LOS VALLES PROJECT

Draft Environmental Impact Report

Volume VIII – Appendices

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Project No. 98-034
Revised Vesting Tentative Tract No. 52584
Variance No. 201300003
Conditional Use Permit No. 201300081
Oak Tree Permit No. 201300023
Environmental Assessment No. 201300138

Lead Agency:

County of Los Angeles
Department of Regional Planning
Land Divisions
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March 2016

APPENDIX 5.6-2

Allan E. Seward Engineering Geology, Inc.,
Geologic and Geotechnical Report, January 15, 1999.

ALLAN E. SEWARD
ENGINEERING GEOLOGY, INC.
Geological And Geotechnical Consultants

GEOLOGIC AND GEOTECHNICAL REPORT

Vesting Tentative Tract 52584

Castaic, California

VOLUME I OF V

Prepared For:

Hasley Canyon Land Company, L.L.C.

C/o Palmer Investments

1999 Avenue of the Stars

15th Floor

Los Angeles, California 90067

January 15, 1999

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ALLAN E. SEWARD
ENGINEERING GEOLOGY, INC.
Geological And Geotechnical Consultants

January 15, 1999 Job No: 98-1617-4

Hasley Canyon Land Company, L.L.C.
c/o Palmer Investments
1999 Avenue of the Stars
15th Floor
Los Angeles, CA 90067

Attention: Mr. Dan Palmer

Subject: **GEOLOGIC AND GEOTECHNICAL REPORT**
Vesting Tentative Tract 52584
Castaic, California

Gentlemen:

This report, in five volumes, presents our opinions on the existing geologic and geotechnical conditions on Vesting Tentative Tract 52584, map dated April, 1998 and their effects on the proposed development.

The project is feasible from the geologic and geotechnical viewpoints, provided the recommendations provided in this report are followed and implemented during the Grading Plan stage.

Thank you for the opportunity to provide our services on this project.

Respectfully submitted,

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Certified Engineering Geologist

Edward Castellanos, RCE 30279, RGE 191
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EXECUTIVE SUMMARY

Vesting Tentative Tract 52584 consists of approximately 442 acres on the northern side of Hasley Canyon Road. The specific topographic parameters are illustrated on the attached Location Map and the Tentative Tract Map. The site is essentially in a natural state with the exception of past grading associated with an abandoned golf course, two residential structures and numerous active oil wells present on the site. Native chaparral and low grasses exist on topography characterized by steep narrow ridges.

The southern portion of the property includes the main channel and flood plain of Hasley Canyon drainage area.

The proposed development is for residential with a golf course and associated facitilies.

Bedrock on the site consists of the Saugus Formation (TQs) and Quaternary Terrace (Qt) deposits. Eight landslides have been mapped on the site for which mitigation measures are presented in Table 1. The active San Gabriel Fault is located 1.9 miles north of the subject site and the Holser Fault is located 0.6 miles south of the site. An east-west trending zone of tectonic deformation traverses the southern portion of site VTT 52584. This firm has delineated a Building Setback that encompasses the zone of tectonic deformation which is shown on the attached Geologic Maps (Plates I, II and III).

Grading recommendations for fill areas supporting residential lots, golf course structures, public and private streets, parking areas and parks will require alluvial removals that range between 6 and 12 feet. All slopewash encountered within fill areas will be removed prior to the placement of fill. Fill areas such as golf course playing areas (fairways, tee-off areas, putting greens, etc.) will require 1-3 feet removals and fill compaction of 85% of the maximum dry density per ASTM D-1557. The fills for the golf course playing areas will be designated as non-structural. The anticipated alluvial removal depths are designated on the Geologic/Geotechnical Removal Maps (Plates IV, V & VI).

Based on recommended removal and recompacted depths, significant hydroconsolidation effects at the site due to water incursion are **not** expected.

Detailed liquefaction and seismically-induced settlement analyses were performed for the site based upon a perched ground water level of minus 26 feet at Rotary Wash Boring RW-1.

The results of the liquefaction assessment indicate that significant liquefaction is not expected at the site and the estimated earthquake-induced maximum differential settlement within the upper 23 ft. feet in a distance of 30 feet is no greater than 0.5 inches. Actual settlements that may occur at the surface are expected to be even less than the calculated settlements at greater depths because the upper soils are proposed to be removed and recompacted.

Stability analyses were performed for this project. Analyzed cut slopes and grades, natural slopes, compacted fill slopes, and temporary backcut slopes comply with Los Angeles County requirements for stability under static and pseudostatic loading conditions along with our recommendations for mitigation.

We have identified 41 proposed cut-slopes (25± ft. or higher) on VTT 52584. The slope geometry and anticipated geologic conditions and recommended mitigation, if necessary, for each slope are presented in the Cut-Slope Summary - **Table 2**. **It has been assumed for the purposes of stability analysis that clay-rich bedding planes may occur anywhere in the proposed cut-slopes.** All fill over cut-slopes must comply with County standards with required setbacks otherwise the slope must be a complete fill slope.

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1.0 SCOPE OF INVESTIGATION

This investigation included the following:

1. Review of previous reports by this firm and the subject area and adjacent tracts, which are listed in the **References**.

2. Review of the Published References listed in the **References**.

3. Review of water well data on file with the Los Angeles County Flood Control District (LACFCD).

4. Review of the 1992 Munger Map Book, California-Alaska Oil & Gas Field.

5. Review of the Alquist-Priolo Map of the Val Verde Quadrangle.

6. Review of the following aerial photographs:

Year	Photo	Scale	Agency
1928	E-59, E-60	1”=2000’±	Fairchild
1968	4-4, 4-3	1”=1750’±	Dept. of Agriculture
1980	65, 66	1”=1500’±	Americal Aerial Surveys
1985	2-7	1”=600’±	Don Reed Corp

7. Review of the site topography and geologic mapping utilizing the Tentative Tract Map for VTT 52584 as a base. Due to the large size of this base map, we have divided this map into three plates (Plates I, II and III) for ease of review. The base map was provided by Land Design Consultants at a scale of 1”=100’ with a date of April, 1998. We make no representations regarding the accuracy of this base map.

8. Geologic logging of 220 backhoe trenches (designated as T-1 through T-220) excavated to a maximum depth of approximately 17 feet. Downhole geologic logging of 6 bucket-auger (24” diameter) borings to a maximum depth of 118 feet. (See Appendices for a listing).

9. Geotechnical logging and sampling of one rotary wash boring and five hollow stem auger borings and one hand auger boring to a maximum depth of 65 feet.

10. Review of 55 pit trenches and 18 geologically-logged exploratory bucket auger borings excavated and logged during the investigation for the Tentative Tract 44945 in AES Report dated October 30, 1987 (Ref. No. 1). The locations of these trenches (designated as TP-1 thru TP-55) are shown on the Geologic/Geotechnical Maps. All exploratory subsurface investigations were backfilled with the excavated materials at the completion of logging.

11. Review of the 18 borings and 13 test pits excavated by Gordon Geotechnical Engineering which are shown on the attached Geologic Map (Borings were geologically logged by this firm in conjunction with Gordon Geotechnical Engineering).

12. Coordination with the Supervising Civil Engineer, Land Design Consultants.

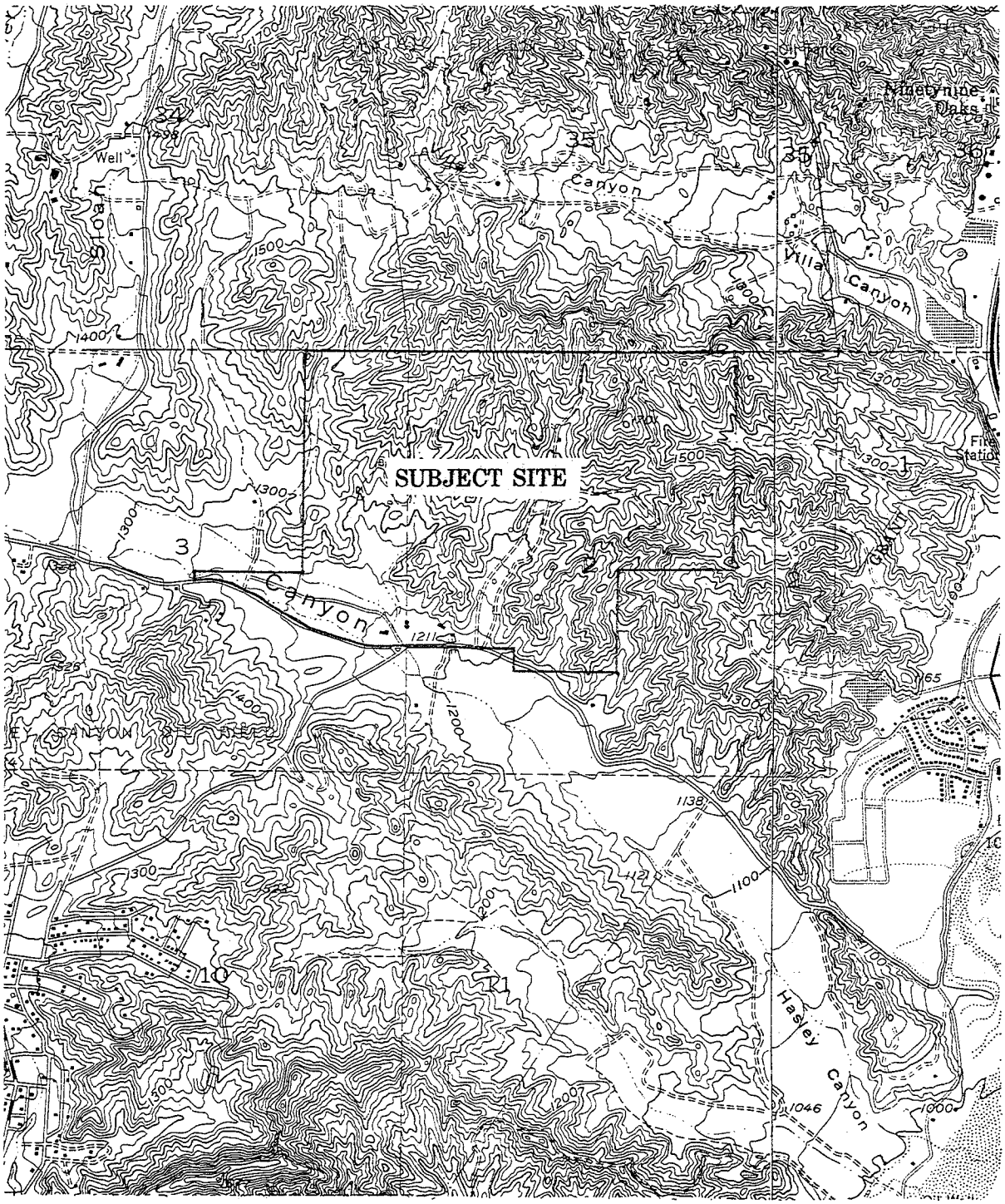
13. Geotechnical laboratory testing on samples obtained for this investigation.

14. Preparation of a detailed Seismicity study of the site.

15. Geologic and Geotechnical Engineering analyses and preparation of Conclusions and Recommendations based on the existing site conditions and future use intended. Principal analyses included assessment of removal depths using boring data, detailed static and pseudostatic stability analyses of proposed and modified grades, including cut-slopes, natural slopes and temporary backcut slopes. Based on the results, the need for tentative stabilization measures was explored. Other major analyses consisted of state-of-the-art liquefaction assessment and evaluation of seismically induced settlements.

16. Preparation of a Location Map, Geologic/Geotechnical Maps, Geologic Legend, Geologic and Geotechnical (slope stability) Cross Sections, Trench and Borings Logs, and this report.

LOCATION MAP



This Map is Not a Survey of the Property | Job Number: 98-1617-4 | Scale: 1"=2000'

Source: Newhall and Val Verde U.S.G.S. Topographic Quadrangles

ALLAN E. SEWARD
ENGINEERING GEOLOGY, INC.

2.0 BACKGROUND

Allan E. Seward Engineering Geology, Inc. and Jeffrey S. Gordon Geotechnical Engineering originally addressed the geologic and geotechnical concerns on Tentative Tract 44945, which was originally the western portion of TT 52585 in our report dated October 30, 1987.

The map for tentative tract 44945 was revised June 11, 1992 and was addressed in our geologic report dated June 24, 1992 and was addressed within a geotechnical report by Solus Geotechnical dated August 21, 1992. L.A. County issued a Geologic and Geotechnical review sheets dated September 30 and September 28, 1992 respectively. These review sheets were addressed in AES Report dated December 3, 1992 and Solus Geotechnical Report dated March 11, 1993. An additional report by Solus Geotechnical (September 29, 1993) addressed the above-noted review sheet.

3.0 SITE DESCRIPTION

Vesting Tentative Tract 52584 consists of approximately 442 acres North of the intersection of Del Valle Road and Hasley Canyon Road. It is bordered by Tentative Tracts 44471 and 44373 to the North, Tentative Tracts 44800 and 45084 to the east and Tentative Tract 20685 to the south.

The site topography generally consists of north to northeast trending moderate to steep ridgelines. Elevations on the site range from approximately 1220 feet in the southern portion of the site to approximately 1640 feet in the north-central portion of the site. Details of the site topography are provided on the Location Map and Tentative Map.

Portions of the subject site have been modified by past grading activities for the abandoned golf course and associated clubhouse and as well as for the existing oil facilities. Two residences exist on the subject site. The attached Tentative Map reflects the topography of these graded conditions.

Vegetation on the site consists of seasonal grasses scattered, chaparral and scattered trees.

4.0 PROPOSED DEVELOPMENT

It is our understanding that VTT 52584 will be a residential development and golf course. The general concept of development is shown on the attached Tentative Map (Plates I, II and III). Plate III has a table of the lot breakdown for the site.

5.0 GEOLOGY

5.1 General

Vesting Tentative Tract 52584 is located in the Transverse Ranges geologic province of southern California in the Easternmost portion of the Ventura Basin. The active San Gabriel Fault is located approximately 1.9 miles north of the subject site and separates the Soledad Basin from the Ventura Basin. Both the Ventura and Soledad Basins have been tectonically downwarped in the geologic past to produce a large-scale synclinal structure, which has developed a thick accumulation of Cenozoic, continentally derived, sediments.

5.2 Bedrock

5.2.1 Saugus Formation (TQs)

Bedrock present beneath Tentative Tract 52584 consists of Plio-Pleistocene, non-marine sediments of the Saugus Formation. These sediments include light-gray to pale reddish-brown and pale yellowish-brown siltstone, massive sandstone, pebble and conglomerate and reddish-brown to dark-gray mudstone. Siltstone and mudstone units of the Saugus Formation are potentially very expansive.

5.2.2 Terrace Deposits (Qt)

Incised alluvial terrace deposits are present in many of the on-site canyons (see Geologic Maps). These deposits generally occur low on the canyon margins and typically consist of light to reddish-brown to yellowish-brown slightly silty pebbly sandstone and conglomerate. The terrace deposits are generally poorly bedded and locally contain root tube voids near the ground surface in the weathered zone. Large boulders up to 3 ft. in diameter are present in some of the terrace deposits.

5.3 Surficial Deposits

5.3.1 Quaternary Alluvium (Qal)

Quaternary alluvium is present along the margin of Hasley Canyon Creek and in the lower tributary canyon areas of VTT 52584, as illustrated on the Geologic Maps. Based upon boring data, the alluvium typically consists of interbeds of sands and silty sands with occasional gravels and occasional silts at depth. Due to grading associated with the abandoned Golf Course and existing oil wells and the associated facilities, areas of minor artificial fill are present in and around the Quaternary alluvium.

5.3.2 Slopewash (Qsw)

Slopewash is a non-bedded, heterogeneous accumulation of soil and weathered bedrock deposited by gravity on all but the steepest slopes. The maximum thickness of soil and slopewash encountered in our exploratory excavations on VTT 52584 was approximately 17 feet within boring B-18 located within the proposed Golf Course. Slopewash has been noted on our geologic logs but has not been differentiated on the Geologic Maps.

5.3.3 Surficial Soils

Ungraded areas of VTT 52584 are mantled by surface soils consisting of moderate- to yellowish-brown and yellowish-gray silty sand with scattered pebbles. This unit is noted on our Geologic Logs, but is not shown on the Geologic and Geotechnical Maps. Soil developed in the alluvial flats has been disturbed by grading activities.

5.4 Mass Movement Deposits

5.4.1 Landslides (Qls)

Eight landslides have been mapped on VTT 52584. The landslides involve bedrock of the Saugus Formation and terrace deposits, and most failed along clay-rich beds toward a daylighted slope. Recommended mitigation measures for each landslide are discussed in the Landslide Summary Table (**Table 1**).

5.4.2 Surficial Failures (Qsf)

Shallow failures and debris flows involving the surficial soils, slopewash and weathered bedrock have been mapped as surficial failures on VTT 52584. Mitigation measures for surficial failures which will adversely impact the proposed development are discussed in the Engineering Geology portion of this report.

5.5 Existing Fill

5.5.1 Artificial Fill (af)

Non-certified artificial fill was placed on the subject site during construction of The Abandoned Golf Course, access roads and drill pads for the existing active oil wells and associated facilities. Significant areas of artificial fill are illustrated on the Geologic Map. It is our recommendation that all artificial fill deposits be completely removed and replaced and recompacted, as necessary, prior to the placement of engineered fill.

6.0 ENGINEERING GEOLOGY

6.1 Proposed Grading

The proposed grading concept for VTT 525584 is illustrated on the attached Tentative Map (Plates I, II and III). Proposed grading will consist of the removal of selected ridgeline areas and filling of canyon areas to produce a series of pad areas, which generally rise in grade toward the north. Cut and fill slopes are proposed on VTT 52584 between pad areas and adjacent to natural areas. The maximum proposed cut-slope (CS-15) height is approximately 150 feet and the maximum proposed fill-slope height is approximately 180 feet. The maximum proposed cut from existing grade is approximately 105 feet and occurs on Plate II in the vicinity of Lot 211. The maximum proposed fill (thickness) over existing grade is approximately 135 feet and occurs on Plate II in the vicinity of Lot 10.

6.1.1 Exploratory Trench and Boring Backfill

The location and dimensions of the exploratory trenches and borings should be noted relative to future Rough Grading and/or Building Plans. If future Lots and/or foundations traverse the existing trenches or borings they should be evaluated for mitigation measures relative to potential settlement. The backfill in the trenches and/or borings may have to be removed by future grading operations.

6.2 Geologic Structure

Bedrock beneath VTT 52584 has been deformed by past tectonic forces to produce generally east-west trending structures. The site is traversed by two roughly east-west trending folds (anticline and syncline) that gently plunge to the west.

The anticline traverses the southern portion of the site and the syncline traverses the mid to northern portion or the site. The potentially active Holser Fault is approximately 0.6 miles from the site. The active San Gabriel Fault is located approximately 1.9 miles from the site. Both are discussed in detail in the Seismicity Section of this report. Bedding within the Saugus Formation varies from massive and indistinct to poorly bedded to well developed planes. Local variance in bedding orientations is common and is due to cross bedding and/or channelized (erosional) contacts. We have based our interpretation of the bedding planes (shown on the Geologic/Geotechnical Cross Sections) generally on averages with more importance given to the attitudes measured on the sharp contacts found within the finer grained units. Many years of experience in the Saugus Formation has revealed that the attitudes measured in the coarser grained units typically show steeper dips than the regional “true dip” of the overall structure.

6.3 Landslides

6.3.1 General

Eight landslides (Qls-1 through Qls-8) have been mapped within the limits of VTT 52584 and are shown on the Geologic/Geotechnical Maps. The mitigation’s for each landslide are discussed in the Landslide Summary (Table 1). All landslide removals should be completed under continuous observations by the Project Geologist.

6.4 Surficial Failures

Surficial failures identified on VTT 52584 are shown on the attached Geologic and Geotechnical Maps. It is our recommendation that any of the surficial failure material which remains below proposed grade be **removed** prior to the placement of certified fill.

6.5 Terrace Deposits

Terrace deposits mapped on VTT 52584 locally contain root hole voids in the upper weathered zones. It is our recommendation that these weathered zones be removed prior to the placement of certified fill. The large boulders (oversize material) in the terrace deposits will need to be exported from the site or special handling (via Windrows) will be needed to mitigate the oversized material.

6.6 Natural Slopes

The natural slopes on VTT 52584 have gradients ranging from 5:1 to 1.7:1 (h:v). All natural slopes that are relatively steep and have accumulations of soil and slopewash are prone to debris flow hazard. Due to the proposed grading concept along with desilting basins and large debris ditches, all of the potential for debris flow hazards have been eliminated (see discussion under Potential Debris Flow Hazard below). We constructed Geologic Cross Sections where natural slopes exhibited daylighted bedding conditions above or below proposed building pads in order to analyze their stability.

The natural slope located on Plate I east of proposed Cut-Slopes CS-14 and CS-15 is a roughly east-facing 1.7:1 slope. Landslide Qls-I is located within this natural slope. Based on stability calculations for this slope, Landslide Qls-1 is recommended for complete removal. The upper portion of the landslide removal bottom is proposed to be cut at the apparent angle of the bedding (11°) starting at approximate elevation 1605 and daylighting towards the west with proposed Cut-Slope CS-15. For details see the Landslide Summary - Table 1 as well as Cross Section 17-17' illustrating the design mitigation located within the mitigation summary in Appendix G. The remaining portion of this 1.7:1 natural slope surficially has a safety factor of 1.6 based on Geotechnical analysis.

The natural slope located on Plate I due south of Lots 99 through 101 has bedding planes dipping into the natural slope-face and is grossly stable.

The natural slope located on Plate II due south of Lots 107 through 103 has been analyzed and determined grossly unstable. Cross Sections 14-14', 15-15' and 26-26' illustrate the three-dimensional geometry of the bedrock beneath this natural slope. It is recommended that this natural slope be redesigned as illustrated on the above-noted cross sections located within the mitigation summary (Appendix G). An alternative mitigation would be to construct a very large buttress slope, which is also illustrated on the above-noted cross sections within the mitigation summary section (Appendix G). This is very large and surely very costly buttress was analyzed since the Civil Engineer expressed the advantage of saving pad area and indicated that high buttress costs may be comparable with the value of potential loss of pad area.

The natural slope lot located on Plate II due west of Lots 110 and 111 has bedding planes oriented neutral to dipping into the proposed slope face. This natural slope is grossly stable.

The natural slope located on Plate II due south of proposed Cut-Slope CS-3 has bedding planes that dip steeper to parallel to the proposed natural slope face as illustrated on Geologic Cross Section 3-3'. This natural slope is grossly stable.

The natural slope located on Plate II, south of Lots 118 and 119 has bedding planes oriented neutral to the proposed natural slopeface. This natural slope is grossly stable.

The natural slope located on Plate II north of Lots 69 through 71 exposes a small landslide (Qls-8). Bedding within this natural slope dips steeper than the proposed natural slope face. This natural slope is geologically grossly stable. Probable Landslide Qls-8 does not pose a hazard to the residential lots and is safe for the use intended.

The natural slope located on Plate II west of Lot 67 has bedding planes that are oriented neutral to the proposed natural slope face. This natural slope is grossly stable.

The natural slope located on Plate II east of Lot 133 has bedding planes that dip steeper than the proposed natural slope face. This natural slope is grossly stable.

The natural slope located on Plate II west of Lot 148 through Lot 151 has bedding planes that are oriented neutral to the proposed natural slope face. This natural slope is grossly stable.

6.7 Potential Debris Flow Hazard

As stated earlier the potential for debris flow hazard has been entirely mitigated via the proposed grading concept.

A more detailed analysis of this potential hazard will be undertaken at the Grading Plan stage for VTT 52584. Should mitigation prove necessary, the following measures are available to reduce the potential debris flow hazard. Alternative debris control devises are also shown on Figure C11 within Appendix C.

1. Remove loose surficial material
2. Construct diverter slough walls
3. Construct impact walls
4. Construct debris basins
5. Control run-off
6. Plant selective deep-rooted vegetation.

6.8 Existing Fills

As recommended in Section 5.5.1, uncompacted artificial fill on VTT 52584 should be removed prior to the placement of engineered fill.

6.9 Ground Water

Ground water was encountered in our subsurface investigation for the subject site within RW-1 at a depth of 26 feet only. Our review of ground water obtained from wells in the immediate area indicates historic ground water highs approximately 40 to 50 feet below the existing ground surface in Hasley Canyon drainage (See Figure C12 and Table III within Appendix C). It should be noted that water table fluctuates up and down in response to natural recharge and pumping requirements. Both of these factors are altered in response to the urbanization of the area.

In our liquefaction analysis we have assumed a ground water depth of minus 26 ft., which is a **conservative** assumption since this is a perched groundwater condition.

6.10 Rippability

The granular and slightly to moderately consolidated nature of alluvial deposits and the bedrock indicates that grading operations can be performed with conventional equipment. Heavy single shank ripping may be required within the more indurated portions of the Saugus Formation.

6.11 Sewage Disposal

It is our understanding that sewage disposal will be by sewers.

6.12 Building Setbacks

A Building Setback has been designated on the Tentative Map based upon our detailed fault investigation. For details see the Seismicity section of this report. The standard setbacks from ascending and descending slopes provided in Section 1806.4 of the 1996 L.A. County Uniform Building Code should be followed, unless superseded by specific geologic and/or soils engineering evaluations.

6.13 Erosion Potential

The existing provisions in the Grading Ordinance for planting and irrigation of constructed slopes in conjunction with drainage recommendations provided in the section "Surface Drainage Control", will be sufficient mitigation against potential erosion within the subject site.

6.14 Oil/Gas Wells

Review of the 1992 Munger Map Book indicates that the following ten oil/gas wells have been drilled in VTT 52584. These wells are currently active.

Petromineral Sadd 4
Petromineral Sadd 5
Petromineral Sadd 6
Petromineral Sadd 7
Petromineral Sadd 8

Petromineral Sadd 9
Petromineral Burns Crist 8
Petromineral Burns Crist 9
Petromineral Burns Crist 10
Petromineral Burns Crist 12

The locations of the oil wells are shown on the attached Geologic/Geotechnical Maps.

The specific status of each oil well on the subject site relative to the Division of Oil, Gas and Geothermal Resources (**D.O.G.G.R**) requirements and/or abandonment procedures will be covered at the **Grading Plan** stage.

It should be noted that it is general **D.O.G.G.R. policy that the space above an oil or gas well not be built on** (See **Figure C13**) to allow access in case of future leaks. If any leaking or undocumented oil wells are encountered during grading operations, their locations should be surveyed and the current well conditions evaluated **immediately**.

6.15 Hazardous Materials

Soils in the vicinity of oil wells could be contaminated with petroleum products spilled during operations of the wells. Wells may have associated mud pits, which could also contain materials considered to be hazardous under current environmental regulations.

6.16 Restricted Use Areas

Landslide Qls-8 is located entirely within the golf course area and will delineated on the Final Map as a Restricted Use Area. The recommended Building Setback Zone for the tectonic deformation zone will also be designated on the Final Map as a Restricted Use Area.

7.0 SEISMICITY

7.1 Introduction

The subject property is within the Transverse Ranges Geomorphic Province of Southern California. The Transverse Ranges consist of a series of west-trending mountains and intervening valleys, which is contrary to the northwest geomorphic trend that is typical of

most of California and reflects the underlying structural (geologic) trend. These ranges are largely the result of north-south compression which has resulted in east-west-trending folds and thrust faults. Associated faults in the vicinity of the site include the Santa Susana, San Fernando, Del Valle and Holser reverse/thrust faults. The January 17, 1994 Northridge (M6.8) Earthquake occurred on a south-dipping thrust fault which uplifted the Santa Susana Mountains at least 40 cm.

The Southern California region is traversed by the San Andreas Fault, which is a transform boundary between the Pacific Plate and the North American Plate. The San Andreas Fault is part of the San Andreas system of northwest-striking, right-lateral faults. The faults of this system are generally historically active, as evidenced by the June 28, 1992 Landers (M7.6) Earthquake (**See Fault and Earthquake Epicenter Location Map, Figure E-1 in Appendix E**).

The Southern California region is seismically active and commonly experiences strong ground shaking resulting from earthquakes along active faults. Earthquakes along these faults are part of a continuous, naturally occurring process which has contributed to the characteristic landscape of the region.

Three common types of geologic hazards may be produced during a seismic event (earthquake). These include:

1. Ground Rupture;
2. Ground Motion; and
3. Ground Failure

7.2 Ground Rupture

Review of the published geologic maps referenced in the Appendix and the L.A. County Safety Element indicates that no active or potentially active faults have previously been recognized on the subject site.

It was determined that the bedrock of the Saugus Formation has been deformed on the subject site. Approximately 5,924.5 lineal feet of fault trenches was subsequently excavated and geologically logged to determine the nature and lateral extent of this “Zone of Deformation”. For details on this fault investigation, see Section 1.1 of Appendix E for discussion.

7.3 Ground Motion

Potential ground motions from future earthquakes on nearby faults have been evaluated utilizing the procedures outlined in the California Department of Conservation, Division of Mines and Geology Guidelines described in Special Publication 117. Section 1.2 of **Appendix E** summarizes our ground motion evaluation, which utilized fault parameters from Peterson, et al. (1996) and computer programs by Thomas F. Blake. A peak horizontal ground acceleration of 0.54 g from a potential maximum magnitude 7.0 earthquake on the San Gabriel Fault was utilized in our liquefaction analysis based on our deterministic evaluation.

7.4 Ground Failure

Potential secondary seismic hazards to VTT 52584 are described in Section 1.3 of **Appendix E**. The potential for liquefaction and seismic settlement are evaluated in detail in **Appendix D**. The potential for adverse impacts to the proposed development from liquefaction and other secondary seismic effects is considered low to non-existent provided that our recommendations are incorporated into the Grading Plan and implemented during construction.

8.0 FIELD EXPLORATION AND LABORATORY TEST RESULTS

For this report we performed geologic mapping, and geologic logging of backhoe trenches, bucket auger borings and dozer cuts. We also reviewed geologic data from our pit trenches, bucket auger borings and dozer cuts performed for Tentative Tract 44945 project. More information on all the above is listed in the “Scope of Investigation” of this report. Additional field explorations consisted of one rotary wash (RW-1) boring drilled to a depth of 50 feet, and five (5) hollow-stem auger borings drilled to depths between 8 and 45 feet. The approximate locations of borings, trenches and dozer cuts are shown on the Geologic/Geotechnical Maps. California-Drive relatively undisturbed ring samples and Standard Penetration Test Samples (SPT) were obtained from borings at various depths. The borings were backfilled with drilling cuttings. The logs of the trenches, rotary-wash and other borings are presented in **Appendix A**.

In addition, bulk samples of near-surface soils were obtained from the test pits for routine laboratory testing. Descriptions in boring logs were refined using geotechnical laboratory

test results. The results of the field investigation and the laboratory test data were used as the basis of analyses and recommendations presented in this report.

The laboratory soil testing was limited to providing supplemental data for our analyses for this report and was principally planned for identification and classification of the existing subsurface soils and determination of their engineering characteristics. In-Situ dry density; gradation, percent passing the No. 200 sieve, and Atterberg Limits; Laboratory Compaction; Expansion Index; pH, sulfates and chlorides contents and resistivity; direct shear; and consolidation tests were conducted. Direct shear tests were principally conducted for determination of strength values for bedding and slide planes and other materials for our stability analyses

The laboratory test results are presented in **Appendix B**.

9.0 GEOTECHNICAL SUBSURFACE CONDITIONS AND SOIL PROPERTIES

General description of geologic units (i.e., TQs, Qt, Qal, and sw), topsoil, landslides, artificial fill is presented in the Geology and Engineering Geology sections of this report.

The subsurface soils (alluvium) encountered in the hollow-stem auger borings, and the rotary wash boring, generally consist of interlayers of sands and silty sands with occasional gravels, and occasional silts at depth. Based on these borings, subsurface soils are typically weak within the top 4 feet, except at the location of HS-4 where a lense of loose to medium dense silty sand was encountered at the 10 feet depth.

Based on preliminary testing, some of the bedrock materials are moderately to highly expansive. Soil electrical resistivity values of typical soils at the site suggest that the potential for **corrosion** of ferrous materials in contact with on site soils is relatively low to high. Data of pH show neutral values. Based on sulfate test results, **concrete exposure to sulfates** in these soils classifies as **negligible** (1997 UBC ratings). Additional testing will be required at the Grading Plan stage.

Laboratory compaction test data show a range of results typical of soils encountered at the site.

Ground water is discussed later in this report.

10.0 GEOTECHNICAL DISCUSSION, CONCLUSIONS & RECOMMENDATIONS

The proposed development is feasible for construction from the geological and geotechnical viewpoints, provided our recommendations contained in this report are followed. General discussions and recommendations are presented below.

10.1 Liquefaction Potential and Associated Seismic Settlements

The potential for liquefaction and lateral spreading of alluvial materials on VTT 52584 has been evaluated based on Rotary wash boring log data from our subsurface explorations, review of historic high ground water levels and potential peak horizontal ground acceleration corresponding to the maximum credible earthquake at the site. The location of Rotary Wash boring RW-1 was selected based on observations from numerous subsurface explorations on the site as indicated in the Geologic/Geotechnical Legend, Plate VIII. The potential for seismic settlement (dynamic densification) during future seismic events has also been evaluated. The analyses are presented in **Appendix D.**

The results of the liquefaction assessment indicate that significant liquefaction is not expected at this site. A conservative estimate of the potential seismically-induced maximum differential settlement within a distance of 30 feet is no greater than 0.5 inches (see **Appendix D**).

Actual settlements that may occur at the surface are expected to be even less than the calculated settlements at greater depths because at least 4 feet of upper soils are proposed to be removed and recompacted in the area analyzed.

10.2 Surface Water

Despite the character of some soils of the project site, there is relatively little erosion on the hillsides, presumably due to the generally grassy ground cover and, at least, a moderately high infiltration capacity. Actual gullying is limited to the areas of slopewash and alluvium that exist in the wider canyons on the site.

Overland flow of precipitation runoff appears largely as the sheet flow type, with very little rill erosion occurring. These flows either move directly onto the flood plain of Hasley Canyon Creek or find their way to existing drainage courses which then flow into

the same. It can be inferred that much of the flow reaching the flood plain in the other water courses is infiltrated into the alluvial deposits rather than continuing overland into the Hasley Canyon Drainage Channel.

10.3 Removals

Removals for VTT 52584 have been separated into two distinct types depending on their proposed use. Removals for the support of structures and removals for the golf course playing areas have been delineated on the Geologic/Geotechnical Removal Map - Plates IV, V and VI.

10.3.1 Removals for the Support of Structures

Removals for the support of structures include all fill areas supporting all proposed residential lots, streets, parks, parking lots, golf course facilities such as maintenance structures, clubhouse and proposed access roads within the golf course area. Based on field observations, dry density and low moisture content during field investigation, the maximum depth of removal of alluvium required will range from 6 to 12 feet. These areas have been delineated on the Geologic/Geotechnical Removal Maps. In areas where the toe of a proposed fill slope supporting structures is located within the golf course area, removal limits were determined by projecting a 2:1 plane from the toe of the fill slope to the anticipated removal elevation within the natural material. We have included Cross Sections 20-20' through 24-24' within the mitigation summary (Appendix G) to illustrate anticipated removal limits for proposed fill slopes supporting structures.

Lateral margins of the valleys include constant accumulation of soil, slopewash and weathered bedrock that are slowly deposited by downslope creep. These deposits are loose, unconsolidated and contain large open voids. Therefore, the interfingering alluvial/slopewash removals at the canyon margins are generally much deeper than the alluvial removals in the center of these wide valleys (see **Schematic Alluvial/Slopewash Detail - Figure C14**).

In proposed graded areas in the smaller canyons and on the slope flanks recommended removals are to firm bedrock (TQs or Qt). These recommendations include the complete removal of all artificial fill, surficial soils, slopewash, loose alluvium and weathered bedrock (TQs and Qt). See Landslide Summary Table 1 for

landslide removal recommendations. Recommended removal depths in these narrower canyons and swales typically range from 6 to 12 feet, but may extend deeper. These depths are based upon the numerous backhoe pits and applicable borings shown on the Geologic/Geotechnical Maps. Isolated "pockets" of deeper removals (greater than 12 feet) may be necessary in the side hill re-entrants.

10.3.2 Golf Course Playing Area Removals

Within the golf course itself the fills proposed are not intended for structures. Therefore, the removals for the golf course playing areas are anticipated to be minimal (1-3 feet). These removal areas are indicated on the Geologic/Geotechnical Removal Map - Plates IV, V & VI. In areas where significant thickness of existing artificial fill is present, it is recommended that the existing artificial fills be removed to the natural ground surface and replaced with new processed fills.

10.4 3-Foot Thick Cap Fill on Cut Lots

We recommend that a minimum 3-foot-thick cap fill be placed on level cut lots within the Saugus Formation. The cap fill should be compacted to the same requirements as the engineered fill. We envision that borrow sources would be from nearby areas of required excavation. The purpose of the cap fill is to serve as a relatively impermeable blanket course for impeding seepage of surface runoff into exposed, adversely dipping beds of Saugus Formation.

Areas and conditions requiring capping should be identified by the geotechnical engineer or the engineering geologist during construction, and the capping recommendation revised as warranted.

10.5 Slope Stability of Proposed and Modified Grades

Stability analyses were performed on several cross sections of the currently proposed development grades for this project, including natural slopes, fill slopes, cut slopes and temporary backcut slopes, and some modifications of existing conditions for stability reasons. Based upon the results from the analyses, the need for tentative stabilization measures was explored and dimensional design of these measures was performed, as needed, in a step-by-step fashion utilizing slope stability analyses. The analyzed cross sections reflect critical conditions for stability (i.e. steeper adverse potential bedding

plane(s), significant slope height and inclination). The analyses are presented in **Appendix F**, which includes a summary table of the results.

Based upon geologic data, we modeled multiple potential bedding planes in the **critical cross sections** analyzed; representative shear strength parameters for the bedding planes were used.

After appropriate modifications from initially proposed geometries, analyzed cut-slopes and grades, natural slopes, compacted fill slopes, and temporary backcut slopes comply with Los Angeles County requirements for stability under static and pseudostatic loading conditions, as applicable.

10.6 Site Preparation

The purpose of site preparation is to clear the site of organic (vegetation) and unsuitable topsoil and to grade and slope the site to provide a firm base for compacted fill. All rubble and organics should be removed from the site.

10.7 Earthwork and Grading

The proposed vesting Tentative Tract Map requires that portion of ridges be cut and the valleys filled to develop the future building pads and roadways. All finished pad surfaces should be sloped to drain, with all depressions or ruts created during grading operations properly backfilled to eliminate ponding. General earthwork and grading operations should adhere to the following recommendations.

10.7.1 Fill Materials

Excavated material to be used for the construction of site fills should not contain organic matter, should have no rock or similar irreducible material with a maximum dimension greater than eight (8) inches, and should be approved by the Geotechnical Engineer before use. It will be permissible to selectively place large rock fragments over eight (8) inches in size within the fill. A description of such selective placement is shown on **Figure C1.** Imported material, if required, should be nonexpansive and predominantly granular and should be approved by the Geotechnical Engineer before use. Alluvial material may be used in earth fill operations provided that the material is relatively free of organic matter.

Any oversize boulders, if encountered, may be incorporated into the fill as rock fill in windrows after being reduced to the specified maximum rock fill size (See **Figure C1**).

10.7.2 Compaction

Depressions or ruts created in the process of grading operations should be properly backfilled with suitable fill compacted to not less than 90 percent relative compaction. Where native soil remains, the upper 6 inches of the native soil subgrade exposed during stripping or excavation should be scarified, moisture-conditioned, and properly compacted to at least 90 percent relative compaction prior to fill placement. All fill material should be placed in uniform lifts not exceeding 8 inches in its loose state and compacted to a minimum of 90 percent relative compaction as determined based on the latest ASTM Test Designation D-1557. Additional field compaction requirements are presented in **Appendix C, "Recommended Earthwork Specifications"**.

10.7.3 Benching and Keying

In areas to receive compacted fill, where the surface gradient is steeper than 5:1 (horizontal:vertical), the soil mantle should be removed and such areas benched horizontally into competent material prior to or in conjunction with fill placement. This would also apply to all backfill placed on landslide excavations slopes. Keys will be required at the toes of embankments and observations should be provided by the Engineering Geologist or Geotechnical Engineer to determine where these keys are needed. All keys should be constructed to a minimum of 15 feet in width and 2 feet in depth below subgrade after topsoil removal. Key requirements are depicted in **Figure C7, "Fill Slope Over Natural Slope"**.

10.7.4 Material Selection

Economic and engineering benefits may be derived from the selective use of the site materials. It is therefore considered to be desirable to perform the required grading in the following manner:

a. Material obtained from excavations in harder bedrock will probably be more granular and should be placed in the lower portions of fills to minimize settlements and to improve subsurface drainage. These materials, however, will not substitute for drain blankets and/or subdrains otherwise required.

b. Where practical, material that is principally clayey should be placed on the outer portions of fill slopes to minimize erosion and to provide a suitable base to support plant growth. These clayey blankets should not impede the drainage path of seepage water through the fill.

c. No adversely inclined layering of clay soils should be allowed in embankment fills or within sidehill fills over natural ground where ground slope is steeper than 5:1 (horizontal:vertical).

d. Use of material consisting of oversized rock fragments in fills throughout the site should be avoided within the expected depth-of-trenching for utilities in street areas and generally in the upper 10 feet, as a minimum.

e. Materials suspected of being potentially highly expansive should be placed in the lower portions of areal fills to minimize potential adverse effects on structures placed on the fills.

10.7.5 Shrinkage and Bulking Factors

Based upon over 20 years grading experience within the immediate area, the following bulking and shrinkage values are presented.

Bedrock (Saugus Formation)	Bulking 3 to 5%
Alluvial Sediments	Shrinkage 15 to 18%

10.8 Proposed Cut Slopes and Fill Slopes

Cut-slopes and fill slopes at the site will be sloped at a 2:1 (h:v) inclination or flatter. Sandy materials will be susceptible to erosion; therefore, cut and fill slopes should be sodded or planted, if practicable, as soon as the grading work is completed in order to minimize erosion.

Benches or terraces at least eight (8) feet in width should be established at vertical intervals of not more than twenty-five (25) feet on all cut or fill slopes to control surface drainage and collect debris. Where only one (1) bench is required, it should be at mid-height. For cut or fill slopes greater than 100 feet the terrace near mid height shall not be less than 20 feet in width.

Swales or ditches on all terraces should have a minimum gradient of five (5) percent and should be paved with gunite, or approved equal. They should have a minimum depth at the deepest point of twelve (12) inches and a minimum paved width of eight (8) feet.

10.8.1 Proposed Cut-Slopes

We have identified 41 proposed cut-slopes (25± ft. or higher) on VTT 52584 and designated them as CS-1 through CS-41. The slope geometry, anticipated geologic conditions, and recommended mitigation, if necessary, for each slope are presented in the Cut-Slope Summary - **Table 2**. **It has been assumed for the purposes of stability analysis that clay-rich bedding planes may occur anywhere in the proposed cut-slopes.** If any of the smaller proposed cut-slopes (less than 25± ft. in height) have adverse geologic or grading configurations (fill over cut) they can be mitigated if necessary with a standard 15 ft. wide key and benching similar to a stability fill. A typical "fill above cut slope" detail is shown on **Figure C9**.

All permanent cut-slopes in both alluvium and bedrock should be constructed at a slope ratio not steeper than 2:1 (horizontal to vertical). Temporary cuts in competent rock may be constructed as steep as 1 ½:1. Temporary construction cuts and trench slopes are discussed in the following section, **"Temporary Trenches"**. Potentially unstable subsurface conditions exposed during construction, such as adverse bedding, joint planes, zones of weakness or exposed seepage, may require either flatter slopes than specified above or construction of benches or, as indicated above, Stability Fills. We recommend that an Engineering Geologist observe all cut slopes during grading and provide recommendations for necessary modifications.

A stability fill should be constructed for the face of cut-slopes exposing landslide debris so surficial stability is attained. Infinite slope analyses should be performed at the time of grading.

10.8.2 Temporary Trenches

It is our opinion that the walls of temporary (construction) trenches for subdrains will stand vertical provided the trench depth does not exceed five feet and heavy equipment is not allowed within five feet of the edge of the trench. It is not advisable to excavate vertical trench walls to depths greater than four feet where trench alignments are in sloping terrain. Shoring of trench walls or flattening of slopes to a 1.5:1 (h:v) slope or flatter will be required if deeper trenches are necessary or if the presence of gravel pockets, loose sands, weak material or adverse dipping beds indicate a potential for localized raveling or instability. All work associated with trench shoring must conform to the State of California, Division of Industrial Safety Code (Cal Osha).

Temporary construction cuts, such as stabilization keyway excavations may be constructed at slopes steeper than 1½:1. Actual geologic and ground water conditions identified for the Grading Plan stage of the project and also the expected duration of the open face will govern the recommended slope for stability of the cut-slope.

10.8.3 Fill Slopes

Fill slopes should be constructed at a slope ratio not steeper than 2:1 (horizontal:vertical). To minimize the probability of slumping and/or erosion of fill slopes, the faces of such slopes should be properly treated. Proper compaction of the face should be accomplished by constructing the fill at least 6 feet (horizontally) beyond the planned final face plane, and compacting to not less than 90 percent relative compaction throughout. The slope face should then be trimmed back to the final face plane. This operation should expose properly compacted material on the finished face of the slope.

In areas where a fill slope will be constructed immediately above a cut slope, the cut slope should be constructed prior to placement of fill. A setback of at least 6 feet should be provided between the top of the cut and the toe of the fill. Details of typical fill over cut slope conditions are shown on **Figure C9, "Typical Fill Above Cut Slope"**.

In areas where fill slopes will be constructed above natural ground, all topsoil and slopewash should be removed and the fill keyed into firm earth a minimum of two (2) feet, measured at the toe of the fill slope, and then benched as shown on **Figure C7, "Fill Slope over Natural Slope"**.

10.9 Foundations and Settlements

No specific building foundation designs are provided at this time. The following general foundation criteria are provided for future design and planning consideration. The proposed grading plan will generally involve the following foundation support conditions:

- Foundation support within bedrock in cut areas
- Foundation support within engineered fill
- Foundation support within transition zones of cut and fill

Shallow spread footings for foundation support of up to two-story residential, commercial or light industrial developments can adequately be derived from native soils, processed as necessary, and bedrock or engineered fill compacted as previously recommended. Heavier structures support, if applicable, should be addressed at the Grading Plan stage. Bearing capacity data and lateral resistance of footing walls should be provided at the Grading Plan stage.

Figure C4, "Cut Lot (Transitional)" and "Cut-Fill Lot (Transitional)" provides a foundation grading detail for locations where foundations will straddle transition zones of cut and fill. **Figure C5** provides overexcavation recommendations at lots where the building is placed over the crest of a natural slope and part of the building would be on compacted fill and part on bedrock. In addition, extra foundation slab reinforcement should be provided in these cases.

To minimize significant settlements, it is recommended that upper soils in areas to receive fills be removed and recompacted to competent materials. No specific foundation design loads are available at this time. The design grades to be achieved by highest fills, may be placed sufficiently ahead of building construction to induce potential settlements ahead of time.

10.10 Drainage Control

Generally, ground water is not expected to interfere with normal construction operations, if performed during the summer months. Ground water and soil moisture conditions can vary seasonally or for other reasons. It must be recognized that we do not and cannot have complete knowledge of the subsurface conditions at the site. It is possible that seepage could be encountered while stripping and excavating during site preparation at other areas. Whenever seepage is observed, the condition must be evaluated by the Engineering Geologist and Geotechnical Engineer prior to covering with fill material so that the necessary subdrain system is established. We are of the opinion that, as a minimum, a subdrain should be placed in **all** major swales or alluvial valleys below proposed major fills. A subdrain detail is presented in **Figure C10**.

10.10.1 Surface Drainage Control

Drainage control design should include provisions for positive surface gradients to ensure that surface runoff is not permitted to pond, particularly above slopes or adjacent to building foundations or slabs. Surface runoff should be directed away from slopes and foundations and collected in lined ditches or drainage swales, via non-erodible drainage devices, which should discharge to paved roadways, or existing watercourses. If these facilities discharge onto natural ground, means should be provided to control erosion and to create sheet flow.

Cut and fill slope terraces should also be provided with suitable drainage gradients and permanently lined ditches capable of collecting and transporting runoff water to suitable discharge points. Inlets of any pipes should be designed against clogging and for minimum maintenance. Lateral discharge pipes should be designed to accommodate some movement (slip joints) and underground conduits should have cleanout facilities. Terraces should be provided with suitable access in order to permit periodic cleaning and maintenance.

10.10.2 Subsurface Water Control

Fill slopes should be provided with subsurface drainage as necessary for stability. A typical backdrain detail is shown on **Figure C3**. Geologically recommended canyon subdrain locations, will be provided at the **Grading Plan** stage, when detailed 40-scale maps are available. The final location, spacing, and design of subdrains should be determined by the Engineering Geologist or Geotechnical Engineer from field observations during grading operations. However, as indicated before, a subdrain should be placed beneath all major fills in any alluvial valley or swale where a fill is planned. As mentioned previously, a typical detail of a canyon subdrain is presented on **Figure C10.**

10.10.3 Buttress and Stability Fill Backdrains

Backdrains are required for Stability Fills and Buttresses. Typical backdrain details are shown on **Figures C3 and C8**.

10.11 Expansive Materials Considerations

Medium to highly expansive rock materials were identified by swell tests. Tentative recommendations for foundations placed on these materials, **unless replaced by non-to-low-expansive soils to at least 4 feet below footing/slab bottoms**, are as follows:

- Footing Depth
  - Perimeter 24”
  - Interior 18”
- Footing Reinforcement: one #4 top & bottom
- Floor Slab Thickness:
  - 5 inch and provide footing/slab interface low friction joints at perimeter walls.
- Floor Slab Reinforcement: #4 at 18” each way
- Provide Moisture Barrier: 2” sand and visqueen + 2” sand
- Premoist (avoiding ponding) the subgrade 24 hours before pouring concrete

10.12 Hydroconsolidation Considerations

Based upon our hydroconsolidation test data, soils beneath recommended removal depths do not show significant hydroconsolidation characteristics.

10.13 Corrosive Soils Considerations

Based on resistivity data presented in **Appendix B**, soils classify as mildly corrosive to moderately corrosive to ferrous metals which requires mitigation measures. Sulfates and chlorides concentrations were negligible and pH was neutral. Additional confirmatory tests should be performed at the Grading Plan stage. Tentative mitigation measures against corrosion to ferrous metals are as follows:

10.13.1 Concrete

Conventional Type I or II portland cement may be used in concrete for structures and concrete pipe that will be in contact with near finish grade soils.

10.13.2 Reinforced Concrete Pipe (RCP)

Based upon pH data from our soil samples, in accordance with Section 854.1 of CalTrans Highway Design Manual, concrete cover over reinforcing steel in RCP may be standard cover. Cast pipe wall thickness shall be in accordance with Section 207.2.3.2 of the 1997 Standard Specifications for Public Works Construction.

10.13.3 Steel Pipe

Perform abrasive blast to underground steel utilities and apply a high quality dielectric coating such as extruded polyethylene, a tape coating system, hot applied coal tar enamel, or fusion bonded epoxy.

Bond underground steel pipe with rubber gasketed, mechanical, grooved end, or other nonconductive type joints for electrical continuity. Electrical continuity is necessary for corrosion monitoring and cathodic protection.

Electrically insulate each buried steel pipeline from dissimilar metals, cement-mortar coated and concrete encased steel, and above ground steel pipe using dielectric fittings to prevent dissimilar metal corrosion cells and to facilitate the application of cathodic protection.

Apply cathodic protection to steel piping as per NACE International RP-0169-92. As an alternative for steel waterlines to a dielectric coating and cathodic protection, apply a mortar coating per AWWA Standard C-205.

10.13.4 Iron Materials Corrosion Protection

Encase cast and ductile iron piping in 8 mil thick low-density polyethylene or 4-mil thick high-density polyethylene, cross-laminated polyethylene plastic tubes or wraps per AWWA Standard C105, or coat with a high quality dielectric coating such as polyurethane or coal tar epoxy. Electrically insulate underground iron pipe from dissimilar metals and above ground iron pipe with insulated joints and dielectric fittings.

Protect any iron valves and fittings with a double polyethylene wrap per AWWA C105. Where concrete thrust blocks are to be placed against iron, use a single polyethylene wrap to prevent concrete/iron contact and to eliminate the slipperiness of a double wrap.

10.13.5 Buried Copper Tubing

Buried copper tubing for cold and hot water shall be provided with cathodic protection (e.g. encase in plastic pipe) or all copper tubing should be kept above ground.

10.13.6 All Pipes

On all pipes, it is recommended to coat bare steel appurtenances such as bolts, joint harnesses, or flexible couplings with a coal tar or elastomer based mastic, coal tar epoxy, moldable sealant, wax tape, or equivalent after assembly.

Where metallic pipelines penetrate concrete structures such as building floors or walls, use plastic sleeves, rubber seals, boots or other dielectric material to prevent pipe contact with the concrete and reinforcing steel.

10.13.7 Other Protective Measures

Electrically insulate (isolate) below-grade ferrous metals by means of dielectric fittings in exposed metal structures breaking grade.

10.14 Retaining Walls

Retaining wall geotechnical design parameters will be provided at the Grading Plan stage.

10.15 Pavement Design

Pavement design recommendations will be provided at the Grading Plan stages.

11.0 LOS ANGELES COUNTY SECTION 111 STATEMENT

In compliance with Section 111 of the Los Angeles County Building Code, it is the finding of this firm that the proposed grading for Vesting Tentative Tract 52584 and the proposed Building Sites will be safe against hazards from landslide, settlement, or slippage and will not adversely affect offsite property, provided all of our recommendations are followed and implemented during construction.

12.0 GEOLOGIST/GEOTECHNICAL ENGINEER OF RECORD

This report has been prepared assuming that Allan E. Seward Engineering Geology, Inc. will refine all geology and geotechnically-related data for the Grading Plan stage. If the recommendations contained in this report are to be utilized, and expansion of the geology/geotechnical work is performed by others, the party performing the work must review this report and assume full responsibility for recommendations contained herein. That party would then assume the title of responsibility as “Geologist/Geotechnical Engineer of Record” for the project.

At the Grading Stage, representatives of the Geology/Geotechnical Engineer of Record should be present to observe all grading operations. A report presenting the results of those observations and related testing should be issued upon completion of the operations. All footing excavations should be observed by a representative of the Geologist/Geotechnical Engineer of Record prior to placing steel or pouring concrete into the excavations.

13.0 LIMITATIONS

This report has been prepared for the exclusive use of Palmer Investments and their design consultants for the specific site discussed herein. This report should not be considered transferable. Prior to use by others, we should be notified, as additional work may be required to update this report.

This study was conducted according to generally accepted engineering geologic practice for studies of this magnitude. Our conclusions and recommendations are based on the data available and our interpretation of the data based on our experience and background. Hence, our **conclusions** and **recommendations** are **professional opinions** and are **not meant** to be a control of nature; therefore, **no warranty** is herein **expressed** or **implied**.

It should be noted that faulting is normally confined to the area immediately adjacent to a known fault, or within a few feet of the last fault movement. Regardless of what criteria are used however, absolute assurance against future fault displacement or strong ground motion cannot be obtained in tectonically active areas. New faults can form, as the orientation and magnitude of deformational forces in the earth's crust change with time. Therefore, the location of new breaks or ground motions during a seismic event cannot be located or anticipated.

In the event that any modifications in the design or location of the proposed development, as discussed herein, are planned, the conclusions and recommendations contained in this report will require a written review by this firm with respect to the planned modifications.

In performing these professional services, we have used the degree of care and skill ordinarily exercised, under similar circumstances, by reputable engineering geologists and geotechnical engineers practicing in this or similar localities.

It is recommended that the owner of the subject property review the findings of this report with adjacent property owners so that any impact arising from the proposed construction can be evaluated.

This report may not be duplicated without the written consent of this firm.

The following references and sections presenting the Appendices are attached and complete this report.

Respectfully submitted,

Eric J. Seward, CEG 2110
Certified Engineering Geologist

Edward Castellanos, RCE 30279, GCE 191
Principal Geotechnical Engineer

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1-Attn: Geotechnical Section - Mr. Amir Alam
1-Attn: Geology Section - Mr. Charles Nestle
(1) Land Design Consultants, Inc.
Attn: Mr. Robert Sims
(1) Taylor and Company
Attn: Mr. Paul Taylor
(1) Oscar & Antoinette F. Fehsel
(1) Mr. S. Lee Ross
(1) Edith L. Newman
(1) Steven S. Sadd, Esq.

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Hasley Canyon
Saugus, California
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Tentative Tract 44945
Revised June 11, 1992
Dated June 24, 1992 - JN: 92-806-4

3. **Geologic Review**
Tentative Tract 44945
Revised June 11, 1992
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Appendix A

JOB NO. 7-806-4

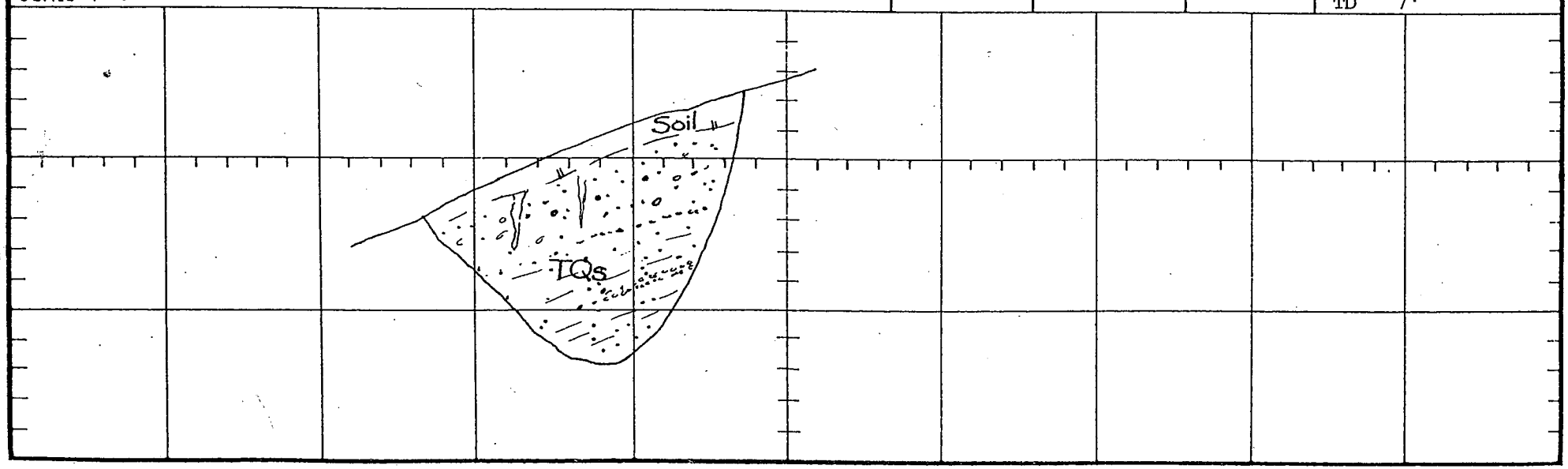
LOGGED BY DGF

Trench Log No. 1

PROJECT Petrominerals

DATE 10/30/87

LITHOLOGY	BEDDING	FAULTING	JOINTS	COMMENTS
0 - 1' SOIL; Light-brown sandy silt with small pebbles; loose; dry 1 - 7' BEDROCK; TQs, Light-gray, medium-to coarse-grained sandstone; loose; dry; massive; scattered root holes; At 4-7'; Reddish-tan, fine-grained silty sandstone moderately dense; damp; poorly bedded; thin-to medium-grained sandstone interbeds. N 40 E SCALE 1" = 5'	N 35 W 20 SW			Excavated trenches 1 through 10 on 7/31/87 with crawler using 24" bucket No Caving No Groundwater TD 7'



ALLAN E. SEWARD

JOB NO. 7-806-4

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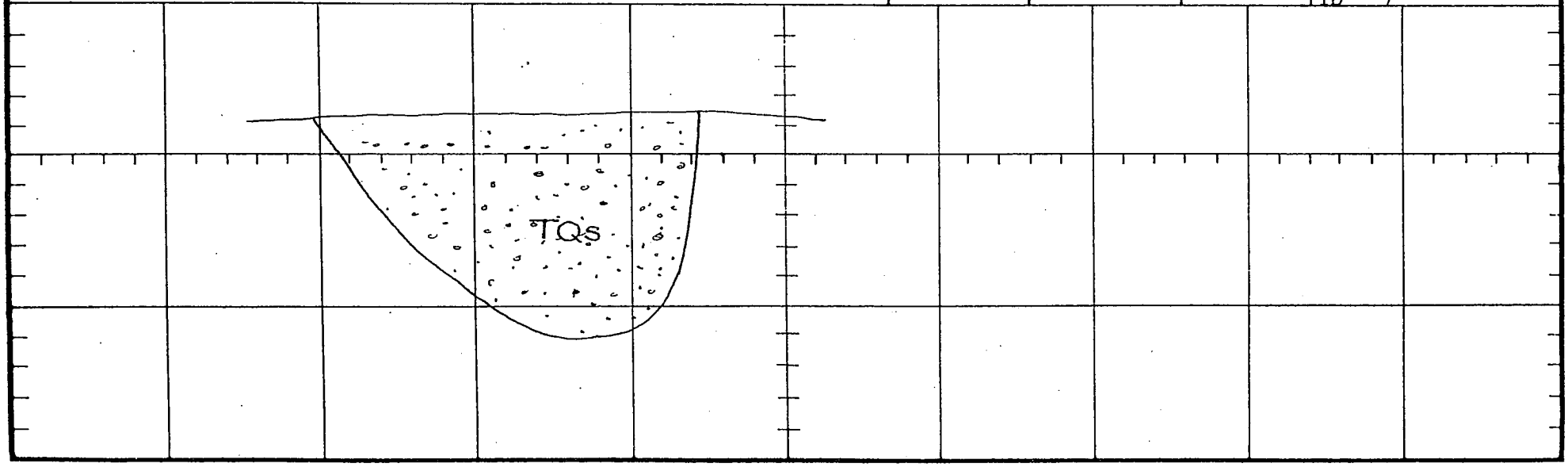
Trench Log No. 2

PROJECT Petrominerals

DATE 10/30/87

LITHOLOGY	BEDDING	FAULTING	JOINTS	COMMENTS
0 - 7' BEDROCK; TQs, Reddish-brown, medium-to coarse-grained pebbly sandstone; loose; damp; massive.				
DUE NORTH →				No Caving
SCALE 1" = 5'				No Groundwater TD 7'



ALLAN E. SEWARD

JOB NO. 7-806-4

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Trench Log No. 3

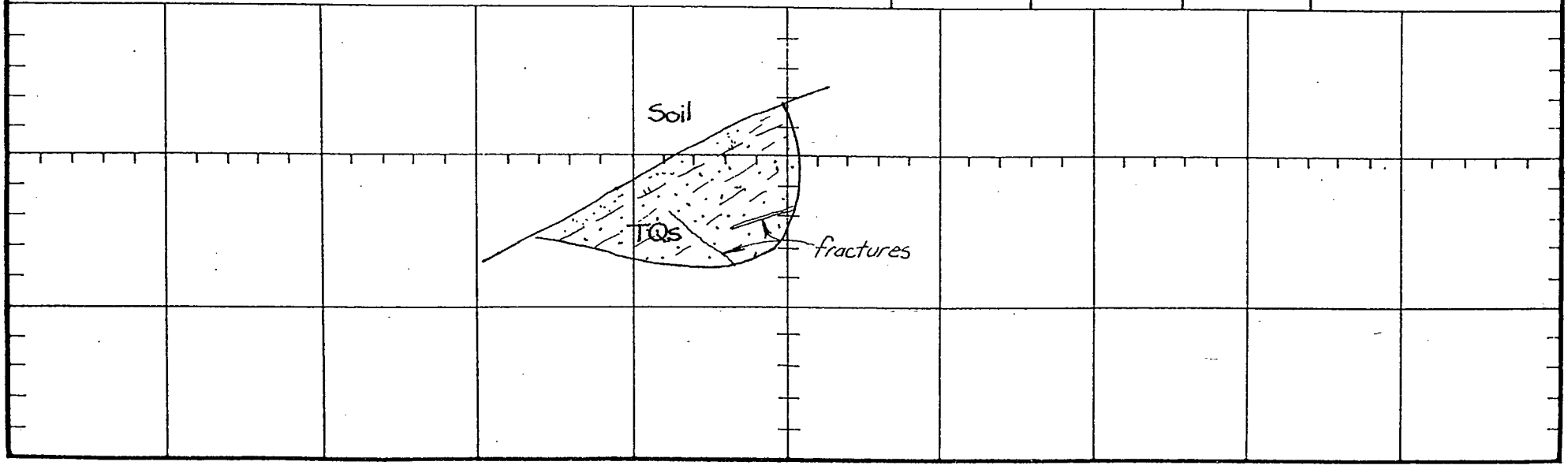
PROJECT Petrominerals

DATE 10/30/87

LITHOLOGY	BEDDING	FAULTING	JOINTS	COMMENTS
0 - 1' SOIL; Brownish-orange, fine-to medium-grained silty sand with scattered pebbles; moderately dense; dry.				
1 - 6' BEDROCK; TQs, Reddish-brown, fine-to medium-grained silty sandstone with scattered pebbles; dense to very dense; dry.	Massive	N70E		
				No Caving No Groundwater TD 6'

N 62 E

SCALE 1" = 5'



ALLAN E. SEWARD

JOB NO. 7-806-4

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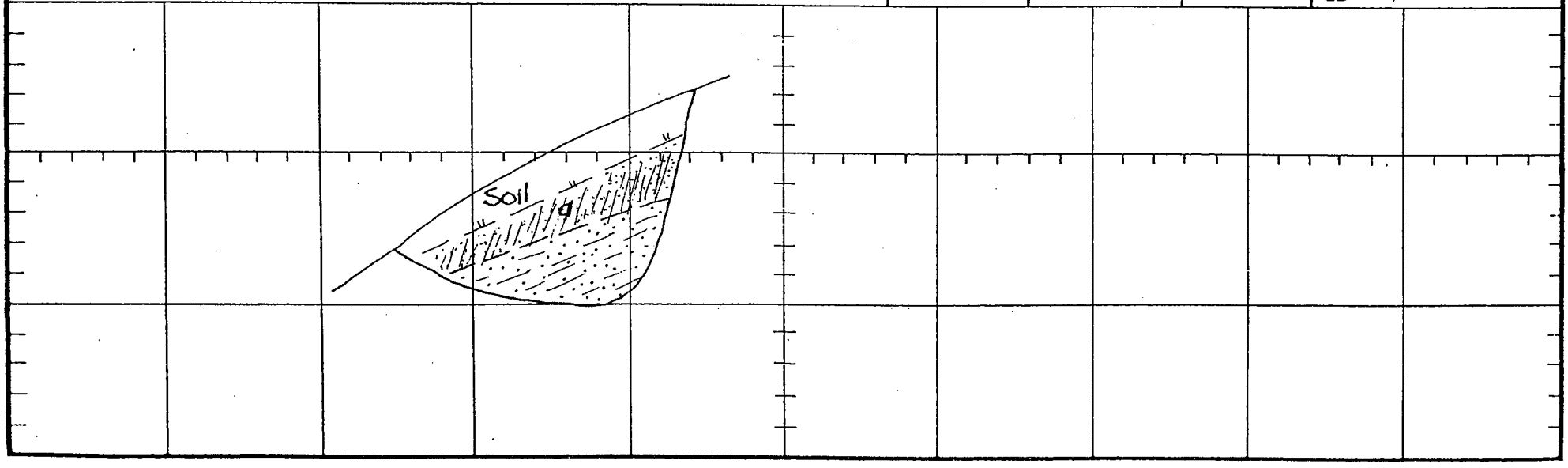
Trench Log No. 4

PROJECT Petrominerals

DATE 10/30/87

LITHOLOGY	BEDDING	FAULTING	JOINTS	COMMENTS
0 - 2' SOIL; Light tannish-brown sandy silt, loose, dry				Cleavage developed within unit A N 20 E 82 SE
2 - 7' BEDROCK; TQs, Light tannish-brown, fine-to medium-grained sandstone; loose; damp; poorly bedded; At 3-7'; Dark reddish-brown, fine-to coarse-grained silty sandstone to clayey siltstone	N 25 W 25 SW			
N 70 E				No Caving No Groundwater TD 7'

SCALE 1" = 5 '



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JOB NO. 7-806-4

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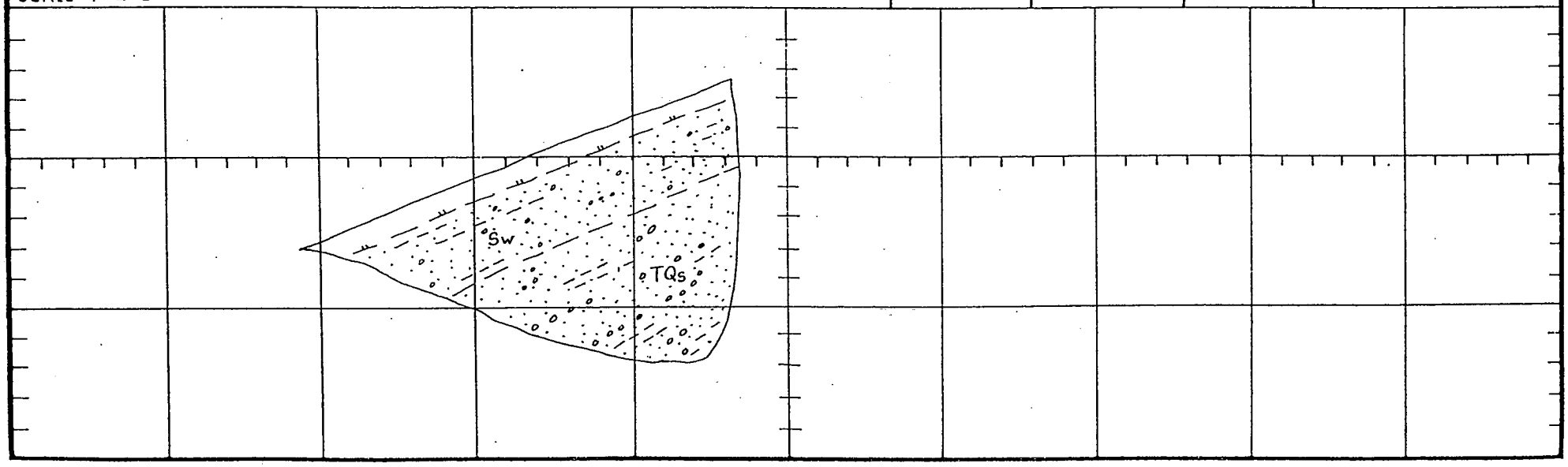
Trench Log No. 5

PROJECT Petrominerals

DATE 10/30/87

LITHOLOGY	BEDDING	FAULTING	JOINTS	COMMENTS
0 - 1' SOIL; Light brown, fine-to coarse-grained silty sand with scattered pebbles; loose; dry				
1 - 3' SLOPEWASH; Sw, Medium-brown to light brown silty sand with scattered pebbles; loose to moderately dense; dry.				
3 - 8½' BEDROCK; TQs, Light tannish-yellow, fine-to medium-grained sandstone with scattered pebbles; 1" thick pebble interbeds.	N 89 W 22 SW approx.			
N 33 W				No Caving No Groundwater TD 8½'

SCALE 1" = 5'



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JOB NO. 7-806-4

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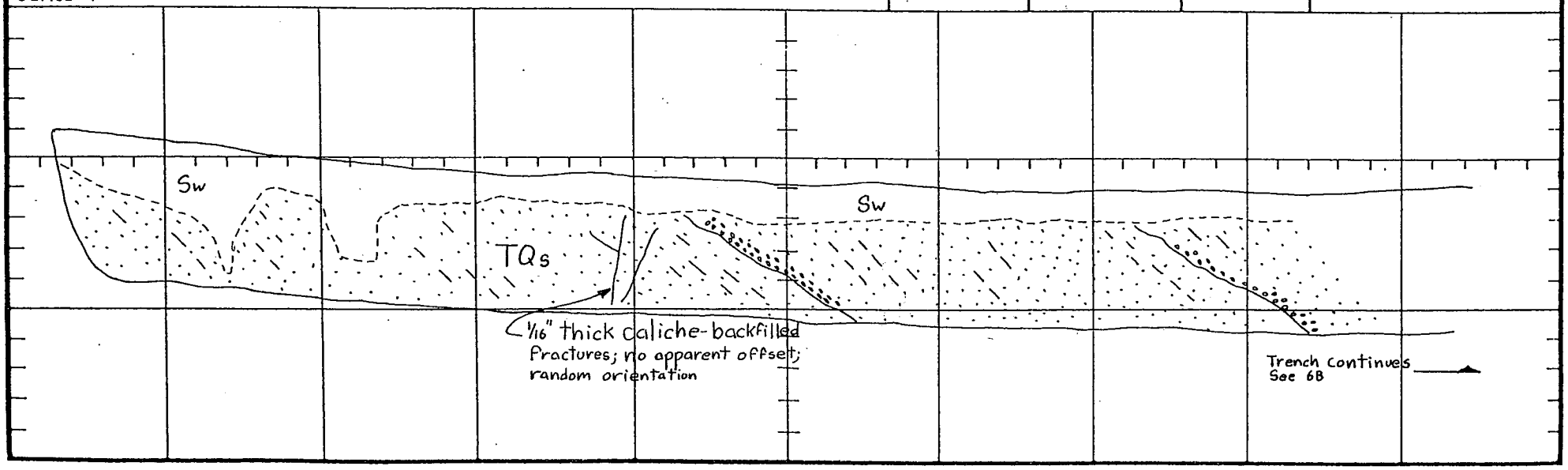
Trench Log No. 6A

PROJECT Petrominerals

DATE 10/30/87

LITHOLOGY	BEDDING	FAULTING	JOINTS	COMMENTS
0 - 4' SLOPEWASH; Sw, Medium brown, fine-grained silty sand; damp; loose.				
1 - 5' BEDROCK; TQs, Medium brown, fine-grained silty sand; moderately dense; dry; massive; light grayish-brown medium-to coarse-grained sandstone; loose; dry; fines upward.				
DUE NORTH				No Caving No Groundwater TD 5'

SCALE 1" = 5'



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JOB NO. 7-806- 4

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Trench Log No. 6B

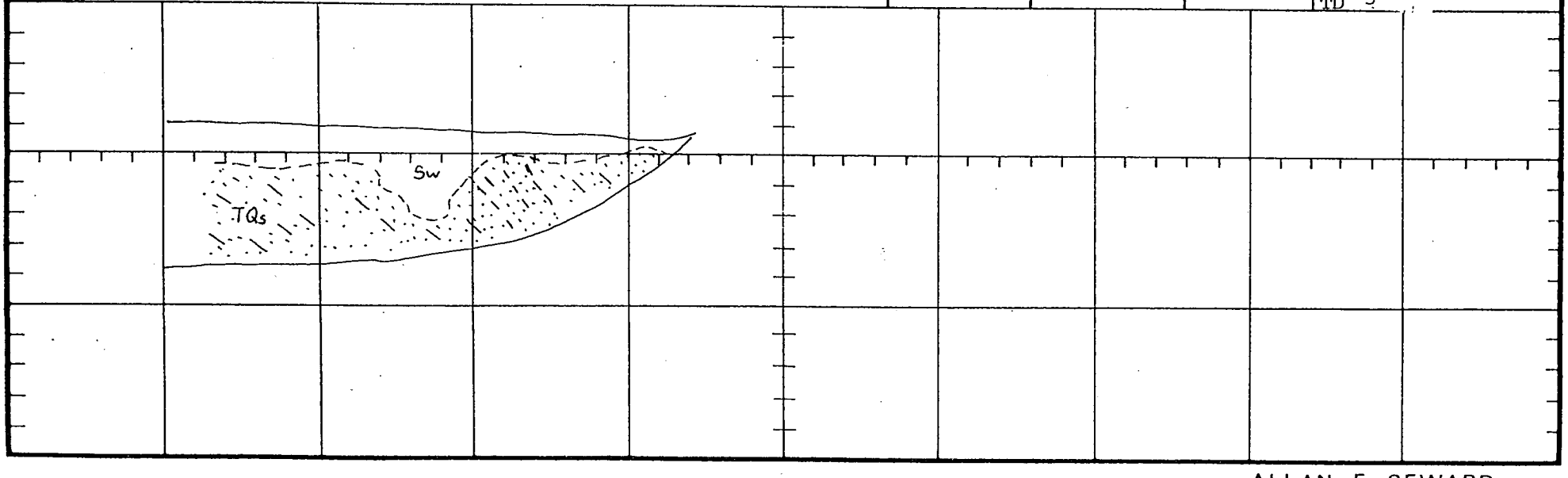
PROJECT Petrominerals

DATE 10/30/87

LITHOLOGY	BEDDING	FAULTING	JOINTS	COMMENTS
See 6A	N 52 W 32 SW			Sw; 5-10% voids No Caving No Groundwater TD 5'

N 8 E

SCALE 1" = 5'



ALLAN F SEWARD

JOB NO. 7-806-4

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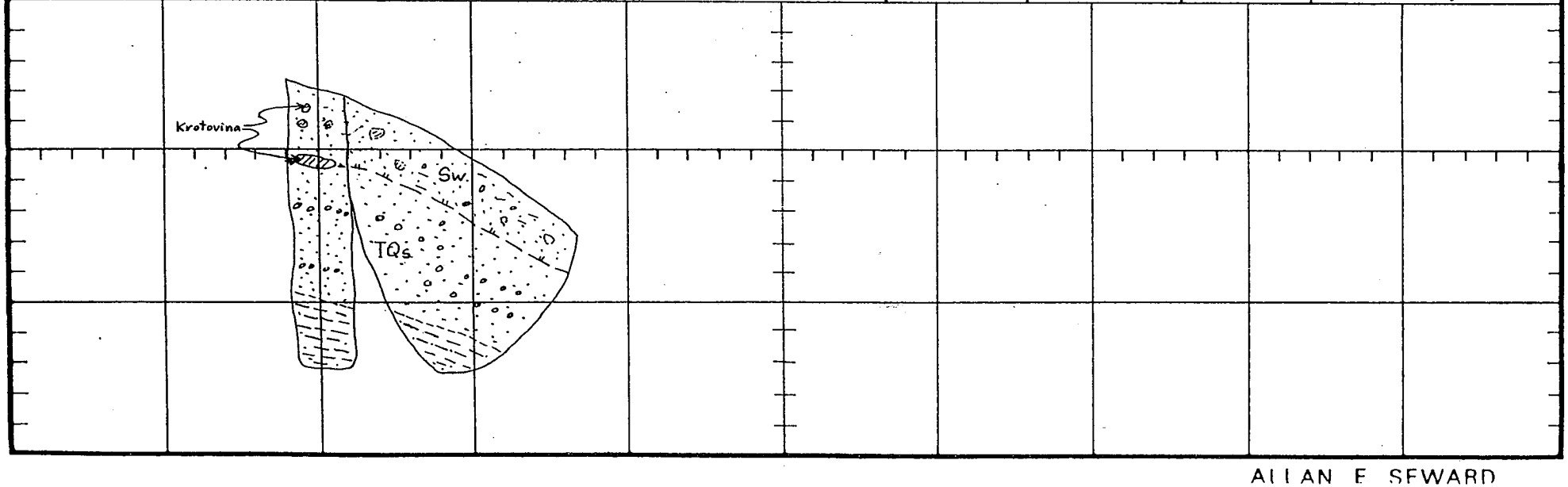
Trench Log No. 7

PROJECT Petrominerals

DATE 10/30/87

LITHOLOGY	BEDDING	FAULTING	JOINTS	COMMENTS
0 - 2' SLOPEWASH; SW, Medium brown, fine-ground silty sand loose; dry; massive; scattered pebbles.				
2 - 7' BEDROCK; TQs, Light gray, coarse-grained sandstone with pebble interbeds; loose; dry; thin-to medium- bedded; 6-7' orangish-brown, fine-grained silty sand; loose moist; massive	N 82 E 27 SE			
N 39 E				No Caving No Groundwater TD = 7'

SCALE 1" = 5'



ALLAN E. SEWARD

JOB NO. 7-806-A

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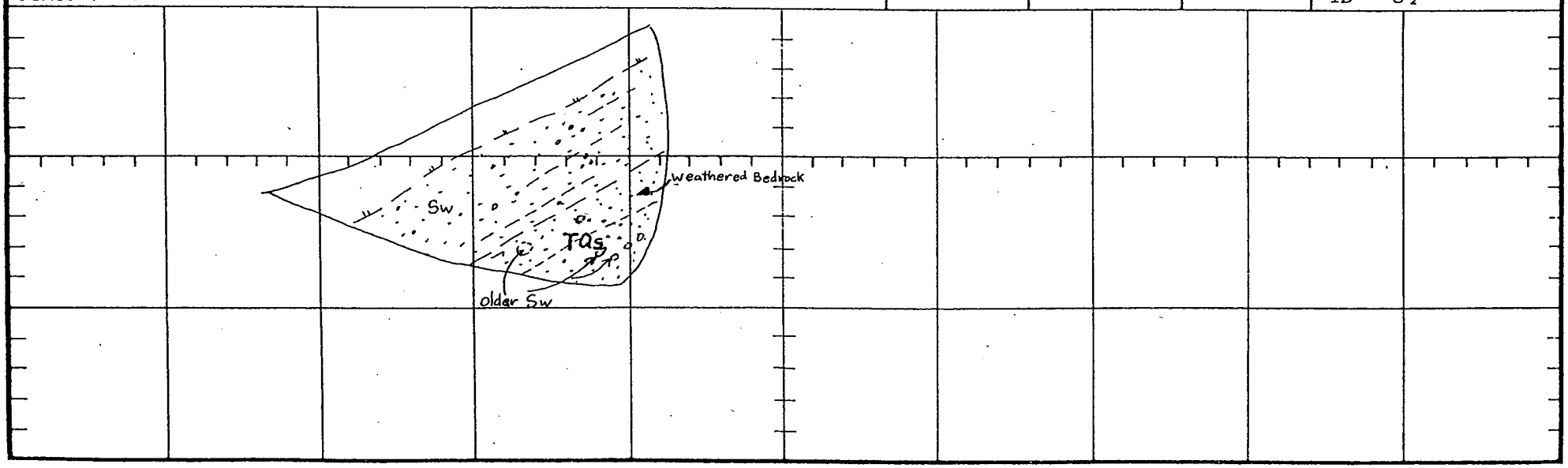
Trench Log No. 8

PROJECT Petrominerals

DATE 10/30/87

LITHOLOGY	BEDDING	FAULTING	JOINTS	COMMENTS
0 - 1½' SOIL; Medium brown, fine-to medium-grained silty sand with scattered pebbles and gravel ; loose; dry.				
1½ - 5' SLOPEWASH; Sw, Medium brown to reddish-brown silty sand with scattered gravel; moderately dense to dense; dry.				Contact between Sw and TQs is gradational
5 - 8½' BEDROCK; TQs, Reddish-brown to light brown, fine-to coarse-sandstone with isolated pebbles and cobbles.	N 81 E 31 SW			Pockets of Sw in TQs
N 45 W				No Caving No Groundwater TD 8½'

SCALE 1" = 5'



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JOB NO. 7-806-4

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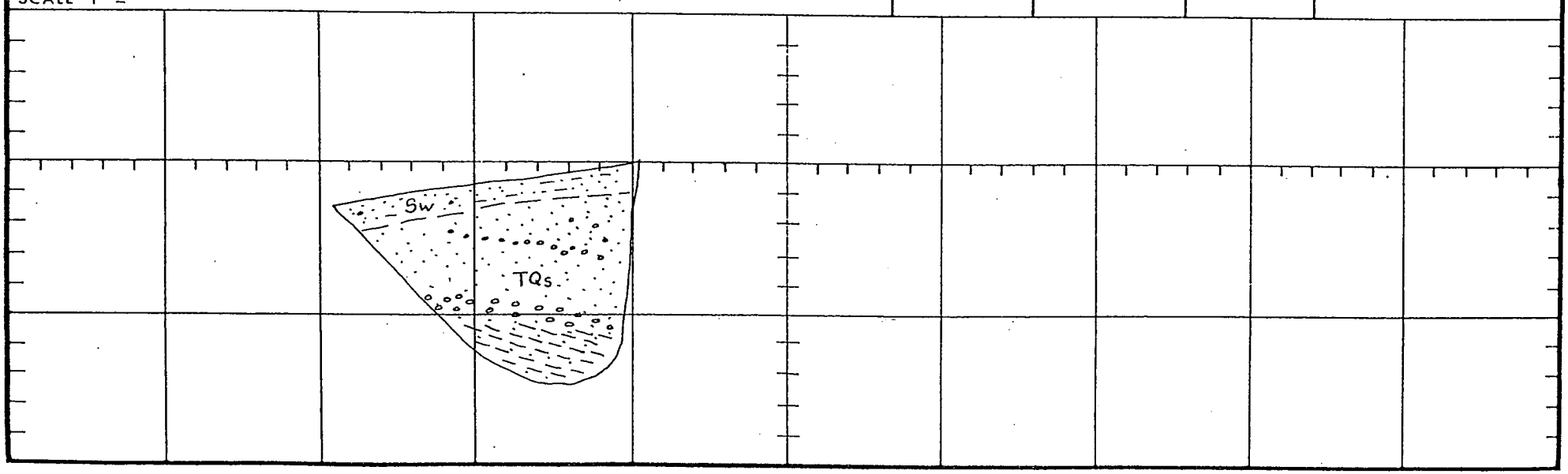
Trench Log No. 9

PROJECT Petrominerals

DATE 10/30/87

LITHOLOGY	BEDDING	FAULTING	JOINTS	COMMENTS
0 - 1½' SLOPEWASH; Sw, Medium brown sandy silt; moderately loose; dry.				
1½ - 7' BEDROCK; TQs, Tannish-brown, fine-to medium-grained sandstone; moderately loose; dry; At 5-7'; Reddish-brown sandy siltstone; dense; damp; massive.	N 65 W 30 SW			
N 50 E				No Caving No Groundwater TD 7'

SCALE 1" = 5'



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JOB NO. 7-806-4

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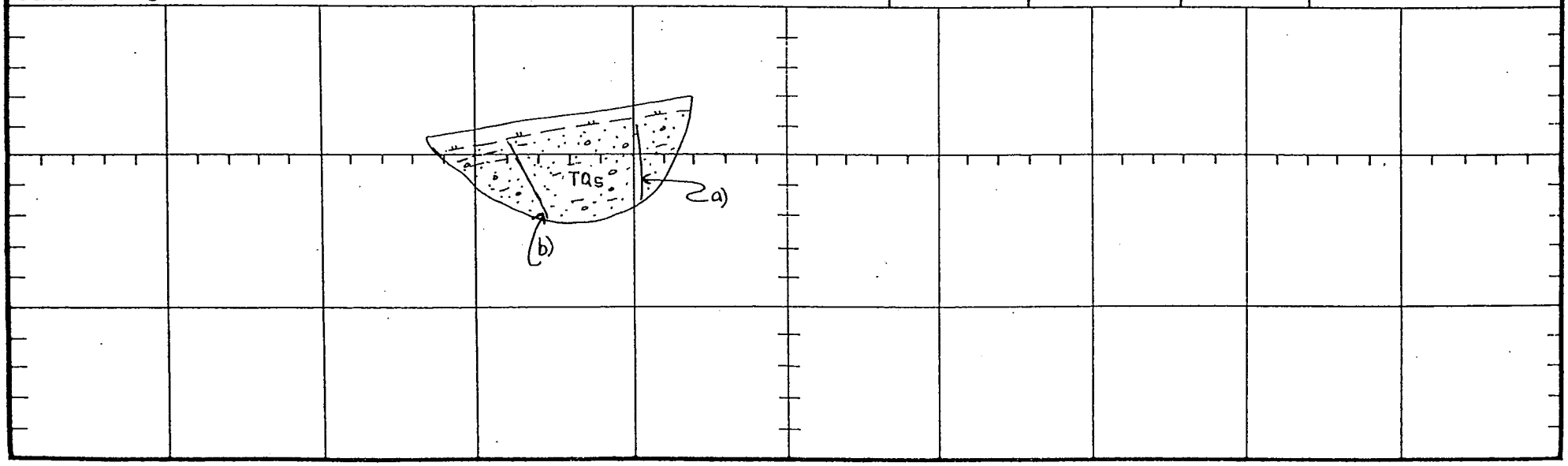
Trench Log No. 10

PROJECT Petrominerals

DATE 10/30/87

LITHOLOGY	BEDDING	FAULTING	JOINTS	COMMENTS
0 - 1' SOIL; Medium brown, fine-to coarse-grained silty sand with scattered pebbles; dense; dry.				
1 - 4' BEDROCK; TQs, Orangish-brown, fine-to coarse-grained silty sandstone with isolated pebbles; very dense; dry.	Massive	a) N 35 E 71 SE b) N 39 W 89 NE		No measurable offset along fault "a"
N 75 W				No Ground Water No Caving TD 4 Ft.

SCALE 1" = 5'



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JOB NO. 7-806-4

LOGGED BY VCG

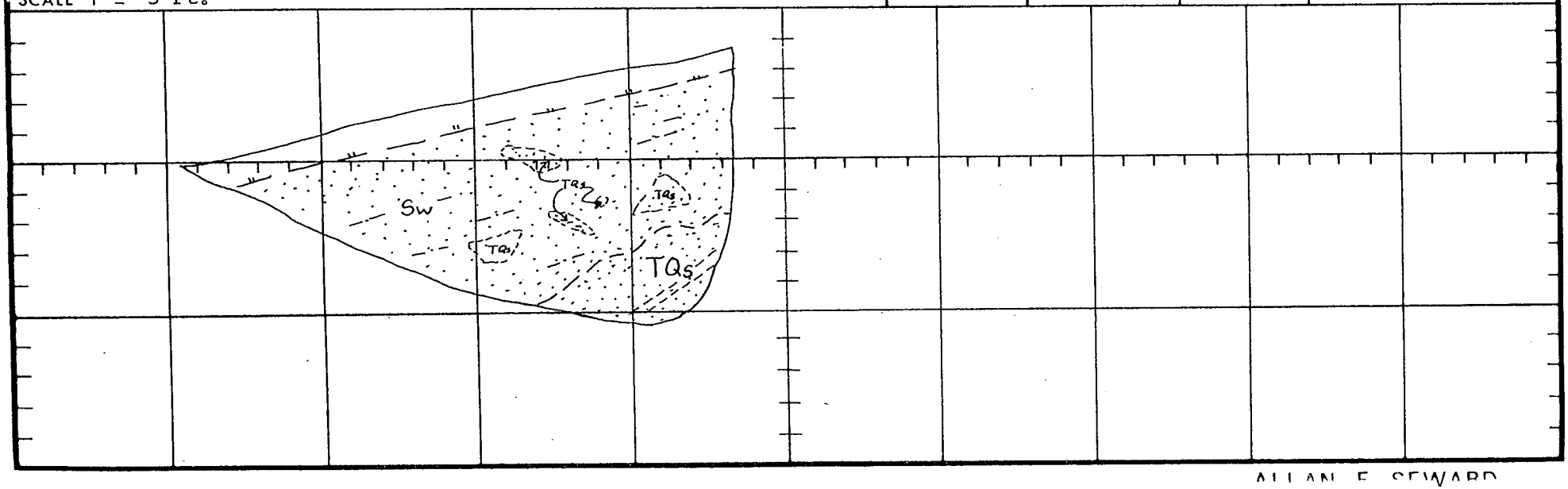
Trench Log No. 11

PROJECT Petromineral

DATE 10/30/87

LITHOLOGY		BEDDING	FAULTING	JOINTS	COMMENTS
0 - 1'	SOIL; Medium- to grayish-brown, fine- to coarse-grained silty sand with scattered pebbles; loose; dry				Trenches 11 through 24 excavated 8/13/87 with a tractor hoe using a 24" bucket
1' - 6'	SLOPEWASH; Sw, Reddish- to medium-brown, fine- to coarse-grained silty sand with scattered pebbles; loose to moderately dense; dry				Pockets of TQs within Sw.
					Contact between Sw and TQs gradational
6' - 9'	BEDROCK; TQs, Light-tan to brown, fine- to coarse-grained sandstone; dense; damp	N 81 W 23 SW Ex.			Contact between Ss and sltst irregular
	@ 8' Moderate-brown, fine- to medium-grained silty sandstone				
	N 37 E				No Ground Water
					No Caving
					TD 9 Ft.

SCALE 1" = 5 Ft.



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JOB NO. 7-806-4

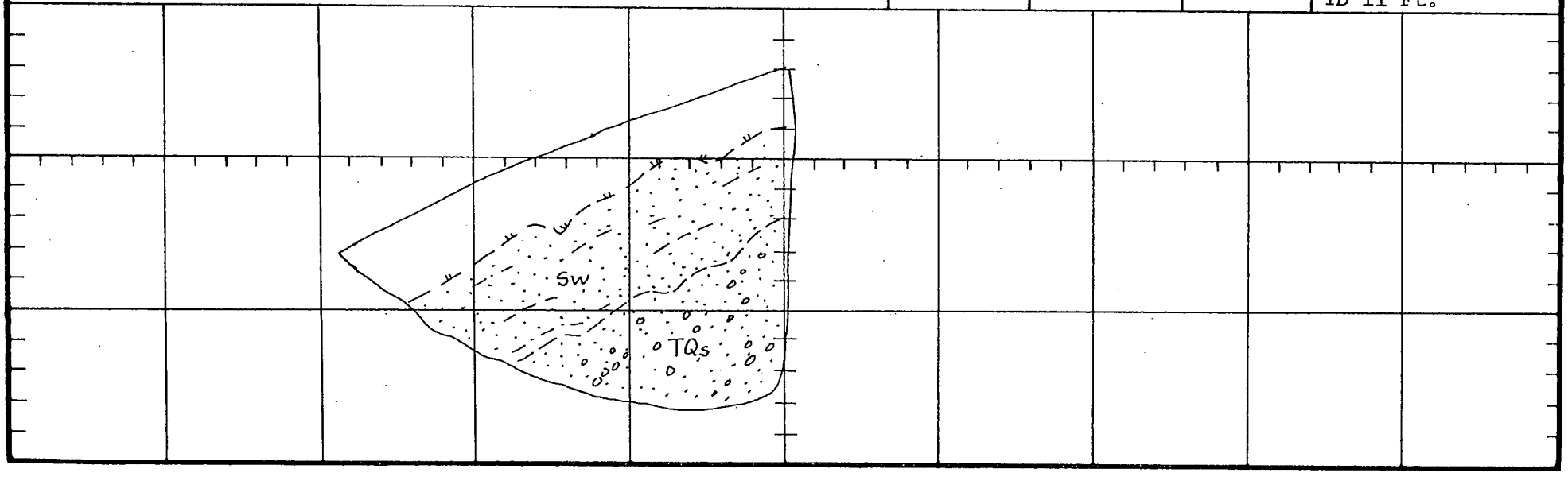
LOGGED BY VCG

Trench Log No. 12

PROJECT Petromineral

DATE 10/30/87

LITHOLOGY		BEDDING	FAULTING	JOINTS	COMMENTS
0 - 2'	SOIL; Moderate- to grayish-brown, fine- to coarse-grained silty sand with isolated pebbles; loose; dry				
2' - 5'	SLOPEWASH; Sw, Moderate-brown, medium- to coarse-grained pebbly sand with isolated cobbles; dense; dry				Attitude off of pebble interbed
5' - 11'	BEDROCK; TQs, Orangish-brown, fine- to coarse-grained pebbly sandstone; dense; slightly moist	N 17 E 12 SE Approx.			
	N 27 E				No Ground Water No Caving
SCALE 1" = 5 Ft.					TD 11 Ft.



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JOB NO. 7-806-4

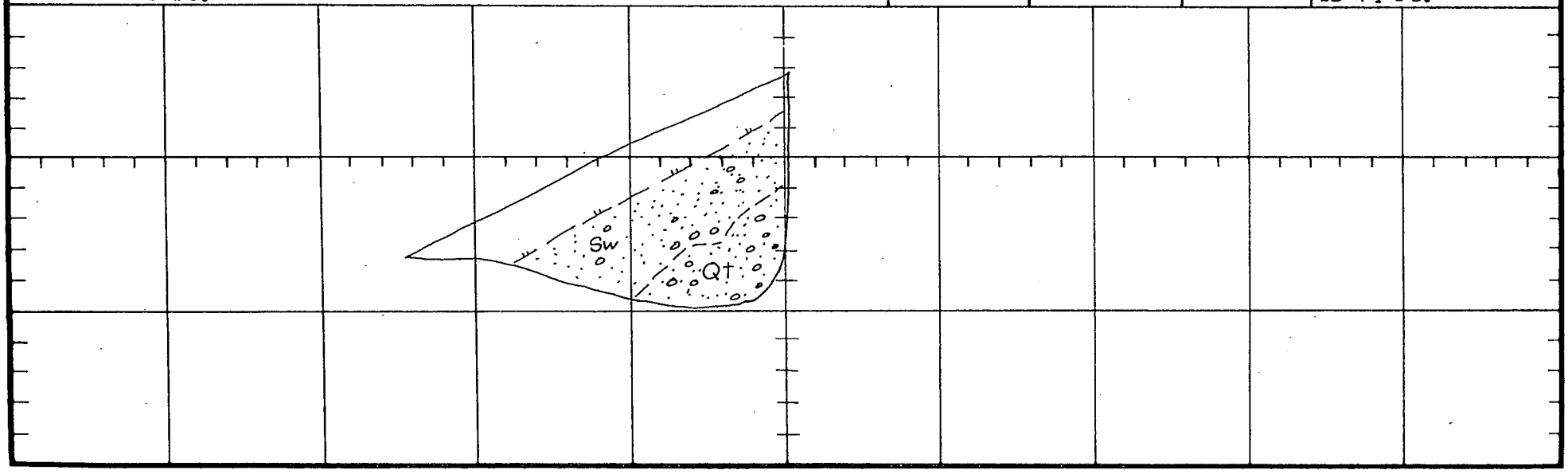
LOGGED BY VCG

Trench Log No. 13

PROJECT Petromineral

DATE 10/30/87

LITHOLOGY		BEDDING	FAULTING	JOINTS	COMMENTS
0 - 1½'	SOIL; Medium- to orangish-brown, silty sand with isolated pebbles; loose; dry				Soil Voids 5 - 10%
1½' - 4'	SLOPEWASH; Sw, Moderate-brown, fine- to coarse-grained cobbly sand; moderately dense; dry				
4' - 7½'	TERRACE; Qt, Oranish-brown, fine- to coarse-grained cobbly sand; dense; dry to moist	Massive			Qt could be Qal?
	N 23 W				No Ground Water No Caving
SCALE 1" = 5 Ft.					TD 7½ Ft.



ALLAN E. SEWARD

JOB NO. 7-806-4

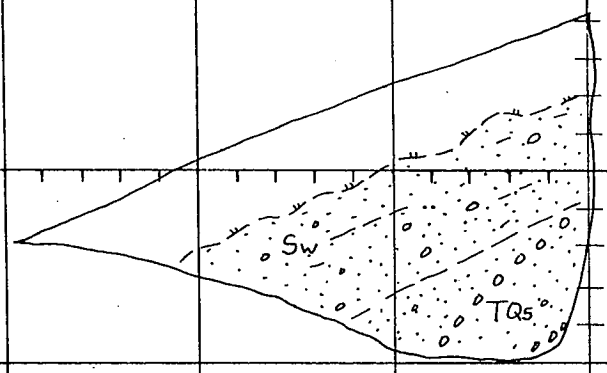
LOGGED BY VCG

Trench Log No. 14

PROJECT Petrominerals

DATE 10/30/87

LITHOLOGY		BEDDING	FAULTING	JOINTS	COMMENTS
0 - 2'	SOIL; Moderate-brown, fine to coarse silty sand with isolated pebbles; loose; dry; rootlets				
2' - 5'	SLOPEWASH; Sw, Light tannish-brown, fine- to coarse-grained silty sand with scattered pebbles; dense; dry				Attitude may have been taken on x-beds
5' - 9'	BEDROCK; TQs, Light yellowish-tan, medium- to coarse-grained sandstone with isolated pebbles; dense; dry to moist @ 8' pebble conglomerate; dense; slightly moist	N 38 W 34 SW Approx? N 69 W 30 SW Approx?			
	N 3 E				No Ground Water No Caving
SCALE 1" = 5 Ft.					TD 9 Ft.



ALLAN E. SEWARD

JOB NO. 7-806-4

LOGGED BY VCG

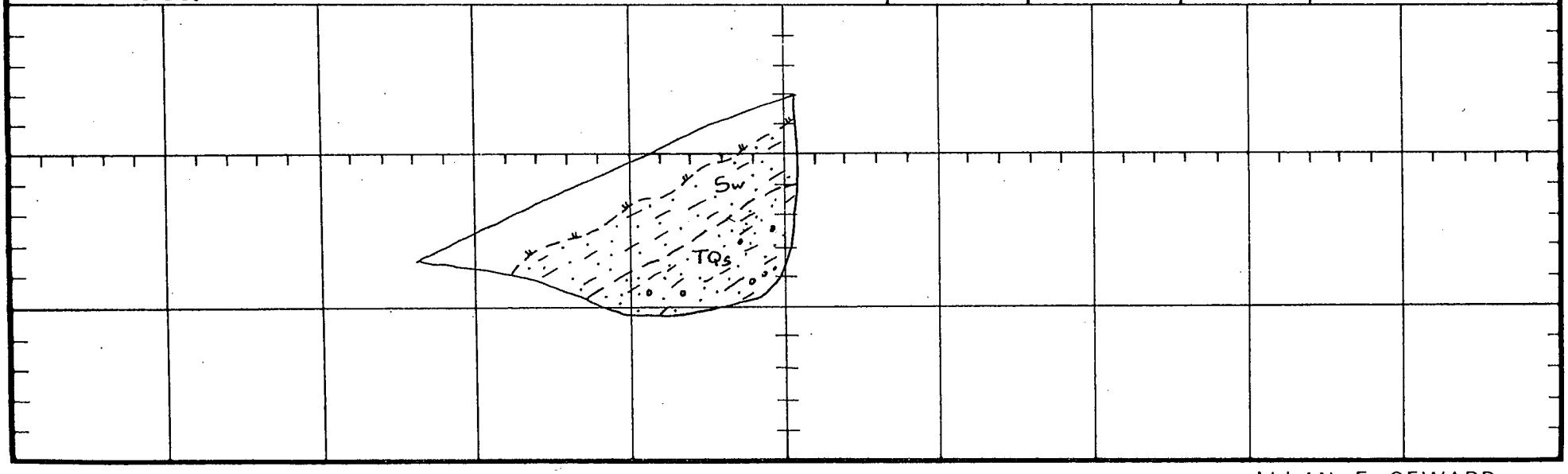
Trench Log No. 15

PROJECT Petrominerals

DATE 10/30/87

LITHOLOGY		BEDDING	FAULTING	JOINTS	COMMENTS
0 - 1'	SOIL; Moderate- to grayish-brown, fine to medium silty sand with isolated pebbles; loose; dry; rootlets				
1' - 3'	SLOPEWASH; Sw, Light orangish-brown, fine- to coarse-grained silty sand with scattered pebbles; moderately dense to dense; dry to moist				
3' - 7'	BEDROCK; TQs, Light-tan, fine- to medium-grained silty sandstone with pebble interbeds; dense; dry	N 89 W 28 SW			
	N 60 W				No Ground Water No Caving TD 7 Ft.

SCALE 1" = 5 Ft.



JOB NO. 7-806-4

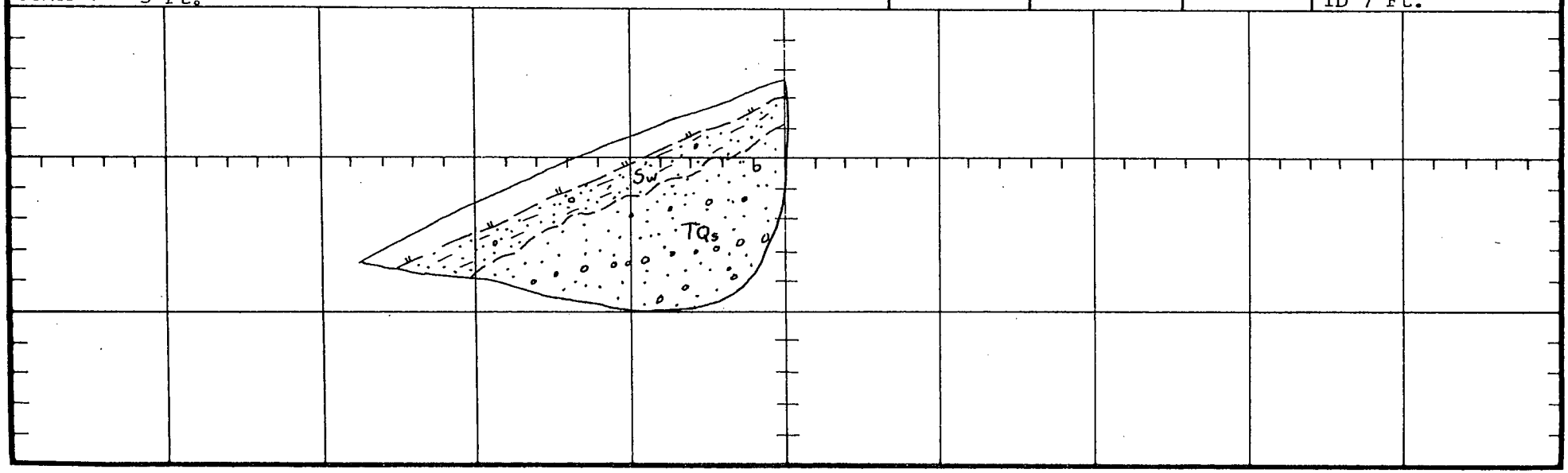
LOGGED BY VCG

Trench Log No. 16

PROJECT Petrominerals

DATE 10/30/87

LITHOLOGY		BEDDING	FAULTING	JOINTS	COMMENTS
0 - 1'	SOIL; Grayish-brown, fine- to medium-grained silty sand with isolated pebbles; dry; loose				
1' - 2'	SLOPEWASH; Sw, Light tannish-brown, fine- to coarse-grained silty sand with isolated pebbles and cobbles; moderately dense to dense; dry				
2' - 7'	BEDROCK; TQs, Orangish-brown, fine- to coarse-grained sandstone with pebble interbeds; dense; dry	N 89 W 33 SW Ex. N 87 W 33 SW			TQs - Iron stained
	N 86 E				No Ground Water No Caving
SCALE 1" = 5 Ft.					TD 7 Ft.



ALLAN E. SEWARD

JOB NO. 7-806-4

LOGGED BY VCG

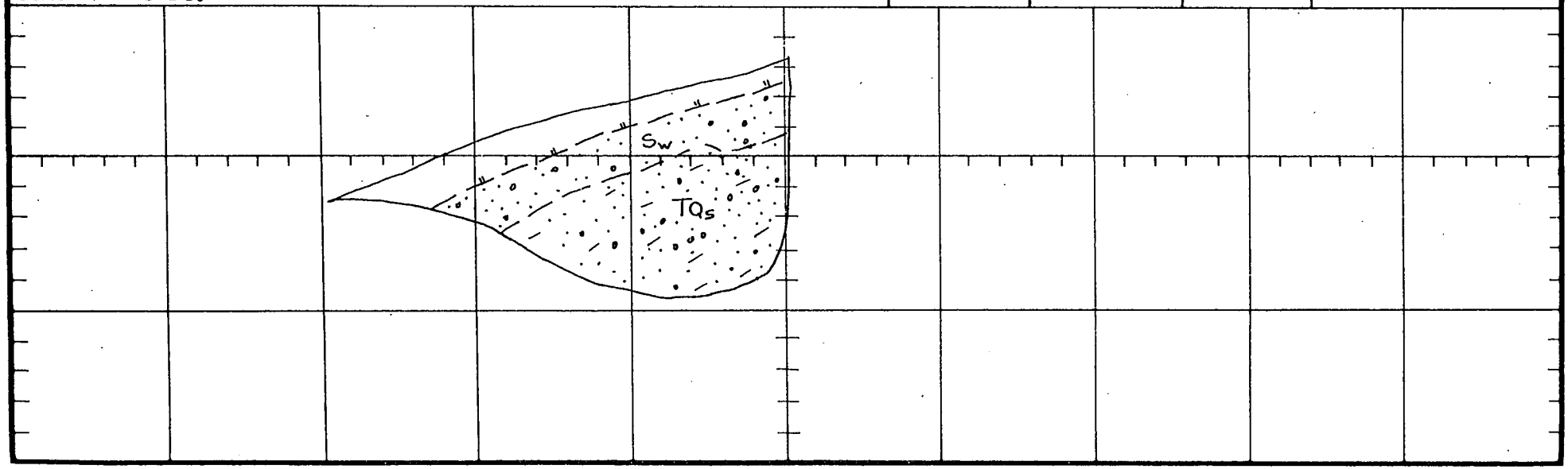
Trench Log No. 17

PROJECT Petrominerals

DATE 10/30/87

LITHOLOGY		BEDDING	FAULTING	JOINTS	COMMENTS
0 - 1'	SOIL; Grayish-brown, fine- to medium-grained silty sand with scattered pebbles; loose; dry				
1' - 2½'	SLOPEWASH; Sw, Medium-brown, fine- to coarse-grained pebbly sand; dense; dry				
2½' - 8'	BEDROCK; TQs, Light tannish-brown, fine to coarse silty sandstone with pebble interbeds; dense; dry; FeO stained	N 87 W 32 SW Ex.			
	N 74 E				No Ground Water No Caving TD 8 Ft.

SCALE 1" = 5 Ft.



ALLAN E. SEWARD

JOB NO. 7-806-4

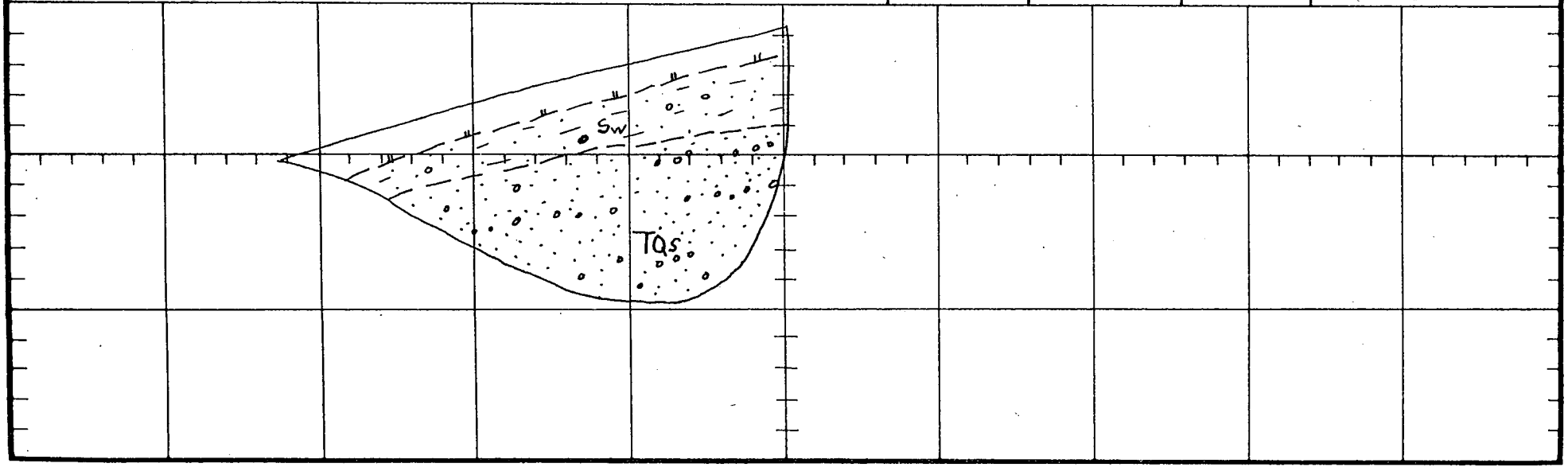
LOGGED BY VCG

Trench Log No. 18

PROJECT Petrominerals

DATE 10/30/87

LITHOLOGY		BEDDING	FAULTING	JOINTS	COMMENTS
0 - 1'	SOIL; Medium-brown to gray, fine- to medium-grained silty sand with scattered pebbles; loose; dry				
1' - 3'	SLOPEWASH; Sw, Light brown, fine- to coarse-grained silty sand with isolated cobbles; moderately dense; dry				
3' - 9'	BEDROCK; TQs, Medium-brown to tan, medium- to coarse-grained pebbly sandstone; dense; dry @ 6½' Medium-grained sandstone interbed	N 85 E 23 SE Approx.			
		N 86 W 25 SW Approx.			No Ground Water
	N 65 E				No Caving
SCALE 1" = 5 Ft.					TD 9 Ft.



ALLAN E. SEWARD

JOB NO. 7-806-4

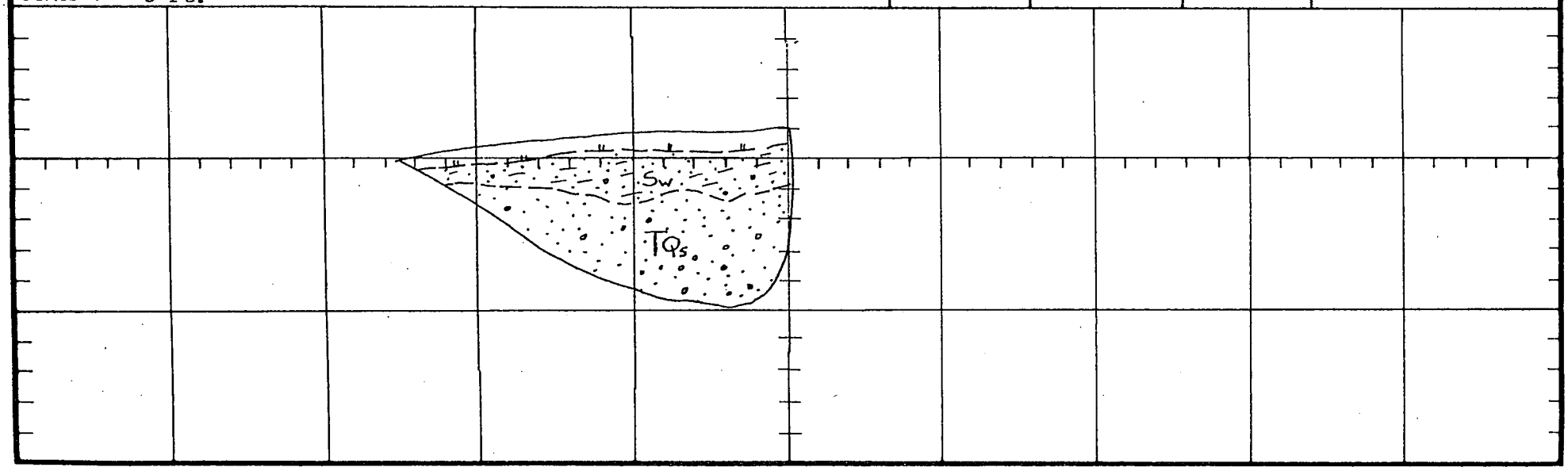
LOGGED BY VCG

Trench Log No. 19

PROJECT Petrominerals

DATE 10/30/87

LITHOLOGY		BEDDING	FAULTING	JOINTS	COMMENTS
0 - ½'	SOIL; Grayish-brown, fine- to medium-grained silty sand with isolated pebbles; loose; dry; root holes				
½' - 2'	SLOPEWASH; Sw, Light reddish-brown, fine- to coarse-grained silty sand with scattered pebbles; moderately dense; dry				
2' - 6'	BEDROCK; TQs, Orangish-tan, medium- to coarse-grained pebbly sandstone; dense to very dense; dry	N 85 E 38 SE Pebble interbed			
	N 23 E				No Ground Water No Caving
SCALE 1" = 5 Ft.					TD 6 Ft.



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JOB NO. 7-806-4

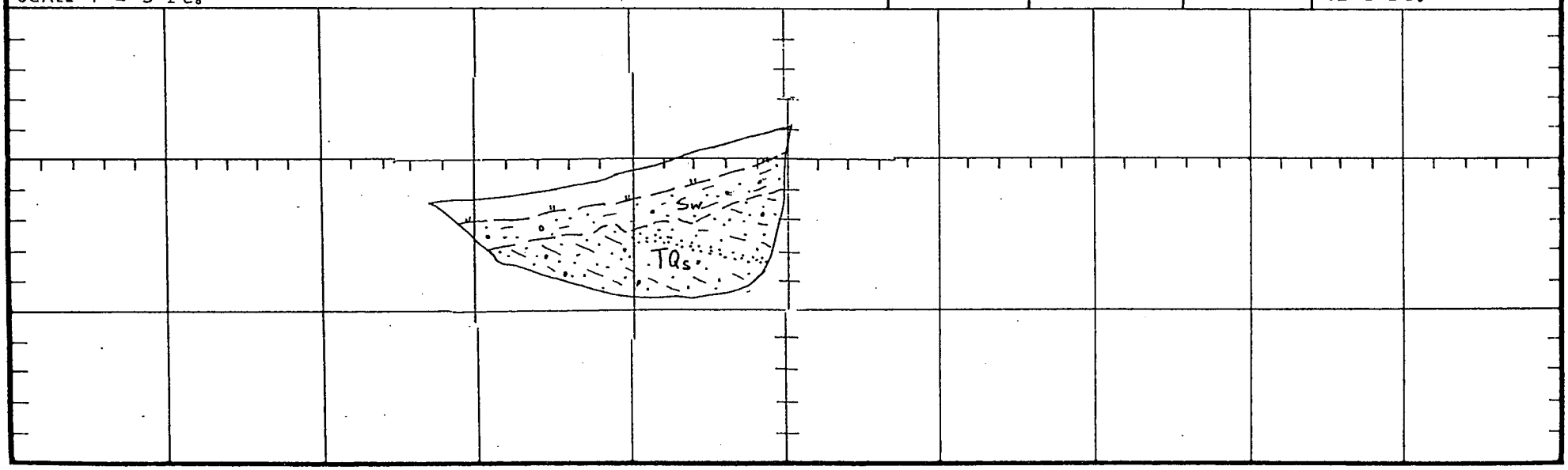
LOGGED BY VCG

Trench Log No. 20

PROJECT Petrominerals

DATE 10/30/87

LITHOLOGY		BEDDING	FAULTING	JOINTS	COMMENTS
0 - 1'	SOIL; Medium brown, fine- to coarse-grained silty sand with scattered pebbles; loose; dry; root holes				Voids in soil 10%
1' - 2'	SLOPEWASH; Sw, Orangish-brown, fine- to medium-grained silty sand with isolated pebbles; dense; dry				
2' - 5'	BEDROCK; TQs, Orangish-brown, fine- to medium-grained silty sandstone; dense; dry @ 4' Sandstone interbed, approx. 6" thick	N 83 E 37 SE Ex.			
	N 57 E				No Ground Water No Caving
SCALE 1" = 5 Ft.					TD 5 Ft.



ALLAN E. SEWARD

JOB NO. 7-806-4

LOGGED BY VCG

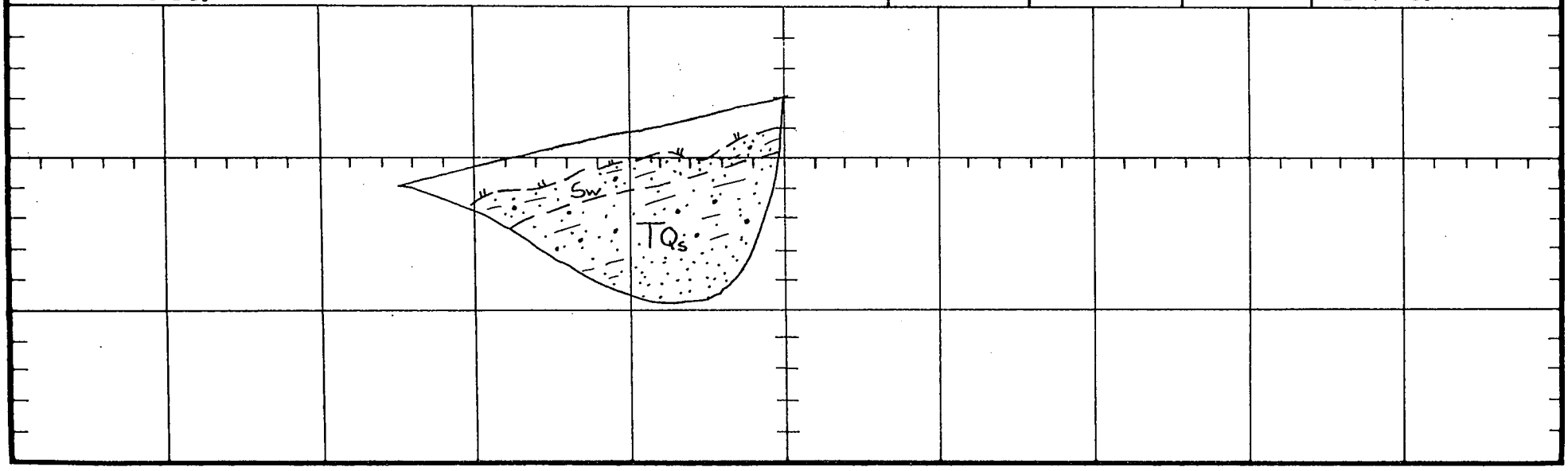
Trench Log No. 21

PROJECT Petrominerals

DATE 10/30/87

LITHOLOGY		BEDDING	FAULTING	JOINTS	COMMENTS
0 - 1'	SOIL; Light tannish-brown, fine- to medium-grained silty sand with scattered pebbles; loose; dry				
1' - 2'	SLOPEWASH; Sw, Orangish-brown, medium- to coarse-grained pebbly sand; moderately dense; dry; root holes				Sandstone interbed @ 5' has FeO staining
2' - 7'	BEDROCK; TQs, Orangish-brown, fine- to coarse-grained silty sandstone with pebble interbeds; dense; dry @ 5' Orangish-tan sandstone; dense; dry	N 82 W 37 SW Ex. N 81 W 36 S Ex.			Both attitudes in Ss/Slt Contacts No Ground Water No Caving
	N 64 W				TD 7 Ft.

SCALE 1" = 5 Ft.



ALLAN E. SEWARD

JOB NO. 7-806-4

LOGGED BY VCG

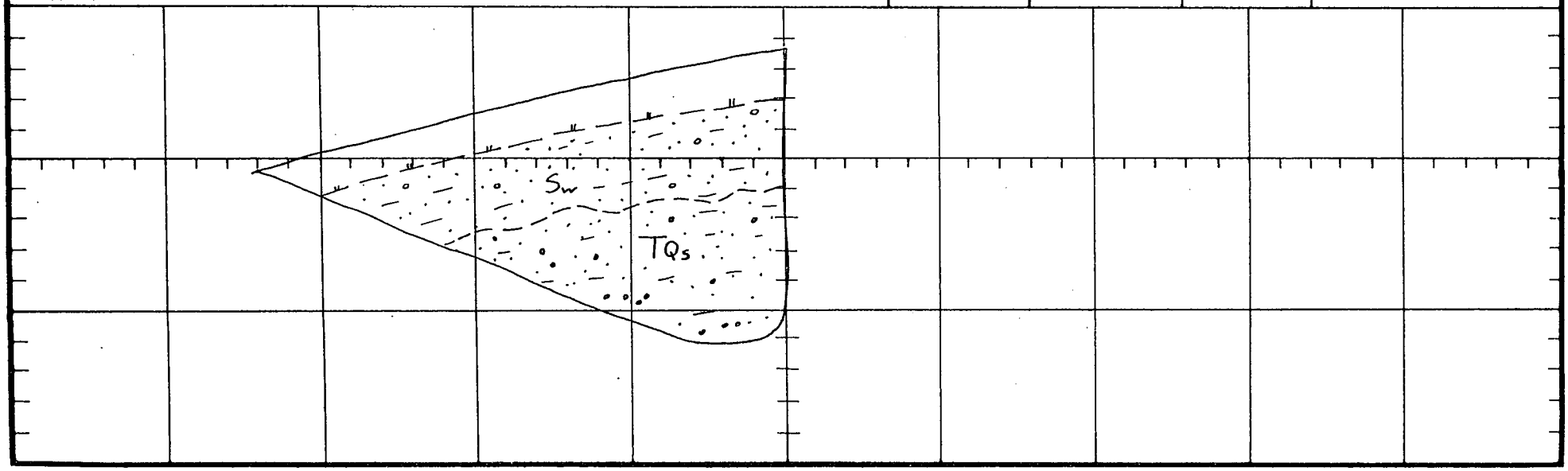
Trench Log No. 22

PROJECT Petrominerals

DATE 10/30/87

LITHOLOGY		BEDDING	FAULTING	JOINTS	COMMENTS
0 - 2'	SOIL; Grayish-brown, fine- to medium-grained silty sand with scattered pebbles; dense; dry				
2' - 5'	SLOPEWASH; Sw, Light-brown, fine- to medium-grained silty sand with isolated pebbles and rootlets; dense; dry				Contact gradational between Sw & TQs
5' - 10'	BEDROCK; TQs, Reddish-brown, fine- to coarse-grained silty sandstone with scattered pebbles; dense to very dense; slightly moist	Massive			
	N 12 E				No Ground Water No Caving TD 10 Ft.

SCALE 1" = 5 Ft.



ALLAN E. SEWARD

JOB NO. 7-806-4

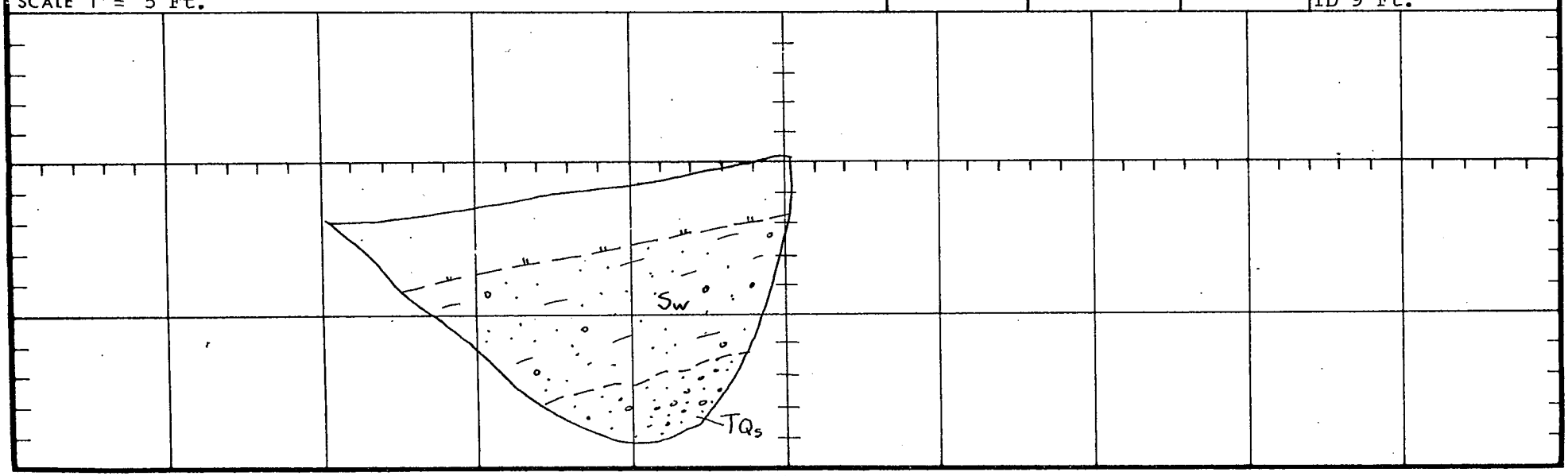
LOGGED BY VCG

Trench Log No. 23

PROJECT Petrominerals

DATE 10/30/87

LITHOLOGY		BEDDING	FAULTING	JOINTS	COMMENTS
0 - 2'	SOIL; Moderate-to grayish-brown, fine- to medium-grained silty sand with isolated pebbles; loose; dry; root holes				
2' - 7½'	SLOPEWASH; Sw, Moderate-to light brown, fine- to coarse-grained silty sand with isolated pebbles and cobbles; dense; dry				Contact between Sw/TQs gradational
7½' - 9'	BEDROCK; TQs, Light tannish-brown, medium- to coarse-grained sandstone with scattered pebbles; dense; dry	N 78 E 25 SE Approx.			
	N 63 W				No Ground Water No Caving
SCALE 1" = 5 Ft.					TD 9 Ft.



ALLAN E. SEWARD

JOB NO. 7-806-4

LOGGED BY VCG

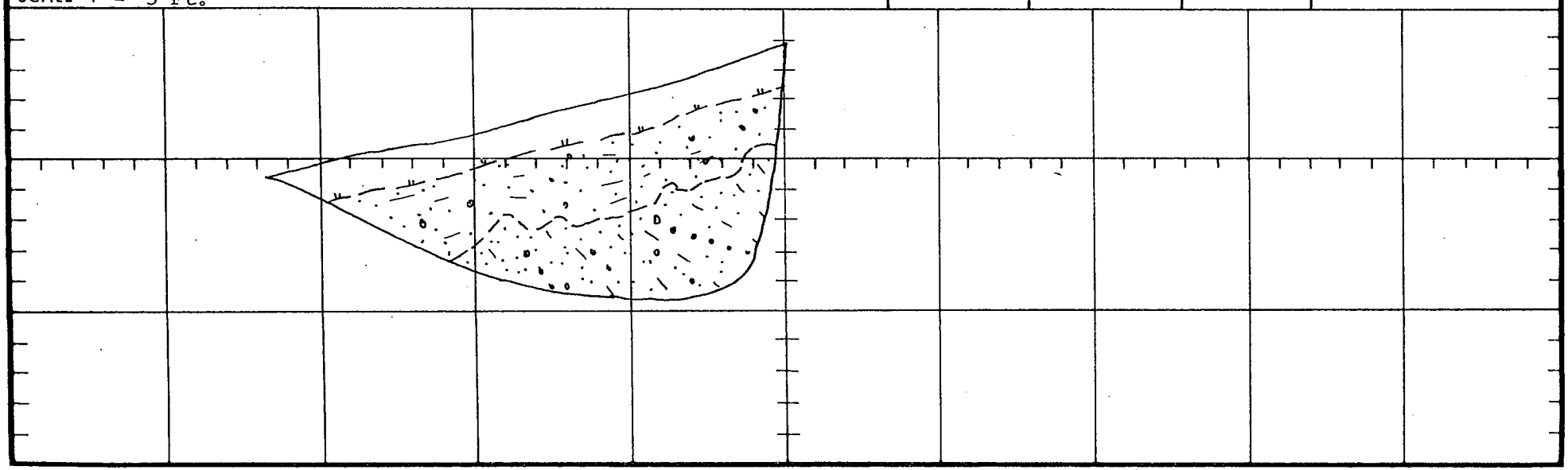
Trench Log No. 24

PROJECT Petrominerals

DATE 10/30/87

LITHOLOGY		BEDDING	FAULTING	JOINTS	COMMENTS
0 - 1½'	SOIL; Grayish-brown, fine- to coarse-grained silty sand with scattered pebbles; loose; dry				
1½' - 4'	SLOPEWASH; Sw, Orangish-brown, medium- to coarse-grained silty sand with isolated cobbles; dense; dry				Contact between Sw/TQs irregular
4' - 8'	BEDROCK; TQs, Light tannish-brown, medium- to coarse-grained silty sandstone with isolated pebbles; dense to very dense; dry	Massive N 84 E 33 S Approx.			
	N 32 E				No Ground Water No Caving TD 8 Ft.

SCALE 1" = 5 Ft.



ALLAN E. SEWARD

JOB NO. 7-806-4

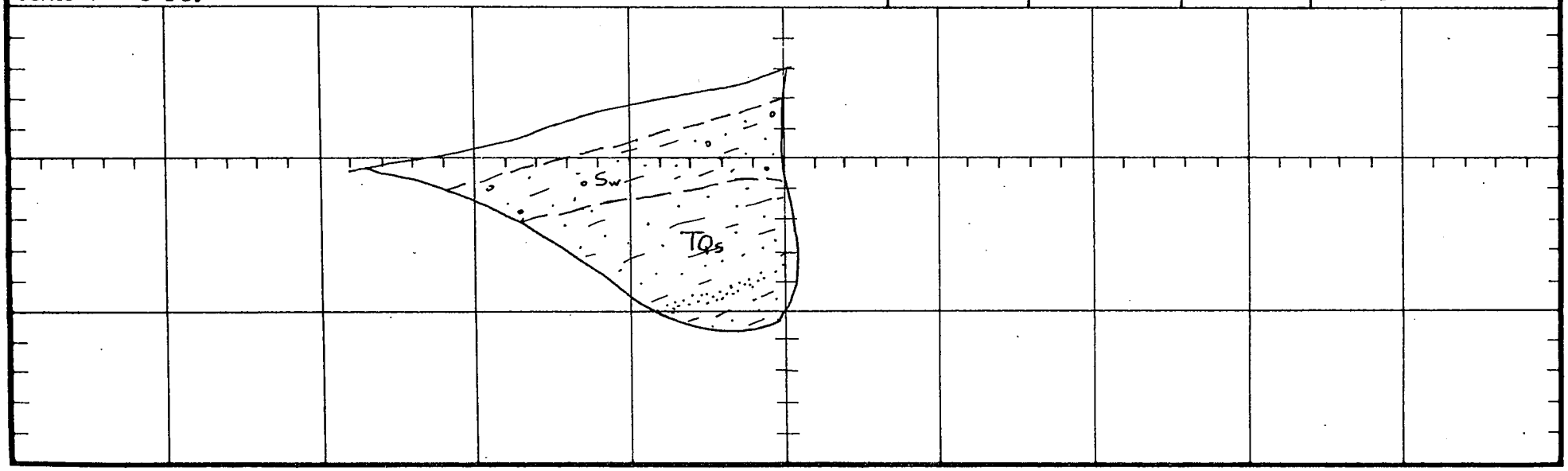
LOGGED BY VCG

Trench Log No. 25

PROJECT Petrominerals

DATE 10/30/87

LITHOLOGY		BEDDING	FAULTING	JOINTS	COMMENTS
0 - 1'	SOIL; Grayish-brown, fine- to coarse-grained silty sand with isolated pebbles; dry; loose; roots				Trenches 25 through 38 excavated 8/14/87 with a tractor hoe using a 24" bucket
1' - 3½'	SLOPEWASH; Sw, Orangish-brown, fine- to medium-grained; silty sand with scattered pebbles; moderately dense; dry				
3½' - 8½'	BEDROCK; TQs, Light yellowish-tan, fine- to coarse-grained silty sandstone; dense; damp @ 7' 4" thick sandstone interbed; dense; damp	N 83 E 35 SE Ex.			
	N 83 W				No Ground Water No Caving
SCALE 1" = 5-Ft.					TD 8½ Ft.



ALLAN E. SEWARD

JOB NO. 7-806-4

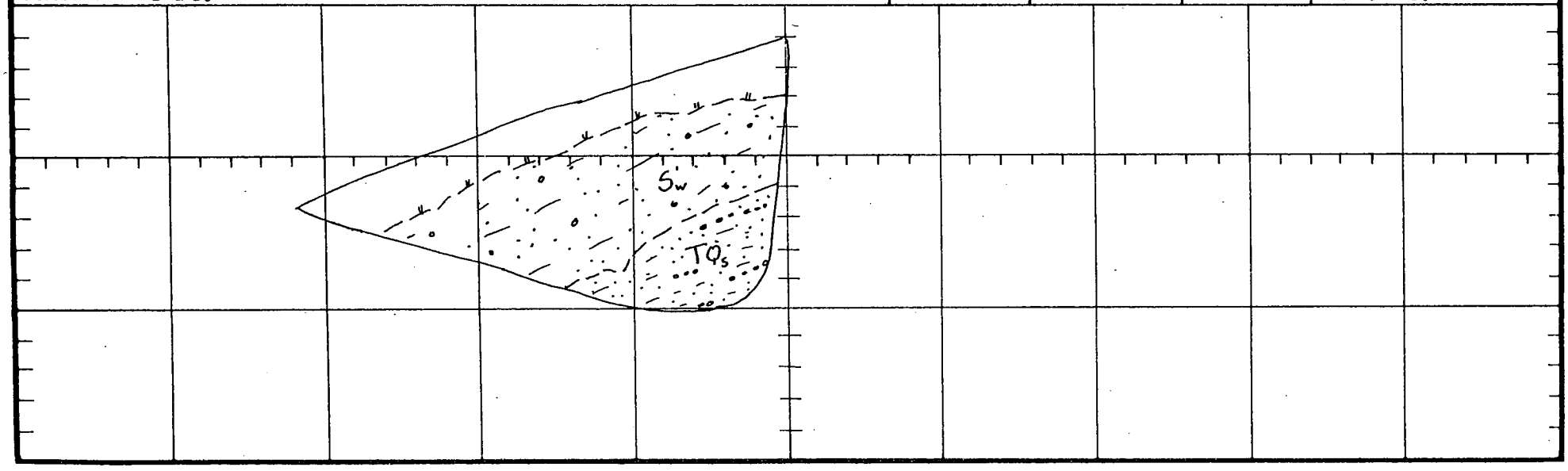
LOGGED BY VCG

Trench Log No. 26

PROJECT Petrominerals

DATE 10/30/87

LITHOLOGY		BEDDING	FAULTING	JOINTS	COMMENTS
0 - 2'	SOIL; Moderate- to grayish-brown, fine- to coarse-grained silty sand with scattered pebbles; loose; dry; root voids				5% - 10% Voids in soil
2' - 5'	SLOPEWASH; Sw, Brownish-yellow, fine- to coarse-grained silty sand with isolated pebbles; dense; dry				
5' - 9'	BEDROCK; TQs, Reddish-yellow to tannish-brown, fine- to coarse-grained silty sandstone with conglomerate interbeds; dense; damp	N 80 E 32 SE Ss/Cgl			
	N 85 E				No Ground Water No Caving
SCALE 1" = 5 Ft.					TD 9 Ft.



ALLAN E. SEWARD

JOB NO. 7-806-4

LOGGED BY VCG

Trench Log No. 27

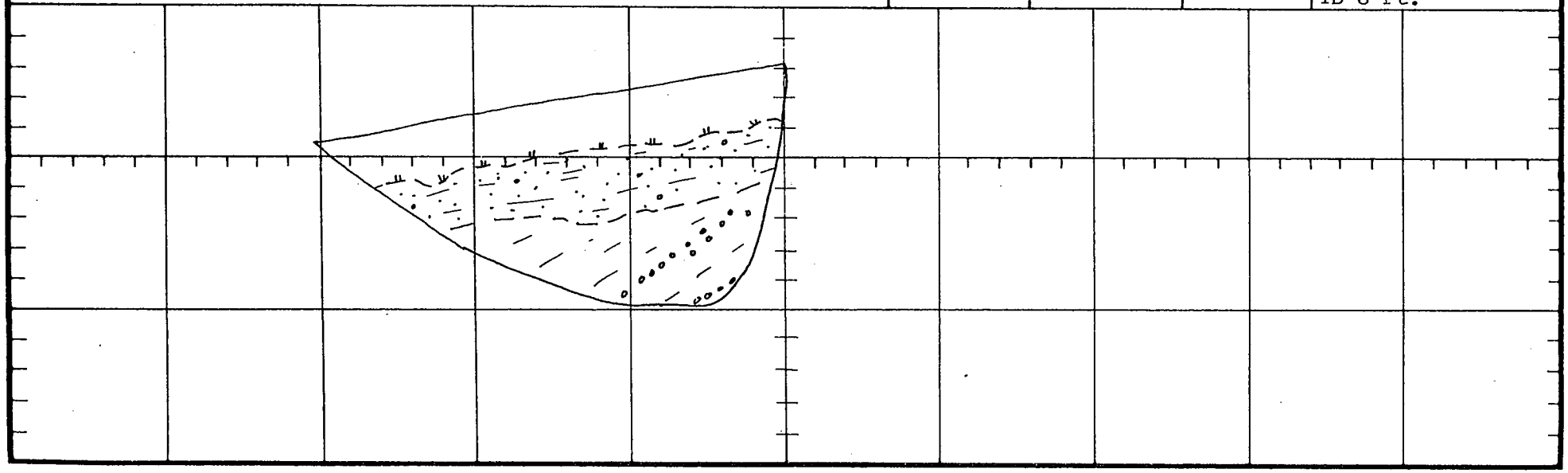
PROJECT Petrominerals

DATE 10/30/87

LITHOLOGY		BEDDING	FAULTING	JOINTS	COMMENTS
0 - 2'	SOIL; Light grayish-brown, fine to coarse silty sand with scattered pebbles; loose; dry; rootlets				
2' - 4½'	SLOPEWASH; Sw, Orangish-brown, fine- to medium-grained silty sand with isolated pebbles; dense; dry				Contact Sw/TQs gradational
4½' - 8'	BEDROCK; TQs, Orangish-brown, fine- to coarse-grained silty sandstone; dense; dry to damp; @ 5' pebble conglomerate; dense; dry @ 7½' pebbly sandstone	N 87 W 32 SW Ex. N 88 W 32 SW			No Ground Water No Caving TD 8 Ft.

N 21 E

SCALE 1" = 5 Ft.



ALLAN E. SEWARD

JOB NO. 7-806-4

LOGGED BY VCG

Trench Log No. 28

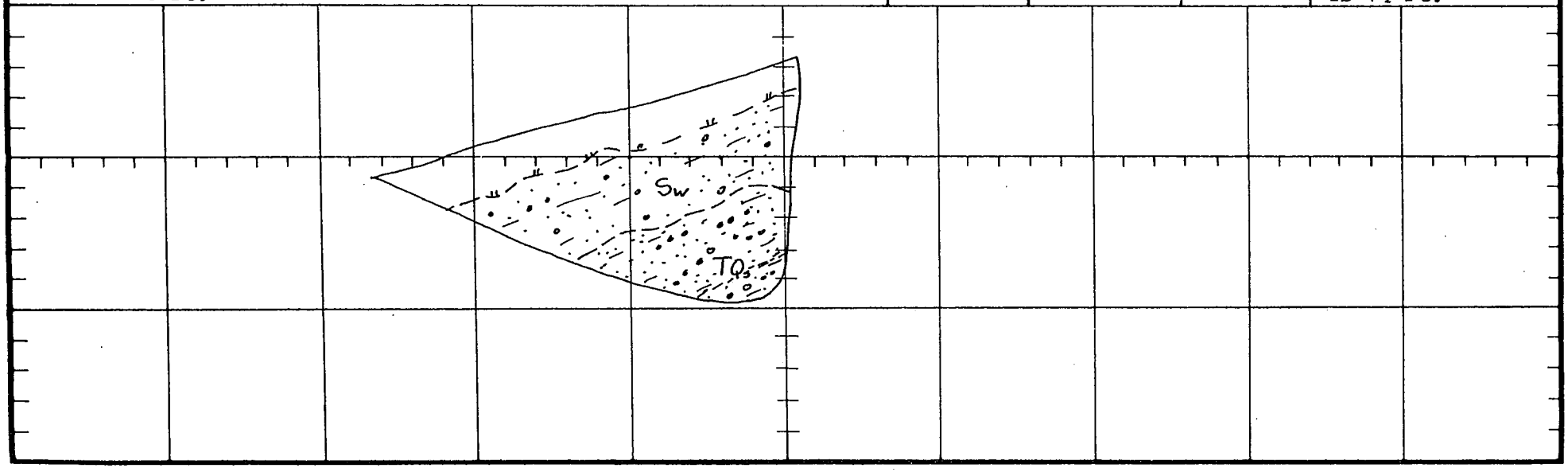
PROJECT Petrominerals

DATE 10/30/87

LITHOLOGY		BEDDING	FAULTING	JOINTS	COMMENTS
0 - 1'	SOIL; Medium- to grayish-brown, fine- to coarse-grained silty sand with isolated pebbles; loose; dry				
1' - 4'	SLOPEWASH; Sw, Yellowish-orange, fine- to coarse-grained silty sand with scattered pebbles and cobbles; dense; dry				
4' - 7½'	BEDROCK; TQs, Yellowish-orange, medium- to coarse-grained pebble conglomerate; dense to very dense; damp @ 6' Siltstone interbed @ 7' Light tannish-brown, medium- to coarse-grained pebbly sandstone; dense to very dense; damp	N 81 W 36 SW Ex.			No Ground Water No Caving TD 7½ Ft.

N 46 W

SCALE 1" = 5 Ft.



ALLAN E. SEWARD

JOB NO. 7-806-4

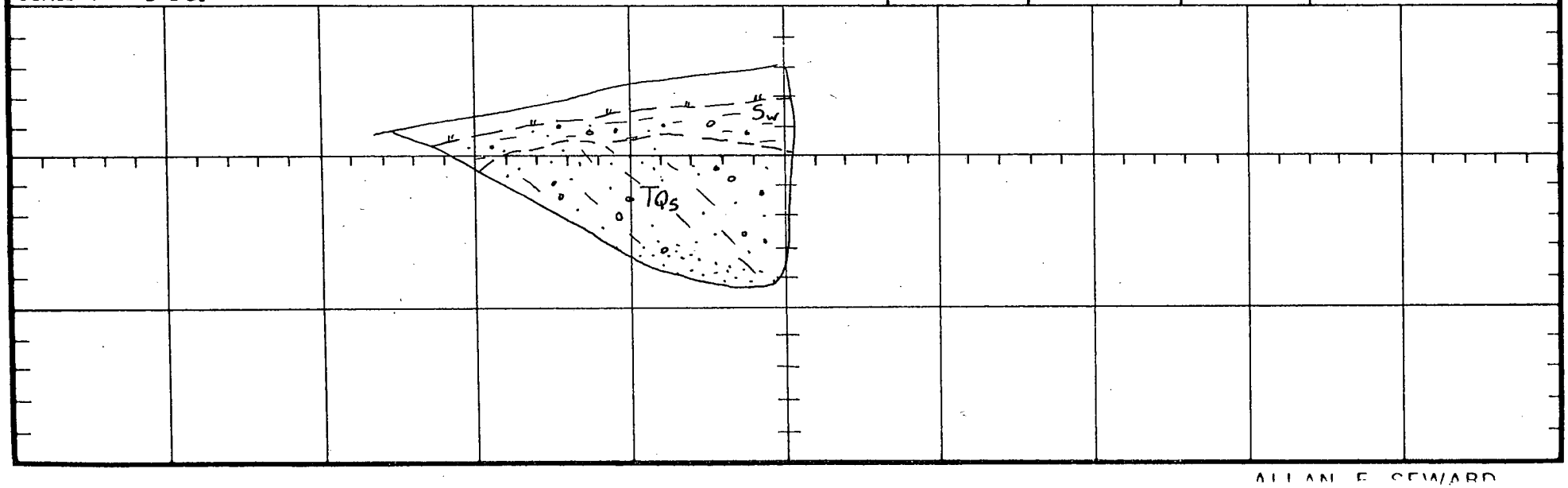
LOGGED BY VCG

Trench Log No. 29

PROJECT Petrominerals

DATE 10/30/87

LITHOLOGY		BEDDING	FAULTING	JOINTS	COMMENTS
0 - 1'	SOIL; Moderate- to light-brown, fine- to medium-grained silty sand with scattered pebbles and cobbles; loose; dry				
1' - 2½'	SLOPEWASH; Sw, Light orangish-brown, fine- to coarse-grained silty sand with scattered cobbles; moderately dense to dense; dry				
2½' - 7'	BEDROCK; TQs, Orangish-brown, fine- to coarse-grained silty sandstone with isolated pebbles; dense; damp @ 6' Coarse sandstone with FEO stain	N 66 W 31 SW			Attitude off of pebble interbed
	N 60 E				No Ground Water No Caving
SCALE 1" = 5 Ft.					TD 7 Ft.



ALLAN E. SEWARD

JOB NO. 7-806-4

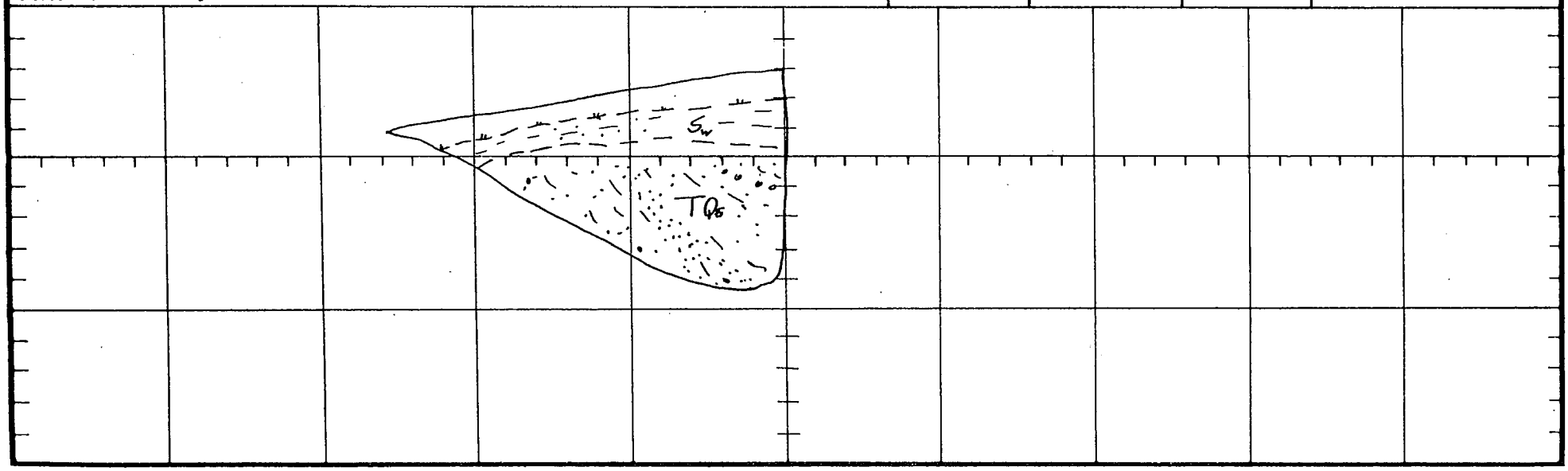
LOGGED BY VCG

Trench Log No. 30

PROJECT Petromineral

DATE 10/30/87

LITHOLOGY		BEDDING	FAULTING	JOINTS	COMMENTS
0 - 1'	SOIL; Moderate-brown to grayish-brown, fine- to coarse-grained silty sand with scattered pebbles; loose; dry				
1' - 3'	SLOPEWASH; Sw, Reddish-brown, medium- to coarse-grained pebbly sand; dense; moist				Sw might be Qt?
3' - 7'	BEDROCK; TQs, Light yellowish-brown, fine- to coarse-grained silty sandstone; dense to very dense; damp; @ 4' Pebble interbed	Approx N 84 E 14 NW			Irregular contact between Sw/TQs; may be N dipping
	N 87 E				No Ground Water No Caving
SCALE 1" = 5 Ft.					TD 7 Ft.



ALLAN E. SEWARD

JOB NO. 7-806-4

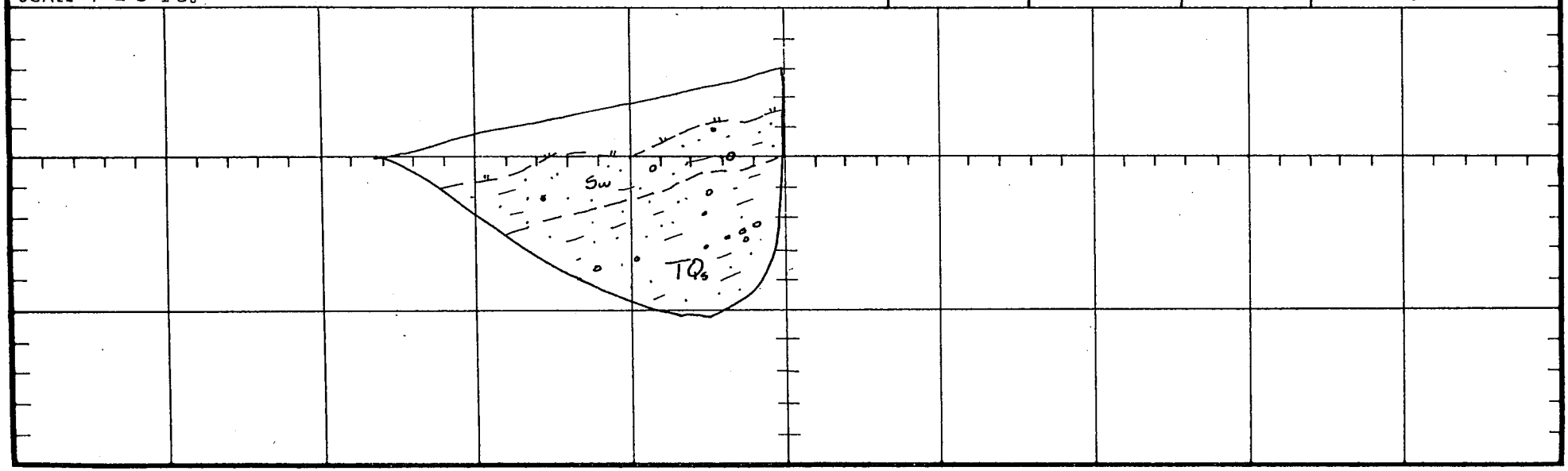
LOGGED BY VCG

Trench Log No. 31

PROJECT Petromineral

DATE 10/30/87

LITHOLOGY		BEDDING	FAULTING	JOINTS	COMMENTS
0 - 2'	SOIL; Grayish-brown, fine- to coarse-grained silty sand with scattered pebbles and cobbles; loose; dry; root holes				10% Voids in soil
2' - 4'	SLOPEWASH; Sw, Reddish-brown, fine- to coarse-grained silty sand with scattered pebbles and cobbles; dense; damp				
4' - 8'	BEDROCKl TQs, Light reddish-brown to orangish-brown, silty sandstone with isolated pebbles; dense; damp @ 6' Orangish-brown, pebble interbed; dense; damp	N 62 W 14 SW Approx?			
	N 5 E				No Ground Water No Caving
SCALE 1" = 5 Ft.					TD 8 Ft.



ALLAN E. SEWARD

JOB NO. 7-806-4

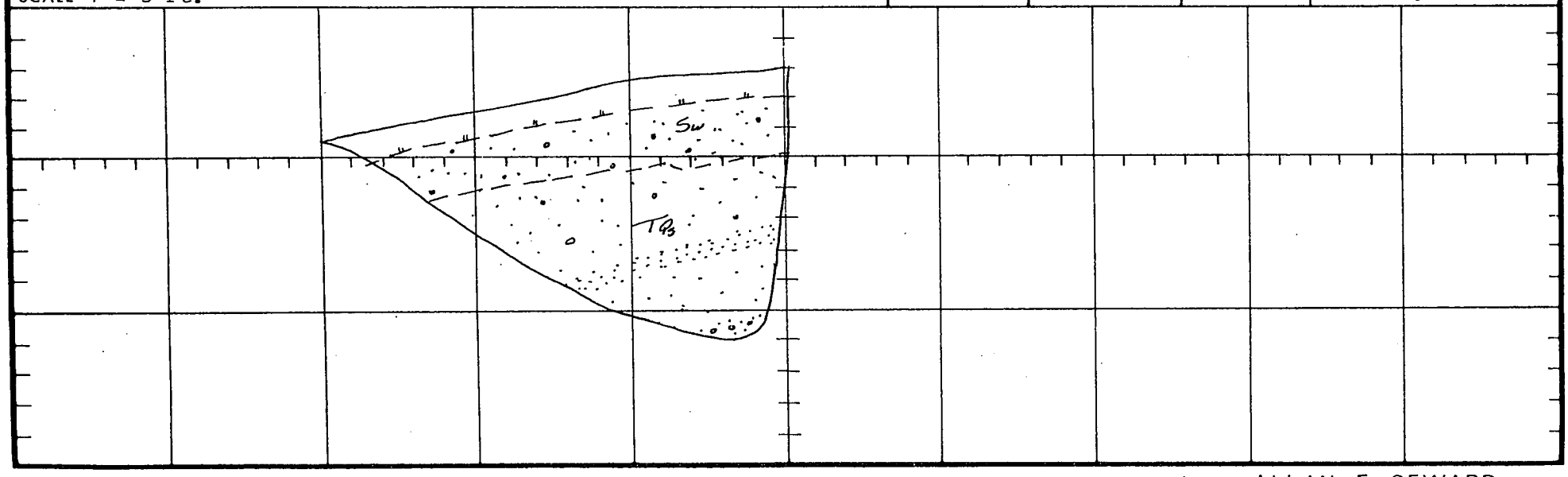
LOGGED BY VCG

Trench Log No. 32

PROJECT Petrominerals

DATE 10/30/87

LITHOLOGY		BEDDING	FAULTING	JOINTS	COMMENTS
0 - 1'	SOIL; Grayish-brown, fine- to coarse-grained silty sand with isolated pebbles; loose; dry; root holes				Voids 5 - 10% in Soil
1' - 3'	SLOPEWASH; Sw, Yellowish-orange, fine- to coarse-grained silty sand with scattered pebbles; dense; dry				TQs mostly massive
3' - 9'	BEDROCK; TQs, Light orangish-yellow to tan, silty sandstone with scattered pebbles and cobbles; dense; dry @ 6' Tan, medium- to coarse-grained sandstone; friable @ 8' Orangish-yellow pebbly sandstone	N 37 W 19 SW Approx?			Attitude very approximate No Ground Water
	N 25 E				No Caving
SCALE 1" = 5 Ft.					TD 9 Ft.



ALLAN E. SEWARD

JOB NO. 7-806-4

LOGGED BY VCG

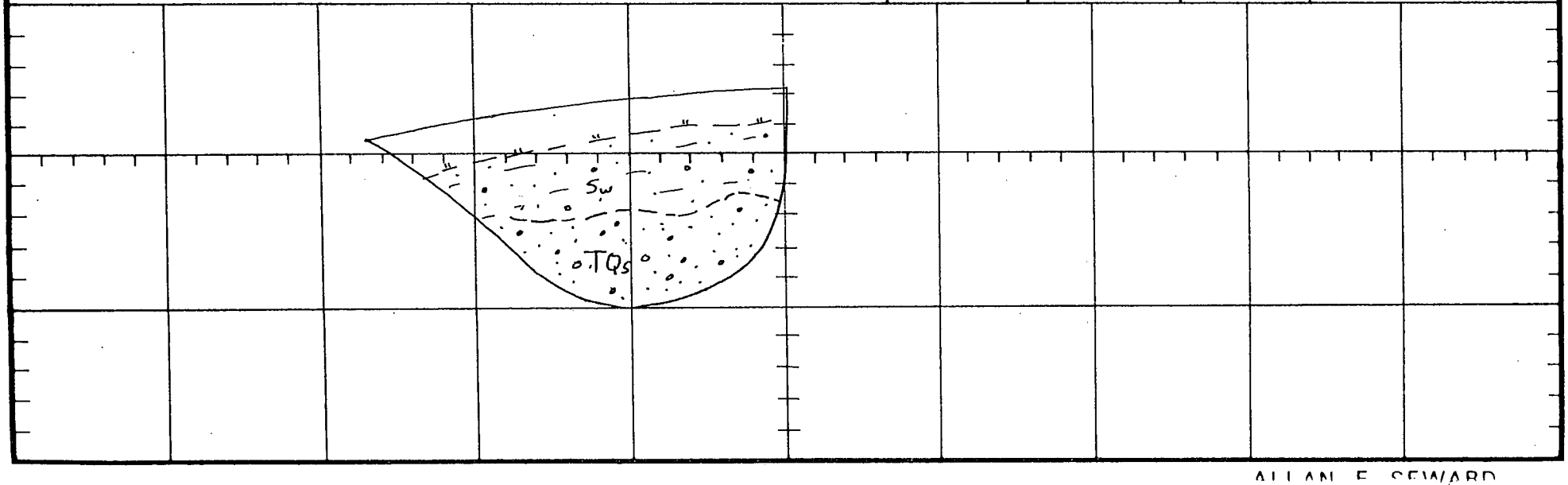
Trench Log No. 33

PROJECT Petrominerals

DATE 10/30/87

LITHOLOGY		BEDDING	FAULTING	JOINTS	COMMENTS
0 - 1'	SOIL; Moderate- to gray-brown, fine- to coarse-grained silty sand with isolated pebbles; loose; dry				
1' - 3½'	SLOPEWASH; Sw, Orangish-tan, fine- to coarse-grained silty sand with isolated pebbles; dense; dry				
3½' - 7'	BEDROCK; TQs, Yellowish-tan, medium- to coarse-grained pebbly sandstone; dense to very dense; damp	Massive			
	N 10 W				No Ground Water No Caving TD 7 Ft.

SCALE 1" = 5 Ft.



ALLAN E. SEWARD

JOB NO. 7-806-4

LOGGED BY VCG

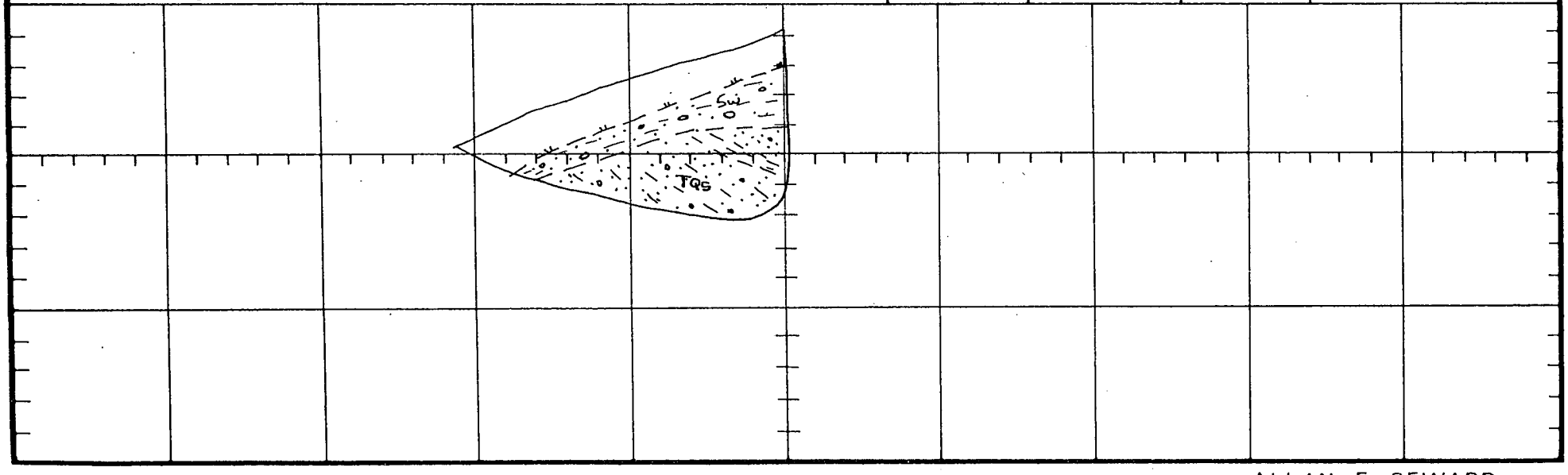
Trench Log No. 34

PROJECT Petrominerals

DATE 10/30/87

LITHOLOGY		BEDDING	FAULTING	JOINTS	COMMENTS
0 - 1'	SOIL; Moderate- to grayish-brown, fine- to coarse-grained silty sand with isolated pebbles and gravel; loose; dry				
1' - 3'	SLOPEWASH; Sw, Orangish-brown, fine- to coarse silty sand with scattered pebbles and cobbles; dense; dry				
3' - 6'	BEDROCK; TQs, Yellowish-tan to orange, fine- to coarse-grained silty sandstone with scattered pebbles; dense to very dense; damp @ 4' 2" thick siltstone interbed	N 78 W 31 NE Ex.			
	N 60 E				No Ground Water No Caving TD 6 Ft.

SCALE 1" = 5 Ft.



ALLAN E. SEWARD

JOB NO. 7-806-4

LOGGED BY VCG

Trench Log No. 35

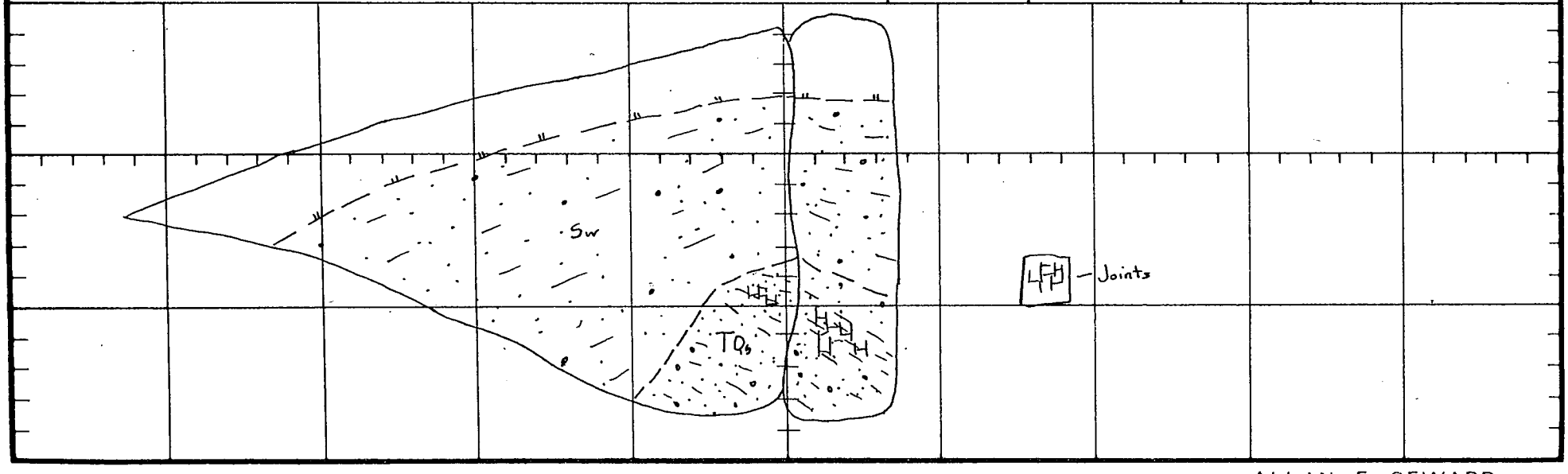
PROJECT Petrominerals

DATE 10/30/87

LITHOLOGY		BEDDING	FAULTING	JOINTS	COMMENTS
0 - 2'	SOIL; Brownish-gray, fine- to coarse-grained silty sand with isolated pebbles; loose; dry				
2' - 7½'	SLOPEWASH; Sw, Orangish-brown, fine- to coarse-grained silty sand with scattered pebbles; dense; damp				
7½' - 12½'	BEDROCK; TQs, Light yellowish-tan, fine- to medium-grained sandstone with scattered pebbles; dense; damp @ 8' - 10' Siltstone - light tannish-brown; dense; damp	N 76 E 26 NW Ex.			TQs - 8 - 10' siltstone jointed with caliche in cracks - random orientation No Ground Water No Caving TD 12½ Ft.

N 12 W

SCALE 1" = 5 Ft.



ALLAN E. SEWARD

JOB NO. 7-806-4

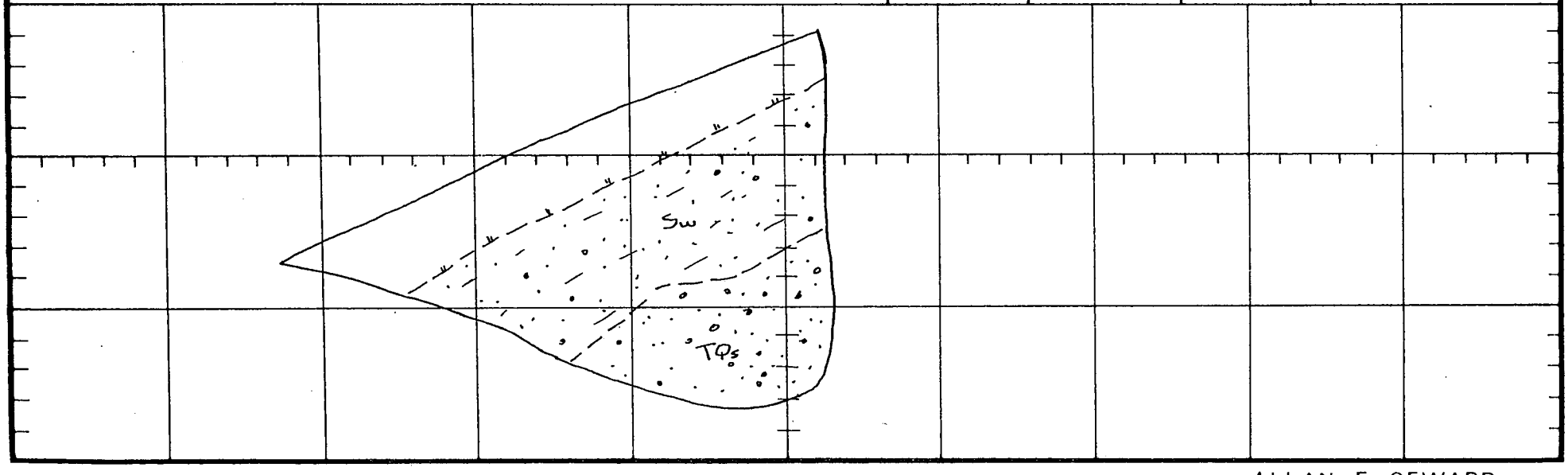
LOGGED BY VCG

Trench Log No. 36

PROJECT Petrominerals

DATE 10/30/87

LITHOLOGY		BEDDING	FAULTING	JOINTS	COMMENTS
0 - 1'	SOIL; Medium- to grayish-brown, fine- to coarse-grained silty sand with isolated pebbles; loose; dry; rootlets				Voids - 5 - 10% in soil
2' - 7½	SLOPEWASH; Sw, Reddish-brown, fine- to coarse-grained silty sand with scattered pebbles and cobbles; dense; damp				
7' - 14'	BEDROCK; TQs, Yellowish-orange to tan, medium- to coarse-grained pebbly sandstone with isolated cobbles; dense to very dense; damp	Massive			TQs - May be horizontal
	N 73 E				No Ground Water No Caving
SCALE 1" = 5 Ft.					TD 14 Ft.



JOB NO. 7-806-4

LOGGED BY VCG

Trench Log No. 37

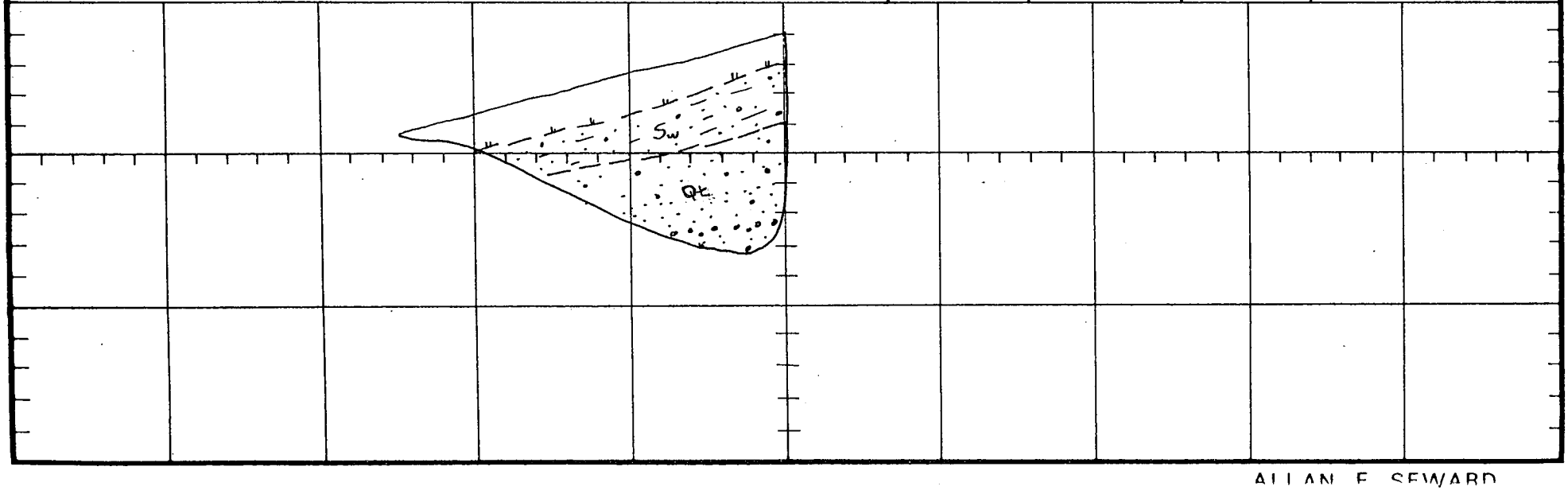
PROJECT Petrominerals

DATE 10/30/87 (Rev. 1/15/99)

LITHOLOGY		BEDDING	FAULTING	JOINTS	COMMENTS
0 - 1'	SOIL; Medium- to grayish-brown, fine- to coarse-grained silty sand with scattered pebbles and cobbles; loose; dry				Voids 5 - 10% in soil
1' - 3'	SLOPEWASH; Sw, Light orangish-tan, fine- to medium-grained silty sand with isolated pebbles; dense; dry				
3' - 7'	QUATERNARY TERRACE; Qt, Orangish-tan, medium- to coarse-grained pebbly sandstone; dense to very dense; damp @ 6' A cobble conglomerate interbed	N 19 W 6 NE Approx?			
					No Ground Water
					No Caving
					TD 7 Ft.

N 51 E

SCALE 1" = 5 Ft.



ALLAN E. SEWARD

JOB NO. 7-806-4

LOGGED BY VCG

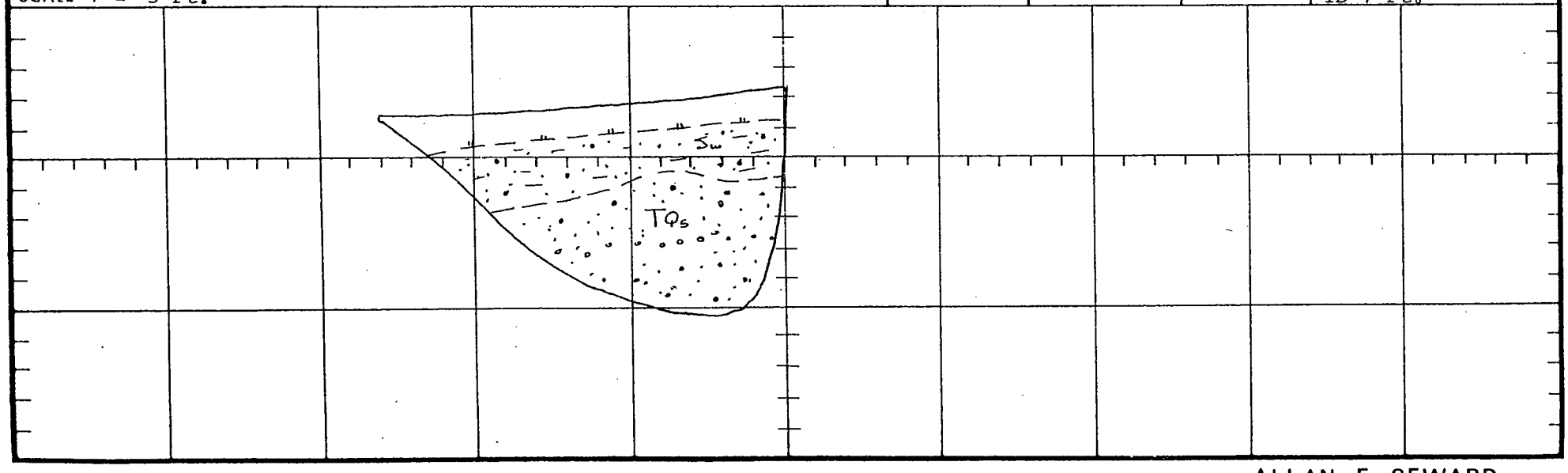
Trench Log No. 38

PROJECT Petrominerals

DATE 10/30/87

LITHOLOGY		BEDDING	FAULTING	JOINTS	COMMENTS
0 - 1'	SOIL; Grayish-brown, fine to coarse silty sand with isolated pebbles; loose; dry				
1' - 3½'	SLOPEWASH; Sw, Light orangish-tan, fine to coarse silty sand with isolated pebbles and cobbles; dense; damp				
3½' - 7'	BEDROCK; TQs, Reddish-brown to tannish-orange, medium-to coarse-grained pebbly sandstone with isolated cobbles; dense to very dense; damp @ 5' Pebble conglomerate; 3" thick	N 72 W 10 NE Approx?			
	N 15 E				No Ground Water No Caving TD 7 Ft.

SCALE 1" = 5 Ft.



ALLAN E. SEWARD

JOB NO. 6-806-4

LOGGED BY VCG

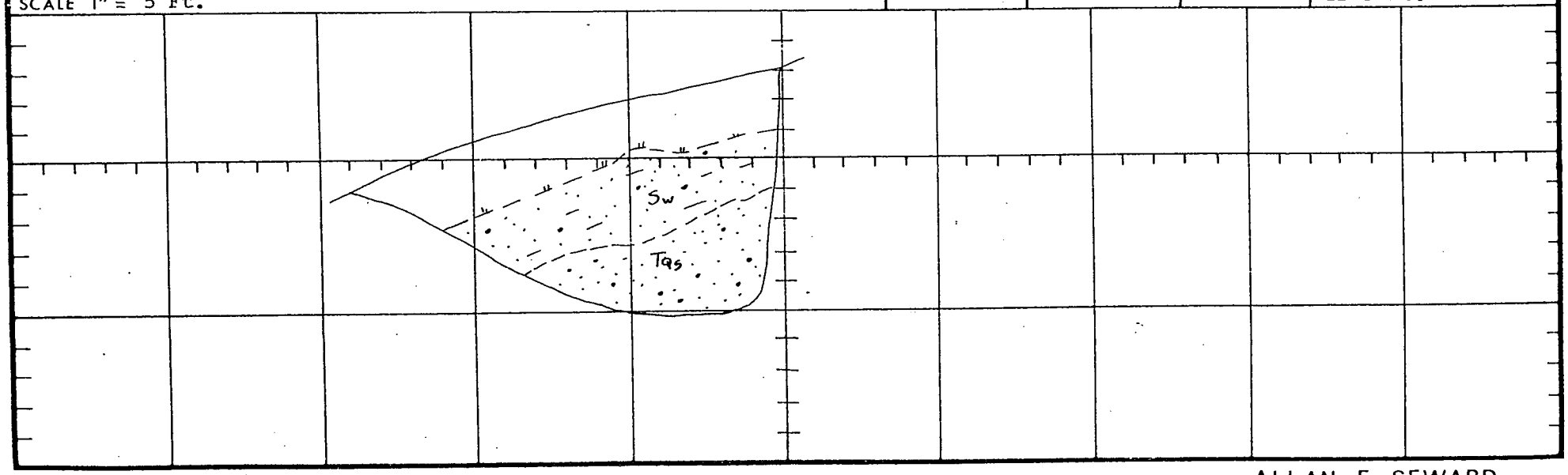
Trench Log No. 39

PROJECT Petrominerals

DATE 10/30/87

LITHOLOGY		BEDDING	FAULTING	JOINTS	COMMENTS
0 - 2'	SOIL; Medium- to grayish-brown, fine- to coarse-grained silty sand with scattered pebbles; loose; dry				Trenches 39 through 52 excavated 8/21/87 with a tractor hoe using a 24" bucket
2' - 4'	SLOPEWASH; Sw, Light orangish-brown, fine- to coarse-grained silty sand with isolated pebbles; loose to moderately dense; dry				
4' - 9'	BEDROCK; TQs, Orangish-brown, fine to coarse pebbly sandstone; dense; dry	N 77 W 23 SW			
	N 85 W				No Ground Water No Caving TD 9 Ft.

SCALE 1" = 5 Ft.



ALLAN E. SEWARD

JOB NO. 6-806-4

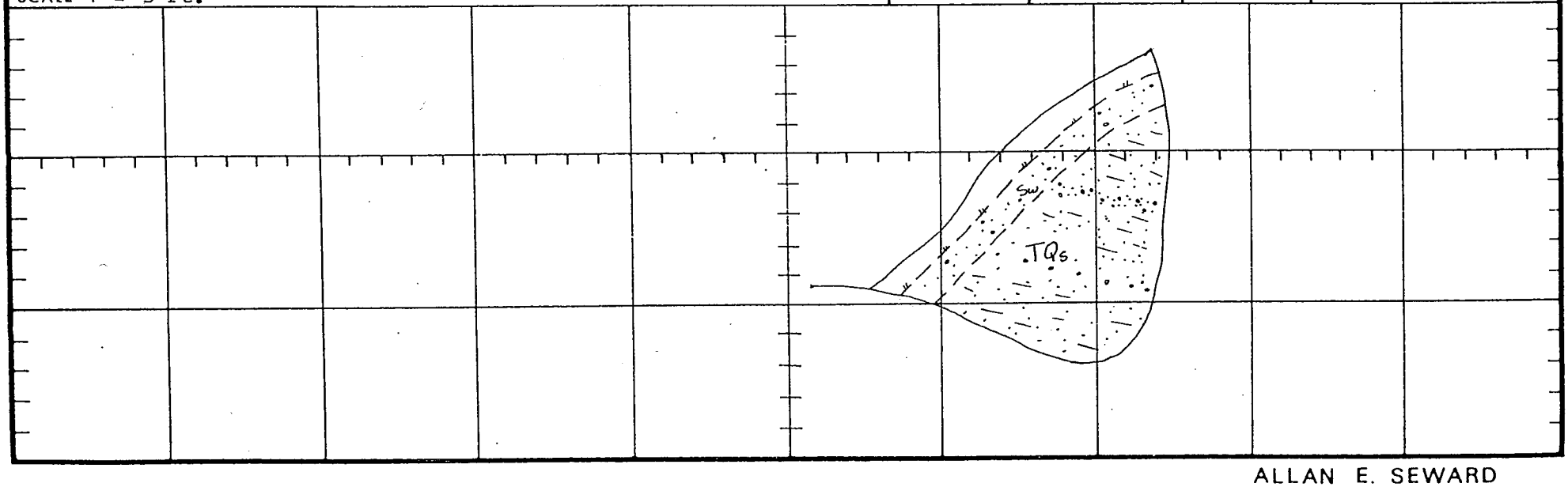
LOGGED BY VCG

Trench Log No. 40

PROJECT Petrominerals

DATE 10/30/87

LITHOLOGY		BEDDING	FAULTING	JOINTS	COMMENTS
0 - 1'	SOIL; Medium to light grayish-brown, fine- to coarse-grained silty sand with scattered pebbles; loose; dry				10% Voids in soil
1' - 2'	SLOPEWASH; Sw, Orangish-brown fine-to coarse-grained silty sand with isolated pebbles; loose to moderately dense; dry				
2' - 10'	BEDROCK; TQs, Orangish-brown to light tannish-brown, fine to coarse silty sandstone with pebbly sandstone interbeds	N 83 W 25 SW Ex.			
		N 84 W 25 SW Ex.			No Ground Water
	N 65 W				No Caving
SCALE 1" = 5 Ft.					TD 10 Ft.



ALLAN E. SEWARD

JOB NO. 6-806-4

LOGGED BY VCG

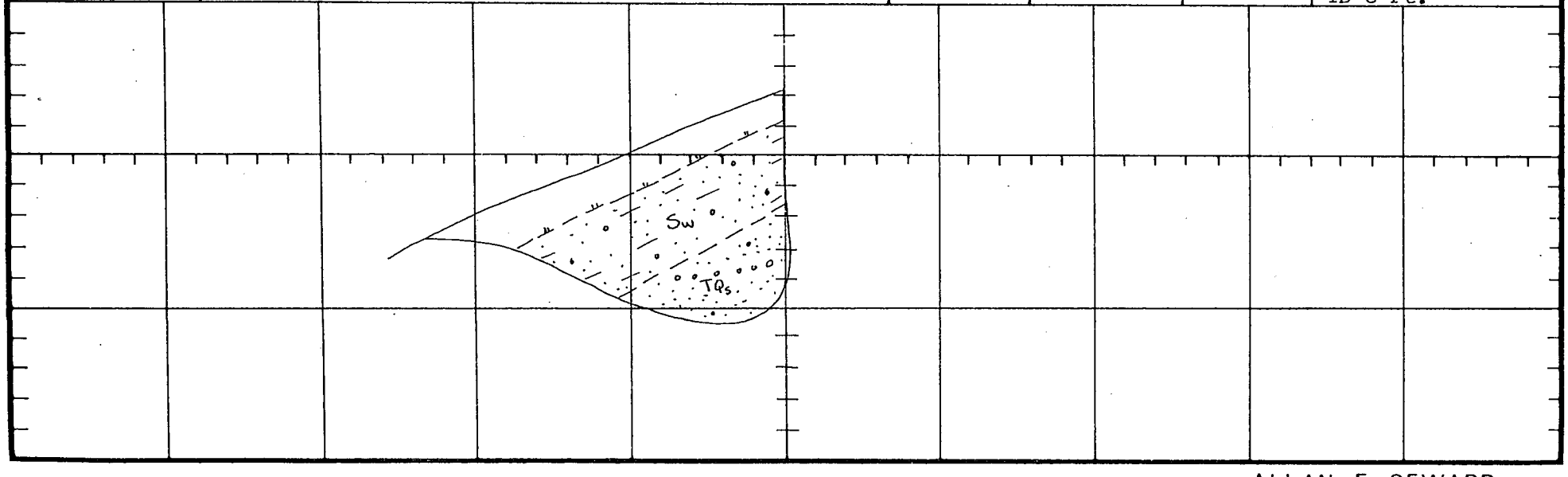
Trench Log No. 41

PROJECT Petrominerals

DATE 10/30/87

LITHOLOGY		BEDDING	FAULTING	JOINTS	COMMENTS
0 - 1'	SOIL; Light orangish-brown, fine- to coarse-grained silty sand with scattered pebbles; loose; dry				TQS Massive up to 6½ Ft.
1' - 4'	SLOPEWASH; Sw, Light reddish-brown, fine- to coarse-grained silty sand with isolated pebbles; dense; dry				
4' - 8'	BEDROCK; TQs, Tan- to orangish-brown, medium- to coarse-grained pebbly sandstone; dense to very dense; dry; @ 6½ Ft. Pebble conglomerate;	N 78 E 29 SE			
	N 10 W				No Ground Water No Caving TD 8 Ft.

