

Roger L. Ames
Registered Professional Geologist
2318 East Lakecrest Drive
Gilbert, Arizona 85234
Telephone 480-926-4710

11 June 2001

Coen Engineering
879 North Plaza Drive
Building F
Apache Junction, Arizona 85220

RE: ADEQ letter of June 7, 2001
Engineering Review File No. 20010167
Los Montanas Phase I

Item # 4

The soils report was originally submitted using a Final Plat of 16 lots (55 acres) for Tierra Ricca Subdivision on 3 August 1999. Subsequently, the Owners change the plan for the area. They resubmitted a plat with 60 lots (118 acres) for Las Montanas Unit I. A revised soils report changing the name of the original was submitted on 27 February 2001. No additional testing was ordered. The revision was only a name change.

Item # 5

The correct plat is the Las Montanas Unit I, Final Plat.

Item # 6

Engineering Bulletin No. 19 provides as exception for the case when "it can be shown by submission of other reliable data that soil conditions are such that individual disposal systems could be reasonable expected to function properly on each lot in the proposed subdivision".

The enclosed information is from the U. S. Soil Conservation Service, Soil Survey of Pinal County, Arizona, Western Part. The soil survey map, sheet no. 11 included with this letter shows that the soils are units 15 and 57 as described in the soils report. These are large and consistent units that have uniform characteristics through out the area where they occur.

Unit 15 is the Denure Series and unit 47 is the Vaiva Series. The Soil Conservation Service has done extensive testing of these units and it is consistent with the on-site testing accomplished by myself. The SCS test results are included with this letter.

It is my Professional opinion that the SCS test results are consistent with the field results and that the data is reliable and consistent with the exception as set forth in Engineering Bulletin No. 19.

Sincerely

Roger L. Ames
Roger L. Ames, R. G. 29186



PERCOLATION AND SOILS TESTING

FOR

LAS MONTANAS

(Formerly Terra Ricca)

A SUBDIVISION IN PINAL COUNTY ARIZONA

Prepared for:

Coen Engineering
212 West Superstition Blvd.
Apache Junction, Arizona 85220

Date:

3 August 1999

(Revised 27 February 2001)

Prepared by:

Roger Ames
2318 East Lakecrest Drive
Gilbert, Arizona

Registered Professional Geologist
Arizona Registration Number 29186



PERCOLATION AND SOILS TESTING
FOR
TIERRA RICA
A SUBDIVISION IN PINAL COUNTY ARIZONA

Prepared for:

**coen Engineering
2115 East Evergreen
Mesa, Arizona 85213**

Date:

3 August 1999

Prepared by:

**Roger Ames
2318 East Lakecrest Drive
Gilbert, Arizona**

**Registered Professional Geologist
Arizona Registration Number 29186**



Table of Contents

Section I

Scope

Field Investigation

Subsurface Conditions

Results of Field Percolation Testing

Conclusions

Section II

Site Plan

Soil profiles

Test Equipment and Procedures

Section III

Percolation Test Data

Depth to Groundwater and Flow Direction

Sewage Disposal Flow Rate

Required Effective Adsorption Area

Attachment # 1 Copy of Plat

Attachment # 2 Well Locations and Depth to Ground Water

Attachment # 3 U. S. Soil Conservation Service Soil Map

Section I

Scope

Tierra Ricca is a 14 lot subdivision of three acre or more lots. The smallest lot is 3.302 acres and the largest lot is 4.169 acres. The subdivision is permitted for individual sewage disposal systems using a septic system and drain field for each lot. Water will be provided by the Arizona Water Company. The percolation tests and soil profiles presented in this report are intended to prove the general suitability of the soils for this type of system and **are not** intended to be used for the site specific testing required by the Pinal Count Health Department to complete the requirements for a Sewage Disposal Permit.

Field Investigation

Pinal County requested a minimum of one soil profile and one percolation test per every five lots in order to evaluate the general suitability of the area for individual sewage disposal systems. A total of four soil profiles and four percolation tests were completed at various locations on the property so that tests were conducted in both of the mapped soil types known to exist on the site. Tests were conducted on lots 2, 4, 9, 14.

