
Soil Physical Properties at the Las Cruces Trench Site

Prepared by P. J. Wierenga, A. F. Toorman/UA
D. B. Hudson, J. Vinson, M. Nash, R. G. Hills/NMSU

University of Arizona
New Mexico State University

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Prepared by

P. J. Wierenga, A. F. Toorman, University of Arizona
D. B. Hudson, J. Vinson, M. Nash, R. G. Hills, New Mexico State University

T. J. Nicholson, NRC Project Manager

Department of Soil and Water Science
University of Arizona
Tucson, AZ 85721

Subcontractor:
New Mexico State University
Las Cruces, NM 88003

Prepared for
Division of Engineering
Office of Nuclear Regulatory Research
U.S. Nuclear Regulatory Commission
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ABSTRACT

Computer modelling has become an essential part of the licensing process of low level waste disposal sites. Validation of models requires high quality data from carefully controlled field experiments. This report provides the soil physical data obtained at a field site near Las Cruces, New Mexico. A large trench was constructed in undisturbed soil to provide horizontal access to irrigated plots on the sides of the trench and to provide soil samples. Details are provided on the construction of the trench and on the physical properties of the samples collected during construction of the trench. A total of 594 disturbed samples and 594 core samples were collected. Morphological characteristics of the soil at the site are presented, as well as data on the saturated hydraulic conductivity determined in the field with the bore hole permeameter and in the laboratory with a constant head method. Soil water retention data, particle size distribution data, and bulk density data are also provided. The van Genuchten equation was fitted to the soil water retention data and the parameters fitted in this equation are presented in the report. All results are presented in tabular form, ASCII format on a floppy disk available at the Nuclear Energy Software Center (NESC) Argonne National Laboratory.

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EXECUTIVE SUMMARY

Computer models are increasingly used to properly understand fluid flow and water transport through unsaturated soils at low level waste disposal sites. Before such models can be used for prediction purposes and licensing, they need to be validated with field data. A critical component of field validation is the availability of high quality data from carefully controlled field experiments. Field data are also needed to study the effects of spatial variability on water flow and transport in soils, to provide experimental input as to how sites can best be characterized and monitored, and to validate site characterization and monitoring methodologies.

This report presents soil physical data from a field experiment at a site near Las Cruces, New Mexico. At this site, a 26.4 meter long, 4.5 meter wide, and 6 meter deep trench was constructed in undisturbed soil. The trench was constructed so that water could be applied at a controlled rate to the soil on both sides of the trench. The advance of water and tracers could be followed with sensors installed through the trench face. During trench construction, a large number of soil samples were taken to determine the soil physical properties. A total of 594 disturbed soil samples and 594 associated soil cores were taken. These samples and cores were taken from nine distinct soil layers identified on the north trench wall. A total of 50 samples and cores, spaced 50 cm apart, were taken from each of the 9 layers. Samples were also taken from three vertical transects on the north trench wall. These latter samples were spaced about 13 cm apart in the vertical direction. The bore hole permeameter was used to determine the saturated hydraulic conductivity in undisturbed soil adjacent to the core sample.

This report contains the results of the measurements of the physical properties of the soil. The data are presented in tabular form and also in ASCII format on a floppy disk provided with the report. More specifically, the following data are presented.

- Sample locations
- Description of the nine soil layers
- Bore hole saturated hydraulic conductivities and outflow data
- Laboratory saturated hydraulic conductivities
- Soil water retention data
- Particle size distribution data
- Bulk density data

In addition to the above data, the parameters used to fit the van Genuchten equation to the water retention data are also presented. This includes the saturated water content, the residual water content, the alpha and n parameters, and the saturated hydraulic conductivities. The estimated van Genuchten parameters for each layer and for all layers combined are also presented in the report. No further analysis of the data is presented. The purpose of the report is to make the data available for validation of various deterministic and stochastic models. Future reports will present the results from the water and solute transport experiments conducted at the site and results from computer modelling.

CHAPTER 1

INTRODUCTION

To enhance the understanding of scientific issues associated with licensing low level waste sites, the U.S. Nuclear Regulatory Commission is actively pursuing research in the areas of site characterization, model validation, and site monitoring. A critical component of this research is the availability of high quality data from carefully controlled field experiments. This data is required 1) to study the effect of spatial variability on water flow and transport in soils, 2) to validate deterministic and stochastic models of water flow and transport, 3) to provide experimental input as to how sites can be best characterized and monitored, and 4) to validate site characterization and monitoring methodologies.

The U.S. Nuclear Regulatory Commission has supported a series of field experiments at a site near Las Cruces, NM to provide data on water and solute movement in spatially variable unsaturated soils under carefully controlled experimental conditions (Wierenga et al., 1986 and Wierenga, 1988). A trench, 26.4 m long, 4.8 m wide and 6.0 m deep was constructed in undisturbed soil to provide horizontal access to irrigated plots on both sides of the trench and to provide soil samples. A 4.0 x 9.0 m area on the south side of the trench and a 1.2 x 12.0 m area on the north side was selected for controlled application of water containing a tracer. Soil water retention and saturated hydraulic conductivity data were determined for 594 disturbed soil samples and 594 associated soil cores taken during trench construction. Neutron probe access tubes, tensiometers, and solute samplers were used to monitor multidimensional water flow and solute movement. Two experiments were performed using several different tracers. The results from those experiments are being incorporated into a data base and will be used for model validation.

In a previous report, Wierenga et al. (1988) presented results of the first trench experiment. The purpose of the present report is to bring together in one report all data collected during the course of the experiment on the morphology of the soil at the site, and on the physical properties of the soil. In addition, a short description of the experimental site is presented. No analysis of the data is included with this report.

SITE DESCRIPTION

2.1 Physiography

The experimental site is located 40 km northeast of Las Cruces, New Mexico, in an arid area with 23 cm/year annual precipitation. Southern New Mexico is characterized by broad desert basins between discontinuous mountain ranges. The site is at an elevation of about 1357 m (4450 ft) on the eastern piedmont slope of Summerford Mountain, the most northern peak of the Dona Ana Mountains. The general boundary between the arid (less than 25 cm rain per year) and semiarid zones for this area is considered to be at an elevation of 1524 m (5000 ft).¹

Although the site is presently in an arid climatic regime, fossil data and evidence of perennial lakes in nearby basins suggest times of more effective moisture in southern New Mexico during the Pleistocene (Martin and Mehringer, 1965; Hawley et al., 1976; van Devender, 1977). Times of more effective moisture (i.e., more precipitation and lower evaporation) probably correspond to glacial advances in the Northern Hemisphere. For example, Reeves (1973) described a cool-moist interval (the Tahoka pluvial) on the southern High Plains that dates from 15,000 to 22,500 yrs B.P., which is roughly the time of the last full glacial advance, the Wisconsin. Climatic conditions in this region prior to the last full glacial are poorly documented.²

2.2 Geology

The Basin and Range Province of southern New Mexico, where the site is located, is dominated by the Rio Grande Rift zone which is one of the four best developed intercontinental rift zones in the world (Kues et al., 1986). The rift zone is characterized by extensional tectonics, block faulted mountain ranges, crustal thinning, shallow seismic activity, volcanism, and basins filled with thick sediments eroded from adjacent mountains.

The trench was constructed in undisturbed soil, which was derived mainly from Summerford Mountain, a laccolith (i.e., an igneous intrusion that has displaced adjacent sedimentary rocks). The laccolith is monzonitic to syenitic in composition and solidified 35 m.y. B.P.³ The dominant minerals contained in the laccolith are microcline, plagioclase, orthoclase,

¹Gile, L.H., J.W. Hawley and R.B. Grossman. 1981. Soils and geomorphology in the Basin and Range area of Southern New Mexico Guidebook to the Desert Project. New Mexico Bureau of Mines and Mineral Resources. Memoir 39. p. 75.

²Ibid.

³Hawley, J.W., W.S. Seager and R.E. Clemons. 1975. Third day road log from Las Cruces to North Mesilla Valley, Cedar Hills, San Diego Mountains, and Rincon area. New Mexico Geol. Soc. Guidebook, 26th Field Conf., Las Cruces County. p. 37.

quartz, augite, biotite, hornblende, sphene, apatite, magnetite, and zircon (Hurlbut and Klein, 1977).

2.3 Geomorphology

The soil at the site is rather typical for New Mexico and the arid southwest. The profile shows several buried horizons with calcium carbonate accumulations. This indicates a cyclic pattern of horizon development and stable periods of climate and landscape formation. After periods of erosion, the landscape is grading and sediment is building slowly. During these periods of sediment buildup there is accumulation of clay and calcium carbonate in the soil near the surface. The darkness at the surface is an indication of organic matter accumulation. The redness in the profile is an indication of clay accumulation. The clay eluviated from upper horizons and some of it formed pedogenically. The white horizons or zones indicate calcium carbonate accumulation. The CaCO_3 originated from dust fall and, because of lack of water, the calcium carbonate accumulated in the profile.⁴ There are various buried arroyos visible along the trench walls. The soil in these arroyos has no structure while the texture is gravelly sandy loam.

The soil at the site was classified as Isaacks' Ranch (0-1.4 m) and Jornada II deposits (1.4-3.1 m). Below the Jornada II deposit is the Jornada I surface (3.1 - 4.0 m) of the Camp Rice Formation. The Jornada I surface is underlain by a sequence of buried soils within the Camp Rice Formation (>4.0 m) (L. H. Gile, personal communication)(Fig. 1). The approximate ages are 8,000-15,000 years for the Isaacks' Ranch, 25,000-150,000 years for the Jornada, and 250,000-400,000 years for the Camp Rice.

Below 3 meters there is a succession of sediment accumulations from the Pleistocene and Holocene ice ages (150 to 300 thousand years B.P.). Soils of the Jornada I surface reflect a very long time of landscape stability.⁵ They are generally underlain by a sequence of buried soils within the Camp Rice Formation. There are at least two buried soils beneath the Jornada I surface which can be identified by separate calcic horizons. A well defined argillic horizon at 3.1 m marks the top of the Jornada I surface; the A horizon appears to have been truncated when overlying material was deposited.

The Jornada II surface is exposed approximately 1.4 m below the top of the trench. The Jornada II deposit is nearly continuous within the trench except where it has been truncated on the north and south walls by an arroyo associated with the Isaacks' Ranch deposit. The Jornada II surface can be identified by its stage III (Gile et al., 1966) calcic horizon. Apparently, the A and B horizons associated with the Jornada II soil were truncated by the deposition of Isaacks' Ranch.

⁴Gile, L.H., et al. 1981.

⁵Ibid.

Morphological Layers

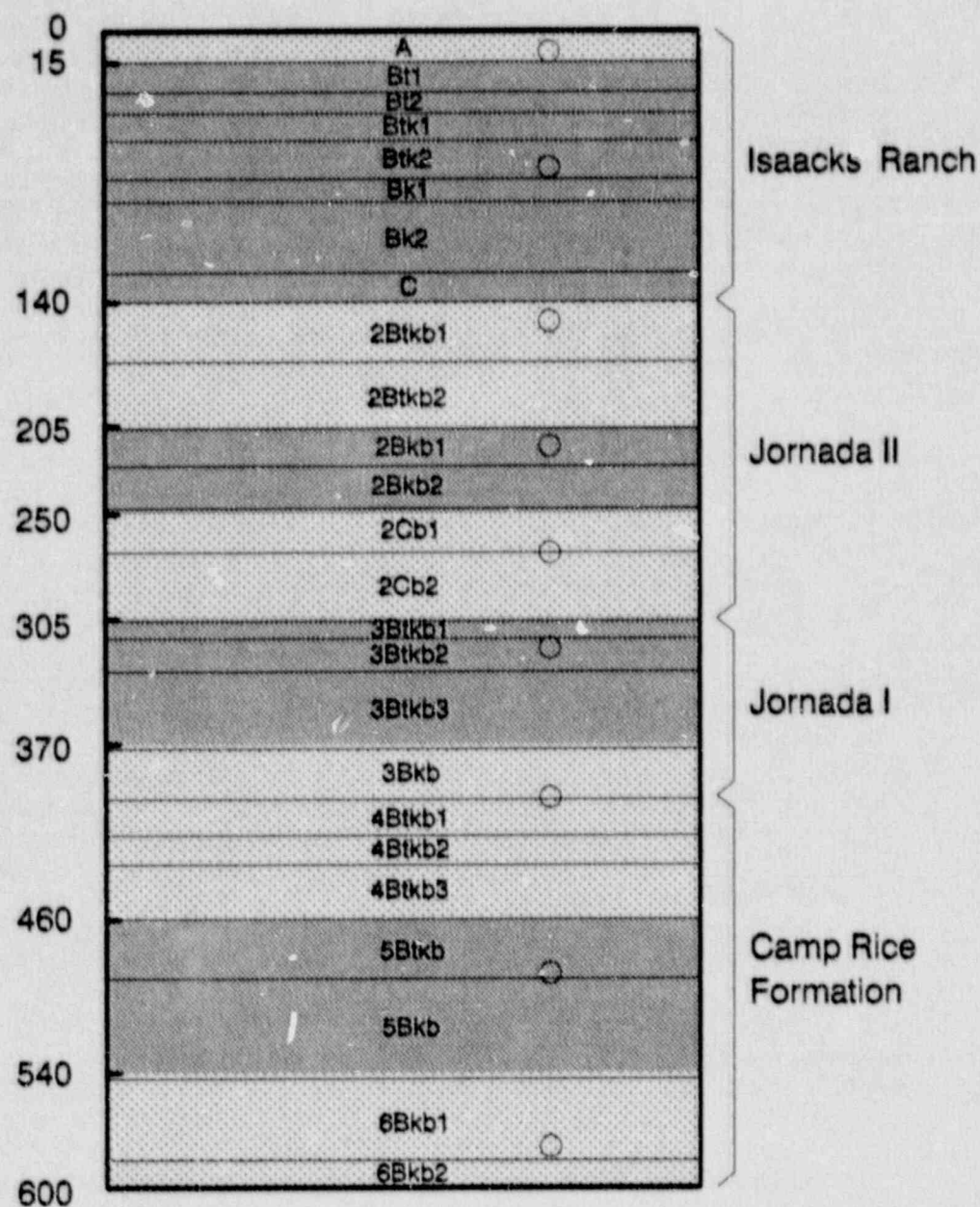


Fig. 1. Morphological horizons of Isaacks' Ranch, Jornada II, Jornada I and Camp Rice Formation. Circles represent depth of sampling layers.

Isaacks' Ranch was deposited after a period of landscape stability and soil formation represented by the Jornada II surface.⁶ The deposition of Isaacks' Ranch probably accompanied a climatic change, as did the deposition of Jornada II, Jornada I, and the buried soils associated with the Camp Rice Formation. During periods of more effective moisture plants cover the landscape and prevent erosion. Soil formation is more effective during these wetter conditions because more water is available for leaching. When the climate again became arid, plant cover decreased while erosion increased, especially during summer thunderstorms.

Each of the deposits exhibits a fining-upward sequence (i.e., coarser particles at depth grading upward to finer particles). The deposits are lithologically similar except that Isaacks' Ranch contains less carbonate (stage II), reflecting its younger age, than the underlying deposits which contain stage III carbonate accumulation.⁷

2.4 Geochemistry

Gile reported that the main soil minerals in this area in the sand and silt fraction are quartz, feldspars, and biotite. The clays, as reported by Gile, are kaolinite, mica, and small amounts of chlorite and montmorillonite.⁸

Monger, et al. studied the mineralogy of soils in the southern portion of the Jornada Basin derived from similar parent material as the soils at the trench site. They found that quartz, K-feldspar, plagioclase, and authigenic calcite dominated the bulk (<2mm) mineralogy with minor amounts of biotite and opaques. They found that the clay mineralogy was dominated by quartz, kaolinite, illite, and authigenic calcite with minor amounts of feldspars, chlorite, and smectites.⁹

Based on the above discussion of soil mineralogy, the chemical species most likely found in the soil solution are Ca^{++} , K^+ , Na^+ , Mg^{++} , $\text{Si}(\text{OH})_4$, Fe^{+++} , Al^{+++} , H^+ , OH^- , and CO_3^{--} . Because of the highly reactive nature of Fe^{+++} and Al^{+++} , these species should quickly precipitate as oxides or, in the case of Al^{+++} , be incorporated into clay mineral structures.

⁶Gile, L.H. et al. 1981.

⁷Ibid.

⁸Ibid.

⁹Monger, H.C., L.A. Daugherty, M.O. McCurry and R.A. Earl. 1987. Mineralogy of some Pleistocene paleosols in southern New Mexico: Implications for soil genesis in the arid Southwest during Pleistocene pluvials. Clay Minerals Society 24th Ann. Meeting Abstract. p. 99.

CHAPTER 3

METHODS AND PROCEDURES

3.1 Trench construction

A trench, 26.4 m long, 4.8 m wide and 6.0 m deep (Fig. 2) was constructed using a front loader and hand digging. The finishing of the trench walls was done by hand. The trench was situated with the long side approximately in the east-west direction. The north wall of the trench was used for collection of core samples and for determination of the saturated hydraulic conductivity using a bore hole permeameter. To monitor multidimensional water flow and solute movement from surface water application neutron probe access tubes were installed in the areas immediately adjacent to the north and south sides of the trench, and tensiometer and solution samples were installed in the north and south walls of the trench. Following excavation, a two level walkway was built inside the trench. This was done to allow inspection of the trench wall, to install instrumentation, and to take samples from the trench wall at various distances from the top of the trench. A roof was built over the trench and lighting and electrical outlets were installed. The access ramp on the east side was closed off, and an evaporative cooler was installed to circulate outside air through the trench, and to moderate temperature fluctuations.

3.2 Soil sampling

Based on visual inspection of the north trench wall, nine soil layers were initially distinguished between the surface and the 6 m depth. Soil samples and core samples were taken from each of these nine layers during trench construction. The procedure used for sampling each layer was as follows. A one meter wide strip of soil was removed with hand tools along the north trench wall down to the approximate center of each soil layer. A total of 50 soil cores were taken at 0.5 m intervals on the exposed ledge. The row of samples was parallel to, and approximately 0.6 m from the trench wall. On a line parallel to and 0.3 m from the trench wall, 50 bore holes were constructed for in situ determination of the saturated hydraulic conductivity. Upon completion of the saturated hydraulic conductivity measurements, additional disturbed soil samples were taken next to the core location. Next the soil was removed by hand from the 1 m wide by 25 m long strip to the center of the next designated horizon. At that time, another 50 cores and disturbed samples were taken, and 50 additional hydraulic conductivity measurements made. This process was repeated for all nine layers, except for layer 3, in which saturated hydraulic conductivity measurements were made at approximately 0.25 m intervals along the trench wall. The centers of the sample depths for each of the nine layers are presented in Table 1 and Figure 1 (pages 12 and 6, respectively).

Upon completion of sampling of layer 2, it was decided to also take bulk and core samples, as well as saturated hydraulic conductivity measurements in the vertical direction at three locations along the north wall.

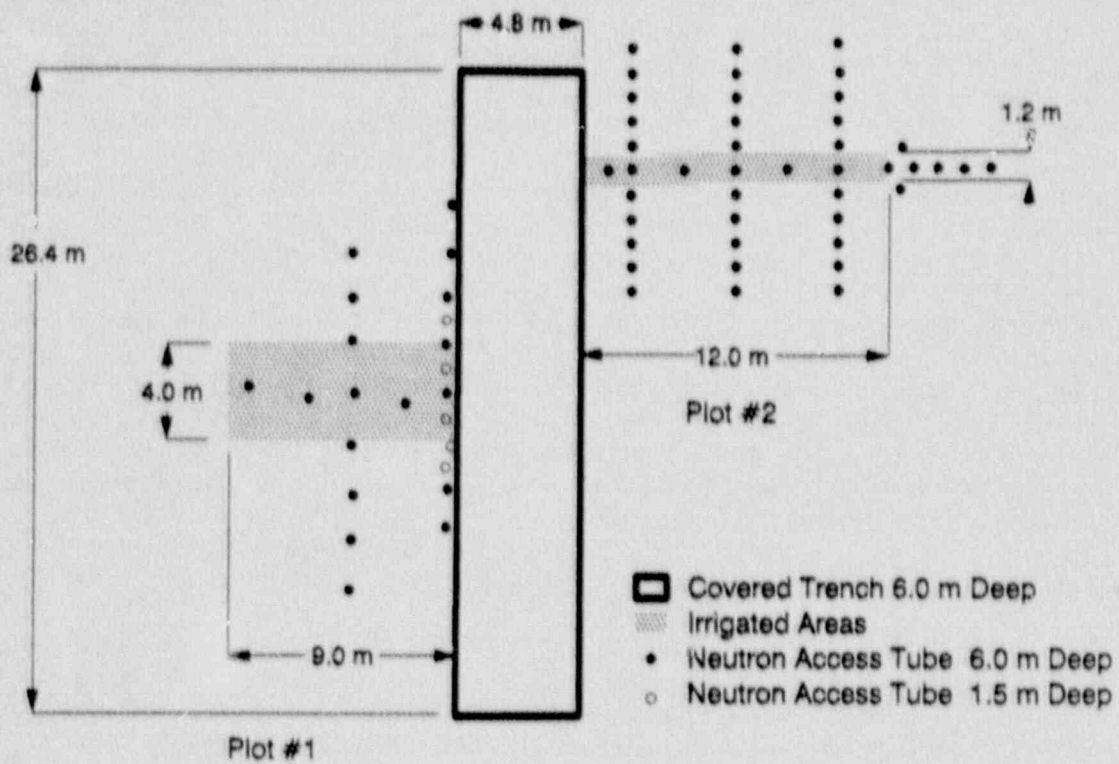


Fig. 2. Overview of trench site.

Samples were taken at approximately 0.13 m depth intervals from 3.1 m to a depth of 6.1 m. The three vertical transects were at 3.25 m, 12.75 m, and 20.75 m from the northwest corner of the trench. Essentially the same sampling procedure was used for the vertical and horizontal transects, except that the depth increments of soil excavated for the vertical transects were much smaller than for the nine layers.

The location of each sample is defined, using three coordinate systems in Tables 1 to 12 in the Appendix. The X , Y , Z coordinate system has its origin at the northwest corner of the trench. The X axis is parallel to the north wall and the positive direction is east. The Y axis is perpendicular to the X axis and the positive Y direction is north. The Z coordinate is depth from the soil surface. The X_2 , Y_2 , Z_2 coordinate system is similar to the XY coordinate system except that the origin is located at the trench wall at the center of the irrigated area for Plot #2. The origin of the X_2 , Y_2 , Z_2 coordinate system is at $X = 4.03$ m, $Y = 0.00$ m and $Z = 0.00$ m. The X_1 , Y_1 , Z_1 coordinate system has its origin at the center of the irrigated area for Plot #1. The X_1 axis is parallel to the south wall and the positive direction is west. Note that the X_1 axis and the X axis are not parallel because the north and south trench walls are not exactly parallel. The Y_1 axis is perpendicular to the X_1 axis and the positive direction is south. The Z_1 axis is depth from an imaginary level plan. $Z_1 = 0.00$ m is at the soil surface at $X_1 = 2.00$ m. The soil surface has a 2.5% slope to the west. The locations where the field saturated hydraulic conductivities were measured have the same coordinates as where the cores were taken except that the Y coordinates are 0.30 m more north. The locations for layer 3 are somewhat different and are given in Appendix 1, Table 13.

3.3 In situ saturated hydraulic conductivity

The saturated hydraulic conductivity of the soil was determined in situ with the bore hole permeameter method (Reynolds et al., 1984; Elrick et al., 1984). In this method a hole is drilled in undisturbed soil and a constant water level is maintained in the hole. The permeameter (often referred to as the Guelph permeameter) is a simple device designed to maintain a constant water level and to measure the rate of water flow out of the hole. In this study, four permeameters were used simultaneously at four adjacent locations. Water level readings on the supply pipes were made at one minute intervals. The auger holes had a diameter of 0.095 m and were approximately 0.15 m deep. The inside diameter of each permeameter was approximately 0.05 m and its length was 1.8 m. Each permeameter had four air supply tubes, with valves, reaching from the top of the permeameter to the bottom. This allowed sequential permeability measurements in the same hole at constant water heads of 0.05, 0.075, 0.10 and 0.125 m. However, due to the relatively high permeability of the soil at the site and the subsequently high outflow rates, it was not always possible to complete four permeability measurements at a site without refilling the permeameter. Because removal of the permeameter from a bore hole and subsequent replacement in the same bore hole would disturb the soil in the bore hole and presumably change the hydraulic conductivity, no efforts

Table 1. Characteristics of the nine layers.

LAYER	TOP (m)	BOTTOM (m)	LENGTH (m)	SAMPLE DEPTH (m)	HORIZONS
1	0.00	0.15	0.15	0.11	A
2	0.15	1.40	1.25	0.71	Bt ₁ , Bt ₂ , Btk ₁ , Btk ₂ , Bk ₁ , Bk ₂ , C
3	1.40	2.05	0.65	1.51	2Btkb ₁ , 2Btkb ₂
4	2.05	2.50	0.45	2.16	2Bkb ₁ , 2Bkb ₂
5	2.50	3.05	0.55	2.71	2Cb ₁ , 2Cb ₂
6	3.05	3.70	0.65	3.21	3Btkb ₁ , 3Btkb ₂ , 3Btkb ₃
7	3.70	4.60	0.90	3.98	3Bkb, 4Btkb ₁ , 4Btkb ₂ , 4Btkb ₃
8	4.60	5.40	0.80	4.89	5Btkb, 5Bkb
9	5.40			5.79	6Bkb ₁ , 6Bkb ₂

were made to refill the permeameters. Once the permeameter had emptied, measurements in the same hole were not continued.

According to Reynolds and Elrick (1985), steady-state flow from a cylindrical, uncased test hole into a uniform, unsaturated soil can be represented by:

$$Q_s = \frac{2\pi H_s^2}{C} K_{fs} + \pi a^2 K_{fs} + \frac{2\pi H_s}{C} \phi_m \quad (1)$$

where $Q_s(\text{m}^3\text{s}^{-1})$ is the steady flow rate into and out of the auger hole, $H_s(\text{m})$ is the depth of water in the hole, $K_{fs}(\text{ms}^{-1})$ is the field saturated hydraulic conductivity, $a(\text{m})$ is the radius of the hole, $\phi_m(\text{m}^2\text{s}^{-1})$ is the matric flux potential and C is a dimensionless parameter.

According to Reynolds and Elrick (1985) the first term on the right hand side of Eq. (1) represents water flow due to hydrostatic pressure, the second term the gravitational pull of water through the bottom of the hole, and the third term gravitational flow due to capillary forces in the

surrounding unsaturated soil. Thus, the latter term represents the unsaturated flow component.

Two unknowns appear in equation (1): K_{fs} and ϕ_m . In order to solve for these at least two H_b levels need to be used. In the case for two or more H_b levels K_{fs} can be obtained by a least squares analysis. Reynolds and Elrick (1985) refer to this as the Richards analysis. K_{fs} can be obtained by (Reynolds and Elrick (1986):

$$K_{fs} = \frac{\sum_{i=1}^n H_{b1}^2 \times \sum_{i=1}^n C_i Q_i T_i - \sum_{i=1}^n H_{b1} T_i \times \sum_{i=1}^n H_{b1} Q_i C_i}{2\pi \left(\sum_{i=1}^n T_i^2 \times \sum_{i=1}^n H_{b1}^2 - \left(\sum_{i=1}^n H_{b1} T_i \right)^2 \right)} \quad (2)$$

where

$$T_i = \frac{C_i a_i^2}{2} + H_{b1}^2 \quad (3)$$

n is the number of H_b levels used. C_i , Q_i and T_i are the values corresponding to the level H_{b1} .

However, as mentioned above, at some locations the hydraulic conductivity was very high and sometimes only one steady flow rate was obtained. There was not enough water left in the permeameter to obtain a second steady flow rate for a different H_b level. For this case Reynolds and Elrick (1985) suggest the Laplace analysis. In the Laplace analysis the third term in equation (1) is neglected. In this way not an exact value but an upper limit of K_{fs} is obtained:

$$K_{fs} = \frac{CQ}{2\pi H_b^2 + C\pi a^2} \quad (4)$$

Another analysis for a constant head well permeameter is the Glover equation as mentioned by Amoozegar and Warrick (1986):

$$K_{fs} = Q \left[\sinh^{-1} \left(\frac{H_b}{a} \right) - \left(\frac{a^2}{H_b^2} + 1 \right)^{1/2} + \frac{a}{H_b} \right] / (2\pi H_b^2) \quad (5)$$

For numerical purposes one can use the identity

$$\sinh^{-1}(x) = \ln [x + \sqrt{x^2 + 1}] \quad (6)$$

The Glover equation needs only one H_e level.

3.4 Laboratory saturated hydraulic conductivity

Laboratory hydraulic conductivity measurements were made on undisturbed soil cores using a modified version of the procedure described by Elrick et al. (1980). This procedure is easy to use and allows precise control of the water head. The soil cores were previously used for low pressure water extraction. To prevent soil from spilling or bulging at the bottom of the core a section of 1/8" wire mesh and porous cloth were secured flush with the soil surface. A 7.6 cm-ID ring of clear acrylic pipe was secured to the top of the core with a 2 cm-wide section of tire inner tube to form a firmly sealed joint (Fig. 3). Ten of these cores were evenly spaced on a mat inside an empty 10 gallon glass aquarium. This rubber mat allowed unrestricted flow of water to the bottom of the cores.

When the cores were in place, the aquarium was slowly filled with well water. Filling was done over a two day period, to slowly re-saturate the cores from below. Water within the aquarium was brought to a level about 7 cm below the top of the aquarium and well above the top of the acrylic ring.

A #10 1/2 one-hole rubber stopper was carefully inserted into the open end of the acrylic ring. This procedure was done slowly, so that water within the ring could escape through the hole in the stopper and so that the soil core was not disturbed. Tubing connectors were fit on a length of 1/4" ID Tygon tubing and filled with water. One end was connected to the stopper hole. This operation was done under water to exclude air bubbles from the continuous water column. The connector at the other end of the tubing was capped and draped over the edge of the aquarium. This end of the outflow tubing was secured to a rack with the capped connector tip at a known distance below the water level inside the aquarium. The working head for the procedure was 5 cm. Each of the ten cores was fit with a stopper and outflow tube in this manner.

To measure the saturated hydraulic conductivity, the cap was removed from the outflow tubing and a tared container was placed below the tip to collect the outflow. When approximately 100 g of water was collected in the container the outflow tube was recapped and the outflow time recorded. The volume of outflow was measured gravimetrically. Up to six outflow tubes could be operated at any one time. A regulated pump replenished outflow lost from the aquarium to maintain the proper 5 cm head.

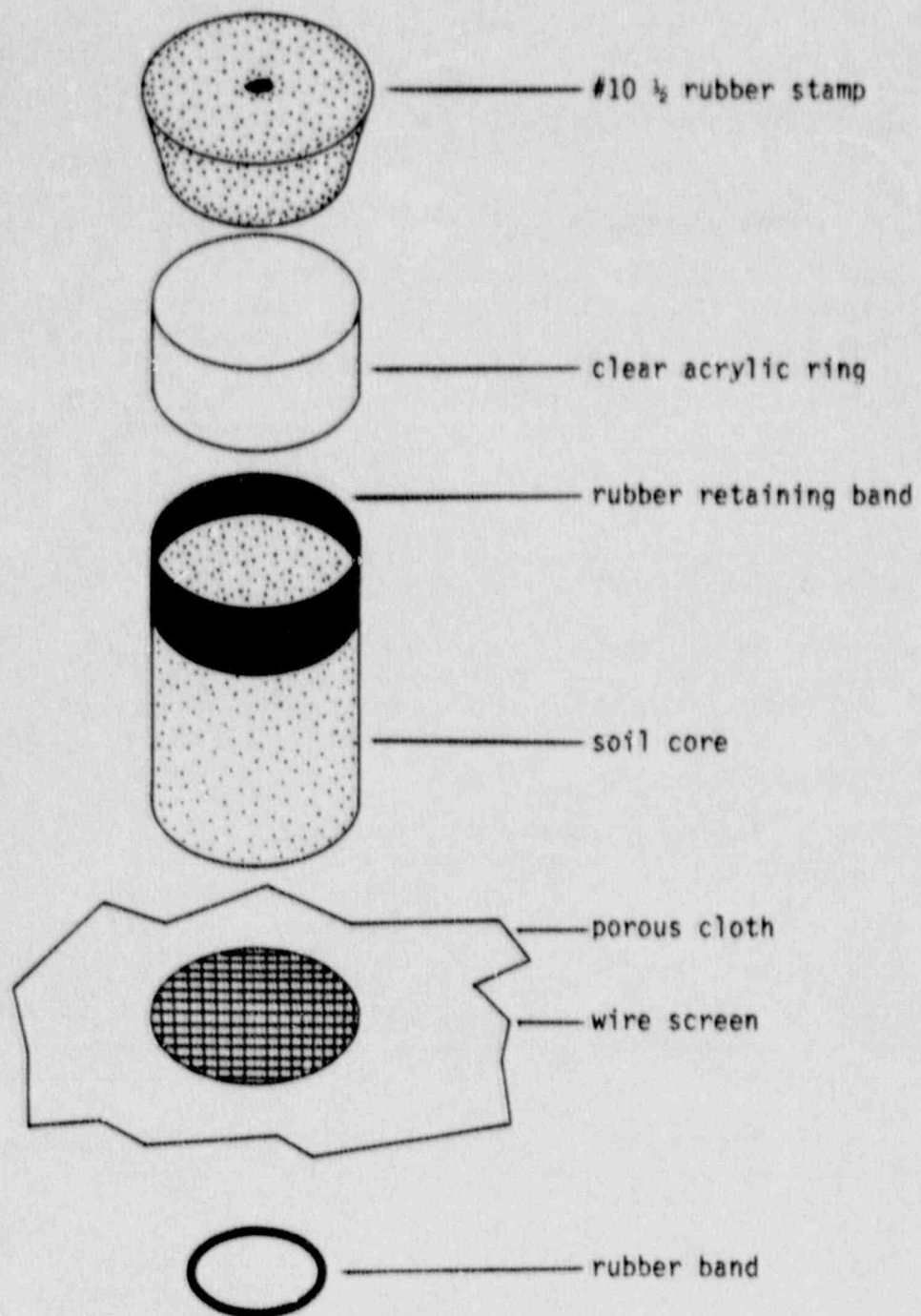


Fig. 3. Schematic of soil core with clear acrylic.

Following the aquarium K_{sat} procedure, water was drained from the aquarium and the cores were allowed to drain. The cores were placed in tared cans and dried in a 105°C oven. Because the soil was enclosed by aluminum rings, the cores were dried for 7 days. After 7 days, the cores were removed from the oven, allowed to cool for about one hour, and weighed to the nearest 0.01 gram. The dry weights and known core volumes were used to calculate the bulk density for each core sample.

3.5 Low pressure moisture retention

A group of 20 cores was run at a time. Each core was placed within a tared 600 cm³ Buchner funnel, fit with an F-porosity ceramic plate (bubble pressure approx. 350 cm H₂O). The cores were then slowly saturated from below with the well water used to irrigate the experimental plots. Saturation took about 48 hours until the water level in the funnel was at or above the level of the core. When the core saturation was complete the excess water located between the core and inside wall of the funnel was vacuumed out of each core and the core plus funnel weight was measured. The twenty saturated cores and funnels were placed into one of four hermetically sealed pressure chambers. The outflow from the bottom of the funnels could be collected outside of the chambers.

When the chambers were closed and leak-tested, a regulated pressure of 10 cm H₂O was applied to the cores. This pressure was maintained for 24 hours, and outflow from each funnel collected separately into tared bottles during that period. During the next 24 hours and for each 24 hour period thereafter, the pressure in the chambers was increased by steps to 20, 40, 80, 120, 200, and 300 cm H₂O, and the outflow for each core at each step determined by weight. A separate bottle was filled with water, tared, and set up to approximate the configuration of the bottles below the outflow tubes of the funnels. Weight loss from this bottle was used to estimate evaporation from the core outflow bottles for each 24 hours period.

Pressure within the chambers was regulated with a Moore Products Co. model 44-20 "Nullmatic" pressure regulator. Pressure was monitored with either a water-filled manometer (10 to 40 cm H₂O) or a mercury-filled manometer (>40 cm H₂O) placed in parallel between the chamber inlet and the pressure regulator. After the outflow bottles at the 300 cm pressure step had been weighed, the low pressure extraction process was complete. Pressure within the chambers was relieved, and individual core and funnels removed to obtain their weights. Cores were then removed from the funnels and stored or prepared for determination of the saturated hydraulic conductivity. Any moist soil from the core which remained attached to the ceramic plate was carefully brushed away. The funnels were then placed in a 0.1 N HCl bath for 24 hours to dissolve any carbonate deposits on the the ceramic.

3.6 High pressure moisture extraction

Approximately 425 g disturbed soil samples were crushed with a rolling pin and sieved through a 2 mm screen to remove coarse material and reduce any

ped. Before sieving the gross weight of each sample was recorded. With this weight and the net weight after sieving, the % coarse materials for each sample was determined. Sieved samples were returned to their original cardboard containers for storage.

Extractions were performed with pressure plate equipment from Soil Moisture Equipment Co., Santa Barbara, CA. The pressure manifold was modified to operate three pressure chambers at three different pressures simultaneously. Applied pressures of 1, 5, and 15 bars were used.

To minimize between-plate variability a soil sample was extracted to equilibrium at all three pressures on the same plate. All moisture extractions were performed on 15-bar ceramic plates. Five different soil samples were each subdivided into three subsamples on one plate for a total of 15 samples. Each sample was approximately 30 grams. A total of fifteen 1 cm high x 3 cm diameter retainer rings were placed on the surface of a plate; the rings were filled with soil samples and saturated with well water; and the plate was placed in the 1-bar chamber for extraction. Two plates were placed in a pressure chamber.

At equilibration one of the three subsamples of each sample was removed from the plate to determine gravimetric water content, after which the plate was placed in the 5-bar chamber. Likewise, at 5-bar equilibration, a second subsample of each sample was removed and the plate was placed in the 15-bar chamber. To insure good soil contact with the plate, the surface of each plate was re-moistened with about 30 ml of water between pressures.

Water extracted from individual plates was channelled from the outflow tubes of the pressure chamber into 1/4" ID acrylic stand-tubes to determine when a plate reached equilibrium. After the second or third day of extraction, when the greatest water extraction had occurred, the water level in the standpipe was monitored. When the water level had changed less than 1 cm over two consecutive days (approx. <0.1% gravimetric moisture per subsample) the soil was considered to be at equilibrium at that pressure. However, since plate rotation involved all plates and all three pressure chambers, it was necessary to wait until the last plate had come to equilibrium before any samples could be rotated into, through or out of the sequence of pressure chambers. This usually required 7 to 9 days per pressure step.

3.7 Retention core fitting

van Genuchten's model (van Genuchten, 1980) was used to fit an equation to the water retention data and to predict the unsaturated hydraulic conductivity at various water contents. Based on predictive conductivity models developed by Mualem (1976), van Genuchten (1978) presented a computer program to calculate the hydraulic conductivity using the saturated hydraulic conductivity as a matching point. In the present calculations, the saturated hydraulic conductivity value measured for each core sample was used. The equations relating water content (θ) and hydraulic conductivity (K) to pressure head (h) are:

$$\theta = \theta_r + \frac{(\theta_s - \theta_r)}{[1 + (\alpha h)^n]^m} \quad (7)$$

$$K(h) = K_s \frac{\{1 - (\alpha h)^{n-1} [1 + (\alpha h)^n]^{-m}\}^2}{[1 + (\alpha h)^n]^{m/2}} \quad (8)$$

where $m = 1 - 1/n$, θ_r is the residual water content, θ_s is the water content at saturation, and α and n are fitting parameters. When equations 7 and 8 were fit to an individual core, only α and n were estimated. K_{sat} was assumed to be the measured saturated hydraulic conductivity, θ_s was assumed to be the measured saturated water content and θ_r was assumed to be the measured 15 bar water content. When equations 7 and 8 were fit to all the cores within a layer or to all the cores, α , n , θ_s and θ_r were estimated. K_{sat} was assumed to be the geometric mean of the measured saturated hydraulic conductivities.

3.8 Particle size distribution

The particle size distributions of the soil samples (diameter < 2.0 mm) were determined using soil sieves and a modified pipet method (Gee and Bauder, 1986). Approximately 10 g samples that had passed through a 2 mm USDA sieve were used. Soluble salts and carbonates were removed with washes of distilled water and 1 N NaOAc; organic matter was removed with sodium hypochlorite; and the soil was dispersed with 5% sodium hexametaphosphate. The sands and coarse silts were separated with sieves and the pipet method was used to determine the amount of remaining silt and clay. The particle size distribution is expressed as the weight percentage of the soil sample (diameter < 2.0 mm).

The percent CaCO_3 for each sample was measured on 5 g samples of soil that had been passed through an 80 mesh screen. An acid-neutralization technique was used (Allison and Moodie, 1965). In this procedure, carbonate is neutralized with excess 0.5 N HCl and then the HCl is back titrated with 0.5 N NaOH. The CaCO_3 is expressed as the weight percentage of the soil sample.

CHAPTER 4

RESULTS

4.1 Definition of the nine soil layers

The nine soil layers were defined based on the observed morphological horizons on the west wall and the hydraulic properties of each layer. This was done by grouping the morphological soil horizons with similar hydrological properties. Each horizon was assigned to a single layer to form a continuous model of the nine layers for better use in computer modeling. The layers, the horizons contained in each layer, and the sample depths are presented in Figure 1 and Table 1.

The first layer (0.00 m to 0.15 m) contains the A horizon of the top soil profile. This layer shows some organic matter accumulation and some evidence of clay eluviation. There are many roots in this layer. The soil is not effervescent and its structure is massive. The field observed texture of this layer is sandy loam and the field observed texture of the A horizon is sand. The soil is brown when dry (7.5YR 5/4) and dark brown when wet (10YR 4/3). The upper boundary is the soil surface and the lower boundary is the bottom of the A horizon. The 50 soil samples from Layer 1 were collected with the centers of the samples at 0.11 m. The 50 samples from the first layer are sandy loams and loamy sands, have an average bulk density of 1.66 g/cm^3 and contain an average of 1.39% CaCO_3 .

The second layer (0.15 m to 1.40 m) contains the remaining horizons from the top soil profile (Bt_1 , Bt_2 , Btk_1 , Btk_2 , Bk_1 , Bk_2 , and C). This layer shows pedogenic clay and carbonate accumulation. It also contains the undeveloped C horizon from the top soil profile. The soil from this layer is moderately effervescent and has subangular blocky structure. The soil is light yellowish brown when dry (10YR 6/4) and brownish yellow when wet (10YR 6/6). The field observed texture of this layer is coarse sandy loam and the field observed textures of the soil horizons are: Bt_1 -loamy sand, Bt_2 -loamy sand, Btk_1 -loamy sand, Btk_2 -sandy loam, Bk_1 -sandy loam, Bk_2 -sandy loam, and C-loamy sand. The upper boundary of this layer is the bottom of the A horizon and the bottom boundary is the bottom of the first profile. The 50 soil samples from Layer 2 were collected with the centers of the samples at 0.71 m. These samples are sands, sandy loams, and loamy sands, have an average bulk density of 1.68 g/cm^3 , an average coarse fraction of 19.86%, and an average of 16.96% CaCO_3 .

The third layer (1.40 m to 2.05 m) contains the two horizons from the first buried soil profile which show pedogenic clay and carbonate accumulation (2Btkb_1 and 2Btkb_2). This layer is characterized by illuviated clay, clay movement, and carbonate accumulation. The soil is strongly effervescent and has subangular blocky structure. The wet and dry color is very pale brown (10YR 7/3). The field observed texture of this layer is coarse sandy loam and the field observed textures of the soil horizons are: 2Btkb_1 -sand and 2Btkb_2 -loamy sand. The upper boundary of this layer is the top of the first buried soil profile and the lower

boundary is the bottom of the 2Btkb₂ horizon. The 50 soil samples from Layer 3 were collected with the centers of the samples at 1.51 m. These samples are sands, sandy loams, loamy sands, and sandy clay loams, have an average bulk density of 1.70 g/cm³, an average coarse fraction of 19.48%, and an average of 8.42% CaCO₃.

The fourth layer (2.05 m to 2.50 m) contains the two horizons from the first buried soil profile with pedogenic carbonate accumulation but no evidence of clay movement (2Bkb₁ and 2Bkb₂). The soil is strongly effervescent and has subangular blocky structure. The soil is light yellowish brown when dry (10YR 6/4) and yellow when wet (10YR 7/6). The field observed texture of this layer is coarse sand and the field observed textures of the soil horizons are: 2Bkb₁-loamy sand and 2Bkb₂-loamy sand. The top boundary of this layer is defined by no evidence of clay movement and the bottom boundary is the bottom of carbonate accumulation. The 50 soil samples from Layer 4 were collected with the centers of the samples at 2.16 m. These samples are sands, sandy loams, and loamy sands, have an average bulk density of 1.72 g/cm³, an average coarse fraction of 21.10%, and an average of 9.08% CaCO₃.

The fifth layer (2.50 m to 3.05 m) contains the C horizons from the first buried soil profile (2Cb₁ and 2Cb₂). The soil is strongly effervescent and has subangular blocky structure. The soil is light yellowish brown when dry (10YR 6/4) and yellow when wet (10YR 7/6). The field observed texture of this layer is coarse sand and the field observed textures of the soil horizons are: 2Cb₁-sandy loam and 2Cb₂-sandy loam. The upper and lower boundaries of this layer are identified by the lack of evidence of pedogenic development. The 50 soil samples from Layer 5 were collected with the centers of the samples at 2.71 m. These samples are sands, sandy loams, and loamy sands, have an average bulk density of 1.74 g/cm³, an average coarse fraction of 24.73%, and an average of 10.22% CaCO₃.

The sixth layer (3.05 m to 3.70 m) contains the horizons from the second buried soil profile which show strong evidence of pedogenic clay movement, clay accumulation, and carbonate accumulation (3Btkb₁, 3Btkb₂, and 3Btkb₃). A large amount of clay has accumulated in the 3Btkb₁ horizon which gives this layer a more reddish color. The color is reddish yellow when dry (7.5YR 7/6) and strongly brown when wet (7.5YR 5/6). The soil is moderately effervescent and has a subangular blocky structure. The field observed texture of this layer is coarse sandy loam and the field observed textures of the soil horizons are: 3Btkb₁-sandy clay loam, 3Btkb₂-sandy loam, and 3Btkb₃-sandy loam. The upper and lower boundaries of this layer are defined by clay accumulation and movement. The 50 samples from Layer 6 were collected with the centers of the samples at 3.21 m. These samples are sands, sandy loams, and loamy sands, have an average bulk density of 1.74 g/cm³, an average coarse fraction of 21.05%, and an average of 4.73% CaCO₃.

The seventh layer (3.70 m to 4.60 m) contains the 3Bkb horizon from the second buried soil profile and all the horizons from the third buried soil profile (4Btkb₁, 4Btkb₂, and 4Btk₃). The soil is moderately effervescent and has a subangular blocky structure. The color is very pale brown when

dry (7.5YR 7/4) and yellowish brown when wet (10YR 5/8). The field observed texture of this layer is sandy clay loam and the field observed textures of the soil horizons are: 3Bkb-sandy loam, 4Btkb₁-sandy loam, 4Btkb₂-sandy loam, and 4Btk₃-sandy loam. The top boundary of this layer is defined by no evidence of clay movement and the bottom boundary is the bottom of the third buried soil profile. The 50 samples from Layer 7 were collected with the centers of the samples at 3.98 m. These samples are sands, sandy loams, and loamy sands, have an average bulk density of 1.67 g/cm³, an average coarse fraction of 33.91%, and an average of 13.44% CaCO₃.

The eighth layer (4.60 m to 5.40 m) contains all the horizons from the fourth buried soil profile (5Btkb and 5Bkb). There is evidence of pedogenic clay and carbonate accumulation in this layer. The soil is slightly effervescent and has subangular blocky structure. The soil is reddish yellow when dry (10YR 6/6) and strong brown when wet (10YR 5/6). The field observed texture of this layer is sandy clay loam and the field observed textures of the soil horizons are: 5Btkb-sandy loam and 5Bkb-sandy loam. The boundaries of this layer are defined by the boundaries of the fourth buried soil profile. The 50 soil samples from Layer 8 were collected with the centers of the samples at 4.89 m. These samples sandy loams and loamy sands, have an average bulk density of 1.67 g/cm³, an average coarse fraction of 22.24%, and an average of 22.58% CaCO₃.

The ninth layer (below 5.40 m) contains the horizons from the fifth buried soil profile (6Bkb₁ and 6Bkb₂). There is carbonate accumulation in this layer. The soil is very strongly effervescent and has subangular blocky structure. The wet and dry color of the soil is very pale brown (10YR 7/3). The field observed texture of this layer is coarse sandy loam and the field observed textures are: 6Bkb₁-sandy loam and 6Bkb₂-sandy loam. The upper boundary of this layer is the upper boundary of the fifth buried soil profile. The 50 soil samples from Layer 9 were collected with the centers of the samples at 5.79 m. These samples are sands, sandy loams, and loamy sands, have an average bulk density of 1.68 g/cm³, an average coarse fraction of 34.56%, and an average of 16.97% CaCO₃.

4.2 Data collected with the constant head permeameter

All the data collected with the constant head permeameter is presented in Tables 2 through 13. For each location the number of water levels used, the steady state outflow rate Q_1 to Q_4 , the field saturated hydraulic conductivity according to the Guelph permeameter theory, K_{fs} , and the saturated hydraulic conductivity KG1 to KG4 for the respective water levels according to the Glover equation are presented. The locations of these measurements are 0.30 m north compared to the coordinates of the samples used in the laboratory experiment. Therefore, the notation of the sample location in these tables is kept the same, except for layer 3 of which the coordinates of the more dense sampling scheme are presented in Appendix I, Table 13.

Locations at which the permeameter emptied too fast at the first water level head before a steady state outflow rate was obtained, are 3-76, 4-

14, 4-15, 4-16, 4-17 and 4-39. Note also that at locations where only one steady state outflow rate was obtained, K_{fs} calculated with the Laplace analysis and KGI computed with Glover's equation give nearly the same results.

4.3 Laboratory saturated hydraulic conductivities.

The laboratory measured saturated hydraulic conductivities for each sample are presented in Tables 14 to 25. For each sample layer the average, number of samples, standard deviation, maximum, minimum, and coefficient of variation is also presented in these tables. The geometric mean saturated hydraulic conductivity for each layer is presented in Table 26. For all samples from the nine horizontal layers the arithmetic mean saturated conductivity is 533.2 cm/d and the geometric mean saturated conductivity is 270.1 cm/d.

4.4 Soil water retention data.

The observed volumetric water contents at each applied pressure for each sample are presented in Tables 27 to 38. Due to a problem adjusting the applied pressure, some samples from Layers 2, 3, and 4 have two observed water contents at an applied pressure of 80 cm H₂O and no observed water contents at 10 cm. There are 27 positions where the horizontal sample layers intersect the vertical samples. At some of these intersections only one sample was taken. The single set of data from this sample was entered for both locations. At other intersecting points, two undisturbed cores were taken but only one disturbed sample was taken for high pressure outflow measurements. The high pressure outflow data was used for both locations. Because the bulk density was calculated from the undisturbed core the same high pressure outflow data gave different volumetric water contents at these intersecting locations. At the remaining intersecting locations, separate undisturbed cores and disturbed cores were taken. At these locations the two intersecting locations are independent samples. Table 39 presents the samples used at each intersecting location.

The estimated values of α and n in Equations 7 and 8 for each location are presented in Tables 14 to 25. The value of θ_r is the observed water content at 15 bars and the values of θ_{sat} and K_{sat} are the observed values. The values of θ_r , θ_{sat} , α , n , and K_{sat} in Equations 7 and 8 are also estimated for each layer and for all the samples from the horizontal layers. These estimated values are presented in Table 26.