SCALE 1" = 5 Ft.



ALLAN F. SEWARD

JOB NO. 6-806-4

LOGGED BY VCG

Trench Log No. 42

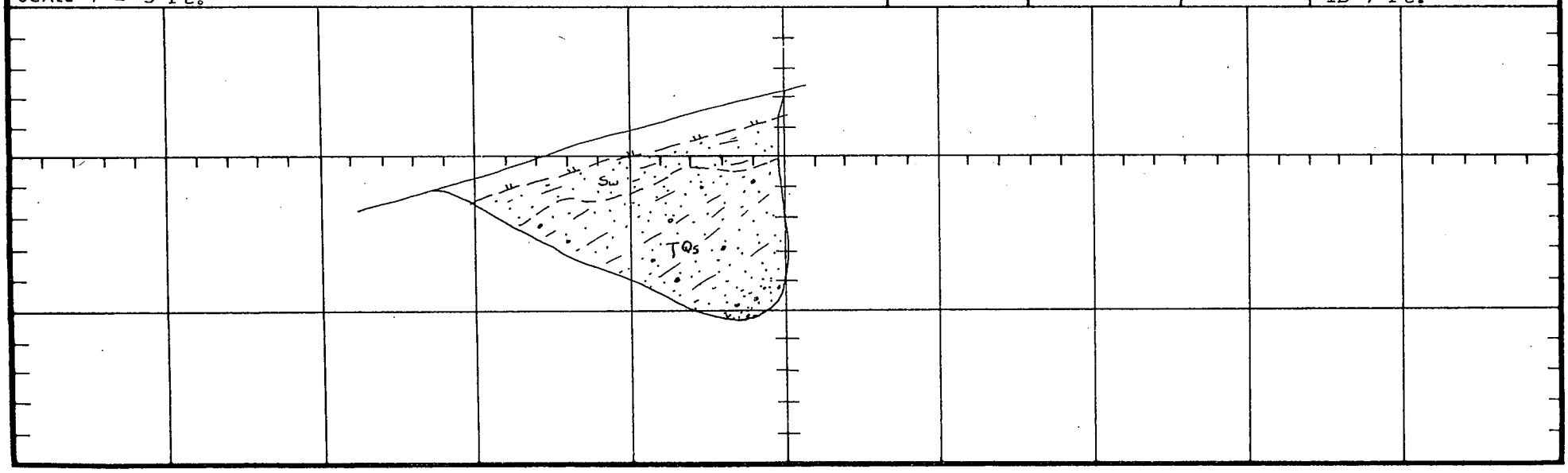
PROJECT Petrominerals

DATE 10/30/87

LITHOLOGY		BEDDING	FAULTING	JOINTS	COMMENTS
0 - ½'	SOIL; Light grayish-brown, fine- to coarse-grained silty sand with scattered pebbles; loose; dry				
½' - 2'	SLOPEWASH; Sw, Orangish-brown, fine- to coarse-grained silty sand with isolated pebbles; dense; dry				
2' - 7'	BEDROCK; TQs, Light yellowish-tan to light brown, fine-to coarse-grained silty sandstone; dense to very dense; dry; @ 6 Ft. Orangish-brown pebbly sandstone interbed; very dense; dry	N 72 E 29 SE Ex. N 75 E 29 SE Ex.			No Ground Water No Caving TD 7 Ft.

N 15 W

SCALE 1" = 5 Ft.



ALLAN E. SEWARD

JOB NO. 6-806-4

LOGGED BY VCG

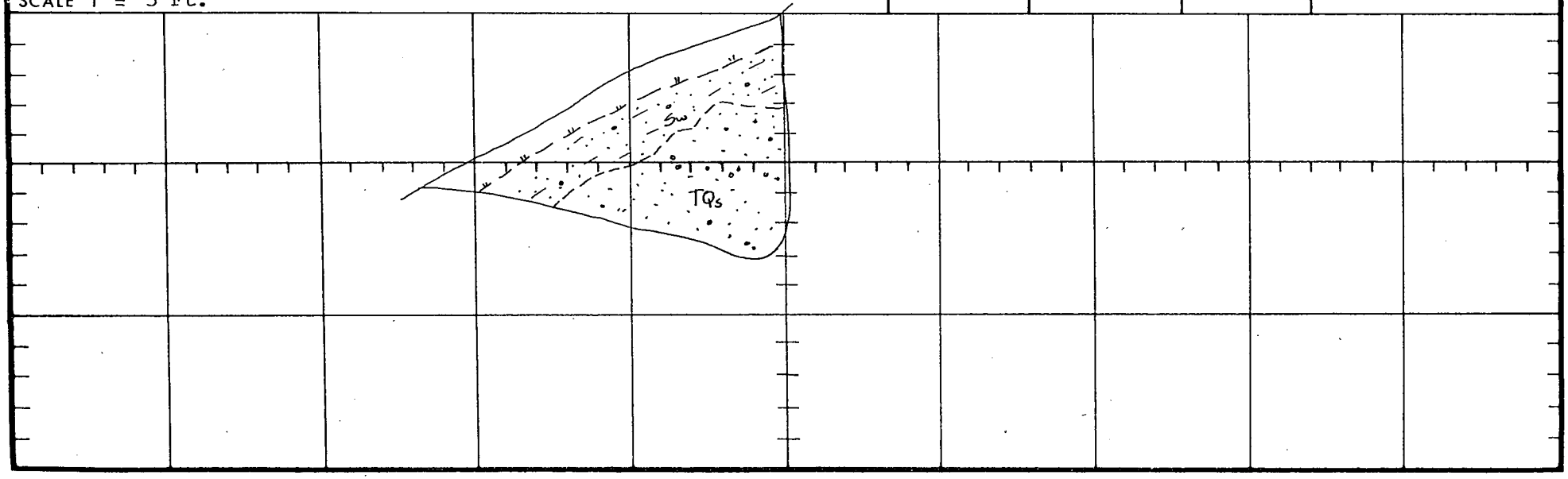
Trench Log No. 43

PROJECT Petrominerals

DATE 10/30/87

LITHOLOGY		BEDDING	FAULTING	JOINTS	COMMENTS
0 - 1'	SOIL; Light grayish-brown, fine- to coarse-grained, pebbly silty sand; loose; dry; rootlets				Voids in soil approx. 10%
1' - 3'	SLOPEWASH; Sw, Light orangish-brown, fine- to coarse-grained silty sand with scattered pebbles; loose to dense; dry				Sw irregular contact with TQs
3' - 8'	BEDROCK; TQs, Light orangish-brown, medium- to coarse-grained pebbly sandstone; dense; dry; @ 5½ Ft. Cobble conglomerate; very dense	N 80 E 32 SE Approx.			
	N 85 E				No Ground Water No Caving TD 8 Ft.

SCALE 1" = 5 Ft.



ALLAN E. SEWARD

JOB NO. 6-806-4

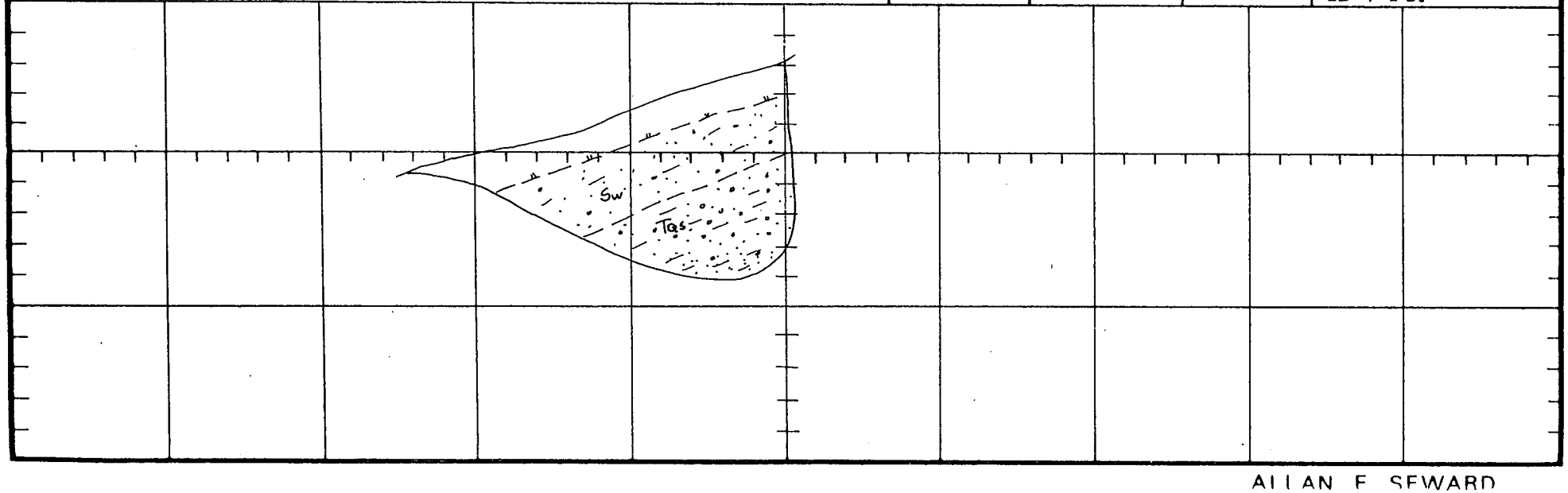
LOGGED BY VCG

Trench Log No. 44

PROJECT Petrominerals

DATE 10/30/87

LITHOLOGY		BEDDING	FAULTING	JOINTS	COMMENTS
0 - 1'	SOIL; Reddish- to grayish-brown, fine- to coarse-grained silty sand with scattered pebbles; loose; dry				
1' - 3'	SLOPEWASH; Sw, Reddish-brown, fine- to coarse-grained silty sand with scattered pebbles; dense; dry				Contact between pebbly Ss and Silty Ss is irregular
3' - 7'	BEDROCK; TQs, Reddish-brown, medium- to coarse-grained pebbly sandstone; dense to very dense; dry; @ 6½ Ft. Orangish-brown fine-to coarse-grained silty sandstone with scattered pebbles	N 40 E 26 SE Approx.			
					No Ground Water
	N 25 E				No Caving
SCALE 1" = 5 Ft.					TD 7 Ft.



ALLAN E. SEWARD

JOB NO. 6-806-4

LOGGED BY VCG

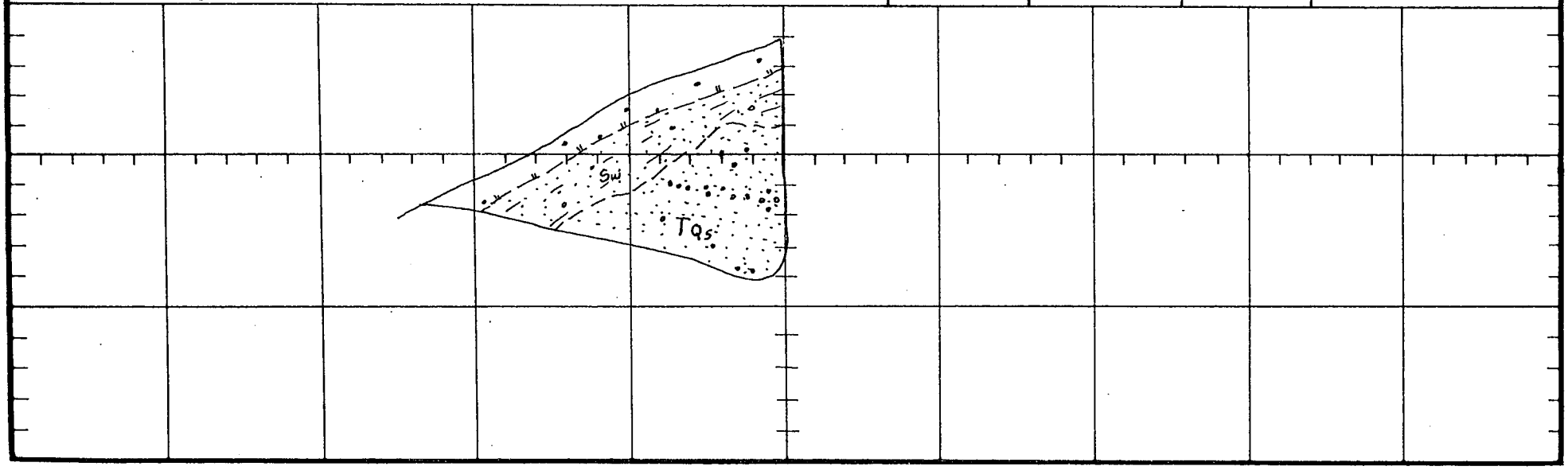
Trench Log No. 45

PROJECT Petrominerals

DATE 10/30/87

LITHOLOGY		BEDDING	FAULTING	JOINTS	COMMENTS
0 - ½'	SOIL; Reddish-brown to grayish-brown, medium- to coarse-grained silty sand with isolated pebbles; loose; dry				
½' - 3'	SLOPEWASH; Sw, Light tannish-brown, fine- to coarse-grained silty sand with isolated pebbles and cobbles; dense; dry				
3' - 7'	BEDROCK; TQs, Light tannish-brown to orangish-brown pebble conglomerate with medium- to coarse-grained sandstone interbeds; dense to very dense; dry	N 78 E 5 SE V. approx?			TQs/Qt?
	N 40 E				No Ground Water No Caving TD 7 Ft.

SCALE 1" = 5 Ft.



ALLAN E. SEWARD

JOB NO. 6-806-4

LOGGED BY VCG

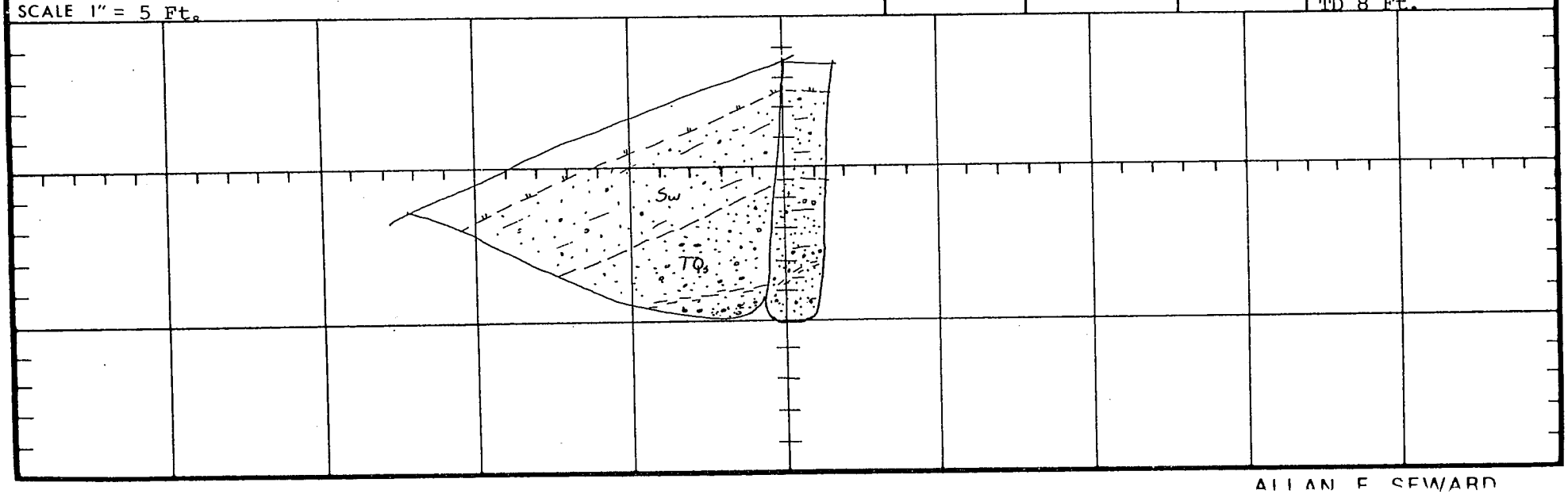
Trench Log No. 46

PROJECT Petrominerals

DATE 10/30/87

LITHOLOGY		BEDDING	FAULTING	JOINTS	COMMENTS
0 - 1'	SOIL; Medium- to light grayish-brown, fine- to coarse-grained silty sand with isolated pebbles; loose; dry				
1' - 4'	SLOPEWASH; Sw, Orangish- to tannish-brown, fine to coarse silty sand with scattered pebbles; dense; dry				Irregular contact between silty Ss and pebbly Ss
4' - 8'	BEDROCK; TQs, Light tannish-brown, pebbly sandstone with a silty sandstone interbed at 6½ Ft.	N 22 E 11 SE Approx?		N 18 W 90°	
	N 44 W				No Ground Water No Caving TD 8 Ft.

SCALE 1" = 5 Ft.



ALLAN E. SEWARD

JOB NO. 6-806-4

LOGGED BY VCG

Trench Log No. 47

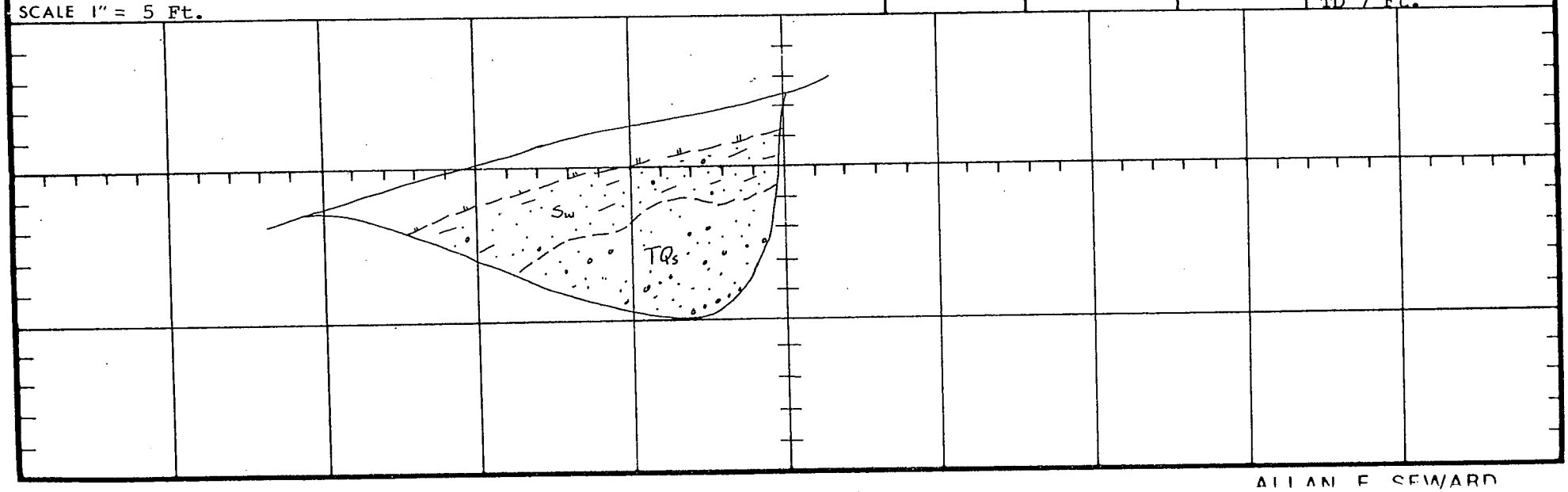
PROJECT Petrominerals

DATE 10/30/87

LITHOLOGY		BEDDING	FAULTING	JOINTS	COMMENTS
0 - 1'	SOIL; Medium- to grayish-brown, firm- to coarse-grained silty sand with scattered pebble; loose; dry				
1' - 3'	SLOPEWASH; Sw, Light-orangish-tan, fine- to coarse-grained silty sand with scattered pebbles; moderately dense to dense; dry				Sw/TQs Irregular contact
3' - 7'	BEDROCK; TQs, Light orangish-brown, medium- to coarse pebbly sandstone with pebble conglomerate interbeds; dense; dry to slightly damp	N 86 E 32 SE Ex. N 89 E 31 SE Ex.			No Ground Water No Caving TD 7 Ft.

N 38 E

SCALE 1" = 5 Ft.



ALLAN E. SEWARD

JOB NO. 6-806-5

LOGGED BY VCG

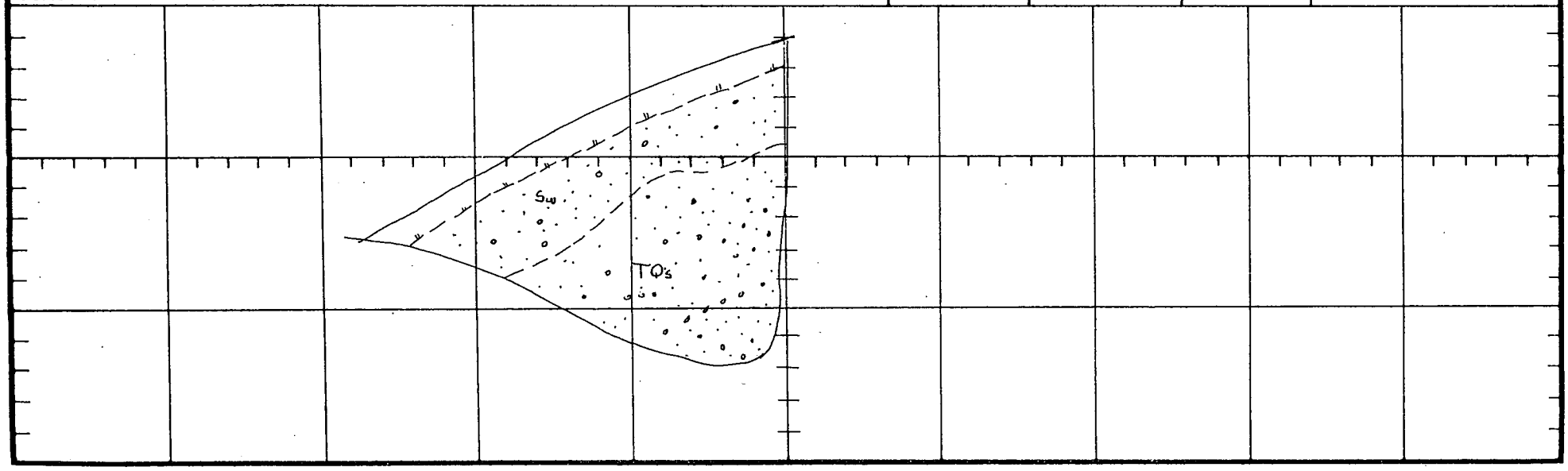
Trench Log No. 48

PROJECT Petrominerals

DATE 10/30/87

LITHOLOGY		BEDDING	FAULTING	JOINTS	COMMENTS
0 - 1'	SOIL; Light orange- to grayish-brown, fine- to coarse-grained silty sand with scattered pebbles; loose; dry				
1' - 3½'	SLOPEWASH; Sw, Reddish-brown, medium- to coarse-grained pebbly sand with scattered rootlets; moderately dense to dense; dry				
3½' - 11'	BEDROCK; TQs, Orangish-brown, medium- to coarse pebbly sandstone with pebble conglomerate lenses; dense; dry	Massive			
	N 85 E				No Ground Water No Caving TD 11 Ft.

SCALE 1" = 5 Ft.



ALLAN E. SEWARD

JOB NO. 6-806-4

LOGGED BY VCG

Trench Log No. 49

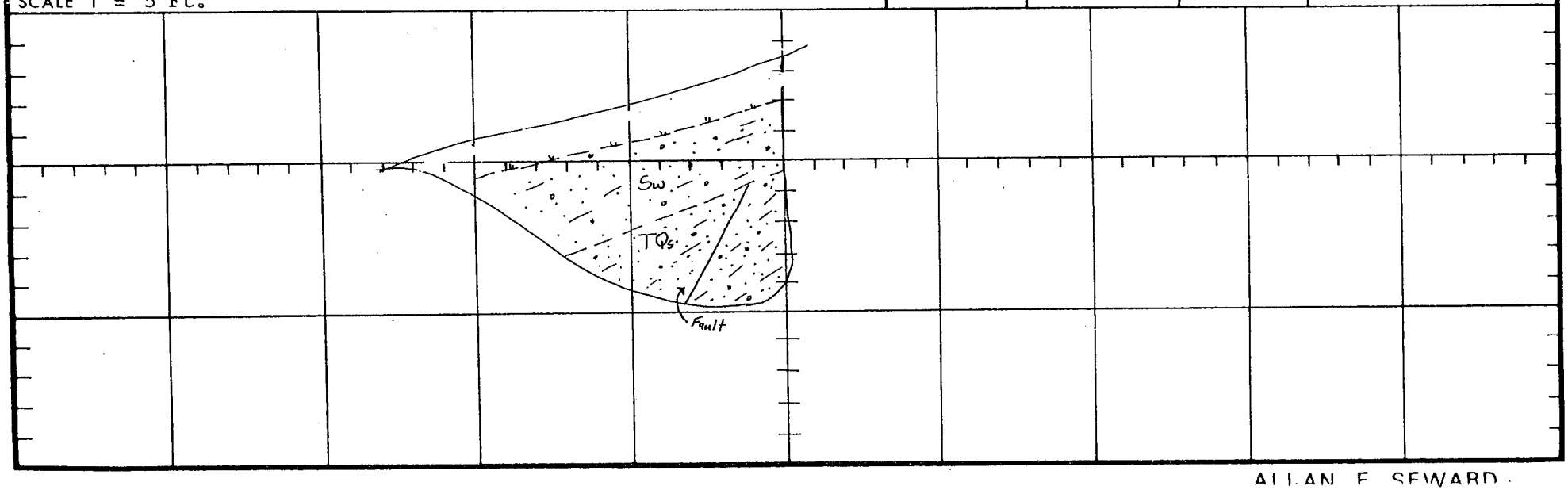
PROJECT Petrominerals

DATE 10/30/87

LITHOLOGY		BEDDING	FAULTING	JOINTS	COMMENTS
0 - 1½'	SOIL; Light orange to grayish-brown, medium- to coarse-grained silty sand with scattered pebbles; loose; dry				Voids approx. 10% in soil
1½' - 4'	SLOPEWASH; Sw, Medium-brown, fine- to medium-grained silty sand with isolated pebbles; dense; dry				Fault - Normal movement, medium to light brown, ½" thick clay gouge, caliche infilling Slicks present but not well defined
4' - 8'	BEDROCK; TQs, Light yellowish-tan, fine- to medium-grained silty sandstone with scattered pebbles; dense to very dense; damp	N 83 W 42 SW	N 80 W 54 SW		
					No Ground Water No Caving TD 8 Ft.

N 27 E

SCALE 1" = 5 Ft.



ALLAN E. SEWARD

JOB NO. 6-806-4

LOGGED BY VCG

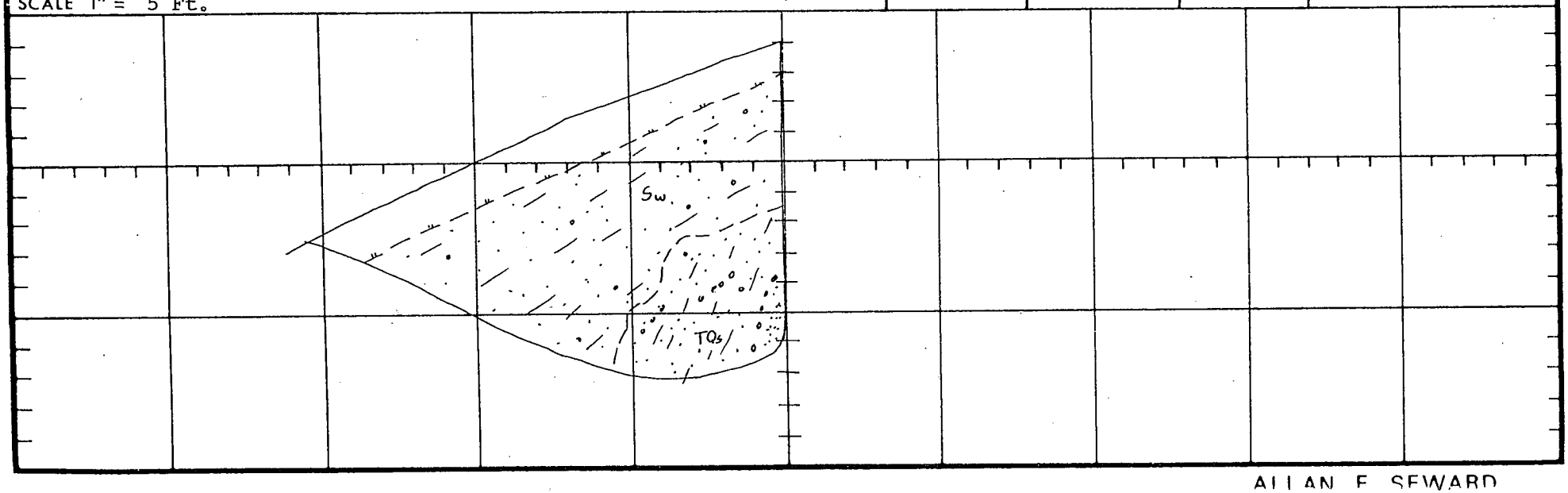
Trench Log No. 50

PROJECT Petrominerals

DATE 10/30/87

LITHOLOGY		BEDDING	FAULTING	JOINTS	COMMENTS
0 - 1'	SOIL; Medium- to grayish-brown, fine- to coarse-grained silty sand with scattered pebbles; loose; dry				
1' - 5½'	SLOPEWASH; Sw, Medium- to grayish-brown, fine- to coarse-grained silty sand with isolated pebbles; moderately dense; dry				
5½' - 10'	BEDROCK; TQs, Light- to tannish-brown, fine- to coarse-grained silty sandstone with scattered pebbles; dense; damp; @ 7½ Ft. Pebble conglomerate	N 83 W 63 NE			
	N 5 E				No Ground Water No Caving TD 10 Ft.

SCALE 1" = 5 Ft.



ALLAN E. SEWARD

JOB NO. 6-806-4

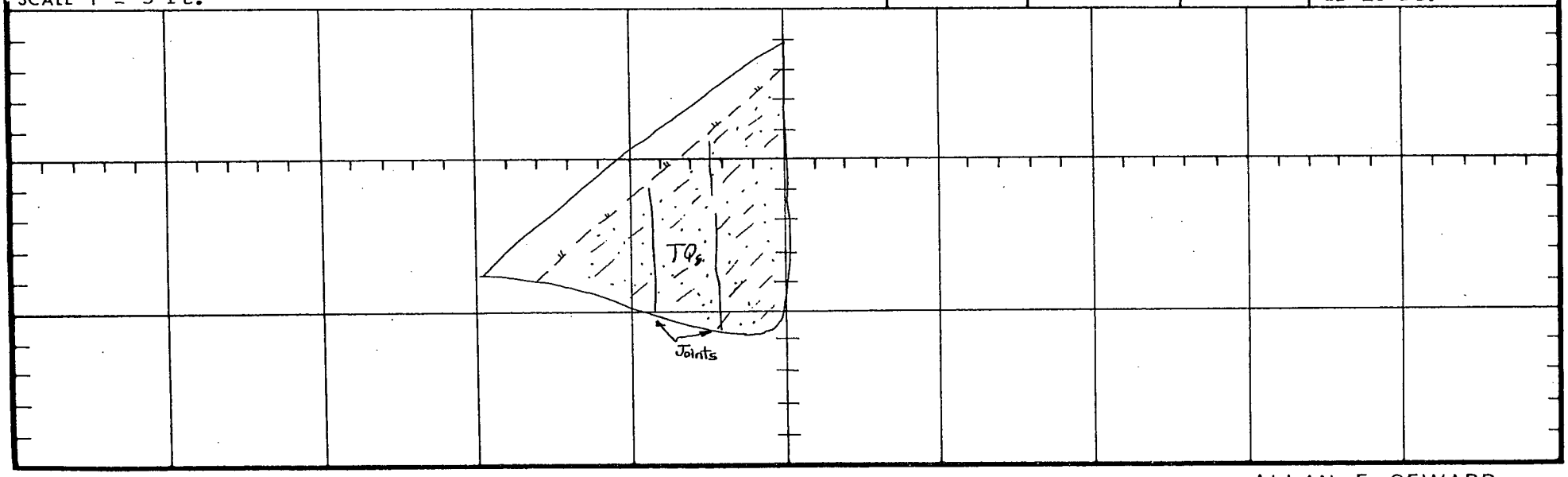
LOGGED BY VCG

Trench Log No. 51

PROJECT Petrominerals

DATE 10/30/87

LITHOLOGY		BEDDING	FAULTING	JOINTS	COMMENTS
0 - 1'	SOIL; Medium-brown to grayish-brown, fine to medium silty sand with isolated pebbles; loose; dry				Caliche infilled joints
					No Slopewash
1' - 10'	BEDROCK; TQs, Tan, fine- to medium-grained silty sandstone; dense; dry to damp	N 75 E 50 NW Ex.		N 47 E 90	
					No Ground Water
	N 80 W				No Caving
SCALE 1" = 5 Ft.					TD 10 Ft.



ALLAN E. SEWARD

JOB NO. 6-806-4

LOGGED BY VCG

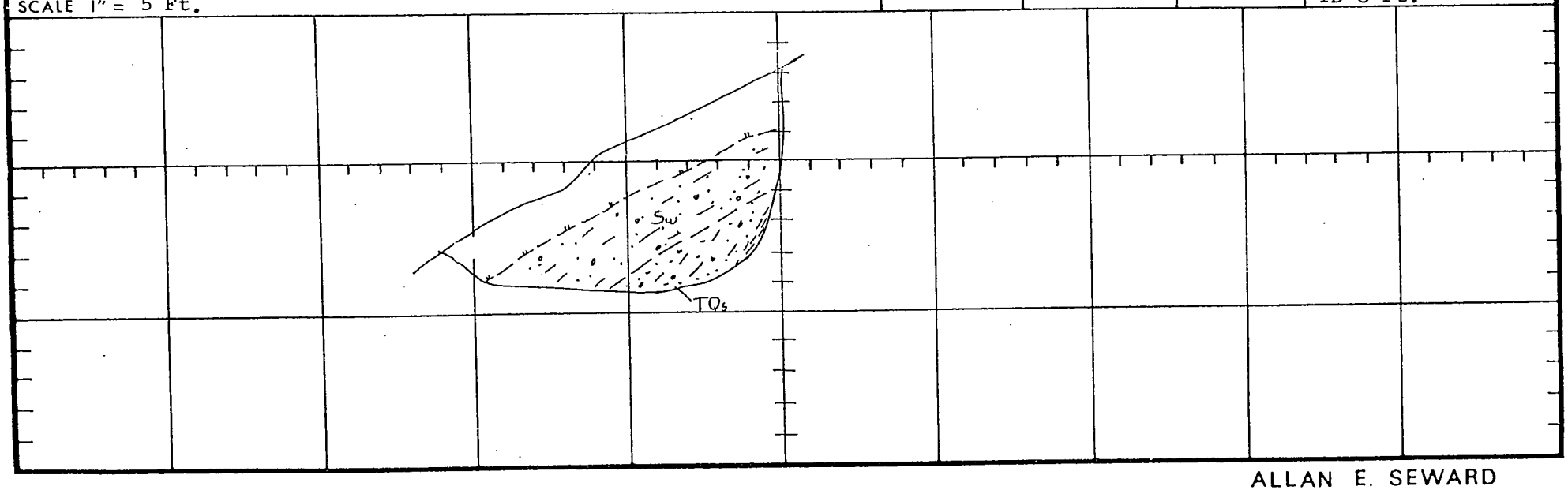
Trench Log No. 52

PROJECT Petrominerals

DATE 10/30/87

LITHOLOGY		BEDDING	FAULTING	JOINTS	COMMENTS
0 - 2'	SOIL; Medium- to light grayish-brown, fine- to coarse-grained silty sand with scattered pebbles; loose; dry				
2' - 4'	SLOPEWASH; Sw, Medium- to orangish-brown fine- to coarse-grained silty sand with scattered pebbles; dense; dry				
4' - 8'	BEDROCK; TQs, Light orangish- to medium-brown, fine- to coarse-grained silty sand with isolated pebbles; dense; damp; @ 5 Ft. Medium- to dark brown siltstone interbed	N 82 W 54 NE Ex.			
		N 84 W 55 NE Ex.			No Ground Water
	N 65 W				No Caving
					TD 8 Ft.

SCALE 1" = 5 Ft.



ALLAN E. SEWARD

JOB NO. 6-806-4

LOGGED BY VCG

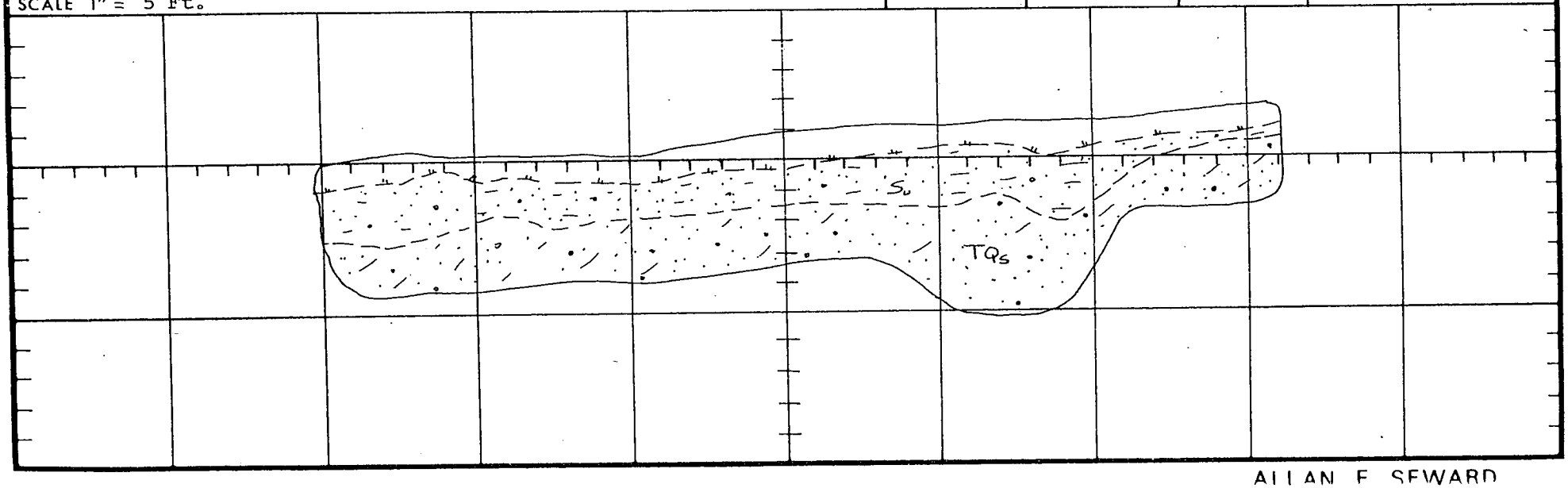
Trench Log No. 53

PROJECT Petrominerals

DATE 10/30/87

LITHOLOGY		BEDDING	FAULTING	JOINTS	COMMENTS
0 - 1'	SOIL; Light grayish-brown, fine- to coarse-grained silty sand with isolated pebbles; loose; dry				Trenches 53 through 55 excavated 8/24/87 using a tractor hoe using a 24" bucket
1' - 3½'	SLOPEWASH; Sw, Reddish-brown, fine- to coarse-grained silty sand with isolated pebbles; dense; dry				
2' - 7'	BEDROCK; TQs, Orangish-brown, fine- to coarse-grained silty sandstone with isolated pebbles; dense to very dense; dry to damp	Massive			
	N 89 W				No Ground Water No Caving TD 7 Ft.

SCALE 1" = 5 Ft.



ALLAN E. SEWARD

JOB NO. 6-806-4

LOGGED BY VCG

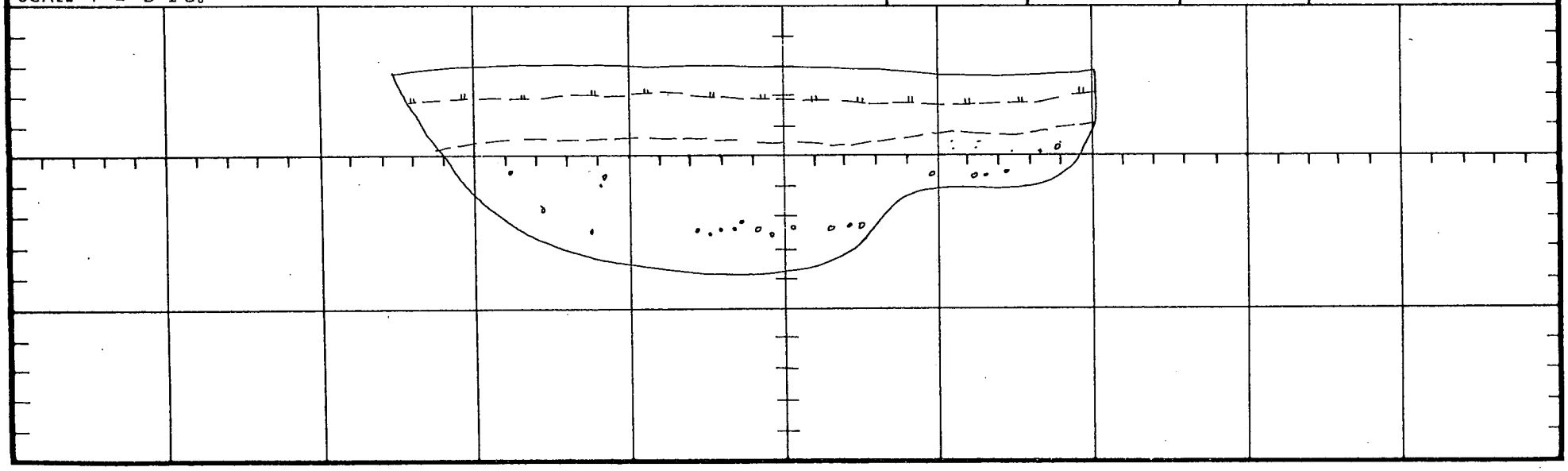
Trench Log No. 54

PROJECT Petrominerals

DATE 10/30/87

LITHOLOGY		BEDDING	FAULTING	JOINTS	COMMENTS
0 - 1'	SOIL; Light grayish-brown, fine- to coarse-grained silty sand with scattered pebbles; loose; dry				
1' - 2½'	SLOPEWASH; Sw, Reddish-brown, fine- to coarse-grained pebbly sand; moderately dense to dense; dry				
2½' - 7'	BEDROCK; TQs, Light tannish-brown, fine- to coarse-grained silty sandstone with scattered pebbles; dense; dry; @ 5½' pebble conglomerate interbed	N 83 W 22 NE			
	N 42 E				No Ground Water No Caving TD 7 Ft.

SCALE 1" = 5 Ft.



ALLAN E. SEWARD

JOB NO. 6-806-4

LOGGED BY VCG

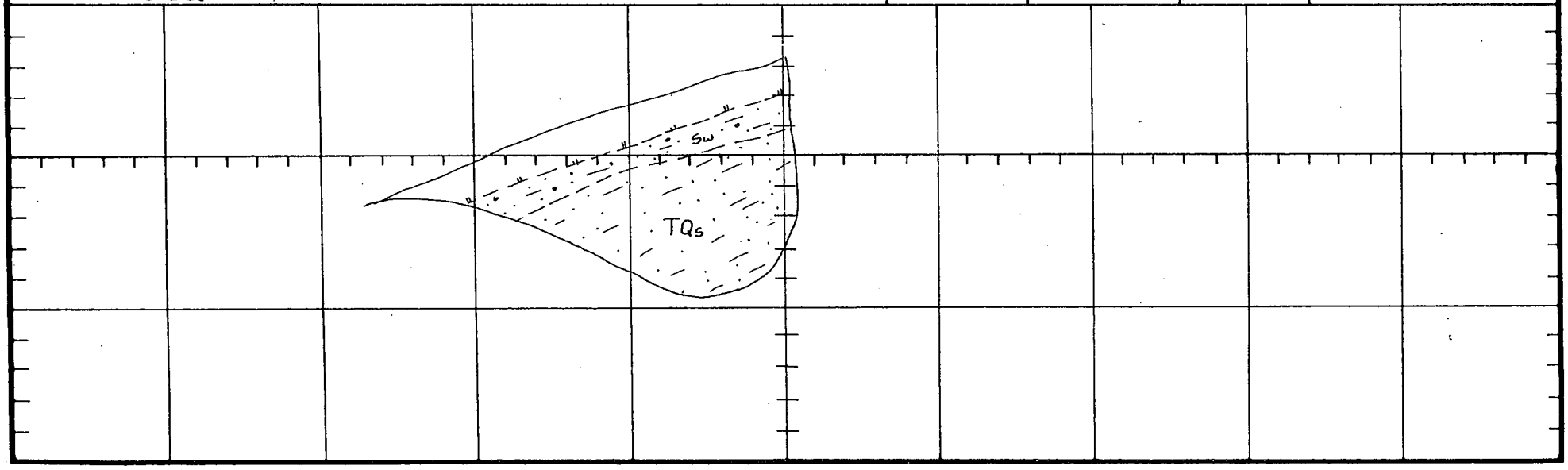
Trench Log No. 55

PROJECT Petrominerals

DATE 10/30/87

LITHOLOGY		BEDDING	FAULTING	JOINTS	COMMENTS
0 - 1'	SOIL; Orangish- to grayish-brown, fine- to coarse-grained silty sand with isolated pebbles; loose; dry				
1' - 2'	SLOPEWASH; Sw, Light tannish-brown, fine- to medium-grained silty sand with isolated pebbles; moderately dense; dry				
2' - 8'	BEDROCK; TQs, Light tannish-brown, fine- to medium-grained silty sandstone; dense; dry	N 73 W 26 NE			
	N 2 W				No Ground Water No Caving TD 8 Ft.

SCALE 1" = 5 Ft.



ALLAN E. SEWARD

JOB NO. 98-1617-4

PROJECT VTT 52584

LOGGED BY MJD

Trench Log No. T-4

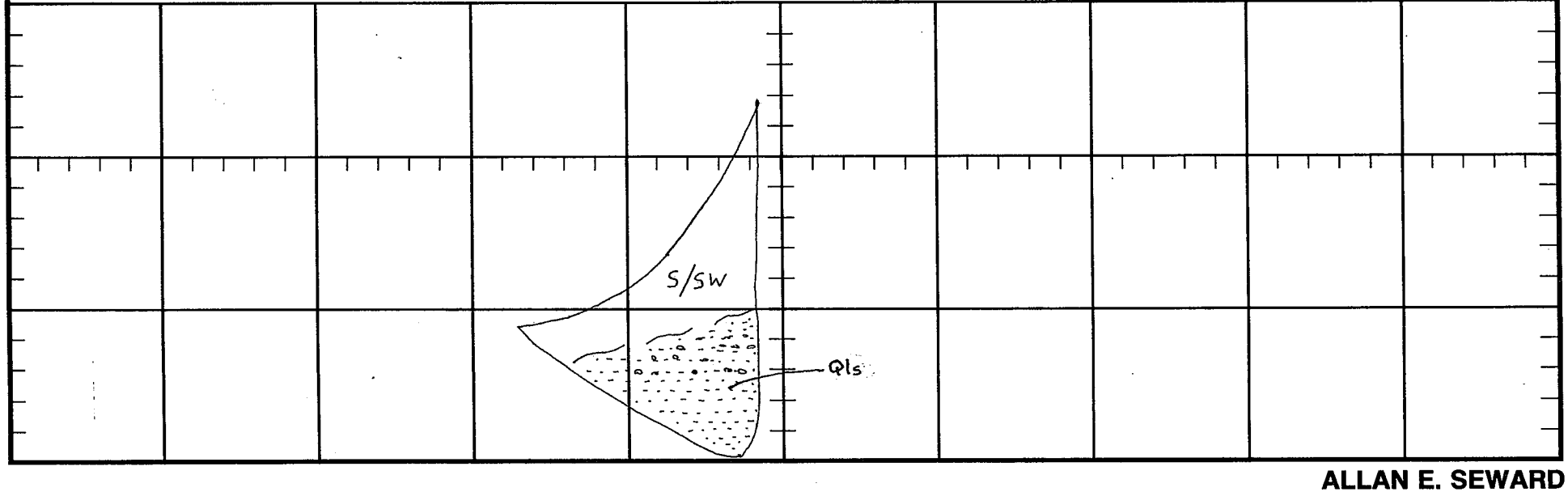
DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 7' SOIL/SLOPEWASH; s/sw, Moderate brown to light brown fine- to coarse-grained pebbly and cobbly sand; soft; moist			T-4 and T-5 dug on 2/11/98 Highly weathered down to 8 ft.
7 - 12' LANDSLIDE DEBRIS; Qls, White sandstone and pebbly sandstone; loose to moderately dense; moist	Approx. a)N81W,4SW		

SCALE 1" = 5'

N 76 W

TOTAL DEPTH 12 Ft.



ALLAN E. SEWARD

JOB NO. 98-1617-4

PROJECT VTT 52584

LOGGED BY MJD

Trench Log No. T-5

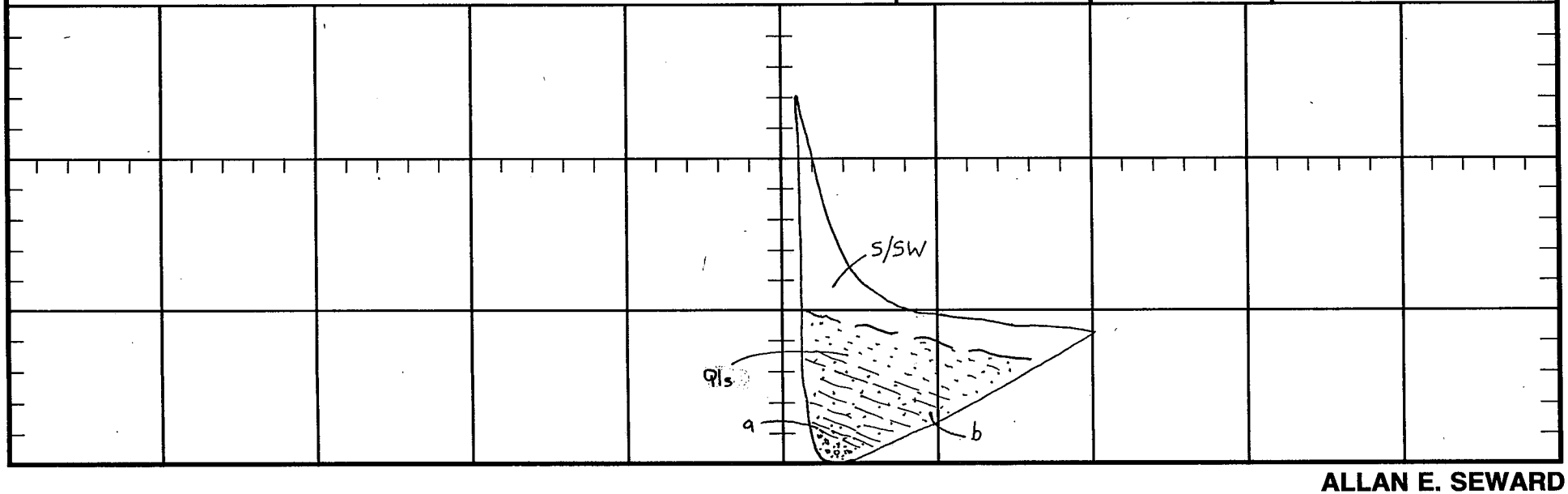
DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 7' SOIL/SLOPEWASH; s/sw, Moderately to dark brown fine- to coarse-grained pebbly and cobbly sand; soft to firm; moist			
7 - 12' LANDSLIDE DEBRIS; Qls, Greenish-brown reddish-brown, moderate brown and greenish-gray sandstone, siltstone and pebbly sandstone; loose to moderately dense; moist	Approx. a) N3W,36SW b) N41W,39SW		Highly weathered down to 10 ft. Weathered and creep affected

SCALE 1" = 5'

N 64 W

TOTAL DEPTH 12 Ft.



ALLAN E. SEWARD

JOB NO. 98-1617-4

PROJECT VTT 52584

LOGGED BY VCG

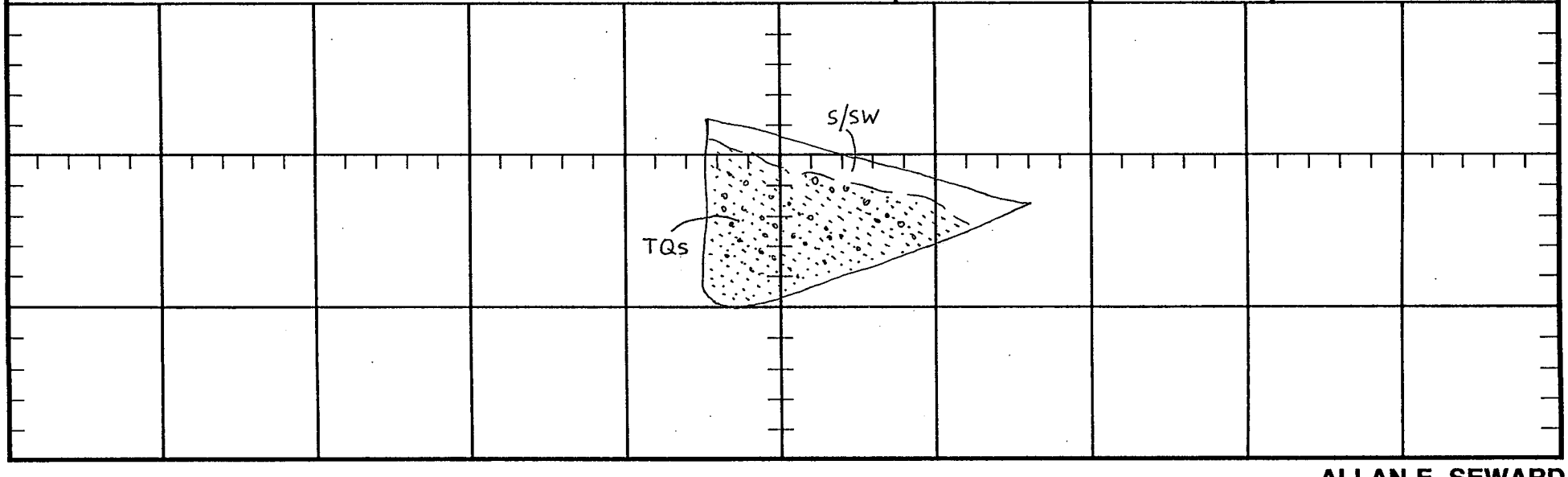
Trench Log No. T-14

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 1' SOIL/SLOPEWASH; s/sw, medium brown fine- to coarse-grained sand and pebbly sand; damp to moist 1 - 6' BEDROCK; TQs, Medium to coarse-grained pebble conglomerate and pebbly sandstone; moist	N65E,32NW		T-14 through T-22 excavated 5/11/98 using a track mounted backhoe with a 24" wide bucket No Ground Water No Caving TOTAL DEPTH 6 Ft.

N 4 E

SCALE 1" = 5'



ALLAN E. SEWARD

JOB NO. 98-1617-4

PROJECT VTT 52584

LOGGED BY VCG

Trench Log No. T-15

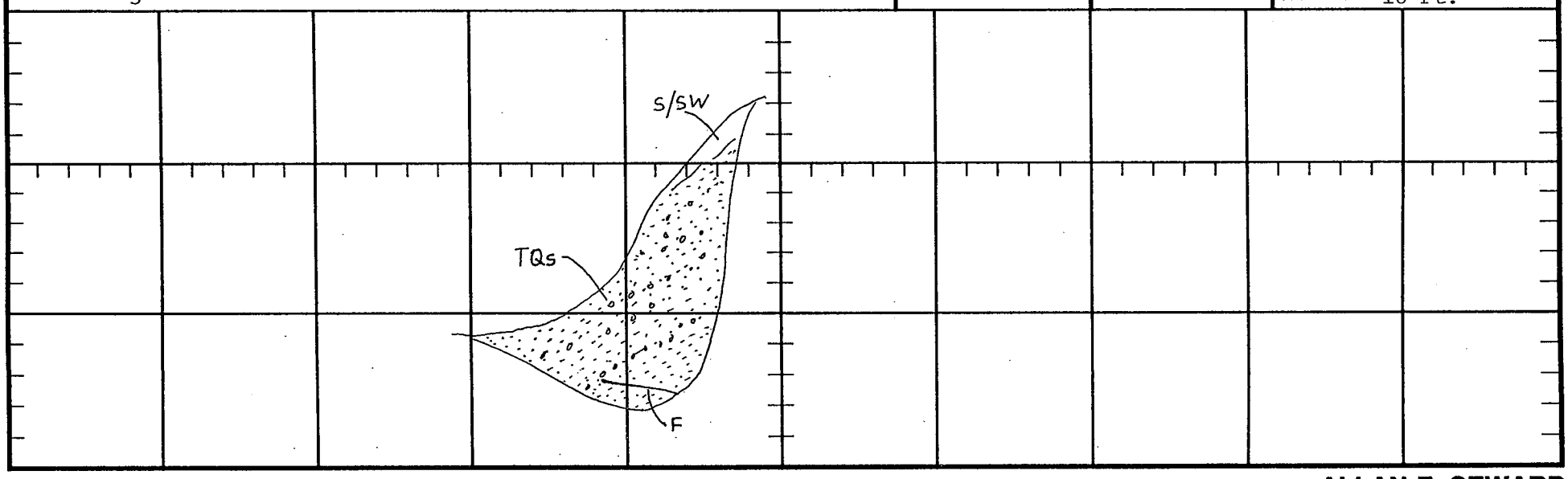
DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 1' SOIL/SLOPEWASH; s/sw, Medium brown fine- to coarse-grained sand and pebbly sand; damp to moist	N67E;40NW	E:N35E,33SE	Minor offset on fault (1.5") reddish-brown silty sandstone gouge
1 - 10' BEDROCK; TQs, Light brown to tan coarse-grained pebbly sandstone and conglomerate; hard; and tan medium-grained sandstone			No Ground Water No Caving

SCALE 1" = 5'

N 5 E

TOTAL DEPTH 10 Ft.



ALLAN E. SEWARD

JOB NO. 98-1617-4

PROJECT VTT 52584

LOGGED BY VCG

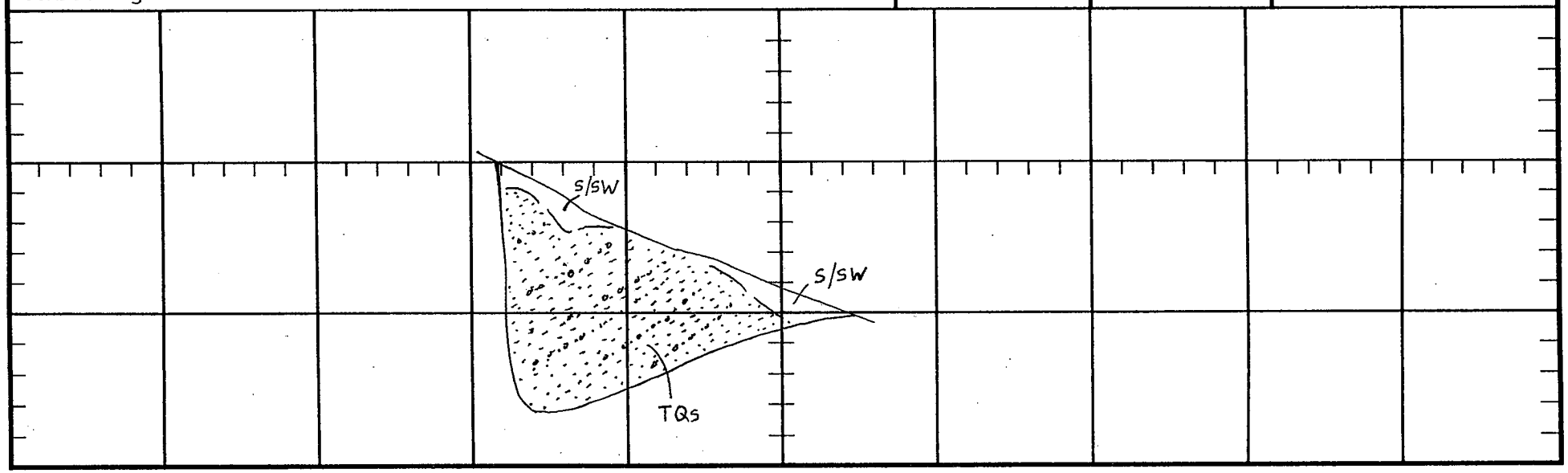
Trench Log No. T-16

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 1' SOIL/SLOPEWASH; s/sw, Medium brown fine- to coarse-grained sand and pebbly sand; damp to moist 1 - 8' BEDROCK; TQs, Medium to coarse-grained pebbly sandstone and pebble conglomerate; damp	N80E,35NW		No Ground Water No Caving TOTAL DEPTH 8 Ft.

SCALE 1" = 5'

N 30 E



ALLAN E. SEWARD

JOB NO. 98-1617-4

PROJECT TTVTT 52584

LOGGED BY VCG

Trench Log No. T-17

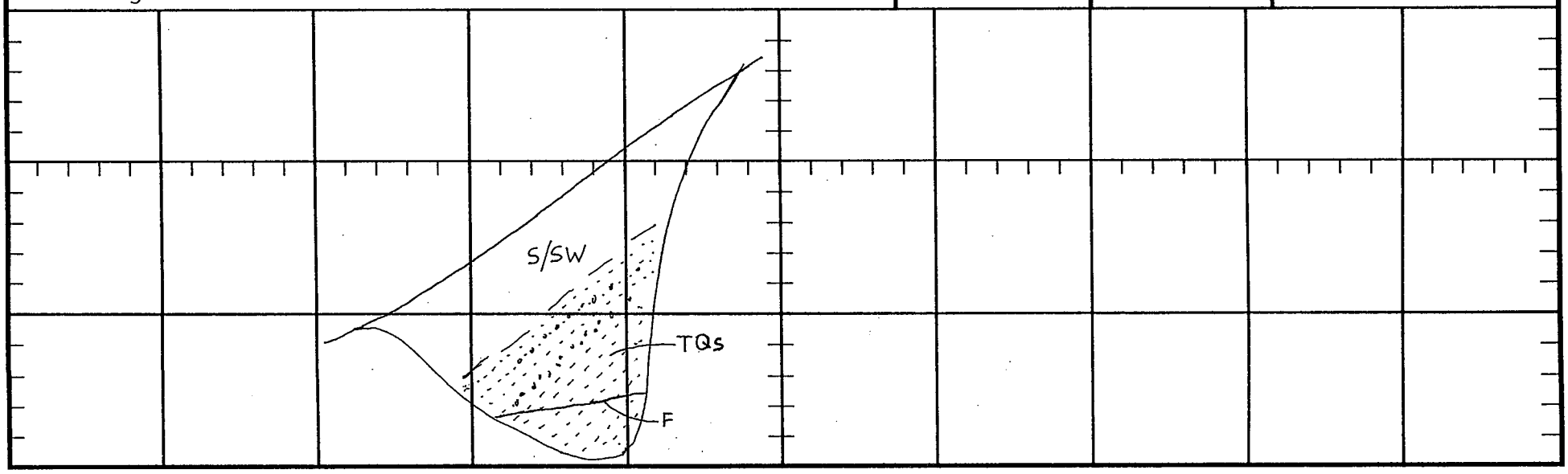
DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 4' SOIL/SLOPEWASH; s/sw, Medium brown fine- to coarse-grained sand and pebbly sand; damp to moist	Approx. N43E, 42NW	Minor Fault N16E,27SE offset 1"	
4 - 13' BEDROCK; TQs, Light brown to tan pebble conglomerate and fine- to medium-grained sandstone; very moist			No Ground Water No Caving

SCALE 1" = 5'

N 5 W

TOTAL DEPTH 13 Ft.



ALLAN E. SEWARD

JOB NO. 98-1617-4

LOGGED BY VCG

Trench Log No. T-18

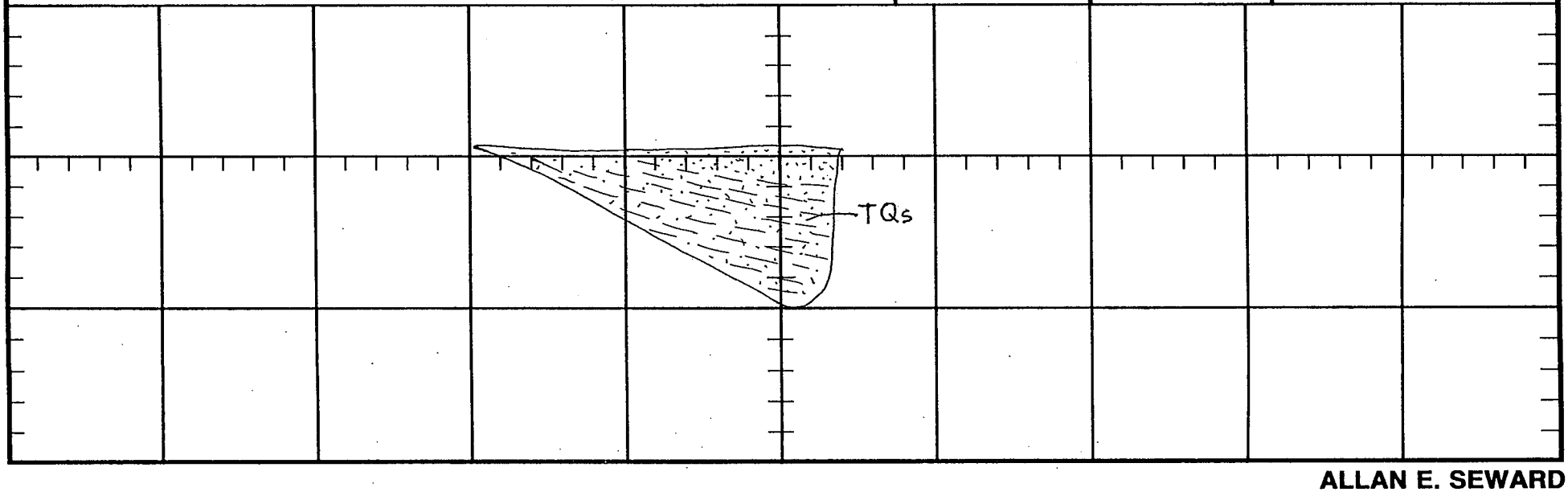
PROJECT VTT 52584

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 5.5' BEDROCK; TQs, Dark reddish-brown silty sandstone and tan medium- to coarse-grained sandstone; hard; damp	N62E,32NW		No Ground Water No Caving TOTAL DEPTH 5.5 Ft.

SCALE 1" = 5'

N 45°E



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JOB NO. 98-1617-4

PROJECT VTT 52584

LOGGED BY VCG

Trench Log No. T-19

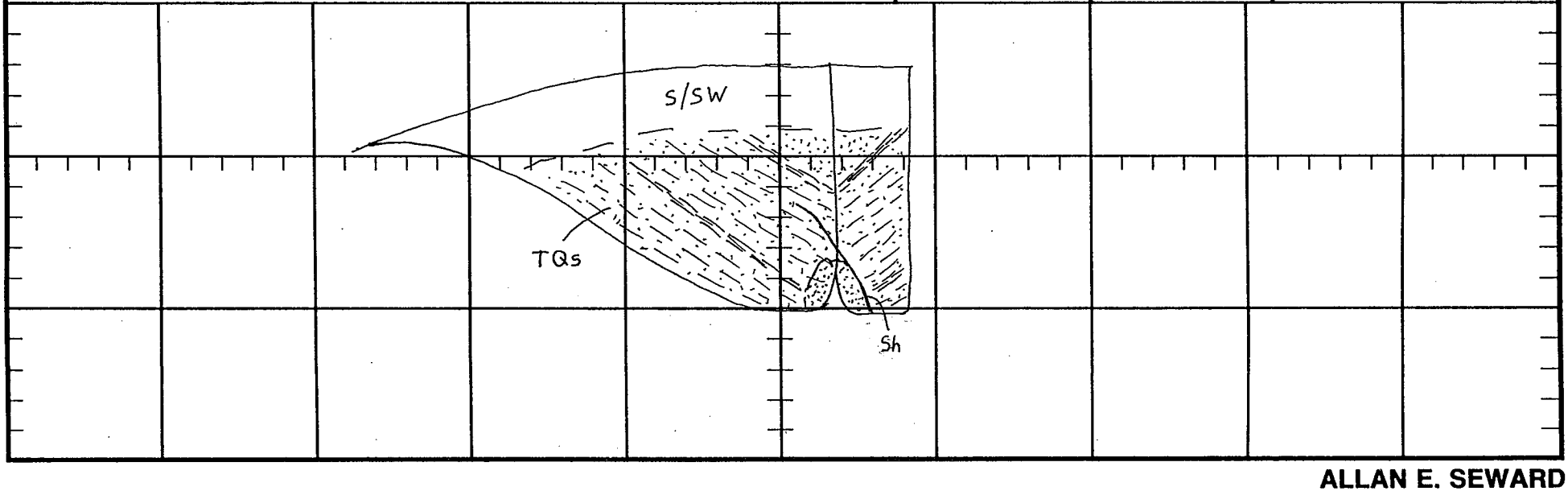
DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 2' SOIL/SLOPEWASH; s/sw, Medium brown fine- to medium-grained sand and pebbly sand; damp to moist		Sh: N73W,46NE	
2 - 8' BEDROCK; TQs, Reddish-brown sandy clayey siltstone; moist; caliche pods; sheared sandstone pieces/ clasts dragged in shears			No Ground Water No Caving

SCALE 1" = 5'

N 61 E

TOTAL DEPTH 8 Ft.



ALLAN E. SEWARD

JOB NO. 98-1617-4

PROJECT VTT 52584

LOGGED BY VCG

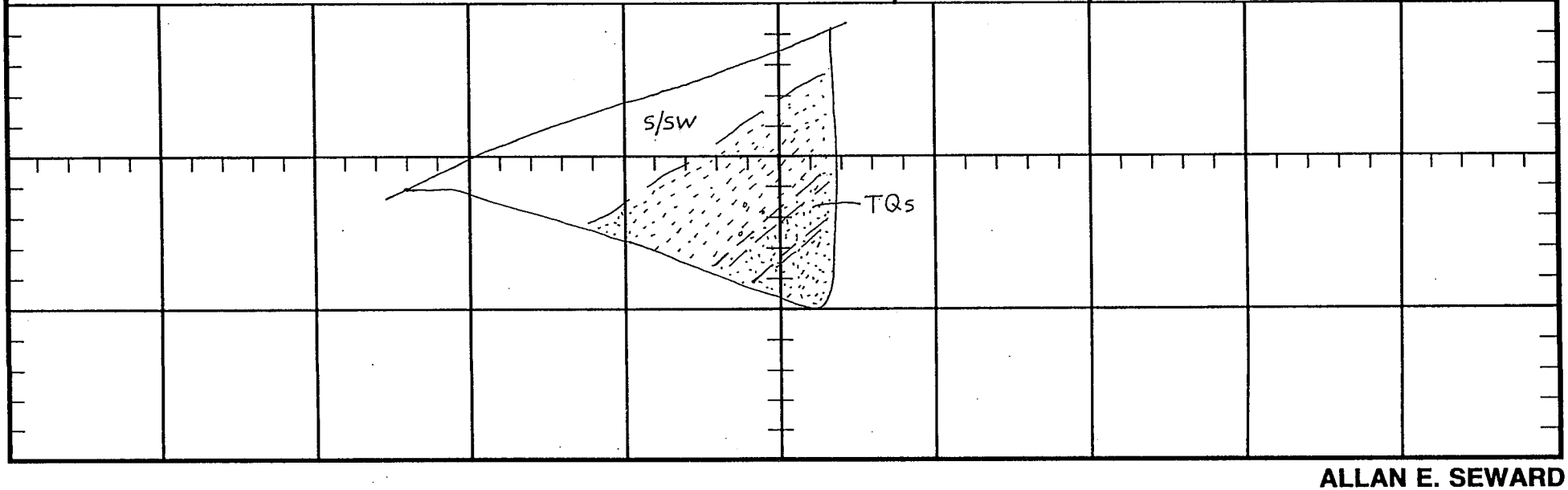
Trench Log No. T-20

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 4' SOIL/SLOPEWASH; s/sw, Medium to light brown silty sand with pebbles; moist	N64W,45SW		
4 - 9' BEDROCK; TQs, Reddish-brown siltstone and medium- to coarse-grained sandstone; loose; soft			No Ground Water No Caving TOTAL DEPTH 9 Ft.

SCALE 1" = 5'

N 21 E



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JOB NO. 98-1617-4

PROJECT VTT 52584

LOGGED BY VCG

Trench Log No. T-21

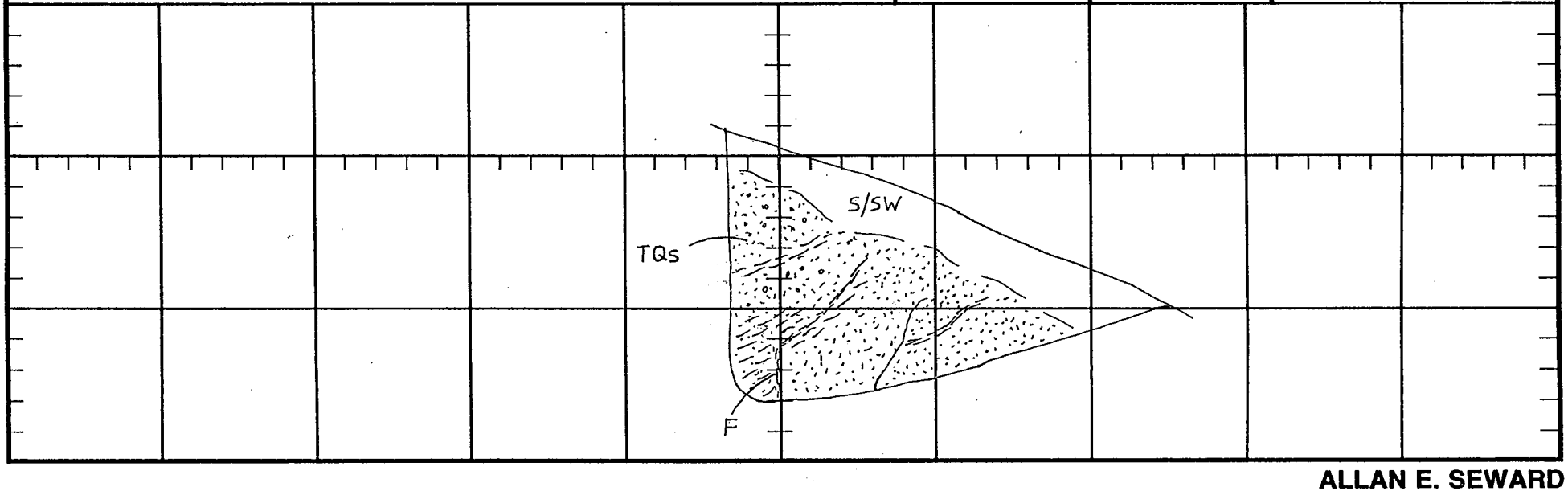
DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 1.5' SOIL/SLOPEWASH; s/sw, Medium to light brown silty sand with pebbles; moist	N10W,15SW N78E,20NW	F:N62W,79NE	
1.5 - 9' BEDROCK; TQs, Reddish-brown siltstone and medium- to coarse-grained sandstone; loose; soft			No Ground Water No Caving

N 13 E

SCALE 1" = 5'

TOTAL DEPTH 9 Ft.



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JOB NO. 98-1617-4

PROJECT VTT 52584

LOGGED BY VCG

Trench Log No. T-22

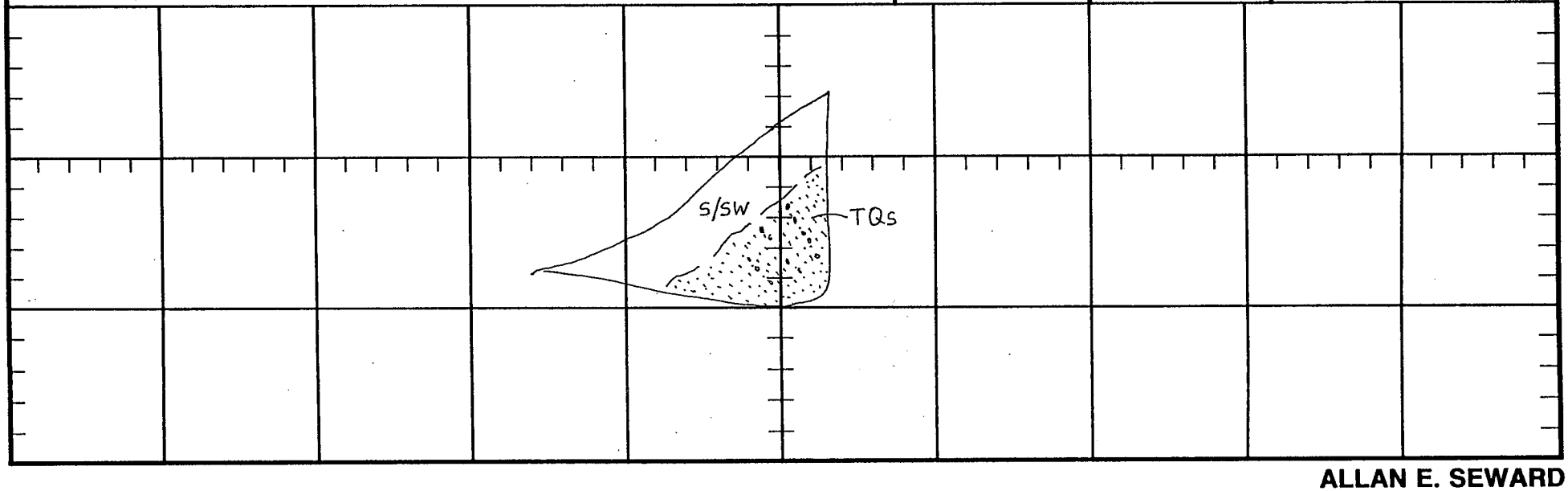
DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 2.5' SOIL/SLOPEWASH; s/sw, Gray to medium brown silty sand with pebbles; loose	N65W,65NE		
2.5 - 7' BEDROCK; TQs, Tan to light brown medium- to coarse-grained sandstone and pebbly sandstone; hard; damp; rootlets			No Ground Water No Caving

N 89 W

SCALE 1" = 5'

TOTAL DEPTH 7 Ft.



ALLAN E. SEWARD

JOB NO. 98-1617-4

PROJECT VTT 52584

LOGGED BY VCG

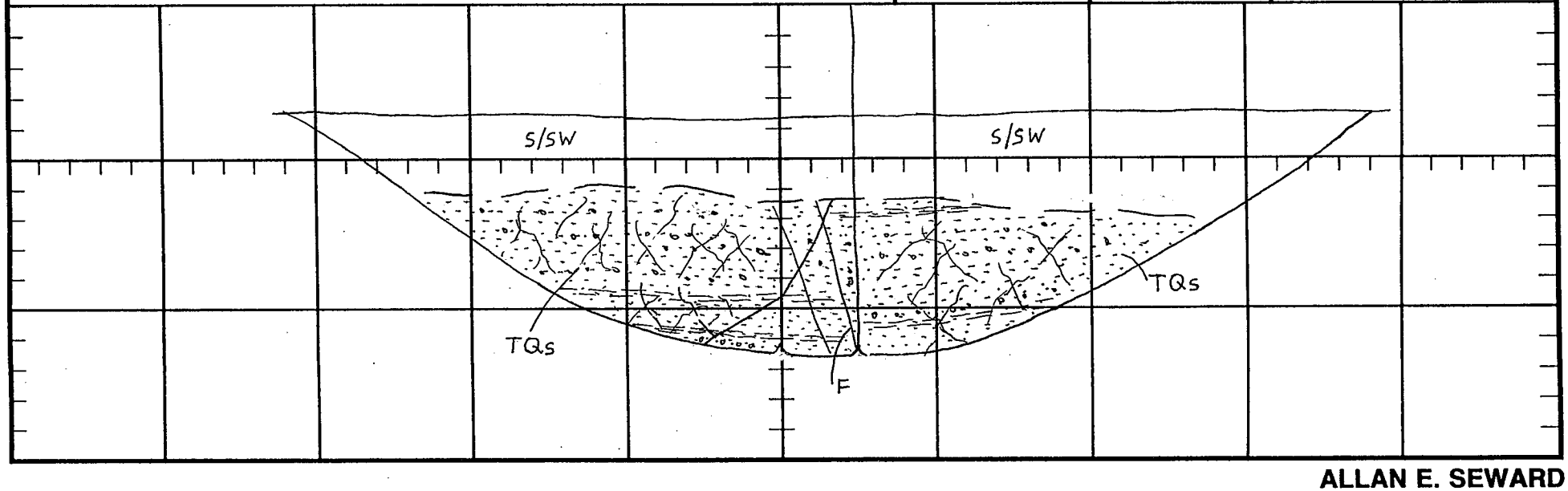
Trench Log No. T-25

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 3' SOIL/SLOPEWASH; s/sw, Reddish-brown to rust fine- to coarse-grained pebbly sand; moist; loose 3 - 8' BEDROCK; TQs, Tan to light brown to rust fine- to coarse-grained sandstone and pebbly sandstone; hard; minor fractures	Indistinct approx. N75E,15NW		Minor faults (stringers) within trench, random orientations, possibly shattered ridge effects F: Fault related to downslope creep movement east of ridgeline T-25 through T-35 excavated 5/21/98 using a track-mounted backhoe with a 24" wide bucket No Ground Water No Caving TOTAL DEPTH 8 Ft.

SCALE 1" = 5'

N 10 E



ALLAN E. SEWARD

JOB NO. 98-1617-4

LOGGED BY VCG

Trench Log No. T-26

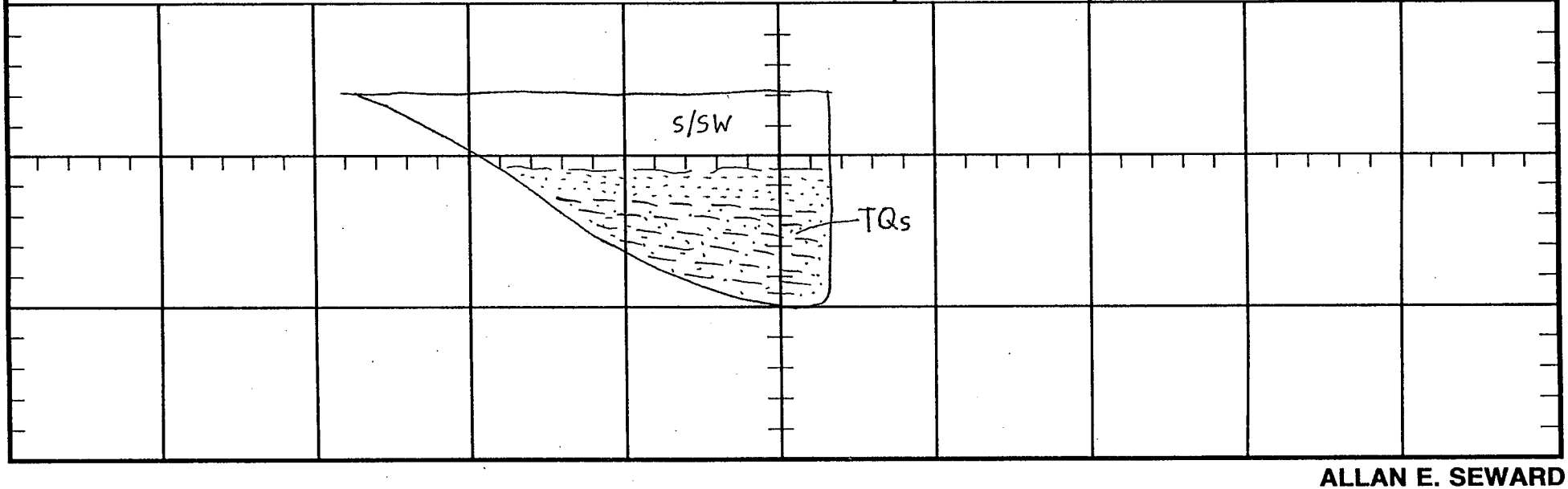
PROJECT VTT 52584

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 2.5' SOIL/SLOPEWASH; s/sw, Reddish-brown to grayish-brown medium- to coarse-grained pebbly sand moist; loose	N69W,14NE		
2.5 - 7' BEDROCK; TQs, Reddish-brown sandy siltstone and tan medium- to coarse-grained sandstone; hard damp to moist			No Ground Water No Caving TOTAL DEPTH 7 Ft.

SCALE 1" = 5'

N 12 E



ALLAN E. SEWARD

JOB NO. 98-1617-4

PROJECT VTT 52584

LOGGED BY VCG

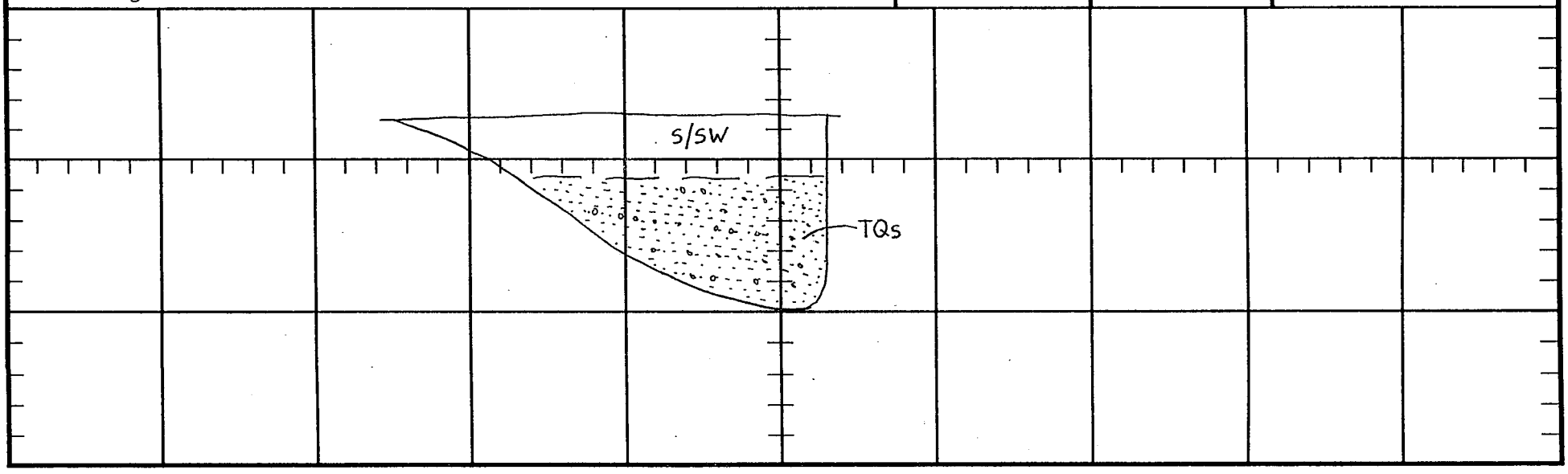
Trench Log No. T-27

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 2' SOIL/SLOPEWASH; s/sw, Reddish-brown to grayish-brown medium- to coarse-grained pebbly sand moist; loose	N80E, 24NW		
2 - 6.5' BEDROCK; TQs, Tan to reddish-brown medium- to coarse-grained pebbly sandstone; moist; hard			No Ground Water No Caving TOTAL DEPTH 6.5 Ft.

SCALE 1" = 5'

N 53 E



ALLAN E. SEWARD

JOB NO. 98-1617-4

LOGGED BY VCG

Trench Log No. T-28

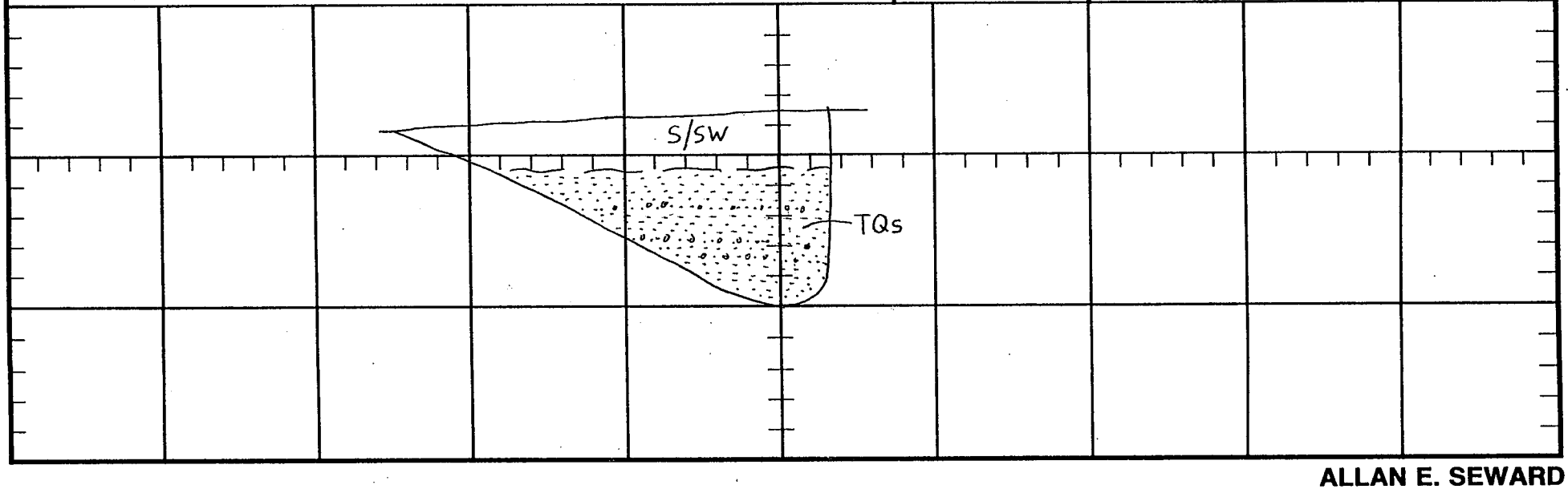
PROJECT VTT 52584

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 2' SOIL/SLOPEWASH; s/sw, Reddish-brown fine- to coarse-grained sand with pebbles; loose; moist 2 - 6.5' BEDROCK; TQs, Tan to rust to reddish-brown fine- to coarse-grained sandstone and pebble conglomerate; friable; hard	N79W,12NE		No faulting visible No Ground Water No Caving TOTAL DEPTH 6.5 Ft.

N 28 W

SCALE 1" = 5'



ALLAN E. SEWARD

JOB NO. 98-1617-4

PROJECT VTT 52584

LOGGED BY VCG

Trench Log No. T-29

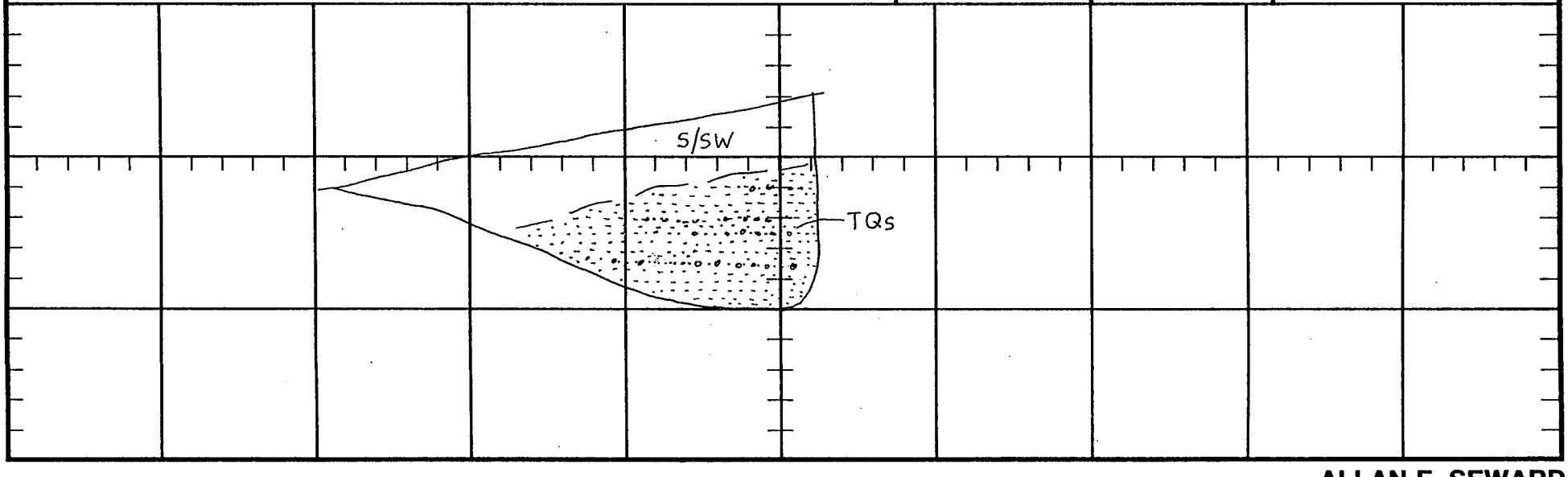
DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 2.5' SOIL/SLOPEWASH; s/sw, Reddish-brown fine- to coarse-grained sand with pebbles; loose; moist	N60W,9NE		
2.5 - 7' BEDROCK; TQs, Reddish-brown to medium brown medium- to coarse-grained pebbly sandstone and sandstone; friable; hard			No Ground Water No Caving

SCALE 1" = 5'

N 25 W

TOTAL DEPTH 7 Ft.



ALLAN E. SEWARD

JOB NO. 98-1617-4

PROJECT VTT 52584

LOGGED BY VCG

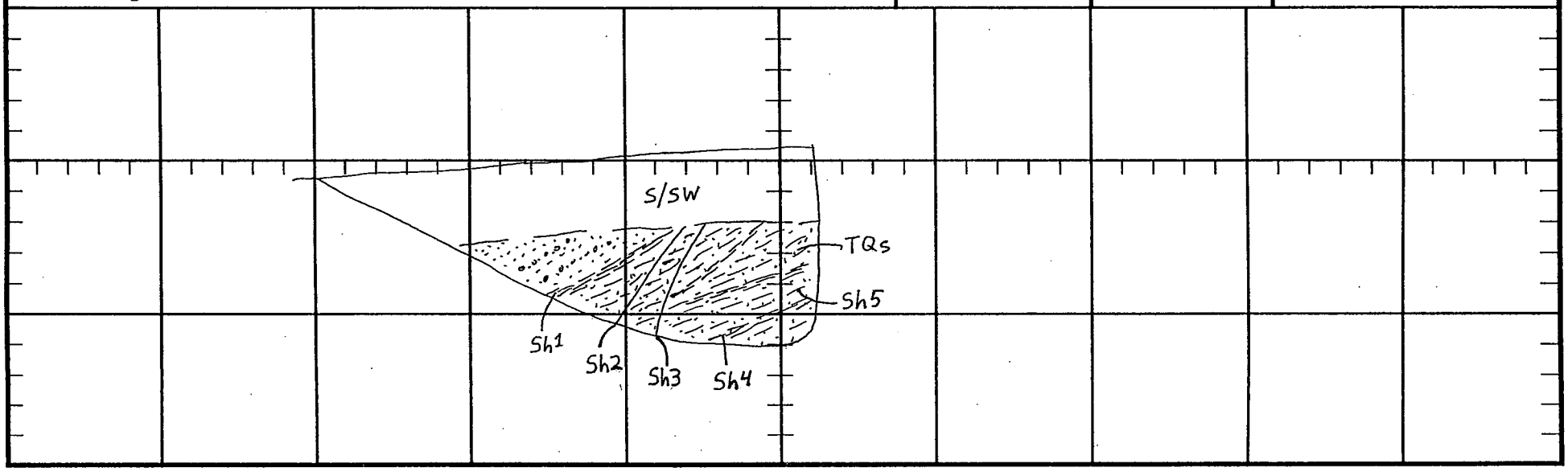
Trench Log No. T-30

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 2.5' SOIL/SLOPEWASH; s/sw, Medium brown to reddish-brown silty sand; loose; moist	N39W,11NE	Sh1:N:2E,12NW Sh2:N10W,36NE Sh3:N14E,54NW Sh4:N12W,26NE Sh5:N34W,24NE	
2.5 - 6.5' BEDROCK; TQs, Tan medium- to coarse-grained pebbly sandstone; moist; friable and dark reddish-brown sandy siltstone; sheared and fractured; mottled with gray sandstone			No Ground Water No Caving TOTAL DEPTH 6.5 Ft.

N 72 E

SCALE 1" = 5'



ALLAN E. SEWARD

JOB NO. 98-1617-4

PROJECT VTT 52584

LOGGED BY VCG

Trench Log No. T-31

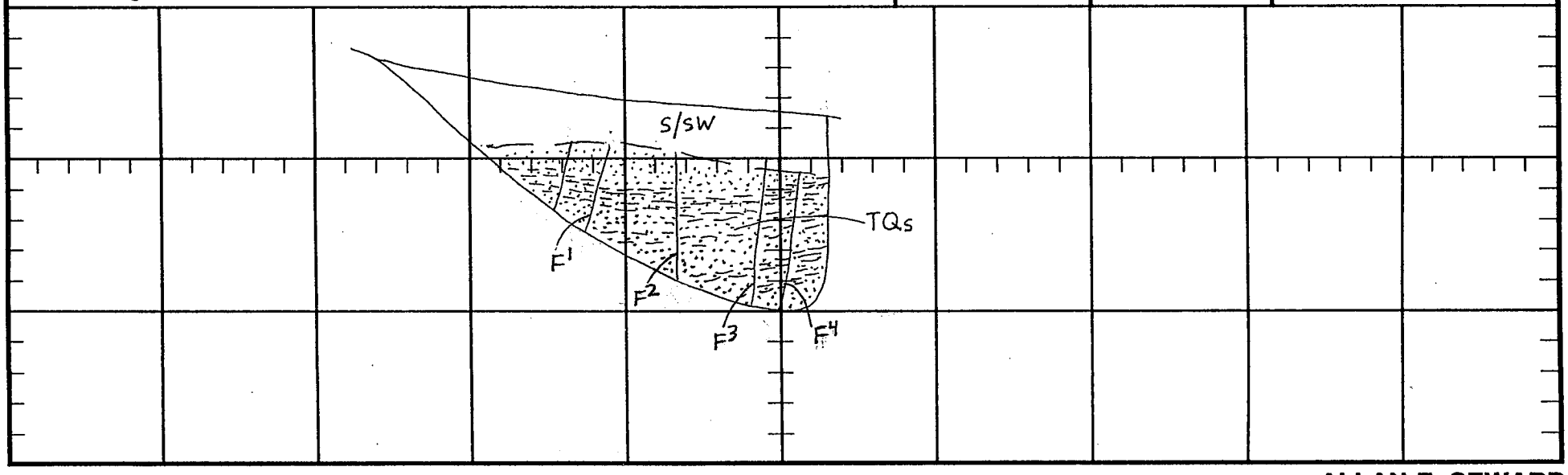
DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 2' SOIL/SLOPEWASH; s/sw, Medium-brown to reddish-brown silty sand; loose; moist	N19W,9NE N12W,10NE	F1:N67W,73NE F2:N60W,80NE F3:N67W,79NE F4:N73E,76NW	No gouge From 1"=6" offsets on faults
2 - 6.5' BEDROCK; TQs, Tan to rust medium- to coarse-grained pebbly sandstone and dark reddish-brown sandy siltstone; hard; moist			No Ground Water No Caving

SCALE 1" = 5'

N 41 E

TOTAL DEPTH 6.5 Ft.



ALLAN E. SEWARD

JOB NO. 98-1617-4

PROJECT VTT 52584

LOGGED BY VCG

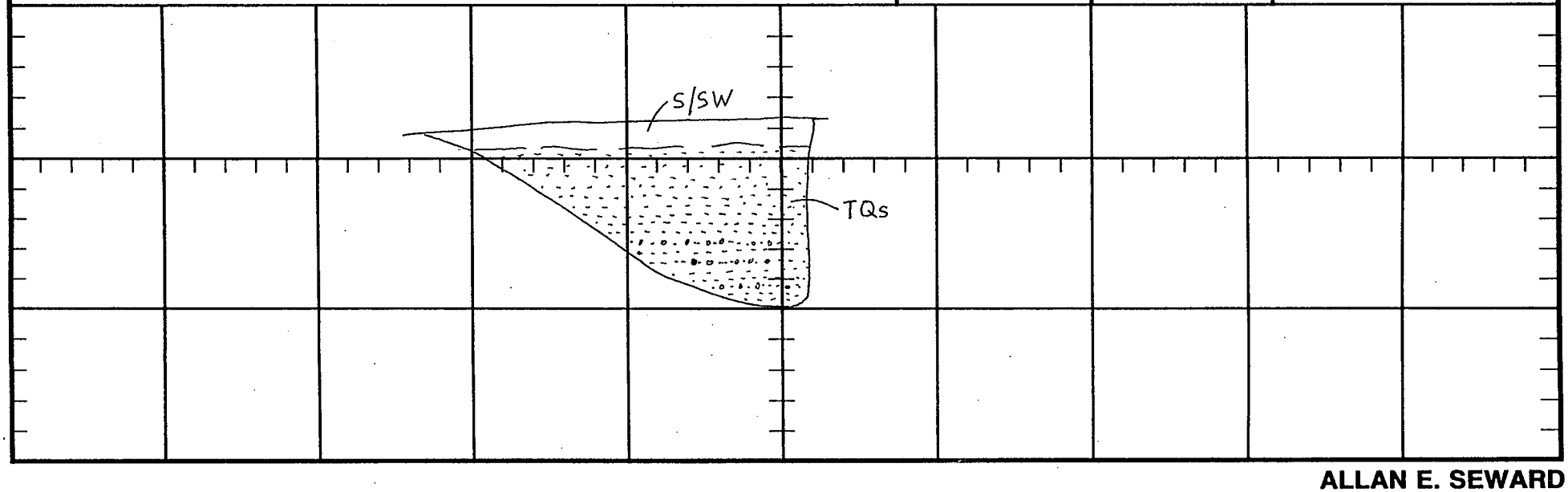
Trench Log No. T-32

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 1' SOIL/SLOPEWASH; s/sw, Light brown pebbly silty sand; loose ;moist 1 - 6' BEDROCK; TQs, Tan to rust medium- to coarse-grained pebbly sandstone; friable; hard	N70E,9NW		No faults present No Ground Water No Caving TOTAL DEPTH 6 Ft.

N 14 W

SCALE 1" = 5'



ALLAN E. SEWARD

JOB NO. 98-1617-4

PROJECT VTT 52584

LOGGED BY VCG

Trench Log No. T-33

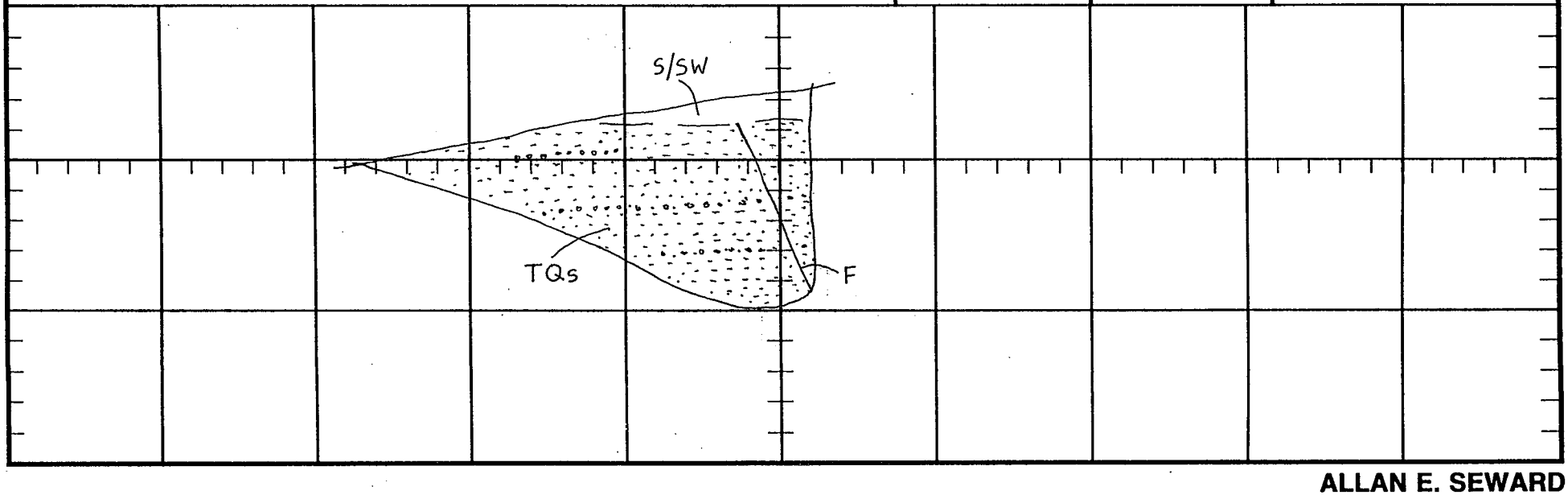
DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 1' SOIL/SLOPEWASH; s/sw, Tan to grayish-brown silty sand with pebbles; loose; damp	N10W,11NE N14E,5SE N38E,10SE N63E,9SE	F:N53E,48NW	Minor fault 1/4" offset (approx.) No Gouge
1 - 7' BEDROCK; TQs, Tan to rust fine- to coarse-grained sandstone and pebbly sandstone; moderately hard moist			No Ground Water No Caving

N 4 W

SCALE 1" = 5'

TOTAL DEPTH 7 Ft.



ALLAN E. SEWARD

JOB NO. 98-1617-4

PROJECT VTT 52584

LOGGED BY VCG

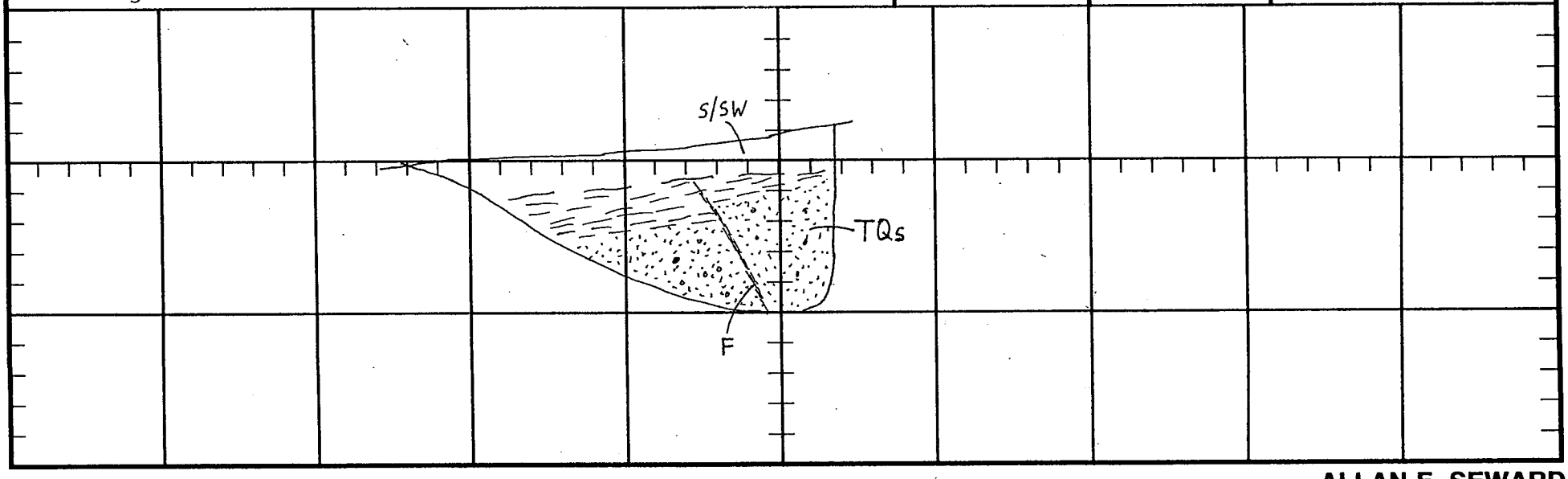
Trench Log No. T-34

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 1.5' SOIL/SLOPEWASH; s/sw, Medium brown to reddish-brown silty sand; loose; moist	N12W,15NE approx.	Minor fault F:N70W,74SW 5" offset apparent	Faulting present but very vague, no gouge
1.5 - 6' BEDROCK; TQs, Dark reddish-brown sandy siltstone; slightly weathered and tan to rust medium- to coarse-grained pebbly sandstone; friable; hard			No Ground Water No Caving TOTAL DEPTH 6 Ft.

N 52 E

SCALE 1" = 5'



ALLAN E. SEWARD

JOB NO. 98-1617-4

PROJECT VTT 52584

LOGGED BY VCG

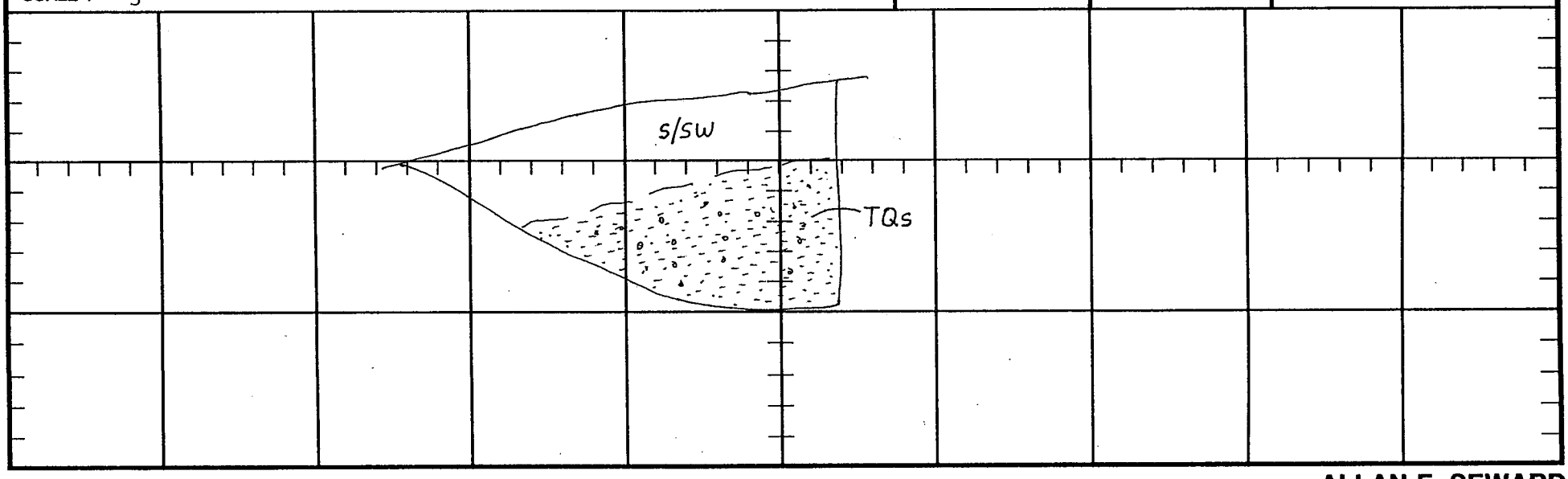
Trench Log No. T-35

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 3' SOIL/SLOPEWASH; s/sw, Light brown to reddish-brown silty pebbly sand; loose; moist	N50E,8NW (aprx.) N35E,11NW (aprx.)		
3 - 7.5' BEDROCK; TQs, Light reddish-brown to tan pebble conglomerate and medium- to coarse-grained sandstone; friable; moist; hard			Bedding vague/ indistinct
			No Ground Water No Caving
			TOTAL DEPTH 7.5 Ft.

SCALE 1" = 5'

N 50 E



ALLAN E. SEWARD

JOB NO. 98-1617-4

PROJECT VTT 52584

LOGGED BY CJS

Trench Log No. T-36

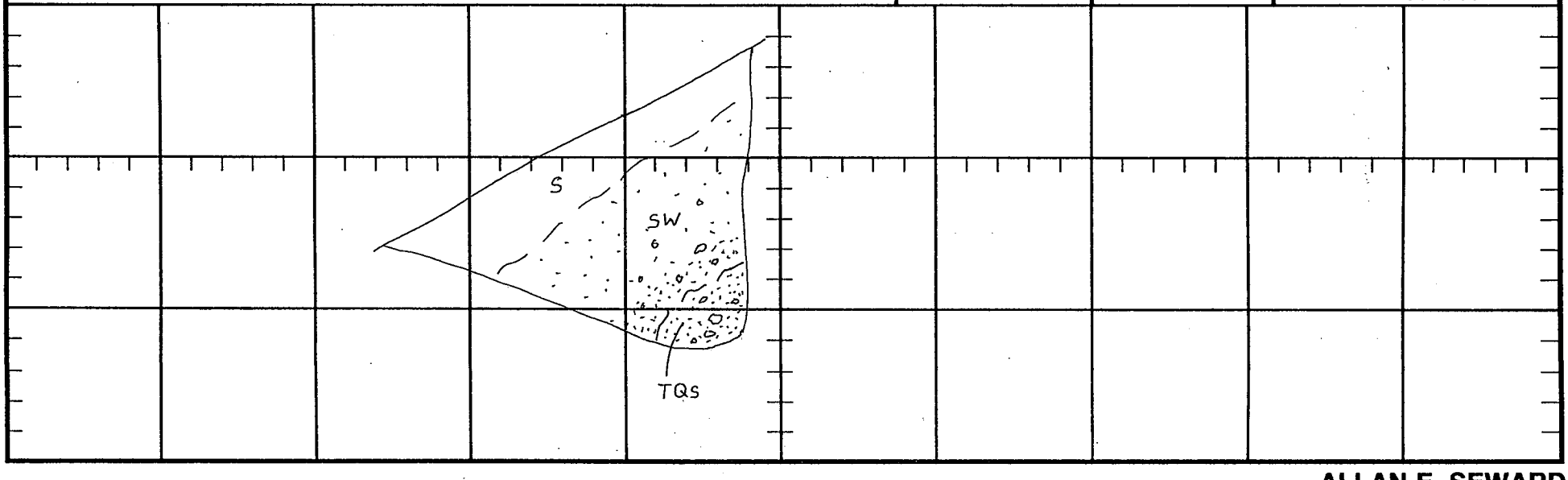
DATE January 15, 1999

LITHOLOGY		BEDDING	OTHER	COMMENTS
0 - 18"	SOIL; s, Moderate yellowish-brown; fine- to medium-grained with scattered pebbles; loose; slightly damp			Trenches T-36 to T-47 excavated 7/20/98 using a 24" bucket on a crawler backhoe
18" - 6.5'	SLOPEWASH/WEATHERED BEDROCK; sw, Moderate yellow-brown to pale-yellow, fine- to coarse-grained with scattered pebbles and cobbles; moderately dense; damp; essentially bedrock weathered in place			
6.5 - 9.5'	BEDROCK; TQs, Pale yellow to pale yellow-brown conglomerate bedrock with 10-20% rounded, pebble to cobble-sized clasts of granite and metamorphic rock in matrix of medium to coarse-grained sand; overall damp and moderately hard	B:N25W,8SW		No Ground Water No Caving

N 80 E

SCALE 1" = 5'

TOTAL DEPTH 9.5 Ft.



ALLAN E. SEWARD

JOB NO. 98-1617-4

PROJECT VTT 52584

LOGGED BY CJS

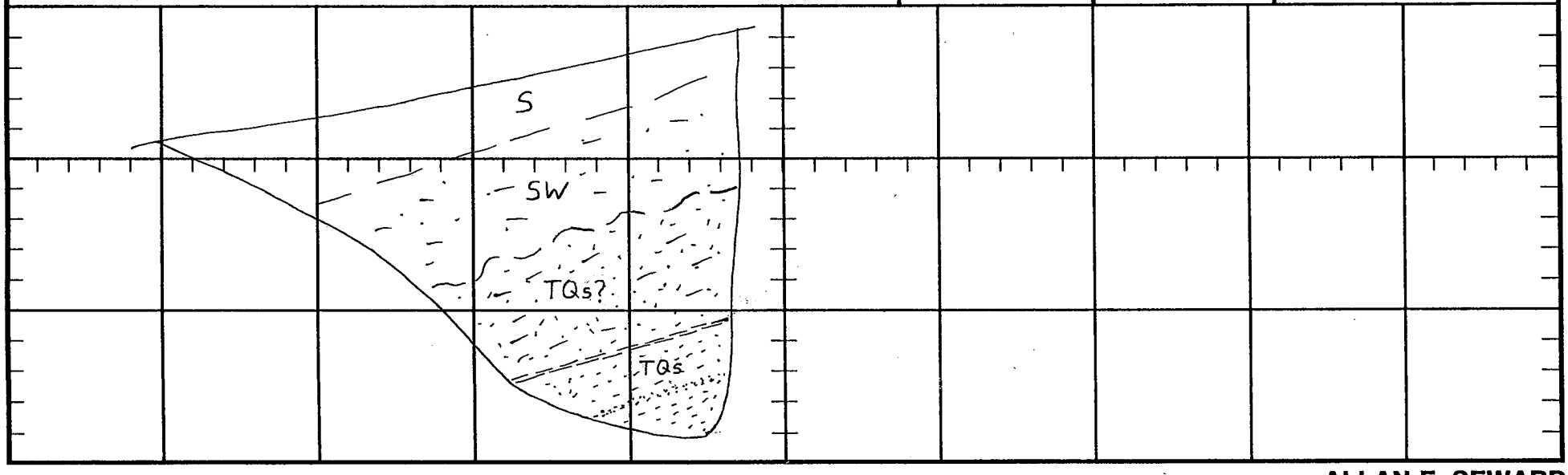
Trench Log No. T-37

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 18" SOIL; s, Moderate yellow brown fine- to medium-grained sand with scattered coarse-sand, fine gravel; loose; damp to moist 18" - 5' SLOPEWASH; sw, Moderate yellow brown to moderate reddish-brown; fine-grained, silty to slightly clayey sand; moderately dense; damp; lower contact gradational 5 - 13.5' LANDSLIDE DEBRIS; Qls, Moderate yellow-brown to moderate reddish-brown silty to sandy mudstone and pale yellowish-gray fine- to medium-grained sandstone; moist; moderately hard to hard; deeply weathered and possibly disturbed to clayey lense at 8 ft.	B:N30W,10SW	Polished Surfaces SP:N30W,15SW	Upper 5 ft. of bedrock has "disturbed" appearance and minor mixing of lithologies Base of disturbed zone is marked by discontinuous, crenulated to planar surface on clayey siltstone that is lightly polished with striations No Ground Water No Caving TOTAL DEPTH 13.5 Ft.

SCALE 1" = 5'

N 32 E



ALLAN E. SEWARD

JOB NO. 98-1617-4

LOGGED BY CJS

Trench Log No. T-38

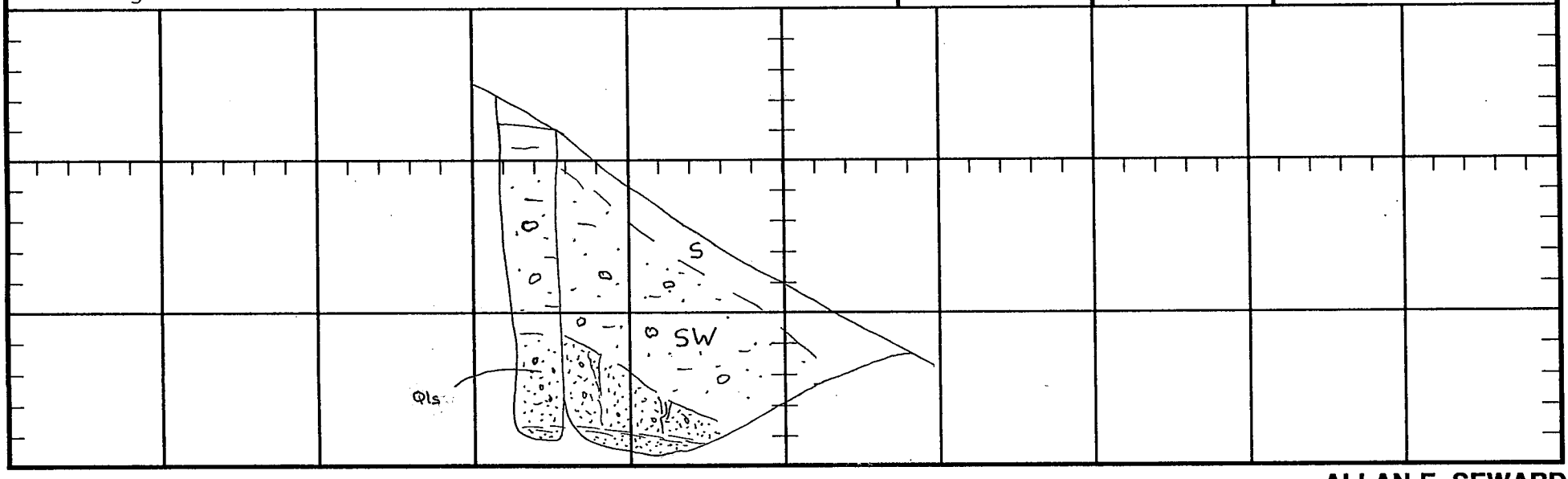
PROJECT VTT 52584

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 12" SOIL; Moderate brown to moderate yellow brown; fine- to medium-grained silty sand; loose; dry to damp			
12" - 6' SLOPEWASH; sw, Moderate yellow brown, fine- to medium-grained silty sand with 3-5% pebbles and cobbles; loose to moderately dense; damp to moist			
6 - 11' LANDSLIDE DEBRIS; Qls, Pale yellowish-grey, medium- to coarse-grained, pebbly sandstone; and moderate yellowish- to greenish-gray, fine- to medium-grained slightly silty sandstone; upper 3 ft. deeply weathered; pebbly sandstone commonly with soil filled fractures that extend to upper contact of silty sandstone; irregular contact or possible offset at west end of trench	B: E-W, 7°S		No visible gouge along "offset" on west wall of trench
			No Ground Water No Caving TOTAL DEPTH 11 Ft.

N 45 W

SCALE 1" = 5'



ALLAN E. SEWARD

JOB NO. 98-1617-4

LOGGED BY CJS

Trench Log No. T-39

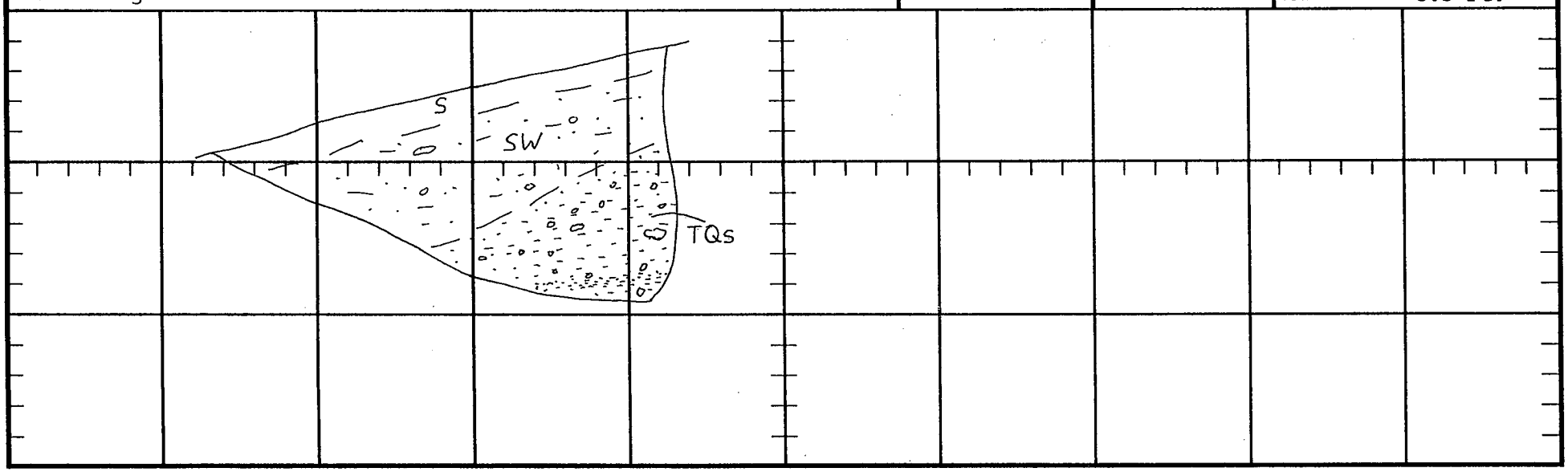
PROJECT VTT 52584

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 12" SOIL; s, Light to moderate brown, fine- to medium-grained silty sand with pebbles; loose; dry			
12" - 3' SLOPEWASH; sw, Moderate yellow-brown, very fine- to fine-grained silty sand with pebbles; moderately dense; dry to damp			
3 - 8.5' BEDROCK;TQs, Pale yellowish-gray, coarse-grained pebbly sandstone to pebbly conglomerate with isolated lenses of medium-grained sandstone; weakly cemented; dry to damp	B: N60W,2SW		Attitude on sand lens
			No Ground Water No Caving
			TOTAL DEPTH 8.5 Ft.

SCALE 1" = 5'

N 60 E



ALLAN E. SEWARD

JOB NO. 98-1617-4

LOGGED BY CJS

Trench Log No. T-40

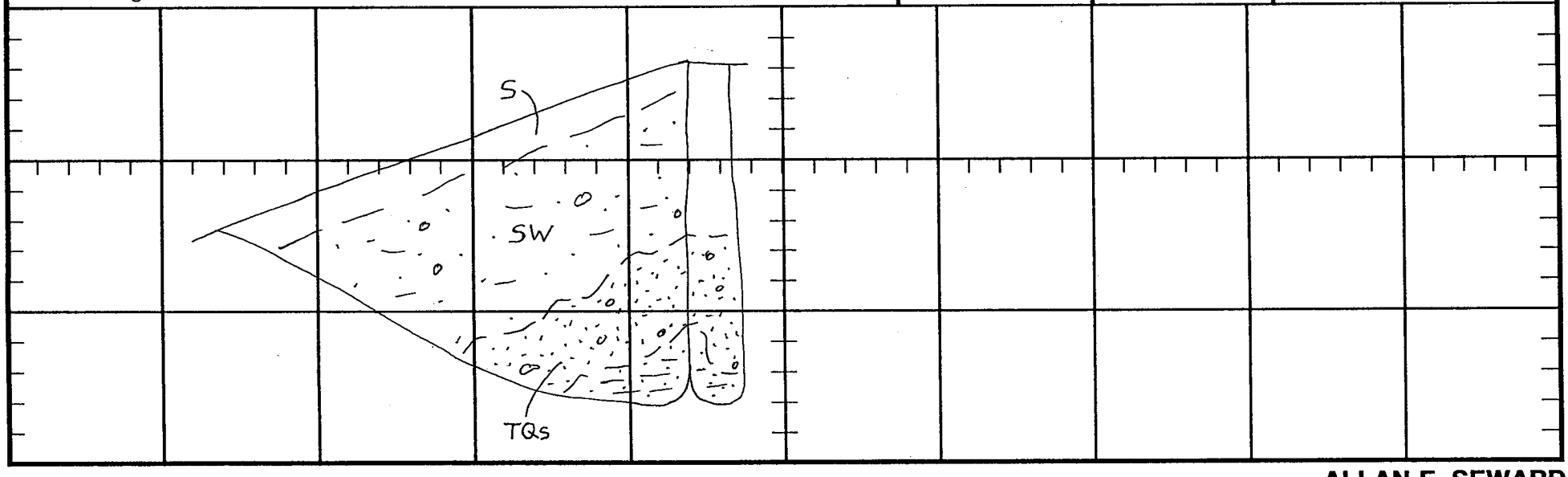
PROJECT VTT 52584

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 8" SOIL; s, Moderate brown, fine-grained silty sand; loose; dry			
8" - 6' SLOPEWASH; sw, Pale yellowish-brown, fine- to medium-grained, silty sand with scattered pebbles; loose to moderately dense; damp			
6 - 11' BEDROCK; TQs, Pale yellowish-gray to pale reddish-brown, medium- to coarse-grained pebbly sandstone and mottled, moderate reddish-brown and yellowish-brown, very fine-grained silty sandstone to sandy siltystone; sandstone is weakly cemented and friable; siltstone is moderately hard; contact may be channelled.	B:N70W,48SW		Bedding attitude may reflect channeled contact
			No Ground Water No Caving
			TOTAL DEPTH 11 Ft.

SCALE 1" = 5'

N 77 W



ALLAN E. SEWARD

JOB NO. 98-1617-4

PROJECT VTT 52584

LOGGED BY CJS

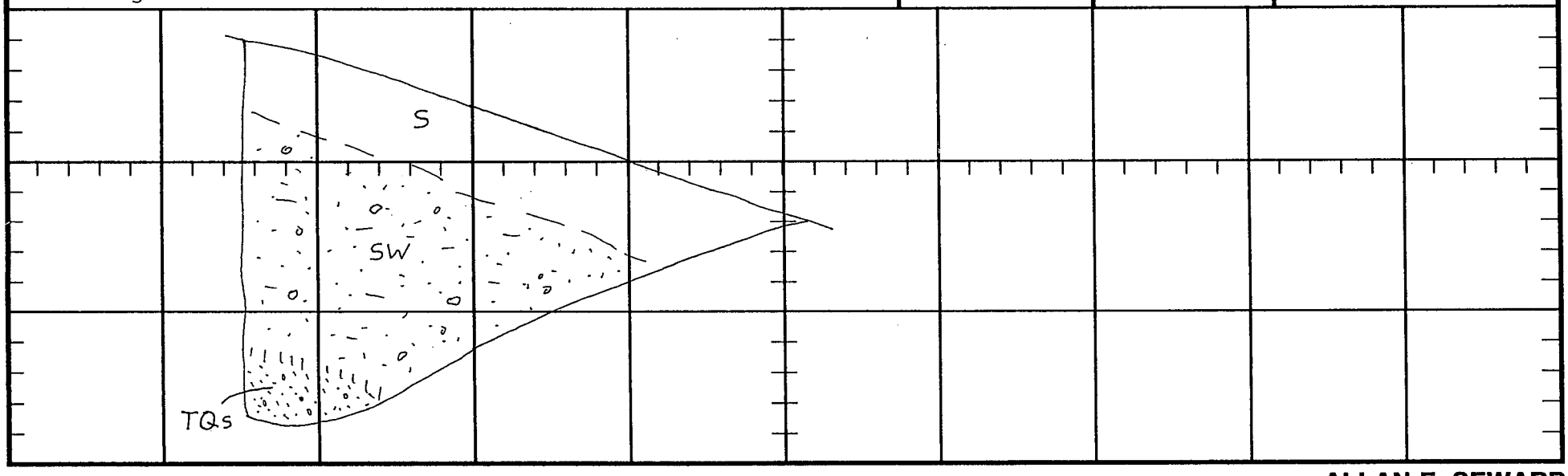
Trench Log No. T-41

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 2' SOIL; s, Moderate brown, fine-grained silty sand; loose; dry to damp			
2 - 10.5' SLOPEWASH: sw, Moderate brown to moderate yellow-brown, fine to very coarse-grained, silty sand with 2-3% pebbles and cobbles; moderately dense; damp to moist			
10.5 - 12.5' BEDROCK; TQs, Light yellow to moderate yellow-brown; medium to coarse-grained sandstone and pebbly sandstone weakly cemented to moderately cemented; damp. Upper contact gradational with overlying slopewash	B: N84W,66NE		No Ground Water No Caving TOTAL DEPTH 12.5 Ft.

SCALE 1" = 5'

N 6 W



ALLAN E. SEWARD

JOB NO. 98-1617-4

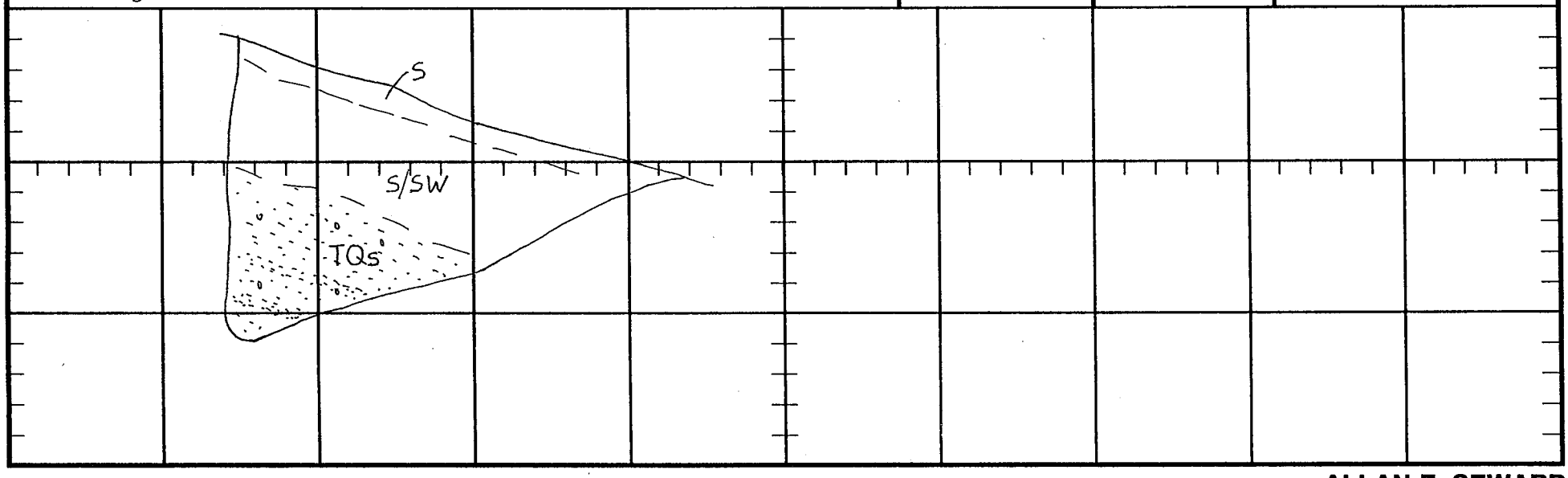
PROJECT VTT 52584

LOGGED BY CJS

Trench Log No. T-42

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 10" SOIL; s, Light brown fine- to medium-grained with scattered coarse-grained sand; loose; dry			
10" - 4' SLOPEWASH; sw, Light brown to light yellowish-brown fine- to coarse-grained, very silty sand with gravel; moderately dense; dry to damp; numerous roots			
4 - 9.5' BEDROCK; TQs, Pale yellowish-brown, medium- to coarse-grained, pebbly sandstone; weakly cemented; damp; bedding defined by stringers of fine-grained sandstone	B:N68E,36NW		
			No Ground Water No Caving
SCALE 1" = 5' N 70 E			TOTAL DEPTH 9.5 Ft.



ALLAN E. SEWARD

JOB NO. 98-1617-4

PROJECT VTT 52584

LOGGED BY CJS

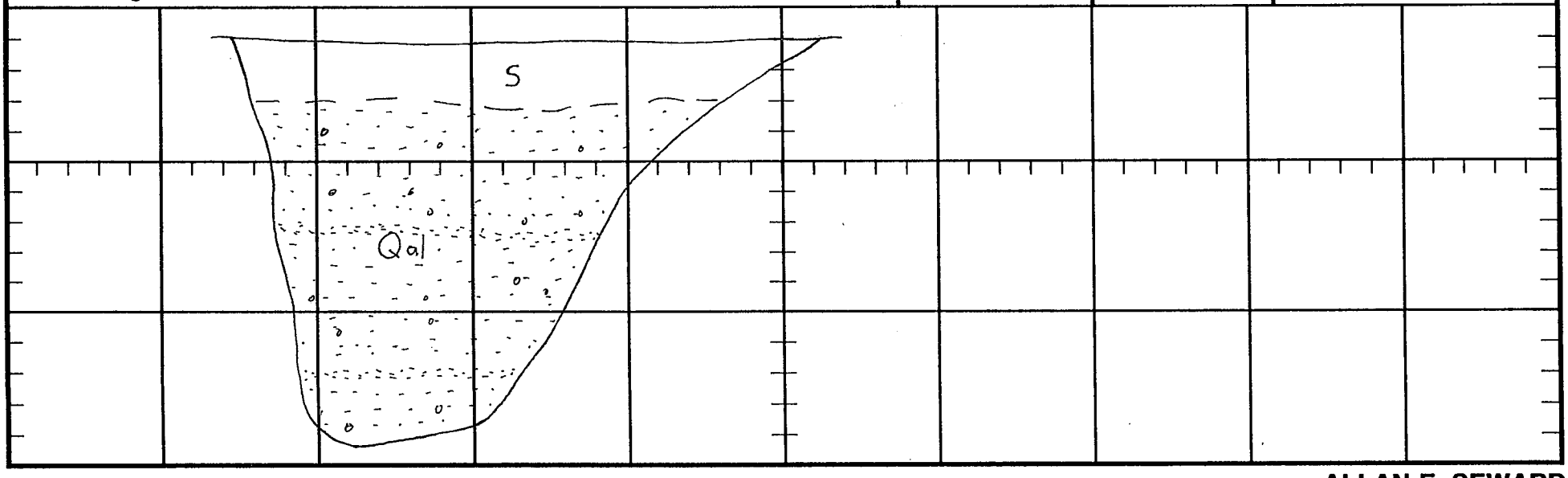
Trench Log No. T-43

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 2' SOIL; s, Light to moderate brown, fine- to medium-grained, silty sand with scattered gravel; dry to damp; loose; numerous roots 2 - 13' ALLUVIUM; Qal, Light brown to pale reddish-brown fine- to coarse-grained, pebbly sand with lenses of moderate brown, fine- to medium-grained silty sand; overall moderately dense to dense and damp to moist			No Ground Water No Caving TOTAL DEPTH 13 Ft.

SCALE 1" = 5'

N 80 W



ALLAN E. SEWARD

JOB NO. 98-1617-4

PROJECT VTT 52584

LOGGED BY CJS

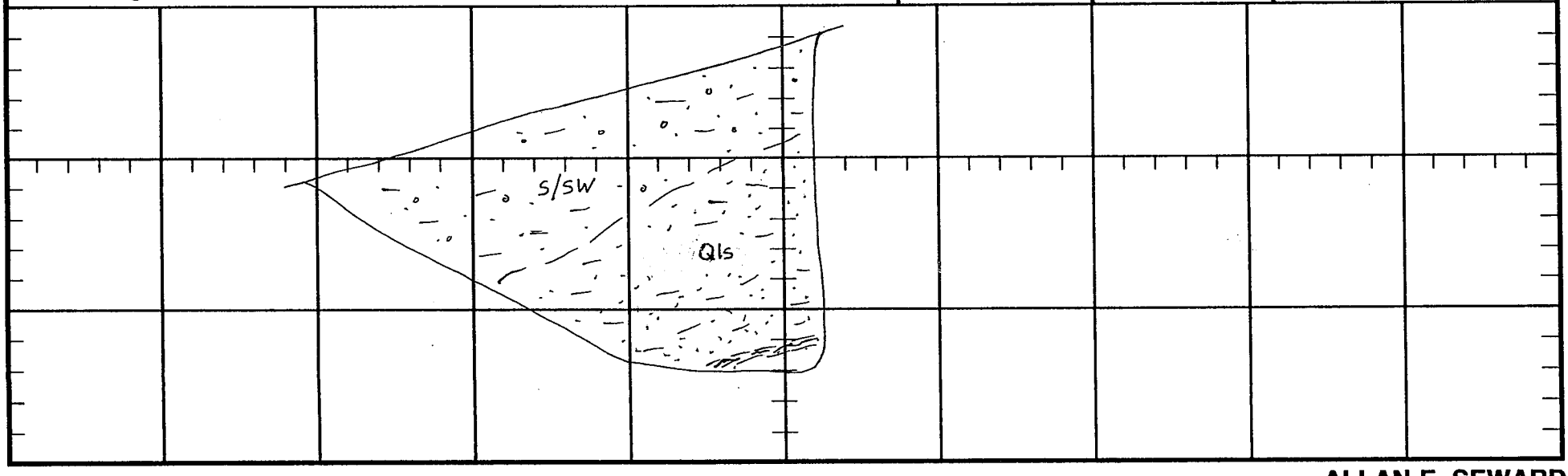
Trench Log No. T-44

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 3' SOIL/SLOPEWASH; s/sw, Moderate brown, fine-grained very silty sand with pebbles; very porous, dry to damp; numerous roots			
3 - 11' QUATERNARY LANDSLIDE; Qls, Moderate yellow-brown, very fine- to fine-grained, very silty sand with stringers and pods of reddish-brown mudstone, overall moderately dense and moist; attitude on relatively continuous bed of reddish-brown silty clay at 10.5 ft.; clay appears lightly sheared and is stained with carbonate; however, no well-defined continuous planar parting surfaces were observed. Otherwise, exposure is massive.		Sheared Clay N30E,19NW	No Ground Water No Caving TOTAL DEPTH 11 Ft.

SCALE 1" = 5'

N 10 W



ALLAN E. SEWARD

JOB NO. 98-1617-4

PROJECT VTT 52584

LOGGED BY CJS

Trench Log No. T-45

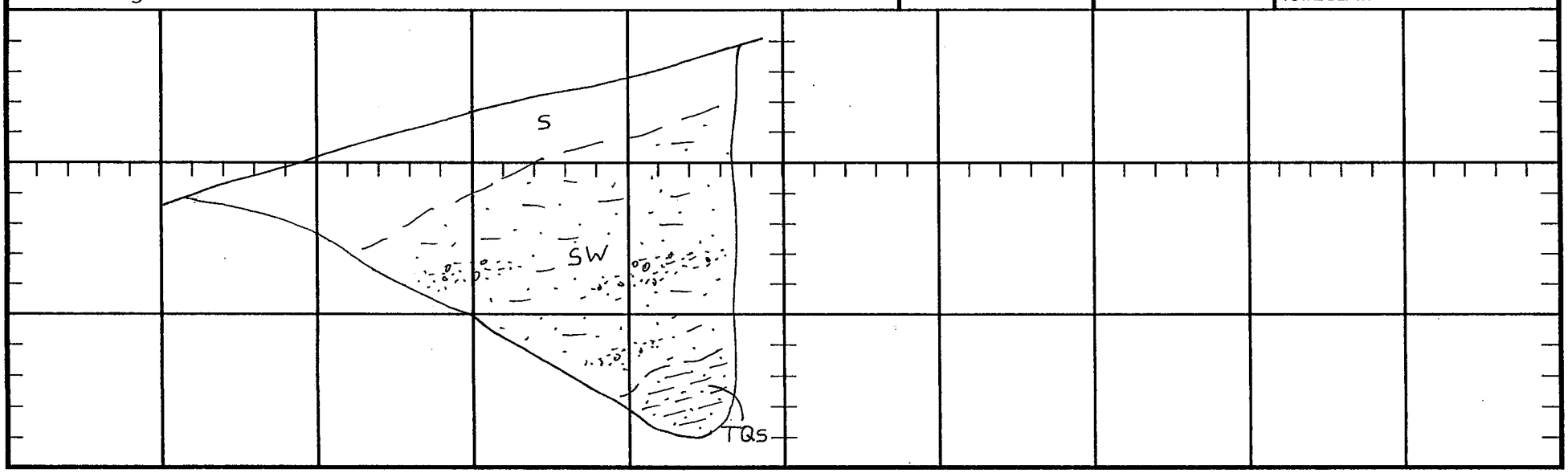
DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 2' SOIL; s, Light to moderate brown, fine-grained, silty sand; dry to damp; loose; very porous with abundant roots			
2 - 10' SLOPEWASH; sw, Light to moderate brown, fine-grained silty sand with lenses of medium- to coarse-grained pebbly sand; moderately dense; moist			
10 - 13' BEDROCK; TQs, Moderate yellowish-brown, very fine-grained silty sandstone to sandy siltstone; moderately hard; damp to moist; lightly fractured with light carbonate staining on fracture surfaces; no bedding; upper contact gradational			No Ground Water No Caving

SCALE 1" = 5'

N 15 E

TOTAL DEPTH 13 Ft.



ALLAN E. SEWARD

JOB NO. 98-1617-4

LOGGED BY CJS

Trench Log No. T-46

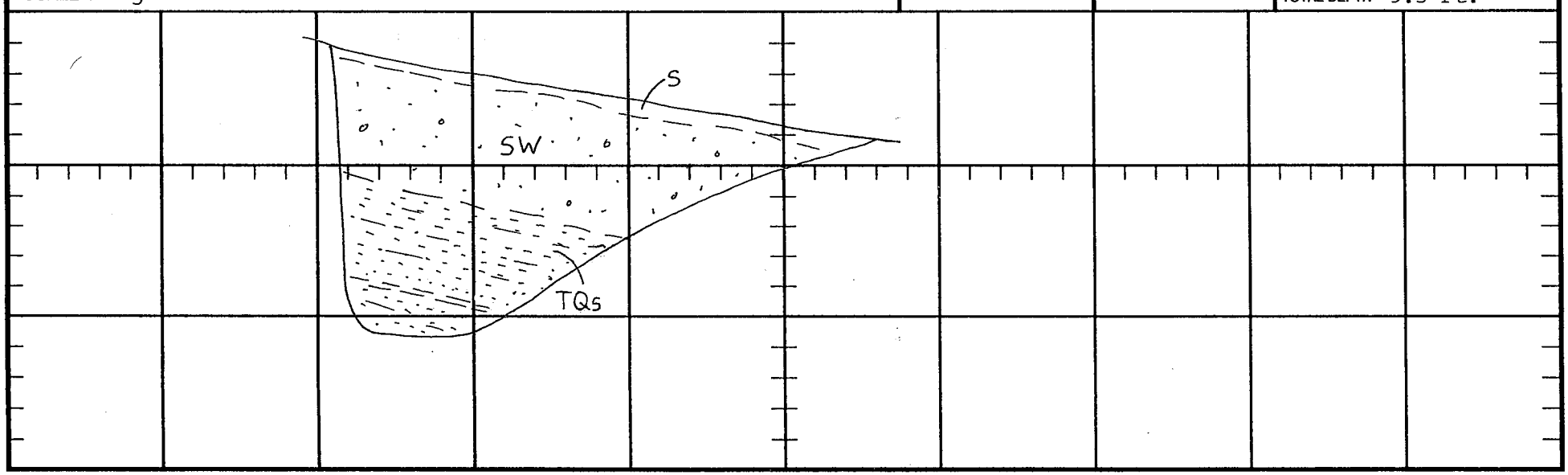
PROJECT VTT 52584

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 6" SOIL;, s, Light brown, fine- to medium-grained silty sand; very porous; dry to damp			
6" - 4' SLOPEWASH; sw, Light brown to light yellowish-brown fine- to medium-grained sand with scattered pebbles; loose to moderately dense; damp			
4 - 9.5' BEDROCK; TQs, Light brown to light-yellowish-brown fine-grained silty sandstone; lightly to moderately fractured with light carbonate staining on fracture surfaces; bedding defined by 2" interbed of reddish-brown mudstone	B:N70E,19NW		No Ground Water No Caving TOTAL DEPTH 9.5 Ft.

SCALE 1" = 5'

N 68 W



ALLAN E. SEWARD

JOB NO. 98-1617-4

PROJECT VTT 52584

LOGGED BY CJS

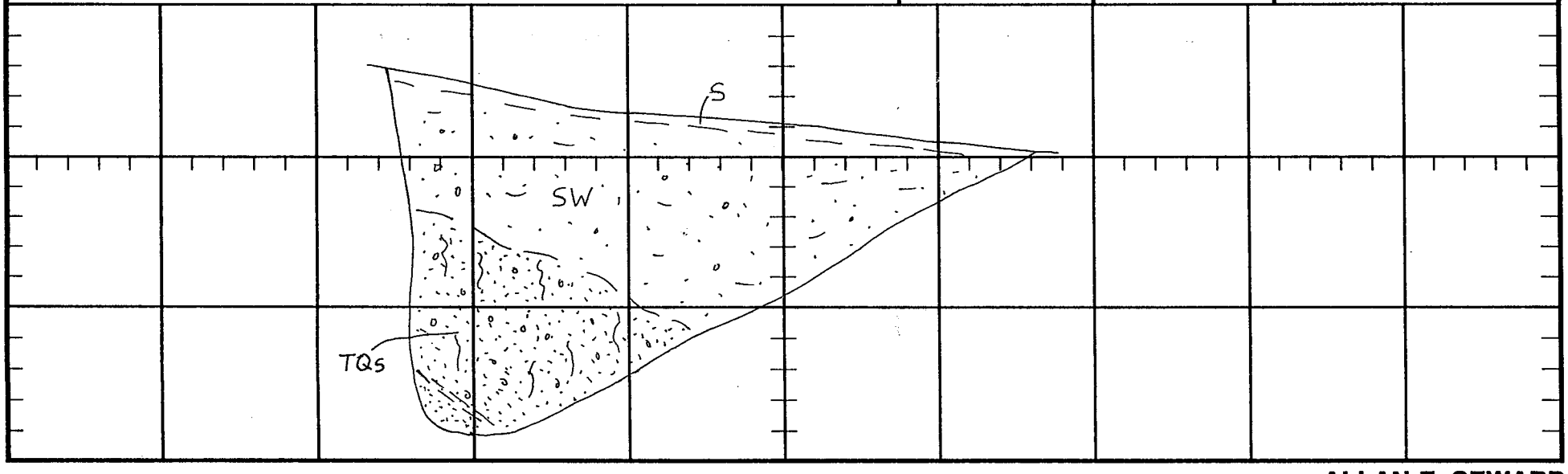
Trench Log No. T-47

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 6" SOIL; s, Light brown, fine- to medium-grained, silty sand; loose; dry			
6" - 4.5' SLOPEWASH; sw, Light brown to light yellow-brown; fine- to coarse-grained silty sand with pebbles; loose to moderately dense; damp			
4.5 - 12.5' BEDROCK; TQs, Light- to moderate-yellow-brown medium to very coarse-grained, pebbly sandstone to pebble conglomerate and moderate yellow-brown, very fine- to fine-grained sandstone; upper contact gradational and upper 6 feet very deeply weathered; weakly to moderately cemented, damp to moist	B:N75E,47NW		No Ground Water No Caving TOTAL DEPTH 12.5 Ft.

SCALE 1" = 5'

N 25 W



ALLAN E. SEWARD

JOB NO. 98-1617-4

PROJECT VTT 52584

LOGGED BY CJS

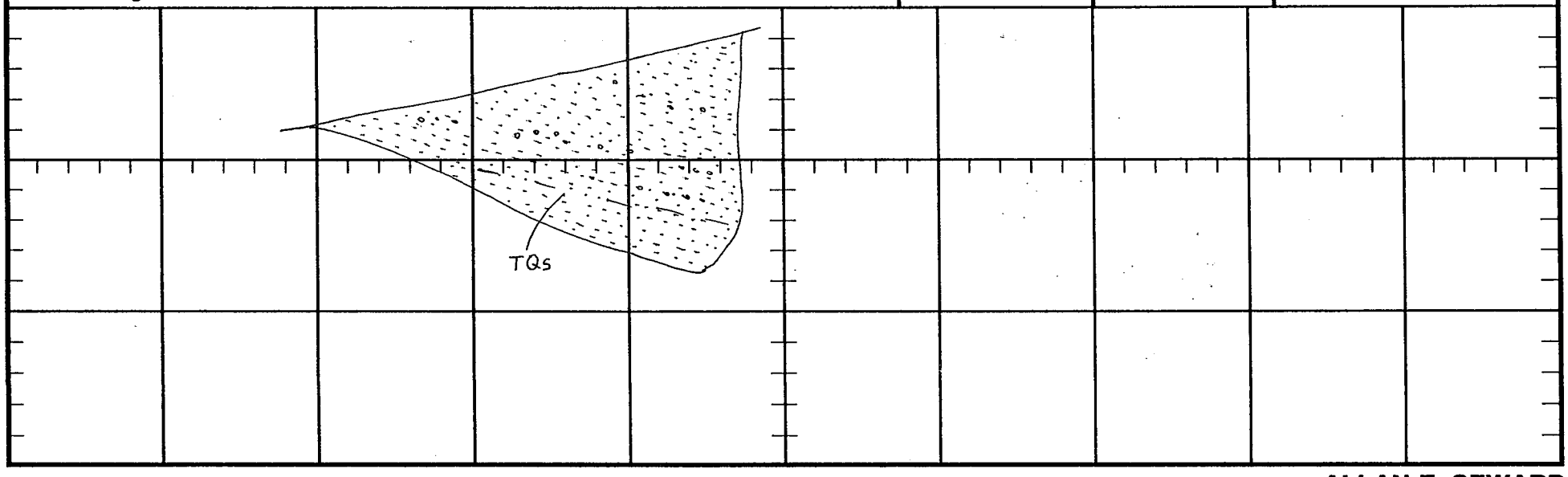
Trench Log No. T-48

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 8' BEDROCK; TQs, Pale brown to pale yellow-brown; medium- to very coarse-grained pebbly sandstone and pale reddish-brown, fine-grained sandstone; moderately hard; damp to moist	B:N65E,19NW		Trenches 48 through 61 excavated on 7/21/98 using a 24" bucket on a track mounted back-hoe Soil horizon removal by grading No Ground Water No Caving TOTAL DEPTH 8 Ft.

SCALE 1" = 5'

N 53 W



ALLAN E. SEWARD

JOB NO. 98-1617-4

LOGGED BY CJS

Trench Log No. T-49

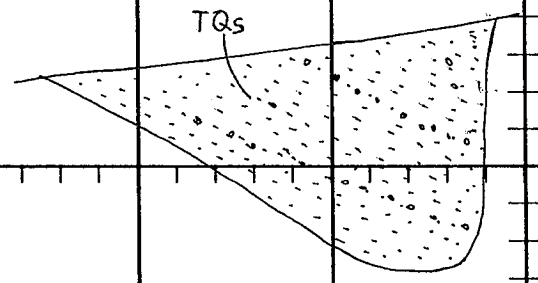
PROJECT VTT 52584

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 7' BEDROCK; TQs, Pale yellow-brown to pale reddish-brown, medium- to coarse-grained pebbly sandstone; friable; damp to moist	B:N73E,38NW		No Ground Water No Caving TOTAL DEPTH 7 Ft.

SCALE 1" = 5'

N 15 E



ALLAN E. SEWARD

JOB NO. 98-1617-4

LOGGED BY CJS

Trench Log No. T-50

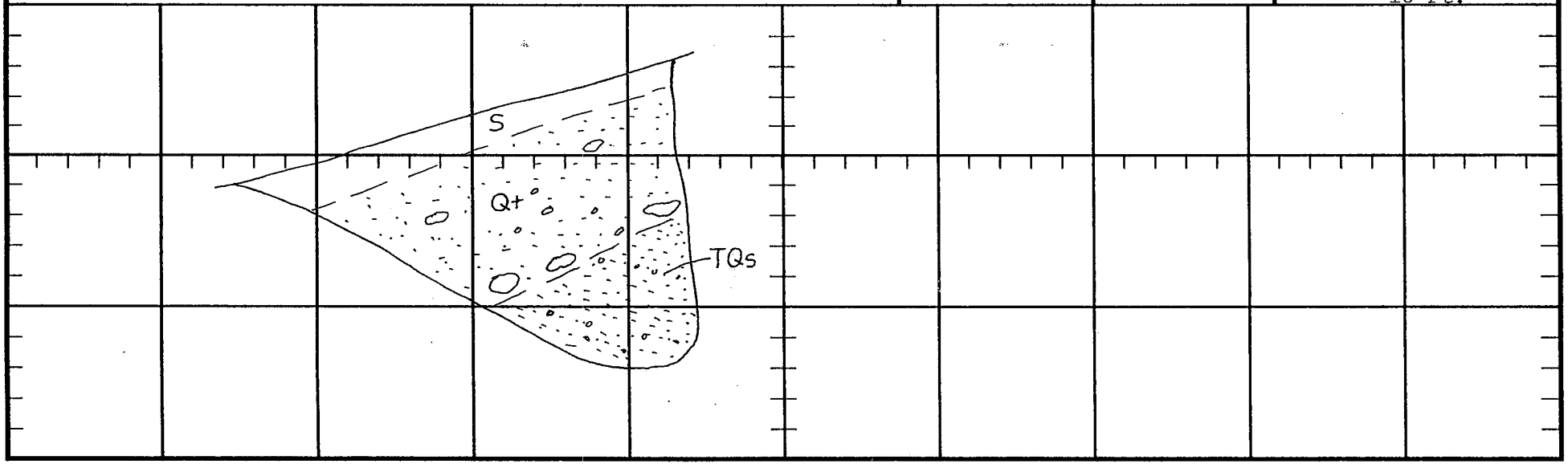
PROJECT VTT 52584

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 1' SOIL; s, Light brown, fine- to medium-grained silty sand, loose; dry			
1 - 5' QUATERNARY TERRACE; Qt, Moderate reddish-brown, medium to coarse-grained silty sand with pebbles, cobbles and boulders; boulders range up to 18 inches maximum dimension, and are concentrated at base of unit; lower contact irregular	B: N55E,40NW	C:N57W,29NE	Orientation on bottom of Qt "averaged" to reflect irregular contact
5 - 10' BEDROCK; TQs, Pale yellow-brown to pale reddish-brown; medium- to very coarse-grained sandstone with scattered pebbles; very friable; damp			
			No Ground Water No Caving
			TOTAL DEPTH 10 Ft.

N 75 E

SCALE 1" = 5'



ALLAN E. SEWARD

JOB NO. 98-1617-4

PROJECT VTT 52584

LOGGED BY CJS

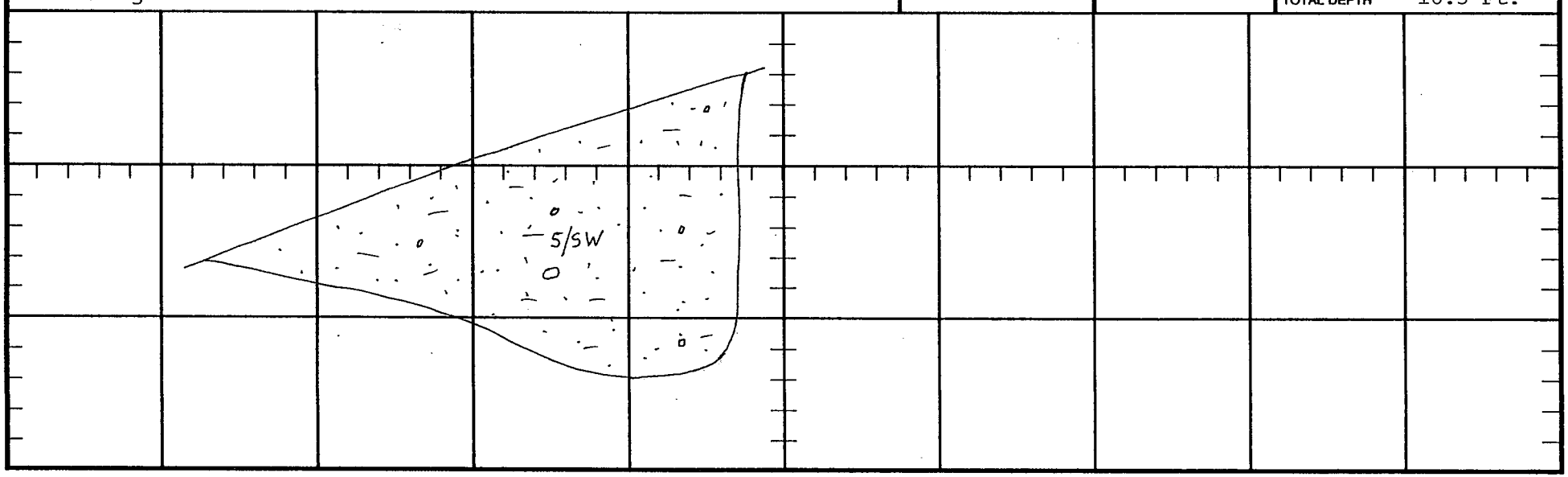
Trench Log No. T-51

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 10.5' SOIL/SLOPEWASH; sw, Moderate brown to moderate yellow-brown, medium- to coarse-grained, silty sand with isolated cobbles and pebbles; no bedding; may be deeply weathered bedrock			No Ground Water No Caving TOTAL DEPTH 10.5 Ft.

SCALE 1" = 5'

N 50 W



ALLAN E. SEWARD

JOB NO. 98-1617-4

PROJECT VTT 52584

LOGGED BY CJS

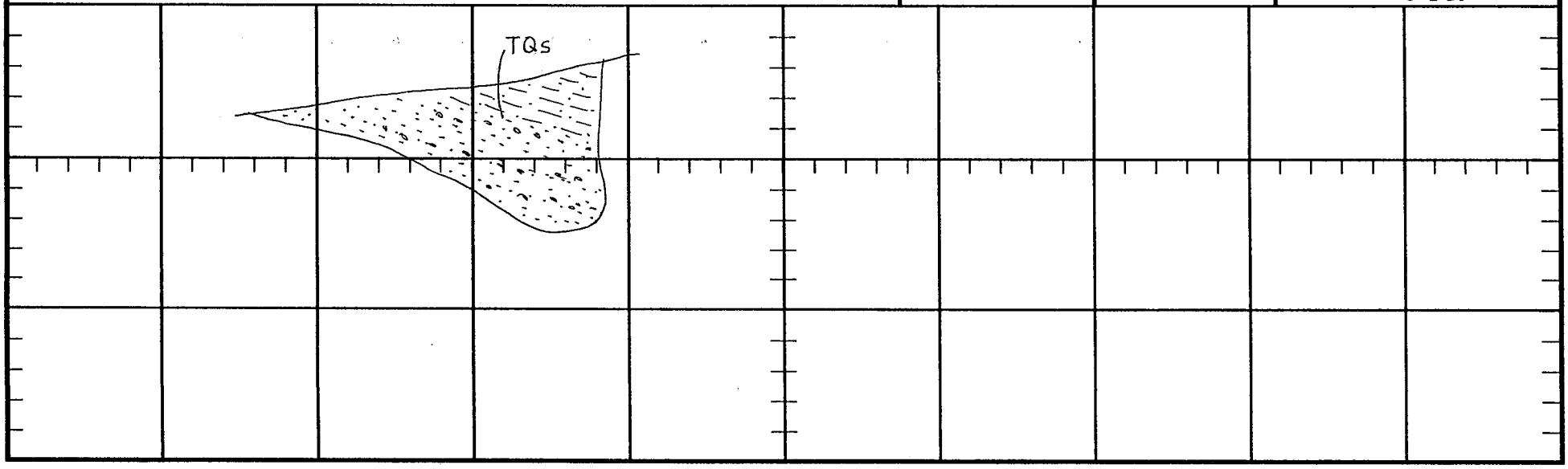
Trench Log No. T-52

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 6' BEDROCK; TQs, Pale yellow-brown, medium- to coarse-grained sandstone and moderate yellow-brown siltstone and clayey siltstone; moderately hard, damp	B:N50E,29NW		No Ground Water No Caving TOTAL DEPTH 6 Ft.

SCALE 1" = 5'

N 15 E



ALLAN E. SEWARD

JOB NO. 98-1617-4

PROJECT VTT 52584

LOGGED BY CJS

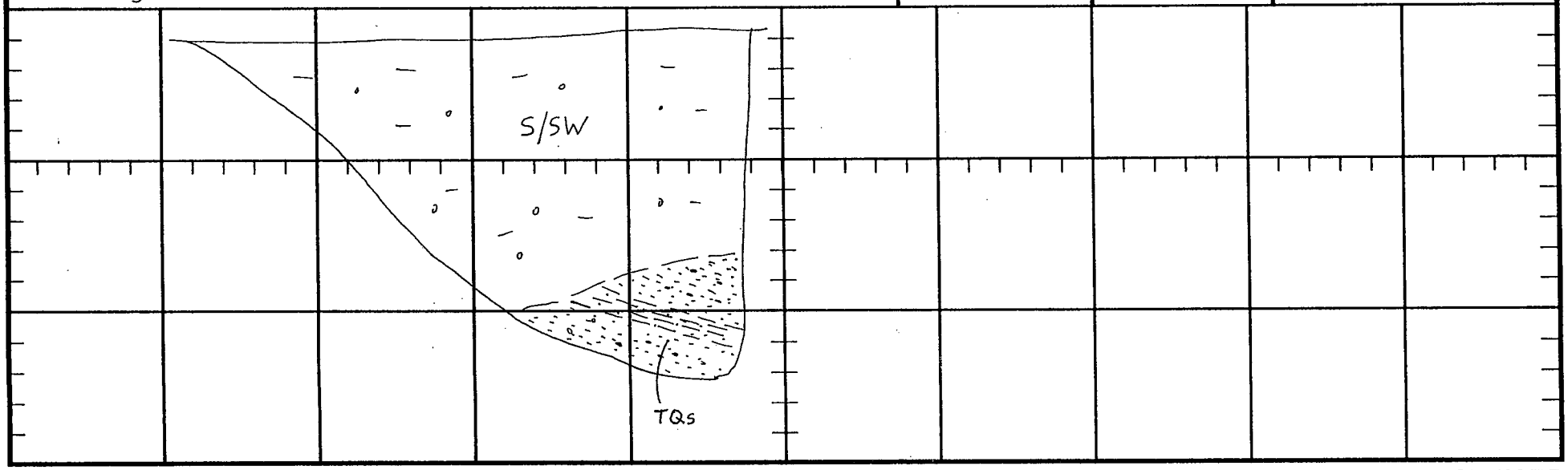
Trench Log No. T-53

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 7' SOIL/SLOPEWASH; s/sw, Light brown to moderate yellow-brown, fine- to medium-grained, silty sand with pebbles; moderatley dense; damp; roots common in uppermost 6".			
7 - 11' BEDROCK; TQs, Moderate yellowish-orange, coarse-grained, pebbly sandstone and olive sandy mud-stone; friable to moderately cemented; damp	B:N80W,30NE		No Ground Water No Caving TOTAL DEPTH 11 Ft.

N 80 W

SCALE 1" = 5'



ALLAN E. SEWARD

JOB NO. 98-1617-4

PROJECT VTT 52584

LOGGED BY CJS

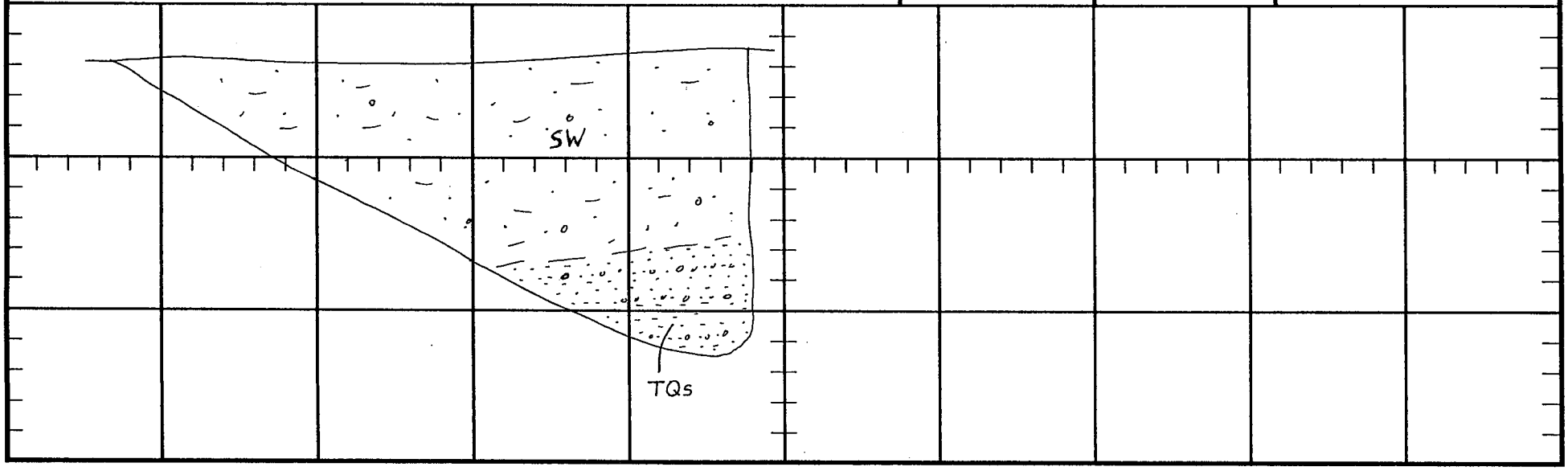
Trench Log No. T-54

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 6' SLOPEWASH; sw, Pale yellowish-brown to moderate reddish-brown; medium- to coarse-grained silty sand with pebbles; moderately dense to dense; moist			
6 - 10.5' BEDROCK; TQs, Moderate yellow-brown; medium- to coarse-grained slightly silty sand with pebbles; poorly cemented; weakly stratified	B: N55W,9SW		Bedrock identified as TQs, may be Qt?
			No Ground Water No Caving
			TOTAL DEPTH 10.5 Ft.

SCALE 1" = 5'

N 15 W



ALLAN E. SEWARD

JOB NO. 98-1617-4

PROJECT VTT 52584

LOGGED BY CJS

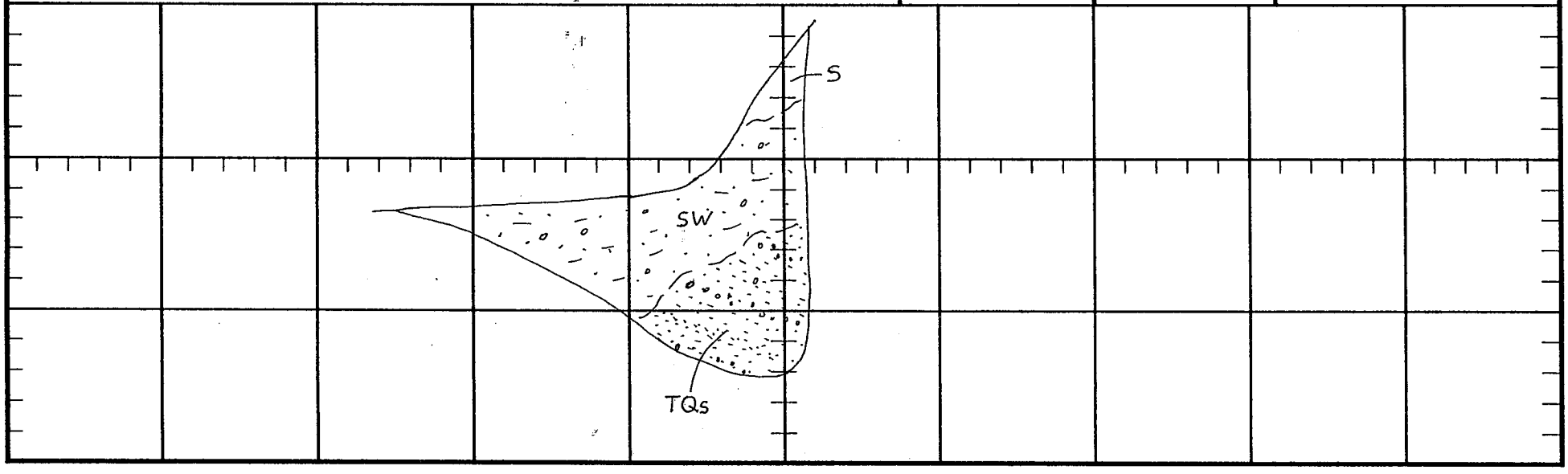
Trench Log No. T-55

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 2' SOIL; s, Light brown, fine- to medium-grained silty sand; loose; dry; numerous roots			
2 - 6' SLOPEWASH; sw, Moderate orange-brown, medium- to coarse-grained, silty sand with scattered pebbles; moderately dense; damp			
6 - 11' BEDROCK; TQs, Moderate yellow-brown, medium- to coarse-grained, pebbly sandstone with interbeds of very fine-grained sandstone; friable to weakly cemented; damp to moist			No Ground Water No Caving TOTAL DEPTH 11 Ft.

SCALE 1" = 5'

N 30 E



ALLAN E. SEWARD

JOB NO. 98-1617-4

PROJECT VTT 52584

LOGGED BY CJS

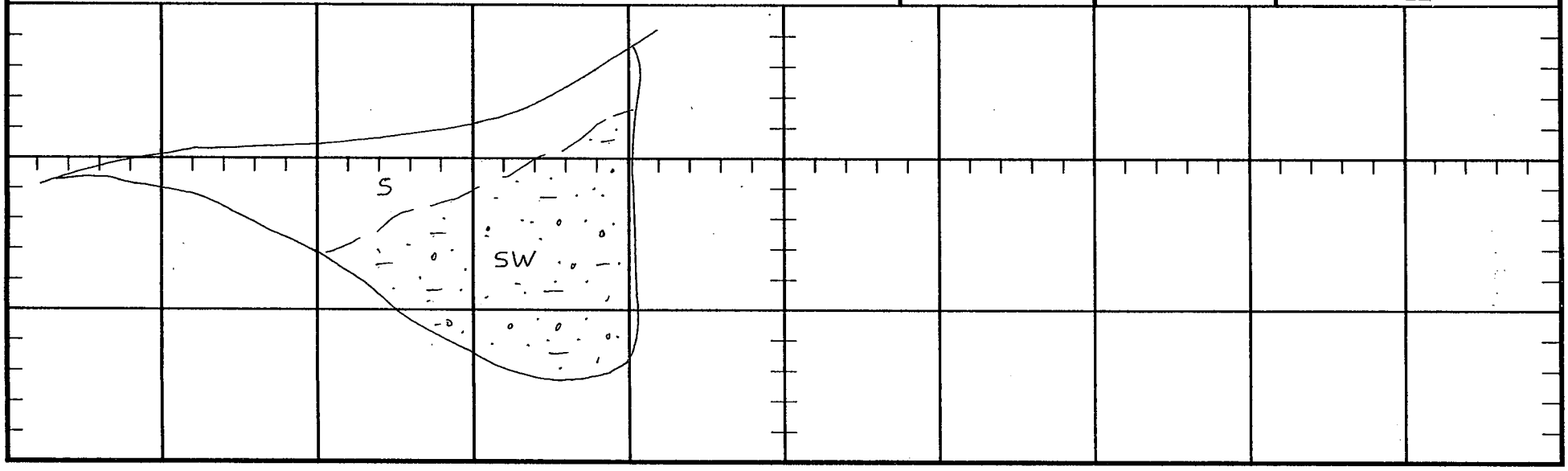
Trench Log No. T-56

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 2' SOIL; s, Light brown, fine- to medium-grained, silty sand; loose; dry to slightly damp; numerous small roots			
2 - 11' SLOPEWASH/WEATHERED BEDROCK/LANDSLIDE DEBRIS; sw, Moderate yellowish-brown; medium to coarse-grained silty sand with pebbles; moderately dense; moist; no obvious stratification.			No Ground Water No Caving TOTAL DEPTH 11 Ft.

N 30 E

SCALE 1" = 5'



ALLAN E. SEWARD

JOB NO. 98-1617-4

PROJECT VTT 52584

LOGGED BY CJS

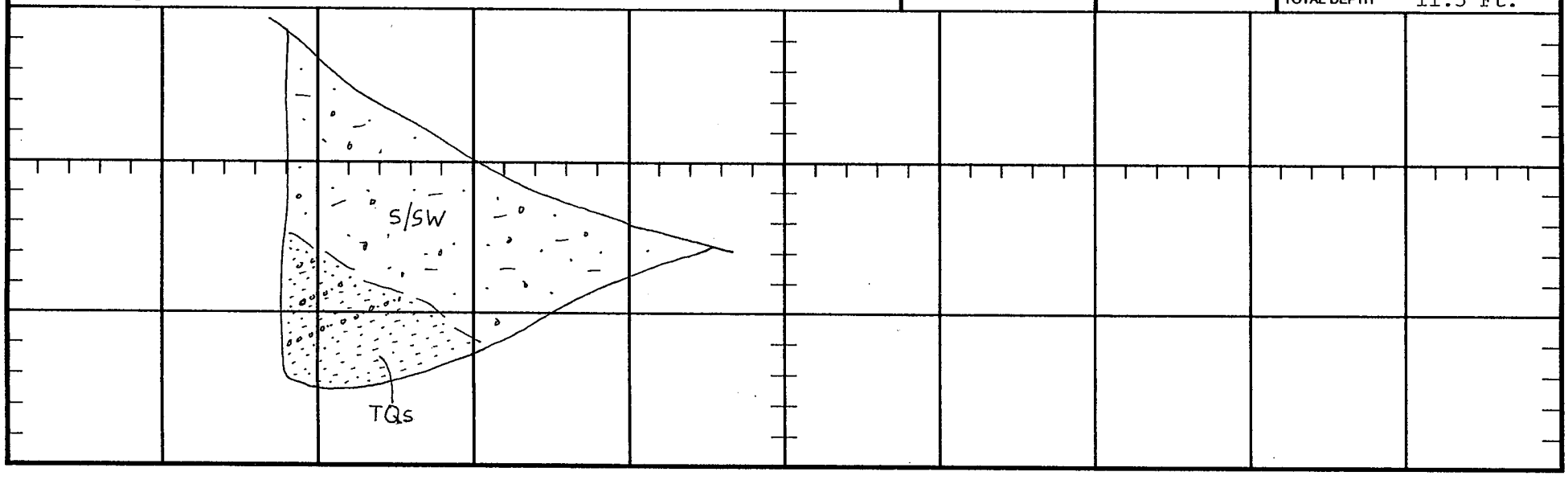
Trench Log No. T-57

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 6.5' SOIL/SLOPEWASH; sw, Light brown to light yellowish-brown; fine- to coarse-grained, silty sand with pebbles; loose to moderately dense; dry to damp			
6.5 - 11.5' BEDROCK; TQs, Light yellowish-brown, medium- to coarse-grained, pebbly sandstone with interbeds of fine- to medium-grained sandstone; poorly to moderately cemented; damp	N77E,26SE		No Ground Water No Caving TOTAL DEPTH 11.5 Ft.

N 32 E

SCALE 1" = 5'



ALLAN E. SEWARD

JOB NO. 98-1617-4

PROJECT VTT 52584

LOGGED BY CJS

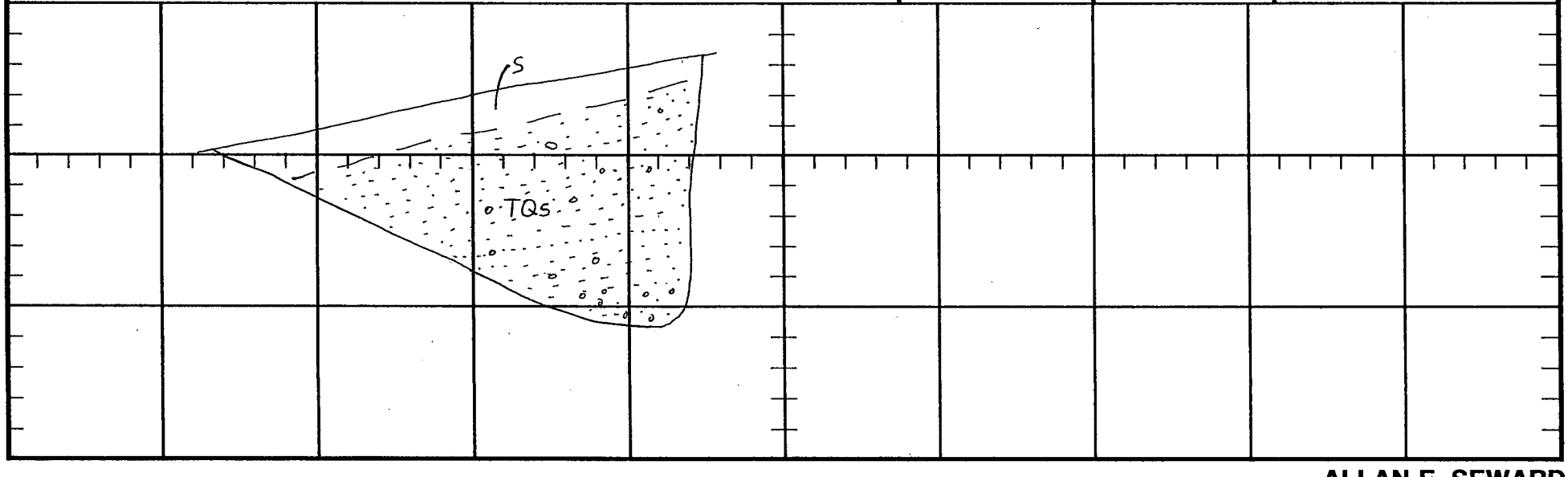
Trench Log No. T-58

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 1' SOIL: s, Light brown fine- to medium-grained, silty gravelly sand; loose; dry; numerous roots			
1 - 8.5' BEDROCK; TQs, Light to moderate yellow brown and pale reddish-brown medium- to very coarse-grained, pebbly sandstone; moderately cemented; dry to damp	E-W, 24N		No Ground Water No Caving TOTAL DEPTH 8.5 Ft.

SCALE 1" = 5'

N 75 E



ALLAN E. SEWARD

JOB NO. 98-1617-4

PROJECT VTT 52584

LOGGED BY CJS

Trench Log No. T-59

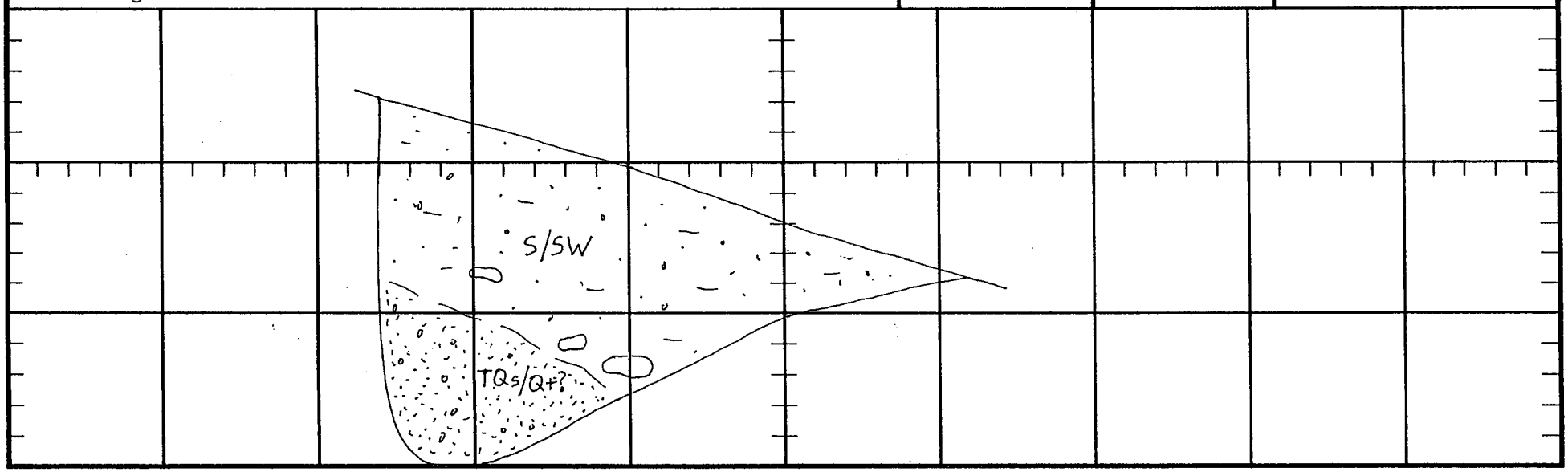
DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 5.5' SOIL/SLOPEWASH; s/sw, Light to moderate-brown, fine- to medium-grained, silty sand with gravel; moderately dense; dry; locally with boulders up to 24" maximum dimension			
5.5 - 12' BEDROCK/QUATERNARY TERRACE; TQs/Qt, Moderate yellowish-brown to dark yellowish-orange, medium- to coarse-grained, pebbly sandstone; very friable; damp to moist; no stratification apparent from surface			Cannot enter trench due to potential for caving No Ground Water No Caving

SCALE 1" = 5'

N 30 W

TOTAL DEPTH 12 Ft.



ALLAN E. SEWARD

JOB NO. 98-1617-4

PROJECT VTT 52584

LOGGED BY CJS

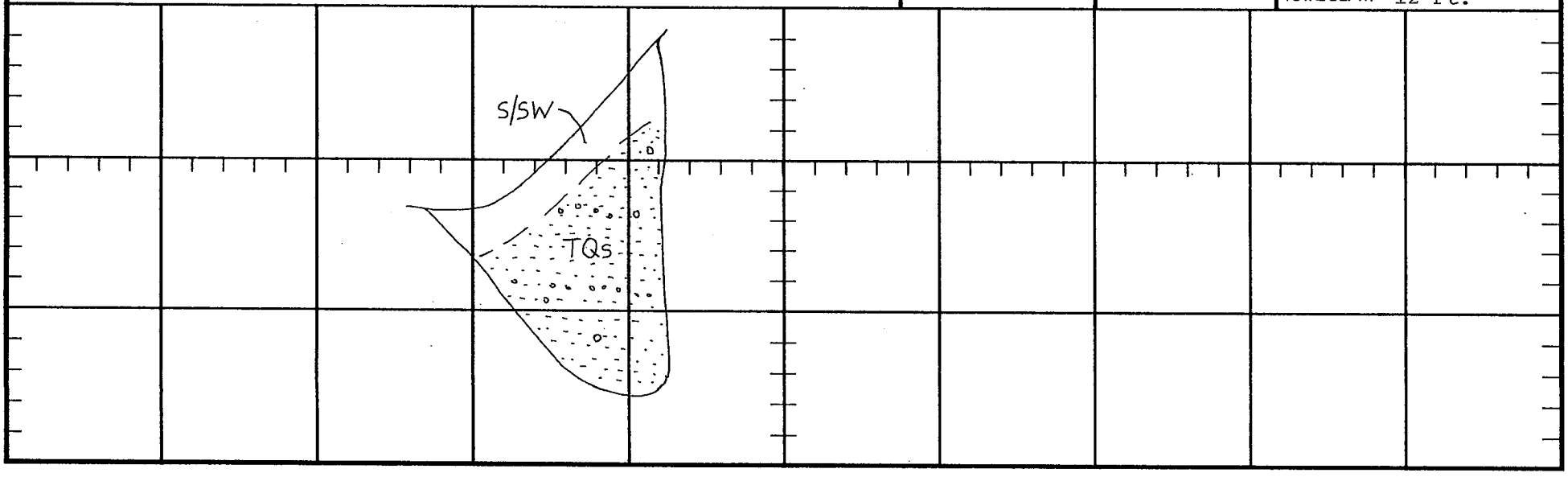
Trench Log No. T-60

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 2' SOIL/SLOPEWASH; sw, Light to moderate yellow-brown, fine-grained silty sand; loose;dry			
2 - 12' BEDROCK; TQs, Light to moderate yellow-brown and dark yellowish-orange; medium- to coarse-grained pebbly sandstone with isolated cobbles moderately hard to hard; moist	N35E,7NW		No Ground Water No Caving TOTAL DEPTH 12 Ft.

