NOTICE!

ALL DRAWINGS
ARE LOCATED
AT THE END OF
THE DOCUMENT

DRAFT FINAL

Phase III RFI/RI Report

Rocky Flats Plant
881 Hillside Area
(Operable Unit No. 1)

Volume V

Appendix A4
Geologic Data

U.S. Department of Energy
Rocky Flats Plant
Golden, Colorado

REVIEWED FOR CLASSIFICATION/UCNI
By _____ October 1992
Date 11/4/92

ADMIN RECORD

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Appendix A

Geologic Data

Phase III
RFI/RI Report

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ADMIN RECORD

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LIST OF ACRONYMS AND ABBREVIATIONS

ASTM	American Society for Testing and Materials
BH	Borehole
cm/sec	centimeters per second
DCN	Document Change Notice
DOE	Department of Energy
E	extraction well
EMD	Environmental Management Department
EPA	Environmental Protection Agency
FSP	Field Sampling Plan
GRRASP	General Radiochemistry and Routine Analytical Services Protocol
GT	geotechnical
GW	groundwater
I	injection well
I.D.	inside diameter
IHSS	Individual Hazardous Substance Site
IM/IRA	Interim Measure/Interim Remedial Action
ml	milliliter
MW	monitoring well
O	observation well
O.D.	outside diameter
OU	operable unit
OU1	Operable Unit No. 1
PCB	Polychlorinated biphenyl
PH	pilot hole
PZ	Piezometer
QA/QC	Quality Assurance/Quality Control
RCRA	Resource Conservation and Recovery Act
RFEDS	Rocky Flats Environmental Database System
RFI/RI	RCRA Facility Investigation/Remedial Investigation
RFP	Rocky Flats Plant
SOP	Standard Operating Procedure
SOPA	SOP Addendum
SVOC	Semivolatile organic compound
SW	surface water
TOC	total organic carbon
USCS	Unified Soil Classification System
VOC	Volatile organic compound

Appendix A4 · Text

French Drain
Geologic Data

Phase III
RFI/RI Report

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A4 FRENCH DRAIN GEOLOGIC DATA

This appendix characterizes the geology and hydrogeology along the french drain alignment at the Rocky Flats Plant (RFP) 881 Hillside area Operable Unit No. 1 (OU1). The report includes the following: 11- by 17-inch geologic cross-sections of 50-foot intervals of the french drain excavation, geologic descriptions of each lithologic unit for each cross-section, geotechnical data on grain-size distribution and plasticity of selected lithologic units, and an assessment of the geology and hydrogeology. Data from the french drain geotechnical investigation report (EG&G 1990a) were used to support geologic and hydrogeologic interpretations related to design and function of the french drain.

A4.1 INTRODUCTION

The french drain has been constructed as part of the Interim Measure/Interim Remedial Action (IM/IRA) for OU1 (EG&G 1990b). The IM/IRA is part of a comprehensive, phased program of site characterization, remedial investigations, feasibility studies, and remedial/corrective actions currently in progress at RFP. These investigations are pursuant to the Department of Energy (DOE) Environmental Restoration Program, and the Federal Facility Agreement and Consent Order (known as the Interagency Agreement). In accordance with the Interagency Agreement, RFP has identified 16 operable units for prioritized implementation of remedial investigations, feasibility studies, and remedial actions. OU1 has been given the highest priority because of the presence of high concentrations of volatile organic compounds (VOCs) in alluvial ground water and the proximity to Woman Creek, which drains the southern part of RFP. A remedial investigation and feasibility study, which is currently in progress, will determine the full nature and extent of contamination and propose a plan for final remediation of OU1. The french drain is designed to capture contaminated alluvial ground water from OU1 and prevent further downgradient contaminant migration, which may pose a long-term threat to public health and the environment.

A4.1.1 Purpose

The purpose of the geologic characterization of the french drain alignment is to provide detailed lithologic descriptions and geologic cross-sections of the stratigraphic units uncovered along the french drain excavation at the 881 Hillside Area, Operable Unit No. 1 (OU1). Structural features are described and observations pertaining to the local hydrogeology are presented. Supporting data include laboratory results of grain-size distribution and plasticity for each lithologic unit and in situ bedrock hydraulic conductivity measurements. This information was used to supplement the OU1 Phase III field investigation. Also, documentation of geological features and hydrogeological conditions along the trench of the french drain gives important three-dimensional confirmation data for the french drain geotechnical investigation. Collectively, these data are used to refine the OU1 site geological and hydrogeological conceptual models and provide a comprehensive characterization of the site. The most important information gathered during this study concerns the size and morphology of slumps and their affect on the occurrence of ground water.

A4.1.2 Background

The french drain is designed to capture contaminated alluvial ground water from OU1 and prevent further downgradient contaminant migration, which may pose a long-term threat to public health and the environment. As part of the IM/IRA, a geotechnical investigation was performed prior to construction of the french drain to evaluate site characteristics along the proposed french drain alignment and to support the geotechnical design (EG&G 1990a). Forty-two borings were drilled on approximately 100-foot centers along the entire length of the proposed french drain and the influent/effluent lines. The borings were lithologically logged and the information was recorded on borehole log forms. In addition, geotechnical testing was conducted on 42 soil and bedrock samples taken from selected borings. Packer tests and back-pressure permeability tests were performed to identify bedrock locations with a hydraulic conductivity of 1×10^{-6} centimeters per second (cm/sec) or less.

Construction of the french drain began in November 1991 and was completed in April 1992. It was constructed by excavating a trench approximately 1,435 feet in length along the downgradient boundary of OU1 (Figure A4-1). Construction control points were established at 50-foot intervals and given a station identification number (0 + 00 at the west end with 50-foot increments to the east, i.e., 0 + 50, 1 + 00, 1 + 50, etc.). The drain was not continued west of station 5 + 00 for the following reasons:

- Ground water modeling showed that ground water in contact with any possible contaminant source would effectively be captured by the drain at its present western terminus.

- The additional 500-foot segment of the drain would capture clean ground water, which would significantly dilute contaminated waters collected by the drain and result in less effective removal of contaminants by the treatment plant.

- Further construction would jeopardize the stability of the hillside and place stresses on the gas transmission line in this area. Test pits dug at 100-foot intervals west of the present western terminus of the french drain encountered saturated alluvium, including artesian conditions at one location. It was felt that continued construction would undermine the foundation of the hillside and promote conditions favorable for slumping.

The western end of the french drain collection pipe was capped; however, should there be a need to extend the french drain to the west, the cap can be easily removed for the expansion. The IM/IRA plan (EG&G 1990b) also specified that the eastern end of the french drain be constructed 150 feet further to the east; however, the drain was shortened because wells east of this point have historically been dry, and continued construction to the east would have required crossing a gas line.

The french drain is installed approximately 2 feet into bedrock to fully penetrate material exhibiting a hydraulic conductivity of 1×10^{-6} cm/sec or less (Figure A4-2) (EG&G 1990b). In general, the bedrock has a hydraulic conductivity two orders of magnitude lower than the alluvium, which prohibits underflow in the shallow bedrock (EG&G 1990b). A permeable geotextile membrane was placed on the north wall of the excavation to allow for capture of the alluvial ground water. An impermeable polyvinyl chloride membrane was placed on the south

wall of the french drain to prevent captured ground water from migrating downgradient of the system. Perforated pipe was installed in the keyway for collection of ground water. The keyway was then backfilled with gravel and covered with a geotextile membrane. Class I soil was placed on top of the geotextile membrane to a depth of approximately 1 foot and the entire excavation was backfilled with material excavated during the french drain construction.

The inclusion of the downstream polyvinyl chloride membrane combined with the continuity of the drain provides positive cutoff of the alluvial ground water. A polyvinyl chloride (PVC) collection pipe inside the drain directs flow under gravity to a 6-foot-wide collection gallery sump (Figure A4-3). Ground water is also collected from a collection well at the base of individual hazardous substance site (IHSS) 119.1 (source well), where it is pumped to the sump (Figure A4-3). The sump, equipped with a submersible pump, delivers the water from the drain to the treatment plant. In addition, contaminated ground water discharged from the Building 881 footing drain is piped directly into the french drain (Figure A4-3). The source well and footing drain flows commingle with alluvial ground water collected by the french drain.

The collected ground water is treated using an ultraviolet/hydrogen peroxide system (for organics removal) and an ion exchange system (for inorganics removal). The water treatment system is enclosed in Building 891 to protect weather- or temperature-sensitive components. Following treatment, the water is directed to an effluent storage tank for sampling and analysis prior to being discharged to the South Interceptor Ditch. Water from the South Interceptor Ditch then goes to the C-series ponds.

A4.1.3 Report Organization

This report describes the geology along the french drain. Section A4.2 provides a description of specific field methods used for data collection; a discussion of the geology, hydrogeology, and structure in the area of the french drain; and a comparison between the results of the geotechnical investigation and this geologic characterization. Section A4.3 discusses uncertainties and sources of error for the geologic characterization, and Section A4.4 provides a list of references.

Pertinent information supporting the geologic characterization are presented in the attachments. Attachment A4-1 contains the lithologic descriptions for the units displayed on the geologic cross sections, and Attachment A4-2 contains the geologic cross sections. Included in the preface for Attachment A4-1 is a guide for the use of the attachment. Attachment A4-3 contains the laboratory data packets for the geotechnical samples, and Attachment A4-4 the tables summarizing the geotechnical results for alluvial and bedrock materials (Attachments A4-4-1 and A4-4-2, respectively).

A4.2 GEOLOGIC CHARACTERIZATION ALONG THE FRENCH DRAIN

This section presents a description of the field methods used to obtain geologic data in the french drain excavation; a description of lithologic units, geologic structures, and ground-water-bearing zones; and a comparison of geologic units and hydraulic conductivities from the french drain geotechnical investigation with results from this investigation. All field methods were performed in accordance with applicable *Environmental Management Department Standard Operating Procedures* (SOPs).

A4.2.1 Methods

The french drain geologic characterization was conducted in accordance with the field sampling plan presented in the french drain geologic characterization work plan (EG&G 1992a) and Geotechnical SOP GT.7, *Logging Pits and Trenches in Construction Excavations* (EG&G 1991a). Only the north slope of the french drain excavation was characterized because the staging and preparation of construction materials (geotextile membrane, impermeable membrane, pipe, etc.) on the south slope prevented visual observation of geologic relationships. The geologic characterization activities were conducted while the french drain was under construction.

A4.2.1.1 Mapping and Logging of Soil and Bedrock Units

Soil and bedrock contacts were mapped at 25-foot transect intervals whenever construction activities of the french drain permitted. Transect intervals coincided with control points established along the drain alignment as specified in the engineering design for the french drain

(Engineering-Science 1991). These control points were surveyed in the field by Merrick and Company and marked with wooden stakes at 50-foot intervals. Each stake was identified with a station number. Transect intervals were projected to the north slope of the excavation from the surveyed control points. Transect intervals mapped between control points were measured by tape from a surveyed station. Measuring tapes were placed at transect intervals and draped vertically along the excavation to determine unit thickness, depth to sample locations, and depth to soil and bedrock contacts.

Prior to logging, a hand pick was used to dig a shallow vertical trench in the excavation wall to expose fresh, in-place soils and bedrock. Soils were described using the Unified Soil Classification System (USCS). Soil descriptions include classification, color, grain size, grading, angularity, plasticity, composition, bedding, and moisture content. Bedrock materials were described according to the *Manual of Field Geology* (Compton 1962), and were classified according to the Wentworth grain-size scale. Bedrock descriptions include rock type, color, grain size, degree of sorting, porosity, cementation, friability, composition, bedding and internal structure, degree of weathering, fractures, slickensides, and moisture content. The distribution and orientation of structural features (e.g., faults, fractures, shear planes, and structures formed by creep and drag or sliding), geomorphologic features (e.g., slumps associated with these movement patterns), and hydrogeologic features (e.g., seeps, zones of saturation, and zones of high permeability) were noted. The apparent thickness of lithologic units and location of structural and other features were measured to the nearest tenth of a foot. The slope angle at each transect interval was measured using a Brunton compass. All measurements, including apparent unit thicknesses, depth to sample locations and structural features, seeps, depth of excavation, were corrected to true vertical depth and transferred to a geologic cross section (scale of 1 inch equals 2 feet). Attachment A4-1 provides the lithologic descriptions corresponding to the cross sections and Attachment A4-2 the geologic cross sections.

A4.2.1.2 Sampling Soil and Bedrock Materials

During the french drain excavation activities, a total of 207 soil and bedrock samples were collected for laboratory testing, which included grain-size/hydrometer analysis and Atterberg limits. Atterberg limits were run on each sample collected that contained an appropriate percentage of silt or clay-size particles. The geotechnical laboratory made this determination based on the results of the grain-size analysis. To the extent possible, samples were collected from fresh surfaces representative of the lithologic unit using a rock hammer and stainless-steel spoon. Sample material was usually collected in 8-ounce glass jars; however, 32-ounce, self-sealing plastic bags were used for samples with high percentages of gravels and cobbles. Soil and bedrock samples were collected from each unit along the transect intervals when construction activities for the french drain permitted. Sample locations were measured and recorded on the field maps. Each sample was numbered by station number and distance from the top of the slope. Sample locations were corrected to true vertical depth on the final geologic cross sections (scale of 1 inch equals 2 feet).

A.4.2.1.3 Classification of Soil and Bedrock Samples

All field classifications were corrected to reflect laboratory grain-size analysis results prior to their inclusion on the geologic cross sections. The components of each sample were recorded as percent by weight and the results were plotted on a U.S. Standard sieve size chart (Figure A4-4). Soils were classified according to the USCS and bedrock materials were classified according to the Wentworth grain-size scale (Geotechnical SOP GT.1, Logging of Alluvial and Bedrock Materials; EG&G 1991a). Table A4-1 is a comparison between the two systems. Each soil classification was given a USCS symbol; Figure A4-3 illustrates the major divisions of the USCS along with the letter, symbol, and description for each classification. The use of modifiers and the terms "with some" or "trace" were based on percentages of the material and criteria set forth in Geotechnical SOP GT.1 (EG&G 1991a).

Attachment A4-4 contains the geotechnical analysis results. In deviation from the SOP guidelines, a #230 mesh sieve was used to determine the percentage of silt and clay in all

laboratory grain-size analyses. The grain-size distribution curves (see Figure A4-4 for example) display the percentage of material that passes through each standard sieve. In order to classify the unconsolidated materials according to the USCS system, which requires the use of a #200 standard sieve, the percentage of materials passing through a #200 standard sieve was interpolated from the grain-size distribution curves.

Attachment A4-3 provides the analytical data packets from which these classifications are based, and Attachment A4-4 presents tables summarizing these data.

A.4.2.1.4 Collecting In Situ Hydraulic Conductivities of Bedrock

In situ hydraulic conductivities in bedrock were measured by drilling a 6-inch hole at grade level and filling the hole with water to measure the rate of infiltration. Hydraulic conductivities of bedrock were measured at 100-foot intervals unless prevented by construction or excavation activities. Methods for measuring in situ hydraulic conductivity of bedrock are detailed in Geotechnical SOP GT.23, In Situ Hydraulic Conductivity Tests (EG&G 1991b).

A4.2.2 Lithologic Units

A4.2.2.1 Top Soil

Top soil encountered in the french drain excavation generally consisted of clay with varying amounts of silt and sand. USCS classifications ranged from silty clay (CH) to sandy clay (CL/CH) with some sandy silty clay (CL) observed from station 8 + 15 east to station 8 + 42. The top soil was generally grayish brown to dusky yellowish brown. Grain-size distribution varied greatly, ranging from a clay matrix to gravels with some cobble constituents. Plasticity was low to medium. Top soil was also characterized by high organic content, traces of vegetation roots, and a trace to some powdery caliche occurring as blebs or as filling in partings and fissures.

A4.2.2.2 Artificial Fill

Artificial fill encountered in the french drain excavation generally consisted of sandy silty clay (CL) with varying amounts of gravel. The fill was generally grayish brown to dark yellowish brown and contained varying amounts of roots and construction debris such as nails, bricks, and wood chips. Grain-size distribution varied greatly, ranging from a clay matrix to gravels with traces of cobble constituents. Artificial fill was generally encountered from station 8 + 95 west to station 5 + 00.

A4.2.2.3 Alluvium

The alluvium encountered during the construction of the french drain is derived from the Rocky Flats Alluvium (Scott 1965). Based on field observations and geotechnical analytical results, the alluvium was composed of clay and sand with varying amounts of silt and gravel. The color range was typically restricted to reddish brown or brown. The alluvium was poorly sorted with subangular to subrounded clasts of sedimentary, igneous, and metasedimentary rocks. Locally, the alluvium contained abundant clasts of underlying bedrock. The alluvium was generally poorly cemented, but some of the alluvial material was moderately cemented with caliche.

During the construction of the french drain, lenticular, tabular, and wedge-shaped units in the alluvium were encountered and mapped. Wedge-shaped units with local facies changes dominated the western portion of the drain, whereas the eastern section was generally characterized by tabular and lenticular units. These types of bedding features are the result of fluvial depositional processes. Attachment A4-1 provides specific lithologic descriptions for each alluvial unit.

A4.2.2.4 Colluvium

Colluvial material encountered during the construction of the french drain was a mixture of reworked alluvial and bedrock materials. Slumping plays a major role in colluvial deposition at 881 Hillside area. Typically, the colluvium was nonstratified, poorly sorted, and generally poorly cemented.

Slumped blocks consisting of alluvial and displaced bedrock materials were the most prominent types of colluvial material found at the french drain excavation. Other colluvium may be related to frost heaving and undercutting. Slump blocks are illustrated on several of the panels (cross sections 25 and 26, Attachments A4-2). The claystone portion of the slump blocks, unless severely weathered, often exhibited characteristics similar to those in the underlying bedrock, i.e., blocky texture, manganese oxide staining, and limonite concretions. In addition, slump blocks were found to contain or to be bounded by shear planes with slickensides. Section A4.2.3 discusses slump mechanics in more detail.

Erosional processes have also resulted in the incorporation of both bedrock and slumped bedrock material into the colluvium, and have also truncated the limbs of some slump blocks. Attachment A4-1 provides specific lithologic descriptions of the colluvial units.

A4.2.2.5 Bedrock

Bedrock encountered during the construction of the french drain is thought to be the upper portion of the Cretaceous Laramie Formation. The upper Laramie Formation consists of gray claystone, sandy claystone, and fine- to medium-grained buff-colored sandstone (EG&G 1992b). The material observed in the field was consistent with this description of the Laramie Formation and the results of the geotechnical analyses. The bedrock logged and analyzed during the french drain geologic characterization also corroborated data from the surface geologic mapping study (EG&G 1992b). The surface geologic mapping report geologic characterization describes the upper part of the Laramie Formation as consisting of primarily olive-gray and yellowish orange claystone with iron nodules with lenticular beds of light olive-gray, fine-grained, and friable sandstones.

Typically, the bedrock at the french drain consisted of claystone that was medium to dark gray and highly plastic, and at times moderately fractured with limonite staining along the fractures. Subunits within the claystone consisted of tan siltstone and sandstone with varying amounts of clay that generally displayed fracture patterns similar to the claystone. Sandstones consisted

mainly of very fine- to medium-grained, subangular to subrounded quartz sand, with local millimeter thick limonite staining. Generally the bedrock was poorly indurated and highly friable; however, at station 12 + 30, well-cemented sandstone was observed and mapped.

Constituents found in the bedrock units included traces of gravel; locally abundant, subrounded gravel-sized limonite concretions; dendritic manganese oxide staining; carbonaceous material; and fossils such as limonite-replaced stems and leaf structures. Locally, the sandstones and siltstones displayed poorly developed cross-bedding. According to visual observations, primary porosity in the mapped portion of the exposed bedrock in the french drain excavation was low. Pore spaces, even in sandstone, appeared to be filled with clay, silt, or cement; however, secondary fracture porosity exists throughout the bedrock. Attachment A4-1 provides specific lithologic descriptions for the bedrock units.

A4.2.3 Geologic Structures

Geologic structures at the 881 Hillside area include slumps and faults.

A4.2.3.1 Slumps

The lithologic units encountered during excavation of the french drain consist of alluvium, colluvium, and bedrock. These units have been subjected to multiple episodes of complex slumping. The following paragraphs describe the generic process of how slump blocks form and move as well as the specific occurrences of slumping in the area of the french drain excavation.

Description

The slump blocks observed at the 881 Hillside area exemplify the characteristics of rotational sliding or slumping (with earth flow occurring at the foot of the slump block) (Shuster and Krizek 1978). Figure A4-6 presents a block diagram of a typical slump, and Figure A4-7 a plan view.

A rotational slide or slump is a slide along a shear plane that is curved upward; in most instances, the shear plane is spoon-shaped (Figure A4-6), and the movement is rotational about an axis parallel to the slope. The slump is typically composed of three areas: the head, the body, and the foot, with each exhibiting different characteristics of movement. The direction of movement at the head area is predominantly downward with the top surface tilting backward towards the slope. The main body of the slump moves downslope along the curvature of the shear plane. This shear plane is rarely uniform and is influenced by pre-existing features of the ruptured material (e.g., fractures and bedding planes). The toe area of the main body of the slump exhibits upward thrusting movement at the distal end or toe of the shear plane, which causes a slight uplift of material. The foot area of the slump has movement typical of earth flow, due to the material behaving as a plastic solid, and results in a hummocky surface topography.

Water from surface runoff and precipitation (i.e., snow and rain) typically ponds at the backward tilt of the slump head. This water can wet the shear plane and cause areas of instability that may cause the slump to continue to move until a stable slope is attained.

The main body of the slump tends to develop transverse cracks, longitudinal cracks, and pressure ridges due to differential tension and varying rates of internal movement as the mass glides over the concave shear plane. These transverse cracks may extend downward and contact the underlying shear plane surface (Shuster and Krizek 1978). Transverse cracks that laterally dissect the entire main body or intersect other transverse cracks may develop into minor scarps. When this happens, multiple slump blocks are created, each with a curved shear plane tangential to the primary shear plane. Each individual shear plane from the multiple slump blocks intersects at depth to form a common basal shear plane surface (Harding 1991). The top surface of each slump block may develop pressure ridges due to the backward tilting of the slump block as the downslope movement occurs. Figure A4-8 depicts the complexity of this situation.

Occurrences and Observations

The slumps observed during construction of the french drain ranged in height from approximately 10 to 30 feet and in width from approximately 30 to 200 feet (Figure A4-7), and exhibited many of the features described above. The head of the slumps exhibited scarps containing slickensides with striations and furrows trending generally north-south, indicating downslope movement. Ponding of surface water was observed between the scarp and the top head surface at areas near stations 5 + 00 to 6 + 00. Ponding was also noticed in secondary minor scarps of blocks within the main body of slumps from stations 6 + 00 to 8 + 00. Crown cracks developed during construction of the french drain in the area north of the perimeter road north of stations 9 + 00 and 10 + 00.

The slump identified at station 14 + 50 to 15 + 00 did not have the typical U-shaped cross section. It is interpreted that the french drain in this area cuts very close to the main scarp. If the trench had intersected the flanks of the slump, the cross-sectional view of the slump at the main scarp would have been convex instead of concave.

Flanks of the slump blocks were observed during construction and mapping of the french drain. Typically, the scarp plane on the flanks extended from the bedrock upward and could not be traced through the alluvium. Occasionally, the flank scarp planes were truncated by subsequent erosion and deposition of alluvial materials. The angles of the flanks ranged from 5 to 80 degrees and are displayed on cross sections at stations 11 + 35 and 13 + 50 to 14 + 00 (Attachments A4-2 and A4-3). Subsequent erosion has removed the upper portion of some flanks and some lateral edges of some slump blocks observed at stations 13 + 40 and 16 + 80.

Diagonal en echelon tension cracks were observed at station 2 + 00 during construction. This area was 300 feet beyond the west end of the french drain at station 5 + 00. This area is interpreted to be the right flank of a slump in which the left flank begins at station 11 + 35. The cracking observed at station 2 + 00 was perhaps due to remobilization of the slump block during construction activities.

Tangential and reverse angle shear planes at the toe of a slump block were observed at stations 6 + 50 to 4 + 50 on the south slope of the excavation. In this interval, the slump block at station 5 + 50 was lithologically similar to claystone bedrock; however, excavation revealed a thin veneer of claystone overlying alluvium. This alluvium contained a high percentage of claystone inclusions in the matrix. It appears that when the tangential shearing occurred, the claystone inclusions smeared along the shear surface forming a thin veneer over the alluvium.

Transverse cracking was observed in slump blocks remobilized during construction activities. As these blocks moved downslope, the main body developed transverse cracks that were open and exposed to the surface. With continued slumping, the alluvial material became entrained beneath the slump block along the shear plane (cross sections 26 to 28, Attachment A4-2). Additional slump movement would have forced the material into the lower surface of the slump block and reformed the shear plane.

The topography between the french drain and Woman Creek has a hummocky appearance and many north-south trending lobate ridges. This topography may be due to slumping or to cut-and-fill construction activities. The toe areas of slumps typically exhibit hummocky topography.

Discontinuous shear planes and small concave fracture blocks were observed in the competent bedrock in areas adjacent to the prominent slump blocks. These are interpreted as being related to tensile and compressive stresses, i.e., the initial increased tension and shearing from initial movement and subsequent lateral and vertical release of restraining/confining stress after the mass moved downslope.

A4.2.3.2 Faults

During construction of the french drain, a structure was encountered in the bedrock at station 11 + 80 that was planar and flanked by silty claystone on one side and sandy clayey siltstone on the other. Caliche was present along with the contact between these units. Only a 2- to 3-foot vertical section of the structure was exposed at the base of the trench. The structure

exhibited a north-south strike with a dip of 45 degrees east. Neither gouge nor breccia was visible on either side of the structure. The shear plane was not visible due to the high degree of caliche cementation. The upper portion of the structure appeared to be truncated by an erosional surface overlain by gravelly clay.

The origin of the structure may be interpreted as a normal fault or a back thrust associated with thrust faulting. There is currently no compelling evidence to accept either interpretation. For example, the siltstone strata, located in the hanging wall east of the structure, had a bedding dip of 10 to 20 degrees to the west with a north-south strike. As the siltstone strata approached the fault plane from the east, the bedding angle changed to a dip of 10 degrees to the east. This indicated drag in the hanging wall resulting from movement along the fault. This drag folding is characteristic of a normal fault; with the east hanging wall moving down relative to the west foot wall (Billings 1972) in an extensional regime. Claystone west of the fault was massive and did not exhibit apparent bedding in the exposed excavation. A sequence of sandy clayey siltstone and silty sandstone overlying silty claystone was observed at station 11 + 30 west of the fault. This siltstone and sandstone sequence was similar to the stratigraphic sequence immediately east of the feature at station 11 + 85, supporting the interpretation that the down-thrown block is the hanging wall of a normal fault. Conversely, a previous report (EG&G 1992b) suggested the structure is the result of a compressional regime, which supports a possible back thrust origin. A thorough investigation of the structural regimes is needed to determine the origin of the structure, which is beyond the scope of work of this project.

A4.2.4 Hydrogeology

During the construction of the french drain, ground water was encountered infrequently in both the alluvial and colluvial deposits and in the bedrock. Ground water in alluvial and colluvial deposits generally resides in bedrock lows. Although the geologic characterization task did not include a technical hydrogeological investigation at the french drain, the occurrence of ground water and water-bearing properties of the unit were characterized from visual observations and geotechnical analysis of soils and bedrock samples. Given the complex array of sedimentary

material exhibiting a wide range of particle sizes (clay to cobbles) and varying degrees of compaction, the ground water regimes appear to be heterogeneous and anisotropic in both alluvial and in bedrock material.

A42.4.1 Alluvial Ground Water

Most of the alluvial ground water appears to occur in distinct lithologic zones bounded by lower permeability clays. Slump glide planes typically occur in the clays beneath the perched ground water zones. Excavation of the slope for the french drain across these perched ground water zones resulted in slope failure.

In the alluvium, ground water appears to be largely confined to two units: a sandy to clayey silt unit and a silty sand and gravel unit. The laterally continuous sandy to clayey silt units are underlain by impermeable clay layers and overlain by very moist clay (cross sections 5, 6, 7, 8, 10, and 11; Table A4-2). On cross section 5 at station 6 + 75, three seeps were mapped in a lenticular clayey silt unit bounded by silty clay. Although hydraulic conductivity tests were not performed, the high percentage of sand- and silt-sized grains would appear to give this unit a higher porosity than the surrounding silty clay. These seeps may have been due to gravity-induced flow across the excavation wall, since excavation activities revealed open fractures from which water appeared to be seeping.

Ground water in the silty sand and gravel units, which pinch out laterally and vertically on exposed slopes, resemble channel deposits. On cross section 6, 7, and 8 from station 7 + 15 to station 8 + 15, a series of seeps originated in moist to wet silty clayey gravel, gravelly sand, and clayey sand, which restricts water to the sands. These units are bounded by silty clay, which restricts water to the sands. The wet gravelly sand, silty clayey gravel, and clayey sand, unstable due to saturated conditions and the release of geostatic pressure along the excavation, flowed into the keyway in the french drain from both sides of the trench, necessitating the construction of de-watering wells. These units produced the highest volume of water encountered during the

french drain excavation. Hydraulic conductivity tests were not performed on these units; therefore, flow rates cannot be quantified.

Ground water also seeped from a lithologic zone at stations 9 + 50 at 18.65 feet below ground level (cross sections 10 and 11). This seep originated at the base of a gravelly sand unit that is underlain by silty clay. Although hydraulic conductivity tests were not performed in this lithologic zone, the silty clay appears to be sufficiently impervious to act as an aquitard or aquiclude, restricting ground water to the gravelly sand unit. Most of the ground water in slump blocks was observed in these perched zones.

Small amounts of ground water were also observed intermittently along shear planes and in clay molds of gravels or cobbles. Along shear planes, water was observed as isolated traces of moisture along shear planes typically found in silty clay and clay slump blocks. One such occurrence was encountered along a shear plane at station 7 + 60 at 20.2 feet below ground level (cross section 7). Water likely entered shear planes due to the release of geostatic pressure along the excavation wall.

Traces of ground water in clay molds of gravels or cobbles were typically found in highly weathered caliche zones. When the gravels or cobbles were removed from the surrounding clays, moisture was observed on the gravels or cobbles and along the clay matrix. Similar to the water found along the shear planes, this moisture was not flowing and occurred as isolated droplets. One such weathered zone containing moisture in gravel or cobble molds was found overlying silty claystone zone from stations 18 + 00 to 19 + 35 (cross sections 28 to 30).

A4.2.4.2 Bedrock Ground Water

The only occurrence of ground water in the bedrock noted during construction of the french drain was found in a fractured silty sandstone/clayey siltstone zone from Stations 10 + 50 to 11 + 00 at 37 to 41 feet below the ground surface (cross sections 12 to 14). Water was observed to be seeping at intermittent locations from fractures near the contact with underlying dry silty

claystone. These fractures may have experienced dilation due to the removal of overburden. This water-bearing unit was overlain by at least 4 feet of damp, dense, silty claystone. The exposed thickness of the water-bearing zone did not exceed 4 feet. Hydraulic conductivity of the silty claystone was measured in situ at 7.084×10^{-7} cm/sec.

A4.2.4.3 Evidence of Previously Existing Water

Surface water may pond in low areas at the top of slump blocks, and preferential surface water flow occurs along the margins of the slumps. Water may enter slumps either through surface or ground water infiltration. Figure A4-9 illustrates potential routes of water infiltration, conduits within a slump body, and resulting seeps. Once water has infiltrated the slump, clay smearing along the shear planes can prevent water from migrating past the shear plane, which results in perched ground water conditions. Subsequent continued slumping and/or internal settling can seal the shear plane, locally isolating water or forcing it from the slump in the form of seeps. The subsequent evaporation of ground water in the vadose zone causes the precipitation of minerals such as caliche.

Although actual ground water occurred only infrequently along the french drain excavation, there was abundant evidence of previously existing water throughout the alluvium, colluvium, and bedrock. This evidence appeared as limonite and manganese oxide staining and caliche deposits. Limonite, a yellowish orange iron oxide, was frequently found as mottling in the alluvium, and also occurred as staining along fractures in bedrock and in slumped bedrock. Occasionally, limonite was noted in the bedrock as a replacement mineral in plant fossils and as subrounded, gravel-sized concretions. Black, dendritic manganese oxide staining was observed and logged frequently in both bedrock and slumped bedrock. Caliche, a calcium carbonate precipitate commonly forming at the water table, was prevalent throughout the alluvium; it occurred as a powdery to well-cemented, buff-colored precipitate in fissures or voids. No caliche was found in undisturbed bedrock.

At station 11 + 80 at 37 feet below ground level (cross section 15), a possible fault was logged between a silty claystone and sandy clayey siltstone. The observable fault zone was noted to be completely filled with dense, well-cemented caliche. The caliche may act as a seal, preventing the fault zone from acting as a ground water conduit. During construction, no moisture was observed at or near the fault plane.

Caliche had also been deposited in old shear planes at several locations along the french drain excavation. From station 13 + 45 to 13 + 95 (cross sections 18 and 19), a truncated shear zone with abundant caliche was observed and logged. No moisture was observed in this zone.

A4.2.5 Comparison of Geotechnical Investigation and the Geologic Characterization Data

A4.2.5.1 Geologic Correlation

Greater subsurface exposure during the construction of the french drain allowed for a more accurate identification of geologic units than during the geotechnical investigation. The extent of slumping at the hillside was not as apparent during the geotechnical investigation because geologic interpretation was restricted to samples collected during drilling.

Table A4-3 lists the sample data obtained from the geotechnical investigation. In addition to the tested interval, resulting grain-size analyses, and subsequent classification, Table A4-3 also displays the approximate location of the boreholes to stations along the french drain alignment. The columns appearing under the heading Geologic Characterization in Table A4-3 represent the revised classification, test intervals, and grain-size analyses of samples obtained during the french drain construction that correspond to test intervals in the geologic characterization borings. For example, the following three samples, collected during borehole testing and logged during the geotechnical investigation, were incorrectly identified as bedrock. These samples are listed in Table A4-3 as follows:

- B301190 Test Interval 23.60–24.00
- B301090 Test Interval 31.10–31.50
- B300590 Test Interval 10.60–11.30

A4.2.5.2 Hydraulic Conductivities

As stated in the IM/IRA plan and decision document (EG&G 1990b), the french drain was to be extended 2 feet into bedrock exhibiting a hydraulic conductivity of 1×10^{-6} cm/sec or less. Tests conducted during the construction of the french drain and during the prior geotechnical investigation confirm that the bedrock material is appropriate and meets the requirement of the IM/IRA plan and decision document.

Three different permeability tests were performed on the shallow bedrock along the french drain; in situ packer tests, back-pressure permeability tests, and in situ falling head permeability tests. In situ packer tests, conducted at approximately 5-foot intervals, and back-pressure permeability tests conducted on core samples were performed in association with the drilling during the geotechnical investigation. In situ falling-head permeability tests were conducted at 100-foot intervals, where possible, on the exposed bedrock in the bottom of the excavated trench for the french drain. The falling-head permeability tests were performed to confirm that the bedrock material had hydraulic conductivities equal to or less than 1×10^{-6} cm/sec. In situ packer tests measure horizontal hydraulic conductivity, whereas laboratory back-pressure permeability tests and in situ falling-head permeability tests measure vertical hydraulic conductivity. In general, the geologic formations were anisotropic. Most commonly, hydraulic conductivity is greater in the horizontal direction than in the vertical. Vertical conductivity is of foremost concern regarding the function of the french drain because of the potential for contaminated ground water to migrate beneath the french drain. Both techniques used to measure vertical conductivities produced results that were less than 1×10^{-6} cm/sec. Table A4-4 presents the results of all three tests.

In situ falling-head permeability tests were conducted in the base of the french drain excavation between stations 19 + 28 and 10 + 45. These tests were conducted approximately every 100 feet in order to confirm that bedrock was hydraulically competent. The results of these tests (Table A4-4) indicate that all of the bedrock material tested was hydraulically competent. These tests were not performed west of station 10 + 45 due to unstable slope conditions that required rapid

construction and backfilling techniques. Test data collected from boreholes during the geotechnical investigation can substantiate hydraulic competency in materials west of station 10 + 45.

Between stations 5 + 25 and 7 + 55, in situ permeability tests were not performed in the french drain excavation due to construction activities. However, previously collected data on permeabilities from the geotechnical investigation indicate that the displaced bedrock materials were generally regarded as hydraulically competent. This displaced bedrock material was interpreted as in place during the geotechnical investigation and was subjected to in situ packer testing. The results of the in situ packer testing (Table A4-4) indicate that the displaced bedrock is able to maintain a hydraulic conductivity of 1×10^{-6} cm/sec (or less) and is therefore suitable material in which to key the bottom of the drain. Given this criteria, the base of the french drain is always below the top of bedrock.

Some of the packer tests and back-pressure permeability tests conducted during the geotechnical investigation were performed on lithologies below the excavated grade of the french drain. Data from these tests confirm that bedrock lithologies in areas where in situ falling-head tests were not conducted have hydraulic conductivities of 1×10^{-6} cm/sec or less. These packer test results are indicative of materials confirmed as in-place bedrock. In addition, back-pressure permeability tests from these lithologies are comparable to the falling-head tests conducted during excavation in the exposed bedrock at the bottom of the trench.

The permeability tests conducted during the geotechnical investigation correlate well with the the in situ falling-head tests conducted during the french drain construction. Intervals tested within the colluvial slump blocks exhibit characteristics similar to those of bedrock materials. This is primarily due to the predominance of bedrock material within these slumps. The subscripts in Table A4-4 identify the characteristics of each tested interval.

A4.2.6 Conclusions

A simplified sequence of the lithologic units exposed during the excavation of the french drain is summarized as follows:

- Top soil – The surficial soils grading from a brown sandy clay to a silty clay
- Alluvium – A lateral and vertical gradational sequence of a reddish/brown clayey sand to silty clay with lenses of gravels to cobbles in a clayey sand matrix containing caliche and scattered inclusions of claystone blocks
- Colluvium – The alluvial and/or bedrock lithologies disturbed or displaced due to slumping and downslope movement
- Bedrock – The competent claystone, siltstone, and sandstone typifying the upper Laramie Formation

The geologic structures encountered during excavation activities included several slump features and a possible fault. The axis of the slump features encountered consistently trended east-west. The movement of the slumps was downslope based on north-south trending slickensides on the shear planes. The possible fault was northwest trending and had a northeast dip.

The alluvial/colluvial ground water flow system is interpreted as being anisotropic and heterogeneous. Slumps in the alluvium/colluvium influence ground water flow patterns. It is theorized that as the slumps move downslope any permeable strata within the slump block may become juxtaposed with the claystone bedrock, thereby forming complex flow paths. The shear plane surfaces could intermittently conduct ground water flow during periods of slope movement, although an inspection of exposed surfaces revealed no visible evidence of ground water flowing through the shear planes. Examination of the possible fault plane encountered in the excavation revealed a dense caliche cement, which is indicative of previous ground water movement. The fault plane appeared to be sealed, which prohibits further ground water flow. Therefore, the possible fault is interpreted as having little or no influence on the present alluvial ground water flow system. In the well-defined areas between slump scarps and the backward rotated tops of

the slump block, depressions form where water from precipitation and alluvial seeps pond. Ponding of water was also noted at the base of the slump block upslope of the toe area.

Ground water flow within the alluvium/colluvium along the french drain alignment appears to be largely confined to the following lithologic units:

- Sandy to clayey silt – These laterally continuous units are underlain by impermeable clay layers and are overlain by very moist clay. The seeps may be due to gravity-induced flow across the excavation wall, since excavation activities revealed open fractures from which water appeared to be seeping.

- Silty sand and gravel – These materials are interpreted as channel deposits because they pinch out laterally and vertically on the exposed slopes. Ground water in the silty sand and gravel deposits appears to be perched above a layer of silty clay. The highest rate of alluvial ground water seepage was observed in these sands. Areas where these saturated sands occurred typically exhibited in-slope creep and earth flows during construction activities, possibly due to the release of geostatic pressure along the excavation.

In summary, the anisotropy and heterogeneity of the alluvial ground water flow system is due to the amount of lower permeability clay bounding water-bearing units in the alluvial material and the presence of discontinuous alluvial sand channels and silt layers within slump blocks. The slump blocks likely create closed systems and, therefore, inhibit lateral continuous flow through the hillside. Ground water within a slump system is typically stagnant, but may flow to the surface and discharge as hillside seeps or may undergo evapotranspiration, leaving behind deposits of caliche.

A4.3 UNCERTAINTIES AND SOURCES OF ERROR

This section identifies all uncertainties and sources of error encountered during the french drain geologic characterization. Standardized procedures and techniques for collecting data were always used to reduce the number of errors and the degree of uncertainty involved with the french drain geologic characterization. However, construction activities took precedence and often hindered attempts to perform detailed logging in many areas. Varying excavation slope angles necessary to ensure slope stability during construction and errors in determining top of

slope influenced apparent unit thicknesses and depth of excavation when corrected to true vertical depth. These conditions also made lateral correlation between units difficult. In addition, grain-size distribution analysis could be biased when coarse-grained materials were sampled.

A4.3.1 Construction Activities

The quantity of data collected during the french drain characterization was a reflection of the time available for logging and sampling. Construction activities would often limit data collection activities, introducing a degree of uncertainty to the mapped geologic interpretations presented in this report. Between stations 15 + 50 and 19 + 35, trenching activities were already underway before the geologic investigation was begun. In order to maintain schedule, the trench was mapped with 50-foot transect intervals (instead of 25-foot intervals). Samples to provide supporting laboratory data were collected only when major lateral and vertical lithological changes were noted; therefore, uncertainties with respect to visual interpretations of grain-size analysis are greater in this portion of the excavation.

West of station 15 + 50, health and safety protocols due to excavation activities and slope stability problems limited logging and sampling activities to the end of the day, after excavation activities were completed. The time available to log at the end of each day was even further limited by the early sunsets during December and January. Through the addition of another geologist to assist in logging and sample collection, the vertical sampling frequency was increased, which provided better supporting laboratory data; however, time constraints still limited transect intervals to a 50-foot spacing. Because of limited time and the spacing of transect intervals, lateral correlation of the complex geology between stations 13 + 00 and 13 + 50 required considerable inference.

West of station 10 + 50 to the end of the excavation at station 5 + 00, transect intervals were mapped every 25 feet. Vertical and lateral sampling frequency provided the best coverage during this section of the excavation. However, poor slope stability in this area of the drain proved to be the greatest factor limiting data acquisition. When active slumping occurred, all personnel

were required to leave the keyway and slope for health and safety reasons. The slumped material would be removed to restabilize the slope, and construction and backfilling operations would immediately resume to further stabilize the area. This periodically prevented the geologist from completing the logging and sampling. Lack of samples in the bedrock unit of transect 6 + 00 was due to restricted trench access caused by slumping. When trench access was restricted, information was inferred from the nearest logged transect interval. Because of large-scale slumping in this area, shorter sections of the excavation were opened in an attempt to control slumping. When sections of open trench were reduced to 25 or 30 feet, the time between the end of excavation activities and the start of construction activities would limit the time available for data collection. Because of these time constraints, the transect interval at stations 7 + 50, 9 + 25, and 5 + 75 were logged but not sampled. Additionally, transects at stations 8 + 50 and 5 + 00 were not sampled in bedrock.

The ability to trace units or structural features laterally from each transect interval was occasionally limited by construction activities. Units that did not correlate between transect intervals were assumed to pinch or grade into each other, but actual boundaries were not always possible to establish. Construction activities and unstable slope conditions did not permit the collection of samples from every unit along each transect. Although construction activities often placed limits on the ability of the geologist to provide detailed descriptions and consistent sampling, an attempt was made to sample and describe each new lithology when encountered.

A4.3.2 Lateral Correlation Uncertainties

Lateral correlation between transect intervals was often difficult due to construction activities and varying slope angles. In addition, varying slope angles between stations 11 + 20 and 10 + 90 and at station 13 + 40 added uncertainty to lateral correlations. Figure A4-10 demonstrates how the exposures of the geologic features may change due to varying slope angles. At station 11 + 00, excavation activities would often smear alluvial materials across the slope faces, thereby obscuring unit contacts and structural features. At station 11 + 00, excavated soil debris placed on the slope, sometimes in excess of 2 feet thick, prohibited logging of in-place soils.

Geologic interpretation in such areas was inferred from the nearest logged transect interval. Shear planes encountered during initial excavation activities were often removed prior to logging in order to better stabilize the slope, altering the appearance of the lithologic and structural features and making them appear to be discontinuous.

A4.3.3 Thickness and Vertical Correction Errors

The apparent thickness of soil and bedrock units and the mapped depth of excavation is greatly influenced by the estimated top of slope elevation and by varying slope angles. Placement of the measuring tape at the top of slope for each transect interval was by the best judgement of the geologist. Surface elevations presented on the geologic maps were estimated using the design specification for the french drain (Engineering-Science 1991). Errors in estimating top of slope are reflected down the entire transect interval, including the depth of excavation.

Errors affecting vertical corrections and apparent thicknesses can also be attributed to minor variations in slope angles. The slopes of the excavation were laid back at various angles as a means to control unstable slope conditions. Slope angles were measured by placing a Brunton compass on a long, flat object laying on the slope. Each obvious change in slope was measured; however, variances of 5 degrees or less were generally not recorded. The cumulative effect of many unrecorded minor slope changes could change apparent thicknesses and depth of excavation when correcting field data to true vertical depth. It should be noted that the mapped approximate depth of excavation reflects these inherent errors and does not reflect the actual constructed grade of the french drain.

A4.3.4 Uncertainties Associated With Comparing Laboratory Analyses With Field Observations

Laboratory grain-size analyses were given in units of percent by weight. Data from samples collected with coarse-grained materials such as gravels and cobbles were biased high (i.e., the analytical sample results reported percentages of coarse-grained materials that were higher than the actual material found in the field). Therefore, the results of these samples had to be compared to field observations and categorized according to the best judgment of the geologist.

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Appendix A4 · Tables

French Drain
Geologic Data

Phase III
RFI/RI Report

U1 OU1 OU
881 Hillside
OU1 OU1 O
Hillside 881
1 OU1 OU1
side 881 Hill
U1 OU1 OU
881 Hillside
OU1 OU1 O
Hillside 881

Table A4-1

Grain Size Scales (millimeters)

U.S.C.S. (unconsolidated material)	Wentworth (Bedrock)	Component
>76.2	256—64	Cobbles
—	64—32*	Very Coarse Gravel
76.2—19	32—16*	Coarse Gravel
—	16—8	Medium Gravel
19—4.76	8—4*	Fine Gravel
—	4—2	Granule
—	2—1	Very Coarse Sand
4.76—2	1—0.5	Coarse Sand
2—0.42	0.5—0.25	Medium Sand
0.42—0.074	0.25—0.125	Fine Sand
—	0.125—0.0625	Very Fine Sand
0.074	0.0625—0.0039	Silt
—	<0.0039	Clay

* Pebbles

Table A4-2

Alluvial Ground-Water Seep Occurrences Along the French Drain Alignment

Station	Depth in Feet	Lithology
6 + 75	13.40	Clayey Silt
6 + 75	16.00	Clayey Silt
6 + 75	16.45	Clayey Silt
7 + 15	23.80	Clayey Sand
7 + 25	10.25	Silty Clayey Gravel
7 + 50	12.00	Silty Clayey Gravel
9 + 50	18.65	Gravelly Sand
8 + 15	23.80	Clayey Sand

Table A4-3

Comparison Between Grain Size Distribution (1) of the
Geotechnical Investigation (EG&G, 1990b) and the Geologic Characterization

Borehole Number	Approximate Corresponding Station Number	Test Interval (feet)	Geotechnical Investigation: Grain Size (percent) Sand	Silt	Clay	Classification	Geologic Characterization: Sample Number/ Corrected Depth (2)	Grain Size (percent) Sand	Silt	Clay	Classification
B301890	05+00	28.90 - 29.30	19	56	25	Clayey Siltstone	ND	ND	ND	ND	
		33.30 - 33.70	12	53	35	Clayey Siltstone (3)	ND	ND	ND	ND	
B304190	05+50	04.00 - 4.50	21	31	48	Silty Clay (CH)	ND	ND	ND	ND	
B301690	07+00	29.60 - 30.00	10	58	32	Clayey Siltstone (3)	ND	ND	ND	ND	
		32.40 - 32.70	36	47	17	Sandy Clayey Siltstone (3)	ND	ND	ND	ND	
		37.00 - 37.30	2	42	56	Silty Claystone (3)	ND	ND	ND	ND	
B301590	08+00	26.75 - 27.10	42	40	18	Silty Sandstone (3)	ND	ND	ND	ND	
B301390	10+00	23.80 - 24.40	13	62	25	Clayey Silt	10+00-43.00/20.23	.8	8.2	91	Clay (CH)
B304090	10+50	04.50 - 5.50	3	28	69	Silty Clay	10+50-4.50/2.89	8.3	25.7	60	Silty Clay (CH)
B301190	12+00	23.60 - 24.00	16	43	41	Clayey Siltstone (4)	ND	ND	ND	ND	
		23.60 - 24.00	41	44	15	Sandy Siltstone (4)	12+00-41.00/26.35	28.4	37	27	Sandy Clayey Silt (CL)
		31.10 - 32.00	32	38	30	Sandy Clayey Siltstone	12+00-49.00/31.50	22.9	53	24	Sandy Clayey Siltstone
		35.00 - 35.50	21	50	29	Sandy Clayey Siltstone	ND	ND	ND	ND	
B301090	13+00	31.10 - 31.50	0	20	80	Silty Claystone (4)	ND	ND	ND	ND	
B303990	15+50	10.70 - 11.20	19	56	25	Clayey Silt	15+40-27.50/13.20	30	48	22	Sandy Clayey Siltstone
B300790	16+00	16.00 - 16.80	0	45	55	Silty Claystone	15+58-26.50/17.03	1.1	42.9	56	Silty Claystone
		20.80 - 21.50	1	56	43	Clayey Siltstone (3)	ND	ND	ND	ND	
B300690	17+00	19.00 - 19.50	16	59	25	Clayey Siltstone	ND	ND	ND	ND	
B300590	18+00	10.60 - 11.30	25	20	55	Silty Sandy Claystone (4)	18+00-17.00/11.00	2.3	30.4	67.3	Silty Clay
		21.20 - 21.90	1	34	65	Silty Claystone (3)	ND	ND	ND	ND	

(1) Comparison between grain size distribution is from a composite interval in the Geotechnical Investigation and a proximal point source sampled during the geologic characterization of the French Drain.
(2) Sample Number corresponds to the Station Number (Engineering Science, 1991) and the sample depth during excavation. Corrected depth corresponds to the sine of the slope angle.
(3) Below grade of French Drain excavation
(4) Displaced bedrock from slumping

ND - No Data

Table A4-4

Permeabilities of Alluvial and Bedrock Materials
Geotechnical Investigation (EG&G, 1990b) and the Geologic Characterization

		Geotechnical Investigation				Geologic Characterization					
Borehole Number	Approximate Corresponding Station Number	Depth to Bedrock (feet)	Test Interval (feet)	In Situ Packer Test Permeability (cm/sec)	Back Pressure Permeability (cm/sec)	Approximate Test Station	Approximate Depth of Excavation (feet)	Approximate Depth to Bedrock (feet)	Approximate Depth to Acceptable Material (1) (feet)	Hydraulic Conductivity Results K(cm/s) Doty/Assoc.	Hydraulic Conductivity Results K(cm/s) EG&G
B301890	05+00	20.0	23.50 - 26.90 (2)	<8.3 E-7			31	29	20		
		20.0	26.90 - 31.90 (3)	3.9 E-6							
		20.0	31.90 - 36.90 (4)	<4.5 E-7							
		20.0	37.90 - 41.90 (4)	<4.5 E-7							
B301790	06+00	17.0	22.76 - 24.60 (3)	<1.3 E-6			26	25	23		
		17.0	24.60 - 29.60 (2,5)	<5.8 E-7							
		17.0	29.60 - 34.60 (4)	<4.8 E-7							
		17.0	34.60 - 39.60 (4)	<4.1 E-7							
B301690	07+00	20.5	22.80 - 27.60 (2,5)	<6.6 E-7			25.5	25	23.5		
		20.5	24.75 - 32.90 (5)	<4.3 E-7							
		20.5	29.60 - 30.00 (4)		2.4 E-8						
		20.5	32.40 - 32.70 (4)		7.1 E-8						
		20.5	32.90 - 37.80 (4)	4.4 E-7							
B301590	08+00	13.5	16.50 - 20.30 (3)	8.5 E-4			24	22	16		
		13.5	20.30 - 25.30 (3)	4.2 E-5							
		13.5	25.30 - 30.30 (4)	2.3 E-6							
		13.5	26.30 - 30.30 (4)	8.0 E-6							
		13.5	26.75 - 27.10 (4)		1.5 E-6						
B301490	09+00	16.1	18.00 - 23.27 (2,3,5)	<4.9 E-6			22	20	15		
		16.1	22.70 - 27.97 (4)	<6.0 E-6							
		16.1	27.50 - 32.77 (4)	<2.3 E-6							
		16.1	28.30 - 28.60 (4)		3.1 E-8						
B301390	10+00	13.0	14.80 - 18.80 (3,6)	3.5 E-6			26	24	16		

(1) Acceptable material is the disturbed bedrock at times utilized to attain a two-foot vertical extension of the trench grade into material representing a hydraulic conductivity of 1 E-6 cm/sec.
(2) The test interval is supportive of acceptable material having a hydraulic conductivity of 1 E-6 cm/sec.
(3) The test interval is within an identified shear plane.
(4) The test interval is below trench grade.
(5) The test interval is supportive of bedrock with a hydraulic conductivity of 1 E-6 cm/sec.
(6) The test interval is within a colluvial slump block.

Table A4-4

Permeabilities of Alluvial and Bedrock Materials
Geotechnical Investigation (EG&G, 1990b) and the Geologic Characterization

		Geotechnical Investigation				Geologic Characterization					
Borehole Number	Approximate Corresponding Station Number	Depth to Bedrock (feet)	Test Interval (feet)	In Situ Packer Test Permeability (cm/sec)	Back Pressure Permeability (cm/sec)	Approximate Test Station	Approximate Depth of Excavation (feet)	Approximate Depth to Bedrock (feet)	Approximate Depth to Acceptable Material (1) (feet)	Hydraulic Conductivity Results K(cm/s) Doty/Assoc.	Hydraulic Conductivity Results K(cm/s) EG&G
		13.0	18.80 - 23.80 (3)	1.7 E-6							
		13.0	23.80 - 24.40 (5)		1.9 E-7						
		13.0	24.80 - 28.80	3.5 E-6							
		13.0	28.80 - 33.80 (4)	<5.0 E-7							
		13.0	N/A	N/A							
						10+45	36	32		7.08 E-07	
B301290	11+00	9.5	09.50 - 14.50 (2)	<1.5 E-6			44	29	8		
		9.5	14.50 - 19.50 (2)	<1.0 E-6							
		9.5	19.50 - 24.50 (3)	1.1 E-4							
						11+35	36	30		3.64 E-08	
B301190	12+00	18.6	23.00 - 28.00 (6)	<6.6 E-6			35	30	21		
		18.6	23.60 - 24.00 (2)		2.4 E-8						
		18.6	28.00 - 33.00 (3)	<5.3 E-6							
		18.6	34.00 - 39.00 (4,5)	<3.5 E-6							
		18.6	35.00 - 35.50 (5)		1.1 E-8						
						12+35	34	27		1.36 E-07	1.36 E-07
B301090	13+00	21.0	22.07 - 27.34 (3,6)	6.4 E-5			36	34	26		
		21.0	31.10 - 31.50 (5)		3.1 E-8						
						13+50	30	28	25	5.50 E-08	5.48 E-08
B300990	14+00	12.1	14.30 - 19.30 (2,6)	<2.6 E-6			26	17	6		
		12.1	19.30 - 24.30 (5)	<1.3 E-6							
		12.1	24.30 - 29.30 (4,5)	<2.0 E-6							
						14+30	25	17		4.86 E-08	4.84 E-08

(1) Acceptable material is the disturbed bedrock at times utilized to attain a two-foot vertical extension of the trench grade into material representing a hydraulic conductivity of 1 E-6 cm/sec.
(2) The test interval is supportive of acceptable material having a hydraulic conductivity of 1 E-6 cm/sec.
(3) The test interval is within an identified shear plane.
(4) The test interval is below trench grade.
(5) The test interval is supportive of bedrock with a hydraulic conductivity of 1 E-6 cm/sec.
(6) The test interval is within a colluvial slump block.

Table A4-4

Permeabilities of Alluvial and Bedrock Materials
Geotechnical Investigation (EG&G, 1990b) and the Geologic Characterization

		Geotechnical Investigation					Geologic Characterization					
Borehole Number	Approximate Corresponding Station Number	Depth to Bedrock (feet)	Test Interval (feet)		In Situ Packer Test Permeability (cm/sec)	Back Pressure Permeability (cm/sec)	Approximate Test Station	Approximate Depth of Excavation (feet)	Approximate Depth to Bedrock (feet)	Approximate Depth to Acceptable Material (1) (feet)	Hydraulic Conductivity Results K(cm/s) Doty/Assoc.	Hydraulic Conductivity Results K(cm/s) EG&G
B300890	15+00	12.0	16.26 - 19.50	(5)	<5.9 E-6			22	15			
		12.0	19.50 - 25.00	(4,5)	<3.4 E-6							
		12.0	24.30 - 29.30	(4)	<2.0 E-6							
							15+40	18	16	12	2.77 E-08	3.42 E-08
							15+70	17	6		2.56 E-08	2.55 E-08
B300790	16+00	3.7	10.12 - 13.00	(5)	<5.0 E-6			18	8			
		3.7	13.00 - 17.00	(5)	<8.4 E-6							
		3.7	17.00 - 23.00	(4,5)	<4.8 E-6							
		3.7	18.60 - 18.80	(4,5)		6.0 E-9						
							16+50	21	17		9.6 E-8	
							16+70	23.5	18	16	1.07 E-07	1.07 E-07
B300690	17+00	12.5	10.10 - 15.37	(2,6)	<3.3 E-6			21	17	2		
		12.5	14.98 - 20.25	(2,3,5)	<3.7 E-6							
		12.5	18.50 - 19.00	(5)		1.6 E-7						
		12.5	19.00 - 19.50	(5)								
		12.5	20.10 - 25.37	(4,5)	8.4 E-7							
B300590	18+00	11.5	09.71 - 14.98	(6)	<2.8 E-6			18	16.5	16		
		11.5	10.60 - 11.30									
		11.5	14.76 - 20.03	(2,5)	<3.7 E-6							
		11.5	17.13 - 22.40	(4,5)	<4.5 E-6							
		11.5	21.20 - 21.90									
B303890	18+50	10.4	14.00 - 18.00	(2,5)	<1.2 E-6		18+50	17	15	11	2.56 E-08	2.55 E-08
		10.4	20.00 - 23.00	(4)	<1.0 E-6							

(1) Acceptable material is the disturbed bedrock at times utilized to attain a two-foot vertical extension of the trench grade into material representing a hydraulic conductivity of 1 E-6 cm/sec.
(2) The test interval is supportive of acceptable material having a hydraulic conductivity of 1 E-6 cm/sec.
(3) The test interval is within an identified shear plane.
(4) The test interval is below trench grade.
(5) The test interval is supportive of bedrock with a hydraulic conductivity of 1 E-6 cm/sec.
(6) The test interval is within a colluvial slump block.

Table A4-4

Permeabilities of Alluvial and Bedrock Materials
Geotechnical Investigation (EG&G, 1990b) and the Geologic Characterization

		Geotechnical Investigation				Geologic Characterization					
Borehole Number	Approximate Corresponding Station Number	Depth to Bedrock (feet)	Test Interval (feet)	In Situ Packer Test Permeability (cm/sec)	Back Pressure Permeability (cm/sec)	Approximate Test Station	Approximate Depth of Excavation (feet)	Approximate Depth to Bedrock (feet)	Approximate Depth to Acceptable Material (1) (feet)	Hydraulic Conductivity Results K(cm/s) Doty/Assoc.	Hydraulic Conductivity Results K(cm/s) EG&G
		10.4	23.00 - 28.00 (4)	<6.2 E-7							
						18+60	14	12	11	8.7 E-08	8.73 E-08
						19+28	12	9	8	1.34 E-07	1.3 E-07

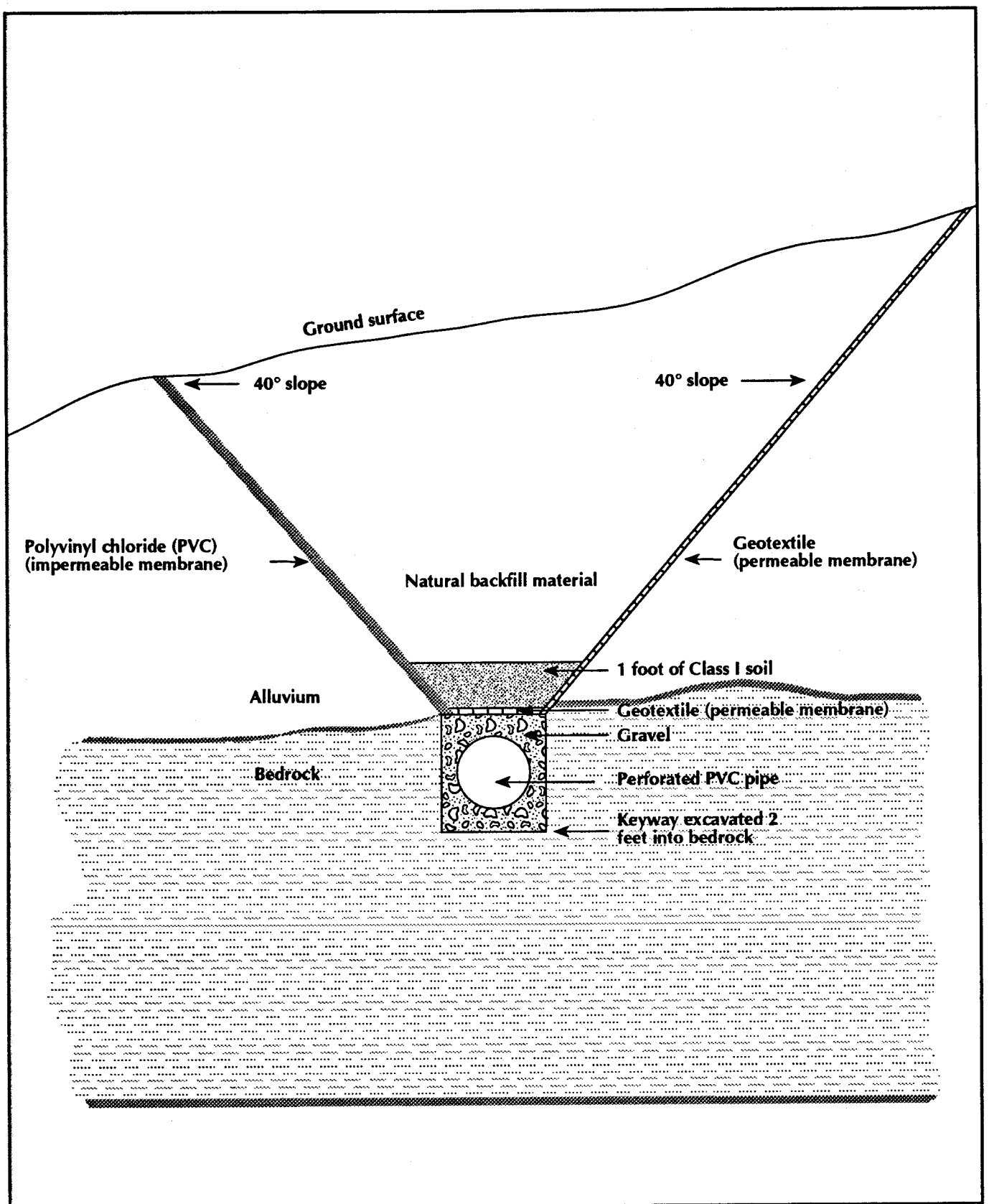
(1) Acceptable material is the disturbed bedrock at times utilized to attain a two-foot vertical extension of the trench grade into material representing a hydraulic conductivity of 1 E-6 cm/sec.
(2) The test interval is supportive of acceptable material having a hydraulic conductivity of 1 E-6 cm/sec.
(3) The test interval is within an identified shear plane.
(4) The test interval is below trench grade.
(5) The test interval is supportive of bedrock with a hydraulic conductivity of 1 E-6 cm/sec.
(6) The test interval is within a colluvial slump block.

Appendix A4 · Figures

French Drain
Geologic Data

Phase III
RFI/RI Report

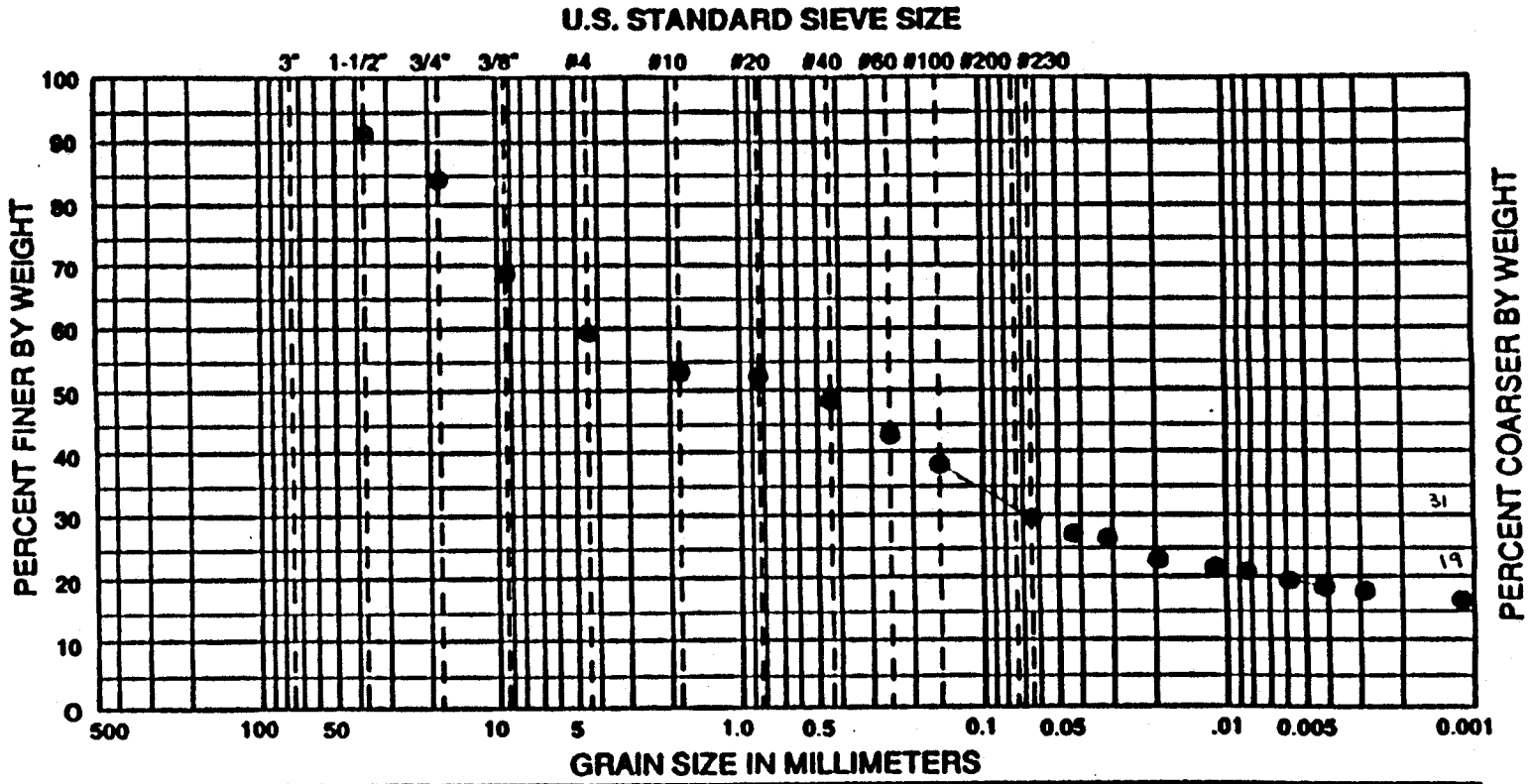
U1 OU1 OU
881 Hillside
OU1 OU1 O
Hillside 881
1 OU1 OU1
side 881 Hill
U1 OU1 OU
881 Hillside
OU1 OU1 O
Hillside 881



U.S. DEPARTMENT OF ENERGY Rocky Flats Plant Golden, Colorado	**FRENCH DRAIN CONSTRUCTION PROFILE**	FIGURE **A4-2**

U.S. DEPARTMENT OF ENERGY
Rocky Flats Plant
Golden, Colorado

U.S. STANDARD SIEVE SIZE



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY			
		COARSE	FINE	COARSE	MEDIUM	FINE				
WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL			SAND			SILT		CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 7175 SAMPLE NO.: CH #12 DATE: 3/26/92 PROJECT NO.:

AREA	DEPTH		CLASSIFICATION					
			sandy gravel					
		Cobbles	GW - 30.4		S 28.9		SL	CL
Rocky Flats	23.0'	9.2	6.1	21.8	6.2	5.3	17.4	12	19

FIGURE A4-4

SOIL TYPES

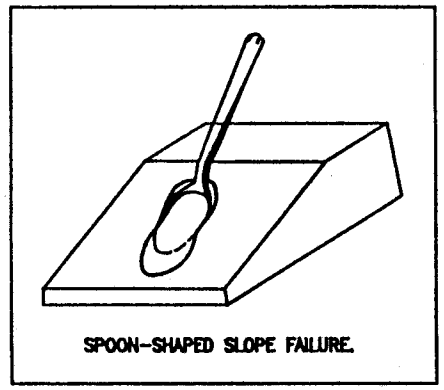
MAJOR DIVISIONS			LETTER	SYMBOL	DESCRIPTION
Coarse Grained Soils More than 50% of material is larger than No.200 sieve size	Gravel and Gravelly Soils More than 50% of coarse fraction retained on No. 4 sieve	Clean Gravels (<5% fines)	GW		Well-graded gravels or gravel-sand mixtures, little or no fines. Uc>4 (lab only)
			GP		Poorly graded gravels or gravel-sand mixtures, little or no fines.
		Gravels with (>12% fines)	GM		Silty gravels, gravel-sand-silt mixtures.
			GC		Clayey gravels, gravel-sand-clay mixtures.
	Sand and Sandy Soils More than 50% of coarse fraction passed No. 4 sieve	Clean Sand (<5% fines)	SW		Well-graded sands or gravelly sands, little or no fines. Uc>6 (lab only)
			SP		Poorly-graded sands or gravelly sands, little or no fines.
		Sands with Fines (>12% fines)	SM		Silty sands, sand-silt mixtures.
			SC		Clayey sands, sand-clay mixtures.
Fine Grained Soils More than 50% of material is smaller than No.200 sieve size	Silts and Clays	Low Plasticity	ML		Inorganic silts and very fine sands, rock flour, silty or clayey fine sands, or clayey silts with slight plasticity.
			CL		Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.
			OL		Organic silts and organic silty clays of low plasticity.
		High Plasticity	MH		Inorganic silts, micaceous or diatomaceous fine sands or silty soils.
			CH		Inorganic clays of high plasticity, fat clays.
			OH		Organic clays of medium to high plasticity, organic silts.
Highly Organic Soils			PT		Peat, humus, swamp soils with high organic contents.

Note: Dual Symbols are used to indicate borderline soil classifications whose fines range from 5 to 12%.

U.S. DEPARTMENT OF ENERGY Rocky Flats Plant Golden, Colorado	UNIFIED SOIL CLASSIFICATION SYSTEM	FIGURE A4-5

R33190.MB052292

R33183.CWCW-051492



ORIGINAL GROUND SURFACE

ZONE OF DEPLETION

CROWN CRACKS

CROWN

MAIN SCARP

HEAD

TOP

ALLUVIUM

CLAYSTONE

RIGHT FLANK

MINOR SCARP

TRANSVERSE CRACKS

DISPLACED MATERIAL

L

Lc

D

LONGITUDINAL FAULT ZONE

MAIN BODY

SURFACE OF RUPTURE OR SHEAR PLANE

FOOT

TOE OF SURFACE OF RUPTURE

SURFACE OF SEPARATION

ZONE OF ACCUMULATION

TRANSVERSE CRACKS

TRANSVERSE RIDGES

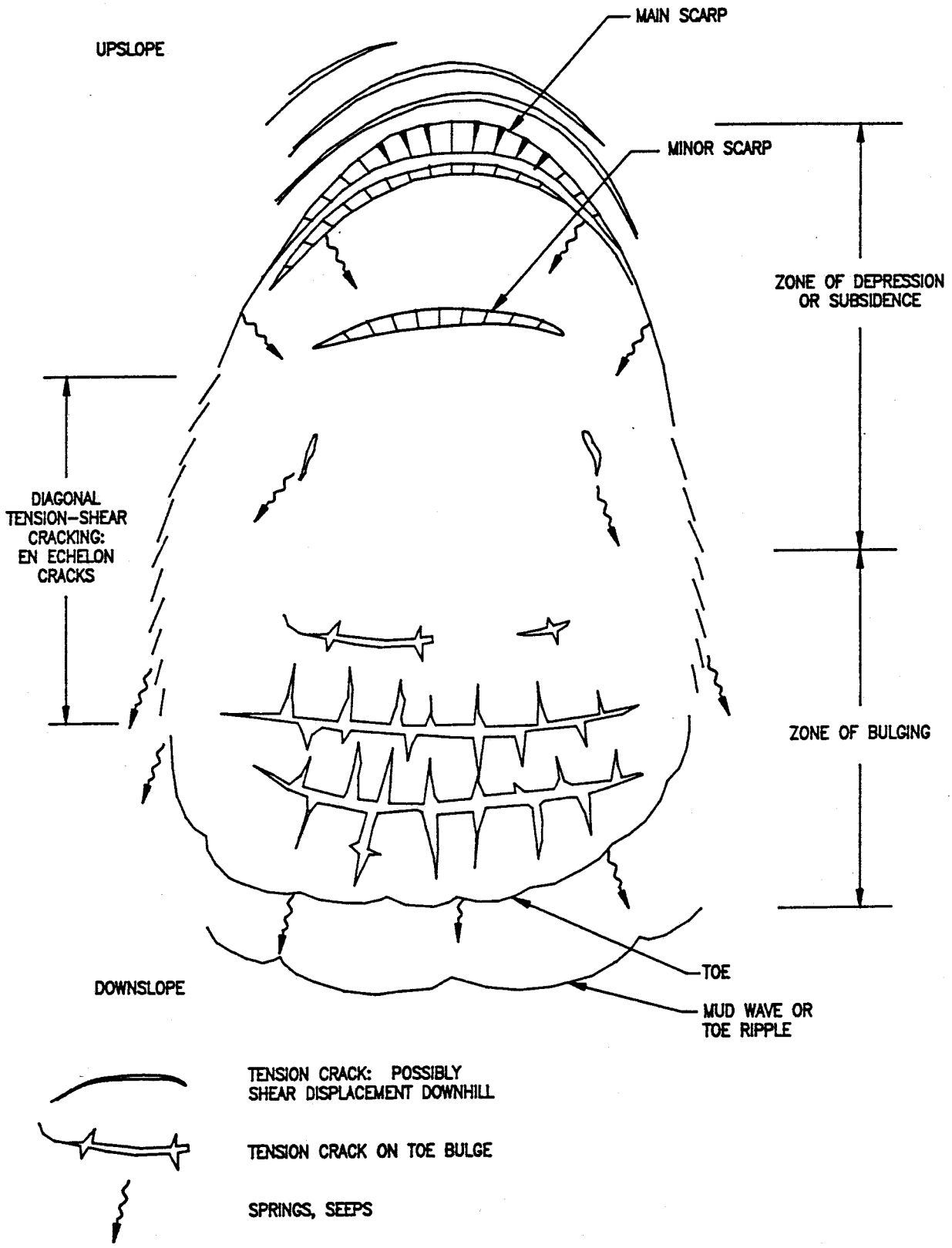
RADIAL CRACKS

TIP

TOE

Adapted from Schuster and Krizek, (1978).

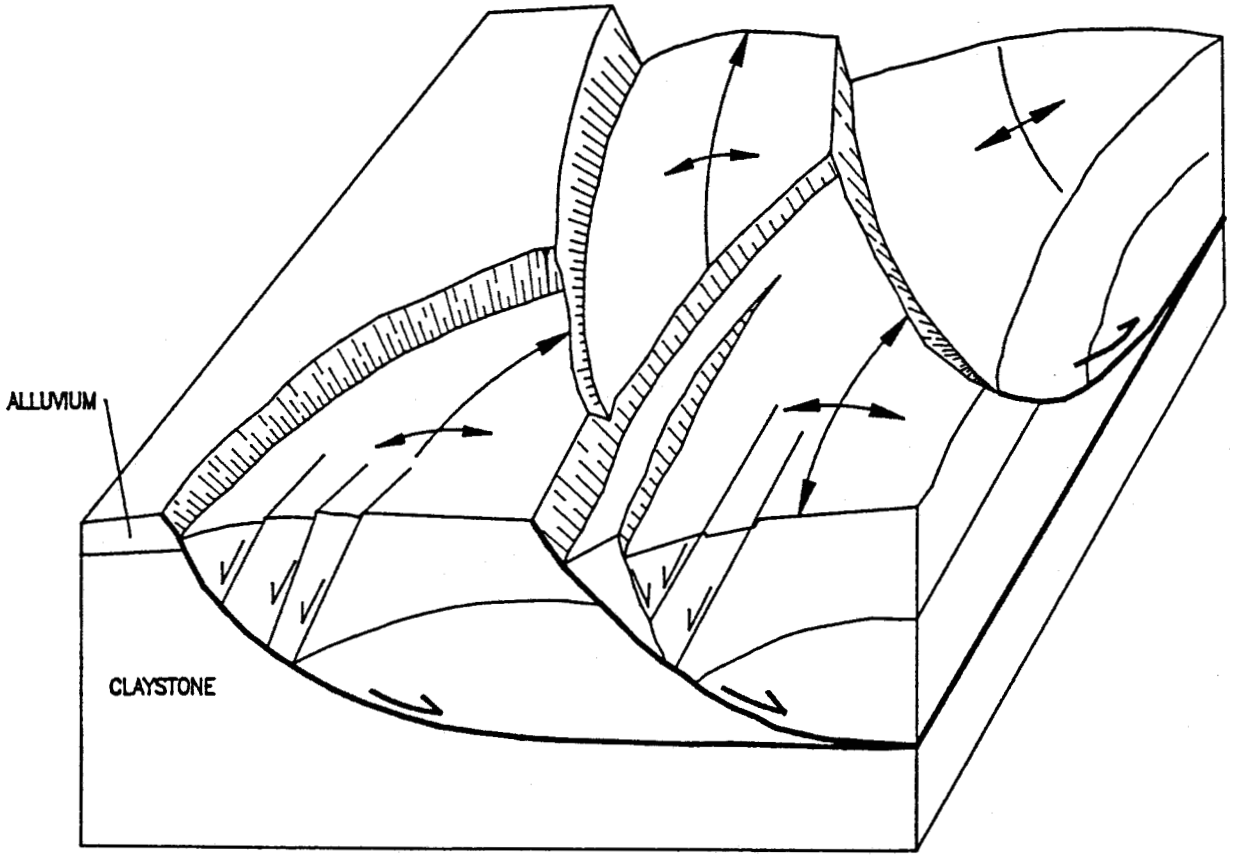
U.S. DEPARTMENT OF ENERGY Rocky Flats Plant Golden, Colorado	BLOCK DIAGRAM OF TYPICAL SLUMP	FIGURE A4-6



Adapted from Schuster and Krizek, (1978).

U.S. DEPARTMENT OF ENERGY Rocky Flats Plant Golden, Colorado	PLANAR DIAGRAM OF TYPICAL SLUMP	FIGURE A4-7

R33184.CWCW-051492

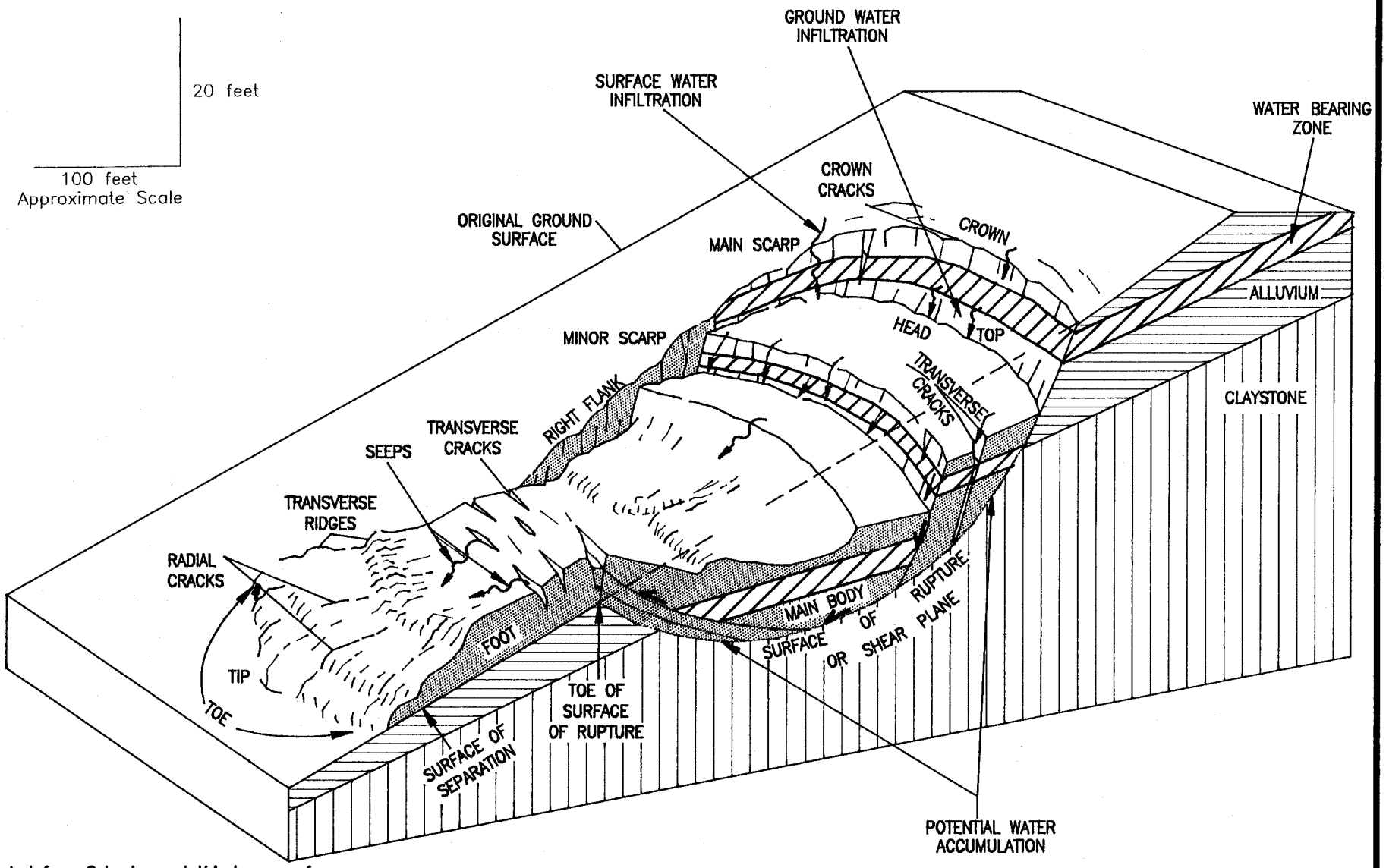


Adapted from Harding, T.P., (1991).

U.S. DEPARTMENT OF ENERGY Rocky Flats Plant Golden, Colorado	TYPICAL COMPLEX SLUMPING	FIGURE A4-8

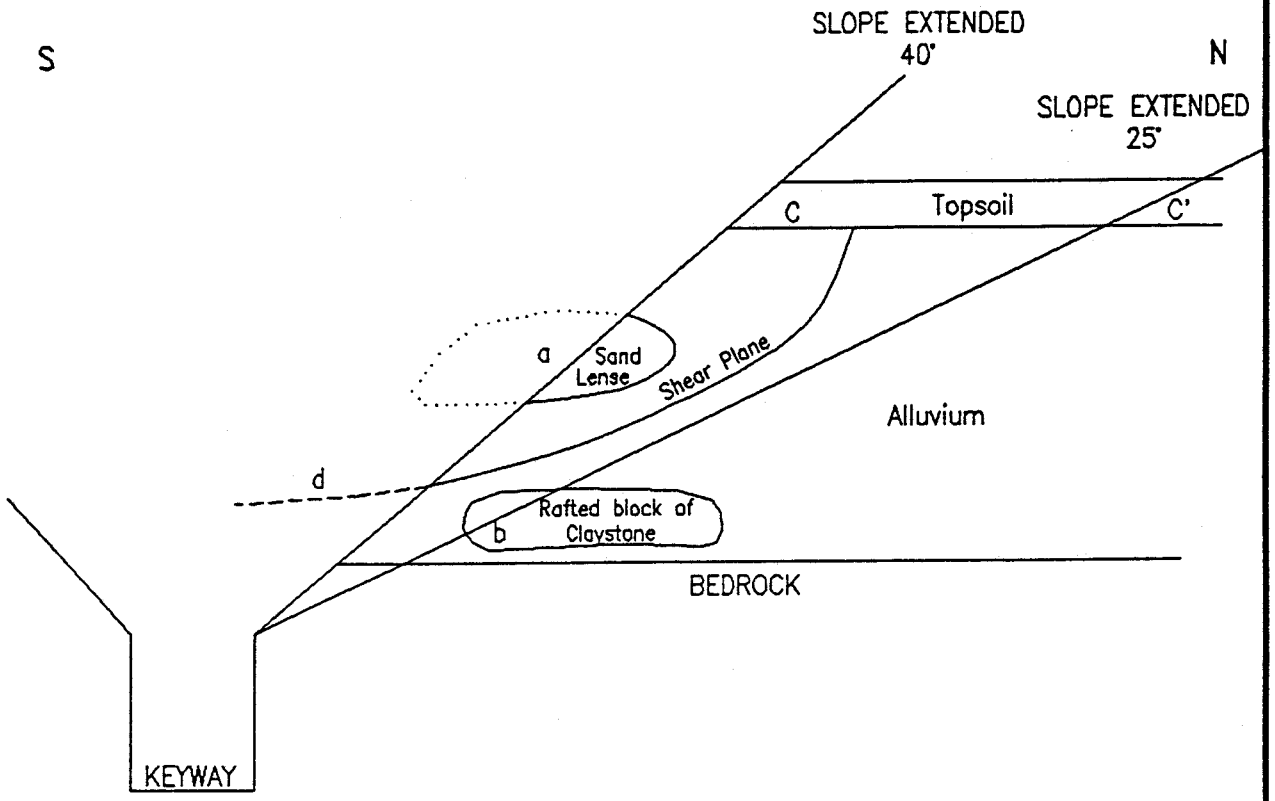
R33186.MBCW-051492

R33189.CWCW-051492



Adapted from Schuster and Krizek, see references.

U.S. DEPARTMENT OF ENERGY Rocky Flats Plant Golden, Colorado	POTENTIAL HYDROGEOLOGIC CONDITIONS OF A TYPICAL SLUMP	FIGURE A4-9



LATERAL CROSS SECTION OF EXCAVATION LOOKING WEST

a: Lenticular sand exposed when slope is 40°, absent with slope of 25°.

b: Rafted block of claystone exposed when slope is 25°, absent when slope is 40°.

C vs C': Change in apparent thicknesses between a 40° slope, and 25° slope.

d: Shear Plane removed by resloping.

R33188.PJCW-052092

U.S. DEPARTMENT OF ENERGY Rocky Flats Plant Golden, Colorado	CONCEPTUAL UNCERTAINTIES RESULTING FROM VARYING EXCAVATION SLOPE ANGLES	FIGURE **A4-10**

Appendix A4
Attachments

French Drain
Geologic Data

Phase III
RFI/RI Report

U1 OU1 OU
881 Hillside
OU1 OU1 O
Hillside 881
1 OU1 OU1
side 881 Hill
U1 OU1 OU
881 Hillside
OU1 OU1 O
Hillside 881

ATTACHMENT A4-1
LITHOLOGIC DESCRIPTIONS

PREFACE

The geology of the north slope of the french drain is shown on the 30 cross sections presented in Attachment A4-2. Each cross section represents a 50-foot east to west segment of the french drain excavation (scale of 1 inch equals 2 feet). Sheet 1 of 30 (Attachment A4-2) provides a location map for reference. Surface elevations recorded on the cross sections were estimated from the design specifications (Engineering Science, 1990). The approximate depth of excavation contains inherent errors discussed in Section A4-3 of the text and does not reflect the actual constructed grade of the drain.

This attachment contains the lithologic descriptions of all units identified on each of the 30 individual geologic cross sections. The U.S.C.S. classification for each overburden unit based on the laboratory grain size analysis is presented in parenthesis behind the unit name. The results of the laboratory grain size analyses are presented in Attachment A4-4. As discussed in Section A.4.2.1.3 (Classification of Soil and Bedrock Samples) in the text, the grain size graphs presented in Attachment A4-4 display the percent of material which passes through sieve number 230 for determination of silt and clay content. In order to classify the unconsolidated materials according to the U.S.C.S. system, the percentage of materials passing through sieve size number 200 was interpolated from the grain size distribution graph.

Lithologic descriptions are furnished with superscripts to facilitate cross-referencing between the descriptions and their occurrence on the individual cross sections. The superscripts are specific to each cross section and do not necessarily correlate to superscripts found on adjoining cross sections.

Each cross section contains a key of symbols to identify the general geologic and hydrogeologic data. Additional information describing specific geologic, hydrogeologic or mapping data may be found on some of the cross sections. For instance; the "break in section" shown on cross sections 12 and 13 refer to the necessary shortening of the sections in order to fit the data on the figure.

881 HILLSIDE AREA
FRENCH DRAIN GEOLOGIC CHARACTERIZATION

STATIONS
5 + 00 to 5 + 50
(Sheet 2 of 30)

SANDY SILTY CLAY (FILL) (CL)[1]: with some gravel; pale yellowish brown (10 YR 6/4) to dark yellowish brown (10 YR 4/2); gravel (3 to 25 centimeters), well graded, rounded, quartzose and granitic; fine- to coarse-grained sand, well graded, angular, quartzose; low to medium plasticity; trace roots; trace nails, wood chips, etc.; damp.

CLAY (CH)[2]: with some sand and silt, trace gravel; possible top soil horizon and wetlands deposits; dusky yellowish brown (10 YR 2/2) to brownish black (5 YR 2/1); fine gravel, poorly graded, rounded, quartzose and metasediment; predominantly fine- to medium-grained sand, poorly to moderately graded, rounded, quartzose; high plasticity; noncalecreous; very organic; damp; grades to Clayey Sand (SC)[3], west of 5 + 34.

CLAYEY SAND (SC)[3]: with some silt and gravel; brownish black (5 YR 2/1) to grayish brown (5 YR 3/2); fine gravel, poorly graded; fine- to coarse-grained sand, well graded, rounded, quartzose; low plasticity; sand forms 5 centimeter thick lenses; damp; grades to Clay (CH)[2] west of 5 + 16.

SILTY CLAY (CL)[4]: with some sand, trace gravel; moderate brown (5 YR 3/4) to moderate yellowish brown (10 YR 5/4) with trace of medium light gray (N 6/0); fine gravel, poorly graded, rounded; fine- to medium-grained sand, poorly to moderately graded, rounded, quartzose; low to medium plasticity; non to slightly calcareous; gravel amounts increase with depth near bottom contact; damp.

SILTY CLAY (CH)[5]: with trace sand and gravel; reworked weathered claystone; light gray (N 7/0) to light olive gray (5 Y 6/1); fine gravel, poorly graded; fine- to medium-grained sand, poorly to moderately graded; medium to high plasticity clay; some clasts of the overlying silty clay were mottled near the upper contact, trace limonite concentrations, trace caliche mottled in; damp.

SILTY CLAY (CL)[6]: with trace sand and gravel; slightly weathered reworked claystone; medium gray (N 5/0); fine gravel, poorly graded; fine-grained sand, poorly graded; low plasticity; weak subblocky texture starting to develop; trace limonite staining mottled in; trace very pale

orange (10 YR 8/2), 2 to 4 centimeter, rounded, caliche nodules near upper contact; damp; grades to Clay (CH)[7] west of 5 + 14.

CLAY (CH)[7]: with some silt, trace sand; reworked weathered claystone; medium gray (N 5/0); fine-grained sand, poorly graded; high plasticity clay; trace small (2 to 5 millimeter) rounded, waxy claystone clasts; some caliche mottled in; damp.

CLAYSTONE[8]: with some silt, trace sand; medium gray (N 5/0); fine- to medium-grained sand, moderately sorted, subblocky to blocky texture, slightly weathered with limonite staining along contact with shear plane, weathering decreasing with depth; damp, grades to Silty Claystone[9] west of 5 + 44.

SILTY CLAYSTONE[9]: with trace sand; medium gray (N 5/0); fine-grained sand, well sorted; subblocky to blocky texture; slightly weathered with limonite staining along contact with shear plane; weathering decreasing with depth; damp.

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STATIONS
5 + 50 to 6 + 00
(Sheet 3 of 30)

SANDY SILTY CLAY (FILL) (CL)[1]: with some gravel; pale yellowish brown (10 YR 6/2) to dark yellowish brown (10 YR 4/2); gravel (3 to 25 centimeters), well graded, rounded, quartzose and granitic; fine- to coarse-grained sand, well graded, angular, quartzose; low to medium plasticity; trace roots; trace nails, wood chips, etc.; damp.

CLAY (CH)[2]: with some sand and silt, trace gravel; possible top soil horizon or deposits in wetlands; dusky yellowish brown (10 YR 2/2) to brownish black (5 YR 2/1); fine gravel, poorly graded, rounded, quartzose and metasediment; predominently fine- to medium-grained sand, poorly to moderately graded, rounded, quartzose; high plasticity; noncalecreous; very organic; damp.

SILTY CLAY (CL)[3]: with some sand, trace gravel; moderate brown (5 YR 3/4) to moderate yellowish brown (10 YR 5/4) with trace of medium light gray (N 6/0); partings of possible reworked claystone at 6 + 25; fine gravel, poorly graded, rounded; fine- to medium-grained sand, poorly to moderately graded, rounded, quartzose; low to medium plasticity; non to slightly calcareous; gravel increase with depth near bottom contact; damp; grades to Clay (CH)[5] with depth.

CLAY (CH)[4]: with some silt, trace sand and clay; reworked rafted block of claystone; light olive gray (5 Y 6/1); fine gravel, poorly graded; fine- to medium-grained sand; poorly to moderately graded; medium to high plasticity; homogenous; some white caliche mottled in; trace to 1 centimeter rounded claystone clasts; possible shear plane near bottom contact, unable to determine slickensides; damp to moist.

CLAY (CH)[5]: with some silt, trace sand and gravel; pale yellowish brown (10 YR 6/2) to light brownish gray (5 YR 6/1); fine gravels (0.4 to 1 centimeters) grading to cobbles (15 to 20 centimeters) moderate to well graded; rounded to subangular, quartzose and metasediment; fine- to coarse-grained sand, well graded, subrounded, quartzose; medium to high plasticity; percentages of coarse materials (>200 sieve size) increases slightly to the west; caliche found as finds around gravels and cobbles; very weak subblocky texture starting to develop; damp to moist; grades to Silty Clay (CL)[3] west of 5 + 90.

CLAYEY SAND (SC)[6]: with some silt and gravel; moderate reddish brown (10 R 4/6); fine to coarse gravel, well graded; rounded to subrounded, quartzose and metasediment; fine- to coarse-grained sand, well graded, rounded to subrounded, quartzose; caliche at upper contact, some caliche mottled in; trace cobbles at upper contact; damp.

SILTY CLAY (CL/CH)[7]: with trace sand and gravel; reworked weathered claystone; olive gray (5 Y 4/1) to medium gray (N 5/0); gravels and cobbles, well graded; predominantly fine-grained sand, poorly graded; medium plasticity; highly weathered claystone with limonite staining; trace caliche mottled in; many discontinuous randomly oriented slide and glide planes; trace gravels and cobbles at lower contact near Station 6 + 00; well graded gravels and cobbles grade to poorly graded fine gravels to the west; damp.

SILTY CLAY (CL)[8]: with trace sand and gravel; slightly weathered reworked claystone; medium gray (N 5/0); fine gravel, poorly graded; fine-grained sand, poorly graded; low plasticity; weak subblocky texture starting to develop; trace limonite staining mottled in; trace very pale orange (10 YR 8/2), 2 to 4 centimeter, rounded, caliche nodules near upper contact; damp.

CLAYSTONE[9]: with some silt, trace sand; medium gray (N 5/0); fine- to medium-grained sand, moderately sorted, subblocky to blocky texture, slightly weathered with limonite staining along contact with shear plan, weathering decreasing with depth; damp.

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STATIONS
6 + 00 to 6 + 50
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SANDY SILTY CLAY (FILL) (CL)[1]: with some gravel; mottled grayish brown (5 YR 3/2), grayish red (10 R 4/2), dark yellowish brown (10 YR 4/2) and medium gray (N 5/0); gravel (3 to 25 centimeters), well graded, rounded, quartzose and granitic; fine- to coarse-grained sand, well graded, angular, quartzose; low to medium plasticity; trace roots; trace nails, wood chips, etc.; damp.

SILTY CLAY (CL)[2]: with some sand, trace gravel; moderate brown (10 YR 3/4) to moderate yellowish brown (10 YR 5/4) with trace of medium light gray (N 6/0) partings of possible reworked claystone at 6 + 25; fine gravel; poorly graded, rounded, fine- to medium-grained sand, poorly to moderately graded, rounded, quartzose; low to medium plasticity; non to slightly calcareous; gravels increase with depth near bottom contact; damp; grades to Clay (CH)[4] with depth west of 6 + 30; locally grades to Clayey Silt (ML)[3] at 6 + 25.

CLAYEY SILT (ML)[3]: with some sand, trace gravel; moderate brown (5 YR 3/4) to moderate yellowish brown (10 Y 5/4); fine gravel, poorly graded; subrounded; fine-grained sand, poorly graded, rounded, quartzose; low plasticity; well developed blocky texture; trace carbonaceous material, trace to some root casts; damp.

CLAY (CH)[4]: with some silt, trace sand and gravel; pale yellowish brown (10 YR 6/2) to light brownish gray (5 YR 6/1); fine gravels (0.4 to 1 centimeters) grading to cobbles (15 to 20 centimeters), moderate to well graded; rounded to subangular, quartzose and metasediment; fine- to coarse-grained sand, well graded, subrounded, quartzose; medium to high plasticity; percentages of coarse materials (>200 sieve size) increases slightly to the west; caliche found as rinds around gravels and cobbles; very weak subblocky texture starting to develop; damp to moist.

CLAY (CH)[5]: with some sand and silt, trace gravel; possible top soil horizon or deposits from wetlands; dusky yellowish brown (10 YR 2/2) to brownish black (5 YR 2/1); fine gravel, poorly graded, rounded, quartzose and metasediment; predominently fine- to medium-grained sand, poorly to moderately graded, rounded, quartzose; high plasticity; noncalecreous; very organic; damp.

CLAY (CH)[6]: with some silt, trace sand and clay; reworked rafted block of claystone; light olive gray (5 Y 6/1); fine gravel, poorly graded; fine- to medium-grained sand, poorly to moderately graded; medium to high plasticity; homogenous; some white caliche mottled in; trace 1 centimeter rounded claystone clasts; possible shear plane near bottom contact, unable to determine slickensides; damp to moist.

SILTY CLAY (CL/CH)[7]: with trace sand; reworked weathered claystone; olive gray (5 Y 4/1) to medium gray (N 5/0); predominantly fine-grained sand, poorly graded; medium plasticity; highly weathered claystone with limonite staining; trace caliche mottled in; many discontinuous randomly oriented slide and shear planes; trace gravels and cobbles at lower contact near Station 6 + 00, damp.

CLAYEY SAND (SC)[8]: with some silt and gravel; moderate reddish brown (10 R 4/6); fine to coarse gravel, well graded, rounded to subrounded, quartzose and metasediment; fine- to coarse-grained sand, well graded, rounded to subrounded, quartzose; caliche at upper contact, some caliche mottled in; trace cobbles at upper contact; damp.

CLAY (CH)[9]: with some silt, trace sand; reworked weathered claystone; medium gray (N 5/0) to olive gray (5 Y 4/1); fine- to medium-grained sand, moderately graded; high plasticity; becoming subblocky with depth; highly weathered and limonite stained; abundant caliche mottled in; damp to moist.

CLAYSTONE[10]: with some silt, trace sand; fine-grained sand, well sorted, dense, hard, blocky, slightly weathered damp.

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STATIONS
6 + 50 to 7 + 00
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SANDY SILTY CLAY (FILL) (CL)[1]: with some gravel; mottled grayish brown (5 YR 3/2), grayish red (10 R 4/2), dark yellowish brown (10 YR 4/2) and medium gray (N 5/0); gravel (3 to 25 centimeters), well graded, rounded, quartzose and granitic; fine- to coarse-grained sand, well graded, angular, quartzose; low to medium plasticity; trace roots; trace nails, wood chips, etc.; damp.

SILTY CLAY (CL)[2]: with some sand, trace gravel; moderate yellowish brown (10 YR 5/4); trace mottled with medium gray (N 5/0); fine gravel; poorly graded, rounded, quartzose and metasediment; predominantly fine-grained sand, poorly graded, rounded, quartzose; low to medium plasticity; highly weathered with mottled limonite staining; damp.

CLAYEY SILT (ML/CL)[3]: with some sand; pale yellowish brown (10 YR 6/2) to light olive gray (5 Y 6/1) to medium gray (N 5/0); fine-grained sand, poorly graded; rounded quartzose; low to medium plasticity; fairly homogeneous; banded with iron staining; trace mica; fractures are not healed and locally contain seeps; moist to wet.

CLAYEY SAND (SC)[4]: with some gravel, trace silt; moderate reddish orange (10 R 6/6) to moderate reddish brown (10 R 4/6); fine to coarse gravels and cobbles from 0.5 to 25 centimeters, well graded, rounded, quartzose and metasediment; fine- to coarse-grained sand, predominantly medium-grained sand, moderately to well graded, subangular to rounded, quartzose and arkosic; medium plasticity; non to very slight calcareous with traces of caliche grading in; some limonite staining; moist.

SILTY CLAY (CH)[5]: with trace sand; reworked weathered claystone; medium gray (N 5/0) to light olive gray (5 Y 6/1); predominantly fine-grained sand, poorly graded; medium to high plasticity; subblocky texture; trace claystone clasts; highly weathered claystone with limonite staining mottled in; trace caliche mottled in; damp. Grades to Clay (CH), west of 6 + 85.

CLAY (CH)[6]: with some silt, trace sand; disturbed claystone; medium gray (N 5/0) to medium dark gray (N 4/0); fine- to medium-grained sand, moderately graded; high plasticity; becoming

subblocky with depth; highly weathered and limonite stained; abundant caliche mottled in; damp to moist.

SILTY CLAY (CL/CH)[7]: with trace sand; reworked weathered claystone; light olive gray (5 Y 6/1) to medium gray (N 5/0); predominantly fine-grained sand, poorly graded; medium plasticity; highly weathered claystone with limonite staining; trace caliche mottled in; moist.

SILTY CLAYSTONE[8]: with trace sand; medium dark gray (N 4/0) to dark gray (N 3/0); fine-grained sand, well sorted; dense; blocky to subblocky; fractures healed or partially healed with limonite; heavily weathered at contact with shear plane; weathering decreases with depth; damp. Grades to Claystone, at 6 + 90.

CLAYSTONE[9]: with some silt, trace sand; medium gray (N 5/0) to medium dark gray (N 4/0); fine-grained sand, well sorted; dense; subblocky to blocky texture; develops better with depth and to the west; damp.

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FRENCH DRAIN GEOLOGIC CHARACTERIZATION

STATIONS
7 + 00 to 7 + 50
(Sheet 6 of 30)

SANDY SILTY CLAY (FILL) (CL)[1]: with some gravel; mottled grayish brown (5 YR 3/2), grayish red (10 R 4/2), dark yellowish brown (10 YR 4/2) and medium gray (N 5/0); gravel (3 to 25 centimeters), well graded, rounded, quartzose and granitic; fine- to coarse-grained sand, well graded, angular, quartzose; low to medium plasticity; trace roots; trace nails, wood chips, etc.; damp.

SILTY CLAY (CL)[2]: with some sand, trace gravel; moderate yellowish brown (10 YR 5/4) grading to pale brown (5 YR 5/2) mottled with medium gray (N 5/0) to the west; fine gravel, poorly graded, rounded, quartzose and metasediment; predominantly fine-grained sand, poorly graded, rounded, quartzose; low to medium plasticity; abundant limonite staining mottled in; grades to Gravelly Clay (CL) with depth; damp.

GRAVELLY CLAY (CL)[3]: with some silt and sand; moderate yellowish brown (10 YR 5/4); fine to coarse gravel (1.5 to 5 centimeters), poorly to moderately graded, rounded, quartzose and metasediment; fine- to medium-grained sand, moderately graded, rounded, quartzose; low to medium plasticity; abundant limonite staining mottled in; damp to moist.

CLAYEY SAND (SC)[4]: with some gravel and silt; moderate reddish orange (10 R 6/6) to moderate reddish brown (10 R 4/6); fine to coarse gravels and cobbles (0.5 to 25 centimeters); well graded, rounded, quartzose and metasediment; fine- to coarse-grained sand, well graded, subangular to rounded, quartzose and arkosic; medium plasticity; non to very slightly calcareous with traces of caliche grading in to the west; some limonite staining; moist. Grades to Silty Clay (CL/CH) to the west.

SILTY CLAY (CL/CH)[5]: with some sand and gravel; light brown (5 YR 5/6) to moderate reddish brown (10 R 4/6); fine to coarse gravel, well graded, rounded to subangular, quartzose; fine- to coarse-grained sand, well graded, angular to subrounded, quartzose grading to arkosic; medium to high plasticity; active seep at upper contact; wet. Grades to Clayey Sand at 7 + 10.

CLAY (CL)[6]: with some sand, trace gravel; mottled light gray (N 5/0) and light brown (5 YR 5/6); fine gravel, poorly graded, rounded, quartzose; fine- to medium-grained, poor to moderately graded, round, quartzose; low to medium plasticity; abundant limonite staining mottled throughout, moist. Grades to Clay (CH) to the west.

CLAY (CH)[7]: with some silt, trace sand and gravel; light olive gray (5 Y 5/2) mottled with light olive brown (5 Y 5/6); fine gravel, poorly graded; fine- to medium-grained sand; poorly to moderately graded; subangular to subrounded; quartzose; medium to high plasticity; wet.

SILTY CLAYEY GRAVEL (GM/GC)[8]: with some sand; moderate brown (5 YR 4/4); fine to coarse gravel and cobbles (0.5 to 20 centimeters), well graded, rounded, quartzose and metasediment; fine- to coarse-grained sand, well graded, quartzose; medium plasticity; moist to wet.

CLAYEY SAND (SC)[9]: with some gravel and silt; moderate reddish orange (10 R 6/6) to moderate reddish brown (10 R 4/6); fine to coarse gravel and cobbles (0.5 to 25 centimeters), well graded, rounded, quartzose and metasediment; fine- to coarse-grained sand, well graded, subangular to rounded quartzose and arkosic; medium plasticity, damp. Grades to Silty Clay (CL/CH) at 7 + 40.

CLAY (CH)[10]: with trace silt and sand; reworked weathered claystone; medium gray (N 5/0); fine-grained sand, poorly graded; high plasticity; subblocky texture decreasing to west; trace claystone clasts; trace limonite staining; trace 8 to 10 centimeters cobbles; moist. Grades to Silty Clay (CH) at 7 + 40.

SILTY CLAY (CH)[11]: with trace sand; reworked weathered claystone; medium gray (N 5/0) to light olive gray (5 Y 6/1); predominantly fine-grained sand, poorly graded; medium to high plasticity; subblocky texture; trace claystone clasts; highly weathered with limonite staining mottled in; trace caliche mottled in; damp.

SILTY CLAY (CH)[12]: with trace sand; disturbed claystone: medium dark gray (N 4/0); medium to high plasticity; dense; blocky; highly fractured and limonite stained; fractures are partially healed with limonite; damp.

SILTY CLAYSTONE[13]: with trace sand; medium dark gray (N 4/0) to dark gray (N 3/0); fine-grained sand, well sorted; dense; blocky to subblocky; fractures healed or partially healed with limonite; heavily weathered at contact with shear plane; weathering decreases with depth; damp.

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STATIONS
7 + 50 to 8 + 00
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CLAYEY SILT (CL)[1]: with some sand, trace gravel; moderate yellowish brown (10 YR 5/4); fine gravel, poorly graded, subangular, quartzose and metasediment; fine-grained sand, poorly graded, subangular to subrounded, quartzose; low to medium plasticity; slightly to moderately calcareous with trace of fine-grained caliche nodules; mottled with dark yellowish brown (10 YR 2/2) limonite staining; becomes more sandy with depth; damp.

CLAYEY SAND (SC)[2]: with some silt and gravel; moderate reddish brown (10 R 4/6) mottled with light brown (5 YR 6/6); fine to coarse gravel (1 to 5 centimeter), well graded, rounded, quartzose; medium- to upper coarse-grained sand, moderately graded, angular to rounded, quartzose; medium plasticity; trace cobbles, damp. Grades to Gravelly Sand (SW), with depth.

SANDY SILTY CLAY (FILL) (CL)[3]: with some gravels; mottled grayish brown (5 YR 3/2), grayish red (10 R 4/2), dark yellowish brown (10 YR 4/2) and medium gray (N 5/0); gravel (3 to 25 centimeters), well graded, rounded, quartzose and granitic; fine- to coarse-grained sand, well graded, angular, quartzose; low to medium plasticity; trace roots; trace nails, wood chips, etc.; damp.

GRAVELLY SAND (SC)[4]: with some clay, trace silt; moderate brown (5 YR 4/4) to moderate reddish brown (10 R 4/6); gravel and cobbles (3 to 18 centimeter), well graded, rounded, quartzose and metasediment; fine- to very coarse-grained sand, well graded, angular to rounded, quartzose; low plasticity, moist to wet. Grade to Clayey Sand (SC), to the west.

CLAYEY SAND (SC)[5]: with some gravel and silt; moderate reddish orange (10 R 6/6) to moderate reddish brown (10 R 4/6); fine to coarse gravels and cobbles from 0.5 to 25 centimeters, well graded, rounded, quartzose and metasediment; fine- to coarse-grained sand, well graded, subangular to rounded, quartzose and arkosic; medium plasticity; non to slightly calcareous with trace of caliche grading in to the west; some limonite staining; moist to wet.

SILTY CLAY (CL)[6]: with some sand, trace gravel; mottled light gray (N 5/0) and light brown (5 YR 5/6); fine gravel; poorly graded; rounded; quartzose; fine- to medium-grained sand; poor

to moderately graded; rounded; quartzose; low to medium plasticity; very weathered with limonite staining mottled throughout; moist.

SILTY CLAYEY GRAVEL (GM/GC)[7]: with some sand; moderate brown (5 YR 4/4); fine to coarse gravel and cobbles (0.5 to 20 centimeters), well graded, rounded, quartzose and metasediment; fine- to coarse-grained sand, well graded, quartzose; medium plasticity; moist to wet.

SILTY CLAY (CH)[8]: with trace sand and gravel; reworked claystone; light gray (N 5/0) to light olive gray (5 Y 6/1); fine gravel, poorly graded; predominantly fine-grained sand, poorly graded, rounded, quartzose; high plasticity; looks like reworked claystone; damp. Weathers out to Clay (CH), west of 7 + 90.

SILTY CLAY (CL)[9]: with trace sand; light olive gray (5 Y 5/2) to light olive brown (5 Y 5/6); fine-grained, poorly graded sand; high plasticity; moderately calcareous; dense with poorly developed blocky texture; very mottled with dark yellowish orange (10 YR 6/6) limonite staining; waxy at times; damp to moist.

CLAY (CH)[10]: with trace silt and sand; medium gray (N 5/0); fine-grained sand, poorly graded; high plasticity; weathered reworked claystone; subblocky texture decreasing to west; trace claystone clasts; trace limonite staining; trace 8 to 10 centimeter cobbles; moist; overlies bedrock.

SILTY CLAY (CH)[11]: medium dark gray (N 4/0); medium to high plasticity; dense; blocky, highly fractured and limonite stained; fractures are partially healed with limonite; damp.

CLAYSTONE[12]: with some silt, trace sand; medium gray (N 5/0) to dark olive gray (5 Y 3/1); fine-grained sand, well sorted; dense; poorly developed bedding; heavy limonite staining healing or partially healing fractures; damp.

SILTY CLAYSTONE[13]: medium dark gray (N 4/0); medium to high plasticity; dense; blocky, highly fractured and limonite stained; fractures are partially healed with limonite; damp.

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STATIONS
8 + 00 to 8 + 50
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SILTY CLAY (TOP SOIL) (CH)[1]: with some sand, trace gravel; dusky brown (5 YR 2/2) to brownish black (5 YR 2/1); fine (1 to 2 centimeter) gravel, poorly graded, angular, lithic; medium- to coarse-grained sand, poorly graded, angular, quartzose; medium to high plasticity; very organic; trace roots; damp. Grades to Sandy Silty Clay at 8 + 43.

SANDY SILTY CLAY (TOP SOIL) (CL)[2]: with some gravel, brownish black (5 YR 2/1); fine to coarse gravel, well graded; predominantly fine-grained sand, moderately graded, subrounded, quartzose; low to medium plasticity; very organic rich; abundant roots; damp.

SILTY CLAY (CH)[3]: with some sand and gravel; mottled dark yellowish brown (10 YR 5/2) with yellowish brown (10 YR 5/4), medium gray (N 5/0) and light olive gray (5 Y 6/1); fine to coarse gravels, well graded, rounded, quartzose and metasediment; fine- to medium-grained sand, moderately graded, subrounded, quartzose; medium to high plasticity; slightly platy texture in part; slightly calcareous; very limonite stained; trace small (1 millimeter) caliche nodules; damp. Grades to Clayey Silt at 8 + 12.

CLAYEY SILT (CL)[4]: with some sand, trace gravel; moderate yellowish brown (10 YR 5/4); fine gravel, poorly graded, subangular, quartzose and metasediment; fine-grained sand, poorly graded, subangular to subrounded, quartzose; low to medium plasticity; slightly to moderately calcareous with trace of fine grained caliche nodules; mottled with dark yellowish brown (10 YR 2/2) limonite staining; becomes more sandy with depth; damp.

CLAYEY SAND (SC)[5]: with some gravel and silt; moderate brown (5 YR 3/4); gravel and cobbles (3 to 24 centimeters), well graded, rounded, quartzose and metasediment; fine- to coarse-grained sand, well graded, angular to rounded, quartzose; low to medium plasticity; damp. Grades to Silty Clay, at 8 + 42.

SILTY CLAY (CH)[6]: with some sand, trace gravel; grayish brown (5 YR 2/2) to dusky brown (5 YR 3/4); fine gravel, poorly graded; predominantly very fine- to fine-grained sand, poorly graded, subangular quartzose; medium to high plasticity; trace mica; trace roots; damp.

CLAYEY SAND (SC)[7]: with some silt, trace gravel; moderate yellowish brown (10 YR 5/4) to moderate brown (5 YR 4/4); fine gravel, poorly graded; fine- to medium-grained sand, moderately graded, subangular, quartzose; low to medium plasticity; non-calcareous; damp.

CLAYEY SAND (SC)[8]: with some silt and gravel; moderate reddish brown (10 R 4/6) mottled with light brown (5 YR 6/6); fine to coarse gravel (1 to 5 centimeter), well graded, rounded fine- to medium-grained sand, poorly graded, quartzose; medium plasticity, sand decreasing with depth, trace white granular caliche increasing with depth, damp. Grades to Gravelly Sand with depth.

GRAVELLY SAND (SC)[9]: with some clay, trace silt; light brown (5 YR 6/4) to moderate reddish brown (10 R 4/6) to pale reddish brown (10 R 5/4); gravel and cobbles (3 to 18 centimeters), well graded, rounded, quartzose and metasediment; fine- to very coarse-grained sand, well graded, angular to rounded, quartzose; low plasticity; caliche rinds around gravels; damp to moist, locally moist to wet.

CLAYEY SILT (CL/ML)[10]: with trace sand; light gray (N 5/0); very fine- to fine-grained sand, poorly graded; low to medium plasticity; generally slightly calcareous with traces of caliche mottled in; damp.

SILTY CLAY (FILL) (CL)[11]: with some sand and gravel; mottled grayish brown (5 YR 3/2), grayish red (10 R 4/2), dark yellowish brown (10 YR 4/2) and medium gray (N 5/0); gravel (3 to 25 centimeters), well graded, rounded, quartzose and granitic; fine- to coarse-grained sand, well graded, angular, quartzose; low to medium plasticity; trace roots; trace nails, wood chips, etc.; damp.

SILTY CLAY (CH)[12]: with trace sand; mottled light gray (N 7/0) and light olive gray (5 Y 6/1); very fine- to fine-grained sand, poorly graded, rounded, quartzose; high plasticity; generally slightly calcareous; some white caliche mottled in; trace limonite staining mottled in; damp.

CLAYEY SILT (CL)[13]: with some sand, trace gravel; mottled pale yellowish brown (10 YR 6/2) and moderate yellowish brown (10 YR 5/4), very fine to fine gravel, poorly graded; predominantly very fine- to fine-grained sand, poorly graded; low to medium plasticity; highly weathered, very limonite stained; damp.

SILTY CLAY (CH)[14]: with some sand and gravel; disturbed silty claystone; olive gray (5 Y 4/1); fine to coarse gravels, well graded; very fine- to coarse-grained sand, well graded; moderate to high plasticity; blocky; waxy; moderately weathered; mottled with limonite staining; damp. Grades to Clay (CH) from 8 + 30 to 8 + 20.

CLAY (CH)[15]: with some silt, trace sand; disturbed claystone; olive gray (5 Y 4/1), some mottled with olive black (5 Y 2/1); fine- to medium-grained sand, moderately graded; high plasticity, blocky texture developing with depth; waxy to subwaxy; highly weathered with limonite staining and limonite concretions, damp to dry. Grades to Silty Clay, at 8 + 20.

SILTY CLAY (CL)[16]: with trace sand; disturbed silty claystone; light olive gray (5 Y 5/2) to light olive brown (5 Y 5/6); fine-grained sand, poorly graded; high plasticity; moderately calcareous; dense with poorly developed blocky texture; very mottled with dark yellowish orange (10 YR 6/6) limonite staining; waxy at times; damp to moist.

SILTY CLAY (CH)[17]: with some sand, trace gravel; reworked weathered claystone; brownish gray (5 YR 4/1) to olive gray (5 Y 4/1); fine gravels, poorly graded; fine- to medium-grained sand, moderately graded; medium plasticity, reworked claystone with clasts of blocky claystone; damp; overlies bedrock.

CLAY (CH)[18]: with some sand and gravel; disturbed claystone; olive gray (5 Y 4/1); fine to coarse gravels, well graded; very fine- to coarse-grained sand, well graded; moderate to high plasticity; blocky; waxy; moderately weathered, mottled with limonite staining, damp.

SILTY CLAYSTONE[19]: with some sand; dark gray (N 3/0) to brownish black (5 YR 2/1); very fine- to fine-grained sand, well sorted; dense; slightly weathered; limonite staining along

fracture features partially healing fractures; trace black carbonaceous nodules; dry. Grades to Claystone at 8 + 32.

CLAYSTONE[20]**:** with some silt, trace sand; medium gray (N 5/0) to dark gray (N 3/0); fine-grained sand, well sorted; dense; well developed blocky texture, at times conchoidal with manganese oxide dendritic staining; subwaxy to waxy; trace carbonaceous material; damp to moist.

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STATIONS
8 + 50 to 9 + 00
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CLAY (CH)[1]: with some sand, silt and gravel; grayish brown (5 YR 3/2) grading to pale brown (5 YR 2/2) and dark yellowish brown (10 YR 4/2) with depth; fine to coarse (0.5 to 5 centimeter) gravel, well graded, rounded, quartzose and lithic, with (15 to 30 centimeter) cobbles increasing with depth; fine- to very coarse-grained sand, well graded, angular, quartzose and feldspathic; medium to high plasticity; slightly calcareous, damp becoming moist with depth.

SILTY CLAY (TOP SOIL) (CH)[2]: with some sand, trace gravel; dusky brown (5 YR 2/2) to brownish black (5 YR 2/1); fine (1 to 2 centimeter) gravel, poorly graded, angular, lithic; medium- to coarse-grained sand, poorly graded, angular, quartzose; medium to high plasticity, very organic, trace roots, damp.

CLAYEY SAND (SC)[3]: with some gravel and silt; moderate brown (5 YR 3/4); gravel and cobbles (3 to 24 centimeters), well graded, rounded, quartzose and metasediment; fine- to coarse-grained sand, well graded, angular to rounded, quartzose; low to medium plasticity; damp.

GRAVELLY SAND (SM)[4]: with trace silt and clay; light brown (5 YR 6/4) to pale reddish brown (10 R 5/4); gravel and cobbles (3 to 18 centimeters), well graded, rounded, quartzose and metasediment; fine- to very coarse-grained sand, well graded, angular to rounded, quartzose; low plasticity, damp.

SILTY CLAY (FILL) (CL)[5]: with some sand and gravel; mottled grayish brown (5 YR 3/2), grayish red (10 R 4/2), dark yellowish brown (10 YR 4/2) and medium gray (N 5/0); gravel and cobbles (3 to 25 centimeters), well graded, rounded, quartzose and granitic; fine- to coarse-grained sand, well graded, angular, quartzose; low to medium plasticity; trace roots; trace nails, wood chips, etc.; damp.

SILTY CLAY (CH)[6]: with trace sand and gravel; light olive gray (5 Y 6/1) to light brownish gray (5 YR 6/1); fine to coarse gravels (0.5 to 5 centimeters), well graded; fine- to coarse-grained sand, moderate to well graded; high plasticity; trace caliche mottled in; trace very thin (1 millimeter) gypsum laminations; damp.

GRAVELLY SAND (SM/SC)[7]: with some clay and silt; moderate reddish brown (10 R 4/6); fine to coarse gravels, grading to cobbles, well graded, rounded, quartzose; lower coarse- to upper very coarse-grained sand, poorly graded, angular to rounded, quartzose; low to medium plasticity; damp.

GRAVELLY SAND (SM/SC)[8]: with some silt and clay; medium gray (N 5/0); fill from old gas line that was removed.

SILTY CLAY (CH)[9]: with trace sand and gravel; light olive gray (5 Y 6/1) to light brownish gray (5 YR 6/1); fine to coarse gravels (0.5 to 5 centimeters), well graded; fine- to coarse-grained sand, moderate to well graded; high plasticity; trace caliche mottled in; damp.

GRAVELLY SAND (SM/SC)[10]: with some clay and silt; moderate reddish brown (10 R 4/6); fine to coarse gravels, grading to cobbles, well graded, rounded, quartzose; lower coarse- to upper very coarse-grained sand, poorly graded, angular to rounded, quartzose; low to medium plasticity; damp.

SILTY CLAY (CH)[11]: with some sand, trace gravel; medium gray (N 5/0); very fine to fine (0.5 to 1.5 centimeters) gravel, poorly graded, rounded, quartzose; very fine- to fine-grained sand, poorly graded, subangular; medium plasticity, mottled with dark yellowish orange (10 YR 6/6) limonite staining; limonite staining decreases to the west; trace caliche nodules; damp to moist; grades to Sandy Clayey Silt.

SANDY CLAYEY SILT (CL)[12]: with trace gravel; mottled moderate yellowish brown (10 YR 5/4), dark yellowish brown (10 YR 4/2) and light olive gray (5 Y 6/1); fine gravel, poorly graded, rounded, quartzose and metasediment; predominantly fine- to very fine-grained sand, poorly graded; low to medium plasticity, trace cobbles, trace caliche found as rinds around gravels; mottled with limonite staining; damp; grades to Clayey Silt at 8 + 67.

CLAYEY SILT (CL)[13]: with some sand, trace gravel; mottled pale yellowish brown (10 YR 6/2) and moderate yellowish brown (10 YR 5/4), very fine to fine gravel, poorly graded;

predominantly very fine- to fine-grained sand, poorly graded; low to medium plasticity; very limonite stained, caliche zone along undulating shear plane at bottom contact; damp.

CLAY (CH)[14]: with some silt, trace sand; reworked weathered claystone; light olive gray (5 Y 6/1) to medium gray (N 5/0); very fine- to fine-grained sand, poorly graded, subrounded, quartzose; high plasticity; weathered claystone with some limonite staining; trace limonite nodules, subblocky texture; grades to Silty Clay at 8 + 65, material has been weathered out to a clay east of 8 + 65.

SILTY CLAY (CH)[15]: with some sand and gravel; disturbed silty claystone; olive gray (5 Y 4/1); fine to coarse gravels, well graded; very fine- to coarse-grained sand, well graded; moderate to high plasticity; blocky; waxy; moderately weathered, mottled with limonite staining, damp.

CLAY (CH)[16]: with some silt, trace sand; disturbed claystone; medium gray (N 5/0); very fine-grained sand, poorly graded; high plasticity; blocky; waxy; very weathered with heavy limonite staining along fractures and bedding; damp; overlies bedrock.

CLAYSTONE[17]: with some silt, trace sand; medium gray (N 5/0); very fine-grained sand, well sorted; subblocky to blocky; poorly developed bedding; moderately weathered; limonite staining along fractures and bedding, damp.

SILTY CLAYSTONE[18]: with some sand; dark gray (N 3/0) to brownish black (5 YR 2/1); very fine- to fine-grained sand; well sorted; dense; slightly weathered; limonite staining along fracture features; partially healed fractures; trace black carbonaceous nodules; dry.

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STATIONS
9 + 00 to 9 + 50
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SILTY CLAY (CL)[1]: with some sand, trace gravel; dusky brown (5 YR 2/2) to moderate yellowish brown (10 YR 5/4) to pale brown (5 YR 2/2); fine to coarse gravel, well graded, subrounded to rounded, quartzose and lithic; fine- to coarse-grained sand, well graded, subangular to subrounded, quartzose and feldspathic; medium to high plasticity; slightly calcareous; some platy texture, some poorly developed blocky texture decreasing with depth; gravels increase in size with depth and to the west grading to cobbles at 9 + 25; sand increases in size to the west, grades to Clay with some silt, sand and gravel at 9 + 15; damp.

CLAY (CH)[2]: with some sand, silt and gravel; grayish brown (5 YR 3/2) grading to pale brown (5 YR 2/2) and dark yellowish brown (10 YR 4/2) with depth; fine to coarse (0.5 to 5 centimeter) gravel, well graded, rounded, quartzose and lithic, with (15 to 30 centimeter) cobbles increasing with depth; fine- to very coarse-grained sand, well graded, angular, quartzose and feldspathic; medium to high plasticity; slightly calcareous; damp, becoming moist with depth.

GRAVELLY CLAY (CL)[3]: with some silt, trace sand; moderate yellowish brown (10 YR 5/4) grading to dark yellowish brown (10 YR 4/2) with depth; fine to medium gravel, moderately graded, rounded, quartzose; fine- to medium-grained sand, poorly graded, quartzose; medium plasticity, sand decreasing with depth, trace white granular caliche increasing with depth, damp.

CLAYEY SAND (SC)[4]: with some silt and gravel; moderate reddish brown (10 R 4/6) mottled with light brown (5 YR 6/6); fine to coarse (1 to 5 centimeter) gravel, well graded, rounded, quartzose; medium- to upper coarse-grained sand, moderately graded, angular to rounded, quartzose; medium plasticity; trace cobbles; damp.

GRAVELLY SAND (SW)[5]: with trace silt and clay; moderate reddish brown (10 R 4/6); fine to coarse gravels, grading to cobbles, well graded, rounded, quartzose; lower coarse- to upper very coarse-grained sand, poorly graded, angular to rounded, quartzose; pinches out at 9 + 30 and continues to the west from 9 + 18 with a lense of gravelly sand (SM/SC) with some silt and clay; medium gray (N 5/0); which looks like fill from old natural gas line that was removed; moist to wet.

GRAVELLY SAND (SM/SC)[6]: with trace clay; dark yellowish brown (10 YR 4/2) with some grayish brown (5 R 3/2), fine gravel, poorly graded, rounded, quartzose; fine- to coarse-grained sand, well graded, subrounded to subangular, quartzose; with some white (N 9/0) caliche nodules, trace limonite staining; slight to moderately calcareous, damp.

SILTY CLAY (CH)[7]: with some sand, trace gravel; medium gray (N 5/0); very fine to fine (0.5 to 1.5 centimeter) gravel, poorly graded, rounded, quartzose; very fine- to fine-grained sand, poorly graded, subangular; medium plasticity; mottled with dark yellowish orange (10 YR 6/6) limonite staining; limonite staining decreases to the west; trace caliche nodules; trace black carbonaceous material at 9 + 25; damp to moist.

CLAY (CH)[8]: with some silt, trace sand and gravel; reworked weathered claystone; medium dark gray (N 4/0) grading to medium gray (N 5/0) to the west; very fine- to fine-grained sand, poorly graded, subrounded, quartzose; high plasticity; moderately weathered with some limonite staining; trace limonite nodules; subblocky texture; trace waxy at 9 + 25, damp to moist; overlays bedrock.

SILTY CLAYSTONE[9]: with trace sand; medium dark gray (N 4/0); very fine- to fine-grained sand, well sorted, quartzose; no visible porosity; well indurated, blocky, poorly developed bedding, limonite staining along fractures; trace black carbonaceous material, grades to Claystone with some silt, trace sand at 9 + 20, damp to moist.

CLAYSTONE[10]: with some silt, trace sand; medium gray (N 5/0); very fine-grained sand, well sorted; subblocky to blocky; poorly developed bedding; moderately weathered; limonite staining along fractures and bedding, damp.

CLAYEY SILTSTONE[11]: with some sand; medium light gray (N 6/0); very fine- to fine-grained sand, well sorted; no visible porosity; well indurated; trace limonite staining; damp.

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SILTY CLAY (TOP SOIL) (CH)[1]: with some sand, trace gravel; dusky brown (5 YR 2/2) to brownish black (5 YR 2/1); fine (1 to 2 centimeter) gravel, poorly graded, angular, lithic; medium- to coarse-grained sand, poorly graded, angular, quartzose; medium to high plasticity; very organic; trace roots; damp.

SILTY CLAY (CH)[2]: with some sand, trace gravel; dusky brown (5 YR 2/2) to moderate yellowish brown (10 R 5/4) to pale brown (5 YR 2/2); fine to coarse gravel, well graded, subrounded to rounded, quartzose and lithic; fine- to coarse-grained sand, well graded, subangular to subrounded, quartzose and feldspathic; medium to high plasticity; slightly calcareous; some platy texture; some poorly developed blocky texture decreasing with depth; gravels increasing in size with depth; damp.

SILTY CLAY (CL)[3]: with some sand, trace gravel; light brown (5 YR 5/6) to moderate reddish brown (10 R 4/6), grades to grayish red (5 YR 4/2) to the west; fine to coarse gravel, well graded, rounded to subangular, quartzose; fine- to coarse-grained sand, well graded, angular to subrounded, quartzose; low to medium plasticity.

SILTY CLAY (CL)[4]: with some sand, trace gravel; grayish red (5 YR 4/2) grading to dusky red (5 R 3/4) with depth; fine gravel, poorly graded, rounded quartzose; fine- to medium- grained sand, moderately graded, angular to subrounded, quartzose; low to medium plasticity; slightly fissile in part; locally grades to Sandy Gravelly Clay (CL); grades to Clayey Sand (SC), with depth; damp.

SANDY GRAVELLY CLAY (CL)[5]: some silt; grayish red (5 YR 4/2) grading to dusky red (5 R 3/4) with depth; fine gravel; poorly graded, rounded; fine- to medium-grained sand; moderately graded; angular to subrounded; quartzose; low to medium plasticity; slightly fissile locally; grades clayey sand (SC), with depth; damp.

SANDY SILTY CLAY (CL)[6]: light brown (5 YR 5/6); fine- to medium-grained sand, moderate to poorly graded, subangular to subrounded, quartzose; low plasticity; slightly calcareous; trace carbonaceous material; moist.

SILTY CLAYEY SAND (SM/SC)[7]: with some gravel; light brown (5 YR 5/6) to moderate reddish brown (10 R 4/6); fine to coarse gravel grading to cobbles, well graded, rounded, quartzose; fine- to coarse-grained sand, moderate to well graded, subangular to subrounded, quartzose; low plasticity; some caliche increasing with depth, occurs as rinds around gravels; grades to Clayey Sand (SC) to the west; moist.

CLAYEY SAND (SC)[8]: with some silt and gravel; dusky red (5 R 3/4) to medium red (5 R 4/6) to moderate reddish brown (10 R 4/6), mottled with light brown (5 YR 6/6); fine to coarse (1 to 5 centimeter) gravel, well graded, rounded, quartzose; medium- to upper coarse-grained sand, moderately graded, angular to rounded, quartzose; medium plasticity; trace cobbles, damp, grades to Gravelly Sand (SW), with depth west of 9 + 60.

GRAVELLY SAND (SW)[9]: with trace silt and clay; moderate reddish brown (10 R 4/6); fine to coarse gravel, grading to cobbles, well graded, rounded, quartzose; lower coarse- to upper very coarse-grained sand, poorly graded, angular to rounded, quartzose; moist.

SILTY CLAY (CL)[10]: with some silt and sand, trace gravel; mottled white (N 9/0), light gray (N 7/0) and medium gray (N 5/0); fine gravel, poorly graded, rounded; fine- to medium-grained sand, moderately graded, angular, quartzose; low plasticity; some caliche mottling; gravel decreasing with depth; trace claystone clasts; moist.

SANDY CLAYEY SILT (ML)[11]: reworked weathered siltstone; light gray (N 5/0); fine-grained sand, poorly graded, subangular, quartzose; low plasticity; highly weathered siltstone; mottled with dark yellowish orange (10 YR 6/6) limonite staining; has thin (2 centimeter) sandy laminations; damp.

CLAY (CH)[12]: with trace silt and sand; reworked claystone; light gray (N 5/0); fine-grained sand, poorly graded; low plasticity; poorly developed subblocky texture; slightly calcareous; trace black carbonaceous material; grades to Silty Clay (CH) to the west; moist.

SILTY CLAY (CH)[13]: with trace sand; reworked weathered claystone; medium gray (N 5/0); fine- to coarse-grained sand, moderate to well graded, subangular, quartzose; medium plasticity; subblocky; highly weathered silty claystone with dark yellowish orange (10 YR 6/0) limonite staining mottled in; trace black carbonaceous material; trace gravels grading in to the west; trace caliche mottled in to the west; damp to moist.

CLAY (CH)[14]: with some silt, trace sand and gravel; reworked weathered claystone; medium dark gray (N 4/0) grading to medium gray (N 5/0) to the west; very fine- to fine-grained sand, poorly graded, subrounded, quartzose; high plasticity; moderately weathered with some limonite staining; trace limonite nodules; subblocky texture; damp to moist; overlays bedrock.

CLAYSTONE[15]: with some silt, trace sand; brownish gray (5 YR 4/1) to dark gray (N 3/0); fine-grained sand, well sorted; dense; blocky grading to subblocky to the west; some waxy; white caliche, limonite and manganese oxide staining on partings; fractures healed with limonite; damp grades to Silty Claystone west of 9 + 65.

SILTY CLAYSTONE[16]: with trace sand; medium dark gray (N 4/0); very fine- to fine-grained sand, well sorted, quartzose; well indurated; blocky; poorly developed bedding; limonite staining along fractures; trace black carbonaceous material; damp to moist.

CLAYEY SILTSTONE[17]: with some sand; light gray (N 7/0); fine-grained sand, well sorted, quartzose; dense; fractures healed with limonite; bedding planes stained with limonite; damp to moist; pinches out at 9 + 80.

CLAYEY SILTSTONE[18]: with some sand; medium light gray (N 6/0); very fine- to fine-grained sand, well sorted; no visible porosity; well indurated; trace limonite staining; damp.

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SANDY CLAY (TOP SOIL) (CL/CH)[1]: with some silt, trace gravel; moderate yellowish brown (10 YR 5/4), moderate reddish brown (10 R 4/6); fine to coarse gravels up to cobbles, well graded, subangular to subrounded, quartzose and metasediment; predominantly fine with trace medium- and coarse-grained sand, moderately graded, subangular to subrounded, quartzose; medium plasticity; slightly calcareous; moist; grades to Silty Clay (CL) to the west.

SILTY CLAY (TOP SOIL) (CH)[2]: with some sand, trace gravel; dusky brown (5 YR 2/2) to brownish black (5 YR 2/1); fine (1 to 2 centimeter) gravel, poorly graded, angular, lithic; medium- to coarse-grained sand, poorly graded, angular, quartzose; medium to high plasticity; very organic; trace roots; damp.

SILTY CLAY (CH)[3]: with some sand, trace gravel; light brown (5 YR 5/6) to moderate brown (5 YR 4/4), mottled with grayish orange (10 YR 7/4); fine gravel, poorly graded, subrounded, quartzose; fine- to medium-grained sand, moderately graded, subangular to subrounded, quartzose; low to medium plasticity; some limonite staining; slightly calcareous; trace caliche blebs; damp to moist.

CLAYEY SILT (CL)[4]: with some sand, trace gravel; moderate reddish brown (10 R 4/6) to dark yellowish brown (10 YR 5/4) and dusky brown (5 YR 2/2); fine gravel, poorly graded, subrounded, quartzose; fine- to medium-grained sand, moderately graded, subangular to subrounded, quartzose; low to medium plasticity; mottled with abundant limonite staining; damp to moist. Grades to Sandy Silty Clay to the west.

SANDY SILTY CLAY (CL)[5]: light brown (5 YR 5/6); fine- to medium-grained sand, moderate to poorly graded, subangular to subrounded, quartzose; low plasticity; slightly calcareous; trace carbonaceous material; moist.

SILTY CLAYEY SAND (SM/SC)[6]: with some gravel; light brown (5 YR 5/6) to moderate reddish brown (10 R 4/6); fine to coarse gravel grading to cobbles, well graded, rounded, quartzose; fine- to coarse-grained sand, moderate to well graded, subangular to subrounded,

quartzose; low plasticity; some caliche increasing with depth; occurs as rinds around gravels; damp to moist.

SILTY CLAY (CH)[7]: trace sand; disturbed claystone; dark gray (N 3/0), olive gray (5 Y 4/1); fine-grained sand, poorly graded, subangular to subrounded, quartzose; medium to high plasticity; limonite mottling; trace caliche deposits; 5 centimeter iron nodules; carbonaceous lenses up to 3 meters thick; predominantly rafted bedrock; randomly oriented shear plains with slickensides; moist.

SILTY CLAY (CH)[8]: with trace sand and gravel; grayish orange (10 YR 7/4) to moderate yellowish brown (10 YR 4/2); fine gravel, poorly graded, subangular, quartzose and metasediment; fine- to medium-grained sand, moderately graded, quartzose; medium plasticity; slightly calcareous with trace granular caliche; damp. Grades to Clay (CH), to the west.

CLAY (CH)[9]: with some silt, trace sand and gravel; medium dark gray (N 4/0) grading to medium gray (N 5/0) to the west; very fine- to fine-grained sand, poorly graded, subrounded, quartzose; high plasticity, some limonite staining, trace limonite nodules, subblocky texture, trace waxy at 9 + 25, damp to moist, overlays bedrock.

SILTY CLAYSTONE[10]: with some sand; brownish gray (5 YR 4/1) to dark gray (N 3/0); fine- to medium-grained sand, well sorted, subangular to subrounded, quartzose; dense; well developed blocky texture; with dendritic manganese oxide staining; some limonite staining on partings; slightly calcareous; damp, locally moist along fractures at lower contact.

CLAYSTONE[11]: with some silt, trace sand; brownish gray (5 YR 4/1) to dark gray (N 3/0); fine-grained sand, well sorted; dense; blocky grading to subblocky to the west; some waxy; white caliche, limonite and manganese oxide staining on partings; fractures healed with limonite; damp.

CLAYEY SILTSTONE[12]: with some sand; grayish orange (10 YR 7/4) to light brown (5 YR 6/4); fine- to coarse-grained sand, well sorted, subangular to subrounded, quartzose; argillaceous with 1 to 3 millimeter limonitic laminations; poorly developed cross laminations;

moderate blocky texture; moderately fractured; poorly cemented with argillaceous material; locally seeping water near lower contact; locally grading to silty sandstone.

SILTY SANDSTONE[13]**:** with some clay; grayish orange (10 YR 7/4) to light brown (5 YR 6/4) some mottling; fine- to coarse-grained sand, well sorted, subangular to subrounded, quartzose, locally with 1 to 3 millimeter limonitic laminations; poorly developed cross lamination; moderate blocky texture; moderately fractured; poorly cemented with argillaceous material; friable; locally seeping water near lower contact; locally grading to clayey siltstone.

SILTY CLAYSTONE[14]**:** with trace sand; olive gray (5 Y 4/1) to greenish black (5 GY 2/1); mottled; fine- to coarse-grained sand, poorly sorted, subangular to subrounded, quartzose; no visible porosity; moderately well indurated; well developed blocky texture; with limonite staining, grayish orange (10 YR 7/4) along partings; dendritic manganese oxide staining, dark gray (N 3/0); trace, 3 to 8 millimeter, subrounded, iron concretions; trace to some carbonaceous material; damp, locally moist along fractures at lower contact.

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SANDY CLAY (TOP SOIL) (CL)[1]: with some gravel and trace of silt; grayish brown (5 YR 3/2) to dusky yellowish brown (10 YR 2/2); fine gravel, poorly graded, subangular to subrounded, quartzose and lithic; fine- to coarse-grained sand, well graded, subangular to subrounded, quartzose; non to low plasticity; at times partly to poorly developed blocky texture; trace roots; trace caliche; slightly to moderately calcareous; primarily dry, locally damp.

SANDY CLAY (CH)[2]: with trace gravel and trace silt; pale reddish brown (10 R 5/4) to dark reddish brown (10 R 3/4); fine to coarse gravels and cobbles, well graded, subangular to subrounded, quartzose and lithic; fine- to coarse-grained sand, well graded, subangular to subrounded, quartzose and lithic; medium to high plasticity; trace mica, partially cemented with caliche; slightly to moderately calcareous; dry; locally grading to clay.

SILTY CLAY (CH)[3]: with some sand, trace gravel; light brown (5 YR 5/6) to moderate brown (5 YR 4/4), mottled with grayish orange (10 YR 7/4); fine gravel, poorly graded, subrounded, quartzose; fine- to medium-grained sand, moderately graded, subangular to subrounded, quartzose; low to medium plasticity; some limonite staining; slightly calcareous; trace caliche blebs; damp to moist.

SILTY CLAY (CH)[4]: with trace of sand; disturbed claystone; grayish orange (10 YR 7/4) with light brown (5 YR 5/6); mottled; fine- to coarse-grained sand, well graded, subangular to subrounded, quartzose; high plasticity; poorly developed blocky texture; highly weathered at upper contact becoming less weathered at depth; some iron oxide staining; trace slickensided shear planes; slightly calcareous; dry to damp; disturbed silty claystone; locally grading to clay; locally highly mottled with limonite staining; at times abundant carbonaceous material; with subrounded gravel sized iron concretions; locally containing well developed slickensided shear planes.

CLAY (CH)[5]: with some sand, silt and gravel; moderate reddish brown (10 R 4/6) to light brown (5 YR 5/6); fine gravel, poorly graded subangular to subrounded, quartzose and lithic; fine- to coarse-grained sand, well graded, subangular to subrounded, quartzose; moderate to high

plasticity; locally caliche encrusting gravel; scattered caliche blebs; slightly to moderately calcareous; dry.

SILTY CLAYSTONE[6]**:** with some sand; brownish gray (5 YR 4/1) to dark gray (N 3/0); fine- to medium-grained sand, subangular to subrounded, well sorted, quartzose; dense; well developed blocky texture; with dendritic manganese oxide staining; some limonite staining on partings; slightly calcareous; damp.

CLAYEY SILTSTONE[7]**:** with some sand, grayish orange (10 YR 7/4) to light brown (5 YR 6/4); fine- to coarse-grained sand, well sorted, subangular to subrounded, quartzose; locally with 1 to 3 millimeter limonite laminations; poorly developed cross laminations; moderate blocky texture; moderately fractured; poorly cemented with argillaceous material; locally seeping water near lower contact; locally grading to silty sandstone.

SILTY SANDSTONE[8]**:** with some clay, grayish orange (10 YR 7/4) to light brown (5 YR 6/5), some mottling; fine- to coarse-grained sand, well sorted, subangular to subrounded, quartzose; locally with 1 to 3 millimeter limonite laminations; poorly developed cross lamination; moderate, blocky texture; moderately fractured; poorly cemented with argillaceous material; friable; locally seeping water near lower contact; locally grading to clayey siltstone.