Subsurface Conditions

There is a surface layer of soil with organic material admixed that varies from .5 feet to 1.6 feet in thickness. Below the soil the material is generally similar and consists of a Gravel, silty, sandy and is classified as (SM) by ASTM(USCS) Unified soil classification system.

Results of Field Percolation Testing

The four percolation test completed established a percolation rate varying form 1.58 minutes per inch to 3.16 minutes per inch. This is considered a rapid rate however ground water is in excess of 100 deep and the rapid percolation rate poses no threat to ground water. The only exception is an Earth Fissure (discussed in a separate report) that crossed The subdivision. No septic systems or drainfields should be constructed within 100 feet of this feature.

Conclusions

The soils underlying this subdivision are well suited for individual disposal systems. A properly designed and installed system will not effect ground water or the land surface and will perform within the design criteria for such a system.

Section II

Site Plan

A cope of the Subdivision Plat with the soil profiles and percolation test located on it is included as attachment # 1.

Soil profiles

The USDA Soil Conservation Service has mapped and described the soil on this property. See "Soil Survey of Pinal County, Arizona, Western Part" Issued in November 1991 (partial map attachment # 3). The Author has used the published terminology so that the soil profiles described herein are compatible with the previously published work.

The soils encountered in the soil profiles done on lots 4 and 14 are of the Denure series and are described as 6 to 20 inches of sandy loam, then sandy gravel with occasional lime masses. This compares to the published description as quoted below.

"15--Denure very gravely sandy loam, 1 to 8 percent slopes. This deep, somewhat excessively drained soil is on fan terraces. It formed in fan alluvium derived from mixed sources. Elevation is 1,140 to 2,000 feet. The average annual precipitation is 6 to 8 inches, the average annual air temperature is 68 to 72 degrees F. and the average frost free period is 240 to 325 days.

Typically, the surface layer is light brown very gravely sandy loam about 8 inches thick. The next 46 inches is light brown sandy loam and fine sandy loam. Below this to a depth of 60 inches or more is reddish brown sandy clay loam. Soft masses of lime are below a depth of about 19 inches.

Included in this unit are about 5 percent Tremant soils on the higher end of fan terraces and lower ridges, 5 percent Mohall soils on the lower end of fan terraces, and 2 percent Carrizo soils on flood plains.

Permeability of this Denure soil is moderately rapid. Available water capacity is moderate. Potential rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is slight. The hazard of soil blowing is slight.

This unit is used as rangeland.

The potential native plant community is a mixture of desertic shrubs and trees with an understory of perennial grasses. The present vegetation is littleleaf paloverde, triangle bursage, white bursage, ratany, creosotebush, bush muhly, and a variety of cacti, annual grasses, and forbs.

This unit is poorly suited to the production of desertic herbaceous plants, shrubs, and trees that provide habitat for wildlife.

This unit is in capability subclass VIIc, nonirrigated. It is in Sandy Loam Upland, 7 - to 10 - inch p.z., range site."

The soils encountered in the soil profiles done on lots 2 and 9 are also of the Denure series and are described as 8 to 10 inches of sandy loam, then 36 to 48 inches of sandy

gravel with occasional lime and then sandy gravel with cobbles. This compares with the published description as quoted below.

"16--Denure sandy loam, 1 to 3 percent slopes. This somewhat excessively drained Soil is on fan terraces. It formed in fan alluvium derived from mixed sources. Elevation is 1,140 to 2,000 feet. The average annual precipitation is 6 to 8 inches, the average annual air temperature is 68 to 72 degrees F, and the average frost free period is 240 to 325 days.

Typically, the surface layer is light brown sandy loam about 2 inches thick. The next 52 inches is light brown sandy loam and fine sandy loam. Below this to a depth of 60 inches or more is reddish brown sandy clay loam. This layer is 5 to 39 percent pebbles. A few soft masses of lime are below a depth of about 19 inches.

Included in this unit are small areas of Coolidge, Dateland, Momoli, and Valencia soils. Also included are small areas of soils that have a surface layer of gravelly sand loam. Included areas make up about 15 percent of the total acreage.