SCALE 1" = 5'

N 10 W



ALLAN E. SEWARD

JOB NO. 98-1617-4

LOGGED BY CJS

Trench Log No. T-61

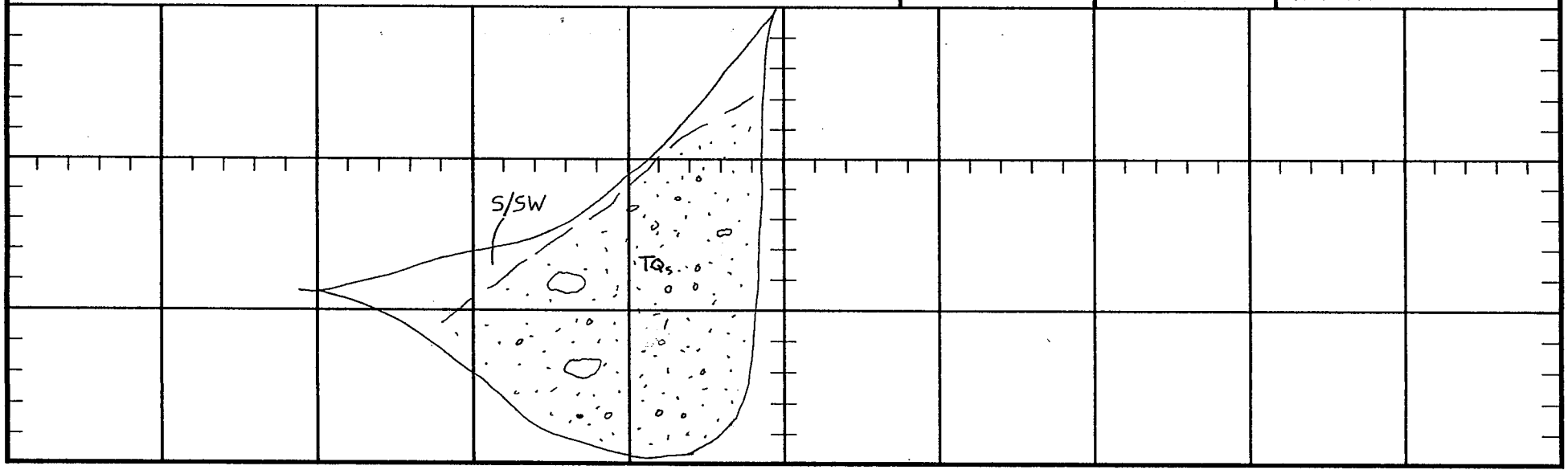
PROJECT VTT 52584

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 2' SOIL/SLOPEWASH; s/sw, Light brown, medium-grained silty sand with pebbles; loose; dry			
2 - 15' BEDROCK; TQs, Moderate yellowish-brown, medium- to very coarse-grained gravelly sand with minor silt binder; isolated boulders up to 18" maximum dimension; no well-defined stratification except for vague pebble lineation at depth of 14 ft.	N87W, 6SW		No Ground Water No Caving TOTAL DEPTH 15 Ft.

N 22 E

SCALE 1" = 5'



ALLAN E. SEWARD

JOB NO. 98-1617-4

PROJECT VTT 52584

LOGGED BY CJS

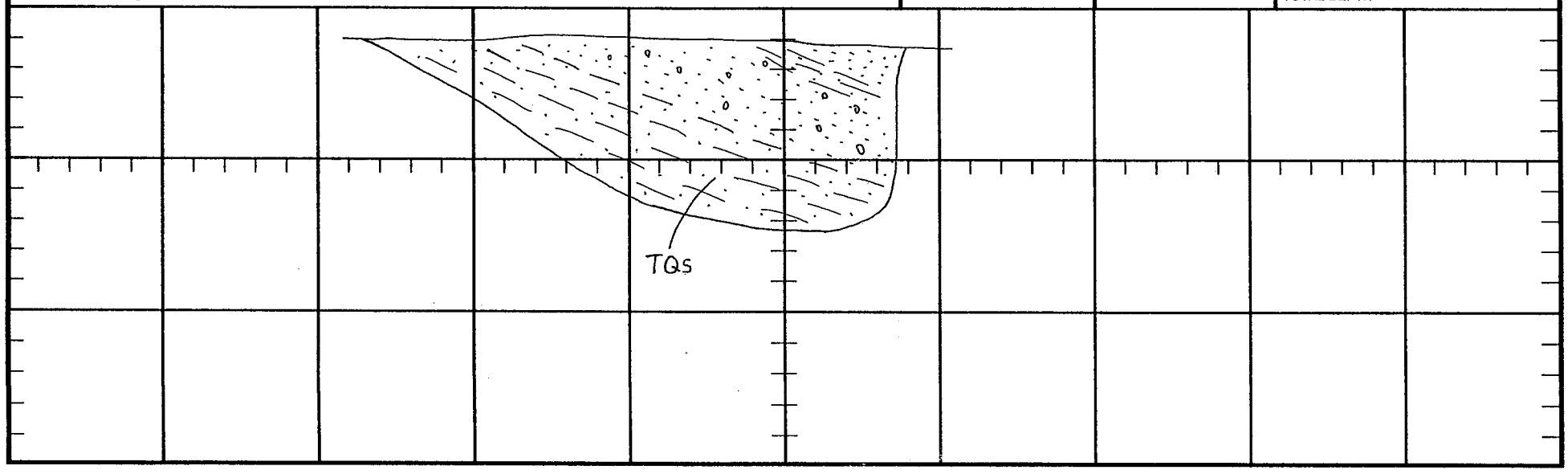
Trench Log No. T-62

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 6' BEDROCK; TQs, Moderate yellow-brown, medium- to coarse-grained pebbly sandstone & fine-grained silty sandstone to sandy siltstone; pebbly sandstone is thoroughly weathered with a concentration of small roots along the lower contact; overall moderatly hard; damp	N85E,24SW		Trenches 62 through 75 excavated on 7/21/98 using a 24" bucket on a track mounted backhoe No Ground Water No Caving TOTAL DEPTH 6 Ft.

SCALE 1" = 5'

N 8 E



ALLAN E. SEWARD

JOB NO. 98-1617-4

LOGGED BY CJS

Trench Log No. T-63

PROJECT VTT 52584

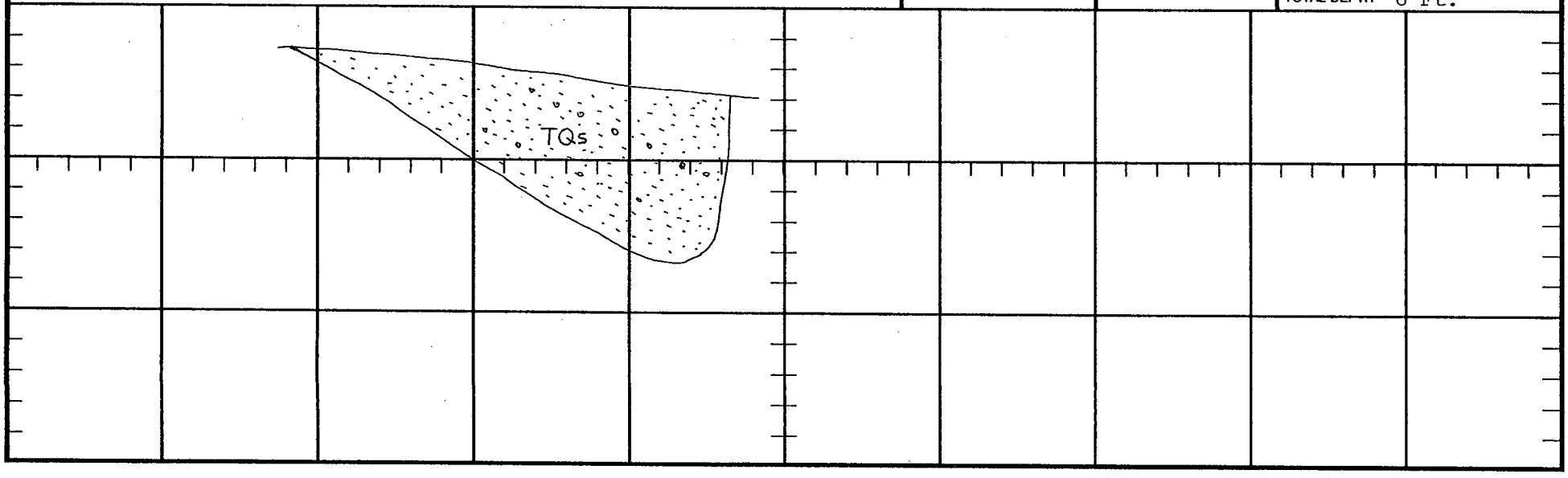
DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 6' BEDROCK; TQs, Pale yellow-brown medium- to coarse-grained, pebbly sandstone; virtually uncemented and caves easily; damp; bedding defined by concentrations of gravel and sand	B:N72E/29SE		Severe Caving No Ground Water

SCALE 1" = 5'

N 40 W

TOTAL DEPTH 6 Ft.



ALLAN E. SEWARD

JOB NO. 98-1617-4

LOGGED BY CJS

Trench Log No. T-64

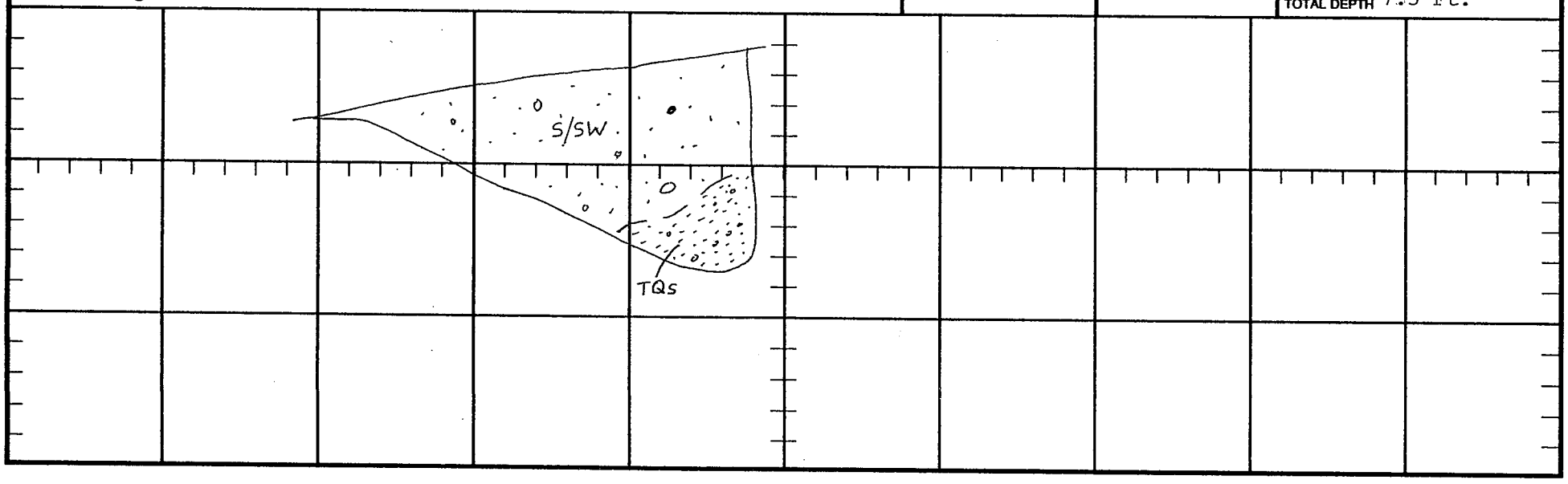
PROJECT VTT 52584

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 4' SOIL/SLOPEWASH; s/sw, Light brown to light yellowish-brown; fine to coarse-grained sand with gravel and isolated cobble-sized clasts; dry; loose; primarily sandstone bedrock deeply weathered in place			
4 - 7.5' BEDROCK; TQs, Pale yellow-brown, medium- to coarse-grained pebbly sandstone; very friable; damp to moist	EW, 29S		No Ground Water No Caving TOTAL DEPTH 7.5 Ft.

SCALE 1" = 5'

N 30 W



ALLAN E. SEWARD

JOB NO. 98-1617-4

LOGGED BY CJS

Trench Log No. T-65

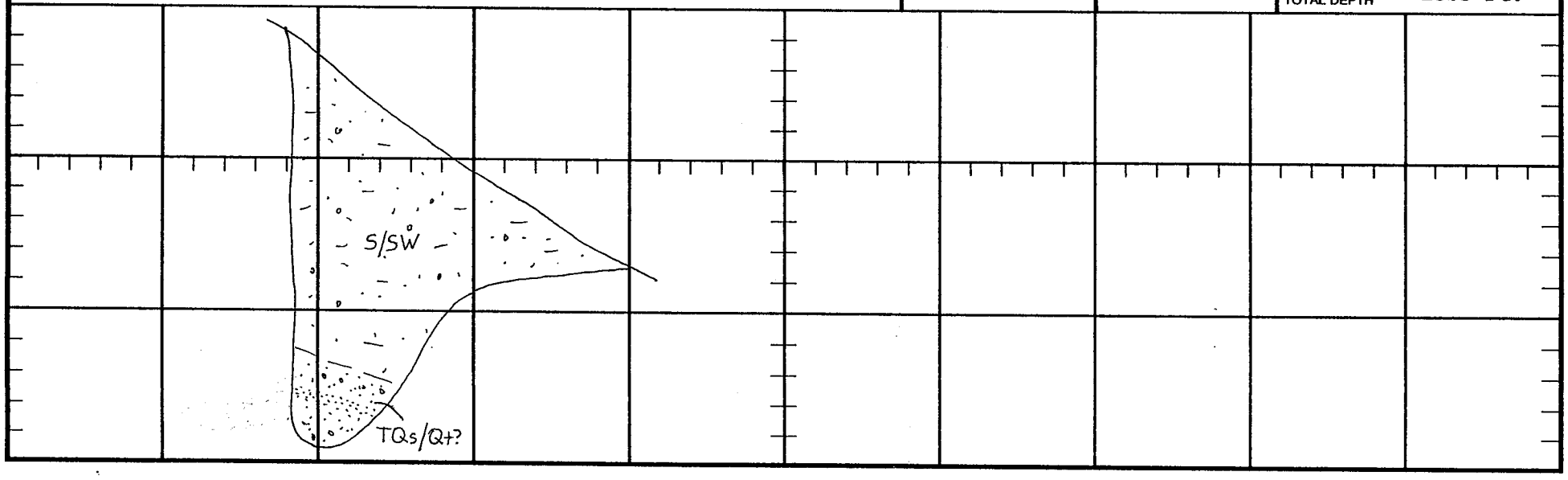
PROJECT VTT 52584

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 9.5' SOIL/SLOPEWASH; sw, Dark yellowish-orange, fine to coarse-grained silty sand with scattered pebbles; loose to moderately dense; damp to moist; lower contact gradational over several feet			
9.5 - 13.5' BEDROCK; TQs/Qt?, Moderate yellowish-orange to moderate yellow-brown medium- to coarse-grained pebbly sandstone; very friable; moist	N73E,8SE		
			No Ground Water No Caving TOTAL DEPTH 13.5 Ft.

SCALE 1" = 5'

N 10 E



ALLAN E. SEWARD

JOB NO. 98-1617-4

LOGGED BY CJS

Trench Log No. T-66

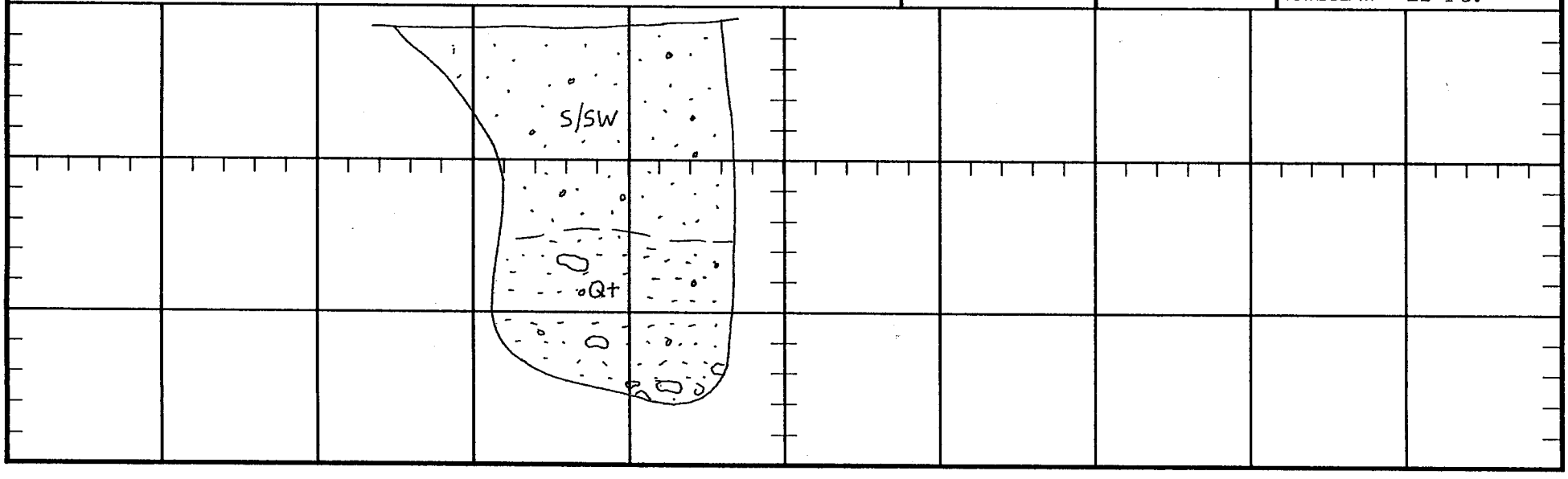
PROJECT VTT 52584

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 7' SOIL/SLOPEWASH; sw, Moderate-brown to moderate yellow-brown, fine-grained silty sand with scattered gravel; loose to moderately dense; damp			
7 - 12' QUATERNARY TERRACE; Qt, Dark yellowish-orange, medium- to very coarse-grained sand with gravel; isolated rounded clasts up to 18" maximum dimension; numerous large cobbles and boulders below 11 feet.			Logged from surface due to caving hazard Minor Caving below 11 Ft. No Ground Water

SCALE 1" = 5'

N 77 E



TOTAL DEPTH 12 Ft.

ALLAN E. SEWARD

JOB NO. 98-1617-4

LOGGED BY CJS

Trench Log No. T-67

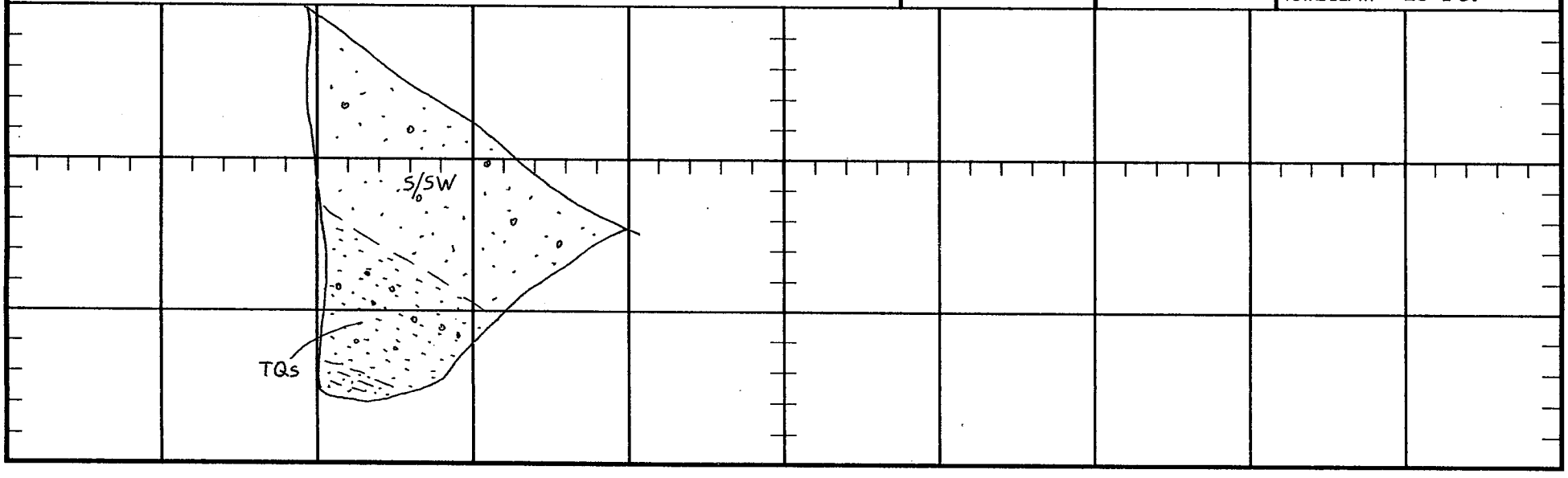
PROJECT VTT 52584

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 6.5' SOIL/SLOPEWASH; sw, Light yellow-brown fine- to coarse-grained silty sand with gravel; moderately dense to dense; damp; grades downward into deeply weathered bedrock 6.5 - 13' BEDROCK; TQs, Pale yellow brown, medium- to very coarse-grained sandstone with scattered pebbles; and moderate yellow-brown to reddish-brown, fine-grained, silty sandstone; pebbly sandstone is deeply weathered and very friable	N76E,16SE		Overall appearance of weathered sandstone in TQs is similar to Qt, however unit lacks a basal gravel, and stratification defined by vague pebble lineations is roughly parallel to well-defined contact lower in trench No Ground Water No Caving TOTAL DEPTH 13 Ft.

SCALE 1" = 5'

N 35 W



ALLAN E. SEWARD

JOB NO. 98-1617-4

PROJECT VTT 52584

LOGGED BY CJS

Trench Log No. T-68

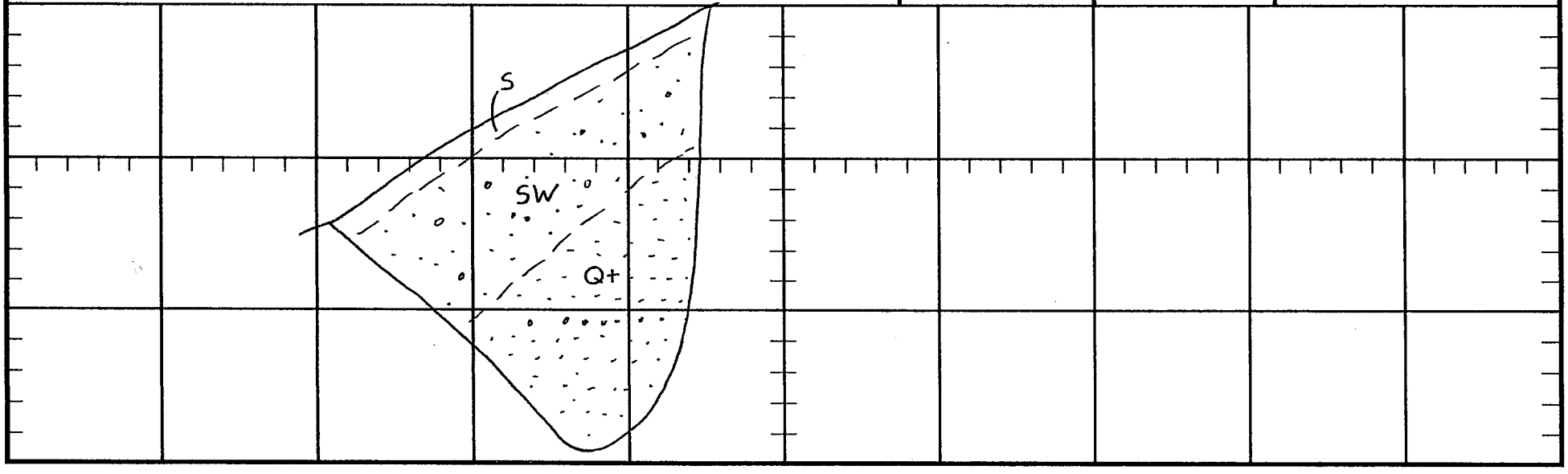
DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 8" SOIL, s, Light brown, fine-grained silty sand with minor gravel; loose; dry; numerous hair-roots			
8" - 4' SLOPEWASH; sw, Light brown to light yellowish-brown; fine- to coarse-grained with scattered pebbles; loose to moderately dense; dry to damp			Slopewash and Qt transitional into one another, both have weathered appearance
4 - 14' QUATERNARY TERRACE ; Qt, Light- to moderate-yellowish-brown; medium- to very coarse-grained pebbly sandstone with isolated cobbles to 6"; overall friable, damp to moist, subtle pebble lineations suggest near horizontal stratification			No Ground Water No Caving

N 87 E

SCALE 1" = 5'

TOTAL DEPTH 14 Ft.



ALLAN E. SEWARD

JOB NO. 98-1617-4

LOGGED BY CJS

Trench Log No. T-69

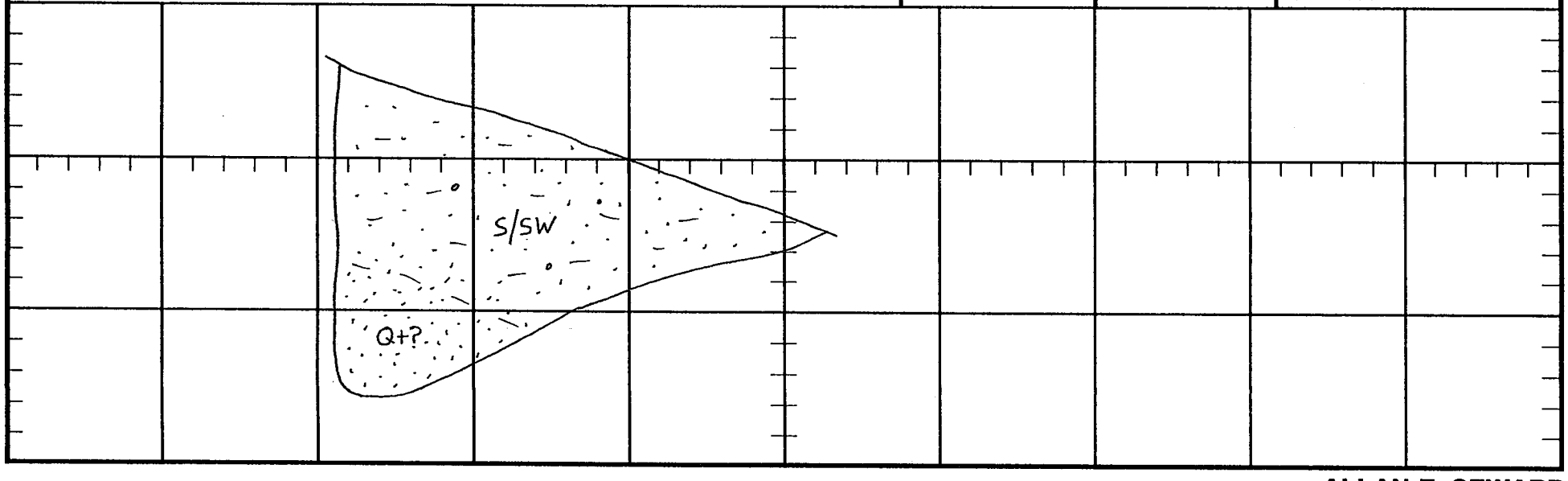
PROJECT VTT 52584

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 11' SOIL/SLOPEWASH; sw, Moderate yellowish-orange fine- to medium-grained silty sand with scattered gravel, grades less silt below 6' (possible Qt?) with no distinct contact apparent; overall massive (no stratification) damp to moist and moderately dense to dense below 6'			No Ground Water No Caving TOTAL DEPTH 11 Ft.

SCALE 1" = 5'

N 20 W



ALLAN E. SEWARD

JOB NO. 98-1617-4

PROJECT VTT 52584

LOGGED BY CJS

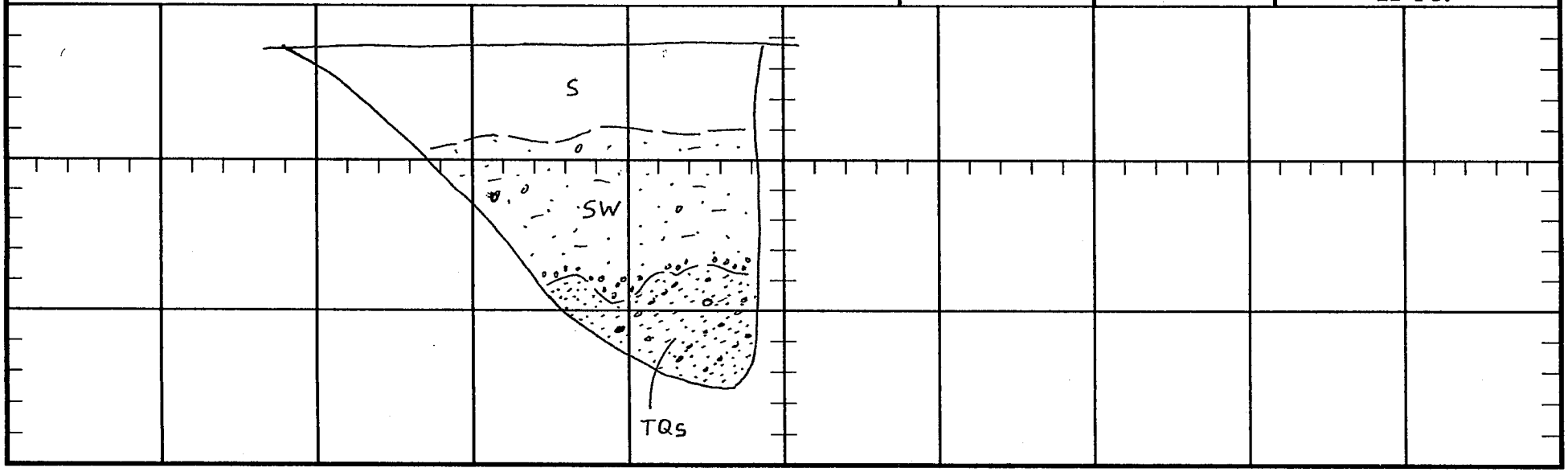
Trench Log No. T-70

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 3' SOIL; s, Light reddish-brown; fine- to coarse-grained silty sand; loose; dry to damp			
3 - 8' SLOPEWASH; sw, Light yellow-brown to brown, fine- to coarse-grained, silty sand with scattered pebbles, gravel concentrated along irregular lower contact	B:N73W,32SW		
8 - 12' BEDROCK; TQs, Pale yellow, coarse-grained, pebbly sandstone; very friable; damp			No Ground Water No Caving TOTAL DEPTH 12 Ft.

SCALE 1" = 5'

N 25 E



ALLAN E. SEWARD

JOB NO. 98-1617-4

LOGGED BY CJS

Trench Log No. T-71

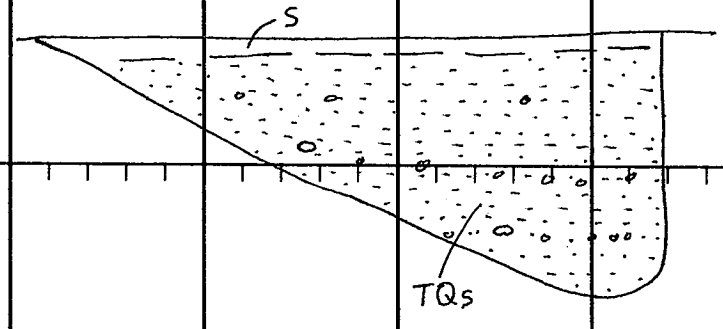
PROJECT VTT 52584

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 6" SOIL; s, Light brown, medium-to coarse-grained silty sand with gravel; loose; dry			
6" - 7' BEDROCK; TQs, Moderate yellowish-brown, medium- to very coarse-grained pebbly sandstone; with isolated clasts up to 8" maximum dimension very friable; damp to moist; deeply weathered with roots to 5'	N53E,29SE		
			No Ground Water No Caving TOTAL DEPTH 7 Ft.

SCALE 1" = 5'

N 60 E



ALLAN E. SEWARD

JOB NO. 98-1617-4

LOGGED BY CJS

Trench Log No. T-72

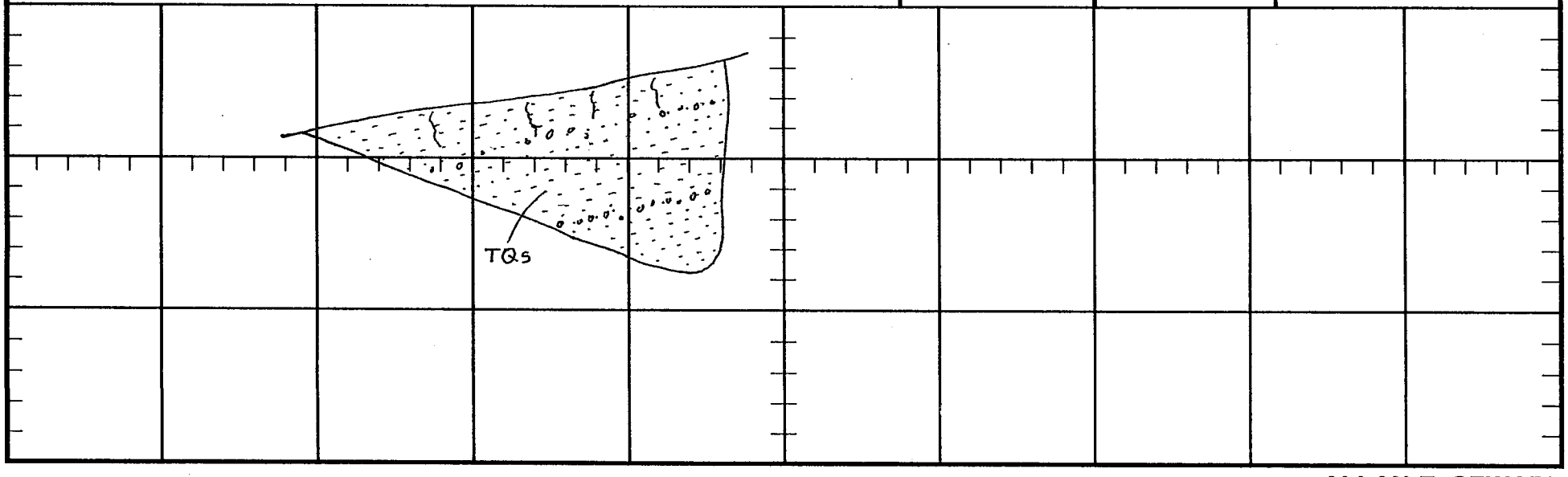
PROJECT VTT 52584

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 7' BEDROCK; TQs, Light- to moderate- yellow-brown; medium- to coarse-grained gravel, pebbly sandstone; friable; damp;upper 2 feet moderately weathered	N78E, 33SE		No Ground Water No Caving TOTAL DEPTH 7 Ft.

N 35 E

SCALE 1" = 5'



ALLAN E. SEWARD

JOB NO. 98-1617-4

LOGGED BY CJS

Trench Log No. T-73

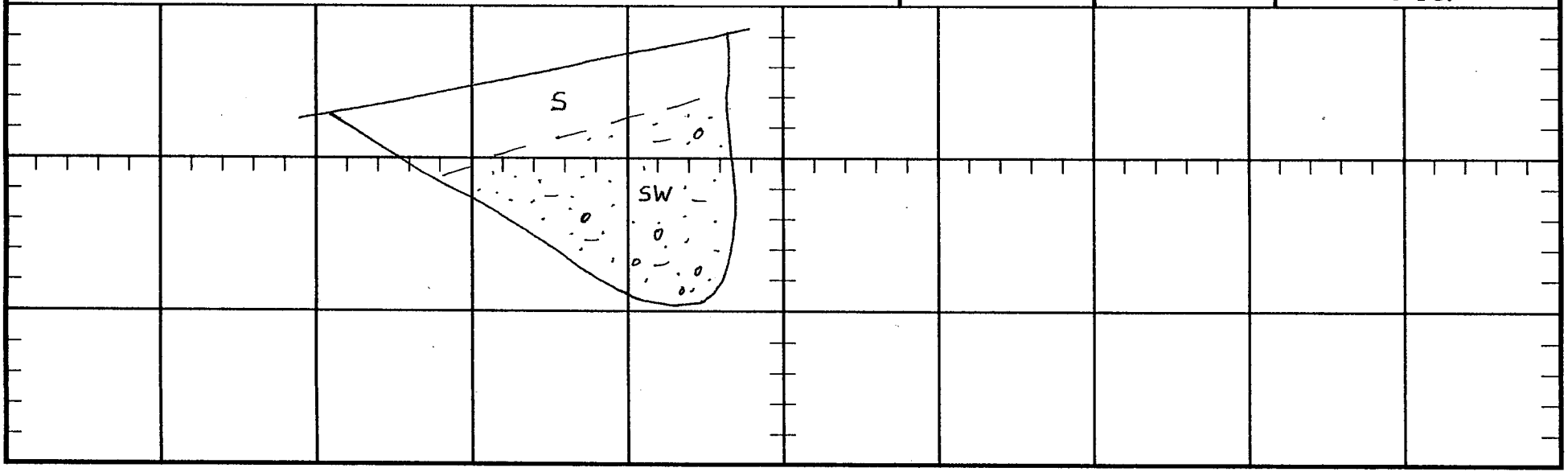
PROJECT VTT 52584

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 2' SOIL; s, Light brown to light yellowish-brown; fine- to medium-grained, silty sand; loose; dry			
2 - 9' SLOPEWASH; sw, Fine- to coarse-grained silty sand with scattered pebbles and cobbles; overall color and composition of Qt or deeply weathered TQs sandstone, but without obvious sorting, stratification or preferred clast orientation; overall friable and damp to moist			No Ground Water No Caving TOTAL DEPTH 9 Ft.

SCALE 1" = 5'

N 15 E



ALLAN E. SEWARD

JOB NO. 98-1617-4

PROJECT VTT 52584

LOGGED BY CJS

Trench Log No. T-74

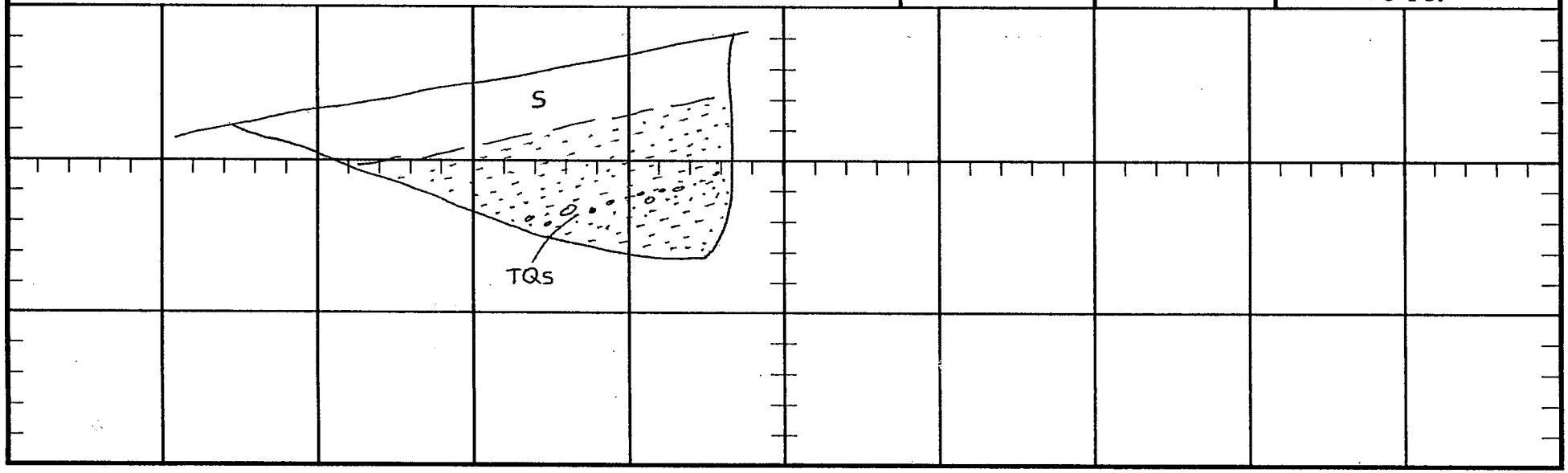
DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 2' SOIL; s, Light brown, fine- to medium-grained, silty sand with scattered gravel; loose; dry; numerous roots			
2 - 8' BEDROCK; TQs, Pale to moderate yellow-brown and dark yellowish-orange, medium- to very coarse-grained pebbly sandstone with isolated cobbles and rare boulders up to 18" maximum dimension; weakly to moderately cemented; moist; very weathered in upper 4-5 feet	B:N73E,21SE		No Ground Water No Caving

SCALE 1" = 5'

N 35 E

TOTAL DEPTH 8 Ft.



ALLAN E. SEWARD

JOB NO. 98-1617-4

PROJECT VTT 52584

LOGGED BY CJS

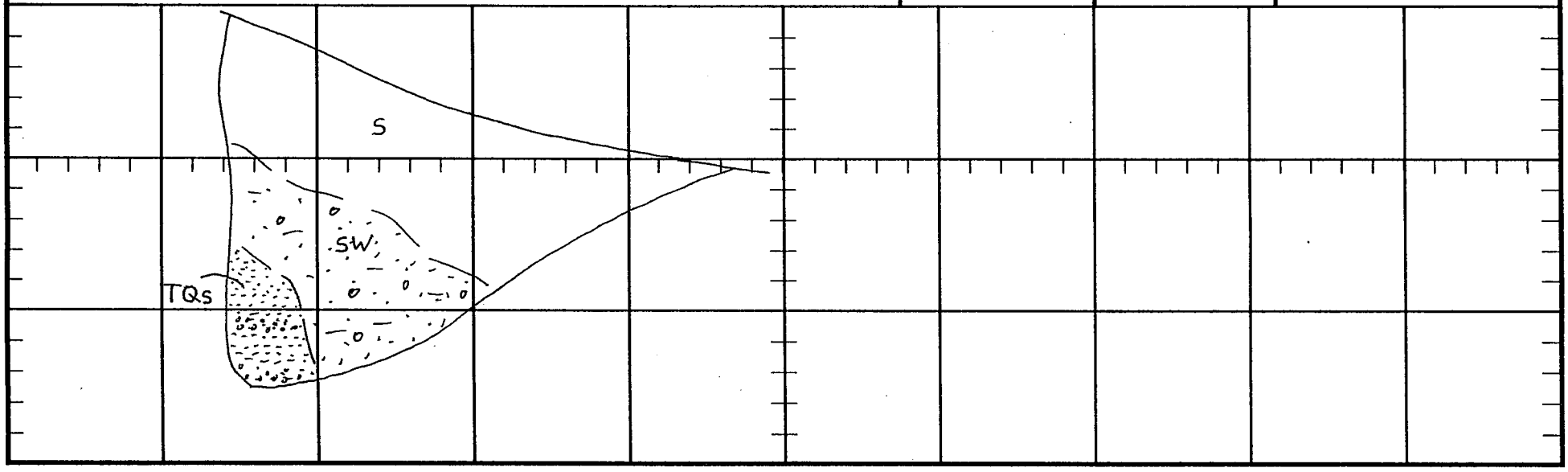
Trench Log No. T-75

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 4.5' SOIL; s, Moderate brown, fine- to medium-grained, silty sand; loose; porous; damp			
4.5 - 7' SLOPEWASH; sw, Dark yellowish-orange, medium- to coarse-grained, pebbly sand with silt binder; moderately dense; moist	B:N85W,26SW		
7 - 12' BEDROCK; TQs, Pale to moderate- yellow brown, medium to coarse-grained, pebbly sandstone, friable moist			No Ground Water No Caving TOTAL DEPTH 12 Ft.

N 73 E

SCALE 1" = 5'



ALLAN E. SEWARD

JOB NO. 98-1617-4

LOGGED BY VCG

Trench Log No. T-76

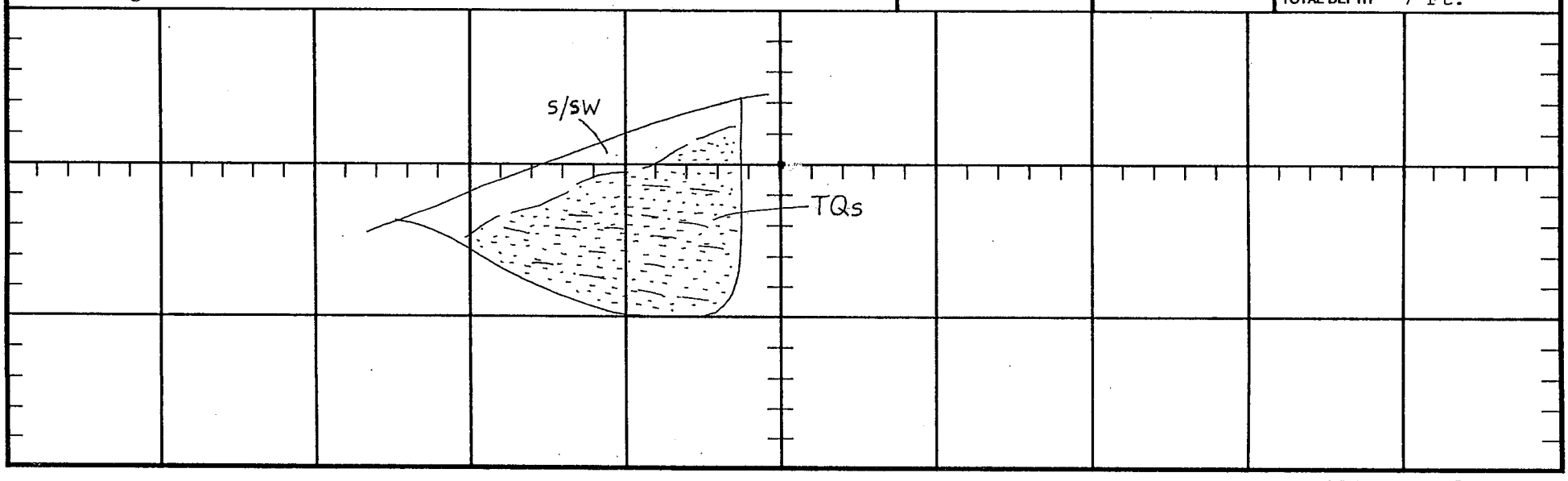
PROJECT VTT 52584

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 1' SOIL/SLOPEWASH; s/sw, Light brown fine- to coarse-grained silty pebbly sand; dry; loose			T-76 through T-95 excavated using a tract mounted back-hoe on 7/24/98
1 - 7' BEDROCK; TQs, Light to reddish-brown, fine- to medium-grained sandstone and silty sandstone; moderately hard to hard; dry	approx. N56E,19SE		
			No Ground Water No Caving
			TOTAL DEPTH 7 Ft.

SCALE 1" = 5'

N 78 E



ALLAN E. SEWARD

JOB NO. 98-1617-4

LOGGED BY VCG

Trench Log No. T-77

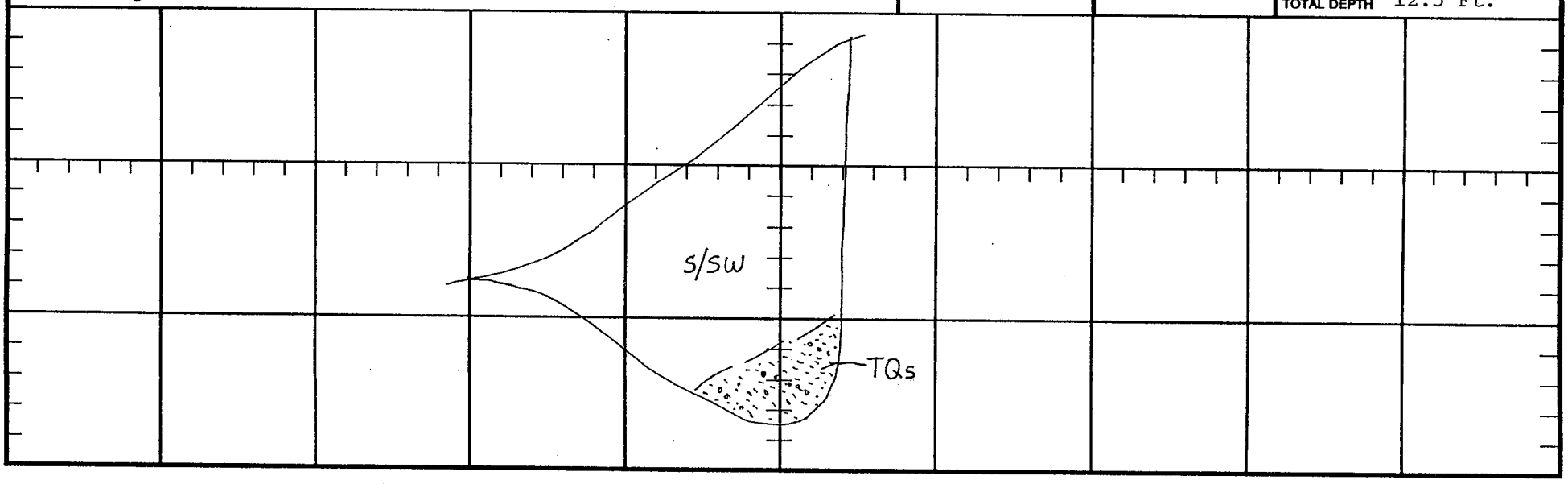
PROJECT VTT 52584

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 9' SOIL/SLOPEWASH; s/sw, Medium brown fine- to coarse-grained silty pebbly sand; loose; dry to damp	B:N89W,28SW		
9 - 12.5' BEDROCK; TQs, Light grayish-brown fine- to coarse-grained pebbly sandstone; friable; hard; slightly damp			No Ground Water No Caving TOTAL DEPTH 12.5 Ft.

SCALE 1" = 5'

N 54 W



ALLAN E. SEWARD

JOB NO. 98-1617-4

LOGGED BY VCG

Trench Log No. T-78

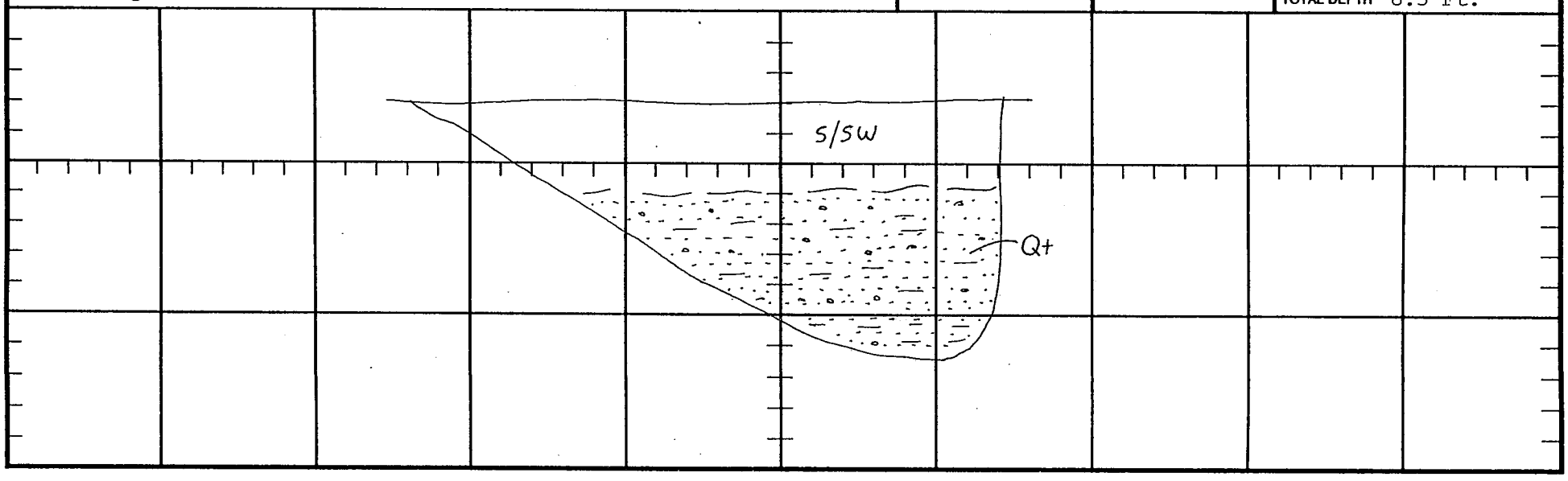
PROJECT VTT 52584

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 3' SOIL/SLOPEWASH; s/sw, Medium reddish-brown fine- to coarse-grained silty pebbly sand ; loose; dry 3 - 8.5' QUATERNARY TERRACE; Qt, Light reddish-brown to moderate brown fine- to coarse-grained silty pebbly sandstone; loose to hard; voids to bottom of trench	Bedding very vague to non-bedded		No Ground Water No Caving TOTAL DEPTH 8.5 Ft.

SCALE 1" = 5'

N 10 W



ALLAN E. SEWARD

JOB NO. 98-1617-4

PROJECT VTT 52584

LOGGED BY VCG

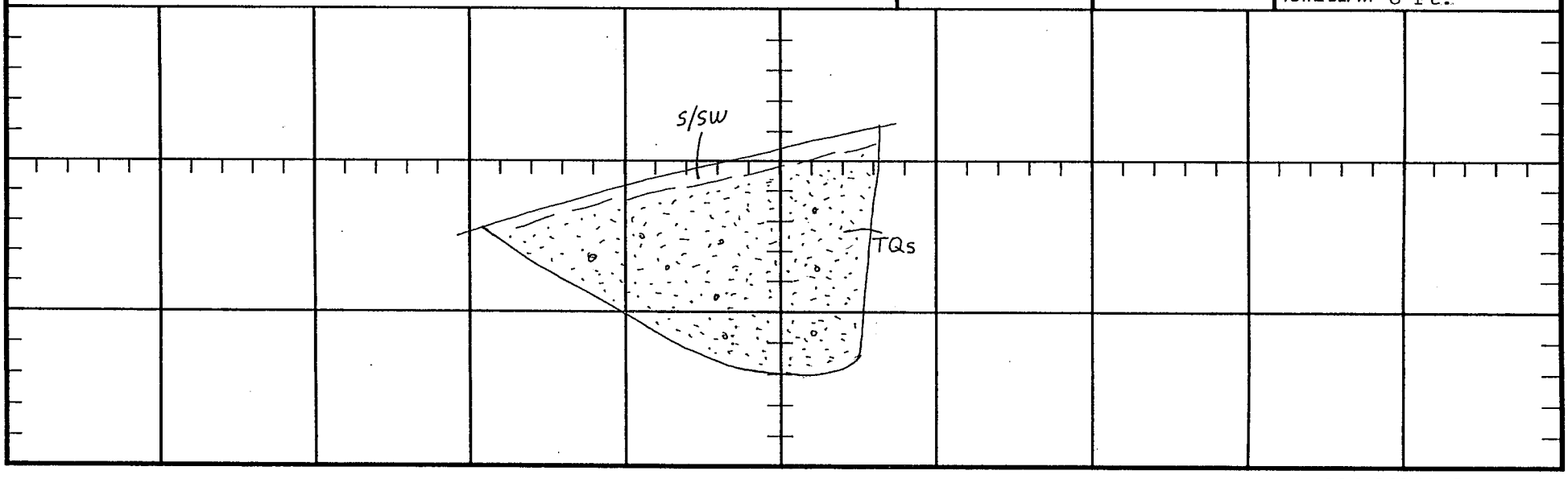
Trench Log No. T-79

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 6" SOIL/SLOPEWASH; s/sw, Light reddish-brown fine- to coarse-grained pebbly sand; loose; dry 6" - 8' BEDROCK; TQs, Tan to light reddish-brown medium- to coarse-grained pebbly sandstone; hard; dry	Approx. B: E-W,30SE Approx. B:N43E,31SE Bedding very vague		Possible Qt? Very non-descript lithology No Ground Water No Caving TOTAL DEPTH 8 Ft.

SCALE 1" = 5'

N 57 E



ALLAN E. SEWARD

JOB NO. 98-1617-4

PROJECT VTT 52584

LOGGED BY VCG

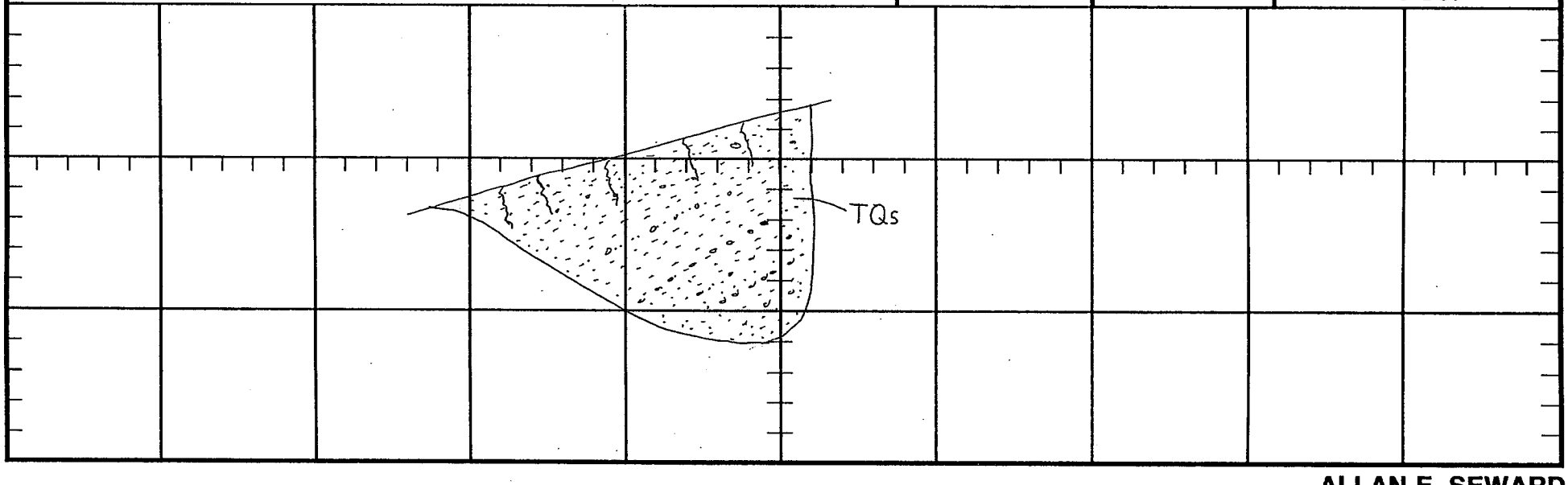
Trench Log No. T-80

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 2' WEATHERED BEDROCK; TQs, Light brown fine- to medium grained pebbly sand; loose; dry; abundant roots			
2 - 8' BEDROCK; TQs, Light yellowish-brown to gray fine- to coarse-grained pebbly sandstone with isolated cobbles; hard; dry to damp	N83E,32SE		No Ground Water No Caving TOTAL DEPTH 8 Ft.

SCALE 1" = 5'

N 15 W



ALLAN E. SEWARD

JOB NO. 98-1617-4

LOGGED BY VCG

Trench Log No. T-81

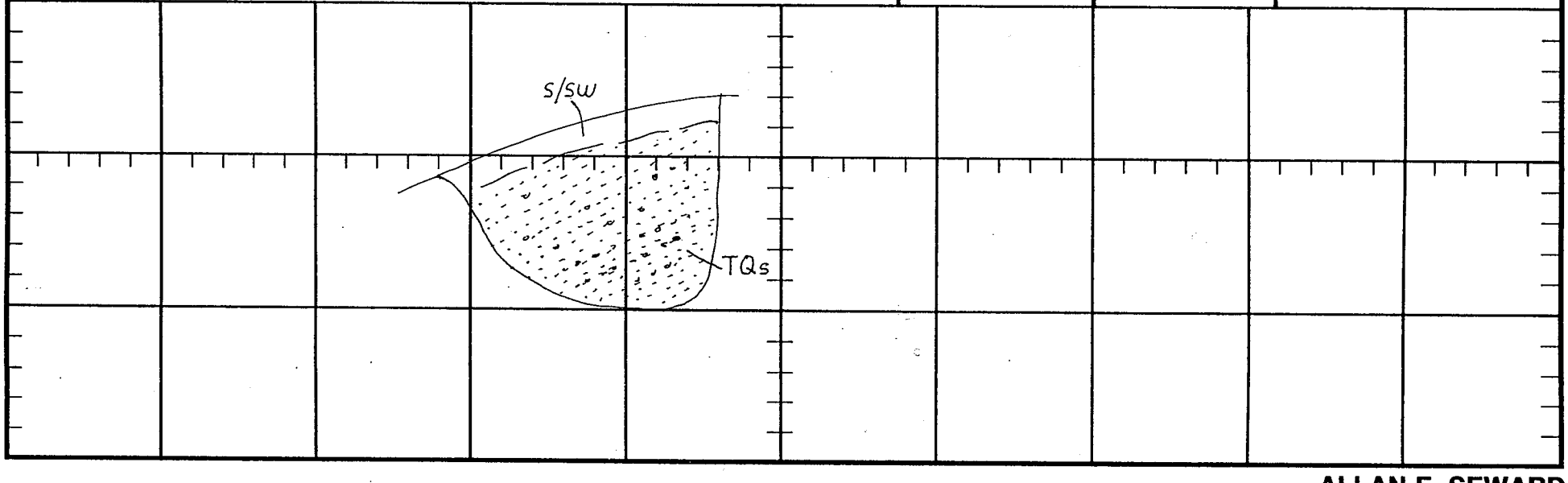
PROJECT VTT 52584

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 1' SOIL/SLOPEWASH; s/sw, Light brown medium- to coarse-grained pebbly sand; loose; dry 1 - 7' BEDROCK; TQs, Tan fine- to coarse-grained sandstone and pebbly sandstone; friable; hard; dry	N87E,31SE		No Ground Water No Caving TOTAL DEPTH 7 Ft.

SCALE 1" = 5'

N 6 E



ALLAN E. SEWARD

JOB NO. 98-1617-4

LOGGED BY VCG

Trench Log No. T-82

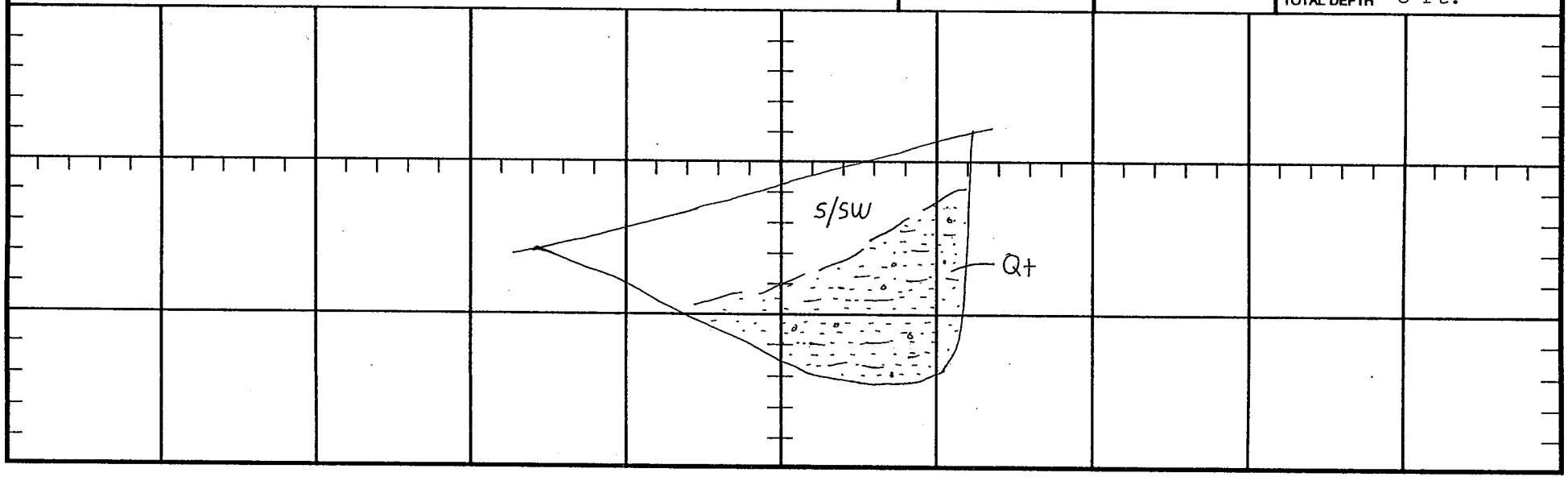
PROJECT VTT 52584

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 3' SOIL/SLOPEWASH; s/sw, Light reddish-brown fine- to coarse-grained pebbly sand; loose; dry			
3 - 8' BEDROCK/QUATERNARY TERRACE; Qt, Reddish-brown to medium brown fine- to coarse-grained pebbly sandstone and silty sandstone; moderately hard to hard; dry	None		Voids to 7 ft. Very hard on bottom of trench
			No Ground Water No Caving TOTAL DEPTH 8 Ft.

SCALE 1" = 5'

N 3 E



ALLAN E. SEWARD

JOB NO. 98-1617-4

LOGGED BY VCG

Trench Log No. T-83

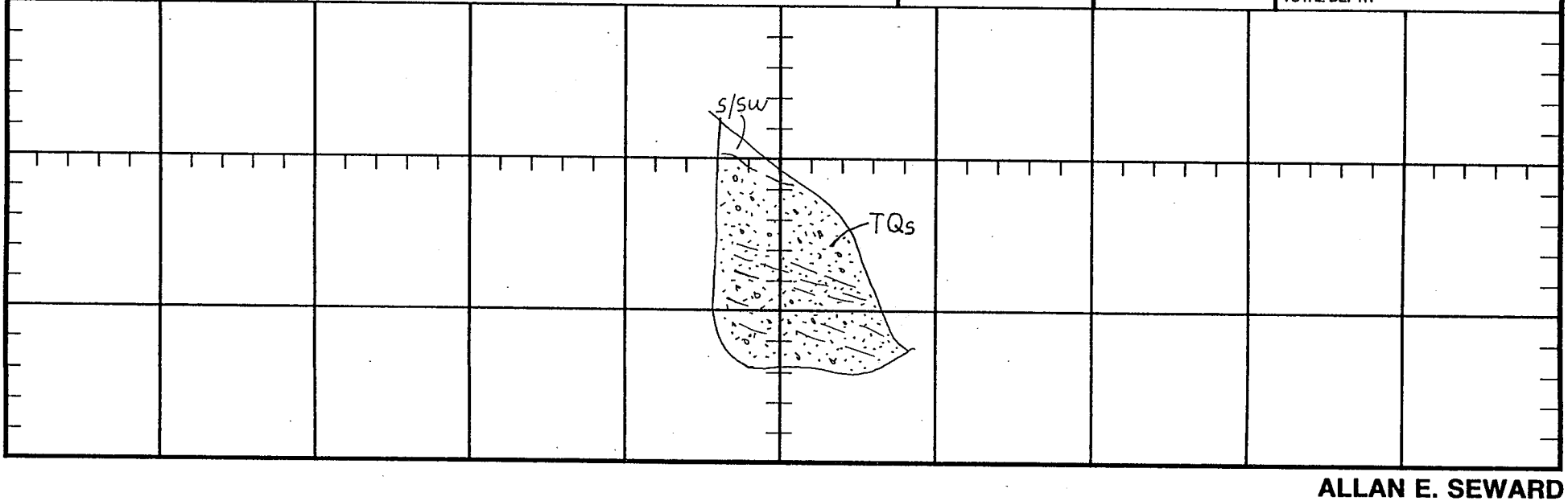
PROJECT VTT 52584

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 1' SOIL; s, Light brown to tan fine- to coarse-grained silty pebbly sand; loose; dry			
1 - 8' BEDROCK; TQs, Light reddish-brown fine- to coarse-grained pebbly sandstone; hard; dry	B: N83W,32SW		No Ground Water No Caving TOTAL DEPTH 8 Ft.

SCALE 1" = 5'

N 58 E



ALLAN E. SEWARD

JOB NO. 98-1617-4

LOGGED BY VCG

Trench Log No. T-84

PROJECT VTT 52584

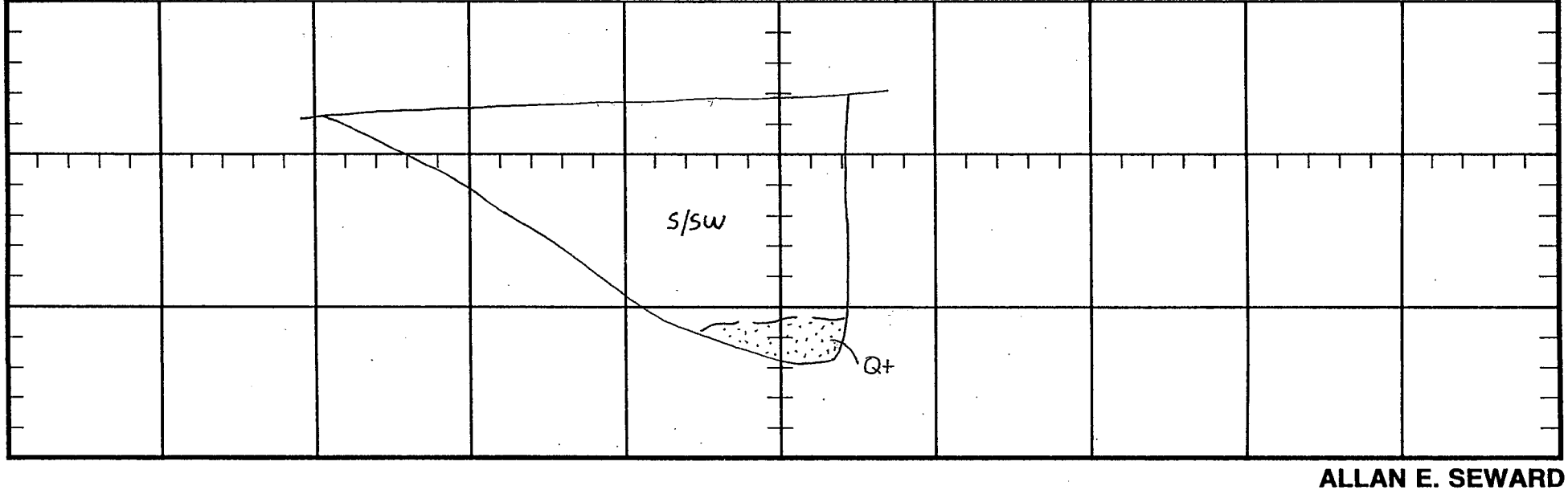
DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 7.5' SOIL/SLOPEWASH; s/sw, Medium brown fine- to coarse-grained pebbly silty sand; abundant roots to 2 ft. loose; dry			
7.5 - 9' BEDROCK/QUATERNARY TERRACE; Qt, Light brown medium- to coarse-grained sandstone and pebbly sandstone; hard; damp	None		Possibly TQs @ 7.5'
			No Ground Water No Caving

SCALE 1" = 5'

N 23 E

TOTAL DEPTH 9 Ft.



ALLAN E. SEWARD

JOB NO. 98-1617-4

PROJECT VTT 52584

LOGGED BY VCG

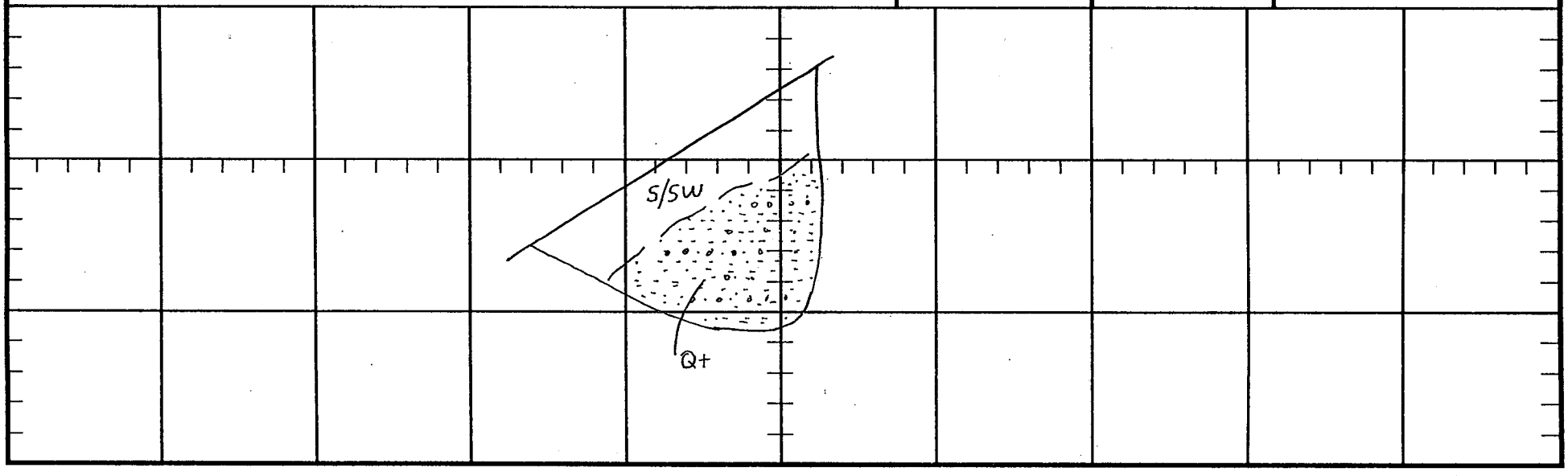
Trench Log No. T-85

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 3' SOIL/SLOPEWASH; s/sw, Medium brown fine- to coarse-grained pebbly sand; loose; dry			
3 - 8.5' BEDROCK/QUATERNARY TERRACE; Qt, Light brown to tan medium- to coarse-grained pebbly sandstone and pebble conglomerate; hard; friable; damp	Approx. N55W,4SW		No Ground Water No Caving TOTAL DEPTH 8.5 Ft.

SCALE 1" = 5'

N 43 W



ALLAN E. SEWARD

JOB NO. 98-1617-4

PROJECT VTT 52584

LOGGED BY VCG

Trench Log No. T-86

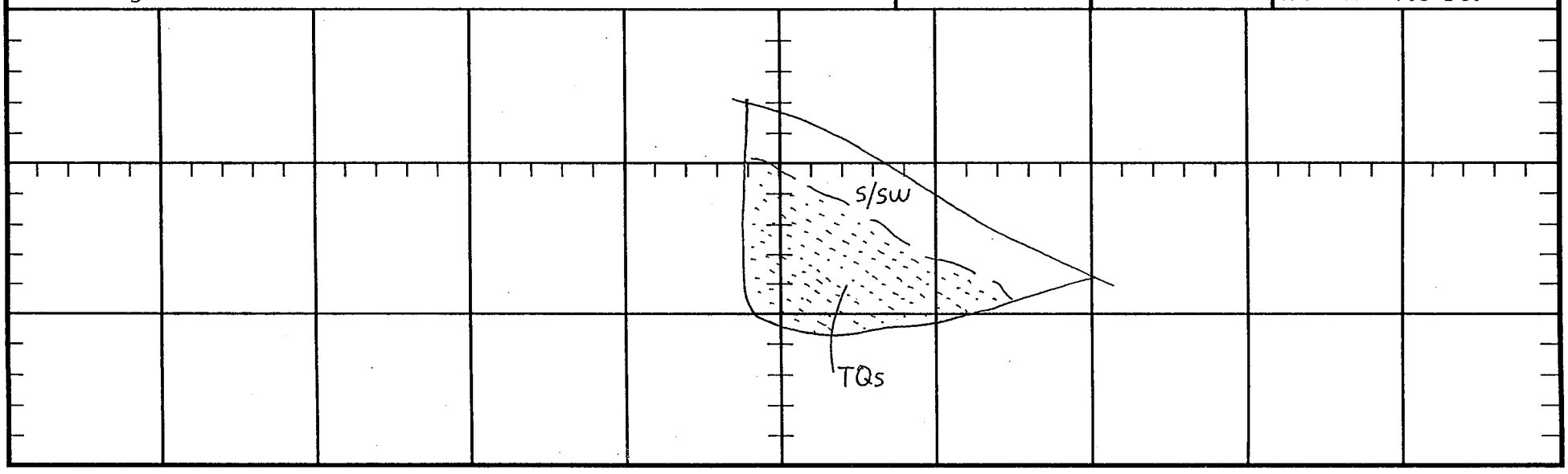
DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 2' SOIL/SLOPEWASH; s/sw, Light brown fine- to coarse-grained sand and pebbly sand; loose; dry			
2 - 7.5' BEDROCK; TQs, Tan medium- to coarse-grained sandstone; hard; damp	N72E,33SE		
			No Ground Water No Caving

SCALE 1" = 5'

N 38 E

TOTAL DEPTH 7.5 Ft.



ALLAN E. SEWARD

JOB NO. 98-1617-4

LOGGED BY VCG

Trench Log No. T-87

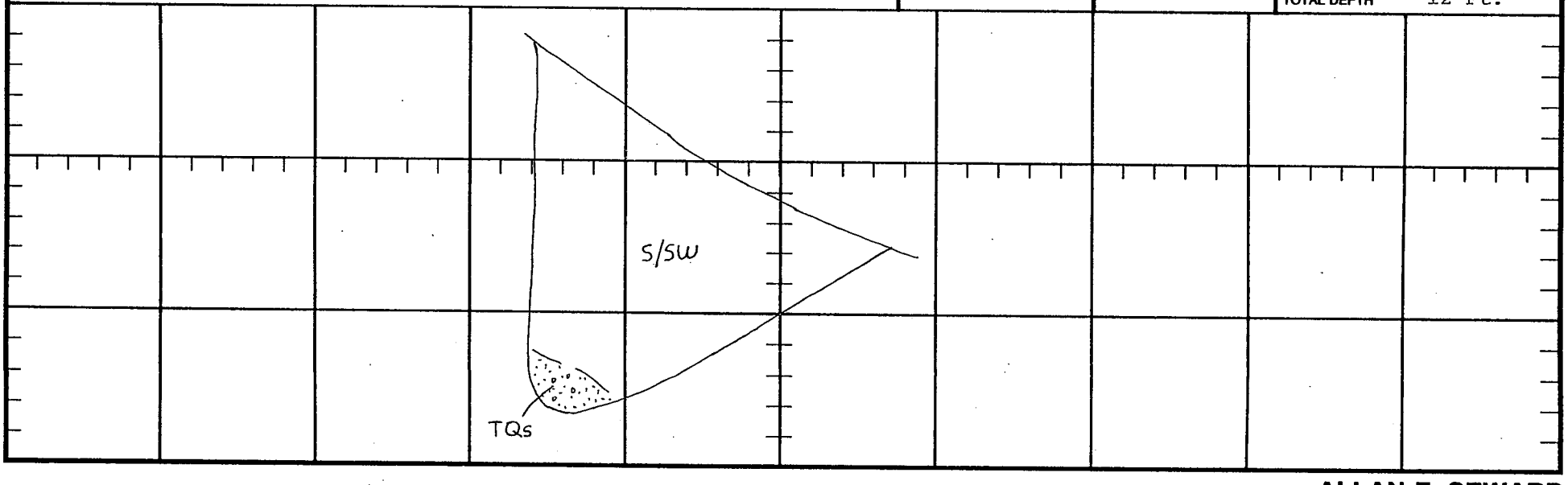
PROJECT VTT 52584

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 10' SOIL/SLOPEWASH; s/sw, Medium brown fine- to coarse-grained pebbly cobbly sand; loose; dry to damp			
10 - 12' BEDROCK; TQs, Rust medium- to coarse-grained pebbly sandstone and sandstone; hard; damp	Approx. N83E,45SE		Bedding dipping steeper than regional
			No Ground Water No Caving
			TOTAL DEPTH 12 Ft.

SCALE 1" = 5'

N 84 W



ALLAN E. SEWARD

JOB NO. 98-1617-4

PROJECT VTT 52584

LOGGED BY VCG

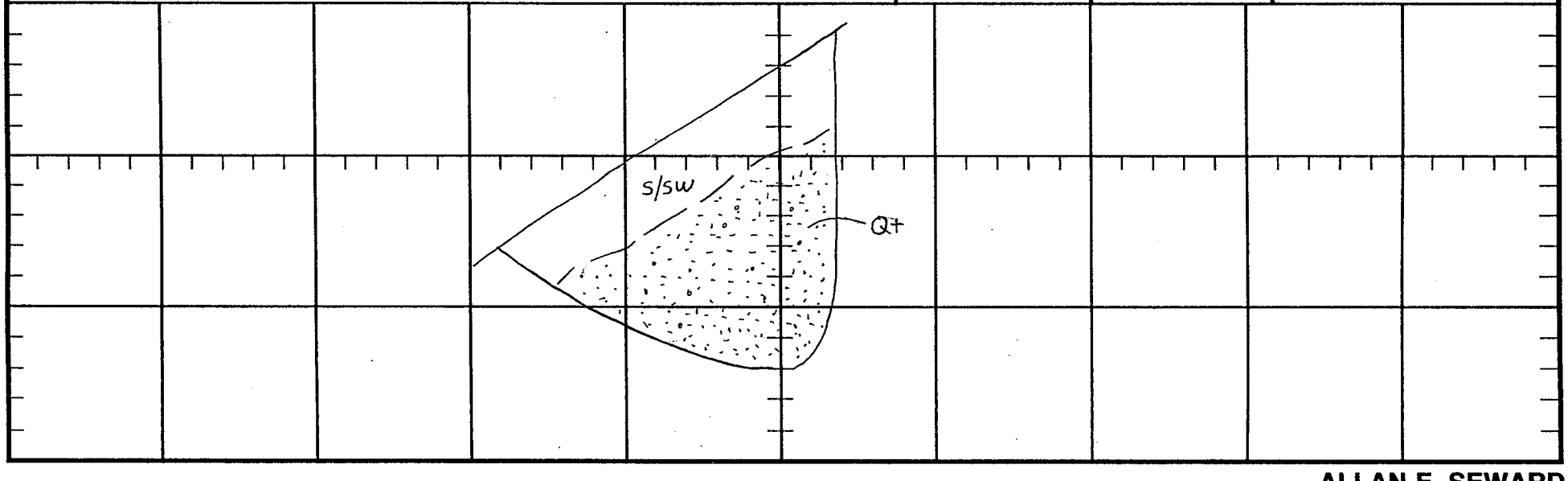
Trench Log No. T-88

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 3' SOIL/SLOEPWASH; s/sw, Medium brown fine- to coarse-grained pebbly cobbly sand; loose; dry			
3 - 11' BEDROCK/QUATERNARY TERRACE; Qt, Medium to reddish-brown fine- to coarse-grained sandstone and pebbly sandstone; loose to dense; hard; damp	Approx. horizontal N3W, 4SE aprx.		Crude bedding
			No Ground Water No Caving
			TOTAL DEPTH 11 ft.

N 82 W

SCALE 1" = 5'



ALLAN E. SEWARD

JOB NO. 98-1617-4

LOGGED BY VCG

Trench Log No. T-89

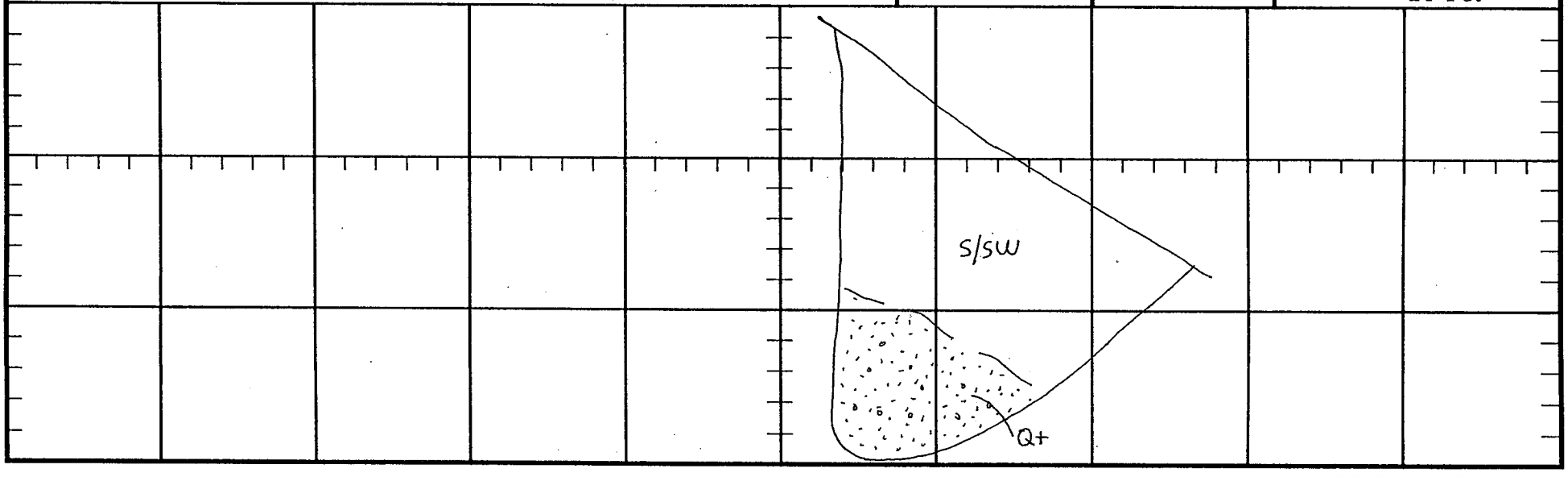
PROJECT VTT 52584

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 8' SOIL/SLOPEWASH; s/sw, Medium brown fine- to coarse-grained pebbly cobbly sand; loose; dry 8 - 14' BEDROCK/QUATERNARY TERRACE; Qt, Medium to reddish-brown fine- to coarse-grained sandstone and pebbly sandstone; loose; damp	No Bedding		Could all be Qsw or non-bedded Qt, voids to bottom of trench (All must come out) No Ground Water No Caving TOTAL DEPTH 14 Ft.

N 79 W

SCALE 1" = 5'



ALLAN E. SEWARD

JOB NO. 98-1617-4

LOGGED BY VCG

Trench Log No. T-90

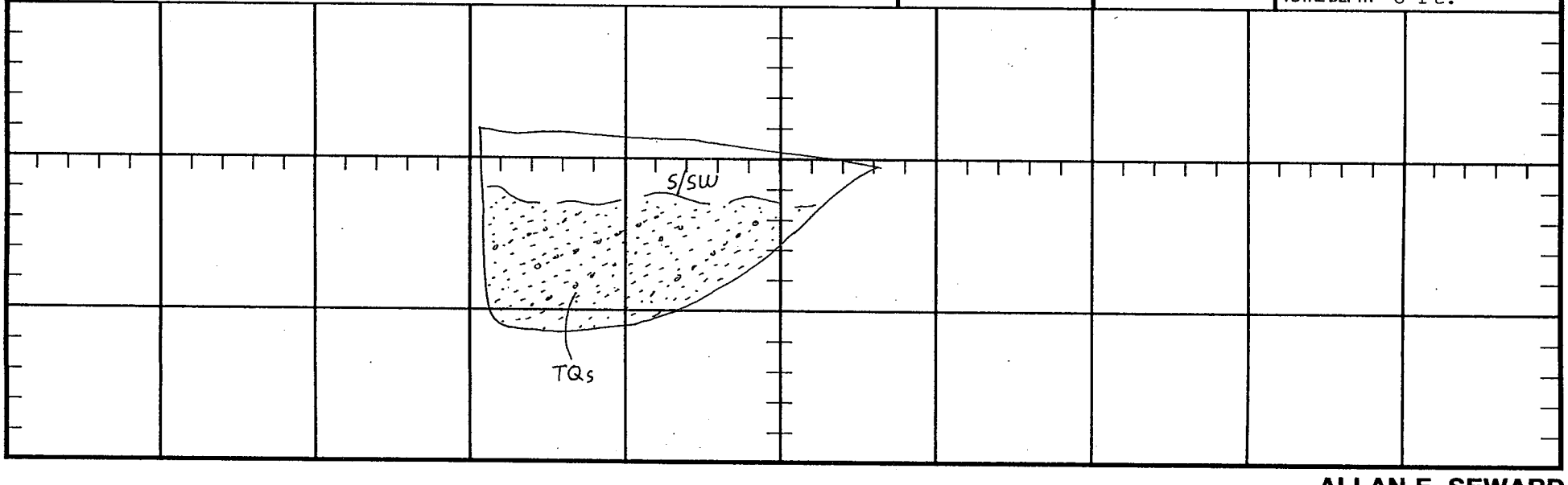
PROJECT VTT 52584

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 2' SOIL/SLOPEWASH; Light reddish-brown fine- to coarse-grained pebbly cobbly sand; dry; loose			
2 - 6' BEDROCK; TQs, Reddish-brown to tan medium- to coarse-grained pebbly sandstone; hard; dry	B:N83W,27SW		No Ground Water No Caving TOTAL DEPTH 6 Ft.

SCALE 1" = 5'

N 44 W



ALLAN E. SEWARD

JOB NO. 98-1617-4

LOGGED BY VCG

Trench Log No. T-91

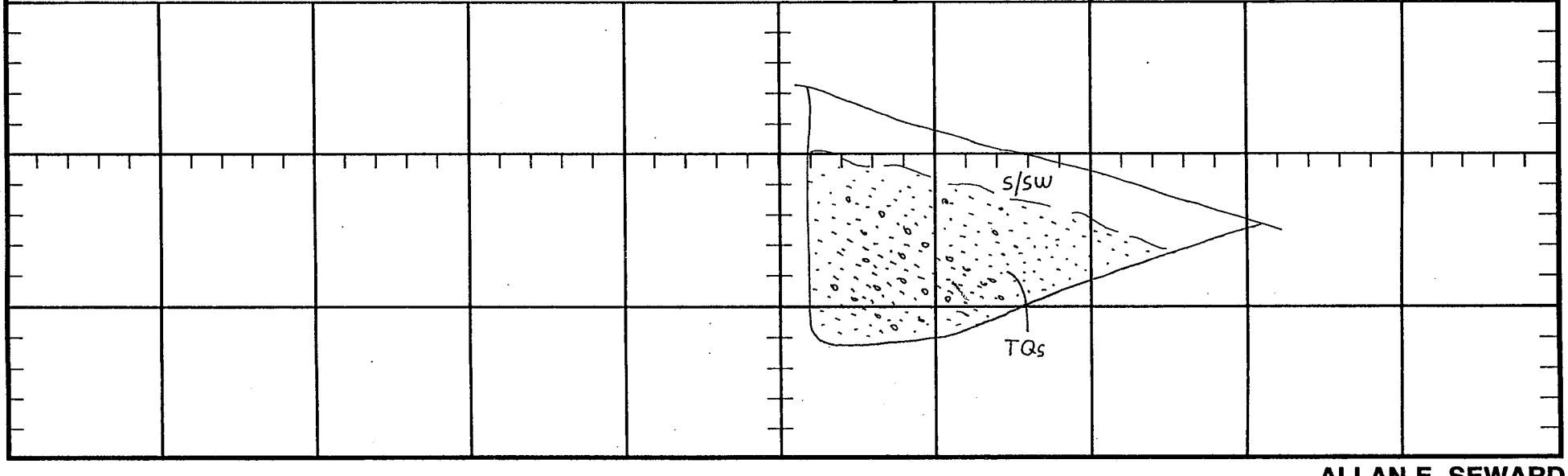
PROJECT VTT 52584

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 2' SOIL/SLOPEWASH; s/sw, Light brown to tan fine- to coarse-grained pebbly sand with isolated cobbles; loose; dry	N72W,29SW		No Ground Water No Caving
2 - 8' BEDROCK; TQs, Light brown to rust medium- to coarse-grained pebbly sandstone and cobble conglomerate; hard; dry			TOTAL DEPTH 8 Ft.

SCALE 1" = 5'

N 27 E



ALLAN E. SEWARD

JOB NO. 98-1617-4

LOGGED BY VCG

Trench Log No. T-92

PROJECT VTT 52584

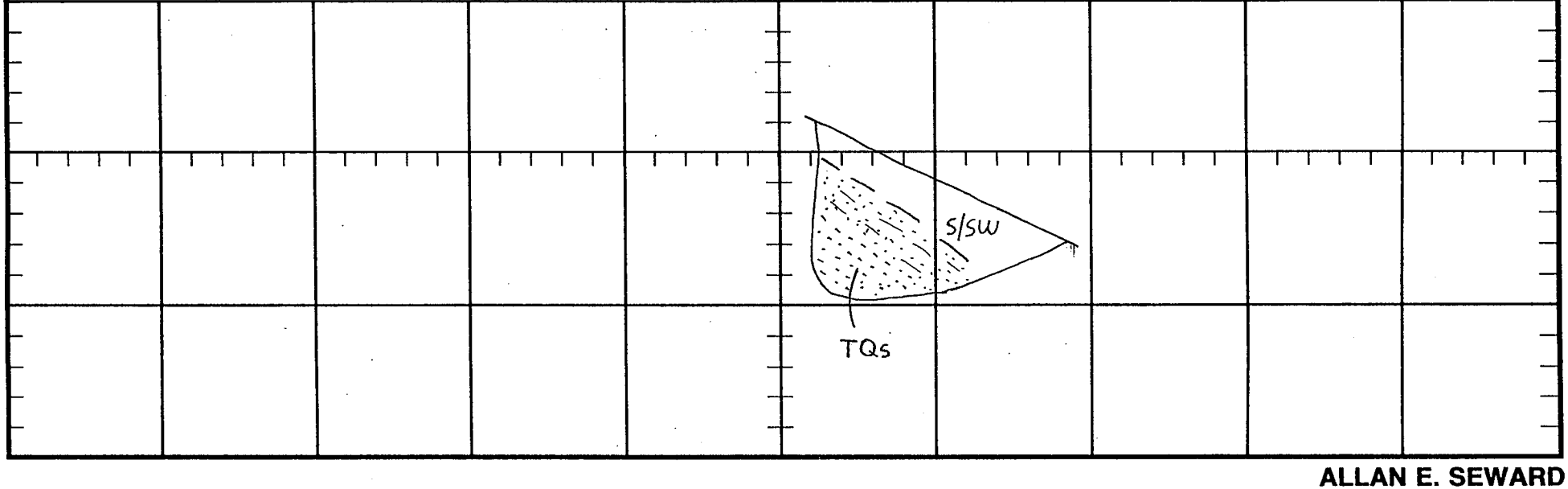
DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 2.5' SOIL/SLOPEWASH; s/sw, Light to medium brown fine- to coarse-grained sand and silty sand; abundant roots; loose; dry			
2.5 - 6' BEDROCK; TQs, Tan to rusty brown fine- to coarse-grained sandstone and silty sandstone; hard; damp	N86W,26SW		No Ground Water No Caving

N 36 E

SCALE 1" = 5'

TOTAL DEPTH 6 Ft.



ALLAN E. SEWARD

JOB NO. 98-1617-4

LOGGED BY VCG

Trench Log No. T-93

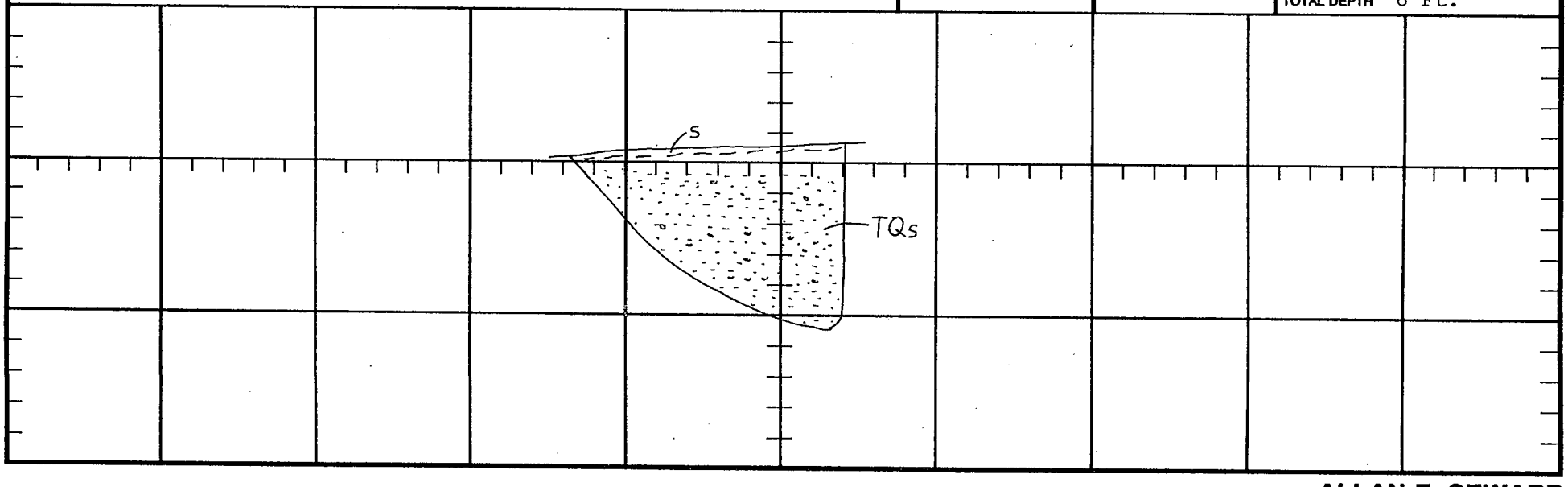
PROJECT VTT 52584

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 4" SOIL; s, Light gray to tan fine- to coarse-grained pebbly sand; loose; dry			
4" - 6' BEDROCK; TQs, Tan medium- to coarse-grained pebbly sandstone with isolated cobbles; hard; dry	B:N87W,30SW		
			No Ground Water No Caving TOTAL DEPTH 6 Ft.

SCALE 1" = 5'

N 63 E



ALLAN E. SEWARD

JOB NO. 98-1617-4

LOGGED BY VCG

Trench Log No. T-94

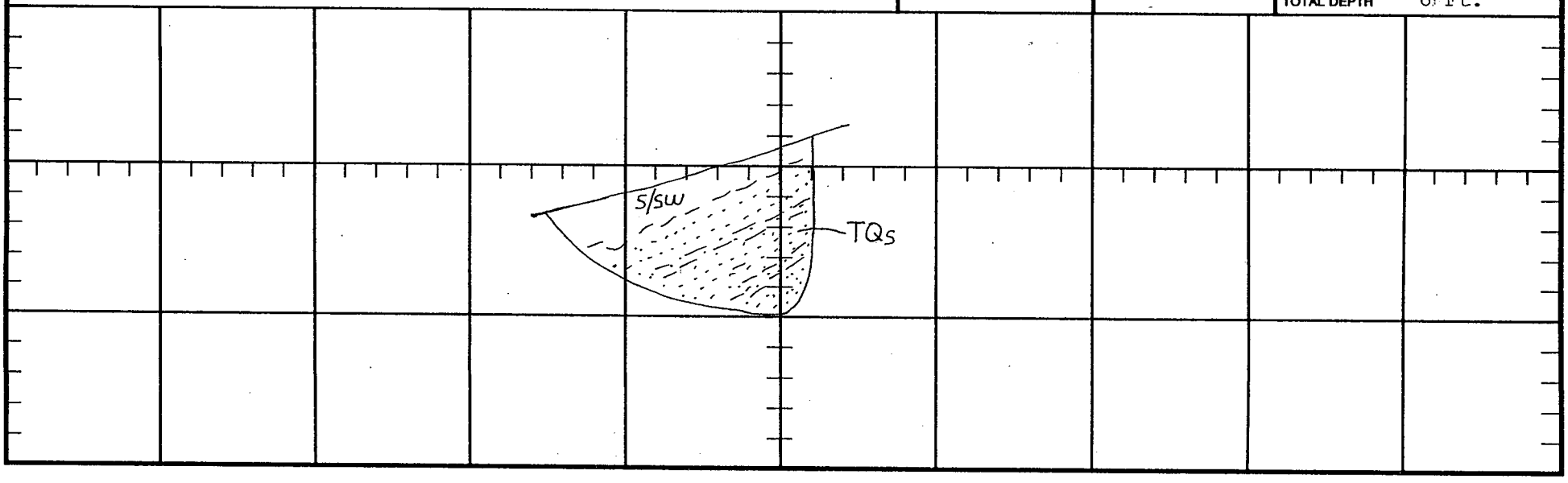
PROJECT VTT 52584

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 2' SOIL/SLOPEWASH; s/sw, Medium to grayish-brown fine- to coarse-grained silty sand with scattered pebbles; loose; dry			
2 - 6' BEDROCK; TQs, Medium to reddish-brown fine- to medium-grained silty sandstone; hard; dry to damp	Approx. B:N74E,28SW		No Ground Water No Caving TOTAL DEPTH 6 Ft.

SCALE 1" = 5'

N 20 E



ALLAN E. SEWARD

JOB NO. 98-1617-4

LOGGED BY VCG

Trench Log No. T-95

PROJECT VTT 52584

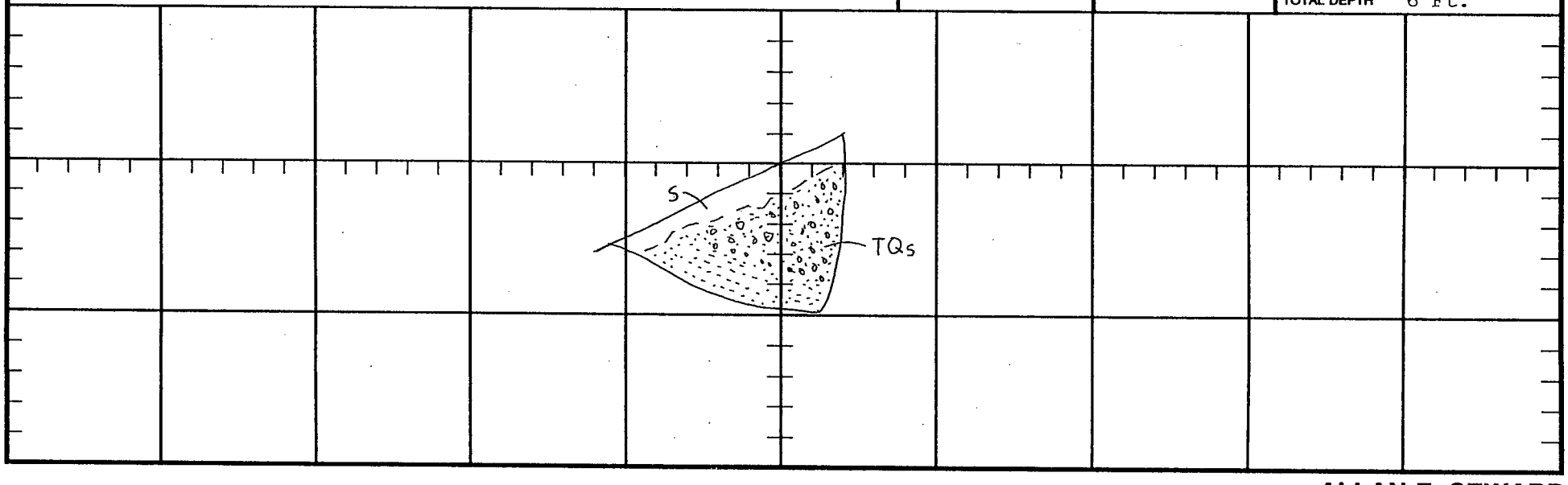
DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 1' SOIL; s, Light to medium brown fine- to coarse-grained pebbly sand; loose; dry			
1 - 6' BEDROCK; TQs, Rusty to medium brown fine- to coarse-grained pebbly sandstone and cobble conglomerate; hard; damp	N80E,32SE		No Ground Water No Caving

SCALE 1" = 5'

N 9 W

TOTAL DEPTH 6 Ft.



ALLAN E. SEWARD

JOB NO. 98-1617-4

PROJECT VTT 52584

LOGGED BY VCG

Trench Log No. T-96

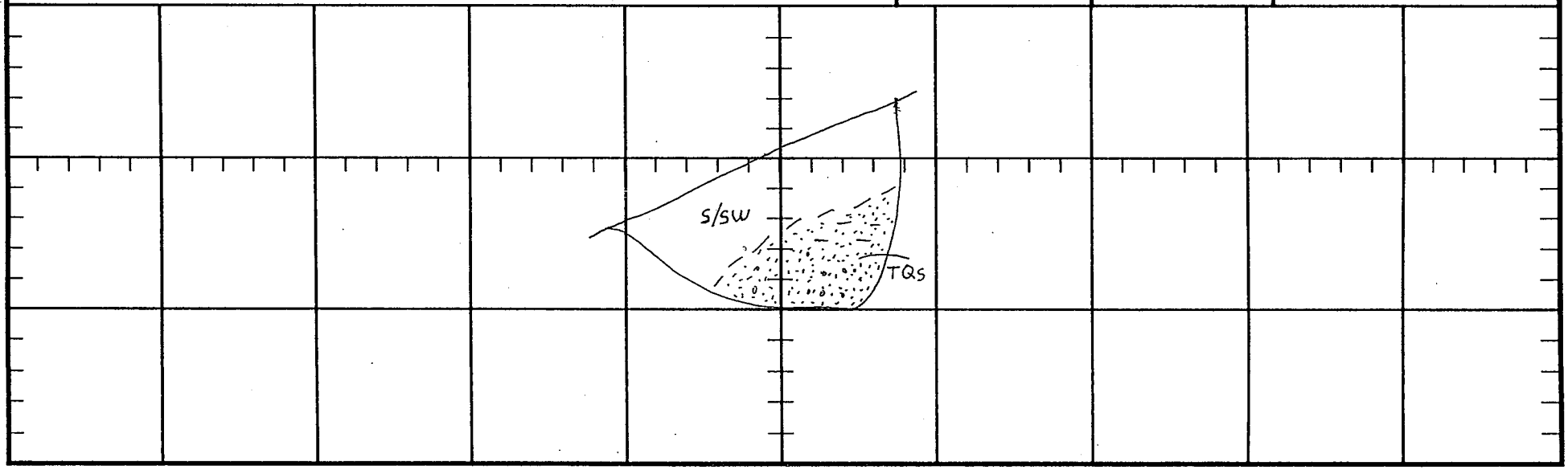
DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 3.5' SOIL/SLOPEWASH; s/sw, Reddish-brown fine- to coarse-grained silty pebbly sand; loose; dry 3.5 - 7' BEDROCK; TQs, Medium to reddish-brown fine- to coarse-grained silty sandstone and pebbly sandstone; friable; soft to hard; dry	Approx. N32W,9SW		T-96 through T-110 excavated 7/27/98 Using a track mounted backhoe with a 24" wide bucket Bedding vague and indistinct near axis of syncline No Ground Water No Caving

N 47 E

SCALE 1" = 5'

TOTAL DEPTH 7.Ft.



ALLAN E. SEWARD

JOB NO. 98-1617-4

LOGGED BY VCG

Trench Log No. T-97

PROJECT VTT 52584

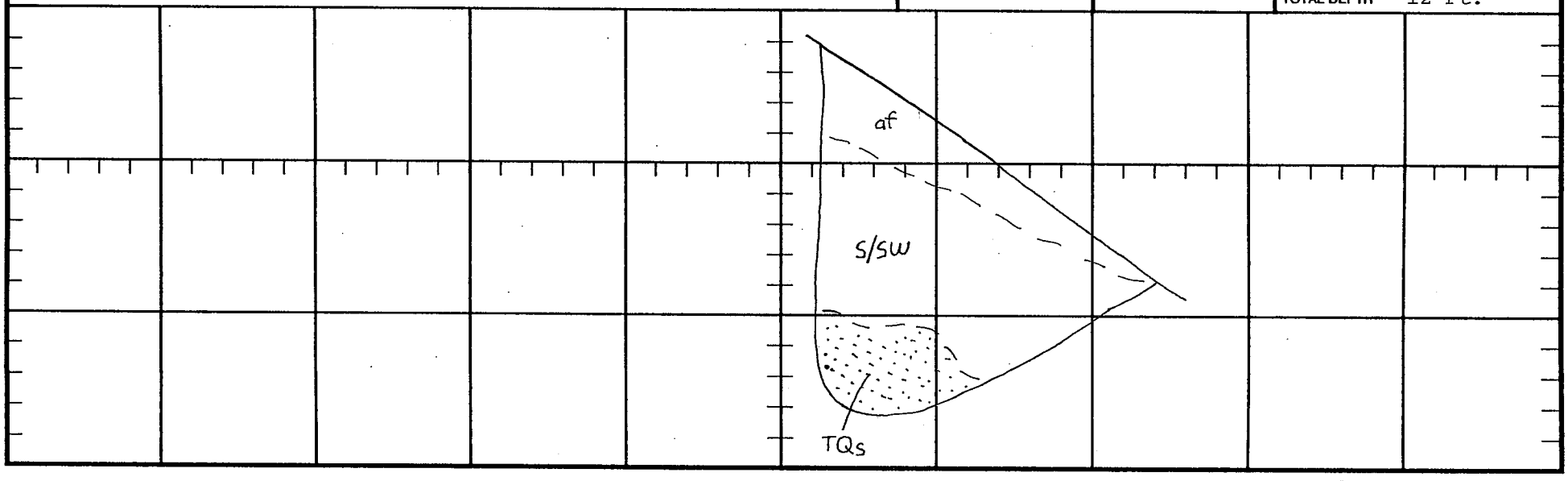
DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 3' ARTIFICIAL FILL; af, Light brown fine- to coarse-grained pebbly sand; loose; dry			
3 - 8' SOIL/SLOPEWASH; s/sw, Medium to dark brown fine- to coarse-grained pebbly cobbly sand; loose dry to damp	N85W,35SW		
8 - 12' BEDROCK; TQs, Tan to gray to light brown medium- to coarse-grained sandstone and pebbly sandstone; friable; hard; damp			No Ground Water No Caving

SCALE 1" = 5'

N 15 E

TOTAL DEPTH 12 Ft.



ALLAN E. SEWARD

JOB NO. 98-1617-4

PROJECT VTT 52584

LOGGED BY VCG

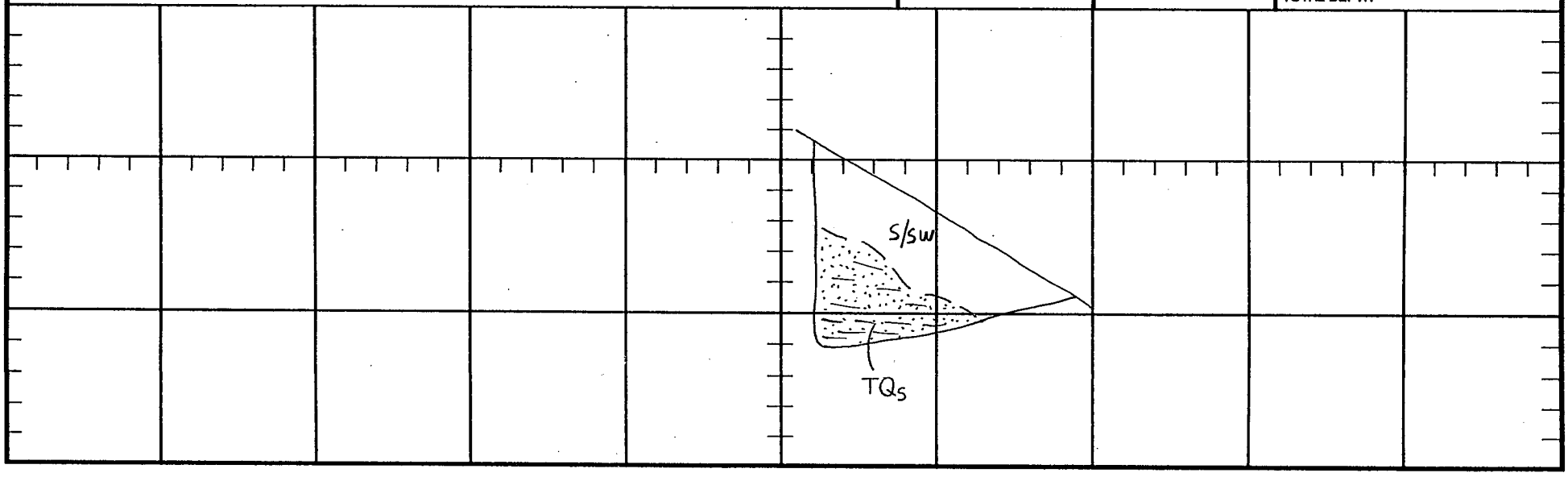
Trench Log No. T-98

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 3' SOIL/SLOPEWASH; s/sw, Medium brown to reddish-brown fine- to coarse-grained silty pebbly sand; loose; dry to damp			
3 - 7' BEDROCK; TQs, Reddish-brown fine- to coarse-grained silty sandstone and sandstone; hard; damp	B:N82W,30SW		
			No Ground Water No Caving TOTAL DEPTH 7 Ft.

SCALE 1" = 5'

N 82 E



ALLAN E. SEWARD

JOB NO. 98-1617-4

LOGGED BY VCG

Trench Log No. T-99

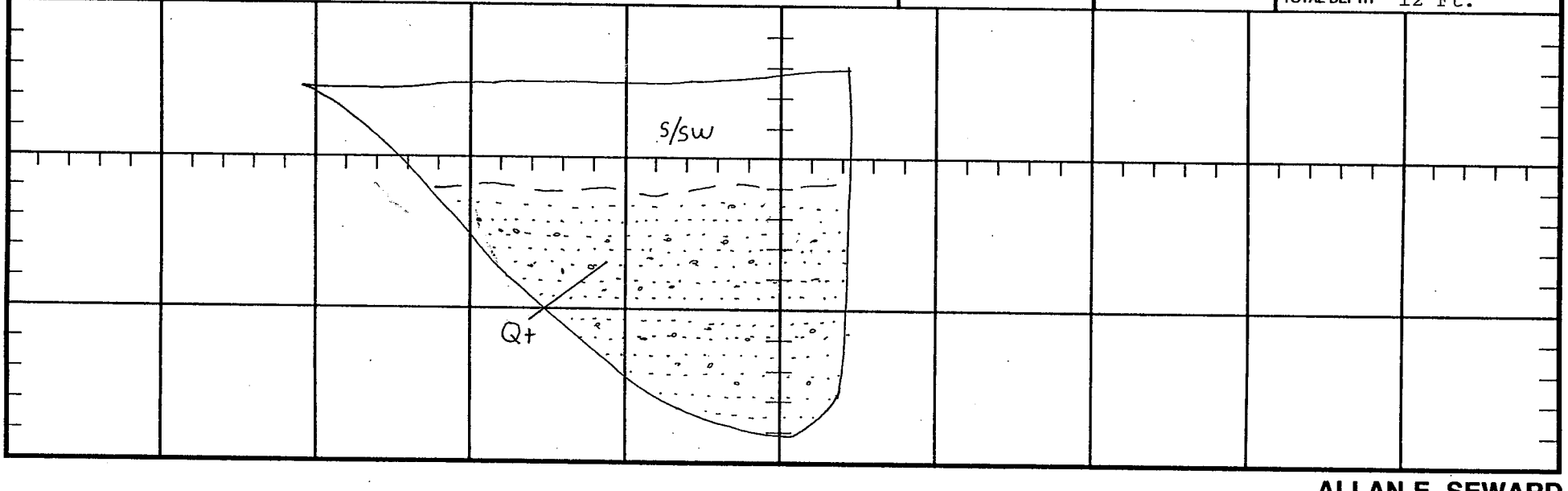
PROJECT VTT 52584

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 4' SOIL/SLOPEWASH; s/sw, Medium brown fine- to coarse-grained silty pebbly sand; loose; dry 4 - 12' BEDROCK/QUATERNARY TERRACE; Qt, Light to rusty brown fine- to coarse-grained pebbly sandstone; loose to dense; hard	Horizontal to subhorizontal N10W;3SW		No Ground Water No Caving TOTAL DEPTH 12 Ft.

SCALE 1" = 5'

N 78 E



ALLAN E. SEWARD

JOB NO. 98-1617-4

PROJECT VTT 52584

LOGGED BY VCG

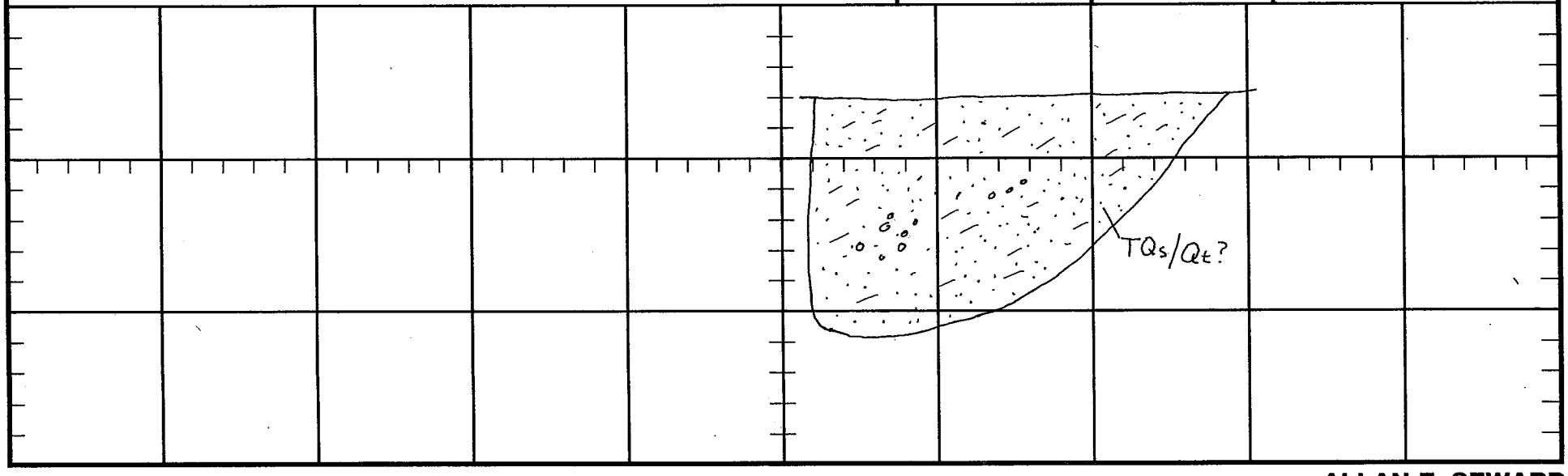
Trench Log No. T-100

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 8' BEDROCK; TQs/Qt? Reddish-brown fine- to medium-grained silty sandstone and light brown medium- to coarse-grained cobble conglomerate; hard; dry	Channeled and indistinct		No Ground Water No Caving TOTAL DEPTH 8 Ft.

SCALE 1" = 5'

N 78 W



ALLAN E. SEWARD

JOB NO. 98-1617-4

LOGGED BY VCG

Trench Log No. T-101

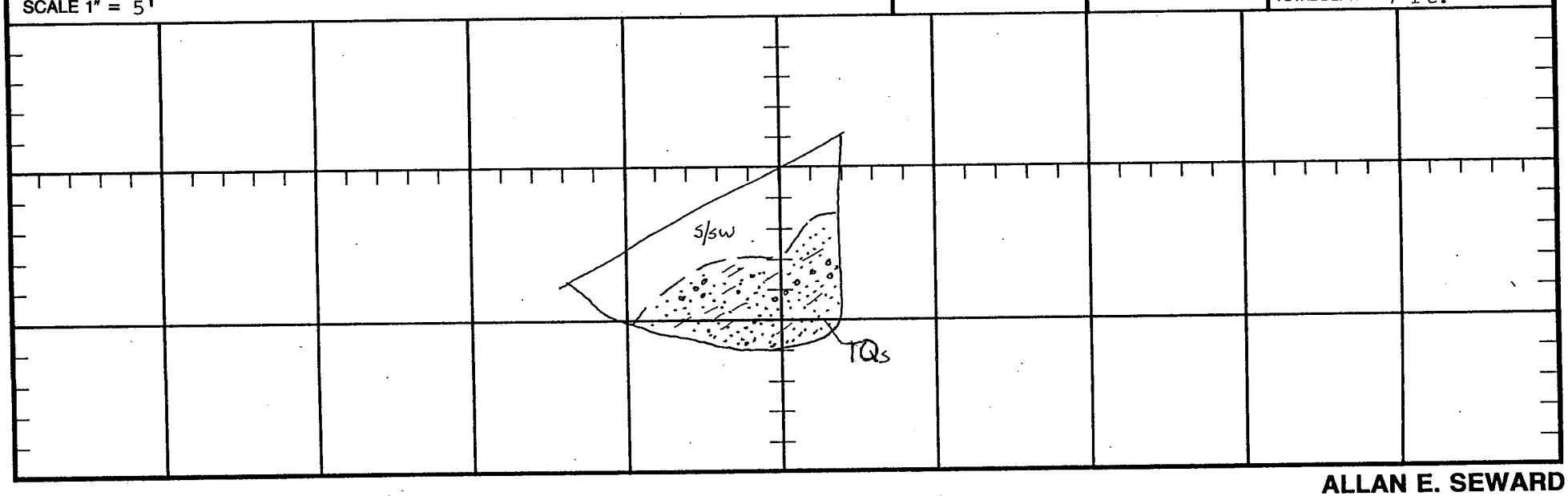
PROJECT VTT 52584

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 3' SOIL/SLOPEWASH; s/sw, Medium to reddish-brown fine- to coarse-grained silty pebbly sand; loose; dry			
3 - 7' BEDROCK; TQs, Light reddish-brown to tan fine- to coarse-grained silty sandstone; medium- to coarse-grained pebbly sandstone and cobble conglomerate; friable; loose to hard; dry	Approx. N78E,21SE		Highly channeled
			No Ground Water No Caving TOTAL DEPTH 7 Ft.

N 29 W

SCALE 1" = 5'



ALLAN E. SEWARD

JOB NO. 98-1617-4

LOGGED BY VCG

Trench Log No. T-102

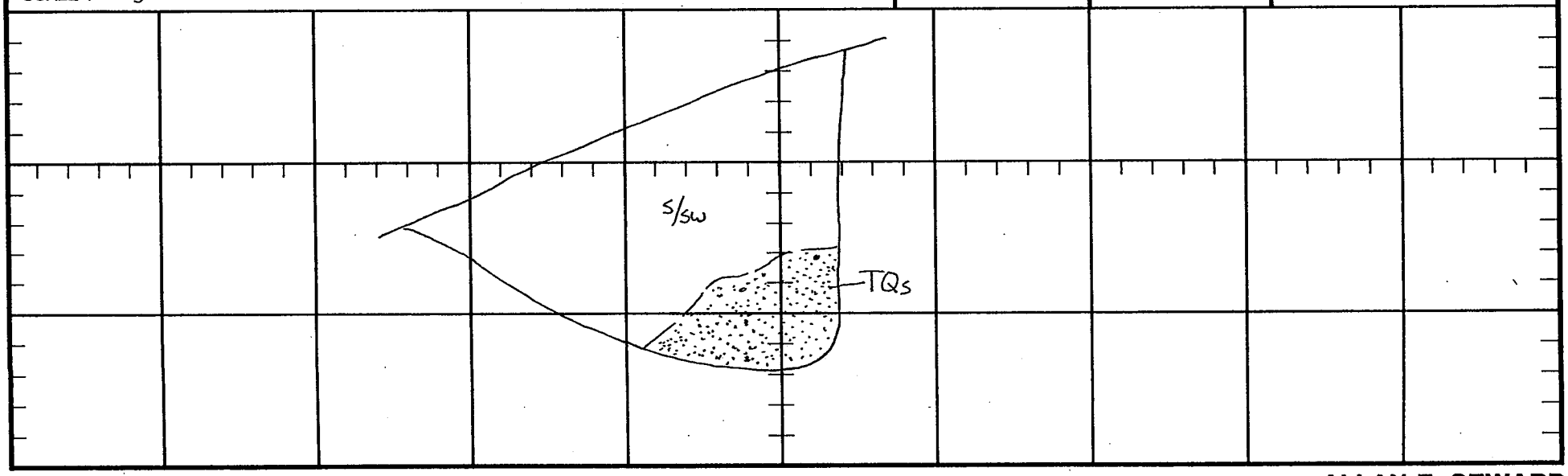
PROJECT VTT 52584

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 6' SOIL/SLOPEWASH; s/sw, Medium brown fine- to coarse-grained silty pebbly sand; loose; dry			
6 - 10' BEDROCK; TQs, Light brown fine- to medium-grained silty sandstone and tan to rusty brown medium- to coarse-grained sandstone and pebbly sandstone with isolated pebble lenses; hard; dry to damp	N89W,52SW		No Ground Water No Caving TOTAL DEPTH 10 Ft.

N 86 E

SCALE 1" = 5'



ALLAN E. SEWARD

JOB NO. 98-1617-4

PROJECT VTT 52584

LOGGED BY VCG

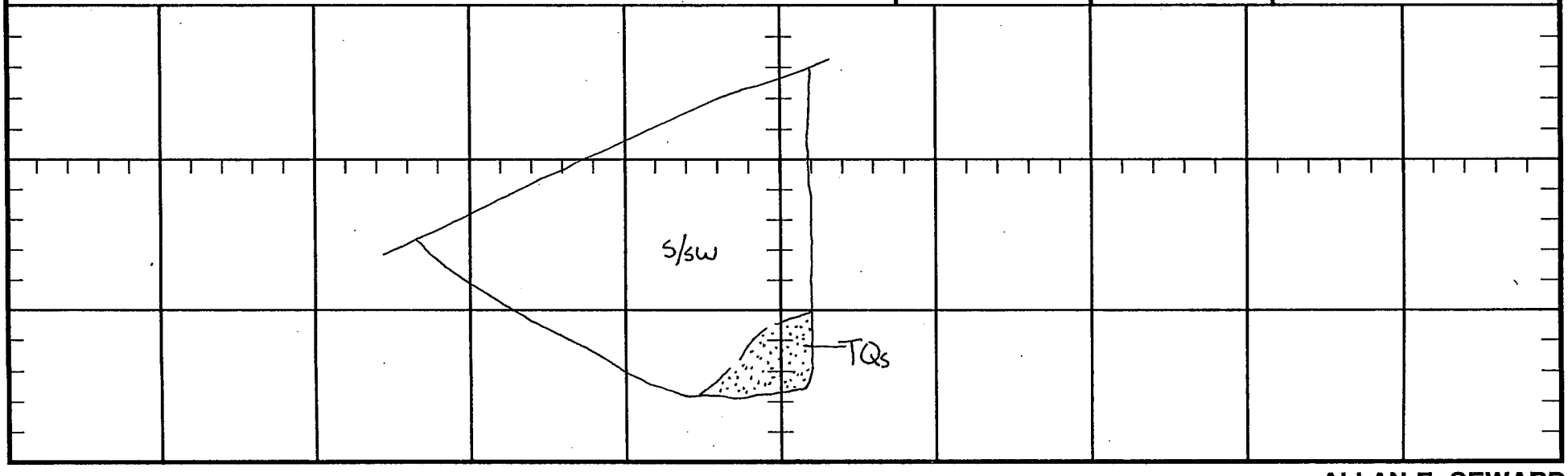
Trench Log No. T-103

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 8' SOIL/SLOPEWASH; s/sw, Medium brown fine- to coarse-grained silty pebbly sand; loose; dry			
8 - 11' BEDROCK; TQs, Tan to light brown fine- to coarse-grained pebbly sandstone; friable; hard	Indistinct bedding approx. N76W,40SW		
			No Ground Water No Caving TOTAL DEPTH 11 Ft.

SCALE 1" = 5'

N 86 E



ALLAN E. SEWARD

JOB NO. 98-1617-4

LOGGED BY VCG

Trench Log No. T-104

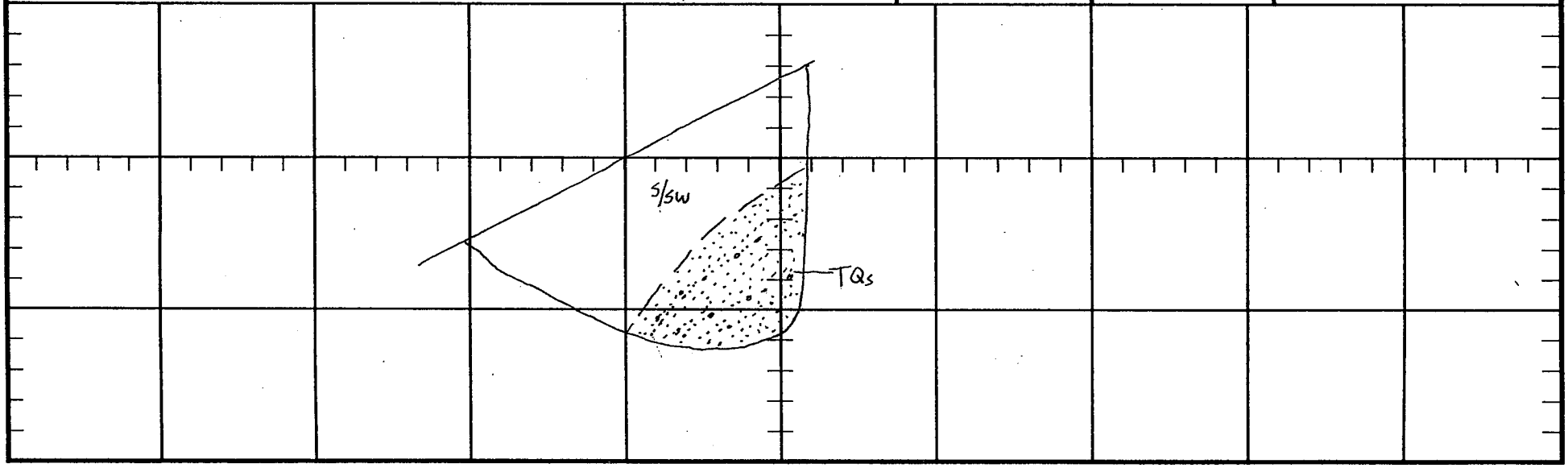
PROJECT VTT 52584

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 5.5' SOIL/SLOPEWASH; s/sw, Light grayish-brown fine- to coarse-grained silty pebbly sand; loose; dry			
5.5 - 9' BEDROCK; TQs, Light rusty brown to tan fine- to coarse-grained sandstone and pebbly sandstone; hard; dry	N86W,30SW		
			No Ground Water No Caving TOTAL DEPTH 9 Ft.

SCALE 1" = 5'

N 34 E



ALLAN E. SEWARD

JOB NO. 98-1617-4

LOGGED BY VCG

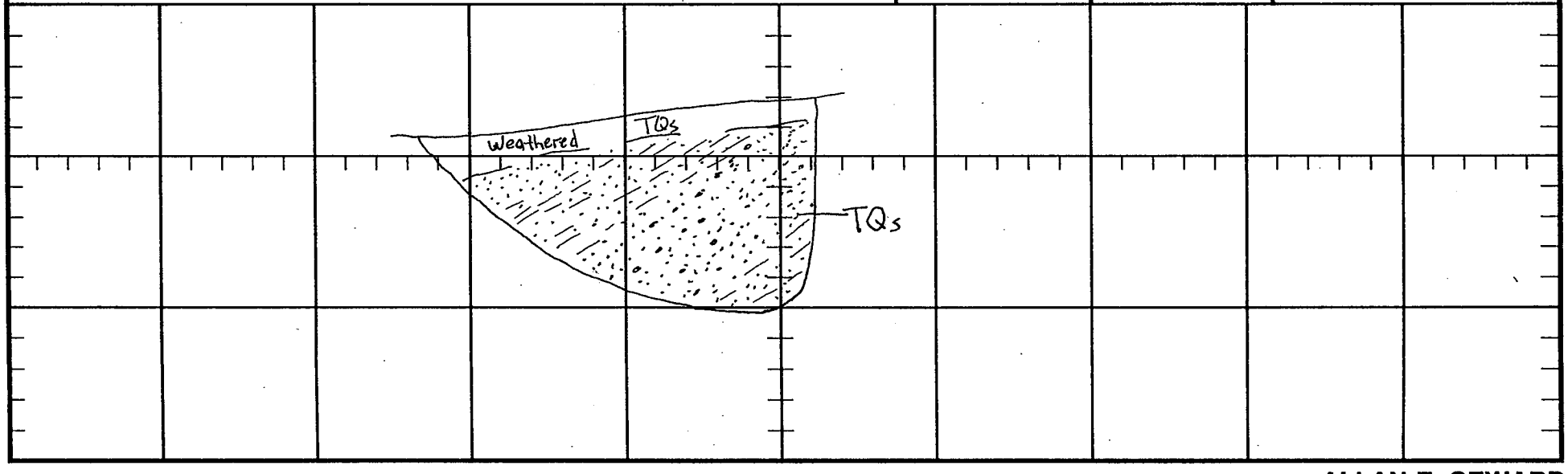
Trench Log No. T-105

PROJECT VTT 52584

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 1' WEATHERED BEDROCK; Light reddish-brown fine- to coarse-grained pebbly sandstone; loose; dry			
1 - 7' BEDROCK; TQs, Tan medium- to coarse-grained pebbly sandstone and conglomerate and light reddish-brown fine- to medium-grained silty sandstone with isolated pebbles; hard; dry	N87E,25SE N70E,36SE N89E,30SE N78E,28SE		
N 12 E			No Ground Water No Caving TOTAL DEPTH 7 Ft.

SCALE 1" = 5'



ALLAN E. SEWARD

JOB NO. 98-1617-4

PROJECT VTT 52584

LOGGED BY VCG

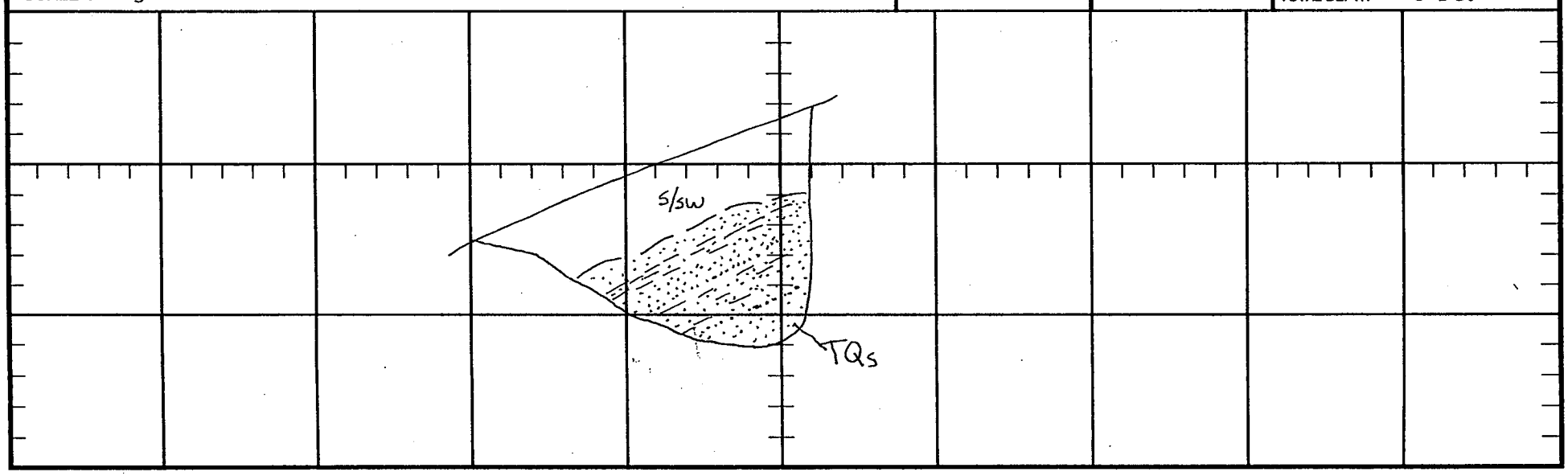
Trench Log No. T-106

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 3' SOIL/SLOPEWASH: s/sw, Light reddish-brown fine- to coarse-grained pebbly sand with minor silt; loose; dry			
3 - 8' BEDROCK; TQs, Light reddish-brown fine- to coarse-grained silty sandstone with isolated pebbles and medium- to coarse-grained pebbly sandstone; friable; hard; dry	N73E,27SE		No Ground Water No Caving TOTAL DEPTH 8 Ft.

SCALE 1" = 5'

N 12 E



ALLAN E. SEWARD

JOB NO. 98-1617-4

LOGGED BY VCG

Trench Log No. T-107

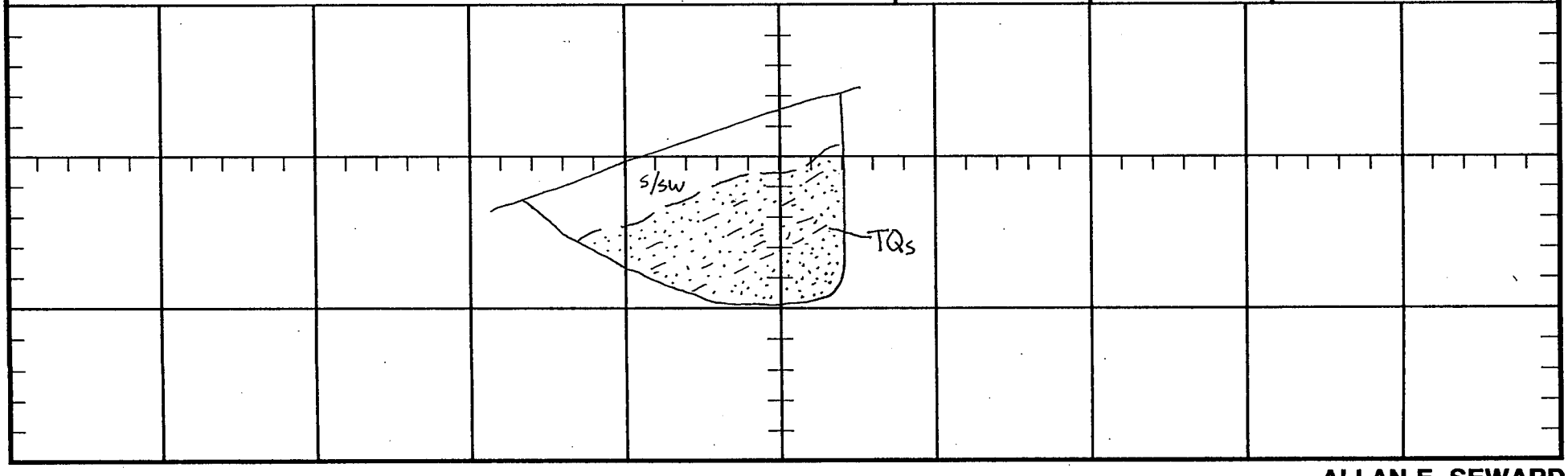
PROJECT VTT 52584

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 2' SOIL/SLOPEWASH; s/sw, Light reddish-brown fine- to coarse-grained pebbly silty sand; loose; dry			
2 - 7' BEDROCK; TQs, Reddish-brown fine-grained silty sandstone/sandy siltstone with fine- to medium-grained sandstone; hard; dry to damp	N72W,24SW		
			No Ground Water No Caving TOTAL DEPTH 7 Ft.

N 31 E

SCALE 1" = 5'



ALLAN E. SEWARD

JOB NO. 98-1617-4

PROJECT VTT 52584

LOGGED BY VCG

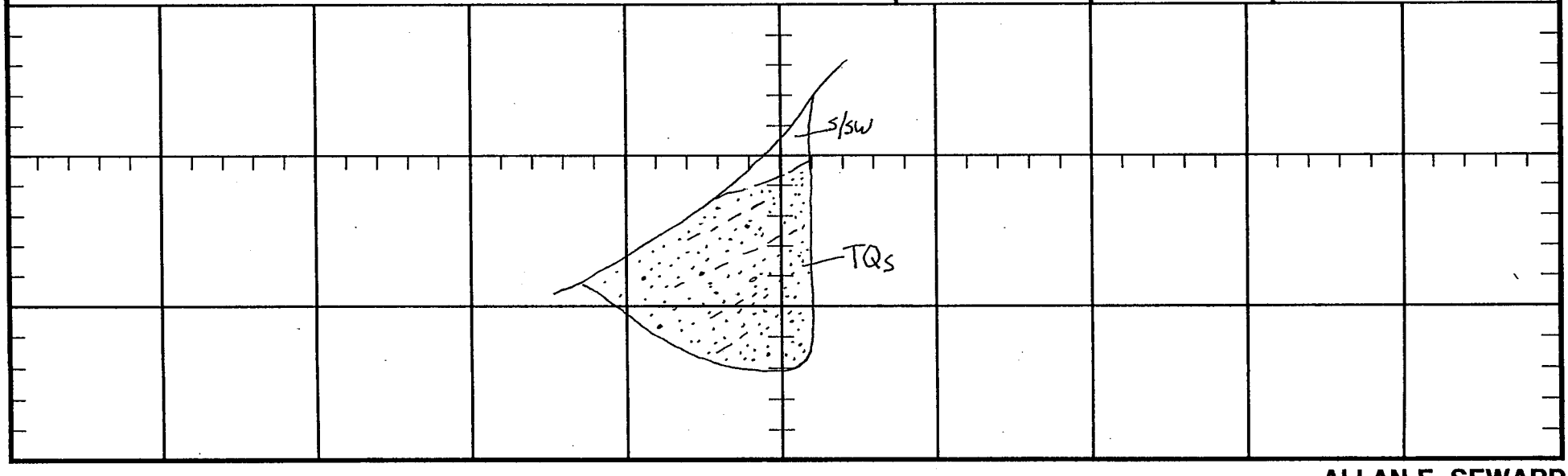
Trench Log No. T-108

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 2' SOIL/SLOPEWASH; s/sw, Medium brown fine- to coarse-grained silty pebbly sand; loose; dry			
2 - 9' BEDROCK; TQs, Tan medium- to coarse-grained pebbly sandstone and medium brown fine- to medium-grained sandstone; hard; damp	N75E,33SE		
			No Ground Water No Caving TOTAL DEPTH 9 Ft.

N 18 E

SCALE 1" = 5'



ALLAN E. SEWARD

JOB NO. 98-1617-4

LOGGED BY VCG

Trench Log No. T-109

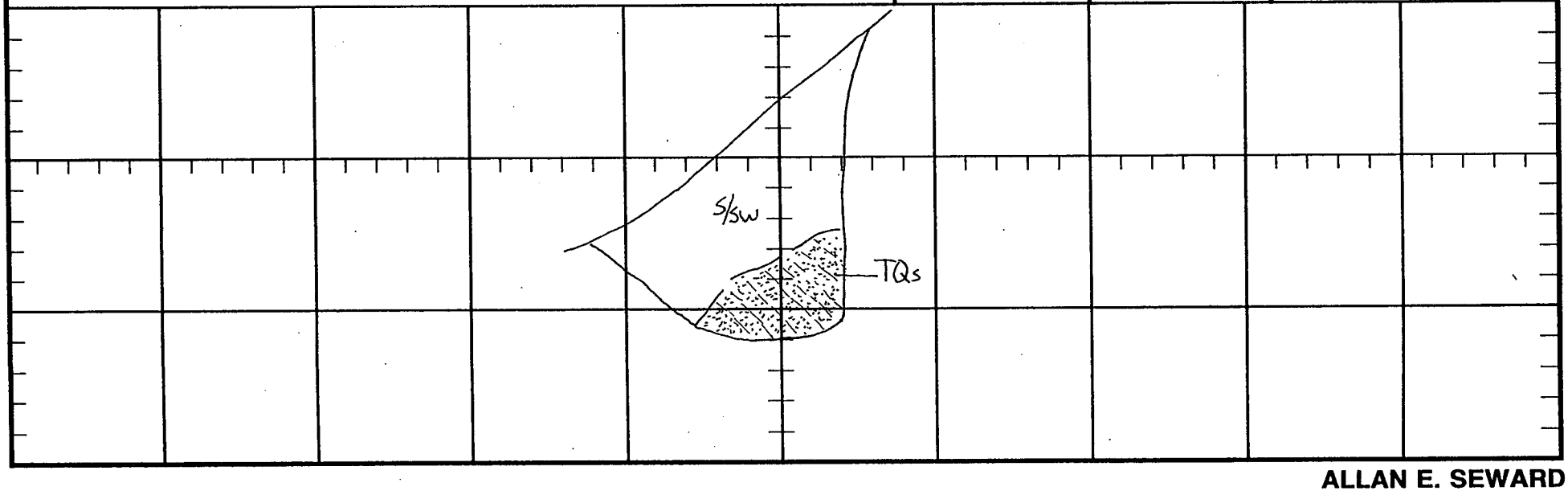
PROJECT VTT 52584

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 6.5' SOIL/SLOPEWASH; s/sw, Medium brown fine- to coarse-grained silty pebbly sand; loose; dry			
6.5 - 10' BEDROCK; TQs, Reddish-brown fine- to medium-grained silty sandstone with isolated pebbles; hard; damp	N85E,30SE		No Ground Water No Caving TOTAL DEPTH 10 Ft.

SCALE 1" = 5'

N 40 W



ALLAN E. SEWARD

JOB NO. 98-1617-4

PROJECT VTT 52584

LOGGED BY VCG

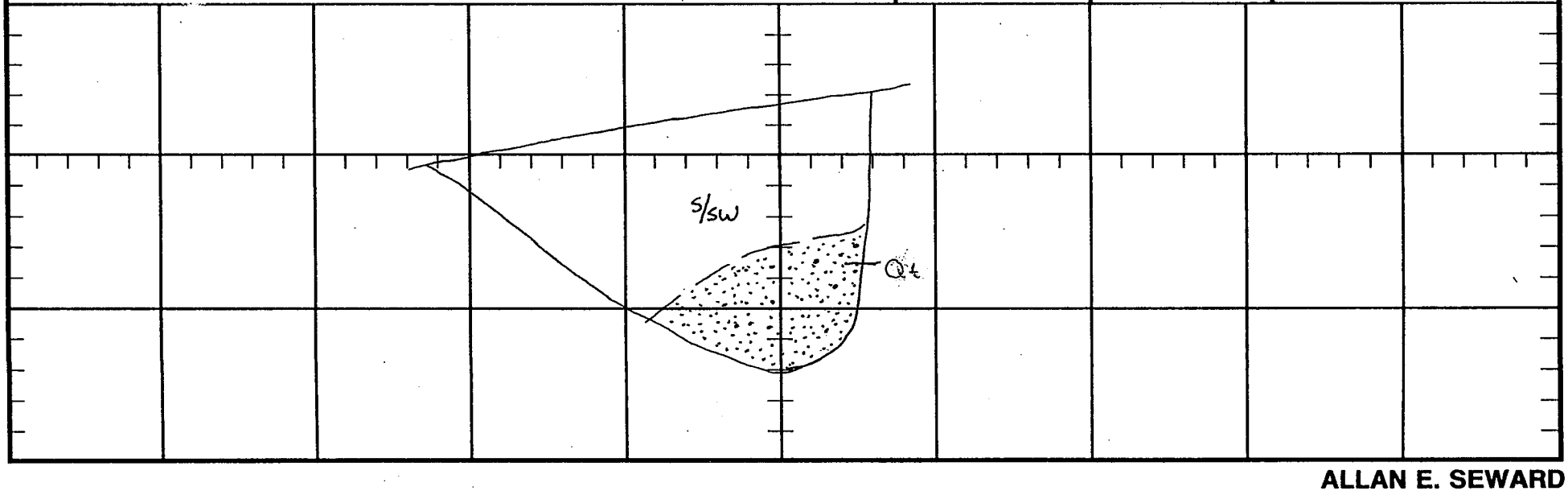
Trench Log No. T-110

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 6' SOIL/SLOPEWASH; s/sw, Medium to dark brown fine-grained silty sand; loose; dry			
6 - 9' BEDROCK; Qt, Medium to rusty brown medium- to coarse-grained pebbly sandstone; loose to hard; damp	Horizontal to subhorizontal		Voids to bottom of trench
			No Ground Water No Caving TOTAL DEPTH 9 Ft.

N 72 E

SCALE 1" = 5'



ALLAN E. SEWARD

JOB NO. 98-1617-4

PROJECT VTT 52584

LOGGED BY VCG

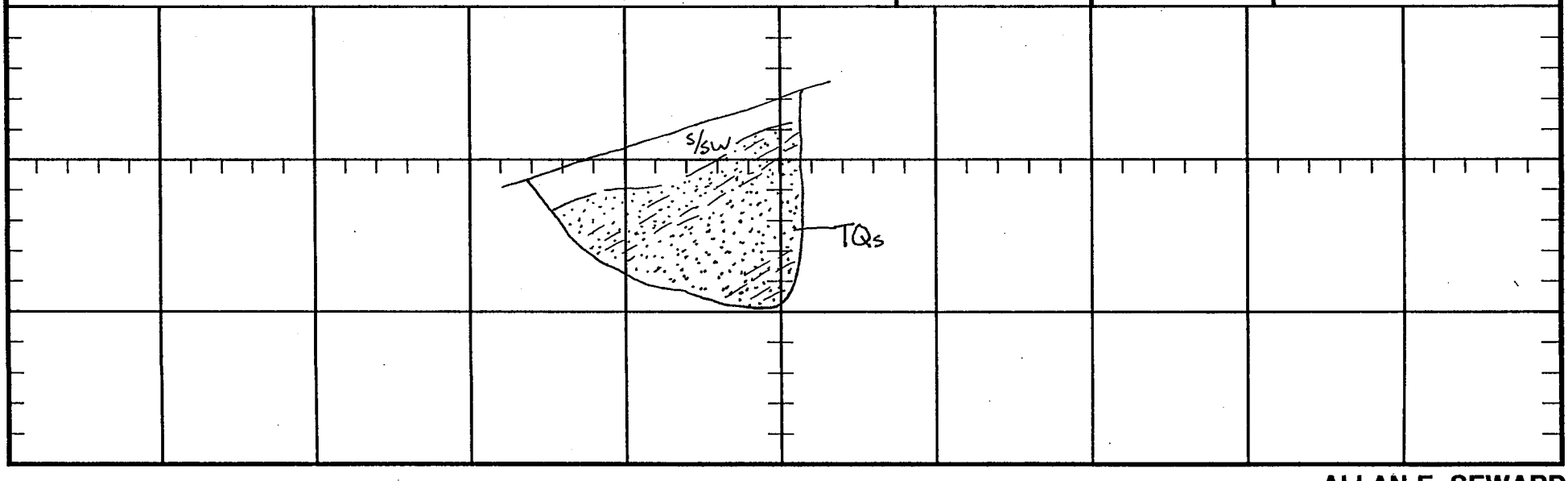
Trench Log No. T-111

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 1.5' SOIL/SLOPEWASH; s/sw, Reddish-brown fine- to coarse-grained silty sand with isolated pebbles; loose; dry			T-111 through T-122 Excavated 7/23/98 using a track mounted backhoe
1.5 - 7' BEDROCK; TQs, Reddish-brown to tan fine- to coarse-grained pebbly sandstone and medium to dark reddish-brown silty sandstone with isolated pebbles; hard; dry to damp	N89E,31SE		No Ground Water No Caving TOTAL DEPTH 7 Ft.

SCALE 1" = 5'

N 27 E



ALLAN E. SEWARD

JOB NO. 98-1617-4

LOGGED BY VCG

Trench Log No. T-112

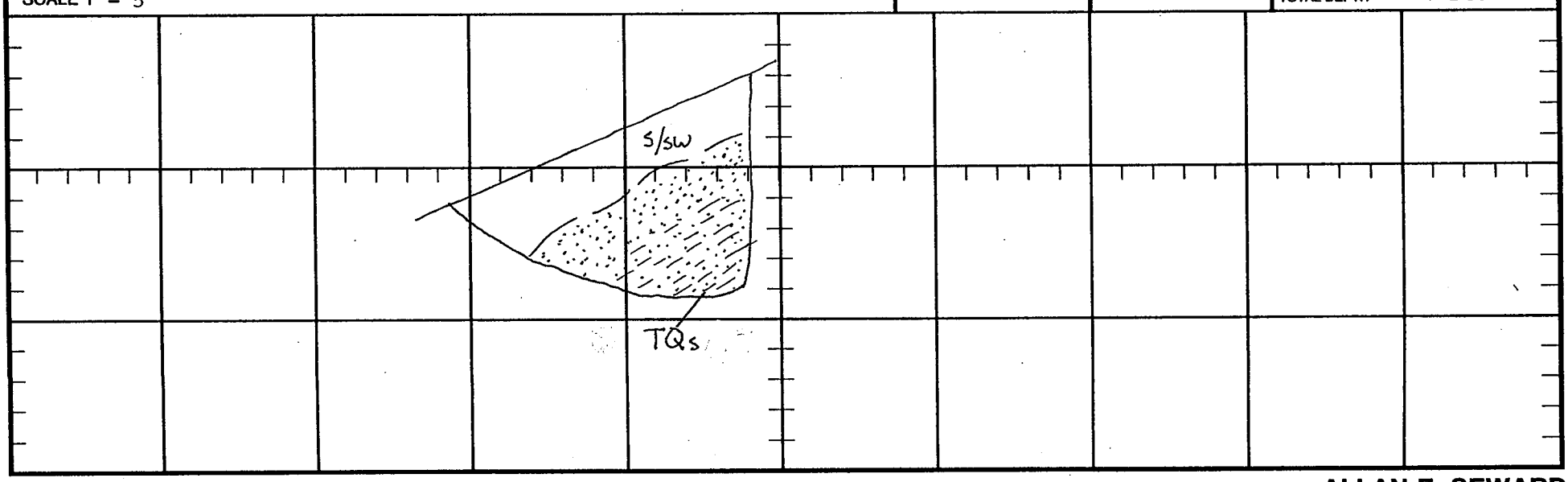
PROJECT VTT 52584

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 2' SOIL/SLOPEWASH: s/sw, Light reddish-brown fine- to coarse-grained silty pebbly sand; loose; dry			
2 - 7' BEDROCK; TQs, Light rusty brown fine- to medium-grained silty sandstone and reddish-brown fine- to medium-grained sandy siltstone/silty sandstone; hard; damp	N62W,13SW N82W,21SW		No Ground Water No Caving TOTAL DEPTH 7 Ft.

N 23 W

SCALE 1" = 5'



ALLAN E. SEWARD

JOB NO. 98-1617-4

PROJECT VTT 52584

LOGGED BY VCG

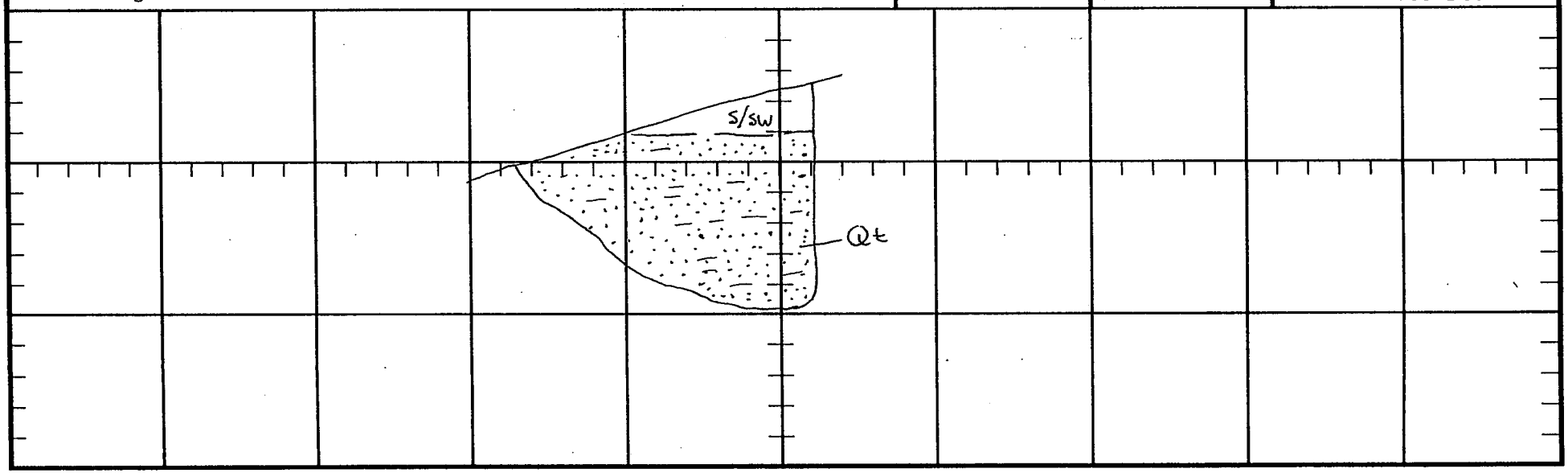
Trench Log No. T-113

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 1.5' SOIL/SLOPEWASH; s/sw, Medium- to light brown fine- to coarse-grained silty sand; loose			
1.5 - 7.5' BEDROCK/QUATERNARY TERRACE; Qt, Medium brown fine- to coarse-grained pebbly sandstone with minor silt; loose to dense; damp	Subhorizontal		No Ground Water No Caving TOTAL DEPTH 7.5 Ft.

SCALE 1" = 5'

N 6 W



ALLAN E. SEWARD

JOB NO. 98-1617-4

PROJECT VTT 52584

LOGGED BY VCG

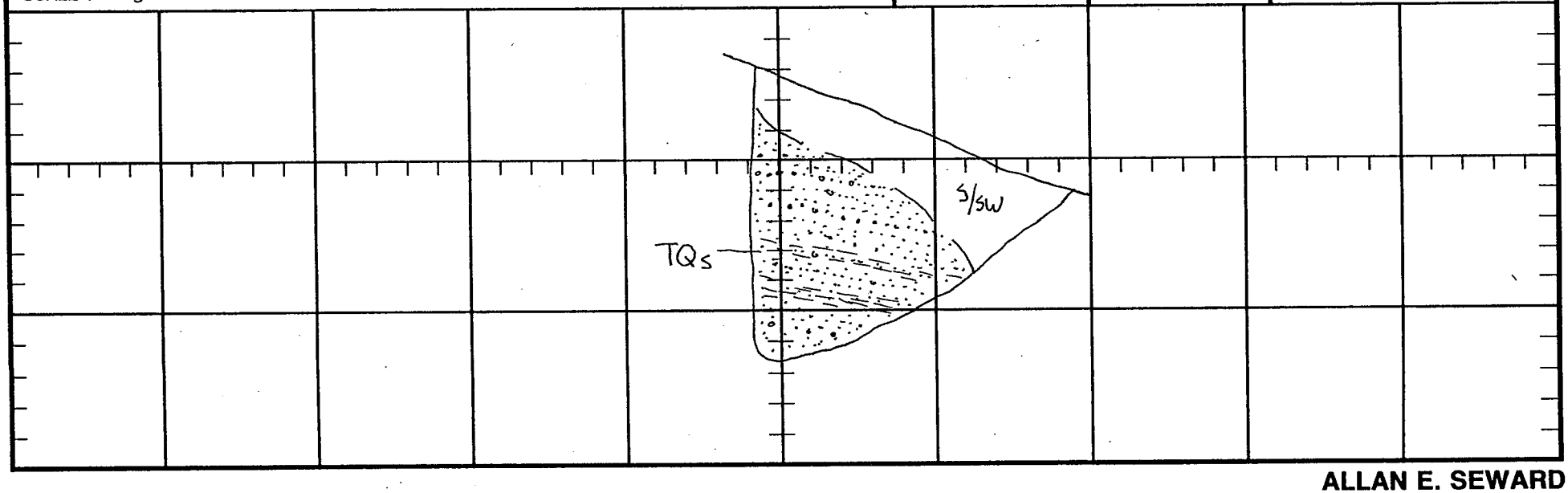
Trench Log No. T-114

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 4' SOIL/SLOPEWASH; s/sw, Medium to light reddish-brown fine- to coarse-grained pebbly sand; loose; dry			
4 - 9.5' BEDROCK; TQs, Reddish-to rusty brown to gray medium- to coarse-grained pebbly sandstone and fine- to medium-grained silty sandstone with isolated pebbles; hard; friable; dry to damp	B: N78W,31SW		No Ground Water No Caving TOTAL DEPTH 9.5 Ft.

N 80 E

SCALE 1" = 5'



ALLAN E. SEWARD

JOB NO. 98-1617-4

LOGGED BY VCG

Trench Log No. T-115

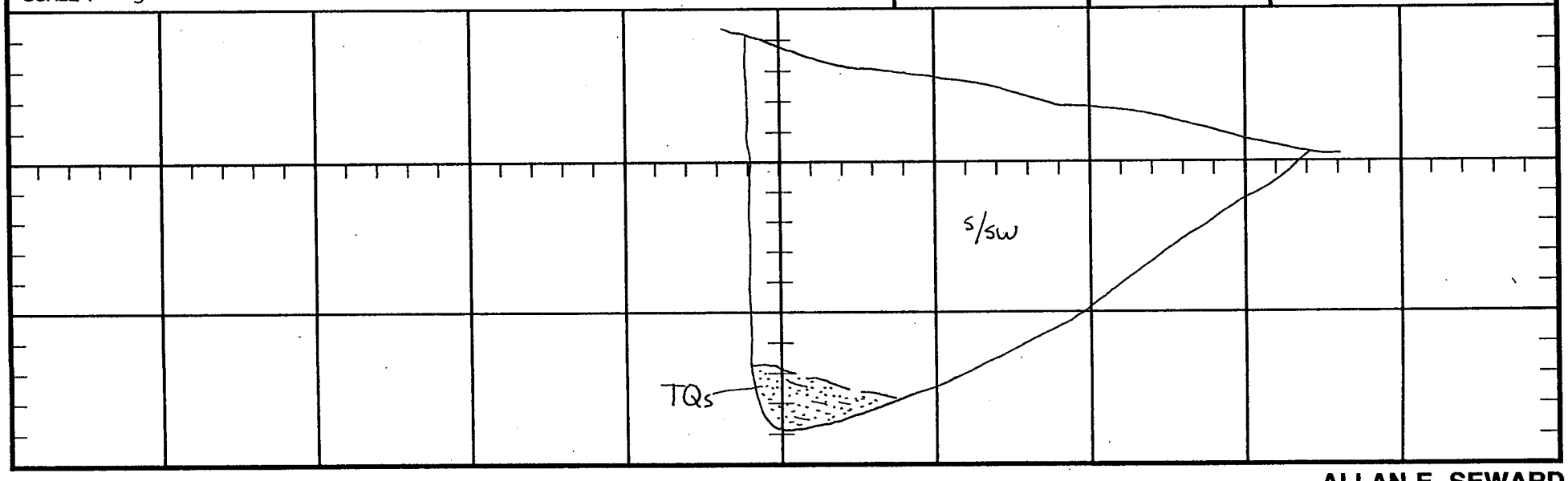
PROJECT VTT 52584

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 11' SOIL/SLOPEWASH; s/sw, Medium to grayish-brown fine- to coarse-grained silty pebbly sand; soft; dry			Logged from surface
11- 13' BEDROCK; TQs, Tan to yellowish-brown fine- to medium-grained sandstone; hard; damp			No Ground Water No Caving TOTAL DEPTH 13 Ft.

N 39 W

SCALE 1" = 5'



ALLAN E. SEWARD

JOB NO. 98-1617-4

PROJECT VTT 52584

LOGGED BY VCG

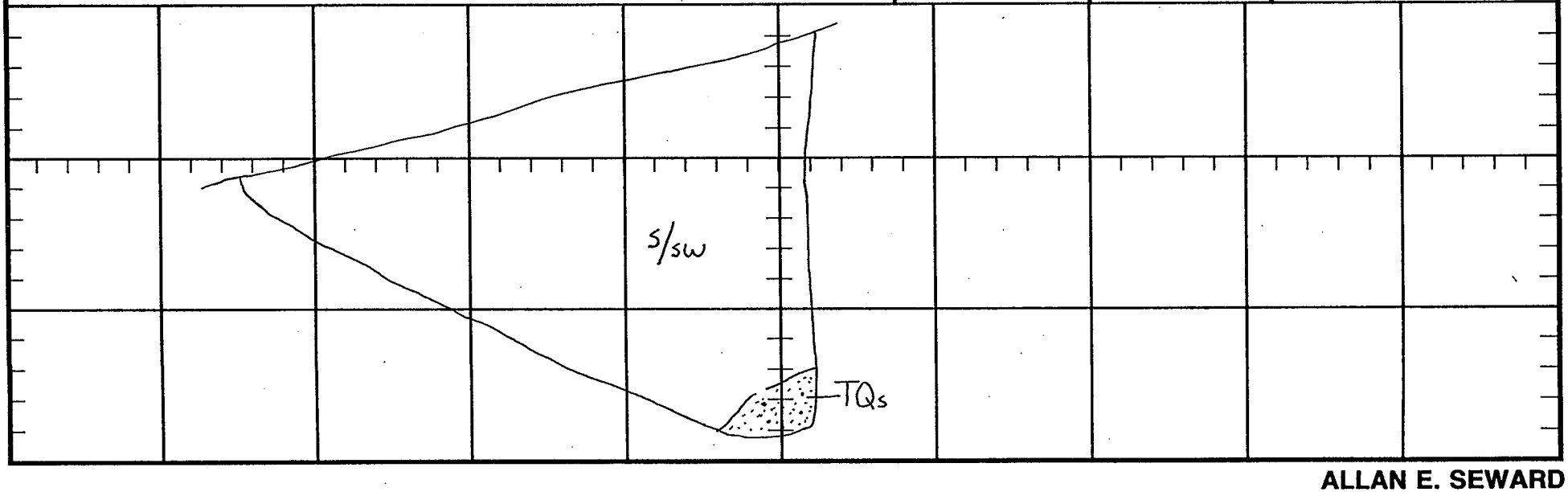
Trench Log No. T-116

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 11' SOIL/SLOPEWASH; s/sw, Medium brown fine- to coarse-grained silty pebbly sand; soft; dry to damp			Surface Log
11 - 13' BEDROCK; TQs, Rusty brown medium- to coarse-grained pebbly sandstone; moderately hard; damp			
			No Ground Water No Caving TOTAL DEPTH 13 Ft.

N 32 E

SCALE 1" = 5'



ALLAN E. SEWARD

JOB NO. 98-1617-4

PROJECT VTT 52584

LOGGED BY VCG

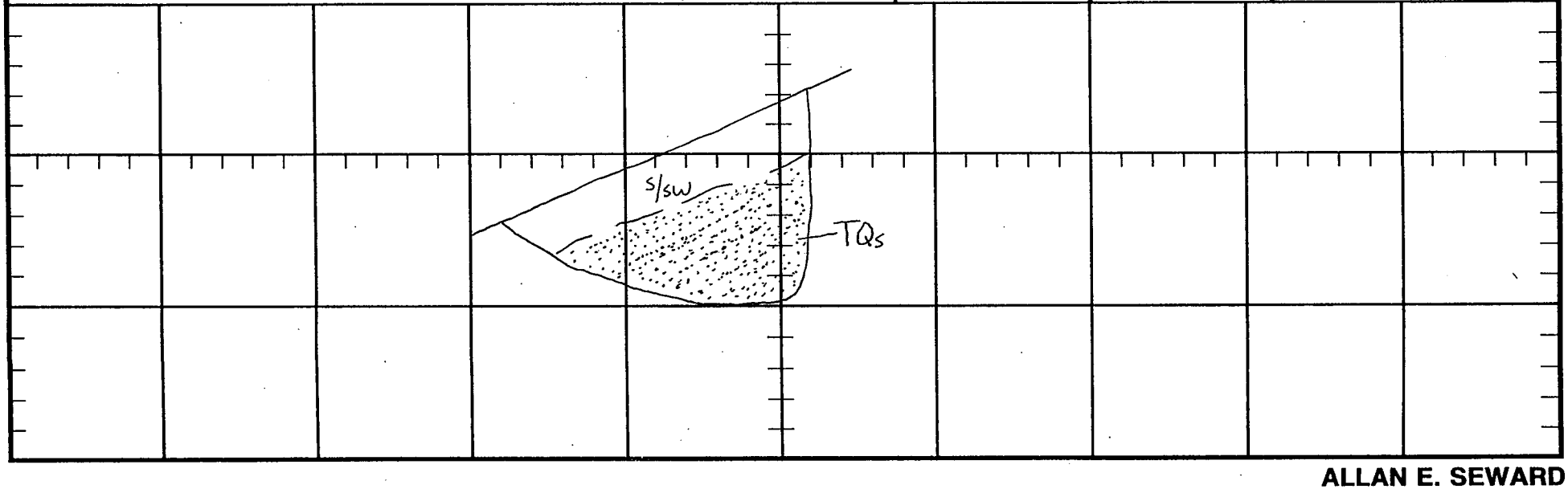
Trench Log No. T-117

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 2.5' SOIL/SLOPEWASH; s/sw, Medium- to light brown fine- to coarse-grained pebbly sand; soft; dry			
2.5 - 7' BEDROCK; TQs, Light reddish-brown to tan fine- to coarse-grained sandstone and pebble conglomerate; hard to moderately hard; dry to damp	N88E,28SE		No Ground Water No Caving TOTAL DEPTH 7 Ft.

SCALE 1" = 5'

N 37 E



ALLAN E. SEWARD

JOB NO. 98-1617-4

LOGGED BY VCG

Trench Log No. T-118

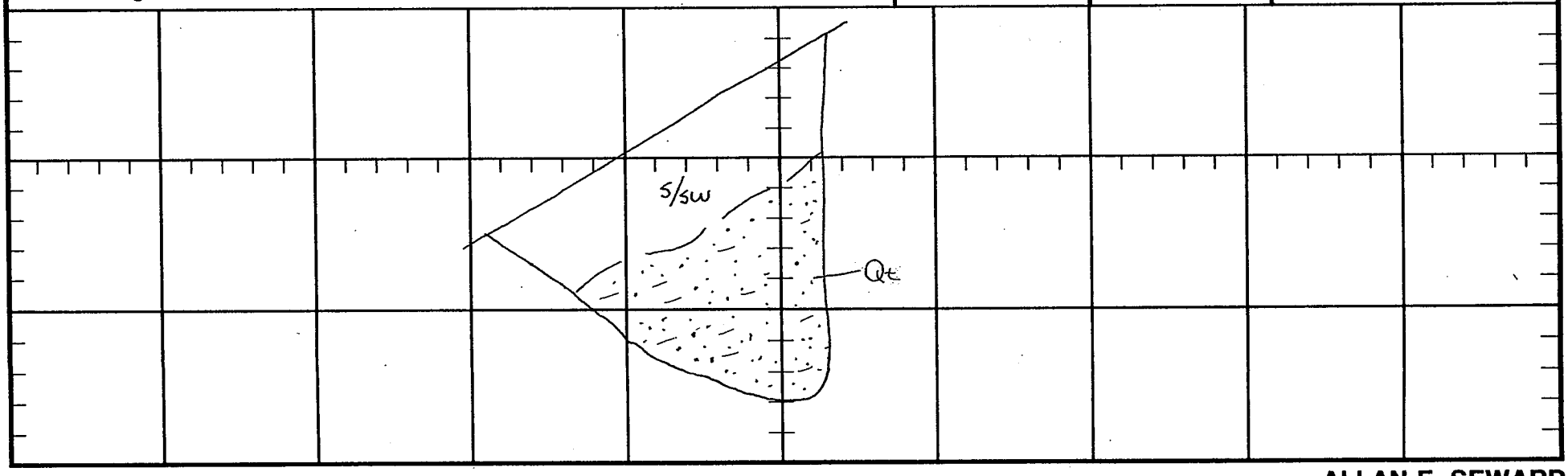
PROJECT VTT 52584

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 4' SOIL/SLOPEWASH; s/sw, Medium brown fine- to coarse-grained silty pebbly sand; soft; dry 4 - 12' BEDROCK/QUATERNARY TERRACE; Qt, Light reddish- to medium brown fine- to coarse-grained silty pebbly sandstone; soft to moderately hard; damp	No bedding visible		No Ground Water No Caving TOTAL DEPTH 12.5 Ft.

SCALE 1" = 5'

N 10 W



ALLAN E. SEWARD

JOB NO. 98-1617-4

LOGGED BY VCG

Trench Log No. T-119

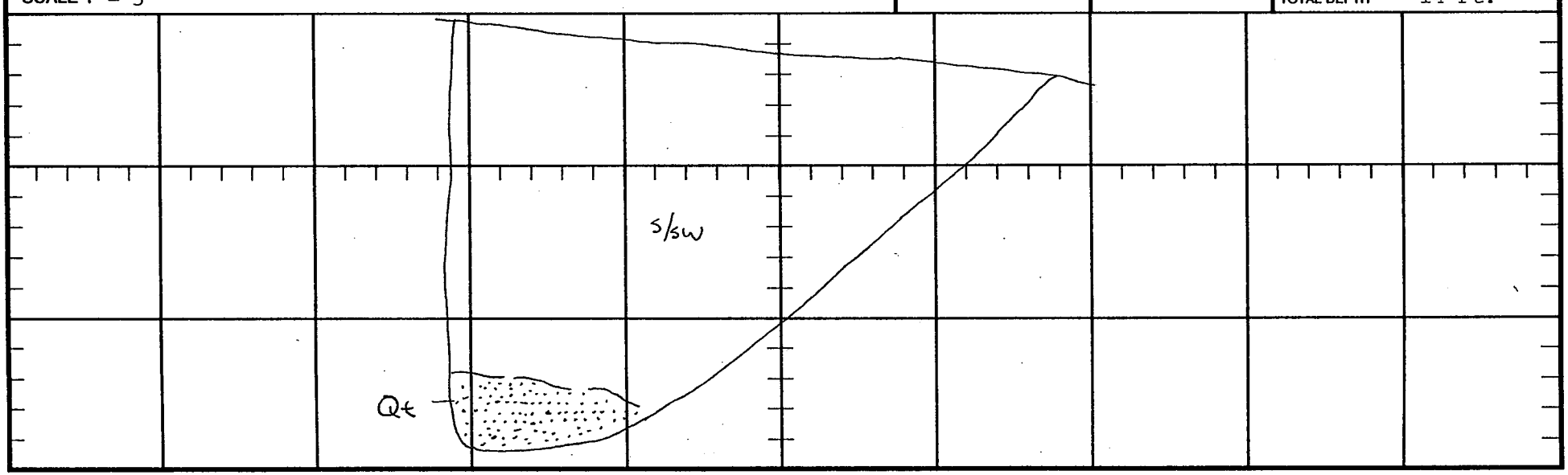
PROJECT VTT 52584

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 11.5' SOIL/SLOPEWASH; s/sw, Medium brown fine- to coarse-grained silty pebbly sand; soft; dry			
11.5 - 14' BEDROCK/QUATERNARY TERRACE; Qt, Light rusty to medium brown fine- to coarse-grained pebbly sandstone; soft to moderately hard; damp	Subhorizontal		Voids to bottom of the trench
			No Ground Water No Caving TOTAL DEPTH 14 Ft.

SCALE 1" = 5'

N 87 W



ALLAN E. SEWARD

JOB NO. 98-1617-4

LOGGED BY VCG

Trench Log No. T-120

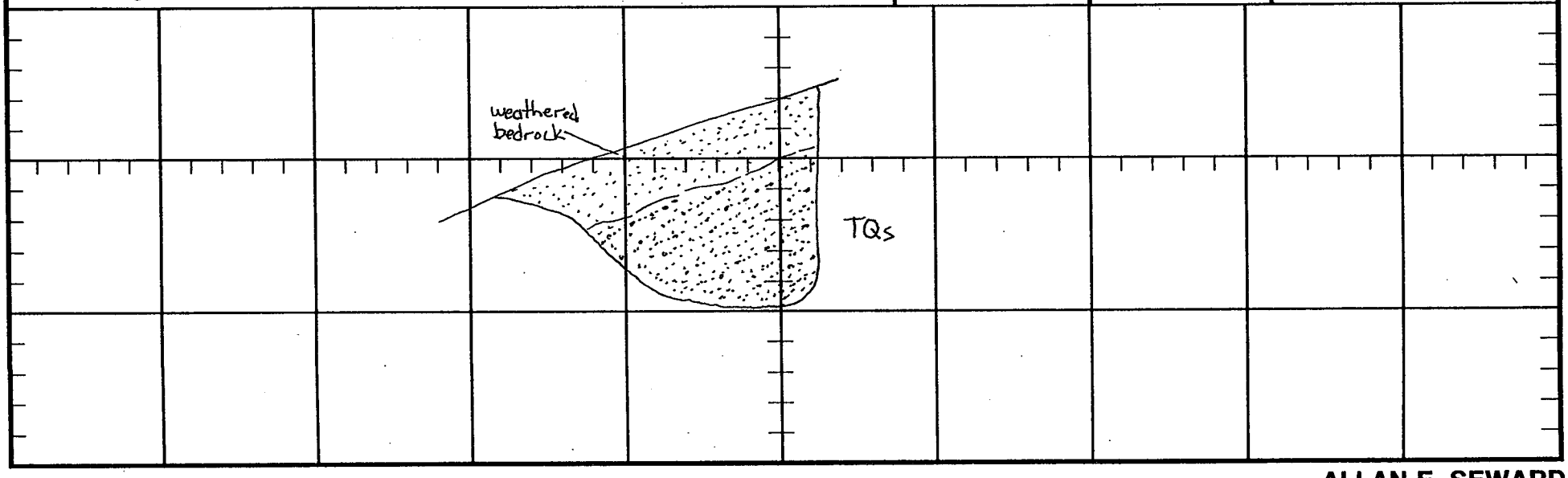
PROJECT VTT 52584

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 2' WEATHERED BEDROCK; Brown fine- to coarse-grained pebbly sand; soft; friable			
2 - 7' BEDROCK; TQs, Tan to medium brown fine- to coarse-grained pebbly sandstone and sandstone; moderately hard; damp; friable	N87W,32SW		No Ground Water No Caving TOTAL DEPTH 7 Ft.

N 25 E

SCALE 1" = 5'



ALLAN E. SEWARD

JOB NO. 98-1617-4

PROJECT VTT 52584

LOGGED BY VCG

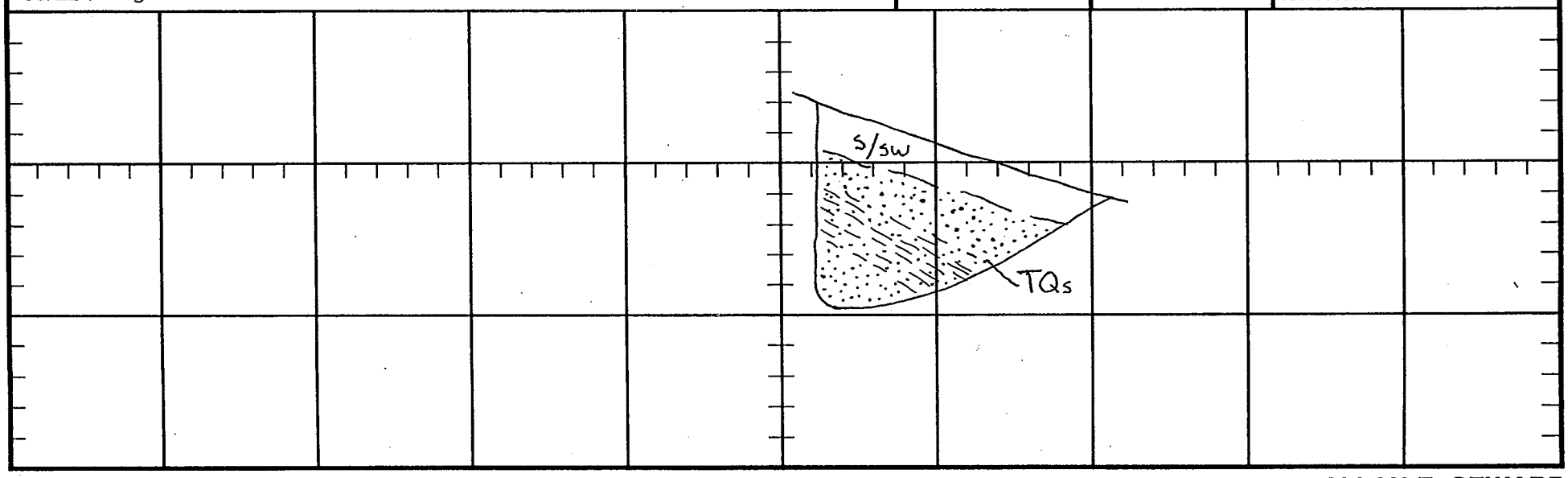
Trench Log No. T-121

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 1.5' SOIL/SLOPEWASH; s/sw, Light reddish-brown fine- to coarse-grained pebbly sand with minor silt; soft; dry			
1.5 - 7' BEDROCK; TQs, Reddish-brown to rust fine- to coarse-grained sandstone with scattered pebbles and fine- to medium-grained silty sandstone with isolated pebbles; moderately hard to hard; dry to slightly damp	N68W,32SW		
			No Ground Water No Caving TOTAL DEPTH 7 Ft.

SCALE 1" = 5'

N 37 E



ALLAN E. SEWARD

JOB NO. 98-1617-4

LOGGED BY VCG

Trench Log No. T-122

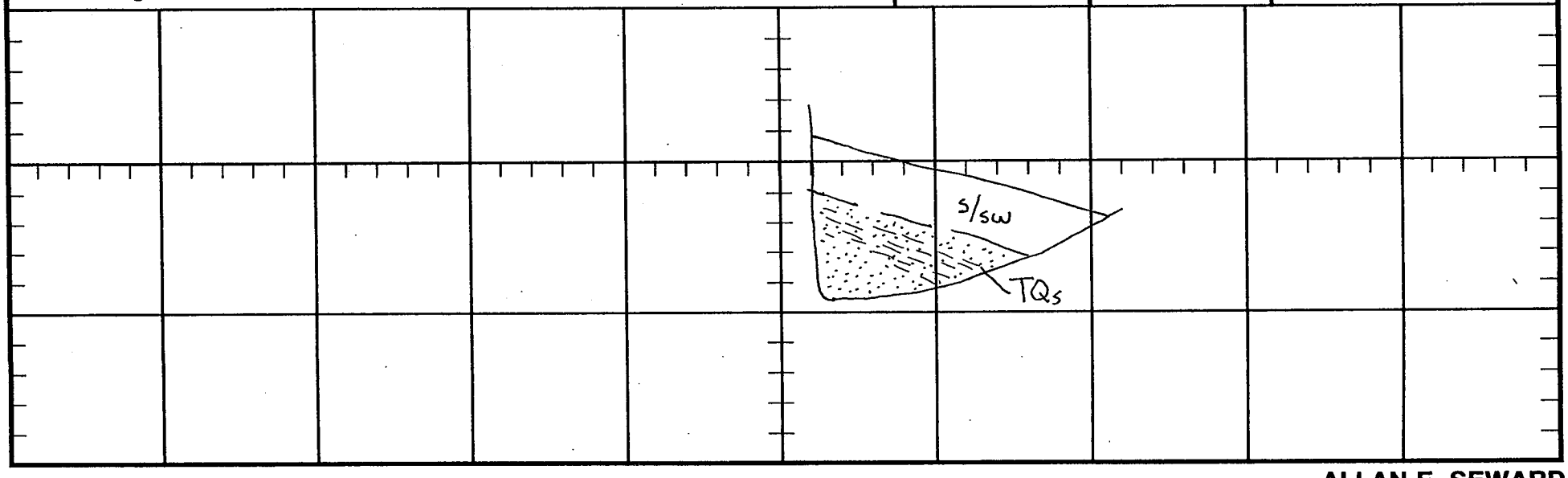
PROJECT VTT 52584

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 2' SOIL/SLOPEWASH; s/sw, Medium- to light-brown fine- to coarse-grained pebbly sand with minor silt; soft; dry			
2 - 6' BEDROCK; TQs, Medium to light brown fine- to coarse-grained silty sandstone with isolated pebbles and medium- to coarse-grained pebbly sandstone; moderately hard; dry	N88W,32SW		Bedding pretty vague
			No Ground Water No Caving TOTAL DEPTH 6 Ft.