4.5 Particle size distribution.

The results of the particle size distribution analysis for all the samples are given in Tables 40 to 51. These tables present the bulk density (g/cm³), the % clay (<0.002 mm), the % silt (0.05 to 0.002 mm), the % sand (2.0 to 0.05 mm), the % very coarse sand (2.0 to 1.0 mm), the % coarse sand (1.0 to 0.5 mm), the % medium sand (0.5 to 0.25 mm), the % fine sand (0.25 to 0.1 mm), the % very fine sand (0.1 to 0.05 mm), the % coarse fragments (>2.0 mm), the % CaCO₃ and the textural classification according to the USDA Soil Conservation Service.

4.6 Property data files

The soil physical property data is presented in 7 ASCII data files on one 1.2 MByte 5.25" floppy disk. The files are SAMPLOC.DAT (sample location data), RET.DAT (retention data), VGPARM.DAT (estimated and measured van Genuchten parameters), PARTICLE.DAT (particle size distribution data), LAYPARM.DAT (estimated van Genuchten parameters for each layer and the entire site), KFIELD.DAT (constant head permeameter data), and FIELDLOC.DAT (constant head permeameter location data). The first line of each file is the number of data lines in the file (I10) and the second line is the data column titles. These lines are followed by the data lines. Missing data in all files has the value -999. A description of each file is presented below.

SAMPLOC.DAT

This file contains the core and disturbed sample locations in the three coordinate systems (X, Y, Z), (X₁, Y₁, Z₁), and (X₂, Y₂, Z₂). The twelve data column titles are SAMP, LAY, POS, X, Y, Z, X1, Y1, Z1, X2, Y2, and Z2 (3A5, 9A7). The data lines contain the location data for each sample (A5, 2I5, 9F7.2). The first data column is the sample name (A5) and the second data column is the layer number (I5). The vertical sample transects A, B, and C are given values of 10, 11, and 12 respectively. The third data column is the position number (I5). The fourth, fifth, and sixth data columns are the X, Y, Z coordinates (3F7.2); the seventh, eighth, and ninth columns are the X₁, Y₁, Z₁ coordinates (3F7.2); and the tenth, eleventh, and twelfth columns are the X₂, Y₂, Z₂ coordinates (3F7.2). All coordinates are in meters.

RET.DAT

This file contains the observed laboratory retention data for each sample. The three data column titles are SAMP, h, and WC (A5, 2A7). The data lines contain the retention data for each sample (A5, F7.0, F7.3). The first data column contains the sample name (A5); the second data column contains the applied pressure (cm H₂O) (F7.0); and the third column contains the observed volumetric water content (m³/m³) (F7.3).

VGPARM.DAT

This file contains the estimated van Genuchten parameters for each sample. The six data column titles are SAMP, WCS, WCR, ALPHA, N, and KSAT (A5, 5A7). The data lines contain the van Genuchten parameters for each sample (A5, 2F7.3, 2F7.4, F7.1). The first data column contains the sample name (A5); the second data column contains the measured saturated water content (m³/m³) (F7.3); the third data column contains the measured 15 bar water content used to estimate the residual water content (m³/m³) (F7.3); the fourth data column contains alpha (F7.4); the fifth data column contains n (F7.4); and the sixth data column contains the laboratory measured saturated conductivity (F7.1).

PARTICLE.DAT

This file contains the particle size analysis data for each sample. The thirteen data column titles are SAMP, BD, CLAY, SILT, SAND, VCS, CS, MS, FS, VFS, COARSE, CAC03, and CLASS (A5, 11A7, A15). The data lines contain the particle size data for each sample (A5, 11F7.2, A15). The first data column contains the sample name (A5); the second data column contains the bulk density (g/cm^3) (F7.2); the third data column contains the % clay (F7.2); the fourth data column contains the % silt (F7.2); the fifth data column contains the % sand (F7.2); the sixth data column contains the % very coarse sand (F7.2); the seventh data column contains the % coarse sand (F7.2); the eighth data column contains the % medium sand (F7.2); the ninth data column contains the % fine sand (F7.2); the tenth data column contains the % very fine sand (F7.2); the eleventh data column contains the % coarse material (F7.2); the twelfth data column contains the % CaCO_3 (F7.2); and the thirteenth data column contains the textural class (A15).

LAYPARM.DAT

This file contains the van Genuchten parameters for each layer and for all the samples from the horizontal layers. The data eight column titles are LAY, NWC, NK, WCR, WCS, ALPHA, N, and KSAT (3A5, 5A8). The first nine data lines contain the estimated van Genuchten parameters for each of the nine horizontal layers. The tenth data line contains the estimated van Genuchten parameters for a single model for all 9 layers (3I5, 3F8.4, F8.5, F9.4, F9.1). This uniform model is given a layer number of 999. The first data column contains the layer number (I5); the second data column contains the number of retention data points (I5); the third data column contains the number of saturated hydraulic conductivity data points (I5); the fourth data column contains the estimated residual water content (m^3/m^3) (F8.4); the fifth data column contains the estimated saturated water content (m^3/m^3) (F8.4); the sixth data column contains the estimated alpha (F8.5); the seventh data column contains the estimated n (F8.4); and the eighth data column contains the estimated saturated conductivity (cm/d) (F8.1).

KFIELD.DAT

This file contains the field measured and derived data from the constant head permeameter. The fifteen data column titles are SAMP, NR, Q1, Q2, Q3, Q4, KFS, KG1, KG2, KG3, and KG4 (2A5, 9A8). The data lines contain the constant head permeameter data (A5, I5, 4F8.4, 5F8.1). The first column of data is the sample name (A5) and the second column is the number of heads used at this location (I5). The third through sixth columns contain the steady state outflow rates (cm^3/s) for the respective heads in the well of 5, 7.5, 10 and 12.5 cm (4F8.4). The seventh column contains the field saturated hydraulic conductivity (cm/day) according to the Guelph permeameter theory (F8.1). The eighth through eleventh columns contain the hydraulic conductivities (cm/day) calculated with the Glover equation for the same respective heads in the third to sixth columns

(4F8.1). Note that for locations 1-10, 1-12, 1-14 and 1-16 the heads used in the well were 4.1, 6.8 and 8.3 cm.

FIELDLOC.DAT

This file contains the constant head permeameter sample locations in the three coordinate systems (X, Y, Z) , (X_1, Y_1, Z_1) , and (X_2, Y_2, Z_2) . Compared to the file SAMPLOC.DAT most of these locations are similar except for the Y , Y_1 , and Y_2 coordinates. Layer 3 is sampled more densely. The twelve data column titles are SAMP, LAY, POS, X , Y , Z , X_1 , Y_1 , Z_1 , X_2 , Y_2 , and Z_2 (3A5, 9A7). The data lines contain the location data for each sample (A5, 2I5, 9F7.2). The first column of data is the sample name (A5) and the second column of data is the layer number (I5). The vertical sample transects A, B, and C are given values of 10, 11, and 12 respectively. The third data is the position number (I5). The fourth, fifth, and sixth data columns are the X , Y , Z coordinates (3F7.2); the seventh, eighth, and ninth columns are the X_1 , Y_1 , Z_1 coordinates (3F7.2); and the tenth, eleventh, and twelfth columns are the X_2 , Y_2 , Z_2 coordinates (3F7.2). All coordinates are in meters.

Table 2. Bore hole permeameter outflow rates and calculated saturated hydraulic conductivities for layer 1.

SAMPLE	# of meas. in well	STEADY STATE OUTFLOW RATE CM/S				Kfs CM/D	Kset according GLOVER EQUATION CM/D			
		Q1	Q2	Q3	Q4		KG1	KG2	KG3	KG4
1-1	3	1.2800	1.9800	2.8600		371.0	344.1	332.7	337.3	
1-2	3	1.3740	1.9460	2.6720		282.7	369.4	327.0	315.1	
1-3	3	1.5650	2.4810	3.2440		352.1	420.8	416.9	382.6	
1-4	4	0.7630	1.0690	1.4500	2.1370	212.1	205.1	179.6	171.0	189.1
1-5	4	0.7630	1.2980	1.8320	2.3660	222.8	205.1	218.1	216.1	209.3
1-6	3	1.9460	2.9700	4.2560		537.0	523.2	499.1	501.9	
1-7	4	1.1450	1.7940	2.7290	3.9500	448.7	307.8	301.5	321.9	349.5
1-8	4	1.5270	2.3790	3.4560	4.8470	507.9	410.5	399.8	407.6	428.8
1-9	3	1.8070	2.8600	3.6260		363.9	485.8	480.6	427.6	
1-10	3	2.4000	3.6670	4.3360		515.5	803.6	692.4	644.5	*
1-11	3	2.2900	2.7100	3.7400		298.5	615.7	455.4	441.1	
1-12	3	2.2500	2.7980	3.3500		240.7	753.4	528.3	498.0	*
1-13	2	3.2400	3.8550			174.5	871.1	647.8		
1-14	3	1.4780	2.5000	2.7600		324.9	494.9	472.0	410.3	*
1-15	3	2.1000	2.5200	3.2800		213.8	564.6	423.5	386.8	
1-16	3	2.1680	2.8000	3.3500		274.1	726.0	528.7	498.0	*
1-17	3	1.8500	2.7000	4.1760		577.6	497.4	453.7	492.5	
1-18	3	1.5460	2.8000	4.0000		580.1	415.7	470.5	471.7	
1-19	3	1.8500	2.9600	4.3000		580.7	497.4	497.4	507.1	
1-20	3	1.5300	2.3700	3.3600		421.6	411.3	398.3	396.3	
1-21	3	1.8300	2.8500	3.5700		339.0	492.0	478.9	421.0	
1-22	3	2.3860	3.6400	5.2100		655.7	641.5	611.7	614.5	
1-23	3	1.4500	1.7900	2.7100		301.1	389.8	300.8	319.6	
1-24	3	1.2300	2.1500	3.2200		487.7	330.7	361.3	379.8	
1-25	3	1.4100	2.0200	2.9400		358.3	379.1	339.5	346.7	
1-26	3	1.0340	1.6700	2.4660		344.8	278.0	280.6	290.8	
1-27	3	1.9080	2.4400	3.3200		293.3	513.0	410.0	391.6	
1-28	3	2.1870	2.9800	4.1760		441.0	588.0	500.8	492.5	
1-29	3	1.5650	2.1000	2.9000		288.8	420.8	352.9	342.0	
1-30	3	1.9100	2.8000	3.8600		430.6	513.5	470.5	455.2	
1-31	3	1.7600	2.4400	3.4350		375.1	473.2	410.0	405.1	
1-32	3	1.6300	2.4260	3.5400		450.8	438.2	407.7	417.5	
1-33	3	1.8320	2.3660	3.0200		217.0	492.5	397.6	356.2	
1-34	3	1.7100	2.5000	3.5000		402.6	459.7	420.1	412.8	
1-35	4	1.2200	1.3200	1.7600	2.2900	146.9	320.0	221.8	207.6	202.6
1-36	4	1.5300	1.3000	1.9300	2.7300	208.0	411.3	218.5	227.6	241.5
1-37	3	1.2800	2.0000	3.1200		462.0	344.1	336.1	368.0	
1-38	3	1.5800	2.0900	2.8800		279.1	424.8	351.2	339.7	
1-39	3	1.2600	1.8500	2.6800		332.0	338.8	310.9	316.1	
1-40	3	0.9900	1.7400	2.6600		415.8	266.2	292.4	313.7	
1-41	3	1.5650	2.0500	2.9900		329.5	420.8	344.5	352.6	
1-42	3	1.4200	2.2600	3.7800		621.6	381.8	379.8	445.8	
1-43	3	1.1530	1.6900	2.4450		301.6	310.0	284.0	288.4	
1-44	3	1.3360	1.8000	2.2900		178.0	359.2	302.5	270.1	
1-45	3	2.0500	2.8800	4.1600		428.5	551.2	484.0	490.6	
1-46	3	1.6800	2.4700	3.3400		357.5	451.7	415.1	393.9	
1-47	3	1.7200	2.4660	3.3600		354.6	462.4	414.4	396.3	
1-48	3	1.3000	2.0900	3.1140		439.9	349.5	351.2	367.3	
1-49	3	1.7990	2.8200	4.0500		526.4	483.7	473.9	477.6	
1-50	3	2.2000	3.0500	4.1870		430.2	591.5	512.5	493.8	
AVG		1.6559	2.3701	3.2529	3.0533	375.2	456.2	403.2	392.3	270.1
n		50	50	49	6	50	50	50	49	6
STD		0.4584	0.6014	0.7507	1.0973	124.7	139.7	107.6	96.6	97.1
MAX		3.2400	3.8550	5.2100	4.8470	655.7	871.1	692.4	644.5	428.8
MIN		0.7630	1.0690	1.4500	2.1370	146.9	205.1	179.6	171.0	189.1
CV%		27.7	25.4	23.1	35.9	33.2	30.6	26.7	24.6	35.9
C COEFF. Guelph Kfs:		0.62	0.84	1.00	1.15		0.62	0.84	1.00	1.15
HEAD IN WELL (CM):		5.0	7.5	10.0	12.5		5.0	7.5	10.0	12.5
* HEAD IN WELL (CM):		4.1	6.8	8.3			4.1	6.8	8.3	

Table 3. Bore hole permeameter outflow rates and calculated saturated hydraulic conductivities for layer 2.

SAMPLE	# of meas. in well	STEADY STATE OUTFLOW RATE CM ³ /S				Kfs GUELPH CM/D	Ksat according GLOVER EQUATION CM/D			
		Q1	Q2	Q3	Q4		KG1	KG2	KG3	KG4
2-1	3	2.6450	3.0650	4.5420		435.9	711.1	515.1	535.7	
2-2	3	2.2040	3.0210	5.2630		824.2	592.6	507.7	620.7	
2-3	2	2.8050	3.7980			451.0	754.1	638.2		
2-4	1	5.5480				1478.4	1491.6			
2-5	2	2.6140	3.8740			638.2	702.8	651.0		
2-6	4	0.9880	1.5960	2.5080	4.4460	617.2	265.6	268.2	295.8	393.3
2-7	3	0.5725	1.1260	1.7180		286.3	153.9	189.2	202.6	
2-8	3	1.6340	2.9640	5.4340		1050.0	439.3	498.1	640.9	
2-9	2	2.9390	4.2860			672.2	790.2	720.3		
2-10	3	1.0640	2.1280	4.4460		981.0	286.1	357.6	524.3	
2-11	2	3.1350	5.2440			1154.9	842.9	881.2		
2-12	2	2.4540	4.3130			1039.5	659.8	724.8		
2-13	3	0.8740	1.1460	2.8590		615.3	235.0	192.6	337.2	
2-14	3	1.2210	2.2520	4.3510		884.0	328.3	378.4	513.1	
2-15	3	0.9160	1.5270	2.5950		476.6	246.3	256.6	306.0	
2-16	3	1.2160	2.0520	3.2300		510.9	326.9	344.8	380.9	
2-17	3	0.7633	1.2980	2.0990		345.0	205.2	218.1	247.6	
2-18	3	1.3300	2.0900	3.2680		487.7	357.6	351.2	385.4	
2-19	3	0.7061	1.2210	2.1910		406.4	189.8	205.2	258.4	
2-20	3	0.6760	1.1130	1.5910		214.3	181.7	187.0	187.6	
2-21	3	0.4940	0.7980	1.6340		330.1	132.8	134.1	192.7	
2-22	3	0.7556	0.9544	1.1930		73.9	203.1	160.4	140.7	
2-23	3	0.7095	1.2610	2.6410		562.2	190.8	211.9	311.5	
2-24	3	0.9066	1.6550	4.1310		985.8	243.7	278.1	487.2	
2-25	2	0.9544	1.5910			348.0	256.6	267.4		
2-26	3	0.4336	1.0640	2.4570		602.1	116.6	178.8	289.8	
2-27	3	0.5170	1.3920	4.4540		1251.1	139.0	233.9	525.3	
2-28	3	1.0250	1.5370	2.5620		403.5	275.6	258.3	302.2	
2-29	3	1.0740	1.9880	3.2610		571.0	288.8	334.1	384.6	
2-30	3	1.0250	1.6560	3.1220		587.4	275.6	278.3	368.2	
2-31	3	0.7158	1.5910	3.6590		876.6	192.4	267.4	431.5	
2-32	3	0.5912	0.9854	2.6010		624.3	158.9	165.6	306.8	
2-33	2	1.5110	3.0220			878.7	406.2	507.8		
2-34	3	0.5124	1.8530	4.4540		1177.9	137.8	311.4	525.3	
2-35	2	1.1930	2.3860			693.8	320.7	401.0		
2-36	3	1.0250	1.7740	4.8090		1180.4	275.6	298.1	567.2	
2-37	2	1.1530	2.5850			852.2	310.0	434.4		
2-38	2	2.2900	3.6640			735.1	615.7	615.7		
2-39	3	1.3400	2.1680	3.7450		449.4	360.3	364.3	441.7	
2-40	3	0.5965	1.2330	2.2270		447.2	160.4	207.2	262.6	
2-41	3	0.9500	2.2040	3.8570		786.0	255.4	370.4	454.9	
2-42	3	1.0690	1.8320	3.3970		646.9	287.4	307.9	400.6	
2-43	2	1.6160	2.3650			375.1	434.5	397.4		
2-44	3	1.5110	2.4660	2.9820		274.1	406.2	414.4	351.7	
2-45	3	1.7100	2.8880	5.1680		945.1	459.7	485.3	609.5	
2-46	2	1.8320	3.4350			916.2	492.5	577.2		
2-47	2	1.4580	2.3650			489.0	392.0	397.4		
2-48	3	1.3520	2.2270	2.9830		356.2	363.5	374.2	351.8	
2-49	3	0.7600	1.4820	3.2300		726.6	204.3	249.0	380.9	
2-50	3	0.4180	0.8360	2.9640		827.1	112.4	140.5	349.6	
AVG		1.3561	2.1504	3.2674	4.4460	670.2	364.6	361.4	385.3	393.3
n		50	49	36	1	50	50	49	36	1
STD		0.9275	1.0197	1.1008		302.9	249.4	171.4	129.8	
MAX		5.5480	5.2440	5.4340	4.4460	1478.4	1491.6	881.2	640.9	393.3
MIN		0.4180	0.7980	1.1930	4.4460	73.9	112.4	134.1	140.7	393.3
CV%		68.4	47.4	33.7		45.2	68.4	47.4	33.7	
C COEFF. Guelph Kfs:		0.62	0.84	1.00	1.15		0.62	0.84	1.00	1.15
HEAD IN WELL (CM)		5.0	7.5	10.0	12.5		5.0	7.5	10.0	12.5

Table 4. Bore hole permeameter outflow rates and calculated saturated hydraulic conductivities for layer 3.

SAMPLE	# of meas. in well	STEADY STATE OUTFLOW RATE CM/S				Kfs GUELPH CM/D	Ksat according GLOVER EQUATION CM/D			
		Q1	Q2	Q3	Q4		KG1	KG2	KG3	KG4
L3-1	3	1.4190	2.4440	2.9170		279.1	381.5	410.7	344.0	
L3-2	4	1.1930	1.4710	1.7890	2.1470	95.6	320.7	247.2	211.0	189.9
L3-3	3	0.9544	1.5110	1.8690		175.4	256.6	253.9	220.4	
L3-4	4	0.9120	1.2160	2.9260	1.7480	39.5	245.2	204.3	345.1	154.6
L3-5	4	1.1430	1.4980	1.9710	2.4040	152.5	307.3	251.7	232.5	212.7
L3-6	4	1.1130	1.5110	1.7890	2.1470	100.2	299.2	253.7	211.0	189.9
L3-7	4	0.9146	1.1930	1.4710	1.6700	67.0	245.9	200.5	173.5	147.7
L3-8	4	0.7600	0.9120	1.0640	1.3300	57.8	204.3	153.3	125.5	117.7
L3-9	4	0.8278	1.0250	1.3800	1.8530	146.1	222.6	172.2	162.8	163.9
L3-10	4	0.9942	1.3520	1.5910	1.9090	87.3	267.3	227.2	187.6	168.9
L3-11	4	1.5910	1.9090	2.3860	2.6640	88.4	427.7	320.8	281.4	235.7
L3-12	3	1.7100	2.3180	2.8120		182.4	459.7	389.5	331.6	
L3-13	3	1.3400	1.7740	2.3060		186.9	360.3	298.1	272.0	
L3-14	1	2.1870				582.8	588.0			
L3-15	3	1.7890	2.2150	2.4650		51.7	481.0	372.2	290.7	
L3-16	3	2.0900	2.4700	2.9640		109.9	561.9	415.1	349.6	
L3-17	3	2.4440	2.8770	3.3110		195.4	657.1	483.5	390.5	
L3-18	3	1.6300	2.2270	2.8630		237.3	438.2	374.2	337.7	
L3-19	3	1.7500	2.5450	3.3100		315.6	470.5	427.7	390.4	
L3-20	3	2.2040	2.7550	3.1160		88.2	592.6	463.0	367.5	
L3-21	3	1.6550	2.1290	2.7000		187.2	445.0	357.8	318.4	
L3-22	3	1.6100	2.1870	2.7740		216.8	432.9	367.5	327.2	
L3-23	3	0.7821	1.0740	1.4320		134.1	210.3	180.5	168.9	
L3-24	3	0.9405	1.3490	1.6590		129.1	252.9	226.7	195.7	
L3-25	3	1.2220	1.4850	1.6460		26.1	328.5	249.6	194.1	
L3-26	3	1.1800	2.1670	3.5920		633.5	317.2	364.2	423.6	
L3-27	2	3.9970	5.4480			666.1	1074.6	915.5		
L3-28	2	1.7230	2.7870			572.8	463.2	468.4		
L3-29	3	2.2990	2.3910	3.3770		215.8	618.1	401.8	398.3	
L3-30	1	2.8010				746.4	753.1			
L3-31	1	3.5260				939.6	948.0			
L3-32	1	4.5730				1218.6	1229.5			
L3-33	1	6.4840				1727.8	1743.3			
L3-34	2	2.6640	4.2290			833.4	716.2	1137.0		
L3-35	2	3.5260	4.0690			107.6	948.0	683.8		
L3-36	2	2.8750	3.7110			343.9	773.0	623.6		
L3-37	2	2.1680	2.5360			88.4	582.9	426.2		
L3-38	2	3.1020	3.9170			314.3	834.0	658.2		
L3-39	1	4.1160				1096.8	1106.6			
L3-40	2	3.6860	4.4460			237.8	991.0	747.1		
L3-41	1	6.0180				1603.6	1618.0			
L3-42	1	9.3650				2495.5	2517.8			
L3-43	2	3.5920	5.3290			880.7	965.7	895.5		
L3-44	1	5.6620				1508.8	1522.3			
L3-45	1	7.2260				1925.5	1942.7			
L3-46	1	12.7300				3392.2	3422.5			
L3-47	1	6.0050				1600.2	1614.5			
L3-48	1	5.7470				1531.4	1545.1			
L3-49	1	5.6630				1509.0	1522.5			
L3-50	1	9.0140				2402.0	2423.5			
L3-51	1	5.6470				1504.8	1518.2			
L3-52	1	5.3590				1428.0	1440.8			
L3-53	1	7.2260				1925.5	1942.7			
L3-54	1	6.9060				1840.3	1856.7			
L3-55	2	4.4670	6.7070			1147.2	1201.0	1127.1		
L3-56	1	6.4730				1724.9	1740.3			
L3-57	1	6.5690				1750.5	1766.1			
L3-58	1	6.0970				1624.7	1639.2			
L3-59	1	8.8480				2357.7	2378.8			
L3-60	1	7.1190				1897.0	1914.0			
L3-61	1	23.4500				6248.8	6304.7			

Table 4. (Continued)

L3-62	1	13.1600				3506.8	3538.1			
L3-63	1	15.7100				4186.3	4223.7			
L3-64	1	12.1600				3240.3	3269.3			
L3-65	1	10.4500				2784.6	2809.5			
L3-66	1	18.9900				5060.3	5105.6			
L3-67	1	11.3900				3035.1	3062.3			
L3-68	1	13.2000				3517.4	3548.9			
L3-69	1	20.6900				5513.3	5562.6			
L3-70	1	15.2900				4074.4	4110.8			
L3-71	1	17.7000				4716.6	4758.7			
L3-72	1	16.1500				4303.5	4342.0			
L3-73	1	10.8400				2888.6	2914.4			
L3-74	1	9.7690				2603.2	2626.4			
L3-75	1	9.7960				2610.4	2633.7			
L3-76	>>									
L3-77	2	4.704	5.972			497.6	1264.7	1003.6		
L3-78	2	2.704	3.38			251.6	727.0	568.0		
L3-79	2	3.075	3.592			122.1	826.7	603.6		
L3-80	3	2.318	2.571	3.192		114.5	623.2	432.1	376.5	
L3-81	3	2.457	2.733	3.232		65.2	660.6	459.3	381.2	
L3-82	2	2.518	2.823			22.9	677.0	474.4		
L3-83	3	2.001	2.519	3.195		210.0	538.0	423.3	376.8	
L3-84	3	2.005	2.508	3.078		168.2	539.1	421.5	363.0	
L3-85	3	1.34	1.872	2.339		183.1	360.3	314.6	275.9	
L3-86	3	1.471	2.214	2.863		282.5	395.5	372.1	337.7	
L3-87	4	0.5567	1.074	1.869	2.754	368.3	149.7	180.5	220.4	243.6
L3-88	4	0.266	0.4408	0.6175	1.361	209.1	71.5	74.1	72.8	122.2
L3-89	4	0.7489	0.9854	1.13	1.656	122.9	201.3	165.6	133.3	146.5
L3-90	4	1.575	1.869	2.207	2.804	133.7	423.4	314.1	260.3	248.1
L3-91	4	0.9942	1.216	1.551	2.214	177.9	267.3	204.3	182.9	195.9
L3-92	3	1.153	1.472	1.813		107.5	310.0	247.4	213.8	
L3-93	3	1.432	1.723	2.2		131.7	385.0	289.5	259.5	
L3-94	3	1.816	2.2	2.519		66.4	488.2	369.7	297.1	
L3-95	3	1.207	1.71	2.328		241.3	324.5	287.4	274.6	
AVG		5.0289	2.4374	2.3320	2.0486	1186.1	1352.0	417.4	275.0	181.2
n		94	55	41	14	94	94	55	41	14
STD		5.0528	1.3197	0.7470	0.4826	1442.3	1358.5	239.2	88.1	42.7
MAX		23.4500	6.7070	3.5920	2.8040	6248.8	6304.7	1137.0	423.6	248.1
MIN		0.2660	0.4408	0.6175	1.3300	22.9	71.5	74.1	72.8	117.7
CV%		100.5	54.1	32.0	23.6	121.6	100.5	57.3	32.0	23.6
C COEFF. Guelph Kfs		0.62	0.84	1.00	1.15		0.62	0.84	1.00	1.15
HEAD IN WELL (CM)		5.0	7.5	10.0	12.5		5.0	7.5	10.0	12.5
>> Permeameter emptied too fast to make a measurement: apparently very high saturated conductivity										

Table 5. Bore hole permeameter outflow rates and calculated saturated hydraulic conductivities for layer 4.

SAMPLE	# of meas. in well	STEADY STATE OUTFLOW RATE CM ³ /S				Kfs GUELPH CM/D	Ksat according GLOVER EQUATION CM/D			
		Q1	Q2	Q3	Q4		KG1	KG2	KG3	KG4
4-1	2	4.7520	6.1880			603.7	1277.6	1039.9		
4-2	2	2.4920	3.3930			412.9	670.0	570.2		
4-3	2	4.4670	5.5670			404.7	1201.0	935.5		
4-4	2	3.6290	4.9970			637.8	975.7	839.7		
4-5	1	4.8480				1291.9	1303.4			
4-6	2	3.1120	5.2090			1148.6	836.7	875.4		
4-7	3	1.6500	2.6510	3.7250		476.1	443.6	445.5	439.3	
4-8	3	1.5330	2.0650	2.4830		151.8	412.2	347.0	292.8	
4-9	4	1.0740	1.3950	1.9450	2.3550	164.6	288.8	234.4	229.4	208.3
4-10	4	0.5965	1.2130	1.7220	1.9880	170.7	160.4	203.8	203.1	175.9
4-11	4	1.3720	1.7500	2.1740	3.1420	254.9	368.9	294.1	256.4	278.0
4-12	1	5.0410				1343.3	1355.3			
4-13	1	5.8530				1559.7	1573.6			
4-14	>>									
4-15	>>									
4-16	>>									
4-17	>>									
4-18	1	19.8800				5297.5	5344.8			
4-19	1	11.4300				3045.8	3073.0			
4-20	1	12.2600				3266.9	3296.2			
4-21	3	0.8540	1.2060	2.5880		512.7	229.6	202.7	305.2	
4-22	4	0.9643	1.0980	1.3520	2.1470	188.1	259.3	184.5	159.5	189.9
4-23	4	1.1730	1.5610	1.8560	2.4920	164.0	315.4	262.3	218.9	220.5
4-24	3	1.0830	1.2540	1.4060		14.0	291.2	210.7	165.8	
4-25	3	1.2420	2.1290	2.0400		59.7	333.9	357.8	240.6	
4-26	3	1.0470	1.5110	1.8450		141.6	281.5	253.9	217.6	
4-27	3	0.9643	1.5370	1.7600		129.0	259.3	258.3	207.6	
4-28	3	1.4690	1.9760	2.6980		261.6	394.9	332.1	318.2	
4-29	2	1.4190	2.0370			303.5	381.5	342.3		
4-30	1	4.6460				1238.0	1249.1			
4-31	1	5.2490				1398.7	1411.2			
4-32	1	5.9560				1587.1	1601.3			
4-33	2	2.1020	3.7710			940.4	565.1	633.7		
4-34	1	7.3370				1955.1	1972.6			
4-35	1	5.0200				1337.7	1349.7			
4-36	2	7.8550	11.1700			1611.0	2111.9	1877.1		
4-37	1	17.8200				4748.5	4791.0			
4-38	1	19.2900				5140.2	5186.2			
4-39	>>									
4-40	2	1.6970	3.9520			1350.3	456.2	664.1		
4-41	1	5.9120				1575.4	1589.5			
4-42	1	13.0600				3480.1	3511.3			
4-43	2	1.7180	4.0830			1420.5	461.9	686.1		
4-44	2	2.3050	3.4710			598.6	619.7	583.3		
4-45	2	2.1380	3.2520			576.4	574.8	546.5		
4-46	2	2.8500	4.3250			761.8	766.2	726.8		
4-47	2	3.3810	4.9710			799.7	909.0	835.4		
4-48	1	3.7110				988.9	997.7			
4-49	1	3.6710				978.2	987.0			
4-50	1	4.3660				1163.4	1173.8			
AVG		4.7620	3.2493	2.1226	2.4248	1236.8	1280.3	546.0	250.3	214.5
n		45	27	13	5	45	45	27	13	5
STD		4.8557	2.2086	0.6347	0.4449	1315.2	1305.5	371.1	74.9	39.4
MAX		19.8800	11.1700	3.7250	3.1420	5297.5	5344.8	1877.1	439.3	278.0
MIN		0.5965	1.0980	1.3520	1.9880	14.0	160.4	184.5	159.5	175.9
CV%		102.0	68.0	29.9	18.3	106.3	102.0	68.0	29.9	18.3
C COEFF. Guelph Kfs: 0.62 0.84 1.00 1.15 0.62 0.84 1.00 1.15										
HEAD IN WELL (CM) 5.0 7.5 10.9 12.5 5.0 7.5 10.0 12.5										

>> Permeameter emptied too fast to make a measurement: apparently very high saturated conductivity

Table 6. Bore hole permeameter outflow rates and calculated saturated hydraulic conductivities for layer 5.

SAMPLE	# of meas. in well	STEADY STATE OUTFLOW RATE CM ³ /S				Kfs GUELPH CM/D	Kset according GLOVER EQUATION CM/D			
		Q1	Q2	Q3	Q4	KG1	KG2	KG3	KG4	
5-1	1	4.8980				1305.2	1316.9			
5-2	2	3.8310	4.7980			362.5	1030.0	806.3		
5-3	2	3.4860	4.3740			335.1	937.2	735.0		
5-4	2	3.1410	4.0030			342.2	844.5	672.7		
5-5	2	2.8300	3.4000			173.8	760.9	571.4		
5-6	1	3.9370				1049.1	1058.5			
5-7	2	1.9880	2.3360			87.9	534.5	392.6		
5-8	2	3.4580	4.5790			488.8	929.7	769.5		
5-9	2	2.4590	3.0240			196.4	661.1	508.2		
5-10	2	2.7340	3.9630			609.7	735.1	666.0		
5-11	1	9.1230				2431.0	2452.8			
5-12	2	3.6850	7.0560			1938.4	990.7	1185.7		
5-13	1	4.9510				1319.3	1331.1			
5-14	2	3.2810	5.3290			1104.9	882.1	895.5		
5-15	1	5.0030				1333.2	1345.1			
5-16	1	7.6210				2030.8	2048.9			
5-17	1	17.2000				4583.3	4624.3			
5-18	1	12.0600				3213.7	3242.4			
5-19	1	15.2100				4053.0	4089.3			
5-20	1	40.6000				10818.8	10915.5			
5-21	2	2.2870	5.5870			1989.7	614.9	938.9		
5-22	1	4.2750				1139.2	1149.4			
5-23	2	2.9260	7.5050			2778.2	786.7	1261.2		
5-24	3	2.2620	2.8510	4.4940		556.9	608.2	479.1	530.0	
5-25	1	5.3290				1420.0	1432.7			
5-26	3	0.9809	3.6590	3.8810		551.6	263.7	614.9	457.7	
5-27	2	2.5330	3.8100			655.0	681.0	640.3		
5-28	2	2.3910	4.7560			1373.5	642.8	799.2		
5-29	2	2.1470	4.1220			1136.5	577.2	692.7		
5-30	2	3.3140	5.0300			886.4	891.0	845.3		
5-31	4	0.4028	2.7550	3.0880	4.2750	475.4	108.3	463.0	364.2	378.2
5-32	2	1.7470	4.3880			1598.2	469.7	737.4		
5-33	1	4.8910				1303.3	1315.0			
5-34	2	3.3200	4.1090			282.2	892.6	690.5		
5-35	3	2.0900	2.9070	3.9900		411.6	561.9	488.5	470.6	
5-36	2	3.5470	4.6310			458.5	953.6	778.2		
5-37	2	3.3400	4.8910			777.1	898.0	821.9		
5-38	2	3.2610	4.8910			834.1	876.7	821.9		
5-39	2	3.0780	3.9520			354.5	827.5	664.1		
5-40	2	2.4040	3.3900			474.4	646.3	569.7		
5-41	2	3.4600	4.4540			406.0	930.2	748.5		
5-42	2	2.0880	2.8370			342.1	561.4	476.8		
5-43	2	1.6530	2.3940			367.3	444.4	402.3		
5-44	2	2.9370	3.6660			269.8	789.6	616.1		
5-45	3	1.7890	2.5050	3.3800		336.8	481.0	421.0	398.6	
5-46	3	1.7890	2.4850	3.4200		354.6	481.0	417.6	403.3	
5-47	3	1.4440	3.2400	2.8690		126.5	388.2	544.5	338.4	
5-48	1	5.0850				1355.0	1367.1			
5-49	1	5.8720				1564.7	1578.7			
5-50	2	2.3460	3.4200			535.8	630.7	574.7		
AVG		4.7297	4.0313	3.5889	4.2750	1257.8	1271.6	677.5	423.3	378.2
n		50	35	7	1	50	50	35	7	1
STD		6.0941	1.2023	0.5637		1690.2	1638.4	202.0	66.5	
MAX		40.6000	7.5050	4.4940	4.2750	10818.8	10915.5	1261.2	530.0	378.2
MIN		0.4028	2.3360	2.8690	4.2750	87.9	108.3	392.6	338.4	378.2
CV%		128.8	29.8	15.7		134.4	128.8	29.8	15.7	
C COEFF. Guelph Kfs:		0.62	0.84	1.00	1.15		0.62	0.84	1.00	1.15
HEAD IN WELL (CM)		5.0	7.5	10.0	12.5		5.0	7.5	10.0	12.5

Table 7. Bore hole permeameter outflow rates and calculated saturated hydraulic conductivities for layer 6.

SAMPLE	# of meas. in well	STEADY STATE OUTFLOW RATE CM ³ /S				Kfs GUELPH CM/D	Ksat according GLOVER EQUATION CM/D			
		Q1	Q2	Q3	Q4		KG1	KG2	KG3	KG4
6-1	4	1.0640	1.1230	1.2350	1.8000	95.0	286.1	188.7	145.7	159.2
6-2	3	0.7238	1.7700	2.6250		470.4	194.6	297.4	309.6	
6-3	4	0.4871	1.0740	2.1080	2.3200	269.1	131.0	180.5	248.6	205.2
6-4	4	0.4180	0.9809	1.6340	2.0150	233.6	112.4	164.8	192.7	178.3
6-5	3	2.2660	2.4310	3.0550		101.5	609.2	408.5	360.3	
6-6	4	0.5806	1.7580	1.8450	2.1870	140.8	156.1	295.4	217.6	193.5
6-7	4	0.4474	0.9675	2.3330	2.5190	328.3	120.3	162.6	275.1	222.9
6-8	3	0.5472	2.3090	3.1670		628.0	147.1	388.0	373.5	
6-9	4	0.2159	0.5806	2.0550	2.2670	359.8	58.0	97.6	242.4	200.6
6-10	3	0.9984	1.6290	3.0980		1764.5	268.4	273.8	4467.9	
6-11	2	2.5750	2.9350			54.8	692.3	493.2		
6-12	4	0.6650	1.1780	2.3940	2.6500	300.9	178.8	198.0	282.3	234.4
6-13	1	8.6490				2304.7	2325.3			
6-14	1	12.8800				3432.2	3462.9			
6-15	1	11.0200				2936.5	2962.8			
6-16	3	1.0260	2.4980	4.5600		973.0	275.8	419.8	537.8	
6-17	4	0.7620	2.2600	2.3910	3.2520	280.8	204.9	379.8	282.0	287.7
6-18	2	1.9880	2.2670			43.0	534.5	381.0		
6-19	3	2.2470	3.8570	5.2090		658.0	604.1	648.2	614.3	
6-20	1	6.1180				1630.3	1644.9			
6-21	1	6.0690				1617.2	1631.7			
6-22	4	1.2190	2.1770	2.5450	3.0020	172.3	327.7	365.8	300.2	265.6
6-23	1	4.8880				1302.5	1314.2			
6-24	1	2.8230				752.3	759.0			
6-25	1	39.5200				10531.0	10625.2			
6-26	1	45.0900				12015.2	12122.7			
6-27	1	11.7800				3139.0	3167.1			
6-28	1	48.7800				12998.5	13114.8			
6-29	1	32.4500				8647.0	8724.4			
6-30	1	7.8870				2101.7	2120.5			
6-31	1	5.1730				1378.5	1390.8			
6-32	1	6.1490				1638.5	1653.2			
6-33	1	7.9140				2108.9	2127.7			
6-34	1	9.3100				2480.9	2503.0			
6-35	1	3.5320				941.2	949.6			
6-36	1	4.5470				1211.6	1222.5			
6-37	1	3.5790				953.7	962.2			
6-38	1	9.5000				2531.5	2554.1			
6-39	1	5.9650				1589.5	1603.7			
6-40	1	4.5320				1207.7	1218.5			
6-41	1	7.7490				2064.9	2083.4			
6-42	2	3.9240	4.9050			365.1	1055.0	824.3		
6-43	3	2.3210	2.7470	3.0600		37.4	624.0	461.6	360.9	
6-44	3	1.2020	1.9880	3.9240		776.8	323.2	334.1	462.8	
6-45	1	16.5000				4396.8	4436.1			
6-46	1	5.9380				1582.3	1596.5			
6-47	2	3.2400	3.6920			68.3	871.1	620.4		
6-48	1	14.4900				3861.2	3895.7			
6-49	2	3.0020	5.6210			1496.3	807.1	944.6		
6-50	1	8.1220				2164.3	2183.6			
AVG		7.6575	2.3067	2.7787	2.4458	2062.7	2058.8	387.6	569.0	216.4
n		50	22	17	9	50	50	22	17	9
STD		10.9587	1.2835	1.0281	0.4642	2917.3	2946.3	215.7	1012.0	41.1
MAX		48.7800	5.6210	5.2090	3.2520	12998.5	13114.8	944.6	4467.9	287.7
MIN		0.2159	0.5806	1.2350	1.8000	37.4	58.0	97.6	145.7	159.2
CV%		143.1	55.6	37.0	19.0	141.4	143.1	55.6	177.8	19.0
C COEFF. Guelph Kfs:		0.62	0.84	1.00	1.15		0.62	0.84	1.00	1.15
HEAD IN WELL (CM)		5.0	7.5	10.0	12.5		5.0	7.5	10.0	12.5

Table 8. Bore hole permeameter outflow rates and calculated saturated hydraulic conductivities for layer 7.

SAMPLE	# of meas. in well	STEADY STATE OUTFLOW RATE CM ³ /S				Kfs GUELPH CM/D	Ksat according GLOVER EQUATION CM/D			
		Q1	Q2	Q3	Q4		KG1	KG2	KG3	KG4
7-1	3	1.2320	2.1150	3.6660		654.6	331.2	355.4	432.4	
7-2	3	1.5640	2.6150	3.1810		307.9	420.5	439.4	375.2	
7-3	3	1.2200	1.7500	2.1570		169.3	328.0	294.1	254.4	
7-4	3	1.1020	1.6620	2.0900		191.2	296.3	279.3	246.5	
7-5	3	2.0550	2.7040	2.9820		88.2	552.5	454.4	351.7	
7-6	3	2.0410	2.3660	2.7840		74.7	548.7	397.6	328.3	
7-7	2	1.9000	2.6790			374.8	510.8	450.2		
7-8	3	1.6830	2.2370	2.6540		145.4	452.5	375.9	313.0	
7-9	2	2.9560	4.0070			478.2	794.7	673.4		
7-10	3	1.1270	1.6700	1.9220		122.2	303.0	280.6	226.7	
7-11	4	1.0600	1.6700	2.0280	3.1220	304.6	285.0	280.6	239.2	276.2
7-12	4	0.6935	1.0830	1.4630	1.5200	75.2	186.5	182.0	172.5	134.5
7-13	3	1.1630	1.4450	1.8000		104.4	312.7	242.8	212.3	
7-14	3	1.0940	1.7890	2.1870		208.1	294.1	300.6	257.9	
7-15	2	1.9750	3.1150			604.7	531.0	523.5		
7-16	4	0.8550	1.2540	1.7290	1.8750	106.2	229.9	210.7	203.9	165.9
7-17	4	1.4060	1.6950	1.9310	2.7390	171.6	378.0	284.8	227.7	242.3
7-18	3	1.2860	1.5510	2.2270		208.9	345.7	260.6	262.6	
7-19	4	0.6363	1.0740	1.3120	1.7500	141.4	171.1	180.5	154.7	154.8
7-20	4	0.8233	1.1780	1.9000	2.2800	209.6	221.3	198.0	224.1	201.7
7-21	4	1.1300	1.3930	1.4340	2.4040	184.3	303.8	234.1	169.1	212.7
7-22	4	1.5110	2.0880	2.2470	2.7440	96.6	406.2	350.9	265.0	242.8
7-23	4	0.8252	1.0340	1.3650	1.7630	124.7	221.9	173.8	161.0	156.0
7-24	4	0.5827	0.9500	1.2160	1.3110	65.9	156.7	159.6	143.4	116.0
7-25	4	1.0640	1.4190	1.9050	2.6110	223.3	286.1	238.5	224.7	231.0
7-26	4	1.1130	1.5770	1.8890	2.1610	91.5	299.2	265.0	222.8	191.2
7-27	4	1.3790	1.8560	2.3590	3.0820	220.1	370.8	311.9	278.2	272.7
7-28	1	7.4730				1991.3	2009.2			
7-29	4	0.7095	1.0900	1.3800	1.6060	94.6	190.8	183.2	162.8	142.1
7-30	4	0.7755	1.2990	1.9490	2.9330	349.3	208.5	218.3	229.9	259.5
7-31	4	0.6164	1.0340	1.4850	2.2870	269.1	165.7	173.8	175.1	202.3
7-32	4	0.8265	1.2920	1.6090	1.7670	83.0	222.2	217.1	189.8	156.3
7-33	2	2.3780	3.3700			480.2	639.3	566.3		
7-34	2	2.3460	2.7570			104.0	630.7	463.3		
7-35	3	1.1830	2.3660	3.3800		523.6	318.1	397.6	398.6	
7-36	4	0.5953	0.9500	1.3530	1.4820	100.0	160.0	159.6	159.6	131.1
7-37	4	0.8080	1.2220	1.8720	3.0220	378.7	217.2	205.4	220.8	267.4
7-38	3	1.1930	1.5240	2.0550		176.1	320.7	256.1	242.4	
7-39	3	0.5885	0.9445	1.6970		303.7	158.2	158.7	200.1	
7-40	4	0.7853	0.9500	1.5580	1.7100	123.2	211.1	159.6	183.7	151.3
7-41	4	0.7980	1.3550	1.7480	1.9130	107.8	214.5	227.7	206.2	169.2
7-42	4	0.7953	1.1330	1.4850	1.8090	122.1	213.8	190.4	175.1	160.0
7-43	4	0.5899	1.0740	1.7300	2.0280	199.5	158.6	180.5	204.0	179.4
7-44	3	1.9610	2.4830	3.5280		347.4	527.2	417.3	416.1	
7-45	2	2.1810	2.9690			361.0	586.4	498.9		
7-46	1	4.3740				1165.6	1176.0			
7-47	3	1.4580	2.6640	4.9510		970.9	392.0	447.7	583.9	
7-48	3	1.4250	2.2670	3.3970		480.1	383.1	381.0	400.6	
7-49	1	3.5790				953.7	962.2			
7-50	4	1.2220	1.4720	1.7930	2.8120	246.2	328.5	247.4	211.5	248.8
AVG		1.4828	1.7913	2.1317	2.1971	313.6	398.6	301.0	251.4	194.4
n		50	47	41	24	50	50	47	41	24
STD		1.1580	0.7396	0.7891	0.5649	341.9	311.3	124.3	93.1	50.0
MAX		7.4730	4.0070	4.9510	3.1220	1991.3	2009.2	673.4	583.9	276.2
MIN		0.5827	0.9445	1.2160	1.3110	65.9	156.7	158.7	143.4	116.0
CV%		78.1	41.3	37.0	25.7	109.0	78.1	41.3	37.0	25.7
C COEFF. Guelph Kfs:		0.62	0.84	1.00	1.15		0.62	0.84	1.00	1.15
HEAD IN WELL (CM)		5.0	7.5	10.0	12.5		5.0	7.5	10.0	12.5

Table 9. Bore hole permeameter outflow rates and calculated saturated hydraulic conductivities for layer 8.

SAMPLE	# of meas. in well	STEADY STATE OUTFLOW RATE CM ³ /S				Kfs GUELPH CM/D	Kse* according GLOVER EQUATION CM/D			
		Q1	Q2	Q3	Q4		KG1	KG2	KG3	KG4
8-1	4	1.0840	1.2390	1.4980	1.7730	62.6	291.4	208.2	176.7	156.9
8-2	4	0.3977	0.5170	0.6363	1.1930	137.9	106.9	86.9	75.0	105.5
8-3	4	0.4373	0.5170	0.6064	0.7953	41.5	117.6	86.9	71.5	70.4
8-4	4	0.5385	0.6840	0.8550	0.8740	16.9	144.8	114.9	100.8	77.3
8-5	4	0.6070	0.6898	0.9460	1.7740	214.0	163.2	115.9	111.6	156.9
8-6	3	0.9345	1.3320	2.7840		541.6	251.2	223.8	328.3	
8-7	4	0.7158	1.6110	1.9350	2.7310	267.7	192.4	270.7	228.2	241.6
8-8	4	0.8360	1.1220	1.3470	1.3830	23.5	224.8	188.6	158.9	122.4
8-9	4	0.8120	0.9854	1.3800	2.1760	228.5	218.3	165.6	162.8	192.5
8-10	4	1.3720	1.7500	2.3300	2.7700	163.9	368.9	294.1	274.8	245.1
8-11	3	1.4000	1.6110	2.2270		168.3	376.4	270.7	262.6	
8-12	2	2.6600	3.5450			340.8	715.2	595.7		
8-13	4	1.1260	1.6030	2.0420	2.4430	147.3	302.7	269.4	240.8	216.1
8-14	2	4.0840	4.8600			220.4	1098.0	816.7		
8-15	3	1.4220	2.3200	2.2540		57.7	382.3	389.9	265.8	
8-16	4	0.7980	1.1880	1.5290	1.6850	84.1	214.5	199.6	180.3	149.1
8-17	3	0.7125	1.3870		3.0130	358.0	191.6	233.1		266.6
8-18	4	1.0840	1.9230	2.7840	3.5790	350.9	291.4	323.2	328.3	316.6
8-19	3	2.2860	3.2320	3.8630		260.0	614.6	543.1	455.6	
8-20	4	1.2850	1.6720	2.1070	2.5570	142.5	345.5	281.0	248.5	226.2
8-21	4	0.9164	1.3400	1.9580	2.7200	276.3	246.4	225.2	230.9	240.6
8-22	3	0.8740	1.0770	1.4160		102.9	235.0	181.0	167.0	
8-23	2	3.8360	4.5930			225.4	1031.3	771.8		
8-24	4	0.6893	1.1660	1.9090	3.2740	458.7	185.3	195.9	225.1	289.6
8-25	3	0.9845	1.4190	1.9050		195.1	264.7	238.5	224.7	
8-26	4	0.4613	0.6760	0.9743	1.1930	98.3	124.0	113.6	114.9	105.5
8-27	4	0.9923	1.5650	1.6870	1.8320	37.7	256.8	263.0	199.0	162.1
8-28	4	0.6064	1.0340	1.3840	1.4710	83.7	163.0	173.8	163.2	130.1
8-29	4	0.6892	1.3520	1.5510	1.7760	95.8	185.3	227.2	182.9	157.1
8-30	4	0.6996	1.1830	1.9080	2.2250	211.4	188.1	198.8	225.0	196.8
8-31	4	0.5890	1.0920	1.3930	1.7480	142.1	158.4	183.5	164.3	154.6
8-32	4	0.6963	1.0560	1.3800	2.0690	208.5	187.2	177.5	162.8	183.0
8-33	4	0.7158	1.6300	2.0280	2.4650	200.5	192.4	273.9	239.2	218.1
8-34	4	0.4408	0.6004	0.9975	1.0550	78.4	118.5	100.9	117.6	93.3
8-35	4	1.4580	2.2170	2.3260	3.1100	168.4	392.0	372.6	274.3	275.1
8-36	4	1.1330	1.6970	1.9350	2.5180	154.1	304.6	285.2	228.2	222.8
8-37	1	5.6670				1510.1	1523.6			
8-38	4	0.7619	1.0250	1.4450	2.0500	198.2	204.8	172.2	170.4	181.4
8-39	3	1.1490	2.0900	2.8410		381.8	308.9	351.2	335.1	
8-40	4	1.1400	1.5240	2.4790	3.4200	370.4	306.5	256.1	292.4	302.6
8-41	2	3.1140	3.5380			58.8	837.2	594.6		
8-42	4	1.3320	1.7020	2.1240	2.2530	61.4	358.1	286.0	250.5	199.3
8-43	4	0.8256	1.4440	2.5270	2.5650	220.7	222.0	242.7	298.0	226.9
8-44	2	3.2110	4.9710			922.2	863.3	835.4		
8-45	2	2.5330	3.0970			190.6	681.0	520.4		
8-46	3	1.2230	2.2530	3.7110		651.1	328.8	378.6	437.7	
8-47	3	1.1630	2.3060	3.5790		610.9	312.7	387.5	422.1	
8-48	3	1.4980	2.4950	3.6460		513.9	402.7	419.3	430.0	
8-49	2	3.0750	5.8260			1577.2	826.7	979.0		
8-50	2	1.9900	2.9460			483.8	535.0	495.1		
AVG		1.3811	1.8919	1.9557	2.1448	287.3	371.3	317.9	230.6	189.8
n		50	49	40	31	50	50	49	40	31
STD		1.0840	1.2148	0.8166	0.7476	317.4	291.4	204.1	96.3	66.1
MAX		5.6670	5.8260	3.8630	3.5790	1577.2	1523.6	979.0	455.6	316.6
MIN		0.3977	0.5170	0.6064	0.7953	16.9	106.9	86.9	71.5	70.4
CV%		78.5	64.2	41.8	34.9	110.5	78.5	64.2	41.8	34.9
C COEFF. Guelph Kfs:		0.62	0.84	1.00	1.15		0.62	0.84	1.00	1.15
HEAD IN WELL (CM)		5.0	7.5	10.0	12.5		5.0	7.5	10.0	12.5

Table 10. Bore hole permeameter outflow rates and calculated saturated hydraulic conductivities for layer 9.

