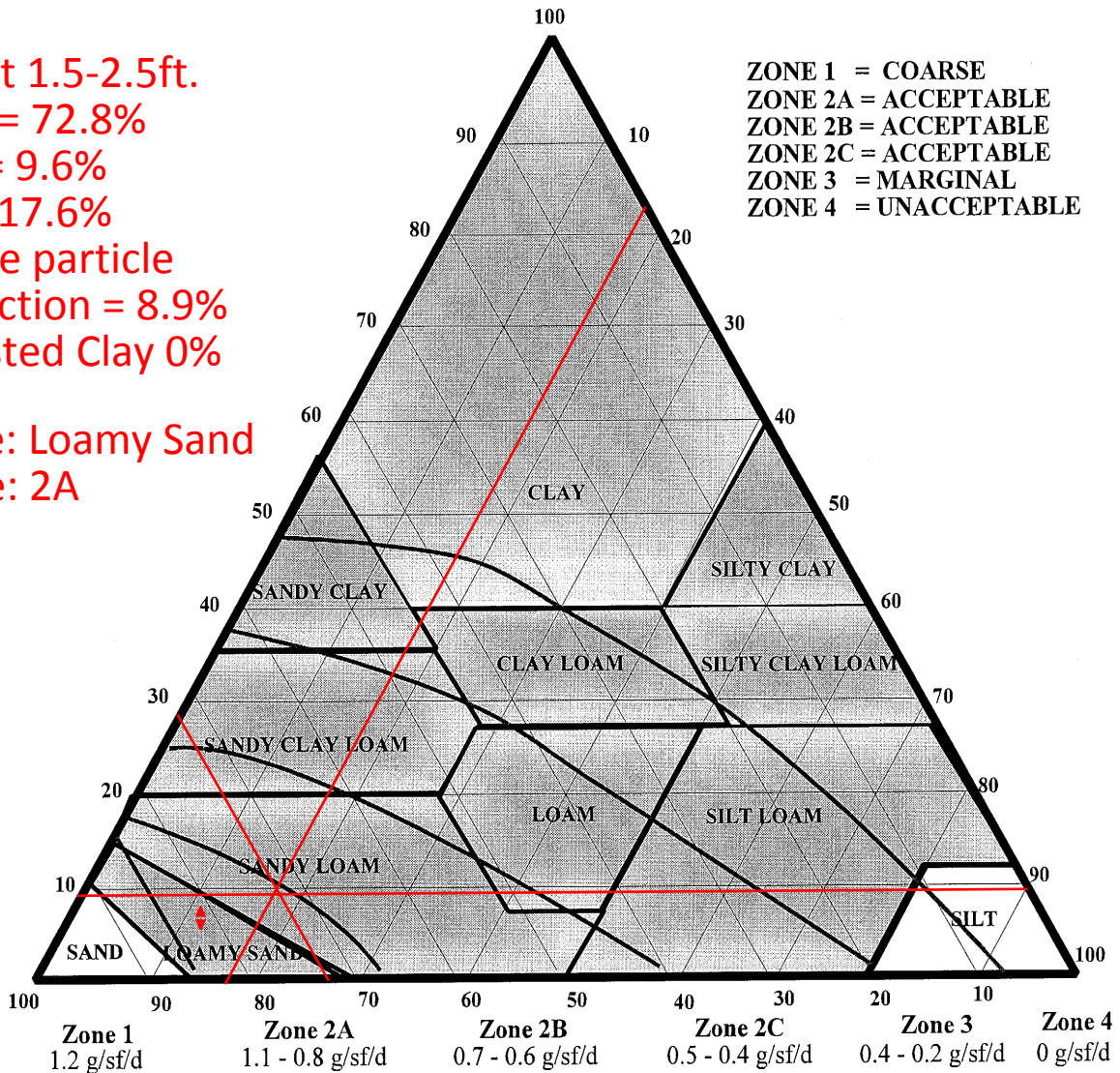
NOTE: For soils falling in sand, loamy sand or sandy loam texture classification, the bulk density analysis will generally not affect suitability and analysis not be necessary.

Soil Texture Suitability Chart

TP2 at 1.5-2.5ft.
 sand = 72.8%
 clay = 9.6%
 silt = 17.6%
 coarse particle
 correction = 8.9%
 Adjusted Clay 0%

ZONE 1 = COARSE
 ZONE 2A = ACCEPTABLE
 ZONE 2B = ACCEPTABLE
 ZONE 2C = ACCEPTABLE
 ZONE 3 = MARGINAL
 ZONE 4 = UNACCEPTABLE

Texture: Loamy Sand
 Zone: 2A



INSTRUCTIONS:

1. Plot texture on triangle based on percent sand, silt, and clay as determined by hydrometer analysis.
2. Adjust for coarse particles (gravel not fractured rock) by moving the plotted point in the sand direction an additional 2% for each 10% by volume of gravels greater than 2 mm in diameter.
3. Adjust for compactness of the soil by moving the plotted point in the clay direction an additional 15% for soils having a bulk-density greater than 1.7 gm/cc.

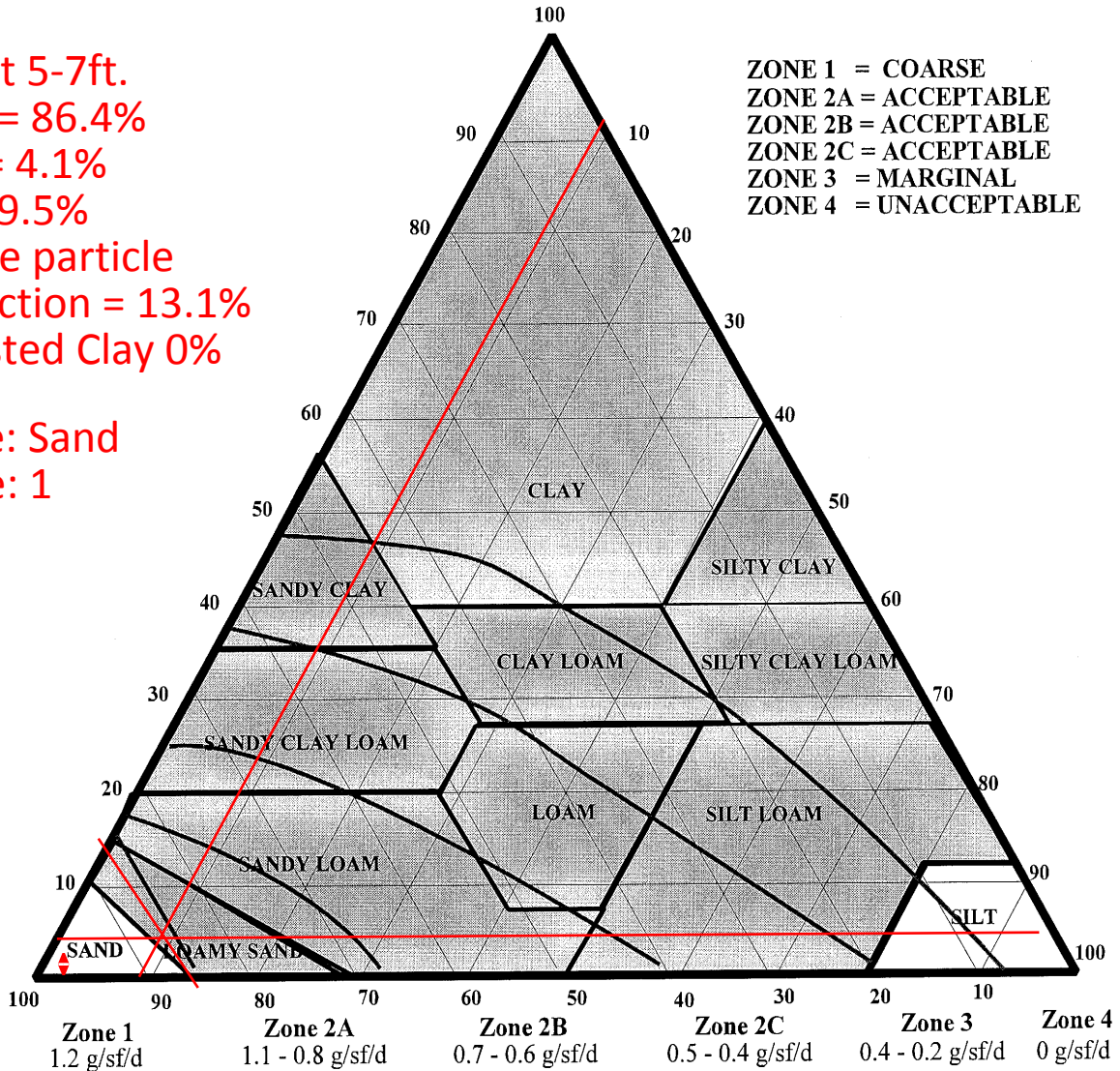
NOTE: For soils falling in sand, loamy sand or sandy loam texture classification, the bulk density analysis will generally not affect suitability and analysis not be necessary.

Soil Texture Suitability Chart

TP2 at 5-7ft.
 sand = 86.4%
 clay = 4.1%
 silt = 9.5%
 coarse particle
 correction = 13.1%
 Adjusted Clay 0%

ZONE 1 = COARSE
 ZONE 2A = ACCEPTABLE
 ZONE 2B = ACCEPTABLE
 ZONE 2C = ACCEPTABLE
 ZONE 3 = MARGINAL
 ZONE 4 = UNACCEPTABLE

Texture: Sand
 Zone: 1



INSTRUCTIONS:

1. Plot texture on triangle based on percent sand, silt, and clay as determined by hydrometer analysis.
2. Adjust for coarse particles (gravel not fractured rock) by moving the plotted point in the sand direction an additional 2% for each 10% by volume of gravels greater than 2 mm in diameter.
3. Adjust for compactness of the soil by moving the plotted point in the clay direction an additional 15% for soils having a bulk-density greater than 1.7 gm/cc.

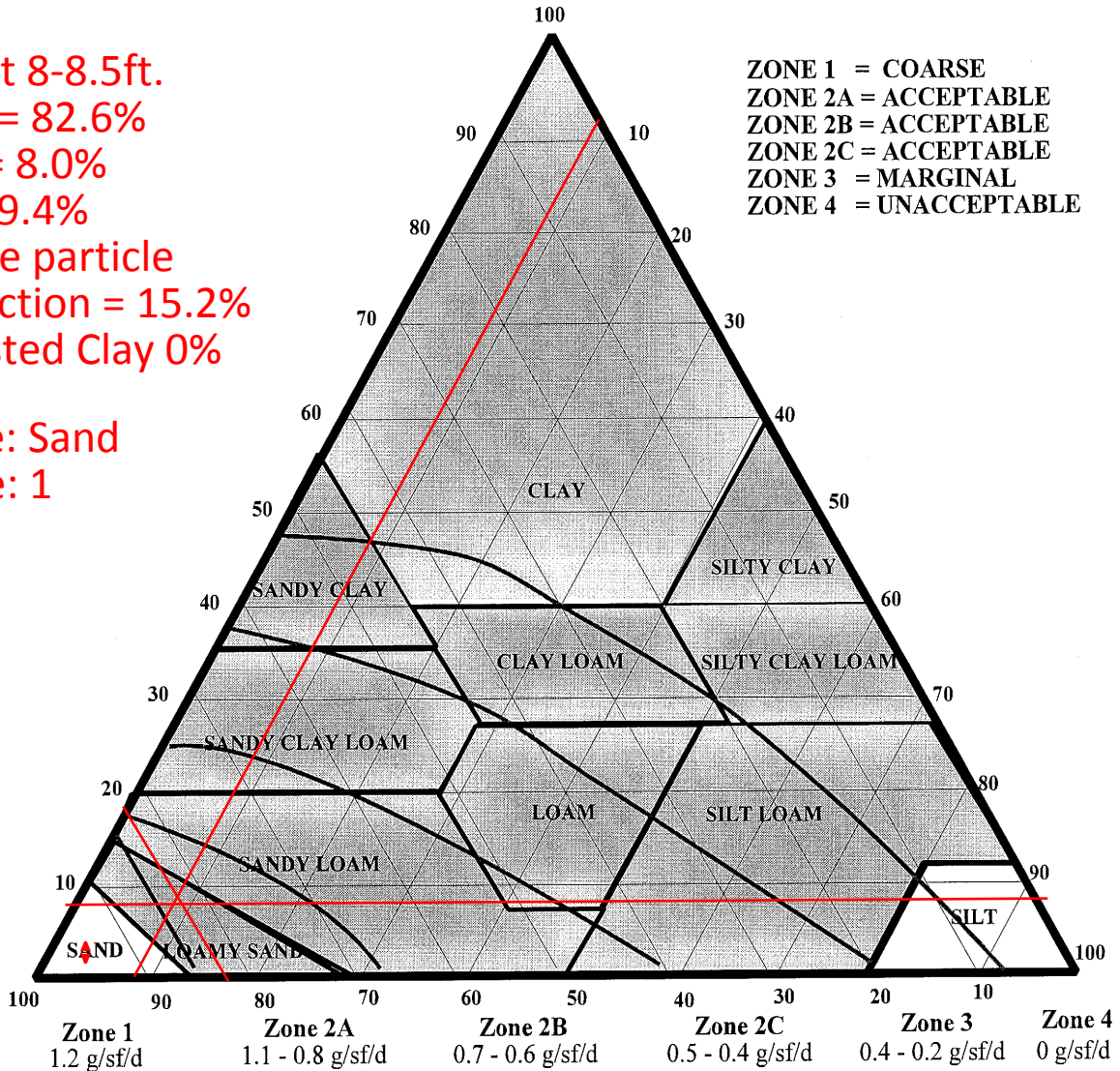
NOTE: For soils falling in sand, loamy sand or sandy loam texture classification, the bulk density analysis will generally not affect suitability and analysis not be necessary.

Soil Texture Suitability Chart

TP2 at 8-8.5ft.
 sand = 82.6%
 clay = 8.0%
 silt = 9.4%
 coarse particle
 correction = 15.2%
 Adjusted Clay 0%

Texture: Sand
 Zone: 1

ZONE 1 = COARSE
 ZONE 2A = ACCEPTABLE
 ZONE 2B = ACCEPTABLE
 ZONE 2C = ACCEPTABLE
 ZONE 3 = MARGINAL
 ZONE 4 = UNACCEPTABLE



INSTRUCTIONS:

1. Plot texture on triangle based on percent sand, silt, and clay as determined by hydrometer analysis.
2. Adjust for coarse particles (gravel not fractured rock) by moving the plotted point in the sand direction an additional 2% for each 10% by volume of gravels greater than 2 mm in diameter.
3. Adjust for compactness of the soil by moving the plotted point in the clay direction an additional 15% for soils having a bulk-density greater than 1.7 gm/cc.

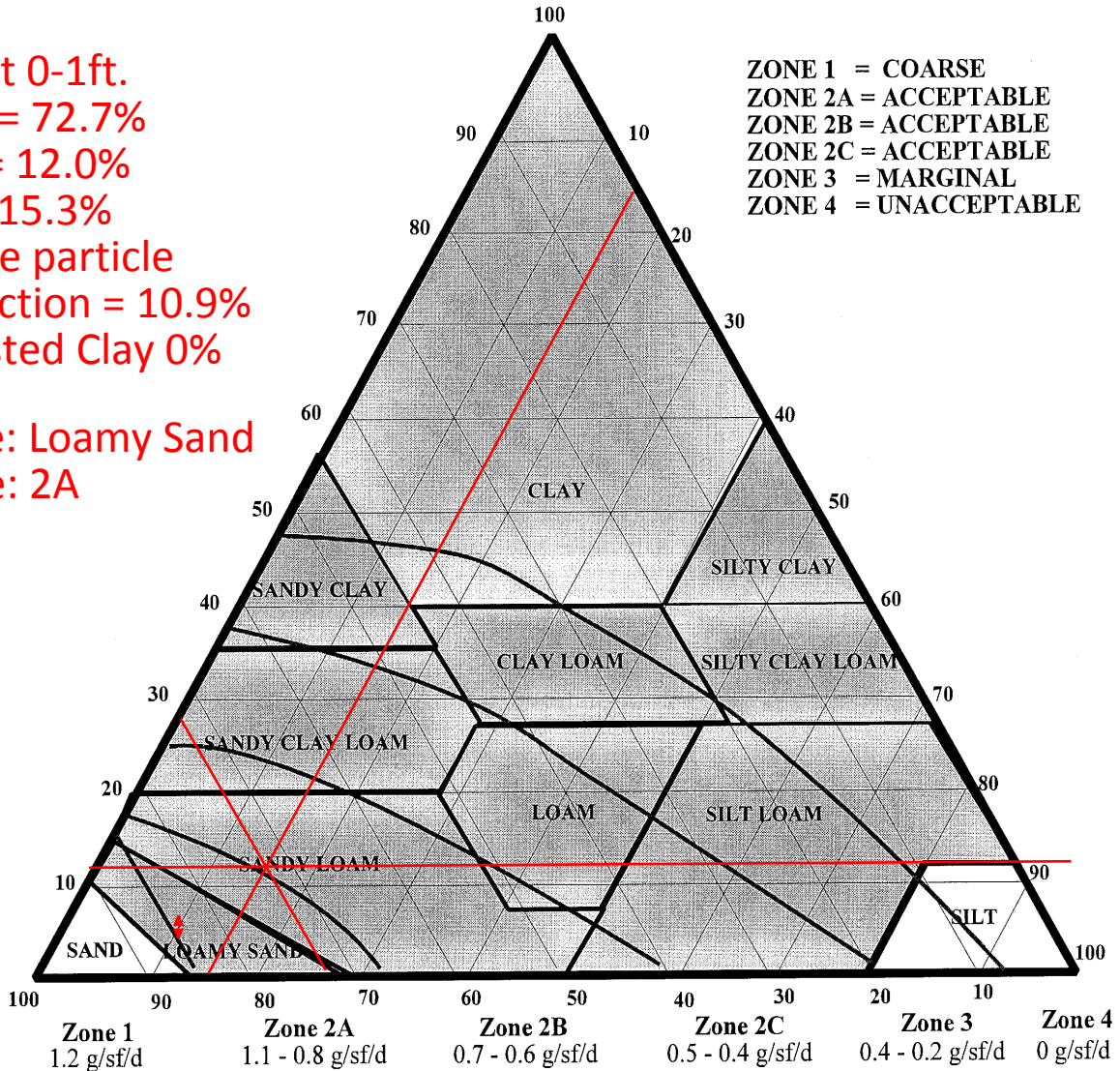
NOTE: For soils falling in sand, loamy sand or sandy loam texture classification, the bulk density analysis will generally not affect suitability and analysis not be necessary.

Soil Texture Suitability Chart

TP3 at 0-1ft.
 sand = 72.7%
 clay = 12.0%
 silt = 15.3%
 coarse particle
 correction = 10.9%
 Adjusted Clay 0%

ZONE 1 = COARSE
 ZONE 2A = ACCEPTABLE
 ZONE 2B = ACCEPTABLE
 ZONE 2C = ACCEPTABLE
 ZONE 3 = MARGINAL
 ZONE 4 = UNACCEPTABLE

Texture: Loamy Sand
 Zone: 2A



INSTRUCTIONS:

1. Plot texture on triangle based on percent sand, silt, and clay as determined by hydrometer analysis.
2. Adjust for coarse particles (gravel not fractured rock) by moving the plotted point in the sand direction an additional 2% for each 10% by volume of gravels greater than 2 mm in diameter.
3. Adjust for compactness of the soil by moving the plotted point in the clay direction an additional 15% for soils having a bulk-density greater than 1.7 gm/cc.

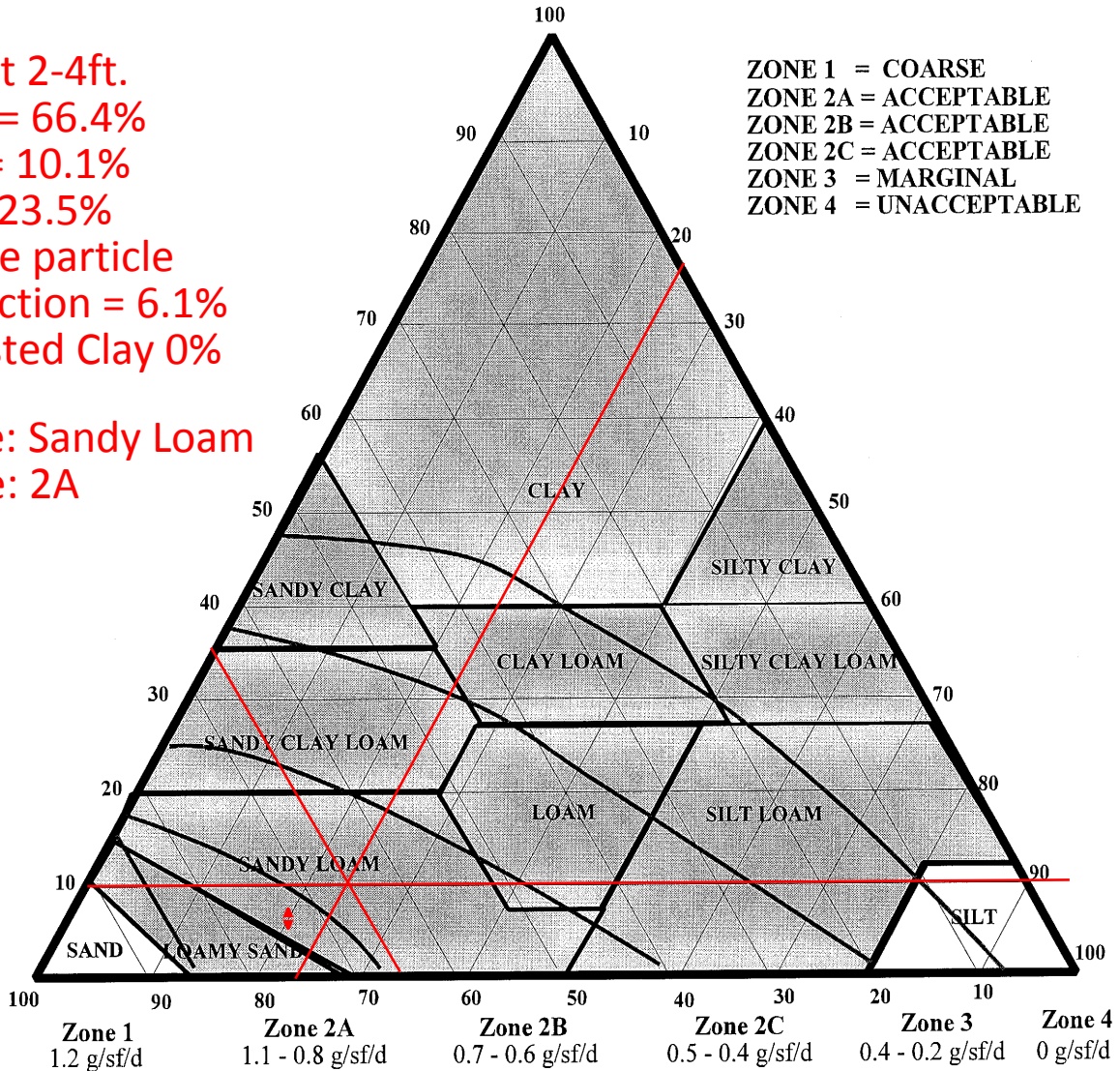
NOTE: For soils falling in sand, loamy sand or sandy loam texture classification, the bulk density analysis will generally not affect suitability and analysis not be necessary.

Soil Texture Suitability Chart

TP3 at 2-4ft.
 sand = 66.4%
 clay = 10.1%
 silt = 23.5%
 coarse particle
 correction = 6.1%
 Adjusted Clay 0%

ZONE 1 = COARSE
 ZONE 2A = ACCEPTABLE
 ZONE 2B = ACCEPTABLE
 ZONE 2C = ACCEPTABLE
 ZONE 3 = MARGINAL
 ZONE 4 = UNACCEPTABLE

Texture: Sandy Loam
 Zone: 2A



INSTRUCTIONS:

1. Plot texture on triangle based on percent sand, silt, and clay as determined by hydrometer analysis.
2. Adjust for coarse particles (gravel not fractured rock) by moving the plotted point in the sand direction an additional 2% for each 10% by volume of gravels greater than 2 mm in diameter.
3. Adjust for compactness of the soil by moving the plotted point in the clay direction an additional 15% for soils having a bulk-density greater than 1.7 gm/cc.

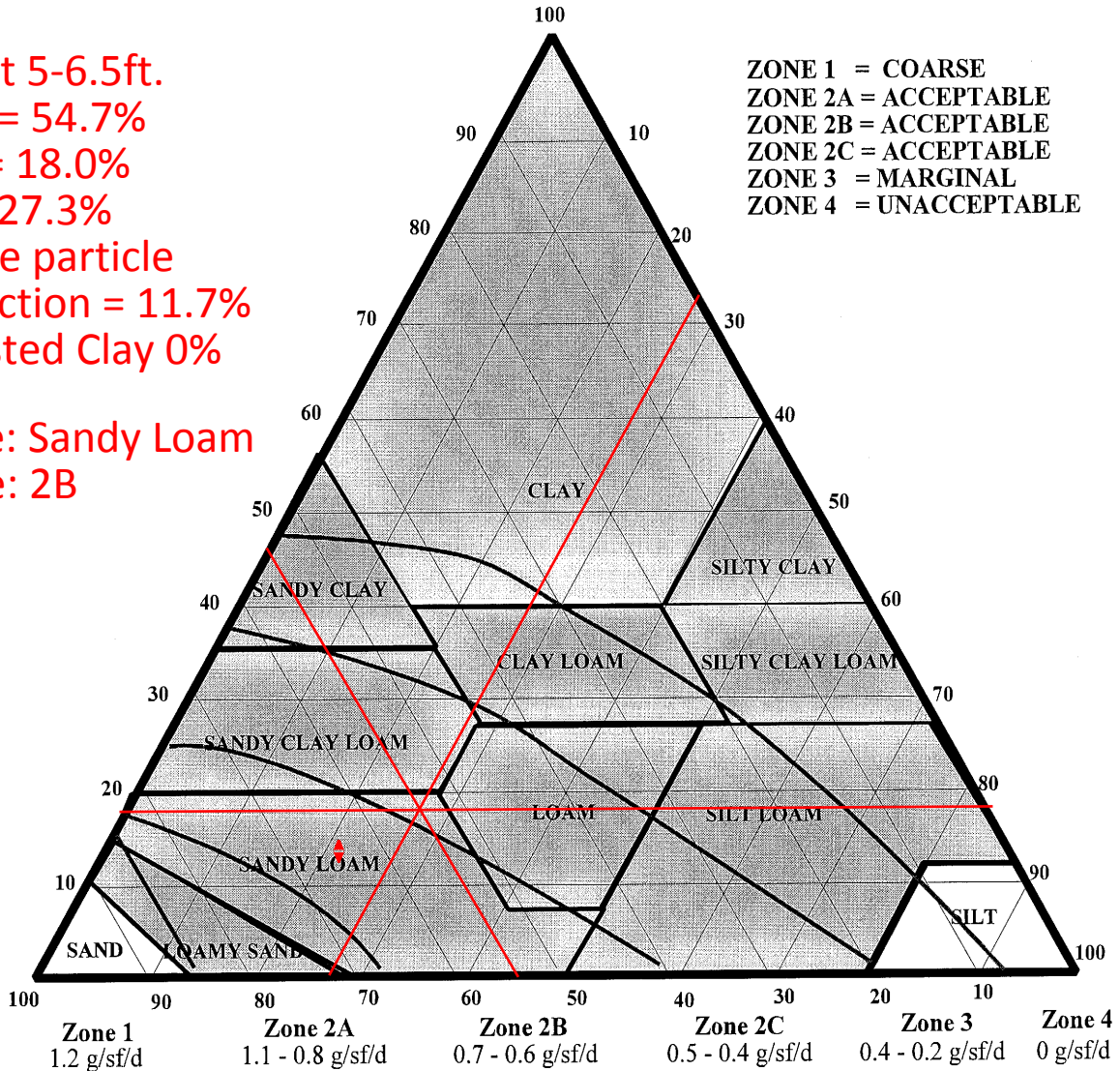
NOTE: For soils falling in sand, loamy sand or sandy loam texture classification, the bulk density analysis will generally not affect suitability and analysis not be necessary.

Soil Texture Suitability Chart

TP3 at 5-6.5ft.
 sand = 54.7%
 clay = 18.0%
 silt = 27.3%
 coarse particle
 correction = 11.7%
 Adjusted Clay 0%

Texture: Sandy Loam
 Zone: 2B

ZONE 1 = COARSE
 ZONE 2A = ACCEPTABLE
 ZONE 2B = ACCEPTABLE
 ZONE 2C = ACCEPTABLE
 ZONE 3 = MARGINAL
 ZONE 4 = UNACCEPTABLE



INSTRUCTIONS:

1. Plot texture on triangle based on percent sand, silt, and clay as determined by hydrometer analysis.
2. Adjust for coarse particles (gravel not fractured rock) by moving the plotted point in the sand direction an additional 2% for each 10% by volume of gravels greater than 2 mm in diameter.
3. Adjust for compactness of the soil by moving the plotted point in the clay direction an additional 15% for soils having a bulk-density greater than 1.7 gm/cc.