SCALE 1" = 5'

N 12 W



ALLAN E. SEWARD

JOB NO. 98-1617-4

PROJECT VTT 52584

LOGGED BY VCG

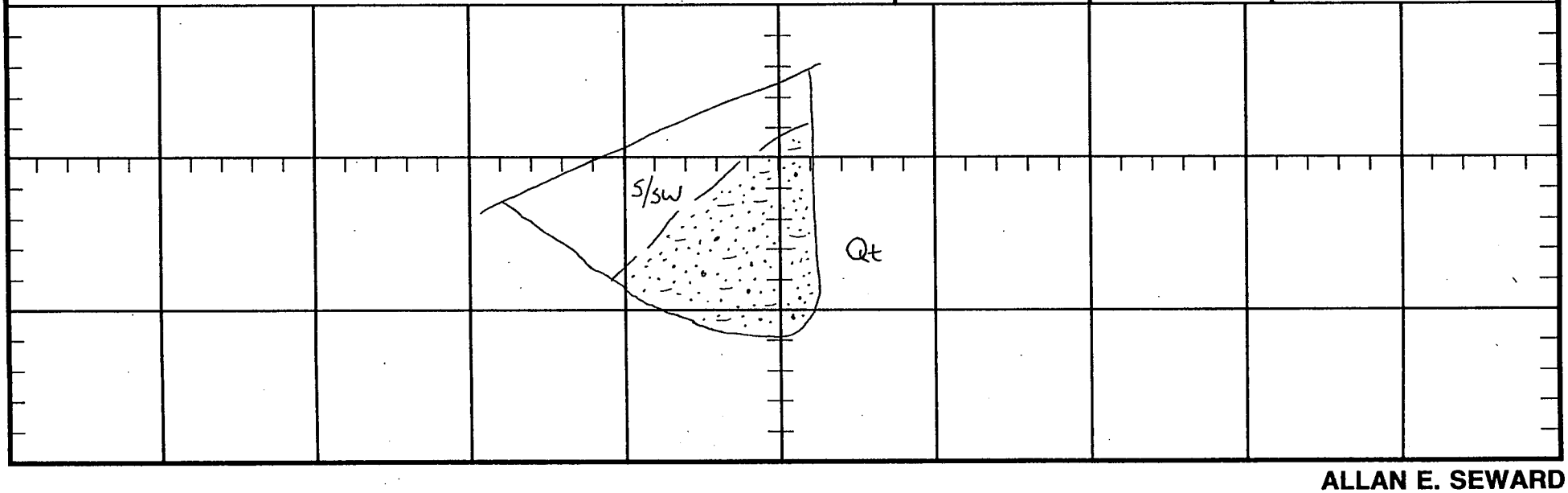
Trench Log No. T-123

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 4' SOIL/SLOPEWASH; s/sw, Light-brown fine- to coarse-grained silty sand with scattered pebbles; soft; dry 4 - 9' BEDROCK/QUATERNARY TERRACE; Qt, Reddish-brown fine- to coarse-grained silty pebbly sandstone; soft to moderately hard; dry to damp			T-123 through T-134 Excavated 7/29/98 using a track-mounted backhoe Bedding very indistinct but looks subhorizontal No Ground Water No Caving TOTAL DEPTH 9 Ft.

Due North

SCALE 1" = 5'



ALLAN E. SEWARD

JOB NO. 98-1617-4

PROJECT VTT 52584

LOGGED BY VCG

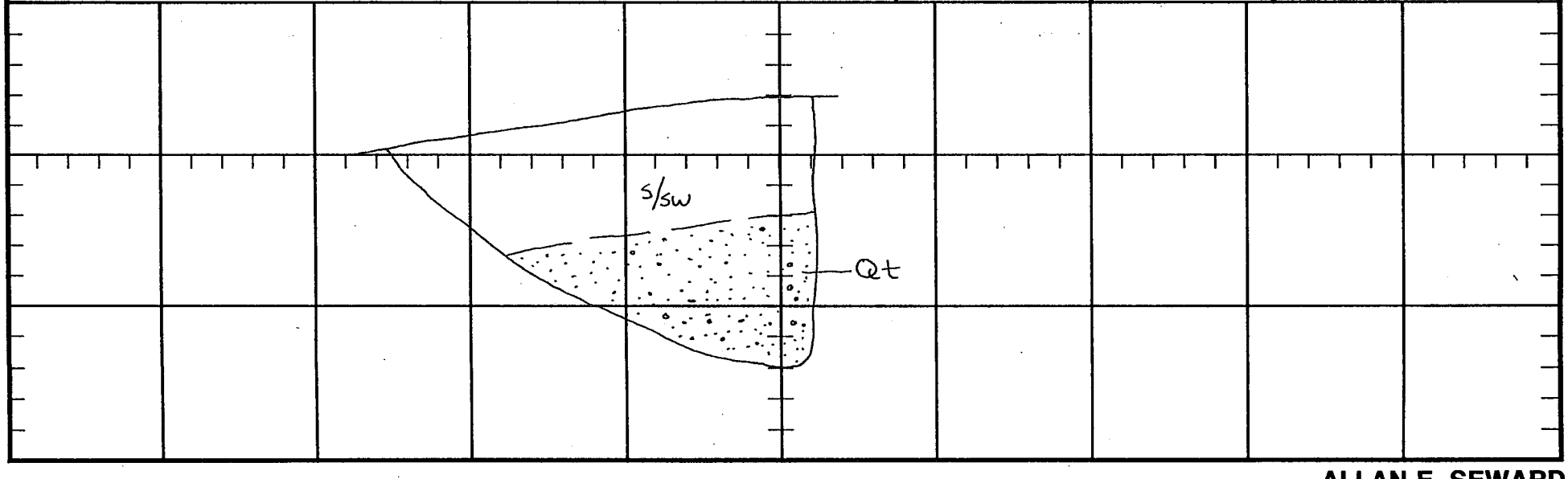
Trench Log No. T-124

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 4' SOIL/SLOPEWASH; s/sw, Medium brown fine- to coarse-grained pebbly silty sandstone; soft; dry			
4 - 9' BEDROCK/QUATERNARY TERRACE; Qt, Medium to light reddish-brown fine- to coarse-grained pebbly sandstone with isolated cobbles; soft to moderately hard; damp	Vague to non-bedded		No Ground Water No Caving TOTAL DEPTH 9 Ft.

SCALE 1" = 5'

N 33 W



ALLAN E. SEWARD

JOB NO. 98-1617-4

LOGGED BY VCG

Trench Log No. T-125

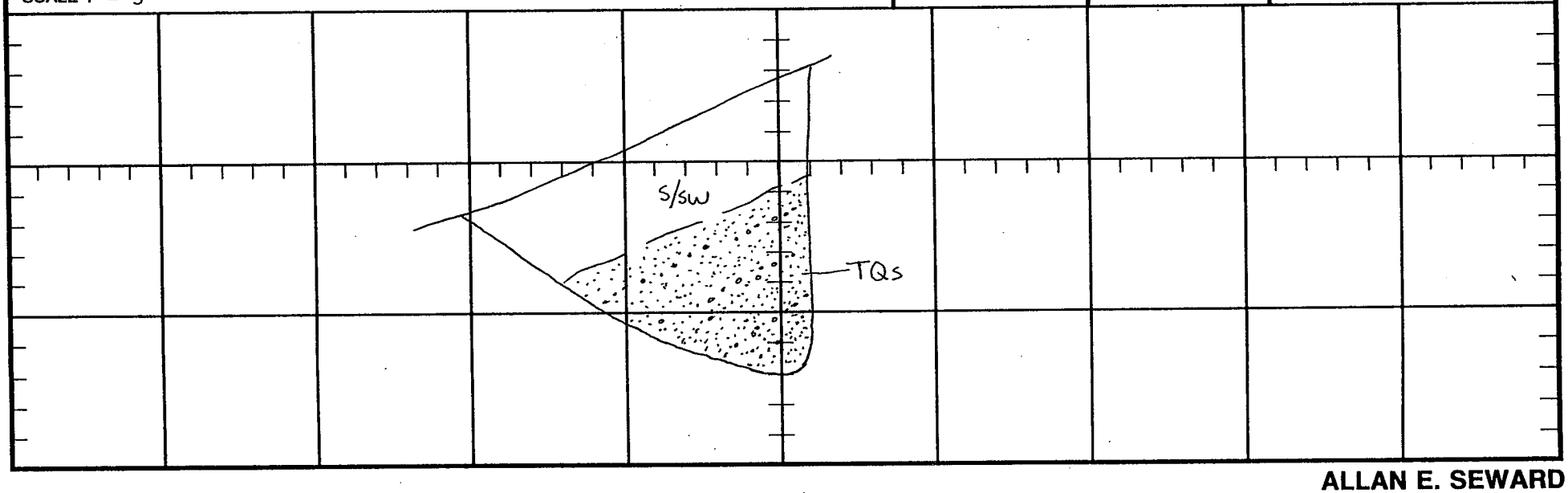
PROJECT VTT 52584

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 4' SOIL/SLOPEWASH; s/sw, Medium brown fine- to coarse-grained pebbly silty sand; soft; dry			
4 - 10' BEDROCK; TQs, Rusty brown to tan fine- to coarse-grained sandstone and pebbly sandstone with isolated cobbles; moderately hard; damp	N83W,29SW		No Ground Water No Caving TOTAL DEPTH 10 Ft.

SCALE 1" = 5'

N 10 W



ALLAN E. SEWARD

JOB NO. 98-1617-4

PROJECT VTT 52584

LOGGED BY VCG

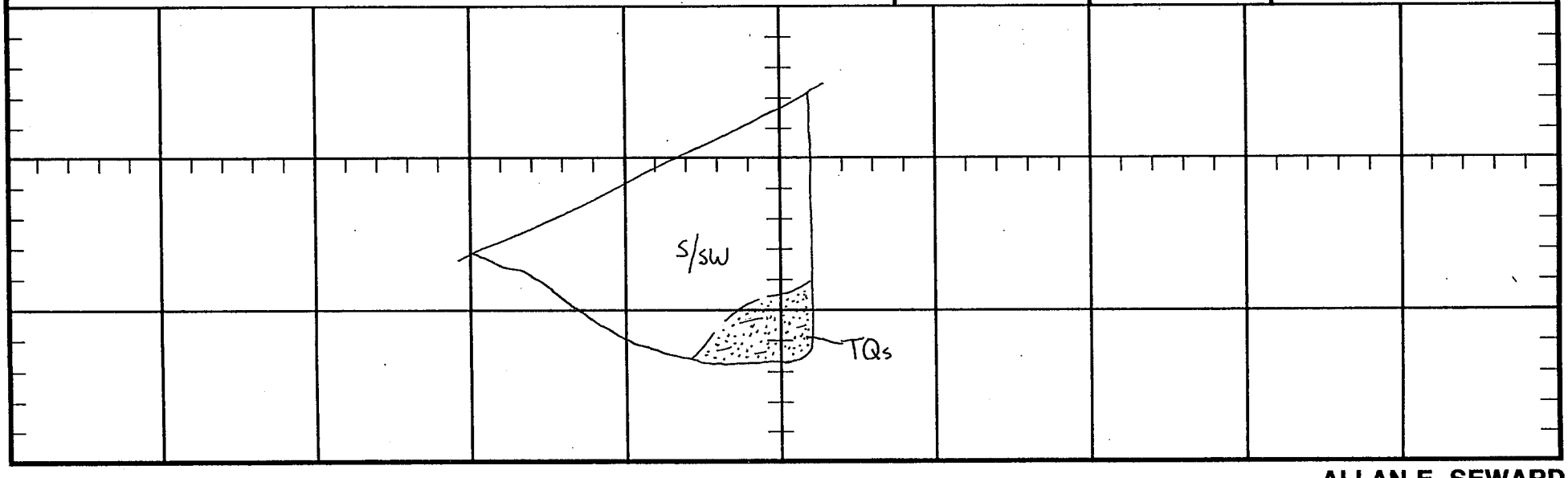
Trench Log No. T-126

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 6.5' SOIL/SLOPEWASH; s/sw, Medium to grayish-brown fine- to coarse-grained silty pebbly sand; soft; dry			
6.5 - 9' BEDROCK; TQs, Tan to light brown fine- to medium-grained sandstone with minor silt; moderately hard; dry to damp	N87W,34SW		No Ground Water No Caving TOTAL DEPTH 9 Ft.

SCALE 1" = 5'

N 60 E



ALLAN E. SEWARD

JOB NO. 98-1617-4

LOGGED BY VCG

Trench Log No. T-127

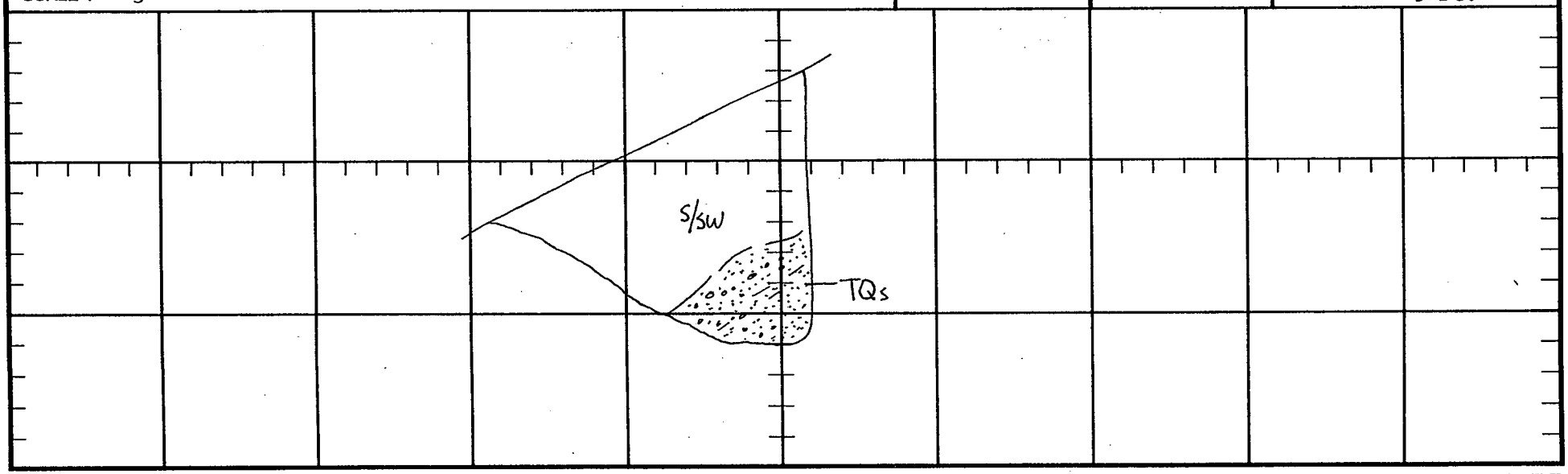
PROJECT VTT 52584

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 5.5' SOIL/SLOPEWASH; s/sw, Medium to reddish-brown fine- to coarse-grained silty pebbly sand; soft; dry			
5.5 - 9' BEDROCK; TQs, Light reddish-brown to tan fine- to medium-grained sandstone and pebbly sandstone; moderately hard; dry to damp	N83E,35SE		
			No Ground Water No Caving TOTAL DEPTH 9 Ft.

SCALE 1" = 5'

N 40 E



ALLAN E. SEWARD

JOB NO. 98-1617-4

LOGGED BY VCG

Trench Log No. T-128

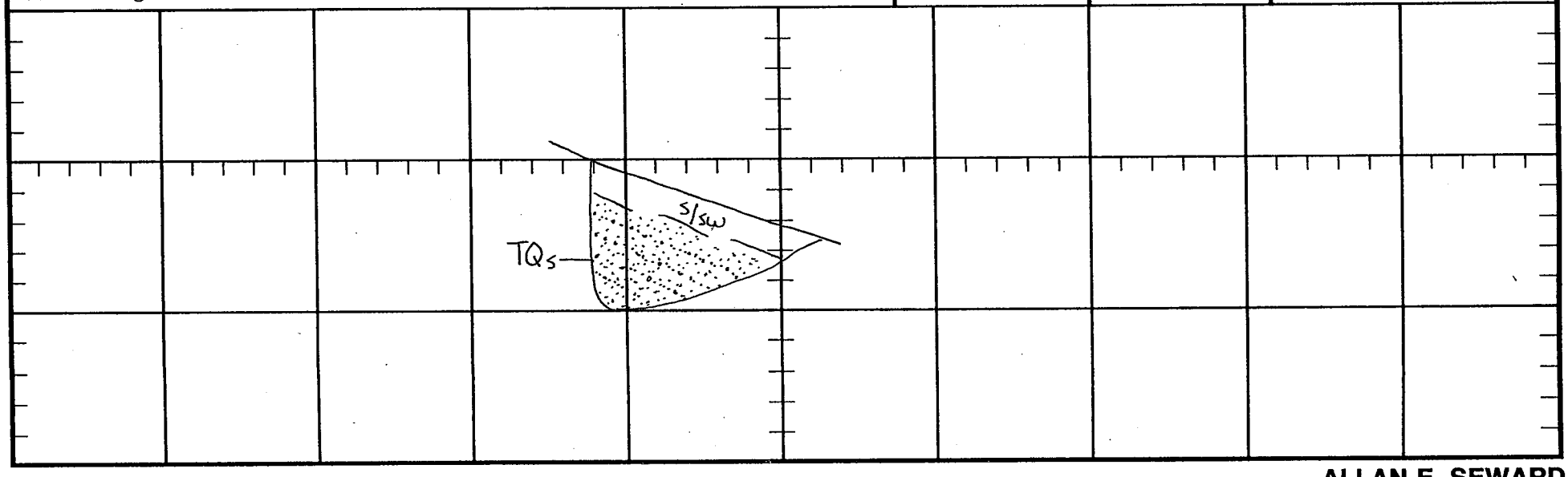
PROJECT VTT 52584

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 1' SOIL/SLOPEWASH; s/sw, Light reddish-brown fine- to coarse-grained pebbly sand; loose; dry			
1 - 5' BEDROCK; TQs, Rusty brown fine- to coarse-grained pebbly sandstone; moderately hard to hard; dry to damp	N72E,30SE		
			No Ground Water No Caving TOTAL DEPTH 5 Ft.

N 18 E

SCALE 1" = 5'



ALLAN E. SEWARD

JOB NO. 98-1617-4

PROJECT VTT 52584

LOGGED BY VCG

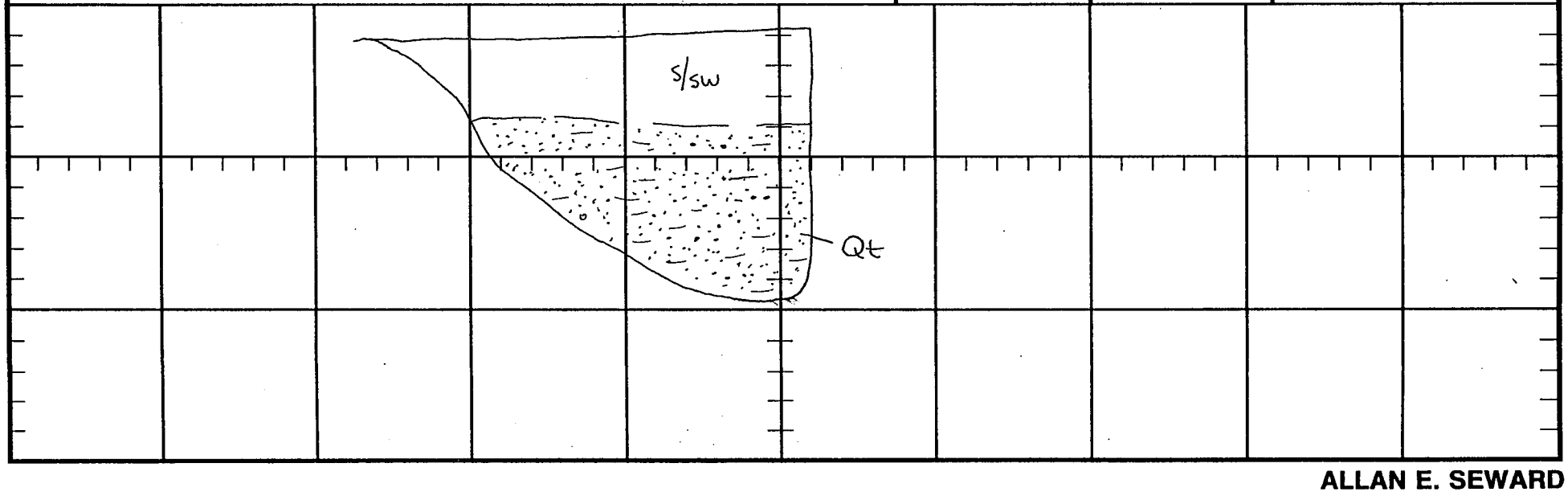
Trench Log No. T-129

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 3' SOIL/SLOPEWASH; s/sw, Medium to reddish-brown fine- to coarse-grained silty pebbly sand; soft; dry			
3 - 9' BEDROCK/QUATERNARY TERRACE; Qt, Medium to rusty brown fine- to coarse-grained silty pebbly sandstone; soft to moderately hard; dry to damp	Crude Horizontal bedding		No Ground Water No Caving TOTAL DEPTH 9 Ft.

SCALE 1" = 5'

N 12 E



ALLAN E. SEWARD

JOB NO. 98-1617-4

PROJECT VTT 52584

LOGGED BY VCG

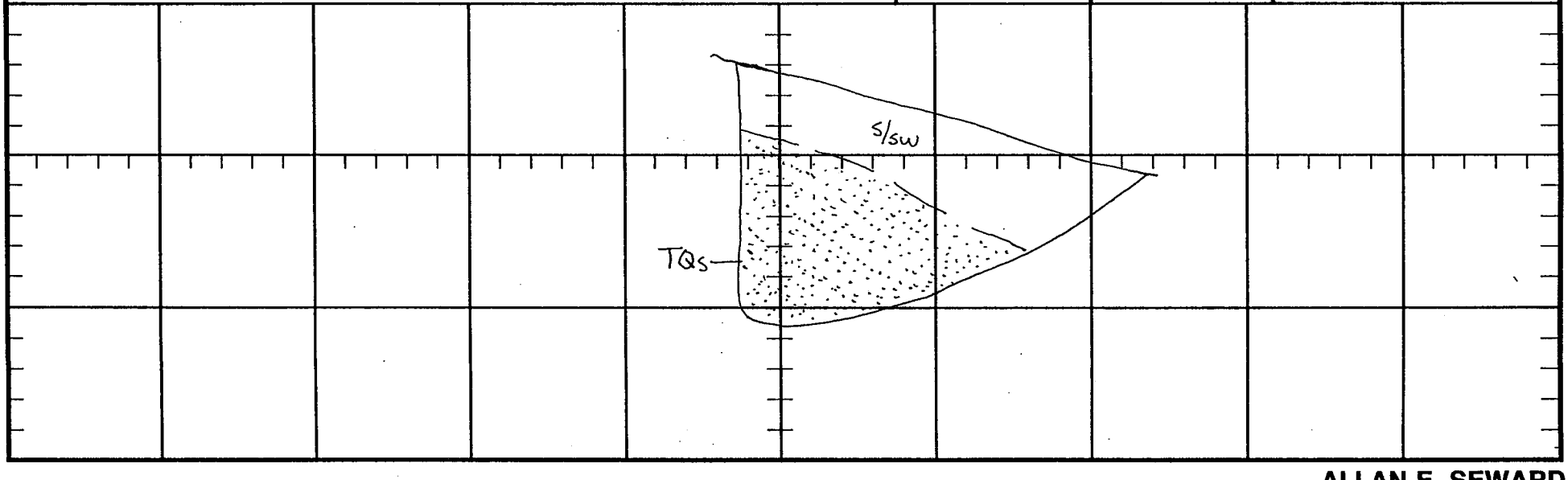
Trench Log No. T-130

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 3' SOIL/SLOPEWASH; s/sw, Medium to grayish-brown fine- to coarse-grained silty pebbly sand; soft; dry			
3 - 8.5' BEDROCK; TQs, Tan fine- to coarse-grained sandstone and pebbly sandstone; thinly bedded; moderately hard to hard; damp	N78E,31SE		
			No Ground Water No Caving TOTAL DEPTH 8.5 Ft.

SCALE 1" = 5'

N 5 W



ALLAN E. SEWARD

JOB NO. 98-1617-4

LOGGED BY VCG

Trench Log No. T-131

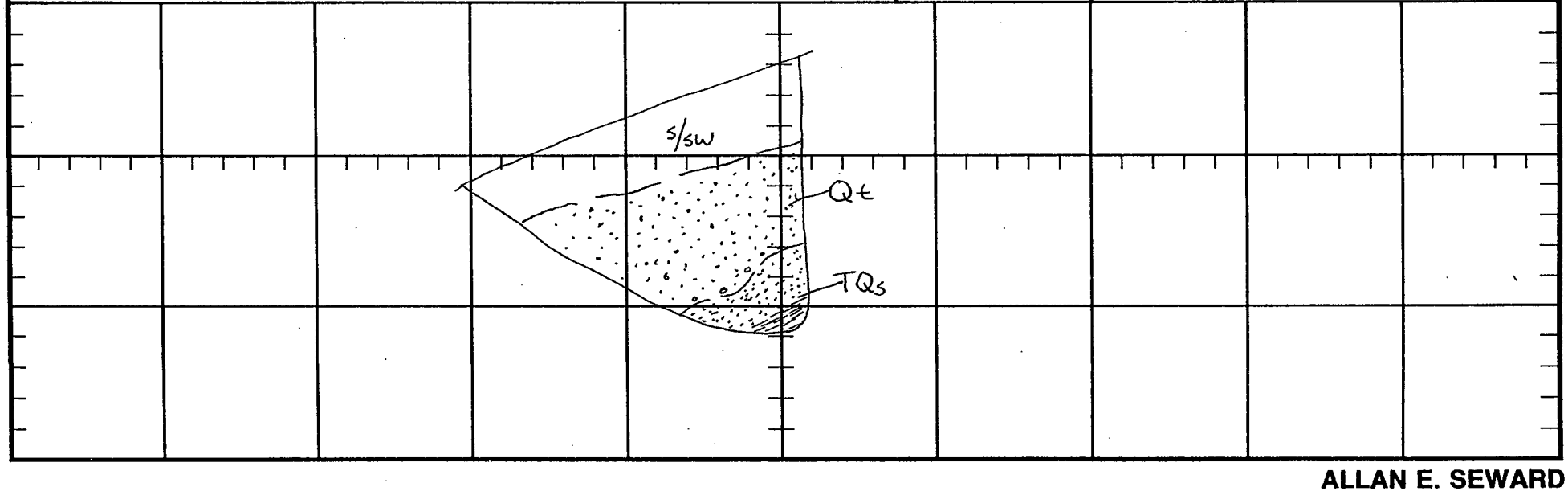
PROJECT VTT 52584

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 2.5' SOIL/SLOPEWASH; s/sw, Medium to grayish-brown fine- to coarse-grained silty pebbly sand; soft dry			
2.5 - 6' BEDROCK/QUATERNARY TERRACE; Qt, Reddish-brown fine- to coarse-grained pebbly sandstone; soft; dry	Very vague		
6 - 9' BEDROCK; TQs, Tan to reddish-brown fine- to medium-grained silty sandstone and medium- to coarse-grained pebbly sandstone; moderately hard	N70E,33SE		
			No Ground Water No Caving TOTAL DEPTH 9 Ft.

N 38 W

SCALE 1" = 5'



ALLAN E. SEWARD

JOB NO. 98-1617-4

LOGGED BY VCG

Trench Log No. T-132

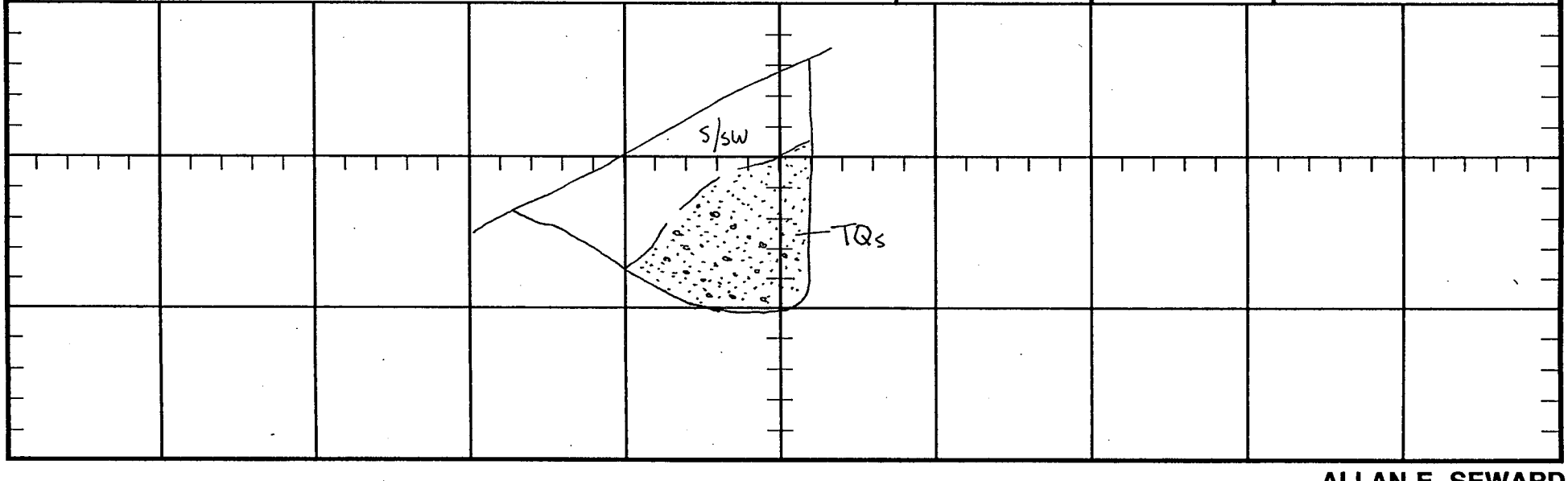
PROJECT VTT 52584

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 4' SOIL/SLOPEWASH; s/sw, Light to medium brown fine- to coarse-grained silty sand with scattered cobbles; soft; dry			
4 - 8' BEDROCK; TQs, Tan medium- to coarse-grained sandstone and cobble conglomerate; moderately hard; dry	N78W,29NE		
			No Ground Water No Caving TOTAL DEPTH 8 Ft.

SCALE 1" = 5'

N 35 E



ALLAN E. SEWARD

JOB NO. 98-1617-4

PROJECT VTT 52584

LOGGED BY VCG

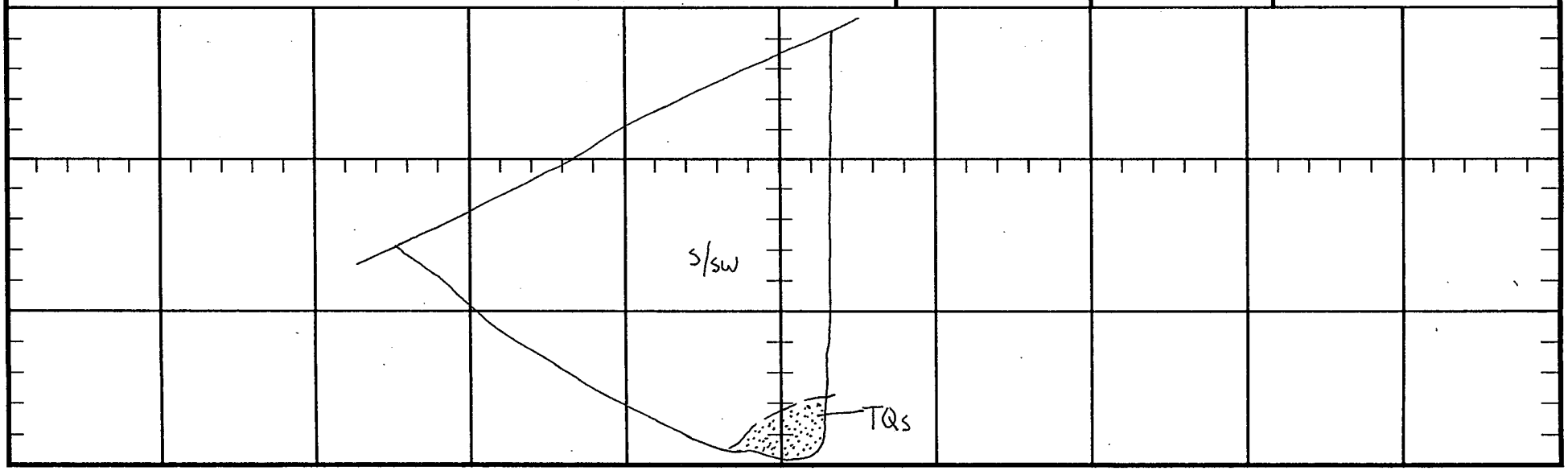
Trench Log No. T-133

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 12' SOIL/SLOPEWASH; s/sw, Medium to grayish-brown fine- to coarse-grained silty pebbly sand; soft; dry to damp			Logged from the surface
12 - 14' BEDROCK; TQs, Yellowish-brown fine- to medium-grained sandstone; moderately hard; damp			
			No Ground Water No Caving TOTAL DEPTH 14 Ft.

N 27 W

SCALE 1" = 5'



ALLAN E. SEWARD

JOB NO. 98-1617-4

PROJECT VTT 52584

LOGGED BY VCG

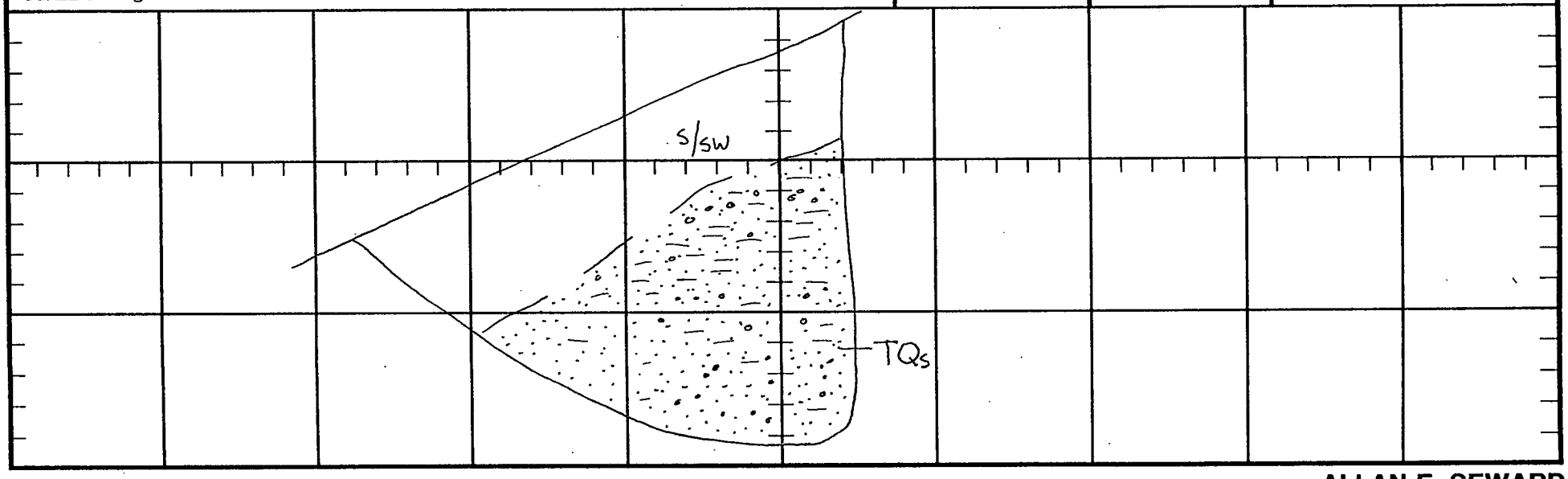
Trench Log No. T-134

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 5' SOIL/SLOPEWASH; s/sw, Medium to grayish-brown fine- to coarse-grained silty sand with isolated pebbles; soft; dry			
5 - 13.5' QUATERNARY LANDSLIDE; Qls, Tan to light reddish-brown fine- to coarse-grained silty sandstone and cobble conglomerate; moderately hard; dry to damp	Indistinct		No Ground Water No Caving TOTAL DEPTH 13.5 Ft.

SCALE 1" = 5'

N 70 W



ALLAN E. SEWARD

JOB NO. 98-1617-4

PROJECT VTT 52584

LOGGED BY VCG

Trench Log No. T-135

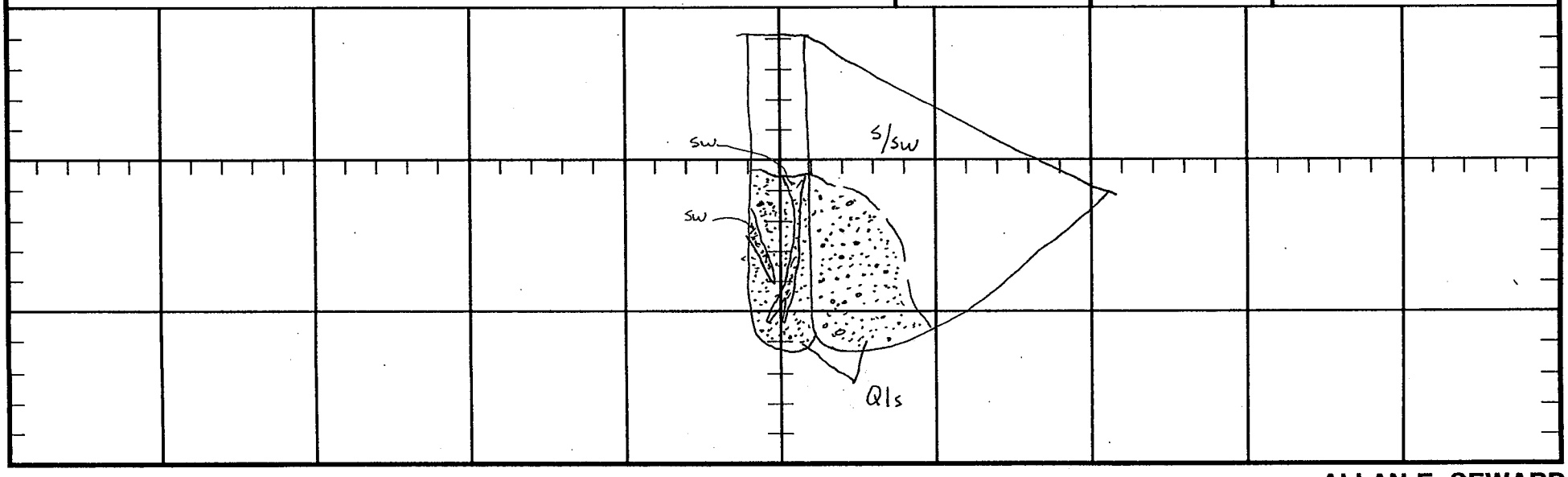
DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 8' SOIL/SLOPEWASH; s/sw, Light grayish-brown to medium brown fine- to coarse-grained silty pebbly sand; soft; dry; infilled in fractures			T-135 through T-142 excavated 7/30/98 using a track mounted backhoe Fractures infilled with slopewash
8 - 10.5' QUATERNARY LANDSLIDE; Qls, Gray to light tan fine- to coarse-grained pebbly sandstone; moderately hard; dry to damp	Non-bedded		No Ground Water No Caving

N 24 W

SCALE 1" = 5'

TOTAL DEPTH 10.5 Ft.



ALLAN E. SEWARD

JOB NO. 98-1617-4

PROJECT VTT 52584

LOGGED BY VCG

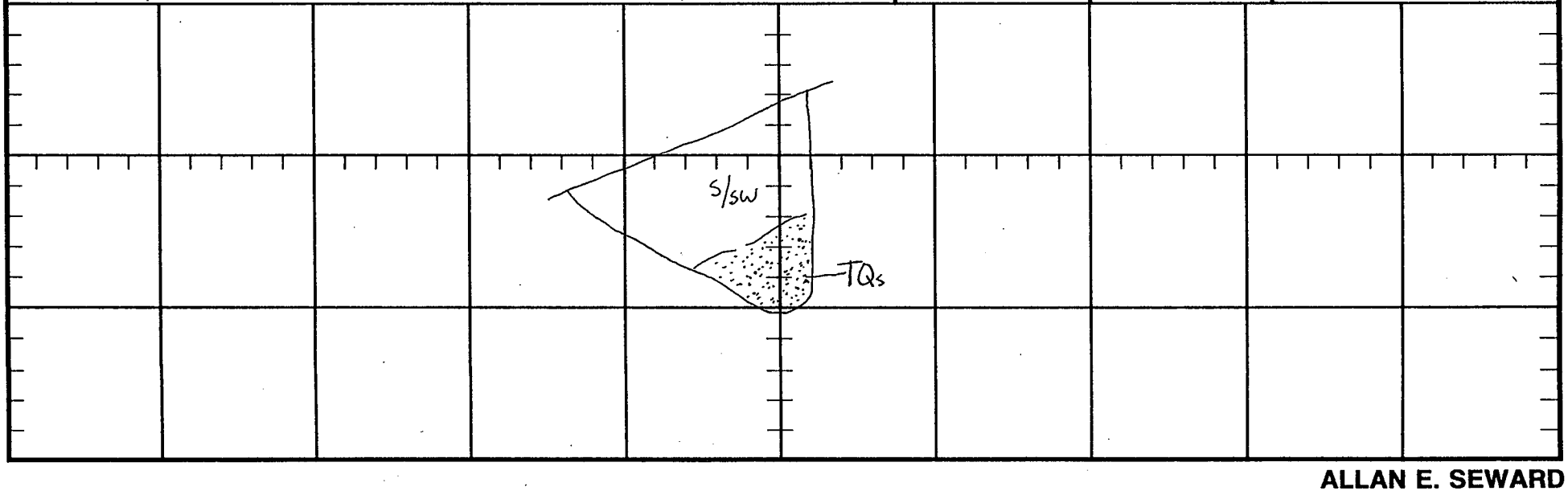
Trench Log No. T-136

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 4' SOIL/SLOPEWASH; s/sw, Medium brown fine- to coarse-grained silty pebbly sand; soft; dry; roots to 3.5 feet 4 - 7' BEDROCK; TQs, Light greenish-brown to tan fine- to medium-grained sandstone and fine- to coarse-grained pebbly sandstone; moderately hard; damp;	N80E,26NW		No Ground Water No Caving TOTAL DEPTH 7 Ft.

N 54 E

SCALE 1" = 5'



ALLAN E. SEWARD

JOB NO. 98-1617-4

LOGGED BY VCG

Trench Log No. T-137

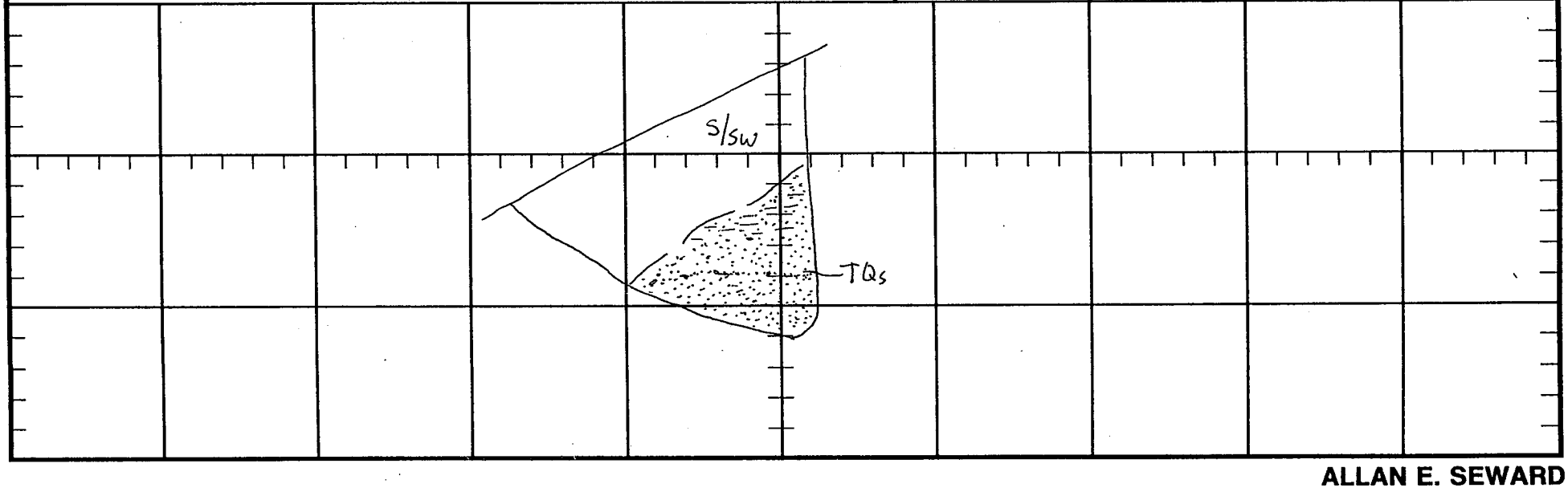
PROJECT VTT 52584

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 4.5' SOIL/SLOPEWASH; s/sw, Medium to light brown fine- to coarse-grained silty pebbly sand with abundant roots; soft; dry			
4.5 - 9' BEDROCK; TQs, Medium reddish-brown fine- to medium-grained silty sandstone/sandy siltstone and gray to tan medium- to coarse-grained sandstone and pebbly sandstone; moderately hard; dry	N48W,17NE N58W,16NE N45W,23NE		No Ground Water No Caving TOTAL DEPTH 9 Ft.

SCALE 1" = 5'

N 40 W



ALLAN E. SEWARD

JOB NO. 98-1617-4

LOGGED BY VCG

Trench Log No. T-138

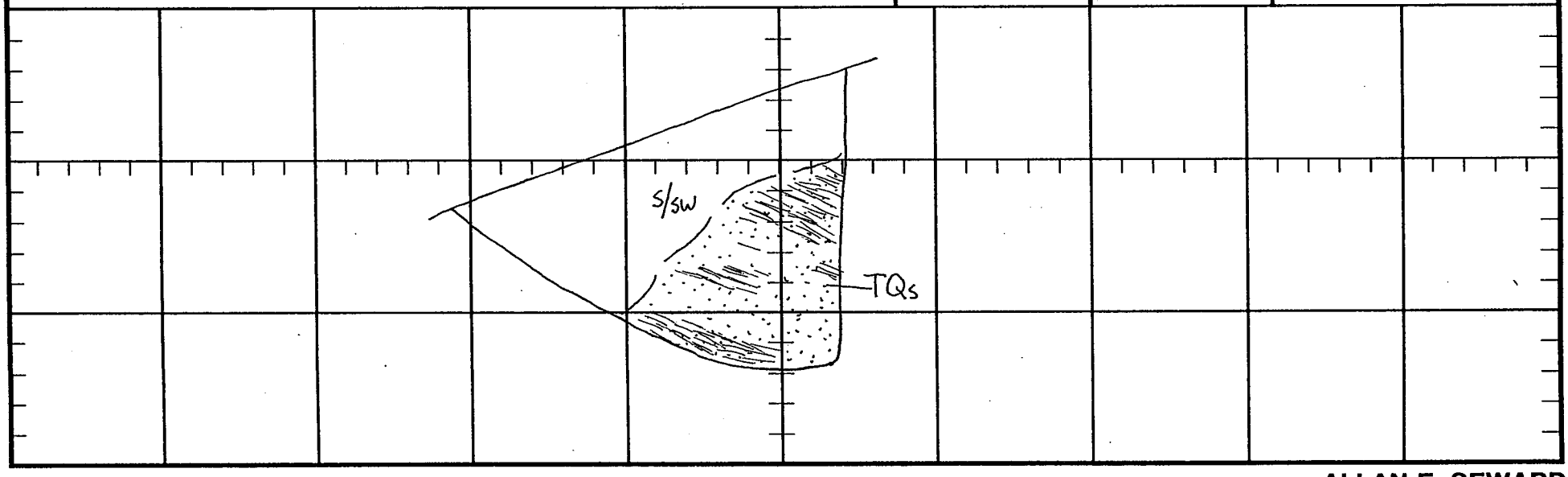
PROJECT VTT 52584

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 5.5' SOIL/SLOPEWASH; s/sw, Medium brown fine- to coarse-grained silty pebbly sand with abundant roots; soft; dry			
5.5 - 10' BEDROCK; TQs, Reddish-brown fine- to medium-grained silty sandstone/sandy siltstone with an interbed of medium-grained sandstone; moderately hard; dry	N58W,18NE N65W,22NE N58W,22NE		No Ground Water No Caving TOTAL DEPTH 10 Ft.

SCALE 1" = 5'

Due East



ALLAN E. SEWARD

JOB NO. 98-1617-4

PROJECT VTT 52584

LOGGED BY VCG

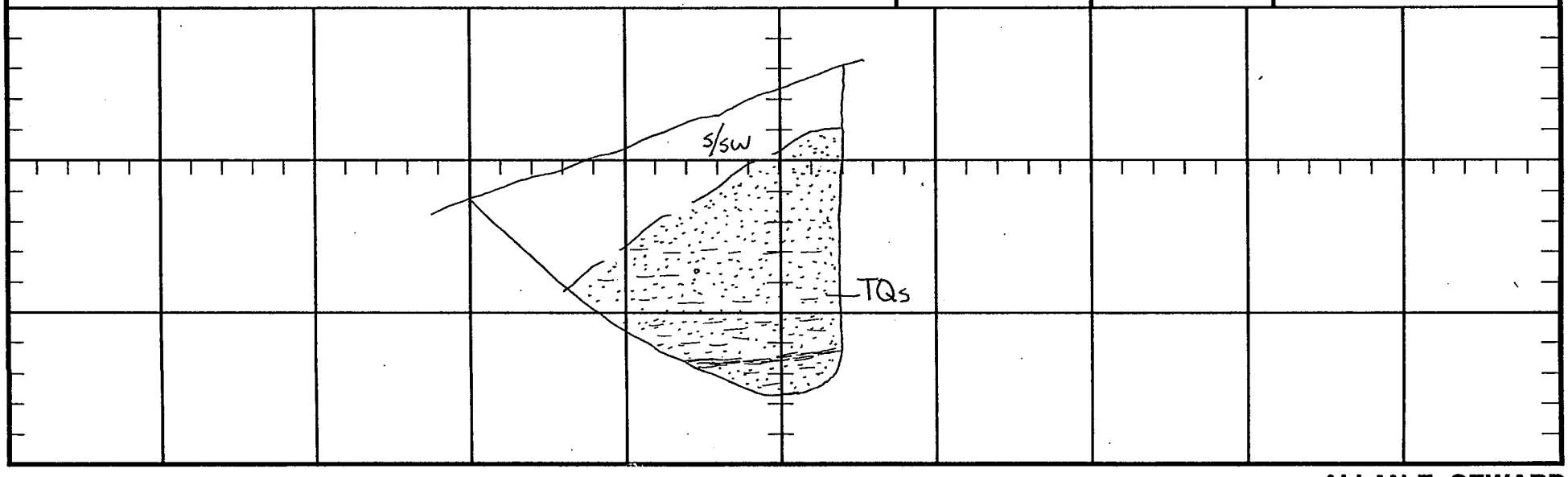
Trench Log No. T-139

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 4' SOIL/SLOPEWASH; s/sw, Medium to light brown fine- to coarse-grained silty pebbly sand; soft; dry			
4 - 11' BEDROCK; TQs, Tan fine- to medium-grained sandstone and reddish-brown fine- to medium-grained sandy siltstone/silty sandstone with a silty clay/clayey silt interbed; moderately hard; damp; minor caliche pods within the clayey siltstone; upper portions of Redbed in contact with sandstone is blocky	N22W,10SW on silty clayey surface N31W,12SW N20W,18SW		No striations on clayey silt seam
			No Ground Water No Caving TOTAL DEPTH 11 Ft.

SCALE 1" = 5'

N 39 W



ALLAN E. SEWARD

JOB NO. 98-1617-4

LOGGED BY VCG

Trench Log No. T-140

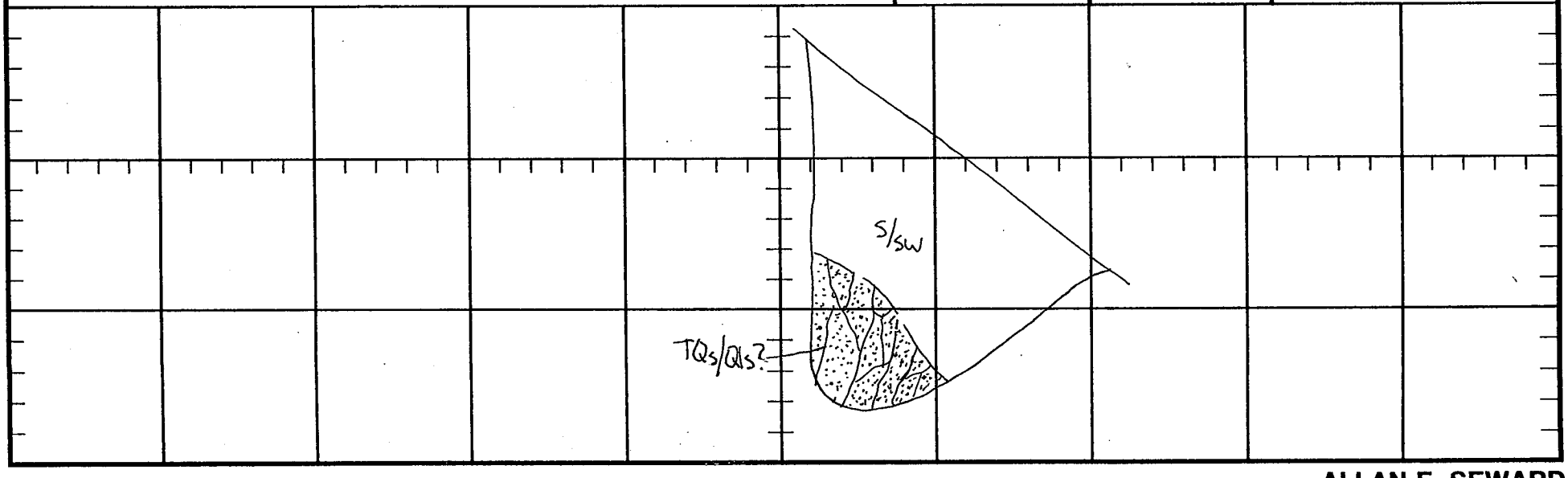
PROJECT VTT 52584

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 8.5' SOIL/SLOPEWASH; s/sw, Light to medium brown fine- to coarse-grained silty pebbly sand with abundant roots; soft; dry 8.5 - 12' BEDROCK/QUATERNARY LANDSLIDE; TQs/Qls?, Tan to gray fine- to coarse-grained sandstone with pebbles; friable; soft to moderately hard; dry; fractured	Approx. N38E,26NW N35E,27NW	Frac. N10E,50W	Faulted and fractured sandstone with no gouge (could be Qls) No Ground Water No Caving TOTAL DEPTH 12 Ft.

SCALE 1" = 5'

N 42 W



ALLAN E. SEWARD

JOB NO. 98-1617-4

LOGGED BY VCG

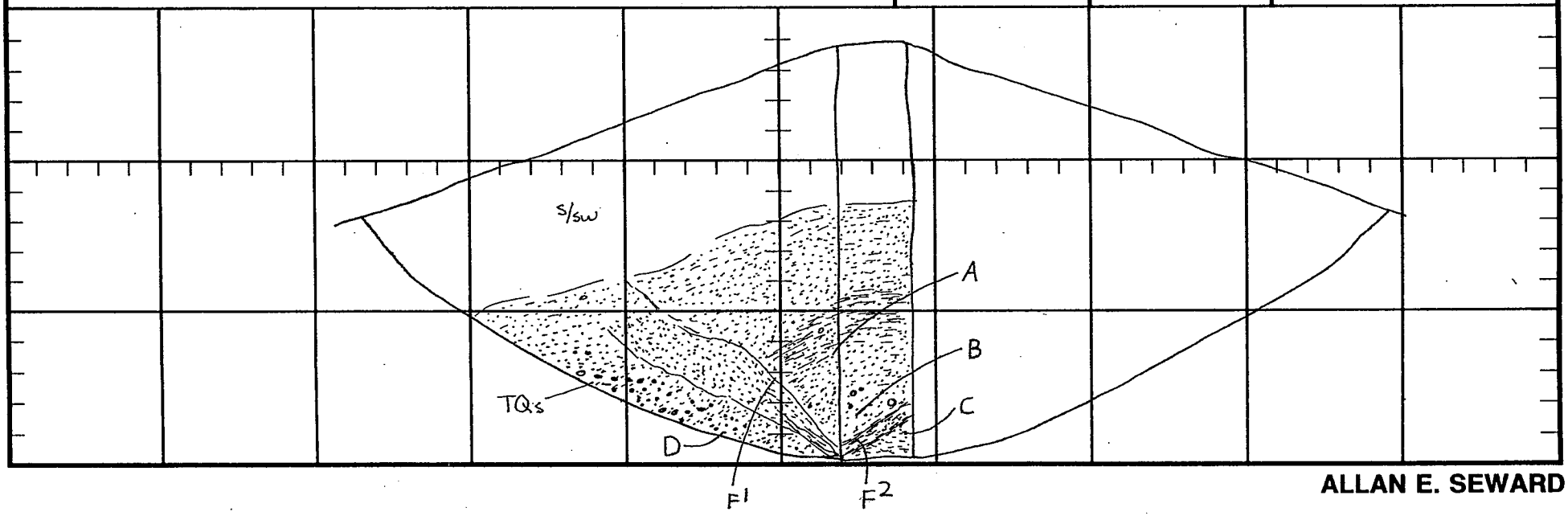
Trench Log No. T-141

PROJECT VTT 52584

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 5.5' SOIL/SLOPEWASH; s/sw, Medium brown fine- to coarse-grained silty pebbly sand with abundant roots; soft; dry to damp at base of unit			
5.5' - 14' BEDROCK; TQs, a)gray to white fine- to coarse-grained pebbly sandstone; b)reddish-brown fine- to medium-grained silty sandstone and sandy siltstone, tan fine- to coarse-grained sandstone and pebbly conglomerate and medium brown fine- to coarse-grained silty pebbly sandstone; soft to moderately hard; damp	A: N8W,21NE B: N13E,20NW C: N15W,19NE D: N88W,13NE	F^1:N27W,38SW F^2:N12W,48SW	
Fault: No distinct parting/planar surface (just a zone 7" to 28' thick) pulverized;sense of movement undetermined			
Gouge: Reddish-brown to grayish-green to light brown fine- to coarse-grained silty pebbly sand; chaotic mixture above			No Ground Water No Caving
N 60 W			TOTAL DEPTH 14 Ft.

SCALE 1" = 5'



ALLAN E. SEWARD

JOB NO. 98-1617-4

PROJECT VTT 52584

LOGGED BY VCG

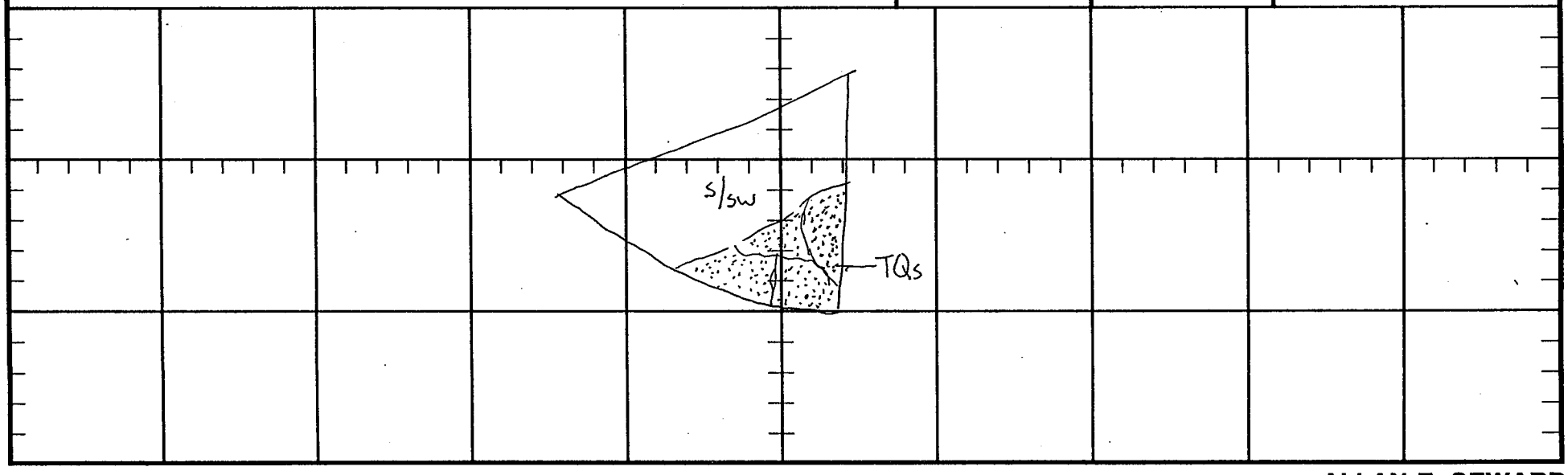
Trench Log No. T-142

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 4' SOIL/SLOPEWASH; s/sw, Medium to light brown fine- to coarse-grained silty pebbly sand; soft; dry			
4 - 8' BEDROCK; TQs, Tan to gray fine- to coarse-grained pebbly sandstone and sandstone; friable; dry; moderately hard; minor factures	N5E,8SE N20W,10NE N18W,7NE		No Ground Water No Caving TOTAL DEPTH 8 Ft.

SCALE 1" = 5'

N 70 W



ALLAN E. SEWARD

JOB NO. 98-1617-4

LOGGED BY VCG

Trench Log No. T-143

PROJECT VTT 52584

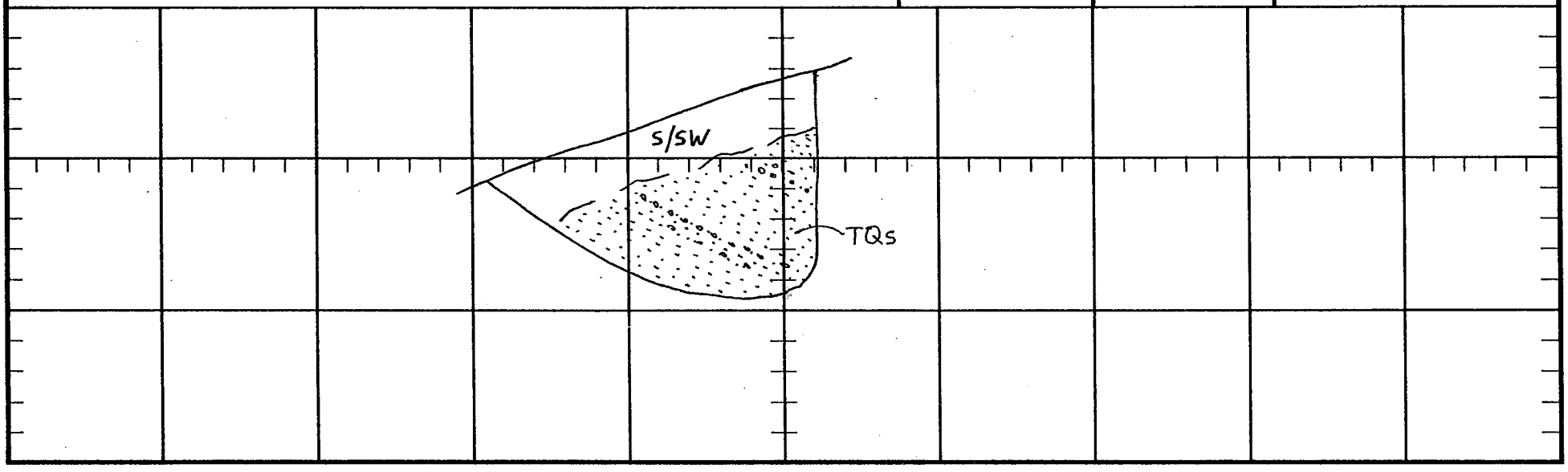
DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 2' SOIL/SLOPEWASH; s/sw, Medium- to light brown fine- to coarse-grained silty pebbly sand with scattered pebbles; loose; dry	N66E,26NW		T-143 through T-154 excavated 8/3/98 using a track mounted backhoe with a 24-inch bucket
2 - 8' BEDROCK; TQs, Tan to light gray bedded medium- to coarse-grained pebbly sandstone and pebble cobble conglomerate; hard; dry	N75E,26NW		No Caving No Ground Water

SCALE 1" = 5'

N 36 W

TOTAL DEPTH 8 Ft.



ALLAN E. SEWARD

JOB NO. 98-1617-4

LOGGED BY VCG

Trench Log No. T-144

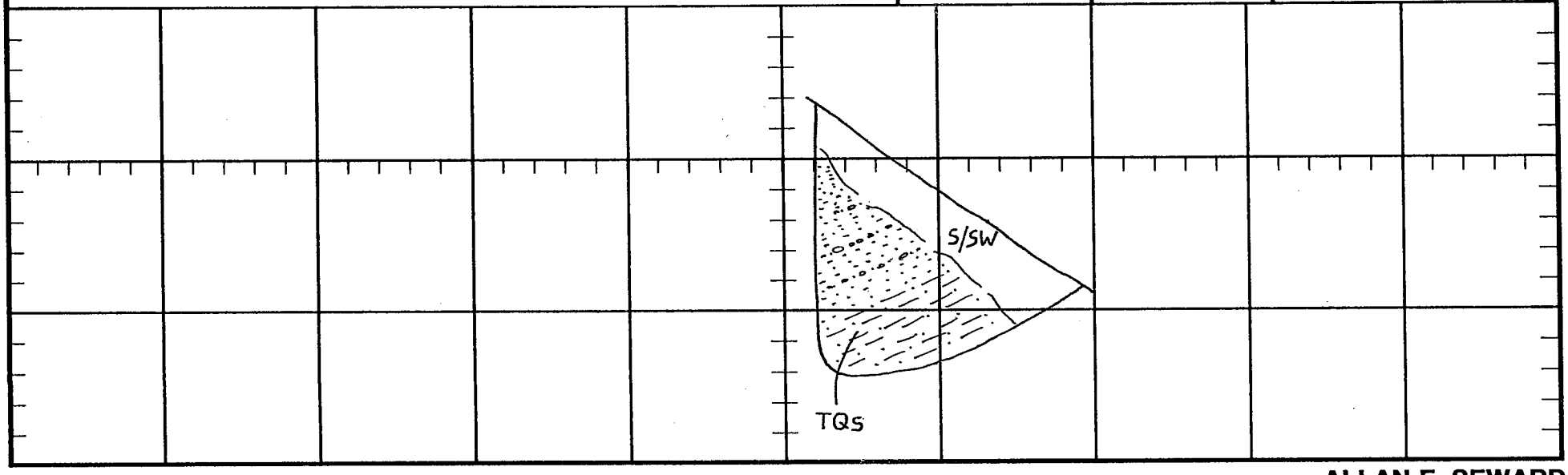
PROJECT VTT 52584

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 2.5' SOIL/SLOPEWASH; s/sw, Light brown fine- to coarse-grained pebbly sand; loose; dry			
2.5 - 9' BEDROCK; TQs, Light brown to tan fine- to coarse-grained sandstone and pebbly sandstone and reddish-brown to brown fine- to medium-grained silty sandstone/sandy silstone with isolated pebbles; hard; dry to damp	B:N71E,26NW		No Caving No Ground Water TOTAL DEPTH 9 Ft.

SCALE 1" = 5'

N 55 E



ALLAN E. SEWARD

JOB NO. 98-1617-4

LOGGED BY VCG

Trench Log No. T-145

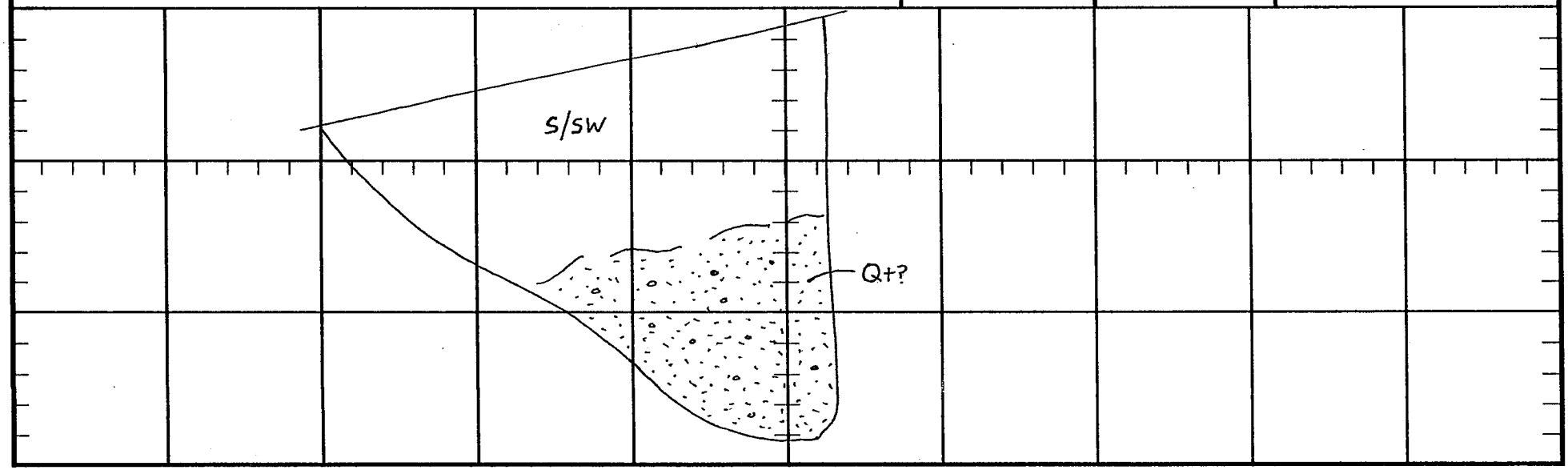
PROJECT VTT 52584

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 7' SOIL/SLOPEWASH; s/sw, Medium brown fine- to coarse-grained pebbly sand; loose; dry			
7 - 14' QUATERNARY TERRACE; Qt?, Medium reddish-brown fine- to coarse-grained pebbly sandstone with scattered pebbles; loose to hard; dry to damp	None		Qt is non-bedded Possibly Qls
			No Caving No Ground Water
			TOTAL DEPTH 14 Ft.

SCALE 1" = 5'

N 33 E



ALLAN E. SEWARD

JOB NO. 98-1617-4

LOGGED BY VCG

Trench Log No. T-146

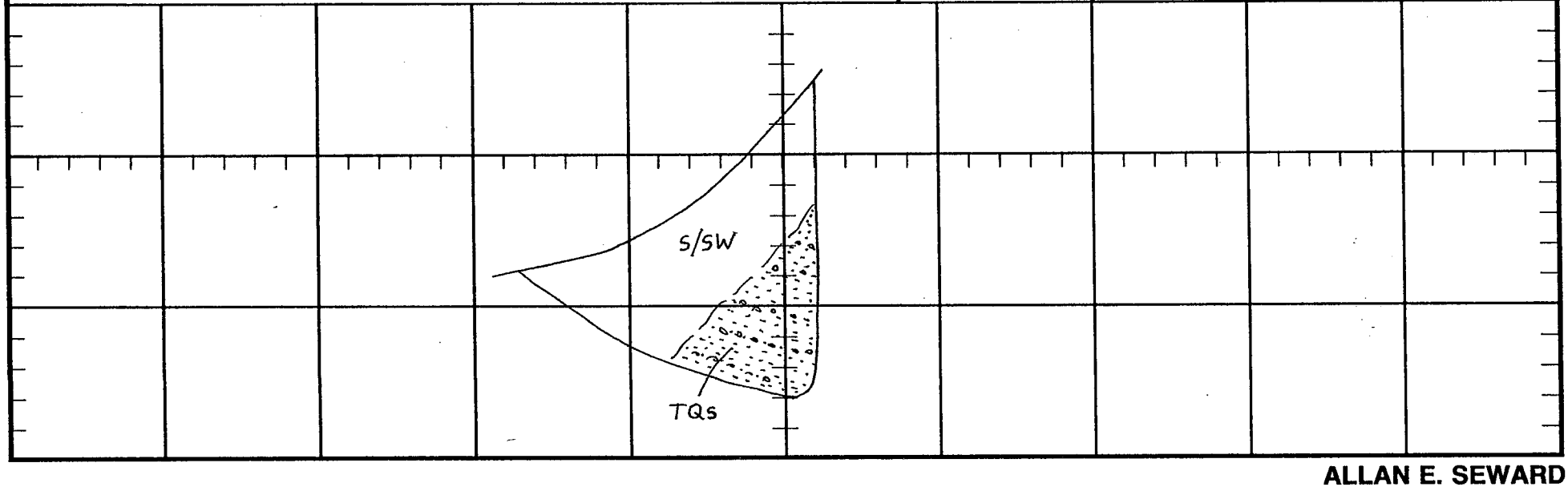
PROJECT VTT 52584

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 4.5' SOIL/SLOPEWASH; s/sw, Medium- to light-brown fine- to coarse-grained silty pebbly sand; loose; dry; scattered cobbles			
4.5' - 10' BEDROCK; TQs, Light reddish-brown to tan medium- to coarse-grained pebbly sandstone and pebble conglomerate; hard; friable; dry	N67E, 24NW		No Caving No Ground Water TOTAL DEPTH 10 Ft.

N 14 E

SCALE 1" = 5'



ALLAN E. SEWARD

JOB NO. 98-1617-4

LOGGED BY VCG

Trench Log No. T-147

PROJECT VTT 52584

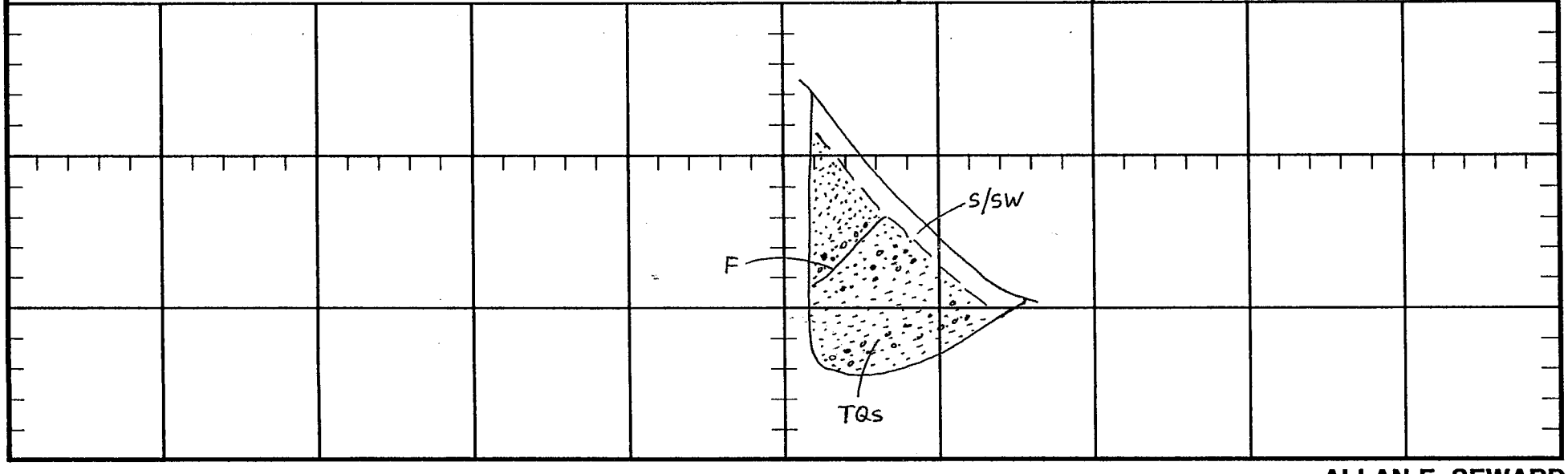
DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 1' SOIL/SLOPEWASH; s/sw, Light brown fine- to coarse-grained silty pebbly sand; loose; dry			
1 - 9' BEDROCK; TQs, Light brown to tan medium- to coarse-grained pebbly sandstone and pebble conglomerate and fine- to coarse-grained sandstone; friable; dry; hard	N36E,27NW	F:N57W,38NE	
Gouge; fine- to medium-grained silty sand			No Caving No Ground Water

SCALE 1" = 5'

N 5 E

TOTAL DEPTH 9 Ft.



ALLAN E. SEWARD

JOB NO. 98-1617-4

LOGGED BY VCG

Trench Log No. T-148

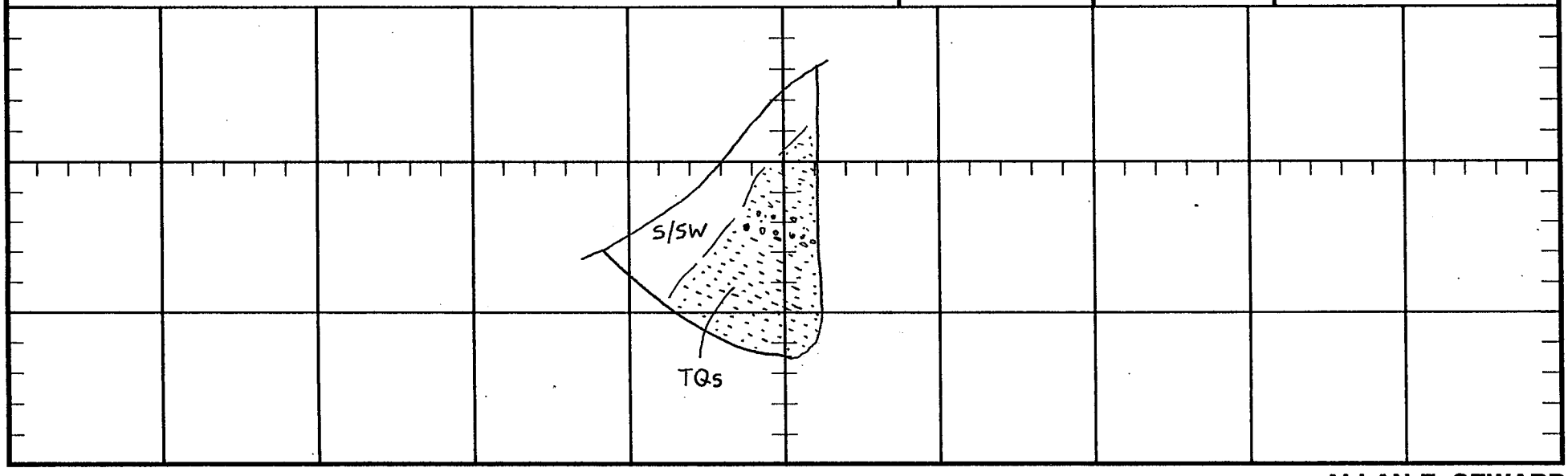
PROJECT VTT 52584

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 2.5' SOIL/SLOPEWASH; s/sw, Medium- to light brown fine- to coarse-grained silty pebbly sand; loose; dry			
2.5 - 9.5' BEDROCK; TQs, Tan to light brown fine- to coarse-grained pebbly sandstone and sandstone; friable; hard; dry to damp	N76E,30NW		No Caving No Ground Water TOTAL DEPTH 9.5 Ft.

SCALE 1" = 5'

N 7 W



ALLAN E. SEWARD

JOB NO. 98-1617-4

PROJECT VTT 52584

LOGGED BY VCG

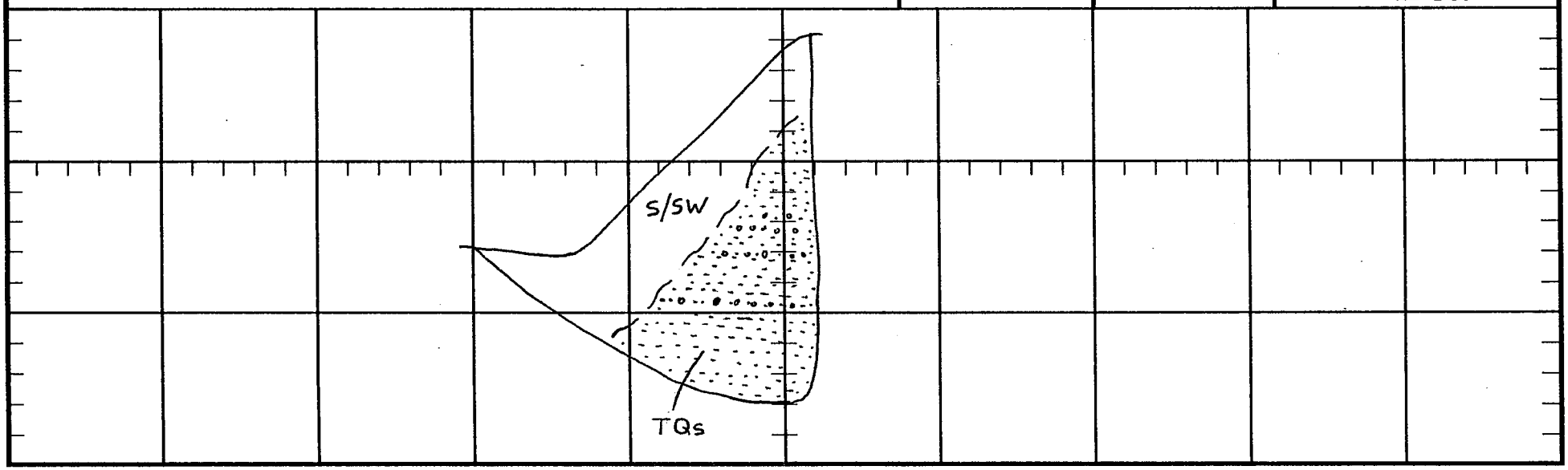
Trench Log No. T-149

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 4.5' SOIL/SLOPEWASH; s/sw, Medium brown fine- to coarse-grained silty pebbly sand; loose; dry			
4.5 - 12' BEDROCK/QUATERNARY TERRACE; Qt, Medium to light reddish-brown medium- to coarse-grained pebbly sandstone; loose to dense; damp	Faint but appears to be subhorizontal		No Caving No Ground Water TOTAL DEPTH 12 Ft.

SCALE 1" = 5'

N 53 W



ALLAN E. SEWARD

JOB NO. 98-1617-4

LOGGED BY VCG

Trench Log No. T-150

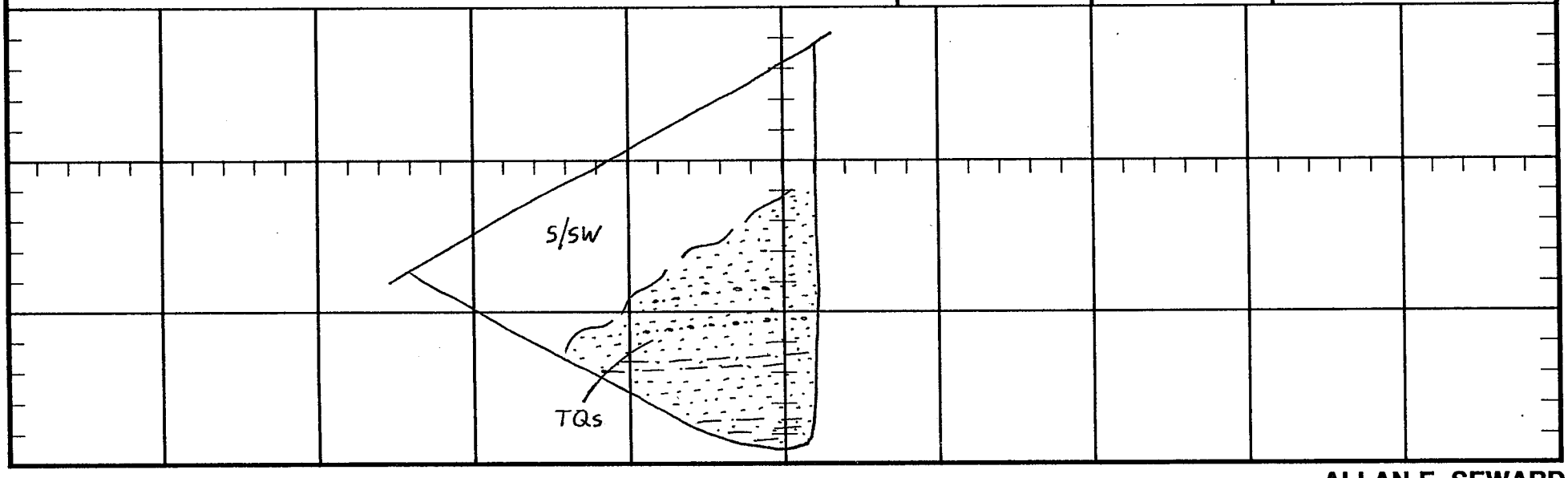
PROJECT VTT 52584

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 5' SOIL/SLOPEWASH; s/sw, Medium to light brown fine- to coarse-grained silty pebbly sand; loose; dry			
5 - 13.5' BEDROCK; TQs, Reddish-brown fine- to medium-grained silty sandstone with isolated pebbles and tan to grayish-brown fine- to coarse-grained pebbly sandstone and sandstone; hard; dry to damp	N87E,11NW N69W,9NE		No Caving No Ground Water TOTAL DEPTH 13.5 Ft.

SCALE 1" = 5'

N 60 E



ALLAN E. SEWARD

JOB NO. 98-1617-4

LOGGED BY VCG

Trench Log No. T-151

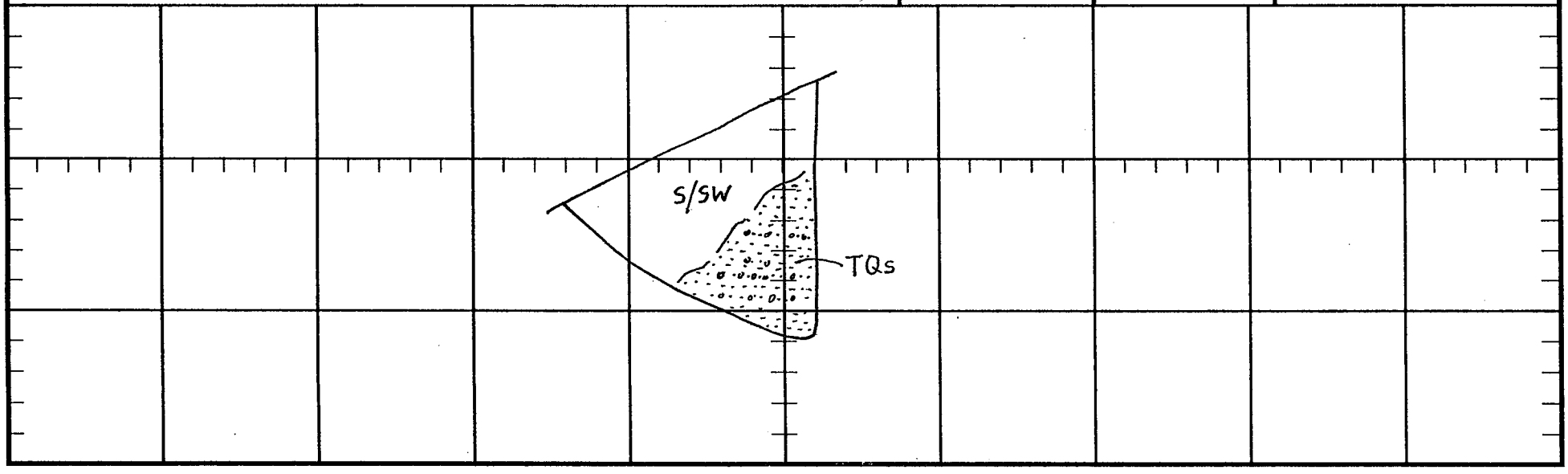
PROJECT VTT 52584

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 4' SOIL/SLOPEWASH; s/sw, Medium-brown fine- to coarse-grained silty pebbly cobbly; sand with isolated roots; loose; dry 4 - 8' BEDROCK; TQs, Tan to light grayish-brown fine- to coarse-grained pebbly sandstone; sandstone and cobble conglomerate; hard; dry to damp	Approx. N2E,6SE		No Caving No Ground Water TOTAL DEPTH 8 Ft.

SCALE 1" = 5'

N 42 W



ALLAN E. SEWARD

JOB NO. 98-1617-4

LOGGED BY VCG

Trench Log No. T-152

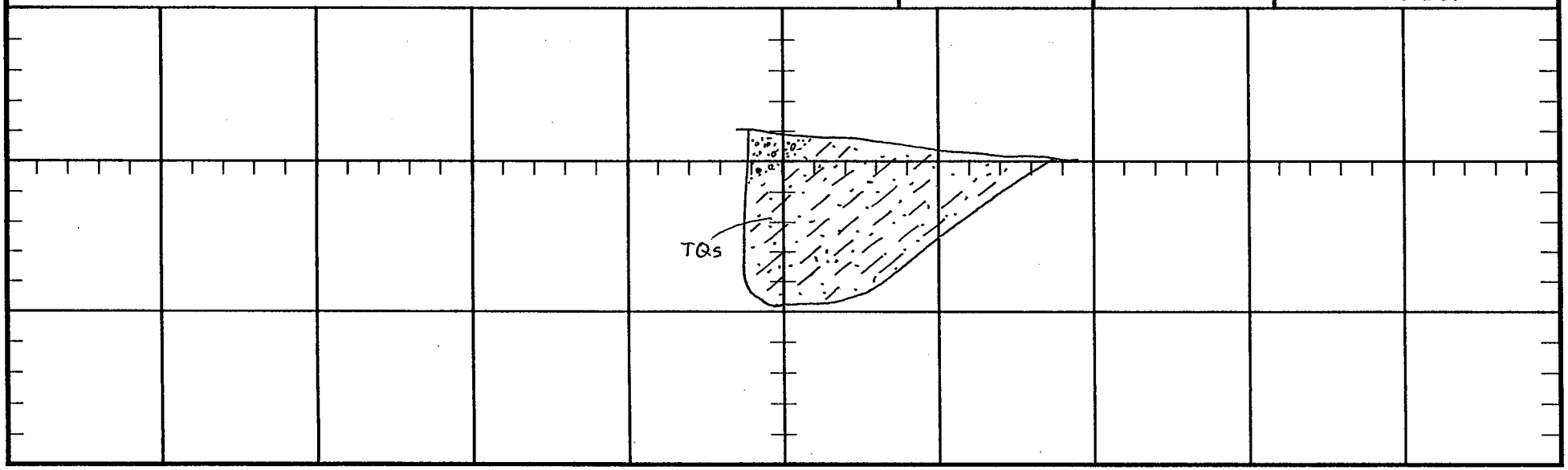
PROJECT VTT 52584

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 6' BEDROCK; TQs, Reddish-brown fine- to medium-grained silty sandstone and sandy siltstone and tan coarse-grained pebble conglomerate; hard; dry to damp	N78E,33NW		No Caving No Ground Water TOTAL DEPTH 6 Ft.

SCALE 1" = 5'

N 10 E



ALLAN E. SEWARD

JOB NO. 98-1617-4

LOGGED BY VCG

Trench Log No. T-153

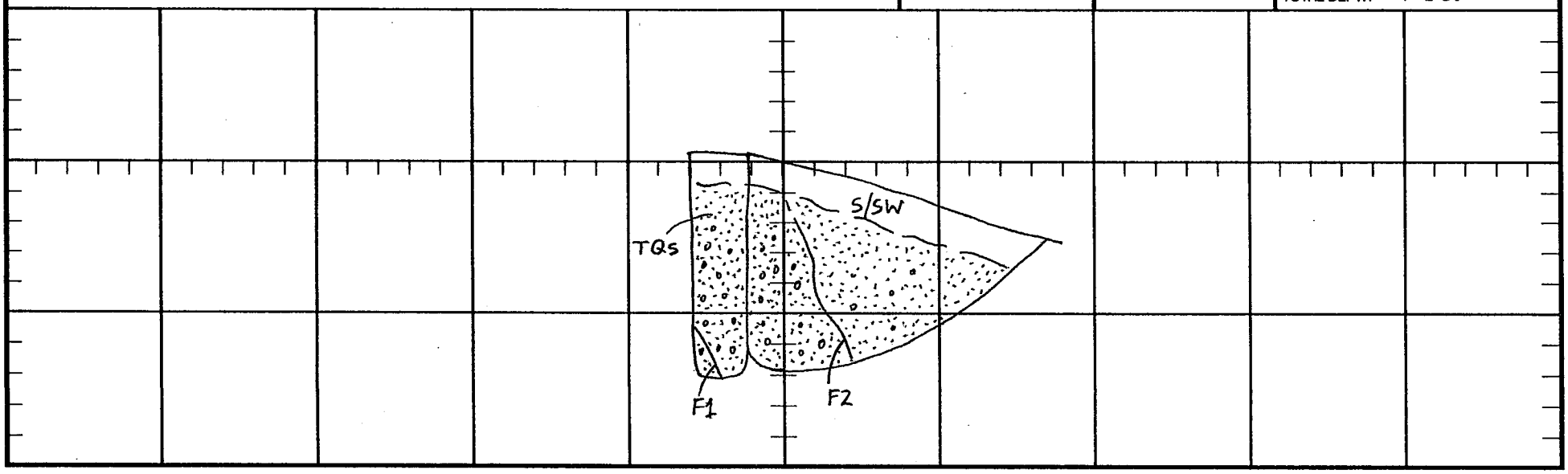
PROJECT VTT 52584

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 1' SOIL/SLOPEWASH; s/sw, Medium- to light brown fine- to coarse-grained sand with scattered pebbles loose; dry 1 - 7' BEDROCK; TQs, Tan to grayish-brown to rusty brown coarse-grained pebbly sandstone and pebble conglomerate; hard; sheared with caliche on surface	Vague	F^1:N80E,85SE F^2:N80E,72SE	Faulted and sheared conglomerate and sandstone Sandstone and conglomerate has pulverized appearance but very hard No gouge present on faults Bedding possibly parallel to faulting No Caving No Ground Water TOTAL DEPTH 7 Ft.

SCALE 1" = 5'

N 33 E



ALLAN E. SEWARD

JOB NO. 98-1617-4

LOGGED BY VCG

Trench Log No. T-154

PROJECT VTT 52584

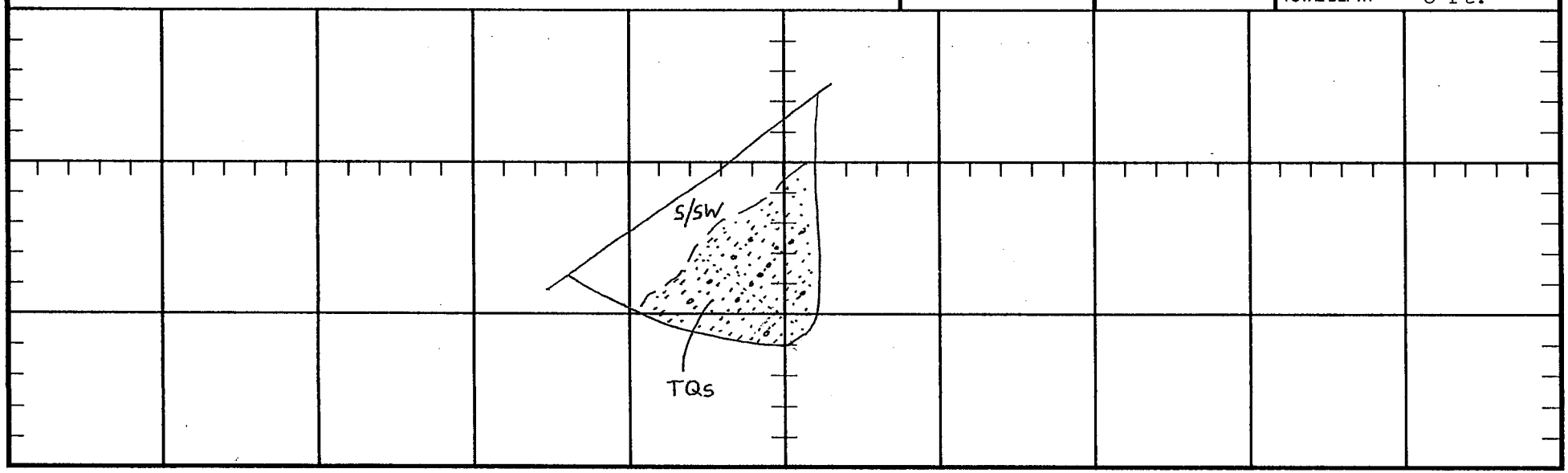
DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 2.5' SOIL/SLOPEWASH; s/sw, Medium brown to tan fine- to coarse-grained silty pebbly sand; loose; dry; abundant roots			
2.5 - 8' BEDROCK; TQs, Tan to grayish-white fine- to coarse-grained pebbly sandstone and sandstone; hard; dry to slightly damp; roots to 4.5 ft.	N88E,65NW		No Caving No Ground Water

SCALE 1" = 5'

N 50 W

TOTAL DEPTH 8 Ft.



ALLAN E. SEWARD

JOB NO. 98-1617-4

LOGGED BY VCG

Trench Log No. T-156

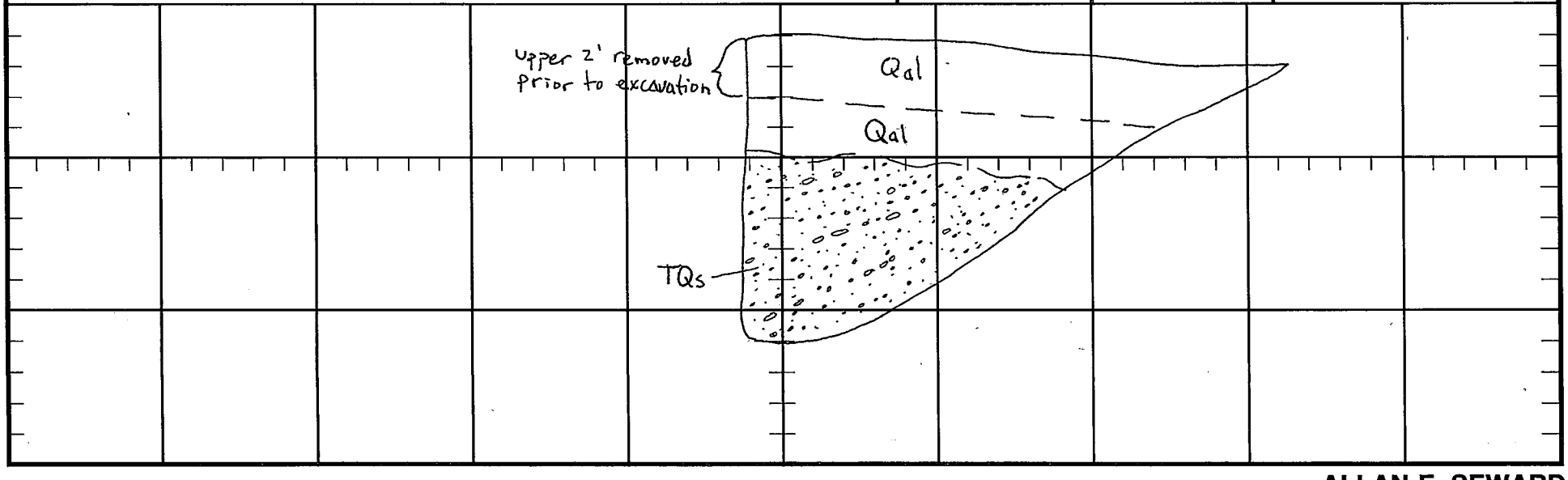
PROJECT VTT 52584

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 4' ALLUVIUM; Qal, Light grayish-brown fine- to coarse-grained pebbly sand with isolated cobbles; loose; dry			T-156 thru T-160 Excavated 10/15/98 using a trackhoe with a 24" wide bucket
4 - 10' BEDROCK; TQs, Tan to light rusty brown fine- to coarse-grained sandstone and pebbly sandstone; bedded; moderately dense; dry	B:N75E,22NW	@ 5' M/C(%)= 3.7 Dry density (Pcf)=120	Drive sample at 5 ft. BC 75 BC 155 (Blow Count for 6") Note: Upper 2 ft. removed prior to excavating trench. Sample elevation measured from original surface elevations No Ground Water No Caving TOTAL DEPTH 10 Ft.

SCALE 1" = 5'

N 4 E



ALLAN E. SEWARD

JOB NO. 98-1617-4

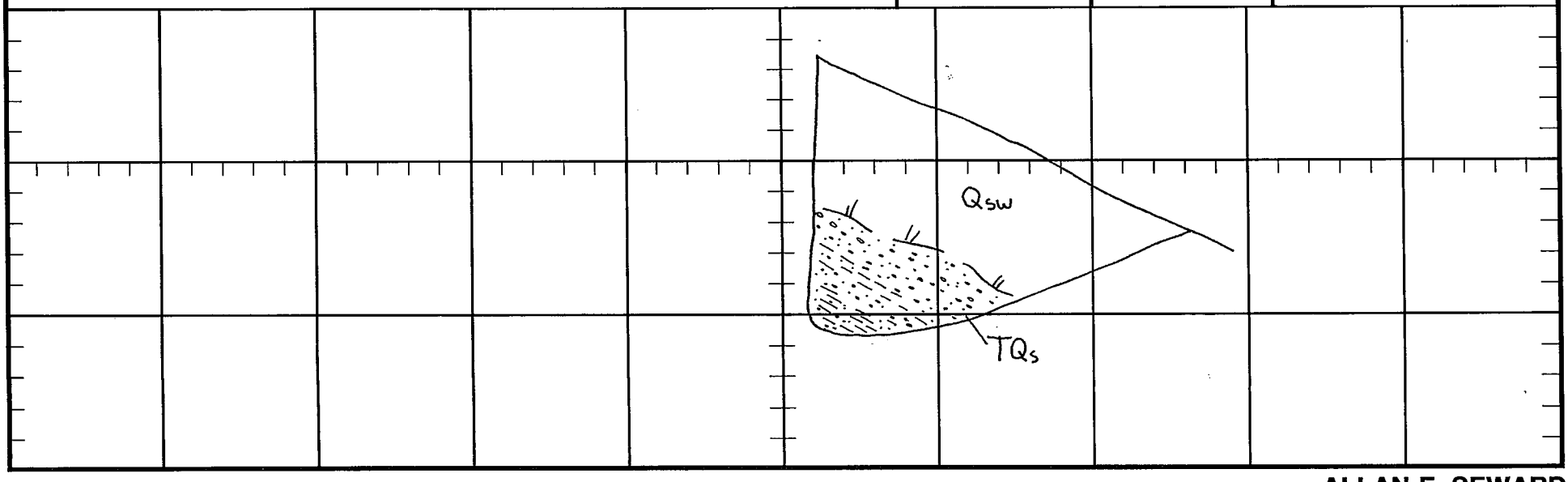
LOGGED BY VCG

Trench Log No. T-157

PROJECT VTT 52584

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 5' SLOPEWASH; Qsw, Medium brown fine- to coarse-grained pebbly sand; loose; damp		@ 2' M/C=5.2	Hand drive sample @ 3.5' and 5.5'
5 - 9.5' BEDROCK; TQs, Gray medium- to coarse-grained pebbly sandstone; and reddish-brown fine- to medium-grained silty sandstone and sandstone; moderately dense; dry to damp	N87E,26NW	@ 5' M/C(%)= 5.9 Dry density (Pcf)=106	Bag Sample @ 2'
			No Ground Water No Caving
SCALE 1" = 5' N 28 W			TOTAL DEPTH 9.5 Ft.



ALLAN E. SEWARD

JOB NO. 98-1617-4

LOGGED BY VCG

Trench Log No. T-158

PROJECT VTT 52584

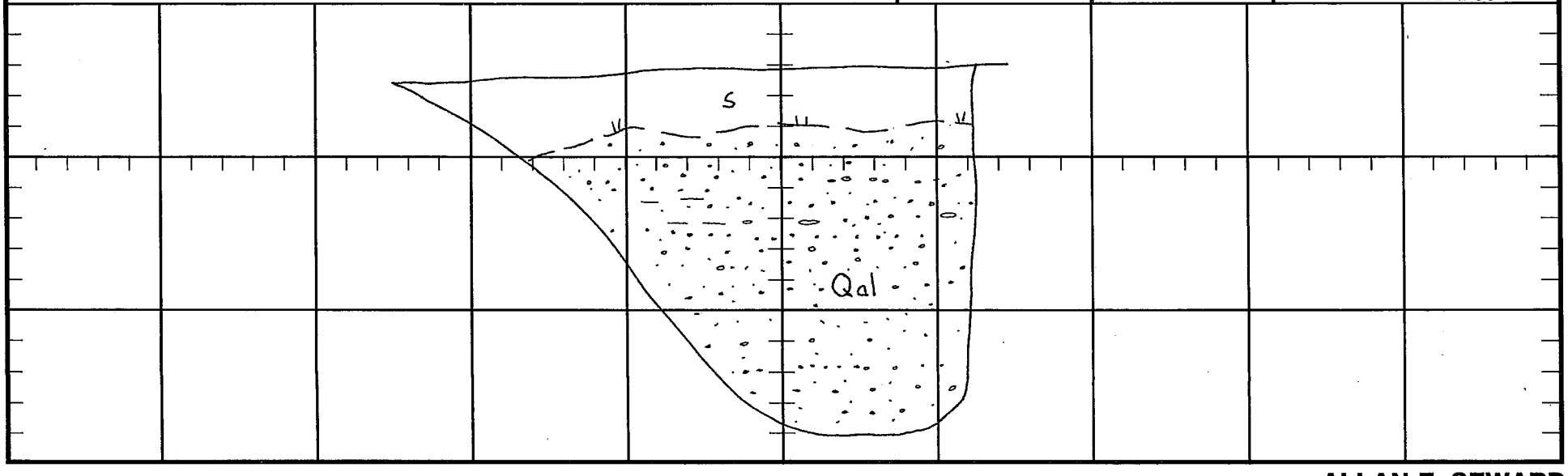
DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 2' SOIL; s, Gray to gray brown, fine- to coarse-grained pebbly sand; loose; root; dry to damp 2 - 12' ALLUVIUM; Qal, Medium to reddish-brown medium- to coarse-grained pebbly sand with isolated cobbles; loose to moderately hard; damp; roots to 5 ft.	Horizontal	@ 9' M/C(%)= 4.7 Dry density (Pcf)=111 @ 12' M/C(%)= 4.8 Dry density (Pcf)=112	Sample @ 4' 50/76 Sample @ 9' 37/29 Sample @ 12' 26/32 (Blow Count for 6") R= approx. 8 ft. Trench sides laid to 1:1 angle No Ground Water No Caving

SCALE 1" = 5'

N 21 W

TOTAL DEPTH 12 Ft.



ALLAN E. SEWARD

JOB NO. 98-1617-4

LOGGED BY VCG

Trench Log No. T-159

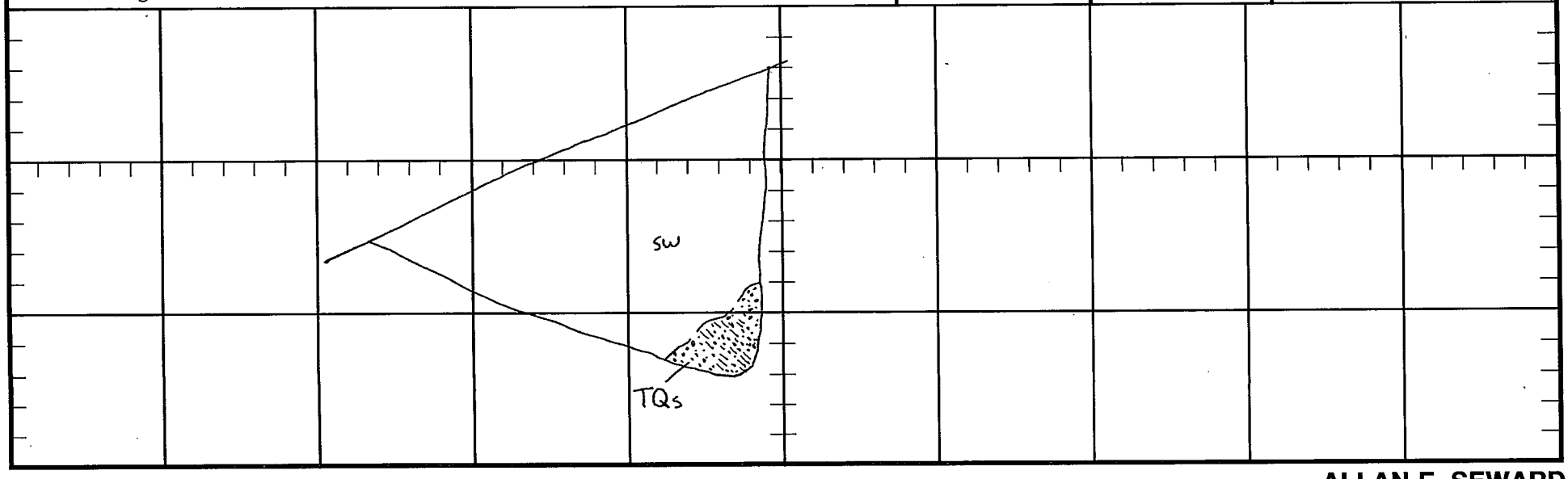
PROJECT VTT 52584

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 7' SLOPEWASH; sw, Moderate to reddish-brown fine- to coarse-grained silty pebbly sand with isolated pebbles; dry to damp; loose	Approx. N28W,10NE		Some portions of the sandy siltstone indicate some movement
7 - 10' LANDSLIDE; Qls, Dark greenish-gray to light yellowish-green sandy siltstone and fine- to medium-grained sandstone; damp; moderately hard to soft	N89E,34NW		
			No Ground Water No Caving TOTAL DEPTH 10 Ft.

SCALE 1" = 5'

N 73 W



ALLAN E. SEWARD

JOB NO. 98-1617-4

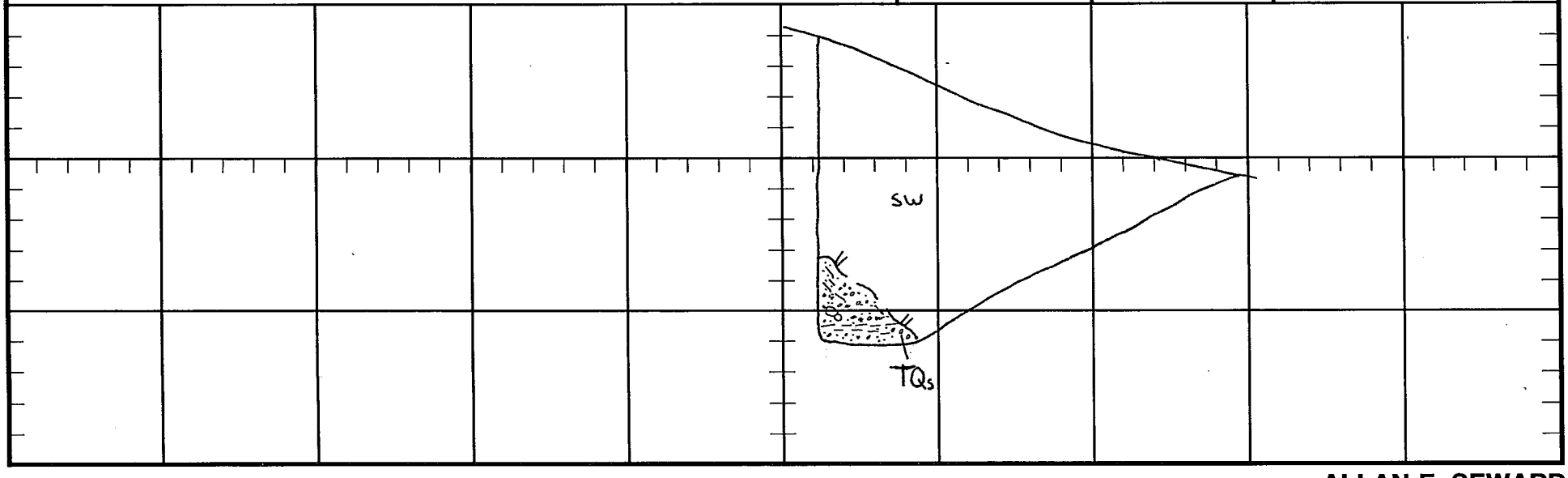
LOGGED BY VCG

Trench Log No. T-160

PROJECT VTT 52584

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 7' SOIL/SLOPEWASH; s/sw, Medium brown fine- to coarse-grained pebbly sand, soft; damp			
7 - 10' LANDSLIDE; Qls, Grayish-brown clayey siltstone/silty claystone; soft; with medium-grained sandstone; looks contorted, possible Qls			Claystone/siltstone is non-bedded and looks contorted
			No Ground Water No Caving
SCALE 1" = 5' N 40 W			TOTAL DEPTH 10 Ft.



ALLAN E. SEWARD

JOB NO. 98-1617-4

LOGGED BY VCG

Trench Log No. T-161

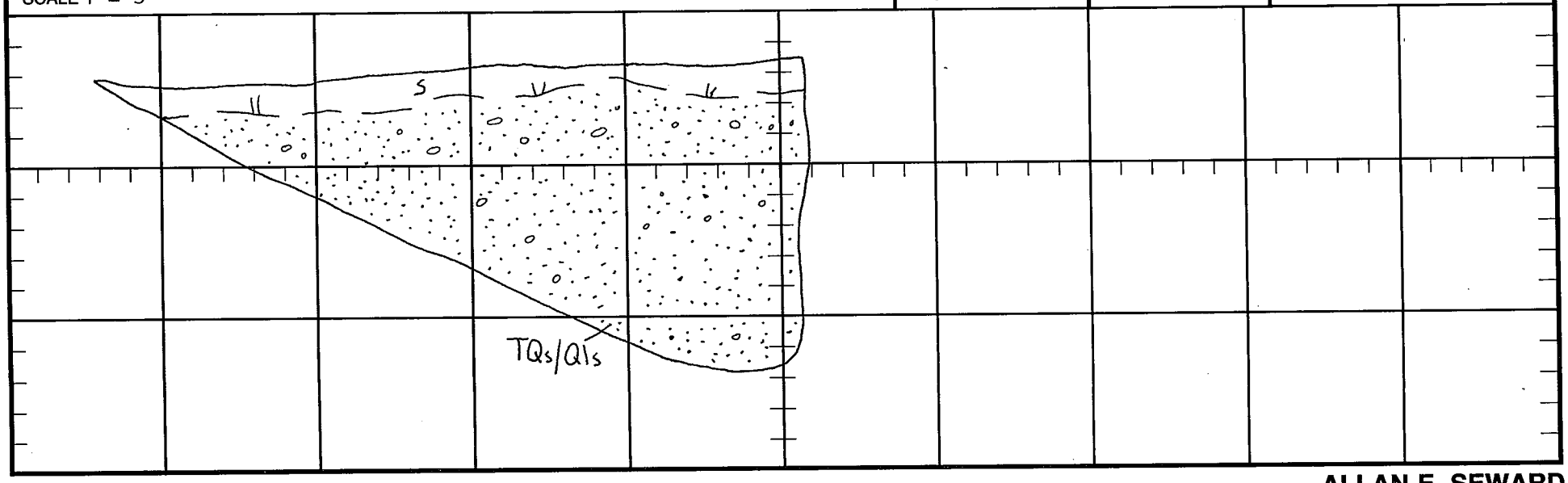
PROJECT VTT 52584

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 1' SOIL; s, Reddish-brown fine- to coarse-grained pebbly sand with abundant roots; loose; dry			T-160 through T-164 excavated using a trackhoe with a 24" wide bucket
1 - 10' LANDSLIDE; Qls, Light reddish-brown to tan medium- to coarse-grained pebbly sandstone and cobble conglomerate; loose to moderately hard; vague bedding; dry	Approx. N62W,10NE Approx. N20E,9SE		Vague bedding relative hardness possibly indicate Qls?
			No Ground Water No Caving
			TOTAL DEPTH 10 Ft.

SCALE 1" = 5'

N 3 W



ALLAN E. SEWARD

JOB NO. 98-1617-4

LOGGED BY VCG

Trench Log No. T-162

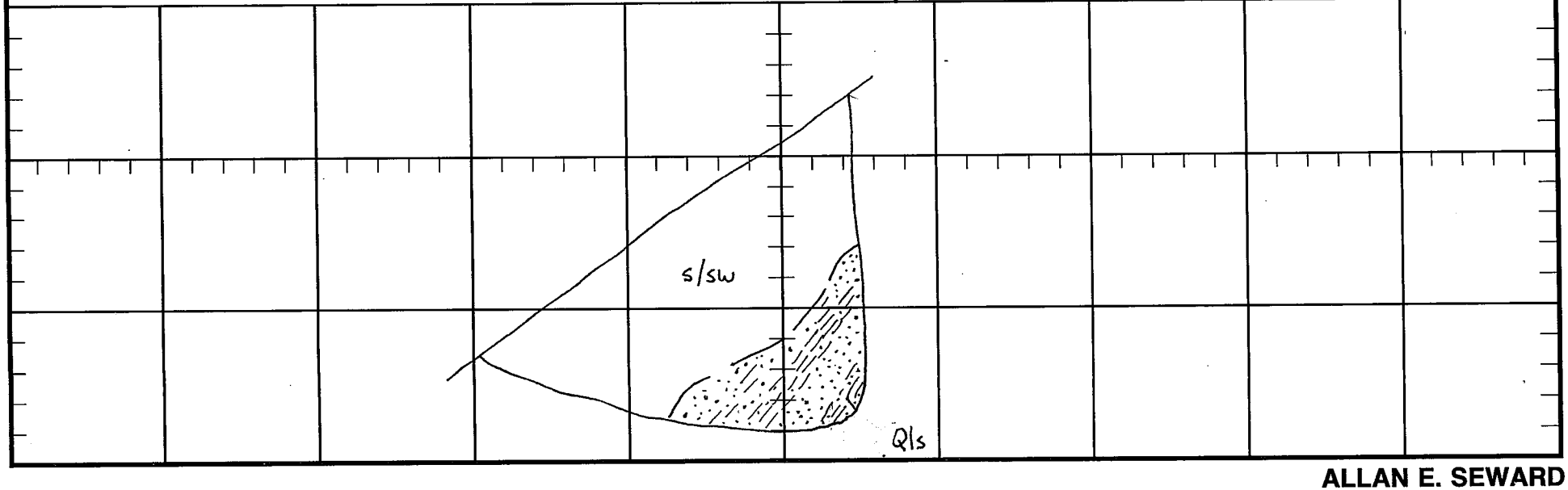
PROJECT VTT 52584

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 6.5' SOIL/SLOPEWASH; s/sw, Light brown fine- to coarse-grained silty sand with scattered pebbles; loose; dry; roots to 4 ft.	N78W,48NE N64W,48NE		Bedding dipping steeper than anticipated; caliche on fracture surfaces
6.5 - 11' LANDSLIDE; Qls, Grayish-green to light brown to tan fine- to medium-grained silty sandstone; damp; loose to moderately dense; minor fractures			No Ground Water No Caving TOTAL DEPTH 11 Ft.

SCALE 1" = 5'

N 42 W



ALLAN E. SEWARD

JOB NO. 98-1617-4

LOGGED BY VCG

Trench Log No. T-163

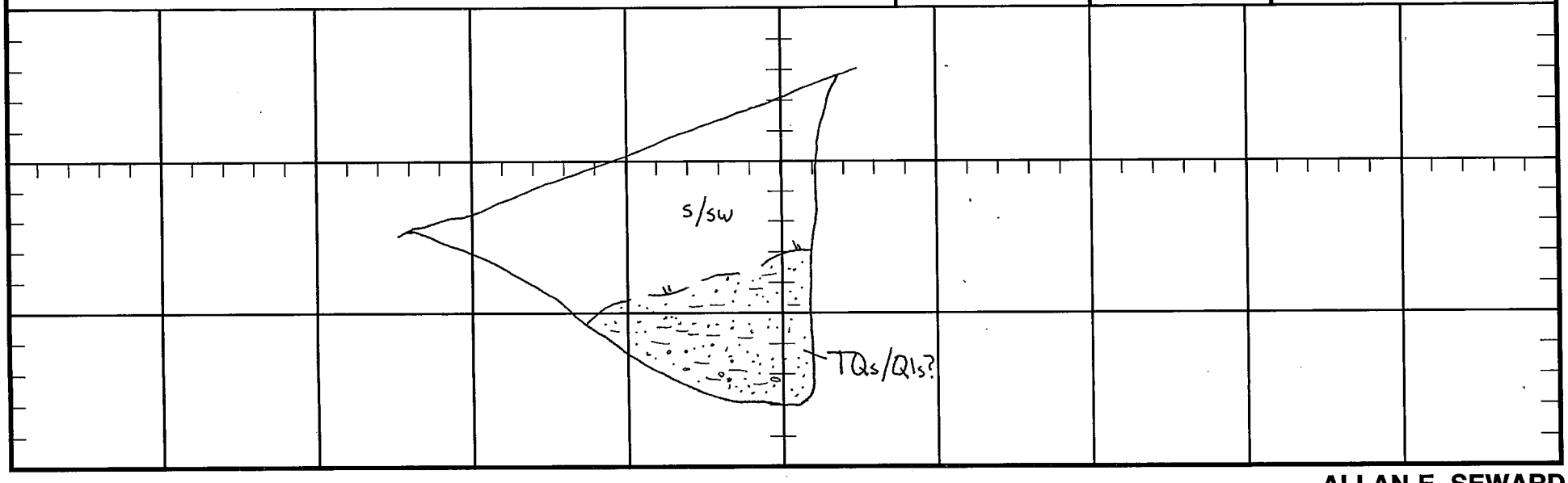
PROJECT VTT 52584

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 5' SOIL/SLOPEWASH; s/sw, Medium- to light reddish-brown fine- to coarse-grained pebbly sand with cobbles at the surface; loose; dry to damp			Discontinuous bedding clasts of fine sandstone within medium- to coarse-grained sandstone; but no faults or fractures
5 - 10' BEDROCK; TQs /Qls?, Gray to light reddish-brown fine-grained pebbly sandstone and fine-grained silty sandstone; loose to moderately hard; pebbly sandstone is friable; no fractures present	Approx. N43E,26NW		
			No Ground Water No Caving TOTAL DEPTH 10 Ft.

N 87 E

SCALE 1" = 5'



ALLAN E. SEWARD

JOB NO. 98-1617-4

LOGGED BY VCG

Trench Log No. T-164

PROJECT VTT 52584

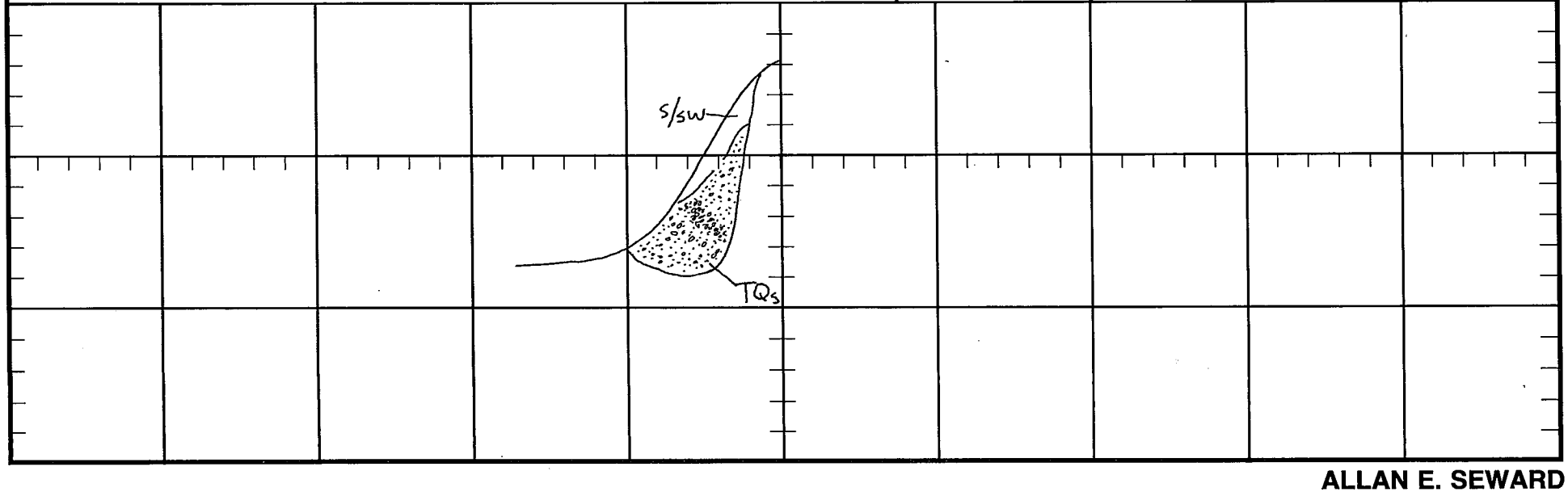
DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 2' SOIL/SLOPEWASH; s/sw, Light reddish-brown fine- to coarse-grained pebbly sand with minor silt; loose; dry			
2 - 8' BEDROCK; TQs, Tan to gray medium- to coarse-grained pebbly sandstone and cobble conglomerate with a lens of fine- to medium-grained bedded sandstone; moderately dense; dry	N72W,64NE N80W,65NE		No Ground Water No Caving

N 88 W

SCALE 1" = 5'

TOTAL DEPTH 8 Ft.



ALLAN E. SEWARD

JOB NO. 98-1617-4

LOGGED BY VCG

Trench Log No. T-165

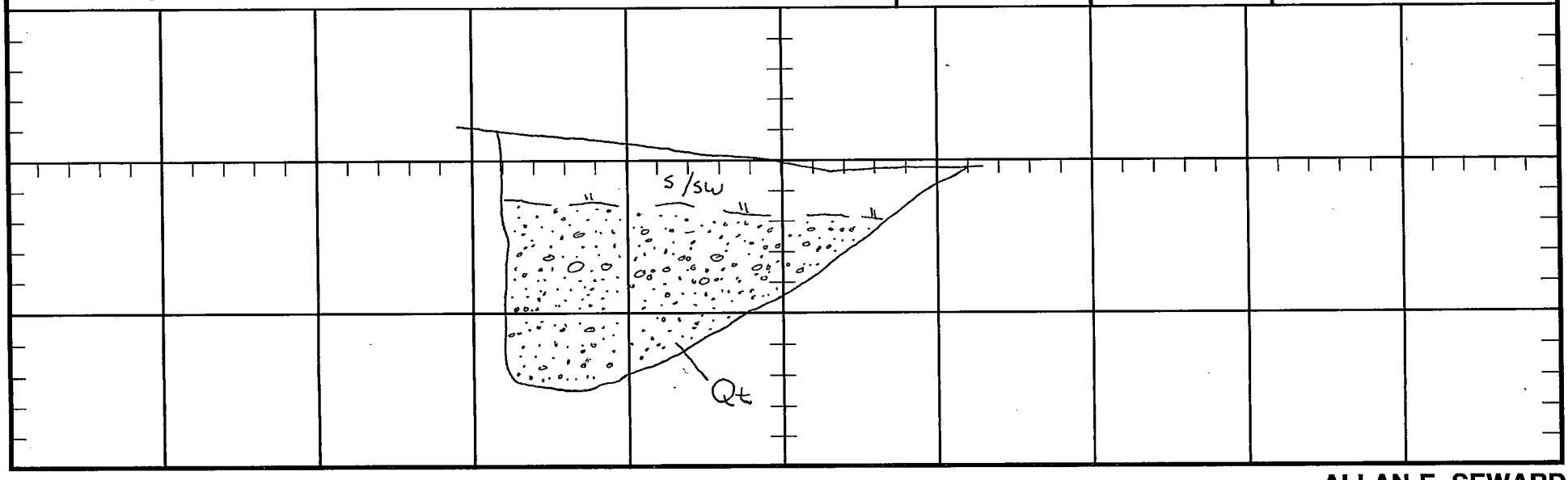
PROJECT VTT 52584

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 2' SOIL/SLOPEWASH; s/sw, Medium- to coarse-grained pebbly sand; loose; dry			
2 - 8' QUATERNARY TERRACE; Qt, Medium- to light reddish-brown medium- to coarse-grained pebbly cobbly sandstone; loose to moderately dense; friable	Crudely bedded Roughly horizontal		R= 7-8'
			No Ground Water No Caving
			TOTAL DEPTH 8 Ft.

N 81 E

SCALE 1" = 5'



ALLAN E. SEWARD

JOB NO. 98-1617-9

PROJECT V.T.T. 52584

LOGGED BY VCG

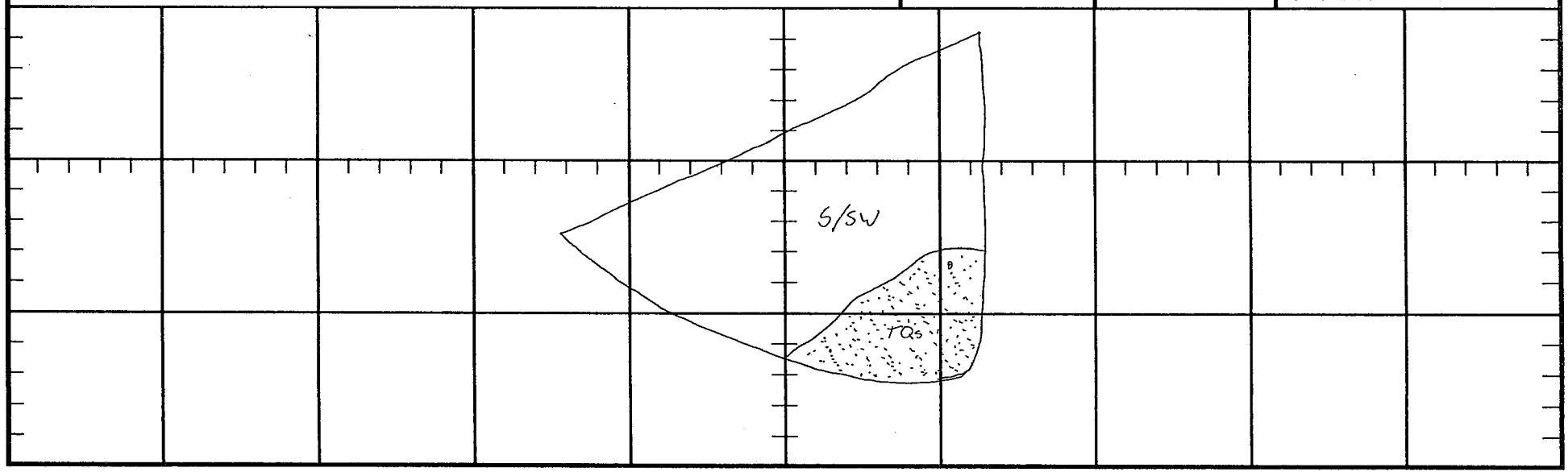
Trench Log No. T-166

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 7' SOIL/SLOPEWASH; s/sw, Light reddish-brown fine-to-coarse-grained silty pebbly sand with scattered pebbles, soft to moderately hard, dry			T-166 through T-176 Excavated 12/14/98 using a track mounted backhoe and a 24" wide bucket
7 - 11' BEDROCK; TQs, Light brown to tan, fine-to-medium grained silty pebbly sandstone and pebble conglomerate, moderately hard, dry	B:N75W,57NE		
			No Ground Water No Caving
			TOTAL DEPTH 11 Ft.

N37WUH

SCALE 1" = 5'



ALLAN E. SEWARD

JOB NO. 98-1617-9

LOGGED BY VCG

Trench Log No. T-167

PROJECT V.T.T. 52584

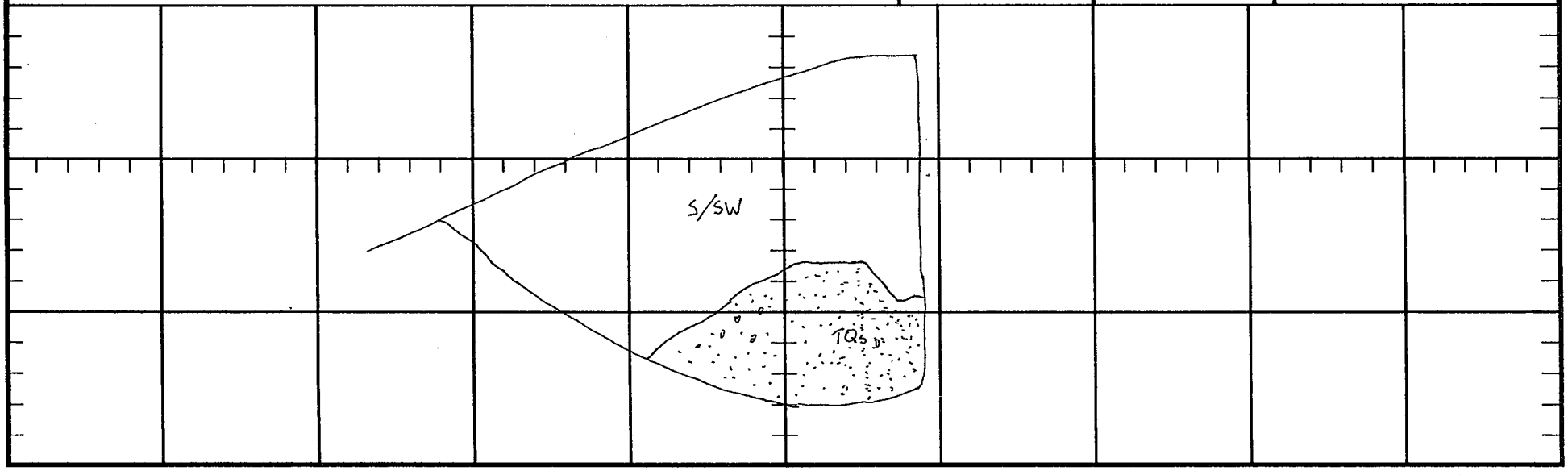
DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 7.5' SOIL/SLOPEWASH; s/sw, Medium to light reddish-brown brown, fine-to coarse-grained silty pebbly sand with isolated cobbles; loose to firm			
7.5 - 11' BEDROCK; TQs, Tan to white medium-to coarse-grained pebbly sandstone; moderately hard; dry; bedding vague	B:N88E,80NW Approx.		
			No Ground Water No Caving

N75EUH

SCALE 1" = 5'

TOTAL DEPTH 11 Ft.



ALLAN E. SEWARD

JOB NO. 98-1617-9

PROJECT V.T.T. 52584

LOGGED BY VCG

Trench Log No. T-168

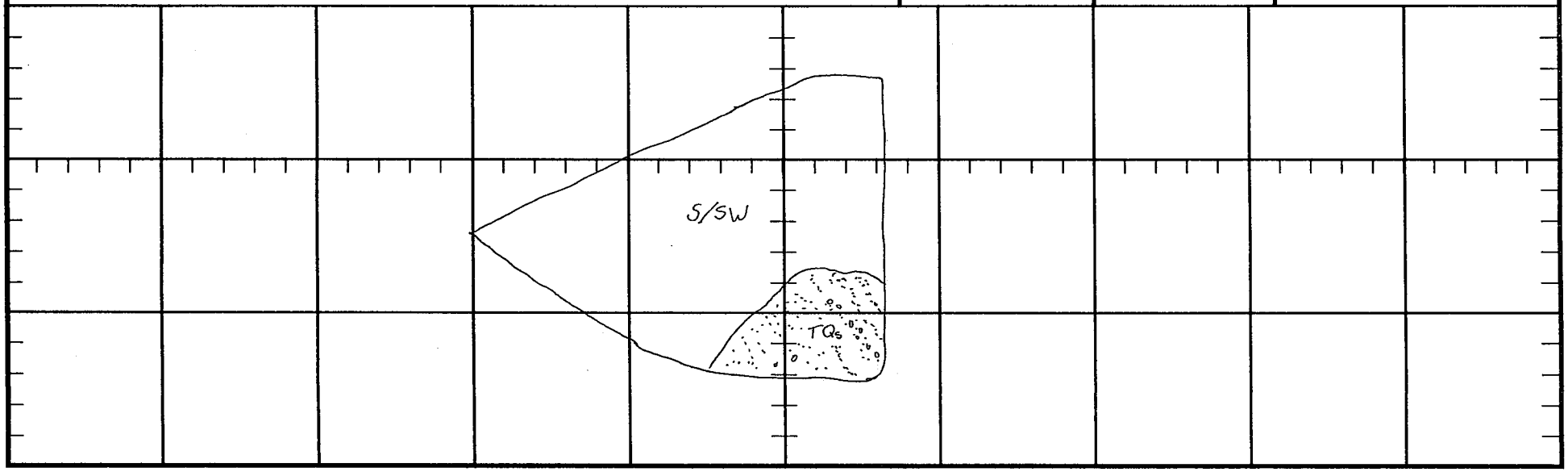
DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 6.5' SOIL/SLOPEWASH; Moderate to medium reddish-brown fine-to coarse-grained silty sand; soft; dry			
6.5 - 10' BEDROCK; TQs, Tan to white medium-to coarse-grained pebbly sandstone and reddish-brown fine-grained silty sandstone; contacts with adjacent pebbly sandstone units very irregular; moderately hard; dry	N86E,75NW Approx. Vague bedding		No Ground Water No Caving

SCALE 1" = 5'

N85W

TOTAL DEPTH 10 Ft.



ALLAN E. SEWARD

JOB NO. 98-1617-9

LOGGED BY VCG

Trench Log No. T-169

PROJECT V.T.T. 52584

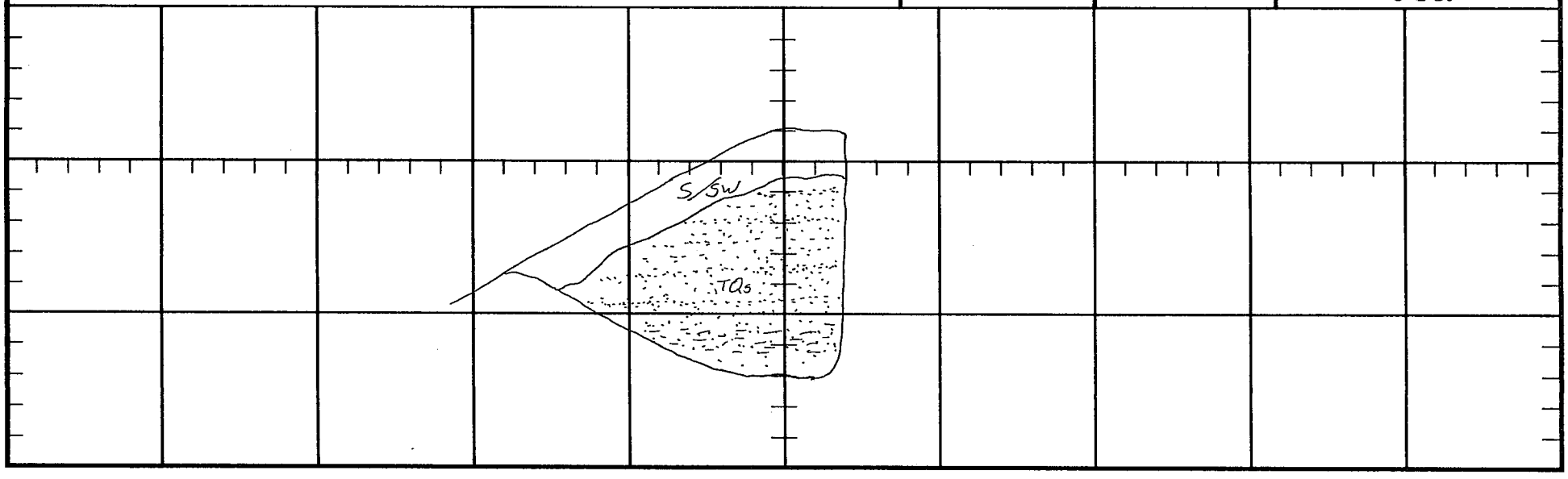
DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 1.5' SOIL/SLOPEWASH; s/sw, Moderate brown, fine-to coarse-grained silty pebbly sand; loose; dry			
1.5 - 8' BEDROCK; TQs, Tan medium-to coarse-grained pebbly sandstone and brown to reddish-brown silty fine-grained sandstone/sandy siltstone; moderately hard; dry	N89W,73NE		No Ground Water No Caving

SCALE 1" = 5'

N67W

TOTAL DEPTH 8 Ft.



ALLAN E. SEWARD

JOB NO. 98-1617-9

LOGGED BY VCG

Trench Log No. T-170

PROJECT V.T.T. 52584

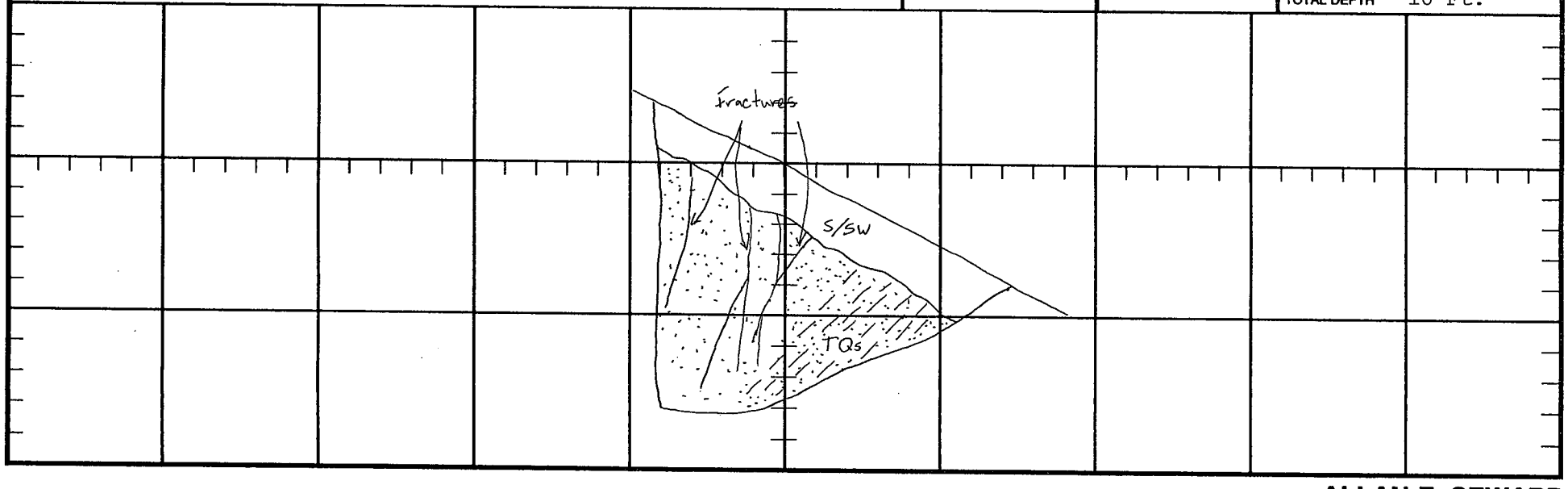
DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 1.5 SOIL/SLOPEWASH; s/sw, Moderate brown fine-to coarse-grained silty sand with scattered pebbles; loose; abundant roots			
1.5 - 10' BEDROCK; TQs, Tan to light reddish-brown medium-to coarse-grained pebbly sandstone and reddish-brown sandy siltstone; fractures within sandstone; moderately hard; dry	N78E,48NW N70E,56NW		No Ground Water No Caving

N12E UH

SCALE 1" = 5'

TOTAL DEPTH 10 Ft.



ALLAN E. SEWARD

JOB NO. 98-1617-9

PROJECT V.T.T. 52584

LOGGED BY VCG

Trench Log No. T-171

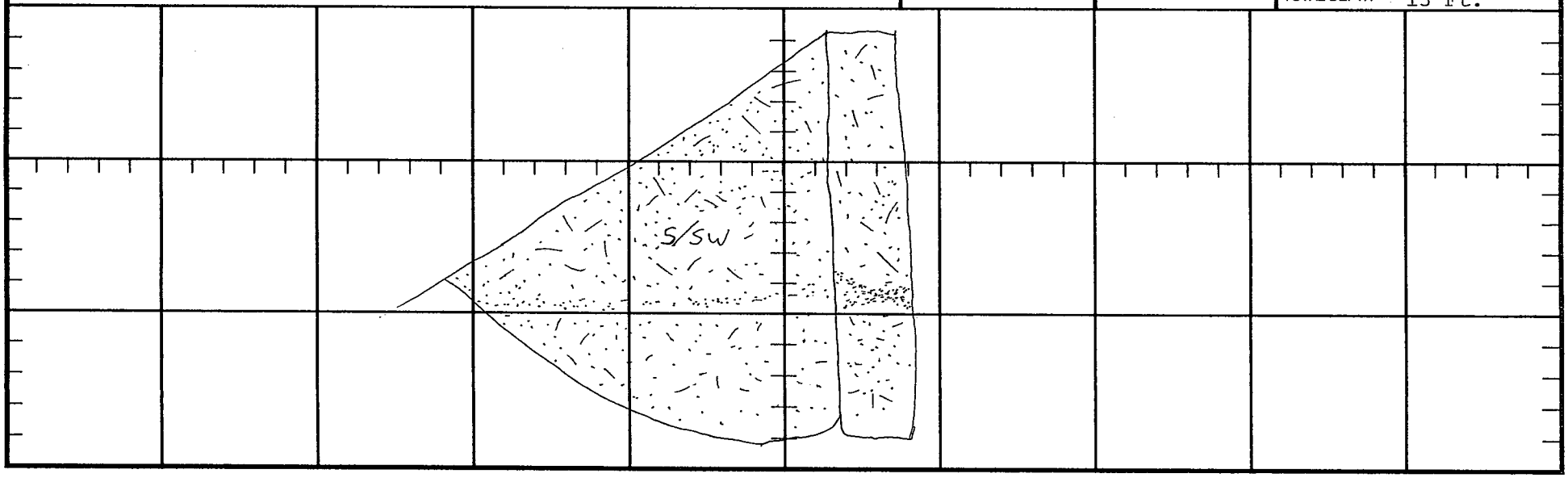
DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 13' SOIL/SLOPEWASH; s/sw, Medium-to reddish-brown fine- to coarse-grained silty sand; loose; damp; very vague layering/bedding	Layering/bedding N18W,12NE		Possibly Qls Digs easy No Ground Water No Caving

SCALE 1" = 5'

N85W

TOTAL DEPTH 13 Ft.



ALLAN E. SEWARD

JOB NO. 98-1617-9

LOGGED BY VCG

Trench Log No. T-172

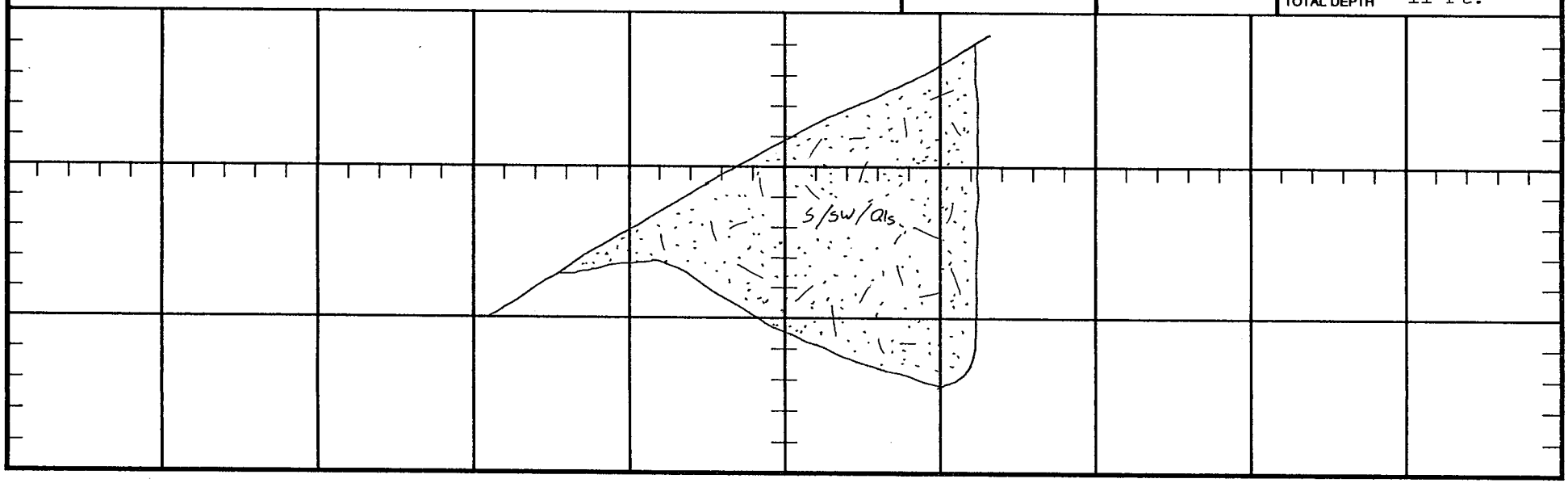
PROJECT V.T.T. 52584

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 11' SOIL/SLOPEWASH/LANDSLIDE; s/sw/Qls, Medium reddish-brown fine-to coarse-grained silty sands, loose; damp; non-bedded but looks like the material has moved around, jumbled	None		Probably landslide No Ground Water No Caving TOTAL DEPTH 11 Ft.

SCALE 1" = 5'

N68W



ALLAN E. SEWARD

JOB NO. 98-1617-9

LOGGED BY VCG

Trench Log No. T-173

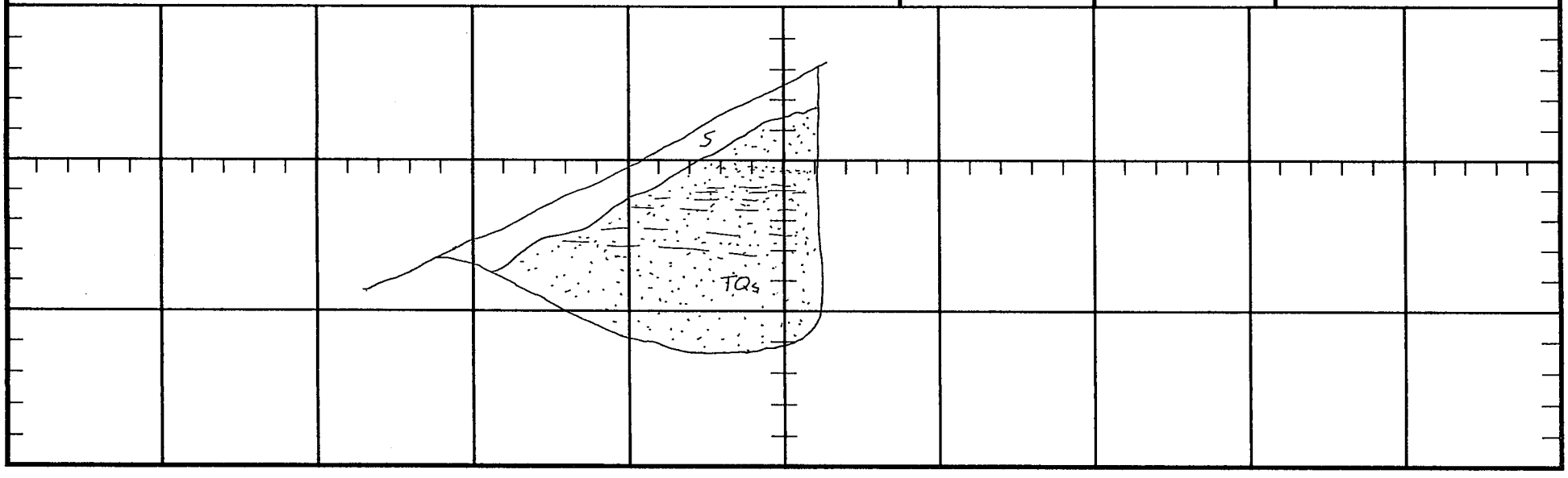
PROJECT V.T.T. 52584

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 1' SOIL; s, Light reddish-brown fine-to coarse-grained silty pebbly sand with abundant roots; dry; loose			
1 - 9' BEDROCK; TQs, Reddish-brown fine-to medium-grained silty sandstone and tan to gray medium-to coarse-grained pebbly sandstone; bedded; dry; moderately hard; roots to 6 ft.	B:N36E,14NW		No Ground Water No Caving TOTAL DEPTH 9 Ft.

SCALE 1" = 5'

N5E



ALLAN E. SEWARD

JOB NO. 98-1617-9

LOGGED BY VCG

Trench Log No. T-174

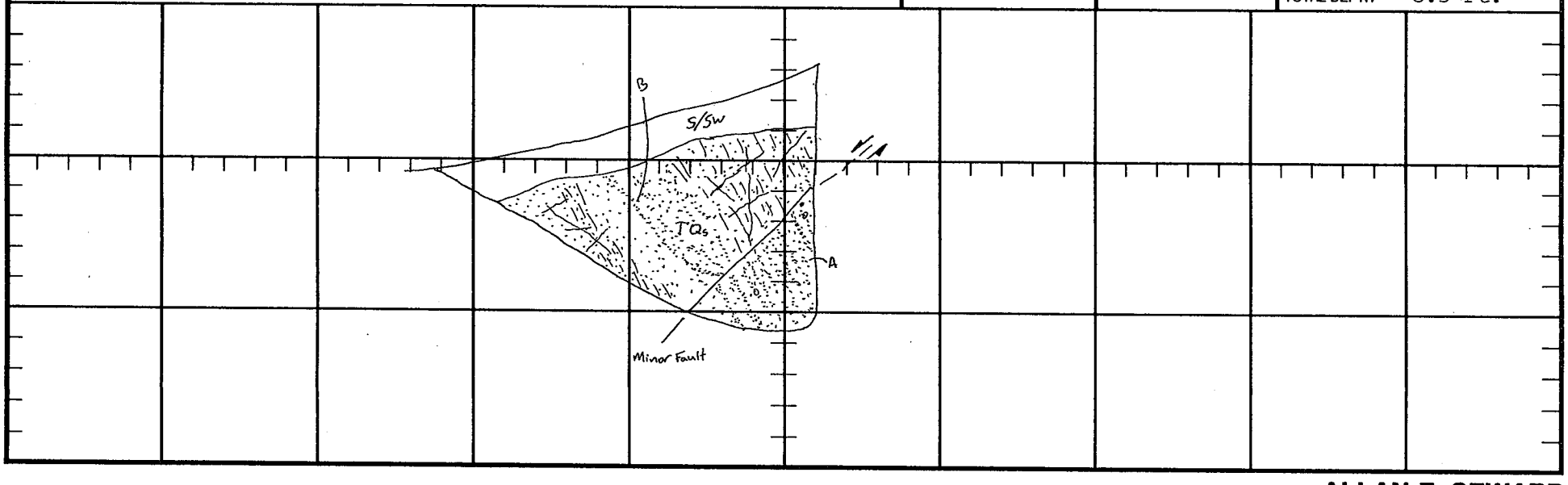
PROJECT V.T.T. 52584

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 2' SOIL/SLOPEWASH: s/sw; Medium to light brown fine-to coarse-grained pebbly sand; loose; dry			MF: N76E,42SE
2 - 8.5' BEDROCK: TQs, Reddish-brown fine-to medium-grained silty sandstone/sandy siltstone and tan to gray medium-to coarse-grained pebbly sandstone; dry; moderately hard; rootlets to 6.5 ft., minor fault present	a) B:N71E,65NW b) B:N68E,49NW		Gouge composed of fine- to coarse-grained silty sand lined with carbonate deposits Drag indicates normal offset
			No Ground Water No Caving
			TOTAL DEPTH 8.5 Ft.

SCALE 1" = 5'

N12W



ALLAN E. SEWARD

JOB NO. 98-1617-9

LOGGED BY VCG

Trench Log No. T-175

PROJECT V.T.T. 52584

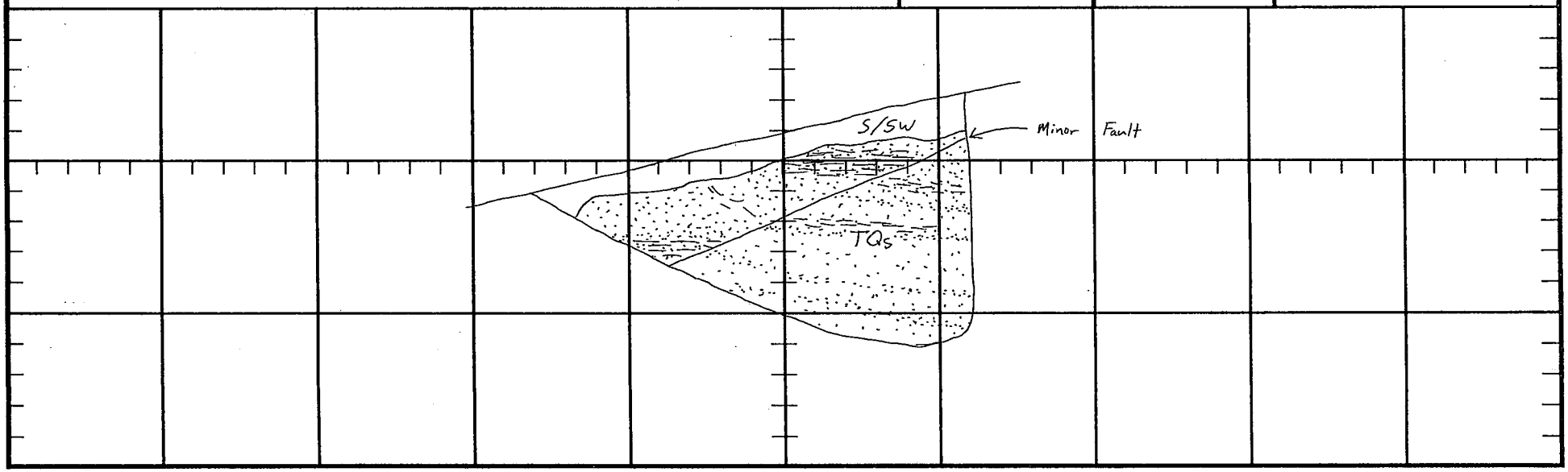
DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 1.5' SOIL/SLOPEWASH: s/sw, Light to medium brown fine- to coarse-grained silty pebbly sand; loose; dry			Minor fault; Gouge: None; Sense of apparent movement undetermined
1.5 - 8' BEDROCK: TQs, White to tan medium-to coarse-grained pebbly sandstone and light olive green to light reddish-brown fine-to medium-grained sandstone with minor silt; moderately hard; dry; minor fault	B:N50E,14NW Bedding indistinct to vague minor fault plane		MF:N72E,39SE No Ground Water No Caving

SCALE 1" = 5'

N8E

TOTAL DEPTH 8 Ft.



ALLAN E. SEWARD

JOB NO. 98-1617-9

PROJECT V.T.T. 52584

LOGGED BY VCG

Trench Log No. T-176

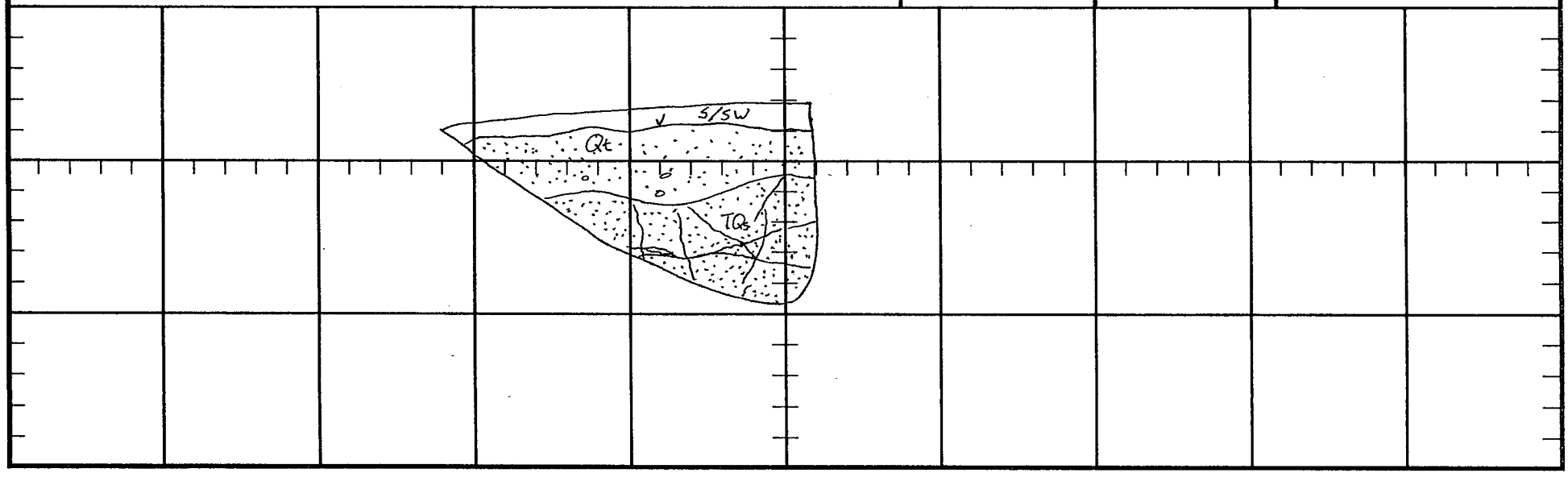
DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 1' SOIL/SLOPEWASH; s/sw, Light reddish-brown medium- to coarse-grained silty sand with scattered pebbles; loose; dry			Faults do not offset Qt
1 - 3.0' QUATERNARY TERRACE; Qt, Rusty brown medium-to coarse-grained pebbly sandstone; friable; loose to moderately hard; dry	B:N76E,82NW Approx.		MF:N47W,30NE
3.0 - 6.5' BEDROCK; TQs, Tan fine-to coarse-grained sandstone and pebbly sandstone; moderately hard; dry; bedding vague; faulted (Random orientation)			No Ground Water No Caving

SCALE 1" = 5'

N 10 E

TOTAL DEPTH 6.5 Ft.



ALLAN E. SEWARD

JOB NO. 98-1617-9

LOGGED BY VCG

Trench Log No. T-177

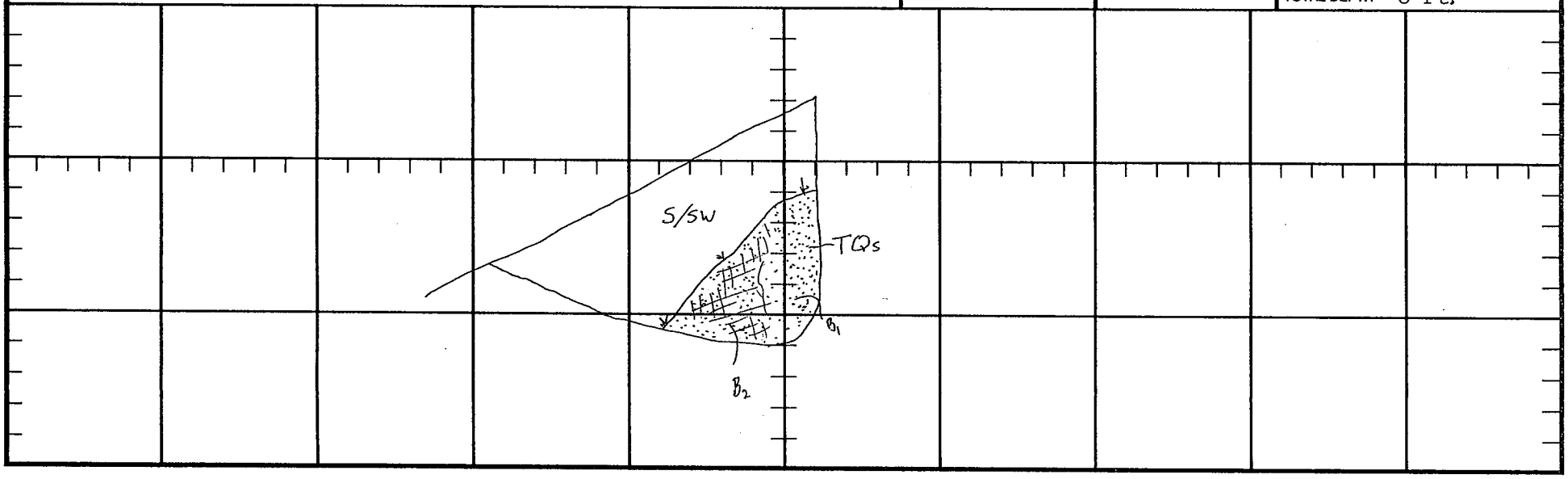
PROJECT V.T.T. 52584

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 5' SOIL/SLOPEWASH; s/sw, Light reddish-brown fine- to coarse-grained pebbly sand with abundant roots; loose; dry 5 - 8' BEDROCK; TQs, White- to tan medium- to coarse-grained pebbly sandstone and light olive green- to reddish-brown sandy siltstone; moderately hard; dry; caliche on sandy siltstone surface	B_1: N86W,60NE B_2: N72W,54NE		Trenches T-177 thru T-182 excavated 12/15/98 using a track-mounted back-hoe with a 24" wide bucket No Ground Water No Caving TOTAL DEPTH 8 Ft.

SCALE 1" = 5'

N 8 E



ALLAN E. SEWARD

JOB NO. 98-1617-9

PROJECT V.T.T. 52584

LOGGED BY VCG

Trench Log No. T-178

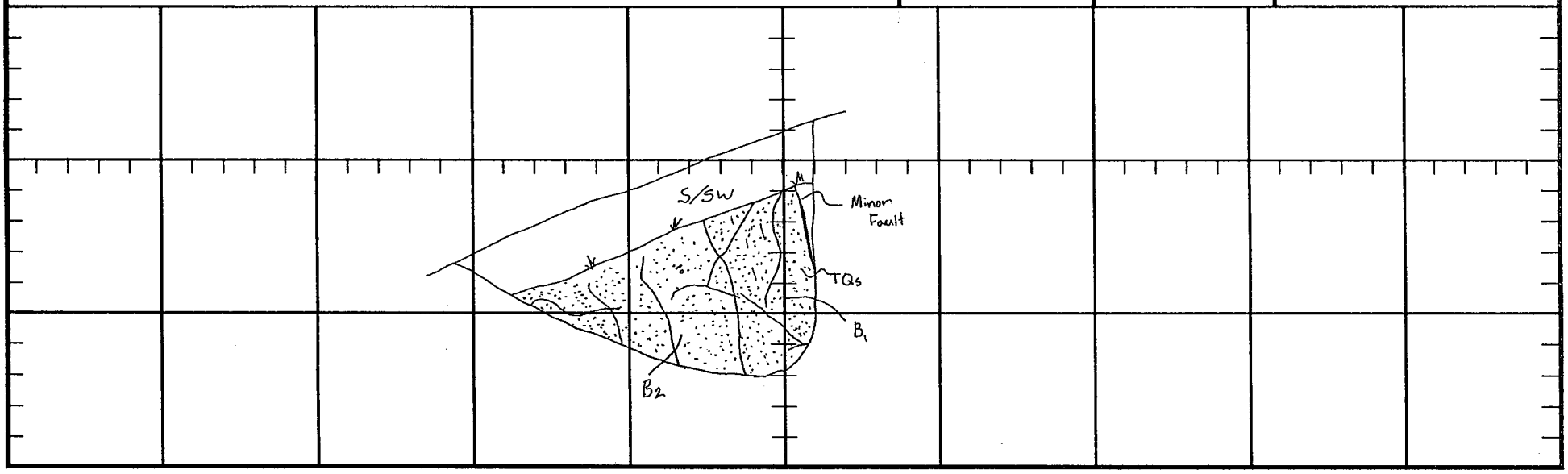
DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 2' SOIL/SLOPEWASH; s/sw, Light reddish-brown fine- to coarse-grained silty pebbly sand with abundant roots; dry; loose	B_1:N83W,85NE B_2:N86W,80NE		Minor fault 1/2-1" thick reddish-brown silty gouge, apparent offset
2 - 8' BEDROCK; TQs, Tan to white medium- to coarse-grained pebbly sandstone; slightly fractured; moderately hard; dry; roots to 4 ft.			MF:N82W,83NE
			No Ground Water No Caving

SCALE 1" = 5'

N 20 W

TOTAL DEPTH 8 Ft.



ALLAN E. SEWARD

JOB NO. 98-1617-9

PROJECT V.T.T. 52584

LOGGED BY VCG

Trench Log No. T-179

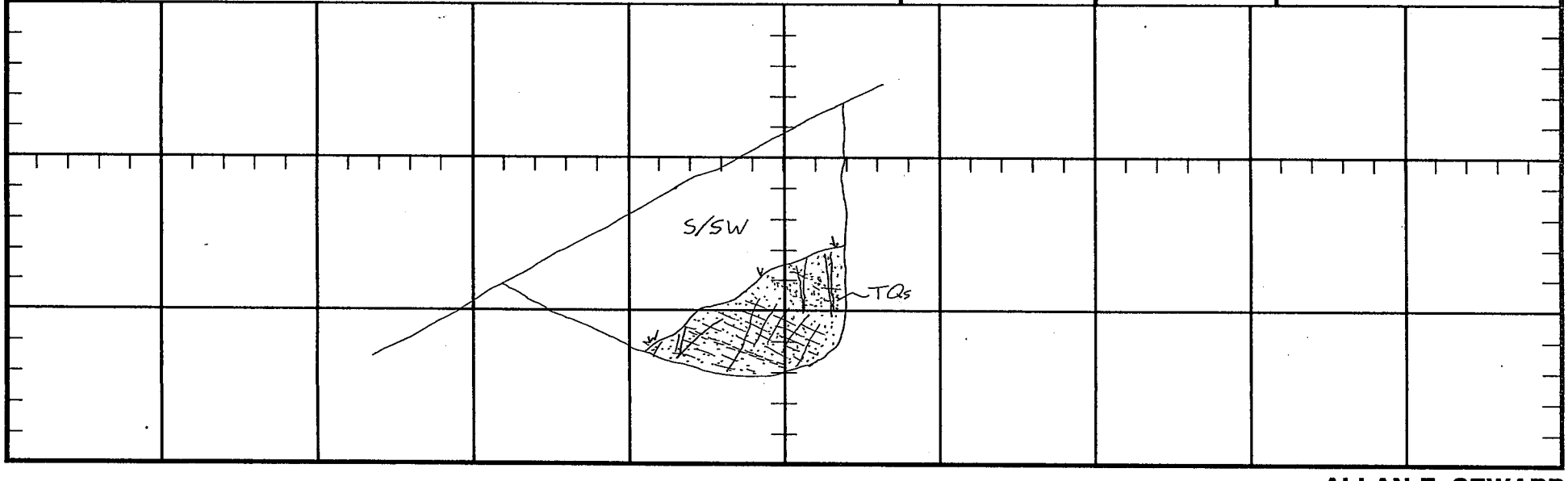
DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 4' SOIL/SLOPEWASH; s/sw, Medium to light reddish-brown fine- to coarse-grained silty pebbly sand; loose; dry; abundant roots			
4 - 9' BEDROCK; TQs, Tan to white, medium- to coarse-grained pebbly sandstone, moderate to reddish-brown fine-grained sandy siltstone and dark brown clayey siltstone; moderately hard; dry to damp; roots to 4.5 ft.; caliche on parting surface within the siltstone units; minor fractures lined with roots within white sandstone unit	B:N75E,38NW		No Ground Water No Caving

N 40 W

SCALE 1" = 5'

TOTAL DEPTH 9 Ft.



ALLAN E. SEWARD

JOB NO. 98-1617-9

LOGGED BY VCG

Trench Log No. T-180

PROJECT V.T.T. 52584

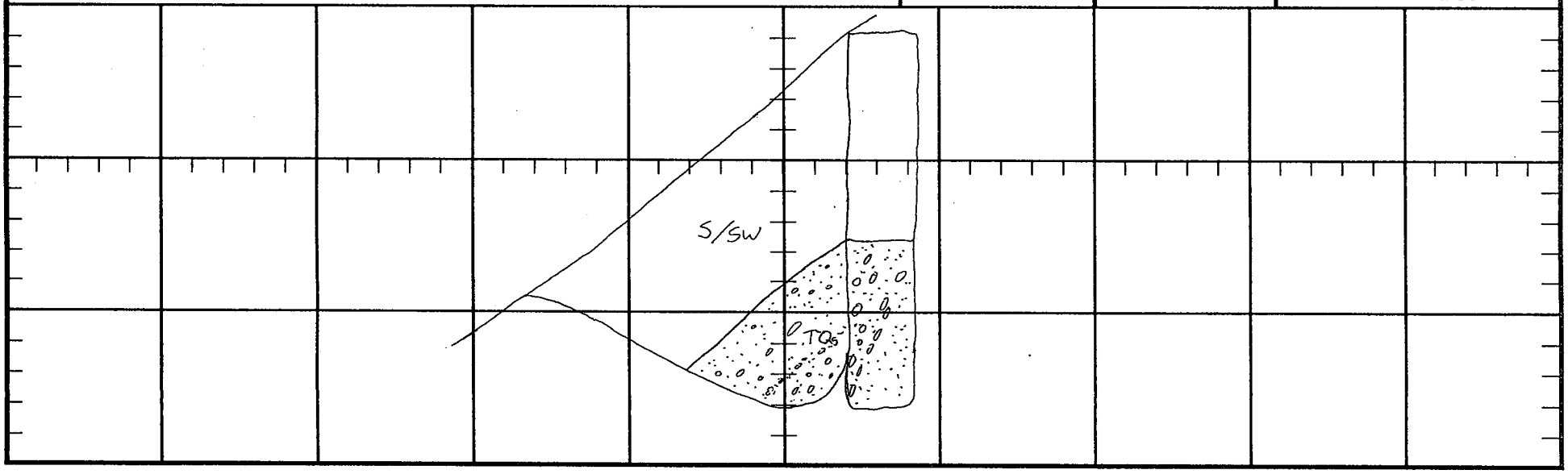
DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 6.5' SOIL/SLOPEWASH; s/sw, Moderate to light reddish-brown fine- to coarse-grained silty pebbly sand with scattered pebbles and cobbles; loose; dry; abundant roots			
6.5 - 12' BEDROCK; TQs, Tan to white to light rusty brown medium- to coarse-grained pebbly sandstone and pebble cobble conglomerate; moderately hard; dry	B:N86E,68NW		No Ground Water No Caving

N 68 W

SCALE 1" = 5'

TOTAL DEPTH 12 Ft.



ALLAN E. SEWARD

JOB NO. 98-1617-9

LOGGED BY VCG

Trench Log No. T-181

PROJECT V.T.T. 52584

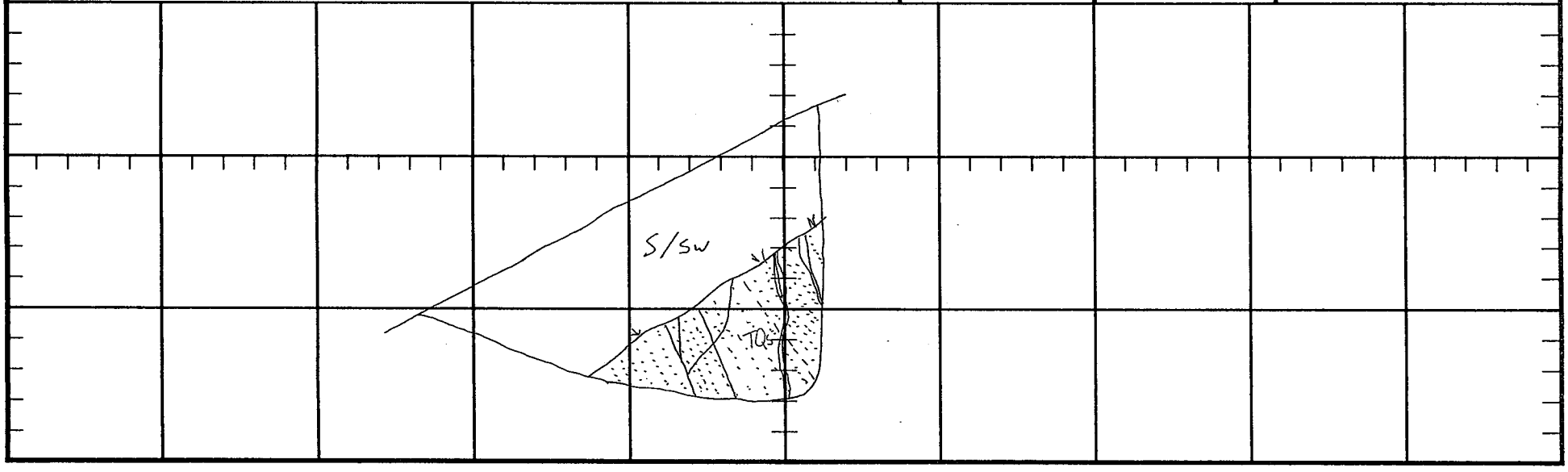
DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 4' SOIL/SLOPEWASH; s/sw, Medium to light brown fine- to coarse-grained silty pebbly sand with abundant roots; loose; dry			
4 - 9.5' BEDROCK; TQs, Light reddish-brown to tan to white medium- to coarse-grained sandstone and pebbly sandstone; minor fractures; moderately hard; dry	N86E,63NW		No Ground Water No Caving

SCALE 1" = 5'

N 38 E

TOTAL DEPTH 9.5 Ft.



ALLAN E. SEWARD

JOB NO. 98-1617-9

LOGGED BY VCG

Trench Log No. T-182

PROJECT V.T.T. 52584

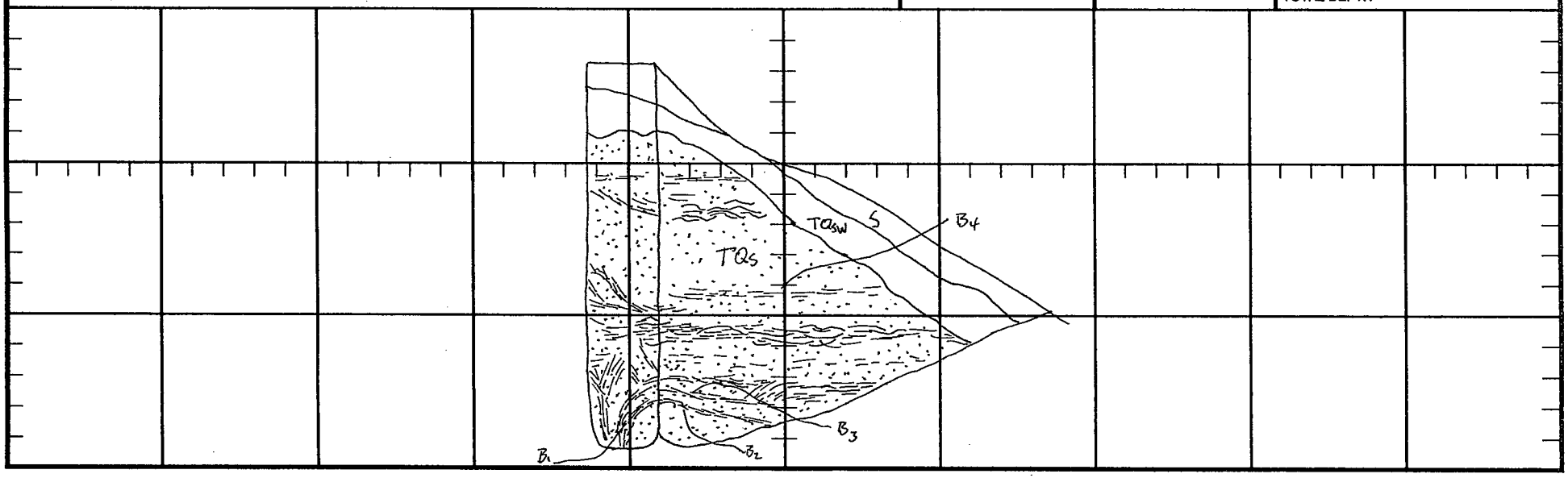
DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 1' SOIL/SLOPEWASH; s/sw, Medium brown fine- to coarse-grained silty pebbly sand; loose; dry; abundant roots			
1 - 2.5' WEATHERED BEDROCK; TQsw; Bedrock lithologies listed below	B_1:N86E,71NW B_2:N19W,15SW B_3:N69W,35SW B_4:N81W,50SW		Possibly Qls/fold/ tectonics
2.5 - 12' BEDROCK; TQs, Light brown to tan fine-grained sandstone and silty sandstone, tan to white to gray medium- to coarse-grained sandstone and dark brown to reddish-brown silty clay and clay; moderately hard; damp; contorted/squeezed, possibly a fold; clay units have cusps of sandstone			No Ground Water No Caving

SCALE 1" = 5'

N 67 W

TOTAL DEPTH 12 Ft.



ALLAN E. SEWARD

JOB NO. 98-1617-9

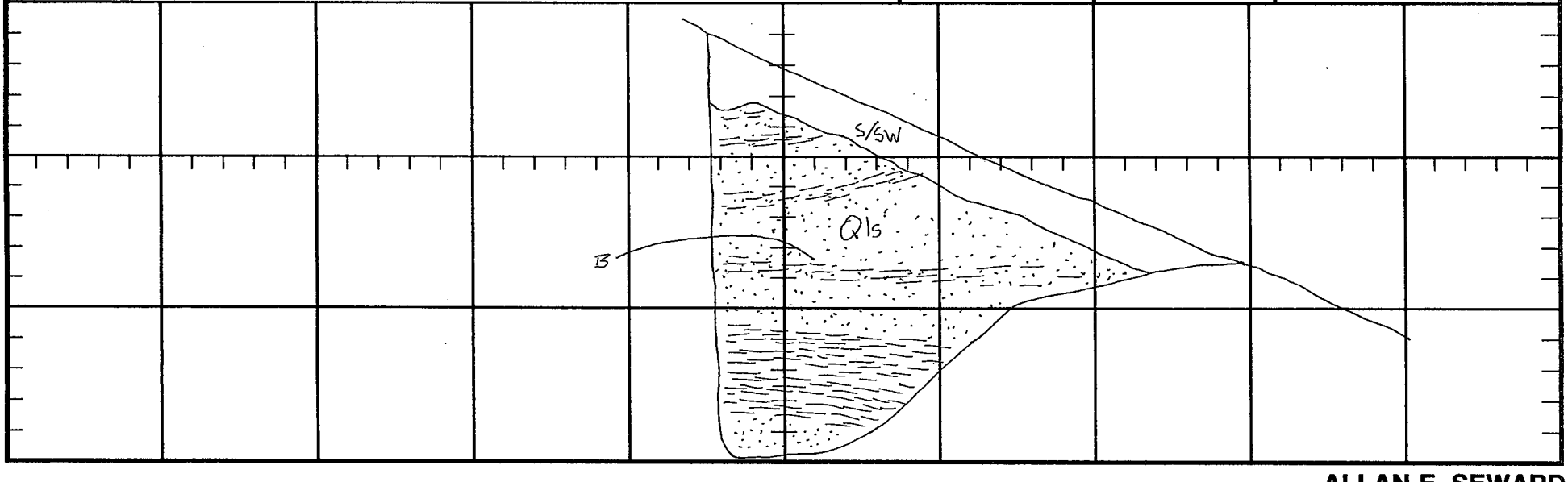
LOGGED BY VCG

Trench Log No. T-183

PROJECT V.T.T. 52584

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 2' SOIL/SLOPEWASH; s/sw, Medium brown fine- to coarse-grained pebbly silty sand; loose; dry; abundant roots			T-183 thru T-191 excavated 12/16/98 using a track-mounted backhoe with 24" wide bucket
2 - 14' QUATERNARY LANDSLIDE; Qls, Tan to medium brown fine- to medium-grained silty sandstone, dark reddish-brown clayey siltstone/silty claystone and medium- to coarse-grained light brown to rust pebbly sandstone; moderately hard; damp; minor calcium carbonate on parting surfaces, wispy appearance; hollow sound when struck with hammer	B:N87E,50NW		No Ground Water No Caving
SCALE 1" = 5' N 69 W			TOTAL DEPTH 14 Ft.



ALLAN E. SEWARD

JOB NO. 98-1617-9

LOGGED BY VCG

Trench Log No. T-184

PROJECT V.T.T. 52584

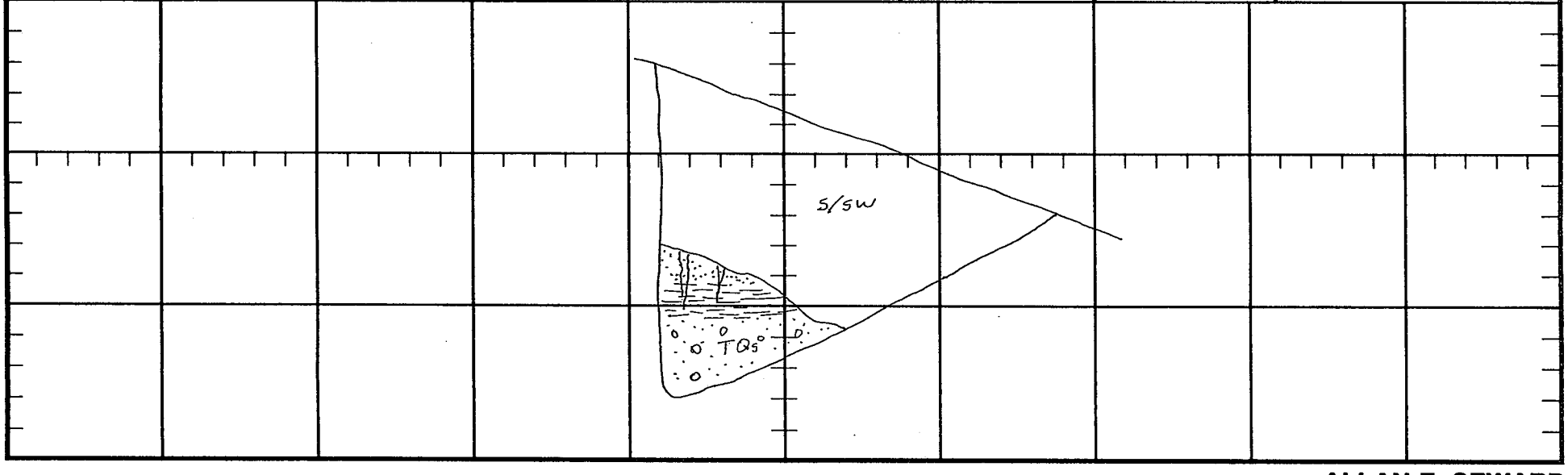
DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 6' SOIL/SLOPEWASH; s/sw, Medium to light brown fine- to coarse-grained silty pebbly sand; loose; dry; abundant roots			
6 - 11' QUATERNARY LANDSLIDE; Qls, Tan to white medium- to coarse-grained pebbly sandstone; reddish-brown clayey siltstone and tan pebble cobble conglomerate; moderately hard; dry; minor fractures infilled with slopewash; hollow sound when hit with hammer	B:N80W,7SW approx.		No Ground Water No Caving

SCALE 1" = 5'

N 5 W

TOTAL DEPTH 11 Ft.



ALLAN E. SEWARD

JOB NO. 98-1617-9

LOGGED BY VCG

Trench Log No. T-185

PROJECT V.T.T. 52584

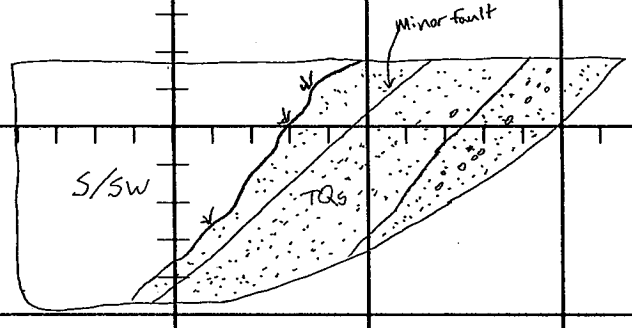
DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 6.5' SLOPEWASH; sw, Reddish-brown fine- to coarse-grained silty pebbly sand with isolated cobbles; loose; dry			Located at toe of cut-slope for drill pad
0 - 6.5' BEDROCK; TQs, Light brown medium- to coarse-grained pebbly sandstone and reddish-brown fine- to coarse-grained pebbly silty sandstone; moderately hard; damp; minor fault- no gouge, offset undetermined, minor fractures	B:N80E,85NW		MF:N65E,45NW
			No Ground Water No Caving

N 38 W

SCALE 1" = 5'

TOTAL DEPTH 6.5 Ft.