Permeability of this Denure soil is moderately rapid. Available water capacity is moderate. Potential rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is slight. The hazard of soil blowing is moderate.

This unit is used mainly as rangeland. It is also used for irrigated crops and homesite development.

The potential native plant community on this unit is desertic shrubs and cacti and a small percentage of annual and perennial grasses and forbs. The present vegetation is creosotebush, traingle bursage, and annual grasses and forbs.

If this unit is used for irrigated crops, it is limited mainly by the slope, the hazard of soil blowing, and the moderate available water capacity. Surface sprinkler, and trickle irrigation systems are suited to this unit. If furrow or corrugation methods are used, the application of water should be on the contour or across the slope. Leveling the soil permits more efficient use of irrigation water. To avoid overirrigating and leaching of plant nutrients, applications of water should be adjusted to the available water capacity, the water intake rate, and the needs of the crop. Maintaining crop residue on or near the surface reduces runoff, reduces soil blowing, and helps to maintain soil tilth and organic matter content. Keeping the soil surface moist helps to control soil blowing and thus reduces the risk of damage to young seedlings.

This soil has few limitations for homesite development. Construction of houses and access roads in places expose soil material that is highly susceptible to soil blowing. Revegetating disturbed areas around construction sites as soon as possible helps to control soil blowing. Plant cover can be established and maintained through proper fertilizing, seeding, mulching, and shaping of slopes. Measures such as wrapping steel pipes and providing cathodic protection can be used to minimize the corrosion of steel.

This unit is poorly suited to the production of desertic herbaceous plants, shrubs, and trees that provide habitat for wildlife. It is moderately well suited to the production of irrigated grain and seed crops and domestic grasses and legumes.

This unit is in capability subclass IIs, irrigated, and VIIs, nonirrigated. It is the limy Fan, 7 - to - 10 inch p.z., range site."

The typical soil profile for the Denure Series is described by the USSCS and is quoted below.

"Denure Series

The Denure Series consists of deep, somewhat excessively drained soils on fan terraces and stream terraces. These soils formed in fan and stream alluvium derived from granite, rhyolite, quartzite, and andesite. Slope is 0 to 8 percent. Elevation is 1,140 to 2,000 feet. the average annual precipitin is about 6 to 8 inches, the average air temperature is 68 to 72 degrees F, and the average frost free season is 240 to 325 days.

These soils are coarse-loamy, mixed hyperthermic Typic Camborthids.

Typical pedon of Denure sand loam, 1 to 3 percent slopes; about 200 feet south and 300 feet west of the northeast corner of sec. 36, T. 5 S, R. 6 E.

A-- 0 to 2 inches; light brown (10YR 6/4) sandy loam, dark brown (7.5YR 4/4) moist; weak medium platy structure; slightly hard, very friable, nonsticky and nonplastic; common fine roots; few tubular pores; slightly effervescent; moderately alkaline; abrupt wavy boundary.

Bw--2 to 19 inches; light brown (7.5YR 6/4) sandy loam, dark brown (7.5YR 4/4) moist; weak medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; common fine roots; few fine tubular pores; slightly effervescent; moderately alkaline; gradual wavy boundary.

Bk--19 to 39 inches; light brown (7.5YR 6/4) sandy loam, dark brown (7.5YR 4/4) moist; weak medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; common fine roots; few fine tubular pores; few fine secondary lime accumulations; strongly effervescent; moderately alkaline; clear wavy boundary.

Bk2--39 to 54 inches; light brown (7.5YR 6/4) fine sandy loam, dark brown (7.5YR 4/4) moist; weak medium subangular blocky structure slightly hard, very friable, nonsticky and nonplastic; few fine tubular pores; common fine secondary lime accumulations; strongly effervescent; moderately alkaline; clear wavy boundary.

2Bt1c--54 to 60 inches; reddish brown (5YR 5/4) sandy clay loam, reddish brown (5YR 4/4) moist; weak fine subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few fine tubular pores; few fine soft lime masses, violently effervescent; moderately alkaline.