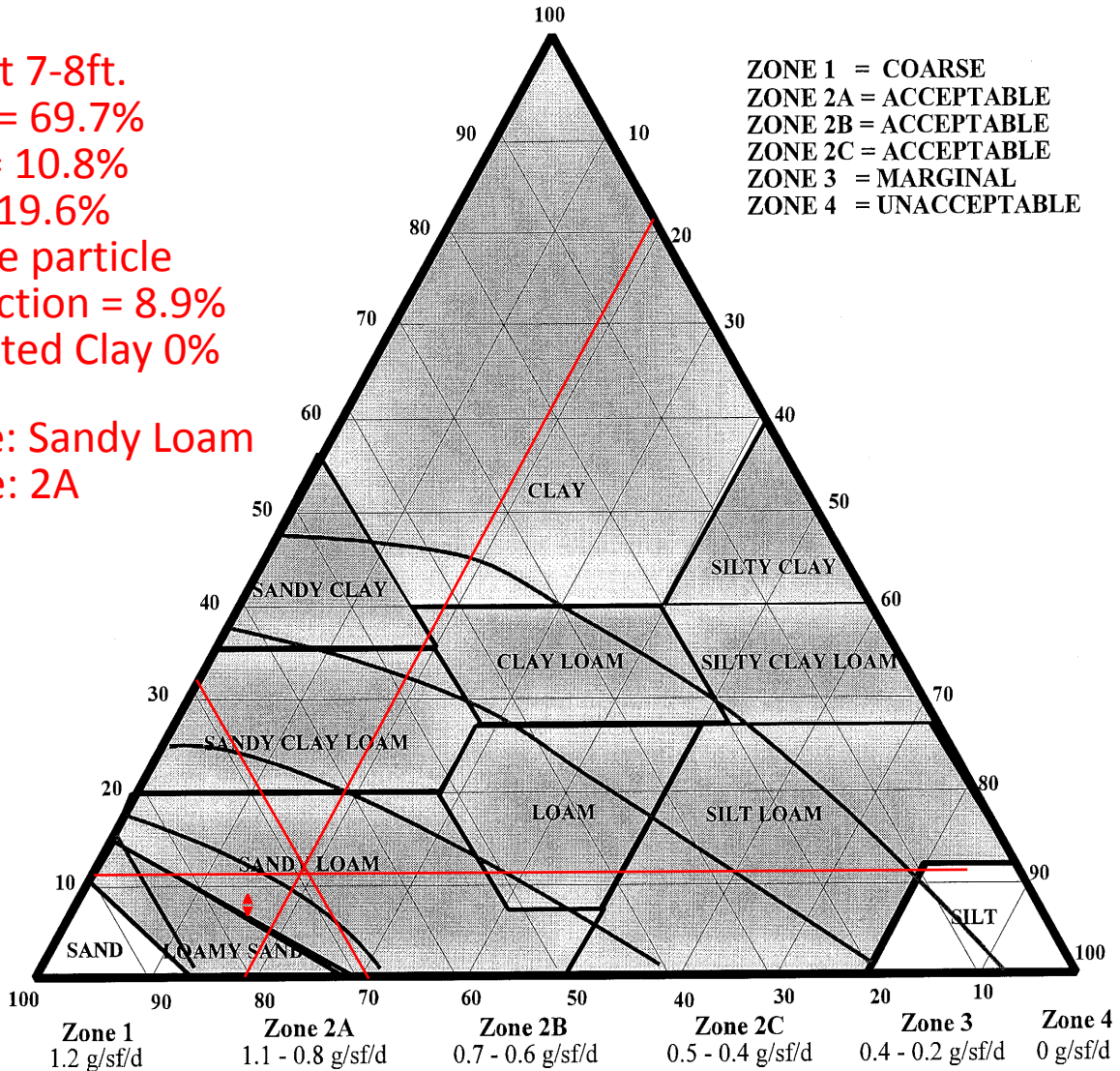
NOTE: For soils falling in sand, loamy sand or sandy loam texture classification, the bulk density analysis will generally not affect suitability and analysis not be necessary.

Soil Texture Suitability Chart

TP3 at 7-8ft.
 sand = 69.7%
 clay = 10.8%
 silt = 19.6%
 coarse particle
 correction = 8.9%
 Adjusted Clay 0%

ZONE 1 = COARSE
 ZONE 2A = ACCEPTABLE
 ZONE 2B = ACCEPTABLE
 ZONE 2C = ACCEPTABLE
 ZONE 3 = MARGINAL
 ZONE 4 = UNACCEPTABLE

Texture: Sandy Loam
 Zone: 2A



INSTRUCTIONS:

1. Plot texture on triangle based on percent sand, silt, and clay as determined by hydrometer analysis.
2. Adjust for coarse particles (gravel not fractured rock) by moving the plotted point in the sand direction an additional 2% for each 10% by volume of gravels greater than 2 mm in diameter.
3. Adjust for compactness of the soil by moving the plotted point in the clay direction an additional 15% for soils having a bulk-density greater than 1.7 gm/cc.

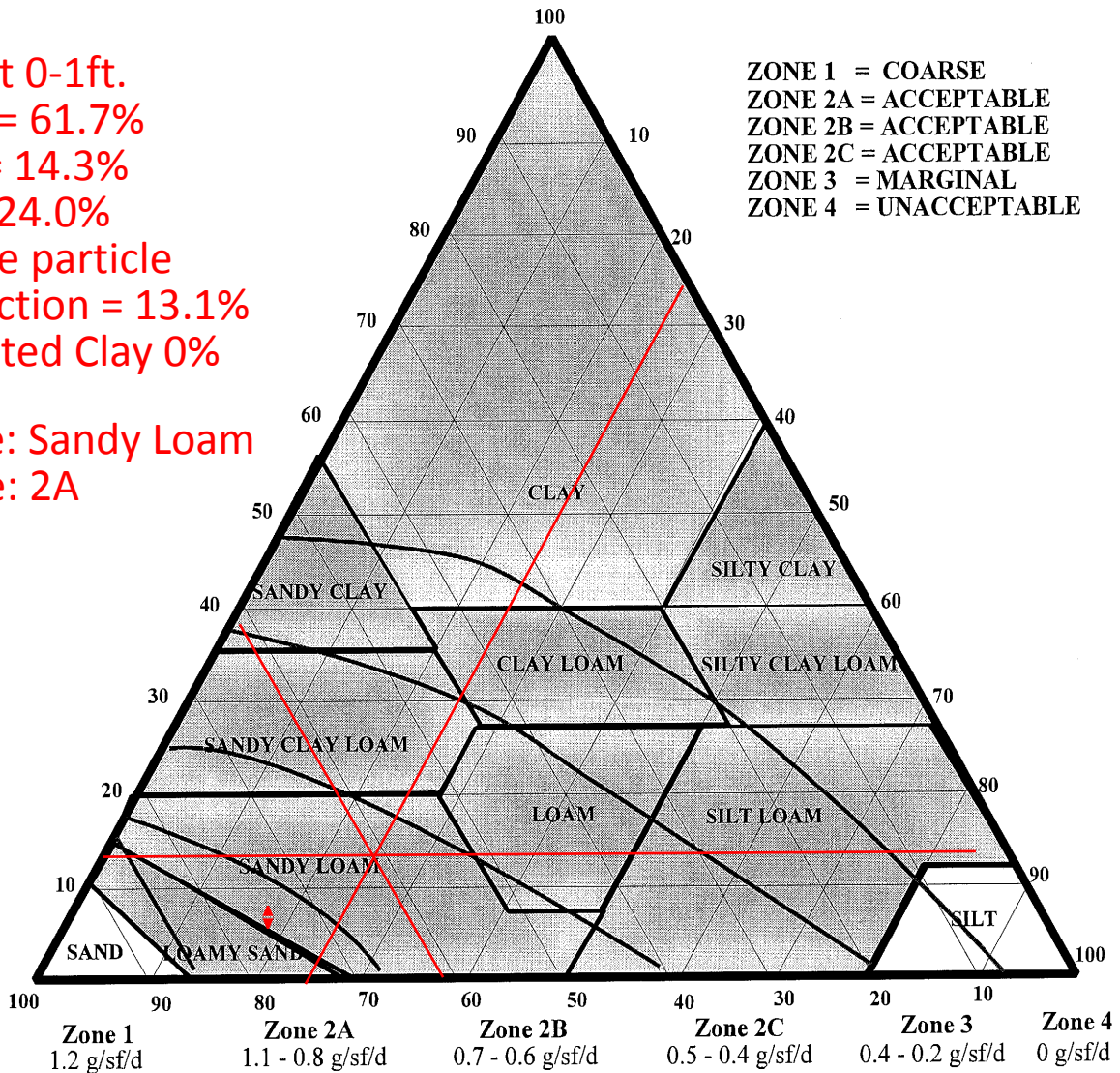
NOTE: For soils falling in sand, loamy sand or sandy loam texture classification, the bulk density analysis will generally not affect suitability and analysis not be necessary.

Soil Texture Suitability Chart

TP4 at 0-1ft.
 sand = 61.7%
 clay = 14.3%
 silt = 24.0%
 coarse particle
 correction = 13.1%
 Adjusted Clay 0%

ZONE 1 = COARSE
 ZONE 2A = ACCEPTABLE
 ZONE 2B = ACCEPTABLE
 ZONE 2C = ACCEPTABLE
 ZONE 3 = MARGINAL
 ZONE 4 = UNACCEPTABLE

Texture: Sandy Loam
 Zone: 2A



INSTRUCTIONS:

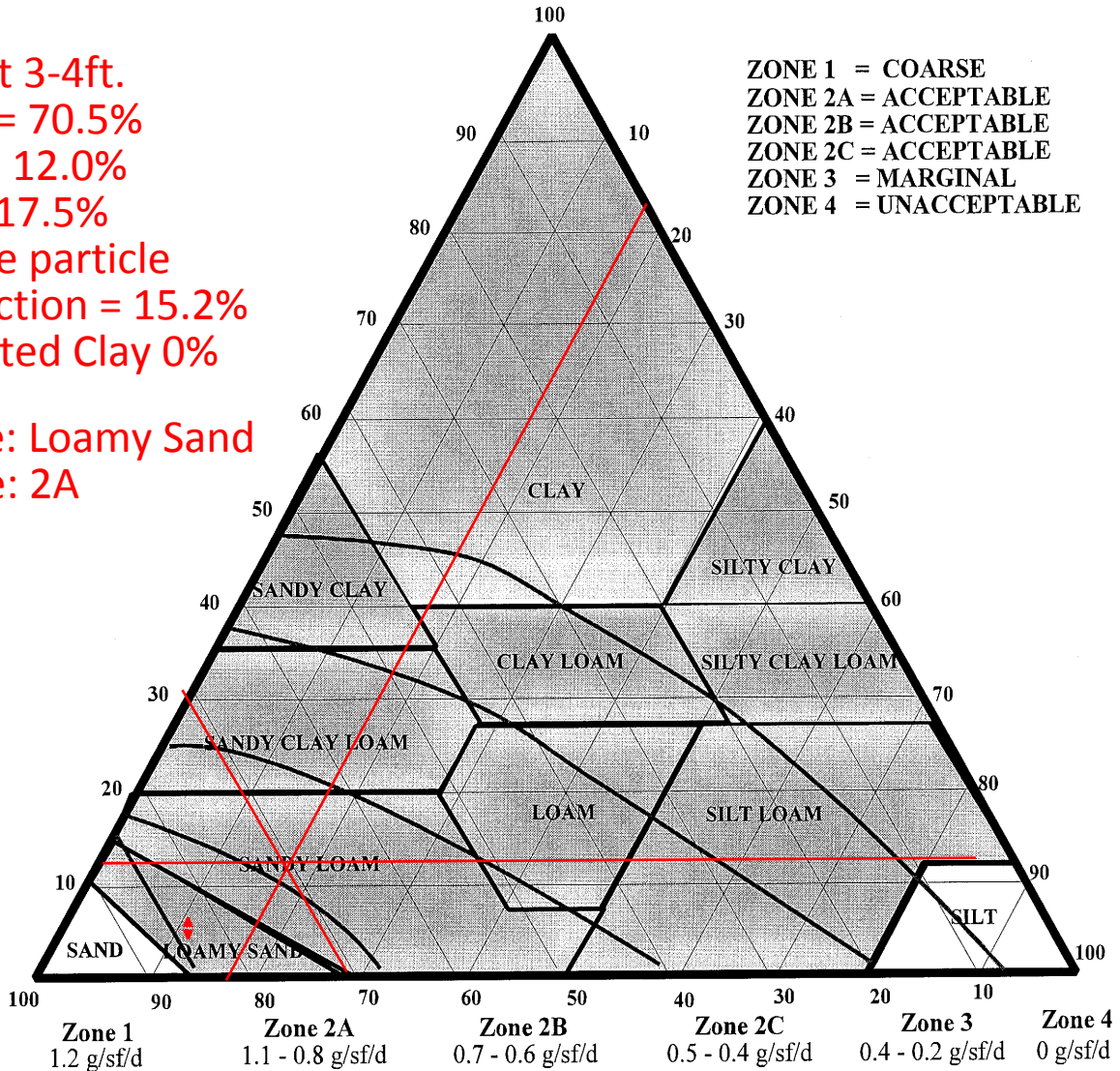
1. Plot texture on triangle based on percent sand, silt, and clay as determined by hydrometer analysis.
2. Adjust for coarse particles (gravel not fractured rock) by moving the plotted point in the sand direction an additional 2% for each 10% by volume of gravels greater than 2 mm in diameter.
3. Adjust for compactness of the soil by moving the plotted point in the clay direction an additional 15% for soils having a bulk-density greater than 1.7 gm/cc.

NOTE: For soils falling in sand, loamy sand or sandy loam texture classification, the bulk density analysis will generally not affect suitability and analysis not be necessary.

Soil Texture Suitability Chart

TP4 at 3-4ft.
 sand = 70.5%
 clay = 12.0%
 silt = 17.5%
 coarse particle
 correction = 15.2%
 Adjusted Clay 0%

Texture: Loamy Sand
 Zone: 2A



ZONE 1 = COARSE
 ZONE 2A = ACCEPTABLE
 ZONE 2B = ACCEPTABLE
 ZONE 2C = ACCEPTABLE
 ZONE 3 = MARGINAL
 ZONE 4 = UNACCEPTABLE

INSTRUCTIONS:

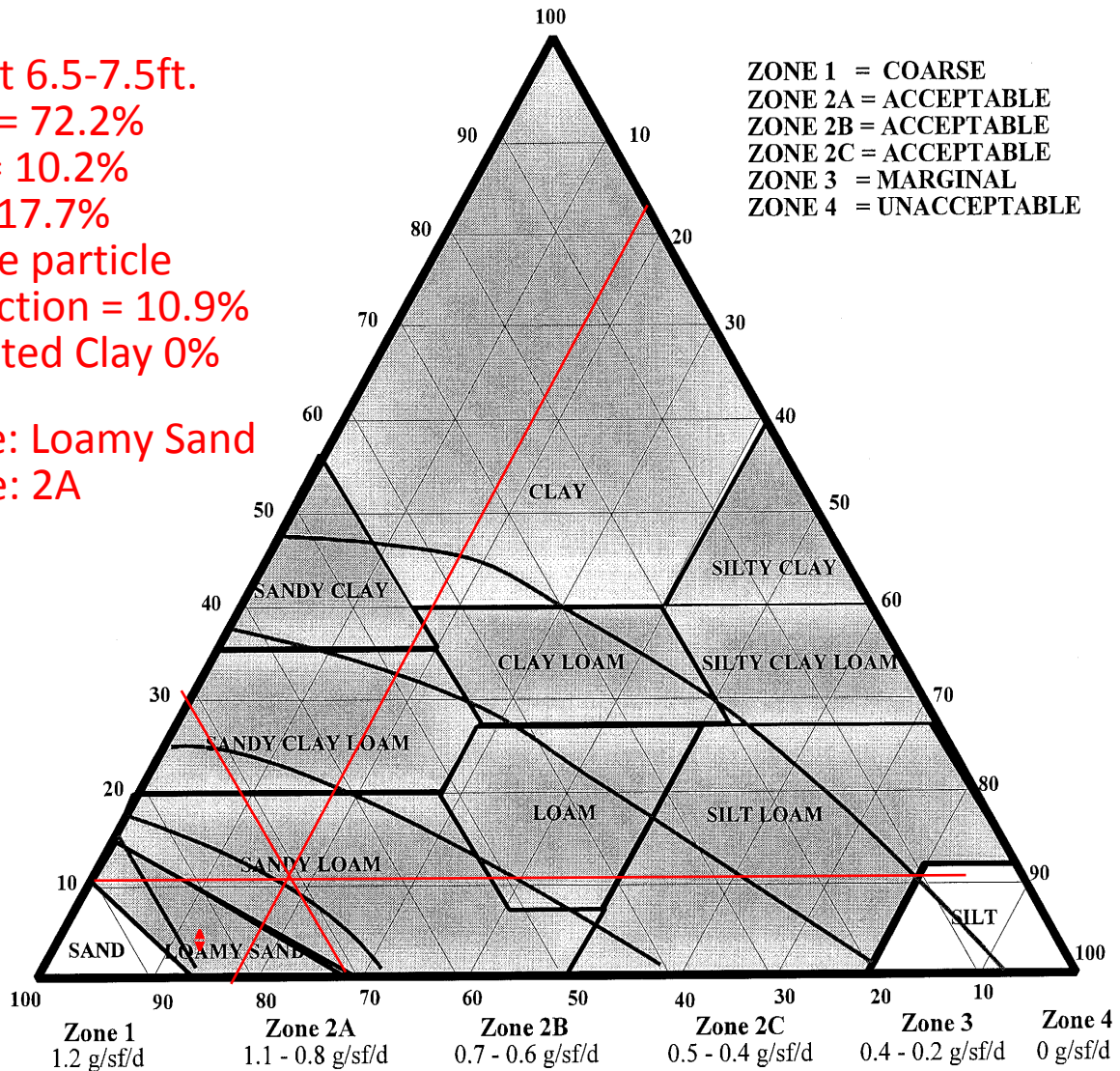
1. Plot texture on triangle based on percent sand, silt, and clay as determined by hydrometer analysis.
2. Adjust for coarse particles (gravel not fractured rock) by moving the plotted point in the sand direction an additional 2% for each 10% by volume of gravels greater than 2 mm in diameter.
3. Adjust for compactness of the soil by moving the plotted point in the clay direction an additional 15% for soils having a bulk-density greater than 1.7 gm/cc.

NOTE: For soils falling in sand, loamy sand or sandy loam texture classification, the bulk density analysis will generally not affect suitability and analysis not be necessary.

Soil Texture Suitability Chart

TP4 at 6.5-7.5ft.
 sand = 72.2%
 clay = 10.2%
 silt = 17.7%
 coarse particle
 correction = 10.9%
 Adjusted Clay 0%

Texture: Loamy Sand
 Zone: 2A



ZONE 1 = COARSE
 ZONE 2A = ACCEPTABLE
 ZONE 2B = ACCEPTABLE
 ZONE 2C = ACCEPTABLE
 ZONE 3 = MARGINAL
 ZONE 4 = UNACCEPTABLE

INSTRUCTIONS:

1. Plot texture on triangle based on percent sand, silt, and clay as determined by hydrometer analysis.
2. Adjust for coarse particles (gravel not fractured rock) by moving the plotted point in the sand direction an additional 2% for each 10% by volume of gravels greater than 2 mm in diameter.
3. Adjust for compactness of the soil by moving the plotted point in the clay direction an additional 15% for soils having a bulk-density greater than 1.7 gm/cc.

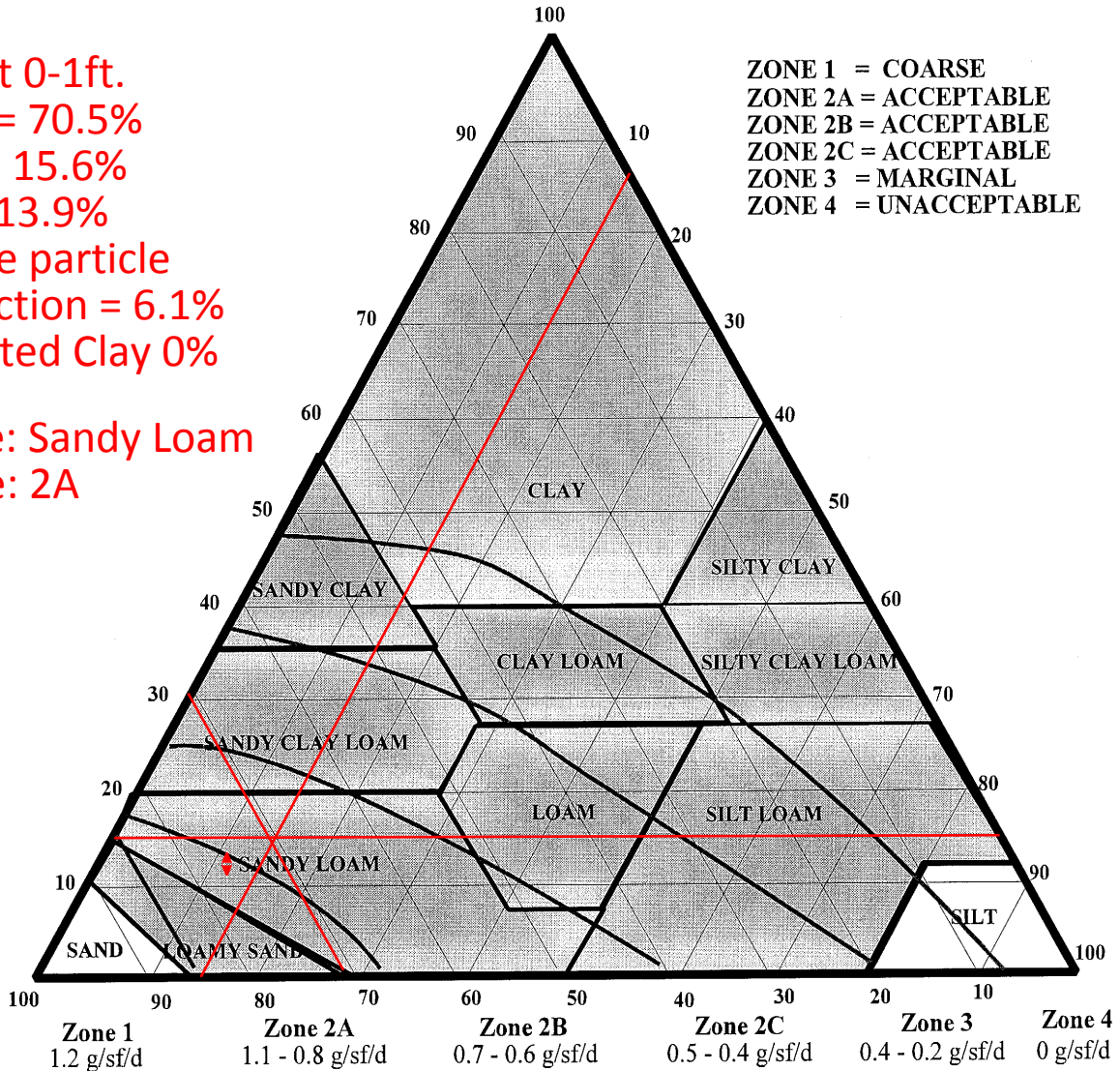
NOTE: For soils falling in sand, loamy sand or sandy loam texture classification, the bulk density analysis will generally not affect suitability and analysis not be necessary.

Soil Texture Suitability Chart

TP5 at 0-1ft.
 sand = 70.5%
 clay = 15.6%
 silt = 13.9%
 coarse particle
 correction = 6.1%
 Adjusted Clay 0%

ZONE 1 = COARSE
 ZONE 2A = ACCEPTABLE
 ZONE 2B = ACCEPTABLE
 ZONE 2C = ACCEPTABLE
 ZONE 3 = MARGINAL
 ZONE 4 = UNACCEPTABLE

Texture: Sandy Loam
 Zone: 2A



INSTRUCTIONS:

1. Plot texture on triangle based on percent sand, silt, and clay as determined by hydrometer analysis.
2. Adjust for coarse particles (gravel not fractured rock) by moving the plotted point in the sand direction an additional 2% for each 10% by volume of gravels greater than 2 mm in diameter.
3. Adjust for compactness of the soil by moving the plotted point in the clay direction an additional 15% for soils having a bulk-density greater than 1.7 gm/cc.

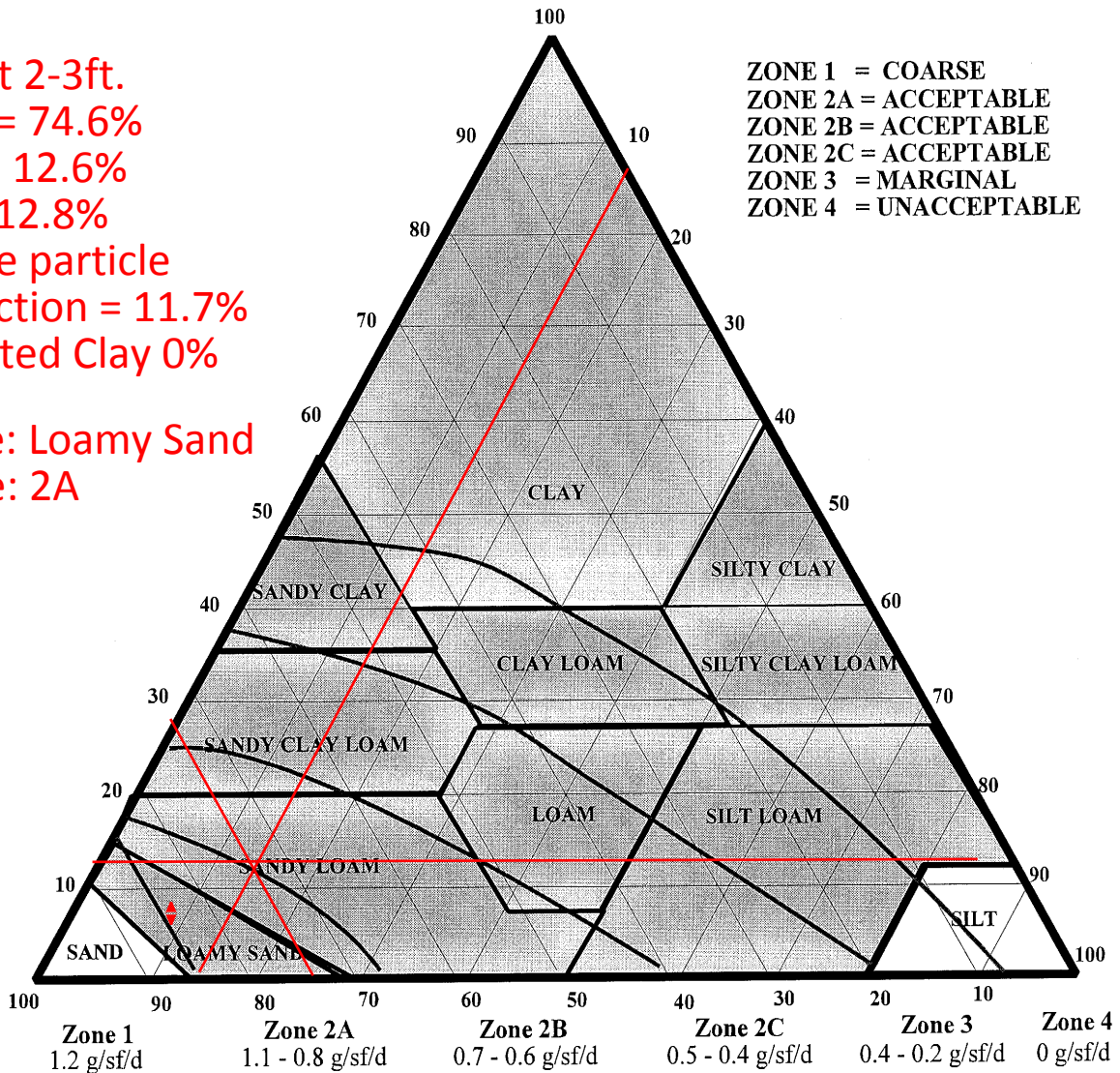
NOTE: For soils falling in sand, loamy sand or sandy loam texture classification, the bulk density analysis will generally not affect suitability and analysis not be necessary.

Soil Texture Suitability Chart

TP5 at 2-3ft.
 sand = 74.6%
 clay = 12.6%
 silt = 12.8%
 coarse particle
 correction = 11.7%
 Adjusted Clay 0%

Texture: Loamy Sand
 Zone: 2A

ZONE 1 = COARSE
 ZONE 2A = ACCEPTABLE
 ZONE 2B = ACCEPTABLE
 ZONE 2C = ACCEPTABLE
 ZONE 3 = MARGINAL
 ZONE 4 = UNACCEPTABLE



INSTRUCTIONS:

1. Plot texture on triangle based on percent sand, silt, and clay as determined by hydrometer analysis.
2. Adjust for coarse particles (gravel not fractured rock) by moving the plotted point in the sand direction an additional 2% for each 10% by volume of gravels greater than 2 mm in diameter.
3. Adjust for compactness of the soil by moving the plotted point in the clay direction an additional 15% for soils having a bulk-density greater than 1.7 gm/cc.

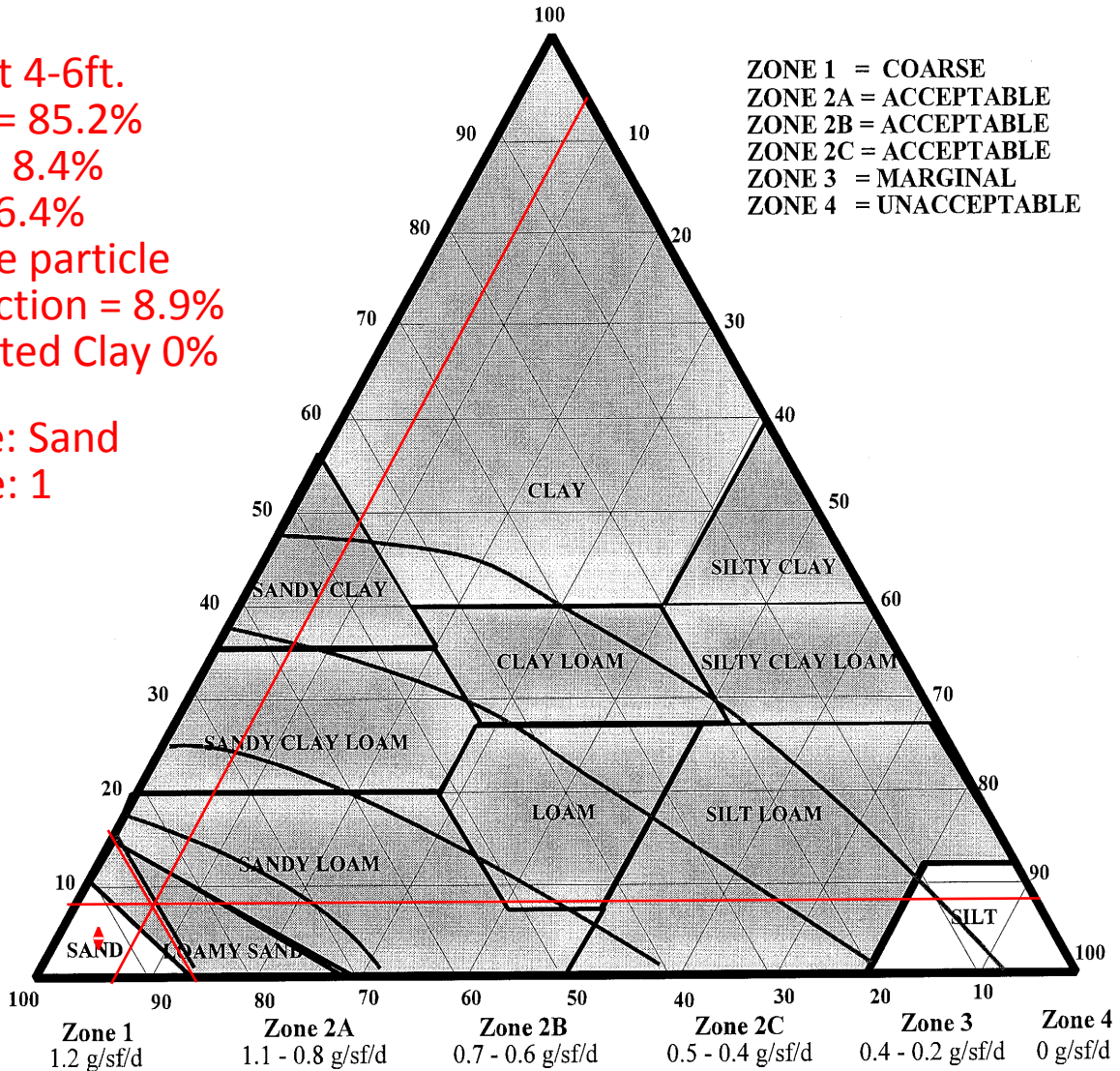
NOTE: For soils falling in sand, loamy sand or sandy loam texture classification, the bulk density analysis will generally not affect suitability and analysis not be necessary.