ALLAN E. SEWARD

JOB NO. 98-1617-9

PROJECT V.T.T. 52584

LOGGED BY VCG

Trench Log No. T-186

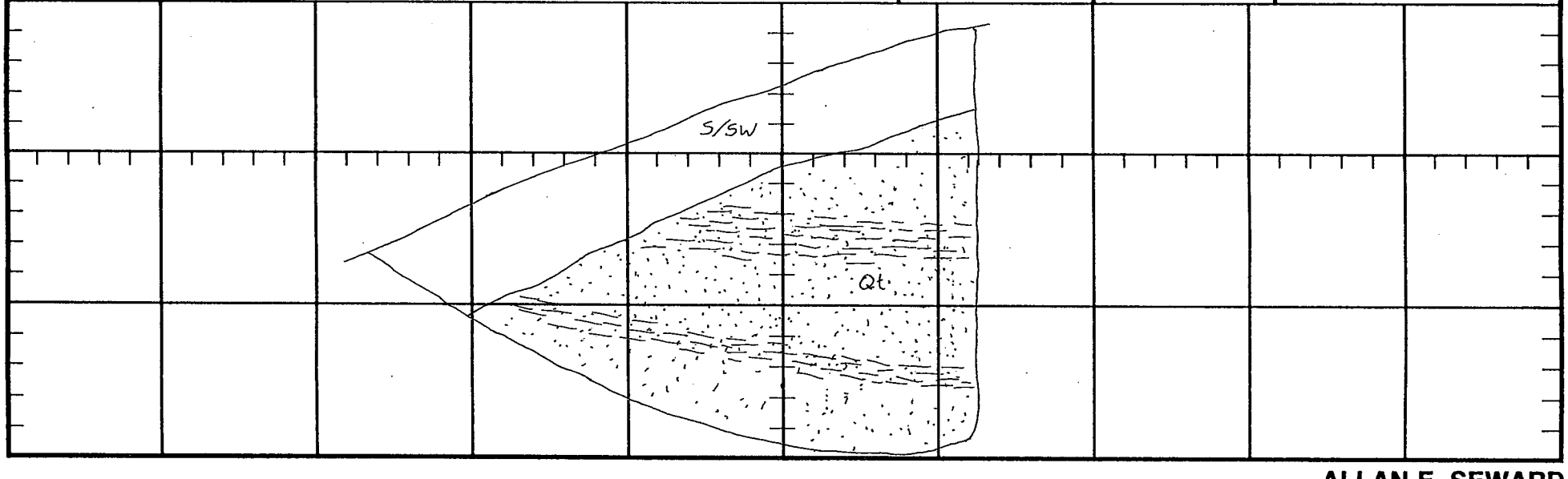
DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 3' SOIL/SLOPEWASH; s/sw, Medium brown fine- to coarse-grained silty pebbly sand with abundant roots; loose; dry			Digs easy
3 - 14' QUATERNARY LANDSLIDE; Qls, Tan to light green mottled with iron oxide stains, fine- to medium-grained sandstone and light olive greenish-gray to light reddish-brown siltstone with minor clay; irregular contacts; calcium carbonate staining within the siltstone units; loose to moderately hard; hollow sound when struck with the hammer	B:N88E,22NW		No Ground Water No Caving

SCALE 1" = 5'

N 70 E

TOTAL DEPTH 14 Ft.



ALLAN E. SEWARD

JOB NO. 98-1617-9

LOGGED BY VCG

Trench Log No. T-187

PROJECT V.T.T. 52584

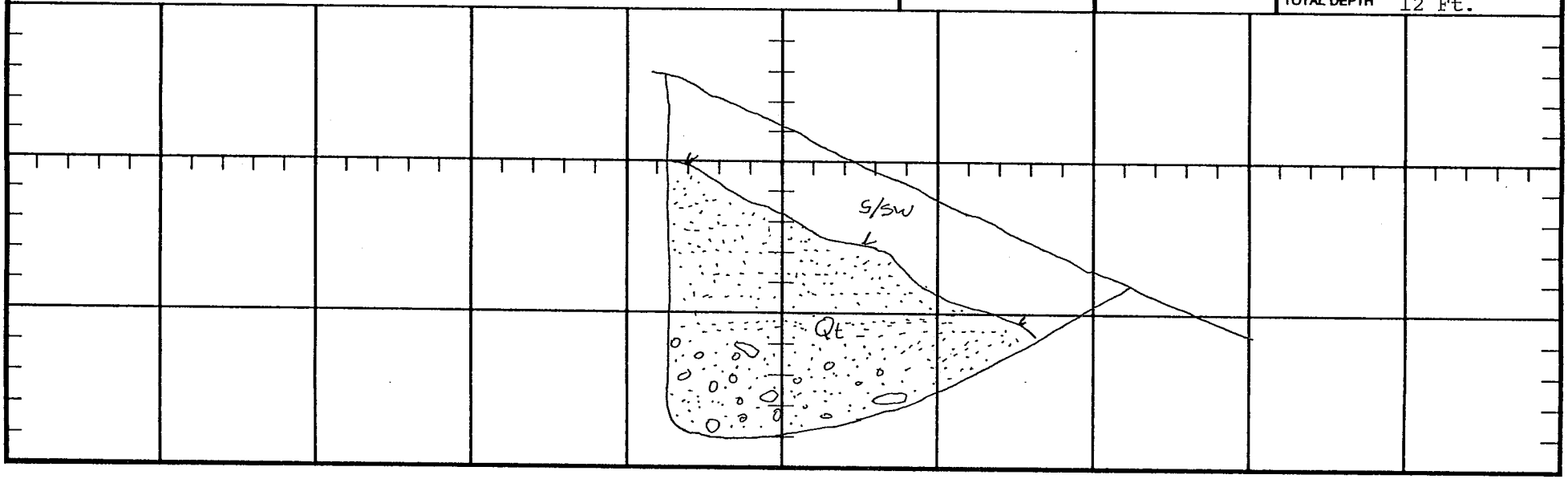
DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 3' SOIL/SLOPEWASH: s/sw, Dark red to medium brown fine- to coarse-grained pebbly sand, loose; dry			
3 - 12' BEDROCK; Qt, Dark red to rusty brown, fine- to coarse-grained pebbly sandstone, cobble conglomerate and silty pebbly sandstone; moderately hard; damp; crudely bedded	Not visible		Possibly disrupted due to underlying landslide
			No Ground Water No Caving

SCALE 1" = 5'

N 17 E

TOTAL DEPTH 12 Ft.



ALLAN E. SEWARD

JOB NO. 98-1617-9

PROJECT V.T.T. 52584

LOGGED BY VCG

Trench Log No. T-188

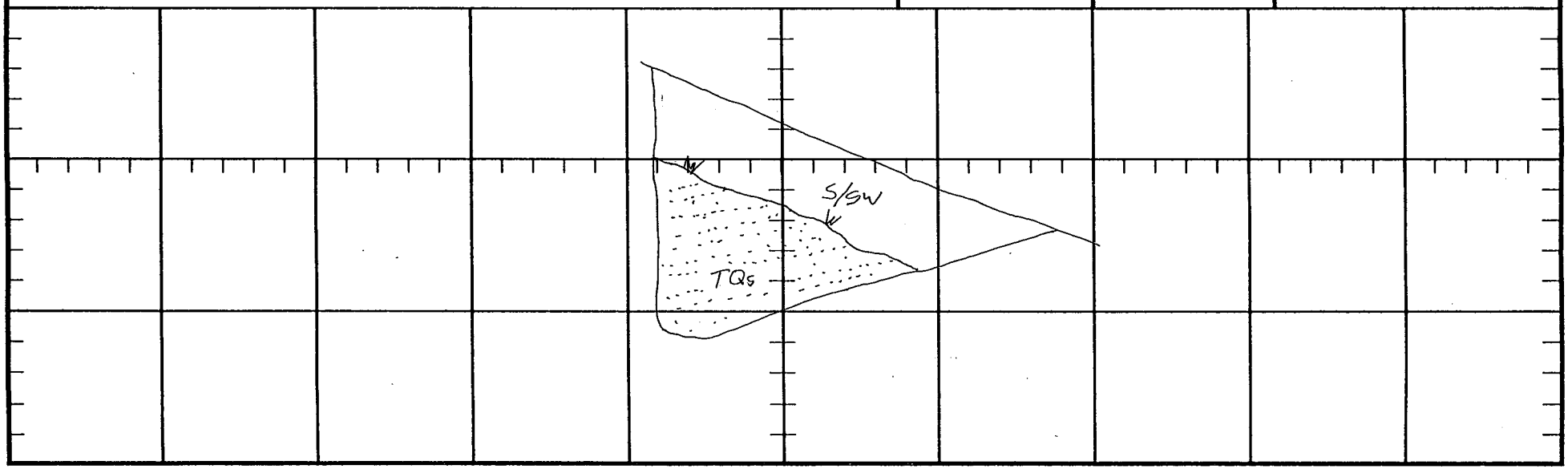
DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 3' SOIL/SLOPEWASH; s/sw, Medium brown fine- to coarse-grained pebbly sand; loose; dry			
3 - 9' BEDROCK; TQs, Light rusty brown medium- to coarse-grained pebbly sandstone; friable; dry; moderately hard	B:N50W,15SW approx		Possibly Qt
			No Ground Water No Caving

N 45 W

SCALE 1" = 5'

TOTAL DEPTH 9 Ft.



ALLAN E. SEWARD

JOB NO. 98-1617-9

LOGGED BY VCG

Trench Log No. T-189

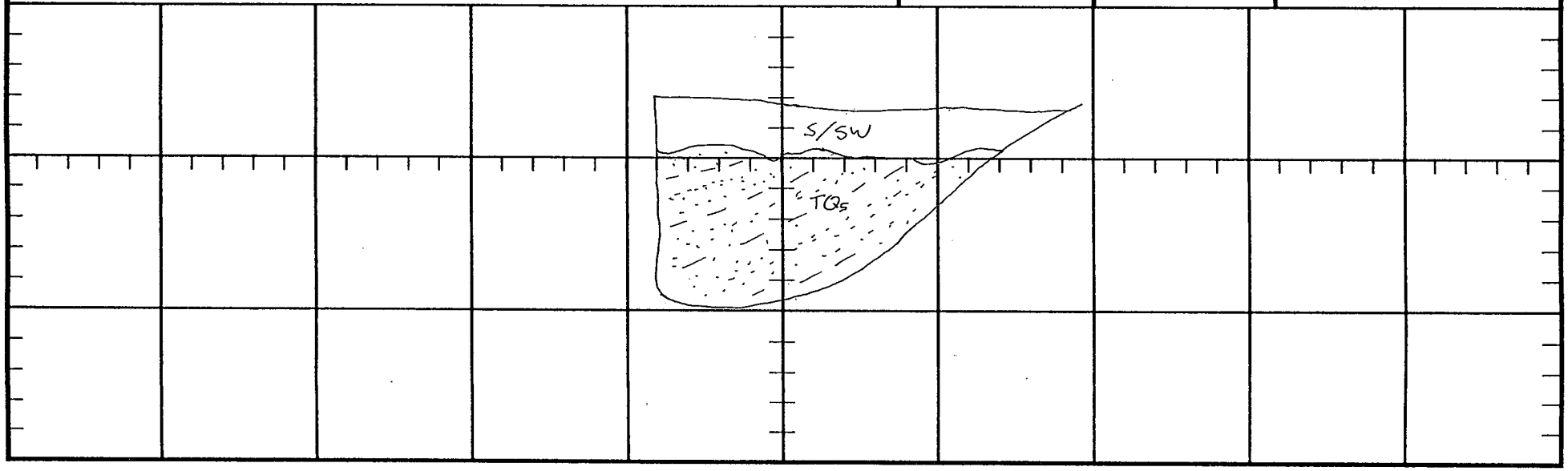
PROJECT V.T.T. 52584

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 2' SOIL/SLOPEWASH; s/sw, Moderate brown fine- to coarse-grained pebbly sand; loose; dry			
2 - 7' BEDROCK; TQs, Tan fine- to coarse-grained pebbly sandstone and silty sandstone; moderately hard; dry; friable	N70E,30SW		No Ground Water No Caving TOTAL DEPTH 7 Ft.

SCALE 1" = 5'

N 32 W



ALLAN E. SEWARD

JOB NO. 98-1617-9

PROJECT V.T.T. 52584

LOGGED BY VCG

Trench Log No. T-190

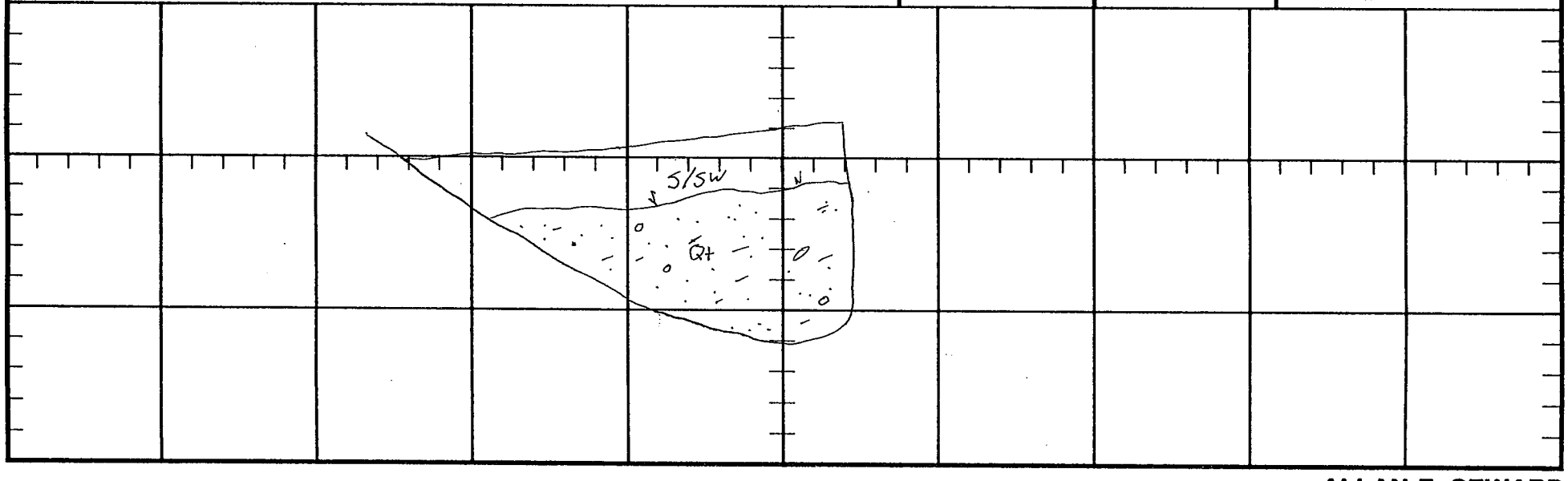
DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 2' SOIL/SLOPEWASH; s/sw, Moderate to grayish-brown fine- to coarse-grained pebbly sand; loose; dry			
2 - 7' QUATERNARY TERRACE; Qt, Medium to reddish-brown fine- to coarse-grained silty pebbly sandstone with isolated cobbles; loose to moderately hard; dry; roots to 6 ft.; friable	Nonbedded		No Ground Water No Caving

SCALE 1" = 5'

N 84 W

TOTAL DEPTH 7 Ft.



ALLAN E. SEWARD

JOB NO. 98-1617-9

PROJECT V.T.T. 52584

LOGGED BY VCG

Trench Log No. T-191

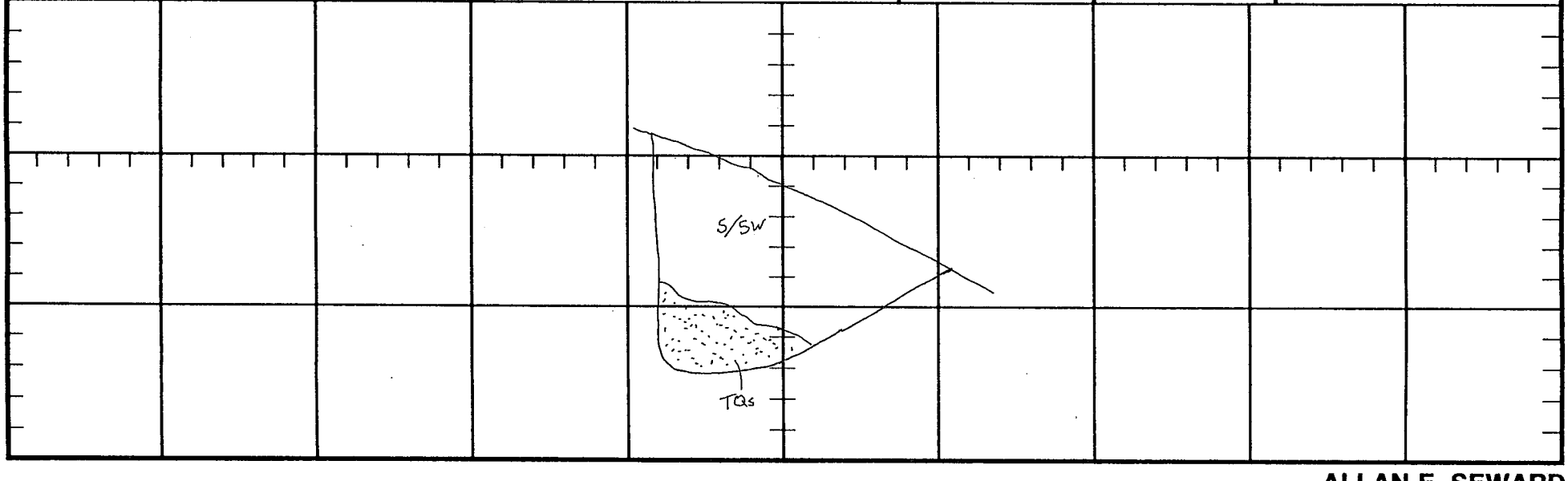
DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 5' SOIL/SLOPEWASH; s/sw, Medium to light brown fine- to coarse-grained silty pebbly sand; loose; dry			
5 - 8' BEDROCK; TQs, Tan fine- to coarse-grained sandstone and pebbly sandstone; moderately hard; friable; dry to damp	N70E,28NW N68E,32NW		No Ground Water No Caving

SCALE 1" = 5'

N 16 E

TOTAL DEPTH 8 Ft.



ALLAN E. SEWARD

JOB NO. 98-1617-9

LOGGED BY VCG

Trench Log No. T-192

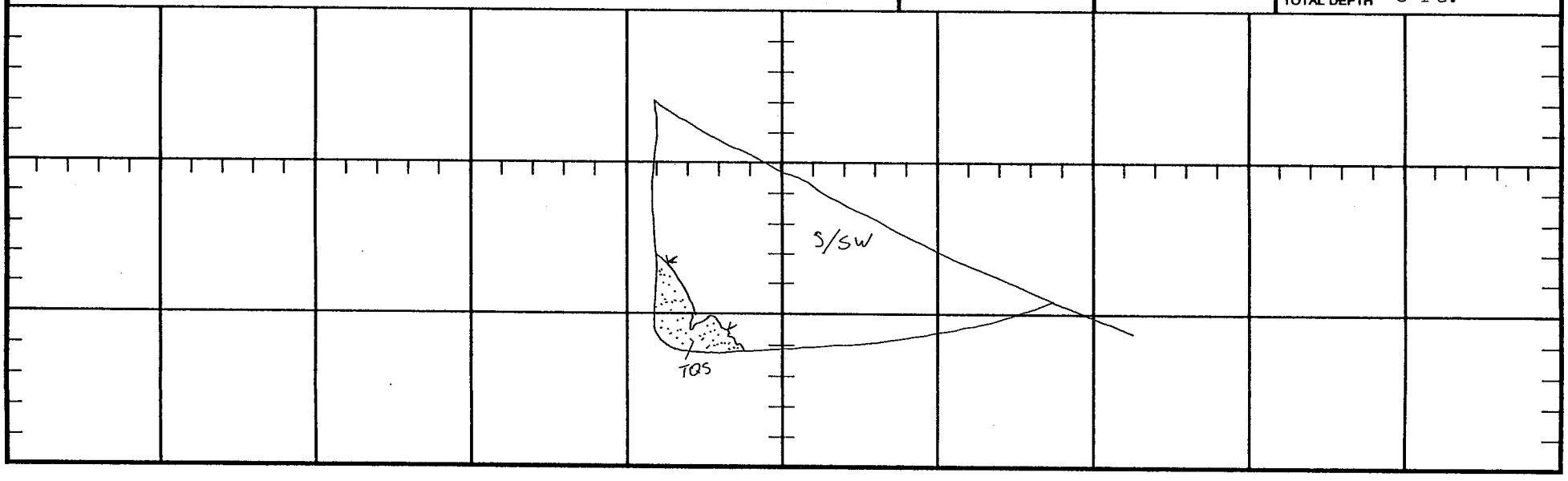
PROJECT V.T.T. 52584

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 5' SOIL/SLOPEWASH; s/sw, Light to medium brown fine- to coarse-grained silty pebbly sand; loose; dry; abundant roots 5 - 8' BEDROCK; TQs, Tan medium- to coarse-grained pebbly sandstone; friable; loose to moderately dense; dry; roots to 6 ft.	B:N56E,28NW		T-192 through T-201 excavated 12/17/98 using a track-mounted backhoe and a 24" wide bucket No Ground Water No Caving TOTAL DEPTH 8 Ft.

SCALE 1" = 5'

N 62 E



ALLAN E. SEWARD

JOB NO. 98-1617-9

LOGGED BY VCG

Trench Log No. T-193

PROJECT V.T.T. 52584

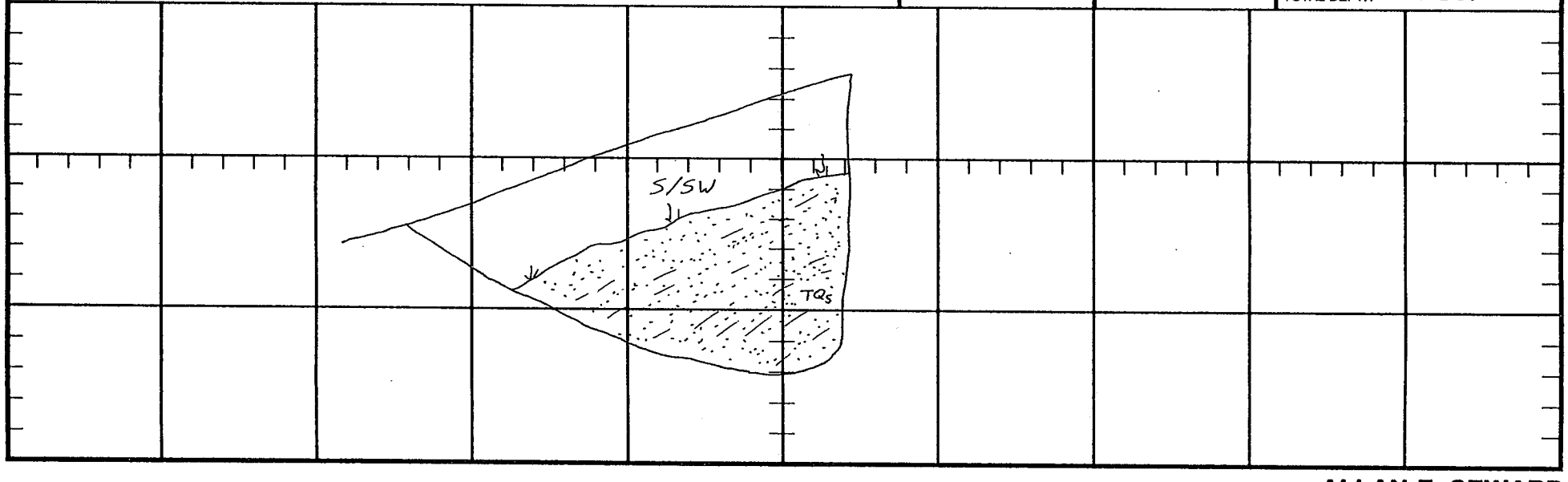
DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 3' SOIL/SLOPEWASH; s/sw, Light to medium brown fine- to coarse-grained pebbly silty sand; loose; dry			
3 - 10' BEDROCK; TQs, Tan to light reddish-brown fine- to medium-grained sandstone and silty sandstone and medium- to coarse-grained pebbly sandstone; moderately hard; dry	Vague - not very distinct B:N56E,33NW		No Ground Water No Caving

SCALE 1" = 5'

N 35 W

TOTAL DEPTH 10 Ft.



ALLAN E. SEWARD

JOB NO. 98-1617-9

LOGGED BY VCG

Trench Log No. T-194

PROJECT V.T.T. 52584

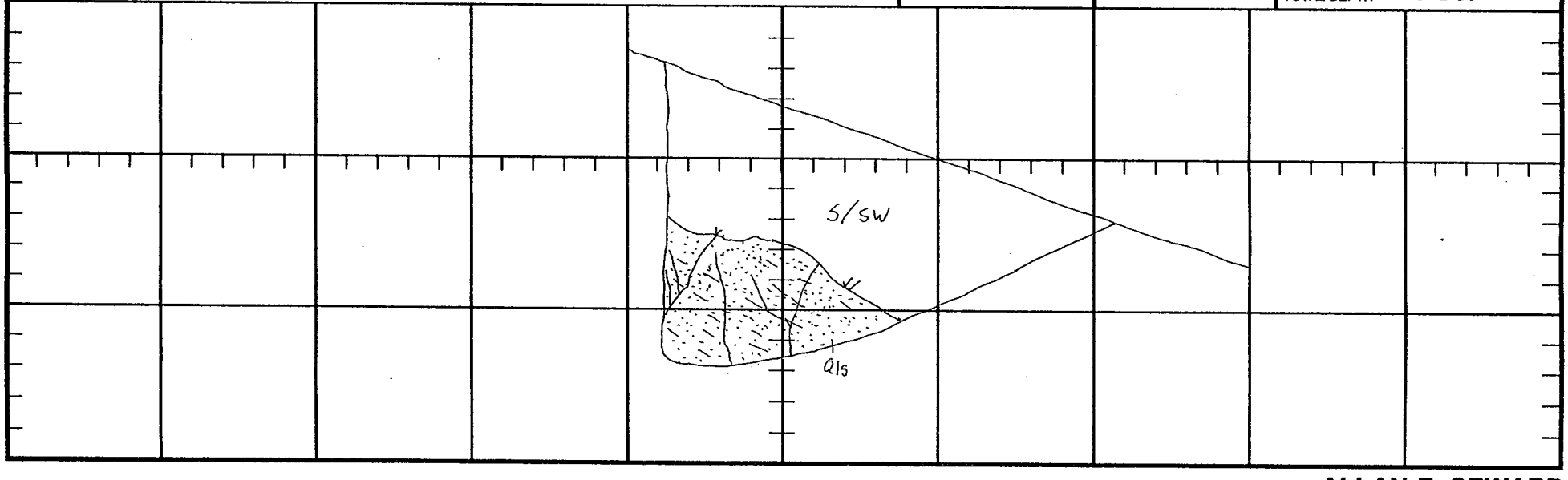
DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 5' SOIL/SLOPEWASH; s/sw, Medium brown fine- to coarse-grained pebbly silty sand; loose; dry to damp			Probably near lateral limit of slide
5 - 10' QUATERNARY LANDSLIDE; Qls, Tan fine-grained silty sandstone, moderately hard; rootlets to 9 ft.; carbonate on fracture and some bedding surfaces; damp; minor fractures	B:N46E,32NW approx.		No Ground Water No Caving

SCALE 1" = 5'

N 75 W

TOTAL DEPTH 10 Ft.



ALLAN E. SEWARD

JOB NO. 98-1617-9

LOGGED BY VCG

Trench Log No. T-195

PROJECT V.T.T. 52584

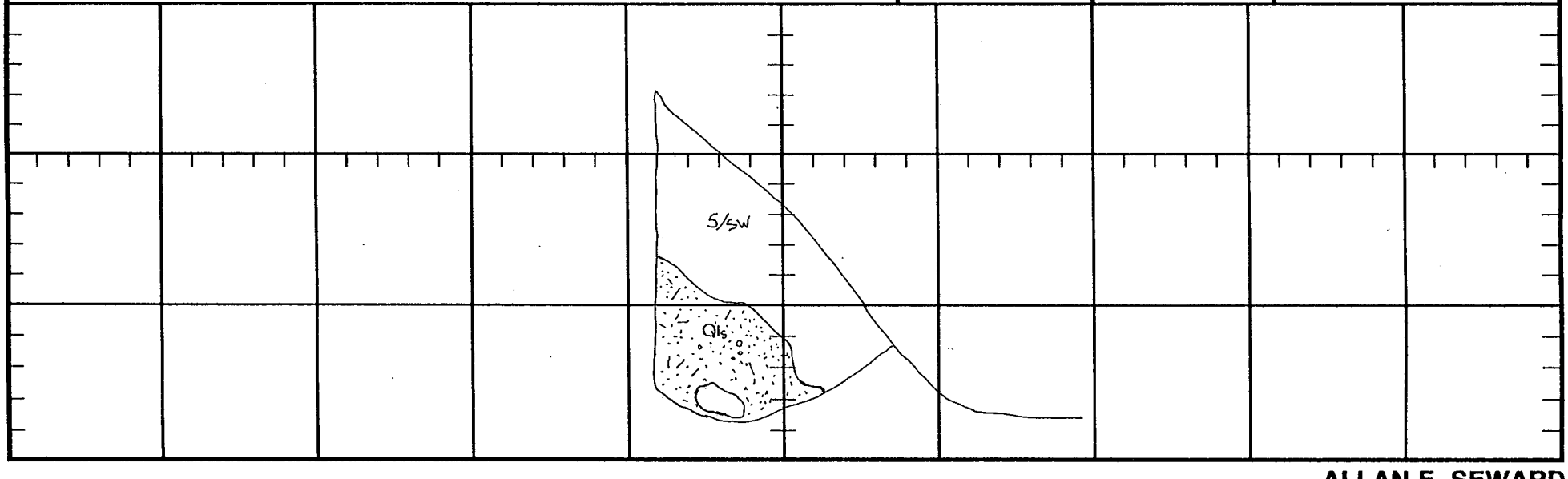
DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 5' SOIL/SLOPEWASH; s/sw, Medium- to dark reddish-brown fine- to coarse-grained pebbly silty sand			
5 - 10' QUATERNARY LANDSLIDE; Qls, Jumbled chaotic assembledge of bedrock lithologies, fine- to coarse-grained pebbly silty sandstone and pebble conglomerate; loose; damp	None		No Ground Water No Caving

SCALE 1" = 5'

N 8 W

TOTAL DEPTH 10 Ft.



ALLAN E. SEWARD

JOB NO. 98-1617-9

LOGGED BY VCG

Trench Log No. T-196

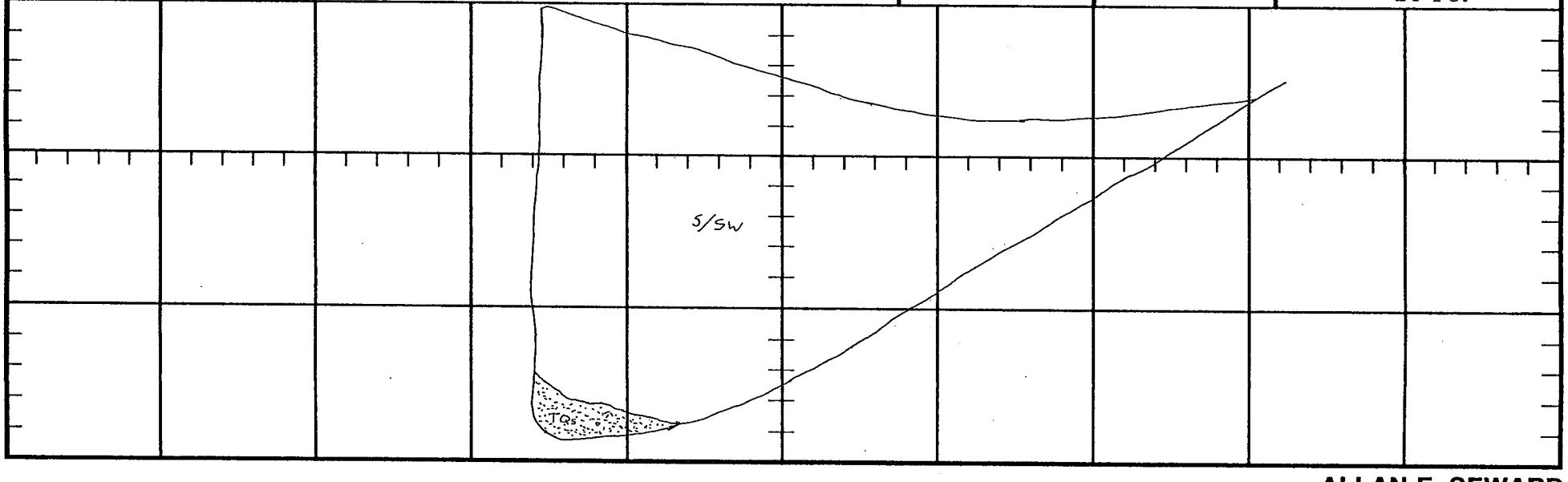
PROJECT V.T.T. 52584

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 12' SOIL/SLOPEWASH; s/sw, Medium to dark reddish-brown fine- to coarse-grained silty pebbly sand; loose; dry; abundant roots with isolated cobbles			
12 - 14' BEDROCK; TQs, Light rusty brown medium- to coarse-grained pebbly sandstone; friable; moderately hard; damp	Vague N81E,31NW approx.		
			No Ground Water No Caving TOTAL DEPTH 14 Ft.

SCALE 1" = 5'

N 9 E



ALLAN E. SEWARD

JOB NO. 98-1617-9

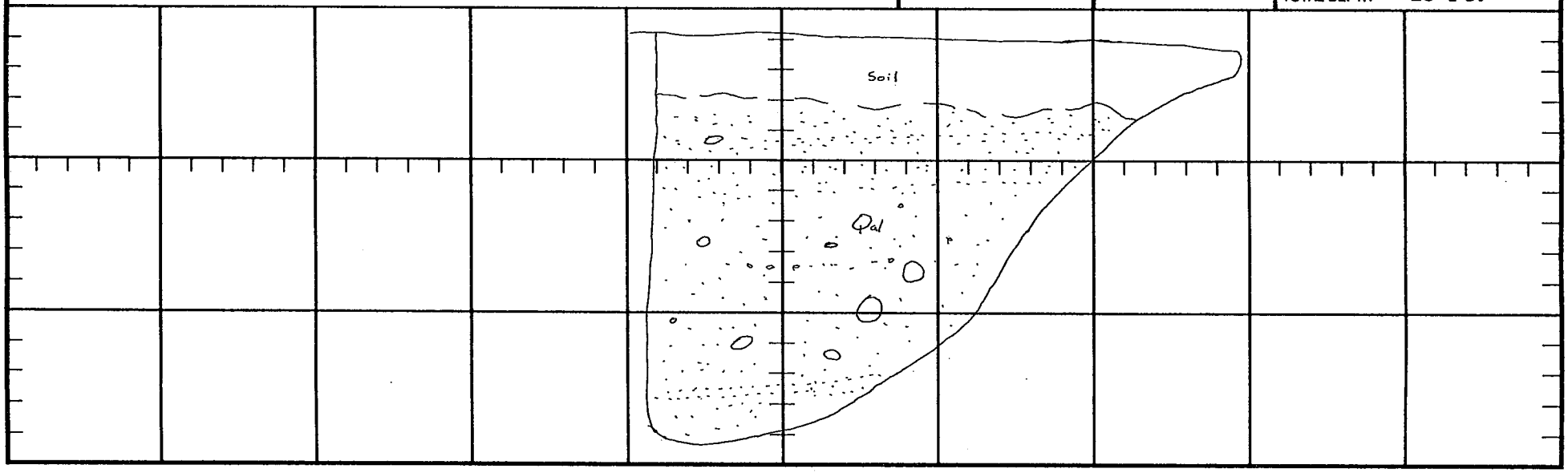
PROJECT V.T.T. 52584

LOGGED BY VCG

Trench Log No. T-197

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 2' SOIL; s, Medium to grayish-brown fine- to coarse-grained pebbly silty sand; loose; dry			Removal depth 6 Ft.±
2 - 13' ALLUVIUM; Qal, Light brown to gray to tan medium- to coarse-grained pebbly sand with isolated cobbles; loose to moderately dense; dry to damp; clean sands and gravels at 5 ft.			No Ground Water No Caving
SCALE 1" = 5' N 3 W			TOTAL DEPTH 13 Ft.



ALLAN E. SEWARD

JOB NO. 98-1617-9

LOGGED BY VCG

Trench Log No. T-198

PROJECT V.T.T. 52584

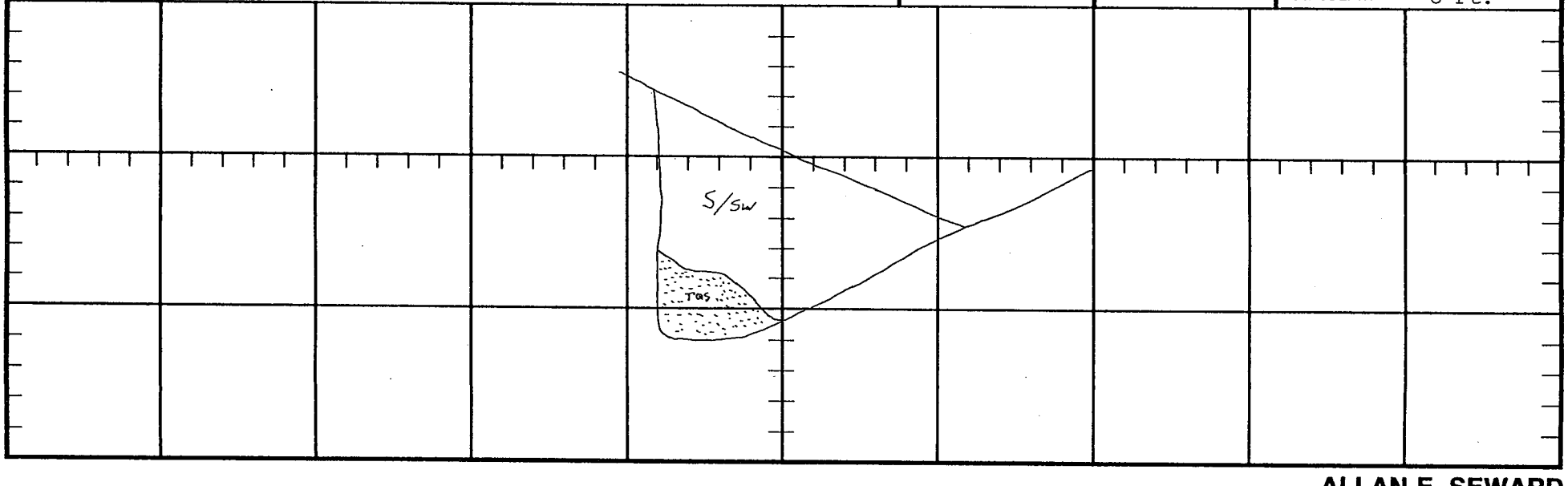
DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 5' SOIL/SLOPEWASH; s/sw, Medium to light reddish-brown fine- to coarse-grained silty pebbly sand; loose; dry			
5 - 8' BEDROCK; TQs, Tan to white medium- to coarse-grained pebbly sandstone; friable; moderately dense; dry	N60W,16NE		No Ground Water No Caving

SCALE 1" = 5'

N 6 W

TOTAL DEPTH 8 Ft.



ALLAN E. SEWARD

JOB NO. 98-1617-9

LOGGED BY VCG

Trench Log No. T-199

PROJECT V.T.T. 52584

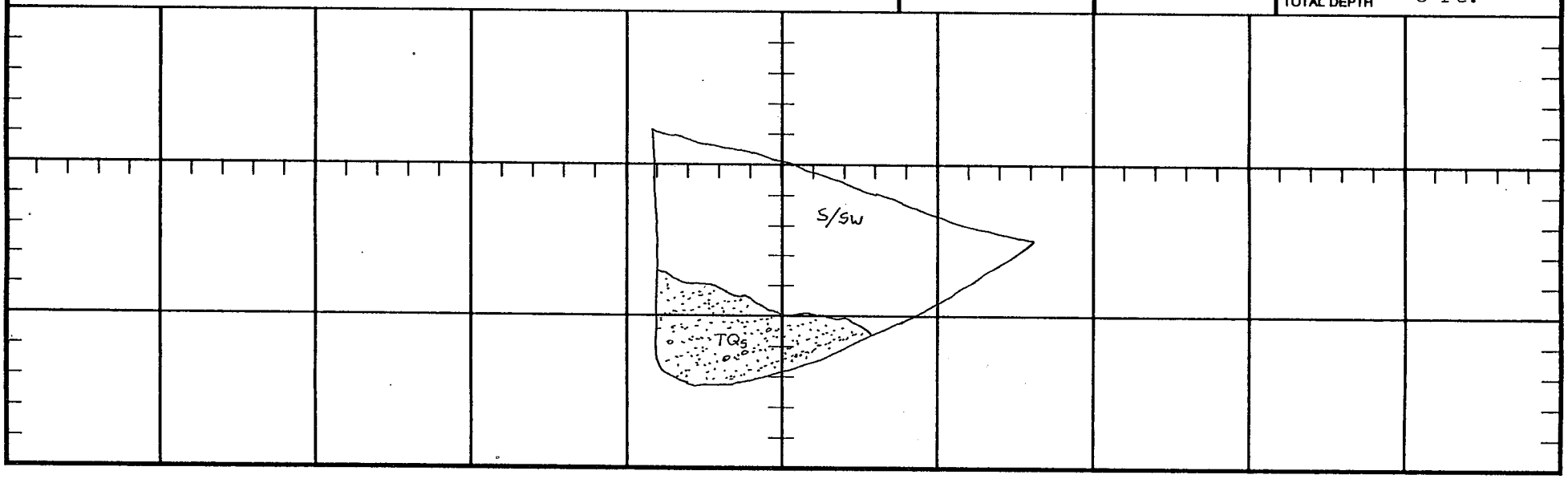
DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 4.5' SOIL/SLOPEWASH; s/sw, Medium to grayish-brown fine- to coarse-grained silty pebbly sand; loose; dry			
4.5 - 8' BEDROCK; TQs, Tan to light rusty brown medium- to coarse-grained pebbly sandstone; friable; and yellowish-tan pebble conglomerate stained with iron oxide; moderately dense; dry	N85W,11NE		
			No Ground Water No Caving

SCALE 1" = 5'

N 65 E

TOTAL DEPTH 8 Ft.



ALLAN E. SEWARD

JOB NO. 98-1617-9

PROJECT V.T.T. 52584

LOGGED BY VCG

Trench Log No. T-200

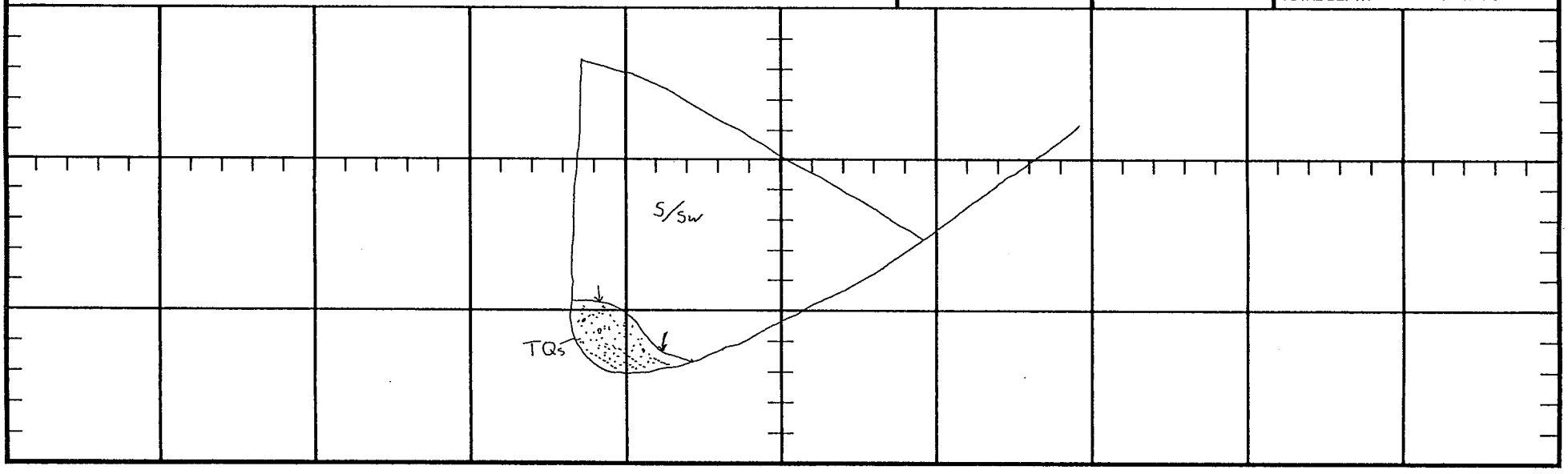
DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 8' SOIL/SLOPEWASH; s/sw, Medium to reddish-brown fine- to coarse-grained silty pebbly sand; loose; dry to damp			
8 - 10' BEDROCK; TQs, Reddish-brown fine- to medium-grained pebbly sandstone; moderately dense; well cemented; damp	B:N84E,23NW B:N55E,23NW		
			No Ground Water No Caving

SCALE 1" = 5'

N 58 W

TOTAL DEPTH 10 Ft.



ALLAN E. SEWARD

JOB NO. 98-1617-9

LOGGED BY VCG

Trench Log No. T-201

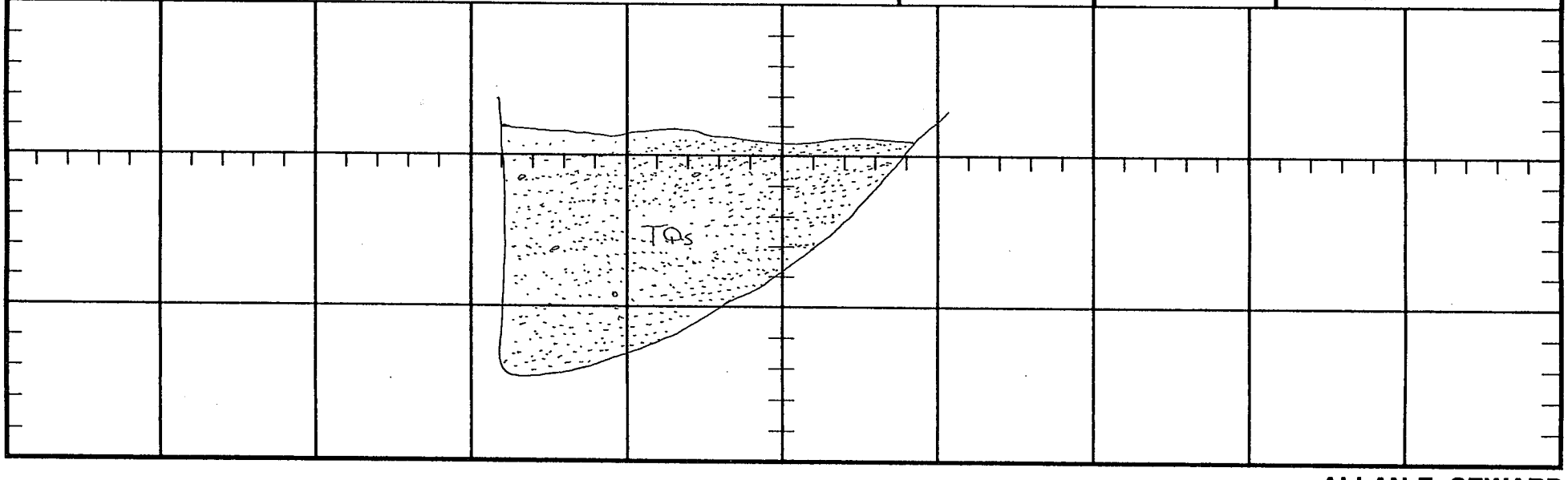
PROJECT V.T.T. 52584

DATE January 15, 1999

LITHOLOGY	BEDDING	OTHER	COMMENTS
0 - 8' BEDROCK; TQs, Tan medium- to coarse-grained pebbly sandstone with isolated pebble lenses; moderately hard; dry to damp	N64E,12NW approx. N84E,23NW		No Ground Water No Caving TOTAL DEPTH 8 Ft.

SCALE 1" = 5'

N 2 E



ALLAN E. SEWARD

TEST PIT LOG

TEST PIT T-202

PROJECT: Hasley Canyon Land Company, L.L.C.
T.T. 52584

JOB NO.: 98-1617-4
DATE: 1/15/99

EXCAVATING CONTRACTOR: Chuck Collins Excavating
EXCAVATION METHOD: Backhoe with a 24" Bucket
HAMMER TYPE:
DRIVING WEIGHT (lbs.): N/A
AVERAGE DROP (in.):
EXCAVATION DATE: 1/16/99
ELEVATION: 1382 apx
LOGGED BY: VCG

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	DRY DENSITY / MOISTURE	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
					SM	QUATERNARY ALLUVIUM; Qal (0 - 12 FT.) @ 0' Fine- to coarse-grained pebbly sand with silt; loose; damp; reddish-brown	
	■			116.0/9.3		@ 3' Medium dense	
5							
	■			116.6/6.5			
				115.6/4.5			
10	■					@ 9' Medium dense	
						@ 11' Scattered gravel	
	■			106.4/6.2		TOTAL DEPTH 12 Ft. (Elevation 1370) No Ground Water No Caving	@ 12' 3 rings only
15							
20							
25							
30							
35							

TEST PIT LOG

TEST PIT T-203

PROJECT: Hasley Canyon Land Company, L.L.C. **JOB NO.:** 98-1617-4
T.T. 52584 **DATE:** 1/15/99
EXCAVATING CONTRACTOR: Chuck Collins Excavating
EXCAVATION METHOD: Backhoe with a 24" Bucket
HAMMER TYPE: **DRIVING WEIGHT (lbs.):** N/A
AVERAGE DROP (in.): **EXCAVATION DATE:** 1/16/99
ELEVATION: 1350 apx **LOGGED BY:** VCG

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	DRY DENSITY / MOISTURE	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
				94.6/4.8	SM	SOIL; s (0 - 6 FT.) @ 0' Fine- to coarse-grained pebbly sand, loose; damp; medium-brown	
5				114.7/2.0		QUATERNARY ALLUVIUM; Qal (6 - 12 Ft.) @ 6' Fine- to coare-grained sand with pebbles, medium dense; damp; light reddish-brown	Removal = 8 ft.
10				108.3/7.7		@ 9' Scattered cobbles; medium dense	
				109.6/4.6		TOTAL DEPTH 12 Ft. (Elev. 1338) No Ground Water No Caving	
15							
20							
25							
30							
35							

TEST PIT LOG

TEST PIT T-204

PROJECT: Hasley Canyon Land Company, L.L.C.
T.T. 52584
JOB NO.: 98-1617-4
DATE: 1/15/99
EXCAVATING CONTRACTOR: Chuck Collins Excavating
EXCAVATION METHOD: Backhoe with a 24" Bucket
HAMMER TYPE:
DRIVING WEIGHT (lbs.): N/A
AVERAGE DROP (in.):
EXCAVATION DATE: 1/16/99
ELEVATION: 1320 apx
LOGGED BY: VCG

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	DRY DENSITY / MOISTURE	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
					SM	QUATERNARY ALLUVIUM; Qal (0 - 12 Ft.) @ 0' Fine- to coarse-grained silty pebbly sand, loose; damp; medium brown	
	■			109.7/2.9			
5							
	■			106.3/6.3			
						@ 8' Medium dense	
10	■			110.3/4.0		@ 9' Fine- to coarse-grained sand with scattered pebbles and minor silt; medium dense	Removals = 9 ft
	■			103.9/4.7		TOTAL DEPTH 12 Ft. (Elev. 1308) No Ground Water No Caving	
15							
20							
25							
30							
35							

TEST PIT LOG

TEST PIT T-205

PROJECT: Hasley Canyon Land Company, L.L.C.
T.T. 52584

JOB NO.: 98-1617-4
DATE: 1/15/99

EXCAVATING CONTRACTOR: Chuck Collins Excavating
EXCAVATION METHOD: Backhoe with a 24" Bucket
HAMMER TYPE:
DRIVING WEIGHT (lbs.): N/A
AVERAGE DROP (in.):
EXCAVATION DATE: 1/16/99
ELEVATION: 1312 apx
LOGGED BY: VCG

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	DRY DENSITY / MOISTURE	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
					SM	QUATERNARY ALLUVIUM; Qal (0 - 12 Ft.) @ 0' Fine- to coarse-grained pebbly sand with silt; loose; damp; medium to light brown	
	■			112.0/3.5		@ 3' Medium dense	
5							
	■			107.4/4.2		@ 6' Loose	
				109.2/6.5		@ 9' Medium dense	Removals = 9 Ft.
10	■						
	■			109.2/7.2		TOTAL DEPTH 12 Ft. (Elev. 1300) No Ground Water No Caving	
15							
20							
25							
30							
35							

TEST PIT LOG

TEST PIT T-206

PROJECT: Hasley Canyon Land Company, L.L.C.
T.T. 52584

JOB NO.: 98-1617-4
DATE: 1/15/99

EXCAVATING CONTRACTOR: Chuck Collins Excavating
EXCAVATION METHOD: Backhoe with a 24" Bucket
HAMMER TYPE:
DRIVING WEIGHT (lbs.): N/A
AVERAGE DROP (in.):
EXCAVATION DATE: 1/16/99
ELEVATION: 1357 apx
LOGGED BY: VCG

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	DRY DENSITY / MOISTURE	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
					SM	QUATERNARY ALLUVIUM; Qal (0 - 12 Ft.) @ 0' Fine- to coarse-grained pebbly sand with silt; loose; damp; medium brown	
	■			103.4/4.1			
5							
	■			106.2/4.3			@ 6' Bulk Sample Removals = 7 ft.
				101.5/6.1		@ 9' Loose; light reddish-brown	
10	■					BEDROCK; TQs (10 - 12 Ft.) @ 10' Rusty brown fine- to medium-grained silty sandstone, medium dense; damp	
	■			99.8/10.3		TOTAL DEPTH 12 Ft. (Elev. 1345) No Ground Water No Caving	
15							
20							
25							
30							
35							

TEST PIT LOG

TEST PIT T-207

PROJECT: Hasley Canyon Land Company, L.L.C. **JOB NO.:** 98-1617-4
T.T. 52584 **DATE:** 1/15/99
EXCAVATING CONTRACTOR: Chuck Collins Excavating
EXCAVATION METHOD: Backhoe with a 24" Bucket
HAMMER TYPE: **DRIVING WEIGHT (lbs.):** N/A
AVERAGE DROP (in.): **EXCAVATION DATE:** 1/16/99
ELEVATION: 1385 apx **LOGGED BY:** VCG

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	DRY DENSITY / MOISTURE	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
					SW-SM	QUATERNARY TERRACE; Qt (0 - 12 Ft.) @ 0' Medium brown fine- to coarse-grained pebbly sand with minor silt; loose; damp; medium brown	
	■						@ 3' No Recovery
5						@ 4' Light reddish-brown, less silt	
	■				SW	@ 6' Medium- to coarse-grained sand with pebbles; loose to medium dense	@ 6' No Recovery
10	■			107.3/2.2			Removals = 8 ft.
	■			106.4/4.9		TOTAL DEPTH 12 Ft. (Elev. 1373) No Ground Water No Caving	
15							
20							
25							
30							
35							

TEST PIT LOG

TEST PIT T-208

PROJECT: Hasley Canyon Land Company, L.L.C. **JOB NO.:** 98-1617-4
T.T. 52584 **DATE:** 1/15/99
EXCAVATING CONTRACTOR: Chuck Collins Excavating
EXCAVATION METHOD: Backhoe with a 24" Bucket
HAMMER TYPE: **DRIVING WEIGHT (lbs.):** N/A
AVERAGE DROP (in.): **EXCAVATION DATE:** 1/16/99
ELEVATION: 1442 apx **LOGGED BY:** VCG

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	DRY DENSITY / MOISTURE	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
					SM	ARTIFICIAL FILL; af (0 - 6 Ft.) @ 0' Fine- to coarse-grained silty sand with scattered pebbles; reddish- to medium-brown	
	■			105.2/4.5			
5							
	■			109.7/6.1		QUATERNARY ALLUVIUM; Qal (6 - 12 Ft.) @ 6' Fine- to coarse-grained silty pebbly sand with isolated pebbles, medium dense; damp	
10	■			112.2/8.4		@ 10' Less silt; medium dense	Removals = 10 Ft.
	■			114.7/5.0		TOTAL DEPTH 12 Ft. (Elev. 1430) No Ground Water No Caving	
15							
20							
25							
30							
35							

TEST PIT LOG

TEST PIT T-209

PROJECT: Hasley Canyon Land Company, L.L.C.
T.T. 52584

JOB NO.: 98-1617-4
DATE: 1/15/99

EXCAVATING CONTRACTOR: Chuck Collins Excavating
EXCAVATION METHOD: Backhoe with a 24" Bucket
HAMMER TYPE:
DRIVING WEIGHT (lbs.): N/A
AVERAGE DROP (in.):
EXCAVATION DATE: 1/16/99
ELEVATION: 1253 apx
LOGGED BY: VCG

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	DRY DENSITY / MOISTURE	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
					SM	QUATERNARY ALLUVIUM; Qal (0 - 12 Ft.) @ 0' Fine- to coarse-grained silty sand with pebbles; dry to damp; loose; medium brown	
	■			107.2/6.1			
5							
	■			118.7/5.3		@ 6' Medium dense	@ 6.5' Bulk Sample
10	■					@ 9' Medium dense, less silt; moist; reddish-brown @ 10' Cobbly	Removals = 9 Ft.
				113.2/5.3			
	■			110.3/5.4		TOTAL DEPTH 12 Ft. (Elev. 1241) No Ground Water No Caving	
15							
20							
25							
30							
35							

TEST PIT LOG

TEST PIT T-210

PROJECT: Hasley Canyon Land Company, L.L.C.
T.T. 52584

JOB NO.: 98-1617-4
DATE: 1/15/99

EXCAVATING CONTRACTOR: Chuck Collins Excavating
EXCAVATION METHOD: Backhoe with a 24" Bucket
HAMMER TYPE:
DRIVING WEIGHT (lbs.): N/A
AVERAGE DROP (in.):
EXCAVATION DATE: 1/16/99
ELEVATION: 1235 apx
LOGGED BY: VCG

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	DRY DENSITY / MOISTURE	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
					SM	QUATERNARY ALLUVIUM; Qal (0 - 12 Ft.) @ 0' Fine- to coarse-grained silty pebbly sand, dry to damp; loose; medium reddish-brown	
	■			109.5/4.1			
5							
	■			112.5/4.3		@ 6' Medium dense; light reddish-brown	Removals = 6-9 Ft.
						@ 8' Less silt	
10	■			119.9/3.9		@ 10' Scattered cobbles and gravel	
	■					TOTAL DEPTH 12 Ft. (Elev. 1323) No Ground Water No Caving	
15							
20							
25							
30							
35							

TEST PIT LOG

TEST PIT T-211

PROJECT: Hasley Canyon Land Company, L.L.C.
T.T. 52584

JOB NO.: 98-1617-4
DATE: 1/15/99

EXCAVATING CONTRACTOR: Chuck Collins Excavating
EXCAVATION METHOD: Backhoe with a 24" Bucket
HAMMER TYPE:
DRIVING WEIGHT (lbs.): N/A
AVERAGE DROP (in.):
EXCAVATION DATE: 1/16/99
ELEVATION: 1212 apx
LOGGED BY: VCG

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	DRY DENSITY / MOISTURE	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
				105.4/6.8	SW-SM	QUATERNARY ALLUVIUM; Qal (0 - 12 Ft.) @ 0' Fine- to coarse-grained silty pebbly sand; loose; damp	
5				106.9/7.6		@ 6' Medium dense	
				107.6/7.4		@ 8' Medium yellowish-brown	
10				106.7/7.5			@ 9' Bulk Sample Removals = 9 Ft.
15						TOTAL DEPTH 12 Ft. (Elev. 1200) No Ground Water No Caving	
20							
25							
30							
35							

TEST PIT LOG

TEST PIT T-212

PROJECT: Hasley Canyon Land Company, L.L.C. **JOB NO.:** 98-1617-4
T.T. 52584 **DATE:** 1/15/99
EXCAVATING CONTRACTOR: Chuck Collins Excavating
EXCAVATION METHOD: Backhoe with a 24" Bucket
HAMMER TYPE: **DRIVING WEIGHT (lbs.):** N/A
AVERAGE DROP (in.): **EXCAVATION DATE:** 1/16/99
ELEVATION: 1262 apx **LOGGED BY:** VCG

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	DRY DENSITY / MOISTURE	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
					SW-SM	SOIL/SLOPEWASH; s/sw (0 - 7 Ft.) @ 0' Fine- to coarse-grained pebbly sand with silt; isolated cobbles; loose; damp; medium- to light brown	
	■			105.1/4.6			@ 3' 2 rings only
5							
	■			112.1/3.3		@ 6' Medium dense, light yellowish-brown, less silt	
					SM	QUATERNARY ALLUVIUM; Qal (7 - 12 Ft.) @ 7' Fine- to coarse-grained silty pebbly sand, medium dense; damp; light yellow to rusty brown	
10	■			105.3/2.8		@ 9' Loose @ 10' Less Silt	Removals = 10 Ft.
	■			113.4/2.6		@ 12' Medium dense	
15						TOTAL DEPTH 12 Ft. (Elev. 1250) No Ground Water No Caving	
20							
25							
30							
35							

TEST PIT LOG

TEST PIT T-213

PROJECT: Hasley Canyon Land Company, L.L.C. **JOB NO.:** 98-1617-4
T.T. 52584 **DATE:** 1/15/99
EXCAVATING CONTRACTOR: Chuck Collins Excavating
EXCAVATION METHOD: Backhoe with a 24" Bucket
HAMMER TYPE: **DRIVING WEIGHT (lbs.):** N/A
AVERAGE DROP (in.): **EXCAVATION DATE:** 1/16/99
ELEVATION: 1283 apx **LOGGED BY:** VCG

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	DRY DENSITY / MOISTURE	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
					SM	SOIL/SLOPEWASH; s/sw (0 - 12 Ft.) @ 0' Fine- to coarse-grained silty pebbly sand; loose; damp; medium brown	
	■			108.5/3.2			@ 3' 5 rings only
5							
	■			104.5/3.7			@ 7' Bulk Sample
				105.2/4.5			@ 9' 4 rings only
10	■						
	■					TOTAL DEPTH 12 Ft. (Elev. 1271)	@ 12' No Recovery
15						No Ground Water No Caving	
20							
25							
30							
35							

TEST PIT LOG

TEST PIT T-214

PROJECT: Hasley Canyon Land Company, L.L.C. **JOB NO.:** 98-1617-4
T.T. 52584 **DATE:** 1/15/99
EXCAVATING CONTRACTOR: Chuck Collins Excavating
EXCAVATION METHOD: Backhoe with a 24" Bucket
HAMMER TYPE: **DRIVING WEIGHT (lbs.):** N/A
AVERAGE DROP (in.): **EXCAVATION DATE:** 1/16/99
ELEVATION: 1337 apx **LOGGED BY:** VCG

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	DRY DENSITY / MOISTURE	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
					SM	SOIL/SLOPEWASH; s/sw (0 - 11 Ft.) @ 0' Fine- to coarse-grained silty pebbly sand; loose; damp	
	■			96.9/6.9			
5						@ 4' Rusty brown	
	■			105.2/5.3			@ 6' 4 rings only
10	■			115.7/3.5		@ 9' Medium dense	
					SW	BEDROCK; TQs (11 - 11.5 Ft.) @ 11' Light rusty to tan fine- to coarse-grained sandstone and pebbly sandstone, moderately dense; damp	Removals = 11 Ft.
15						TOTAL DEPTH 11.5 Ft. (Elev. 1325.5) No Ground Water No Caving	
20							
25							
30							
35							

TEST PIT LOG

TEST PIT T-215

PROJECT: Hasley Canyon Land Company, L.L.C.
T.T. 52584

JOB NO.: 98-1617-4
DATE: 1/15/99

EXCAVATING CONTRACTOR: Chuck Collins Excavating
EXCAVATION METHOD: Backhoe with a 24" Bucket
HAMMER TYPE:
DRIVING WEIGHT (lbs.): N/A
AVERAGE DROP (in.):
EXCAVATION DATE: 1/16/99
ELEVATION: 1408 apx
LOGGED BY: VCG

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	DRY DENSITY / MOISTURE	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
					SW-SM	QUATERNARY TERRACE; Qt (0 - 12 Ft.) @ 0' Medium- to light reddish-brown fine- to coarse-grained silty pebbly sand, loose; damp,	
	■			105.1/4.2		@ 3' Yellowish to rusty brown - less silt	
5							
	■			109.7/4.1			
							Removals = 8 Ft.
10	■			111.4/6.5		@ 9' Medium dense; Medium- to dark reddish-brown, more silt; damp to moist,	
	■			112.8/5.2		@ 12' Medium brown minor silt TOTAL DEPTH 12 Ft. (Elev. 1396) No Ground Water No Caving	
15							
20							
25							
30							
35							

TEST PIT LOG

TEST PIT T-216

PROJECT: Hasley Canyon Land Company, L.L.C. **JOB NO.:** 98-1617-4
T.T. 52584 **DATE:** 1/15/99
EXCAVATING CONTRACTOR: Chuck Collins Excavating
EXCAVATION METHOD: Backhoe with a 24" Bucket
HAMMER TYPE: **DRIVING WEIGHT (lbs.):** N/A
AVERAGE DROP (in.): **EXCAVATION DATE:** 1/16/99
ELEVATION: 1468 apx **LOGGED BY:** VCG

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	DRY DENSITY / MOISTURE	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
					SW-SM	QUATERNARY ALLUVIUM; Qal (0 - 8 Ft.) @ 0' Fine- to coarse-grained silty pebbly sand; loose; damp; abundant roots; medium- to dark brown	
	■			104.6/5.9		@ 3' Light reddish-brown	
5							
	■			103.6/7.1			
						BEDROCK; TQs (8 - 12 Ft.) @ 8' Tan, medium- to coarse-grained silty sandstone; dense; damp; tan	Removals = 8 Ft.
10	■			102.9/10.5	SM		
						TOTAL DEPTH 12 Ft. (Elev. 1456) No Ground Water No Caving	No sample at 12 ft. due to bedrock
15							
20							
25							
30							
35							

TEST PIT LOG

TEST PIT T-217

PROJECT: Hasley Canyon Land Company, L.L.C.
T.T. 52584

JOB NO.: 98-1617-4
DATE: 1/15/99

EXCAVATING CONTRACTOR: Chuck Collins Excavating
EXCAVATION METHOD: Backhoe with a 24" Bucket
HAMMER TYPE:
DRIVING WEIGHT (lbs.): N/A
AVERAGE DROP (in.):
EXCAVATION DATE: 1/16/99
ELEVATION: 1475 apx
LOGGED BY: VCG

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	DRY DENSITY / MOISTURE	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
					SW-SM	QUATERNARY ALLUVIUM; Qal (0 - 12 Ft.) @ 0' Fine- to coarse-grained silty pebbly sand; loose; damp; medium to reddish-brown	
	■			107.4/3.1			
5							
	■			107.8/7.0		@ 6' Medium- to coarse-grained; medium dense	Removals = 6-7 Ft.
				119.1/6.4		@ 9' Medium dense	
10	■						
						TOTAL DEPTH 12 Ft. (Elev. 1463) No Ground Water No Caving	
15							
20							
25							
30							
35							

TEST PIT LOG

TEST PIT T-218

PROJECT: Hasley Canyon Land Company, L.L.C.
T.T. 52584

JOB NO.: 98-1617-4
DATE: 1/15/99

EXCAVATING CONTRACTOR: Chuck Collins Excavating
EXCAVATION METHOD: Backhoe with a 24" Bucket
HAMMER TYPE:
DRIVING WEIGHT (lbs.): N/A
AVERAGE DROP (in.):
EXCAVATION DATE: 1/16/99
ELEVATION: 1455 apx
LOGGED BY: VCG

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	DRY DENSITY / MOISTURE	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
					SW-SM	QUATERNARY ALLUVIUM; Qal (0 - 12 Ft.) @ 0' Fine- to coarse-grained pebbly sand with minor silt; loose; damp; reddish-brown	
	■			106.3/4.1			
5							@ 5' Bulk Sample
	■			104.9/5.8		@ 6' Medium- to coarse-grained; loose to medium dense	@ 6' 5 Rings only Removals = 6 Ft.
10	■			111.6/4.4		@ 9' Medium dense	
	■			108.2/4.3		@ 12' Tan TOTAL DEPTH 12 Ft. (Elev. 1443) No Ground Water No Caving	
15							
20							
25							
30							
35							

TEST PIT LOG

TEST PIT T-219

PROJECT: Hasley Canyon Land Company, L.L.C.
T.T. 52584

JOB NO.: 98-1617-4
DATE: 1/15/99

EXCAVATING CONTRACTOR: Chuck Collins Excavating
EXCAVATION METHOD: Backhoe with a 24" Bucket
HAMMER TYPE:
DRIVING WEIGHT (lbs.): N/A
AVERAGE DROP (in.):
EXCAVATION DATE: 1/16/99
ELEVATION: 1493 apx
LOGGED BY: VCG

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	DRY DENSITY / MOISTURE	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
					SW	ARTIFICIAL FILL; af (0 - 4 Ft.) @ 0' Fine- to coarse-grained sand and pebbly sand; loose; damp; medium brown QUATERNARY ALLUVIUM; Qal (4 - 13 Ft.) @ 4' Fine- to coarse-grained pebbly sand, medium dense; damp	Visual inspection indicates that the af/ Qal contact dips to the south side of the trench dictating a 12' removal
5							
10				122.4/4.3			
				106/4.8		TOTAL DEPTH 13 Ft. (Elev. 1480) No Ground Water No Caving	
15							
20							
25							
30							
35							

TEST PIT LOG

TEST PIT T-220

PROJECT: Hasley Canyon Land Company, L.L.C.
T.T. 52584
JOB NO.: 98-1617-4
DATE: 1/15/99
EXCAVATING CONTRACTOR: Chuck Collins Excavating
EXCAVATION METHOD: Backhoe with a 24" Bucket
HAMMER TYPE:
DRIVING WEIGHT (lbs.): N/A
AVERAGE DROP (in.):
EXCAVATION DATE: 1/16/99
ELEVATION: 1442 apx
LOGGED BY: VCG

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	DRY DENSITY / MOISTURE	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
					SW	SOIL/SLOPEWASH; s/sw (0 - 6 Ft.) @ 0' Fine- to coarse-grained pebbly sand; loose; dry to damp; medium to light brown	
	■			108.1/3.1			
5							
	■			107.0/2.9		QUATERNARY ALLUVIUM; Qal (6 - 12 Ft.) @ 6' Fine- to coarse-grained pebbly sand, loose; dry to damp; medium to dark brown	
	■			115.8/3.8		@ 9' Medium dense	@ 10' Bulk Sample
10							
	■			111.3/4.6		BEDROCK; TQsw @ 12' Rusty brown, fine- to coarse-grained pebbly sandstone; moderately dense; damp; rusty brown	Removal = 12 Ft.
15						TOTAL DEPTH 12 Ft. (Elev. 1430) No Ground Water No Caving	
20							
25							
30							
35							

DRILLING LOG

Project PETROMINERALS Boring No. B-1

Method of Drilling 24" Bucket Auger Logged by VCG Job No. 6-806-4

Elev. 1370 Location See Geologic Map Date 10/30/87

ATTITUDES	GRAPHIC LOG	LITHOLOGY	REMARKS
		RECENT ALLUVIUM; Qal (0 - 9 Ft.) @ 0 Ft. Light tannish- to reddish-brown, fine- to coarse-grained silty sand with scattered pebbles; loose to moderately dense; dry	Borings 1 through 2 drilled on 9/15/87
5			
		BEDROCK; TQs (9 - 26 Ft.) @ 9 Ft. Tan, medium- to coarse-grained pebble sandstone with silty sandstone interbeds; dense; damp	
10			
B:N83W, 32SW			
15		@ 17 Ft. Pebble conglomerate with sandstone interbeds; dense to very dense; damp	
20			
25		TOTAL DEPTH 26 Ft.	No Ground Water
30			
35			
40			
45			
50			

Sheet 1 of 1

B-Bedding; F-Fault; J-Joint;
SP-Slide Plane; St-Striation; f-fracture

ALLAN E. SEWARD

DRILLING LOG

Project PETROMINERALS Boring No. B-2

Method of Drilling 24" Bucket Auger Logged by VCG Job No. 6-806-4

Elev. 1360' Location See Geologic Map Date 10/30/87

ATTITUDES	GRAPHIC LOG	LITHOLOGY	REMARKS
		SLOPEWASH; Sw (0 - 13½ Ft.) @ 0 Ft. Light reddish-brown, fine- to coarse-grained silty sand with scattered pebbles; dry to damp; rootlets	
5			Sample @ 7 Ft.
10			
Mostly massive		BEDROCK; TQs (13½ - 24½ Ft.) @ 13½ Ft. Tannish-brown, fine- to coarse-grained silty sandstone with scattered pebbles; damp; massive	
15			
B:N73W, 34SW Ex.		@ 18 Ft. Orangish-brown pebbly sandstone with a silty sandstone interbed	
20		@ 21 Ft. Tannish-brown coarse-grained sandstone	
B:N72W, 35S Ex.			
25			
		TOTAL DEPTH 24½ Ft.	No Ground Water
30			
35			
40			
45			
50			

Sheet 1 of 1

B-Bedding; F-Fault; J-Joint;

ALLAN E. SEWARD

DRILLING LOG

Project PETROMINERALS Boring No. B-3

Method of Drilling 24" Bucket Auger Logged by VCG Job No. 6-806-4

Elev. 1412.0 Location See Geologic Map Date 10/30/87

ATTITUDES	GRAPHIC LOG	LITHOLOGY	REMARKS
		SLOPEWASH; Sw (0 - 9 Ft.) @ 2 Ft. Light to reddish-brown, fine- to medium-grained silty sand with scattered pebbles	Borings 3 through 9 drilled on 9/16/87
		BEDROCK; TQs (9 - 25 Ft.) @ 9 Ft. Yellowish-tan, medium- to coarse-grained sandstone with scattered pebbles; dense to very dense; damp; pebble interbeds @ 12 Ft. Silty sandstone interbed; 1 ft. thick @ 14 Ft. Pebble conglomerate upper contact gradational, lower contact irregular @ 15 Ft. Yellowish-tan sandy siltstone; very dense; damp @ 20 Ft. Light tan, fine- to medium-grained silty sandstone interbed; very dense; damp; 8" thick	
B:N72E, 42SE Approx.		TOTAL DEPTH 25 Ft.	

5 10 15 20 25 30 35 40 45 50

Sheet 1 of 1

B-Bedding; F-Fault; J-Joint;
SP-Slide Plane; St-Striation; f-fracture

ALLAN E. SEWARD

DRILLING LOG

Project PETROMINERALS Boring No. B-4

Method of Drilling 24" Bucket Auger Logged by VCG Job No. 6-806-4

Elev. 1407.0 Location See Geologic Map Date 10/30/87 (Rev. 1/15/99)

ATTITUDES	GRAPHIC LOG	LITHOLOGY	REMARKS
	S	SOIL; (0 - 3½ Ft.)	
		@ 0 Ft. Medium-brown, fine- to coarse-grained silty sand with scattered pebbles and cobbles	
5		QUATERNARY TERRACE; Qt (3½ - 20 Ft.)	
		@ 3½ Ft. Orangish-brown, medium- to coarse-grained sand with scattered pebbles and cobbles; damp to moist	
10	Qt		
		@ 13 Ft. Silty sand	
15			
		@ 17 Ft. Cobble lens	
20		@ 20 Ft. Siltier	
25		TOTAL DEPTH 20 Ft.	No Ground Water
30			
35			
40			
45			
50			

Sheet 1 of 1

B-Bedding; F-Fault; J-Joint;

ALLAN E. SEWARD

DRILLING LOG

Project PETROMINERALS Boring No. B-5

Method of Drilling 24" Bucket Auger Logged by VCG Job No. 6-806-4

Elev. 1394.0 Location See Geologic Map Date 10/30/87 (Rev. 1/15/99)

ATTITUDES	GRAPHIC LOG	LITHOLOGY	REMARKS
	S	SOIL; (0 - 4 Ft.) @ 0 Ft. Medium-brown, fine- to coarse-grained silty sand with scattered pebbles; loose; dry	
5	Qt	QUATERNARY TERRACE, Qt (4 - 15 Ft.) @ 4 Ft. Tannish-orange, fine- to medium-grained silty sand with scattered pebbles and cobbles; dense damp	
10		@ 10 Ft. less silt	
15		TOTAL DEPTH 15 Ft.	No Ground Water
20			
25			
30			
35			
40			
45			
50			

Sheet 1 of 1

B-Bedding; F-Fault; J-Joint;
SP-Slip Plane; St-Striation; f-fracture

ALLAN E. SEWARD

DRILLING LOG

Project PETROMINERALS Boring No. B-6

Method of Drilling 24" Bucket Auger Logged by VCG Job No. 6-806-4

Elev. 1366.0 Location See Geologic Map Date 10/30/87

ATTITUDES	GRAPHIC LOG	LITHOLOGY	REMARKS
		RECENT ALLUVIUM; Qal (0 - 8 Ft.) @ 0 Ft. Medium-brown, fine- to medium-grained silty sand with scattered pebbles; dry to damp; loose to dense @ 3 Ft. Cobble lense @ 6½ Ft. Orangish-brown, medium- to coarse-grained sand with scattered pebbles; moist; dense	
		TOTAL DEPTH 8 Ft.	No Ground Water

5 10 15 20 25 30 35 40 45 50

Sheet 1 of 1

B-Bedding; F-Fault; J-Joint;

ALLAN E. SEWARD

DRILLING LOG

Project PETROMINERALS Boring No. B-7

Method of Drilling 24" Bucket Auger Logged by VCG Job No. 6-806-4

Elev. 1364.0 Location See Geologic Map Date 10/30/87

ATTITUDES	GRAPHIC LOG	LITHOLOGY	REMARKS
		SOIL; (0 - 1½ Ft.) @ 0 Ft. Light brown, fine- to medium silty sand with scattered pebbles; loose; dry	
5		RECENT ALLUVIUM; Qal (1½ - 15 Ft.) @ 1½ Ft. Orangish-brown, fine- to coarse-grained silty sand with scattered pebbles; dense; dry to damp	
10			
		@ 13 Ft. Cobble lens	
15			
		TOTAL DEPTH 15 Ft.	No Ground Water
20			
25			
30			
35			
40			
45			
50			

Sheet 1 of 1

B-Bedding; F-Fault; J-Joint;

ALLAN E. SEWARD

DRILLING LOG

Project PETROMINERALS Boring No. B-8

Method of Drilling 24" Bucket Auger Logged by VCG Job No. 6-806-4

Elev. 1346.0 Location See Geologic Map Date 10/30/87

ATTITUDES	GRAPHIC LOG	LITHOLOGY	REMARKS
		SOIL; (0 - 3 Ft.) @ 0 Ft. Medium- to light-brown, fine- to coarse-grained silty sand with scattered pebbles; loose; dry RECENT ALLUVIUM; Qal (3 - 15 Ft.) @ 3 Ft. Orangish-brown, medium- to coarse-grained silty sand; moderately dense; damp @ 7 Ft. Cobbles @ 14 Ft. Coarse sand TOTAL DEPTH 15 Ft.	No Ground Water

5 10 15 20 25 30 35 40 45 50

Sheet 1 of 1 B-Bedding; F-Fault; J-Joint;

ALLAN E. SEWARD

DRILLING LOG

Project PETROMINERALS Boring No. B-9

Method of Drilling 24" Bucket Auger Logged by VCG Job No. 6-806-4

Elev. 1331.0 Location See Geologic Map Date 10/30/87

ATTITUDES	GRAPHIC LOG	LITHOLOGY	REMARKS
		SOIL; (0 - 3 Ft.) @ 0 Ft. Light-brown, fine- to coarse-grained silty sand with scattered pebbles; dry; loose	
5		RECENT ALLUVIUM; Qal (3 - 15 Ft.) @ 3 Ft. Tannish-brown, fine- to coarse-grained sand with isolated pebbles; moderately dense; dry to damp	
10		@ 7 ft. Cobble lens @ 8 Ft. Medium- to orangish-brown medium-grained sand	
		@ 13 Ft. Pebbly sand	Drill hard @ 13 ft.
15			
		TOTAL DEPTH 15 Ft.	No Ground Water
20			
25			
30			
35			
40			
45			
50			

Sheet 1 of 1 B-Bedding; F-Fault; J-Joint;

ALLAN E. SEWARD

DRILLING LOG

Project PETROMINERALS Boring No. B-10

Method of Drilling 24" Bucket Auger Logged by VCG Job No. 6-806-4

Elev. 1248.0 Location See Geologic Map Date 10/30/87

ATTITUDES	GRAPHIC LOG	LITHOLOGY	REMARKS
		SOIL; (0 - 2 Ft.) @ 0 Ft. Light-brown, fine- to medium-grained silty sand with isolated pebbles; loose; dry	Borings 10 through 13 drilled on 9/17/87
5		SLOPEWASH; Sw (2 - 14 Ft.) @ 2 Ft. Medium- to reddish-brown, fine- to coarse-grained silty sand with scattered pebbles; moderately dense; damp	
10			
		BEDROCK; TQs (14 - 31 Ft.) @ 14 Ft. Light tannish-brown, medium to coarse-grained pebbly sandstone and silty sandstone; dense; damp	
15			Drills hard @ 15 Ft.
Massive			Bedding vertical?
20			
F:N81W, 43N			Gouge - 1/8" thick Dark brown clay Slicks not well defined
F:N70E, 90			
25			
B:N87W, 90			Bedding vertical
30		TOTAL DEPTH 31 Ft.	No Ground Water
35			
40			
45			
50			

Sheet 1 of 1

B-Bedding; F-Fault; J-Joint;

ALLAN E. SEWARD

DRILLING LOG

Project PETROMINERALS Boring No. B-11

Method of Drilling 24" Bucket Auger Logged by VCG Job No. 6-806-4

Elev. 1242.0 Location See Geologic Map Date 10/30/87

ATTITUDES	GRAPHIC LOG	LITHOLOGY	REMARKS
		SOIL; (0 - 4 Ft.) @ 0 Ft. Light-brown, fine- to coarse-grained silty sand with scattered pebbles; loose; dry	
		SLOPEWASH; Sw (4 - 12 Ft.) @ 4 Ft. Orangish-brown, fine- to coarse silty sand with scattered pebbles and cobbles; moderately dense to dense; dry to damp	Numerous cobbles at base of Sw
		BEDROCK; TQs (12 - 24 Ft.) @ 12 Ft. Pebble conglomerate	
B:Massive F:N71W, 39NW		@ 14 Ft. Silty sandstone interbed; gradational contact @ 16 Ft. Fine- to medium-grained sandstone	Gouge - ¼" thick; looks like normal movement?
		@ 19 Ft. Sandy siltstone; upper contact gradational	
		TOTAL DEPTH 24 Ft.	No Ground Water

5 10 15 20 25 30 35 40 45 50

Sheet 1 of 1

B-Bedding; F-Fault; J-Joint;

ALLAN E. SEWARD

DRILLING LOG

Project PETROMINERALS Boring No. B-12

Method of Drilling 24" Bucket Auger Logged by VCG Job No. 6-806-4

Elev. 1249.0 Location See Geologic Map Date 10/30/87

ATTITUDES	GRAPHIC LOG	LITHOLOGY	REMARKS
		SOIL; (0 - 5 Ft.) @ 0 Ft. Light grayish-brown, fine- to coarse silty sand; loose; dry	
5		RECENT ALLUVIUM; Qal (5 - 20 Ft.) @ 5 Ft. Yellowish-tan, fine- to coarse-grained silty sand with scattered pebbles; moderately dense; dry to damp	Caving @ 5 - 7 Ft.
10		@ 8 Ft. Medium- to orangish-brown; moist @ 9 Ft. cobble lense	
15			
20		TOTAL DEPTH 20 Ft.	No Ground Water
25			
30			
35			
40			
45			
50			

Sheet 1 of 1

B-Bedding; F-Fault; J-Joint;
gp-Slip Plane, St-Striation, f-fracture

ALLAN E. SEWARD

DRILLING LOG

Project PETROMINERALS Boring No. B-13

Method of Drilling Bucket Auger 24" Logged by VCG Job No. 6-806-4

Elev. 1303.0 Location See Geologic Map Date 10/30/87

ATTITUDES	GRAPHIC LOG	LITHOLOGY	REMARKS
		SOIL; (0 - 3 Ft.)	
		@ 0 Ft. Light grayish-brown, fine- to coarse-grained silty sand with scattered pebbles	2 - 5 Ft. Caving Very dry @ 3 - 5 Ft.
5		RECENT ALLUVIUM; Qal (3 - 15 Ft.)	
		@ 3 Ft. Tannish-brown, fine- to coarse-grained silty pebbly sand; loose to moderately dense; dry	
10		@ 8 Ft. Orangish-brown, medium- to coarse-grained sand with scattered pebbles; damp to moist	
15		@ 15 Ft. Cobble lense	
20		TOTAL DEPTH 15 Ft.	No Ground Water
25			
30			
35			
40			
45			
50			

Sheet 1 of 1

B-Bedding; F-Fault; J-Joint;
SP-Slide Plane; St-Striation; f-fracture

ALLAN E. SEWARD

DRILLING LOG

Project PETROMINERALS Boring No. B-14

Method of Drilling 24" Bucket Auger Logged by VCG Job No. 6-806-4

Elev. 1333.0 Location See Geologic Map Date 10/30/87

ATTITUDES	GRAPHIC LOG	LITHOLOGY	REMARKS
		SOIL; (0 - 5 Ft.) @ 0 Ft. Grayish-brown, fine- to coarse-grained pebbly sand with scattered cobbles; dry; loose	Borings 14 through 18 drilled on 9/18/87
5		RECENT ALLUVIUM; Qal (5 - 25 Ft.) @ 5 Ft. Reddish-brown coarse-grained sand with scattered pebbles; moist; dense	
10			
15			
20			
25		TOTAL DEPTH 25 Ft.	No Ground Water
30			
35			
40			
45			
50			

Sheet 1 of 1

B-Bedding; F-Fault; J-Joint;
SP-Slide Plane; St-Striation; f-fracture

ALLAN E. SEWARD

DRILLING LOG

Project PETROMINERALS Boring No. B-15

Method of Drilling 24" Bucket Auger Logged by VCG Job No. 6-806-4

Elev. 1319.0 Location See Geologic Map Date 10/30/87

ATTITUDES	GRAPHIC LOG	LITHOLOGY	REMARKS
		SOIL; (0 - 4 Ft.) @ 0 Ft. Grayish-brown, fine- to coarse-grained silty sand with scattered pebbles; loose; dry	
5		RECENT ALLUVIUM; Qal (4 - 20 Ft.) @ 4 Ft. Orangish-brown, fine- to coarse-grained pebbly sand with scattered cobbles; moderately dense; damp	
10		@ 6 Ft. Dark-brown, fine- to medium silty sand with scattered pebbles; moist; moderately dense	
		@ 12 Ft. Yellowish-brown, sandy silt with scattered pebbles; dense; mottled; moist	
15		@ 17 Ft. Light yellowish-brown	
20			
		TOTAL DEPTH 20 Ft.	No Ground Water
25			
30			
35			
40			
45			
50			

Sheet 1 of 1

B-Bedding; F-Fault; J-Joint;
SP-Slide Plane; St-Striation; f-fracture

ALLAN E. SEWARD

DRILLING LOG

Project PETROMINERALS Boring No. B-16

Method of Drilling 24" Bucket Auger Logged by VCG Job No. 6-806-4

Elev. 1279.0 Location See Geologic Map Date 10/30/87

ATTITUDES	GRAPHIC LOG	LITHOLOGY	REMARKS
		SOIL; (0 - 4½ Ft.) @ 0 Ft. Grayish-brown, fine- to coarse-grained silty sand with scattered pebbles; loose; dry RECENT ALLUVIUM; Qal (4½ - 27 Ft.) @ 4½ Ft. Medium-brown, fine- to coarse-grained silty sand with scattered pebbles; moderately dense; damp	
		@ 23 Ft. Orangish-brown; 10% voids; moist	
		@ 26 Ft. Pebbly sand; dense	
		TOTAL DEPTH 27 Ft.	No Ground Water

5 10 15 20 25 30 35 40 45 50

Sheet 1 of 1

B-Bedding; F-Fault; J-Joint;
SP-Slide Plane; St-Striation; f-fracture

ALLAN E. SEWARD

DRILLING LOG

Project PETROMINERALS Boring No. B-17

Method of Drilling 24" Bucket Auger Logged by VCG Job No. 6-806-5

Elev. 1412.0 Location See Geologic Map Date 10/30/87 (Rev. 1/15/99)

ATTITUDES	GRAPHIC LOG	LITHOLOGY	REMARKS
	S	SOIL; (0 - 3 Ft.) @ 0 Ft. Grayish-brown, fine- to coarse-grained silty sand with scattered pebbles; loose; dry	
5	Qt	QUATERNARY TERRACE; Qt (3 - 24½ Ft.) @ 3 Ft. Medium-brown, fine- to medium-grained silty sand with isolated pebbles; damp	
10			
			@ 12 Ft. Moist
15			
20		@ 20 Ft. Reddish-brown, clayey silt	
Massive		@ 23 Ft. Yellowish-brown, sandy silt	
25		BEDROCK; TQs (24½ - 44 Ft.) @ 24½ Ft. Medium-brown, sandy siltstone; very dense @ 27 Ft. Pebble cobble conglomerate	
30	TQs		
B:N85W, 27SW		@ 32 Ft. Coarse-grained sandstone; FeOx @ 33 Ft. Silt interbed, 8" thick	
35		@ 35 Ft. Pebbly sandstone upper contact gradational	
B: 87W, 28SW Ex.		@ 37½ Ft. Silty sandstone; very dense; damp	
40			
		TOTAL DEPTH 44 Ft.	
45			
50			

Sheet 1 of 1

B-Bedding; F-Fault; J-Joint;
SP-Slide Plane; St-Striation; f-fracture

ALLAN E. SEWARD

DRILLING LOG

Project PETROMINERALS Boring No. B-18

Method of Drilling 24" Bucket Auger Logged by VCG Job No. 6-806-4

Elev. 1264.0 Location See Geologic Map Date 10/30/87

ATTITUDES	GRAPHIC LOG	LITHOLOGY	REMARKS
		SOIL; (0 - 3 Ft.) @ 0 Ft. Grayish-brown, fine- to coarse-grained silty sand with isolated pebbles; loose; dry	
5		SLOPEWASH; Sw (3 - 17 Ft.) @ 3 Ft. Orangish- to medium-brown fine- to coarse-grained silty sand with scattered pebbles and cobbles; moderately dense to dense; damp	
10			
15			
		RECENT ALLUVIUM; Qal (17 - 37 Ft.) @ 17 Ft. Tannish-brown, medium- to coarse-grained pebbly sand; moderately dense to dense; damp	Drills hard @ 17 Ft.
20			
25			
30			
35		TOTAL DEPTH 37 Ft.	
40			
45			
50			

Sheet 1 of 1

B-Bedding; F-Fault; J-Joint;
SP-Slide Plane; St-Striation; f-fracture

ALLAN E. SEWARD

DRILL HOLE LOG

BORING NO. BA-1

PROJECT: Hasley Canyon Land Company, L.L.C.
T.T. 52584

JOB NO.: 98-1617-4
DATE: 1/15/99

DRILLING COMPANY/DRILLER: Tri Valley Drilling
METHOD OF DRILLING/HOLE DIAMETER (in.) 24" Bucket-Auger
HAMMER TYPE: Kelly **AVERAGE DROP (in.):** 12"
DRIVING WEIGHTS: 0-30 (3450 lbs.), 30-60' (2050 lbs.), 60-87' (1140 lbs.),
ELEVATION: 1286 **LOGGED BY:** VCG

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	ATTITUDES, DRY DENSITY (pcf)/ MOISTURE CONTENT (%)	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
						QUATERNARY LANDSLIDE; Qls (0 - 70 Ft.) Light rusty- to reddish-brown fine- to coarse-grained silty pebbly sandstone and sandy siltstone; no distinct sedimentary structures; moist; soft to moderately hard	Drilled 9/23/98 and downhole logged 9/24/98
	■	1 2		117/10.7			
5	■	1 2	Qls	118/11.5•			@ 5' Fines= 52%
				B:N80E,31SE approx.		@ 6' Greenish-gray fine- to coarse-grained sandstone and pebbly sandstone; vague bedding	@ 4-35' moderately fractured and faulted with 0-8" offsets. Minor fault stringers
				F:N78E,51SE			
10	■	1 2		117/13.7		@ 10.6' Reddish-brown to dark gray to charcoal sandy siltstone, grades to reddish-brown clayey siltstone; soft to moderately hard	@ 10' Saved extra ring sample
						@ 11' Silty sandstone	
				B:N37W,8SW		@ 13' Jumbled chaotic reddish-brown silty sandstone clasts within a fine- to medium-grained pebbly sandstone matrix	
15						@ 15.5' Reddish-brown siltstone with minor sand; minor faults and fractures with caliche in fracture surfaces	
				F:N60W,77SW		@ 19' Fine- to coarse-grained pebbly sandstone	
20	■	1 2		114/15.4			
25							
						@ 27.5' Minor silt within pebbly sandstone @ 28' Pebble conglomerate lens	
30	■	6 7		127/7.6			@ 30':Fines= 25%
						@ 32' Reddish-brown silty sandstone	
						@ 33' Pebble conglomerate with isolated cobbles	
35						@ 35' Reddish-brown fine- to coarse-grained sandstone with isolated cobbles	
						@ 37.5' Cobble conglomerate with interbeds of coarse-	

DRILL HOLE LOG

BORING NO. BA-1

PROJECT: Hasley Canyon Land Company, L.L.C. **JOB NO.:** 98-1617-4
T.T. 52584 **DATE:** 1/15/99
DRILLING COMPANY/DRILLER: Tri Valley Drilling
METHOD OF DRILLING/HOLE DIAMETER (in.) 24" Bucket-Auger
HAMMER TYPE: Kelly **AVERAGE DROP (in.):** 12"
DRIVING WEIGHTS: 0-30 (3450 lbs.), 30-60' (2050 lbs.), 60-87' (1140 lbs.),
ELEVATION: 1286 **LOGGED BY:** VCG

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	ATTITUDES, DRY DENSITY (pcf)/ MOISTURE CONTENT (%)	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
						grained tan to gray sandstone; friable	
40		7 9/5"		116/3.6			
45							
			Qls	B:N87E,8SE			
50		4 8		118/3.8		@ 49' Sandstone lens	
				B:N78W,32SW			
55						@ 54.5' Reddish-brown sandy siltstone/silty sandstone	
				SS:N79W,4SW		@ 56' Slip surface; light reddish-brown clayey siltstone; 1/2" thick; minor striations downdip	@ 57' Fault has normal offset
				F:N72W,62SW		@ 56.1 Rusty brown sandstone with minor silt @ 57' Fault: gouge; light brown fine- to medium-grained silty sandstone	
60		7 17		113/4.1		@ 57.5' Pebble conglomerate	
						@ 62' Interbeds of grey to light brown coarse-grained pebbly sandstone @ 63' Fault; normal movement; no gouge	
65							
						@ 66' Tan medium-grained sandstone; many minor faultlets	
70				108/20.1 SP:N86E,10NW		@ 69.7' Slideplane; 1-6" thick medium to light brown "fat clay"; portion of the fat clay has been squeezed up.	@ 69.7' - 3 ring samples (hand driven)
			TQs	B:N88E,11SE		BEDROCK; TQs (70 - 85 Ft.) @ 70' Light brown to rust fine- to medium-grained micaceous sandstone; hard; damp; no fractures, bedded	@ 69.7':Fines =94% LL=67 PI=45
75				103/18.9		@ 75.4' Medium- to dark-brown silty claystone/ clayey/siltstone some iron oxide staining charcoal present (bedding plane)	@ 75.4' - 3 ring samples (hand driven)

DRILL HOLE LOG

BORING NO. BA-1

PROJECT: Hasley Canyon Land Company, L.L.C.
T.T. 52584

JOB NO.: 98-1617-4
DATE: 1/15/99

DRILLING COMPANY/DRILLER: Tri Valley Drilling
METHOD OF DRILLING/HOLE DIAMETER (in.) 24" Bucket-Auger
HAMMER TYPE: Kelly **AVERAGE DROP (in.):** 12"
DRIVING WEIGHTS: 0-30 (3450 lbs.), 30-60' (2050 lbs.), 60-87' (1140 lbs.),
ELEVATION: 1286 **LOGGED BY:** VCG

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	ATTITUDES, DRY DENSITY (pcf)/ MOISTURE CONTENT (%)	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
				B:N84W,10SW B:N86E,8SE		@ 75.6' Siltstone and sandy siltstone with minor clay @ 76.5' Dark brown to green to gray sandy siltstone with minor clay; micaceous; damp; moist to wet; some iron oxide staining;	@ 75.4': Fines=95% LL=64 PI=36
80				110/20.9			
85	■	42 64		108/7.4		TOTAL DEPTH 85 Ft. (Elev. 1201.0) No Ground Water No Caving Slide Plane 69.7 Ft. (Elev. 1216.3)	
90							
95							
100							
105							
110							
115							

DRILL HOLE LOG

BORING NO. BA-2

PROJECT: Hasley Canyon Land Company, L.L.C. **JOB NO.:** 98-1617-4
T.T. 52584 **DATE:** 1/15/99
DRILLING COMPANY/DRILLER: Tri Valley Drilling
METHOD OF DRILLING/HOLE DIAMETER (in.) 24" Bucket-Auger
HAMMER TYPE: Kelly **AVERAGE DROP (in.):** 12"
DRIVING WEIGHTS: 0-30 (3450 lbs.), 30-60' (2050 lbs.), 60-87' (1140 lbs.),
ELEVATION: 1653 **LOGGED BY:** VCG

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	ATTITUDES, DRY DENSITY (pcf)/ MOISTURE CONTENT (%)	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
						BEDROCK; TQs, (0 - 118 Ft.) Medium- to reddish-brown fine- to medium-grained silty sandstone with isolated pebbles and coarse-sand; moderately hard; damp; bedded	Drilled 9/28/98 and logged 9/29/98
5			TQs				
10				B:N52E,26SE		@ 10.5' No pebbles, minor lenses of fine- to medium- grained micaceous sandstone	
15				B:N61E,30SE		@ 14.4' 1/4" thick reddish-brown clayey siltstone within silty sandstone @ 16' Tan to gray fine- to coarse-grained sandstone	
20				B:N72E,30SE		@ 19' 1/8" thick clayey siltstone interbed @ 20' Grades to a reddish-brown to tan fine- to coarse-grained pebbly sandstone; friable; damp; well bedded	
25							
	■	5 8		B:N68E,28SE 112/3.2		@ 28' Pebble conglomerate lenses	
30						@ 30' Medium- to coarse-grained friable sandstone with isolated cobbles	
				B:N33E,31SE			
35							

DRILL HOLE LOG

BORING NO. BA-2

PROJECT: Hasley Canyon Land Company, L.L.C. **JOB NO.:** 98-1617-4
T.T. 52584 **DATE:** 1/15/99
DRILLING COMPANY/DRILLER: Tri Valley Drilling
METHOD OF DRILLING/HOLE DIAMETER (in.) 24" Bucket-Auger
HAMMER TYPE: Kelly **AVERAGE DROP (in.):** 12"
DRIVING WEIGHTS: 0-30 (3450 lbs.), 30-60' (2050 lbs.), 60-87' (1140 lbs.),
ELEVATION: 1653 **LOGGED BY:** VCG

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	ATTITUDES, DRY DENSITY (pcf)/ MOISTURE CONTENT (%)	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
				B:N88E,26SE			
40							
45							
50						@ 51' Cobble and pebble conglomerate with interbeds of coarse-grained sandstone and pebbly sandstone	
55							
							@ 58' Switched to the coring bucket for approx. 20 minutes
60				B:N64E,30SE			
				109/18.9		@ 62' Reddish-brown silty claystone/clayey siltstone and a 1/2 inch thick seam of "fat clay" (bedding plane?) within a fine- to medium-grained silty sandstone; moist	@ 62'-3 hand driven ring samples of fat clay
	■	21 39		130/10.1			
65							
						@ 67' Scattered pebbles	
70						@ 70' Reddish-brown sandy siltstone and siltstone	
						@ 72' Fine- to medium-grained sandstone	
75						@ 75' Fine- to coarse-grained pebbly sandstone	

DRILL HOLE LOG

BORING NO. BA-2

PROJECT: Hasley Canyon Land Company, L.L.C. **JOB NO.:** 98-1617-4
T.T. 52584 **DATE:** 1/15/99
DRILLING COMPANY/DRILLER: Tri Valley Drilling
METHOD OF DRILLING/HOLE DIAMETER (in.) 24" Bucket-Auger
HAMMER TYPE: Kelly **AVERAGE DROP (in.):** 12"
DRIVING WEIGHTS: 0-30 (3450 lbs.), 30-60' (2050 lbs.), 60-87' (1140 lbs.),
ELEVATION: 1653 **LOGGED BY:** VCG

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	ATTITUDES, DRY DENSITY (pcf)/ MOISTURE CONTENT (%)	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
						@ 77' Cobble conglomerate with friable sandstone interbeds	
80				B:N75E,29SE			
85							
				B:N77E,35SE B:N68E,32SE		@ 87' Silty sandstone/sandy siltstone with minor clay; moist	
90							
						@ 91' Reddish-brown silty sandstone with isolated pebbles	
95							
				B:N71E,32SE		@ 96' Tan to gray fine- to coarse-grained pebbly sandstone interbed	
100						@ 99' Pebbly sandstone and pebble conglomerate with minor lenses of fine- to medium-grained friable sandstone	
				B:N79E,30SE			
105							
				B:N85E,28SE			
110						@ 110' Mostly coarse-grained sandstone with scattered pebbles	
115							

DRILL HOLE LOG

BORING NO. BA-2

PROJECT: Hasley Canyon Land Company, L.L.C.
T.T. 52584

JOB NO.: 98-1617-4
DATE: 1/15/99

DRILLING COMPANY/DRILLER: Tri Valley Drilling
METHOD OF DRILLING/HOLE DIAMETER (in.) 24" Bucket-Auger
HAMMER TYPE: Kelly **AVERAGE DROP (in.):** 12"
DRIVING WEIGHTS: 0-30 (3450 lbs.), 30-60' (2050 lbs.), 60-87' (1140 lbs.),
ELEVATION: 1653 **LOGGED BY:** VCG

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	ATTITUDES, DRY DENSITY (pcf)/ MOISTURE CONTENT (%)	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
				B:N82E,33SE		TOTAL DEPTH 118 Ft. (Elev. 1535) No Ground Water No Caving	
120							
125							
130							
135							
140							
145							
150							

DRILL HOLE LOG

BORING NO. BA-3

PROJECT: Hasley Canyon Land Company, L.L.C.
T.T. 52584

JOB NO.: 98-1617-4
DATE: 1/15/99

DRILLING COMPANY/DRILLER: Tri Valley Drilling
METHOD OF DRILLING/HOLE DIAMETER (in.) 24" Bucket-Auger
HAMMER TYPE: Kelly **AVERAGE DROP (in.):** 12"
DRIVING WEIGHTS: 0-30 (3450 lbs.), 30-60' (2050 lbs.), 60-87' (1140 lbs.),
ELEVATION: 1554 **LOGGED BY:** VCG

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	ATTITUDES, DRY DENSITY (pcf)/ MOISTURE CONTENT (%)	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
						QUATERNARY LANDSLIDE; Qls (0 - 20.5 Ft.) Medium to light to reddish-brown fine- to coarse-grained sand with isolated pebbles; loose, friable, roots present to 7 ft.	Drilled and logged 9/30/98
	■	3 2		112/2.5			
5	■	2 1		110/5.3			@ 5':Fines= 14%
				B:N2W,17NE		@ 6' Damp @ 6.5' Reddish-brown fine- to coarse-grained sandstone; no sedimentary structures, friable; jumbled @ 8' Vague bedding, discontinuous	
10			Qls	117/4.4			@ 10':Fines= 10%
15							
20						@ 20.4' Base of landslide; no distinct slide plane; gradational into the in place bedrock	
	■	7 20		B:N72E,32SE 118/3.7		BEDROCK; TQs (20.5 to 43 ft.) @ 20.5' Tan to light brown fine- to coarse-grained pebbly sandstone and pebble conglomerate; friable; moderately hard; bedded	
25			TQs			@ 25.5' Light brown silty sandstone interbed (4" thick)	
				B:N72W,30SW			
30	■	9 25		B:N82E,29SE 119/3.7		@ 31' Thin pebble lenses	
35							

DRILL HOLE LOG

BORING NO. BA-3

PROJECT: Hasley Canyon Land Company, L.L.C.
T.T. 52584

JOB NO.: 98-1617-4
DATE: 1/15/99

DRILLING COMPANY/DRILLER: Tri Valley Drilling
METHOD OF DRILLING/HOLE DIAMETER (in.) 24" Bucket-Auger
HAMMER TYPE: Kelly **AVERAGE DROP (in.):** 12"
DRIVING WEIGHTS: 0-30 (3450 lbs.), 30-60' (2050 lbs.), 60-87' (1140 lbs.),
ELEVATION: 1554 **LOGGED BY:** VCG

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	ATTITUDES, DRY DENSITY (pcf)/ MOISTURE CONTENT (%)	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
40	■	13 40		122/2.4			
						TOTAL DEPTH 43 Feet (Elev. 1511) No Ground Water No Caving	
45							
50							
55							
60							
65							
70							
75							

DRILL HOLE LOG

BORING NO. BA-4

PROJECT: Hasley Canyon Land Company, L.L.C. **JOB NO.:** 98-1617-4
T.T. 52584 **DATE:** 1/15/99
DRILLING COMPANY/DRILLER: Tri Valley Drilling
METHOD OF DRILLING/HOLE DIAMETER (in.) 24" Bucket-Auger
HAMMER TYPE: Kelly **AVERAGE DROP (in.):** 12"
DRIVING WEIGHTS: 0-30 (3450 lbs.), 30-60' (2050 lbs.), 60-87' (1140 lbs.),
ELEVATION: 1337 **LOGGED BY:** VCG

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	ATTITUDES, DRY DENSITY (pcf)/ MOISTURE CONTENT (%)	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
						BEDROCK; TQs (0 - 108 Ft.) Tan fine- to coarse-grained sandstone and pebbly sandstone; moderately hard, slightly friable, moist	Drilled 9/30/98 and downhole logged 10/1/98 @ 0' Backfilled listric fracture no offset
	■	2 4		Frac:N30E,59NW 114/17.1		@ 4' Silty sandstone and sandy siltstone	
5	■	2 4		118/14.6		@ 5' Pebbly sandstone; roots to 7 feet	
				B:N51W,11NE		@ 7' Reddish-brown to gray sandy siltstone with minor clay bedding seams	
10	■	3 3	TQs	115/15.7			@ 10':Fines= 69%
				B:N7W,12NE		@ 11.6' 1/8" fat clay seam within reddish-brown siltstone	Hand driven ring sample at 11.6' (3-rings) @ 11.6':Fines= 93% LL=54 PI=31
				B:N64W,8NE		@ 12.5' Gray to tan medium- to coarse-grained sandstone with pebbles; bedded	
15							
20				B:N83W,11NE 111/19.2		@ 19.5' Alternating reddish-brown to grayish-green silty sandstone and sandy siltstone with minor clay @ 20.4' 1/4" fat clay seam within sandy siltstone	@ 20':Fines= 83% Hand driven ring sample @ 20.4' (3-rings)
25						@ 25' Gray to tan fine- to coarse-grained pebbly sandstone	@ 24':Fines= 74%
				B:N85E,9NW		@ 27,7' Moderate brown to reddish-brown silty sandstone interbed	
30	■	10 22		121/7.9		@ 33' Gray pebble conglomerate with medium- to coarse-grained sandstone	
35							@ 37':Fines= 8%

DRILL HOLE LOG

BORING NO. BA-4

PROJECT: Hasley Canyon Land Company, L.L.C.
T.T. 52584

JOB NO.: 98-1617-4
DATE: 1/15/99

DRILLING COMPANY/DRILLER: Tri Valley Drilling
METHOD OF DRILLING/HOLE DIAMETER (in.) 24" Bucket-Auger
HAMMER TYPE: Kelly
AVERAGE DROP (in.): 12"
DRIVING WEIGHTS: 0-30 (3450 lbs.), 30-60' (2050 lbs.), 60-87' (1140 lbs.),
ELEVATION: 1337
LOGGED BY: VCG

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	ATTITUDES, DRY DENSITY (pcf)/ MOISTURE CONTENT (%)	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
40							
	■	10 19		127/2.9			
45				B:N61E,4NW approx.			
						@ 49' Scattered cobbles	
50							
	■	13 47		125/3.6			
55							
60							
65							
70							
						@ 73' Moderate brown silty sandstone/sandy siltstone	
75	■	14/ 5"		N58E,9NW 119/15.2			Bulk Sample @ 74'

DRILL HOLE LOG

BORING NO. BA-4

PROJECT: Hasley Canyon Land Company, L.L.C.
T.T. 52584

JOB NO.: 98-1617-4
DATE: 1/15/99

DRILLING COMPANY/DRILLER: Tri Valley Drilling
METHOD OF DRILLING/HOLE DIAMETER (in.) 24" Bucket-Auger
HAMMER TYPE: Kelly **AVERAGE DROP (in.):** 12"
DRIVING WEIGHTS: 0-30 (3450 lbs.), 30-60' (2050 lbs.), 60-87' (1140 lbs.),
ELEVATION: 1337 **LOGGED BY:** VCG

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	ATTITUDES, DRY DENSITY (pcf)/ MOISTURE CONTENT (%)	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
80				B:N82E,9NW			
85				B:N46W,8NE			
90							
95						@ 94.5' Reddish-brown silty sandstone and sandy siltstone with minor clay	
100				B:N57W,6NE			
				N61W,10NE		@ 103' Medium-brown fine-grained silty sandstone	
105							
110						TOTAL DEPTH 108 Feet (Elev. 1229) No Ground Water No Caving	
115							

DRILL HOLE LOG

BORING NO. BA-5

PROJECT: Hasley Canyon Land Company, L.L.C. **JOB NO.:** 98-1617-4
T.T. 52584 **DATE:** 1/15/99
DRILLING COMPANY/DRILLER: Tri Valley Drilling
METHOD OF DRILLING/HOLE DIAMETER (in.) 24" Bucket-Auger
HAMMER TYPE: Kelly **AVERAGE DROP (in.):** 12"
DRIVING WEIGHTS: 0-30 (3450 lbs.), 30-60' (2050 lbs.), 60-87' (1140 lbs.),
ELEVATION: 1607 **LOGGED BY:** VCG

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	ATTITUDES, DRY DENSITY (pcf)/ MOISTURE CONTENT (%)	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
						SURFACE CASING; (0 - 4.5 Ft.)	Drilled 10/7/98 and 10/8/98 and downhole logged 10/9/98
5				B:N68E,28SE		BEDROCK; TQs, (4.5 - 108 Ft.) @ 4.5' Light rusty- to reddish-brown coarse-grained pebbly sandstone and pebble conglomerate; moderately hard; dry to damp	
10						@ 11' Damp	
	■	4 7		119/5.4		@ 12' Cobble conglomerate with coarse-grained pebbly sandstone interbeds, with silt	
15				B:N84E,30SE			
20	■	7 14		133/4.2			@ 20':Fines= 12%
						@ 23.5' Coarse-grained sandstone with pebbles	
25				B:E-W,30S			
30	■	6 20				@ 31' Pebble conglomerate	Bulk Sample @ 29'
35						@ 35' Cobble conglomerate	
				B:N76E,30SE		@ 38' Medium- to coarse-grained sandstone	

DRILL HOLE LOG

BORING NO. BA-5

PROJECT: Hasley Canyon Land Company, L.L.C.
T.T. 52584

JOB NO.: 98-1617-4
DATE: 1/15/99

DRILLING COMPANY/DRILLER: Tri Valley Drilling
METHOD OF DRILLING/HOLE DIAMETER (in.) 24" Bucket-Auger
HAMMER TYPE: Kelly **AVERAGE DROP (in.):** 12"
DRIVING WEIGHTS: 0-30 (3450 lbs.), 30-60' (2050 lbs.), 60-87' (1140 lbs.),
ELEVATION: 1607 **LOGGED BY:** VCG

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	ATTITUDES, DRY DENSITY (pcf)/ MOISTURE CONTENT (%)	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
40		9 20		119/6.0		@ 42' Pebble conglomerate with interbeds of medium- to coarse-grained friable sandstone	
45				B:N83E,31SE			
						@ 48' Cobble conglomerate	
50		9 27		121/3.7			
55							
				B:N78E,30SE		@ 57' Light rusty brown medium- to coarse-grained pebbly sandstone	
						@ 59' Pebble conglomerate with isolated cobbles and lenses of medium- to coarse-grained sandstone	
60		28 50/ 3"		118/3.4			
65							
70				B:N76E,35SE			
75						@ 75' Coarse-grained sandstone, pebbly sandstone and pebble conglomerate	

DRILL HOLE LOG

BORING NO. BA-5

PROJECT: Hasley Canyon Land Company, L.L.C. **JOB NO.:** 98-1617-4
T.T. 52584 **DATE:** 1/15/99
DRILLING COMPANY/DRILLER: Tri Valley Drilling
METHOD OF DRILLING/HOLE DIAMETER (in.) 24" Bucket-Auger
HAMMER TYPE: Kelly **AVERAGE DROP (in.):** 12"
DRIVING WEIGHTS: 0-30 (3450 lbs.), 30-60' (2050 lbs.), 60-87' (1140 lbs.),
ELEVATION: 1607 **LOGGED BY:** VCG

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	ATTITUDES, DRY DENSITY (pcf)/ MOISTURE CONTENT (%)	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
80							
85				B:N71E,32SE		@ 85' 6" thick reddish- to medium-brown fine- to medium-grained silty sandstone	
90							
95				B:N88E,30SE			
100							
105				B:N88E,32SE			
110						TOTAL DEPTH 108 Feet (Elev. 1499) No Ground Water No Caving	
115							

DRILL HOLE LOG

BORING NO. BA-6

PROJECT: Hasley Canyon Land Company, L.L.C.
T.T. 52584

JOB NO.: 98-1617-4
DATE: 1/15/99

DRILLING COMPANY/DRILLER: Tri Valley Drilling
METHOD OF DRILLING/HOLE DIAMETER (in.) 24" Bucket-Auger
HAMMER TYPE: Kelly **AVERAGE DROP (in.):** 12"
DRIVING WEIGHTS: 0-30 (3450 lbs.), 30-60' (2050 lbs.), 60-87' (1140 lbs.),
ELEVATION: 1368 **LOGGED BY:** VCG

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	ATTITUDES, DRY DENSITY (pcf)/ MOISTURE CONTENT (%)	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
				B:N80E,68NW 117/4.1		BEDROCK; TQs (0 - 95 Ft.) Tan to light brown fine- to coarse-grained sandstone; moderately friable, moderately hard, dry to damp; small fractures and faults present with minor offsets @ 2' Pebble conglomerate interbeds	Drilled and downhole logged 10/8/98 and 10/9/98
		3 6					
5		4 8		B:N80E,80NW 119/3.6			
							@ 8':Fines= 11%
10		4 9		120/4.3 B:N79E,72NW		@ 11' Cobble conglomerate	
15						@ 15' Shear; reddish-brown silty sands with minor clay gouge, 1-inch thick, no sharp contacts with bounding units; offset? @ 18' Reddish-brown pebbly sandstone and pebble conglomerate with isolated cobbles	
20		5 8		123/6.7			
25				B:N74E,12NW			
30		9 19		B:N62E,44NW 127/4.8		@ 30' Minor Fault; medium brown fine-grained sandstone and silty sandstone gouge; no distinct parting; truncates bedding	
35				B:E-W,82S overturned F:N10W,23NE			
							@ 38':Fines= 16%

DRILL HOLE LOG

BORING NO. BA-6

PROJECT: Hasley Canyon Land Company, L.L.C. T.T. 52584
JOB NO.: 98-1617-4
DATE: 1/15/99
DRILLING COMPANY/DRILLER: Tri Valley Drilling
METHOD OF DRILLING/HOLE DIAMETER (in.) 24" Bucket-Auger
HAMMER TYPE: Kelly **AVERAGE DROP (in.):** 12"
DRIVING WEIGHTS: 0-30 (3450 lbs.), 30-60' (2050 lbs.), 60-87' (1140 lbs.),
ELEVATION: 1368 **LOGGED BY:** VCG

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	ATTITUDES, DRY DENSITY (pcf)/ MOISTURE CONTENT (%)	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
				F:N39W,36NE			
40		11 23		120/2.3		@ 40' Tan to reddish-brown fine- to coarse-grained sandstone and pebbly sandstone with isolated cobbles	@ 40':Fines= 11%
				B:N89E,89NW			
45							
				B:N84E,86NW			
50		16 35		119/2.4			
55						@ 55' Minor Fault: 1/16-1/8" reddish-brown silty sand gouge; reverse movement	
60		41 76/ 3"		116/2.4			
				B:N87E,81NW			
65							
				B:N80E,72NW			
70		49 50/ 1"		113/3.4			
75							

DRILL HOLE LOG

BORING NO. BA-6

PROJECT: Hasley Canyon Land Company, L.L.C.
T.T. 52584

JOB NO.: 98-1617-4
DATE: 1/15/99

DRILLING COMPANY/DRILLER: Tri Valley Drilling
METHOD OF DRILLING/HOLE DIAMETER (in.) 24" Bucket-Auger
HAMMER TYPE: Kelly
AVERAGE DROP (in.): 12"
DRIVING WEIGHTS: 0-30 (3450 lbs.), 30-60' (2050 lbs.), 60-87' (1140 lbs.),
ELEVATION: 1368
LOGGED BY: VCG

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	ATTITUDES, DRY DENSITY (pcf)/ MOISTURE CONTENT (%)	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
80		52 58/ 1"		112/2.5			
				B:N87W,65NE			
85				B:N75E,62NW			
90		24 94		115/3.2			
95						TOTAL DEPTH 95 Feet (Elev. 1273) No Ground Water No Caving	
100							
105							
110							
115							

DRILL HOLE LOG

BORING NO. RW-1

PROJECT: Hasley Canyon Land Company, L.L.C.
T.T. 52584

JOB NO.: 98-1617-4
DATE: 1/15/99

DRILLING COMPANY/DRILLER: Valley Well
METHOD OF DRILLING: Rotary Wash - 5 1/4"
HAMMER TYPE: Down Hole
DRIVING WEIGHT (lbs.): 140 lbs.
AVERAGE DROP (in.): 30"
HOLE DIAMETER (in.):
ELEVATION: 1223
LOGGED BY: DGG/BC

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	DRY DENSITY (pcf)/ MOISTURE CONTENT (%)	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
					SW	QUATERNARY ALLUVIUM; Qal (0 - 50 Ft.)	
		10 20 20		124/11.2		@ 3' SAND, well graded, with gravel, medium dense, moist, reddish-to medium brown	
5							
		12 23 54		115/12.5		@ 6' - dense, white to gray to light brown	
		15 25 40				@ 9' - no gravel, dense, reddish- to medium brown	
10							
15		10 15 30			SM	@ 15' SILTY SAND, fine, dense, moist, reddish- to medium brown	@ 15':Fines= 23%
20		15 25 25		111/9.8		@ 20' - dense, moist	
25		16 26 35				@ 25' - very dense, wet, reddish-brown	@ 25':Fines= 42%
30		40 50-5"				@ 30' No Recovery	
35		35 50				@ 35' - very dense, wet, reddish-brown	@ 35':Fines= 15%

DRILL HOLE LOG

BORING NO. RW-1

PROJECT: Hasley Canyon Land Company, L.L.C.
T.T. 52584

JOB NO.: 98-1617-4
DATE: 1/15/99

DRILLING COMPANY/DRILLER: Valley Well
METHOD OF DRILLING: Rotary Wash - 5 1/4"
HAMMER TYPE: Down Hole
DRIVING WEIGHT (lbs.): 140 lbs.
AVERAGE DROP (in.): 30"
HOLE DIAMETER (in.):
ELEVATION: 1223
LOGGED BY: DGG/BC

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	DRY DENSITY (pcf)/ MOISTURE CONTENT (%)	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
40		20 20 20				@ 40' - with gravel, dense	@ 40':Fines= 14%
45		20 50			SW-SM	@ 45' SAND, well graded, with silt; very dense, wet, reddish-brown	@ 45':Fines= 11%
50		25 50-2"			SM	@ 50' SILTY SAND, with gravel, very dense, wet, reddish-brown TOTAL DEPTH 50 Feet (Elev. 1173) Ground Water @ 26 Feet (Elev. 1197) No Caving	@ 50':Fines= 15%
55							
60							
65							
70							
75							

DRILL HOLE LOG

BORING NO. HS-1

PROJECT: Hasley Canyon Land Company, L.L.C.
T.T. 52584

JOB NO.: 98-1617-4
DATE: 1/15/99

DRILLING COMPANY/DRILLER: Valley Well
METHOD OF DRILLING: Hollow Stem Auger 6 1/2"
HAMMER TYPE: Downhole
DRIVING WEIGHT (lbs.): 140 lbs.
AVERAGE DROP (in.): 30
HOLE DIAMETER (in.):
ELEVATION: 1252
LOGGED BY: DGG/BC

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	DRY DENSITY (pcf)/ MOISTURE CONTENT (%)	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
					SM	QUATERNARY ALLUVIUM; Qal (0 - 20 Ft.)	
5		10 15 16				@ 5' SILTY SAND, with gravel, medium dense, dry, orangish- to light brown	@ 5':Fines= 12% @ 7':Fines= 13%
10		10 20 25			SP	@ 10' SAND, poorly graded, medium dense, dry, tan to orangish-brown	
15		5 10 22		114/7.9	SM	@ 15' SILTY SAND, medium dense, moist, orangish to medium brown	
20		35 50- 5"		114/6.7		BEDROCK; TQs (20 - 45 Ft.) @ 20' SILTY SANDSTONE, very dense, moist, light brown	
25		15 35 50			SM/ ML	@ 25' SILTSTONE, reddish- to medium brown, hard, dry to slightly damp and light gray SILTY SANDSTONE/SANDY SILTSTONE, very dense, moist	
30		50- 6"		102/3.9	SP-SM	@ 30' SILTY SANDSTONE, reddish-brown, very dense, moist	@ 30':Fines= 12%
35		50- 6"				@ 35' -light gray to tan, very dense, moist	

DRILL HOLE LOG

BORING NO. HS-1

PROJECT: Hasley Canyon Land Company, L.L.C.
T.T. 52584

JOB NO.: 98-1617-4
DATE: 1/15/99

DRILLING COMPANY/DRILLER: Valley Well
METHOD OF DRILLING: Hollow Stem Auger 6 1/2"
HAMMER TYPE: Downhole
DRIVING WEIGHT (lbs.): 140 lbs.
AVERAGE DROP (in.): 30
HOLE DIAMETER (in.):
ELEVATION: 1252
LOGGED BY: DGG/BC

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	DRY DENSITY (pcf)/ MOISTURE CONTENT (%)	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
40		12 27 30		111/15.0	SM-SC	@ 40' SANDY, CLAYEY SILTSTONE, dense, moist, brown	@ 40':Fines= 86%
45		25 50-5"				@ 45' - reddish-brown, very dense, dry TOTAL DEPTH 45 Feet (Elev. 1207) No Ground Water No Caving	
50							
55							
60							
65							
70							
75							

DRILL HOLE LOG

BORING NO. HS-2

PROJECT: Hasley Canyon Land Company, L.L.C. T.T. 52584
JOB NO.: 98-1617-4
DATE: 1/15/99
DRILLING COMPANY/DRILLER: Valley Well
METHOD OF DRILLING/HOLE DIAMETER (in.) Hollow Stem Auger 6.5"
HAMMER TYPE: Down Hole **AVERAGE DROP (in.):** 30
DRIVING WEIGHTS:
ELEVATION: 1385 **LOGGED BY:** DGG

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	ATTITUDES, DRY DENSITY (pcf)/ MOISTURE CONTENT (%)	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
					SM	QUATERNARY TERRACE; Qt (0 - 45 Ft.)	
5		15 20 28		117/3.2		@ 5' SILTY SANDSTONE, medium dense, dry, to damp, reddish-brown	@ 5':Fines= 13% @ 7':Fines= 26%
10		30 35 50			SM-ML	@ 10' SILTSTONE, hard, dry, tan to light-brown and reddish-brown fine-grained SANDSTONE, very dense, damp	@ 10':Fines= 18%
15		12 30 30			SW-SM	@ 15' SANDSTONE & SILTY SANDSTONE, dense, reddish-brown	
20		12 20 20		113/10.6		@ 20' - medium dense to dense, moist, with gravel	
25		20 20 15					
30		12 21 34				@ 30' - dense	
35		11 15 17					

DRILL HOLE LOG

BORING NO. HS-2

PROJECT: Hasley Canyon Land Company, L.L.C.
T.T. 52584

JOB NO.: 98-1617-4
DATE: 1/15/99

DRILLING COMPANY/DRILLER: Valley Well
METHOD OF DRILLING: Hollow Stem Auger 6.5"
HAMMER TYPE: Down Hole
DRIVING WEIGHT (lbs.): 140 lbs.
AVERAGE DROP (in.): 30
HOLE DIAMETER (in.):
ELEVATION: 1385
LOGGED BY: DGG

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	DRY DENSITY (pcf)/ MOISTURE CONTENT (%)	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
40		19 20 24				@ 40' - tan to light orangish-brown, medium dense	
45		50- 6"			SM	@ 45' - more silty, dense TOTAL DEPTH 45 Feet (Elev. 1340) No Ground Water No Caving	
50							
55							
60							
65							
70							
75							

DRILL HOLE LOG

BORING NO. HS-3

PROJECT: Hasley Canyon Land Company, L.L.C.
T.T. 52584

JOB NO.: 98-1617-4
DATE: 1/15/99

DRILLING COMPANY/DRILLER: Valley Well
METHOD OF DRILLING: Hollow Stem Auger 6.5"
HAMMER TYPE: Down Hole
DRIVING WEIGHT (lbs.): 140 lbs.
AVERAGE DROP (in.): 30
HOLE DIAMETER (in.):
ELEVATION: 1416
LOGGED BY: DGG

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	DRY DENSITY (pcf)/ MOISTURE CONTENT (%)	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
					SM	QUATERNARY TERRACE; Qt (0 - 45 Ft.)	
5		17 24 22		116/2.4		@ 5' SILTY SANDSTONE, medium dense, dry to damp, orangish-brown	@ 5':Fines= 14%
10		10 16 20		114/3.8			
15		12 20 20			SP-SM	@ 15' SILTY SANDSTONE, medium dense, dry to damp reddish-brown	
20		10 20 30				@ 20' - medium dense to dense	
25		10 20 25			SW	@ 25' SANDSTONE, dense, dry to slightly damp, tan to light brown	
30		10 20 24			SW-SM	@ 30' SILTY SANDSTONE, medium dense, dry to damp, reddish-brown	
35		14 16 16				@ 35' SILTY SANDSTONE, dense, dry to damp, light reddish-brown	

DRILL HOLE LOG

BORING NO. HS-3

PROJECT: Hasley Canyon Land Company, L.L.C.
T.T. 52584

JOB NO.: 98-1617-4
DATE: 1/15/99

DRILLING COMPANY/DRILLER: Valley Well
METHOD OF DRILLING: Hollow Stem Auger 6.5"
HAMMER TYPE: Down Hole
DRIVING WEIGHT (lbs.): 140 lbs.
AVERAGE DROP (in.): 30
HOLE DIAMETER (in.):
ELEVATION: 1416
LOGGED BY: DGG

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	DRY DENSITY (pcf)/ MOISTURE CONTENT (%)	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
40		7 12 15		119/10.6	SM-SC	@ 40' SILTY CLAYEY SANDSTONE and SANDY CLAYSTONE, medium dense/very stiff, moist, reddish-brown	@ 40':Fines= 28%
45		15 20 20				@ 45' - dense, dry TOTAL DEPTH 45 Feet (Elev. 1371) No Ground Water No Caving	
50							
55							
60							
65							
70							
75							

DRILL HOLE LOG

BORING NO. HS-4

PROJECT: Hasley Canyon Land Company, L.L.C.
T.T. 52584

JOB NO.: 98-1617-4
DATE: 1/15/99

DRILLING COMPANY/DRILLER: Valley Well
METHOD OF DRILLING: Hollow Stem Auger 6.5"
HAMMER TYPE: Down Hole
DRIVING WEIGHT (lbs.): 140 lbs.
AVERAGE DROP (in.): 30
HOLE DIAMETER (in.):
ELEVATION: 1335
LOGGED BY: DGG

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	DRY DENSITY (pcf)/ MOISTURE CONTENT (%)	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
					SM	QUATERNARY ALLUVIUM; Qal (0 - 45 Ft.)	
5		15 30 30				@ 5' No Recovery	
							@ 8':Fines= 21%
10		8 8 8		116/7.5		@ 10' SILTY SAND, loose to medium dense, moist, medium brown	@ 10': Fines- 26%
15		5 11 15		108/10.8	SP-SM	@ 15' SAND, poorly graded with silt and gravel, medium dense, moist, light to medium brown	
20		10 22 22		123/9.2	SM-SC	@ 20' SILTY, CLAYEY SAND, medium dense, moist, light to medium brown	@ 20': Fines= 21%
25		15 20 30			SW-SM	@ 25' SAND, well graded, with silt and gravel, dense to very dense, moist, medium brown	
30		15 35 40		116/6.6	SM-SC	@ 30' SILTY, CLAYEY SAND, dense, moist, light to medium brown	@ 30':Fines= 25%
35		10 20 50					

DRILL HOLE LOG

BORING NO. HS-4

PROJECT: Hasley Canyon Land Company, L.L.C.
T.T. 52584

JOB NO.: 98-1617-4
DATE: 1/15/99

DRILLING COMPANY/DRILLER: Valley Well
METHOD OF DRILLING: Hollow Stem Auger 6.5"
HAMMER TYPE: Down Hole
DRIVING WEIGHT (lbs.): 140 lbs.
AVERAGE DROP (in.): 30
HOLE DIAMETER (in.):
ELEVATION: 1335
LOGGED BY: DGG

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	DRY DENSITY (pcf)/ MOISTURE CONTENT (%)	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
40		15 50- 3"			SP	@ 40' SAND, poorly graded, very dense, moist, medium brown	
45		25 50				@ 45' - with trace of silt TOTAL DEPTH 45 Feet (Elev. 1290) No Ground Water No Caving	
50							
55							
60							
65							
70							
75							

DRILL HOLE LOG

BORING NO. HS-5

PROJECT: Hasley Canyon Land Company, L.L.C. T.T. 52584
JOB NO.: 98-1617-4
DATE: 1/15/99
DRILLING COMPANY/DRILLER: Valley Well
METHOD OF DRILLING: Hollow Stem Auger 6.5"
HAMMER TYPE: Down Hole
DRIVING WEIGHT (lbs.): 140 lbs.
AVERAGE DROP (in.): 30
HOLE DIAMETER (in.):
ELEVATION: 1415
LOGGED BY: DGG

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	DRY DENSITY (pcf)/ MOISTURE CONTENT (%)	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
					SM	QUATERNARY TERRACE; Qt (0 - 45 Feet)	
5		8 9 10				@ 5' SILTY SAND, medium dense, dry to slightly damp, reddish to medium brown	@ 5':Fines= 14%
10		6 12 14					@ 10':Fines= 14%
15		9 9 14		113/6.1	SW	@ 15' SAND, well graded, with gravel, medium dense, moist, medium brown	
20		10 10 12		115/5.9	SW-SM	@ 20' SAND, well graded with silt, with some gravel, medium dense, moist, medium brown	@ 20':Fines= 9%
25		10 14 22			SM	@ 25' SILTY SAND, dense, moist, medium brown	
30		7 20 30			SP	@ 30' SAND, poorly graded, medium dense to dense, moist, reddish- to medium brown	
35		7 8 12			CL-ML	@ 35' SILTY CLAY, with sand, very stiff, moist, olive brown	

DRILL HOLE LOG

BORING NO. HS-5

PROJECT: Hasley Canyon Land Company, L.L.C.
T.T. 52584

JOB NO.: 98-1617-4
DATE: 1/15/99

DRILLING COMPANY/DRILLER: Valley Well
METHOD OF DRILLING: Hollow Stem Auger 6.5"
HAMMER TYPE: Down Hole
DRIVING WEIGHT (lbs.): 140 lbs.
AVERAGE DROP (in.): 30
HOLE DIAMETER (in.):
ELEVATION: 1415
LOGGED BY: DGG

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	DRY DENSITY (pcf)/ MOISTURE CONTENT (%)	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
40		10 17 24		110/10.7	ML	@ 40' SILT, very stiff to hard, moist, medium brown	
45		8 12 14			CL	@ 45' CLAY, with some fine sands, very stiff, damp, medium brown TOTAL DEPTH 45 Feet (Elev. 1370) No Ground Water No Caving	
50							
55							
60							
65							
70							
75							

DRILL HOLE LOG

BORING NO. HA-1

PROJECT: Hasley Canyon Land Company, L.L.C.
T.T. 52584

JOB NO.: 98-1617-4
DATE: 1/15/99

DRILLING COMPANY/DRILLER: n/a
METHOD OF DRILLING/HOLE DIAMETER (in.) Hand Auger (3" diameter)
HAMMER TYPE: Hammer
AVERAGE DROP (in.): 30"
DRIVING WEIGHTS: 51.3 lbs.
ELEVATION: 1525 apx
LOGGED BY: VCG

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	ATTITUDES, DRY DENSITY (pcf)/ MOISTURE CONTENT (%)	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
					SW	QUATERNARY LANDSLIDE; Qls (0 - 12 Ft.) Fine-to coarse-grained sand with isolated gravel and minor silt, loose, dry to slightly damp, friable, light-reddish-brown	
5	■	50 75					@ 5' high blow count due to gravel
	■	16 38		111/3.1		@ 8' - medium dense, damp	
10							
	■	16 30		109/4.1		@ 12' - medium dense, damp TOTAL DEPTH 12 Ft. (Elev. 1513) No Ground Water No Caving	
15							
20							
25							
30							
35							

KEY TO SYMBOLS

Symbol	Description
Strata symbols	
	High plasticity clay (CH : C)
	Inorganic silts and clays (CH-MH : MC)
	Low plasticity clay (CL : O)
	Low-high plasticity clays (CL-CH : CO)
	Silty low plasticity clay (CL-ML : CZ)
	Low plasticity clay to silt (CL/ML : O)
	Silt to low plasticity clay (ML/CL : Z)
	Fill (FILL : F)
	Clayey gravel (GC : O8)
	Clayey sand and gravel (GC-SC : DO8)
	Silty gravel (GM : Z8)
	Silty clayey gravel (GM-GC : ZO8)
	Silty sand and gravel (GM-SM : 08)
	Silty gravel to silty sand (GM/SM : Z8)
	Poorly graded gravel (GP : G)
	Poorly graded gravel with clay (GP-GC : DGO3)
	Poorly graded gravel with silt (GP-GM : DGZ3)

Symbol	Description
	Poorly graded gravel and sand (GP-SP : :G)
	Well graded gravel (GW : 83)
	Well graded gravel with clay (GW-GC : 83O)
	Well graded gravel with silt (GW-GM : 83Z)
	Well graded gravel/ clayey gravel (GW-GP : 83G)
	Well graded gravel and sand (GW-SW : 83D)

KEY TO SYMBOLS

Symbol	Description
	Well graded gravel to well graded sand (GW/SW : 83)
	Elastic silt (MH : M)
	Silt (ML : Z)
	High plasticity organic clays (OH : 5)
	Silt to silty clay (ML/CL-ML : Z)
	Low plasticity organic silts (OL : 4)
	Basalt (or generic rock) (ROCK :])
	Clayey sand (SC : DO)
	Clayey sand to sandy clay (SC/CL : DO)
	Sandy clay to clayey sand (CL/SC : O)
	Silty sand (SM : 0)
	Poorly graded clayey silty sand (SM-SC : :ZO)
	Poorly graded silty fine sand (SM-ML : :Z)
	Poorly graded sand (SP : :)
	Poorly graded sand with clay (SP-SC : :R)
	Poorly graded sand with silt (SP-SM : :=)
	Well graded sand (SW : D)
	Well graded sand with clay (SW-SC : DR)
	Well graded sand with silt (SW-SM : D=)

KEY TO SYMBOLS

Symbol	Description
	Interlayered well/poorly graded sand (SW-SP : D:)
	Silty sandy clay (CL : 0C)
	Variable gravel and silty sand mix (GM-SM : 0G)
	Silty sand to silt (SM/ML : 0)
	Silt to silty sand (ML/SM : Z)
	Agglomerate (\)
	Blank (E)
	CH fraction (U)
	CL fraction (R)
	Claystone (H)
	Cobble frac (A)
	Cobbles (B)
	Competent (K)
	Dolomite (()
	Extra fine gravel (3)
	Fine gravel (Y)
	Frac rock (X)
	Granite (/)

Symbol	Description
	Gravel (8)
	Gravel frac (9)
	Intrusive (V)
	Limestone (L)
	Metamorphic rocks ())
	MH fraction (?)
	ML fraction (=)
	Mudstone (7)
	Organics (J)
	Paving (P)
	Peat (Q)
	Sand (S)
	Sandstone (N)
	Schist ($)
	Sediment (2)
	Shale (>)
	Shell fragments (&)
	Siltstone (I)

Symbol	Description
	Topsoil (T)
	Weathered (W)
	EXTRA: alternating dot-dash pattern (|)
	EXTRA: dashed horizontal lines (%)

KEY TO SYMBOLS

Symbol	Description
	EXTRA: medium closely-spaced dots (6)
	EXTRA: narrow-spaced horizontal dashed lines (-)
	EXTRA: random dot pattern (1)
	EXTRA: regularly spaced "V"'s (<)
	EXTRA: very narrow cross-hatching (!)
	EXTRA: dashed lines with 3 dots above each dash (.)
	EXTRA: large widely-spaced dots (*)
	EXTRA: small filled triangles ([)
	EXTRA: semi-random triangle pattern (')
	EXTRA: zigzag lines (#)
	EXTRA: grass pattern ({)
	EXTRA: tilde sign (})
	EXTRA: randomly arranged square boxes (;)

Symbol	Description
Misc. Symbols	
	Water table at boring completion (LWATER)
	Water table during drilling (WATER)
Soil Samplers	
	Auger (A)
	Bulk sample (B)
	California sampler (C)
	Bulk/Grab sample (F)
	Pitcher (L)
	Denison (O)
	Standard penetration test (P)
	No recovery (X)

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GEOLOGIC AND GEOTECHNICAL REPORT

Vesting Tentative Tract 52584

Castaic, California

VOLUME II OF V

Prepared For:

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C/o Palmer Investments

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January 15, 1999

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Appendix B

GEOTECHNICAL LABORATORY INVESTIGATION

1. General

   a. The purpose of the laboratory investigation was to evaluate the geotechnical engineering characteristics of the various materials encountered during the field investigation. The investigation program was carried out employing, wherever practical, currently accepted test procedures of the American Society of Testing and Materials (ASTM) and California Test Standards.

   b. Relatively undisturbed ring samples and bag samples were obtained during the course of the field investigation. Laboratory sample identification is by project name and number, drill hole number or trench number and depth.

   c. Geotechnical laboratory testing is classified in two major subgroups:
      - Index Properties Tests, and
      - Geotechnical Engineering Properties Tests

   d. We also performed soluble chloride and sulfate[1] contents, resistivity and pH tests to evaluate the corrosivity potential of onsite soil.

2. Index Properties Tests

   The following Index Properties test were performed on native soils collected during the field exploration.

Test Type	No. of Tests Performed	Testing Standard
Moisture Content & Unit Weight	73	ASTM D 2216 (Water Content)
Percent-Finer Than # 200	36	ASTM D 1140
Expansion Index	2	ASTM D 4829
Particle-size Analysis	1	ASTM D422 and D 1140
Atterberg Limits	3	ASTM D4318
Sulfate-Content	7	EPA Standard 9056
Chloride-Content	7	EPA Standard 9056
Resistivity	7	California Test Method 532
PH	7	--

[1] Chloride and Sulfate Contents were performed by FGL Environmental Laboratory in Santa Paula

The purpose of each test is briefly described below.

a. The natural water content and in-situ unit dry weight of soils provided an indication of the strength of natural soils before additional testing was performed. These data, in conjunction with field blow count data, served in the selection of samples for additional testing. Test results are presented on the Drill Hole Logs and Trench Logs within **Appendix A**.

b. Minus No. 200 wash-sieve analyses were performed on some samples to evaluate only the percentage of fine particles smaller than 75 microns within the soil. These tests were conducted to aid in classifying the soils in accordance with the Unified Soil Classification System (USCS). Test results are presented on the Drill Hole Logs and Trench Logs within **Appendix A.**

c. Expansion Index Tests provided an index to the expansion potential of soils when inundated with water. This test method controls variables that influence the expansive characteristics of soils. Results are summarized below:

Samples	USCS	Expansion Index
Boring BA-4 @ 24’	ML	79.9
Boring BA-4 @ 74’	ML	64.7

d. Complete mechanical particle-size analyses of soil fractions larger and smaller than 75 microns (No. 200 sieve) were conducted to aid in classifying the soils in accordance with the Unified Soil Classification System (USCS). Test results are presented on **Figures B1** within this **Appendix**.

e. Liquid and plastic limit tests (Atterberg limits) were conducted on selected samples to aid in classifying the soils in accordance with USCS (by evaluating soil plasticity). Test results are presented on **Figure B2** within this **Appendix.**

f. Soluble sulfates and chloride contents, resistivity and pH tests were conducted to access the potential corrosive effects of soils on concrete, ferrous and non-ferrous metals. Test results are presented on **Table B1** within this **Appendix**.

3. Geotechnical Engineering Properties Tests

The following Geotechnical Engineering Property Tests were performed on relatively undisturbed ring samples collected at this site.

Test Type	Test No.	Testing Standard
Compaction	5	ASTM D1557-91
Consolidation	18	ASTM D 2435
Direct Shear	15	ASTM D 3080

The purpose of each test is briefly described below.

a. Compaction tests were performed on selected samples to assess the moisture-density relationship of materials that may be used for recompaction at removal areas. Test results are presented on **Figures B3.1 through B3.5** within this **Appendix.**

b. One-dimensional consolidation tests were performed on selected ring samples to assess the soils compressibility characteristics by subjecting the specimens to loads ranging from 150 psf to 16,000 psf, and with the addition of water at loads near the overburden pressure. Tests results are plotted on **Figures B4.1 through B4.18** within this **Appendix.**

c. Direct shear tests were performed on relatively undisturbed specimens using a displacement-controlled direct shear machine. Samples were tested at normal pressures ranging from approximately 1.4 ksf to 8.4 ksf in order to define both the peak and residual shear strength parameters. The samples were consolidated under the normal load at saturated conditions and then sheared horizontally at a controlled displacement rate until a residual strength was attained. Test results are plotted on **Figures B5.1 through B5.15** within this **Appendix**.

The following attachments completed this Appendix

Laboratory Test Results

- Corrosion Test on Soil Samples — Table B1.1-B1.2
- Summary of Shear Strength Test Data — Table B2
- Soil Collapse Potential of Shallow Soils to Receive Fill — Table B3
- Particle Size Distribution Test Report — Figure B1
- Liquid and Plastic Limits Test Report — Figure B2
- Compaction Test Reports — Figure B3.1-B3.5
- Consolidation Test Reports — Figure B4.1-B4.18
- Direct Shear Test Results — Figure B5.1-B5.14

Corrosion Test Results on Soil Samples

Sample Location	BA-1 (40')	BA-3 (40')	BA-4 (24')	BA-4 (74')
Soil Type - USCS	SW	SW	ML	ML

Resistivity

Saturated (Ohm-cm)	NA	NA	867	1367
Corrosion Characteristic[1]	-	-	Corrosive	Moderately Corrosive

Chemical Analyses

pH	7.2	7.0	7.4	7.0
Chloride Cl (ppm)	100	ND	40	ND
Sulfate SO_4 (%)	0.006	0.005	0.014	ND
Concrete exposure to sulfate[2]	Negligible	Negligible	Negligible	Negligible

ND = not detected
NA = not analyzed

[1] Peabody Classification
[2] Per 1997 UBC – Table 19-A-4

Corrosion Test Results on Soil Samples

Sample Location	BA-5 (40')	BA-6 (38')	T-156 (2')
Soil Type - USCS	SW	SM	SM

Resistivity

Saturated (Ohm-cm)	NA	7403.7	4769
Corrosion Characteristic[3]	-	Mildly Corrosive	Mildly Corrosive

Chemical Analyses

pH	6.8	7.0	6.4
Chloride Cl (ppm)	ND	10	ND
Sulfate SO_4 (%)	ND	ND	ND
Concrete exposure to sulfate[4]	Negligible	Negligible	Negligible

ND = not detected
NA = not analyzed

[3] Peabody Classification
[4] Per 1997 UBC – Table 19-A-4

SUMMARY OF SHEAR STRENGTH TEST DATA

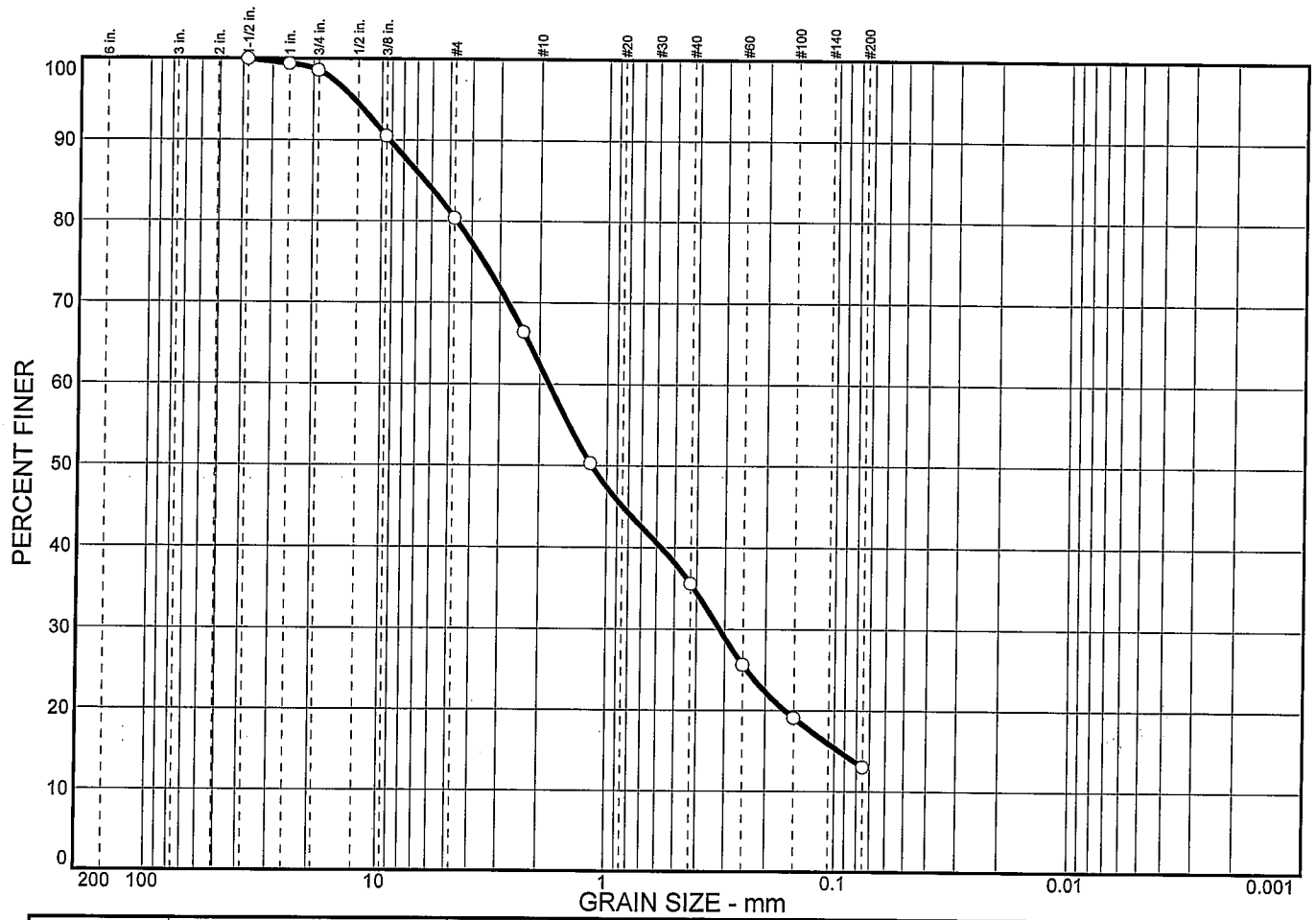
Boring or Test Pit No.	Fig. No.	Material	Peak[1]		Residual[1]		Unit Wt. (pcf)
			Cohesion (psf)	Phi ϕ (deg)	Cohesion (psf)	Phi ϕ	
BA-1 @ 69.7'	B5.1	Landslide Plane (Qls)	210	28.1°	290	7°	130
BA-1 @ 10'	B5.2	Landslide Debris (Qls)	1800	29°	510	26°	--
BA-3 @ 5'	B5.3	Landslide Debris (Qls)	50	28°	100	25°	116
BA-1 @ 75.4'	B5.4	Bedding Plane (TQs)	290	30°	200	17.4°	122
BA-2 @ 62'	B5.5	Bedding Plane (TQs)	1270	28°	1570	11.8°	--
BA-4 @ 10'	B5.6	Bedding Plane (TQs)	1250	19.5°	150	18°	--
BA-5 @ 50'	B5.7	Cross Bedding (TQs)	440	24.3°	320	24.6°	119
BA-6 @ 20'	B5.8	Cross Bedding (TQs)	350	35.7°	240	29.5°	--
HS-2 @ 20'	B5.9	Terrace Deposits (Qt)	10	31°	10	30.5°	120
BA-4 @ 24'	B5.10	Compacted Fill (Cef)	310	40°	310	40°	--
BA-5 @12'	B5.11	Compacted Fill (Cef)	190	39.8°	130	40.3°	123
HS-4 @ 10'	B5.12	Alluvium (Qal)	320	37.8°	160	37.8°	125
RW-1 @ 6'	B5.13	Alluvium (Qal)	360	48.4°	170	47.2°	--
T-156 @ 3.5'	B5.14	Slopewash (sw)	150	15.7°	150	15.7°	104

[1] Data in **bold** were selected for stability analyses

SOIL COLLAPSE POTENTIAL OF SHALLOW SOILS TO RECEIVE FILL

Location	Depth (Ft.)	% Hydroconsolidation	Hydroconsolidation Classification (Per L.A. County)
T-202	3	0.4	Low (<2%)
T-202	6	0.3	Low (<2%)
T-203	9	1.7	Low (<2%)
T-204	9	1.5	Low (<2%)
T-205	9	1.8	Low (<2%)
T-208	9	1.3	Low (<2%)
T-209	9	1.7	Low (<2%)
T-210	6	0.9	Low (<2%)
T-212	6	0.1	Low (<2%)
T-215	9	0	Low (<2%)
T-217	6	0	Low (<2%)
T-218	6	0	Low (<2%)
HS-1	5	0	Low (<2%)
HS-1	10	0	Low (<2%)
HS-4	10	0	Low (<2%)
HS-5	5	0	Low (<2%)
HS-5	10	0	Low (<2%)
RW-1	9	0	Low (<2%)

PARTICLE SIZE DISTRIBUTION TEST REPORT



	% COBBLES	% GRAVEL		% SAND			% FINES	
		CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
○	0.0	1.4	18.2	18.0	26.8	22.6	13.0	

SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	DESCRIPTION	USCS
○	HS-1	2	7	Silty sand with gravel	SM

PARTICLE SIZE DISTRIBUTION TEST REPORT

ALLAN E. SEWARD ENGINEERING GEOLOGY, INC.

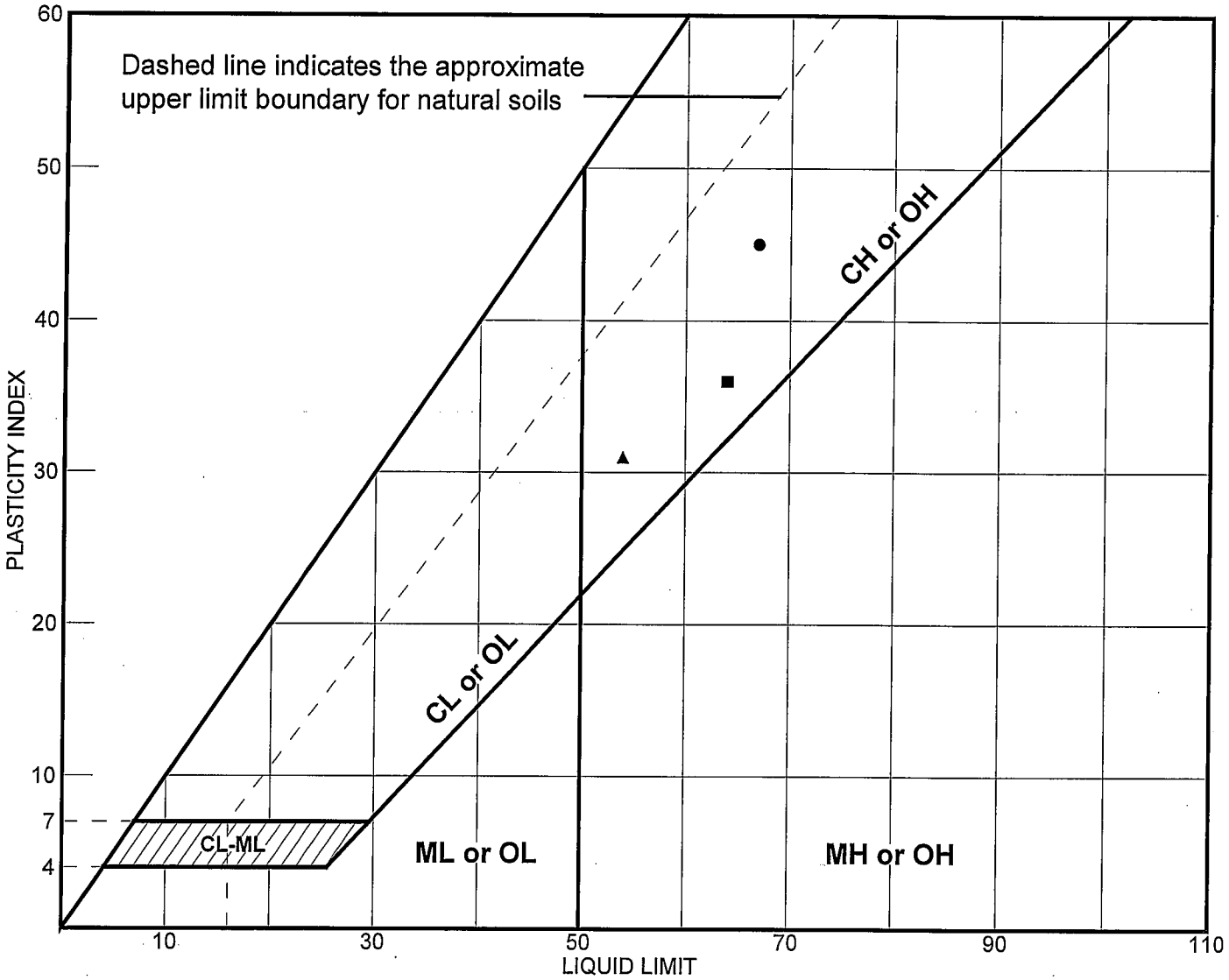
Client: Hasley Canyon Land Company, L.L.C.

Project: TT 52584

Project No.: 98-1617-4

Figure B1

LIQUID AND PLASTIC LIMITS TEST REPORT

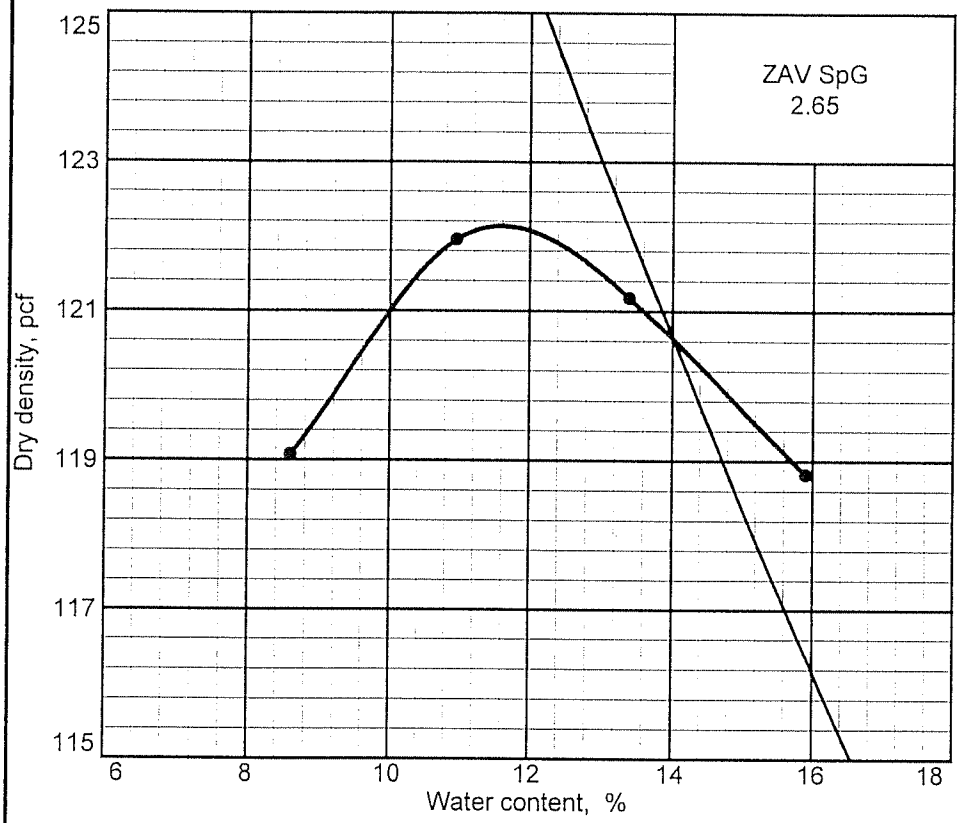


SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	BA-1	1	69.7		22	67	45	CH
■	BA-1	2	75.4		28	64	36	CH
▲	BA-1	3	11.6		23	54	31	CH

LIQUID AND PLASTIC LIMITS TEST REPORT **ALLAN E. SEWARD ENGINEERING GEOLOGY, INC.**	**Client:** Hasley Canyon Land Company, L.L.C. **Project:** TT 52584 **Project No.:** 98-1617-4 **Figure** B2

COMPACTION TEST REPORT



Curve No.
-A-

Test Specification:
ASTM D 1557-91 Procedure A Modified
Oversize correction applied to each point

Hammer Wt.: 10 lb.
Hammer Drop: 18 in.
Number of Layers: five
Blows per Layer: 25
Mold Size: .03333 cu.ft.

Test Performed on Material Passing No.4 **Sieve**

Soil Data

NM		**Sp.G.**	2.65
LL		**PI**	
%>No.4	0.0	**%<#200**	74
USCS	CH	**AASHTO**	

TESTING DATA

	1	2	3	4	5	6
WM + WS	8.81	9.01	9.08	9.09		
WM	4.50	4.50	4.50	4.50		
WW + T #1	400.82	399.98	407.12	406.51		
WD + T #1	386.12	381.73	384.43	380.25		
TARE #1	215.11	215.11	215.11	215.11		
WW + T #2						
WD + T #2						
TARE #2						
MOISTURE	8.6	11.0	13.4	15.9		
DRY DENSITY	119.1	122.0	121.2	118.8		

ROCK CORRECTED TEST RESULTS	UNCORRECTED	Material Description
Maximum dry density = 122 pcf	122 pcf	Clay
Optimum moisture = 11.5 %	11.5 %	

Project No. 98-1617-4 **Client:** Hasley Canyon Land Company, L.L.C.
Project: TT 52584

● **Source:** BA-4 **Sample No.:** -A- **Elev./Depth:** 24

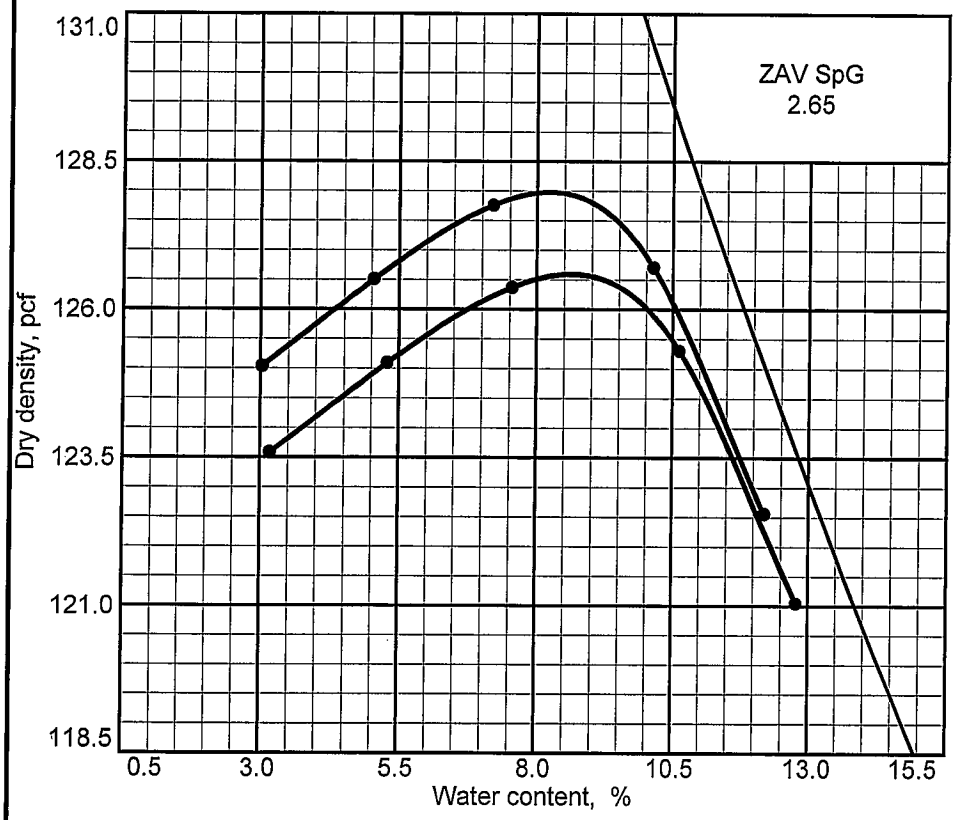
Remarks:
BEdrock (TQs)

COMPACTION TEST REPORT

ALLAN E. SEWARD ENGINEERING GEOLOGY, INC.

Figure B3.1

COMPACTION TEST REPORT



Curve No.
-B-

Test Specification:
ASTM D 1557-91 Procedure A Modified
Oversize correction applied to each point

Hammer Wt.: 10 lb.
Hammer Drop: 18 in.
Number of Layers: five
Blows per Layer: 25
Mold Size: .03333 cu.ft.

Test Performed on Material Passing No.4 **Sieve**

Soil Data

NM		**Sp.G.**	2.65
LL		**PI**	
%>No.4	4.6	**%<#200**	16
USCS	SM	**AASHTO**	

TESTING DATA

	1	2	3	4	5	6
WM + WS	8.75	8.89	9.03	9.12	9.05	
WM	4.50	4.50	4.50	4.50	4.50	
WW + T #1	393.17	389.14	396.56	398.84	399.19	
WD + T #1	387.47	380.04	383.33	380.52	377.54	
TARE #1	208.14	208.14	208.14	208.14	208.14	
WW + T #2						
WD + T #2						
TARE #2						
MOISTURE	3.0	5.1	7.2	10.1	12.2	
DRY DENSITY	125.0	126.5	127.8	126.7	122.6	

ROCK CORRECTED TEST RESULTS	UNCORRECTED	Material Description
Maximum dry density = 128 pcf	126.5 pcf	silty Sand with gravel
Optimum moisture = 8 %	8.5 %	

Project No. 98-1617-4 **Client:** Hasley Canyon Land Company, L.L.C.
Project: TT 52584

● **Source:** BA-6 **Sample No.:** -B- **Elev./Depth:** 38

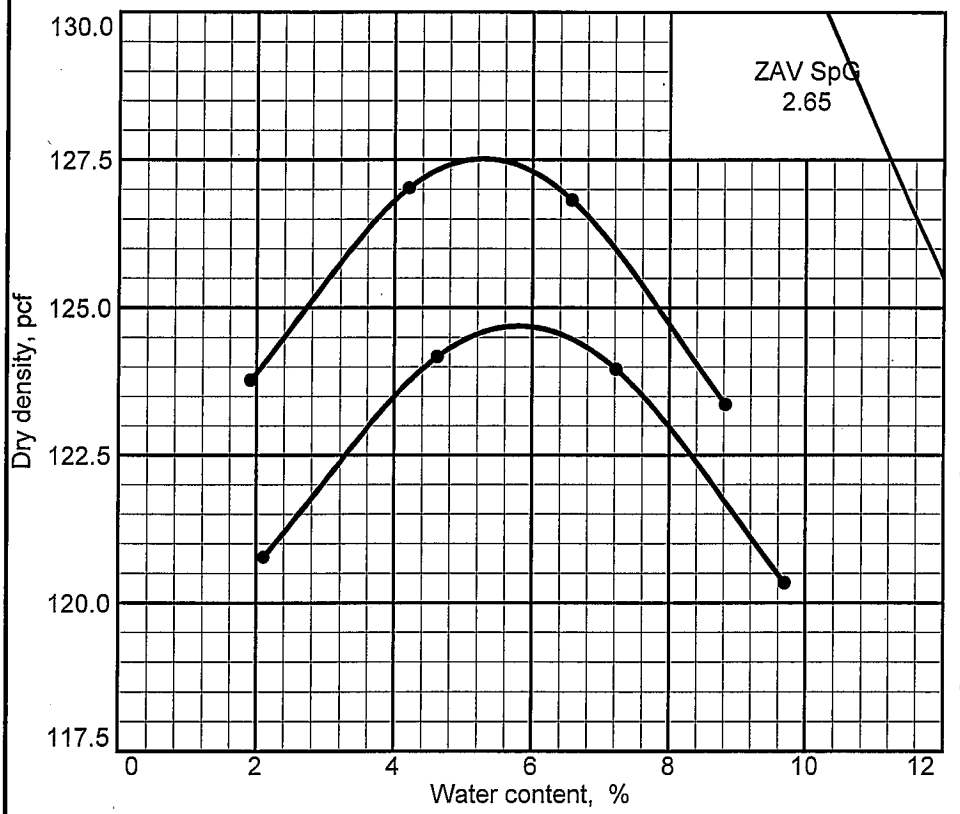
Remarks:
Bedrock (TQs)

COMPACTION TEST REPORT

ALLAN E. SEWARD ENGINEERING GEOLOGY, INC.

Figure B3.2

COMPACTION TEST REPORT



Curve No.
-C-

Test Specification:
ASTM D 1557-91 Procedure A Modified
Oversize correction applied to each point

Hammer Wt.: 10 lb.
Hammer Drop: 18 in.
Number of Layers: five
Blows per Layer: 25
Mold Size: .03333 cu.ft.

Test Performed on Material Passing No.4 **Sieve**

Soil Data

NM		**Sp.G.**	2.65
LL		**PI**	
%>No.4	9.0	**%<#200**	
USCS	SM	**AASHTO**	

TESTING DATA

	1	2	3	4	5	6
WM + WS	8.62	8.84	8.94	8.91		
WM	4.51	4.51	4.51	4.51		
WW + T #1	182.12	184.22	194.17	183.12		
WD + T #1	179.00	177.45	183.25	169.56		
TARE #1	30.98	30.95	32.05	29.78		
WW + T #2						
WD + T #2						
TARE #2						
MOISTURE	1.9	4.2	6.6	8.8		
DRY DENSITY	123.8	127.0	126.8	123.4		

ROCK CORRECTED TEST RESULTS	UNCORRECTED	Material Description
Maximum dry density = 127.5 pcf	124.5 pcf	silty SAND
Optimum moisture = 5.5 %	6 %	

Project No. 98-1617-4 **Client:** Hasley Canyon Land Company, L.L.C.
Project: TT 52584

● **Source:** T-206 **Sample No.:** -C- **Elev./Depth:** 6'

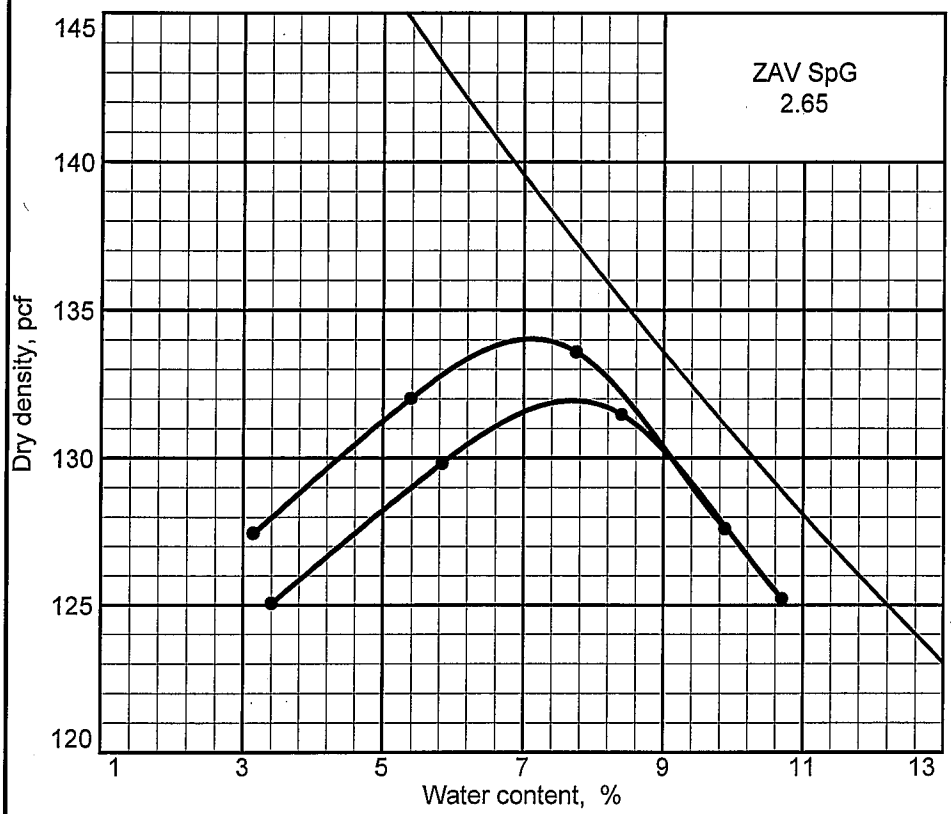
Remarks:
Alluvium (Qal)

COMPACTION TEST REPORT

ALLAN E. SEWARD ENGINEERING GEOLOGY, INC.

Figure B3.3

COMPACTION TEST REPORT



Curve No.
-D-

Test Specification:
ASTM D 1557-91 Procedure A Modified
Oversize correction applied to each point

Hammer Wt.: 10 lb.
Hammer Drop: 18 in.
Number of Layers: five
Blows per Layer: 25
Mold Size: .03333 cu.ft.

Test Performed on Material Passing No.4 **Sieve**

Soil Data

NM		**Sp.G.**	2.65
LL		**PI**	
%>No.4	7.7	**%<#200**	
USCS	SM	**AASHTO**	

TESTING DATA

	1	2	3	4	5	6
WM + WS	8.82	9.09	9.26	9.13		
WM	4.51	4.51	4.51	4.51		
WW + T #1	180.40	189.97	209.90	211.64		
WD + T #1	175.57	181.24	196.10	194.44		
TARE #1	33.68	31.84	31.80	33.75		
WW + T #2						
WD + T #2						
TARE #2						
MOISTURE	3.1	5.4	7.8	9.9		
DRY DENSITY	127.5	132.0	133.6	127.6		

ROCK CORRECTED TEST RESULTS	UNCORRECTED	Material Description
Maximum dry density = 134 pcf	132 pcf	silty SAND
Optimum moisture = 7 %	7.5 %	

Project No. 98-1617-4 **Client:** Hasley Canyon Land Company, L.L.C.
Project: TT 52584

● **Source:** T-211 **Sample No.:** -D- **Elev./Depth:** 9'

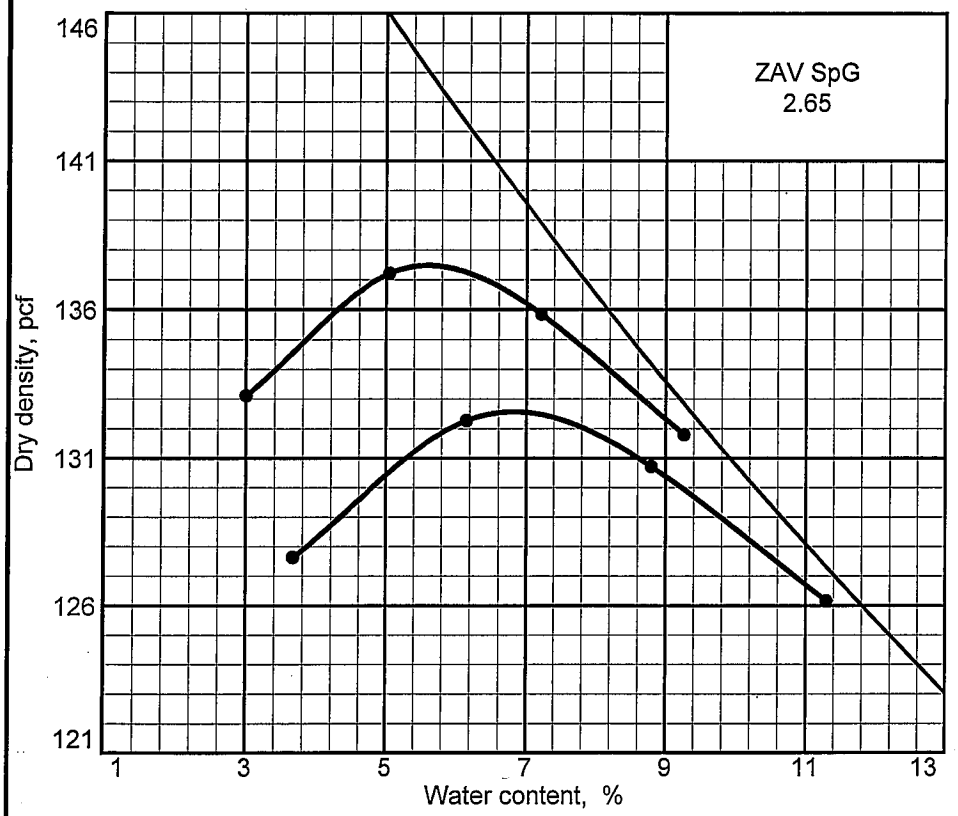
Remarks:
Alluvium (Qal)

COMPACTION TEST REPORT

ALLAN E. SEWARD ENGINEERING GEOLOGY, INC.

Figure B3.4

COMPACTION TEST REPORT



Curve No.
-E-

Test Specification:
ASTM D 1557-91 Procedure B Modified
Oversize correction applied to each point

Hammer Wt.: 10 lb.
Hammer Drop: 18 in.
Number of Layers: five
Blows per Layer: 25
Mold Size: .03333 cu.ft.

Test Performed on Material Passing 3/8 in. **Sieve**

Soil Data

NM _____ **Sp.G.** 2.65
LL _____ **PI** _____
%>3/8 in. 18.0 **%<#200** _____
USCS SM **AASHTO** _____

TESTING DATA

	1	2	3	4	5	6
WM + WS	8.92	9.19	9.25	9.19		
WM	4.51	4.51	4.51	4.51		
WW + T #1	202.74	206.56	208.77	219.09		
WD + T #1	196.66	196.44	194.39	199.90		
TARE #1	30.95	32.05	31.00	30.05		
WW + T #2						
WD + T #2						
TARE #2						
MOISTURE	3.0	5.0	7.2	9.3		
DRY DENSITY	133.1	137.2	135.8	131.8		

ROCK CORRECTED TEST RESULTS	UNCORRECTED	Material Description
Maximum dry density = 137.5 pcf	132.5 pcf	silty SAND with gravel
Optimum moisture = 5.5 %	7 %	

Project No. 98-1617-4 **Client:** Hasley Canyon Land Company, L.L.C.
Project: TT 52584

● **Source:** T-209 **Sample No.:** -E- **Elev./Depth:** 6.5'

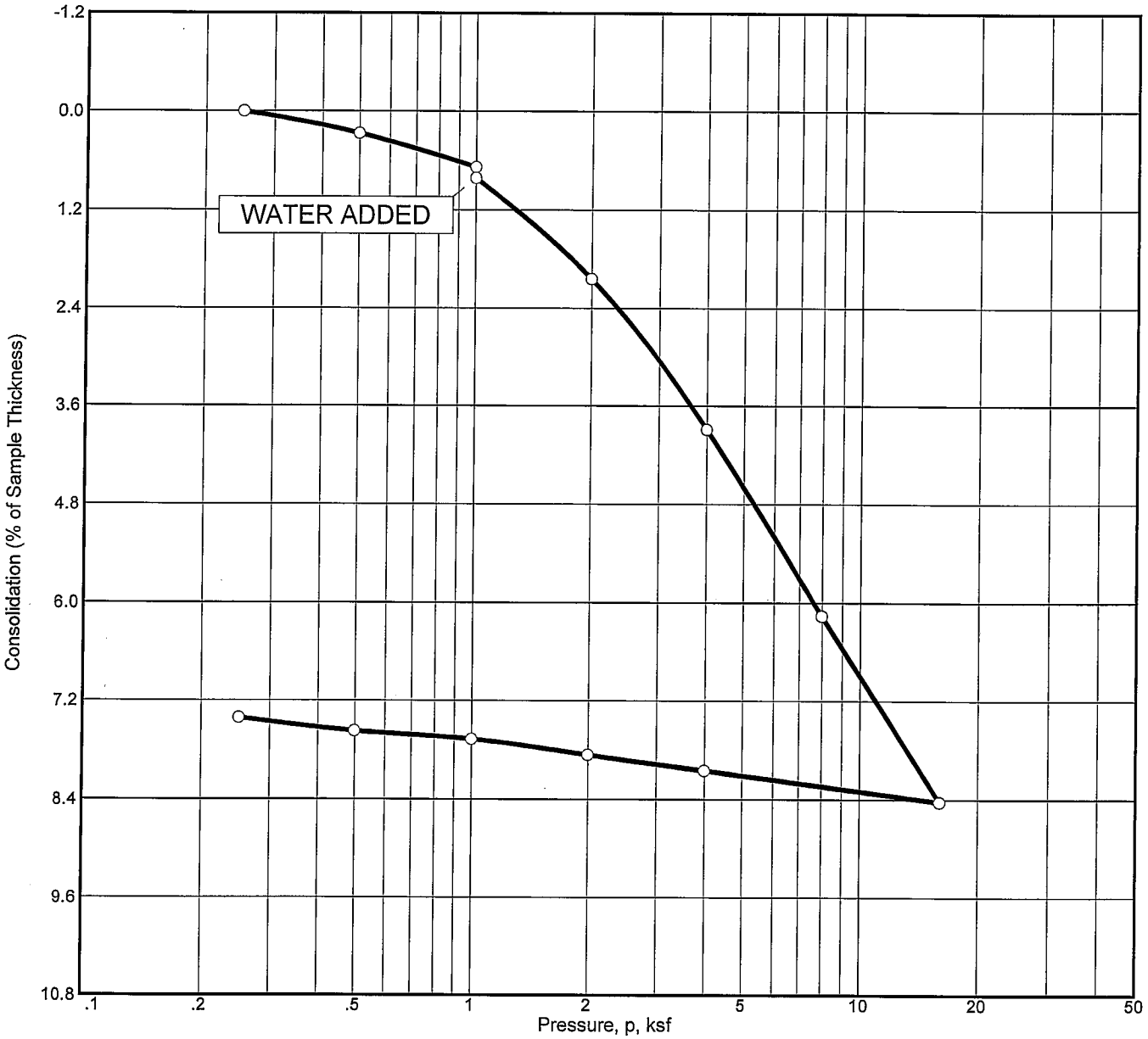
Remarks:
Alluvium (Qal)

COMPACTION TEST REPORT

ALLAN E. SEWARD ENGINEERING GEOLOGY, INC.