SAMPLE	# of meas. in well	STEADY STATE OUTFLOW RATE CM ³ /S				Kfs GUELPH CM/D	Ksat according GLOVER EQUATION CM/D			
		Q1	Q2	Q3	Q4		KG1	KG2	KG3	KG4
9-1	2	1.8920	2.1090			9.3	508.7	354.4		
9-2	3	2.0680	2.3060	2.6640		33.5	556.0	387.5	314.2	
9-3	3	1.4440	1.9760	3.5070		561.8	388.2	332.1	413.6	
9-4	3	1.8610	2.2870	3.2410		302.1	500.3	384.3	382.2	
9-5	2	2.9820	3.4800			116.3	801.7	584.8		
9-6	1	4.7300				1260.4	1271.7			
9-7	1	4.0960				1091.5	1101.2			
9-8	2	3.0020	3.6940			241.2	807.1	620.8		
9-9	3	1.2250	2.5250	3.4800		522.9	329.3	424.3	410.4	
9-10	2	2.3860	3.2410			390.4	641.5	544.6		
9-11	3	1.8710	2.4320	3.1920		258.2	503.0	408.7	376.5	
9-12	2	3.0940	3.4410			10.1	831.8	578.3		
9-13	2	2.1710	2.5650			105.1	583.7	431.0		
9-14	3	1.4160	1.8530	2.4190		194.6	380.7	311.4	285.3	
9-15	3	1.8410	2.1290	2.6610		122.6	495.0	357.8	313.8	
9-16	3	2.2270	3.2810	4.2150		395.8	598.7	551.4	497.1	
9-17	1	3.9710				1058.2	1067.6			
9-18	4	1.5750	1.9490	2.2570	2.6050	75.0	423.4	327.5	266.2	230.5
9-19	4	1.4980	1.6560	1.8610	2.4630	103.4	402.7	278.3	219.5	217.9
9-20	4	0.6999	0.8749	1.0740	1.4020	86.8	188.2	147.0	126.7	124.0
9-21	2	2.9040	3.8650			423.3	780.8	649.5		
9-22	2	2.3150	3.0490			316.5	622.4	512.4		
9-23	2	2.8250	3.1900			40.6	759.5	536.1		
9-24	2	2.7860	4.0400			622.3	749.0	678.9		
9-25	3	1.8890	2.4130	2.9070		153.0	507.9	405.5	342.8	
9-26	3	2.0780	2.4360	3.8060		424.1	558.7	409.4	448.9	
9-27	3	1.2530	1.6190	2.3060		235.5	336.9	272.1	272.0	
9-28	3	1.6950	1.8920	2.4830		135.8	455.7	317.9	292.8	
9-29	2	1.9490	2.1870			19.0	524.0	367.5		
9-30	3	1.5670	1.9900	2.3140		93.4	421.3	334.4	272.9	
9-31	2	2.1670	2.4740			48.7	582.6	415.8		
9-32	3	1.9000	2.3560	2.6600		69.6	510.8	395.9	313.7	
9-33	2	2.8230	3.8970			502.5	759.0	654.9		
9-34	3	1.8420	2.1930	2.4050		19.1	495.2	368.5	283.6	
9-35	2	2.7040	3.3800			251.6	727.0	568.0		
9-36	4	1.5650	2.0590	2.1560	2.7590	100.0	420.8	346.0	254.3	244.1
9-37	3	0.7106	0.7980		1.1020	29.6	191.0	134.1		97.5
9-38	3	2.0280	3.1890	4.5930		601.7	545.2	535.9	541.7	
9-39	2	3.7580	4.6720			333.1	1010.4	785.1		
9-40	4	1.2460	1.5960	1.8610	2.4830	147.8	335.0	268.2	219.5	219.7
9-41	4	1.4090	1.4390	1.6560	2.4680	151.4	378.8	241.8	195.3	218.3
9-42	4	0.9500	1.1020	1.1780	1.9970	159.6	255.4	185.2	138.9	176.7
9-43	4	1.0040	1.2810	1.4240	1.8370	84.0	269.9	215.3	167.9	162.5
9-44	2	1.0020	1.1530			28.4	269.4	193.8		
9-45	3	1.7620	2.1770	2.3180		11.8	473.7	365.8	273.4	
9-46	3	0.9263	1.0370	3.4980		850.5	249.0	174.3	412.5	
9-47	3	0.8132	1.5200	2.2310		343.6	218.6	255.4	263.1	
9-48	4	0.4255	0.7675	1.1530	1.4440	143.3	114.4	129.0	136.0	127.7
9-49	4	0.7804	0.9302	1.3720	1.9830	195.4	209.8	156.3	161.8	175.4
9-50	4	1.0820	1.2090	1.6700	3.1930	391.8	290.9	203.2	197.0	282.5
AVG		1.9642	2.2917	2.4854	2.1447	277.3	528.1	385.1	293.1	189.7
n		50	47	30	12	50	50	47	30	12
STD		0.9390	0.9591	0.9074	0.6238	291.5	252.4	161.2	107.0	55.2
MAX		4.7300	4.6720	4.5930	3.1930	1260.4	1271.7	785.1	541.7	282.5
MIN		0.4255	0.7675	1.0740	1.1020	9.3	114.4	129.0	126.7	97.5
CV%		47.8	41.9	36.5	29.1	105.1	47.8	41.9	36.5	29.1
C COEFF. Guelph Kfs:		0.62	0.84	1.00	1.15		0.62	0.84	1.00	1.15
HEAD IN WELL (CM)		5.0	7.5	10.0	12.5		5.0	7.5	10.0	12.5

Table 11. Bore hole permeameter outflow rates and calculated saturated hydraulic conductivities for vertical A.

SAMPLE	# of meas. in well	STEADY STATE OUTFLOW RATE CM ³ /S				Kfs GUELPH CM/D	Ksa according GLOVER EQUATION CM/D			
		Q1	Q2	Q3	Q4		KG1	KG2	KG3	KG4
A-1										
A-2										
A-3										
A-4										
A-5										
A-6	3	0.6307	0.8278	1.2220		138.7	169.6	139.1	144.1	
A-7										
A-8										
A-9										
A-10										
A-11										
A-12										
A-13	3	1.8290	2.6640	3.2610		257.2	491.7	447.7	384.6	
A-14	3	1.6700	2.3860	3.0220		258.4	449.0	401.0	356.4	
A-15	4	0.8531	1.4510	1.9090	2.8230	294.5	229.4	243.8	225.1	249.7
A-16	3	1.3520	1.6700	2.2510		180.5	363.5	280.6	265.5	
A-17										
A-18	4	0.8740	1.3300	1.6720	2.5460	251.0	235.0	223.5	197.2	225.2
A-19	4	0.5624	1.1020	2.2990	3.2110	457.2	151.2	185.2	271.1	284.1
A-20	3	1.2540	2.6870	4.4080		825.5	337.1	451.5	519.9	
A-21	3	1.1020	3.2300	4.9400		972.2	296.3	542.8	582.6	
A-22	3	1.9710	2.3560	2.7590		86.2	529.9	395.9	325.4	
A-23	3	2.0380	2.4830	2.8770		90.4	547.9	417.3	339.3	
A-24	2	2.4830	3.7050			622.6	667.6	622.6		
A-25										
A-26	4	0.3390	0.5518	1.0250	1.8000	270.1	91.1	92.7	120.9	159.2
A-27	4	0.5124	0.7883	1.3010	1.8530	220.3	137.8	132.5	153.4	163.9
A-28	4	0.6460	0.7855	0.9245	1.0070	18.4	173.7	132.0	109.0	89.1
A-29	4	0.5781	0.7095	1.3400	2.4630	363.4	155.4	119.2	158.0	217.9
A-30	4	0.7883	0.9460	1.3640	1.5770	98.1	211.9	159.0	160.9	139.5
A-31										
A-32	3	1.6440	1.9880	2.2140		36.6	442.0	334.1	261.1	
A-33	4	1.1930	1.8290	2.4130	4.2150	508.8	320.7	307.4	284.6	372.9
A-34	4	0.4237	0.8869	1.4980	3.0350	486.7	113.9	149.0	176.7	268.5
A-35	4	0.6363	0.7158	0.8848	1.6300	175.1	171.1	120.3	104.4	144.2
A-36	4	0.3927	0.6460	0.7855	0.8550	38.0	105.6	108.6	92.6	75.6
A-37	4	1.0260	1.1650	1.3300	1.4630	12.9	275.8	195.8	156.9	129.4
A-38										
A-39	4	0.8936	1.1040	1.6560	2.1290	183.0	240.2	185.5	195.3	188.3
A-40	4	1.7940	1.8130	1.9310	2.7590	111.5	482.3	304.7	227.7	244.1
A-41	3	2.2860	3.0250	3.5470		178.7	614.6	508.3	418.3	
A-42	3	1.8530	2.3650	2.9560		188.2	498.2	397.4	348.6	
A-43	4	1.1230	1.4980	2.2070	3.5470	413.6	301.9	251.7	260.3	313.8
A-44	3	1.7500	2.2000	2.9190		229.4	470.5	369.7	344.3	
A-45										
A-46	2	2.7990	3.4980			259.9	752.5	587.8		
A-47	3	2.0260	2.6510	3.7050		366.9	544.7	445.5	437.0	
A-48	4	1.3140	1.7080	2.3650	3.3370	307.6	353.3	287.0	278.9	295.2
AVG		1.2699	1.7739	2.2329	2.3676	278.2	341.4	298.1	263.3	209.5
n		32	32	30	17	32	32	32	30	17
STD		0.6693	0.9083	1.0521	0.9378	221.7	179.9	152.6	124.1	83.0
MAX		2.7990	3.7050	4.9400	4.2150	972.2	752.5	622.6	582.6	372.9
MIN		0.3390	0.5518	0.7855	0.8550	12.9	91.1	92.7	92.6	75.6
CV%		52.7	51.2	47.1	39.6	79.7	52.7	51.2	47.1	39.6
C COEFF. Guelph Kfs:		0.62	0.84	1.00	1.15		0.62	0.84	1.00	1.15
HEAD IN WELL (CM)		5.0	7.5	10.0	12.5		5.0	7.5	10.0	12.5

Table 12. Bore hole permeameter outflow rates and calculated saturated hydraulic conductivities for vertical B.

SAMPLE	# of meas. in well	STEADY STATE OUTFLOW RATE CM ³ /S				Kfs GUELPH CM/D	Ksat according GLOVER EQUATION CM/D			
		Q1	Q2	Q3	Q4		KG1	KG2	KG3	KG4
B-1										
B-2										
B-3										
B-4										
B-5										
B-6	3	0.6307	0.9066	1.3530		173.5	169.6	152.4	159.6	
B-7										
B-8										
B-9										
B-10										
B-11										
B-12										
B-13	1	4.8120				1282.3	1293.7			
B-14	2	2.1990	3.9500			987.0	591.2	663.8		
B-15	2	2.3860	3.1710			344.8	641.5	532.9		
B-16	4	0.5567	0.7755	1.0940	1.7990	210.0	149.7	130.3	129.0	159.2
B-17										
B-18	4	0.8968	1.1400	1.3110	1.3940	17.1	241.1	191.6	154.6	123.3
B-19	4	0.3818	0.7755	1.4710	2.3760	354.9	102.6	130.3	173.5	210.2
B-20	4	0.8482	1.4050	2.1210	2.9300	320.0	228.0	236.1	250.1	259.2
B-21	4	0.9413	1.6940	2.1470	2.9820	280.1	253.1	284.7	253.2	263.8
B-22	4	0.3942	0.5518	0.7489	1.4430	188.4	106.0	92.7	88.3	127.7
B-23	4	0.6898	0.7883	0.8829	1.9790	239.6	185.5	132.5	104.1	175.1
B-24	3	1.4580	1.6160	4.5030		977.5	392.0	271.6	531.1	
B-25										
B-26	3	0.2069	0.3350	1.1690		313.9	55.6	56.3	137.9	
B-27	4	0.3181	0.5436	1.3920	2.5980	448.5	85.5	91.4	164.2	229.8
B-28	4	0.9724	1.2220	2.2860	4.2370	628.2	261.4	205.4	269.6	374.8
B-29	1	1.7740				472.7	476.9			
B-30	4	1.1010	1.2610	1.4190	1.6560	32.6	296.0	211.9	167.4	146.5
B-31										
B-32	4	1.1210	1.3680	1.7100	1.8240	46.0	301.4	229.9	201.7	161.4
B-33	3	1.5240	2.3860	3.5290		482.0	409.7	401.0	416.2	
B-34	3	1.5110	1.9680	2.4100		147.0	406.2	330.7	284.2	
B-35	4	1.1140	1.5510	2.5850	3.9770	496.3	299.5	260.6	304.9	351.8
B-36	4	0.7953	1.1930	1.6440	2.5170	273.7	213.8	200.5	193.9	222.7
B-37	4	0.7953	1.2330	2.2270	3.6780	520.8	213.8	207.2	262.6	325.4
B-38										
B-39	3	0.7953	1.3240	1.7100		191.0	213.8	222.5	201.7	
B-40	3	1.3240	2.2270	2.6250		233.9	356.0	374.2	309.6	
B-41	4	1.3680	1.9000	2.1850	2.3750	56.4	367.8	319.3	257.7	210.1
B-42	4	1.1400	1.7480	2.2800	2.5080	133.8	306.5	293.7	268.9	221.9
B-43	3	2.1920	2.7850	3.0400		59.0	589.3	468.0	358.5	
B-44	3	2.0140	2.2800	2.6600		50.9	541.5	383.1	313.7	
B-45										
B-46	4	1.3010	1.7740	1.9840	2.2730	64.2	349.8	298.1	234.0	201.1
B-47	4	1.4830	1.9880	2.3660	2.5850	73.4	398.7	334.1	279.0	228.7
B-48	4	0.6561	0.8749	1.2330	1.8920	201.5	176.4	147.0	145.4	167.4
AVG		1.2407	1.5578	2.0031	2.4749	321.9	333.6	261.8	236.2	219.0
n		32	30	28	19	32	32	30	28	19
STD		0.8615	0.8101	0.8283	0.8074	299.8	231.6	136.1	97.7	71.4
MAX		4.8120	3.9500	4.5030	4.2370	1282.3	1293.7	663.8	531.1	374.8
MIN		0.2069	0.2069	0.3350	0.7489	1.4	17.1	55.6	56.3	88.3
CV%		69.4	52.0	41.4	32.6	93.1	69.4	52.0	41.4	32.6
C COEFF. Guelph Kfs:		0.62	0.84	1.00	1.15		0.62	0.84	1.00	1.15
HEAD IN WELL (CM)		5.0	7.5	10.0	12.5		5.0	7.5	10.0	12.5

Table 13. Bore hole permeameter outflow rates and calculated saturated hydraulic conductivities for vertical C.

SAMPLE	# of meas. in well	STEADY STATE OUTFLOW RATE CM ³ /S				Kfs GUELPH CM/D	Ksat according GLOVER EQUATION CM/D			
		Q1	Q2	Q3	Q4		KG1	KG2	KG3	KG4
C-1										
C-2										
C-3										
C-4										
C-5										
C-6	2	3.5080	4.1390			166.2	943.1	695.6		
C-7										
C-8										
C-9										
C-10										
C-11										
C-12										
C-13	1	7.1580				1907.4	1924.5			
C-14	2	1.7890	2.9030			600.7	481.0	487.8		
C-15	3	2.2400	3.0060	3.5790		205.9	602.2	505.2	422.1	
C-16	1	5.5740				1485.3	1498.6			
C-17	2	2.1680	3.9450			1006.1	582.9	662.9		
C-18	1	7.9530				2119.3	2138.2			
C-19	1	13.6800				3645.3	3677.9			
C-20	2	2.3560	4.5920			1291.9	633.4	771.7		
C-21	3	1.1780	2.2800	3.8000		691.2	316.7	383.1	448.2	
C-22	3	2.1290	2.8770	3.7450		317.0	572.4	483.5	441.7	
C-23	3	2.7590	2.9900	3.5470		56.1	741.8	502.5	418.3	
C-24	4	0.7785	1.1210	1.6290	2.2070	214.0	209.3	188.4	192.1	195.3
C-25										
C-26	2	2.0660	3.0680			508.4	555.5	515.6		
C-27	4	0.7224	0.8351	3.0160	5.2290	921.4	194.2	140.3	355.7	462.6
C-28	4	0.3232	0.4572	1.3400	2.4040	416.1	86.9	76.8	158.0	212.7
C-29	3	1.2610	1.8720	2.7600		357.2	339.0	314.6	325.5	
C-30	4	1.3200	1.7740	2.0100	2.5370	122.4	354.9	298.1	237.1	224.4
C-31										
C-32	2	1.7740	2.5650			391.4	476.9	431.0		
C-33	4	0.5965	1.0540	1.5210	2.1210	239.2	160.4	177.1	179.4	187.6
C-34	4	0.7620	1.0720	1.6160	2.2760	239.2	204.9	180.1	190.6	201.4
C-35	4	0.5130	0.8615	1.2730	1.7100	177.8	137.9	144.8	150.1	151.3
C-36	4	0.7600	1.0000	1.2920	1.4360	63.7	204.3	168.0	152.4	127.0
C-37	4	0.4180	0.7600	1.1400	1.4390	144.5	112.4	127.7	134.4	127.3
C-38										
C-39	2	3.2680	4.2790			430.4	878.6	719.1		
C-40	3	2.6600	3.8000	4.7500		388.7	715.2	638.6	560.2	
C-41	3	0.8220	1.9750	3.5260		737.6	221.0	331.9	415.8	
C-42	3	1.7480	3.0400	3.8000		414.0	470.0	510.9	448.2	
C-43	4	0.4940	1.0260	1.5200	1.7010	148.3	132.8	172.4	179.3	150.5
C-44										
C-45										
C-46	3	0.5985	0.7600	0.8360		18.3	160.9	127.7	98.6	
C-47	3	1.2630	1.5910	1.8290		64.3	339.6	267.4	215.7	
C-48	2	2.9230	3.5090			177.7	785.9	589.7		
C-49	4	0.5912	0.7883	1.2810	1.5770	146.8	158.9	132.5	151.1	139.5
AVG		2.3683	2.2048	2.3719	2.2397	600.1	636.7	370.5	279.7	198.1
n		33	29	21	11	33	33	29	21	11
STD		2.7296	1.2685	1.1802	1.0661	757.3	733.9	213.2	139.2	94.3
MAX		13.6800	4.5920	4.7500	5.2290	3645.3	3677.9	771.7	560.2	462.6
MIN		0.3232	0.4572	0.8360	1.4360	18.3	86.9	76.8	98.6	127.0
CV%		115.3	57.5	49.8	47.6	126.2	115.3	57.5	49.8	47.6
C COEFF. Guelph Kfs:		0.62	0.84	1.00	1.15		0.62	0.84	1.00	1.15
HEAD IN WELL (CM)		5.0	7.5	10.0	12.5		5.0	7.5	10.0	12.5

Table 14. Soil parameters for layer 1.

SAMPLE	θ_s	θ_r	α	n	K_{sat}
	cm^3/cm^3	cm^3/cm^3			cm/d
1-1	0.345	0.080	0.0594	1.7446	843.9
1-2	0.352	0.077	0.0671	1.6439	683.8
1-3	0.323	0.084	0.0575	1.6409	293.0
1-4	0.311	0.073	0.0573	1.7318	583.7
1-5	0.329	0.081	0.0563	1.6331	456.0
1-6	0.301	0.078	0.0467	1.9734	502.6
1-7	0.288	0.074	0.0536	1.6611	367.1
1-8	0.300	0.079	0.0437	1.9897	533.1
1-9	0.315	0.068	0.0490	1.6525	451.9
1-10	0.381	0.052	0.0405	1.8466	620.8
1-11	0.335	0.083	0.0391	1.7728	1378.2
1-12	0.345	0.078	0.0480	1.7632	601.4
1-13	0.364	0.088	0.0483	1.7006	730.5
1-14	0.343	0.069	0.0539	1.6074	410.3
1-15	0.342	0.064	0.0484	1.8470	430.0
1-16	0.309	0.077	0.0457	1.7876	267.8
1-17	0.318	0.085	0.0464	1.6797	226.5
1-18	0.333	0.082	0.0395	1.7795	404.3
1-19	0.347	0.083	0.0379	2.0075	456.2
1-20	0.341	0.078	0.0391	1.7537	278.7
1-21	0.341	0.061	0.0289	1.7471	700.7
1-22	0.384	0.066	0.0387	1.7757	1022.3
1-23	0.343	0.072	0.0359	1.6137	586.9
1-24	0.364	0.073	0.0360	1.6488	408.9
1-25	0.351	0.075	0.0326	1.7058	463.7
1-26	0.342	0.076	0.0418	1.5753	539.4
1-27	0.312	0.056	0.0452	1.4840	553.8
1-28	0.364	0.069	0.0380	1.7133	891.3
1-29	0.360	0.069	0.0572	1.7010	1215.1
1-30	0.334	0.070	0.0550	1.5334	463.1
1-31	0.322	0.097	0.0322	1.7101	276.3
1-32	0.376	0.088	0.0439	1.7895	672.6
1-33	0.320	0.086	0.0321	1.6812	675.0
1-34	0.335	0.080	0.0360	1.7783	635.9
1-35	0.327	0.087	0.0303	1.9209	278.1
1-36	0.339	0.085	0.0342	1.8906	791.3
1-37	0.334	0.090	0.0314	1.8760	595.3
1-38	0.336	0.090	0.0378	1.7068	360.2
1-39	0.341	0.089	0.0297	1.8882	469.8
1-40	0.369	0.089	0.0376	1.7723	489.7
1-41	0.397	0.089	0.0438	1.8768	947.1
1-42	0.373	0.094	0.0474	1.9786	1313.2
1-43	0.357	0.088	0.0403	1.8650	870.2
1-44	0.342	0.098	0.0403	1.8471	293.5
1-45	0.381	0.095	0.0398	1.9426	870.9
1-46	0.359	0.080	0.0317	1.8520	494.7
1-47	0.332	0.089	0.0347	1.8036	381.6
1-48	0.338	0.094	0.0409	1.7152	972.8
1-49	0.342	0.092	0.0430	1.8020	371.2
1-50	0.366	0.090	0.0473	1.7629	479.5
AVG	0.342	0.080	0.0428	1.7635	592.1
n	50	50	50	50	50
STD	0.023	0.010	0.0089	0.1189	270.23
MAX	0.397	0.098	0.0671	2.0075	1378.2
MIN	0.288	0.052	0.0289	1.4840	226.5
CV%	6.78	13.00	20.71	6.74	45.64

Table 15. Soil parameters for layer 2.

SAMPLE	θ_s	θ_x	α	n	K_{sat}
	cm^3/cm^3	cm^3/cm^3			cm/d
2-1	0.285	0.077	0.0787	1.4800	86.0
2-2	0.277	0.090	0.0717	1.6541	471.0
2-3	0.291	0.073	0.0569	1.4775	39.3
2-4	0.270	0.080	0.0621	1.5898	119.6
2-5	0.312	0.070	0.1019	1.5866	285.9
2-6	0.293	0.074	0.1199	1.6534	256.7
2-7	0.286	0.074	0.0844	1.6132	189.3
2-8	0.297	0.083	0.0857	1.5358	130.5
2-9	0.280	0.078	0.0684	1.6281	500.1
2-10	0.288	0.081	0.0715	1.4777	62.5
2-11	0.351	0.093	0.0944	1.5947	261.7
2-12	0.338	0.097	0.0818	1.6010	171.1
2-13	0.357	0.119	0.0523	1.6360	183.6
2-14	0.356	0.117	0.0659	1.6423	222.0
2-15	0.348	0.117	0.0644	1.5543	53.8
2-16	0.385	0.086	0.0618	1.5602	198.3
2-17	0.305	0.087	0.0460	1.5826	646.4
2-18	0.369	0.097	0.0219	1.5668	1057.5
2-19	0.371	0.085	0.0337	1.4873	70.6
2-20	0.314	0.089	0.0337	1.5020	41.1
2-21	0.298	0.093	0.0318	1.7473	148.7
2-22	0.309	0.094	0.0405	1.6583	543.1
2-23	0.360	0.100	0.0450	1.6698	1019.8
2-24	0.325	0.105	0.0402	1.6057	79.2
2-25	0.353	0.114	0.0269	1.5682	874.9
2-26	0.339	0.102	0.0415	1.4385	169.0
2-27	0.375	0.094	0.0558	1.4614	88.2
2-28	0.351	0.089	0.0248	1.5280	102.6
2-29	0.324	0.071	0.0498	1.6301	163.0
2-30	0.303	0.081	0.0290	1.5487	230.5
2-31	0.337	0.100	0.0426	1.7176	112.6
2-32	0.381	0.095	0.0288	1.9950	225.9
2-33	0.399	0.093	0.1191	1.5047	1093.2
2-34	0.370	0.112	0.0461	1.7671	791.0
2-35	0.388	0.120	0.0580	1.5111	164.0
2-36	0.366	0.083	0.0595	1.4742	325.3
2-37	0.370	0.087	0.0403	1.5216	614.8
2-38	0.375	0.084	0.1105	1.4542	411.0
2-39	0.394	0.097	0.0433	1.5283	914.0
2-40	0.388	0.096	0.1278	1.3143	90.2
2-41	0.353	0.095	0.0515	1.7762	543.0
2-42	0.375	0.082	0.0807	1.4378	822.1
2-43	0.380	0.091	0.0491	1.4683	101.0
2-44	0.338	0.093	0.0526	1.8960	577.2
2-45	0.371	0.097	0.0503	1.7209	1137.1
2-46	0.370	0.100	0.0469	1.8139	244.5
2-47	0.409	0.068	0.0615	1.4902	1484.3
2-48	0.330	0.066	0.0754	1.4711	411.5
2-49	0.376	0.094	0.0441	1.5428	231.7
2-50	0.312	0.104	0.0542	2.1784	228.4
AVG	0.342	0.091	0.0597	1.5973	379.8
n	50	50	50	50	50
STD	0.038	0.013	0.0255	0.1501	351.73
MAX	0.409	0.120	0.1278	2.1784	1484.3
MIN	0.270	0.066	0.0219	1.3143	39.3
CV%	11.02	14.72	42.75	9.40	92.61

Table 16. Soil parameters for layer 3.

SAMPLE	θ_s	θ_r	α	n	K_{sat}
	cm^3/cm^3	cm^3/cm^3			cm/d
3-1	0.372	0.103	0.0396	1.4253	85.0
3-2	0.395	0.105	0.0261	1.5377	257.2
3-3	0.369	0.102	0.0359	1.4942	73.3
3-4	0.355	0.084	0.0649	1.4236	413.1
3-5	0.360	0.093	0.0871	1.4411	107.5
3-6	0.320	0.111	0.0302	2.0311	99.1
3-7	0.337	0.083	0.0395	1.6098	103.4
3-8	0.350	0.073	0.0430	1.5411	355.4
3-9	0.354	0.077	0.0248	1.6417	589.9
3-10	0.354	0.083	0.0388	1.5858	101.7
3-11					
3-12	0.366	0.132	0.0404	1.5554	477.0
3-13	0.326	0.137	0.0440	2.0579	254.5
3-14	0.347	0.099	0.0591	1.5772	580.2
3-15	0.321	0.114	0.0407	1.6038	51.5
3-16	0.318	0.093	0.0539	1.5208	68.7
3-17	0.369	0.101	0.1099	1.4555	40.0
3-18	0.262	0.112	0.0410	2.2561	187.7
3-19	0.350	0.091	0.0392	1.7699	256.5
3-20	0.328	0.096	0.0549	1.7753	590.7
3-21	0.309	0.076	0.0430	1.7295	727.6
3-22	0.331	0.055	0.3933	1.4859	428.3
3-23	0.332	0.062	0.1046	1.7452	1186.4
3-24	0.305	0.067	0.1018	1.5656	538.3
3-25	0.353	0.078	0.0524	1.6780	197.7
3-26	0.305	0.076	0.0762	1.5985	94.3
3-27	0.302	0.066	0.0603	1.5381	450.8
3-28	0.314	0.081	0.0507	1.8590	284.1
3-29	0.302	0.077	0.0290	2.2487	797.3
3-30	0.323	0.058	0.1542	1.4564	359.5
3-31	0.310	0.069	0.0553	1.7011	365.5
3-32	0.333	0.070	0.0650	1.8470	865.7
3-33	0.319	0.073	0.0704	1.7551	225.8
3-34	0.337	0.060	0.0845	1.7760	740.0
3-35	0.357	0.052	0.0810	1.7876	1158.3
3-36	0.312	0.057	0.7880	1.7043	1041.7
3-37	0.344	0.052	0.0716	1.8662	1007.5
3-38	0.312	0.052	0.0761	1.7549	1156.3
3-39	0.330	0.061	0.0621	1.8074	304.0
3-40	0.334	0.059	0.0709	1.7792	722.0
3-41	0.306	0.083	0.0287	1.8154	89.4
3-42	0.347	0.112	0.0445	1.6565	174.6
3-43	0.361	0.103	0.0241	1.5515	31.4
3-44	0.361	0.093	0.0176	1.7192	56.0
3-45	0.329	0.093	0.0255	1.7867	
3-46	0.352	0.098	0.0549	1.4373	586.5
3-47	0.321	0.090	0.0268	1.5850	575.0
3-48	0.361	0.106	0.0362	1.6414	1012.2
3-49	0.347	0.094	0.0383	1.4777	72.7
3-50	0.316	0.106	0.0242	1.5532	43.7
AVG	0.335	0.085	0.0618	1.6778	416.3
n	49	49	49	49	48
STD	0.024	0.021	0.0554	0.1929	347.12
MAX	0.395	0.137	0.3933	2.2561	1186.4
MIN	0.262	0.052	0.0176	1.4236	31.4
CV%	7.31	24.67	89.55	11.50	83.37

Table 17. Soil parameters for layer 4.

SAMPLE	θ_h	θ_r	α	n	K_{sat}
	cm^3/cm^3	cm^3/cm^3			cm/d
4-1	0.293	0.107	0.0151	1.7675	24.5
4-2	0.305	0.105	0.0167	1.6192	14.0
4-3	0.283	0.067	0.0325	2.0012	792.7
4-4	0.287	0.075	0.0356	1.9312	96.8
4-5	0.297	0.082	0.0224	1.9113	48.9
4-6	0.307	0.092	0.0300	2.0175	726.3
4-7	0.309	0.126	0.0255	1.9483	173.0
4-8	0.291	0.114	0.0226	1.6686	490.9
4-9	0.267	0.105	0.0165	1.6494	316.7
4-10	0.343	0.093	0.0163	1.6947	631.4
4-11	0.306	0.093	0.0350	1.6346	36.3
4-12	0.303	0.067	0.0396	1.5812	375.5
4-13	0.301	0.082	0.0442	1.5732	431.0
4-14	0.378	0.034	1.5012	1.3382	5103.3
4-15	0.351	0.046	0.1010	1.8525	471.9
4-16					
4-17	0.357	0.039	0.1610	1.7182	2377.5
4-18	0.364	0.036			2360.7
4-19	0.322	0.061	0.0898	2.2992	2063.2
4-20	0.294	0.088	0.0499	1.4603	452.5
4-21	0.290	0.093	0.0346	1.5096	39.8
4-22	0.361	0.094	0.0399	1.5923	84.3
4-23	0.263	0.097	0.0324	1.5616	1050.6
4-24	0.349	0.079	0.0697	1.5416	614.1
4-25	0.315	0.073	0.0509	1.5166	435.7
4-26	0.292	0.058	0.0218	1.6105	33.0
4-27	0.294	0.078	0.0477	1.4955	55.4
4-28	0.307	0.075	0.0834	1.5237	119.8
4-29	0.291	0.070	0.0292	1.5317	27.7
4-30	0.348	0.047	0.0626	1.5387	123.6
4-31	0.312	0.069	0.0487	1.5727	182.8
4-32	0.326	0.053	0.1056	1.6411	153.3
4-33	0.342	0.060	0.0306	1.5708	21.4
4-34	0.346	0.096	0.0519	1.9424	898.1
4-35	0.305	0.066	0.0592	1.9802	480.7
4-36	0.294	0.072	0.0383	2.1227	262.7
4-37	0.308	0.053	0.0833	1.7815	275.9
4-38	0.334	0.038	0.4057	1.5276	3092.3
4-39	0.317	0.046	0.1049	1.9692	1113.9
4-40	0.349	0.053	0.3618	1.6538	2536.2
4-41	0.276	0.056	0.0583	1.7701	289.1
4-42	0.296	0.054	0.0771	1.5938	353.7
4-43	0.291	0.076	0.0276	1.8064	885.9
4-44	0.325	0.101	0.0536	1.5951	579.6
4-45	0.371	0.110	0.0219	1.6419	557.9
4-46	0.307	0.070	0.0302	1.7330	651.1
4-47	0.303	0.074	0.0402	1.6272	145.4
4-48	0.281	0.068	0.0229	1.6770	83.7
4-49	0.281	0.054	0.0393	1.5136	787.2
4-50	0.316	0.054	0.0692	1.4705	936.5
AVG	0.313	0.073	0.0929	1.6933	691.0
n	49	49	48	48	49
STD	0.028	0.022	0.2203	0.1973	963.97
MAX	0.378	0.126	1.5012	2.2992	5103.3
MIN	0.263	0.034	0.0151	1.3382	14.0
CV%	9.01	30.58	237.24	11.65	139.51

Table 18. Soil parameters for layer 5.

SAMPLE	θ_s	θ_r	α	n	K_{sat}
	cm ³ /cm ³	cm ³ /cm ³			cm/d
5-1	0.299	0.023	0.0482	1.7357	1231.2
5-2	0.288	0.067	0.0284	1.6817	54.6
5-3	0.331	0.071	0.0261	1.6938	665.8
5-4	0.310	0.083	0.0346	1.6814	307.0
5-5	0.306	0.085	0.0382	1.5607	25.4
5-6	0.312	0.080	0.0320	1.6409	59.9
5-7	0.269	0.098	0.0331	1.6190	23.6
5-8	0.318	0.096	0.0127	1.7761	22.3
5-9	0.328	0.089	0.0235	1.7030	1150.8
5-10	0.314	0.067	0.0403	1.7497	797.5
5-11	0.272	0.078	0.0398	1.8789	1015.8
5-12	0.286	0.070	0.0277	1.8104	97.6
5-13	0.327	0.065	0.0487	1.5013	473.4
5-14	0.252	0.064	0.0399	1.5233	921.1
5-15	0.297	0.070	0.1494	1.5115	178.0
5-16	0.312	0.051	0.0599	1.5423	1371.8
5-17	0.355	0.068	0.0828	1.6450	1037.1
5-18	0.327	0.049	0.0649	1.6916	231.6
5-19	0.318	0.044	0.0468	1.5807	79.0
5-20	0.319	0.059	0.0660	1.7234	338.2
5-21	0.282	0.074	0.0279	1.6844	1039.4
5-22	0.319	0.076	0.1394	1.5843	276.7
5-23	0.305	0.081	0.0580	1.5747	898.3
5-24	0.306	0.073	0.0591	1.5127	70.2
5-25	0.290	0.068	0.0411	1.6805	156.6
5-26	0.287	0.121	0.0400	1.9290	167.1
5-27	0.278	0.101	0.0255	1.5258	19.5
5-28	0.309	0.113	0.0449	1.5387	458.6
5-29	0.274	0.100	0.0606	1.4235	507.5
5-30	0.271	0.099	0.0455	1.5967	735.6
5-31	0.297	0.078	0.0696	1.6141	540.2
5-32	0.297	0.090	0.0366	1.7950	138.4
5-33	0.276	0.087	0.0312	1.7203	244.0
5-34	0.305	0.045	0.0645	1.3919	609.8
5-35	0.362	0.076	0.0095	1.7893	652.9
5-36	0.304	0.071	0.0254	1.6449	52.1
5-37	0.302	0.077	0.0366	1.6632	106.9
5-38	0.311	0.066	0.0392	1.6204	558.7
5-39	0.327	0.065	0.0321	1.5866	73.6
5-40	0.304	0.086	0.0205	1.6469	583.7
5-41	0.328	0.073	0.0161	1.7120	41.8
5-42	0.308	0.082	0.0176	1.7201	1045.2
5-43	0.284	0.077	0.0175	1.7071	44.4
5-44	0.287	0.071	0.0180	1.6602	810.2
5-45	0.296	0.078	0.0145	1.8224	392.2
5-46	0.320	0.084	0.0263	1.6750	1005.7
5-47	0.338	0.076	0.0274	1.6192	62.0
5-48	0.325	0.068	0.0489	1.5516	938.7
5-49	0.320	0.066	0.1027	1.7807	383.9
5-50	0.338	0.093	0.0649	1.6075	53.6
AVG	0.306	0.077	0.0441	1.6526	455.0
n	50	50	50	50	50
STD	0.022	0.016	0.0281	0.1096	398.30
MAX	0.362	0.121	0.1494	1.9290	1371.8
MIN	0.252	0.044	0.0095	1.3919	19.5
CV%	7.31	20.06	63.80	6.63	87.54

Table 19. Soil parameters for layer 6.

SAMPLE	θ_s	θ_r	α	n	K_{sat}
	cm ³ /cm ³	cm ³ /cm ³			cm/d
6-1	0.324	0.099	0.0331	1.4072	11.1
6-2	0.353	0.111	0.0431	1.3750	38.4
6-3	0.345	0.112	0.0260	1.4510	19.1
6-4	0.277	0.132	0.0335	1.7365	563.9
6-5	0.434	0.117	0.0095	1.6227	1158.7
6-6	0.314	0.089	0.0061	1.8536	749.3
6-7	0.280	0.100	0.0292	1.7131	1176.7
6-8	0.290	0.093	0.0334	1.6670	128.4
6-9	0.314	0.104	0.0572	1.4738	43.8
6-10	0.235	0.115	0.0326	2.6688	685.3
6-11	0.315	0.134	0.0833	1.5368	60.3
6-12	0.323	0.108	0.0832	1.4049	18.4
6-13	0.306	0.095	0.0646	1.4477	732.6
6-14	0.312	0.082	0.0848	1.8710	495.9
6-15	0.283	0.143	0.0667	3.6037	332.9
6-16	0.286	0.149	0.1061	3.9017	629.2
6-17	0.293	0.092	0.0504	2.1234	163.3
6-18	0.283	0.086	0.0537	1.6364	401.9
6-19	0.287	0.098	0.0545	2.3188	210.7
6-20	0.288	0.142	0.1011	4.3825	604.7
6-21	0.240	0.078	0.0748	2.9238	1460.7
6-22	0.305	0.085	0.0957	2.3491	759.2
6-23	0.296	0.095	0.0523	2.2459	712.9
6-24	0.314	0.068	0.0445	2.5825	1858.6
6-25	0.335	0.064	0.0739	1.7595	1421.2
6-26	0.315	0.049	4.0420	1.3236	
6-27	0.305	0.069	0.0633	1.7678	1046.8
6-28	0.303	0.044	0.4200	1.6875	2742.0
6-29	0.310	0.047	0.2833	2.4692	6730.6
6-30	0.286	0.060	0.0503	2.0407	1024.0
6-31	0.278	0.082	0.0344	2.3013	152.9
6-32	0.297	0.066	0.0422	2.1831	901.5
6-33	0.301	0.088	0.0405	1.5444	17.5
6-34	0.282	0.069	0.0414	2.3298	919.2
6-35	0.297	0.071	0.0445	1.7299	91.1
6-36	0.245	0.062	0.0389	2.1582	962.2
6-37	0.274	0.063	0.1018	2.1339	1847.7
6-38	0.281	0.059	0.0603	2.2995	411.2
6-39	0.291	0.095	0.0405	2.5370	1308.2
6-40	0.287	0.068	0.0432	2.3604	1.4
6-41	0.300	0.075	0.0353	1.8916	135.3
6-42	0.218	0.074	0.0263	1.9572	95.1
6-43	0.287	0.065	0.0611	1.6355	123.8
6-44	0.260	0.067	0.0792	1.8359	854.0
6-45	0.289	0.069	0.0546	1.7837	1733.4
6-46	0.287	0.090	0.0493	1.6632	722.9
6-47	0.280	0.068	0.0359	1.6432	74.2
6-48	0.307	0.068	0.0646	1.6833	220.0
6-49	0.273	0.060	0.0678	2.1831	950.3
6-50	0.329	0.073	0.0784	1.7148	1225.7
AVG	0.296	0.086	0.1459	2.0383	790.4
n	50	50	50	50	49
STD	0.033	0.026	0.5659	0.6248	1057.74
MAX	0.434	0.149	4.0420	4.3825	6730.6
MIN	0.218	0.044	0.0061	1.3236	1.4
CV%	10.99	29.73	387.99	30.65	133.83

Table 20. Soil parameters for layer 7.

SAMPLE	θ_s	θ_r	α	n	K_{sat}
	cm ³ /cm ³	cm ³ /cm ³			cm/d
7-1	0.340	0.087	0.0889	1.4054	126.9
7-2	0.320	0.108	0.0207	1.6004	728.8
7-3	0.343	0.113	0.0411	1.5245	89.1
7-4	0.339	0.082	0.0552	1.5375	1192.8
7-5	0.348	0.070	0.0151	1.6636	110.3
7-6	0.323	0.077	0.0136	1.6721	1077.0
7-7	0.331	0.065	0.0491	1.4443	184.8
7-8	0.350	0.093	0.0381	1.4124	1407.5
7-9	0.356	0.102	0.0293	1.4845	106.3
7-10	0.333	0.086	0.0219	1.3977	1330.6
7-11	0.299	0.088	0.0340	1.4308	1023.0
7-12	0.332	0.081	0.0256	1.4532	72.9
7-13	0.311	0.081	0.0085	1.6807	58.5
7-14	0.327	0.096	0.0234	1.5219	66.4
7-15	0.310	0.079	0.0244	1.5264	998.5
7-16	0.296	0.073	0.0136	1.6551	1319.8
7-17	0.307	0.076	0.0156	1.6345	978.2
7-18	0.316	0.099	0.0267	1.5017	146.6
7-19	0.331	0.085	0.0190	1.5308	66.1
7-20	0.351	0.103	0.0187	1.5460	48.3
7-21	0.322	0.113	0.0157	1.5717	438.4
7-22	0.326	0.122	0.0207	1.6912	60.4
7-23	0.301	0.110	0.0191	1.5665	26.0
7-24	0.322	0.108	0.0339	1.6344	56.1
7-25	0.309	0.116	0.0185	1.7019	827.5
7-26	0.323	0.061	0.0114	1.7935	33.0
7-27	0.393	0.098	0.0139	1.7107	1477.9
7-28	0.355	0.107	0.0255	1.5364	1060.2
7-29	0.296	0.090	0.0246	1.5230	42.6
7-30	0.308	0.078	0.0445	1.3363	59.3
7-31	0.322	0.077	0.0417	1.3867	61.6
7-32	0.304	0.073	0.0286	1.4453	642.0
7-33	0.324	0.068	0.0234	1.4784	46.6
7-34	0.326	0.071	0.0369	1.4249	44.4
7-35	0.329	0.084	0.0456	1.4496	3166.0
7-36	0.304	0.099	0.0369	1.4092	829.6
7-37	0.308	0.100	0.0355	1.4219	1190.6
7-38	0.295	0.083	0.0304	1.4095	891.3
7-39	0.300	0.074	0.0174	1.5021	35.1
7-40	0.319	0.084	0.0247	1.3911	32.2
7-41	0.346	0.095	0.0219	1.6005	46.3
7-42	0.317	0.107	0.0341	1.4488	804.5
7-43	0.305	0.099	0.0164	1.6227	18.8
7-44	0.293	0.074	0.0524	1.4934	194.5
7-45	0.334	0.065	0.0233	1.6612	72.3
7-46	0.287	0.111	0.0776	2.0736	1169.1
7-47	0.283	0.136	0.0350	2.0819	1351.4
7-48	0.279	0.095	0.0455	1.6948	1422.2
7-49	0.275	0.068	0.0196	1.5989	24.0
7-50	0.285	0.109	0.0574	2.1508	351.0
AVG	0.319	0.090	0.0303	1.5687	552.1
n	50	50	50	50	50
STD	0.023	0.017	0.0163	0.1729	639.92
MAX	0.393	0.136	0.0889	2.1508	3166.0
MIN	0.275	0.061	0.0085	1.3363	18.8
CV%	7.22	18.96	53.71	11.02	115.90

Table 21. Soil parameters for layer 8.

SAMPLE	θ_s	θ_r	α	n	K_{sat}
	cm^3/cm^3	cm^3/cm^3			cm/d
8-1	0.335	0.105	0.0567	1.4239	35.8
8-2	0.312	0.117	0.0288	1.5169	1021.1
8-3	0.325	0.117	0.0354	1.4614	14.7
8-4	0.282	0.111	0.0412	1.4477	101.5
8-5	0.336	0.108	0.0275	1.6271	37.5
8-6	0.308	0.078	0.0395	1.5885	940.2
8-7	0.352	0.109	0.0493	1.4428	791.6
8-8	0.337	0.104	0.0421	1.5104	1773.0
8-9	0.306	0.107	0.0250	1.5966	678.6
8-10	0.305	0.110	0.0356	1.5183	32.1
8-11	0.295	0.105	0.0455	1.4015	21.4
8-12	0.338	0.102	0.0320	1.6349	58.8
8-13	0.355	0.129	0.0520	1.5598	806.1
8-14	0.309	0.120	0.0361	1.6430	64.0
8-15	0.301	0.115	0.0533	1.3822	20.9
8-16	0.349	0.108	0.0304	1.4937	69.4
8-17	0.351	0.114	0.0471	1.3750	771.3
8-18	0.324	0.117	0.0405	1.3233	13.7
8-19	0.337	0.109	0.0373	1.4066	1037.9
8-20	0.337	0.116	0.0222	1.4977	32.4
8-21	0.326	0.121	0.0423	1.4513	49.6
8-22	0.359	0.113	0.0476	1.5163	105.9
8-23	0.295	0.125	0.0266	1.7329	494.3
8-24	0.310	0.125	0.0290	1.4472	637.5
8-25	0.271	0.130	0.0152	1.4959	25.3
8-26	0.282	0.120	0.0233	1.4194	240.9
8-27	0.349	0.111	0.0265	1.4911	48.3
8-28	0.351	0.126	0.0283	1.4915	763.1
8-29	0.334	0.114	0.0368	1.3746	22.9
8-30	0.332	0.115	0.0317	1.3939	826.3
8-31	0.345	0.111	0.0268	1.5075	25.6
8-32	0.366	0.099	0.0326	1.5464	71.3
8-33	0.316	0.110	0.0442	1.5296	55.1
8-34	0.321	0.094	0.0362	1.6437	1073.6
8-35	0.337	0.098	0.0417	1.4631	906.1
8-36	0.326	0.104	0.0810	1.4293	83.2
8-37	0.399	0.085	0.0682	1.4344	42.6
8-38	0.344	0.085	0.0344	1.5179	879.8
8-39	0.330	0.090	0.0177	1.6817	22.3
8-40	0.332	0.101	0.0471	1.5126	905.3
8-41	0.373	0.097	0.0347	1.4668	58.0
8-42	0.345	0.089	0.0122	1.6982	53.2
8-43	0.359	0.086	0.0237	1.5353	461.7
8-44	0.362	0.072	0.0379	1.5995	1255.4
8-45	0.313	0.073	0.0277	1.5804	1013.7
8-46	0.343	0.084	0.0209	1.5329	120.2
8-47	0.358	0.072	0.1256	1.3999	425.2
8-48	0.334	0.079	0.1223	1.5378	938.3
8-49	0.332	0.073	0.0969	1.5487	771.6
8-50	0.280	0.080	0.0470	1.6421	910.3
AVG	0.331	0.104	0.0413	1.5095	432.2
n	50	50	50	50	50
STD	0.026	0.016	0.0229	0.0924	453.29
MAX	0.399	0.130	0.1256	1.7329	1773.0
MIN	0.271	0.072	0.0122	1.3233	13.7
CV%	7.81	15.67	55.48	6.12	104.89

Table 22. Soil parameters for layer 9.

SAMPLE	θ_s	θ_r	α	n	K_{sat}
	cm^3/cm^3	cm^3/cm^3			cm/d
9-1	0.356	0.093	0.0174	1.7485	70.8
9-2	0.363	0.088	0.0184	1.6700	81.4
9-3	0.263	0.079	0.0183	1.6689	50.2
9-4	0.289	0.074	0.0155	1.6321	912.4
9-5	0.270	0.084	0.0447	1.7136	1148.9
9-6	0.330	0.102	0.0315	1.5724	85.9
9-7	0.322	0.074	0.0333	1.9229	312.8
9-8	0.294	0.078	0.0517	1.7114	118.5
9-9	0.310	0.094	0.0337	1.5319	40.1
9-10	0.285	0.094	0.0209	1.6385	689.3
9-11	0.280	0.090	0.0260	1.7702	60.5
9-12	0.334	0.087	0.0669	1.5675	884.5
9-13	0.303	0.089	0.0281	1.5825	37.3
9-14	0.293	0.104	0.0290	1.6492	85.2
9-15	0.307	0.095	0.0545	1.5210	81.3
9-16	0.281	0.089	0.0249	1.6338	570.6
9-17	0.317	0.089	0.0367	1.7157	1267.9
9-18	0.224	0.057	0.0333	1.4074	62.7
9-19	0.275	0.058	0.0488	1.5012	113.1
9-20	0.276	0.067	0.0203	1.4567	498.0
9-21	0.356	0.092	0.0394	1.5446	132.4
9-22	0.329	0.100	0.0226	1.5130	40.1
9-23	0.268	0.095	0.0189	1.8482	525.7
9-24	0.257	0.076	0.0508	1.9058	982.9
9-25	0.247	0.084	0.0413	1.5893	57.5
9-26	0.322	0.114	0.0309	1.7121	717.0
9-27	0.283	0.111	0.0185	1.9196	60.9
9-28	0.315	0.093	0.0181	1.5888	18.5
9-29	0.300	0.084	0.0226	1.6393	690.5
9-30	0.320	0.081	0.0210	1.6686	235.8
9-31	0.326	0.076	0.0395	1.4792	80.7
9-32	0.292	0.088	0.0366	1.4501	1439.0
9-33	0.311	0.096	0.0501	1.5346	91.8
9-34	0.304	0.102	0.0464	1.5011	137.5
9-35	0.300	0.095	0.0672	1.5206	170.8
9-36	0.267	0.099	0.1198	1.3661	652.5
9-37	0.321	0.131	0.0621	1.3822	342.5
9-38	0.301	0.101	0.0491	1.4770	45.0
9-39	0.279	0.088	0.0954	1.7766	385.8
9-40	0.350	0.079	0.2829	1.4892	1780.8
9-41	0.367	0.095	0.3491	1.4634	401.9
9-42	0.337	0.118	0.0924	1.4112	1094.9
9-43	0.529	0.077	0.0496	1.3675	4756.6
9-44	0.352	0.098	0.0526	1.4612	592.5
9-45	0.327	0.089	0.0651	1.4670	159.7
9-46	0.338	0.116	0.1010	1.6274	504.6
9-47	0.323	0.119	0.0913	1.6009	891.7
9-48	0.287	0.103	0.0718	1.5656	53.7
9-49	0.374	0.078	0.0299	1.4460	397.5
9-50	0.412	0.100	0.0652	1.4690	76.6
AVG	0.313	0.091	0.0551	1.5880	493.8
n	50	50	50	50	50
STD	0.047	0.015	0.0595	0.1411	748.66
MAX	0.529	0.131	0.3491	1.9229	4756.6
MIN	0.224	0.057	0.0155	1.3661	18.5
CV%	15.11	16.14	107.90	8.89	151.62

Table 23. Soil parameters for vertical A.