SILTY CLAYSTONE[9]**:** with trace sand; olive gray (5 Y 4/1) to greenish black (5 GY 2/1); mottled; fine- to coarse-grained sand, poorly sorted, subangular to subrounded, quartzose; no visible porosity; moderately well indurated; well developed blocky texture; with limonite staining, grayish orange (10 YR 7/4) along partings; dendritic manganese oxide staining, dark gray (N 3/0); trace, 3 to 8 millimeter, subrounded, iron concretions; trace to some carbonaceous material; damp, locally moist along fractures at lower contact.

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SANDY CLAY (TOP SOIL) (CL/CH)[1]: with some silt, trace gravel; moderate yellowish brown (10 YR 5/4), moderate reddish brown (10 R 4/6); fine to coarse gravels up to cobbles, well graded, subangular to subrounded, quartzose and lithic; predominantly fine with trace medium- and coarse-grained sand, moderately graded, subangular to subrounded, quartzose; medium plasticity; slightly calcareous; moist.

SANDY SILTY CLAY (CL/CH)[2]: with some to trace gravel; dark reddish brown (10 R 3/4), moderate reddish brown (10 R 4/6), light gray (N 7/0); fine to coarse gravel, well graded, subangular, quartzose; fine- to coarse-grained sand, well graded, subangular to subrounded; quartzose; medium plasticity; abundant caliche; some claystone inclusions; slightly to moderately calcareous; damp.

CALICHE ZONE[3]: sandy clay and gravel to clayey sand and gravel (GC/GW); fine to coarse gravel to 30 centimeter cobbles, well graded, subangular to subrounded quartzose; fine- to coarse-grained sand, well graded, subangular to subround, quartzose; non to low plasticity; predominant matrix is caliche and caliched clays; damp to wet.

SILTY CLAY (CH)[4]: disturbed claystone; trace sand; dark gray (N 3/0), olive gray (5 Y 4/1); fine-grained sand, poorly graded, subangular to subrounded, quartzose; medium to high plasticity; limonite mottling, trace caliche deposits; 5 centimeters iron nodules; carbonaceous lenses up to 1 meter thick; predominant rafted bedrock; randomly oriented shear planes with slickensides and 3 prominent shear plans with south dipping slickensides; moist.

SANDY CLAY (CH)[5]: with some silt; moderately reddish brown (10 R 4/6); predominantly fine with a trace of medium- and coarse-grained sand, moderately graded, subangular to subrounded, quartzose; medium plasticity; inclusions of claystone; caliche veining; small slickensided shear planes randomly oriented; slight blocky texture; dry to moist.

SANDY CLAYEY SILT (ML)[6]: with some to trace gravel; moderate reddish brown (10 R 4/6); fine to coarse gravel to cobbles, well graded, subrounded to subangular, quartzose, trace arkose, random orientation; predominantly fine-grained sand, poorly graded, subangular to

subround, quartzose; medium to low plasticity; abundant limonite staining; abundant caliche; slightly to very calcareous; damp; wet to moist around gravels and cobbles.

GRAVELLY SANDY CLAY (CL)[7]: with trace silt; dark reddish brown (10 R 3/4) to grayish brown (5 YR 3/2), at times mottled; fine to coarse gravel, well graded, subangular to angular, quartzose and lithic; fine- to coarse-grained sand, well graded, subangular to angular, quartzose and lithic; medium plasticity; inclusions mixed with claystone; moist.

SILTY CLAY (CH)[8]: with trace sand and gravel; mixed medium gray (N 5/0), moderate reddish brown (10 R 4/6); fine to coarse gravels, well graded, subangular to subrounded, quartzose; fine- to medium-grained sand, moderately graded, subangular to subrounded, quartzose; medium plasticity; abundant limonite staining; caliche deposits; predominantly reworked silty claystone in alluvium matrix; discontinuous small shear planes, random orientation; moist.

SANDY CLAYEY SILTSTONE[9]: varicolored light gray (N 7/0), medium dark gray (N 4/0), greenish gray (5 GY 6/1), light bluish gray (5 B 7/1), grayish red purple (5 RP 4/2), grading with depth to yellowish gray (5 Y 8/1), light olive gray (5 Y 6/1); fine-grained sand, well sorted, subangular to subrounded, quartzose; no visible porosity; noncemented to thin iron cemented laminations; slightly to moderately friable; carbonaceous in upper varicolored zone; limonite staining in bands; calcareous in part; thinly bedded; thin lenses of silty sandy claystone; low plasticity; moist.

CLAYEY SILTSTONE[10]: with some sand; dark yellowish orange (10 YR 6/6), moderate brown (5 YR 3/4), yellowish gray (5 Y 7/2); fine-grained sand, well sorted, subangular to subrounded; quartzose; no visible porosity; noncemented; friable; weathered; abundant limonite stain and iron nodules; manganese oxide deposits; low plasticity; 2 centimeter laminations of silty claystone; moist.

CLAYSTONE[11]: some to trace silt; dark yellowish orange (10 YR 6/6), olive gray (5 Y 4/1); no visible porosity; noncemented; nonfriable; limonite staining; caliche veins and pockets;

medium to high plasticity; weathered; discontinuous shear planes from 11 + 65 to 11 + 35; slickensides dipping south; moist.

SILTY SANDSTONE[12]: with some clay; light olive gray (5 Y 5/2), yellowish gray (5 Y 7/2), medium gray (N 5/0); very fine- to fine-grained sand, well sorted, subangular to subrounded; quartzose; low estimated porosity; weakly cemented; friable; calcareous; laminations of limonite staining; caliche deposits; manganese oxide staining and dendrites; thin to moderate bedding; fractures filled with limonite, caliche and/or manganese oxide; moist.

SILTY CLAYSTONE[13]: with trace to some sand; olive gray (5 Y 3/2); medium gray (N 5/0), grayish red purple (5 RP 4/2); very fine- to fine-grained sand, well sorted, subangular to subrounded, quartzose; no visible porosity; noncemented; nonfriable; limonite mottling and staining; iron concentrations; manganese oxide dendritic staining; medium to low plasticity; blocky texture; moist.

SILTY SANDSTONE[14]: with some clay; grayish orange (10 YR 7/4) to light brown (5 YR 6/4); some mottling; fine- to coarse-grained sand, well sorted, subangular to subrounded, quartzose; locally with 1 to 3 millimeters limonite laminations; poorly developed cross lamination; moderate, blocky texture; moderately fractured; poorly cemented with argillaceous material; friable; locally seeping water near lower contact; locally grading to clayey siltstone.

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STATIONS
11 + 50 to 12 + 00
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SANDY CLAY (FILL) (CL)[1]: with some gravel and trace of silt; grayish brown (5 YR 3/2) to dusky yellowish brown (10 YR 2/2); fine- to coarse-grained sand, well graded; subangular to subrounded, quartzose; fine gravel, poorly graded, subangular to subrounded, quartzose; non to low plasticity; nonlaminated; at times platy to poorly developed blocky texture; with roots; trace caliche; slightly to moderately calcareous; primarily dry; locally damp.

CLAYEY SAND (SC)[2]: with some silt and gravel, trace cobbles; dark reddish brown (10 R 3/4), moderate reddish brown (10 R 4/6); fine to coarse gravels, well graded, angular to subrounded, quartzose; fine- to coarse-grained sand, well graded, subangular to subrounded, quartzose; medium to high plasticity; abundant roots and organics; slightly to moderately calcareous; abundant caliche; moist.

SILTY CLAY (CH)[3]: disturbed silty claystone, with trace of sand; olive gray (5 Y 4/1) to medium gray (N 2/0); mottled; fine- to coarse-grained sand, well graded, subangular to subrounded, quartzose; high plasticity; poorly developed blocky texture; highly weathered at surface becoming less weathered with depth; some iron oxide staining; trace slickensided slip planes; slightly calcareous; dry to damp; reworked silty claystone; locally grading to clay.

SANDY SILTY CLAY (CL/CH)[4]: with some to trace gravel; dark reddish brown (10 R 3/4), moderate reddish brown (10 R 4/6), light gray (N 7/0); fine to coarse gravel, well graded, subangular, quartzose; fine-to coarse-grained sand, well graded, subangular to subrounded, quartzose; medium plasticity; abundant caliche; some claystone inclusions; slightly to moderately calcareous; damp.

CALICHE ZONE[5]: sandy clay and gravel to clayey sand and gravel (GC/GW); fine to coarse gravel to 30 centimeter cobbles, well graded, subangular to subround, quartzose; fine- to coarse-grained sand, well graded, subangular to subround, quartzose; non to low plasticity; predominant matrix is caliche and caliche clays; damp to wet.

SANDY CLAYEY SILT (ML)[6]: with some to trace gravel; moderate reddish brown (10 R 4/6); fine to coarse gravel to cobbles, well graded, subrounded to subangular, quartzose,

trace arkose; random orientation; predominantly fine-grained sand, poorly graded, subangular to subround, quartzose; medium to low plasticity; abundant limonite staining; abundant caliche; slightly to very calcareous; damp; wet to moist around gravel and cobbles.

GRAVELLY SAND (SW/SC)[7]: moderate reddish brown (10 R 4/6); at times mottled; poorly graded; subangular to angular; quartzose and lithic; fine- to coarse-grained sand, medium plasticity; moist; grades into gravelly sandy clay at approximately 11 + 90.

SILTY CLAY (CL)[8]: disturbed silty claystone, trace to some sand, moderate yellowish brown (10 YR 5/4); very fine- to fine-grained sand; poorly graded, subrounded; medium plasticity; convoluted blocky texture; slight bedding to laminations; discontinuous shear planes; caliche deposits; reworked claystone; iron stained; moist.

GRAVELLY SANDY CLAY (CL)[9]: with some sand; coarse to fine gravel; cobbles, well graded, subangular to subrounded, quartzose and metamorphics; fine- to coarse-grained sand, well graded, subrounded to subangular; quartzose; medium to low plasticity; abundant caliche deposits; reworked claystone; moist.

GRAVELLY CLAY (CL)[10]: disturbed claystone; with some sand; coarse to fine gravel, cobbles, well graded, subangular to subrounded, quartzose and metamorphics; fine- to coarse-grained sand, well graded, subrounded to subangular; quartzose; medium to low plasticity; abundant caliche deposits; reworked claystone; moist.

CALICHE ZONE:[11]: 4.5 centimeter thick zone of well cemented white (N 9/0), powdery caliche, dry.

SANDY CLAYEY SILTSTONE[12]: pale yellowish brown (10 YR 6/2), moderate olive brown (5 Y 4/4); very fine- to fine-grained with trace medium-grained sand, moderately well sorted, subangular to subround, quartzose; no visible porosity; low cemented; slightly friable; scattered iron concretions; millimeter-banding limonite staining; some cross bedding; from 11 + 90 to 11

+ 78 interbedded with 6 to 9 centimeter lenses of silty claystone; 2 from 11 + 90 to 11 + 80; discontinuous small shear planes; moist.

SANDY SILTY CLAYSTONE[13]**:** olive gray (5 Y 4/1), moderate brown (5 YR 4/4), medium gray (N 5/0); very fine- to fine-grained sand, moderately well sorted; subrounded to subangular, quartzose; no visible porosity; noncemented; nonfriable; medium plasticity; limonite staining; dendrite manganese oxide; discontinuous small interbedded shear planes; slickensides dipping south; fractures filled with limonite and manganese oxide; moist.

SILTY SANDSTONE[14]**:** light gray (N 7/0) with some clay; very fine to fine grained with trace medium-grained sand; moderately well sorted; subangular to subrounded, quartzose; no visible porosity; noncemented; friable; iron staining, minor cross bedding; moist.

SILTY CLAYSTONE[15]**:** medium gray (N 5/0), grayish red purple (5 RP 4/2); no visible porosity; noncemented; nonfriable; medium plasticity; limonite staining to veining; blocky texture; laminated bedding; limonite filled fractures, moist.

CLAYSTONE[16]**:** some to trace silt; dark yellowish orange (10 YR 6/6), olive gray (5 Y 4/1); no visible porosity; noncemented; nonfriable; limonite staining; caliche veins and pockets; medium to high plasticity; weathered; discontinuous shear planes from 11 + 65 to 11 + 35; slickensides dipping south; moist.

CLAYEY SILTSTONE[17]**:** with some sand; dark yellowish orange (10 YR 6/6), moderate brown (5 YR 3/4), yellowish gray (5 Y 7/2); fine-grained sand, well sorted, subangular to subrounded, quartzose; no visible porosity; noncemented; friable; weathered; abundant limonite stain and iron nodules; manganese oxide deposits; low plasticity; 2 centimeter laminations at silty claystone; moist.

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STATIONS
12 + 00 to 12 + 50
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SILTY CLAY (TOPSOIL) (CH)[1]: with trace of sand and gravels; dusky yellowish brown (10 YR 2/2) to dark yellowish brown (10 YR 4/2); fine to coarse gravels up to cobbles, well graded, subangular to subrounded, quartzose; fine- to coarse-grained sand, well graded, subangular to subrounded, quartzose; medium plasticity; with roots; damp to moist; grades to sandy clay at Station 12 + 30.

SANDY CLAY (TOP SOIL) (CL)[2]: with some gravel and trace silt; grayish brown (5 YR 3/2) to dusky yellowish brown (10 YR 2/2); fine- to coarse-grained sand, well graded, subangular to subrounded, quartzose; fine gravel, poorly graded, subangular to subrounded, quartzose and lithic; non to low plasticity; at times partly to poorly developed blocky texture; trace roots; trace caliche; slightly to moderately calcareous; primarily dry, locally damp.

CLAYEY SAND (SC)[3]: with some silt and gravel, trace cobbles; dark reddish brown (10 R 3/4), moderate reddish brown (10 R 4/6); fine to coarse gravels, well graded, angular to subrounded, quartzose; fine- to coarse-grained sand, well graded, subangular to subrounded, quartzose; medium to high plasticity; abundant roots and organics; slightly to moderately calcareous; abundant caliche; moist.

SILTY CLAY (CH)[4]: disturbed silty claystone, light gray (N 7/0); "rafted" block of silty claystone; medium plasticity; blocky texture; some caliche; weathered; dry to moist.

CALICHE ZONE[5]: sandy clay and gravel to clayey sand and gravel (GC/GW); fine to coarse gravel to 30 centimeter cobbles, well graded, subangular to subround, quartzose; fine- to coarse-grained sand, well graded, subangular to subround, quartzose; non to low plasticity; predominant matrix is caliche and caliched clays; damp to wet.

CLAYEY SAND (SC)[6]: with some silt and gravel; dark reddish brown (10 R 3/4), moderate reddish brown (10 R 4/6); fine to coarse gravel, scattered cobbles, well graded, subangular to subrounded, quartzose; fine- to coarse-grained sand, well graded, subangular to subrounded, quartzose; medium plasticity; abundant roots; claystone inclusions and rafted blocks; slightly to moderately calcareous; abundant caliche; damp.

GRAVELLY CLAY (CH)[7]: disturbed claystone, pale olive (10 Y 6/2), medium gray (N 5/0); fine to coarse gravel to 30 centimeter cobbles, well graded, subangular to subround, quartzose; medium plasticity; caliche cemented matrix; clay is reworked claystone block; abundant limonite staining; caliche zones up to 30 centimeter thick; gravels oriented 45 degrees to 70 degrees; moist.

SANDY CLAYEY SILT (ML)[8]: with some to trace gravel; moderate reddish brown (10 R 4/6); fine to coarse gravel to cobbles, well graded, subrounded to subangular, quartzose, trace arkose, random orientation; predominantly fine-grained sand, poorly graded, subangular to subrounded, quartzose; medium to low plasticity; abundant limonite staining; abundant caliche; slightly to very calcareous; damp; wet to moist around gravels and cobbles.

GRAVELLY SAND (SW/SC)[9]: moderate reddish brown (10 R 4/6); at times mottled; poorly graded; subangular to angular; quartzose and lithic; fine- to coarse-grained sand, medium plasticity; moist; grades into gravelly sandy clay at approximately 11 + 90.

SILTY CLAY (CH)[10]: disturbed silty claystone, with trace sand and gravels; pale reddish brown (10 R 5/4) grayish red (5 R 4/2); light brown (5 YR 5/6), moderate yellowish brown (10 YR 5/4), mottled; fine to coarse gravels up to cobbles, well graded, subangular to subrounded, quartzose; fine- to coarse-grained sand, well graded, subangular to subrounded, quartzose; medium plasticity; abundant roots; slightly to moderately calcareous; abundant caliche; damp.

CLAYEY SILTY SANDSTONE[11]: yellowish gray (5 Y 7/2), with light olive (10 Y 5/4) to moderate yellow (5 Y 7/6) banding; predominant fine-grained sand, moderately well sorted, subangular to subrounded, quartzose; no visible porosity; weakly to noncemented; friable; millimeter banded limonite staining, very thinly bedded; poorly developed cross bedding; blocky texture; fractures filled with caliche and limonite; moist.

SANDSTONE[12]: light gray (N 7/0); very fine- to fine-grained sand; well sorted, subangular, quartzose; low estimated porosity, well cemented; nonfriable; calcareous cement; noncemented

from 12 + 35 eastward; anticlinal structure at 12 + 36; fractures stained with manganese oxide; dry to moist.

SANDY SILTY CLAYSTONE[13]**:** olive gray (5 Y 4/1), moderate brown (5 YR 4/4), medium gray (N 5/0); very fine- to fine-grained sand, moderately well sorted, subrounded to subangular; quartzose; no visible porosity; noncemented; nonfriable; medium plasticity; limonite staining; dendrite manganese oxide; discontinuous small interbedded shear planes; slickensides dipping south; fractures filled with limonite and manganese oxide; moist.

SILTY SANDSTONE[14]**:** with some clay; light gray (N 7/0); very fine- to fine-grained with trace medium-grained sand; moderately well sorted; subangular to subrounded; quartzose; no visible porosity; noncemented; friable, iron staining; minor cross bedding; moist.

SANDY CLAYEY SILTSTONE[15]**:** pale yellowish brown (10 YR 6/2), moderate olive brown (5 Y 4/4); very fine- to fine-grained with trace medium-grained sand, moderately well sorted, subangular to subround, quartzose; no visible porosity; noncemented; slightly friable; scattered iron concretions; millimeter banding limonite staining; some cross bedding; discontinuous small shear plans; moist.

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STATIONS
12 + 50 to 13 + 00
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SILTY CLAY (TOPSOIL) (CH)[1]: with a trace sand and gravels; dark yellowish brown (10 YR 4/2) to dusky yellowish brown (10 YR 2/2) fine to coarse gravels up to cobbles, well graded, subangular to subrounded, quartzose; fine- to coarse-grained sand, well graded, subangular to subrounded, quartzose; low to medium plasticity; trace roots; damp to moist.

CLAYEY SAND (SC)[2]: with some silt and gravel, trace cobbles and boulders; dark reddish brown (10 R 3/4), moderate reddish brown (10 R 4/6); fine to coarse gravels, well graded, angular to subrounded, quartzose; fine- to coarse-grained sand, well graded, subangular to subrounded, quartzose; medium plasticity; abundant roots; slightly to moderately calcareous; inclusions of claystone up to small 2 to 3 meter "rafted" blocks; abundant caliche; moist.

CALICHE ZONE[3]: sandy clay and gravel to clayey sand and gravel (GC/GW); fine to coarse gravel to 30 centimeter cobbles, well graded, subangular to subround, quartzose; fine- to coarse-grained sand, well graded, subangular to subround, quartzose; non to low plasticity; predominant matrix is caliche and caliched clays; damp to wet.

GRAVELLY CLAY (CH)[4]: disturbed claystone, pale olive (10 Y 6/2), medium gray (N 5/0); fine to coarse gravel to 30 centimeter cobbles, well graded, subangular to subround, quartzose; medium plasticity; caliche cemented matrix; clay is reworked claystone block; abundant limonite staining; caliche zones up to 30 centimeter thick; gravels oriented 45 degrees to 70 degrees; moist.

GRAVELLY CLAY (CH)[5]: disturbed claystone, (lower unit) with some sand; light olive gray (5 Y 5/2), light olive brown (5 Y 5/6); fine to coarse gravels up to small boulders 45 centimeters; well graded, subangular to subrounded; quartzose; low plasticity; clay is reworked claystone; abundant pockets and lenses of caliche; moist.

SILTY SANDSTONE[6]: with some clay; medium light gray (N 6/0); predominantly fine-grained sand, moderately well sorted, subrounded, quartzose; no visible porosity; weakly to noncemented; friable; millimeter banding of limonite staining; fractures filled with caliche; moist.

CLAYEY SILTY SANDSTONE[7]**:** grayish orange (10 YR 7/4), light olive brown (5 Y 5/6); predominantly fine-grained sand, moderately well sorted, subangular to subrounded, quartzose; no visible porosity; weakly to noncemented; friable; very thinly bedded; poorly developed cross bedding; blocky texture; fractures filled with caliche and limonite; moist.

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STATIONS
13 + 00 to 13 + 50
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SILTY CLAY (TOPSOIL) (CH)[1]: with a trace of sand and gravels; dusky yellowish brown (10 YR 2/2) to dark yellowish brown (10 YR 4/2); fine to coarse gravels up to cobbles, well graded, subangular to subrounded, quartzose; fine- to coarse-grained sand, well graded, subangular to subrounded quartzose; medium plasticity; trace roots; damp to moist.

CLAYEY SAND (SC)[2]: with some silt and gravel; trace cobbles; dark reddish brown (10 R 3/4), moderate reddish brown (10 R 4/6); fine to coarse gravels, well graded, angular to subrounded, quartzose; fine- to coarse-grained sand, well graded, subangular to subrounded, quartzose; medium to high plasticity; abundant roots and organics; slightly to moderately calcareous; abundant caliche; moist.

SILTY CLAY (CH)[3]: disturbed silty claystone, light gray (N 7/0); "rafted" block of silty claystone; medium plasticity; blocky texture; some caliche; weathered; dry to moist.

SANDY SILTY CLAY (CL/CH)[4]: with some to trace gravel; dark reddish brown (10 R 3/4), moderate reddish brown (10 R 4/6), light gray (N 7/0); fine to coarse gravel, well graded; subangular, quartzose; fine- to coarse-grained sand, well graded, subangular to subrounded, quartzose; medium plasticity; abundant caliche; some claystone inclusions; slightly to moderately calcareous; damp.

SANDY CLAYEY SILT (ML)[5]: with some to trace gravel; brownish gray (5 YR 4/1), light olive brown (5 Y 5/6), mottled; fine to coarse gravel, well graded, subangular to subrounded, quartzose; fine- to coarse-grained sand, well graded, subangular to subrounded, quartzose; medium to low plasticity; abundant limonite staining; abundant caliche; slightly to very calcareous; claystone blocks and inclusions; damp.

CLAY (CH)[6]: disturbed claystone, with some sand and silt, trace gravel; yellowish gray (5 Y 7/2); fine to coarse gravels, well graded, subangular, quartzose; fine- to coarse-grained sand, well graded, subangular to subrounded, quartzose; medium plasticity; reworked and weathered claystone; moist.

GRAVELLY CLAY (CH)[7]: disturbed claystone, olive gray (5 Y 4/1), brownish gray (5 YR 4/1), moderate yellowish brown (10 YR 5/4); varicolored; fine to coarse gravels up to 30 centimeters, cobbles, well graded, subangular to subrounded, quartzose and lithic; low plasticity; up to 30 percent of clay is reworked claystone; caliche deposits surround gravel and cobbles; gravels with variable imbrications in upper zone to 5 degrees dip west orientation at lower contact; moist.

CALICHE ZONE[8]: sandy clay and gravel to clayey sand and gravel (GC/GW); fine to coarse gravel to 30 centimeter cobbles, well graded, subangular to subround, quartzose; fine- to coarse-grained sand, well graded, subangular to subround, quartzose; non to low plasticity; predominant matrix is caliche and caliched clays; damp to wet.

SANDSTONE[9]: with some silt and trace clay; moderate yellowish brown (10 YR 5/4), light brown (5 YR 5/6); fine- to very fine-grained sand; well sorted; subangular, quartzose; no visible porosity; weakly cemented with limonite and caliche; moderately friable; limonite staining to concretions; caliche mottling to concretions; 3 to 6 centimeter iron cemented lenses; thinly bedded; interbeds of sandy claystone; moist.

SANDY CLAYSTONE[10]: with some silt; yellowish brown (10 YR 5/4), light brown (5 YR 5/6); fine to very fine-grained sand, well sorted, subangular, quartzose; no visible porosity; nonfriable; abundant limonite staining; caliche mottling; lenses of clayey silty sandstone, 0.2 to 0.8 inches thick, light gray (N 7/0); fractures filled with limonite; moist.

SILTY SANDSTONE[11]: with some clay; medium light gray (N 6/0); predominantly fine-grained sand, moderately well sorted, subround, quartzose; no visible porosity; weakly to noncemented; friable; millimeter banding of limonite staining; fractures filled with caliche; moist.

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STATIONS
13 + 50 to 14 + 00
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SANDY CLAY (TOP SOIL) (CL)[1]: with some gravel and trace of silt; grayish brown (5 YR 3/2) to dusky yellowish brown (10 YR 2/2); fine- to coarse-grained sand, well graded, subangular to subrounded, quartzose; fine gravel, poorly graded, subangular to subrounded, quartzose and lithic; non to low plasticity; at times partly to poorly developed blocky texture; trace roots; trace caliche; slightly to moderately calcareous; primarily dry, locally damp.

SILTY CLAY (TOPSOIL) (CH)[2]: with trace sand and gravels; dark yellowish brown (10 YR 4/2), grayish brown (5 YR 3/2); fine to coarse gravels up to cobbles, well graded, subangular to subrounded, quartzose; fine- to coarse-grained sand, well graded, subangular to subrounded quartzose; medium plasticity; with roots; damp to moist.

CLAYEY SAND (SC)[3]: with some silt and gravel; dark reddish brown (10 R 3/4), moderate reddish brown (10 R 4/6); fine to coarse gravel, well graded, subangular to subrounded, quartzose; fine- to coarse-grained sand, well graded, subangular to subrounded, quartzose; medium plasticity; abundant roots; slightly to moderately calcareous; abundant caliche; damp.

SILTY CLAY (CH)[4]: with trace sand and gravels; pale reddish brown (10 R 5/4) grayish red (5 R 4/2); light brown (5 YR 5/6), moderate yellowish brown (10 YR 5/4), mottled; fine to coarse gravels up to cobbles, well graded, subangular to subrounded, quartzose; fine- to coarse-grained sand, well graded, subangular to subrounded, quartzose; medium plasticity; 2 to 3 millimeter caliche veining; slightly to moderately calcareous; damp to moist.

SANDY SILTY CLAY (CL/CH)[5]: with some to trace gravel; dark reddish brown (10 R 3/4), moderate reddish brown (10 R 4/6), light gray (N 7/0); fine to coarse gravel, well graded, subangular, quartzose; fine- to coarse-grained sand, well graded subangular to subrounded; quartzose; medium plasticity; abundant caliche; some claystone inclusions; slightly to moderately calcareous; damp.

SANDY CLAYEY SILT (ML)[6]: with some to trace gravel; brownish gray (5 YR 4/1), light olive brown (5 Y 5/6) mottled; fine to coarse gravel, well graded; subangular to subrounded quartzose; fine- to coarse-grained sand, well graded, subangular to subrounded quartzose; low to

medium plasticity; abundant limonite staining; abundant caliche; slightly to very calcareous; claystone blocks and inclusions; damp.

CALICHE ZONE[7]: sandy clay and gravel to clayey sand and gravel (GC/GW); fine to coarse gravel to 30 centimeter cobbles, well graded, subangular to subrounded quartzose; fine- to coarse-grained sand, well graded, subangular to subrounded, quartzose; non to low plasticity; predominant matrix is caliche and calcareous clays; damp to wet.

SILT (ML)[8]: disturbed siltstone, with some clay and sand; grayish brown (5 YR 3/2), moderate brown (5 YR 4/4), olive gray (5 Y 4/1), medium light gray (N 6/0), varicolored; fine to coarse gravels, well graded, subangular, quartzose; reworked siltstone; slightly to locally weathered, with some to abundant caliche; medium to low plasticity; moist to very moist.

CLAY (CH)[9]: disturbed claystone, with some sand and silt; trace gravels; yellowish gray (5 Y 7/2); fine to coarse gravels, well graded, subangular; quartzose; fine- to coarse-grained sand, well graded, subangular to subrounded, quartzose; medium plasticity; reworked and weathered claystone; moist.

CLAYEY SAND (SC)[10]: with some to trace silt and gravel; moderate reddish brown (10 R 4/6), moderate reddish brown (10 R 6/6); fine to coarse gravels up to 30 centimeter cobbles, well graded, subangular to subrounded, quartzose; fine- to medium-grained sand, moderately graded, quartzose; medium plasticity; caliche veining and encrusting around claystone inclusions; moist.

GRAVELLY CLAY (CH)[11]: disturbed claystone, olive gray (5 Y 4/1), brownish gray (5 YR 4/1) varicolored; fine to coarse gravels up to 30 centimeter cobbles, well graded, subangular to subrounded, quartzose; low plasticity; up to 30 percent of clay is reworked claystone; caliche deposits surrounding gravel and cobbles; gravels with variable imbrications in upper zone dipping 5 degrees dip west at lower contact; moist to very moist.

SILTY CLAY (CH)[12]: disturbed silty claystone, trace to some sand; moderate yellowish brow (10 YR 5/4), light brown (5 YR 5/6); very fine-grained sand, well sorted, subangular, quartzose; medium plasticity; abundant limonite staining to iron concreted lenses of less than 3 centimeters thick; caliche mottling, veining, and concretions; weathered rafted block of silty claystone; interbedded with 12 centimeter discontinuous lenses of sandy siltstone; moist.

CLAYEY SILTSTONE[13]: trace to some sand; grayish orange (10 YR 7/4), light gray (N 7/0); very fine-grained sand, subangular, well sorted, quartzose; low to medium plasticity; moderately cemented; slightly calcareous; trace iron concretions; damp.

SILTY CLAYSTONE[14]: some sand; olive gray (5 Y 3/2); predominantly fine-grained sand, moderately well sorted, subangular, quartzose; no visible porosity; noncemented; nonfriable; limonite staining; medium to high plasticity; massive; moist.

SANDSTONE[15]: with some silt and trace clay; moderate yellowish brown (10 YR 5/4), light brown (5 YR 5/6); fine- to very fine-grained sand; well sorted; subangular, quartzose; no visible porosity; weakly cemented with limonite and caliche; moderately friable; limonite staining to concretions; caliche mottling to concretions; 3 to 6 centimeter iron cemented lenses; thinly bedded; interbeds of sandy claystone; moist.

SANDY CLAYSTONE[16]: with some silt; yellowish brown (10 YR 5/4), light brown (5 YR 5/6); fine- to very fine-grained sand, well sorted, subangular, quartzose; no visible porosity; noncemented; nonfriable; limonite staining; caliche mottling; interbedded with clayey silty sandstone; fractures filled with limonite; moist.

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FRENCH DRAIN GEOLOGIC CHARACTERIZATION

STATIONS
14 + 00 to 14 + 50
(Sheet 20 of 30)

SANDY CLAY (TOP SOIL) (CL)[1]: with some gravel and trace of silt; grayish brown (5 YR 3/2) to dusky yellowish brown (10 YR 2/2); fine- to coarse-grained sand, well graded, subangular to subrounded, quartzose; fine gravel, poorly graded, subangular to subrounded, quartzose and lithic; non to low plasticity; at times partly to poorly developed blocky texture; trace roots; trace caliche; slightly to moderately calcareous; primarily dry, locally damp.

SILTY CLAY (CH)[2]: with trace sand and gravels; pale reddish brown (10 R 5/4) grayish red (5 R 4/2); light brown (5 YR 5/6), moderate yellowish brown (10 YR 5/4), mottled; fine to coarse gravels up to cobbles, well graded, subangular to subrounded, quartzose; fine- to coarse-grained sand, well graded, subangular to subrounded, quartzose; medium plasticity; 2 to 3 millimeter caliche veining; slightly to moderately calcareous; damp to moist.

CLAY (CH)[3]: with some silt, trace sand and gravels; moderate reddish brown (10 R 4/6); fine to coarse gravels and up to 30 centimeter cobbles, well graded, subangular to subrounded, quartzose; low to high plasticity; caliche encrusting gravel and cobbles; moist.

SILT (ML)[4]: disturbed siltstone, with some clay and sand, grayish brown (5 YR 3/2), moderate brown (5 YR 4/4), olive gray (5 Y 4/1), medium light gray (N 6/0), varicolored; fine to coarse gravels, well graded, subangular, quartzose; fine- to medium-grained sand, moderately graded, subangular to subrounded, quartzose; reworked siltstone; slightly to locally lightly weathered, with some to abundant caliche; medium to low plasticity; moist to very moist.

CLAYEY SILT (ML)[5]: with trace to some sand and trace gravels; grayish brown (5 YR 3/2), moderate brown (5 YR 4/4), olive gray (5 Y 4/1), medium light gray (N 6/0), varicolored; fine to coarse gravels, well graded, subangular, quartzose; fine- to medium-grained sand, moderately graded, subangular to subrounded, quartzose; medium to low plasticity; abundant inclusion of reworked claystone; limonite staining; some caliche deposits; some organic debris near upper contact; poorly developed blocky texture; moist to very moist.

CLAYEY SILTSTONE[6]: trace to some sand; grayish orange (10 YR 7/4); some light gray (N 7/0); very fine-grained sand, subangular, well sorted, quartzose; low to medium plasticity; moderately cemented; slightly calcareous; trace iron concentrations, damp.

SILTY CLAYSTONE[7]: some sand; olive gray (5 Y 3/2) to light olive brown (5 Y 5/6); with dark yellowish orange (10 YR 6/6) mottling and staining/filling along partings; predominantly fine-grained sand, moderately well sorted, subangular, quartzose; medium to high plasticity; dense; homogeneous; waxy; blocky; slightly calcareous, trace dendritic manganese oxide staining; damp.

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FRENCH DRAIN GEOLOGIC CHARACTERIZATION

STATIONS
14 + 50 to 15 + 00
(Sheet 21 of 30)

SANDY CLAY (TOP SOIL) (CL)[1]: with some gravel and trace of silt; grayish brown (5 YR 3/2) to dusky yellowish brown (10 YR 2/2); fine- to coarse-grained sand, well graded, subangular to subrounded, quartzose; fine gravel, poorly graded, subangular to subrounded, quartzose and lithic; non to low plasticity; at times partly to poorly developed blocky texture; trace roots; trace caliche; slightly to moderately calcareous; primarily dry, locally damp.

CLAYEY SILT (ML)[2]: with trace to some sand and gravels; moderate reddish brown (10 R 4/6); fine to coarse gravels, well graded, subangular to subrounded, quartzose; fine- to coarse-grained sands, well graded, subangular to subrounded, quartzose; medium to low plasticity; caliche encrusting gravels; limonite staining; trace roots; damp.

CLAYEY SILT (ML)[3]: with trace to some sand and trace gravels; grayish brown (5 YR 3/2), moderate brown (5 YR 4/4), olive gray (5 Y 4/1), medium light gray (N 6/0), varicolored; fine to coarse gravels, well graded, subangular, quartzose; fine- to medium-grained sand, moderately graded; subangular to subrounded, quartzose; medium to low plasticity; abundant inclusions of claystone; limonite staining; some caliche deposits; some organic debris near upper contact; poorly developed blocky texture; moist to very moist.

CLAY (CH)[4]: with some silt, trace sand and gravels; moderate reddish brown (10 R 4/6); fine to coarse gravels, up to 30 centimeter cobbles, well graded, subangular to subrounded, quartzose; fine- to coarse-grained sand, well graded, subangular to subrounded, quartzose; low to high plasticity; caliche encrusting gravel and cobbles; moist.

CLAY (CH)[5]: disturbed claystone, with trace gravels to cobbles; brownish gray (5 Y 4/1), moderate brown (5 YR 3/4); fine to coarse gravels, up to 30 centimeter cobbles, well graded, subrounded to rounded, quartzose; medium plasticity; disturbed to reworked claystone; slightly calcareous; dry to slightly damp.

SANDY CLAYEY SILTSTONE[6]: olive gray (5 Y 4/1), moderate brown (5 YR 4/4), brownish gray (5 YR 4/1), very fine- to trace medium-grained sand, occasional trace coarse-grained sand, medium gray (N 5/0), moderately poorly sorted, subangular to subrounded, quartzose; no visible

porosity; some thin (3 to 6 centimeters) limonite cemented lenses; moderately friable; scattered iron concentrations; 3 to 30 centimeter interbeds of silty claystone; limonite filling in fractures; damp.

SILTY CLAYSTONE[7]**:** light olive gray (5 Y 6/1), brownish gray (5 Y 4/1); no visible porosity; noncemented; nonfriable; medium plasticity; limonite filling in blocky texture; fractures filled with limonite and manganese oxide; damp.

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FRENCH DRAIN GEOLOGIC CHARACTERIZATION

STATIONS
15 + 00 to 15 + 50
(Sheet 22 of 30)

SANDY CLAY (TOP SOIL) (CL)[1]: with some gravel and trace of silt; grayish brown (5 YR 3/2) to dusky yellowish brown (10 YR 2/2); fine- to coarse-grained sand, well graded, subangular to subrounded, quartzose; fine gravel, poorly graded, subangular to subrounded, quartzose and lithic; non to low plasticity; at times partly to poorly developed blocky texture; trace roots; trace caliche; slightly to moderately calcareous; primarily dry, locally damp.

CLAYEY SILT (ML)[2]: with trace to some sand and gravels; moderate reddish brown (10 R 4/6); fine to coarse gravels, well graded, subangular to subround, quartzose; fine- to coarse-grained sand, well graded, subangular to subrounded, quartzose; medium to low plasticity; caliche encrusting gravels; limonite staining; trace roots; damp.

CLAYEY SAND (SC)[3]: with some silt and gravel; dark reddish brown (10 R 3/4) to moderate reddish brown (10 R 4/6); fine gravel, poorly graded, subrounded to subangular, quartzose and lithic; fine- to coarse-grained sand, well graded, quartzose; high plasticity; trace roots; dry.

CLAYEY SILT (ML)[4]: with trace to some sand and trace gravels; grayish brown (5 YR 3/2), moderate brown (5 YR 4/4); olive gray (5 Y 4/1), medium light gray (N 6/0), varicolored; fine to coarse gravels, well graded, subangular, quartzose; fine- to medium-grained sand, moderately graded, subangular to subrounded, quartzose; medium to low plasticity; abundant inclusions of claystone; limonite staining; some caliche deposits; some organic debris near upper contact; poorly developed blocky texture; moist to very moist.

SILTY CLAY (CH)[5]: with trace sand; light brown (5 YR 6/4) to moderate brown (5 YR 4/4); fine- to medium-grained sand, moderately well graded, subangular to subrounded, quartzose and caliche; high plasticity, moderately calcareous; damp.

SILTY SANDSTONE[6]: with some clay; light gray (N 7/0) to light olive gray (5 Y 6/1); very fine-grained sand, well sorted, poorly graded, subangular, quartzose; calcareous; blocky to poorly developed blocky texture; damp.

SILTY CLAYSTONE[7]: interbedded with silty clayey sandstone; light gray (N 7/0) to light grayish orange (10 YR 7/4); mottled; very fine- to fine-grained sand, subangular to subrounded, quartzose; medium to low plasticity; slightly calcareous; fractures filled with manganese oxide and limonite; damp.

SANDY CLAYEY SILTSTONE[8]: olive gray (5 Y 4/1), moderate brown (5 YR 4/4), brownish gray (5 YR 4/1), medium gray (N 5/0); very fine to trace medium, occasional trace coarse-grained sand, moderately poorly sorted, subangular to subrounded, limonite cemented lenses; moderately friable; scattered iron concentrations; 3 to 30 centimeter intervals of silty claystone; limonite filling in fractures; damp.

SILTY CLAYSTONE[9]: with trace sand; olive gray (5 Y 4/1) to greenish black (5 GY 2/1); mottled; with some fine-grained sand, trace medium- to coarse-grained, poorly sorted, subangular to subrounded, quartzose; no visible porosity; moderately well indurated; well developed blocky texture with limonite staining, grayish range (10 YR 7/4) along partings; dendritic manganese oxide staining, dark gray (N 3/0); trace roots; some to abundant, noncontinuous slickensided shear planes up to 3.2 meters in length; trace, 3 to 8 millimeter, subrounded, iron concretions; trace to some carbonaceous material; damp.

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FRENCH DRAIN GEOLOGIC CHARACTERIZATION

STATIONS
15 + 50 to 16 + 00
(Sheet 23 of 30)

SANDY CLAY (TOPSOIL) (CL)[1]: with some gravel and trace of silt; grayish brown (5 YR 3/2) to dusky yellowish brown (10 YR 2/2); fine gravel, poorly graded, subangular to subrounded, quartzose and lithic; fine- to coarse-grained sand, well graded, subangular to subrounded, quartzose; non to low plasticity; at times platy to poorly developed blocky texture; trace roots; trace caliche; slightly to moderately calcareous; primarily dry, locally damp.

CLAYEY SAND (SC)[2]: with some silt and gravel; dark reddish brown (10 R 3/4) to moderate reddish brown (10 R 4/6); fine gravel, poorly graded, subrounded to subangular, quartzose and lithic; fine- to coarse-grained sand, well graded, quartzose; high plasticity; trace roots; dry; locally grading to gravel with some sand and trace clay.

SILTY CLAY (CL/CH)[3]: with trace to some sand, pale brown (5 YR 2/2) to light olive gray (5 Y 5/2), fine- to medium-grained sand, moderately well graded, subangular to subrounded, quartzose and caliche; high plasticity; moderately calcareous; damp.

SILTY CLAYSTONE[4]: with trace sand; olive gray (5 Y 4/1) to greenish black (5 GY 2/1); mottled; with some fine-grained sand, trace medium- to coarse-grained, poorly sorted, subangular to subrounded, quartzose; no visible porosity; moderately well indurated; well developed blocky texture with limonite staining, grayish orange (10 YR 7/4) along partings; dendritic manganese oxide staining, dark gray (N 3/0); trace roots; trace, 3 to 8 millimeter, subrounded, iron concretions; trace to some carbonaceous material; damp.

SANDY CLAYEY SILTSTONE[5]: olive gray (5 Y 4/1), moderate brown (5 YR 4/4), brownish gray (5 YR 4/1), medium gray (N 5/0); very fine- to trace medium-grained sand, occasional trace coarse-grained sand, moderately poorly sorted, subangular to subrounded, limonite cemented lenses; moderately friable; scattered iron concentrations; 3 to 30 centimeter intervals of silty claystone; limonite filling in fractures; damp.

SILTY CLAYSTONE[6]: with trace sand; olive gray (5 Y 4/1) to greenish black (5 GY 2/1); mottled; fine- to coarse-grained sand, poorly sorted, subangular to subrounded, quartzose; no visible porosity; moderately well indurated; well developed blocky texture with limonite staining,

grayish range (10 YR 7/4) along partings; dendritic manganese oxide staining, dark gray (N 3/0); trace roots; trace, 3 to 8 millimeter, subrounded, iron concretions; trace to some carbonaceous material; damp.

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FRENCH DRAIN GEOLOGIC CHARACTERIZATION

STATIONS
16 + 00 to 16 + 50
(Sheet 24 of 30)

SANDY CLAY (TOP SOIL) (CL)[1]: with some gravel and trace of silt; grayish brown (5 YR 3/2) to dusky yellowish brown (10 YR 2/2); fine gravel, poorly graded, subangular to subrounded, quartzose and lithic; fine- to coarse-grained sand, well graded, subangular to subrounded, quartzose; non to low plasticity; at times platy to poorly developed blocky texture; trace roots; trace caliche; slightly to moderately calcareous; primarily dry, locally damp.

CLAYEY SAND (SC)[2]: with some silt and gravel; dark reddish brown (10 R 3/4) to moderate reddish brown (10 R 4/6); fine gravel, poorly graded, subrounded to subangular, quartzose and lithic; fine- to coarse-grained sand, well graded, quartzose; high plasticity; trace roots; dry.

CLAY (CH)[3]: with some silt and trace sand; pale brown (5 YR 5/2) to light olive gray (5 Y 5/2); mottled; fine- to coarse-grained sand, well graded, subangular to subrounded, quartzose; high plasticity; with randomly oriented, 2 to 5 millimeter caliche veins and blebs, very pale orange (10 YR 8/2) dry.

SILTY CLAY (CL)[4]: with trace to some sand, pale brown (5 YR 2/2) to light olive gray (5 Y 5/2), fine- to medium-grained sand, moderately well graded, subangular to subrounded, quartzose and caliche; high plastic; moderately calcareous; damp.

SILTY CLAYSTONE[5]: with trace sand; olive gray (5 Y 4/1) to greenish black (5 GY 2/1); mottled; fine- to coarse-grained sand, poorly sorted, subangular to subrounded, quartzose; no visible porosity; moderately well indurated; well developed blocky texture with limonite staining, grayish range (10 YR 7/4) along partings; dendritic manganese oxide staining, dark gray (N 3/0); trace, 3 to 8 millimeter, subrounded, iron concretions; trace to some carbonaceous material; damp.

SANDY CLAYEY SILTSTONE[6]: olive gray (5 Y 4/1), moderate brown (5 YR 4/4), brownish gray (5 YR 4/1), medium gray (N 5/0); very fine- to trace medium-grained sand, occasional trace coarse-grained sand, moderately poorly sorted, subangular to subrounded, limonite cemented lenses; moderately friable; scattered iron concentrations; 3 to 30 centimeter intervals of silty claystone; limonite filling in fractures; damp.

SANDY SILTSTONE[7]**:** with trace to some clay; pale yellowish brown (10 YR 6/2) to grayish orange (10 YR 7/4); fine- to medium-grained sand, moderately well sorted; subangular to subrounded; quartzose, with blocky texture; well developed iron laminations; 1 to 2 millimeters, with well developed monoclincal folding to the west at 22 degrees to 34 degrees; limonite staining on partings, with 6 centimeter limonite band at bottom of unit.

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FRENCH DRAIN GEOLOGIC CHARACTERIZATION

STATIONS
16 + 50 to 17 + 00
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SANDY CLAY (TOP SOIL) (CL)[1]: with some gravel and trace of silt; grayish brown (5 YR 3/2) to dusky yellowish brown (10 YR 2/2); fine gravel, poorly graded, subangular to subrounded, quartzose and lithic; fine- to coarse-grained sand, well graded, subangular to subrounded, quartzose; non to low plasticity; at times platy to poorly developed blocky texture; trace roots; trace caliche; slightly to moderately calcareous; primarily dry, locally damp.

CLAYEY SAND (SC)[2]: with some silt and gravel; dark reddish brown (10 R 3/4) to moderate reddish brown (10 R 4/6); fine gravel, poorly graded, subrounded to subangular, quartzose and lithic; fine- to coarse-grained sand, well graded, quartzose; high plasticity; trace roots; dry.

SILTY CLAY (CH)[3]: with trace sand; disturbed silty claystone; olive gray (5 Y 4/1) to medium gray (N 2/0); mottled; fine- to coarse-grained sand, well graded, subangular to subrounded, quartzose; high plasticity clays; dense, poorly developed blocky texture; highly weathered at upper contact becoming less weathered with depth; some iron oxide staining; trace slickensided shear planes; slightly calcareous; dry to damp; locally grading to clay.

CLAY (CH)[4]: with some silt and trace sand; pale brown (5 YR 5/2) to light olive gray (5 Y 5/2); mottled; fine- to coarse-grained sand, well graded, subangular to subrounded, quartzose; high plasticity; randomly oriented, 2 to 5 millimeter caliche veins and blebs, very pale orange (10 YR 8/2) dry.

CLAYEY SANDY SILTSTONE[5]: olive gray (5 Y 4/1); fine- to medium-grained sand, moderately well sorted, subangular to subrounded, quartzose; well developed blocky texture; trace to some limonite along partings; poorly cemented with argillaceous material; friable; damp.

SILTY SANDSTONE[6]: olive gray (5 Y 4/1) to grayish orange (10 YR 7/4); mottled; fine- to medium-grained sand, moderately well sorted, subangular to subrounded, quartzose; trace to some clay; poorly cemented with argillaceous material; friable; well developed blocky texture; trace to some limonite along partings; trace of subrounded iron concretions up to 8 centimeters in length; damp.

SANDY SILTSTONE[7]: with trace to some clay; pale yellowish brown (10 YR 6/2) to grayish orange (10 YR 7/4); fine- to medium-grained sand, moderately well sorted; subangular to subrounded; quartzose, with blocky texture; well developed iron laminations; 1 to 2 millimeters, with well developed monoclincal folding to the west at 22 degrees to 34 degrees; limonite staining on partings, with 6 centimeter limonite band at bottom of unit.

SILTY CLAYSTONE[8]: with trace sand; olive gray (5 Y 4/1) to greenish black (5 GY 2/1); mottled; fine- to coarse-grained sand, poorly sorted, subangular to subrounded, quartzose; no visible porosity; moderately well indurated; well developed blocky texture with limonite staining, grayish range (10 YR 7/4) along partings; dendritic manganese oxide staining, dark gray (N 3/0); trace roots; trace 3 to 8 millimeter, subrounded, iron concretions; trace to some carbonaceous material; damp.

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FRENCH DRAIN GEOLOGIC CHARACTERIZATION

STATIONS
17 + 00 to 17 + 50
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SANDY CLAY (TOP SOIL) (CL)[1]: with some gravel and trace of silt; grayish brown (5 YR 3/2) to dusky yellowish brown (10 YR 2/2); fine gravel, poorly graded, subangular to subrounded, quartzose and lithic; fine- to coarse-grained sand, well graded, subangular to subrounded, quartzose; non to low plasticity; at times platy to poorly developed blocky texture; with roots; traces caliche; slightly to moderately calcareous; primarily dry, locally damp.

CLAYEY SAND (CH)[2]: with some silt and gravel; dark reddish brown (10 R 3/4) to moderate reddish brown (10 R 4/6); fine gravel, poorly graded, subrounded to subangular, quartzose and lithic; fine- to coarse-grained sand, well graded, quartzose; high plasticity; trace roots; dry.

SILTY CLAY (CH)[3]: with trace sand; disturbed silty claystone; olive gray (5 Y 4/1) to medium gray (N 2/0); mottled; fine- to coarse-grained sand, well graded, subangular to subrounded, quartzose; high plasticity; dense, poorly developed blocky texture; highly weathered at upper contact becoming less weathered with depth; some iron oxide staining; trace slickensided shear planes; slightly calcareous; dry to damp; locally grading to clay.

CALICHE ZONE[4]: sandy clay and gravel (CL/GW); white (N 9/0); fine to coarse gravel to 30 centimeter cobbles, well graded, subangular to subround, quartzose; fine- to coarse-grained sand, well graded, subangular to subround, quartzose; non to low plasticity; predominant matrix is caliche and clay; dry.

SANDY CLAY (CL/CH)[5]: with trace gravel and trace silt, pale reddish brown (10 R 5/54) to dark reddish brown (10 R 3/4); fine to coarse gravels and cobbles, well graded, subangular to subrounded, quartzose and lithic; fine- to coarse-grained sand, well graded, subangular to subrounded, quartzose and lithic; medium to high plastic clays; trace mica, partially cemented with caliche; slightly to moderately calcareous; dry; locally grading to clay, grading to gravelly sandy clay locally and at borders, with some 3 to 6 millimeter randomly oriented caliche filled fractures.

CLAYEY SANDY SILTSTONE[6]: olive gray (5 Y 4/1); fine- to medium-grained sand, moderately well sorted, subangular to subrounded, quartzose; homogeneous; poorly cemented

with argillaceous material; well developed blocky texture; trace to some limonite along partings; friable; damp.

SILTY SANDSTONE[7]**:** olive gray (5 Y 4/1) to grayish orange (10 YR 7/4); mottled; fine- to medium-grained sand, moderately well sorted, subangular to subrounded, quartzose; trace to some clay; poorly cemented with argillaceous material; friable; well developed blocky texture; trace to some limonite along partings; trace subrounded iron concretions up to 8 centimeters in length; damp.

SILTY CLAYSTONE[8]**:** with trace sand; olive gray (5 Y 4/1) to greenish black (5 GY 2/1); mottled; fine- to coarse-grained sand, poorly sorted, subangular to subrounded, quartzose; no visible porosity; moderately well indurated; well developed blocky texture with limonite staining along partings; dendritic manganese oxide staining; trace 3 to 8 millimeter subrounded iron concretions; trace to some carbonaceous material; damp.

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FRENCH DRAIN GEOLOGIC CHARACTERIZATION

STATIONS
17 + 50 to 18 + 00
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SANDY CLAY (TOP SOIL) (CL)[1]: with some gravel and trace of silt; grayish brown (5 YR 3/2) to dusky yellowish brown (10 YR 2/2); fine gravel, poorly graded, subangular to subrounded, quartzose and lithic; fine- to coarse-grained sand, well graded, subangular to subrounded, quartzose; non to low plasticity; at times platy to poorly developed blocky texture; trace roots; traces caliche; slightly to moderately calcareous; primarily dry, locally damp.

GRAVELLY SANDY CLAY (CH)[2]: with trace silt; grayish brown (5 YR 3/2) to dark reddish brown (10 R 3/4), at times dusky yellowish brown (10 YR 4/2); mottled; fine gravel, subangular to angular, poorly graded, quartzose and lithic gravel; fine- to coarse-grained sand, well graded, subangular to angular, quartzose and lithic; high plasticity; 1 to 3 millimeters, randomly oriented, white (N 9/0), caliche filled veins, white caliche also occurs in up to 6 centimeter ellipsoid scattered blebs, caliche is poorly cemented, powdery; trace roots; slightly to moderately calcareous; dry to damp.

SILTY CLAY (CH)[3]: with trace sand; reworked silty claystone; olive gray (5 Y 4/1) to medium gray (N 2/0); mottled; fine- to coarse-grained sand; well graded, subangular to subrounded, quartzose; high plasticity; poorly developed blocky texture; highly weathered at upper contact becoming less weathered with depth; some iron oxide staining; trace slickensided shear planes; slightly calcareous; dry to damp; locally grading to clay.

CALICHE ZONE[4]: sandy clay and gravel (CL/GW); white (N 9/0); fine to coarse gravel to 30 centimeter cobbles, well graded, subangular to subround, quartzose; fine- to coarse-grained sand, well graded, subangular to subround, quartzose; non to low plasticity; predominant matrix is caliche and clay; dry.

SANDY CLAY (CL/CH)[5]: with trace gravel and trace silt, pale reddish brown (10 R 5/4) to dark reddish brown (10 R 3/4); fine to course gravels and cobbles, well graded, subangular to subrounded, quartzose and lithic; fine- to coarse-grained sand, well graded, subangular to subrounded, quartzose and lithic; medium to high plasticity; trace mica, partially cemented with caliche; slightly to moderately calcareous; dry; locally grading to clay, grading to gravelly sandy

clay locally and at borders of unit, with some 3 to 6 millimeter randomly oriented caliche filled fractures.

CLAYEY SANDY SILTSTONE[6]**:** olive gray (5 Y 4/1); fine- to medium-grained sand, moderately well sorted, subangular to subrounded, quartzose; homogenous, well developed blocky texture; trace to some limonite along partings; poorly cemented with argillaceous material; friable; damp.

SILTY CLAYSTONE[7]**:** with trace sand; olive gray (5 Y 4/1) to greenish black (5 GY 2/1); mottled; fine- to coarse-grained sand, poorly sorted, subangular to subrounded, quartzose; no visible porosity; moderately well indurated; well developed blocky texture with limonite staining along partings; dendritic manganese oxide staining; some to abundant noncontinuous slickensided shear planes up to 3.2 meters in length; trace 3 to 8 millimeter subrounded iron concretions; trace to some carbonaceous material; damp.

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FRENCH DRAIN GEOLOGIC CHARACTERIZATION

STATIONS
18 + 00 to 18 + 50
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SANDY CLAY (TOP SOIL) (CL)[1]: with some gravel and trace of silt; grayish brown (5 YR 3/2) to dusky yellowish brown (10 YR 2/2); fine gravel, poorly graded, subangular to subrounded, quartzose and lithic; fine- to coarse-grained sand, well graded, subangular to subrounded, quartzose; non to low plasticity; at times platy to poorly developed blocky texture; trace roots; trace caliche; slightly to moderately calcareous; primarily dry, locally damp.

GRAVELLY SANDY CLAY (CH)[2]: with trace silt; grayish brown (5 YR 3/2) to dark reddish brown (10 R 3/4), at times dusky yellowish brown (10 YR 4/2); mottled; fine gravel, subangular to angular, poorly graded, quartzose and lithic gravel; fine- to coarse-grained sand, well graded, subangular to angular, quartzose and lithic; high plasticity; white (N 9/0), caliche filled veins, 1 to 3 millimeters, randomly oriented, white caliche also occurs in up to 6 centimeter ellipsoid scattered blebs, caliche is poorly cemented, powdery; trace roots; slightly to moderately calcareous; dry to damp.

SILTY CLAY (CH)[3]: with trace sand; disturbed silty claystone; olive gray (5 Y 4/1) to medium gray (N 2/0); mottled; fine- to coarse-grained sand, well graded, subangular to subrounded, quartzose; high plasticity; dense; poorly developed blocky texture; highly weathered at upper contact becoming less weathered with depth; some iron oxide staining; trace slickensided shear planes; slightly calcareous; dry to damp; locally grading to clay.

CALICHE ZONE[4]: sandy clay and gravel (CL/GW); white (N 9/0); fine to coarse gravel to 30 centimeter cobbles, well graded, subangular to subround, quartzose; fine- to coarse-grained sand, well graded, subangular to subround, quartzose; non to low plasticity; predominant matrix is caliche and clay; dry.

SANDY CLAY (CL/CH)[5]: with trace gravel and trace silt; pale reddish brown (10 R 5/4) to dark reddish brown (10 R 3/4); fine to coarse gravels and cobbles, well graded, subangular to subrounded, quartzose and lithic; fine- to coarse-grained sand, well graded, subangular to subrounded, quartzose and lithic; medium to high plasticity; trace mica, partially cemented with caliche; slightly to moderately calcareous; dry; locally grading to clay; grading to gravelly sandy

clay locally and at borders of unit, with some 3 to 6 millimeter, randomly oriented, caliche filled fractures.

SILTY CLAY (CH)[6]: with trace sand; light brown (5 YR 6/4) to moderate brown (5 YR 4/4); fine- to medium-grained sand, moderately well graded, subangular to subrounded, quartzose and caliche; high plasticity; moderately calcareous, damp.

CLAY (CH)[7]: with trace to some silt, trace gravels and cobbles; clay is disturbed claystone; olive gray (5 Y 4/1) to greenish black (5 GY 2/1); mottled; fine to coarse gravels to cobbles, well graded, subangular to subrounded, lithic and quartzose; high plasticity, poorly developed blocky texture; limonite staining, grayish orange (10 YR 7/4), along partings, some dendritic manganese oxide staining; trace roots; 1 to 4 millimeters, randomly oriented caliche filled veins, pinkish gray (5 YR 8/1) to bluish white (5 B 9/1), trace up to 9 centimeters; caliche blebs, 1 to 3 millimeter caliche borders around gravels and cobbles; predominantly damp to dry; locally moist around gravels and cobbles; abundant stacked slickensided shear planes near upper contact diminishing towards bottom contact; highly weathered.

SILTY CLAYSTONE[8]: with trace sand; olive gray (5 Y 4/1) to greenish black (5 GY 2/1); mottled; fine- to coarse-grained sand, poorly sorted, subangular to subrounded, quartzose; no visible porosity; moderately well indurated; well developed blocky texture with limonite staining along partings; dendritic manganese oxide staining; some to abundant, noncontinuous slickensided shear planes up to 3.2 meters in length; trace, 3 to 8 millimeter subrounded iron concretions; trace to some carbonaceous material; damp.

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FRENCH DRAIN GEOLOGIC CHARACTERIZATION

STATIONS
18 + 50 to 19 + 00
(Sheet 29 of 30)

SANDY CLAY (TOP SOIL) (CL)[1]: with some gravel and trace of silt; grayish brown (5 YR 3/2) to dusky yellowish brown (10 YR 2/2); fine gravel, poorly graded, subangular to subrounded, quartzose and lithic; fine- to coarse-grained sand, well graded, subangular to subrounded, quartzose, non to low plasticity, at times platy to poorly developed blocky texture; trace roots; trace caliche; slightly to moderately calcareous; primarily dry, locally damp.

GRAVELLY SANDY CLAY (CH)[2]: with trace silt; grayish brown (5 YR 3/2) to dark reddish brown (10 R 3/4), at times dusky yellowish brown (10 YR 4/2); mottled; fine gravel, subangular to angular, poorly graded, quartzose and lithic gravel; fine- to coarse-grained sand, well graded, subangular to angular, quartzose and lithic; high plasticity; white (N 9/0) caliche filled veins, 1 to 3 millimeters, randomly oriented, white caliche also occurs in up to 6 centimeter ellipsoid scattered blebs, caliche is poorly cemented, powdery; trace roots; slightly to moderately calcareous; dry to damp.

CLAY (CH)[3]: with trace to some silt, trace gravels and cobbles, clay is disturbed claystone; olive gray (5 Y 4/1) to greenish black (5 GY 2/1); mottled; fine to coarse gravels to cobbles, well graded, subangular to subrounded, lithic and quartzose; high plasticity, poorly developed blocky texture; limonite staining, grayish orange (10 YR 7/4), along partings, some dendritic manganese oxide staining; trace roots; 1 to 4 millimeters randomly oriented caliche filled veins, pinkish gray (5 YR 8/1) to bluish white (5 B 9/1), trace up to 9 centimeter caliche blebs with 1 to 3 millimeter caliche borders around gravels and cobbles, predominantly damp to dry, locally moist around gravels and cobbles; abundant stacked slickensided shear planes near upper contact, diminishing towards bottom contact, highly weathered.

SILTY CLAY (CH)[4]: with trace sand, light brown (5 YR 6/4) to moderate brown (5 YR 4/4); fine- to medium-grained sand, moderately well graded, subangular to subrounded, quartzose and caliche; high plasticity; moderately calcareous; damp.

SILTY CLAYSTONE[5]: olive gray (5 Y 4/1) to greenish black (5 GY 2/1); mottled; no visible porosity; moderately well indurated; well developed blocky texture with limonite staining along partings; dendritic manganese oxide staining dark gray (N 3/0); some to abundant, noncontinuous

slickensided shear planes up to 3.2 meters in length; trace, 3 to 8 millimeter, subrounded iron concretions; trace to some carbonaceous material; damp.

881 HILLSIDE AREA
FRENCH DRAIN GEOLOGIC CHARACTERIZATION

STATIONS
19 + 00 to 19 + 35
(Sheet 30 of 30)

SANDY CLAY (TOP SOIL) (CL)[1]: with some gravel and trace of silt; grayish brown (5 YR 3/2) to dusky yellowish brown (10 YR 2/2); fine gravel, poorly graded, subangular to subrounded, quartzose and lithic; fine- to coarse-grained sand, well graded, subangular to subrounded, quartzose; non to low plasticity; at times platy to poorly developed blocky texture; trace roots; trace caliche; slightly to moderately calcareous; primarily dry, locally damp.

GRAVELLY SANDY CLAY (CH)[2]: with trace silt; grayish brown (5 YR 3/2) to dark reddish brown (10 R 3/4), at times dusky yellowish brown (10 YR 4/2); mottled; fine gravel, subangular to angular, poorly graded, quartzose and lithic gravel; fine- to coarse-grained sand, well graded, subangular to angular, quartzose and lithic; high plasticity; 1 to 3 millimeters, randomly oriented, white (N 9/0), caliche filled veins, white caliche also occurs in up to 0.3 feet ellipsoid scattered blebs, caliche is poorly cemented, powdery; trace roots; slightly to moderately calcareous; dry to damp.

CLAY (CH)[3]: with trace to some silt, trace gravels and cobbles; disturbed claystone, olive gray (5 Y 4/1) to greenish black (5 GY 2/1); mottled; fine to coarse gravels to cobbles, well graded, subangular to subrounded, lithic and quartzose; high plasticity, poorly developed blocky texture; limonite staining, grayish orange (10 YR 7/4), along partings, some dendritic manganese oxide staining, dark gray (N 2/0); trace roots; 1 to 4 millimeters randomly oriented caliche filled veins, pinkish gray (5 YR 8/1) to bluish white (5 B 9/1), trace up to 9 centimeter caliche blebs with 1 to 3 millimeter caliche encrustations around gravels and cobbles; predominantly damp to dry, locally moist around gravels and cobbles; abundant stacked slickensided shear planes near upper contact; diminishing towards bottom contact, highly weathered; clay is disturbed claystone.

SILTY CLAYSTONE[4]: with trace sand; olive gray (5 Y 4/1) to greenish black (5 GY 2/1); mottled; fine- to coarse-grained sand, poorly sorted, subangular to subrounded, quartzose; no visible porosity; moderately well indurated; well developed blocky texture with limonite staining along partings; dendritic manganese oxide staining, dark gray (N 3/0); trace roots; some to abundant, noncontinuous slickensided shear planes up to 3.2 meters in length; trace, 3 to 8 millimeter, subrounded, iron concretions; trace to some carbonaceous material; damp.

ATTACHMENT A4-2
GEOLOGIC CROSS SECTIONS

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT **Weston**

JOB NO. 2066-03

BORING NO.	5+00	SAMPLED	Rocky Flats
DEPTH	43'	DATE TESTED	04-14-92 TNU
SAMPLE NO.	#18	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan	(g)	35.05
Wt. Dry Soil & Pan	(g)	34.19
Wt. Lost Moisture	(g)	0.86
Wt. of Pan Only	(g)	3.66
Wt. of Dry Soil	(g)	30.53
Moisture Content	%	2.8

Wt. Hydrom. Sample Wet	(g)	55.07
Wt. Hydrom. Sample Dry	(g)	53.56

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	466.22
Weight of + #10 Before Washing (g)	50.35
Weight of + #10 After Washing (g)	36.58
Weight of - #10 Wet (g)	415.87
Weight of - #10 Dry (g)	417.87
Wt. Total Sample Dry (g)	454.45
Calc. Wt. "W" (g)	58.25
Calc. Mass + #10	4.69

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	8.39	8.39	8.39	1.8	98.2
3/8"	0.00	10.22	10.22	18.61	4.1	95.9
#4	0.00	9.22	9.22	27.83	6.1	93.9
#10	0.00	8.75	8.75	36.58	8.0	92.0
#20	1.55	3.21	1.66	1.66	10.9	89.1
#40	1.55	3.15	1.60	3.26	13.6	86.4
#60	1.56	3.21	1.65	4.91	16.5	83.5
#100	1.56	4.04	2.48	7.39	20.7	79.3
#230	1.57	6.56	4.99	12.38	29.3	70.7

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT **Weston** JOB NO. 2066-03

BORING NO.	5+00	SAMPLED	Rocky Flats
DEPTH	43'	DATE TESTED	04-14-92 TNU
SAMPLE NO.	#18	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

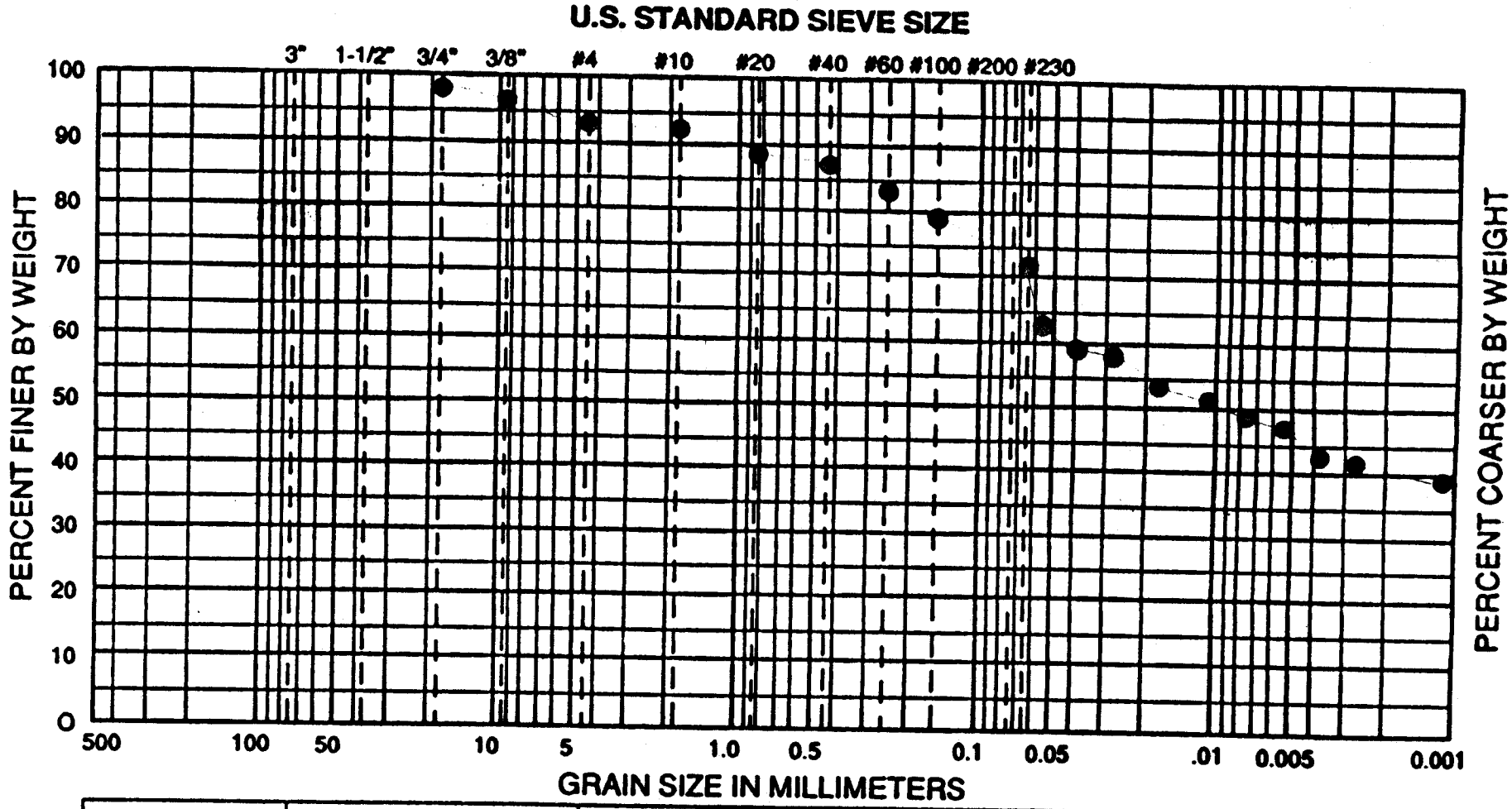
Hydrometer #	ASTM 152 H	Temp., Deg. C	23.0
Sp. Gr. of Soil	2.73	Temp. Coef. K	0.01286
Value of "a"	0.98	Wt. Dry Sample "W"	58.253
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	5.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	43.00	37.00	62.5	62.5	9.24	0.0553
1.0	41.00	35.00	59.1	59.1	9.57	0.0398
2.0	40.50	34.50	58.3	58.3	9.65	0.0282
5.0	38.00	32.00	54.1	54.1	10.06	0.0182
15.0	36.00	30.00	50.7	50.7	10.39	0.0107
30.0	35.00	29.00	49.0	49.0	10.55	0.0076
60.0	34.00	28.00	47.3	47.3	10.71	0.0054
120.0	32.00	26.00	43.9	43.9	11.04	0.0039
250.0	30.50	24.50	41.4	41.4	11.29	0.0027
1440.0	29.50	23.50	39.7	39.7	11.45	0.0011

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING inc



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY
		COARSE	FINE	COARSE	MEDIUM	FINE	

WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 5+00 SAMPLE NO.: CH# 18 DATE: 4-17-92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION
Rocky Flats	43.0'	Clay (clt) w/some silt and sand, trace gravel. 1.8% c. gvl, 4.3% f. gvl / 1.9% c sd, 5.6% med sd, 13.9% f sd / 25.5% silt 47% clay

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION _____

LABORATORY CLASSIFICATION _____

JOB NO. 2-46-03
CLIENT/OWNER WESTON
LOCATION ROCKY FLATS / EG&G
BORING 5700 SAMPLE CH #18 DEPTH 43.0'

FIELD DENSITY BY ___/__/__

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

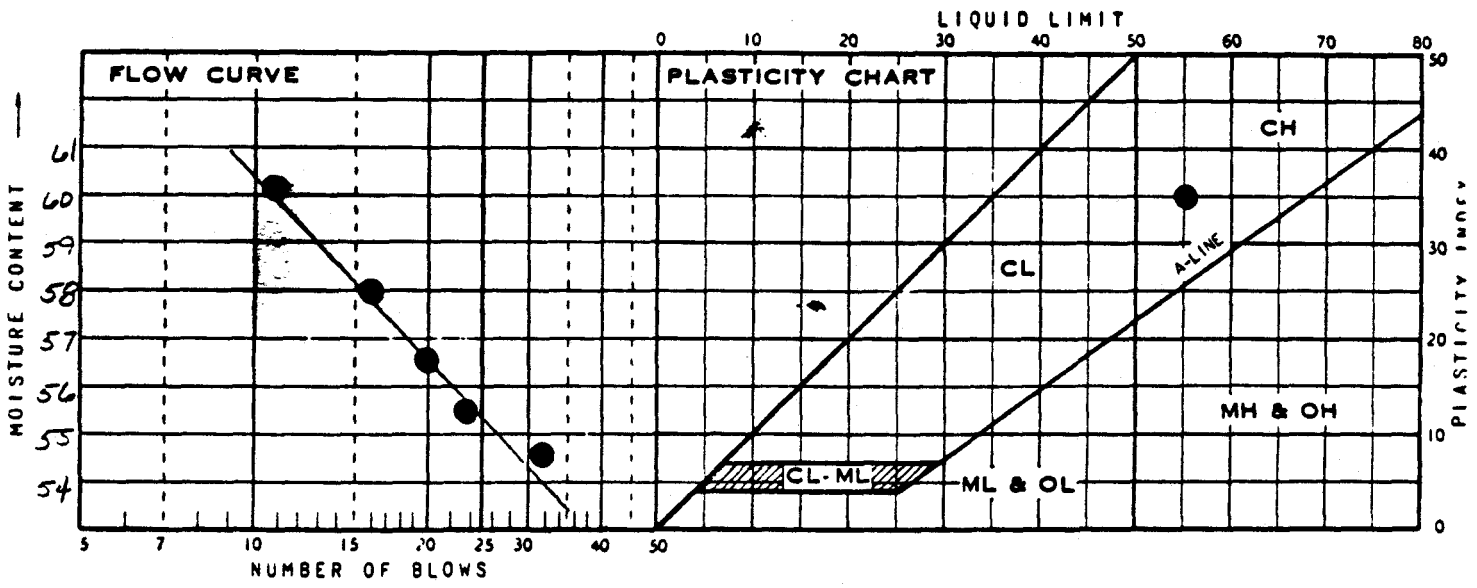
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY SB 4/14/92

DETERMINATION	1	2	3	4	5	6
DISH	B32	32C	2072			
WT OF DISH + WET SOIL	4.55	4.31	3.91			
WT OF DISH + DRY SOIL	3.97	3.77	3.42	—	—	—
WT OF MOISTURE	.58	.54	.49			
WT OF DISH	1.04	1.06	1.05	—	—	—
WT OF DRY SOIL	2.93	2.71	2.37			
MOISTURE CONTENT %	19.8	19.9	20.7			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	B13	2046	19C	B31	B3	
NUMBER OF BLOWS	32	24	20	16	11	
WT OF DISH + WET SOIL	12.23	11.48	12.58	11.64	15.29	
WT OF DISH + DRY SOIL	8.96	7.76	8.41	7.75	9.93	—
WT OF MOISTURE	4.32	3.72	4.17	3.89	5.36	
WT OF DISH	1.05	1.06	1.04	1.04	1.03	—
WT OF DRY SOIL	7.91	6.70	7.37	6.71	8.90	
MOISTURE CONTENT %	54.6	55.5	56.6	58.0	60.2	



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		55.3	20.1	35.2	CH	

ADVANCED TERRA TESTING INC

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT **Weston**

JOB NO. 2066-03

BORING NO.	5+00	SAMPLED	Rocky Flats
DEPTH	57'	DATE TESTED	04-15-92 TNU
SAMPLE NO.	#18	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC	Yes	
NATURAL	No	
Wt. Wet Soil & Pan	(g)	39.86
Wt. Dry Soil & Pan	(g)	38.98
Wt. Lost Moisture	(g)	0.88
Wt. of Pan Only	(g)	3.83
Wt. of Dry Soil	(g)	35.15
Moisture Content	%	2.5
Wt. Hydrom. Sample Wet	(g)	55.01
Wt. Hydrom. Sample Dry	(g)	53.67

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	611.13
Weight of + #10 Before Washing (g)	5.20
Weight of + #10 After Washing (g)	3.05
Weight of - #10 Wet (g)	605.93
Weight of - #10 Dry (g)	593.23
Wt. Total Sample Dry (g)	596.28
Calc. Wt. "W" (g)	53.94
Calc. Mass + #10	0.28

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	0.00	0.00	0.00	0.0	100.0
#4	0.00	0.49	0.49	0.49	0.1	99.9
#10	0.00	2.56	2.56	3.05	0.5	99.5
#20	1.55	1.94	0.39	0.39	1.2	98.8
#40	1.55	1.91	0.36	0.75	1.9	98.1
#60	1.56	1.97	0.41	1.16	2.7	97.3
#100	1.56	2.77	1.21	2.37	4.9	95.1
#230	1.58	4.91	3.33	5.70	11.1	88.9

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT **Weston**

JOB NO. 2066-03

BORING NO.	5+00	SAMPLED	Rocky Flats
DEPTH	57'	DATE TESTED	04-15-92 TNU
SAMPLE NO.	#18	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

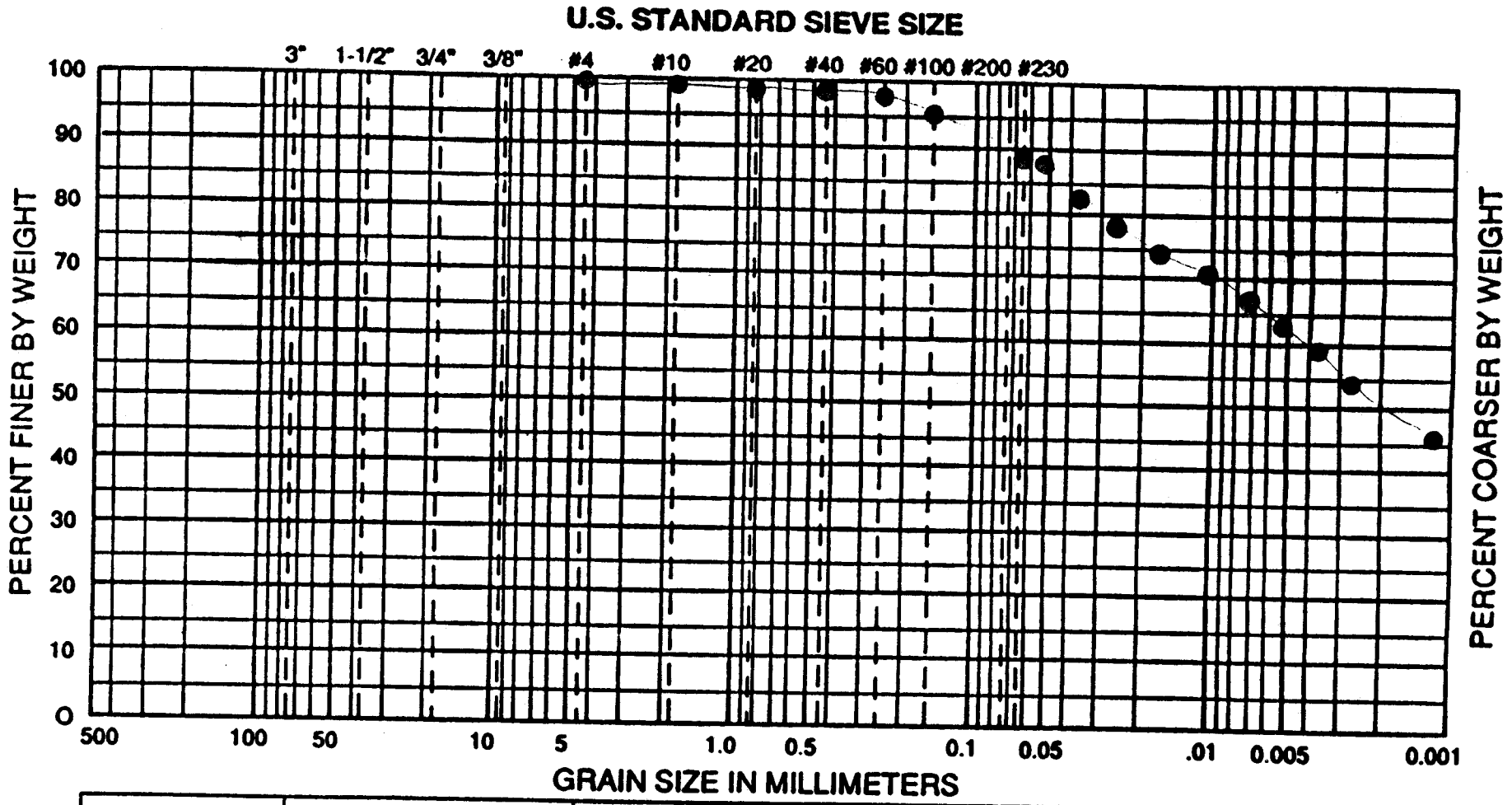
Hydrometer #	ASTM 152 H	Temp., Deg. C	22.0
Sp. Gr. of Soil	2.73	Temp. Coef. K	0.01301
Value of "a"	0.98	Wt. Dry Sample "W"	53.944
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	4.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	53.00	48.00	87.6	87.6	7.60	0.0507
1.0	50.00	45.00	82.1	82.1	8.09	0.0370
2.0	48.00	43.00	78.4	78.4	8.42	0.0267
5.0	46.00	41.00	74.8	74.8	8.75	0.0172
15.0	43.50	38.50	70.2	70.2	9.16	0.0102
30.0	41.50	36.50	66.6	66.6	9.48	0.0073
60.0	39.50	34.50	62.9	62.9	9.81	0.0053
120.0	37.50	32.50	59.3	59.3	10.14	0.0038
250.0	35.00	30.00	54.7	54.7	10.55	0.0027
1440.0	30.00	25.00	45.6	45.6	11.37	0.0012

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY			
		COARSE	FINE	COARSE	MEDIUM	FINE				
WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 5+00 SAMPLE NO.: CH # 18 DATE: 4-17-92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION
Rocky Flats	57.0'	Silty Clay (CH) with some silt trace gravel. .1% fine gravel / .4% coarse sand, 1.4% medium sand, 9.1% f sand / 26.5% silt / 62.5% clay

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION - - - - - - - - - - - - - - -

LABORATORY CLASSIFICATION - - - - - - - - - - - - -

JOB NO. 2066-03

CLIENT/OWNER Wilston

LOCATION Rocky Flats / EG&G

BORING 5+00 SAMPLE #18 DEPTH @ 57.0'

FIELD DENSITY BY ../../..

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD [redacted]

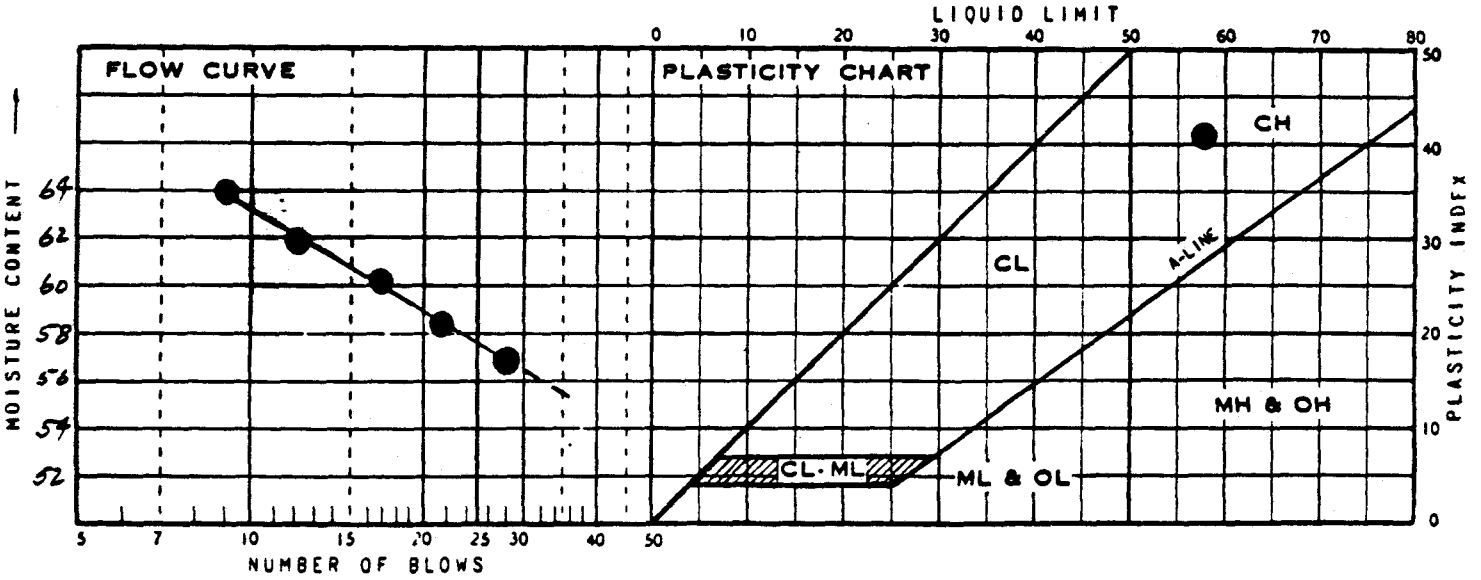
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY [illegible] 4/15/92

DETERMINATION	1	2	3	4	5	6
DISH	156	136	28C			
WT OF DISH + WET SOIL g	6.06	6.74	5.78			
WT OF DISH + DRY SOIL g	5.36	5.94	5.08	—	—	—
WT OF MOISTURE g	0.70	0.80	0.70			
WT OF DISH g	1.05	1.03	1.06	—	—	—
WT OF DRY SOIL g	4.31	4.91	4.02			
MOISTURE CONTENT %	16.2	16.3	17.4	= 49.9/3 =	16.6	

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	42C	43C	B12	21C	2053	2024
NUMBER OF BLOWS	36+	28	21	17	12	9-
WT OF DISH + WET SOIL g	14.45	18.35	16.41	16.03	17.55	14.42
WT OF DISH + DRY SOIL g	9.79	12.07	10.74	10.40	11.24	9.21
WT OF MOISTURE g	4.66	6.28	5.67	5.63	6.31	5.21
WT OF DISH g	1.05	1.04	1.04	1.05	1.05	1.06
WT OF DRY SOIL g	8.74	11.03	9.70	9.35	10.19	8.15
MOISTURE CONTENT %	53.3	56.9	58.5	60.2	61.9	63.9



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		57.6	16.6	41.0	CH	

ADVANCED TERRA TESTING INC

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	5+00	SAMPLED	Rocky Flats
DEPTH	62.5'	DATE TESTED	04-14-92 TNU
SAMPLE NO.	#18	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan	(g)	57.90
Wt. Dry Soil & Pan	(g)	56.38
Wt. Lost Moisture	(g)	1.52
Wt. of Pan Only	(g)	3.78
Wt. of Dry Soil	(g)	52.60
Moisture Content	%	2.9

Wt. Hydrom. Sample Wet (g)	55.01
Wt. Hydrom. Sample Dry (g)	53.46

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	55.01
Weight of + #10 Before Washing (g)	0.00
Weight of + #10 After Washing (g)	0.00
Weight of - #10 Wet (g)	55.01
Weight of - #10 Dry (g)	53.46
Wt. Total Sample Dry (g)	53.46
Calc. Wt. "W" (g)	53.46
Calc. Mass + #10	0.00

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	0.00	0.00	0.00	0.0	100.0
#4	0.00	0.00	0.00	0.00	0.0	100.0
#10	0.00	0.00	0.00	0.00	0.0	100.0
#20	1.56	1.59	0.03	0.03	0.1	99.9
#40	1.56	1.61	0.05	0.08	0.1	99.9
#60	1.56	1.60	0.04	0.12	0.2	99.8
#100	1.31	1.38	0.07	0.19	0.4	99.6
#230	1.58	1.81	0.23	0.42	0.8	99.2

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT **Weston**

JOB NO. 2066-03

BORING NO.	5+00	SAMPLED	Rocky Flats
DEPTH	62.5'	DATE TESTED	04-14-92 TNU
SAMPLE NO.	#18	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

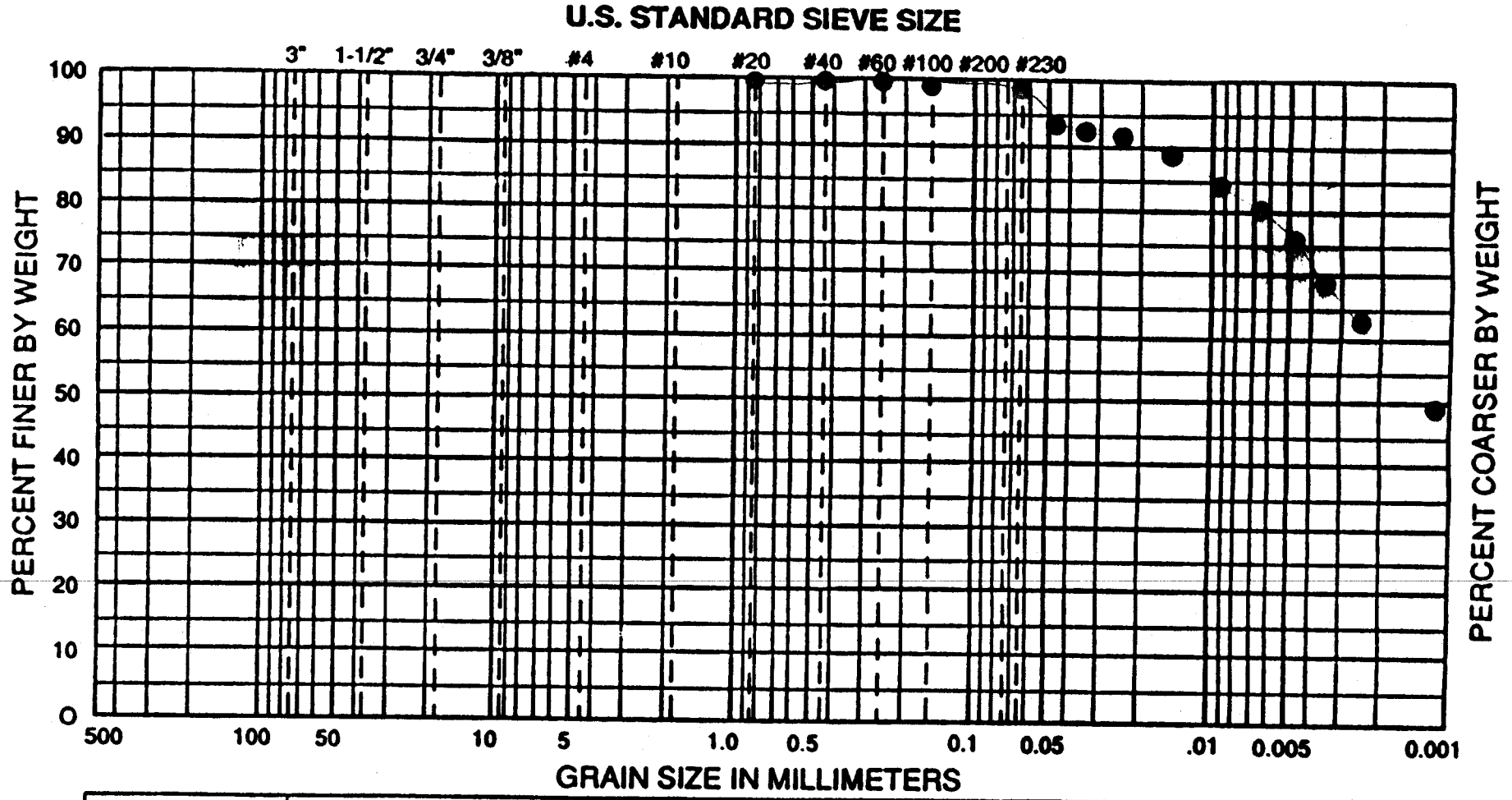
Hydrometer #	ASTM 152 H	Temp., Deg. C	23.0
Sp. Gr. of Soil	2.73	Temp. Coef. K	0.01286
Value of "a"	0.98	Wt. Dry Sample "W"	53.462
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	5.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	57.00	51.00	93.9	93.9	6.94	0.0479
1.0	56.00	50.00	92.0	92.0	7.11	0.0343
2.0	55.75	49.75	91.6	91.6	7.15	0.0243
5.0	54.50	48.50	89.3	89.3	7.35	0.0156
15.0	52.00	46.00	84.7	84.7	7.76	0.0093
30.0	49.50	43.50	80.1	80.1	8.17	0.0067
60.0	47.00	41.00	75.5	75.5	8.58	0.0049
120.0	43.50	37.50	69.0	69.0	9.16	0.0036
250.0	40.00	34.00	62.6	62.6	9.73	0.0025
1440.0	33.00	27.00	49.7	49.7	10.88	0.0011

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY			
		COARSE	FINE	COARSE	MEDIUM	FINE				
WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 5+00 SAMPLE NO.: CH #18 DATE: 4-17-92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION
Rocky Flats	62.5'	CH Clay w/ some silt and trace sand. 1% med. sd, 0.7% fine sand / 23.2% silt, 76% clay

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION - - - - - - - - - - - - - - -

LABORATORY CLASSIFICATION - - - - - - - - - - - -

JOB NO. 2066-03
CLIENT/OWNER Weston
LOCATION Rocky Flats
BORING 5-00 SAMPLE CH #18 DEPTH 62.5'

FIELD DENSITY BY ...../...../.....

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

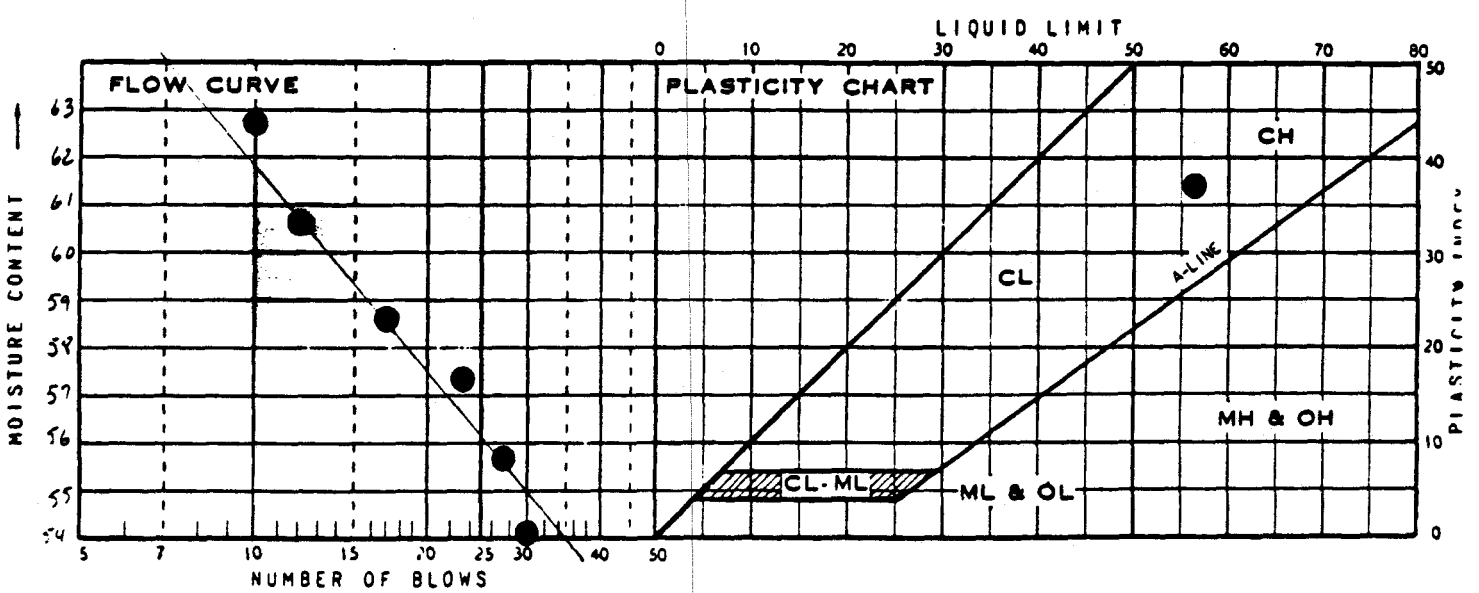
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY AM 4/15/92

DETERMINATION	1	2	3	4	5	6
DISH	2008	2023	9C			
WT OF DISH + WET SOIL g	6.50	7.23	5.25			
WT OF DISH + DRY SOIL g	5.64	6.23	4.58	—	—	—
WT OF MOISTURE g	.86	1.00	.67			
WT OF DISH g	1.07	1.06	1.08	—	—	—
WT OF DRY SOIL g	4.57	5.17	3.50			
MOISTURE CONTENT %	18.8	19.3	19.1			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	44C	2037	8C	B34	2002	B47
NUMBER OF BLOWS	30	27	23	17	12	10
WT OF DISH + WET SOIL g	12.52	11.74	11.46	11.46	12.37	10.95
WT OF DISH + DRY SOIL g	8.49	7.92	7.66	7.60	8.10	7.13
WT OF MOISTURE g	4.03	3.82	3.40	3.86	4.27	3.82
WT OF DISH g	1.04	1.06	1.04	1.02	1.06	1.05
WT OF DRY SOIL g	7.45	6.86	6.62	6.58	7.04	6.08
MOISTURE CONTENT %	54.1	55.7	57.4	58.7	60.7	62.8



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		56.1	19.1	37.0	CH	

ADVANCED TERRA TESTING inc

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MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO. 5+25
DEPTH 32'
SAMPLE NO. #18
SOIL DESCR. Bulk (Jar)

SAMPLED Rocky Flats
DATE TESTED 04-15-92 TNU
WASH SIEVE Yes
DRY SIEVE No

MOISTURE DATA

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan	(g)	43.71
Wt. Dry Soil & Pan	(g)	43.24
Wt. Lost Moisture	(g)	0.47
Wt. of Pan Only	(g)	3.74
Wt. of Dry Soil	(g)	39.50
Moisture Content	%	1.2

Wt. Hydrom. Sample Wet (g)	55.01
Wt. Hydrom. Sample Dry (g)	54.36

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	729.39
Weight of + #10 Before Washing (g)	154.87
Weight of + #10 After Washing (g)	146.00
Weight of - #10 Wet (g)	574.52
Weight of - #10 Dry (g)	576.53
Wt. Total Sample Dry (g)	722.53
Calc. Wt. "W" (g)	68.13
Calc. Mass + #10	13.77

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	64.19	64.19	64.19	8.9	91.1
#4	0.00	38.10	38.10	102.29	14.2	85.8
#10	0.00	43.71	43.71	146.00	20.2	79.8
#20	1.31	4.10	2.79	2.79	24.3	75.7
#40	1.55	5.63	4.08	6.87	30.3	69.7
#60	1.57	5.34	3.77	10.64	35.8	64.2
#100	1.56	6.52	4.96	15.60	43.1	56.9
#230	1.55	9.34	7.79	23.39	54.5	45.5

CLAYEY SAND (SC)

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	5+25	SAMPLED	Rocky Flats
DEPTH	32'	DATE TESTED	04-15-92 TNU
SAMPLE NO.	#18	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

Hydrometer #	ASTM 152 H	Temp., Deg. C	22.0
Sp. Gr. of Soil	2.69	Temp. Coef. K	0.01316
Value of "a"	0.99	Wt. Dry Sample "W"	68.131
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	4.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	35.00	30.00	43.7	43.7	10.55	0.0605
1.0	32.50	27.50	40.0	40.0	10.96	0.0436
2.0	31.50	26.50	38.6	38.6	11.12	0.0310
5.0	29.50	24.50	35.7	35.7	11.45	0.0199
15.0	27.00	22.00	32.0	32.0	11.86	0.0117
30.0	26.50	21.50	31.3	31.3	11.94	0.0083
60.0	24.00	19.00	27.7	27.7	12.35	0.0060
120.0	23.50	18.50	26.9	26.9	12.44	0.0042
250.0	22.00	17.00	24.8	24.8	12.68	0.0030
1440.0	20.00	15.00	21.8	21.8	13.01	0.0013

Grain Diameter = K*(SQRT(L/T))

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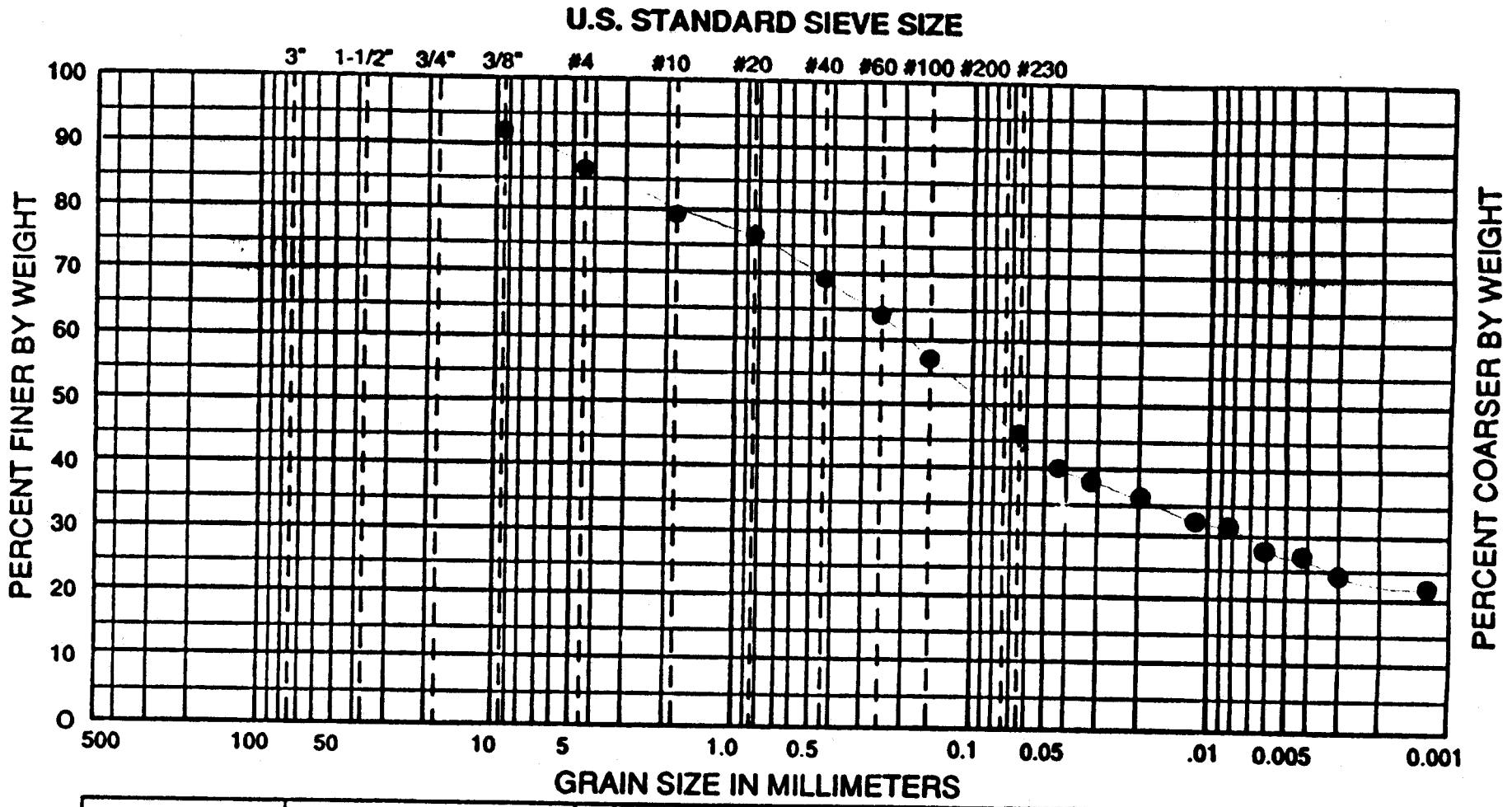


USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY
		COARSE	FINE	COARSE	MEDIUM	FINE	

WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 5+25 SAMPLE NO.: CH #18 DATE: 4-17-98 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION
Rocky Flats	32.0'	Clayey Sand (SC) with some silt and gravel. 14.2% fine gravel, 6% c. sand, 10.1% medium sand, 23.7% fine sand, 18.7% silt, 27.3% clay

FIELD CLASSIFICATION _____

LABORATORY CLASSIFICATION _____

JOB NO. [illegible]

CLIENT/OWNER Weston

LOCATION Rocky Flats / EG #6

BORING ST25 SAMPLE #18 DEPTH @32

FIELD DENSITY BY ____/__/__

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD [redacted]

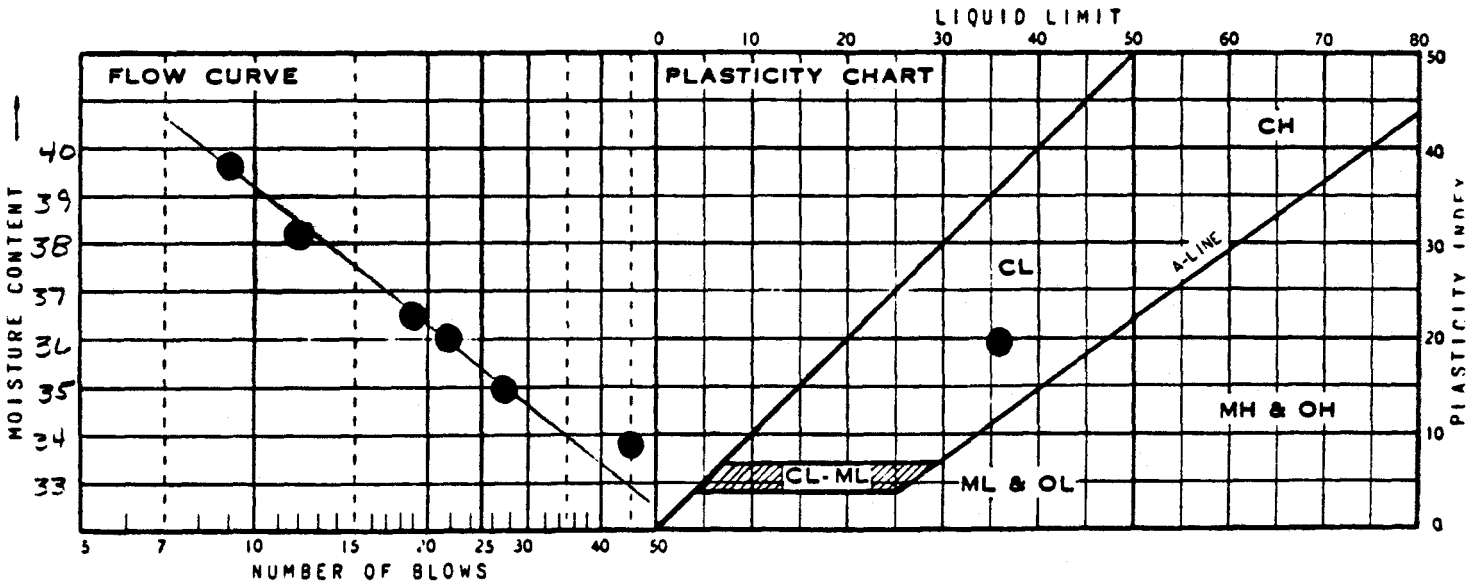
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY [illegible] 4/16/92

DETERMINATION	1	2	3	4	5	6
DISH	B30	B13	6C			
WT OF DISH + WET SOIL g	8.67	7.62	6.23			
WT OF DISH + DRY SOIL g	7.63	6.77	5.54	—	—	—
WT OF MOISTURE g	1.04	.85	.69			
WT OF DISH g	1.03	1.05	1.04	—	—	—
WT OF DRY SOIL g	6.60	5.72	4.50			
MOISTURE CONTENT %	15.8	14.9	15.3			

LIQUID LIMIT (48?) 13?

DETERMINATION	1	2	3	4	5	6
DISH	B52	58C	2012	2005	2060	2046
NUMBER OF BLOWS	45+	27	22	19	12+	9
WT OF DISH + WET SOIL g	18.62	20.11	17.68	17.99	17.28	19.58
WT OF DISH + DRY SOIL g	14.23	15.17	13.27	13.46	12.79	14.32
WT OF MOISTURE g	4.39	4.94	4.41	4.53	4.49	5.26
WT OF DISH g	1.04	1.05	1.04	1.06	1.03	1.05
WT OF DRY SOIL g	13.19	14.12	12.23	12.40	11.76	13.27
MOISTURE CONTENT %	33.8	35.0	36.1	36.5	38.2	39.6



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		35.4	15.3	20.1	CL	

ADVANCED TERRA TESTING INC

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	5+25	SAMPLED	Rocky Flats
DEPTH	42'	DATE TESTED	04-14-92 TNU
SAMPLE NO.	#18	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC	Yes	
NATURAL	No	
Wt. Wet Soil & Pan	(g)	36.35
Wt. Dry Soil & Pan	(g)	35.14
Wt. Lost Moisture	(g)	1.21
Wt. of Pan Only	(g)	3.78
Wt. of Dry Soil	(g)	31.36
Moisture Content	%	3.9
Wt. Hydrom. Sample Wet	(g)	55.01
Wt. Hydrom. Sample Dry	(g)	52.96

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	711.52
Weight of + #10 Before Washing (g)	67.80
Weight of + #10 After Washing (g)	62.60
Weight of - #10 Wet (g)	643.72
Weight of - #10 Dry (g)	624.81
Wt. Total Sample Dry (g)	687.41
Calc. Wt. "W" (g)	58.27
Calc. Mass + #10	5.31

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	25.83	25.83	25.83	3.8	96.2
3/8"	0.00	15.74	15.74	41.57	6.0	94.0
#4	0.00	8.07	8.07	49.64	7.2	92.8
#10	0.00	12.96	12.96	62.60	9.1	90.9
#20	1.57	2.42	0.85	0.85	10.6	89.4
#40	1.55	2.69	1.14	1.99	12.5	87.5
#60	1.55	3.03	1.48	3.47	15.1	84.9
#100	1.31	3.66	2.35	5.82	19.1	80.9
#230	1.57	6.15	4.58	10.40	27.0	73.0

Silty Clay (ML)

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	5+25	SAMPLED	Rocky Flats
DEPTH	42'	DATE TESTED	04-14-92 TNU
SAMPLE NO.	#18	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

Hydrometer #	ASTM 152 H	Temp., Deg. C	23.0
Sp. Gr. of Soil	2.73	Temp. Coef. K	0.01290
Value of "a"	0.98	Wt. Dry Sample "W"	58.271
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	5.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	46.50	40.50	68.4	68.4	8.66	0.0537
1.0	44.00	38.00	64.2	64.2	9.07	0.0389
2.0	42.50	36.50	61.6	61.6	9.32	0.0278
5.0	40.00	34.00	57.4	57.4	9.73	0.0180
15.0	37.50	31.50	53.2	53.2	10.14	0.0106
30.0	35.00	29.00	49.0	49.0	10.55	0.0077
60.0	33.00	27.00	45.6	45.6	10.88	0.0055
120.0	31.00	25.00	42.2	42.2	11.21	0.0039
250.0	29.00	23.00	38.8	38.8	11.53	0.0028
1440.0	27.00	21.00	35.5	35.5	11.86	0.0012

Grain Diameter = K*(SQRT(L/T))

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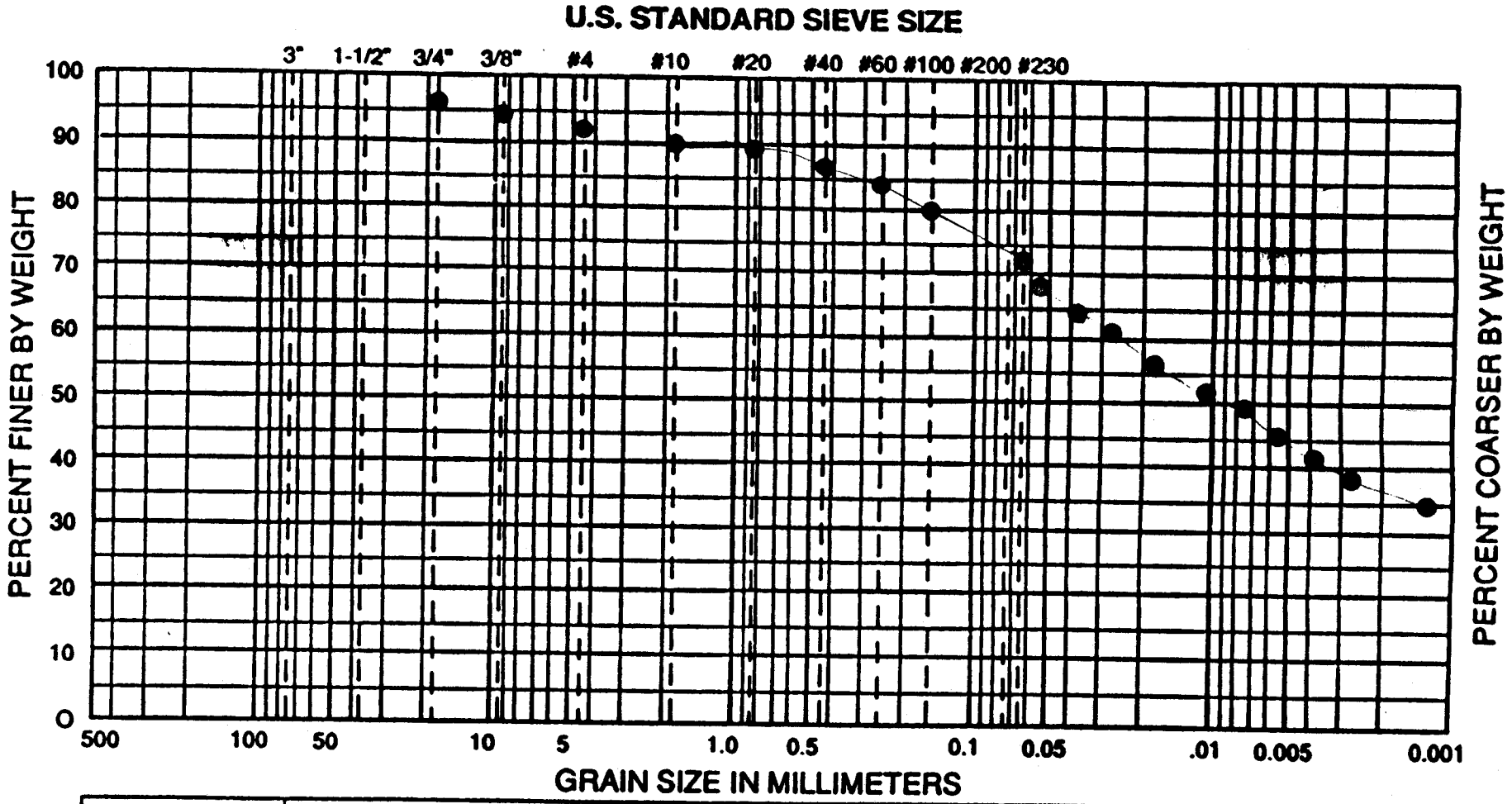


USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY	
		COARSE	FINE	COARSE	MEDIUM	FINE		

WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 5+25 SAMPLE NO.: CH #18 DATE: 4-17-92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION
	420'	Silty Clay (CL/CH) with some sand, trace gravel. Rocky Flat / EG+G 38 cgvl, 3.4% fgvl / 1.9% csd, 3.4% msd, 13.5% fsd, 29.5% silt, 44.5% clay

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION - - - - - - - - - - - - - - -

LABORATORY CLASSIFICATION - - - - - - - - - - - - -

JOB NO. 2066-03
CLIENT/OWNER Wilson
LOCATION Rocky Flats / EG&G
BORING 5425 SAMPLE #18 DEPTH 42.0'

FIELD DENSITY BY ...../...

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

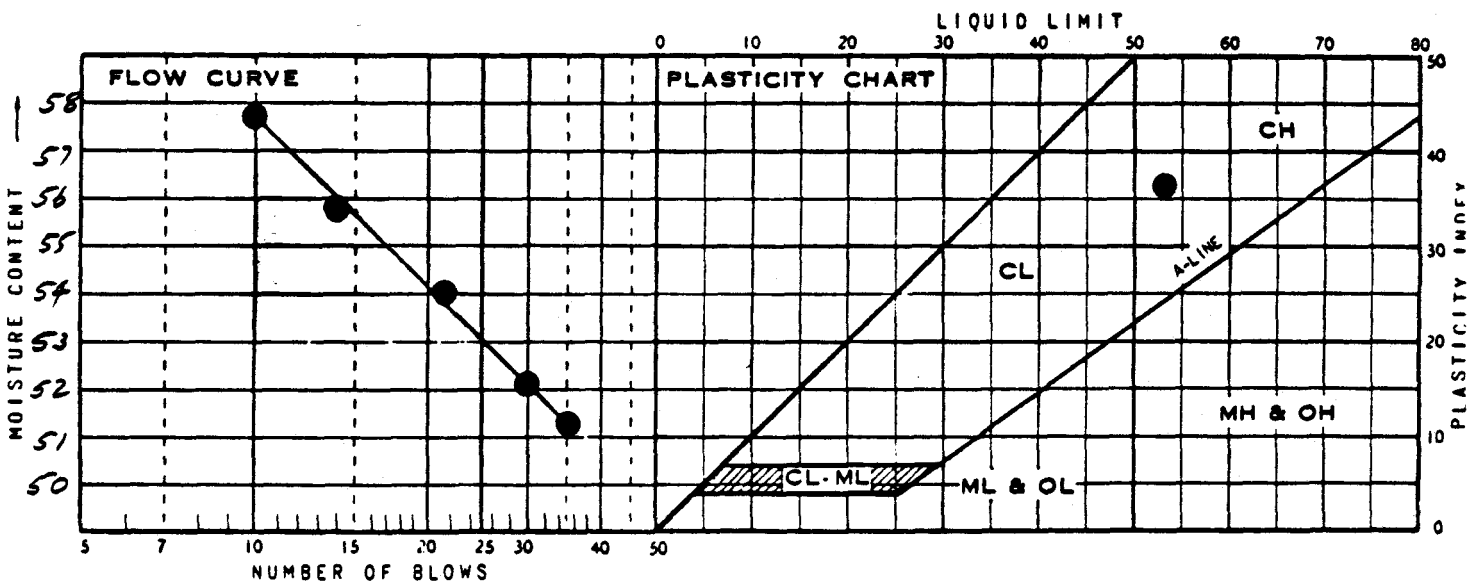
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY [illegible] 4/13/92

DETERMINATION	1	2	3	4	5	6
DISH	2066	35C	2067			
WT OF DISH + WET SOIL g	7.67	6.54	7.87			
WT OF DISH + DRY SOIL g	6.73	5.79	6.88	—	—	—
WT OF MOISTURE g	0.94	0.75	0.99			
WT OF DISH g	1.06	1.06	1.04	—	—	—
WT OF DRY SOIL g	5.67	4.73	5.84			
MOISTURE CONTENT %	16.6	15.9	16.9	49.4/3 =	16.5	

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	44C	BC	2037	2023	9C	
NUMBER OF BLOWS	35	30	21	14	10	
WT OF DISH + WET SOIL g	11.05	12.28	11.97	9.23	10.62	
WT OF DISH + DRY SOIL g	7.66	8.42	8.14	6.30	7.12	—
WT OF MOISTURE g	3.39	3.86	3.83	2.93	3.50	
WT OF DISH g	1.04	1.03	1.05	1.05	1.07	—
WT OF DRY SOIL g	6.62	7.39	7.09	5.25	6.05	
MOISTURE CONTENT %	51.2	52.2	54.0	55.8	57.8	



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		53.1	16.5	36.6	CH	

ADVANCED TERRA TESTING INC

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MECHANICAL ANALYSIS - SIEVE TEST DATA

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CLIENT Weston

JOB NO. 2066-03

BORING NO.	5+25	SAMPLED	Rocky Flats
DEPTH	50.4'	DATE TESTED	04-14-92 TNU
SAMPLE NO.	#18	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan	(g)	41.47
Wt. Dry Soil & Pan	(g)	40.26
Wt. Lost Moisture	(g)	1.21
Wt. of Pan Only	(g)	3.74
Wt. of Dry Soil	(g)	36.52
Moisture Content	%	3.3

Wt. Hydrom. Sample Wet (g)	55.02
Wt. Hydrom. Sample Dry (g)	53.25

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	55.02
Weight of + #10 Before Washing (g)	0.00
Weight of + #10 After Washing (g)	0.00
Weight of - #10 Wet (g)	55.02
Weight of - #10 Dry (g)	53.25
Wt. Total Sample Dry (g)	53.25
Calc. Wt. "W" (g)	53.25
Calc. Mass + #10	0.00

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	0.00	0.00	0.00	0.0	100.0
#4	0.00	0.00	0.00	0.00	0.0	100.0
#10	0.00	0.00	0.00	0.00	0.0	100.0
#20	1.57	1.68	0.11	0.11	0.2	99.8
#40	1.56	1.65	0.09	0.20	0.4	99.6
#60	1.32	1.39	0.07	0.27	0.5	99.5
#100	1.57	1.66	0.09	0.36	0.7	99.3
#230	1.57	1.75	0.18	0.54	1.0	99.0

Silty Clay

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT **Weston** JOB NO. 2066-03

BORING NO.	5+25	SAMPLED	Rocky Flats
DEPTH	50.4'	DATE TESTED	04-14-92 TNU
SAMPLE NO.	#18	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

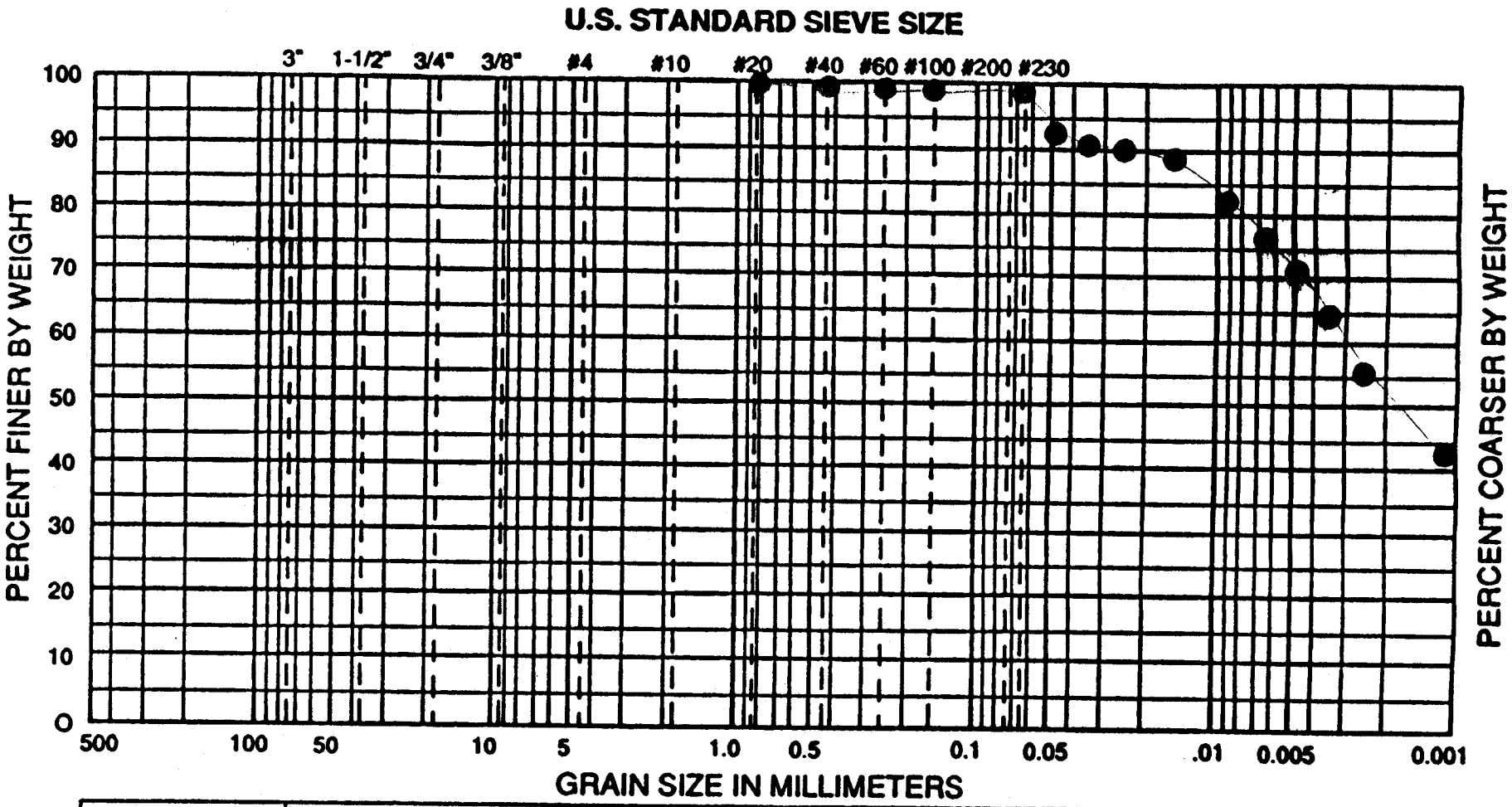
Hydrometer #	ASTM 152 H	Temp., Deg. C	23.0
Sp. Gr. of Soil	2.73	Temp. Coef. K	0.01286
Value of "a"	0.98	Wt. Dry Sample "W"	53.253
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	5.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	56.00	50.00	92.4	92.4	7.11	0.0485
1.0	55.00	49.00	90.5	90.5	7.27	0.0347
2.0	54.75	48.75	90.1	90.1	7.31	0.0246
5.0	54.00	48.00	88.7	88.7	7.43	0.0157
15.0	50.50	44.50	82.2	82.2	8.01	0.0094
30.0	47.50	41.50	76.7	76.7	8.50	0.0068
60.0	44.50	38.50	71.1	71.1	8.99	0.0050
120.0	40.50	34.50	63.7	63.7	9.65	0.0036
250.0	36.50	30.50	56.4	56.4	10.30	0.0026
1440.0	29.00	23.00	42.5	42.5	11.53	0.0012

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY		
		COARSE	FINE	COARSE	MEDIUM	FINE			
WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL			SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 5+25 SAMPLE NO.: CH #18 DATE: 4/17/92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION
Rocky Flats	50.4'	silty Clay (CH) w/ trace sand. 4% Med sand, 6% fine sand / 27.8% silt, 71.1% Clay

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION _____

LABORATORY CLASSIFICATION _____

JOB NO. 2066-07

CLIENT/OWNER WESTON

LOCATION ROCKY FLATS/EG&G

BORING 5+25 SAMPLE CH#18 DEPTH 50.4'

FIELD DENSITY BY ...../../...

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

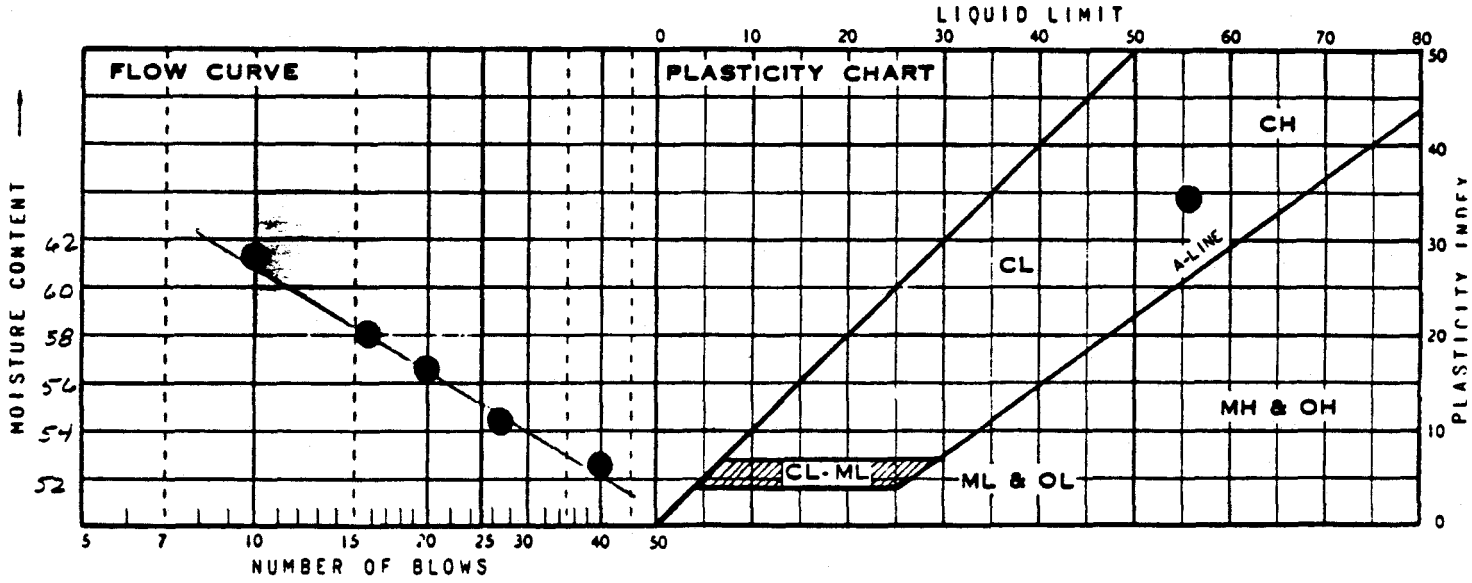
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY SR.4/13/92.

DETERMINATION	1	2	3	4	5	6
DISH	2041	B23	6C			
WT OF DISH + WET SOIL	4.72	5.65	5.66			
WT OF DISH + DRY SOIL	4.13	4.87	4.85	—	—	—
WT OF MOISTURE	.59	.78	.81			
WT OF DISH	1.06	1.04	1.05	—	—	—
WT OF DRY SOIL	3.07	3.83	3.80			
MOISTURE CONTENT	19.2	20.4	21.3			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	2016	B11	B1	2064	27C	
NUMBER OF BLOWS	40	27	20	16	10	
WT OF DISH + WET SOIL	13.79	15.84	15.22	12.42	15.00	
WT OF DISH + DRY SOIL	9.39	10.62	10.09	8.24	9.69	—
WT OF MOISTURE	4.40	5.22	5.13	4.18	5.31	
WT OF DISH	1.04	1.04	1.04	1.05	1.06	—
WT OF DRY SOIL	8.35	9.58	9.05	7.19	8.63	
MOISTURE CONTENT	52.7	54.5	56.7	58.1	61.5	



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		55.1	20.3	34.8	CH	

ADVANCED TERRA TESTING inc

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT **Weston**

JOB NO. 2066-03

BORING NO.	5+25	SAMPLED	Rocky Flats
DEPTH	63.2'	DATE TESTED	04-14-92 TNU
SAMPLE NO.	#18	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan	(g)	81.64
Wt. Dry Soil & Pan	(g)	78.06
Wt. Lost Moisture	(g)	3.58
Wt. of Pan Only	(g)	3.70
Wt. of Dry Soil	(g)	74.36
Moisture Content	%	4.8

Wt. Hydrom. Sample Wet (g)	55.12
Wt. Hydrom. Sample Dry (g)	52.59

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	55.12
Weight of + #10 Before Washing (g)	0.00
Weight of + #10 After Washing (g)	0.00
Weight of - #10 Wet (g)	55.12
Weight of - #10 Dry (g)	52.59
Wt. Total Sample Dry (g)	52.59
Calc. Wt. "W" (g)	52.59
Calc. Mass + #10	0.00

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	0.00	0.00	0.00	0.0	100.0
#4	0.00	0.00	0.00	0.00	0.0	100.0
#10	0.00	0.00	0.00	0.00	0.0	100.0
#20	1.55	1.56	0.01	0.01	0.0	100.0
#40	1.56	1.57	0.01	0.02	0.0	100.0
#60	1.58	1.59	0.01	0.03	0.1	99.9
#100	1.57	1.58	0.01	0.04	0.1	99.9
#230	1.56	1.62	0.06	0.10	0.2	99.8

Silty Claystone

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT	Weston	JOB NO.	2066-03
BORING NO.	5+25	SAMPLED	Rocky Flats
DEPTH	63.2'	DATE TESTED	04-14-92 TNU
SAMPLE NO.	#18	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

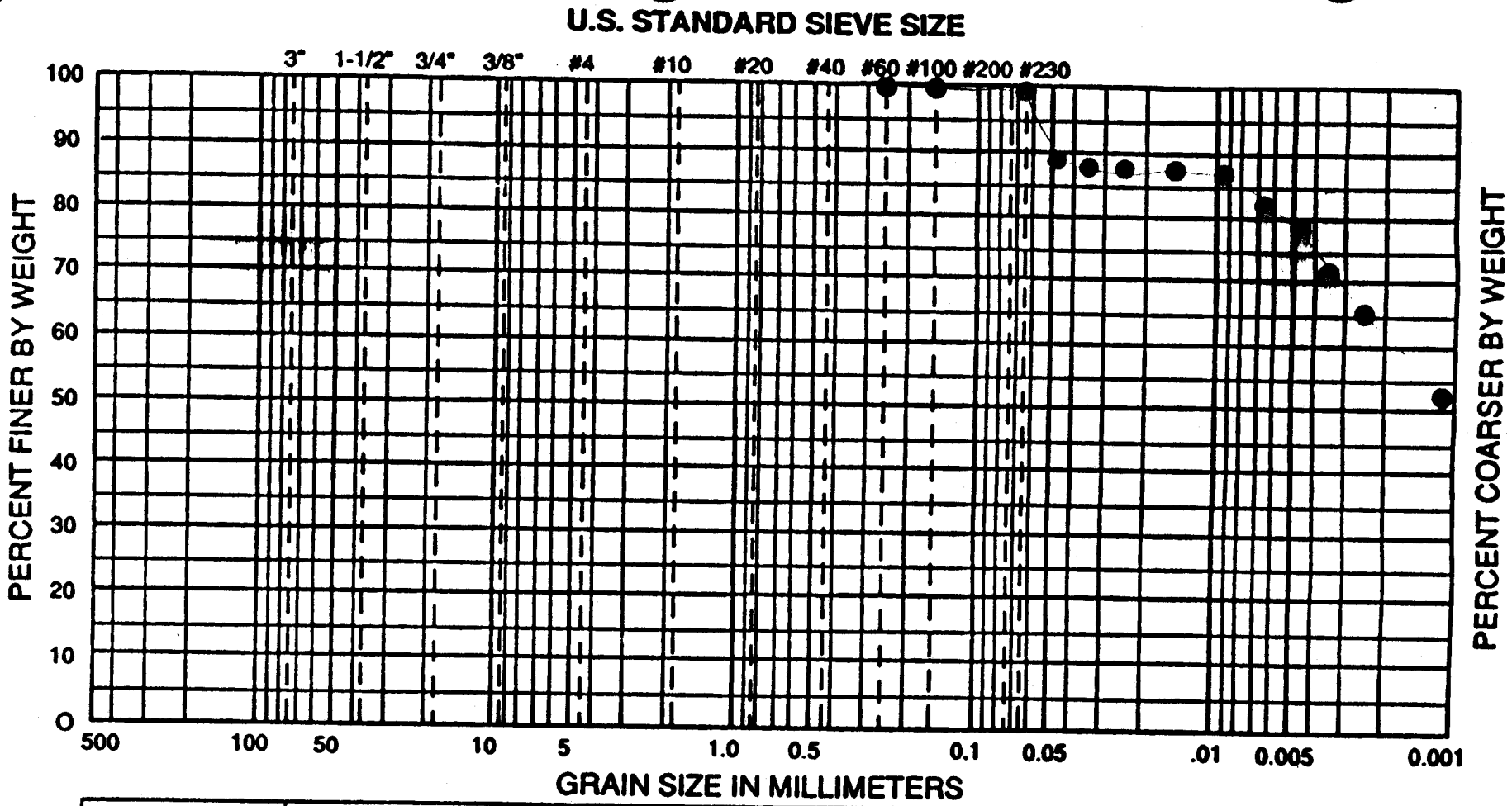
Hydrometer #	ASTM 152 H	Temp., Deg. C	23.0
Sp. Gr. of Soil	2.76	Temp. Coef. K	0.01275
Value of "a"	0.98	Wt. Dry Sample "W"	52.589
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	5.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	54.00	48.00	89.3	89.3	7.43	0.0492
1.0	53.75	47.75	88.8	88.8	7.48	0.0349
2.0	53.50	47.50	88.3	88.3	7.52	0.0247
5.0	53.25	47.25	87.9	87.9	7.56	0.0157
15.0	52.50	46.50	86.5	86.5	7.68	0.0091
30.0	50.00	44.00	81.8	81.8	8.09	0.0066
60.0	48.50	42.50	79.0	79.0	8.34	0.0048
120.0	44.00	38.00	70.7	70.7	9.07	0.0035
250.0	41.00	35.00	65.1	65.1	9.57	0.0025
1440.0	34.00	28.00	52.1	52.1	10.71	0.0011

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY		
		COARSE	FINE	COARSE	MEDIUM	FINE			
WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 5+25 SAMPLE NO.: CH # 18 DATE: 4-17-92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION
Rocky Flats	63.2'	Silty Claystone w/ trace sand. .2% fine sand (20.3% Silt, 79.5% Clay)

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION _____

LABORATORY CLASSIFICATION _____

JOB NO. 2066-03

CLIENT/OWNER Weston

LOCATION Rocky Flats / EG&G

BORING 5+25 SAMPLE #18 DEPTH 63.2'

FIELD DENSITY BY ___/__/__

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD → [redacted]

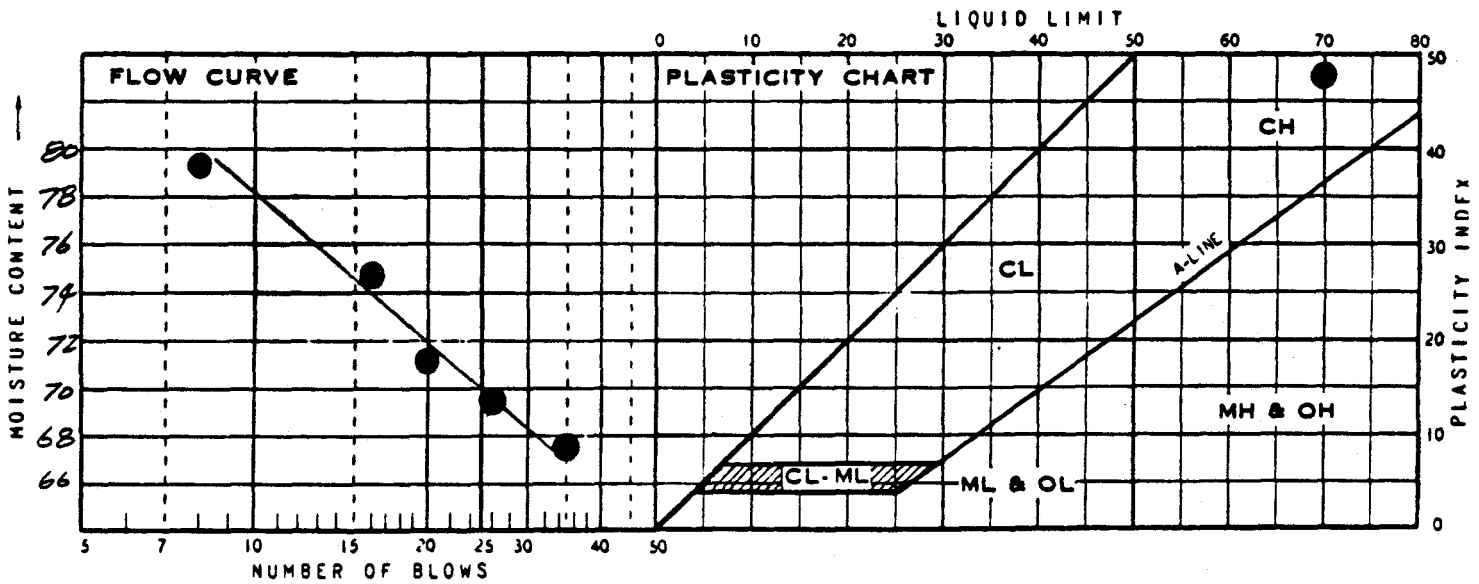
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY ~~LB~~ 4/15/92

DETERMINATION	1	2	3	4	5	6
DISH	B50	2066	B56			
WT OF DISH + WET SOIL g	6.34	5.97	6.48			
WT OF DISH + DRY SOIL g	5.35	5.09	5.48	—	—	—
WT OF MOISTURE g	0.99	0.88	1.00			
WT OF DISH g	1.03	1.05	1.04	—	—	—
WT OF DRY SOIL g	4.32	4.04	4.44			
MOISTURE CONTENT %	22.9	21.8	22.5	= 67.2/3 =	22.4	

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	B8	2014	B21	35C	2068	B38
NUMBER OF BLOWS	35	26	20	16	13	8
WT OF DISH + WET SOIL g	9.67	11.69	13.52	11.70	9.32	10.06
WT OF DISH + DRY SOIL g	6.18	7.33	8.33	7.15	5.71	6.07
WT OF MOISTURE g	3.49	4.36	5.19	4.55	3.61	3.99
WT OF DISH g	1.02	1.06	1.04	1.06	1.05	1.04
WT OF DRY SOIL g	5.16	6.27	7.29	6.09	4.66	5.03
MOISTURE CONTENT %	67.6	69.5	71.2	74.7	77.5	79.3



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		70.0	22.4	47.6	CH	

ADVANCED TERRA TESTING inc

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT Westen

JOB NO. 2066-03

BORING NO.	5+50	SAMPLED	Rocky Flats
DEPTH	24'	DATE TESTED	04-15-92 TNU
SAMPLE NO.	#19	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC	Yes	
NATURAL	No	
Wt. Wet Soil & Pan	(g)	47.98
Wt. Dry Soil & Pan	(g)	46.24
Wt. Lost Moisture	(g)	1.74
Wt. of Pan Only	(g)	3.67
Wt. of Dry Soil	(g)	42.57
Moisture Content	%	4.1
Wt. Hydrom. Sample Wet	(g)	55.13
Wt. Hydrom. Sample Dry	(g)	52.96

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	503.88
Weight of + #10 Before Washing (g)	28.78
Weight of + #10 After Washing (g)	26.33
Weight of - #10 Wet (g)	475.10
Weight of - #10 Dry (g)	458.80
Wt. Total Sample Dry (g)	485.13
Calc. Wt. "W" (g)	56.00
Calc. Mass + #10	3.04

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	20.47	20.47	20.47	4.2	95.8
#4	0.00	3.23	3.23	23.70	4.9	95.1
#10	0.00	2.63	2.63	26.33	5.4	94.6
#20	1.57	2.33	0.76	0.76	6.8	93.2
#40	1.57	2.76	1.19	1.95	8.9	91.1
#60	1.57	3.03	1.46	3.41	11.5	88.5
#100	1.56	3.75	2.19	5.60	15.4	84.6
#230	1.55	5.72	4.17	9.77	22.9	77.1

78 %

Clay (cH)

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT **Weston** JOB NO. 2066-03

BORING NO.	5+50	SAMPLED	Rocky Flats
DEPTH	24'	DATE TESTED	04-15-92 TNU
SAMPLE NO.	#19	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

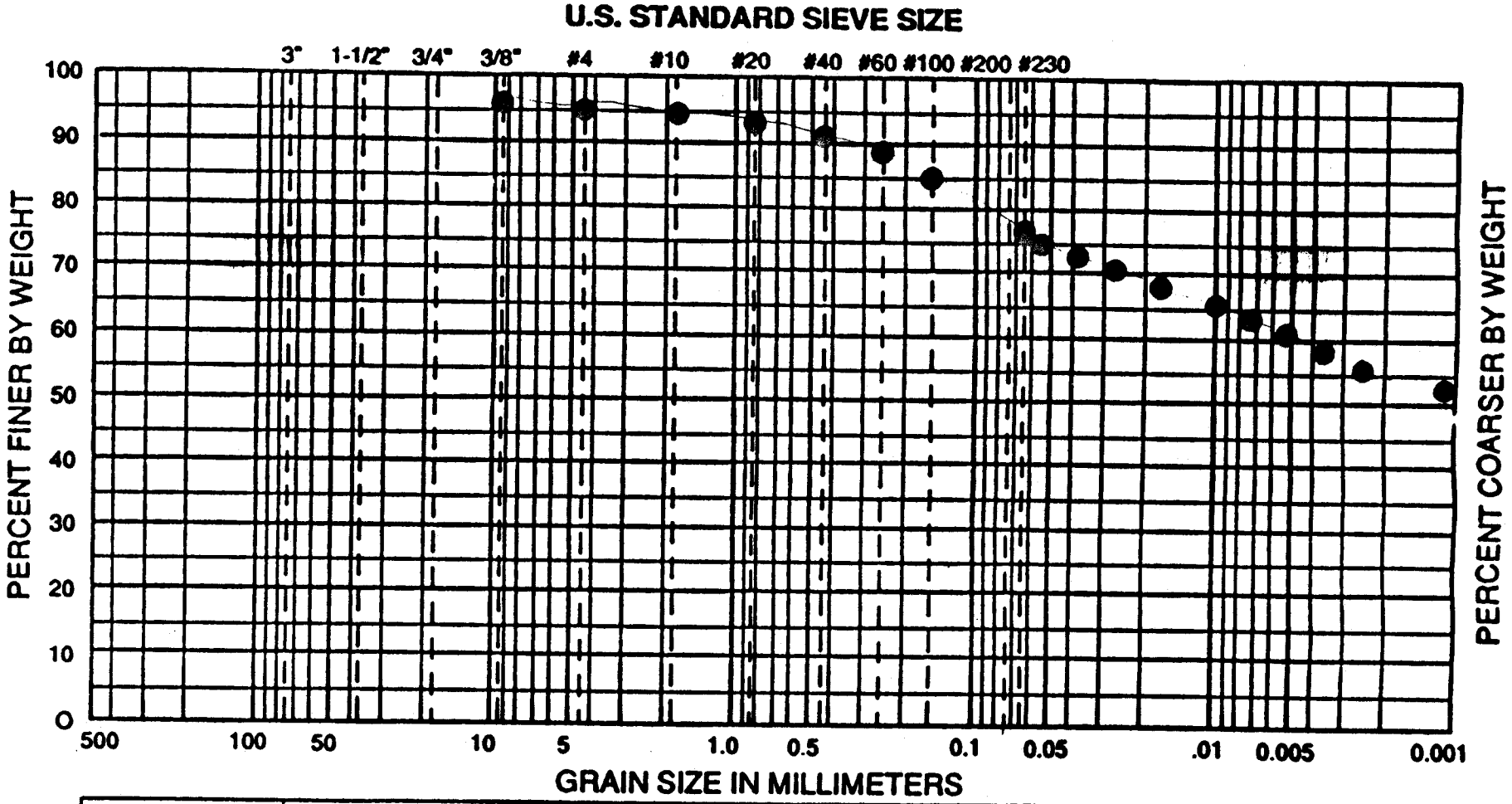
Hydrometer #	ASTM 152 H	Temp., Deg. C	22.0
Sp. Gr. of Soil	2.75	Temp. Coef. K	0.01294
Value of "a"	0.98	Wt. Dry Sample "W"	56.000
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	4.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	48.50	43.50	76.1	76.1	8.34	0.0528
1.0	46.50	41.50	72.6	72.6	8.66	0.0381
2.0	45.50	40.50	70.9	70.9	8.83	0.0272
5.0	44.00	39.00	68.3	68.3	9.07	0.0174
15.0	42.50	37.50	65.6	65.6	9.32	0.0102
30.0	41.50	36.50	63.9	63.9	9.48	0.0073
60.0	40.00	35.00	61.3	61.3	9.73	0.0052
120.0	38.00	33.00	57.8	57.8	10.06	0.0037
250.0	37.00	32.00	56.0	56.0	10.22	0.0026
1440.0	35.50	30.50	53.4	53.4	10.47	0.0011

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY		
		COARSE	FINE	COARSE	MEDIUM	FINE			
WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 5+50 SAMPLE NO.: CH #19 DATE: 4/17/91 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION
Rocky Flats	24'	CL-(CH) with some coarse sand silt, trace gravel 4.9% fine gvl / 5% c sd, 3.5% med sd, 13.1% fine sd / 77% silt, 16% clay

JOB NO. 2066-03
CLIENT/OWNER Weston
LOCATION Rocky Flats / EG&G
BORING 5L50 SAMPLE #19 DEPTH @ 24.0

FIELD CLASSIFICATION
LABORATORY CLASSIFICATION

FIELD DENSITY BY ___/__/__

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

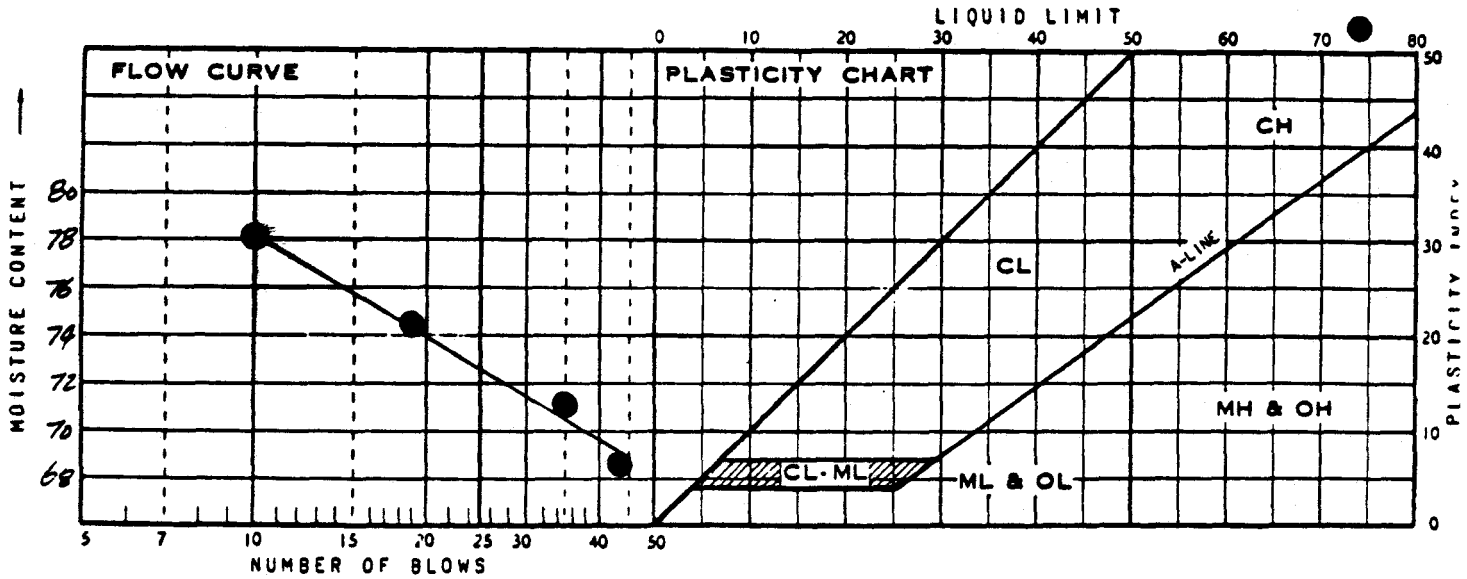
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY [illegible] 4/13/92

DETERMINATION	1	2	3	4	5	6
DISH	B43	2026	B33			
WT OF DISH + WET SOIL g	3.33	3.92	3.95			
WT OF DISH + DRY SOIL g	2.93	3.43	3.46	—	—	—
WT OF MOISTURE g	0.40	0.49	0.49			
WT OF DISH g	1.04	1.03	1.04	—	—	—
WT OF DRY SOIL g	1.89	2.40	2.42			
MOISTURE CONTENT %	21.2	20.4	20.2	= 61.8/3	= 20.6	

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	B58	2056	B29	B45	B56	B57
NUMBER OF BLOWS	44±	35-	19	17	11	10-
WT OF DISH + WET SOIL g	11.10	10.57	15.45	10.75	16.20	14.63
WT OF DISH + DRY SOIL g	7.01	6.61	9.40	6.65	9.66	8.67
WT OF MOISTURE g	4.09	3.96	6.05	4.10	6.54	5.96
WT OF DISH g	1.05	1.04	1.05	1.04	1.03	1.04
WT OF DRY SOIL g	5.96	5.57	8.35	5.61	8.63	7.63
MOISTURE CONTENT %	68.6	71.1	74.5	73.1	75.8	78.1



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		72.6	20.6	52.0	CH	

ADVANCED TERRA TESTING inc

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	5+50	SAMPLED	Rocky Flats
DEPTH	31.5'	DATE TESTED	04-15-92 TNU
SAMPLE NO.	#19	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC	Yes	
NATURAL	No	
Wt. Wet Soil & Pan	(g)	36.64
Wt. Dry Soil & Pan	(g)	35.82
Wt. Lost Moisture	(g)	0.82
Wt. of Pan Only	(g)	3.76
Wt. of Dry Soil	(g)	32.06
Moisture Content	%	2.6
Wt. Hydrom. Sample Wet	(g)	55.02
Wt. Hydrom. Sample Dry	(g)	53.65

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	663.80
Weight of + #10 Before Washing (g)	2.13
Weight of + #10 After Washing (g)	1.67
Weight of - #10 Wet (g)	661.67
Weight of - #10 Dry (g)	645.62
Wt. Total Sample Dry (g)	647.29
Calc. Wt. "W" (g)	53.79
Calc. Mass + #10	0.14

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	0.00	0.00	0.00	0.0	100.0
#4	0.00	0.56	0.56	0.56	0.1	99.9
#10	0.00	1.11	1.11	1.67	0.3	99.7
#20	1.56	1.78	0.22	0.22	0.7	99.3
#40	1.55	2.26	0.71	0.93	2.0	98.0
#60	1.55	2.95	1.40	2.33	4.6	95.4
#100	1.56	4.47	2.91	5.24	10.0	90.0
#230	1.56	7.59	6.03	11.27	21.2	78.8

Silty CLAY (CL)

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	5+50	SAMPLED	Rocky Flats
DEPTH	31.5'	DATE TESTED	04-15-92 TNU
SAMPLE NO.	#19	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

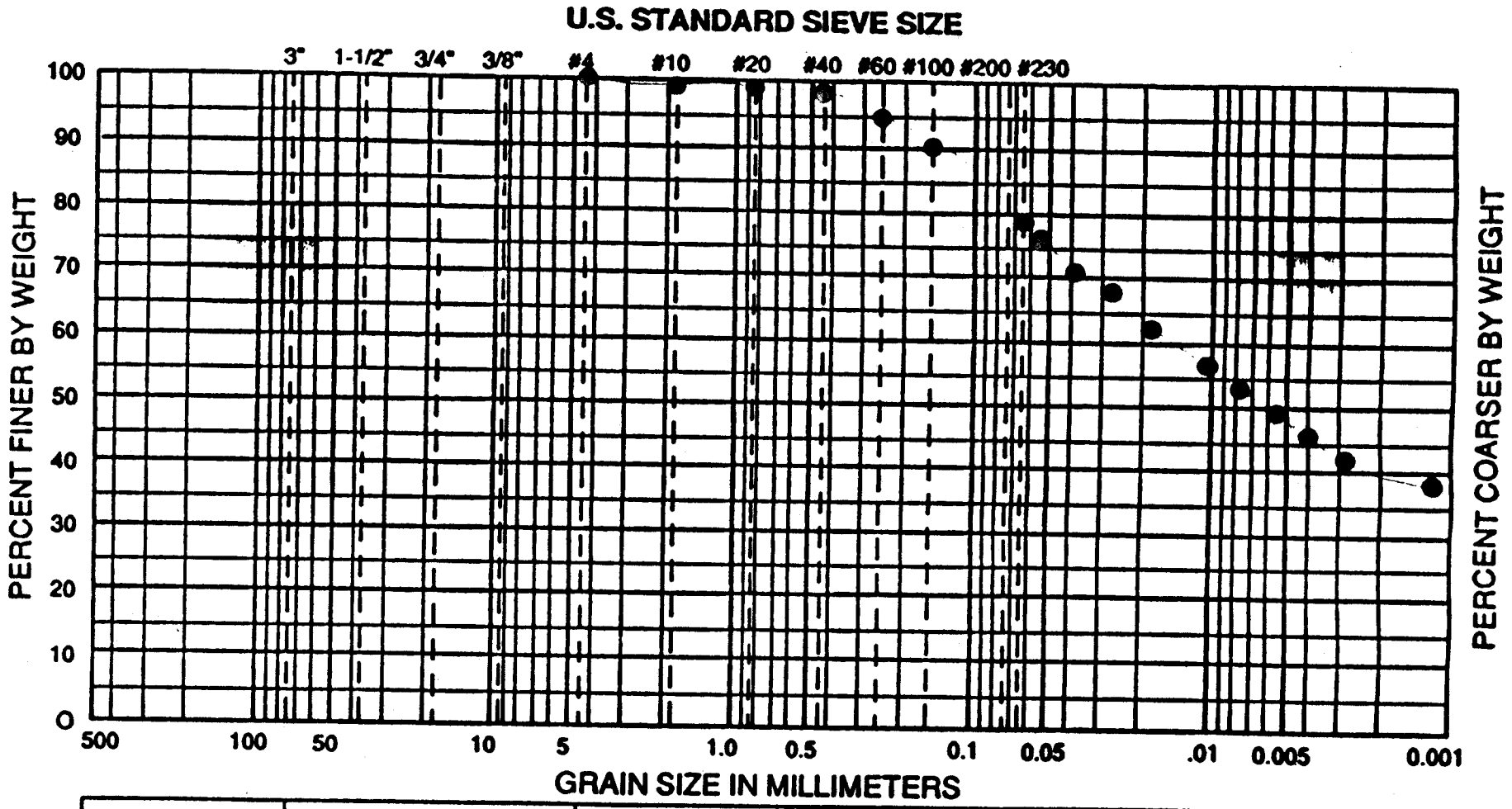
Hydrometer #	ASTM 152 H	Temp., Deg. C	22.0
Sp. Gr. of Soil	2.74	Temp. Coef. K	0.01298
Value of "a"	0.98	Wt. Dry Sample "W"	53.786
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	4.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	47.00	42.00	76.7	76.7	8.58	0.0538
1.0	44.00	39.00	71.2	71.2	9.07	0.0391
2.0	42.00	37.00	67.6	67.6	9.40	0.0281
5.0	39.00	34.00	62.1	62.1	9.89	0.0183
15.0	36.00	31.00	56.6	56.6	10.39	0.0108
30.0	34.00	29.00	52.9	52.9	10.71	0.0078
60.0	32.00	27.00	49.3	49.3	11.04	0.0056
120.0	30.00	25.00	45.6	45.6	11.37	0.0040
250.0	28.00	23.00	42.0	42.0	11.70	0.0028
1440.0	26.00	21.00	38.3	38.3	12.03	0.0012

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY
		COARSE	FINE	COARSE	MEDIUM	FINE	

WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 5+50 SAMPLE NO.: CH # 19 DATE: 4/17/92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION
Rocky Flats	31.5'	Silty Clay (CL), w/ some sand, trace gravel .1% fine gvl / .2% c. sand, 1.7% med sd, 17% fine sand / 32.5% silt, 48.5% clay

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION - - - - - - - - - - - - - - - -

LABORATORY CLASSIFICATION - - - - - - - - - - - - -

JOB NO. 2066-03

CLIENT/OWNER WESTON

LOCATION ROCKY FLATS/ EG&G

BORING 5350 SAMPLE CH #19 DEPTH 31.5'

FIELD DENSITY BY ...../../...