Figure B3.5

CONSOLIDATION TEST REPORT



SUMMARY OF TEST RESULTS

	DRY DENSITY (pcf)	MOISTURE CONTENT, (%)	SATURATION (%)	HEIGHT (in.)	VOID RATIO	SPECIFIC GRAVITY	C_c	P'_o (ksf)	P_c (ksf)	USCS
INITIAL	109.2	3.2	16.4	1.000	0.515	2.65	0.11	0.56	2.40	SM with gravel
FINAL	118.0	14.8	97.2	0.926	0.402					

Source: HS-1 **Sample No.:** 1 **Elev./Depth:** 5'
Material Description: silty SAND with gravel
Remarks:

ALLAN E. SEWARD ENGINEERING GEOLOGY, INC.	**Client:** Hasley Canyon Land Company, L.L.C. **Project:** TT 52584 **Job No.:** 98-1617-4 **Figure** B4.1

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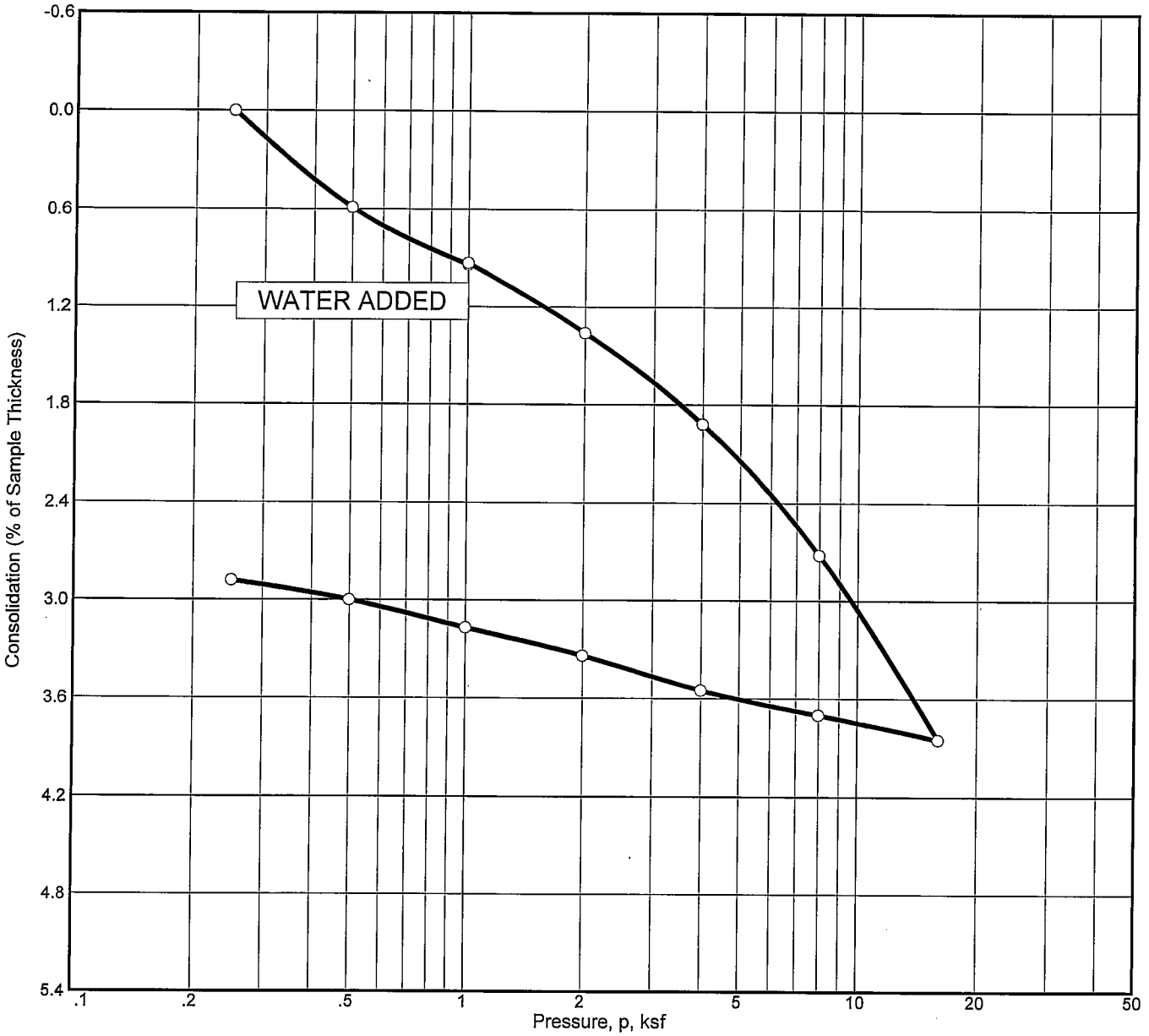
CONSOLIDATION TEST REPORT



SUMMARY OF TEST RESULTS

	DRY DENSITY (pcf)	MOISTURE CONTENT, (%)	SATURATION (%)	HEIGHT (in.)	VOID RATIO	SPECIFIC GRAVITY	C_c	P'_o (ksf)	P_c (ksf)	USCS
INITIAL	124.8	3.6	29.5	1.000	0.326	2.65	0.05	1.29	3.33	SP
FINAL	128.5	11.4	100.0	0.971	0.288					

Source: HS-1 **Sample No.:** 3 **Elev./Depth:** 10'
Material Description: poorly graded SAND
Remarks:

ALLAN E. SEWARD	**Client:** Hasley Canyon Land Company, L.L.C.
	Project: TT 52584
ENGINEERING GEOLOGY, INC.	**Job No.:** 98-1617-4 **Figure** B4.2

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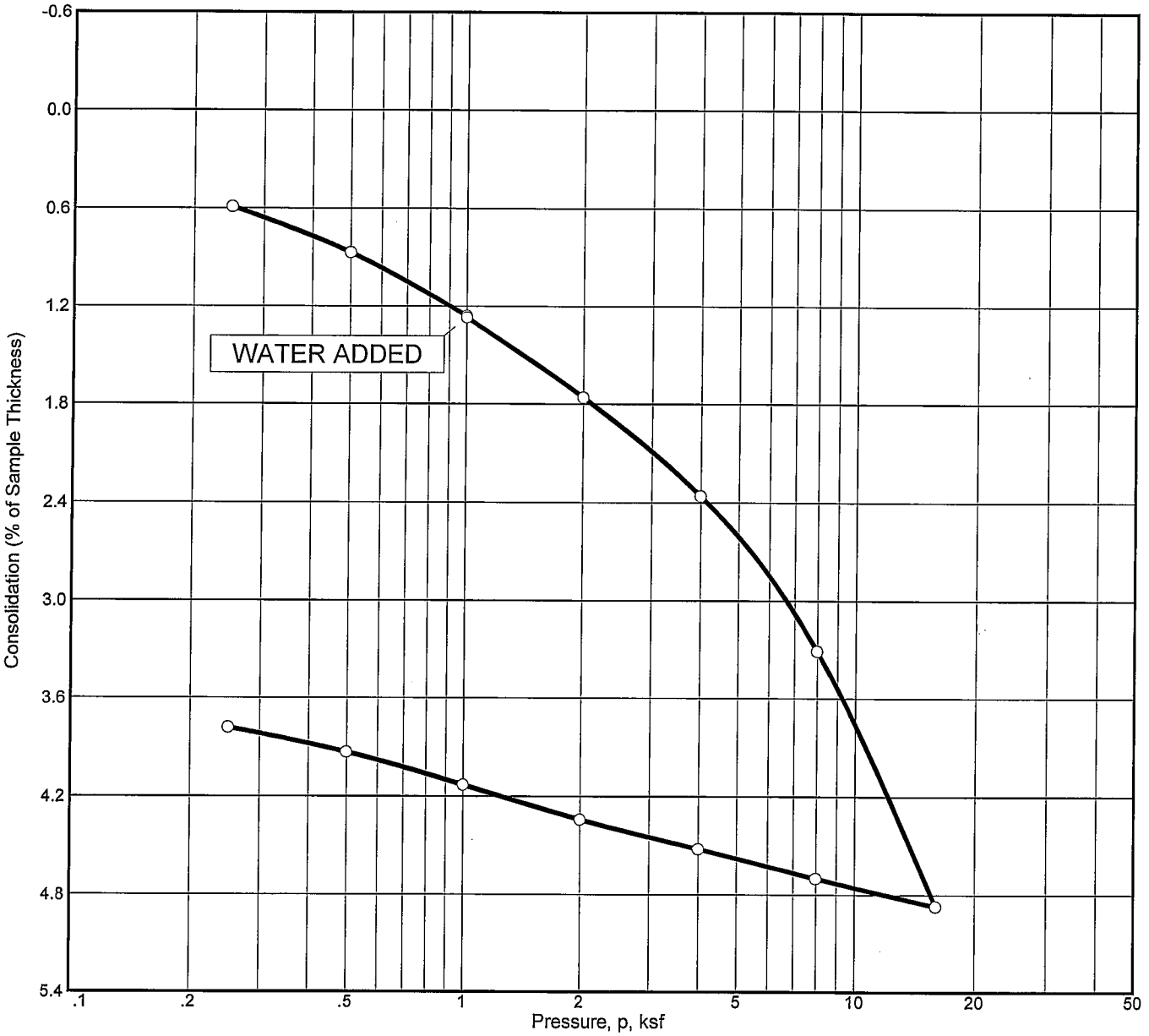
CONSOLIDATION TEST REPORT



SUMMARY OF TEST RESULTS

	DRY DENSITY (pcf)	MOISTURE CONTENT, (%)	SATURATION (%)	HEIGHT (in.)	VOID RATIO	SPECIFIC GRAVITY	C_c	P'_o (ksf)	P_c (ksf)	USCS
INITIAL	118.2	7.1	47.6	1.000	0.395	2.65	0.07	1.27	7.77	SM
FINAL	123.3	12.6	97.8	0.962	0.342					

Source: HS-4 **Sample No.:** 1 **Elev./Depth:** 10
Material Description: silty SAND
Remarks:

ALLAN E. SEWARD ENGINEERING GEOLOGY, INC.	**Client:** Hasley Canyon Land Company, L.L.C. **Project:** TT 52584 **Job No.:** 98-1617-4 **Figure** B4.3

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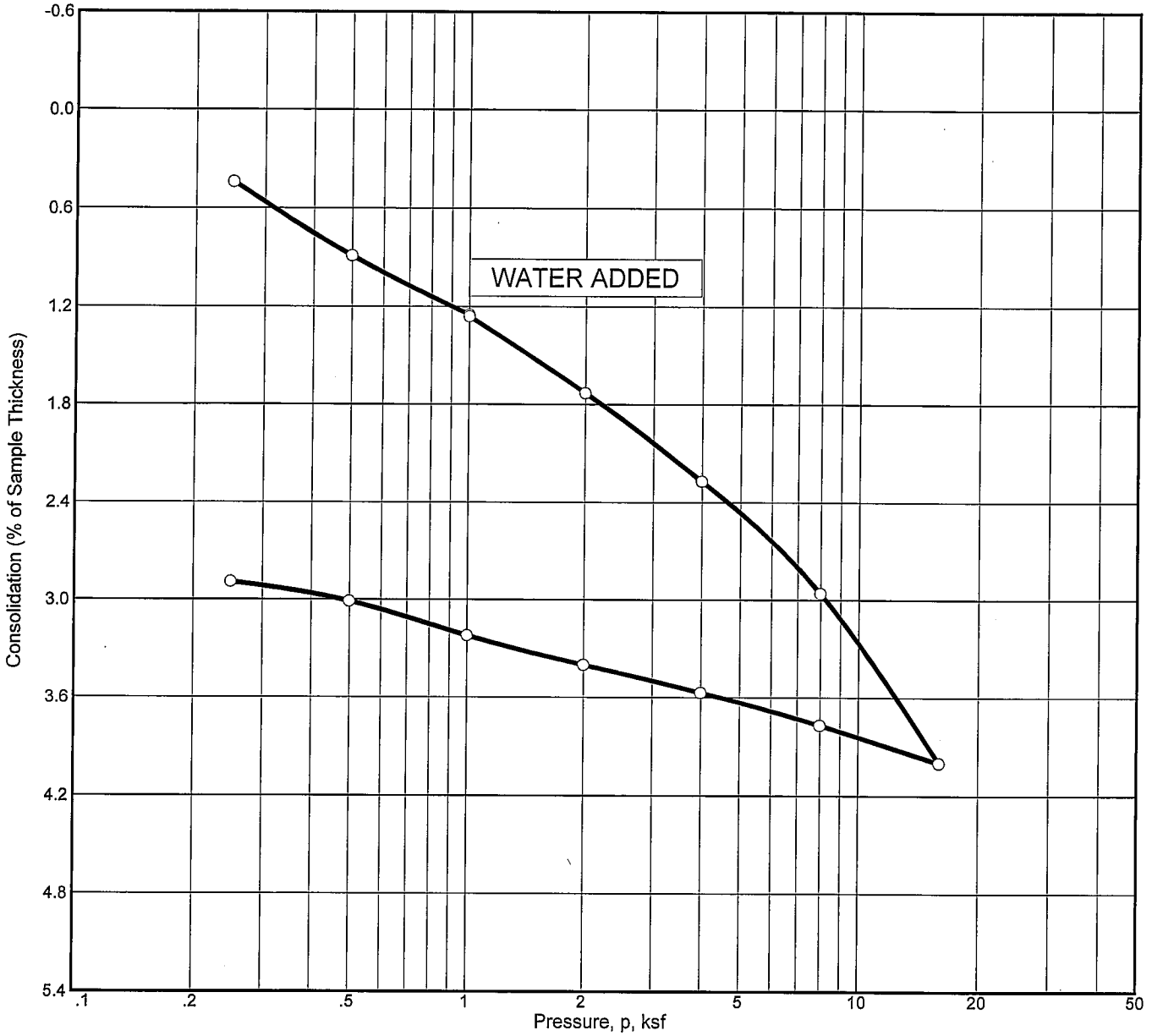
DATE	APPROVED BY

CONSOLIDATION TEST REPORT



SUMMARY OF TEST RESULTS

	DRY DENSITY (pcf)	MOISTURE CONTENT, (%)	SATURATION (%)	HEIGHT (in.)	VOID RATIO	SPECIFIC GRAVITY	C_c	P'_o (ksf)	P_c (ksf)	USCS
INITIAL	117.8	5.3	34.8	1.000	0.405	2.65	0.05	0.62	8.38	SP/SM
FINAL	121.3	13.7	99.6	0.971	0.364					

Source: HS-5 **Sample No.:** 1 **Elev./Depth:** 5
Material Description: Poorly graded SAND to silty SAND
Remarks:

ALLAN E. SEWARD	**Client:** Hasley Canyon Land Company, L.L.C.
	Project: TT 52584
ENGINEERING GEOLOGY, INC.	**Job No.:** 98-1617-4 **Figure** B4.4

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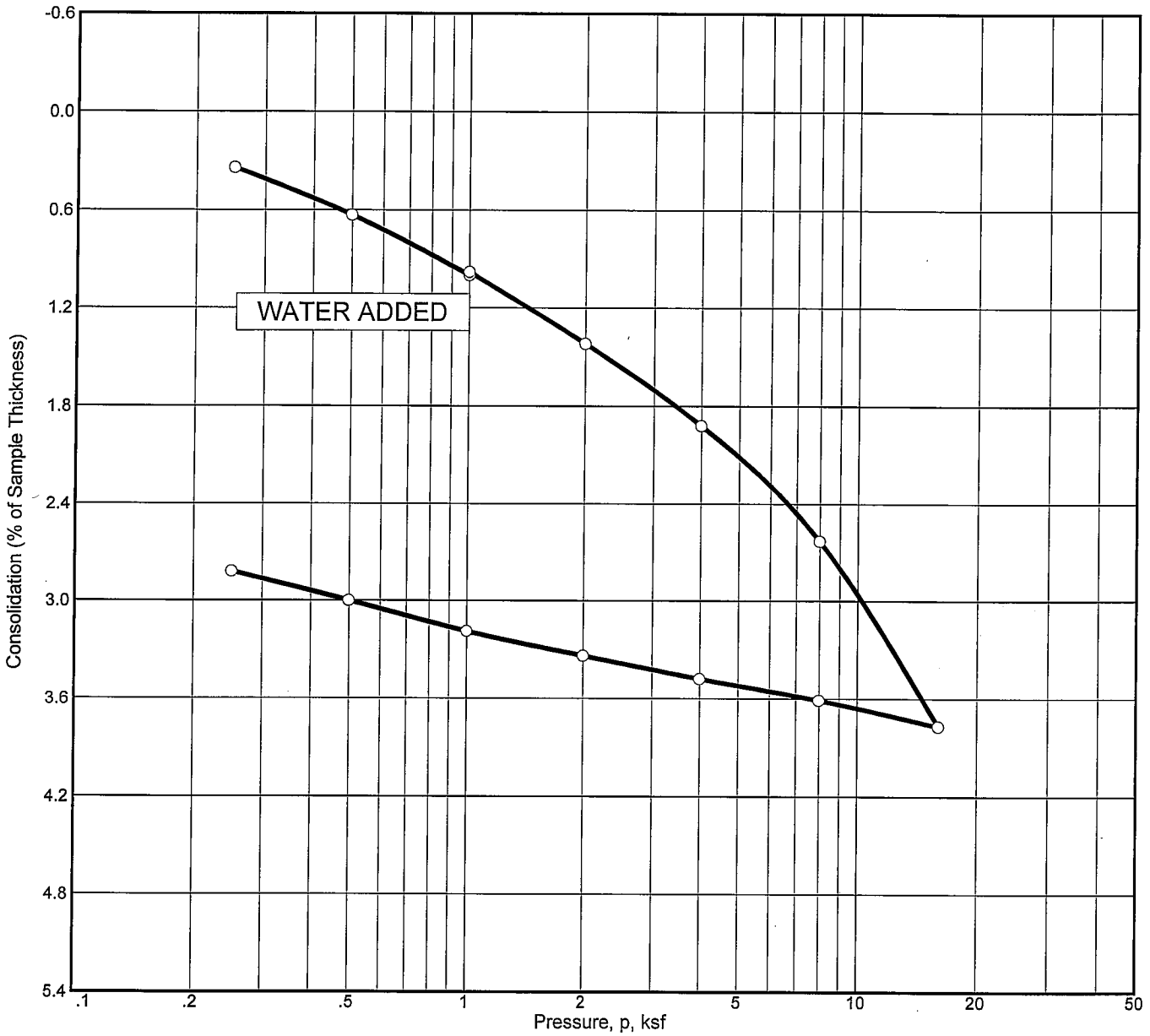
DATE	APPROVED BY

CONSOLIDATION TEST REPORT



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DATE
CHECKED BY
APPROVED BY

SUMMARY OF TEST RESULTS

	DRY DENSITY (pcf)	MOISTURE CONTENT, (%)	SATURATION (%)	HEIGHT (in.)	VOID RATIO	SPECIFIC GRAVITY	C_c	P'_o (ksf)	P_c (ksf)	USCS
INITIAL	117.4	5.9	38.4	1.000	0.410	2.65	0.05	1.24	8.29	SM
FINAL	120.8	14.0	100.0	0.972	0.370					

Source: HS-5 **Sample No.:** 2 **Elev./Depth:** 10
Material Description: silty SAND
Remarks:

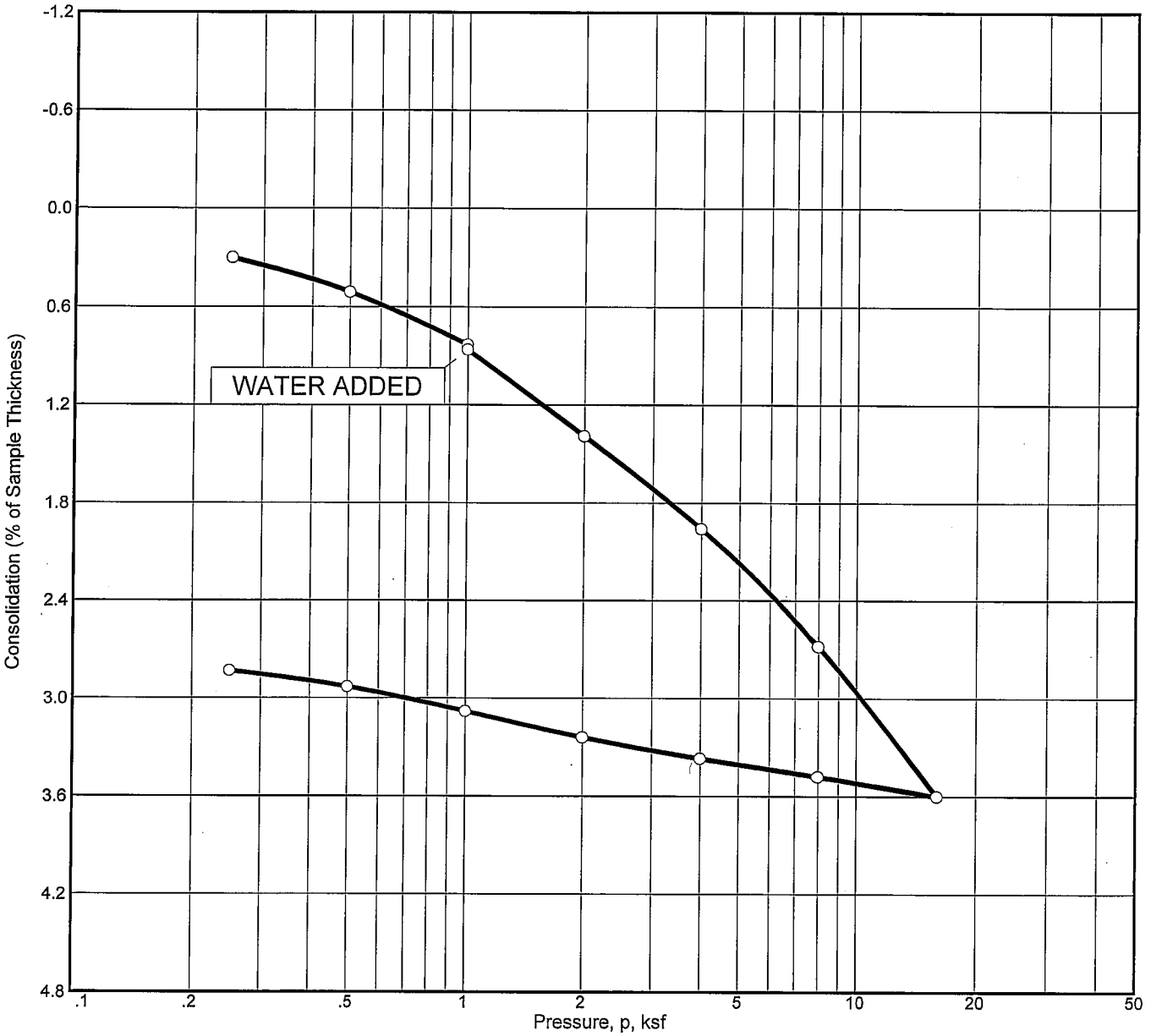
ALLAN E. SEWARD

ENGINEERING GEOLOGY, INC.

Client: Hasley Canyon Land Company, L.L.C.
Project: TT 52584

Job No.: 98-1617-4 **Figure** B4.5

CONSOLIDATION TEST REPORT



SUMMARY OF TEST RESULTS

	DRY DENSITY (pcf)	MOISTURE CONTENT, (%)	SATURATION (%)	HEIGHT (in.)	VOID RATIO	SPECIFIC GRAVITY	C_c	P'_o (ksf)	P_c (ksf)	USCS
INITIAL	116.8	10.1	64.1	1.000	0.416	2.65	0.04	1.16	1.96	SW
FINAL	120.2	13.9	98.0	0.972	0.376					

Source: RW-1 **Sample No.:** 1 **Elev./Depth:** 9'
Material Description: well graded SAND
Remarks:

ALLAN E. SEWARD

ENGINEERING GEOLOGY, INC.

Client: Hasley Canyon Land Company, L.L.C.
Project: TT 52584

Job No.: 98-1617-4 **Figure** B4.6

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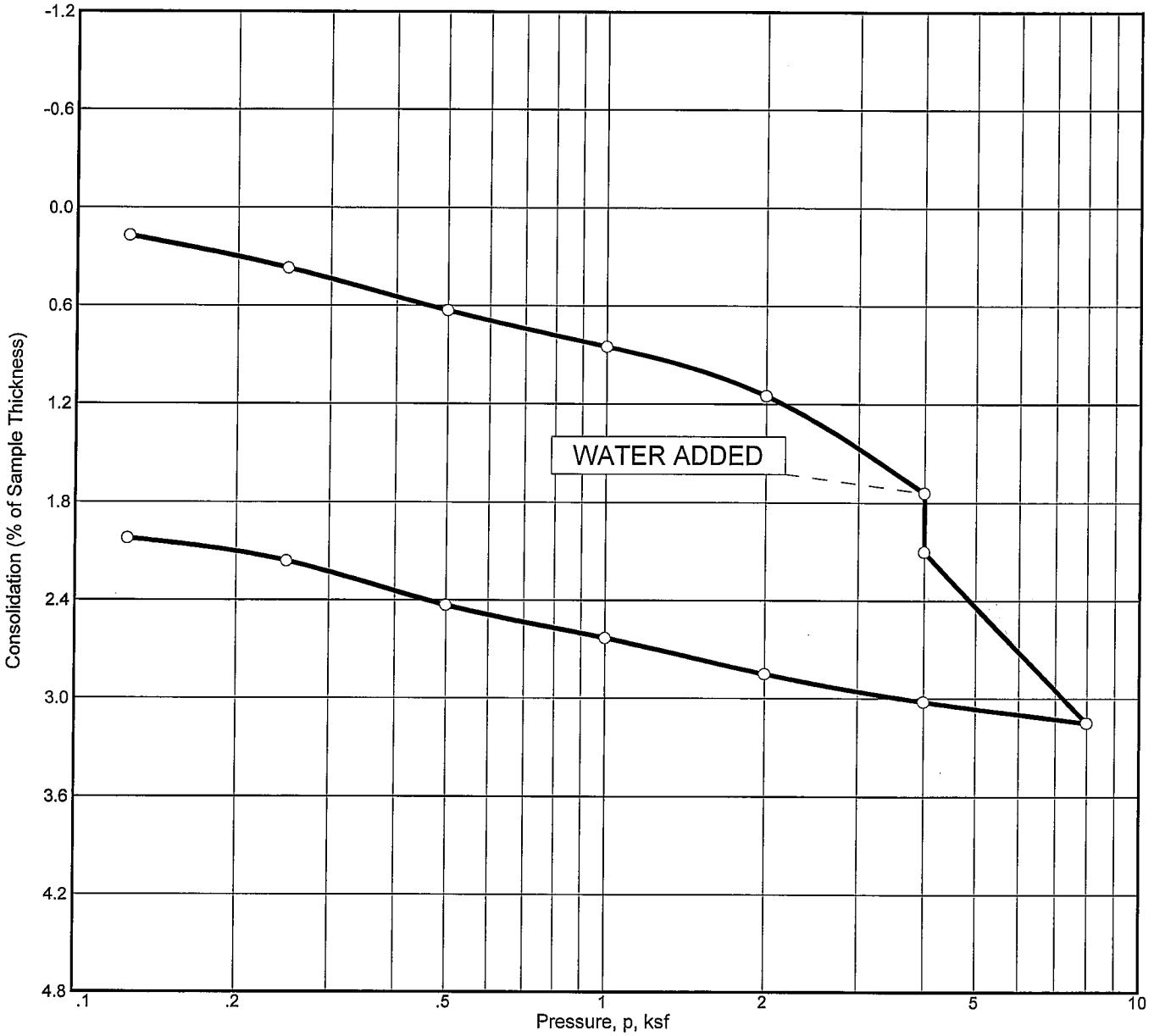
DATE | APPROVED BY

CONSOLIDATION TEST REPORT



SUMMARY OF TEST RESULTS

	DRY DENSITY (pcf)	MOISTURE CONTENT, (%)	SATURATION (%)	HEIGHT (in.)	VOID RATIO	SPECIFIC GRAVITY	C_c	P'_o (ksf)	P_c (ksf)	USCS
INITIAL	116.0	9.3	57.8	1.000	0.427	2.65	0.05	0.38	2.18	SM
FINAL	118.4	14.7	98.1	0.980	0.398					

Source: T-202 **Sample No.:** 1 **Elev./Depth:** 3'
Material Description: Silty SAND
Remarks:

ALLAN E. SEWARD	**Client:** Hasley Canyon Land Company, L.L.C.
	Project: TT 52584
ENGINEERING GEOLOGY, INC.	**Job No.:** 98-1617-4 **Figure** B4.7

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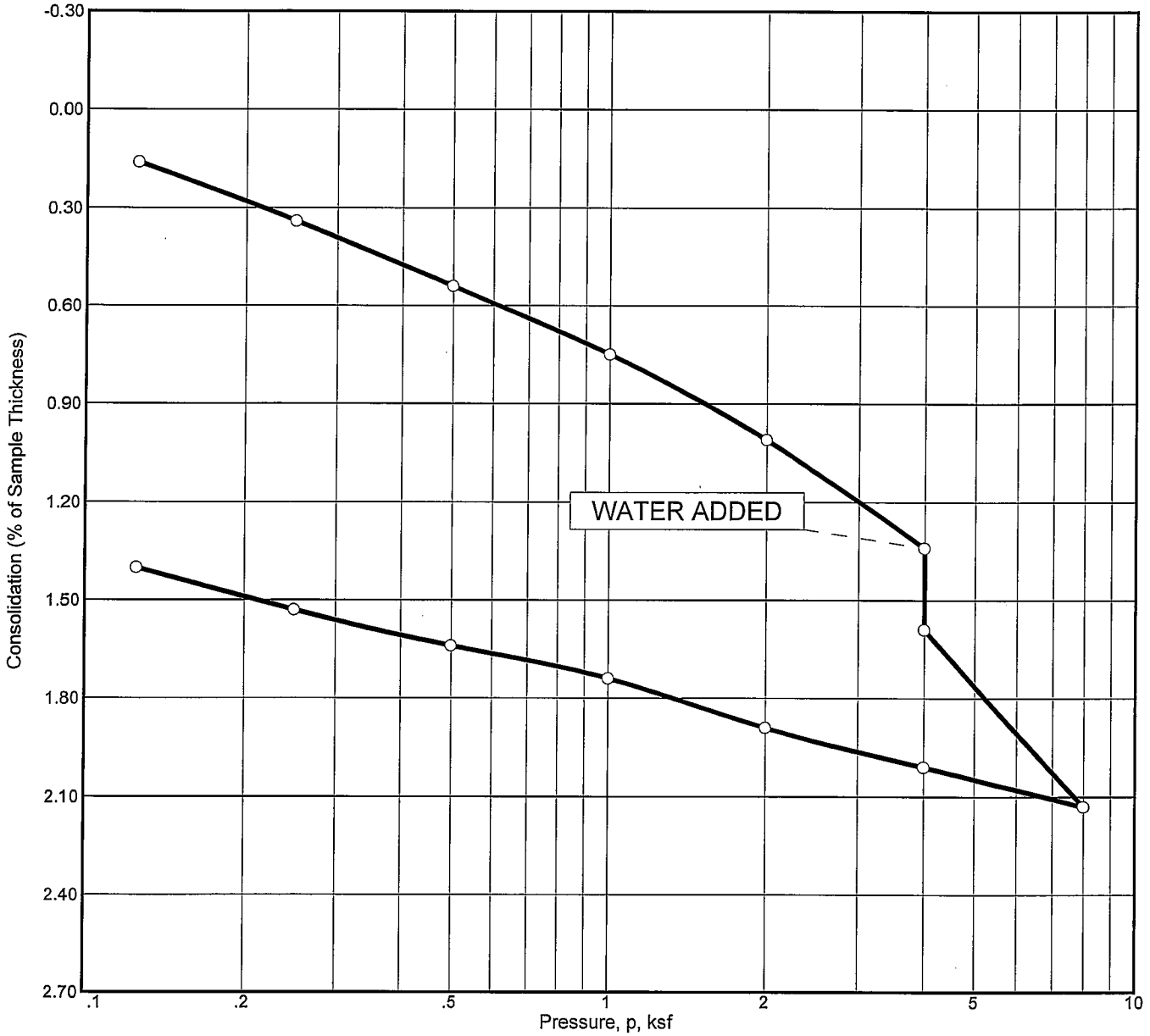
DATE	APPROVED BY

CONSOLIDATION TEST REPORT



SUMMARY OF TEST RESULTS

	DRY DENSITY (pcf)	MOISTURE CONTENT, (%)	SATURATION (%)	HEIGHT (in.)	VOID RATIO	SPECIFIC GRAVITY	C_c	P'_o (ksf)	P_c (ksf)	USCS
INITIAL	116.6	6.5	41.4	1.000	0.419	2.65	0.03	0.74	1.86	SM
FINAL	118.3	14.8	98.2	0.986	0.399					

Source: T-202 **Sample No.:** 2 **Elev./Depth:** 6'
Material Description: silty SAND
Remarks:

ALLAN E. SEWARD	**Client:** Hasley Canyon Land Company, L.L.C.
	Project: TT 52584
ENGINEERING GEOLOGY, INC.	**Job No.:** 98-1617-4 **Figure** B4.8

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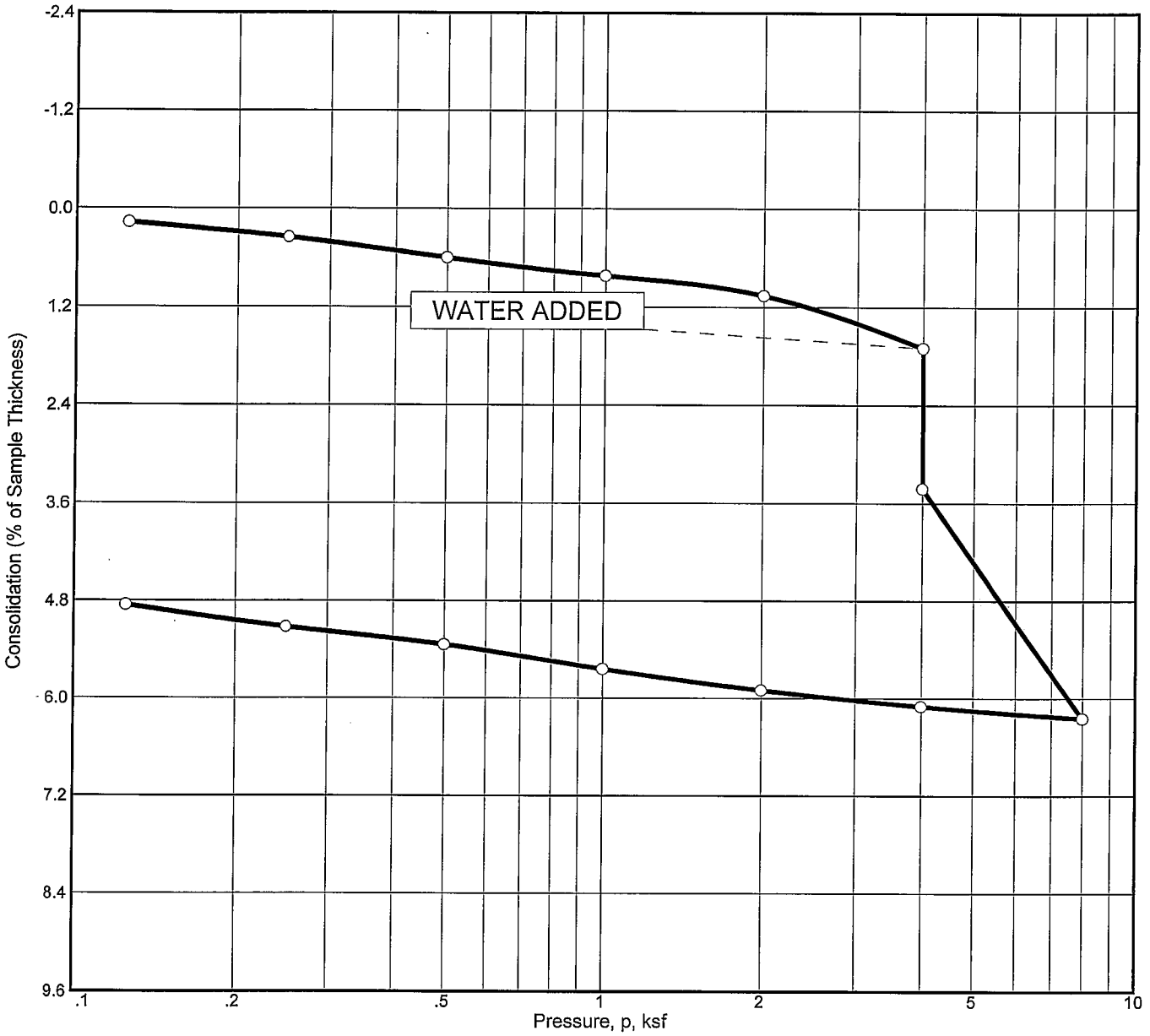
DATE	APPROVED BY

CONSOLIDATION TEST REPORT



SUMMARY OF TEST RESULTS

	DRY DENSITY (pcf)	MOISTURE CONTENT, (%)	SATURATION (%)	HEIGHT (in.)	VOID RATIO	SPECIFIC GRAVITY	C_c	P'_o (ksf)	P_c (ksf)	USCS
INITIAL	108.3	7.7	38.8	1.000	0.527	2.65	0.14	1.05	2.27	SM
FINAL	113.8	17.0	99.5	0.951	0.453					

Source: T-203 **Sample No.:** 1 **Elev./Depth:** 9'
Material Description: silty SAND
Remarks:

ALLAN E. SEWARD	**Client:** Hasley Canyon Land Company, L.L.C.
	Project: TT 52584
ENGINEERING GEOLOGY, INC.	**Job No.:** 98-1617-4 **Figure** B4.9

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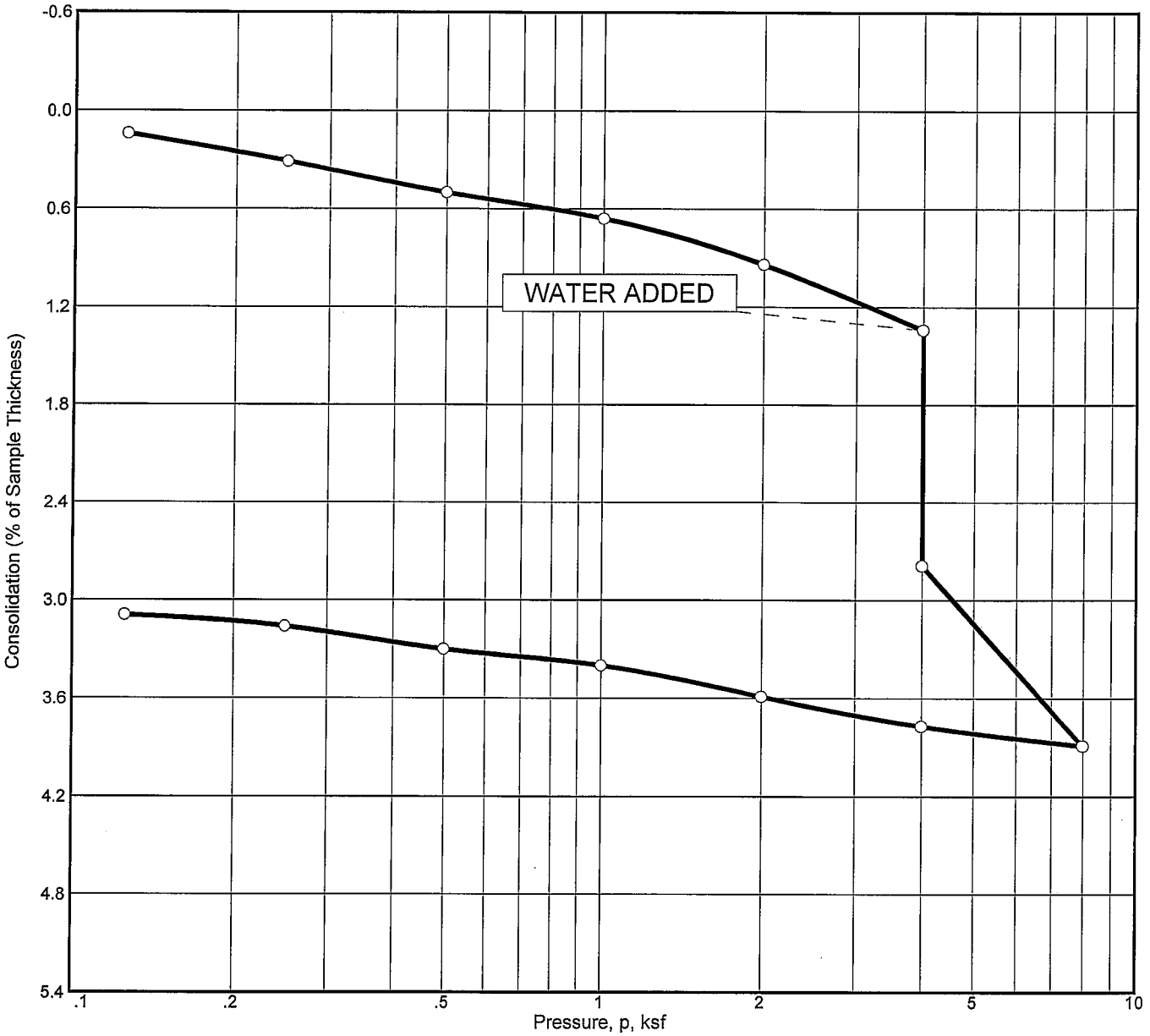
DATE	APPROVED BY

CONSOLIDATION TEST REPORT



SUMMARY OF TEST RESULTS

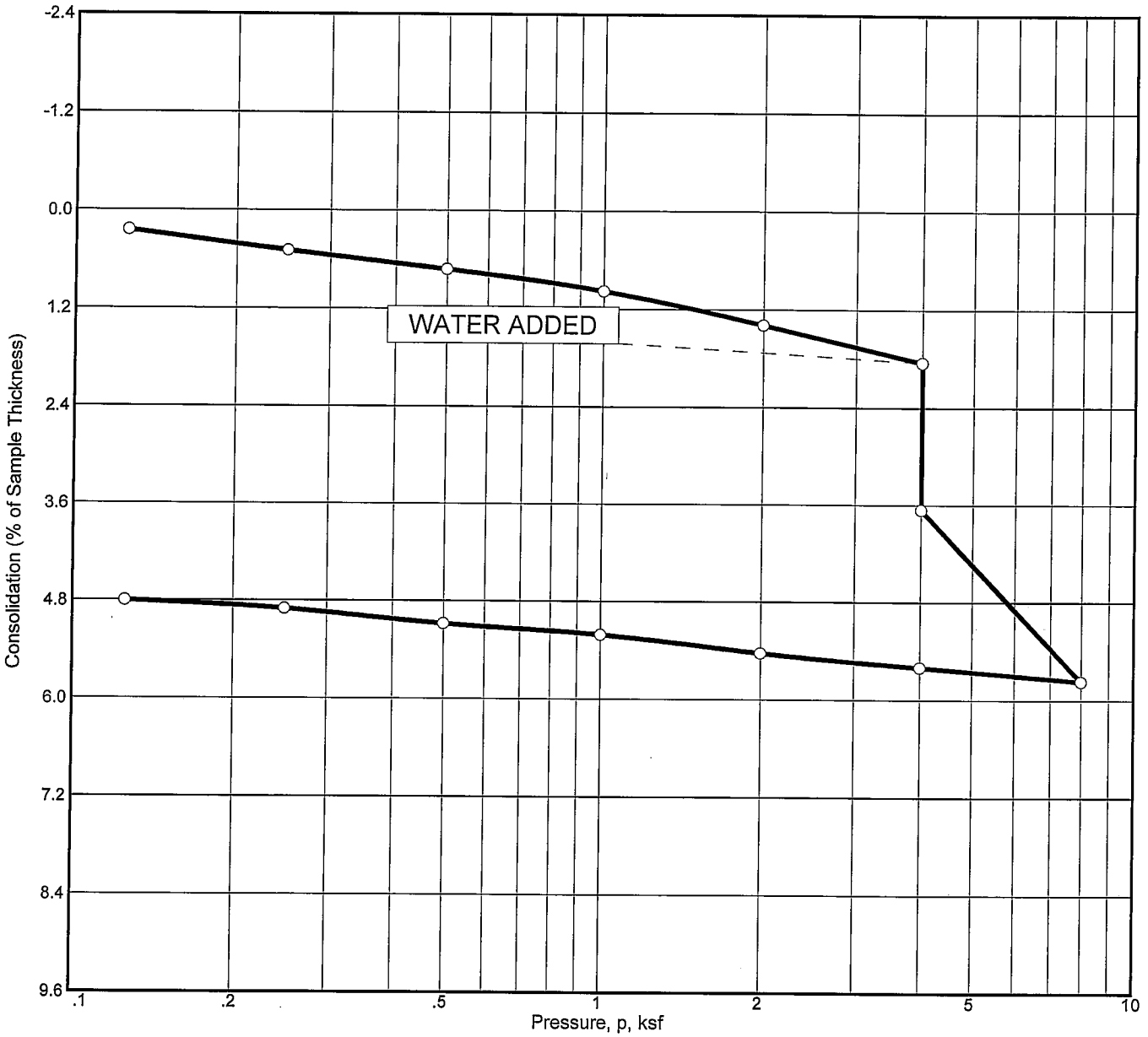
	DRY DENSITY (pcf)	MOISTURE CONTENT, (%)	SATURATION (%)	HEIGHT (in.)	VOID RATIO	SPECIFIC GRAVITY	C_c	P'_o (ksf)	P_c (ksf)	USCS
INITIAL	110.3	4.0	21.1	1.000	0.500	2.65	0.05	1.03	1.05	SM
FINAL	113.8	17.2	100.0	0.969	0.453					

Source: T-204 **Sample No.:** 1 **Elev./Depth:** 9'
Material Description: Silty SAND
Remarks:

ALLAN E. SEWARD	**Client:** Hasley Canyon Land Company, L.L.C.
	Project: TT 52584
ENGINEERING GEOLOGY, INC.	**Job No.:** 98-1617-4 **Figure** B4.10

DRAWN BY	CHECKED BY
DATE	APPROVED BY

CONSOLIDATION TEST REPORT



SUMMARY OF TEST RESULTS

	DRY DENSITY (pcf)	MOISTURE CONTENT, (%)	SATURATION (%)	HEIGHT (in.)	VOID RATIO	SPECIFIC GRAVITY	C_c	P'_o (ksf)	P_c (ksf)	USCS
INITIAL	109.2	6.5	33.2	1.000	0.515	2.65	0.11	1.05	1.73	SM
FINAL	114.7	16.1	96.4	0.952	0.443					

Source: T-205 **Sample No.:** 1 **Elev./Depth:** 9'
Material Description: silty SAND
Remarks:

ALLAN E. SEWARD	**Client:** Hasley Canyon Land Company, L.L.C.
ENGINEERING GEOLOGY, INC.	**Project:** TT 52584
	Job No.: 98-1617-4 **Figure** B4.11

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DATE
CHECKED BY
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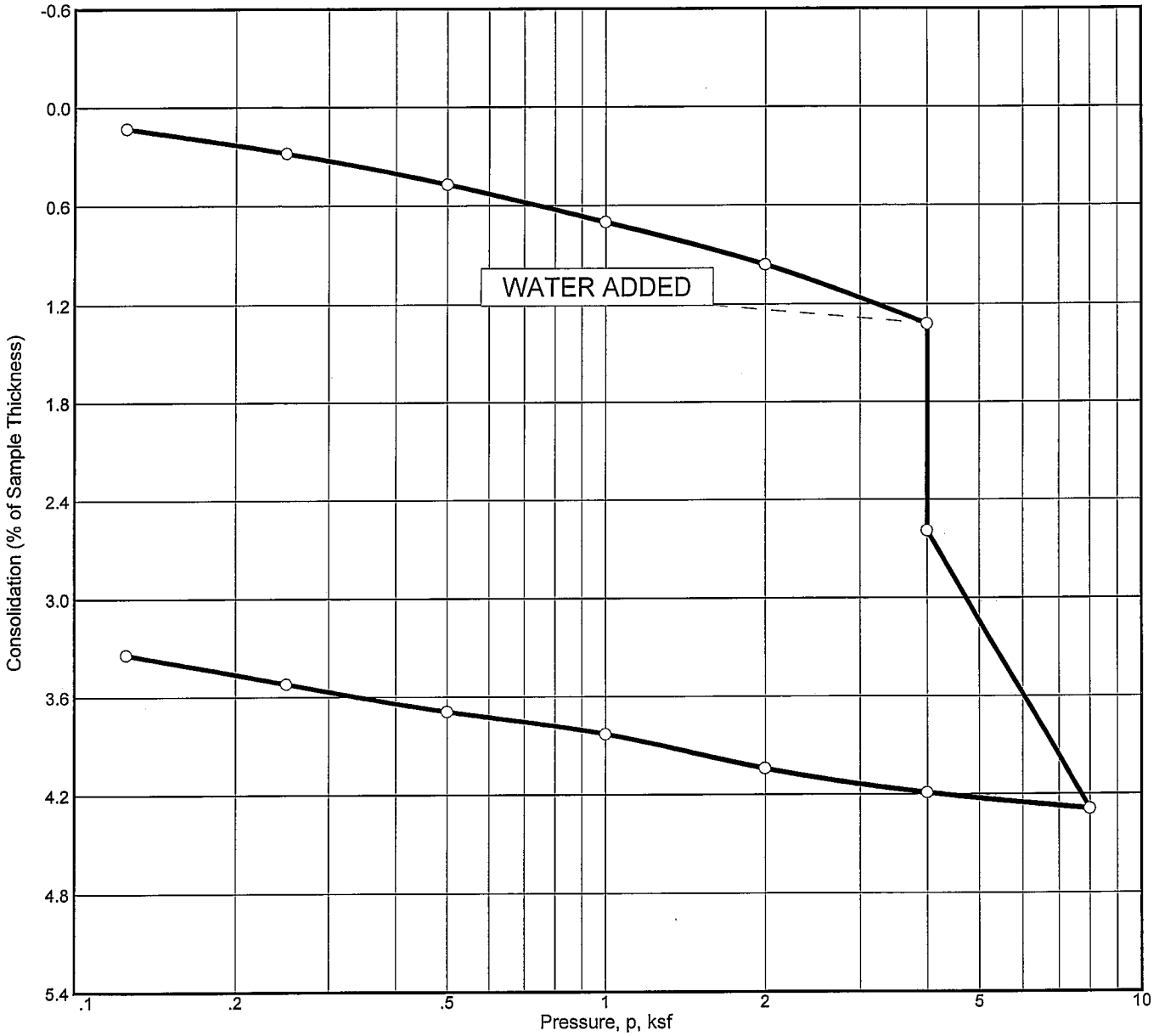
CONSOLIDATION TEST REPORT



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SUMMARY OF TEST RESULTS

	DRY DENSITY (pcf)	MOISTURE CONTENT, (%)	SATURATION (%)	HEIGHT (in.)	VOID RATIO	SPECIFIC GRAVITY	C_c	P'_o (ksf)	P_c (ksf)	USCS
INITIAL	112.2	8.4	46.8	1.000	0.474	2.65	0.08	1.09	2.06	SM
FINAL	116.1	15.9	98.9	0.967	0.425					

Source: T-208 **Sample No.:** 1 **Elev./Depth:** 9'
Material Description: silty SAND
Remarks:

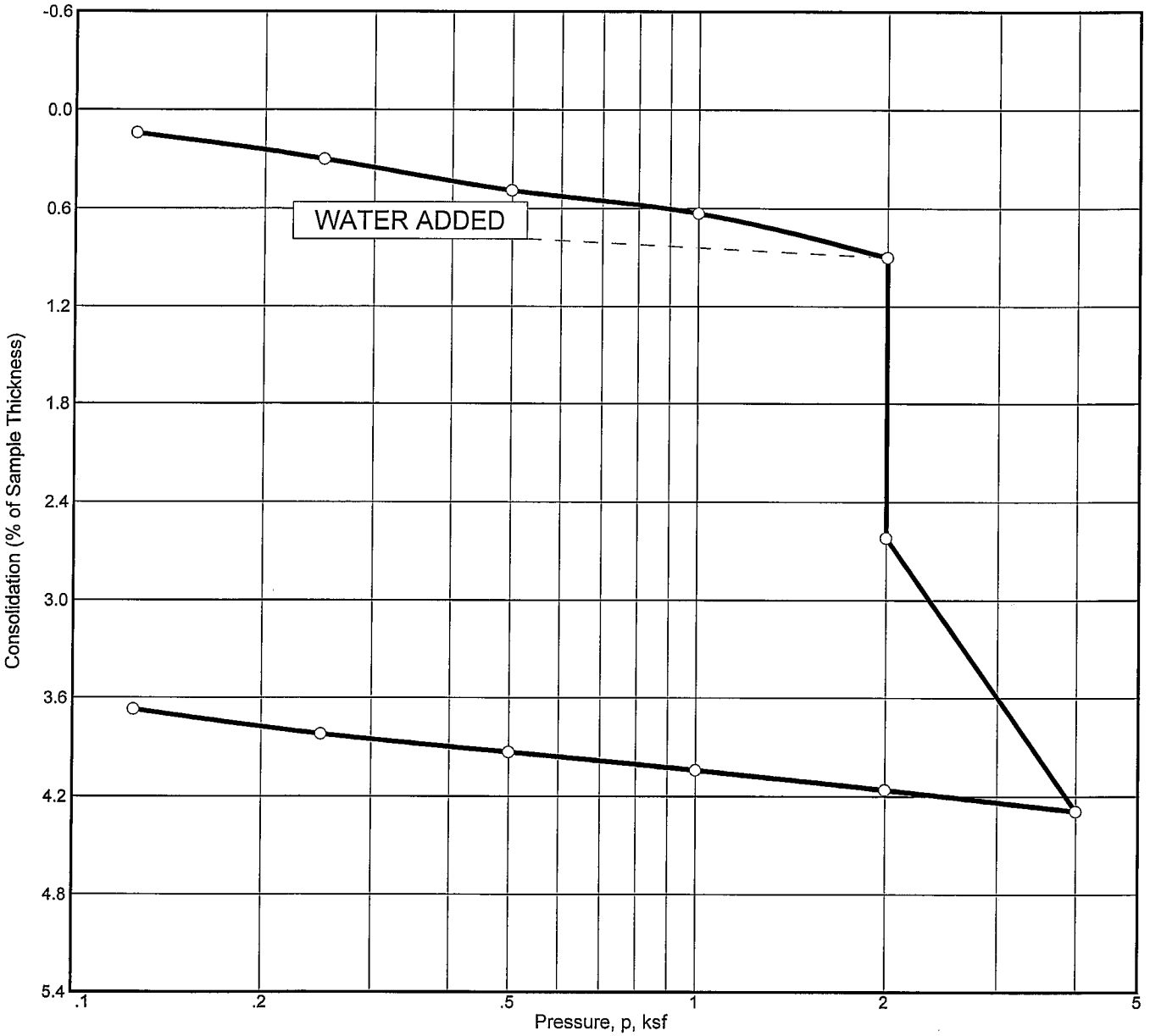
ALLAN E. SEWARD

ENGINEERING GEOLOGY, INC.

Client: Hasley Canyon Land Company, L.L.C.
Project: TT 52584

Job No.: 98-1617-4 **Figure** B4.12

CONSOLIDATION TEST REPORT



SUMMARY OF TEST RESULTS

	DRY DENSITY (pcf)	MOISTURE CONTENT, (%)	SATURATION (%)	HEIGHT (in.)	VOID RATIO	SPECIFIC GRAVITY	C_c	P'_o (ksf)	P_c (ksf)	USCS
INITIAL	113.2	5.3	30.6	1.000	0.461	2.65	0.08	1.07	0.87	SM
FINAL	117.6	14.9	97.2	0.963	0.407					

Source: T-209 **Sample No.:** 1 **Elev./Depth:** 9'
Material Description: silty SAND
Remarks:

ALLAN E. SEWARD	**Client:** Hasley Canyon Land Company, L.L.C.
	Project: TT 52584
ENGINEERING GEOLOGY, INC.	**Job No.:** 98-1617-4 **Figure** B4.13

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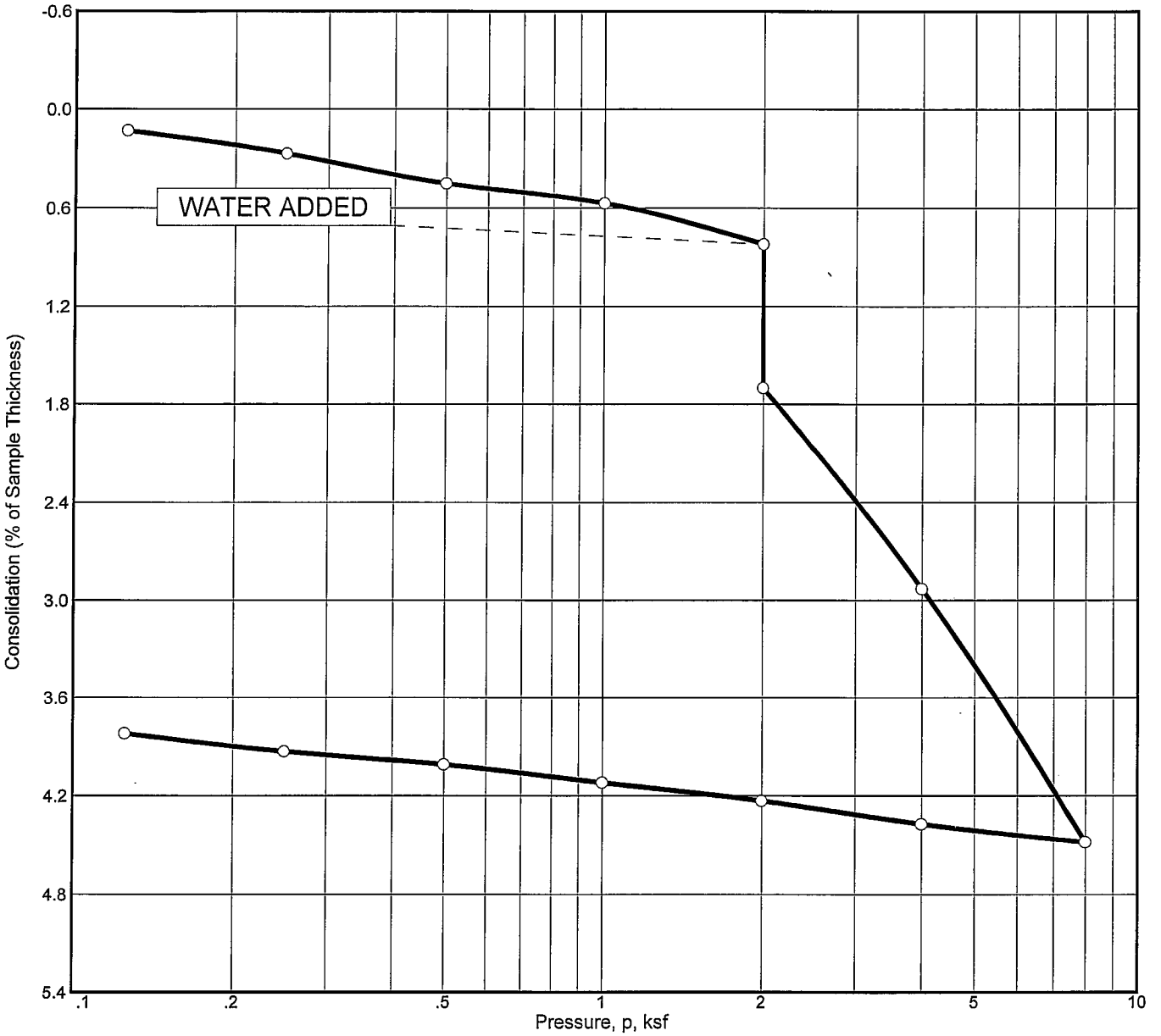
CONSOLIDATION TEST REPORT



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DATE | APPROVED BY

SUMMARY OF TEST RESULTS

	DRY DENSITY (pcf)	MOISTURE CONTENT, (%)	SATURATION (%)	HEIGHT (in.)	VOID RATIO	SPECIFIC GRAVITY	C_c	P'_o (ksf)	P_c (ksf)	USCS
INITIAL	112.5	4.3	24.2	1.000	0.471	2.65	0.08	0.70	1.47	SM
FINAL	116.9	16.0	100.0	0.962	0.415					

Source: T-210 **Sample No.:** 1 **Elev./Depth:** 6'
Material Description: silty SAND
Remarks:

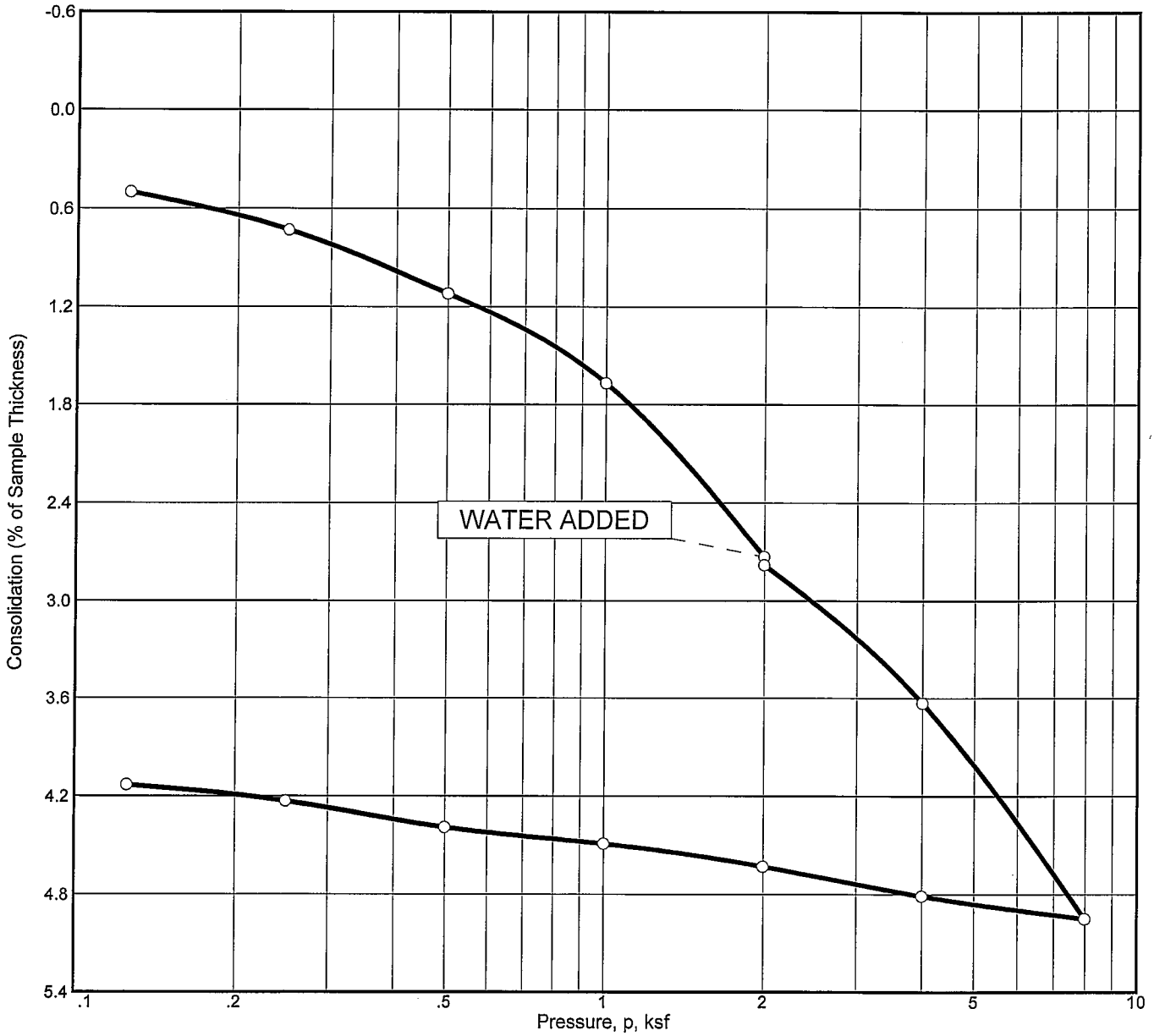
ALLAN E. SEWARD

ENGINEERING GEOLOGY, INC.

Client: Hasley Canyon Land Company, L.L.C.
Project: TT 52584

Job No.: 98-1617-4 **Figure** B4.14

CONSOLIDATION TEST REPORT



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SUMMARY OF TEST RESULTS

	DRY DENSITY (pcf)	MOISTURE CONTENT, (%)	SATURATION (%)	HEIGHT (in.)	VOID RATIO	SPECIFIC GRAVITY	C_c	P'_o (ksf)	P_c (ksf)	USCS
INITIAL	112.1	3.3	18.5	1.000	0.476	2.65	0.07	0.69	1.79	SW/SM
FINAL	116.9	15.4	98.4	0.959	0.415					

Source: T-212 **Sample No.:** 1 **Elev./Depth:** 6'
Material Description: well graded SAND to silty SAND
Remarks:

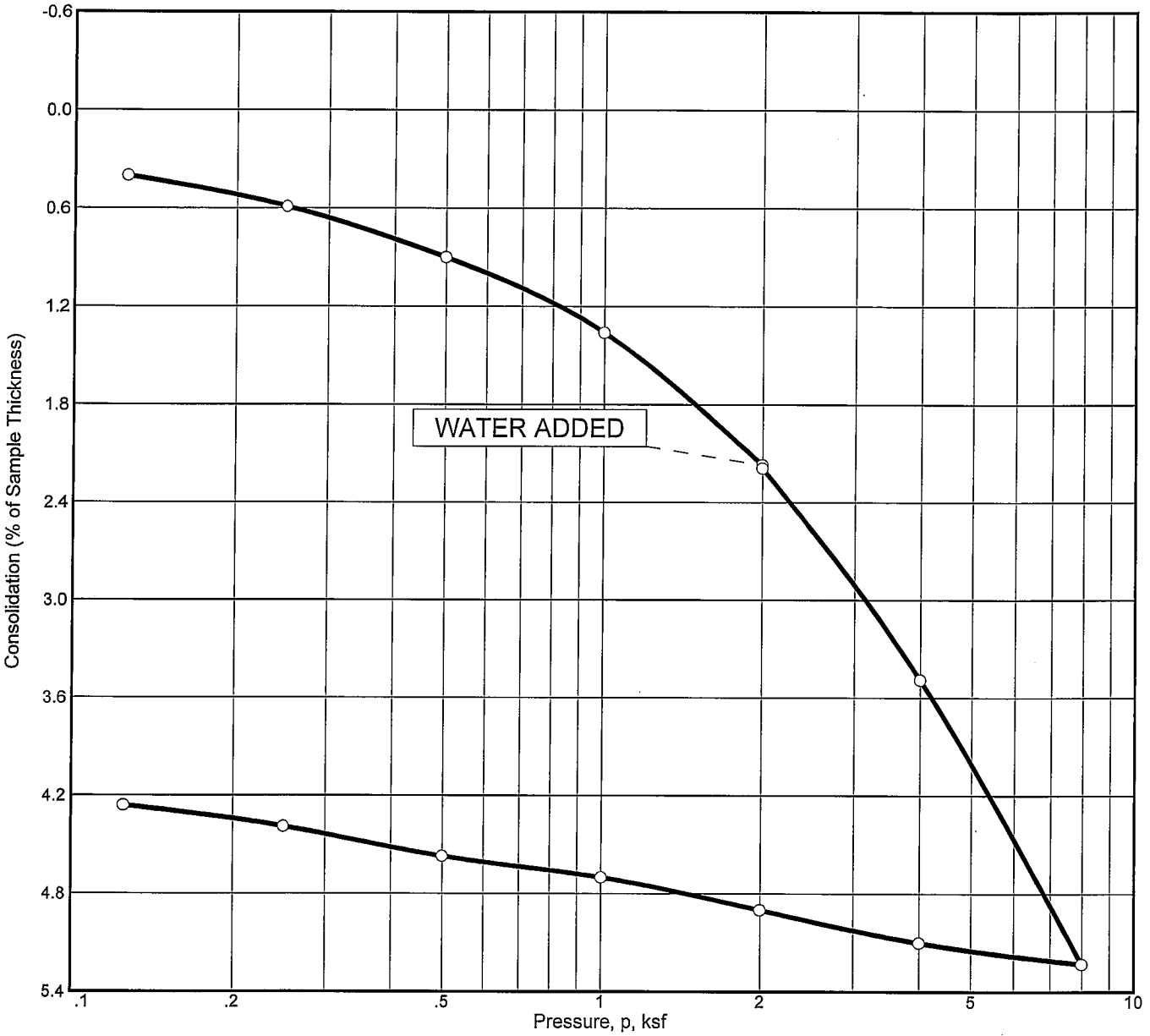
ALLAN E. SEWARD

ENGINEERING GEOLOGY, INC.

Client: Hasley Canyon Land Company, L.L.C.
Project: TT 52584

Job No.: 98-1617-4 **Figure** B4.15

CONSOLIDATION TEST REPORT



SUMMARY OF TEST RESULTS

	DRY DENSITY (pcf)	MOISTURE CONTENT, (%)	SATURATION (%)	HEIGHT (in.)	VOID RATIO	SPECIFIC GRAVITY	C_c	P'_o (ksf)	P_c (ksf)	USCS
INITIAL	111.4	6.5	35.4	1.000	0.486	2.65	0.09	1.07	2.01	SW/SM
FINAL	116.3	15.6	98.0	0.957	0.422					

Source: T-215 **Sample No.:** 1 **Elev./Depth:** 9'
Material Description: well graded SAND to silty SAND
Remarks:

ALLAN E. SEWARD

ENGINEERING GEOLOGY, INC.

Client: Hasley Canyon Land Company, L.L.C.
Project: TT 52584

Job No.: 98-1617-4 **Figure** B4.16

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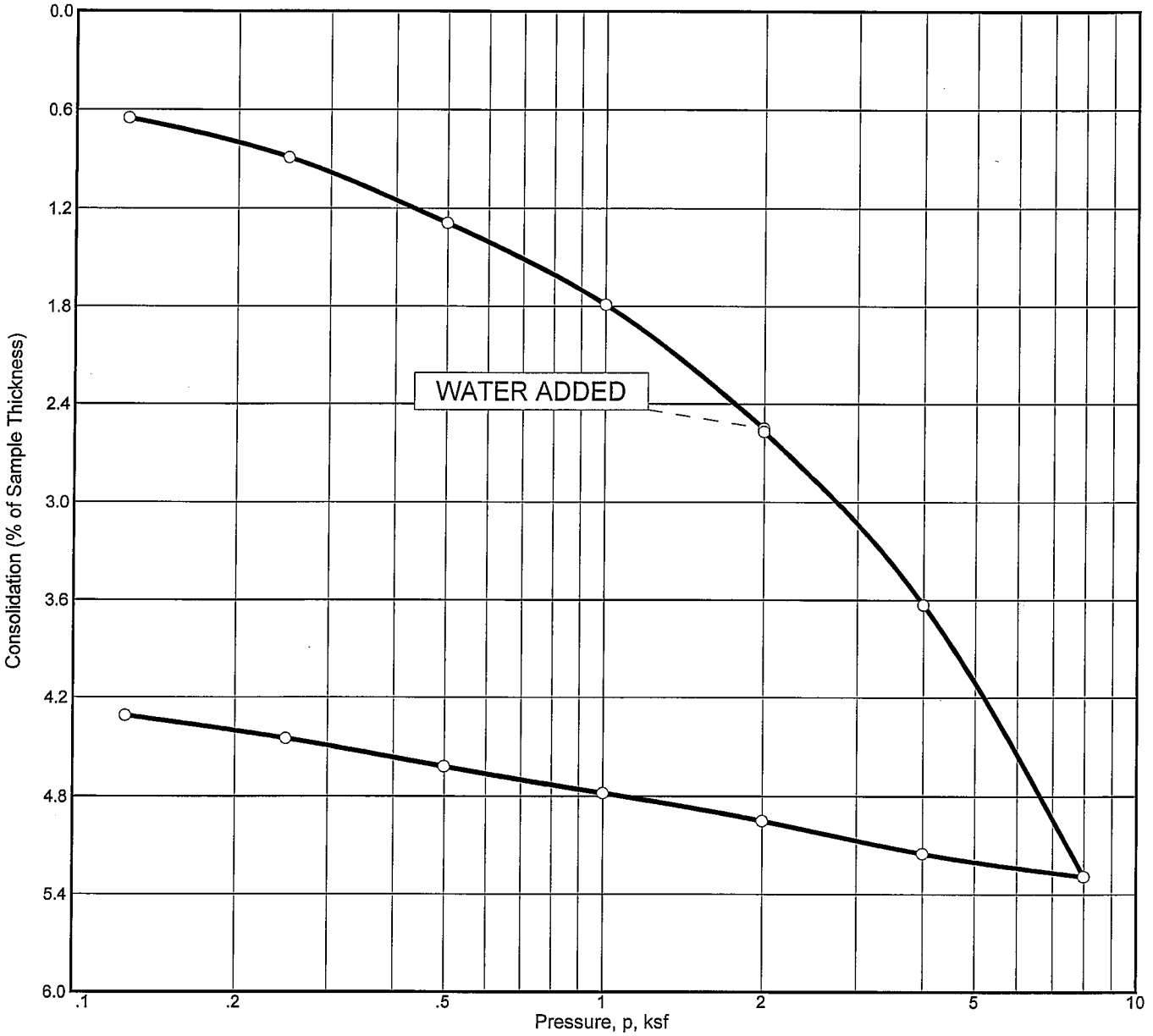
DATE	APPROVED BY

CONSOLIDATION TEST REPORT



SUMMARY OF TEST RESULTS

	DRY DENSITY (pcf)	MOISTURE CONTENT, (%)	SATURATION (%)	HEIGHT (in.)	VOID RATIO	SPECIFIC GRAVITY	C_c	P'_o (ksf)	P_c (ksf)	USCS
INITIAL	107.8	7.0	34.6	1.000	0.535	2.65	0.09	0.69	4.21	SW/SM
FINAL	112.6	17.2	97.3	0.957	0.469					

Source: T-217 **Sample No.:** 1 **Elev./Depth:** 6'
Material Description: well graded SAND to silty SAND
Remarks:

ALLAN E. SEWARD	**Client:** Hasley Canyon Land Company, L.L.C.
	Project: TT 52584
ENGINEERING GEOLOGY, INC.	**Job No.:** 98-1617-4 **Figure** B4.17

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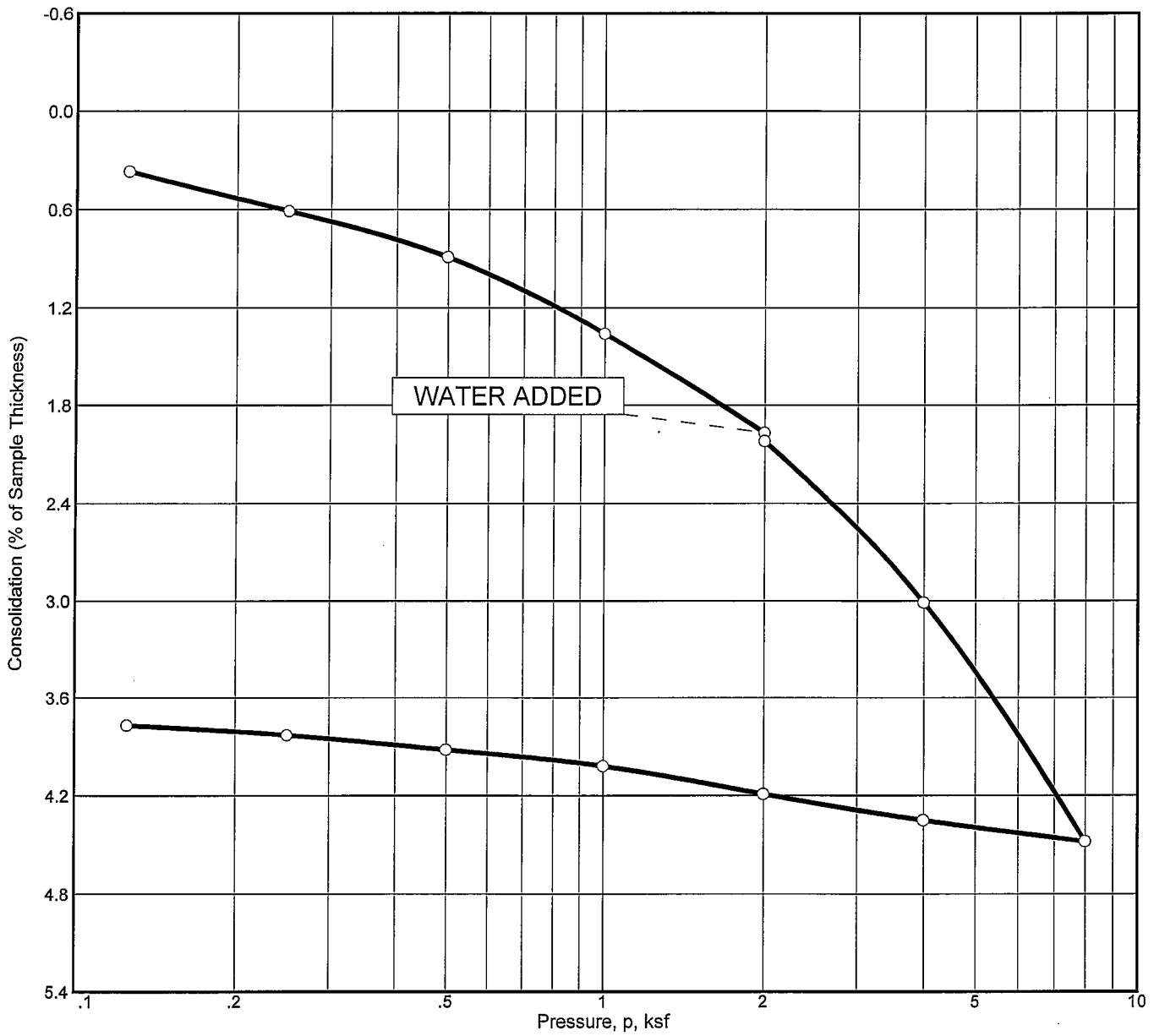
CONSOLIDATION TEST REPORT



SUMMARY OF TEST RESULTS

	DRY DENSITY (pcf)	MOISTURE CONTENT, (%)	SATURATION (%)	HEIGHT (in.)	VOID RATIO	SPECIFIC GRAVITY	C_c	P'_o (ksf)	P_c (ksf)	USCS
INITIAL	104.9	5.8	26.5	1.000	0.578	2.65	0.08	0.67	4.19	SW/SM
FINAL	109.0	19.4	99.3	0.962	0.518					

Source: T-218 **Sample No.:** 1 **Elev./Depth:** 6'
Material Description: well graded SAND to silty SAND
Remarks:

ALLAN E. SEWARD	**Client:** Hasley Canyon Land Company, L.L.C.
	Project: TT 52584
ENGINEERING GEOLOGY, INC.	**Job No.:** 98-1617-4 **Figure** B4.18

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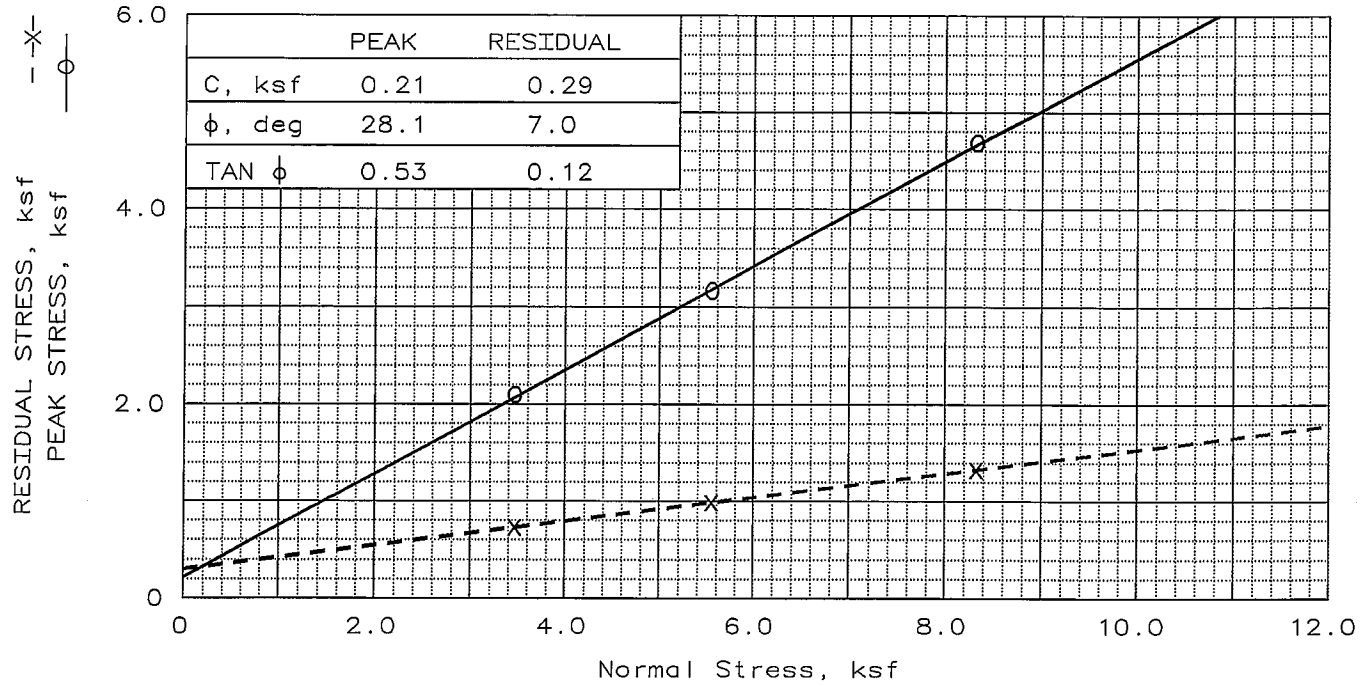
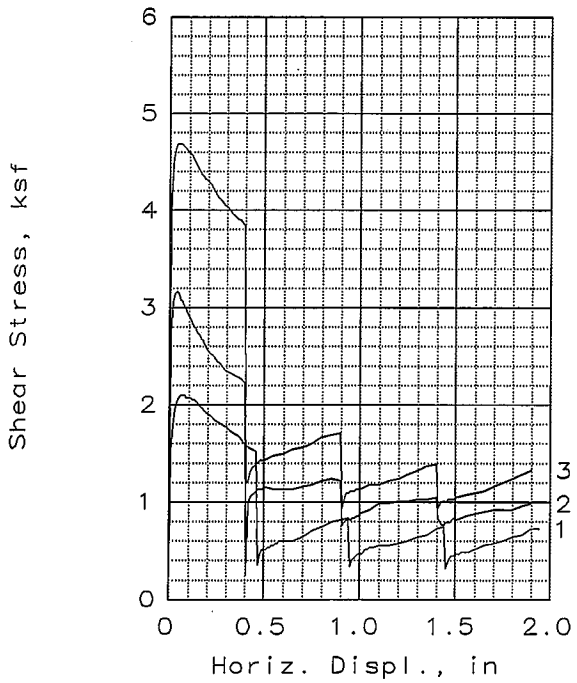




SAMPLE NO.:		1	2	3
INITIAL	WATER CONTENT, %	20.4	20.3	19.6
	DRY DENSITY, pcf	108.7	108.2	108.7
	SATURATION, %	100.0	98.2	95.9
	VOID RATIO	0.550	0.557	0.551
	DIAMETER, in	2.42	2.42	2.42
	HEIGHT, in	1.00	1.00	1.00
AT TEST	WATER CONTENT, %	19.4	19.1	18.5
	DRY DENSITY, pcf	110.7	111.2	112.3
	SATURATION, %	100.0	100.0	99.8
	VOID RATIO	0.523	0.516	0.501
	DIAMETER, in	2.42	2.42	2.42
	HEIGHT, in	0.98	0.97	0.97
NORMAL STRESS, ksf		3.50	5.58	8.36
PEAK STRESS, ksf		2.10	3.17	4.68
DISPLACEMENT, in		0.06	0.04	0.04
RESIDUAL STRESS, ksf		0.73	0.98	1.33
DISPLACEMENT, in		1.94	1.90	1.90
Strain rate, in/min		0.0079	0.0079	0.0079

SAMPLE TYPE: Undisturbed
DESCRIPTION: Fat Clay

LL= 67 PL= 22 PI= 45
SPECIFIC GRAVITY= 2.7
REMARKS: landslide plane (Qls)

CLIENT: Hasley Canyon Land Company L.L.C.

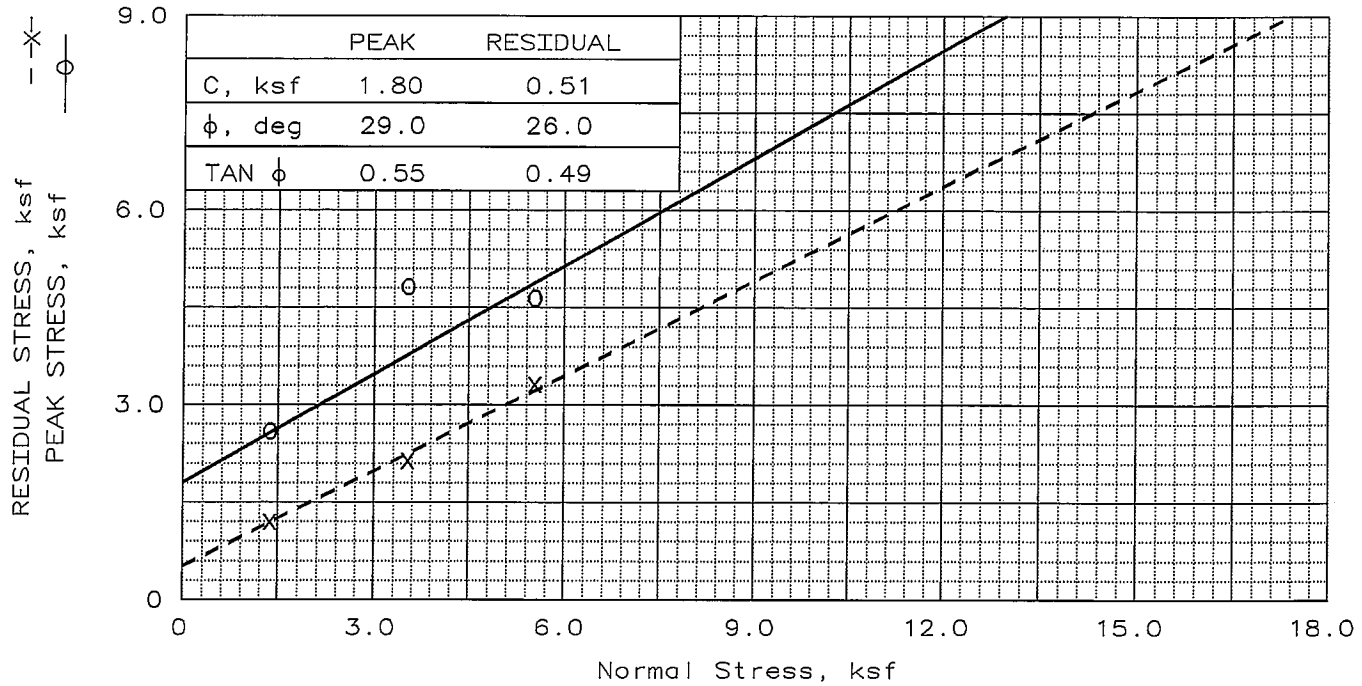
PROJECT: T.T. 52584

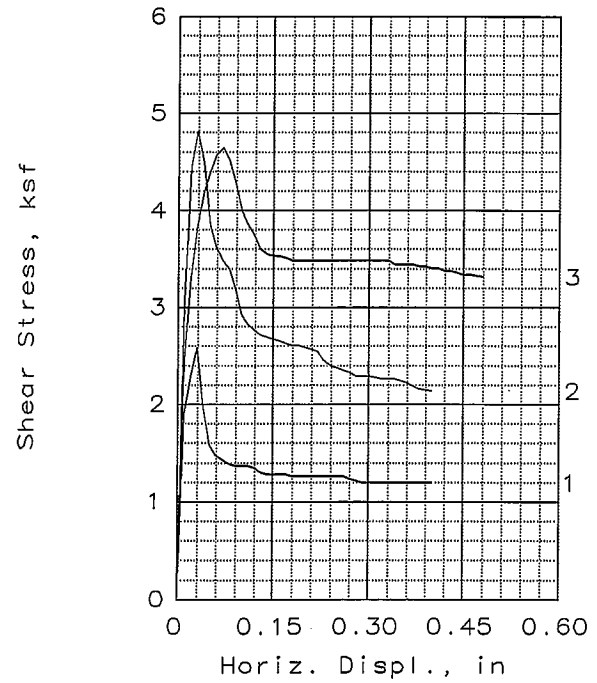
SAMPLE LOCATION: BA-1 @ 69.7 ft.

PROJ. NO.: 98-1617-4 DATE: 1/15/99

DIRECT SHEAR TEST REPORT
ALLAN E. SEWARD
ENGINEERING GEOLOGY, INC.

Fig. No.: B5.1





	SAMPLE NO.:	1	2	3
INITIAL	WATER CONTENT, %	13.7	15.5	12.0
	DRY DENSITY, pcf	117.7	115.5	118.6
	SATURATION, %	85.8	91.2	76.8
	VOID RATIO	0.432	0.460	0.421
	DIAMETER, in	2.42	2.42	2.42
	HEIGHT, in	1.00	1.00	1.00
AT TEST	WATER CONTENT, %	15.7	16.1	14.0
	DRY DENSITY, pcf	118.2	116.9	121.1
	SATURATION, %	99.4	98.3	96.6
	VOID RATIO	0.426	0.442	0.392
	DIAMETER, in	2.42	2.42	2.42
	HEIGHT, in	1.00	0.99	0.98
NORMAL STRESS, ksf		1.42	3.58	5.58
PEAK STRESS, ksf		2.59	4.81	4.64
DISPLACEMENT, in		0.03	0.03	0.07
RESIDUAL STRESS, ksf		1.20	2.14	3.32
DISPLACEMENT, in		0.40	0.40	0.48
Strain rate, in/min		0.0079	0.0079	0.0079

SAMPLE TYPE: Undisturbed
DESCRIPTION: Silt

SPECIFIC GRAVITY= 2.7
REMARKS: landslide debris (Qls)

CLIENT: Hasley Canyon Land Company, L.L.C.

PROJECT: T.T. 52584

SAMPLE LOCATION: BA-1 @ 10 ft.

PROJ. NO.: 98-1617-4 DATE: 1/15/99

DIRECT SHEAR TEST REPORT
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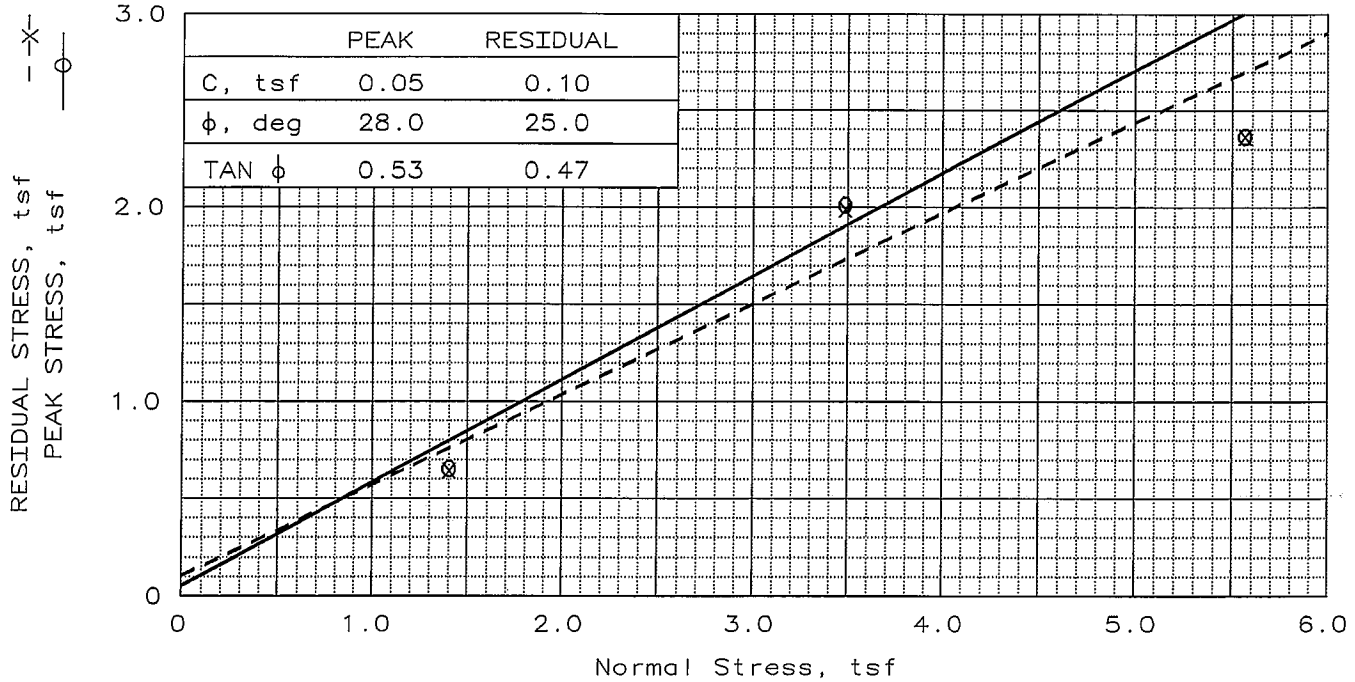
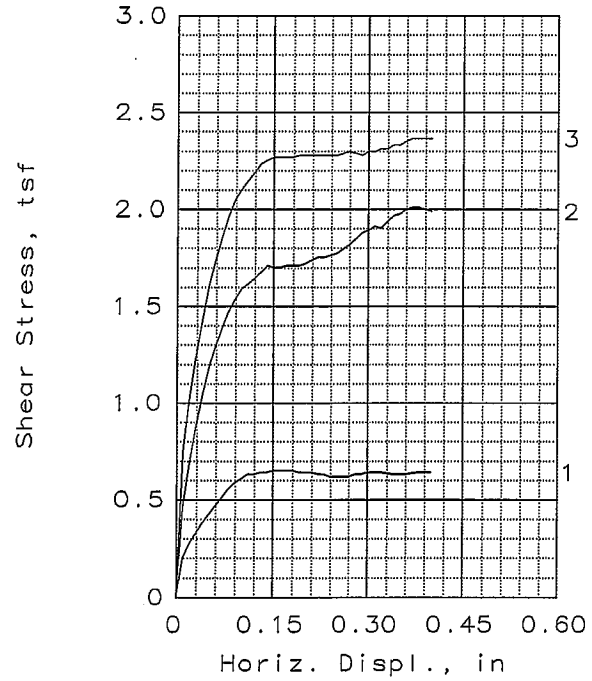
ENGINEERING GEOLOGY, INC.

Fig. No.: B5.2



	PEAK	RESIDUAL
C, tsf	0.05	0.10
ϕ, deg	28.0	25.0
TAN ϕ	0.53	0.47



SAMPLE NO.:		1	2	3
INITIAL	WATER CONTENT, %	5.6	5.5	4.8
	DRY DENSITY, pcf	109.6	110.1	110.8
	SATURATION, %	28.1	28.0	24.9
	VOID RATIO	0.538	0.531	0.521
	DIAMETER, in	2.42	2.42	2.42
	HEIGHT, in	1.00	1.00	1.00
AT TEST	WATER CONTENT, %	18.6	17.7	17.0
	DRY DENSITY, pcf	111.7	113.8	115.1
	SATURATION, %	98.5	99.4	98.6
	VOID RATIO	0.509	0.482	0.464
	DIAMETER, in	2.42	2.42	2.42
	HEIGHT, in	0.98	0.97	0.96
NORMAL STRESS, tsf		1.42	3.50	5.58
PEAK STRESS, tsf		0.65	2.01	2.36
DISPLACEMENT, in		0.15	0.37	0.37
RESIDUAL STRESS, tsf		0.64	1.99	2.36
DISPLACEMENT, in		0.40	0.40	0.40
Strain rate, in/min		0.0197	0.0197	0.0197

SAMPLE TYPE: Undisturbed
DESCRIPTION: Well-graded sand w/trace of gravel

SPECIFIC GRAVITY= 2.7
REMARKS: landslide debris (Qls)

CLIENT: Hasley Canyon Land Company, L.L.C.

PROJECT: T.T. 52584

SAMPLE LOCATION: BA-3 @ 5 ft.

PROJ. NO.: 98-1617-4 DATE: 1/15/99

DIRECT SHEAR TEST REPORT
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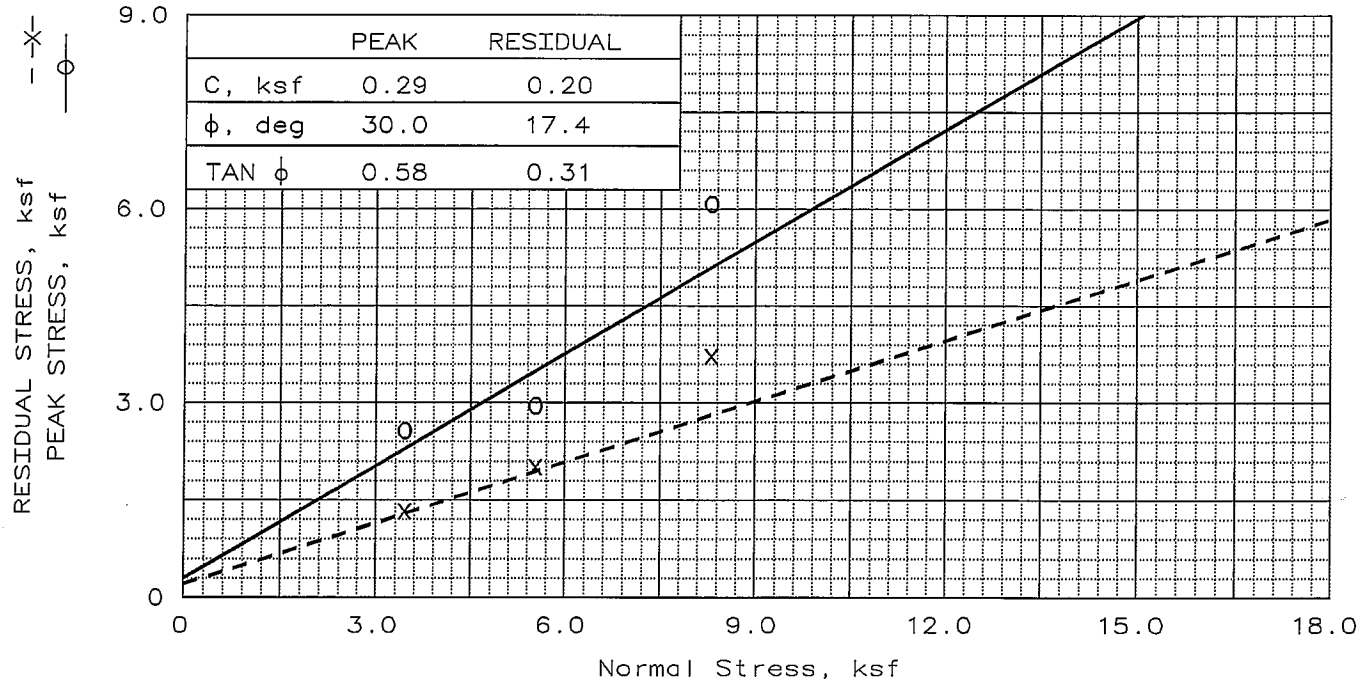
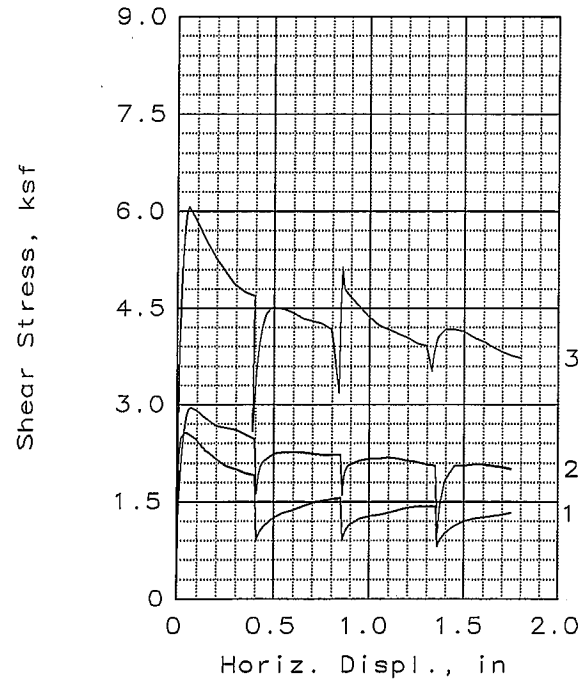
ENGINEERING GEOLOGY, INC.

Fig. No.: B5.3





SAMPLE NO.:		1	2	3
INITIAL	WATER CONTENT, %	25.7	18.1	13.0
	DRY DENSITY, pcf	95.8	106.8	107.3
	SATURATION, %	91.5	84.5	61.6
	VOID RATIO	0.759	0.578	0.571
	DIAMETER, in	2.42	2.42	2.42
	HEIGHT, in	1.00	1.00	1.00
AT TEST	WATER CONTENT, %	27.0	20.4	19.1
	DRY DENSITY, pcf	97.4	108.3	111.2
	SATURATION, %	99.7	99.1	99.7
	VOID RATIO	0.731	0.557	0.516
	DIAMETER, in	2.42	2.42	2.42
	HEIGHT, in	0.98	0.99	0.97
NORMAL STRESS, ksf		3.50	5.58	8.36
PEAK STRESS, ksf		2.57	2.95	6.07
DISPLACEMENT, in		0.04	0.07	0.06
RESIDUAL STRESS, ksf		1.33	2.01	3.72
DISPLACEMENT, in		1.75	1.75	1.80
Strain rate, in/min		0.0079	0.0079	0.0079

SAMPLE TYPE: Undisturbed
DESCRIPTION: Fat Clay

LL= 64 PL= 28 PI= 36
SPECIFIC GRAVITY= 2.7
REMARKS: bedding plane bedrock (TQs)

Fig. No.: B5.4

CLIENT: Hasley Canyon Land Company, L.L.C.

PROJECT: T.T. 52584

SAMPLE LOCATION: BA-1 @ 75.4 ft.

PROJ. NO.: 98-1617-4 DATE: 1/15/99

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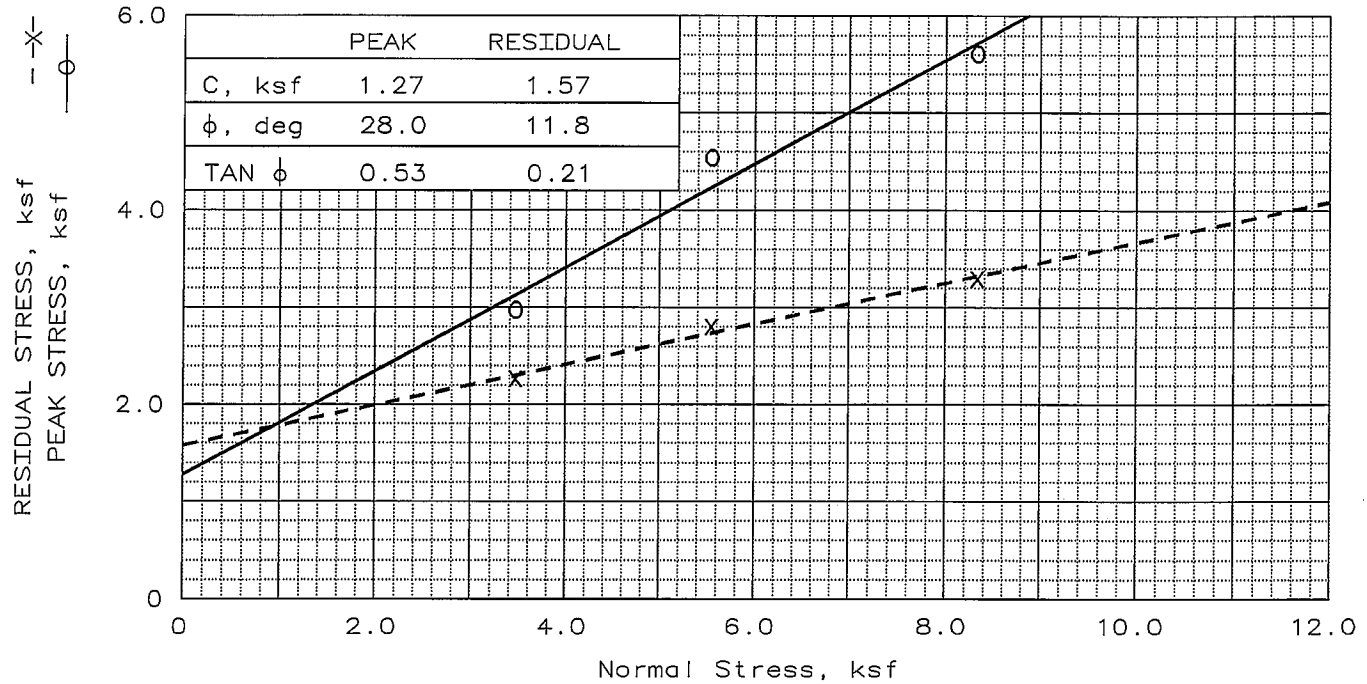

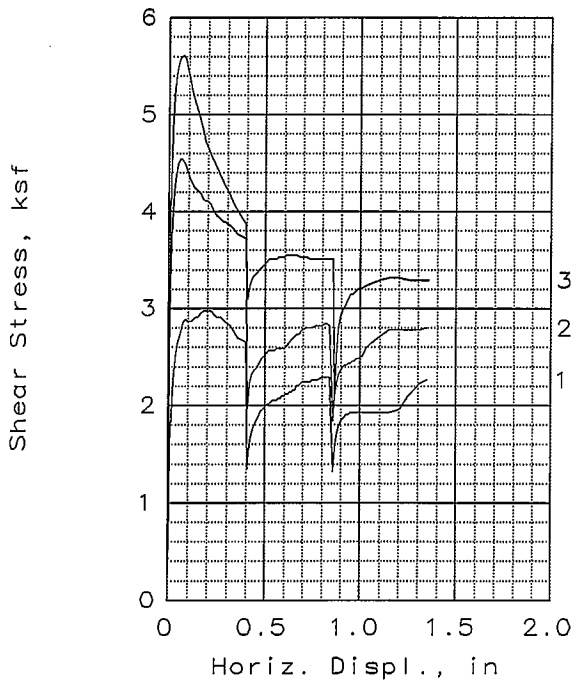

SAMPLE NO.:		1	2	3
INITIAL	WATER CONTENT, %	19.2	19.7	17.9
	DRY DENSITY, pcf	106.4	109.9	109.7
	SATURATION, %	88.6	99.8	90.1
	VOID RATIO	0.584	0.533	0.537
	DIAMETER, in	2.42	2.42	2.42
	HEIGHT, in	1.00	1.00	1.00
AT TEST	WATER CONTENT, %	20.5	18.5	17.8
	DRY DENSITY, pcf	108.5	112.4	113.8
	SATURATION, %	99.7	100.0	100.0
	VOID RATIO	0.554	0.499	0.481
	DIAMETER, in	2.42	2.42	2.42
	HEIGHT, in	0.98	0.98	0.96
NORMAL STRESS, ksf		3.50	5.58	8.36
PEAK STRESS, ksf		2.97	4.53	5.60
DISPLACEMENT, in		0.18	0.07	0.07
RESIDUAL STRESS, ksf		2.27	2.80	3.29
DISPLACEMENT, in		1.35	1.35	1.36
Strain rate, in/min		0.0079	0.0079	0.0079

SAMPLE TYPE: undisturbed
DESCRIPTION: fat clay

SPECIFIC GRAVITY= 2.7
REMARKS: bedding plane bedrock (TQs)
Hand driven rings

Fig. No.: B5.5

CLIENT: Hasley Canyon Land Company, L.L.C.

PROJECT: T.T. 52584

SAMPLE LOCATION: BA-2 @ 62 ft.

PROJ. NO.: 98-1617-4 DATE: 1/15/99

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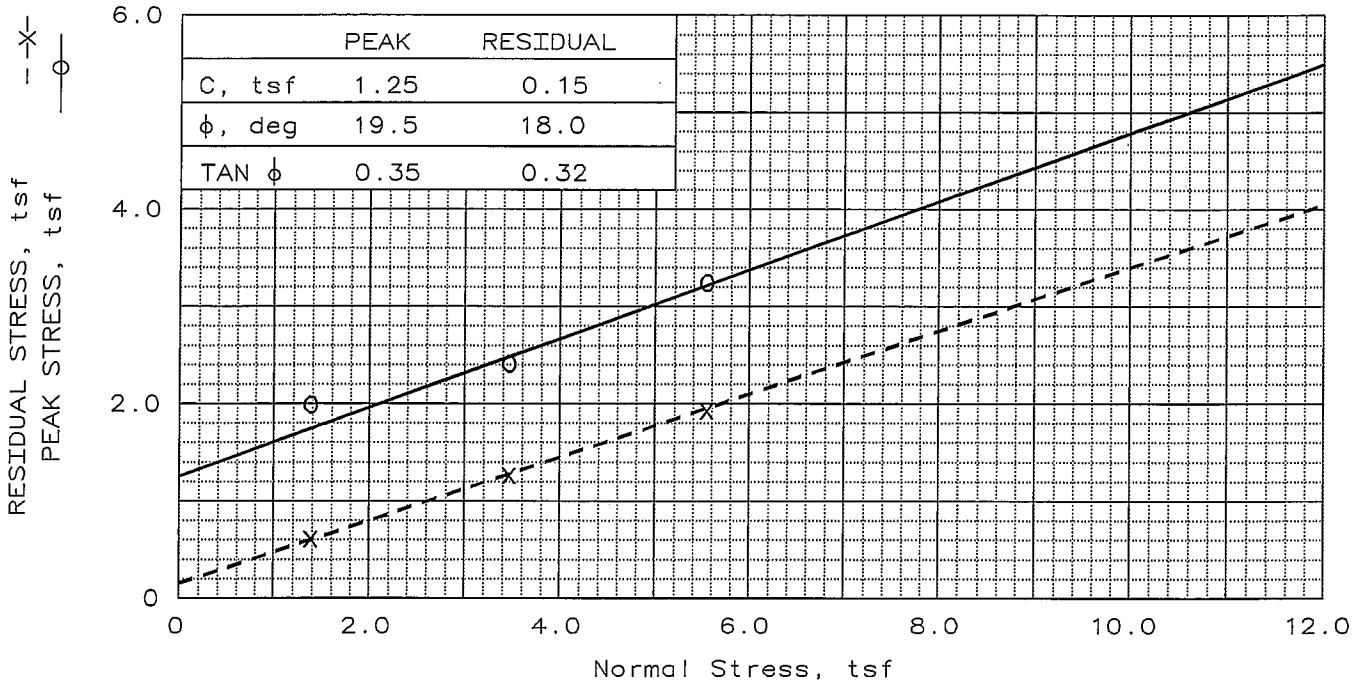
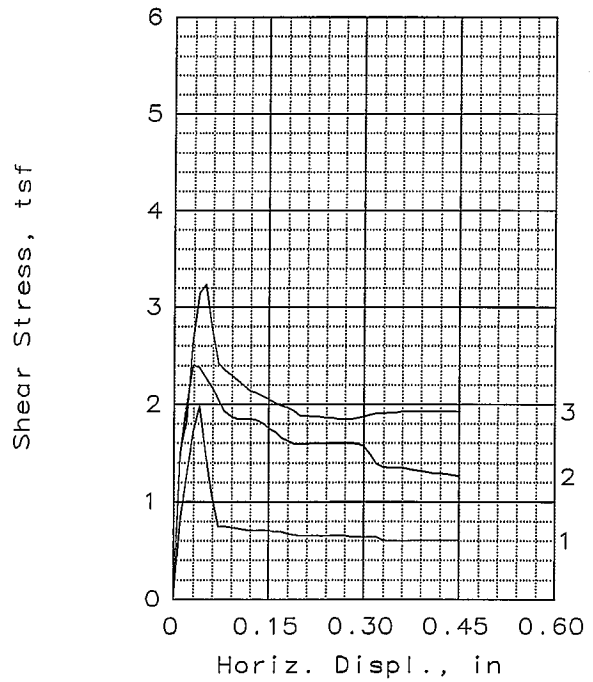


	PEAK	RESIDUAL
C, tsf	1.25	0.15
ϕ, deg	19.5	18.0
TAN ϕ	0.35	0.32



SAMPLE NO.:		1	2	3
INITIAL	WATER CONTENT, %	14.5	17.0	15.5
	DRY DENSITY, pcf	117.8	112.7	114.6
	SATURATION, %	90.6	92.6	89.2
	VOID RATIO	0.431	0.496	0.470
	DIAMETER, in	2.42	2.42	2.42
	HEIGHT, in	1.00	1.00	1.00
AT TEST	WATER CONTENT, %	15.7	16.6	15.3
	DRY DENSITY, pcf	118.3	116.0	118.1
	SATURATION, %	99.8	99.2	96.9
	VOID RATIO	0.425	0.453	0.427
	DIAMETER, in	2.42	2.42	2.42
	HEIGHT, in	1.00	0.97	0.97
NORMAL STRESS, tsf		1.42	3.50	5.58
PEAK STRESS, tsf		1.99	2.41	3.24
DISPLACEMENT, in		0.04	0.03	0.05
RESIDUAL STRESS, tsf		0.61	1.26	1.93
DISPLACEMENT, in		0.45	0.45	0.45
Strain rate, in/min		0.0197	0.0197	0.0197

SAMPLE TYPE: undisturbed
DESCRIPTION: sandy clayey silt

SPECIFIC GRAVITY= 2.7
REMARKS: bedding plane (TQs)

CLIENT: Hasley Canyon Land Company, L.L.C.

PROJECT: T.T. 52584

SAMPLE LOCATION: BA-4 @ 10 ft.

PROJ. NO.: 98-1617-4 DATE: 1/15/99

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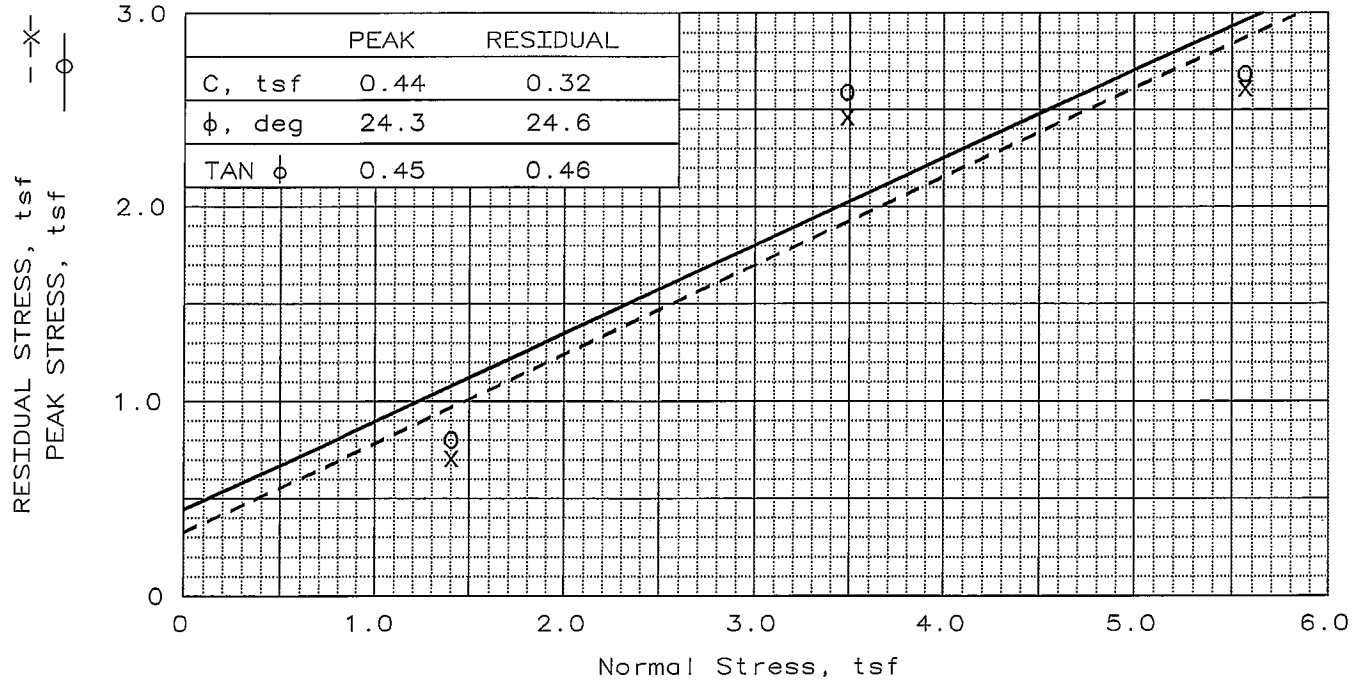
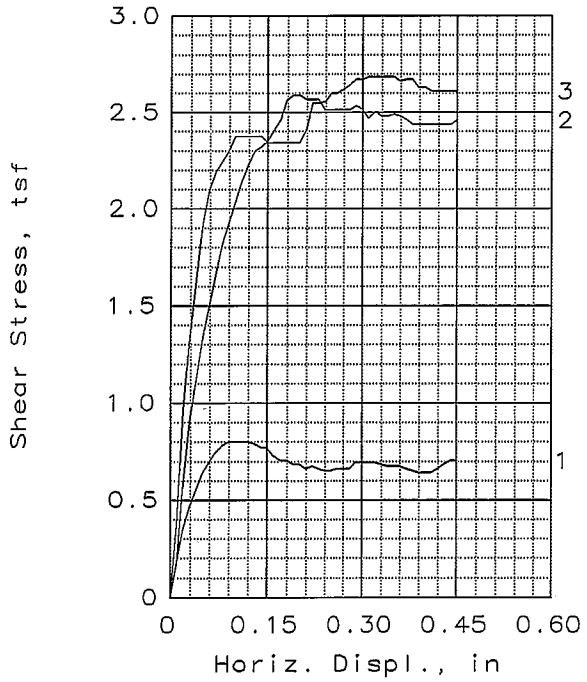
ENGINEERING GEOLOGY, INC.

Fig. No.: B5.6





	SAMPLE NO.:	1	2	3
INITIAL	WATER CONTENT, %	4.8	5.6	4.8
	DRY DENSITY, pcf	112.8	115.3	112.8
	SATURATION, %	26.5	32.5	26.5
	VOID RATIO	0.495	0.461	0.495
	DIAMETER, in	2.42	2.42	2.42
	HEIGHT, in	1.00	1.00	1.00
AT TEST	WATER CONTENT, %	17.3	15.3	16.2
	DRY DENSITY, pcf	114.5	118.9	117.2
	SATURATION, %	98.7	99.1	99.6
	VOID RATIO	0.472	0.417	0.438
	DIAMETER, in	2.42	2.42	2.42
	HEIGHT, in	0.98	0.97	0.96
NORMAL STRESS, tsf		1.42	3.50	5.58
PEAK STRESS, tsf		0.80	2.59	2.68
DISPLACEMENT, in		0.09	0.19	0.31
RESIDUAL STRESS, tsf		0.71	2.46	2.61
DISPLACEMENT, in		0.45	0.45	0.45
Strain rate, in/min		0.0197	0.0197	0.0197

SAMPLE TYPE: undisturbed
DESCRIPTION: SP/SM

SPECIFIC GRAVITY= 2.7
REMARKS: cross bedding (TQs)

CLIENT: Hasley Canyon Land Company, L.L.C.

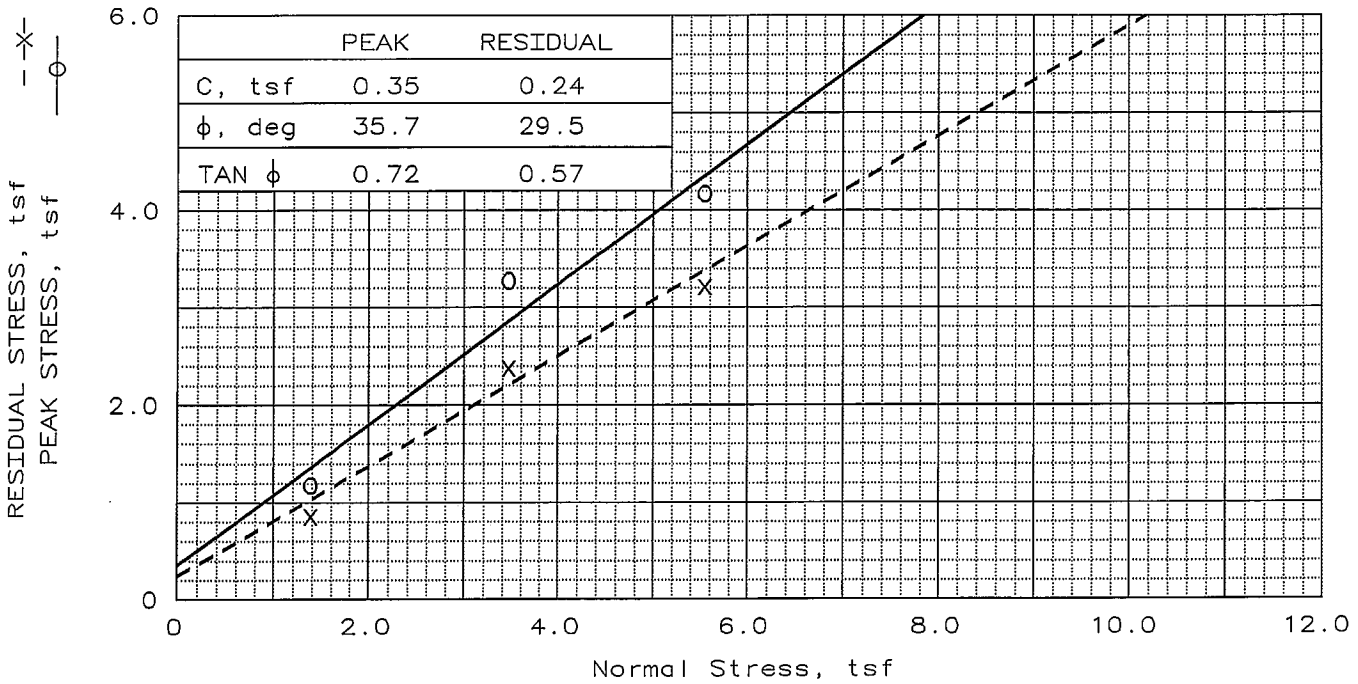
PROJECT: T.T. 52584

SAMPLE LOCATION: BA-5 @ 50 ft.

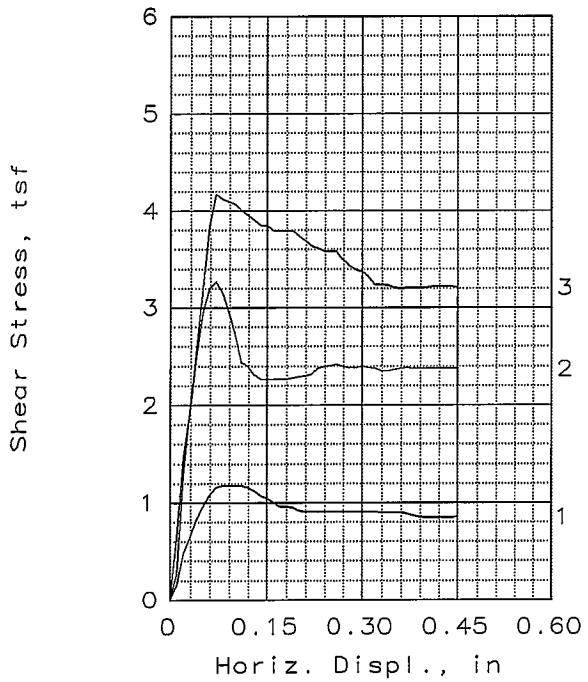
PROJ. NO.: 98-1617-4 DATE: 1/15/99

DIRECT SHEAR TEST REPORT
ALLAN E. SEWARD
ENGINEERING GEOLOGY, INC.

Fig. No.: B5.7



	PEAK	RESIDUAL
C, tsf	0.35	0.24
ϕ, deg	35.7	29.5
TAN ϕ	0.72	0.57



SAMPLE NO.:		1	2	3
INITIAL	WATER CONTENT, %	6.3	6.7	7.0
	DRY DENSITY, pcf	120.7	125.6	123.9
	SATURATION, %	42.7	52.6	52.5
	VOID RATIO	0.396	0.342	0.361
	DIAMETER, in	2.42	2.42	2.42
	HEIGHT, in	1.00	1.00	1.00
AT TEST	WATER CONTENT, %	13.7	11.0	11.7
	DRY DENSITY, pcf	122.9	129.5	127.9
	SATURATION, %	99.6	98.4	99.2
	VOID RATIO	0.372	0.301	0.317
	DIAMETER, in	2.42	2.42	2.42
	HEIGHT, in	0.98	0.97	0.97
NORMAL STRESS, tsf		1.42	3.50	5.58
PEAK STRESS, tsf		1.18	3.27	4.17
DISPLACEMENT, in		0.08	0.07	0.07
RESIDUAL STRESS, tsf		0.86	2.37	3.21
DISPLACEMENT, in		0.45	0.45	0.45
Strain rate, in/min		0.0197	0.0197	0.0197

SAMPLE TYPE: undisturbed
DESCRIPTION: well graded sand with gravel

SPECIFIC GRAVITY= 2.7
REMARKS: cross bedding (TQs)

CLIENT: Hasley Canyon Land Comapny, L.L.C.

PROJECT: T.T. 52584

SAMPLE LOCATION: BA-6 @ 20 ft.

PROJ. NO.: 98-1617-4 DATE: 1/15/99

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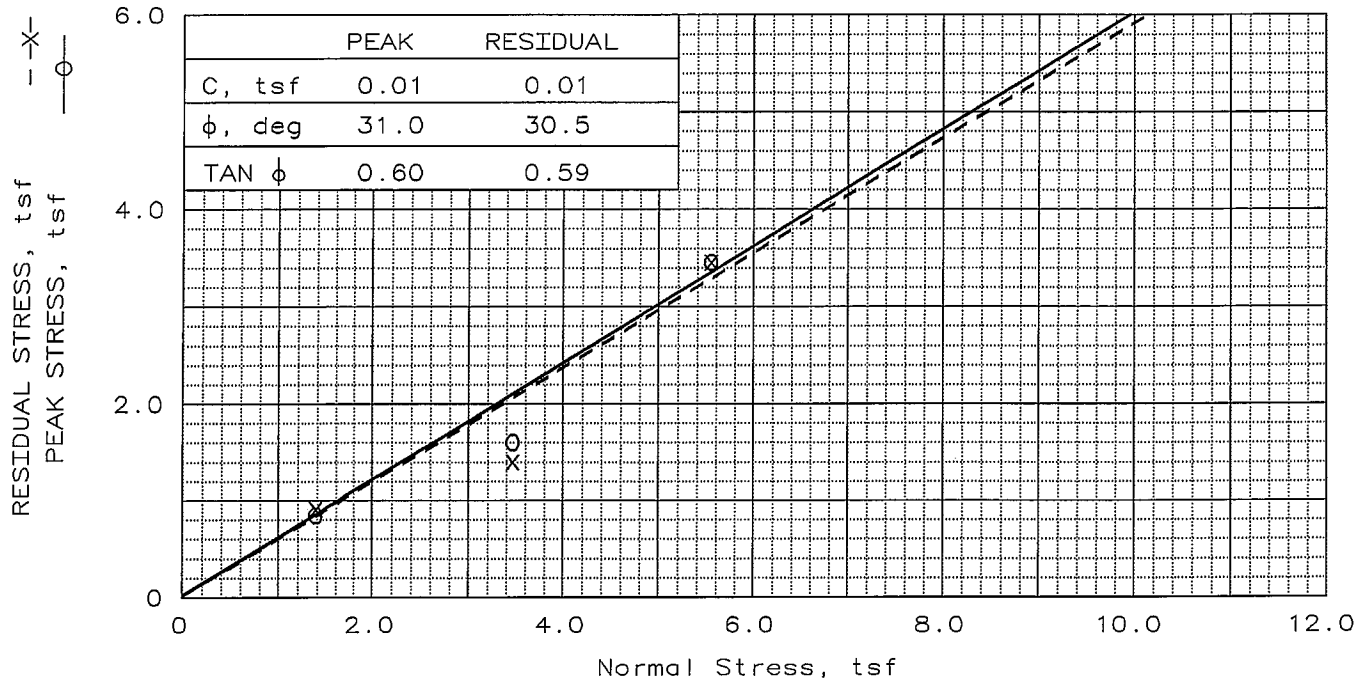
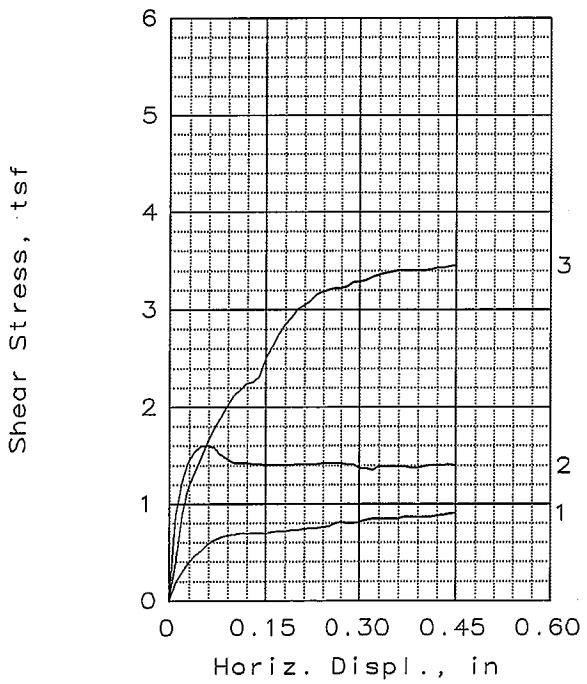
ENGINEERING GEOLOGY, INC.

Fig. No.: B5.8





SAMPLE NO.:		1	2	3
INITIAL	WATER CONTENT, %	2.4	5.3	5.7
	DRY DENSITY, pcf	118.5	110.9	114.7
	SATURATION, %	15.5	27.4	32.8
	VOID RATIO	0.422	0.519	0.469
	DIAMETER, in	2.42	2.42	2.42
	HEIGHT, in	1.00	1.00	1.00
AT TEST	WATER CONTENT, %	14.7	17.9	15.4
	DRY DENSITY, pcf	120.2	113.4	118.9
	SATURATION, %	99.1	99.5	99.2
	VOID RATIO	0.402	0.486	0.418
	DIAMETER, in	2.42	2.42	2.42
	HEIGHT, in	0.99	0.98	0.97
NORMAL STRESS, tsf		1.42	3.50	5.58
PEAK STRESS, tsf		0.84	1.60	3.45
DISPLACEMENT, in		0.34	0.05	0.45
RESIDUAL STRESS, tsf		0.91	1.40	3.45
DISPLACEMENT, in		0.45	0.45	0.45
Strain rate, in/min		0.0197	0.0197	0.0197

SAMPLE TYPE: Undisturbed
DESCRIPTION: Well-graded sand w/gravel

SPECIFIC GRAVITY= 2.7
REMARKS: Qt

CLIENT: Hasley Canyon Land Company, L.L.C.

PROJECT: T.T. 52584

SAMPLE LOCATION: HS-2 @ 20 ft.

PROJ. NO.: 98-1617-4 DATE: 1/15/99

DIRECT SHEAR TEST REPORT
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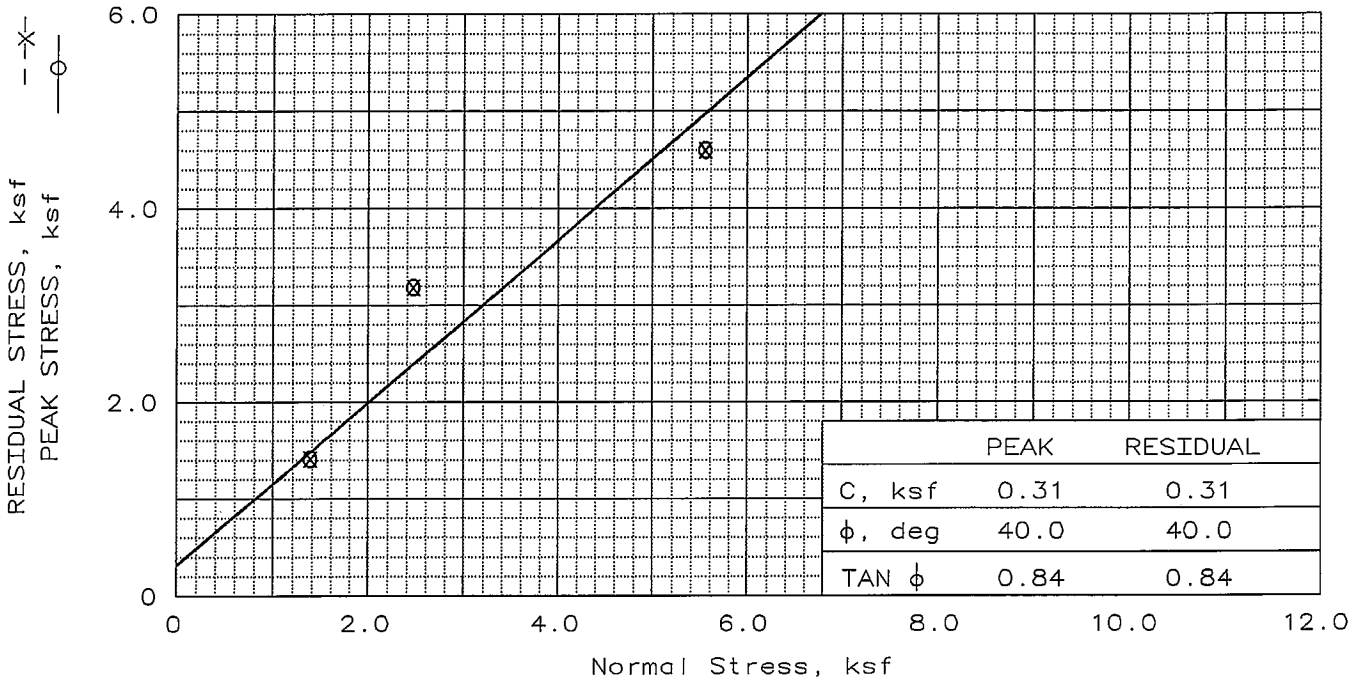
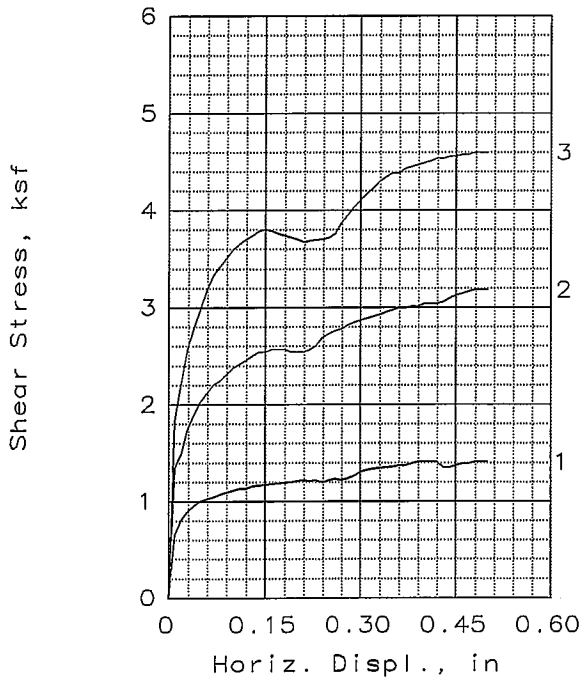
ENGINEERING GEOLOGY, INC.

Fig. No.: B5.9



	PEAK	RESIDUAL
C, ksf	0.31	0.31
ϕ, deg	40.0	40.0
TAN ϕ	0.84	0.84



SAMPLE NO.:		1	2	3
INITIAL	WATER CONTENT, %	7.3	7.3	7.4
	DRY DENSITY, pcf	109.8	109.8	109.8
	SATURATION, %	36.8	36.8	37.3
	VOID RATIO	0.535	0.534	0.535
	DIAMETER, in	2.42	2.42	2.42
	HEIGHT, in	1.00	1.00	1.00
AT TEST	WATER CONTENT, %	18.7	18.7	18.0
	DRY DENSITY, pcf	110.7	111.5	112.2
	SATURATION, %	96.8	98.5	96.7
	VOID RATIO	0.522	0.512	0.502
	DIAMETER, in	2.42	2.42	2.42
	HEIGHT, in	0.99	0.99	0.98
NORMAL STRESS, ksf		1.42	2.50	5.58
PEAK STRESS, ksf		1.41	3.19	4.60
DISPLACEMENT, in		0.50	0.48	0.50
RESIDUAL STRESS, ksf		1.41	3.19	4.60
DISPLACEMENT, in		0.50	0.50	0.50
Strain rate, in/min		0.0197	0.0197	0.0197

SAMPLE TYPE: Remolded
DESCRIPTION: Well graded sand w/silt & gravel (SW-SM)

SPECIFIC GRAVITY= 2.7
REMARKS: Remold of Bedrock (TQs)
90% R/C of 122 pcf

Fig. No.: B5.10

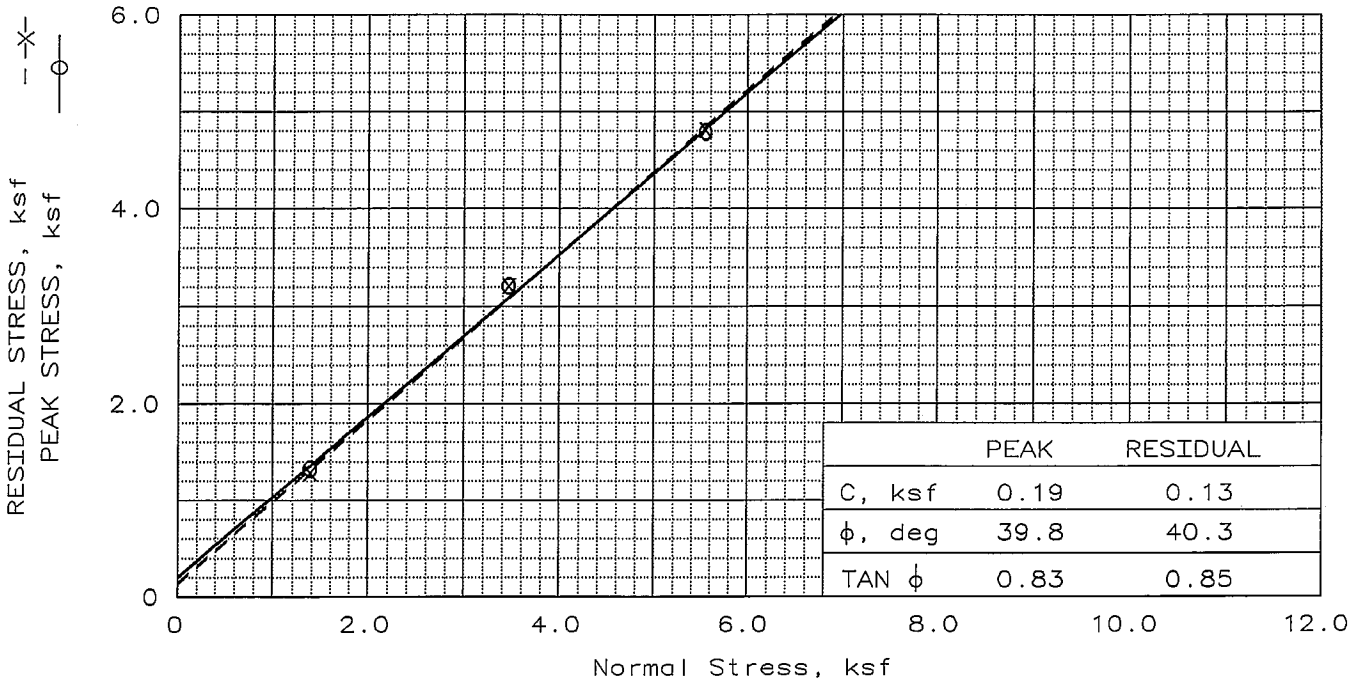
CLIENT: Hasley Canyon Land Company, L.L.C.

PROJECT: T.T. 52584

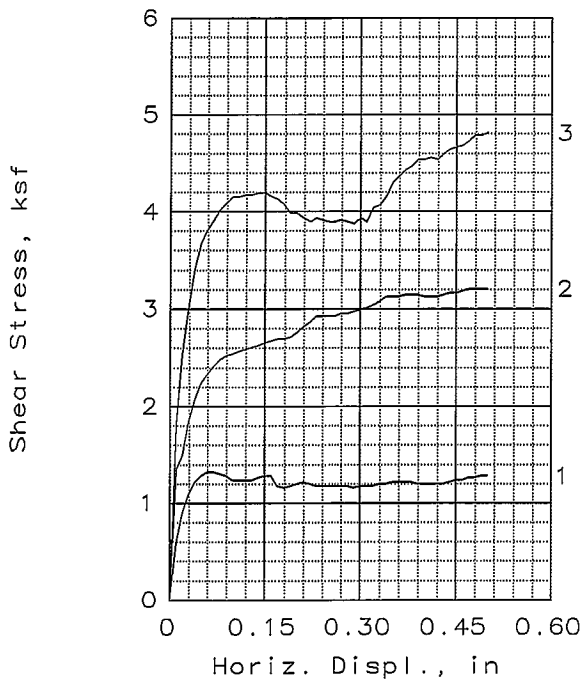
SAMPLE LOCATION: BA-4 @ 24 ft.

PROJ. NO.: 98-1617-4 DATE: 1/15/99

DIRECT SHEAR TEST REPORT
ALLAN E. SEWARD
ENGINEERING GEOLOGY, INC.



	PEAK	RESIDUAL
C, ksf	0.19	0.13
ϕ, deg	39.8	40.3
TAN ϕ	0.83	0.85



SAMPLE NO.:		1	2	3
INITIAL	WATER CONTENT, %	6.2	6.2	6.4
	DRY DENSITY, pcf	114.2	114.2	119.2
	SATURATION, %	35.3	35.0	41.7
	VOID RATIO	0.476	0.476	0.414
	DIAMETER, in	2.42	2.42	2.42
	HEIGHT, in	1.00	1.00	1.00
AT TEST	WATER CONTENT, %	16.9	16.7	14.6
	DRY DENSITY, pcf	115.4	116.0	120.9
	SATURATION, %	99.3	99.4	99.8
	VOID RATIO	0.461	0.452	0.394
	DIAMETER, in	2.42	2.42	2.42
	HEIGHT, in	0.99	0.98	0.99
NORMAL STRESS, ksf		1.42	3.50	5.58
PEAK STRESS, ksf		1.33	3.21	4.79
DISPLACEMENT, in		0.06	0.50	0.49
RESIDUAL STRESS, ksf		1.28	3.21	4.81
DISPLACEMENT, in		0.50	0.50	0.50
Strain rate, in/min		0.0197	0.0197	0.0197

SAMPLE TYPE: remolded
DESCRIPTION: well graded sand with silt and gravel

SPECIFIC GRAVITY= 2.7
REMARKS: Remold of bedrock (TQs)
90% R/C of 122 pcf

Fig. No.: B5.11

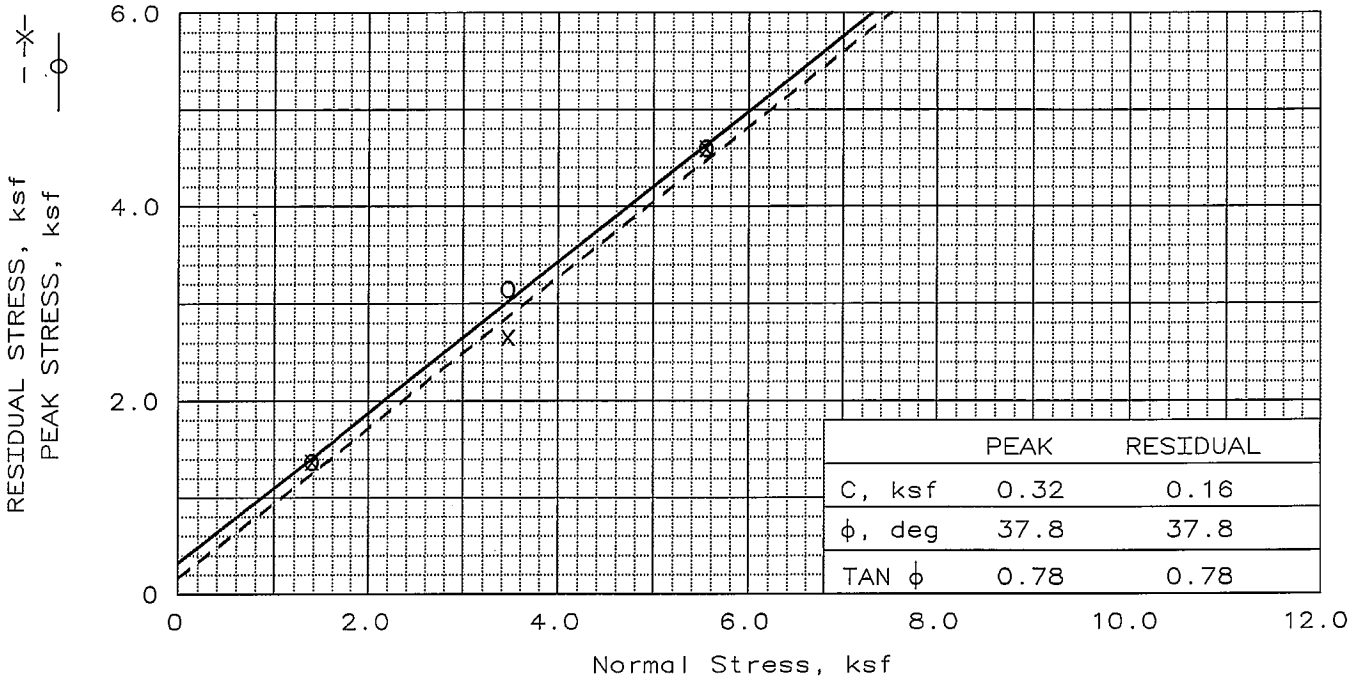
CLIENT: Hasley Canyon Land Compamy, L.L.C.

PROJECT: T.T. 52584

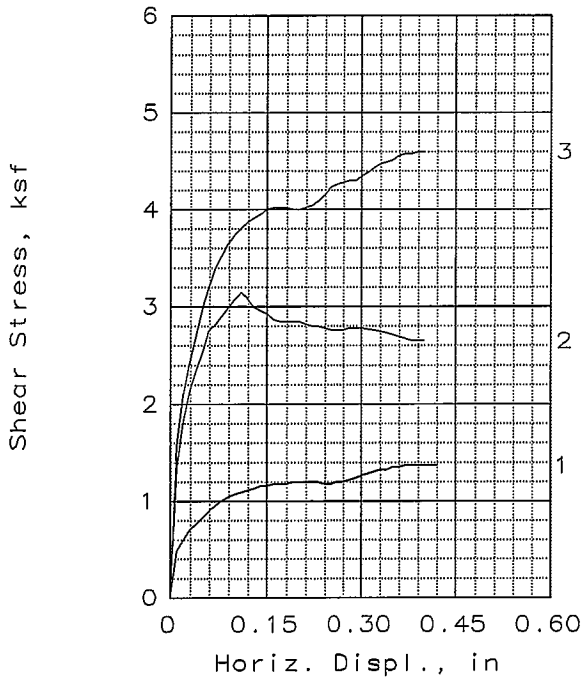
SAMPLE LOCATION: BA-5 @ 12 ft.

PROJ. NO.: 98-1617-4 DATE: 1/15/99

DIRECT SHEAR TEST REPORT
ALLAN E. SEWARD
ENGINEERING GEOLOGY, INC.



	PEAK	RESIDUAL
C, ksf	0.32	0.16
ϕ, deg	37.8	37.8
TAN ϕ	0.78	0.78



SAMPLE NO.:		1	2	3
INITIAL	WATER CONTENT, %	6.7	9.4	6.4
	DRY DENSITY, pcf	115.6	115.1	117.4
	SATURATION, %	39.6	54.9	39.6
	VOID RATIO	0.458	0.465	0.436
	DIAMETER, in	2.42	2.42	2.42
	HEIGHT, in	1.00	1.00	1.00
AT TEST	WATER CONTENT, %	16.2	16.2	14.1
	DRY DENSITY, pcf	117.0	117.2	121.7
	SATURATION, %	99.2	99.8	98.6
	VOID RATIO	0.441	0.439	0.385
	DIAMETER, in	2.42	2.42	2.42
	HEIGHT, in	0.99	0.98	0.96
NORMAL STRESS, ksf		1.42	3.50	5.58
PEAK STRESS, ksf		1.37	3.14	4.60
DISPLACEMENT, in		0.37	0.11	0.40
RESIDUAL STRESS, ksf		1.37	2.65	4.60
DISPLACEMENT, in		0.42	0.40	0.40
Strain rate, in/min		0.0079	0.0079	0.0079

SAMPLE TYPE: undisturbed
DESCRIPTION: Silty Sand

SPECIFIC GRAVITY= 2.7
REMARKS: alluvium (Qal)

CLIENT: Hasley Canyon Land Company, L.L.C.

PROJECT: T.T. 52584

SAMPLE LOCATION: HS-4 @ 10 ft.

PROJ. NO.: 98-1617-4 DATE: 1/15/99

DIRECT SHEAR TEST REPORT
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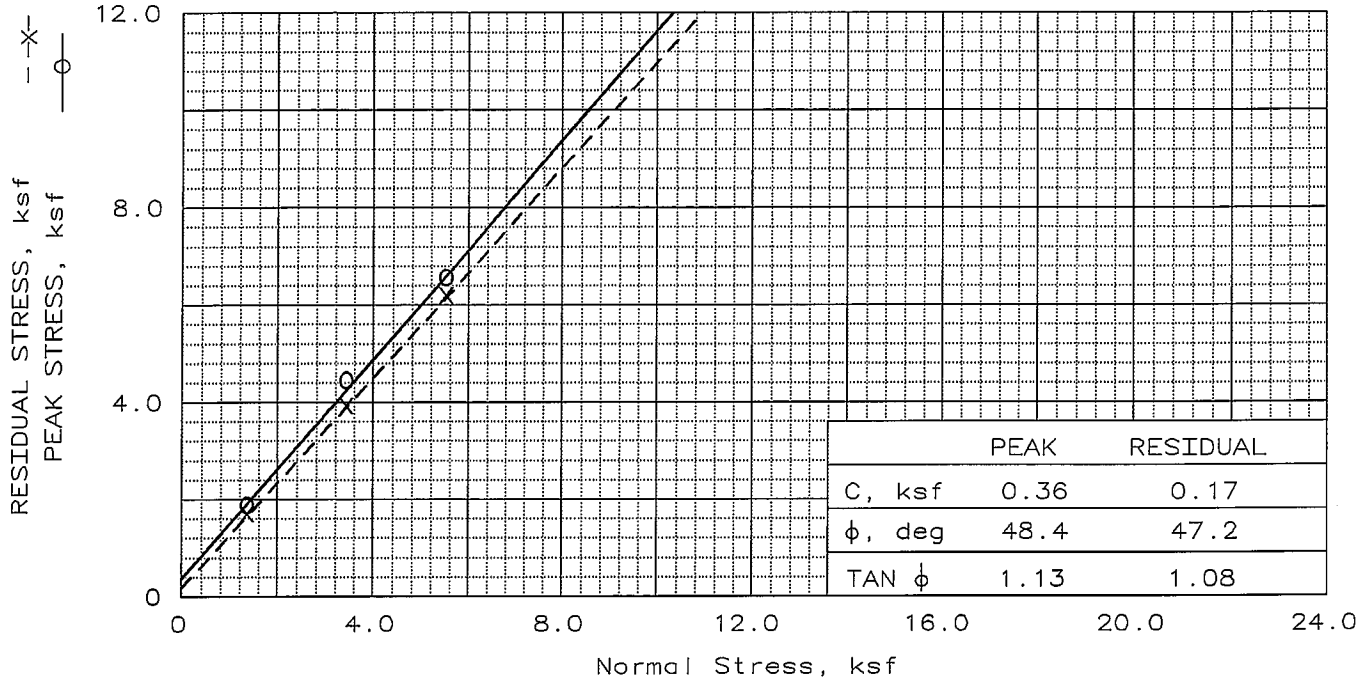
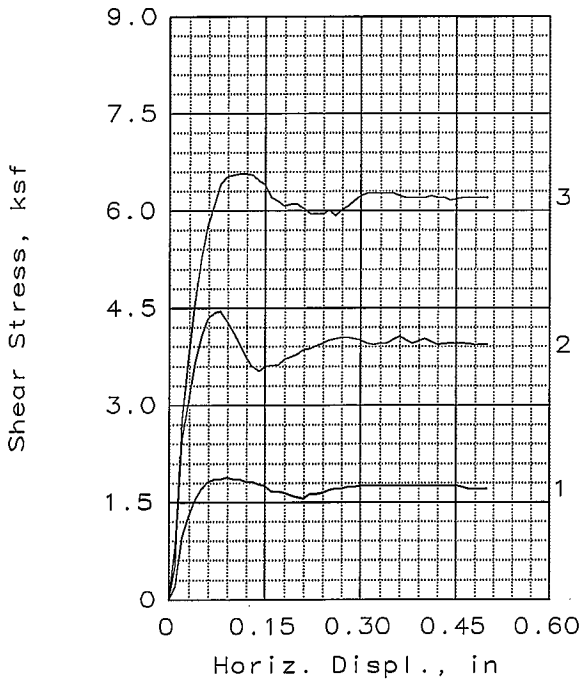
ENGINEERING GEOLOGY, INC.

Fig. No.: B5.12



	PEAK	RESIDUAL
C, ksf	0.36	0.17
ϕ, deg	48.4	47.2
TAN ϕ	1.13	1.08



SAMPLE NO.:		1	2	3
INITIAL	WATER CONTENT, %	12.2	13.2	12.2
	DRY DENSITY, pcf	113.7	114.2	115.7
	SATURATION, %	67.9	74.7	71.8
	VOID RATIO	0.483	0.476	0.457
	DIAMETER, in	2.42	2.42	2.42
	HEIGHT, in	1.00	1.00	1.00
AT TEST	WATER CONTENT, %	15.9	15.6	14.8
	DRY DENSITY, pcf	114.5	115.5	118.3
	SATURATION, %	91.0	91.9	94.1
	VOID RATIO	0.472	0.459	0.425
	DIAMETER, in	2.42	2.42	2.42
	HEIGHT, in	0.99	0.99	0.98
NORMAL STRESS, ksf		1.42	3.50	5.58
PEAK STRESS, ksf		1.88	4.45	6.57
DISPLACEMENT, in		0.09	0.08	0.11
RESIDUAL STRESS, ksf		1.71	3.94	6.20
DISPLACEMENT, in		0.49	0.50	0.50
Strain rate, in/min		0.0079	0.0079	0.0079

SAMPLE TYPE: Undisturbed
DESCRIPTION: Well graded sand with gravel

SPECIFIC GRAVITY= 2.7
REMARKS: alluvium (Qal)

CLIENT: Hasley Canyon Land Company, L.L.C.

PROJECT: T.T. 52584

SAMPLE LOCATION: RW-1 @ 6 ft.

PROJ. NO.: 98-1617-4 DATE: 1/15/99

DIRECT SHEAR TEST REPORT
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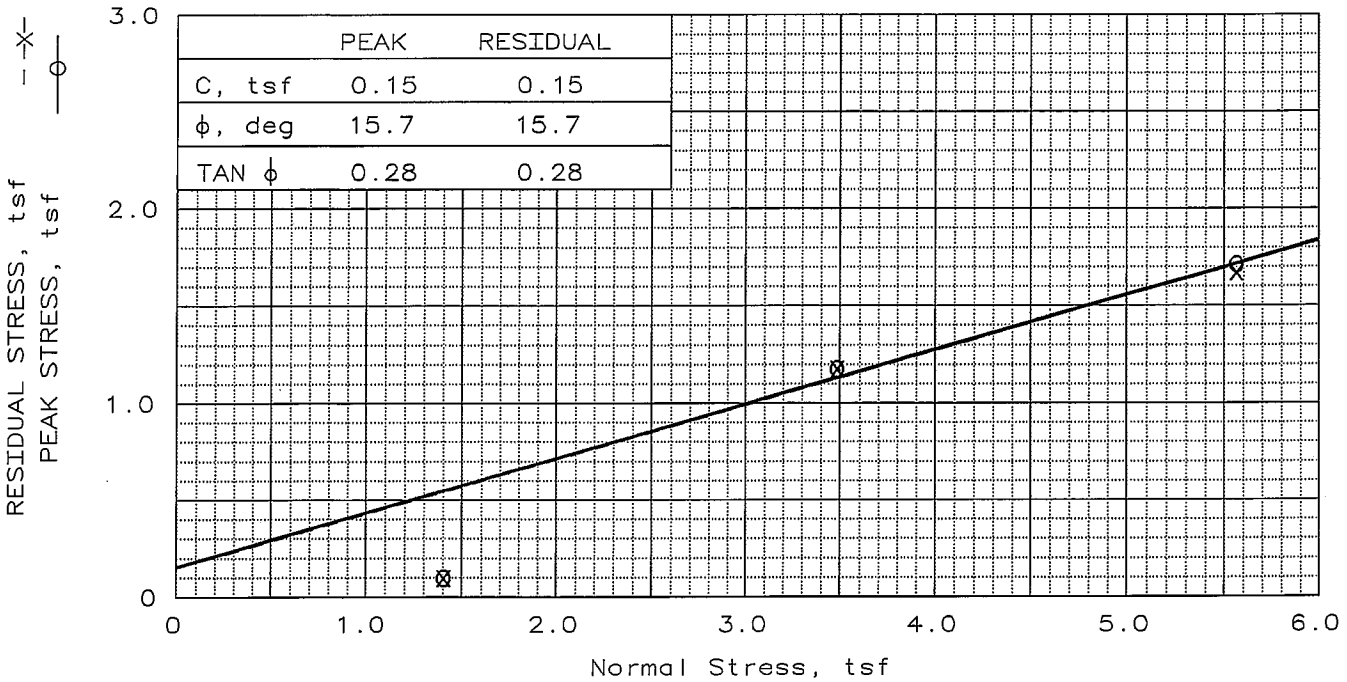
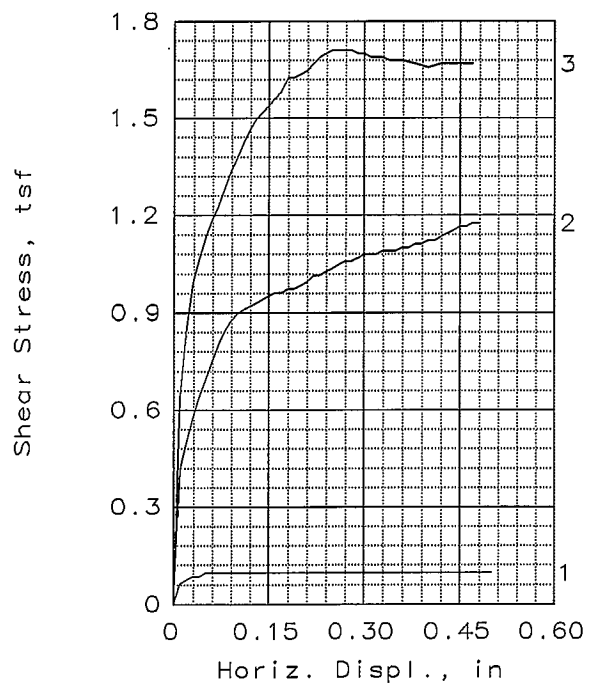
ENGINEERING GEOLOGY, INC.

Fig. No.: B5.13



	PEAK	RESIDUAL
C, tsf	0.15	0.15
ϕ, deg	15.7	15.7
TAN ϕ	0.28	0.28



SAMPLE NO.:		1	2	3
INITIAL	WATER CONTENT, %	11.7	20.7	12.0
	DRY DENSITY, pcf	90.0	83.3	98.7
	SATURATION, %	36.2	54.6	45.8
	VOID RATIO	0.873	1.024	0.707
	DIAMETER, in	2.42	2.42	2.42
	HEIGHT, in	1.00	1.00	1.00
AT TEST	WATER CONTENT, %	29.6	31.2	19.5
	DRY DENSITY, pcf	93.6	91.5	110.4
	SATURATION, %	99.8	99.8	99.9
	VOID RATIO	0.801	0.843	0.527
	DIAMETER, in	2.42	2.42	2.42
	HEIGHT, in	0.96	0.91	0.89
NORMAL STRESS, tsf		1.42	3.50	5.58
PEAK STRESS, tsf		0.10	1.18	1.71
DISPLACEMENT, in		0.10	0.47	0.25
RESIDUAL STRESS, tsf		0.10	1.18	1.67
DISPLACEMENT, in		0.50	0.48	0.47
Strain rate, in/min		0.0197	0.0197	0.0197

SAMPLE TYPE: undisturbed
DESCRIPTION: silty sand

SPECIFIC GRAVITY= 2.7
REMARKS: slopewash (sw)

CLIENT: Hasley Canyon Land Comapny, L.L.C.

PROJECT: T.T. 52584

SAMPLE LOCATION: T-156 @ 3.5 ft.

PROJ. NO.: 98-1617-4 DATE: 1/15/99

DIRECT SHEAR TEST REPORT
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ENGINEERING GEOLOGY, INC.

Fig. No.: B5.14

Appendix C

RECOMMENDED EARTHWORK SPECIFICATIONS

The following specifications are recommended to provide a basis for quality control during the placement of compacted fill or backfill as applicable.

1. Areas that are to receive compacted fill shall be observed by Allan E. Seward Engineering Geology, Inc. (AES) prior to the placement of fill.

2. All drainage devices shall be properly installed and observed by AES and/or owner's representative(s) prior to placement of backfill.

3. Fill shall be placed in controlled layers (lifts), the thickness of which is compatible with the type of compaction equipment used. The fill materials shall be brought to approximately 2 percent over optimum moisture content, then placed in layers with a thickness (loose) not exceeding 8 inches. Each layer shall be compacted to a minimum compaction of 90% relative to the maximum dry density determined per the latest ASTM D1557 test. Density testing shall be performed by AES to verify relative compaction. The contractor shall provide proper access and level areas for testing.

4. Where space limitations do not allow for conventional fill compaction operations, special backfill materials and procedures may be required. Pea gravel or other select fill can be used in areas of limited space. A sand and portland cement slurry (2 sacks per cubic-yard mix) shall be used in limited space areas for shallow backfill near final pad grade, and pea gravel shall be placed in deeper backfill near drainage systems.

5. Fill soils shall consist of imported soils or on site soils free of organics, cobbles, and deleterious material and shall be approved by AES. Rocks larger than 8 inches in diameter shall not be used unless they are sufficiently broken down. All imported soil shall be granular, non-expansive, with an Expansion Index (EI) less than 30. AES shall evaluate and/or test the import material for its conformance with the specifications prior to its delivery to the site. The contractor shall notify AES 72 hours prior to importing material to the site.

6. AES shall observe the placement of compacted fill and conduct in-place field density tests on the compacted fill to check for adequate moisture content and the required relative compaction. Where less than specified relative compaction is indicated,

additional compactive effort shall be applied and the soil moisture conditioned as necessary until adequate relative compaction is attained.

7. The Contractor shall comply with the minimum relative compaction out to the finish slope face of fill slopes, buttresses, and stabilization fills as set forth in the specifications for compacted fill. This may be achieved by either overbuilding the slope and cutting back as necessary, or by direct compaction of the slope face with suitable equipment, or by any other procedure which produces the required result.

8. Any abandoned underground structures such as cesspools, cisterns, mining shafts, tunnels, septic tanks, wells, pipelines or others not discovered prior to grading are to be removed or treated to the satisfaction of the Soils Engineer and/or the controlling agency for the project.

9. The Contractor shall have suitable and sufficient equipment during a particular operation to handle the volume of fill being placed. When necessary, fill placement equipment shall be shut down temporarily in order to permit proper compaction of fills, correction of deficient areas, or to facilitate required field testing.

10. The Contractor shall be responsible for the satisfactory completion of all earthwork in accordance with the project plans and specifications.

11. Final reports shall be submitted after completion of earthwork and after the Soils Engineer and Engineering Geologist have finished their observations of the work. No additional excavation or filling shall be performed without prior notification to the Soils Engineer and/or Engineering Geologist.

12. Whenever the words “supervision”, “inspection” or “control” are used, they shall mean <u>observation</u> of the work and/or testing of the compacted fill by AES to assess whether substantial compliance with plans, specifications and design concepts has been achieved, and does not include direction of the actual work of the contractor or the contractor’s workmen.

RECOMMENDED SPECIFICATIONS FOR PLACEMENT OF TRENCH BACKFILL

1. Trench excavations to receive backfill shall be free of trash, debris or other unsatisfactory materials prior to backfill placement, and shall be observed by Allan E. Seward Engineering Geology, Inc. (AES) representative.

2. Trench backfills shall be compacted to at least a relative compaction of 90 percent. The top 6 inches of trench backfill underlying pavement sections shall be compacted to a minimum relative compaction of 95 percent. Relative compaction is defined as the ratio of the in-place soil dry density to the laboratory maximum dry density as determined by the ASTM D1557 test method.

3. Except as stipulated herein, soils obtained from the excavation may be used as backfill if they are essentially free of organics and deleterious materials.

   Rocks generated from the trench excavation not exceeding 3 inches in largest dimension may be used as backfill material. However, such material may not be placed within 12 inches of the top of the pipeline. No more than 30 percent of the backfill volume shall contain particles larger than 1 ½ inches in diameter, and rocks shall be well mixed with finer soil.

4. Soils (other than aggregates) with a Sand Equivalent (SE) greater than or equal to 30, as determined by ASTM D 2419 Standard Test Method or at the discretion of the engineer or representative in the field, may be used for bedding and shading material in the pipe zone areas. These soils are considered satisfactory for compaction by jetting procedures.

5. No jetting will be permitted in utility trenches within the top 2 feet of the subgrade of concrete slabs-on-grade.

6. Trench backfill other than bedding and shading shall be compacted by mechanical methods as tamping sheepsfoot, vibrating or pneumatic rollers or other mechanical tampers to achieve the density specified herein. The backfill materials shall be brought to approximately 2 percent over optimum moisture content, then placed in horizontal layers with a thickness (loose) not exceeding 8 inches. Each layer shall be

evenly spread, moistened or dried as necessary and then tamped or rolled until the specified density has been achieved.

7. The contractor shall select the equipment and process to be used to achieve the specified density without damage to the pipeline, the adjacent ground, existing improvements or completed work.

8. Observations and field tests shall be carried on during construction by AES to confirm that the required degree of compaction has been obtained. Where compaction is less than that specified, additional compaction effort shall be made with adjustment of the moisture content as necessary until the specified compaction is obtained. Field density tests may be omitted at the discretion of the engineer or his representative in the field.

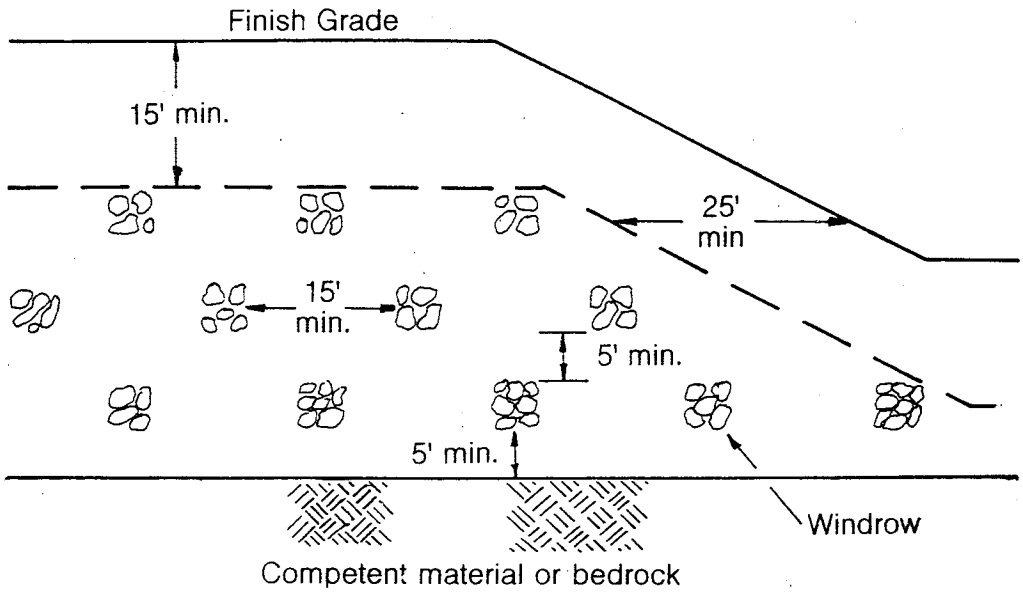
9. Whenever, in the opinion of AES or the Owner's Representative(s), an unstable condition is being created, either by cutting or filling, the work shall not proceed until an investigation has been made and the excavation plan revised, if deemed necessary.

10. Fill material shall not be placed, spread, or rolled during unfavorable weather conditions. When the work is interrupted by heavy rain, fill operations shall not be resumed until field tests by AES indicate the moisture content and density of the fill are as specified.

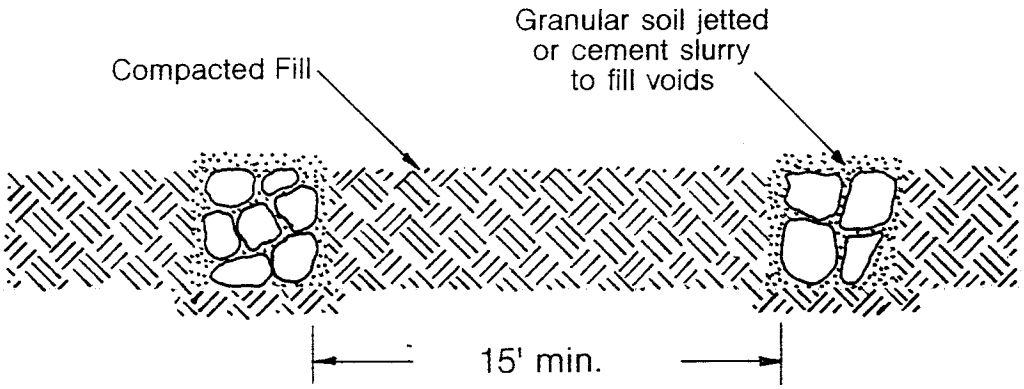
11. Whenever the words "supervision", "inspection", or "control" are used, they shall mean observation of the work and/or testing of the compacted fill by AES to assess whether substantial compliance with plans, specifications and design concepts has been achieved.

Figure C1

ROCK DISPOSAL DIAGRAM



WINDROW DETAIL



NOTES:
- Oversized material larger than 4 feet in it's largest dimension should be individually placed, not windrowed.
- Compacted fill shall be brough up along the windrow so granular soil or cement slurry can be placed in a trench condition.

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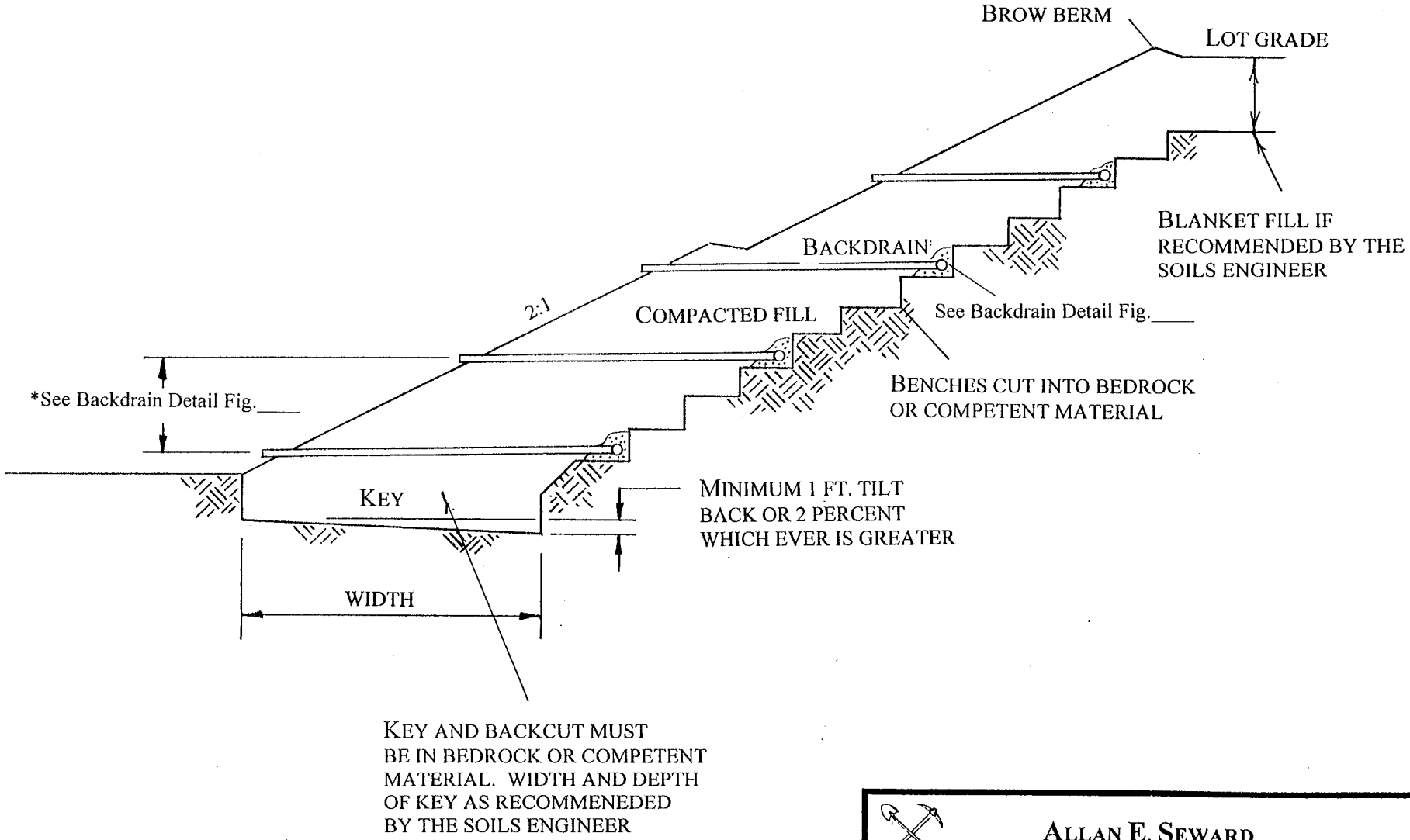
JOB NUMBER: 98-1617-4	DATE: 1/15/99	
SCALE: N/A		DRAWN BY: N/A REVISED:

STABILITY FILL



*NOT TO SCALE

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Job No.: 98-1617-4 **Date:** 1/15/99

FIGURE: C2

BACKDRAIN DETAIL*

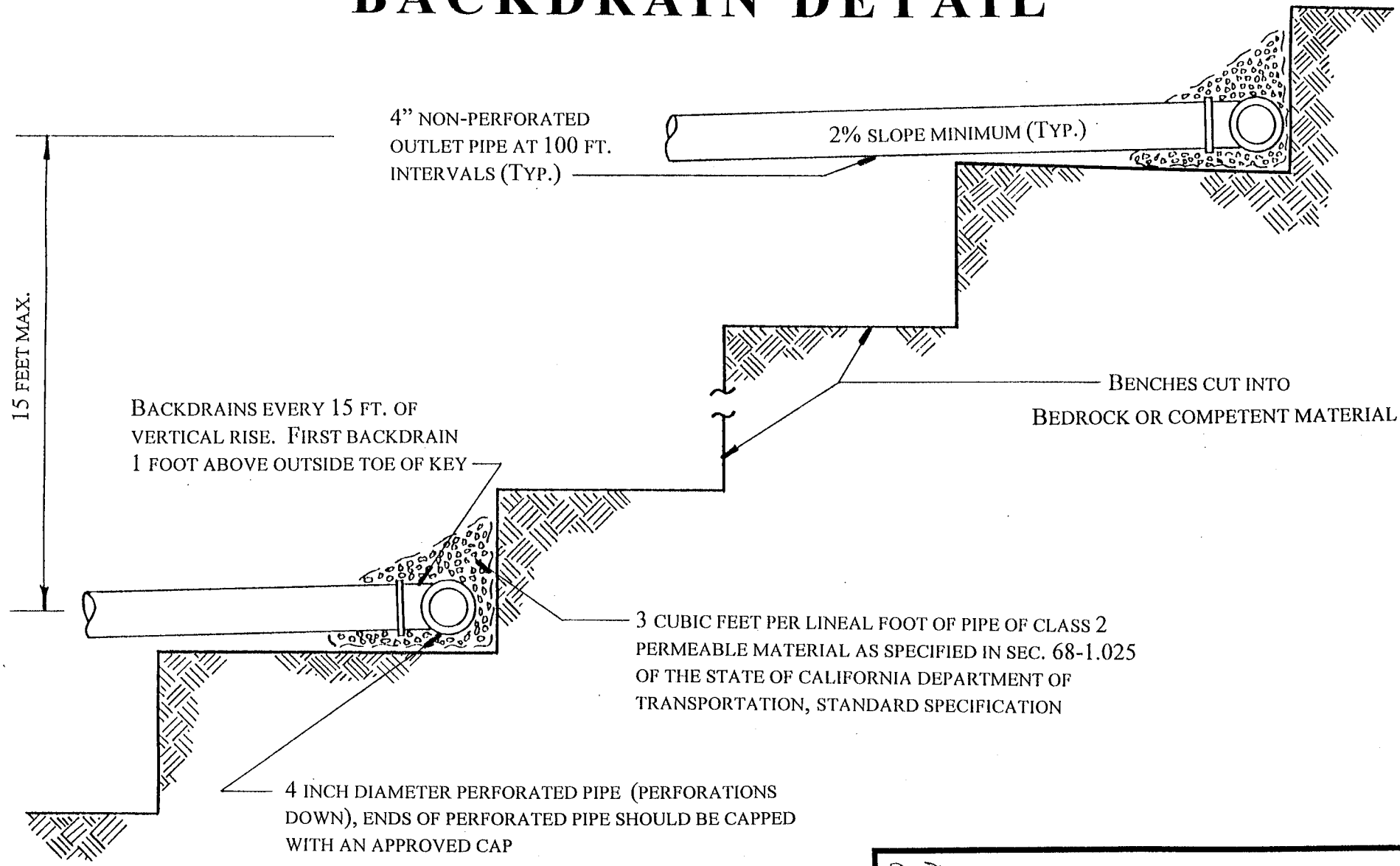

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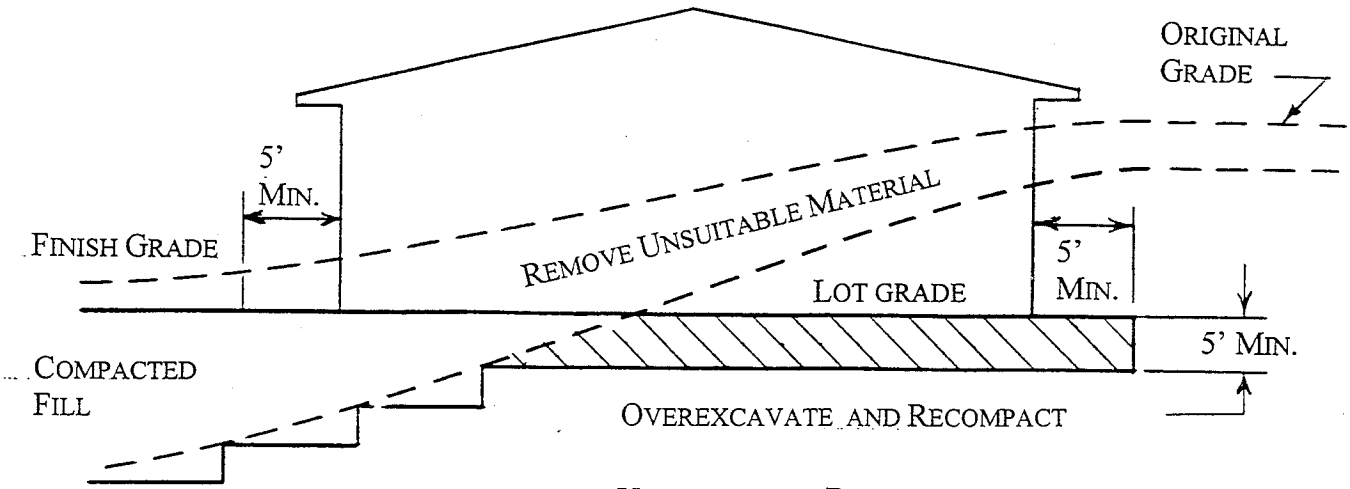
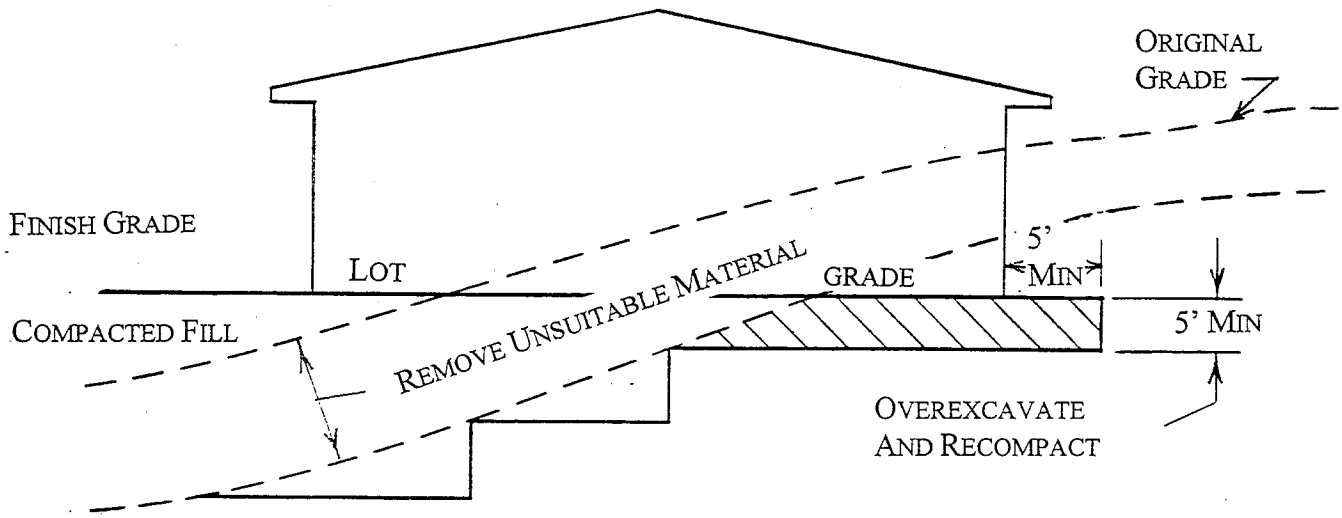
FIGURE: C3

CUT LOT (Transitional)*



UNWEATHERED BEDROCK OR COMPETENT MATERIAL ACCEPTED BY THE SOILS ENGINEER

CUT-FILL LOT (Transitional)*



UNWEATHERED BEDROCK OR COMPETENT MATERIAL ACCEPTED BY THE SOILS ENGINEER

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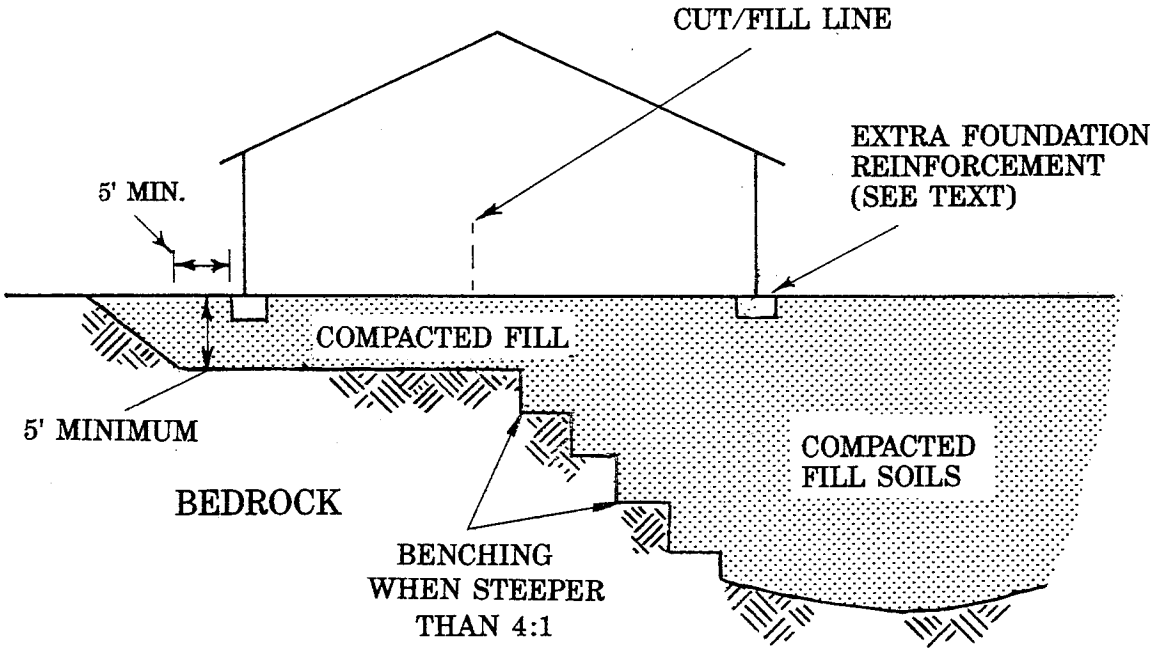
FIGURE: C4

OVEREXCAVATION BENEATH BUILDINGS *



*NOT TO SCALE

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SINCE 1958

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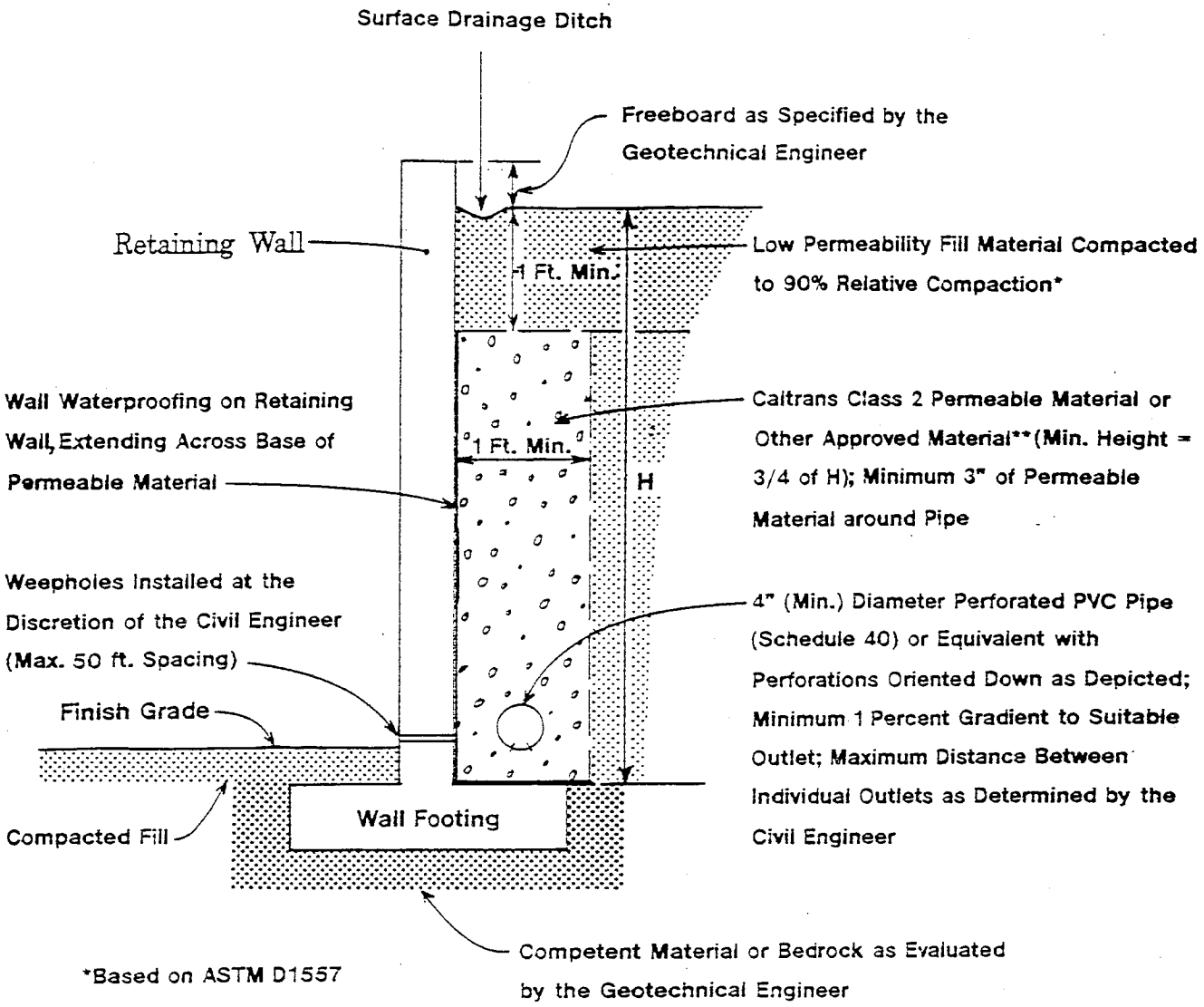
FIGURE: C5

RETAINING WALL DRAINAGE DETAIL



*Based on ASTM D1557

**Specifications for Caltrans Class 2 Permeable Material

U.S. Standard Sieve Size	% Passing
1"	100
3/4"	90–100
3/8"	40–100
No. 4	25–40
No. 8	18–33
No. 30	5–15
No. 50	0–7
No. 200	0–3

Sand Equivalent >75

Not to Scale

Figure C6

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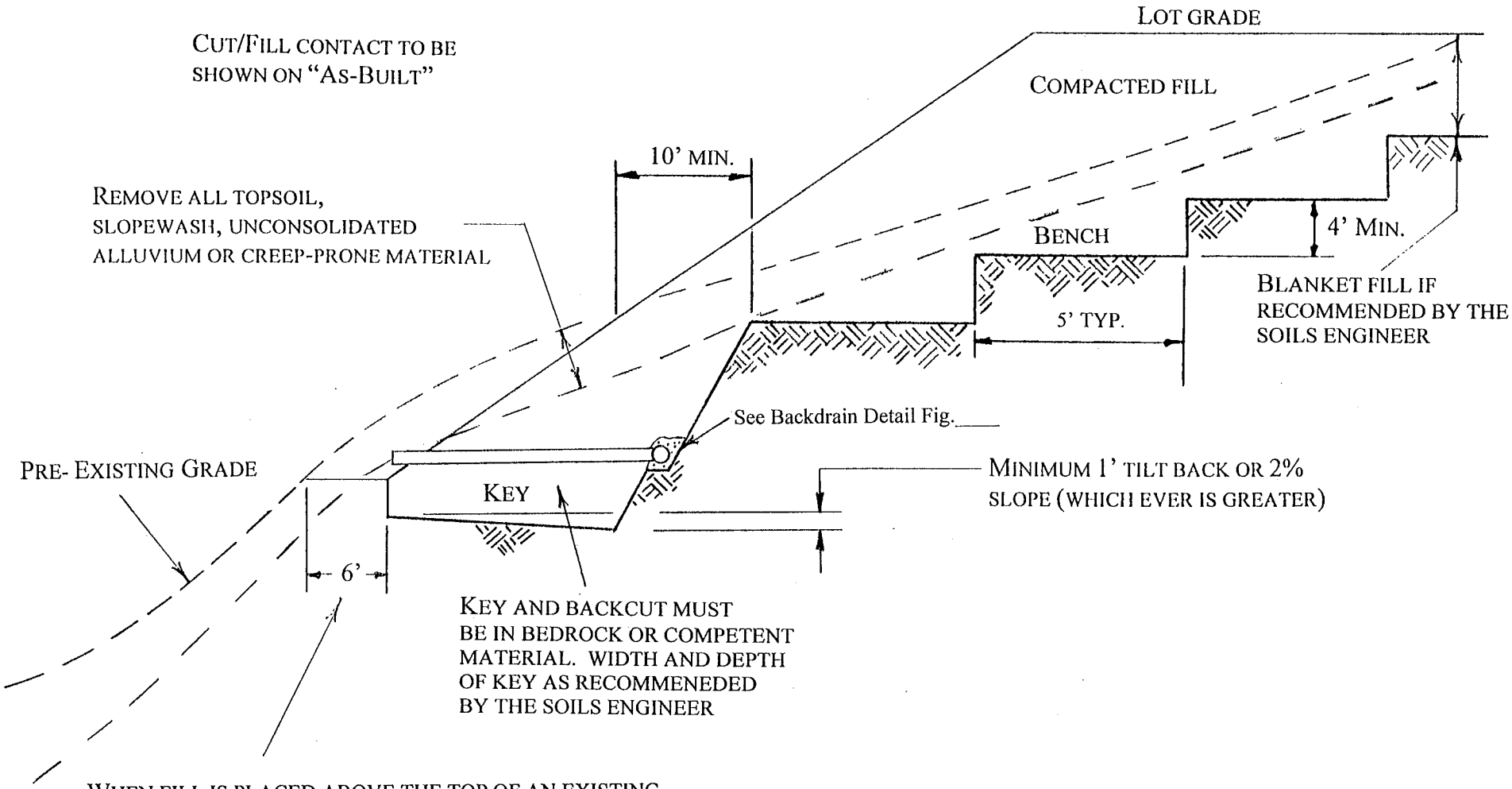
FILL SLOPE OVER NATURAL SLOPE*



WHEN FILL IS PLACED ABOVE THE TOP OF AN EXISTING SLOPE STEEPER THAN 3:1, THE TOE OF THE FILL SHALL BE SETBACK A MINIMUN DISTANCE OF 6 FEET.