The profile is as much as 35 percent rock fragments. The buried Bt horizon is not within a depth of 60 inches in all pedons.

The A horizon has hue of 7.5YR or 10YR, value of 5 to 7 when dry and 2 to 5 when moist, and chroma of 4 to 6 when dry or moist. Texture is sandy loam, very gravelly sandy loam, fine sandy loam, or clay loam.

The B horizon has hue of 7.5YR or 10YR, value of 4 to 6 when dry and 4 or 5 when moist, and chroma of 3 to 6 when dry or moist. Texture is sandy loam, fine sandy loam, or gravelly sandy loam."

Test Equipment and procedures

Groundwater in the area is in excess of 100 feet below the surface and is not threatened by the use of individual disposal systems and is not a factor in the soil profiles or percolation tests conducted on the property.

A backhoe was used to excavate an 8 foot trench for the soil profile. This provides for placement of the drainfield at 2 feet below the surface and a soil profile extending 5 feet below the bottom of the drainfield.

The backhoe was then used to clear the top 2 feet of material and then hand tools were use to dig a 15 inch round hole to a depth of 12 inches below the bottom of the trench level or 3 feet below the surface. The percolation test was conducted in the 12 inch interval from 2 feet to 3 feet below the surface. The percolation test holes were then presoaked with 12 inches of water. In all cases the water seep away in 20 to 40 minutes and the holes were refilled. The water seep away in 20 to 40 minutes again in the second and third applications and the percolation tests were conducted immediately.

Section III

Percolation test data

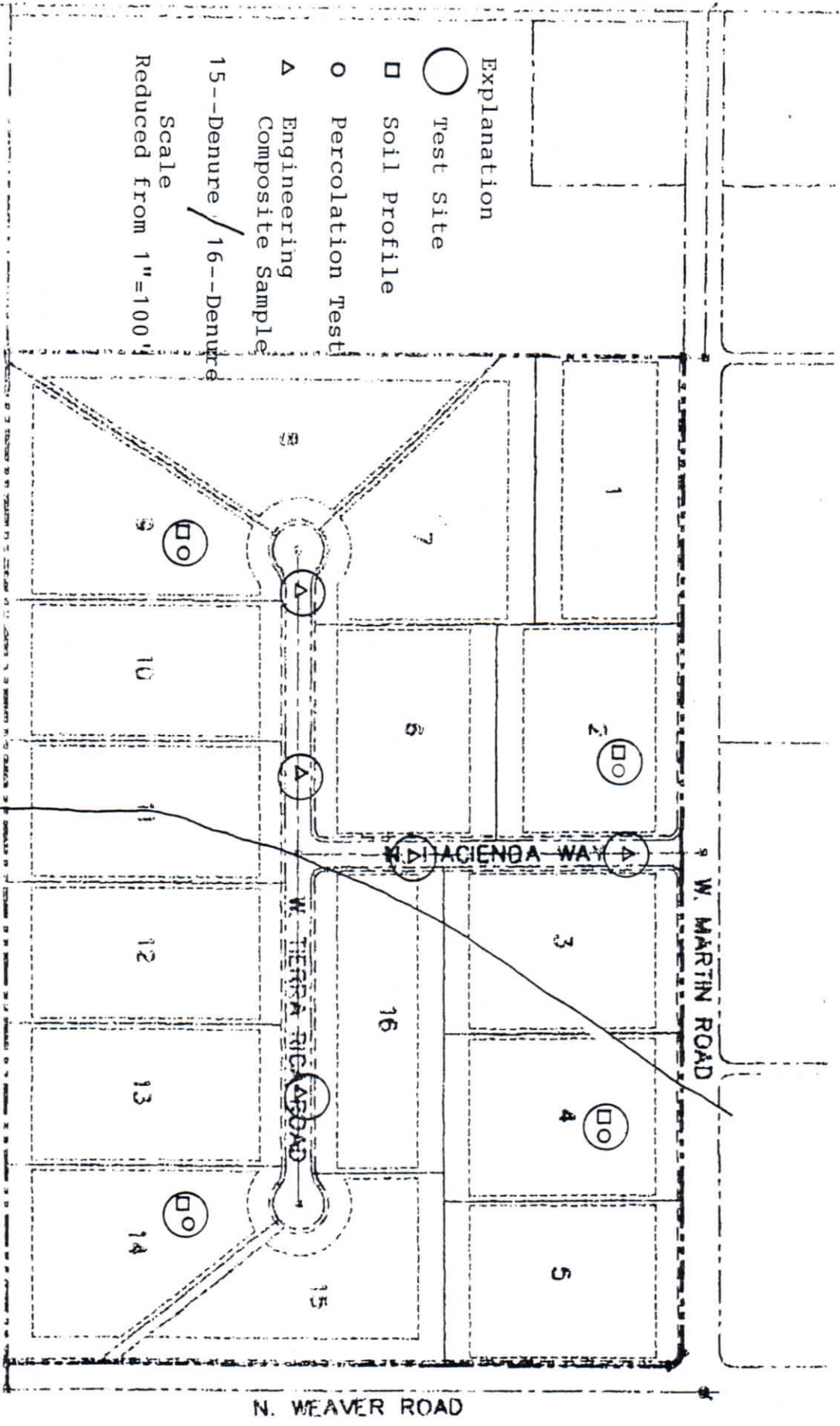
Lot #	Start Time	Stop Time	Percolation Rate
2	1018	1054	3.0 minutes per inch
4	0951	1029	3.16 minutes per inch
9	1140	1203	1.92 minutes per inch
14	1047	1106	1.58 minutes per inch