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL g		
WT OF RINGS g	—	—
WT OF WET SOIL g		
FIELD DENSITY PCF		
DRY DENSITY PCF		

THIS IS AN 1/8-INCH THREAD

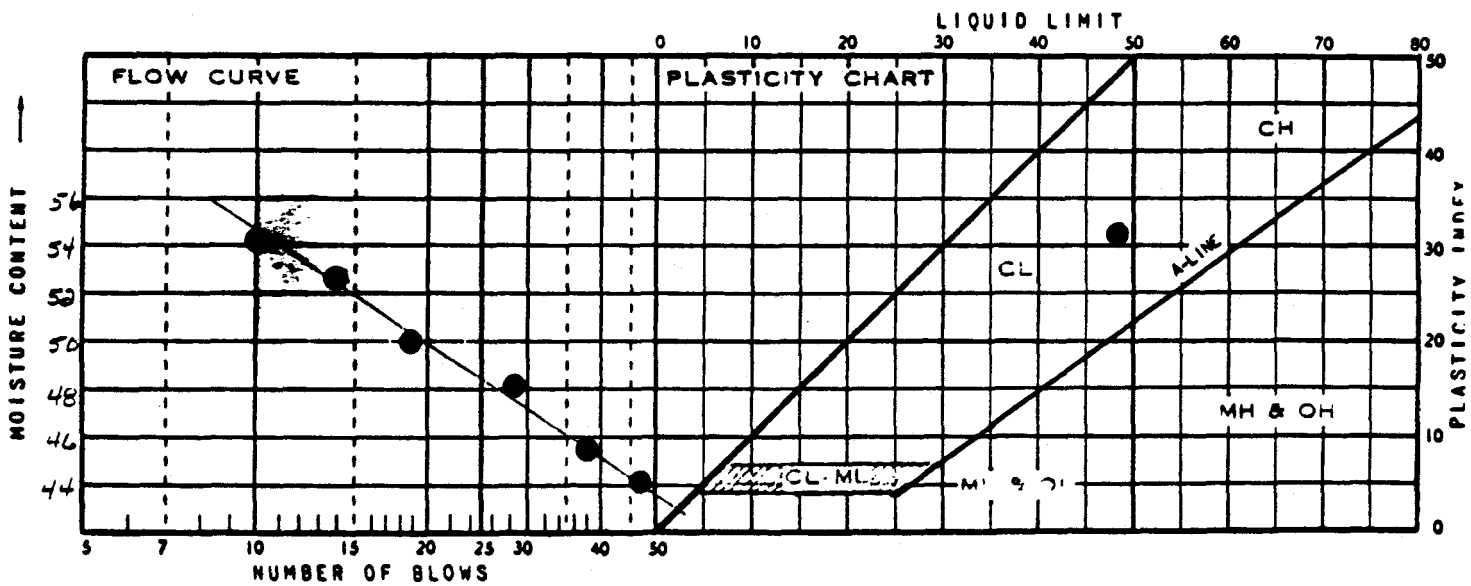
DETERMINATION	1	2
DISH#		
WT OF DISH + WET SOIL g		
WT OF DISH + DRY SOIL g	—	—
WT OF MOISTURE g		
WT OF DISH g	—	—
WT OF DRY SOIL g		
FIELD MOISTURE CONTENT %		

PLASTIC LIMIT BY SB..4/16/92

DETERMINATION	1	2	3	4	5	6
DISH	2039	B18	B31			
WT OF DISH + WET SOIL g	4.72	5.58	6.21			
WT OF DISH + DRY SOIL g	4.21	4.94	5.47	—	—	—
WT OF MOISTURE g	.51	.64	.74			
WT OF DISH g	1.07	1.05	1.06	—	—	—
WT OF DRY SOIL g	3.14	3.89	4.41			
MOISTURE CONTENT %	16.2	16.5	16.8			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	B3	46 C	2064	2034	32 C	2067
NUMBER OF BLOWS	47	38	29	19	14	10
WT OF DISH + WET SOIL g	14.25	13.55	14.34	14.88	13.92	15.15
WT OF DISH + DRY SOIL g	10.20	9.64	10.03	10.27	9.48	10.18
WT OF MOISTURE g	4.05	3.91	4.31	4.61	4.44	4.97
WT OF DISH g	1.04	1.06	1.08	1.06	1.06	1.04
WT OF DRY SOIL g	9.16	8.58	8.95	9.21	8.42	9.14
MOISTURE CONTENT %	44.2	45.6	48.2	50.1	52.7	54.4



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		48.5	16.5	32.0	CL	

ADVANCED TERRA TESTING inc

KW

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT **Weston**

JOB NO. 2066-03

BORING NO.	5+50	SAMPLED	Rocky Flats
DEPTH	39'	DATE TESTED	04-15-92 TNU
SAMPLE NO.	#19	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan	(g)	44.25
Wt. Dry Soil & Pan	(g)	43.35
Wt. Lost Moisture	(g)	0.90
Wt. of Pan Only	(g)	3.80
Wt. of Dry Soil	(g)	39.55
Moisture Content	%	2.3

Wt. Hydrom. Sample Wet (g)	55.10
Wt. Hydrom. Sample Dry (g)	53.87

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	675.64
Weight of + #10 Before Washing (g)	5.47
Weight of + #10 After Washing (g)	4.50
Weight of - #10 Wet (g)	670.17
Weight of - #10 Dry (g)	656.21
Wt. Total Sample Dry (g)	660.71
Calc. Wt. "W" (g)	54.24
Calc. Mass + #10	0.37

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	2.64	2.64	2.64	0.4	99.6
#4	0.00	0.21	0.21	2.85	0.4	99.6
#10	0.00	1.65	1.65	4.50	0.7	99.3
#20	1.55	1.86	0.31	0.31	1.3	98.7
#40	1.57	2.04	0.47	0.78	2.1	97.9
#60	1.56	2.12	0.56	1.34	3.2	96.8
#100	1.55	2.43	0.88	2.22	4.8	95.2
#230	1.31	3.46	2.15	4.37	8.7	91.3

Silty Clay (CH)

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT **Weston**

JOB NO. 2066-03

BORING NO.	5+50	SAMPLED	Rocky Flats
DEPTH	39'	DATE TESTED	04-15-92 TNU
SAMPLE NO.	#19	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

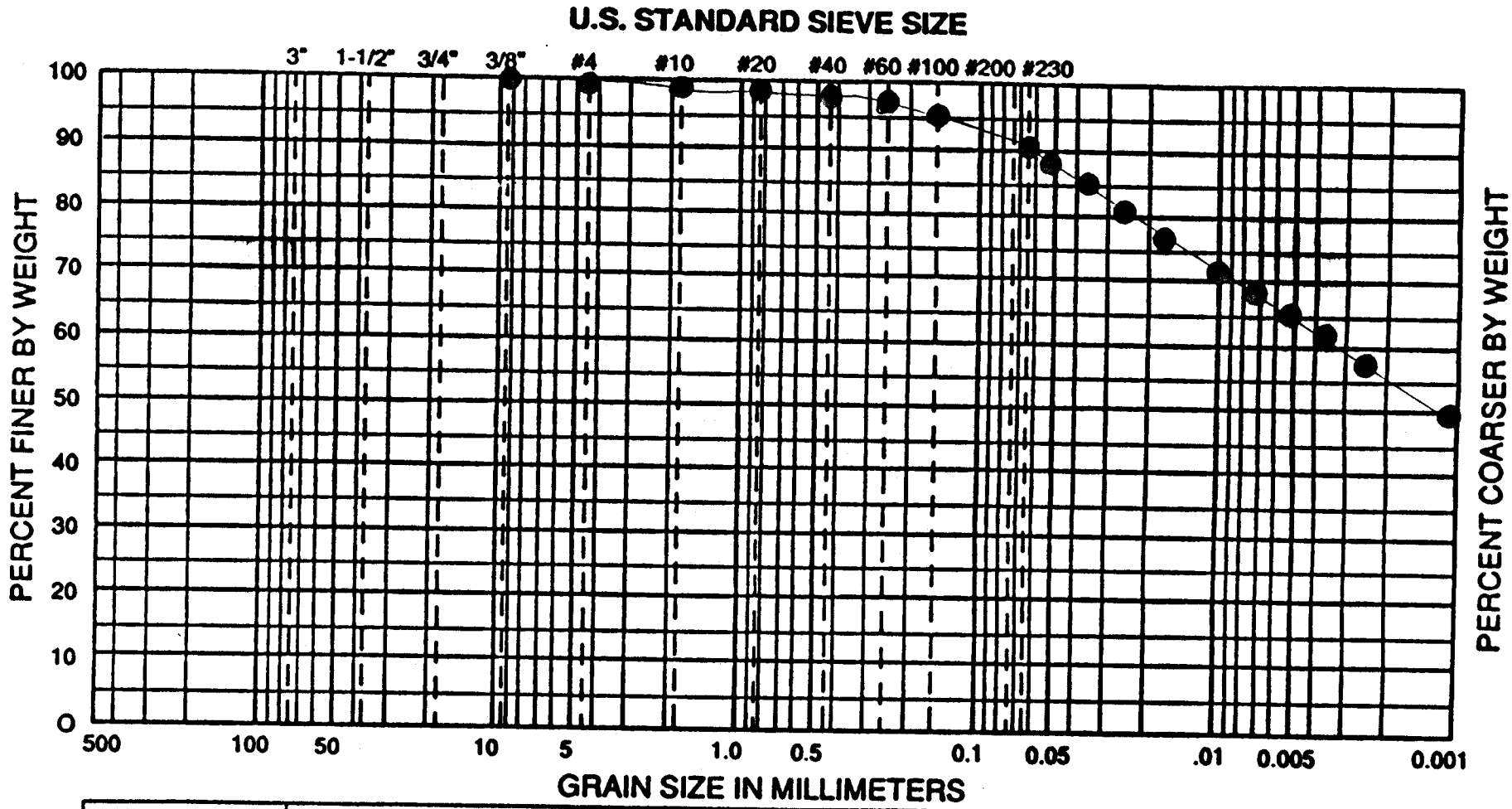
Hydrometer #	ASTM 152 H	Temp., Deg. C	22.0
Sp. Gr. of Soil	2.72	Temp. Coef. K	0.01305
Value of "a"	0.99	Wt. Dry Sample "W"	54.242
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	4.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	53.50	48.50	88.2	88.2	7.52	0.0506
1.0	51.50	46.50	84.5	84.5	7.84	0.0366
2.0	49.50	44.50	80.9	80.9	8.17	0.0264
5.0	47.50	42.50	77.3	77.3	8.50	0.0170
15.0	44.50	39.50	71.8	71.8	8.99	0.0101
30.0	42.50	37.50	68.2	68.2	9.32	0.0073
60.0	41.00	36.00	65.4	65.4	9.57	0.0052
120.0	39.00	34.00	61.8	61.8	9.89	0.0037
250.0	36.50	31.50	57.3	57.3	10.30	0.0026
1440.0	32.00	27.00	49.1	49.1	11.04	0.0011

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY			
		COARSE	FINE	COARSE	MEDIUM	FINE				
WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 5+50 SAMPLE NO.: CH #19 DATE: 4/17/91 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION
Rocky Flats	39'	Silty Clay (CH) with trace sand & gravel. .4% fine gvl / .3% c. sd, 1.4% med. sd, 5.9% fine sd / 27.1% Silt, 64.9% Clay

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION _____

LABORATORY CLASSIFICATION _____

JOB NO. 066-03
CLIENT/OWNER Weston
LOCATION Rocky Flats
BORING 5-50 SAMPLE CH #19 DEPTH 39'

FIELD DENSITY BY ___/___/___

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

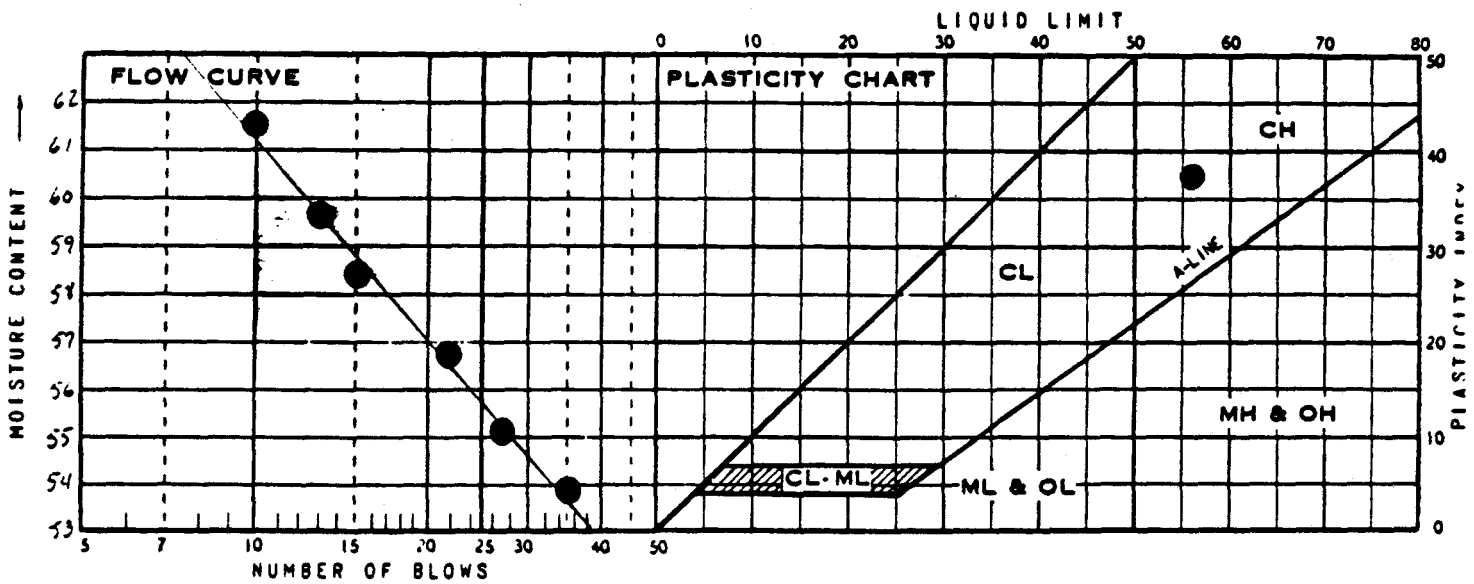
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY RA 4/15/92

DETERMINATION	1	2	3	4	5	6
DISH	B58	2056	20C			
WT OF DISH + WET SOIL g	5.64g	5.82g	6.04g			
WT OF DISH + DRY SOIL g	4.95	5.04	5.27	—	—	—
WT OF MOISTURE g	.69	.78	.77			
WT OF DISH g	1.05	1.04	1.06	—	—	—
WT OF DRY SOIL g	3.90	4.00	4.21			
MOISTURE CONTENT %	17.7	19.5	18.3			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	B57	18C	35CC	17C	4	B33
NUMBER OF BLOWS	35	27	22	15	13	10
WT OF DISH + WET SOIL g	12.15	11.55	11.32	11.65	11.48	12.24
WT OF DISH + DRY SOIL g	8.26	7.82	7.60	7.74	7.58	7.97
WT OF MOISTURE g	3.89	3.73	3.72	3.91	3.90	4.27
WT OF DISH g	1.04	1.05	1.05	1.04	1.05	1.04
WT OF DRY SOIL g	7.22	6.77	6.55	6.70	6.53	6.93
MOISTURE CONTENT %	53.9	55.1	56.8	58.4	59.8	61.6



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		55.7	18.5	37.2	CH	

ADVANCED TERRA TESTING inc

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	5+50	SAMPLED	Rocky Flats
DEPTH	47'	DATE TESTED	04-15-92 TNU
SAMPLE NO.	#19	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC	Yes	
NATURAL	No	
Wt. Wet Soil & Pan	(g)	60.99
Wt. Dry Soil & Pan	(g)	59.53
Wt. Lost Moisture	(g)	1.46
Wt. of Pan Only	(g)	3.84
Wt. of Dry Soil	(g)	55.69
Moisture Content	%	2.6
Wt. Hydrom. Sample Wet	(g)	55.17
Wt. Hydrom. Sample Dry	(g)	53.76

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	55.17
Weight of + #10 Before Washing (g)	0.00
Weight of + #10 After Washing (g)	0.00
Weight of - #10 Wet (g)	55.17
Weight of - #10 Dry (g)	53.76
Wt. Total Sample Dry (g)	53.76
Calc. Wt. "W" (g)	53.76
Calc. Mass + #10	0.00

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	0.00	0.00	0.00	0.0	100.0
#4	0.00	0.00	0.00	0.00	0.0	100.0
#10	0.00	0.00	0.00	0.00	0.0	100.0
#20	1.56	1.84	0.28	0.28	0.5	99.5
#40	1.56	1.75	0.19	0.47	0.9	99.1
#60	1.56	1.72	0.16	0.63	1.2	98.8
#100	1.57	1.74	0.17	0.80	1.5	98.5
#230	1.57	3.96	2.39	3.19	5.9	94.1

Silty Clay (CL)

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT **Weston** JOB NO. 2066-03

BORING NO.	5+50	SAMPLED	Rocky Flats
DEPTH	47'	DATE TESTED	04-15-92 TNU
SAMPLE NO.	#19	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

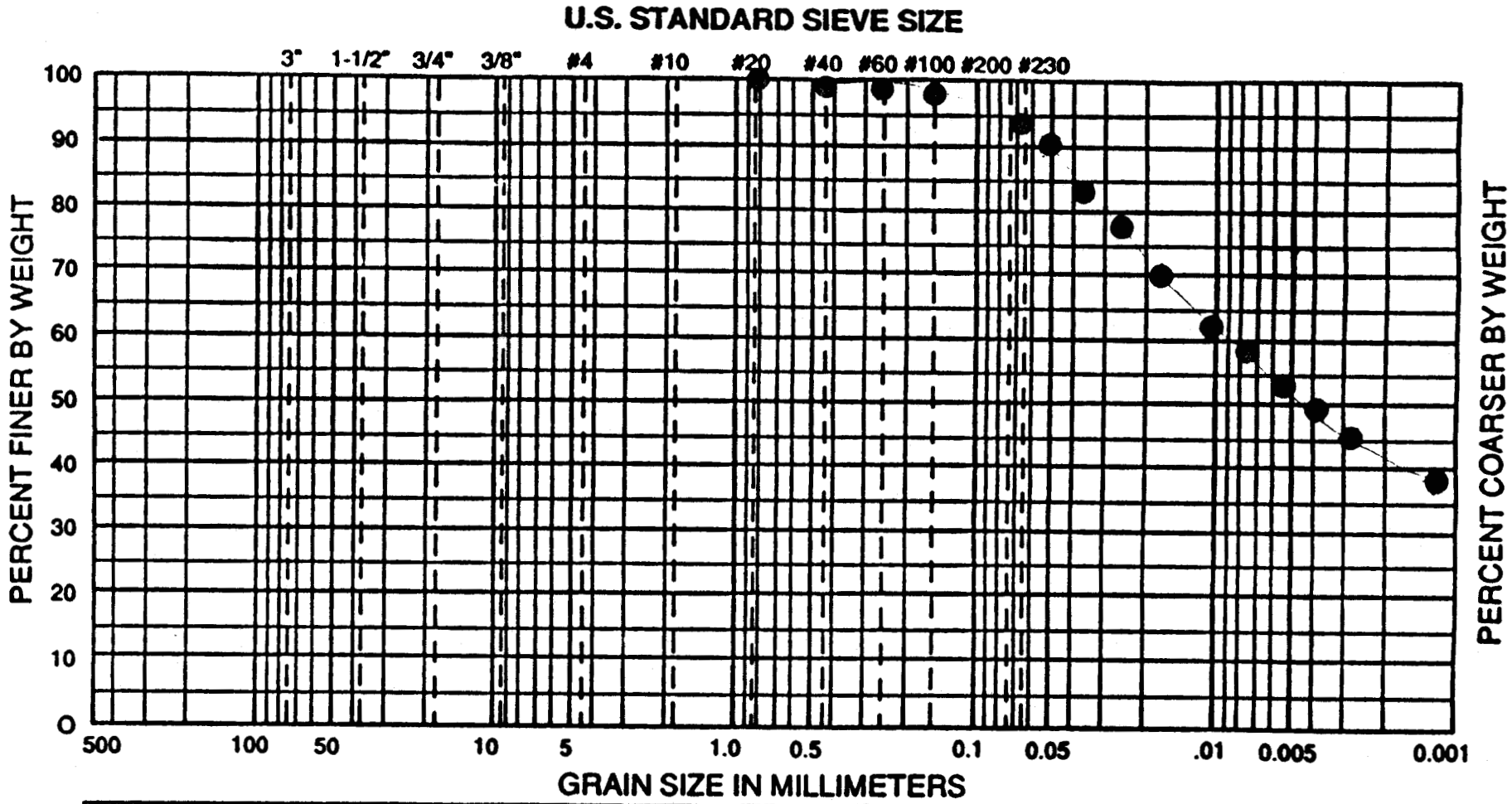
Hydrometer #	ASTM 152 H	Temp., Deg. C	22.0
Sp. Gr. of Soil	2.72	Temp. Coef. K	0.01305
Value of "a"	0.99	Wt. Dry Sample "W"	53.758
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	4.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	54.50	49.50	90.8	90.8	7.35	0.0500
1.0	50.00	45.00	82.5	82.5	8.09	0.0371
2.0	47.50	42.50	78.0	78.0	8.50	0.0269
5.0	43.00	38.00	69.7	69.7	9.24	0.0177
15.0	39.00	34.00	62.4	62.4	9.89	0.0106
30.0	37.00	32.00	58.7	58.7	10.22	0.0076
60.0	34.00	29.00	53.2	53.2	10.71	0.0055
120.0	32.50	27.50	50.4	50.4	10.96	0.0039
250.0	30.00	25.00	45.9	45.9	11.37	0.0028
1440.0	25.50	20.50	37.6	37.6	12.11	0.0012

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY		
		COARSE	FINE	COARSE	MEDIUM	FINE			

WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 5+50 SAMPLE NO.: CH #19 DATE: 4/17.92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION
Rocky Flats	47'	Silty Clay w/ trace sand .9% Medium sand, 4.1% Fine sand, 44% silt, 51% clay

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION _____

LABORATORY CLASSIFICATION _____

JOB NO. 2066-03

CLIENT/OWNER Weston

LOCATION Rocky Flats / EG&G

BORING 5+50 SAMPLE #19 DEPTH 47.0'

FIELD DENSITY BY ___/__/__

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

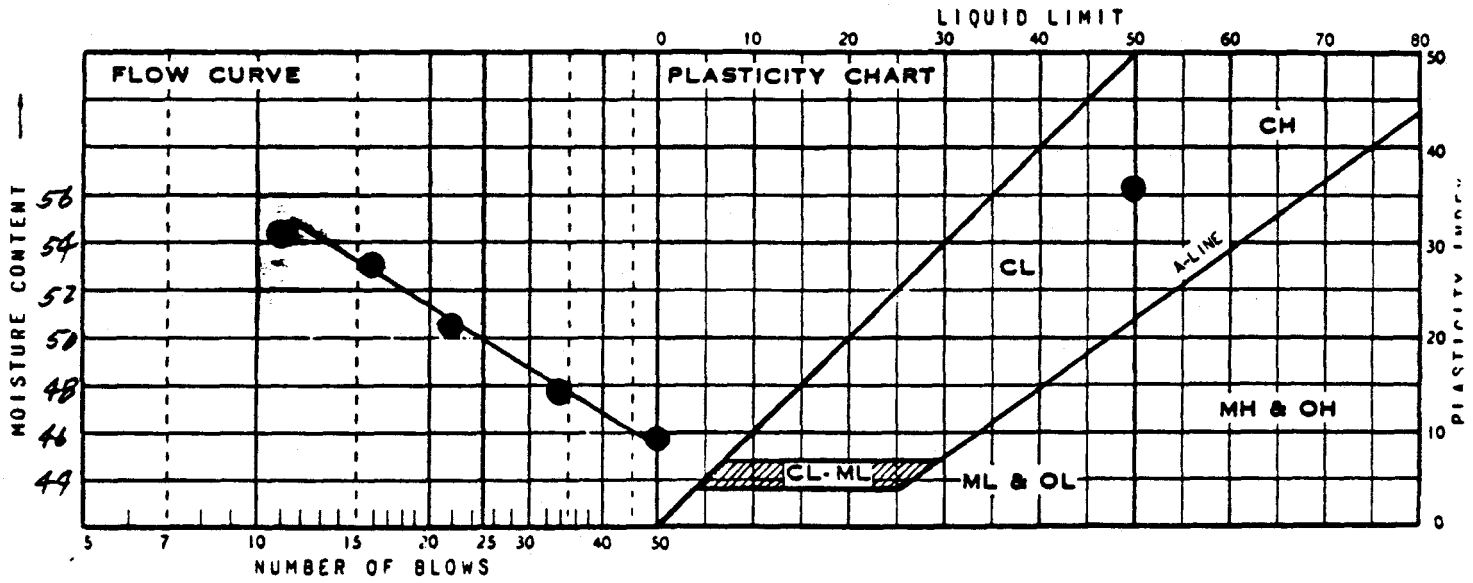
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY ~~[illegible]~~ 4/13/92

DETERMINATION	1	2	3	4	5	6
DISH	24C	B47	B21			
WT OF DISH + WET SOIL g	6.14	8.73	6.91			
WT OF DISH + DRY SOIL g	5.47	7.77	6.17	—	—	—
WT OF MOISTURE g	0.67	0.96	0.74			
WT OF DISH g	1.04	1.05	1.04	—	—	—
WT OF DRY SOIL g	4.43	6.72	5.13			
MOISTURE CONTENT %	15.1	14.3	14.4	= 28.7/2 = 14.4		

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	B24	2002	B50	31C	28C	
NUMBER OF BLOWS	50 -	34	22	16	11	
WT OF DISH + WET SOIL g	10.38	10.67	11.68	12.27	14.43	
WT OF DISH + DRY SOIL g	7.45	7.56	8.10	8.38	9.72	—
WT OF MOISTURE g	2.93	3.11	3.58	3.89	4.71	
WT OF DISH g	1.02	1.06	1.03	1.05	1.05	—
WT OF DRY SOIL g	6.43	6.50	7.07	7.33	8.67	
MOISTURE CONTENT %	45.6	47.8	50.6	53.1	54.3	



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		49.9	14.4	35.5	CL	

ADVANCED TERRA TESTING inc

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT **Weston**

JOB NO. 2066-03

BORING NO.	5+50	SAMPLED	Rocky Flats
DEPTH	56.3'	DATE TESTED	04-14-92 TNU
SAMPLE NO.	#19	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC	Yes
NATURAL	No

Wt. Wet Soil & Pan	(g)	37.08
Wt. Dry Soil & Pan	(g)	35.84
Wt. Lost Moisture	(g)	1.24
Wt. of Pan Only	(g)	3.66
Wt. of Dry Soil	(g)	32.18
Moisture Content	%	3.9

Wt. Hydrom. Sample Wet (g)	54.98
Wt. Hydrom. Sample Dry (g)	52.94

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	54.98
Weight of + #10 Before Washing (g)	0.00
Weight of + #10 After Washing (g)	0.00
Weight of - #10 Wet (g)	54.98
Weight of - #10 Dry (g)	52.94
Wt. Total Sample Dry (g)	52.94
Calc. Wt. "W" (g)	52.94
Calc. Mass + #10	0.00

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	0.00	0.00	0.00	0.0	100.0
#4	0.00	0.00	0.00	0.00	0.0	100.0
#10	0.00	0.00	0.00	0.00	0.0	100.0
#20	1.55	1.60	0.05	0.05	0.1	99.9
#40	1.56	1.68	0.12	0.17	0.3	99.7
#60	1.55	1.64	0.09	0.26	0.5	99.5
#100	1.55	1.67	0.12	0.38	0.7	99.3
#230	1.56	1.75	0.19	0.57	1.1	98.9

Claystone

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT	Weston	JOB NO.	2066-03
BORING NO.	5+50	SAMPLED	Rocky Flats
DEPTH	56.3'	DATE TESTED	04-14-92 TNU
SAMPLE NO.	#19	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

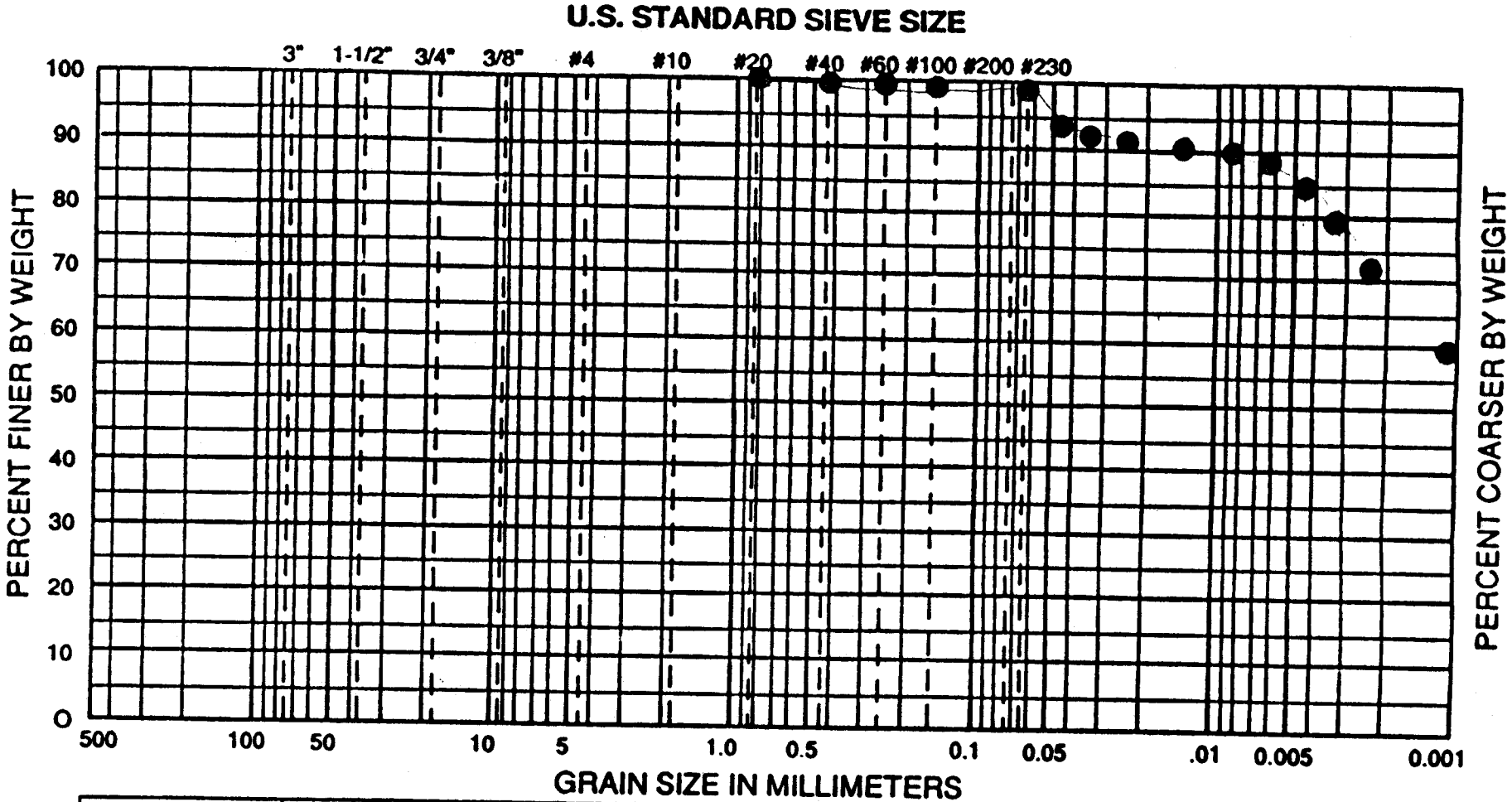
Hydrometer #	ASTM 152 H	Temp., Deg. C	23.0
Sp. Gr. of Soil	2.76	Temp. Coef. K	0.01275
Value of "a"	0.98	Wt. Dry Sample "W"	52.941
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	5.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	56.50	50.50	93.3	93.3	7.02	0.0478
1.0	56.00	50.00	92.4	92.4	7.11	0.0340
2.0	56.00	50.00	92.4	92.4	7.11	0.0240
5.0	55.75	49.75	91.9	91.9	7.15	0.0152
15.0	54.50	48.50	89.6	89.6	7.35	0.0089
30.0	54.00	48.00	88.7	88.7	7.43	0.0063
60.0	52.00	46.00	85.0	85.0	7.76	0.0046
120.0	48.50	42.50	78.5	78.5	8.34	0.0034
250.0	45.00	39.00	72.0	72.0	8.91	0.0024
1440.0	38.00	32.00	59.1	59.1	10.06	0.0011

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY		
		COARSE	FINE	COARSE	MEDIUM	FINE			
WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 54 50 SAMPLE NO.: CH #19 DATE: 4/17/92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION
Rocky Flats	56.3'	Claystone with some silt trace sand. .3% medium sand, .8% fine sand 12.6% silt, 86% clay

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION - - - - - - - - - - - - - - - -

LABORATORY CLASSIFICATION - - - - - - - - - - - - -

JOB NO. 2066-03
CLIENT/OWNER Weston
LOCATION Rocky Flats
BORING 550 SAMPLE CU #19 DEPTH 56.3'

FIELD DENSITY BY ___/___/___

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

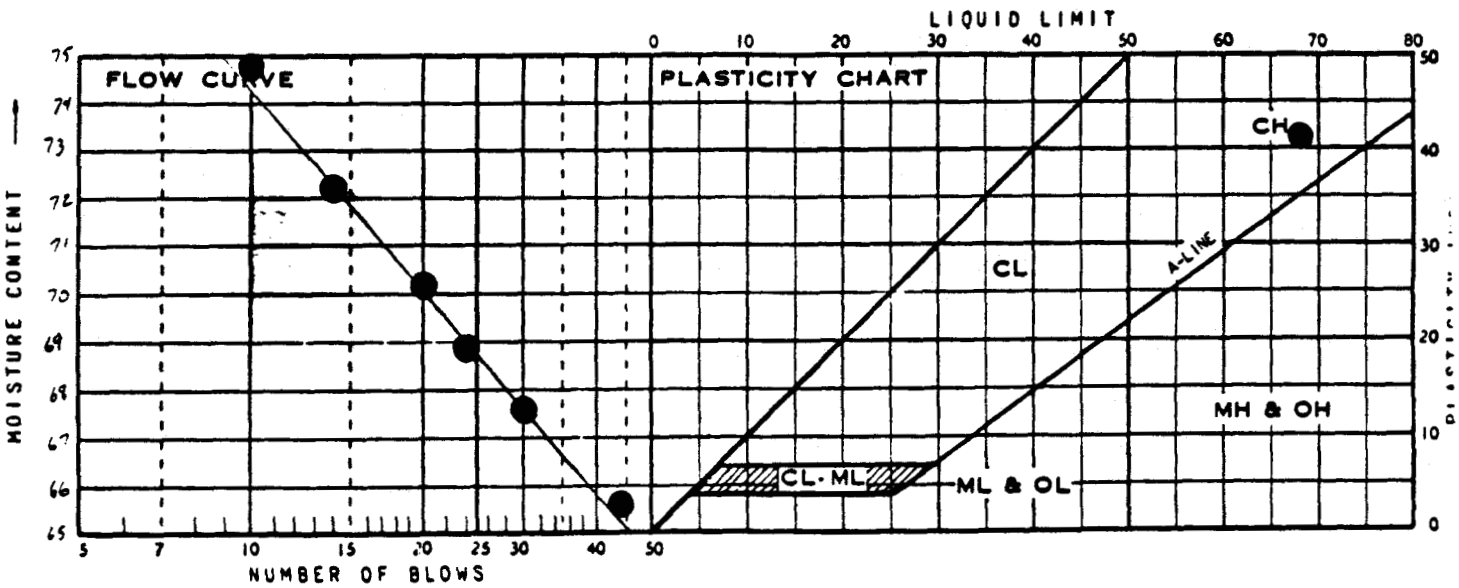
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY Ow 4/15/92

DETERMINATION	1	2	3	4	5	6
DISH	2057	37C	2004			
WT OF DISH + WET SOIL g	5.55	5.48	4.75			
WT OF DISH + DRY SOIL g	4.72	4.65	4.08	—	—	—
WT OF MOISTURE g	.83	.83	.67			
WT OF DISH g	1.06	1.07	1.05	—	—	—
WT OF DRY SOIL g	3.66	3.58	3.03			
MOISTURE CONTENT %	22.7	23.2	22.1			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	2021	B4	2001	34CX	815	22
NUMBER OF BLOWS	44	30	24	20	14	10
WT OF DISH + WET SOIL g	11.94	10.92	11.83	11.88	11.33	11.12
WT OF DISH + DRY SOIL g	7.63	6.94	7.44	7.41	7.01	6.81
WT OF MOISTURE g	4.31	3.98	4.39	4.47	4.32	4.31
WT OF DISH g	1.06	1.05	1.06	1.04	1.03	1.05
WT OF DRY SOIL g	6.57	5.89	6.38	6.37	5.98	5.76
MOISTURE CONTENT %	65.6	67.6	68.9	70.2	72.2	74.8



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		68.7	22.7	46.0	CH	

ADVANCED TERRA TESTING

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT **Weston**

JOB NO. 2066-03

BORING NO.	6+00	SAMPLED	Rocky Flats
DEPTH	18'	DATE TESTED	04-14-92 TNU
SAMPLE NO.	#19	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC	Yes	
NATURAL	No	
Wt. Wet Soil & Pan	(g)	33.38
Wt. Dry Soil & Pan	(g)	32.67
Wt. Lost Moisture	(g)	0.71
Wt. of Pan Only	(g)	3.71
Wt. of Dry Soil	(g)	28.96
Moisture Content	%	2.5
Wt. Hydrom. Sample Wet	(g)	55.02
Wt. Hydrom. Sample Dry	(g)	53.70

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	376.11
Weight of + #10 Before Washing (g)	2.74
Weight of + #10 After Washing (g)	2.10
Weight of - #10 Wet (g)	373.37
Weight of - #10 Dry (g)	365.06
Wt. Total Sample Dry (g)	367.16
Calc. Wt. "W" (g)	54.01
Calc. Mass + #10	0.31

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	0.00	0.00	0.00	0.0	100.0
#4	0.00	0.61	0.61	0.61	0.2	99.8
#10	0.00	1.49	1.49	2.10	0.6	99.4
#20	1.56	2.38	0.82	0.82	2.1	97.9
#40	1.55	2.96	1.41	2.23	4.7	95.3
#60	1.55	3.24	1.69	3.92	7.8	92.2
#100	1.56	4.02	2.46	6.38	12.4	87.6
#230	1.56	5.96	4.40	10.78	20.5	79.5 81.5

CLAY (CH)

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT	Weston	JOB NO.	2066-03
BORING NO.	6+00	SAMPLED	Rocky Flats
DEPTH	18'	DATE TESTED	04-14-92 TNU
SAMPLE NO.	#19	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

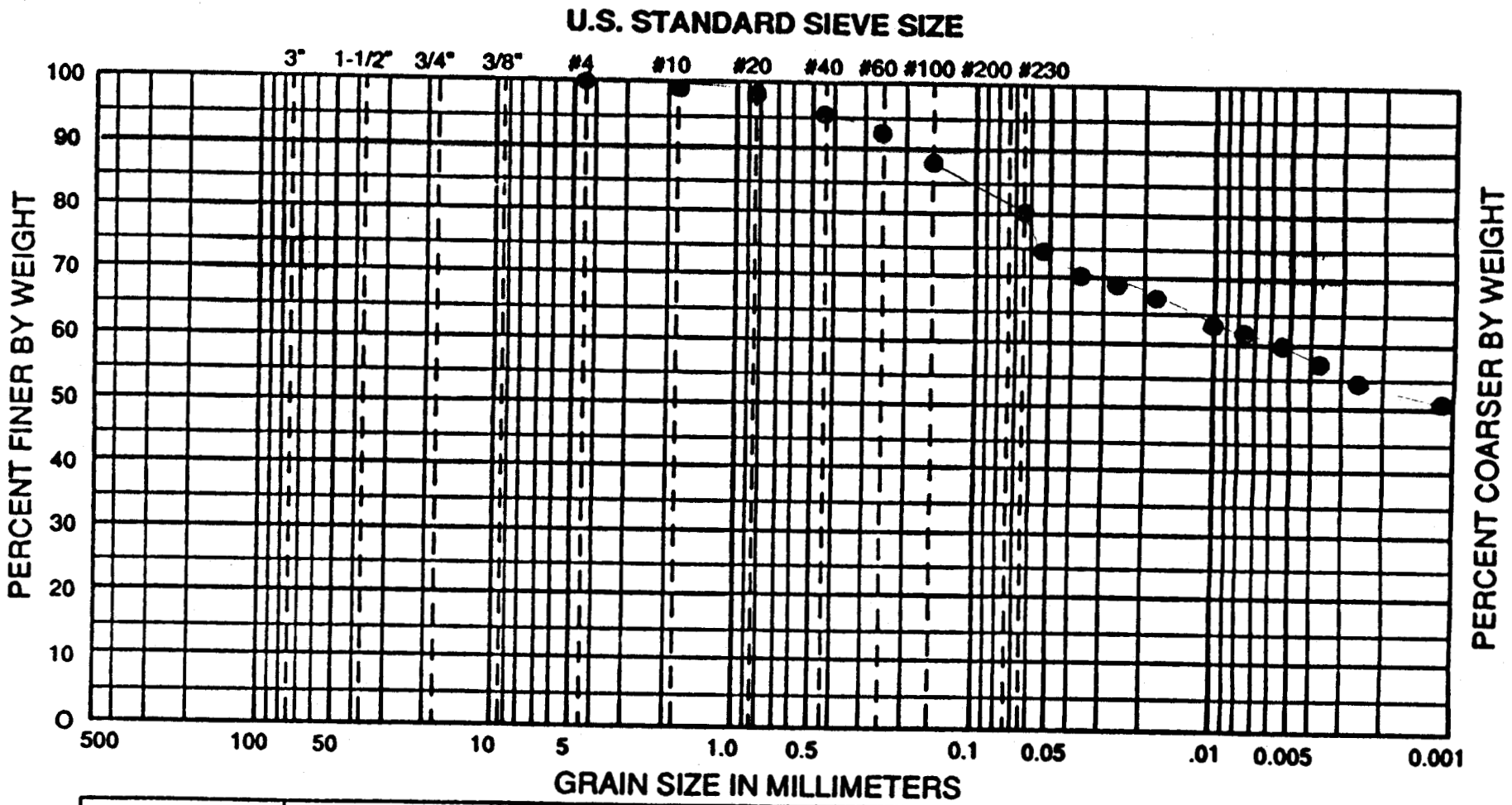
Hydrometer #	ASTM 152 H	Temp., Deg. C	23.0
Sp. Gr. of Soil	2.71	Temp. Coef. K	0.01293
Value of "a"	0.99	Wt. Dry Sample "W"	54.010
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	5.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	46.50	40.50	74.1	74.1	8.66	0.0538
1.0	44.50	38.50	70.4	70.4	8.99	0.0388
2.0	44.00	38.00	69.5	69.5	9.07	0.0275
5.0	42.50	36.50	66.8	66.8	9.32	0.0177
15.0	40.25	34.25	62.7	62.7	9.69	0.0104
30.0	40.00	34.00	62.2	62.2	9.73	0.0074
60.0	39.00	33.00	60.4	60.4	9.89	0.0053
120.0	37.00	31.00	56.7	56.7	10.22	0.0038
250.0	35.50	29.50	54.0	54.0	10.47	0.0026
1440.0	34.00	28.00	51.2	51.2	10.71	0.0011

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY			
		COARSE	FINE	COARSE	MEDIUM	FINE				

WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 6+00 SAMPLE NO.: CH #19 DATE: 4/17/92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION
Rocky Flats	18'	Clay (CH) w/ some sand & silt, trace gravel
		0.2% fine gravel, 4% c. sand, 4.1% med. sand, 13.8% fine sand, 23% silt, 58.5% clay

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION - - - - - - - - - - - - - - - -

LABORATORY CLASSIFICATION - - - - - - - - - - - - -

JOB NO. 2066-03

CLIENT/OWNER WESTON

LOCATION ROCKY FLATS/EG&G

BORING 6+00 SAMPLE CH #19 DEPTH 18.0'

FIELD DENSITY BY ...../../..

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD → [redacted]

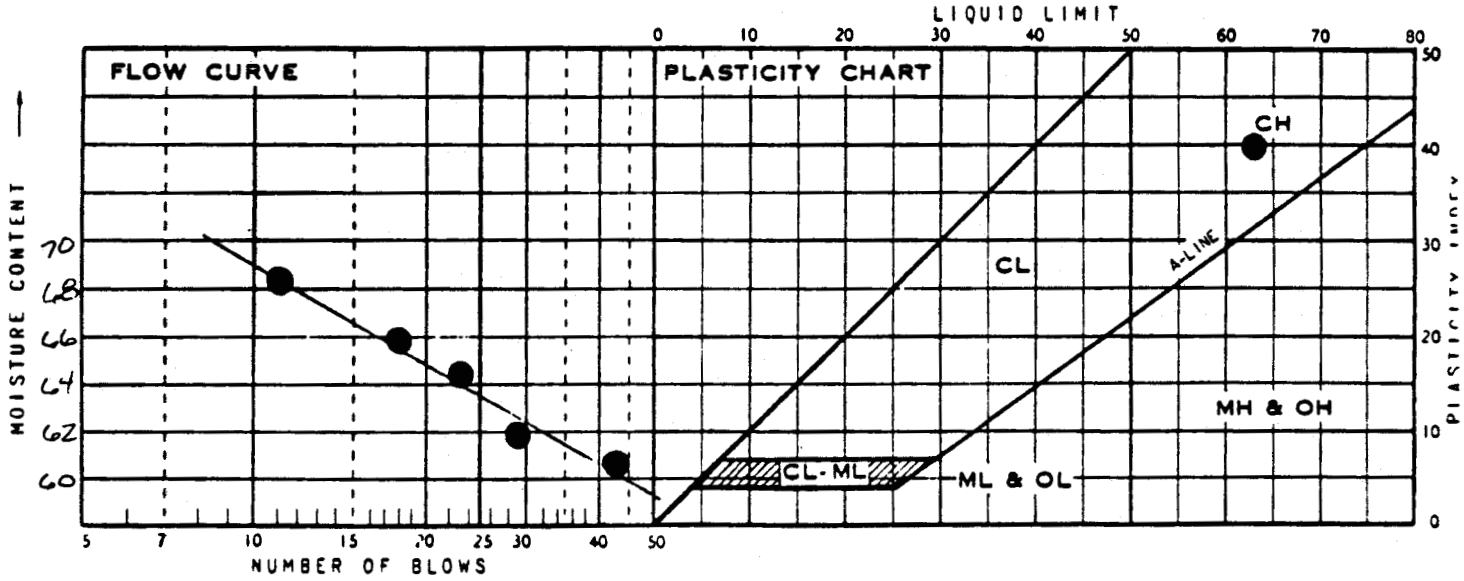
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY SR.4.113/92.

DETERMINATION	1	2	3	4	5	6
DISH	2015	2006	36 C			
WT OF DISH + WET SOIL g	4.46	5.02	5.31			
WT OF DISH + DRY SOIL g	3.80	4.26	4.52	—	—	—
WT OF MOISTURE g	.66	.76	.79			
WT OF DISH g	1.03	1.05	1.08	—	—	—
WT OF DRY SOIL g	2.77	3.21	3.44			
MOISTURE CONTENT %	23.8	23.7	23.0	AVE 2		

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	2054	R18	46C	37C	30C	
NUMBER OF BLOWS	43	29	23	18	11	
WT OF DISH + WET SOIL g	13.64	12.79	12.08	14.45	11.21	
WT OF DISH + DRY SOIL g	8.89	8.30	7.77	9.12	7.09	—
WT OF MOISTURE g	4.75	4.49	4.31	5.33	4.12	
WT OF DISH g	1.05	1.04	1.06	1.03	1.06	—
WT OF DRY SOIL g	7.84	7.26	6.71	8.09	6.03	
MOISTURE CONTENT %	60.6	61.9	64.2	65.9	68.3	



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		63.7	23.5	40.2	CH	

ADVANCED TERRA TESTING

RBM

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT **Weston**

JOB NO. 2066-03

BORING NO.	6+00	SAMPLED	Rocky Flats
DEPTH	24'	DATE TESTED	04-15-92 TNU
SAMPLE NO.	#19	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC	Yes	
NATURAL	No	
Wt. Wet Soil & Pan	(g)	33.70
Wt. Dry Soil & Pan	(g)	33.11
Wt. Lost Moisture	(g)	0.59
Wt. of Pan Only	(g)	3.57
Wt. of Dry Soil	(g)	29.54
Moisture Content	%	2.0
Wt. Hydrom. Sample Wet	(g)	55.01
Wt. Hydrom. Sample Dry	(g)	53.93

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	459.09
Weight of + #10 Before Washing (g)	4.20
Weight of + #10 After Washing (g)	3.73
Weight of - #10 Wet (g)	454.89
Weight of - #10 Dry (g)	446.44
Wt. Total Sample Dry (g)	450.17
Calc. Wt. "W" (g)	54.39
Calc. Mass + #10	0.45

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	0.00	0.00	0.00	0.0	100.0
#4	0.00	0.97	0.97	0.97	0.2	99.8
#10	0.00	2.76	2.76	3.73	0.8	99.2
#20	1.56	1.82	0.26	0.26	1.3	98.7
#40	1.57	2.71	1.14	1.40	3.4	96.6
#60	1.55	3.53	1.98	3.38	7.0	93.0
#100	1.57	5.44	3.87	7.25	14.2	85.8
#230	1.31	8.69	7.38	14.63	27.7	72.3

Silty Clay (CL)

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT **Weston** JOB NO. 2066-03

BORING NO.	6+00	SAMPLED	Rocky Flats
DEPTH	24'	DATE TESTED	04-15-92 TNU
SAMPLE NO.	#19	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

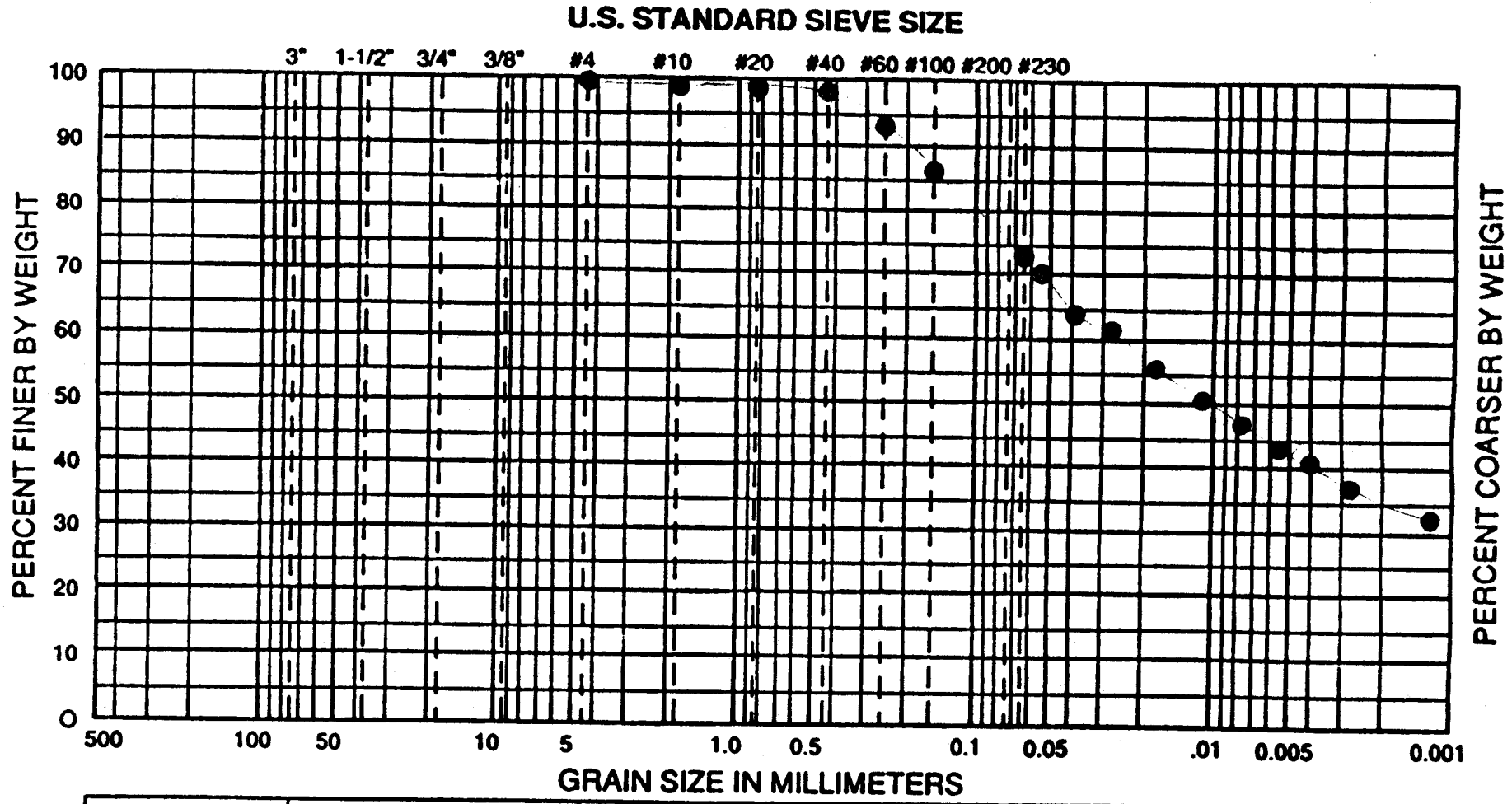
Hydrometer #	ASTM 152 H	Temp., Deg. C	22.0
Sp. Gr. of Soil	2.77	Temp. Coef. K	0.01287
Value of "a"	0.98	Wt. Dry Sample "W"	54.385
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	4.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	44.00	39.00	70.0	70.0	9.07	0.0548
1.0	41.00	36.00	64.6	64.6	9.57	0.0398
2.0	39.00	34.00	61.0	61.0	9.89	0.0286
5.0	36.00	31.00	55.6	55.6	10.39	0.0185
15.0	33.00	28.00	50.2	50.2	10.88	0.0110
30.0	31.00	26.00	46.7	46.7	11.21	0.0079
60.0	29.50	24.50	44.0	44.0	11.45	0.0056
120.0	27.50	22.50	40.4	40.4	11.78	0.0040
250.0	25.50	20.50	36.8	36.8	12.11	0.0028
1440.0	23.50	18.50	33.2	33.2	12.44	0.0012

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY			
		COARSE	FINE	COARSE	MEDIUM	FINE				
WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 6+00 SAMPLE NO.: CH #19 DATE: 4-17-92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION
Rocky Flats	24.0'	SILTY CLAY (CL) w/ some sand, trace gravel.
		0.2% fine gvl / 0.6% C. sd, 2.6% med sd, 21.6 fine sd / 32.5% silt, 42.5% clay

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION _____

LABORATORY CLASSIFICATION _____

JOB NO. 2066-03

CLIENT/OWNER Weston

LOCATION Rocky Flats

BORING 6+00 SAMPLE #19 DEPTH @ 24.0

FIELD DENSITY BY ___/__/__

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

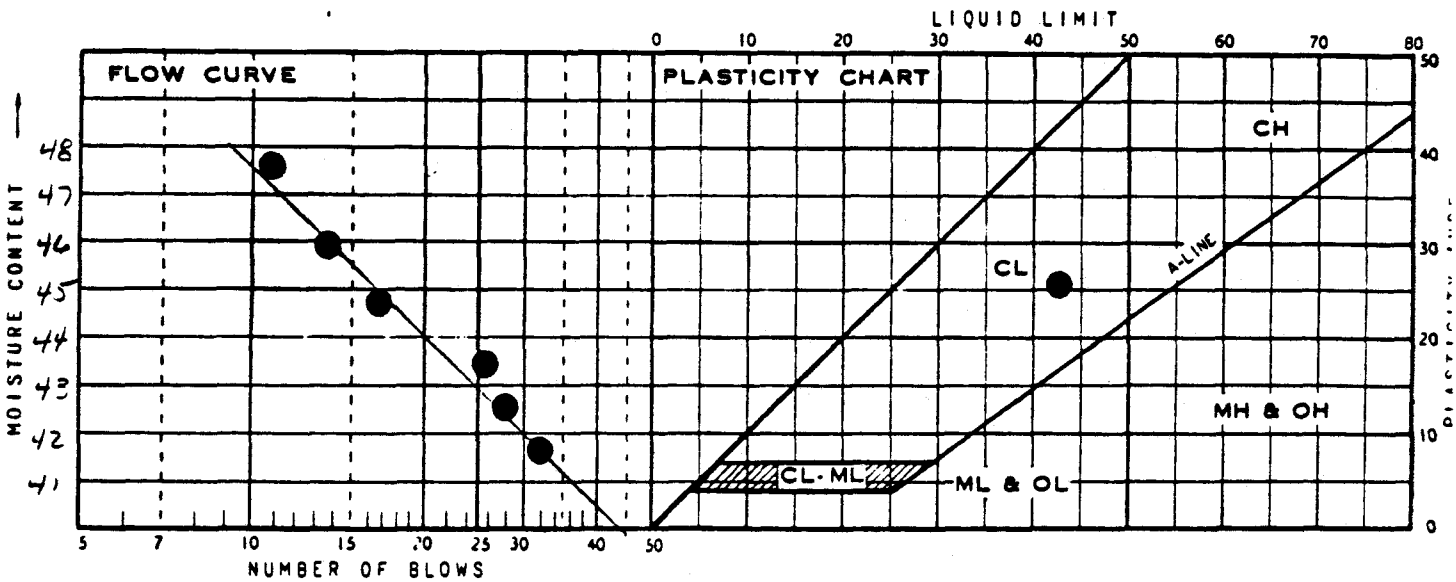
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY ~~RDS~~ SR 4/16/92

DETERMINATION	1	2	3	4	5	6
DISH	2006	25C	B32			
WT OF DISH + WET SOIL g	6.15	6.63	5.76			
WT OF DISH + DRY SOIL g	5.41	5.83	5.09	—	—	—
WT OF MOISTURE g	.74	.80	.67			
WT OF DISH g	1.05	1.06	1.03	—	—	—
WT OF DRY SOIL g	4.36	4.77	4.06			
MOISTURE CONTENT %	17.0	16.8	16.5			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	10C	27C	37C	B36	2072	36C
NUMBER OF BLOWS	32	28	26	17	14	11f
WT OF DISH + WET SOIL g	17.42	18.95	17.03	16.51	16.24	20.66
WT OF DISH + DRY SOIL g	12.61	13.61	12.19	11.73	11.46	14.32
WT OF MOISTURE g	4.81	5.34	4.84	4.78	4.78	6.34
WT OF DISH g	1.06	1.06	1.05	1.05	1.04	1.04
WT OF DRY SOIL g	11.55	12.55	11.14	10.68	10.42	13.28
MOISTURE CONTENT %	41.7	42.6	43.5	44.8	45.9	47.7



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		42.9	16.8	26.1	CL	

ADVANCED TERRA TESTING

R.N.

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT **Weston**

JOB NO. 2066-03

BORING NO.	6+00	SAMPLED	Rocky Flats
DEPTH	26'	DATE TESTED	04-15-92 TNU
SAMPLE NO.	#19	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan	(g)	37.55
Wt. Dry Soil & Pan	(g)	36.49
Wt. Lost Moisture	(g)	1.06
Wt. of Pan Only	(g)	3.79
Wt. of Dry Soil	(g)	32.70
Moisture Content	%	3.2

Wt. Hydrom. Sample Wet (g)	55.01
Wt. Hydrom. Sample Dry (g)	53.28

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	445.65
Weight of + #10 Before Washing (g)	13.98
Weight of + #10 After Washing (g)	8.71
Weight of - #10 Wet (g)	431.67
Weight of - #10 Dry (g)	423.22
Wt. Total Sample Dry (g)	431.93
Calc. Wt. "W" (g)	54.38
Calc. Mass + #10	1.10

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	3.26	3.26	3.26	0.8	99.2
#4	0.00	2.60	2.60	5.86	1.4	98.6
#10	0.00	2.85	2.85	8.71	2.0	98.0
#20	1.57	2.24	0.67	0.67	3.2	96.8
#40	1.56	2.20	0.64	1.31	4.4	95.6
#60	1.56	2.22	0.66	1.97	5.6	94.4
#100	1.56	2.45	0.89	2.86	7.3	92.7
#230	1.56	3.28	1.72	4.58	10.4	89.6

Clay (CH)

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT **Weston** JOB NO. 2066-03

BORING NO.	6+00	SAMPLED	Rocky Flats
DEPTH	26'	DATE TESTED	04-15-92 TNU
SAMPLE NO.	#19	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

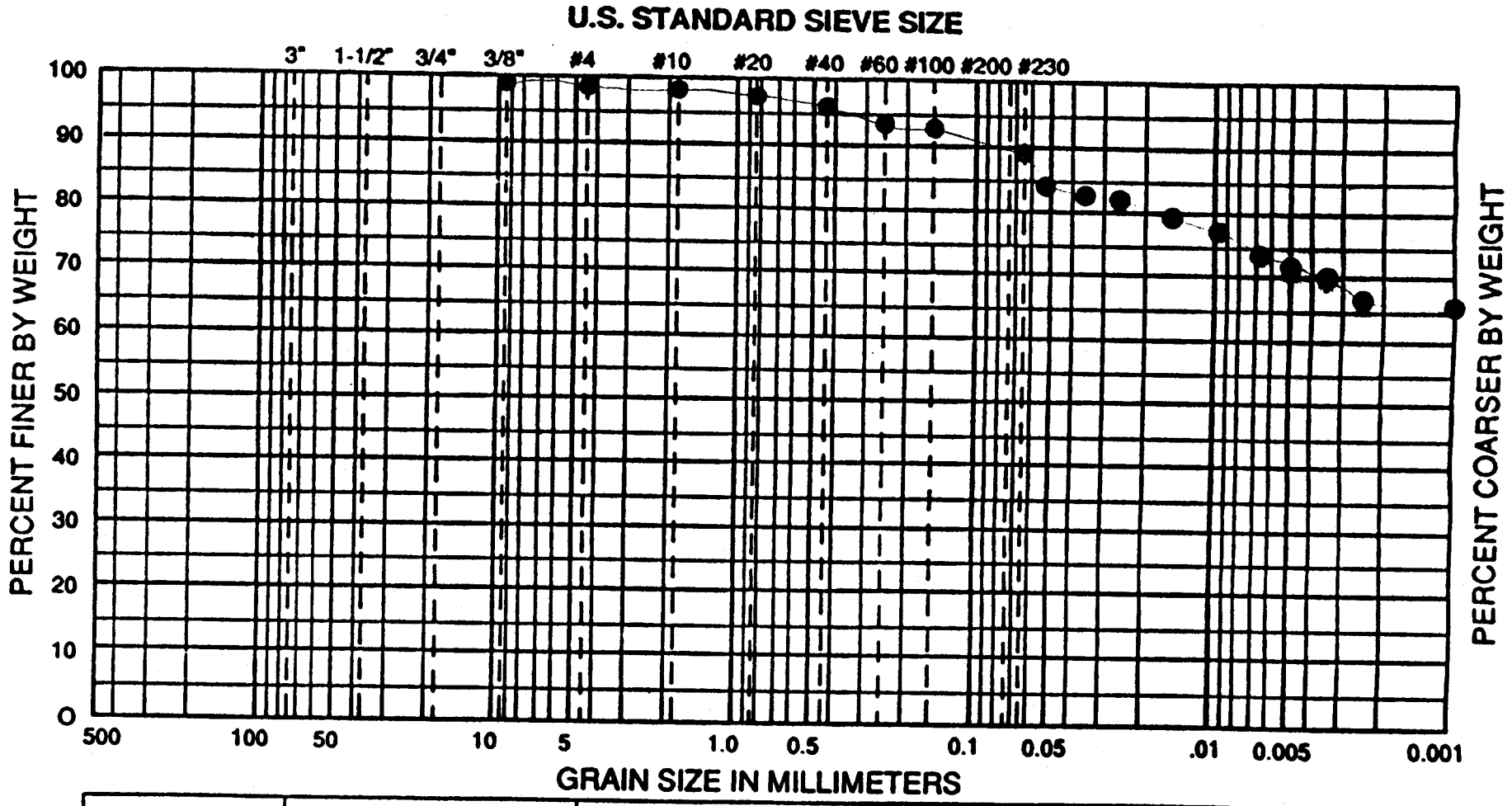
Hydrometer #	ASTM 152 H	Temp., Deg. C	22.0
Sp. Gr. of Soil	2.77	Temp. Coef. K	0.01287
Value of "a"	0.98	Wt. Dry Sample "W"	54.380
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	4.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	52.00	47.00	84.4	84.4	7.76	0.0507
1.0	51.00	46.00	82.6	82.6	7.93	0.0362
2.0	50.50	45.50	81.7	81.7	8.01	0.0258
5.0	49.50	44.50	79.9	79.9	8.17	0.0165
15.0	48.00	43.00	77.2	77.2	8.42	0.0096
30.0	46.50	41.50	74.5	74.5	8.66	0.0069
60.0	45.00	40.00	71.8	71.8	8.91	0.0050
120.0	44.00	39.00	70.0	70.0	9.07	0.0035
250.0	42.00	37.00	66.4	66.4	9.40	0.0025
1440.0	41.50	36.50	65.5	65.5	9.48	0.0010

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY
		COARSE	FINE	COARSE	MEDIUM	FINE	

WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 6+00 SAMPLE NO.: CH #19 DATE: 4-17-92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION
Rocky Flats	26.0'	Clay with some silt, trace sand & gvl. 1.4% fine gvl / .6% c. sd, 2.4% med sd, 5.6% f sd / 17% silt, 73% clay

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION - - - - - - - - - - - - - - - -

LABORATORY CLASSIFICATION - - - - - - - - - - - - -

JOB NO. 2066-03
CLIENT/OWNER Weston
LOCATION Rocky Flats / EG&G
BORING 6400 SAMPLE E19 DEPTH 26.0'

FIELD DENSITY BY ../../..

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD [redacted]

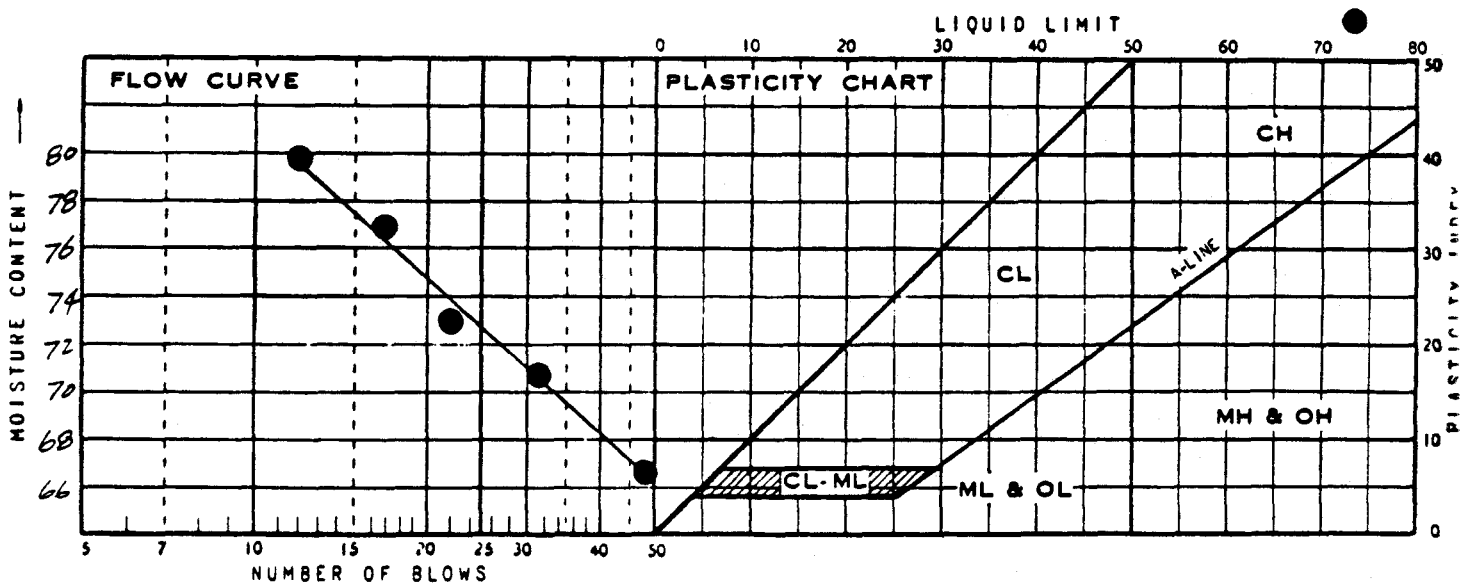
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY [illegible] 4/13/92

DETERMINATION	1	2	3	4	5	6
DISH	20C	2027	B38+			
WT OF DISH + WET SOIL g	7.87	4.62	5.98			
WT OF DISH + DRY SOIL g	6.83	4.07	5.20	—	—	—
WT OF MOISTURE g	1.04	0.55	0.78			
WT OF DISH g	1.06	1.05	1.05	—	—	—
WT OF DRY SOIL g	5.77	3.02	4.15			
MOISTURE CONTENT %	18.0	18.2	18.8	= 55.0/3 = 18.3		

LIQUID LIMIT ?

DETERMINATION	1	2	3	4	5	6
DISH	2033	B38	2068	2029	2037	
NUMBER OF BLOWS	48	31	22	17	12	
WT OF DISH + WET SOIL g	12.45+	11.83	10.49	8.25	9.14	
WT OF DISH + DRY SOIL g	7.89	7.36	6.51	5.12	5.55	—
WT OF MOISTURE g	4.56	4.47	3.98	3.13	3.59	
WT OF DISH g	1.04	1.04	1.06	1.05	1.05	—
WT OF DRY SOIL g	6.85	6.32	5.45	4.07	4.50	
MOISTURE CONTENT %	66.6	70.7	73.0	76.9	79.8	



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		72.7	18.3	54.4	CH	

ADVANCED TERRA TESTING INC

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT **Weston**

JOB NO. 2066-03

BORING NO.	6+00	SAMPLED	Rocky Flats
DEPTH	41'	DATE TESTED	04-15-92 TNU
SAMPLE NO.	#19	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC	Yes	
NATURAL	No	
Wt. Wet Soil & Pan	(g)	31.52
Wt. Dry Soil & Pan	(g)	30.89
Wt. Lost Moisture	(g)	0.63
Wt. of Pan Only	(g)	3.59
Wt. of Dry Soil	(g)	27.30
Moisture Content	%	2.3
Wt. Hydrom. Sample Wet	(g)	55.00
Wt. Hydrom. Sample Dry	(g)	53.76

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	480.42
Weight of + #10 Before Washing (g)	21.53
Weight of + #10 After Washing (g)	16.20
Weight of - #10 Wet (g)	458.89
Weight of - #10 Dry (g)	453.75
Wt. Total Sample Dry (g)	469.95
Calc. Wt. "W" (g)	55.68
Calc. Mass + #10	1.92

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	2.56	2.56	2.56	0.5	99.5
#4	0.00	6.81	6.81	9.37	2.0	98.0
#10	0.00	6.83	6.83	16.20	3.4	96.6
#20	1.54	2.41	0.87	0.87	5.0	95.0
#40	1.57	2.79	1.22	2.09	7.2	92.8
#60	1.56	3.02	1.46	3.55	9.8	90.2
#100	1.30	3.47	2.17	5.72	13.7	86.3
#230	1.56	5.65	4.09	9.81	21.1	78.9

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Clay (CH)

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT **Weston**

JOB NO. 2066-03

BORING NO.	6+00	SAMPLED	Rocky Flats
DEPTH	41'	DATE TESTED	04-15-92 TNU
SAMPLE NO.	#19	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

Hydrometer #	ASTM 152 H	Temp., Deg. C	22.0
Sp. Gr. of Soil	2.72	Temp. Coef. K	0.01305
Value of "a"	0.99	Wt. Dry Sample "W"	55.680
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	4.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	48.00	43.00	76.1	76.1	8.42	0.0535
1.0	46.00	41.00	72.6	72.6	8.75	0.0386
2.0	45.50	40.50	71.7	71.7	8.83	0.0274
5.0	44.00	39.00	69.1	69.1	9.07	0.0176
15.0	42.50	37.50	66.4	66.4	9.32	0.0103
30.0	41.50	36.50	64.6	64.6	9.48	0.0073
60.0	40.00	35.00	62.0	62.0	9.73	0.0053
120.0	38.00	33.00	58.4	58.4	10.06	0.0038
250.0	36.00	31.00	54.9	54.9	10.39	0.0027
1440.0	33.00	28.00	49.6	49.6	10.88	0.0011

Grain Diameter = K*(SQRT(L/T))

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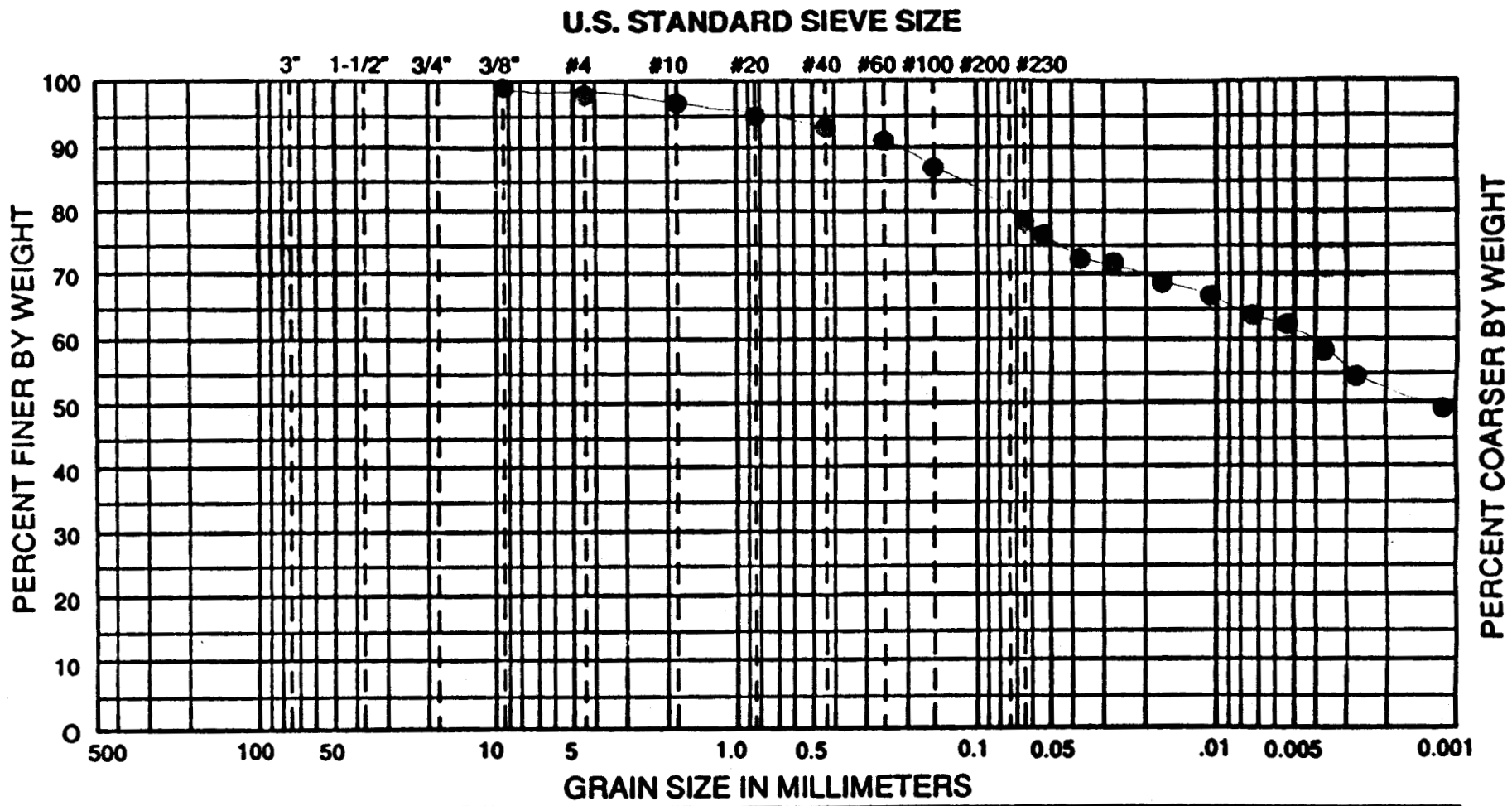
ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY
		COARSE	FINE	COARSE	MEDIUM	FINE	

WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 6+00 SAMPLE NO.: CH # 17 DATE: 4-17-92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION
Rocky Flats	41.0'	Clay (CH) with some sand and silt, tr gravel [illegible] fine gravel/1.4% coarse sand, 3.8% med. sand, 12.8% fine sand/17.5% silt, 62.5% clay

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION - - - - - - - - - - - - - - - -

LABORATORY CLASSIFICATION - - - - - - - - - - - - -

JOB NO. 2066-03
CLIENT/OWNER Weston
LOCATION Rocky Flats / EG&G
BORING 6109 SAMPLE #19 DEPTH @ 41.0'

FIELD DENSITY BY ___/___/___

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD [redacted]

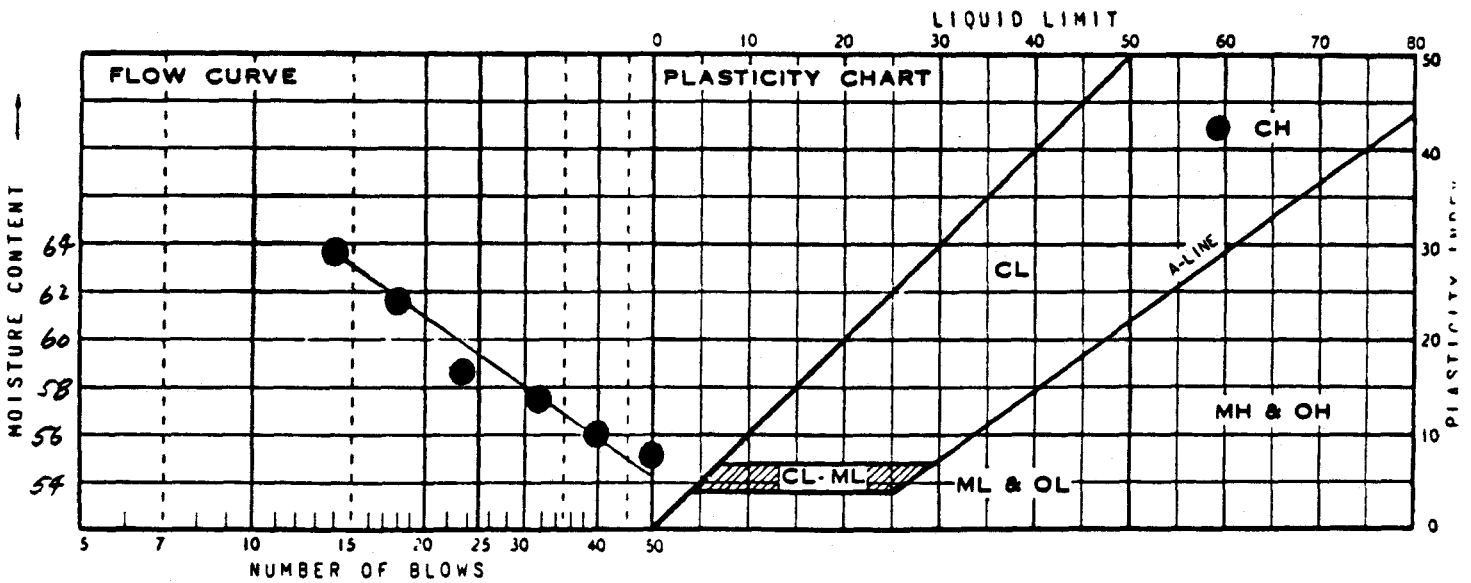
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY [illegible] 4/15/92

DETERMINATION	1	2	3	4	5	6
DISH	B30	2042	32CX			
WT OF DISH + WET SOIL g	6.64	6.70	6.57			
WT OF DISH + DRY SOIL g	5.81	5.86	5.78	—	—	—
WT OF MOISTURE g	0.83	0.84	0.79			
WT OF DISH g	1.03	1.06	1.03	—	—	—
WT OF DRY SOIL g	4.78	4.80	4.75			
MOISTURE CONTENT %	17.4	17.5	16.6	= 51.5/3 =	17.2	

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	B42	2032	2029	2033	2027	B38+
NUMBER OF BLOWS	50	40	32	23	18	14
WT OF DISH + WET SOIL g	10.37	11.55	10.61	10.44	9.88	11.48
WT OF DISH + DRY SOIL g	7.05	7.78	7.12	6.97	6.51	7.42
WT OF MOISTURE g	3.32	3.77	3.49	3.47	3.37	4.06
WT OF DISH g	1.03	1.05	1.05	1.04	1.05	1.05
WT OF DRY SOIL g	6.02	6.73	6.07	5.93	5.46	6.37
MOISTURE CONTENT %	55.2	56.0	57.5	58.5	61.7	63.7



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		59.4	17.2	42.2	CH	

ADVANCED TERRA TESTING

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MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	6+25	SAMPLED	Rocky Flats
DEPTH	24.0'	DATE TESTED	03-24-92 DU
SAMPLE NO.	#17	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan	(g)	63.54
Wt. Dry Soil & Pan	(g)	62.40
Wt. Lost Moisture	(g)	1.14
Wt. of Pan Only	(g)	3.70
Wt. of Dry Soil	(g)	58.70
Moisture Content	%	1.9

Wt. Hydrom. Sample Wet (g)	55.05
Wt. Hydrom. Sample Dry (g)	54.00

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	55.05
Weight of + #10 Before Washing (g)	0.00
Weight of + #10 After Washing (g)	0.00
Weight of - #10 Wet (g)	55.05
Weight of - #10 Dry (g)	54.00
Wt. Total Sample Dry (g)	54.00
Calc. Wt. "W" (g)	54.00
Calc. Mass + #10	0.00

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	0.00	0.00	0.00	0.0	100.0
#4	0.00	0.00	0.00	0.00	0.0	100.0
#10	0.00	0.00	0.00	0.00	0.0	100.0
#20	1.55	1.80	0.25	0.25	0.5	99.5
#40	1.56	2.38	0.82	1.07	2.0	98.0
#60	1.57	3.03	1.46	2.53	4.7	95.3
#100	1.56	4.66	3.10	5.63	10.4	89.6
#230	1.55	8.06	6.51	12.14	22.5	77.5

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	6+25	SAMPLED	Rocky Flats
DEPTH	24.0'	DATE TESTED	03-24-92 DU
SAMPLE NO.	#17	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

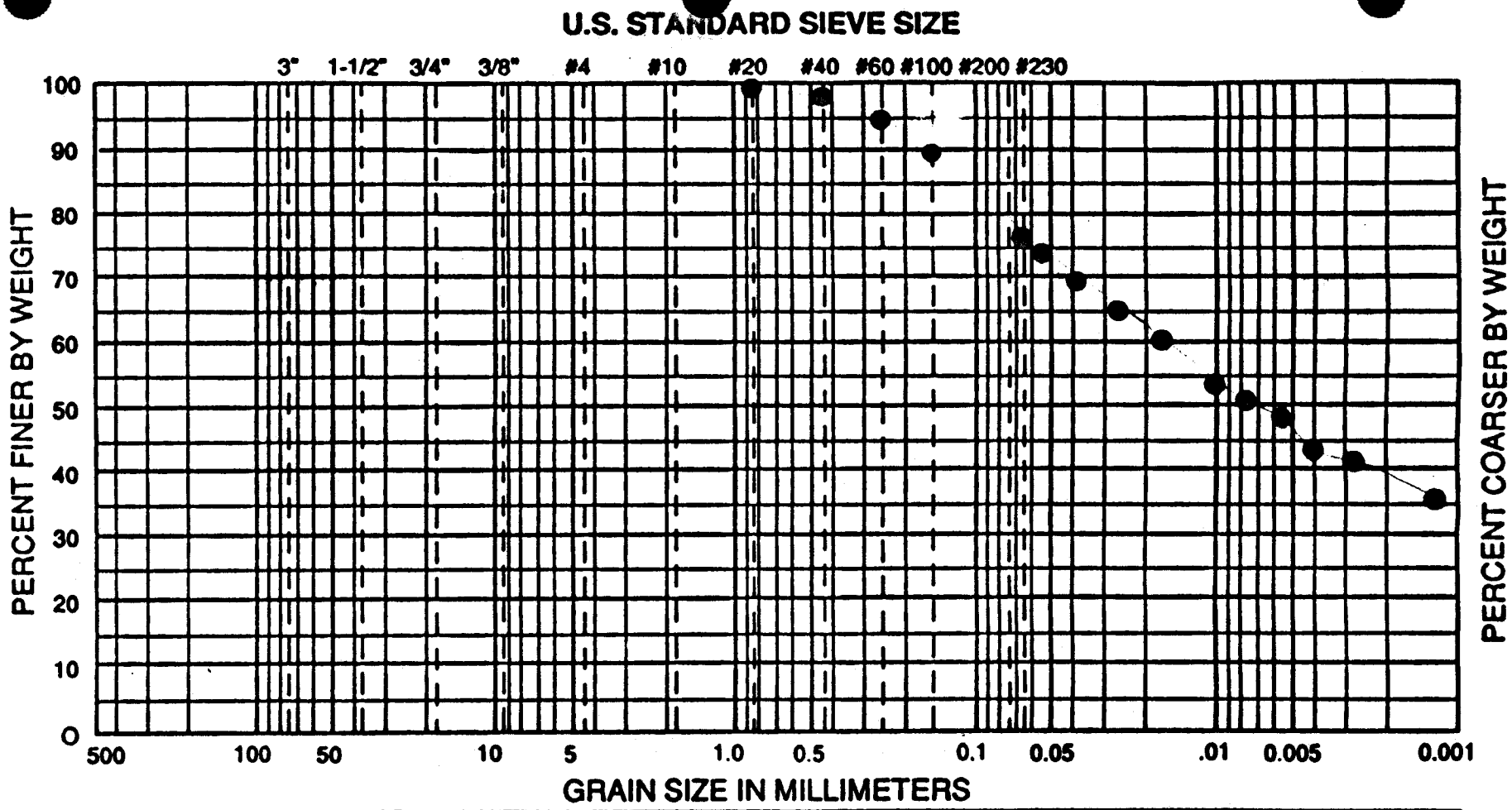
Hydrometer #	ASTM 152 H	Temp., Deg. C	22.0
Sp. Gr. of Soil	2.74	Temp. Coef. K	0.01298
Value of "a"	0.98	Wt. Dry Sample "W"	54.000
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	4.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	46.00	41.00	74.6	74.6	8.75	0.0543
1.0	43.00	38.00	69.1	69.1	9.24	0.0395
2.0	41.00	36.00	65.5	65.5	9.57	0.0284
5.0	38.50	33.50	60.9	60.9	9.98	0.0183
15.0	35.00	30.00	54.6	54.6	10.55	0.0109
30.0	33.50	28.50	51.8	51.8	10.80	0.0078
60.0	31.50	26.50	48.2	48.2	11.12	0.0056
120.0	29.50	24.50	44.6	44.6	11.45	0.0040
250.0	28.00	23.00	41.8	41.8	11.70	0.0028
1440.0	25.00	20.00	36.4	36.4	12.19	0.0012

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING INC



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY
		COARSE	FINE	COARSE	MEDIUM	FINE	

WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 6+25 SAMPLE NO.: CH #17 DATE: 4-2-92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION
	24.0'	ROCKY FLATS/EG&G 1.0 [illegible] 2% [illegible], 19.[illegible] f Sand // 33.5 [illegible] 32.8% silt, 47% clay

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION _____

LABORATORY CLASSIFICATION _____

JOB NO. 2066-03

CLIENT/OWNER WESTON

LOCATION ROCKY FLATS/EG&G

BORING 6±25 SAMPLE CH#17 DEPTH 24.0'

FIELD DENSITY BY ___/__/__

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD [redacted]

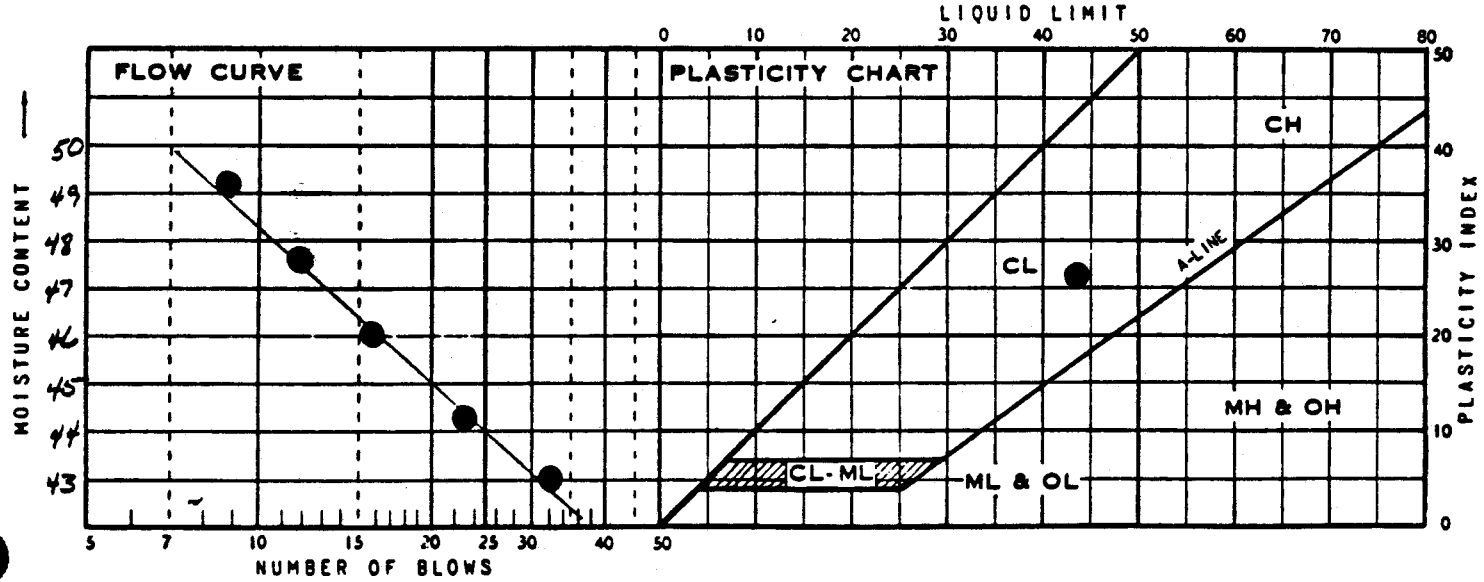
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY SR 3/30/92

DETERMINATION	1	2	3	4	5	6
DISH	26C	2053	37C			
WT OF DISH + WET SOIL g	8.66	7.67	6.50			
WT OF DISH + DRY SOIL g	7.54	6.68	5.71	—	—	—
WT OF MOISTURE g	1.12	.99	.79			
WT OF DISH g	1.06	1.06	1.04	—	—	—
WT OF DRY SOIL g	6.48	5.62	4.67			
MOISTURE CONTENT %	17.3	17.6	16.9			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	B6	B16	2062	2027	2028	
NUMBER OF BLOWS	32	23	16±	12	9±	
WT OF DISH + WET SOIL g	14.25	14.74	17.31	14.41	13.71	
WT OF DISH + DRY SOIL g	10.27	10.54	12.18	10.10	9.54	—
WT OF MOISTURE g	3.98	4.20	5.13	4.31	4.17	
WT OF DISH g	1.04	1.05	1.04	1.06	1.06	—
WT OF DRY SOIL g	9.23	9.49	11.14	9.04	8.48	
MOISTURE CONTENT %	43.1	44.3	46.1	47.7	49.2	



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		44.0	17.3	26.7	CL	

ADVANCED TERRA TESTING inc

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT	Weston	JOB NO.	2066-03
BORING NO.	6+75	SAMPLED	Rocky Flats
DEPTH	26'	DATE TESTED	03-31-92 DU
SAMPLE NO.	#17	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

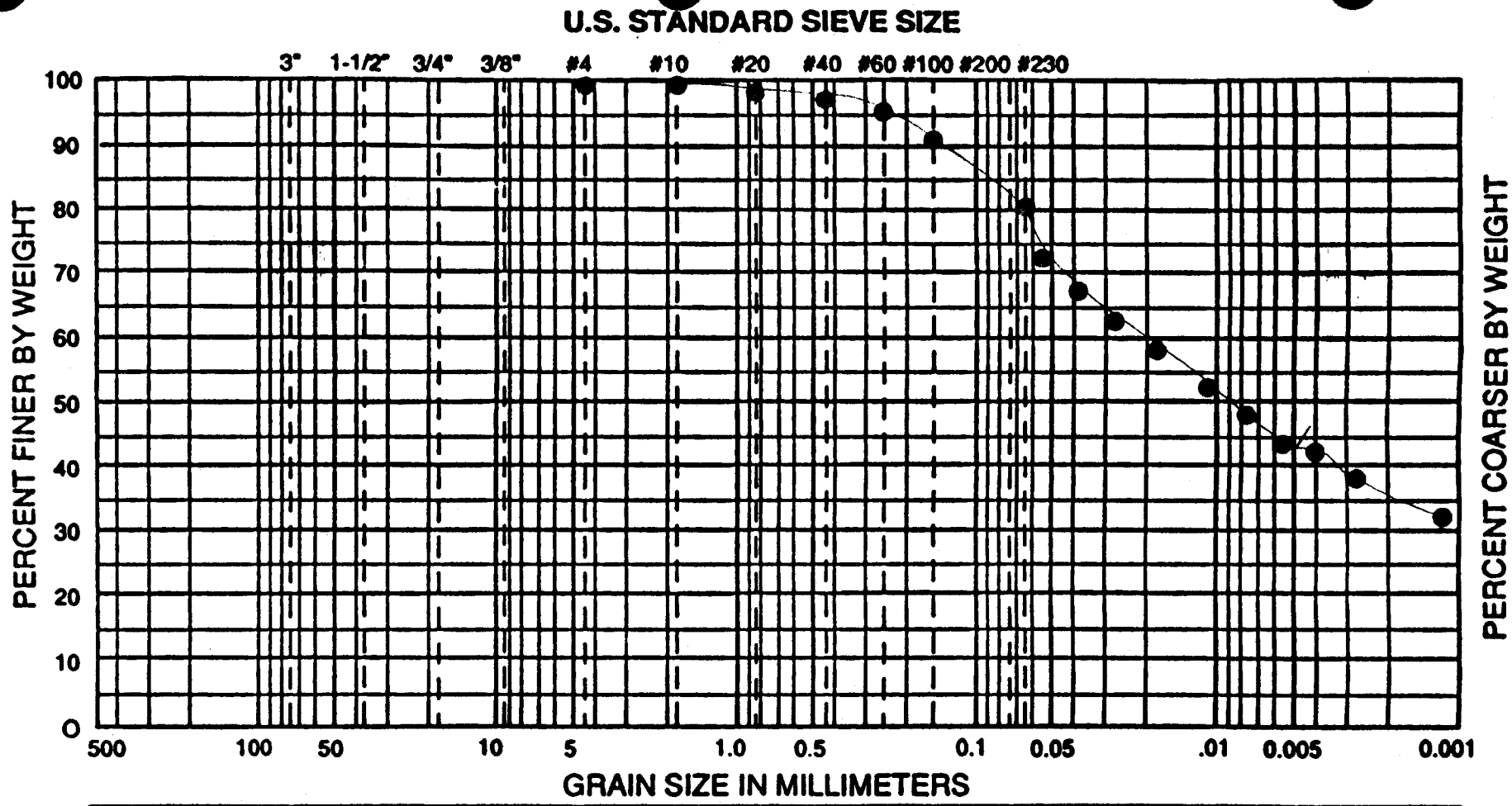
Hydrometer #	ASTM 152 H	Temp., Deg. C	22.0
Sp. Gr. of Soil	2.74	Temp. Coef. K	0.01298
Value of "a"	0.98	Wt. Dry Sample "W"	54.036
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	5.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	46.00	40.00	72.7	72.7	8.75	0.0543
1.0	43.00	37.00	67.2	67.2	9.24	0.0395
2.0	41.00	35.00	63.6	63.6	9.57	0.0284
5.0	38.00	32.00	58.2	58.2	10.06	0.0184
15.0	35.00	29.00	52.7	52.7	10.55	0.0109
30.0	32.50	26.50	48.2	48.2	10.96	0.0078
60.0	30.50	24.50	44.5	44.5	11.29	0.0056
120.0	29.00	23.00	41.8	41.8	11.53	0.0040
250.0	27.25	21.25	38.6	38.6	11.82	0.0028
1440.0	23.50	17.50	31.8	31.8	12.44	0.0012

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY			
		COARSE	FINE	COARSE	MEDIUM	FINE				
WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 6-75 SAMPLE NO.: CH # 17 DATE: 4-3-92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION
Rocky Flats	26.0'	Silty Clay 1% Fgravel, 2.7% med sand, 14.2% fine sand, 39.5% silt, 43.5% clay

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION _____

LABORATORY CLASSIFICATION _____

JOB NO. 2066-03
CLIENT/OWNER Weston
LOCATION Rocky Flats / EG&G
BORING 6+25 SAMPLE # 17 DEPTH 26.0'

FIELD DENSITY BY ___/___/___

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

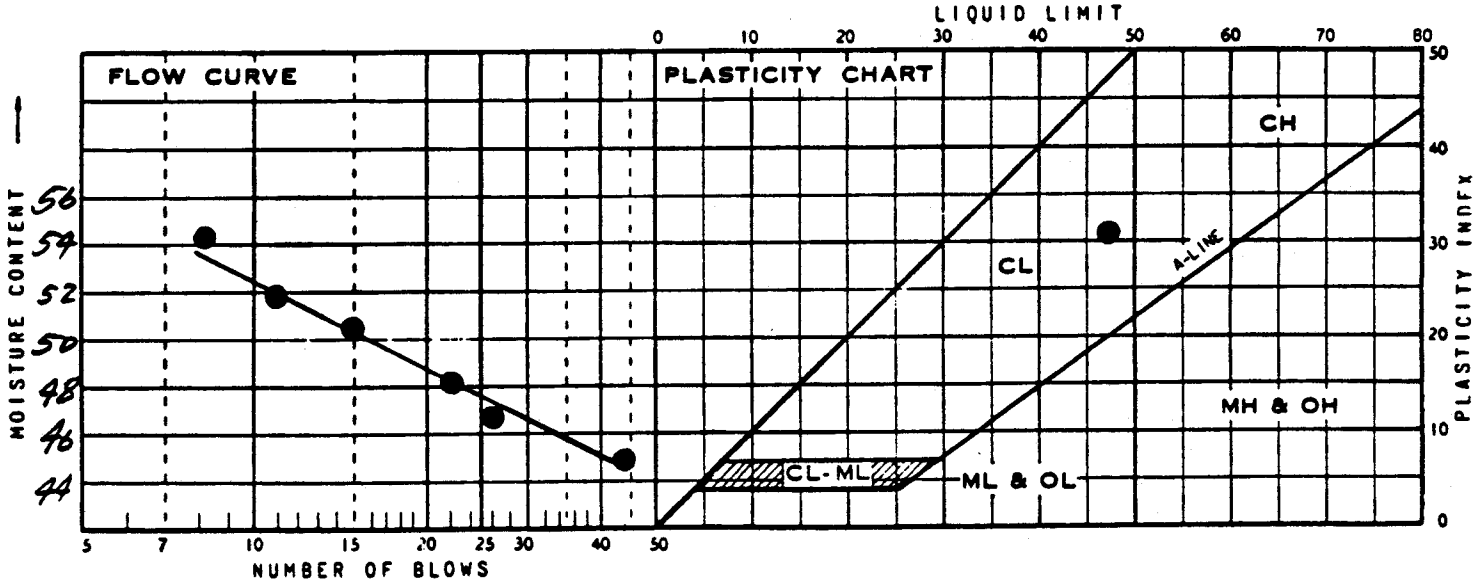
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY [illegible] 3/25/92

DETERMINATION	1	2	3	4	5	6
DISH	2042	22C	2010			
WT OF DISH + WET SOIL g	6.26	6.77	6.66			
WT OF DISH + DRY SOIL	5.50	5.95	5.87	—	—	—
WT OF MOISTURE	0.76	0.82	0.79			
WT OF DISH	1.06	1.04	1.05	—	—	—
WT OF DRY SOIL	4.44	4.91	4.82			
MOISTURE CONTENT %	17.1	16.7	16.4	= 50.2/3	16.7	

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	2059	28C	2007	B2	11C	B4
NUMBER OF BLOWS	26	44-	22	15	11	B+
WT OF DISH + WET SOIL g	10.65	11.05	9.58	11.44	10.96	9.34
WT OF DISH + DRY SOIL	7.60	7.95	6.81	7.95	7.57	6.42
WT OF MOISTURE	3.05	3.10	2.77	3.49	3.39	2.92
WT OF DISH	1.05	1.05	1.05	1.04	1.03	1.04
WT OF DRY SOIL	6.55	6.90	5.76	6.91	6.54	5.38
MOISTURE CONTENT %	46.6	44.9	48.1	50.5	51.8	54.3



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		47.6	16.7	30.9	CL	

ADVANCED TERRA TESTING inc

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT	Weston	JOB NO.	2066-03
BORING NO.	6+75	SAMPLED	Rocky Flats
DEPTH	38.3'	DATE TESTED	03-31-92 DU
SAMPLE NO.	#17	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC	Yes	
NATURAL	No	
Wt. Wet Soil & Pan	(g)	45.91
Wt. Dry Soil & Pan	(g)	44.96
Wt. Lost Moisture	(g)	0.95
Wt. of Pan Only	(g)	3.74
Wt. of Dry Soil	(g)	41.22
Moisture Content	%	2.3
Wt. Hydrom. Sample Wet	(g)	55.10
Wt. Hydrom. Sample Dry	(g)	53.86

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	460.73
Weight of + #10 Before Washing (g)	0.42
Weight of + #10 After Washing (g)	0.02
Weight of - #10 Wet (g)	460.31
Weight of - #10 Dry (g)	450.33
Wt. Total Sample Dry (g)	450.35
Calc. Wt. "W" (g)	53.86
Calc. Mass + #10	0.00

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	0.00	0.00	0.00	0.0	100.0
#4	0.00	0.00	0.00	0.00	0.0	100.0
#10	0.00	0.02	0.02	0.02	0.0	100.0
#20	1.32	1.51	0.19	0.19	0.4	99.6
#40	1.30	1.75	0.45	0.64	1.2	98.8
#60	1.31	2.56	1.25	1.89	3.5	96.5
#100	1.56	4.75	3.19	5.08	9.4	90.6
#230	1.56	9.22	7.66	12.74	23.7	76.3

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT	Weston	JOB NO.	2066-03
BORING NO.	6+75	SAMPLED	Rocky Flats
DEPTH	38.3'	DATE TESTED	03-31-92 DU
SAMPLE NO.	#17	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

Hydrometer #	ASTM 152 H	Temp., Deg. C	22.0
Sp. Gr. of Soil	2.76	Temp. Coef. K	0.01290
Value of "a"	0.98	Wt. Dry Sample "W"	53.863
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	5.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	43.00	37.00	67.2	67.2	9.24	0.0555
1.0	41.00	35.00	63.6	63.6	9.57	0.0399
2.0	40.00	34.00	61.7	61.7	9.73	0.0285
5.0	35.50	29.50	53.6	53.6	10.47	0.0187
15.0	32.00	26.00	47.2	47.2	11.04	0.0111
30.0	30.00	24.00	43.6	43.6	11.37	0.0079
60.0	29.00	23.00	41.8	41.8	11.53	0.0057
120.0	27.00	21.00	38.1	38.1	11.86	0.0041
250.0	26.00	20.00	36.3	36.3	12.03	0.0028
1440.0	23.00	17.00	30.9	30.9	12.52	0.0012

Grain Diameter = K*(SQRT(L/T))

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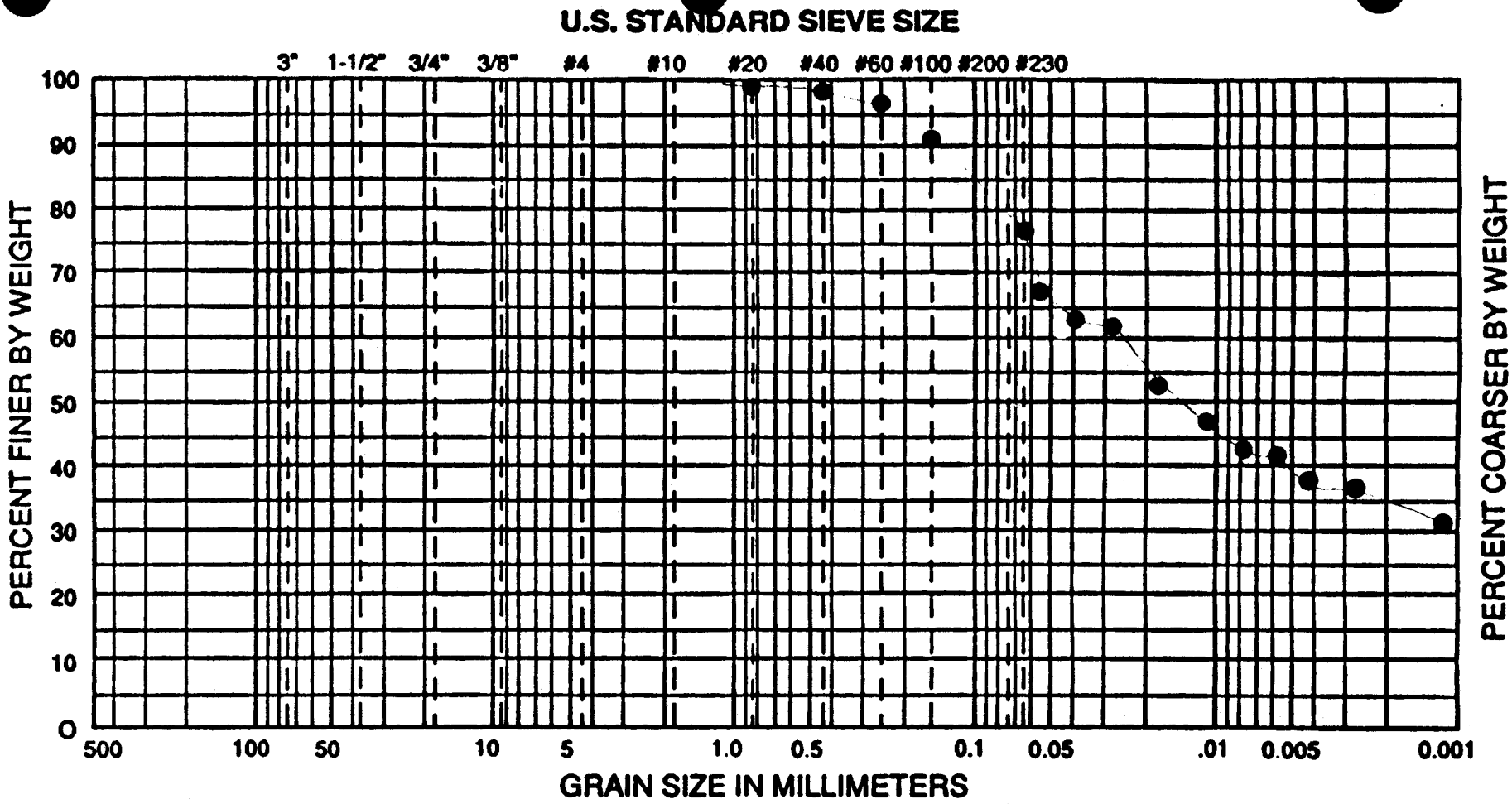


USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY			
		COARSE	FINE	COARSE	MEDIUM	FINE				
WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 6-75 SAMPLE NO.: CH #17 DATE: 4-3-92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION
Rocky Flats	38.3'	Clayey Silt w/ some sand 12% med sand 20.8% fine sand, 41.5% silt, 37.5% clay

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION - - - - - - - - - - - - - - -

LABORATORY CLASSIFICATION - - - - - - - - - - - -

JOB NO. 2066-03

CLIENT/OWNER Weston

LOCATION Rocky Flats / EG&G

BORING 6+75 SAMPLE #17 DEPTH @38.3'

FIELD DENSITY BY ___/___/___

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

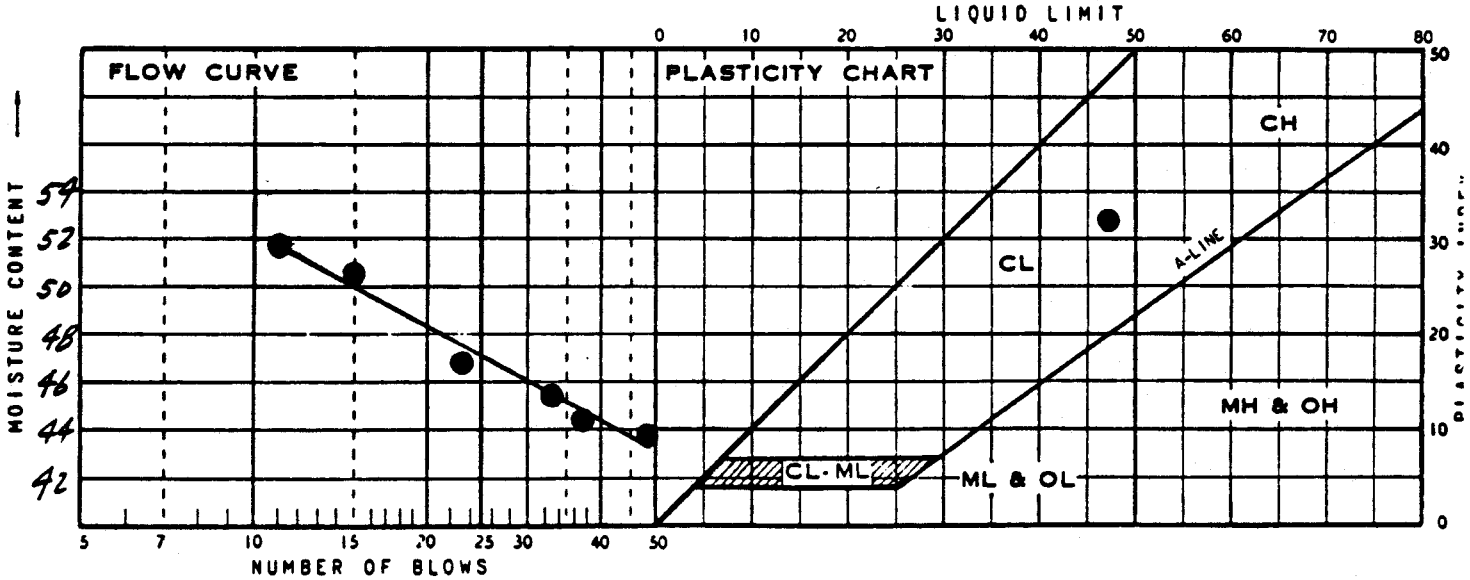
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY [illegible] 3/30/92

DETERMINATION	1	2	3	4	5	6
DISH	31C	B14	2010			
WT OF DISH + WET SOIL g	6.80	6.40	5.99			
WT OF DISH + DRY SOIL g	6.01	5.69	5.33	—	—	—
WT OF MOISTURE	0.79	0.71	0.66			
WT OF DISH	1.06	1.03	1.05	—	—	—
WT OF DRY SOIL	4.95	4.66	4.28			
MOISTURE CONTENT %	16.0	15.2	15.4	= 46.6/3 =	15.5	

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	2060	2059	11C	2042	B3	7C
NUMBER OF BLOWS	49	38	33 +	23	15	11
WT OF DISH + WET SOIL g	8.05	9.06	9.30	9.89	10.39	10.94
WT OF DISH + DRY SOIL g	5.91	6.60	6.72	7.08	7.25	7.17
WT OF MOISTURE	2.14	2.46	2.58	2.81	3.14	3.17
WT OF DISH	1.03	1.05	1.04	1.06	1.03	1.05
WT OF DRY SOIL	4.88	5.55	5.68	6.02	6.22	6.12
MOISTURE CONTENT %	43.8	44.3	45.4	46.7	50.5	51.8



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		47.2	15.5	31.7	CL	

ADVANCED TERRA TESTING INC

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	6+75	SAMPLED	Rocky Flats
DEPTH	51.0'	DATE TESTED	03-24-92 DU
SAMPLE NO.	#17	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC	Yes	
NATURAL	No	
Wt. Wet Soil & Pan	(g)	40.40
Wt. Dry Soil & Pan	(g)	39.68
Wt. Lost Moisture	(g)	0.72
Wt. of Pan Only	(g)	3.81
Wt. of Dry Soil	(g)	35.87
Moisture Content	%	2.0
Wt. Hydrom. Sample Wet	(g)	55.06
Wt. Hydrom. Sample Dry	(g)	53.98

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	682.10
Weight of + #10 Before Washing (g)	256.09
Weight of + #10 After Washing (g)	221.62
Weight of - #10 Wet (g)	426.01
Weight of - #10 Dry (g)	451.42
Wt. Total Sample Dry (g)	673.04
Calc. Wt. "W" (g)	80.48
Calc. Mass + #10	26.50

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	57.67	57.67	57.67	8.6	91.4
3/8"	0.00	36.26	36.26	93.93	14.0	86.0
#4	0.00	65.53	65.53	159.46	23.7	76.3
#10	0.00	62.16	62.16	221.62	32.9	67.1
#20	1.57	15.62	14.05	14.05	50.4	49.6
#40	1.55	7.84	6.29	20.34	58.2	41.8
#60	1.55	3.95	2.40	22.74	61.2	38.8
#100	1.57	3.81	2.24	24.98	64.0	36.0
#230	1.56	4.79	3.23	28.21	68.0	32.0

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT	Weston	JOB NO.	2066-03
BORING NO.	6+75	SAMPLED	Rocky Flats
DEPTH	51.0'	DATE TESTED	03-24-92 DU
SAMPLE NO.	#17	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

Hydrometer #	ASTM 152 H	Temp., Deg. C	22.0
Sp. Gr. of Soil	2.72	Temp. Coef. K	0.01305
Value of "a"	0.99	Wt. Dry Sample "W"	80.477
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	4.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	31.00	26.00	31.9	31.9	11.21	0.0618
1.0	29.50	24.50	30.0	30.0	11.45	0.0442
2.0	29.00	24.00	29.4	29.4	11.53	0.0313
5.0	28.50	23.50	28.8	28.8	11.62	0.0199
15.0	27.50	22.50	27.6	27.6	11.78	0.0116
30.0	27.00	22.00	27.0	27.0	11.86	0.0082
60.0	26.75	21.75	26.6	26.6	11.90	0.0058
120.0	25.75	20.75	25.4	25.4	12.07	0.0041
250.0	25.00	20.00	24.5	24.5	12.19	0.0029
1440.0	24.00	19.00	23.3	23.3	12.35	0.0012

Grain Diameter = K*(SQRT(L/T))

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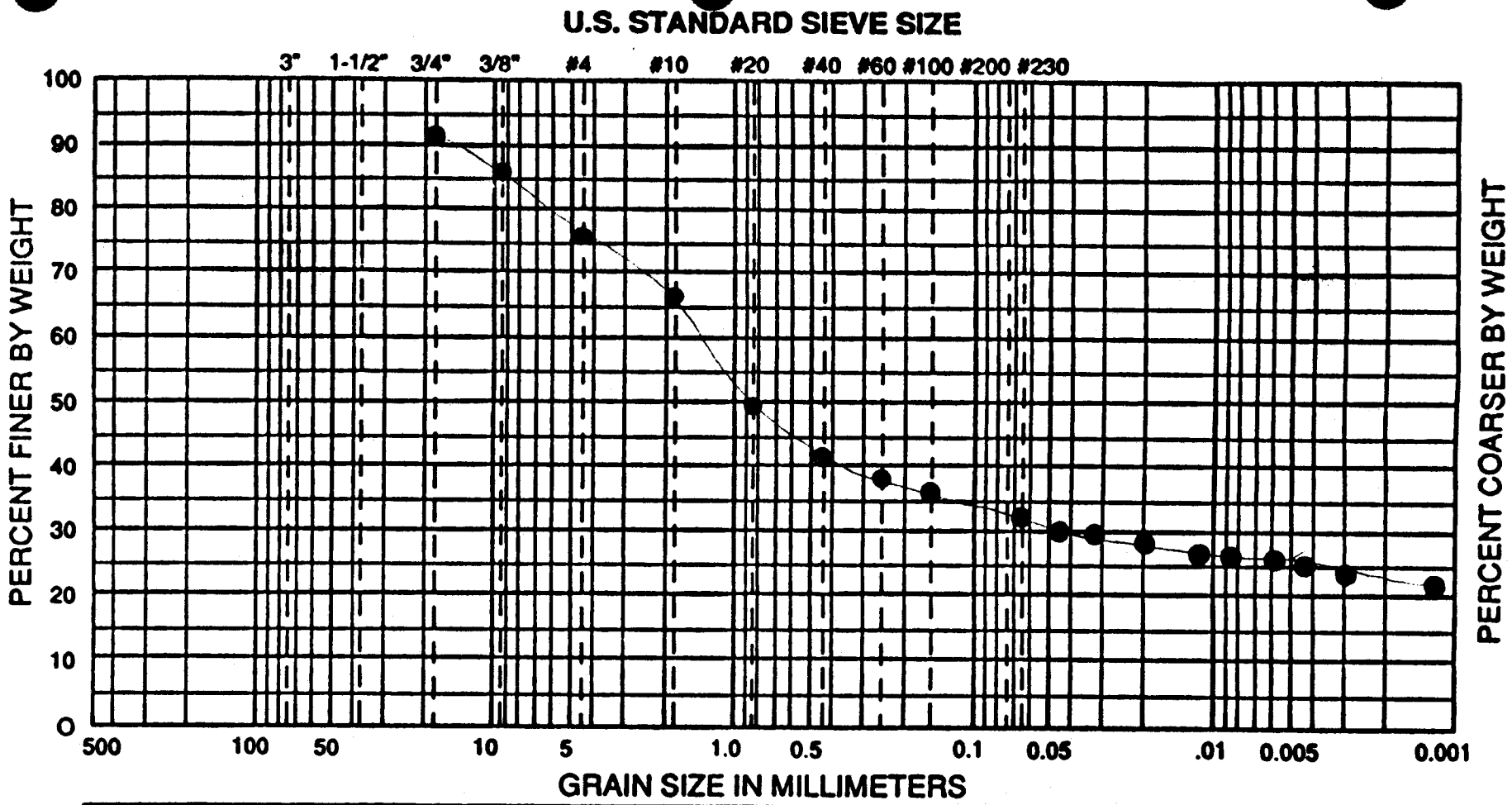
ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY		
		COARSE	FINE	COARSE	MEDIUM	FINE			
WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 6+75 SAMPLE NO.: CH #17 DATE: 4-2-92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION
	51.0'	8.6% cgvl, 15.1% fgvl / 9.7% csd, 25.3% medsd, 9.8% fsd / 5.5% silt, 26.5% clay ROCKY FLATS / EG&G

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION _____

LABORATORY CLASSIFICATION _____

JOB NO. 2066-03
CLIENT/OWNER WESTON
LOCATION ROCKY FLATS/EG&G
BORING 6+75 SAMPLE CH#17 DEPTH 51.0'

FIELD DENSITY BY ___/___/___

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

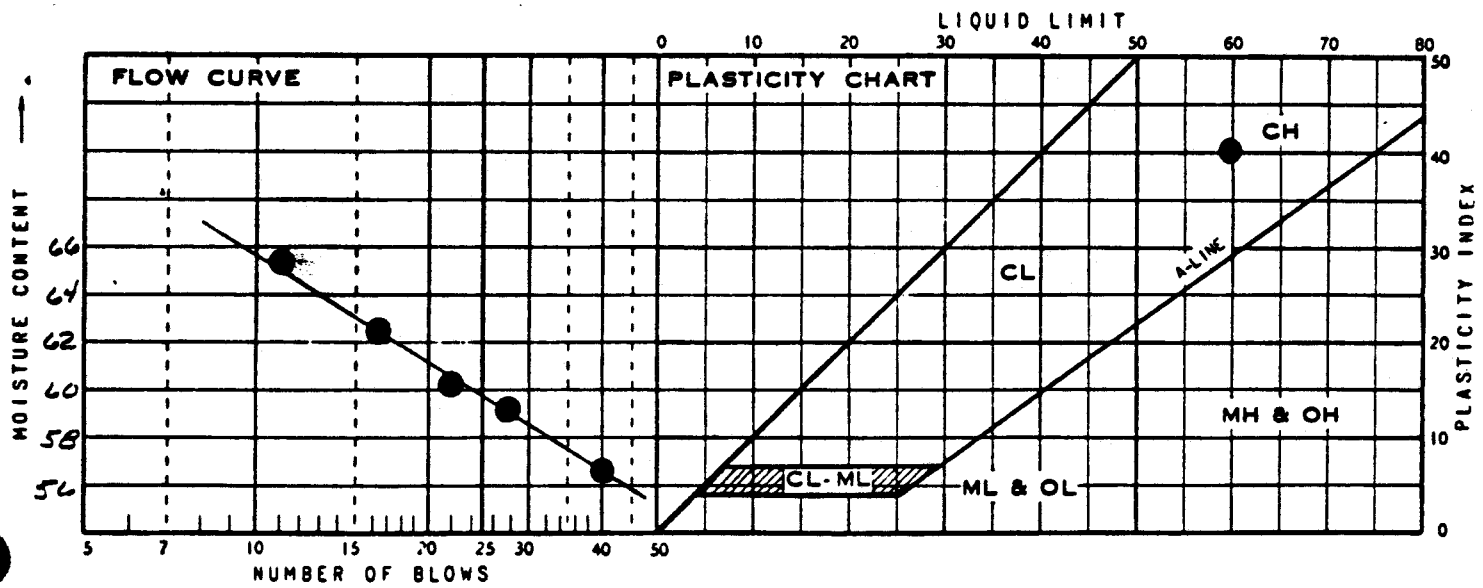
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY SR 3/31/92

DETERMINATION	1	2	3	4	5	6
DISH	B15	2069	20C			
WT OF DISH + WET SOIL g	5.75	5.76	6.62			
WT OF DISH + DRY SOIL g	4.97	4.99	5.71	—	—	—
WT OF MOISTURE g	.78	.77	.91			
WT OF DISH g	1.03	1.04	1.03	—	—	—
WT OF DRY SOIL g	3.94	3.45	4.68			
MOISTURE CONTENT %	19.8	19.5	19.4			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	35 CC	10C	37 C	27 C	3	
NUMBER OF BLOWS	40	27	22	16	11	
WT OF DISH + WET SOIL g	15.70	13.90	13.97	13.81	11.77	
WT OF DISH + DRY SOIL g	10.40	9.12	9.10	8.90	7.53	—
WT OF MOISTURE g	5.30	4.78	4.87	4.91	4.24	
WT OF DISH g	1.05	1.05	1.08	1.04	1.06	—
WT OF DRY SOIL g	9.35	8.07	8.02	7.86	6.47	
MOISTURE CONTENT %	56.7	59.2	60.7	62.5	65.5	



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		59.9	19.6	40.3	CH	

ADVANCED TERRA TESTING inc

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	6+75	SAMPLED	Rocky Flats
DEPTH	58.9'	DATE TESTED	03-31-92 DU
SAMPLE NO.	#17	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC	Yes	
NATURAL	No	
Wt. Wet Soil & Pan	(g)	46.43
Wt. Dry Soil & Pan	(g)	44.89
Wt. Lost Moisture	(g)	1.54
Wt. of Pan Only	(g)	3.60
Wt. of Dry Soil	(g)	41.29
Moisture Content	%	3.7
Wt. Hydrom. Sample Wet	(g)	55.01
Wt. Hydrom. Sample Dry	(g)	53.03

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	354.27
Weight of + #10 Before Washing (g)	0.65
Weight of + #10 After Washing (g)	0.43
Weight of - #10 Wet (g)	353.62
Weight of - #10 Dry (g)	341.12
Wt. Total Sample Dry (g)	341.55
Calc. Wt. "W" (g)	53.10
Calc. Mass + #10	0.07

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	0.00	0.00	0.00	0.0	100.0
#4	0.00	0.13	0.13	0.13	0.0	100.0
#10	0.00	0.30	0.30	0.43	0.1	99.9
#20	1.56	2.05	0.49	0.49	1.0	99.0
#40	1.56	1.98	0.42	0.91	1.8	98.2
#60	1.55	1.88	0.33	1.24	2.5	97.5
#100	1.55	1.95	0.40	1.64	3.2	96.8
#230	1.55	2.35	0.80	2.44	4.7	95.3

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT	Weston	JOB NO.	2066-03
BORING NO.	6+75	SAMPLED	Rocky Flats
DEPTH	58.9'	DATE TESTED	03-31-92 DU
SAMPLE NO.	#17	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

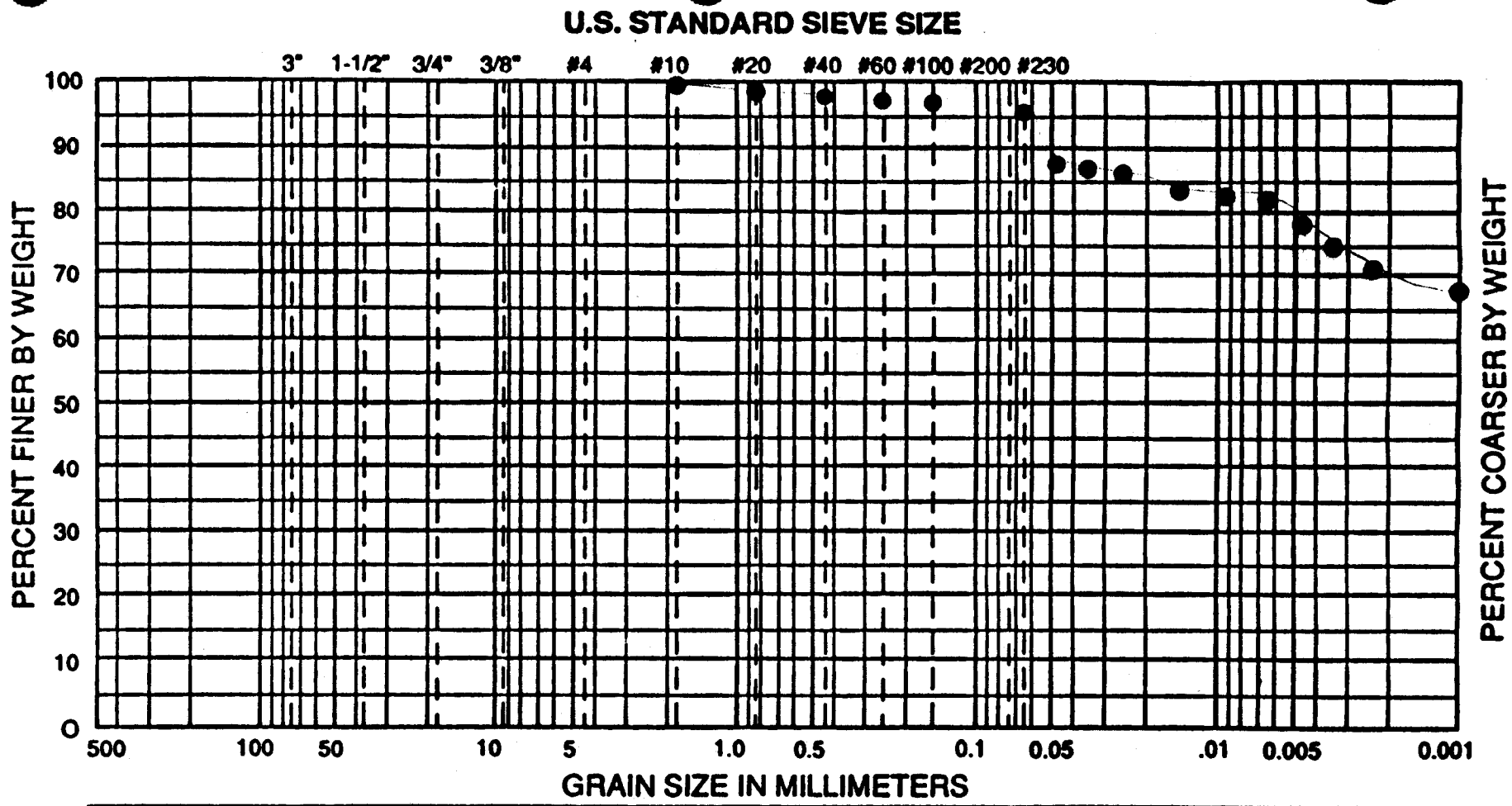
Hydrometer #	ASTM 152 H	Temp., Deg. C	22.0
Sp. Gr. of Soil	2.79	Temp. Coef. K	0.01280
Value of "a"	0.97	Wt. Dry Sample "W"	53.102
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	5.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	54.00	48.00	87.9	87.9	7.43	0.0494
1.0	53.50	47.50	86.9	86.9	7.52	0.0351
2.0	53.00	47.00	86.0	86.0	7.60	0.0249
5.0	52.00	46.00	84.2	84.2	7.76	0.0159
15.0	51.00	45.00	82.4	82.4	7.93	0.0093
30.0	50.50	44.50	81.5	81.5	8.01	0.0066
60.0	48.75	42.75	78.3	78.3	8.30	0.0048
120.0	47.00	41.00	75.0	75.0	8.58	0.0034
250.0	44.75	38.75	70.9	70.9	8.95	0.0024
1440.0	43.00	37.00	67.7	67.7	9.24	0.0010

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY
		COARSE	FINE	COARSE	MEDIUM	FINE	

WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 6+75 SAMPLE NO.: CH # 17 DATE: 4-3-92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION Clay
Rocky Flats	58.9'	.1% c sand, 1.7% med sd, 2.9% fine sand, 16.3% silt, 79% clay

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION _____

LABORATORY CLASSIFICATION _____

JOB NO. 2066-03

CLIENT/OWNER WESTON

LOCATION ROCKY FLATS / EG&G

BORING 6+75 SAMPLE CH#17 DEPTH 58.9'

FIELD DENSITY BY ___/__/__

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

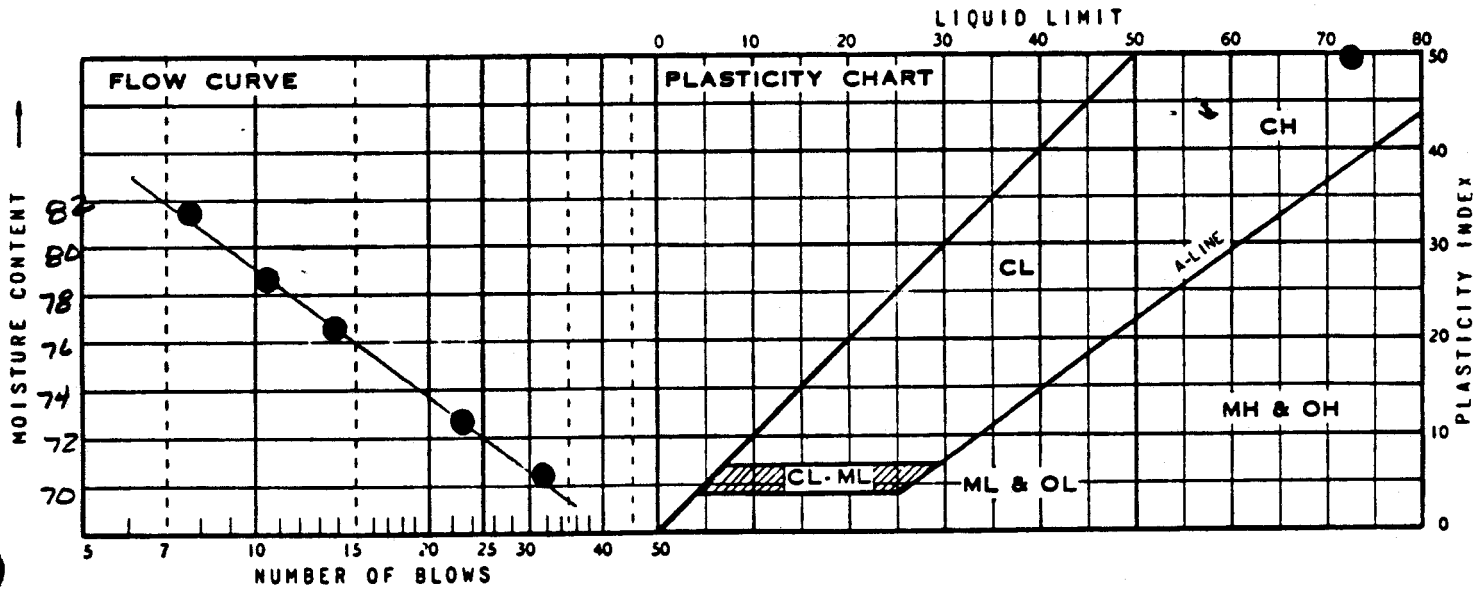
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY SR..312792.