Soil Texture Suitability Chart

TP5 at 4-6ft.
 sand = 85.2%
 clay = 8.4%
 silt = 6.4%
 coarse particle
 correction = 8.9%
 Adjusted Clay 0%

Texture: Sand
 Zone: 1

ZONE 1 = COARSE
 ZONE 2A = ACCEPTABLE
 ZONE 2B = ACCEPTABLE
 ZONE 2C = ACCEPTABLE
 ZONE 3 = MARGINAL
 ZONE 4 = UNACCEPTABLE



INSTRUCTIONS:

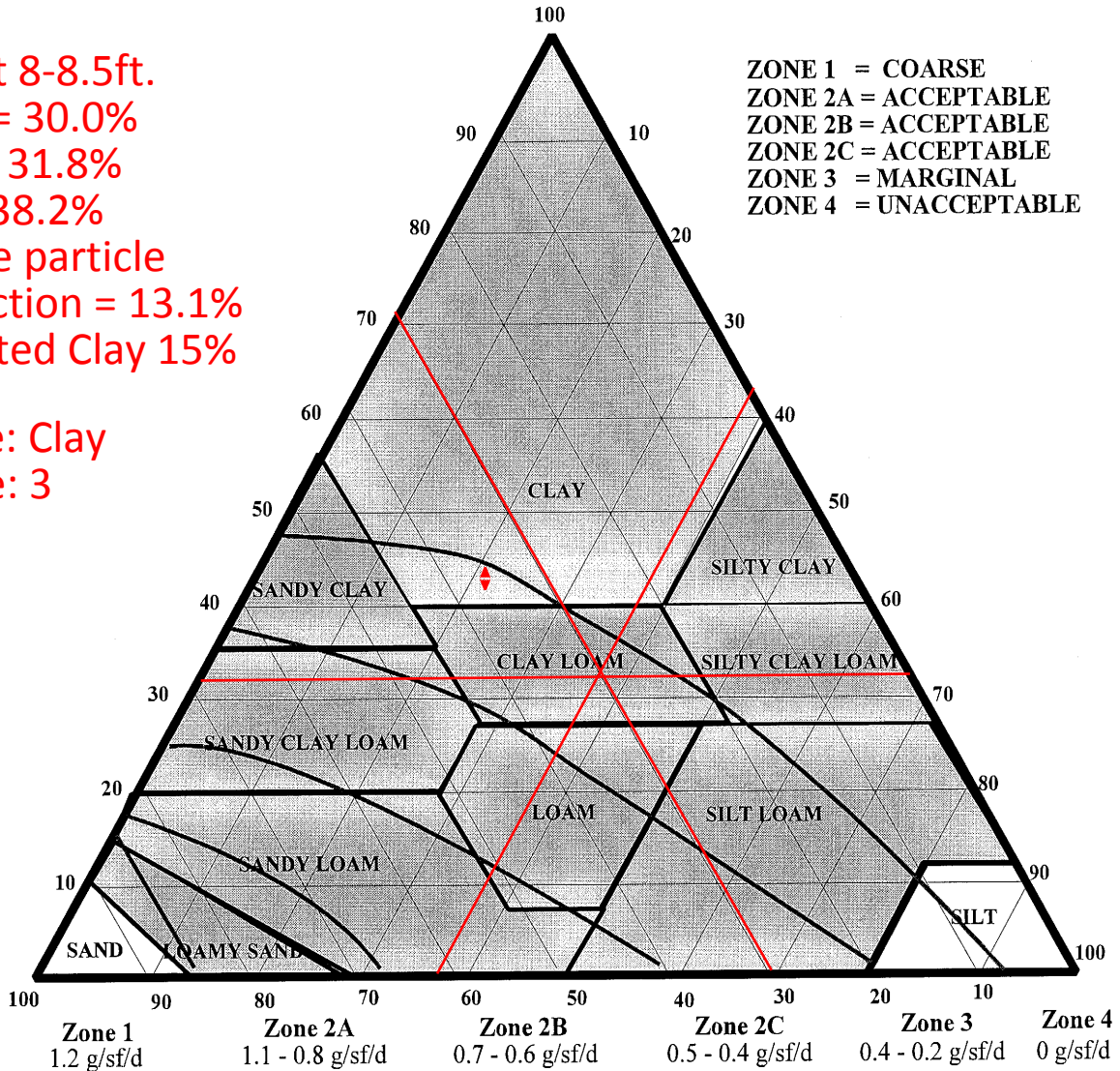
1. Plot texture on triangle based on percent sand, silt, and clay as determined by hydrometer analysis.
2. Adjust for coarse particles (gravel not fractured rock) by moving the plotted point in the sand direction an additional 2% for each 10% by volume of gravels greater than 2 mm in diameter.
3. Adjust for compactness of the soil by moving the plotted point in the clay direction an additional 15% for soils having a bulk-density greater than 1.7 gm/cc.

NOTE: For soils falling in sand, loamy sand or sandy loam texture classification, the bulk density analysis will generally not affect suitability and analysis not be necessary.

Soil Texture Suitability Chart

TP5 at 8-8.5ft.
 sand = 30.0%
 clay = 31.8%
 silt = 38.2%
 coarse particle
 correction = 13.1%
 Adjusted Clay 15%

Texture: Clay
 Zone: 3



INSTRUCTIONS:

1. Plot texture on triangle based on percent sand, silt, and clay as determined by hydrometer analysis.
2. Adjust for coarse particles (gravel not fractured rock) by moving the plotted point in the sand direction an additional 2% for each 10% by volume of gravels greater than 2 mm in diameter.
3. Adjust for compactness of the soil by moving the plotted point in the clay direction an additional 15% for soils having a bulk-density greater than 1.7 gm/cc.

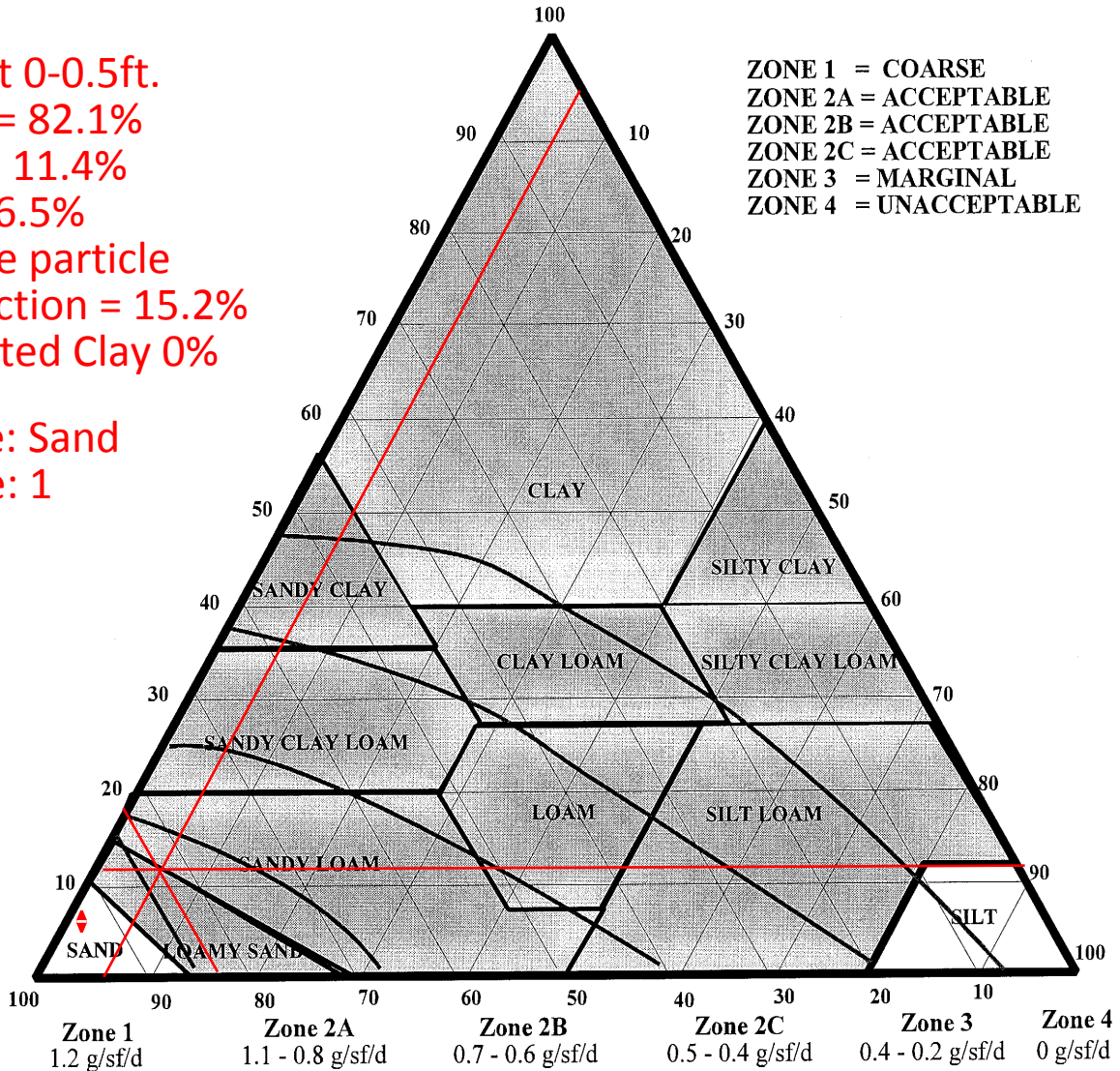
NOTE: For soils falling in sand, loamy sand or sandy loam texture classification, the bulk density analysis will generally not affect suitability and analysis not be necessary.

Soil Texture Suitability Chart

TP6 at 0-0.5ft.
 sand = 82.1%
 clay = 11.4%
 silt = 6.5%
 coarse particle
 correction = 15.2%
 Adjusted Clay 0%

Texture: Sand
 Zone: 1

ZONE 1 = COARSE
 ZONE 2A = ACCEPTABLE
 ZONE 2B = ACCEPTABLE
 ZONE 2C = ACCEPTABLE
 ZONE 3 = MARGINAL
 ZONE 4 = UNACCEPTABLE



INSTRUCTIONS:

1. Plot texture on triangle based on percent sand, silt, and clay as determined by hydrometer analysis.
2. Adjust for coarse particles (gravel not fractured rock) by moving the plotted point in the sand direction an additional 2% for each 10% by volume of gravels greater than 2 mm in diameter.
3. Adjust for compactness of the soil by moving the plotted point in the clay direction an additional 15% for soils having a bulk-density greater than 1.7 gm/cc.

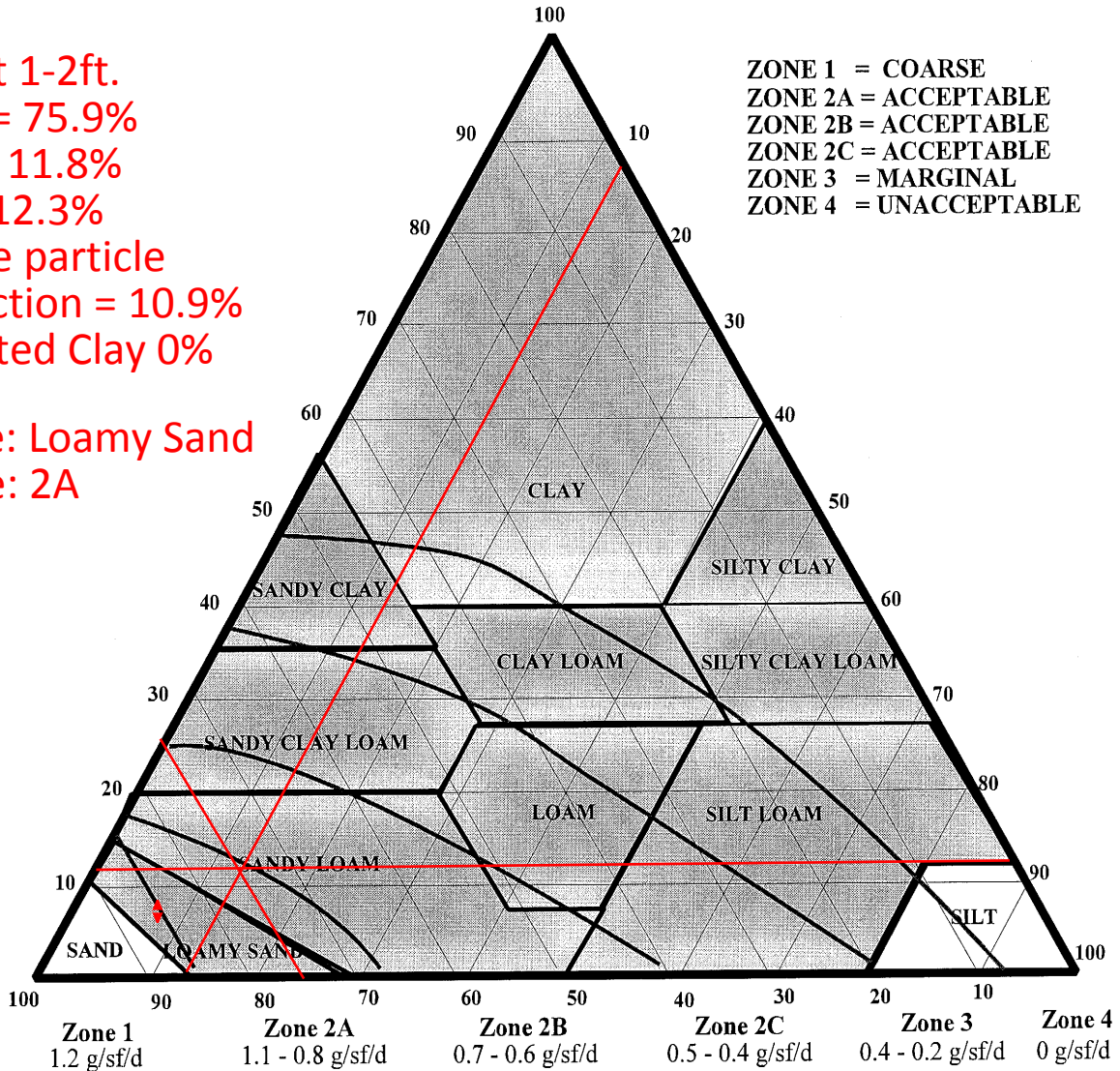
NOTE: For soils falling in sand, loamy sand or sandy loam texture classification, the bulk density analysis will generally not affect suitability and analysis not be necessary.

Soil Texture Suitability Chart

TP6 at 1-2ft.
 sand = 75.9%
 clay = 11.8%
 silt = 12.3%
 coarse particle
 correction = 10.9%
 Adjusted Clay 0%

ZONE 1 = COARSE
 ZONE 2A = ACCEPTABLE
 ZONE 2B = ACCEPTABLE
 ZONE 2C = ACCEPTABLE
 ZONE 3 = MARGINAL
 ZONE 4 = UNACCEPTABLE

Texture: Loamy Sand
 Zone: 2A



INSTRUCTIONS:

1. Plot texture on triangle based on percent sand, silt, and clay as determined by hydrometer analysis.
2. Adjust for coarse particles (gravel not fractured rock) by moving the plotted point in the sand direction an additional 2% for each 10% by volume of gravels greater than 2 mm in diameter.
3. Adjust for compactness of the soil by moving the plotted point in the clay direction an additional 15% for soils having a bulk-density greater than 1.7 gm/cc.

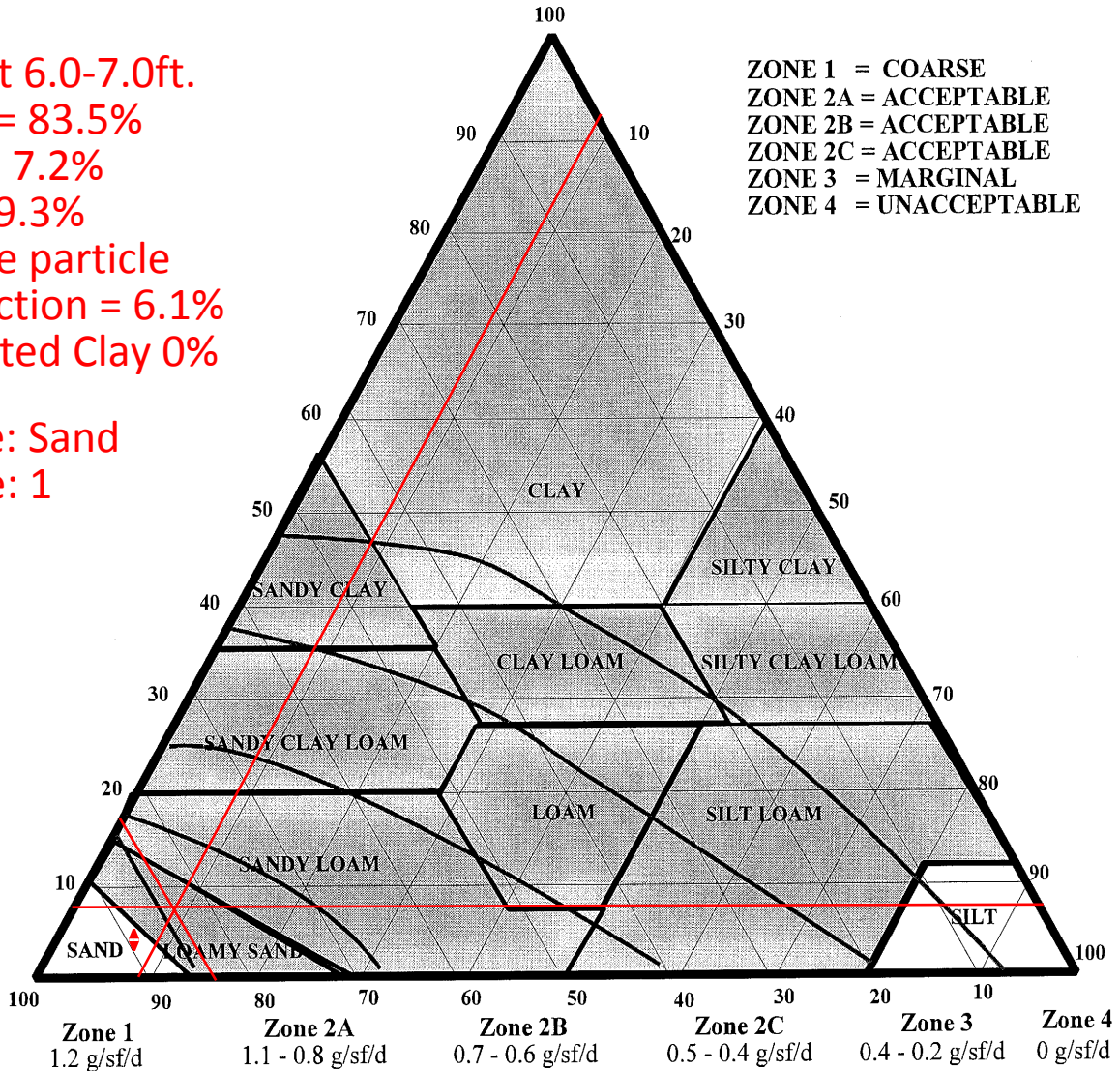
NOTE: For soils falling in sand, loamy sand or sandy loam texture classification, the bulk density analysis will generally not affect suitability and analysis not be necessary.

Soil Texture Suitability Chart

TP6 at 6.0-7.0ft.
 sand = 83.5%
 clay = 7.2%
 silt = 9.3%
 coarse particle
 correction = 6.1%
 Adjusted Clay 0%

Texture: Sand
 Zone: 1

ZONE 1 = COARSE
 ZONE 2A = ACCEPTABLE
 ZONE 2B = ACCEPTABLE
 ZONE 2C = ACCEPTABLE
 ZONE 3 = MARGINAL
 ZONE 4 = UNACCEPTABLE



INSTRUCTIONS:

1. Plot texture on triangle based on percent sand, silt, and clay as determined by hydrometer analysis.
2. Adjust for coarse particles (gravel not fractured rock) by moving the plotted point in the sand direction an additional 2% for each 10% by volume of gravels greater than 2 mm in diameter.
3. Adjust for compactness of the soil by moving the plotted point in the clay direction an additional 15% for soils having a bulk-density greater than 1.7 gm/cc.

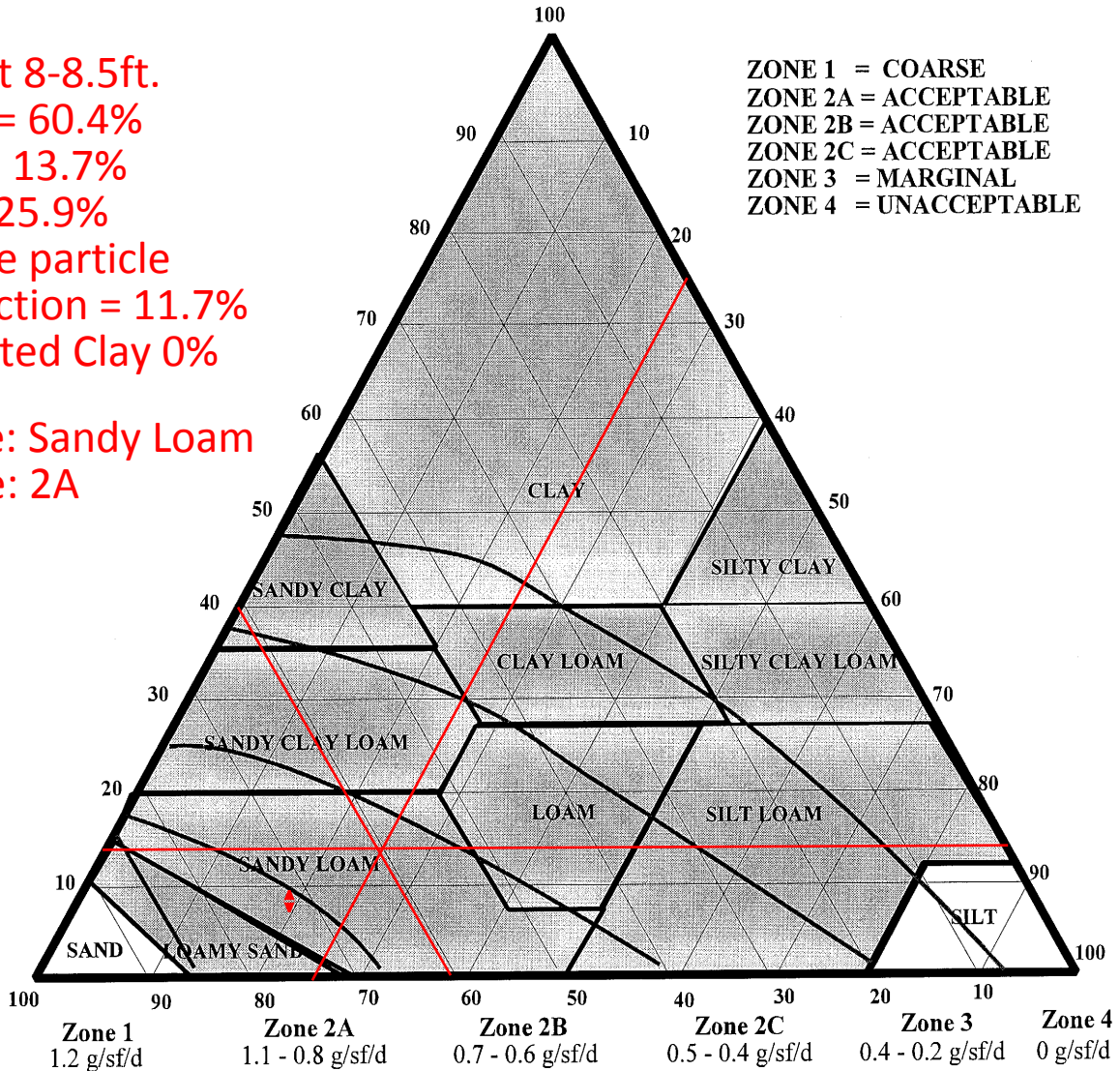
NOTE: For soils falling in sand, loamy sand or sandy loam texture classification, the bulk density analysis will generally not affect suitability and analysis not be necessary.

Soil Texture Suitability Chart

TP6 at 8-8.5ft.
 sand = 60.4%
 clay = 13.7%
 silt = 25.9%
 coarse particle
 correction = 11.7%
 Adjusted Clay 0%

Texture: Sandy Loam
 Zone: 2A

ZONE 1 = COARSE
 ZONE 2A = ACCEPTABLE
 ZONE 2B = ACCEPTABLE
 ZONE 2C = ACCEPTABLE
 ZONE 3 = MARGINAL
 ZONE 4 = UNACCEPTABLE



INSTRUCTIONS:

1. Plot texture on triangle based on percent sand, silt, and clay as determined by hydrometer analysis.
2. Adjust for coarse particles (gravel not fractured rock) by moving the plotted point in the sand direction an additional 2% for each 10% by volume of gravels greater than 2 mm in diameter.
3. Adjust for compactness of the soil by moving the plotted point in the clay direction an additional 15% for soils having a bulk-density greater than 1.7 gm/cc.

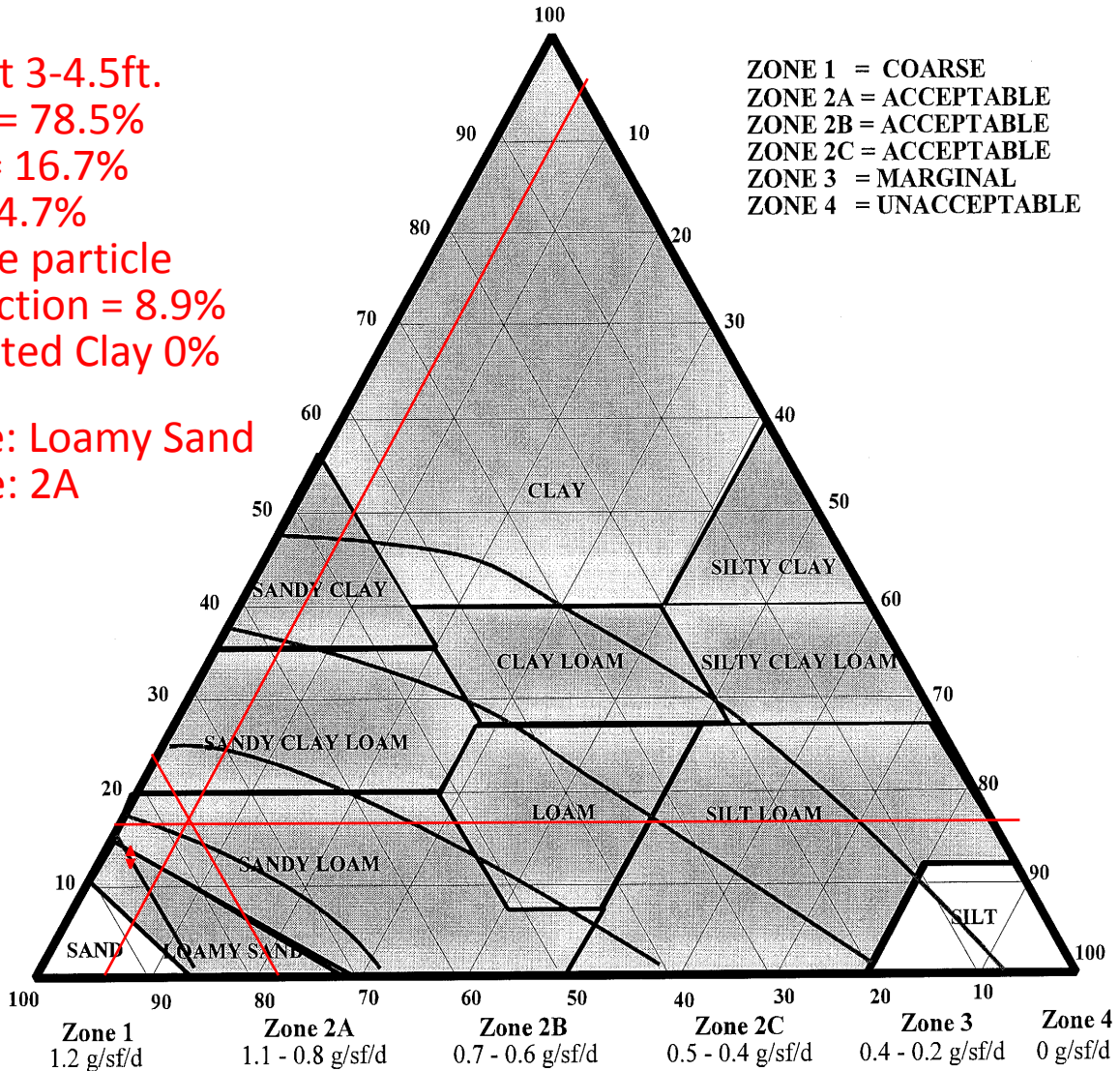
NOTE: For soils falling in sand, loamy sand or sandy loam texture classification, the bulk density analysis will generally not affect suitability and analysis not be necessary.

Soil Texture Suitability Chart

TP7 at 3-4.5ft.
 sand = 78.5%
 clay = 16.7%
 silt = 4.7%
 coarse particle
 correction = 8.9%
 Adjusted Clay 0%

Texture: Loamy Sand
 Zone: 2A

ZONE 1 = COARSE
 ZONE 2A = ACCEPTABLE
 ZONE 2B = ACCEPTABLE
 ZONE 2C = ACCEPTABLE
 ZONE 3 = MARGINAL
 ZONE 4 = UNACCEPTABLE



INSTRUCTIONS:

1. Plot texture on triangle based on percent sand, silt, and clay as determined by hydrometer analysis.
2. Adjust for coarse particles (gravel not fractured rock) by moving the plotted point in the sand direction an additional 2% for each 10% by volume of gravels greater than 2 mm in diameter.
3. Adjust for compactness of the soil by moving the plotted point in the clay direction an additional 15% for soils having a bulk-density greater than 1.7 gm/cc.