SAMPLE	θ_s cm ³ /cm ³	θ_{st} cm ³ /cm ³	α	n	K _{sat} cm/d
A-1	0.417	0.072	0.0705	1.3754	369.6
A-2	0.278				34.0
A-3	0.336				379.8
A-4	0.366				1563.4
A-5	0.271				96.3
A-6	0.369	0.067	0.1679	1.5029	745.5
A-7	0.218				511.8
A-8					
A-9					
A-10					
A-11					
A-12	0.338	0.092	0.0299	1.6669	1222.8
A-13	0.328	0.113	0.0484	1.6161	1094.3
A-14	0.305	0.104	0.0308	1.7465	1549.7
A-15	0.260	0.110	0.0263	1.7398	878.3
A-16	0.297	0.115	0.0529	1.4893	602.9
A-17	0.309	0.126	0.0255	1.9483	173.0
A-18	0.298	0.106	0.0767	1.5433	61.0
A-19	0.285	0.100	0.0315	1.4979	38.0
A-20	0.306	0.098	0.0551	1.5102	119.2
A-21	0.261	0.102	0.0134	1.6803	781.4
A-22	0.307	0.089	0.0240	1.7340	446.3
A-23	0.283	0.082	0.0128	1.8127	14.9
A-24	0.320	0.081	0.0202	1.5207	13.8
A-25	0.356	0.127	0.0542	1.3140	1670.0
A-26	0.372	0.132	0.0688	1.3568	18.8
A-27					
A-28	0.303	0.113	0.0181	1.5511	14.8
A-29	0.303				24.2
A-30	0.354	0.076	0.0493	1.4488	71.3
A-31	0.331	0.065	0.0491	1.4443	184.8
A-32	0.353	0.104	0.0316	1.4726	45.1
A-33	0.325	0.100	0.0345	1.5094	567.5
A-34	0.352	0.135	0.0721	1.3930	1063.6
A-35	0.335	0.141	0.0456	1.3031	825.1
A-36	0.330	0.105	0.0755	1.3386	112.0
A-37	0.327	0.095	0.0321	1.4854	45.4
A-38	0.352	0.109	0.0493	1.4428	791.6
A-39	0.316	0.098	0.0527	1.3832	715.1
A-40	0.305	0.113	0.1026	1.3240	399.1
A-41	0.317				26.1
A-42	0.344	0.102	0.0464	1.5002	592.8
A-43	0.367	0.104	0.0337	1.5954	124.9
A-44	0.326	0.101	0.0552	1.5055	480.6
A-45	0.322	0.074	0.0333	1.9229	312.8
A-46	0.372	0.104	0.0405	1.7754	239.6
A-47	0.381	0.090	0.0521	1.6300	264.6
A-48	0.356	0.117	0.0373	1.6462	774.0
AVG	0.324	0.102	0.0478	1.5480	466.5
n	43	36	36	36	43
STD	0.038	0.018	0.0285	0.1666	462.51
MAX	0.417	0.141	0.1679	1.9483	1670.0
MIN	0.218	0.065	0.0128	1.3031	13.8
CV%	11.67	18.19	59.76	10.76	99.14

Table 24. Soil parameters for vertical B.

SAMPLE	θ_s cm ³ /cm ³	θ_r cm ³ /cm ³	α	n	K _{sat} cm/d
B-1	0.346	0.096	0.0538	1.9804	314.4
B-2	0.369	0.103	0.0545	1.8719	269.5
B-3	0.354	0.093	0.0725	1.6214	264.5
B-4	0.316	0.103	0.0392	1.5662	181.3
B-5	0.323	0.101	0.0532	1.6390	1263.4
B-6	0.363	0.104	0.0407	1.5263	120.9
B-7	0.240	0.114	0.0179	1.5211	2.1
B-8					
B-9					
B-10					
B-11					
B-12	0.319	0.072	0.0367	1.6126	322.1
B-13	0.300	0.110	0.0867	1.5168	67.2
B-14	0.310	0.067	0.0741	1.6030	1381.5
B-15	0.287	0.101	0.0121	1.5904	6.9
B-16	0.323	0.104	0.0677	1.3583	15.7
B-17	0.292	0.058	0.0218	1.6105	33.0
B-18	0.305	0.114	0.0396	1.5481	23.1
B-19	0.292	0.103	0.0448	1.5381	450.6
B-20	0.336	0.090	0.0445	1.5778	666.5
B-21	0.364	0.113	0.0332	1.4782	560.7
B-22	0.375	0.103	0.0313	1.4497	692.2
B-23	0.346	0.109	0.0333	1.4065	9.5
B-24	0.316	0.115	0.0611	1.3868	27.4
B-25	0.315	0.049	4.0420	1.3236	
B-26	0.372	0.172	0.0262	1.4602	6.6
B-27	0.371	0.139	0.0187	1.4377	667.6
B-28	0.378	0.108	0.0201	1.5610	41.6
B-29	0.384	0.097	0.0641	1.4952	1
B-30	0.400	0.097	0.0236	1.5364	
B-31	0.323	0.061	0.0114	1.7933	
B-32	0.308	0.133	0.0275	1.4360	
B-33	0.347	0.118	0.0546	1.5637	702.9
B-34	0.358	0.104	0.0563	1.3926	38.7
B-35	0.292	0.110	0.0269	1.4212	54.2
B-36	0.321	0.131	0.0397	1.4092	37.3
B-37	0.346	0.124	0.0316	1.4356	47.9
B-38	0.282	0.120	0.0233	1.4194	240.9
B-39	0.284	0.095	0.0106	1.6057	211.7
B-40	0.271	0.128	0.0344	1.3490	10.6
B-41	0.303	0.090	0.0794	1.3742	189.4
B-42	0.291	0.113	0.0298	1.5331	39.1
B-43	0.287	0.103	0.0587	1.4770	669.9
B-44	0.317	0.112	0.0195	1.5738	861.7
B-45	0.322	0.114	0.0309	1.7121	717.0
B-46	0.398	0.096	0.0124	1.8245	58.5
B-47	0.385	0.096	0.0184	1.7575	82.6
B-48	0.354	0.109	0.0229	1.5977	895.2
AVG	0.329	0.104	0.1296	1.5430	288.6
n	44	44	44	44	43
STD	0.037	0.021	0.6039	0.1432	357.88
MAX	0.400	0.172	4.0420	1.9804	1381.5
MIN	0.240	0.049	0.0106	1.3236	2.1
CV%	11.32	20.58	465.99	9.28	123.99

Table 25. Soil parameters for vertical C.

SAMPLE	θ_s cm ³ /cm ³	θ_r cm ³ /cm ³	α	n	K_{sat} cm/d
C-1	0.329	0.095	0.0409	2.3840	198.2
C-2	0.330				379.1
C-3	0.375				763.0
C-4	0.348				106.8
C-5	0.298				893.9
C-6	0.370	0.092	0.1348	1.8068	659.2
C-7					
C-8					
C-9					
C-10					
C-11					
C-12	0.347	0.112	0.0445	1.6565	174.6
C-13	0.265	0.082	0.0313	1.6680	751.2
C-14	0.288	0.040	0.1075	1.8129	866.8
C-15	0.257	0.086	0.0229	1.4939	10.1
C-16	0.264	0.070	0.0105	1.8292	992.3
C-17	0.296	0.054	0.0771	1.5938	353.7
C-18	0.257	0.050	0.0468	1.5570	731.7
C-19	0.298	0.071	0.0740	1.6912	266.1
C-20	0.314	0.074	0.1042	1.5105	897.0
C-21	0.294	0.070	0.0930	1.5311	215.8
C-22	0.304	0.077	0.0456	1.6868	188.1
C-23	0.341	0.064	0.0447	1.6080	327.7
C-24	0.281	0.047	0.1732	1.5230	91.8
C-25	0.218	0.074	0.0263	1.9572	95.1
C-26	0.224	0.086	0.0568	1.4943	886.7
C-27	0.364	0.131	0.0375	1.4083	25.3
C-28	0.350	0.107	0.0323	1.4569	104.8
C-29	0.306	0.083	0.0416	1.5951	1263.1
C-30	0.331	0.107	0.0242	1.6305	753.0
C-31	0.317	0.107	0.0341	1.4488	804.4
C-32	0.318	0.098	0.0388	1.7349	1431.2
C-33	0.314	0.086	0.0490	1.4969	116.7
C-34	0.334	0.104	0.0636	1.4180	1327.4
C-35	0.326	0.110	0.0390	1.5318	722.9
C-36	0.378	0.110	0.1743	1.3420	162.7
C-37	0.294	0.105	0.0332	1.6443	765.2
C-38	0.345	0.089	0.0122	1.6982	53.2
C-39	0.303	0.094	0.0187	1.6707	544.2
C-40	0.270	0.080	0.0409	1.5712	825.1
C-41	0.281	0.079	0.0444	1.3894	1222.4
C-42	0.298	0.065	0.0876	1.3786	948.0
C-43	0.290	0.090	0.0749	1.3169	720.1
C-44	0.370	0.075	0.3022	1.3370	775.8
C-45	0.337	0.118	0.0924	1.4112	1094.9
C-46	0.271	0.079	0.0779	1.4805	936.0
C-47	0.298	0.086	0.0525	1.7311	705.5
C-48	0.266	0.090	0.0426	1.4049	32.3
AVG	0.308	0.086	0.0653	1.5872	585.7
n	43	39	39	39	43
STD	0.039	0.020	0.0549	0.2002	407.31
MAX	0.378	0.131	0.3022	2.3840	1431.2
MIN	0.218	0.040	0.0105	1.3169	10.1
CV%	12.56	23.56	84.00	12.61	69.55

Table 26. Estimated soil-water parameters for each layer and for the entire site.

LAYER	n_0	n_k	θ_r	θ_s	α	n	K_{sat}	EMS
1	550	50	0.0949	0.3483	0.04194	1.9026	539.2	3.5794E-04
2	550	50	0.0914	0.3434	0.06237	1.5278	250.0	1.0076E-03
3	539	48	0.0849	0.3359	0.05960	1.5742	266.9	1.4974E-03
4	536	49	0.0714	0.3129	0.06772	1.5373	299.8	1.6104E-03
5	550	50	0.0716	0.3021	0.04039	1.5496	250.0	6.8840E-04
6	550	49	0.0896	0.2942	0.07029	1.7117	334.0	2.3501E-03
7	550	50	0.0726	0.3104	0.02719	1.4177	220.6	6.7409E-04
8	550	50	0.0834	0.3248	0.04110	1.3826	171.5	6.4565E-04
9	550	50	0.0778	0.3061	0.04679	1.4315	225.9	1.2996E-03
ALL	4925	446	0.0828	0.3209	0.05501	1.5093	270.1	1.5123E-03

Table 27. Soil retention data for layer 1.

Sample	θ_{sat}	θ_{10}	θ_{20}	θ_{40}	θ_{80}	θ_{120}	θ_{200}	θ_{300}	θ_{1000}	θ_{5000}	θ_{10000}
cm^3/cm^3											
1-1	0.345	0.322	0.270	0.199	0.151	0.135	0.121	0.112	0.127	0.112	0.080
1-2	0.352	0.332	0.271	0.199	0.155	0.139	0.126	0.118	0.141	0.107	0.077
1-3	0.323	0.315	0.265	0.201	0.158	0.143	0.132	0.125	0.142	0.106	0.084
1-4	0.311	0.299	0.245	0.183	0.139	0.123	0.110	0.102	0.130	0.101	0.073
1-5	0.329	0.319	0.271	0.207	0.160	0.144	0.122	0.125	0.139	0.133	0.081
1-6	0.301	0.300	0.244	0.176	0.130	0.115	0.104	0.099	0.138	0.104	0.078
1-7	0.288	0.286	0.243	0.180	0.138	0.125	0.115	0.111	0.130	0.109	0.074
1-8	0.300	0.299	0.250	0.181	0.133	0.117	0.106	0.100	0.133	0.107	0.079
1-9	0.315	0.313	0.267	0.199	0.151	0.135	0.124	0.119	0.112	0.096	0.068
1-10	0.381	0.375	0.328	0.227	0.150	0.127	0.113	0.107	0.098	0.080	0.052
1-11	0.335	0.333	0.294	0.226	0.172	0.153	0.139	0.120	0.108	0.093	0.083
1-12	0.345	0.333	0.283	0.213	0.163	0.144	0.128	0.119	0.107	0.090	0.078
1-13	0.364	0.347	0.305	0.236	0.183	0.162	0.145	0.125	0.127	0.096	0.088
1-14	0.343	0.323	0.282	0.218	0.170	0.150	0.133	0.123	0.110	0.088	0.069
1-15	0.342	0.331	0.271	0.195	0.143	0.124	0.109	0.100	0.090	0.076	0.064
1-16	0.309	0.299	0.257	0.199	0.152	0.133	0.117	0.107	0.111	0.090	0.077
1-17	0.318	0.306	0.273	0.217	0.167	0.149	0.135	0.126	0.125	0.102	0.085
1-18	0.333	0.331	0.295	0.222	0.170	0.149	0.132	0.122	0.126	0.097	0.082
1-19	0.347	0.344	0.303	0.217	0.158	0.137	0.123	0.113	0.114	0.092	0.083
1-20	0.341	0.339	0.303	0.228	0.173	0.152	0.134	0.124	0.121	0.094	0.078
1-21	0.341	0.339	0.329	0.251	0.184	0.158	0.137	0.129	0.093	0.082	0.061
1-22	0.384	0.371	0.342	0.246	0.178	0.154	0.134	0.126	0.098	0.088	0.066
1-23	0.343	0.343	0.318	0.243	0.193	0.175	0.153	0.144	0.113	0.092	0.072
1-24	0.364	0.362	0.329	0.258	0.199	0.177	0.154	0.145	0.109	0.093	0.073
1-25	0.351	0.330	0.330	0.253	0.193	0.170	0.148	0.139	0.110	0.100	0.075
1-26	0.342	0.333	0.310	0.242	0.190	0.168	0.151	0.144	0.127	0.101	0.076
1-27	0.312	0.310	0.286	0.215	0.172	0.155	0.141	0.137	0.111	0.094	0.056
1-28	0.364	0.359	0.329	0.243	0.182	0.157	0.140	0.134	0.106	0.091	0.069
1-29	0.360	0.344	0.282	0.204	0.155	0.137	0.124	0.120	0.113	0.083	0.069
1-30	0.334	0.322	0.283	0.216	0.173	0.156	0.144	0.140	0.118	0.090	0.070
1-31	0.322	0.320	0.311	0.238	0.191	0.175	0.160	0.155	0.124	0.102	0.097
1-32	0.376	0.363	0.319	0.239	0.182	0.160	0.144	0.136	0.113	0.097	0.088
1-33	0.320	0.319	0.302	0.240	0.190	0.169	0.152	0.144	0.120	0.097	0.086
1-34	0.335	0.333	0.307	0.228	0.175	0.154	0.137	0.130	0.109	0.098	0.080
1-35	0.327	0.324	0.311	0.236	0.176	0.153	0.133	0.124	0.124	0.095	0.087
1-36	0.339	0.338	0.308	0.231	0.175	0.152	0.133	0.125	0.110	0.096	0.085
1-37	0.334	0.333	0.313	0.239	0.183	0.161	0.139	0.131	0.118	0.101	0.090
1-38	0.336	0.331	0.300	0.239	0.189	0.168	0.148	0.140	0.120	0.104	0.090
1-39	0.341	0.341	0.323	0.247	0.188	0.164	0.144	0.135	0.109	0.097	0.089
1-40	0.369	0.357	0.327	0.254	0.195	0.171	0.149	0.141	0.113	0.096	0.089
1-41	0.397	0.387	0.333	0.239	0.181	0.155	0.140	0.133	0.120	0.095	0.089
1-42	0.373	0.360	0.296	0.219	0.166	0.142	0.128	0.121	0.117	0.092	0.094
1-43	0.357	0.342	0.308	0.234	0.176	0.151	0.133	0.125	0.116	0.091	0.088
1-44	0.342	0.333	0.298	0.231	0.178	0.155	0.142	0.135	0.126	0.102	0.098
1-45	0.381	0.365	0.329	0.244	0.182	0.156	0.137	0.128	0.122	0.103	0.095
1-46	0.359	0.350	0.332	0.256	0.189	0.159	0.139	0.129	0.109	0.093	0.080
1-47	0.332	0.326	0.305	0.236	0.181	0.156	0.141	0.134	0.122	0.098	0.089
1-48	0.338	0.319	0.300	0.240	0.186	0.162	0.148	0.139	0.128	0.103	0.094
1-49	0.342	0.322	0.300	0.226	0.173	0.151	0.137	0.129	0.127	0.104	0.092
1-50	0.366	0.347	0.309	0.231	0.179	0.156	0.140	0.132	0.130	0.097	0.090
AVG	0.342	0.334	0.298	0.225	0.171	0.151	0.135	0.127	0.118	0.096	0.080
n	50	50	50	50	50	50	50	50	50	50	50
STD	0.023	0.021	0.026	0.021	0.017	0.015	0.013	0.013	0.012	0.007	0.010
MAX	0.397	0.387	0.342	0.258	0.199	0.177	0.160	0.155	0.142	0.112	0.098
MIN	0.288	0.286	0.243	0.176	0.130	0.115	0.104	0.099	0.090	0.076	0.052
CV%	6.78	6.42	8.74	9.46	10.02	10.02	9.67	10.11	9.87	7.78	13.00

Table 28. Soil retention data for layer 2.

Sample	e_{sat}	e_{10}	e_{20}	e_{40}	e_{60}	e_{80}	e_{120}	e_{200}	e_{300}	e_{1000}	e_{5000}	e_{15000}
-----cm ³ /cm ³ -----												
2-1	0.281	0.264	0.224	0.182	0.154		0.144	0.135	0.129	0.114	0.098	0.077
2-2	0.277	0.260	0.210	0.170	0.145		0.135	0.126	0.119	0.116	0.086	0.090
2-3	0.291	0.282	0.239	0.199	0.170		0.158	0.148	0.141	0.096	0.092	0.073
2-4	0.270	0.261	0.214	0.174	0.147		0.137	0.127	0.120	0.100	0.089	0.080
2-5	0.312	0.270	0.210	0.162	0.133		0.123	0.115	0.111	0.095	0.088	0.070
2-6	0.293	0.242	0.184	0.141	0.116		0.109	0.103	0.100	0.109	0.094	0.074
2-7	0.236	0.262	0.204	0.160	0.130		0.121	0.116	0.114	0.098	0.090	0.074
2-8	0.297	0.270	0.222	0.181	0.151		0.141	0.133	0.130	0.104	0.101	0.083
2-9	0.280	0.260	0.219	0.172	0.137		0.125	0.118	0.115	0.108	0.094	0.078
2-10	0.288	0.260	0.234	0.199	0.164		0.149	0.138	0.135	0.113	0.097	0.081
2-11	0.351	0.303	0.246	0.201	0.167		0.153	0.142	0.137	0.108	0.096	0.093
2-12	0.338	0.300	0.250	0.206	0.172		0.156	0.142	0.135	0.125	0.097	0.097
2-13	0.357	0.329	0.298	0.256	0.211		0.189	0.171	0.161	0.146	0.117	0.119
2-14	0.356	0.320	0.281	0.237	0.198		0.179	0.163	0.155	0.132	0.114	0.117
2-15	0.348	0.315	0.284	0.246	0.208		0.188	0.171	0.162	0.148	0.120	0.117
2-16	0.385	0.347	0.303	0.250	0.204		0.182	0.164	0.154	0.106	0.089	0.086
2-17	0.305	0.282	0.260	0.224	0.186		0.164	0.146	0.134	0.114	0.092	0.087
2-18	0.369	0.350	0.336	0.308	0.269		0.246	0.224	0.209	0.121	0.102	0.097
2-19	0.371	0.336	0.319	0.290	0.253		0.232	0.210	0.195	0.114	0.087	0.085
2-20	0.314	0.301	0.281	0.251	0.214		0.196	0.182	0.164	0.124	0.101	0.089
2-21	0.298	0.296	0.273	0.230	0.183		0.161	0.145	0.128	0.127	0.097	0.093
2-22	0.309	0.296	0.271	0.229	0.185		0.163	0.149	0.133	0.127	0.099	0.094
2-23	0.360	0.336	0.307	0.256	0.201		0.177	0.162	0.147	0.129	0.103	0.100
2-24	0.325	0.305	0.288	0.249	0.205		0.184	0.169	0.156	0.134	0.106	0.105
2-25	0.353	0.345	0.334	0.299	0.249		0.223	0.205	0.185	0.171	0.118	0.114
2-26	0.339	0.330	0.303	0.267	0.230		0.212	0.198	0.184	0.156	0.126	0.102
2-27	0.375	0.345	0.318	0.276	0.224		0.199	0.186	0.174	0.154	0.113	0.094
2-28	0.351	0.350	0.336	0.294	0.245		0.220	0.204	0.185	0.142	0.110	0.089
2-29	0.324	0.304	0.271	0.218	0.166		0.142	0.128	0.115	0.118	0.087	0.071
2-30	0.303	0.302	0.295	0.252	0.199		0.175	0.161	0.145	0.135	0.112	0.081
2-31	0.337	0.314	0.290	0.247	0.191		0.164	0.147	0.130	0.146	0.103	0.100
2-32	0.381	0.379	0.370	0.276	0.191		0.167	0.154	0.144	0.131	0.104	0.095
2-33	0.399	0.324	0.279	0.231	0.185		0.165	0.151	0.135	0.155	0.098	0.093
2-34	0.370	0.353	0.314	0.255	0.196		0.171	0.155	0.138	0.176	0.120	0.112
2-35	0.388	0.364	0.328	0.282	0.232		0.209	0.193	0.173	0.186	0.138	0.120
2-36	0.366	0.340	0.303	0.257	0.207		0.185	0.169	0.154	0.141	0.109	0.083
2-37	0.370	0.357	0.332	0.280	0.222		0.197	0.182	0.167	0.149	0.104	0.087
2-38	0.375	0.313	0.274	0.229	0.186		0.166	0.154	0.141	0.137	0.103	0.084
2-39	0.394	0.378	0.342	0.290	0.236		0.213	0.198	0.183	0.137	0.114	0.097
2-40	0.388	0.332	0.291	0.248	0.245		0.232	0.219	0.205	0.157	0.112	0.096
2-41	0.353		0.292	0.236	0.171	0.168	0.146	0.128	0.115	0.175	0.125	0.095
2-42	0.375		0.296	0.246	0.205	0.203	0.187	0.173	0.165	0.134	0.093	0.082
2-43	0.380		0.330	0.280	0.233	0.231	0.211	0.192	0.182	0.148	0.105	0.091
2-44	0.338		0.267	0.208	0.159	0.156	0.137	0.119	0.109	0.124	0.104	0.093
2-45	0.371		0.305	0.248	0.193	0.190	0.166	0.143	0.133	0.138	0.106	0.097
2-46	0.370		0.309	0.248	0.182	0.180	0.159	0.142	0.134	0.146	0.106	0.100
2-47	0.409		0.328	0.269	0.216	0.213	0.192	0.175	0.166	0.110	0.078	0.068
2-48	0.330		0.268	0.218	0.171	0.169	0.149	0.128	0.118	0.144	0.088	0.066
2-49	0.376		0.329	0.284	0.224	0.221	0.197	0.179	0.169	0.153	0.098	0.094
2-50	0.312		0.237	0.187	0.140	0.139	0.122	0.110	0.103	0.150	0.109	0.104
AVG	0.342	0.312	0.282	0.236		0.191	0.172	0.158	0.147	0.132	0.102	0.091
n	50	40	50	50		60	50	50	50	50	50	50
STD	0.038	0.036	0.043	0.041		0.034	0.032	0.030	0.027	0.022	0.012	0.013
MAX	0.409	0.379	0.370	0.308		0.269	0.246	0.224	0.209	0.186	0.138	0.120
MIN	0.270	0.242	0.184	0.141		0.116	0.109	0.103	0.100	0.095	0.078	0.066
CV%	11.02	11.66	15.24	17.38		18.05	18.78	19.02	18.54	16.61	11.89	14.72

Table 29. Soil retention data for layer 3.

Sample	e_{sat}	e_{20}	e_{40}	e_{60}	e_{80}	e_{120}	e_{200}	e_{300}	e_{1000}	e_{5000}	e_{15000}
----- cm^3/cm^3 -----											
3-1	0.372	0.320	0.292	0.257	0.253	0.239	0.230	0.224	0.157	0.097	0.103
3-2	0.375	0.348	0.325	0.289	0.285	0.259	0.223	0.199	0.153	0.119	0.105
3-3	0.369	0.318	0.291	0.257	0.254	0.232	0.202	0.182	0.149	0.115	0.102
3-4	0.355	0.280	0.254	0.222	0.220	0.198	0.173	0.160	0.137	0.098	0.084
3-5	0.360	0.275	0.245	0.208	0.204	0.185	0.164	0.153	0.142	0.110	0.093
3-6	0.320	0.287	0.277	0.190	0.186	0.160	0.140	0.133	0.135	0.112	0.111
3-7	0.337	0.285	0.277	0.204	0.200	0.173	0.157	0.150	0.102	0.086	0.083
3-8	0.350	0.296	0.277	0.207	0.202	0.176	0.164	0.156	0.103	0.086	0.073
3-9	0.354	0.318	0.277	0.241	0.235	0.201	0.175	0.165	0.101	0.087	0.077
3-10	0.354	0.303	0.269	0.217	0.212	0.184	0.162	0.155	0.118	0.088	0.083
3-11											
3-12	0.366	0.318	0.290	0.252	0.248	0.224	0.204	0.194	0.162	0.137	0.132
3-13	0.326	0.273	0.234	0.188	0.185	0.164	0.149	0.142	0.167	0.136	0.137
3-14	0.347	0.287	0.242	0.193	0.187	0.171	0.161	0.155	0.135	0.102	0.099
3-15	0.321	0.287	0.255	0.205	0.199	0.185	0.177	0.172	0.138	0.118	0.114
3-16	0.318	0.274	0.232	0.183	0.175	0.163	0.156	0.152	0.140	0.106	0.093
3-17	0.369	0.270	0.239	0.200	0.195	0.177	0.168	0.162	0.135	0.111	0.101
3-18	0.262	0.223	0.184	0.147	0.144	0.129	0.119	0.115	0.124	0.118	0.112
3-19	0.350	0.290	0.254	0.197	0.193	0.164	0.140	0.130	0.107	0.089	0.091
3-20	0.328	0.269	0.211	0.163	0.156	0.144	0.137	0.131	0.115	0.119	0.096
3-21	0.309	0.267	0.217	0.162	0.159	0.136	0.122	0.115	0.117	0.086	0.076
3-22	0.331	0.164	0.116	0.104	0.099	0.096	0.093	0.090	0.077	0.064	0.055
3-23	0.332	0.211	0.140	0.115	0.109	0.104	0.099	0.096	0.069	0.061	0.062
3-24	0.305	0.220	0.167	0.134	0.129	0.119	0.113	0.109	0.097	0.080	0.067
3-25	0.353	0.286	0.229	0.177	0.170	0.151	0.140	0.134	0.091	0.079	0.078
3-26	0.305	0.233	0.188	0.150	0.146	0.131	0.121	0.116	0.098	0.094	0.076
3-27	0.302	0.251	0.199	0.160	0.151	0.142	0.137	0.132	0.087	0.076	0.066
3-28	0.314	0.253	0.196	0.146	0.141	0.126	0.117	0.112	0.095	0.085	0.081
3-29	0.302	0.276	0.221	0.145	0.140	0.119	0.110	0.105	0.090	0.082	0.077
3-30	0.323	0.220	0.158	0.139	0.131	0.126	0.121	0.118	0.086	0.071	0.058
3-31	0.310	0.251	0.194	0.149	0.140	0.127	0.119	0.115	0.085	0.077	0.069
3-32	0.333	0.247	0.174	0.130	0.125	0.113	0.105	0.101	0.093	0.077	0.070
3-33	0.319	0.238	0.173	0.137	0.128	0.120	0.114	0.109	0.083	0.078	0.073
3-34	0.337	0.227	0.157	0.119	0.112	0.104	0.097	0.093	0.078	0.067	0.060
3-35	0.357	0.242	0.155	0.115	0.111	0.103	0.097	0.094	0.064	0.053	0.052
3-36	0.312	0.213	0.156	0.117	0.111	0.101	0.094	0.090	0.080	0.069	0.057
3-37	0.344	0.241	0.151	0.109	0.103	0.097	0.092	0.089	0.073	0.061	0.052
3-38	0.312	0.221	0.151	0.115	0.107	0.098	0.092	0.088	0.068	0.061	0.052
3-39	0.330	0.245	0.180	0.131	0.127	0.108	0.097	0.092	0.088	0.067	0.061
3-40	0.334	0.238	0.174	0.123	0.121	0.105	0.097	0.093	0.085	0.068	0.059
3-41	0.306	0.277	0.247	0.185	0.185	0.153	0.128	0.119	0.121	0.103	0.083
3-42	0.347	0.304	0.261	0.205	0.202	0.179	0.164	0.156	0.154	0.130	0.112
3-43	0.361	0.329	0.314	0.267	0.263	0.233	0.204	0.192	0.154	0.121	0.103
3-44	0.361	0.340	0.321	0.271	0.266	0.230	0.192	0.177	0.132	0.100	0.093
3-45	0.329	0.304	0.275	0.213	0.209	0.177	0.155	0.146	0.119	0.105	0.093
3-46	0.352	0.301	0.268	0.226	0.223	0.203	0.182	0.171	0.158	0.123	0.098
3-47	0.321	0.290	0.269	0.225	0.222	0.199	0.175	0.162	0.122	0.102	0.090
3-48	0.361	0.321	0.285	0.224	0.220	0.196	0.175	0.162	0.149	0.113	0.106
3-49	0.547	0.311	0.278	0.234	0.230	0.209	0.184	0.171	0.153	0.117	0.094
3-50	0.316	0.288	0.273	0.238	0.236	0.216	0.191	0.178	0.148	0.110	0.106
AVG	0.335	0.272	0.228	0.183	0.179	0.160	0.145	0.138	0.115	0.094	0.085
n	49	49	49	49	49	49	49	49	49	49	49
STD	0.024	0.039	0.054	0.050	0.051	0.045	0.038	0.035	0.030	0.022	0.021
MAX	0.395	0.348	0.325	0.289	0.285	0.259	0.230	0.224	0.167	0.137	0.137
MIN	0.262	0.164	0.116	0.104	0.099	0.096	0.092	0.088	0.064	0.053	0.052
CV%	7.31	14.27	23.50	27.29	28.47	28.02	26.05	25.11	26.11	23.32	24.67

Table 30. Soil retention data for layer 4

Sample	e_{ret}	e_{10}	e_{20}	e_{40}	e_{60}	e_{80}	e_{100}	e_{200}	e_{300}	e_{1000}	e_{5000}	e_{15000}
cm^3/cm^3												
4-1	0.293		0.276	0.269	0.239	0.239	0.210	0.174	0.156	0.143	0.118	0.107
4-2	0.305		0.282	0.276	0.251	0.251	0.222	0.186	0.168	0.150	0.125	0.105
4-3	0.283		0.246	0.205	0.144	0.143	0.114	0.096	0.088	0.097	0.078	0.067
4-4	0.287		0.241	0.209	0.152	0.151	0.121	0.104	0.095	0.097	0.086	0.075
4-5	0.297		0.266	0.251	0.196	0.195	0.156	0.131	0.122	0.097	0.090	0.082
4-6	0.307		0.272	0.237	0.172	0.171	0.142	0.126	0.117	0.112	0.093	0.092
4-7	0.309		0.278	0.258	0.215	0.215	0.186	0.155	0.139	0.155	0.130	0.126
4-8	0.291		0.266	0.257	0.224	0.223	0.196	0.169	0.154	0.151	0.122	0.114
4-9	0.267		0.243	0.239	0.222	0.222	0.198	0.172	0.160	0.133	0.111	0.105
4-10	0.343		0.313	0.300	0.265	0.265	0.235	0.199	0.182	0.120	0.094	0.093
4-11	0.306		0.265	0.243	0.198	0.198	0.171	0.153	0.144	0.117	0.095	0.093
4-12	0.303		0.261	0.227	0.179	0.178	0.155	0.140	0.132	0.092	0.075	0.067
4-13	0.301		0.260	0.229	0.179	0.178	0.156	0.145	0.138	0.115	0.092	0.082
4-14	0.378		0.152	0.108	0.098	0.095	0.092	0.090	0.088	0.073	0.048	0.034
4-15	0.351		0.200	0.133	0.092	0.090	0.081	0.077	0.074	0.055	0.049	0.046
4-16												
4-17	0.357		0.181	0.102	0.086	0.083	0.078	0.076	0.074	0.049	0.045	0.039
4-18	0.364		0.109	0.086	0.076	0.074	0.070	0.067	0.066			
4-19	0.322		0.172	0.099	0.083	0.080	0.076	0.073	0.071	0.082	0.068	0.061
4-20	0.294		0.239	0.220	0.197	0.195	0.182	0.169	0.162	0.100	0.091	0.088
4-21	0.290		0.251	0.240	0.207	0.207	0.183	0.160	0.150	0.132	0.106	0.093
4-22	0.361		0.300	0.272	0.226	0.225	0.197	0.170	0.158	0.123	0.087	0.094
4-23	0.263		0.235	0.224	0.192	0.191	0.167	0.142	0.131	0.147	0.105	0.097
4-24	0.349		0.262	0.231	0.188	0.187	0.160	0.136	0.128	0.116	0.083	0.079
4-25	0.315		0.260	0.236	0.187	0.186	0.157	0.134	0.126	0.130	0.089	0.073
4-26	0.292		0.259	0.244	0.206	0.205	0.178	0.153	0.144	0.082	0.062	0.058
4-27	0.294		0.254	0.231	0.183	0.183	0.156	0.136	0.130	0.135	0.103	0.078
4-28	0.307		0.238	0.198	0.155	0.155	0.134	0.117	0.110	0.133	0.098	0.075
4-29	0.291		0.267	0.245	0.199	0.198	0.170	0.148	0.139	0.122	0.089	0.070
4-30	0.348		0.266	0.220	0.168	0.167	0.144	0.127	0.121	0.078	0.048	0.047
4-31	0.312		0.259	0.227	0.173	0.173	0.148	0.130	0.123	0.109	0.083	0.069
4-32	0.326		0.205	0.163	0.120	0.119	0.102	0.089	0.085	0.080	0.051	0.053
4-33	0.342		0.289	0.269	0.221	0.220	0.186	0.158	0.146	0.094	0.067	0.060
4-34	0.346		0.266	0.220	0.150	0.158	0.132	0.117	0.112	0.131	0.092	0.096
4-35	0.305		0.230	0.153	0.114	0.109	0.099	0.052	0.089	0.101	0.068	0.066
4-36	0.294		0.251	0.186	0.130	0.129	0.111	0.096	0.090	0.091	0.069	0.072
4-37	0.308		0.206	0.143	0.106	0.105	0.094	0.087	0.084	0.063	0.053	0.053
4-38	0.334		0.139	0.099	0.083	0.082	0.076	0.072	0.070	0.049	0.040	0.038
4-39	0.317		0.169	0.105	0.079	0.078	0.070	0.065	0.063	0.053	0.044	0.046
4-40	0.349		0.131	0.109	0.087	0.086	0.075	0.068	0.065	0.063	0.057	0.053
4-41	0.276	0.242	0.214	0.164	0.115		0.099	0.090	0.082	0.078	0.058	0.056
4-42	0.296	0.251	0.216	0.174	0.135		0.116	0.100	0.089	0.081	0.054	0.054
4-43	0.291	0.276	0.267	0.234	0.175		0.148	0.129	0.115	0.106	0.071	0.076
4-44	0.325	0.290	0.274	0.240	0.189		0.167	0.151	0.141	0.134	0.112	0.101
4-45	0.371	0.356	0.345	0.319	0.269		0.241	0.207	0.191	0.149	0.111	0.110
4-46	0.307	0.282	0.274	0.246	0.185		0.153	0.125	0.109	0.108	0.085	0.070
4-47	0.303	0.267	0.259	0.233	0.184		0.155	0.126	0.113	0.107	0.085	0.074
4-48	0.281	0.268	0.261	0.239	0.195		0.166	0.137	0.120	0.105	0.079	0.068
4-49	0.281	0.258	0.248	0.222	0.173		0.145	0.120	0.107	0.123	0.066	0.054
4-50	0.316	0.274	0.255	0.216	0.164		0.139	0.117	0.104	0.135	0.066	0.054
AVG	0.313	0.277	0.242	0.209		0.166	0.145	0.127	0.118	0.106	0.081	0.074
n	49	10	49	49		88	49	49	49	48	48	48
STD	0.028	0.031	0.047	0.057		0.052	0.045	0.036	0.033	0.029	0.023	0.022
MAX	0.378	0.356	0.345	0.319		0.269	0.241	0.207	0.191	0.155	0.130	0.126
MIN	0.263	0.242	0.109	0.086		0.074	0.070	0.065	0.063	0.049	0.040	0.034
CV%	9.01	11.29	19.23	27.43		31.53	30.86	28.69	27.83	27.45	28.96	29.66

Table 31. Soil retention data for layer 5.

Sample	e_{airt}	e_{10}	e_{20}	e_{40}	e_{60}	e_{120} cm/cm ³	e_{200}	e_{300}	e_{1000}	e_{5000}	e_{15000}
5-1	0.299	0.261	0.248	0.214	0.159	0.137	0.117	0.111	0.102	0.086	0.083
5-2	0.288	0.261	0.255	0.234	0.186	0.158	0.131	0.117	0.083	0.080	0.067
5-3	0.331	0.306	0.296	0.269	0.214	0.182	0.153	0.137	0.085	0.082	0.071
5-4	0.310	0.276	0.270	0.245	0.193	0.164	0.140	0.125	0.104	0.087	0.083
5-5	0.306	0.267	0.262	0.246	0.205	0.179	0.151	0.135	0.111	0.093	0.085
5-6	0.312	0.282	0.274	0.252	0.204	0.173	0.143	0.126	0.115	0.087	0.080
5-7	0.269	0.244	0.239	0.227	0.193	0.169	0.140	0.123	0.138	0.104	0.098
5-8	0.318	0.308	0.305	0.295	0.262	0.233	0.192	0.167	0.137	0.098	0.096
5-9	0.328	0.298	0.293	0.277	0.233	0.202	0.164	0.142	0.114	0.093	0.089
5-10	0.314	0.281	0.265	0.224	0.166	0.137	0.113	0.100	0.091	0.074	0.067
5-11	0.272	0.250	0.233	0.193	0.146	0.121	0.102	0.093	0.110	0.085	0.078
5-12	0.286	0.271	0.262	0.226	0.174	0.142	0.118	0.108	0.098	0.078	0.070
5-13	0.327	0.292	0.273	0.234	0.191	0.170	0.157	0.152	0.082	0.070	0.065
5-14	0.252	0.239	0.225	0.197	0.160	0.137	0.119	0.112	0.107	0.085	0.064
5-15	0.297	0.223	0.198	0.165	0.134	0.116	0.104	0.099	0.099	0.076	0.070
5-16	0.312	0.277	0.247	0.201	0.157	0.135	0.123	0.116	0.070	0.062	0.051
5-17	0.355	0.294	0.257	0.193	0.146	0.127	0.114	0.108	0.096	0.073	0.068
5-18	0.327	0.280	0.255	0.174	0.124	0.110	0.102	0.097	0.069	0.057	0.049
5-19	0.318	0.288	0.265	0.213	0.161	0.138	0.124	0.117	0.058	0.058	0.044
5-20	0.319	0.289	0.239	0.163	0.126	0.116	0.109	0.105	0.074	0.057	0.059
5-21	0.282	0.281	0.269	0.226	0.176	0.151	0.134	0.128	0.113	0.081	0.074
5-22	0.319	0.236	0.209	0.171	0.135	0.117	0.102	0.095	0.102	0.089	0.076
5-23	0.305	0.266	0.252	0.216	0.173	0.147	0.127	0.119	0.122	0.085	0.081
5-24	0.306	0.270	0.251	0.217	0.177	0.153	0.133	0.124	0.116	0.078	0.073
5-25	0.290	0.270	0.252	0.207	0.159	0.135	0.116	0.108	0.101	0.079	0.068
5-26	0.287	0.260	0.248	0.222	0.181	0.155	0.136	0.127	0.140	0.116	0.121
5-27	0.278	0.271	0.262	0.241	0.211	0.189	0.171	0.163	0.150	0.102	0.101
5-28	0.309	0.287	0.273	0.245	0.208	0.184	0.167	0.158	0.162	0.110	0.113
5-29	0.274	0.244	0.230	0.213	0.194	0.178	0.162	0.152	0.134	0.098	0.100
5-30	0.271	0.253	0.239	0.211	0.175	0.153	0.136	0.128	0.146	0.102	0.099
5-31	0.297	0.259	0.231	0.190	0.151	0.134	0.119	0.114	0.092	0.094	0.078
5-32	0.297	0.282	0.265	0.221	0.167	0.146	0.128	0.123	0.126	0.088	0.090
5-33	0.276	0.255	0.244	0.220	0.181	0.160	0.135	0.124	0.095	0.089	0.087
5-34	0.305	0.274	0.242	0.207	0.177	0.164	0.150	0.145	0.077	0.071	0.045
5-35	0.362	0.360	0.357	0.333	0.289	0.265	0.240	0.231	0.088	0.079	0.076
5-36	0.304	0.287	0.280	0.254	0.200	0.173	0.150	0.143	0.099	0.076	0.071
5-37	0.302	0.274	0.263	0.234	0.182	0.155	0.129	0.122	0.108	0.080	0.077
5-38	0.311	0.286	0.271	0.231	0.175	0.151	0.132	0.126	0.095	0.073	0.066
5-39	0.327	0.294	0.283	0.257	0.210	0.181	0.151	0.141	0.088	0.069	0.065
5-40	0.304	0.285	0.280	0.267	0.228	0.199	0.163	0.151	0.128	0.087	0.086
5-41	0.328	0.312	0.307	0.292	0.249	0.213	0.176	0.160	0.107	0.077	0.073
5-42	0.308	0.296	0.290	0.274	0.233	0.201	0.162	0.146	0.122	0.087	0.082
5-43	0.284	0.277	0.268	0.250	0.214	0.189	0.155	0.140	0.109	0.080	0.077
5-44	0.287	0.286	0.280	0.256	0.211	0.135	0.154	0.142	0.116	0.079	0.071
5-45	0.296	0.295	0.291	0.273	0.227	0.195	0.159	0.142	0.113	0.082	0.078
5-46	0.320	0.305	0.295	0.267	0.213	0.182	0.151	0.141	0.130	0.086	0.084
5-47	0.338	0.311	0.301	0.279	0.229	0.195	0.157	0.143	0.117	0.087	0.076
5-48	0.325	0.288	0.274	0.235	0.182	0.159	0.137	0.130	0.101	0.080	0.068
5-49	0.320	0.243	0.216	0.173	0.129	0.113	0.099	0.094	0.096	0.087	0.086
5-50	0.338	0.294	0.266	0.227	0.181	0.161	0.145	0.140	0.100	0.094	0.093
AVG	0.306	0.278	0.263	0.231	0.187	0.163	0.140	0.130	0.107	0.083	0.077
n	50	50	50	50	50	50	50	50	50	50	50
STD	0.022	0.024	0.028	0.036	0.035	0.032	0.026	0.024	0.022	0.012	0.016
MAX	0.362	0.360	0.357	0.333	0.289	0.265	0.240	0.231	0.162	0.116	0.121
MIN	0.252	0.223	0.198	0.163	0.124	0.110	0.099	0.093	0.058	0.057	0.044
CV%	7.31	8.55	10.60	15.50	18.92	19.60	18.60	18.53	20.48	14.92	20.06

Table 32. Soil retention data for layer 6.

Sample	e_{sat}	e_{10}	e_{20}	e_{40}	e_{80}	e_{120}	e_{200}	e_{300}	e_{1000}	e_{5000}	e_{15000}
cm^3/cm^3											
6-1	0.324	0.297	0.287	0.269	0.242	0.227	0.205	0.198	0.161	0.107	0.099
6-2	0.353	0.321	0.309	0.286	0.258	0.243	0.223	0.215	0.177	0.126	0.111
6-3	0.345	0.330	0.317	0.294	0.262	0.246	0.223	0.213	0.175	0.121	0.112
6-4	0.277	0.258	0.254	0.238	0.201	0.179	0.152	0.145	0.177	0.141	0.132
6-5	0.434	0.403	0.399	0.384	0.357	0.343	0.322	0.315	0.173	0.116	0.117
6-6	0.314	0.308	0.304	0.294	0.273	0.260	0.241	0.236	0.116	0.092	0.089
6-7	0.280	0.274	0.260	0.230	0.187	0.166	0.146	0.141	0.125	0.110	0.100
6-8	0.290	0.281	0.268	0.232	0.183	0.160	0.139	0.134	0.136	0.110	0.093
6-9	0.314	0.289	0.269	0.237	0.200	0.183	0.166	0.162	0.147	0.114	0.104
6-10	0.235	0.229	0.211	0.178	0.143	0.127	0.107	0.102	0.156	0.115	0.115
6-11	0.315	0.284	0.263	0.226	0.190	0.178	0.163	0.158	0.183	0.161	0.134
6-12	0.323	0.285	0.262	0.234	0.207	0.194	0.179	0.172	0.153	0.107	0.108
6-13	0.306	0.278	0.258	0.224	0.190	0.176	0.162	0.155	0.129	0.115	0.095
6-14	0.312	0.264	0.207	0.154	0.122	0.112	0.101	0.095	0.113	0.088	0.082
6-15	0.283	0.250	0.207	0.151	0.111	0.101	0.092	0.087	0.193	0.167	0.143
6-16	0.286	0.222	0.172	0.133	0.107	0.099	0.090	0.085	0.198	0.143	0.149
6-17	0.293	0.266	0.234	0.177	0.129	0.115	0.104	0.099	0.121	0.101	0.092
6-18	0.283	0.259	0.239	0.199	0.155	0.139	0.124	0.117	0.129	0.089	0.086
6-19	0.287	0.254	0.222	0.166	0.122	0.109	0.099	0.094	0.122	0.093	0.098
6-20	0.288	0.224	0.164	0.112	0.083	0.075	0.070	0.067	0.176	0.142	0.142
6-21	0.240	0.201	0.146	0.098	0.076	0.071	0.068	0.067	0.093	0.069	0.078
6-22	0.305	0.233	0.173	0.119	0.057	0.090	0.084	0.080	0.105	0.094	0.085
6-23	0.296	0.262	0.236	0.169	0.123	0.111	0.104	0.099	0.128	0.101	0.095
6-24	0.314	0.295	0.249	0.149	0.098	0.088	0.083	0.079	0.088	0.068	0.068
6-25	0.335	0.280	0.243	0.173	0.125	0.112	0.102	0.097	0.080	0.062	0.064
6-26	0.315	0.128	0.111	0.100	0.092	0.088	0.083	0.080	0.065	0.053	0.049
6-27	0.305	0.278	0.238	0.160	0.125	0.116	0.108	0.104	0.099	0.082	0.069
6-28	0.303	0.142	0.097	0.076	0.067	0.063	0.060	0.058	0.056	0.045	0.044
6-29	0.310	0.101	0.069	0.055	0.049	0.046	0.043	0.041	0.059	0.045	0.047
6-30	0.286	0.267	0.224	0.149	0.105	0.095	0.089	0.084	0.070	0.060	0.060
6-31	0.278	0.264	0.249	0.185	0.126	0.110	0.100	0.096	0.110	0.095	0.082
6-32	0.297	0.270	0.246	0.175	0.112	0.098	0.085	0.079	0.086	0.072	0.066
6-33	0.301	0.267	0.260	0.237	0.199	0.180	0.155	0.139	0.114	0.092	0.088
6-34	0.282	0.254	0.231	0.169	0.107	0.092	0.078	0.072	0.077	0.067	0.069
6-35	0.297	0.256	0.247	0.214	0.158	0.135	0.110	0.098	0.090	0.072	0.071
6-36	0.245	0.218	0.204	0.164	0.108	0.089	0.071	0.064	0.084	0.070	0.062
6-37	0.274	0.199	0.157	0.112	0.077	0.068	0.060	0.056	0.078	0.062	0.063
6-38	0.281	0.237	0.196	0.132	0.082	0.070	0.061	0.055	0.078	0.061	0.059
6-39	0.291	0.256	0.239	0.192	0.124	0.104	0.085	0.077	0.117	0.100	0.095
6-40	0.287	0.257	0.231	0.166	0.103	0.087	0.074	0.068	0.096	0.069	0.068
6-41	0.300	0.265	0.257	0.223	0.160	0.135	0.107	0.094	0.093	0.073	0.075
6-42	0.218	0.216	0.213	0.176	0.128	0.115	0.103	0.098	0.105	0.073	0.074
6-43	0.287	0.243	0.227	0.191	0.142	0.126	0.106	0.096	0.086	0.065	0.065
6-44	0.260	0.209	0.186	0.146	0.103	0.092	0.080	0.074	0.066	0.065	0.067
6-45	0.289	0.245	0.228	0.190	0.136	0.117	0.096	0.086	0.083	0.068	0.069
6-46	0.287	0.251	0.243	0.216	0.163	0.146	0.125	0.115	0.126	0.089	0.090
6-47	0.280	0.257	0.247	0.217	0.164	0.146	0.125	0.114	0.098	0.070	0.068
6-48	0.307	0.261	0.236	0.193	0.140	0.123	0.105	0.097	0.093	0.066	0.068
6-49	0.273	0.228	0.184	0.126	0.083	0.074	0.066	0.063	0.078	0.059	0.060
6-50	0.329	0.269	0.240	0.189	0.135	0.118	0.101	0.093	0.109	0.078	0.073
AVG	0.296	0.254	0.228	0.186	0.145	0.131	0.116	0.110	0.116	0.090	0.086
n	50	50	50	50	50	50	50	50	50	50	50
STD	0.033	0.048	0.055	0.061	0.060	0.058	0.054	0.053	0.039	0.029	0.026
MAX	0.434	0.403	0.399	0.384	0.357	0.343	0.322	0.315	0.198	0.167	0.149
MIN	0.218	0.101	0.069	0.055	0.049	0.046	0.043	0.041	0.056	0.045	0.044
CV%	10.99	18.95	24.30	32.63	41.66	44.31	46.18	48.06	32.60	32.37	29.73

Table 33. Soil retention data for layer 2.