DETERMINATION	1	2	3	4	5	6
DISH	2051	36C	2015			
WT OF DISH + WET SOIL g	5.23	5.03	4.38			
WT OF DISH + DRY SOIL g	4.48	4.31	3.77	—	—	—
WT OF MOISTURE g	.75	.72	.61			
WT OF DISH g	1.03	1.04	1.06	—	—	—
WT OF DRY SOIL g	3.45	3.27	2.71			
MOISTURE CONTENT %	21.7	22.0	22.5			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	21C	6C	66C	2067	2008	
NUMBER OF BLOWS	32	23	14	11	8±	
WT OF DISH + WET SOIL g	12.28	12.24	12.16	13.21	12.20g	
WT OF DISH + DRY SOIL g	7.64	7.53	7.34	7.85	7.19	—
WT OF MOISTURE g	4.64	4.71	4.82	5.36	5.01	
WT OF DISH g	1.07	1.05	1.05	1.04	1.06	—
WT OF DRY SOIL g	6.57	6.48	6.29	6.81	6.13	
MOISTURE CONTENT %	70.6	72.7	76.6	78.7	81.7	



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		72.0	22.1	49.9	CH	

ADVANCED TERRA TESTING inc

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	7+00	SAMPLED	Rocky Flats
DEPTH	34'	DATE TESTED	03-31-92 DU
SAMPLE NO.	#17	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC	Yes	
NATURAL	No	
Wt. Wet Soil & Pan	(g)	43.92
Wt. Dry Soil & Pan	(g)	43.18
Wt. Lost Moisture	(g)	0.74
Wt. of Pan Only	(g)	3.56
Wt. of Dry Soil	(g)	39.62
Moisture Content	%	1.9
Wt. Hydrom. Sample Wet	(g)	55.02
Wt. Hydrom. Sample Dry	(g)	54.01

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	572.37
Weight of + #10 Before Washing (g)	50.81
Weight of + #10 After Washing (g)	22.96
Weight of - #10 Wet (g)	522.19
Weight of - #10 Dry (g)	539.96
Wt. Total Sample Dry (g)	562.92
Calc. Wt. "W" (g)	56.31
Calc. Mass + #10	2.30

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	8.42	8.42	8.42	1.5	98.5
#4	0.00	6.36	6.36	14.78	2.6	97.4
#10	0.00	8.18	8.18	22.96	4.1	95.9
#20	1.55	2.25	0.70	0.70	5.3	94.7
#40	1.55	2.73	1.18	1.88	7.4	92.6
#60	1.57	3.53	1.96	3.84	10.9	89.1
#100	1.55	5.23	3.68	7.52	17.4	82.6
#230	1.31	8.39	7.08	14.60	30.0	70.0

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	7+00	SAMPLED	Rocky Flats
DEPTH	34'	DATE TESTED	03-31-92 DU
SAMPLE NO.	#17	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

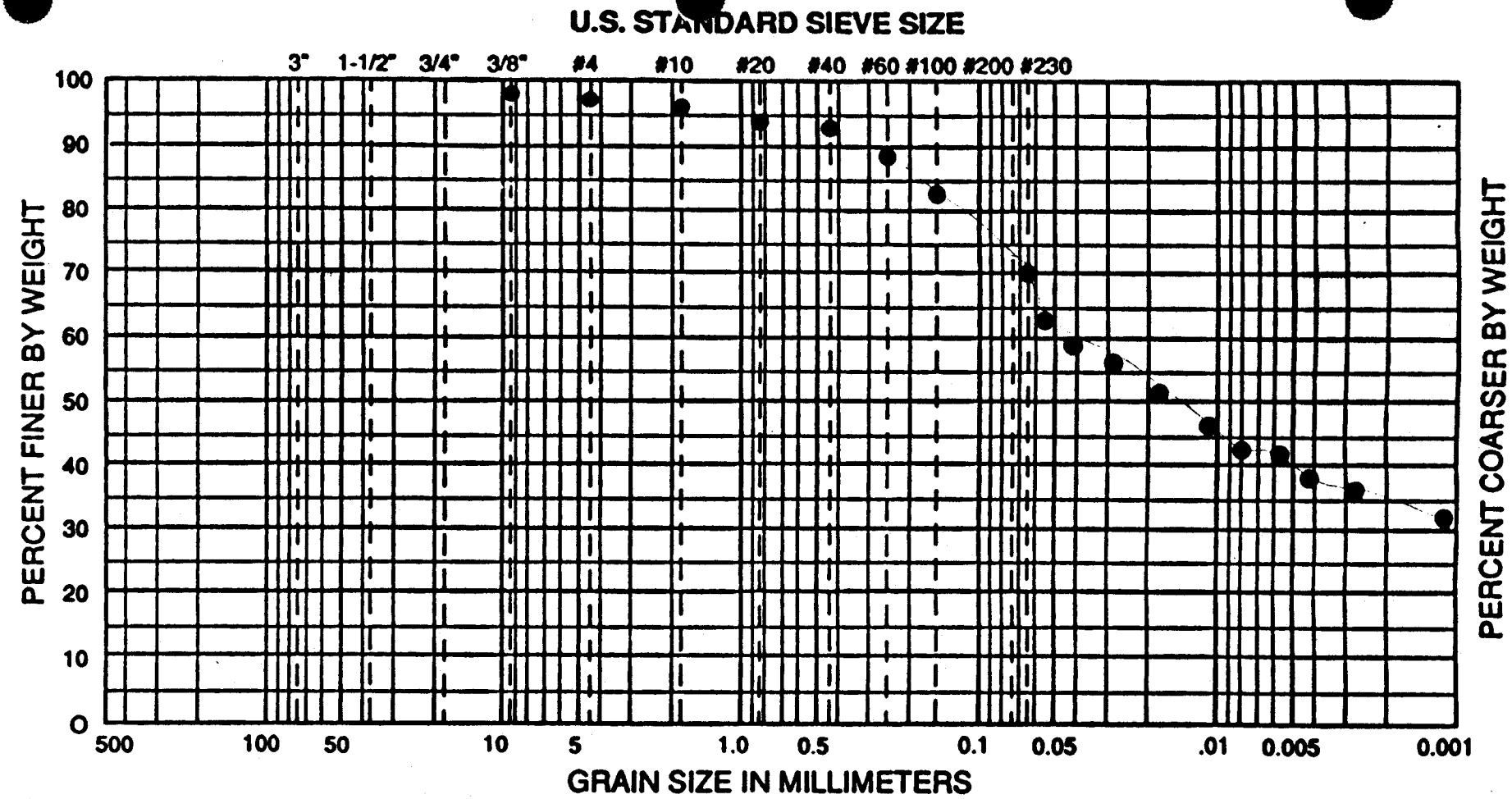
Hydrometer #	ASTM 152 H	Temp., Deg. C	22.0
Sp. Gr. of Soil	2.73	Temp. Coef. K	0.01301
Value of "a"	0.98	Wt. Dry Sample "W"	56.306
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	5.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	42.00	36.00	62.9	62.9	9.40	0.0564
1.0	40.00	34.00	59.4	59.4	9.73	0.0406
2.0	38.00	32.00	55.9	55.9	10.06	0.0292
5.0	35.00	29.00	50.7	50.7	10.55	0.0189
15.0	32.50	26.50	46.3	46.3	10.96	0.0111
30.0	30.50	24.50	42.8	42.8	11.29	0.0080
60.0	29.50	23.50	41.1	41.1	11.45	0.0057
120.0	28.00	22.00	38.4	38.4	11.70	0.0041
250.0	26.50	20.50	35.8	35.8	11.94	0.0028
1440.0	24.00	18.00	31.5	31.5	12.35	0.0012

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY
		COARSE	FINE	COARSE	MEDIUM	FINE	

WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 7+00 SAMPLE NO.: CH #17 DATE: 4-3-92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION
Rocky Flats	34.0'	Silty Clay w/ some sand + tr gravel 2.6% fine gravel / 1.5% c. sand, 3.3% med sd, 20.1% fine sand / 32.5% silt, 40% clay

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION - - - - - - - - - - - - - - - -

LABORATORY CLASSIFICATION - - - - - - - - - - - - -

JOB NO. 2066-03

CLIENT/OWNER WESTON

LOCATION ROCKY FLATS / EG&G

BORING 7+00 SAMPLE CH#17 DEPTH 34.0'

FIELD DENSITY BY ...../../...

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD → [redacted]

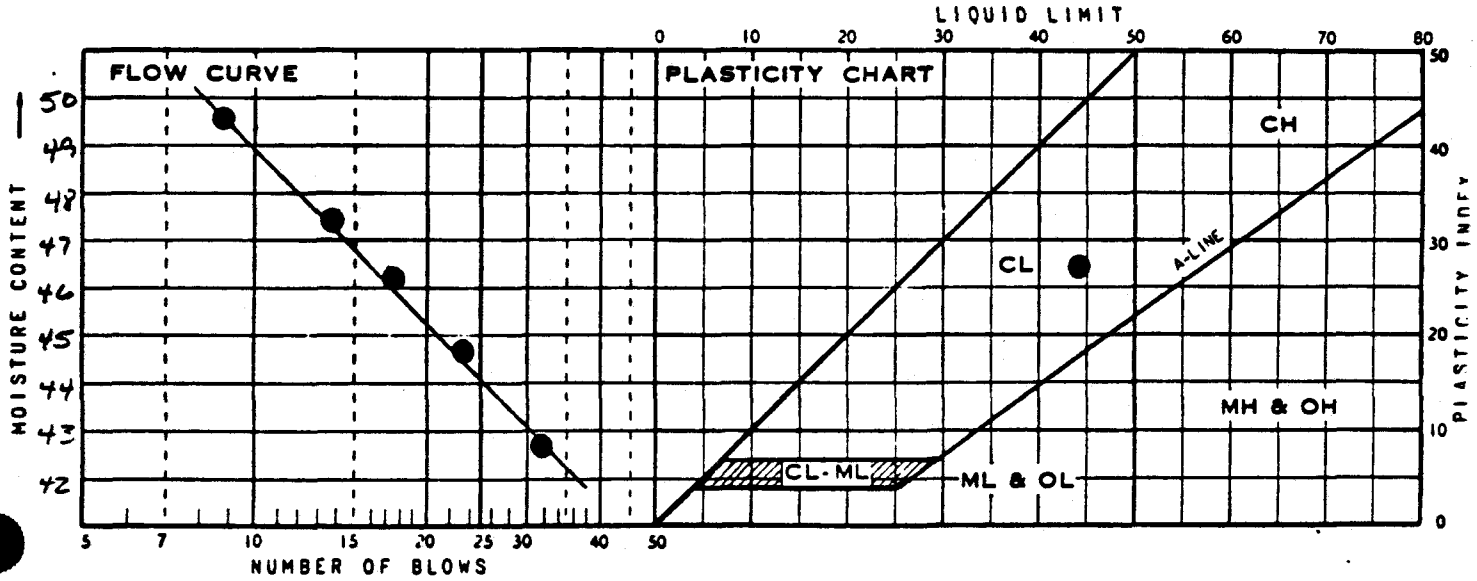
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY SR. 3/26/92

DETERMINATION	1	2	3	4	5	6
DISH	B10	66C	2015			
WT OF DISH + WET SOIL	7.62	5.58	6.96			
WT OF DISH + DRY SOIL	6.64	4.94	6.11	—	—	—
WT OF MOISTURE	.98	.64	.85			
WT OF DISH	1.02	1.05	1.06	—	—	—
WT OF DRY SOIL	5.62	3.89	5.05			
MOISTURE CONTENT	17.4	16.5	16.8			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	B18	17C	2005	18C	36C	
NUMBER OF BLOWS	32	24	18	14	9	
WT OF DISH + WET SOIL	14.55	13.68	16.43	11.09	14.28	
WT OF DISH + DRY SOIL	10.50	9.77	11.57	7.86	9.89	—
WT OF MOISTURE	4.05	3.91	4.86	3.23	4.39	
WT OF DISH	1.04	1.05	1.06	1.04	1.04	—
WT OF DRY SOIL	9.46	8.72	10.51	6.82	8.85	
MOISTURE CONTENT	42.8	44.8	46.2	47.4	49.6	



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		44.1	16.9	27.2		

ADVANCED TERRA TESTING inc

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	7+00	SAMPLED	Rocky Flats
DEPTH	43'	DATE TESTED	03-31-92 DU
SAMPLE NO.	#17	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan	(g)	39.50
Wt. Dry Soil & Pan	(g)	38.78
Wt. Lost Moisture	(g)	0.72
Wt. of Pan Only	(g)	3.64
Wt. of Dry Soil	(g)	35.14
Moisture Content	%	2.0

Wt. Hydrom. Sample Wet (g)	60.02
Wt. Hydrom. Sample Dry (g)	58.81

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	584.85
Weight of + #10 Before Washing (g)	189.07
Weight of + #10 After Washing (g)	165.57
Weight of - #10 Wet (g)	395.78
Weight of - #10 Dry (g)	410.86
Wt. Total Sample Dry (g)	576.43
Calc. Wt. "W" (g)	82.51
Calc. Mass + #10	23.70

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	45.30	45.30	45.30	7.9	92.1
3/8"	0.00	44.47	44.47	89.77	15.6	84.4
#4	0.00	44.72	44.72	134.49	23.3	76.7
#10	0.00	31.08	31.08	165.57	28.7	71.3
#20	1.57	7.80	6.23	6.23	36.3	63.7
#40	1.56	8.53	6.97	13.20	44.7	55.3
#60	1.55	5.93	4.38	17.58	50.0	50.0
#100	1.55	4.97	3.42	21.00	54.2	45.8
#230	1.58	5.89	4.31	25.31	59.4	40.6

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT	Weston	JOB NO.	2066-03
BORING NO.	7+00	SAMPLED	Rocky Flats
DEPTH	43'	DATE TESTED	03-31-92 DU
SAMPLE NO.	#17	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

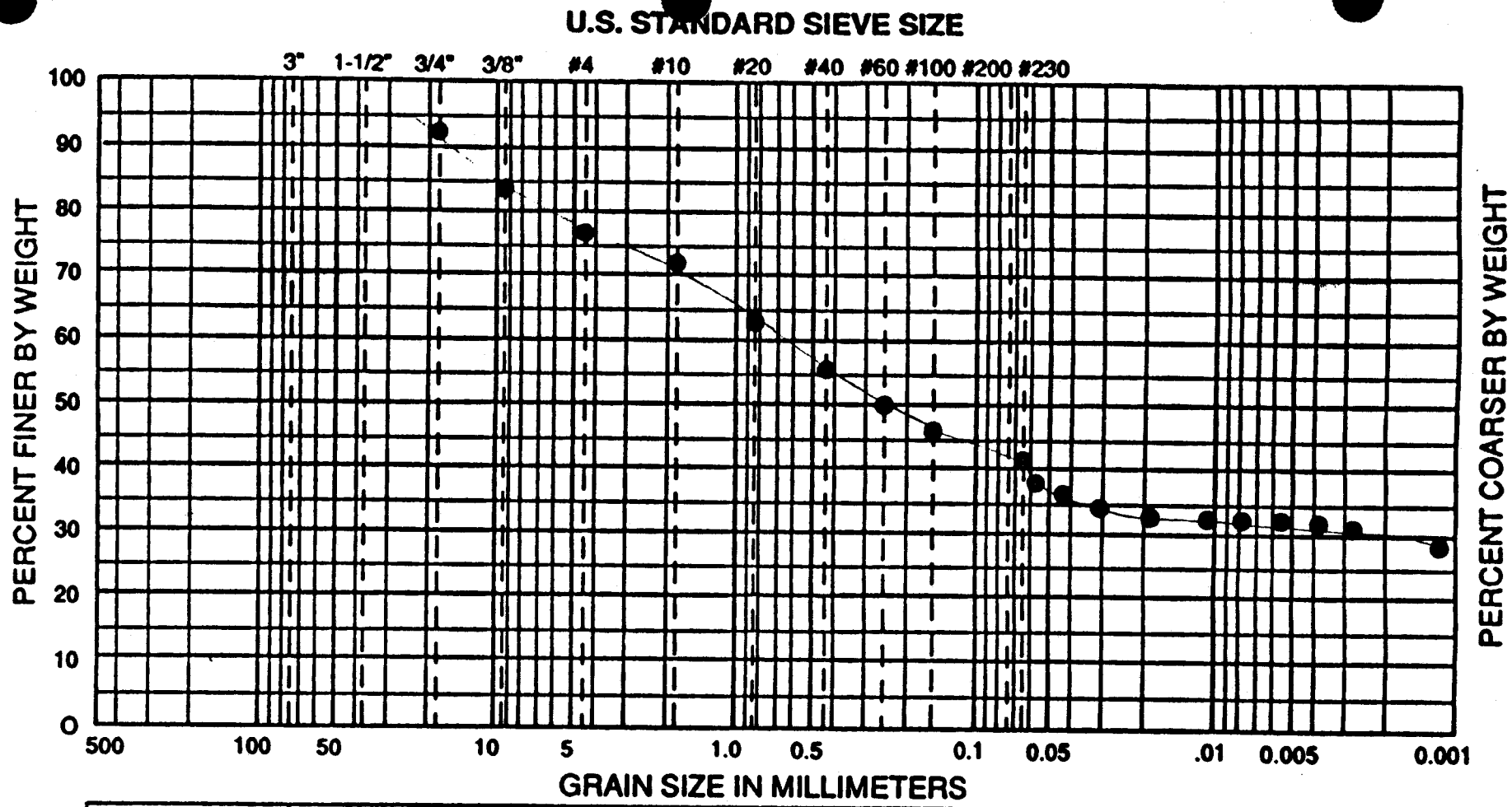
Hydrometer #	ASTM 152 H	Temp., Deg. C	22.0
Sp. Gr. of Soil	2.69	Temp. Coef. K	0.01316
Value of "a"	0.99	Wt. Dry Sample "W"	82.515
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	5.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	38.00	32.00	38.5	38.5	10.06	0.0590
1.0	36.00	30.00	36.1	36.1	10.39	0.0424
2.0	35.00	29.00	34.9	34.9	10.55	0.0302
5.0	34.00	28.00	33.7	33.7	10.71	0.0193
15.0	33.50	27.50	33.1	33.1	10.80	0.0112
30.0	33.00	27.00	32.5	32.5	10.88	0.0079
60.0	33.00	27.00	32.5	32.5	10.88	0.0056
128.0	32.00	26.00	31.3	31.3	11.04	0.0039
250.0	31.50	25.50	30.7	30.7	11.12	0.0028
1440.0	30.00	24.00	28.9	28.9	11.37	0.0012

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY		
		COARSE	FINE	COARSE	MEDIUM	FINE			
WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 7+00 SAMPLE NO.: CH # 17 DATE: 4-3-92 PROJECT NO.:

AREA	DEPTH	CLAYEY SAND CLASSIFICATION
Rocky Flats	43.0'	7.9% c. gravel / 15.4% f. gravel / 5.4% c. sd, 16% md sd, 14.3% f. sd / 9% Silt, 32% Clay / 35.7% sand

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION _____

LABORATORY CLASSIFICATION _____

JOB NO. 2066-03
CLIENT/OWNER Weston
LOCATION Rocky Flats
BORING 7+00 SAMPLE CH #17 DEPTH 43'

FIELD DENSITY BY ____/__/__

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD [redacted]

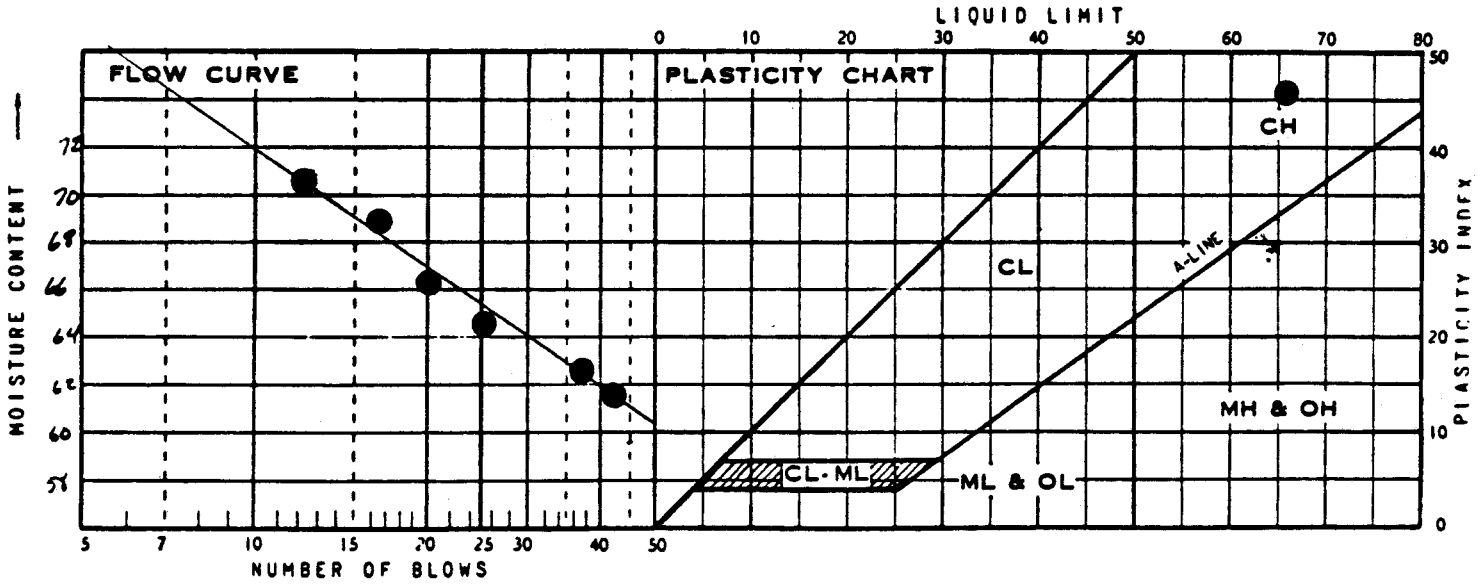
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY DW 3/27/92

DETERMINATION	1	2	3	4	5	6
DISH	B15	B5	2028			
WT OF DISH + WET SOIL g	4.92	6.27	6.05			
WT OF DISH + DRY SOIL g	4.29	5.43	5.23	—	—	—
WT OF MOISTURE g	.63	.84	.82			
WT OF DISH g	1.03	1.04	1.06	—	—	—
WT OF DRY SOIL g	3.26	4.39	4.17			
MOISTURE CONTENT %	19.3	19.1	19.7			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	2053	B6	2069	37C	20C	B16
NUMBER OF BLOWS	46	42	39	25	20	16
WT OF DISH + WET SOIL g	11.57	11.93	10.78	11.34	11.19	10.75
WT OF DISH + DRY SOIL g	7.64	7.77	7.03	7.29	7.13	6.79
WT OF MOISTURE g	3.93	4.16	3.75	4.05	4.06	3.96
WT OF DISH g	1.06	1.03	1.05	1.03	1.02	1.05
WT OF DRY SOIL g	6.58	6.74	5.98	6.26	6.11	5.74
MOISTURE CONTENT %	54.7	61.7	68.7	64.7	66.4	69.0



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		65.4	19.4	46.0	CH	

ADVANCED TERRA TESTING inc

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	7+00	SAMPLED	Rocky Flats
DEPTH	46'	DATE TESTED	03-31-92 DU
SAMPLE NO.	#17	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC	Yes	
NATURAL	No	
Wt. Wet Soil & Pan	(g)	50.39
Wt. Dry Soil & Pan	(g)	48.92
Wt. Lost Moisture	(g)	1.47
Wt. of Pan Only	(g)	3.69
Wt. of Dry Soil	(g)	45.23
Moisture Content	%	3.3
Wt. Hydrom. Sample Wet	(g)	55.04
Wt. Hydrom. Sample Dry	(g)	53.31

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	55.04
Weight of + #10 Before Washing (g)	0.00
Weight of + #10 After Washing (g)	0.00
Weight of - #10 Wet (g)	55.04
Weight of - #10 Dry (g)	53.31
Wt. Total Sample Dry (g)	53.31
Calc. Wt. "W" (g)	53.31
Calc. Mass + #10	0.00

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	0.00	0.00	0.00	0.0	100.0
#4	0.00	0.00	0.00	0.00	0.0	100.0
#10	0.00	0.00	0.00	0.00	0.0	100.0
#20	1.56	1.72	0.16	0.16	0.3	99.7
#40	1.55	1.79	0.24	0.40	0.8	99.2
#60	1.55	1.72	0.17	0.57	1.1	98.9
#100	1.55	1.74	0.19	0.76	1.4	98.6
#230	1.55	2.13	0.58	1.34	2.5	97.5

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT	Weston	JOB NO.	2066-03
BORING NO.	7+00	SAMPLED	Rocky Flats
DEPTH	46'	DATE TESTED	03-31-92 DU
SAMPLE NO.	#17	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

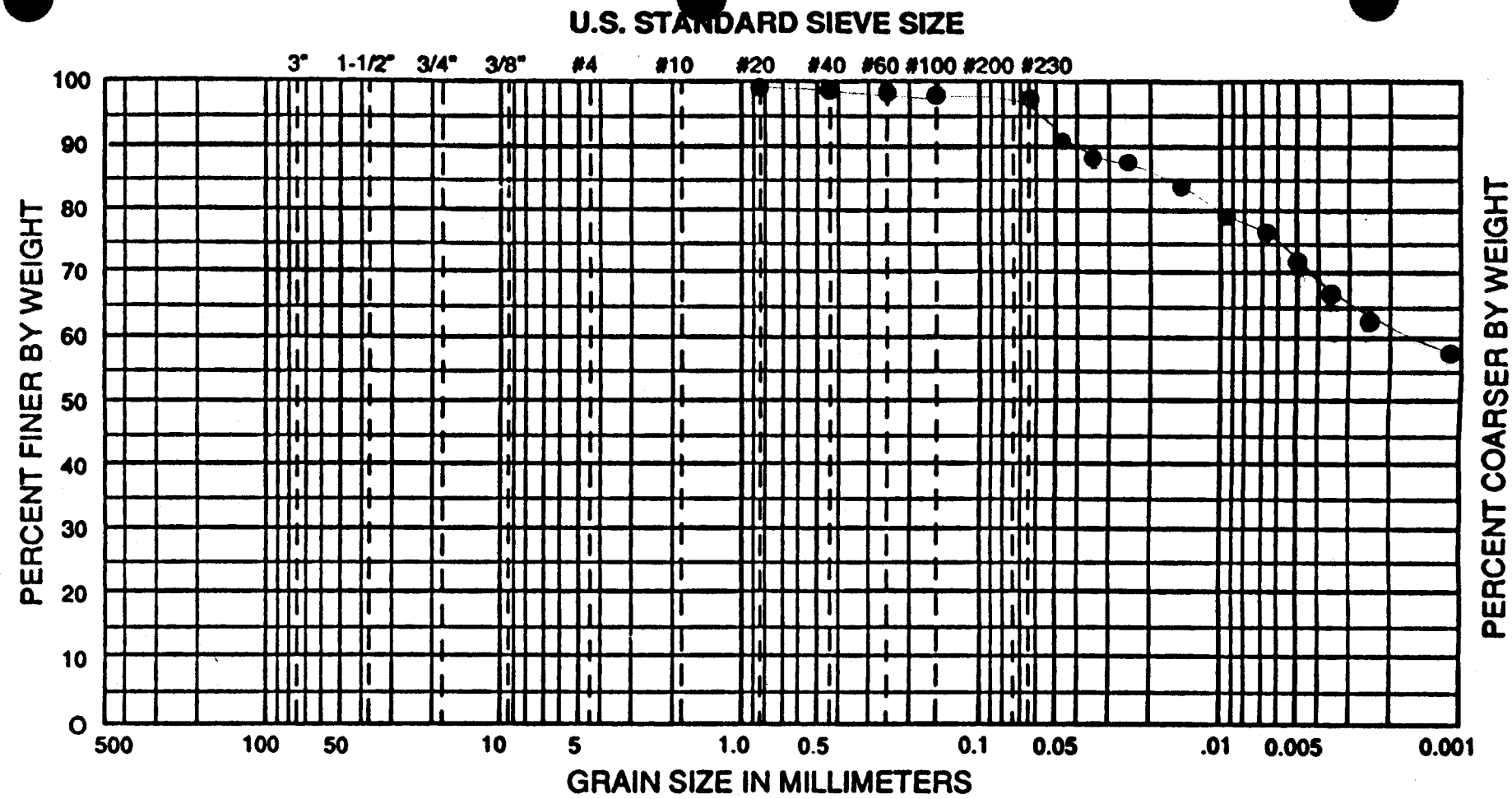
Hydrometer #	ASTM 152 H	Temp., Deg. C	22.0
Sp. Gr. of Soil	2.77	Temp. Coef. K	0.01287
Value of "a"	0.98	Wt. Dry Sample "W"	53.310
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	5.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	55.50	49.50	90.6	90.6	7.19	0.0488
1.0	54.50	48.50	88.8	88.8	7.35	0.0349
2.0	54.00	48.00	87.9	87.9	7.43	0.0248
5.0	52.00	46.00	84.2	84.2	7.76	0.0160
15.0	49.50	43.50	79.6	79.6	8.17	0.0095
30.0	47.75	41.75	76.4	76.4	8.46	0.0068
60.0	45.00	39.00	71.4	71.4	8.91	0.0050
120.0	42.50	36.50	66.8	66.8	9.32	0.0036
250.0	40.50	34.50	63.2	63.2	9.65	0.0025
1440.0	37.50	31.50	57.7	57.7	10.14	0.0011

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY
		COARSE	FINE	COARSE	MEDIUM	FINE	

WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 7+00 SAMPLE NO.: CH # 17 DATE: 4-3-92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION
Rocky Flats	46.0'	[illegible] Clay .8% med sand, 1.7% fine [illegible], 25.5% SILT, 72 [illegible] 2.5% [illegible]

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION - - - - - - - - - - - - - - -

LABORATORY CLASSIFICATION - - - - - - - - - - - - -

JOB NO. 2066-03

CLIENT/OWNER Weston

LOCATION Rocky Flats / EG & G

BORING 2+08 SAMPLE #12 DEPTH @46'

FIELD DENSITY BY ..../..../....

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

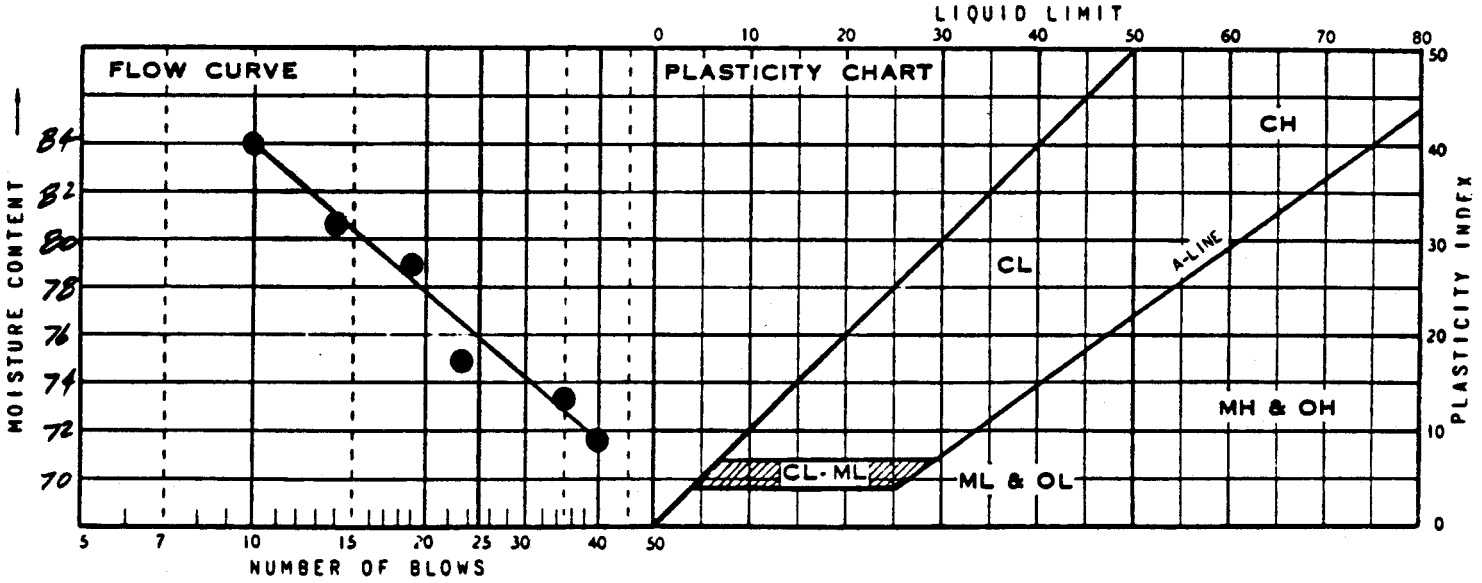
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY [illegible] 3/25/92

DETERMINATION	1	2	3	4	5	6
DISH	27C	29C	43C			
WT OF DISH + WET SOIL g	5.49	5.48	5.00			
WT OF DISH + DRY SOIL g	4.79	4.76	4.38	—	—	—
WT OF MOISTURE	0.70	0.72	0.62			
WT OF DISH	1.03	1.05	1.04	—	—	—
WT OF DRY SOIL	3.76	3.71	3.34			
MOISTURE CONTENT %	18.6	19.4	18.6	= 56.6/3 =	18.9	

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	2035	2036	2019	3	5C	2060
NUMBER OF BLOWS	40	35	23	19	14	10
WT OF DISH + WET SOIL g	9.61	9.31	9.67	9.38	9.60	9.58
WT OF DISH + DRY SOIL g	6.04	5.82	5.99	5.71	5.79	5.68
WT OF MOISTURE	3.57	3.49	3.68	3.61	3.81	3.90
WT OF DISH	1.05	1.06	1.07	1.06	1.06	1.03
WT OF DRY SOIL	4.99	4.76	4.92	4.65	4.73	4.65
MOISTURE CONTENT %	71.5	73.3	74.8	78.9	80.6	83.9



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		75.8	18.9	56.9	CH	

ADVANCED TERRA TESTING INC

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	7+00	SAMPLED	Rocky Flats
DEPTH	56.0'	DATE TESTED	03-24-92 DU
SAMPLE NO.	#17	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan	(g)	60.40
Wt. Dry Soil & Pan	(g)	58.95
Wt. Lost Moisture	(g)	1.45
Wt. of Pan Only	(g)	3.64
Wt. of Dry Soil	(g)	55.31
Moisture Content	%	2.6

Wt. Hydrom. Sample Wet (g)	55.06
Wt. Hydrom. Sample Dry (g)	53.65

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	55.06
Weight of + #10 Before Washing (g)	0.00
Weight of + #10 After Washing (g)	0.00
Weight of - #10 Wet (g)	55.06
Weight of - #10 Dry (g)	53.65
Wt. Total Sample Dry (g)	53.65
Calc. Wt. "W" (g)	53.65
Calc. Mass + #10	0.00

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	0.00	0.00	0.00	0.0	100.0
#4	0.00	0.00	0.00	0.00	0.0	100.0
#10	0.00	0.00	0.00	0.00	0.0	100.0
#20	1.57	2.28	0.71	0.71	1.3	98.7
#40	1.36	1.78	0.42	1.13	2.1	97.9
#60	1.57	1.73	0.16	1.29	2.4	97.6
#100	1.57	1.66	0.09	1.38	2.6	97.4
#230	1.55	1.86	0.31	1.69	3.1	96.9

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT	Weston	JOB NO.	2066-03
BORING NO.	7+00	SAMPLED	Rocky Flats
DEPTH	56.0'	DATE TESTED	03-24-92 DU
SAMPLE NO.	#17	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

Hydrometer #	ASTM 152 H	Temp., Deg. C	22.0
Sp. Gr. of Soil	2.77	Temp. Coef. K	0.01287
Value of "a"	0.98	Wt. Dry Sample "W"	53.653
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	4.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	55.50	50.50	91.9	91.9	7.19	0.0488
1.0	54.50	49.50	90.0	90.0	7.35	0.0349
2.0	54.00	49.00	89.1	89.1	7.43	0.0248
5.0	53.00	48.00	87.3	87.3	7.60	0.0159
15.0	51.50	46.50	84.6	84.6	7.84	0.0093
30.0	49.50	44.50	80.9	80.9	8.17	0.0067
60.0	47.00	42.00	76.4	76.4	8.58	0.0049
120.0	44.00	39.00	70.9	70.9	9.07	0.0035
250.0	41.00	36.00	65.5	65.5	9.57	0.0025
1440.0	33.00	28.00	50.9	50.9	10.88	0.0011

Grain Diameter = K*(SQRT(L/T))

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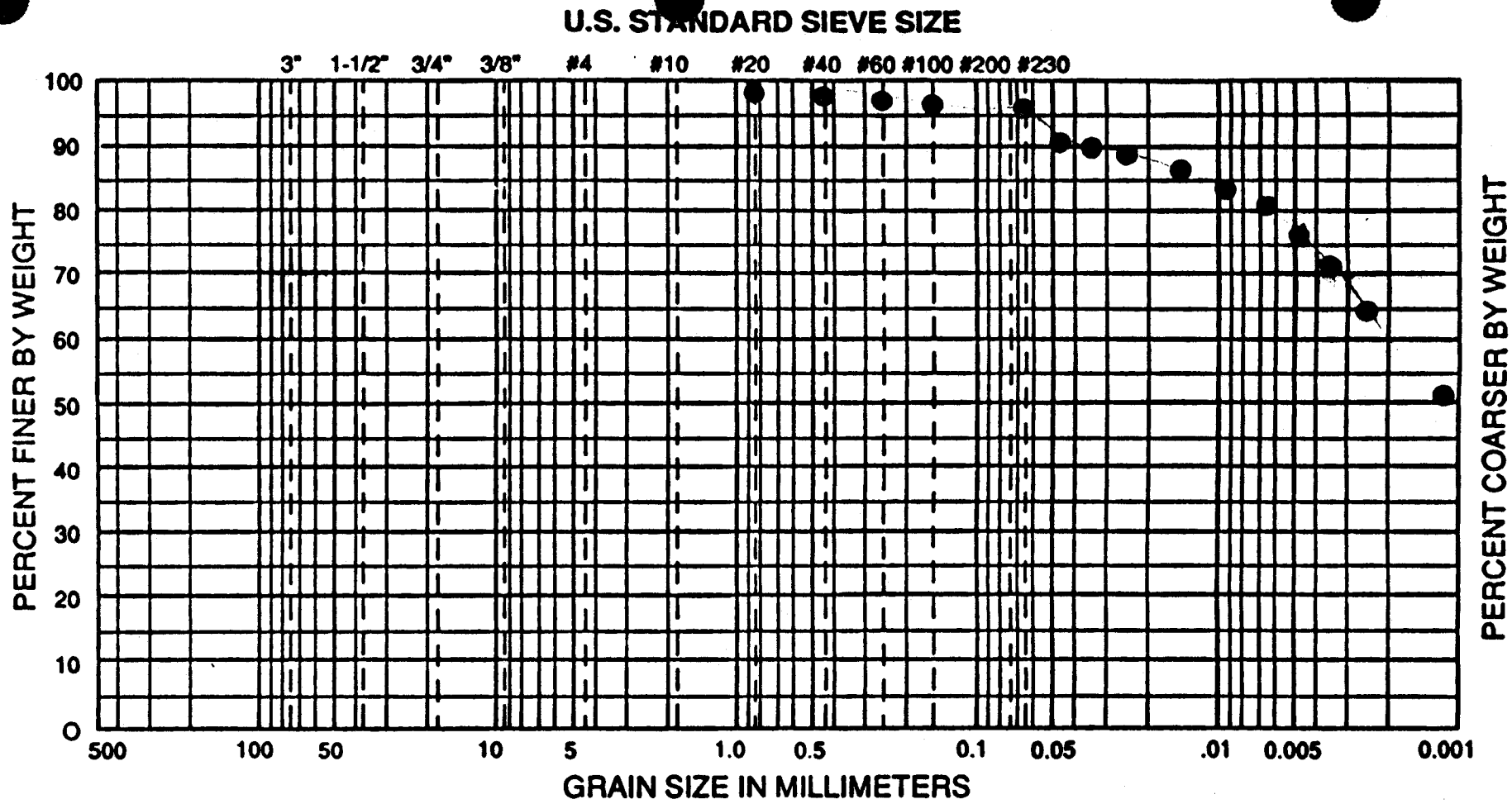


USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY
		COARSE	FINE	COARSE	MEDIUM	FINE	

WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 7+00 SAMPLE NO.: CH #17 DATE: 4-2-92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION SILTY CLAYSTONE
	56.0'	ROCKY FLATS / EG&G 2.1% med sa, [illegible] / 20.4% silt, 76.5% clay

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION - - - - - - - - - - - - - - - -

LABORATORY CLASSIFICATION - - - - - - - - - - - - -

JOB NO. 2066-03
CLIENT/OWNER Weston
LOCATION Rocky Flats / E626
BORING 7tao SAMPLE #12 DEPTH @56.0'

FIELD DENSITY BY ___/___/___

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

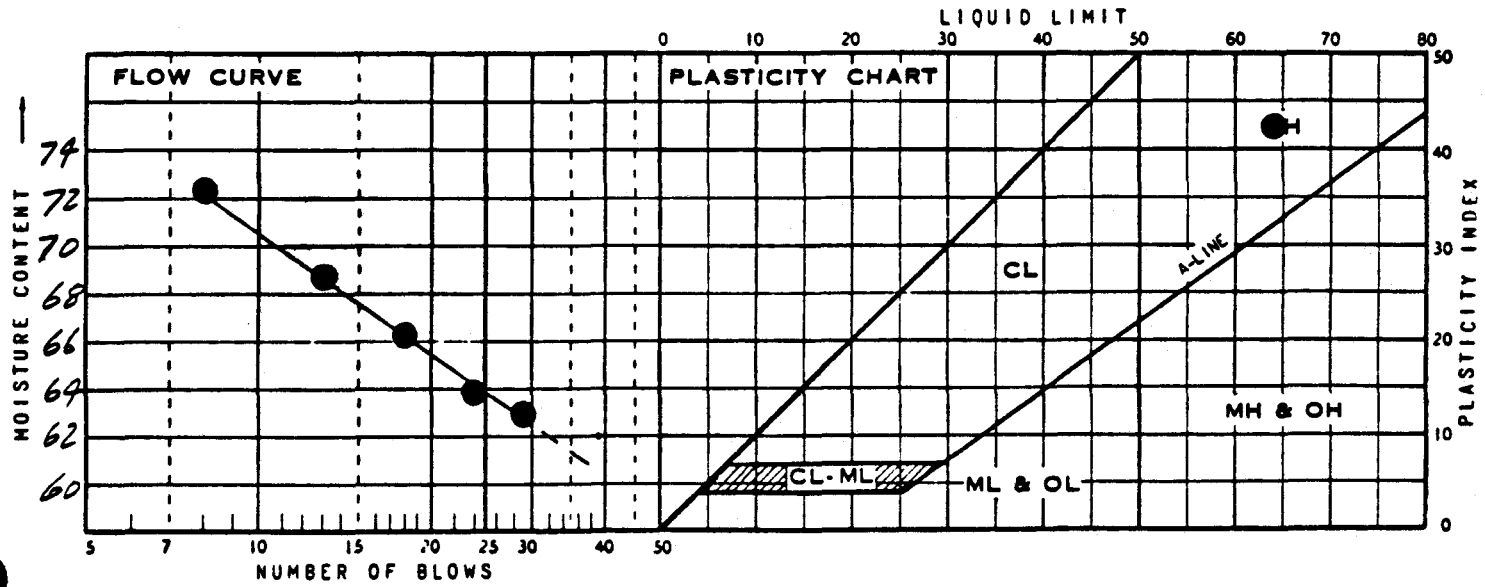
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY [illegible] 3/31/92

DETERMINATION	1	2	3	4	5	6
DISH	28C	38C	2035			
WT OF DISH + WET SOIL g	7.36	6.39	5.98			
WT OF DISH + DRY SOIL g	6.25	5.44	5.11	—	—	—
WT OF MOISTURE	1.11	0.95	0.87			
WT OF DISH	1.05	1.04	1.05	—	—	—
WT OF DRY SOIL	5.20	4.40	4.06			
MOISTURE CONTENT %	21.4	21.6	21.4	= 64.4/3 = 21.5		

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	43C	25C	22	2071	2007	41C
NUMBER OF BLOWS	39	29	24	18+	13	8+
WT OF DISH + WET SOIL g	8.98	11.38	9.32	12.52	9.65	11.56
WT OF DISH + DRY SOIL g	5.94	7.39	6.10	7.95	6.15	7.14
WT OF MOISTURE	3.04	3.99	3.22	4.57	3.50	4.42
WT OF DISH	1.04	1.05	1.05	1.06	1.05	1.03
WT OF DRY SOIL	4.90	6.34	5.05	6.89	5.10	6.11
MOISTURE CONTENT %	62.0	62.9	63.8	66.3	68.6	72.3



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		63.8	21.5	42.3	CH	

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JEM

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT **Weston**

JOB NO. 2066-03

BORING NO.	7+25	SAMPLED	Rocky Flats
DEPTH	15'	DATE TESTED	03-17-92 TNU
SAMPLE NO.	#12	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan	(g)	50.90
Wt. Dry Soil & Pan	(g)	49.18
Wt. Lost Moisture	(g)	1.72
Wt. of Pan Only	(g)	3.76
Wt. of Dry Soil	(g)	45.42
Moisture Content	%	3.8

Wt. Hydrom. Sample Wet (g)	55.00
Wt. Hydrom. Sample Dry (g)	53.00

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	558.43
Weight of + #10 Before Washing (g)	5.10
Weight of + #10 After Washing (g)	2.75
Weight of - #10 Wet (g)	553.33
Weight of - #10 Dry (g)	535.40
Wt. Total Sample Dry (g)	538.15
Calc. Wt. "W" (g)	53.27
Calc. Mass + #10	0.27

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	0.00	0.00	0.00	0.0	100.0
#4	0.00	1.36	1.36	1.36	0.3	99.7
#10	0.00	1.39	1.39	2.75	0.5	99.5
#20	1.56	1.72	0.16	0.16	0.8	99.2
#40	1.57	2.18	0.61	0.77	2.0	98.0
#60	1.55	2.97	1.42	2.19	4.6	95.4
#100	1.55	5.30	3.75	5.94	11.7	88.3
#230	1.56	9.27	7.71	13.65	26.1	73.9

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT	Weston	JOB NO.	2066-03
BORING NO.	7+25	SAMPLED	Rocky Flats
DEPTH	15'	DATE TESTED	03-17-92 TNU
SAMPLE NO.	#12	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

Hydrometer #	ASTM 152 H	Temp., Deg. C	22.0
Sp. Gr. of Soil	2.77	Temp. Coef. K	0.01287
Value of "a"	0.98	Wt. Dry Sample "W"	53.268
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	4.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	45.50	40.50	74.2	74.2	8.83	0.0541
1.0	42.50	37.50	68.7	68.7	9.32	0.0393
2.0	40.00	35.00	64.1	64.1	9.73	0.0284
5.0	37.00	32.00	58.6	58.6	10.22	0.0184
15.0	33.00	28.00	51.3	51.3	10.88	0.0110
30.0	31.50	26.50	48.6	48.6	11.12	0.0078
60.0	29.50	24.50	44.9	44.9	11.45	0.0056
120.0	28.00	23.00	42.1	42.1	11.70	0.0040
250.0	26.50	21.50	39.4	39.4	11.94	0.0028
1440.0	24.00	19.00	34.8	34.8	12.35	0.0012

Grain Diameter = K*(SQRT(L/T))

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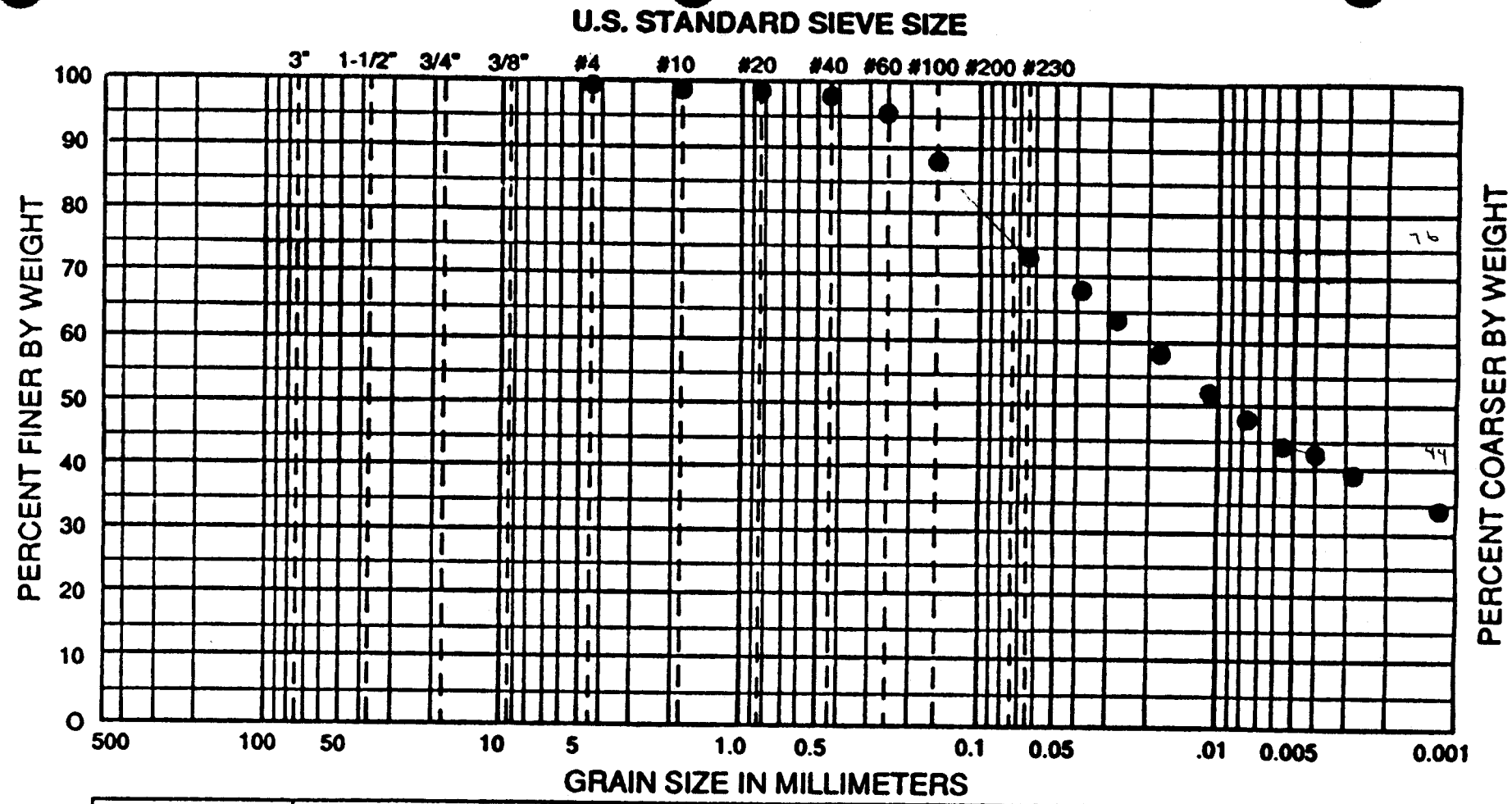
ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY		
		COARSE	FINE	COARSE	MEDIUM	FINE			
WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 7+25 SAMPLE NO.: CH #12 DATE: 3-26-92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION						
		Silty clay with some sand tr gravel						
		GV .3		S 23.7			SL	CL
Rocky Flats	15.0'	0	.3	.2	1.5	22	32	44

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION _____

LABORATORY CLASSIFICATION _____

JOB NO. 2066-09

CLIENT/OWNER WESTON

LOCATION

BORING 7+25 SAMPLE CH#12 DEPTH 15.0'

FIELD DENSITY BY ___/___/___

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

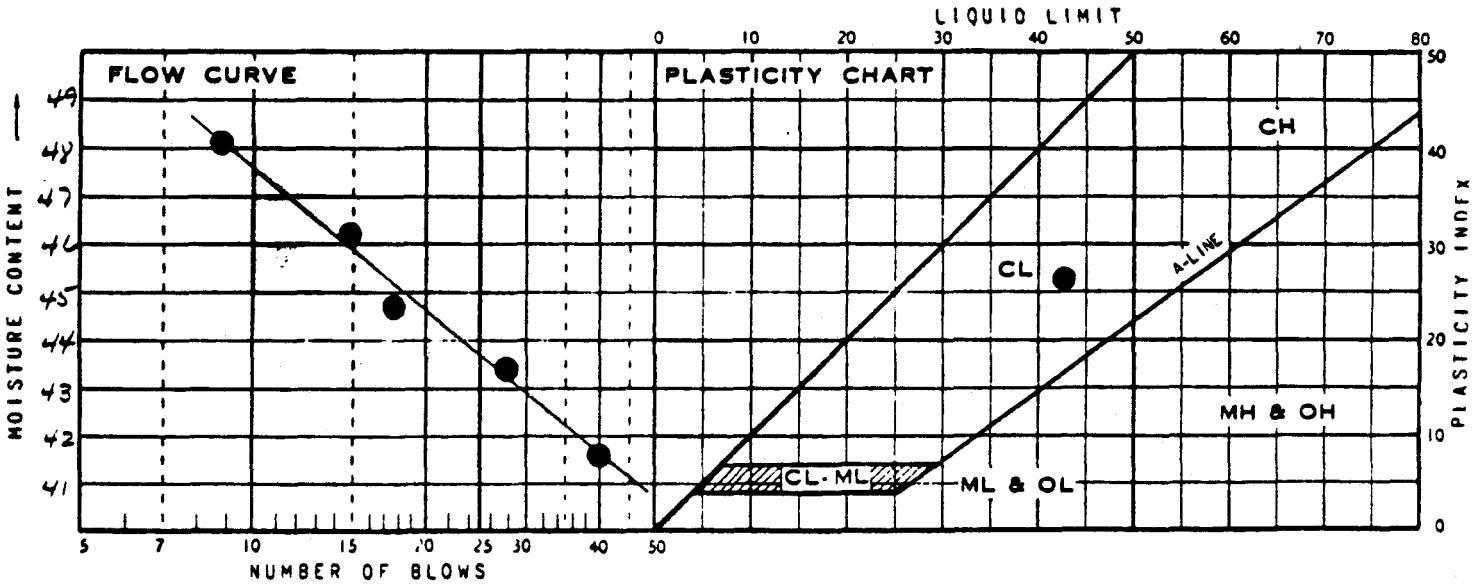
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY SR 3/19/92

DETERMINATION	1	2	3	4	5	6
DISH	200R	2011	44 CX			
WT OF DISH + WET SOIL g	7.22	7.11	6.84			
WT OF DISH + DRY SOIL g	6.31	6.19	6.00	—	—	—
WT OF MOISTURE g	.91	.92	.84			
WT OF DISH g	1.06	1.05	1.07	—	—	—
WT OF DRY SOIL g	5.25	5.14	4.93			
MOISTURE CONTENT %	17.3	17.9	17.0			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	23 C	36 C	2046	34 CX	2056	
NUMBER OF BLOWS	40	28	18	15	9±	
WT OF DISH + WET SOIL g	13.86	12.17	16.48	15.34	16.02	
WT OF DISH + DRY SOIL g	10.10	8.80	11.85	10.82	11.16	—
WT OF MOISTURE g	3.76	3.37	4.63	4.52	4.86	
WT OF DISH g	1.07	1.04	1.06	1.03	1.05	—
WT OF DRY SOIL g	9.03	7.76	10.79	9.79	10.11	
MOISTURE CONTENT %	41.6	43.4	44.8	46.2	48.1	



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		43.8	17.4	26.4	CL	

ADVANCED TERRA TESTING INC

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT **Weston**

JOB NO. 2066-03

BORING NO.	7+25	SAMPLED	Rocky Flats
DEPTH	25'	DATE TESTED	03-17-92 TNU
SAMPLE NO.	#12	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

03

MOISTURE DATA

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan	(g)	37.57
Wt. Dry Soil & Pan	(g)	36.63
Wt. Lost Moisture	(g)	0.94
Wt. of Pan Only	(g)	3.76
Wt. of Dry Soil	(g)	32.87
Moisture Content	%	2.9

Wt. Hydrom. Sample Wet (g)	55.01
Wt. Hydrom. Sample Dry (g)	53.48

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	940.89
Weight of + #10 Before Washing (g)	439.25
Weight of + #10 After Washing (g)	402.74
Weight of - #10 Wet (g)	501.64
Weight of - #10 Dry (g)	523.19
Wt. Total Sample Dry (g)	925.93
Calc. Wt. "W" (g)	94.65
Calc. Mass + #10	41.17

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	315.17	315.17	315.17	34.0	66.0
3/8"	0.00	53.28	53.28	368.45	39.8	60.2
#4	0.00	19.64	19.64	388.09	41.9	58.1
#10	0.00	14.65	14.65	402.74	43.5	56.5
#20	1.57	3.06	1.49	1.49	45.1	54.9
#40	1.55	3.41	1.86	3.35	47.0	53.0
#60	1.56	3.29	1.73	5.08	48.9	51.1
#100	1.57	4.42	2.85	7.93	51.9	48.1
#230	1.32	7.71	6.39	14.32	58.6	41.4 — 43

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT	Weston	JOB NO.	2066-03
BORING NO.	7+25	SAMPLED	Rocky Flats
DEPTH	25'	DATE TESTED	03-17-92 TNU
SAMPLE NO.	#12	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

Hydrometer #	ASTM 152 H	Temp., Deg. C	22.0
Sp. Gr. of Soil	2.71	Temp. Coef. K	0.01308
Value of "a"	0.99	Wt. Dry Sample "W"	94.645
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	4.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	44.50	39.50	41.2	41.2	8.99	0.0555
1.0	41.50	36.50	38.1	38.1	9.48	0.0403
2.0	39.00	34.00	35.5	35.5	9.89	0.0291
5.0	37.50	32.50	33.9	33.9	10.14	0.0186
15.0	34.50	29.50	30.8	30.8	10.63	0.0110
30.0	33.25	28.25	29.5	29.5	10.84	0.0079
60.0	31.50	26.50	27.7	27.7	11.12	0.0056
120.0	30.50	25.50	26.6	26.6	11.29	0.0040
250.0	29.00	24.00	25.1	25.1	11.53	0.0028
1440.0	25.50	20.50	21.4	21.4	12.11	0.0012

Grain Diameter = K*(SQRT(L/T))

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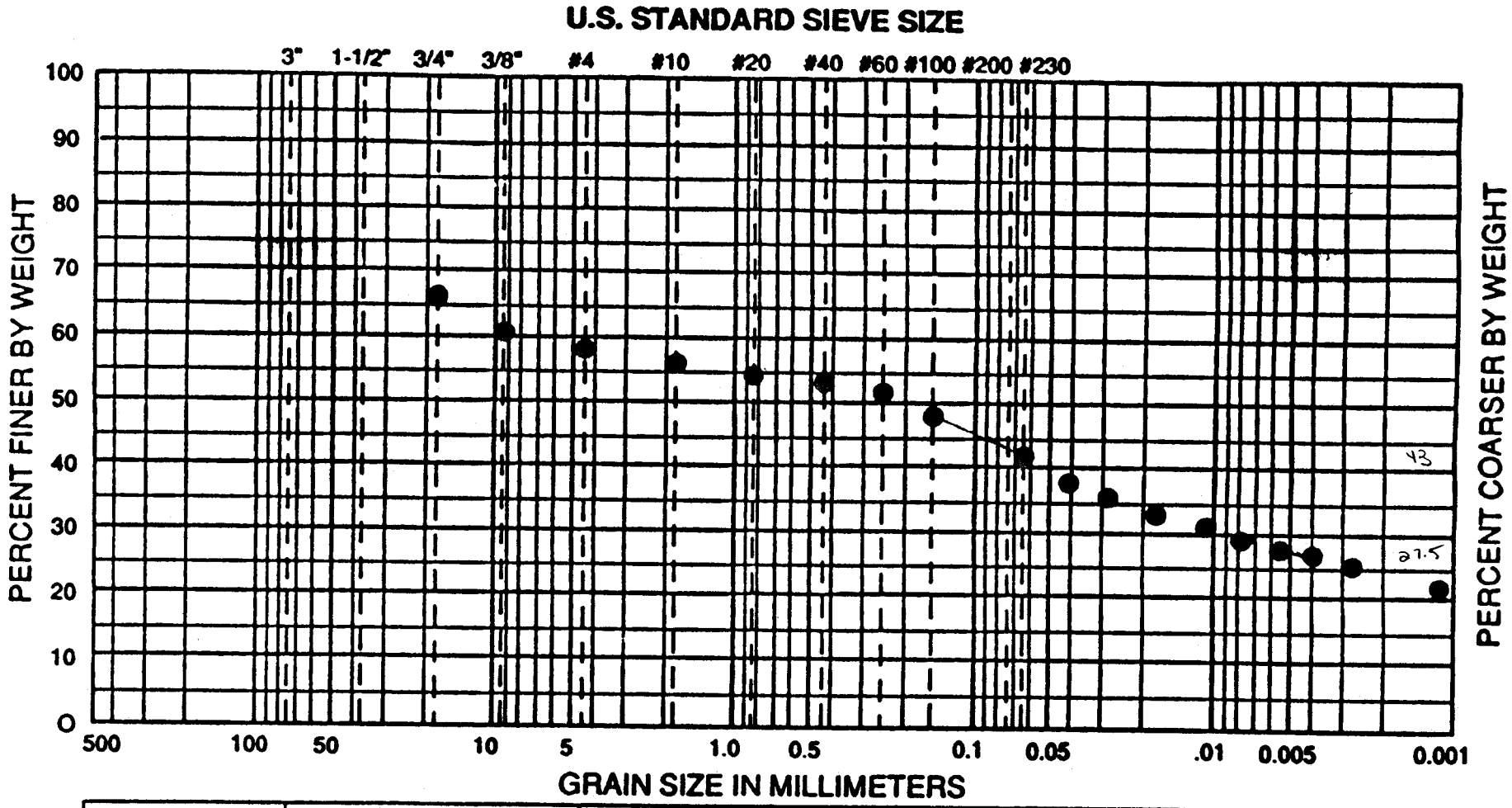


USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY
		COARSE	FINE	COARSE	MEDIUM	FINE	

WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 7+25 SAMPLE NO.: CH #12 DATE: 3-26-92 PROJECT NO.:

AREA	DEPTH	clayey gravel CLASSIFICATION					
		41.9		15.1			
Rocky Flats	25.0'	34	7.9	1.6	3.5	10	15.5	27.5

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION - - - - - - - - - - - - - - - -

LABORATORY CLASSIFICATION - - - - - - - - - - - - -

JOB NO. 2066-03

CLIENT/OWNER WESTON

LOCATION ROCKY FLATS/ EG&G

BORING 7+25 SAMPLE CH#12 DEPTH 25.0'

FIELD DENSITY BY ...../../...

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD → [redacted]

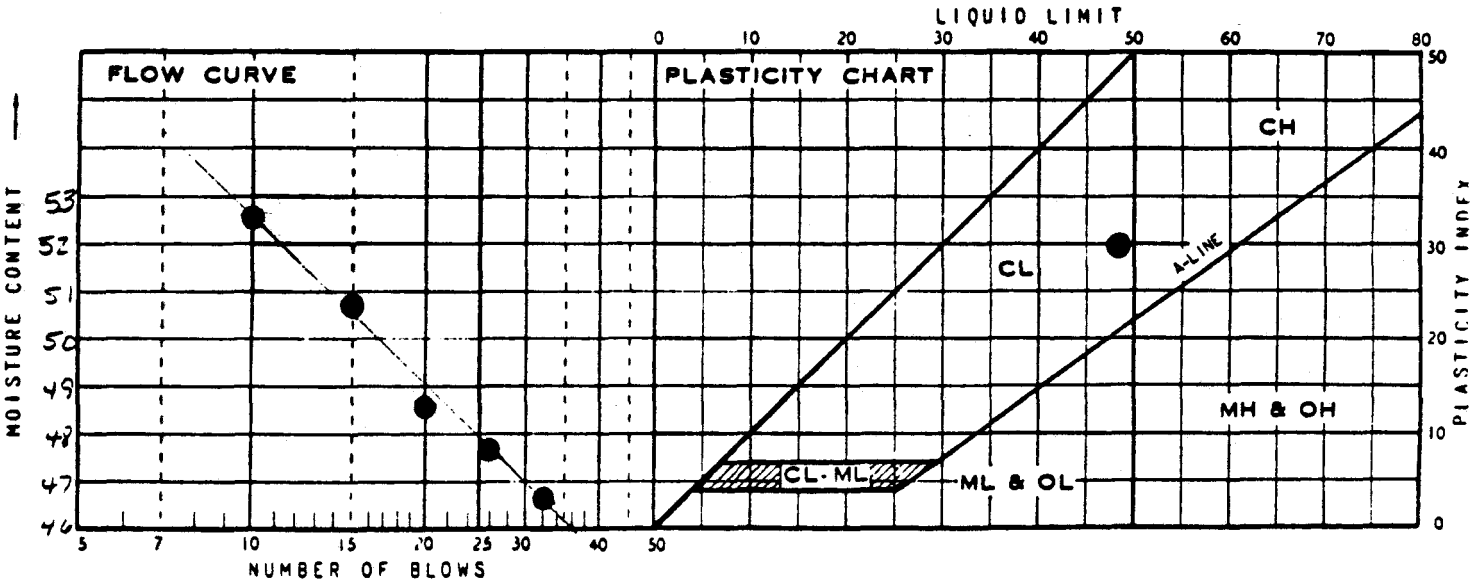
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY SR.3.120/92.

DETERMINATION	1	2	3	4	5	6
DISH	2066	2056	2052			
WT OF DISH + WET SOIL g	8.12	6.98	6.66			
WT OF DISH + DRY SOIL g	7.03	6.07	5.77	—	—	—
WT OF MOISTURE g	1.09	.91	.89			
WT OF DISH g	1.05	1.05	1.03	—	—	—
WT OF DRY SOIL g	5.98	5.02	4.74			
MOISTURE CONTENT %	18.2	18.1	18.8			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	2002	2009	32C	2023	29C	
NUMBER OF BLOWS	32	26	20	15	11±	
WT OF DISH + WET SOIL g	15.82	13.94	13.57	13.31	12.22	
WT OF DISH + DRY SOIL g	11.12	9.77	9.47	9.19	8.37	—
WT OF MOISTURE g	4.70	4.17	4.10	4.12	3.85	
WT OF DISH g	1.06	1.05	1.04	1.06	1.05	—
WT OF DRY SOIL g	10.06	8.72	8.43	8.13	7.32	
MOISTURE CONTENT %	46.7	47.8	48.6	50.7	52.6	



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		47.9	18.4	29.5	CL	

ADVANCED TERRA TESTING INC

jlm

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT **Weston**

JOB NO. 2066-03

BORING NO.	7+25	SAMPLED	Rocky Flats
DEPTH	33'	DATE TESTED	03-17-92 TNU
SAMPLE NO.	#12	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

OB

MOISTURE DATA

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan	(g)	46.90
Wt. Dry Soil & Pan	(g)	45.54
Wt. Lost Moisture	(g)	1.36
Wt. of Pan Only	(g)	3.70
Wt. of Dry Soil	(g)	41.84
Moisture Content	%	3.3

Wt. Hydrom. Sample Wet (g)	54.96
Wt. Hydrom. Sample Dry (g)	53.23

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	697.04
Weight of + #10 Before Washing (g)	225.10
Weight of + #10 After Washing (g)	185.72
Weight of - #10 Wet (g)	471.94
Weight of - #10 Dry (g)	495.22
Wt. Total Sample Dry (g)	680.94
Calc. Wt. "W" (g)	73.19
Calc. Mass + #10	19.96

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	72.85	72.85	72.85	10.7	89.3
3/8"	0.00	41.96	41.96	114.81	16.9	83.1
#4	0.00	36.50	36.50	151.31	22.2	77.8
#10	0.00	34.41	34.41	185.72	27.3	72.7
#20	1.56	2.12	0.56	0.56	28.0	72.0
#40	1.55	2.66	1.11	1.67	29.6	70.4
#60	1.57	3.03	1.46	3.13	31.6	68.4
#100	1.57	4.03	2.46	5.59	34.9	65.1
#230	1.56	6.64	5.08	10.67	41.9	58.1 — 64

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT **Weston** JOB NO. 2066-03

BORING NO.	7+25	SAMPLED	Rocky Flats
DEPTH	33'	DATE TESTED	03-17-92 TNU
SAMPLE NO.	#12	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

Hydrometer #	ASTM 152 H	Temp., Deg. C	22.0
Sp. Gr. of Soil	2.71	Temp. Coef. K	0.01308
Value of "a"	0.99	Wt. Dry Sample "W"	73.192
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	4.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	47.00	42.00	56.7	56.7	8.58	0.0542
1.0	45.00	40.00	54.0	54.0	8.91	0.0390
2.0	44.00	39.00	52.6	52.6	9.07	0.0279
5.0	41.50	36.50	49.3	49.3	9.48	0.0180
15.0	38.00	33.00	44.5	44.5	10.06	0.0107
30.0	36.75	31.75	42.9	42.9	10.26	0.0077
60.0	35.00	30.00	40.5	40.5	10.55	0.0055
120.0	33.00	28.00	37.8	37.8	10.88	0.0039
250.0	31.75	26.75	36.1	36.1	11.08	0.0028
1440.0	29.00	24.00	32.4	32.4	11.53	0.0012

Grain Diameter = K*(SQRT(L/T))

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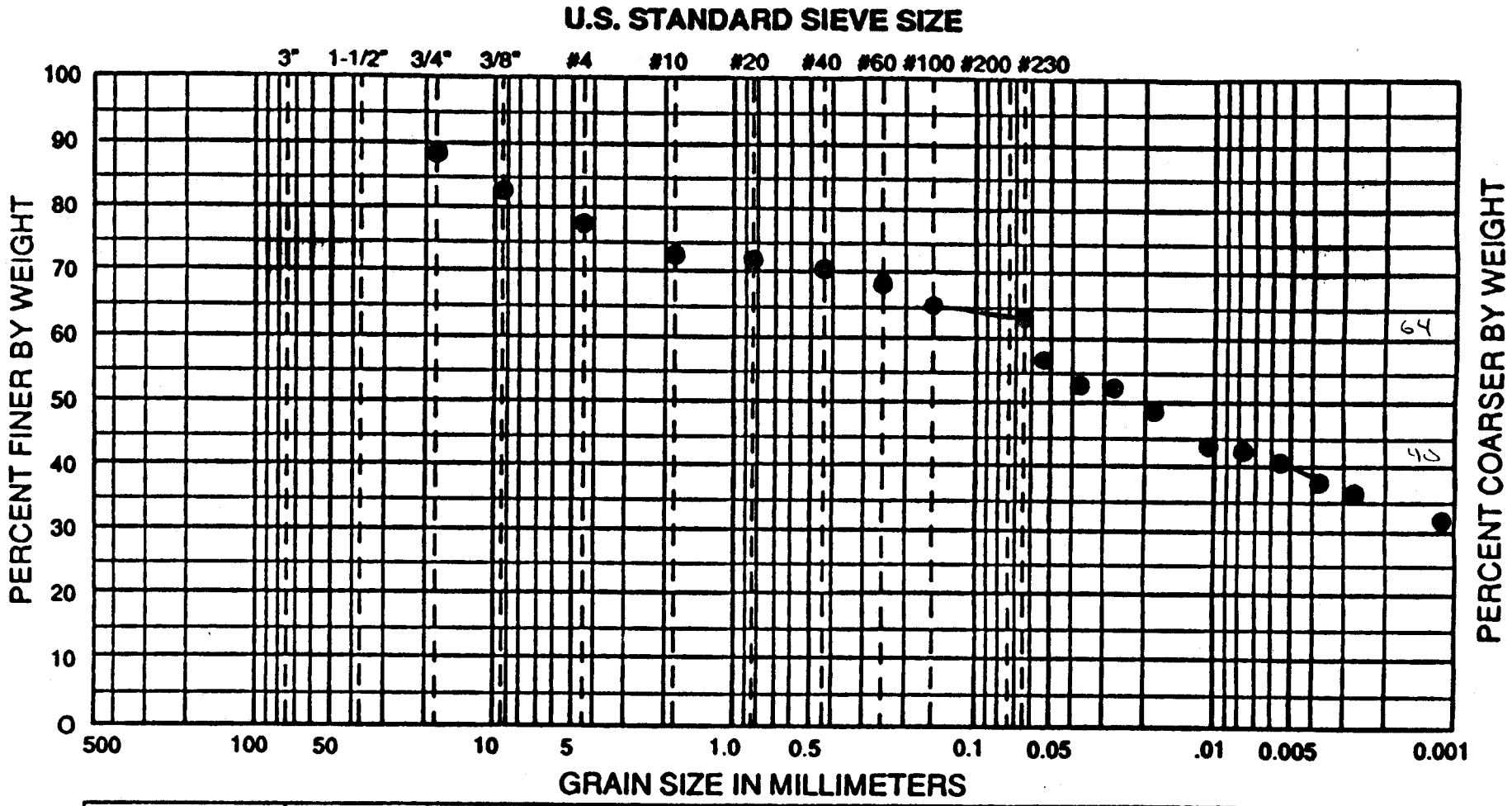


USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY		
		COARSE	FINE	COARSE	MEDIUM	FINE			

WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 7-25 SAMPLE NO.: CH # 12 DATE: 3-26-92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION						
		clay						
		22.2			13.8			
Rocky Flats	33.0'	10.7	11.5	5.1	2.3	6.4	24	40

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION - - - - - - - - - - - - - - - -

LABORATORY CLASSIFICATION - - - - - - - - - - - - -

JOB NO. 2066-03

CLIENT/OWNER Weston

LOCATION Rocky Flats / EG&G

BORING 7+25 SAMPLE #12 DEPTH @33'

FIELD DENSITY BY ...../../..

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD [redacted]

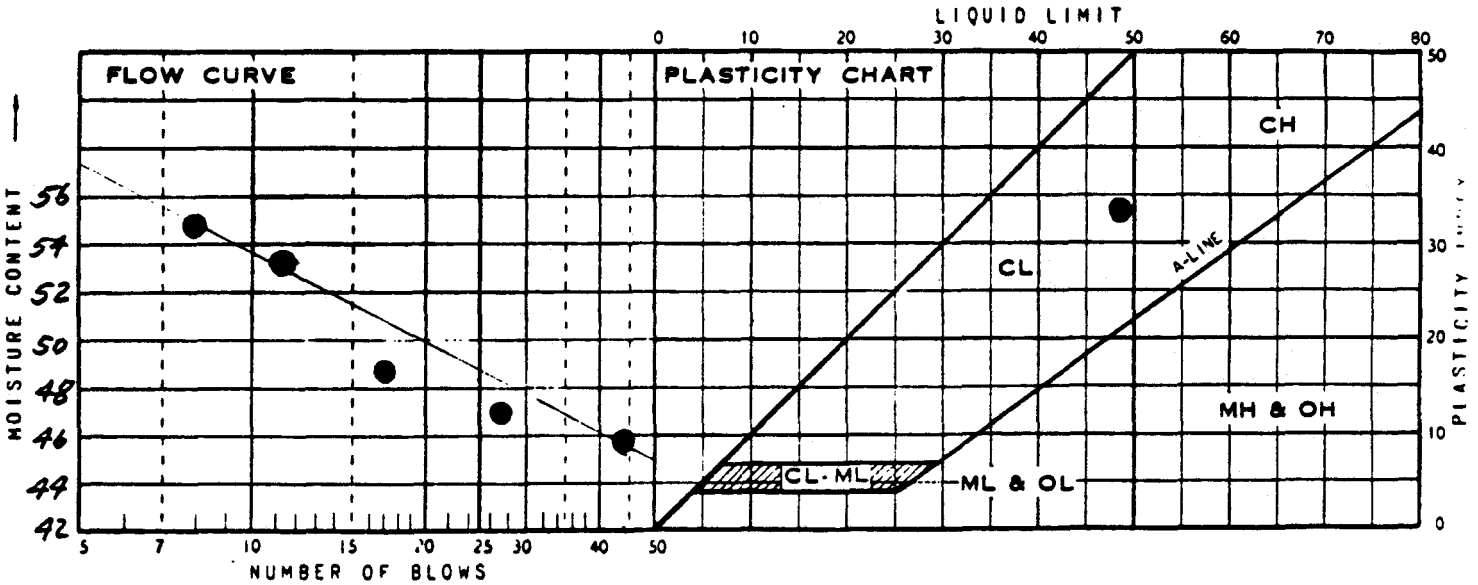
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY [illegible] 3.120192

DETERMINATION	1	2	3	4	5	6
DISH	2046	2075	2011			
WT OF DISH + WET SOIL g	7.86	6.92	7.06			
WT OF DISH + DRY SOIL	6.94	6.14	6.25	—	—	—
WT OF MOISTURE	0.92	0.78	0.81			
WT OF DISH	1.05	1.04	1.05	—	—	—
WT OF DRY SOIL	5.89	5.10	5.20			
MOISTURE CONTENT %	15.6	15.3	15.6	= 46.50/3 =	15.5	

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	18C	36C	B19	44CX	2022	
NUMBER OF BLOWS	44	27	17	11	8+	
WT OF DISH + WET SOIL g	7.82	7.70	7.50	9.23	8.07	
WT OF DISH + DRY SOIL	5.69	5.57	5.39	6.39	5.59	—
WT OF MOISTURE	2.13	2.13	2.11	2.84	2.48	
WT OF DISH	1.04	1.04	1.05	1.06	1.06	—
WT OF DRY SOIL	4.65	4.53	4.34	5.33	4.53	
MOISTURE CONTENT %	45.8	47.0	48.6	53.3	54.8	



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		48.7	15.5	33.2	CL	

ADVANCED TERRA TESTING

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MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT **Weston**

JOB NO. 2066-03

BORING NO.	7+25	SAMPLED	Rocky Flats
DEPTH	44.3'	DATE TESTED	03-17-92 TNU
SAMPLE NO.	#12	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC	Yes	
NATURAL	No	
Wt. Wet Soil & Pan	(g)	37.91
Wt. Dry Soil & Pan	(g)	36.51
Wt. Lost Moisture	(g)	1.40
Wt. of Pan Only	(g)	3.68
Wt. of Dry Soil	(g)	32.83
Moisture Content	%	4.3
Wt. Hydrom. Sample Wet	(g)	55.01
Wt. Hydrom. Sample Dry	(g)	52.76

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	468.35
Weight of + #10 Before Washing (g)	5.40
Weight of + #10 After Washing (g)	5.09
Weight of - #10 Wet (g)	462.95
Weight of - #10 Dry (g)	444.31
Wt. Total Sample Dry (g)	449.40
Calc. Wt. "W" (g)	53.37
Calc. Mass + #10	0.60

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	0.00	0.00	0.00	0.0	100.0
#4	0.00	3.82	3.82	3.82	0.9	99.1
#10	0.00	1.27	1.27	5.09	1.1	98.9
#20	1.56	1.96	0.40	0.40	1.9	98.1
#40	1.56	2.38	0.82	1.22	3.4	96.6
#60	1.55	2.21	0.66	1.88	4.7	95.3
#100	1.56	2.22	0.66	2.54	5.9	94.1
#230	1.56	2.72	1.16	3.70	8.1	91.9 — 92

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT **Weston**

JOB NO. 2066-03

BORING NO.	7+25	SAMPLED	Rocky Flats
DEPTH	44.3'	DATE TESTED	03-17-92 TNU
SAMPLE NO.	#12	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

Hydrometer #	ASTM 152 H	Temp., Deg. C	22.0
Sp. Gr. of Soil	2.74	Temp. Coef. K	0.01298
Value of "a"	0.98	Wt. Dry Sample "W"	53.365
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	4.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	53.00	48.00	88.3	88.3	7.60	0.0506
1.0	52.00	47.00	86.5	86.5	7.76	0.0362
2.0	51.75	46.75	86.0	86.0	7.80	0.0256
5.0	51.00	46.00	84.6	84.6	7.93	0.0163
15.0	48.50	43.50	80.0	80.0	8.34	0.0097
30.0	46.50	41.50	76.4	76.4	8.66	0.0070
60.0	45.00	40.00	73.6	73.6	8.91	0.0050
120.0	42.50	37.50	69.0	69.0	9.32	0.0036
250.0	39.75	34.75	63.9	63.9	9.77	0.0026
1440.0	35.50	30.50	56.1	56.1	10.47	0.0011

Grain Diameter = K*(SQRT(L/T))

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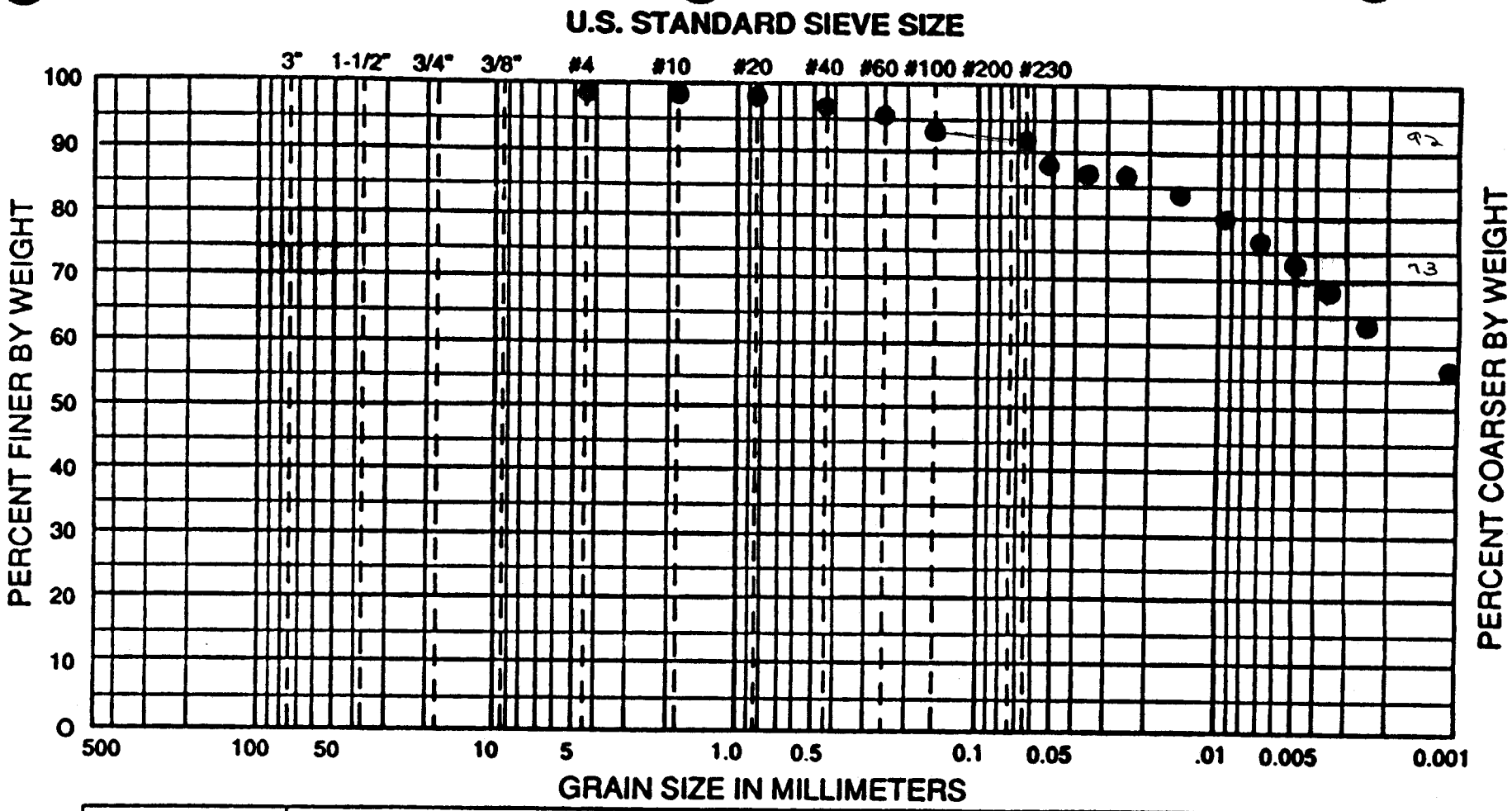
ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY			
		COARSE	FINE	COARSE	MEDIUM	FINE				

WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 7+25 SAMPLE NO.: EH #12 DATE: 3-26-92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION					
		clay					
		.9		7.1			
Rocky Flats	44.3'	0 .9	.2	2.3	4.6	.9	.73

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION - - - - - - - - - - - - - - - -

LABORATORY CLASSIFICATION - - - - - - - - - - - - -

JOB NO. 2066-03

CLIENT/OWNER WESTON

LOCATION ROCKY FLATS/EG+G

BORING 7+25 SAMPLE CH#12 DEPTH 44.3'

FIELD DENSITY BY ...../../...

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD [redacted]

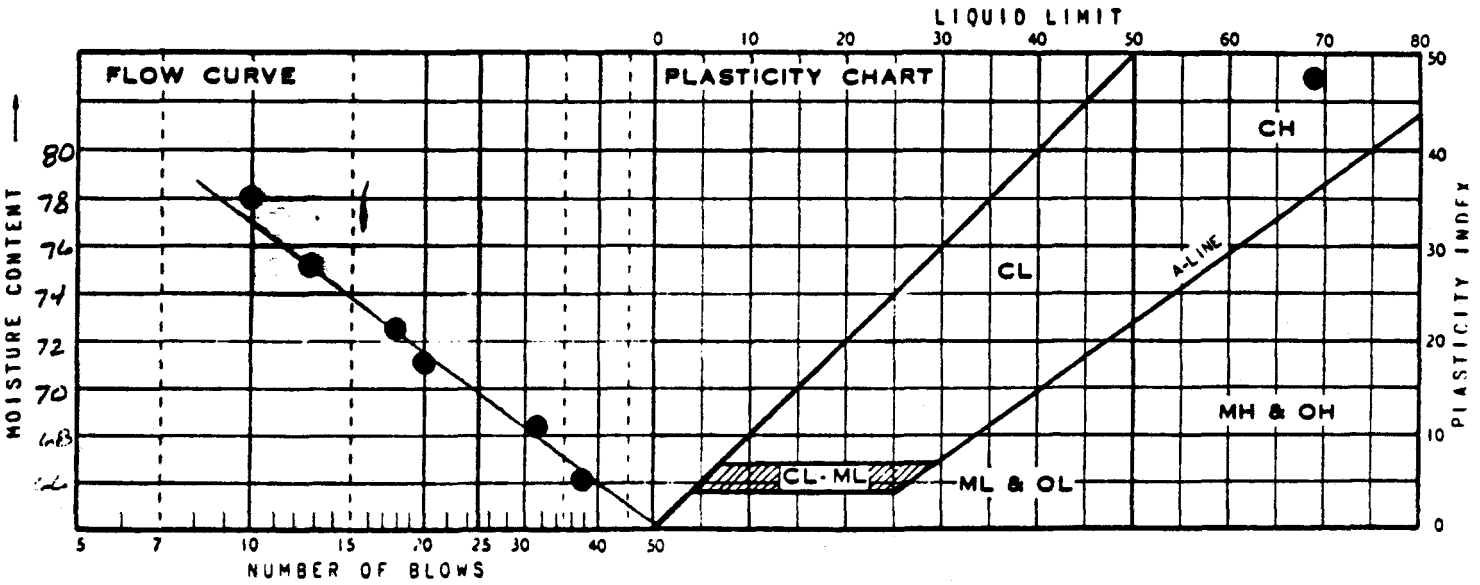
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY SR 3/21/92.

DETERMINATION	1	2	3	4	5	6
DISH	35 C	35 CC	4 C			
WT OF DISH + WET SOIL g	6.10	5.37	6.16			
WT OF DISH + DRY SOIL g	5.24	4.62	5.24	—	—	—
WT OF MOISTURE g	.86	.75	.92			
WT OF DISH g	1.07	1.06	1.06	—	—	—
WT OF DRY SOIL g	4.17	3.56	4.18			
MOISTURE CONTENT %	20.6	21.1	22.0			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	2062	5 C	43 C	2036	2038	2024
NUMBER OF BLOWS	38	32	21±	18	13±	10
WT OF DISH + WET SOIL g	14.72	11.86	11.85	12.03	10.91	10.56
WT OF DISH + DRY SOIL g	9.26	7.47	7.35	7.41	6.16	6.39
WT OF MOISTURE g	5.46	4.39	4.50	4.62	3.85	4.17
WT OF DISH g	1.04	1.06	1.04	1.05	1.05	1.06
WT OF DRY SOIL g	8.22	6.41	6.31	6.36	5.11	5.33
MOISTURE CONTENT %	66.4	68.5	71.3	72.6	75.3	78.2



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		69.9	2.2	48.7	CH	

ADVANCED TERRA TESTING

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT **Weston**

JOB NO. 2066-03

BORING NO.	7+25	SAMPLED	Rocky Flats
DEPTH	63.5'	DATE TESTED	03-31-92 DU
SAMPLE NO.	#16	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan	(g)	89.85
Wt. Dry Soil & Pan	(g)	88.30
Wt. Lost Moisture	(g)	1.55
Wt. of Pan Only	(g)	3.54
Wt. of Dry Soil	(g)	84.76
Moisture Content	%	1.8

Wt. Hydrom. Sample Wet (g)	55.04
Wt. Hydrom. Sample Dry (g)	54.05

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	55.04
Weight of + #10 Before Washing (g)	0.00
Weight of + #10 After Washing (g)	0.00
Weight of - #10 Wet (g)	55.04
Weight of - #10 Dry (g)	54.05
Wt. Total Sample Dry (g)	54.05
Calc. Wt. "W" (g)	54.05
Calc. Mass + #10	0.00

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	0.00	0.00	0.00	0.0	100.0
#4	0.00	0.00	0.00	0.00	0.0	100.0
#10	0.00	0.00	0.00	0.00	0.0	100.0
#20	1.56	1.78	0.22	0.22	0.4	99.6
#40	1.58	1.67	0.09	0.31	0.6	99.4
#60	1.57	1.62	0.05	0.36	0.7	99.3
#100	1.56	1.65	0.09	0.45	0.8	99.2
#230	1.56	2.18	0.62	1.07	2.0	98.0

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT	Weston	JOB NO.	2066-03
BORING NO.	7+25	SAMPLED	Rocky Flats
DEPTH	63.5'	DATE TESTED	03-31-92 DU
SAMPLE NO.	#16	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

Hydrometer #	ASTM 152 H	Temp., Deg. C	22.0
Sp. Gr. of Soil	2.74	Temp. Coef. K	0.01298
Value of "a"	0.98	Wt. Dry Sample "W"	54.052
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	5.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	54.00	48.00	87.2	87.2	7.43	0.0501
1.0	51.50	45.50	82.7	82.7	7.84	0.0364
2.0	48.00	42.00	76.3	76.3	8.42	0.0266
5.0	44.00	38.00	69.0	69.0	9.07	0.0175
15.0	40.00	34.00	61.8	61.8	9.73	0.0105
30.0	37.50	31.50	57.2	57.2	10.14	0.0075
60.0	35.00	29.00	52.7	52.7	10.55	0.0054
120.0	33.25	27.25	49.5	49.5	10.84	0.0039
250.0	31.00	25.00	45.4	45.4	11.21	0.0027
1440.0	25.00	19.00	34.5	34.5	12.19	0.0012

Grain Diameter = K*(SQRT(L/T))

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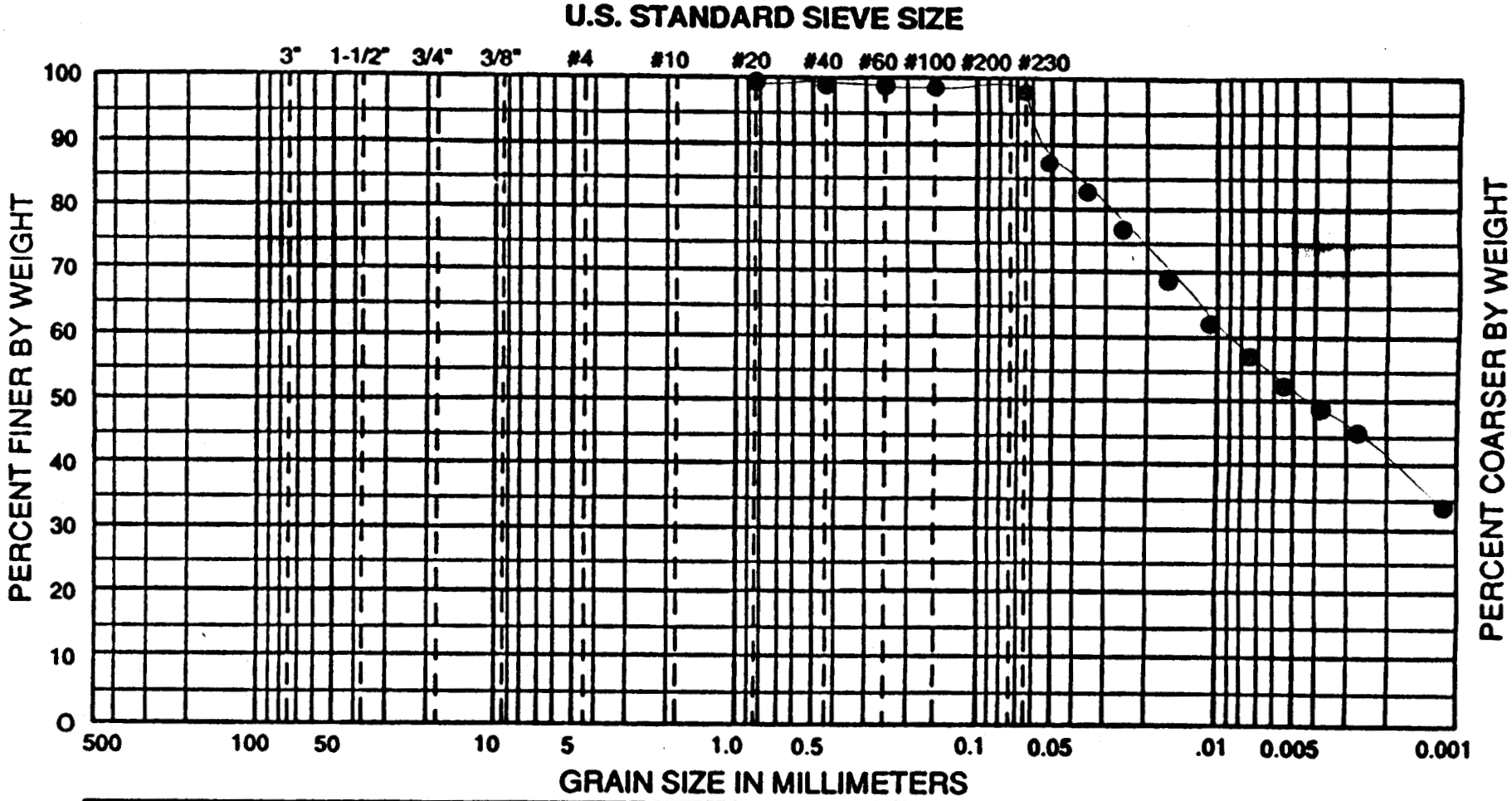
ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY		
		COARSE	FINE	COARSE	MEDIUM	FINE			

WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 7+25 SAMPLE NO.: CH #16 DATE: 4-2-92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION Silty CLAY
Rocky Flats	63.5'	.6% [illegible], 1.4% F. Sand, 41.6% Silt, 52% CLAY

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION - - - - - - - - - - - - - - -

LABORATORY CLASSIFICATION - - - - - - - - - - - - -

JOB NO. 2066-03
CLIENT/OWNER Weston
LOCATION Rocky Flats/EG&G
BORING 7225 SAMPLE #16 DEPTH @ 63.5'

FIELD DENSITY BY ...../../..

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

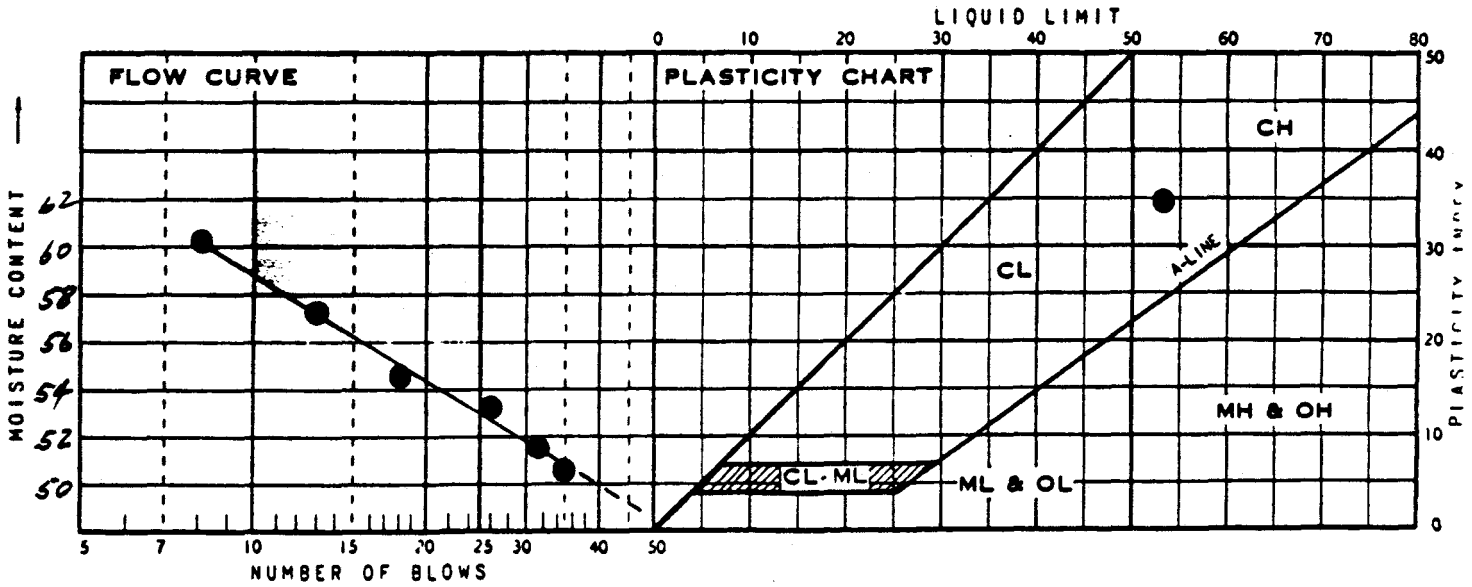
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY [illegible] 3.15/92

DETERMINATION	1	2	3	4	5	6
DISH	38C	10C	2018			
WT OF DISH + WET SOIL	6.93	6.45	6.28			
WT OF DISH + DRY SOIL	6.04	5.59	5.48	—	—	—
WT OF MOISTURE	0.89	0.86	0.80			
WT OF DISH	1.04	1.05	1.05	—	—	—
WT OF DRY SOIL	5.00	4.54	4.43			
MOISTURE CONTENT %	17.8	18.9	18.1	= 54.8/3 =	18.3	

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	0C	37C	25C	22	2071	41C
NUMBER OF BLOWS	31	35	26+	18-	13	8+
WT OF DISH + WET SOIL	10.51	9.96	9.78	11.01	10.39	9.85
WT OF DISH + DRY SOIL	7.29	6.98	6.75	7.50	6.99	6.54
WT OF MOISTURE	3.22	2.98	3.03	3.51	3.44	3.31
WT OF DISH	1.04	1.07	1.05	1.05	1.05	1.03
WT OF DRY SOIL	6.25	5.91	5.70	6.45	5.94	5.51
MOISTURE CONTENT %	51.5	50.4	53.2	54.4	57.2	60.1



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		53.0	18.3	34.7	CH	

ADVANCED TERRA TESTING inc

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT **Weston**

JOB NO. 2066-03

BORING NO.	7+25	SAMPLED	Rocky Flats
DEPTH	66.5'	DATE TESTED	03-31-92 DU
SAMPLE NO.	#16	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan	(g)	66.43
Wt. Dry Soil & Pan	(g)	65.19
Wt. Lost Moisture	(g)	1.24
Wt. of Pan Only	(g)	3.59
Wt. of Dry Soil	(g)	61.60
Moisture Content	%	2.0

Wt. Hydrom. Sample Wet (g)	55.02
Wt. Hydrom. Sample Dry (g)	53.94

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	55.02
Weight of + #10 Before Washing (g)	0.00
Weight of + #10 After Washing (g)	0.00
Weight of - #10 Wet (g)	55.02
Weight of - #10 Dry (g)	53.94
Wt. Total Sample Dry (g)	53.94
Calc. Wt. "W" (g)	53.94
Calc. Mass + #10	0.00

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	0.00	0.00	0.00	0.0	100.0
#4	0.00	0.00	0.00	0.00	0.0	100.0
#10	0.00	0.00	0.00	0.00	0.0	100.0
#20	1.54	1.57	0.03	0.03	0.1	99.9
#40	1.56	1.57	0.01	0.04	0.1	99.9
#60	1.57	1.58	0.01	0.05	0.1	99.9
#100	1.57	1.59	0.02	0.07	0.1	99.9
#230	1.57	2.19	0.62	0.69	1.3	98.7

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT	Weston	JOB NO.	2066-03
BORING NO.	7+25	SAMPLED	Rocky Flats
DEPTH	66.5'	DATE TESTED	03-31-92 DU
SAMPLE NO.	#16	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

Hydrometer #	ASTM 152 H	Temp., Deg. C	22.0
Sp. Gr. of Soil	2.71	Temp. Coef. K	0.01308
Value of "a"	0.99	Wt. Dry Sample "W"	53.935
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	5.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	55.00	49.00	89.8	89.8	7.27	0.0499
1.0	53.50	47.50	87.0	87.0	7.52	0.0359
2.0	51.50	45.50	83.3	83.3	7.84	0.0259
5.0	49.50	43.50	79.7	79.7	8.17	0.0167
15.0	46.00	40.00	73.3	73.3	8.75	0.0100
30.0	43.00	37.00	67.8	67.8	9.24	0.0073
60.0	41.00	35.00	64.1	64.1	9.57	0.0052
120.0	38.00	32.00	58.6	58.6	10.06	0.0038
250.0	35.00	29.00	53.1	53.1	10.55	0.0027
1440.0	29.00	23.00	42.1	42.1	11.53	0.0012

Grain Diameter = K*(SQRT(L/T))

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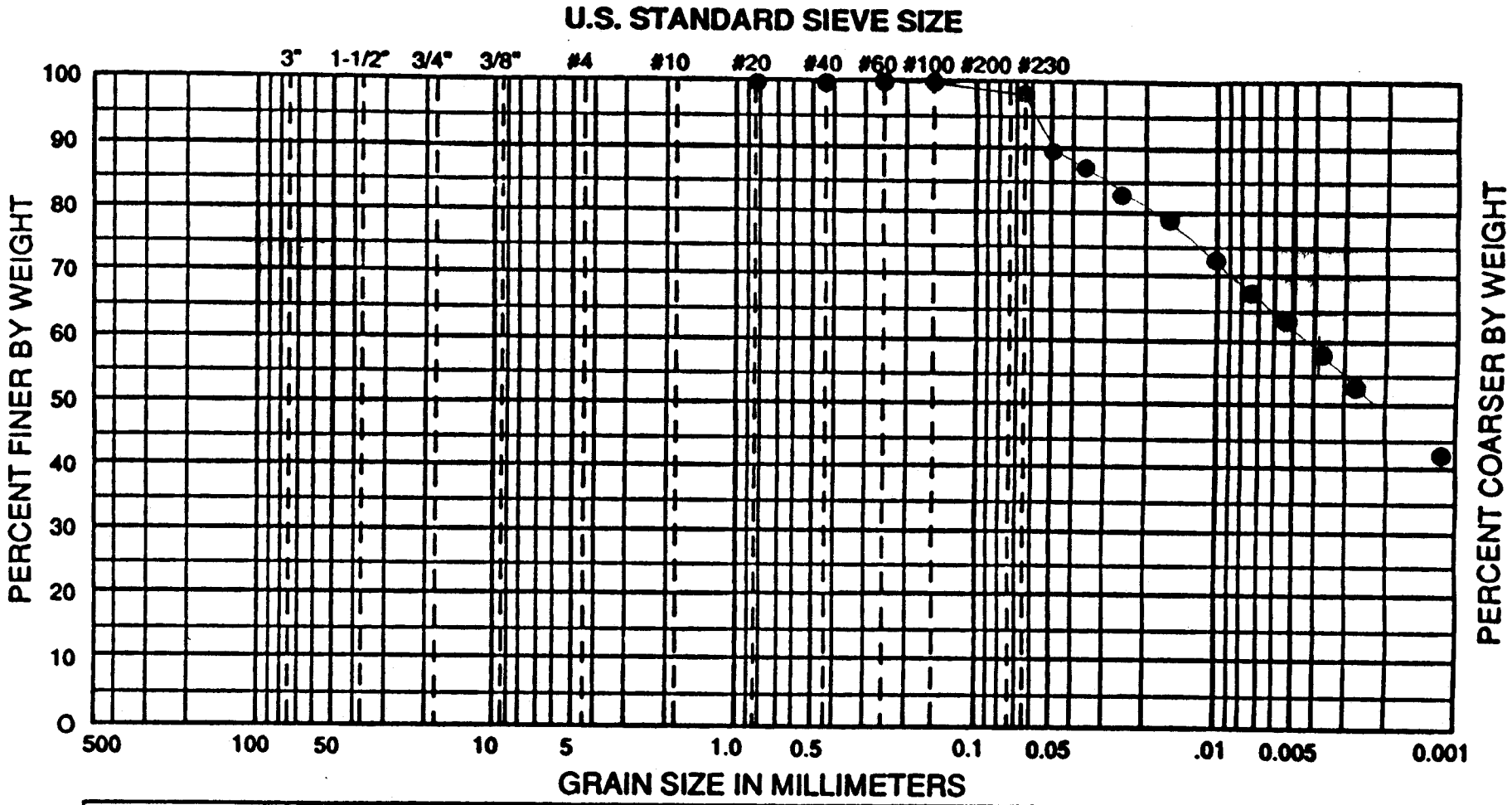


USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY		
		COARSE	FINE	COARSE	MEDIUM	FINE			
WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 7+25 SAMPLE NO.: CH#6 DATE: 4-2-92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION
Rocky Flats	66.5'	Silty CLAYSTONE .1% med sand, 1.9% f sand, 40.7% silt, 58% clay

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION _____

LABORATORY CLASSIFICATION _____

JOB NO. 2066-03

CLIENT/OWNER Weston

LOCATION Rocky Flats

BORING 7+25 SAMPLE CH #16 DEPTH 66.5'

FIELD DENSITY BY ___/__/__

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD [redacted]

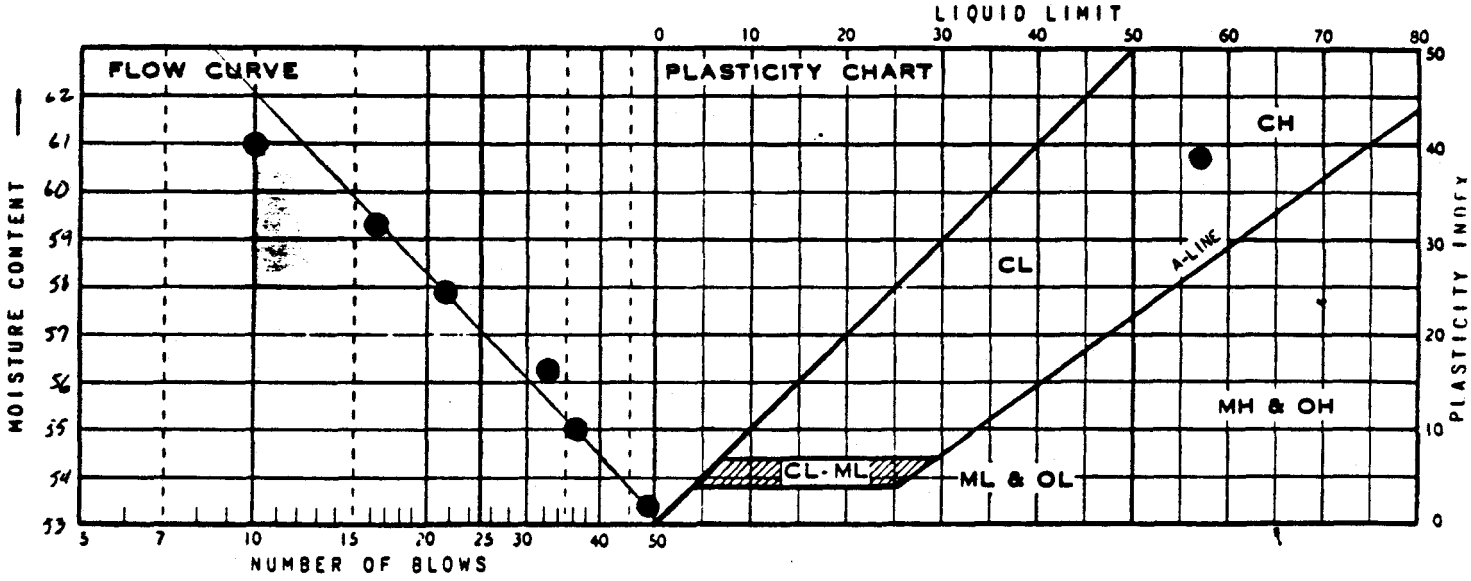
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY DM 3/26/92

DETERMINATION	1	2	3	4	5	6
DISH	2020	1C	30C			
WT OF DISH + WET SOIL g	5.86	6.18	6.72			
WT OF DISH + DRY SOIL g	5.11	5.36	5.85	—	—	—
WT OF MOISTURE g	.75	.82	.87			
WT OF DISH g	1.05	1.07	1.05	—	—	—
WT OF DRY SOIL g	4.06	4.29	4.80			
MOISTURE CONTENT %	18.5	19.1	18.1			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	B20	B9	2095	9C	2070	48C
NUMBER OF BLOWS	49	36±	32+	21	16+	10
WT OF DISH + WET SOIL g	11.32	12.92	11.25	11.51	13.11	11.33
WT OF DISH + DRY SOIL g	7.74	8.70	7.58	7.68	8.62	7.43
WT OF MOISTURE g	3.58	4.22	3.67	3.83	4.49	3.90
WT OF DISH g	1.04	1.03	1.06	1.07	1.05	1.04
WT OF DRY SOIL g	6.70	7.67	6.52	6.61	7.57	6.39
MOISTURE CONTENT %	53.4	55.0	56.3	57.9	59.3	61.0



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		57.0	18.6	38.4	CH	

ADVANCED TERRA TESTING inc

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	7+25	SAMPLED	Rocky Flats
DEPTH	67.5'	DATE TESTED	03-31-92 DU
SAMPLE NO.	#17	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan	(g)	52.90
Wt. Dry Soil & Pan	(g)	51.45
Wt. Lost Moisture	(g)	1.45
Wt. of Pan Only	(g)	3.65
Wt. of Dry Soil	(g)	47.80
Moisture Content	%	3.0

Wt. Hydrom. Sample Wet (g)	55.04
Wt. Hydrom. Sample Dry (g)	53.41

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	55.04
Weight of + #10 Before Washing (g)	0.00
Weight of + #10 After Washing (g)	0.00
Weight of - #10 Wet (g)	55.04
Weight of - #10 Dry (g)	53.41
Wt. Total Sample Dry (g)	53.41
Calc. Wt. "W" (g)	53.41
Calc. Mass + #10	0.00

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	0.00	0.00	0.00	0.0	100.0
#4	0.00	0.00	0.00	0.00	0.0	100.0
#10	0.00	0.00	0.00	0.00	0.0	100.0
#20	1.56	1.94	0.38	0.38	0.7	99.3
#40	1.54	1.81	0.27	0.65	1.2	98.8
#60	1.56	1.74	0.18	0.83	1.6	98.4
#100	1.56	1.69	0.13	0.96	1.8	98.2
#230	1.55	1.91	0.36	1.32	2.5	97.5

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	7+25	SAMPLED	Rocky Flats
DEPTH	67.5'	DATE TESTED	03-31-92 DU
SAMPLE NO.	#17	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

Hydrometer #	ASTM 152 H	Temp., Deg. C	22.0
Sp. Gr. of Soil	2.77	Temp. Coef. K	0.01287
Value of "a"	0.98	Wt. Dry Sample "W"	53.415
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	5.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	56.00	50.00	91.4	91.4	7.11	0.0485
1.0	55.00	49.00	89.5	89.5	7.27	0.0347
2.0	54.50	48.50	88.6	88.6	7.35	0.0247
5.0	54.00	48.00	87.7	87.7	7.43	0.0157
15.0	53.00	47.00	85.9	85.9	7.60	0.0092
30.0	52.00	46.00	84.1	84.1	7.76	0.0065
60.0	50.25	44.25	80.9	80.9	8.05	0.0047
120.0	47.50	41.50	75.8	75.8	8.50	0.0034
250.0	44.25	38.25	69.9	69.9	9.03	0.0024
1440.0	35.50	29.50	53.9	53.9	10.47	0.0011

Grain Diameter = K*(SQRT(L/T))

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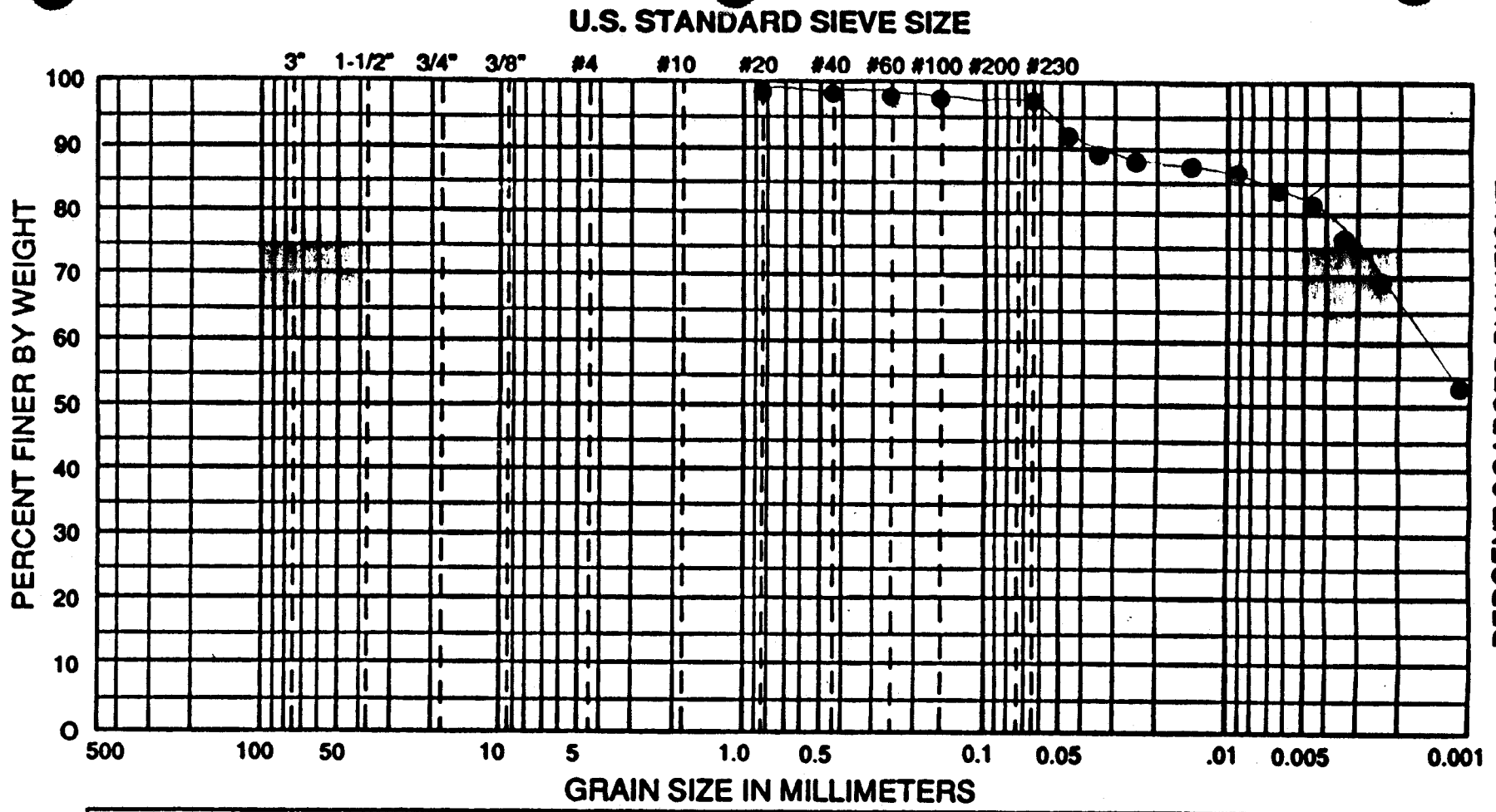


USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY		
		COARSE	FINE	COARSE	MEDIUM	FINE			
WENTWORTH	COBBLES TO BOULDERS.	PEBBLE GRAVEL			SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 7+25 SAMPLE NO.: CH#17 DATE: 4-3-92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION
Rocky Flats	67.5'	0.2 0.4 0.9 17.5 80 15% silt, 82.5% Clay

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION _____

LABORATORY CLASSIFICATION _____

JOB NO. 2066-03
CLIENT/OWNER Weston
LOCATION Rocky Flats
BORING 7-25 SAMPLE CM #17 DEPTH 67.5'

FIELD DENSITY BY ____/__/__

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD [redacted]

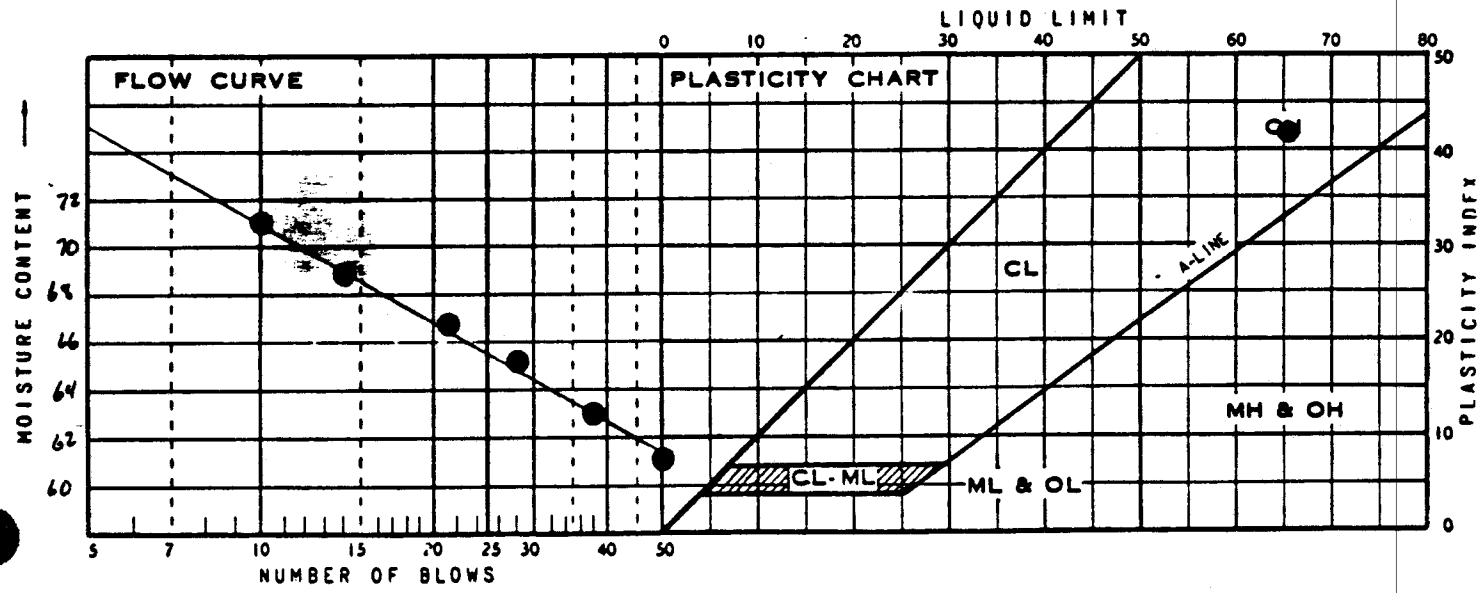
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY DM 3/27/93

DETERMINATION	? 1 ?	2	3	4	5	6
DISH	35CC	2023	2062			
WT OF DISH + WET SOIL g	6.63	6.09	6.345			
WT OF DISH + DRY SOIL g	5.49	5.15	5.32	—	—	—
WT OF MOISTURE g	1.14	.94	1.025			
WT OF DISH g	1.05	1.06	1.04	—	—	—
WT OF DRY SOIL g	4.44	4.09	4.28			
MOISTURE CONTENT %	25.7	23.0	23.9			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	35C	34CX	4C	81	2024	2038
NUMBER OF BLOWS	50	39	28	21	14	10
WT OF DISH + WET SOIL g	10.97	10.54	13.71	11.88	11.48	10.94
WT OF DISH + DRY SOIL g	7.21	6.86	8.71	7.54	7.23	6.83
WT OF MOISTURE g	3.76	3.68	5.00	4.34	4.25	4.11
WT OF DISH g	1.06	1.03	1.05	1.03	1.06	1.05
WT OF DRY SOIL g	6.15	5.83	7.66	6.51	6.17	5.78
MOISTURE CONTENT %	61.1	63.1	65.3	66.7	68.9	71.1



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION
		65.5	23.5	42.0	CH

ADVANCED TERRA TESTING INC

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MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT **Weston**

JOB NO. 2066-03

BORING NO.	7+75	SAMPLED	Rocky Flats
DEPTH	23.0'	DATE TESTED	03-17-92 TNU
SAMPLE NO.	#12	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

OB

MOISTURE DATA

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan	(g)	38.69
Wt. Dry Soil & Pan	(g)	37.82
Wt. Lost Moisture	(g)	0.87
Wt. of Pan Only	(g)	3.85
Wt. of Dry Soil	(g)	33.97
Moisture Content	%	2.6

Wt. Hydrom. Sample Wet (g)	55.06
Wt. Hydrom. Sample Dry (g)	53.69

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	829.94
Weight of + #10 Before Washing (g)	386.27
Weight of + #10 After Washing (g)	378.23
Weight of - #10 Wet (g)	442.67
Weight of - #10 Dry (g)	439.46
Wt. Total Sample Dry (g)	817.69
Calc. Wt. "W" (g)	99.90
Calc. Mass + #10	46.21

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	74.96	74.96	74.96	9.2	90.8
3/4"	0.00	49.90	49.90	124.86	15.3	84.7
3/8"	0.00	130.17	130.17	255.03	31.2	68.8
#4	0.00	72.47	72.47	327.50	40.1	59.9
#10	0.00	50.73	50.73	378.23	46.3	53.7
#20	1.57	3.09	1.52	1.52	47.8	52.2
#40	1.31	5.15	3.84	5.36	51.6	48.4
#60	1.30	5.88	4.58	9.94	56.2	43.8
#100	1.56	7.38	5.82	15.76	62.0	38.0
#230	1.57	9.63	8.06	23.82	70.1	29.9 — 31

Sandy Gravel (GM)

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	7+75	SAMPLED	Rocky Flats
DEPTH	23.0'	DATE TESTED	03-17-92 TNU
SAMPLE NO.	#12	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

Hydrometer #	ASTM 152 H	Temp., Deg. C	22.0
Sp. Gr. of Soil	2.71	Temp. Coef. K	0.01308
Value of "a"	0.99	Wt. Dry Sample "W"	99.898
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	4.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	35.50	30.50	30.2	30.2	10.47	0.0599
1.0	32.50	27.50	27.2	27.2	10.96	0.0433
2.0	31.50	26.50	26.2	26.2	11.12	0.0308
5.0	29.00	24.00	23.7	23.7	11.53	0.0199
15.0	26.50	21.50	21.3	21.3	11.94	0.0117
30.0	26.00	21.00	20.8	20.8	12.03	0.0083
60.0	25.00	20.00	19.8	19.8	12.19	0.0059
120.0	24.00	19.00	18.8	18.8	12.35	0.0042
250.0	23.00	18.00	17.8	17.8	12.52	0.0029
1440.0	21.50	16.50	16.3	16.3	12.76	0.0012

Grain Diameter = K*(SQRT(L/T))

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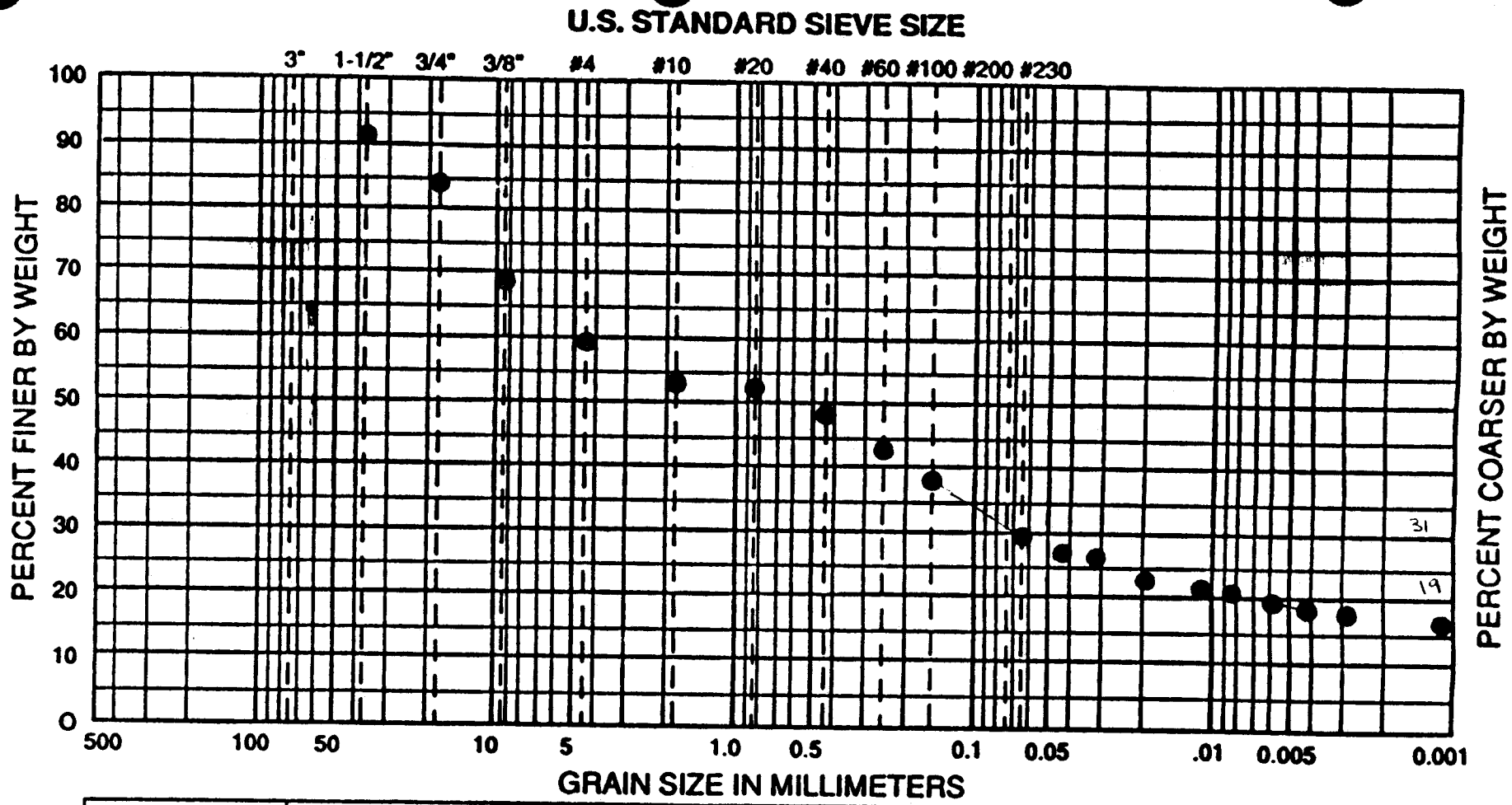


USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY		
		COARSE	FINE	COARSE	MEDIUM	FINE			

WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 7+75 SAMPLE NO.: CH #12 DATE: 3/26/92 PROJECT NO.:

AREA	DEPTH		CLASSIFICATION						
			sandy gravel						
		Cobbles	GW - 30.9		S 28.9			SL	CL
Rocky Flats	23.0'	9.2	6.1	24.8	6.2	5.3	17.4	12	19

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION _____

LABORATORY CLASSIFICATION _____

JOB NO. 2066-03

CLIENT/OWNER WESTON

LOCATION ROCKY FLATS / EG&G

BORING 7+75 SAMPLE CH #12 DEPTH 23.0'

FIELD DENSITY BY ___/__/__

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

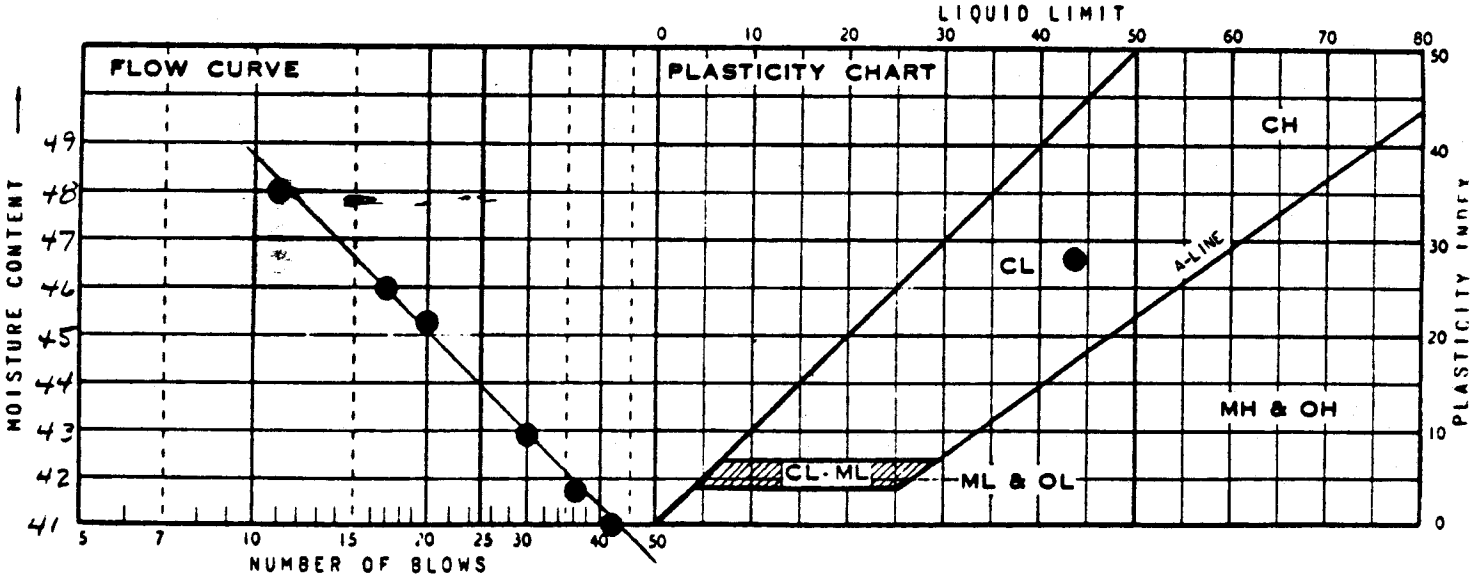
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY SR. 3/20/92.