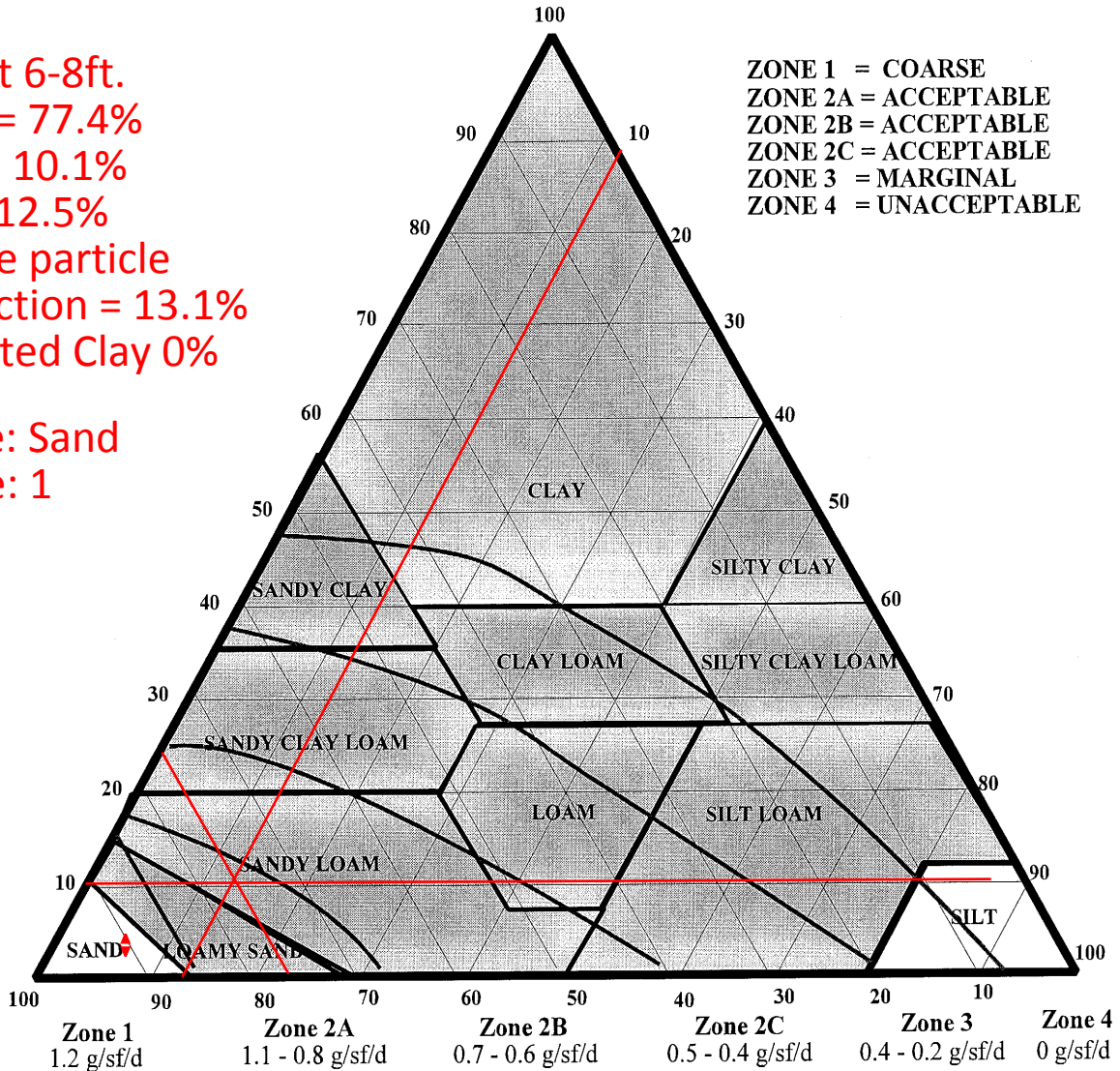
NOTE: For soils falling in sand, loamy sand or sandy loam texture classification, the bulk density analysis will generally not affect suitability and analysis not be necessary.

Soil Texture Suitability Chart

TP7 at 6-8ft.
 sand = 77.4%
 clay = 10.1%
 silt = 12.5%
 coarse particle
 correction = 13.1%
 Adjusted Clay 0%

Texture: Sand
 Zone: 1

ZONE 1 = COARSE
 ZONE 2A = ACCEPTABLE
 ZONE 2B = ACCEPTABLE
 ZONE 2C = ACCEPTABLE
 ZONE 3 = MARGINAL
 ZONE 4 = UNACCEPTABLE



INSTRUCTIONS:

1. Plot texture on triangle based on percent sand, silt, and clay as determined by hydrometer analysis.
2. Adjust for coarse particles (gravel not fractured rock) by moving the plotted point in the sand direction an additional 2% for each 10% by volume of gravels greater than 2 mm in diameter.
3. Adjust for compactness of the soil by moving the plotted point in the clay direction an additional 15% for soils having a bulk-density greater than 1.7 gm/cc.

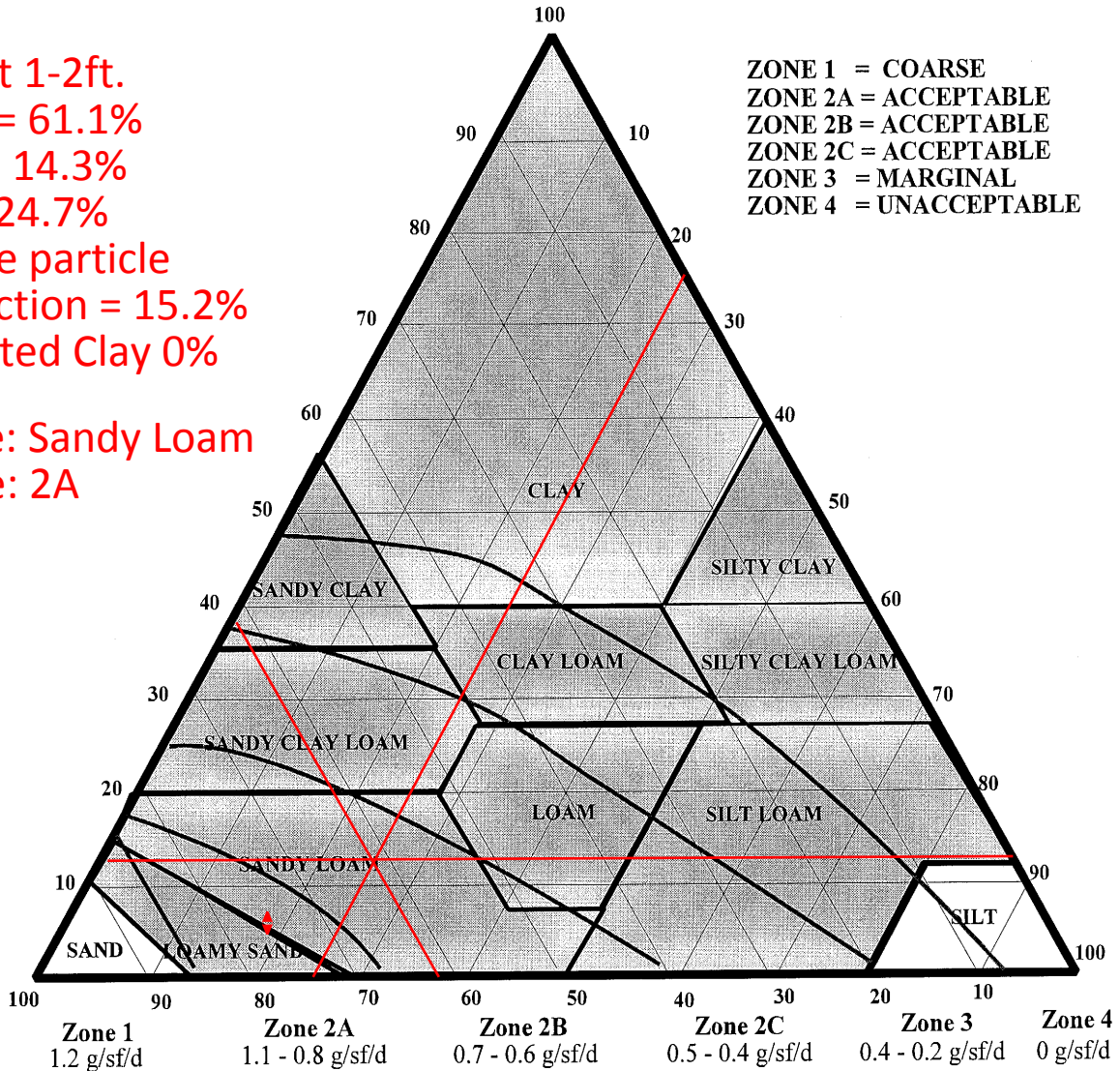
NOTE: For soils falling in sand, loamy sand or sandy loam texture classification, the bulk density analysis will generally not affect suitability and analysis not be necessary.

Soil Texture Suitability Chart

TP8 at 1-2ft.
 sand = 61.1%
 clay = 14.3%
 silt = 24.7%
 coarse particle
 correction = 15.2%
 Adjusted Clay 0%

Texture: Sandy Loam
 Zone: 2A

ZONE 1 = COARSE
 ZONE 2A = ACCEPTABLE
 ZONE 2B = ACCEPTABLE
 ZONE 2C = ACCEPTABLE
 ZONE 3 = MARGINAL
 ZONE 4 = UNACCEPTABLE



INSTRUCTIONS:

1. Plot texture on triangle based on percent sand, silt, and clay as determined by hydrometer analysis.
2. Adjust for coarse particles (gravel not fractured rock) by moving the plotted point in the sand direction an additional 2% for each 10% by volume of gravels greater than 2 mm in diameter.
3. Adjust for compactness of the soil by moving the plotted point in the clay direction an additional 15% for soils having a bulk-density greater than 1.7 gm/cc.

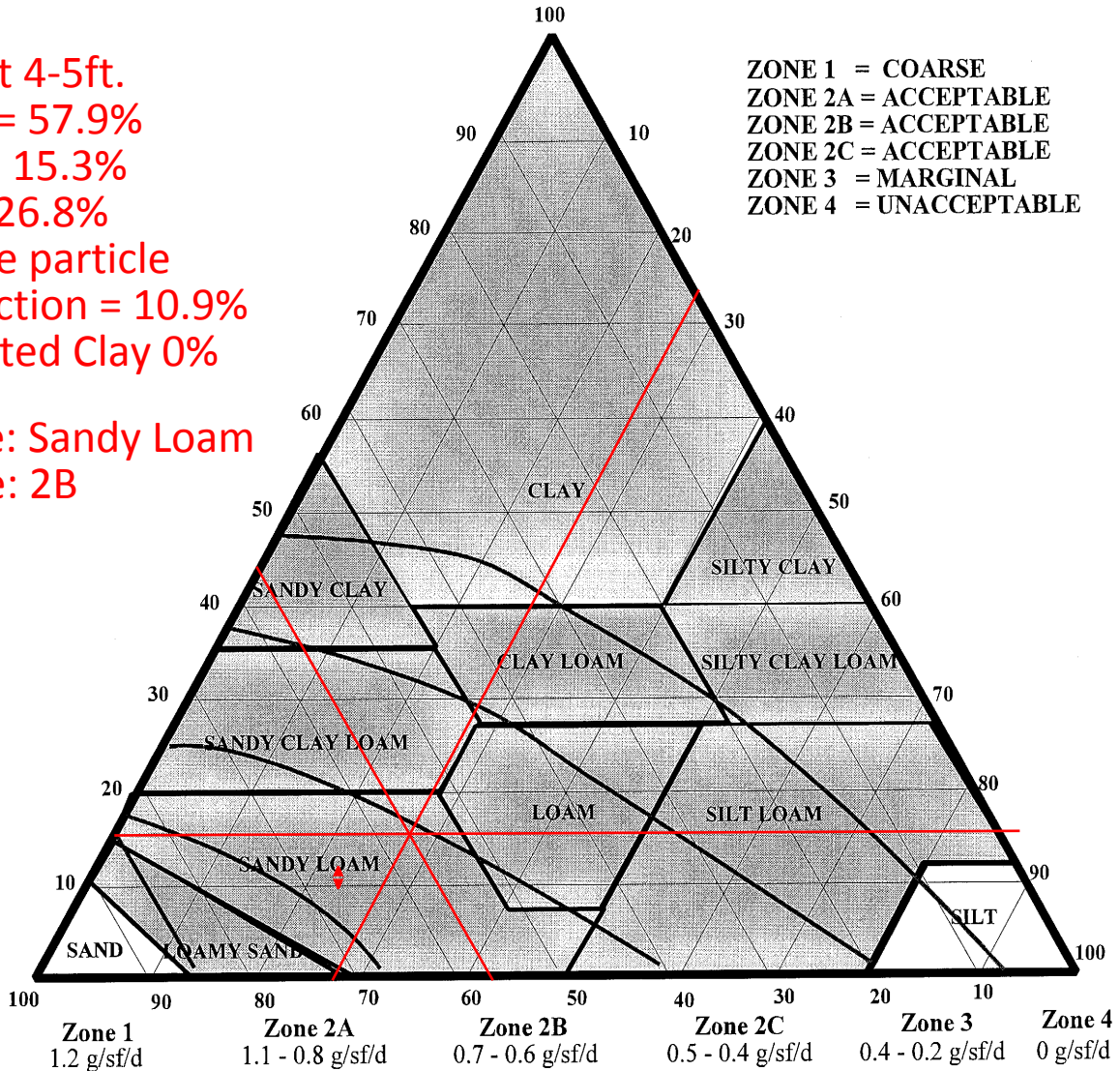
NOTE: For soils falling in sand, loamy sand or sandy loam texture classification, the bulk density analysis will generally not affect suitability and analysis not be necessary.

Soil Texture Suitability Chart

TP8 at 4-5ft.
 sand = 57.9%
 clay = 15.3%
 silt = 26.8%
 coarse particle
 correction = 10.9%
 Adjusted Clay 0%

Texture: Sandy Loam
 Zone: 2B

ZONE 1 = COARSE
 ZONE 2A = ACCEPTABLE
 ZONE 2B = ACCEPTABLE
 ZONE 2C = ACCEPTABLE
 ZONE 3 = MARGINAL
 ZONE 4 = UNACCEPTABLE



INSTRUCTIONS:

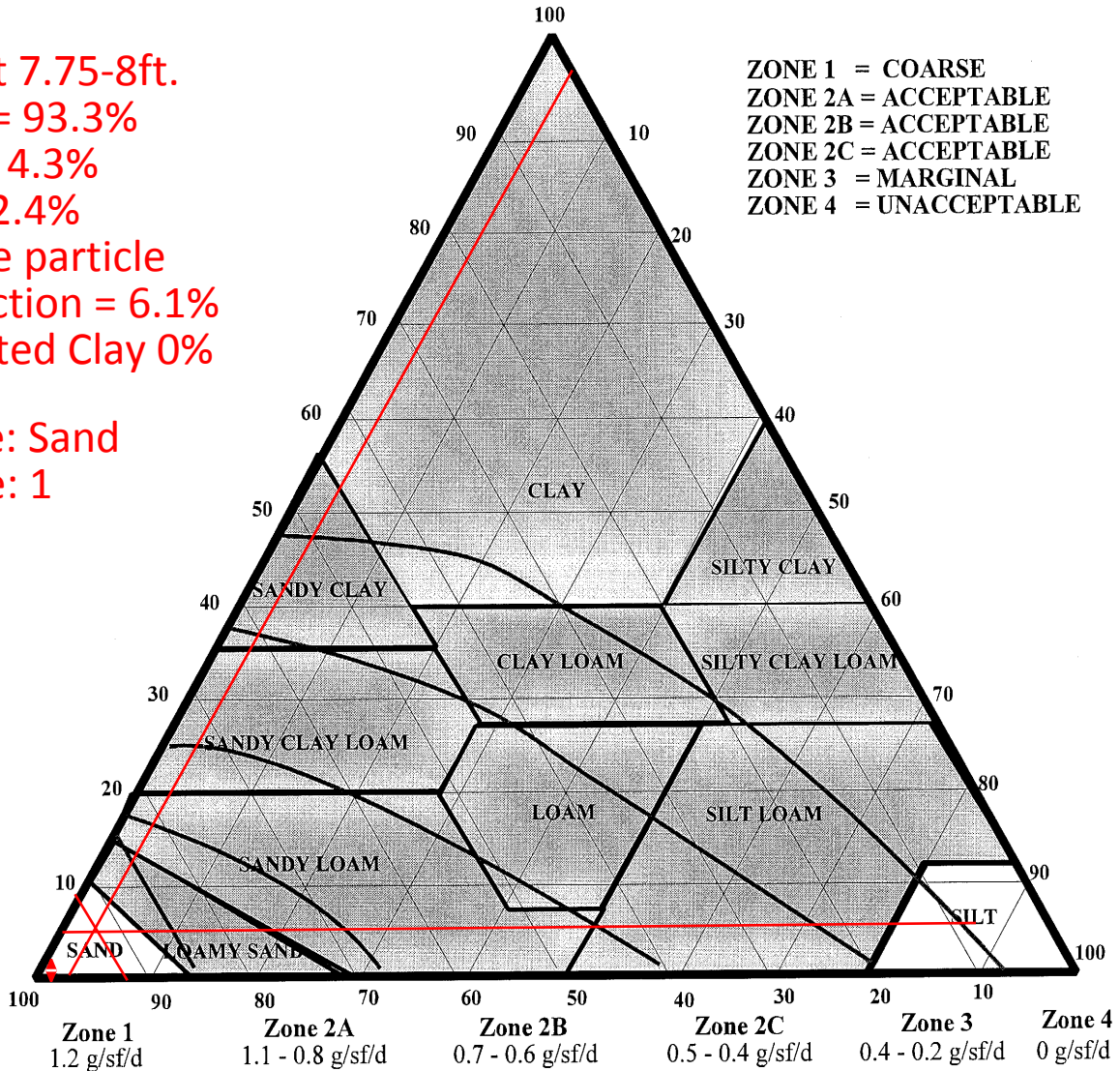
1. Plot texture on triangle based on percent sand, silt, and clay as determined by hydrometer analysis.
2. Adjust for coarse particles (gravel not fractured rock) by moving the plotted point in the sand direction an additional 2% for each 10% by volume of gravels greater than 2 mm in diameter.
3. Adjust for compactness of the soil by moving the plotted point in the clay direction an additional 15% for soils having a bulk-density greater than 1.7 gm/cc.

NOTE: For soils falling in sand, loamy sand or sandy loam texture classification, the bulk density analysis will generally not affect suitability and analysis not be necessary.

Soil Texture Suitability Chart

TP8 at 7.75-8ft.
 sand = 93.3%
 clay = 4.3%
 silt = 2.4%
 coarse particle
 correction = 6.1%
 Adjusted Clay 0%

Texture: Sand
 Zone: 1



INSTRUCTIONS:

1. Plot texture on triangle based on percent sand, silt, and clay as determined by hydrometer analysis.
2. Adjust for coarse particles (gravel not fractured rock) by moving the plotted point in the sand direction an additional 2% for each 10% by volume of gravels greater than 2 mm in diameter.
3. Adjust for compactness of the soil by moving the plotted point in the clay direction an additional 15% for soils having a bulk-density greater than 1.7 gm/cc.

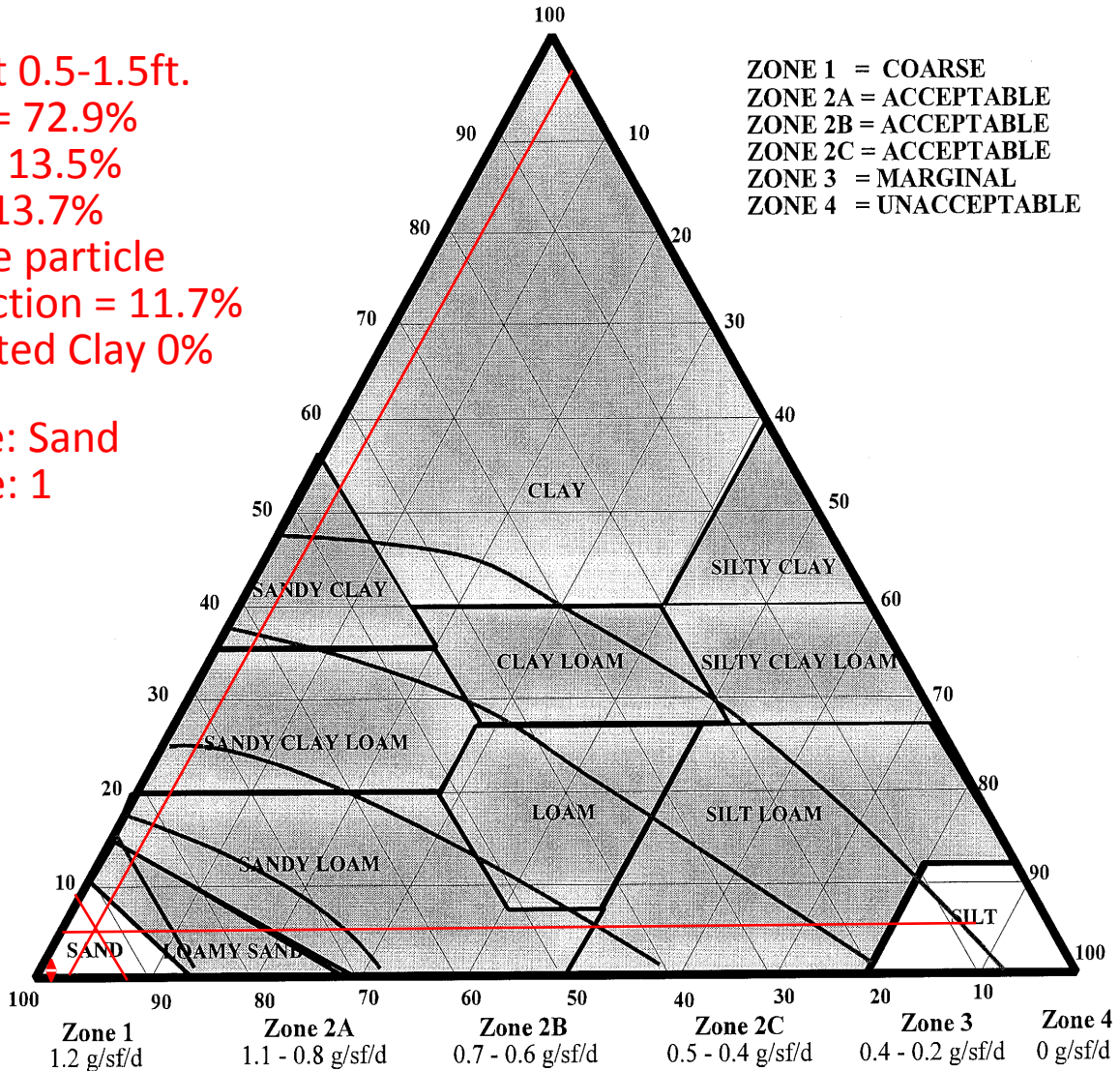
NOTE: For soils falling in sand, loamy sand or sandy loam texture classification, the bulk density analysis will generally not affect suitability and analysis not be necessary.

Soil Texture Suitability Chart

TP9 at 0.5-1.5ft.
 sand = 72.9%
 clay = 13.5%
 silt = 13.7%
 coarse particle
 correction = 11.7%
 Adjusted Clay 0%

Texture: Sand
 Zone: 1

ZONE 1 = COARSE
 ZONE 2A = ACCEPTABLE
 ZONE 2B = ACCEPTABLE
 ZONE 2C = ACCEPTABLE
 ZONE 3 = MARGINAL
 ZONE 4 = UNACCEPTABLE



INSTRUCTIONS:

1. Plot texture on triangle based on percent sand, silt, and clay as determined by hydrometer analysis.
2. Adjust for coarse particles (gravel not fractured rock) by moving the plotted point in the sand direction an additional 2% for each 10% by volume of gravels greater than 2 mm in diameter.
3. Adjust for compactness of the soil by moving the plotted point in the clay direction an additional 15% for soils having a bulk-density greater than 1.7 gm/cc.

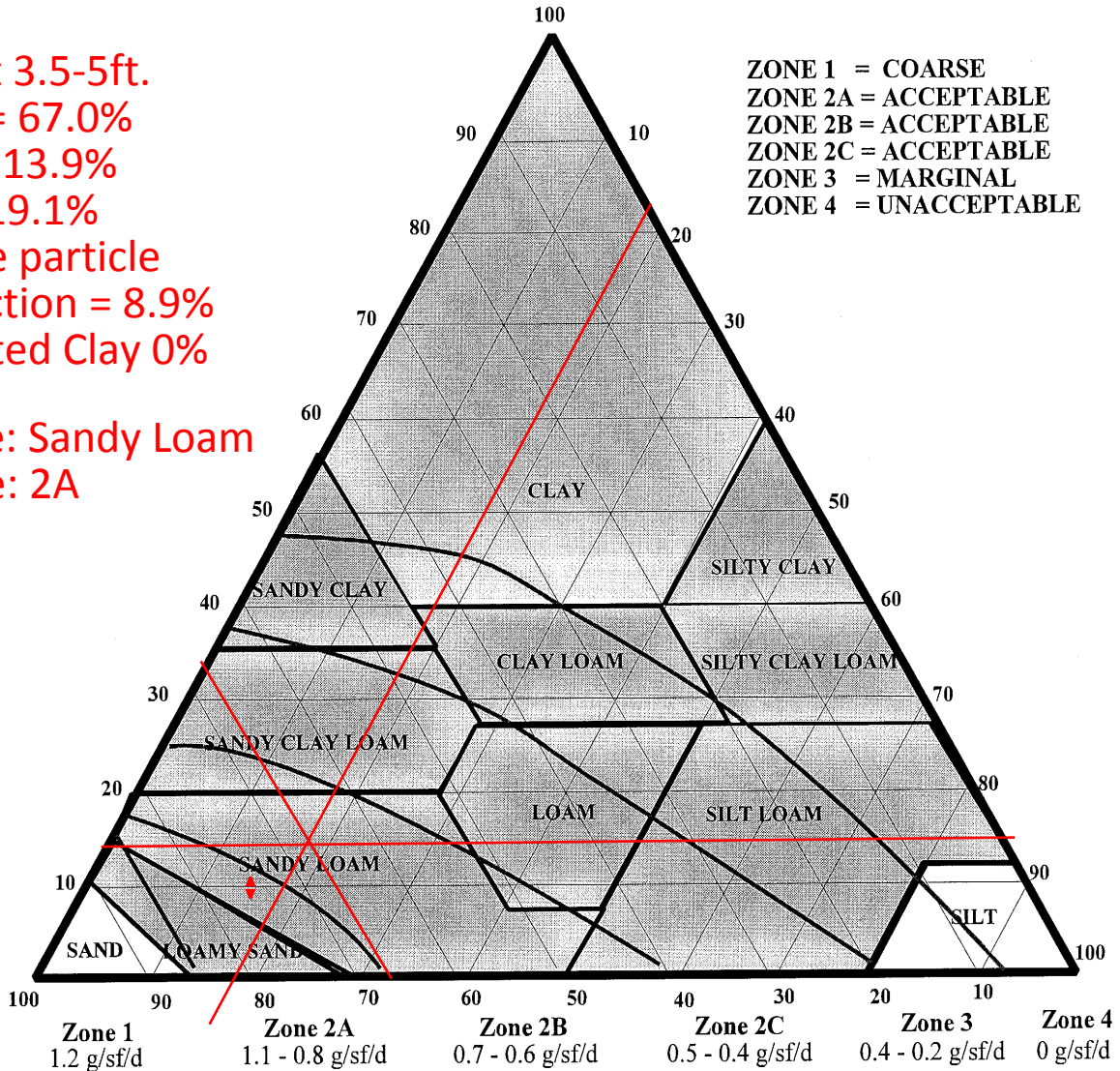
NOTE: For soils falling in sand, loamy sand or sandy loam texture classification, the bulk density analysis will generally not affect suitability and analysis not be necessary.

Soil Texture Suitability Chart

TP9 at 3.5-5ft.
 sand = 67.0%
 clay = 13.9%
 silt = 19.1%
 coarse particle
 correction = 8.9%
 Adjusted Clay 0%

Texture: Sandy Loam
 Zone: 2A

ZONE 1 = COARSE
 ZONE 2A = ACCEPTABLE
 ZONE 2B = ACCEPTABLE
 ZONE 2C = ACCEPTABLE
 ZONE 3 = MARGINAL
 ZONE 4 = UNACCEPTABLE



INSTRUCTIONS:

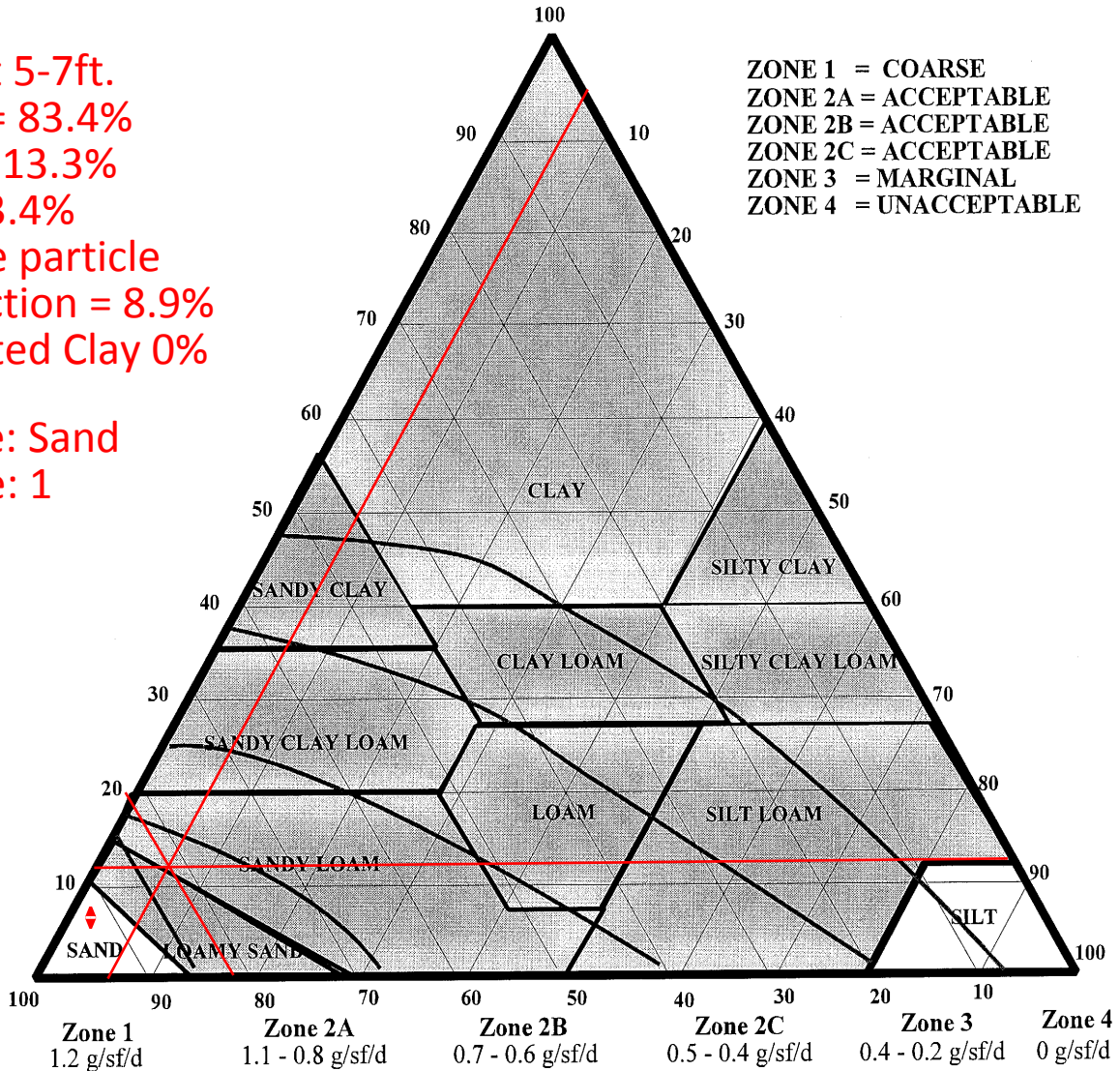
1. Plot texture on triangle based on percent sand, silt, and clay as determined by hydrometer analysis.
2. Adjust for coarse particles (gravel not fractured rock) by moving the plotted point in the sand direction an additional 2% for each 10% by volume of gravels greater than 2 mm in diameter.
3. Adjust for compactness of the soil by moving the plotted point in the clay direction an additional 15% for soils having a bulk-density greater than 1.7 gm/cc.