Sample	θ_{sat}	θ_{10}	θ_{20}	θ_{40}	θ_{60}	θ_{120}	θ_{200}	θ_{300}	θ_{1000}	θ_{5000}	θ_{15000}
cm^3/cm^3											
7-1	0.340	0.283	0.267	0.240	0.203	0.184	0.168	0.160	0.125	0.095	0.087
7-2	0.320	0.303	0.299	0.283	0.249	0.222	0.189	0.175	0.157	0.109	0.108
7-3	0.343	0.305	0.298	0.275	0.241	0.214	0.182	0.166	0.153	0.117	0.113
7-4	0.339	0.295	0.276	0.243	0.202	0.176	0.148	0.134	0.110	0.089	0.082
7-5	0.348	0.337	0.327	0.307	0.272	0.240	0.193	0.167	0.117	0.087	0.070
7-6	0.323	0.318	0.317	0.301	0.262	0.229	0.185	0.164	0.131	0.100	0.077
7-7	0.331	0.294	0.280	0.249	0.209	0.185	0.155	0.140	0.124	0.085	0.065
7-8	0.350	0.294	0.293	0.293	0.264	0.237	0.204	0.186	0.141	0.116	0.093
7-9	0.356	0.304	0.303	0.302	0.278	0.245	0.205	0.185	0.142	0.120	0.102
7-10	0.333	0.289	0.288	0.287	0.271	0.253	0.227	0.210	0.153	0.121	0.086
7-11	0.299	0.269	0.269	0.256	0.222	0.199	0.172	0.158	0.149	0.111	0.088
7-12	0.332	0.289	0.288	0.287	0.257	0.231	0.197	0.180	0.135	0.107	0.081
7-13	0.311	0.310	0.309	0.305	0.276	0.251	0.216	0.195	0.136	0.105	0.081
7-14	0.327	0.311	0.305	0.284	0.248	0.222	0.191	0.177	0.149	0.116	0.096
7-15	0.310	0.294	0.286	0.261	0.225	0.202	0.178	0.166	0.121	0.092	0.079
7-16	0.296	0.287	0.284	0.269	0.240	0.213	0.177	0.163	0.116	0.083	0.073
7-17	0.307	0.288	0.287	0.273	0.245	0.218	0.178	0.157	0.124	0.083	0.076
7-18	0.316	0.276	0.276	0.276	0.249	0.222	0.182	0.163	0.152	0.109	0.099
7-19	0.331	0.291	0.291	0.289	0.260	0.236	0.207	0.190	0.129	0.091	0.085
7-20	0.351	0.307	0.307	0.305	0.283	0.261	0.222	0.202	0.147	0.106	0.103
7-21	0.322	0.289	0.289	0.288	0.277	0.254	0.212	0.187	0.165	0.121	0.113
7-22	0.326	0.302	0.301	0.287	0.255	0.228	0.189	0.169	0.157	0.125	0.122
7-23	0.301	0.283	0.280	0.270	0.244	0.225	0.193	0.170	0.162	0.113	0.110
7-24	0.322	0.290	0.283	0.263	0.224	0.198	0.161	0.139	0.149	0.108	0.108
7-25	0.309	0.285	0.281	0.271	0.249	0.229	0.186	0.160	0.144	0.120	0.116
7-26	0.323	0.296	0.292	0.283	0.260	0.235	0.188	0.173	0.072	0.064	0.061
7-27	0.393	0.364	0.360	0.346	0.311	0.283	0.239	0.209	0.128	0.097	0.098
7-28	0.355	0.318	0.315	0.303	0.269	0.244	0.208	0.184	0.153	0.112	0.107
7-29	0.296	0.274	0.267	0.251	0.224	0.208	0.178	0.160	0.130	0.097	0.090
7-30	0.308	0.279	0.271	0.255	0.225	0.209	0.182	0.167	0.163	0.118	0.078
7-31	0.322	0.291	0.282	0.263	0.229	0.209	0.178	0.158	0.151	0.112	0.077
7-32	0.304	0.279	0.273	0.257	0.224	0.205	0.175	0.155	0.133	0.099	0.073
7-33	0.324	0.300	0.296	0.281	0.244	0.220	0.180	0.158	0.131	0.106	0.068
7-34	0.326	0.286	0.283	0.269	0.230	0.209	0.169	0.161	0.130	0.101	0.071
7-35	0.329	0.297	0.288	0.260	0.215	0.192	0.168	0.156	0.143	0.105	0.084
7-36	0.304	0.277	0.271	0.256	0.229	0.211	0.186	0.169	0.153	0.125	0.099
7-37	0.308	0.277	0.273	0.260	0.233	0.214	0.189	0.170	0.155	0.118	0.100
7-38	0.295	0.262	0.260	0.249	0.224	0.209	0.188	0.171	0.136	0.102	0.083
7-39	0.300	0.283	0.278	0.265	0.238	0.221	0.192	0.169	0.128	0.100	0.074
7-40	0.319	0.294	0.289	0.278	0.253	0.236	0.204	0.180	0.174	0.115	0.084
7-41	0.346	0.320	0.317	0.302	0.257	0.227	0.193	0.172	0.130	0.119	0.095
7-42	0.317	0.288	0.281	0.266	0.238	0.221	0.196	0.177	0.153	0.121	0.107
7-43	0.305	0.277	0.275	0.268	0.246	0.229	0.198	0.175	0.125	0.103	0.099
7-44	0.293	0.259	0.242	0.218	0.186	0.164	0.140	0.125	0.100	0.091	0.074
7-45	0.334	0.309	0.298	0.274	0.229	0.196	0.160	0.140	0.088	0.072	0.065
7-46	0.287	0.236	0.210	0.174	0.137	0.119	0.101	0.091	0.153	0.114	0.111
7-47	0.283	0.258	0.251	0.230	0.189	0.162	0.139	0.126	0.187	0.139	0.136
7-48	0.279	0.249	0.236	0.211	0.173	0.149	0.127	0.116	0.116	0.098	0.095
7-49	0.275	0.252	0.247	0.237	0.208	0.186	0.159	0.141	0.100	0.068	0.068
7-50	0.285	0.248	0.224	0.181	0.142	0.123	0.103	0.094	0.150	0.115	0.109
AVG	0.319	0.289	0.283	0.268	0.236	0.213	0.181	0.163	0.137	0.105	0.090
n	50	50	50	50	50	50	50	50	50	50	50
STD	0.023	0.023	0.025	0.031	0.033	0.032	0.027	0.025	0.021	0.015	0.017
MAX	0.393	0.364	0.360	0.346	0.311	0.283	0.239	0.210	0.187	0.139	0.136
MIN	0.275	0.236	0.210	0.174	0.137	0.119	0.101	0.091	0.072	0.064	0.061
CV%	7.22	7.81	8.99	11.49	14.08	14.98	15.15	15.06	15.63	14.69	18.96

Table 34. Soil retention data for layer 8.

Sample	e_{sat}	e_{10}	e_{20}	e_{40}	e_{60}	e_{120}	e_{200}	e_{300}	e_{1000}	e_{5000}	e_{15000}
-----cm ³ /cm ³ -----											
B-1	0.335	0.295	0.281	0.258	0.230	0.212	0.190	0.176	0.141	0.115	0.105
B-2	0.312	0.290	0.282	0.265	0.237	0.219	0.197	0.182	0.148	0.124	0.117
B-3	0.325	0.295	0.287	0.271	0.244	0.226	0.203	0.188	0.156	0.124	0.117
B-4	0.282	0.267	0.248	0.233	0.199	0.200	0.179	0.180	0.137	0.116	0.111
B-5	0.336	0.305	0.297	0.278	0.245	0.218	0.184	0.166	0.125	0.111	0.108
B-6	0.308	0.280	0.268	0.241	0.194	0.160	0.133	0.124	0.121	0.100	0.078
B-7	0.352	0.320	0.303	0.273	0.241	0.221	0.196	0.183	0.157	0.121	0.109
B-8	0.337	0.306	0.292	0.267	0.229	0.205	0.179	0.162	0.147	0.110	0.104
B-9	0.306	0.283	0.278	0.263	0.232	0.207	0.179	0.162	0.139	0.112	0.107
B-10	0.305	0.276	0.270	0.255	0.224	0.201	0.175	0.162	0.148	0.114	0.110
B-11	0.295	0.268	0.262	0.249	0.223	0.201	0.171	0.154	0.156	0.145	0.105
B-12	0.338	0.302	0.296	0.278	0.236	0.198	0.159	0.151	0.138	0.108	0.102
B-13	0.355	0.311	0.299	0.276	0.239	0.214	0.183	0.164	0.146	0.147	0.129
B-14	0.309	0.285	0.278	0.257	0.214	0.185	0.162	0.149	0.160	0.137	0.120
B-15	0.301	0.267	0.261	0.248	0.225	0.208	0.190	0.178	0.169	0.120	0.115
B-16	0.349	0.322	0.313	0.295	0.262	0.231	0.198	0.178	0.169	0.123	0.108
B-17	0.351	0.316	0.308	0.290	0.259	0.236	0.212	0.194	0.192	0.136	0.114
B-18	0.324	0.290	0.287	0.280	0.260	0.242	0.220	0.202	0.210	0.141	0.117
B-19	0.337	0.302	0.296	0.283	0.258	0.235	0.206	0.185	0.177	0.126	0.109
B-20	0.337	0.318	0.312	0.300	0.269	0.243	0.214	0.194	0.184	0.125	0.116
B-21	0.326	0.294	0.285	0.269	0.242	0.221	0.197	0.180	0.174	0.119	0.121
B-22	0.359	0.314	0.300	0.279	0.246	0.219	0.187	0.169	0.140	0.113	0.113
B-23	0.295	0.271	0.267	0.254	0.223	0.196	0.167	0.151	0.151	0.122	0.125
B-24	0.310	0.283	0.280	0.271	0.249	0.231	0.207	0.190	0.180	0.130	0.125
B-25	0.271	0.250	0.249	0.247	0.238	0.227	0.211	0.196	0.177	0.128	0.130
B-26	0.282	0.260	0.258	0.249	0.236	0.223	0.207	0.195	0.167	0.133	0.120
B-27	0.349	0.325	0.318	0.301	0.267	0.240	0.210	0.190	0.176	0.121	0.111
B-28	0.351	0.322	0.316	0.302	0.275	0.250	0.215	0.193	0.184	0.136	0.126
B-29	0.334	0.300	0.296	0.286	0.263	0.242	0.213	0.193	0.192	0.137	0.114
B-30	0.332	0.303	0.299	0.289	0.264	0.242	0.213	0.193	0.195	0.136	0.115
B-31	0.345	0.311	0.305	0.291	0.265	0.242	0.213	0.194	0.145	0.121	0.111
B-32	0.366	0.325	0.315	0.295	0.261	0.230	0.192	0.172	0.125	0.111	0.099
B-33	0.316	0.283	0.272	0.252	0.220	0.196	0.170	0.153	0.146	0.111	0.110
B-34	0.321	0.281	0.273	0.254	0.216	0.183	0.150	0.136	0.112	0.090	0.094
B-35	0.337	0.294	0.284	0.268	0.242	0.220	0.189	0.170	0.132	0.103	0.098
B-36	0.326	0.270	0.257	0.249	0.211	0.191	0.171	0.160	0.131	0.103	0.104
B-37	0.399	0.336	0.315	0.286	0.243	0.216	0.187	0.169	0.126	0.098	0.085
B-38	0.344	0.332	0.302	0.270	0.229	0.207	0.180	0.162	0.129	0.100	0.085
B-39	0.330	0.329	0.316	0.290	0.246	0.219	0.187	0.167	0.127	0.097	0.090
B-40	0.332	0.294	0.286	0.263	0.216	0.190	0.168	0.156	0.145	0.109	0.101
B-41	0.373	0.328	0.318	0.301	0.271	0.248	0.210	0.187	0.141	0.109	0.097
B-42	0.345	0.334	0.325	0.309	0.278	0.256	0.222	0.200	0.122	0.090	0.089
B-43	0.359	0.346	0.334	0.310	0.260	0.229	0.196	0.178	0.147	0.112	0.086
B-44	0.362	0.340	0.325	0.272	0.200	0.175	0.155	0.144	0.116	0.101	0.072
B-45	0.313	0.307	0.291	0.254	0.203	0.181	0.164	0.153	0.104	0.089	0.073
B-46	0.349	0.347	0.339	0.307	0.255	0.228	0.201	0.184	0.143	0.117	0.084
B-47	0.358	0.281	0.258	0.231	0.191	0.169	0.146	0.132	0.117	0.092	0.072
B-48	0.334	0.256	0.230	0.198	0.155	0.134	0.117	0.107	0.108	0.084	0.079
B-49	0.332	0.268	0.239	0.202	0.155	0.135	0.118	0.109	0.099	0.090	0.073
B-50	0.280	0.256	0.234	0.203	0.162	0.145	0.126	0.115	0.097	0.084	0.080
AVG	0.331	0.299	0.288	0.268	0.234	0.211	0.184	0.169	0.147	0.115	0.104
n	50	50	50	50	50	50	50	50	50	50	50
STD	0.026	0.025	0.026	0.026	0.029	0.029	0.026	0.024	0.027	0.016	0.016
MAX	0.399	0.347	0.339	0.310	0.278	0.256	0.222	0.202	0.210	0.147	0.130
MIN	0.271	0.250	0.230	0.198	0.155	0.134	0.117	0.107	0.097	0.084	0.072
CV%	7.81	8.53	9.05	9.85	12.54	13.66	14.34	14.12	18.15	14.18	15.67

Table 35. Soil retention data for layer 9.

Sample	e_{sat}	e_{10}	e_{20}	e_{40}	e_{80}	e_{120}	e_{200}	e_{300}	e_{1000}	e_{5000}	e_{15000}
cm^3/cm^3											
9-1	0.356	0.325	0.319	0.307	0.276	0.244	0.185	0.154	0.126	0.100	0.093
9-2	0.363	0.340	0.333	0.319	0.283	0.246	0.179	0.146	0.167	0.093	0.088
9-3	0.263	0.258	0.251	0.233	0.200	0.178	0.152	0.133	0.108	0.094	0.079
9-4	0.289	0.279	0.271	0.256	0.229	0.209	0.174	0.147	0.117	0.084	0.074
9-5	0.270	0.245	0.229	0.200	0.156	0.136	0.116	0.105	0.116	0.085	0.084
9-6	0.330	0.297	0.290	0.273	0.239	0.209	0.174	0.151	0.146	0.104	0.102
9-7	0.322	0.309	0.291	0.226	0.158	0.137	0.120	0.112	0.093	0.081	0.074
9-8	0.294	0.259	0.243	0.202	0.151	0.132	0.113	0.103	0.107	0.087	0.078
9-9	0.310	0.277	0.272	0.258	0.221	0.194	0.167	0.152	0.133	0.100	0.094
9-10	0.285	0.270	0.264	0.252	0.220	0.192	0.161	0.146	0.135	0.099	0.094
9-11	0.280	0.263	0.254	0.233	0.193	0.164	0.137	0.122	0.114	0.096	0.090
9-12	0.334	0.275	0.262	0.236	0.193	0.163	0.132	0.115	0.116	0.089	0.087
9-13	0.303	0.283	0.274	0.253	0.217	0.191	0.159	0.142	0.137	0.091	0.089
9-14	0.293	0.266	0.260	0.244	0.214	0.189	0.160	0.140	0.134	0.093	0.104
9-15	0.307	0.273	0.259	0.234	0.195	0.172	0.145	0.131	0.137	0.114	0.095
9-16	0.281	0.266	0.258	0.241	0.204	0.176	0.152	0.140	0.126	0.090	0.089
9-17	0.317	0.285	0.275	0.247	0.193	0.159	0.133	0.124	0.123	0.094	0.089
9-18	0.224	0.200	0.199	0.195	0.166	0.137	0.137	0.122	0.108	0.073	0.057
9-19	0.275	0.236	0.227	0.211	0.178	0.138	0.118	0.104	0.103	0.068	0.058
9-20	0.276	0.245	0.242	0.238	0.224	0.203	0.175	0.152	0.136	0.074	0.067
9-21	0.356	0.319	0.311	0.283	0.231	0.196	0.163	0.153	0.147	0.102	0.092
9-22	0.329	0.306	0.302	0.290	0.256	0.230	0.198	0.176	0.169	0.105	0.100
9-23	0.268	0.247	0.245	0.237	0.210	0.174	0.140	0.123	0.126	0.095	0.095
9-24	0.257	0.226	0.207	0.171	0.125	0.107	0.089	0.079	0.104	0.096	0.076
9-25	0.247	0.220	0.216	0.201	0.165	0.144	0.119	0.109	0.125	0.087	0.084
9-26	0.322	0.294	0.286	0.269	0.227	0.188	0.156	0.144	0.151	0.127	0.114
9-27	0.283	0.264	0.262	0.253	0.217	0.195	0.149	0.130	0.147	0.111	0.111
9-28	0.315	0.285	0.283	0.272	0.250	0.232	0.199	0.169	0.129	0.097	0.093
9-29	0.300	0.274	0.272	0.245	0.234	0.204	0.153	0.128	0.125	0.091	0.084
9-30	0.320	0.294	0.288	0.273	0.238	0.211	0.161	0.137	0.119	0.092	0.081
9-31	0.326	0.286	0.276	0.257	0.224	0.200	0.166	0.147	0.115	0.090	0.076
9-32	0.292	0.262	0.256	0.242	0.215	0.195	0.164	0.151	0.140	0.099	0.088
9-33	0.311	0.269	0.261	0.242	0.204	0.180	0.150	0.135	0.130	0.100	0.096
9-34	0.304	0.273	0.265	0.247	0.211	0.185	0.151	0.134	0.160	0.122	0.102
9-35	0.300	0.256	0.244	0.222	0.189	0.164	0.133	0.118	0.138	0.106	0.095
9-36	0.267	0.228	0.218	0.200	0.173	0.156	0.138	0.130	0.156	0.122	0.099
9-37	0.321	0.281	0.275	0.262	0.242	0.228	0.201	0.182	0.186	0.134	0.131
9-38	0.301	0.261	0.253	0.238	0.215	0.197	0.163	0.146	0.134	0.107	0.101
9-39	0.279	0.227	0.195	0.157	0.125	0.113	0.101	0.094	0.118	0.090	0.088
9-40	0.350	0.224	0.200	0.170	0.138	0.124	0.109	0.102	0.106	0.086	0.079
9-41	0.367	0.233	0.212	0.184	0.153	0.138	0.122	0.113	0.141	0.097	0.095
9-42	0.337	0.278	0.269	0.254	0.229	0.211	0.175	0.153	0.163	0.122	0.118
9-43	0.529	0.423	0.407	0.386	0.360	0.344	0.320	0.307	0.111	0.076	0.077
9-44	0.352	0.295	0.286	0.270	0.243	0.224	0.184	0.161	0.128	0.093	0.098
9-45	0.327	0.272	0.261	0.242	0.213	0.191	0.155	0.134	0.128	0.082	0.089
9-46	0.338	0.284	0.251	0.203	0.171	0.158	0.145	0.137	0.158	0.118	0.116
9-47	0.323	0.273	0.250	0.216	0.180	0.162	0.145	0.138	0.158	0.119	0.119
9-48	0.287	0.240	0.233	0.220	0.183	0.153	0.113	0.099	0.168	0.123	0.103
9-49	0.374	0.333	0.327	0.305	0.271	0.246	0.215	0.200	0.119	0.116	0.078
9-50	0.412	0.344	0.327	0.298	0.255	0.227	0.191	0.178	0.128	0.103	0.100
AVG	0.313	0.274	0.264	0.243	0.209	0.185	0.155	0.139	0.132	0.098	0.091
n	50	50	50	50	50	50	50	50	50	50	50
STD	0.047	0.038	0.039	0.041	0.043	0.042	0.036	0.034	0.020	0.015	0.015
MAX	0.529	0.423	0.407	0.386	0.360	0.344	0.320	0.307	0.186	0.134	0.131
MIN	0.224	0.200	0.195	0.157	0.125	0.107	0.089	0.079	0.093	0.068	0.057
CV%	15.11	13.78	14.66	16.84	20.63	22.66	23.51	24.48	15.26	15.04	16.14

Table 36. Soil retention data for vertical A.

Sample	e_{sat}	e_{10}	e_{20}	e_{40}	e_{60}	e_{80}	e_{120}	e_{200}	e_{300}	e_{1000}	e_{5000}	e_{15000}
	cm^3/cm^3											
A-1	0.417	0.380	0.337	0.277	0.239		0.227	0.216	0.210	0.126	0.107	0.072
A-2	0.278	0.263	0.262	0.221	0.179		0.166	0.154	0.151			
A-3	0.336	0.267	0.238	0.200	0.170		0.158	0.150	0.145			
A-4	0.366	0.257	0.217	0.180	0.153		0.144	0.136	0.133			
A-5	0.271	0.264	0.233	0.191	0.155		0.142	0.128	0.121			
A-6	0.369	0.266	0.231	0.183	0.145		0.130	0.117	0.112	0.089	0.082	0.067
A-7	0.218	0.216	0.215	0.197	0.166		0.152	0.140	0.137			
A-8												
A-9												
A-10												
A-11												
A-12	0.338	0.313	0.304	0.274	0.223		0.189	0.159	0.144	0.131	0.096	0.092
A-13	0.328	0.288	0.279	0.253	0.210		0.183	0.157	0.141	0.148	0.113	0.113
A-14	0.305	0.289	0.278	0.246	0.200		0.172	0.149	0.138	0.141	0.100	0.104
A-15	0.260	0.248	0.244	0.227	0.190		0.166	0.145	0.135	0.148	0.113	0.110
A-16	0.297	0.266	0.257	0.238	0.209		0.187	0.164	0.149	0.162	0.118	0.115
A-17	0.309		0.278	0.258	0.215	0.215	0.186	0.155	0.139	0.155	0.130	0.126
A-18	0.298	0.258	0.242	0.211	0.177		0.159	0.143	0.134	0.143	0.107	0.106
A-19	0.285	0.269	0.260	0.241	0.211		0.192	0.168	0.155	0.150	0.106	0.100
A-20	0.306	0.276	0.260	0.229	0.193		0.173	0.157	0.148	0.134	0.101	0.098
A-21	0.261	0.259	0.257	0.246	0.223		0.202	0.172	0.153	0.146	0.108	0.102
A-22	0.307	0.276	0.272	0.260	0.223		0.187	0.146	0.125	0.122	0.093	0.089
A-23	0.283	0.267	0.264	0.256	0.232		0.203	0.170	0.150	0.099	0.086	0.082
A-24	0.320	0.297	0.291	0.278	0.251		0.224	0.191	0.170	0.136	0.098	0.081
A-25	0.356	0.317	0.311	0.297	0.274		0.256	0.236	0.220	0.215	0.156	0.127
A-26	0.372	0.326	0.315	0.295	0.268		0.249	0.227	0.210	0.197	0.149	0.132
A-27												
A-28	0.303	0.290	0.285	0.274	0.249		0.228	0.201	0.180	0.162	0.124	0.113
A-29	0.303	0.280	0.275	0.262	0.235		0.211	0.181	0.171			
A-30	0.354	0.308	0.296	0.270	0.233		0.207	0.166	0.144	0.133	0.100	0.076
A-31	0.331	0.294	0.280	0.249	0.209		0.185	0.155	0.140	0.124	0.085	0.065
A-32	0.353	0.329	0.321	0.298	0.260		0.231	0.196	0.178	0.173	0.129	0.104
A-33	0.325	0.301	0.293	0.269	0.230		0.205	0.174	0.157	0.158	0.114	0.100
A-34	0.352	0.322	0.305	0.273	0.239		0.223	0.204	0.192	0.196	0.164	0.135
A-35	0.335	0.312	0.303	0.285	0.266		0.255	0.242	0.235	0.232	0.161	0.141
A-36	0.330	0.295	0.280	0.252	0.224		0.211	0.194	0.184	0.182	0.121	0.105
A-37	0.327	0.299	0.290	0.269	0.239		0.216	0.185	0.171	0.141	0.107	0.095
A-38	0.352	0.320	0.303	0.273	0.241		0.221	0.196	0.183	0.157	0.121	0.109
A-39	0.316	0.282	0.269	0.245	0.226		0.212	0.190	0.178	0.155	0.100	0.098
A-40	0.305	0.265	0.253	0.234	0.214		0.201	0.182	0.167	0.179	0.129	0.113
A-41	0.317	0.284	0.278	0.264	0.242		0.227	0.203	0.186			
A-42	0.344	0.310	0.296	0.267	0.229		0.206	0.173	0.155	0.149	0.118	0.102
A-43	0.367	0.331	0.321	0.293	0.251		0.225	0.178	0.154	0.142	0.117	0.104
A-44	0.326	0.287	0.276	0.247	0.210		0.189	0.157	0.142	0.147	0.112	0.101
A-45	0.322	0.309	0.291	0.226	0.158		0.137	0.120	0.112	0.093	0.081	0.074
A-46	0.372	0.346	0.314	0.270	0.208		0.177	0.150	0.140	0.133	0.102	0.104
A-47	0.381	0.355	0.306	0.254	0.205		0.181	0.155	0.143	0.121	0.087	0.090
A-48	0.356	0.340	0.314	0.276	0.232		0.206	0.172	0.155	0.163	0.126	0.117
AVG	0.324	0.293	0.279	0.251		0.216	0.195	0.171	0.158	0.149	0.113	0.102
n	43	42	43	43		44	43	43	43	36	36	36
STD	0.038	0.032	0.029	0.030		0.032	0.031	0.029	0.028	0.030	0.021	0.018
MAX	0.417	0.380	0.337	0.298		0.274	0.256	0.242	0.235	0.232	0.164	0.141
MIN	0.218	0.216	0.215	0.160		0.145	0.130	0.117	0.112	0.089	0.081	0.065
CV%	11.67	11.03	10.49	12.12		14.84	16.00	16.95	17.55	20.35	18.65	18.19

Table 37. Soil retention data for vertical B.

Sample	e_{sat}	e_{1c}	e_{20}	e_{40}	e_{80}	$e_{80} \text{ cm}^3/\text{cm}^3$	e_{120}	e_{200}	e_{300}	e_{1000}	e_{5000}	e_{15000}
B-1	0.346	0.312	0.272	0.202	0.151		0.134	0.119	0.113	0.117	0.096	0.096
B-2	0.369	0.340	0.296	0.219	0.167		0.150	0.136	0.131	0.145	0.107	0.103
B-3	0.354	0.311	0.272	0.216	0.175		0.159	0.145	0.139	0.110	0.095	0.093
B-4	0.316	0.310	0.292	0.243	0.197		0.182	0.167	0.158	0.155	0.109	0.103
B-5	0.323	0.305	0.264	0.229	0.183		0.164	0.144	0.135	0.146	0.099	0.101
B-6	0.363	0.335	0.319	0.282	0.234		0.213	0.190	0.176	0.146	0.109	0.104
B-7	0.240	0.228	0.228	0.227	0.206		0.191	0.171	0.160	0.157	0.120	0.114
B-8												
B-9												
B-10												
B-11												
B-12	0.319	0.309	0.287	0.235	0.179		0.162	0.150	0.145	0.098	0.076	0.072
B-13	0.300	0.259	0.242	0.211	0.179		0.160	0.144	0.138	0.154	0.115	0.110
B-14	0.310	0.279	0.235	0.173	0.137		0.130	0.124	0.123	0.080	0.072	0.067
B-15	0.287	0.270	0.267	0.262	0.244		0.226	0.206	0.198	0.140	0.104	0.101
B-16	0.323	0.280	0.267	0.252	0.228		0.212	0.195	0.188	0.155	0.109	0.104
B-17	0.292		0.259	0.244	0.206	0.205	0.178	0.153	0.144	0.082	0.062	0.058
B-18	0.305	0.276	0.269	0.252	0.216		0.189	0.169	0.163	0.148	0.114	0.114
B-19	0.292	0.270	0.258	0.232	0.194		0.173	0.153	0.146	0.142	0.116	0.103
B-20	0.336	0.308	0.291	0.250	0.199		0.175	0.158	0.152	0.125	0.091	0.090
B-21	0.364	0.332	0.323	0.302	0.265		0.239	0.212	0.204	0.164	0.117	0.113
B-22	0.375	0.338	0.327	0.307	0.274		0.252	0.231	0.222	0.147	0.110	0.103
B-23	0.346	0.310	0.303	0.287	0.262		0.245	0.225	0.217	0.167	0.114	0.109
B-24	0.316	0.277	0.266	0.250	0.227		0.212	0.198	0.192	0.152	0.114	0.115
B-25	0.315	0.128	0.111	0.100	0.092		0.088	0.083	0.080	0.065	0.053	0.049
B-26	0.372	0.353	0.345	0.328	0.303		0.286	0.265	0.254	0.228	0.173	0.172
B-27	0.371	0.340	0.333	0.323	0.307		0.294	0.277	0.266	0.201	0.150	0.139
B-28	0.378	0.356	0.346	0.324	0.288		0.263	0.235	0.220	0.138	0.123	0.108
B-29	0.384	0.327	0.306	0.272	0.233		0.206	0.178	0.164	0.123	0.094	0.097
B-30	0.400	0.364	0.354	0.334	0.295		0.267	0.232	0.212	0.135	0.109	0.097
B-31	0.323	0.296	0.292	0.283	0.260		0.235	0.188	0.173	0.072	0.064	0.061
B-32	0.308	0.283	0.280	0.271	0.254		0.237	0.213	0.202	0.182	0.143	0.133
B-33	0.347	0.308	0.292	0.263	0.222		0.191	0.168	0.154	0.159	0.126	0.118
B-34	0.358	0.305	0.295	0.276	0.254		0.234	0.212	0.198	0.144	0.105	0.104
B-35	0.292	0.275	0.269	0.254	0.234		0.217	0.196	0.180	0.186	0.109	0.110
B-36	0.321	0.297	0.289	0.270	0.248		0.231	0.210	0.196	0.198	0.130	0.131
B-37	0.346	0.314	0.307	0.293	0.274		0.250	0.218	0.202	0.197	0.121	0.124
B-38	0.282	0.260	0.258	0.249	0.236		0.223	0.207	0.195	0.167	0.133	0.120
B-39	0.284	0.269	0.268	0.262	0.247		0.229	0.206	0.190	0.139	0.106	0.095
B-40	0.271	0.253	0.249	0.242	0.228		0.213	0.196	0.185	0.195	0.141	0.128
B-41	0.303	0.269	0.252	0.222	0.195		0.179	0.163	0.154	0.147	0.109	0.090
B-42	0.291	0.271	0.268	0.254	0.223		0.200	0.170	0.152	0.161	0.132	0.113
B-43	0.287	0.253	0.244	0.224	0.196		0.175	0.152	0.137	0.147	0.108	0.103
B-44	0.317	0.290	0.289	0.281	0.263		0.238	0.193	0.169	0.165	0.122	0.112
B-45	0.322	0.294	0.286	0.269	0.227		0.188	0.156	0.144	0.151	0.127	0.114
B-46	0.398	0.368	0.365	0.353	0.329		0.293	0.219	0.185	0.137	0.104	0.096
B-47	0.385	0.355	0.349	0.330	0.292		0.249	0.191	0.161	0.134	0.103	0.096
B-48	0.354	0.329	0.324	0.307	0.270		0.237	0.198	0.173	0.162	0.119	0.109
AVG	0.329	0.298	0.284	0.260		0.229	0.208	0.184	0.172	0.147	0.110	0.104
n	44	43	44	44		45	44	44	44	44	44	44
STD	0.037	0.043	0.043	0.046		0.048	0.045	0.039	0.036	0.034	0.023	0.021
MAX	0.400	0.368	0.365	0.353		0.329	0.294	0.277	0.266	0.228	0.173	0.172
MIN	0.240	0.128	0.111	0.100		0.092	0.088	0.083	0.080	0.065	0.053	0.049
CV%	11.32	14.37	15.10	17.75		20.86	21.43	20.96	21.02	23.05	20.53	20.58

Table 38. Soil retention data for vertical C.

Sample	e_{sat}	e_{10}	e_{20}	e_{40}	e_{80}	v_d cm ³ /cm ³	e_{120}	e_{200}	e_{300}	e_{1000}	e_{5000}	e_{15000}
C-1	0.329	0.308	0.274	0.197	0.139		0.121	0.104	0.095	0.118	0.093	0.095
C-2	0.330	0.292	0.246	0.164	0.106		0.089	0.074	0.067			
C-3	0.375	0.302	0.263	0.198	0.150		0.135	0.120	0.111			
C-4	0.348	0.310	0.291	0.242	0.193		0.174	0.154	0.144			
C-5	0.298	0.269	0.257	0.222	0.175		0.150	0.135	0.125			
C-6	0.370	0.255	0.225	0.175	0.130		0.112	0.094	0.086	0.128	0.095	0.092
C-7												
C-8												
C-9												
C-10												
C-11												
C-12	0.347		0.304	0.261	0.205	0.202	0.179	0.164	0.156	0.154	0.130	0.112
C-13	0.265	0.252	0.240	0.211	0.177		0.157	0.128	0.113	0.112	0.096	0.082
C-14	0.288	0.224	0.158	0.102	0.081		0.073	0.066	0.063	0.057	0.044	0.040
C-15	0.257	0.234	0.232	0.224	0.204		0.186	0.166	0.155	0.120	0.096	0.086
C-16	0.264	0.255	0.249	0.238	0.218		0.196	0.169	0.156	0.079	0.067	0.070
C-17	0.296	0.251	0.216	0.174	0.135		0.116	0.100	0.089	0.081	0.054	0.054
C-18	0.257	0.243	0.221	0.181	0.139		0.117	0.106	0.103	0.088	0.066	0.050
C-19	0.298	0.254	0.224	0.173	0.132		0.113	0.104	0.099	0.099	0.078	0.071
C-20	0.314	0.264	0.226	0.180	0.153		0.137	0.127	0.120	0.104	0.077	0.074
C-21	0.294	0.248	0.224	0.179	0.137		0.119	0.111	0.106	0.116	0.096	0.070
C-22	0.304	0.265	0.252	0.222	0.176		0.141	0.114	0.102	0.111	0.082	0.077
C-23	0.341	0.307	0.287	0.242	0.185		0.154	0.134	0.128	0.092	0.074	0.064
C-24	0.281	0.198	0.166	0.134	0.107		0.093	0.082	0.078	0.063	0.047	0.047
C-25	0.218	0.216	0.213	0.176	0.128		0.115	0.103	0.098	0.105	0.073	0.074
C-26	0.224	0.212	0.193	0.174	0.149		0.133	0.119	0.113	0.129	0.095	0.086
C-27	0.364	0.329	0.319	0.299	0.276		0.261	0.245	0.234	0.170	0.142	0.131
C-28	0.350	0.322	0.308	0.286	0.257		0.236	0.218	0.208	0.150	0.109	0.107
C-29	0.306	0.277	0.260	0.231	0.194		0.166	0.144	0.130	0.108	0.082	0.083
C-30	0.331	0.309	0.300	0.280	0.247		0.221	0.185	0.161	0.143	0.110	0.107
C-31	0.317	0.288	0.281	0.266	0.238		0.221	0.196	0.177	0.153	0.121	0.107
C-32	0.318	0.289	0.276	0.242	0.191		0.162	0.142	0.131	0.122	0.099	0.098
C-33	0.314	0.283	0.270	0.240	0.204		0.175	0.148	0.135	0.137	0.106	0.086
C-34	0.334	0.298	0.281	0.255	0.224		0.198	0.177	0.166	0.158	0.123	0.104
C-35	0.326	0.313	0.290	0.256	0.222		0.201	0.181	0.169	0.150	0.115	0.110
C-36	0.378	0.293	0.274	0.251	0.230		0.214	0.200	0.192	0.144	0.106	0.110
C-37	0.294	0.268	0.259	0.238	0.208		0.185	0.155	0.142	0.125	0.102	0.105
C-38	0.345	0.334	0.325	0.309	0.278		0.256	0.222	0.200	0.122	0.090	0.089
C-39	0.303	0.288	0.284	0.269	0.235		0.207	0.169	0.154	0.131	0.106	0.094
C-40	0.270	0.252	0.240	0.209	0.173		0.150	0.127	0.118	0.123	0.095	0.080
C-41	0.281	0.257	0.247	0.226	0.198		0.182	0.163	0.159	0.129	0.102	0.079
C-42	0.298	0.251	0.236	0.207	0.176		0.163	0.145	0.133	0.115	0.079	0.065
C-43	0.290	0.251	0.242	0.227	0.205		0.193	0.177	0.173	0.154	0.103	0.090
C-44	0.370	0.253	0.234	0.210	0.185		0.174	0.147	0.139	0.124	0.075	0.075
C-45	0.337	0.278	0.269	0.254	0.229		0.211	0.175	0.153	0.163	0.122	0.118
C-46	0.271	0.230	0.217	0.194	0.159		0.136	0.128	0.120	0.115	0.079	0.079
C-47	0.298	0.267	0.247	0.204	0.153		0.133	0.116	0.110	0.127	0.094	0.086
C-48	0.266	0.236	0.232	0.218	0.198		0.184	0.165	0.153	0.139	0.091	0.090
AVG	0.308	0.270	0.252	0.220		0.184	0.164	0.144	0.134	0.122	0.093	0.086
n	43	42	43	43		44	43	43	43	39	39	39
STD	0.039	0.033	0.037	0.043		0.046	0.044	0.040	0.038	0.026	0.022	0.020
MAX	0.378	0.334	0.325	0.309		0.278	0.261	0.245	0.234	0.170	0.142	0.131
MIN	0.218	0.198	0.158	0.102		0.081	0.073	0.066	0.063	0.057	0.044	0.040
CV%	12.56	12.13	14.53	19.63		24.75	27.18	27.91	28.07	21.70	23.35	23.56

Table 39. Samples used at intersections between vertical and horizontal sampling layers.

Sample Locations		Soil Core	Soil Sample
A-1	1-7	Different	Same
A-6	2-7	Different	Same
A-12	3-7	Different	Different
A-17	4-7	Same	Same
A-21	5-7	Different	Different
A-25	6-7	Different	Different
A-31	7-7	Same	Same
A-38	8-7	Same	Same
A-45	9-7	Same	Same
B-1	1-26	Different	Different
B-6	2-26	Different	Different
B-12	3-26	Different	Different
B-17	4-26	Same	Same
B-21	5-26	Different	Different
B-25	6-26	Same	Same
B-31	7-26	Same	Same
B-38	8-26	Same	Same
B-45	9-26	Same	Same
C-1	1-42	Different	Same
C-6	2-42	Different	Different
C-12	3-42	Same	Same
C-17	4-42	Same	Same
C-21	5-42	Different	Different
C-25	6-42	Same	Same
C-31	7-42	Same	Same
C-38	8-42	Same	Same
C-45	9-42	Same	Same

Table 40. Particle size data for layer 1.

SAMPLE	BD g/cm ³	CLAY % <.002	SILT % .05-.002	SAND % 2-.05	VCS % 2-1	CS % 1-.5	MS % .5-.25	FS % .25-.1	VFS % .1-.05	Coarse % >2	CaCO ₃ %	Textural Class
1-1	1.67	8.98	10.95	80.07	5.56	21.29	21.90	22.87	8.44		0.53	LOAMY SAND
1-2	1.65	10.15	9.95	79.90	4.86	21.51	21.84	22.87	8.82		0.69	SANDY LOAM
1-3	1.73	9.38	9.24	81.38	7.17	25.15	21.27	19.94	7.84		0.43	LOAMY SAND
1-4	1.67	7.86	9.52	82.62	9.27	25.49	21.37	19.29	7.21		0.52	LOAMY SAND
1-5	1.68	9.05	8.99	81.96	8.10	23.75	22.06	20.52	7.52		0.62	LOAMY SAND
1-6	1.66	9.43	11.20	79.37	6.03	18.87	21.84	23.85	8.78		0.63	SANDY LOAM
1-7	1.69	9.55	11.59	78.85	6.01	17.64	21.16	24.10	9.95		0.57	SANDY LOAM
1-8	1.70	8.13	12.40	79.48	5.69	19.01	21.39	23.63	9.75		0.73	LOAMY SAND
1-9	1.69	6.63	11.19	82.18	6.50	21.34	22.28	23.27	8.78		0.74	LOAMY SAND
1-10	1.51	6.54	7.93	85.53	5.67	17.14	24.61	27.78	10.33		0.82	LOAMY SAND
1-11	1.70	7.23	9.67	83.10	5.77	19.15	23.23	25.75	9.20		0.58	LOAMY SAND
1-12	1.68	7.57	7.59	84.84	8.97	23.13	23.75	21.13	7.87		0.61	LOAMY SAND
1-13	1.67	9.37	10.87	79.76	4.79	18.19	23.01	24.13	9.64		0.68	LOAMY SAND
1-14	1.70	8.31	8.67	83.02	4.25	13.34	24.00	30.66	10.78		0.69	LOAMY SAND
1-15	1.72	6.75	9.71	83.53	5.36	17.74	23.17	27.15	10.11		0.67	LOAMY SAND
1-16	1.73	8.37	8.71	82.92	4.65	17.55	24.15	27.19	9.38		0.75	LOAMY SAND
1-17	1.74	8.92	10.59	80.49	5.55	16.85	21.37	26.04	10.68		0.71	LOAMY SAND
1-18	1.70	8.95	11.82	79.23	5.32	14.66	20.04	27.31	11.92		0.34	LOAMY SAND
1-19	1.65	9.31	9.81	80.89	5.48	15.29	23.46	26.95	9.71		0.69	LOAMY SAND
1-20	1.71	9.19	10.54	80.27	4.33	15.22	21.16	28.26	11.30		0.66	LOAMY SAND
1-21	1.63	7.57	8.55	83.88	5.24	15.61	24.09	28.05	10.89		0.93	LOAMY SAND
1-22	1.62	7.43	9.21	83.37	4.84	15.01	22.23	28.89	12.40		0.88	LOAMY SAND
1-23	1.61	8.55	10.68	80.76	4.57	17.90	22.90	25.57	9.81		6.79	LOAMY SAND
1-24	1.62	9.20	10.93	79.87	4.85	16.72	20.48	26.03	11.79		0.77	LOAMY SAND
1-25	1.63	9.54	11.91	78.55	3.30	13.18	19.83	28.71	13.53		0.71	SANDY LOAM
1-26	1.69	9.48	9.72	80.80	4.34	16.61	22.39	26.88	10.57		0.86	LOAMY SAND
1-27	1.61	9.04	9.18	81.78	8.24	20.90	20.58	22.63	9.45		1.42	LOAMY SAND
1-28	1.62	9.61	11.46	78.93	3.43	14.25	20.55	28.64	12.06		0.82	SANDY LOAM
1-29	1.54	11.45	8.58	79.98	5.08	15.40	20.62	27.22	11.66		0.79	SANDY LOAM
1-30	1.64	11.14	9.21	79.65	6.40	19.04	21.46	23.44	9.31		0.88	SANDY LOAM
1-31	1.70	9.99	10.09	79.92	3.99	15.60	21.03	27.92	11.38		0.80	SANDY LOAM
1-32	1.62	10.49	9.59	79.92	3.25	11.06	20.08	31.85	13.58		8.17	SANDY LOAM
1-33	1.64	8.27	9.29	82.44	7.08	18.55	21.52	25.11	10.18		1.79	LOAMY SAND
1-34	1.63	8.43	9.02	82.55	6.33	17.58	23.07	25.46	10.11		2.06	LOAMY SAND
1-35	1.72	7.82	9.39	82.78	5.69	16.49	22.48	27.25	10.87		2.07	LOAMY SAND
1-36	1.62	8.18	9.14	82.69	7.49	18.80	21.96	24.27	10.16		2.81	LOAMY SAND
1-37	1.68	8.47	9.95	81.57	5.43	15.18	22.27	27.38	11.31		1.79	LOAMY SAND
1-38	1.71	8.41	10.06	81.54	7.70	17.05	20.97	25.21	10.60		1.88	LOAMY SAND
1-39	1.63	9.31	10.03	80.65	3.70	14.81	21.05	28.75	12.33		1.65	LOAMY SAND
1-40	1.65	7.89	8.07	84.04	5.62	16.14	23.00	27.95	11.33		1.28	LOAMY SAND
1-41	1.60	8.58	9.55	81.87	5.71	17.25	21.38	32.21	5.32		1.97	LOAMY SAND
1-42	1.58	9.43	9.78	80.78	5.91	16.24	21.44	26.16	11.04		3.03	LOAMY SAND
1-43	1.62	8.94	8.70	82.36	7.09	18.29	21.21	25.13	10.65		1.98	LOAMY SAND
1-44	1.73	7.48	8.98	83.53	7.62	17.91	22.65	25.35	10.01		2.13	LOAMY SAND
1-45	1.64	8.66	9.62	81.71	7.42	17.48	20.75	25.20	10.86		2.82	LOAMY SAND
1-46	1.67	7.93	11.51	80.56	5.89	13.75	20.25	28.34	12.32		1.84	LOAMY SAND
1-47	1.69	9.12	9.28	81.60	5.95	16.47	22.31	26.46	10.40		1.16	LOAMY SAND
1-48	1.75	6.44	10.52	83.04	5.69	18.81	22.86	25.45	10.23		0.97	LOAMY SAND
1-49	1.70	10.35	7.00	82.65	4.92	15.82	23.06	28.18	10.67		0.97	LOAMY SAND
1-50	1.66	11.97	8.29	79.74	7.60	16.31	19.68	25.51	10.63		0.85	SANDY LOAM
AVG	1.66	8.78	9.76	81.46	5.79	17.53	21.90	25.96	10.27		1.39	
n	50	50	50	50	50	50	50	50	50		50	
STD	0.05	1.20	1.17	1.67	1.41	2.96	1.22	2.75	1.57		1.43	
MAX	1.75	11.97	12.40	85.53	9.27	25.49	24.61	32.21	13.68		8.17	
MIN	1.51	6.44	7.00	78.55	3.25	11.06	19.68	19.29	5.32		0.34	
CV%	3.02	13.62	12.01	2.05	24.31	16.86	5.57	10.60	15.28		102.77	

Table 41. Particle size data for layer 2.

SAMPLE	BD g/cm ³	CLAY % <.002	SILT % .05-.002	SAND % 2-.05	VCS % 2-1	CS % 1-.5	MS % .5-.25	FS % .25-.1	VFS % .1-.05	Coarse % >2	CaCO ₃ %	Textural Class
2-1	1.78	7.78	7.24	84.99	12.64	23.63	23.56	18.99	6.17	15.19	2.62	LOAMY SAND
2-2	1.81	5.30	6.57	88.13	25.18	27.00	18.08	13.17	4.70	17.90	11.27	SAND
2-3	1.78	6.25	6.38	87.37	13.23	28.88	24.04	15.90	5.32	20.38	12.85	LOAMY SAND
2-4	1.76	6.12	7.09	86.79	25.17	22.96	18.80	14.35	5.49	16.74	10.08	LOAMY SAND
2-5	1.73	6.44	6.87	86.69	21.50	23.91	19.69	15.58	6.02	15.00	9.47	LOAMY SAND
2-6	1.74	6.96	5.79	87.25	24.05	27.50	18.83	11.66	5.22	19.19	8.48	LOAMY SAND
2-7	1.74	8.16	7.33	84.50	16.55	24.99	19.55	15.83	7.59	20.29	7.43	LOAMY SAND
2-8	1.72	9.90	7.37	82.72	13.85	24.87	20.57	16.13	7.29	20.49	9.63	LOAMY SAND
2-9	1.77	8.84	5.93	85.23	19.71	27.99	17.22	13.49	6.81	21.13	6.27	LOAMY SAND
2-10	1.77	7.75	6.80	85.45	19.40	27.40	18.67	13.39	6.60	20.20	10.66	LOAMY SAND
2-11	1.71	6.72	6.29	86.99	25.50	30.16	15.92	10.39	5.02	21.41	6.12	LOAMY SAND
2-12	1.69	9.88	5.85	84.27	20.40	24.06	17.28	14.40	8.14	16.05	15.83	LOAMY SAND
2-13	1.72	8.31	7.79	83.90	21.02	22.51	15.97	15.31	9.08	20.79	18.65	LOAMY SAND
2-14	1.69	8.03	7.44	84.53	29.02	21.75	12.76	12.50	8.50	18.25	16.57	LOAMY SAND
2-15	1.75	9.15	9.61	81.25	17.25	23.67	14.84	14.89	10.60	19.45	16.76	LOAMY SAND
2-16	1.63	9.55	9.30	81.15	19.77	18.82	12.95	16.80	12.80	28.54	26.23	LOAMY SAND
2-17	1.75	9.63	9.35	81.02	17.01	19.45	15.39	17.41	11.75	18.49	18.48	LOAMY SAND
2-18	1.68	9.94	10.96	79.10	14.01	20.56	13.76	17.02	13.75	15.97	25.30	SANDY LOAM
2-19	1.68	7.13	9.13	83.74	22.70	22.66	13.17	14.57	10.63	20.45	28.42	LOAMY SAND
2-20	1.75	10.37	11.18	78.45	15.08	20.03	14.96	16.64	11.73	17.31	10.95	SANDY LOAM
2-21	1.67	7.36	8.78	83.87	19.32	22.10	14.95	16.20	11.29	20.77	14.48	LOAMY SAND
2-22	1.72	6.83	9.63	83.54	18.05	20.61	16.21	17.22	11.44	20.24	15.63	LOAMY SAND
2-23	1.67	6.88	9.73	83.39	21.35	22.59	15.32	14.53	9.60	19.54	17.32	LOAMY SAND
2-24	1.74	6.88	10.85	82.27	20.73	21.85	14.89	14.95	9.85	19.24	20.65	LOAMY SAND
2-25	1.64	8.86	14.09	77.05	14.32	16.91	11.88	17.33	16.60	15.02	28.38	SANDY LOAM
2-26	1.65	10.32	13.97	75.71	9.00	15.35	14.16	20.36	16.85	11.50	24.33	SANDY LOAM
2-27	1.64	9.16	13.21	77.63	14.84	15.96	12.25	18.06	16.53	13.83	17.28	SANDY LOAM
2-28	1.60	8.96	13.65	77.38	13.67	18.19	12.29	17.32	15.92	17.17	23.25	SANDY LOAM
2-29	1.72	5.91	10.18	83.91	25.49	19.49	10.80	15.32	12.81	27.13	16.98	LOAMY SAND
2-30	1.64	8.38	10.23	81.39	26.84	18.16	11.10	13.96	11.33	24.68	20.75	LOAMY SAND
2-31	1.69	8.30	13.14	78.56	14.75	15.58	12.33	19.00	16.91	22.10	18.30	LOAMY SAND
2-32	1.64	6.43	7.29	86.28	25.12	27.07	14.20	12.42	7.47	15.55	20.05	LOAMY SAND
2-33	1.58	4.41	7.91	87.68	40.20	24.55	9.46	7.93	5.55	28.25	28.13	SAND
2-34	1.59	7.50	12.27	80.24	22.82	20.33	11.93	13.90	11.26	24.06	23.38	LOAMY SAND
2-35	1.61	8.36	15.92	75.72	16.76	20.72	11.60	10.76	15.90	14.00	27.63	SANDY LOAM
2-36	1.65	6.75	10.95	82.29	27.14	21.47	10.81	12.57	10.30	21.66	17.98	LOAMY SAND
2-37	1.67	8.90	12.04	79.06	15.29	19.87	14.85	16.83	12.23	17.30	16.38	LOAMY SAND
2-38	1.63	6.59	10.73	82.69	26.49	20.20	11.67	13.15	11.17	27.74	20.24	LOAMY SAND
2-39	1.60	8.23	10.81	80.96	17.74	20.55	15.70	16.45	10.52	18.07	25.94	LOAMY SAND
2-40	1.67	6.91	10.63	82.45	29.23	20.96	10.63	11.94	9.69	20.44	19.12	LOAMY SAND
2-41	1.67	8.56	11.22	80.22	25.23	22.70	10.99	11.35	9.96	21.18	26.67	LOAMY SAND
2-42	1.59	7.35	9.69	82.96	23.44	25.46	13.13	12.09	8.84	19.51	22.77	LOAMY SAND
2-43	1.68	7.40	9.69	82.92	31.50	19.96	11.87	11.97	7.61	21.47	15.29	LOAMY SAND
2-44	1.69	8.29	8.95	82.76	28.13	21.80	12.96	12.36	7.51	21.74	12.58	LOAMY SAND
2-45	1.66	7.63	8.47	83.90	28.08	24.45	12.65	11.34	7.38	20.00	12.54	LOAMY SAND
2-46	1.61	9.19	10.64	80.17	5.26	32.02	15.93	16.64	10.32	16.27	11.85	LOAMY SAND
2-47	1.51	4.44	14.05	81.51	21.12	22.33	14.56	14.38	9.11	22.19	11.82	LOAMY SAND
2-48	1.63	10.19	2.87	86.94	39.07	21.29	9.68	10.04	6.87	26.70	14.48	LOAMY SAND
2-49	1.59	8.64	8.02	83.34	28.01	22.05	12.37	12.73	8.18	24.75	21.66	LOAMY SAND
2-50	1.66	9.16	8.01	82.82	24.26	23.11	14.43	13.64	7.39	17.60	10.22	LOAMY SAND
AVG	1.68	7.90	9.44	82.66	21.33	22.41	14.63	14.50	9.79	19.86	16.96	
n	50	50	50	50	50	50	50	50	50	50	50	
STD	0.06	1.45	2.66	3.17	6.83	3.61	3.33	2.59	3.37	3.83	6.58	
MAX	1.81	10.37	15.92	88.13	40.20	32.02	24.04	20.36	16.91	28.54	28.42	
MIN	1.51	4.41	2.87	75.71	5.26	15.35	9.46	7.93	4.70	11.50	2.62	
CV%	3.73	18.41	28.23	3.84	32.04	16.12	22.76	17.87	34.41	19.30	38.79	

Table 42. Particle size data for layer 3.