DETERMINATION	1	2	3	4	5	6
DISH	B10	33 C	2070			
WT OF DISH + WET SOIL	5.45	8.25	6.43			
WT OF DISH + DRY SOIL	4.86	7.20	5.66	—	—	—
WT OF MOISTURE	.59	1.05	.77			
WT OF DISH	1.02	1.07	1.06	—	—	—
WT OF DRY SOIL	3.84	6.13	4.60			
MOISTURE CONTENT	15.4	17.1	16.7			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	2016	2 C	40 C	2031	2055	B7
NUMBER OF BLOWS	42	36	30	20	17	11
WT OF DISH + WET SOIL	14.41	16.31	12.02	15.70	13.21	12.57
WT OF DISH + DRY SOIL	10.52	11.82	8.73	11.14	9.38	8.83
WT OF MOISTURE	3.89	4.49	3.29	4.56	3.83	3.74
WT OF DISH	1.04	1.04	1.06	1.06	1.06	1.04
WT OF DRY SOIL	9.48	10.78	7.67	10.08	8.32	7.79
MOISTURE CONTENT	41.0	41.7	42.9	45.2	46.0	48.0



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		43.9	16.4	27.5	CL	

ADVANCED TERRA TESTING INC

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MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	7+75	SAMPLED	Rocky Flats
DEPTH	29.5'	DATE TESTED	03-17-92 TNU
SAMPLE NO.	#12	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

6B

MOISTURE DATA

HYGROSCOPIC	Yes	
NATURAL	No	
Wt. Wet Soil & Pan	(g)	37.30
Wt. Dry Soil & Pan	(g)	36.48
Wt. Lost Moisture	(g)	0.82
Wt. of Pan Only	(g)	3.63
Wt. of Dry Soil	(g)	32.85
Moisture Content	%	2.5
Wt. Hydrom. Sample Wet	(g)	55.05
Wt. Hydrom. Sample Dry	(g)	53.71

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	674.38
Weight of + #10 Before Washing (g)	210.00
Weight of + #10 After Washing (g)	204.31
Weight of - #10 Wet (g)	464.38
Weight of - #10 Dry (g)	458.62
Wt. Total Sample Dry (g)	662.93
Calc. Wt. "W" (g)	77.63
Calc. Mass + #10	23.93

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	117.17	117.17	117.17	17.7	82.3
3/8"	0.00	19.52	19.52	136.69	20.6	79.4
#4	0.00	34.84	34.84	171.53	25.9	74.1
#10	0.00	32.78	32.78	204.31	30.8	69.2
#20	1.55	3.83	2.28	2.28	33.8	66.2
#40	1.55	9.15	7.60	9.88	43.5	56.5
#60	1.55	7.13	5.58	15.46	50.7	49.3
#100	1.55	7.00	5.45	20.91	57.8	42.2
#230	1.55	8.12	6.57	27.48	66.2	33.8 — 34

Gravelly Sand (SC)

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT **Weston**

JOB NO. 2066-03

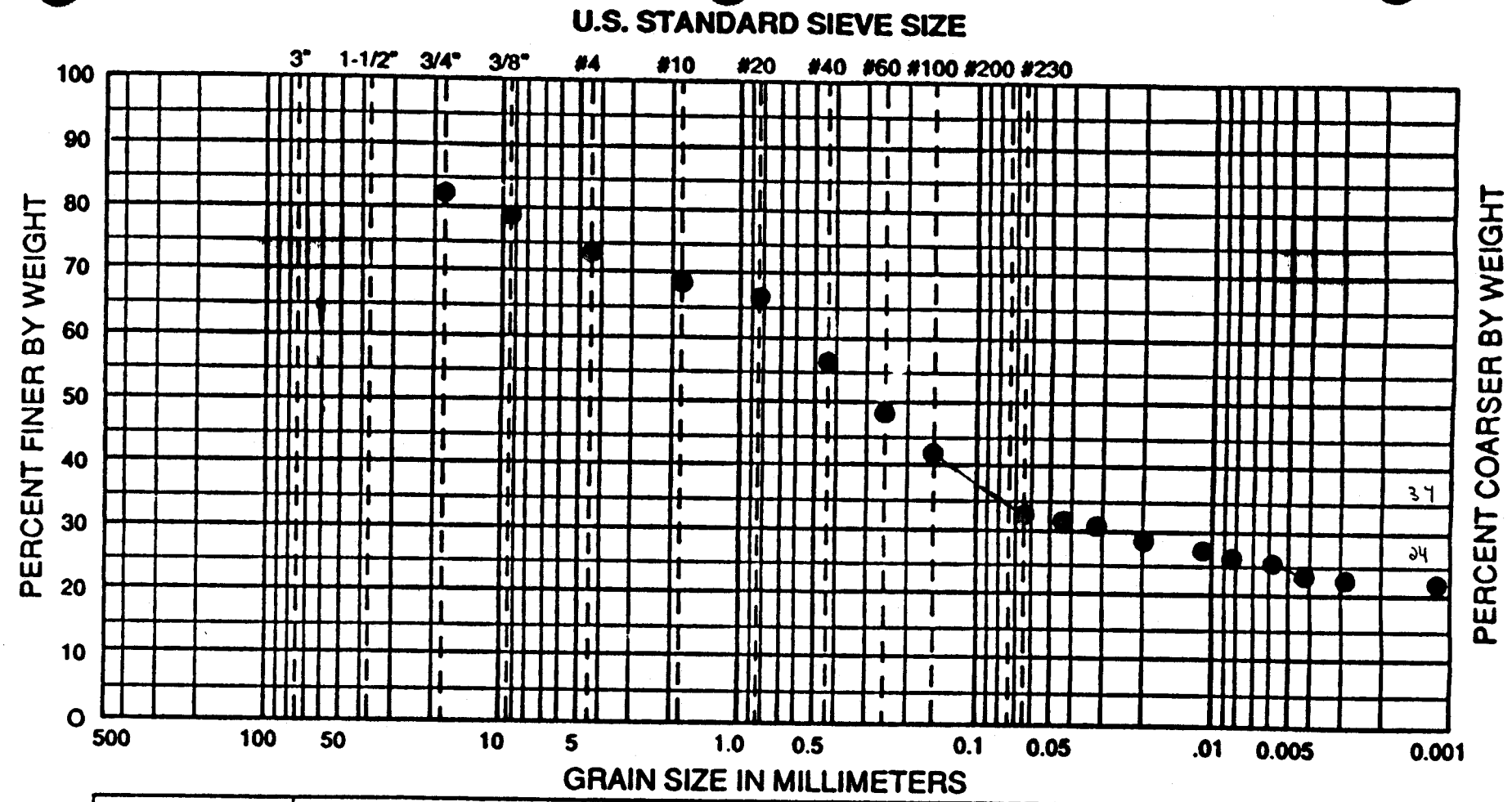
BORING NO.	7+75	SAMPLED	Rocky Flats
DEPTH	29.5'	DATE TESTED	03-17-92 TNU
SAMPLE NO.	#12	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

Hydrometer #	ASTM 152 H	Temp., Deg. C	22.0
Sp. Gr. of Soil	2.72	Temp. Coef. K	0.01305
Value of "a"	0.99	Wt. Dry Sample "W"	77.630
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	4.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	32.50	27.50	34.9	34.9	10.96	0.0611
1.0	30.00	25.00	31.8	31.8	11.37	0.0440
2.0	29.00	24.00	30.5	30.5	11.53	0.0313
5.0	28.00	23.00	29.2	29.2	11.70	0.0200
15.0	26.50	21.50	27.3	27.3	11.94	0.0116
30.0	25.50	20.50	26.0	26.0	12.11	0.0083
60.0	25.00	20.00	25.4	25.4	12.19	0.0059
120.0	24.00	19.00	24.1	24.1	12.35	0.0042
250.0	23.00	18.00	22.9	22.9	12.52	0.0029
1440.0	22.00	17.00	21.6	21.6	12.68	0.0012

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY			
		COARSE	FINE	COARSE	MEDIUM	FINE				
WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 7+75 SAMPLE NO.: CH #12 DATE: 5-26-92 PROJECT NO.:

AREA	DEPTH	gravelley sand with clay CLASSIFICATION						
		GV - 25.9		S 40.1			SI	CL
Rocky Flats	29.5'	17.7	8.2	4.9	12.7	22.5	10	24

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION _____

LABORATORY CLASSIFICATION _____

JOB NO. 2066-03

CLIENT/OWNER WESTON

LOCATION _____

BORING 7+75 SAMPLE CH#12 DEPTH 29.5'

FIELD DENSITY BY ___/__/__

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD [redacted]

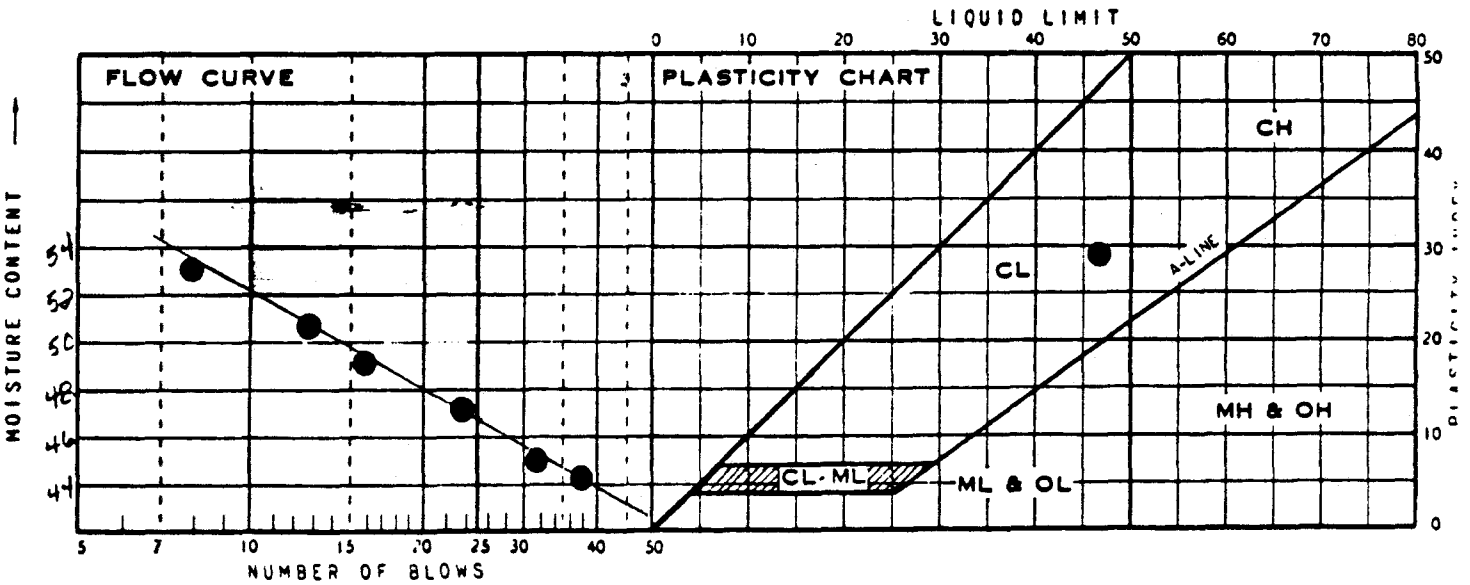
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY SR 3/19/93

DETERMINATION	1	2	3	4	5	6
DISH	B9	B18	B20			
WT OF DISH + WET SOIL g	5.72	6.29	5.57			
WT OF DISH + DRY SOIL g	5.01	5.48	4.90	—	—	—
WT OF MOISTURE g	.71	.81	.67			
WT OF DISH g	1.02	1.03	1.03	—	—	—
WT OF DRY SOIL g	3.99	4.45	3.87			
MOISTURE CONTENT %	17.8	18.2	17.3			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	B10	B19	B11	B21	B12	2024
NUMBER OF BLOWS	38	31	24	16	13±	8
WT OF DISH + WET SOIL g	14.60	14.89	15.49	15.96	17.82	16.74
WT OF DISH + DRY SOIL g	10.44	10.59	10.86	11.05	12.17	11.30
WT OF MOISTURE g	4.16	4.30	4.63	4.91	5.65	5.44
WT OF DISH g	1.02	1.04	1.03	1.04	1.04	1.06
WT OF DRY SOIL g	9.42	9.55	9.83	10.01	11.13	10.24
MOISTURE CONTENT %	44.2	45.0	47.1	49.1	50.8	53.1



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		46.8	17.8	29.0	CL	

ADVANCED TERRA TESTING

JEM

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	7+75	SAMPLED	Rocky Flats
DEPTH	36'	DATE TESTED	03-17-92 TNC
SAMPLE NO.	#12	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

OB

MOISTURE DATA

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan	(g)	47.35
Wt. Dry Soil & Pan	(g)	46.18
Wt. Lost Moisture	(g)	1.17
Wt. of Pan Only	(g)	3.68
Wt. of Dry Soil	(g)	42.50
Moisture Content	%	2.8

Wt. Hydrom. Sample Wet	(g)	55.01
Wt. Hydrom. Sample Dry	(g)	53.53

WASH SIEVE ANALYSIS

Wt. Total Sample Wet	(g)	566.74
Weight of + #10 Before Washing	(g)	15.81
Weight of + #10 After Washing	(g)	10.96
Weight of - #10 Wet	(g)	550.93
Weight of - #10 Dry	(g)	540.89
Wt. Total Sample Dry	(g)	551.85
Calc. Wt. "W"	(g)	54.62
Calc. Mass + #10		1.08

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	2.70	2.70	2.70	0.5	99.5
#4	0.00	6.68	6.68	9.38	1.7	98.3
#10	0.00	1.58	1.58	10.96	2.0	98.0
#20	1.56	1.93	0.37	0.37	2.7	97.3
#40	1.31	2.05	0.74	1.11	4.0	96.0
#60	1.55	2.00	0.45	1.56	4.8	95.2
#100	1.55	2.09	0.54	2.10	5.8	94.2
#230	1.55	9.60	8.05	10.15	20.6	79.4 — 81

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT	Weston	JOB NO.	2066-03
BORING NO.	7+75	SAMPLED	Rocky Flats
DEPTH	36'	DATE TESTED	03-17-92 TNU
SAMPLE NO.	#12	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

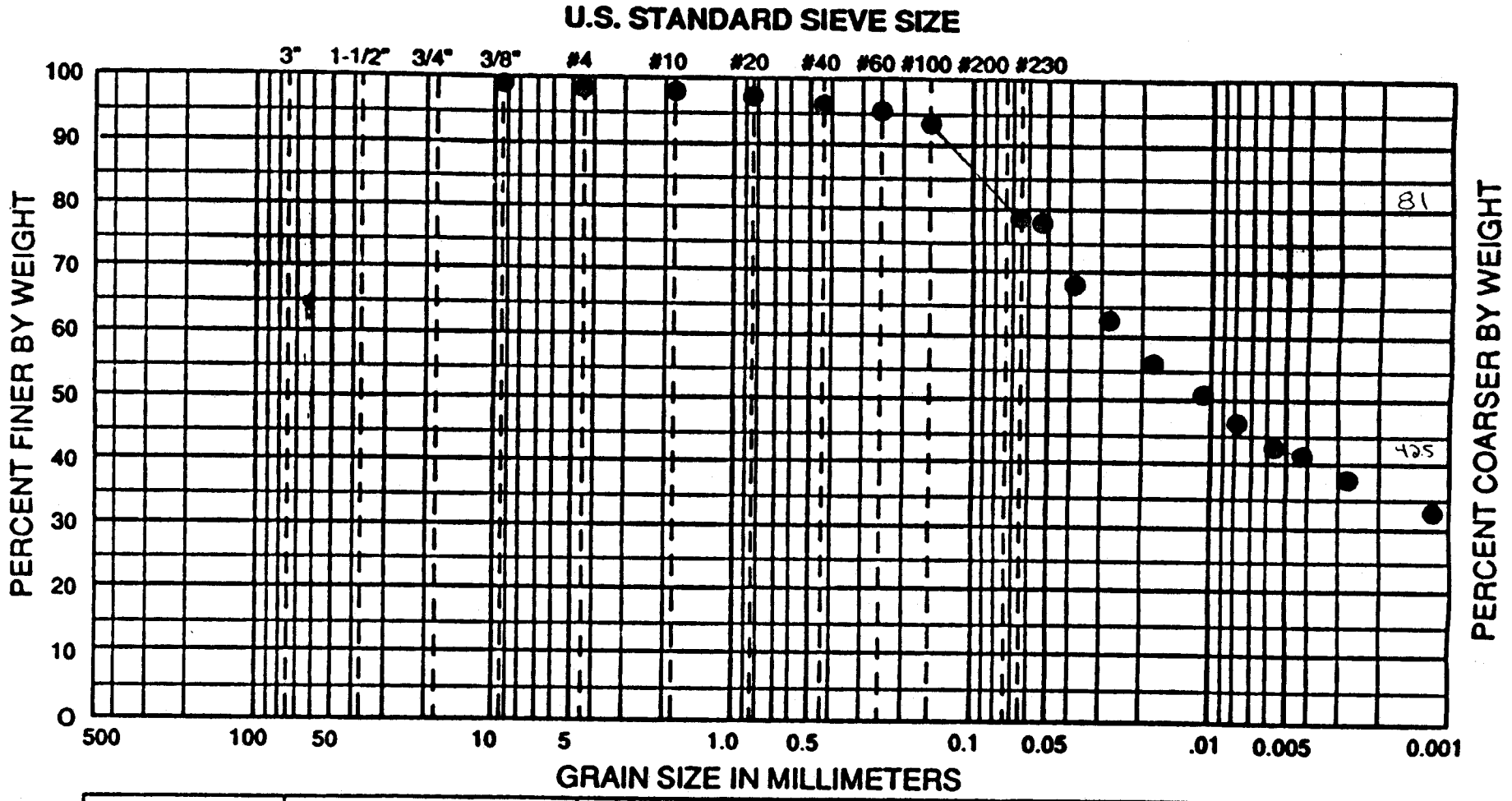
Hydrometer #	ASTM 152 H	Temp., Deg. C	22.0
Sp. Gr. of Soil	2.74	Temp. Coef. K	0.01298
Value of "a"	0.98	Wt. Dry Sample "W"	54.616
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	4.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	48.50	43.50	78.2	78.2	8.34	0.0530
1.0	43.00	38.00	68.3	68.3	9.24	0.0395
2.0	40.00	35.00	62.9	62.9	9.73	0.0286
5.0	36.00	31.00	55.7	55.7	10.39	0.0187
15.0	33.00	28.00	50.3	50.3	10.88	0.0111
30.0	31.00	26.00	46.7	46.7	11.21	0.0079
60.0	29.00	24.00	43.2	43.2	11.53	0.0057
120.0	28.00	23.00	41.4	41.4	11.70	0.0041
250.0	26.00	21.00	37.8	37.8	12.03	0.0028
1440.0	23.50	18.50	33.3	33.3	12.44	0.0012

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY			
		COARSE	FINE	COARSE	MEDIUM	FINE				
WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 7+75 SAMPLE NO.: CH #12 DATE: 3/26/92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION					
		silty clay					
		GV 1.7		S 17.3		SL	CL
Rocky Flats	36.0'	0 1.7	.3	2.0	.15	38.5	42.5

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION _____

LABORATORY CLASSIFICATION _____

JOB NO. 2066-03

CLIENT/OWNER Weston

LOCATION Rocky Flats / EG&G

BORING 7+75 SAMPLE #12 DEPTH @36'

FIELD DENSITY BY ___/__/__

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

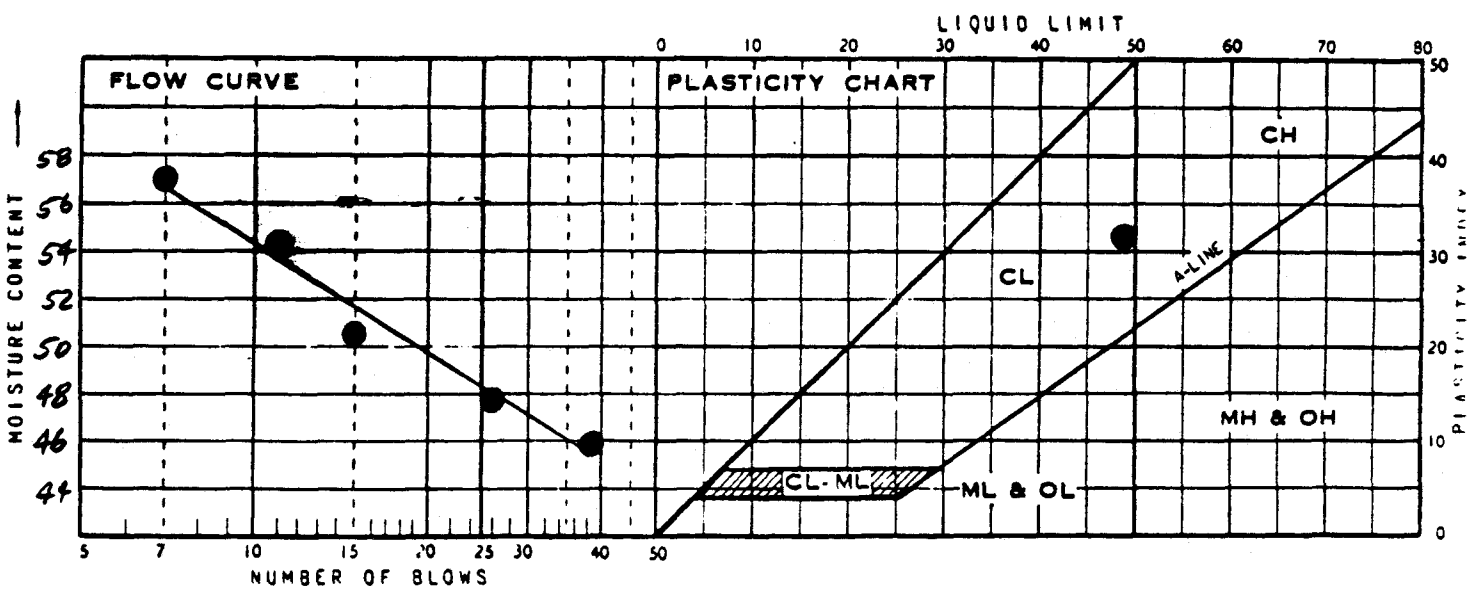
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY ___/__/__

DETERMINATION	1	2	3	4	5	6
DISH	B17	B8				
WT OF DISH + WET SOIL	7.71	6.04				
WT OF DISH + DRY SOIL	6.74	5.32	—	—	—	—
WT OF MOISTURE	0.97	0.72				
WT OF DISH	1.05	1.02	—	—	—	—
WT OF DRY SOIL	5.69	4.30				
MOISTURE CONTENT	17.0	16.7		= 33.7/2	= 16.8	

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	2044	54C	2068	15C	2012	
NUMBER OF BLOWS	39	26	15	11	7	
WT OF DISH + WET SOIL	9.87	10.59	10.41	9.84	8.87	
WT OF DISH + DRY SOIL	7.10	7.51	7.27	6.75	6.03	—
WT OF MOISTURE	2.77	3.08	3.14	3.09	2.84	
WT OF DISH	1.05	1.07	1.05	1.05	1.05	—
WT OF DRY SOIL	6.05	6.44	6.22	5.70	4.98	
MOISTURE CONTENT	45.8	47.8	50.5	54.2	57.0	



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		48.3	16.8	31.5	CL	

ADVANCED TERRA TESTING

Fm

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT **Weston**

JOB NO. 2066-03

BORING NO.	7+75	SAMPLED	Rocky Flats
DEPTH	45'	DATE TESTED	03-17-92 TNU
SAMPLE NO.	#12	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

SB

MOISTURE DATA

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan	(g)	50.83
Wt. Dry Soil & Pan	(g)	49.43
Wt. Lost Moisture	(g)	1.40
Wt. of Pan Only	(g)	3.82
Wt. of Dry Soil	(g)	45.61
Moisture Content	%	3.1

Wt. Hydrom. Sample Wet (g)	55.02
Wt. Hydrom. Sample Dry (g)	53.38

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	548.02
Weight of + #10 Before Washing (g)	59.45
Weight of + #10 After Washing (g)	51.87
Weight of - #10 Wet (g)	488.57
Weight of - #10 Dry (g)	481.37
Wt. Total Sample Dry (g)	533.24
Calc. Wt. "W" (g)	59.14
Calc. Mass + #10	5.75

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	37.04	37.04	37.04	6.9	93.1
3/8"	0.00	11.02	11.02	48.06	9.0	91.0
#4	0.00	2.27	2.27	50.33	9.4	90.6
#10	0.00	1.54	1.54	51.87	9.7	90.3
#20	1.57	1.75	0.18	0.18	10.0	90.0
#40	1.56	1.82	0.26	0.44	10.5	89.5
#60	1.54	1.73	0.19	0.63	10.8	89.2
#100	1.56	1.79	0.23	0.86	11.2	88.8
#230	1.56	5.18	3.62	4.48	17.3	82.7 — 84

Silty Clay (CH).

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	7+75	SAMPLED	Rocky Flats
DEPTH	45'	DATE TESTED	03-17-92 TNU
SAMPLE NO.	#12	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

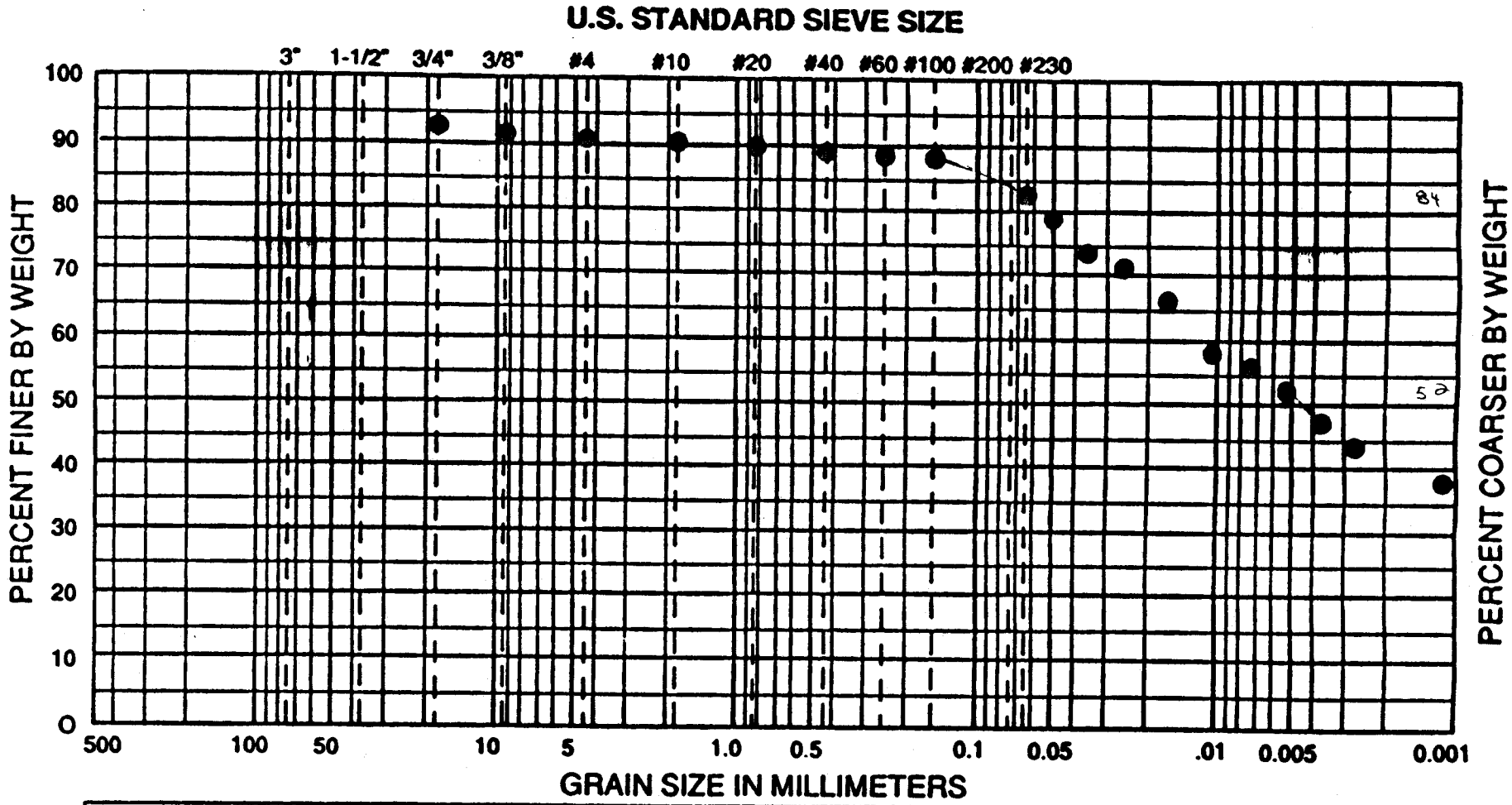
Hydrometer #	ASTM 152 H	Temp., Deg. C	22.0
Sp. Gr. of Soil	2.78	Temp. Coef. K	0.01283
Value of "a"	0.97	Wt. Dry Sample "W"	59.136
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	4.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	53.00	48.00	79.1	79.1	7.60	0.0500
1.0	50.00	45.00	74.1	74.1	8.09	0.0365
2.0	48.00	43.00	70.8	70.8	8.42	0.0263
5.0	45.00	40.00	65.9	65.9	8.91	0.0171
15.0	40.50	35.50	58.5	58.5	9.65	0.0103
30.0	39.00	34.00	56.0	56.0	9.89	0.0074
60.0	36.75	31.75	52.3	52.3	10.26	0.0053
120.0	34.00	29.00	47.8	47.8	10.71	0.0038
250.0	32.00	27.00	44.5	44.5	11.04	0.0027
1440.0	28.50	23.50	38.7	38.7	11.62	0.0012

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY		
		COARSE	FINE	COARSE	MEDIUM	FINE			

WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 7+75 SAMPLE NO.: CH #12 DATE: 3-26-92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION						
		siltyclay						
		9.4			6.6			
Rocky Flats	45.0'	6.9	2.5	0.3	0.8	5.5	32	52

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION - - - - - - - - - - - - - - -

LABORATORY CLASSIFICATION - - - - - - - - - - - - -

JOB NO. 2066-03
CLIENT/OWNER Weston
LOCATION Rocky Flats / EG&G
BORING 2475 SAMPLE #12 DEPTH 45.0'

FIELD DENSITY BY ...../...../.....

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

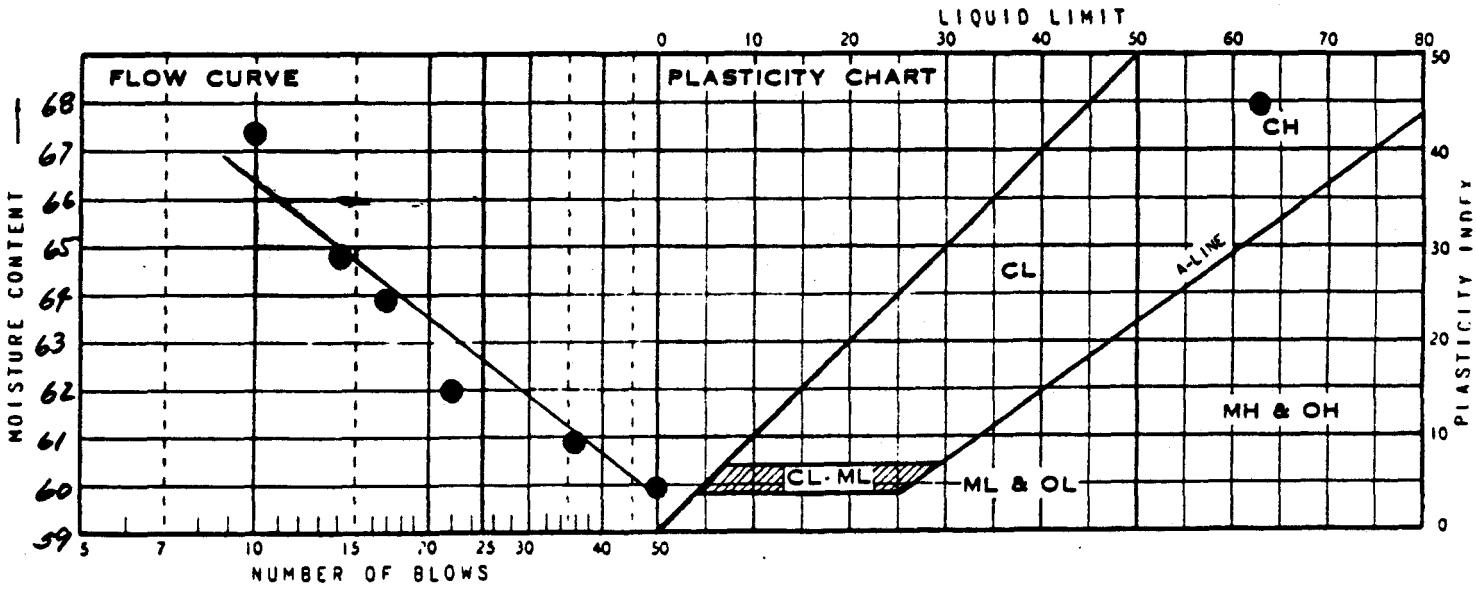
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY [illegible] 3.18.92

DETERMINATION	1	2	3	4	5	6
DISH	B6	B5	B4			
WT OF DISH + WET SOIL g	4.85	6.78	6.01			
WT OF DISH + DRY SOIL g	4.27	5.89	5.26	—	—	—
WT OF MOISTURE	0.58	0.89	0.75			
WT OF DISH	1.03	1.04	1.04	—	—	—
WT OF DRY SOIL	3.24	4.85	4.22			
MOISTURE CONTENT %	17.9	18.4	17.8	= 54.1/3 = 18.0		

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	B3	B2	B14	B1	B15	B16
NUMBER OF BLOWS	50	36	22	17	14	10
WT OF DISH + WET SOIL g	10.44	10.10	9.86	8.88	10.24	9.35
WT OF DISH + DRY SOIL g	6.91	6.67	6.48	5.82	6.62	6.00
WT OF MOISTURE	3.53	3.43	3.38	3.06	3.62	3.35
WT OF DISH	1.02	1.04	1.03	1.03	1.03	1.03
WT OF DRY SOIL	5.89	5.63	5.45	4.79	5.59	4.97
MOISTURE CONTENT	59.9	60.9	62.0	63.9	64.8	67.4



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		62.7	18.0	44.7	CH	

ADVANCED TERRA TESTING INC

JEM

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT **Weston**

JOB NO. 2066-03

BORING NO.	7+75	SAMPLED	Rocky Flats
DEPTH	46.5'	DATE TESTED	03-17-92 TNU
SAMPLE NO.	#12	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No
6B			

MOISTURE DATA

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan	(g)	39.73
Wt. Dry Soil & Pan	(g)	38.32
Wt. Lost Moisture	(g)	1.41
Wt. of Pan Only	(g)	3.67
Wt. of Dry Soil	(g)	34.65
Moisture Content	%	4.1

Wt. Hydrom. Sample Wet (g)	55.02
Wt. Hydrom. Sample Dry (g)	52.87

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	55.02
Weight of + #10 Before Washing (g)	0.00
Weight of + #10 After Washing (g)	0.00
Weight of - #10 Wet (g)	55.02
Weight of - #10 Dry (g)	52.87
Wt. Total Sample Dry (g)	52.87
Calc. Wt. "W" (g)	52.87
Calc. Mass + #10	0.00

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	0.00	0.00	0.00	0.0	100.0
#4	0.00	0.00	0.00	0.00	0.0	100.0
#10	0.00	0.00	0.00	0.00	0.0	100.0
#20	1.57	1.58	0.01	0.01	0.0	100.0
#40	1.58	1.60	0.02	0.03	0.1	99.9
#60	1.56	1.61	0.05	0.08	0.2	99.8
#100	1.56	1.66	0.10	0.18	0.3	99.7
#230	1.56	2.12	0.56	0.74	1.4	98.6

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT **Weston** JOB NO. 2066-03

BORING NO.	7+75	SAMPLED	Rocky Flats
DEPTH	46.5'	DATE TESTED	03-17-92 TNU
SAMPLE NO.	#12	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

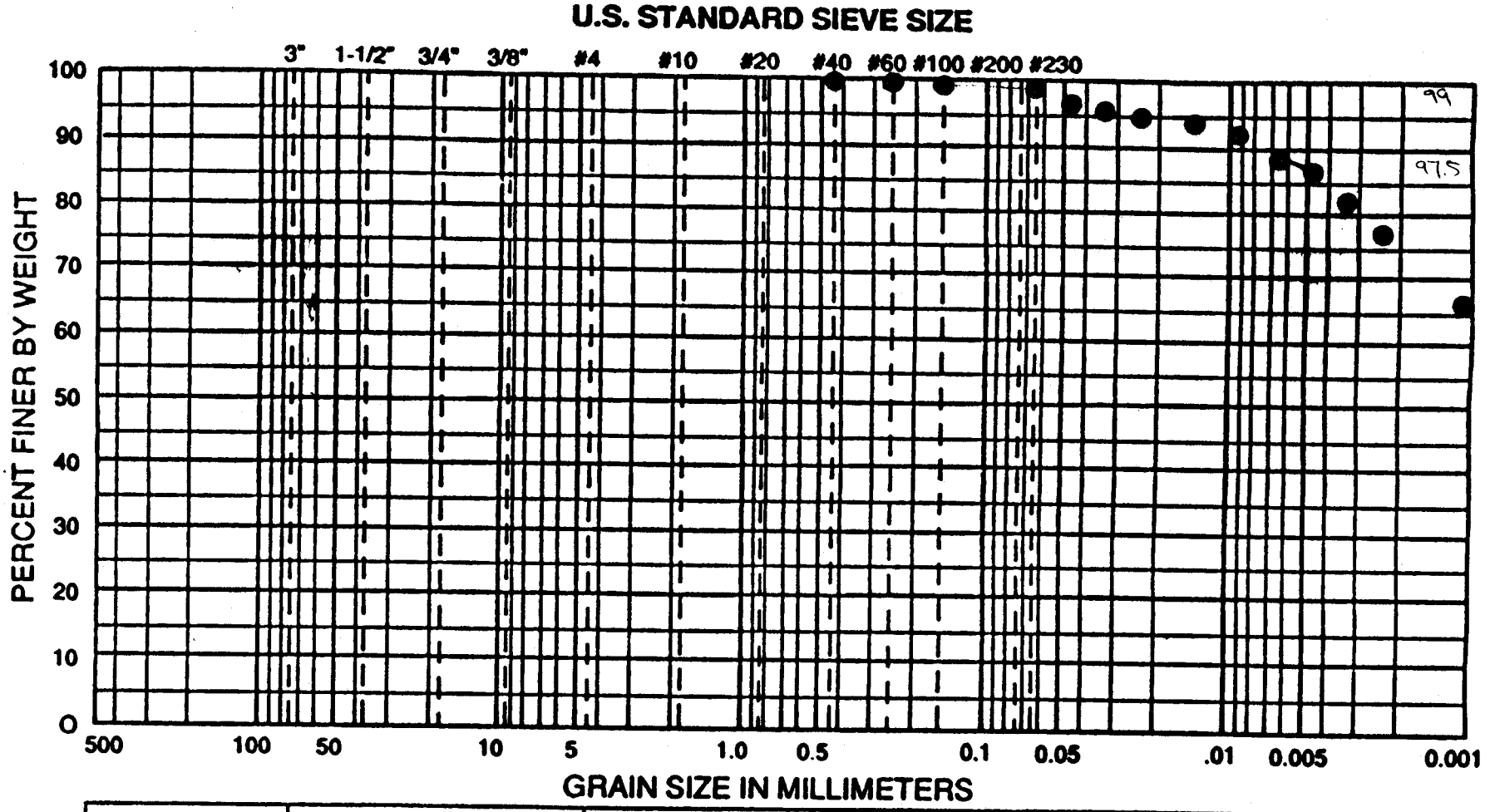
Hydrometer #	ASTM 152 H	Temp., Deg. C	22.0
Sp. Gr. of Soil	2.75	Temp. Coef. K	0.01294
Value of "a"	0.98	Wt. Dry Sample "W"	52.871
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	4.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	57.00	52.00	96.4	96.4	6.94	0.0482
1.0	56.50	51.50	95.5	95.5	7.02	0.0343
2.0	56.25	51.25	95.0	95.0	7.07	0.0243
5.0	55.75	50.75	94.1	94.1	7.15	0.0155
15.0	54.50	49.50	91.8	91.8	7.35	0.0091
30.0	53.00	48.00	89.0	89.0	7.60	0.0065
60.0	51.75	46.75	86.7	86.7	7.80	0.0047
120.0	49.00	44.00	81.6	81.6	8.25	0.0034
250.0	46.50	41.50	76.9	76.9	8.66	0.0024
1440.0	40.50	35.50	65.8	65.8	9.65	0.0011

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY			
		COARSE	FINE	COARSE	MEDIUM	FINE				
WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 7+75 SAMPLE NO.: CH#12 DATE: 3-26-92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION				
		clay G O		S-1	SL	CL
Rocky Flats	46.5'	0	0	0 0.1 .9	1.5	97.5

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION - - - - - - - - - - - - - - - -

LABORATORY CLASSIFICATION - - - - - - - - - - - - -

JOB NO. 2066-03

CLIENT/OWNER WESTON

LOCATION ROCKY FLATS/ EG&G

BORING 7+75 SAMPLE CH#12 DEPTH 46.5'

FIELD DENSITY BY ...../../..

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

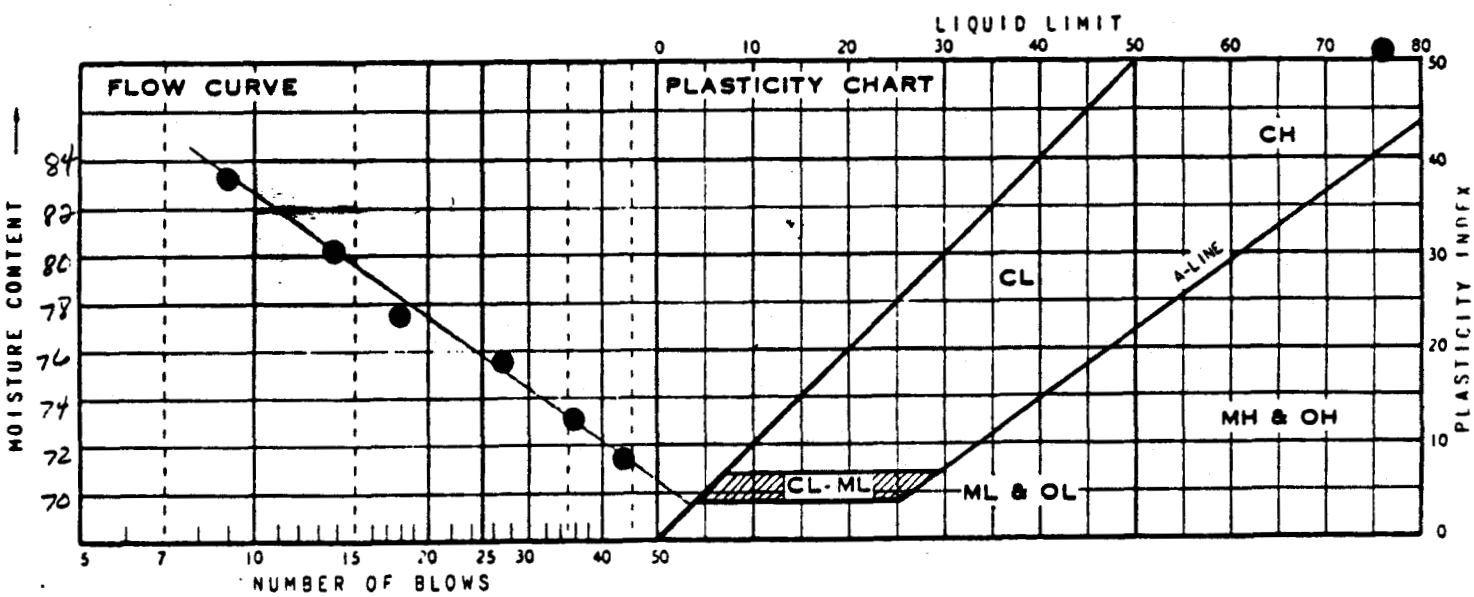
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY SB. 3/20/92.

DETERMINATION	1	2	3	4	5	6
DISH	54C	2008	B11			
WT OF DISH + WET SOIL g	4.78	5.60	5.50			
WT OF DISH + DRY SOIL g	4.05	4.68	4.61	—	—	—
WT OF MOISTURE g	.73	.92	.89			
WT OF DISH g	1.07	1.06	1.03	—	—	—
WT OF DRY SOIL g	2.98	3.62	3.58			
MOISTURE CONTENT %	24.5	25.4	24.9			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	B21	23C	2033	34CX	B12	44C
NUMBER OF BLOWS	44	36	27	18	14	9
WT OF DISH + WET SOIL g	13.00	12.15	14.21	14.47	13.64	12.22
WT OF DISH + DRY SOIL g	8.00	7.47	8.53	8.59	8.03	7.13
WT OF MOISTURE g	5.00	4.68	5.68	5.88	5.61	5.09
WT OF DISH g	1.04	1.07	1.04	1.03	1.04	1.04
WT OF DRY SOIL g	6.96	6.40	7.49	7.56	6.99	6.09
MOISTURE CONTENT %	71.8	73.1	75.8	77.8	80.3	83.6



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		75.9	24.9	51.0	CH	

ADVANCED TERRA TESTING

MECHANICAL ANALYSIS - SIEVE TEST DATA

BR

CLIENT **Weston**

JOB NO. 2066-03

BORING NO.	7+75	SAMPLED	Rocky Flats
DEPTH	52'	DATE TESTED	03-17-92 TNU
SAMPLE NO.	#12	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No
BR			

MOISTURE DATA

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan	(g)	42.17
Wt. Dry Soil & Pan	(g)	40.13
Wt. Lost Moisture	(g)	2.04
Wt. of Pan Only	(g)	3.78
Wt. of Dry Soil	(g)	36.35
Moisture Content	%	5.6

Wt. Hydrom. Sample Wet (g)	53.38
Wt. Hydrom. Sample Dry (g)	50.54

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	53.38
Weight of + #10 Before Washing (g)	0.00
Weight of + #10 After Washing (g)	0.00
Weight of - #10 Wet (g)	53.38
Weight of - #10 Dry (g)	50.54
Wt. Total Sample Dry (g)	50.54
Calc. Wt. "W" (g)	50.54
Calc. Mass + #10	0.00

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	0.00	0.00	0.00	0.0	100.0
#4	0.00	0.00	0.00	0.00	0.0	100.0
#10	0.00	0.00	0.00	0.00	0.0	100.0
#20	1.56	1.59	0.03	0.03	0.1	99.9
#40	1.56	1.64	0.08	0.11	0.2	99.8
#60	1.57	1.63	0.06	0.17	0.3	99.7
#100	1.57	1.62	0.05	0.22	0.4	99.6
#230	1.55	1.68	0.13	0.35	0.7	99.3

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT **Weston** JOB NO. 2066-03

BORING NO.	7+75	SAMPLED	Rocky Flats
DEPTH	52'	DATE TESTED	03-17-92 TNU
SAMPLE NO.	#12	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

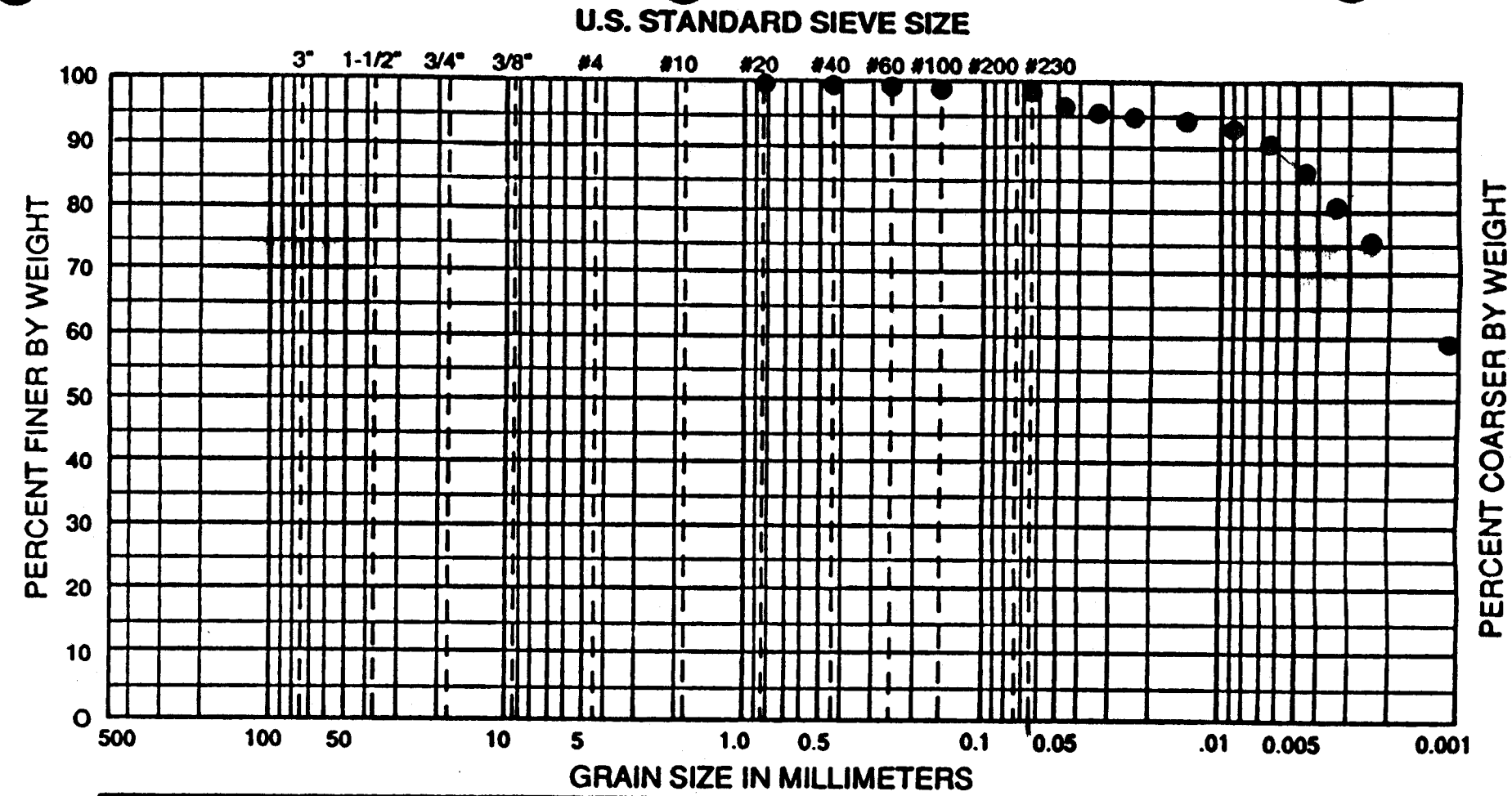
Hydrometer #	ASTM 152 H	Temp., Deg. C	22.0
Sp. Gr. of Soil	2.80	Temp. Coef. K	0.01276
Value of "a"	0.97	Wt. Dry Sample "W"	50.540
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	4.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	55.00	50.00	96.0	96.0	7.27	0.0487
1.0	54.75	49.75	95.5	95.5	7.31	0.0345
2.0	54.50	49.50	95.0	95.0	7.35	0.0245
5.0	54.25	49.25	94.5	94.5	7.39	0.0155
15.0	53.50	48.50	93.1	93.1	7.52	0.0090
30.0	52.00	47.00	90.2	90.2	7.76	0.0065
60.0	50.00	45.00	86.4	86.4	8.09	0.0047
120.0	47.00	42.00	80.6	80.6	8.58	0.0034
250.0	44.25	39.25	75.3	75.3	9.03	0.0024
1440.0	36.00	31.00	59.5	59.5	10.39	0.0011

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY		
		COARSE	FINE	COARSE	MEDIUM	FINE			
WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL			SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 7+75 SAMPLE NO.: CH #12 DATE: 3-26-92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION					
		GU		S		SL	CL
Rocky Flats	52.0'	0	0	0	0.2	0.5	14.3	85

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION - - - - - - - - - - - - - - - -

LABORATORY CLASSIFICATION - - - - - - - - - - - - -

JOB NO. 2066-03

CLIENT/OWNER Weston

LOCATION Rocky Flats/EG&G

BORING 7+75 SAMPLE #12 DEPTH @52'

FIELD DENSITY BY - - - - - / - / - -

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD [redacted]

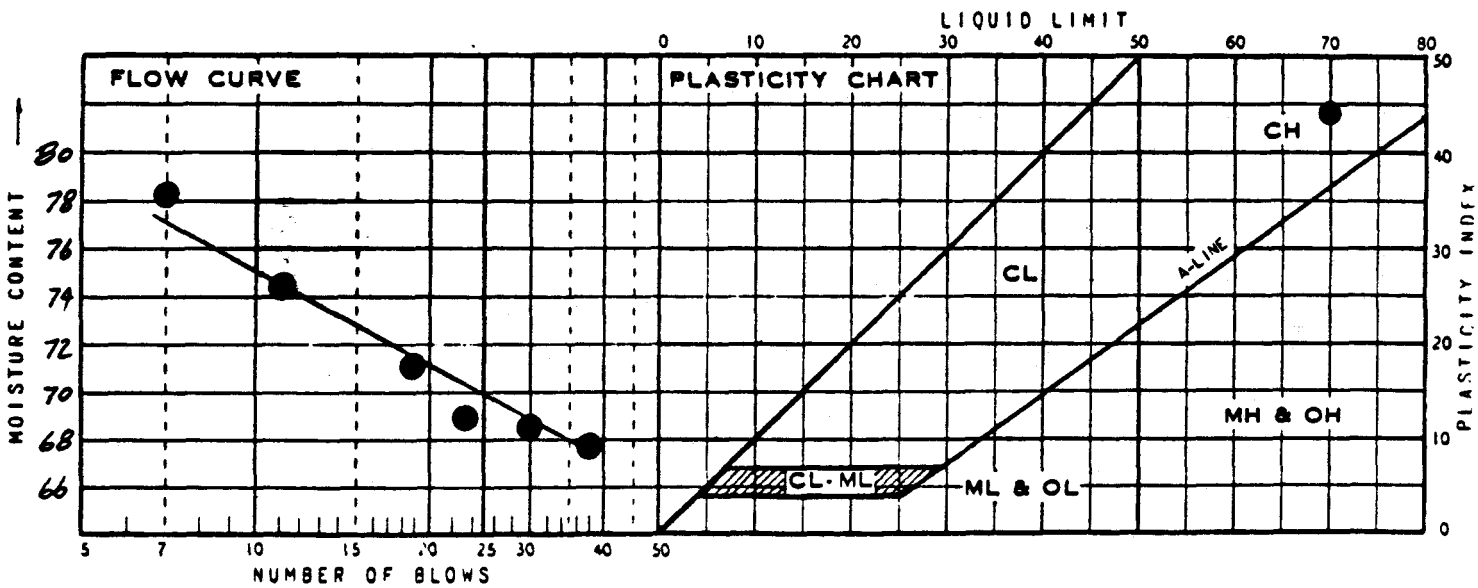
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY [illegible] 3.1.19.92

DETERMINATION	1	2	3	4	5	6
DISH	2019	2028	2021			
WT OF DISH + WET SOIL g	4.29	5.61	5.24			
WT OF DISH + DRY SOIL g	3.65	4.61	4.38	—	—	—
WT OF MOISTURE g	0.64	1.00	0.86			
WT OF DISH g	1.06	1.07	1.05	—	—	—
WT OF DRY SOIL g	2.59	3.54	3.33			
MOISTURE CONTENT %	24.7	28.2	25.8	78.7/3	= 26.2	

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	3	12C	24	44C	2018	16C
NUMBER OF BLOWS	38	30	23	19	11	7
WT OF DISH + WET SOIL g	7.68	9.11	6.95	9.27	7.62	9.58
WT OF DISH + DRY SOIL g	5.01	5.84	4.54	5.85	4.82	5.84
WT OF MOISTURE g	2.67	3.27	2.41	3.42	2.80	3.74
WT OF DISH g	1.06	1.05	1.04	1.03	1.05	1.06
WT OF DRY SOIL g	3.95	4.79	3.50	4.82	3.77	4.78
MOISTURE CONTENT %	67.6	68.3	68.9	71.0	74.3	78.2



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		69.8	26.2	43.6	CH	

ADVANCED TERRA TESTING

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MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	8+00	SAMPLED	Rocky Flats
DEPTH	6.5'	DATE TESTED	03-20-92 TNU
SAMPLE NO.	#13	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan	(g)	40.50
Wt. Dry Soil & Pan	(g)	39.56
Wt. Lost Moisture	(g)	0.94
Wt. of Pan Only	(g)	3.78
Wt. of Dry Soil	(g)	35.78
Moisture Content	%	2.6

Wt. Hydrom. Sample Wet (g)	55.03
Wt. Hydrom. Sample Dry (g)	53.62

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	617.97
Weight of + #10 Before Washing (g)	2.18
Weight of + #10 After Washing (g)	2.14
Weight of - #10 Wet (g)	615.79
Weight of - #10 Dry (g)	600.07
Wt. Total Sample Dry (g)	602.21
Calc. Wt. "W" (g)	53.81
Calc. Mass + #10	0.19

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	0.00	0.00	0.00	0.0	100.0
#4	0.00	2.11	2.11	2.11	0.4	99.6
#10	0.00	0.03	0.03	2.14	0.4	99.6
#20	1.57	1.58	0.01	0.01	0.4	99.6
#40	1.59	1.69	0.10	0.11	0.6	99.4
#60	1.31	1.89	0.58	0.69	1.6	98.4
#100	1.57	3.90	2.33	3.02	6.0	94.0
#230	1.57	8.88	7.31	10.33	19.6	80.4

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ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT **Weston** JOB NO. 2066-03

BORING NO.	8+00	SAMPLED	Rocky Flats
DEPTH	6.5'	DATE TESTED	03-20-92 TNU
SAMPLE NO.	#13	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

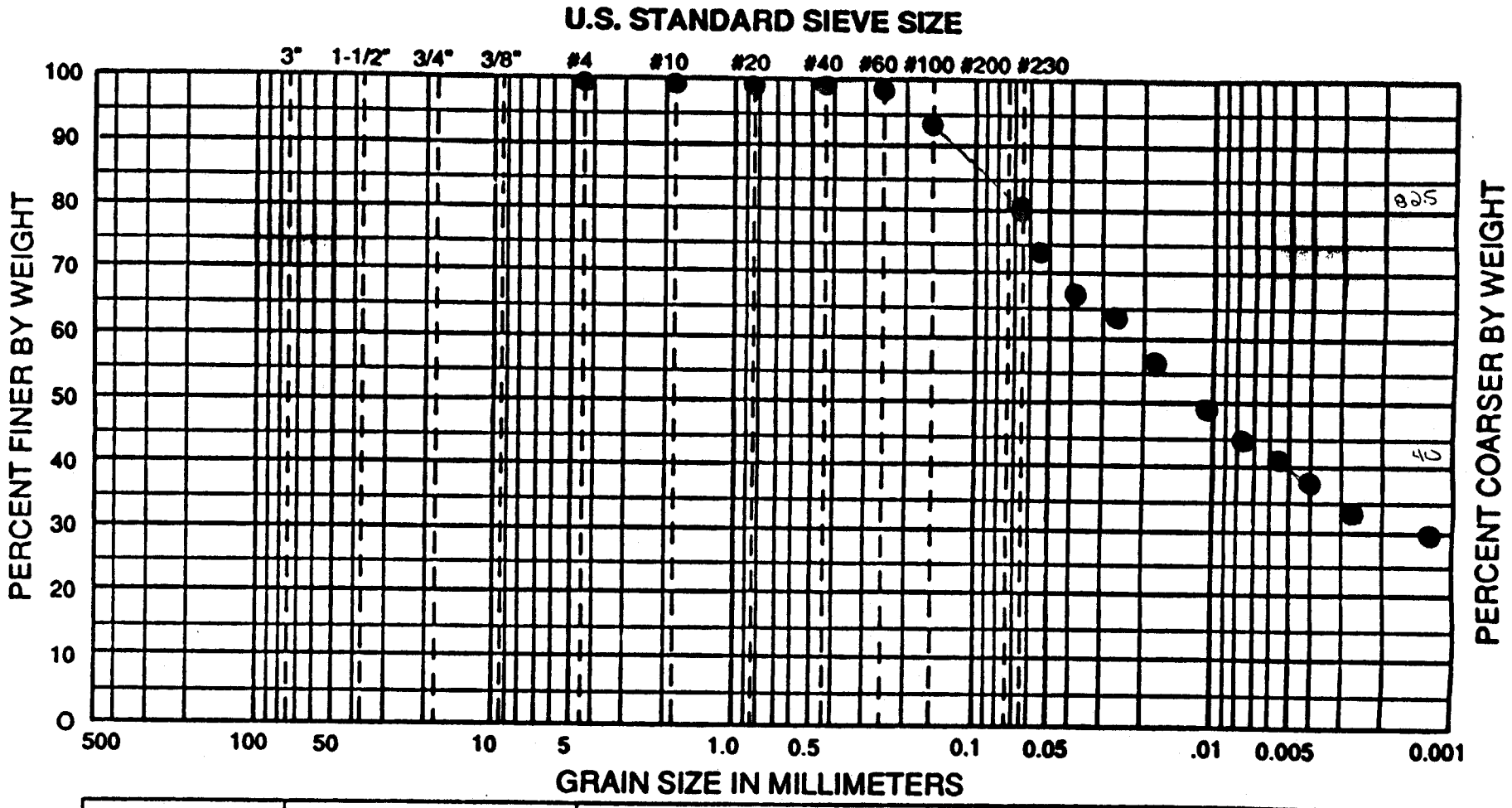
Hydrometer #	ASTM 152 H	Temp., Deg. C	22.0
Sp. Gr. of Soil	2.79	Temp. Coef. K	0.01280
Value of "a"	0.97	Wt. Dry Sample "W"	53.812
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	5.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	47.00	41.00	74.1	74.1	8.58	0.0530
1.0	43.50	37.50	67.7	67.7	9.16	0.0387
2.0	41.50	35.50	64.1	64.1	9.48	0.0279
5.0	38.00	32.00	57.8	57.8	10.06	0.0182
15.0	33.50	27.50	49.7	49.7	10.80	0.0109
30.0	31.00	25.00	45.2	45.2	11.21	0.0078
60.0	29.00	23.00	41.5	41.5	11.53	0.0056
120.0	27.50	21.50	38.8	38.8	11.78	0.0040
250.0	25.00	19.00	34.3	34.3	12.19	0.0028
1440.0	23.00	17.00	30.7	30.7	12.52	0.0012

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY
		COARSE	FINE	COARSE	MEDIUM	FINE	

WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 8+00 SAMPLE NO.: CH #13 DATE: 3-27-92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION				
		clayey silt				
		GV .4	S 17.1		SL	CL
	6.5'	0 .4	0 .2	16.9	42.50	40
		ROCKY FLATS / EG&G				
		C F	C M F			

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION - - - - - - - - - - - - - - - -

LABORATORY CLASSIFICATION - - - - - - - - - - - - -

JOB NO. 2066-03

CLIENT/OWNER Weston

LOCATION Rocky Flats / EG&G

BORING B+00 SAMPLE # 13 DEPTH @ 65'

FIELD DENSITY BY ...../../...

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD [redacted]

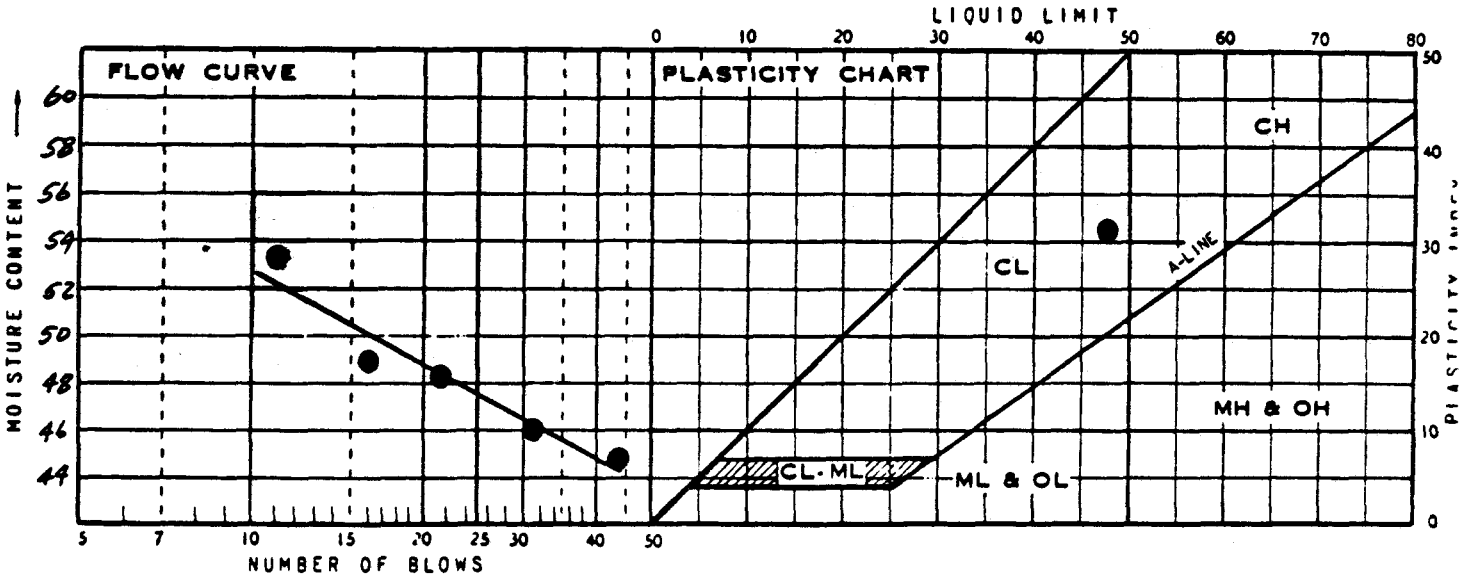
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY [illegible] 3/22/92

DETERMINATION	1	2	3	4	5	6
DISH	2020	6C	30C			
WT OF DISH + WET SOIL g	7.98	7.82	6.85			
WT OF DISH + DRY SOIL	7.00	6.82	6.02	—	—	—
WT OF MOISTURE	0.98	1.00	0.83			
WT OF DISH	1.05	1.07	1.05	—	—	—
WT OF DRY SOIL	5.95	5.75	4.97			
MOISTURE CONTENT %	16.5	17.4	16.7	= 50.5/3	● 16.9	

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	2095	66C	48C	17C	1C	2015
NUMBER OF BLOWS	44 -	31	21	16	11	8 -
WT OF DISH + WET SOIL g	9.93	8.50	9.29	9.30	9.17	8.58
WT OF DISH + DRY SOIL	7.19	6.15	6.61	6.59	6.35	5.98
WT OF MOISTURE	2.74	2.35	2.68	2.71	2.82	2.60
WT OF DISH	1.06	1.04	1.04	1.04	1.06	1.05
WT OF DRY SOIL	6.13	5.11	5.57	5.55	5.29	4.93
MOISTURE CONTENT %	44.7	46.0	48.1	48.8	53.3	52.7



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		47.5	16.9	30.6	CL	

ADVANCED TERRA TESTING

NFM

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT **Weston**

JOB NO. 2066-03

BORING NO.	8+00	SAMPLED	Rocky Flats
DEPTH	13.5'	DATE TESTED	03-20-92 INC
SAMPLE NO.	#13	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC	Yes	
NATURAL	No	
Wt. Wet Soil & Pan	(g)	38.00
Wt. Dry Soil & Pan	(g)	37.18
Wt. Lost Moisture	(g)	0.82
Wt. of Pan Only	(g)	3.60
Wt. of Dry Soil	(g)	33.58
Moisture Content	%	2.4
Wt. Hydrom. Sample Wet	(g)	55.04
Wt. Hydrom. Sample Dry	(g)	53.73

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	730.49
Weight of + #10 Before Washing (g)	116.61
Weight of + #10 After Washing (g)	112.99
Weight of - #10 Wet (g)	613.88
Weight of - #10 Dry (g)	602.78
Wt. Total Sample Dry (g)	715.77
Calc. Wt. "W" (g)	63.72
Calc. Mass + #10	9.99

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	49.60	49.60	49.60	6.9	93.1
3/8"	0.00	23.16	23.16	72.76	10.2	89.8
#4	0.00	19.96	19.96	92.72	13.0	87.0
#10	0.00	19.55	19.55	112.27	15.7	84.3
#20	1.32	2.57	1.25	1.25	17.6	82.4
#40	1.57	5.68	4.11	5.36	24.1	75.9
#60	1.57	7.38	5.81	11.17	33.2	66.8
#100	1.55	8.43	6.88	18.05	44.0	56.0
#230	1.57	10.05	8.48	26.53	57.3	42.7 — 45

Clayey Sand (SC)

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT **Weston** JOB NO. 2066-03

BORING NO.	8+00	SAMPLED	Rocky Flats
DEPTH	13.5'	DATE TESTED	03-20-92 TNU
SAMPLE NO.	#13	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

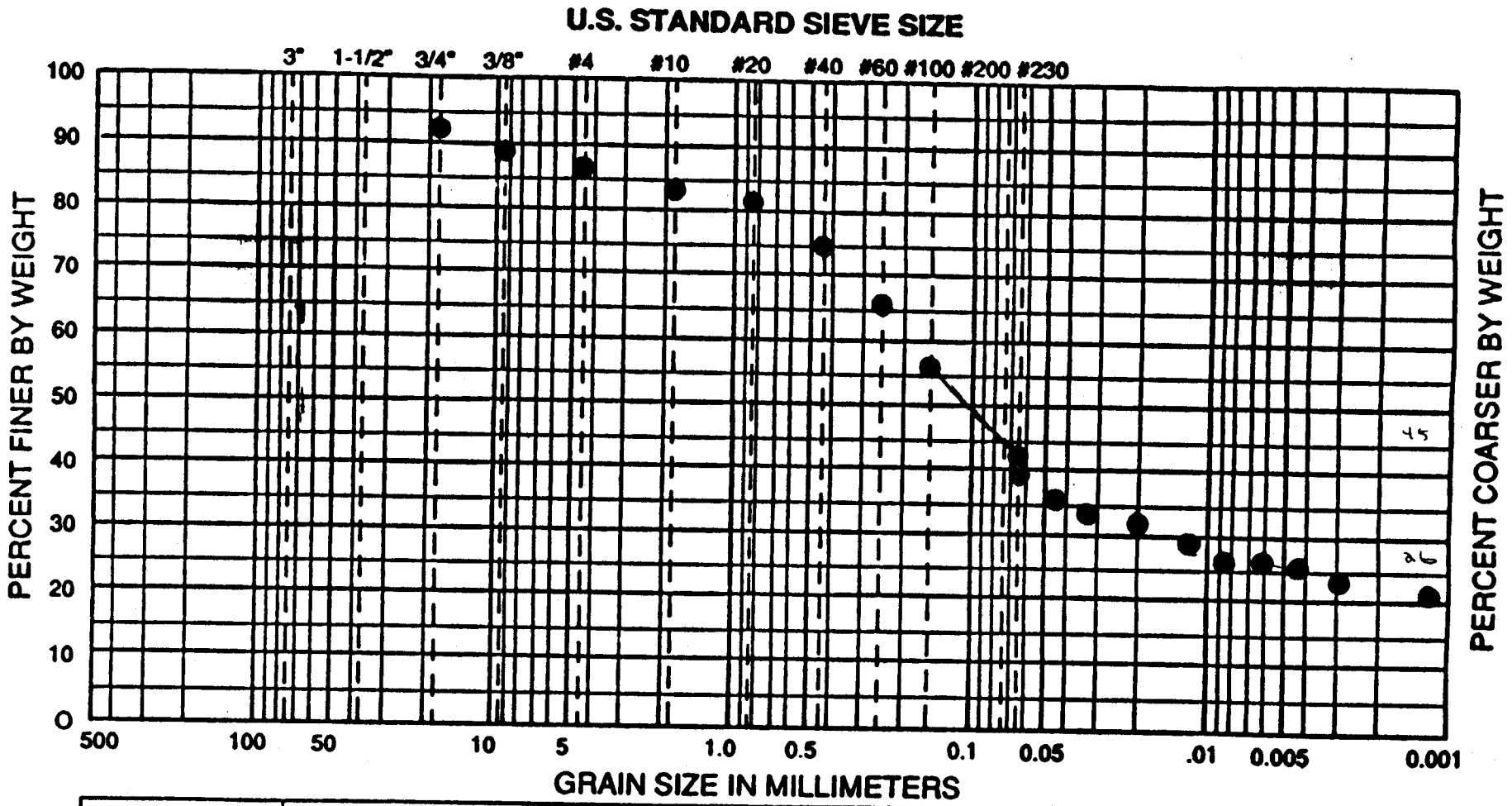
Hydrometer #	ASTM 152 H	Temp., Deg. C	22.0
Sp. Gr. of Soil	2.71	Temp. Coef. K	0.01308
Value of "a"	0.99	Wt. Dry Sample "W"	63.721
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	5.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	31.50	25.50	39.5	39.5	11.12	0.0617
1.0	29.50	23.50	36.4	36.4	11.45	0.0443
2.0	28.00	22.00	34.1	34.1	11.70	0.0316
5.0	27.75	21.75	33.7	33.7	11.74	0.0200
15.0	25.00	19.00	29.5	29.5	12.19	0.0118
30.0	24.00	18.00	27.9	27.9	12.35	0.0084
60.0	23.50	17.50	27.1	27.1	12.44	0.0060
120.0	23.00	17.00	26.4	26.4	12.52	0.0042
250.0	22.00	16.00	24.8	24.8	12.68	0.0029
1440.0	20.50	14.50	22.5	22.5	12.93	0.0012

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY
		COARSE	FINE	COARSE	MEDIUM	FINE	

WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 8+00 SAMPLE NO.: CH #13 DATE: 3-27-92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION						
		clayey sand						
		Coarse Gravel 6.9	Fine Gravel 6.1	Coarse S 2.7	42 Med Sand 8.4	F Sand 30.9	Silt 19	Clay 26
	13.5'	ROCKY FLATS / EG&G						

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION - - - - - - - - - - - - - - - -

LABORATORY CLASSIFICATION - - - - - - - - - - - - -

JOB NO. 2266-03

CLIENT/OWNER WESTON

LOCATION ROCKY FLATS / EG&G

BORING 8+00 SAMPLE CU-19 DEPTH 13.5'

FIELD DENSITY BY.../.../...

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

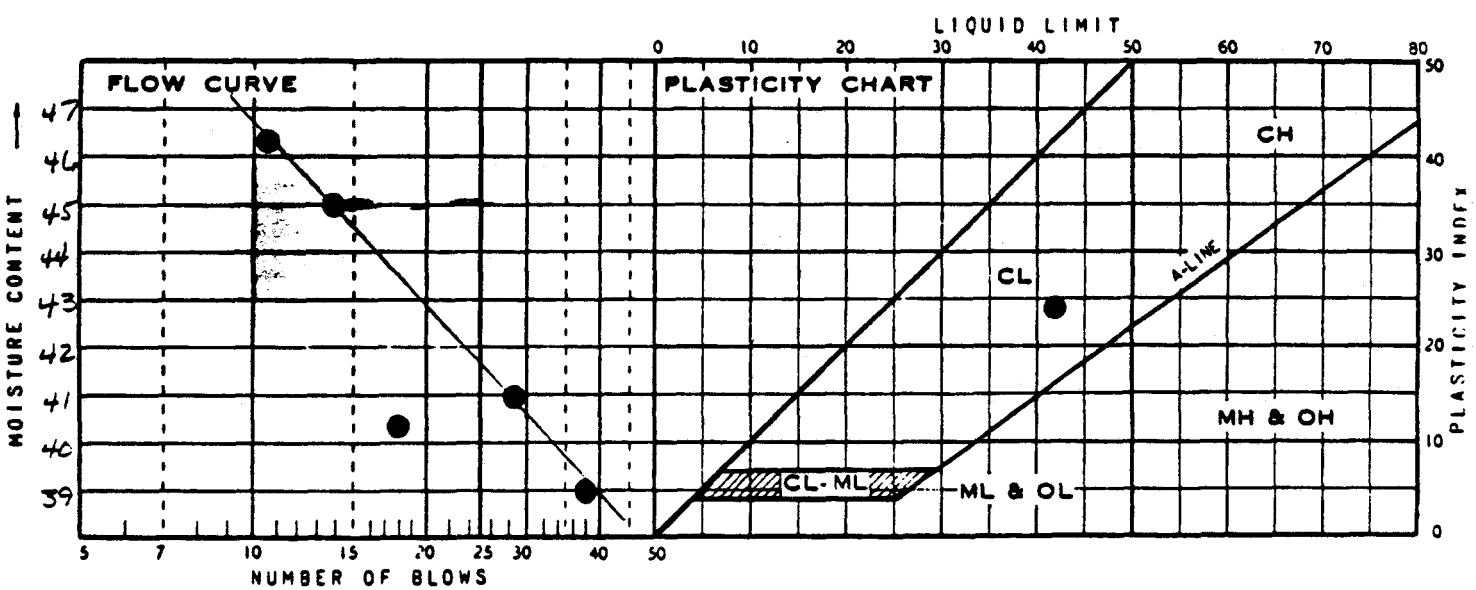
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY SE..3/23/92.

DETERMINATION	1	2	3	4	5	6
DISH	37C	2018	OC			
WT OF DISH + WET SOIL g	6.84	6.65	8.06			
WT OF DISH + DRY SOIL g	6.02	5.83	7.03	—	—	—
WT OF MOISTURE g	.82	.82	1.03			
WT OF DISH g	1.08	1.05	1.05	—	—	—
WT OF DRY SOIL g	4.94	4.78	5.98			
MOISTURE CONTENT %	16.6	17.2	17.2			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	10C	25C	22	2021	41C	
NUMBER OF BLOWS	39	29	18	14±	11	
WT OF DISH + WET SOIL g	13.60	18.57	18.35	12.78	13.55	
WT OF DISH + DRY SOIL g	10.08	13.48	13.11	9.14	9.58	—
WT OF MOISTURE g	3.52	5.09	4.87	3.64	3.97	
WT OF DISH g	1.06	1.05	1.05	1.06	1.03	—
WT OF DRY SOIL g	9.02	12.43	12.06	8.08	8.55	
MOISTURE CONTENT %	39.0	41.0	40.4	45.1	46.4	



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		41.6	17.0	24.6	CL	

ADVANCED TERRA TESTING

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	8+00	SAMPLED	Rocky Flats
DEPTH	29'	DATE TESTED	03-20-92 TNU
SAMPLE NO.	#13	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan	(g)	39.04
Wt. Dry Soil & Pan	(g)	38.28
Wt. Lost Moisture	(g)	0.76
Wt. of Pan Only	(g)	3.68
Wt. of Dry Soil	(g)	34.60
Moisture Content	%	2.2

Wt. Hydrom. Sample Wet (g)	55.03
Wt. Hydrom. Sample Dry (g)	53.85

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	965.48
Weight of + #10 Before Washing (g)	437.15
Weight of + #10 After Washing (g)	407.25
Weight of - #10 Wet (g)	528.23
Weight of - #10 Dry (g)	546.13
Wt. Total Sample Dry (g)	953.38
Calc. Wt. "W" (g)	93.87
Calc. Mass + #10	40.02

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	119.87	119.87	119.87	12.6	87.4
3/8"	0.00	114.14	114.14	234.01	24.5	75.5
#4	0.00	95.83	95.83	329.84	34.6	65.4
#10	0.00	76.64	76.64	406.48	42.6	57.4
#20	1.56	9.18	7.62	7.62	50.8	49.2
#40	1.56	12.91	11.35	18.97	62.8	37.2
#60	1.54	7.11	5.57	24.54	68.8	31.2
#100	1.56	5.44	3.88	28.42	72.9	27.1
#230	1.56	6.41	4.85	33.27	78.1	21.9

Gravelly Sand (GM)

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT **Weston** JOB NO. 2066-03

BORING NO.	8+00	SAMPLED	Rocky Flats
DEPTH	29'	DATE TESTED	03-20-92 TNU
SAMPLE NO.	#13	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

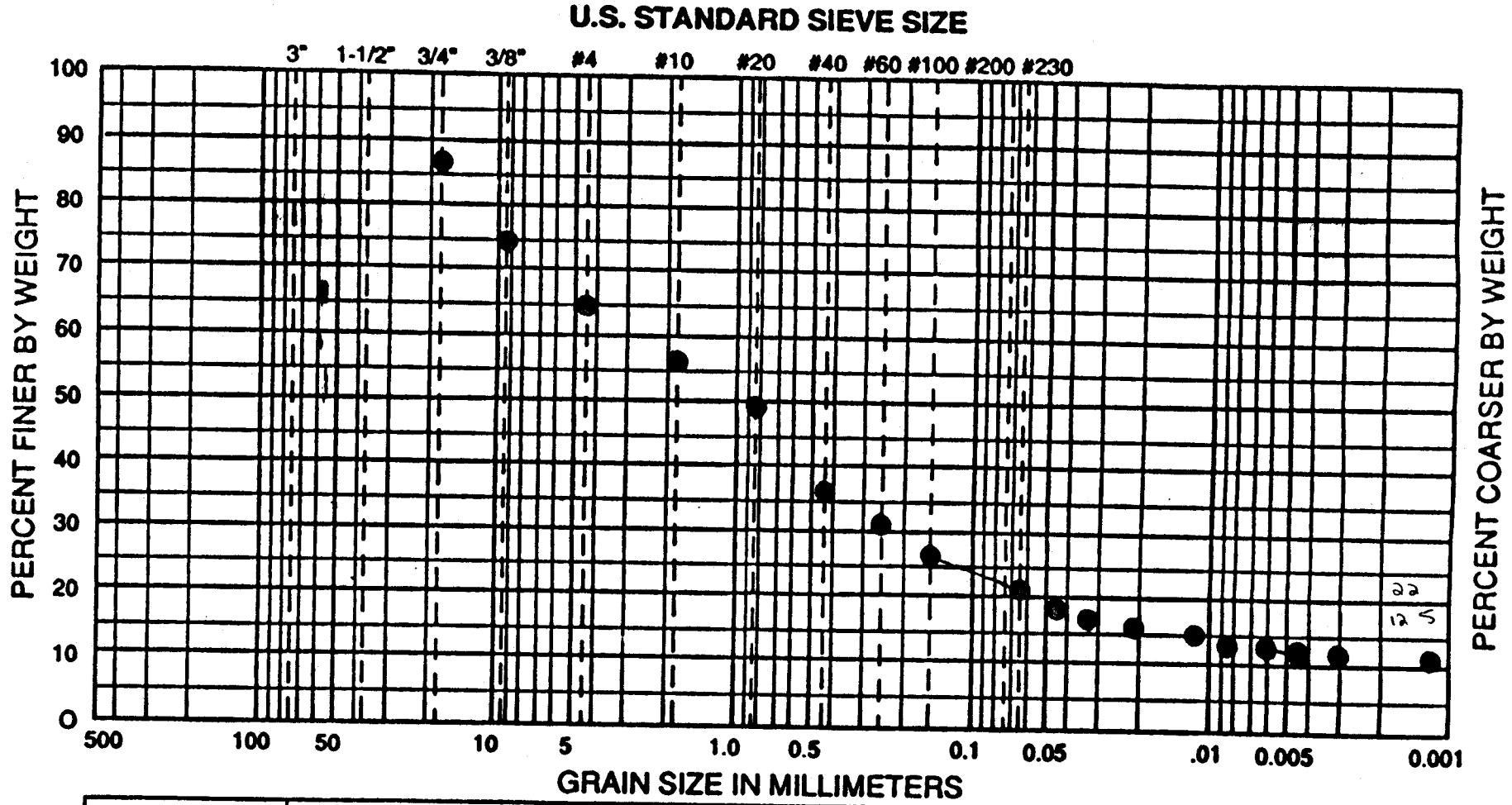
Hydrometer #	ASTM 152 H	Temp., Deg. C	22.0
Sp. Gr. of Soil	2.77	Temp. Coef. K	0.01287
Value of "a"	0.98	Wt. Dry Sample "W"	93.867
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	5.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	26.00	20.00	20.8	20.8	12.03	0.0631
1.0	24.00	18.00	18.7	18.7	12.35	0.0452
2.0	23.00	17.00	17.7	17.7	12.52	0.0322
5.0	21.50	15.50	16.1	16.1	12.76	0.0206
15.0	21.00	15.00	15.6	15.6	12.85	0.0119
30.0	19.50	13.50	14.0	14.0	13.09	0.0085
60.0	19.50	13.50	14.0	14.0	13.09	0.0060
120.0	19.00	13.00	13.5	13.5	13.17	0.0043
250.0	18.50	12.50	13.0	13.0	13.26	0.0030
1440.0	17.50	11.50	12.0	12.0	13.42	0.0012

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY			
		COARSE	FINE	COARSE	MEDIUM	FINE				
WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 8+00 SAMPLE NO.: CH # 13 DATE: 3-27-92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION				
	29.0'	gravelly sand C 12.6 34.6 F 22.9 Rocky Flats/EG&G	C 8.0 43.4 M 20.2 F 15.2		Silt 9.5	Clay 12.5

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION _____

LABORATORY CLASSIFICATION _____

JOB NO. 2066-03
CLIENT/OWNER Weston
LOCATION Rocky Flats
BORING 8+00 SAMPLE CH #13 DEPTH 29'

FIELD DENSITY BY ____/__/__

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

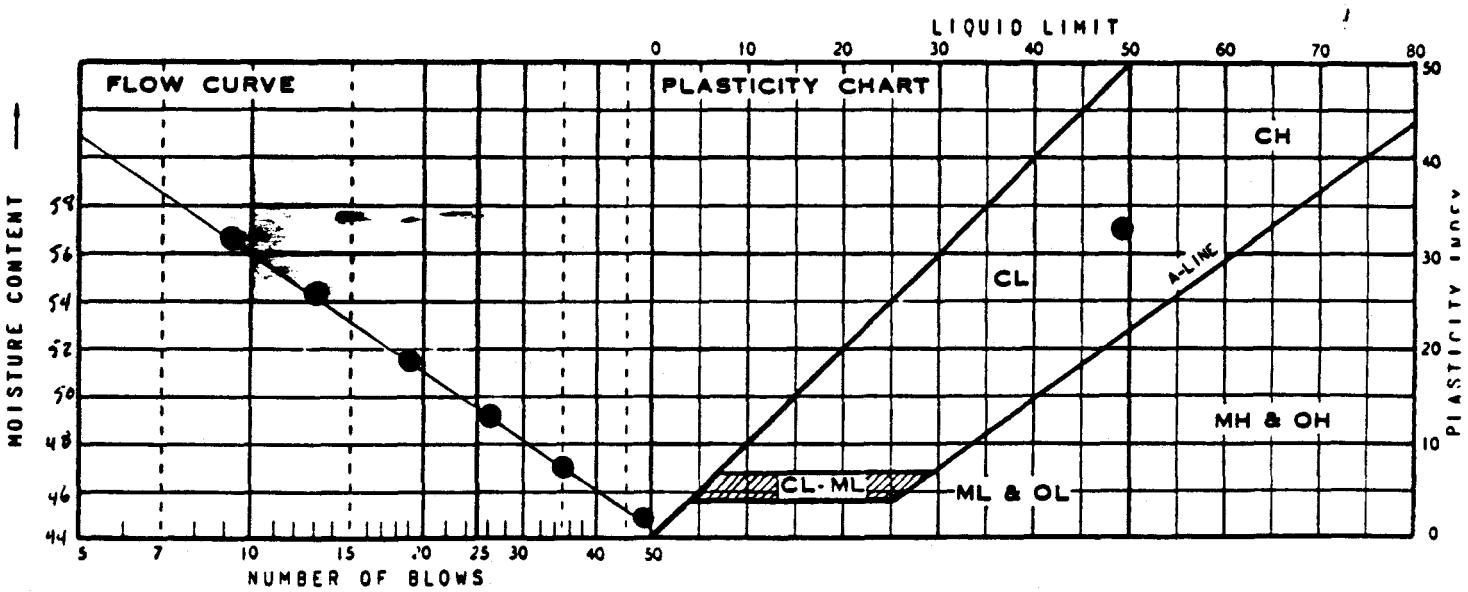
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY DW 3/23/92

DETERMINATION	1	2	3	4	5	6
DISH	2044	15C	2012			
WT OF DISH + WET SOIL g	5.01	6.55	5.69			
WT OF DISH + DRY SOIL g	4.45	5.77	5.01	—	—	—
WT OF MOISTURE g	.56	.78	.68			
WT OF DISH g	1.05	1.05	1.05	—	—	—
WT OF DRY SOIL g	3.40	4.72	3.96			
MOISTURE CONTENT %	16.5	16.5	17.2			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	B17	2025	B8	2068	24	12C
NUMBER OF BLOWS	48	35	26	19	13	9
WT OF DISH + WET SOIL g	12.50	13.85	12.35	12.37	12.61	11.65
WT OF DISH + DRY SOIL g	8.95	9.76	8.61	8.52	8.54	7.82
WT OF MOISTURE g	3.55	4.09	3.74	3.85	4.07	3.83
WT OF DISH g	1.05	1.06	1.02	1.06	1.04	1.05
WT OF DRY SOIL g	7.90	8.70	7.59	7.46	7.50	6.77
MOISTURE CONTENT %	44.9	47.0	49.3	51.6	54.3	56.6



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		49.5	16.5	33.0	CL	

ADVANCED TERRA TESTING

JEM

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT **Weston**

JOB NO. 2066-03

BORING NO.	8+00	SAMPLED	Rocky Flats
DEPTH	38'	DATE TESTED	03-20-92 TNU
SAMPLE NO.	#13	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan	(g)	38.23
Wt. Dry Soil & Pan	(g)	37.31
Wt. Lost Moisture	(g)	0.92
Wt. of Pan Only	(g)	3.51
Wt. of Dry Soil	(g)	33.80
Moisture Content	%	2.7

Wt. Hydrom. Sample Wet (g)	54.83
Wt. Hydrom. Sample Dry (g)	53.38

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	54.83
Weight of + #10 Before Washing (g)	0.00
Weight of + #10 After Washing (g)	0.00
Weight of - #10 Wet (g)	54.83
Weight of - #10 Dry (g)	53.38
Wt. Total Sample Dry (g)	53.38
Calc. Wt. "W" (g)	53.38
Calc. Mass + #10	0.00

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	0.00	0.00	0.00	0.0	100.0
#4	0.00	0.00	0.00	0.00	0.0	100.0
#10	0.00	0.00	0.00	0.00	0.0	100.0
#20	1.57	1.60	0.03	0.03	0.1	99.9
#40	1.57	1.60	0.03	0.06	0.1	99.9
#60	1.57	1.62	0.05	0.11	0.2	99.8
#100	1.57	1.76	0.19	0.30	0.6	99.4
#230	1.55	6.66	5.11	5.41	10.1	89.9 — 91

Silty Clay (CL)

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT **Weston**

JOB NO. 2066-03

BORING NO.	8+00	SAMPLED	Rocky Flats
DEPTH	38'	DATE TESTED	03-20-92 TNU
SAMPLE NO.	#13	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

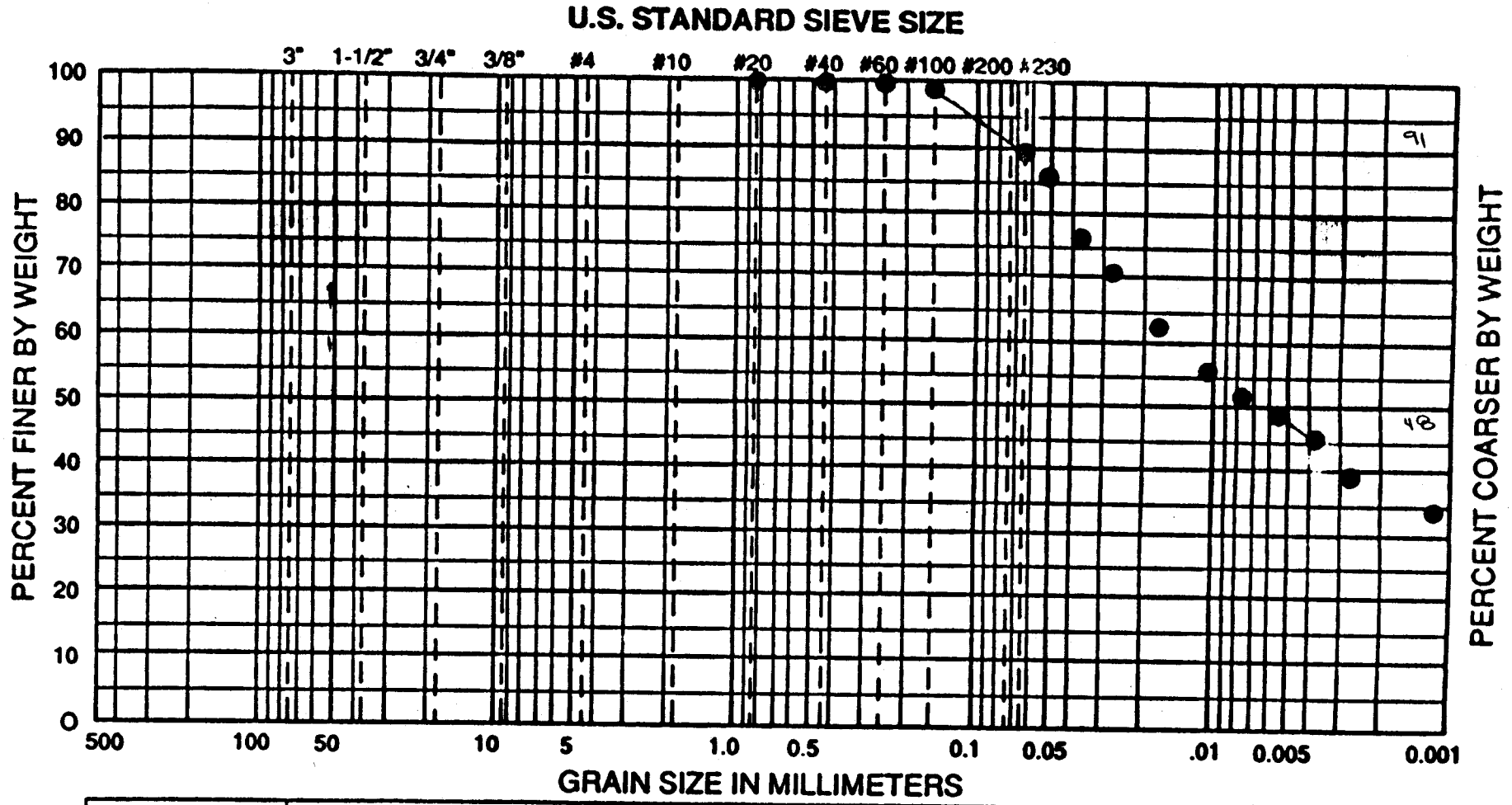
Hydrometer #	ASTM 152 H	Temp., Deg. C	22.0
Sp. Gr. of Soil	2.79	Temp. Coef. K	0.01282
Value of "a"	0.97	Wt. Dry Sample "W"	53.380
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	4.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	52.00	47.00	85.6	85.6	7.76	0.0505
1.0	47.00	42.00	76.5	76.5	8.58	0.0376
2.0	43.50	38.50	70.1	70.1	9.16	0.0274
5.0	39.50	34.50	62.8	62.8	9.81	0.0180
15.0	35.50	30.50	55.5	55.5	10.47	0.0107
30.0	33.00	28.00	51.0	51.0	10.88	0.0077
60.0	32.00	27.00	49.2	49.2	11.04	0.0055
120.0	30.00	25.00	45.5	45.5	11.37	0.0039
250.0	26.50	21.50	39.1	39.1	11.94	0.0028
1440.0	24.00	19.00	34.6	34.6	12.35	0.0012

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY
		COARSE	FINE	COARSE	MEDIUM	FINE	

WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 8+00 SAMPLE NO.: CH# 13 DATE: 3-30-92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION					
		silty clay (CL)					
Rocky Flats	38.0'	0	0	0	9.0 0.1	8.9	43 48

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION _____

LABORATORY CLASSIFICATION _____

JOB NO. 2066-03

CLIENT/OWNER WESTON

LOCATION _____

BORING 8+00 SAMPLE CH #13 DEPTH 38.0

FIELD DENSITY BY ___/__/__

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

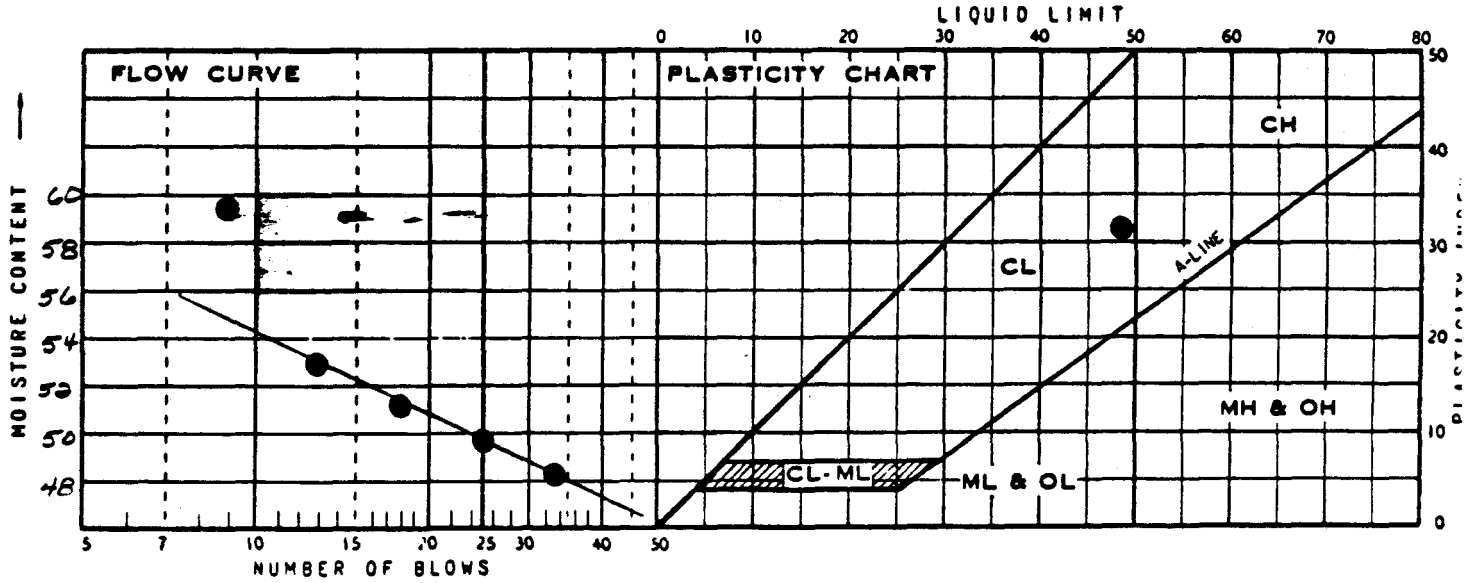
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY SL 3/23/92

DETERMINATION	1	2	3	4	5	6
DISH	2039	6C	11C			
WT OF DISH + WET SOIL g	8.29	6.87	7.67			
WT OF DISH + DRY SOIL g	7.17	5.96	6.63	—	—	—
WT OF MOISTURE g	1.12	.91	1.04			
WT OF DISH g	1.05	1.03	1.04	—	—	—
WT OF DRY SOIL g	6.12	4.93	5.59			
MOISTURE CONTENT %	18.3	18.5	18.6			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	28C	2067	2008	2C	2006	
NUMBER OF BLOWS	34	25	18	13±	9±	
WT OF DISH + WET SOIL g	13.62	18.12	17.12	14.86	13.78	
WT OF DISH + DRY SOIL g	9.52	12.45	11.68	10.07	9.08	—
WT OF MOISTURE g	4.10	5.67	5.44	4.79	4.76	
WT OF DISH g	1.05	1.03	1.06	1.04	1.05	—
WT OF DRY SOIL g	8.47	11.42	10.62	9.03	7.97	
MOISTURE CONTENT %	48.4	49.7	51.2	53.1	59.7	



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		49.8	18.5	31.3	CL	

ADVANCED TERRA TESTING INC

JEM

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MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT **Weston**

JOB NO. 2066-03

BORING NO.	8+00	SAMPLED	Rocky Flats
DEPTH	52'	DATE TESTED	03-20-92 TNU
SAMPLE NO.	#13	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC	Yes	
NATURAL	No	
Wt. Wet Soil & Pan	(g)	42.03
Wt. Dry Soil & Pan	(g)	40.79
Wt. Lost Moisture	(g)	1.24
Wt. of Pan Only	(g)	3.77
Wt. of Dry Soil	(g)	37.02
Moisture Content	%	3.3
Wt. Hydrom. Sample Wet	(g)	55.03
Wt. Hydrom. Sample Dry	(g)	53.25

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	55.03
Weight of + #10 Before Washing (g)	0.00
Weight of + #10 After Washing (g)	0.00
Weight of - #10 Wet (g)	55.03
Weight of - #10 Dry (g)	53.25
Wt. Total Sample Dry (g)	53.25
Calc. Wt. "W" (g)	53.25
Calc. Mass + #10	0.00

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	0.00	0.00	0.00	0.0	100.0
#4	0.00	0.00	0.00	0.00	0.0	100.0
#10	0.00	0.00	0.00	0.00	0.0	100.0
#20	1.55	1.62	0.07	0.07	0.1	99.9
#40	1.57	1.79	0.22	0.29	0.5	99.5
#60	1.57	1.73	0.16	0.45	0.8	99.2
#100	1.57	1.70	0.13	0.58	1.1	98.9
#230	1.57	2.03	0.46	1.04	2.0	98.0

Chapline

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT **Weston** JOB NO. 2066-03

BORING NO.	8+00	SAMPLED	Rocky Flats
DEPTH	52'	DATE TESTED	03-20-92 TNU
SAMPLE NO.	#13	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

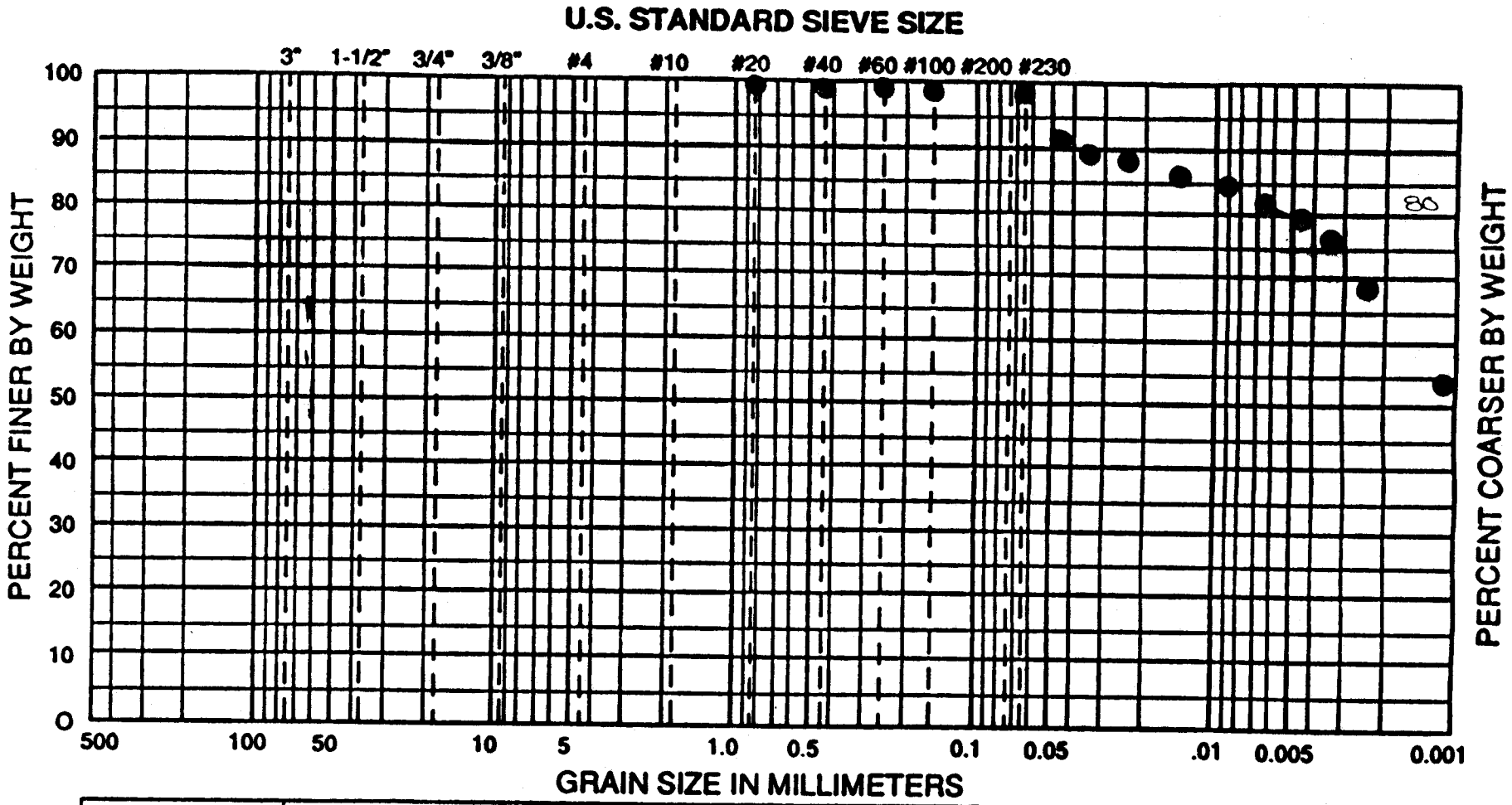
Hydrometer #	ASTM 152 H	Temp., Deg. C	22.0
Sp. Gr. of Soil	2.84	Temp. Coef. K	0.01262
Value of "a"	0.96	Wt. Dry Sample "W"	53.248
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	5.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	57.00	51.00	92.1	92.1	6.94	0.0470
1.0	55.50	49.50	89.4	89.4	7.19	0.0338
2.0	55.00	49.00	88.5	88.5	7.27	0.0241
5.0	54.00	48.00	86.7	86.7	7.43	0.0154
15.0	53.00	47.00	84.9	84.9	7.60	0.0090
30.0	52.00	46.00	83.1	83.1	7.76	0.0064
60.0	50.00	44.00	79.5	79.5	8.09	0.0046
120.0	48.00	42.00	75.9	75.9	8.42	0.0033
250.0	44.00	38.00	68.7	68.7	9.07	0.0024
1440.0	36.00	30.00	54.2	54.2	10.39	0.0011

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY
		COARSE	FINE	COARSE	MEDIUM	FINE	

WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 8+00 SAMPLE NO.: CH # 13 DATE: 3-27-92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION				
	52.0'	claystone 0 0 0 Rocky Flats / EG&G	0 2.0 0.5 1.5	18	80	

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION - - - - - - - - - - - - - - - -

LABORATORY CLASSIFICATION - - - - - - - - - - - - -

JOB NO. 2066-03

CLIENT/OWNER Weston

LOCATION Rocky Flats / 2 & 6

BORING B+00 SAMPLE #13 DEPTH @52'

FIELD DENSITY BY ___/__/__

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

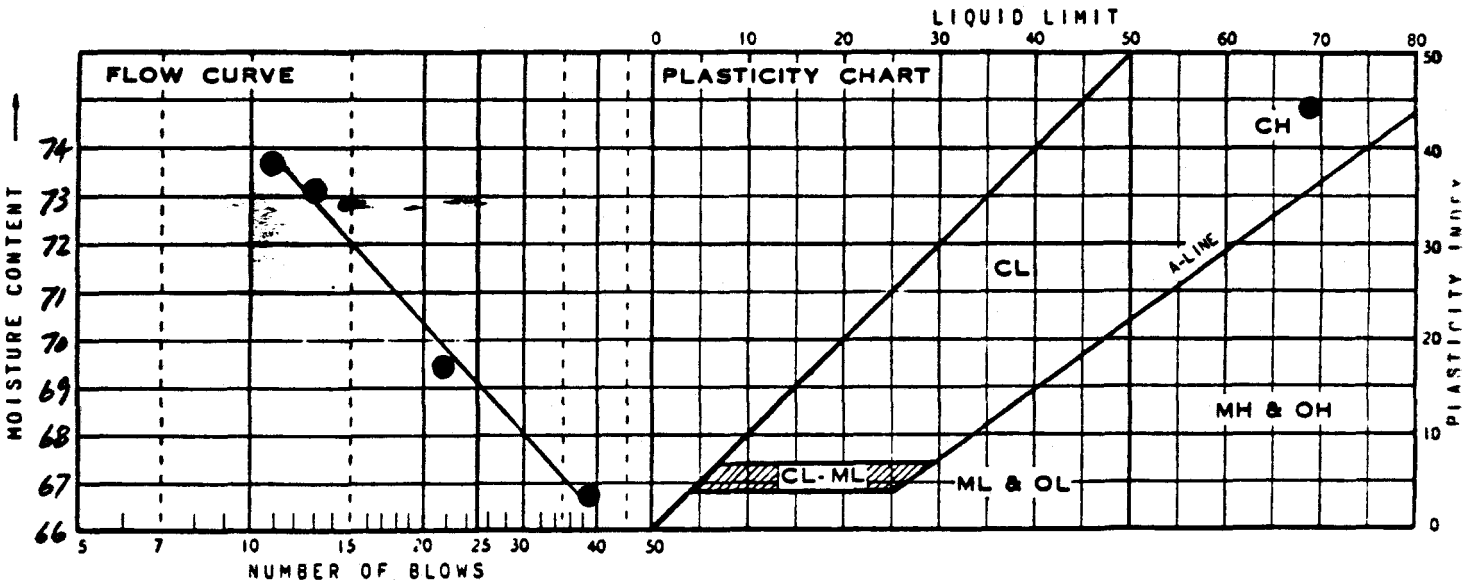
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY [illegible] 3/23/92

DETERMINATION	1	2	3	4	5	6
DISH	2062	35CC	35C			
WT OF DISH + WET SOIL g	6.58	7.78	6.36			
WT OF DISH + DRY SOIL	5.45	6.45	5.29	—	—	—
WT OF MOISTURE	1.13	1.33	1.07			
WT OF DISH	1.02	1.04	1.05	—	—	—
WT OF DRY SOIL	443	5.41	4.24			
MOISTURE CONTENT %	25.5	24.6	25.2	= 75.3/3 =	25.1	

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	2038	2024	4C	2036	5C	43C
NUMBER OF BLOWS	39	29	22	14	13	11
WT OF DISH + WET SOIL g	8.34	8.64	9.24	8.79	8.91	8.22
WT OF DISH + DRY SOIL	5.42	5.51	5.88	5.57	5.59	5.17
WT OF MOISTURE	2.92	3.13	3.36	3.22	3.32	3.05
WT OF DISH	1.04	1.05	1.04	1.04	1.05	1.03
WT OF DRY SOIL	4.38	4.46	4.84	4.53	4.54	4.14
MOISTURE CONTENT %	66.7	70.2	69.4	71.1	73.1	73.7



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		69.2	25.1	44.1	CH	

ADVANCED TERRA TESTING INC

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	8+25	SAMPLED	Rocky Flats
DEPTH	1.5'	DATE TESTED	03-11-92 RL
SAMPLE NO.	#9	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

CB

MOISTURE DATA

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan	(g)	39.82
Wt. Dry Soil & Pan	(g)	38.83
Wt. Lost Moisture	(g)	0.99
Wt. of Pan Only	(g)	3.75
Wt. of Dry Soil	(g)	35.08
Moisture Content	%	2.8
Wt. Hydrom. Sample Wet	(g)	55.00
Wt. Hydrom. Sample Dry	(g)	53.49

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	698.76
Weight of + #10 Before Washing (g)	179.36
Weight of + #10 After Washing (g)	169.46
Weight of - #10 Wet (g)	519.40
Weight of - #10 Dry (g)	514.77
Wt. Total Sample Dry (g)	684.23
Calc. Wt. "W" (g)	71.10
Calc. Mass + #10	17.61

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	61.00	61.00	61.00	8.9	91.1
3/8"	0.00	42.38	42.38	103.38	15.1	84.9
#4	0.00	40.03	40.03	143.41	21.0	79.0
#10	0.00	26.05	26.05	169.46	24.8	75.2
#20	1.58	2.53	0.95	0.95	26.1	73.9
#40	1.31	3.58	2.27	3.22	29.3	70.7
#60	1.57	4.27	2.70	5.92	33.1	66.9
#100	1.57	4.80	3.23	9.15	37.6	62.4
#230	1.56	7.48	5.92	15.07	46.0	54.0 — 55

Clay (CL)

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT Western

JOB NO. 2066-03

BORING NO.	8+25	SAMPLED	Rocky Flats
DEPTH	1.5'	DATE TESTED	03-11-92 RL
SAMPLE NO.	#9	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

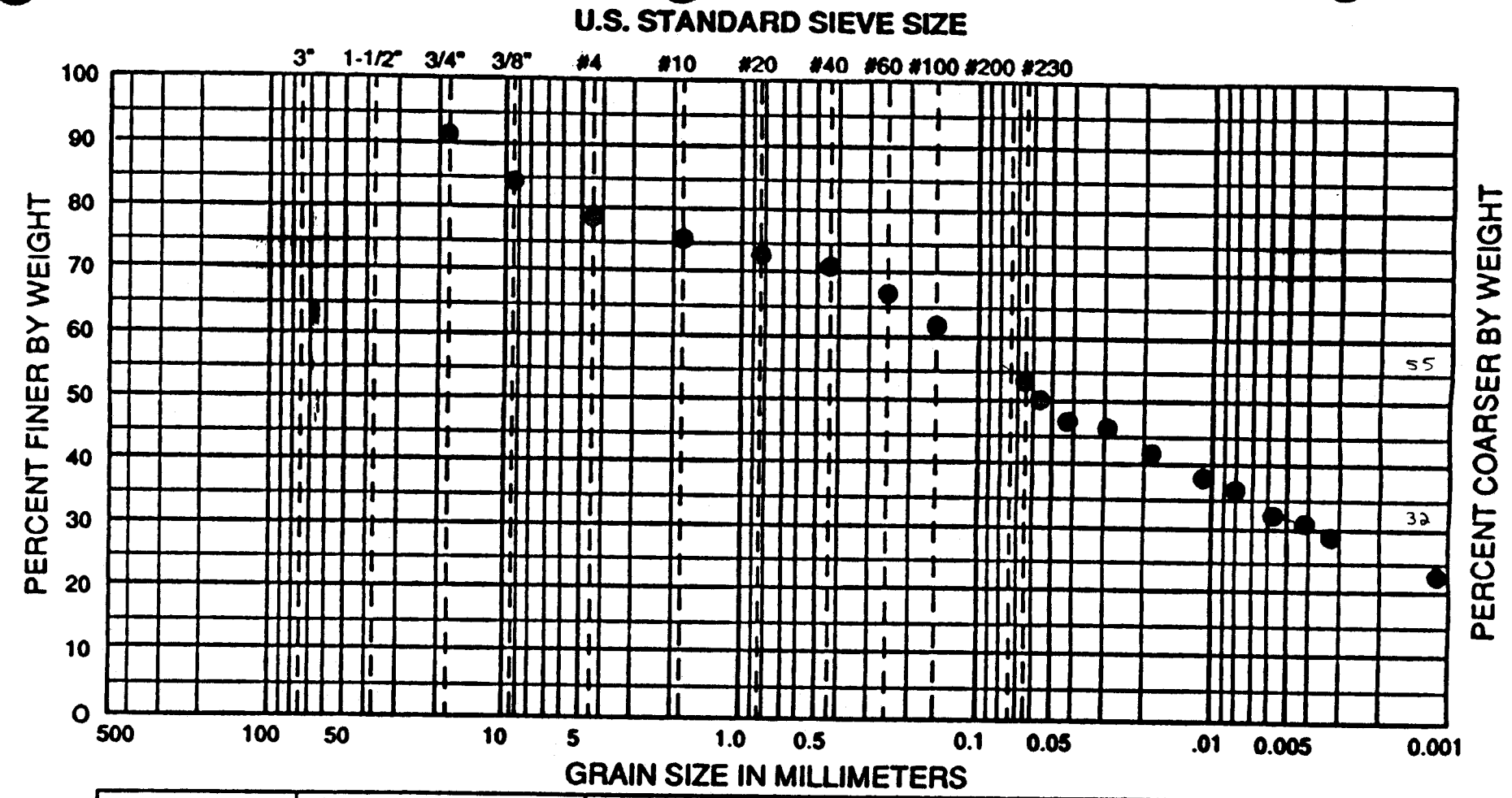
Hydrometer #	ASTM 152 H	Temp., Deg. C	21.0
Sp. Gr. of Soil	2.69	Temp. Coef. K	0.01332
Value of "a"	0.99	Wt. Dry Sample "W"	71.104
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	6.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	43.00	36.00	50.2	50.2	9.24	0.0573
1.0	40.75	33.75	47.1	47.1	9.61	0.0413
2.0	40.00	33.00	46.0	46.0	9.73	0.0294
5.0	37.00	30.00	41.9	41.9	10.22	0.0190
15.0	34.50	27.50	38.4	38.4	10.63	0.0112
30.0	33.00	26.00	36.3	36.3	10.88	0.0080
60.0	30.50	23.50	32.8	32.8	11.29	0.0058
120.0	29.25	22.25	31.0	31.0	11.49	0.0041
190.0	28.00	21.00	29.3	29.3	11.70	0.0033
1440.0	24.00	17.00	23.7	23.7	12.35	0.0012

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY			
		COARSE	FINE	COARSE	MEDIUM	FINE				
WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 8+25 SAMPLE NO.: CH #9 DATE: 3-19-92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION						
		clay with sand, silt + gravel						
		GV - 21		S - 24.0			SL	CL
Rocky Flats	1.5'	8.9	12.1	3.8	4.5	15.7	23.0	32.0

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION _____

LABORATORY CLASSIFICATION _____

JOB NO. 2066-03
CLIENT/OWNER Weston
LOCATION Rocky Flats
BORING 8+25 SAMPLE CH #9 DEPTH 1.5'

FIELD DENSITY BY ____/__/__

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

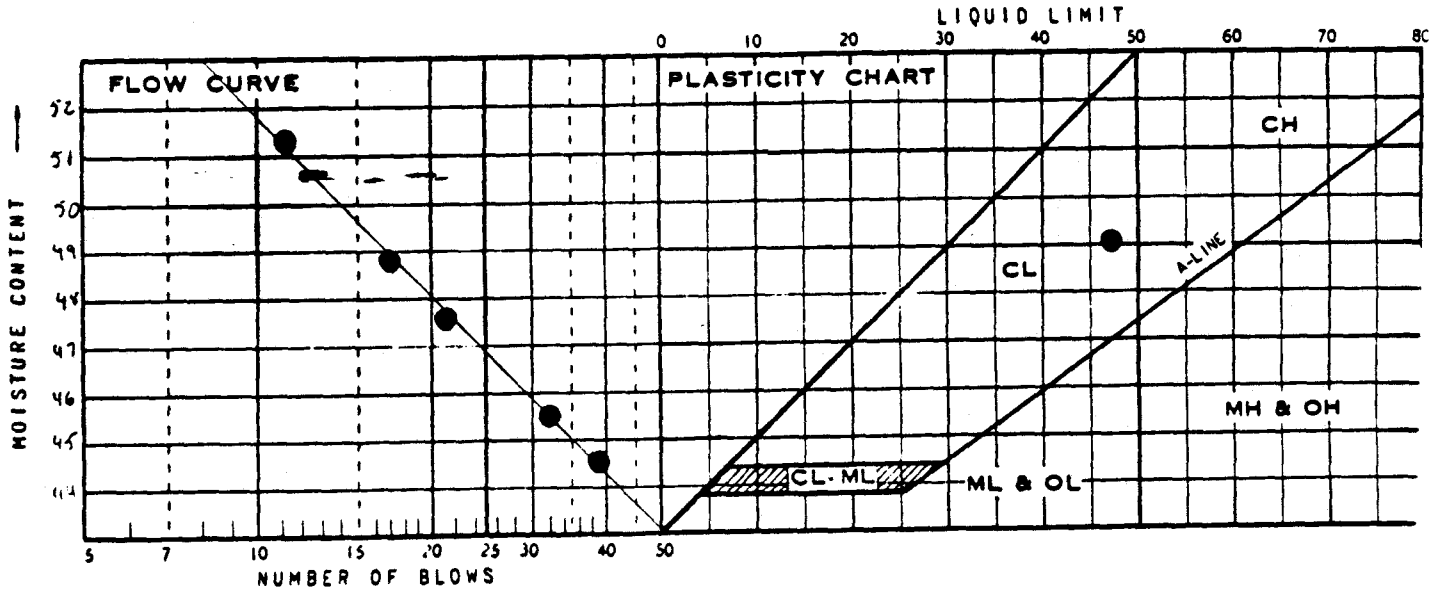
PLASTIC LIMIT BY DM 3/12/92

DETERMINATION	1	2	3	4	5	6
DISH	30C	2057	42C			
WT OF DISH + WET SOIL g	6.08	5.50	5.89			
WT OF DISH + DRY SOIL g	5.37	4.87	5.18	—	—	—
WT OF MOISTURE g	.71	.63	.71			
WT OF DISH g	1.05	1.05	1.05	—	—	—
WT OF DRY SOIL g	4.32	3.82	4.13			
MOISTURE CONTENT %	16.4	16.5	17.2			

LIQUID LIMIT

??

DETERMINATION	1	2	3	4	5	6
DISH	66C	2095	2020	39C	43C	14C
NUMBER OF BLOWS	39*	32*	18	21	17	11
WT OF DISH + WET SOIL g	11.32	12.67	11.47	12.43	11.37	10.92
WT OF DISH + DRY SOIL g	8.15	9.04	8.09	8.75	7.98	7.57
WT OF MOISTURE g	3.17	3.63	3.33	3.68	3.39	3.35
WT OF DISH g	1.05	1.06	1.05	1.03	1.04	1.04
WT OF DRY SOIL g	7.10	7.98	7.04	7.72	6.94	6.53
MOISTURE CONTENT %	44.6	45.5	47.3	47.7	48.3	51.3



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION
		46.9	16.7	30.2	CL

ADVANCED TERRA TESTING

JEW

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	8+25	SAMPLED	Rocky Flats
DEPTH	4.0'	DATE TESTED	03-11-92 SR
SAMPLE NO.	#9	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

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MOISTURE DATA

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan	(g)	52.01
Wt. Dry Soil & Pan	(g)	50.38
Wt. Lost Moisture	(g)	1.63
Wt. of Pan Only	(g)	3.82
Wt. of Dry Soil	(g)	46.56
Moisture Content	%	3.5

Wt. Hydrom. Sample Wet (g)	60.00
Wt. Hydrom. Sample Dry (g)	57.97

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	640.75
Weight of + #10 Before Washing (g)	106.33
Weight of + #10 After Washing (g)	85.06
Weight of - #10 Wet (g)	534.42
Weight of - #10 Dry (g)	536.89
Wt. Total Sample Dry (g)	621.95
Calc. Wt. "W" (g)	67.15
Calc. Mass + #10	9.18

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	31.93	31.93	31.93	5.1	94.9
3/8"	0.00	33.72	33.72	65.65	10.6	89.4
#4	0.00	14.18	14.18	79.83	12.8	87.2
#10	0.00	5.23	5.23	85.06	13.7	86.3
#20	1.54	4.08	2.54	2.54	17.5	82.5
#40	1.56	3.52	1.96	4.50	20.4	79.6
#60	1.56	3.34	1.78	6.28	23.0	77.0
#100	1.56	4.33	2.77	9.05	27.2	72.8
#230	1.55	7.17	5.62	14.67	35.5	64.5

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Silty Clay (CH)

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT	Weston	JOB NO.	2066-03
BORING NO.	8+25	SAMPLED	Rocky Flats
DEPTH	4.0'	DATE TESTED	03-11-92 SR
SAMPLE NO.	#9	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

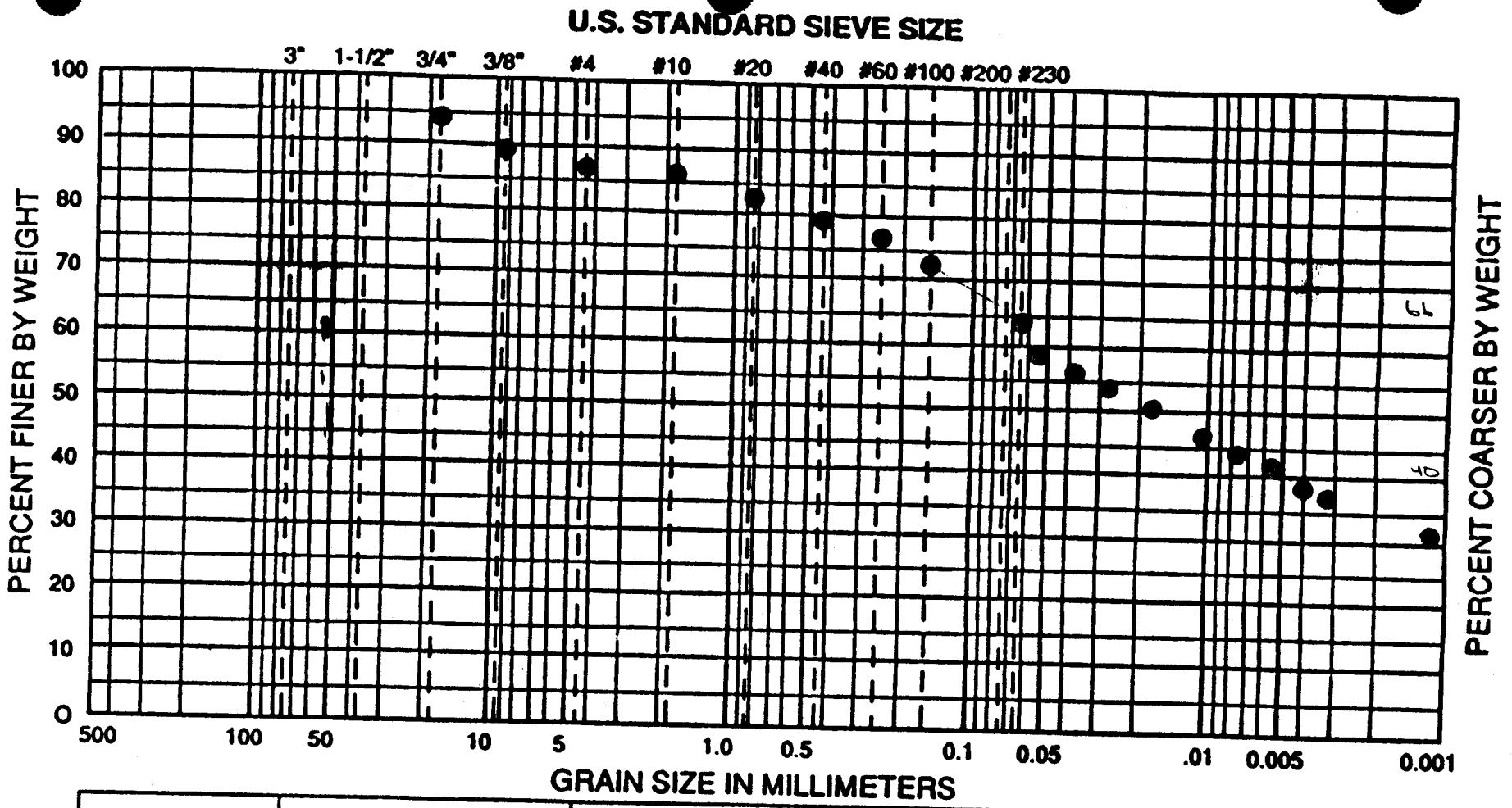
Hydrometer #	ASTM 152 H	Temp., Deg. C	22.0
Sp. Gr. of Soil	2.69	Temp. Coef. K	0.01316
Value of "a"	0.99	Wt. Dry Sample "W"	67.155
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	6.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	47.00	40.00	59.1	59.1	8.58	0.0545
1.0	45.00	38.00	56.1	56.1	8.91	0.0393
2.0	43.75	36.75	54.3	54.3	9.12	0.0281
5.0	41.00	34.00	50.2	50.2	9.57	0.0182
15.0	38.75	31.75	46.9	46.9	9.94	0.0107
30.0	37.25	30.25	44.7	44.7	10.18	0.0077
60.0	35.00	28.00	41.4	41.4	10.55	0.0055
120.0	33.25	26.25	38.8	38.8	10.84	0.0040
190.0	32.00	25.00	36.9	36.9	11.04	0.0032
1440.0	28.00	21.00	31.0	31.0	11.70	0.0012

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY			
		COARSE	FINE	COARSE	MEDIUM	FINE				

WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 8+25 SAMPLE NO.: CH #9 DATE: 3-14-92 PROJECT NO.:

AREA	DEPTH	silty clay with sand CLASSIFICATION						
		GV - 12.8		S 21.2			SL	CL
Rocky Flats	4.0'	5.1	7.7	0.9	6.7	13.6	26	40

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION _____

LABORATORY CLASSIFICATION _____

JOB NO. 2066-03
CLIENT/OWNER Weston
LOCATION Rocky Flats
BORING 8-25 SAMPLE CH#9, DEPTH 4.0'

FIELD DENSITY BY ___/___/___

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD [redacted]

DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

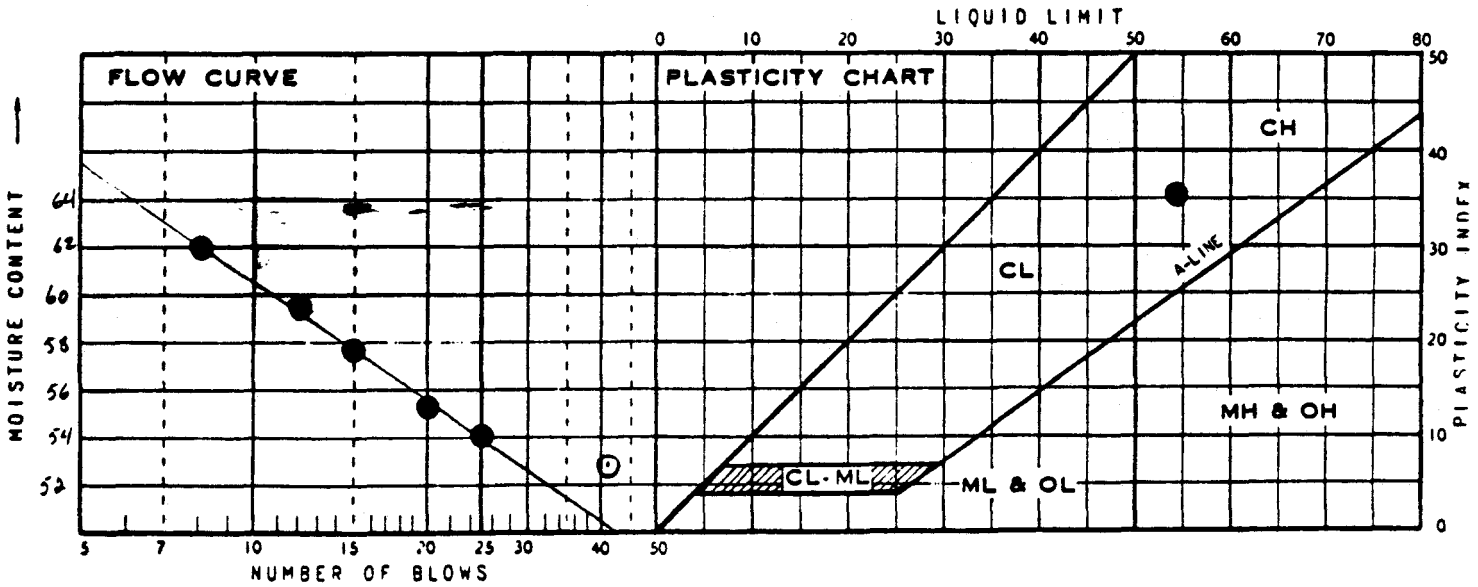
PLASTIC LIMIT BY DW 3/10/93

DETERMINATION	1	2	3	4	5	6
DISH	2034	2039	18C			
WT OF DISH + WET SOIL g	5.36	4.69	4.75			
WT OF DISH + DRY SOIL g	4.67	4.11	4.16	—	—	—
WT OF MOISTURE g	.69	.58	.59			
WT OF DISH g	1.04	1.06	1.04	—	—	—
WT OF DRY SOIL g	3.63	3.05	3.12			
MOISTURE CONTENT %	19.0	19.0	18.9			

LIQUID LIMIT

??

DETERMINATION	1	2	3	4	5	6
DISH	2066	33C	2052	2046	2075	21C
NUMBER OF BLOWS	41	25	20	15	12	8
WT OF DISH + WET SOIL g	11.18	11.28	10.89	10.68	11.01	11.47
WT OF DISH + DRY SOIL g	7.62	7.69	7.36	7.16	7.29	7.48
WT OF MOISTURE g	3.48	3.59	3.53	3.52	3.72	3.99
WT OF DISH g	1.04	1.05	1.02	1.06	1.04	1.04
WT OF DRY SOIL g	6.58	6.64	6.34	6.10	6.25	6.44
MOISTURE CONTENT %	52.9	54.1	55.7	57.8	59.5	62.0



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		54.1	19.0	35.1	CH	

ADVANCED TERRA TESTING INC

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MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT **Weston**

JOB NO. 2066-03

BORING NO.	8+25	SAMPLED	Rocky Flats
DEPTH	8.0'	DATE TESTED	03-13-92 TNU
SAMPLE NO.	#9	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

SB

MOISTURE DATA

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan	(g)	40.94
Wt. Dry Soil & Pan	(g)	39.47
Wt. Lost Moisture	(g)	1.47
Wt. of Pan Only	(g)	3.80
Wt. of Dry Soil	(g)	35.67
Moisture Content	%	4.1

Wt. Hydrom. Sample Wet (g)	55.05
Wt. Hydrom. Sample Dry (g)	52.87

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	578.12
Weight of + #10 Before Washing (g)	5.44
Weight of + #10 After Washing (g)	4.82
Weight of - #10 Wet (g)	572.68
Weight of - #10 Dry (g)	550.61
Wt. Total Sample Dry (g)	555.43
Calc. Wt. "W" (g)	53.33
Calc. Mass + #10	0.46

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	2.07	2.07	2.07	0.4	99.6
#4	0.00	1.65	1.65	3.72	0.7	99.3
#10	0.00	1.10	1.10	4.82	0.9	99.1
#20	1.55	1.66	0.11	0.11	1.1	98.9
#40	1.57	2.17	0.60	0.71	2.2	97.8
#60	1.56	2.86	1.30	2.01	4.6	95.4
#100	1.56	4.15	2.59	4.60	9.5	90.5
#230	1.57	7.76	6.19	10.79	21.1	78.9

Silty Clay (CH)

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT **Weston**

JOB NO. 2066-03

BORING NO.	8+25	SAMPLED	Rocky Flats
DEPTH	8.0'	DATE TESTED	03-13-92 TNU
SAMPLE NO.	#9	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

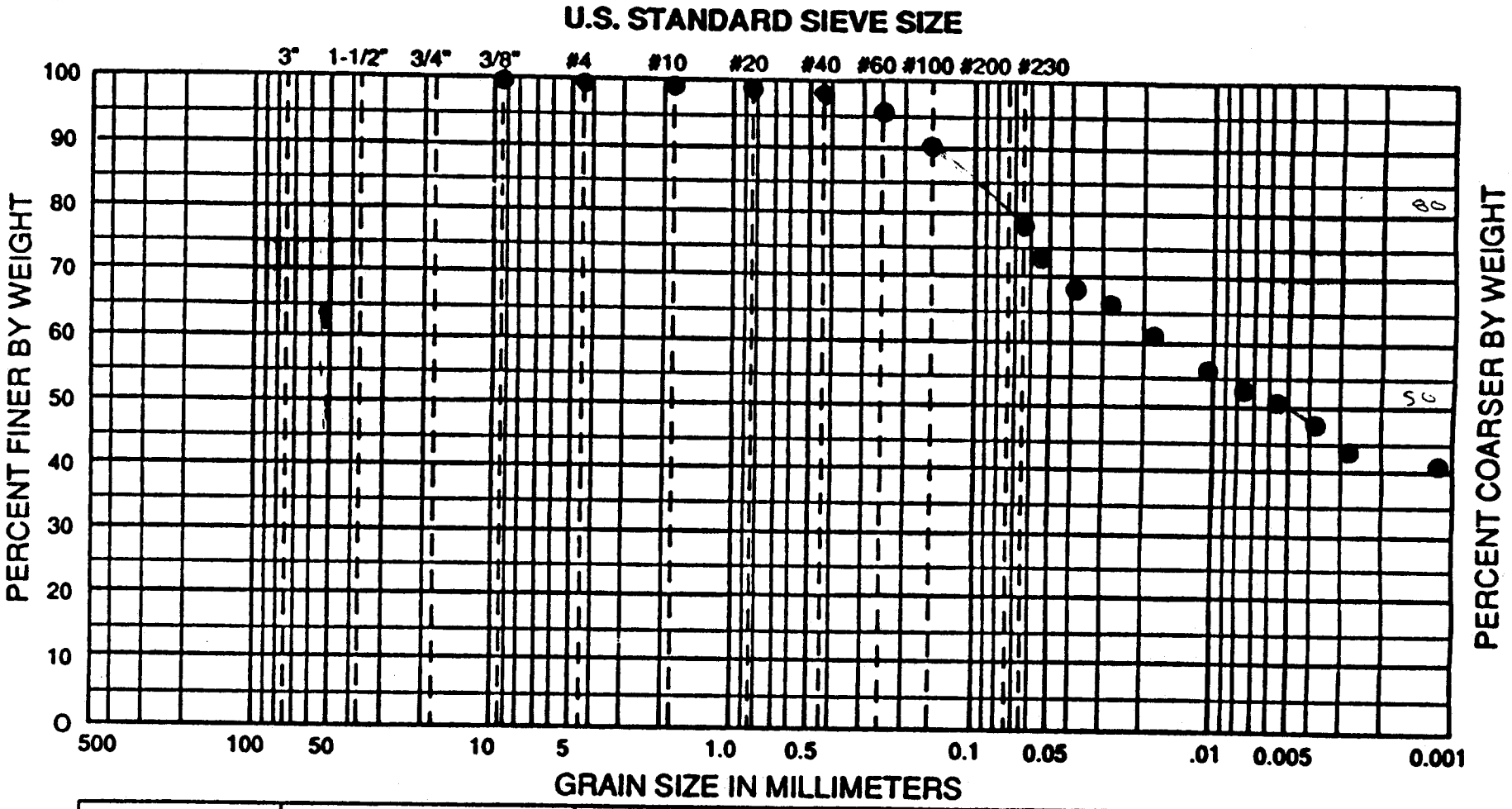
Hydrometer #	ASTM 152 H	Temp., Deg. C	22.0
Sp. Gr. of Soil	2.73	Temp. Coef. K	0.01301
Value of "a"	0.98	Wt. Dry Sample "W"	53.329
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	6.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	46.50	39.50	72.9	72.9	8.66	0.0542
1.0	44.00	37.00	68.3	68.3	9.07	0.0392
2.0	42.75	35.75	66.0	66.0	9.28	0.0280
5.0	40.00	33.00	60.9	60.9	9.73	0.0181
15.0	37.00	30.00	55.4	55.4	10.22	0.0107
30.0	36.00	29.00	53.5	53.5	10.39	0.0077
60.0	34.50	27.50	50.7	50.7	10.63	0.0055
120.0	32.75	25.75	47.5	47.5	10.92	0.0039
250.0	31.00	24.00	44.3	44.3	11.21	0.0028
1440.0	29.00	22.00	40.6	40.6	11.53	0.0012

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY		
		COARSE	FINE	COARSE	MEDIUM	FINE			
WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 8+25 SAMPLE NO.: CH #9 DATE: 3-18-92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION						
		silty clay	GV - 0.7		S - 19.3		SL	CL
Rocky Flats	8.0'	0	0.7	.2	1.3	17.8	30	50

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION _____

LABORATORY CLASSIFICATION _____

JOB NO. 2066-03

CLIENT/OWNER Weston

LOCATION Rocky Flats

BORING 8+25 SAMPLE CH 9 DEPTH 8.0'

FIELD DENSITY BY ___/__/__

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD → [redacted]

DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY RM 3/10/92

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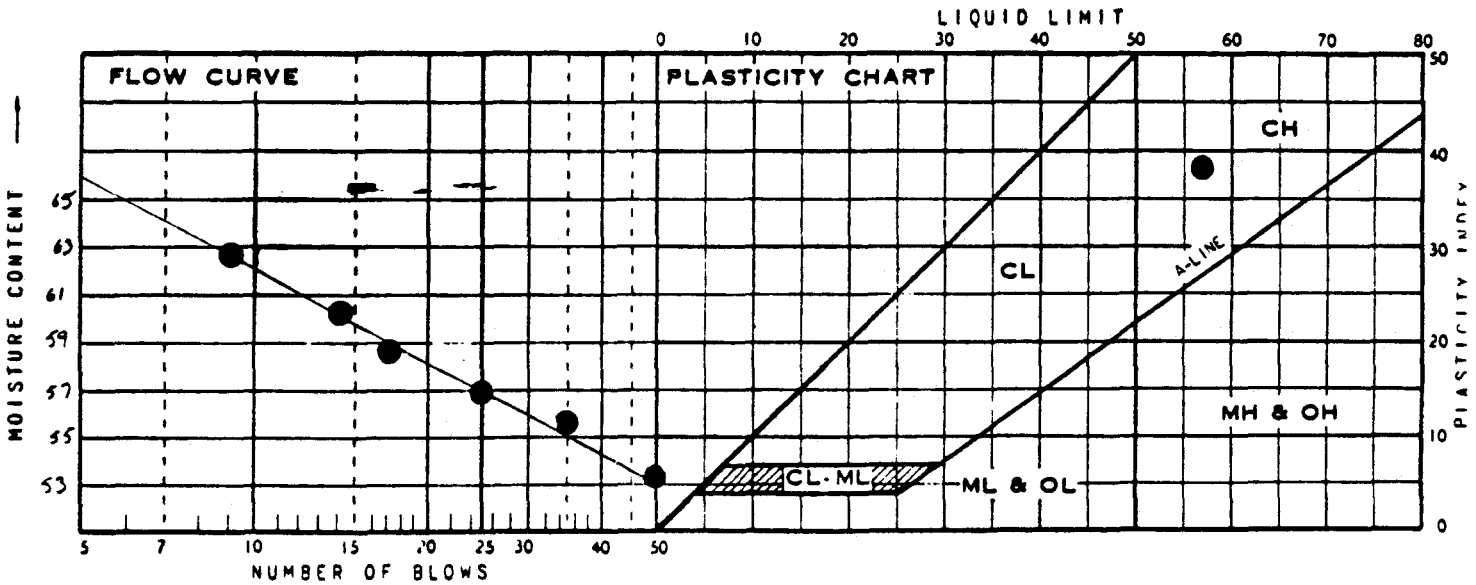
DETERMINATION	1	2	3	4	5	6
DISH	1C	14C	2057			
WT OF DISH + WET SOIL g	4.55	5.14	4.79			
WT OF DISH + DRY SOIL g	4.00	4.46	4.20	—	—	—
WT OF MOISTURE g	.55	.68	.59			
WT OF DISH g	1.08	1.04	1.06	—	—	—
WT OF DRY SOIL g	2.92	3.42	3.14			
MOISTURE CONTENT %	18.8	19.9	18.8			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	2043	39C	2037	2010	2061	2095
NUMBER OF BLOWS	50+	35	25	17	14	9
WT OF DISH + WET SOIL g	11.51	11.61	12.22	11.69	11.05	12.04
WT OF DISH + DRY SOIL g	7.87	7.83	8.16	7.76	7.29	7.80
WT OF MOISTURE g	3.64	3.78	4.06	3.93	3.76	4.24
WT OF DISH g	1.05	1.03	1.04	1.06	1.03	1.05
WT OF DRY SOIL g	6.82	6.80	7.12	6.70	8.26	6.75
MOISTURE CONTENT %	53.4	55.6	57.0	58.7	60.1	62.8



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		57.0	18.8	38.2	CH	

ADVANCED TERRA TESTING

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT **Weston**

JOB NO. 2066-03

BORING NO.	8+25	SAMPLED	Rocky Flats
DEPTH	18'	DATE TESTED	03-11-92 SR
SAMPLE NO.	#9	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

SB

MOISTURE DATA

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan	(g)	59.86
Wt. Dry Soil & Pan	(g)	58.20
Wt. Lost Moisture	(g)	1.66
Wt. of Pan Only	(g)	3.64
Wt. of Dry Soil	(g)	54.56
Moisture Content	%	3.0

Wt. Hydrom. Sample Wet (g)	60.00
Wt. Hydrom. Sample Dry (g)	58.23

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	652.63
Weight of + #10 Before Washing (g)	25.69
Weight of + #10 After Washing (g)	20.69
Weight of - #10 Wet (g)	626.94
Weight of - #10 Dry (g)	613.28
Wt. Total Sample Dry (g)	633.97
Calc. Wt. "W" (g)	60.19
Calc. Mass + #10	1.96

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	2.11	2.11	2.11	0.3	99.7
#4	0.00	7.14	7.14	9.25	1.5	98.5
#10	0.00	11.44	11.44	20.69	3.3	96.7
#20	1.57	5.40	3.83	3.83	9.6	90.4
#40	1.56	5.96	4.40	8.23	16.9	83.1
#60	1.56	5.19	3.63	11.86	23.0	77.0
#100	1.57	6.26	4.69	16.55	30.8	69.2
#230	1.57	8.84	7.27	23.82	42.8	57.2

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT **Weston**

JOB NO. 2066-03

BORING NO.	8+25	SAMPLED	Rocky Flats
DEPTH	18'	DATE TESTED	03-11-92 SR
SAMPLE NO.	#9	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

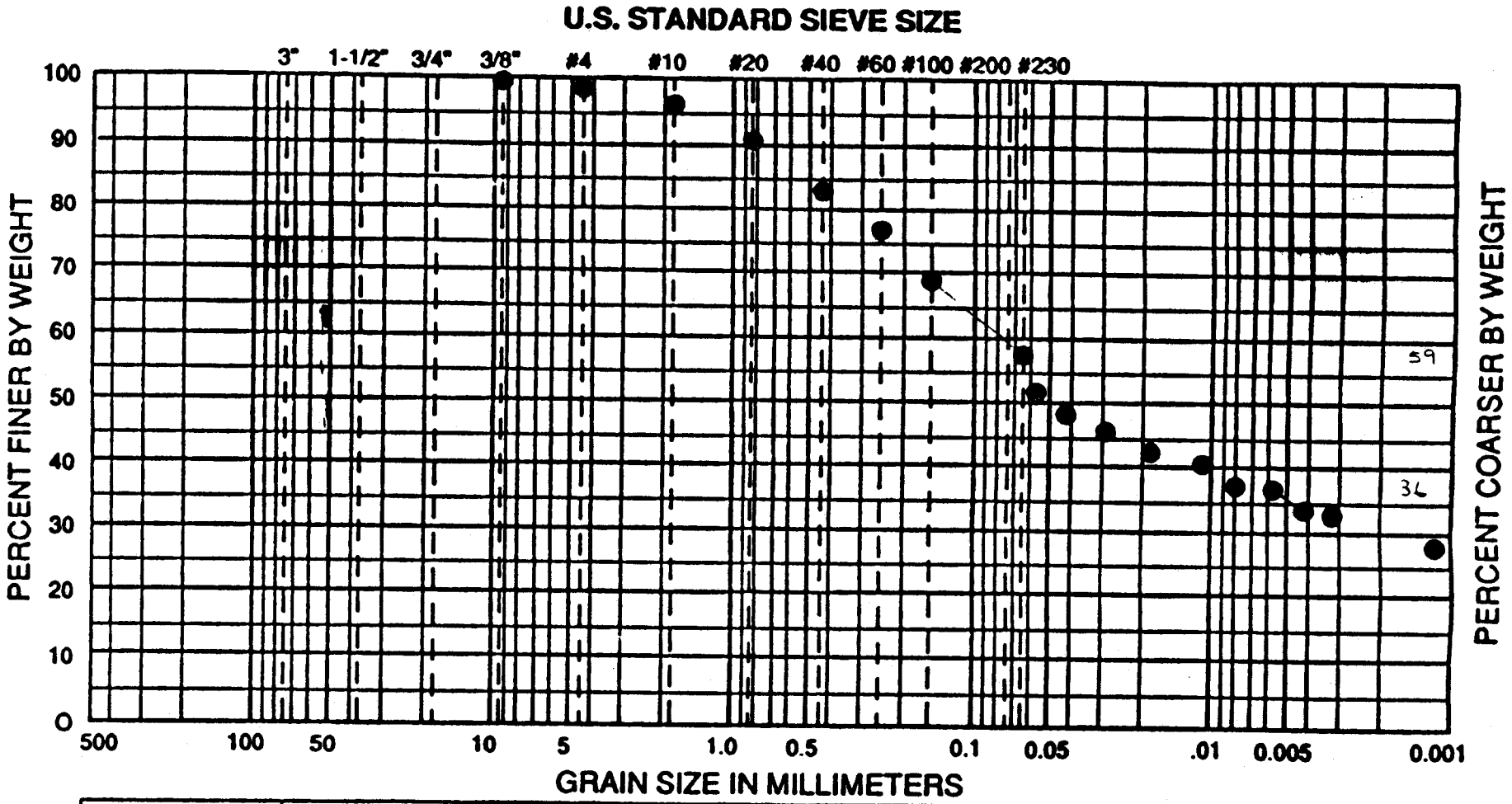
Hydrometer #	ASTM 152 H	Temp., Deg. C	22.0
Sp. Gr. of Soil	2.74	Temp. Coef. K	0.01298
Value of "a"	0.98	Wt. Dry Sample "W"	60.193
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	6.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	38.75	31.75	51.8	51.8	9.94	0.0579
1.0	36.75	29.75	48.5	48.5	10.26	0.0416
2.0	35.00	28.00	45.7	45.7	10.55	0.0298
5.0	33.00	26.00	42.4	42.4	10.88	0.0191
15.0	31.75	24.75	40.4	40.4	11.08	0.0112
30.0	30.00	23.00	37.5	37.5	11.37	0.0080
60.0	29.75	22.75	37.1	37.1	11.41	0.0057
120.0	27.75	20.75	33.9	33.9	11.74	0.0041
190.0	27.25	20.25	33.0	33.0	11.82	0.0032
1440.0	24.50	17.50	28.5	28.5	12.27	0.0012

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY
		COARSE	FINE	COARSE	MEDIUM	FINE	

WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 8+25 SAMPLE NO.: CH #9 DATE: 3-18-92 PROJECT NO.:

AREA	DEPTH	clayey sand CLASSIFICATION					
		GV - 1.5		S - 39.5		SL	CL
Rocky Flats	18'	0	1.5	1.8	13.6	24.1	23	36

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION - - - - - - - - - - - - - - - -

LABORATORY CLASSIFICATION - - - - - - - - - - - - -

JOB NO. [illegible]

CLIENT/OWNER Weston

LOCATION Rocky Flats

BORING 8-25 SAMPLE CH #9 DEPTH 18'

FIELD DENSITY BY ...../../..