Depth to ground water and flow direction

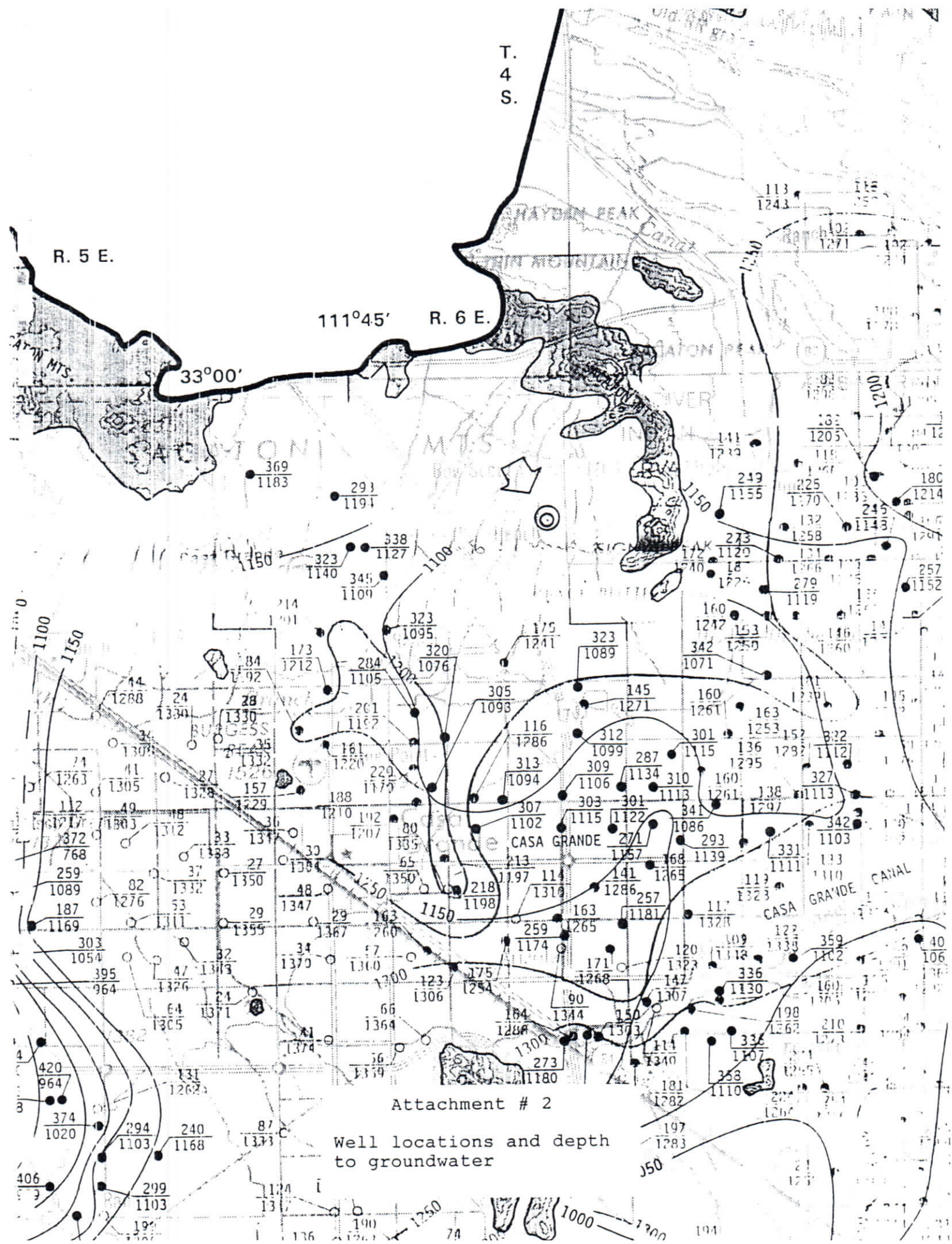
Data from the Arizona Department of Water Resources Hydrologic map series Report Number 23 (attachment # 2) indicates that groundwater in the area is in excess of 100 feet and flows to the Southwest. There is an Earth fissure that crosses the subdivision and is the subject of a separate report. The Earth fissure has the potential to provide direct communication to the water table and the setback restrictions of 100 feet from this feature should be strictly enforced.