NOTE: For soils falling in sand, loamy sand or sandy loam texture classification, the bulk density analysis will generally not affect suitability and analysis not be necessary.

Soil Texture Suitability Chart

TP9 at 5-7ft.
 sand = 83.4%
 clay = 13.3%
 silt = 3.4%
 coarse particle
 correction = 8.9%
 Adjusted Clay 0%

Texture: Sand
 Zone: 1



INSTRUCTIONS:

1. Plot texture on triangle based on percent sand, silt, and clay as determined by hydrometer analysis.
2. Adjust for coarse particles (gravel not fractured rock) by moving the plotted point in the sand direction an additional 2% for each 10% by volume of gravels greater than 2 mm in diameter.
3. Adjust for compactness of the soil by moving the plotted point in the clay direction an additional 15% for soils having a bulk-density greater than 1.7 gm/cc.

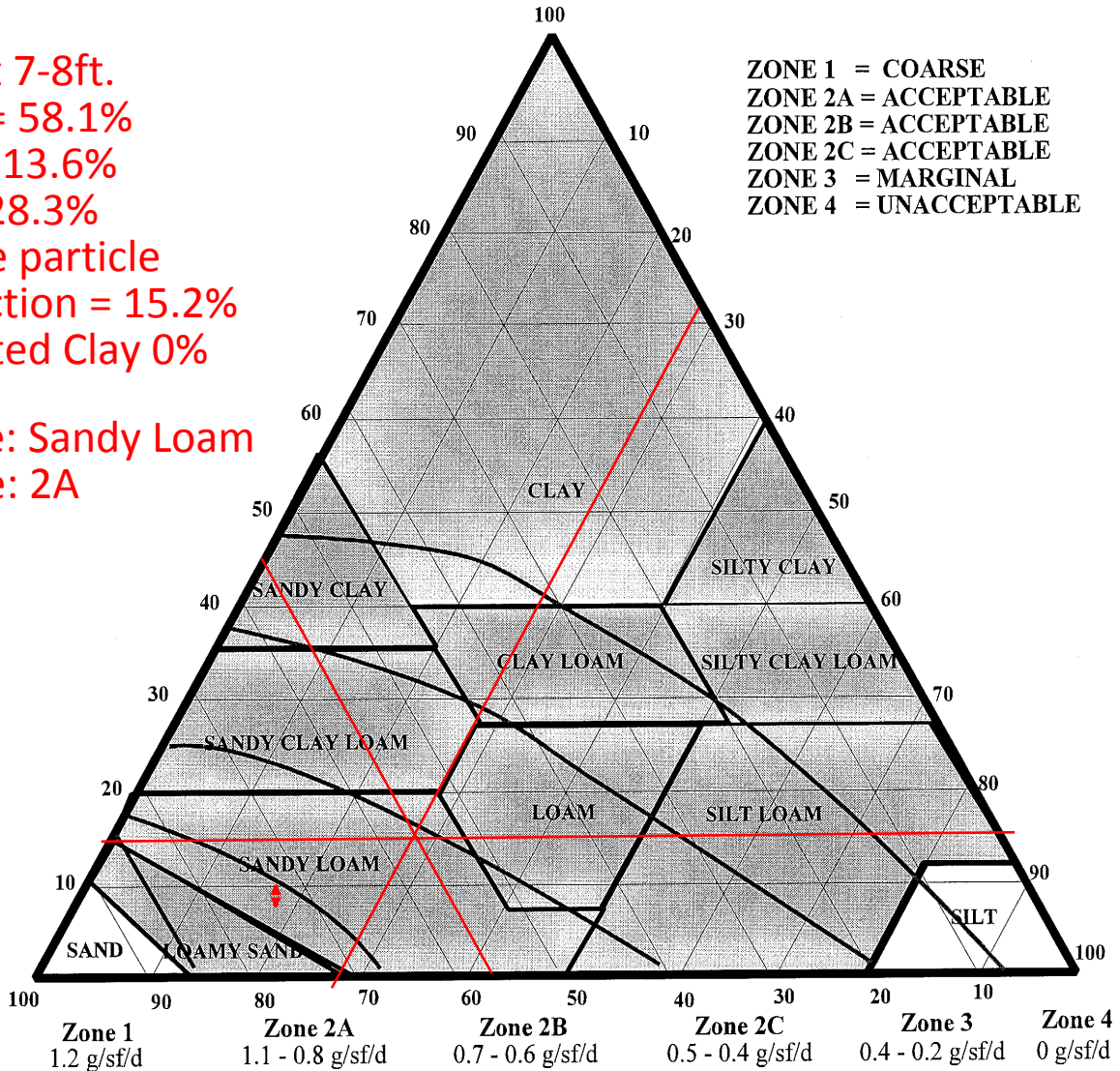
NOTE: For soils falling in sand, loamy sand or sandy loam texture classification, the bulk density analysis will generally not affect suitability and analysis not be necessary.

Soil Texture Suitability Chart

TP9 at 7-8ft.
 sand = 58.1%
 clay = 13.6%
 silt = 28.3%
 coarse particle
 correction = 15.2%
 Adjusted Clay 0%

Texture: Sandy Loam
 Zone: 2A

ZONE 1 = COARSE
 ZONE 2A = ACCEPTABLE
 ZONE 2B = ACCEPTABLE
 ZONE 2C = ACCEPTABLE
 ZONE 3 = MARGINAL
 ZONE 4 = UNACCEPTABLE



INSTRUCTIONS:

1. Plot texture on triangle based on percent sand, silt, and clay as determined by hydrometer analysis.
2. Adjust for coarse particles (gravel not fractured rock) by moving the plotted point in the sand direction an additional 2% for each 10% by volume of gravels greater than 2 mm in diameter.
3. Adjust for compactness of the soil by moving the plotted point in the clay direction an additional 15% for soils having a bulk-density greater than 1.7 gm/cc.

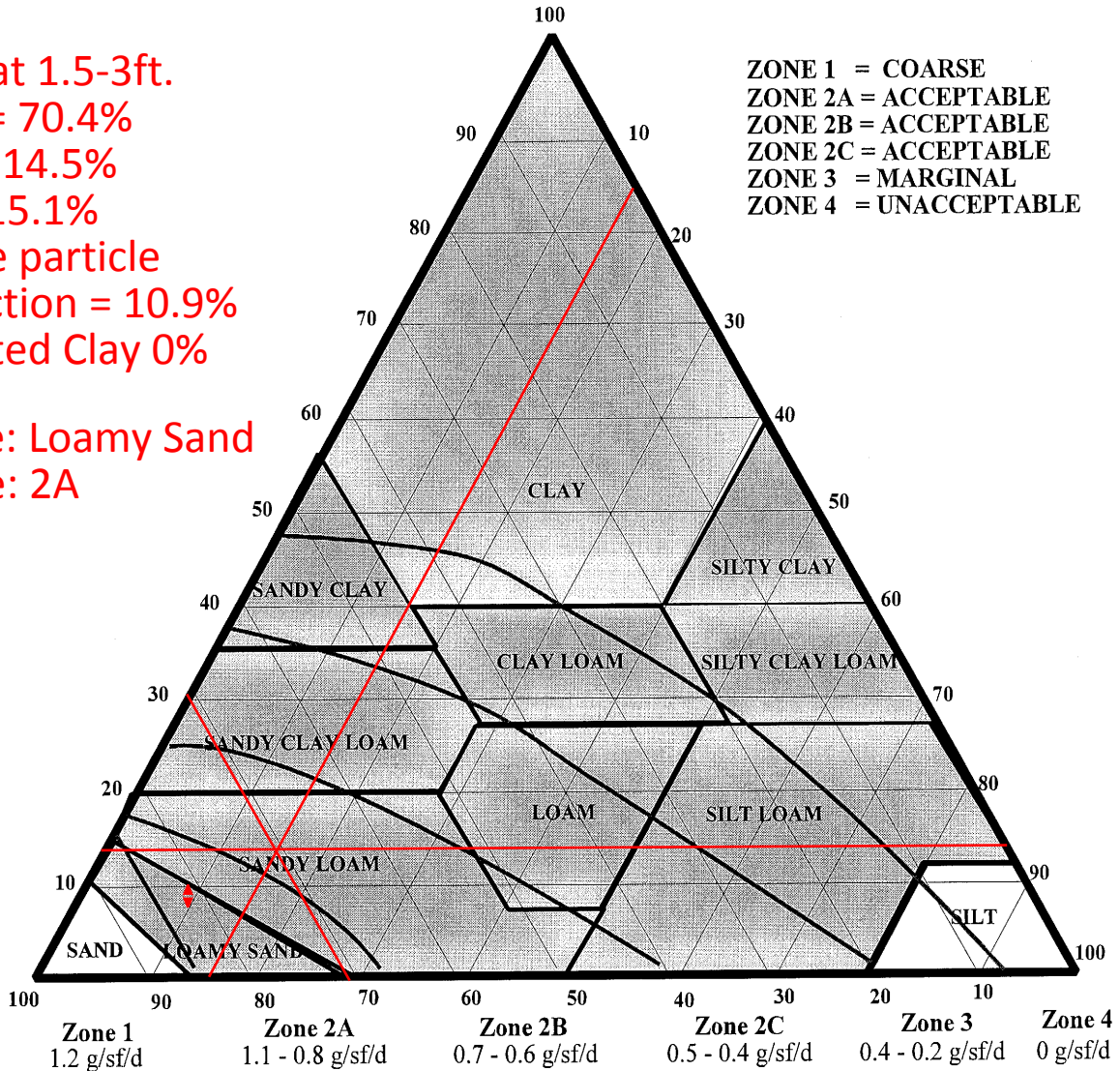
NOTE: For soils falling in sand, loamy sand or sandy loam texture classification, the bulk density analysis will generally not affect suitability and analysis not be necessary.

Soil Texture Suitability Chart

TP10 at 1.5-3ft.
 sand = 70.4%
 clay = 14.5%
 silt = 15.1%
 coarse particle
 correction = 10.9%
 Adjusted Clay 0%

ZONE 1 = COARSE
 ZONE 2A = ACCEPTABLE
 ZONE 2B = ACCEPTABLE
 ZONE 2C = ACCEPTABLE
 ZONE 3 = MARGINAL
 ZONE 4 = UNACCEPTABLE

Texture: Loamy Sand
 Zone: 2A



INSTRUCTIONS:

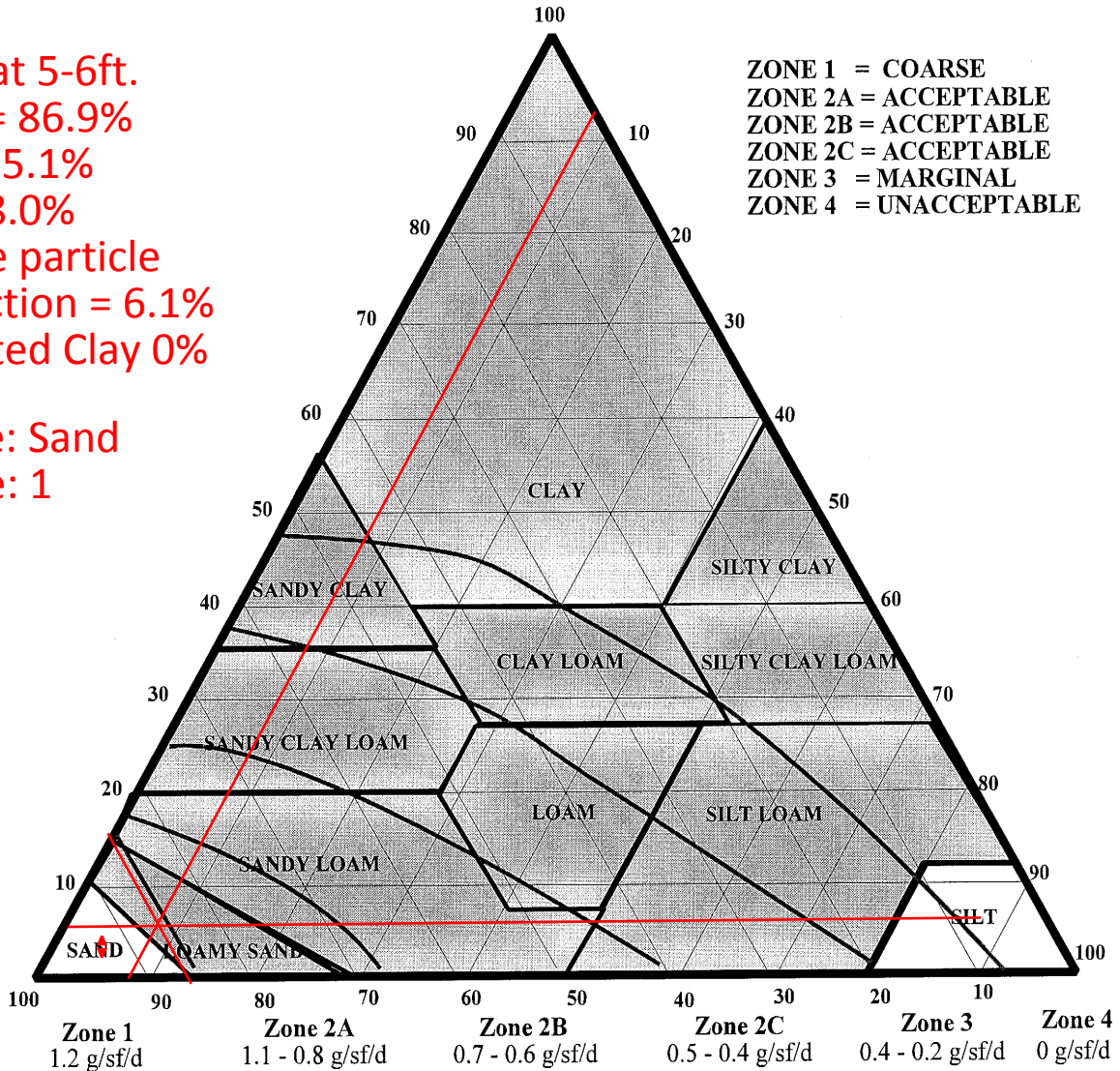
1. Plot texture on triangle based on percent sand, silt, and clay as determined by hydrometer analysis.
2. Adjust for coarse particles (gravel not fractured rock) by moving the plotted point in the sand direction an additional 2% for each 10% by volume of gravels greater than 2 mm in diameter.
3. Adjust for compactness of the soil by moving the plotted point in the clay direction an additional 15% for soils having a bulk-density greater than 1.7 gm/cc.

NOTE: For soils falling in sand, loamy sand or sandy loam texture classification, the bulk density analysis will generally not affect suitability and analysis not be necessary.

Soil Texture Suitability Chart

TP10 at 5-6ft.
 sand = 86.9%
 clay = 5.1%
 silt = 8.0%
 coarse particle
 correction = 6.1%
 Adjusted Clay 0%

Texture: Sand
 Zone: 1



ZONE 1 = COARSE
 ZONE 2A = ACCEPTABLE
 ZONE 2B = ACCEPTABLE
 ZONE 2C = ACCEPTABLE
 ZONE 3 = MARGINAL
 ZONE 4 = UNACCEPTABLE

INSTRUCTIONS:

1. Plot texture on triangle based on percent sand, silt, and clay as determined by hydrometer analysis.
2. Adjust for coarse particles (gravel not fractured rock) by moving the plotted point in the sand direction an additional 2% for each 10% by volume of gravels greater than 2 mm in diameter.
3. Adjust for compactness of the soil by moving the plotted point in the clay direction an additional 15% for soils having a bulk-density greater than 1.7 gm/cc.

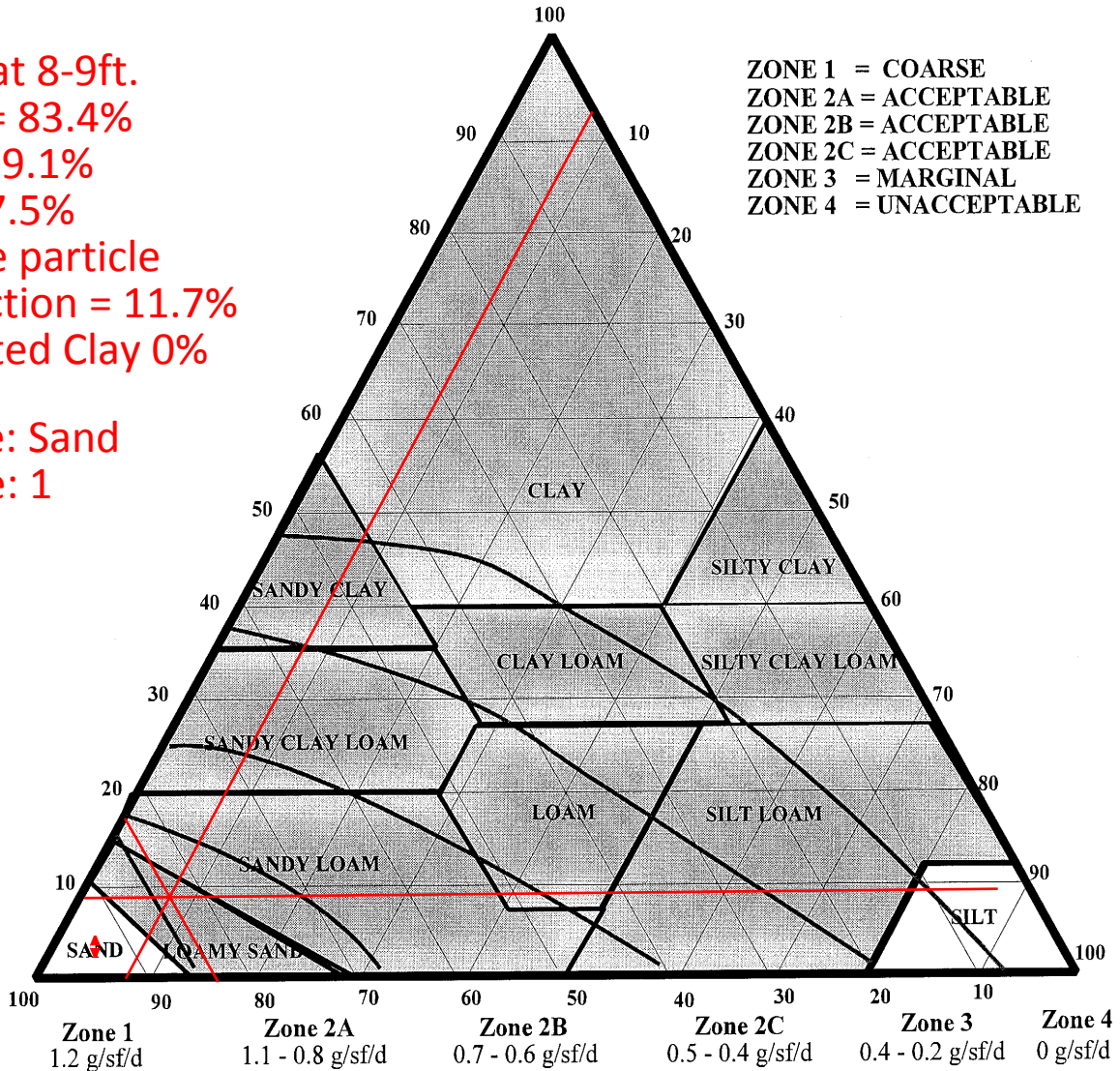
NOTE: For soils falling in sand, loamy sand or sandy loam texture classification, the bulk density analysis will generally not affect suitability and analysis not be necessary.

Soil Texture Suitability Chart

TP10 at 8-9ft.
 sand = 83.4%
 clay = 9.1%
 silt = 7.5%
 coarse particle
 correction = 11.7%
 Adjusted Clay 0%

Texture: Sand
 Zone: 1

ZONE 1 = COARSE
 ZONE 2A = ACCEPTABLE
 ZONE 2B = ACCEPTABLE
 ZONE 2C = ACCEPTABLE
 ZONE 3 = MARGINAL
 ZONE 4 = UNACCEPTABLE



INSTRUCTIONS:

1. Plot texture on triangle based on percent sand, silt, and clay as determined by hydrometer analysis.
2. Adjust for coarse particles (gravel not fractured rock) by moving the plotted point in the sand direction an additional 2% for each 10% by volume of gravels greater than 2 mm in diameter.
3. Adjust for compactness of the soil by moving the plotted point in the clay direction an additional 15% for soils having a bulk-density greater than 1.7 gm/cc.

NOTE: For soils falling in sand, loamy sand or sandy loam texture classification, the bulk density analysis will generally not affect suitability and analysis not be necessary.

Hydrometer Test Worksheet

Site Address:	700 East School Way redwood Valley			Lab Test Date:	3/7/2019	
APN:	163-060-15			Project No.:	7097.26	
Project Name:	Redwood Valley School Site			Site Evaluator:	KRM	
HYDROMETER TEST						
Sample ID Number	TP1	TP1	TP2	TP2	TP2	TP3
Sample Depth (Feet)	2.5-4	6-7	1.5-2.5	5-7	8-8.5	0-1
Slake Test (pass or fail)	Pass	Pass	Pass	N/A	N/A	N/A
A. Oven dry wt. (gm)	51.0	53.3	51.1	50.7	51.1	51.0
B. Start Time	7:04 AM	7:10 AM	7:17 AM	7:21 AM	7:27 AM	7:34 AM
C. Temp @ 40 sec (°F)	56.9	57.	57.3	57.3	57.7	57.7
D. Hydrometer reading @ 40 sec (gm/l)	22	24	22	15	17	22
E. Composite correction (gm/l)	8.1	8.1	8.1	8.1	8.1	8.1
F. True Density @ 40 sec (gm/l)	13.9	15.9	13.9	6.9	8.9	13.9
G. Temp @ 2 hrs. (°F.)	60.9	60.9	60.5	61.0	61.0	61.1
H. Hydrometer reading @ 2 hrs. (gm/l)	13	15	13	10	12	14
I. Composite correction (gm/l)	8.1	8.1	8.1	7.9	7.9	7.9
J. True Density @ 2 hrs. (gm/l)	4.9	6.9	4.9	2.1	4.1	6.1
K. %Sand = [(F ÷ A) x 100]	72.7	70.2	72.8	86.4	82.6	72.7
L. %Clay = (J ÷ A) x 100	9.6	12.9	9.6	4.1	8.0	12.0
M. %Silt = 100 - (K + L)	17.6	16.9	17.6	9.5	9.4	15.3
Coarse Particles						
N. Wt. Coarse particles retained (gm)	280.2	480.5	308.5	642.4	1110	370.9
N2. Wt.-10 particles (gm)	636.9	342.5	381.3	335.2	352	311.3
O. Wt of total sample (gm)	917.1	823	689.8	977.6	1462	682.2
P. % Coarse particles = (N ÷ O) x 100	30.6%	58.4%	44.7%	65.7%	75.9%	54.4%
Bulk Density Needed Y/N	NO	NO	NO	NO	NO	NO
Q. Total sample wt (gm)	-	-	-	-	-	-
R. Coarse particles wt. (gm)	-	-	-	-	-	-
S. Total sample vol. (cc)	-	-	-	-	-	-
T. Coarse particles vol. (cc)	-	-	-	-	-	-
U. Bulk Density = [(Q - R) ÷ (S - T)] (gm/cc)	-	-	-	-	-	-
W. Adjusted Sand (%)	6.1%	11.7%	8.9%	13.1%	15.2%	10.9%
X. Adjusted Clay (%)	0%	0%	0%	0%	0%	0%
Y. Adjusted Silt (%)	-	-	-	-	-	-
Z. Soil Suitability Zone	2A	2A	2A	1	1	2A
Texture	Loamy Sand	Loamy Sand	Loamy Sand	Sand	Sand	Loamy Sand

I certify the test was carried out by the procedures specified by the Mendocino County Division of Environmental Health. I declare under penalty that the foregoing is true and correct.

Signed: _____





MENDOCINO COUNTY

Environmental Health

Hydrometer Test Worksheet

Site Address:	700 East School Way redwood Valley			Lab Test Date:	3/7/2019	
APN:	163-060-15			Project No.:	7097.26	
Project Name:	Redwood Valley School Site			Site Evaluator:	KRM	
HYDROMETER TEST						
Sample ID Number	TP3	TP3	TP3	TP4	TP4	TP4
Sample Depth (Feet)	2-4	5-6.5	7-8	0-1	3-4	6.5-7.5
Slake Test (pass or fail)	Pass	Pass	Pass	Pass	Pass	Pass
A. Oven dry wt. (gm)	50.3	50.5	51.1	50.9	52.6	52.1
B. Start Time	7:40 AM	7:45 AM	11:09 AM	11:15 AM	11:20 AM	11:25 AM
C. Temp @ 40 sec (°F)	57.9	58.1	63.2	63.1	63.1	63.3
D. Hydrometer reading @ 40 sec (gm/l)	25	31	23	27	23	22
E. Composite correction (gm/l)	8.1	8.1	7.5	7.5	7.5	7.5
F. True Density @ 40 sec (gm/l)	16.9	22.9	15.5	19.5	15.5	14.5
G. Temp @ 2 hrs. (°F.)	61.5	61.6	68.2	67.7	67.4	67.5
H. Hydrometer reading @ 2 hrs. (gm/l)	13	17	12	14	13	12
I. Composite correction (gm/l)	7.9	7.9	6.5	6.7	6.7	6.7
J. True Density @ 2 hrs. (gm/l)	5.1	9.1	5.5	7.3	6.3	5.3
K. %Sand = [(F ÷ A) x 100]	66.4	54.7	69.7	61.7	70.5	72.2
L. %Clay = (J ÷ A) x 100	10.1	18.0	10.8	14.3	12.0	10.2
M. %Silt = 100 - (K + L)	23.5	27.3	19.6	24.0	17.5	17.7
Coarse Particles						
N. Wt. Coarse particles retained (gm)	280.2	480.5	308.5	642.4	1110	370.9
N2. Wt.-10 particles (gm)	636.9	342.5	381.3	335.2	352	311.3
O. Wt of total sample (gm)	917.1	823	689.8	977.6	1462	682.2
P. % Coarse particles = (N ÷ O) x 100	30.6%	58.4%	44.7%	65.7%	75.9%	54.4%
Bulk Density Needed Y/N						
Q. Total sample wt (gm)	-	-	-	-	-	-
R. Coarse particles wt. (gm)	-	-	-	-	-	-
S. Total sample vol. (cc)	-	-	-	-	-	-
T. Coarse particles vol. (cc)	-	-	-	-	-	-
U. Bulk Density = [(Q - R) ÷ (S - T)] (gm/cc)	-	-	-	-	-	-
W. Adjusted Sand (%)	6.1%	11.7%	8.9%	13.1%	15.2%	10.9%
X. Adjusted Clay (%)	0%	0%	0%	0%	0%	0%
Y. Adjusted Silt (%)	-	-	-	-	-	-
Z. Soil Suitability Zone						
Texture	2A	2B	2A	2A	2A	2A
	Loamy Sand	Sandy Loam	Sandy Loam	Sandy Loam	Loamy Sand	Loamy Sand

I certify the test was carried out by the procedures specified by the Mendocino County Division of Environmental Health. I declare under penalty that the foregoing is true and correct.

Signed: 



MENDOCINO COUNTY

Environmental Health

Hydrometer Test Worksheet

Site Address:	700 East School Way redwood Valley			Lab Test Date:	3/7/2019	
APN:	163-060-15			Project No.:	7097.26	
Project Name:	Redwood Valley School Site			Site Evaluator:	KRM	
HYDROMETER TEST						
Sample ID Number	TP5	TP5	TP5	TP5	TP6	TP6
Sample Depth (Feet)	0-1	2-3	4-6	8-8.5	0-0.5	1-2
Slake Test (pass or fail)	Pass	Pass	N/A	Pass	Pass	Pass
A. Oven dry wt. (gm)	50.5	54.7	53.3	51.3	55.2	53.5
B. Start Time	6:47 AM	6:54 AM	7:00 AM	7:05 AM	7:10 AM	7:18 AM
C. Temp @ 40 sec (°F)	59.7	59.9	60.	58.8	60.5	60.8
D. Hydrometer reading @ 40 sec (gm/l)	23	22	16	44	18	21
E. Composite correction (gm/l)	8.1	8.1	8.1	8.1	8.1	8.1
F. True Density @ 40 sec (gm/l)	14.9	13.9	7.9	35.9	9.9	12.9
G. Temp @ 2 hrs. (°F.)	64.1	63.6	63.5	65.2	64.9	64.9
H. Hydrometer reading @ 2 hrs. (gm/l)	15	14	11	23	13	13
I. Composite correction (gm/l)	7.1	7.1	6.5	6.7	6.7	6.7
J. True Density @ 2 hrs. (gm/l)	7.9	6.9	4.5	16.3	6.3	6.3
K. %Sand = [(F ÷ A) x 100]	70.5	74.6	85.2	30.0	82.1	75.9
L. %Clay = (J ÷ A) x 100	15.6	12.6	8.4	31.8	11.4	11.8
M. %Silt = 100 - (K + L)	13.9	12.8	6.4	38.2	6.5	12.3
Coarse Particles						
N. Wt. Coarse particles retained (gm)	280.2	480.5	308.5	642.4	1110	370.9
N2. Wt.-10 particles (gm)	636.9	342.5	381.3	335.2	352	311.3
O. Wt of total sample (gm)	917.1	823	689.8	977.6	1462	682.2
P. % Coarse particles = (N ÷ O) x 100	30.6%	58.4%	44.7%	65.7%	75.9%	54.4%
Bulk Density Needed Y/N	NO	NO	NO	Y	NO	NO
Q. Total sample wt (gm)	-	-	-	16.8	-	-
R. Coarse particles wt. (gm)	-	-	-	0.0	-	-
S. Total sample vol. (cc)	-	-	-	8.6	-	-
T. Coarse particles vol. (cc)	-	-	-	0.0	-	-
U. Bulk Density = [(Q - R) ÷ (S - T)] (gm/cc)	-	-	-	1.95	-	-
W. Adjusted Sand (%)	6.1%	11.7%	8.9%	13.1%	15.2%	10.9%
X. Adjusted Clay (%)	0%	0%	0%	15%	0%	0%
Y. Adjusted Silt (%)	-	-	-	-	-	-
Z. Soil Suitability Zone	2A	2A	1	3	1	2A
Texture	Sandy Loam	Loamy Sand	Sand	Clay	Sand	Loamy sand

I certify the test was carried out by the procedures specified by the Mendocino County Division of Environmental Health. I declare under penalty that the foregoing is true and correct.