* Not to Scale

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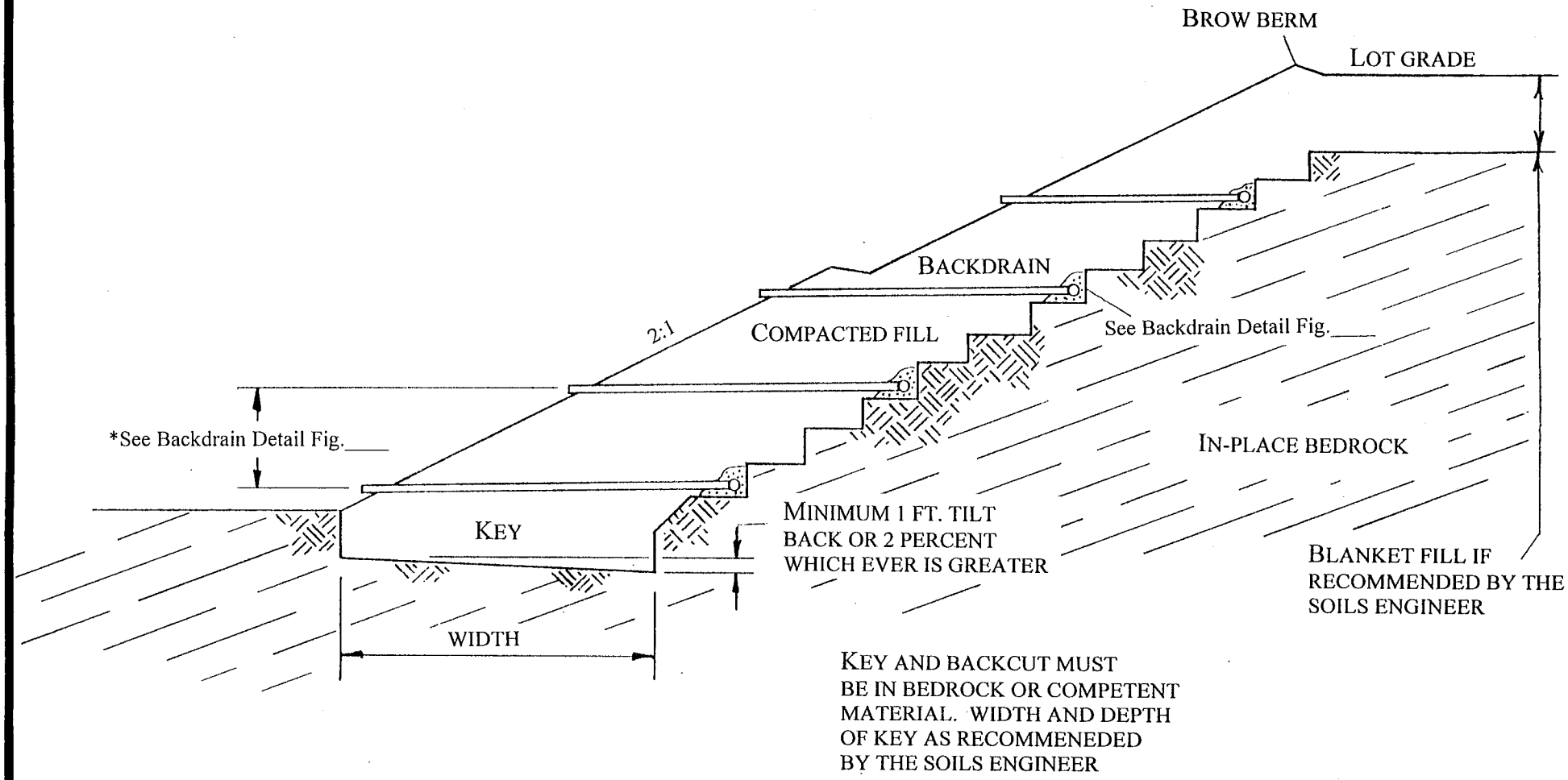
FIGURE: C7

BUTTRESS FILL*



KEY AND BACKCUT MUST
BE IN BEDROCK OR COMPETENT
MATERIAL. WIDTH AND DEPTH
OF KEY AS RECOMMENEDED
BY THE SOILS ENGINEER

*NOT TO SCALE

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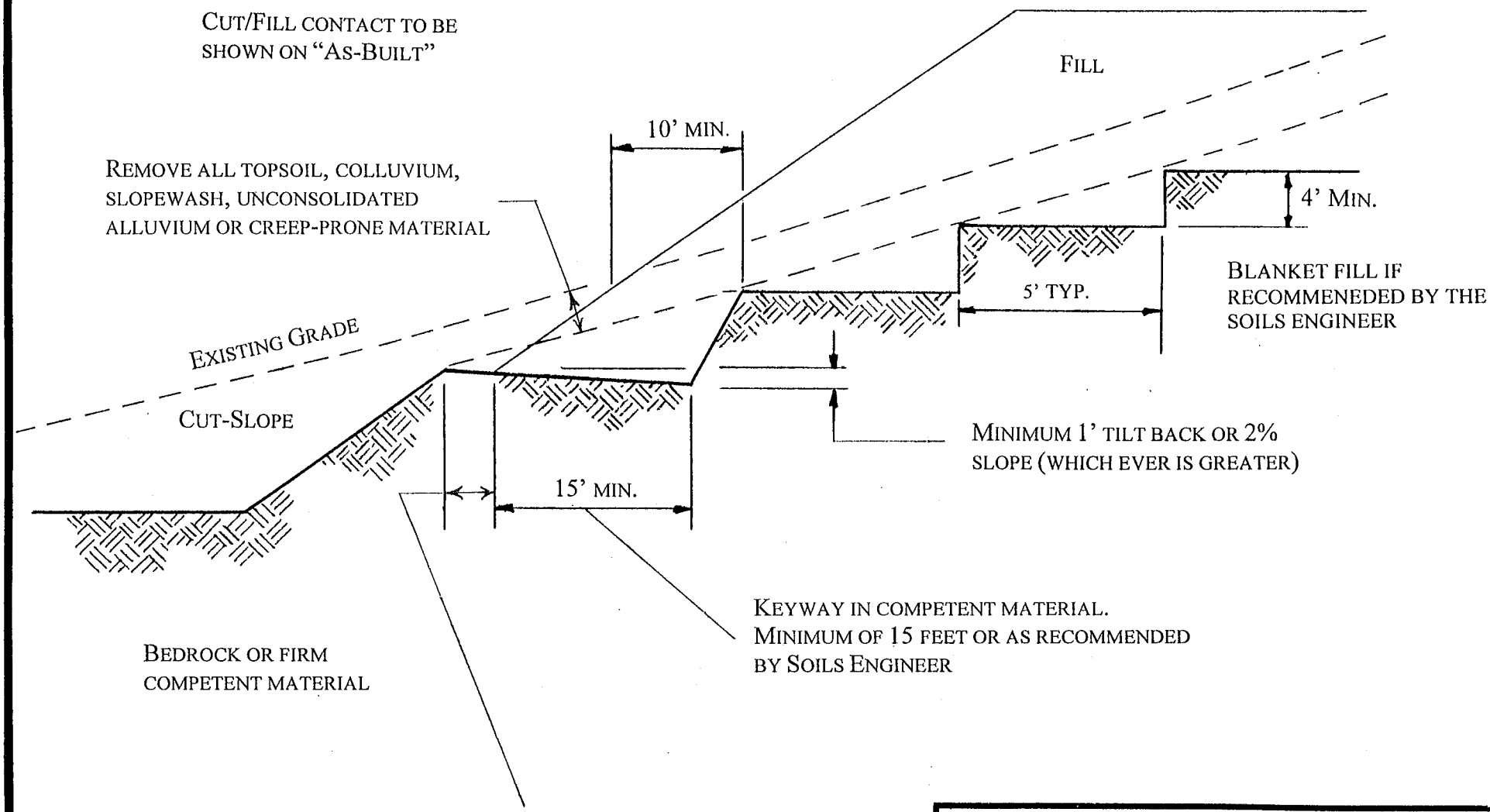
FIGURE: C8

TYPICAL FILL ABOVE CUT-SLOPE*



*NOT TO SCALE

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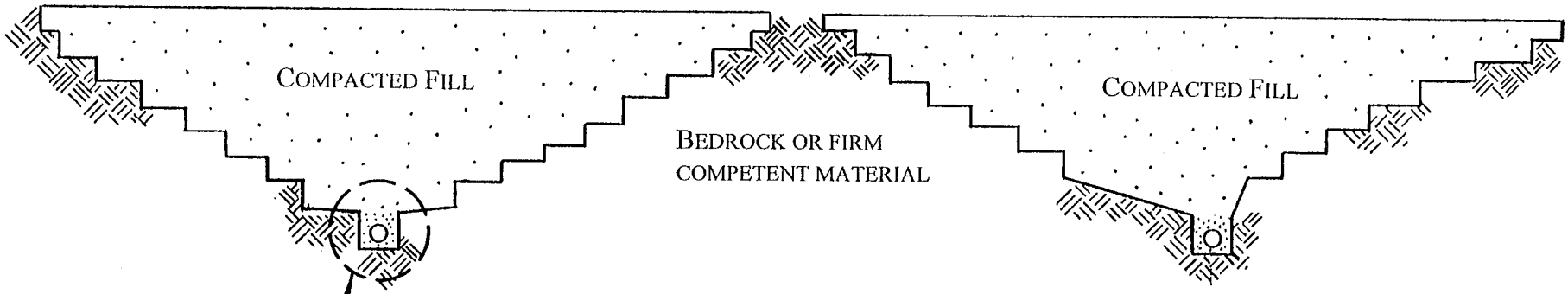
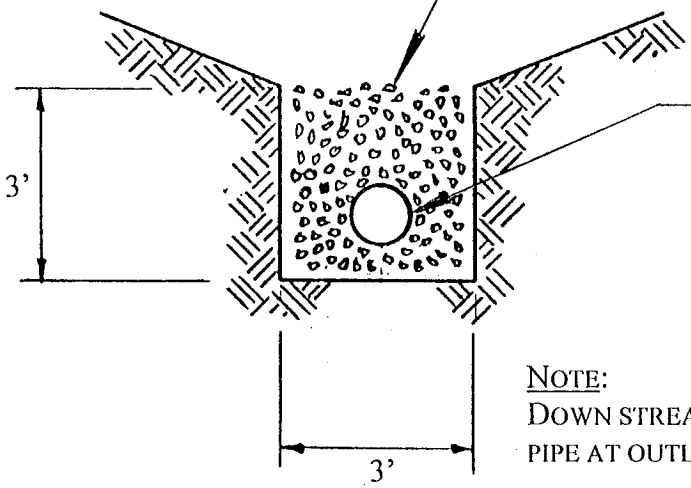
FIGURE: C9

SUBDRAIN DETAIL*



SEE ENLARGEMENT
BELOW (TYP.)

9 CUBIC FEET PER LINEAR FOOT OF PIPE OF CLASS 2 PERMEABLE MATERIAL AS SPECIFIED IN SEC. 68-1.025 OF THE STATE OF CALIFORNIA, DEPT. OF TRANSPORTATION STANDARD SPEC.



8 INCH DIAMETER PERFORATED PIPE (PERFORATIONS DOWN); INITIAL (TOP OF UPSLOPE) 500 FEET OF PIPE MAY BE 6 INCH IN DIAMETER; OR FOR OTHER LARGER SIZE (GREATER THAN 8 INCH DIAMETER) WILL BE DETERMINED BY THE SOILS ENGINEER; UPSLOPE END OF PIPE SHOULD BE CAPPED WITH AN APPROVED CAP

NOTE:
DOWN STREAM 20 FEET MINIMUM OF PIPE AT OUTLET SHALL BE NON-PERFORATED

REMOVE ALL UNSUITABLE MATERIAL BEFORE PLACING ANY FILL

*NOT TO SCALE

SINCE 1958

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ENGINEERING GEOLOGY, INC.

Job No.: 98-1617-4 Date: 1/15/99

FIGURE: C10

SUMMARY OF LANDSLIDES
TABLE 1

Landslide No.	Plate No.	Mitigation
1	I	Landslide located mostly within proposed natural slope area (Open Space Lot No. 228) and partially within residential Lot 199. A small fill slope is proposed at the toe of this slide. Cross Section 17-17' illustrates the three-dimensional geometry of this slide. Per engineering calculation on Cross Section 17-17' the **entire landslide** is to be **removed**. The excavation depression between the Future "Q" street and the landslide removal bottom should be filled to the approximate elevation of street (daylight the fill to the west against the landslide removal). The upper portion of the landslide removal bottom must be removed/laid back to the apparent angle of the bedding (11°) from elevation 1605 as illustrated on Cross Section 17-17' within the geotechnical analysis portion of the report. A additional copy of this cross section with the recommended design mitigation is also enclosed within the Mitigation Summary (Appendix G)
2	I	Relatively small landslide complex located directly east of Landslide Qls-1 and beneath Lot 199 and the proposed street. It is recommended that this landslide complex be **completely removed** during the grading operations under the continuous observation of the Project Engineering Geologist. In areas to receive fill, the landslide removal bottom should be surveyed in order to document the removal for future reference.
3	II	Landslide located within a fill canyon beneath proposed Lots 15, 16, 17, 25, 26 and 27. It is recommended that this landslide be **completely removed** from beneath the proposed lots under the continuous observation of the Project Engineering Geologist. In areas to receive fill, the landslide removal bottom should be surveyed in order to document the removal for future reference.

Landslide No.	Plate No.	Mitigation
4	I	Small landslide located beneath proposed Lots 64 and 65. The proposed grading concept will remove approximately half this landslide. It is recommended that the **remaining portion** of this **landslide be completely removed** under the observation of the Project Engineering Geologist. In areas to receive fill, the landslide removal bottom should be surveyed in order to document the removal for future reference.
5	II	Landslide located beneath proposed Lots 210, 211 and 212. The proposed grading concept will remove approximately 65% of this landslide. It is recommended that the **landslide material** be **excavated** a **minimum of 20 feet** below the proposed grade and replaced with certified engineered fill. See Cross Section 19-19' within the mitigation summary section located within Appendix G for the recommended design. In areas to receive fill, the landslide removal bottom should be surveyed in order to document the removal for future reference. Prior to the placement of Certified Engineered Fill, the remaining landslide material exposed within the bottom excavation should be sampled and tested to confirm the adequacy of the bottom removal.
6	II	Based on Geotechnical Engineering analysis of Cross Section 7-7' it is recommended that the proposed grade be redesigned to the configuration illustrated on Cross Section 7-7' located within the mitigation summary section (Appendix G). It is recommended that the redesigned cut-slopes be removed and replaced with a standard 15 feet wide **Stability Fill**. The material below the proposed street should be sampled and analyzed during the grading operations for recommended overexcavation depth.

Landslide No.	Plate No.	Mitigation
7	II	Landslide located beneath proposed Lots 81 thru 84. The proposed grading concept will remove approximately 85% of this landslide. It is recommended that the remaining portion of this **landslide be completely removed** under the observation of the Project Engineering Geologist. Cross Section 16-16' illustrates the three dimensional geometry of the landslide. This cross section with the design mitigation is included within the mitigation summary section located within Appendix G. In areas to receive fill, the landslide removal bottom should be surveyed in order to document the removal for future reference.
8	II	Small probable landslide located north of Lot 70 within the proposed golf course area. This probable landslide poses no hazard to the future residential lots and the golf course and is safe for the use intended. Landslide Qls-8 will be noted on the Final Map as a Restricted Use Area.

SUMMARY OF CUT-SLOPES
Table 2

PROPOSED CUT-SLOPE CS-1

Location:	Plate II - North of Lot 162
Direction Slope Faces:	South to Southwest
Slope Parameters:	118± ft. high; 2:1 gradient
Cross Sections:	1-1’
Anticipated Geologic Conditions:	TQs bedrock dipping an average of 30° towards the south which is steeper than the proposed cut-slope face; **grossly stable**
Mitigation Measures:	N/A

PROPOSED CUT-SLOPE CS-2

Location:	Plate II - North of Lots 156 thru 160
Direction Slope Faces:	South
Slope Parameters:	80± ft. high; 2:1 gradient
Cross Sections:	2-2’
Anticipated Geologic Conditions:	TQs bedrock dipping an average of 29° towards the south which is steeper than the proposed cut-slope face; **grossly stable**
Mitigation Measures:	N/A

PROPOSED CUT-SLOPE CS-3

Location:	Plate II - Northeast of Lot 116
Direction Slope Faces:	South
Slope Parameters:	90± ft; high; 2:1 gradient
Cross Sections:	3-3’
Anticipated Geologic Conditions:	TQs bedrock dipping an average of 32° towards the south which is steeper than the proposed cut-slope face; **grossly stable**
Mitigation Measures:	N/A

PROPOSED CUT-SLOPE CS-4

Location:	Plate II - South of Lots 136 thru 138
Direction Slope Faces:	Southwest
Slope Parameters:	85± ft. high; 2:1 gradient
Cross Sections:	4-4’ & 5-5’
Anticipated Geologic Conditions:	TQs bedrock dipping towards the south with the apparent dip of the bedding dipping out of the proposed slope face as indicated on cross section 5-5’. Cross section 4-4’ indicates this slope is grossly stable. Cross section 5-5’ indicates this slope is **surficially unstable**. The middle portion of this slope is proposed as fill and the eastern portion is anticipated to expose the axis of the syncline as well as a fill over cut condition directly south of Lot 136.
Mitigation Measures:	**Stability Fill** required. This stability fill is illustrated on cross section 5-5’, which is located within the Mitigation Summary (Appendix G) portion of this report.

PROPOSED CUT-SLOPE CS-5

Location:	Plate II - East of proposed clubhouse location; merges southward into Cut-Slope CS-40
Direction Slope Faces:	Northwest to west to southwest
Slope Parameters:	85± ft. high; 2:1 gradient
Cross Sections:	6-6’
Anticipated Geologic Conditions:	The northwest-facing portion of the slope is anticipated to expose TQs bedrock dipping 26 to 65° towards the south, which is steeper than the proposed cut-slope face. The south-west facing portion of the slope is anticipated to expose TQs bedrock oriented neutral to the proposed slope face. **Grossly stable**.
Mitigation Measures:	N/A

PROPOSED CUT-SLOPE CS-6

Location:	Plate II - Northwest of Lots 200 thru 202
Direction Slope Faces:	Northwest
Slope Parameters:	26± ft. high; 3:1 or flatter gradient
Cross Sections:	None
Anticipated Geologic Conditions:	TQs bedrock dipping 36-58° north, which is steeper than the proposed cut-slope face; but a portion of the slope is located within the Building Setback Zone. Due to the complexity of faulting within this zone, the exact location, orientation and engineering characteristics of the potential faults cannot be precisely determined until the slope is graded. This is characteristic of all fault zones.
Mitigation Measures:	A **Stability Fill is required** for the northern portion of the cut-slope within the "Zone of Deformation". During the grading operations the backcut and keyway excavations will be geologically logged in detail and cross sections will be provided to our soils engineer for additional analysis (if necessary) relative to the gross stability of the slope. These cross sections, backcut and keyway logs will be presented in our geologic report approving Rough Grading.

PROPOSED CUT-SLOPE CS-7

Location:	Plate II - East of Lots 210- thru 212
Direction Slope Faces:	West to southwest
Slope Parameters:	80± ft. high; 2:1 gradient
Cross Sections:	7-7'
Anticipated Geologic Conditions:	The west-facing portion of Cut-Slope CS-7 is located within the recommended Building Setback Zone. Minor faults and bedding shears anticipated to be exposed as well as the east-west trending anticlinal axial trace. Bedding is anticipated to be neutral to dipping into the proposed slope face. Due to the complexity of faulting the exact location, orientation and engineering characteristics of the potential faults cannot be precisely determined until the slope is graded. This is characteristic of all fault zones. Landslide material (Qls-6) will be exposed within the south-facing portion of the proposed cut-slope face. Geologically **unstable**.
Mitigation Measures:	Based on Geotechnical Engineering calculations, move the south-facing portion of the slope 100 ft. towards the northeast removing the landslide material from the modified slope face. A 15 feet wide **Stability Fill** is required to mitigate surficial instability due to the existing anticline anticipated to be exposed within the slope face. See the Landslide Summary for discussion on landslide Qls-6. **Stabilization Fill** is required for the west-facing portion of the slope within the recommended Building Setback Zone. During the grading operations the backcut and keyway excavations will be geologically logged in detail and cross sections will be provided to our soils engineer for additional analysis (if necessary) relative to the gross stability of the slope. These cross sections, backcut and keyway logs will be presented in our geologic report approving Rough Grading. This stability fill is illustrated on cross section 7-7' located within the Mitigation Summary (Appendix G) of this report.

PROPOSED CUT-SLOPE CS-8

Location:	Plate II - West of Lots 19 thru 22
Direction Slope Faces:	West
Slope Parameters:	40± ft. high; 2:1 gradient
Cross Sections:	None
Anticipated Geologic Conditions:	TQs bedrock oriented essentially neutral to dipping into the proposed cut-slope face; **grossly stable** but probable fill over cut situation west of Lots 19 and 20. Southern portion of slope is located within the recommended Building Setback Zone where potential faults, shears and deformed bedrock is anticipated to be exposed; probable surficial materials anticipated to be exposed at the top of the proposed cut slope within Lots 21 and 22; grossly **stable** but **surficially unstable**.
Mitigation Measures:	**Stability Fill** for the portion of the slope located within the "Zone of Deformation". During the grading operations, the backcut and keyway excavation will be geologically logged in detail and cross sections will be provided to our soils engineer for additional analysis (if necessary) relative to the gross stability of the slope. These cross sections, backcut and keyway logs will be presented in our geologic report approving Rough Grading. Remove and replace the surficial material (sw) with certified fill using a keyway located at a terrace bench or the toe of slope for the area adjacent to Lots 21 & 22.

PROPOSED CUT-SLOPE CS-9

Location:	Plate II - Adjacent to Lots 30 thru 32
Direction Slope Faces:	West and north
Slope Parameters:	40± ft. high; 2:1 gradient
Cross Sections:	None
Anticipated Geologic Conditions:	TQs bedrock dipping 32 to 37° toward the northwest which is steeper than the proposed slope face; **grossly stable**
Mitigation Measures:	N/A

PROPOSED CUT-SLOPE CS-10

Location:	Plate II - Adjacent to Lots 162 thru 168; traversed by two fill slopes (three separate slopes)
Direction Slope Faces:	South-Southeast
Slope Parameters:	35 ft. high; approximately 3:1 gradient
Cross Sections:	None
Anticipated Geologic Conditions:	TQs bedrock dipping 28 to 36° towards the south which is steeper than the proposed cut-slope face; **grossly stable**
Mitigation Measures:	N/A

PROPOSED CUT-SLOPE CS-11

Location:	Plate I - North of Lots 114 and 115
Direction Slope Faces:	South and southwest
Slope Parameters:	80± ft. high; 2:1 gradient
Cross Sections:	None
Anticipated Geologic Conditions:	TQs bedrock dipping an average of 31° towards the south (steeper than the proposed cut-slope face); **grossly stable**
Mitigation Measures:	N/A

PROPOSED CUT-SLOPE CS-12

Location:	Plate I - North of Lot 220
Direction Slope Faces:	South to southwest
Slope Parameters:	105± ft. high; 2:1 gradient
Cross Sections:	8-8’
Anticipated Geologic Conditions:	TQs bedrock dipping an average of 30° towards the south (steeper than the proposed cut-slope face); **grossly stable**
Mitigation Measures:	N/A

PROPOSED CUT-SLOPE CS-13

Location:	Plate I - Northeast of Lot 217
Direction Slope Faces:	Southwest
Slope Parameters:	80± ft. high; 2:1 gradient
Cross Sections:	9-9' & 10-10'
Anticipated Geologic Conditions:	TQs bedrock dipping 26 to 32° towards the southeast; Cross Section 10-10' indicates bedding dipping steeper than the proposed cut-slope face. Cross Section 9-9' indicates a very minor component dipping out of slope; grossly stable, but possibly **surficially unstable** due to minor daylighted wedge.
Mitigation Measures:	**Stabilization Fill required**. This stability fill is illustrated on cross section 9-9' which is located within the Mitigation Summary (Appendix G).

PROPOSED CUT-SLOPE CS-14

Location:	Plate I - East of Lot 113
Direction Slope Faces:	North and northwest
Slope Parameters:	95± ft. high; 2:1 gradient
Cross Sections:	8-8'
Anticipated Geologic Conditions:	TQs bedrock dipping an average of 30° into the proposed cut-slope face; grossly stable
Mitigation Measures:	N/A

PROPOSED CUT-SLOPE CS-15

Location:	Plate I - North of Lots 98 thru 105
Direction Slope Faces:	Southwest
Slope Parameters:	150± ft. high: 3:1 gradient north of Lots 100 through 111 and 2:1 gradient north of Lots 97 through 99
Cross Sections:	8-8’
Anticipated Geologic Conditions:	TQs bedrock generally dipping steeper than the proposed cut-slope face but the eastern portion of slope in the vicinity north of Lot 98 is anticipated to expose the syncline axial trace; north of Lots 102 through 111 - **grossly stable**; north of Lots 97 through 101 - **grossly unstable**.
Mitigation Measures:	Design change required per geotechnical engineering analysis for the portion located north of Lots 97 through 101. Per analysis, construct a south-facing 2:1 (h:v) cut-slope with a 115 feet wide bench at elevation 1540. This design is illustrated on cross section 8-8’, which is located within the Mitigation Summary (Appendix G) of this report.

PROPOSED CUT-SLOPE CS-16

Location:	Plate I - West of Lot 59
Direction Slope Faces:	Southeast
Slope Parameters:	50± ft. high; 2:1 gradient
Cross Sections:	11-11'
Anticipated Geologic Conditions:	Located just north of the syncline axial trace; TQs bedrock dipping 8 to 27° towards the southeast beneath Quaternary Terrace deposits. **Grossly unstable** per engineering calculations
Mitigation Measures:	Design change required per geotechnical engineering analysis. Construct a 2.2:1 cut-slope with the toe of slope located approximately 60 feet northwest of the current proposed toe of slope location. This recommended design is illustrated on cross section 11-11', which is located within the Mitigation Summary (Appendix G) of this report.

PROPOSED CUT-SLOPE CS-17

Location:	Plate I - East of Lots 55 and 56
Direction Slope Faces:	East
Slope Parameters:	80± ft. high; 2:1 gradient
Cross Sections:	12-12' and 13-13'
Anticipated Geologic Conditions:	TQs bedrock dipping an average of 30° into the proposed cut-slope face; **grossly stable**
Mitigation Measures:	N/A

PROPOSED CUT-SLOPE CS-18

Location:	Plate I - East of Lots 55 & 56
Direction Slope Faces:	West
Slope Parameters:	60± ft. high; 2:1 gradient
Cross Sections:	12-12' & 13-13'
Anticipated Geologic Conditions:	TQs bedrock dipping shallower (apparent dip) than the proposed cut-slope face as depicted on Cross Section 13-13'; **grossly unstable**
Mitigation Measures:	**Buttress Fill** required or redesign the upper portion of the slope, above the terrace bench, to approximately 14° (4.2 to 1 h:v). This will require offsite easement letter. This recommended cut-slope design is illustrated on cross section 13-13', which is located within the Mitigation Summary (Appendix G) of this report.

PROPOSED CUT-SLOPE CS-19

Location:	Plate I - West of Lots 92 thru 94
Direction Slope Faces:	Northwest to west
Slope Parameters:	40± ft. high; 3:1 gradient
Cross Sections:	None
Anticipated Geologic Conditions:	TQs bedrock dipping approximately 19 to 47° towards the northwest which is steeper than the proposed cut-slope face; Alluvium and slopewash are anticipated to be exposed directly north of Lots 91 and 93; bedrock **grossly stable**, alluvium **surficially unstable**.
Mitigation Measures:	Stability Fill required for that portion of the slope exposing alluvium and slopewash.

PROPOSED CUT-SLOPE CS-20

Location:	Plate I - North and west of Lots 39 thru 53
Direction Slope Faces:	Northwest and southwest
Slope Parameters:	Semicircular 30 ft. high; 2:1 gradient
Cross Sections:	None
Anticipated Geologic Conditions:	TQs bedrock dipping 19 to 47° towards the northwest. The north and northwest facing portion of the slope (Lots 39-46) the bedding is anticipated to be dipping steeper than the proposed cut-slope face. The west and southwest-facing portion of the slope (Lots 47-53) the bedding is anticipated to be neutral to dipping into the proposed cut-slope face; **grossly stable**
Mitigation Measures:	N/A

PROPOSED CUT-SLOPE CS-21

Location:	Plate I - Southeast of Lots 41 thru 43 and Lots 64 and 65
Direction Slope Faces:	Southeast and South
Slope Parameters:	42± ft. high; 2:1 gradient
Cross Sections:	None
Anticipated Geologic Conditions:	TQs bedrock dipping 14 to 32° into the proposed cut-slope face; surficial material (slopewash) anticipated to be exposed within the cut-slope face east of Lot 64; entire Cut-Slope CS-21 is **grossly stable**, but **surficially unstable** in the vicinity of **Lot 64**.
Mitigation Measures:	Stability Fill required for the portion of the slope exposing slopewash.

PROPOSED CUT-SLOPE CS-22

Location:	Plate I - Southwest of Proposed Cut-Slope CS-21
Direction Slope Faces:	Northwest
Slope Parameters:	32± ft. high; 2:1 gradient
Cross Sections:	None
Anticipated Geologic Conditions:	TQs bedrock anticipated to be dipping steeper than the proposed cut-slope face; **grossly stable**
Mitigation Measures:	N/A

PROPOSED CUT-SLOPE CS-23

Location:	Plate II - Offsite, North of Lot 193
Direction Slope Faces:	South to Southwest
Slope Parameters:	40± ft. high; 2:1 gradient
Cross Sections:	None
Anticipated Geologic Conditions:	TQs bedrock dipping an average of 30° towards the south and is anticipated to be steeper than the proposed cut-slope face; **grossly stable**
Mitigation Measures:	N/A

PROPOSED CUT-SLOPE CS-24

Location:	Plate II - South of Lots 187 & 188
Direction Slope Faces:	South to Southwest
Slope Parameters:	30± ft. high; 2:1 gradient
Cross Sections:	None
Anticipated Geologic Conditions:	TQs bedrock dipping an average of 30° towards the south which is steeper than the proposed cut-slope face; **grossly stable**
Mitigation Measures:	N/A

PROPOSED CUT-SLOPE CS-25

Location:	Plate II - West of Lots 178 & 179
Direction Slope Faces:	West
Slope Parameters:	26± ft. high; 6:1 gradient
Cross Sections:	None
Anticipated Geologic Conditions:	TQs bedrock dipping an average of 30° towards the south and is anticipated to be oriented neutral to the proposed cut-slope face; **grossly stable**
Mitigation Measures:	N/A

PROPOSED CUT-SLOPE CS-26

Location:	Plate II - North of Lot 179
Direction Slope Faces:	South
Slope Parameters:	30± ft. high; 2:1 gradient
Cross Sections:	None
Anticipated Geologic Conditions:	TQs bedrock dipping an average of 31° towards the south, which is steeper than the proposed cut-slope face; **grossly stable** but fill over cut condition anticipated along entire proposed cut-slope.
Mitigation Measures:	Remove the cut portion of the proposed slope to a terrace bench or to the proposed toe of slope and replace with Certified Engineered Fill.

PROPOSED CUT-SLOPE CS- 27

Location:	Plate II - North of Lot 139
Direction Slope Faces:	Southwest
Slope Parameters:	30± ft. high; 2:1 gradient
Cross Sections:	None
Anticipated Geologic Conditions:	TQs bedrock dipping an average of 30° towards the south which is steeper than the proposed cut-slope face; **grossly stable**
Mitigation Measures:	N/A

PROPOSED CUT-SLOPE CS-28

Location:	Plate II - North of Lot 151
Direction Slope Faces:	South to Southwest
Slope Parameters:	41± ft. high; 2:1 gradient
Cross Sections:	None
Anticipated Geologic Conditions:	TQs; Bedrock dipping an average of 29° towards the south which is steeper than the proposed cut-slope face; **grossly stable**
Mitigation Measures:	N/A

PROPOSED CUT-SLOPE CS-29

Location:	Plate II - south of Lots 120 & 121
Direction Slope Faces:	Southeast
Slope Parameters:	35± ft. high; 3:1 gradient
Cross Sections:	None
Anticipated Geologic Conditions:	TQs; Bedrock dipping an average of 30° towards the southeast which is steeper than the proposed cut-slope face; **grossly stable**
Mitigation Measures:	N/A

PROPOSED CUT-SLOPE CS-30

Location:	Plate I - Adjacent to Lot 38
Direction Slope Faces:	North and West
Slope Parameters:	25± ft. high; 2:1 gradient
Cross Sections:	None
Anticipated Geologic Conditions:	North-facing portion - TQs bedrock dipping an average of 32° towards the north which is steeper than the proposed cut-slope face; West-facing portion - bedding anticipated neutral to the proposed cut-slope face; **grossly stable**
Mitigation Measures:	N/A

PROPOSED CUT-SLOPE CS-31

Location:	Plate I - North and east of Lot 1 - CS-31
Direction Slope Faces:	North and East
Slope Parameters:	25± ft. high; 2:1 gradient
Cross Sections:	None
Anticipated Geologic Conditions:	North-facing portion - TQs bedrock potentially dipping out of the proposed cut-slope face- geologically **unstable**; East-facing portion - TQs bedrock dipping towards the north essentially neutral to the proposed east-facing slope face; **grossly stable**
Mitigation Measures:	**Buttress** required for the north-facing portion of the proposed cut-slope

PROPOSED CUT-SLOPE CS-32

Location:	Plate I - East of Lot 1
Direction Slope Faces:	West
Slope Parameters:	27± ft. high; 2:1 gradient
Cross Sections:	None
Anticipated Geologic Conditions:	TQs bedrock dipping 14 to 23° towards the north which is essentially neutral to the proposed cut-slope face; **grossly stable**
Mitigation Measures:	N/A

PROPOSED CUT-SLOPE CS-33

Location:	Plate I & Plate II - Southeast of Lot 3
Direction Slope Faces:	Southeast
Slope Parameters:	60± ft. high; 2:1 gradient
Cross Sections:	None
Anticipated Geologic Conditions:	TQs bedrock dipping 9 to 14° towards the northeast which is into the proposed cut-slope face; **grossly stable** but fill over cut condition is anticipated.
Mitigation Measures:	Remove cut portion of slope to a proposed terrace bench or toe of slope and construct a fill slope utilizing a keyway and backcut.

PROPOSED CUT-SLOPE CS-34

Location:	Plate II - South of Proposed Cut Slope CS-7
Direction Slope Faces:	South to Southwest
Slope Parameters:	75± ft. high; 2:1 gradient
Cross Sections:	7-7'
Anticipated Geologic Conditions:	Quaternary landslide material anticipated to be exposed within the proposed cut-slope face; **surficially unstable**
Mitigation Measures:	**Stability Fill** required. See cross section 7-7', illustrating the design mitigation, located within the Mitigation Summary (Appendix G) of this report. See the Landslide Summary for details on Landslide Qls-7.

PROPOSED CUT-SLOPE CS-35

Location:	Plate II - Within golf course area at the southwest portion of the site.
Direction Slope Faces:	Easterly
Slope Parameters:	40± ft. high; 3:1 gradient
Cross Sections:	None
Anticipated Geologic Conditions:	Axis of syncline traverses the proposed cut-slope; Quaternary terrace deposits will possibly be exposed within the cut-slope face; southern portion of the slope is located within the proposed recommended Building Setback Zone. Due to the complexity of faulting within this zone, the exact location, orientation and engineering characteristics of the potential fault cannot be precisely determined until the slope is graded. This is characteristic of all fault zones.
Mitigation Measures:	A **Stabilization Fill** is required for that portion of the slope within the recommended Building Setback Zone. During the grading operations the backcut and keyway excavation will be geologically logged in detail and cross sections will be provided to our soils engineer for additional analysis (if necessary) relative to the gross stability of the slope. These cross sections and backcut and keyway logs will be presented in our geologic report approving Rough Grading. A **Stabilization Fill** is also required for the portion of the cut-slope exposing the Quaternary Terrace deposits.

PROPOSED CUT-SLOPE CS-36

Location:	Plate II - Southeast of Lots 120-122 within the proposed golf course area
Direction Slope Faces:	Northwest
Slope Parameters:	35± ft. high; 3:1 gradient
Cross Sections:	None
Anticipated Geologic Conditions:	TQs bedrock dipping into the proposed cut-slope face; **grossly stable**
Mitigation Measures:	N/A

PROPOSED CUT-SLOPE CS-37

Location:	Plate II - Adjacent to proposed Cut-Slope CS-36 within the proposed golf course
Direction Slope Faces:	Southeast
Slope Parameters:	45± ft. high; 3:1 gradient
Cross Sections:	None
Anticipated Geologic Conditions:	TQs bedrock dipping an average of 30° towards the southwest which is steeper than the proposed cut-slope face; **grossly stable**
Mitigation Measures:	N/A

PROPOSED CUT-SLOPE CS-38

Location:	Plate II - East of Lots 132 and 133 within the proposed golf course area
Direction Slope Faces:	South
Slope Parameters:	35± ft. high; 3:1 gradient
Cross Sections:	None
Anticipated Geologic Conditions:	TQs bedrock dipping an average of 31° toward the south which is steeper than the proposed cut-slope face; **grossly stable**
Mitigation Measures:	N/A

PROPOSED CUT-SLOPE CS-39

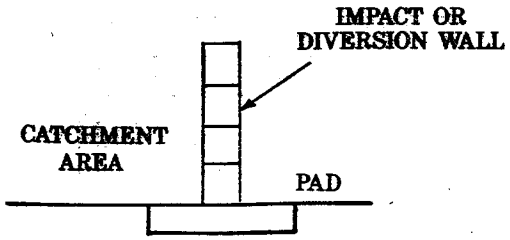
Location:	Plate II - East of proposed Cut-Slope CS-38 within the proposed golf course
Direction Slope Faces:	South
Slope Parameters:	35± ft. high; 3:1 gradient
Cross Sections:	None
Anticipated Geologic Conditions:	TQs bedrock dipping 29-34° towards the south which is steeper than the proposed cut-slope face; **grossly stable**
Mitigation Measures:	N/A

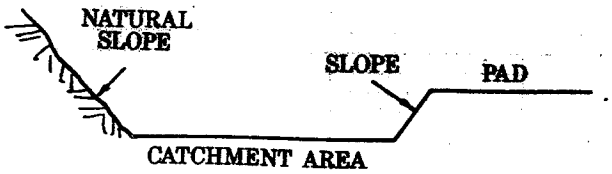
PROPOSED CUT-SLOPE CS-40

Location:	Plate II - Northeast of the proposed golf course clubhouse parking area; merge northerly into Cut-Slope CS-5.
Direction Slope Faces:	Southwest
Slope Parameters:	35± ft. high; 2:1 gradient
Cross Sections:	None
Anticipated Geologic Conditions:	The southern portion of the cut-slope located within the recommended Building Setback Zone. Numerous minor faults and bedding shears oriented essentially neutral to the proposed cut-slope face. Due to the complexity of faulting within this zone, the exact location, orientation and engineering characteristics of the potential faults cannot be precisely determined until the slope is graded. This is characteristic of ALL fault zones.
Mitigation Measures:	A **Stability Fill** is required for that portion of the slope within the Building Setback Zone. During the grading operations the backcut and keyway excavations will be geologically logged in detail and cross sections will be provided to our Soils Engineer for additional analysis (if necessary) relative to the gross stability of the slope. These cross sections and backcut and keyway logs will be presented in our geologic report approving Rough Grading.

PROPOSED CUT-SLOPE CS-41

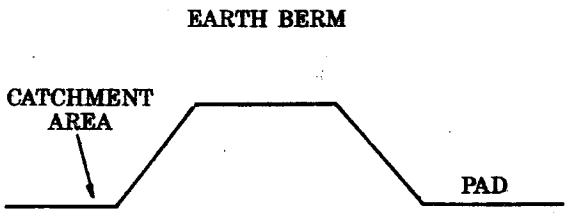
Location:	Plate II - West of proposed clubhouse within the Golf Course playing area.
Direction Slope Faces:	South
Slope Parameters:	70± ft. high; 2:1 gradient
Cross Sections:	None
Anticipated Geologic Conditions:	TQs bedrock dipping towards 30-41° towards the south, which is steeper than the proposed slope face; **grossly stable.**
Mitigation Measures:	N/A

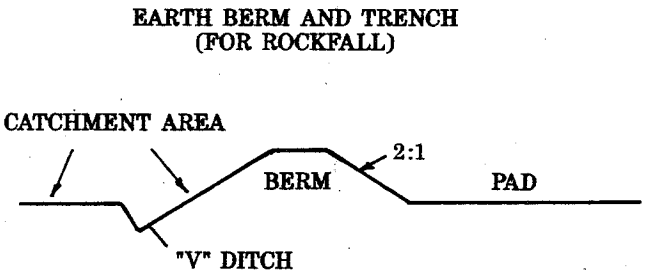




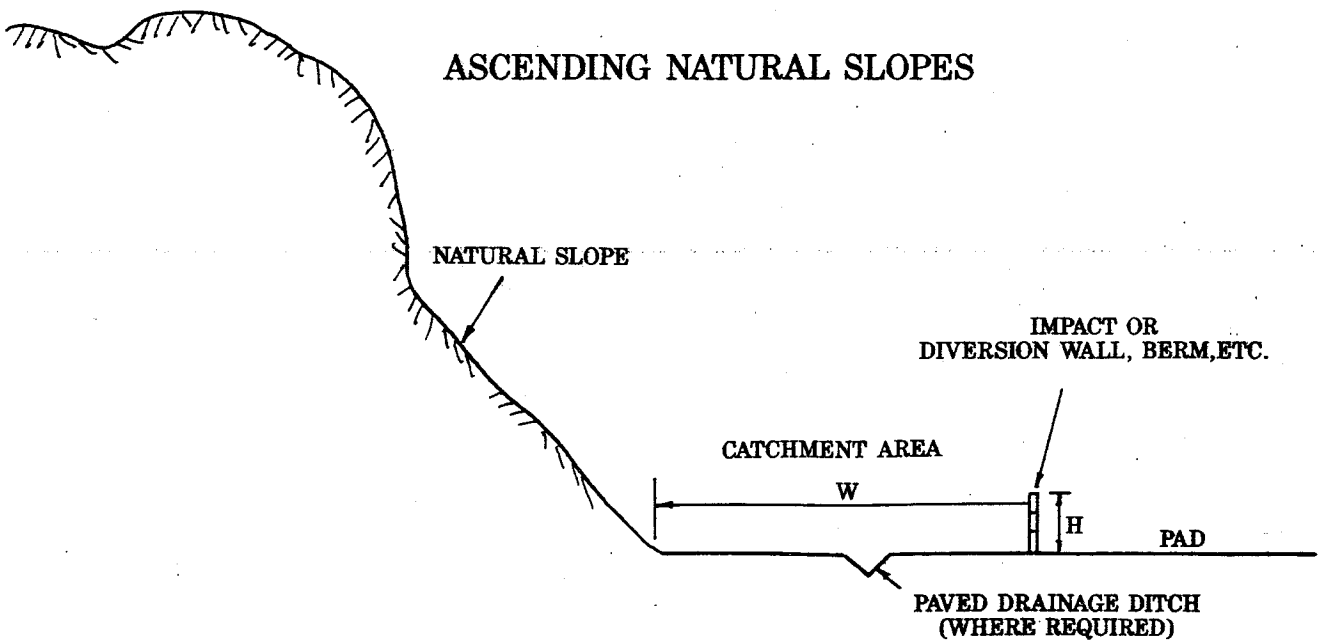
NOTE: NOT TO SCALE

ALTERNATIVE DEBRIS CONTROL DEVICES





ASCENDING NATURAL SLOPES



NOTE: W AND H WILL VARY ACCORDING TO NATURAL SLOPE HEIGHT,GRADIENT AND MATERIAL

Figure C11

ALLAN E. SEWARD
ENGINEERING GEOLOGY, INC.
SINCE 1958

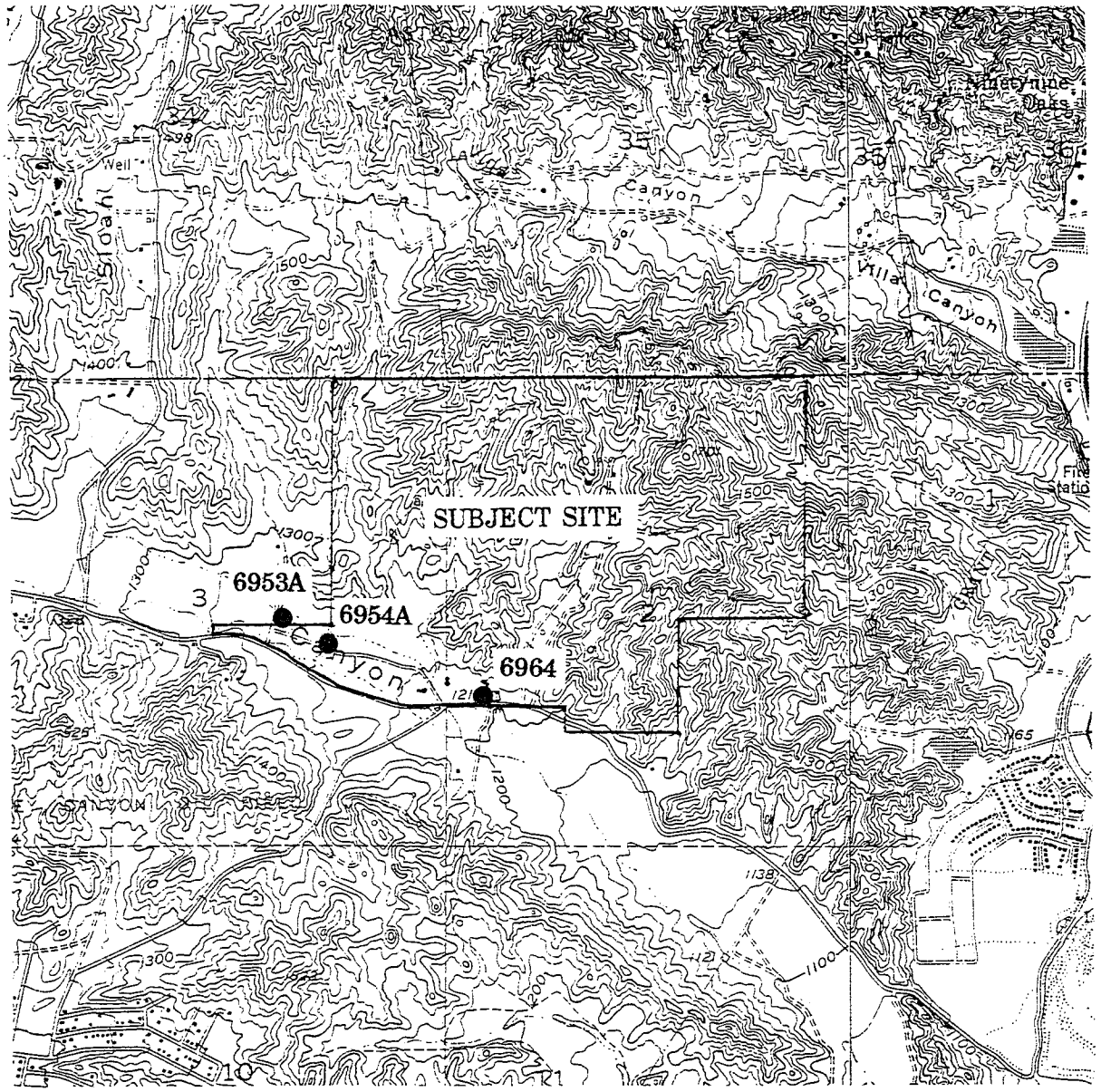
Date: 1/15/99	Job No.: 98-1617-4

HISTORIC HIGH GROUND WATER RECORDS

TABLE 3

Well No.	Elevation*	Date	Highest Measured Water Surface* (Depth of Water*)
6953A	1262	10/28/67	1164.7 (97.3)
6964	1201	11/30/65	1156.0 (45)
6954A	1252	10/28/67	1181.9 (70.1)

*All elevations and depths reported in feet. Data from records maintained by L.A. County Flood Control District



WATER WELL LOCATION MAP

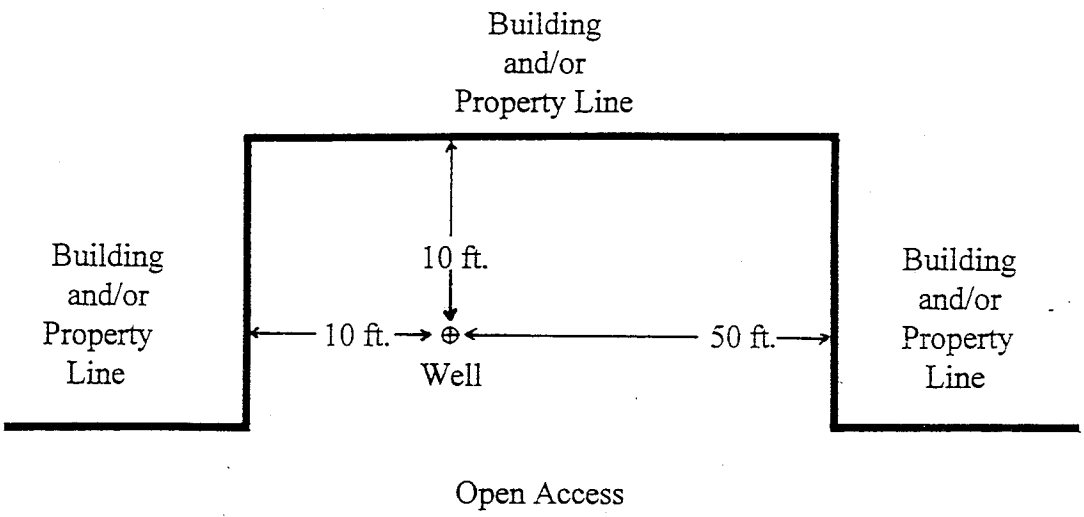
6964
●

L.A. County Flood Control
District Well Numbers

Figure C12

ALLAN E. SEWARD ENGINEERING GEOLOGY		
JOB NUMBER: 98-1617-4	DATE: 1/15/99	
SCALE: 1"=2000'		DRAWN BY: Staff REVISED:

NEARBY DETAIL FOR OIL WELL SETBACK



Nearby is defined as being within 10 feet from the structure and/or property line, limited to any two adjacent sides of the well, and within 50 feet from the property line and/or structure on the third side of the well. The fourth side shall always have open access.

Source: Division of Oil, Gas and Geothermal Resources, 10/23/97

SINCE 1958

ALLAN E. SEWARD
ENGINEERING GEOLOGY, INC.

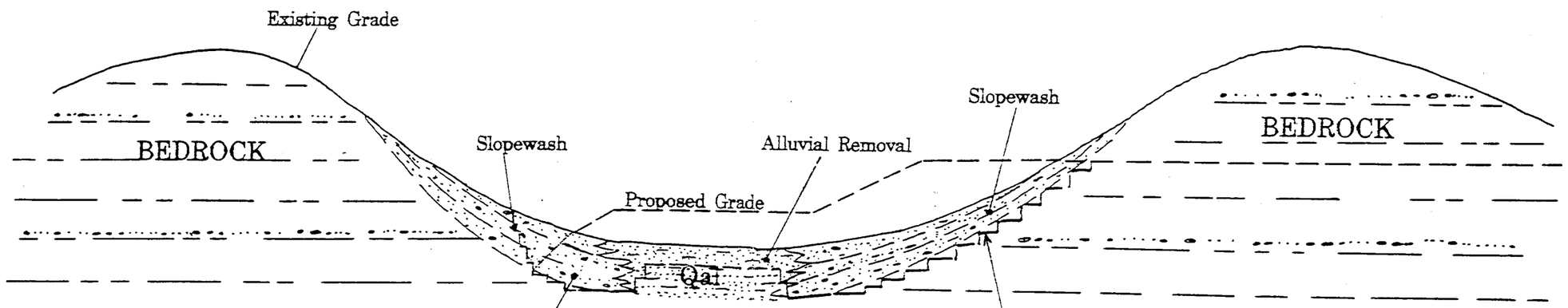
Job No.: 98-1617-4 Date: 1/15/99

FIGURE: C13

Figure C14

SCHEMATIC

ALLUVIAL/SLOPEWASH DETAIL



SLOPEWASH REMOVAL

(Slopewash to be completely removed from within the keyway unless sampled, tested and determined competent by the Project Soils Engineer).

BENCHING TO REMOVE SLOPEWASH

ALLAN E. SEWARD ENGINEERING GEOLOGY		
JOB NUMBER: 98-1617-4	DATE: 1/15/99	
SCALE: Not To Scale		DRAWN BY: Staff REVISED:

Appendix D

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1.0 INTRODUCTION

2.0 DATA AND ASSUMPTIONS

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- **3.1** Method and Locations Analyzed

4.0 ESTIMATION OF EARTHQUAKE-INDUCED SETTLEMENTS
- **4.1** Method of Analysis
- **4.2** Calculations
- **4.3** Results of Earthquake-Inducted Settlements Analyses

5.0 CONCLUSIONS

6.0 RECOMMENDATIONS

7.0 REFERENCES

Attachment 1 - Calculations and Charts for Assessment of Liquefaction Potential and Earthquake-Induced Settlements

1.0 INTRODUCTION

By an examination of boring data for the site, in-situ subsurface soils inherently (based on high to very high blow counts) reveal low potential for significant liquefaction and seismic settlement, thus making further analyses unwarranted. However, in an effort to provide a quantitative estimate (although expected to be low) of seismic settlements, we have performed the following detailed liquefaction potential and seismic settlement analyses.

2.0 DATA AND ASSUMPTIONS

A design earthquake magnitude of 7.0 and a maximum peak horizontal ground acceleration of 0.54g were used for the liquefaction analysis. These values were obtained as indicated in Appendix E of this report.

Data included soil types, ground water level and blow counts obtained from the rotary wash boring RW-1 drilled in an area underlain by granular alluvial deposits. The enhanced boring log is included in this appendix. The approximate boring location is shown on the geologic and geotechnical map.

For analysis, a conservative and perched ground water depth of 26 feet was used. Historic ground water depth is estimated to be deeper than 40 feet.

This analysis is based on the references provided at the end of this Appendix. Liquefiable zones are based upon the premise that liquefaction potential exists if the resisting stress (Strength) against liquefaction is less than the earthquake-induced stress; this is to say, a stress ratio or factor of safety less than unity. However, the earthquake-induced settlement analysis considers zones that may settle somewhat even though the factor of safety may be greater than one (i.e. a non-liquefaction condition).

3.0 ASSESSMENT OF LIQUEFACTION POTENTIAL

3.1 Method and Locations Analyzed

Liquefaction is a phenomenon whereby a saturated granular soil temporarily loses its strength because of the buildup of pore water pressure during seismic excitation. This

loss of strength may cause structures founded on these soils to experience subsidence and/or lateral movement. Thus, for liquefaction to occur loose to medium granular soils need to be below the ground water.

Liquefaction potential analyses are performed by a method proposed by Seed, et al. (1984). Some data provided by the liquefaction analyses are used for the evaluation of earthquake-induced settlements. Per Seed's method, the earthquake-induced stresses at any depth are estimated and compared with empirically-based stresses (strength) for sites where liquefaction has occurred.

The location of boring RW-1, considered critical for liquefaction potential analyses was selected based on a careful examination of soil types (e.g. sands to silty sands), and blow count data. Blow count data is high to very high thus making liquefaction very unlikely to occur. However, earthquake-induced settlements may occur in moist soils even though liquefaction is not expected. To estimate these settlements it is necessary to calculate first basic data obtained by a simulated "liquefaction" analysis. This analysis is presented in Page 1 of the calculation sheet which provides blow count corrections and induced stresses.

4.0 ESTIMATION OF EARTHQUAKE-INDUCED SETTLEMENTS

4.1 Method of Analysis

Earthquake-induced settlements are estimated using procedures presented by Tokimatsu and Seed (1987) for dry/moist soils (above the water table) and saturated sands. Based on very high blow count data (See RW-1 boring log), seismic settlements in the saturated sands are expected to be negligible.

Volumetric strains for sands above the water table were estimated using the blow counts and cyclic shear strain. **The volumetric strain was then doubled to account for multidirectional effects** (the volumetric strain data were originally obtained from one-dimensional laboratory testing). Settlement was obtained by multiplying the thickness of the soil layer by the calculated volumetric strain.

Blow counts used in the settlement calculations above the water table were not corrected for fines content (but were corrected for other factors used in the "liquefaction" potential

assessment). Although the referenced procedure applies to both silty and clean sands, the use of the blow counts without corrections for fines content produces more conservative results.

4.2 Calculations

Calculations for the estimation of earthquake-induced settlements are presented in the attached spread sheet.

4.3 Results of Earthquake-Induced Settlement Analysis

The results of the analyses indicate a seismic settlement less than 0.1 inch. For practical purposes, a conservative total settlement of 0.5 inch may be assumed.

Considering procedural conservatism and the above results, differential settlements are expected to be not significant overall and also no greater than 0.5 inch in a horizontal distance of 30 feet. This assumes (conservatively from the differential settlement standpoint) that the total settlement in an area near the augumented location of the maximum settlement of 0.5 inch is zero.

5.0 CONCLUSIONS

1. The results of these analyses indicate that significant liquefaction-is not expected at this site.

2. More important than the identification of zones of potential liquefaction are the settlements caused by seismic excitation. **The potential seismically-induced settlements in subsurface soils at the site are very small**, as expected by our initial examination of data. The maximum cumulative calculated settlement is 0.1 inch (augmented to 0.5 inch), and as indicated previously, differential settlements are expected to be not greater than 0.5 inch in a distance of 30 ft. Furthermore, some recompaction has been recommended and certified compacted fill will be added throughout the site, thus diminishing the likelihood of liquefaction to occur.

   No lateral spreading due to liquefaction is expected at this site because significant liquefaction is not anticipated. Also, seismic settlements are considered to be minimal

at the site. It should be noted that the settlement calculations include multi-directional effects in the volumetric strains. Furthermore, subsurface soils are essentially horizontally layered.

6.0 RECOMMENDATIONS

1. Owing to the low magnitude of estimated conservative earthquake-induced total and differential settlements and some recompaction proposed during grading, special measures to further mitigate these settlements are considered to be unnecessary.

The following attachments are located within the Appendix:

Attachment 1

- Calculations for Assessment of Liquefaction Potential and Earthquake-Induced Settlements RW-1

7.0 REFERENCES

Bartlett, S.F., and Youd, T.L., "Empirical prediction of liquefaction - induced lateral spread", Journal of Geotechnical Engineering, Vol. 121, No. 4, April 1995.

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Ishihara, K., "Stability of natural deposits during earthquakes", Proceedings of the Eleventh International Conference on Soil Mechanics and Foundation Engineering, A.A. Balkema Publishers, Rotterdame, Netherlands, 1985

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Proprietary charts for correction blow-count by sampler type to N-SPT

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DRILL HOLE LOG

BORING NO. RW-1

PROJECT: Hasley Canyon Land Company, L.L.C. **JOB NO.:** 98-1617-4
T.T. 52584 **DATE:**
DRILLING COMPANY/DRILLER: Valley Well
METHOD OF DRILLING: Rotary Wash - 5 1/4"
HAMMER TYPE: Down Hole **DRIVING WEIGHT (lbs.):** 140 lbs.
AVERAGE DROP (in.): 30" **HOLE DIAMETER (in.):**
ELEVATION: 1223 **LOGGED BY:** DGG/BC

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	DRY DENSITY (pcf)/ MOISTURE CONTENT (%) (γt (pcf))	% -200	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
B/C 0						SW	QUATERNARY ALLUVIUM; Qal (0 - 50 Ft.)	
C40 (f=.55) 5		10 20 20		138 ~~124~~/~~11.2~~ (5) (5')	(<5)		@ 3' SAND, well graded, with gravel, medium dense, moist, reddish-to medium brown	
C77 (f=.55)		12 23 54		129 ~~115~~/~~12.5~~ (8')	(<5)	SW	@ 6' - dense, white to gray to light brown	
C65 (f=.55) 10		15 25 40		(129) (13')	(<5)	SW	@ 9' - no gravel, dense, reddish- to medium brown	
45 15		10 15 30		(122) (19')	23	SM	@ 15' SILTY SAND, fine, dense, moist, reddish- to medium brown	@ 15':Fines= 23%
C50 (f=.55) 20		15 25 25		122 ~~111~~/~~9.8~~ (23')	(23)	SM	@ 20' - dense, moist	
							NON-LIQUEFIABLE	
61 25		16 26 35		(125)	42	SM	@ 25' - very dense, wet, reddish-brown 26' PERCHED (HIGH)	@ 25':Fines= 42%
>100 30		40 50- 5"		(130)	(15)	SM	@ 30' No Recovery	
85 35		35 50		(130)	15	SM	@ 35' - very dense, wet, reddish-brown	@ 35':Fines= 15%

DRILL HOLE LOG

BORING NO. RW-1

PROJECT: Hasley Canyon Land Company, L.L.C. **JOB NO.:** 98-1617-4
T.T. 52584 **DATE:**
DRILLING COMPANY/DRILLER: Valley Well
METHOD OF DRILLING: Rotary Wash - 5 1/4"
HAMMER TYPE: Down Hole **DRIVING WEIGHT (lbs.):** 140 lbs.
AVERAGE DROP (in.): 30" **HOLE DIAMETER (in.):**
ELEVATION: 1223 **LOGGED BY:** DGG/BC

DEPTH (feet)	SAMPLE TYPE	BLOWS / 6"	GRAPHIC LOG	DRY DENSITY (pcf)/ MOISTURE CONTENT (%) γt (pcf)	% -200	USCS SYMBOL	Description Soils: description; consistency/density; moisture; color; other Bedrock: color, lithology; hardness; moisture; other	Remarks
40								
40		20 20 20		(125)	14	SM	@ 40' - with gravel, dense	@ 40':Fines= 14%
45								
70		20 50		(130)	11	SW-SM	@ 45' SAND, well graded, with silt; very dense, wet, reddish-brown	@ 45':Fines= 11%
50								
>100		25 50-2"		(130)	15	SM	@ 50' SILTY SAND, with gravel, very dense, wet, reddish-brown TOTAL DEPTH 50 Feet (Elev. 1173) Ground Water @ 26 Feet (Elev. 1197) No Caving	@ 50':Fines= 15%
55								
60								
65								
70								
75								

LIQUEFACTION POTENTIAL AND CYCLIC SETTLEMENT ANALYSIS

PROJECT: TT52584 - HASLEY CANYON

By	EC	Date:	1/29/99	Subject:	Liquefaction and Cyclic Settlement Analysis
Chkd. By		Date		Conditions:	Existing conditions

Sheet No. 1 of 2
Project No. 98-1617-4

CPT No.	RW-1		
Design Earthquake Magnitude =	7.0		
Approx. Distance From Site =		miles/Km.	
Design Peak Horizontal Accel =	0.54	g.	
Ground Surface Elevation =	1223	ft. MSL	
Historic Ground Water Depth=	26	ft. Below Ground Surface (perched)	

Mid-layer Depth (ft)	Elevation (ft. MSL)	Main soil USCS Symbol	Depth Interval (ft) Top	Bottom	Total Unit Wt. (1). (kcf)	Total Stress (ksf)	Effective Stress (ksf)	Cn (2).	Lower-bound SPT Blow Count (blows/ft)	Sampler Type (3).	Sampler Correction Factor (4).	Short Rod Correction Factor (5)	Hammer Correction Factor (6).	(N1)60 (blows/ft) (7).	Percent Fines (%) (8).	Delta-N (9).	Equivalent (N1)60 for Clean Sand	Critical Stress Ratio (10) M=7.5	Critical Stress Ratio (11) M=7.0	Critical Shear Stress (ksf) (12)	Stress Reduction Factor (13).	Induced Shear Stress (ksf) (14)	Theoretical Factor of Safety (15).
2.50	1220.50	SW	0	5.00	0.138	0.345	0.345	2.000	40	Calif.Drive	0.55	0.75	1	33	<5	0	33	Infinite	#VALUE!	#VALUE!	0.9885	0.120	#VALUE!
6.50	1216.50	SW	5	8.00	0.129	0.861	0.861	1.524	77	Calif.Drive	0.55	0.75	1	48	<5	0	48	Infinite	#VALUE!	#VALUE!	0.9705	0.293	#VALUE!
10.50	1212.50	SW	8	13.00	0.129	1.377	1.377	1.205	65	Calif.Drive	0.55	0.75	1	32	<5	0	32	Infinite	#VALUE!	#VALUE!	0.9520	0.460	#VALUE!
16.00	1207.00	SM	13	19.00	0.122	2.048	2.048	0.988	45	SPT	1	1	1	44	23	4	48	Infinite	#VALUE!	#VALUE!	0.9270	0.666	#VALUE!
21.00	1202.00	SM	19	23.00	0.122	2.658	2.658	0.867	50	Calif.Drive	0.55	1	1	24	23	4	28	0.360	0.392	1.043	0.9040	0.843	1.24
			23	50.00																			non-liq

NOTES:
(1)Total unit weight is assumed to be 120 pcf in the absence of lab test results.Other values are actual data from tests.
(2) Cn = SQRT(1/effective stress in tsf) or SQRT(2/eff. stress in ksf); with Cn max=2 & Cn min=0.5 (Chart 1)
(3) SPT = standard split barrel sampler per ASTM D1586.// CALIFORNIA DRIVE = California modified sampler w/3-inch OD and 2.5-inch ID.
(4) Reference: Charts 2(a)(b)
(5) Ref.: Chart 3
(6) Ref.: Chart 4 - Safety Hammer/Drop used: 140 lb/30 inches.
(7)Corrected for overburden pressure, short rods, hammer efficiency, and sampler type.
(8) Laboratory % passing No 200 sieve results are indicated as "lab". Other values shown are assumed.
(9) Increase in N value with increase in fines content of **silty sands** - Chart 5 - Ref: Robertson & Fear (1996))
(10) Ref: Chart 6
(11) A correction factor of >>>> 1.09 was used for the design earthquake magnitude (Ref: Chart 7)
(12) Critical shear stress = critical stress ratio*effective stress.
(13) Ref: Chart 8
(14) Induced shear stress = 0.65 * (amax/g) * total stress * stress reduction factor (rd).
(15) Theoretical Factor of Safety = Critical Shear Stress/Induced shear stress

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LIQUEFACTION POTENTIAL AND CYCLIC SETTLEMENT ANALYSIS

Subject: EARTHQUAKE-INDUCED SETTLEMENT - VTPM 22992
Condition: Existing conditions
CPT No. RW-1
TOTAL SETTLEMENT = 0.07 inches

Settlement of Dry/Moist Soils

Layer Number	Depth Interval (ft) Top	Bottom	Thickness (ft)	Vertical Effective Stress (psf)	(N1)60 (1). (blows/ft)	Gmax (2). (ksf)	Induced Shear Stress (ksf)	Gama.eff*(Geff/Gmax) (3).	Vertical Effective Stress (tsf)	Gama.eff X 100 (4). (%)	Volumetric Strain M = 7.5 (%) (5)	Volumetric Strain M = 7 (%) (6)	2*Volum. Strain M = 7 (%) (7)	Settlement (inches) (8).
1	0	5.00	5.00	345	33	1190	0.120	1.0E-04	0.17	0.01800	0.008	0.0072	0.0144	0.00864
2	5	8.00	3.00	861	48	2136	0.293	1.4E-04	0.43	0.02300	0.0045	0.00405	0.0081	0.00292
3	8	13.00	5.00	1377	32	2361	0.460	1.9E-04	0.69	0.03400	0.015	0.0135	0.027	0.01620
4	13	19.00	6.00	2048	44	3203	0.666	2.1E-04	1.02	0.03500	0.008	0.0072	0.0144	0.01037
5	19	23.00	4.00	2658	24	2965	0.843	2.8E-04	1.33	0.05000	0.04	0.036	0.072	0.03456
SUM														0.07

NOTES:
(1) N1(60)= Nspt corrected for overburden, short rods, hammer efficiency, and sampler type (no correction for fines).
(2) Gmax (ksf) = 20*(N1(60))^0.333*(vertical eff.stress)^0.5
(3) (THAUave/Gmax) (Ref: Tokimatsu and Seed (1987))
(4) Ref.: Chart 9
(5) Ref.: Chart 10
(6) Use Volumetric Strain Ratio (to convert to M=7) >> = 0.90 (Chart 11)
(7) Volumetric strain increase to account for multidirectional effect.
(8) Settlement(in) = 2 * volumetric strain/100 * thickness(ft)*12

Settlement of Saturated Sands (top dry layers are included in above calculations)

Layer Number	Depth Interval (ft) Top	Bottom	Thickness (ft)	Theoretical Factor of Safety (15)above	Equiv. N1(60) (blows/ft) (1).	Cyclic Stress Ratio (induced)	Volumetric Strain (%) (2).	Settlement (inches) (3).
	0	26.00	26.00	~			N/A (dry)	0
	26	50.00	24.00	Non-Liq			0	0
SUM								0.00

NOTES:
(1) Equiv. N1(60) corrected for fines content, overburden, short rods, hammer efficiency, and sampler type
(2) Ref.: Chart 12
(3) Settlement = Volumetric strain * thickness

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Appendix E

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1.0 EVALUATION OF POTENTIAL SEISMIC HAZARDS

1.1 Ground Rupture

1.1.1 Introduction

Review of CDMG Special Publication 42 indicates that the nearest fault designated as an active earthquake fault zone under Alquist-Priolo criteria is the San Gabriel Fault, which is located 3 km northeast of the site. Review of the Los Angeles County Safety Element indicates that the nearest active fault per County criteria is the Holser Fault, which is located approximately 1 kilometer south of the site. No faults, which have been active in the last 11,000 years (Holocene time), are known to traverse the site.

Review of the published maps covering the site by Yeats, et al. (1985), Barrows (1986), Dibblee (1993) and Yerkes and Campbell (1995) indicates that there are no faults on the site, but that there are different interpretations of the bedrock structural geometry underlying the site. Review of Weber (1982) indicates possible faulting on the site along a northeast-trending synclinal fold axis. Owing to the inconsistency in published interpretations of the site geology and possible presence of faulting, a detailed subsurface investigation was completed by this firm to delineate the bedrock structure and evaluate any evidence for faulting.

1.1.2 Geologic Fault Investigation

1.1.2.1 *Background*

Although new faults may well develop during a seismic event, significant ground rupture is generally expected to occur along pre-existing fault breaks. Ground rupture cannot be prevented; therefore, mitigation of the ground rupture hazard involves identifying major faults which exhibit evidence for potential ground rupture in the near future and avoiding construction over their surface traces. Recognition and mapping of these pre-existing, active fault breaks is accomplished by review of published literature, field mapping, evaluation of aerial photo-lineaments, and by excavating appropriate trenches.

1.1.2.2 *Aerial Photograph Analysis*

Review of the aerial photographs referenced at the beginning of this report revealed the presence of four fairly strong photo lineaments on the subject site, two of which trend northwest and two of which trend east-west. No distinct lineation was observed along the syncline trace. No distinct geomorphic features associated with active faulting such as offset drainages, shutter ridges or scarps were observed along any of the photo lineaments or elsewhere on the site.

1.1.2.3 *Subsurface Investigation*

In order to evaluate the observed photo lineaments and possible faulting mapped by Weber, we conducted a detailed subsurface investigation. Our investigation included a total of 220 trenches excavated to a maximum depth of approximately 17 feet including 5,924.5 lineal feet of fault trenches (See Geologic Map). Because the upper 3 to 7 feet of material exposed in our excavations was commonly soil, slopewash or highly weathered bedrock, we commonly used a dozer to remove the upper 3 to 7 feet of material prior to trenching. This allowed the field geologist to observe relatively unweathered bedrock at depth while providing stability for the excavation.

Our subsurface investigation initially concentrated on the observed photo lineaments and fold axis mapped by Weber. No evidence of northwest-trending faulting was observed in our trenches along the northwest-trending photo lineaments on the northwestern portion of the site (see Trenches T-1, T-2, T-7 & T-8). These lineaments are, therefore, apparently the result of other non-tectonic causes, such as changes in lithology.

Trenches T-9, T-10, T-11, T-12, T-23, T-24 and T-155 were excavated across the east-west-trending photo lineaments on the southeastern portion of the site. No faults directly correlating with these lineaments were found. However, a zone of faulting was observed along the northern limb of an anticline. The observed deformation typically consists of strongly sheared, north-dipping mudstone and claystone beds and moderate to low angle faults, which dip primarily to the south. No primary, through-going fault was identified within this zone.

Trenches T-3 and T-8 were excavated across the trace of the northeast-trending syncline mapped by Weber. No evidence of faulting was observed along the fold axis. However, a zone of faulting was observed parallel to the fold in Trenches T-

9, T-10, T-11, T-12, T-23 and T-24 along the southern limb of the syncline. This faulting was observed to dissipate in intensity toward the east. The observed deformation typically consists of strongly sheared, north-dipping mudstone and claystone and silty sandstone beds and moderate to low angle faults, which dip primarily to the north. No primary, through-going fault was identified within this zone.

In summary, a tectonically deformed zone is present on the southern portion of the site along the north-dipping fold limb between the mapped syncline and anticline fold traces. The zone trends roughly east west, parallel to the syncline in the western portion of the site. The main zone of deformation then apparently bends to the southeast on the southeastern portion of the site. No primary, through-going fault was identified within this zone.

1.1.3 Age of Deformation

The faulting observed in our trenches was restricted entirely to the Saugus Formation bedrock. However, in Trench No. T-11 (See Plate XIV) the terrace deposits are apparently warped from horizontal up to 23° adjacent to a strongly sheared, reddish-brown clayey siltstone unit of the Saugus Formation. These terrace deposits are located approximately 80 feet above the adjacent canyon bottom at an elevation of approximately 1325 ft. but the age of these materials is not known with certainty at this time. No evidence of tectonically disturbed alluvium or surficial materials, or distinct evidence of Holocene activity was observed during our investigation.

1.1.4 Building Setback on VTT 52584

A zone of tectonic deformation has been identified on the southern portion of VTT 52584. A Building Setback Zone is recommended and has been delineated which extends a minimum of 50 feet beyond the main zone of deformation and any faults which are considered potential ground rupture hazards (See Geologic/Geotechnical Maps - Plates I, II & III). Local faults observed outside of this zone are considered subsidiary to the main zone and their potential for primary ground rupture is considered low to nonexistent because they do not exhibit evidence of activity, lateral continuity, or significant structure changes. Although no direct evidence of Holocene activity was observed on the site, we have delineated a Building Setback based on the extensive degree of observed deformation, the association with folds which are

oriented consistently with the regional, compressional, tectonic stresses known to be active across the Transverse Ranges, and the observed deformation of Quaternary terrace deposits.

The Building Setback Zone currently traverses the proposed golf course and portions of proposed residential lot nos. 10, 19, 66 and 201 through 206. Structures for human occupancy, as defined in the Alquist-Priolo Act and County Policy, may not be constructed within the Building Setback Zone. The zone of deformation should be geologically observed during future grading activities to verify the fault zone and evaluate any possible shifts in the fault zone resulting from changes in grade. The Building Setback will be designated as a Restricted Use Area on the Final Map. If the site is recorded prior to the completion of grading and any changes are subsequently made to the Building Setback Zone, the changes will have to be recorded by separate instrument.

1.2 Ground Motion

1.2.1 Introduction

Ground motion is generated during an earthquake as two blocks of the earth's crust slip past each other. The intensity of ground motion at a specific site is controlled primarily by the magnitude of the earthquake and the distance from the epicenter and/or ground rupture area. Ground motion generally increases with increasing magnitude and is generally greatest near the epicenter and/or rupture area, and decreases (attenuates) with increasing distance. However, the ground motion measured at a given site is modified by a number of factors including focal depth, proximity to projected or actual fault rupture, fault mechanism, duration of shaking, local geologic structure, source direction of earthquake, underlying earth material characteristics, and topography. All of these factors make it difficult to accurately predict potential ground motions at a given site in the geologically and topographically complex Southern California area.

Current methods used to evaluate future potential ground motions are based on the review of historic earthquakes and statistical distributions of both rupture dimensions and ground motions generated during these earthquakes. Three primary procedures are currently in use to evaluate potential ground motions at a site:

1. Review of ground motions recorded during historic earthquakes
2. Deterministic seismic hazard analysis (DSHA)
3. Probabilistic seismic hazard analysis (PSHA)

Procedure number one involves the use of historically recorded earthquake magnitudes and ground accelerations to estimate accelerations, which have occurred at a given site during known earthquake events. Deterministic analysis (DSHA) utilizes maximum potential magnitude values for each significant fault to estimate maximum potential ground accelerations at a site without reference to a specific time frame. A probabilistic analysis (PSHA) evaluates potential earthquake magnitudes and accelerations based on historic earthquake data and interpreted slip rates for each fault to estimate potential accelerations anticipated within a particular time frame (return period) of interest. Review of Guidelines for Evaluating and Mitigating Seismic Hazards in California (CDMG, 1997a) indicates that potential ground motion should be evaluated using simple prescribed parameter values derived from published State maps (Petersen, et al., 1996; SHMA Quadrangle Maps) or by site specific probabilistic or deterministic analyses. Because the guidelines state that published maps are not recommended for sites located very near to seismic sources, site specific analyses have been completed for our evaluation of the site.

1.2.2 Earthquake Magnitude

Earthquake **magnitude** is a quantitative measure of the strength of an earthquake or the strain energy released by it, as determined by seismographic or geologic observations. It does not vary with distance or the underlying earth material. This differs from **intensity**, which is a qualitative measure of the effects a given earthquake has on people, structures, loose objects, and the ground at a specific location. Intensity generally increases with increasing magnitude and in areas underlain by unconsolidated materials, and decreases with distance from the epicenter. **Figure E-2** gives the 1956 version of the Modified Mercalli intensity scale and the approximate magnitude necessary to generate the effects.

In the past, potential ground motions were evaluated using the maximum credible earthquake magnitude for critical facilities and the maximum probable earthquake magnitude for standard developments based on CDMG Note 43. However, current CDMG Guidelines, Building Code Requirements, and County policies now use revised terminology. CDMG guidelines suggest that a Maximum Magnitude be

estimated for each significant fault based on a maximum rupture size-to-magnitude relationship for use in deterministic analyses. In this report, maximum potential earthquake magnitudes for significant nearby faults to the site have been derived from Petersen et al. (1996) which utilizes historic displacements per event or the rupture area-to-magnitude relationships of Wells and Coppersmith (1994) to determine maximum moment magnitudes values. The maximum magnitude for each fault (AMMAX) along with the minimum potentially damaging earthquake (AMMIN) are input parameters for probabilistic seismic hazard analysis.

Review of the 1996 Los Angeles County Building Code (LACBC), which adopts portions of the 1994 Uniform Building Code (UBC), indicates that ground motions with a 10% chance of exceedance in 50 years should be utilized as a minimum to evaluate standard occupancy developments. The earthquake which generates this level of ground motion is defined in Section 1651 of the Code as the Design Basis Earthquake. The LACBC defines the Maximum Capable Earthquake as the maximum level of ground shaking which may ever be expected at the building site within the known geologic framework. In Seismic Zones 3 and 4, this intensity may be taken as the level of earthquake ground motion that has a 10% probability of being exceeded in a 100-year period. This level of ground motion is also designated as the upper-bound earthquake and is commonly used in the evaluation of school and hospital facilities (1995 California Building Code, Section 1629A.2).

1.2.3 Ground Acceleration

Ground motion is typically reported with respect to the acceleration of gravity in units of g. Maximum, peak amplitudes in two perpendicular horizontal directions and the vertical axis are typically recorded during historic earthquakes on accelerograms. Site specific evaluation of potential ground motions requires the use of an attenuation relationship to estimate how ground acceleration will dissipate with increasing distance from the source. The attenuation relationships of Boore et al. (1993a) for a random horizontal component, which includes modified coefficients to differentiate strike-slip from dip-slip faults (Blake, 1995a), has been utilized in this report. This is also one of the relationships used by Petersen et al. (1996).

It should be emphasized that the ground acceleration values presented in our report are based on simplified curves of fault rupture area to magnitude, and ground motion attenuation relationships which represent averages of highly variable data measured

during historic earthquakes. Predicted accelerations should be considered rough estimates rather than precise facts and, therefore, ground accelerations at the subject site from future seismic events may exceed the predicted accelerations. Due to the dip-slip nature of most of the faults in Southern California, vertical accelerations may equal horizontal accelerations. Ground motions may originate from virtually any direction due to the presence of major faults in all directions from the site.

1.2.4 Seismic Analysis - VTT 52584

1.2.4.1 *Site Conditions*

The elevated portions of the subject site are underlain primarily by bedrock of the Saugus Formation and local terrace deposits. The larger tributary canyons on the eastern and southern margins of the site are underlain by Quaternary Alluvium as illustrated on the attached Geologic/Geotechnical Maps (Plates I, II & III). The alluvium underlying the site typically consists of interbeds of silts, sands, and silty gravelly sands, and local gravels at depth. These alluvial materials have an average shear wave velocity of approximately 280 m/s which correlates with Site Class C of Boore et al. (1993a).

1.2.4.2 *Maximum Historic Accelerations*

In order to provide a rough estimate of maximum ground motions which have occurred at the site from known, historic earthquakes, a site specific analysis using the computer program EQSEARCH (Version 2.2) by Thomas F. Blake was completed. This program utilizes a data base file that contains data on approximately 6000 events greater than magnitude 4 which have occurred in California between 1800 and 1995. This data was extracted primarily from the CDMG computerized earthquake catalog, Townley and Allen (1939) and the U.S. Geological Survey's Earthquake Data Base System. The attenuation relationship of Boore et al. (1993a) with a random horizontal component and a Site Class C was used to estimate the dissipation of ground motion from the epicenter to the subject site.

Table E-I summarizes the input parameters and a listing of earthquakes of magnitude 5 or greater which have occurred within 50 miles of the site, and the estimated ground motions produced at the site from each event. A map

illustrating the location of these historic earthquakes was prepared for reference using the Grapher program (**See Figure E-3**). The largest historic acceleration indicated by EQSEARCH for the alluvium at the site is 0.17 g from the 1971 San Fernando Earthquake. However, because the rupture area of the 1994 Northridge Earthquake extended substantially north of the epicenter and closer to the site, the contour map of accelerations for bedrock and soil sites prepared by Stewart et al. (1994) for the Northridge Earthquake was consulted. This map indicates that the alluvium at the site probably experienced ground accelerations of approximately 0.34 g during the Northridge Earthquake (**Figure E-4**).

1.2.4.3 *Deterministic Seismic Hazard Analysis*

A deterministic seismic hazard analysis has been completed for the site utilizing the computer program EQFAULT (Version 2.2) by Thomas F. Blake. Maximum Magnitude Values have been derived from Petersen, et al. (1996) and the relationships of Boore et al. (1993a) for Site Class C with a random horizontal component have been used to estimate ground motion attenuation. Site-fault distances of significant faults (**See Figure E-5**) have been derived as specified by Boore et al. (1993a). Parameters used in our deterministic analysis and a list of Maximum Magnitudes and estimated ground accelerations for faults within 50 miles of the site are summarized in **Table E-II**. The maximum deterministic ground acceleration estimated for alluvium at the site is 0.54 g, which would be generated by a 7.0 magnitude event on the San Gabriel Fault. It is our understanding that the Geology Section of the Los Angeles County Department of Public Works prefers the deterministic method for estimating potential site specific ground accelerations.

1.2.4.4 *Probabilistic Seismic Hazard Analysis*

As described in Sections 1804.5 and 1629.2 in the 1996 LACBC and Chapter 4 of the CDMG Guidelines, the potential for liquefaction and soil strength loss has been evaluated for a site peak acceleration that has a 10% probability of being exceeded in 50 years (Design Basis Earthquake). In order to provide a site specific, probabilistic seismic hazard analysis for the proposed development, the computer program FRISKSP (Version 3.0) by Thomas F. Blake was utilized. The site was evaluated using the attenuation relationships of Boore et al. (1993a) for a

Site Class C with a random horizontal component. Additional parameters for this analysis are provided on the first two pages of **Table E-III**.

The dominant faults controlling maximum potential ground accelerations at the site include the San Gabriel, Santa Susana and Holser Faults (**see Table E-III** for Summaries of Significant Faults). Site-fault distances based on the nearest surface projection of the fault rupture area per Boore et al. (1993a) for faults within 50 km of the site are summarized at the end of **Table E-III**. Maximum magnitudes and slip rates for the significant faults have been derived from Petersen et al. (1996) where available. It should be noted that slip rates for most faults are poorly constrained. The peak ground acceleration with a 10% probability of exceedance in 50 years (design basis acceleration) was calculated to be 0.47 g for the alluvial portions of the site. Graphic plots illustrating the probability of exceedance vs. acceleration and the average return period vs. acceleration have been created using the Grapher program and are included for reference in (see **Figures E-6 & E-7**).

1.2.5 Summary

The peak horizontal ground acceleration value used in our liquefaction analysis was 0.54 g from a 7.0 maximum magnitude earthquake on the San Gabriel Fault based on our deterministic evaluation of the site.

Although research on earthquakes during the last forty years has greatly enhanced the level of understanding of earthquake faulting in California, the record is much too short to constrain behavior of all faults in Southern California and the attenuation characteristics of all areas relative to each future potential earthquakes. Predicted accelerations should, therefore, be considered **rough estimates** rather than precise facts and ground motions from future earthquakes may exceed the predicted accelerations. Neither the **Time, Location, nor Magnitude** of an earthquake can be accurately predicted at this time.

The proposed development is located in Southern California, which is in a geologically and seismically active region where large magnitude, potentially destructive earthquakes are common. Therefore, it is reasonable to assume that moderate or large magnitude earthquakes will affect the site during the life of a given structure. The current standards for construction provided in the Los Angeles County

Building Code are designed to safeguard against **major failures** and **loss of life**, but are **not intended** to **limit damage**, **maintain functions or** provide for **easy repair**. Conformance to these recommendations does not constitute any kind of guarantee or assurance that significant structural damage will not occur in the event of a maximum level of earthquake ground motion. However, it is reasonable to expect that a well-planned and constructed structure will not collapse in a major earthquake and that protection of life is reasonably provided, but not with complete assurance.

1.3 Ground Failure

Ground failure is a general term describing seismically induced secondary permanent ground deformation caused by strong ground motion. This includes liquefaction, lateral spreading, seismic settlement of poorly consolidated materials (dynamic densification), differential materials response, slope failures, sympathetic movement on weak bedding planes or non-causative faults, shattered ridge effects and ground lurching.

A seismic hazards map for the Val Verde Quadrangle has not been released yet. However, the potential for liquefaction and lateral spreading on VTT 52584 has been evaluated based on subsurface rotary wash and hollow stem auger boring data, review of historic high ground water levels at the site, and potential peak horizontal ground accelerations estimated in our deterministic evaluation. The potential for seismic settlement (dynamic densification) during future seismic events has also been evaluated (**see Appendix D**).

Differential materials response refers to the different responses various materials display when subjected to seismic waves. Where materials with different densities or strengths are in contact, differential response to the seismic energy may cause distress along the contact. The combination of dynamic compaction and differential settlement along with differential materials response is a source of future potential hazard along cut/fill and bedrock/alluvium contacts. It is, therefore, recommended that **transition lots** be **over-excavated 5 feet** to minimize potential adverse impacts.

Earthquake-induced slope failures include activation and reactivation of landslides, rock falls, debris flows and surficial failures. Landslides and surficial failures which may have an adverse impact on VTT 52584 will be mitigated as discussed under the Engineering Geology Section of this report. Natural slopes and proposed cut-slopes which are anticipated to expose unsupported (daylighted) bedding conditions adjacent to the

proposed development have been evaluated for pseudostatic stability and appropriate mitigation has been recommended where necessary (See **Appendix F**). The potential hazard to the proposed development from the seismic activation or reactivation of slope failures is, therefore, considered negligible, provided that our Recommendations and those of the Supervising Civil Engineer are incorporated into the proposed design and implemented during construction.

The specific location of future potential sympathetic movement along weak planes (clay beds and noncausative faults) cannot be reliably predicted on a site specific basis at this time. The portions of VTT 52584 underlain by horizontally bedded Quaternary Alluvium are not subject to bedding plane slippage. Overexcavation of clay-rich bedding planes of the Saugus Formation and subsequent placement of a certified fill cap has been recommended to mitigate potential hazards from expansive material, and this certified fill will also reduce potential hazards from potential secondary seismogenic movement along bedding planes or noncausative faults.

VTT 52584 is traversed by syncline near the center of the tract and an anticline located at the southern portion of the site. Current research suggests the possibility of significant seismic activity associated with folding (Stein and Yeats, 1989). Tightening of folds during regional compression and anticlinal folding above blind thrust faults could potentially cause ground surface distress as was noted during the Coalinga, Whittier Narrows and Northridge Earthquakes. Distress may involve uplift and tensional cracking, tilting, and/or flexural slip along bedding. However, it is not currently feasible to evaluate potential deformation associated with coseismic folding on a site-specific basis.

The existing narrow ridge line areas on the portions of the subject site proposed for development will be lowered during the proposed grading to create flat pad areas. The potential hazard to the building sites from shattered ridge effects is, therefore, considered negligible.

Appendix E

Summary Table of EQSEARCH Parameters and Output	Table E-1
Summary Table of EQFAULT Parameters and Output	Table E-II
Summary Table of FRISKSP Parameters and Output	Table E-III
Fault and Earthquake Epicenter Location Map	Figure E-1
Modified Mercalli Scale, 1956 Version	Figure E-2
Historic Earthquakes, 1800-1995 (EQSEARCH)	Figure E-3
Contours of Maximum Acceleration - Northridge Earthquake (Stewart, et al., 1994)	Figure E-4
California Fault Map (EQFAULT)	Figure E-5
Probability of Exceedance vs. Acceleration (FRISKSP)	Figure E-6
Average Return Period vs. Acceleration (FRISKSP)	Figure E-7

TABLE E-I

```
*************************************
*                                   *
*           E Q S E A R C H         *
*                                   *
*              Ver. 2.20            *
*                                   *
*                                   *
*************************************
```

(Estimation of Peak Horizontal Acceleration
From California Earthquake Catalogs)

SEARCH PERFORMED FOR: Palmer Investments

DATE: Tuesday, July 14, 1998

JOB NUMBER: 98-1617-4

JOB NAME: Hasley Canyon Golf Course/Residential

SITE COORDINATES:
LATITUDE: 34.457 N
LONGITUDE: 118.633 W

TYPE OF SEARCH: RADIUS
SEARCH RADIUS: 50 mi

SEARCH MAGNITUDES: 5.0 TO 9.0

SEARCH DATES: 1800 TO 1995

ATTENUATION RELATION: 3) Boore et al. (1993a) Horiz. - Random - Site Class C

UNCERTAINTY (M=Mean, S=Mean+1-Sigma): M

SCOND: 0

FAULT TYPE ASSUMED (DS=Reverse, SS=Strike-Slip): DS

COMPUTE PEAK HORIZONTAL ACCELERATION

EARTHQUAKE-DATA FILE USED: ALLQUAKE.DAT

TIME PERIOD OF EXPOSURE FOR STATISTICAL COMPARISON: 475 years

SOURCE OF DEPTH VALUES (A=Attenuation File, E=Earthquake Catalog): A

FILE CODE	LAT. NORTH	LONG. WEST	DATE	TIME (GMT) H M Sec	DEPTH (km)	QUAKE MAG.	SITE ACC. g	SITE MM INT.	APPROX. DISTANCE mi [km]
T-A	34.000	118.250	9/23/1827	0 0 0.0	5.6	5.00	0.038	V	38 [62]
DMG	34.000	119.000	9/24/1827	4 0 0.0	5.6	7.00	0.109	VII	38 [61]
T-A	34.830	118.750	11/27/1852	0 0 0.0	5.6	7.00	0.144	VIII	27 [43]
MGI	34.100	118.100	7/11/1855	415 0.0	5.6	6.30	0.074	VII	39 [63]
T-A	34.000	118.250	1/10/1856	0 0 0.0	5.6	5.00	0.038	V	38 [62]
T-A	34.920	118.920	1/20/1857	0 0 0.0	5.6	5.00	0.040	V	36 [58]
T-A	34.920	118.920	5/23/1857	0 0 0.0	5.6	5.00	0.040	V	36 [58]
T-A	34.000	118.250	3/26/1860	0 0 0.0	5.6	5.00	0.038	V	38 [62]
DMG	34.800	119.100	9/ 5/1883	1230 0.0	5.6	6.00	0.068	VI	36 [57]
DMG	34.200	117.900	8/28/1889	215 0.0	5.6	5.50	0.043	VI	45 [73]
DMG	34.300	118.600	4/ 4/1893	1940 0.0	5.6	6.00	0.163	VIII	11 [18]
MGI	34.000	118.000	12/25/1903	1745 0.0	5.6	5.00	0.032	V	48 [77]
MGI	34.000	118.300	9/ 3/1905	540 0.0	5.6	5.30	0.046	VI	37 [59]
MGI	34.000	119.000	12/14/1912	0 0 0.0	5.6	5.70	0.055	VI	38 [61]
DMG	34.900	118.900	10/23/1916	244 0.0	5.6	6.00	0.070	VI	34 [55]
DMG	34.700	119.000	10/23/1916	254 0.0	5.6	5.50	0.065	VI	27 [43]
MGI	34.000	118.500	11/19/1918	2018 0.0	5.6	5.00	0.043	VI	32 [52]
DMG	35.000	119.000	2/16/1919	1557 0.0	5.6	5.00	0.035	V	43 [69]
MGI	34.080	118.260	7/16/1920	18 8 0.0	5.6	5.00	0.042	VI	34 [54]
DMG	34.500	119.500	6/29/1926	2321 0.0	5.6	5.50	0.040	V	49 [80]
DMG	34.000	118.500	8/ 4/1927	1224 0.0	5.6	5.00	0.043	VI	32 [52]
DMG	34.500	119.500	8/ 5/1930	1125 0.0	5.6	5.00	0.031	V	49 [80]
DMG	33.950	118.632	8/31/1930	04036.0	5.6	5.20	0.045	VI	35 [56]
DMG	33.850	118.267	3/11/1933	1425 0.0	5.6	5.00	0.032	V	47 [75]
DMG	34.867	118.933	9/21/1941	1953 7.2	5.6	5.20	0.047	VI	33 [53]
DMG	35.000	119.017	7/21/1952	115214.0	5.6	7.70	0.142	VIII	43 [70]
DMG	35.000	119.033	7/21/1952	12 2 0.0	5.6	5.60	0.047	VI	44 [71]
DMG	35.000	119.000	7/21/1952	12 531.0	5.6	6.40	0.072	VII	43 [69]
DMG	34.950	118.867	7/21/1952	121936.0	5.6	5.30	0.046	VI	37 [59]
DMG	35.133	118.767	7/21/1952	194122.0	5.6	5.50	0.042	VI	47 [76]
DMG	35.000	118.833	7/23/1952	75319.0	5.6	5.40	0.046	VI	39 [63]
DMG	35.000	118.833	7/23/1952	181351.0	5.6	5.20	0.041	V	39 [63]
DMG	34.900	118.950	8/ 1/1952	13 430.0	5.6	5.10	0.042	VI	35 [57]
DMG	34.519	118.198	8/23/1952	10 9 7.1	5.6	5.00	0.052	VI	25 [40]
DMG	35.000	119.017	1/12/1954	233349.0	5.6	5.90	0.055	VI	43 [70]
DMG	35.150	118.633	1/27/1954	141948.0	5.6	5.00	0.032	V	48 [77]
DMG	34.983	118.983	5/23/1954	235243.0	5.6	5.10	0.037	V	41 [67]
DMG	34.941	118.987	11/15/1961	53855.5	5.6	5.00	0.037	V	39 [63]
DMG	34.932	118.976	3/ 1/1963	02557.9	5.6	5.00	0.038	V	38 [61]
DMG	34.411	118.401	2/ 9/1971	14 041.8	5.6	6.40	0.173	VIII	14 [22]
DMG	34.411	118.401	2/ 9/1971	14 1 8.0	5.6	5.80	0.126	VIII	14 [22]
DMG	34.411	118.401	2/ 9/1971	14 244.0	5.6	5.80	0.126	VIII	14 [22]
DMG	34.411	118.401	2/ 9/1971	141028.0	5.6	5.30	0.097	VII	14 [22]
DMG	34.308	118.454	2/ 9/1971	144346.7	5.6	5.20	0.088	VII	14 [23]
DMG	34.065	119.035	2/21/1973	144557.3	5.6	5.90	0.064	VI	35 [57]
PAS	33.944	118.681	1/ 1/1979	231438.9	5.6	5.00	0.040	V	36 [57]
PAS	34.061	118.079	10/ 1/1987	144220.0	5.6	5.90	0.057	VI	42 [67]
PAS	34.073	118.098	10/ 4/1987	105938.2	5.6	5.30	0.042	VI	40 [65]
PAS	34.943	118.743	6/10/1988	23 643.0	5.6	5.40	0.051	VI	34 [55]
PAS	33.919	118.627	1/19/1989	65328.8	5.6	5.00	0.039	V	37 [60]
GSP	34.262	118.002	6/28/1991	144354.5	5.6	5.40	0.047	VI	38 [62]
GSP	34.213	118.537	1/17/1994	123055.4	5.6	6.70	0.167	VIII	18 [29]
GSB	34.301	118.565	1/17/1994	204602.4	5.6	5.20	0.104	VII	11 [18]
GSP	34.326	118.698	1/17/1994	233330.7	5.6	5.60	0.144	VIII	10 [16]
GSP	34.377	118.698	1/18/1994	004308.9	5.6	5.20	0.150	VIII	7 [11]
GSB	34.379	118.711	1/19/1994	210928.6	5.6	5.50	0.170	VIII	7 [11]
GSP	34.378	118.618	1/19/1994	211144.9	5.6	5.10	0.158	VIII	6 [9]
GSP	34.305	118.579	1/29/1994	112036.0	5.6	5.10	0.102	VII	11 [18]

FILE CODE	LAT. NORTH	LONG. WEST	DATE	TIME (GMT) H M Sec	DEPTH (km)	QUAKE MAG.	SITE ACC. g	SITE MM INT.	APPROX. DISTANCE mi [km]
GSP	34.231	118.475	3/20/1994	212012.3	5.6	5.30	0.079	VII	18 [29]
GSP	34.394	118.669	6/26/1995	084028.9	5.6	5.00	0.162	VIII	5 [8]

****

-END OF SEARCH- 60 RECORDS FOUND

COMPUTER TIME REQUIRED FOR EARTHQUAKE SEARCH: 0.1 minutes

MAXIMUM SITE ACCELERATION DURING TIME PERIOD 1800 TO 1995: 0.173g

MAXIMUM SITE INTENSITY (MM) DURING TIME PERIOD 1800 TO 1995: VIII

MAXIMUM MAGNITUDE ENCOUNTERED IN SEARCH: 7.70

NEAREST HISTORICAL EARTHQUAKE WAS ABOUT 5 MILES AWAY FROM SITE.

NUMBER OF YEARS REPRESENTED BY SEARCH: 196 years

RESULTS OF PROBABILITY ANALYSES

TIME PERIOD OF SEARCH: 1800 TO 1995
LENGTH OF SEARCH TIME: 196 years
ATTENUATION RELATION: 3) Boore et al. (1993a) Horiz. - Random - Site Class C
*** TIME PERIOD OF EXPOSURE FOR PROBABILITY: 475 years

PROBABILITY OF EXCEEDANCE FOR ACCELERATION

ACC. g	NO.OF TIMES EXCED	AVE. OCCUR. #/yr	RECURR. INTERV. years	COMPUTED PROBABILITY OF EXCEEDANCE in 0.5 yr	in 1 yr	in 10 yr	in 50 yr	in 75 yr	in 100 yr	in *** yr
0.01	60	0.306	3.267	0.1419	0.2637	0.9532	1.0000	1.0000	1.0000	1.0000
0.02	60	0.306	3.267	0.1419	0.2637	0.9532	1.0000	1.0000	1.0000	1.0000
0.03	60	0.306	3.267	0.1419	0.2637	0.9532	1.0000	1.0000	1.0000	1.0000
0.04	46	0.235	4.261	0.1107	0.2092	0.9043	1.0000	1.0000	1.0000	1.0000
0.05	29	0.148	6.759	0.0713	0.1375	0.7723	0.9994	1.0000	1.0000	1.0000
0.06	24	0.122	8.167	0.0594	0.1152	0.7061	0.9978	0.9999	1.0000	1.0000
0.07	20	0.102	9.800	0.0497	0.0970	0.6396	0.9939	0.9995	1.0000	1.0000
0.08	17	0.087	11.529	0.0424	0.0831	0.5799	0.9869	0.9985	0.9998	1.0000
0.09	16	0.082	12.250	0.0400	0.0784	0.5579	0.9831	0.9978	0.9997	1.0000
0.10	15	0.077	13.067	0.0375	0.0737	0.5348	0.9782	0.9968	0.9995	1.0000
0.11	12	0.061	16.333	0.0301	0.0594	0.4579	0.9532	0.9899	0.9978	1.0000
0.12	12	0.061	16.333	0.0301	0.0594	0.4579	0.9532	0.9899	0.9978	1.0000
0.13	10	0.051	19.600	0.0252	0.0497	0.3996	0.9220	0.9782	0.9939	1.0000
0.14	10	0.051	19.600	0.0252	0.0497	0.3996	0.9220	0.9782	0.9939	1.0000
0.15	6	0.031	32.667	0.0152	0.0301	0.2637	0.7836	0.8993	0.9532	1.0000
0.16	5	0.026	39.200	0.0127	0.0252	0.2252	0.7207	0.8524	0.9220	1.0000
0.17	2	0.010	98.000	0.0051	0.0102	0.0970	0.3996	0.5348	0.6396	0.9921

PROBABILITY OF EXCEEDANCE FOR MAGNITUDE

MAG.	NO.OF TIMES EXCED	AVE. OCCUR. #/yr	RECURR. INTERV. years	COMPUTED PROBABILITY OF EXCEEDANCE in 0.5 yr	in 1 yr	in 10 yr	in 50 yr	in 75 yr	in 100 yr	in *** yr
5.00	60	0.306	3.267	0.1419	0.2637	0.9532	1.0000	1.0000	1.0000	1.0000
5.50	23	0.117	8.522	0.0570	0.1107	0.6907	0.9972	0.9998	1.0000	1.0000
6.00	10	0.051	19.600	0.0252	0.0497	0.3996	0.9220	0.9782	0.9939	1.0000
6.50	4	0.020	49.000	0.0102	0.0202	0.1846	0.6396	0.7836	0.8701	0.9999
7.00	3	0.015	65.333	0.0076	0.0152	0.1419	0.5348	0.6827	0.7836	0.9993
7.50	1	0.005	196.000	0.0025	0.0051	0.0497	0.2252	0.3180	0.3996	0.9114

GUTENBERG & RICHTER RECURRENCE RELATIONSHIP:

a-value= 3.368
b-value= 0.778

beta-value= 1.792

TABLE E-II

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*************************************
*                                   *
*           E Q F A U L T           *
*                                   *
*             Ver. 2.20             *
*                                   *
*                                   *
*************************************
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(Estimation of Peak Horizontal Acceleration
From Digitized California Faults)

SEARCH PERFORMED FOR: Palmer Investments

DATE: Tuesday, July 14, 1998

JOB NUMBER: 98-1617-4

JOB NAME: Hasley Canyon Golf Course/Residential

SITE COORDINATES:
LATITUDE: 34.457 N
LONGITUDE: 118.633 W

SEARCH RADIUS: 50 mi

ATTENUATION RELATION: 3) Boore et al. (1993a) Horiz. - Random - Site Class C

UNCERTAINTY (M=Mean, S=Mean+1-Sigma): M

SCOND: 0

COMPUTE PEAK HORIZONTAL ACCELERATION

FAULT-DATA FILE USED: AESFLT.DAT

SOURCE OF DEPTH VALUES (A=Attenuation File, F=Fault Data File): A

DETERMINISTIC SITE PARAMETERS

ABBREVIATED FAULT NAME	APPROX. DISTANCE mi (km)	MAX. MAGNITUDE EVENT MAX. MAG.	PEAK SITE ACC. g	SITE INTENS MM
ANACAPA	36 (58)	7.30	0.134	VIII
ARROYO PARIDA - MORE RANCH	28 (46)	6.70	0.117	VII
BIG PINE	33 (53)	6.70	0.086	VII
CHANNEL IS. THRUST (EAST)	38 (61)	7.40	0.203	VIII
CLAMSHELL-SAWPIT	40 (65)	6.50	0.080	VII
CLEARWATER	11 (17)	7.00	0.284	IX
COMPTON-LOS ALAMITOS	33 (54)	6.80	0.162	VIII
ELYSIAN PARK SEISMIC ZONE	32 (51)	6.70	0.107	VII
FRAZIER MOUNTAIN	25 (41)	6.50	0.114	VII
GARLOCK (West)	29 (47)	7.10	0.115	VII
HOLSER	1 (1)	6.50	0.528	X
MALIBU COAST	30 (47)	6.70	0.113	VII
MID-CHANNEL	45 (72)	7.50	0.125	VII
MONTALVO THRUST	41 (66)	6.60	0.125	VII
NEWPORT-INGLEWOOD (NORTH)	30 (49)	6.90	0.101	VII
NORTHRIDGE HILLS	13 (21)	6.50	0.191	VIII
OAK RIDGE (Eastern Blind)	7 (11)	6.90	0.371	IX
OAK RIDGE (Offshore)	32 (52)	6.90	0.118	VII
OAK RIDGE (Western Onshore	10 (15)	6.90	0.291	IX
OZENA	44 (71)	7.00	0.097	VII
PALOS VERDES HILLS	44 (70)	7.10	0.085	VII
PINE MOUNTAIN	14 (22)	7.00	0.233	IX
PITAS POINT THRUST	40 (65)	6.80	0.141	VIII
PLEITO	35 (56)	7.20	0.130	VIII
RAYMOND	33 (53)	6.50	0.094	VII

DETERMINISTIC SITE PARAMETERS

ABBREVIATED FAULT NAME	APPROX. DISTANCE mi (km)	MAX. MAGNITUDE EVENT MAX. MAG.	PEAK SITE ACC. g	SITE INTENS MM
RED MOUNTAIN	38 (62)	6.80	0.097	VII
SAN ANDREAS (Mojave)	18 (29)	7.80	0.244	IX
SAN CAYETANO (East)	7 (11)	6.80	0.348	IX
SAN CAYETANO (West)	17 (27)	6.80	0.185	VIII
SAN GABRIEL	2 (3)	7.00	0.535	X
SANTA MONICA - HOLLYWOOD	30 (48)	6.40	0.097	VII
SANTA MONICA MTNS. THRUST	26 (41)	6.60	0.179	VIII
SANTA SUSANA	3 (4)	6.60	0.477	X
SANTA YNEZ (East)	17 (28)	7.00	0.164	VIII
SIERRA MADRE-SAN FERNANDO	15 (24)	6.70	0.189	VIII
SIMI - SANTA ROSA	10 (17)	6.70	0.244	IX
VENTURA - PITAS POINT	33 (54)	6.80	0.109	VII
VERDUGO	17 (28)	6.70	0.170	VIII
WHITE WOLF	44 (70)	7.20	0.109	VII
WHITTIER - NORTH ELSINORE	35 (56)	6.80	0.086	VII
WILSHIRE ARCH	31 (50)	5.70	0.096	VII

-END OF SEARCH- 41 FAULTS FOUND WITHIN THE SPECIFIED SEARCH RADIUS.

THE HOLSER FAULT IS CLOSEST TO THE SITE.
IT IS ABOUT 0.9 MILES AWAY.

LARGEST MAXIMUM-MAGNITUDE SITE ACCELERATION: 0.535 g

TABLE E-III

```
*****************************************
*                                       *
*        FRISKSP - IBM-PC VERSION       *
*                                       *
*  Modified from *FRISK* (McGuire 1978) *
*   To Perform Probabilistic Earthquake *
*  Hazard Analyses Using Multiple Forms *
* of Ground-Motion-Attenuation Relations *
*                                       *
*   Modifications by:  Thomas F. Blake  *
*             - 1988-1996 -             *
*                                       *
*         Serial No. FRSP183.301a       *
* Licensed to: ALLAN SEWARD ENG. GEOLOGY *
*****************************************
```

ANALYSIS PERFORMED FOR: Palmer Investments

JOB NO: 98-1617-4

TITLE: VTT 52584 - Final Run

IPR_FILE
 0

IPLOT
 0

SITE CONDITION
  .00

BASEMENT DEPTH (km)
  .00

RHGA FACTOR	RHGA DIST (km)
1.000	.000

NFLT	NSITE	NPROB	NATT	LCD
22	1	2	4	1

ATT	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14
1	-.1360	.2290	.0000	-.7780	.0000	.2510	5.5700	.0000	.0000	.0000	.0000	.0000	.0000	.0000
ATT	C15	C16	C17	C18	C19	C20	C21	C22	C23	PER	DSMIN	SIGA	IRELAF	ICHK
1	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0010	3	0

ATT	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14
2	-.0510	.2290	.0000	-.7780	.0000	.2510	5.5700	.0000	.0000	.0000	.0000	.0000	.0000	.0000
ATT	C15	C16	C17	C18	C19	C20	C21	C22	C23	PER	DSMIN	SIGA	IRELAF	ICHK
2	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0010	3	0

ATT	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14
3	-.1360	.2290	.0000	-.7780	.0000	.2510	5.5700	.0000	.0000	.0000	.0000	.0000	.0000	.0000
ATT	C15	C16	C17	C18	C19	C20	C21	C22	C23	PER	DSMIN	SIGA	IRELAF	ICHK
3	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.5200	3	0

ATT	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14
4	-.0510	.2290	.0000	-.7780	.0000	.2510	5.5700	.0000	.0000	.0000	.0000	.0000	.0000	.0000
ATT	C15	C16	C17	C18	C19	C20	C21	C22	C23	PER	DSMIN	SIGA	IRELAF	ICHK
4	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.5200	3	0

PROBLEM DATA:

BOORE ET AL. (1993a) RND. M - C AMPLITUDES:

20	.050	.100	.150	.200	.250	.300	.350	.400	.420	.440
	.460	.480	.500	.520	.540	.560	.580	.600	.620	.640

MAGNITUDE WEIGHTING FACTORS: MWF: 0 MWF MAGNITUDE: .00

RISKS SPECIFIED:

5	.013900	.010000	.005000	.002105	.001000

SITE COORDINATES:

1	-118.6330	34.4570

FAULT INFORMATION:

FAULT 1

FAULT NAME: HOLSER

NFP	NRL	ATTENUATION CODES:	
6	10	2	4

AMMIN	AMSTEP	IRATE	RATE	BETA	ECTR	ECDP	COEF
5.000	.1000	1	.4000	2.072	.900	2.000	1.000

NMAX	AMMAX	PMAX
1	6.50	1.00

```
  dmchar ampchar dmpchar
     .50    6.00    1.00

Slip Rate (   .4000 mm/yr) Converted to Activity Rate:
Input Shear Modulus - dyne/cm**2
.330E+12
Input Fault Area    - cm**2
.340E+13
LOG10[Mo(m)]        = (1.50)m + (16.05)
  IMAX   AMMAX    PMAX     ARATE = EX-RATE + CH-RATE
     1  6.5000  1.0000    .00258    .00118    .00140

IND_RL
     2

RUPTURE AREA VS. MAGNITUDE  A_RA      B_RA    SIG_RA  -3.490      .910      .240

FAULT SEGMENT COORDINATES
 1    -118.7510   34.4320
 2    -118.7080   34.4400
 3    -118.6760   34.4490
 4    -118.6250   34.4420
 5    -118.5850   34.4280
 6    -118.5610   34.4140

NDP
  2
ORIGINAL FAULT CROSS SECTION
 1        .0000     .0000
 2       8.7000   15.0000

Computed Total Fault Area =  .26E+03
-------------------------------------------------------------------------------
FAULT  2

FAULT NAME:  SAN GABRIEL

NFP    NRL   ATTENUATION CODES:
12     10      1  3

AMMIN   AMSTEP  IRATE    RATE   BETA   ECTR   ECDP   COEF
5.000    .1000      1  1.0000  2.072  5.000  2.000  1.000

NMAX AMMAX  PMAX
 1    7.00  1.00

  dmchar ampchar dmpchar
     .50    6.50    1.00

Slip Rate (  1.0000 mm/yr) Converted to Activity Rate:
```

```
Input Shear Modulus - dyne/cm**2
.330E+12
Input Fault Area    - cm**2
.150E+14
LOG10[Mo(m)]        = (1.50)m + (16.05)
  IMAX   AMMAX    PMAX     ARATE = EX-RATE + CH-RATE
     1  7.0000  1.0000    .00987    .00713    .00274

IND_RL
     2

RUPTURE AREA VS. MAGNITUDE  A_RA      B_RA    SIG_RA  -3.490      .910      .240

FAULT SEGMENT COORDINATES
 1    -118.9110   34.7600
 2    -118.8560   34.6930
 3    -118.8030   34.6430
 4    -118.7490   34.5930
 5    -118.6670   34.5220
 6    -118.5930   34.4580
 7    -118.5420   34.4240
 8    -118.4280   34.3640
 9    -118.3060   34.3230
10    -118.2170   34.2720
11    -118.1430   34.2090
12    -118.0940   34.1840

NDP
  2
ORIGINAL FAULT CROSS SECTION
 1        .0000     .0000
 2        .0000   15.0000

Computed Total Fault Area =  .15E+04
-----------------------------------------------------------------------------
FAULT  3

FAULT NAME:  OAK RIDGE (Eastern)

NFP    NRL   ATTENUATION CODES:
 5     10      2  4

AMMIN   AMSTEP  IRATE    RATE   BETA   ECTR   ECDP   COEF
5.000    .1000      1  1.5000  2.072  1.700  2.000  1.000

NMAX AMMAX  PMAX
 1    6.90  1.00

  dmchar ampchar dmpchar
     .50    6.40    1.00
```

```
Slip Rate (  1.5000 mm/yr) Converted to Activity Rate:
Input Shear Modulus - dyne/cm**2
.360E+12
Input Fault Area    - cm**2
.635E+13
LOG10[Mo(m)]        = (1.50)m + (16.05)
  IMAX   AMMAX    PMAX     ARATE = EX-RATE + CH-RATE
     1  6.9000  1.0000    .00829    .00561    .00268

IND_RL
     2

RUPTURE AREA VS. MAGNITUDE  A_RA      B_RA    SIG_RA  -3.490      .910      .240

FAULT SEGMENT COORDINATES
 1    -118.7710   34.3590
 2    -118.7170   34.3670
 3    -118.6810   34.3690
 4    -118.5820   34.3510
 5    -118.4320   34.2800

NDP
  3
ORIGINAL FAULT CROSS SECTION
 1        .0000    3.9900
 2        .0000    4.0000
 3      15.0000   19.0000

Computed Total Fault Area =  .60E+03
-------------------------------------------------------------------------------
FAULT  4

FAULT NAME:  SAN CAYETANO (EAST)

NFP    NRL   ATTENUATION CODES:
 4     10      2  4

AMMIN   AMSTEP  IRATE    RATE   BETA   ECTR   ECDP   COEF
5.000    .1000      1  6.0000  2.072   .800  2.000  1.000

NMAX AMMAX  PMAX
 1    6.80  1.00

  dmchar ampchar dmpchar
     .50    6.30    1.00

Slip Rate (  6.0000 mm/yr) Converted to Activity Rate:
Input Shear Modulus - dyne/cm**2
.330E+12
Input Fault Area    - cm**2
.470E+13
```

```
LOG10[Mo(m)]        = (1.50)m + (16.05)
  IMAX   AMMAX    PMAX     ARATE = EX-RATE + CH-RATE
     1  6.8000  1.0000    .02754    .01724    .01029

IND_RL
     2

RUPTURE AREA VS. MAGNITUDE  A_RA      B_RA    SIG_RA  -3.490      .910      .240

FAULT SEGMENT COORDINATES
 1    -118.7500   34.4240
 2    -118.7690   34.4240
 3    -118.8430   34.3970
 4    -118.9180   34.3970

NDP
  2
ORIGINAL FAULT CROSS SECTION
 1        .0000     .0000
 2      23.8000   20.0000

Computed Total Fault Area =  .50E+03
-------------------------------------------------------------------------------
FAULT  5

FAULT NAME:  SANTA SUSANA

NFP    NRL   ATTENUATION CODES:
 6     10      2  4

AMMIN   AMSTEP  IRATE    RATE   BETA   ECTR   ECDP   COEF
5.000    .1000      1  5.0000  2.072  1.600  2.000  1.000

NMAX AMMAX  PMAX
 1    6.60  1.00

  dmchar ampchar dmpchar
     .50    6.10    1.00

Slip Rate (  5.0000 mm/yr) Converted to Activity Rate:
Input Shear Modulus - dyne/cm**2
.330E+12
Input Fault Area    - cm**2
.545E+13
LOG10[Mo(m)]        = (1.50)m + (16.05)

  IMAX   AMMAX    PMAX     ARATE = EX-RATE + CH-RATE
     1  6.6000  1.0000    .04099    .02115    .01984

IND_RL
     2
```

```
RUPTURE AREA VS. MAGNITUDE  A_RA      B_RA    SIG_RA  -3.490      .910      .240

FAULT SEGMENT COORDINATES
 1    -118.4450   34.3300
 2    -118.4700   34.3340
 3    -118.5360   34.2990
 4    -118.6980   34.3470
 5    -118.7560   34.3590
 6    -118.7690   34.3570

NDP
  2
ORIGINAL FAULT CROSS SECTION
 1        .0000     .0000
 2       9.2000   16.0000

Computed Total Fault Area =  .62E+03
-------------------------------------------------------------------------------
FAULT  6

FAULT NAME:  OAK RIDGE (Western)

NFP    NRL   ATTENUATION CODES:
 6     10      2  4

AMMIN   AMSTEP  IRATE    RATE   BETA   ECTR   ECDP   COEF
5.000    .1000      1  4.0000  2.072  1.800  2.000  1.000

NMAX AMMAX  PMAX
 1    6.90  1.00

  dmchar ampchar dmpchar
     .50    6.40    1.00

Slip Rate (  4.0000 mm/yr) Converted to Activity Rate:
Input Shear Modulus - dyne/cm**2
.330E+12
Input Fault Area    - cm**2
.730E+13
LOG10[Mo(m)]        = (1.50)m + (16.05)
  IMAX   AMMAX    PMAX     ARATE = EX-RATE + CH-RATE
     1  6.9000  1.0000    .02331    .01576    .00754

IND_RL
     2

RUPTURE AREA VS. MAGNITUDE  A_RA      B_RA    SIG_RA  -3.490      .910      .240

FAULT SEGMENT COORDINATES
 1    -119.1380   34.2790
```

```
 2    -119.1270   34.2820
 3    -119.0460   34.3540
 4    -118.9830   34.3560
 5    -118.9030   34.3780
 6    -118.7800   34.3910

NDP
  2
ORIGINAL FAULT CROSS SECTION
 1        .0000     .0000
 2      14.0000   20.0000

Computed Total Fault Area =  .86E+03
-------------------------------------------------------------------------------
FAULT  7

FAULT NAME:  SIMI-SANTA ROSA

NFP    NRL   ATTENUATION CODES:
 6     10      2  4

AMMIN   AMSTEP  IRATE    RATE   BETA   ECTR   ECDP   COEF
5.000    .1000      1  1.0000  2.072  2.200  2.000  1.000

NMAX AMMAX  PMAX
 1    6.70  1.00

  dmchar ampchar dmpchar
     .50    6.20    1.00

Slip Rate (  1.0000 mm/yr) Converted to Activity Rate:
Input Shear Modulus - dyne/cm**2
.330E+12
Input Fault Area    - cm**2
.765E+13
LOG10[Mo(m)]        = (1.50)m + (16.05)
  IMAX   AMMAX    PMAX     ARATE = EX-RATE + CH-RATE
     1  6.7000  1.0000    .00923    .00528    .00394

IND_RL
     2

RUPTURE AREA VS. MAGNITUDE  A_RA      B_RA    SIG_RA  -3.490      .910      .240

FAULT SEGMENT COORDINATES
 1    -118.6580   34.3060
 2    -118.8690   34.2590
 3    -118.9070   34.2450
 4    -118.9520   34.2470
 5    -119.0150   34.2340
 6    -119.1180   34.2110
```

```
NDP
  2
ORIGINAL FAULT CROSS SECTION
 1        .0000     .0000
 2       6.0000   10.0000

Computed Total Fault Area =  .51E+03
-----------------------------------------------------------------------------
FAULT  8

FAULT NAME:  CLEARWATER

NFP    NRL   ATTENUATION CODES:
 6     10      2  4

AMMIN   AMSTEP  IRATE    RATE   BETA   ECTR   ECDP   COEF
5.000    .1000      1   .0500  2.072  1.600  2.000  1.000

NMAX AMMAX  PMAX
 1    7.00  1.00

  dmchar ampchar dmpchar
     .50    6.50    1.00

Slip Rate (   .0500 mm/yr) Converted to Activity Rate:
Input Shear Modulus - dyne/cm**2
.330E+12
Input Fault Area    - cm**2
.510E+13
LOG10[Mo(m)]        = (1.50)m + (16.05)
  IMAX   AMMAX    PMAX     ARATE = EX-RATE + CH-RATE
     1  7.0000  1.0000    .00017    .00012    .00005

IND_RL
     2

RUPTURE AREA VS. MAGNITUDE  A_RA      B_RA    SIG_RA  -3.490      .910      .240

FAULT SEGMENT COORDINATES
 1    -118.7020   34.6460
 2    -118.6810   34.6430
 3    -118.6400   34.6150
 4    -118.5610   34.6020
 5    -118.4800   34.5860
 6    -118.3700   34.5830

NDP
  2
ORIGINAL FAULT CROSS SECTION
 1        .0000     .0000
```

```
 2      -8.7000   15.0000

Computed Total Fault Area =  .54E+03
-------------------------------------------------------------------------------
FAULT  9

FAULT NAME:  NORTHRIDGE HILLS

NFP    NRL   ATTENUATION CODES:
 3     10      2  4

AMMIN   AMSTEP  IRATE    RATE   BETA   ECTR   ECDP   COEF
5.000    .1000      1   .5000  2.072   .600  2.000  1.000

NMAX AMMAX  PMAX
 1    6.50  1.00

  dmchar ampchar dmpchar
     .50    6.00    1.00

Slip Rate (   .5000 mm/yr) Converted to Activity Rate:
Input Shear Modulus - dyne/cm**2
.330E+12
Input Fault Area    - cm**2
.320E+13
LOG10[Mo(m)]        = (1.50)m + (16.05)
  IMAX   AMMAX    PMAX     ARATE = EX-RATE + CH-RATE
     1  6.5000  1.0000    .00303    .00139    .00165

IND_RL
     2

RUPTURE AREA VS. MAGNITUDE  A_RA      B_RA    SIG_RA  -3.490      .910      .240

FAULT SEGMENT COORDINATES
 1    -118.5950   34.2740
 2    -118.4970   34.2360
 3    -118.4660   34.2330

NDP
  2
ORIGINAL FAULT CROSS SECTION
 1        .0000     .0000
 2      -5.5000   15.0000

Computed Total Fault Area =  .19E+03
-------------------------------------------------------------------------------
FAULT 10

FAULT NAME:  PINE MOUNTAIN
```

```
NFP    NRL   ATTENUATION CODES:
 9     10      2  4

AMMIN   AMSTEP  IRATE    RATE   BETA   ECTR   ECDP   COEF
5.000    .1000      1   .1000  2.072  2.900  2.000  1.000

NMAX AMMAX  PMAX
 1    7.00  1.00

  dmchar ampchar dmpchar
     .50    6.50    1.00

Slip Rate (   .1000 mm/yr) Converted to Activity Rate:
Input Shear Modulus - dyne/cm**2
.330E+12
Input Fault Area    - cm**2
.960E+13
LOG10[Mo(m)]        = (1.50)m + (16.05)
  IMAX   AMMAX    PMAX     ARATE = EX-RATE + CH-RATE
     1  7.0000  1.0000    .00063    .00046    .00018

IND_RL
     2

RUPTURE AREA VS. MAGNITUDE  A_RA      B_RA    SIG_RA  -3.490      .910      .240

FAULT SEGMENT COORDINATES
 1    -119.3880   34.6480
 2    -119.3360   34.6220
 3    -119.2620   34.6050
 4    -119.1830   34.5890
 5    -119.1130   34.5690
 6    -119.0130   34.5720
 7    -118.9460   34.5830
 8    -118.8900   34.6130
 9    -118.7890   34.6140

NDP
  2
ORIGINAL FAULT CROSS SECTION
 1        .0000     .0000
 2     -12.6000   15.0000

Computed Total Fault Area =  .11E+04
-------------------------------------------------------------------------------
FAULT 11

FAULT NAME:  SIERRA MADRE - SAN FERNANDO

NFP    NRL   ATTENUATION CODES:
10     10      2  4
```

```
AMMIN   AMSTEP  IRATE    RATE   BETA   ECTR   ECDP   COEF
5.000    .1000      1  2.0000  2.072  3.900  2.000  1.000

NMAX AMMAX  PMAX
 1    6.70  1.00

  dmchar ampchar dmpchar
     .50    6.20    1.00

Slip Rate (  2.0000 mm/yr) Converted to Activity Rate:
Input Shear Modulus - dyne/cm**2
.330E+12
Input Fault Area    - cm**2
.150E+14
LOG10[Mo(m)]        = (1.50)m + (16.05)
  IMAX   AMMAX    PMAX     ARATE = EX-RATE + CH-RATE
     1  6.7000  1.0000    .03618    .02071    .01546

IND_RL
     2

RUPTURE AREA VS. MAGNITUDE  A_RA      B_RA    SIG_RA  -3.490      .910      .240

FAULT SEGMENT COORDINATES
 1    -117.6520   34.1590
 2    -117.7000   34.1310
 3    -117.7620   34.1250
 4    -117.9130   34.1540
 5    -118.0260   34.1690
 6    -118.1330   34.1980
 7    -118.2310   34.2370
 8    -118.3190   34.2670
 9    -118.3750   34.2880
10    -118.4520   34.3000

NDP
  2
ORIGINAL FAULT CROSS SECTION
 1        .0000     .0000
 2      11.2000   16.0000

Computed Total Fault Area =  .14E+04
-------------------------------------------------------------------------------
FAULT 12

FAULT NAME:  SAN CAYETANO (WEST)

NFP    NRL   ATTENUATION CODES:
 4     10      2  4
```

```
AMMIN   AMSTEP  IRATE    RATE   BETA   ECTR   ECDP   COEF
5.000    .1000      1  6.0000  2.072  1.300  2.000  1.000

NMAX AMMAX  PMAX
 1    6.80  1.00

  dmchar ampchar dmpchar
     .50    6.30    1.00

Slip Rate (  6.0000 mm/yr) Converted to Activity Rate:
Input Shear Modulus - dyne/cm**2
.330E+12
Input Fault Area    - cm**2
.625E+13
LOG10[Mo(m)]        = (1.50)m + (16.05)
  IMAX   AMMAX    PMAX     ARATE = EX-RATE + CH-RATE
     1  6.8000  1.0000    .03662    .02293    .01369

IND_RL
     2

RUPTURE AREA VS. MAGNITUDE  A_RA      B_RA    SIG_RA  -3.490      .910      .240

FAULT SEGMENT COORDINATES
 1    -118.9230   34.4490
 2    -118.9570   34.4490
 3    -119.0180   34.4180
 4    -119.1830   34.4510

NDP
  2

ORIGINAL FAULT CROSS SECTION
 1        .0000     .0000
 2      16.8000   20.0000

Computed Total Fault Area =  .60E+03

-------------------------------------------------------------------------------
FAULT 13

FAULT NAME:  SANTA YNEZ (East)

NFP    NRL   ATTENUATION CODES:
 8     10      1  3

AMMIN   AMSTEP  IRATE    RATE   BETA   ECTR   ECDP   COEF
5.000    .1000      1  2.0000  2.072  4.400  2.000  1.000

NMAX AMMAX  PMAX
 1    7.00  1.00
```

```
  dmchar ampchar dmpchar
     .50    6.50    1.00

Slip Rate (  2.0000 mm/yr) Converted to Activity Rate:
Input Shear Modulus - dyne/cm**2
.330E+12
Input Fault Area    - cm**2
.140E+14
LOG10[Mo(m)]        = (1.50)m + (16.05)
  IMAX   AMMAX    PMAX     ARATE = EX-RATE + CH-RATE
     1  7.0000  1.0000    .01843    .01331    .00512

IND_RL
     2

RUPTURE AREA VS. MAGNITUDE  A_RA      B_RA    SIG_RA  -3.490      .910      .240

FAULT SEGMENT COORDINATES
 1    -119.8330   34.5440
 2    -119.6660   34.4990
 3    -119.5980   34.4860
 4    -119.5220   34.4830
 5    -119.3400   34.5000
 6    -119.1830   34.5260
 7    -119.0220   34.5530
 8    -118.8950   34.5820

NDP
  2
ORIGINAL FAULT CROSS SECTION
 1        .0000     .0000
 2       2.6000   15.0000

Computed Total Fault Area =  .14E+04
-------------------------------------------------------------------------------
FAULT 14

FAULT NAME:  VERDUGO

NFP    NRL   ATTENUATION CODES:
 6     10      2  4

AMMIN   AMSTEP  IRATE    RATE   BETA   ECTR   ECDP   COEF
5.000    .1000      1   .5000  2.072  1.600  2.000  1.000

NMAX AMMAX  PMAX
 1    6.70  1.00

  dmchar ampchar dmpchar
     .50    6.20    1.00
```

```
Slip Rate (   .5000 mm/yr) Converted to Activity Rate:
Input Shear Modulus - dyne/cm**2
.330E+12
Input Fault Area    - cm**2
.510E+13
LOG10[Mo(m)]        = (1.50)m + (16.05)
  IMAX   AMMAX    PMAX     ARATE = EX-RATE + CH-RATE
     1  6.7000  1.0000    .00308    .00176    .00131

IND_RL
     2

RUPTURE AREA VS. MAGNITUDE  A_RA      B_RA    SIG_RA  -3.490      .910      .240

FAULT SEGMENT COORDINATES
 1    -118.4360   34.2670
 2    -118.3860   34.2270
 3    -118.3360   34.2020
 4    -118.2780   34.1750
 5    -118.2280   34.1380
 6    -118.1530   34.1160

NDP
  2
ORIGINAL FAULT CROSS SECTION
 1        .0000     .0000
 2      -9.2000   16.0000

Computed Total Fault Area =  .54E+03
-------------------------------------------------------------------------------
FAULT 15

FAULT NAME:  SAN ANDREAS (Mojave)

NFP    NRL   ATTENUATION CODES:
15     10      1  3

AMMIN   AMSTEP  IRATE    RATE   BETA   ECTR   ECDP   COEF
5.000    .1000      1 34.0000  2.072 15.600  2.000  1.000

NMAX AMMAX  PMAX
 1    7.80  1.00

  dmchar ampchar dmpchar
     .50    7.30    1.00

Slip Rate ( 34.0000 mm/yr) Converted to Activity Rate:
Input Shear Modulus - dyne/cm**2
.300E+12
Input Fault Area    - cm**2
```

```
.465E+14
LOG10[Mo(m)]        = (1.50)m + (16.05)
  IMAX   AMMAX    PMAX     ARATE = EX-RATE + CH-RATE
     1  7.8000  1.0000    .25128    .23470    .01659

IND_RL
     2

RUPTURE AREA VS. MAGNITUDE  A_RA      B_RA    SIG_RA  -3.490      .910      .240

FAULT SEGMENT COORDINATES
 1    -120.2870   35.7230
 2    -120.1560   35.5970
 3    -119.9790   35.4180
 4    -119.7920   35.2330
 5    -119.5430   35.0280
 6    -119.3940   34.9280
 7    -119.2970   34.8900
 8    -119.1490   34.8550
 9    -119.0160   34.8270
10    -118.8820   34.8030
11    -118.6330   34.7360
12    -118.2970   34.6240
13    -118.0360   34.5240
14    -117.7620   34.4110
15    -117.4740   34.2900

NDP
  2
ORIGINAL FAULT CROSS SECTION
 1        .0000     .0000
 2        .0000   15.0000

Computed Total Fault Area =  .47E+04
```

Note: Faults 16-22 do not contribute significantly to the ground motion hazard at the site and, therefore, detailed summaries have not been included in this report in order to save space and paper.

```
SITE 1 COORDINATES: -118.6330  34.4570

BOORE ET AL. (1993a) RND. M - C
     AMPLITUDES (g):      .5000E-01 .1000E+00 .1500E+00 .2000E+00 .2500E+00 .3000E+00 .3500E+00 .4000E+00 .4200E+00 .4400E+00
     LN (AMPLITUDE):       -3.00     -2.30     -1.90     -1.61     -1.39     -1.20     -1.05      -.92      -.87      -.82
  FAULT   1 E(NO/YR)      .2579E-02 .2579E-02 .2564E-02 .2233E-02 .1803E-02 .1563E-02 .1360E-02 .1025E-02 .8174E-03 .6003E-03
  FAULT   2 E(NO/YR)      .8828E-02 .5660E-02 .4201E-02 .3111E-02 .2346E-02 .1976E-02 .1753E-02 .1537E-02 .1489E-02 .1283E-02
  FAULT   3 E(NO/YR)      .8294E-02 .6564E-02 .3836E-02 .2986E-02 .2429E-02 .1488E-02 .3184E-03 .0000E+00 .0000E+00 .0000E+00
  FAULT   4 E(NO/YR)      .2754E-01 .2297E-01 .1383E-01 .1107E-01 .8813E-02 .4285E-02 .0000E+00 .0000E+00 .0000E+00 .0000E+00
  FAULT   5 E(NO/YR)      .4099E-01 .4081E-01 .3343E-01 .2573E-01 .2111E-01 .1749E-01 .1304E-01 .7133E-02 .4718E-02 .2569E-02
  FAULT   6 E(NO/YR)      .2278E-01 .1114E-01 .6793E-02 .3164E-02 .7447E-03 .0000E+00 .0000E+00 .0000E+00 .0000E+00 .0000E+00
  FAULT   7 E(NO/YR)      .9089E-02 .5790E-02 .3414E-02 .1948E-02 .8528E-03 .1548E-03 .0000E+00 .0000E+00 .0000E+00 .0000E+00
  FAULT   8 E(NO/YR)      .1678E-03 .1091E-03 .5853E-04 .4796E-04 .1824E-04 .0000E+00 .0000E+00 .0000E+00 .0000E+00 .0000E+00
```

FAULT 9	E(NO/YR)	.3034E-02	.2410E-02	.1687E-02	.5090E-03	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00
FAULT 10	E(NO/YR)	.5212E-03	.2071E-03	.1142E-03	.2584E-04	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00
FAULT 11	E(NO/YR)	.2650E-01	.8812E-02	.2447E-02	.3807E-03	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00
FAULT 12	E(NO/YR)	.3621E-01	.1587E-01	.7613E-02	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00
FAULT 13	E(NO/YR)	.8801E-02	.2383E-02	.3969E-03	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00
FAULT 14	E(NO/YR)	.2859E-02	.1326E-02	.1900E-03	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00
FAULT 15	E(NO/YR)	.7713E-01	.2052E-01	.1448E-01	.1004E-01	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00
FAULT 16	E(NO/YR)	.8702E-04	.1267E-04	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00
FAULT 17	E(NO/YR)	.1920E-01	.1443E-01	.9483E-02	.4732E-02	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00
FAULT 18	E(NO/YR)	.5510E-03	.2036E-03	.2487E-04	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00
FAULT 19	E(NO/YR)	.7841E-02	.3103E-02	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00
FAULT 20	E(NO/YR)	.2229E-01	.3314E-02	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00
FAULT 21	E(NO/YR)	.1081E-02	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00
FAULT 22	E(NO/YR)	.1360E-02	.3687E-03	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00
TOTAL	E(NO/YR)	.3277E+00	.1686E+00	.1046E+00	.6598E-01	.3812E-01	.2696E-01	.1647E-01	.9695E-02	.7025E-02	.4452E-02
TOTAL RISK		.2795E+00	.1551E+00	.9928E-01	.6385E-01	.3740E-01	.2660E-01	.1634E-01	.9648E-02	.7000E-02	.4442E-02

AMPLITUDES (g):		.4600E+00	.4800E+00	.5000E+00	.5200E+00	.5400E+00	.5600E+00	.5800E+00	.6000E+00	.6200E+00	.6400E+00
LN (AMPLITUDE):		-.78	-.73	-.69	-.65	-.62	-.58	-.54	-.51	-.48	-.45
FAULT 1	E(NO/YR)	.4482E-03	.2698E-03	.9499E-04	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00
FAULT 2	E(NO/YR)	.1036E-02	.7388E-03	.3818E-03	.1386E-03	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00
FAULT 3	E(NO/YR)	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00
FAULT 4	E(NO/YR)	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00
FAULT 5	E(NO/YR)	.1758E-02	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00
FAULT 6	E(NO/YR)	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00
FAULT 7	E(NO/YR)	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00
FAULT 8	E(NO/YR)	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00
FAULT 9	E(NO/YR)	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00
FAULT 10	E(NO/YR)	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00
FAULT 11	E(NO/YR)	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00
FAULT 12	E(NO/YR)	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00
FAULT 13	E(NO/YR)	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00
FAULT 14	E(NO/YR)	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00
FAULT 15	E(NO/YR)	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00
FAULT 16	E(NO/YR)	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00
FAULT 17	E(NO/YR)	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00
FAULT 18	E(NO/YR)	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00
FAULT 19	E(NO/YR)	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00
FAULT 20	E(NO/YR)	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00
FAULT 21	E(NO/YR)	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00
FAULT 22	E(NO/YR)	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00
TOTAL	E(NO/YR)	.3242E-02	.1009E-02	.4768E-03	.1386E-03	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00
TOTAL RISK		.3237E-02	.1008E-02	.4767E-03	.1386E-03	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00	.0000E+00

SPECIFIED RISKS:	.013900	.010000	.005000	**.002105**	.001000
ESTIMATED LN AMP. :	-1.009	-.925	-.833	-.761	-.734
ESTIMATED AMP. (g):	.36463	.39638	.43471	**.46728**	.48021

CLOSEST DISTANCES BETWEEN SITE AND FAULT RUPTURES

NO.	FAULT NAME	CD_1DRP	**CD_2DRP**	CDIST	CLODIS	CD_EPI	CD_HYPO
1	HOLSER	1.5	1.5	1.5	1.5	2.1	2.3 km
2	SAN GABRIEL	2.7	2.7	2.7	2.7	2.8	3.5 km
3	OAK RIDGE (Eastern)	10.5	10.5	11.2	11.2	11.3	12.2 km
4	SAN CAYETANO (EAST)	11.3	10.7	11.0	11.0	11.8	12.0 km
5	SANTA SUSANA	13.5	4.3	11.7	11.7	4.9	11.7 km
6	OAK RIDGE (Western)	15.3	15.3	15.3	15.3	16.6	16.6 km
7	SIMI-SANTA ROSA	16.9	11.7	14.9	14.9	12.7	15.4 km
8	CLEARWATER	17.1	17.1	17.1	17.1	17.7	17.7 km
9	NORTHRIDGE HILLS	20.6	16.4	19.8	19.8	17.5	20.5 km
10	PINE MOUNTAIN	22.6	22.6	22.6	22.6	23.8	23.8 km
11	SIERRA MADRE - SAN FERNANDO	24.1	19.8	22.7	22.7	20.9	23.6 km
12	SAN CAYETANO (WEST)	26.6	26.6	26.6	26.6	27.7	27.7 km
13	SANTA YNEZ (East)	27.8	26.0	27.5	27.5	26.9	28.3 km
14	VERDUGO	27.8	27.7	27.8	27.8	28.8	28.8 km
15	SAN ANDREAS (Mojave)	28.8	28.8	28.8	28.8	28.8	29.0 km
16	FRAZIER MOUNTAIN	41.2	41.2	41.2	41.2	42.0	42.0 km
17	SANTA MONICA MTNS. THRUST	41.5	27.2	33.5	33.5	28.2	34.1 km
18	ARROYO PARIDA - MORE RANCH	45.7	45.7	45.7	45.7	46.8	46.8 km
19	GARLOCK (West)	47.6	47.6	47.6	47.6	47.6	47.6 km
20	SANTA MONICA HOLLYWOOD	47.7	40.7	44.1	44.1	41.1	44.1 km
21	NEWPORT-INGLEWOOD (Northern)	48.9	48.4	48.9	48.9	49.6	49.9 km
22	MALIBU COAST	49.3	44.8	47.6	47.6	45.3	47.9 km

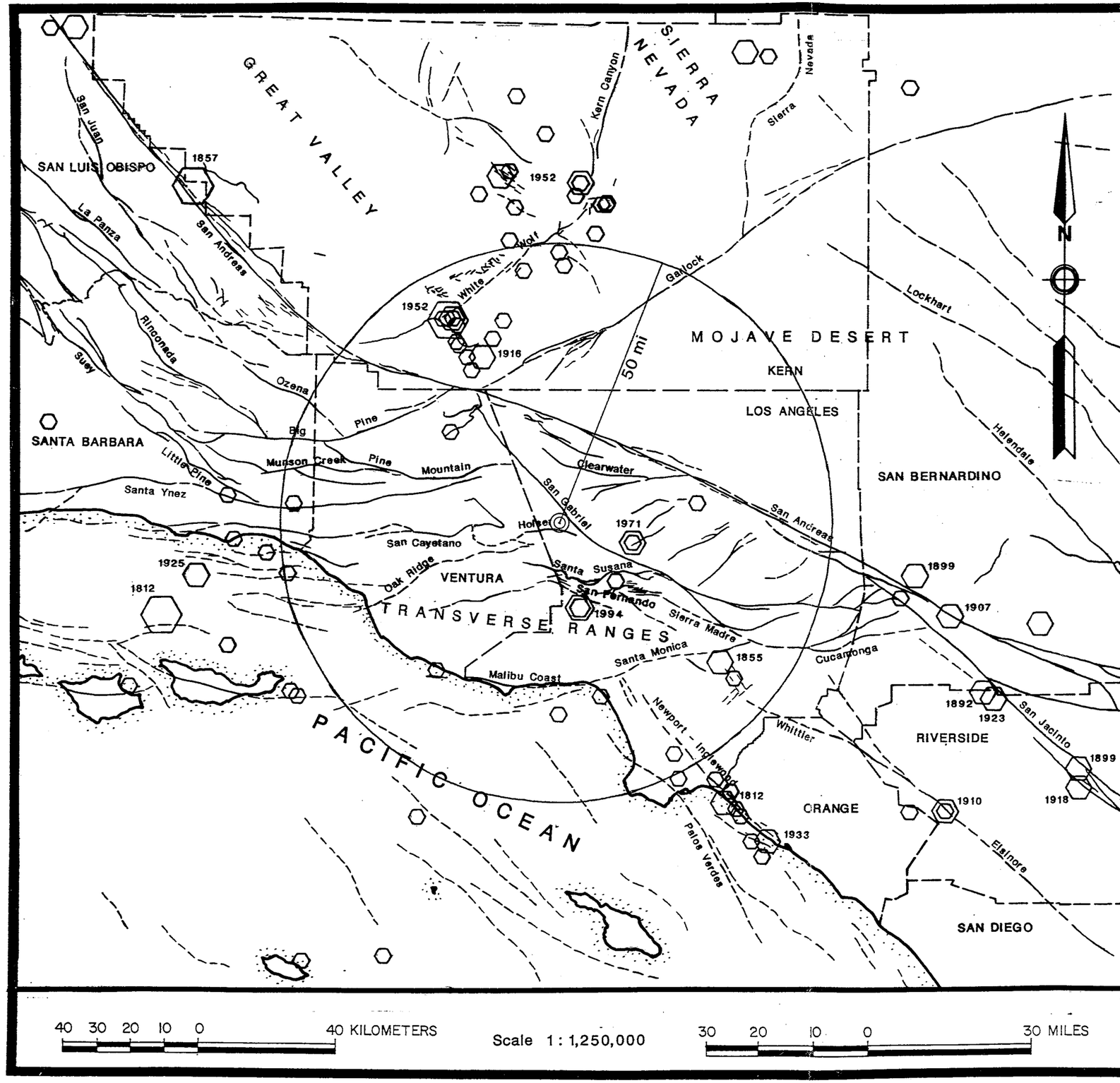
EXPLANATION

CD_1DRP = Closest distance to projection of rupture area along fault trace.
CD_2DRP = Closest distance to surface projection of the rupture area.
CDIST = Closest distance to seismogenic rupture.
CLODIS = Closest distance to subsurface rupture.
CD_EPI = Closest epicentral distance.
CD_HYPO = Closest hypocentral distance.

Note: CD-2DRP is used for Boore et al. (1993a)

Figure E-1

FAULT AND EARTHQUAKE EPICENTER LOCATION MAP



Explanation

FAULTS – Dashed where uncertain or concealed

San Andreas

EARTHQUAKE EPICENTERS

Location	Magnitude
⬡	5.0 – 5.9
⬢	6.0 – 6.9
⬢ (larger)	7.0 – 7.9

SUBJECT SITE

◎

Compiled from: Jennings, 1988, Real and others, 1978, Yerkes, 1985, Ziony and Jones, 1989 and Shakal and others, 1994

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ENGINEERING GEOLOGY, INC.
SINCE 1958

Date: 1/15/99

Job No.: 98-1617-4

Figure E-2

MODIFIED MERCALLI SCALE, 1956 VERSION*

	Intensity	Effects	v,† cm/s	g‡
M§	I.	Not felt. Marginal and long-period effects of large earthquakes (for details see text).		
3	II.	Felt by persons at rest, on upper floors, or favorably placed.		
	III.	Felt indoors. Hanging objects swing. Vibration like passing of light trucks. Duration estimated. May not be recognized as an earthquake.		0.0035-0.007
4	IV.	Hanging objects swing. Vibration like passing of heavy trucks; or sensation of a jolt like a heavy ball striking the walls. Standing motor cars rock. Windows, dishes, doors rattle. Glasses clink. Crockery clashes. In the upper range of IV wooden walls and frame creak.		0.007-0.015
	V.	Felt outdoors; direction estimated. Sleepers wakened. Liquids disturbed, some spilled. Small unstable objects displaced or upset. Doors swing, close, open. Shutters, pictures move. Pendulum clocks stop, start, change rate.	1-3	0.015-0.035
5	VI.	Felt by all. Many frightened and run outdoors. Persons walk unsteadily. Windows, dishes, glassware broken. Knickknacks, books, etc., off shelves. Pictures off walls. Furniture moved or overturned. Weak plaster and masonry D cracked. Small bells ring (church, school). Trees, bushes shaken (visibly, or heard to rustle—CFR).	3-7	0.035-0.07
6	VII.	Difficult to stand. Noticed by drivers of motor cars. Hanging objects quiver. Furniture broken. Damage to masonry D, including cracks. Weak chimneys broken at roof line. Fall of plaster, loose bricks, stones, tiles, cornices (also unbraced parapets and architectural ornaments—CFR). Some cracks in masonry C. Waves on ponds; water turbid with mud. Small slides and caving in along sand or gravel banks. Large bells ring. Concrete irrigation ditches damaged.	7-20	0.07-0.15
	VIII.	Steering of motor cars affected. Damage to masonry C; partial collapse. Some damage to masonry B; none to masonry A. Fall of stucco and some masonry walls. Twisting, fall of chimneys, factory stacks, monuments, towers, elevated tanks. Frame houses moved on foundations if not bolted down; loose panel walls thrown out. Decayed piling broken off. Branches broken from trees. Changes in flow or temperature of springs and wells. Cracks in wet ground and on steep slopes.	20-60	0.15-0.35
7	IX.	General panic. Masonry D destroyed; masonry C heavily damaged, sometimes with complete collapse; masonry B seriously damaged. (General damage to foundations—CFR.) Frame structures, if not bolted, shifted off foundations. Frames racked. Serious damage to reservoirs. Underground pipes broken. Conspicuous cracks in ground. In alluviated areas sand and mud ejected, earthquake fountains, sand craters.	60-200	0.35-0.7
8	X.	Most masonry and frame structures destroyed with their foundations. Some well-built wooden structures and bridges destroyed. Serious damage to dams, dikes, embankments. Large landslides. Water thrown on banks of canals, rivers, lakes, etc. Sand and mud shifted horizontally on beaches and flat land. Rails bent slightly.	200-500	0.7-1.2
	XI.	Rails bent greatly. Underground pipelines completely out of service.		>1.2
	XII.	Damage nearly total. Large rock masses displaced. Lines of sight and level distorted. Objects thrown into the air.	From Fig. 11.14	

NOTE: *Masonry A, B, C, D.* To avoid ambiguity of language, the quality of masonry, brick or otherwise, is specified by the following lettering (which has no connection with the conventional Class A, B, C construction).

- *Masonry A:* Good workmanship, mortar, and design; reinforced, especially laterally, and bound together by using steel, concrete, etc.; designed to resist lateral forces.
- *Masonry B:* Good workmanship and mortar; reinforced, but not designed to resist lateral forces.
- *Masonry C:* Ordinary workmanship and mortar; no extreme weaknesses such as non-tied-in corners, but masonry is neither reinforced nor designed against horizontal forces.
- *Masonry D:* Weak materials, such as adobe; poor mortar; low standards of workmanship; weak horizontally.

*From Richter (1958). Adapted with permission of W. H. Freeman and Company.

†Average peak ground velocity, cm/s.

‡Average peak acceleration (away from source).

§Magnitude correlation.

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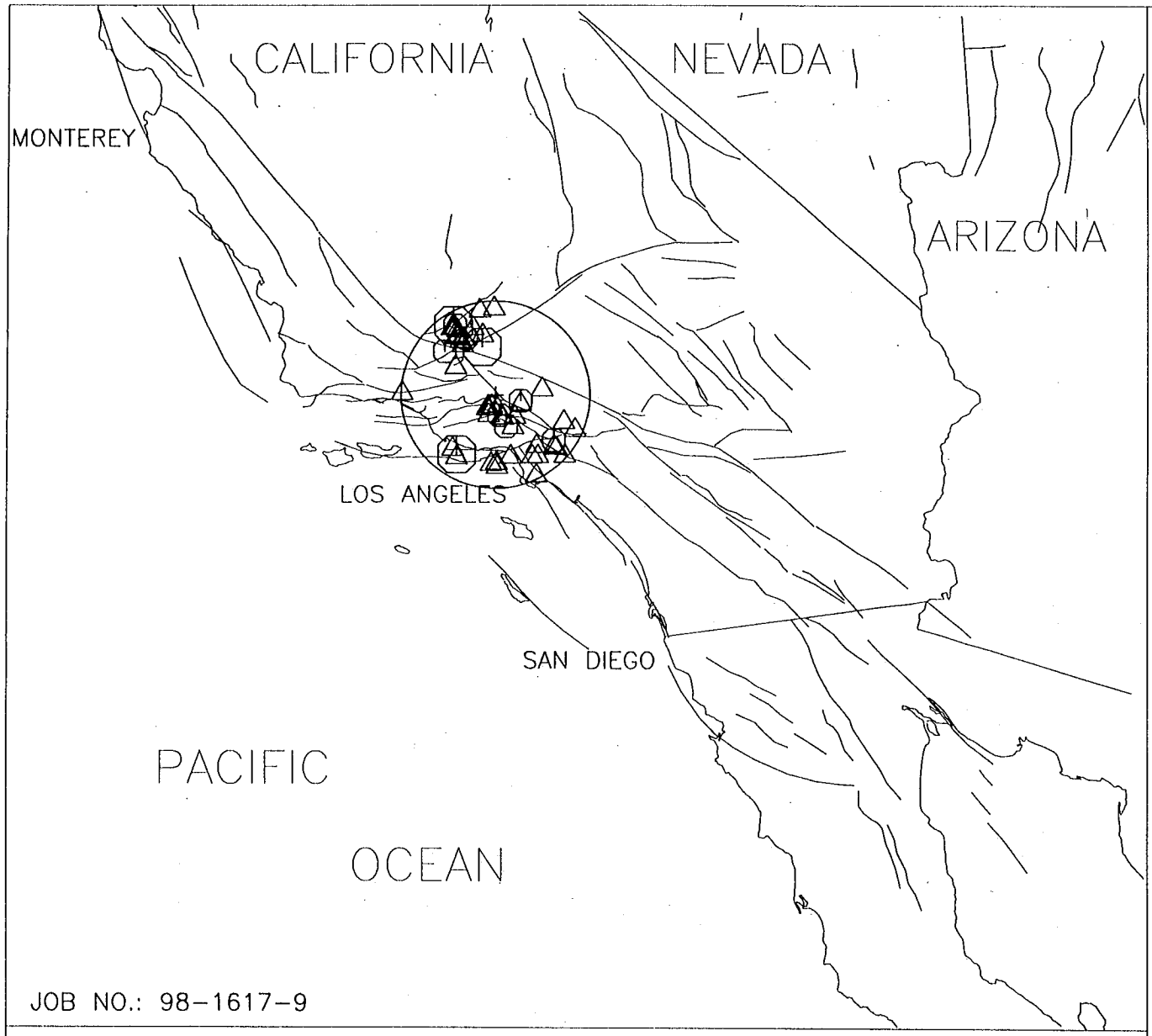
Figure E-3



JOB NO.: 98-1617-9

HISTORICAL EARTHQUAKES 1800 TO 1995

N

0 50 100

SCALE
(Miles)

EXPLANATION

M = 8.0 +

M = 7.0-7.9

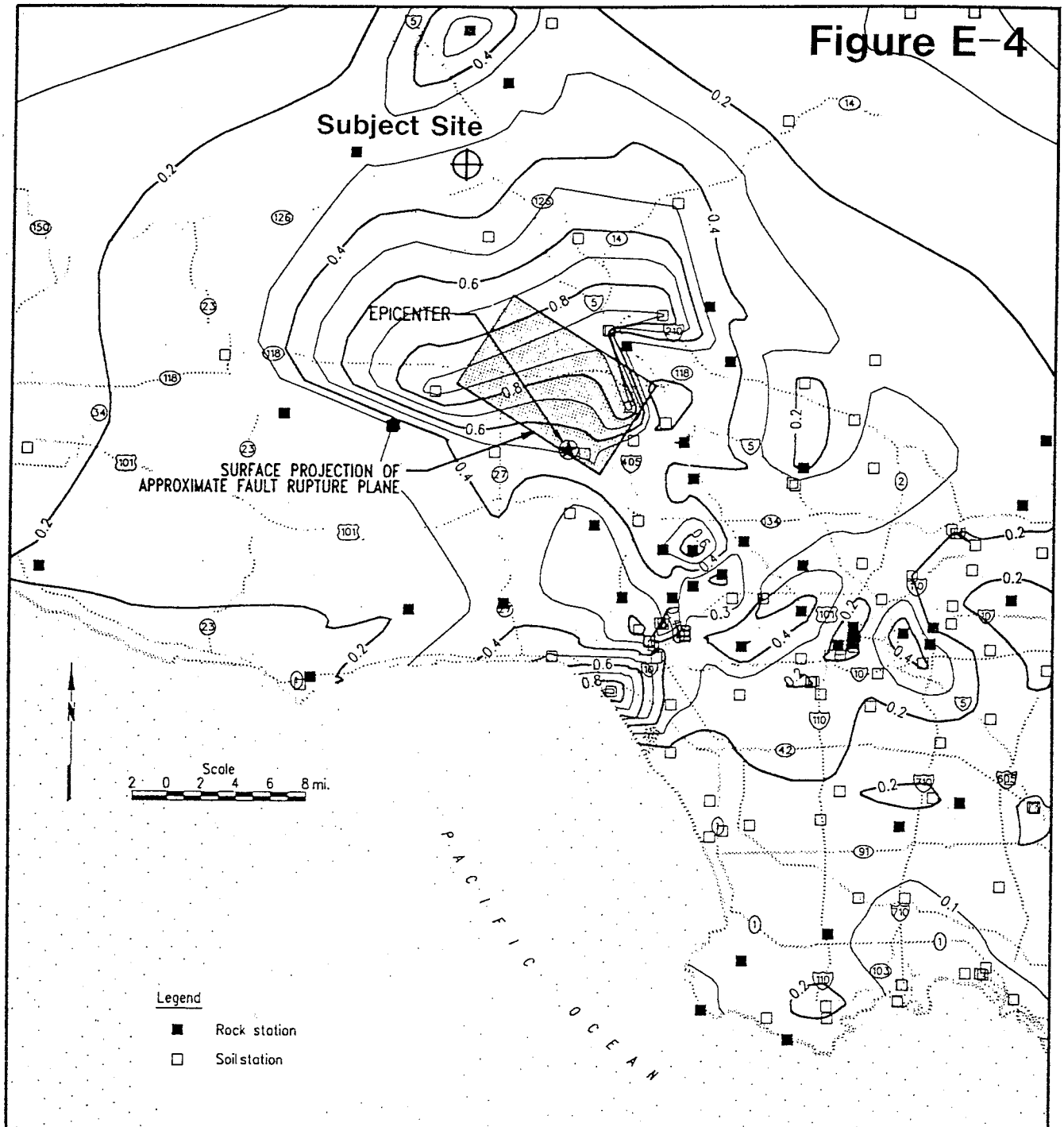
M = 6.0-6.9

M = 5.0-5.9

× M = 4.0-4.9

SITE LOCATION (+):

Latitude - 34.4570 N
Longitude - 118.6330 W



Note: Site classification was provided by the owner/agency except for USGS stations as discussed in Section 3.3.1. Sites were typically classified by surficial geology; however, USC stations were classified based on Seed et. al. (1976) in which surficial materials with V_s > 800 m/s are designated as "rock" sites.

Contours of maximum horizontal acceleration based on recordings at rock and soil sites during the January 17, 1994 Northridge Earthquake

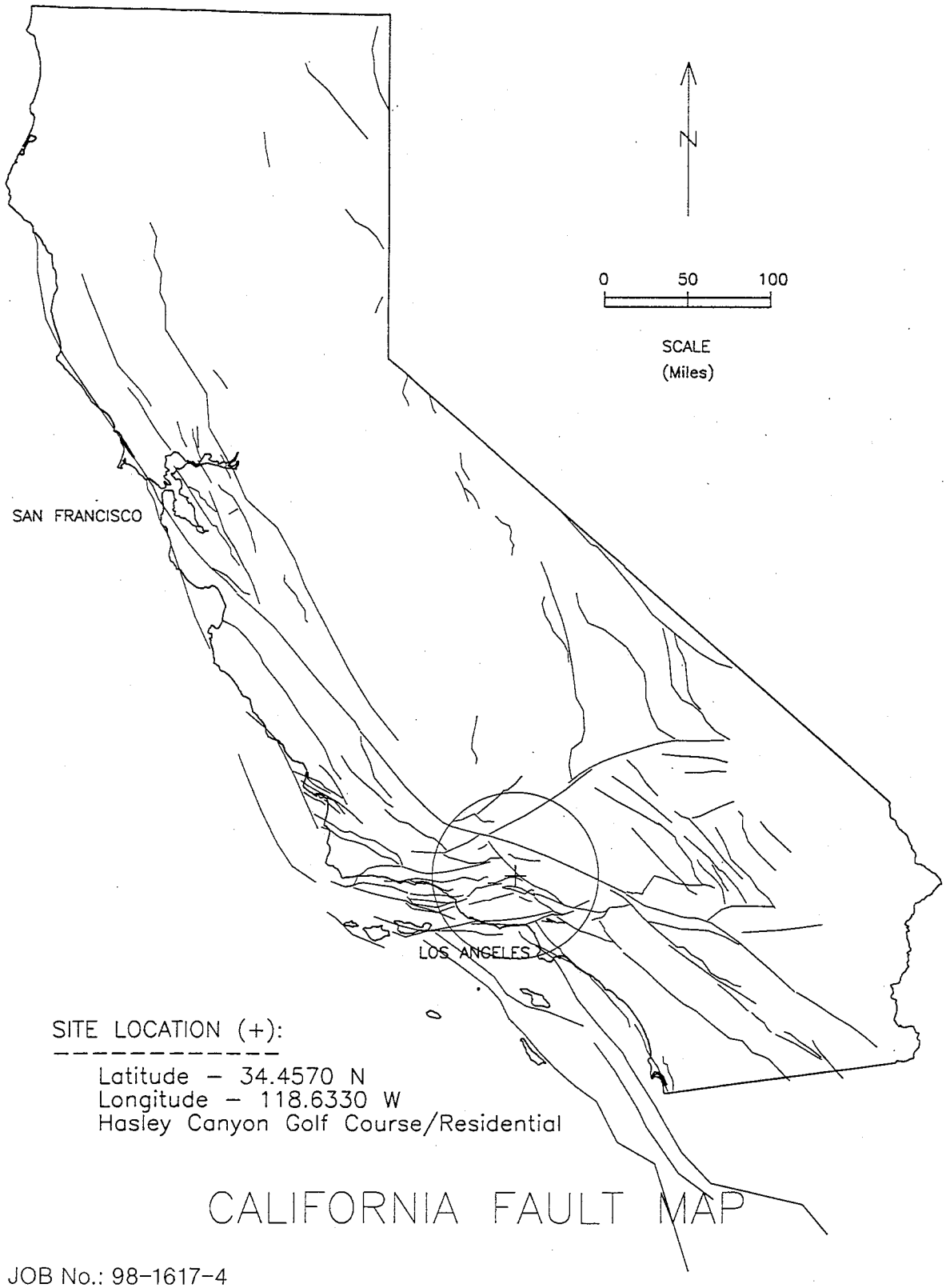
(Figure taken from Stewart and others, 1994)

ALLAN E. SEWARD

ENGINEERING GEOLOGY

JOB NUMBER: 98-1617-4	DATE: 1/15/99	
SCALE: As Shown		DRAWN BY: ———
		REVISED:

Figure E-5



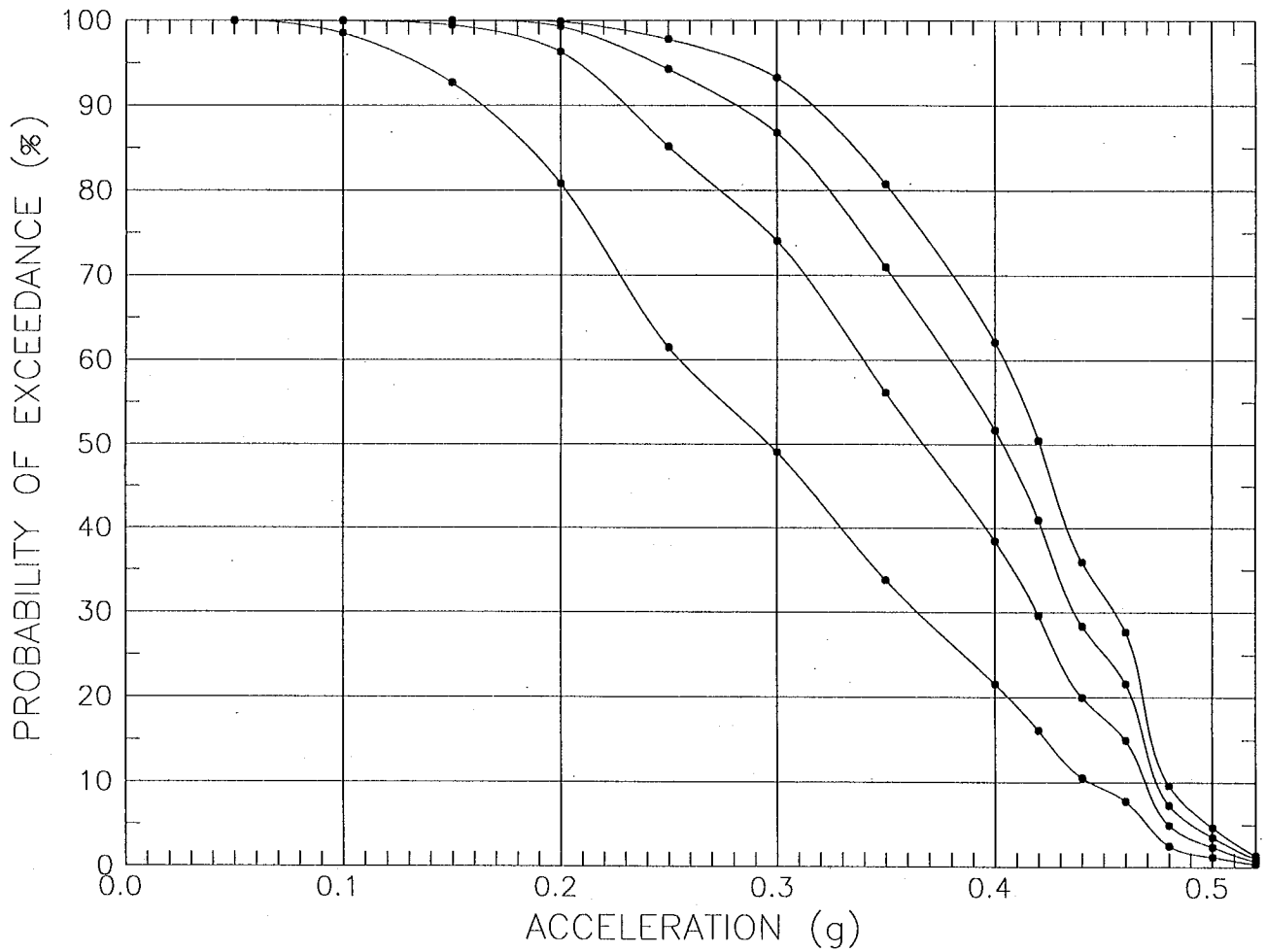
SITE LOCATION (+):

Latitude – 34.4570 N
Longitude – 118.6330 W
Hasley Canyon Golf Course/Residential

CALIFORNIA FAULT MAP

JOB No.: 98-1617-4

Figure E-6

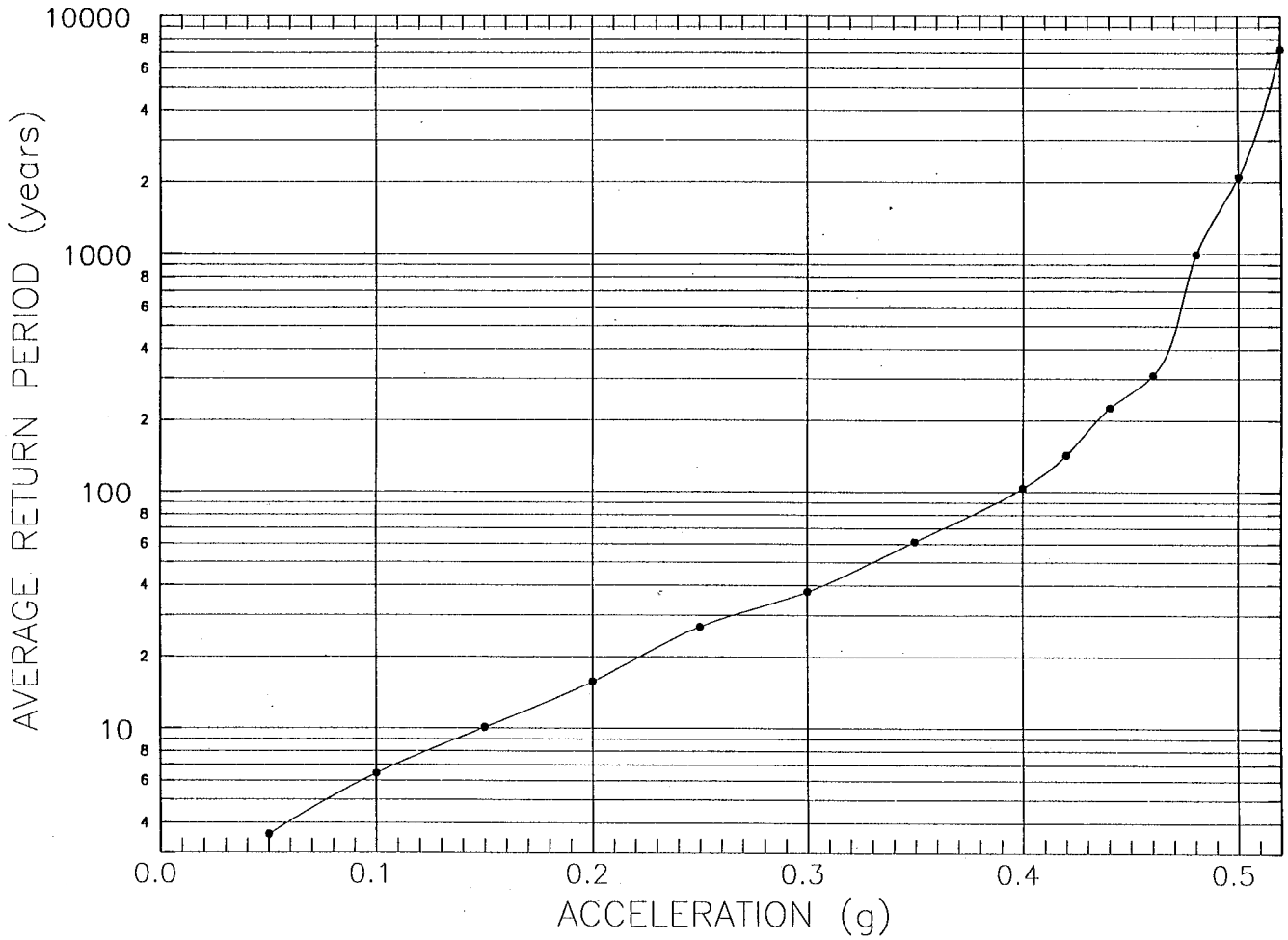


EXPOSURE PERIODS:
25 years 75 years
50 years 100 years

BOORE ET AL. (1993a) RND. M – C

JOB No.: 98-1617-4

Figure E-7



Palmer, VTT 52584 – Final Run

BOORE ET AL. (1993a) RND. M – C

JOB No.: 98-1617-4

ALLAN E. SEWARD
ENGINEERING GEOLOGY, INC.
Geological And Geotechnical Consultants

GEOLOGIC AND GEOTECHNICAL REPORT

Vesting Tentative Tract 52584

Castaic, California

VOLUME III OF V

Prepared For:

Hasley Canyon Land Company, L.L.C.

C/o Palmer Investments

1999 Avenue of the Stars

15th Floor

Los Angeles, California 90067

January 15, 1999

27825 Smyth Drive, Valencia, California 91355 661-294-0065 FAX 661-294-0833

SLOPE STABILITY ANALYSES

Introduction

Table F-1 summarizes the results of state-of-the-art computerized static and pseudostatic (i.e. with a statically-simulated seismic load) stability analyses performed on several cross sections of the currently proposed development of the vesting Tentative Tract 52584. Table F-2 includes the results of surficial (Infinite Slope) analyses. Based upon the results from the analyses, the need for tentative stabilization measures were explored and dimensional design of these measures was performed, as needed, by a step-by-step fashion utilizing slope stability analyses.

A stabilization fill has been recommended to prevent erosion of cuts exposing landslide debris. Pertinent surficial stability of possible materials comprising this fill will be performed at the grading plan stage.

Analysis Approach

The stability of the proposed cut, fill slopes and natural slopes were evaluated. Ten cross sections representing the critical three-dimensional geometry of the subsurface conditions have been selected for stability analyses, based upon critical conditions for stability (i.e. potential adverse bedding and slope height and slope inclination). Temporary cut conditions during construction were also analyzed for buttress backcut slopes where applicable. Surficial stability for fill and natural and cut (in TQs) slopes were analyzed using the "Infinite Slope" method since the lower-bound cohesion values of these materials less than 250 psf. A rapid drawdown analysis for the highest fill-slope in a desilting basin, and a gross stability analysis of the highest fill were also performed.

Geometry and Groundwater

The analyzed geometries of cut slopes included removal of existing landslides and slopewash material and replacement with certified compacted fill to currently proposed grades, as needed. Analyses also included natural slopes and cuts in bedrock with cross bedding and potential adverse bedding. Geometries were modified as analyses progressed since most of the proposed grades did not comply with County standards for minimum factors of safety. Alternatively, for one natural slope a very large and surely very costly buttress was analyzed

since the Civil Engineer expressed the advantage of saving pad area and indicated that high buttress costs may be comparable with the value of potential loss of pad area.

Review of groundwater data in the vicinity of the site and exploratory trench and boring log data indicates that ground water is not present in the elevated portion of the site. Therefore, ground water was not modeled in the slope stability analyses. Backdrains are proposed for all stability fill and buttress fill slopes.

Shear Strength Parameters

A significant number of shear strength tests were performed for this project. The shear strength values used in our analysis are summarized in Table B-2.

In our analyses, residual shear strengths were used for static analysis while peak strengths were used for pseudostatic analysis.

Sections Analyzed

We have performed analysis on ten cross sections. The cross sections and the subject of each analysis are presented in Table F-1. Surficial stability analyses are presented in Table F-2.

Methods of Analysis

The computer program PCSTABL5M, originally written by Purdue University was used for the analyses. This program computes the minimum factor of safety from trial failure surfaces using limit equilibrium methods of analysis, such as the Modified Bishop's Method for circular slip surfaces or Janbu's and Spencer's methods for both circular or planar surfaces. In many cases, exit of slip planes at the ground surface is not known. For this report, PCSTABLSM method was used to determine breakage of slip planes through upper layers and their exit at the ground surface where the failure surface is unknown. Conservatively, Janbu's method was used to provide the static minimum safety factor corresponding to the complete slip plane. Using this complete planar slip surface, the Fellenius method, also known as Ordinary Method of Slices (OMS), adopted by the Los Angeles County, was used to modify the minimum static safety factor and estimate both the static and pseudo-static factors of safety.

The pseudostatic procedure introduces a static horizontal force equal to a "seismic" (pseudostatic) coefficient times the weight of individual slices in addition to other forces

acting on the slice. The seismic coefficient is an empirical number which in no way models actual seismic forces. However, the pseudostatic method provides some indication of stability or instability. We selected a seismic coefficent of 0.15 for our analyses in accordance with Los Angeles County Guidelines.

As indicated previously, the "Infinite Slope" method was used for surficial stability of natural and cut slopes in TQs, and fill slopes. Bishop's Modified Method was used for the highest fill and rapid drawdown analyses.

Results of Stability Analyses

Analyzed cut-slopes and grades, natural slopes, compacted fill slopes, temporary backcut slopes and surficial stability comply with Los Angeles County requirements for stability under static and pseudostatic loading conditions, as applicable, with source mitigating modifications presented in Appendix G. The results of the stability analyses are summarized in Table F-1. Per Los Angeles County requirements, results from the OMS method for planar analyses were considered final. For analyses of the highest compacted fill and cross-bedding slopes, results using the Bishop's Modified Method of Slices were considered final.

A complete package of computer output sheets and output cross sections for the stability analyses performed are included in this **Appendix**. The critical failure surfaces and their corresponding factors of safety are plotted on the respective cross sections. Cross Sections with input data used for OMS analyses have been are hand drawn since the L.A. County OMS Program does not provide graphics.

The following attachments complete this Appendix.