SAMPLE	BD g/cm ³	CLAY % <.002	SILT % .05-.002	SAND % 2-.05	VCS % 2-1	CS % 1-.5	MS % .5-.25	FS % .25-.1	VFS % .1-.05	Coarse % >2	CaCO ₃ %	Textural Class
3-1	1.65	7.63	13.05	79.32	14.59	17.31	14.79	19.25	13.39	17.97	24.28	LOAMY SAND
3-2	1.57	6.79	16.24	76.97	18.34	17.21	11.11	16.44	13.87	22.21	27.04	LOAMY SAND
3-3	1.59	6.60	12.89	80.51	30.62	18.59	9.58	11.36	10.36	14.74	27.67	LOAMY SAND
3-4	1.55	6.83	13.67	79.50	23.55	17.79	10.56	14.52	13.09	27.08	19.44	LOAMY SAND
3-5	1.59	6.56	11.82	81.62	25.00	19.49	11.36	14.48	11.29	33.43	23.10	LOAMY SAND
3-6	1.72	9.28	12.26	78.46	16.08	17.71	15.14	17.84	11.68	23.67	17.21	SANDY LOAM
3-7	1.63	6.29	7.95	85.77	18.01	20.46	16.75	20.16	10.39	25.27	8.60	LOAMY SAND
3-8	1.60	8.57	11.46	79.97	14.31	13.14	14.88	21.75	15.88	14.28	4.12	LOAMY SAND
3-9	1.70	5.92	8.28	85.80	23.25	22.95	16.03	14.83	8.74	16.12	4.24	LOAMY SAND
3-10	1.61	7.49	9.04	83.47	18.13	23.49	17.83	15.97	8.06	19.52	4.39	LOAMY SAND
3-11		9.32	11.46	79.23	22.87	18.04	11.29	14.67	12.36	26.89	3.50	SANDY LOAM
3-12	1.60	13.07	14.41	72.52	13.40	15.47	12.56	17.15	13.95	15.76	5.57	SANDY LOAM
3-13	1.72	12.81	10.71	76.48	11.31	15.84	14.95	21.30	13.08	24.58	5.11	SANDY LOAM
3-14	1.68	9.99	7.89	82.12	19.24	20.87	16.83	17.02	8.16	45.75	15.29	LOAMY SAND
3-15	1.78	10.27	6.44	83.29	8.69	17.39	20.43	27.63	9.16	12.40	7.74	LOAMY SAND
3-16	1.75	10.03	6.26	83.72	23.51	22.37	15.17	14.32	7.86	25.45	8.07	LOAMY SAND
3-17	1.73	9.56	6.33	84.11	27.64	24.21	12.68	12.98	6.60	19.45	4.28	LOAMY SAND
3-18	1.68	14.01	5.22	80.77	13.64	21.09	18.15	17.83	10.07	25.38	4.43	SANDY LOAM
3-19	1.58	11.05	11.62	77.33	13.87	22.21	17.23	15.62	8.40	14.77	7.30	SANDY LOAM
3-20	1.71	7.70	0.67	91.63	27.41	35.55	18.07	7.70	2.91		6.79	SAND
3-21	1.76	7.58	6.93	85.50	20.14	26.14	18.86	14.59	5.77	12.43	6.13	LOAMY SAND
3-22	1.74	5.60	1.41	92.99	14.41	31.41	32.05	14.32	0.80	5.42	2.83	SAND
3-23	1.70	5.43	1.64	92.93	14.06	30.56	30.98	15.65	1.69	3.74	3.81	SAND
3-24	1.78	6.95	4.29	88.77	13.28	26.03	26.56	18.38	4.52	13.62	6.35	SAND
3-25	1.70	6.31	3.77	89.93	16.87	27.54	24.40	16.44	4.68	17.91	5.93	SAND
3-26	1.80	7.21	4.38	88.41	18.09	18.44	24.70	21.91	5.26	15.77	6.04	LOAMY SAND
3-27	1.78	6.67	2.78	90.55	15.41	24.74	27.54	19.17	3.69	12.53	3.32	SAND
3-28	1.75	7.38	4.59	88.02	16.96	22.91	20.65	20.31	7.19	20.64	5.96	LOAMY SAND
3-29	1.76	7.38	4.90	87.72	15.91	20.58	18.89	23.76	8.59	22.53	4.00	LOAMY SAND
3-30	1.78	5.53	3.06	91.41	16.40	27.14	23.42	18.83	5.63	18.31	3.66	SAND
3-31	1.76	5.35	2.97	91.68	16.09	30.36	23.80	17.27	4.16	11.98	2.47	SAND
3-32	1.74	1.61	8.90	89.49	16.78	23.75	24.06	18.93	5.98	23.27	3.11	SAND
3-33	1.74	6.25	2.98	90.76	19.53	27.34	20.29	17.71	5.90	7.51	5.18	SAND
3-34	1.69	4.96	3.47	91.57	22.93	29.97	19.35	14.85	4.46	18.40	5.07	SAND
3-35	1.68	5.46	3.40	91.14	29.38	22.70	18.30	16.00	4.75	8.81	4.57	SAND
3-36	1.71	5.49	3.83	90.68	17.56	29.44	22.11	17.10	4.46	12.90	4.18	SAND
3-37	1.71	4.68	1.95	93.37	16.23	31.29	24.40	17.03	4.41	7.55	3.71	SAND
3-38	1.66	3.06	4.01	92.93	32.44	33.19	14.54	9.83	2.92	23.50	2.88	SAND
3-39	1.69	5.87	4.63	89.50	26.97	24.12	16.55	15.27	6.59	17.90	4.27	SAND
3-40	1.68	6.92	6.67	86.41	22.13	19.72	17.15	19.03	8.38	16.65	5.43	LOAMY SAND
3-41	1.72	8.09	8.98	82.93	13.89	21.79	18.36	19.20	9.69	10.68	2.99	LOAMY SAND
3-42	1.67	13.35	13.28	73.36	11.41	16.30	14.67	19.14	11.84	18.70	11.26	SANDY LOAM
3-43	1.67	12.67	11.74	75.58	9.72	13.27	13.98	23.61	15.00	14.05	9.14	SANDY LOAM
3-44	1.70	20.37	12.62	67.01	8.48	11.66	12.82	20.52	13.53	14.34	7.93	SANDY CLAY LOAM
3-45	1.73	9.04	8.80	82.15	15.89	17.71	16.41	21.02	11.13	27.64	9.37	LOAMY SAND
3-46	1.68	12.05	14.34	73.61	14.14	16.87	12.59	16.97	13.04	35.54	7.91	SANDY LOAM
3-47	1.81	8.64	7.74	83.62	17.93	24.56	18.42	15.10	7.61	24.39	11.69	LOAMY SAND
3-48	1.67	8.43	8.31	83.26	35.56	15.51	10.71	12.48	9.00	41.67	10.57	LOAMY SAND
3-49	1.69	8.03	9.84	82.13	24.99	20.04	13.14	14.35	9.62	22.08	20.93	LOAMY SAND
3-50	1.78	9.14	9.31	81.55	25.14	21.76	13.29	13.00	8.35	29.45	12.35	LOAMY SAND
AVG	1.70	8.10	7.66	84.23	18.84	22.17	17.77	17.09	8.36	19.48	8.42	
n	49	50	50	50	50	50	50	50	50	49	50	
STD	0.06	3.16	4.10	6.30	6.19	5.57	5.28	3.62	3.73	8.58	6.60	
MAX	1.81	20.37	16.24	93.37	35.56	35.55	32.05	27.63	15.88	45.75	27.67	
MIN	1.55	1.61	0.67	67.01	8.48	11.66	9.58	7.70	0.80	3.74	2.47	
CV%	3.78	39.02	53.45	7.48	32.83	25.13	29.72	21.16	44.68	44.02	78.36	

Table 43. Particle size data for layer 4.

SAMPLE	BD g/cm ³	CLAY % <.002	SILT % .05-.002	SAND % 2-.05	VCS % 2-1	CS % 1-.5	MS % .5-.25	FS % .25-.1	VFS % .1-.05	Coarse % >2	CaCO ₃ %	Textural Class
4-1	1.75	2.26	12.07	85.67	25.50	21.32	13.56	14.78	10.52	24.11	11.06	LOAMY SAND
4-2	1.77	5.34	12.39	82.26	20.07	21.76	13.72	15.35	11.37	25.83	17.02	LOAMY SAND
4-3	1.75	3.24	6.43	90.33	26.64	27.12	14.87	13.75	7.95	23.38	8.61	SAND
4-4	1.77	7.43	6.01	86.56	29.40	23.57	13.62	13.04	6.93	25.28	10.03	LOAMY SAND
4-5	1.77	4.70	7.40	87.90	30.31	20.63	13.51	14.94	8.52	31.15	9.21	SAND
4-6	1.73	4.29	6.02	89.69	37.91	25.87	11.25	9.40	5.25	29.19	12.36	SAND
4-7	1.71	11.66	10.44	77.90	16.76	19.92	14.87	16.36	9.98	24.80	8.31	SANDY LOAM
4-8	1.82	8.96	11.76	79.29	22.83	17.18	12.38	15.66	11.23	29.98	19.28	LOAMY SAND
4-9	1.92	7.26	10.29	82.45	23.27	20.23	13.44	15.34	10.17	28.09	11.71	LOAMY SAND
4-10	1.71	7.83	9.78	82.38	13.91	21.02	17.97	18.74	10.75	15.67	12.00	LOAMY SAND
4-11	1.76	6.42	10.50	83.08	14.85	15.01	12.45	24.53	16.24	17.13	8.47	LOAMY SAND
4-12	1.78	6.31	5.48	88.21	23.74	33.28	9.90	15.18	6.11	22.28	6.89	SAND
4-13	1.78	9.64	8.24	82.12	14.85	18.68	17.22	20.56	10.82	23.94	7.44	LOAMY SAND
4-14	1.54	4.53	1.62	93.85	29.41	31.14	23.58	8.47	1.25	15.74	1.91	SAND
4-15	1.75	4.27	2.42	93.32	33.26	30.46	19.51	8.47	1.61	10.46	3.58	SAND
4-16		5.40	2.09	92.51	29.56	24.70	20.23	15.51	2.52	14.48	5.60	SAND
4-17	1.60	4.74	2.01	93.25	33.54	29.04	18.82	10.19	1.66	18.07	3.69	SAND
4-18	1.51	5.49	3.61	90.90	42.38	28.15	10.25	6.91	3.21	19.90	5.66	SAND
4-19	1.62	5.01	3.35	91.64	36.26	31.62	15.55	6.41	1.80	15.77	5.63	SAND
4-20	1.83	9.12	7.32	83.56	15.99	21.12	21.69	17.66	7.11	21.84	12.63	LOAMY SAND
4-21	1.81	10.35	11.39	78.26	17.55	18.16	14.79	17.71	10.05	23.86	7.49	SANDY LOAM
4-22	1.70	9.52	9.19	81.29	21.94	20.41	13.72	15.69	9.53	17.52	10.42	LOAMY SAND
4-23	1.87	9.84	11.22	78.93	19.26	17.52	13.23	17.36	11.55	20.33	11.45	SANDY LOAM
4-24	1.62	8.38	10.28	81.34	30.30	16.07	9.84	15.93	9.20	21.00	9.40	LOAMY SAND
4-25	1.73	9.31	9.37	81.32	25.80	20.81	12.93	13.56	8.22	22.72	9.49	LOAMY SAND
4-26	1.79	7.46	12.65	79.89	10.55	18.53	16.59	21.25	12.97	8.65	10.16	LOAMY SAND
4-27	1.80	8.93	9.54	81.53	19.93	18.42	15.12	17.99	10.06	17.76	7.76	LOAMY SAND
4-28	1.76	8.83	12.08	79.09	12.56	17.30	15.51	21.02	12.70	16.72	7.60	LOAMY SAND
4-29	1.75	9.78	10.47	79.74	13.07	18.25	17.53	21.26	9.63	16.56	7.87	SANDY LOAM
4-30	1.67	5.91	10.74	83.35	26.63	20.61	16.59	16.49	3.04	23.37	4.76	LOAMY SAND
4-31	1.70	7.10	7.13	85.76	26.86	22.18	14.82	15.11	6.80	15.78	8.16	LOAMY SAND
4-32	1.67	6.02	6.78	87.20	29.38	17.65	14.70	17.83	7.65	13.21	6.05	LOAMY SAND
4-33	1.74	6.81	5.84	87.34	25.62	18.48	16.89	19.42	6.93	22.35	7.14	LOAMY SAND
4-34	1.66	11.58	12.21	76.21	11.54	11.48	10.89	24.47	17.84	12.32	11.33	SANDY LOAM
4-35	1.69	8.21	7.88	83.91	22.22	16.86	15.65	19.61	9.56	19.43	8.29	LOAMY SAND
4-36	1.73	7.01	4.81	88.18	24.98	26.51	17.77	13.01	5.91	14.92	7.46	LOAMY SAND
4-37	1.81	6.97	2.35	90.69	12.63	29.46	25.86	18.77	3.98	12.74	3.65	SAND
4-38	1.63	4.43	1.78	93.78	26.43	39.54	17.16	9.02	1.63	3.91	3.18	SAND
4-39	1.67	4.78	2.00	93.22	30.06	36.42	15.99	9.23	1.52	4.07	3.40	SAND
4-40	1.53	5.31	3.06	91.63	48.05	22.91	10.41	7.12	3.14	18.65	6.07	SAND
4-41	1.75	5.70	3.79	90.51	39.00	24.18	12.99	10.17	4.18	29.59	10.33	SAND
4-42	1.68	4.61	5.75	89.64	34.56	25.44	12.78	11.08	5.77	29.29	9.68	SAND
4-43	1.69	11.86	6.84	81.30	31.62	21.17	12.16	10.63	5.72	21.80	9.53	SANDY LOAM
4-44	1.70	10.80	11.60	77.61	21.87	22.14	14.94	12.31	6.35	18.92	9.60	SANDY LOAM
4-45	1.49	12.30	17.46	70.24	22.78	19.50	10.14	10.01	7.82	26.13	13.19	SANDY LOAM
4-46	1.73	5.55	7.29	87.16	41.73	17.54	10.68	10.61	6.61	35.40	13.93	LOAMY SAND
4-47	1.70	6.45	9.13	84.42	40.70	15.94	10.07	10.79	6.92	42.63	12.77	LOAMY SAND
4-48	1.73	12.00	10.57	77.42	26.37	14.09	11.50	14.79	10.68	39.73	15.16	SANDY LOAM
4-49	1.74	6.45	7.34	86.21	34.44	15.79	11.74	14.55	9.69	24.22	13.51	LOAMY SAND
4-50	1.66	4.21	6.81	88.98	41.51	22.06	10.35	9.45	5.61	24.36	14.06	SAND
AVG	1.72	7.21	7.73	85.06	26.21	22.14	14.63	14.55	7.53	21.10	9.08	
n	49	50	50	50	50	50	50	50	50	50	50	
STD	0.09	2.52	3.66	5.54	9.13	5.87	3.57	4.53	3.82	7.76	3.69	
MAX	1.92	12.30	17.46	93.85	48.05	39.54	25.86	24.53	17.84	42.63	19.28	
MIN	1.49	2.26	1.62	70.24	10.55	11.48	9.84	6.41	1.25	3.91	1.91	
CV%	5.05	35.02	47.30	6.52	34.85	26.49	24.37	31.16	50.73	36.79	40.63	

Table 44. Particle size data for layer 5.

SAMPLE	BD g/cm ³	CLAY % <.002	SILT % .05-.002	SAND % 2-.05	VCS % 2-1	CS % 1-.5	MS % .5-.25	FS % .25-.1	VFS % .1-.05	Coarse % >2	CaCO ₃ %	Textural Class
5-1	1.75	6.52	7.02	86.46	24.21	23.57	16.28	15.84	6.57	20.02	4.31	LOAMY SAND
5-2	1.77	5.25	6.57	88.17	26.37	25.22	16.56	13.76	6.27	23.90	9.42	SAND
5-3	1.71	6.15	5.98	87.87	37.40	21.21	12.56	10.88	5.83	22.48	13.71	LOAMY SAND
5-4	1.77	6.32	7.57	86.11	27.36	23.07	15.01	13.50	7.17	24.95	10.22	LOAMY SAND
5-5	1.78	5.12	6.30	88.57	34.79	24.95	12.27	10.98	5.57	24.95	10.77	SAND
5-6	1.82	7.90	9.72	82.38	25.78	18.71	14.14	14.78	8.97	23.63	12.42	LOAMY SAND
5-7	1.84	8.02	11.07	80.91	20.39	18.31	16.07	15.85	10.29	24.39	9.89	LOAMY SAND
5-8	1.75	7.05	12.45	80.50	20.82	19.29	13.84	15.71	10.85	22.43	14.17	LOAMY SAND
5-9	1.77	6.66	9.17	84.17	25.05	20.43	14.85	14.86	8.99	27.33	15.73	LOAMY SAND
5-10	1.74	5.91	8.06	86.03	18.98	19.99	18.26	19.29	9.52	25.42	12.28	LOAMY SAND
5-11	1.81	5.62	7.98	86.40	23.13	22.28	17.41	15.89	7.68	22.09	14.26	LOAMY SAND
5-12	1.76	7.04	6.97	86.00	19.78	23.41	17.46	16.55	8.81	19.28	13.13	LOAMY SAND
5-13	1.76	6.66	5.87	87.47	26.51	25.06	15.45	14.02	6.43	24.71	9.51	LOAMY SAND
5-14	1.80	7.85	6.03	86.12	21.52	25.00	18.08	15.87	5.66	20.28	9.07	LOAMY SAND
5-15	1.72	6.96	5.30	87.74	26.22	24.00	18.47	14.16	4.89	26.91	9.21	LOAMY SAND
5-16	1.72	5.10	4.07	90.84	27.47	23.60	17.63	18.21	3.92	34.31	4.23	SAND
5-17	1.66	8.42	9.63	81.94	20.46	20.21	16.98	17.19	7.11	33.82	5.03	LOAMY SAND
5-18	1.75	4.04	2.59	93.37	18.63	26.00	28.51	18.06	2.18	16.19	5.36	SAND
5-19	1.75	4.68	2.99	92.32	20.49	26.13	24.74	18.52	2.44	11.30	4.88	SAND
5-20	1.71	4.90	3.36	91.74	31.85	27.88	16.66	12.37	2.98	15.55	5.81	SAND
5-21	1.75	8.51	6.56	84.93	22.68	25.27	17.02	14.38	5.58	20.21	7.45	LOAMY SAND
5-22	1.68	7.44	5.34	87.22	27.20	25.66	16.10	12.81	5.45	23.70	9.89	LOAMY SAND
5-23	1.76	7.52	5.04	87.44	29.81	24.24	14.91	12.72	5.77	25.87	7.70	LOAMY SAND
5-24	1.74	7.05	4.38	88.58	29.38	24.87	17.45	12.42	4.46	22.04	12.17	SAND
5-25	1.82	7.35	5.45	87.20	25.17	24.30	17.31	14.29	6.13	20.62	11.28	LOAMY SAND
5-26	1.79	9.28	10.56	80.16	23.42	20.74	12.93	14.02	9.04	27.70	14.72	LOAMY SAND
5-27	1.78	9.73	9.24	81.02	19.35	22.47	14.58	15.28	9.35	25.90	8.30	LOAMY SAND
5-28	1.70	11.01	12.72	76.27	24.80	17.67	10.27	13.60	9.93	32.37	8.62	SANDY LOAM
5-29	1.77	8.21	7.08	84.71	30.33	24.61	12.43	11.80	5.54	31.01	4.68	LOAMY SAND
5-30	1.81	11.07	9.48	79.45	21.69	20.09	14.32	15.71	7.64	28.26	5.24	SANDY LOAM
5-31	1.75	7.87	6.82	85.30	34.72	23.91	12.17	10.19	4.31	31.48	7.27	LOAMY SAND
5-32	1.76	9.02	7.99	82.99	15.57	19.76	19.89	19.76	8.01	26.76	11.48	LOAMY SAND
5-33	1.79	14.59	9.22	76.19	7.13	15.33	20.69	23.79	9.26	27.60	7.72	SANDY LOAM
5-34	1.65	7.21	5.91	86.89	37.14	28.84	9.92	7.13	3.85	29.37	12.63	LOAMY SAND
5-35	1.63	7.84	6.56	85.59	24.13	25.26	16.09	13.48	6.63	24.05	14.87	LOAMY SAND
5-36	1.78	7.71	6.70	85.59	18.83	22.37	20.41	17.06	6.92	16.59	11.01	LOAMY SAND
5-37	1.76	8.29	6.48	85.23	24.30	25.14	16.25	13.23	6.33	22.20	11.33	LOAMY SAND
5-38	1.72	7.21	6.38	86.41	27.79	24.24	14.93	13.08	6.35	26.37	10.47	LOAMY SAND
5-39	1.70	8.31	8.68	83.00	23.35	20.24	14.59	15.53	9.29	23.33	11.73	LOAMY SAND
5-40	1.77	9.50	6.68	83.83	19.53	21.98	15.46	16.38	10.47	21.69	11.34	LOAMY SAND
5-41	1.75	8.31	9.79	81.90	11.66	19.09	17.95	20.96	12.23	17.50	9.88	LOAMY SAND
5-42	1.73	8.68	10.46	80.86	16.48	21.33	14.98	17.39	10.69	24.53	11.16	LOAMY SAND
5-43	1.76	8.45	10.08	81.48	22.51	20.29	13.67	15.20	9.80	38.09	11.66	LOAMY SAND
5-44	1.73	7.39	7.74	84.87	27.36	22.78	14.15	12.80	7.78	25.07	13.75	LOAMY SAND
5-45	1.73	7.62	9.35	83.04	17.52	21.78	16.61	17.13	9.99	21.91	12.73	LOAMY SAND
5-46	1.74	9.29	9.24	81.46	22.12	20.59	30.03	8.62	0.10	22.12	13.25	LOAMY SAND
5-47	1.69	8.37	9.96	81.67	20.98	21.77	14.77	15.34	8.82	23.13	12.91	LOAMY SAND
5-48	1.72	6.16	8.08	85.77	21.25	24.66	17.80	14.53	7.52	28.38	13.48	LOAMY SAND
5-49	1.64	9.62	8.39	81.99	10.19	19.81	20.30	21.68	10.01	40.83	9.53	LOAMY SAND
5-50	1.66	7.70	8.49	83.81	29.19	22.41	14.23	12.18	5.79	24.00	9.21	LOAMY SAND
AVG	1.74	7.65	7.55	84.80	23.66	22.60	16.47	14.98	7.10	24.73	10.22	
n	50	50	50	50	50	50	50	50	50	50	50	
STD	0.05	1.82	2.28	3.65	6.19	2.75	3.77	3.14	2.55	5.48	3.08	
MAX	1.84	14.59	12.72	93.37	37.40	28.84	30.03	23.79	12.23	40.83	15.73	
MIN	1.63	4.04	2.59	76.19	7.13	15.33	9.92	7.13	0.10	11.30	4.23	
CV%	2.70	23.80	30.20	4.31	26.15	12.17	22.91	20.96	35.92	22.15	30.18	

Table 45. Particle size data for layer 6.

SAMPLE	BD g/cm ³	CLAY % <.002	SILT % .05-.002	SAND % 2-.05	VCS % 2-1	CS % 1-.5	MS % .5-.25	FS % .25-.1	VFS % .1-.05	Coarse % >2	CaCO ₃ %	Textural Class
6-1	1.74	10.28	12.10	77.62	26.17	24.57	11.94	10.23	4.71	28.04	6.11	SANDY LOAM
6-2	1.68	13.58	12.08	74.34	17.04	21.73	14.81	13.98	6.77	20.22	8.31	SANDY LOAM
6-3	1.69	13.18	9.20	77.63	28.33	21.51	11.95	10.52	5.33	23.24	5.54	SANDY LOAM
6-4	1.80	12.70	11.30	76.00	21.70	20.93	13.77	12.78	6.82	18.55	9.29	SANDY LOAM
6-5	1.62	12.96	9.99	77.06	19.46	20.06	14.82	15.29	7.44	18.22	5.19	SANDY LOAM
6-6	1.75	14.46	11.57	73.97	20.51	20.17	12.81	13.25	7.23	32.35	8.85	SANDY LOAM
6-7	1.66	12.26	10.13	77.62	10.85	20.71	20.64	18.22	7.19	28.89	4.27	SANDY LOAM
6-8	1.69	12.09	10.44	77.47	24.01	21.58	13.73	12.32	5.84	22.01	1.89	SANDY LOAM
6-9	1.69	9.20	6.78	83.62	27.60	27.18	15.54	9.61	3.69	24.70	2.43	LOAMY SAND
6-10	1.71	12.30	8.19	79.51	14.55	21.64	19.79	17.35	6.18	23.00	3.24	SANDY LOAM
6-11	1.72	18.77	12.74	68.48	8.99	17.85	15.95	16.81	8.88	18.35	5.18	SANDY LOAM
6-12	1.68	13.49	7.57	78.94	9.29	23.17	22.09	18.36	6.03	19.07	2.86	SANDY LOAM
6-13	1.71	13.86	5.25	80.89	11.26	25.13	22.01	17.00	5.49	26.62	1.90	SANDY LOAM
6-14	1.69	8.04	4.59	87.37	21.81	29.80	19.09	12.79	3.88	20.75	4.14	LOAMY SAND
6-15	1.80	6.82	3.12	90.06	23.95	30.54	20.63	12.37	2.56	23.51	1.77	SAND
6-16	1.72	19.98	8.22	71.80	5.92	16.48	20.27	21.11	8.02	22.67	2.89	SANDY LOAM
6-17	1.76	6.82	3.52	89.66	36.92	26.69	13.82	9.39	2.84	20.16	3.16	SAND
6-18	1.83	8.41	4.41	87.18	19.35	28.07	21.16	14.43	4.16	19.66	3.57	LOAMY SAND
6-19	1.76	8.63	4.34	87.03	18.34	28.44	20.37	15.39	4.47	18.70	2.84	LOAMY SAND
6-20	1.72	7.39	3.69	88.92	33.84	25.86	14.73	11.26	3.23	20.59	5.76	SAND
6-21	1.75	5.43	2.76	91.81	29.81	31.32	16.83	11.05	2.80	27.19	2.50	SAND
6-22	1.71	6.09	3.87	90.05	36.58	26.33	14.14	9.75	3.24	21.00	3.98	SAND
6-23	1.75	7.53	5.16	87.31	29.11	26.22	15.63	11.54	4.81	17.75	4.93	LOAMY SAND
6-24	1.81	6.00	3.02	90.98	8.13	21.71	30.98	25.03	5.13	8.10	1.43	SAND
6-25	1.70	7.39	4.66	87.95	25.80	25.17	18.63	13.78	4.58	16.87	3.62	LOAMY SAND
6-26	1.56	13.07	6.40	80.53	5.08	18.17	25.93	23.87	7.48	12.82	5.16	SANDY LOAM
6-27	1.72	6.95	4.15	88.89	16.18	29.11	23.23	16.26	4.10	27.55	6.17	SAND
6-28	1.73	2.65	1.98	95.36	57.12	20.37	11.63	5.18	1.06	36.00	3.57	SAND
6-29	1.62	3.86	3.19	92.95	43.10	26.73	13.57	7.20	2.34	31.59	6.47	SAND
6-30	1.84	8.92	2.44	88.64	8.31	25.60	29.96	20.75	4.02	8.43	2.31	LOAMY SAND
6-31	1.84	6.88	4.27	88.86	19.04	30.21	21.65	13.88	4.09	16.59	7.48	SAND
6-32	1.85	6.47	2.72	90.81	17.63	27.32	23.45	18.17	4.24	8.04	2.38	SAND
6-33	1.79	7.38	7.32	85.30	17.20	24.11	21.34	16.78	5.87	14.95	8.11	LOAMY SAND
6-34	1.82	4.18	2.37	93.45	32.37	25.76	18.10	13.05	4.17	24.11	4.60	SAND
6-35	1.76	6.02	6.91	87.08	32.73	22.46	14.66	11.71	5.53	17.41	6.57	LOAMY SAND
6-36	1.78	3.71	4.98	91.32	19.90	26.74	22.84	17.34	4.49	24.53	4.89	SAND
6-37	1.73	4.39	3.54	92.08	32.94	28.90	16.26	11.04	2.93	14.18	4.02	SAND
6-38	1.84	4.37	3.11	92.51	21.43	26.08	22.15	18.01	4.84	11.99	2.62	SAND
6-39	1.90	6.37	5.14	88.49	28.36	26.72	16.89	12.40	4.13	32.40	5.27	SAND
6-40	1.80	6.27	5.27	88.46	21.01	21.69	19.97	19.56	6.22	19.57	3.80	SAND
6-41	1.80	5.04	4.53	90.44	26.02	24.67	17.55	16.67	5.53	13.78	4.87	SAND
6-42	1.75	5.41	4.97	89.63	29.23	24.53	16.57	13.69	5.61	16.93	6.46	SAND
6-43	1.75	4.35	5.85	89.81	20.43	24.21	15.64	16.99	12.54	23.60	6.75	SAND
6-44	1.72	4.06	4.89	91.05	38.70	27.36	12.49	8.39	4.12	31.74	7.52	SAND
6-45	1.76	4.46	6.00	89.54	23.28	27.44	17.14	14.59	7.09	20.05	4.63	SAND
6-46	1.78	6.50	9.13	84.38	15.30	24.17	19.47	17.01	8.42	15.77	7.44	LOAMY SAND
6-47	1.73	5.75	5.93	88.32	27.96	24.03	16.99	14.04	5.30	28.43	6.35	SAND
6-48	1.69	5.16	4.58	90.26	29.35	27.02	17.18	12.21	4.50	17.58	4.20	SAND
6-49	1.75	5.27	7.33	87.40	10.94	25.89	26.06	19.25	5.25	19.13	4.43	LOAMY SAND
6-50	1.63	5.22	3.26	91.51	37.41	26.14	13.15	10.24	4.57	25.18	4.80	SAND
AVG	1.74	8.21	5.98	85.81	23.21	24.77	18.20	14.44	5.20	21.05	4.73	
n	50	50	50	50	50	50	50	50	50	50	50	
STD	0.07	3.99	2.93	6.44	10.43	3.42	4.51	4.10	1.97	6.39	1.98	
MAX	1.90	19.98	12.74	95.36	57.12	31.32	30.98	25.03	12.54	36.00	9.29	
MIN	1.56	2.65	1.98	68.48	5.08	16.48	11.63	5.18	1.06	8.04	1.43	
CV%	3.83	48.62	48.99	7.50	44.93	13.81	24.75	28.38	37.83	30.36	41.77	

Table 46. Particle size data for layer 7.

SAMPLE	BD g/cm ³	CLAY % <.002	SILT % .05-.002	SAND % 2-.05	VCS % 2-1	CS % 1-.5	MS % .5-.25	FS % .25-.1	VFS % .1-.05	Coarse % >2	CaCO ₃ %	Textural Class
7-1	1.54	10.30	22.54	77.16	23.75	23.10	11.77	10.83	7.72	43.02	6.97	SANDY LOAM
7-2	1.68	9.48	11.96	78.56	32.49	19.39	9.65	9.74	7.29	34.47	12.35	SANDY LOAM
7-3	1.63	9.65	13.23	77.12	29.98	18.25	10.22	11.00	7.69	27.15	11.29	SANDY LOAM
7-4	1.55	5.82	13.19	80.99	34.37	20.22	9.98	9.68	6.75	31.70	11.23	LOAMY SAND
7-5	1.52	8.56	15.88	75.56	25.19	18.86	10.56	11.67	9.28	32.99	15.24	SANDY LOAM
7-6	1.69	6.55	15.85	77.61	24.33	22.76	6.44	13.25	10.83	23.78	9.64	LOAMY SAND
7-7	1.66	7.63	10.96	81.41	31.69	21.51	10.90	10.42	6.89	29.37	9.90	LOAMY SAND
7-8	1.66	10.09	14.76	75.15	21.38	18.66	12.53	13.15	9.43	26.17	9.64	SANDY LOAM
7-9	1.62	9.85	10.80	79.34	24.01	21.99	12.01	13.23	8.11		8.15	SANDY LOAM
7-10	1.73	10.86	13.23	75.91	20.87	20.35	12.52	12.81	9.37	29.79	10.24	SANDY LOAM
7-11	1.72	11.20	12.32	76.48	23.36	20.57	11.65	12.11	8.79	35.28	10.04	SANDY LOAM
7-12	1.71	9.25	10.27	80.48	30.84	20.33	10.65	10.94	7.72	37.44	12.68	LOAMY SAND
7-13	1.68	9.42	16.06	74.52	21.05	17.91	11.50	14.02	10.04	32.96	7.77	SANDY LOAM
7-14	1.67	11.75	11.85	76.40	30.86	17.16	10.56	9.69	8.13	37.21	10.76	SANDY LOAM
7-15	1.69	6.67	14.65	78.68	30.12	22.25	8.13	8.93	9.26	34.68	15.98	LOAMY SAND
7-16	1.71	8.57	17.60	73.83	19.88	18.21	12.27	14.26	9.20	31.74	13.76	SANDY LOAM
7-17	1.71	7.20	16.05	76.74	20.02	17.64	12.30	15.08	11.70	29.49	12.04	SANDY LOAM
7-18	1.72	8.42	14.00	77.58	26.44	19.84	10.67	11.59	9.03	39.18	23.34	SANDY LOAM
7-19	1.64	10.60	14.39	75.01	22.58	17.42	10.86	13.51	10.64	37.70	15.05	SANDY LOAM
7-20	1.64	8.92	12.32	78.75	19.68	19.43	13.25	15.54	10.85	28.31	9.47	SANDY LOAM
7-21	1.77	6.04	11.82	82.14	26.93	22.22	12.25	12.05	8.70	31.65	18.25	LOAMY SAND
7-22	1.69	8.69	17.57	73.74	21.12	18.95	10.91	12.60	10.15	35.45	18.17	SANDY LOAM
7-23	1.71	19.72	3.54	76.75	21.50	17.44	10.69	14.95	12.17	33.33	13.56	SANDY LOAM
7-24	1.69	9.02	15.26	75.71	17.34	18.67	12.41	15.58	11.71	32.87	9.25	SANDY LOAM
7-25	1.70	9.32	11.61	79.07	20.36	19.42	13.20	15.85	10.25	35.89	12.81	SANDY LOAM
7-26	1.66	7.10	10.95	81.95	28.97	21.48	10.76	11.61	9.12	32.69	8.43	LOAMY SAND
7-27	1.53	10.25	10.03	79.72	19.31	22.55	14.14	14.99	8.71	28.29	7.82	SANDY LOAM
7-28	1.59	8.68	10.78	80.53	23.71	19.77	13.45	15.06	8.55	39.23	16.12	LOAMY SAND
7-29	1.68	8.48	8.72	82.80	26.50	22.42	13.27	13.24	7.36	41.43	22.07	LOAMY SAND
7-30	1.67	10.81	10.22	78.97	29.22	19.11	11.06	11.73	7.86	37.27	23.31	SANDY LOAM
7-31	1.63	12.34	12.48	75.18	19.07	17.14	12.58	15.61	10.78	32.19	19.53	SANDY LOAM
7-32	1.68	8.51	15.81	75.67	17.69	16.70	13.11	16.81	11.35	34.60	10.67	SANDY LOAM
7-33	1.63	7.63	10.13	82.24	22.56	22.02	14.13	14.64	8.89	16.84	11.73	LOAMY SAND
7-34	1.62	8.51	8.58	82.91	28.04	23.75	12.51	11.60	7.02	28.92	19.26	LOAMY SAND
7-35	1.66	8.60	9.46	81.95	16.16	21.28	20.08	18.13	6.29	35.73	19.63	LOAMY SAND
7-36	1.70	10.85	14.66	74.49	26.85	18.35	10.38	11.23	7.67	45.03	21.38	SANDY LOAM
7-37	1.70	12.31	14.48	73.21	21.37	18.49	11.50	12.71	9.15	45.91	21.27	SANDY LOAM
7-38	1.73	7.76	17.11	75.13	18.55	19.27	12.04	13.83	11.43	40.48	18.38	SANDY LOAM
7-39	1.68	9.47	17.00	73.54	18.83	18.68	11.39	13.45	11.20	47.18	13.06	SANDY LOAM
7-40	1.64	8.92	14.98	76.10	20.68	20.54	12.09	12.89	9.91	29.18	17.64	SANDY LOAM
7-41	1.58	10.18	13.40	76.42	27.64	18.25	10.28	11.75	8.50	36.95	15.92	SANDY LOAM
7-42	1.68	11.12	15.81	73.07	19.01	17.35	11.59	14.18	10.95	45.69	11.58	SANDY LOAM
7-43	1.71	8.59	18.25	73.15	22.69	18.44	10.45	11.83	9.75	30.43	10.94	SANDY LOAM
7-44	1.68	7.18	13.83	78.99	23.24	23.77	11.60	11.16	9.22	25.75	11.25	LOAMY SAND
7-45	1.59	10.26	11.46	78.28	25.52	22.11	12.65	10.99	7.01	29.22	13.31	SANDY LOAM
7-46	1.68	5.93	15.56	78.50	25.14	19.20	12.05	13.80	8.31	35.03	10.64	LOAMY SAND
7-47	1.77	5.64	19.50	74.87	21.99	18.00	11.61	13.07	10.20	35.01	18.26	SANDY LOAM
7-48	1.74	6.04	17.44	76.52	24.27	24.15	11.18	10.04	6.88	34.19	8.05	LOAMY SAND
7-49	1.72	1.93	8.43	89.64	35.22	24.50	12.29	11.18	6.46	32.88	5.34	SAND
7-50	1.74	7.45	11.37	81.18	23.38	20.39	13.22	14.79	9.39	29.77	8.61	LOAMY SAND
AVG	1.67	8.96	13.24	77.79	24.12	20.00	11.75	12.86	9.07	33.91	13.44	
n	50	50	50	50	50	50	50	50	50	49	50	
STD	0.06	2.50	3.08	3.30	4.64	2.09	1.85	2.03	1.54	5.96	4.67	
MAX	1.77	19.72	19.50	89.64	35.22	24.50	20.08	18.13	12.17	47.18	23.34	
MIN	1.52	1.93	3.54	73.07	16.16	16.70	6.44	8.93	6.29	16.84	5.34	
CV%	3.48	27.86	23.29	4.24	19.23	10.44	15.73	15.78	17.01	17.57	34.73	

Table 47. Particle size data for layer 8.

SAMPLE	BD g/cm ³	CLAY % <.002	SILT % .05-.002	SAND % 2-.05	VCS % 2-1	CS % 1-.5	MS % .5-.25	FS % .25-.1	VFS % .1-.05	Coarse % >2	CaCO ₃ %	Textural Class
B-1	1.64	11.47	11.96	76.57	19.87	18.28	13.35	15.70	9.37	20.05	41.21	SANDY LOAM
B-2	1.72	12.29	12.45	75.26	21.05	16.18	12.21	15.70	10.12	23.35	40.85	SANDY LOAM
B-3	1.71	10.94	11.55	77.51	22.38	18.26	12.66	14.97	9.24	33.38	41.30	SANDY LOAM
B-4	1.57	11.71	10.48	77.81	25.91	17.15	10.99	14.03	9.73	27.20	33.71	SANDY LOAM
B-5	1.69	9.26	12.07	78.67	20.77	17.61	11.91	16.31	12.07	22.96	21.15	SANDY LOAM
B-6	1.68	8.30	8.32	83.38	21.90	20.99	14.73	16.47	9.29	25.20	20.39	LOAMY SAND
B-7	1.61	10.47	11.23	78.30	21.11	19.38	12.28	14.91	10.63	28.79	26.21	SANDY LOAM
B-8	1.65	9.35	11.06	79.60	21.91	18.54	12.22	16.02	10.91	29.81	27.63	LOAMY SAND
B-9	1.76	9.16	9.96	80.88	21.05	18.80	14.35	17.30	9.38	29.67	23.94	LOAMY SAND
B-10	1.76	8.96	9.55	81.49	20.39	18.51	14.12	17.99	10.49	24.29	25.72	LOAMY SAND
B-11	1.78	10.23	13.77	76.00	14.06	18.17	13.99	17.91	11.87	9.25	25.35	SANDY LOAM
B-12	1.73	9.28	10.25	80.47	18.85	21.45	14.65	25.45	0.07	25.21	13.06	LOAMY SAND
B-13	1.68	9.97	11.81	78.22	18.82	18.31	13.68	16.42	11.00	20.08	19.41	SANDY LOAM
B-14	1.70	10.80	10.72	78.48	18.92	19.78	14.20	15.66	9.92	16.60	12.72	SANDY LOAM
B-15	1.84	11.24	7.82	80.94	17.88	13.16	26.01	16.23	7.66	26.73	13.42	SANDY LOAM
B-16	1.64	14.31	14.02	71.67	11.54	17.27	13.52	17.51	11.83	21.69	25.96	SANDY LOAM
B-17	1.66	12.03	9.84	78.13	20.05	20.36	13.10	14.80	9.82	23.52	28.64	SANDY LOAM
B-18	1.76	12.14	10.68	77.18	20.85	21.20	12.20	13.55	9.39	32.73	32.33	SANDY LOAM
B-19	1.71	10.44	8.67	80.89	24.52	23.55	12.92	12.18	7.72	29.17	31.26	LOAMY SAND
B-20	1.64	11.49	12.17	76.34	15.00	30.84	10.71	12.08	7.71	23.92	24.80	SANDY LOAM
B-21	1.68	9.43	12.45	78.12	20.42	21.06	13.30	14.55	8.79	22.04	32.69	SANDY LOAM
B-22	1.41	12.96	16.38	70.66	14.04	16.49	12.78	16.11	11.23	15.91	29.23	SANDY LOAM
B-23	1.74	11.14	7.20	81.66	28.56	22.00	11.81	12.42	6.88	21.78	18.07	LOAMY SAND
B-24	1.75	10.39	11.73	77.88	22.26	19.45	13.27	14.11	8.80	18.43	30.50	SANDY LOAM
B-25	1.86	12.23	11.88	75.89	11.96	16.93	15.31	19.14	12.56	27.84	24.65	SANDY LOAM
B-26	1.73	11.21	12.04	76.75	18.66	18.70	12.89	16.00	10.50	32.69	20.50	SANDY LOAM
B-27	1.64	12.77	12.75	74.48	12.06	17.62	14.48	18.30	12.02	23.00	26.35	SANDY LOAM
B-28	1.65	13.96	13.57	72.47	18.15	17.26	11.57	14.75	10.74	21.35	20.48	SANDY LOAM
B-29	1.71	13.91	14.28	71.81	12.27	17.82	12.70	16.64	12.38	16.16	20.77	SANDY LOAM
B-30	1.74	13.59	14.07	72.34	17.34	16.98	11.81	15.43	10.77	19.45	17.03	SANDY LOAM
B-31	1.67	12.07	13.14	74.79	13.19	17.38	13.66	18.15	12.40	16.07	20.17	SANDY LOAM
B-32	1.62	14.00	14.55	71.45	14.19	17.10	13.24	17.24	9.68	15.12	18.28	SANDY LOAM
B-33	1.72	11.49	12.85	75.66	17.00	19.30	12.56	15.31	11.48	12.87	19.18	SANDY LOAM
B-34	1.72	9.20	10.87	79.93	20.03	22.07	14.47	14.69	8.66	19.15	11.12	LOAMY SAND
B-35	1.66	10.23	12.14	77.63	20.43	19.64	14.07	13.89	9.59	23.94	21.72	SANDY LOAM
B-36	1.72	11.16	12.56	76.28	21.68	20.72	11.72	12.56	9.60	22.23	12.78	SANDY LOAM
B-37	1.52	10.51	10.23	79.26	15.19	16.95	14.74	20.46	11.93	11.85	20.57	SANDY LOAM
B-38	1.43	12.23	12.10	75.68	19.20	20.48	14.42	14.29	7.29	21.64	29.73	SANDY LOAM
B-39	1.55	11.35	9.19	79.47	15.49	18.87	13.43	18.32	13.36	19.20	27.58	SANDY LOAM
B-40	1.75	9.00	7.66	83.33	22.39	23.09	14.92	14.62	8.31	18.92	14.72	LOAMY SAND
B-41	1.58	11.11	13.87	75.02	15.16	17.96	13.42	16.91	11.56	14.83	26.09	SANDY LOAM
B-42	1.59	11.55	8.84	79.61	19.54	19.28	15.34	16.87	8.59	20.38	8.21	SANDY LOAM
B-43	1.55	9.52	8.61	81.86	20.28	22.06	13.32	15.16	11.05	16.26	24.00	LOAMY SAND
B-44	1.58	11.25	10.36	78.38	18.93	26.31	15.21	11.97	5.95	13.25	7.20	SANDY LOAM
B-45	1.73	6.78	12.68	80.55	10.47	16.50	15.45	22.72	15.41	28.42	26.43	LOAMY SAND
B-46	1.55	13.31	20.10	66.60	9.20	27.94	17.59	0.84	11.03	15.64	6.69	SANDY LOAM
B-47	1.59	10.51	9.22	80.27	21.51	20.50	15.07	15.30	7.89	25.61	21.50	SANDY LOAM
B-48	1.62	9.47	10.20	80.33	20.16	20.88	15.82	15.67	7.80	29.35	12.30	LOAMY SAND
B-49	1.62	8.31	7.46	84.23	26.77	22.78	15.91	13.16	5.60	31.88	15.43	LOAMY SAND
B-50	1.72	9.04	6.79	84.16	22.90	22.83	17.74	15.07	5.63	23.35	16.19	LOAMY SAND
AVG	1.67	10.95	11.36	77.69	18.73	19.70	13.92	15.64	9.71	22.24	22.58	
n	50	50	50	50	50	50	50	50	50	50	50	
STD	0.09	1.67	2.48	3.69	4.23	3.09	2.31	3.30	2.45	5.88	8.26	
MAX	1.86	14.31	20.10	84.23	28.56	30.84	26.01	25.45	15.41	33.38	41.30	
MIN	1.41	6.78	6.79	66.60	9.20	13.16	10.71	0.84	0.07	9.25	6.69	
CV%	5.39	15.24	21.85	4.75	22.59	15.71	16.57	21.08	25.21	26.42	36.59	

Table 48. Particle size data for layer 9.

SAMPLE	BD g/cm ³	CLAY % <.002	SILT % .05-.002	SAND % 2-.05	VCS % 2-1	CS % 1-.5	MS % .5-.25	FS % .25-.1	VFS % .1-.05	Coarse % >2	CaCO ₃ %	Textural Class
9-1	1.61	7.51	13.33	79.16	19.99	14.34	11.43	17.18	16.21	25.35	18.58	LOAMY SAND
9-2	1.59	7.59	10.02	82.39	26.38	20.92	9.54	12.94	12.62	20.53	14.86	LOAMY SAND
9-3	1.76	6.94	9.02	84.04	26.39	19.14	10.03	14.19	14.29	36.87	18.26	LOAMY SAND
9-4	1.74	7.53	4.20	88.27	32.96	22.79	10.89	12.18	9.45	45.85	18.80	LOAMY SAND
9-5	1.77	9.43	4.50	86.06	26.24	23.97	11.98	13.32	10.54	32.34	16.97	LOAMY SAND
9-6	1.67	8.25	13.33	78.41	19.18	20.02	11.79	14.40	13.02	29.01	16.43	LOAMY SAND
9-7	1.72	5.75	13.75	80.51	13.66	24.59	13.69	16.64	11.92	13.60	12.82	LOAMY SAND
9-8	1.69	3.77	14.82	81.41	17.00	21.72	13.83	10.81	12.05	19.35	14.95	LOAMY SAND
9-9	1.74	6.61	11.34	82.05	18.91	22.96	15.06	15.45	9.67	22.62	7.98	LOAMY SAND
9-10	1.77	5.67	11.90	82.42	20.23	22.21	14.48	14.86	10.63	20.24	16.88	LOAMY SAND
9-11	1.72	6.92	11.25	81.84	22.61	19.28	12.87	15.35	11.73	38.17	17.43	LOAMY SAND
9-12	1.66	5.70	10.00	84.30	28.10	19.51	11.02	14.07	11.60	29.33	16.37	LOAMY SAND
9-13	1.66	7.82	15.98	76.20	23.76	14.26	8.29	13.92	15.97	45.95	18.99	SANDY LOAM
9-14	1.75	5.01	5.43	89.56	42.19	19.09	8.57	9.81	9.89	46.04	20.68	SAND
9-15	1.66	4.92	20.84	74.24	25.57	15.16	8.25	12.29	12.96	32.48	19.68	SANDY LOAM
9-16	1.74	5.00	21.00	74.00	20.71	16.34	10.45	14.29	12.21	28.43	17.33	SANDY LOAM
9-17	1.72	9.94	4.09	85.97	12.45	21.41	16.30	21.09	14.71	21.25	14.08	LOAMY SAND
9-18	1.78	7.55	18.79	73.67	16.90	14.80	10.53	16.45	14.98	41.96	18.23	SANDY LOAM
9-19	1.80	6.02	31.96	62.02	16.55	12.83	7.32	12.17	13.15	39.41	18.56	SANDY LOAM
9-20	1.81	4.89	13.51	81.60	18.10	17.21	11.28	17.02	17.99	27.19	21.03	LOAMY SAND
9-21	1.61	8.43	12.12	79.45	17.18	18.68	12.93	17.32	13.34	28.58	17.42	LOAMY SAND
9-22	1.65	8.59	12.49	78.92	18.29	17.65	10.99	16.00	15.99	22.05	15.23	LOAMY SAND
9-23	1.80	6.53	13.48	79.99	18.54	17.88	11.14	16.22	16.21	31.38	18.42	LOAMY SAND
9-24	1.74	6.55	11.06	82.39	28.98	16.82	9.40	14.26	12.92	42.71	18.45	LOAMY SAND
9-25	1.82	7.30	13.44	79.27	19.10	18.91	12.71	16.33	12.21	33.20	15.22	LOAMY SAND
9-26	1.64	6.34	8.77	84.88	28.23	18.32	11.39	15.26	11.68	32.69	14.72	LOAMY SAND
9-27	1.70	5.68	8.86	85.46	45.30	22.36	9.77	6.69	1.33	28.77	16.92	LOAMY SAND
9-28	1.76	7.59	11.96	80.45	22.23	18.07	11.18	15.07	13.91	23.70	17.38	LOAMY SAND
9-29	1.72	7.86	12.38	79.76	21.28	17.13	11.58	15.65	14.13	27.16	16.93	LOAMY SAND
9-30	1.62	7.58	14.71	77.70	15.84	16.63	10.54	17.06	17.63	34.36	16.28	LOAMY SAND
9-31	1.59	7.26	11.75	80.99	20.45	21.21	11.64	13.95	13.73	39.74	19.53	LOAMY SAND
9-32	1.69	6.28	14.62	79.10	22.50	16.03	9.34	15.38	15.86	49.10	15.52	LOAMY SAND
9-33	1.65	8.05	16.48	75.47	13.87	14.80	10.17	17.68	18.96	49.25	21.04	SANDY LOAM
9-34	1.66	6.51	11.06	82.43	32.10	14.38	7.57	13.38	15.00	43.32	17.97	LOAMY SAND
9-35	1.66	6.70	14.35	78.94	21.80	17.25	8.99	14.87	16.03	47.35	18.36	LOAMY SAND
9-36	1.80	7.41	9.75	82.84	23.61	20.37	11.64	14.82	12.40	49.18	13.23	LOAMY SAND
9-37	1.70	9.76	13.30	76.94	17.72	15.41	10.06	16.87	16.88	41.24	11.59	SANDY LOAM
9-38	1.67	13.44	5.86	80.70	29.90	19.43	11.14	11.88	8.34	40.82	2.79	SANDY LOAM
9-39	1.66	10.35	9.03	80.62	17.55	19.82	13.03	16.54	13.68	46.42	9.77	LOAMY SAND
9-40	1.41	8.96	7.07	83.97	21.08	19.34	11.74	13.68	18.32	46.60	21.64	LOAMY SAND
9-41	1.43	9.15	7.43	83.42	20.10	21.91	13.80	16.32	11.30	34.07	29.70	LOAMY SAND
9-42	1.56	9.56	10.10	80.34	16.32	17.96	13.92	18.89	13.24	39.28	19.95	LOAMY SAND
9-43	1.25	8.32	5.18	86.51	32.82	26.04	12.87	9.48	5.29	37.64	16.43	LOAMY SAND
9-44	1.56	7.24	11.40	78.36	22.54	17.07	10.93	14.80	13.02	40.49	20.03	LOAMY SAND
9-45	1.62	6.53	8.49	84.97	22.35	19.54	11.17	15.74	16.17	45.23	16.98	LOAMY SAND
9-46	1.76	7.06	8.45	84.48	25.83	21.80	11.22	13.26	12.38	25.53	16.08	LOAMY SAND
9-47	1.71	8.82	11.80	79.38	26.46	18.45	10.12	12.34	12.01	29.89	20.11	LOAMY SAND
9-48	1.76	11.38	14.43	74.18	15.40	15.37	9.93	16.23	17.25	33.96	20.08	SANDY LOAM
9-49	1.71	10.76	7.47	81.77	27.99	20.32	11.44	12.42	9.61	31.28	12.93	LOAMY SAND
9-50	1.51	10.48	8.39	81.13	24.16	17.03	11.58	15.94	12.42	37.02	19.00	LOAMY SAND
AVG	1.68	7.59	11.75	80.66	22.75	18.77	11.23	14.77	13.14	34.56	16.97	
n	50	50	50	50	50	50	50	50	50	50	50	
STD	0.11	1.87	4.86	4.50	6.65	2.96	1.87	2.44	3.23	9.24	3.92	
MAX	1.82	13.44	31.96	89.56	45.30	26.04	16.30	21.09	18.96	49.25	29.70	
MIN	1.25	3.77	4.09	62.02	12.45	12.83	7.32	6.69	1.33	13.60	2.79	
CV%	6.47	24.64	41.38	5.57	29.23	15.75	16.69	16.54	24.59	26.73	23.09	

Table 49. Particle size data for vertical A.