Signed: 



MENDOCINO COUNTY

Environmental Health

Hydrometer Test Worksheet

Site Address:	700 East School Way redwood Valley			Lab Test Date:	3/7/2019	
APN:	163-060-15			Project No.:	7097.26	
Project Name:	Redwood Valley School Site			Site Evaluator:	KRM	
HYDROMETER TEST						
Sample ID Number	TP6	TP6	TP7	TP7	TP8	TP8
Sample Depth (Feet)	6-7	8-8.5	3-4.5	6-8	1-2	4-5
Slake Test (pass or fail)	N/A	Pass	Pass	Pass	Pass	Pass
A. Oven dry wt. (gm)	54.0	50.2	50.8	52.7	51.1	54.4
B. Start Time	7:23 AM	7:28 AM	11:27 AM	11:33 AM	11:38 AM	11:43 AM
C. Temp @ 40 sec (°F)	60.7	60.9	65.1	65.3	65.3	65.7
D. Hydrometer reading @ 40 sec (gm/l)	17	28	18	19	27	30
E. Composite correction (gm/l)	8.1	8.1	7.1	7.1	7.1	7.1
F. True Density @ 40 sec (gm/l)	8.9	19.9	10.9	11.9	19.9	22.9
G. Temp @ 2 hrs. (°F.)	65.1	65.2	68.1	67.7	67.6	67.7
H. Hydrometer reading @ 2 hrs. (gm/l)	11	14	15	12	14	15
I. Composite correction (gm/l)	7.1	7.1	6.5	6.7	6.7	6.7
J. True Density @ 2 hrs. (gm/l)	3.9	6.9	8.5	5.3	7.3	8.3
K. %Sand = [(F ÷ A) x 100]	83.5	60.4	78.5	77.4	61.1	57.9
L. %Clay = (J ÷ A) x 100	7.2	13.7	16.7	10.1	14.3	15.3
M. %Silt = 100 - (K + L)	9.3	25.9	4.7	12.5	24.7	26.8
Coarse Particles						
N. Wt. Coarse particles retained (gm)	280.2	480.5	308.5	642.4	1110	370.9
N2. Wt.-10 particles (gm)	636.9	342.5	381.3	335.2	352	311.3
O. Wt of total sample (gm)	917.1	823	689.8	977.6	1462	682.2
P. % Coarse particles = (N ÷ O) x 100	30.6%	58.4%	44.7%	65.7%	75.9%	54.4%
Bulk Density Needed Y/N	NO	NO	NO	NO	NO	NO
Q. Total sample wt (gm)	-	-	-	-	-	-
R. Coarse particles wt. (gm)	-	-	-	-	-	-
S. Total sample vol. (cc)	-	-	-	-	-	-
T. Coarse particles vol. (cc)	-	-	-	-	-	-
U. Bulk Density = [(Q - R) ÷ (S - T)] (gm/cc)	-	-	-	-	-	-
W. Adjusted Sand (%)	6.1%	11.7%	8.9%	13.1%	15.2%	10.9%
X. Adjusted Clay (%)	0%	0%	0%	0%	0%	0%
Y. Adjusted Silt (%)	-	-	-	-	-	-
Z. Soil Suitability Zone	1	2A	2A	1	2A	2B
Texture	Sand	Sandy Loam	Loamy Sand	Sand	Sandy Loam	Sandy Loam

I certify the test was carried out by the procedures specified by the Mendocino County Division of Environmental Health. I declare under penalty that the foregoing is true and correct.

Signed: 

Hydrometer Test Worksheet

Site Address:	700 East School Way redwood Valley			Lab Test Date:	3/7/2019	
APN:	163-060-15			Project No.:	7097.26	
Project Name:	Redwood Valley School Site			Site Evaluator:	KRM	
HYDROMETER TEST						
Sample ID Number	TP8	TP9	TP9	TP9	TP9	TP10
Sample Depth (Feet)	7.75-8	0.5-1.5	3.5-5	5-7	7-8	1.5-3
Slake Test (pass or fail)	N/A	Pass	Pass	N/A	Pass	Pass
A. Oven dry wt. (gm)	58.0	51.2	51.2	53.5	52.3	50.3
B. Start Time	6:57 AM	7:04 AM	7:10 AM	7:15 AM	7:19 AM	7:25 AM
C. Temp @ 40 sec (°F)	59.5	59.6	59.9	60.2	60.7	60.4
D. Hydrometer reading @ 40 sec (gm/l)	12	22	25	17	30	23
E. Composite correction (gm/l)	8.1	8.1	8.1	8.1	8.1	8.1
F. True Density @ 40 sec (gm/l)	3.9	13.9	16.9	8.9	21.9	14.9
G. Temp @ 2 hrs. (°F.)	63.9	65.2	65.0	65.1	65.7	64.3
H. Hydrometer reading @ 2 hrs. (gm/l)	10	14	14	11	15	13
I. Composite correction (gm/l)	7.5	7.1	7	6.7	6.7	6.7
J. True Density @ 2 hrs. (gm/l)	2.5	6.9	7.1	7.1	7.1	7.3
K. %Sand = [(F ÷ A) x 100]	93.3	72.9	67.0	83.4	58.1	70.4
L. %Clay = (J ÷ A) x 100	4.3	13.5	13.9	13.3	13.6	14.5
M. %Silt = 100 - (K + L)	2.4	13.7	19.1	3.4	28.3	15.1
Coarse Particles						
N. Wt. Coarse particles retained (gm)	280.2	480.5	308.5	642.4	1110	370.9
N2. Wt.-10 particles (gm)	636.9	342.5	381.3	335.2	352	311.3
O. Wt of total sample (gm)	917.1	823	689.8	977.6	1462	682.2
P. % Coarse particles = (N ÷ O) x 100	30.6%	58.4%	44.7%	65.7%	75.9%	54.4%
Bulk Density Needed Y/N	NO	NO	NO	NO	NO	NO
Q. Total sample wt (gm)	-	-	-	-	-	-
R. Coarse particles wt. (gm)	-	-	-	-	-	-
S. Total sample vol. (cc)	-	-	-	-	-	-
T. Coarse particles vol. (cc)	-	-	-	-	-	-
U. Bulk Density = [(Q - R) ÷ (S - T)] (gm/cc)	-	-	-	-	-	-
W. Adjusted Sand (%)	6.1%	11.7%	8.9%	13.1%	15.2%	10.9%
X. Adjusted Clay (%)	0%	0%	0%	0%	0%	0%
Y. Adjusted Silt (%)	-	-	-	-	-	-
Z. Soil Suitability Zone	1	1	2A	1	2A	2A
Texture	Sand	Sand	Sandy Loam	Sand	Sandy Loam	Loamy Sand

I certify the test was carried out by the procedures specified by the Mendocino County Division of Environmental Health. I declare under penalty that the foregoing is true and correct.

Signed: _____





MENDOCINO COUNTY

Environmental Health

Hydrometer Test Worksheet

Site Address:	700 East School Way redwood Valley	Lab Test Date:	
APN:	163-060-15	Project No.:	7097.26
Project Name:	Redwood Valley School Site	Site Evaluator:	KRM
HYDROMETER TEST			
Sample ID Number	TP10	TP10	
Sample Depth (Feet)	5-6	8-9	
Slake Test (pass or fail)	N/A	N/A	
A. Oven dry wt. (gm)	52.8	53.6	
B. Start Time	7:30 AM	7:35 AM	
C. Temp @ 40 sec (°F)	60.5	60.6	
D. Hydrometer reading @ 40 sec (gm/l)	15	17	
E. Composite correction (gm/l)	8.1	8.1	
F. True Density @ 40 sec (gm/l)	6.9	8.9	
G. Temp @ 2 hrs. (°F.)	64.8	65.1	
H. Hydrometer reading @ 2 hrs. (gm/l)	10	12	
I. Composite correction (gm/l)	7.3	7.1	
J. True Density @ 2 hrs. (gm/l)	2.7	4.9	
K. %Sand = [(F ÷ A) x 100]	86.9	83.4	
L. %Clay = (J ÷ A) x 100	5.1	9.1	
M. %Silt = 100 - (K + L)	8.0	7.5	
Coarse Particles			
N. Wt. Coarse particles retained (gm)	280.2	480.5	
N ₂ . Wt.-10 particles (gm)	636.9	342.5	
O. Wt of total sample (gm)	917.1	823	
P. % Coarse particles = (N ÷ O) x 100	30.6%	58.4%	
Bulk Density Needed Y/N			
	NO	NO	
Q. Total sample wt (gm)	-	-	
R. Coarse particles wt. (gm)	-	-	
S. Total sample vol. (cc)	-	-	
T. Coarse particles vol. (cc)	-	-	
U. Bulk Density = [(Q - R) ÷ (S - T)] (gm/cc)	-	-	
W. Adjusted Sand (%)	6.1%	11.7%	
X. Adjusted Clay (%)	0%	0%	
Y. Adjusted Silt (%)	-	-	
Z. Soil Suitability Zone			
	1	1	
Texture	Sand	Sand	

I certify the test was carried out by the procedures specified by the Mendocino County Division of Environmental Health. I declare under penalty that the foregoing is true and correct.

Signed: 

APPENDIX E

Percolation Test Data Sheets



ABBREVIATIONS
MPI: Minutes Per Inch
AF: Adjustment Factor

PERCOLATION TEST DATA SHEET

CLIENT: Ukiah Unified School District	DATE: 3/30/2018
LACO JOB NO.: 7097.26	A.P.N.: 163-060-15

PERCOLATION LOCATION:		PP1		TESTED BY:		KAS / DBS	
DEPTH OF HOLE:	-	HOLE DIA (D _h):	3 inches	PIPE DIA (D _p):	3 inches	AF:	1.00
DEPTH TESTED:	48.5 to 49.25 inches bgs		ANNULAR SPACE MATERIAL:		none		
DEPTH TO GW:	dry		PRESOAK:		none		
Reading No.	Start Time (T _s) (hr:mm:ss)	Start Level (W _s) (inches)	Read Time (T _r) (hr:mm:ss)	▲ Time (T _s - T _r) Decimal Format (min.sec)	▲ Level (W _s - W _r) (inches)	MPI	MPI x AF
1	0:00:00	14 1/2	0:00:30	0.50	1/4	2.00	2.00
2	0:00:00	14 1/4	0:00:30	0.50	1/4	2.00	2.00
3	0:00:00	14	0:00:31	0.52	1/4	2.07	2.07
4							
5							
6							
7							
STABILIZED RATE:					2.0	MPI	

PERCOLATION LOCATION:		PP2		TESTED BY:		KAS / DBS	
DEPTH OF HOLE:	-	HOLE DIA (D _h):	3 inches	PIPE DIA (D _p):	3 inches	AF:	1.00
DEPTH TESTED:	45 to 45.5 inches bgs		ANNULAR SPACE MATERIAL:		none		
DEPTH TO GW:	dry		PRESOAK:		none		
Reading No.	Start Time (T _s) (hr:mm:ss)	Start Level (W _s) (inches)	Read Time (T _r) (hr:mm:ss)	▲ Time (T _s - T _r) Decimal Format (min.sec)	▲ Level (W _s - W _r) (inches)	MPI	MPI x AF
1	0:00:00	18	0:01:40	1.67	1/8	13.33	13.33
2	0:00:00	17 7/8	0:01:37	1.62	1/8	12.93	12.93
3	0:00:00	17 3/4	0:01:41	1.68	1/8	13.47	13.47
4	0:00:00	17 5/8	0:01:41	1.68	1/8	13.47	13.47
5							
6							
7							
STABILIZED RATE:					13.3	MPI	

PERCOLATION LOCATION:		PP3		TESTED BY:		KAS / DBS	
DEPTH OF HOLE:	-	HOLE DIA (D _h):	3 inches	PIPE DIA (D _p):	3 inches	AF:	1.00
DEPTH TESTED:	47 to 48 inches bgs		ANNULAR SPACE MATERIAL:		none		
DEPTH TO GW:	dry		PRESOAK:		none		
Reading No.	Start Time (T _s) (hr:mm:ss)	Start Level (W _s) (inches)	Read Time (T _r) (hr:mm:ss)	▲ Time (T _s - T _r) Decimal Format (min.sec)	▲ Level (W _s - W _r) (inches)	MPI	MPI x AF
1	0:00:00	15 1/2	0:02:00	2.00	1/8	16.00	16.00
2	0:00:00	15 3/8	0:01:59	1.98	1/8	15.87	15.87
3	0:00:00	15 1/4	0:02:00	2.00	1/8	16.00	16.00
4	0:00:00	15 1/8	0:01:59	1.98	1/8	15.87	15.87
5							
6							
7							
STABILIZED RATE:					15.9	MPI	

21 W. 4th Street, Eureka, California 95501 707 443-5054 Fax 707 443-0553
 776 S. State Street, Suite 102A, Ukiah, CA 95482 707 462-0222 Fax 707 462-0223
 3450 Regional Parkway, Suite B2, Santa Rosa, California 95403 707 525-1222

Toll Free 800 515-5054 www.lacoassociates.com



ABBREVIATIONS
MPI: Minutes Per Inch
AF: Adjustment Factor

PERCOLATION TEST DATA SHEET

CLIENT: Ukiah Unified School District	DATE: 3/21/2019
LACO JOB NO.: 7097.26	A.P.N.: 163-060-15

PERCOLATION LOCATION: PP4		TESTED BY: KRM					
DEPTH OF HOLE: 25.5 inches	HOLE DIA (D _h): 5 inches	PIPE DIA (D _p): 3 inches	AF: 1.71				
DEPTH TESTED: 18.5 to 20.5 inches bgs		ANNULAR SPACE MATERIAL: pea gravel					
DEPTH TO GW: dry		PRESOAK: 3 refills					
Reading No.	Start Time (T _s) (hr:mm:ss)	Start Level (W _s) (inches)	Read Time (T _r) (hr:mm:ss)	▲ Time (T _s - T _r) Decimal Format (min.sec)	▲ Level (W _s - W _r) (inches)	MPI	MPI x AF
1	0:00:00	7.0	0:01:06	1.10	1.0	1.10	1.87
2	0:00:00	6.0	0:01:17	1.29	1.0	1.29	2.20
3	0:00:00	5.0	0:01:32	1.53	1.0	1.53	2.61
4	0:00:00	4.0	0:01:36	1.59	1.0	1.59	2.73
5	0:00:00	3.0	0:01:38	1.64	1.0	1.64	2.80
6							
7							
STABILIZED RATE:					2.7	MPI	

PERCOLATION LOCATION: PP5		TESTED BY: KRM					
DEPTH OF HOLE: 36 inches	HOLE DIA (D _h): 5 inches	PIPE DIA (D _p): 3 inches	AF: 1.71				
DEPTH TESTED: 31 to 33 inches bgs		ANNULAR SPACE MATERIAL: pea gravel					
DEPTH TO GW: dry		PRESOAK: 4 refills					
Reading No.	Start Time (T _s) (hr:mm:ss)	Start Level (W _s) (inches)	Read Time (T _r) (hr:mm:ss)	▲ Time (T _s - T _r) Decimal Format (min.sec)	▲ Level (W _s - W _r) (inches)	MPI	MPI x AF
1	0:00:00	33.0	0:00:43	0.72	1.0	0.72	1.23
2	0:00:00	32.0	0:00:40	0.67	1.0	0.67	1.14
3	0:00:00	31.0	0:00:42	0.70	1.0	0.70	1.20
4	0:00:00	30.0	0:00:45	0.76	1.0	0.76	1.30
5	0:00:00	29.0	0:00:54	0.89	1.0	0.89	1.53
6	0:00:00	28.0	0:00:55	0.91	1.0	0.91	1.56
7	0:00:00	27.0	0:00:55	0.91	1.0	0.91	1.56
STABILIZED RATE:					1.5	MPI	

PERCOLATION LOCATION: PP6		TESTED BY: KRM					
DEPTH OF HOLE: 37.5 inches	HOLE DIA (D _h): 5 inches	PIPE DIA (D _p): 3 inches	AF: 1.71				
DEPTH TESTED: 32 to 35 inches		ANNULAR SPACE MATERIAL: pea gravel					
DEPTH TO GW: dry		PRESOAK: 3 refills					
Reading No.	Start Time (T _s) (hr:mm:ss)	Start Level (W _s) (inches)	Read Time (T _r) (hr:mm:ss)	▲ Time (T _s - T _r) Decimal Format (min.sec)	▲ Level (W _s - W _r) (inches)	MPI	MPI x AF
1	0:00:00	28.5	0:03:18	3.29	0.5	6.58	11.26
2	0:00:00	28.0	0:04:00	3.99	0.5	7.98	13.65
3	0:00:00	27.5	0:04:00	4.00	0.5	7.99	13.66
4	0:00:00	27.0	0:03:50	3.83	0.5	7.66	13.10
5	0:00:00	26.5	0:03:54	3.91	0.5	7.81	13.36
6	0:00:00	26.0	0:03:57	3.96	0.5	7.91	13.53
7	0:00:00	25.5	0:04:04	4.07	0.5	8.14	13.93
STABILIZED RATE:					13.5	MPI	

21 W. 4th Street, Eureka, California 95501 707 443-5054 Fax 707 443-0553
 776 S. State Street, Suite 102A, Ukiah, CA 95482 707 462-0222 Fax 707 462-0223
 3450 Regional Parkway, Suite B2, Santa Rosa, California 95403 707 525-1222

Toll Free 800 515-5054 www.lacoassociates.com



ABBREVIATIONS	
MPI:	Minutes Per Inch
AF:	Adjustment Factor

PERCOLATION TEST DATA SHEET

CLIENT:	Ukiah Unified School District	DATE:	3/21/2019
LACO JOB NO.:	7097.26	A.P.N.:	163-060-15

PERCOLATION LOCATION:		PP8		TESTED BY:		JRG	
DEPTH OF HOLE:	18 inches	HOLE DIA (D _h):	5 inches	PIPE DIA (D _p):	3 inches	AF:	1.71
DEPTH TESTED:	14 to 17 inches		ANNULAR SPACE MATERIAL:		pea gravel		
DEPTH TO GW:	dry		PRESOAK:		3 refills		
Reading No.	Start Time (T _s) (hr:mm:ss)	Start Level (W _s) (inches)	Read Time (T _r) (hr:mm:ss)	▲ Time (T _s - T _r) Decimal Format (min.sec)	▲ Level (W _s - W _r) (inches)	MPI	MPI x AF
1	0:00:00	6.0	0:01:43	1.72	1.0	1.72	2.94
2	0:00:00	5.0	0:01:49	1.82	1.0	1.82	3.11
3	0:00:00	4.0	0:01:55	1.92	1.0	1.92	3.28
4							
5							
6							
7							
STABILIZED RATE:					3.1		MPI

PERCOLATION LOCATION:		OBS-3		TESTED BY:		KRM/JRG	
DEPTH OF HOLE:	8 feet	HOLE DIA (D _h):	9 inches	PIPE DIA (D _p):	2 inches	AF:	2.62
DEPTH TESTED:	7.3 to 7.7 feet bgs		ANNULAR SPACE MATERIAL:		pea gravel		
DEPTH TO GW:	dry		PRESOAK:		3 refills		
Reading No.	Start Time (T _s) (hr:mm:ss)	Start Level (W _s) (tenths of feet)	Read Time (T _r) (hr:mm:ss)	▲ Time (T _s - T _r) Decimal Format (min.sec)	▲ Level (W _s - W _r) (inches)	MPI	MPI x AF
1	0:00:00	7.8	0:00:26	0.43	1.2	0.52	1.36
2	0:00:00	7.9	0:00:33	0.55	1.2	0.66	1.73
3	0:00:00	8.0	0:00:36	0.60	1.2	0.72	1.89
4	0:00:00	8.1	0:00:34	0.57	1.2	0.68	1.78
5	0:00:00	8.2	0:00:40	0.67	1.2	0.80	2.10
6							
7							
STABILIZED RATE:					1.92		MPI

PERCOLATION LOCATION:		OBS-8		TESTED BY:		KRM/JRG	
DEPTH OF HOLE:	6.5 feet	HOLE DIA (D _h):	6 inches	PIPE DIA (D _p):	2 inches	AF:	2.37
DEPTH TESTED:	5.0 to 5.6 feet bgs		ANNULAR SPACE MATERIAL:		pea gravel		
DEPTH TO GW:	6.47 feet below ground surface		PRESOAK:		2 refills		
Reading No.	Start Time (T _s) (hr:mm:ss)	Start Level (W _s) (tenths of feet)	Read Time (T _r) (hr:mm:ss)	▲ Time (T _s - T _r) Decimal Format (min.sec)	▲ Level (W _s - W _r) (inches)	MPI	MPI x AF
1	0:00:00	6.0	0:00:21	0.35	1.2	0.42	1.00
2	0:00:00	6.1	0:00:29	0.48	1.2	0.58	1.37
3	0:00:00	6.2	0:00:21	0.35	1.2	0.42	1.00
4	0:00:00	6.3	0:00:32	0.53	1.2	0.64	1.52
5	0:00:00	6.4	0:00:30	0.50	1.2	0.60	1.42
6	0:00:00	6.5	0:00:29	0.48	1.2	0.58	1.37
7							
STABILIZED RATE:					1.44		MPI

21 W. 4th Street, Eureka, California 95501 707 443-5054 Fax 707 443-0553
 776 S. State Street, Suite 102A, Ukiah, CA 95482 707 462-0222 Fax 707 462-0223
 3450 Regional Parkway, Suite B2, Santa Rosa, California 95403 707 525-1222

Toll Free 800 515-5054 www.lacoassociates.com



ABBREVIATIONS
MPI: Minutes Per Inch
AF: Adjustment Factor

PERCOLATION TEST DATA SHEET

CLIENT: Ukiah Unified School District	DATE: 4/11/2019
LACO JOB NO.: 7097.26	A.P.N.: 163-060-15

PERCOLATION LOCATION:		PP10		TESTED BY: JRG			
DEPTH OF HOLE:	34.5 inches	HOLE DIA (D _h):	5 inches	PIPE DIA (D _p):	3 inches	AF:	1.71
DEPTH TESTED:	24.5 to 27.5 inches		ANNULAR SPACE MATERIAL:		pea gravel		
DEPTH TO GW:	dry		PRESOAK:		no presoak		
Reading No.	Start Time (T _s) (hr:mm:ss)	Start Level (W _s) (inches)	Read Time (T _r) (hr:mm:ss)	▲ Time (T _s - T _r) Decimal Format (min.sec)	▲ Level (W _s - W _r) (inches)	MPI	MPI x AF
1	0:00:00	27.5	0:05:33	5.55	1.0	5.55	9.48
2	0:00:00	26.5	0:05:36	5.60	1.0	5.60	9.57
3	0:00:00	25.5	0:05:37	5.62	1.0	5.62	9.61
4	0:00:00	24.5	0:05:44	5.73	1.0	5.73	9.80
5							
6							
7							
STABILIZED RATE:					9.6		MPI

PERCOLATION LOCATION:		PP11		TESTED BY: KRM			
DEPTH OF HOLE:	38 inches	HOLE DIA (D _h):	4 inches	PIPE DIA (D _p):	3 inches	AF:	1.40
DEPTH TESTED:	34 to 36 inches		ANNULAR SPACE MATERIAL:		pea gravel		
DEPTH TO GW:	dry		PRESOAK:		2 refills		
Reading No.	Start Time (T _s) (hr:mm:ss)	Start Level (W _s) (inches)	Read Time (T _r) (hr:mm:ss)	▲ Time (T _s - T _r) Decimal Format (min.sec)	▲ Level (W _s - W _r) (inches)	MPI	MPI x AF
1	0:00:00	32	0:00:06	0.09	1.0	0.09	0.16
2	0:00:00	31	0:00:08	0.13	1.0	0.13	0.23
3	0:00:00	30	0:00:06	0.11	1.0	0.11	0.18
4	0:00:00	29	0:00:09	0.15	1.0	0.15	0.26
5	0:00:00	28	0:00:10	0.17	1.0	0.17	0.30
6	0:00:00	27	0:00:10	0.17	1.0	0.17	0.29
7	0:00:00	26	0:00:11	0.18	1.0	0.18	0.31
STABILIZED RATE:					0.30		MPI

PERCOLATION LOCATION:				TESTED BY:			
DEPTH OF HOLE:		HOLE DIA (D _h):		PIPE DIA (D _p):		AF:	
DEPTH TESTED:			ANNULAR SPACE MATERIAL:				
DEPTH TO GW:			PRESOAK:				
Reading No.	Start Time (T _s) (hr:mm:ss)	Start Level (W _s) (tenths of feet)	Read Time (T _r) (hr:mm:ss)	▲ Time (T _s - T _r) Decimal Format (min.sec)	▲ Level (W _s - W _r) (inches)	MPI	MPI x AF
STABILIZED RATE:					MPI		

21 W. 4th Street, Eureka, California 95501 707 443-5054 Fax 707 443-0553
 776 S. State Street, Suite 102A, Ukiah, CA 95482 707 462-0222 Fax 707 462-0223
 3450 Regional Parkway, Suite B2, Santa Rosa, California 95403 707 525-1222
 Toll Free 800 515-5054 www.lacoassociates.com

APPENDIX F

Observation Well Logs

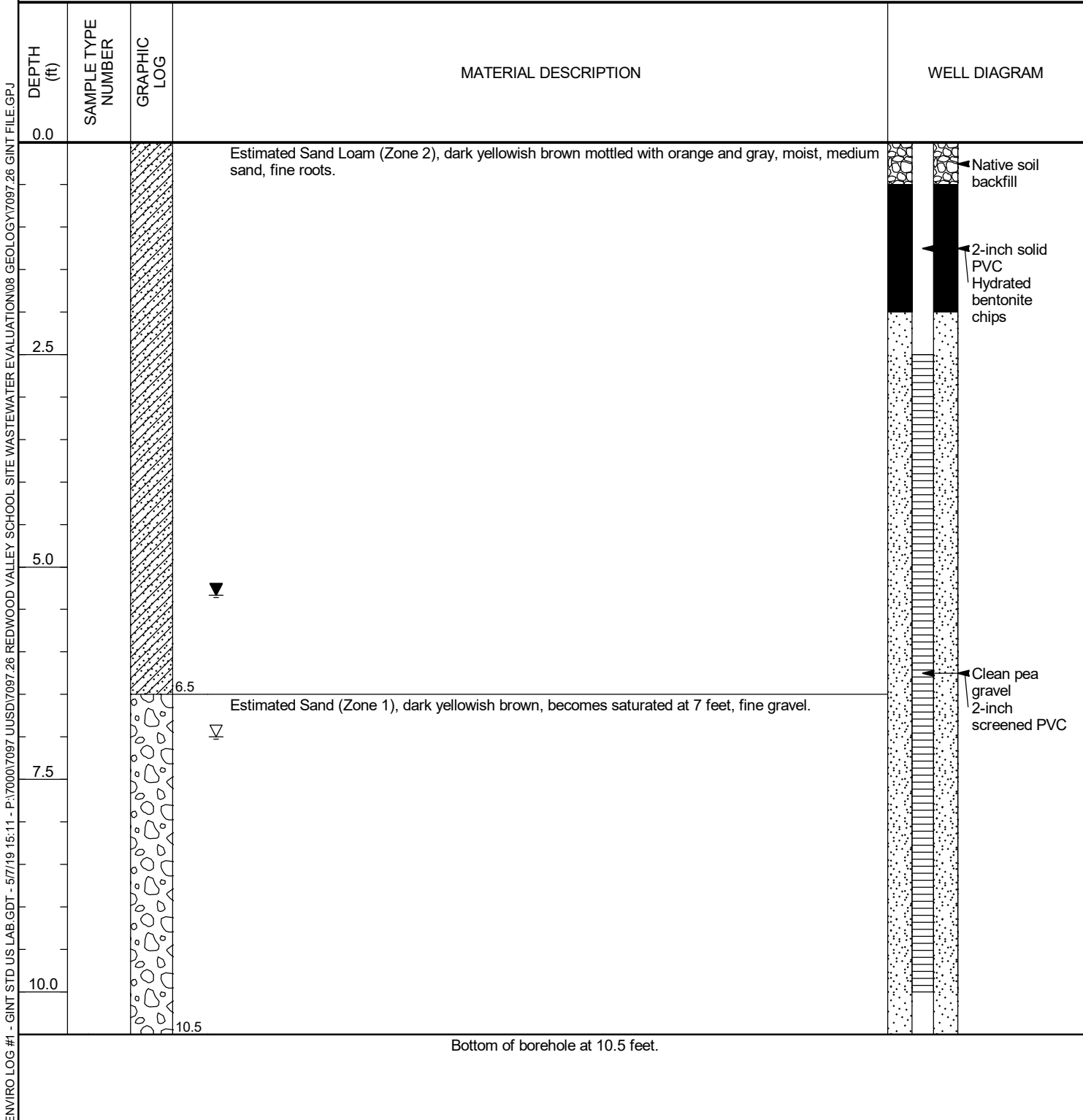
CLIENT Ukiah Unified School District
 PROJECT NUMBER 7097.26
 DATE STARTED 2/7/19 COMPLETED 2/7/19
 DRILLING CONTRACTOR R&M Construction
 DRILLING METHOD Backhoe with Auger
 LOGGED BY JRG CHECKED BY KRM
 NOTES _____

PROJECT NAME Redwood Valley School Septic Evaluation
 PROJECT LOCATION 700 East School Way, Redwood Valley, CA
 GROUND ELEVATION _____ HOLE SIZE 9 inches
 GROUND WATER LEVELS:
 ▽ AT TIME OF DRILLING 8.00 feet
 ▼ AT END OF DRILLING 8.00 feet

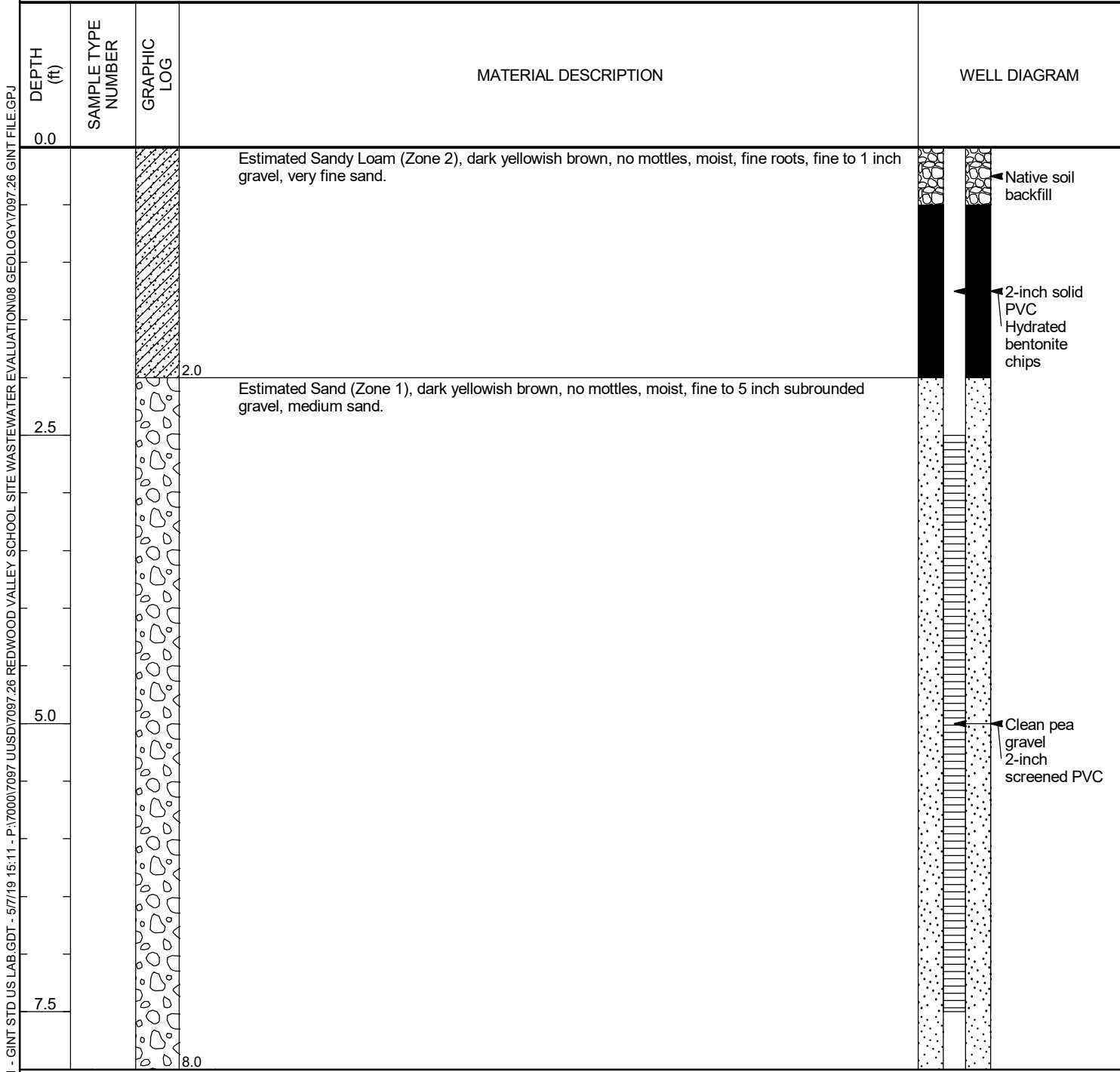
ENVIRO LOG #1 - GINT STD US LAB.GDT - 5/7/19 15:11 - P:\7000\7097 UUSD\7097.26 REDWOOD VALLEY SCHOOL SITE WASTEWATER EVALUATION\08 GEOLOGY\7097.26 GINT FILE.GPJ

DEPTH (ft)	SAMPLE TYPE NUMBER	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
0.0				
2.5			Estimated Loamy Sand (Zone 2), dark yellowish brown, no mottles, moist. Mottled with orange beginning at 5.5 feet.	Native soil backfill 2-inch solid PVC Hydrated bentonite chips
4.0			Estimated Clay (Zone 3), dark yellowish brown with gray and orange mottling, moist, fine to 1 inch gravel.	
5.0				
7.5				Clean pea gravel 2-inch screened PVC
8.0			Estimated Loamy Sand (Zone 2), dark yellowish brown, saturated, fine to 3 inch subrounded gravel.	
10.0				
10.5			Bottom of borehole at 10.5 feet.	