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD [redacted]

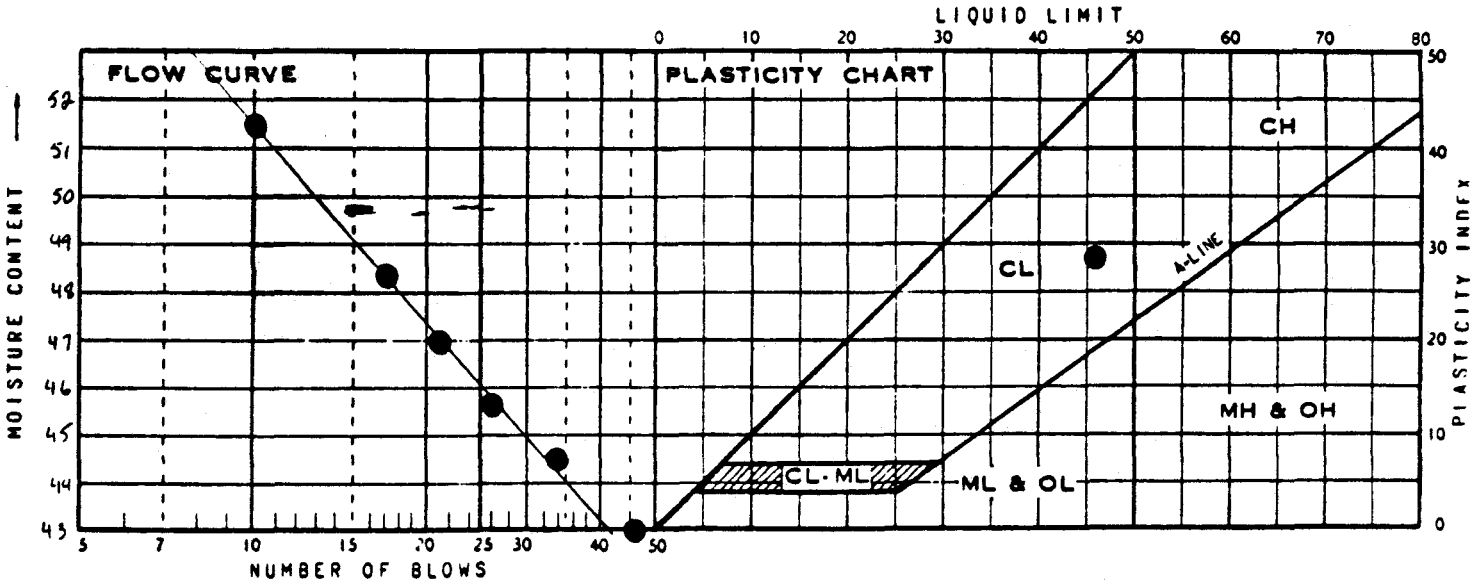
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY [illegible] 2/10/93

DETERMINATION	1	2	3	4	5	6
DISH	2003	7C	22			
WT OF DISH + WET SOIL g	5.56	6.70	5.78			
WT OF DISH + DRY SOIL g	4.89	5.88	5.07	—	—	—
WT OF MOISTURE g	.67	.82	.71			
WT OF DISH g	1.03	1.04	1.06	—	—	—
WT OF DRY SOIL g	3.86	4.84	4.01			
MOISTURE CONTENT %	17.4	16.9	17.7			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	2059	36C	2001	6C	2050	44C
NUMBER OF BLOWS	47	34	26	21	17	10
WT OF DISH + WET SOIL g	12.15	11.33	11.78	12.31	11.53	12.02
WT OF DISH + DRY SOIL g	8.81	8.16	8.42	8.72	8.11	8.30
WT OF MOISTURE g	3.34	3.17	3.36	3.59	3.42	3.72
WT OF DISH g	1.05	1.03	1.06	1.08	1.04	1.07
WT OF DRY SOIL g	7.76	7.13	7.36	7.64	7.07	7.23
MOISTURE CONTENT %	43.0	44.5	45.7	47.0	48.4	51.5



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		46.0	17.3	28.7	CL	

ADVANCED TERRA TESTING INC

JTM

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT **Weston**

JOB NO. 2066-03

BORING NO.	8+25	SAMPLED	Rocky Flats
DEPTH	21.5'	DATE TESTED	03-13-92 TNU
SAMPLE NO.	#9	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No
SB			

MOISTURE DATA

HYGROSCOPIC	Yes	
NATURAL	No	
Wt. Wet Soil & Pan	(g)	42.05
Wt. Dry Soil & Pan	(g)	41.13
Wt. Lost Moisture	(g)	0.92
Wt. of Pan Only	(g)	3.36
Wt. of Dry Soil	(g)	37.77
Moisture Content	%	2.4
Wt. Hydrom. Sample Wet	(g)	55.03
Wt. Hydrom. Sample Dry	(g)	53.72

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	766.17
Weight of + #10 Before Washing (g)	456.03
Weight of + #10 After Washing (g)	436.28
Weight of - #10 Wet (g)	310.14
Weight of - #10 Dry (g)	322.05
Wt. Total Sample Dry (g)	758.33
Calc. Wt. "W" (g)	126.51
Calc. Mass + #10	72.78

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	246.70	246.70	246.70	32.5	67.5
3/8"	0.00	76.71	76.71	323.41	42.6	57.4
#4	0.00	60.83	60.83	384.24	50.7	49.3
#10	0.00	52.04	52.04	436.28	57.5	42.5
#20	1.55	7.34	5.79	5.79	62.1	37.9
#40	1.57	11.29	9.72	15.51	69.8	30.2
#60	1.46	7.12	5.66	21.17	74.3	25.7
#100	1.56	6.16	4.60	25.77	77.9	22.1
#230	1.57	7.72	6.15	31.92	82.8	17.2

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ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT **Weston**

JOB NO. 2066-03

BORING NO.	8+25	SAMPLED	Rocky Flats
DEPTH	21.5'	DATE TESTED	03-13-92 TNU
SAMPLE NO.	#9	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

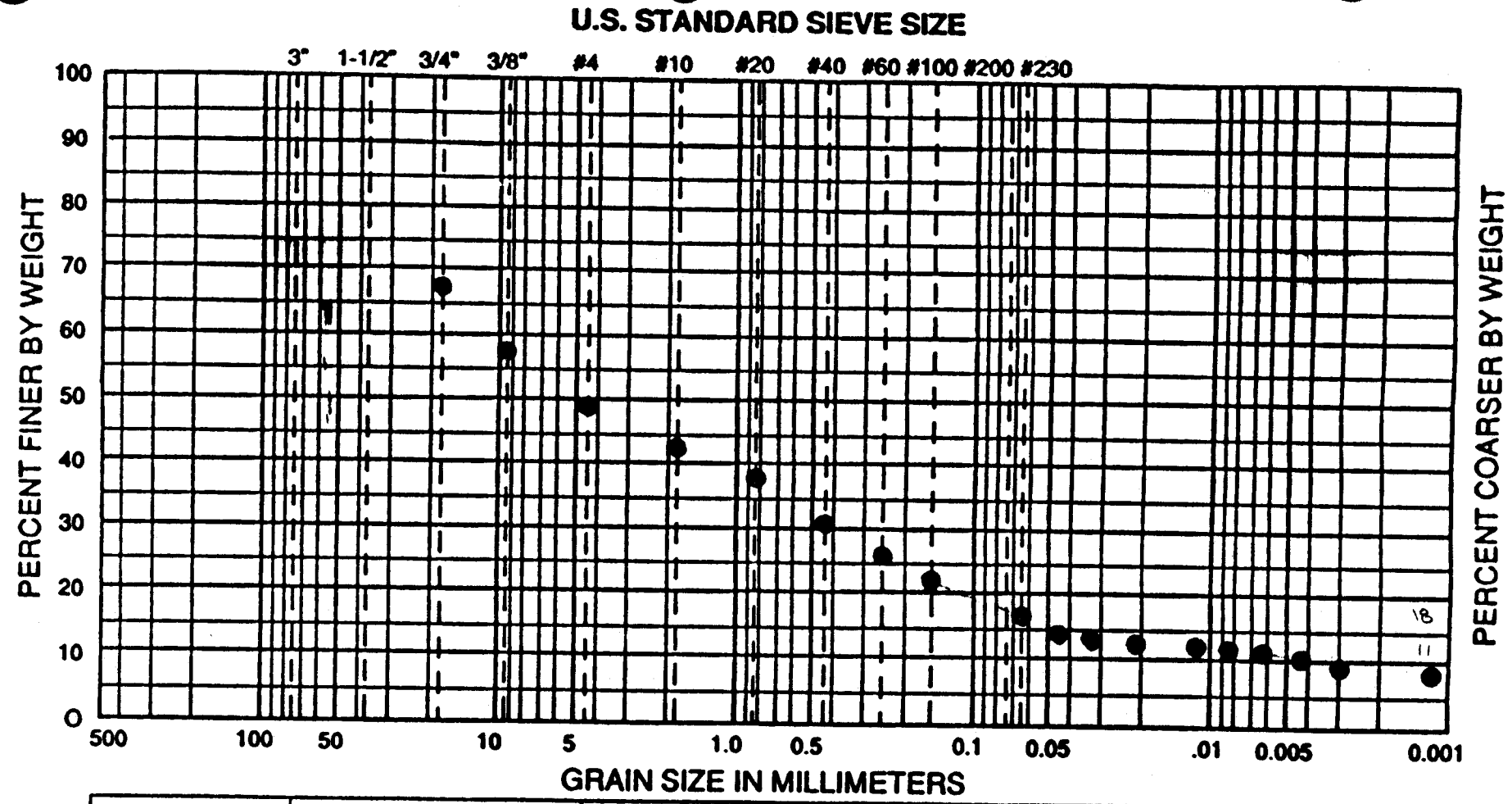
Hydrometer #	ASTM 152 H	Temp., Deg. C	22.0
Sp. Gr. of Soil	2.68	Temp. Coef. K	0.01320
Value of "a"	0.99	Wt. Dry Sample "W"	126.506
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	6.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	28.00	21.00	16.5	16.5	11.70	0.0638
1.0	26.00	19.00	14.9	14.9	12.03	0.0458
2.0	24.75	17.75	13.9	13.9	12.23	0.0326
5.0	23.00	16.00	12.6	12.6	12.52	0.0209
15.0	22.00	15.00	11.8	11.8	12.68	0.0121
30.0	21.25	14.25	11.2	11.2	12.81	0.0086
60.0	21.00	14.00	11.0	11.0	12.85	0.0061
120.0	20.00	13.00	10.2	10.2	13.01	0.0043
250.0	19.00	12.00	9.4	9.4	13.17	0.0030
1440.0	18.00	11.00	8.6	8.6	13.34	0.0013

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY			
		COARSE	FINE	COARSE	MEDIUM	FINE				
WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 8+25 SAMPLE NO.: CH#9 DATE: 3-14-92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION						
		Sandy Gravel						
		GW - 50.7		SS - 31.3			SL	CL
Rocky Flats	21.5'	32.5	18.2	6.8	12.3	12.7	7	11

FIELD CLASSIFICATION _____

LABORATORY CLASSIFICATION _____

JOB NO. _____

CLIENT/OWNER Weston

LOCATION Rocky Flats

BORING 8-25 SAMPLE CH #9 DEPTH 21.5'

FIELD DENSITY BY ____/__/__

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

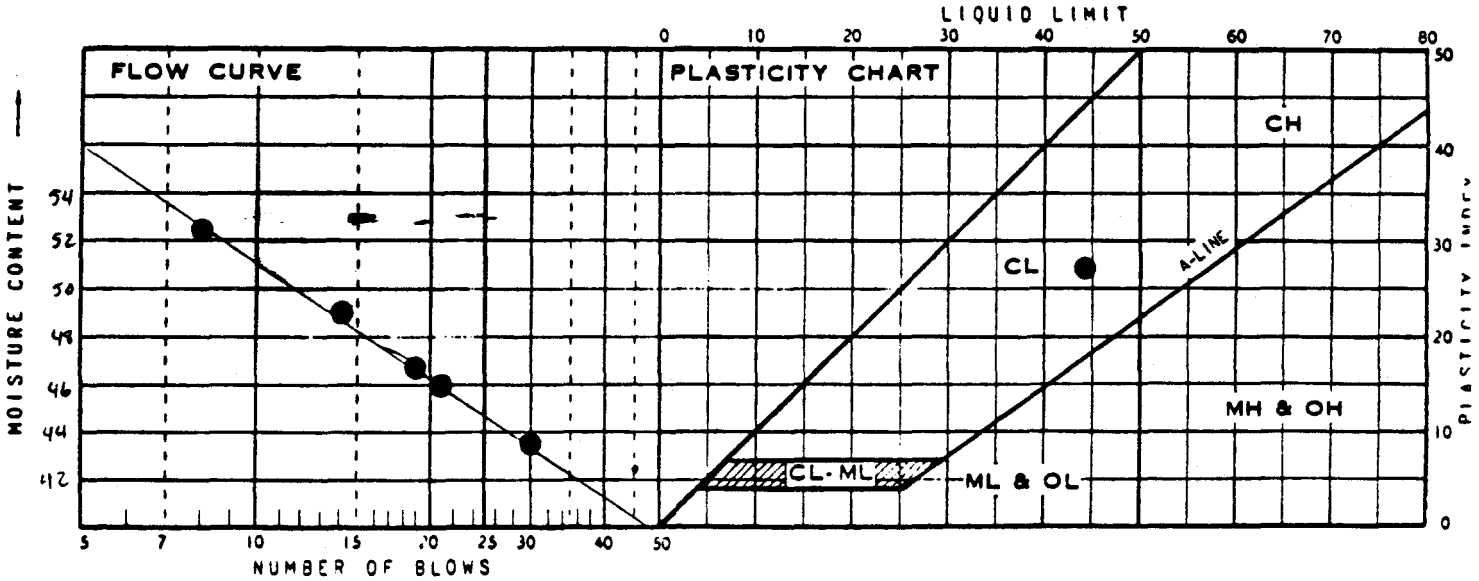
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY DH 3/10/92

DETERMINATION	1	2	3	4	5	6
DISH	0C	2071	2038			
WT OF DISH + WET SOIL g	6.83	7.19	7.24			
WT OF DISH + DRY SOIL g	6.00	6.28	6.31	—	—	—
WT OF MOISTURE g	.83	.91	.93			
WT OF DISH g	1.05	1.05	1.06	—	—	—
WT OF DRY SOIL g	4.95	5.23	5.25			
MOISTURE CONTENT %	16.8	17.4	17.7			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	24C	2027	2040	12C	2063	31C
NUMBER OF BLOWS	46	30	21	19	14	8
WT OF DISH + WET SOIL g	10.69	9.63	10.00	11.30	11.77	11.31
WT OF DISH + DRY SOIL g	7.81	7.02	7.18	8.03	8.24	7.78
WT OF MOISTURE g	2.88	2.61	2.82	3.27	3.53	3.53
WT OF DISH g	1.04	1.05	1.05	1.05	1.06	1.05
WT OF DRY SOIL g	6.77	5.97	6.13	6.98	7.18	6.73
MOISTURE CONTENT %	42.5	43.7	46.0	46.8	49.2	52.5



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		44.7	17.3	27.4	CL	

ADVANCED TERRA TESTING INC

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT **Weston**

JOB NO. 2066-03

BORING NO.	8+25	SAMPLED	Rocky Flats
DEPTH	25.5	DATE TESTED	03-13-92 TNU
SAMPLE NO.	#9	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

SB

MOISTURE DATA

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan	(g)	41.15
Wt. Dry Soil & Pan	(g)	40.00
Wt. Lost Moisture	(g)	1.15
Wt. of Pan Only	(g)	3.75
Wt. of Dry Soil	(g)	36.25
Moisture Content	%	3.2

Wt. Hydrom. Sample Wet (g)	55.05
Wt. Hydrom. Sample Dry (g)	53.36

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	55.05
Weight of + #10 Before Washing (g)	0.00
Weight of + #10 After Washing (g)	0.00
Weight of - #10 Wet (g)	55.05
Weight of - #10 Dry (g)	53.36
Wt. Total Sample Dry (g)	53.36
Calc. Wt. "W" (g)	53.36
Calc. Mass + #10	0.00

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	0.00	0.00	0.00	0.0	100.0
#4	0.00	0.00	0.00	0.00	0.0	100.0
#10	0.00	0.00	0.00	0.00	0.0	100.0
#20	1.31	1.36	0.05	0.05	0.1	99.9
#40	1.29	1.60	0.31	0.36	0.7	99.3
#60	1.31	1.56	0.25	0.61	1.1	98.9
#100	1.31	1.59	0.28	0.89	1.7	98.3
#230	1.55	6.51	4.96	5.85	11.0	89.0

CLAYEY SILT (CH)

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT **Weston**

JOB NO. 2066-03

BORING NO.	8+25	SAMPLED	Rocky Flats
DEPTH	25.5	DATE TESTED	03-13-92 TNU
SAMPLE NO.	#9	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

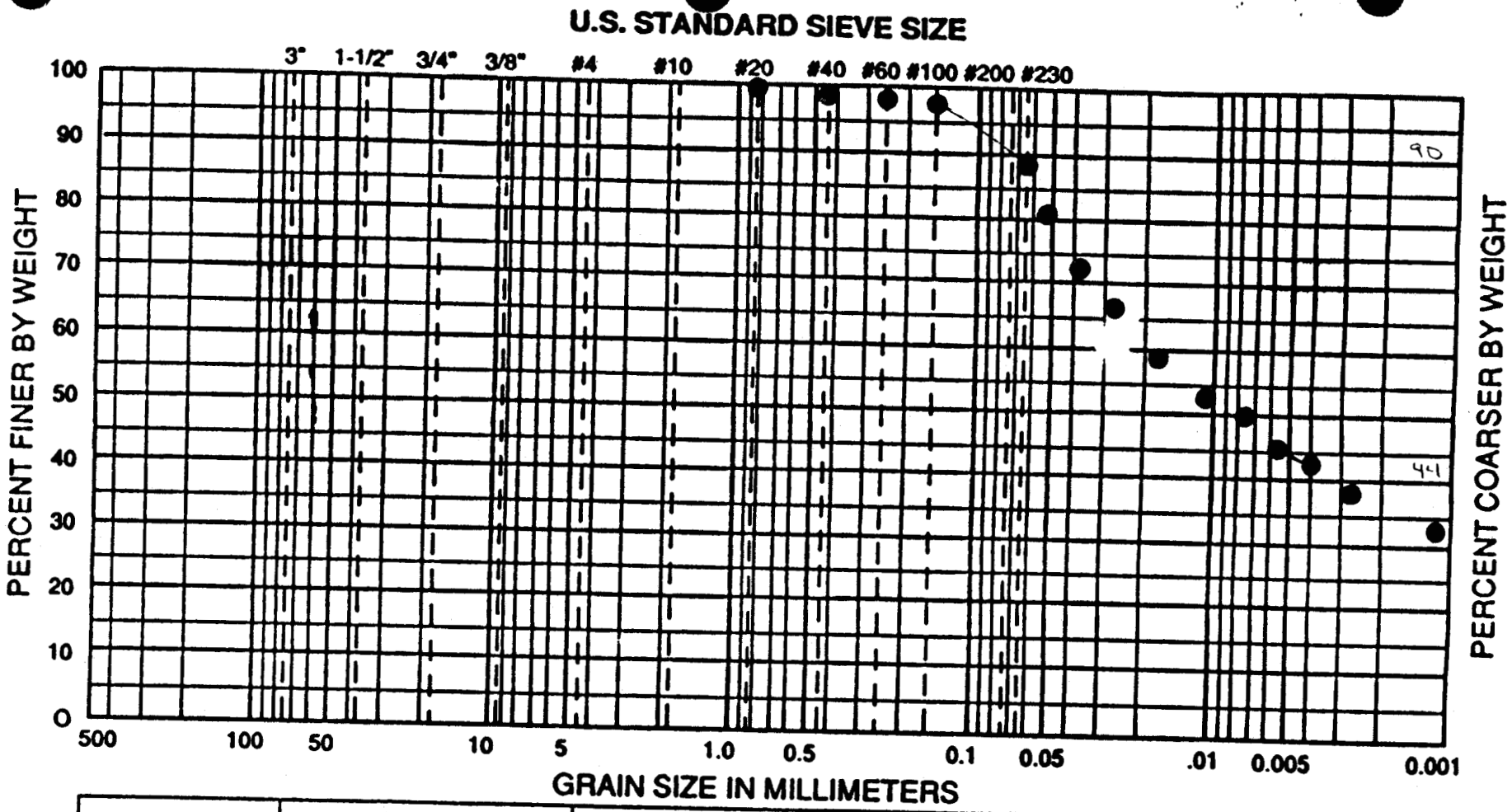
Hydrometer #	ASTM 152 H	Temp., Deg. C	22.0
Sp. Gr. of Soil	2.71	Temp. Coef. K	0.01308
Value of "a"	0.99	Wt. Dry Sample "W"	53.358
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	6.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	50.50	43.50	80.5	80.5	8.01	0.0523
1.0	46.00	39.00	72.2	72.2	8.75	0.0387
2.0	42.75	35.75	66.2	66.2	9.28	0.0282
5.0	39.00	32.00	59.3	59.3	9.89	0.0184
15.0	35.50	28.50	52.8	52.8	10.47	0.0109
30.0	34.00	27.00	50.0	50.0	10.71	0.0078
60.0	31.50	24.50	45.4	45.4	11.12	0.0056
120.0	30.00	23.00	42.6	42.6	11.37	0.0040
250.0	28.00	21.00	38.9	38.9	11.70	0.0028
1440.0	25.00	18.00	33.3	33.3	12.19	0.0012

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY
		COARSE	FINE	COARSE	MEDIUM	FINE	

WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 8+25 SAMPLE NO.: CH # 9 DATE: 3-18-92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION					
		clayey silt					
		GV - 0		S - 10		SL	CL
Rocky Flats	25.5'	0	0	0	0.7	7.3	46	44

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION _____

LABORATORY CLASSIFICATION _____

JOB NO. 2066-03

CLIENT/OWNER Weston

LOCATION Rocky Flats

BORING 8+25 SAMPLE CH#9 DEPTH 25.5'

FIELD DENSITY BY ___/__/__

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

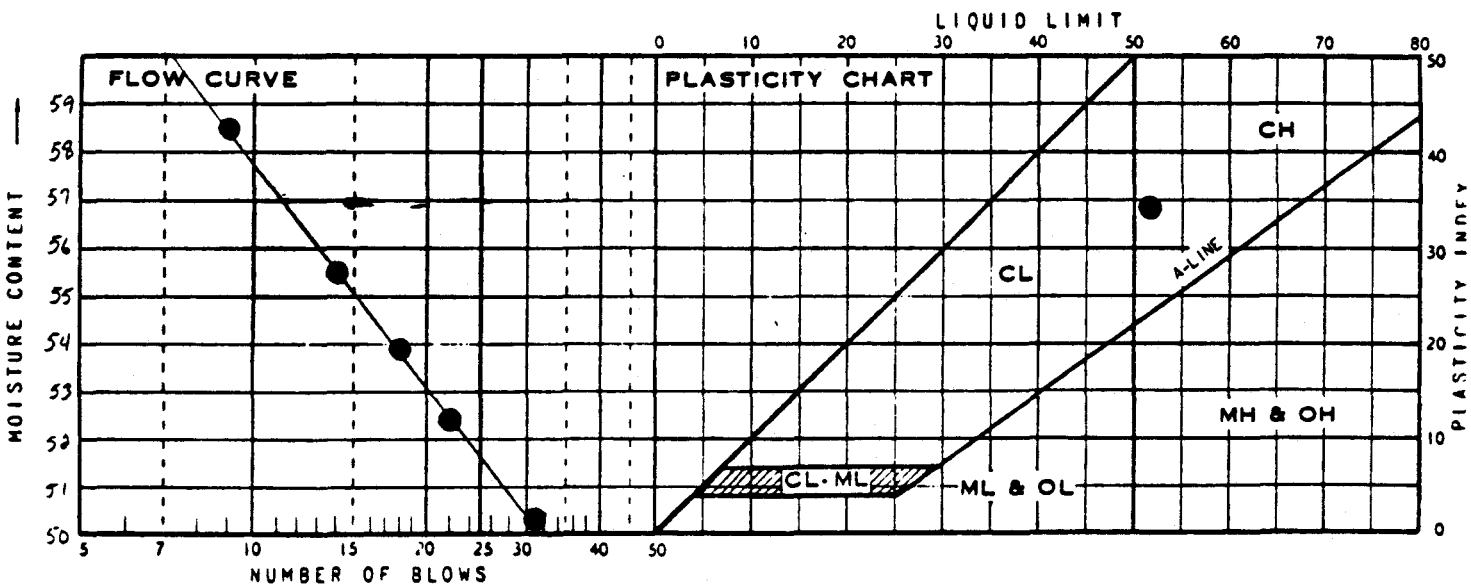
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY DU 3/10/92

DETERMINATION	1	2	3	4	5	6
DISH	2004	2014	2007			
WT OF DISH + WET SOIL g	5.99	5.81	5.32			
WT OF DISH + DRY SOIL g	5.26	5.14	4.68	—	—	—
WT OF MOISTURE g	.73	.67	.64			
WT OF DISH g	1.05	1.07	1.05	—	—	—
WT OF DRY SOIL g	4.21	4.07	3.63			
MOISTURE CONTENT %	17.3	16.5	17.6			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	66C	10C	2017	37C	15g	20C
NUMBER OF BLOWS	31	22	18	14	9	
WT OF DISH + WET SOIL g	12.52	11.86	12.77	12.50	11.89	
WT OF DISH + DRY SOIL g	8.68	8.14	8.66	8.40	7.89	—
WT OF MOISTURE g	3.84	3.72	4.11	4.10	4.00	
WT OF DISH g	1.06	1.04	1.03	1.03	1.05	1.02
WT OF DRY SOIL g	7.62	7.10	7.63	7.37	6.84	
MOISTURE CONTENT %	50.4	52.4	53.9	55.6	58.5	



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		51.7	17.1	34.6	CH	

ADVANCED TERRA TESTING INC

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT **Weston**

JOB NO. 2066-03

BORING NO.	8+25	SAMPLED	Rocky Flats
DEPTH	35'	DATE TESTED	03-11-92 RL
SAMPLE NO.	#9	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

OB

MOISTURE DATA

HYGROSCOPIC	Yes	
NATURAL	No	
Wt. Wet Soil & Pan	(g)	39.36
Wt. Dry Soil & Pan	(g)	38.14
Wt. Lost Moisture	(g)	1.22
Wt. of Pan Only	(g)	3.74
Wt. of Dry Soil	(g)	34.40
Moisture Content	%	3.5
Wt. Hydrom. Sample Wet	(g)	55.04
Wt. Hydrom. Sample Dry	(g)	53.16

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	55.04
Weight of + #10 Before Washing (g)	0.00
Weight of + #10 After Washing (g)	0.00
Weight of - #10 Wet (g)	55.04
Weight of - #10 Dry (g)	53.16
Wt. Total Sample Dry (g)	53.16
Calc. Wt. "W" (g)	53.16
Calc. Mass + #10	0.00

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	0.00	0.00	0.00	0.0	100.0
#4	0.00	0.00	0.00	0.00	0.0	100.0
#10	0.00	0.00	0.00	0.00	0.0	100.0
#20	1.57	1.59	0.02	0.02	0.0	100.0
#40	1.57	1.62	0.05	0.07	0.1	99.9
#60	1.55	1.58	0.03	0.10	0.2	99.8
#100	1.55	2.32	0.77	0.87	1.6	98.4
#230	1.57	7.22	5.65	6.52	12.3	87.7

Silty Clay

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT **Weston** JOB NO. 2066-03

BORING NO.	8+25	SAMPLED	Rocky Flats
DEPTH	35'	DATE TESTED	03-11-92 RL
SAMPLE NO.	#9	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

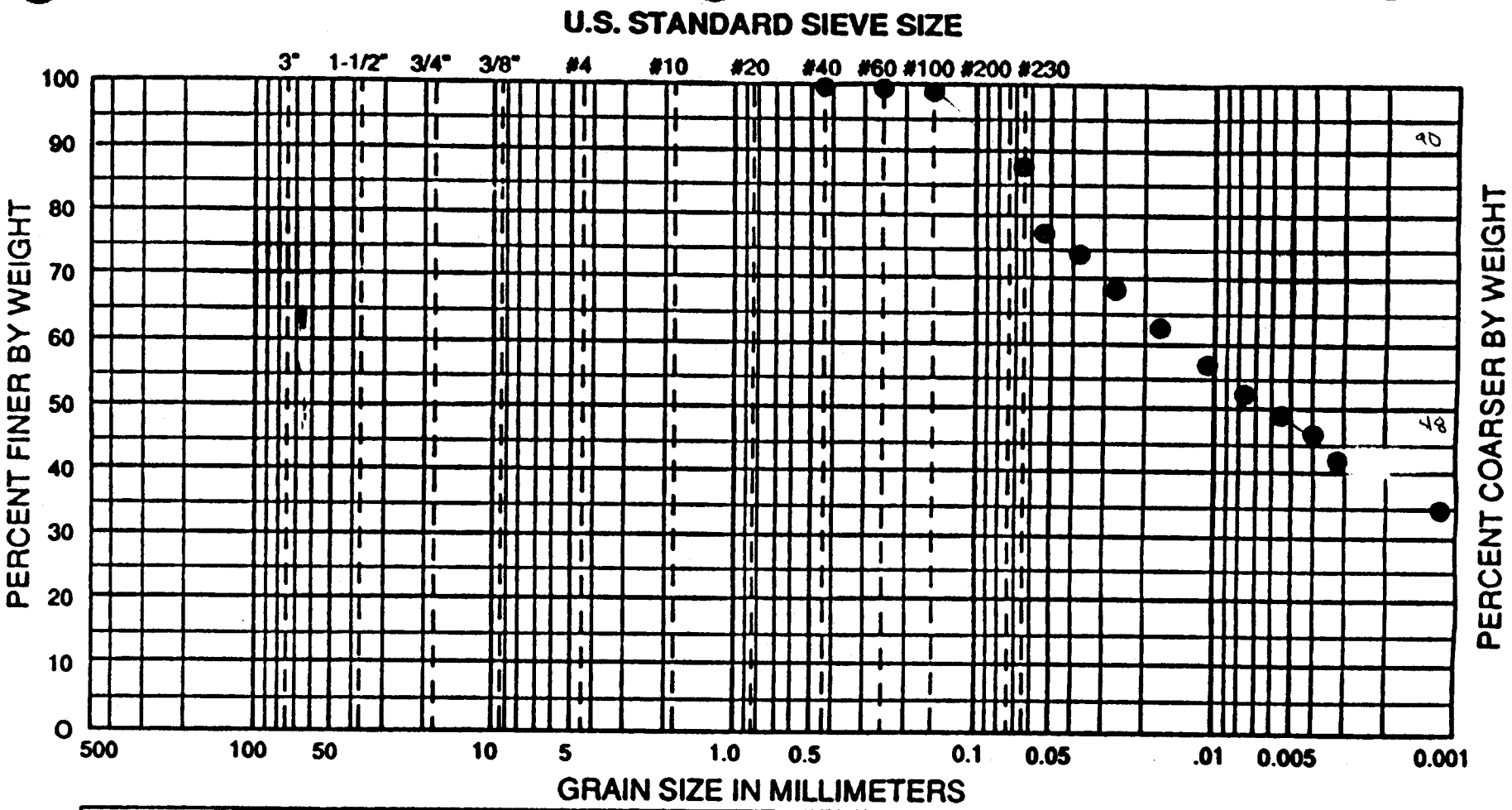
Hydrometer #	ASTM 152 H	Temp., Deg. C	21.0
Sp. Gr. of Soil	2.75	Temp. Coef. K	0.01309
Value of "a"	0.98	Wt. Dry Sample "W"	53.158
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	6.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	49.00	42.00	77.4	77.4	8.25	0.0532
1.0	47.50	40.50	74.7	74.7	8.50	0.0382
2.0	44.00	37.00	68.2	68.2	9.07	0.0279
5.0	41.00	34.00	62.7	62.7	9.57	0.0181
15.0	38.00	31.00	57.2	57.2	10.06	0.0107
30.0	35.50	28.50	52.5	52.5	10.47	0.0077
60.0	33.75	26.75	49.3	49.3	10.76	0.0055
120.0	32.00	25.00	46.1	46.1	11.04	0.0040
190.0	30.00	23.00	42.4	42.4	11.37	0.0032
1440.0	26.00	19.00	35.0	35.0	12.03	0.0012

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY
		COARSE	FINE	COARSE	MEDIUM	FINE	

WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 8-25 SAMPLE NO.: CH #9 DATE: 5-18-92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION						
		silty clay						
		GV - 0		S - 10			SL	CL
Rocky Flats	35.0'	0	0	0	0.1	9.9	42	48

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION _____

LABORATORY CLASSIFICATION _____

JOB NO. 2066-03

CLIENT/OWNER WESTON

LOCATION _____

BORING B+25 SAMPLE CH #9 DEPTH 35'

FIELD DENSITY BY ___/__/__

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD → [redacted]

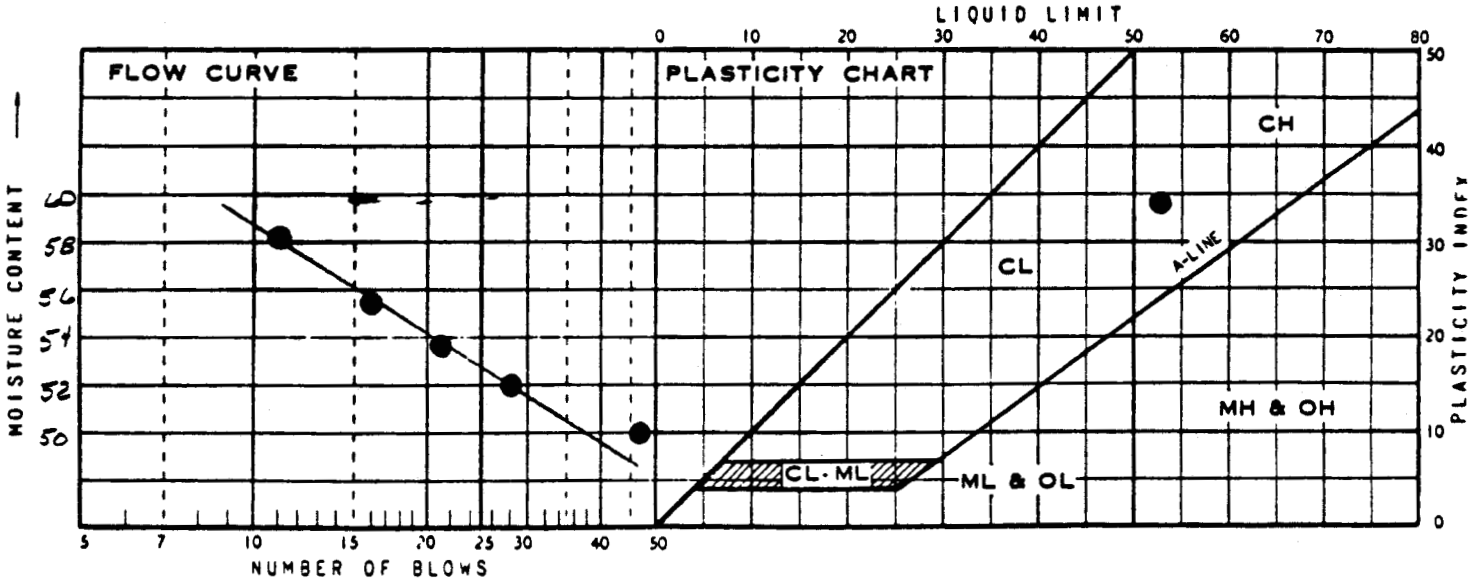
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY SR 3/6/92

DETERMINATION	1	2	3	4	5	6
DISH	2011	2043	2053			
WT OF DISH + WET SOIL g	6.47	6.46	7.39			
WT OF DISH + DRY SOIL g	5.67	5.60	6.35	—	—	—
WT OF MOISTURE g	.80	.86	1.04			
WT OF DISH g	1.05	1.05	1.05	—	—	—
WT OF DRY SOIL g	4.62	4.55	5.30			
MOISTURE CONTENT %	17.3	18.9	19.6			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	2057	1C	2061	2037	2095	
NUMBER OF BLOWS	46	28	21	16	11	
WT OF DISH + WET SOIL g	16.94	14.39	14.26	15.93	17.39	
WT OF DISH + DRY SOIL g	11.63	9.83	9.63	10.62	11.39	—
WT OF MOISTURE g	5.31	4.56	4.63	5.31	6.00	
WT OF DISH g	1.05	1.06	1.03	1.05	1.06	—
WT OF DRY SOIL g	10.58	8.77	8.60	9.57	10.33	
MOISTURE CONTENT %	50.2	52.0	53.8	55.5	58.1	



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		52.8	18.6	34.2	CH	

ADVANCED TERRA TESTING

JFM

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	8+25	SAMPLED	Rocky Flats
DEPTH	45'	DATE TESTED	03-20-92 TNU
SAMPLE NO.	#13	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan	(g)	35.29
Wt. Dry Soil & Pan	(g)	34.26
Wt. Lost Moisture	(g)	1.03
Wt. of Pan Only	(g)	3.72
Wt. of Dry Soil	(g)	30.54
Moisture Content	%	3.4

Wt. Hydrom. Sample Wet (g)	55.09
Wt. Hydrom. Sample Dry (g)	53.29

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	55.09
Weight of + #10 Before Washing (g)	0.00
Weight of - #10 After Washing (g)	0.00
Weight of - #10 Wet (g)	55.09
Weight of - #10 Dry (g)	53.29
Wt. Total Sample Dry (g)	53.29
Calc. Wt. "W" (g)	53.29
Calc. Mass + #10	0.00

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	0.00	0.00	0.00	0.0	100.0
#4	0.00	0.00	0.00	0.00	0.0	100.0
#10	0.00	0.00	0.00	0.00	0.0	100.0
#20	1.57	2.01	0.44	0.44	0.8	99.2
#40	1.56	2.95	1.39	1.83	3.4	96.6
#60	1.30	2.10	0.80	2.63	4.9	95.1
#100	1.31	1.81	0.50	3.13	5.9	94.1
#230	1.57	2.17	0.60	3.73	7.0	93.0

Clay (CH)

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT **Weston**

JOB NO. 2066-03

BORING NO.	8+25	SAMPLED	Rocky Flats
DEPTH	45'	DATE TESTED	03-20-92 TNU
SAMPLE NO.	#13	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

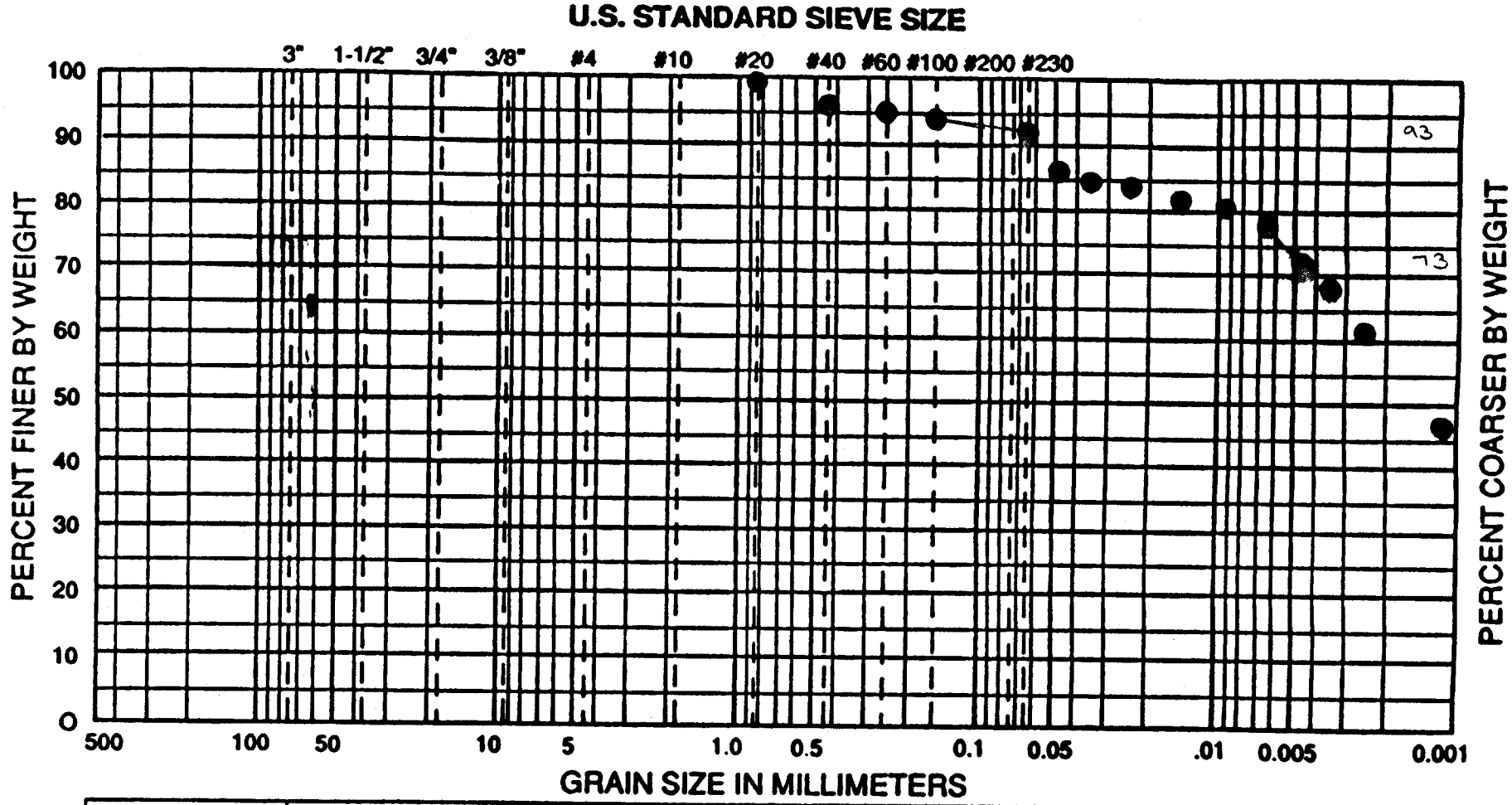
Hydrometer #	ASTM 152 H	Temp., Deg. C	22.0
Sp. Gr. of Soil	2.83	Temp. Coef. K	0.01265
Value of "a"	0.96	Wt. Dry Sample "W"	53.290
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	5.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	53.50	47.50	85.9	85.9	7.52	0.0490
1.0	53.00	47.00	85.0	85.0	7.60	0.0349
2.0	52.50	46.50	84.1	84.1	7.68	0.0248
5.0	52.00	46.00	83.2	83.2	7.76	0.0158
15.0	51.00	45.00	81.4	81.4	7.93	0.0092
30.0	49.00	43.00	77.8	77.8	8.25	0.0066
60.0	46.50	40.50	73.3	73.3	8.66	0.0048
120.0	44.00	38.00	68.7	68.7	9.07	0.0035
250.0	40.00	34.00	61.5	61.5	9.73	0.0025
1440.0	32.50	26.50	47.9	47.9	10.96	0.0011

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY		
		COARSE	FINE	COARSE	MEDIUM	FINE			
WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 8+25 SAMPLE NO.: CH #13 DATE: 3-27-92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION			
		Clay GV-0	S-7.0	SL	CL
	45.0'	0 0 Rocky Flats/ EG+G	0 3.4 3.6	20	43

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION _____

LABORATORY CLASSIFICATION _____

JOB NO. 2066-03

CLIENT/OWNER Weston

LOCATION Rocky Flats

BORING 8-25 SAMPLE CH #13 DEPTH 45'

FIELD DENSITY BY ___/__/__

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD [redacted]

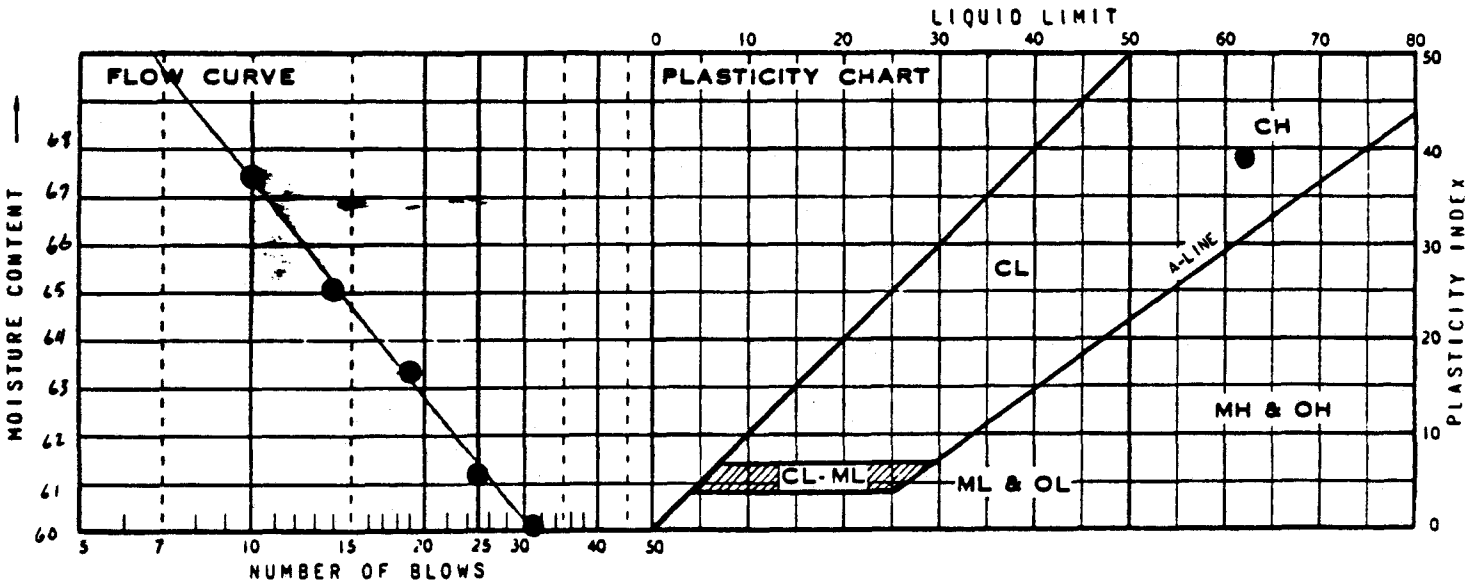
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY DM 3/23/92

DETERMINATION	? 1 ?	2	3	4	5	6
DISH	2050	2027	2032			
WT OF DISH + WET SOIL g	5.58	4.99	5.94			
WT OF DISH + DRY SOIL g	4.81	4.28	5.06	—	—	—
WT OF MOISTURE g	.77	.71	.88			
WT OF DISH g	1.04	1.05	1.05	—	—	—
WT OF DRY SOIL g	3.77	3.23	4.01			
MOISTURE CONTENT %	20.4	22.0	21.9			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	2061	2040	15a	2072	2001	
NUMBER OF BLOWS	31	25	19	14	10	
WT OF DISH + WET SOIL g	12.30	12.39	12.32	11.97	12.14	
WT OF DISH + DRY SOIL g	8.07	8.08	7.95	7.66	7.68	—
WT OF MOISTURE g	4.23	4.31	4.37	4.31	4.46	
WT OF DISH g	1.03	1.04	1.05	1.04	1.06	—
WT OF DRY SOIL g	7.04	7.04	6.90	6.62	6.62	
MOISTURE CONTENT %	60.1	61.2	63.3	65.1	67.4	



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		61.4	22.0	39.4	CH	

ADVANCED TERRA TESTING

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT **Weston**

JOB NO. 2066-03

BORING NO.	8+25	SAMPLED	Rocky Flats
DEPTH	55'	DATE TESTED	03-20-92 TNU
SAMPLE NO.	#13	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC	Yes	
NATURAL	No	
Wt. Wet Soil & Pan	(g)	36.40
Wt. Dry Soil & Pan	(g)	35.34
Wt. Lost Moisture	(g)	1.06
Wt. of Pan Only	(g)	3.83
Wt. of Dry Soil	(g)	31.51
Moisture Content	%	3.4
Wt. Hydrom. Sample Wet	(g)	55.07
Wt. Hydrom. Sample Dry	(g)	53.28

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	538.74
Weight of + #10 Before Washing (g)	26.54
Weight of + #10 After Washing (g)	23.31
Weight of - #10 Wet (g)	512.20
Weight of - #10 Dry (g)	498.66
Wt. Total Sample Dry (g)	521.97
Calc. Wt. "W" (g)	55.75
Calc. Mass + #10	2.47

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	18.11	18.11	18.11	3.5	96.5
#4	0.00	0.92	0.92	19.03	3.6	96.4
#10	0.00	4.11	4.11	23.14	4.4	95.6
#20	1.56	1.96	0.40	0.40	5.2	94.8
#40	1.57	2.46	0.89	1.29	6.7	93.3
#60	1.57	2.51	0.94	2.23	8.4	91.6
#100	1.56	2.08	0.52	2.75	9.4	90.6
#230	1.56	5.14	3.58	6.33	15.8	84.2

Silty Clay (CH)

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT	**Weston**	JOB NO.	2066-03
BORING NO.	8+25	SAMPLED	Rocky Flats
DEPTH	55'	DATE TESTED	03-20-92 TNU
SAMPLE NO.	#13	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

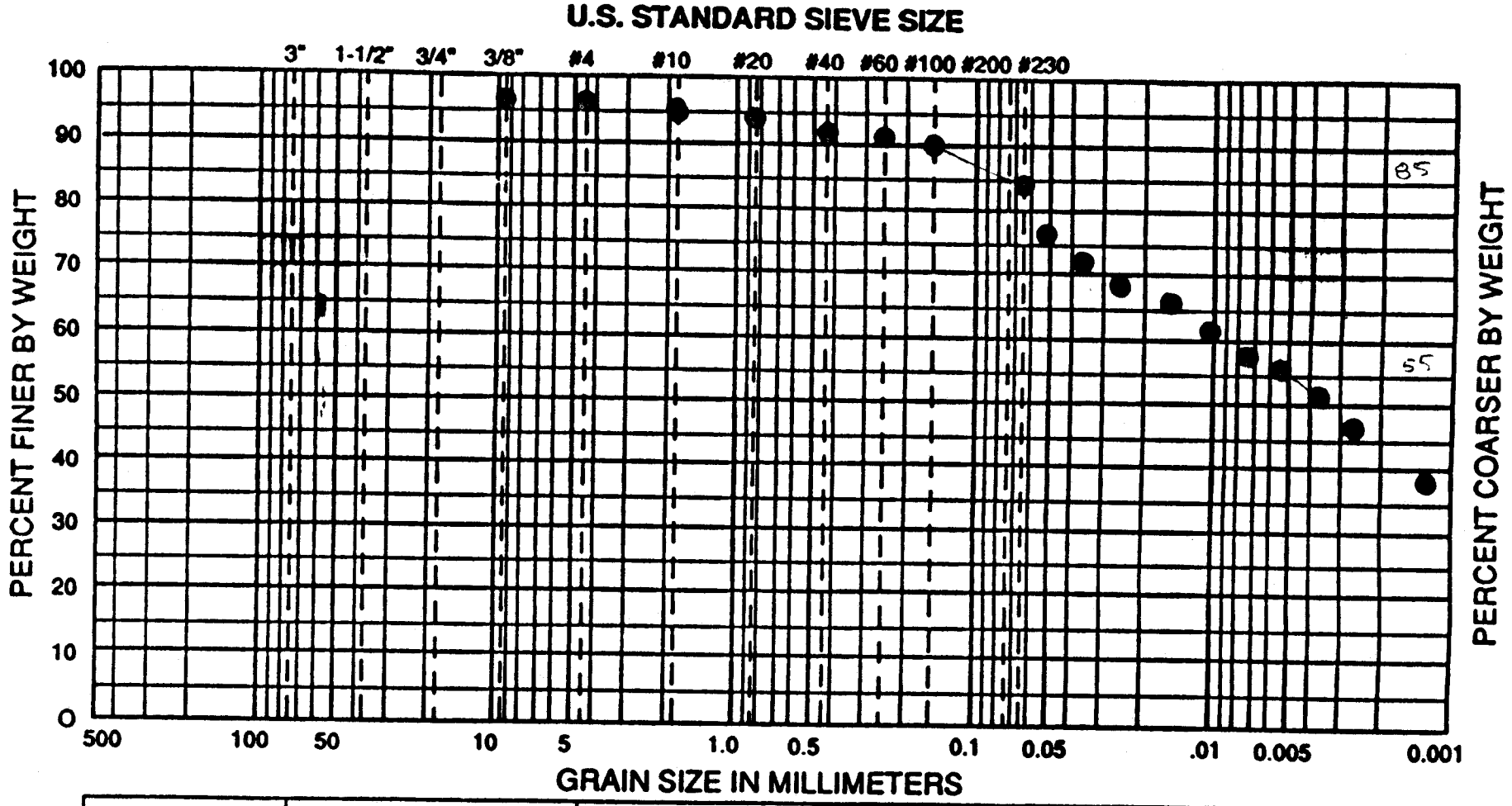
Hydrometer #	ASTM 152 H	Temp., Deg. C	22.0
Sp. Gr. of Soil	2.79	Temp. Coef. K	0.01280
Value of "a"	0.97	Wt. Dry Sample "W"	55.750
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	5.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	50.50	44.50	77.6	77.6	8.01	0.0512
1.0	48.00	42.00	73.2	73.2	8.42	0.0371
2.0	45.50	39.50	68.9	68.9	8.83	0.0269
5.0	44.00	38.00	66.3	66.3	9.07	0.0172
15.0	41.50	35.50	61.9	61.9	9.48	0.0102
30.0	39.50	33.50	58.4	58.4	9.81	0.0073
60.0	38.00	32.00	55.8	55.8	10.06	0.0052
120.0	36.00	30.00	52.3	52.3	10.39	0.0038
250.0	33.00	27.00	47.1	47.1	10.88	0.0027
1440.0	28.00	22.00	38.4	38.4	11.70	0.0012

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY		
		COARSE	FINE	COARSE	MEDIUM	FINE			
WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 8+25 SAMPLE NO.: CH#13 DATE: 3-27-92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION
	55.0'	silty clay 0 3.6 3.6 / 0.8 11.4 2.3 8.3 / 30 55 Rocky Flats / EG&G

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION - - - - - - - - - - - - - - - -

LABORATORY CLASSIFICATION - - - - - - - - - - - - -

JOB NO. 2066-03
CLIENT/OWNER Weston
LOCATION Rocky Flats
BORING B-25 SAMPLE #13 DEPTH @ 55'

FIELD DENSITY BY ___/___/___

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD [redacted]

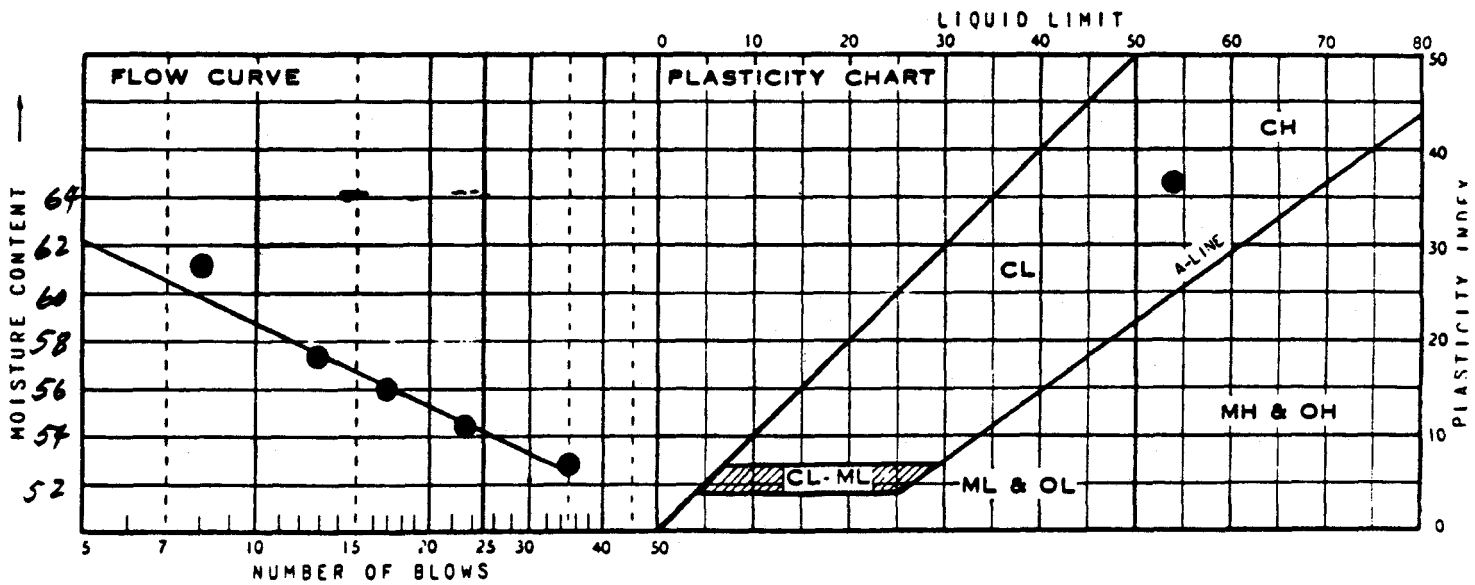
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY [illegible] 3/23/92

DETERMINATION	1	2	3	4	5	6
DISH	44C	2052	B12			
WT OF DISH + WET SOIL g	6.68	6.20	6.84			
WT OF DISH + DRY SOIL	5.83	5.45	5.96	—	—	—
WT OF MOISTURE	0.85	0.75	0.88			
WT OF DISH	1.04	1.03	1.04	—	—	—
WT OF DRY SOIL	4.79	4.42	4.92			
MOISTURE CONTENT %	17.8	17.0	17.9	= 52.7/3 =	17.6	

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	2023	34CX	29C	32C	2009	2056
NUMBER OF BLOWS	30	35	23	17	13	8+
WT OF DISH + WET SOIL g	7.82	9.04	10.80	10.08	10.44	12.57
WT OF DISH + DRY SOIL	5.50	6.28	7.37	6.83	7.01	8.19
WT OF MOISTURE	2.32	2.76	3.43	3.25	3.43	4.38
WT OF DISH	1.05	1.03	1.05	1.03	1.04	1.04
WT OF DRY SOIL	4.45	5.25	6.32	5.80	5.97	7.15
MOISTURE CONTENT %	52.1	52.6	54.3	56.0	57.4	61.3



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		54.2	17.6	36.6	CH	

ADVANCED TERRA TESTING

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MECHANICAL ANALYSIS - SIEVE TEST DATA

BR

CLIENT **Weston**

JOB NO. 2066-03

BORING NO.	8+25	SAMPLED	Rocky Flats
DEPTH	56.1'	DATE TESTED	03-20-92 TNU
SAMPLE NO.	#13	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan	(g)	36.74
Wt. Dry Soil & Pan	(g)	35.69
Wt. Lost Moisture	(g)	1.05
Wt. of Pan Only	(g)	3.66
Wt. of Dry Soil	(g)	32.03
Moisture Content	%	3.3

Wt. Hydrom. Sample Wet (g)	55.08
Wt. Hydrom. Sample Dry (g)	53.33

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	55.08
Weight of + #10 Before Washing (g)	0.00
Weight of + #10 After Washing (g)	0.00
Weight of - #10 Wet (g)	55.08
Weight of - #10 Dry (g)	53.33
Wt. Total Sample Dry (g)	53.33
Calc. Wt. "W" (g)	53.33
Calc. Mass + #10	0.00

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	0.00	0.00	0.00	0.0	100.0
#4	0.00	0.00	0.00	0.00	0.0	100.0
#10	0.00	0.00	0.00	0.00	0.0	100.0
#20	1.56	1.57	0.01	0.01	0.0	100.0
#40	1.56	1.57	0.01	0.02	0.0	100.0
#60	1.56	1.58	0.02	0.04	0.1	99.9
#100	1.54	1.58	0.04	0.08	0.2	99.8
#230	1.56	3.22	1.66	1.74	3.3	96.7

Cornstone

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT **Weston** JOB NO. 2066-03

BORING NO.	8+25	SAMPLED	Rocky Flats
DEPTH	56.1'	DATE TESTED	03-20-92 TNU
SAMPLE NO.	#13	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

Hydrometer #	ASTM 152 H	Temp., Deg. C	22.0
Sp. Gr. of Soil	2.72	Temp. Coef. K	0.01305
Value of "a"	0.99	Wt. Dry Sample "W"	53.328
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	5.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	55.50	49.50	91.5	91.5	7.19	0.0495
1.0	53.75	47.75	88.3	88.3	7.48	0.0357
2.0	53.50	47.50	87.8	87.8	7.52	0.0253
5.0	52.50	46.50	86.0	86.0	7.68	0.0162
15.0	51.00	45.00	83.2	83.2	7.93	0.0095
30.0	49.50	43.50	80.4	80.4	8.17	0.0068
60.0	48.00	42.00	77.7	77.7	8.42	0.0049
120.0	45.50	39.50	73.0	73.0	8.83	0.0035
250.0	42.50	36.50	67.5	67.5	9.32	0.0025
1440.0	35.00	29.00	53.6	53.6	10.55	0.0011

Grain Diameter = K*(SQRT(L/T))

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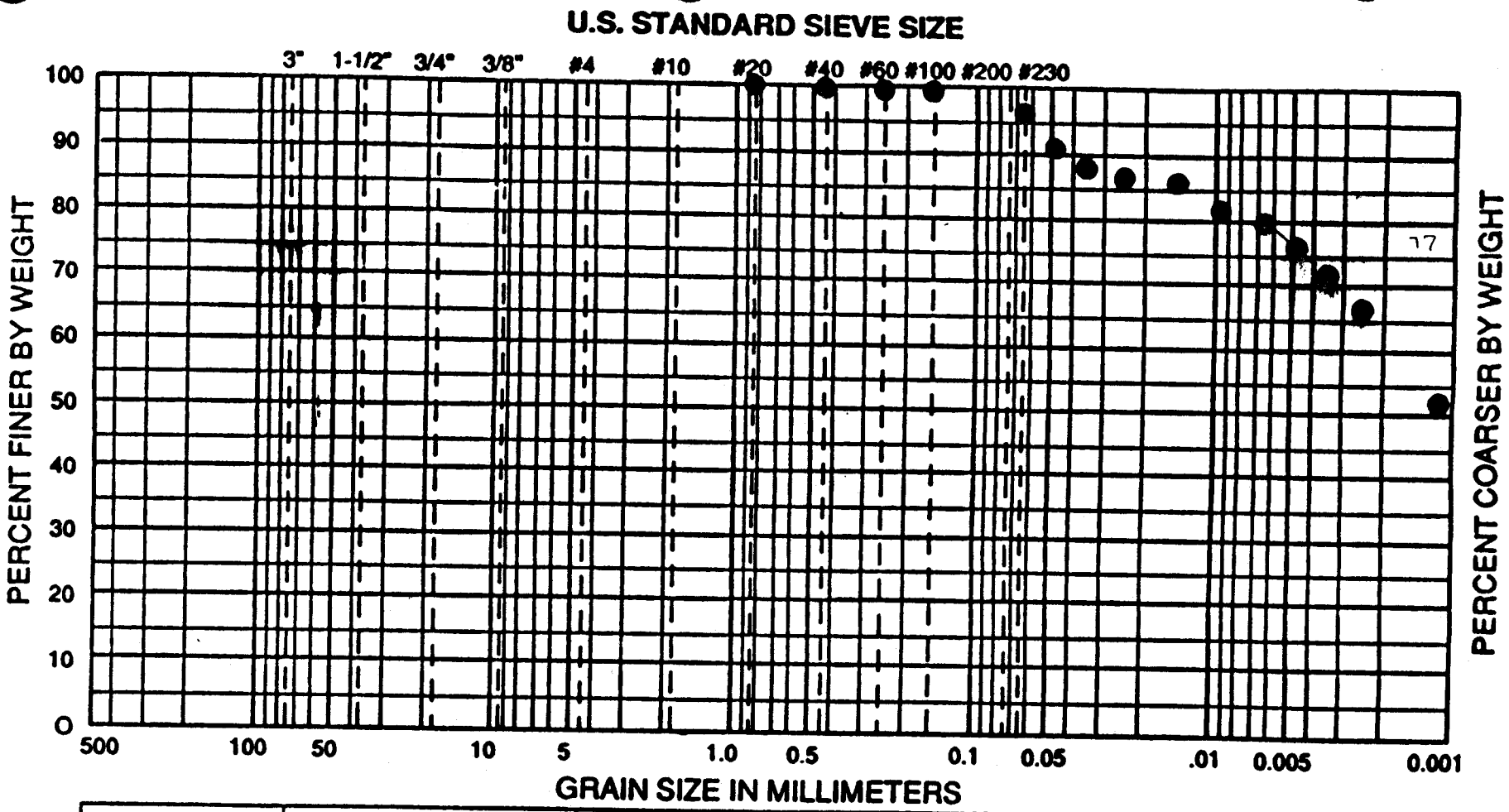


USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY		
		COARSE	FINE	COARSE	MEDIUM	FINE			
WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: B+25 SAMPLE NO.: CH #13 DATE: 3-27-92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION				
	56.1'	claystone 0 0 0 0 ROCKY FLATS/EG&G	3.3 0	3.3	19.7	77

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION - - - - - - - - - - - - - - - -

LABORATORY CLASSIFICATION - - - - - - - - - - - - -

JOB NO. 2066-03

CLIENT/OWNER WESTON

LOCATION ROCKY FLATS / EG&G

BORING B-25 SAMPLE CH #13 DEPTH 56.1'

FIELD DENSITY BY ...../../...

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

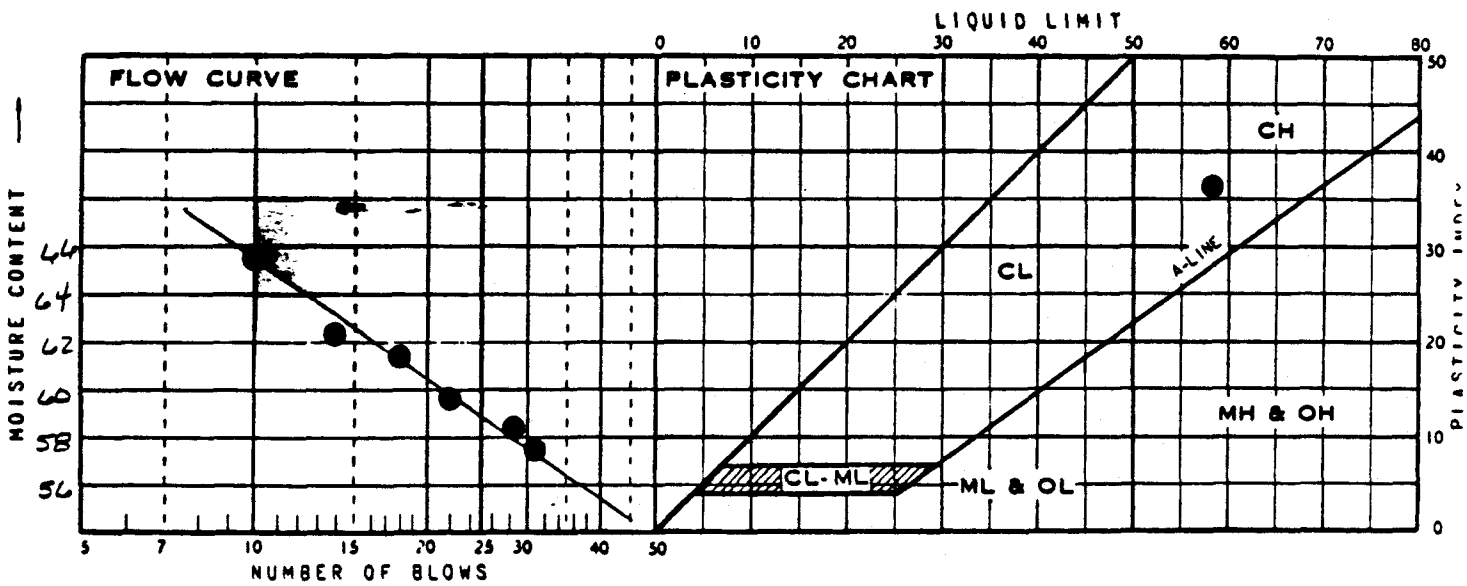
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY SR 3/23/92

DETERMINATION	1	2	3	4	5	6
DISH	2051	21 C	7 C			
WT OF DISH + WET SOIL g	6.46	6.28	5.73			
WT OF DISH + DRY SOIL g	5.47	5.31	4.86	—	—	—
WT OF MOISTURE g	.99	.97	.87			
WT OF DISH g	1.04	1.05	1.05	—	—	—
WT OF DRY SOIL g	4.43	4.26	3.81			
MOISTURE CONTENT %	22.4	22.8	22.8			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	2010	38 C	24 C	22 C	2059	2042
NUMBER OF BLOWS	31	29	22	18 ±	14	10 ±
WT OF DISH + WET SOIL g	14.90	15.39	12.69	12.88	15.46	11.03
WT OF DISH + DRY SOIL g	9.85	10.11	8.33	8.37	9.91	7.08
WT OF MOISTURE g	5.05	5.28	4.36	4.51	5.55	3.95
WT OF DISH g	1.06	1.05	1.04	1.04	1.05	1.06
WT OF DRY SOIL g	8.79	9.06	7.29	7.33	8.86	6.02
MOISTURE CONTENT %	57.5	58.3	59.8	61.5	62.6	65.6



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		58.8	22.7	36.1	CH	

ADVANCED TERRA TESTING

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MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT **Weston**

JOB NO. 2066-03

BORING NO.	8+50	SAMPLED	Rocky Flats
DEPTH	2.6'	DATE TESTED	03-11-92 RL
SAMPLE NO.	#9	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan	(g)	40.63
Wt. Dry Soil & Pan	(g)	39.33
Wt. Lost Moisture	(g)	1.30
Wt. of Pan Only	(g)	3.64
Wt. of Dry Soil	(g)	35.69
Moisture Content	%	3.6

Wt. Hydrom. Sample Wet (g)	55.00
Wt. Hydrom. Sample Dry (g)	53.07

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	630.77
Weight of + #10 Before Washing (g)	78.91
Weight of + #10 After Washing (g)	47.38
Weight of - #10 Wet (g)	551.86
Weight of - #10 Dry (g)	562.89
Wt. Total Sample Dry (g)	610.27
Calc. Wt. "W" (g)	57.54
Calc. Mass + #10	4.47

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	25.29	25.29	25.29	4.1	95.9
#4	0.00	11.56	11.56	36.85	6.0	94.0
#10	0.00	10.53	10.53	47.38	7.8	92.2
#20	1.57	2.53	0.96	0.96	9.4	90.6
#40	1.57	3.13	1.56	2.52	12.1	87.9
#60	1.57	3.35	1.78	4.30	15.2	84.8
#100	1.55	4.42	2.87	7.17	20.2	79.8
#230	1.57	7.48	5.91	13.08	30.5	69.5

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ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT Westen

JOB NO. 2066-03

BORING NO.	8+50	SAMPLED	Rocky Flats
DEPTH	2.6'	DATE TESTED	03-11-92 RL
SAMPLE NO.	#9	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

Hydrometer #	ASTM 152 H	Temp., Deg. C	21.0
Sp. Gr. of Soil	2.71	Temp. Coef. K	0.01324
Value of "a"	0.99	Wt. Dry Sample "W"	57.538
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	6.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	44.50	37.50	64.4	64.4	8.99	0.0561
1.0	42.50	35.50	61.0	61.0	9.32	0.0404
2.0	40.25	33.25	57.1	57.1	9.69	0.0291
5.0	38.25	31.25	53.7	53.7	10.02	0.0187
15.0	36.50	29.50	50.7	50.7	10.30	0.0110
30.0	35.00	28.00	48.1	48.1	10.55	0.0079
60.0	33.25	26.25	45.1	45.1	10.84	0.0056
120.0	32.00	25.00	42.9	42.9	11.04	0.0040
190.0	31.00	24.00	41.2	41.2	11.21	0.0032
1440.0	28.50	21.50	36.9	36.9	11.62	0.0012

Grain Diameter = K*(SQRT(L/T))

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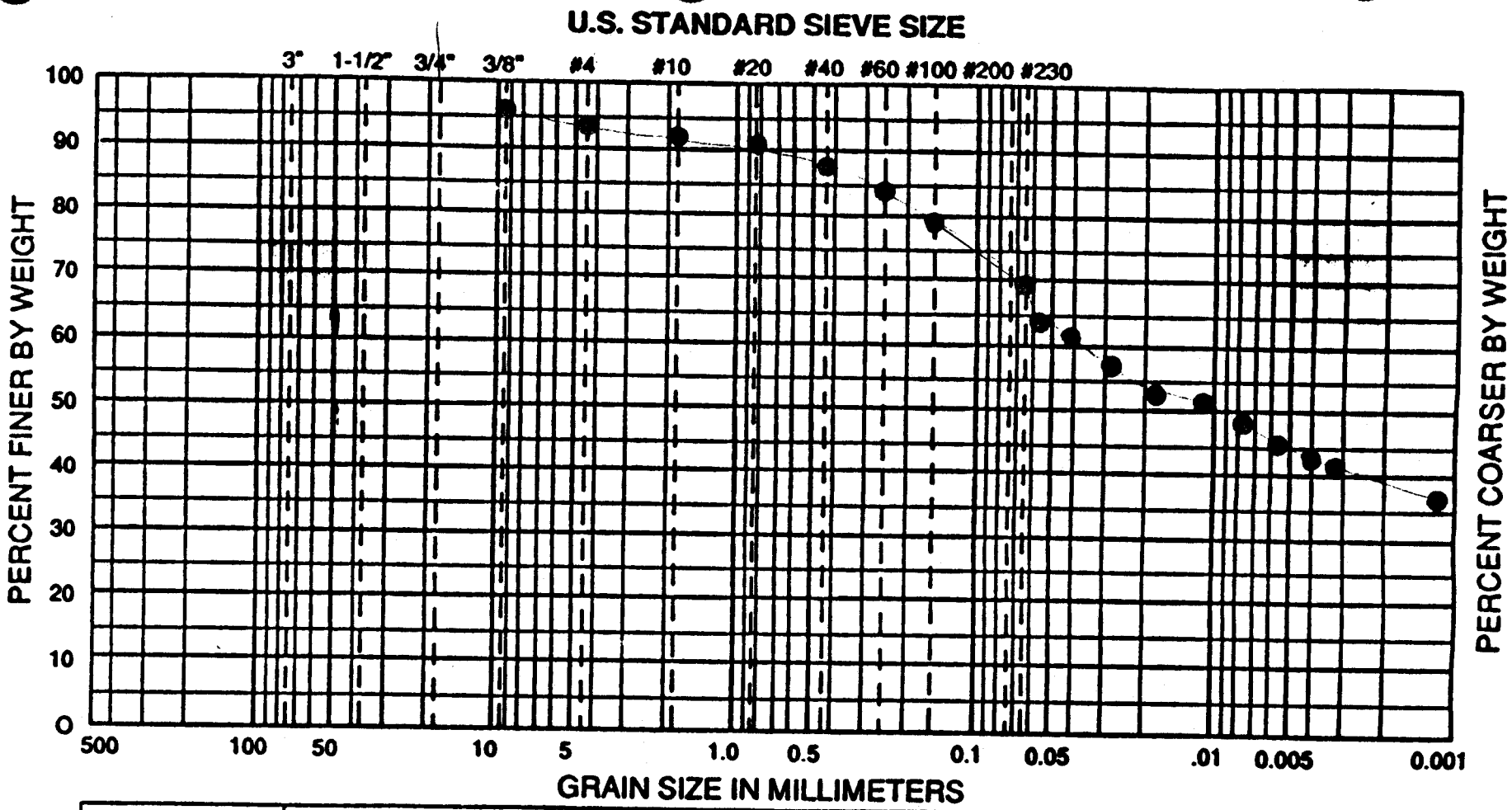


USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY			
		COARSE	FINE	COARSE	MEDIUM	FINE				
WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 8+50 SAMPLE NO.: CH #9 DATE: 3-18-92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION
Rocky Flats	2.6'	Clay w/ some silt & sand 6% fine gravel, 1.1% c sand, 4.3% med sand, 17.4% fine sand, 25.5% silt, 45% clay

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION _____

LABORATORY CLASSIFICATION _____

JOB NO. 2066-03

CLIENT/OWNER Weston

LOCATION Rocky Flats EG+G

BORING 8+50 SAMPLE CH #9 DEPTH 26'

FIELD DENSITY BY ___/__/__

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD [redacted]

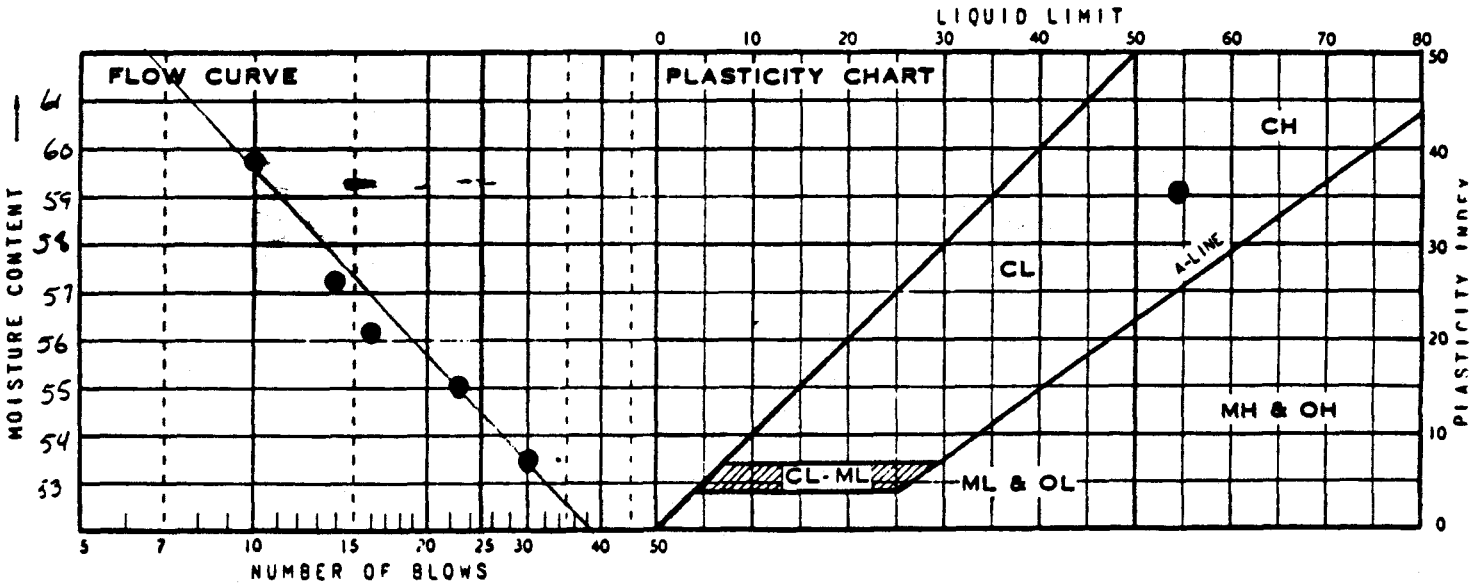
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY DU 3/7/92

DETERMINATION	1	2	3	4	5	6
DISH	2069	43C	58C			
WT OF DISH + WET SOIL g	5.32	6.49	6.21			
WT OF DISH + DRY SOIL g	4.65	5.60	5.36	—	—	—
WT OF MOISTURE g	.67	.89	.85			
WT OF DISH g	1.05	1.04	1.07	—	—	—
WT OF DRY SOIL g	3.60	4.56	4.29			
MOISTURE CONTENT %	18.6	19.5	19.8			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	30C	2041	2067	2005	2065	2033
NUMBER OF BLOWS	34	30	23	16	14	10
WT OF DISH + WET SOIL g	12.43	11.78	11.15	10.90	11.70	11.28
WT OF DISH + DRY SOIL g	9.20	9.04	7.56	7.36	7.82	7.45
WT OF MOISTURE g	3.83	3.74	3.59	3.54	3.88	3.83
WT OF DISH g	1.05	1.06	1.04	1.06	1.05	1.04
WT OF DRY SOIL g	7.15	6.98	6.52	6.30	6.77	6.41
MOISTURE CONTENT %	53.6	53.6	55.1	56.2	57.3	59.8



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		54.5	19.3	35.2	CH	

ADVANCED TERRA TESTING inc

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MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	8+50	SAMPLED	Rocky Flats
DEPTH	4.2'	DATE TESTED	03-11-92 SR
SAMPLE NO.	#9	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC	Yes	
NATURAL	No	
Wt. Wet Soil & Pan	(g)	40.23
Wt. Dry Soil & Pan	(g)	39.10
Wt. Lost Moisture	(g)	1.13
Wt. of Pan Only	(g)	3.69
Wt. of Dry Soil	(g)	35.41
Moisture Content	%	3.2
Wt. Hydrom. Sample Wet	(g)	55.06
Wt. Hydrom. Sample Dry	(g)	53.35

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	623.64
Weight of + #10 Before Washing (g)	323.03
Weight of + #10 After Washing (g)	312.92
Weight of - #10 Wet (g)	300.61
Weight of - #10 Dry (g)	301.11
Wt. Total Sample Dry (g)	614.03
Calc. Wt. "W" (g)	108.80
Calc. Mass + #10	55.45

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	174.53	174.53	174.53	28.4	71.6
3/8"	0.00	60.83	60.83	235.36	38.3	61.7
#4	0.00	42.31	42.31	277.67	45.2	54.8
#10	0.00	35.25	35.25	312.92	51.0	49.0
#20	1.56	5.19	3.63	3.63	54.3	45.7
#40	1.57	5.67	4.10	7.73	58.1	41.9
#60	1.56	4.87	3.31	11.04	61.1	38.9
#100	1.57	5.66	4.09	15.13	64.9	35.1
#230	1.55	7.97	6.42	21.55	70.8	29.2

Gravel (GM)

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT	Weston	JOB NO.	2066-03
BORING NO.	8+50	SAMPLED	Rocky Flats
DEPTH	4.2'	DATE TESTED	03-11-92 SR
SAMPLE NO.	#9	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

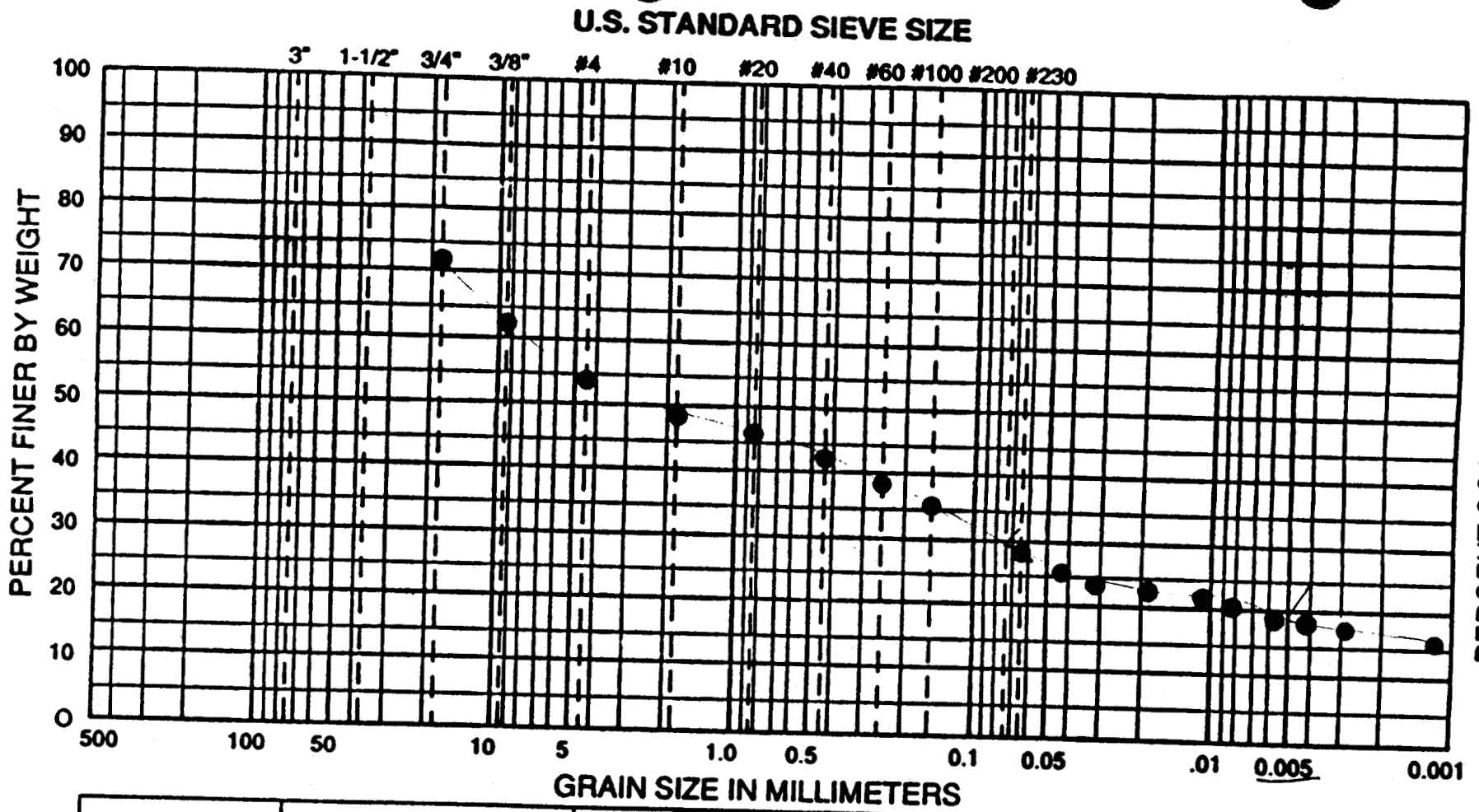
Hydrometer #	ASTM 152 H	Temp., Deg. C	22.0
Sp. Gr. of Soil	2.71	Temp. Coef. K	0.01308
Value of "a"	0.99	Wt. Dry Sample "W"	108.799
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	6.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	37.00	30.00	27.2	27.2	10.22	0.0591
1.0	35.00	28.00	25.4	25.4	10.55	0.0425
2.0	34.00	27.00	24.5	24.5	10.71	0.0303
5.0	32.00	25.00	22.7	22.7	11.04	0.0194
15.0	30.50	23.50	21.3	21.3	11.29	0.0113
30.0	29.50	22.50	20.4	20.4	11.45	0.0081
60.0	28.00	21.00	19.1	19.1	11.70	0.0058
120.0	27.00	20.00	18.2	18.2	11.86	0.0041
250.0	26.25	19.25	17.5	17.5	11.99	0.0029
1440.0	24.00	17.00	15.4	15.4	12.35	0.0012

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY			
		COARSE	FINE	COARSE	MEDIUM	FINE				
WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 8+50 SAMPLE NO.: CH # 9 DATE: 3-19-92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION
Rocky Flats	4.2'	gravel 28.4% C.G 16.8% F.G 45.2% | 5.8 CS 7.1% MS 11.9% FS 24.8% | 12% Silt 18% Clay

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION _____

LABORATORY CLASSIFICATION _____

JOB NO. 2066-03
CLIENT/OWNER Weston
LOCATION Rocky Flats
BORING B-50 SAMPLE CH #8 DEPTH 4.2'

FIELD DENSITY BY ____/__/__

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY AH 3/19/92

DETERMINATION	1	2	3	4	5	6
DISH	24	2028	22C			
WT OF DISH + WET SOIL g	6.54	6.58	6.73			
WT OF DISH + DRY SOIL g	5.72	5.73	5.87	—	—	—
WT OF MOISTURE g	.82	.85	.86			
WT OF DISH g	1.05	1.08	1.04	—	—	—
WT OF DRY SOIL g	4.67	4.65	4.83			
MOISTURE CONTENT %	17.6	18.3	17.8			

LIQUID LIMIT

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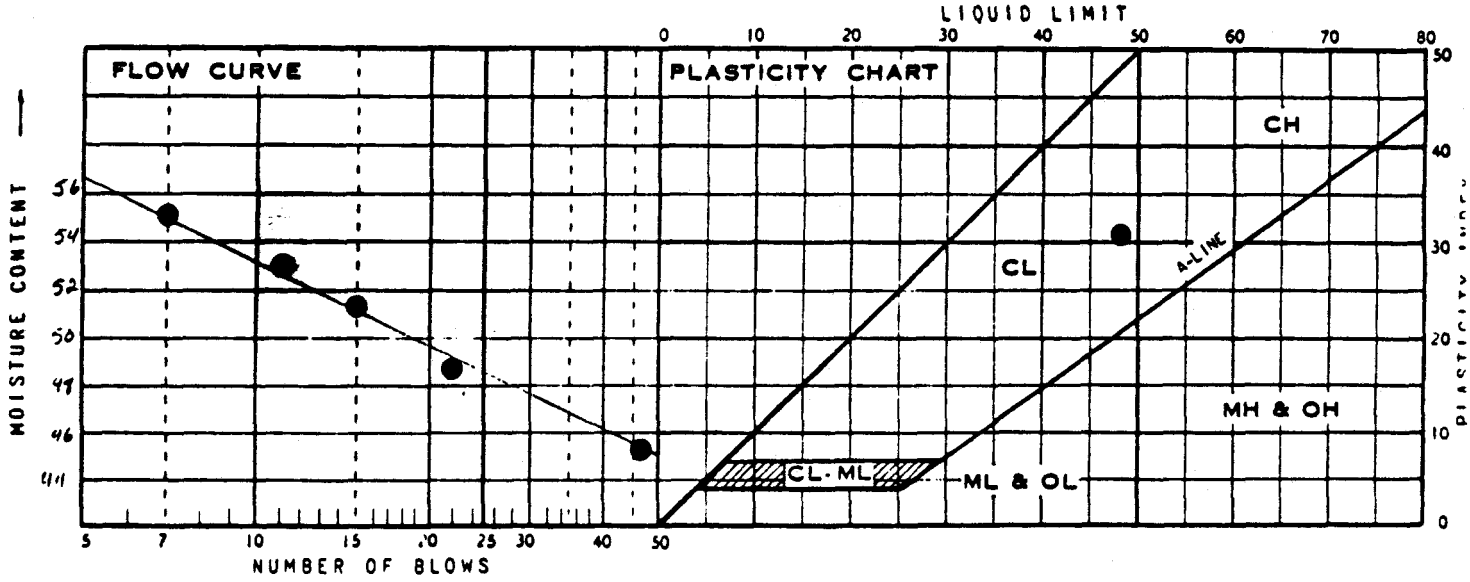
DETERMINATION	1	2	3	4	5	6
DISH	2021	2089	10C	2030	38C	2071
NUMBER OF BLOWS	47	23	22	15	11	7
WT OF DISH + WET SOIL g	11.34	11.98	11.69	11.77	11.41	12.49
WT OF DISH + DRY SOIL g	8.13	8.45	8.21	8.14	7.82	8.41
WT OF MOISTURE g	3.21	3.53	3.48	3.63	3.59	4.08
WT OF DISH g	1.05	1.05	1.07	1.05	1.04	1.03
WT OF DRY SOIL g	7.08	7.40	7.14	7.09	6.78	7.38
MOISTURE CONTENT %	45.3	47.7	48.7	51.2	53.0	55.3



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		48.6	17.9	30.7	CL	

ADVANCED TERRA TESTING INC

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	8+50	SAMPLED	Rocky Flats
DEPTH	12.7'	DATE TESTED	03-11-92 SR
SAMPLE NO.	#9	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC	Yes
NATURAL	No

Wt. Wet Soil & Pan	(g)	41.18
Wt. Dry Soil & Pan	(g)	40.21
Wt. Lost Moisture	(g)	0.97
Wt. of Pan Only	(g)	3.78
Wt. of Dry Soil	(g)	36.43
Moisture Content	%	2.7

Wt. Hydrom. Sample Wet (g)	55.06
Wt. Hydrom. Sample Dry (g)	53.64

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	762.56
Weight of + #10 Before Washing (g)	475.42
Weight of + #10 After Washing (g)	466.13
Weight of - #10 Wet (g)	287.14
Weight of - #10 Dry (g)	288.74
Wt. Total Sample Dry (g)	754.87
Calc. Wt. "W" (g)	140.22
Calc. Mass + #10	86.59

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	216.66	216.66	216.66	28.7	71.3
3/8"	0.00	130.32	130.32	346.98	46.0	54.0
#4	0.00	70.96	70.96	417.94	55.4	44.6
#10	0.00	48.19	48.19	466.13	61.7	38.3
#20	1.55	10.74	9.19	9.19	68.3	31.7
#40	1.57	9.88	8.31	17.50	74.2	25.8
#60	1.56	7.01	5.45	22.95	78.1	21.9
#100	1.55	6.16	4.61	27.56	81.4	18.6
#230	1.31	7.24	5.93	33.49	85.6	14.4

Sandy Gravel (GM)

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	8+50	SAMPLED	Rocky Flats
DEPTH	12.7'	DATE TESTED	03-11-92 SR
SAMPLE NO.	#9	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

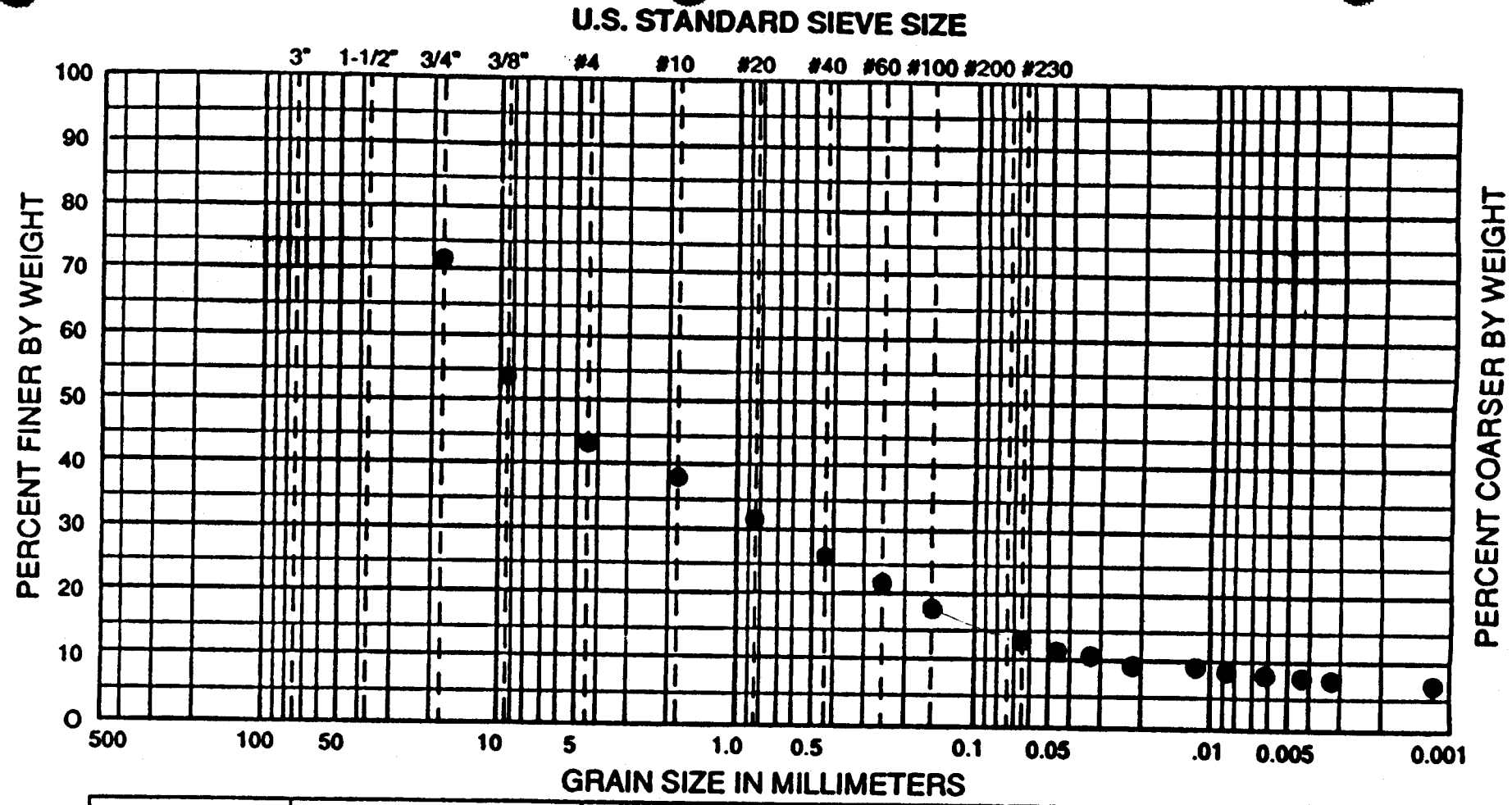
Hydrometer #	ASTM 152 H	Temp., Deg. C	22.0
Sp. Gr. of Soil	2.70	Temp. Coef. K	0.01312
Value of "a"	0.99	Wt. Dry Sample "W"	140.223
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	6.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	25.50	18.50	13.1	13.1	12.11	0.0646
1.0	23.25	16.25	11.5	11.5	12.48	0.0463
2.0	22.00	15.00	10.6	10.6	12.68	0.0330
5.0	21.00	14.00	9.9	9.9	12.85	0.0210
15.0	20.75	13.75	9.7	9.7	12.89	0.0122
30.0	20.00	13.00	9.2	9.2	13.01	0.0086
60.0	19.75	12.75	9.0	9.0	13.05	0.0061
120.0	19.00	12.00	8.5	8.5	13.17	0.0043
211.0	18.75	11.75	8.3	8.3	13.22	0.0033
1440.0	17.00	10.00	7.1	7.1	13.50	0.0013

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY			
		COARSE	FINE	COARSE	MEDIUM	FINE				

WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 8+50 SAMPLE NO.: CH# 9 DATE: 3-13-92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION						
		Sandy gravel						
		C	F	C	M	F		
Rocky Flats	12.7'	28.7	26.7	6.3	12.5	11.8	Silt 6%	Clay 8%

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION - - - - - - - - - - - - - - -

LABORATORY CLASSIFICATION - - - - - - - - - - - - -

JOB NO. 2066-03

CLIENT/OWNER WESTON

LOCATION

BORING B-50 SAMPLE #9 DEPTH 12.7'

FIELD DENSITY BY ../../..

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

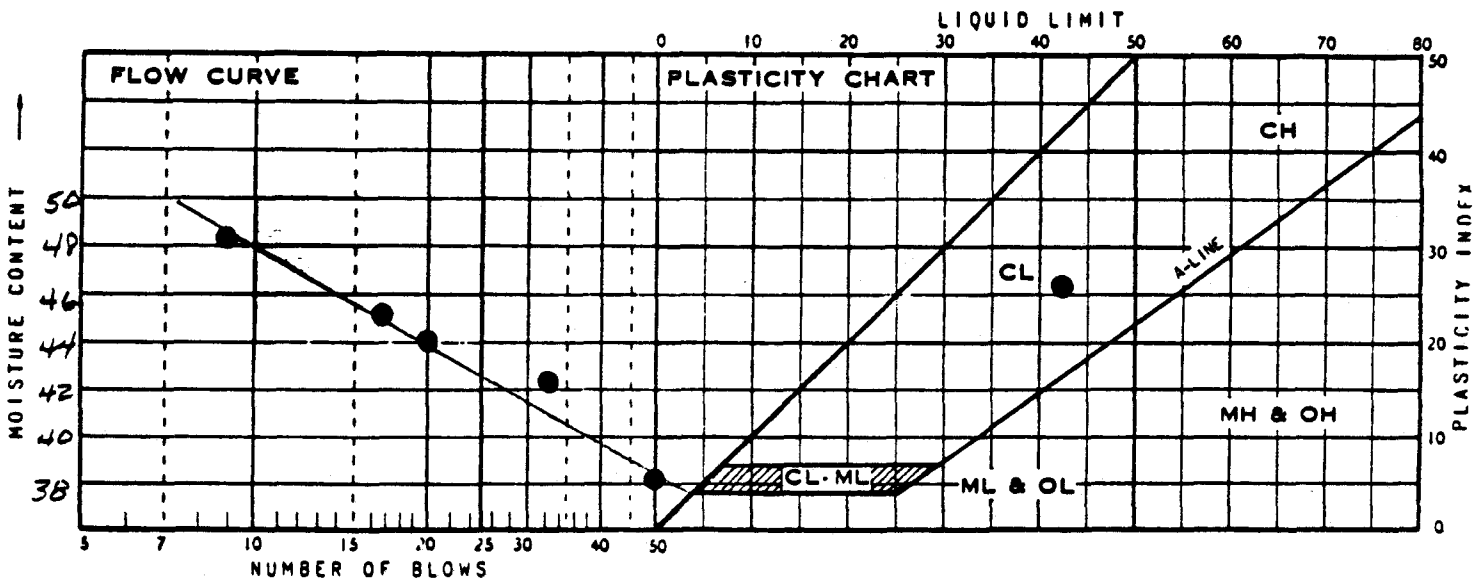
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY SB 3/16/92

DETERMINATION	1	2	3	4	5	6
DISH	2054	2013	2060			
WT OF DISH + WET SOIL g	5.60	5.09	5.22			
WT OF DISH + DRY SOIL g	4.94	4.53	4.63	—	—	—
WT OF MOISTURE g	.66	.56	.59			
WT OF DISH g	1.06	1.06	1.03	—	—	—
WT OF DRY SOIL g	3.88	3.47	3.60			
MOISTURE CONTENT %	17.0	16.1	16.4			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	29C	2019	2042	17C	2006	
NUMBER OF BLOWS	50	33	20	17±	9±	
WT OF DISH + WET SOIL g	17.92	14.89	15.02	17.14	20.06	
WT OF DISH + DRY SOIL g	13.24	10.77	10.75	12.13	13.86	—
WT OF MOISTURE g	4.68	4.12	4.27	5.01	6.20	
WT OF DISH g	1.06	1.07	1.07	1.04	1.05	—
WT OF DRY SOIL g	12.18	9.70	9.68	11.09	12.81	
MOISTURE CONTENT %	38.4	42.5	44.1	45.2	48.4	



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		42.6	16.5	26.1	CL	

ADVANCED TERRA TESTING INC

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT **Weston**

JOB NO. 2066-03

BORING NO.	8+50	SAMPLED	Rocky Flats
DEPTH	36'	DATE TESTED	03-11-92 RL
SAMPLE NO.	#9	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

OB

MOISTURE DATA

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan	(g)	37.12
Wt. Dry Soil & Pan	(g)	36.25
Wt. Lost Moisture	(g)	0.87
Wt. of Pan Only	(g)	3.84
Wt. of Dry Soil	(g)	32.41
Moisture Content	%	2.7

Wt. Hydrom. Sample Wet (g)	55.02
Wt. Hydrom. Sample Dry (g)	53.59

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	649.27
Weight of + #10 Before Washing (g)	12.99
Weight of + #10 After Washing (g)	8.56
Weight of - #10 Wet (g)	636.28
Weight of - #10 Dry (g)	623.96
Wt. Total Sample Dry (g)	632.52
Calc. Wt. "W" (g)	54.32
Calc. Mass + #10	0.74

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	0.00	0.00	0.00	0.0	100.0
#4	0.00	5.87	5.87	5.87	0.9	99.1
#10	0.00	2.69	2.69	8.56	1.4	98.6
#20	1.57	1.96	0.39	0.39	2.1	97.9
#40	1.58	1.91	0.33	0.72	2.7	97.3
#60	1.55	1.84	0.29	1.01	3.2	96.8
#100	1.55	2.29	0.74	1.75	4.6	95.4
#230	1.56	8.70	7.14	8.89	17.7	82.3

Clayey Silt (ML)

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	8+50	SAMPLED	Rocky Flats
DEPTH	36'	DATE TESTED	03-11-92 RL
SAMPLE NO.	#9	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

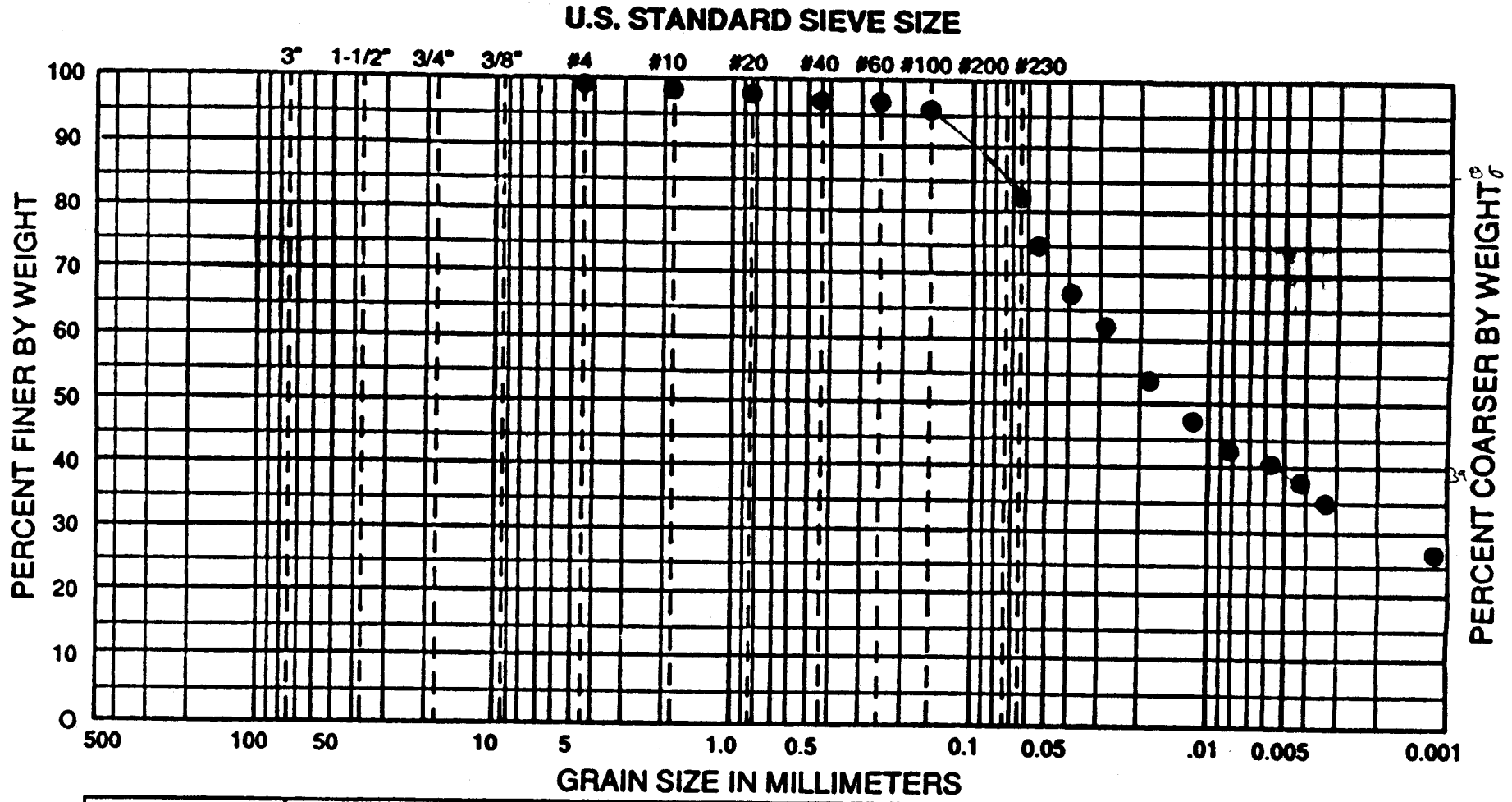
Hydrometer #	ASTM 152 H	Temp., Deg. C	21.0
Sp. Gr. of Soil	2.71	Temp. Coef. K	0.01324
Value of "a"	0.99	Wt. Dry Sample "W"	54.321
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	6.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	48.25	41.25	75.0	75.0	8.38	0.0542
1.0	44.00	37.00	67.3	67.3	9.07	0.0399
2.0	41.00	34.00	61.8	61.8	9.57	0.0290
5.0	37.00	30.00	54.6	54.6	10.22	0.0189
15.0	33.00	26.00	47.3	47.3	10.88	0.0113
30.0	31.00	24.00	43.7	43.7	11.21	0.0081
60.0	29.25	22.25	40.5	40.5	11.49	0.0058
120.0	27.75	20.75	37.7	37.7	11.74	0.0041
190.0	26.25	19.25	35.0	35.0	11.99	0.0033
1440.0	21.75	14.75	26.8	26.8	12.72	0.0012

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY
		COARSE	FINE	COARSE	MEDIUM	FINE	

WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 8+50 SAMPLE NO.: CH #9 DATE: 5-18-82 PROJECT NO.:

AREA	DEPTH	clayey silt CLASSIFICATION					
		G 0.9		S - 13.1		SL	C
Rocky Flats	36'	0	0.9	0.5	1.3	11.3	47%	39%

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION _____

LABORATORY CLASSIFICATION _____

JOB NO. 2066-03

CLIENT/OWNER Weston

LOCATION Rocky Flats

BORING 8+50 SAMPLE CH #9 DEPTH 36'

FIELD DENSITY BY ___/__/__

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD → [redacted]

DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY DU 3/10/92

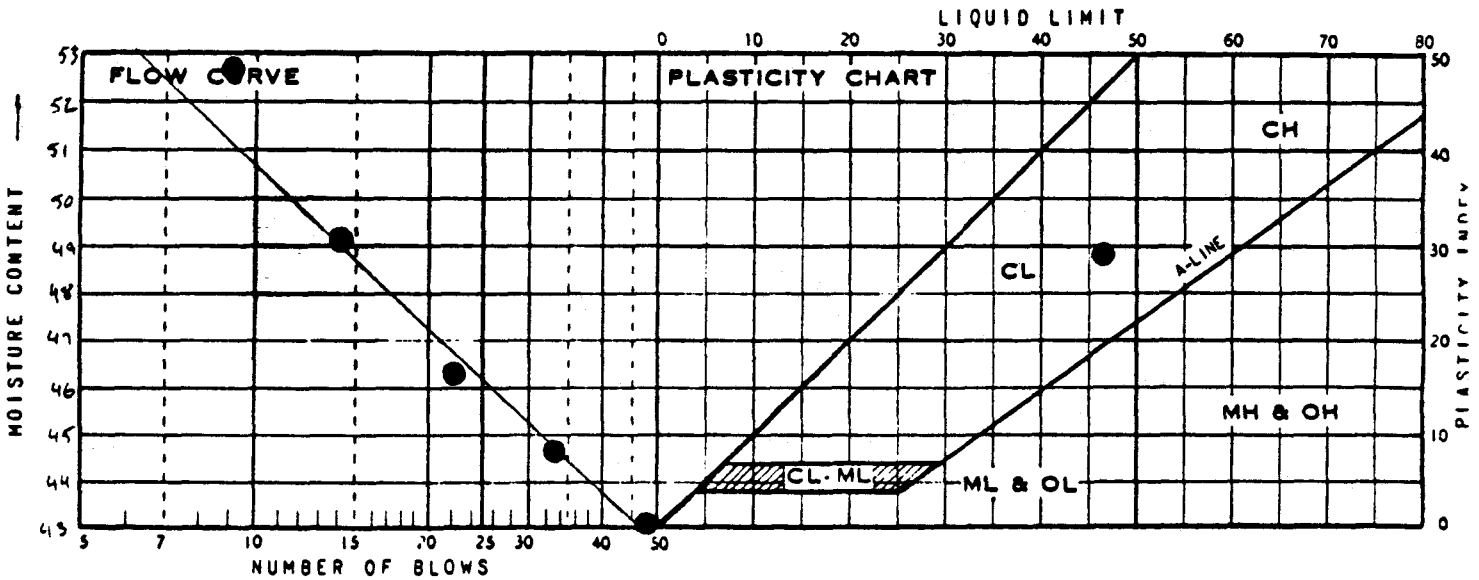
??

DETERMINATION	1	2	3	4	5	6
DISH	58C	2041	2072			
WT OF DISH + WET SOIL g	6.28	6.40	5.52			
WT OF DISH + DRY SOIL g	5.54	5.60	4.88	—	—	—
WT OF MOISTURE g	.74	.80	.64			
WT OF DISH g	1.07	1.06	1.04	—	—	—
WT OF DRY SOIL g	4.47	4.54	3.84			
MOISTURE CONTENT %	16.6	17.6	16.7			

LIQUID LIMIT

??

DETERMINATION	1	2	3	4	5	6
DISH	42C	20C	2053	2011	30C	2067
NUMBER OF BLOWS	48-	33	22	14	9	
WT OF DISH + WET SOIL g	12.10	11.41	11.82	12.03	11.10	
WT OF DISH + DRY SOIL g	8.77	9.20	8.41	8.41	7.63	—
WT OF MOISTURE g	3.33	3.21	3.41	3.62	3.47	
WT OF DISH g	1.04	1.02	1.05	1.05	1.05	1.04
WT OF DRY SOIL g	7.73	7.18	7.36	7.36	6.58	
MOISTURE CONTENT %	43.1	44.7	46.3	49.2	52.7	



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		46.2	16.7	29.5	CL	

ADVANCED TERRA TESTING INC

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MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	8+50	SAMPLED	Rocky Flats
DEPTH	39'	DATE TESTED	03-11-92 SR
SAMPLE NO.	#9	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

08

MOISTURE DATA

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan	(g)	40.00
Wt. Dry Soil & Pan	(g)	38.74
Wt. Lost Moisture	(g)	1.26
Wt. of Pan Only	(g)	3.73
Wt. of Dry Soil	(g)	35.01
Moisture Content	%	3.6

Wt. Hydrom. Sample Wet (g)	55.05
Wt. Hydrom. Sample Dry (g)	53.14

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	611.67
Weight of + #10 Before Washing (g)	95.07
Weight of + #10 After Washing (g)	76.77
Weight of - #10 Wet (g)	516.60
Weight of - #10 Dry (g)	516.32
Wt. Total Sample Dry (g)	593.09
Calc. Wt. "W" (g)	61.04
Calc. Mass + #10	7.90

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	32.12	32.12	32.12	5.4	94.6
3/8"	0.00	13.96	13.96	46.08	7.8	92.2
#4	0.00	16.15	16.15	62.23	10.5	89.5
#10	0.00	14.54	14.54	76.77	12.9	87.1
#20	1.57	3.02	1.45	1.45	15.3	84.7
#40	1.57	3.29	1.72	3.17	18.1	81.9
#60	1.57	2.55	0.98	4.15	19.7	80.3
#100	1.57	2.31	0.74	4.89	21.0	79.0
#230	1.56	3.72	2.16	7.05	24.5	75.5

Silty Clay (CH).

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT **Weston**

JOB NO. 2066-03

BORING NO.	8+50	SAMPLED	Rocky Flats
DEPTH	39'	DATE TESTED	03-11-92 SR
SAMPLE NO.	#9	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

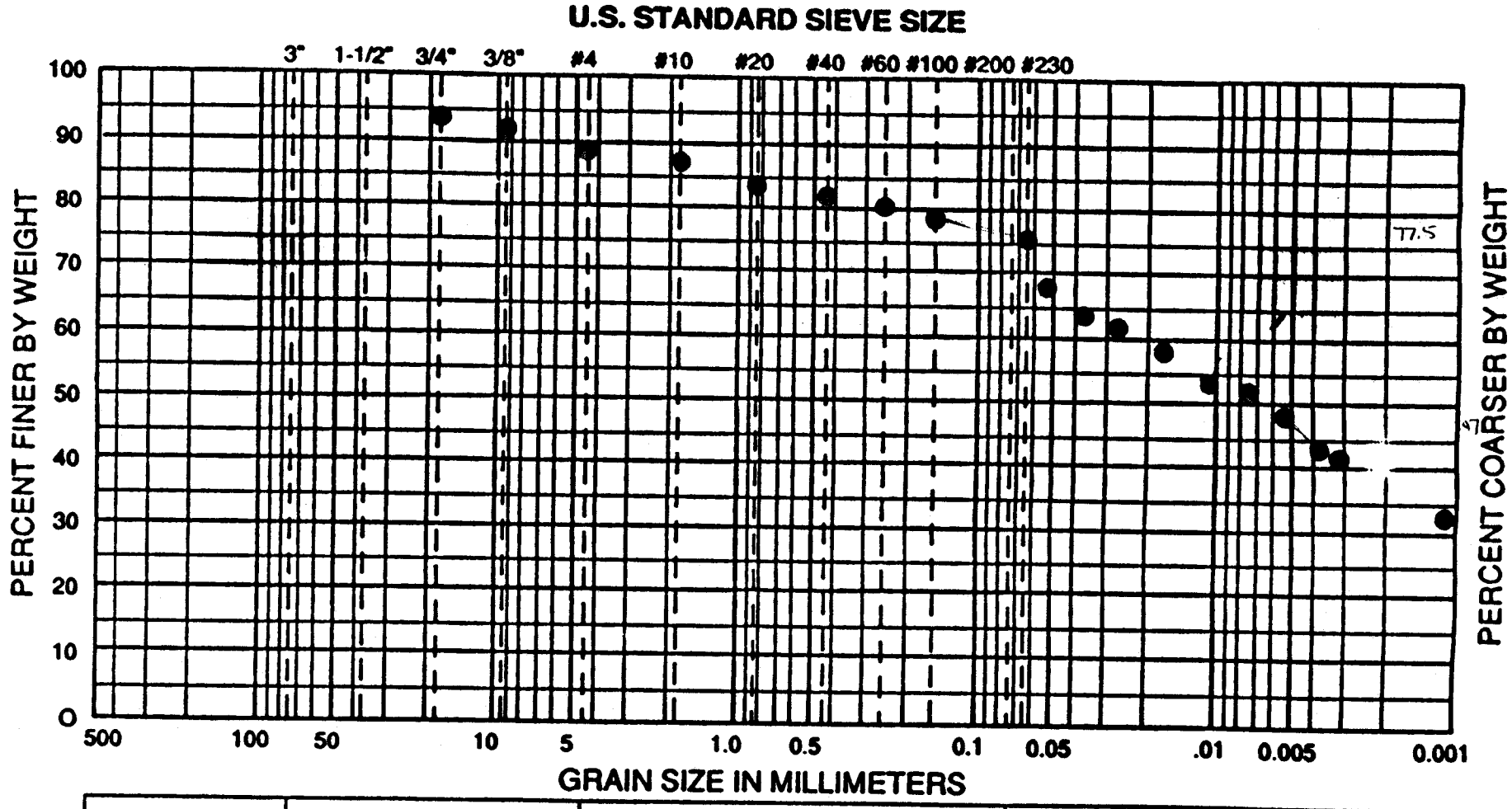
Hydrometer #	ASTM 152 H	Temp., Deg. C	22.0
Sp. Gr. of Soil	2.73	Temp. Coef. K	0.01301
Value of "a"	0.98	Wt. Dry Sample "W"	61.043
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	6.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	49.00	42.00	67.7	67.7	8.25	0.0529
1.0	47.00	40.00	64.5	64.5	8.58	0.0381
2.0	45.00	38.00	61.3	61.3	8.91	0.0275
5.0	43.25	36.25	58.4	58.4	9.20	0.0176
15.0	40.75	33.75	54.4	54.4	9.61	0.0104
30.0	39.00	32.00	51.6	51.6	9.89	0.0075
60.0	37.00	30.00	48.4	48.4	10.22	0.0054
120.0	34.25	27.25	43.9	43.9	10.67	0.0039
195.0	33.00	26.00	41.9	41.9	10.88	0.0031
1440.0	27.00	20.00	32.2	32.2	11.86	0.0012

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY
		COARSE	FINE	COARSE	MEDIUM	FINE	

WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 8+50 SAMPLE NO.: CH # 9 DATE: 3-19-92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION					
		silty clay GV - 10.5		SS - 12.0		SL	CL
Rocky Flats	39'	5.4	5.1	2.4	5.2	4.4	30.5	.47

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION - - - - - - - - - - - - - - - -

LABORATORY CLASSIFICATION - - - - - - - - - - - - -

JOB NO. 3066-03
CLIENT/OWNER Weston
LOCATION Rocky Flats
BORING 8-50 SAMPLE CH #9 DEPTH 39'

FIELD DENSITY BY ___/___/___

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

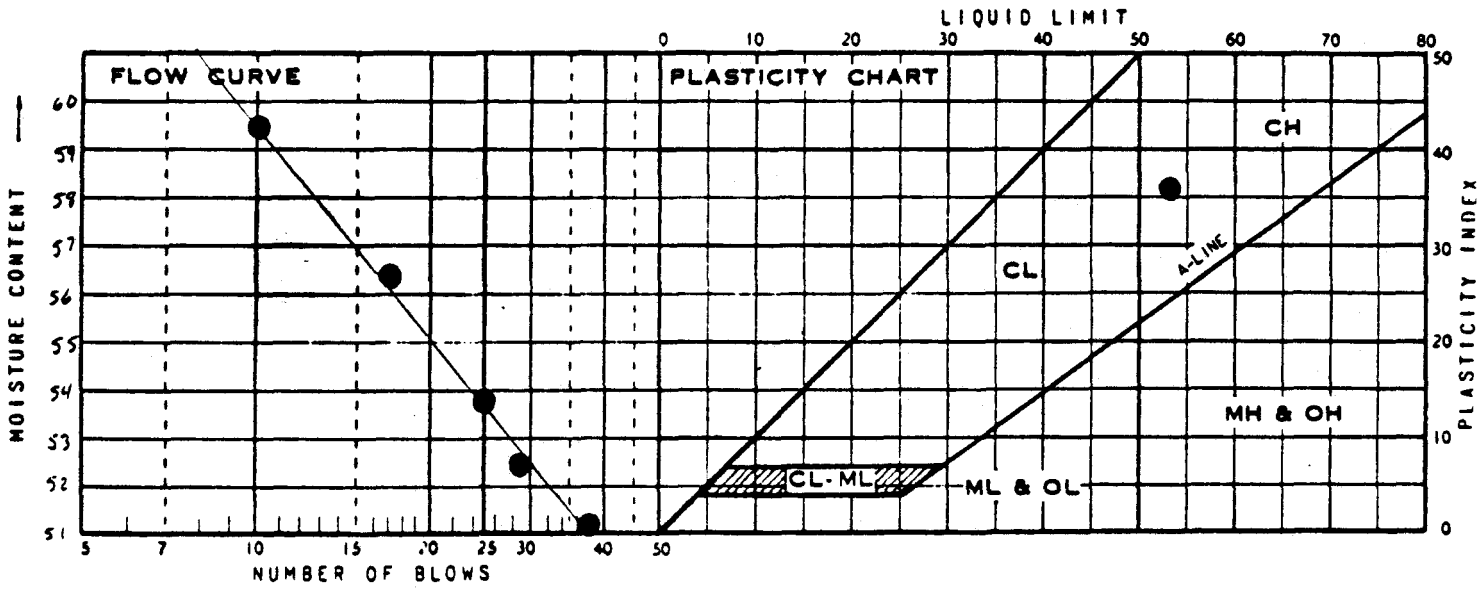
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY DW 3/10/92

DETERMINATION	1	2	3	4	5	6
DISH	32C	2036	46C			
WT OF DISH + WET SOIL g	5.50	6.29	5.52			
WT OF DISH + DRY SOIL g	4.87	5.52	4.82	—	—	—
WT OF MOISTURE g	.63	.77	.70			
WT OF DISH g	1.05	1.05	1.06	—	—	—
WT OF DRY SOIL g	3.82	4.47	3.76			
MOISTURE CONTENT %	16.5	17.2	18.6			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	5C	2020	28C	43C	2074	2008
NUMBER OF BLOWS	38	28	25	17	10	
WT OF DISH + WET SOIL g	11.39	11.01	12.89	11.19	12.86	
WT OF DISH + DRY SOIL g	7.89	7.58	8.75	7.53	8.45	—
WT OF MOISTURE g	3.50	3.43	4.14	3.66	4.41	
WT OF DISH g	1.06	1.05	1.05	1.04	1.04	1.06
WT OF DRY SOIL g	6.83	6.53	7.70	6.49	7.41	
MOISTURE CONTENT %	51.2	52.5	53.8	56.4	59.5	



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		53.8	17.4	36.4	CH	

ADVANCED TERRA TESTING INC

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MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	8+75	SAMPLED	Rocky Flats
DEPTH	15.0'	DATE TESTED	03-20-92 TNU
SAMPLE NO.	#14	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC	Yes	
NATURAL	No	
Wt. Wet Soil & Pan	(g)	38.49
Wt. Dry Soil & Pan	(g)	37.46
Wt. Lost Moisture	(g)	1.03
Wt. of Pan Only	(g)	3.78
Wt. of Dry Soil	(g)	33.68
Moisture Content	%	3.1
Wt. Hydrom. Sample Wet	(g)	55.03
Wt. Hydrom. Sample Dry	(g)	53.39

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	540.50
Weight of + #10 Before Washing (g)	112.34
Weight of + #10 After Washing (g)	102.95
Weight of - #10 Wet (g)	428.16
Weight of - #10 Dry (g)	424.57
Wt. Total Sample Dry (g)	527.52
Calc. Wt. "W" (g)	66.35
Calc. Mass + #10	12.96

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	53.20	53.20	53.20	10.1	89.9
3/8"	0.00	29.26	29.26	82.46	15.6	84.4
#4	0.00	11.33	11.33	93.79	17.8	82.2
#10	0.00	9.24	9.24	103.03	19.5	80.5
#20	1.56	3.39	1.83	1.83	22.3	77.7
#40	1.55	3.01	1.46	3.29	24.5	75.5
#60	1.55	2.78	1.23	4.52	26.3	73.7
#100	1.55	3.58	2.03	6.55	29.4	70.6
#230	1.55	6.61	5.06	11.61	37.0	63.0

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ADVANCED TERRA TESTING, INC.

Silty Clay (CH)

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	8+75	SAMPLED	Rocky Flats
DEPTH	15.0'	DATE TESTED	03-20-92 TNU
SAMPLE NO.	#14	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

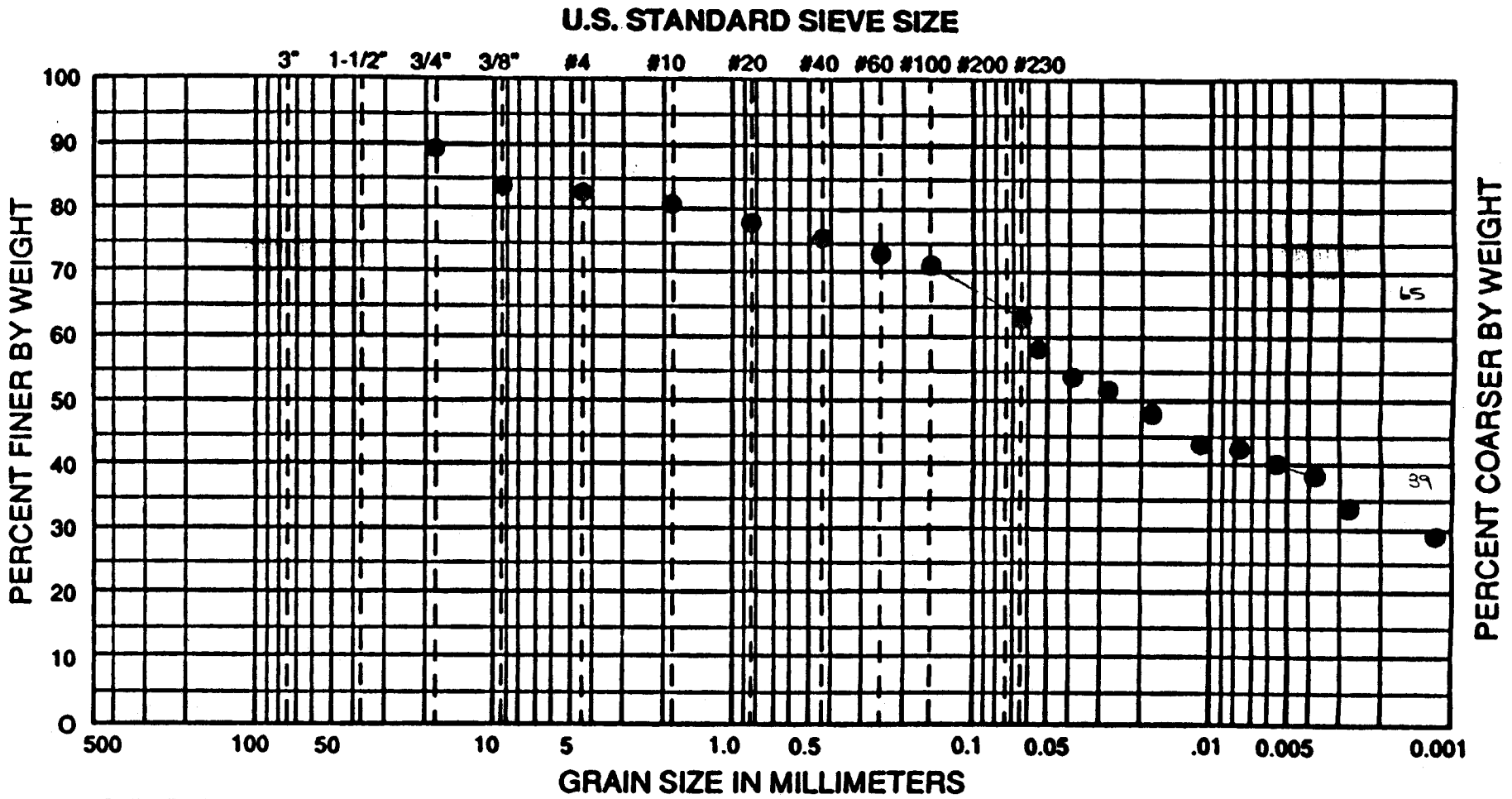
Hydrometer #	ASTM 152 H	Temp., Deg. C	22.0
Sp. Gr. of Soil	2.74	Temp. Coef. K	0.01298
Value of "a"	0.98	Wt. Dry Sample "W"	66.353
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	5.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	45.50	39.50	58.5	58.5	8.83	0.0545
1.0	43.00	37.00	54.8	54.8	9.24	0.0395
2.0	40.50	34.50	51.1	51.1	9.65	0.0285
5.0	39.00	33.00	48.8	48.8	9.89	0.0183
15.0	36.00	30.00	44.4	44.4	10.39	0.0108
30.0	35.00	29.00	42.9	42.9	10.55	0.0077
60.0	33.00	27.00	40.0	40.0	10.88	0.0055
120.0	32.00	26.00	38.5	38.5	11.04	0.0039
250.0	29.00	23.00	34.0	34.0	11.53	0.0028
1440.0	26.00	20.00	29.6	29.6	12.03	0.0012

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY			
		COARSE	FINE	COARSE	MEDIUM	FINE				

WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 8+75 SAMPLE NO.: CH #14 DATE: 3-30-92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION						
		silty clay						
			GV-17.8		S-17.2		SL	CL
Rocky Flats	15.0'	10.1	7.7	1.7	5.0	10.5	26	39
		C	F	C	M	F		

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION - - - - - - - - - - - - - - - -

LABORATORY CLASSIFICATION - - - - - - - - - - - - -

JOB NO. 2066-03
CLIENT/OWNER Weston
LOCATION Rocky Flats / 2666
BORING B-75 SAMPLE 14 DEPTH @ 15.0'

FIELD DENSITY BY ../../..

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

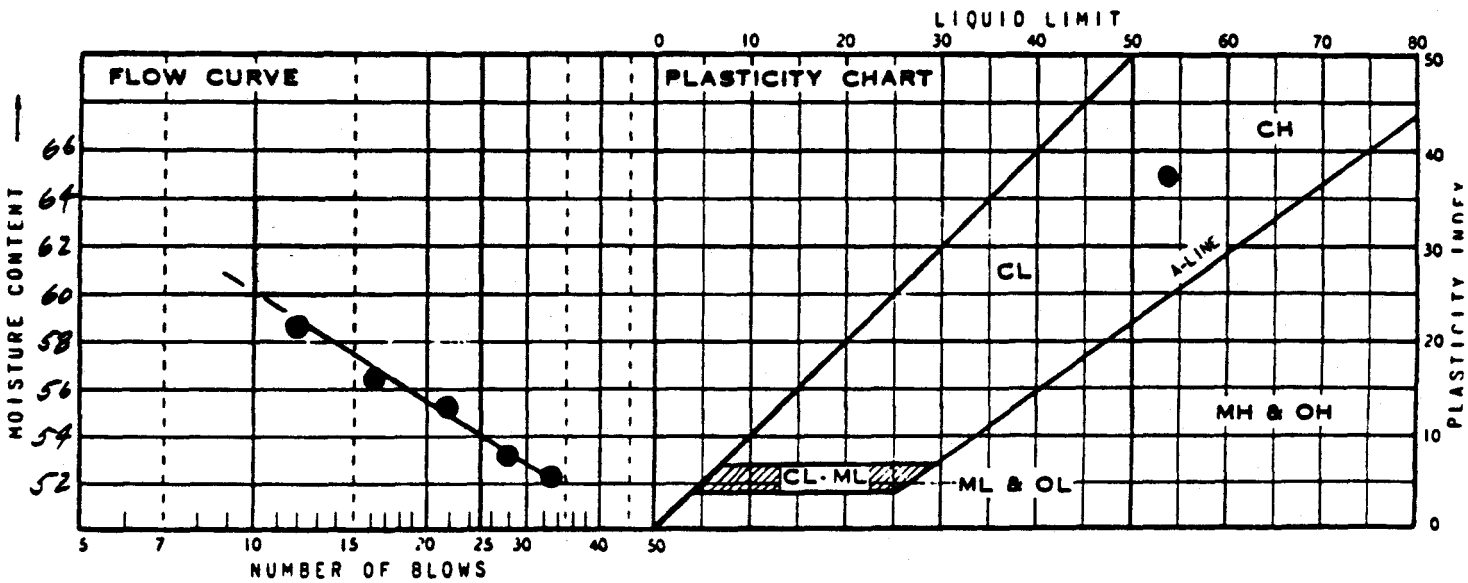
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY [illegible] 3.122/82

DETERMINATION	1	2	3	4	5	6
DISH	2070	B10	5BC			
WT OF DISH + WET SOIL	5.52	7.52	5.53			
WT OF DISH + DRY SOIL	4.87	6.56	4.89	—	—	—
WT OF MOISTURE	0.65	0.96	0.64			
WT OF DISH	1.05	1.02	1.06	—	—	—
WT OF DRY SOIL	3.82	5.54	3.83			
MOISTURE CONTENT	17.0	17.3	16.7	= 51.0/3 =	17.0	

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	B20	2005	2017	B18	B9	9C
NUMBER OF BLOWS	33	22	28	16	12	8+
WT OF DISH + WET SOIL	9.52	9.44	8.12	8.31	9.74	7.82
WT OF DISH + DRY SOIL	6.61	6.46	5.66	5.69	6.52	5.17
WT OF MOISTURE	2.91	2.98	2.46	2.62	3.22	2.65
WT OF DISH	1.03	1.06	1.03	1.04	1.02	1.06
WT OF DRY SOIL	5.58	5.40	4.63	4.65	5.50	4.11
MOISTURE CONTENT	52.1	55.2	53.1	56.3	58.6	64.5



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		54.0	17.0	37.0	CH	

ADVANCED TERRA TESTING

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MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT **Weston** .

JOB NO. 2066-03

BORING NO.	8+75	SAMPLED	Rocky Flats
DEPTH	31.3	DATE TESTED	03-20-92 TNU
SAMPLE NO.	#14	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC	Yes
NATURAL	No

Wt. Wet Soil & Pan	(g)	37.84
Wt. Dry Soil & Pan	(g)	36.59
Wt. Lost Moisture	(g)	1.25
Wt. of Pan Only	(g)	3.72
Wt. of Dry Soil	(g)	32.87
Moisture Content	%	3.8

Wt. Hydrom. Sample Wet (g)	55.05
Wt. Hydrom. Sample Dry (g)	53.03

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	509.59
Weight of + #10 Before Washing (g)	28.97
Weight of + #10 After Washing (g)	27.47
Weight of - #10 Wet (g)	480.62
Weight of - #10 Dry (g)	464.46
Wt. Total Sample Dry (g)	491.93
Calc. Wt. "W" (g)	56.16
Calc. Mass + #10	3.13

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	22.12	22.12	22.12	4.5	95.5
#4	0.00	3.80	3.80	25.92	5.3	94.7
#10	0.00	1.51	1.51	27.43	5.6	94.4
#20	1.55	1.99	0.44	0.44	6.4	93.6
#40	1.57	2.51	0.94	1.38	8.0	92.0
#60	1.55	2.19	0.64	2.02	9.2	90.8
#100	1.56	2.32	0.76	2.78	10.5	89.5
#230	1.56	3.80	2.24	5.02	14.5	85.5

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Silty Clay/Clay

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT **Weston**

JOB NO. 2066-03

BORING NO.	8+75	SAMPLED	Rocky Flats
DEPTH	31.3	DATE TESTED	03-20-92 TNU
SAMPLE NO.	#14	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

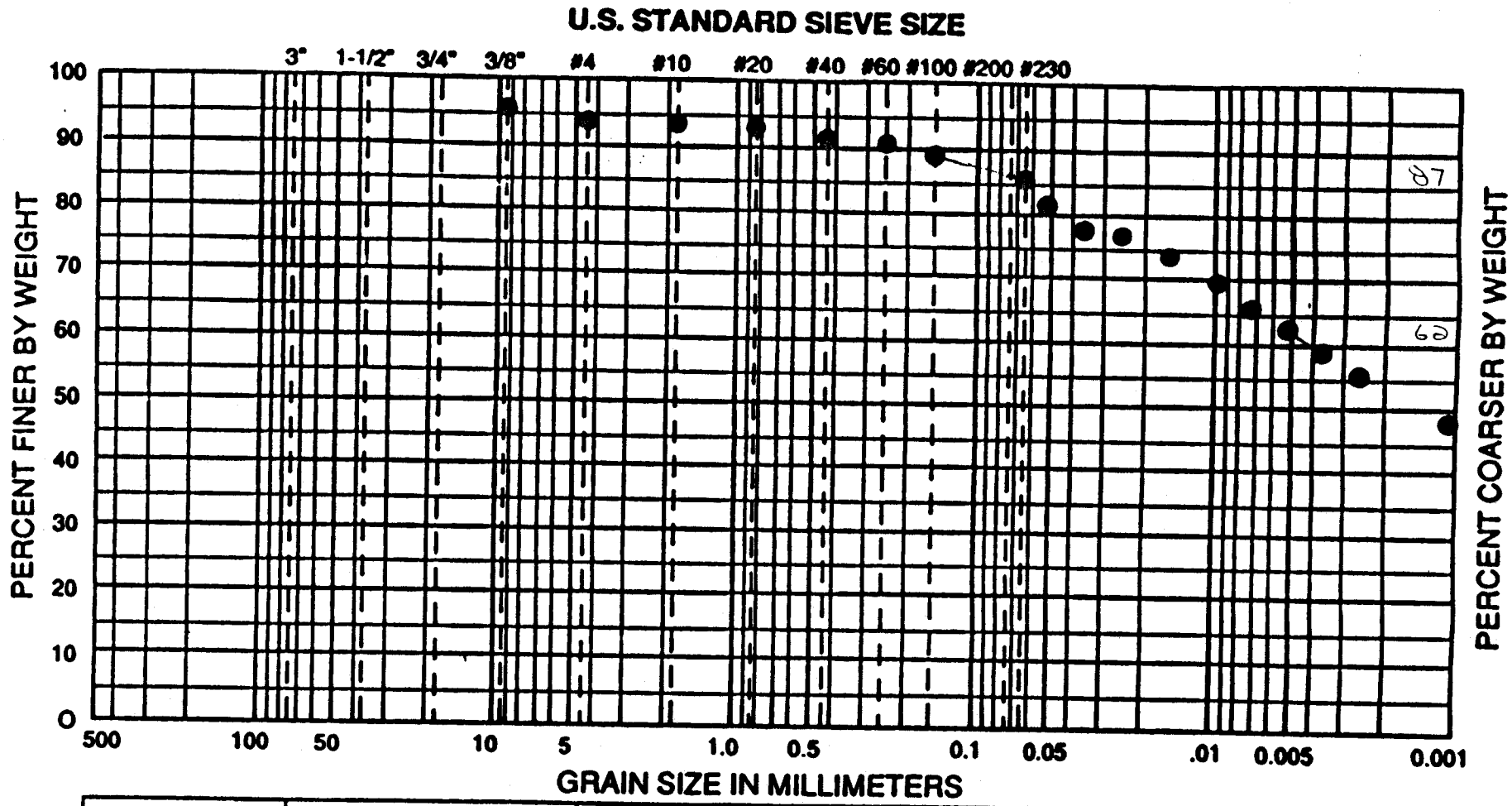
Hydrometer #	ASTM 152 H	Temp., Deg. C	22.0
Sp. Gr. of Soil	2.74	Temp. Coef. K	0.01298
Value of "a"	0.98	Wt. Dry Sample "W"	56.165
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	5.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	52.50	46.50	81.3	81.3	7.68	0.0509
1.0	50.50	44.50	77.8	77.8	8.01	0.0367
2.0	50.00	44.00	76.9	76.9	8.09	0.0261
5.0	48.50	42.50	74.3	74.3	8.34	0.0168
15.0	46.00	40.00	69.9	69.9	8.75	0.0099
30.0	43.50	37.50	65.6	65.6	9.16	0.0072
60.0	42.00	36.00	62.9	62.9	9.40	0.0051
120.0	40.00	34.00	59.4	59.4	9.73	0.0037
250.0	37.50	31.50	55.1	55.1	10.14	0.0026
1440.0	33.50	27.50	48.1	48.1	10.80	0.0011

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY			
		COARSE	FINE	COARSE	MEDIUM	FINE				

WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 8 + 75 SAMPLE NO.: CH #14 DATE: 3-30-92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION					
		Silty clay					
		5.3		7.7			
Rocky Flats	31.3'	0	5.3	0.3	2.4	5.0	25	62

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION - - - - - - - - - - - - - - - -

LABORATORY CLASSIFICATION - - - - - - - - - - - - -

JOB NO. 2066-03

CLIENT/OWNER WESTON

LOCATION Rocky Flats/EG&G

BORING 8+75 SAMPLE CH#14 DEPTH 31.3'

FIELD DENSITY BY ...../../..

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD [redacted]

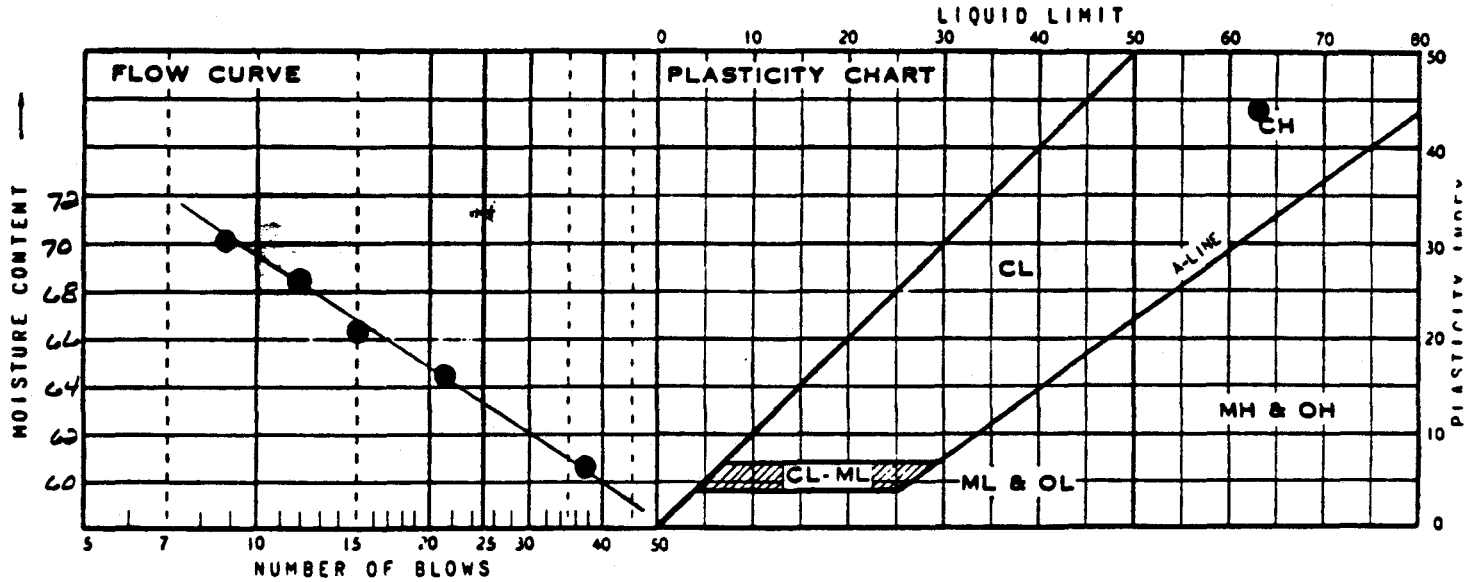
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY SR 3/23/92

DETERMINATION	1	2	3	4	5	6
DISH	2053	2007	20C			
WT OF DISH + WET SOIL g	5.73	5.95	5.86			
WT OF DISH + DRY SOIL g	4.98	5.16	5.08	—	—	—
WT OF MOISTURE g	.75	.79	.78			
WT OF DISH g	1.06	1.05	1.03	—	—	—
WT OF DRY SOIL g	3.92	4.11	4.05			
MOISTURE CONTENT %	19.1	19.2	19.3			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	2063	46C	37C	2002	23C	
NUMBER OF BLOWS	38	21	15	12	9	
WT OF DISH + WET SOIL g	15.10	16.47	13.16	11.34	12.20	
WT OF DISH + DRY SOIL g	9.80	10.13	8.32	7.16	7.60	—
WT OF MOISTURE g	5.30	6.04	4.84	4.18	4.60	
WT OF DISH g	1.06	1.06	1.03	1.06	1.07	—
WT OF DRY SOIL g	8.74	9.37	7.29	6.10	6.53	
MOISTURE CONTENT %	60.6	64.5	66.4	68.5	70.4	



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		63.4	19.2	44.2	CH	

ADVANCED TERRA TESTING INC

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MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT **Weston**

JOB NO. 2066-03

BORING NO.	8+75	SAMPLED	Rocky Flats
DEPTH	33.8	DATE TESTED	03-20-92 TNU
SAMPLE NO.	#14	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan	(g)	37.84
Wt. Dry Soil & Pan	(g)	37.04
Wt. Lost Moisture	(g)	0.80
Wt. of Pan Only	(g)	3.73
Wt. of Dry Soil	(g)	33.31
Moisture Content	%	2.4

Wt. Hydrom. Sample Wet (g)	55.01
Wt. Hydrom. Sample Dry (g)	53.72

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	748.01
Weight of + #10 Before Washing (g)	295.64
Weight of + #10 After Washing (g)	289.23
Weight of - #10 Wet (g)	452.37
Weight of - #10 Dry (g)	448.02
Wt. Total Sample Dry (g)	737.25
Calc. Wt. "W" (g)	88.40
Calc. Mass + #10	34.68

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	160.72	160.72	160.72	21.8	78.2
3/8"	0.00	72.65	72.65	233.37	31.7	68.3
#4	0.00	30.91	30.91	264.28	35.8	64.2
#10	0.00	24.95	24.95	289.23	39.2	60.8
#20	1.57	5.89	4.32	4.32	44.1	55.9
#40	1.56	8.20	6.64	10.96	51.6	48.4
#60	1.56	7.70	6.14	17.10	58.6	41.4
#100	1.57	7.84	6.27	23.37	65.7	34.3 — 27.5
#230	1.57	9.10	7.53	30.90	74.2	25.8

Gravelly Sand (SP)

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT **Weston**

JOB NO. 2066-03

BORING NO.	8+75	SAMPLED	Rocky Flats
DEPTH	33.8	DATE TESTED	03-20-92 TNU
SAMPLE NO.	#14	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

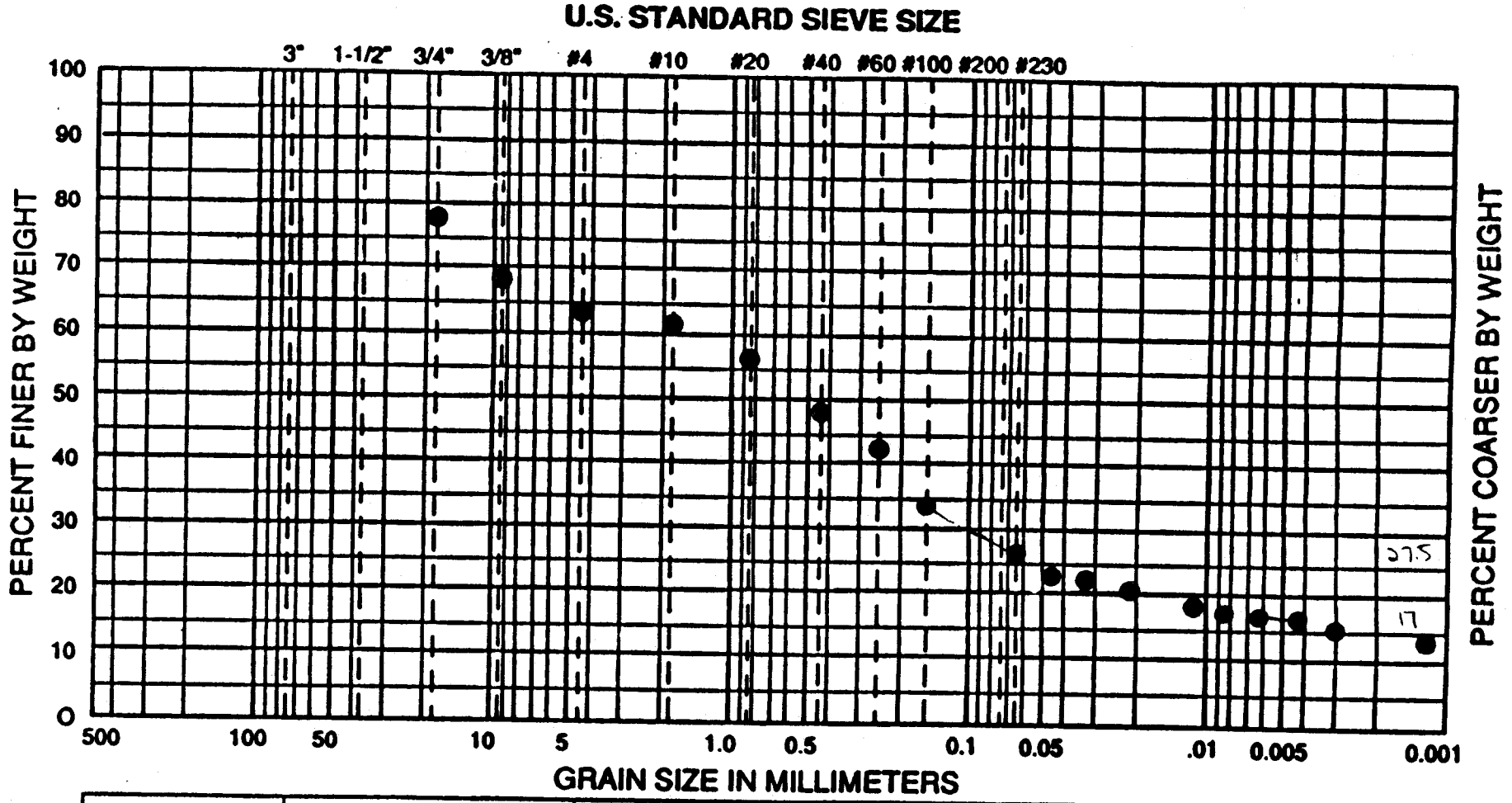
Hydrometer #	ASTM 152 H	Temp., Deg. C	22.0
Sp. Gr. of Soil	2.70	Temp. Coef. K	0.01312
Value of "a"	0.99	Wt. Dry Sample "W"	88.395
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	5.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	28.50	22.50	25.2	25.2	11.62	0.0632
1.0	26.50	20.50	23.0	23.0	11.94	0.0453
2.0	26.00	20.00	22.4	22.4	12.03	0.0322
5.0	24.00	18.00	20.2	20.2	12.35	0.0206
15.0	22.50	16.50	18.5	18.5	12.60	0.0120
30.0	21.50	15.50	17.4	17.4	12.76	0.0086
60.0	21.00	15.00	16.8	16.8	12.85	0.0061
120.0	20.75	14.75	16.5	16.5	12.89	0.0043
250.0	19.50	13.50	15.1	15.1	13.09	0.0030
1440.0	18.50	12.50	14.0	14.0	13.26	0.0013

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY			
		COARSE	FINE	COARSE	MEDIUM	FINE				

WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 8+75 SAMPLE NO.: CH # 14 DATE: 3-30-92 PROJECT NO.:

AREA	DEPTH	gravelly sand		CLASSIFICATION				
		35.8		36.7				
Rocky Flats	33.8'	21.8	14.0	3.4	12.4	20.9	10.5	17

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION - - - - - - - - - - - - - - - -

LABORATORY CLASSIFICATION - - - - - - - - - - - - -

JOB NO. 2066-03

CLIENT/OWNER WESTON

LOCATION Rocky Flats/EG&G

BORING 8+75 SAMPLE CH#64 DEPTH 33.8

FIELD DENSITY BY ...../../..