SAMPLE	BD g/cm ³	CLAY % <.002	SILT % .05+.002	SAND % 2+.05	VCS % 2-1	CS % 1-5	MS % .5+.25	FS % .25+.1	VFS % .1+.05	Coarse % >2	CaCO ₃ %	Textural Class
A-1	1.65	11.06	5.13	83.81	12.27	28.27	21.48	16.51	5.28		0.69	LOAMY SAND
A-2	1.81	14.25	9.07	76.68	14.68	24.31	15.03	14.73	7.93		0.07	SANDY LOAM
A-3	1.61	16.62	12.15	71.23	17.85	17.94	10.98	13.93	10.54		9.43	SANDY LOAM
A-4	1.53	11.56	10.04	78.40	17.82	24.21	14.84	13.49	8.04		3.32	SANDY LOAM
A-5	1.75	10.00	9.77	80.23	14.50	23.92	18.16	15.65	7.99		8.07	LOAMY SAND
A-6	1.58	7.65	8.60	83.75	20.93	29.73	17.15	10.79	5.16	20.29	14.46	LOAMY SAND
A-7	1.90	6.08	4.15	89.77	37.36	29.35	12.95	6.98	3.13		10.38	SAND
A-8		9.59	8.11	82.30	12.04	21.56	19.48	20.40	8.82		6.89	LOAMY SAND
A-9		4.64	8.54	86.82	19.77	24.86	16.52	16.01	9.67		6.73	LOAMY SAND
A-10		9.74	10.62	79.64	13.53	15.87	13.18	20.88	16.18		9.23	SANDY LOAM
A-11		3.10	10.30	86.59	13.61	17.70	12.82	23.09	19.38		13.82	SAND
A-12	1.71	7.15	11.76	81.10	14.44	22.03	15.27	16.31	13.05	13.37	3.08	LOAMY SAND
A-13	1.72	10.10	13.35	76.54	10.89	17.65	15.72	19.06	13.22	14.25	7.66	SANDY LOAM
A-14	1.71	10.72	11.63	77.65	12.61	18.73	14.21	18.72	13.38	18.41	9.09	SANDY LOAM
A-15	1.81	8.39	9.15	82.47	18.90	18.40	14.30	18.33	12.53	30.70	8.71	LOAMY SAND
A-16	1.77	6.61	8.13	85.26	24.21	17.76	14.11	17.64	11.54	31.98	8.73	LOAMY SAND
A-17	1.71	6.68	6.85	86.47	20.96	24.75	17.86	15.20	7.69	24.80	10.26	LOAMY SAND
A-18	1.75	7.98	8.95	83.07	21.66	23.86	27.87	1.24	8.42	29.61	6.98	LOAMY SAND
A-19	1.74	8.19	9.67	82.13	22.90	19.18	13.52	16.10	10.44	35.44	11.54	LOAMY SAND
A-20	1.78	8.55	10.97	80.48	20.28	19.81	13.31	15.74	11.35	45.76	9.63	LOAMY SAND
A-21	1.72	8.92	12.30	78.78	17.59	20.45	13.09	15.37	12.28	27.99	13.44	SANDY LOAM
A-22	1.77	9.50	9.48	81.02	12.41	17.08	16.57	21.70	13.26	13.73	8.27	LOAMY SAND
A-23	1.80	7.91	9.52	82.56	10.66	17.27	18.52	23.07	13.04	15.73	5.37	LOAMY SAND
A-24	1.78	7.49	9.36	83.15	16.61	20.05	16.70	18.78	11.01	23.73	5.67	LOAMY SAND
A-25	1.74	7.10	7.80	85.11	16.96	22.56	15.93	17.20	12.45	16.90	15.72	LOAMY SAND
A-26	1.63	16.71	11.03	72.26	12.69	18.24	13.01	15.20	13.11	21.19	12.87	SANDY LOAM
A-27		13.44	10.87	75.69	16.37	21.32	13.38	13.44	11.18	26.88	22.88	SANDY LOAM
A-28	1.76	10.90	14.95	74.15	12.22	16.32	14.42	16.78	14.41	24.49	18.04	SANDY LOAM
A-29	1.74	10.49	16.50	73.00	10.69	17.87	10.95	19.58	13.91		4.60	SANDY LOAM
A-30	1.66	13.05	12.59	74.36	16.58	17.73	12.83	15.94	11.28	26.22	14.28	SANDY LOAM
A-31	1.66	11.74	13.90	74.35	11.83	15.77	13.03	18.64	15.09	29.37	9.90	SANDY LOAM
A-32	1.67	9.98	14.57	75.44	18.13	18.72	13.58	14.81	10.21	18.48	7.46	SANDY LOAM
A-33	1.72	11.77	11.61	76.62	14.76	18.31	15.10	17.05	11.40	22.59	10.67	SANDY LOAM
A-34	1.64	14.78	7.82	77.40	23.90	19.59	12.59	13.30	8.02	26.75	17.08	SANDY LOAM
A-35	1.76	8.67	8.59	82.74	10.77	24.94	21.37	18.07	7.59	29.06	14.81	LOAMY SAND
A-36	1.64	15.09	10.43	74.48	14.51	20.11	15.23	15.32	9.33	20.79	33.35	SANDY LOAM
A-37	1.71	11.26	11.42	77.32	18.65	19.12	12.81	15.19	11.55	19.59	45.03	SANDY LOAM
A-38	1.61	9.15	11.83	79.02	17.12	18.23	12.43	16.62	14.63	35.69	39.48	SANDY LOAM
A-39	1.63	8.83	10.05	81.12	25.96	17.63	10.84	14.75	11.94	36.44	26.98	LOAMY SAND
A-40	1.64	10.26	10.27	79.47	16.15	18.82	14.48	18.40	11.62	31.76	31.14	SANDY LOAM
A-41	1.74	5.90	12.36	81.74	22.32	15.92	12.25	17.70	13.55		27.94	LOAMY SAND
A-42	1.61	7.85	8.74	83.41	28.03	23.12	11.56	12.19	8.52	30.90	24.74	LOAMY SAND
A-43	1.60	5.63	10.91	83.46	22.10	16.03	11.78	18.25	15.30	27.37	19.83	LOAMY SAND
A-44	1.69	4.53	10.24	85.23	24.12	17.73	10.53	17.38	15.47	37.63	16.33	LOAMY SAND
A-45	1.72	15.19	10.65	74.16	31.57	15.74	7.99	10.37	8.49		12.82	SANDY LOAM
A-46	1.64	6.11	11.08	82.81	20.27	19.02	13.54	17.23	12.75	28.60	13.07	LOAMY SAND
A-47	1.53	6.81	10.17	83.02	21.53	22.90	14.95	14.49	9.15	22.24	10.42	LOAMY SAND
A-48	1.64	7.87	11.39	80.74	20.41	20.59	13.94	15.31	10.79	28.99	18.59	LOAMY SAND
AVG	1.70	9.49	10.36	80.15	18.04	20.23	14.63	16.10	11.14	25.93	13.13	
n	43	48	48	48	48	48	48	48	48	35	48	
STD	0.08	3.16	2.30	4.33	5.66	3.55	3.31	3.75	3.10	7.47	8.35	
MAX	1.90	16.71	16.50	89.77	37.36	29.73	27.87	23.09	19.38	45.76	39.48	
MIN	1.53	3.10	4.15	71.23	10.66	15.74	7.99	1.24	3.13	13.37	0.07	
CV%	4.57	33.28	22.15	5.40	31.36	17.56	22.65	23.28	27.83	28.81	63.61	

Table 50. Particle size data for vertical B.

SAMPLE	BD g/cm ³	CLAY % <.002	SILT % .05-.002	SAND % 2-.05	VCS % 2-1	CS % 1-.5	MS % .5-.25	FS % .25-.1	VFS % .1-.05	Coarse % >2	CaCO ₃ %	Textural Class
B-1	1.63	9.51	10.27	80.21	11.27	25.40	18.61	17.43	7.51		0.86	LOAMY SAND
B-2	1.57	9.84	7.24	82.92	18.70	24.97	16.44	15.48	7.34		5.42	LOAMY SAND
B-3	1.63	10.09	8.53	81.38	24.01	21.43	12.48	14.60	8.87		10.34	LOAMY SAND
B-4	1.57	9.57	7.19	83.25	25.80	24.59	14.99	11.71	6.17		7.73	LOAMY SAND
B-5	1.59	8.80	6.78	84.41	34.58	26.30	9.78	8.22	5.53		20.05	LOAMY SAND
B-6	1.64	10.11	12.01	77.88	17.24	20.99	11.83	15.16	12.66	11.44	24.80	SANDY LOAM
B-7	1.86	7.28	9.04	83.68	26.56	26.03	11.64	17.26	8.18		18.09	LOAMY SAND
B-8		6.31	12.74	80.55	10.52	16.58	15.53	22.83	15.49		18.58	LOAMY SAND
B-9		8.50	8.62	82.88	16.92	21.26	17.36	17.40	9.94		20.63	LOAMY SAND
B-10		5.96	8.37	85.67	15.06	23.12	19.19	18.90	9.41		18.48	LOAMY SAND
B-11		4.47	4.88	90.65	17.09	25.81	21.95	18.89	6.92		19.27	SAND
B-12	1.74	5.80	4.25	89.95	23.96	23.06	18.06	17.96	6.92	21.16	6.88	SAND
B-13	1.77	6.32	7.87	85.81	31.67	26.11	11.26	10.12	6.64	20.20	4.61	LOAMY SAND
B-14	1.75	3.45	2.38	94.16	49.68	27.19	10.60	4.78	1.93	20.64	6.04	SAND
B-15	1.86	7.28	7.22	85.50	20.68	21.35	16.51	18.01	8.94	30.33	6.90	LOAMY SAND
B-16	1.73	3.97	3.37	92.66	27.02	30.08	19.84	12.33	3.40		7.75	SAND
B-17	1.79	11.33	10.47	78.20	14.06	17.18	15.01	20.38	11.56	8.65	5.29	SANDY LOAM
B-18	1.81	8.77	9.98	81.25	15.96	20.76	14.95	17.90	11.69	13.01	8.73	LOAMY SAND
B-19	1.79	8.50	7.77	83.72	14.36	20.73	17.75	21.15	9.74	20.95	6.70	LOAMY SAND
B-20	1.70	9.49	10.13	80.39	39.82	18.29	7.55	8.19	6.53	20.46	8.29	LOAMY SAND
B-21	1.74	11.33	10.47	78.20	14.06	17.18	15.01	20.38	11.56	16.87	9.27	SANDY LOAM
B-22	1.69	9.66	13.14	77.20	17.28	19.04	13.29	16.20	11.38	12.60	9.80	SANDY LOAM
B-23	1.79	9.56	11.65	78.78	17.92	18.17	14.19	16.66	11.85	27.00	13.31	SANDY LOAM
B-24	1.78	10.12	11.16	78.72	15.17	20.35	15.86	17.47	9.87	26.42	9.96	SANDY LOAM
B-25	1.56	3.15	2.27	94.58	55.09	24.60	8.38	4.53	1.98	54.88	14.54	SAND
B-26	1.72	18.12	9.59	72.29	14.83	20.83	13.52	13.52	9.59	9.32	14.21	SANDY LOAM
B-27	1.70	13.15	7.69	79.17	18.88	24.38	14.56	12.35	9.00	15.33	16.75	SANDY LOAM
B-28	1.67	9.19	6.79	84.03	35.97	22.99	9.57	8.71	6.78	25.25	13.04	LOAMY SAND
B-29	1.73	6.04	9.42	84.53	29.58	20.37	12.23	13.14	9.22	28.34	19.93	LOAMY SAND
B-30	1.57	6.91	10.74	82.35	29.65	20.43	11.20	11.97	9.11	29.72	16.58	LOAMY SAND
B-31	1.66	7.40	10.92	81.69	28.88	21.42	10.73	11.57	9.10	19.07	4.49	LOAMY SAND
B-32	1.81	13.02	12.66	74.33	17.86	17.97	11.80	15.22	11.47	21.61	6.38	SANDY LOAM
B-33	1.67	12.54	10.94	76.52	17.14	20.13	13.43	15.49	10.32	20.22	5.82	SANDY LOAM
B-34	1.55	9.62	13.03	77.35	10.18	14.18	15.47	23.57	13.96	23.64	11.37	SANDY LOAM
B-35	1.68	7.63	7.30	85.07	24.80	21.94	14.34	15.50	8.50	44.59	26.61	LOAMY SAND
B-36	1.67	10.82	10.60	78.58	19.82	19.69	12.50	15.87	10.70	27.10	26.63	SANDY LOAM
B-37	1.62	9.14	12.15	78.70	17.06	19.72	13.05	17.04	11.82	24.43	25.61	SANDY LOAM
B-38	1.73	10.67	12.12	77.21	18.77	18.81	12.97	16.09	10.57	21.01	27.25	SANDY LOAM
B-39	1.75	8.73	15.68	75.59	8.99	16.44	14.24	19.79	16.13	20.14	12.99	SANDY LOAM
B-40	1.79	5.91	13.81	80.28	16.16	17.27	13.84	18.30	14.71	21.07	31.38	LOAMY SAND
B-41	1.63	8.62	12.67	78.72	17.17	20.15	13.33	16.26	11.81	31.70	10.33	LOAMY SAND
B-42	1.69	5.29	6.68	88.03	22.95	23.45	15.89	16.06	9.67	21.49	35.65	SAND
B-43	1.71	5.12	10.02	84.86	21.14	20.48	15.29	17.55	10.40	33.81	29.72	LOAMY SAND
B-44	1.70	4.19	10.69	85.12	22.94	21.48	12.34	14.97	13.39	6.65	25.70	LOAMY SAND
B-45	1.64	5.20	12.25	82.55	23.04	18.61	13.28	16.15	11.47	22.96	16.37	LOAMY SAND
B-46	1.57	2.67	13.13	84.19	10.16	13.30	12.01	24.64	24.09	17.25	20.45	LOAMY SAND
B-47	1.56	4.19	10.26	85.54	13.43	19.16	15.74	21.71	15.50	16.48	15.11	LOAMY SAND
B-48	1.63	2.97	6.19	90.83	27.95	23.65	13.04	16.26	9.94	23.47	19.80	SAND
AVG	1.69	8.05	9.44	82.51	21.70	21.20	14.01	15.62	9.98	22.41	14.89	
n	44	48	48	48	48	48	48	48	48	37	48	
STD	0.08	3.11	3.02	5.01	9.57	3.46	2.93	4.42	3.76	9.26	8.30	
MAX	1.86	18.12	15.68	94.58	55.09	30.08	21.95	24.64	24.09	54.88	35.65	
MIN	1.55	2.67	2.27	72.29	8.99	13.30	7.55	4.53	1.93	6.65	0.86	
CV%	5.02	38.59	32.01	6.08	44.11	16.27	20.90	28.28	37.63	41.31	55.74	

Table 51. Particle size data for vertical C.

SAMPLE	BD g/cm ³	CLAY % <.002	SILT % .05-.002	SAND % 2-.05	VCS % 2-1	CS % 1-.5	MS % .5-.25	FS % .25-.1	VFS % .1-.05	Coarse % >.2	CaCO ₃ %	Textural Class
C-1	1.60	8.99	9.83	81.18	5.94	16.32	21.54	26.29	11.10		3.38	LOAMY SAND
C-2	1.54	7.12	8.78	84.09	13.03	21.90	19.31	20.87	8.98		6.97	LOAMY SAND
C-3	1.51	7.30	8.02	84.68	19.93	21.05	15.77	17.68	10.24		12.58	LOAMY SAND
C-4	1.64	9.38	10.03	80.59	19.47	20.38	15.04	15.79	9.90		22.73	LOAMY SAND
C-5	1.74	7.93	8.01	84.05	25.69	22.51	13.61	13.59	8.65		19.20	LOAMY SAND
C-6	1.42	10.12	10.63	79.25	19.10	19.18	14.07	16.26	10.64		19.59	SANDY LOAM
C-7		8.82	11.38	79.79	15.24	18.77	15.53	18.85	11.41	19.51	18.43	LOAMY SAND
C-8		8.39	10.18	81.43	4.66	14.13	21.56	27.82	13.26		12.64	LOAMY SAND
C-9		6.38	6.90	86.72	14.81	22.67	20.41	21.02	7.80		9.05	LOAMY SAND
C-10		7.15	6.83	86.03	22.06	21.19	14.90	19.68	8.19		8.81	LOAMY SAND
C-11		5.67	4.84	89.50	21.73	21.62	16.23	21.52	8.40		6.13	SAND
C-12	1.67	3.87	2.53	93.60	39.57	27.29	14.45	9.36	2.93		8.62	SAND
C-13	1.83	3.56	2.45	93.99	41.92	28.45	12.48	8.37	2.77	18.70	11.04	SAND
C-14	1.72	3.23	2.36	94.41	44.46	29.70	10.35	7.30	2.60	19.78	5.27	SAND
C-15	1.88	8.01	10.41	81.58	15.62	17.87	14.82	20.18	13.10	23.02	13.96	LOAMY SAND
C-16	1.82	7.06	8.91	84.03	23.14	23.88	14.75	14.05	8.18		10.51	LOAMY SAND
C-17	1.68	9.59	10.69	79.72	15.41	18.14	13.72	20.05	12.41	22.78	8.12	LOAMY SAND
C-18	1.68	8.29	8.71	83.00	19.53	22.36	16.27	15.50	9.35	27.33	13.90	LOAMY SAND
C-19	1.71	6.05	6.23	87.72	28.36	15.54	18.47	16.89	8.47	31.59	10.06	LOAMY SAND
C-20	1.65	7.52	6.26	86.22	26.71	24.42	15.21	12.81	7.08	16.29	9.17	LOAMY SAND
C-21	1.74	6.77	4.79	88.44	22.32	24.18	16.38	16.46	9.10	28.68	12.48	SAND
C-22	1.74	7.26	9.78	82.96	16.46	21.93	16.06	18.38	10.15	31.69	11.74	LOAMY SAND
C-23	1.63	7.51	6.03	86.46	15.16	22.01	19.68	19.95	9.66	24.89	9.79	LOAMY SAND
C-24	1.69	4.39	4.96	90.65	28.93	30.34	16.29	10.84	4.24	21.08	5.93	SAND
C-25	1.75	5.70	4.95	89.35	29.14	24.46	16.52	13.65	5.59	24.99	12.63	SAND
C-26	1.77	9.48	6.34	84.18	18.63	27.18	17.30	14.79	6.28	16.93	7.62	LOAMY SAND
C-27	1.64	15.85	9.32	74.83	17.03	22.74	11.89	12.53	10.65	19.09	16.50	SANDY LOAM
C-28	1.60	13.21	15.00	71.79	16.23	18.70	6.30	15.37	15.19	25.97	17.03	SANDY LOAM
C-29	1.69	9.08	25.32	65.60	18.39	17.98	11.27	10.11	7.84	24.57	19.86	SANDY LOAM
C-30	1.66	8.05	7.86	84.09	27.36	21.28	11.67	14.21	9.57	22.08	15.28	LOAMY SAND
C-31	1.68	11.42	15.75	72.83	18.94	17.29	11.55	14.13	10.91	25.02	20.80	SANDY LOAM
C-32	1.73	9.79	8.14	82.07	15.13	23.16	18.86	17.00	7.90	45.69	10.77	LOAMY SAND
C-33	1.70	10.07	9.81	80.11	17.30	18.92	16.48	18.79	10.62	17.61	22.82	LOAMY SAND
C-34	1.70	9.61	7.53	82.87	24.98	25.78	10.48	11.46	6.17	22.37	15.52	LOAMY SAND
C-35	1.58	11.72	7.44	80.83	24.03	25.29	15.11	11.81	6.59	21.14	13.54	SANDY LOAM
C-36	1.53	10.38	7.36	82.27	21.56	23.21	14.54	14.98	7.97	19.32	31.47	LOAMY SAND
C-37	1.67	8.90	7.26	83.84	18.85	20.93	16.10	18.47	9.49	37.45	28.49	LOAMY SAND
C-38	1.59	11.08	8.89	80.03	19.64	19.38	15.42	16.95	8.63	22.55	35.37	SANDY LOAM
C-39	1.71	11.87	6.42	81.71	15.85	20.90	17.89	18.80	8.27		3.93	SANDY LOAM
C-40	1.62	16.54	4.76	78.70	24.80	23.38	13.82	11.12	5.58	21.61	12.97	SANDY LOAM
C-41	1.65	2.07	2.62	95.31	15.78	42.16	10.37	13.73	13.27	19.85	24.10	SAND
C-42	1.63	7.98	6.17	85.86	21.39	21.40	16.53	17.21	9.33	26.95	39.02	LOAMY SAND
C-43	1.61	5.91	8.43	85.67	24.84	20.71	13.00	15.95	11.16	33.66	41.20	LOAMY SAND
C-44	1.41	5.91	6.99	87.03	29.71	28.63	13.85	9.07	5.78	25.32	25.78	LOAMY SAND
C-45	1.56	9.70	15.44	74.86	19.71	18.40	10.83	13.05	12.88	28.04	24.69	SANDY LOAM
C-46	1.65	6.61	11.02	82.36	24.01	20.10	9.88	14.33	14.05		17.53	LOAMY SAND
C-47	1.66	8.77	8.20	83.04	24.42	20.39	13.27	14.87	10.09	43.41	13.10	LOAMY SAND
C-48	1.79	7.39	7.50	85.11	27.46	20.56	14.52	14.93	7.65	34.43	23.39	LOAMY SAND
										36.29		
AVG	1.67	8.28	8.29	83.43	21.55	22.26	14.88	15.77	8.96	25.71	15.91	
n	43	48	48	48	48	48	48	48	48	35	48	
STD	0.10	2.86	3.91	5.74	7.60	4.63	3.08	4.24	2.86	7.23	8.84	
MAX	1.88	16.54	25.32	95.31	44.46	42.16	21.56	27.82	15.19	45.69	41.20	
MIN	1.41	2.07	2.36	65.60	4.66	14.13	6.30	7.30	2.60	16.29	3.38	
CV%	5.93	34.48	47.17	6.88	35.27	20.78	20.67	26.87	31.89	28.12	55.61	

SELECTED BIBLIOGRAPHY

- Allison, L.E. and C.D. Moodie. 1965. Carbonate. In C.A. Black (ed.), Methods of Soil Analysis. Part 2. 2nd ed. ASA, SSSA, Madison, WI, Agronomy 9:1379-1396.
- Amoozegar, A. and A.W. Warrick. 1986. Hydraulic Conductivity of Saturated Soils: Field methods, In A. Klute (Editor) Methods of Soil Analysis Part 1. Physical and Mineralogical Methods, Second Edition. ASA, SSSA, Madison, WI, Agronomy 9:755-770.
- Elrick, D.E., R.W. Sheard, and N. Baumgartner. 1980. A simple procedure for determining the hydraulic conductivity and water retention of putting green soil mixtures. pp 189-200. In R.W. Sheard (ed), Proc. Fourth International Turfgrass Research Conf. The Ontario Agricultural College, University of Guelph, Guelph, Ontario.
- Gee, G.W. and J.W. Bauder. 1986. Particle-size analysis. In A. Klute (ed.), Methods of Soil Analysis. Part 1. 2nd ed. ASA, SSSA, Madison, WI, Agronomy 9:383-411.
- Gile, L.H., F.F. Peterson, and R.B. Grossman. 1966. Morphological and genetic sequences of carbonate accumulation in desert soils. Soil Sci. 101:347-360.
- Hawley, J.W., G.O. Bachman, and K. Manley. 1976. Quaternary stratigraphy in the Basin and Range and Great Plains provinces, New Mexico and West Texas. In W.C. Mahaney (ed) Quaternary stratigraphy of North America. Stroudsburg, Pennsylvania, Dowden, Hutchinson, and Ross, Inc. p. 235-274.
- Hurlbut, C.S. and C. Klein. 1977. Manual of mineralogy. 19th ed. John Wiley and Sons, New York. p. 459.
- Kues, B.S., C.T. Smith, R.M. North, S.G. Lucas, S.A. Northrop, C.L. Balk, and R.W. Eveleth. 1986. New Mexico's geological panorama. In D. Hsi and J. Panitz (ed.) From sundaggers to space exploration -- significant scientific contributions to science and technology in New Mexico. New Mexico Journal of Science, vol. 26, no. 1. NM Academy of Science and NM Sigma Xi Chapter. p. 231.
- Martin, P.S. and P.J. Mehringer. 1965. Pleistocene pollen analysis and biogeography of the Southwest. In H.E. Wright and D.G. Frey (eds.) The Quaternary of the United States. Princeton Univ. Press. p. 433-451.
- Reeves, C.C., Jr. 1973. The full-glacial climate of the southern High Plains, West Texas. Journal of Geology. 81:693-704.
- Reynolds, W.D. and D.E. Elrick. 1985a. In situ measurement of field-saturated hydraulic conductivity, sorptivity, and the α -parameter using the Guelph permeameter. Soil Sci. 140:292-302.

- Reynolds, W.D. and D.E. Elrick. 1986. A method for simultaneous in situ measurement in the vadose zone of field-saturated hydraulic conductivity, sorptivity, and the conductivity-pressure head relationship. Ground Water Monit. Rev. 6:84-95.
- Reynolds, W.D., D.E. Elrick, N. Baumgartner, and B.E. Clothier. 1984. The "Guelph Permeameter" for measuring the field-saturated soil hydraulic conductivity above the water table. II. The apparatus. Proc. Canadian Hydrology Symposium. Quebec City, Quebec.
- van Devender, T.R. 1977. Holocene woodlands in the southwestern deserts. Science. 198:189-192.
- Wierenga, P.J., L.W. Gelhar, C.S. Simmons, G.W. Gee and T.J. Nicholson. 1988. Validation of stochastic flow and transport models for unsaturated soils: A comprehensive field study. NUREG report/CR-4622, PNL-5875. pp. 54.
- Wierenga, P.J. 1988. Validation of flow and transport models at the Jornada test facility. Proc. Intern. Conf. on Validation of Flow and Transport Models, Ruidoso, NM. 525-530.

APPENDIX I

Table 1. Location of samples from layer 1.

Sample	X (m)	Y (m)	Z (m)	X ₁ (m)	Y ₁ (m)	Z ₁ (m)	X ₂ (m)	Y ₂ (m)	Z ₂ (m)
1-1	0.25	-0.60	0.06	12.94	-4.17	-0.21	-3.78	-0.60	0.06
1-2	0.75	-0.60	0.06	12.44	-4.17	-0.20	-3.28	-0.60	0.06
1-3	1.25	-0.60	0.06	11.94	-4.17	-0.19	-2.78	-0.60	0.06
1-4	1.75	-0.60	0.06	11.44	-4.17	-0.18	-2.28	-0.60	0.06
1-5	2.25	-0.60	0.06	10.94	-4.18	-0.16	-1.78	-0.60	0.06
1-6	2.75	-0.60	0.06	10.44	-4.18	-0.15	-1.28	-0.60	0.06
1-7	3.25	-0.60	0.06	9.94	-4.18	-0.14	-0.78	-0.60	0.06
1-8	3.75	-0.60	0.06	9.44	-4.18	-0.13	-0.28	-0.60	0.06
1-9	4.25	-0.60	0.06	8.94	-4.18	-0.11	0.22	-0.60	0.06
1-10	4.75	-0.60	0.06	8.44	-4.18	-0.10	0.72	-0.60	0.06
1-11	5.25	-0.60	0.06	7.94	-4.18	-0.09	1.22	-0.60	0.06
1-12	5.75	-0.60	0.06	7.44	-4.19	-0.08	1.72	-0.60	0.06
1-13	6.25	-0.60	0.06	6.94	-4.19	-0.06	2.22	-0.60	0.06
1-14	6.75	-0.60	0.06	6.44	-4.19	-0.05	2.72	-0.60	0.06
1-15	7.25	-0.60	0.06	5.94	-4.19	-0.04	3.22	-0.60	0.06
1-16	7.75	-0.60	0.06	5.44	-4.19	-0.03	3.72	-0.60	0.06
1-17	8.25	-0.60	0.06	4.94	-4.19	-0.01	4.22	-0.60	0.06
1-18	8.75	-0.60	0.06	4.44	-4.19	-0.00	4.72	-0.60	0.06
1-19	9.25	-0.60	0.06	3.94	-4.19	0.01	5.22	-0.60	0.06
1-20	9.75	-0.60	0.06	3.44	-4.20	0.02	5.72	-0.60	0.06
1-21	10.25	-0.60	0.06	2.94	-4.20	0.04	6.22	-0.60	0.06
1-22	10.75	-0.60	0.06	2.44	-4.20	0.05	6.72	-0.60	0.06
1-23	11.25	-0.60	0.06	1.94	-4.20	0.06	7.22	-0.60	0.06
1-24	11.75	-0.60	0.06	1.44	-4.20	0.07	7.72	-0.60	0.06
1-25	12.25	-0.60	0.06	0.94	-4.20	0.09	8.22	-0.60	0.06
1-26	12.75	-0.60	0.06	0.44	-4.20	0.10	8.72	-0.60	0.06
1-27	13.25	-0.60	0.06	-0.06	-4.21	0.11	9.22	-0.60	0.06
1-28	13.75	-0.60	0.06	-0.56	-4.21	0.12	9.72	-0.60	0.06
1-29	14.25	-0.60	0.06	-1.06	-4.21	0.14	10.22	-0.60	0.06
1-30	14.75	-0.60	0.06	-1.56	-4.21	0.15	10.72	-0.60	0.06
1-31	15.25	-0.60	0.06	-2.06	-4.21	0.16	11.22	-0.60	0.06
1-32	15.75	-0.60	0.06	-2.56	-4.21	0.17	11.72	-0.60	0.06
1-33	16.25	-0.60	0.06	-3.06	-4.21	0.19	12.22	-0.60	0.06
1-34	16.75	-0.60	0.06	-3.56	-4.21	0.20	12.72	-0.60	0.06
1-35	17.25	-0.60	0.06	-4.06	-4.22	0.21	13.22	-0.60	0.06
1-36	17.75	-0.60	0.06	-4.56	-4.22	0.22	13.72	-0.60	0.06
1-37	18.25	-0.60	0.06	-5.06	-4.22	0.24	14.22	-0.60	0.06
1-38	18.75	-0.60	0.06	-5.56	-4.22	0.25	14.72	-0.60	0.06
1-39	19.25	-0.60	0.06	-6.06	-4.22	0.26	15.22	-0.60	0.06
1-40	19.75	-0.60	0.06	-6.56	-4.22	0.27	15.72	-0.60	0.06
1-41	20.25	-0.60	0.06	-7.06	-4.22	0.29	16.22	-0.60	0.06
1-42	20.75	-0.60	0.06	-7.56	-4.22	0.30	16.72	-0.60	0.06
1-43	21.25	-0.60	0.06	-8.06	-4.23	0.31	17.22	-0.60	0.06
1-44	21.75	-0.60	0.06	-8.56	-4.23	0.32	17.72	-0.60	0.06
1-45	22.25	-0.60	0.06	-9.06	-4.23	0.34	18.22	-0.60	0.06
1-46	22.75	-0.60	0.06	-9.56	-4.23	0.35	18.72	-0.60	0.06
1-47	23.25	-0.60	0.06	-10.06	-4.23	0.36	19.22	-0.60	0.06
1-48	23.75	-0.60	0.06	-10.56	-4.23	0.37	19.72	-0.60	0.06
1-49	24.25	-0.60	0.06	-11.06	-4.23	0.39	20.22	-0.60	0.06
1-50	24.75	-0.60	0.06	-11.56	-4.24	0.40	20.72	-0.60	0.06

APPENDIX I

Table 2. Location of samples from layer 2.

Sample	X (m)	Y (m)	Z (m)	X ₁ (m)	Y ₁ (m)	Z ₁ (m)	X ₂ (m)	Y ₂ (m)	Z ₂ (m)
2-1	0.25	-0.60	0.71	12.94	-4.17	0.44	-3.78	-0.60	0.71
2-2	0.75	-0.60	0.71	12.44	-4.17	0.45	-3.28	-0.60	0.71
2-3	1.25	-0.60	0.71	11.94	-4.17	0.46	-2.78	-0.60	0.71
2-4	1.75	-0.60	0.71	11.44	-4.17	0.47	-2.28	-0.60	0.71
2-5	2.25	-0.60	0.71	10.94	-4.18	0.49	-1.78	-0.60	0.71
2-6	2.75	-0.60	0.71	10.44	-4.18	0.50	-1.28	-0.60	0.71
2-7	3.25	-0.60	0.71	9.94	-4.18	0.51	-0.78	-0.60	0.71
2-8	3.75	-0.60	0.71	9.44	-4.18	0.52	-0.28	-0.60	0.71
2-9	4.25	-0.60	0.71	8.94	-4.18	0.54	0.22	-0.60	0.71
2-10	4.75	-0.60	0.71	8.44	-4.18	0.55	0.72	-0.60	0.71
2-11	5.25	-0.60	0.71	7.94	-4.18	0.56	1.22	-0.60	0.71
2-12	5.75	-0.60	0.71	7.44	-4.19	0.57	1.72	-0.60	0.71
2-13	6.25	-0.60	0.71	6.94	-4.19	0.59	2.22	-0.60	0.71
2-14	6.75	-0.60	0.71	6.44	-4.19	0.60	2.72	-0.60	0.71
2-15	7.25	-0.60	0.71	5.94	-4.19	0.61	3.22	-0.60	0.71
2-16	7.75	-0.60	0.71	5.44	-4.19	0.62	3.72	-0.60	0.71
2-17	8.25	-0.60	0.71	4.94	-4.19	0.64	4.22	-0.60	0.71
2-18	8.75	-0.60	0.71	4.44	-4.19	0.65	4.72	-0.60	0.71
2-19	9.25	-0.60	0.71	3.94	-4.19	0.66	5.22	-0.60	0.71
2-20	9.75	-0.60	0.71	3.44	-4.20	0.67	5.72	-0.60	0.71
2-21	10.25	-0.60	0.71	2.94	-4.20	0.69	6.22	-0.60	0.71
2-22	10.75	-0.60	0.71	2.44	-4.20	0.70	6.72	-0.60	0.71
2-23	11.25	-0.60	0.71	1.94	-4.20	0.71	7.22	-0.60	0.71
2-24	11.75	-0.60	0.71	1.44	-4.20	0.72	7.72	-0.60	0.71
2-25	12.25	-0.60	0.71	0.94	-4.20	0.74	8.22	-0.60	0.71
2-26	12.75	-0.60	0.71	0.44	-4.20	0.75	8.72	-0.60	0.71
2-27	13.25	-0.60	0.71	-0.06	-4.21	0.76	9.22	-0.60	0.71
2-28	13.75	-0.60	0.71	-0.56	-4.21	0.77	9.72	-0.60	0.71
2-29	14.25	-0.60	0.71	-1.06	-4.21	0.79	10.22	-0.60	0.71
2-30	14.75	-0.60	0.71	-1.56	-4.21	0.80	10.72	-0.60	0.71
2-31	15.25	-0.60	0.71	-2.06	-4.21	0.81	11.22	-0.60	0.71
2-32	15.75	-0.60	0.71	-2.56	-4.21	0.82	11.72	-0.60	0.71
2-33	16.25	-0.60	0.71	-3.06	-4.21	0.84	12.22	-0.60	0.71
2-34	16.75	-0.60	0.71	-3.56	-4.21	0.85	12.72	-0.60	0.71
2-35	17.25	-0.60	0.71	-4.06	-4.22	0.86	13.22	-0.60	0.71
2-36	17.75	-0.60	0.71	-4.56	-4.22	0.87	13.72	-0.60	0.71
2-37	18.25	-0.60	0.71	-5.06	-4.22	0.89	14.22	-0.60	0.71
2-38	18.75	-0.60	0.71	-5.56	-4.22	0.90	14.72	-0.60	0.71
2-39	19.25	-0.60	0.71	-6.06	-4.22	0.91	15.22	-0.60	0.71
2-40	19.75	-0.60	0.71	-6.56	-4.22	0.92	15.72	-0.60	0.71
2-41	20.25	-0.60	0.71	-7.06	-4.22	0.94	16.22	-0.60	0.71
2-42	20.75	-0.60	0.71	-7.56	-4.22	0.95	16.72	-0.60	0.71
2-43	21.25	-0.60	0.71	-8.06	-4.23	0.96	17.22	-0.60	0.71
2-44	21.75	-0.60	0.71	-8.56	-4.23	0.97	17.72	-0.60	0.71
2-45	22.25	-0.60	0.71	-9.06	-4.23	0.99	18.22	-0.60	0.71
2-46	22.75	-0.60	0.71	-9.56	-4.23	1.00	18.72	-0.60	0.71
2-47	23.25	-0.60	0.71	-10.06	-4.23	1.01	19.22	-0.60	0.71
2-48	23.75	-0.60	0.71	-10.56	-4.23	1.02	19.72	-0.60	0.71
2-49	24.25	-0.60	0.71	-11.06	-4.23	1.04	20.22	-0.60	0.71
2-50	24.75	-0.60	0.71	-11.56	-4.24	1.05	20.72	-0.60	0.71

APPENDIX I

Table 3. Location of samples from layer 3.

Sample	X (m)	Y (m)	Z (m)	X ₁ (m)	Y ₁ (m)	Z ₁ (m)	X ₂ (m)	Y ₂ (m)	Z ₂ (m)
3-1	0.25	-0.60	1.51	12.94	-4.17	1.24	-3.78	-0.60	1.51
3-2	0.75	-0.60	1.51	12.44	-4.17	1.25	-3.28	-0.60	1.51
3-3	1.25	-0.60	1.51	11.94	-4.17	1.26	-2.78	-0.60	1.51
3-4	1.75	-0.60	1.51	11.44	-4.17	1.27	-2.28	-0.60	1.51
3-5	2.25	-0.60	1.51	10.94	-4.18	1.29	-1.78	-0.60	1.51
3-6	2.75	-0.60	1.51	10.44	-4.18	1.30	-1.28	-0.60	1.51
3-7	3.25	-0.60	1.51	9.94	-4.18	1.31	-0.78	-0.60	1.51
3-8	3.75	-0.60	1.51	9.44	-4.18	1.32	-0.28	-0.60	1.51
3-9	4.25	-0.60	1.51	8.94	-4.18	1.34	0.22	-0.60	1.51
3-10	4.75	-0.60	1.51	8.44	-4.18	1.35	0.72	-0.60	1.51
3-11	5.25	-0.60	1.51	7.94	-4.18	1.36	1.22	-0.60	1.51
3-12	5.75	-0.60	1.51	7.44	-4.19	1.37	1.72	-0.60	1.51
3-13	6.25	-0.60	1.51	6.94	-4.19	1.39	2.22	-0.60	1.51
3-14	6.75	-0.60	1.51	6.44	-4.19	1.40	2.72	-0.60	1.51
3-15	7.25	-0.60	1.51	5.94	-4.19	1.41	3.22	-0.60	1.51
3-16	7.75	-0.60	1.51	5.44	-4.19	1.42	3.72	-0.60	1.51
3-17	8.25	-0.60	1.51	4.94	-4.19	1.44	4.22	-0.60	1.51
3-18	8.75	-0.60	1.51	4.44	-4.19	1.45	4.72	-0.60	1.51
3-19	9.25	-0.60	1.51	3.94	-4.19	1.46	5.22	-0.60	1.51
3-20	9.75	-0.60	1.51	3.44	-4.20	1.47	5.72	-0.60	1.51
3-21	10.25	-0.60	1.51	2.94	-4.20	1.49	6.22	-0.60	1.51
3-22	10.75	-0.60	1.51	2.44	-4.20	1.50	6.72	-0.60	1.51
3-23	11.25	-0.60	1.51	1.94	-4.20	1.51	7.22	-0.60	1.51
3-24	11.75	-0.60	1.51	1.44	-4.20	1.52	7.72	-0.60	1.51
3-25	12.25	-0.60	1.51	0.94	-4.20	1.54	8.22	-0.60	1.51
3-26	12.75	-0.60	1.51	0.44	-4.20	1.55	8.72	-0.60	1.51
3-27	13.25	-0.60	1.51	-0.06	-4.21	1.56	9.22	-0.60	1.51
3-28	13.75	-0.60	1.51	-0.56	-4.21	1.57	9.72	-0.60	1.51
3-29	14.25	-0.60	1.51	-1.06	-4.21	1.59	10.22	-0.60	1.51
3-30	14.75	-0.60	1.51	-1.56	-4.21	1.60	10.72	-0.60	1.51
3-31	15.25	-0.60	1.51	-2.06	-4.21	1.61	11.22	-0.60	1.51
3-32	15.75	-0.60	1.51	-2.56	-4.21	1.62	11.72	-0.60	1.51
3-33	16.25	-0.60	1.51	-3.06	-4.21	1.64	12.22	-0.60	1.51
3-34	16.75	-0.60	1.51	-3.56	-4.21	1.65	12.72	-0.60	1.51
3-35	17.25	-0.60	1.51	-4.06	-4.22	1.66	13.22	-0.60	1.51
3-36	17.75	-0.60	1.51	-4.56	-4.22	1.67	13.72	-0.60	1.51
3-37	18.25	-0.60	1.51	-5.06	-4.22	1.69	14.22	-0.60	1.51
3-38	18.75	-0.60	1.51	-5.56	-4.22	1.70	14.72	-0.60	1.51
3-39	19.25	-0.60	1.51	-6.06	-4.22	1.71	15.22	-0.60	1.51
3-40	19.75	-0.60	1.51	-6.56	-4.22	1.72	15.72	-0.60	1.51
3-41	20.25	-0.60	1.51	-7.06	-4.22	1.74	16.22	-0.60	1.51
3-42	20.75	-0.60	1.51	-7.56	-4.22	1.75	16.72	-0.60	1.51
3-43	21.25	-0.60	1.51	-8.06	-4.23	1.76	17.22	-0.60	1.51
3-44	21.75	-0.60	1.51	-8.56	-4.23	1.77	17.72	-0.60	1.51
3-45	22.25	-0.60	1.51	-9.06	-4.23	1.79	18.22	-0.60	1.51
3-46	22.75	-0.60	1.51	-9.56	-4.23	1.80	18.72	-0.60	1.51
3-47	23.25	-0.60	1.51	-10.06	-4.23	1.81	19.22	-0.60	1.51
3-48	23.75	-0.60	1.51	-10.56	-4.23	1.82	19.72	-0.60	1.51
3-49	24.25	-0.60	1.51	-11.06	-4.23	1.84	20.22	-0.60	1.51
3-50	24.75	-0.60	1.51	-11.56	-4.24	1.85	20.72	-0.60	1.51

APPENDIX I

Table 4. Location of samples from layer 4.

Sample	X (m)	Y (m)	Z (m)	X ₁ (m)	Y ₁ (m)	Z ₁ (m)	X ₂ (m)	Y ₂ (m)	Z ₂ (m)
4-1	0.25	-0.60	2.16	12.94	-4.17	1.89	-3.78	-0.60	2.16
4-2	0.75	-0.60	2.16	12.44	-4.17	1.90	-3.28	-0.60	2.16
4-3	1.25	-0.60	2.16	11.94	-4.17	1.91	-2.78	-0.60	2.16
4-4	1.75	-0.60	2.16	11.44	-4.17	1.92	-2.28	-0.60	2.16
4-5	2.25	-0.60	2.16	10.94	-4.18	1.94	-1.78	-0.60	2.16
4-6	2.75	-0.60	2.16	10.44	-4.18	1.95	-1.28	-0.60	2.16
4-7	3.25	-0.60	2.16	9.94	-4.18	1.96	-0.78	-0.60	2.16
4-8	3.75	-0.60	2.16	9.44	-4.18	1.97	-0.28	-0.60	2.16
4-9	4.25	-0.60	2.16	8.94	-4.18	1.99	0.22	-0.60	2.16
4-10	4.75	-0.60	2.16	8.44	-4.18	2.00	0.72	-0.60	2.16
4-11	5.25	-0.60	2.16	7.94	-4.18	2.01	1.22	-0.60	2.16
4-12	5.75	-0.60	2.16	7.44	-4.19	2.02	1.72	-0.60	2.16
4-13	6.25	-0.60	2.16	6.94	-4.19	2.04	2.22	-0.60	2.16
4-14	6.75	-0.60	2.16	6.44	-4.19	2.05	2.72	-0.60	2.16
4-15	7.25	-0.60	2.16	5.94	-4.19	2.06	3.22	-0.60	2.16
4-16	7.75	-0.60	2.16	5.44	-4.19	2.07	3.72	-0.60	2.16
4-17	8.25	-0.60	2.16	4.94	-4.19	2.09	4.22	-0.60	2.16
4-18	8.75	-0.60	2.16	4.44	-4.19	2.10	4.72	-0.60	2.16
4-19	9.25	-0.60	2.16	3.94	-4.19	2.11	5.22	-0.60	2.16
4-20	9.75	-0.60	2.16	3.44	-4.20	2.12	5.72	-0.60	2.16
4-21	10.25	-0.60	2.16	2.94	-4.20	2.14	6.22	-0.60	2.16
4-22	10.75	-0.60	2.16	2.44	-4.20	2.15	6.72	-0.60	2.16
4-23	11.25	-0.60	2.16	1.94	-4.20	2.16	7.22	-0.60	2.16
4-24	11.75	-0.60	2.16	1.44	-4.20	2.17	7.72	-0.60	2.16
4-25	12.25	-0.60	2.16	0.94	-4.20	2.19	8.22	-0.60	2.16
4-26	12.75	-0.60	2.16	0.44	-4.20	2.20	8.72	-0.60	2.16
4-27	13.25	-0.60	2.16	-0.06	-4.21	2.21	9.22	-0.60	2.16
4-28	13.75	-0.60	2.16	-0.56	-4.21	2.22	9.72	-0.60	2.16
4-29	14.25	-0.60	2.16	-1.06	-4.21	2.24	10.22	-0.60	2.16
4-30	14.75	-0.60	2.16	-1.56	-4.21	2.25	10.72	-0.60	2.16
4-31	15.25	-0.60	2.16	-2.06	-4.21	2.26	11.22	-0.60	2.16
4-32	15.75	-0.60	2.16	-2.56	-4.21	2.27	11.72	-0.60	2.16
4-33	16.25	-0.60	2.16	-3.06	-4.21	2.29	12.22	-0.60	2.16
4-34	16.75	-0.60	2.16	-3.56	-4.21	2.30	12.72	-0.60	2.16
4-35	17.25	-0.60	2.16	-4.06	-4.22	2.31	13.22	-0.60	2.16
4-36	17.75	-0.60	2.16	-4.56	-4.22	2.32	13.72	-0.60	2.16
4-37	18.25	-0.60	2.16	-5.06	-4.22	2.34	14.22	-0.60	2.16
4-38	18.75	-0.60	2.16	-5.56	-4.22	2.35	14.72	-0.60	2.16
4-39	19.25	-0.60	2.16	-6.06	-4.22	2.36	15.22	-0.60	2.16
4-40	19.75	-0.60	2.16	-6.56	-4.22	2.37	15.72	-0.60	2.16
4-41	20.25	-0.60	2.16	-7.06	-4.22	2.39	16.22	-0.60	2.16
4-42	20.75	-0.60	2.16	-7.56	-4.22	2.40	16.72	-0.60	2.16
4-43	21.25	-0.60	2.16	-8.06	-4.23	2.41	17.22	-0.60	2.16
4-44	21.75	-0.60	2.16	-8.56	-4.23	2.42	17.72	-0.60	2.16
4-45	22.25	-0.60	2.16	-9.06	-4.23	2.44	18.22	-0.60	2.16
4-46	22.75	-0.60	2.16	-9.56	-4.23	2.45	18.72	-0.60	2.16
4-47	23.25	-0.60	2.16	-10.06	-4.23	2.46	19.22	-0.60	2.16
4-48	23.75	-0.60	2.16	-10.56	-4.23	2.47	19.72	-0.60	2.16
4-49	24.25	-0.60	2.16	-11.06	-4.23	2.49	20.22	-0.60	2.16
4-50	24.75	-0.60	2.16	-11.56	-4.24	2.50	20.72	-0.60	2.16

APPENDIX I

Table 5. Location of samples from layer 5.

Sample	X (m)	Y (m)	Z (m)	X ₁ (m)	Y ₁ (m)	Z ₁ (m)	X ₂ (m)	Y ₂ (m)	Z ₂ (m)
5-1	0.25	-0.60	2.71	12.94	-4.17	2.44	-3.78	-0.60	2.71
5-2	0.75	-0.60	2.71	12.44	-4.17	2.45	-3.28	-0.60	2.71
5-3	1.25	-0.60	2.71	11.94	-4.17	2.46	-2.78	-0.60	2.71
5-4	1.75	-0.60	2.71	11.44	-4.17	2.47	-2.28	-0.60	2.71
5-5	2.25	-0.60	2.71	10.94	-4.18	2.49	-1.78	-0.60	2.71
5-6	2.75	-0.60	2.71	10.44	-4.18	2.50	-1.28	-0.60	2.71
5-7	3.25	-0.60	2.71	9.94	-4.18	2.51	-0.78	-0.60	2.71
5-8	3.75	-0.60	2.71	9.44	-4.18	2.52	-0.28	-0.60	2.71
5-9	4.25	-0.60	2.71	8.94	-4.18	2.54	0.22	-0.60	2.71
5-10	4.75	-0.60	2.71	8.44	-4.18	2.55	0.72	-0.60	2.71
5-11	5.25	-0.60	2.71	7.94	-4.18	2.56	1.22	-0.60	2.71
5-12	5.75	-0.60	2.71	7.44	-4.19	2.57	1.72	-0.60	2.71
5-13	6.25	-0.60	2.71	6.94	-4.19	2.59	2.22	-0.60	2.71
5-14	6.75	-0.60	2.71	6.44	-4.19	2.60	2.72	-0.60	2.71
5-15	7.25	-0.60	2.71	5.94	-4.19	2.61	3.22	-0.60	2.71
5-16	7.75	-0.60	2.71	5.44	-4.19	2.62	3.72	-0.60	2.71
5-17	8.25	-0.60	2.71	4.94	-4.19	2.64	4.22	-0.60	2.71
5-18	8.75	-0.60	2.71	4.44	-4.19	2.65	4.72	-0.60	2.71
5-19	9.25	-0.60	2.71	3.94	-4.19	2.66	5.22	-0.60	2.71
5-20	9.75	-0.60	2.71	3.44	-4.20	2.67	5.72	-0.60	2.71
5-21	10.25	-0.60	2.71	2.94	-4.20	2.69	6.22	-0.60	2.71
5-22	10.75	-0.60	2.71	2.44	-4.20	2.70	6.72	-0.60	2.71
5-23	11.25	-0.60	2.71	1.94	-4.20	2.71	7.22	-0.60	2.71
5-24	11.75	-0.60	2.71	1.44	-4.20	2.72	7.72	-0.60	2.71
5-25	12.25	-0.60	2.71	0.94	-4.20	2.74	8.22	-0.60	2.71
5-26	12.75	-0.60	2.71	0.44	-4.20	2.75	8.72	-0.60	2.71
5-27	13.25	-0.60	2.71	-0.06	-4.21	2.76	9.22	-0.60	2.71
5-28	13.75	-0.60	2.71	-0.56	-4.21	2.77	9.72	-0.60	2.71
5-29	14.25	-0.60	2.71	-1.06	-4.21	2.79	10.22	-0.60	2.71
5-30	14.75	-0.60	2.71	-1.56	-4.21	2.80	10.72	-0.60	2.71
5-31	15.25	-0.60	2.71	-2.06	-4.21	2.81	11.22	-0.60	2.71
5-32	15.75	-0.60	2.71	-2.56	-4.21	2.82	11.72	-0.60	2.71
5-33	16.25	-0.60	2.71	-3.06	-4.21	2.84	12.22	-0.60	2.71
5-34	16.75	-0.60	2.71	-3.56	-4.21	2.85	12.72	-0.60	2.71
5-35	17.25	-0.60	2.71	-4.06	-4.22	2.86	13.22	-0.60	2.71
5-36	17.75	-0.60	2.71	-4.56	-4.22	2.87	13.72	-0.60	2.71
5-37	18.25	-0.60	2.71	-5.06	-4.22	2.89	14.22	-0.60	2.71
5-38	18.75	-0.60	2.71	-5.56	-4.22	2.90	14.72	-0.60	2.71
5-39	19.25	-0.60	2.71	-6.06	-4.22	2.91	15.22	-0.60	2.71
5-40	19.75	-0.60	2.71	-6.56	-4.22	2.92	15.72	-0.60	2.71
5-41	20.25	-0.60	2.71	-7.06	-4.22	2.94	16.22	-0.60	2.71
5-42	20.75	-0.60	2.71	-7.56	-4.22	2.95	16.72	-0.60	2.71
5-43	21.25	-0.60	2.71	-8.06	-4.23	2.96	17.22	-0.60	2.71
5-44	21.75	-0.60	2.71	-8.56	-4.23	2.97	17.72	-0.60	2.71
5-45	22.25	-0.60	2.71	-9.06	-4.23	2.99	18.22	-0.60	2.71
5-46	22.75	-0.60	2.71	-9.56	-4.23	3.00	18.72	-0.60	2.71
5-47	23.25	-0.60	2.71	-10.06	-4.23	3.01	19.22	-0.60	2.71
5-48	23.75	-0.60	2.71	-10.56	-4.23	3.02	19.72	-0.60	2.71
5-49	24.25	-0.60	2.71	-11.06	-4.23	3.04	20.22	-0.60	2.71
5-50	24.75	-0.60	2.71	-11.56	-4.24	3.05	20.72	-0.60	2.71

APPENDIX I

Table 6. Location of samples from layer 6.