CLIENT Ukiah Unified School District **PROJECT NAME** Redwood Valley School Septic Evaluation
PROJECT NUMBER 7097.26 **PROJECT LOCATION** 700 East School Way, Redwood Valley, CA
DATE STARTED 2/7/19 **COMPLETED** 2/7/19 **GROUND ELEVATION** _____ **HOLE SIZE** 9 inches
DRILLING CONTRACTOR R&M Construction **GROUND WATER LEVELS:**
DRILLING METHOD Backhoe with Auger ▽ **AT TIME OF DRILLING** 7.00 feet
LOGGED BY JRG **CHECKED BY** KRM ▼ **AT END OF DRILLING** 5.33 feet
NOTES _____

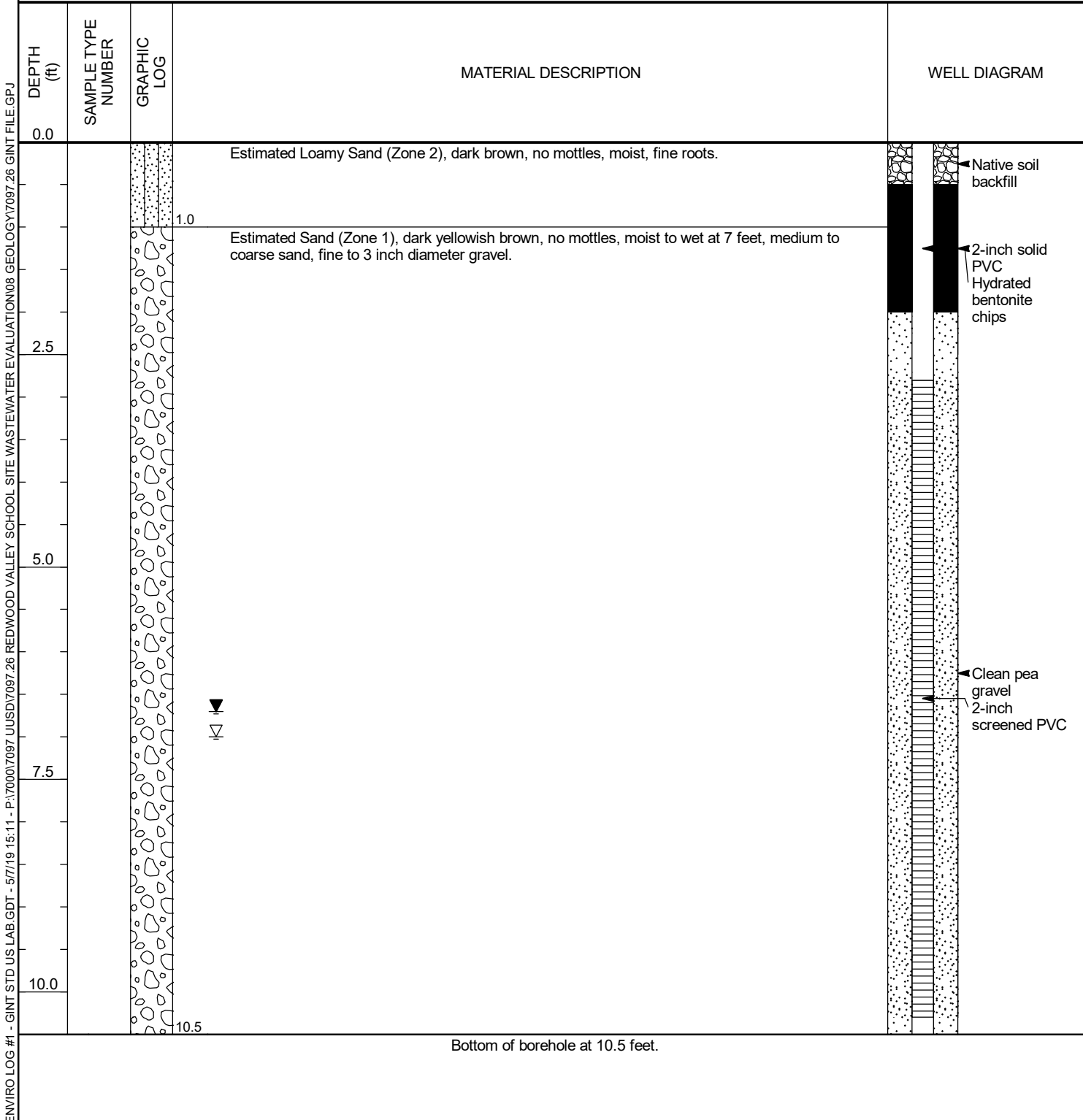


CLIENT Ukiah Unified School District **PROJECT NAME** Redwood Valley School Septic Evaluation
PROJECT NUMBER 7097.26 **PROJECT LOCATION** 700 East School Way, Redwood Valley, CA
DATE STARTED 2/7/19 **COMPLETED** 2/7/19 **GROUND ELEVATION** _____ **HOLE SIZE** 9 inches
DRILLING CONTRACTOR R&M Construction **GROUND WATER LEVELS:**
DRILLING METHOD Backhoe with Auger **AT TIME OF DRILLING** ---
LOGGED BY JRG **CHECKED BY** KRM **AT END OF DRILLING** ---
NOTES _____



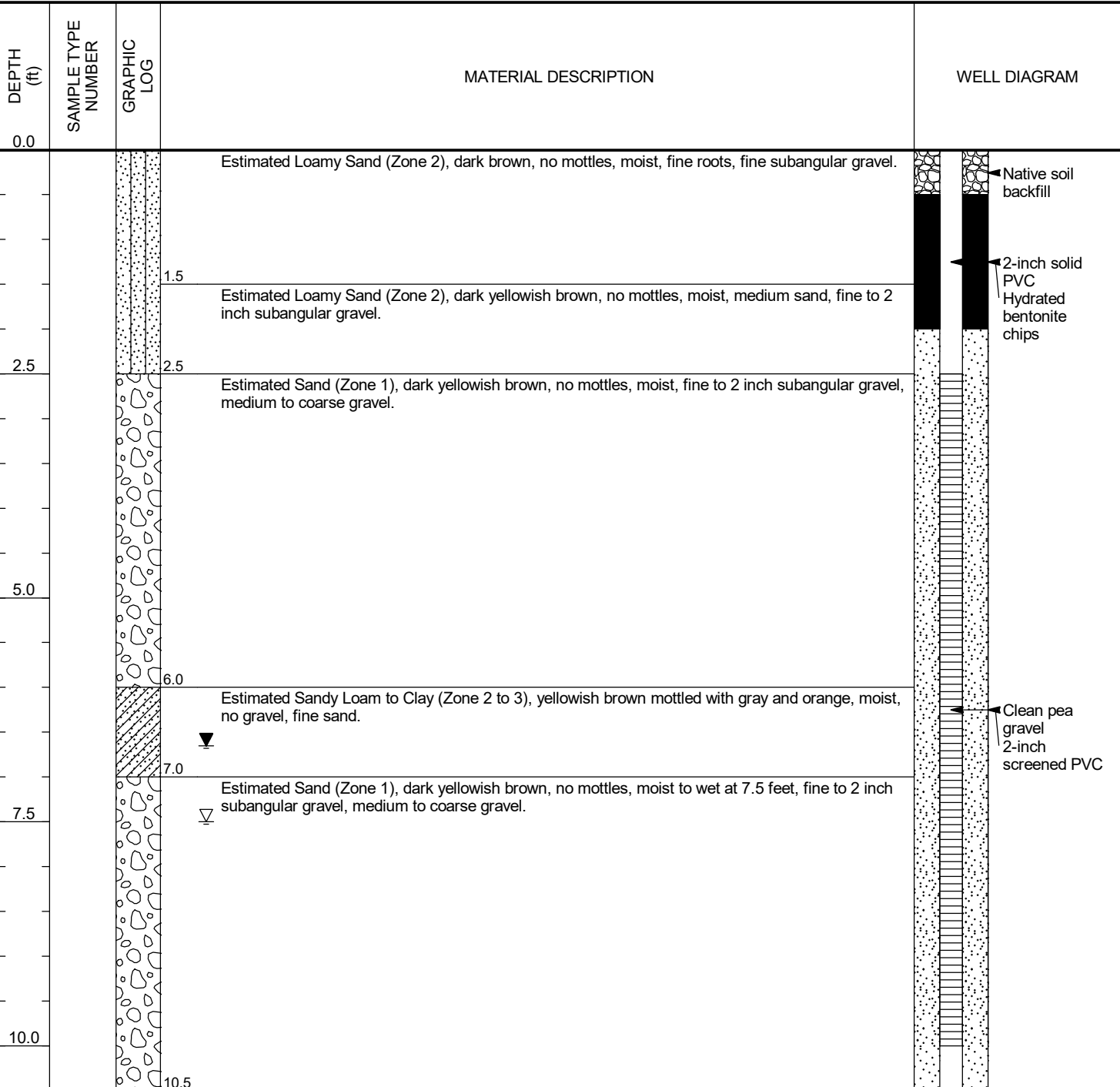
ENVIRO LOG #1 - GINT STD US LAB.GDT - 5/7/19 15:11 - P:\7000\7097 UUSD\7097.26 REDWOOD VALLEY SCHOOL SITE WASTEWATER EVALUATION\08 GEOLOGY\7097.26 GINT FILE.GPJ

CLIENT Ukiah Unified School District **PROJECT NAME** Redwood Valley School Septic Evaluation
PROJECT NUMBER 7097.26 **PROJECT LOCATION** 700 East School Way, Redwood Valley, CA
DATE STARTED 2/7/19 **COMPLETED** 2/7/19 **GROUND ELEVATION** _____ **HOLE SIZE** 9 inches
DRILLING CONTRACTOR R&M Construction **GROUND WATER LEVELS:**
DRILLING METHOD Backhoe with Auger ▽ **AT TIME OF DRILLING** 7.00 feet
LOGGED BY JRG **CHECKED BY** KRM ▼ **AT END OF DRILLING** 6.70 feet
NOTES _____

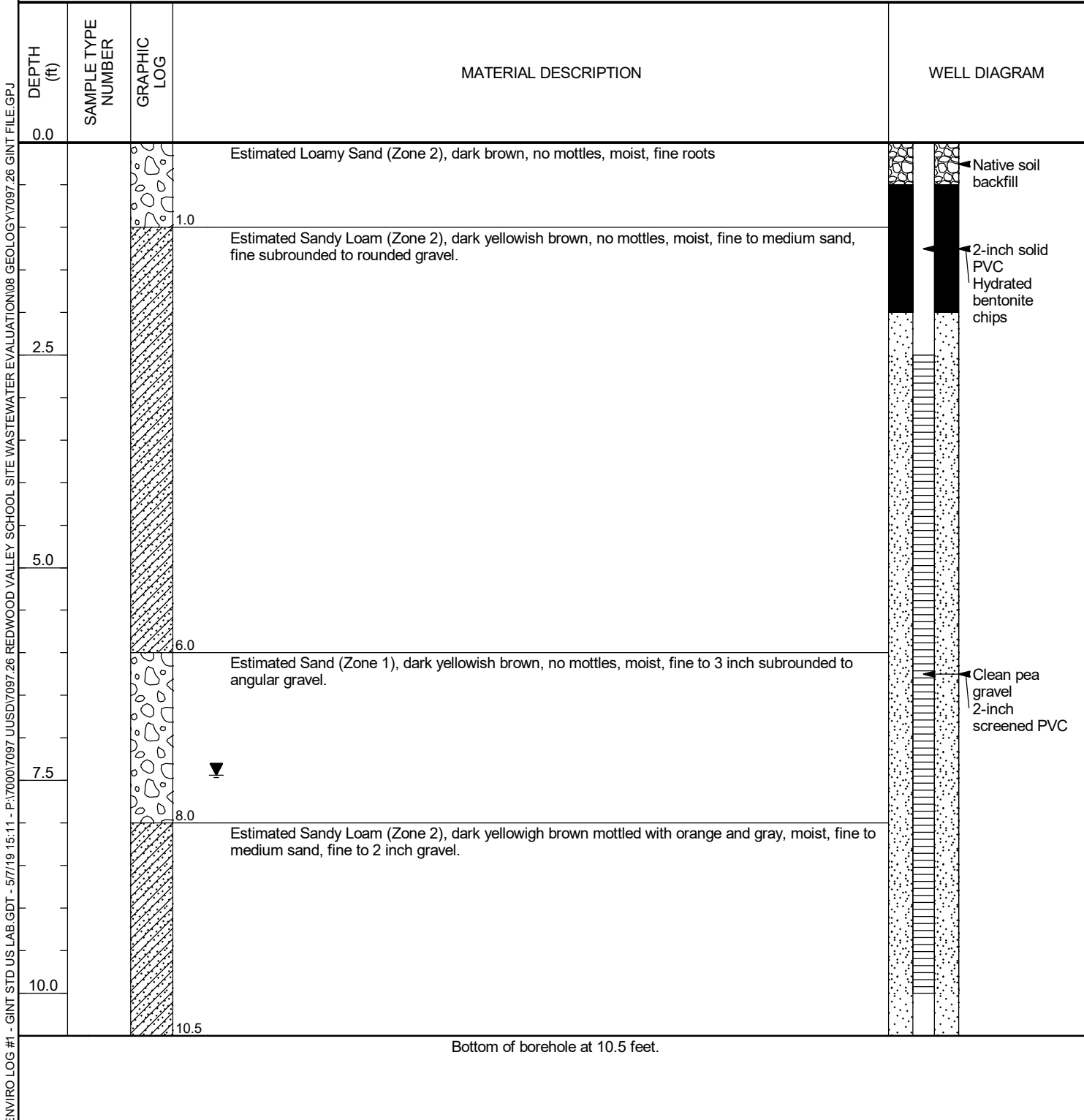


CLIENT Ukiah Unified School District **PROJECT NAME** Redwood Valley School Septic Evaluation
PROJECT NUMBER 7097.26 **PROJECT LOCATION** 700 East School Way, Redwood Valley, CA
DATE STARTED 2/7/19 **COMPLETED** 2/7/19 **GROUND ELEVATION** _____ **HOLE SIZE** 6 inches
DRILLING CONTRACTOR R&M Construction **GROUND WATER LEVELS:**
DRILLING METHOD Backhoe with Auger ▽ **AT TIME OF DRILLING** 7.50 feet
LOGGED BY JRG **CHECKED BY** KRM ▼ **AT END OF DRILLING** 6.65 feet
NOTES _____

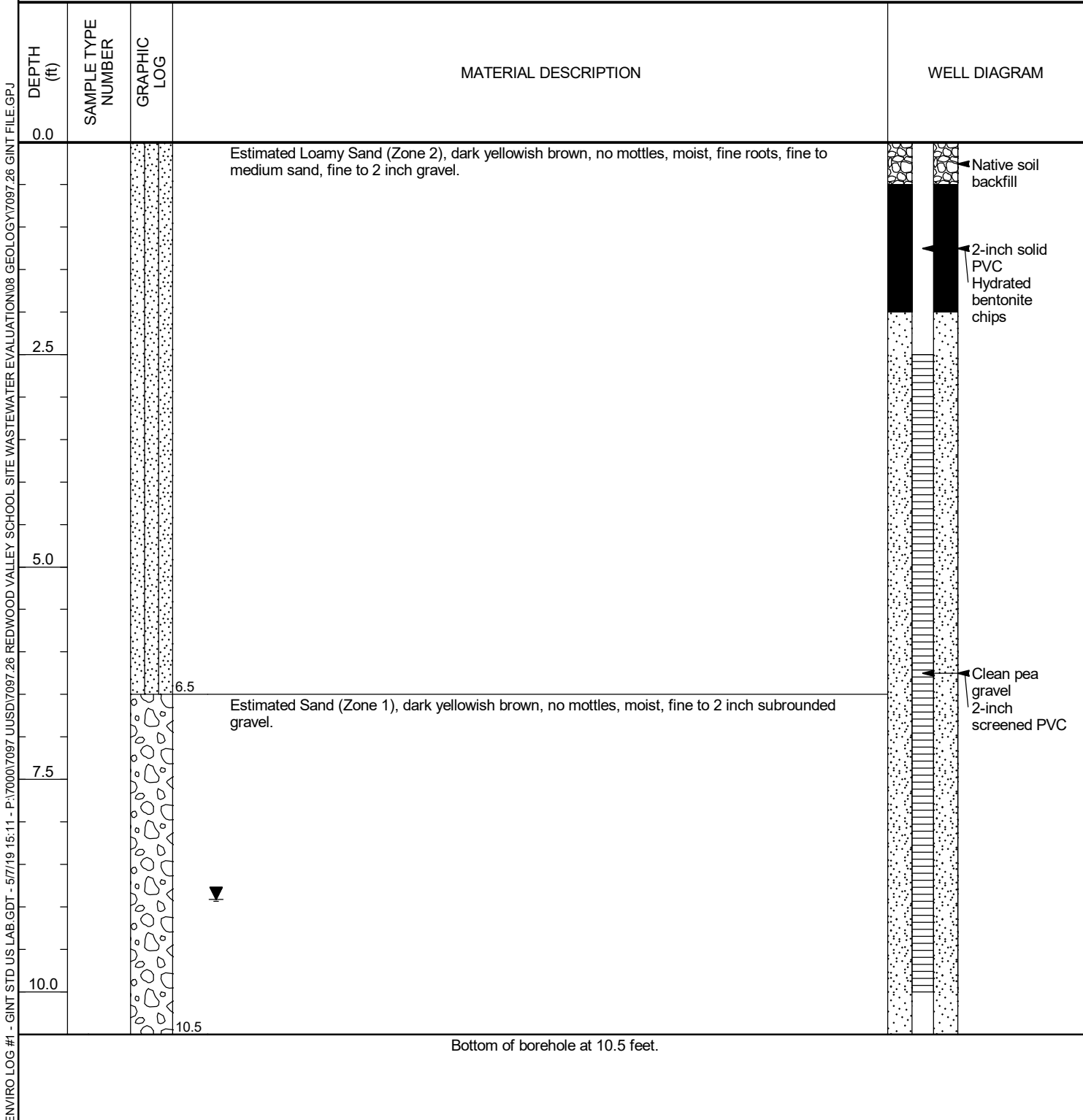
ENVIRO LOG #1 - GINT STD US LAB.GDT - 5/7/19 15:11 - P:\7000\7097 UUSD\7097.26 REDWOOD VALLEY SCHOOL SITE WASTEWATER EVALUATION\08 GEOLOGY\7097.26 GINT FILE.GPJ



CLIENT Ukiah Unified School District **PROJECT NAME** Redwood Valley School Septic Evaluation
PROJECT NUMBER 7097.26 **PROJECT LOCATION** 700 East School Way, Redwood Valley, CA
DATE STARTED 2/7/19 **COMPLETED** 2/7/19 **GROUND ELEVATION** _____ **HOLE SIZE** 6 inches
DRILLING CONTRACTOR R&M Construction **GROUND WATER LEVELS:**
DRILLING METHOD Backhoe with Auger **AT TIME OF DRILLING** ---
LOGGED BY JRG **CHECKED BY** KRM **AT END OF DRILLING** 7.44 feet
NOTES _____

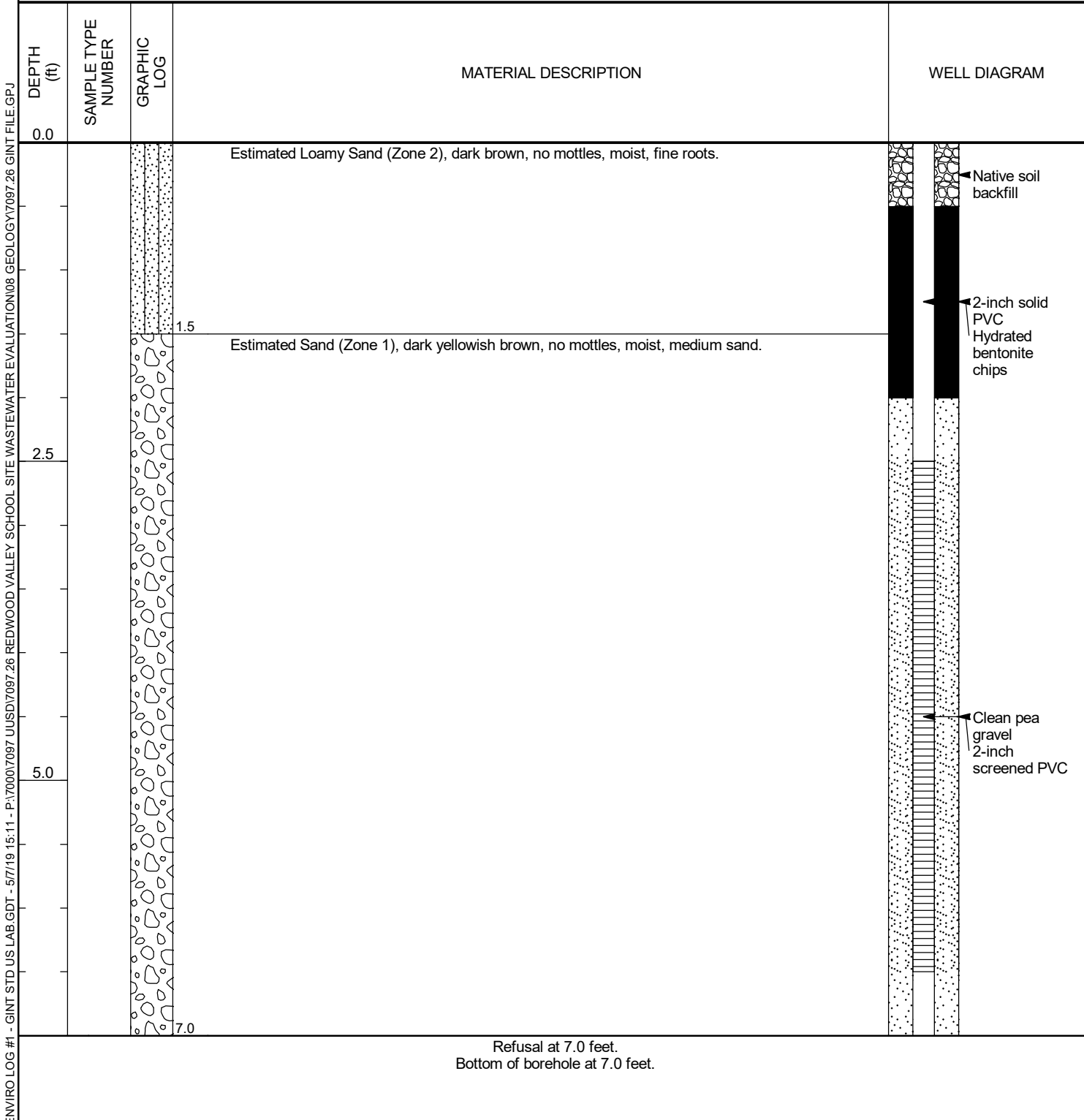


CLIENT Ukiah Unified School District **PROJECT NAME** Redwood Valley School Septic Evaluation
PROJECT NUMBER 7097.26 **PROJECT LOCATION** 700 East School Way, Redwood Valley, CA
DATE STARTED 2/7/19 **COMPLETED** 2/7/19 **GROUND ELEVATION** _____ **HOLE SIZE** 6 inches
DRILLING CONTRACTOR R&M Construction **GROUND WATER LEVELS:**
DRILLING METHOD Backhoe with Auger **AT TIME OF DRILLING** ---
LOGGED BY JRG **CHECKED BY** KRM **AT END OF DRILLING** 8.91 feet
NOTES _____



ENVIRO LOG #1 - GINT STD US LAB.GDT - 5/7/19 15:11 - P:\7000\7097 UUSD\7097.26 REDWOOD VALLEY SCHOOL SITE WASTEWATER EVALUATION\08 GEOLOGY\7097.26 GINT FILE.GPJ

CLIENT Ukiah Unified School District **PROJECT NAME** Redwood Valley School Septic Evaluation
PROJECT NUMBER 7097.26 **PROJECT LOCATION** 700 East School Way, Redwood Valley, CA
DATE STARTED 2/7/19 **COMPLETED** 2/7/19 **GROUND ELEVATION** _____ **HOLE SIZE** 6 inches
DRILLING CONTRACTOR R&M Construction **GROUND WATER LEVELS:**
DRILLING METHOD Backhoe with Auger **AT TIME OF DRILLING** ---
LOGGED BY JRG **CHECKED BY** KRM **AT END OF DRILLING** ---
NOTES _____



APPENDIX G

Observation Field Notes and Coyote Dam Precipitation Data

OBSERVATION WELL MONITORING FIELD FORM

Date: 2/7/19

*Rain Gauge total: 0 inches

Project No.: 7097.26

*Dump rain gauge after reading

Field Technician: KRM/JRG

Current Weather Conditions: Sunny

Is this storm qualifying? (1 inch of rain in a 48 hour period) no

Casing height (above ground) level

casing height

OBS-1 12"
** Installed transducer*
 Time: 4:40
 Depth to Water 8.83 feet btoc

OBS-5 12"
 Time: 5:02
 Depth to Water 7.65 feet btoc

OBS-2 11"
 Time: 5:10
 Depth to Water 6.25 feet btoc

OBS-6 12"
 Time: 4:59
 Depth to Water 8.44 feet btoc

OBS-3 12"
 Time: 5:18
 Depth to Water None feet btoc

OBS-7 12"
 Time: 5:14
 Depth to Water 10.06 feet btoc

OBS-4 10"
 Time: 5:07
 Depth to Water 7.45 feet btoc

OBS-8 12"
 Time: 4:56
 Depth to Water None feet btoc

Notes:

OBSERVATION WELL MONITORING FIELD FORM

Date: 2/11/2019

Project No.: 7097.26

Field Technician: JRG

*Rain Gauge total: 1.6" in gauge gauge emptied inches

*Dump rain gauge after reading

Current Weather Conditions: overcast
Is this storm qualifying? (1 inch of rain in a 48 hour period) yes

OBS-1
Time: 11:46
Depth to Water 8.45 feet btoC

OBS-5
Time: 11:55
Depth to Water 9.39 feet btoC

OBS-2
Time: 12:08
Depth to Water 7.93 feet btoC

OBS-6
Time: 12:01
Depth to Water 10.44 feet btoC

OBS-3
Time: ~~Dry~~ 11:50
Depth to Water Dry feet btoC

OBS-7
Time: 11:59
Depth to Water Dry feet btoC

OBS-4
Time: 12:05
Depth to Water 8.36 feet btoC

OBS-8
Time: 11:53
Depth to Water Dry feet btoC

Notes:

OBSERVATION WELL MONITORING FIELD FORM

Date: 2/14/2019 4:50 pm

Project No.: 7097.26

Field Technician: JRG

*Rain Gauge total: 4.75 inches

*Dump rain gauge after reading

Current Weather Conditions: overcast
Is this storm qualifying? (1 inch of rain in a 48 hour period) yes

OBS-1
Time: _____
Depth to Water _____ feet btoc

OBS-5
Time: _____
Depth to Water _____ feet btoc

OBS-2
Time: _____
Depth to Water _____ feet btoc

OBS-6
Time: _____
Depth to Water _____ feet btoc

OBS-3
Time: _____
Depth to Water _____ feet btoc

OBS-7
Time: _____
Depth to Water _____ feet btoc

OBS-4
Time: _____
Depth to Water _____ feet btoc

OBS-8
Time: _____
Depth to Water _____ feet btoc

Notes:

OBSERVATION WELL MONITORING FIELD FORM

Date: 2/22/2019

Project No.: 7097.26

Field Technician: KRM

*Rain Gauge total: 2.5 inches

*Dump rain gauge after reading

Current Weather Conditions: Sunny
Is this storm qualifying? (1 inch of rain in a 48 hour period) _____

OBS-1
Time: 4:02 pm
Depth to Water 8.55 feet btoc

OBS-5
Time: 4:10 pm
Depth to Water 9.05 feet btoc

OBS-2
Time: 4:17 pm
Depth to Water 7.62 feet btoc

OBS-6
Time: 4:12 pm
Depth to Water 10.58 feet btoc

OBS-3
Time: 4:05 pm
Depth to Water Dry feet btoc

OBS-7
Time: 2:30 pm
Depth to Water Dry feet btoc

OBS-4
Time: 4:15 pm
Depth to Water 7.81 feet btoc

OBS-8
Time: 4:07 pm
Depth to Water Dry feet btoc

Notes:

OBSERVATION WELL MONITORING FIELD FORM

Date: 2/27/2019

Project No.: 7097.26

Field Technician: JRG

*Rain Gauge total: 0.5 inches (FULL)

*Dump rain gauge after reading

Current Weather Conditions: light Rain
Is this storm qualifying? (1 inch of rain in a 48 hour period) Yes

OBS-1

Time: _____

Depth to Water _____ feet btoC

OBS-5

Time: _____

Depth to Water _____ feet btoC

OBS-2

Time: _____

Depth to Water _____ feet btoC

OBS-6

Time: _____

Depth to Water _____ feet btoC

OBS-3

Time: _____

Depth to Water _____ feet btoC

OBS-7

Time: _____

Depth to Water _____ feet btoC

OBS-4

Time: _____

Depth to Water _____ feet btoC

OBS-8

Time: _____

Depth to Water _____ feet btoC

Notes:

OBSERVATION WELL MONITORING FIELD FORM

Date: 3/12/2019

Project No.: 7097.26

Field Technician: KEM / C. SW

*Rain Gauge total: 3.5 inches

*Dump rain gauge after reading

Current Weather Conditions: Sunny
Is this storm qualifying? (1 inch of rain in a 48 hour period) n/a

OBS-1
Time: 1:55pm
Depth to Water 7.95 feet btoC

OBS-5
Time: 2:02pm
Depth to Water 8.52 feet btoC

OBS-2
Time: 1:55pm
Depth to Water 7.65 feet btoC

OBS-6
Time: 1:58pm
Depth to Water 10.56 feet btoC

OBS-3
Time: 2:03pm
Depth to Water dry feet btoC

OBS-7
Time: 1:59
Depth to Water 11.02 feet btoC

OBS-4
Time: 1:56
Depth to Water 6.89 feet btoC

OBS-8
Time: 2:00pm
Depth to Water 7.47 feet btoC

Notes: collected transducers & dumped data.
Three of the transducers needed to be brought back to the office to extract data. They were re-installed by Zack Hansen in the evening ~ 5:00pm.