Sewage Disposal Flow Rate

It is recommended that for design purposes a percolation rate of 4 minutes per inch be used. This will require an effective absorption area of 200 square feet per bedroom. The maximum application rate is one gallon per square foot of effective absorption area per day.



Enclosure # 1



EXPLANATION

WELL IN WHICH DEPTH TO WATER WAS MEASURED IN 1988-89, AND WHICH REFLECTS GROUNDWATER CONDITIONS IN THE LOWER MAIN WATER ZONE--First number, 493, is depth to water in feet below land surface. Second number, 1280, is the altitude of the water level in feet

WELL IN WHICH DEPTH TO WATER WAS MEASURED IN 1988-89, AND WHICH REFLECTS GROUNDWATER CONDITIONS IN THE UPPER MAIN WATER ZONE--First number, 107, is depth to water in feet below land surface. Second number, 1326, is the altitude of the water level in feet

WELL IN WHICH DEPTH TO WATER WAS MEASURED IN 1988-89, AND WHICH REFLECTS GROUNDWATER CONDITIONS IN A SIGNIFICANT LOCAL WATER ZONE--First number, 48, is depth to water in feet below land surface. Second number, 1312, is the altitude of the water level in feet

WELL IN WHICH DEPTH TO WATER WAS MEASURED IN 1988-89, AND WHICH REFLECTS ANOMALOUS GROUNDWATER CONDITIONS--First number, 283, is depth to water in feet below land surface. Second number, 1298, is the altitude of the water level in feet

ROCKS OF THE MOUNTAINS (MOSTLY GRANITIC, METAMORPHIC, OR VOLCANIC ROCK)--Water may occur in weathered or fractured zones, joint systems, or thin veneer of alluvial or fluvial deposits overlying consolidated rocks