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD → [redacted]

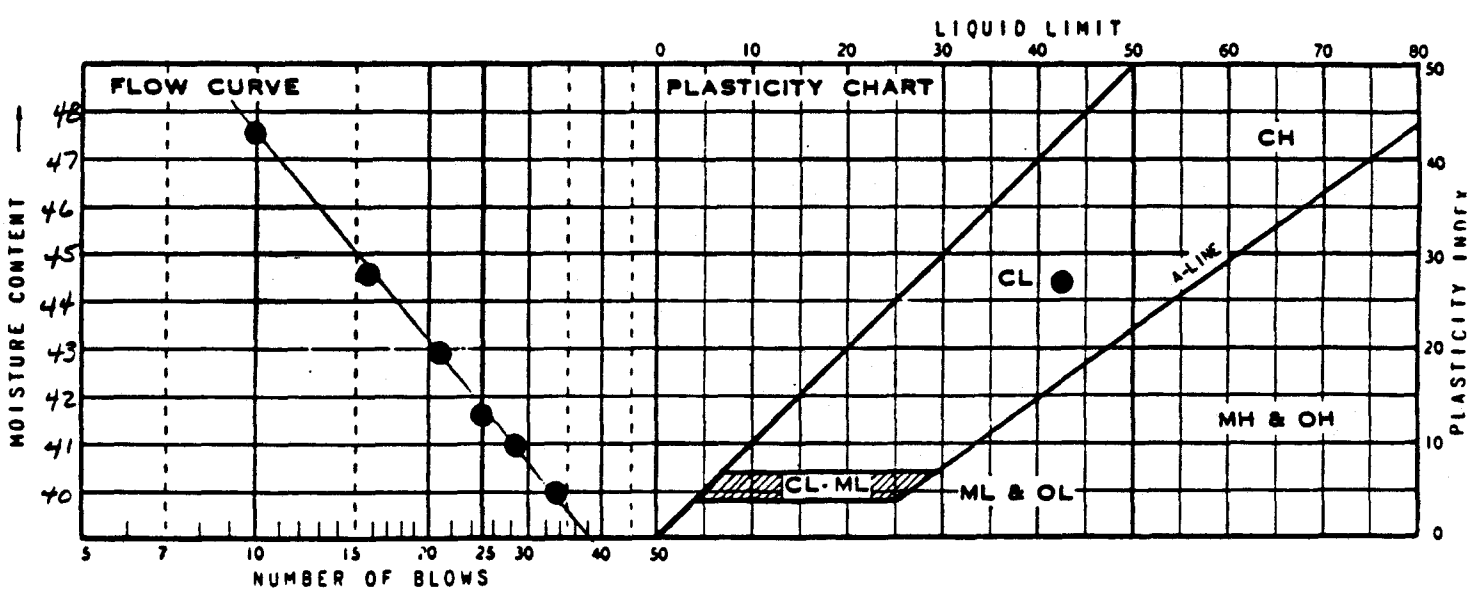
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY SB..312392

DETERMINATION	1	2	3	4	5	6
DISH	2033	2069	32C			
WT OF DISH + WET SOIL g	7.57	6.14	5.95			
WT OF DISH + DRY SOIL g	6.69	5.46	5.28	—	—	—
WT OF MOISTURE g	.88	.68	.67			
WT OF DISH g	1.05	1.05	1.05	—	—	—
WT OF DRY SOIL g	5.64	4.41	4.23			
MOISTURE CONTENT %	15.6	15.4	15.8			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	31C	2026	26C	2030	2034	8C
NUMBER OF BLOWS	34	29±	25	21	16±	10±
WT OF DISH + WET SOIL g	15.51	16.05	16.01	16.55	14.18	16.27
WT OF DISH + DRY SOIL g	11.38	11.69	11.61	11.89	10.12	11.36
WT OF MOISTURE g	4.13	4.36	4.40	4.66	4.06	4.91
WT OF DISH g	1.05	1.04	1.05	1.06	1.04	1.04
WT OF DRY SOIL g	10.33	10.65	10.56	10.83	9.08	10.32
MOISTURE CONTENT %	40.0	40.9	41.7	43.0	44.7	47.6



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		41.9	15.6	26.3	CL	

ADVANCED TERRA TESTING

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	8+75	SAMPLED	Rocky Flats
DEPTH	51.0'	DATE TESTED	03-20-92 TNU
SAMPLE NO.	#14	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC	Yes	
NATURAL	No	
Wt. Wet Soil & Pan	(g)	37.82
Wt. Dry Soil & Pan	(g)	37.09
Wt. Lost Moisture	(g)	0.73
Wt. of Pan Only	(g)	3.81
Wt. of Dry Soil	(g)	33.28
Moisture Content	%	2.2
Wt. Hydrom. Sample Wet	(g)	55.08
Wt. Hydrom. Sample Dry	(g)	53.90

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	695.94
Weight of + #10 Before Washing (g)	24.24
Weight of + #10 After Washing (g)	22.38
Weight of - #10 Wet (g)	671.70
Weight of - #10 Dry (g)	659.10
Wt. Total Sample Dry (g)	681.48
Calc. Wt. "W" (g)	55.71
Calc. Mass + #10	1.81

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	1.52	1.52	1.52	0.2	99.8
#4	0.00	13.24	13.24	14.76	2.2	97.8
#10	0.00	7.38	7.38	22.14	3.2	96.8
#20	1.57	2.13	0.56	0.56	4.3	95.7
#40	1.56	2.53	0.97	1.53	6.0	94.0
#60	1.55	2.99	1.44	2.97	8.6	91.4
#100	1.57	5.30	3.73	6.70	15.3	84.7
#230	1.56	12.01	10.45	17.15	34.0	66.0

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ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	8+75	SAMPLED	Rocky Flats
DEPTH	51.0'	DATE TESTED	03-20-92 TNU
SAMPLE NO.	#14	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

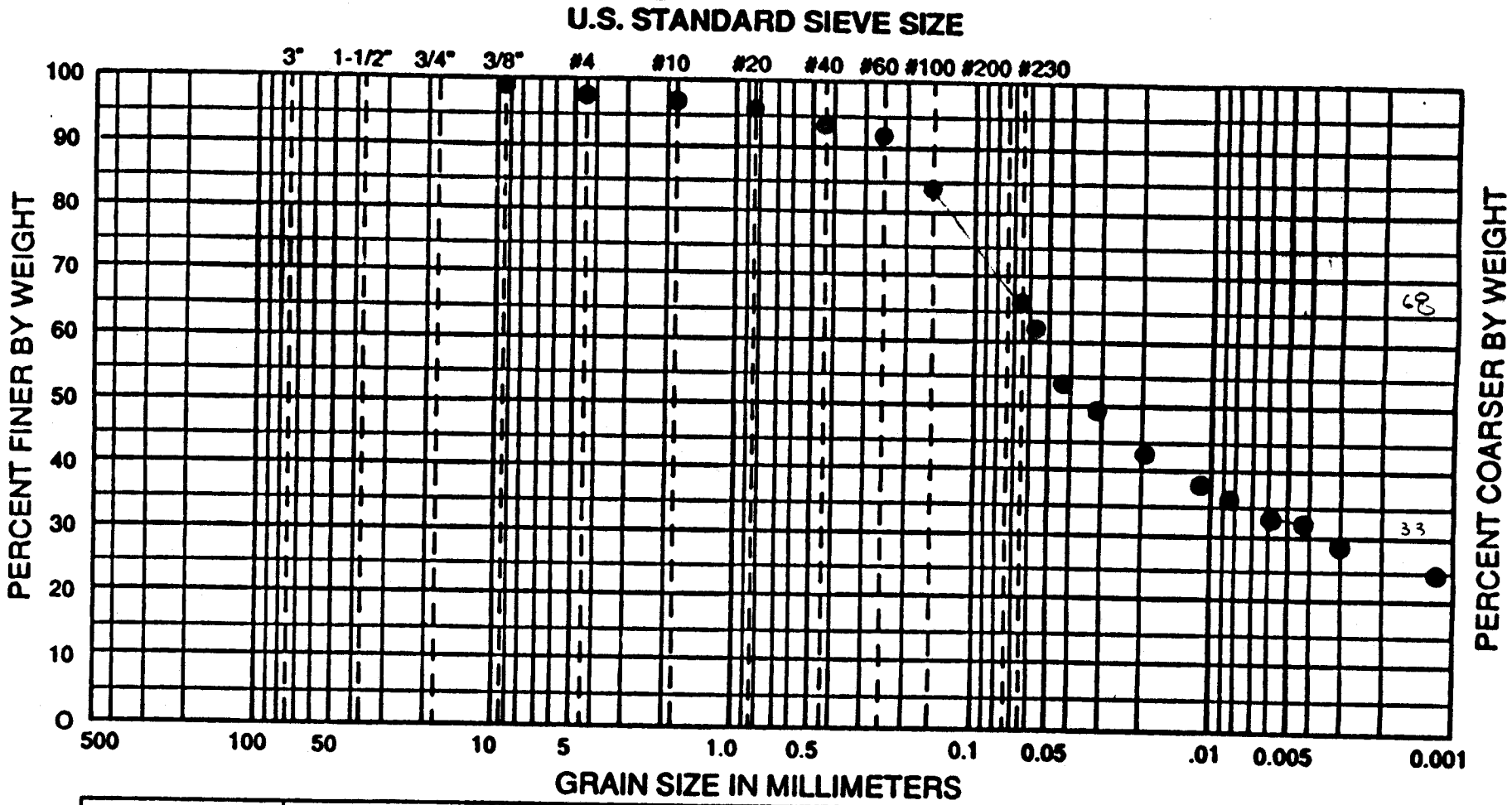
Hydrometer #	ASTM 152 H	Temp., Deg. C	22.0
Sp. Gr. of Soil	2.70	Temp. Coef. K	0.01312
Value of "a"	0.99	Wt. Dry Sample "W"	55.707
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	5.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	41.00	35.00	62.2	62.2	9.57	0.0574
1.0	36.50	30.50	54.2	54.2	10.30	0.0421
2.0	34.00	28.00	49.8	49.8	10.71	0.0304
5.0	30.00	24.00	42.7	42.7	11.37	0.0198
15.0	27.50	21.50	38.2	38.2	11.78	0.0116
30.0	26.00	20.00	35.5	35.5	12.03	0.0083
60.0	25.00	19.00	33.8	33.8	12.19	0.0059
120.0	24.00	18.00	32.0	32.0	12.35	0.0042
250.0	22.00	16.00	28.4	28.4	12.68	0.0030
1440.0	20.00	14.00	24.9	24.9	13.01	0.0012

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY		
		COARSE	FINE	COARSE	MEDIUM	FINE			

WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 8+75 SAMPLE NO.: CH #14 DATE: 3-30-92 PROJECT NO.:

AREA	DEPTH	sandy clayey silt CLASSIFICATION				
		2.2		29.8		
Rocky Flats	51.0'	0 2.2	1.0	2.8	26	35 33

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION _____

LABORATORY CLASSIFICATION _____

JOB NO. 2066-03

CLIENT/OWNER Weston

LOCATION Rocky Flats / EG&G

BORING B+75 SAMPLE #14 DEPTH @51.0'

FIELD DENSITY BY ___/___/___

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD → [redacted]

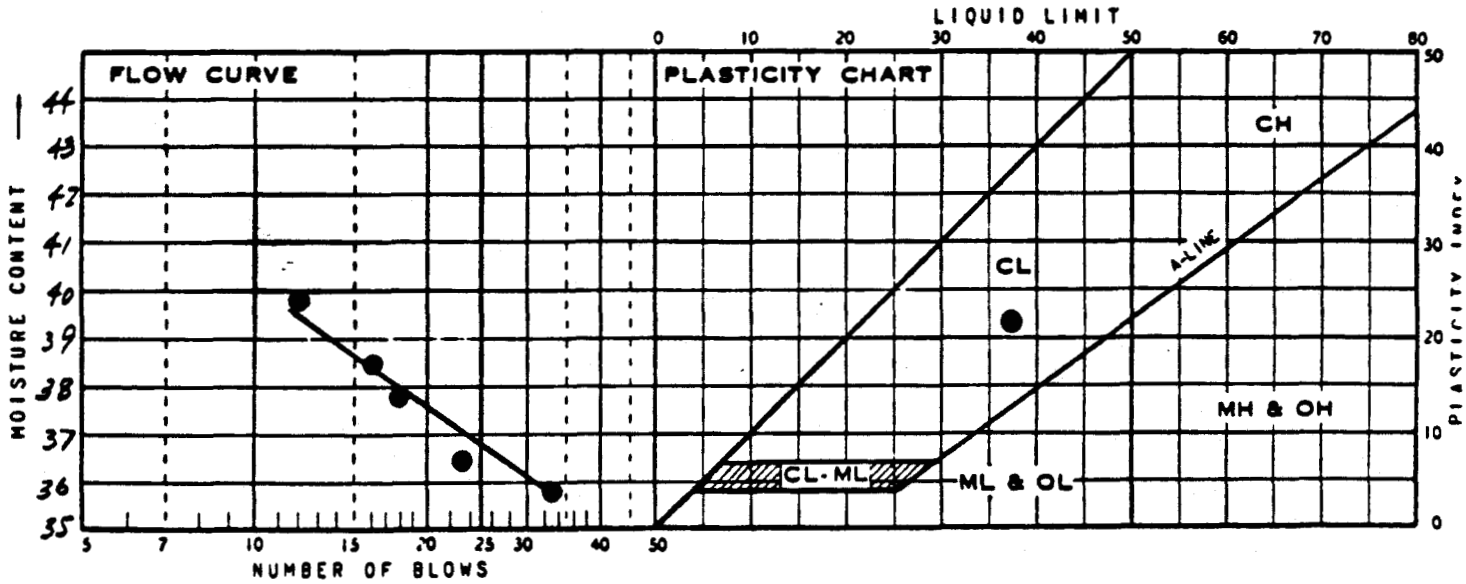
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY [illegible] 3/29/92

DETERMINATION	1	2	3	4	5	6
DISH	2067	2051	2026			
WT OF DISH + WET SOIL g	7.99	6.97	6.63			
WT OF DISH + DRY SOIL	7.07	6.21	5.89	—	—	—
WT OF MOISTURE	0.92	0.76	0.74			
WT OF DISH	1.04	1.04	1.04	—	—	—
WT OF DRY SOIL	6.03	5.17	4.85			
MOISTURE CONTENT %	15.3	14.7	15.3	= 45.3/3 =	15.1	

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6 ??
DISH	46C	26C	2008	21C	2C	6C
NUMBER OF BLOWS	33	18	23	16	12	7+
WT OF DISH + WET SOIL g	9.79	10.72	9.26	10.64	10.80	9.97
WT OF DISH + DRY SOIL	7.49	8.07	7.07	7.97	8.02	7.28
WT OF MOISTURE	2.30	2.65	2.19	2.67	2.78	2.69
WT OF DISH	1.06	1.05	1.06	1.04	1.04	1.03
WT OF DRY SOIL	6.43	7.02	6.01	6.93	6.98	6.25
MOISTURE CONTENT %	35.8	37.8	36.4	38.5	39.8	43.0



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		36.8	15.1	21.7	CL	

ADVANCED TERRA TESTING inc

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MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT **Weston**

JOB NO. 2066-03

BORING NO.	8+75	SAMPLED	Rocky Flats
DEPTH	64.1	DATE TESTED	03-20-92 TNU
SAMPLE NO.	#14	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan	(g)	38.22
Wt. Dry Soil & Pan	(g)	36.77
Wt. Lost Moisture	(g)	1.45
Wt. of Pan Only	(g)	3.75
Wt. of Dry Soil	(g)	33.02
Moisture Content	%	4.4

Wt. Hydrom. Sample Wet (g)	55.02
Wt. Hydrom. Sample Dry (g)	52.70

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	557.15
Weight of + #10 Before Washing (g)	4.69
Weight of + #10 After Washing (g)	4.52
Weight of - #10 Wet (g)	552.46
Weight of - #10 Dry (g)	529.38
Wt. Total Sample Dry (g)	533.90
Calc. Wt. "W" (g)	53.15
Calc. Mass + #10	0.45

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	2.96	2.96	2.96	0.6	99.4
#4	0.00	1.40	1.40	4.36	0.8	99.2
#10	0.00	0.16	0.16	4.52	0.8	99.2
#20	1.56	1.67	0.11	0.11	1.1	98.9
#40	1.57	1.79	0.22	0.33	1.5	98.5
#60	1.57	1.74	0.17	0.50	1.8	98.2
#100	1.57	1.80	0.23	0.73	2.2	97.8 97
#230	1.56	2.05	0.49	1.22	3.1	96.9

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT **Weston**

JOB NO. 2066-03

BORING NO.	8+75	SAMPLED	Rocky Flats
DEPTH	64.1	DATE TESTED	03-20-92 TNU
SAMPLE NO.	#14	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

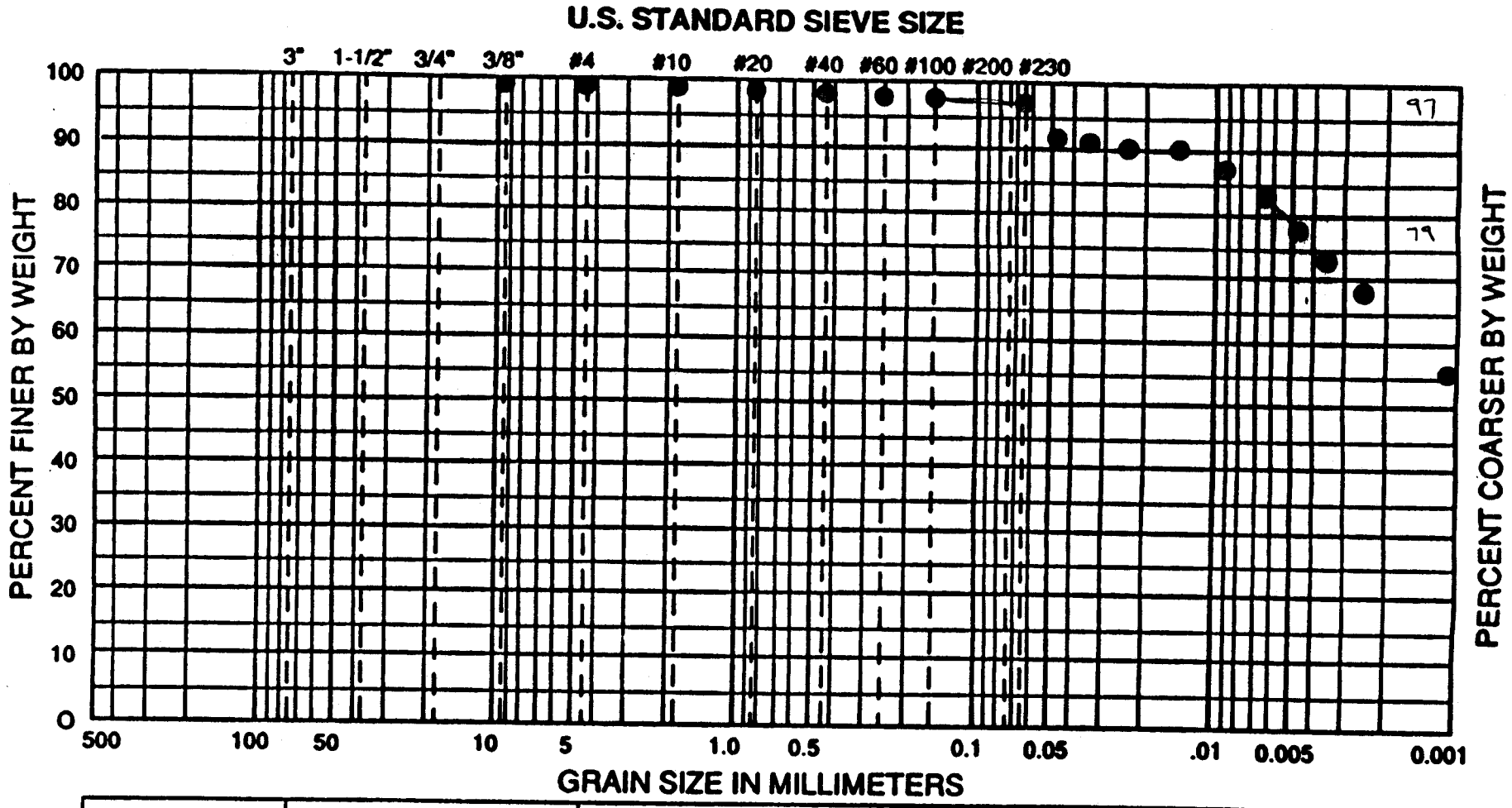
Hydrometer #	ASTM 152 H	Temp., Deg. C	22.0
Sp. Gr. of Soil	2.76	Temp. Coef. K	0.01290
Value of "a"	0.98	Wt. Dry Sample "W"	53.151
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	5.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	55.50	49.50	91.1	91.1	7.19	0.0489
1.0	55.25	49.25	90.6	90.6	7.23	0.0347
2.0	55.00	49.00	90.2	90.2	7.27	0.0246
5.0	55.00	49.00	90.2	90.2	7.27	0.0156
15.0	53.50	47.50	87.4	87.4	7.52	0.0091
30.0	51.00	45.00	82.8	82.8	7.93	0.0066
60.0	48.50	42.50	78.2	78.2	8.34	0.0048
120.0	46.00	40.00	73.6	73.6	8.75	0.0035
250.0	43.00	37.00	68.1	68.1	9.24	0.0025
1440.0	36.00	30.00	55.2	55.2	10.39	0.0011

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY			
		COARSE	FINE	COARSE	MEDIUM	FINE				
WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 8+75 SAMPLE NO.: CH #14 DATE: 3-20-92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION								
		clay								
		0.8			2.2					
Rocky Flats	64.1'	0	0.8		0	0.7	1.5		18	79

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION - - - - - - - - - - - - - - -

LABORATORY CLASSIFICATION - - - - - - - - - - - -

JOB NO. 2066-03

CLIENT/OWNER Weston

LOCATION Rocky Flats / EG&G

BORING 8+75 SAMPLE #14 DEPTH @ 64.1'

FIELD DENSITY BY ...../../...

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

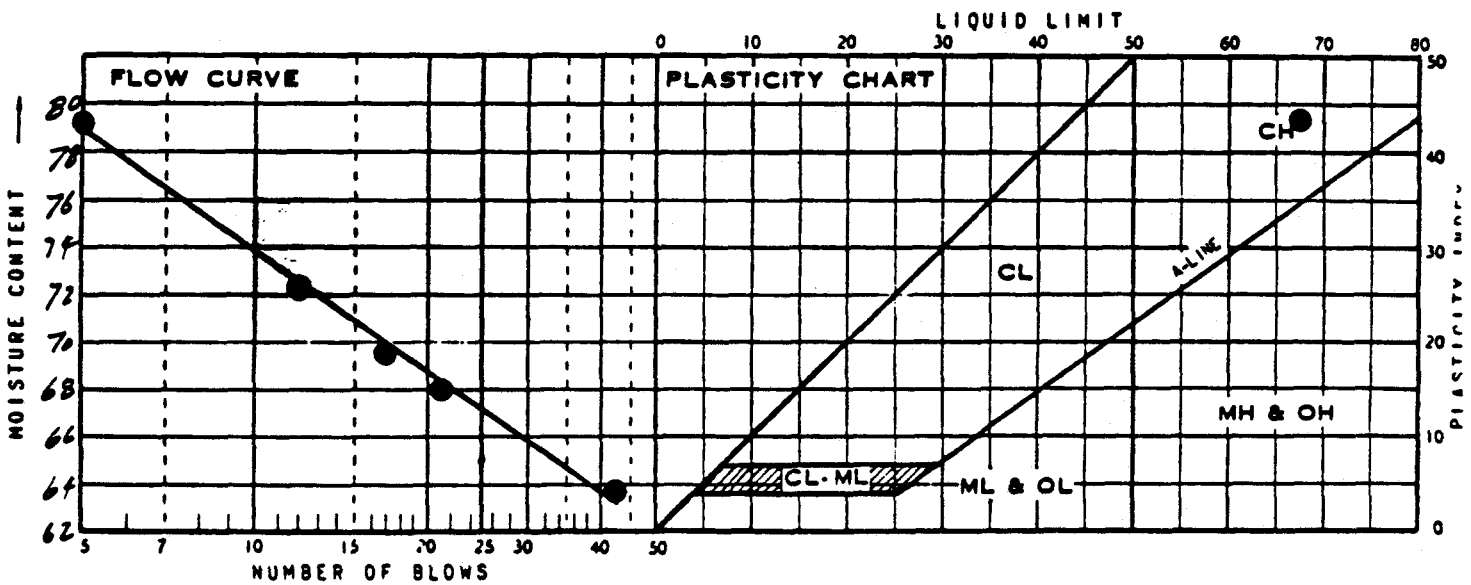
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY [illegible] 3/23/92

DETERMINATION	1	2	3	4	5	6
DISH	2016	B21	54C			
WT OF DISH + WET SOIL g	6.63	6.35	7.55			
WT OF DISH + DRY SOIL	5.57	5.36	6.25	—	—	—
WT OF MOISTURE	1.06	0.99	1.30			
WT OF DISH	1.04	1.04	1.06	—	—	—
WT OF DRY SOIL	4.53	4.32	5.19			
MOISTURE CONTENT %	23.4	22.9	25.0	71.3/3	23.8	

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	2019	3	2028	2065	2021	16C
NUMBER OF BLOWS	42-	25	21	17	12	5
WT OF DISH + WET SOIL g	9.90	9.31	8.73	10.10	12.63	10.55
WT OF DISH + DRY SOIL	6.46	6.06	5.63	6.39	7.78	6.35
WT OF MOISTURE	3.44	3.25	3.10	3.71	4.85	4.20
WT OF DISH	1.06	1.06	1.07	1.05	1.05	1.06
WT OF DRY SOIL	5.40	5.00	4.56	5.34	6.73	5.29
MOISTURE CONTENT %	63.7	65.0	68.0	69.5	72.1	79.4



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		67.2	23.8	43.4	CH	

ADVANCED TERRA TESTING INC

JEM

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT **Weston** .

JOB NO. 2066-03

BORING NO.	8+75	SAMPLED	Rocky Flats
DEPTH	72.0	DATE TESTED	03-20-92 TNU
SAMPLE NO.	#14	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan	(g)	38.18
Wt. Dry Soil & Pan	(g)	36.86
Wt. Lost Moisture	(g)	1.32
Wt. of Pan Only	(g)	3.60
Wt. of Dry Soil	(g)	33.26
Moisture Content	%	4.0

Wt. Hydrom. Sample Wet	(g)	55.02
Wt. Hydrom. Sample Dry	(g)	52.92

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	55.02
Weight of + #10 Before Washing (g)	0.00
Weight of + #10 After Washing (g)	0.00
Weight of - #10 Wet (g)	55.02
Weight of - #10 Dry (g)	52.92
Wt. Total Sample Dry (g)	52.92
Calc. Wt. "W" (g)	52.92
Calc. Mass + #10	0.00

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	0.00	0.00	0.00	0.0	100.0
#4	0.00	0.00	0.00	0.00	0.0	100.0
#10	0.00	0.00	0.00	0.00	0.0	100.0
#20	0.00	0.00	0.00	0.00	0.0	100.0
#40	1.56	1.57	0.01	0.01	0.0	100.0
#60	1.55	1.57	0.02	0.03	0.1	99.9
#100	1.57	1.58	0.01	0.04	0.1	99.9
#230	1.55	1.59	0.04	0.08	0.2	99.8

Chg (CH7)

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	8+75	SAMPLED	Rocky Flats
DEPTH	72.0	DATE TESTED	03-20-92 TNU
SAMPLE NO.	#14	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

Hydrometer #	ASTM 152 H	Temp., Deg. C	22.0
Sp. Gr. of Soil	2.81	Temp. Coef. K	0.01272
Value of "a"	0.97	Wt. Dry Sample "W"	52.922
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	5.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	57.00	51.00	93.3	93.3	6.94	0.0474
1.0	57.00	51.00	93.3	93.3	6.94	0.0335
2.0	57.00	51.00	93.3	93.3	6.94	0.0237
5.0	57.00	51.00	93.3	93.3	6.94	0.0150
15.0	55.50	49.50	90.5	90.5	7.19	0.0088
30.0	53.50	47.50	86.9	86.9	7.52	0.0064
60.0	51.00	45.00	82.3	82.3	7.93	0.0046
120.0	48.00	42.00	76.8	76.8	8.42	0.0034
250.0	44.50	38.50	70.4	70.4	8.99	0.0024
1440.0	37.00	31.00	56.7	56.7	10.22	0.0011

Grain Diameter = K*(SQRT(L/T))

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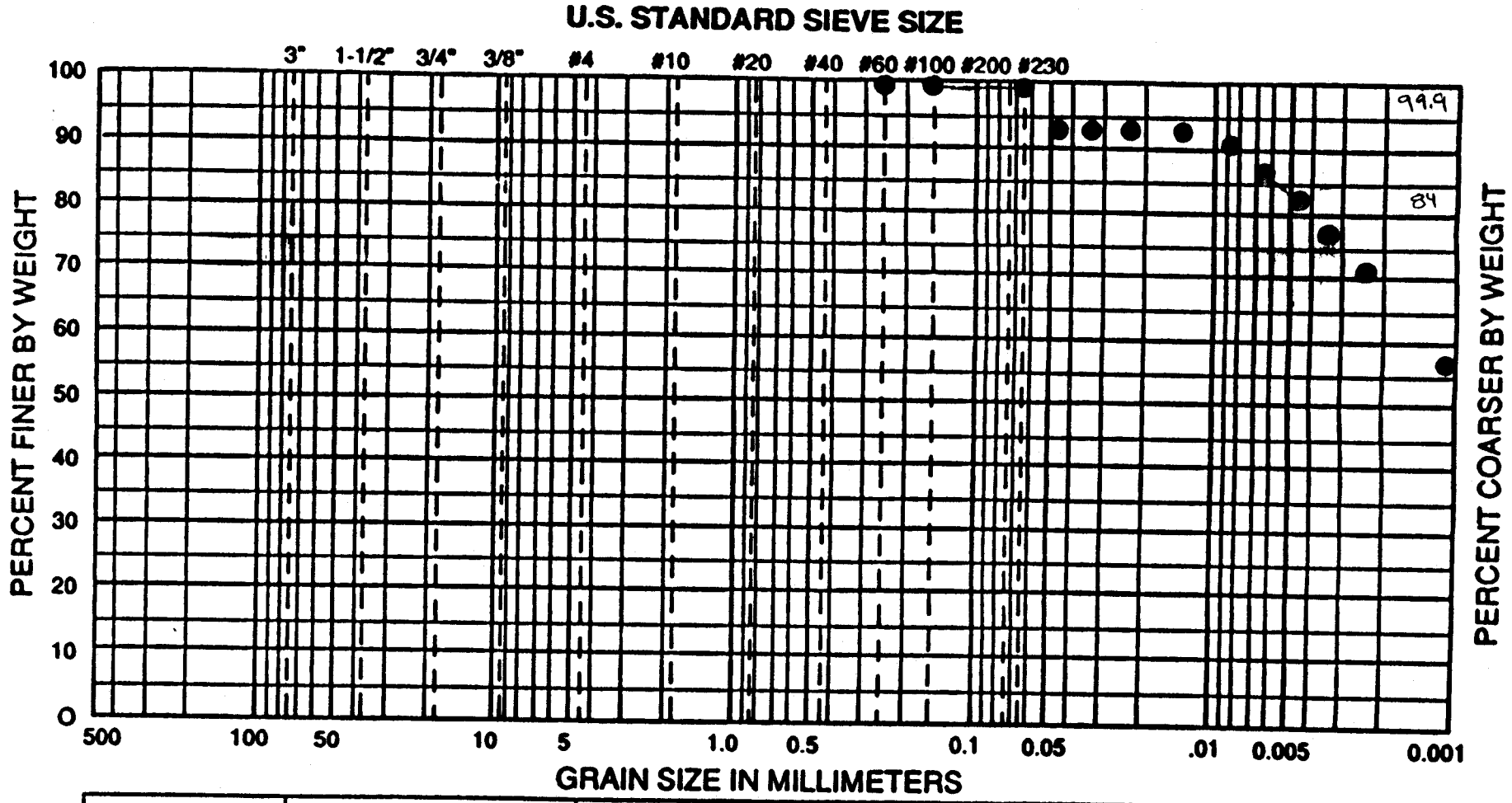
ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY			
		COARSE	FINE	COARSE	MEDIUM	FINE				
WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 8+75 SAMPLE NO.: CH #14 DATE: 3-20-92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION				
		clay				
Rocky Flats	72.0'	0	0	0	0.1	15.9	84

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION - - - - - - - - - - - - - - - -

LABORATORY CLASSIFICATION - - - - - - - - - - - - -

JOB NO. 2066-13

CLIENT/OWNER WESTON

LOCATION ROCKY FLATS/ EG&G

BORING B+75 SAMPLE CH #14 DEPTH 72.0

FIELD DENSITY BY ...../../..

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD [redacted]

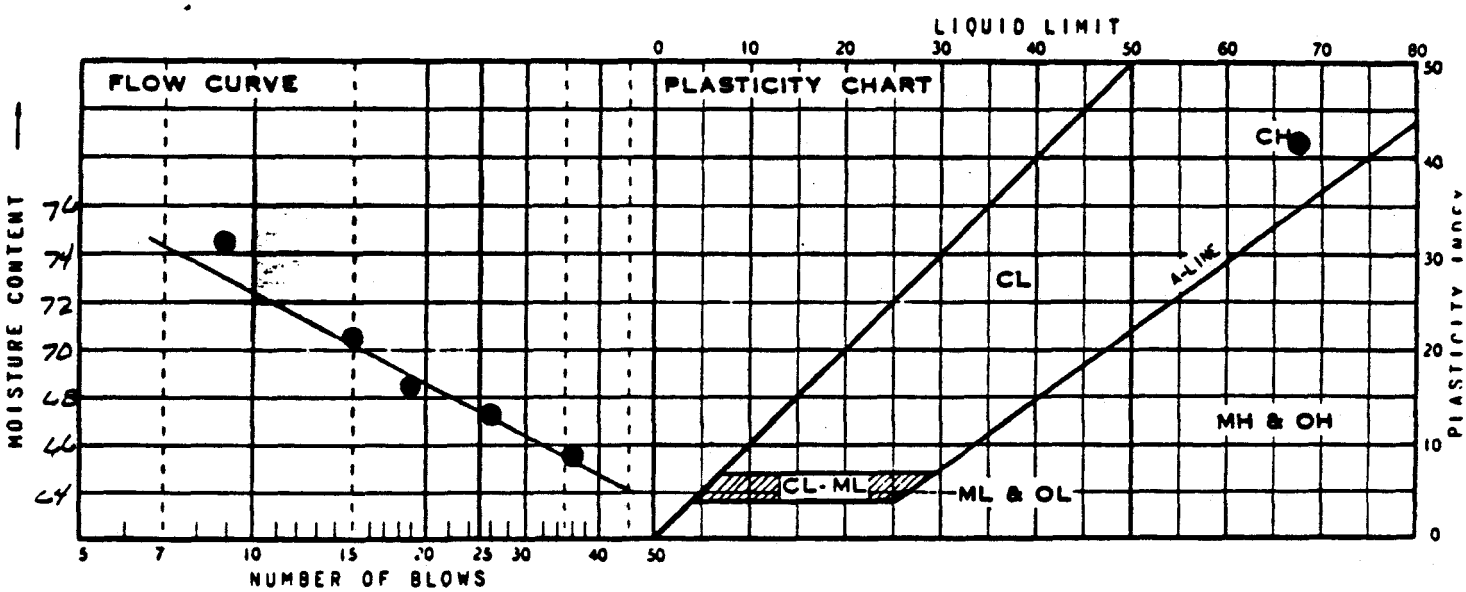
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY SB..3.124/92.

DETERMINATION	1	2	3	4	5	6
DISH	2041	20 C	2074			
WT OF DISH + WET SOIL g	5.72	6.67	7.26			
WT OF DISH + DRY SOIL g	4.78	5.53	6.01	—	—	—
WT OF MOISTURE g	.94	1.14	1.25			
WT OF DISH g	1.06	1.07	1.05	—	—	—
WT OF DRY SOIL g	3.72	4.46	4.96			
MOISTURE CONTENT %	25.3	25.6	25.2			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	2054	42 C	2013	2006	2003	
NUMBER OF BLOWS	36	26	18±	15	9	
WT OF DISH + WET SOIL g	14.40	16.50	11.82	12.80	14.24	
WT OF DISH + DRY SOIL g	9.11	10.29	7.44	7.94	8.61	—
WT OF MOISTURE g	5.29	6.21	4.38	4.86	5.63	
WT OF DISH g	1.05	1.05	1.05	1.05	1.03	—
WT OF DRY SOIL g	8.06	9.24	6.39	6.89	7.58	
MOISTURE CONTENT %	65.6	67.2	68.5	70.5	74.3	



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		67.5	25.4	42.1	CH	

ADVANCED TERRA TESTING inc

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MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT **Weston** -

JOB NO. 2066-03

BORING NO.	8+75	SAMPLED	Rocky Flats
DEPTH	75.0	DATE TESTED	03-20-92 TNU
SAMPLE NO.	#14	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC	Yes	
NATURAL	No	
Wt. Wet Soil & Pan	(g)	38.83
Wt. Dry Soil & Pan	(g)	37.79
Wt. Lost Moisture	(g)	1.04
Wt. of Pan Only	(g)	3.55
Wt. of Dry Soil	(g)	34.24
Moisture Content	%	3.0
Wt. Hydrom. Sample Wet	(g)	55.09
Wt. Hydrom. Sample Dry	(g)	53.47

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	55.09
Weight of + #10 Before Washing (g)	0.00
Weight of + #10 After Washing (g)	0.00
Weight of - #10 Wet (g)	55.09
Weight of - #10 Dry (g)	53.47
Wt. Total Sample Dry (g)	53.47
Calc. Wt. "W" (g)	53.47
Calc. Mass + #10	0.00

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	0.00	0.00	0.00	0.0	100.0
#4	0.00	0.00	0.00	0.00	0.0	100.0
#10	0.00	0.00	0.00	0.00	0.0	100.0
#20	1.57	1.58	0.01	0.01	0.0	100.0
#40	1.56	1.57	0.01	0.02	0.0	100.0
#60	1.57	1.58	0.01	0.03	0.1	99.9
#100	1.55	1.58	0.03	0.06	0.1	99.9
#230	1.56	7.25	5.69	5.75	10.8	89.2

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT **Weston**

JOB NO. 2066-03

BORING NO.	8+75	SAMPLED	Rocky Flats
DEPTH	75.0	DATE TESTED	03-20-92 TNU
SAMPLE NO.	#14	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

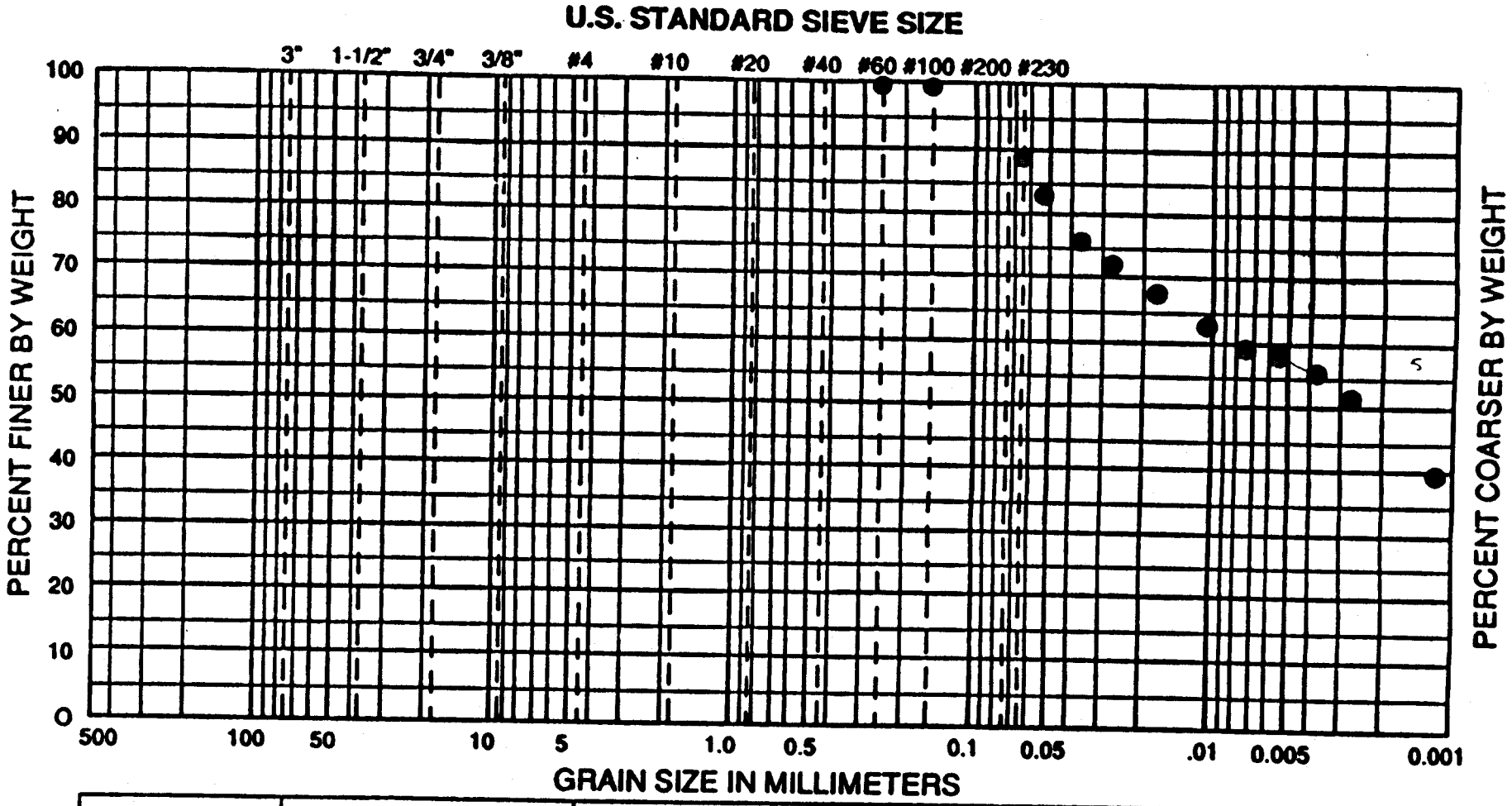
Hydrometer #	ASTM 152 H	Temp., Deg. C	22.0
Sp. Gr. of Soil	2.72	Temp. Coef. K	0.01305
Value of "a"	0.99	Wt. Dry Sample "W"	53.465
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	5.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	51.00	45.00	83.0	83.0	7.93	0.0520
1.0	47.00	41.00	75.6	75.6	8.58	0.0382
2.0	45.00	39.00	71.9	71.9	8.91	0.0275
5.0	42.50	36.50	67.3	67.3	9.32	0.0178
15.0	40.50	34.50	63.6	63.6	9.65	0.0105
30.0	38.50	32.50	59.9	59.9	9.98	0.0075
60.0	37.50	31.50	58.1	58.1	10.14	0.0054
120.0	36.00	30.00	55.3	55.3	10.39	0.0038
250.0	33.50	27.50	50.7	50.7	10.80	0.0027
1440.0	27.50	21.50	39.7	39.7	11.78	0.0012

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY		
		COARSE	FINE	COARSE	MEDIUM	FINE			
WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 8+75 SAMPLE NO.: CH#4 DATE: 3-30-92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION				
		silty claystone				
Rocky Flats	75.0'	0	0	0	10.8	10.8	31.2	58

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION - - - - - - - - - - - - - - - -

LABORATORY CLASSIFICATION - - - - - - - - - - - - -

JOB NO. 2066-03

CLIENT/OWNER WESTON

LOCATION ROCKY FLATS/EG&G

BORING B+75 SAMPLE CH #14 DEPTH 75.0'

FIELD DENSITY BY ...../../..

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

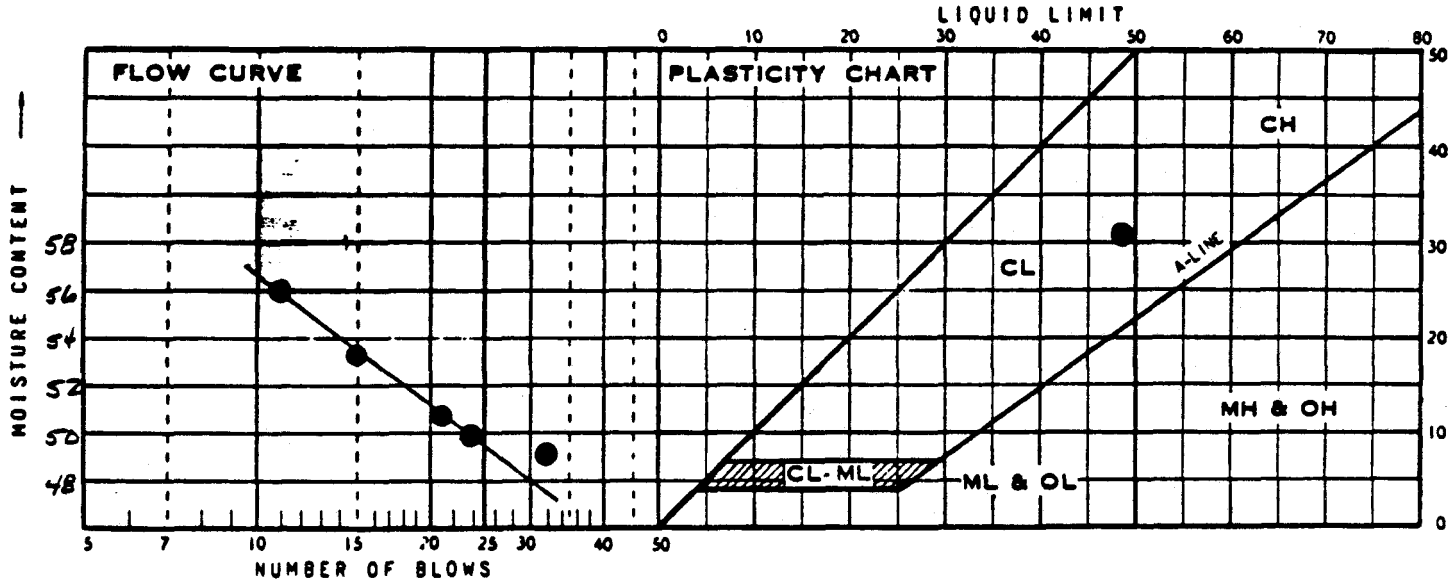
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY SB.3.124/92.

DETERMINATION	1	2	3	4	5	6
DISH	2033	2002	8C			
WT OF DISH + WET SOIL g	6.67	6.46	7.49			
WT OF DISH + DRY SOIL g	5.79	5.62	6.45	—	—	—
WT OF MOISTURE g	.88	.84	1.04			
WT OF DISH g	1.04	1.06	1.04	—	—	—
WT OF DRY SOIL g	4.75	4.56	5.41			
MOISTURE CONTENT %	18.5	18.4	19.2			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	2063	2034	2030	23C	2066	
NUMBER OF BLOWS	32	24	21	15±	11	
WT OF DISH + WET SOIL g	13.30	14.22	14.08	16.28	12.31	
WT OF DISH + DRY SOIL g	9.27	9.83	9.69	11.00	8.27	—
WT OF MOISTURE g	4.03	4.39	4.39	5.28	4.04	
WT OF DISH g	1.06	1.04	1.06	1.07	1.06	—
WT OF DRY SOIL g	8.21	8.79	8.63	9.93	7.21	
MOISTURE CONTENT %	49.1	49.9	50.9	53.2	56.0	



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		49.5	18.7	30.8	CL	

ADVANCED TERRA TESTING

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	9+00	SAMPLED	Rocky Flats
DEPTH	7.5'	DATE TESTED	03-11-92 SR
SAMPLE NO.	#10	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan	(g)	39.53
Wt. Dry Soil & Pan	(g)	38.25
Wt. Lost Moisture	(g)	1.28
Wt. of Pan Only	(g)	3.58
Wt. of Dry Soil	(g)	34.67
Moisture Content	%	3.7

Wt. Hydrom. Sample Wet (g)	55.02
Wt. Hydrom. Sample Dry (g)	53.06

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	596.63
Weight of + #10 Before Washing (g)	159.56
Weight of + #10 After Washing (g)	146.93
Weight of - #10 Wet (g)	437.07
Weight of - #10 Dry (g)	433.69
Wt. Total Sample Dry (g)	580.62
Calc. Wt. "W" (g)	71.03
Calc. Mass + #10	17.98

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	63.40	63.40	63.40	10.9	89.1
3/8"	0.00	47.28	47.28	110.68	19.1	80.9
#4	0.00	19.18	19.18	129.86	22.4	77.6
#10	0.00	17.07	17.07	146.93	25.3	74.7
#20	1.57	2.39	0.82	0.82	26.5	73.5
#40	1.57	3.85	2.28	3.10	29.7	70.3
#60	1.56	3.83	2.27	5.37	32.9	67.1
#100	1.56	4.33	2.77	8.14	36.8	63.2
#230	1.57	6.94	5.37	13.51	44.3	55.7

Clay Cont

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	9+00	SAMPLED	Rocky Flats
DEPTH	7.5'	DATE TESTED	03-11-92 SR
SAMPLE NO.	#10	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

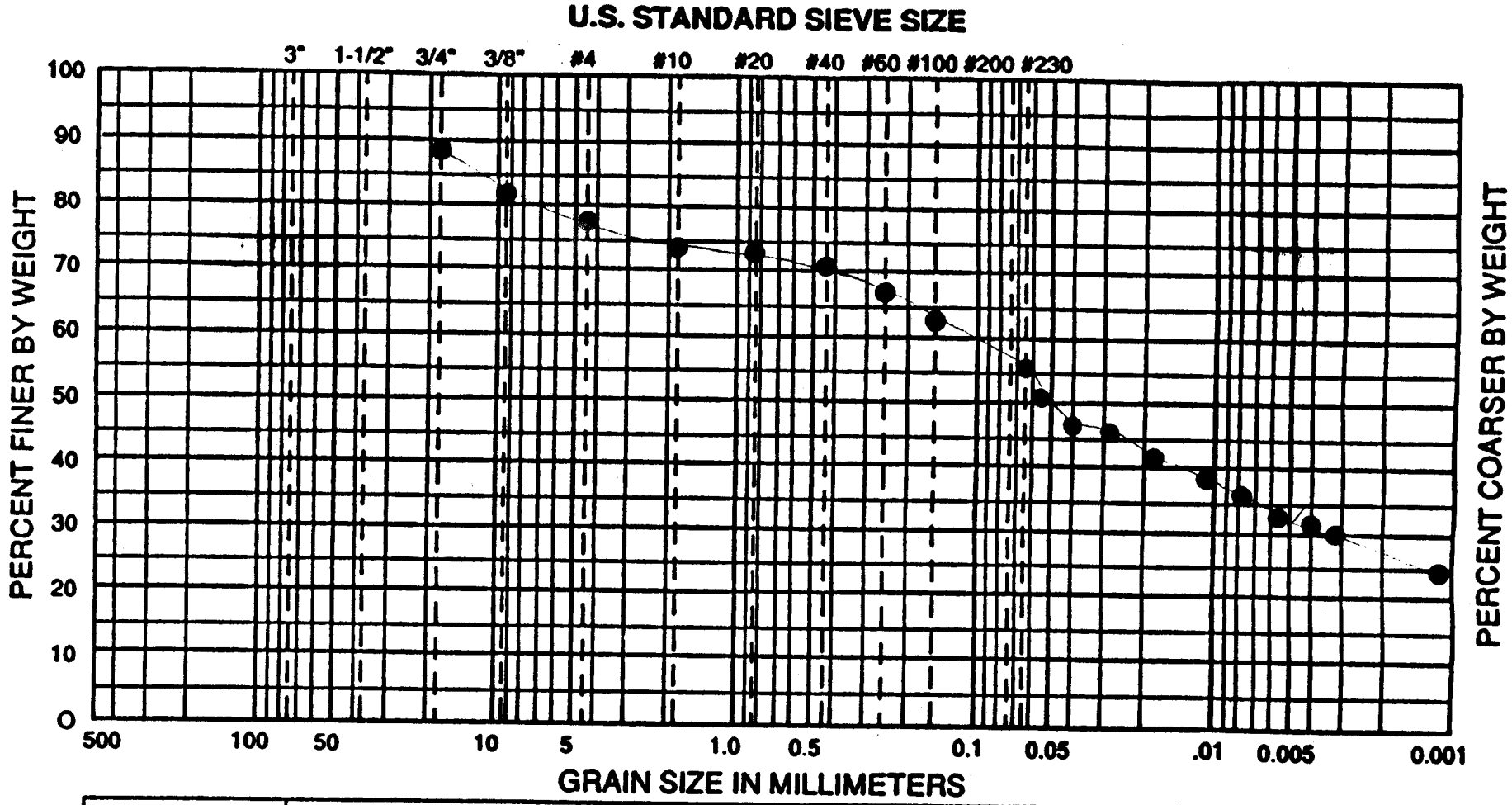
Hydrometer #	ASTM 152 H	Temp., Deg. C	22.0
Sp. Gr. of Soil	2.75	Temp. Coef. K	0.01294
Value of "a"	0.98	Wt. Dry Sample "W"	71.032
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	6.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	44.00	37.00	51.0	51.0	9.07	0.0551
1.0	41.00	34.00	46.9	46.9	9.57	0.0400
2.0	40.25	33.25	45.9	45.9	9.69	0.0285
5.0	37.25	30.25	41.7	41.7	10.18	0.0185
15.0	35.25	28.25	39.0	39.0	10.51	0.0108
30.0	33.25	26.25	36.2	36.2	10.84	0.0078
60.0	31.50	24.50	33.8	33.8	11.12	0.0056
120.0	29.50	22.50	31.0	31.0	11.45	0.0040
190.0	28.75	21.75	30.0	30.0	11.58	0.0032
1440.0	25.00	18.00	24.8	24.8	12.19	0.0012

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY		
		COARSE	FINE	COARSE	MEDIUM	FINE			

WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 9+00 SAMPLE NO.: CH #10 DATE: 3-19-92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION
Rocky Flats	7.5'	CLAY w/ some sand, silt & gravel
		10.7% c. gravel, 11.5% f. gravel / 2.9% c. sd, 4.4% med sand, 12.8% f sd / 25% silt, 32% clay

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION _____

LABORATORY CLASSIFICATION _____

JOB NO. 2066-03

CLIENT/OWNER Weston

LOCATION Rocky Flats EG+G

BORING 9+00 SAMPLE CH #10 DEPTH 7.5'

FIELD DENSITY BY ___/__/__

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

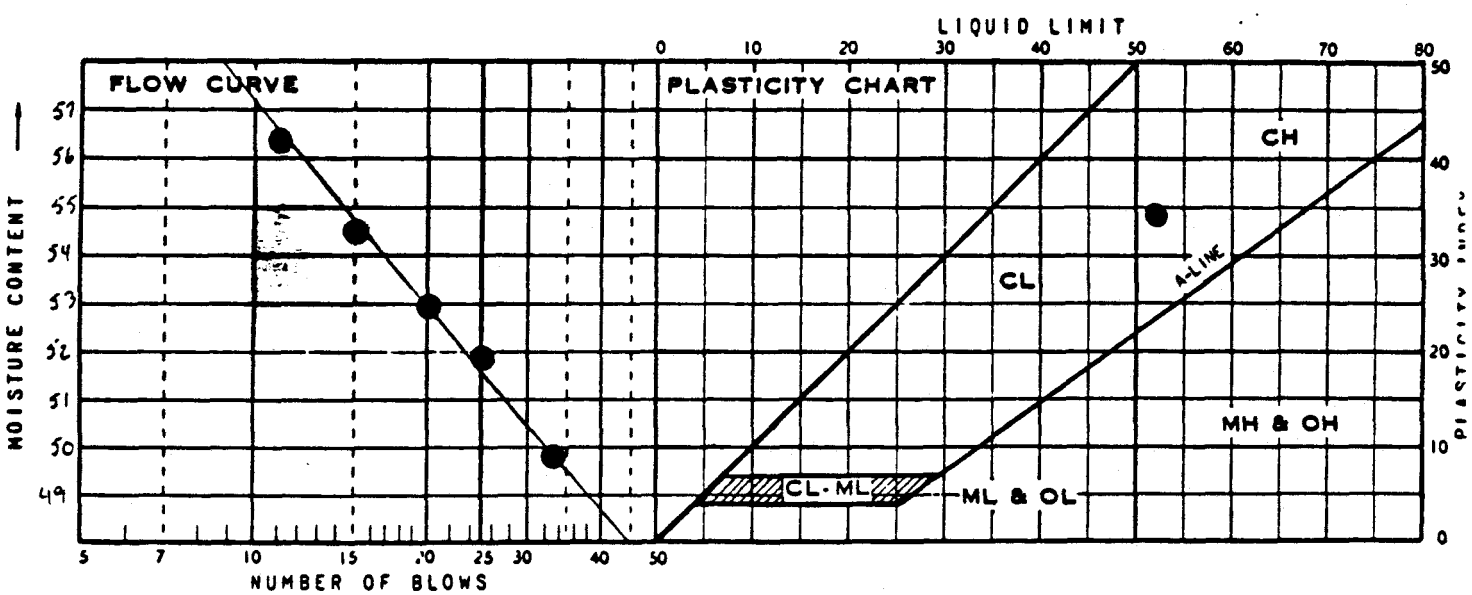
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY DU 3/12/92

DETERMINATION	1	2	3	4	5	6
DISH	6C	2037	2074			
WT OF DISH + WET SOIL g	5.60	5.89	5.40			
WT OF DISH + DRY SOIL g	4.94	5.18	4.76	—	—	—
WT OF MOISTURE g	.66	.71	.64			
WT OF DISH g	1.08	1.05	1.05	—	—	—
WT OF DRY SOIL g	3.86	4.13	3.71			
MOISTURE CONTENT %	17.1	17.2	17.3			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	2054	2001	2003	2061	1C	22
NUMBER OF BLOWS	33	25	20	15	11	
WT OF DISH + WET SOIL g	12.51	11.66	12.12	11.07	11.43	
WT OF DISH + DRY SOIL g	8.70	8.04	8.28	7.53	7.69	—
WT OF MOISTURE g	3.81	3.62	3.84	3.54	3.74	
WT OF DISH g	1.05	1.06	1.03	1.03	1.06	1.05
WT OF DRY SOIL g	7.65	6.98	7.25	6.50	6.63	
MOISTURE CONTENT %	49.8	51.9	53.0	54.5	56.4	



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		51.6	17.2	34.4	CH	

ADVANCED TERRA TESTING inc

RDM

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	9+00	SAMPLED	Rocky Flats
DEPTH	19.8'	DATE TESTED	03-11-92 SR
SAMPLE NO.	#10	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC	Yes	
NATURAL	No	
Wt. Wet Soil & Pan	(g)	39.46
Wt. Dry Soil & Pan	(g)	37.89
Wt. Lost Moisture	(g)	1.57
Wt. of Pan Only	(g)	3.77
Wt. of Dry Soil	(g)	34.12
Moisture Content	%	4.6
Wt. Hydrom. Sample Wet	(g)	55.05
Wt. Hydrom. Sample Dry	(g)	52.63

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	635.80
Weight of + #10 Before Washing (g)	204.63
Weight of + #10 After Washing (g)	129.31
Weight of - #10 Wet (g)	431.17
Weight of - #10 Dry (g)	484.21
Wt. Total Sample Dry (g)	613.52
Calc. Wt. "W" (g)	66.68
Calc. Mass + #10	14.05

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	71.05	71.05	71.05	11.6	88.4
3/8"	0.00	29.41	29.41	100.46	16.4	83.6
#4	0.00	12.68	12.68	113.14	18.4	81.6
#10	0.00	16.17	16.17	129.31	21.1	78.9
#20	1.57	3.51	1.94	1.94	24.0	76.0
#40	1.55	3.13	1.58	3.52	26.4	73.6
#60	1.57	2.66	1.09	4.61	28.0	72.0
#100	1.55	2.73	1.18	5.79	29.8	70.2
#230	1.56	3.59	2.03	7.82	32.8	67.2

Clay CCH

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT **Weston**

JOB NO. 2066-03

BORING NO.	9+00	SAMPLED	Rocky Flats
DEPTH	19.8'	DATE TESTED	03-11-92 SR
SAMPLE NO.	#10	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

Hydrometer #	ASTM 152 H	Temp., Deg. C	22.0
Sp. Gr. of Soil	2.76	Temp. Coef. K	0.01290
Value of "a"	0.98	Wt. Dry Sample "W"	66.681
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	6.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	49.00	42.00	61.6	61.6	8.25	0.0524
1.0	48.00	41.00	60.1	60.1	8.42	0.0374
2.0	47.75	40.75	59.8	59.8	8.46	0.0265
5.0	46.50	39.50	57.9	57.9	8.66	0.0170
15.0	45.00	38.00	55.7	55.7	8.91	0.0099
30.0	43.25	36.25	53.2	53.2	9.20	0.0071
60.0	41.50	34.50	50.6	50.6	9.48	0.0051
120.0	39.00	32.00	46.9	46.9	9.89	0.0037
190.0	38.00	31.00	45.5	45.5	10.06	0.0030
1440.0	37.00	30.00	44.0	44.0	10.22	0.0011

Grain Diameter = K*(SQRT(L/T))

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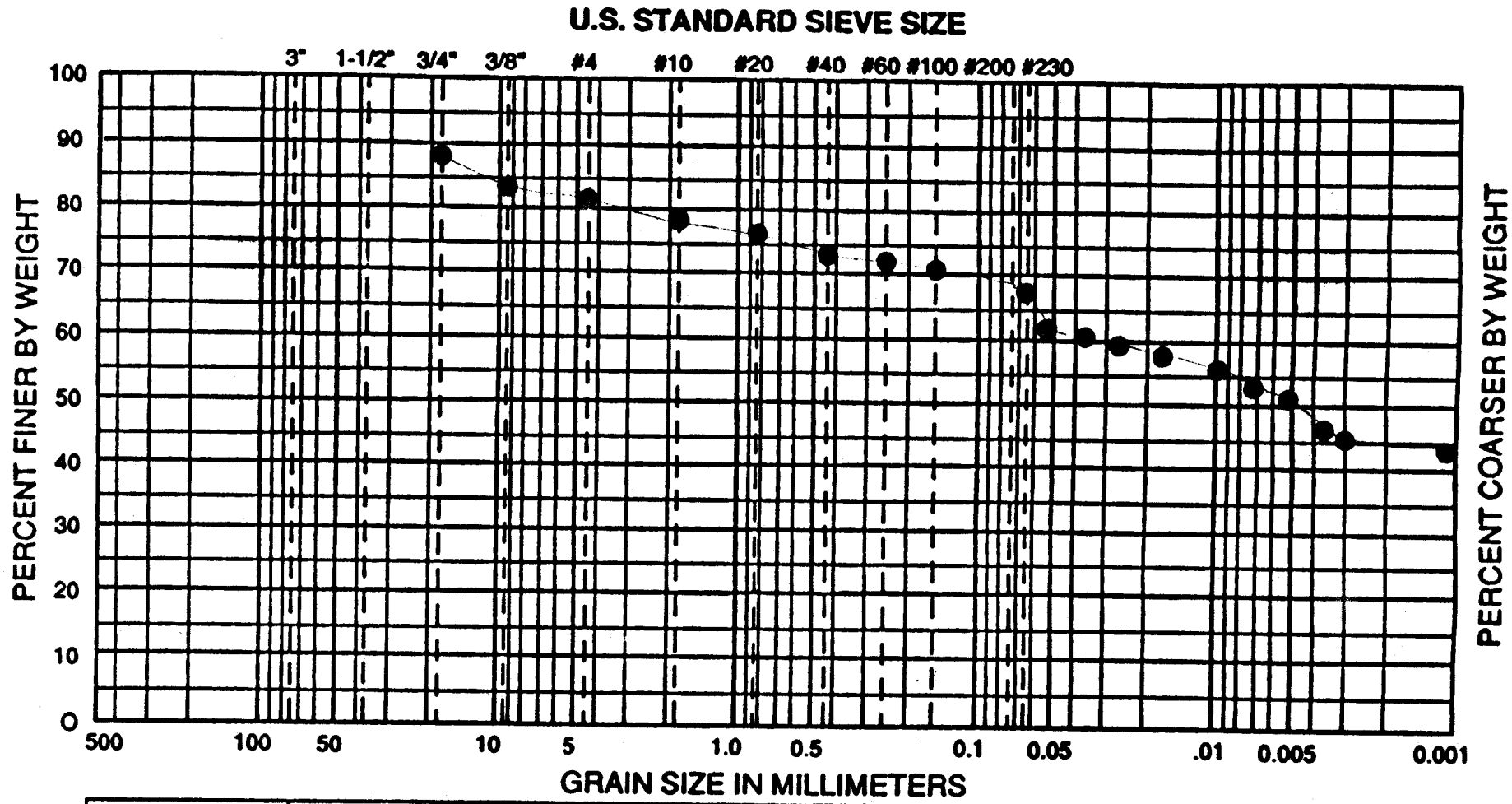


USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY		
		COARSE	FINE	COARSE	MEDIUM	FINE			
WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL			SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 9+00 SAMPLE NO.: CH #10 DATE: 3-18-92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION
Rocky Flats	19.8'	Clay w/some sand, silt & gravel 11.6% c. gvl, 6.8% f gvl, 2.7% c sd, 5.3% med sand, 5.6% f sand, 16.5% silt, 51.5% clay

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION _____

LABORATORY CLASSIFICATION _____

JOB NO. 2066-03
CLIENT/OWNER Weston
LOCATION Rocky Flats EG-G
BORING 9-00 SAMPLE CH #10 DEPTH 19.8'

FIELD DENSITY BY ___/___/___

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

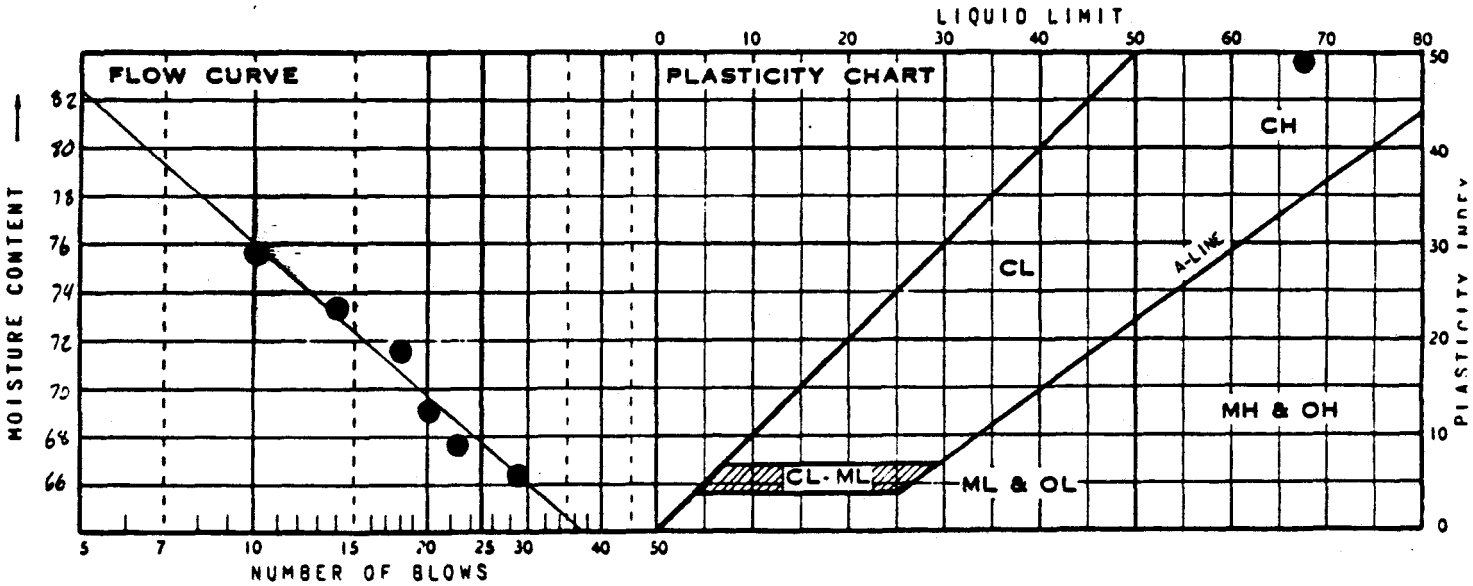
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY DH 3/12/93

DETERMINATION	1	2	3	4	5	6
DISH	2039	2008				
WT OF DISH + WET SOIL	5.11	4.18				
WT OF DISH + DRY SOIL	4.46	3.70	—	—	—	—
WT OF MOISTURE	.65	.48				
WT OF DISH	1.06	1.06	—	—	—	—
WT OF DRY SOIL	3.40	2.64				
MOISTURE CONTENT	19.1	18.2				

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	23C	2046	2063	44C	2040	36C
NUMBER OF BLOWS	29	23	20	18	14	10
WT OF DISH + WET SOIL	10.54	11.46	10.40	11.70	10.57	10.84
WT OF DISH + DRY SOIL	6.76	7.26	6.58	7.26	6.54	6.61
WT OF MOISTURE	3.78	4.20	3.82	4.44	4.03	4.23
WT OF DISH	1.06	1.06	1.06	1.06	1.05	1.03
WT OF DRY SOIL	5.70	6.20	5.52	6.20	5.49	5.58
MOISTURE CONTENT	66.3	67.7	69.2	71.6	73.4	75.8



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		67.7	18.7	49.0	CH	

ADVANCED TERRA TESTING inc

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT **Weston**

JOB NO. 2066-03

BORING NO.	9+00	SAMPLED	Rocky Flats
DEPTH	26.0'	DATE TESTED	03-20-92 TNC
SAMPLE NO.	#14	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC	Yes	
NATURAL	No	
Wt. Wet Soil & Pan	(g)	38.16
Wt. Dry Soil & Pan	(g)	37.39
Wt. Lost Moisture	(g)	0.77
Wt. of Pan Only	(g)	3.73
Wt. of Dry Soil	(g)	33.66
Moisture Content	%	2.3
Wt. Hydrom. Sample Wet	(g)	55.01
Wt. Hydrom. Sample Dry	(g)	53.78

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	675.16
Weight of + #10 Before Washing (g)	344.34
Weight of + #10 After Washing (g)	335.18
Weight of - #10 Wet (g)	330.82
Weight of - #10 Dry (g)	332.38
Wt. Total Sample Dry (g)	667.56
Calc. Wt. "W" (g)	107.50
Calc. Mass + #10	53.72

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	92.62	92.62	92.62	13.9	86.1
3/8"	0.00	129.86	129.86	222.48	33.3	66.7
#4	0.00	63.56	63.56	286.04	42.8	57.2
#10	0.00	47.55	47.55	333.59	50.0	50.0
#20	1.56	11.40	9.84	9.84	59.1	40.9
#40	1.55	11.55	10.00	19.84	68.4	31.6
#60	1.55	6.89	5.34	25.18	73.4	26.6
#100	1.31	5.02	3.71	28.89	76.8	23.2
#230	1.57	5.78	4.21	33.10	80.8	19.2

19.5

Sample brought from

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT	Weston	JOB NO.	2066-03
BORING NO.	9+00	SAMPLED	Rocky Flats
DEPTH	26.0'	DATE TESTED	03-20-92 TNU
SAMPLE NO.	#14	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

Hydrometer #	ASTM 152 H	Temp., Deg. C	22.0
Sp. Gr. of Soil	2.77	Temp. Coef. K	0.01287
Value of "a"	0.98	Wt. Dry Sample "W"	107.499
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	5.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	24.50	18.50	16.8	16.8	12.27	0.0638
1.0	24.00	18.00	16.3	16.3	12.35	0.0452
2.0	23.50	17.50	15.9	15.9	12.44	0.0321
5.0	23.00	17.00	15.4	15.4	12.52	0.0204
15.0	21.75	15.75	14.3	14.3	12.72	0.0119
30.0	21.00	15.00	13.6	13.6	12.85	0.0084
60.0	20.75	14.75	13.4	13.4	12.89	0.0060
120.0	20.75	14.75	13.4	13.4	12.89	0.0042
250.0	20.00	14.00	12.7	12.7	13.01	0.0029
1440.0	19.00	13.00	11.8	11.8	13.17	0.0012

Grain Diameter = K*(SQRT(L/T))

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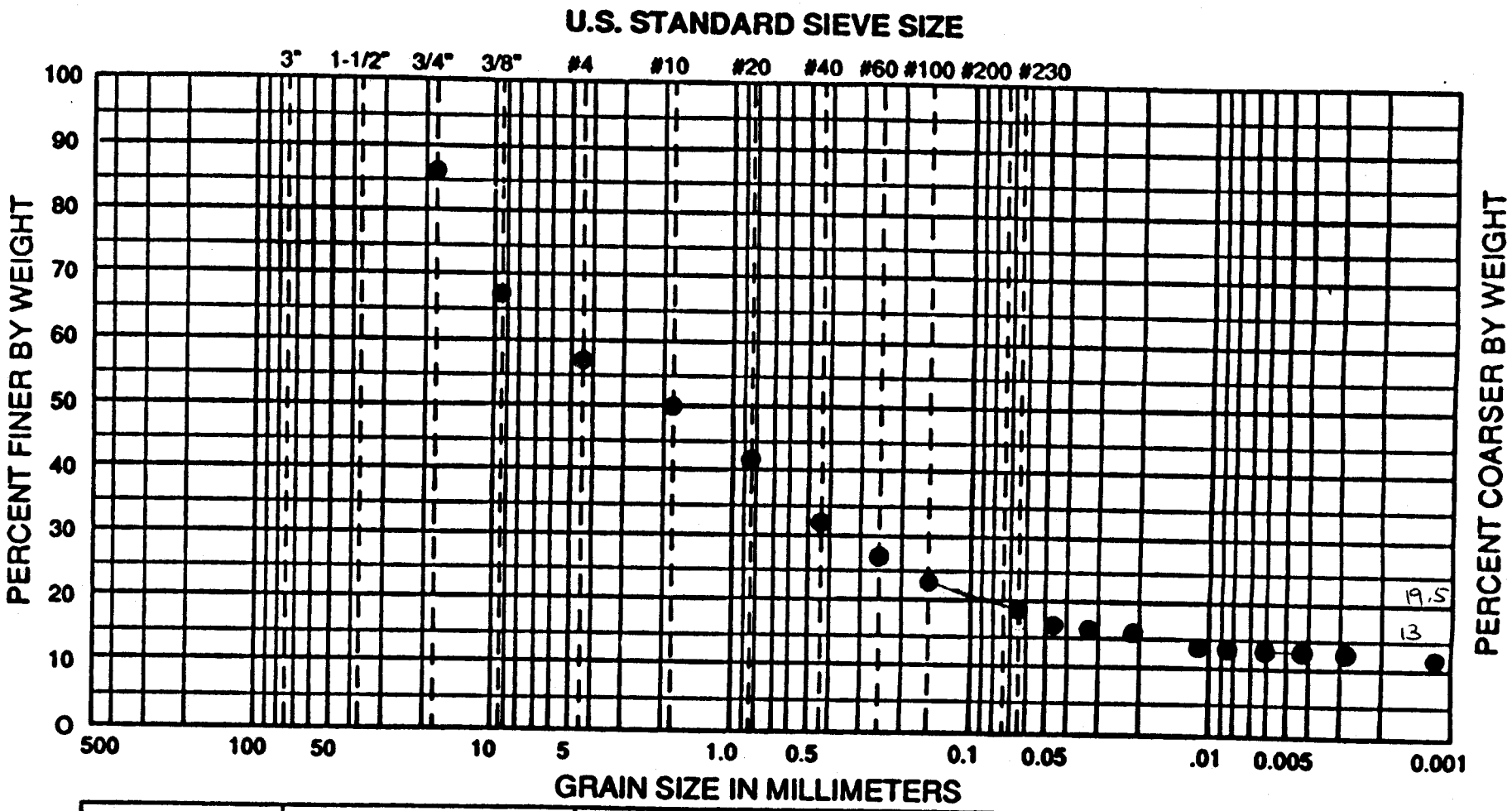


USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY
		COARSE	FINE	COARSE	MEDIUM	FINE	

WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 9+00 SAMPLE NO.: CH # 14 DATE: 3-20-92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION					
		sandy gravel					
		GU-428		S-37.7		SL	CL
Rocky Flats	26.0'	13.9	28.9	7.2	18.4	12.1	6.5	13

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION - - - - - - - - - - - - - - - -

LABORATORY CLASSIFICATION - - - - - - - - - - - - -

JOB NO. 2066-03

CLIENT/OWNER Weston

LOCATION Rocky Flats / EG & G

BORING 9L00 SAMPLE #14 DEPTH @26.0

FIELD DENSITY BY ...../...../.....

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

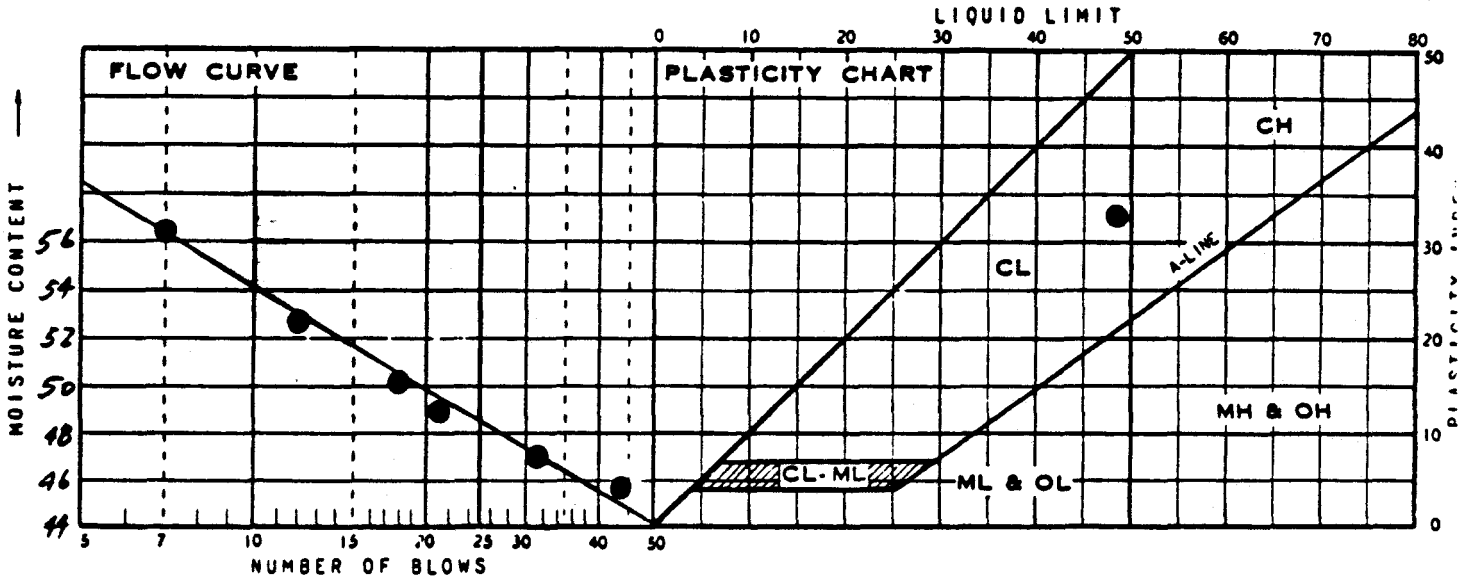
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY 3/23/92

DETERMINATION	1	2	3	4	5	6
DISH	2035	2060	2064			
WT OF DISH + WET SOIL g	4.95	6.03	5.16			
WT OF DISH + DRY SOIL	4.42	5.36	4.59	—	—	—
WT OF MOISTURE	0.53	0.67	0.57			
WT OF DISH	1.05	1.03	1.04	—	—	—
WT OF DRY SOIL	3.37	4.33	3.55			
MOISTURE CONTENT %	15.7	15.5	16.1	= 47.3/3 =	15.8	

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	13C	B13	27C	3C	19C	2073
NUMBER OF BLOWS	44	31	21	18	12	7
WT OF DISH + WET SOIL g	10.19	10.15	10.52	10.31	9.88	10.06
WT OF DISH + DRY SOIL	7.32	7.24	7.41	7.22	6.83	6.81
WT OF MOISTURE	2.87	2.91	3.11	3.09	3.05	3.25
WT OF DISH	1.05	1.05	1.04	1.05	1.03	1.04
WT OF DRY SOIL	6.27	6.19	6.37	6.17	5.80	5.77
MOISTURE CONTENT %	45.8	47.0	48.9	50.1	52.6	56.3



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		48.6	15.8	32.8	CL	

ADVANCED TERRA TESTING INC

JEM

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	9+00	SAMPLED	Rocky Flats
DEPTH	31.8'	DATE TESTED	03-20-92 TNU
SAMPLE NO.	#14	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan	(g)	38.82
Wt. Dry Soil & Pan	(g)	37.88
Wt. Lost Moisture	(g)	0.94
Wt. of Pan Only	(g)	3.58
Wt. of Dry Soil	(g)	34.30
Moisture Content	%	2.7

Wt. Hydrom. Sample Wet (g)	55.03
Wt. Hydrom. Sample Dry (g)	53.56

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	669.45
Weight of + #10 Before Washing (g)	335.21
Weight of + #10 After Washing (g)	317.63
Weight of - #10 Wet (g)	334.24
Weight of - #10 Dry (g)	342.44
Wt. Total Sample Dry (g)	660.07
Calc. Wt. "W" (g)	103.24
Calc. Mass + #10	49.68

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	81.35	81.35	81.35	12.3	87.7
3/8"	0.00	109.80	109.80	191.15	29.0	71.0
#4	0.00	73.93	73.93	265.08	40.2	59.8
#10	0.00	52.55	52.55	317.63	48.1	51.9
#20	1.56	11.13	9.57	9.57	57.4	42.6
#40	1.55	9.11	7.56	17.13	64.7	35.3
#60	1.57	6.35	4.78	21.91	69.3	30.7
#100	1.57	5.53	3.96	25.87	73.2	26.8
#230	1.56	6.76	5.20	31.07	78.2	21.8

Sandy Gravel

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO.	9+00	SAMPLED	Rocky Flats
DEPTH	31.8'	DATE TESTED	03-20-92 TNU
SAMPLE NO.	#14	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

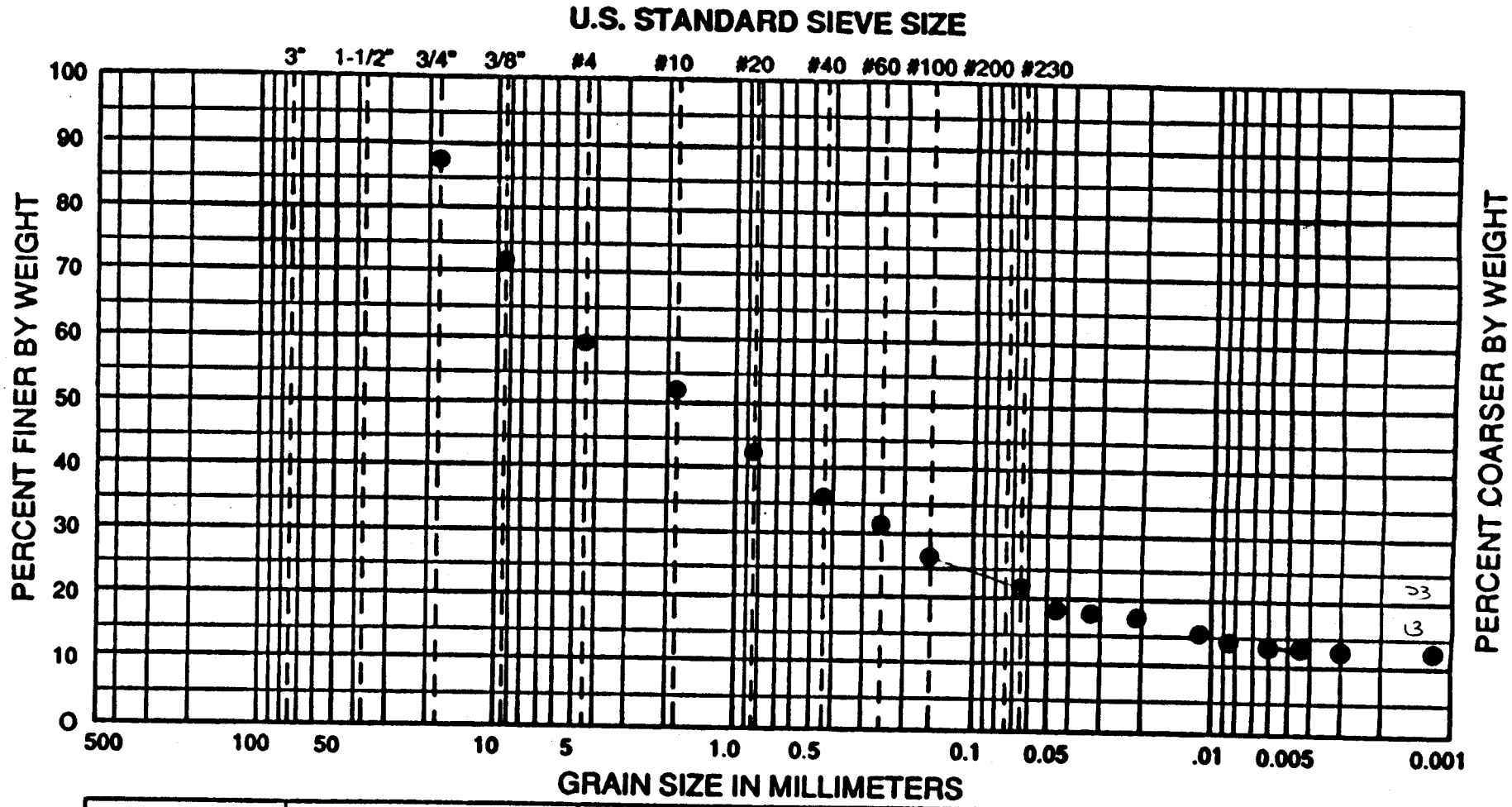
Hydrometer #	ASTM 152 H	Temp., Deg. C	22.0
Sp. Gr. of Soil	2.73	Temp. Coef. K	0.01301
Value of "a"	0.98	Wt. Dry Sample "W"	103.239
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	5.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	27.50	21.50	20.5	20.5	11.78	0.0632
1.0	25.75	19.75	18.8	18.8	12.07	0.0452
2.0	25.50	19.50	18.6	18.6	12.11	0.0320
5.0	24.50	18.50	17.6	17.6	12.27	0.0204
15.0	22.00	16.00	15.3	15.3	12.68	0.0120
30.0	21.50	15.50	14.8	14.8	12.76	0.0085
60.0	21.00	15.00	14.3	14.3	12.85	0.0060
120.0	21.00	15.00	14.3	14.3	12.85	0.0043
250.0	19.50	13.50	12.9	12.9	13.09	0.0030
1440.0	19.00	13.00	12.4	12.4	13.17	0.0012

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY			
		COARSE	FINE	COARSE	MEDIUM	FINE				

WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 9+00 SAMPLE NO.: CH #14 DATE: 3-30-92 PROJECT NO.:

AREA	DEPTH	sandy gravel CLASSIFICATION							
		40.2			36.8				
Rocky Flats	31.8'	12.3	27.9	7.9	16.6	12.3	10	13	

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION - - - - - - - - - - - - - - - -

LABORATORY CLASSIFICATION - - - - - - - - - - - - -

JOB NO. [illegible]

CLIENT/OWNER WESTON

LOCATION ROCKY FLATS / EG&G

BORING 9+00 SAMPLE CH#14 DEPTH 31.8'

FIELD DENSITY BY - - - - / - / - -

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

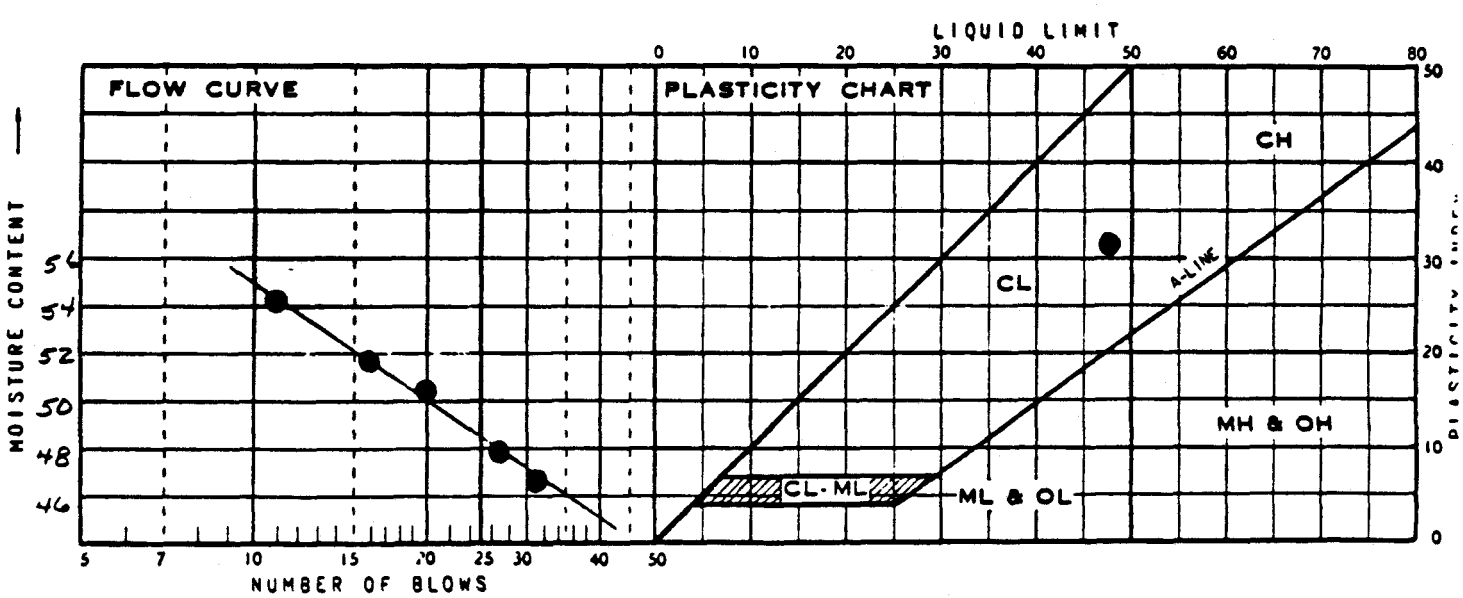
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY SR-3-12-4/92.

DETERMINATION	1	2	3	4	5	6
DISH	2014	4	10 C			
WT OF DISH + WET SOIL g	5.30	4.74	4.24			
WT OF DISH + DRY SOIL g	4.66	4.20	3.78	—	—	—
WT OF MOISTURE g	.64	.54	.46			
WT OF DISH g	1.07	1.06	1.04	—	—	—
WT OF DRY SOIL g	3.59	3.14	2.74			
MOISTURE CONTENT %	17.8	17.2	17.0			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	39 C	2037	14 C	2057	2004	
NUMBER OF BLOWS	31	27	20±	16	11±	
WT OF DISH + WET SOIL g	14.06	15.16	13.56	12.63	17.68	
WT OF DISH + DRY SOIL g	9.91	10.59	9.36	8.68	11.84	—
WT OF MOISTURE g	4.15	4.57	4.20	3.95	5.84	
WT OF DISH g	1.04	1.05	1.05	1.06	1.04	—
WT OF DRY SOIL g	8.87	9.54	8.31	7.62	10.80	
MOISTURE CONTENT %	46.8	47.9	50.5	51.8	54.1	



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		48.5	17.3	31.2	CL	

ADVANCED TERRA TESTING INC

JEM

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT **Weston** -

JOB NO. 2066-03

BORING NO.	9+00	SAMPLED	Rocky Flats
DEPTH	40.0'	DATE TESTED	03-20-92 TNU
SAMPLE NO.	#14	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan	(g)	47.90
Wt. Dry Soil & Pan	(g)	46.94
Wt. Lost Moisture	(g)	0.96
Wt. of Pan Only	(g)	3.83
Wt. of Dry Soil	(g)	43.11
Moisture Content	%	2.2

Wt. Hydrom. Sample Wet (g)	55.02
Wt. Hydrom. Sample Dry (g)	53.82

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	607.19
Weight of + #10 Before Washing (g)	38.25
Weight of + #10 After Washing (g)	32.66
Weight of - #10 Wet (g)	568.94
Weight of - #10 Dry (g)	562.01
Wt. Total Sample Dry (g)	594.67
Calc. Wt. "W" (g)	56.93
Calc. Mass + #10	3.11

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	21.05	21.05	21.05	3.5	96.5
3/8"	0.00	2.16	2.16	23.21	3.9	96.1
#4	0.00	3.88	3.88	27.09	4.6	95.4
#10	0,00	5.38	5.38	32.47	5.5	94.5
#20	1.58	2.27	0.69	0.69	6.7	93.3
#40	1.57	2.92	1.35	2.04	9.0	91.0
#60	1.56	2.58	1.02	3.06	10.8	89.2
#100	1.57	3.02	1.45	4.51	13.4	86.6
#230	1.56	6.34	4.78	9.29	21.8	78.2 — 79

Silty Clay (CH)

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT **Weston** - JOB NO. 2066-03

BORING NO.	9+00	SAMPLED	Rocky Flats
DEPTH	40.0'	DATE TESTED	03-20-92 TNU
SAMPLE NO.	#14	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

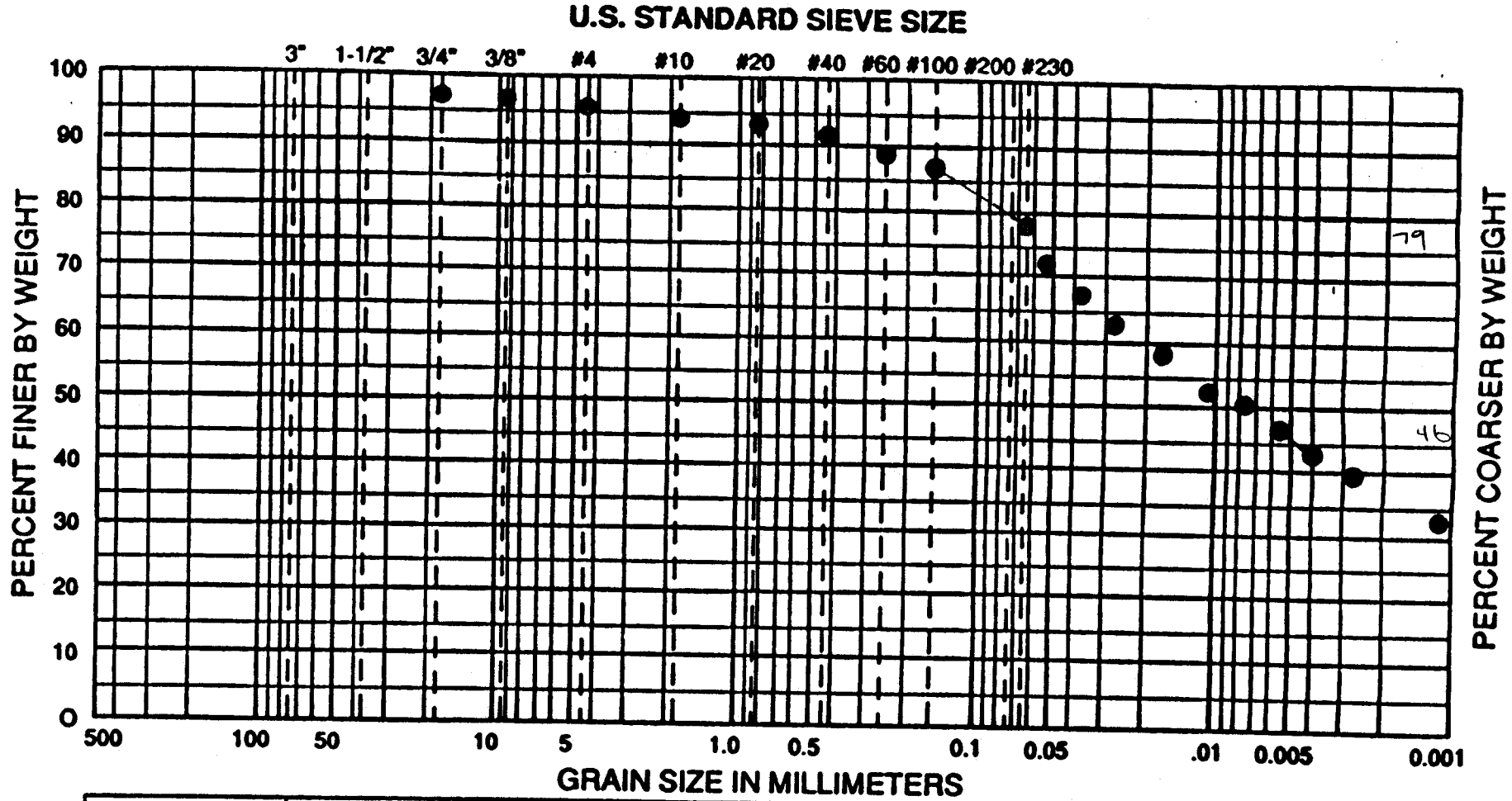
Hydrometer #	ASTM 152 H	Temp., Deg. C	22.0
Sp. Gr. of Soil	2.73	Temp. Coef. K	0.01301
Value of "a"	0.98	Wt. Dry Sample "W"	56.932
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	5.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	47.50	41.50	71.7	71.7	8.50	0.0536
1.0	45.00	39.00	67.4	67.4	8.91	0.0388
2.0	43.00	37.00	63.9	63.9	9.24	0.0280
5.0	40.00	34.00	58.8	58.8	9.73	0.0181
15.0	36.50	30.50	52.7	52.7	10.30	0.0108
30.0	35.00	29.00	50.1	50.1	10.55	0.0077
60.0	33.00	27.00	46.7	46.7	10.88	0.0055
120.0	31.00	25.00	43.2	43.2	11.21	0.0040
250.0	29.00	23.00	39.8	39.8	11.53	0.0028
1440.0	25.50	19.50	33.7	33.7	12.11	0.0012

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY		
		COARSE	FINE	COARSE	MEDIUM	FINE			
WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL			SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 9+00 SAMPLE NO.: CH# 14 DATE: 3-20-92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION						
		Silty clay						
		4.6			16.4			
Rocky Flats	40.0'	3.5	1.1	0.9	3.5	12	33	46

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION - - - - - - - - - - - - - - -

LABORATORY CLASSIFICATION - - - - - - - - - - - -

JOB NO. 2066-03
CLIENT/OWNER Weston
LOCATION Lowry Flats / EG&G
BORING 9+00 SAMPLE #14 DEPTH 80.0'

FIELD DENSITY BY - - - - - / / -

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

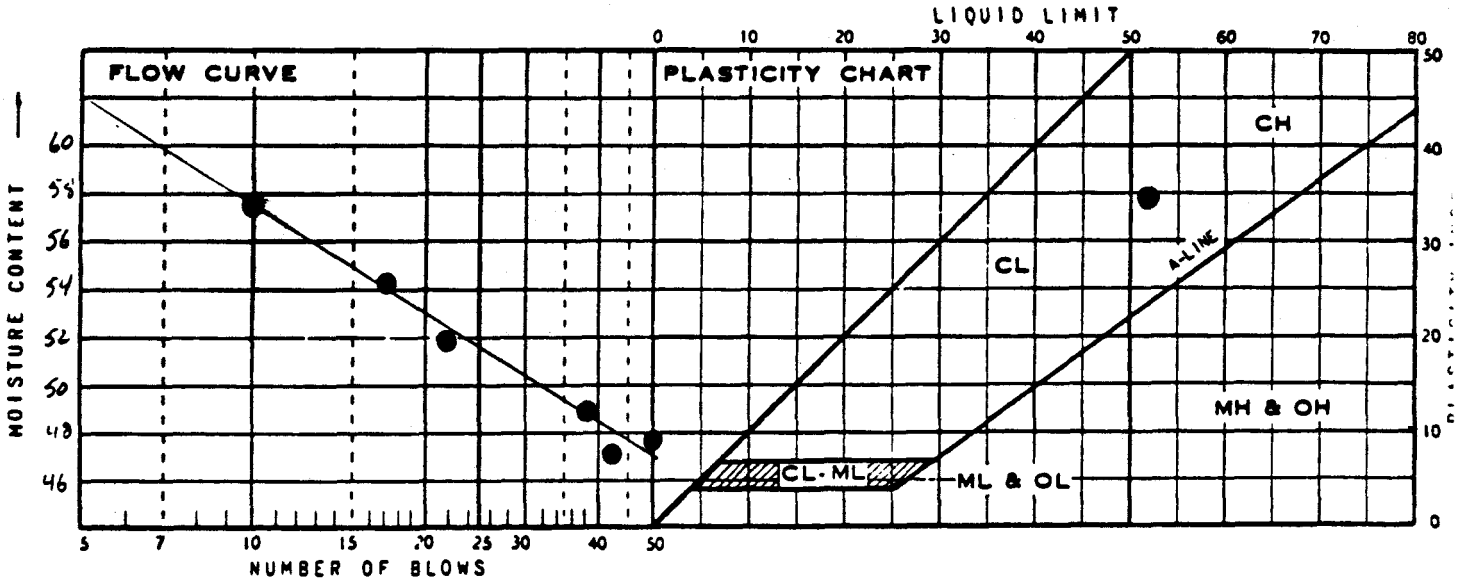
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY ~~RDA~~ 3/25/92

DETERMINATION	1	2	3	4	5	6
DISH	54C	3C	32C			
WT OF DISH + WET SOIL g	6.84	6.82	6.62			
WT OF DISH + DRY SOIL	6.04	5.97	5.78	—	—	—
WT OF MOISTURE	.80	.85	.84			
WT OF DISH	1.06	1.05	1.03	—	—	—
WT OF DRY SOIL	4.98	4.92	4.75			
MOISTURE CONTENT %	16.1	17.3	17.7			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	19C	Z016	B21	13C	B12	Z056
NUMBER OF BLOWS	43	50	38	22	17	10
WT OF DISH + WET SOIL g	10.72	9.60	11.80	10.71	9.87	9.99
WT OF DISH + DRY SOIL	7.61	6.83	8.26	7.41	6.76	6.72
WT OF MOISTURE	3.11	2.77	3.54	3.30	3.11	3.27
WT OF DISH	1.03	1.04	1.04	1.05	1.04	1.04
WT OF DRY SOIL	6.58	5.79	7.22	6.36	5.72	5.68
MOISTURE CONTENT %	47.3	47.8	49.0	51.9	54.4	57.6



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		51.6	17.0	34.6	CH	

ADVANCED TERRA TESTING

JEW

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT **Weston** -

JOB NO. 2066-03

BORING NO.	9+00	SAMPLED	Rocky Flats
DEPTH	52.0	DATE TESTED	03-20-92 TNU
SAMPLE NO.	#14	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

MOISTURE DATA

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan	(g)	37.24
Wt. Dry Soil & Pan	(g)	35.88
Wt. Lost Moisture	(g)	1.36
Wt. of Pan Only	(g)	3.77
Wt. of Dry Soil	(g)	32.11
Moisture Content	%	4.2
Wt. Hydrom. Sample Wet	(g)	55.05
Wt. Hydrom. Sample Dry	(g)	52.82

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	552.06
Weight of + #10 Before Washing (g)	0.49
Weight of + #10 After Washing (g)	0.39
Weight of - #10 Wet (g)	551.57
Weight of - #10 Dry (g)	529.25
Wt. Total Sample Dry (g)	529.64
Calc. Wt. "W" (g)	52.86
Calc. Mass + #10	0.04

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	0.00	0.00	0.00	0.0	100.0
#4	0.00	0.00	0.00	0.00	0.0	100.0
#10	0.00	0.39	0.39	0.39	0.1	99.9
#20	1.55	1.61	0.06	0.06	0.2	99.8
#40	1.58	1.92	0.34	0.40	0.8	99.2
#60	1.46	2.09	0.63	1.03	2.0	98.0
#100	1.56	2.20	0.64	1.67	3.2	96.8
#230	1.57	2.44	0.87	2.54	4.9	95.1

No

Clay (cont.)

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT **Weston** -

JOB NO. 2066-03

BORING NO.	9+00	SAMPLED	Rocky Flats
DEPTH	52.0	DATE TESTED	03-20-92 TNU
SAMPLE NO.	#14	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

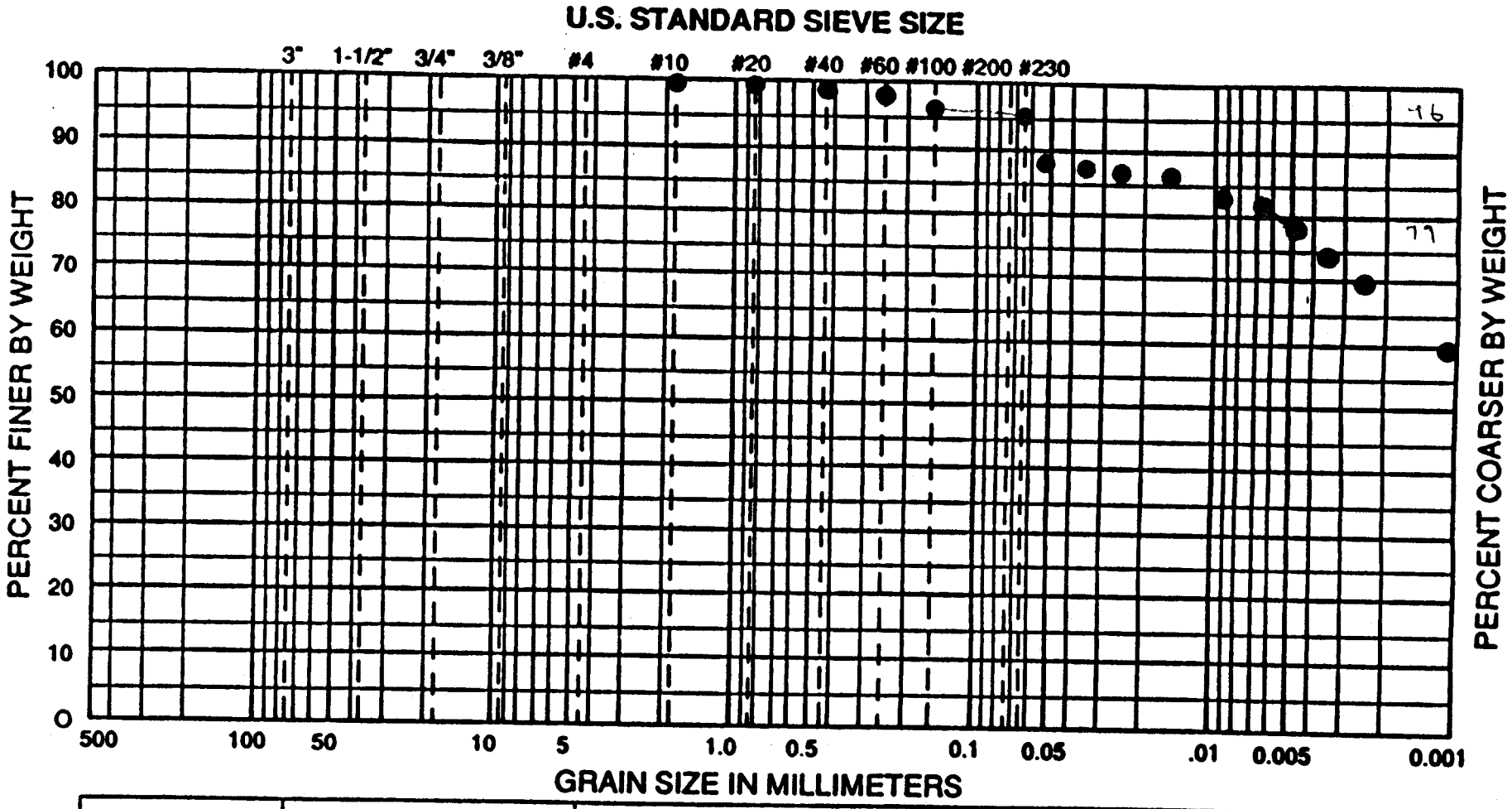
Hydrometer #	ASTM 152 H	Temp., Deg. C	22.0
Sp. Gr. of Soil	2.79	Temp. Coef. K	0.01305
Value of "a"	0.97	Wt. Dry Sample "W"	52.856
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	5.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Deptn L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	54.00	48.00	88.3	88.3	7.43	0.0503
1.0	53.50	47.50	87.4	87.4	7.52	0.0358
2.0	53.25	47.25	86.9	86.9	7.56	0.0254
5.0	53.00	47.00	86.4	86.4	7.60	0.0161
15.0	51.50	45.50	83.7	83.7	7.84	0.0094
30.0	50.50	44.50	81.8	81.8	8.01	0.0067
60.0	48.50	42.50	78.2	78.2	8.34	0.0049
120.0	46.50	40.50	74.5	74.5	8.66	0.0035
250.0	44.00	38.00	69.9	69.9	9.07	0.0025
1440.0	38.50	32.50	59.8	59.8	9.98	0.0011

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY			
		COARSE	FINE	COARSE	MEDIUM	FINE				

WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 9+00 SAMPLE NO.: CH#4 DATE: 3-20-92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION						
		clay						
Rocky Flats	52.0'	0	0	0	0.1	4.0 0.7	3.2	17	79

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION - - - - - - - - - - - - - - - -

LABORATORY CLASSIFICATION - - - - - - - - - - - - -

JOB NO. 2066-03

CLIENT/OWNER Weston

LOCATION Rocky Flats

BORING 9+00 SAMPLE CH #14 DEPTH 52'

FIELD DENSITY BY ...../../..

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD [redacted]

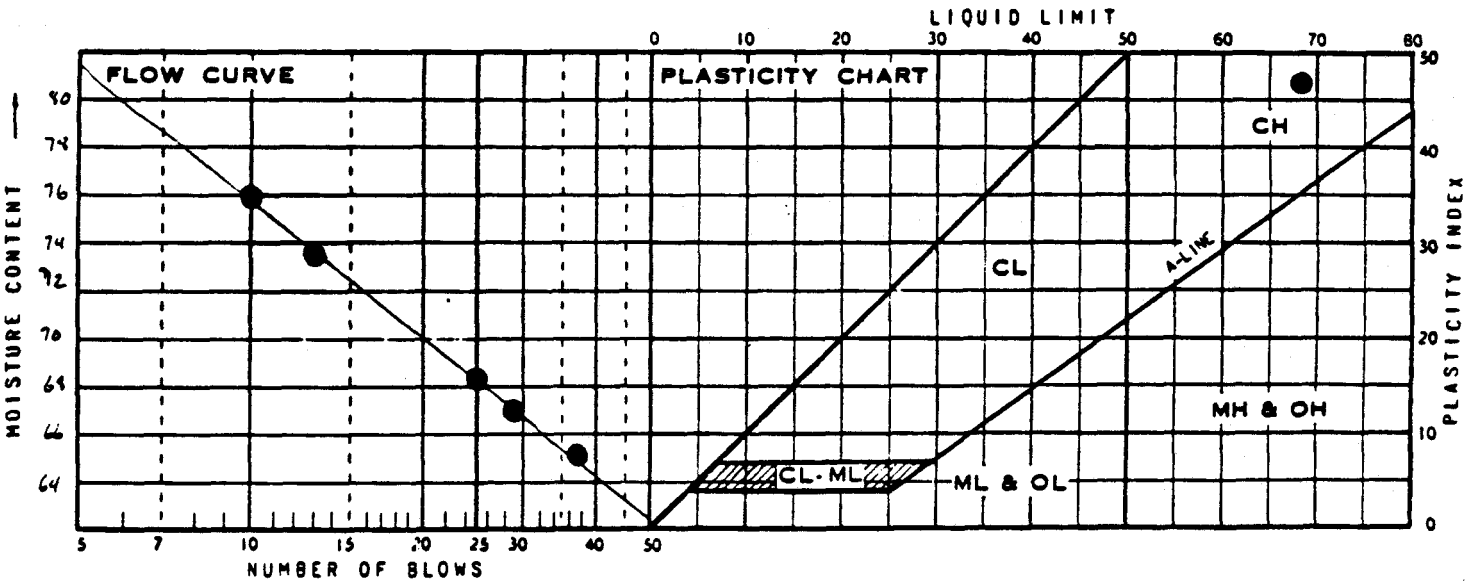
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY DU 3/23/92

DETERMINATION	1	2	3	4	5	6
DISH	B23	B22	2029			
WT OF DISH + WET SOIL g	5.47	4.76	4.81			
WT OF DISH + DRY SOIL g	4.69	4.09	4.15	—	—	—
WT OF MOISTURE g	.78	.67	.66			
WT OF DISH g	1.03	1.04	1.05	—	—	—
WT OF DRY SOIL g	3.66	3.05	3.10			
MOISTURE CONTENT %	21.3	22.0	21.3			

LIQUID LIMIT

DETERMINATION	1	2	3	4	5	6
DISH	2055	2031	B11	33C	B7	40C
NUMBER OF BLOWS	37=	29	25	22	13	10+
WT OF DISH + WET SOIL g	11.13	12.10	11.84	11.76	11.68	11.13
WT OF DISH + DRY SOIL g	7.15	7.67	7.45	7.30	7.17	6.78
WT OF MOISTURE g	3.48	4.43	4.39	4.46	4.51	4.35
WT OF DISH g	1.05	1.06	1.03	1.07	1.04	1.06
WT OF DRY SOIL g	6.10	6.61	6.42	6.23	6.13	5.72
MOISTURE CONTENT %	65.2	67.0	68.4	71.6	73.6	76.0



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		68.4	21.3	47.1	CH	

ADVANCED TERRA TESTING INC

JEM
BR

MECHANICAL ANALYSIS - SIEVE TEST DATA

CLIENT Weston

JOB NO. 2066-03

BORING NO. - 9+00
DEPTH 60.0'
SAMPLE NO. #14
SOIL DESCR. Bulk (Jar)

SAMPLED Rocky Flats
DATE TESTED 03-20-92 TNU
WASH SIEVE Yes
DRY SIEVE No

MOISTURE DATA

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan	(g)	38.50
Wt. Dry Soil & Pan	(g)	37.28
Wt. Lost Moisture	(g)	1.22
Wt. of Pan Only	(g)	3.72
Wt. of Dry Soil	(g)	33.56
Moisture Content	%	3.6

Wt. Hydrom. Sample Wet (g)	55.05
Wt. Hydrom. Sample Dry (g)	53.12

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g)	514.11
Weight of + #10 Before Washing (g)	0.75
Weight of + #10 After Washing (g)	0.74
Weight of - #10 Wet (g)	513.36
Weight of - #10 Dry (g)	495.36
Wt. Total Sample Dry (g)	496.10
Calc. Wt. "W" (g)	53.20
Calc. Mass + #10	0.08

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	0.00	0.00	0.00	0.0	100.0
#4	0.00	0.00	0.00	0.00	0.0	100.0
#10	0.00	0.74	0.74	0.74	0.1	99.9
#20	1.56	1.60	0.04	0.04	0.2	99.8
#40	1.56	1.65	0.09	0.13	0.4	99.6
#60	1.55	1.64	0.09	0.22	0.6	99.4
#100	1.55	1.68	0.13	0.35	0.8	99.2
#230	1.56	2.04	0.48	0.83	1.7	98.3

Clayton

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA

CLIENT	Weston	JOB NO.	2066-03
BORING NO.	9+00	SAMPLED	Rocky Flats
DEPTH	60.0'	DATE TESTED	03-20-92 TNU
SAMPLE NO.	#14	WASH SIEVE	Yes
SOIL DESCR.	Bulk (Jar)	DRY SIEVE	No

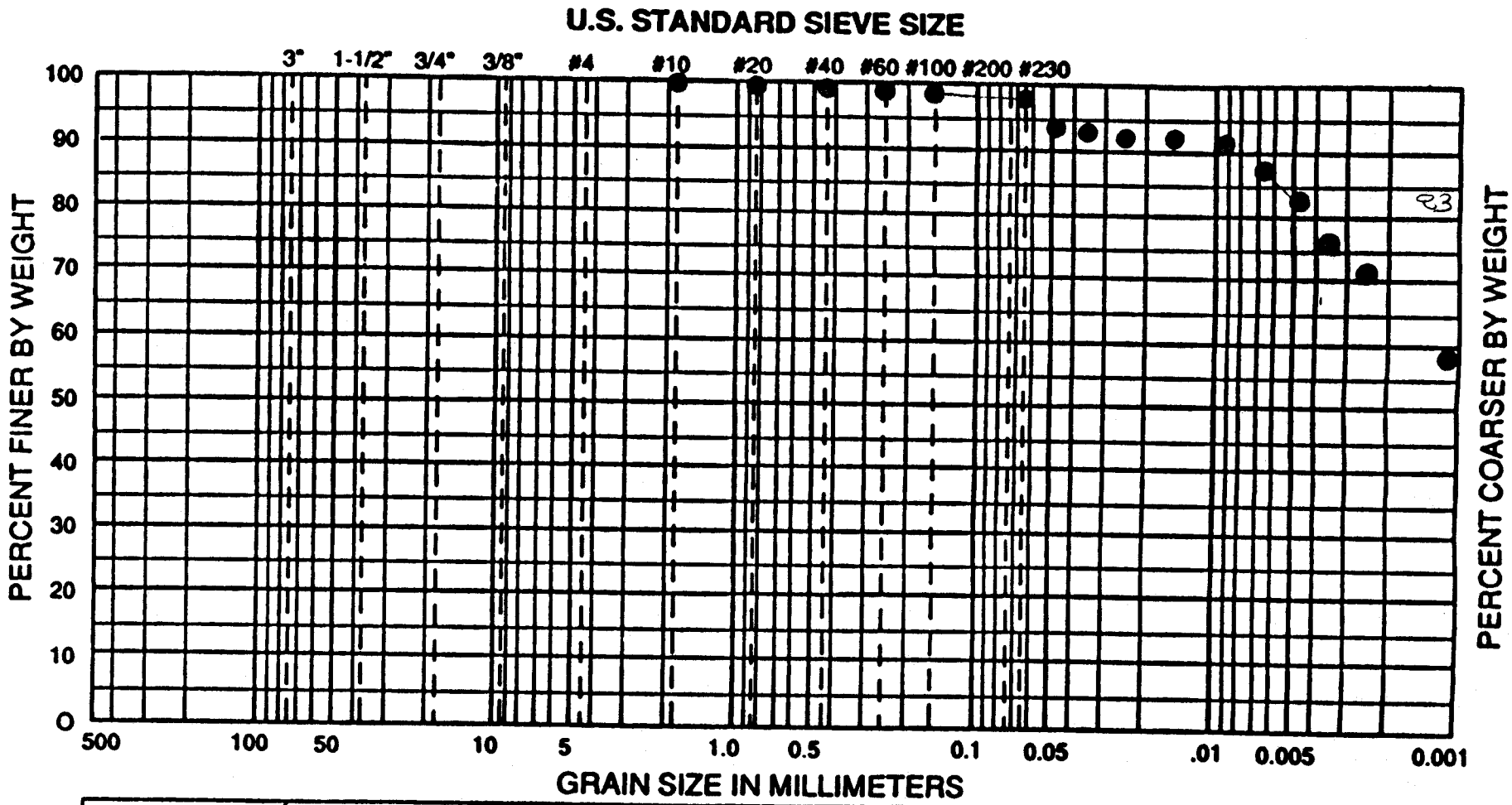
Hydrometer #	ASTM 152 H	Temp., Deg. C	22.0
Sp. Gr. of Soil	2.70	Temp. Coef. K	0.01312
Value of "a"	0.99	Wt. Dry Sample "W"	53.197
Deflocculant	Sodium Hexametaphosphate	% of Total Sample	100.0
Defloc. Corr'n	5.0		
Meniscus Corr'n	-1.0		

T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effecitve Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	56.50	50.50	94.0	94.0	7.02	0.0492
1.0	56.00	50.00	93.0	93.0	7.11	0.0350
2.0	55.50	49.50	92.1	92.1	7.19	0.0249
5.0	55.50	49.50	92.1	92.1	7.19	0.0157
15.0	55.00	49.00	91.2	91.2	7.27	0.0091
30.0	53.00	47.00	87.5	87.5	7.60	0.0066
60.0	50.50	44.50	82.8	82.8	8.01	0.0048
120.0	48.00	42.00	78.2	78.2	8.42	0.0035
250.0	44.00	38.00	70.7	70.7	9.07	0.0025
1440.0	37.50	31.50	58.6	58.6	10.14	0.0011

Grain Diameter = K*(SQRT(L/T))

ADVANCED TERRA TESTING, INC.

ADVANCED TERRA TESTING



USCS	COBBLES	GRAVEL		SAND			SILT OR CLAY
		COARSE	FINE	COARSE	MEDIUM	FINE	

WENTWORTH	COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
		COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

WELLNAME: 9+00 SAMPLE NO.: CH#14 DATE: 3-30-92 PROJECT NO.:

AREA	DEPTH	CLASSIFICATION		
Rocky Flats	60.0'	Claystone 0 / 0 0	1.7 / 0.1 0.3 1.3	15.3 83

ATTERBERG LIMITS TEST DATA

FIELD CLASSIFICATION - - - - - - - - - - - - - - - -

LABORATORY CLASSIFICATION - - - - - - - - - - - - -

JOB NO. 2066-03
CLIENT/OWNER Weston
LOCATION Rocky Flats / EG&G
BORING 9+00 SAMPLE # 14 DEPTH @ 60'

FIELD DENSITY BY ...../../..