OBSERVATION WELL MONITORING FIELD FORM

Date: 04/04/2019 10:05 AM
 Project No.: 7097.26
 Field Technician: Jennifer Genetti

*Rain Gauge total: 4 1/8 inches
 *Dump rain gauge after reading

Current Weather Conditions: Overcast
 Is this storm qualifying? (1 inch of rain in a 48 hour period) YES
Start of storm 4/2/19

OBS-1	Total Depth	OBS-5	Total Depth
Time: <u>10:10 AM</u> Depth to Water <u>8.12</u> feet btoc	<u>10'11" TOC</u> <u>10'1" BGS</u>	Time: <u>10:54 AM</u> Depth to Water <u>8.65</u> feet btoc	<u>11'0" TOC</u> <u>10'0" BGS</u>
Time: <u>10:21 AM</u> Depth to Water <u>6.83</u> feet btoc	<u>11'0.75" TOC</u> <u>10'3.25" BGS</u>	Time: <u>10:34 AM</u> Depth to Water <u>10.61</u> feet btoc	<u>11'0.25" TOC</u> <u>9'11.75" BGS</u>
Time: <u>10:59 AM</u> Depth to Water <u>Dry</u> feet btoc	<u>8'11" TOC</u> <u>8'1" BGS</u>	Time: <u>10:42 AM</u> Depth to Water <u>Dry</u> feet btoc	<u>11'0.25" TOC</u> <u>9'10.25" BGS</u>
Time: <u>10:29 AM</u> Depth to Water <u>7.02</u> feet btoc	<u>11'1" TOC</u> <u>10'4" BGS</u>	Time: <u>10:50 AM</u> Depth to Water <u>Dry</u> feet btoc	<u>7'6" TOC</u> <u>6'5.25" BGS</u>

Notes:

7097.26
3/21/2018

Field Notes

12:10 pm Arrive on site (KRM & JRG). Unload buckets of water.
Start first test - PP4 together.

12:36 pm KRM & JRG offsite. KRM lunch, JRG apt.

1:12 pm KRM onsite.

2:30 JRG onsite

5:30 pm OBS-3 dry

5:45 pm OBS-3 dry

5:52 pm OBS-8 7.47' ~~btoc~~ btoc

6:06 pm OBS-7 10.96' ~~btoc~~ btoc

6:10 pm OBS-6 10.73' ~~btoc~~ btoc

6:13 pm OBS-5 8.74' ~~btoc~~ btoc

6:15 pm OBS-4 7.25' ~~btoc~~ btoc

6:18 pm OBS-2 7.04' ~~btoc~~ btoc

6:21 pm OBS-1 8.28' ~~btoc~~ btoc

Depth to water, below top of casing

0.5" Rain gauge

Offsite 6:30 pm

★ PP7 not installed by DAS and ZH.

★ PP9 ~~is~~ draining ≈ 30 gal/6" leach field could potentially be impacting rate.

★ PP10 really slow - need to finish another day.

★ measurements for PP4, PPS, PP6, PP8, OBS-3, OBS-8 completed.

★ uninstalled PP4, PPS, PP6, PP8 by backfilling with dirt & pulling pipe

★ Took depth to water measurements for OBS. ~~is~~ prior to leaving.

Back to office 6:50 pm.

Table 1: Precipitation Values Recorded from the Coyote Dam
LACO Project 7097.26
Former Redwood Valley School Site Wastewater Evaluation

DATE / TIME (PST)	PRECIPITATION (inches per day)	TEMP MN DEG F	TEMP MX DEG F
1/21/2019	0.03	37	57
1/22/2019	0.00	31	61
1/23/2019	0.01	33	63
1/24/2019	0.00	38	71
1/25/2019	0.00	34	69
1/26/2019	0.01	36	63
1/27/2019	0.00	40	74
1/28/2019	0.00	47	71
1/29/2019	0.00	48	74
1/30/2019	0.00	44	68
1/31/2019	0.00	39	69
2/1/2019	0.26	48	56
2/2/2019	0.57	48	57
2/3/2019	0.28	44	52
2/4/2019	0.56	33	47
2/5/2019	0.01	31	48
2/6/2019	0.00	29	54
2/7/2019	0.00	29	51
2/8/2019	0.39	39	50
2/9/2019	0.69	35	47
2/10/2019	0.05	31	48
2/11/2019	0.00	33	48
2/12/2019	0.64	40	48
2/13/2019	2.67	42	56
2/14/2019	0.65	41	58
2/15/2019	0.69	38	48
2/16/2019	0.67	36	48
2/17/2019	0.10	32	50
2/18/2019	0.00	30	56
2/19/2019	0.00	28	57
2/20/2019	0.00	37	54
2/21/2019	0.00	30	58
2/22/2019	0.04	25	58
2/23/2019	0.00	31	56
2/24/2019	0.00	43	50
2/25/2019	2.56	46	52
2/26/2019	2.64	50	54
2/27/2019	0.37	42	56
2/28/2019	0.00	36	54
3/1/2019	0.04	39	54
3/2/2019	0.53	46	60
3/3/2019	0.16	48	56
3/4/2019	0.00	45	57
3/5/2019	0.60	44	55
3/6/2019	0.40	49	58
3/7/2019	0.02	41	50

Table 1: Precipitation Values Recorded from the Coyote Dam
LACO Project 7097.26
Former Redwood Valley School Site Wastewater Evaluation

DATE / TIME (PST)	PRECIPITATION (inches per day)	TEMP MN DEG F	TEMP MX DEG F
3/8/2019	0.00	34	54
3/9/2019	0.71	37	49
3/10/2019	0.03	40	58
3/11/2019	0.00	31	68
3/12/2019	0.00	42	58
03/13/2019	0.00	34	62
03/14/2019	0.00	32	72
03/15/2019	0.00	35	72
03/16/2019	0.00	36	76
03/17/2019	0.00	39	76
03/18/2019	0.01	40	76
03/19/2019	0.00	46	68
03/20/2019	0.34	42	57
03/21/2019	0.00	40	65
03/22/2019	0.68	37	52
03/23/2019	0.02	41	60
03/24/2019	0.00	35	63
03/25/2019	0.94	45	54
03/26/2019	0.15	44	58
03/27/2019	0.97	41	60
03/28/2019	0.52	42	57
03/29/2019	0.04	43	63
03/30/2019	0.00	36	70
03/31/2019	0.00	40	75
04/01/2019	0.03	50	70
04/02/2019	0.06	47	58
04/03/2019	0.00	49	62
04/04/2019	0.00	51	60

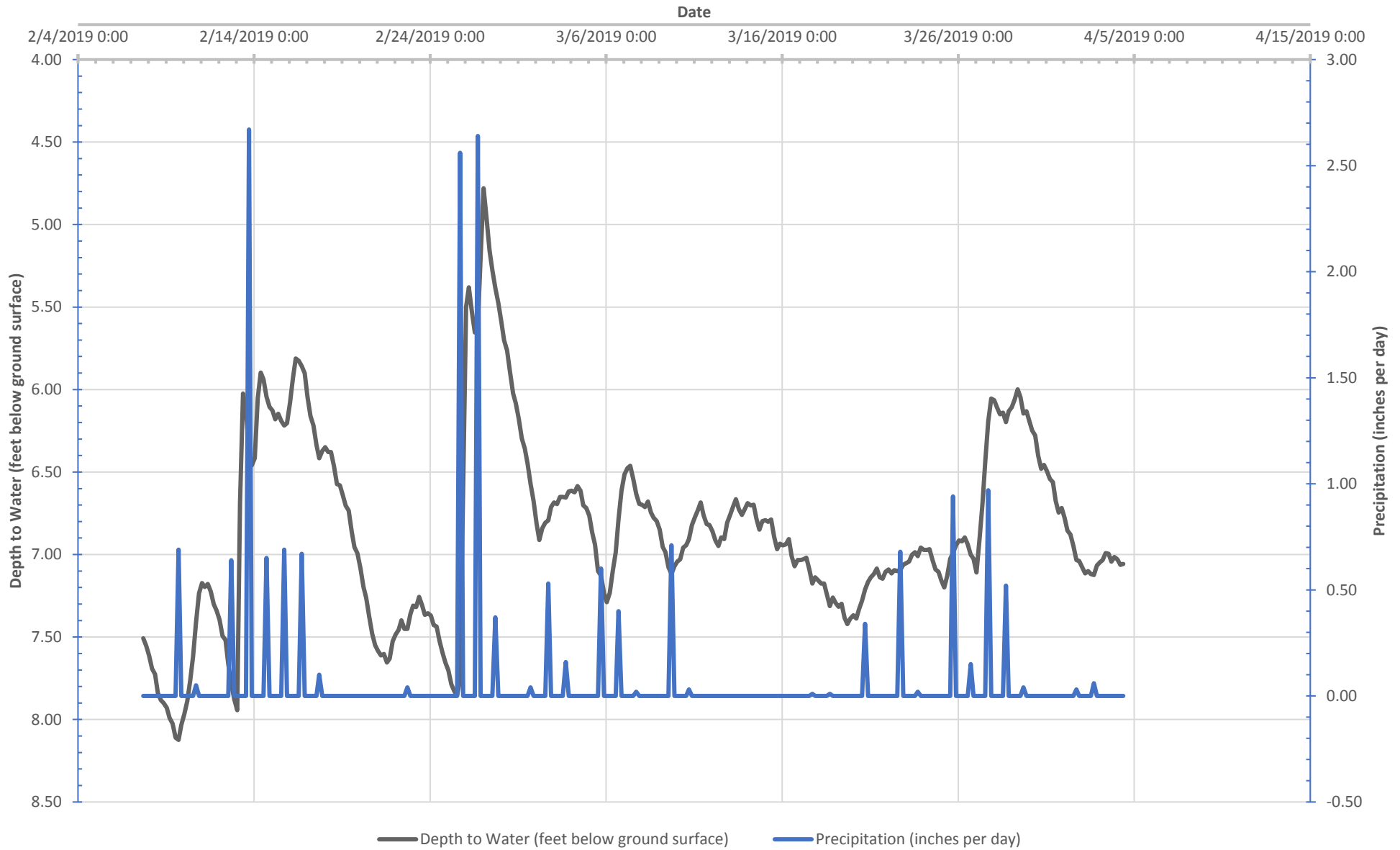
Data from:

California Data Exchange Center. Coyote (Lake Mendocino) COY. California Department of Water Resources; 2017. <http://cdec.water.ca.gov/river/res_COY.html>.

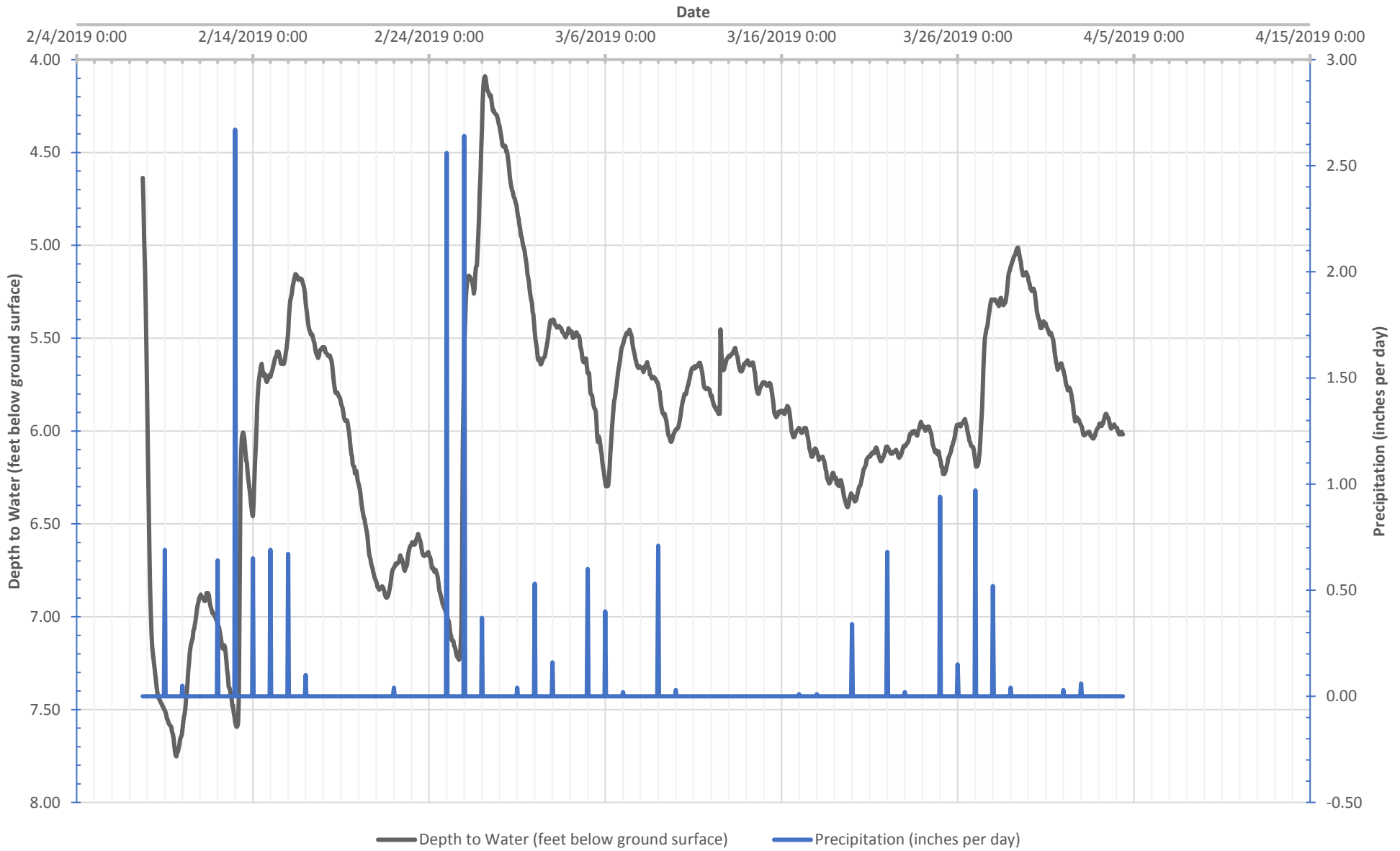
APPENDIX H

Observation Well Line Charts

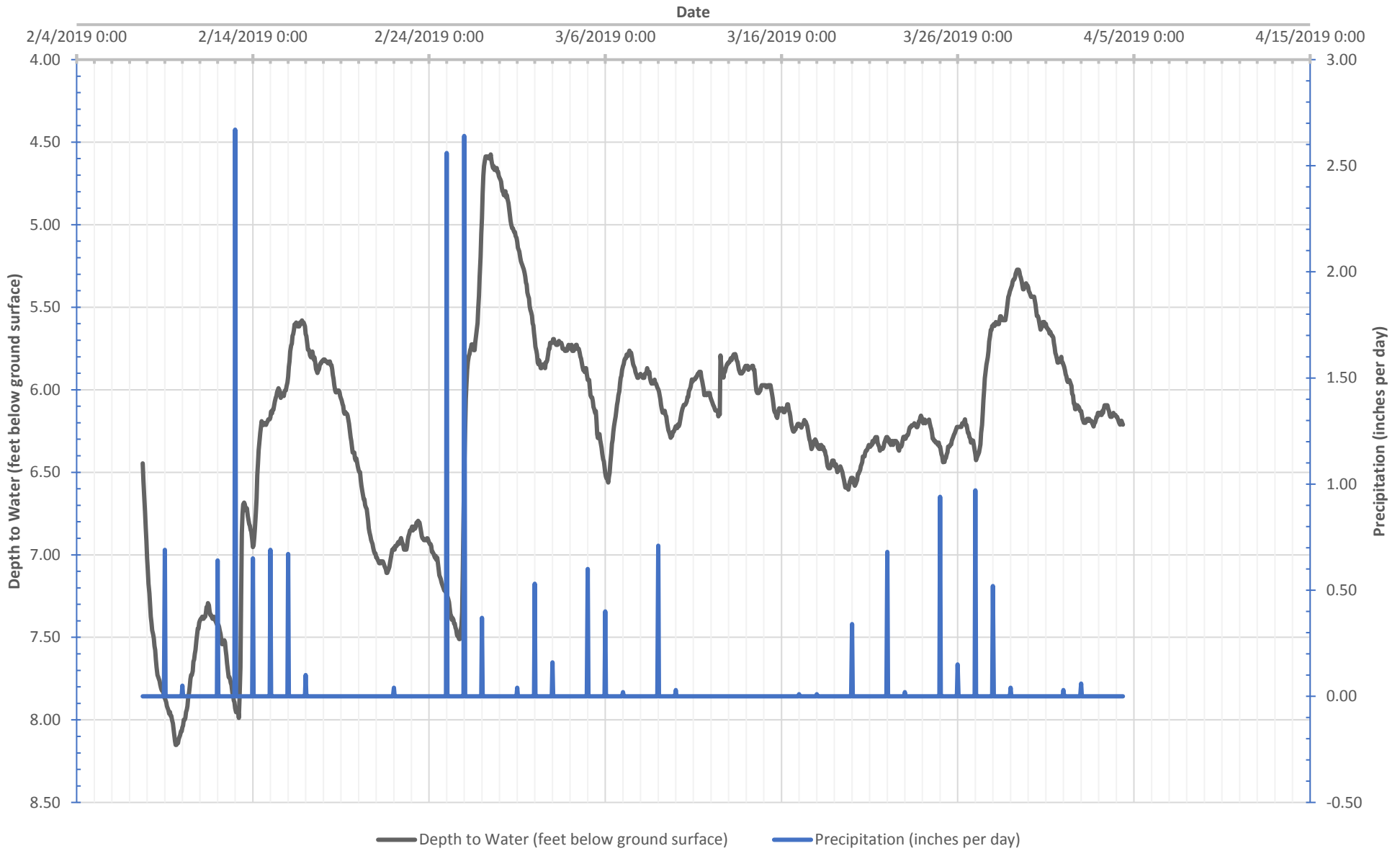
OBS-1 WET SEASON MONITORING DATA



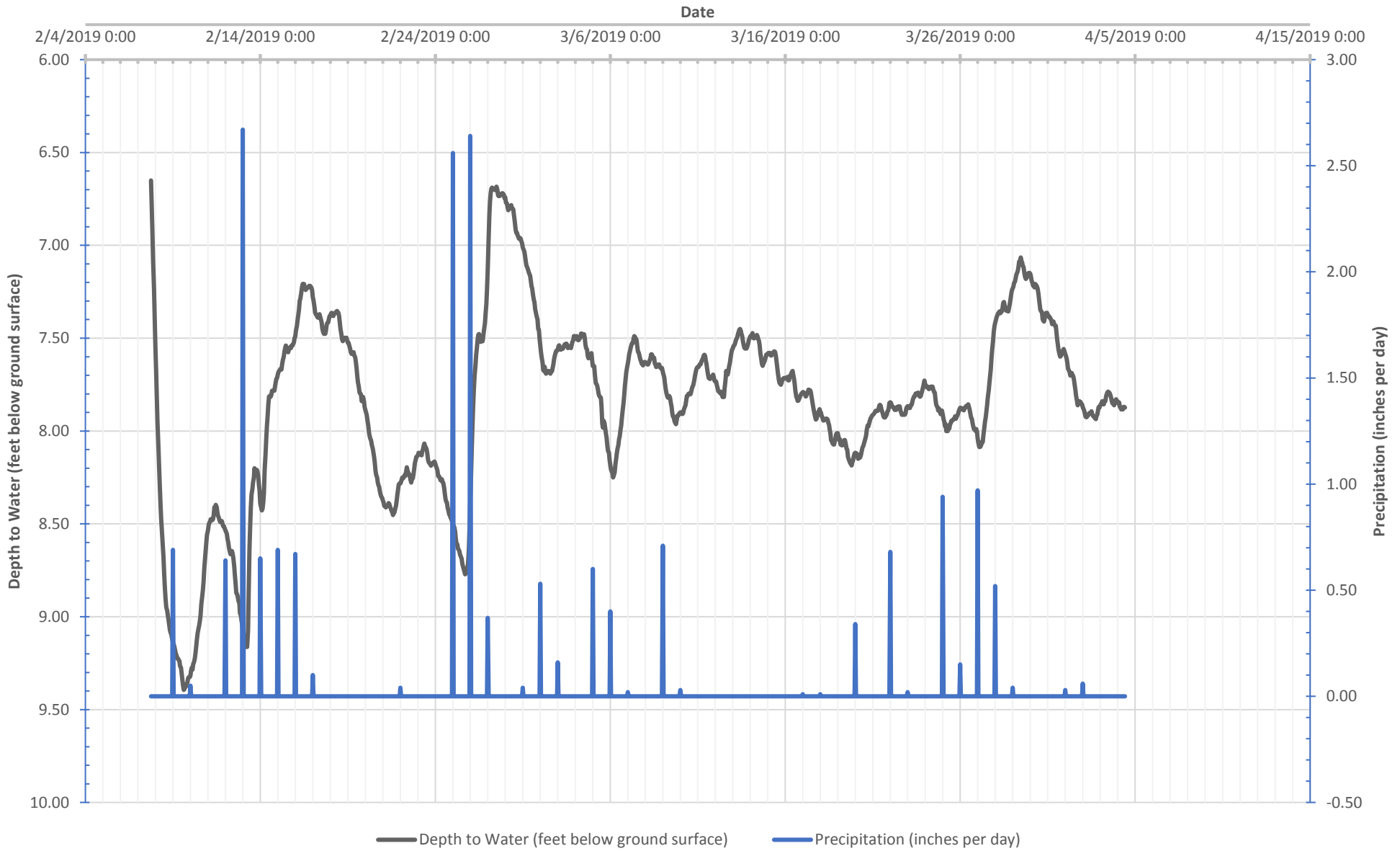
OBS-2 WET SEASON MONITORING DATA



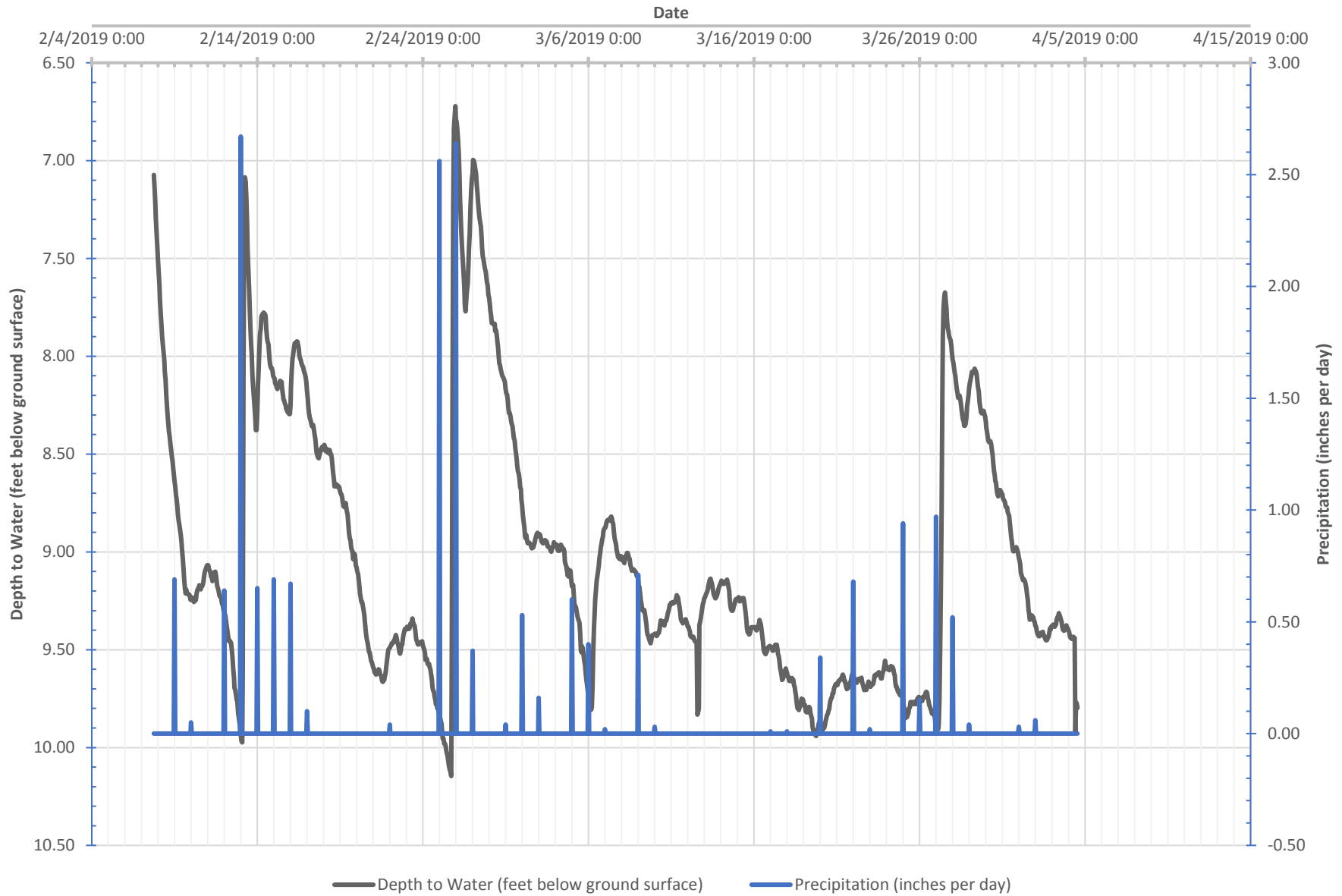
OBS-4 WET SEASON MONITORING DATA



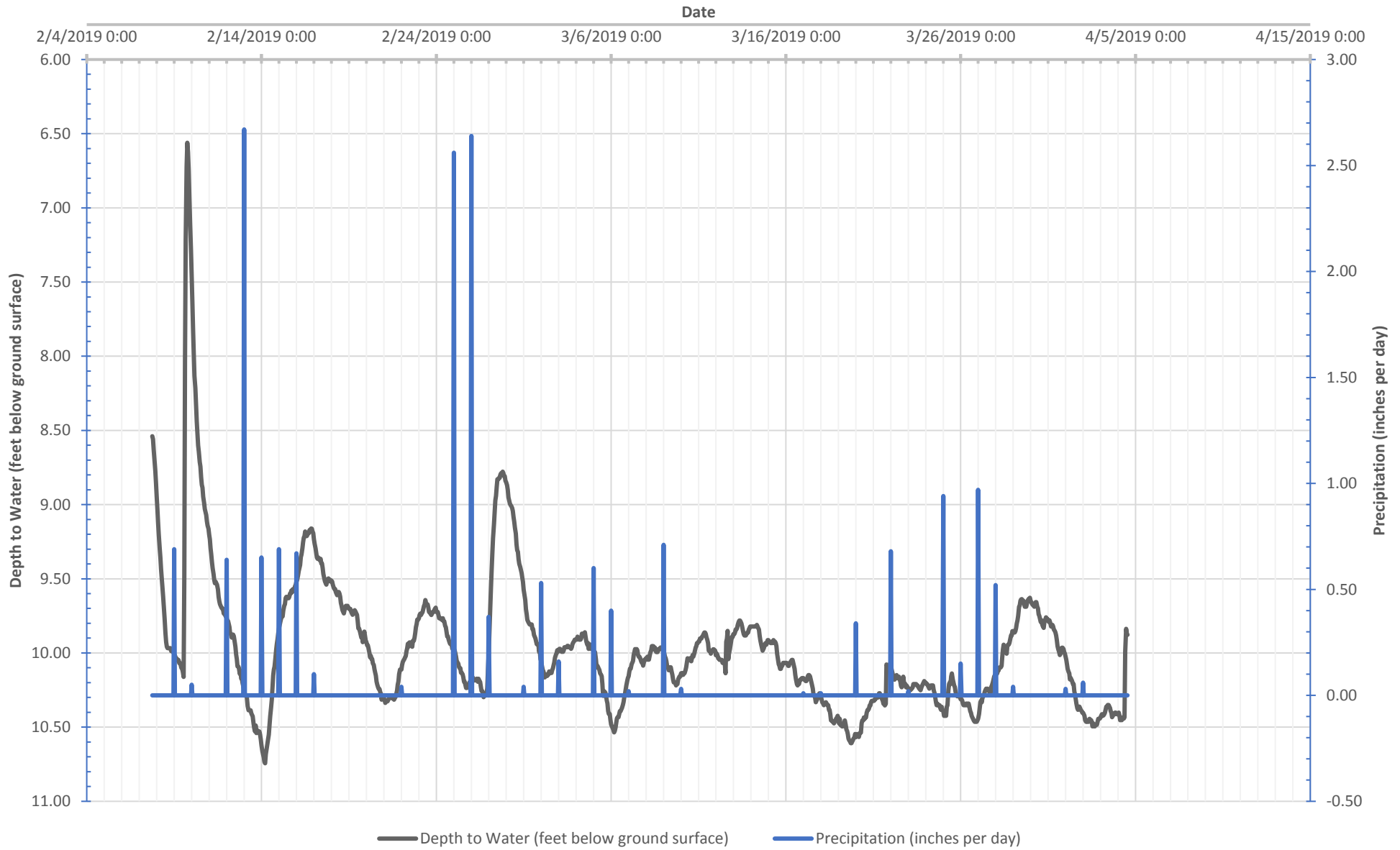
OBS-5 WET SEASON MONITORING DATA



OBS-6 WET SEASON MONITORING DATA



OBS-7 WET SEASON MONITORING DATA



OBS-8 WET SEASON MONITORING DATA