Sample	X (m)	Y (m)	Z (m)	X ₁ (m)	Y ₁ (m)	Z ₁ (m)	X ₂ (m)	Y ₂ (m)	Z ₂ (m)
6-1	0.25	-0.60	3.21	12.94	-4.17	2.94	-3.78	-0.60	3.21
6-2	0.75	-0.60	3.21	12.44	-4.17	2.95	-3.28	-0.60	3.21
6-3	1.25	-0.60	3.21	11.94	-4.17	2.96	-2.78	-0.60	3.21
6-4	1.75	-0.60	3.21	11.44	-4.17	2.97	-2.28	-0.60	3.21
6-5	2.25	-0.60	3.21	10.94	-4.18	2.99	-1.78	-0.60	3.21
6-6	2.75	-0.60	3.21	10.44	-4.18	3.00	-1.28	-0.60	3.21
6-7	3.25	-0.60	3.21	9.94	-4.18	3.01	-0.78	-0.60	3.21
6-8	3.75	-0.60	3.21	9.44	-4.18	3.02	-0.28	-0.60	3.21
6-9	4.25	-0.60	3.21	8.94	-4.18	3.04	0.22	-0.60	3.21
6-10	4.75	-0.60	3.21	8.44	-4.18	3.05	0.72	-0.60	3.21
6-11	5.25	-0.60	3.21	7.94	-4.18	3.06	1.22	-0.60	3.21
6-12	5.75	-0.60	3.21	7.44	-4.19	3.07	1.72	-0.60	3.21
6-13	6.25	-0.60	3.21	6.94	-4.19	3.09	2.22	-0.60	3.21
6-14	6.75	-0.60	3.21	6.44	-4.19	3.10	2.72	-0.60	3.21
6-15	7.25	-0.60	3.21	5.94	-4.19	3.11	3.22	-0.60	3.21
6-16	7.75	-0.60	3.21	5.44	-4.19	3.12	3.72	-0.60	3.21
6-17	8.25	-0.60	3.21	4.94	-4.19	3.14	4.22	-0.60	3.21
6-18	8.75	-0.60	3.21	4.44	-4.19	3.15	4.72	-0.60	3.21
6-19	9.25	-0.60	3.21	3.94	-4.19	3.16	5.22	-0.60	3.21
6-20	9.75	-0.60	3.21	3.44	-4.20	3.17	5.72	-0.60	3.21
6-21	10.25	-0.60	3.21	2.94	-4.20	3.19	6.22	-0.60	3.21
6-22	10.75	-0.60	3.21	2.44	-4.20	3.20	6.72	-0.60	3.21
6-23	11.25	-0.60	3.21	1.94	-4.20	3.21	7.22	-0.60	3.21
6-24	11.75	-0.60	3.21	1.44	-4.20	3.22	7.72	-0.60	3.21
6-25	12.25	-0.60	3.21	0.94	-4.20	3.24	8.22	-0.60	3.21
6-26	12.75	-0.60	3.21	0.44	-4.20	3.25	8.72	-0.60	3.21
6-27	13.25	-0.60	3.21	-0.06	-4.21	3.26	9.22	-0.60	3.21
6-28	13.75	-0.60	3.21	-0.56	-4.21	3.27	9.72	-0.60	3.21
6-29	14.25	-0.60	3.21	-1.06	-4.21	3.29	10.22	-0.60	3.21
6-30	14.75	-0.60	3.21	-1.56	-4.21	3.30	10.72	-0.60	3.21
6-31	15.25	-0.60	3.21	-2.06	-4.21	3.31	11.22	-0.60	3.21
6-32	15.75	-0.60	3.21	-2.56	-4.21	3.32	11.72	-0.60	3.21
6-33	16.25	-0.60	3.21	-3.06	-4.21	3.34	12.22	-0.60	3.21
6-34	16.75	-0.60	3.21	-3.56	-4.21	3.35	12.72	-0.60	3.21
6-35	17.25	-0.60	3.21	-4.06	-4.22	3.36	13.22	-0.60	3.21
6-36	17.75	-0.60	3.21	-4.56	-4.22	3.37	13.72	-0.60	3.21
6-37	18.25	-0.60	3.21	-5.06	-4.22	3.39	14.22	-0.60	3.21
6-38	18.75	-0.60	3.21	-5.56	-4.22	3.40	14.72	-0.60	3.21
6-39	19.25	-0.60	3.21	-6.06	-4.22	3.41	15.22	-0.60	3.21
6-40	19.75	-0.60	3.21	-6.56	-4.22	3.42	15.72	-0.60	3.21
6-41	20.25	-0.60	3.21	-7.06	-4.22	3.44	16.22	-0.60	3.21
6-42	20.75	-0.60	3.21	-7.56	-4.22	3.45	16.72	-0.60	3.21
6-43	21.25	-0.60	3.21	-8.06	-4.23	3.46	17.22	-0.60	3.21
6-44	21.75	-0.60	3.21	-8.56	-4.23	3.47	17.72	-0.60	3.21
6-45	22.25	-0.60	3.21	-9.06	-4.23	3.49	18.22	-0.60	3.21
6-46	22.75	-0.60	3.21	-9.56	-4.23	3.50	18.72	-0.60	3.21
6-47	23.25	-0.60	3.21	-10.06	-4.23	3.51	19.22	-0.60	3.21
6-48	23.75	-0.60	3.21	-10.56	-4.23	3.52	19.72	-0.60	3.21
6-49	24.25	-0.60	3.21	-11.06	-4.23	3.54	20.22	-0.60	3.21
6-50	24.75	-0.60	3.21	-11.56	-4.24	3.55	20.72	-0.60	3.21

APPENDIX I

Table 7. Location of samples from layer 7.

Sample	X (m)	Y (m)	Z (m)	X ₁ (m)	Y ₁ (m)	Z ₁ (m)	X ₂ (m)	Y ₂ (m)	Z ₂ (m)
7-1	0.25	-0.60	3.98	12.94	-4.17	3.71	-3.78	-0.60	3.98
7-2	0.75	-0.60	3.98	12.44	-4.17	3.72	-3.28	-0.60	3.98
7-3	1.25	-0.60	3.98	11.94	-4.17	3.73	-2.78	-0.60	3.98
7-4	1.75	-0.60	3.98	11.44	-4.17	3.74	-2.28	-0.60	3.98
7-5	2.25	-0.60	3.98	10.94	-4.18	3.76	-1.78	-0.60	3.98
7-6	2.75	-0.60	3.98	10.44	-4.18	3.77	-1.28	-0.60	3.98
7-7	3.25	-0.60	3.98	9.94	-4.18	3.78	-0.78	-0.60	3.98
7-8	3.75	-0.60	3.98	9.44	-4.18	3.79	-0.28	-0.60	3.98
7-9	4.25	-0.60	3.98	8.94	-4.18	3.81	0.22	-0.60	3.98
7-10	4.75	-0.60	3.98	8.44	-4.18	3.82	0.72	-0.60	3.98
7-11	5.25	-0.60	3.98	7.94	-4.18	3.83	1.22	-0.60	3.98
7-12	5.75	-0.60	3.98	7.44	-4.19	3.84	1.72	-0.60	3.98
7-13	6.25	-0.60	3.98	6.94	-4.19	3.86	2.22	-0.60	3.98
7-14	6.75	-0.60	3.98	6.44	-4.19	3.87	2.72	-0.60	3.98
7-15	7.25	-0.60	3.98	5.94	-4.19	3.88	3.22	-0.60	3.98
7-16	7.75	-0.60	3.98	5.44	-4.19	3.89	3.72	-0.60	3.98
7-17	8.25	-0.60	3.98	4.94	-4.19	3.91	4.22	-0.60	3.98
7-18	8.75	-0.60	3.98	4.44	-4.19	3.92	4.72	-0.60	3.98
7-19	9.25	-0.60	3.98	3.94	-4.19	3.93	5.22	-0.60	3.98
7-20	9.75	-0.60	3.98	3.44	-4.20	3.94	5.72	-0.60	3.98
7-21	10.25	-0.60	3.98	2.94	-4.20	3.96	6.22	-0.60	3.98
7-22	10.75	-0.60	3.98	2.44	-4.20	3.97	6.72	-0.60	3.98
7-23	11.25	-0.60	3.98	1.94	-4.20	3.98	7.22	-0.60	3.98
7-24	11.75	-0.60	3.98	1.44	-4.20	3.99	7.72	-0.60	3.98
7-25	12.25	-0.60	3.98	0.94	-4.20	4.01	8.22	-0.60	3.98
7-26	12.75	-0.60	3.98	0.44	-4.20	4.02	8.72	-0.60	3.98
7-27	13.25	-0.60	3.98	-0.06	-4.21	4.03	9.22	-0.60	3.98
7-28	13.75	-0.60	3.98	-0.56	-4.21	4.04	9.72	-0.60	3.98
7-29	14.25	-0.60	3.98	-1.06	-4.21	4.06	10.22	-0.60	3.98
7-30	14.75	-0.60	3.98	-1.56	-4.21	4.07	10.72	-0.60	3.98
7-31	15.25	-0.60	3.98	-2.06	-4.21	4.08	11.22	-0.60	3.98
7-32	15.75	-0.60	3.98	-2.56	-4.21	4.09	11.72	-0.60	3.98
7-33	16.25	-0.60	3.98	-3.06	-4.21	4.11	12.22	-0.60	3.98
7-34	16.75	-0.60	3.98	-3.56	-4.21	4.12	12.72	-0.60	3.98
7-35	17.25	-0.60	3.98	-4.06	-4.22	4.13	13.22	-0.60	3.98
7-36	17.75	-0.60	3.98	-4.56	-4.22	4.14	13.72	-0.60	3.98
7-37	18.25	-0.60	3.98	-5.06	-4.22	4.16	14.22	-0.60	3.98
7-38	18.75	-0.60	3.98	-5.56	-4.22	4.17	14.72	-0.60	3.98
7-39	19.25	-0.60	3.98	-6.06	-4.22	4.18	15.22	-0.60	3.98
7-40	19.75	-0.60	3.98	-6.56	-4.22	4.19	15.72	-0.60	3.98
7-41	20.25	-0.60	3.98	-7.06	-4.22	4.21	16.22	-0.60	3.98
7-42	20.75	-0.60	3.98	-7.56	-4.22	4.22	16.72	-0.60	3.98
7-43	21.25	-0.60	3.98	-8.06	-4.23	4.23	17.22	-0.60	3.98
7-44	21.75	-0.60	3.98	-8.56	-4.23	4.24	17.72	-0.60	3.98
7-45	22.25	-0.60	3.98	-9.06	-4.23	4.26	18.22	-0.60	3.98
7-46	22.75	-0.60	3.98	-9.56	-4.23	4.27	18.72	-0.60	3.98
7-47	23.25	-0.60	3.98	-10.06	-4.23	4.28	19.22	-0.60	3.98
7-48	23.75	-0.60	3.98	-10.56	-4.23	4.29	19.72	-0.60	3.98
7-49	24.25	-0.60	3.98	-11.06	-4.23	4.31	20.22	-0.60	3.98
7-50	24.75	-0.60	3.98	-11.56	-4.24	4.32	20.72	-0.60	3.98

APPENDIX I

Table 8. Location of samples from layer 8.

Sample	X (m)	Y (m)	Z (m)	X ₁ (m)	Y ₁ (m)	Z ₁ (m)	X ₂ (m)	Y ₂ (m)	Z ₂ (m)
8-1	0.25	-0.60	4.89	12.94	-4.17	4.62	-3.78	-0.60	4.89
8-2	0.75	-0.60	4.89	12.44	-4.17	4.63	-3.28	-0.60	4.89
8-3	1.25	-0.60	4.89	11.94	-4.17	4.64	-2.78	-0.60	4.89
8-4	1.75	-0.60	4.89	11.44	-4.17	4.65	-2.28	-0.60	4.89
8-5	2.25	-0.60	4.89	10.94	-4.18	4.67	-1.78	-0.60	4.89
8-6	2.75	-0.60	4.89	10.44	-4.18	4.68	-1.28	-0.60	4.89
8-7	3.25	-0.60	4.89	9.94	-4.18	4.69	-0.78	-0.60	4.89
8-8	3.75	-0.60	4.89	9.44	-4.18	4.70	-0.28	-0.60	4.89
8-9	4.25	-0.60	4.89	8.94	-4.18	4.72	0.22	-0.60	4.89
8-10	4.75	-0.60	4.89	8.44	-4.18	4.73	0.72	-0.60	4.89
8-11	5.25	-0.60	4.89	7.94	-4.18	4.74	1.22	-0.60	4.89
8-12	5.75	-0.60	4.89	7.44	-4.19	4.75	1.72	-0.60	4.89
8-13	6.25	-0.60	4.89	6.94	-4.19	4.77	2.22	-0.60	4.89
8-14	6.75	-0.60	4.89	6.44	-4.19	4.78	2.72	-0.60	4.89
8-15	7.25	-0.60	4.89	5.94	-4.19	4.79	3.22	-0.60	4.89
8-16	7.75	-0.60	4.89	5.44	-4.19	4.80	3.72	-0.60	4.89
8-17	8.25	-0.60	4.89	4.94	-4.19	4.82	4.22	-0.60	4.89
8-18	8.75	-0.60	4.89	4.44	-4.19	4.83	4.72	-0.60	4.89
8-19	9.25	-0.60	4.89	3.94	-4.19	4.84	5.22	-0.60	4.89
8-20	9.75	-0.60	4.89	3.44	-4.20	4.85	5.72	-0.60	4.89
8-21	10.25	-0.60	4.89	2.94	-4.20	4.87	6.22	-0.60	4.89
8-22	10.75	-0.60	4.89	2.44	-4.20	4.88	6.72	-0.60	4.89
8-23	11.25	-0.60	4.89	1.94	-4.20	4.89	7.22	-0.60	4.89
8-24	11.75	-0.60	4.89	1.44	-4.20	4.90	7.72	-0.60	4.89
8-25	12.25	-0.60	4.89	0.94	-4.20	4.92	8.22	-0.60	4.89
8-26	12.75	-0.60	4.89	0.44	-4.20	4.93	8.72	-0.60	4.89
8-27	13.25	-0.60	4.89	-0.06	-4.21	4.94	9.22	-0.60	4.89
8-28	13.75	-0.60	4.89	-0.56	-4.21	4.95	9.72	-0.60	4.89
8-29	14.25	-0.60	4.89	-1.06	-4.21	4.97	10.22	-0.60	4.89
8-30	14.75	-0.60	4.89	-1.56	-4.21	4.98	10.72	-0.60	4.89
8-31	15.25	-0.60	4.89	-2.06	-4.21	4.99	11.22	-0.60	4.89
8-32	15.75	-0.60	4.89	-2.56	-4.21	5.00	11.72	-0.60	4.89
8-33	16.25	-0.60	4.89	-3.06	-4.21	5.02	12.22	-0.60	4.89
8-34	16.75	-0.60	4.89	-3.56	-4.21	5.03	12.72	-0.60	4.89
8-35	17.25	-0.60	4.89	-4.06	-4.22	5.04	13.22	-0.60	4.89
8-36	17.75	-0.60	4.89	-4.56	-4.22	5.05	13.72	-0.60	4.89
8-37	18.25	-0.60	4.89	-5.06	-4.22	5.07	14.22	-0.60	4.89
8-38	18.75	-0.60	4.89	-5.56	-4.22	5.08	14.72	-0.60	4.89
8-39	19.25	-0.60	4.89	-6.06	-4.22	5.09	15.22	-0.60	4.89
8-40	19.75	-0.60	4.89	-6.56	-4.22	5.10	15.72	-0.60	4.89
8-41	20.25	-0.60	4.89	-7.06	-4.22	5.12	16.22	-0.60	4.89
8-42	20.75	-0.60	4.89	-7.56	-4.22	5.13	16.72	-0.60	4.89
8-43	21.25	-0.60	4.89	-8.06	-4.23	5.14	17.22	-0.60	4.89
8-44	21.75	-0.60	4.89	-8.56	-4.23	5.15	17.72	-0.60	4.89
8-45	22.25	-0.60	4.89	-9.06	-4.23	5.17	18.22	-0.60	4.89
8-46	22.75	-0.60	4.89	-9.56	-4.23	5.18	18.72	-0.60	4.89
8-47	23.25	-0.60	4.89	-10.06	-4.23	5.19	19.22	-0.60	4.89
8-48	23.75	-0.60	4.89	-10.56	-4.23	5.20	19.72	-0.60	4.89
8-49	24.25	-0.60	4.89	-11.06	-4.23	5.22	20.22	-0.60	4.89
8-50	24.75	-0.60	4.89	-11.56	-4.24	5.23	20.72	-0.60	4.89

APPENDIX I

Table 9. Location of samples from layer 9.

Sample	X (m)	Y (m)	Z (m)	X ₁ (m)	Y ₁ (m)	Z ₁ (m)	X ₂ (m)	Y ₂ (m)	Z ₂ (m)
9-1	0.25	-0.60	5.79	12.94	-4.17	5.52	-3.78	-0.60	5.79
9-2	0.75	-0.60	5.79	12.44	-4.17	5.53	-3.28	-0.60	5.79
9-3	1.25	-0.60	5.79	11.94	-4.17	5.54	-2.78	-0.60	5.79
9-4	1.75	-0.60	5.79	11.44	-4.17	5.55	-2.28	-0.60	5.79
9-5	2.25	-0.60	5.79	10.94	-4.18	5.57	-1.78	-0.60	5.79
9-6	2.75	-0.60	5.79	10.44	-4.18	5.58	-1.28	-0.60	5.79
9-7	3.25	-0.60	5.79	9.94	-4.18	5.59	-0.78	-0.60	5.79
9-8	3.75	-0.60	5.79	9.44	-4.18	5.60	-0.28	-0.60	5.79
9-9	4.25	-0.60	5.79	8.94	-4.18	5.62	0.22	-0.60	5.79
9-10	4.75	-0.60	5.79	8.44	-4.18	5.63	0.72	-0.60	5.79
9-11	5.25	-0.60	5.79	7.94	-4.18	5.64	1.22	-0.60	5.79
9-12	5.75	-0.60	5.79	7.44	-4.19	5.65	1.72	-0.60	5.79
9-13	6.25	-0.60	5.79	6.94	-4.19	5.67	2.22	-0.60	5.79
9-14	6.75	-0.60	5.79	6.44	-4.19	5.68	2.72	-0.60	5.79
9-15	7.25	-0.60	5.79	5.94	-4.19	5.69	3.22	-0.60	5.79
9-16	7.75	-0.60	5.79	5.44	-4.19	5.70	3.72	-0.60	5.79
9-17	8.25	-0.60	5.79	4.94	-4.19	5.72	4.22	-0.60	5.79
9-18	8.75	-0.60	5.79	4.44	-4.19	5.73	4.72	-0.60	5.79
9-19	9.25	-0.60	5.79	3.94	-4.19	5.74	5.22	-0.60	5.79
9-20	9.75	-0.60	5.79	3.44	-4.20	5.75	5.72	-0.60	5.79
9-21	10.25	-0.60	5.79	2.94	-4.20	5.77	6.22	-0.60	5.79
9-22	10.75	-0.60	5.79	2.44	-4.20	5.78	6.72	-0.60	5.79
9-23	11.25	-0.60	5.79	1.94	-4.20	5.79	7.22	-0.60	5.79
9-24	11.75	-0.60	5.79	1.44	-4.20	5.80	7.72	-0.60	5.79
9-25	12.25	-0.60	5.79	0.94	-4.20	5.82	8.22	-0.60	5.79
9-26	12.75	-0.60	5.79	0.44	-4.20	5.83	8.72	-0.60	5.79
9-27	13.25	-0.60	5.79	-0.06	-4.21	5.84	9.22	-0.60	5.79
9-28	13.75	-0.60	5.79	-0.56	-4.21	5.85	9.72	-0.60	5.79
9-29	14.25	-0.60	5.79	-1.06	-4.21	5.87	10.22	-0.60	5.79
9-30	14.75	-0.60	5.79	-1.56	-4.21	5.88	10.72	-0.60	5.79
9-31	15.25	-0.60	5.79	-2.06	-4.21	5.89	11.22	-0.60	5.79
9-32	15.75	-0.60	5.79	-2.56	-4.21	5.90	11.72	-0.60	5.79
9-33	16.25	-0.60	5.79	-3.06	-4.21	5.92	12.22	-0.60	5.79
9-34	16.75	-0.60	5.79	-3.56	-4.21	5.93	12.72	-0.60	5.79
9-35	17.25	-0.60	5.79	-4.06	-4.22	5.94	13.22	-0.60	5.79
9-36	17.75	-0.60	5.79	-4.56	-4.22	5.95	13.72	-0.60	5.79
9-37	18.25	-0.60	5.79	-5.06	-4.22	5.97	14.22	-0.60	5.79
9-38	18.75	-0.60	5.79	-5.56	-4.22	5.98	14.72	-0.60	5.79
9-39	19.25	-0.60	5.79	-6.06	-4.22	5.99	15.22	-0.60	5.79
9-40	19.75	-0.60	5.79	-6.56	-4.22	6.00	15.72	-0.60	5.79
9-41	20.25	-0.60	5.79	-7.06	-4.22	6.02	16.22	-0.60	5.79
9-42	20.75	-0.60	5.79	-7.56	-4.22	6.03	16.72	-0.60	5.79
9-43	21.25	-0.60	5.79	-8.06	-4.23	6.04	17.22	-0.60	5.79
9-44	21.75	-0.60	5.79	-8.56	-4.23	6.05	17.72	-0.60	5.79
9-45	22.25	-0.60	5.79	-9.06	-4.23	6.07	18.22	-0.60	5.79
9-46	22.75	-0.60	5.79	-9.56	-4.23	6.08	18.72	-0.60	5.79
9-47	23.25	-0.60	5.79	-10.06	-4.23	6.09	19.22	-0.60	5.79
9-48	23.75	-0.60	5.79	-10.56	-4.23	6.10	19.72	-0.60	5.79
9-49	24.25	-0.60	5.79	-11.06	-4.23	6.12	20.22	-0.60	5.79
9-50	24.75	-0.60	5.79	-11.56	-4.24	6.13	20.72	-0.60	5.79

APPENDIX I

Table 10. Location of samples from layer A.

Sample	X (m)	Y (m)	Z (m)	X ₁ (m)	Y ₁ (m)	Z ₁ (m)	X ₂ (m)	Y ₂ (m)	Z ₂ (m)
A-1	3.25	-0.60	0.06	9.94	-4.18	-0.14	-0.78	-0.60	0.06
A-2	3.25	-0.60	0.19	9.94	-4.18	-0.01	-0.78	-0.60	0.19
A-3	3.25	-0.60	0.32	9.94	-4.18	0.12	-0.78	-0.60	0.32
A-4	3.25	-0.60	0.45	9.94	-4.18	0.25	-0.78	-0.60	0.45
A-5	3.25	-0.60	0.58	9.94	-4.18	0.38	-0.78	-0.60	0.58
A-6	3.25	-0.60	0.71	9.94	-4.18	0.51	-0.78	-0.60	0.71
A-7	3.25	-0.60	0.84	9.94	-4.18	0.64	-0.78	-0.60	0.84
A-8	3.25	-0.60	0.97	9.94	-4.18	0.77	-0.78	-0.60	0.97
A-9	3.25	-0.60	1.10	9.94	-4.18	0.90	-0.78	-0.60	1.10
A-10	3.25	-0.60	1.23	9.94	-4.18	1.03	-0.78	-0.60	1.23
A-11	3.25	-0.60	1.36	9.94	-4.18	1.16	-0.78	-0.60	1.36
A-12	3.25	-0.60	1.49	9.94	-4.18	1.29	-0.78	-0.60	1.49
A-13	3.25	-0.60	1.62	9.94	-4.18	1.42	-0.78	-0.60	1.62
A-14	3.25	-0.60	1.75	9.94	-4.18	1.55	-0.78	-0.60	1.75
A-15	3.25	-0.60	1.88	9.94	-4.18	1.68	-0.78	-0.60	1.88
A-16	3.25	-0.60	2.01	9.94	-4.18	1.81	-0.78	-0.60	2.01
A-17	3.25	-0.60	2.14	9.94	-4.18	1.94	-0.78	-0.60	2.14
A-18	3.25	-0.60	2.27	9.94	-4.18	2.07	-0.78	-0.60	2.27
A-19	3.25	-0.60	2.40	9.94	-4.18	2.20	-0.78	-0.60	2.40
A-20	3.25	-0.60	2.53	9.94	-4.18	2.33	-0.78	-0.60	2.53
A-21	3.25	-0.60	2.66	9.94	-4.18	2.46	-0.78	-0.60	2.66
A-22	3.25	-0.60	2.79	9.94	-4.18	2.59	-0.78	-0.60	2.79
A-23	3.25	-0.60	2.92	9.94	-4.18	2.72	-0.78	-0.60	2.92
A-24	3.25	-0.60	3.05	9.94	-4.18	2.85	-0.78	-0.60	3.05
A-25	3.25	-0.60	3.18	9.94	-4.18	2.98	-0.78	-0.60	3.18
A-26	3.25	-0.60	3.31	9.94	-4.18	3.11	-0.78	-0.60	3.31
A-27	3.25	-0.60	3.44	9.94	-4.18	3.24	-0.78	-0.60	3.44
A-28	3.25	-0.60	3.57	9.94	-4.18	3.37	-0.78	-0.60	3.57
A-29	3.25	-0.60	3.70	9.94	-4.18	3.50	-0.78	-0.60	3.70
A-30	3.25	-0.60	3.83	9.94	-4.18	3.63	-0.78	-0.60	3.83
A-31	3.25	-0.60	3.96	9.94	-4.18	3.76	-0.78	-0.60	3.96
A-32	3.25	-0.60	4.09	9.94	-4.18	3.89	-0.78	-0.60	4.09
A-33	3.25	-0.60	4.22	9.94	-4.18	4.02	-0.78	-0.60	4.22
A-34	3.25	-0.60	4.35	9.94	-4.18	4.15	-0.78	-0.60	4.35
A-35	3.25	-0.60	4.48	9.94	-4.18	4.28	-0.78	-0.60	4.48
A-36	3.25	-0.60	4.61	9.94	-4.18	4.41	-0.78	-0.60	4.61
A-37	3.25	-0.60	4.74	9.94	-4.18	4.54	-0.78	-0.60	4.74
A-38	3.25	-0.60	4.87	9.94	-4.18	4.67	-0.78	-0.60	4.87
A-39	3.25	-0.60	5.00	9.94	-4.18	4.80	-0.78	-0.60	5.00
A-40	3.25	-0.60	5.13	9.94	-4.18	4.93	-0.78	-0.60	5.13
A-41	3.25	-0.60	5.26	9.94	-4.18	5.06	-0.78	-0.60	5.26
A-42	3.25	-0.60	5.39	9.94	-4.18	5.19	-0.78	-0.60	5.39
A-43	3.25	-0.60	5.52	9.94	-4.18	5.32	-0.78	-0.60	5.52
A-44	3.25	-0.60	5.65	9.94	-4.18	5.45	-0.78	-0.60	5.65
A-45	3.25	-0.60	5.78	9.94	-4.18	5.58	-0.78	-0.60	5.78
A-46	3.25	-0.60	5.91	9.94	-4.18	5.71	-0.78	-0.60	5.91
A-47	3.25	-0.60	6.04	9.94	-4.18	5.84	-0.78	-0.60	6.04
A-48	3.25	-0.60	6.17	9.94	-4.18	5.97	-0.78	-0.60	6.17

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Table 11. Location of samples from layer B.

Sample	X (m)	Y (m)	Z (m)	X ₁ (m)	Y ₁ (m)	Z ₁ (m)	X ₂ (m)	Y ₂ (m)	Z ₂ (m)
B-1	12.75	-0.60	0.06	0.44	-4.20	0.10	8.72	-0.60	0.06
B-2	12.75	-0.60	0.19	0.44	-4.20	0.23	8.72	-0.60	0.19
B-3	12.75	-0.60	0.32	0.44	-4.20	0.36	8.72	-0.60	0.32
B-4	12.75	-0.60	0.45	0.44	-4.20	0.49	8.72	-0.60	0.45
B-5	12.75	-0.60	0.58	0.44	-4.20	0.62	8.72	-0.60	0.58
B-6	12.75	-0.60	0.71	0.44	-4.20	0.75	8.72	-0.60	0.71
B-7	12.75	-0.60	0.84	0.44	-4.20	0.88	8.72	-0.60	0.84
B-8	12.75	-0.60	0.97	0.44	-4.20	1.01	8.72	-0.60	0.97
B-9	12.75	-0.60	1.10	0.44	-4.20	1.14	8.72	-0.60	1.10
B-10	12.75	-0.60	1.23	0.44	-4.20	1.27	8.72	-0.60	1.23
B-11	12.75	-0.60	1.36	0.44	-4.20	1.40	8.72	-0.60	1.36
B-12	12.75	-0.60	1.49	0.44	-4.20	1.53	8.72	-0.60	1.49
B-13	12.75	-0.60	1.62	0.44	-4.20	1.66	8.72	-0.60	1.62
B-14	12.75	-0.60	1.75	0.44	-4.20	1.79	8.72	-0.60	1.75
B-15	12.75	-0.60	1.88	0.44	-4.20	1.92	8.72	-0.60	1.88
B-16	12.75	-0.60	2.01	0.44	-4.20	2.05	8.72	-0.60	2.01
B-17	12.75	-0.60	2.14	0.44	-4.20	2.18	8.72	-0.60	2.14
B-18	12.75	-0.60	2.27	0.44	-4.20	2.31	8.72	-0.60	2.27
B-19	12.75	-0.60	2.40	0.44	-4.20	2.44	8.72	-0.60	2.40
B-20	12.75	-0.60	2.53	0.44	-4.20	2.57	8.72	-0.60	2.53
B-21	12.75	-0.60	2.66	0.44	-4.20	2.70	8.72	-0.60	2.66
B-22	12.75	-0.60	2.79	0.44	-4.20	2.83	8.72	-0.60	2.79
B-23	12.75	-0.60	2.92	0.44	-4.20	2.96	8.72	-0.60	2.92
B-24	12.75	-0.60	3.05	0.44	-4.20	3.09	8.72	-0.60	3.05
B-25	12.75	-0.60	3.18	0.44	-4.20	3.22	8.72	-0.60	3.18
B-26	12.75	-0.60	3.31	0.44	-4.20	3.35	8.72	-0.60	3.31
B-27	12.75	-0.60	3.44	0.44	-4.20	3.48	8.72	-0.60	3.44
B-28	12.75	-0.60	3.57	0.44	-4.20	3.61	8.72	-0.60	3.57
B-29	12.75	-0.60	3.70	0.44	-4.20	3.74	8.72	-0.60	3.70
B-30	12.75	-0.60	3.83	0.44	-4.20	3.87	8.72	-0.60	3.83
B-31	12.75	-0.60	3.96	0.44	-4.20	4.00	8.72	-0.60	3.96
B-32	12.75	-0.60	4.09	0.44	-4.20	4.13	8.72	-0.60	4.09
B-33	12.75	-0.60	4.22	0.44	-4.20	4.26	8.72	-0.60	4.22
B-34	12.75	-0.60	4.35	0.44	-4.20	4.39	8.72	-0.60	4.35
B-35	12.75	-0.60	4.48	0.44	-4.20	4.52	8.72	-0.60	4.48
B-36	12.75	-0.60	4.61	0.44	-4.20	4.65	8.72	-0.60	4.61
B-37	12.75	-0.60	4.74	0.44	-4.20	4.78	8.72	-0.60	4.74
B-38	12.75	-0.60	4.87	0.44	-4.20	4.91	8.72	-0.60	4.87
B-39	12.75	-0.60	5.00	0.44	-4.20	5.04	8.72	-0.60	5.00
B-40	12.75	-0.60	5.13	0.44	-4.20	5.17	8.72	-0.60	5.13
B-41	12.75	-0.60	5.26	0.44	-4.20	5.30	8.72	-0.60	5.26
B-42	12.75	-0.60	5.39	0.44	-4.20	5.43	8.72	-0.60	5.39
B-43	12.75	-0.60	5.52	0.44	-4.20	5.56	8.72	-0.60	5.52
B-44	12.75	-0.60	5.65	0.44	-4.20	5.69	8.72	-0.60	5.65
B-45	12.75	-0.60	5.78	0.44	-4.20	5.82	8.72	-0.60	5.78
B-46	12.75	-0.60	5.91	0.44	-4.20	5.95	8.72	-0.60	5.91
B-47	12.75	-0.60	6.04	0.44	-4.20	6.08	8.72	-0.60	6.04
B-48	12.75	-0.60	6.17	0.44	-4.20	6.21	8.72	-0.60	6.17

APPENDIX I

Table 12. Location of samples from layer C.

Sample	X (m)	Y (m)	Z (m)	X ₁ (m)	Y ₁ (m)	Z ₁ (m)	X ₂ (m)	Y ₂ (m)	Z ₂ (m)
C-1	20.75	-0.60	0.06	-7.56	-4.22	0.30	16.72	-0.60	0.06
C-2	20.75	-0.60	0.19	-7.56	-4.22	0.43	16.72	-0.60	0.19
C-3	20.75	-0.60	0.32	-7.56	-4.22	0.56	16.72	-0.60	0.32
C-4	20.75	-0.60	0.45	-7.56	-4.22	0.69	16.72	-0.60	0.45
C-5	20.75	-0.60	0.58	-7.56	-4.22	0.82	16.72	-0.60	0.58
C-6	20.75	-0.60	0.71	-7.56	-4.22	0.95	16.72	-0.60	0.71
C-7	20.75	-0.60	0.84	-7.56	-4.22	1.08	16.72	-0.60	0.84
C-8	20.75	-0.60	0.97	-7.56	-4.22	1.21	16.72	-0.60	0.97
C-9	20.75	-0.60	1.10	-7.56	-4.22	1.34	16.72	-0.60	1.10
C-10	20.75	-0.60	1.23	-7.56	-4.22	1.47	16.72	-0.60	1.23
C-11	20.75	-0.60	1.36	-7.56	-4.22	1.60	16.72	-0.60	1.36
C-12	20.75	-0.60	1.49	-7.56	-4.22	1.73	16.72	-0.60	1.49
C-13	20.75	-0.60	1.62	-7.56	-4.22	1.86	16.72	-0.60	1.62
C-14	20.75	-0.60	1.75	-7.56	-4.22	1.99	16.72	-0.60	1.75
C-15	20.75	-0.60	1.88	-7.56	-4.22	2.12	16.72	-0.60	1.88
C-16	20.75	-0.60	2.01	-7.56	-4.22	2.25	16.72	-0.60	2.01
C-17	20.75	-0.60	2.14	-7.56	-4.22	2.38	16.72	-0.60	2.14
C-18	20.75	-0.60	2.27	-7.56	-4.22	2.51	16.72	-0.60	2.27
C-19	20.75	-0.60	2.40	-7.56	-4.22	2.64	16.72	-0.60	2.40
C-20	20.75	-0.60	2.53	-7.56	-4.22	2.77	16.72	-0.60	2.53
C-21	20.75	-0.60	2.66	-7.56	-4.22	2.90	16.72	-0.60	2.66
C-22	20.75	-0.60	2.79	-7.56	-4.22	3.03	16.72	-0.60	2.79
C-23	20.75	-0.60	2.92	-7.56	-4.22	3.16	16.72	-0.60	2.92
C-24	20.75	-0.60	3.05	-7.56	-4.22	3.29	16.72	-0.60	3.05
C-25	20.75	-0.60	3.18	-7.56	-4.22	3.42	16.72	-0.60	3.18
C-26	20.75	-0.60	3.31	-7.56	-4.22	3.55	16.72	-0.60	3.31
C-27	20.75	-0.60	3.44	-7.56	-4.22	3.68	16.72	-0.60	3.44
C-28	20.75	-0.60	3.57	-7.56	-4.22	3.81	16.72	-0.60	3.57
C-29	20.75	-0.60	3.70	-7.56	-4.22	3.94	16.72	-0.60	3.70
C-30	20.75	-0.60	3.83	-7.56	-4.22	4.07	16.72	-0.60	3.83
C-31	20.75	-0.60	3.96	-7.56	-4.22	4.20	16.72	-0.60	3.96
C-32	20.75	-0.60	4.09	-7.56	-4.22	4.33	16.72	-0.60	4.09
C-33	20.75	-0.60	4.22	-7.56	-4.22	4.46	16.72	-0.60	4.22
C-34	20.75	-0.60	4.35	-7.56	-4.22	4.59	16.72	-0.60	4.35
C-35	20.75	-0.60	4.48	-7.56	-4.22	4.72	16.72	-0.60	4.48
C-36	20.75	-0.60	4.61	-7.56	-4.22	4.85	16.72	-0.60	4.61
C-37	20.75	-0.60	4.74	-7.56	-4.22	4.98	16.72	-0.60	4.74
C-38	20.75	-0.60	4.87	-7.56	-4.22	5.11	16.72	-0.60	4.87
C-39	20.75	-0.60	5.00	-7.56	-4.22	5.24	16.72	-0.60	5.00
C-40	20.75	-0.60	5.13	-7.56	-4.22	5.37	16.72	-0.60	5.13
C-41	20.75	-0.60	5.26	-7.56	-4.22	5.50	16.72	-0.60	5.26
C-42	20.75	-0.60	5.39	-7.56	-4.22	5.63	16.72	-0.60	5.39
C-43	20.75	-0.60	5.52	-7.56	-4.22	5.76	16.72	-0.60	5.52
C-44	20.75	-0.60	5.65	-7.56	-4.22	5.89	16.72	-0.60	5.65
C-45	20.75	-0.60	5.78	-7.56	-4.22	6.02	16.72	-0.60	5.78
C-46	20.75	-0.60	5.91	-7.56	-4.22	6.15	16.72	-0.60	5.91
C-47	20.75	-0.60	6.04	-7.56	-4.22	6.28	16.72	-0.60	6.04
C-48	20.75	-0.60	6.17	-7.56	-4.22	6.41	16.72	-0.60	6.17

APPENDIX I

Table 13. Coordinates of Guelph permeameter measurement locations for layer 3.

Sample	X (m)	Y (m)	Z (m)	X1 (m)	Y1 (m)	Z1 (m)	X2 (m)	Y2 (m)	Z2 (m)
L3-1	0.25	-0.30	1.51	12.94	-4.47	1.24	-3.78	-0.30	1.51
L3-2	0.52	-0.30	1.51	12.67	-4.47	1.24	-3.51	-0.30	1.51
L3-3	0.76	-0.30	1.51	12.43	-4.47	1.25	-3.27	-0.30	1.51
L3-4	1.01	-0.30	1.51	12.18	-4.47	1.26	-3.02	-0.30	1.51
L3-5	1.21	-0.30	1.51	11.98	-4.47	1.26	-2.82	-0.30	1.51
L3-6	1.50	-0.30	1.51	11.69	-4.47	1.27	-2.53	-0.30	1.51
L3-7	1.81	-0.30	1.51	11.38	-4.47	1.28	-2.22	-0.30	1.51
L3-8	2.06	-0.30	1.51	11.13	-4.48	1.28	-1.97	-0.30	1.51
L3-9	2.25	-0.30	1.51	10.94	-4.48	1.29	-1.78	-0.30	1.51
L3-10	2.50	-0.30	1.51	10.69	-4.48	1.29	-1.53	-0.30	1.51
L3-11	2.77	-0.30	1.51	10.42	-4.48	1.30	-1.26	-0.30	1.51
L3-12	3.03	-0.30	1.51	10.16	-4.48	1.31	-1.00	-0.30	1.51
L3-13	3.28	-0.30	1.51	9.91	-4.48	1.31	-0.75	-0.30	1.51
L3-14	3.69	-0.30	1.51	9.50	-4.48	1.32	-0.34	-0.30	1.51
L3-15	3.92	-0.30	1.51	9.27	-4.48	1.33	-0.11	-0.30	1.51
L3-16	4.22	-0.30	1.51	8.97	-4.48	1.34	0.19	-0.30	1.51
L3-17	4.47	-0.30	1.51	8.72	-4.48	1.34	0.44	-0.30	1.51
L3-18	4.78	-0.30	1.51	8.41	-4.48	1.35	0.75	-0.30	1.51
L3-19	5.04	-0.30	1.51	8.15	-4.48	1.36	1.01	-0.30	1.51
L3-20	5.27	-0.30	1.51	7.92	-4.48	1.36	1.24	-0.30	1.51
L3-21	5.51	-0.30	1.51	7.68	-4.48	1.37	1.48	-0.30	1.51
L3-22	5.73	-0.30	1.51	7.46	-4.49	1.37	1.70	-0.30	1.51
L3-23	5.99	-0.30	1.51	7.20	-4.49	1.38	1.96	-0.30	1.51
L3-24	6.23	-0.30	1.51	6.96	-4.49	1.39	2.20	-0.30	1.51
L3-25	6.46	-0.30	1.51	6.73	-4.49	1.39	2.43	-0.30	1.51
L3-26	6.73	-0.30	1.51	6.46	-4.49	1.40	2.70	-0.30	1.51
L3-27	6.97	-0.30	1.51	6.22	-4.49	1.40	2.94	-0.30	1.51
L3-28	7.25	-0.30	1.51	5.94	-4.49	1.41	3.22	-0.30	1.51
L3-29	7.48	-0.30	1.51	5.71	-4.49	1.42	3.45	-0.30	1.51
L3-30	7.74	-0.30	1.51	5.45	-4.49	1.42	3.71	-0.30	1.51
L3-31	7.99	-0.30	1.51	5.20	-4.49	1.43	3.96	-0.30	1.51
L3-32	8.23	-0.30	1.51	4.96	-4.49	1.44	4.20	-0.30	1.51
L3-33	8.47	-0.30	1.51	4.72	-4.49	1.44	4.44	-0.30	1.51
L3-34	8.74	-0.30	1.51	4.45	-4.49	1.45	4.71	-0.30	1.51
L3-35	9.02	-0.30	1.51	4.17	-4.49	1.46	4.99	-0.30	1.51
L3-36	9.32	-0.30	1.51	3.87	-4.49	1.46	5.29	-0.30	1.51
L3-37	9.56	-0.30	1.51	3.63	-4.50	1.47	5.53	-0.30	1.51
L3-38	9.92	-0.30	1.51	3.27	-4.50	1.48	5.89	-0.30	1.51
L3-39	10.23	-0.30	1.51	2.96	-4.50	1.49	6.20	-0.30	1.51
L3-40	10.56	-0.30	1.51	2.63	-4.50	1.49	6.53	-0.30	1.51
L3-41	10.80	-0.30	1.51	2.39	-4.50	1.50	6.77	-0.30	1.51
L3-42	11.05	-0.30	1.51	2.14	-4.50	1.51	7.02	-0.30	1.51
L3-43	11.31	-0.30	1.51	1.88	-4.50	1.51	7.28	-0.30	1.51
L3-44	11.65	-0.30	1.51	1.54	-4.50	1.52	7.62	-0.30	1.51
L3-45	12.00	-0.30	1.51	1.19	-4.50	1.53	7.97	-0.30	1.51
L3-46	12.34	-0.30	1.51	0.85	-4.50	1.54	8.31	-0.30	1.51
L3-47	12.68	-0.30	1.51	0.51	-4.50	1.55	8.65	-0.30	1.51
L3-48	12.95	-0.30	1.51	0.24	-4.50	1.55	8.92	-0.30	1.51
L3-49	13.24	-0.30	1.51	-0.05	-4.51	1.56	9.21	-0.30	1.51
L3-50	13.43	-0.30	1.51	-0.24	-4.51	1.57	9.40	-0.30	1.51
L3-51	13.67	-0.30	1.51	-0.48	-4.51	1.57	9.64	-0.30	1.51
L3-52	13.91	-0.30	1.51	-0.72	-4.51	1.58	9.88	-0.30	1.51
L3-53	14.14	-0.30	1.51	-0.95	-4.51	1.58	10.11	-0.30	1.51
L3-54	14.41	-0.30	1.51	-1.22	-4.51	1.59	10.38	-0.30	1.51
L3-55	14.68	-0.30	1.51	-1.49	-4.51	1.60	10.65	-0.30	1.51
L3-56	14.95	-0.30	1.51	-1.76	-4.51	1.60	10.92	-0.30	1.51
L3-57	15.29	-0.30	1.51	-2.10	-4.51	1.61	11.26	-0.30	1.51
L3-58	15.55	-0.30	1.51	-2.36	-4.51	1.62	11.52	-0.30	1.51
L3-59	15.83	-0.30	1.51	-2.64	-4.51	1.63	11.80	-0.30	1.51

Table 13. (Continued)

Sample	X (m)	Y (m)	Z (m)	X1 (m)	Y1 (m)	Z1 (m)	X2 (m)	Y2 (m)	Z2 (m)
L3-60	16.10	-0.30	1.51	-2.91	-4.51	1.63	12.07	-0.30	1.51
L3-61	16.41	-0.30	1.51	-3.22	-4.51	1.64	12.38	-0.30	1.51
L3-62	16.67	-0.30	1.51	-3.48	-4.51	1.65	12.64	-0.30	1.51
L3-63	16.93	-0.30	1.51	-3.74	-4.51	1.65	12.90	-0.30	1.51
L3-64	17.20	-0.30	1.51	-4.01	-4.52	1.66	13.17	-0.30	1.51
L3-65	17.43	-0.30	1.51	-4.24	-4.52	1.67	13.40	-0.30	1.51
L3-66	17.69	-0.30	1.51	-4.50	-4.52	1.67	13.66	-0.30	1.51
L3-67	17.95	-0.30	1.51	-4.76	-4.52	1.68	13.92	-0.30	1.51
L3-68	18.21	-0.30	1.51	-5.02	-4.52	1.69	14.18	-0.30	1.51
L3-69	18.52	-0.30	1.51	-5.33	-4.52	1.69	14.49	-0.30	1.51
L3-70	18.84	-0.30	1.51	-5.65	-4.52	1.70	14.81	-0.30	1.51
L3-71	19.15	-0.30	1.51	-5.96	-4.52	1.71	15.12	-0.30	1.51
L3-72	19.43	-0.30	1.51	-6.24	-4.52	1.72	15.40	-0.30	1.51
L3-73	19.69	-0.30	1.51	-6.50	-4.52	1.72	15.66	-0.30	1.51
L3-74	19.93	-0.30	1.51	-6.74	-4.52	1.73	15.90	-0.30	1.51
L3-75	20.18	-0.30	1.51	-6.99	-4.52	1.73	16.15	-0.30	1.51
L3-76	20.46	-0.30	1.51	-7.27	-4.52	1.74	16.43	-0.30	1.51
L3-77	20.73	-0.30	1.51	-7.54	-4.52	1.75	16.70	-0.30	1.51
L3-78	21.01	-0.30	1.51	-7.82	-4.53	1.76	16.98	-0.30	1.51
L3-79	21.27	-0.30	1.51	-8.08	-4.53	1.76	17.24	-0.30	1.51
L3-80	21.48	-0.30	1.51	-8.29	-4.53	1.77	17.45	-0.30	1.51
L3-81	21.74	-0.30	1.51	-8.55	-4.53	1.77	17.71	-0.30	1.51
L3-82	22.01	-0.30	1.51	-8.82	-4.53	1.78	17.98	-0.30	1.51
L3-83	22.25	-0.30	1.51	-9.06	-4.53	1.79	18.22	-0.30	1.51
L3-84	22.56	-0.30	1.51	-9.37	-4.53	1.79	18.53	-0.30	1.51
L3-85	22.83	-0.30	1.51	-9.64	-4.53	1.80	18.80	-0.30	1.51
L3-86	23.09	-0.30	1.51	-9.90	-4.53	1.81	19.06	-0.30	1.51
L3-87	23.31	-0.30	1.51	-10.12	-4.53	1.81	19.28	-0.30	1.51
L3-88	23.59	-0.30	1.51	-10.40	-4.53	1.82	19.56	-0.30	1.51
L3-89	23.87	-0.30	1.51	-10.68	-4.53	1.83	19.84	-0.30	1.51
L3-90	24.13	-0.30	1.51	-10.94	-4.53	1.83	20.10	-0.30	1.51
L3-91	24.37	-0.30	1.51	-11.18	-4.53	1.84	20.34	-0.30	1.51
L3-92	24.66	-0.30	1.51	-11.47	-4.54	1.85	20.63	-0.30	1.51
L3-93	24.91	-0.30	1.51	-11.72	-4.54	1.85	20.88	-0.30	1.51
L3-94	25.17	-0.30	1.51	-11.98	-4.54	1.86	21.14	-0.30	1.51
L3-95	25.42	-0.30	1.51	-12.23	-4.54	1.87	21.39	-0.30	1.51

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P. J. Wierenga, A. F. Toorman, University of Arizona
D. B. Hudson, J. Vinson, M. Nash, R. G. Hills,
New Mexico State University

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Department of Agronomy and
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New Mexico State University
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11. ABSTRACT (200 words or less)

Computer modelling has become an essential part of the licensing process of low level waste disposal sites. Validation of models requires high quality data from carefully controlled field experiments. This report provides the soil physical data obtained at a field site near Las Cruces, New Mexico. A large trench was constructed in undisturbed soil to provide horizontal access to irrigated plots on the sides of the trench and to provide soil samples. Details are provided on the construction of the trench and on the physical properties of the samples collected during construction of the trench. A total of 594 disturbed samples and 594 core samples were collected. Morphological characteristics of the soil at the site are presented, as well as data on the saturated hydraulic conductivity determined in the field with the bore hole permeameter and in the laboratory with a constant head method. Soil water retention data, particle size distribution data, and bulk density data are also provided. The van Genuchten equation was fitted to the soil water retention data and the parameters fitted in this equation are presented in the report. All results are presented in tabular form, ASCII format on a floppy disk available at the Nuclear Energy Software Center(NESC) Argonne National Laboratory.

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