DETERMINATION	1	2
NUMBER OF RINGS		
WT OF RINGS + WET SOIL		
WT OF RINGS	—	—
WT OF WET SOIL		
FIELD DENSITY		
DRY DENSITY		

THIS IS AN 1/8-INCH THREAD

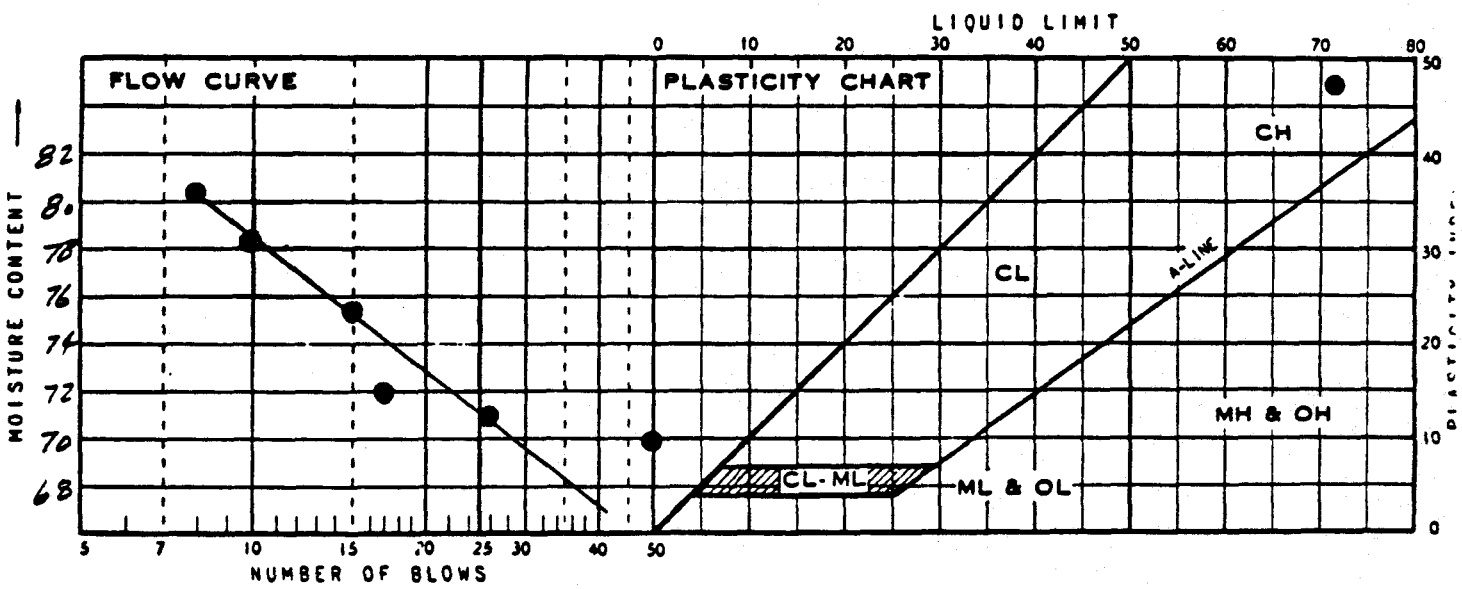
DETERMINATION	1	2
DISH		
WT OF DISH + WET SOIL		
WT OF DISH + DRY SOIL	—	—
WT OF MOISTURE		
WT OF DISH	—	—
WT OF DRY SOIL		
FIELD MOISTURE CONTENT		

PLASTIC LIMIT BY RDL 3.12.92

DETERMINATION	1	2	3	4	5	6
DISH	2052	2009	B13			
WT OF DISH + WET SOIL g	5.48	6.30	6.44			
WT OF DISH + DRY SOIL g	4.59	5.30	5.41	—	—	—
WT OF MOISTURE	0.89	1.00	1.03			
WT OF DISH	1.03	1.05	1.05	—	—	—
WT OF DRY SOIL	3.56	4.25	4.36			
MOISTURE CONTENT %	25.0	23.5	23.6	72.1/3 =	24.0	

LIQUID LIMIT

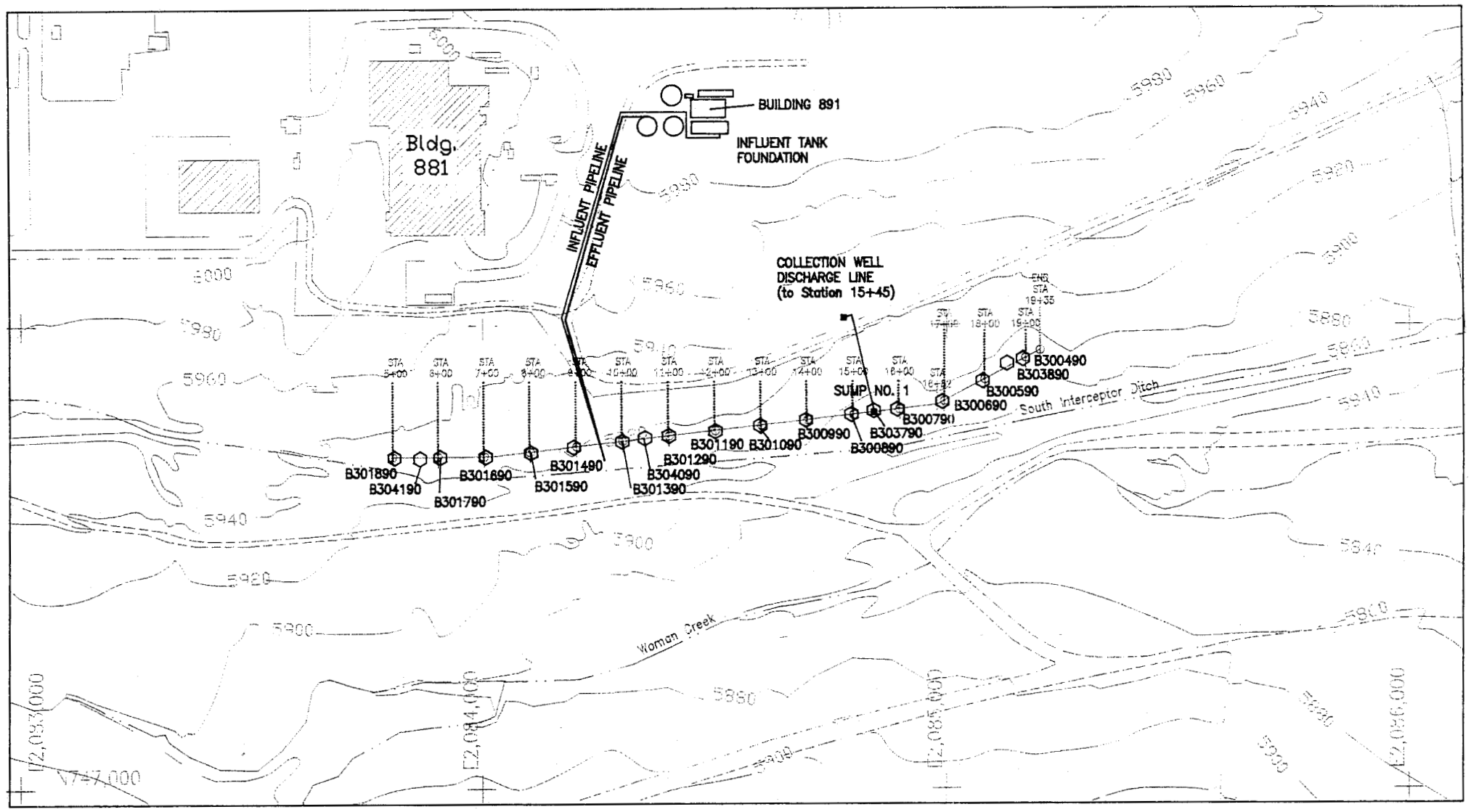
DETERMINATION	1	2	3	4	5	6
DISH	2021	44C	2064	16C	2073	2065
NUMBER OF BLOWS	50 =	26	17	15	10 -	8
WT OF DISH + WET SOIL g	9.28	9.51	9.41	10.42	8.41	8.36
WT OF DISH + DRY SOIL g	5.90	6.00	5.91	6.40	5.18	5.11
WT OF MOISTURE	3.38	3.51	3.50	4.02	3.23	3.25
WT OF DISH	1.06	1.04	1.04	1.07	1.05	1.06
WT OF DRY SOIL	4.84	4.96	4.87	5.33	4.13	4.05
MOISTURE CONTENT %	69.8	70.8	71.9	75.4	78.2	80.2



SUMMARY

DRY DENSITY	MOISTURE CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	IDENTIFICATION	
		71.2	24.0	47.2	CH	

ADVANCED TERRA TESTING



EXPLANATION

B300490 Borehole Location and Number

1+00 Station Location and Number

N

Scale: 1" = 300'

0' 150' 300'

CONTOUR INTERVAL = 20'

U.S. DEPARTMENT OF ENERGY
Rocky Flats Plant, Golden, Colorado

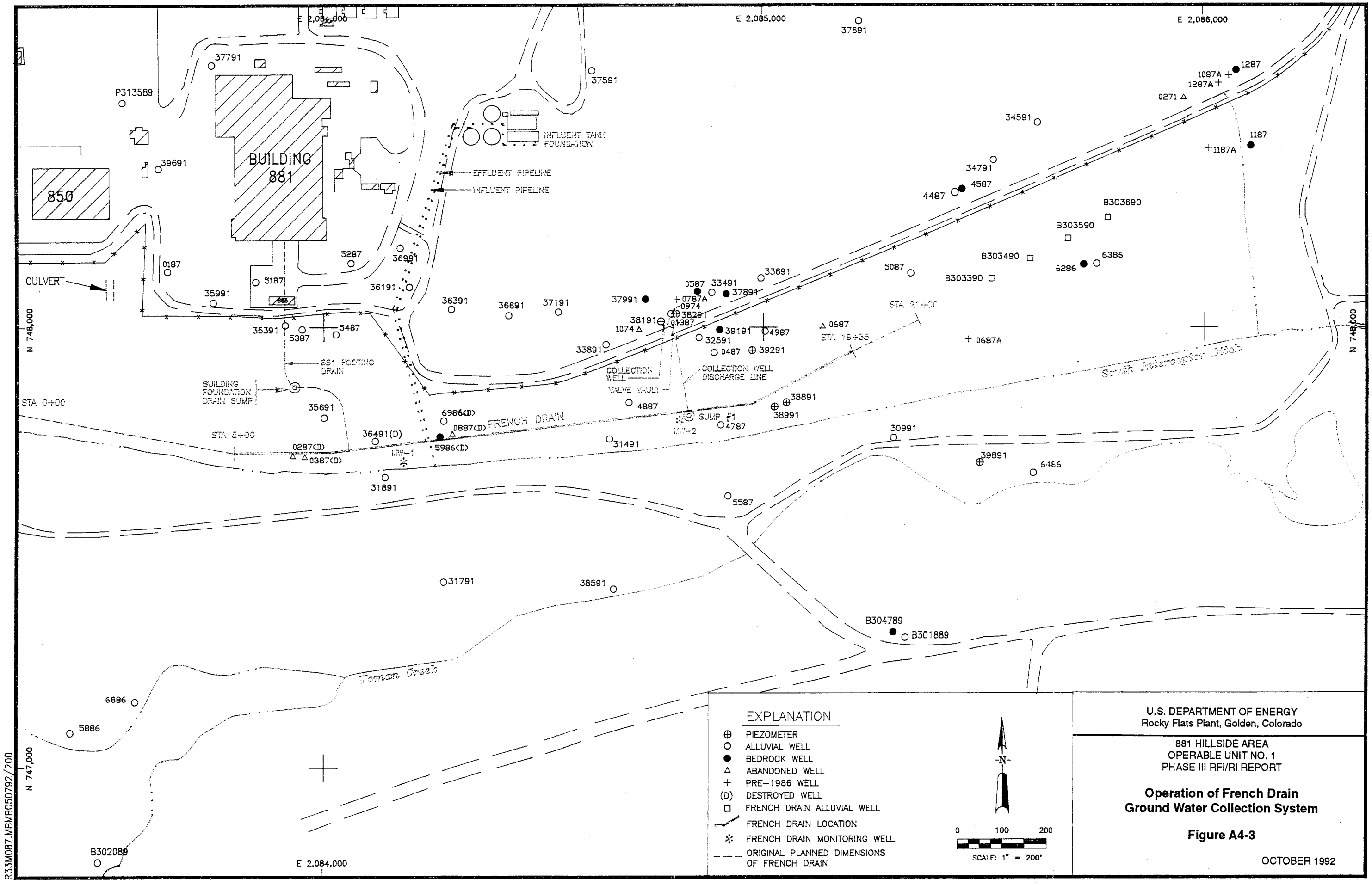
881 HILLSIDE AREA
OPERABLE UNIT NO. 1
PHASE III RFI/RI REPORT

French Drain Index Map

Figure A4-1

OCTOBER 1992

R33187.CWpj–042892/300



EXPLANATION

- ⊕ PIEZOMETER
- ○ ALLUVIAL WELL
- ● BEDROCK WELL
- △ ABANDONED WELL
- + PRE-1986 WELL
- (D) DESTROYED WELL
- □ FRENCH DRAIN ALLUVIAL WELL
- FRENCH DRAIN LOCATION
- ✲ FRENCH DRAIN MONITORING WELL
- ORIGINAL PLANNED DIMENSIONS OF FRENCH DRAIN

-N-

0 100 200

SCALE: 1" = 200'

U.S. DEPARTMENT OF ENERGY
Rocky Flats Plant, Golden, Colorado

881 HILLSIDE AREA
OPERABLE UNIT NO. 1
PHASE III RFI/RI REPORT

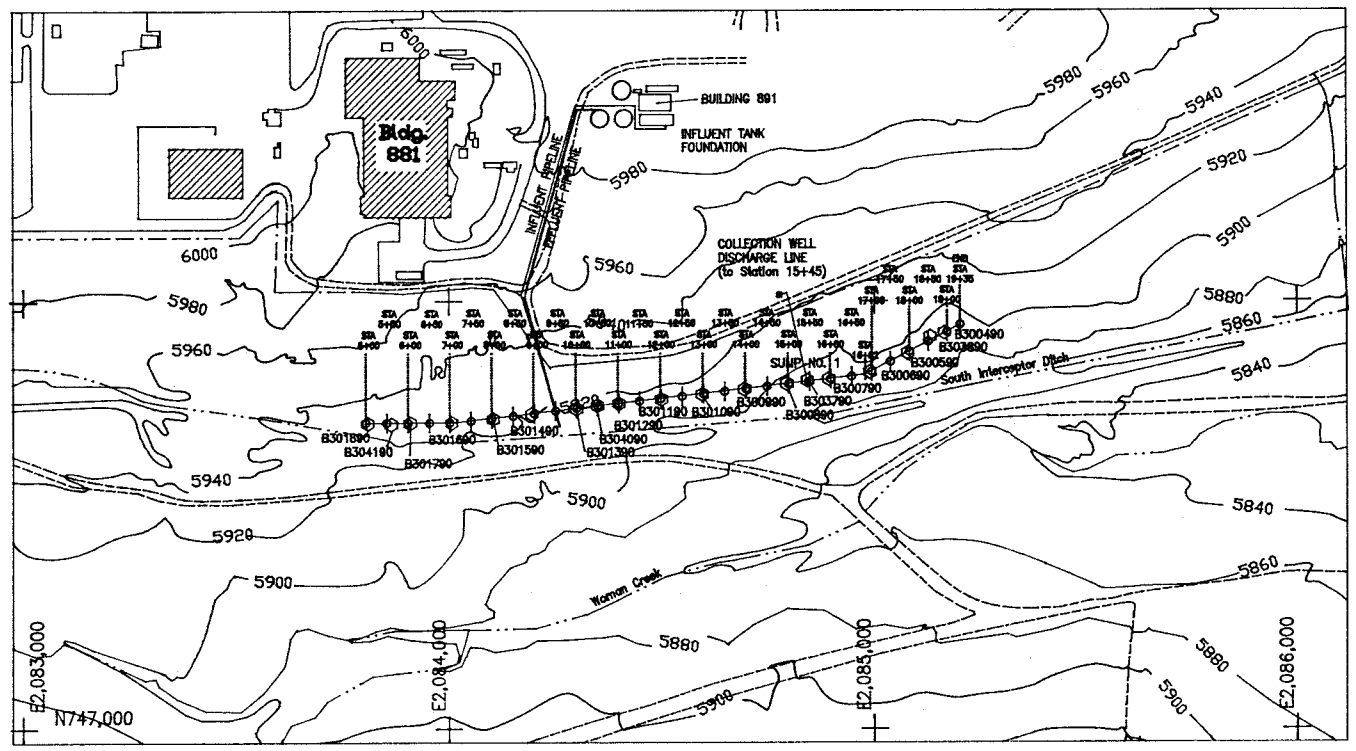
Operation of French Drain Ground Water Collection System

Figure A4-3

OCTOBER 1992

R33M087.MBMB050792/200

INDEX MAP
WITH STATION LOCATIONS AND BOREHOLES



EXPLANATION

○ B300490 Borehole Location and Number

ϕ 1+00 Station Location and Number

Scale: 1" = 200'

0' 100' 200'

CONTOUR INTERVAL = 20'

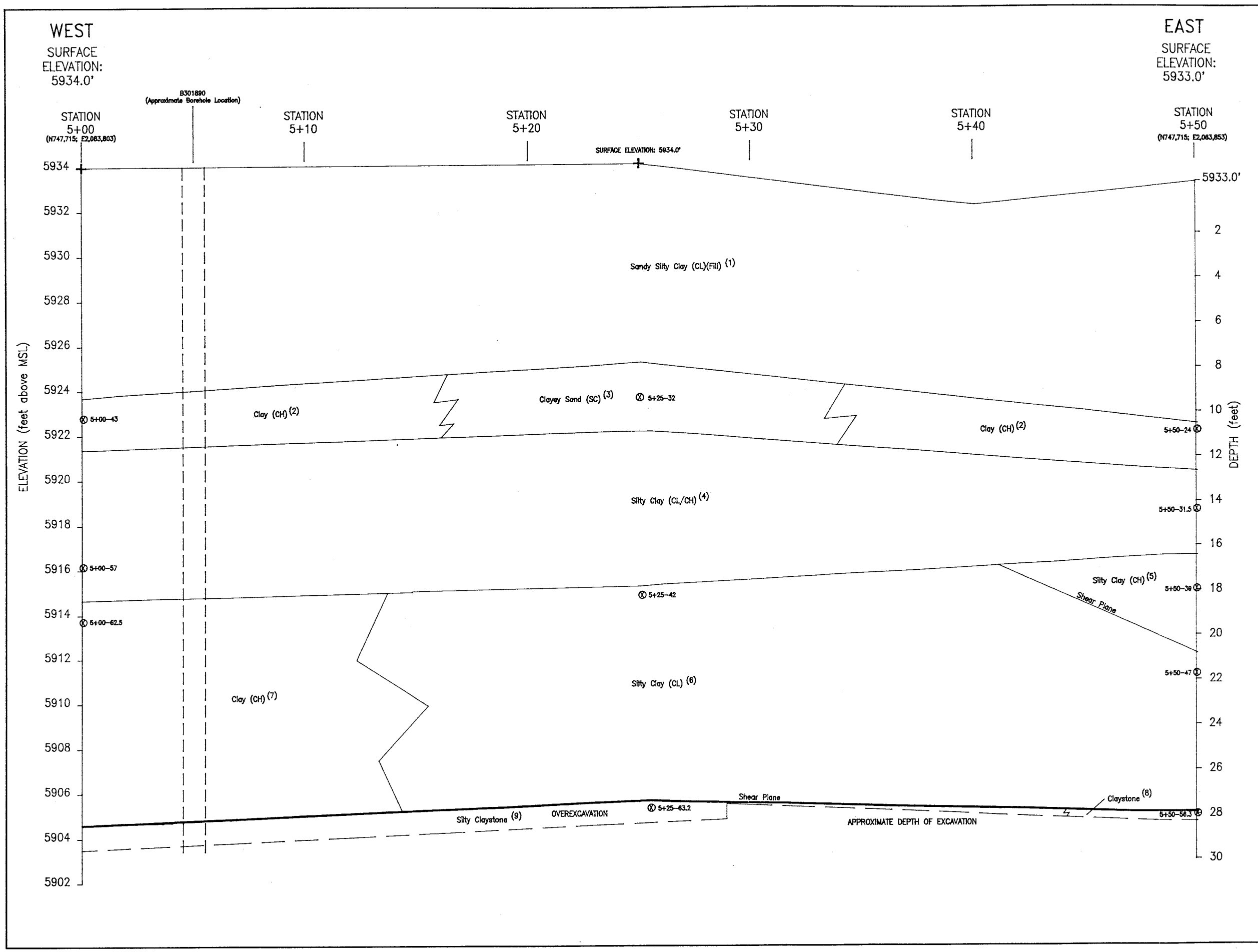
U.S. DEPARTMENT OF ENERGY
ROCKY FLATS AREA OFFICE GOLDEN, COLORADO

ROCKY FLATS PLANT
GOLDEN, COLORADO 80402-0464

FRENCH DRAIN GEOLOGIC CHARACTERIZATION
INDEX MAP WITH STATIONS AND
EXPLANATIONS / NOTES

SIZE	FILE NAME: INDEXMAP	DATE	SHEET
D	DRAFT	5/20/92	1 OF 30

INDEXMAP.PJ-052092/200



EXPLANATION

SURFACE ELEVATION

APPROXIMATE DEPTH OF BOREHOLES From Geotechnical Investigation Report, (EG&G, 1990)

CONTACTS:

INTER-UNIT CONTACT

UNIT CONTACT

BEDROCK CONTACT

GRADATION BETWEEN UNITS

Dashed Where Approximate; Queried Where Existence Is Uncertain

SAMPLE STATION LOCATION AND IDENTIFICATION NUMBER (12+20-15)

STRIKES AND DIPS: ? = Uncertain

30 / 28 BEDDING PLANES

30 / 75 FRACTURES

30 / RO SHEAR PLANE RO = RANDOMLY ORIENTED

30 / 90 VERTICAL FRACTURES

SUBSURFACE SEEPS

HYDRAULIC CONDUCTIVITY TEST In Centimeters Per Second (from Doty and Associates) (2.55×10^{-8} cm/s)

2' 0 2'

SCALE: 1 INCH = 2 FEET
NO VERTICAL EXAGGERATION

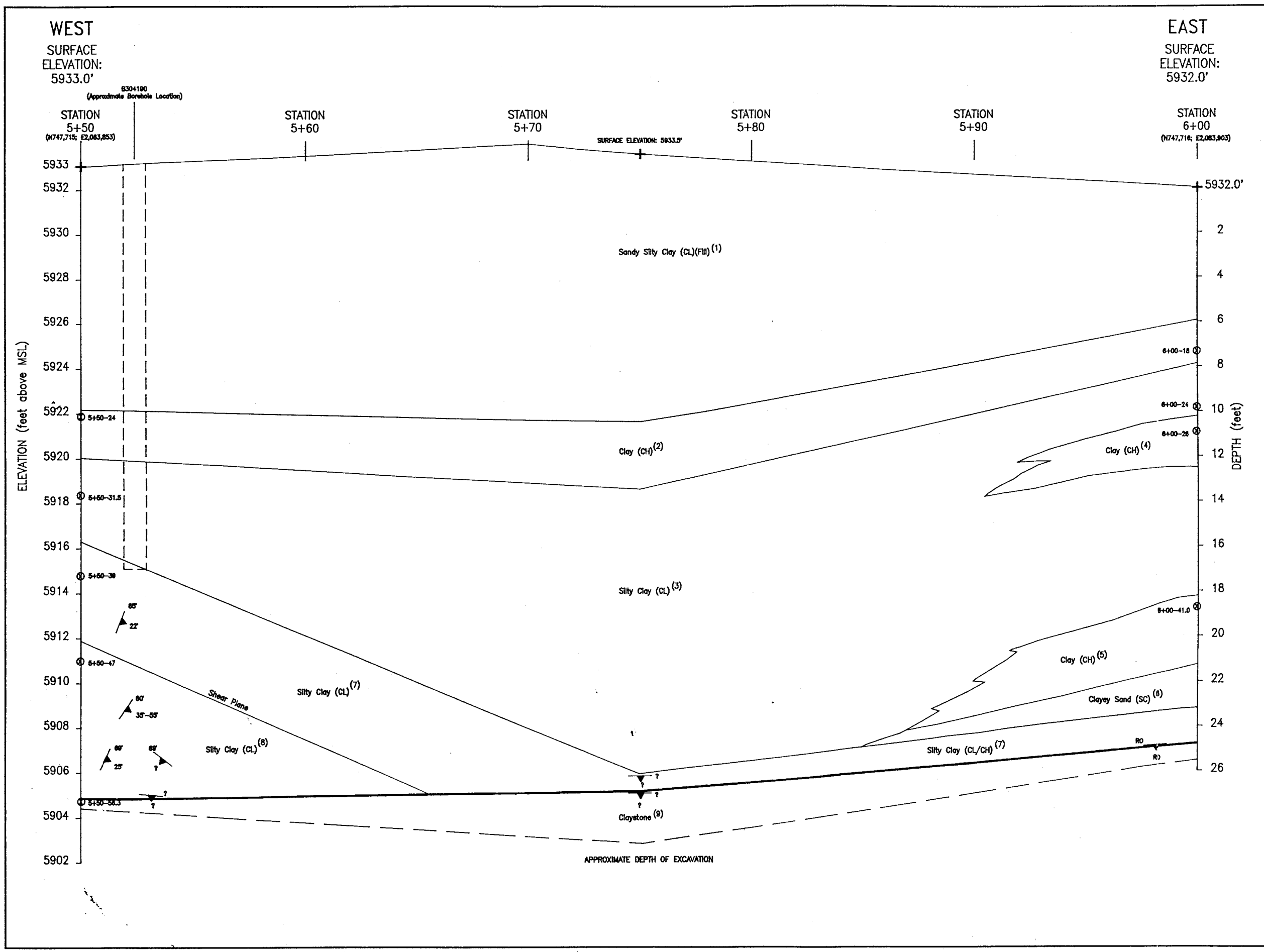
U.S. DEPARTMENT OF ENERGY
ROCKY FLATS AREA OFFICE — GOLDEN, COLORADO

ROCKY FLATS PLANT
GOLDEN, COLORADO 80402-0464

FRENCH DRAIN GEOLOGIC CHARACTERIZATION
VERTICAL SECTION FROM
STATION 5+00 – 5+50

SIZE	FILE NAME: R33X500	DATE	SHEET
D	DRAFT	5/20/92	2 OF 30

R33X500.CW-052192



EXPLANATION

SURFACE ELEVATION

APPROXIMATE DEPTH OF BOREHOLES From Geotechnical Investigation Report, (EG&G, 1990)

CONTACTS:

INTER-UNIT CONTACT

UNIT CONTACT

BEDROCK CONTACT

GRADATION BETWEEN UNITS

Dashed Where Approximate; Queried Where Existence Is Uncertain

SAMPLE STATION LOCATION AND IDENTIFICATION NUMBER (12+20-15)

STRIKES AND DIPS: ? = Uncertain

BEDDING PLANES

FRACTURES

SHEAR PLANE RO = RANDOMLY ORIENTED

VERTICAL FRACTURES

SUBSURFACE SEEPS

HYDRAULIC CONDUCTIVITY TEST In Centimeters Per Second (from Daly and Associates) (2.50×10^{-6} cm/s)

2' 0 2'

SCALE: 1 INCH = 2 FEET
NO VERTICAL EXAGGERATION

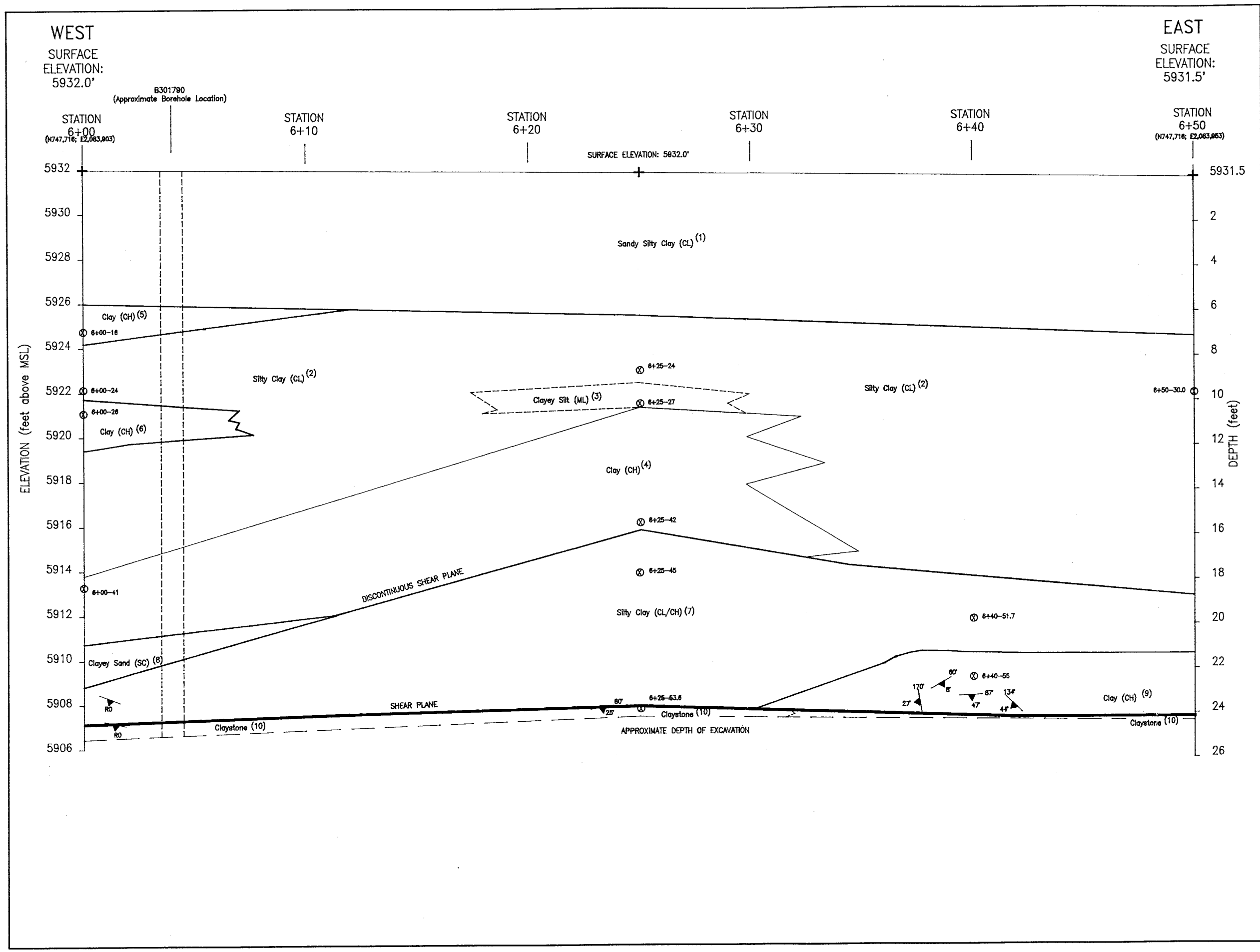
U.S. DEPARTMENT OF ENERGY
ROCKY FLATS AREA OFFICE — GOLDEN, COLORADO

ROCKY FLATS PLANT
GOLDEN, COLORADO 80402-0464

FRENCH DRAIN GEOLOGIC CHARACTERIZATION
VERTICAL SECTION FROM
STATION 5+50 – 6+00

SIZE	FILE NAME: R33X550	DATE	SHEET
D	DRAFT	5/20/92	3 of 30

R33X550.CW-052192



EXPLANATION

SURFACE ELEVATION

APPROXIMATE DEPTH OF BOREHOLES From Geotechnical Investigation Report, (EG&G, 1990)

CONTACTS:

INTER-UNIT CONTACT

UNIT CONTACT

BEDROCK CONTACT

GRADATION BETWEEN UNITS

Dashed Where Approximate; Queried Where Existence Is Uncertain

SAMPLE STATION LOCATION AND IDENTIFICATION NUMBER (12+20-15)

STRIKES AND DIPS: ? = Uncertain

BEDDING PLANES

FRACTURES

SHEAR PLANE

RO = RANDOMLY ORIENTED

VERTICAL FRACTURES

SUBSURFACE SEEPS

HYDRAULIC CONDUCTIVITY TEST In Centimeters Per Second (from Daly and Associates) (2.55×10^{-8} cm/s)

2' 0 2'

SCALE: 1 INCH = 2 FEET
NO VERTICAL EXAGGERATION

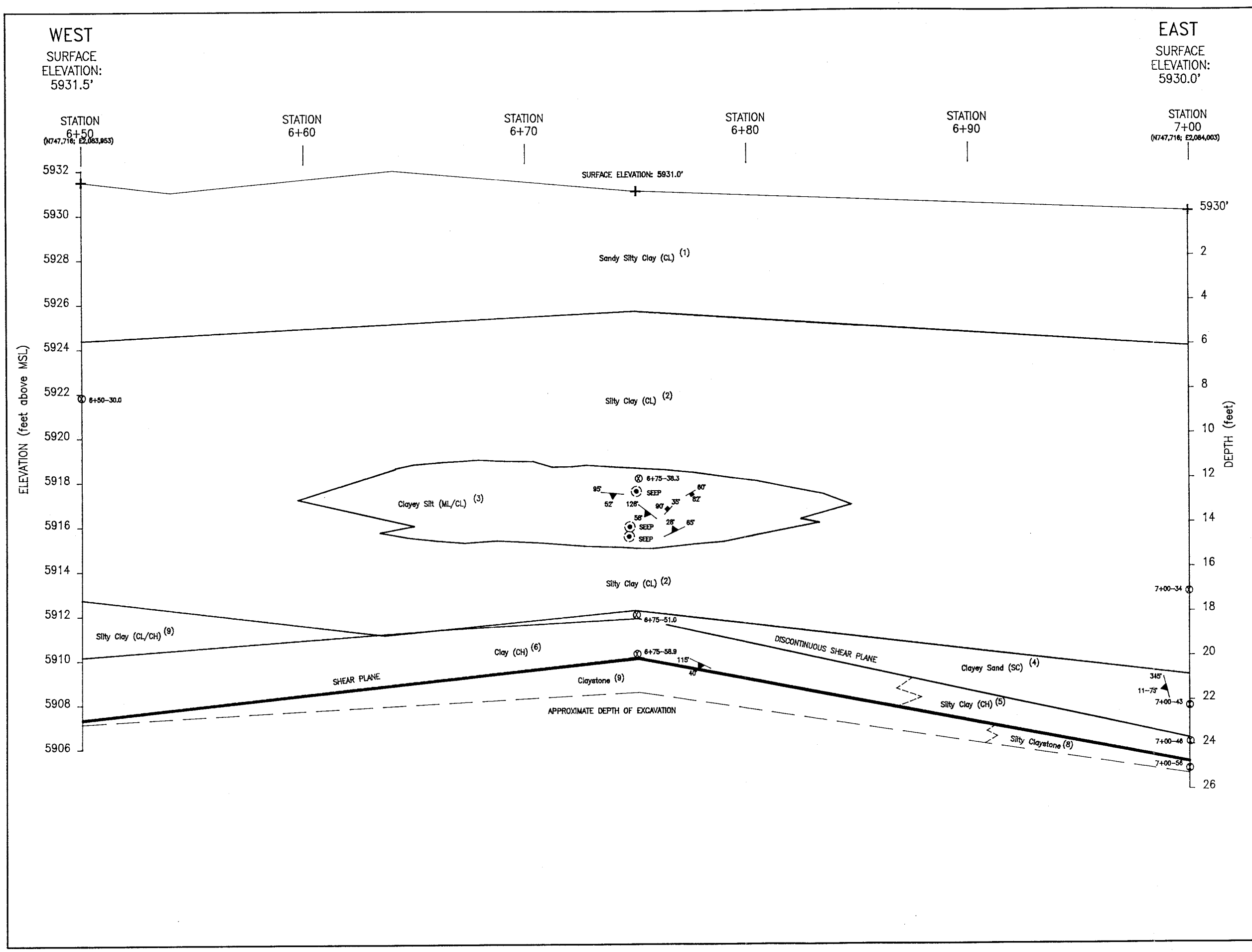
U.S. DEPARTMENT OF ENERGY
ROCKY FLATS AREA OFFICE — GOLDEN, COLORADO

ROCKY FLATS PLANT
GOLDEN, COLORADO 80402-0464

FRENCH DRAIN GEOLOGIC CHARACTERIZATION
VERTICAL SECTION FROM
STATION 6+00 – 6+50

SIZE	FILE NAME: R33X600	DATE	SHEET
D	DRAFT	5/20/92	4 OF 30

R33X600.PJ-052092



EXPLANATION

SURFACE ELEVATION

APPROXIMATE DEPTH OF BOREHOLES From Geotechnical Investigation Report, (EG&G, 1990)

CONTACTS:

INTER-UNIT CONTACT

UNIT CONTACT

BEDROCK CONTACT

GRADATION BETWEEN UNITS

Dashed Where Approximate; Queried Where Existence Is Uncertain

12+20-15 SAMPLE STATION LOCATION AND IDENTIFICATION NUMBER

STRIKES AND DIPS: ? = Uncertain

30° 25° BEDDING PLANES

30° 75° FRACTURES

30° 80 SHEAR PLANE RO = RANDOMLY ORIENTED

30° 90° VERTICAL FRACTURES

SUBSURFACE SEEPS

HYDRAULIC CONDUCTIVITY TEST In Centimeters Per Second (from Doty and Associates)

2.55×10^{-8} cm/s

2' 0 2'

SCALE: 1 INCH = 2 FEET
NO VERTICAL EXAGGERATION

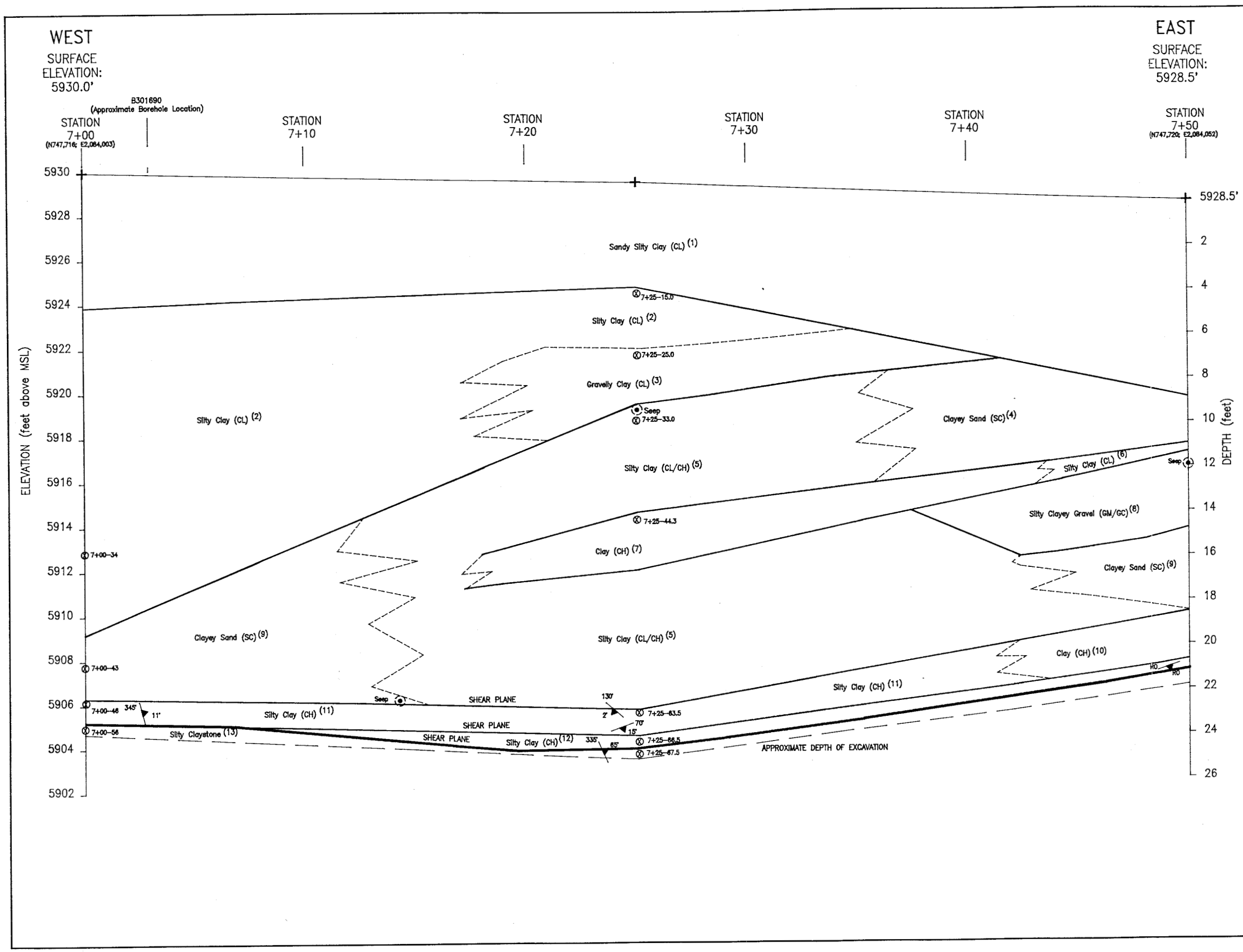
U.S. DEPARTMENT OF ENERGY
ROCKY FLATS AREA OFFICE GOLDEN, COLORADO

ROCKY FLATS PLANT
GOLDEN, COLORADO 80402-0464

FRENCH DRAIN GEOLOGIC CHARACTERIZATION
VERTICAL SECTION FROM
STATION 6+50 – 7+00

SIZE	FILE NAME: R33X650	DATE	SHEET
D	DRAFT	5/20/92	5 OF 30

R33X650.PJ-052092



EXPLANATION

SURFACE ELEVATION

APPROXIMATE DEPTH OF BOREHOLES From Geotechnical Investigation Report, (ESI&G, 1990)

CONTACTS:

INTER-UNIT CONTACT

UNIT CONTACT

BEDROCK CONTACT

GRADATION BETWEEN UNITS

Dashed Where Approximate; Queried Where Existence Is Uncertain

12+20-15 SAMPLE STATION LOCATION AND IDENTIFICATION NUMBER

STRIKES AND DIPS: ? = Uncertain

30° 25° BEDDING PLANES

30° 75° FRACTURES

30° RO SHEAR PLANE RO = RANDOMLY ORIENTED

30° 90° VERTICAL FRACTURES

SUBSURFACE SEEPS

HYDRAULIC CONDUCTIVITY TEST In Centimeters Per Second (from Doty and Associates)

2.55×10^{-6} cm/s

2' 0 2'

SCALE: 1 INCH = 2 FEET
NO VERTICAL EXAGGERATION

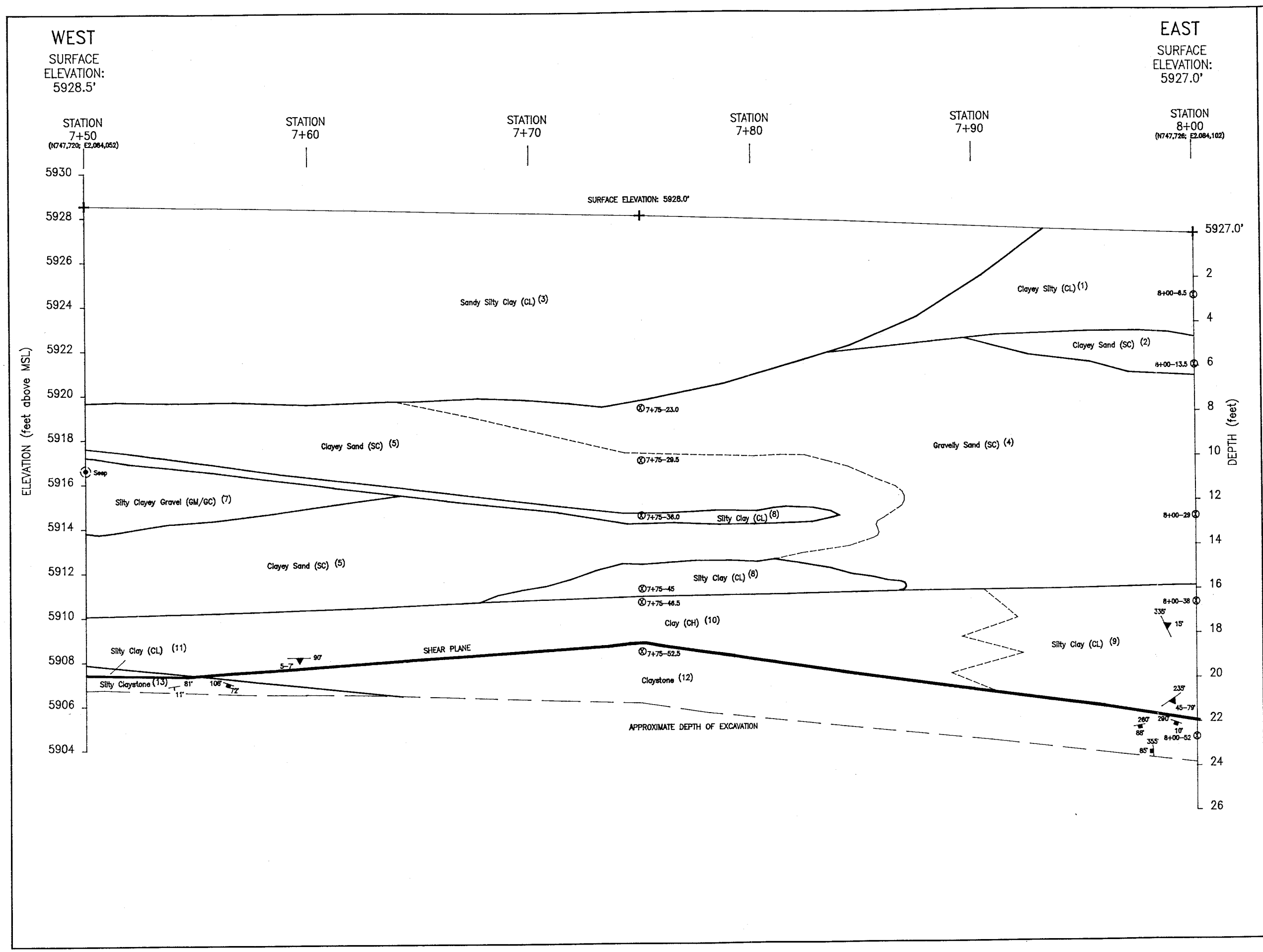
U.S. DEPARTMENT OF ENERGY
ROCKY FLATS AREA OFFICE GOLDEN, COLORADO

ROCKY FLATS PLANT
GOLDEN, COLORADO 80402-0464

FRENCH DRAIN GEOLOGIC CHARACTERIZATION
VERTICAL SECTION FROM
STATION 7+00 – 7+50

SIZE	FILE NAME: R33X700	DATE	SHEET
D	DRAFT	5/20/92	6 OF 30

R33X700.PJ-052092



EXPLANATION

SURFACE ELEVATION

APPROXIMATE DEPTH OF BOREHOLES From Geotechnical Investigation Report, (Dames, 1990)

CONTACTS:

INTER-UNIT CONTACT

UNIT CONTACT

BEDROCK CONTACT

GRADATION BETWEEN UNITS

Dashed Where Approximate; Queried Where Existence Is Uncertain

12+29-15 SAMPLE STATION LOCATION AND IDENTIFICATION NUMBER

STRIKES AND DIPS: ? = Uncertain

30° 28° BEDDING PLANES

30° 78° FRACTURES

30° RO SHEAR PLANE RO = RANDOMLY ORIENTED

30° 90° VERTICAL FRACTURES

SUBSURFACE SEEPS

2.55×10^{-8} cm/s HYDRAULIC CONDUCTIVITY TEST In Centimeters Per Second (from Doty and Associates)

2' 0 2'

SCALE: 1 INCH = 2 FEET

NO VERTICAL EXAGGERATION

U.S. DEPARTMENT OF ENERGY

ROCKY FLATS AREA OFFICE — GOLDEN, COLORADO

ROCKY FLATS PLANT

GOLDEN, COLORADO 80402-0464

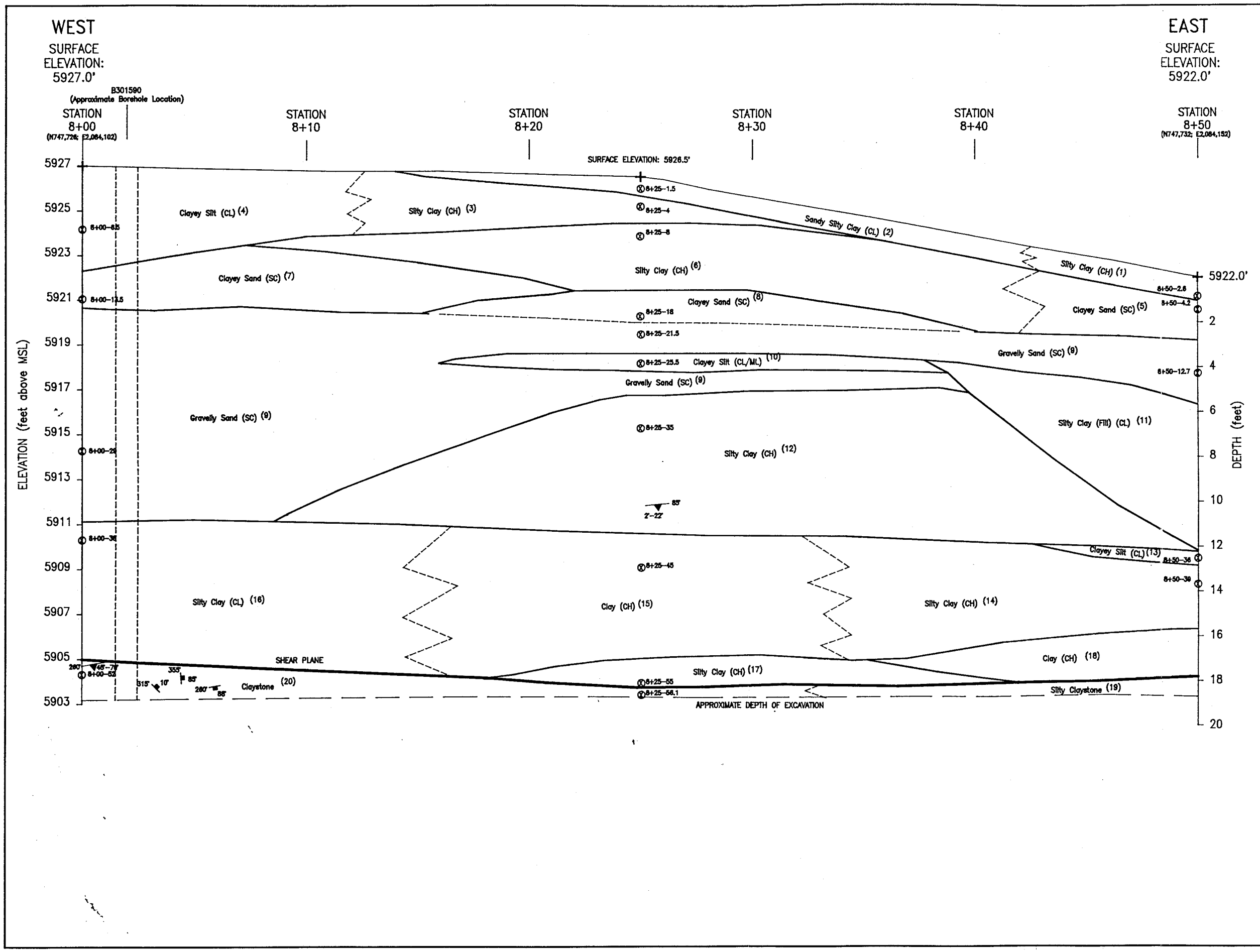
FRENCH DRAIN GEOLOGIC CHARACTERIZATION

VERTICAL SECTION FROM

STATION 7+50 – 8+00

SIZE	FILE NAME: R33X750	DATE	SHEET
D	DRAFT	5/20/92	7 OF 30

R33X750.PJ-052092



EXPLANATION

SURFACE ELEVATION

APPROXIMATE DEPTH OF BOREHOLES From Geotechnical Investigation Report, (EG&G, 1990)

CONTACTS:

INTER-UNIT CONTACT

UNIT CONTACT

BEDROCK CONTACT

GRADATION BETWEEN UNITS

Dashed Where Approximate; Queried Where Existence Is Uncertain

SAMPLE STATION LOCATION AND IDENTIFICATION NUMBER

12+20-15

STRIKES AND DIPS: ? = Uncertain

BEDDING PLANES

FRACTURES

SHEAR PLANE RO = RANDOMLY ORIENTED

VERTICAL FRACTURES

SUBSURFACE SEEPS

HYDRAULIC CONDUCTIVITY TEST In Centimeters Per Second (from Daly and Associates)

2.58x10⁻⁶ cm/s

2'

0

2'

SCALE: 1 INCH = 2 FEET

NO VERTICAL EXAGGERATION

U.S. DEPARTMENT OF ENERGY

ROCKY FLATS AREA OFFICE GOLDEN, COLORADO

ROCKY FLATS PLANT

GOLDEN, COLORADO 80402-0464

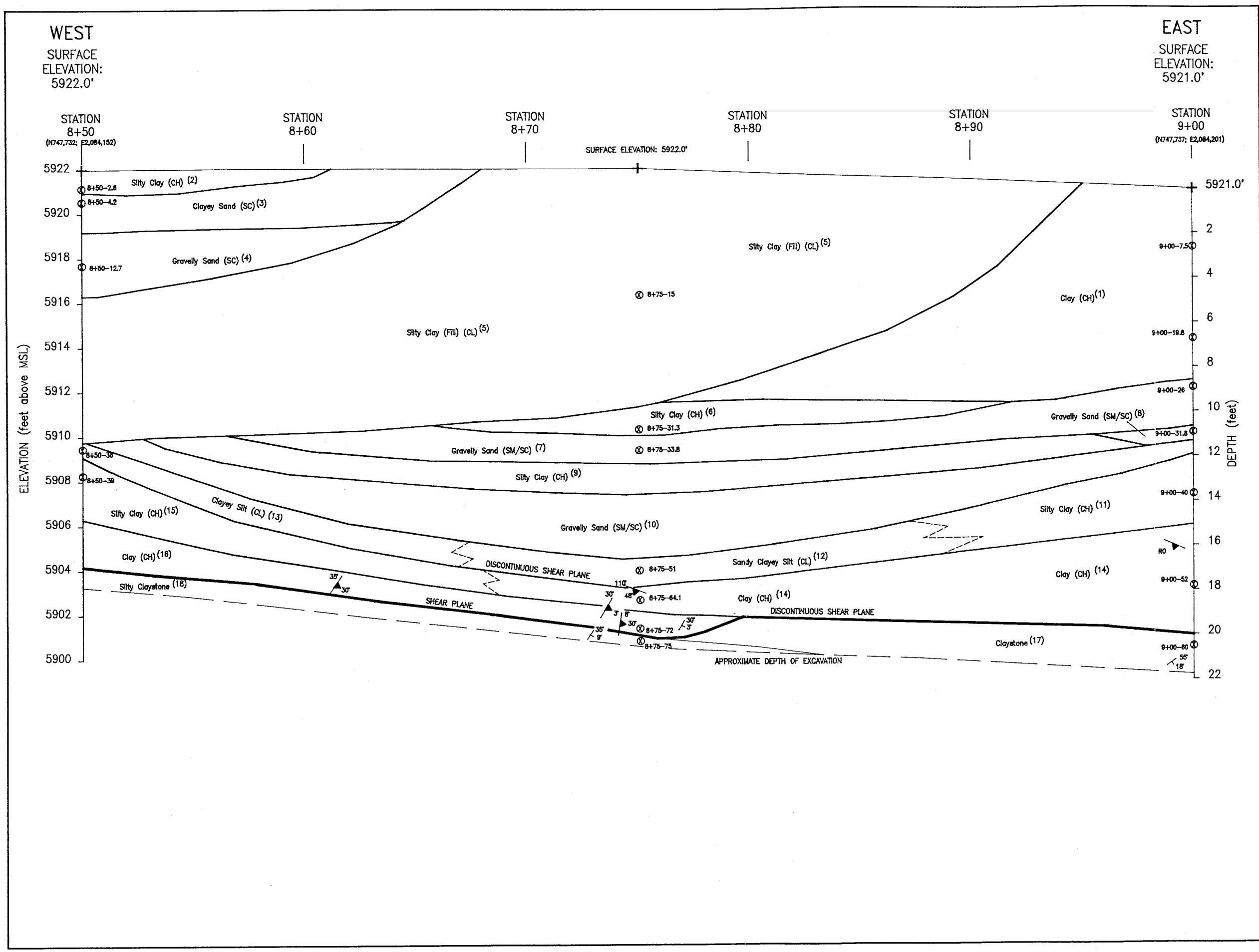
FRENCH DRAIN GEOLOGIC CHARACTERIZATION

VERTICAL SECTION FROM

STATION 8+00 - 8+50

SIZE	FILE NAME: R33X800	DATE	SHEET
D	DRAFT	5/20/92	8 OF 30

R33X800.PJ-052092



EXPLANATION

SURFACE ELEVATION

APPROXIMATE DEPTH OF BOREHOLES From Geotechnical Investigation Report, (EG&G, 1990)

CONTACTS:

INTER-UNIT CONTACT

UNIT CONTACT

BEDROCK CONTACT

GRADATION BETWEEN UNITS

Dashed Where Approximate; Queried Where Existence Is Uncertain

SAMPLE STATION LOCATION AND IDENTIFICATION NUMBER (12+20-15)

STRIKES AND DIPS: ? = Uncertain

BEDDING PLANES

FRACTURES

SHEAR PLANE

R0 = RANDOMLY ORIENTED

VERTICAL FRACTURES

SUBSURFACE SEEPS

HYDRAULIC CONDUCTIVITY TEST In Centimeters Per Second (from Daly and Associates) 2.55×10^{-8} cm/s

2' 0 2'

SCALE: 1 INCH = 2 FEET
NO VERTICAL EXAGGERATION

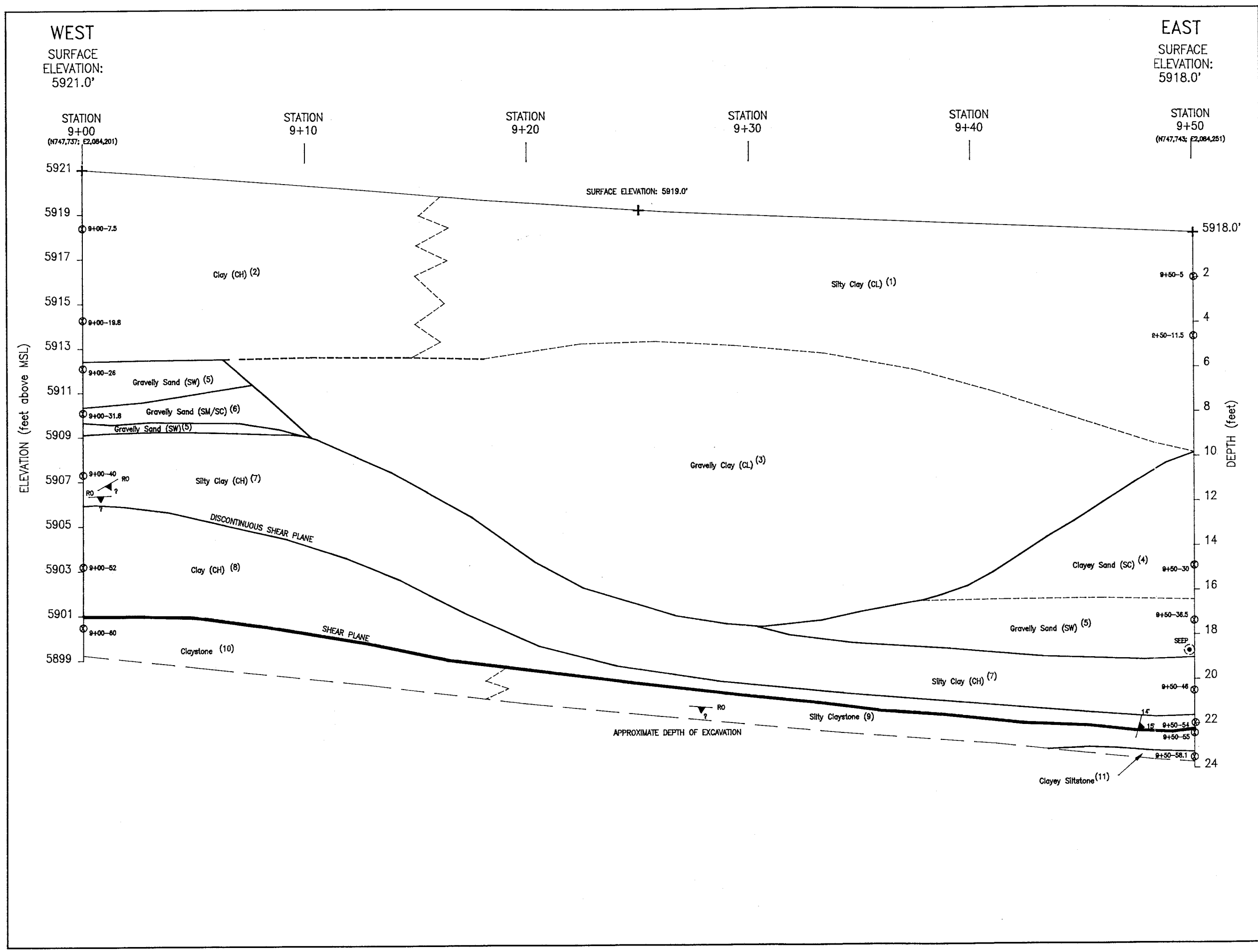
U.S. DEPARTMENT OF ENERGY
ROCKY FLATS AREA OFFICE — GOLDEN, COLORADO

ROCKY FLATS PLANT
GOLDEN, COLORADO 80402-0464

FRENCH DRAIN GEOLOGIC CHARACTERIZATION
VERTICAL SECTION FROM
STATION 8+50 – 9+00

SIZE	FILE NAME: R33X850	DATE	SHEET
D	DRAFT	5/20/92	9 OF 30

R33X850.PJ-052092



EXPLANATION

SURFACE ELEVATION

APPROXIMATE DEPTH OF BOREHOLES From Geotechnical Investigation Report, (Ecolog, 1990)

CONTACTS:

INTER-UNIT CONTACT

UNIT CONTACT

BEDROCK CONTACT

GRADATION BETWEEN UNITS

Dashed Where Approximate; Queried Where Existence Is Uncertain

12+20-15 SAMPLE STATION LOCATION AND IDENTIFICATION NUMBER

STRIKES AND DIPS: ? = Uncertain

30°/29° BEDDING PLANES

30°/75° FRACTURES

30° RO SHEAR PLANE RO = RANDOMLY ORIENTED

30° 90° VERTICAL FRACTURES

SUBSURFACE SEEPS

2.55×10^{-8} cm/s HYDRAULIC CONDUCTIVITY TEST In Centimeters Per Second (from Daly and Associates)

2' 0 2'

SCALE: 1 INCH = 2 FEET

NO VERTICAL EXAGGERATION

U.S. DEPARTMENT OF ENERGY

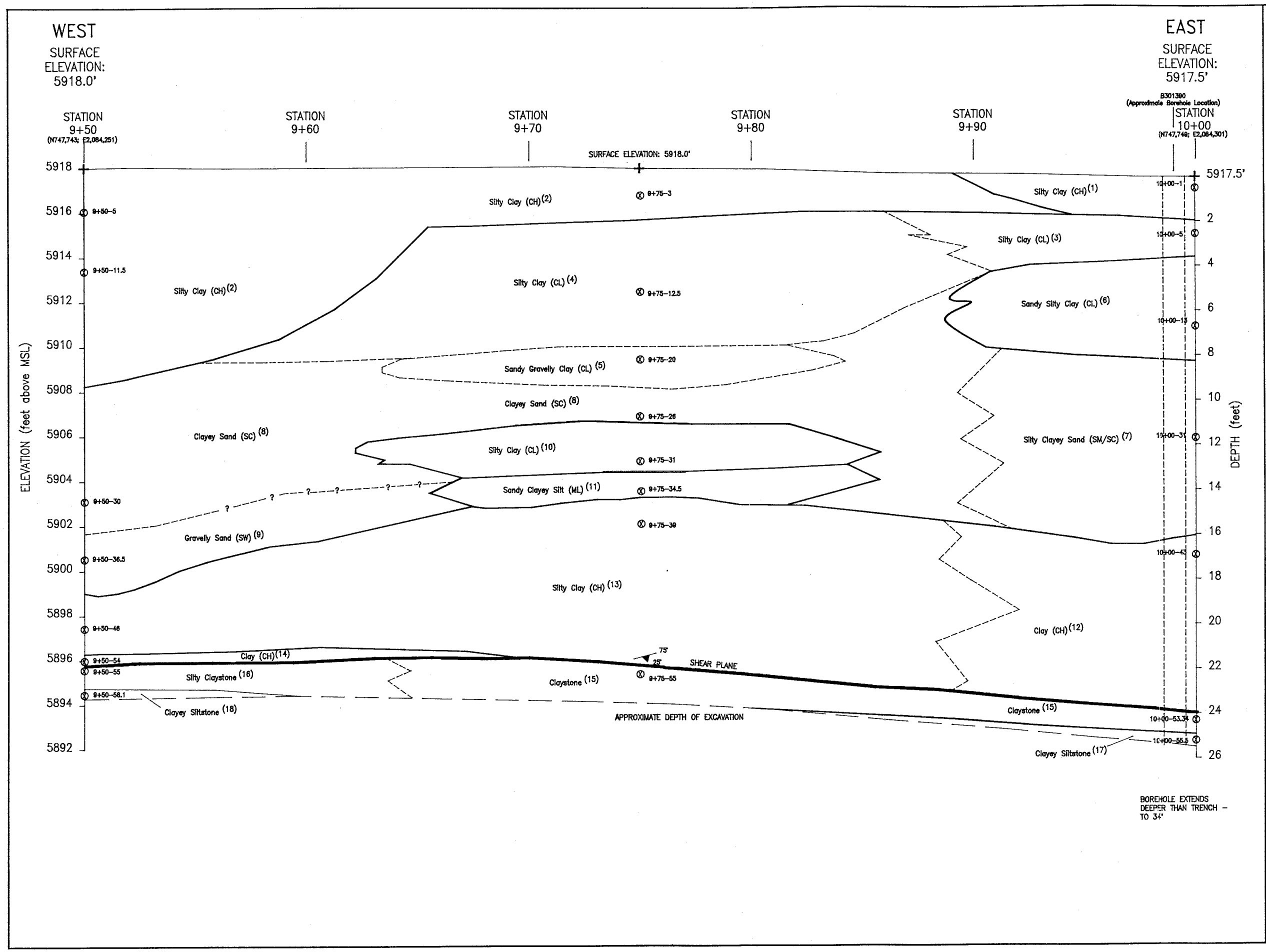
ROCKY FLATS AREA OFFICE — GOLDEN, COLORADO

ROCKY FLATS PLANT
GOLDEN, COLORADO 80402-0464

FRENCH DRAIN GEOLOGIC CHARACTERIZATION
VERTICAL SECTION FROM
STATION 9+00 – 9+50

SIZE	DRAWING NUMBER	DATE	SHEET
D	DRAFT	5/20/92	10 OF 30

R33X900.PJ-052092



EXPLANATION

SURFACE ELEVATION

APPROXIMATE DEPTH OF BOREHOLES From Geotechnical Investigation Report, (EG&G, 1990)

CONTACTS:

INTER-UNIT CONTACT

UNIT CONTACT

BEDROCK CONTACT

GRADATION BETWEEN UNITS

Dashed Where Approximate; Queried Where Existence Is Uncertain

SAMPLE STATION LOCATION AND IDENTIFICATION NUMBER

STRIKES AND DIPS: ? = Uncertain

BEDDING PLANES

FRACTURES

SHEAR PLANE

RO = RANDOMLY ORIENTED

VERTICAL FRACTURES

SUBSURFACE SEEPS

HYDRAULIC CONDUCTIVITY TEST In Centimeters Per Second (from Doty and Associates)

SCALE: 1 INCH = 2 FEET

NO VERTICAL EXAGGERATION

U.S. DEPARTMENT OF ENERGY

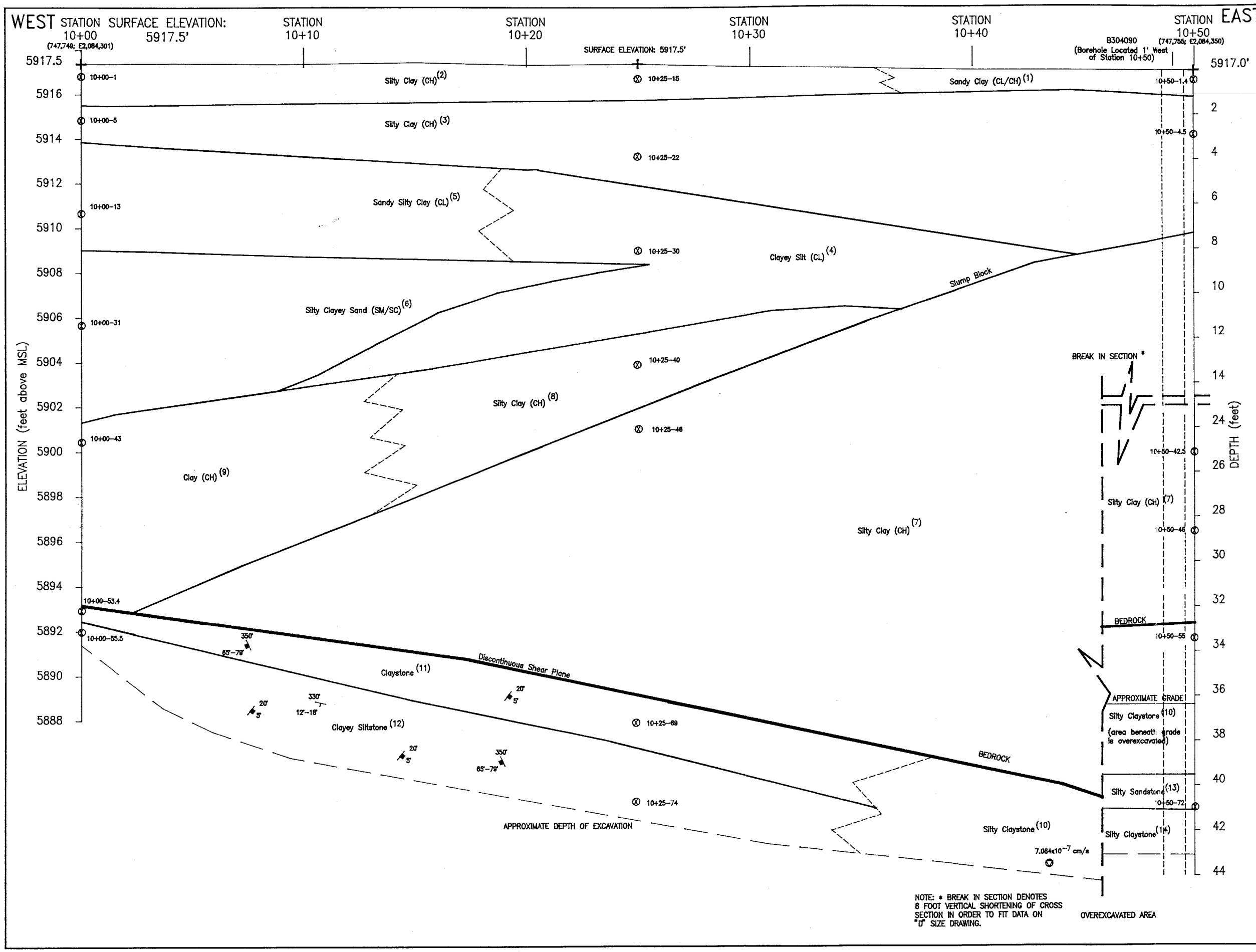
ROCKY FLATS AREA OFFICE — GOLDEN, COLORADO

ROCKY FLATS PLANT
GOLDEN, COLORADO 80402-0464

FRENCH DRAIN GEOLOGIC CHARACTERIZATION VERTICAL SECTION FROM STATION 9+50 – 10+00

SIZE	FILE NAME: R33X950	DATE	SHEET
D	DRAFT	5/20/92	11 OF 30

R33X950.PJ-052092



NOTE: * BREAK IN SECTION DENOTES 8 FOOT VERTICAL SHORTENING OF CROSS SECTION IN ORDER TO FIT DATA ON "D" SIZE DRAWING.

EXPLANATION

SURFACE ELEVATION

APPROXIMATE DEPTH OF BOREHOLES From Geotechnical Investigation Report, (EG&G, 1990)

CONTACTS:

INTER-UNIT CONTACT

UNIT CONTACT

BEDROCK CONTACT

GRADATION BETWEEN UNITS

Dashed Where Approximate; Queried Where Existence Is Uncertain

12+20-15 SAMPLE STATION LOCATION AND IDENTIFICATION NUMBER

STRIKES AND DIPS: ? = Uncertain

30' 20' BEDDING PLANES

30' 75' FRACTURES

30' 80 SHEAR PLANE RO = RANDOMLY ORIENTED

30' 90' VERTICAL FRACTURES

SUBSURFACE SEEPS

2.58x10^-8 cm/s HYDRAULIC CONDUCTIVITY TEST In Centimeters Per Second (from Doty and Associates)

2' 0 2'

SCALE: 1 INCH = 2 FEET
NO VERTICAL EXAGGERATION

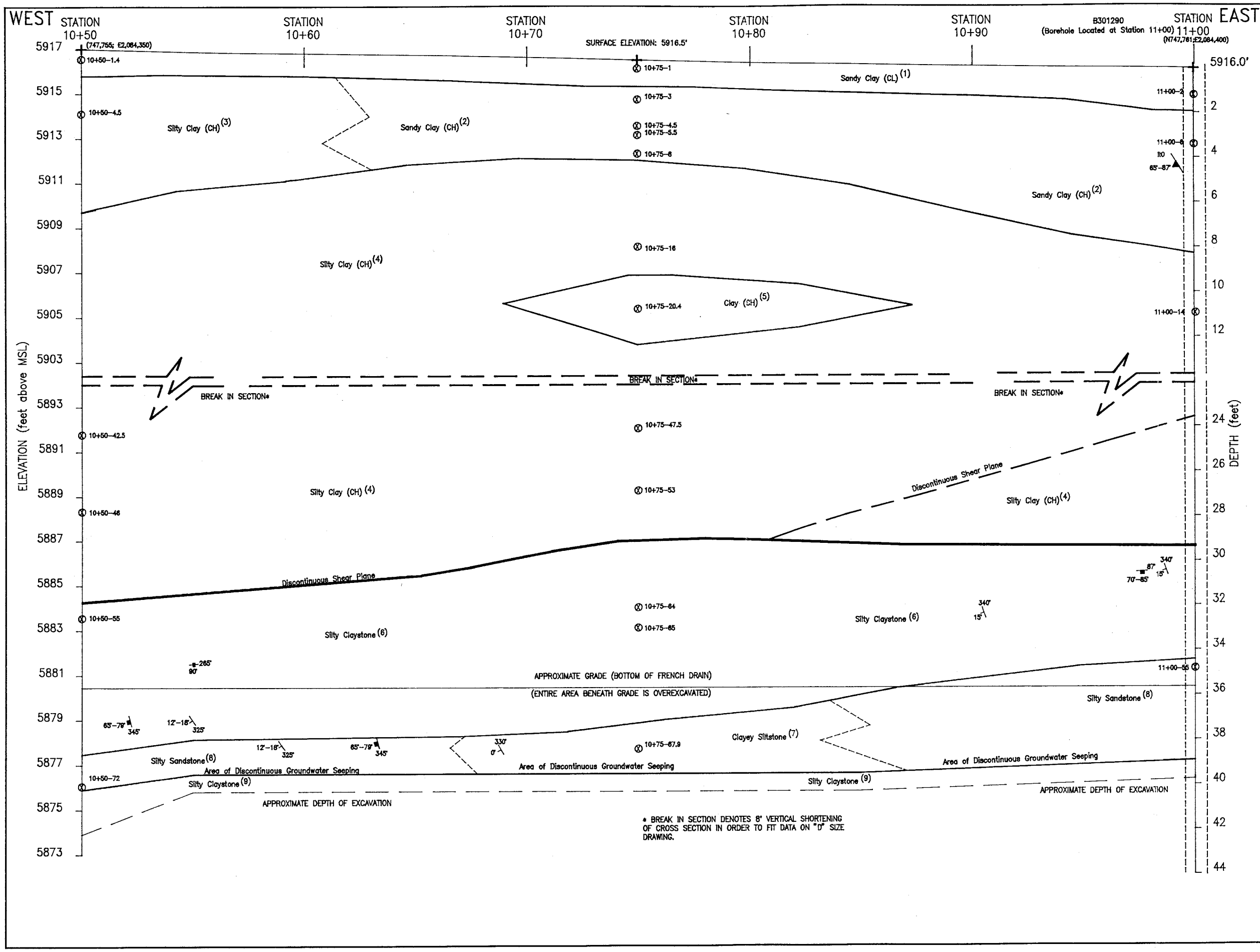
U.S. DEPARTMENT OF ENERGY
ROCKY FLATS AREA OFFICE — GOLDEN, COLORADO

ROCKY FLATS PLANT
GOLDEN, COLORADO 80402-0464

FRENCH DRAIN GEOLOGIC CHARACTERIZATION
VERTICAL SECTION FROM
STATION 10+00 – 10+50

SIZE	FILE NAME: R33X1000	DATE	SHEET
D	DRAFT	5/20/92	12 OF 30

R33X1000.PJCW-052292



EXPLANATION

SURFACE ELEVATION

APPROXIMATE DEPTH OF BOREHOLES From Geotechnical Investigation Report, (EG&G, 1990)

CONTACTS:

INTER-UNIT CONTACT

UNIT CONTACT

BEDROCK CONTACT

GRADATION BETWEEN UNITS

Dashed Where Approximate; Queried Where Existence is Uncertain

12+20-15 SAMPLE STATION LOCATION AND IDENTIFICATION NUMBER

STRIKES AND DIPS: ? = Uncertain

30° 29° BEDDING PLANES

30° 76° FRACTURES

30° 80 SHEAR PLANE RO = RANDOMLY ORIENTED

30° 80° VERTICAL FRACTURES

SUBSURFACE SEEPS

HYDRAULIC CONDUCTIVITY TEST In Centimeters Per Second (from Doty and Associates)

2.55×10^{-6} cm/s

2' 0 2'

SCALE: 1 INCH = 2 FEET

NO VERTICAL EXAGGERATION

U.S. DEPARTMENT OF ENERGY

ROCKY FLATS AREA OFFICE GOLDEN, COLORADO

ROCKY FLATS PLANT

GOLDEN, COLORADO 80402-0464

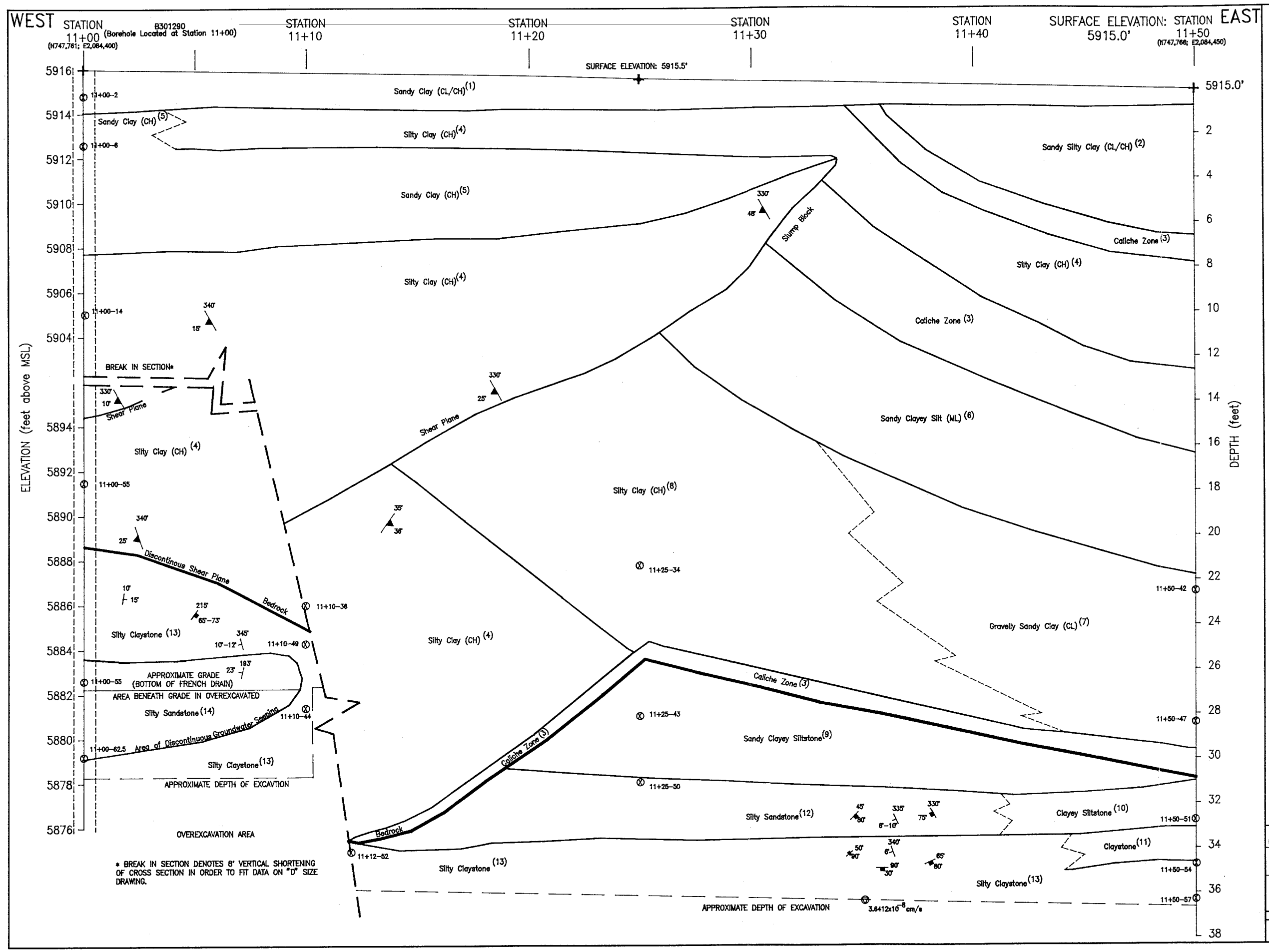
FRENCH DRAIN GEOLOGIC CHARACTERIZATION

VERTICAL SECTION FROM

STATION 10+50 - 11+00

SIZE	FILE NAME: R33X1050	DATE	SHEET
D	DRAFT	5/20/92	13 OF 30

R33X1050.PJCW-052292



EXPLANATION

SURFACE ELEVATION

APPROXIMATE DEPTH OF BOREHOLES From Geotechnical Investigation Report, (SSAG, 1990)

CONTACTS:

INTER-UNIT CONTACT

UNIT CONTACT

BEDROCK CONTACT

GRADATION BETWEEN UNITS

Dashed Where Approximate; Queried Where Existence Is Uncertain

SAMPLE STATION LOCATION AND IDENTIFICATION NUMBER (12+20-15)

STRIKES AND DIPS: ? = Uncertain

BEDDING PLANES

FRACTURES

SHEAR PLANE

RO = RANDOMLY ORIENTED

VERTICAL FRACTURES

SUBSURFACE SEEPS

HYDRAULIC CONDUCTIVITY TEST In Centimeters Per Second (from Doty and Associates) ($2.55x10^{-5}$ cm/s)

2' 0 2'

SCALE: 1 INCH = 2 FEET

NO VERTICAL EXAGGERATION

U.S. DEPARTMENT OF ENERGY

ROCKY FLATS AREA OFFICE — GOLDEN, COLORADO

ROCKY FLATS PLANT

GOLDEN, COLORADO 80402-0464

FRENCH DRAIN GEOLOGIC CHARACTERIZATION

VERTICAL SECTION FROM

STATION 11+00 – 11+50

SIZE	FILE NAME: R33X1100	DATE	SHEET
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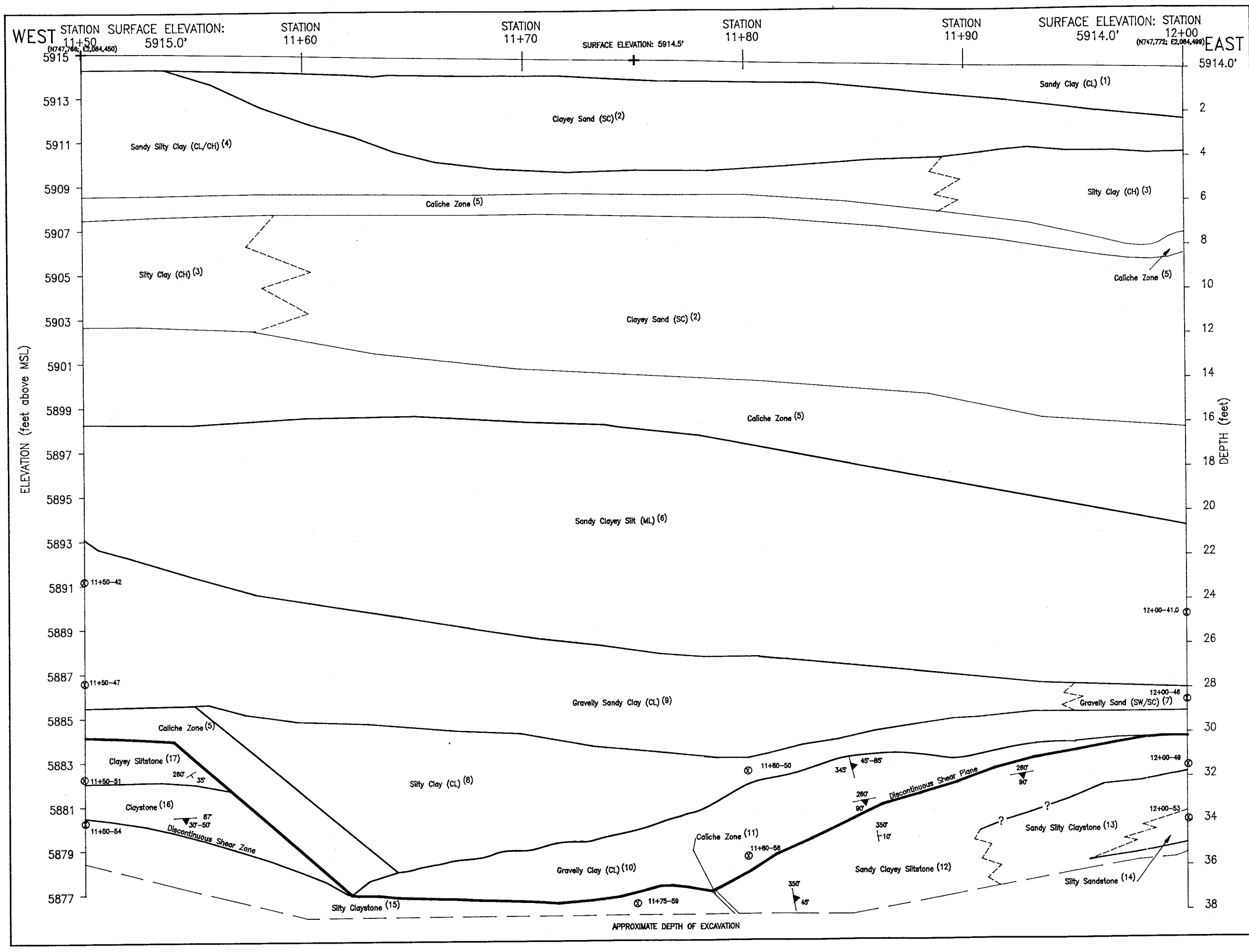
R33X1100.FJCW-052292



EXPLANATION

SURFACE ELEVATION

APPROXIMATE DEPTH OF BOREHOLES From Geotechnical Investigation Report, (ESE&S, 1990)

CONTACTS:

INTER-UNIT CONTACT

UNIT CONTACT

BEDROCK CONTACT

GRADATION BETWEEN UNITS

Dashed Where Approximate; Queried Where Existence Is Uncertain

12+20-15 SAMPLE STATION LOCATION AND IDENTIFICATION NUMBER

STRIKES AND DIPS: ? = Uncertain

30° 25° BEDDING PLANES

30° 75° FRACTURES

30° 80 SHEAR PLANE RO = RANDOMLY ORIENTED

30° 90° VERTICAL FRACTURES

SUBSURFACE SEEPS

2.52×10^{-6} cm/s HYDRAULIC CONDUCTIVITY TEST In Centimeters Per Second (from Doty and Associates)

2' 0 2'

SCALE: 1 INCH = 2 FEET

NO VERTICAL EXAGGERATION

U.S. DEPARTMENT OF ENERGY

ROCKY FLATS AREA OFFICE GOLDEN, COLORADO

ROCKY FLATS PLANT

GOLDEN, COLORADO 80402-0464

FRENCH DRAIN GEOLOGIC CHARACTERIZATION

VERTICAL SECTION FROM

STATION 11+50 – 12+00

SIZE	FILE NAME: R33X1150	DATE	SHEET
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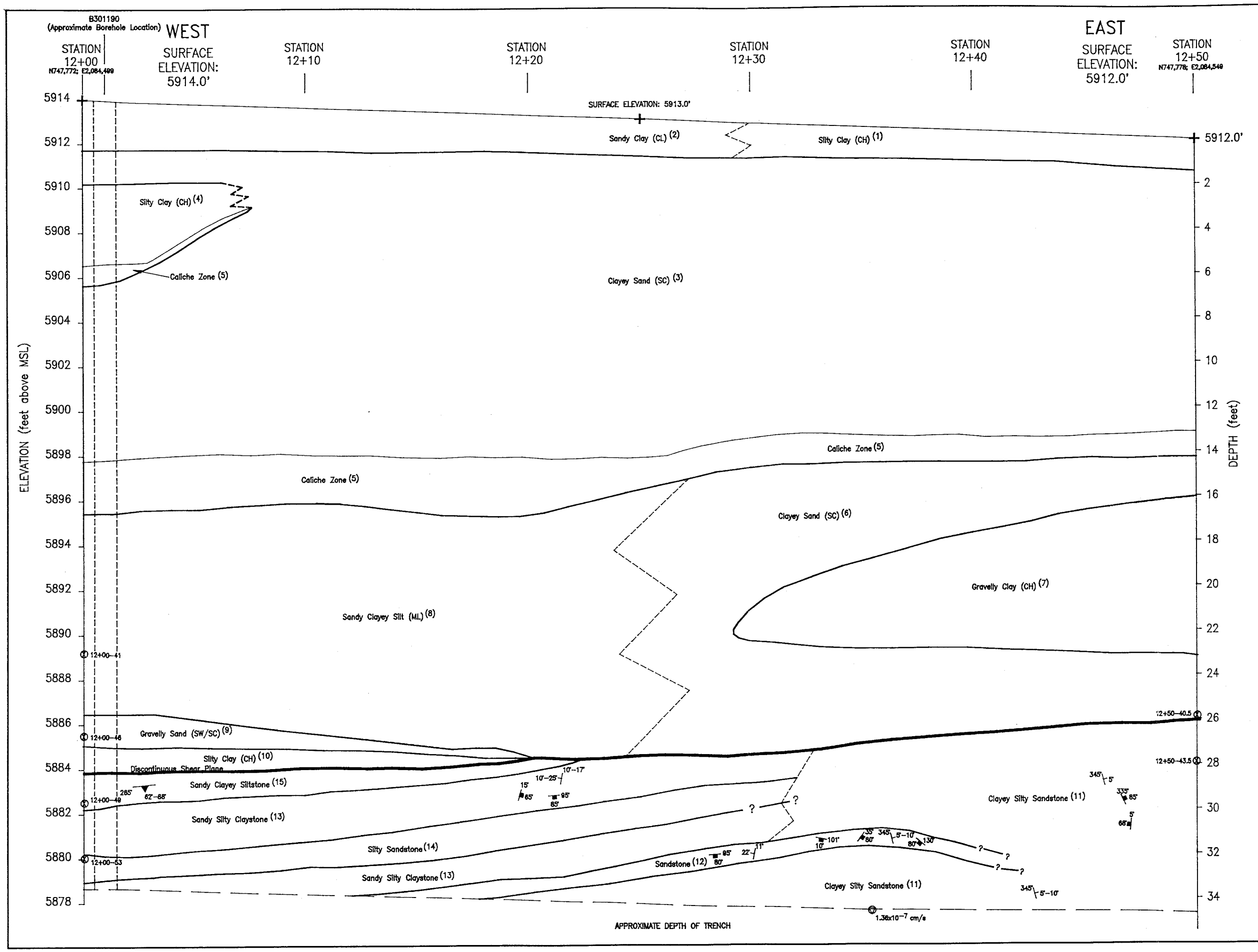
R33X1150.PJCW-052292



EXPLANATION

SURFACE ELEVATION

APPROXIMATE DEPTH OF BOREHOLES From Geotechnical Investigation Report, (EG&G, 1990)

CONTACTS:

INTER-UNIT CONTACT

UNIT CONTACT

BEDROCK CONTACT

GRADATION BETWEEN UNITS

Dashed Where Approximate; Queried Where Existence Is Uncertain

12+20-15 SAMPLE STATION LOCATION AND IDENTIFICATION NUMBER

STRIKES AND DIPS: ? = Uncertain

30° 25° BEDDING PLANES

30° 75° FRACTURES

30° RO SHEAR PLANE RO = RANDOMLY ORIENTED

30° 90° VERTICAL FRACTURES

SUBSURFACE SEEPS

HYDRAULIC CONDUCTIVITY TEST In Centimeters Per Second (from Doty and Associates)

$2.55x10^{-4}$ cm/s

2' 0 2'

SCALE: 1 INCH = 2 FEET
NO VERTICAL EXAGGERATION

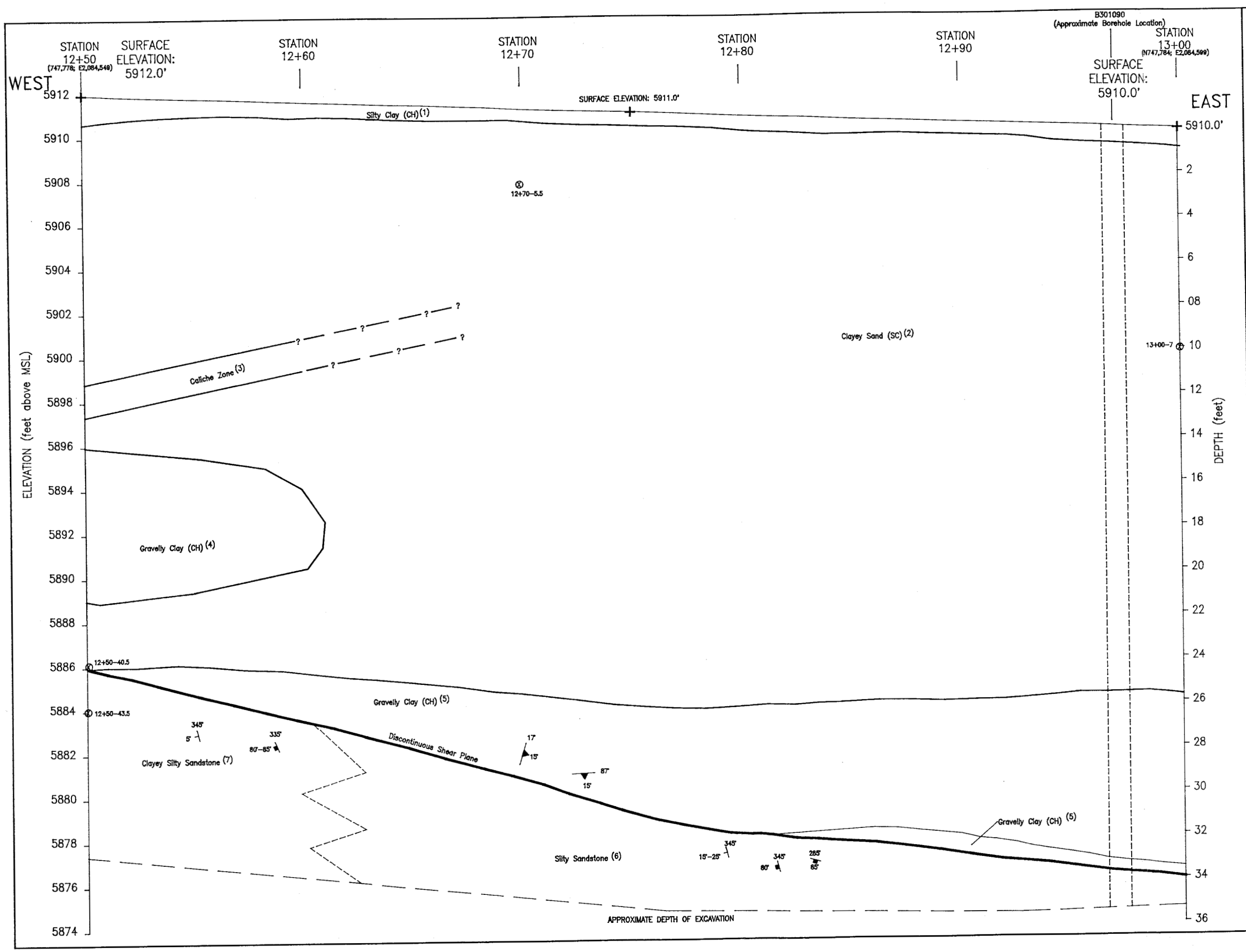
U.S. DEPARTMENT OF ENERGY
ROCKY FLATS AREA OFFICE GOLDEN, COLORADO

ROCKY FLATS PLANT
GOLDEN, COLORADO 80402-0464

FRENCH DRAIN GEOLOGIC CHARACTERIZATION
VERTICAL SECTION FROM
STATION 12+00 - 12+50

SIZE	FILE NAME: R33X1200	DATE	SHEET
D	DRAFT	5/20/92	16 OF 30

R33X1200.CWCW-052292



EXPLANATION

SURFACE ELEVATION

APPROXIMATE DEPTH OF BOREHOLES From Geotechnical Investigation Report, (EG&G, 1990)

CONTACTS:

INTER-UNIT CONTACT

UNIT CONTACT

BEDROCK CONTACT

GRADATION BETWEEN UNITS

Dashed Where Approximating, Queried Where Existence Is Uncertain

SAMPLE STATION LOCATION AND IDENTIFICATION NUMBER (12+20-15)

STRIKES AND DIPS: ? = Uncertain

BEDDING PLANES

FRACTURES

SHEAR PLANE RO = RANDOMLY ORIENTED

VERTICAL FRACTURES

SUBSURFACE SEEPS

HYDRAULIC CONDUCTIVITY TEST In Centimeters Per Second (from Doty and Associates)

SCALE: 1 INCH = 2 FEET
NO VERTICAL EXAGGERATION

U.S. DEPARTMENT OF ENERGY
ROCKY FLATS AREA OFFICE — GOLDEN, COLORADO

ROCKY FLATS PLANT
GOLDEN, COLORADO 80402-0464

FRENCH DRAIN GEOLOGIC CHARACTERIZATION
VERTICAL SECTION FROM
STATION 12+50 - 13+00

SIZE	FILE NAME: R33X1250	DATE	SHEET
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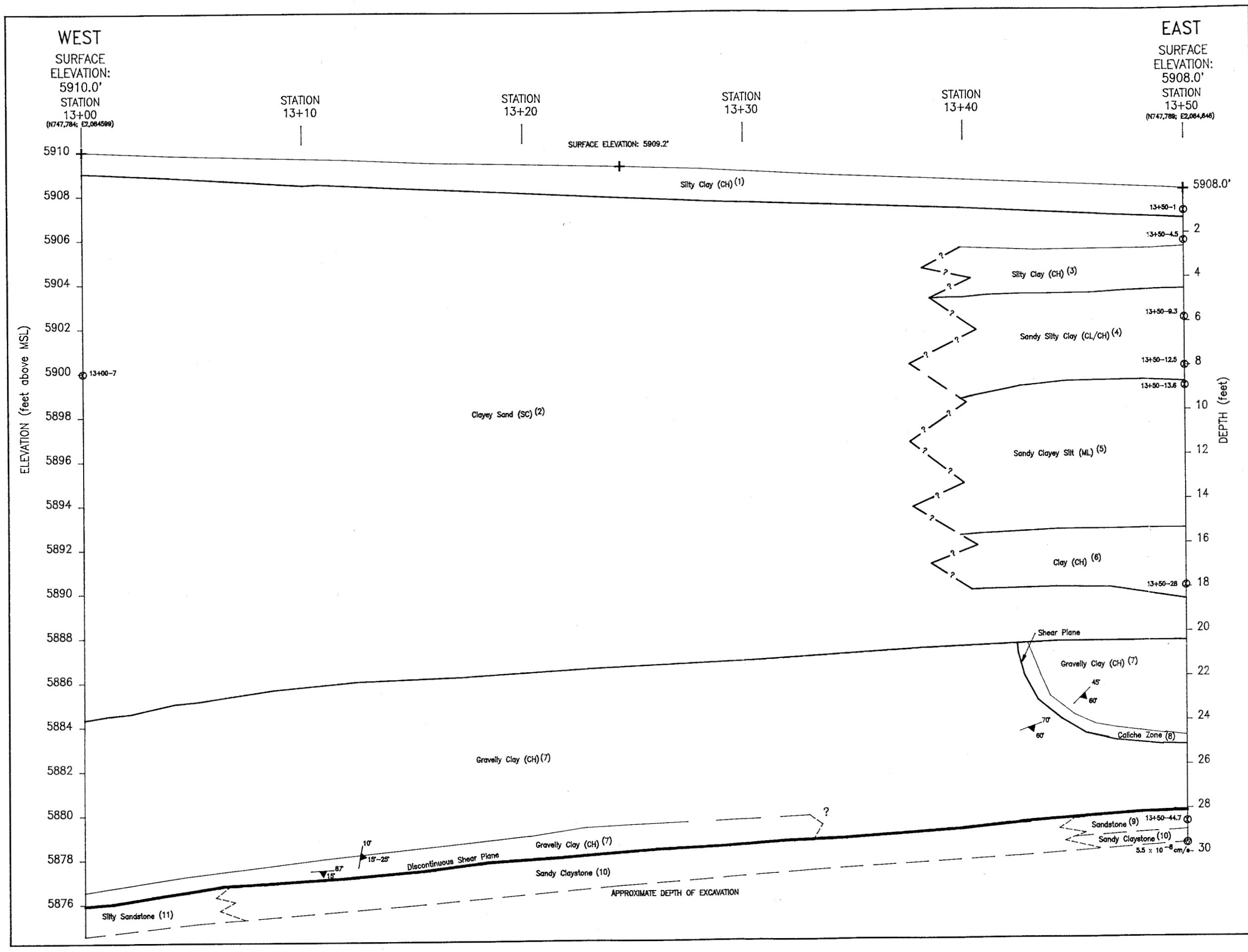
R33X1250.FJCW-052292



EXPLANATION

SURFACE ELEVATION

APPROXIMATE DEPTH OF BOREHOLES From Geotechnical Investigation Report, (ESE&S, 1990)

CONTACTS:

INTER-UNIT CONTACT

UNIT CONTACT

BEDROCK CONTACT

GRADATION BETWEEN UNITS

Dashed Where Approximate; Queried Where Existence Is Uncertain

SAMPLE STATION LOCATION AND IDENTIFICATION NUMBER (12+20-15)

STRIKES AND DIPS: ? = Uncertain

BEDDING PLANES (30° / 25°)

FRACTURES (30° / 75°)

SHEAR PLANE (30° / 80°) RO = RANDOMLY ORIENTED

VERTICAL FRACTURES (30° / 90°)

SUBSURFACE SEEPS

HYDRAULIC CONDUCTIVITY TEST In Centimeters Per Second (from Doty and Associates) (2.55×10^{-8} cm/s)

2' 0 2'

SCALE: 1 INCH = 2 FEET
NO VERTICAL EXAGGERATION

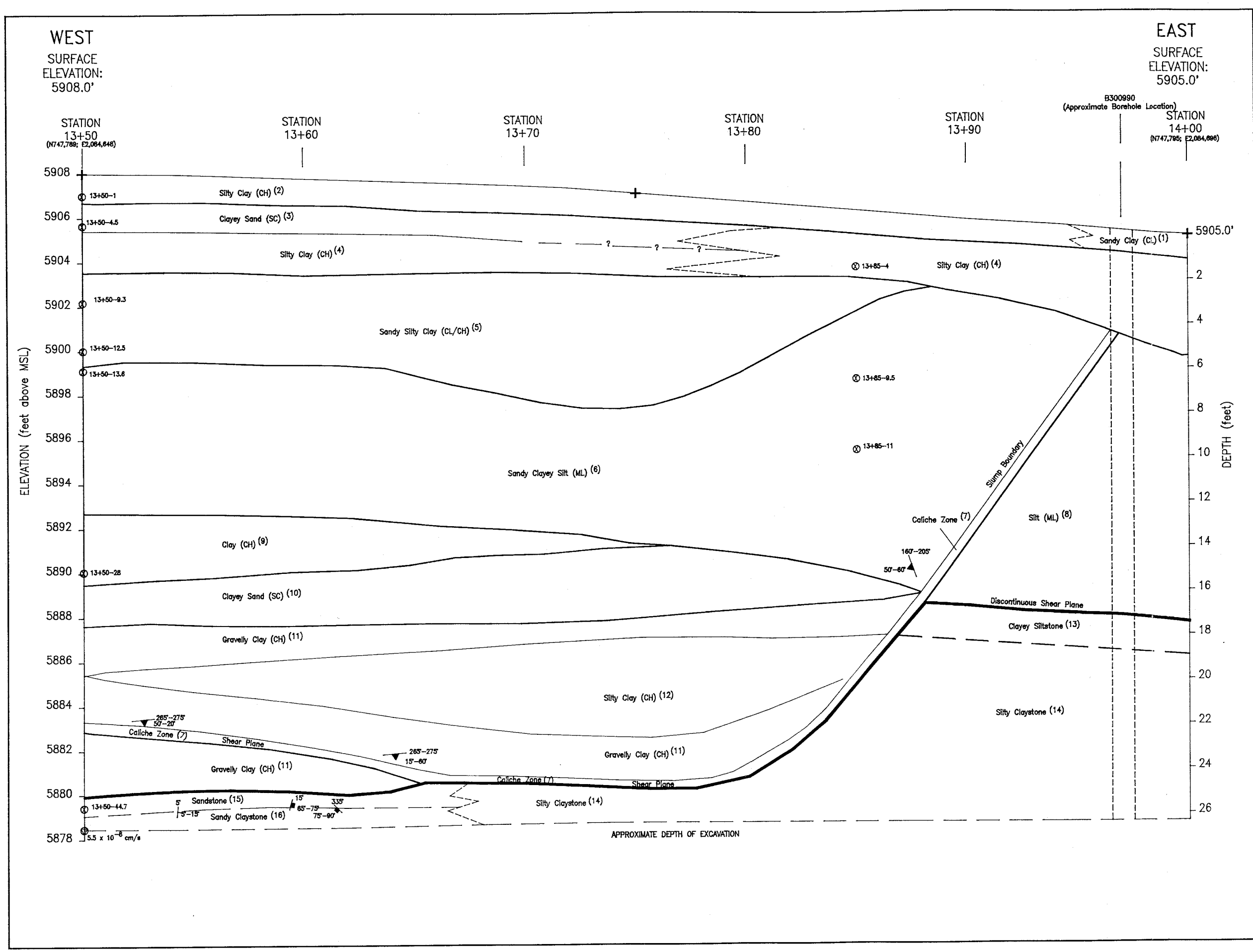
U.S. DEPARTMENT OF ENERGY
ROCKY FLATS AREA OFFICE — GOLDEN, COLORADO

ROCKY FLATS PLANT
GOLDEN, COLORADO 80402-0464

FRENCH DRAIN GEOLOGIC CHARACTERIZATION
VERTICAL SECTION FROM
STATION 13+00 – 13+50

SIZE	FILE NAME: R33X1300	DATE	SHEET
D	DRAFT	5/20/92	18 OF 30

R33X1300.PJCW-052192



EXPLANATION

SURFACE ELEVATION

APPROXIMATE DEPTH OF BOREHOLES From Geotechnical Investigation Report, (ESAIA, 1990)

CONTACTS:

INTER-UNIT CONTACT

UNIT CONTACT

BEDROCK CONTACT

GRADATION BETWEEN UNITS

Dashed Where Approximate; Queried Where Existence Is Uncertain

SAMPLE STATION LOCATION AND IDENTIFICATION NUMBER

STRIKES AND DIPS: ? = Uncertain

BEDDING PLANES

FRACTURES

SHEAR PLANE RO = RANDOMLY ORIENTED

VERTICAL FRACTURES

SUBSURFACE SEEPS

HYDRAULIC CONDUCTIVITY TEST In Centimeters Per Second (from Doty and Associates)

SCALE: 1 INCH = 2 FEET
NO VERTICAL EXAGGERATION

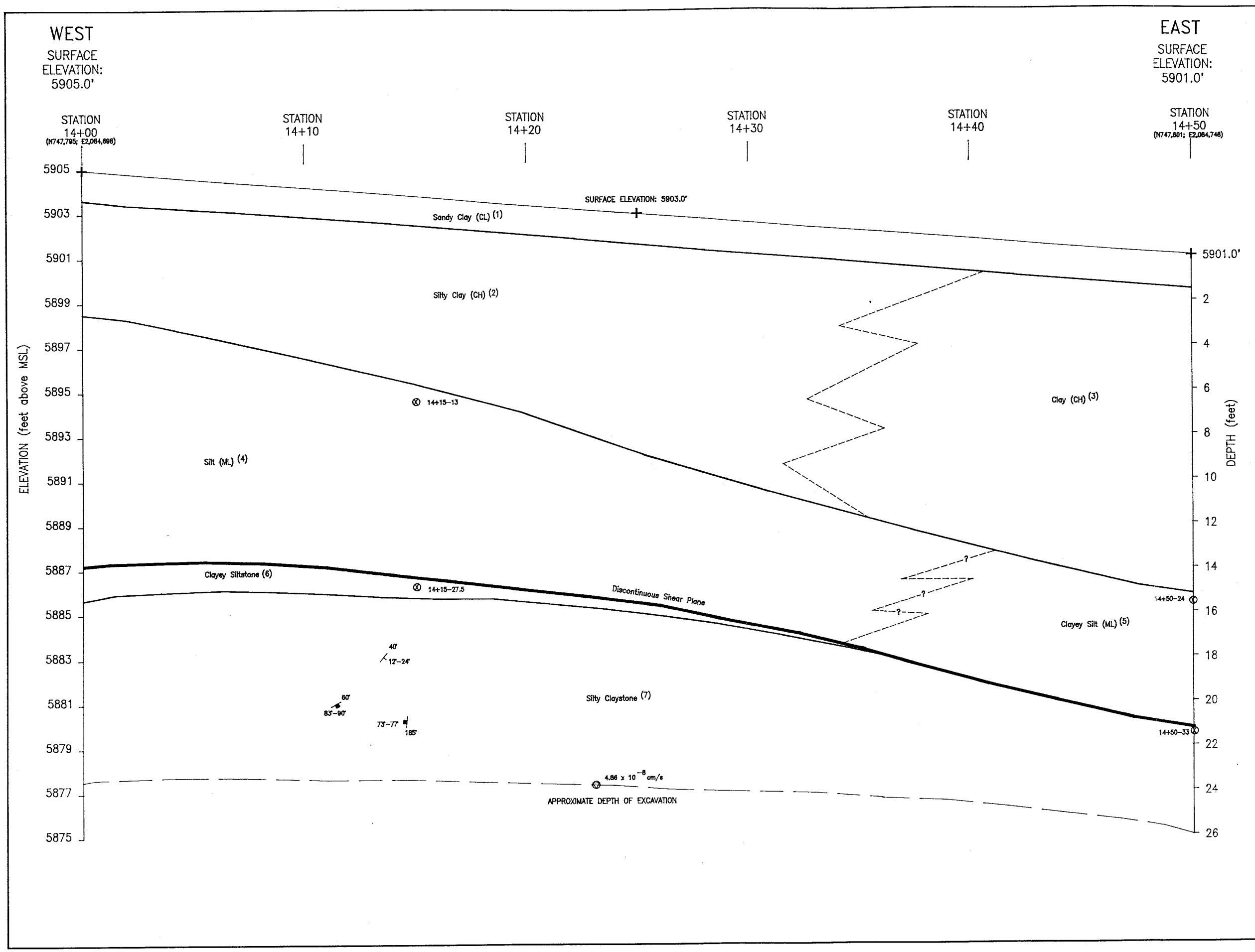
U.S. DEPARTMENT OF ENERGY
ROCKY FLATS AREA OFFICE — GOLDEN, COLORADO

ROCKY FLATS PLANT
GOLDEN, COLORADO 80402-0464

FRENCH DRAIN GEOLOGIC CHARACTERIZATION
VERTICAL SECTION FROM
STATION 13+50 – 14+00

SIZE	FILE NAME: R33X1350	DATE	SHEET
D	DRAFT	5/20/92	19 OF 30

R33X1350.PJCW-052192



EXPLANATION

SURFACE ELEVATION

APPROXIMATE DEPTH OF BOREHOLES From Geotechnical Investigation Report, (EG&G, 1990)

CONTACTS:

INTER-UNIT CONTACT

UNIT CONTACT

BEDROCK CONTACT

GRADATION BETWEEN UNITS

Dashed Where Approximate; Queried Where Existence Is Uncertain

SAMPLE STATION LOCATION AND IDENTIFICATION NUMBER (12+20-15)

STRIKES AND DIPS: ? = Uncertain

BEDDING PLANES

FRACTURES

SHEAR PLANE RO = RANDOMLY ORIENTED

VERTICAL FRACTURES

SUBSURFACE SEEPS

HYDRAULIC CONDUCTIVITY TEST In Centimeters Per Second (from Doty and Associates) (2.55×10^{-8} cm/s)

2' 0 2'

SCALE: 1 INCH = 2 FEET

NO VERTICAL EXAGGERATION

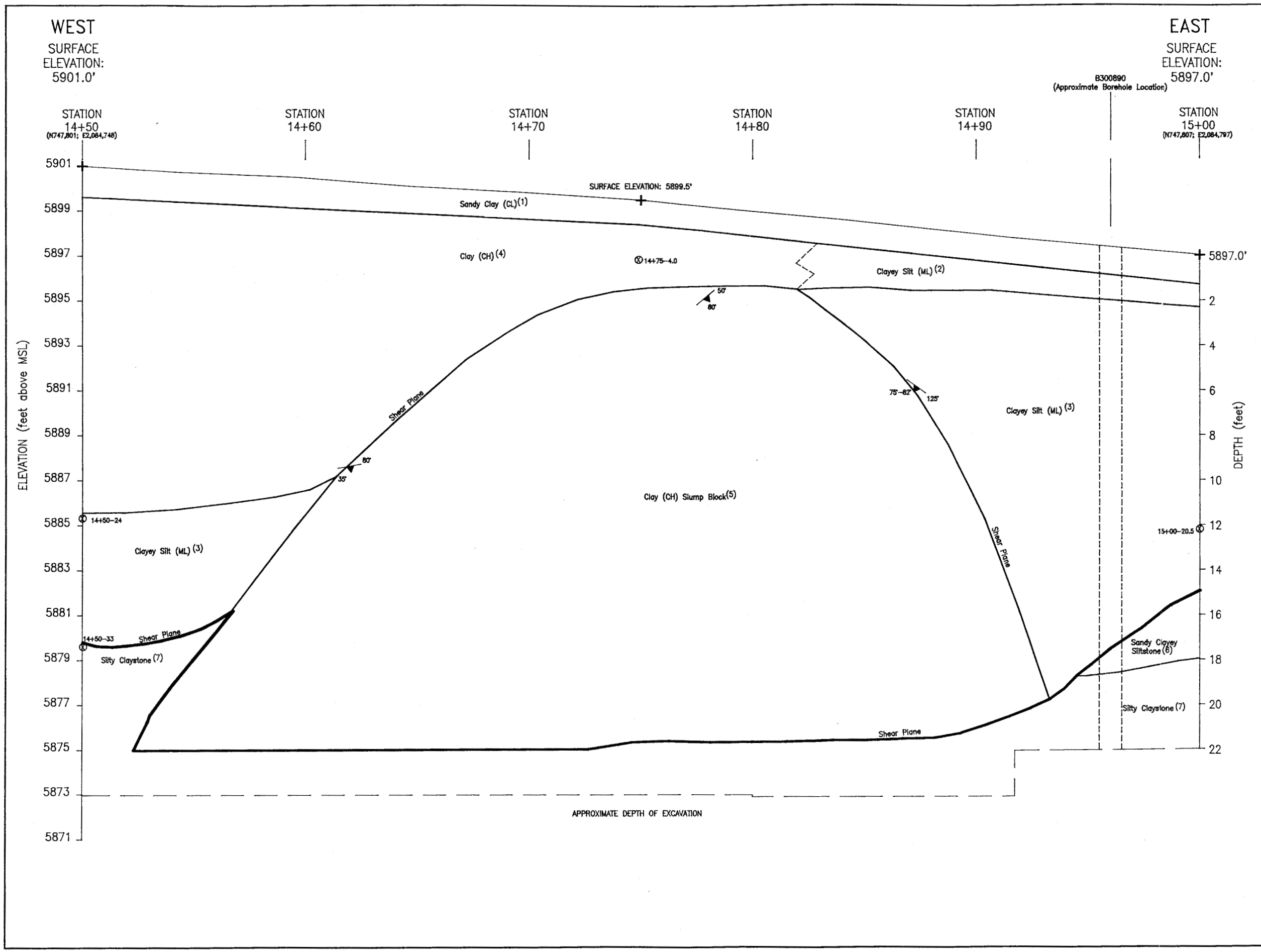
U.S. DEPARTMENT OF ENERGY
ROCKY FLATS AREA OFFICE — GOLDEN, COLORADO

ROCKY FLATS PLANT
GOLDEN, COLORADO 80402-0464

FRENCH DRAIN GEOLOGIC CHARACTERIZATION
VERTICAL SECTION FROM
STATION 14+00 – 13+50

SIZE	FILE NAME: R33X1400	DATE	SHEET
D	DRAFT	5/20/92	20 OF 30

R33X1400.PJCW-052292



EXPLANATION

SURFACE ELEVATION

APPROXIMATE DEPTH OF BOREHOLES From Geotechnical Investigation Report, (ES&G, 1990)

CONTACTS:

INTER-UNIT CONTACT

UNIT CONTACT

BEDROCK CONTACT

GRADATION BETWEEN UNITS

Dashed Where Approximate; Queried Where Existence Is Uncertain

12+20-15 SAMPLE STATION LOCATION AND IDENTIFICATION NUMBER

STRIKES AND DIPS: ? = Uncertain

30 / 20 BEDDING PLANES

30 / 75 FRACTURES

30 / RO SHEAR PLANE RO = RANDOMLY ORIENTED

30 / 80 VERTICAL FRACTURES

SUBSURFACE SEEPS

2.58×10^{-6} cm/s HYDRAULIC CONDUCTIVITY TEST In Centimeters Per Second (from Doty and Associates)

2' 0 2'

SCALE: 1 INCH = 2 FEET
NO VERTICAL EXAGGERATION

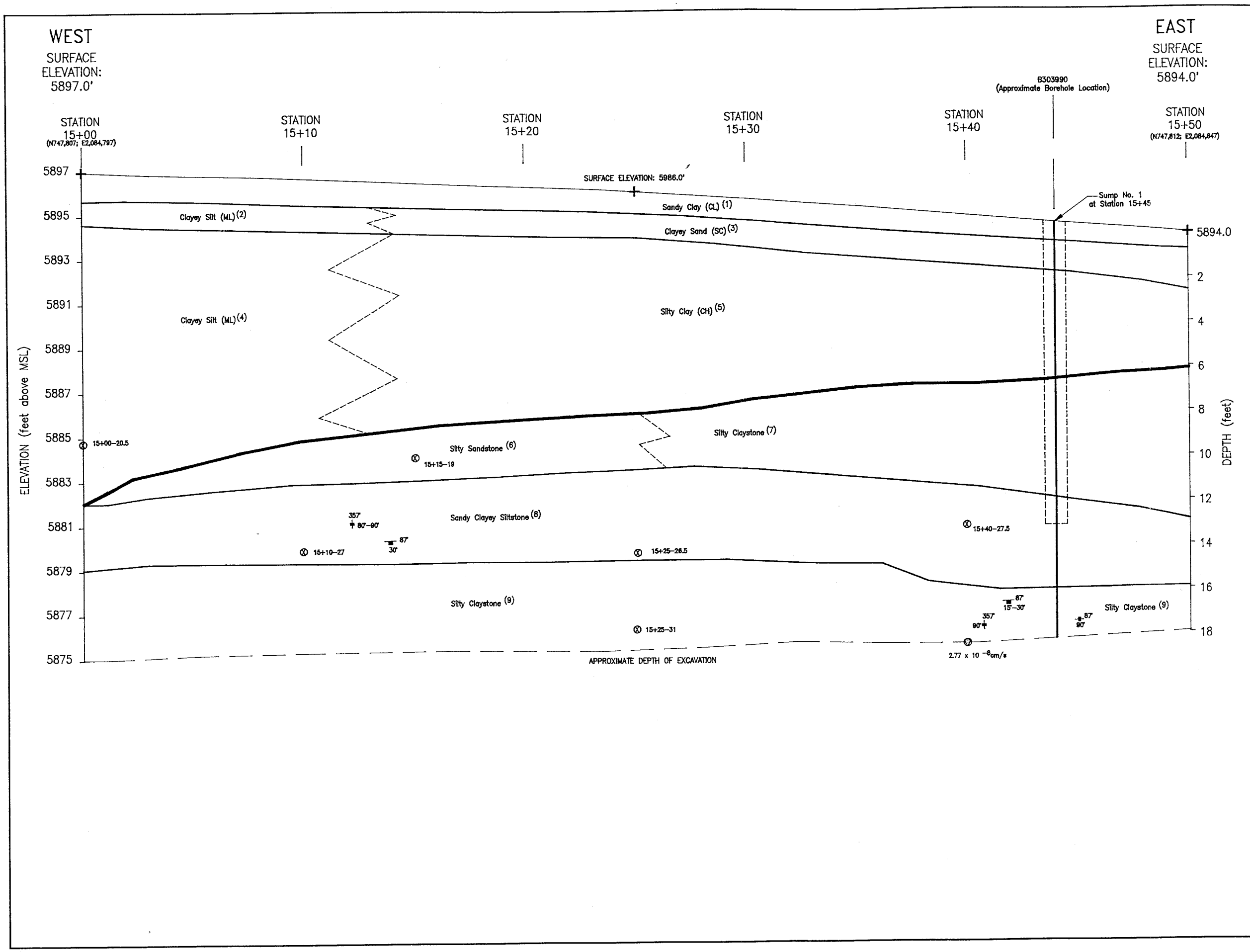
U.S. DEPARTMENT OF ENERGY
ROCKY FLATS AREA OFFICE GOLDEN, COLORADO

ROCKY FLATS PLANT
GOLDEN, COLORADO 80402-0464

FRENCH DRAIN GEOLOGIC CHARACTERIZATION
VERTICAL SECTION FROM
STATION 14+50 - 15+00

SIZE	FILE NAME: R33X1450	DATE	SHEET
D	DRAFT	5/20/92	21 OF 30

R33X1450.PJCW-052292



EXPLANATION

SURFACE ELEVATION

APPROXIMATE DEPTH OF BOREHOLES From Geotechnical Investigation Report, (EG&G, 1990)

CONTACTS:

INTER-UNIT CONTACT

UNIT CONTACT

BEDROCK CONTACT

GRADATION BETWEEN UNITS

Dashed Where Approximate; Queried Where Existence is Uncertain

SAMPLE STATION LOCATION AND IDENTIFICATION NUMBER (12+20-15)

STRIKES AND DIPS: ? = Uncertain

30° 28° BEDDING PLANES

30° 75° FRACTURES

30° RO SHEAR PLANE RO = RANDOMLY ORIENTED

30° 90° VERTICAL FRACTURES

SUBSURFACE SEEPS

HYDRAULIC CONDUCTIVITY TEST In Centimeters Per Second (from Doty and Associates) (2.55×10^{-8} cm/s)

2' 0 2'

SCALE: 1 INCH = 2 FEET
NO VERTICAL EXAGGERATION

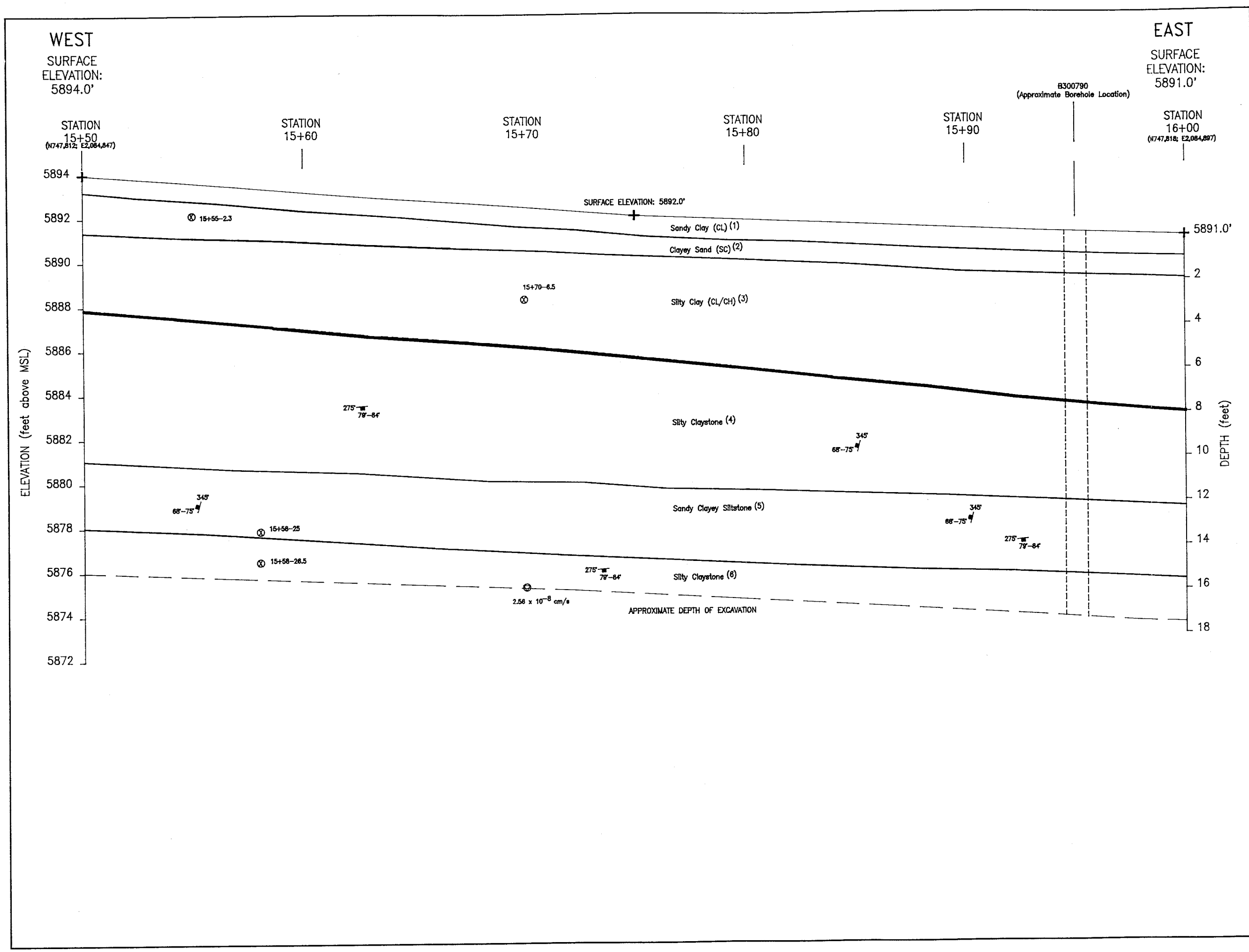
U.S. DEPARTMENT OF ENERGY
ROCKY FLATS AREA OFFICE — GOLDEN, COLORADO

ROCKY FLATS PLANT
GOLDEN, COLORADO 80402--0464

FRENCH DRAIN GEOLOGIC CHARACTERIZATION
VERTICAL SECTION FROM
STATION 15+00 – 15+50

SIZE	FILE NAME: R33X1500	DATE	SHEET
D	DRAFT	5/20/92	22 OF 30

R33X1500.PJCW-052192



EXPLANATION

SURFACE ELEVATION

APPROXIMATE DEPTH OF BOREHOLES From Geotechnical Investigation Report, (ES&G, 1990)

CONTACTS:

INTER-UNIT CONTACT

UNIT CONTACT

BEDROCK CONTACT

GRADATION BETWEEN UNITS

Dashed Where Approximate; Queried Where Existence Is Uncertain

SAMPLE STATION LOCATION AND IDENTIFICATION NUMBER (12+20-15)

STRIKES AND DIPS: ? = Uncertain

BEDDING PLANES

FRACTURES

SHEAR PLANE (RO = RANDOMLY ORIENTED)

VERTICAL FRACTURES

SUBSURFACE SEEPS

HYDRAULIC CONDUCTIVITY TEST In Centimeters Per Second (from Doty and Associates) ($2.56x10^{-8}$ cm/s)

SCALE: 1 INCH = 2 FEET

NO VERTICAL EXAGGERATION

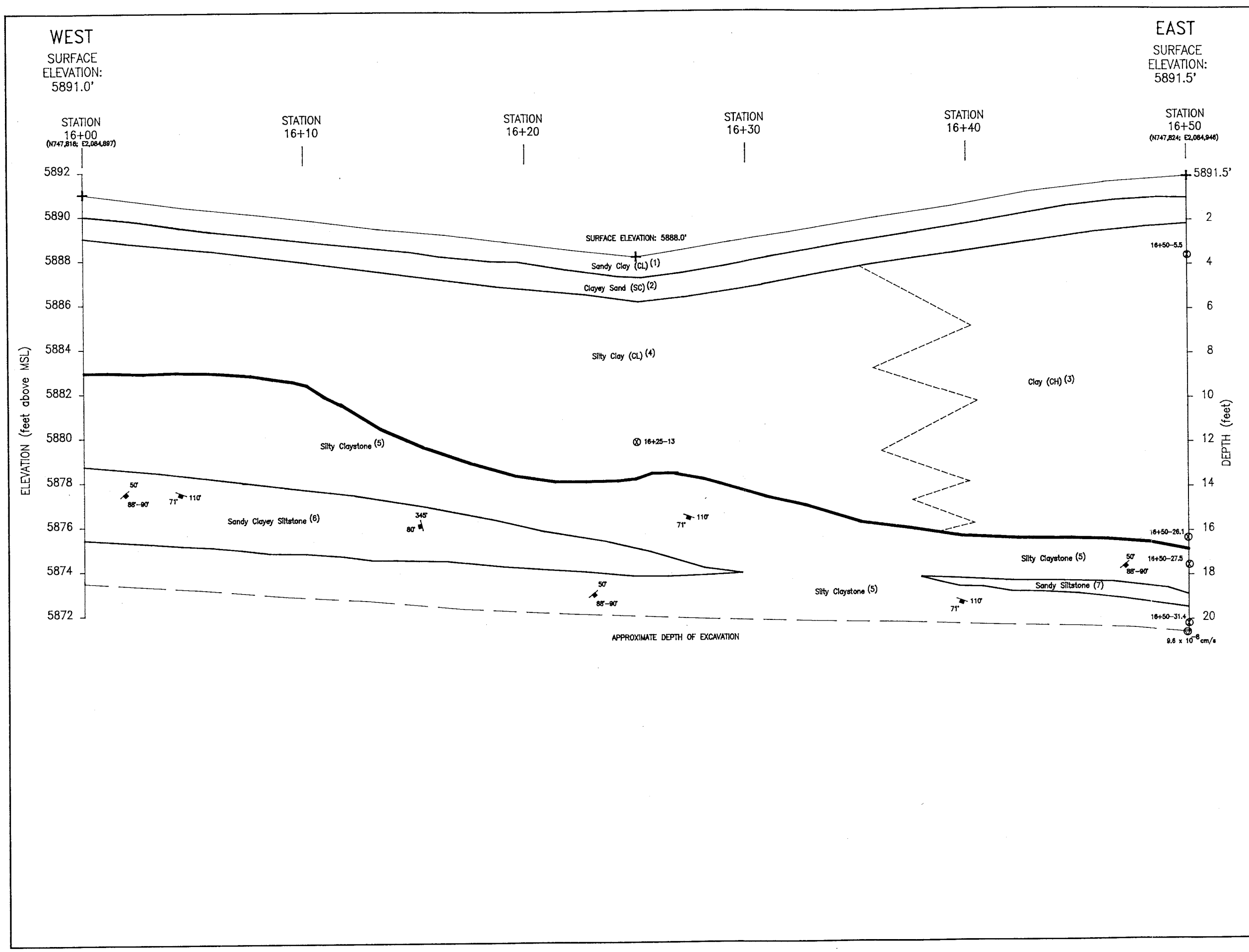
U.S. DEPARTMENT OF ENERGY
ROCKY FLATS AREA OFFICE — GOLDEN, COLORADO

ROCKY FLATS PLANT
GOLDEN, COLORADO 80402-0464

FRENCH DRAIN GEOLOGIC CHARACTERIZATION
VERTICAL SECTION FROM
STATION 15+50 – 16+00

SIZE	FILE NAME: R33X1550	DATE	SHEET
D	DRAFT	5/20/92	23 OF 30

R33X1550.PJCW-052292



EXPLANATION

SURFACE ELEVATION

APPROXIMATE DEPTH OF BOREHOLES From Geotechnical Investigation Report, (ESAG, 1990)

CONTACTS:

INTER-UNIT CONTACT

UNIT CONTACT

BEDROCK CONTACT

GRADATION BETWEEN UNITS

Dashed Where Approximate; Queried Where Existence Is Uncertain

12+20-15 SAMPLE STATION LOCATION AND IDENTIFICATION NUMBER

STRIKES AND DIPS: ? = Uncertain

30' 28' BEDDING PLANES

30' 75' FRACTURES

30' RO SHEAR PLANE RO = RANDOMLY ORIENTED

30' 80' VERTICAL FRACTURES

SUBSURFACE SEEPS

2.55x10^-6 cm/s HYDRAULIC CONDUCTIVITY TEST In Centimeters Per Second (from Dorly and Associates)

2' 0 2'

SCALE: 1 INCH = 2 FEET
NO VERTICAL EXAGGERATION

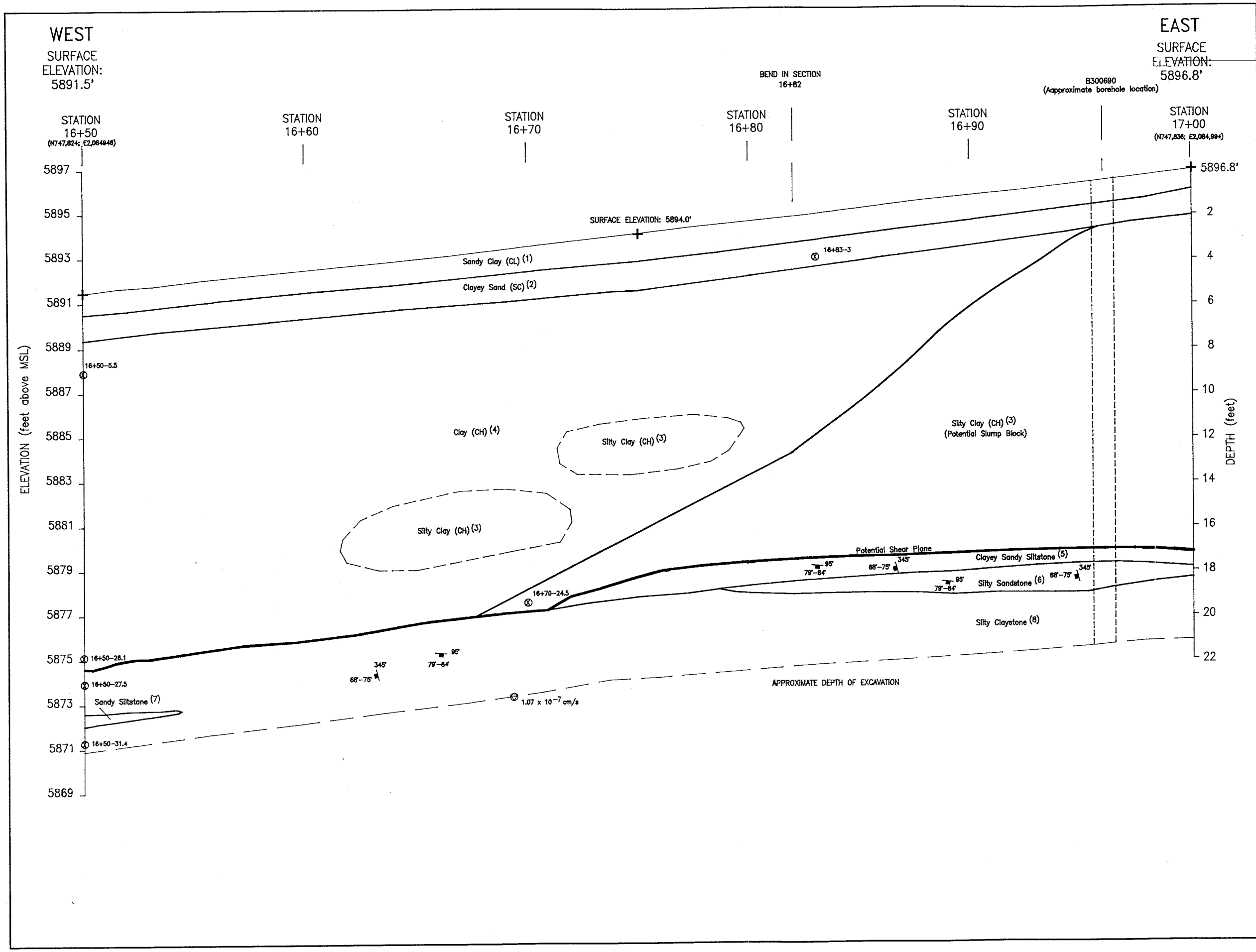
U.S. DEPARTMENT OF ENERGY
ROCKY FLATS AREA OFFICE GOLDEN, COLORADO

ROCKY FLATS PLANT
GOLDEN, COLORADO 80402-0464

FRENCH DRAIN GEOLOGIC CHARACTERIZATION
VERTICAL SECTION FROM
STATION 16+00 - 16+50

SIZE	FILE NAME: R33X1600	DATE	SHEET
D	DRAFT	5/20/92	24 OF 30

R33X1600.PJCW-052192



EXPLANATION

SURFACE ELEVATION

APPROXIMATE DEPTH OF BOREHOLES From Geotechnical Investigation Report, (EG&G, 1990)

CONTACTS:

INTER-UNIT CONTACT

UNIT CONTACT

BEDROCK CONTACT

GRADATION BETWEEN UNITS

Dashed Where Approximate; Queried Where Existence is Uncertain

SAMPLE STATION LOCATION AND IDENTIFICATION NUMBER

12+20-15

STRIKES AND DIPS: ? = Uncertain

BEDDING PLANES

FRACTURES

SHEAR PLANE RO = RANDOMLY ORIENTED

VERTICAL FRACTURES

SUBSURFACE SEEPS

HYDRAULIC CONDUCTIVITY TEST In Centimeters Per Second (from Doty and Associates)

2.55x10^-6 cm/s

2' 0 2'

SCALE: 1 INCH = 2 FEET

NO VERTICAL EXAGGERATION

U.S. DEPARTMENT OF ENERGY

ROCKY FLATS AREA OFFICE GOLDEN, COLORADO

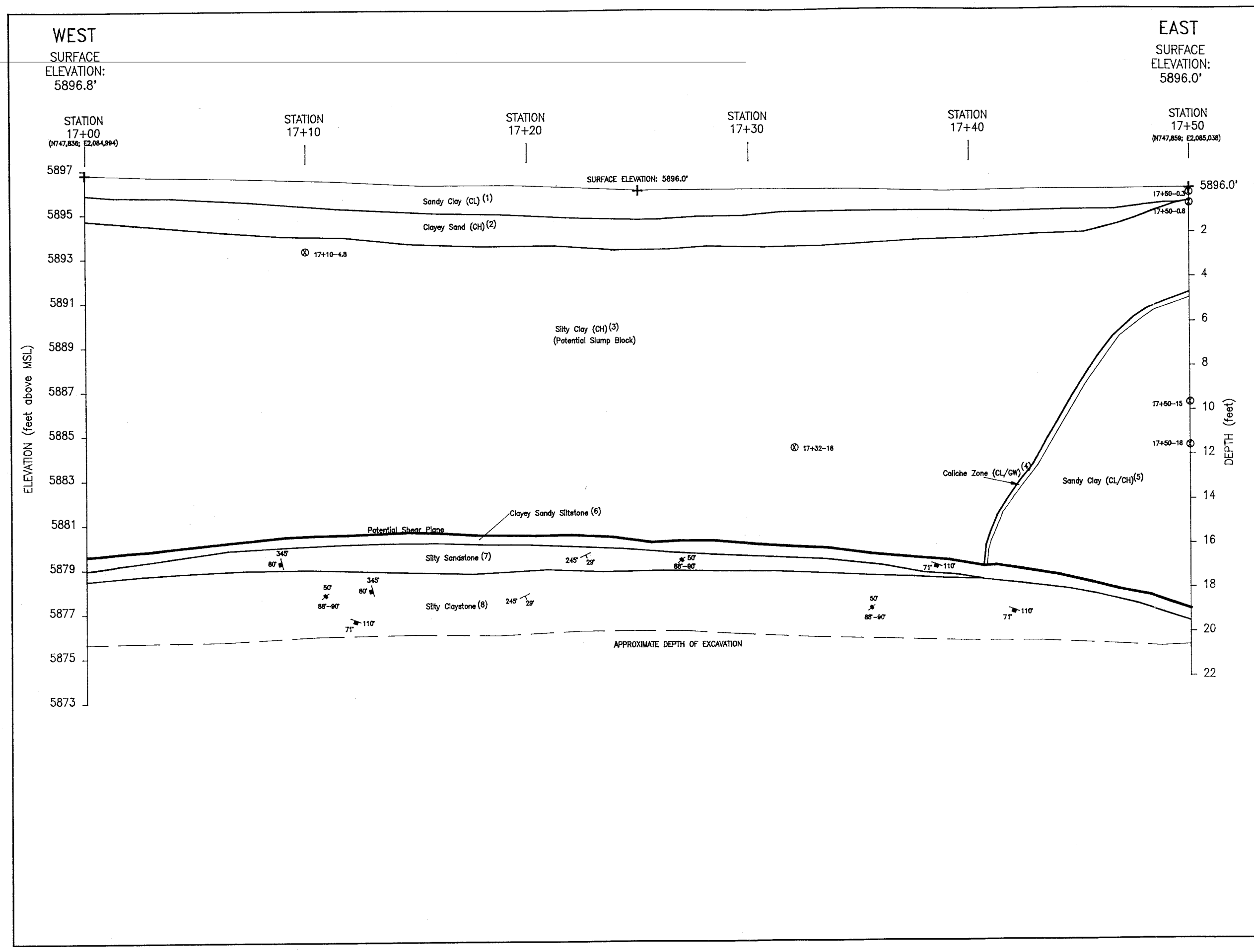
ROCKY FLATS PLANT

GOLDEN, COLORADO 80402-0464

FRENCH DRAIN GEOLOGIC CHARACTERIZATION
VERTICAL SECTION FROM
STATION 16+50 - 17+00

SIZE	FILE NAME: R33X1650	DATE	SHEET
D	DRAFT	5/20/92	25 OF 30

R33X1650.PJCW-052192



EXPLANATION

SURFACE ELEVATION

APPROXIMATE DEPTH OF BOREHOLES From Geotechnical Investigation Report, (EG&G, 1990)

CONTACTS:

INTER-UNIT CONTACT

UNIT CONTACT

BEDROCK CONTACT

GRADATION BETWEEN UNITS

Dashed Where Approximate; Queried Where Existence Is Uncertain

12+20-15 SAMPLE STATION LOCATION AND IDENTIFICATION NUMBER

STRIKES AND DIPS: ? = Uncertain

30' 28' BEDDING PLANES

30' 75' FRACTURES

30' 80 SHEAR PLANE RO = RANDOMLY ORIENTED

30' 90' VERTICAL FRACTURES

SUBSURFACE SEEPS

HYDRAULIC CONDUCTIVITY TEST 2.55×10^{-6} cm/s In Centimeters Per Second (from Doty and Associates)

2' 0 2'

SCALE: 1 INCH = 2 FEET
NO VERTICAL EXAGGERATION

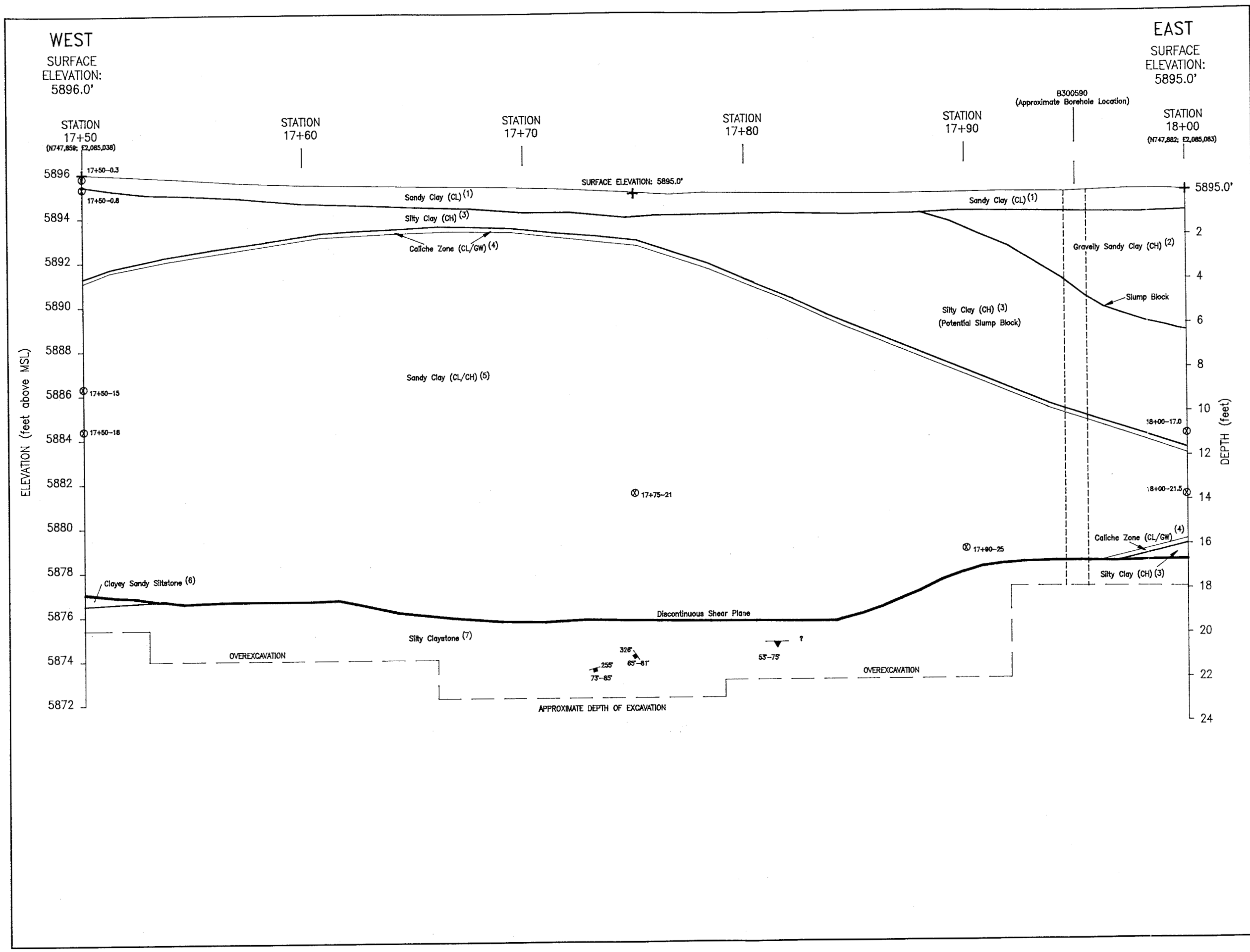
U.S. DEPARTMENT OF ENERGY
ROCKY FLATS AREA OFFICE — GOLDEN, COLORADO

ROCKY FLATS PLANT
GOLDEN, COLORADO 80402-0464

FRENCH DRAIN GEOLOGIC CHARACTERIZATION
VERTICAL SECTION FROM
STATION 17+00 – 17+50

SIZE	FILE NAME: R33X1700	DATE	SHEET
D	DRAFT	5/20/92	26 OF 30

R33X1700.PJCW-052292



EXPLANATION

SURFACE ELEVATION

APPROXIMATE DEPTH OF BOREHOLES From Geotechnical Investigation Report, (EG&G, 1990)

CONTACTS:

INTER-UNIT CONTACT

UNIT CONTACT

BEDROCK CONTACT

GRADATION BETWEEN UNITS

Dashed Where Approximate; Queried Where Existence Is Uncertain

SAMPLE STATION LOCATION AND IDENTIFICATION NUMBER

STRIKES AND DIPS: ? = Uncertain

BEDDING PLANES

FRACTURES

SHEAR PLANE RO = RANDOMLY ORIENTED

VERTICAL FRACTURES

SUBSURFACE SEEPS

HYDRAULIC CONDUCTIVITY TEST In Centimeters Per Second (from Doty and Associates)

SCALE: 1 INCH = 2 FEET
NO VERTICAL EXAGGERATION

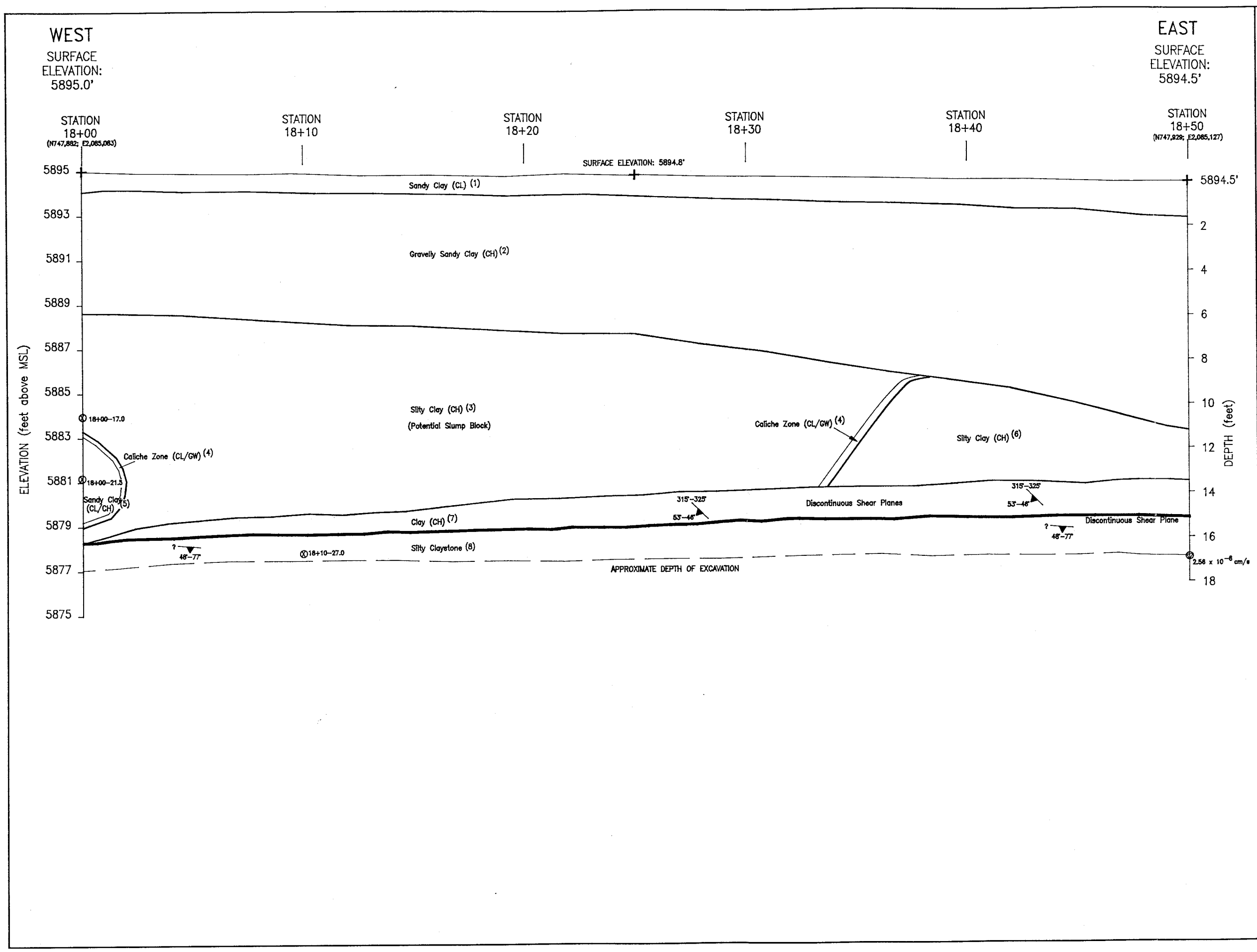
U.S. DEPARTMENT OF ENERGY
ROCKY FLATS AREA OFFICE GOLDEN, COLORADO

ROCKY FLATS PLANT
GOLDEN, COLORADO 80402-0464

FRENCH DRAIN GEOLOGIC CHARACTERIZATION
VERTICAL SECTION FROM
STATION 17+50 - 18+00

SIZE	FILE NAME: R33X1750	DATE	SHEET
D	DRAFT	5/20/92	27 OF 30

R33X1750.PJCW-052292



EXPLANATION

SURFACE ELEVATION

APPROXIMATE DEPTH OF BOREHOLES From Geotechnical Investigation Report, (EG&G, 1990)

CONTACTS:

INTER-UNIT CONTACT

UNIT CONTACT

BEDROCK CONTACT

GRADATION BETWEEN UNITS

Dashed Where Approximate; Queried Where Existence Is Uncertain

12+20-15 SAMPLE STATION LOCATION AND IDENTIFICATION NUMBER

STRIKES AND DIPS: ? = Uncertain

30/29 BEDDING PLANES

30/RO SHEAR PLANE RO = RANDOMLY ORIENTED

30/75 FRACTURES

30/90 VERTICAL FRACTURES

SUBSURFACE SEEPS

HYDRAULIC CONDUCTIVITY TEST In Centimeters Per Second (from Doty and Associates)

2.58×10^{-8} cm/s

2' 0 2'

SCALE: 1 INCH = 2 FEET
NO VERTICAL EXAGGERATION

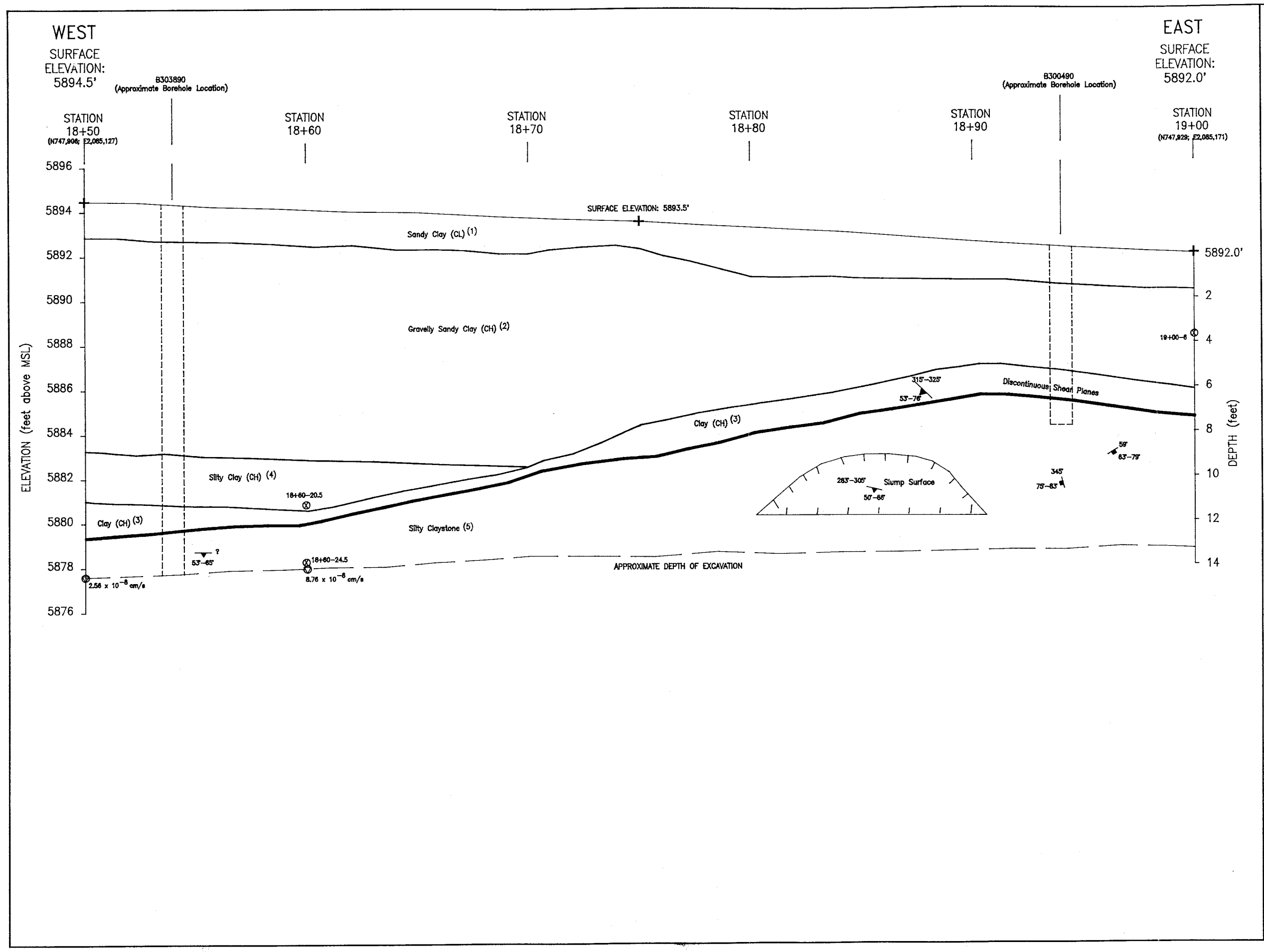
U.S. DEPARTMENT OF ENERGY
ROCKY FLATS AREA OFFICE GOLDEN, COLORADO

ROCKY FLATS PLANT
GOLDEN, COLORADO 80402-0464

FRENCH DRAIN GEOLOGIC CHARACTERIZATION
VERTICAL SECTION FROM
STATION 18+00 – 18+50

SIZE	FILE NAME: R33X1800	DATE	SHEET
D	DRAFT	5/20/92	28 OF 30

R33X1800.PJCW-052192



EXPLANATION

SURFACE ELEVATION

APPROXIMATE DEPTH OF BOREHOLES From Geotechnical Investigation Report, (ES&G, 1990)

CONTACTS:

INTER-UNIT CONTACT

UNIT CONTACT

BEDROCK CONTACT

GRADATION BETWEEN UNITS

Dashed Where Approximate; Queried Where Existence is Uncertain

12+20-15 SAMPLE STATION LOCATION AND IDENTIFICATION NUMBER

STRIKES AND DIPS: ? = Uncertain

30' 29' BEDDING PLANES

30' 75' FRACTURES

30' R0 SHEAR PLANE R0 = RANDOMLY ORIENTED

30' 90' VERTICAL FRACTURES

SUBSURFACE SEEPS

HYDRAULIC CONDUCTIVITY TEST

2.55x10^-8 cm/s In Centimeters Per Second (from Daly and Associates)

2' 0 2'

SCALE: 1 INCH = 2 FEET

NO VERTICAL EXAGGERATION

U.S. DEPARTMENT OF ENERGY

ROCKY FLATS AREA OFFICE — GOLDEN, COLORADO

ROCKY FLATS PLANT

GOLDEN, COLORADO 80402-0464

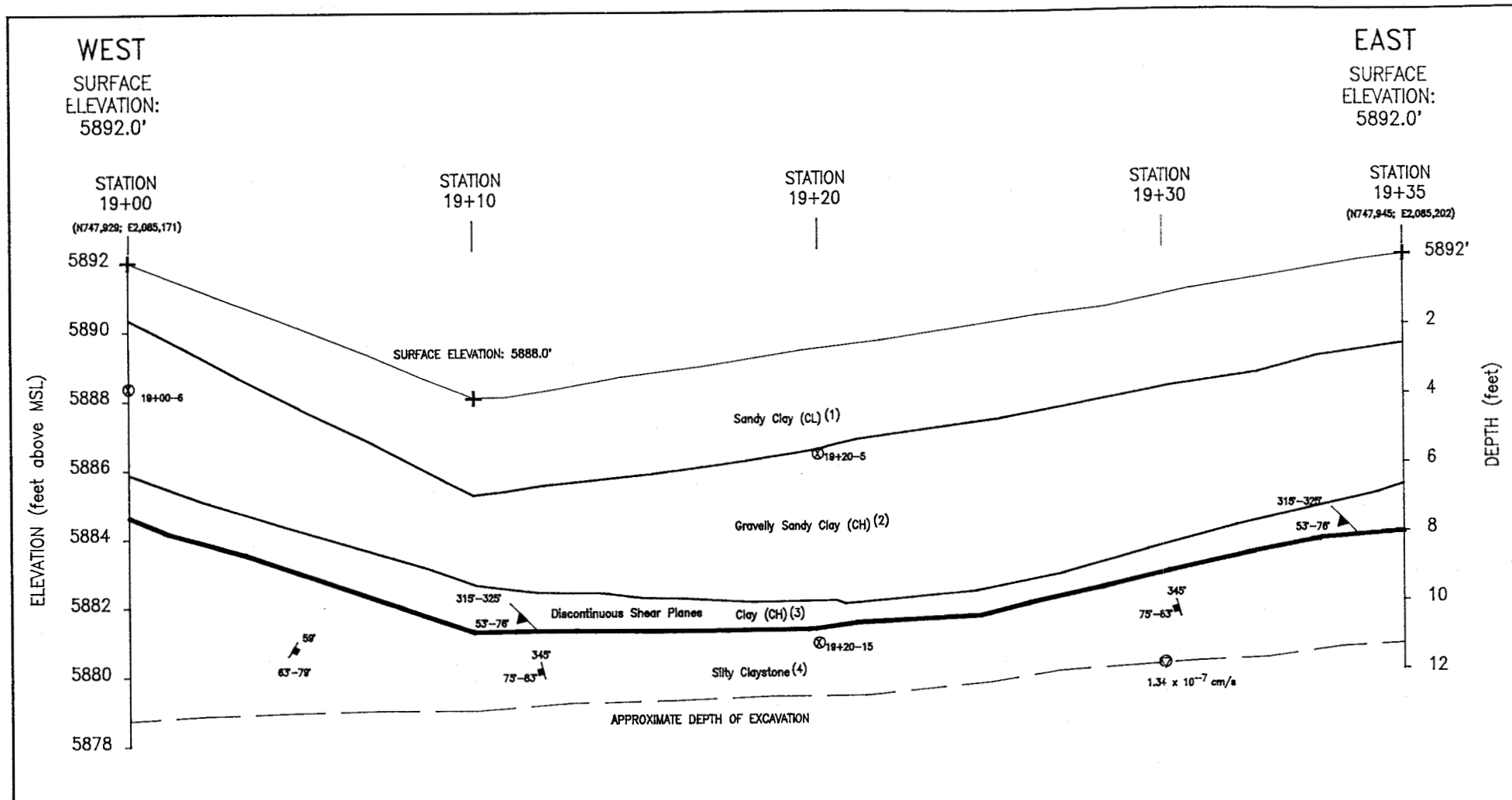
FRENCH DRAIN GEOLOGIC CHARACTERIZATION

VERTICAL SECTION FROM

STATION 18+50 – 19+00

SIZE	FILE NAME: R33X1850	DATE	SHEET
D	DRAFT	5/20/92	29 OF 30

R33X1850.PJCW-052192



EXPLANATION

SURFACE ELEVATION

APPROXIMATE DEPTH OF BOREHOLES From Geotechnical Investigation Report, (EG&G, 1990)

CONTACTS:

INTER-UNIT CONTACT

UNIT CONTACT

BEDROCK CONTACT

GRADATION BETWEEN UNITS

Dashed Where Approximate; Queried Where Existence Is Uncertain

12+20-15 SAMPLE STATION LOCATION AND IDENTIFICATION NUMBER

STRIKES AND DIPS: ? = Uncertain

37 28 BEDDING PLANES

37 72 FRACTURES

37 RO SHEAR PLANE RO = RANDOMLY ORIENTED

37 90 VERTICAL FRACTURES

SUBSURFACE SEEPS

2.58x10^-6 cm/s HYDRAULIC CONDUCTIVITY TEST In Centimeters Per Second (from Doty and Associates)

2' 0 2'

SCALE: 1 INCH = 2 FEET
NO VERTICAL EXAGGERATION

U.S. DEPARTMENT OF ENERGY
ROCKY FLATS AREA OFFICE GOLDEN, COLORADO

ROCKY FLATS PLANT
GOLDEN, COLORADO 80402--0464

FRENCH DRAIN GEOLOGIC CHARACTERIZATION
VERTICAL SECTION FROM
STATION 19+00 - 19+35

SIZE	FILE NAME: R33X1900	DATE	SHEET
D	DRAFT	5/20/92	30OF 30

R33X1900.PJCW-052292