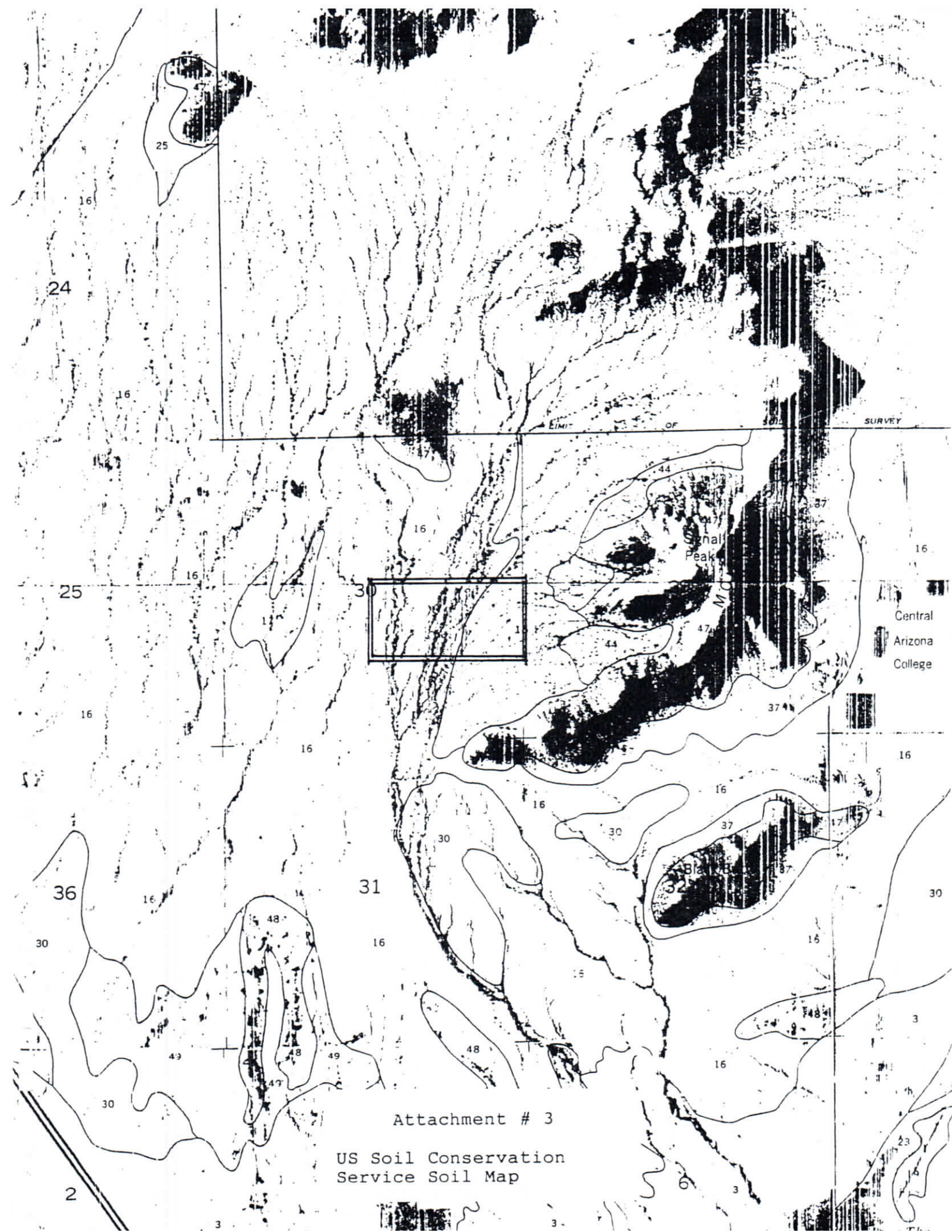
BASIN-FILL DEPOSITS (Consist of silt, sand, clay, and gravel)

SIGNIFICANT LOCAL WATER ZONE (Important source of groundwater with characteristics distinct from that in overlying and underlying zones, where present)

WATER-LEVEL CONTOUR--Shows approximate altitude of the water level in the lower main water zone in 1988-89. Contour intervals 50 and 100 feet, datum is the National Geodetic Vertical Datum of 1929

WATER-LEVEL CONTOUR--Shows approximate altitude of the water level in the upper main water zone in 1988-89. Contour interval 50 feet, datum is National Geodetic Vertical Datum of 1929

EXTERNAL BOUNDARY OF ELOY AND MARICOPA-STANFIELD SUB-BASINS



Attachment # 3
US Soil Conservation
Service Soil Map