Slope Stability Analysis Results	Table F1
Analysis of Infinite Slope	Table F2

CROSS SECTION 7-7'

Landslide Plane Analysis of Qls-6, Cut-slope CS-7
Modified Janbu Method

• Full Slide Plane	Run 1
• Partial Slide Plane	Run 2
• Partial Slide Plane	Run 3
• Partial Slide Plane	Run 4 & 5

Ordinary Method of Slices (OMS)

- Partial Slide Plane Static — Run 6
- Partial Slide Plane Static & Pseudostatic Analyses — Run 7 & 8

CROSS SECTION 8-8'

Bedding Plane Analysis of **3:1** Cut-Slope CS-15

Modified Janbu Method

- Bedding Plane 60 ft. below toe — Run 9
- Bedding Plane 60 ft. below toe — Run 10 & 11
- Bedding Plane 30 ft. below toe — Run 12
- Bedding Plane 30 ft. below toe Cut 115' Wide Bench — Run 13
- Bedding Plane Toe Plane Cut 115' Wide Bench — Run 14 & 15

Ordinary Method of Slices (OMS)

- Toe Plane, Cut 115' Wide Bench
  Static & Pseudostatic Analyses — Run 16 & 17

CROSS SECTION 11-11'

Bedding Plane Analysis of Cut-Slope CS-16

Modified Janbu Method

- 1st Lower Bedding Plane — Run 18 & 19

CROSS SECTION 13-13'

Bedding Plane Analysis of 2:1 Cut-Slope CS-18

Modified Janbu Method

- Upper Area — Run 20
- Mid Area — Run 21
- Toe Area — Run 22
- Toe Area, cutting ridge top — Run 23
- Lower Area, cutting ridge top — Run 24 & 25

Ordinary Method of Slices (OMS)

- Lower Area, cutting ridge top — Run 26 & 27

CROSS SECTION 14-14'

Bedding Plane Analysis of Natural Slope

Modified Janbu Method

- Third Plane from Top — Run 28
- Fourth Plane from Top — Run 29
- Second Plane from Top — Run 30

- Second Plane from Top w/30' wide mid bench & Cutting top half — Run 31 & 32

Ordinary Method of Slices (OMS)
- Second Plane from Top w/30' wide mid bench & Cutting top half — Run 33
- Second Plane from Top w/20' wide mid bench Top half cut to 2:1 — Run 34 & 35

Bedding Plane Analysis Temporary Stability of Buttress backcut
Modified Janbu Method
- Third bedding Plane from Top — Run 36
- Fourth bedding Plane from Top — Run 37

Ordinary Method of Slices (OMS)
- Fourth bedding plane from Top — Run 38

Buttress Stability
Modified Janbu Method
- Stability through buttress — Run 39 & 40
- Stability below buttress — Run 41 & 42

CROSS SECTION 15-15'

Bedding Plane Analysis of Natural Slope
Modified Janbu Method
- Lower Bedding Plane — Run 43
- Lower Bedding Plane trimmed 30' — Run 44 & 45
- Bedding Plane 20 ft. below toe — Run 46 & 47
- Toe Bedding Plane trimmed — Run 48 & 49

Ordinary Method of Slices (OMS)
- Toe Bedding Plane 30 ft. trimmed and 50 ft. bench — Run 50 & 51
- Lower Bedding Plane 30 ft. trimmed and 50 ft. upper bench — Run 52 & 53

Temporary stability of backcut slope for buttress
Modified Janbu Method
- Bedding Plane at Key — Run 54
- Bedding Plane at Key's flatter backcut than Run 54 — Run 55

Ordinary Method of Slices (OMS)
- Bedding Plane @ Keyway flatter backcut than Run 55 — Run 56

Buttress Stability

Modified Janbu Method

- Stability through buttress Run 57 & 58
- Stability below buttress Run 59 & 60

CROSS SECTION 17-17'

Landslide Removal, Bedding Plane Analysis of Cut-slope

Modified Janbu Method

- Bedding Plane 60 ft. below toe Run 61 & 62
- Toe bedding plane Run 63 & 64
- Upper bedding plane Run 65

Landslide Removal, fill added @ toe and ridge peak removed

Modified Janbu Method

- Upper Bedding plane Run 66
- Mid Low bedding plane Run 67 & 68
- Toe Bedding Plane Run 69
- Lower Bedding Plane Run 70

Ordinary Method of Slices (OMS)

- Mid low bedding plane Run 71 & 72

CROSS SECTION 18-18'

Highest fill slope – Gross stability

Bishops Modified

- Circular Top search Run 73 & 74

CROSS SECTION 26-26'

Major Cut

Modified Janbu Method

- Toe bedding plane Run 75
- Toe bedding plane, add 55 ft. band and 2:1 slope below pad Run 76

Add 10 ft. & 50 ft. wide benches and three 2:1 slopes

Modified Janbu Method

- Toe bedding plane Run 77
- Upper bedding plane Run 78
- Bedding Plane 30 ft. below toe Run 79 & 80

Ordinary Method of Slices (OMS)

- Bedding Plane 30 ft. below toe Run 81 & 82

Temporary Stability of backcut slope for Buttress

Modified Janbu Method

- Lower bedding plane (not included) Run 83
- Bedding plane @ Keyway Run 84
- Bedding plane @ Keyway w/flattened backcut slope Run 85

Ordinary Method of Slices (OMS)

- Bedding plane @ Keyway w/flattened backcut slope Run 86

Buttress Stability

Modified Janbu Method

- Stability through buttress Run 87 & 88
- Stability below buttress Run 89 & 90

CROSS SECTION 25-25'

Rapid drawdown analysis of desilting basin

Bishops Modified

- Circular Search Run 91

TT 52584 - Hasley Canyon
Slope Stability Analyses Results [1]

File Name	Cross Section	Analyzed Plane	Method	Factor of Safety		Comments	Run No.
				Static	Pseudostatic[2] (Coeff=0.15)		
HAS7A-IN	7-7′	Full Slide Plane	Janbu's	1.08	~	Cut in landslide debris	1
HAS7B-IN	7-7′	Partial Slide Plane	Janbu's	1.06	~	Cut in landslide debris - search for downslope failure surface break	2
HAS7C-IN	7-7′	Partial Slide Plane	Janbu's	1.28	~	Cut in landslide debris and upper ½ of slide replaced with Cef	3
HAS7D-IN	7-7′	Partial Slide Plane	Janbu's	1.72	2.02	Cut in landslide debris and part of upper ½ of slide replaced with Cef	4 & 5
--	7-7′	Partial Slide Plane	OMS	1.33	~	Cut in landslide debris and part of upper ½ of slide replaced with Cef	6
--	7-7′	Partial Slide Plane	OMS	1.63	2.00	Cut in landslide debris and upper half of cut further extended to the slide plane	7 & 8
HAS8A-IN	8-8′	Bedding Plane 60′ Below Toe	Janbu's	1.83	~	Proposed 3:1 cut slope at upper 2/3rds - full plane analysis	9
HAS8C-IN	8-8′	Bedding Plane 60′ Below Toe	Janbu's	1.63	1.67	Proposed 3:1 cut slope at upper 2/3rds - search analysis for plane exit	10 & 11
HAS8D-IN	8-8′	Bedding Plane 30′ Below Toe	Janbu's	1.48	~	Proposed 3:1 cut slope at upper 2/3rds -search analysis for plane exit	12
HAS8E-IN	8-8′	Bedding Plane 30′ below toe	Janbu's	2.04	~	Cut 115′ bench and 2:1 slope at toe - search analysis for plane exit	13
HAS8F-IN	8-8′	Toe Bedding Plane	Janbu's	1.65	1.73	Cut 115′ bench and 2:1 slope at top - search analysis for plane exit	14 & 15
--	8-8′	Toe Bedding Plane	OMS	1.79	1.77	Cut 115′ bench and 2:1 slope at top - search analysis for plane exit	16 & 17
HAS11A-IN	11-11′	1st Lower Bedding Plane	Janbu's	2.44	2.08	Slope trimmed 30′ perpendicular to existing slope in lower ½ and 20′ above - (No OMS F.S. is high)	18 & 19
HAS13A-IN	13-13′	Upper Area	Janbu's	2.14	~	2:1 Cut Slope	20
HAS13B-IN	13-13′	Mid Area	Janbu's	1.75	~	2:1 Cut Slope	21
HAS13C-IN	13-13′	Toe Area	Janbu's	1.40	~	2:1 Cut Slope	22
HAS13D-IN	13-13′	Toe Area	Janbu's	1.63	~	2:1 Cut Slope and cutting ridge top for stability	23
HAS13E-IN	13-13′	Lower Area	Janbu's	1.54	1.52	2:1 Cut Slope and cutting ridge top for stability	24 & 25
--	13-13′	Lower Area	OMS	1.60	1.64	2:1 Cut Slope and cutting ridge top for stability	26 & 27
HAS14A-IN	14-14′	Third Plane from top	Janbu's	1.56	--	Analysis of proposed natural slope	28
HAS14B-IN	14-14′	Fourth Bedding Plane from Top	Janbu's	1.70	~	Analysis of proposed natural slope	29
HAS14C-IN	14-14′	Second Bedding Plane from Top	Janbu's	1.43	~	Analysis of proposed natural slope	30
HAS14D-IN	14-14′	Second Bedding Plane from Top	Janbu's	1.65	1.84	Analysis of proposed natural slope with 70′ mid bench and cutting top half	31 & 32
--	14-14′	Second Bedding Plane from Top	OMS	1.45	~	Analysis of proposed natural slope with 70′ mid bench and cutting top half	33
--	14-14′	Second Bedding Plane from Top	OMS	1.50	1.60	Analysis of proposed natural slope with 70′ mid bench and top ½ cut to 2:1	34 & 35
HAS14E-IN	14-14′	Third Bedding Plane from Top	Janbu's	0.93	~	Temporary stability of backcut slope for large buttress option	36

HAS14F-IN	14-14′	Fourth Bedding Plane from Top	Janbu's	1.52	~	Temporary stability of backcut slope flatter than for HAS14E.IN run for large buttress option	37
--	14-14′	Fourth Bedding Plane from Top	OMS	1.44	~	Temporary stability of backcut slope for large buttress option	38
HAS14G-IN	14-14′	Fourth Bedding Plane from Top	Janbu's	3.05	1.91	Stability through buttress	39 & 40
HAS14H-IN	14-14′	Fourth Bedding Plane from Top	Janbu's	2.17	1.71	Stability below buttress	41 & 42
HAS15A-IN	15-15′	Lower Bedding Plane	Janbu's	1.43	~	Analysis of proposed natural slope	43
HAS15B-IN	15-15′	Lower Bedding Plane	Janbu's	1.56	1.48	Analysis of proposed natural slope trimmed 30′ perpendicular to face for stability	44 & 45
HAS15C-IN	15-15′	Bedding Plane 20′ Below Toe	Janbu's	1.52	1.46	Analysis of proposed natural slope trimmed 30′ perpendicular to face for stability	46 & 47
HAS15D-IN	15-15′	Toe Bedding Plane	Janbu's	1.50	1.57	Analysis of proposed natural slope trimmed 30′ perpendicular to face for stability	48 & 49
--	15-15′	Toe Bedding Plane	OMS	1.70	1.83	Analysis of proposed natural slope trimmed 30′ perpendicular to face and with 50′ upper bench	50 & 51
--	15-15′	Lower Bedding Plane	OMS	1.56	1.61	Analysis of proposed natural slope trimmed 30′ perpendicular to face and with 50′ upper bench	52 & 53
HAS15E-IN	15-15′	Lower Bedding Plane	Janbu's	1.22	~	Temporary stability of backcut slope for large buttress option - bedding plane on inner face of key	54
HAS15F-IN	15-15′	Bedding Plane at Key's Inner Corner	Janbu's	1.29	~	Temporary stability of backcut slope flatter than for HAS15E.IN Run for large buttress option.	55
--	15-15′	Bedding Plane at Key's Inner Corner	OMS	1.27	~	Temporary stability of backcut slope as in HAS15F.IN for large buttress option.	56
HAS15G-IN	15-15′	Deeper Bedding Plane and thru Buttress	Janbu's	3.14	1.82	Stability through buttress	57 & 58
HAS15H-IN	15-15′	Deeper Bedding Plane and Below Buttress	Janbu's	2.19	1.52	Stability below buttress	59 & 60
HAS17A-IN	17-17′	Bedding 60′ Below Toe	Janbu's	1.50	1.43	Landslide removed and fill added at toe	61 & 62
HAS17B-IN	17-17′	Toe Bedding Plane Top	Janbu's	1.78	1.68	Landslide removed and fill added at toe	63 & 64
HAS17C-IN	17-17′	Upper Bedding Plane	Janbu's	1.43	~	Landslide removed and fill added at toe	65
HAS17D-IN	17-17′	Upper Bedding Plane	Janbu's	1.81	~	Landslide removed and fill added at toe and ridge peak removed	66
HAS17E-IN	17-17′	Mid Low Bedding Plane	Janbu's	1.54	1.48	Landslide removed and fill added at toe and ridge peak removed	67 & 68
HAS17F-IN	17-17′	Toe Bedding Plane	Janbu's	2.06	~	Landslide removed and fill added at toe and ridge peak removed	69
HAS17G-IN	17-17′	Lower Bedding Plane	Janbu's	1.68	~	Landslide removed and fill added at toe and ridge peak removed	70
--	17-17′	Mid Low Bedding Plane	OMS	1.67	1.58	Landslide removed and fill added at toe and ridge peak removed	71 & 72
HAS18FA-IN	18-18′	Circular Top Search	Bishop's Modified	2.31	1.54	Highest fill slope - gross stability	73 & 74
HAS26A-IN	26-26′	Toe Bedding Plane	Janbu's	1.30	~	Major cut of upper natural slope at top	75
HAS26B-IN	26-26′	Toe Bedding Plane	Janbu's	1.49	~	Major cut of upper natural slope at top - added 55′ bench and 2:1 slope below pad level	76

HAS26C-IN	26-26′	Toe Bedding Plane	Janbu's	1.70	~	Major cut of upper natural slope at top - added 10′ & 50′ benches and three 2:1 slopes below pad level	77
HAS26D-IN	26-26′	Upper Bedding Plane	Janbu's	2.09	~	Major cut of upper natural slope at top - added 10′ & 50′ benches and three 2:1 slopes below pad level	78
HAS26E-IN	26-26′	Bedding Plane 30′ Below Toe	Janbu's	1.61	1.70	Major cut of upper natural slope at top - added 10′ & 50′ benches and three 2:1 slopes below pad level	79 & 80
--	26-26′	Bedding Plane 30′ Below Toe	OMS	1.68	1.70	Major cut of upper natural slope at top - added 10′ & 50′ benches and three 2:1 slopes below pad level	81 & 82
(Not saved)	26-26′	Lower Bedding Plane	Janbu's	<1.25	~	Temporary stability of backcut slope for large buttress option - bedding plane on inner face of key	83
HAS26X-IN	26-26′	Bedding Plane at Key's Inner Corner	Janbu's	1.18	~	Temporary stability of backcut slope for large buttress option	84
HAS26F.IN	26-26′	Bedding Plane at Key's Inner Corner	Janbu's	1.43	~	Temporary stability of flattened backcut slope for large buttress option	85
--	26-26′	Bedding Plane at Key's Inner Corner	OMS	1.45	~	Temporary stability of backcut slope for large buttress option	86
HAS26G-IN	26-26′	Deeper Bedding Plane and thru buttress	Janbu's	3.33	2.00	Stability through buttress	87 & 88
HAS26H-IN	26-26′	Bedding Plane Below Buttress	Janbu's	2.22	1.51	Stability below buttress	89 & 90
--	25-25′	Circular Search	Bishop's Modified	2.68	--	Rapid drawdown analysis of desilting basin	91
--	--	4′ Below Surface	Infinite Slope	1.50 1.60	--	Surficial stability of fill slope and natural slope (TQs), respectively	

(1) The above results for static conditions are based upon residual, site-specific shear strength test results indicated below, as applicable:

Compacted Fill	Phi = 28 deg; c = 600 psf
Cross Bedding	Phi = 34 deg; c = 600 psf
Bedding Plane(s)	Phi = 20 deg; c = 200psf
Landslide Plane	Phi = 7 deg; c = 290 psf
Landslide Debris	Phi = 25 deg; c = 100 psf
Alluvium	Phi = 37.8 deg; c = 160 psf
Slopewash	Phi = 15.7 deg; c = 150 psf
Terrace Deposits	Phi = 30.5 deg; c = 10 psf

(2) Based on peak shear strength values for short-term simulated earthquake loading. For peak values, see specific computer output sheets and Table of "Summary of Shear Strength Test Data".

TABLE F-2

ANALYSIS OF INFINITE SLOPE WITH PARALLEL SEEPAGE

By: EC Date: 1/19/99

Project: TT 52584 - Hasley Canyon Project No.: 99-1617-4

Required vertical depth of saturation (LA County) = h = 4 feet Slope: 2:1(h:v)

$$FS = [c' + (Gamma_t - Gamma_{H2O})*h*Cos^2Alpha*TanPhi']/(Gamma_t*h*CosAlpha*SinAlpha)$$

c' (psf)	Phi' (deg)	$Gamma_{t\ (pcf)}$	$Gamma_{H2O\ (pcf)}$	h (ft)	Alpha (deg)	Safety Factor	Comments
130	40.3	123	62.4	4	26.6	**1.5**	**Lower-bound strength values(1)**
310	40	123	62.4	4	26.6	**2.4**	w/additional strength data for fill
230	29.5	120	62.4	4	30.5	**1.6**	**Lower-bound cohesion for TQs**
							steepest natural slope
320	24.6	119	62.4	4	30.5	**1.9**	w/additional strength data for TQs

(1): Strength parameters correspond to lower-bound residual values from site-specific tests on specimens remolded to 90% Relative Compaction.

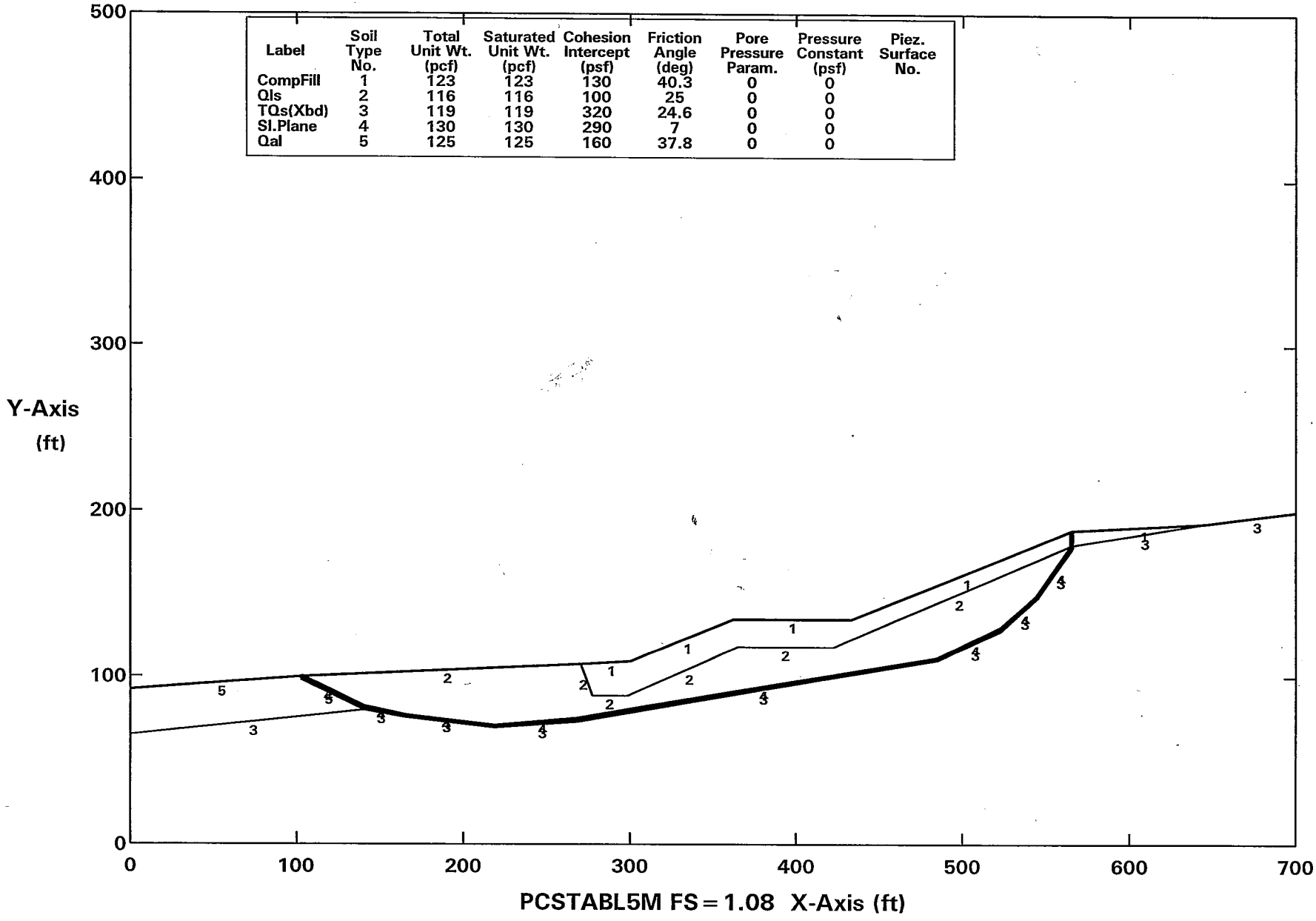
STABILITY ANALYSIS

FOR CROSS SECTION 7-7'

TT52584-Hasley Cny-Sec.7-7'-Cut over Qls-L/slide analysis-Full slide plane-Statc

Specified Surface. C:HAS7A.PLT By: EC 1/15/99 2:28pm

Label	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
CompFill	1	123	123	130	40.3	0	0	
Qls	2	116	116	100	25	0	0	
TQs(Xbd)	3	119	119	320	24.6	0	0	
Sl.Plane	4	130	130	290	7	0	0	
Qal	5	125	125	160	37.8	0	0	



Run #1

Run #1

** PCSTABL5M **

by
Purdue University

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date: 1/15/99
Time of Run: 2:28pm
Run By: EC
Input Data Filename: C:HAS7A.IN
Output Filename: C:HAS7A.OUT
Plotted Output Filename: C:HAS7A.PLT

PROBLEM DESCRIPTION TT52584-Hasley Cny-Sec.7-7'-Cut over Qls
-L/slide analysis-Full slide plane-Statc

BOUNDARY COORDINATES

8 Top Boundaries
31 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	.00	92.00	102.00	100.00	5
2	102.00	100.00	270.00	108.00	2
3	270.00	108.00	300.00	109.00	1
4	300.00	109.00	362.00	135.00	1
5	362.00	135.00	433.00	135.00	1
6	433.00	135.00	565.00	189.00	1
7	565.00	189.00	645.00	193.00	1
8	645.00	193.00	700.00	200.00	3
9	270.00	108.00	277.00	88.00	2
10	277.00	88.00	298.00	88.00	2
11	298.00	88.00	365.00	118.00	2
12	365.00	118.00	423.00	118.00	2
13	423.00	118.00	565.00	180.00	2
14	565.00	180.00	645.00	193.00	3
15	102.00	100.00	140.00	82.00	4
16	140.00	82.00	165.00	77.00	4
17	165.00	77.00	219.00	71.00	4
18	219.00	71.00	268.00	75.00	4
19	268.00	75.00	485.00	112.00	4
20	485.00	112.00	522.00	130.00	4
21	522.00	130.00	544.00	150.00	4
22	544.00	150.00	565.00	180.00	4

Run #1

23	102.00	98.00	140.00	80.00	5
24	140.00	80.00	165.00	75.00	3
25	165.00	75.00	219.00	69.00	3
26	219.00	69.00	268.00	73.00	3
27	268.00	73.00	485.00	110.00	3
28	485.00	110.00	522.00	128.00	3
29	522.00	128.00	544.00	148.00	3
30	544.00	148.00	565.00	178.00	3
31	.00	65.00	140.00	80.00	3

ISOTROPIC SOIL PARAMETERS

5 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	123.0	123.0	130.0	40.3	.00	.0	0
2	116.0	116.0	100.0	25.0	.00	.0	0
3	119.0	119.0	320.0	24.6	.00	.0	0
4	130.0	130.0	290.0	7.0	.00	.0	0
5	125.0	125.0	160.0	37.8	.00	.0	0

Trial Failure Surface Specified By 10 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	102.00	100.00
2	140.00	81.00
3	165.00	76.00
4	219.00	70.00
5	268.00	74.00
6	485.00	111.00
7	522.00	129.00
8	544.00	149.00
9	565.00	179.00
10	565.10	189.01

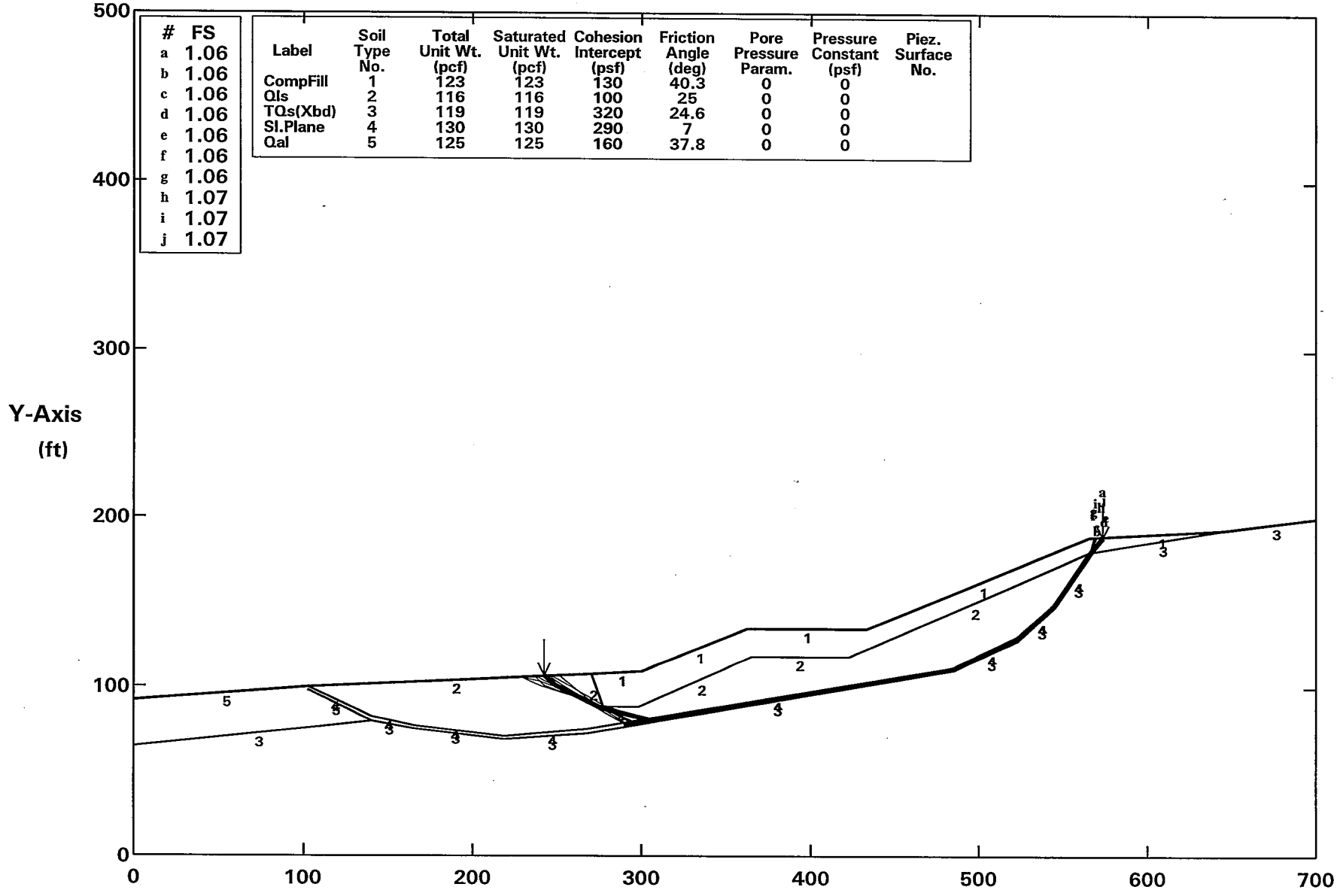
Factor Of Safety For The Preceding Specified Surface = 1.078

TT52584-Hasley Cny-Sec.7-7'-Cut over Qls-L/slide analysis-Downslope search-Statc

Ten Most Critical. C:HAS7B.PLT By: EC 1/15/99 2:33pm

#	FS
a	1.06
b	1.06
c	1.06
d	1.06
e	1.06
f	1.06
g	1.06
h	1.07
i	1.07
j	1.07

Label	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
CompFill	1	123	123	130	40.3	0	0	
Qls	2	116	116	100	25	0	0	
TQs(Xbd)	3	119	119	320	24.6	0	0	
Sl.Plane	4	130	130	290	7	0	0	
Qal	5	125	125	160	37.8	0	0	



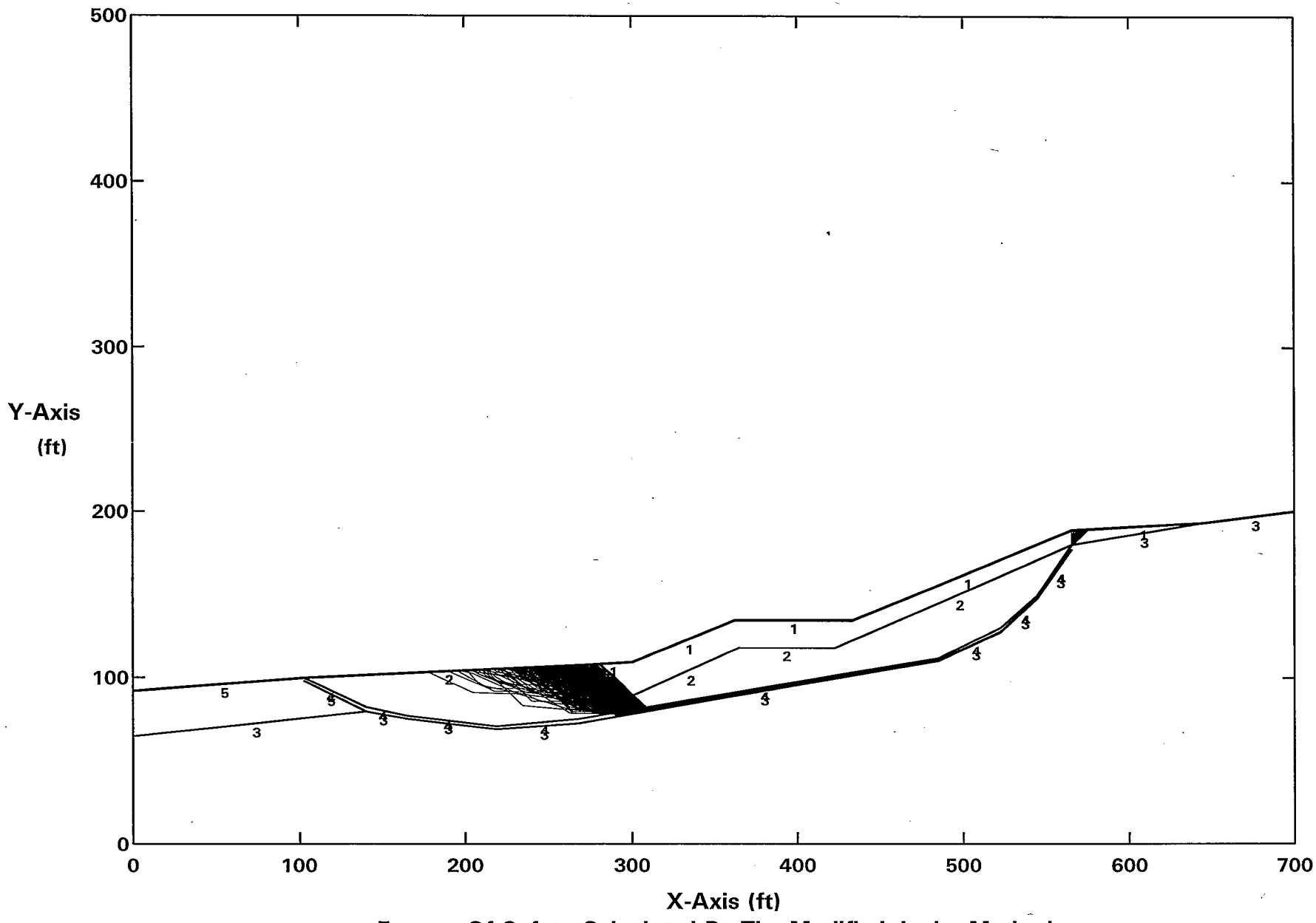
PCSTABL5M FSmin = 1.06 X-Axis (ft)

Factors Of Safety Calculated By The Modified Janbu Method

Run #2

TT52584-Hasley Cny-Sec.7-7'-Cut over Qls-L/slide analysis-Downslope search-Statc

All surfaces evaluated. C:HAS7B.PLT By: EC 1/15/99 2:33pm



Factors Of Safety Calculated By The Modified Janbu Method

Run #2

Run #2

** PCSTABL5M **

by
Purdue University

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date: 1/15/99
Time of Run: 2:33pm
Run By: EC
Input Data Filename: C:HAS7B.IN
Output Filename: C:HAS7B.OUT
Plotted Output Filename: C:HAS7B.PLT

PROBLEM DESCRIPTION TT52584-Hasley Cny-Sec.7-7'-Cut over Qls
-L/slide analysis-Downslope search-Statc

BOUNDARY COORDINATES

8 Top Boundaries
31 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	.00	92.00	102.00	100.00	5
2	102.00	100.00	270.00	108.00	2
3	270.00	108.00	300.00	109.00	1
4	300.00	109.00	362.00	135.00	1
5	362.00	135.00	433.00	135.00	1
6	433.00	135.00	565.00	189.00	1
7	565.00	189.00	645.00	193.00	1
8	645.00	193.00	700.00	200.00	3
9	270.00	108.00	277.00	88.00	2
10	277.00	88.00	298.00	88.00	2
11	298.00	88.00	365.00	118.00	2
12	365.00	118.00	423.00	118.00	2
13	423.00	118.00	565.00	180.00	2
14	565.00	180.00	645.00	193.00	3
15	102.00	100.00	140.00	82.00	4
16	140.00	82.00	165.00	77.00	4
17	165.00	77.00	219.00	71.00	4
18	219.00	71.00	268.00	75.00	4
19	268.00	75.00	485.00	112.00	4
20	485.00	112.00	522.00	130.00	4
21	522.00	130.00	544.00	150.00	4
22	544.00	150.00	565.00	180.00	4

Run #2

23	102.00	98.00	140.00	80.00	5
24	140.00	80.00	165.00	75.00	3
25	165.00	75.00	219.00	69.00	3
26	219.00	69.00	268.00	73.00	3
27	268.00	73.00	485.00	110.00	3
28	485.00	110.00	522.00	128.00	3
29	522.00	128.00	544.00	148.00	3
30	544.00	148.00	565.00	178.00	3
31	.00	65.00	140.00	80.00	3

ISOTROPIC SOIL PARAMETERS

5 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	123.0	123.0	130.0	40.3	.00	.0	0
2	116.0	116.0	100.0	25.0	.00	.0	0
3	119.0	119.0	320.0	24.6	.00	.0	0
4	130.0	130.0	290.0	7.0	.00	.0	0
5	125.0	125.0	160.0	37.8	.00	.0	0

Janbus Empirical Coef is being used for the case of c & phi both > 0

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Sliding Block Surfaces, Has Been Specified.

400 Trial Surfaces Have Been Generated.

5 Boxes Specified For Generation Of Central Block Base

Length Of Line Segments For Active And Passive Portions Of Sliding Block Is 30.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	290.00	77.70	310.00	81.20	.10
2	485.00	111.00	485.00	111.00	.00
3	522.00	129.00	522.00	129.00	.00
4	544.00	149.00	544.00	149.00	.00
5	565.00	179.00	565.00	179.00	.00

Factor Of Safety Calculation Has Gone Through Ten Iterations

Run #2

The Trial Failure Surface In Question Is Defined
By The Following 8 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	274.16	108.14
2	287.26	102.13
3	308.48	80.91
4	485.00	111.00
5	522.00	129.00
6	544.00	149.00
7	565.00	179.00
8	569.51	189.23

Factor Of Safety For The Preceding Specified Surface = 1.327

Factor Of Safety Calculation Has Gone Through Ten Iterations

The Trial Failure Surface In Question Is Defined
By The Following 8 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	279.03	108.30
2	286.21	101.98
3	307.45	80.79
4	485.00	111.00
5	522.00	129.00
6	544.00	149.00
7	565.00	179.00
8	571.30	189.32

Factor Of Safety For The Preceding Specified Surface = 1.339

Factor Of Safety Calculation Has Gone Through Ten Iterations

The Trial Failure Surface In Question Is Defined
By The Following 8 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	276.00	108.20
2	287.31	102.11
3	308.53	80.91
4	485.00	111.00
5	522.00	129.00
6	544.00	149.00
7	565.00	179.00
8	570.91	189.30

Factor Of Safety For The Preceding Specified Surface = 1.326

Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Examined. They Are Ordered - Most Critical
First.

* * Safety Factors Are Calculated By The Modified Janbu Method * *

Failure Surface Specified By 9 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	242.57	106.69
2	249.08	100.22
3	276.15	87.27
4	305.34	80.34
5	485.00	111.00
6	522.00	129.00
7	544.00	149.00
8	565.00	179.00
9	573.55	189.43

*** 1.060 ***

Individual data on the 18 slices

Run #2

Slice No.	Width Ft(m)	Weight Lbs(kg)	Water Force Top Lbs(kg)	Water Force Bot Lbs(kg)	Tie Force Norm Lbs(kg)	Tie Force Tan Lbs(kg)	Earthquake Force Hor Lbs(kg)	Earthquake Force Ver Lbs(kg)	Surcharge Load Lbs(kg)
1	6.5	2563.5	.0	.0	.0	.0	.0	.0	.0
2	20.9	29815.8	.0	.0	.0	.0	.0	.0	.0
3	6.1	14189.3	.0	.0	.0	.0	.0	.0	.0
4	.9	2196.0	.0	.0	.0	.0	.0	.0	.0
5	21.0	61513.1	.0	.0	.0	.0	.0	.0	.0
6	2.0	6579.9	.0	.0	.0	.0	.0	.0	.0
7	2.8	9653.4	.0	.0	.0	.0	.0	.0	.0
8	2.5	9152.6	.0	.0	.0	.0	.0	.0	.0
9	56.7	257819.4	.0	.0	.0	.0	.0	.0	.0
10	3.0	15981.6	.0	.0	.0	.0	.0	.0	.0
11	58.0	273681.8	.0	.0	.0	.0	.0	.0	.0
12	10.0	40302.3	.0	.0	.0	.0	.0	.0	.0
13	52.0	240760.1	.0	.0	.0	.0	.0	.0	.0
14	37.0	191452.7	.0	.0	.0	.0	.0	.0	.0
15	22.0	96021.7	.0	.0	.0	.0	.0	.0	.0
16	21.0	52095.8	.0	.0	.0	.0	.0	.0	.0
17	.9	1097.9	.0	.0	.0	.0	.0	.0	.0
18	7.6	4161.0	.0	.0	.0	.0	.0	.0	.0

Failure Surface Specified By 8 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	243.13	106.72
2	266.13	93.32
3	291.95	78.05
4	485.00	111.00
5	522.00	129.00
6	544.00	149.00
7	565.00	179.00
8	569.27	189.21

*** 1.061 ***

Failure Surface Specified By 8 Coordinate Points

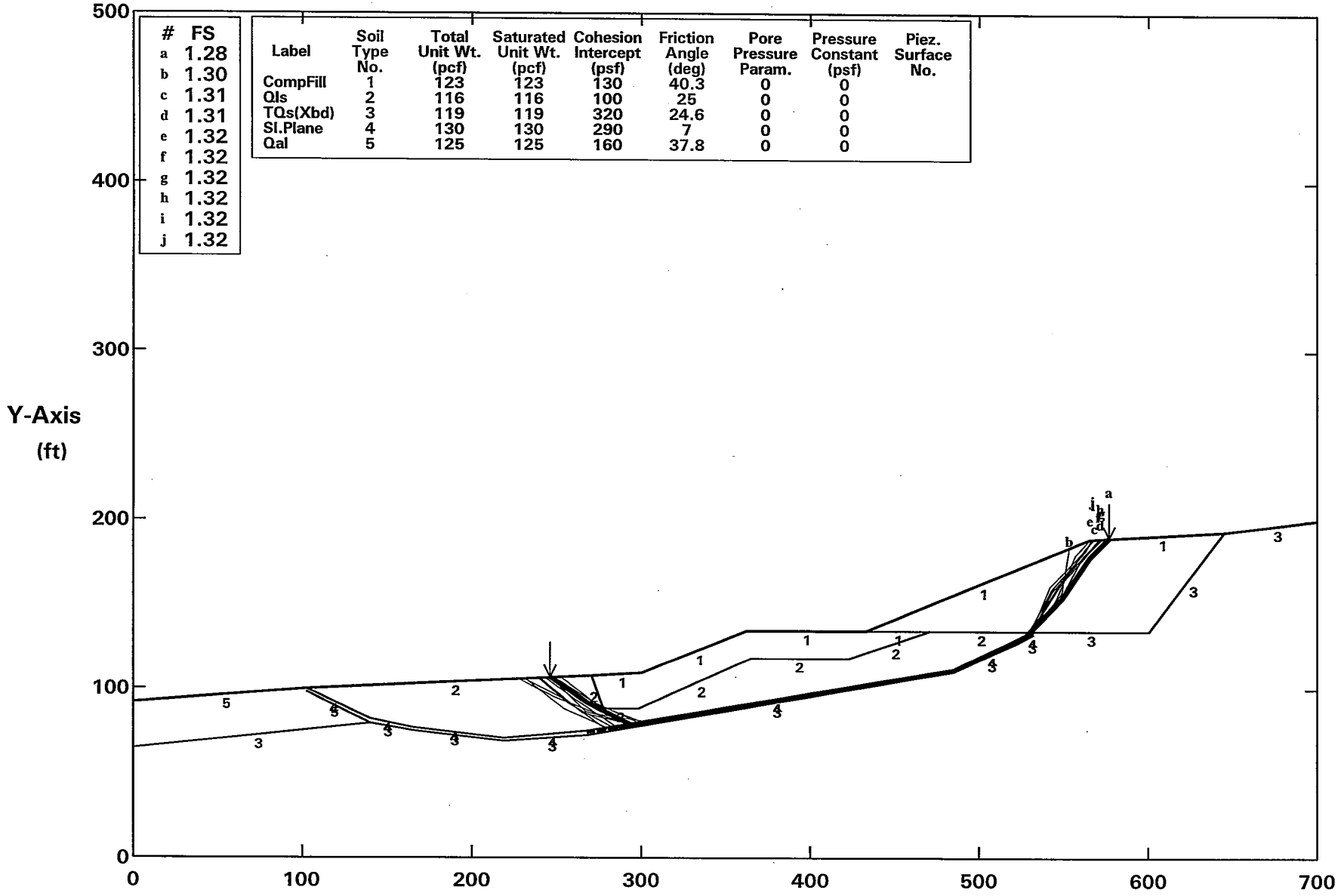
Point No.	X-Surf (ft)	Y-Surf (ft)
1	243.13	106.72
2	266.13	93.32
3	291.95	78.05
4	485.00	111.00
5	522.00	129.00
6	544.00	149.00

TT52584-Hasley Cny-Sec.7-7'-Cut & upper 1/2 of slide replaced w/Cef-Static

Ten Most Critical. C:HAS7C.PLT By: EC 1/15/99 2:43pm

#	FS
a	1.28
b	1.30
c	1.31
d	1.31
e	1.32
f	1.32
g	1.32
h	1.32
i	1.32
j	1.32

Label	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
CompFill	1	123	123	130	40.3	0	0	
Qls	2	116	116	100	25	0	0	
TQs(Xbd)	3	119	119	320	24.6	0	0	
Sl.Plane	4	130	130	290	7	0	0	
Qal	5	125	125	160	37.8	0	0	



PCSTABL5M FSmin = 1.28 X-Axis (ft)

Factors Of Safety Calculated By The Modified Janbu Method

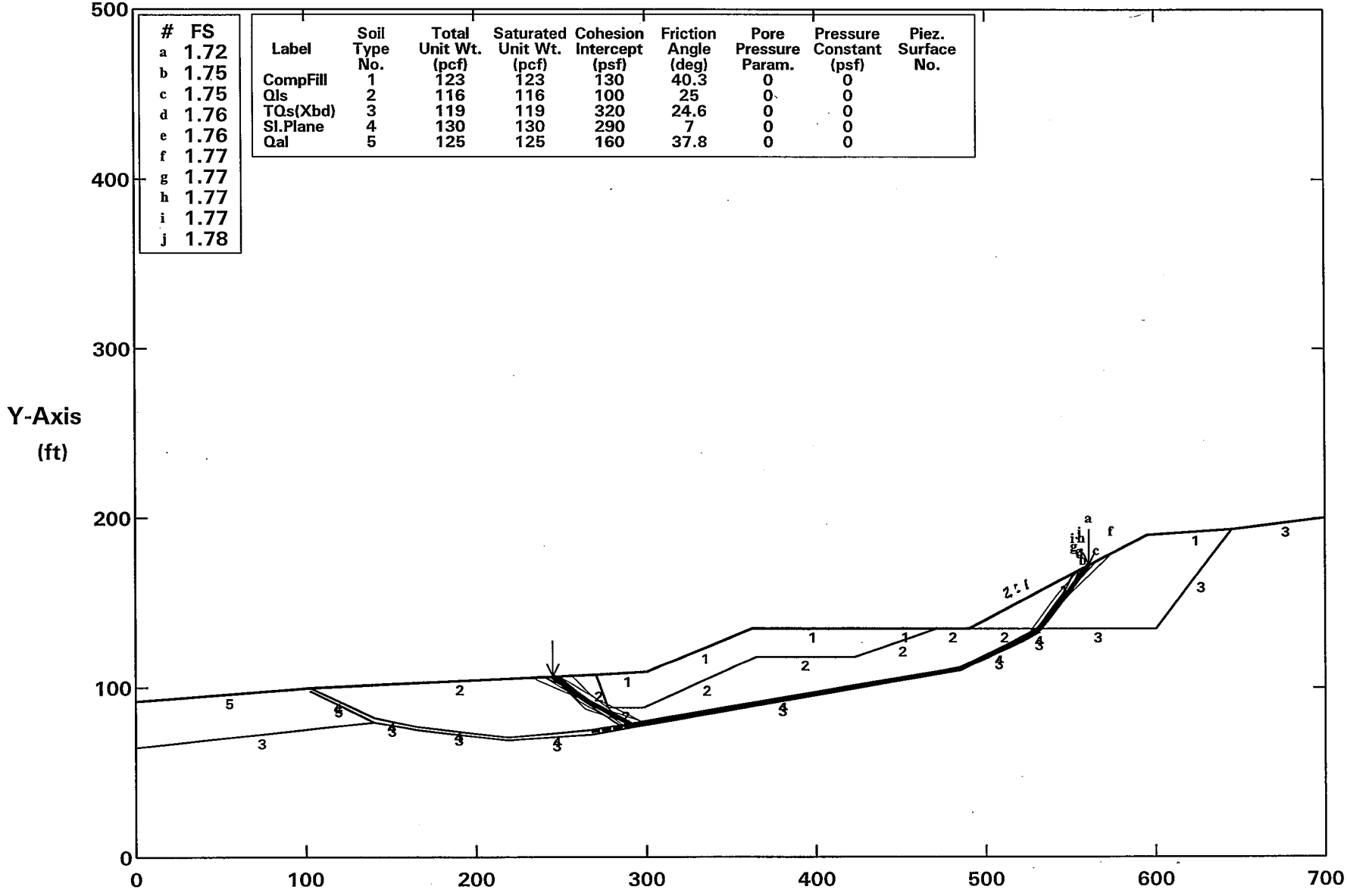
Run #3

TT52584-Hasley Cny-Sec.7-7'-Cut & part of 1/2 of slide replaced w/Cef-Static

Ten Most Critical. C:HAS7D.PLT By: EC 1/15/99 2:07pm

#	FS
a	1.72
b	1.75
c	1.75
d	1.76
e	1.76
f	1.77
g	1.77
h	1.77
i	1.77
j	1.78

Label	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
CompFill	1	123	123	130	40.3	0	0	
Qls	2	116	116	100	25	0	0	
TQs(Xbd)	3	119	119	320	24.6	0	0	
Sl.Plane	4	130	130	290	7	0	0	
Qal	5	125	125	160	37.8	0	0	



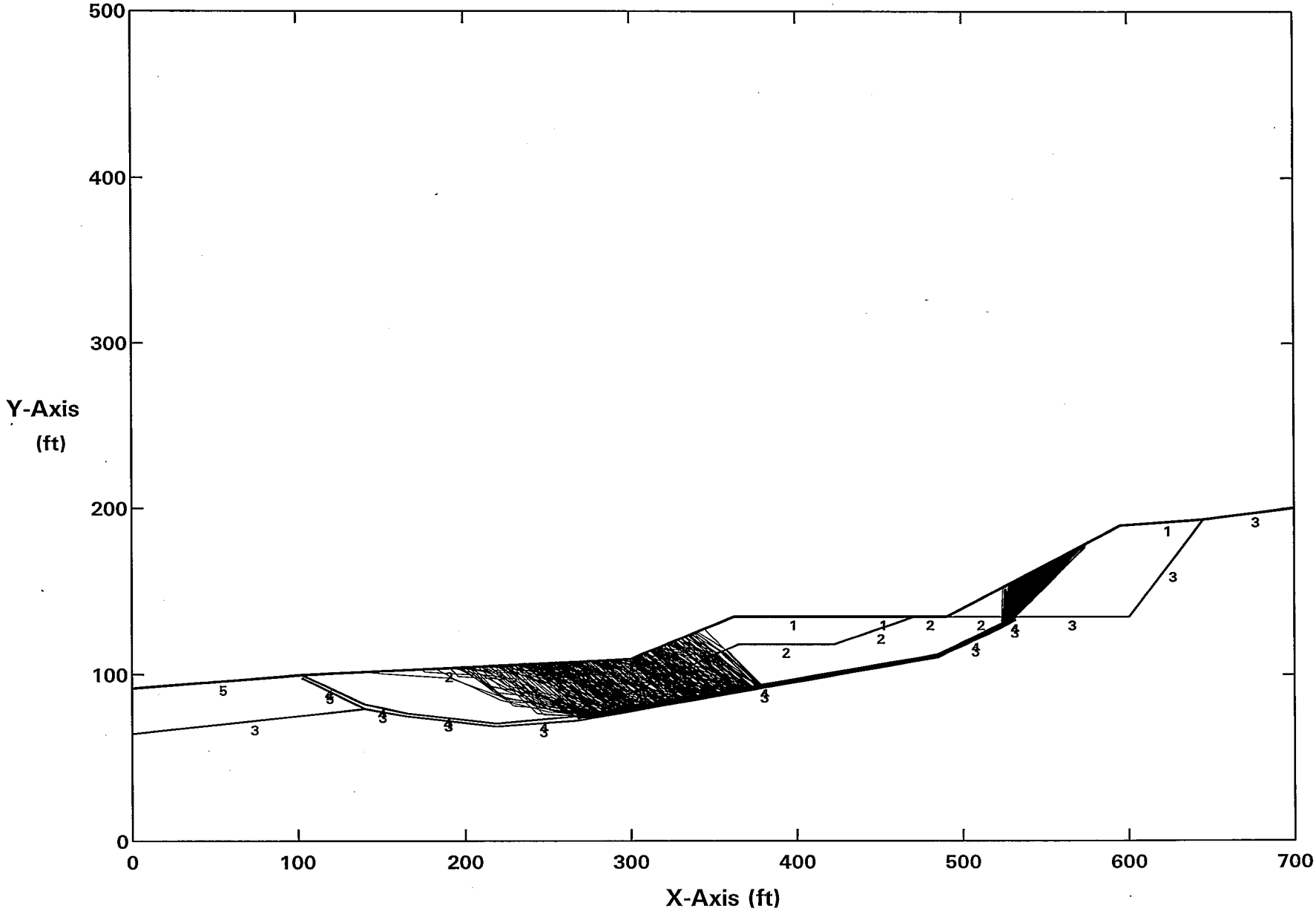
PCSTABL5M FSmin = 1.72 X-Axis (ft)

Factors Of Safety Calculated By The Modified Janbu Method

Run #4

TT52584-Hasley Cny-Sec.7-7'-Cut & part of 1/2 of slide replaced w/Cef-Static

All surfaces evaluated. C:HAS7D.PLT By: EC 1/15/99 2:07pm

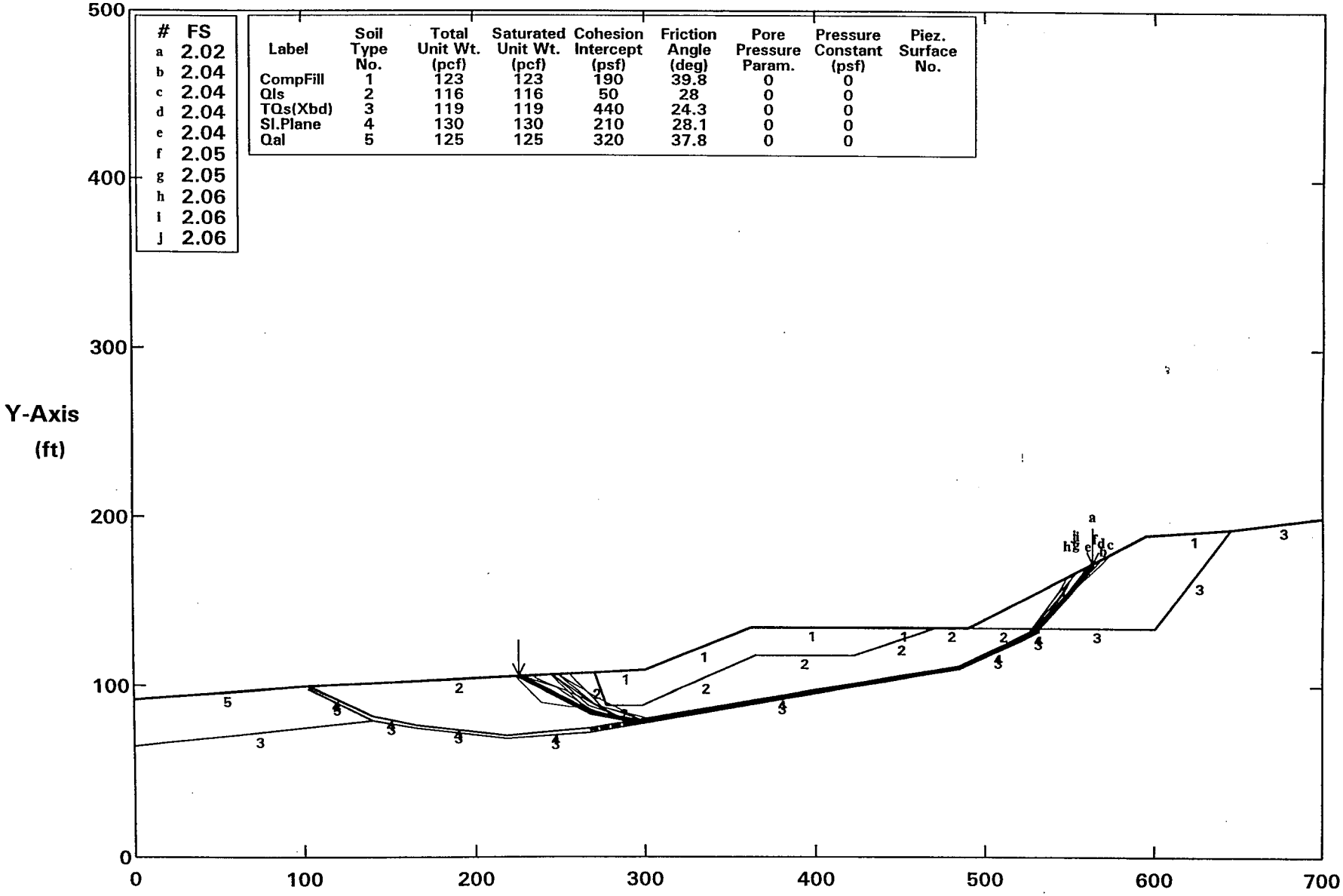


Factors Of Safety Calculated By The Modified Janbu Method

Run # 4

TT52584-Hasley Cny-Sec.7-7'-Cut & part of 1/2 of slide replaced w/Cef-Seismic

Ten Most Critical. C:HAS7D'.PLT By: EC 1/15/99 2:04pm



#	FS
a	2.02
b	2.04
c	2.04
d	2.04
e	2.04
f	2.05
g	2.05
h	2.06
i	2.06
j	2.06

Label	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
CompFill	1	123	123	190	39.8	0	0	
Qls	2	116	116	50	28	0	0	
TQs(Xbd)	3	119	119	440	24.3	0	0	
Sl.Plane	4	130	130	210	28.1	0	0	
Qal	5	125	125	320	37.8	0	0	

PCSTABL5M FSmin = 2.02 X-Axis (ft)

Factors Of Safety Calculated By The Modified Janbu Method

Run # 5

Run # 4

** PCSTABL5M **

by
Purdue University

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date:	1/15/99
Time of Run:	2:07pm
Run By:	EC
Input Data Filename:	C:HAS7D.IN
Output Filename:	C:HAS7D.OUT
Plotted Output Filename:	C:HAS7D.PLT

PROBLEM DESCRIPTION TT52584-Hasley Cny-Sec.7-7'-Cut & part of 1/2 of slide replaced w/Cef-Static

BOUNDARY COORDINATES

10 Top Boundaries
33 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	.00	92.00	102.00	100.00	5
2	102.00	100.00	270.00	108.00	2
3	270.00	108.00	300.00	109.00	1
4	300.00	109.00	362.00	135.00	1
5	362.00	135.00	433.00	135.00	1
6	433.00	135.00	471.00	135.00	1
7	471.00	135.00	490.00	135.00	2
8	490.00	135.00	595.00	190.00	1
9	595.00	190.00	645.00	193.00	1
10	645.00	193.00	700.00	200.00	3
11	490.00	135.00	532.00	135.00	2
12	532.00	135.00	600.00	135.00	3
13	600.00	135.00	645.00	193.00	3
14	270.00	108.00	277.00	88.00	2
15	277.00	88.00	298.00	88.00	2
16	298.00	88.00	365.00	118.00	2
17	365.00	118.00	423.00	118.00	2
18	423.00	118.00	471.00	135.00	2
19	102.00	100.00	140.00	82.00	4
20	140.00	82.00	165.00	77.00	4
21	165.00	77.00	219.00	71.00	4
22	219.00	71.00	268.00	75.00	4

Run #4

23	268.00	75.00	485.00	112.00	4
24	485.00	112.00	522.00	130.00	4
25	522.00	130.00	532.00	135.00	4
26	102.00	98.00	140.00	80.00	5
27	140.00	80.00	165.00	75.00	3
28	165.00	75.00	219.00	69.00	3
29	219.00	69.00	268.00	73.00	3
30	268.00	73.00	485.00	110.00	3
31	485.00	110.00	522.00	128.00	3
32	522.00	128.00	532.00	133.00	3
33	.00	65.00	140.00	80.00	3

ISOTROPIC SOIL PARAMETERS

5 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	123.0	123.0	130.0	40.3	.00	.0	0
2	116.0	116.0	100.0	25.0	.00	.0	0
3	119.0	119.0	320.0	24.6	.00	.0	0
4	130.0	130.0	290.0	7.0	.00	.0	0
5	125.0	125.0	160.0	37.8	.00	.0	0

Janbus Empirical Coef is being used for the case of c & phi both > 0

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Sliding Block Surfaces, Has Been Specified.

400 Trial Surfaces Have Been Generated.

4 Boxes Specified For Generation Of Central Block Base

Length Of Line Segments For Active And Passive Portions Of Sliding Block Is 30.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	268.00	74.00	380.00	93.10	.10
2	485.00	111.00	485.00	111.00	.00
3	486.00	111.50	522.00	129.00	.10
4	523.00	129.60	532.00	135.00	.10

Run #4

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Modified Janbu Method * *

Failure Surface Specified By 8 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	244.64	106.79
2	265.57	91.85
3	292.25	78.13
4	485.00	111.00
5	511.62	123.95
6	531.79	134.85
7	550.38	158.39
8	560.83	172.10

*** 1.723 ***

Individual data on the 21 slices

Slice No.	Width Ft(m)	Weight Lbs(kg)	Water Force Top Lbs(kg)	Water Force Bot Lbs(kg)	Tie Force Norm Lbs(kg)	Tie Force Tan Lbs(kg)	Earthquake Force Hor Lbs(kg)	Earthquake Force Ver Lbs(kg)	Surcharge Load Lbs(kg)
1	20.9	19354.5	.0	.0	.0	.0	.0	.0	.0
2	4.4	8833.4	.0	.0	.0	.0	.0	.0	.0
3	7.0	17018.2	.0	.0	.0	.0	.0	.0	.0
4	13.8	43578.7	.0	.0	.0	.0	.0	.0	.0
5	1.5	5381.6	.0	.0	.0	.0	.0	.0	.0
6	5.8	21087.6	.0	.0	.0	.0	.0	.0	.0
7	2.0	7203.2	.0	.0	.0	.0	.0	.0	.0
8	62.0	277222.1	.0	.0	.0	.0	.0	.0	.0
9	3.0	15976.4	.0	.0	.0	.0	.0	.0	.0
10	58.0	273606.6	.0	.0	.0	.0	.0	.0	.0
11	10.0	40323.0	.0	.0	.0	.0	.0	.0	.0
12	38.0	132923.3	.0	.0	.0	.0	.0	.0	.0
13	14.0	41110.8	.0	.0	.0	.0	.0	.0	.0
14	5.0	13284.7	.0	.0	.0	.0	.0	.0	.0
15	21.6	56258.4	.0	.0	.0	.0	.0	.0	.0
16	10.4	27969.6	.0	.0	.0	.0	.0	.0	.0
17	9.8	26482.7	.0	.0	.0	.0	.0	.0	.0
18	.1	162.1	.0	.0	.0	.0	.0	.0	.0
19	.1	159.5	.0	.0	.0	.0	.0	.0	.0
20	18.5	34297.9	.0	.0	.0	.0	.0	.0	.0
21	10.4	5289.5	.0	.0	.0	.0	.0	.0	.0

Run #4

Failure Surface Specified By 8 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	238.83	106.52
2	260.60	93.79
3	285.41	76.92
4	485.00	111.00
5	519.26	127.66
6	530.57	134.15
7	549.82	157.16
8	557.59	170.41

*** 1.748 ***

Failure Surface Specified By 9 Coordinate Points

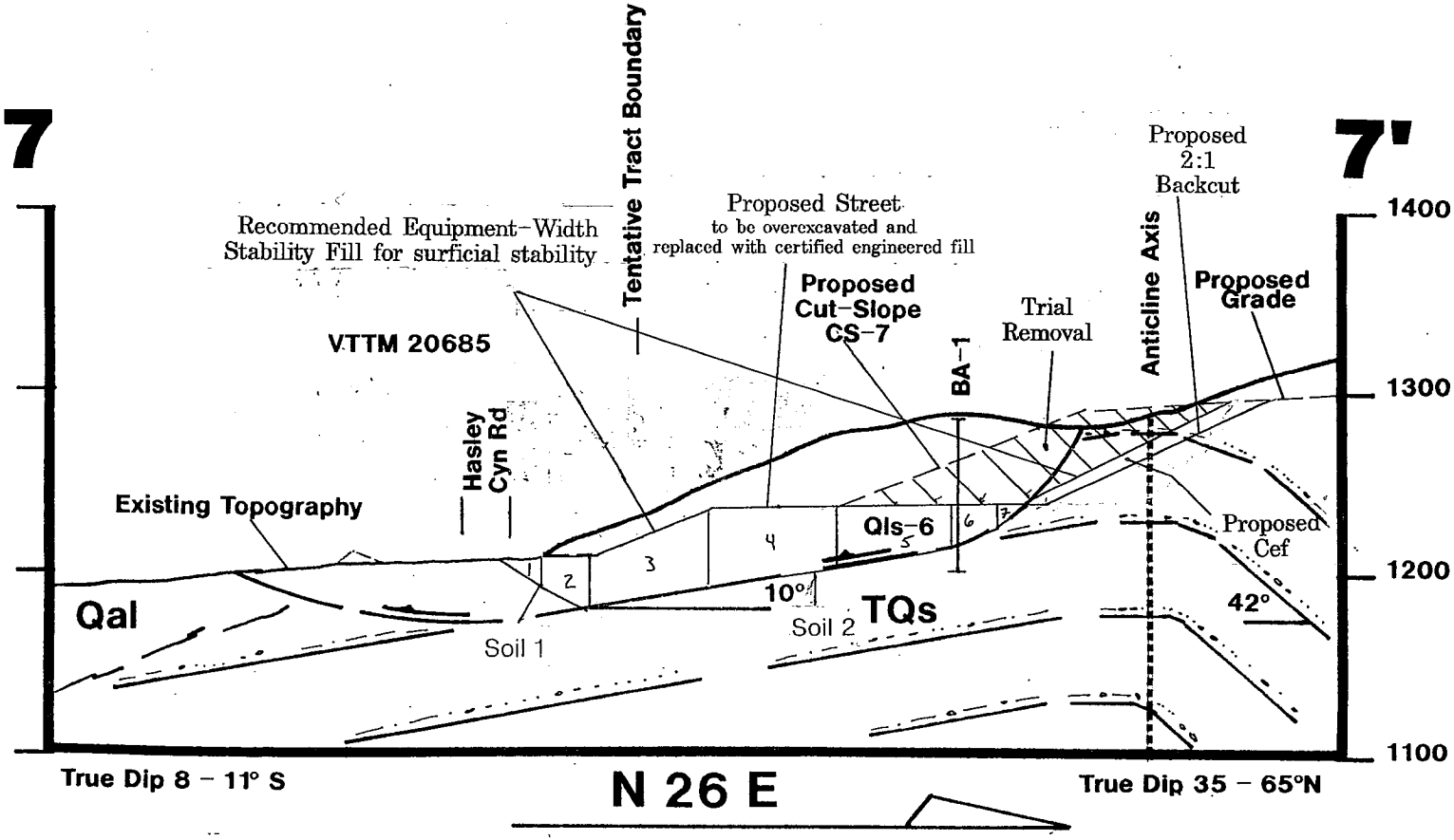
Point No.	X-Surf (ft)	Y-Surf (ft)
1	233.85	106.28
2	235.91	104.30
3	263.59	92.73
4	289.51	77.63
5	485.00	111.00
6	514.68	125.39
7	527.70	132.43
8	547.61	154.87
9	564.82	174.19

*** 1.754 ***

Failure Surface Specified By 8 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	240.09	106.58
2	262.69	94.17
3	287.54	77.36
4	485.00	111.00
5	503.92	120.17
6	526.56	131.72
7	547.77	152.94

CROSS SECTION
OMS STABILITY ANALYSIS



	Static		Pseudostatic	
	C	Ø	C	Ø
Soil 1 (Qls)	100	25	50	28
Soil 2 (Slide Plane)	290	7	210	28.1

ALLAN E. SEWARD
ENGINEERING GEOLOGY

JOB NUMBER: 98-1617-4		DATE: 1/15/99	
SCALE: 1"=100'		DRAWN BY: Staff	
		REVISED:	

Run #7 8

LOS ANGELES COUNTY
DEPARTMENT OF PUBLIC WORKS
LAND DEVELOPMENT DIVISION
GEOTECHNICAL ENGINEERING
ORDINARY METHOD OF SLICES USED FOR ANALYSIS

PROJECT: TT 52584
CONSULTANT: AES
REPORT DATE: 1/ /99
SECTION: 7-7'-Upper half of cut further extended to the slide plane CIRCLE: Along slide & exit near toe- Static DATE: 1/15/99 BY: EC

SLICE	HEIGHT(1)	HEIGHT(2)	WIDTH	AREA	WEIGHT	UNIT WT
1.	0.00	18.00	21.00	189.00	21.92	116.0
2.	18.00	30.00	25.00	600.00	69.60	116.0
3.	30.00	42.00	65.00	2340.00	304.20	130.0
4.	42.00	31.00	70.00	2555.00	332.15	130.0
5.	31.00	22.00	62.00	1643.00	213.59	130.0
6.	22.00	11.00	25.00	412.50	53.63	130.0
7.	11.00	0.00	20.00	110.00	14.30	130.0
8.	0.00	0.00	0.00	0.00	0.00	0.0
9.	0.00	0.00	0.00	0.00	0.00	0.0

SLOPE STABILITY DATA

SEISMIC COEFFICIENT = 0.00 g

SLICE NO.	1 SLICE WEIGHT W (kips)	2 FAILURE PLANE ANGLE i(deg)	3 ANGLE OF INT. FRICTION phi(deg)	4 COHE-SION C (ksf)	5 LENGTH OF ARC L (ft)	6 W (1-Ru) COS i / COS i TAN phi	7 C L / COS i	8 g W (1-Ru) SINi COSi / TAN phi	9 W SIN i / COS i	10 g W COS i / COS i
1.	21.92	-35.00	25.00	0.100	25.64	6.86	2.10	0.00	-10.30	0.00
2.	69.60	-27.00	25.00	0.100	28.06	25.77	2.50	0.00	-28.15	0.00
3.	304.20	10.00	7.00	0.290	66.00	36.22	18.85	0.00	52.02	0.00
4.	332.15	10.00	7.00	0.290	71.08	39.55	20.30	0.00	56.80	0.00
5.	213.59	10.00	7.00	0.290	62.96	25.43	17.98	0.00	36.53	0.00
6.	53.63	22.00	7.00	0.290	26.96	5.66	7.25	0.00	18.63	0.00
7.	14.30	36.00	7.00	0.290	24.72	1.15	5.80	0.00	6.80	0.00
8.	0.00	0.00	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
9.	0.00	0.00	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00

STATIC
FS= 1.63

Run #7

SUMMATION:	140.65	74.78	0.00	132.32	0.00

STATIC SAFETY FACTOR = 1.63

~~SEISMIC SAFETY FACTOR = 1.63~~

Run #7

LOS ANGELES COUNTY
DEPARTMENT OF PUBLIC WORKS
LAND DEVELOPMENT DIVISION
GEOTECHNICAL ENGINEERING
ORDINARY METHOD OF SLICES USED FOR ANALYSIS

PROJECT: TT 52584
CONSULTANT: AES
REPORT DATE: 1/ /99
SECTION: 7-7'-Upper half of cut further extended to the slide plane CIRCLE: Along slide & exiting near toe - Pseudostatic DATE: 1/15 /99 BY: EC

SLICE	HEIGHT(1)	HEIGHT(2)	WIDTH	AREA	WEIGHT	UNIT WT
1.	0.00	18.00	21.00	189.00	21.92	116.0
2.	18.00	30.00	25.00	600.00	69.60	116.0
3.	30.00	42.00	65.00	2340.00	304.20	130.0
4.	42.00	31.00	70.00	2555.00	332.15	130.0
5.	31.00	22.00	62.00	1643.00	213.59	130.0
6.	22.00	11.00	25.00	412.50	53.63	130.0
7.	11.00	0.00	20.00	110.00	14.30	130.0
8.	0.00	0.00	0.00	0.00	0.00	0.0
9.	0.00	0.00	0.00	0.00	0.00	0.0

SLOPE STABILITY DATA

SEISMIC COEFFICIENT = 0.15 g

SLICE NO.	1 SLICE WEIGHT W (kips)	2 FAILURE PLANE ANGLE i(deg)	3 ANGLE OF INT. FRICTION phi(deg)	4 COHE-SION C (ksf)	5 LENGTH OF ARC L (ft)	6 W (1-Ru) COS i COS i TAN phi	7 C L COS i	8 g W (1-Ru) SINi COSi TAN phi	9 W SIN i COS i	10 g W COS i COS i
1.	21.92	-35.00	28.00	0.050	25.64	7.82	1.05	-0.82	-10.30	2.21
2.	69.60	-27.00	28.00	0.050	28.06	29.38	1.25	-2.25	-28.15	8.29
3.	304.20	10.00	28.10	0.210	66.00	157.53	13.65	4.17	52.02	44.25
4.	332.15	10.00	28.10	0.210	71.08	172.00	14.70	4.55	56.80	48.32
5.	213.59	10.00	28.10	0.210	62.96	110.61	13.02	2.93	36.53	31.07
6.	53.63	22.00	28.10	0.210	26.96	24.62	5.25	1.49	18.63	6.91
7.	14.30	36.00	28.10	0.210	24.72	5.00	4.20	0.54	6.80	1.40
8.	0.00	0.00	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00
9.	0.00	0.00	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00

PSEUDOSTATIC
FS = 2

Run #8

SUMMATION:	506.96	53.12	10.61	132.32	142.46

~~STATIC SAFETY FACTOR = 1.23~~

SEISMIC SAFETY FACTOR = 2.00

Run # 8

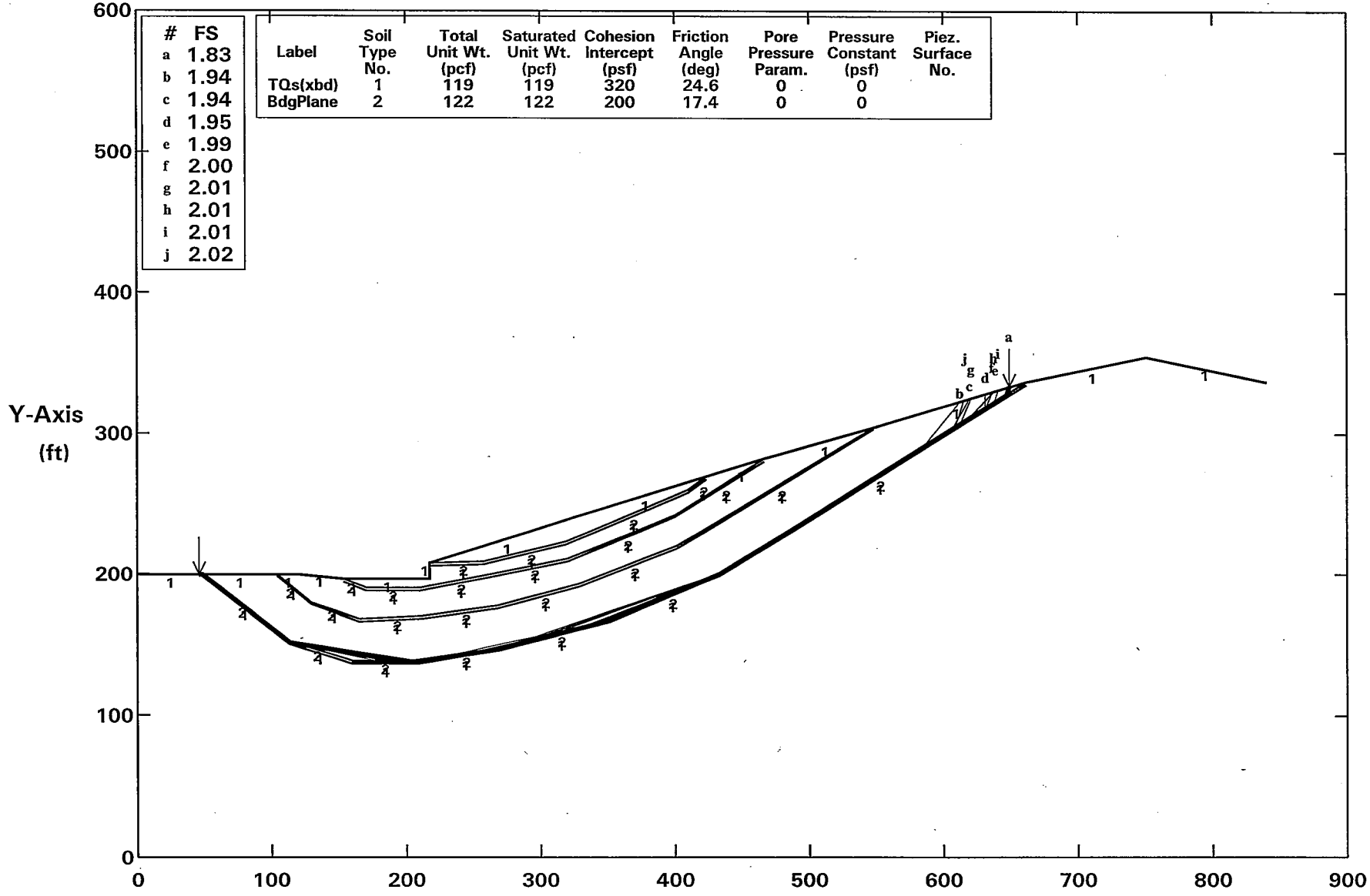
STABILITY ANALYSIS

FOR CROSS SECTION 8-8'

TT52584-Hasley Cny-Sec.8-8'-Plane 60 ft. below toe - Static

FULL PLANE ANALYSIS

Ten Most Critical. C:HAS8A.PLT By: EC 1/22/99 7:11pm



#	FS
a	1.83
b	1.94
c	1.94
d	1.95
e	1.99
f	2.00
g	2.01
h	2.01
i	2.01
j	2.02

Label	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
TQs(xbd)	1	119	119	320	24.6	0	0	
BdgPlane	2	122	122	200	17.4	0	0	

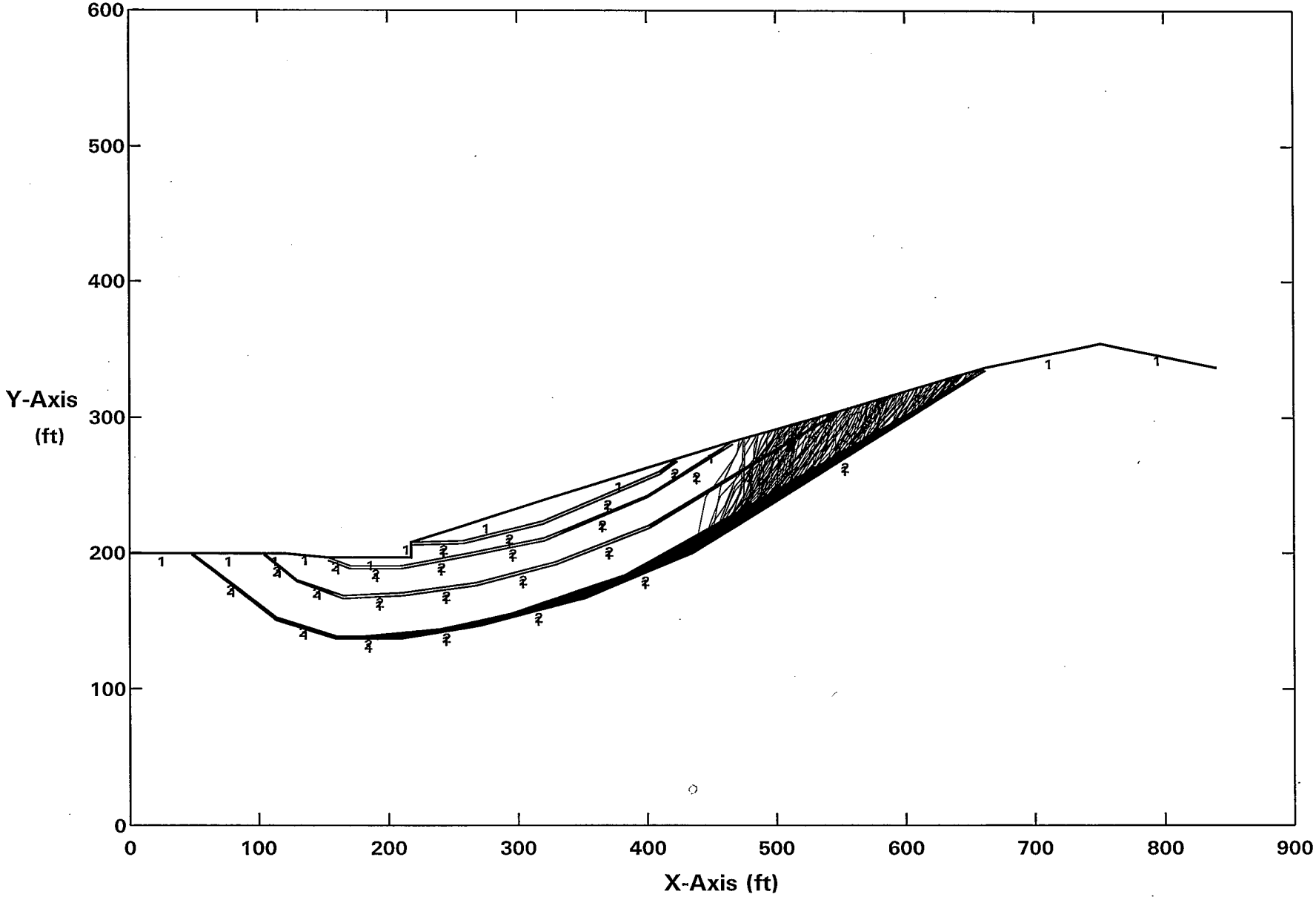
PCSTABL5M FSmin = 1.83 X-Axis (ft)

Factors Of Safety Calculated By The Modified Janbu Method

Run #9

TT52584-Hasley Cny-Sec.8-8'-Plane 60 ft. below toe - Static

All surfaces evaluated. C:HAS8A.PLT By: EC 1/22/99 7:18pm



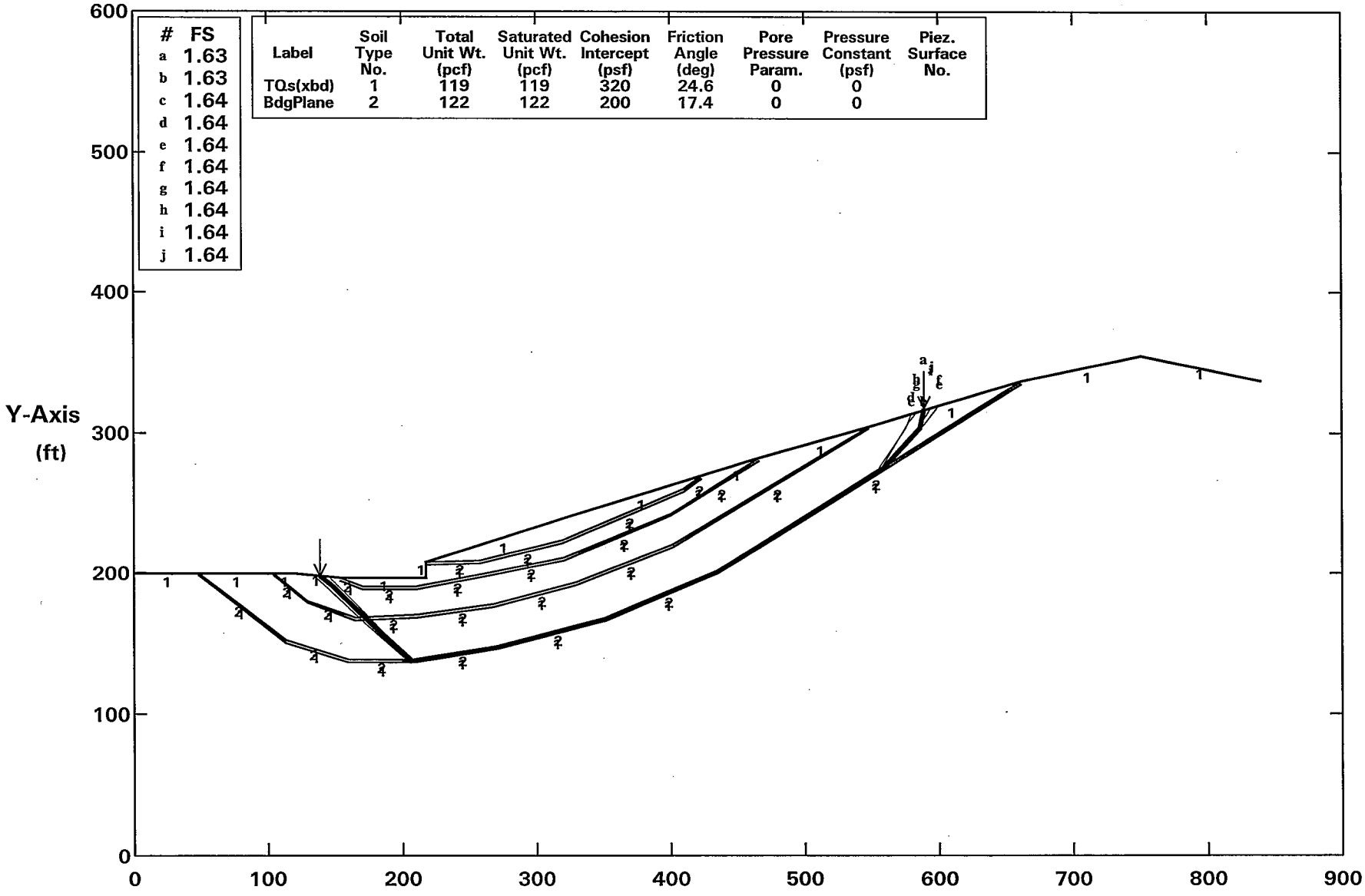
Factors Of Safety Calculated By The Modified Janbu Method

Run #9

TT52584-Hasley Cny-Sec.8-8'-Plane 60 ft. below toe - Static

Ten Most Critical. C:HAS8C.PLT By: EC 1/22/99 7:44pm

PLANE EXIT SEARCH ANALYSIS



#	FS
a	1.63
b	1.63
c	1.64
d	1.64
e	1.64
f	1.64
g	1.64
h	1.64
i	1.64
j	1.64

Label	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
TQs(xbd)	1	119	119	320	24.6	0	0	
BdgPlane	2	122	122	200	17.4	0	0	

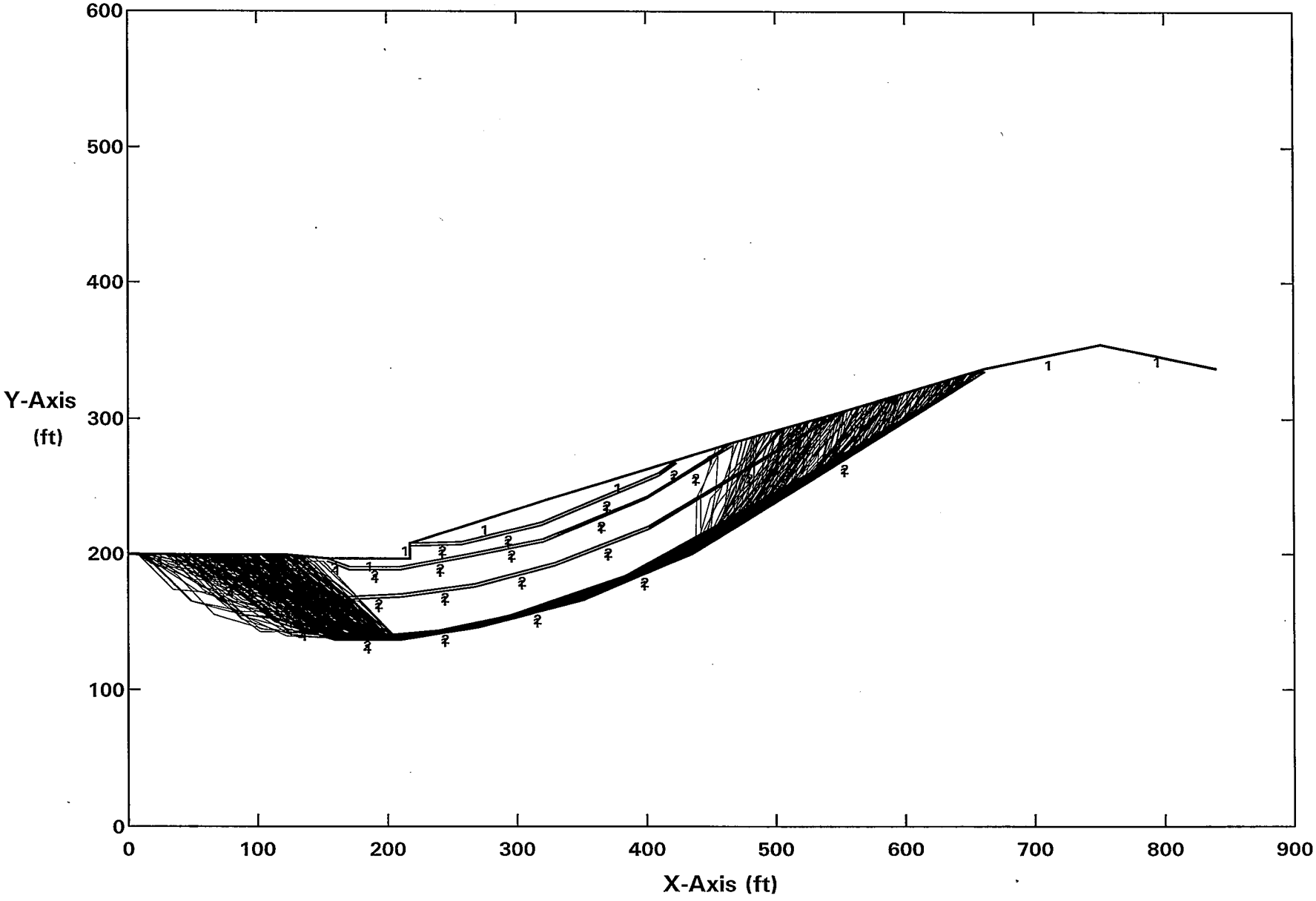
PCSTABL5M FSmin = 1.63 X-Axis (ft)

Factors Of Safety Calculated By The Modified Janbu Method

Run # 10

TT52584-Hasley Cny-Sec.8-8'-Plane 60 ft. below toe - Static

All surfaces evaluated. C:HAS8C.PLT By: EC 1/22/99 7:22pm

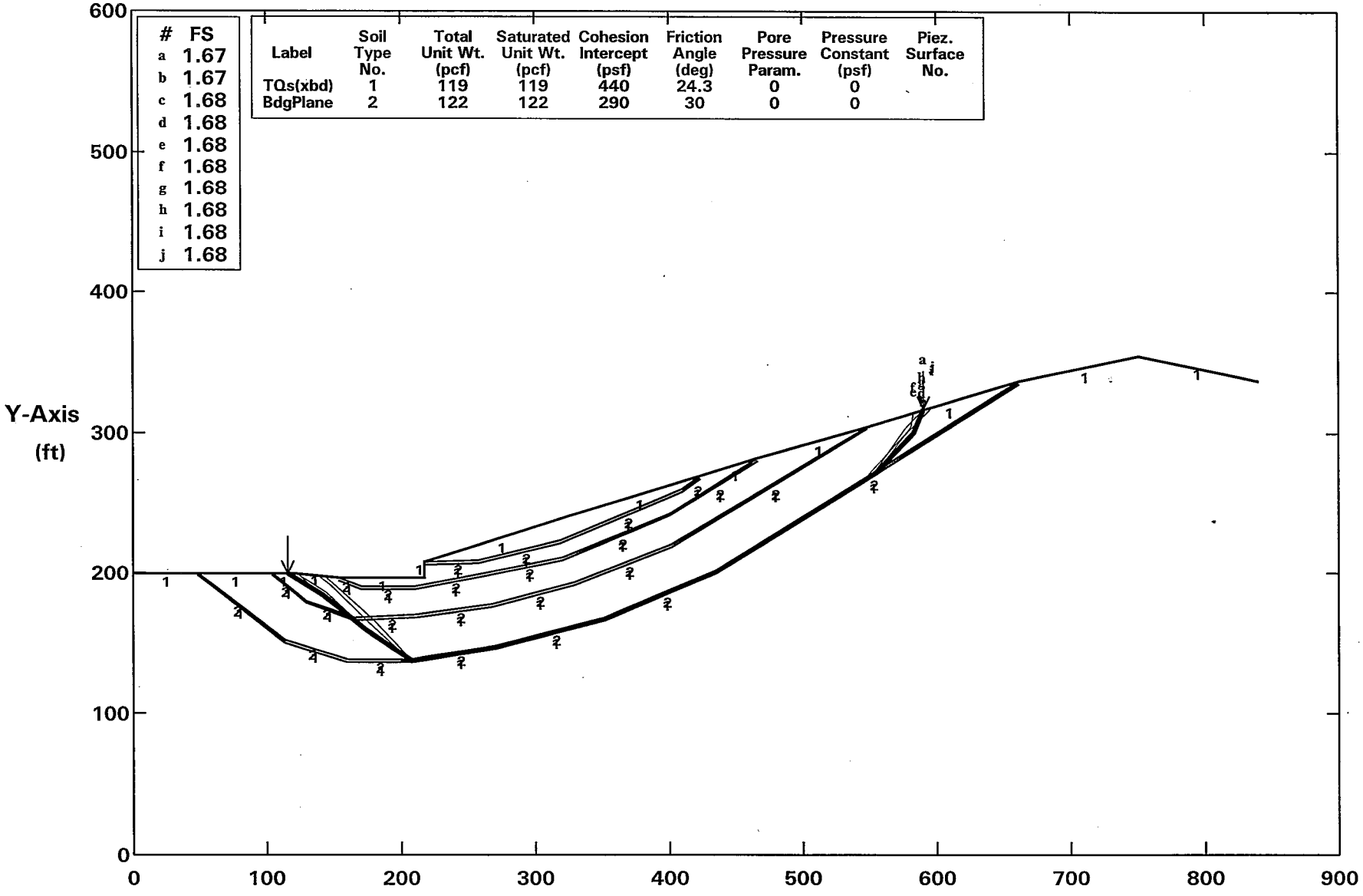


Factors Of Safety Calculated By The Modified Janbu Method

Run #10

TT52584-Hasley Cny-Sec.8-8'-Plane 60 ft. below toe - Pseudostatic

Ten Most Critical. C:HAS8C'.PLT By: EC 1/22/99 7:50pm



#	FS
a	1.67
b	1.67
c	1.68
d	1.68
e	1.68
f	1.68
g	1.68
h	1.68
i	1.68
j	1.68

Label	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
TQs(xbd)	1	119	119	440	24.3	0	0	
BdgPlane	2	122	122	290	30	0	0	

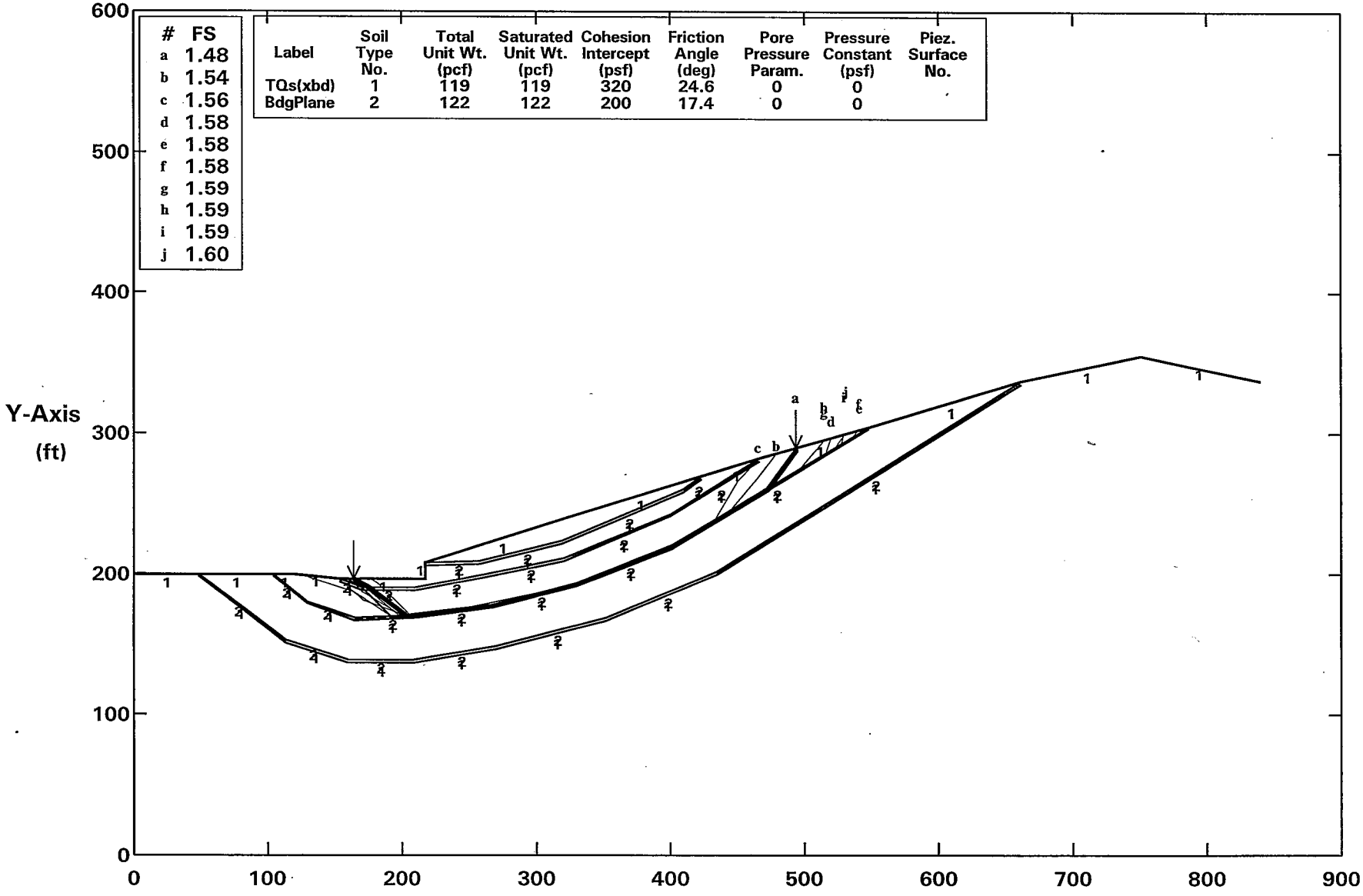
PCSTABL5M FSmin = 1.67 X-Axis (ft)

Factors Of Safety Calculated By The Modified Janbu Method

Run #11

TT52584-Hasley Cny-Sec.8-8'-Plane 30 ft below toe - Static

Ten Most Critical. C:HAS8D.PLT By: EC 1/25/99 2:58pm



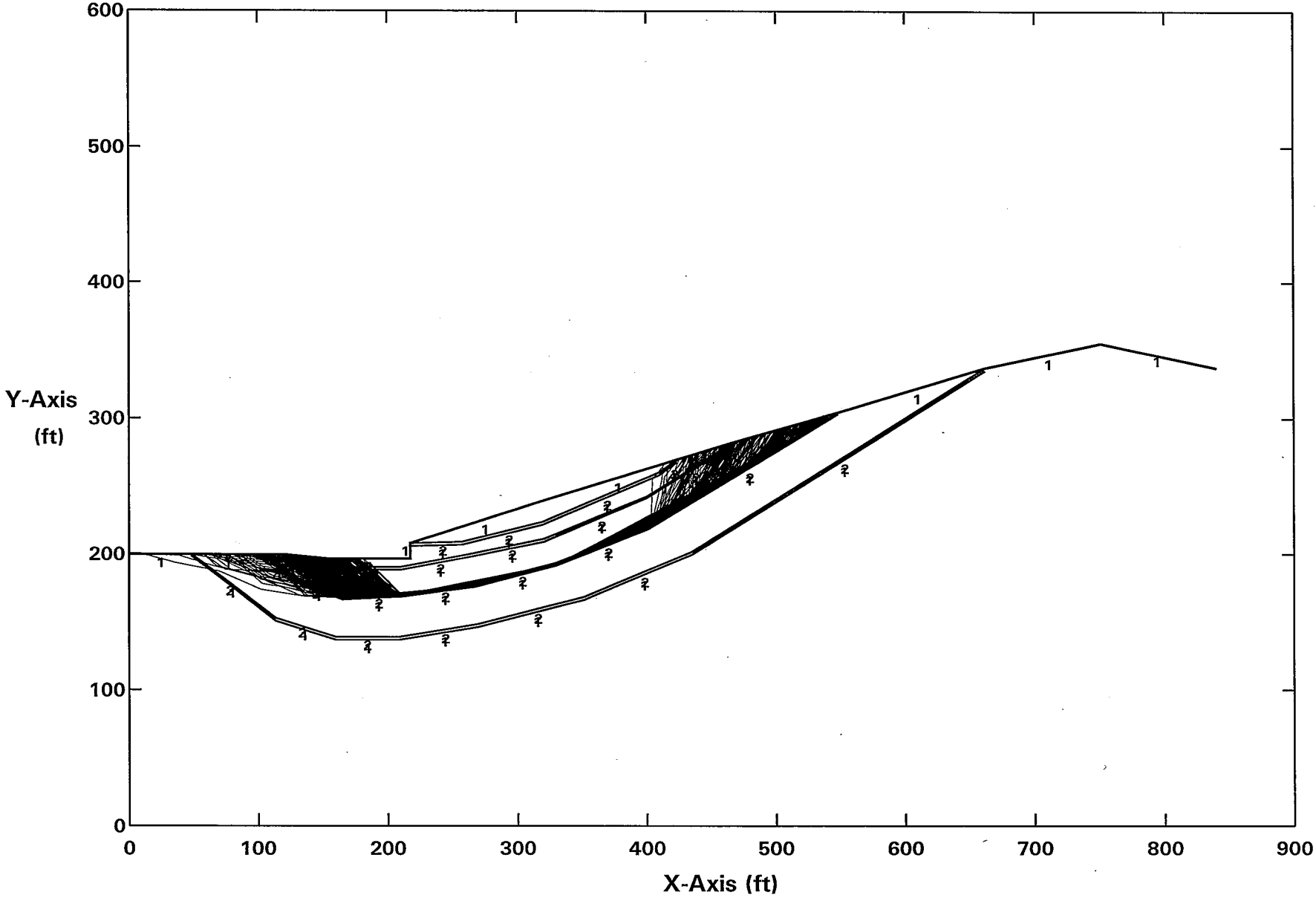
PCSTABL5M FSmin = 1.48 X-Axis (ft)

Factors Of Safety Calculated By The Modified Janbu Method

Run #12

TT52584-Hasley Cny-Sec.8-8'-Plane 30 ft below toe - Static

All surfaces evaluated. C:HAS8D.PLT By: EC 1/25/99 2:58pm

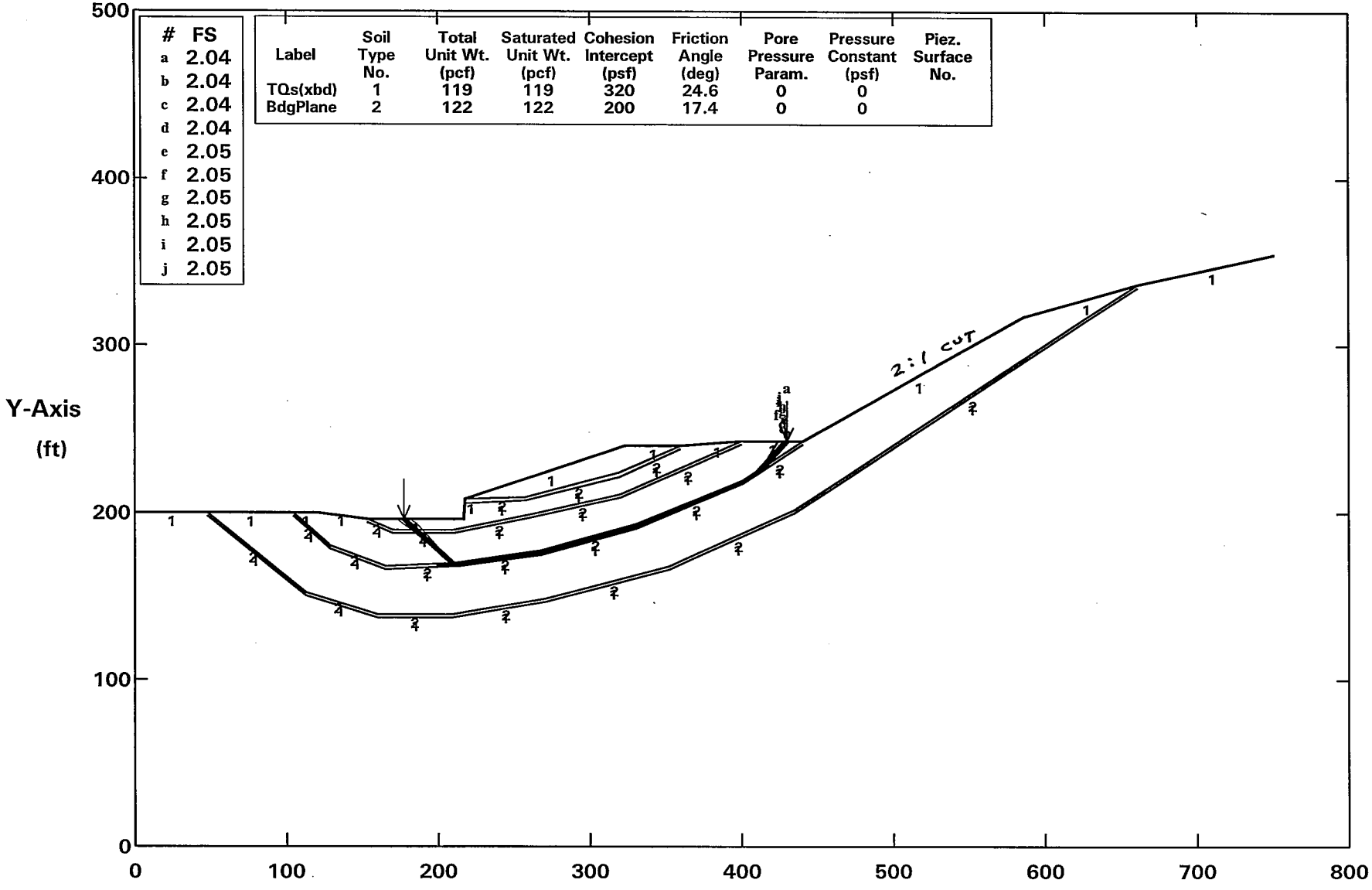


Factors Of Safety Calculated By The Modified Janbu Method

Run #12

TT52584-Hasley Cny-Sec.8-8'-w/115'bench & 2:1 cut @top-Plane 30'below toe-Static

Ten Most Critical. C:HAS8E.PLT By: EC 1/25/99 5:32pm



#	FS
a	2.04
b	2.04
c	2.04
d	2.04
e	2.05
f	2.05
g	2.05
h	2.05
i	2.05
j	2.05

Label	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
TQs(xbd)	1	119	119	320	24.6	0	0	
BdgPlane	2	122	122	200	17.4	0	0	

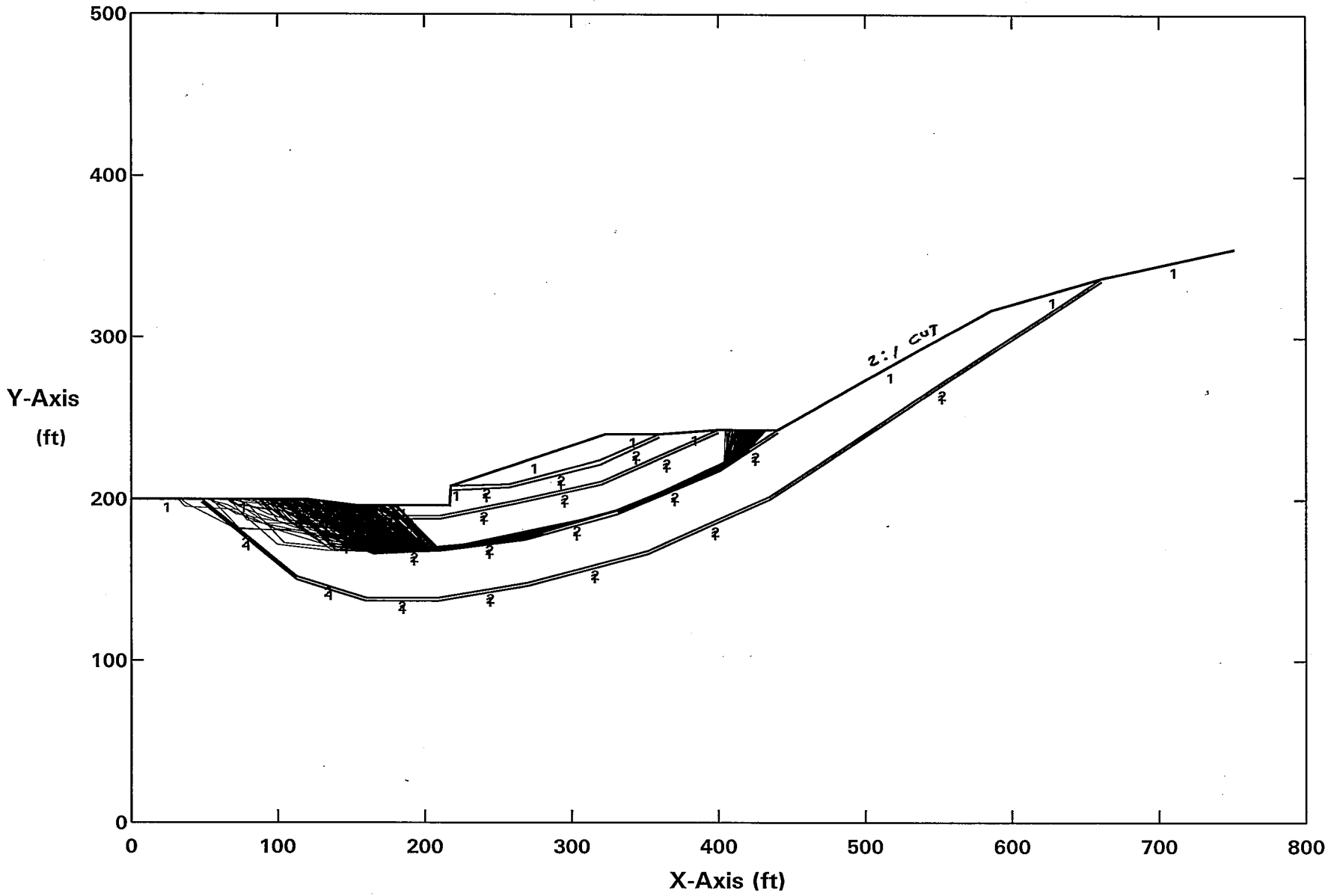
PCSTABL5M FSmin = 2.04 X-Axis (ft)

Factors Of Safety Calculated By The Modified Janbu Method

Run # 13

TT52584-Hasley Cny-Sec.8-8'-w/115'bench & 2:1 cut @top-Plane 30'below toe-Static

All surfaces evaluated. C:HAS8E.PLT By: EC 1/25/99 5:04pm

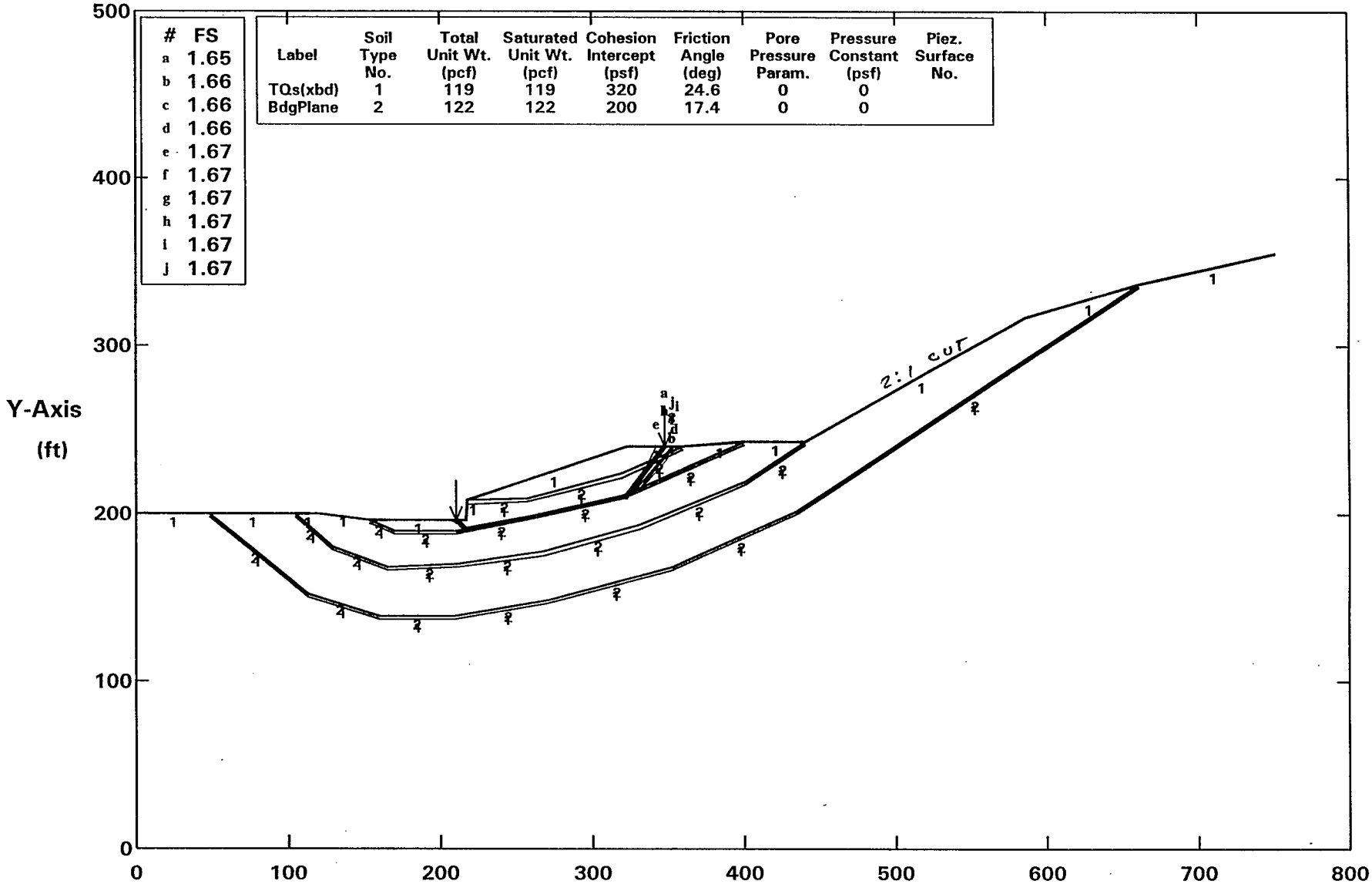


Factors Of Safety Calculated By The Modified Janbu Method

Run #13

TT52584-Hasley Cny-Sec.8-8'-w/115'bench & 2:1 cut @top- Toe plane -Static

Ten Most Critical. C:HAS8F.PLT By: EC 1/25/99 7:34pm



#	FS
a	1.65
b	1.66
c	1.66
d	1.66
e	1.67
f	1.67
g	1.67
h	1.67
i	1.67
j	1.67

Label	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
TQs(xbd)	1	119	119	320	24.6	0	0	
BdgPlane	2	122	122	200	17.4	0	0	

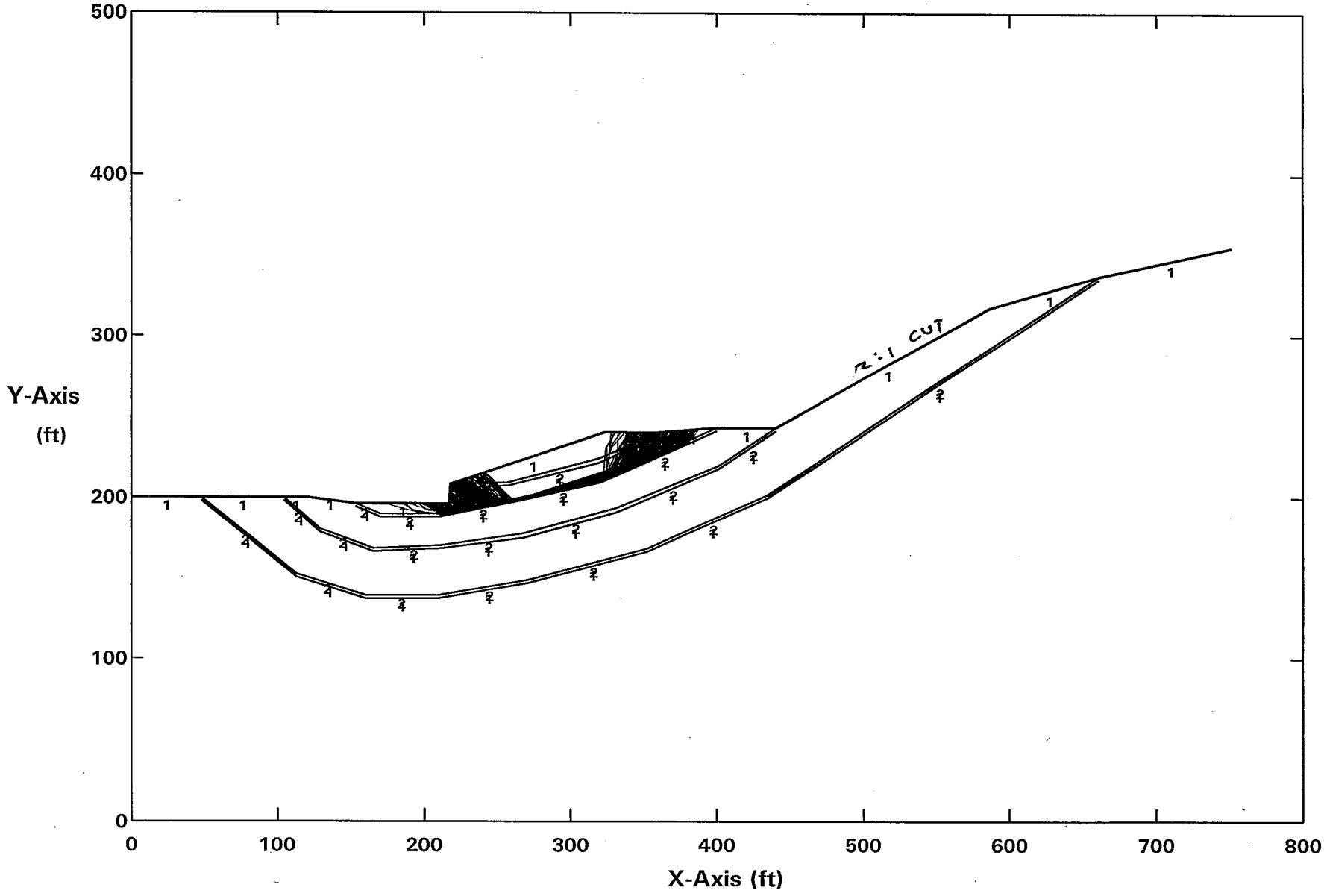
PCSTABL5M FSmin = 1.65 X-Axis (ft)

Factors Of Safety Calculated By The Modified Janbu Method

Run #14

TT52584-Hasley Cny-Sec.8-8'-w/115'bench & 2:1 cut @top- Toe plane -Static

All surfaces evaluated. C:HAS8F.PLT By: EC 1/25/99 7:17pm

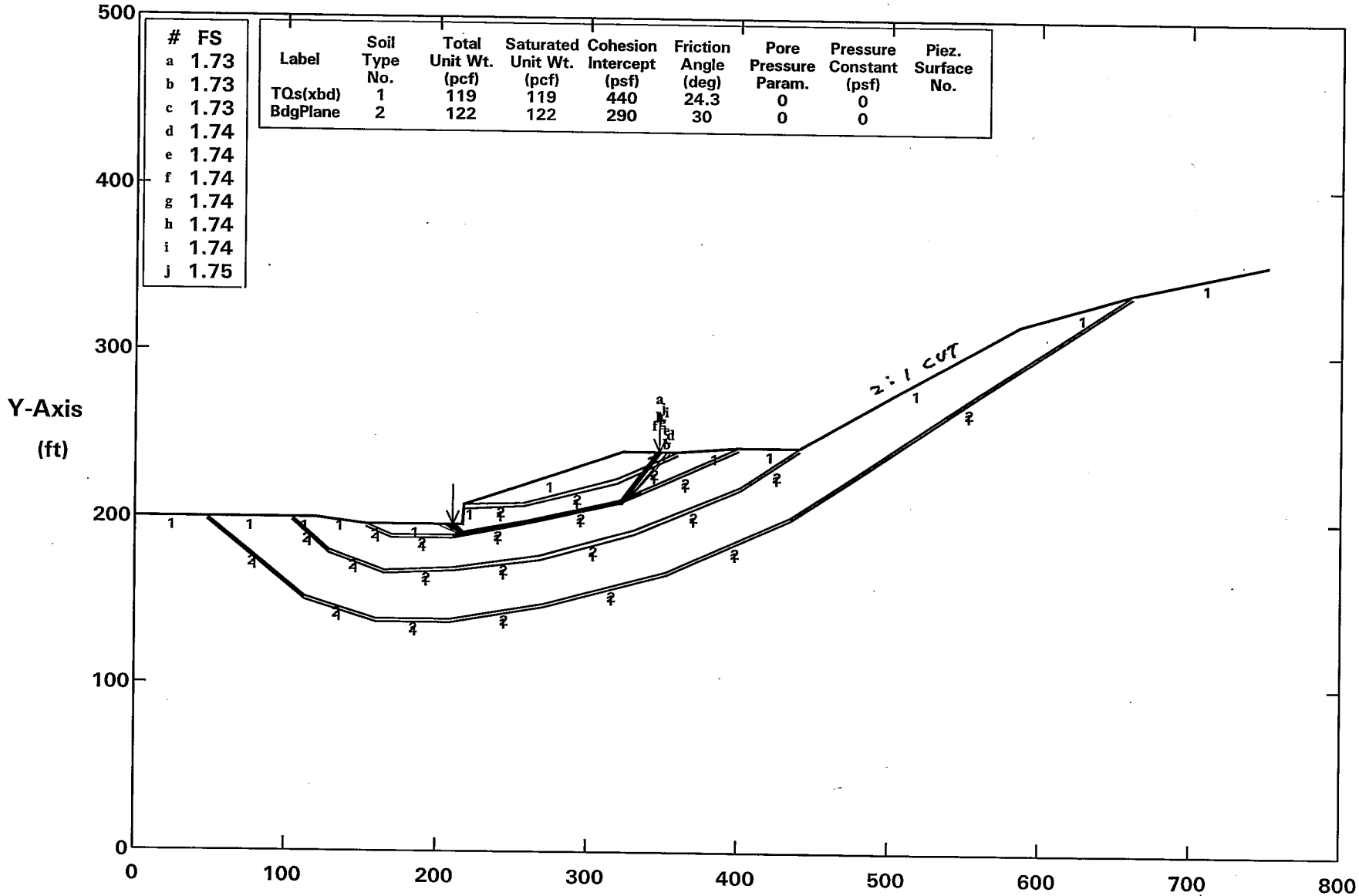


Factors Of Safety Calculated By The Modified Janbu Method

Run # 14

TT52584-Hasley Cny-Sec.8-8'-w/115'bench & 2:1 cut @top- Toe plane -Pseudostatic

Ten Most Critical. C:HAS8F'.PLT By: EC 1/25/99 7:40pm



#	FS
a	1.73
b	1.73
c	1.73
d	1.74
e	1.74
f	1.74
g	1.74
h	1.74
i	1.74
j	1.75

Label	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
TQs(xbd)	1	119	119	440	24.3	0	0	
BdgPlane	2	122	122	290	30	0	0	

PCSTABL5M FSmin = 1.73 X-Axis (ft)

Factors Of Safety Calculated By The Modified Janbu Method

Run # 15

Run #14

** PCSTABL5M **

by
Purdue University

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date: 1/25/99
Time of Run: 7:34pm
Run By: EC
Input Data Filename: C:HAS8F.IN
Output Filename: C:HAS8F.OUT
Plotted Output Filename: C:HAS8F.PLT

PROBLEM DESCRIPTION TT52584-Hasley Cny-Sec.8-8'-w/115'bench
& 2:1 cut @top- Toe plane -Static

BOUNDARY COORDINATES

13 Top Boundaries
57 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	.00	200.00	48.00	200.00	1
2	48.00	200.00	104.00	200.00	1
3	104.00	200.00	120.00	200.00	1
4	120.00	200.00	153.00	196.00	1
5	153.00	196.00	217.00	196.00	1
6	217.00	196.00	217.50	208.00	1
7	217.50	208.00	323.00	240.00	1
8	323.00	240.00	360.00	240.00	1
9	360.00	240.00	400.00	243.00	1
10	400.00	243.00	440.00	243.00	1
11	440.00	243.00	586.00	317.00	1
12	586.00	317.00	661.00	337.00	1
13	661.00	337.00	751.00	355.00	1
14	217.50	208.00	257.00	209.00	2
15	257.00	209.00	319.00	224.00	2
16	319.00	224.00	360.00	240.00	2
17	217.50	206.00	257.00	207.00	1
18	257.00	207.00	319.00	222.00	1
19	319.00	222.00	360.00	238.00	1
20	153.00	196.00	170.00	190.00	2
21	170.00	190.00	210.00	190.00	2
22	210.00	190.00	261.00	199.00	2

Run#14

23	261.00	199.00	320.00	211.00	2
24	320.00	211.00	400.00	243.00	2
25	153.00	194.00	170.00	188.00	1
26	170.00	188.00	210.00	188.00	1
27	210.00	188.00	261.00	197.00	1
28	261.00	197.00	320.00	209.00	1
29	320.00	209.00	400.00	241.00	1
30	104.00	200.00	129.00	180.00	2
31	129.00	180.00	165.00	168.00	2
32	165.00	168.00	211.00	170.00	2
33	211.00	170.00	268.00	177.00	2
34	268.00	177.00	330.00	193.00	2
35	330.00	193.00	401.00	220.00	2
36	401.00	220.00	440.00	243.00	2
37	104.00	198.00	129.00	178.00	1
38	129.00	178.00	165.00	166.00	1
39	165.00	166.00	211.00	168.00	1
40	211.00	168.00	268.00	175.00	1
41	268.00	175.00	330.00	191.00	1
42	330.00	191.00	401.00	218.00	1
43	401.00	218.00	440.00	241.00	1
44	48.00	200.00	113.00	152.00	2
45	113.00	152.00	160.00	139.00	2
46	160.00	139.00	209.00	139.00	2
47	209.00	139.00	270.00	148.00	2
48	270.00	148.00	352.00	168.00	2
49	352.00	168.00	435.00	202.00	2
50	435.00	202.00	661.00	337.00	2
51	48.00	198.00	113.00	150.00	1
52	113.00	150.00	160.00	137.00	1
53	160.00	137.00	209.00	137.00	1
54	209.00	137.00	270.00	146.00	1
55	270.00	146.00	352.00	166.00	1
56	352.00	166.00	435.00	200.00	1
57	435.00	200.00	661.00	335.00	1

ISOTROPIC SOIL PARAMETERS

2 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	119.0	119.0	320.0	24.6	.00	.0	0
2	122.0	122.0	200.0	17.4	.00	.0	0

Janbus Empirical Coef is being used for the case of c & phi both > 0

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Sliding Block Surfaces, Has Been Specified.

Run #14

HMS 8F. IN

300 Trial Surfaces Have Been Generated.

4 Boxes Specified For Generation Of Central Block Base

Length Of Line Segments For Active And Passive Portions Of Sliding Block Is 20.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	210.00	189.00	220.00	190.80	.10
2	261.00	198.00	261.00	198.00	.00
3	320.00	210.00	320.00	210.00	.00
4	321.00	210.40	335.00	216.00	.10

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Modified Janbu Method * *

Failure Surface Specified By 7 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	210.19	196.00
2	216.51	190.14
3	261.00	198.00
4	320.00	210.00
5	321.84	210.71
6	334.97	225.79
7	347.34	240.00

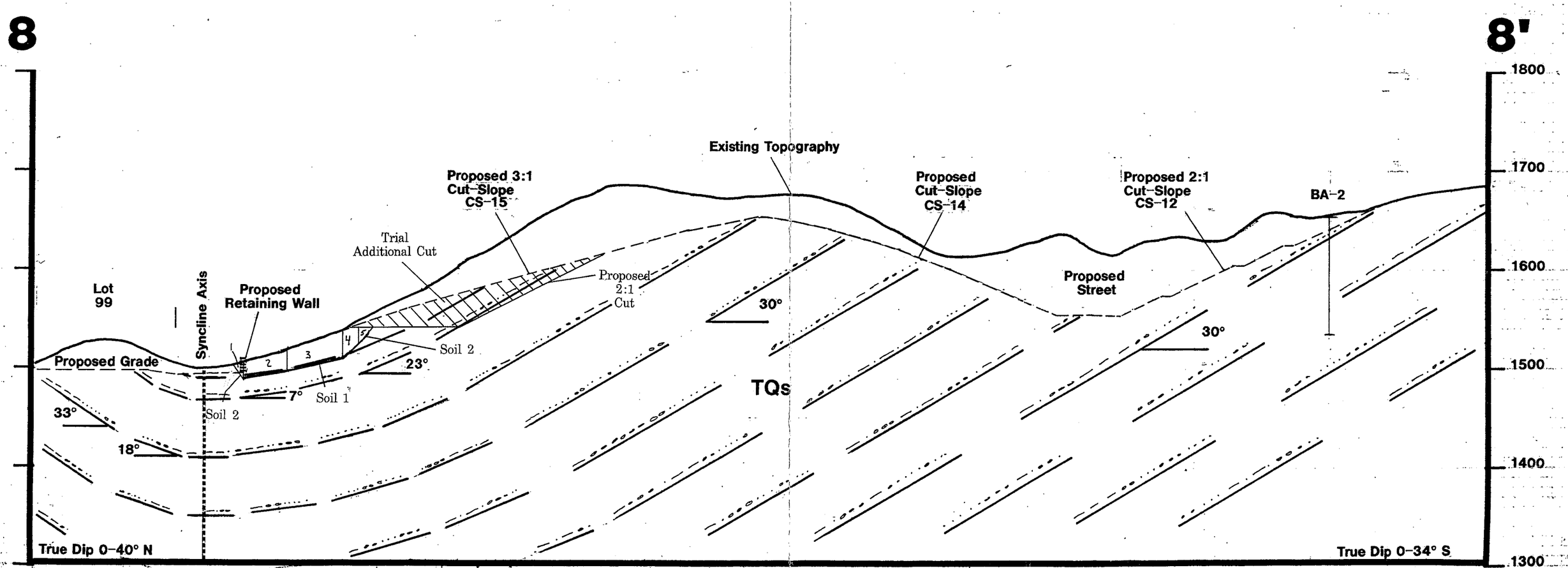
*** 1.652 *** ←

Individual data on the 15 slices

Slice No.	Width Ft(m)	Weight Lbs(kg)	Water Force Top Lbs(kg)	Water Force Bot Lbs(kg)	Tie Force Norm Lbs(kg)	Tie Force Tan Lbs(kg)	Earthquake Force Hor Lbs(kg)	Earthquake Force Ver Lbs(kg)	Surcharge Load Lbs(kg)
1	5.4	1612.0	.0	.0	.0	.0	.0	.0	.0

Run #16 & 17

CROSS SECTION
OMS STABILITY ANALYSIS



	Static		Pseudostatic	
	c	ø	c	ø
Soil 1 (Bedding Plane)	200	17.4	290	30
Soil 2 (TQs)	320	24.6	440	24.3

Run #14

2	.9	590.3	.0	.0	.0	.0	.0	.0	.0
3	.5	340.0	.0	.0	.0	.0	.0	.0	.0
4	.5	699.2	.0	.0	.0	.0	.0	.0	.0
5	39.5	95232.5	.0	.0	.0	.0	.0	.0	.0
6	4.0	10955.9	.0	.0	.0	.0	.0	.0	.0
7	58.0	180610.4	.0	.0	.0	.0	.0	.0	.0
8	1.0	3464.8	.0	.0	.0	.0	.0	.0	.0
9	1.8	6357.7	.0	.0	.0	.0	.0	.0	.0
10	1.2	3947.6	.0	.0	.0	.0	.0	.0	.0
11	.2	693.7	.0	.0	.0	.0	.0	.0	.0
12	11.8	29420.8	.0	.0	.0	.0	.0	.0	.0
13	3.2	4758.8	.0	.0	.0	.0	.0	.0	.0
14	2.6	2828.6	.0	.0	.0	.0	.0	.0	.0
15	6.5	2897.2	.0	.0	.0	.0	.0	.0	.0

Failure Surface Specified By 7 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	207.93	196.00
2	217.53	190.38
3	261.00	198.00
4	320.00	210.00
5	325.88	212.33
6	339.87	226.62
7	352.35	240.00

*** 1.664 ***

Failure Surface Specified By 7 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	211.32	196.00
2	217.11	190.26
3	261.00	198.00
4	320.00	210.00
5	329.08	213.67
6	342.60	228.40
7	352.29	240.00

*** 1.664 ***

Failure Surface Specified By 7 Coordinate Points

LOS ANGELES COUNTY
DEPARTMENT OF PUBLIC WORKS
LAND DEVELOPMENT DIVISION
GEOTECHNICAL ENGINEERING
ORDINARY METHOD OF SLICES USED FOR ANALYSIS

PROJECT: TT 52584 - Hasley Canyon (Palmer Investments)
CONSULTANT: AES
REPORT DATE: 1/31/99
SECTION: 8-8' w/115' Bench & 2:1 Cut at top CIRCLE: Toe Bedding Plane - Static DATE: 1/26/99 BY: NAO

SLICE	HEIGHT(1)	HEIGHT(2)	WIDTH	AREA	WEIGHT	UNIT WT
1.	0.00	18.00	10.00	90.00	10.71	119.0
2.	18.00	21.00	45.00	877.50	107.06	122.0
3.	21.00	29.00	58.00	1450.00	176.90	122.0
4.	29.00	16.00	15.50	348.75	41.50	119.0
5.	16.00	0.00	12.00	96.00	11.42	119.0

SLOPE STABILITY DATA

SEISMIC COEFFICIENT = 0.00 g

SLICE NO.	1 SLICE WEIGHT W (kips)	2 FAILURE PLANE ANGLE i(deg)	3 ANGLE OF INT. FRICTION phi(deg)	4 COHE-SION C (ksf)	5 LENGTH OF ARC L (ft)	6 W (1-Ru) COS i COS i TAN phi	7 C L COS i	8 g W (1-Ru) SINi COSi TAN phi	9 W SIN i COS i	10 g W COS i COS i
1.	10.71	-54.00	24.60	0.320	17.01	1.69	3.20	0.00	-5.09	0.00
2.	107.06	9.00	17.40	0.200	45.56	32.73	9.00	0.00	16.54	0.00
3.	176.90	12.00	17.40	0.200	59.30	53.04	11.60	0.00	35.98	0.00
4.	41.50	45.00	24.60	0.320	21.92	9.50	4.96	0.00	20.75	0.00
5.	11.42	49.00	24.60	0.320	18.29	2.25	3.84	0.00	5.66	0.00
SUMMATION:						99.21	32.60	0.00	73.83	0.00

STATIC SAFETY FACTOR = 1.79
~~SEISMIC SAFETY FACTOR = 1.79~~

Run #16

LOS ANGELES COUNTY
DEPARTMENT OF PUBLIC WORKS
LAND DEVELOPMENT DIVISION
GEOTECHNICAL ENGINEERING
ORDINARY METHOD OF SLICES USED FOR ANALYSIS

PROJECT: TT 52584 - Hasley Canyon (Palmer Investments)
CONSULTANT: AES
REPORT DATE: 1/31/99
SECTION: 8-8' w/115' Bench & 2:1 Cut at top CIRCLE: Toe Bedding Plane- Pseudostatic DATE: 1/26/99 BY: NAO

SLICE	HEIGHT(1)	HEIGHT(2)	WIDTH	AREA	WEIGHT	UNIT WT
1.	0.00	18.00	10.00	90.00	10.71	119.0
2.	18.00	21.00	45.00	877.50	107.06	122.0
3.	21.00	29.00	58.00	1450.00	176.90	122.0
4.	29.00	16.00	15.50	348.75	41.50	119.0
5.	16.00	0.00	12.00	96.00	11.42	119.0

SLOPE STABILITY DATA

SEISMIC COEFFICIENT = 0.15 g

SLICE NO.	1 SLICE WEIGHT W (kips)	2 FAILURE PLANE ANGLE i(deg)	3 ANGLE OF INT. FRICTION phi(deg)	4 COHE-SION C (ksf)	5 LENGTH OF ARC L (ft)	6 W (1-Ru) COS i COS i TAN phi	7 C L COS i	8 g W (1-Ru) SINi COSi TAN phi	9 W SIN i COS i	10 g W COS i COS i
1.	10.71	-54.00	24.30	0.440	17.01	1.67	4.40	-0.34	-5.09	0.56
2.	107.06	9.00	30.00	0.290	45.56	60.30	13.05	1.43	16.54	15.67
3.	176.90	12.00	30.00	0.290	59.30	97.72	16.82	3.12	35.98	25.39
4.	41.50	45.00	24.30	0.440	21.92	9.37	6.82	1.41	20.75	3.11
5.	11.42	49.00	24.30	0.440	18.29	2.22	5.28	0.38	5.66	0.74
SUMMATION:						171.27	46.37	5.99	73.83	45.46

~~STATIC SAFETY FACTOR = 2.95~~
SEISMIC SAFETY FACTOR = 1.77

Run #17

STABILITY ANALYSIS

FOR CROSS SECTION 11-11'

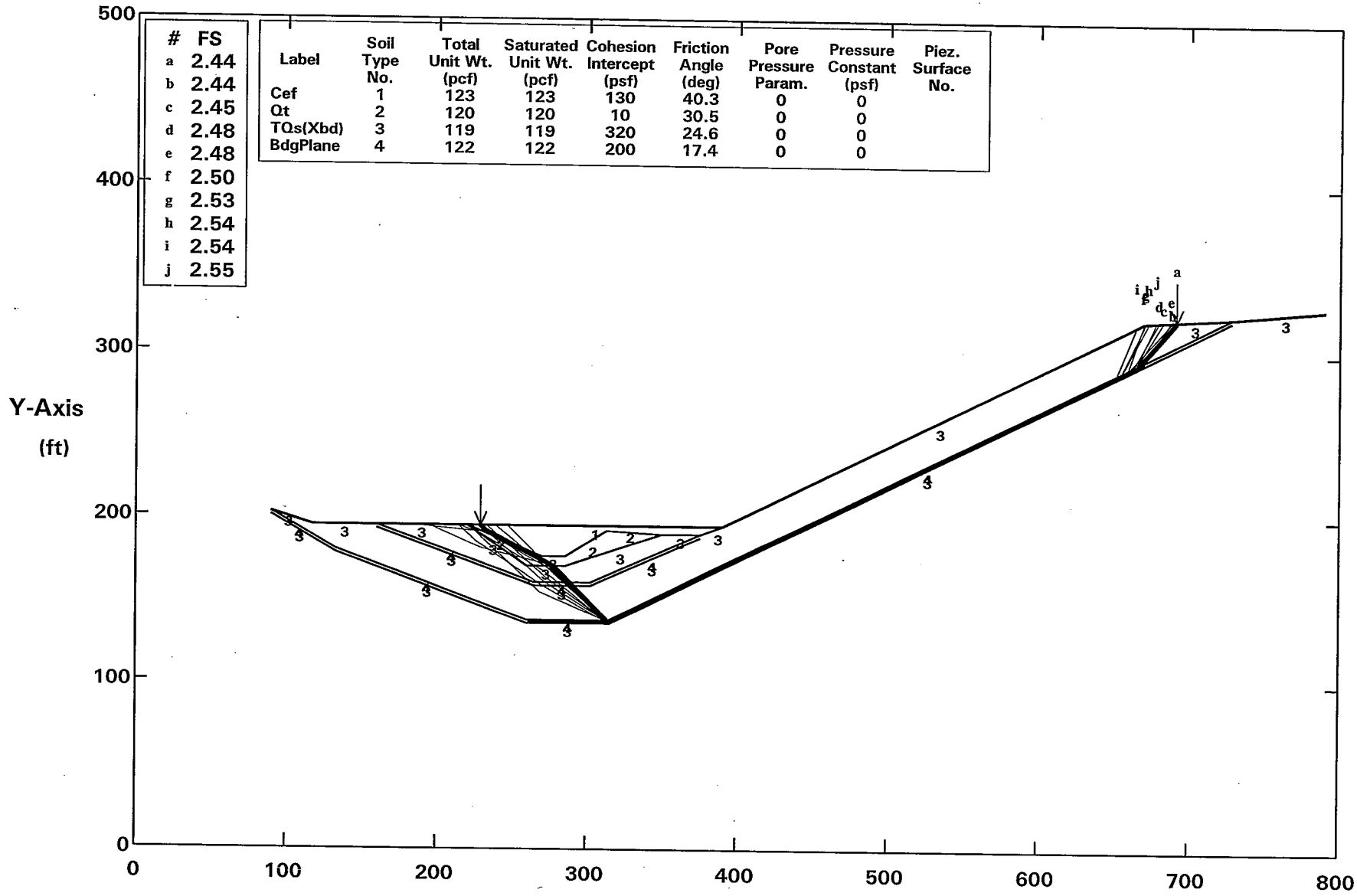
Run # 18

TT52584-Hasley Cny-Sec.11-11'-Full slope trimmed-1st lower plane-Static

Ten Most Critical. C:HAS11A.PLT By: EC 1/13/99 3:35pm

#	FS
a	2.44
b	2.44
c	2.45
d	2.48
e	2.48
f	2.50
g	2.53
h	2.54
i	2.54
j	2.55

Label	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
Cef	1	123	123	130	40.3	0	0	
Qt	2	120	120	10	30.5	0	0	
TQs(Xbd)	3	119	119	320	24.6	0	0	
BdgPlane	4	122	122	200	17.4	0	0	



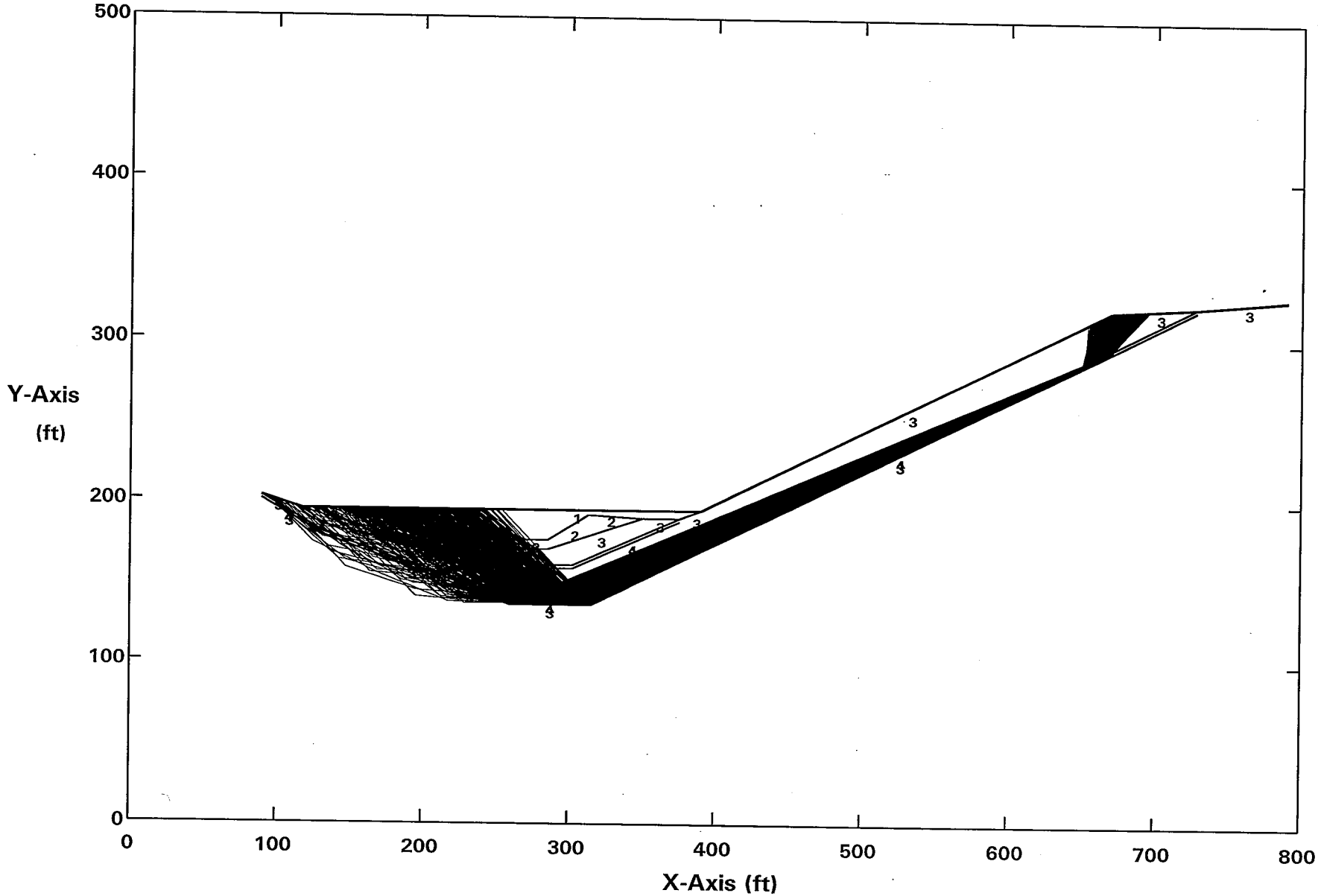
PCSTABL5M FSmin = 2.44 X-Axis (ft)

Factors Of Safety Calculated By The Modified Janbu Method

Run # 18

TT52584-Hasley Cny-Sec.11-11'-Full slope trimmed-1st lower plane-Static

All surfaces evaluated. C:HAS11A.PLT By: EC 1/13/99 3:35pm

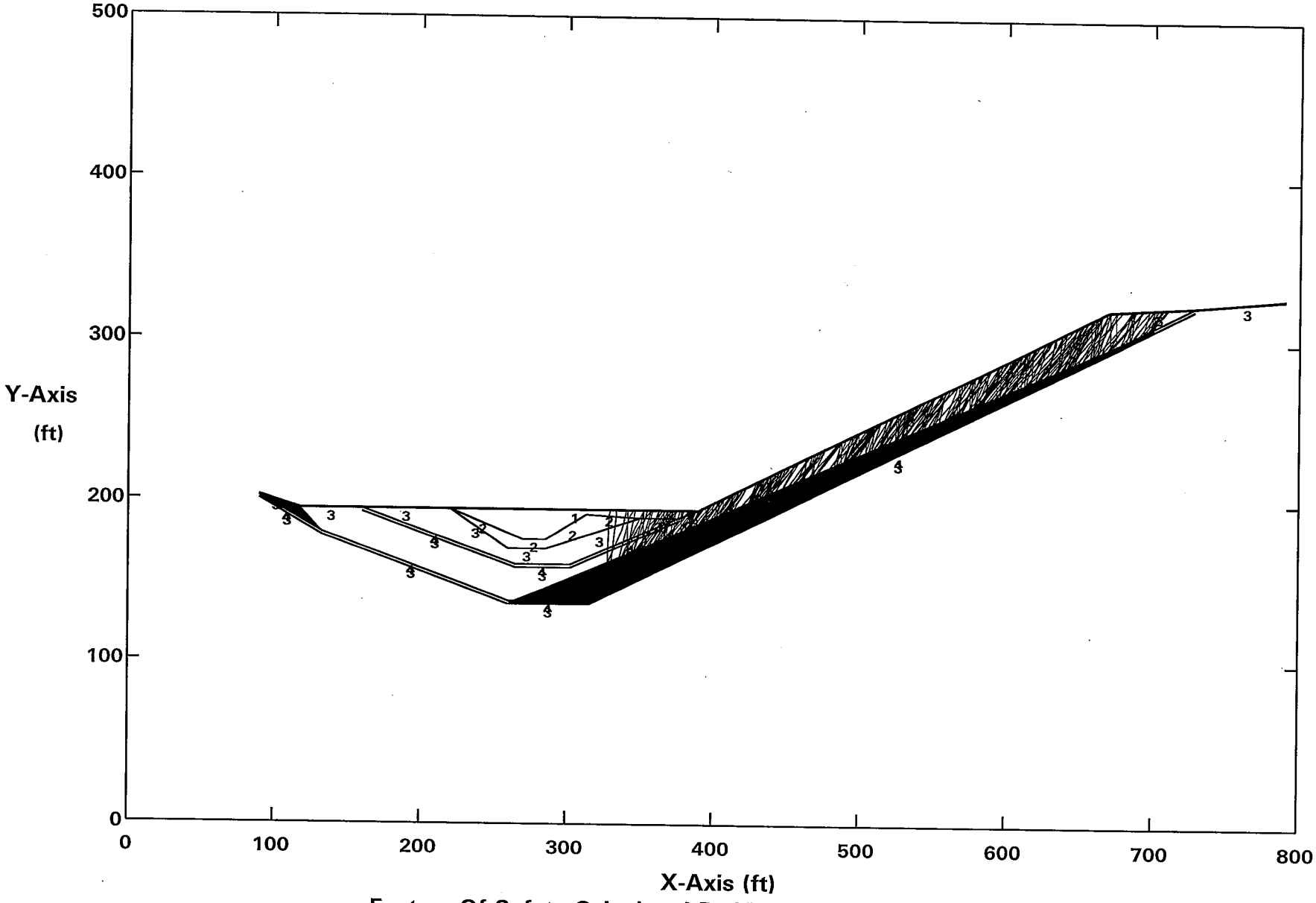


Factors Of Safety Calculated By The Modified Janbu Method

Run # 18

TT52584-Hasley Cny-Sec.11-11'-Full slope trimmed-1st lower plane-Static

All surfaces evaluated. C:HAS11A.PLT By: EC 1/12/99 8:49pm



Factors Of Safety Calculated By The Modified Janbu Method

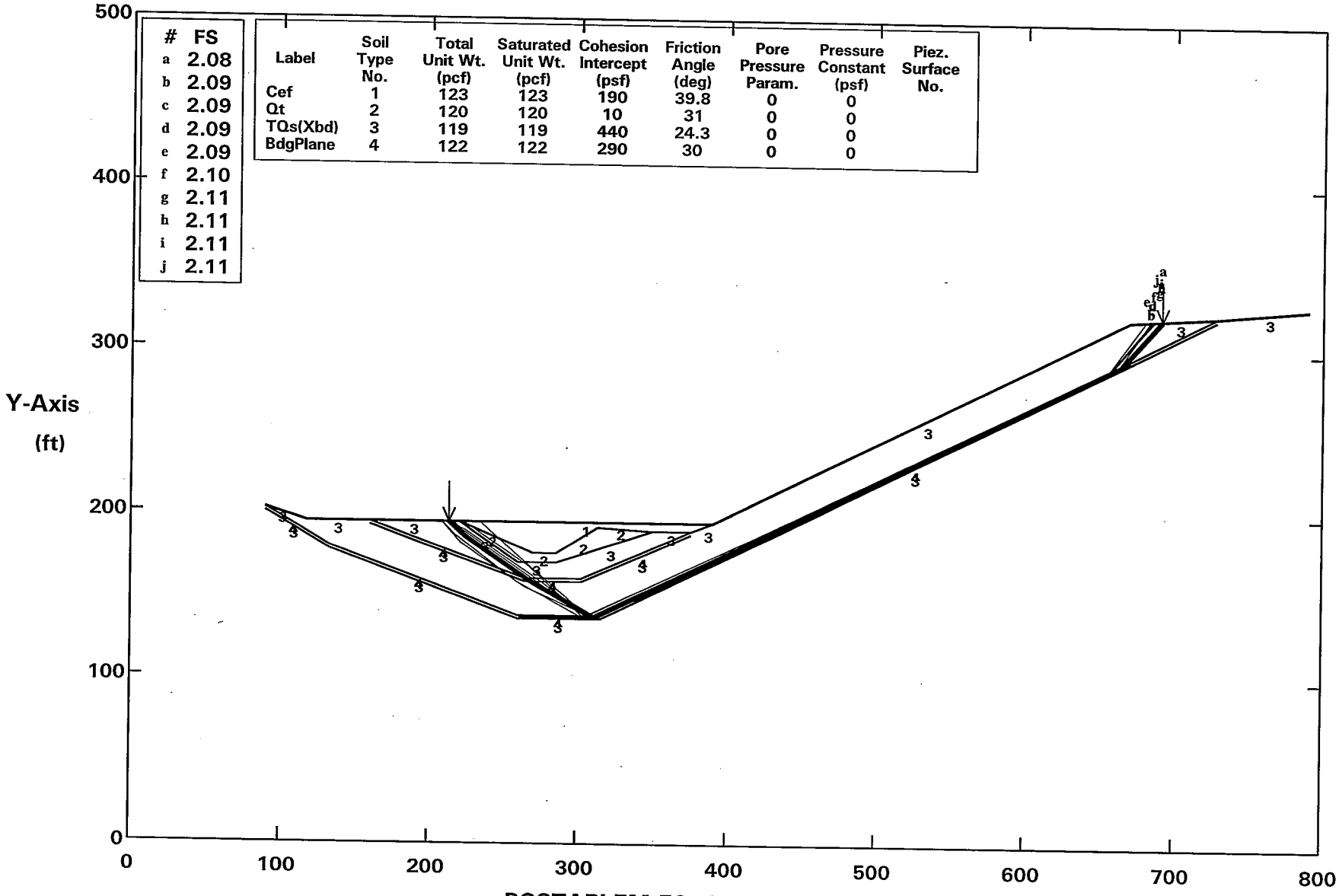
Run #18

TT52584-Hasley Cny-Sec.11-11'-Full slope trimmed-1st lower plane-Pseudostatic

Ten Most Critical. C:HAS11A'.PLT By: EC 1/13/99 3:41pm

#	FS
a	2.08
b	2.09
c	2.09
d	2.09
e	2.09
f	2.10
g	2.11
h	2.11
i	2.11
j	2.11

Label	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
Cef	1	123	123	190	39.8	0	0	
Qt	2	120	120	10	31	0	0	
TQs(Xbd)	3	119	119	440	24.3	0	0	
BdgPlane	4	122	122	290	30	0	0	



PCSTABL5M FSmin = 2.08 X-Axis (ft)

Factors Of Safety Calculated By The Modified Janbu Method

Run #19

Run #18

** PCSTABL5M **

by
Purdue University

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date:	1/13/99
Time of Run:	3:35pm
Run By:	EC
Input Data Filename:	C:HAS11A.IN
Output Filename:	C:HAS11A.OUT
Plotted Output Filename:	C:HAS11A.PLT

PROBLEM DESCRIPTION TT52584-Hasley Cny-Sec.11-11'-Full slope trimmed-1st lower plane-Static

BOUNDARY COORDINATES

7 Top Boundaries
30 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	90.00	202.00	118.00	195.00	3
2	118.00	195.00	160.00	195.00	3
3	160.00	195.00	220.00	195.00	3
4	220.00	195.00	390.00	195.00	1
5	390.00	195.00	670.00	320.00	3
6	670.00	320.00	728.00	323.00	3
7	728.00	323.00	790.00	328.00	3
8	220.00	195.00	270.00	176.00	2
9	270.00	176.00	285.00	176.00	2
10	285.00	176.00	313.00	192.00	2
11	313.00	192.00	350.00	190.00	2
12	350.00	190.00	375.00	190.00	3
13	375.00	190.00	390.00	195.00	3
14	220.00	195.00	260.00	170.00	3
15	260.00	170.00	285.00	170.00	3
16	285.00	170.00	350.00	190.00	3
17	160.00	195.00	265.00	160.00	4
18	265.00	160.00	302.00	160.00	4
19	302.00	160.00	375.00	190.00	4
20	160.00	193.00	265.00	158.00	3
21	265.00	158.00	302.00	158.00	3
22	302.00	158.00	375.00	188.00	3

Run #18

23	90.00	202.00	132.00	180.00	4
24	132.00	180.00	260.00	137.00	4
25	260.00	137.00	315.00	137.00	4
26	315.00	137.00	728.00	323.00	4
27	90.00	200.00	132.00	178.00	3
28	132.00	178.00	260.00	135.00	3
29	260.00	135.00	315.00	135.00	3
30	315.00	135.00	728.00	321.00	3

ISOTROPIC SOIL PARAMETERS

4 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	123.0	123.0	130.0	40.3	.00	.0	0
2	120.0	120.0	10.0	30.5	.00	.0	0
3	119.0	119.0	320.0	24.6	.00	.0	0
4	122.0	122.0	200.0	17.4	.00	.0	0

Janbus Empirical Coef is being used for the case of c & phi both > 0

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Sliding Block Surfaces, Has Been Specified.

600 Trial Surfaces Have Been Generated.

2 Boxes Specified For Generation Of Central Block Base

Length Of Line Segments For Active And Passive Portions Of Sliding Block Is 50.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	261.00	136.00	315.00	136.00	.10
2	650.00	286.90	670.00	295.90	.10

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Modified Janbu Method * *

Run #18

Failure Surface Specified By 6 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	228.80	195.00
2	232.30	191.79
3	277.12	169.63
4	314.09	135.97
5	664.65	293.52
6	691.33	321.10

*** 2.437 ***

Individual data on the 20 slices

Slice No.	Width Ft(m)	Weight Lbs(kg)	Water Force Top Lbs(kg)	Water Force Bot Lbs(kg)	Tie Force Norm Lbs(kg)	Tie Force Tan Lbs(kg)	Earthquake Force Hor Lbs(kg)	Earthquake Force Ver Lbs(kg)	Surcharge Load Lbs(kg)
1	3.5	689.9	.0	.0	.0	.0	.0	.0	.0
2	12.8	10055.9	.0	.0	.0	.0	.0	.0	.0
3	24.9	47926.8	.0	.0	.0	.0	.0	.0	.0
4	6.4	18287.2	.0	.0	.0	.0	.0	.0	.0
5	.7	2288.2	.0	.0	.0	.0	.0	.0	.0
6	7.9	27799.0	.0	.0	.0	.0	.0	.0	.0
7	2.7	11051.9	.0	.0	.0	.0	.0	.0	.0
8	2.2	9577.8	.0	.0	.0	.0	.0	.0	.0
9	12.1	62048.0	.0	.0	.0	.0	.0	.0	.0
10	11.0	69555.9	.0	.0	.0	.0	.0	.0	.0
11	.0	334.4	.0	.0	.0	.0	.0	.0	.0
12	1.1	7608.2	.0	.0	.0	.0	.0	.0	.0
13	.9	6422.0	.0	.0	.0	.0	.0	.0	.0
14	35.0	212475.9	.0	.0	.0	.0	.0	.0	.0
15	25.0	111595.5	.0	.0	.0	.0	.0	.0	.0
16	15.0	50673.6	.0	.0	.0	.0	.0	.0	.0
17	274.7	801576.3	.0	.0	.0	.0	.0	.0	.0
18	1.6	4579.0	.0	.0	.0	.0	.0	.0	.0
19	3.7	9756.0	.0	.0	.0	.0	.0	.0	.0
20	21.3	26585.9	.0	.0	.0	.0	.0	.0	.0

Failure Surface Specified By 6 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	228.59	195.00
2	231.80	191.88

Run #18

3	270.90	160.72
4	314.38	136.03
5	657.18	290.11
6	687.98	320.93

*** 2.440 ***

Failure Surface Specified By 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	238.96	195.00
2	275.00	167.75
3	313.64	136.02
4	663.47	293.01
5	682.52	320.65

*** 2.453 ***

Failure Surface Specified By 6 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	183.47	195.00
2	231.50	190.92
3	275.93	167.98
4	314.40	136.04
5	661.96	292.25
6	679.17	320.47

*** 2.475 ***

Failure Surface Specified By 6 Coordinate Points

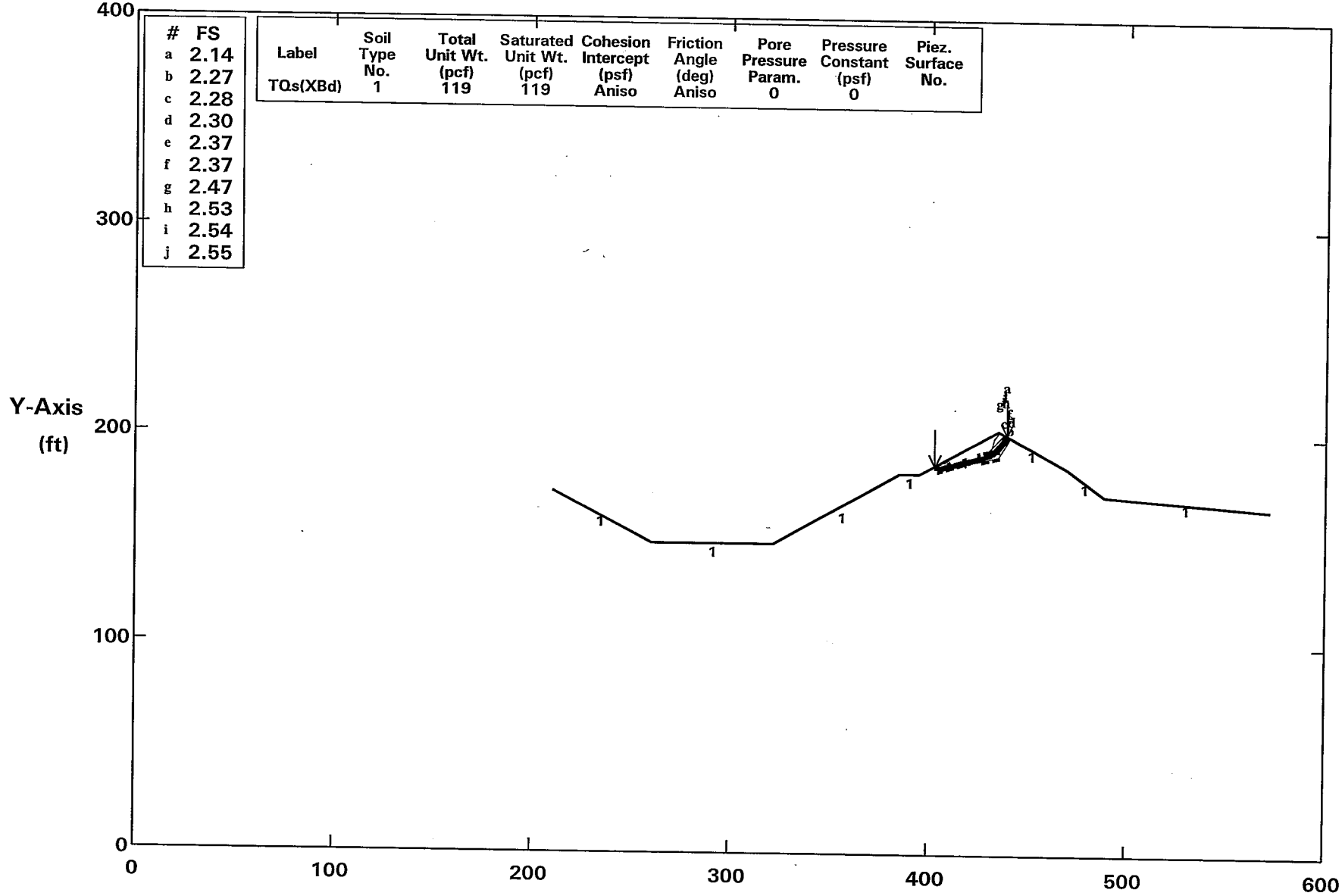
Point No.	X-Surf (ft)	Y-Surf (ft)
1	214.70	195.00
2	225.85	184.38

STABILITY ANALYSIS

FOR CROSS SECTION 13-13'

TT52584-Hasley Cny-Sec.13-13'- Cut slope CS-18 -Upper area- Static

Ten Most Critical. C:HAS13A.PLT By: EC 1/12/99 3:36pm



#	FS
a	2.14
b	2.27
c	2.28
d	2.30
e	2.37
f	2.37
g	2.47
h	2.53
i	2.54
j	2.55

Label	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
TQs(XBd)	1	119	119	Aniso	Aniso	0	0	

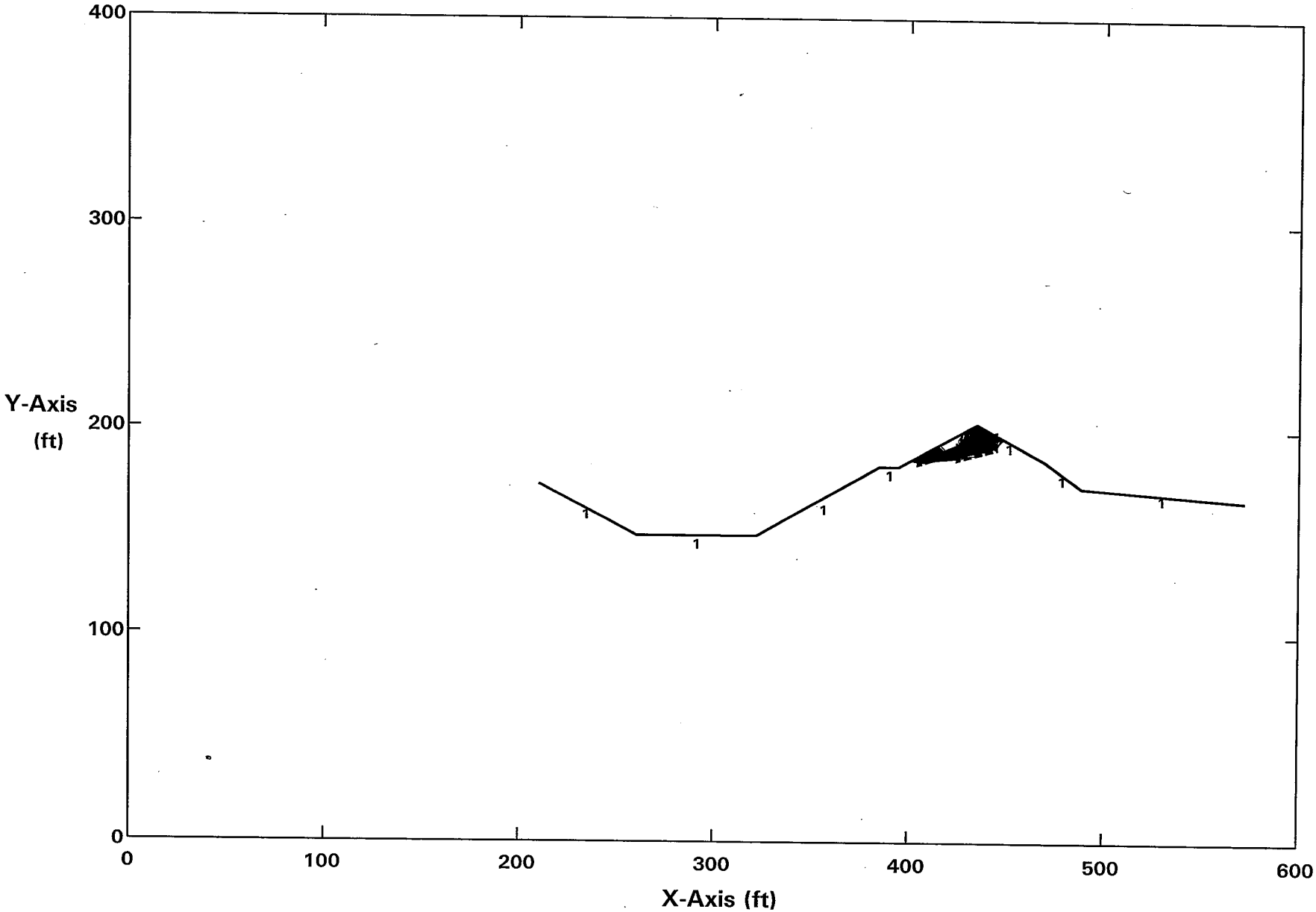
PCSTABL5M FSmin = 2.14 X-Axis (ft)

Factors Of Safety Calculated By The Modified Janbu Method

Run # 20

TT52584-Hasley Cny-Sec.13-13'- Cut slope CS-18 -Upper area- Static

All surfaces evaluated. C:HAS13A.PLT By: EC 1/12/99 3:33pm

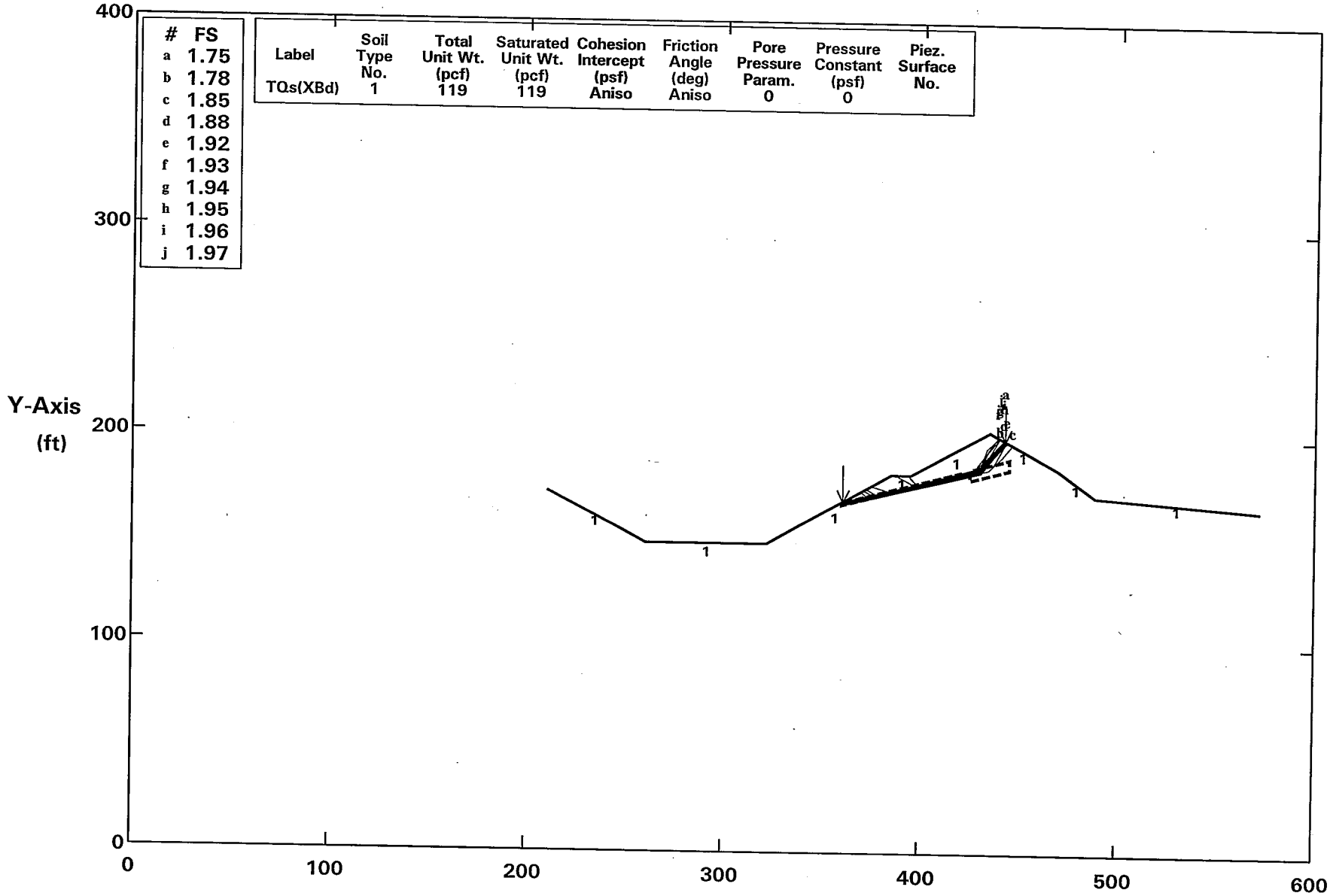


Factors Of Safety Calculated By The Modified Janbu Method

Run # 20

TT52584-Hasley Cny-Sec.13-13'- Cut slope CS-18 -Mid area-Static

Ten Most Critical. C:HAS13B.PLT By: EC 1/12/99 3:56pm



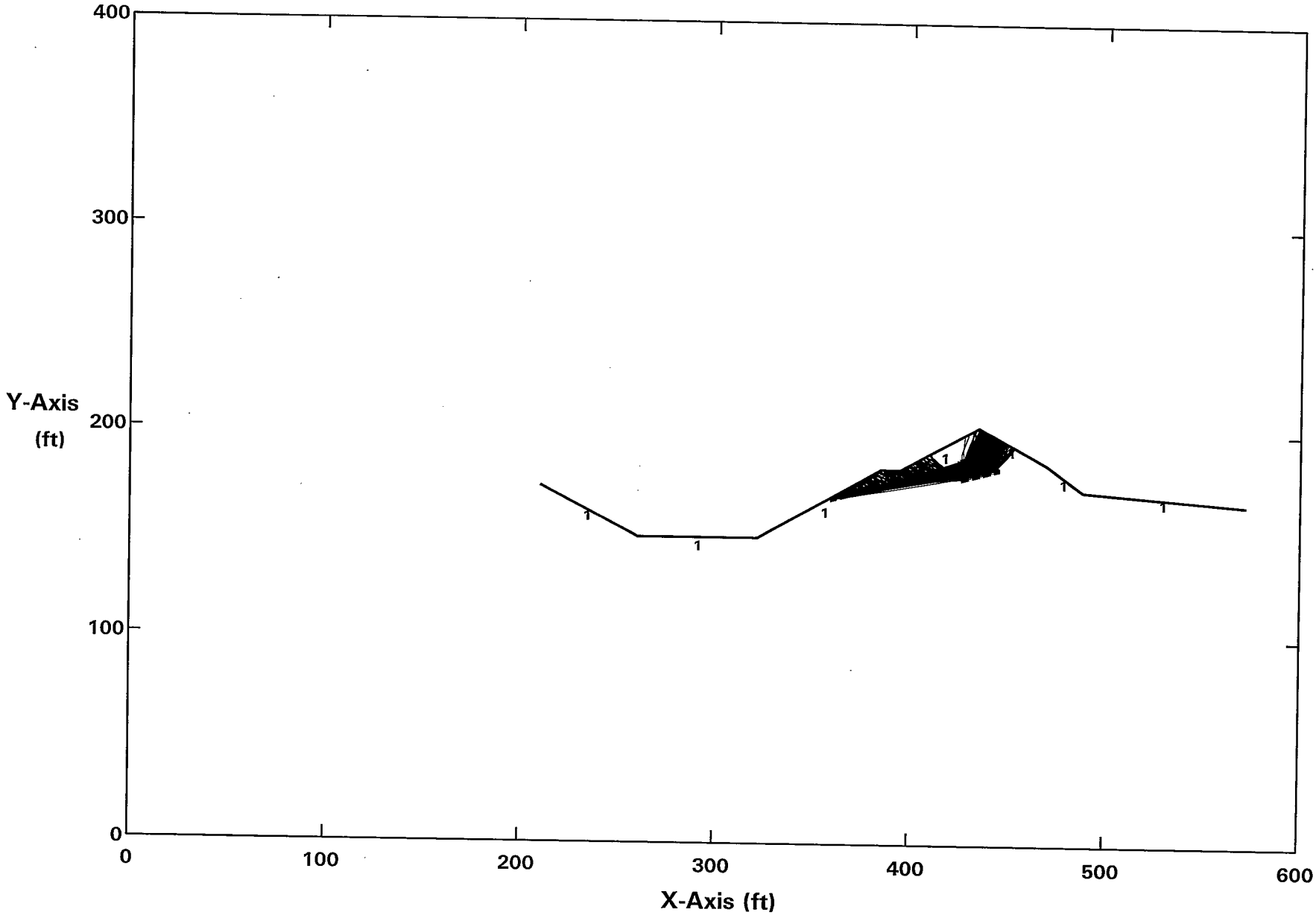
PCSTABL5M FSmin = 1.75 X-Axis (ft)

Factors Of Safety Calculated By The Modified Janbu Method

Run # 21

TT52584-Hasley Cny-Sec.13-13'- Cut slope CS-18 -Mid area-Static

All surfaces evaluated. C:HAS13B.PLT By: EC 1/12/99 3:53pm

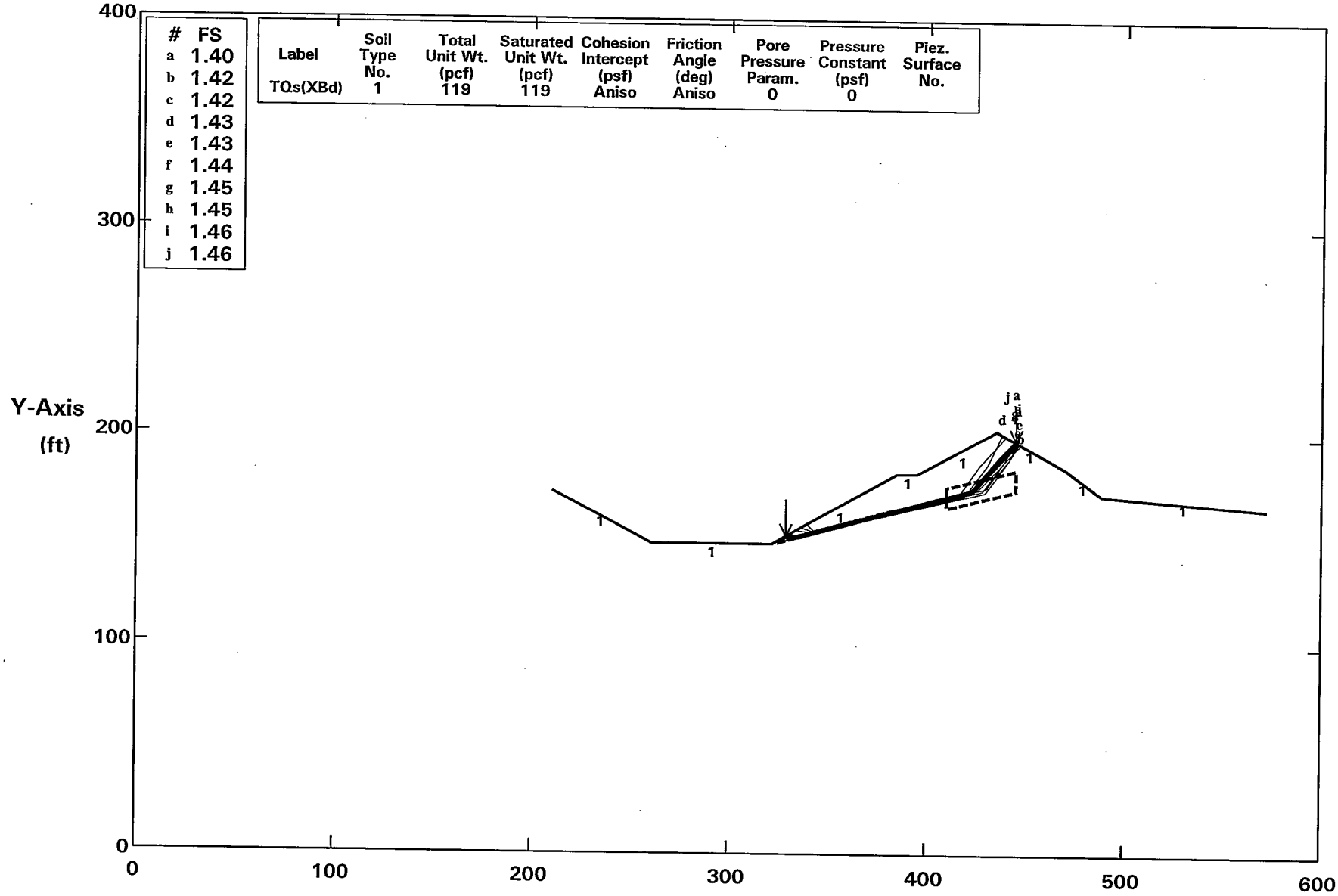


Factors Of Safety Calculated By The Modified Janbu Method

Run #21

TT52584-Hasley Cny-Sec.13-13'- Cut slope CS-18 -Toe area-Static

Ten Most Critical. C:HAS13C.PLT By: EC 1/12/99 4:20pm



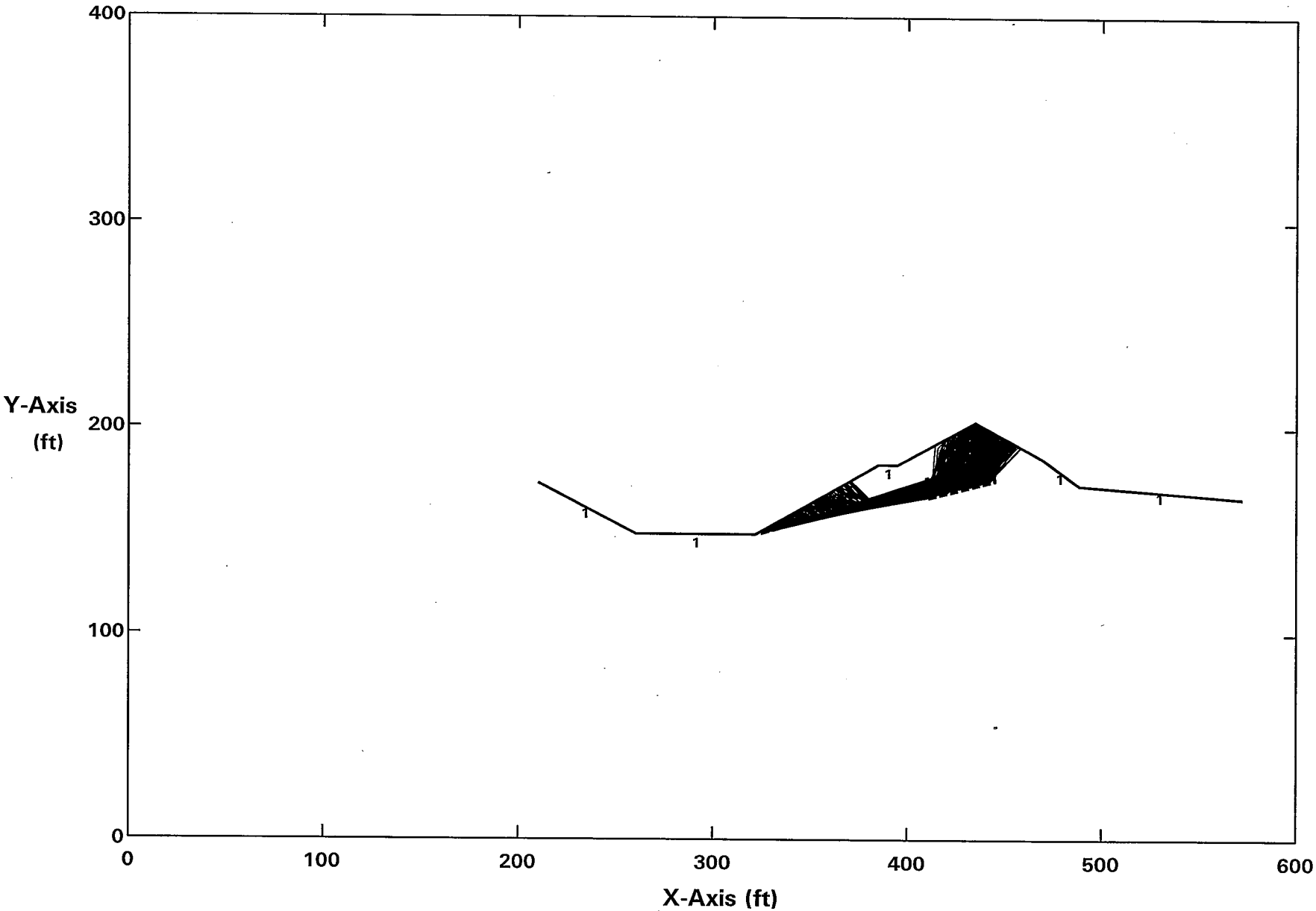
PCSTABL5M FSmin = 1.40 X-Axis (ft)

Factors Of Safety Calculated By The Modified Janbu Method

Run # 22

TT52584-Hasley Cny-Sec.13-13'- Cut slope CS-18 -Toe area-Static

All surfaces evaluated. C:HAS13C.PLT By: EC 1/12/99 4:20pm



Factors Of Safety Calculated By The Modified Janbu Method

Run # 23

Run # 22

C

** PCSTABL5M **

by
Purdue University

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date:	1/12/99
Time of Run:	4:20pm
Run By:	EC
Input Data Filename:	C:HAS13C.IN
Output Filename:	C:HAS13C.OUT
Plotted Output Filename:	C:HAS13C.PLT

PROBLEM DESCRIPTION TT52584-Hasley Cny-Sec.13-13'- Cut slope
CS-18 -Toe area-Static

BOUNDARY COORDINATES

8 Top Boundaries
8 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	210.00	173.00	260.00	148.00	1
2	260.00	148.00	322.00	148.00	1
3	322.00	148.00	385.00	182.00	1
4	385.00	182.00	395.00	182.00	1
5	395.00	182.00	435.00	203.00	1
6	435.00	203.00	470.00	185.00	1
7	470.00	185.00	488.00	172.00	1
8	488.00	172.00	572.00	166.00	1

ISOTROPIC SOIL PARAMETERS

1 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	119.0	119.0	320.0	24.6	.00	.0	0

Run #22

ANISOTROPIC STRENGTH PARAMETERS
1 soil type(s)

Soil Type 1 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	13.0	320.0	24.6
2	15.0	200.0	17.4
3	90.0	320.0	24.6

Janbus Empirical Coef is being used for the case of c & phi both > 0

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Sliding Block Surfaces, Has Been Specified.

400 Trial Surfaces Have Been Generated.

2 Boxes Specified For Generation Of Central Block Base

Length Of Line Segments For Active And Passive Portions Of Sliding Block Is 20.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	325.00	149.00	382.00	164.20	1.00
2	410.00	171.00	445.00	179.70	10.00

Factor Of Safety Calculation Has Gone Through Ten Iterations

The Trial Failure Surface In Question Is Defined By The Following 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)

Run #22

1	366.53	172.03
2	379.39	163.49
3	432.58	176.17
4	433.18	196.16
5	437.04	201.95

Factor Of Safety For The Preceding Specified Surface = 3.999

Factor Of Safety Calculation Has Gone Through Ten Iterations

The Trial Failure Surface In Question Is Defined
By The Following 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	367.16	172.37
2	379.28	163.88
3	434.15	181.78
4	434.57	201.77
5	435.46	202.77

Factor Of Safety For The Preceding Specified Surface = 4.678

Factor Of Safety Calculation Has Gone Through Ten Iterations

The Trial Failure Surface In Question Is Defined
By The Following 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	365.92	171.70
2	376.71	162.60
3	431.14	171.62
4	431.22	191.62
5	438.45	201.23

Run # 22

Factor Of Safety For The Preceding Specified Surface = 9.262

Factor Of Safety Calculation Has Gone Through Ten Iterations

The Trial Failure Surface In Question Is Defined
By The Following 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	366.95	172.26
2	379.17	163.26
3	435.73	177.38
4	435.96	197.38
5	439.34	200.77

Factor Of Safety For The Preceding Specified Surface = 4.793

Factor Of Safety Calculation Has Gone Through Tén Iterations

The Trial Failure Surface In Question Is Defined
By The Following 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	348.18	162.13
2	357.89	158.23
3	416.85	169.38
4	417.24	189.38
5	421.86	196.10

Factor Of Safety For The Preceding Specified Surface = 5.598

Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Examined. They Are Ordered - Most Critical
First.

Run #22

* * Safety Factors Are Calculated By The Modified Janbu Method * *

Failure Surface Specified By 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	329.00	151.78
2	335.18	151.24
3	422.59	174.64
4	436.36	189.14
5	444.39	198.17

*** 1.401 ***

Individual data on the 7 slices

Slice No.	Width Ft(m)	Weight Lbs(kg)	Water Force Top Lbs(kg)	Water Force Bot Lbs(kg)	Tie Force Norm Lbs(kg)	Tie Force Tan Lbs(kg)	Earthquake Force Hor Lbs(kg)	Earthquake Force Ver Lbs(kg)	Surcharge Load Lbs(kg)
1	6.2	1426.6	.0	.0	.0	.0	.0	.0	.0
2	49.8	63143.2	.0	.0	.0	.0	.0	.0	.0
3	10.0	19145.6	.0	.0	.0	.0	.0	.0	.0
4	27.6	60092.4	.0	.0	.0	.0	.0	.0	.0
5	12.4	27417.5	.0	.0	.0	.0	.0	.0	.0
6	1.4	2300.6	.0	.0	.0	.0	.0	.0	.0
7	8.0	6286.0	.0	.0	.0	.0	.0	.0	.0

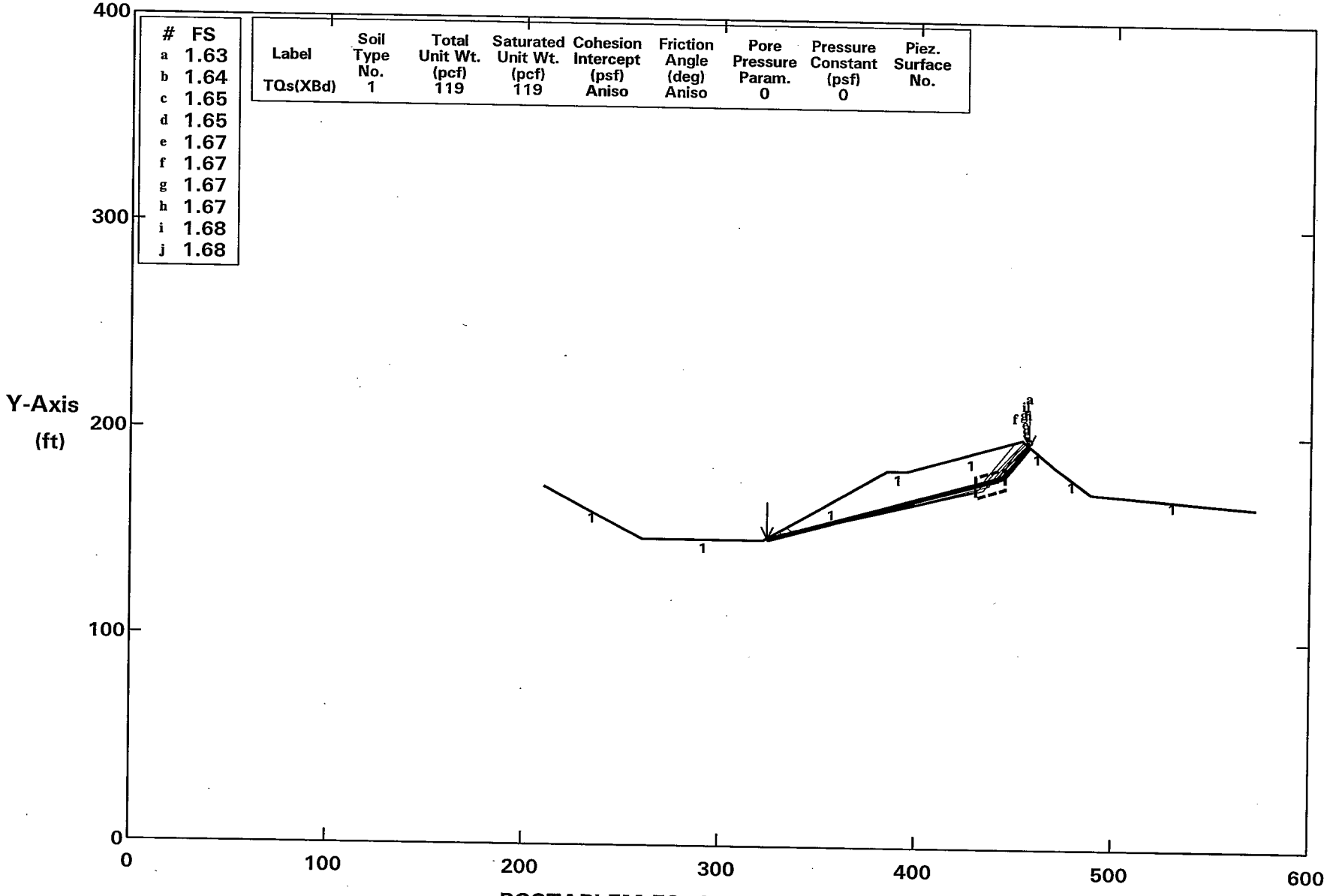
Failure Surface Specified By 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	327.13	150.77
2	328.78	149.73
3	425.50	175.21
4	439.64	189.36
5	446.81	196.93

*** 1.418 ***

TT52584-Hasley Cny-Sec.13-13'- Cut slope CS-18 -Ridge top cut-Toe area-Static

Ten Most Critical. C:HAS13D.PLT By: EC 1/12/99 5:12pm



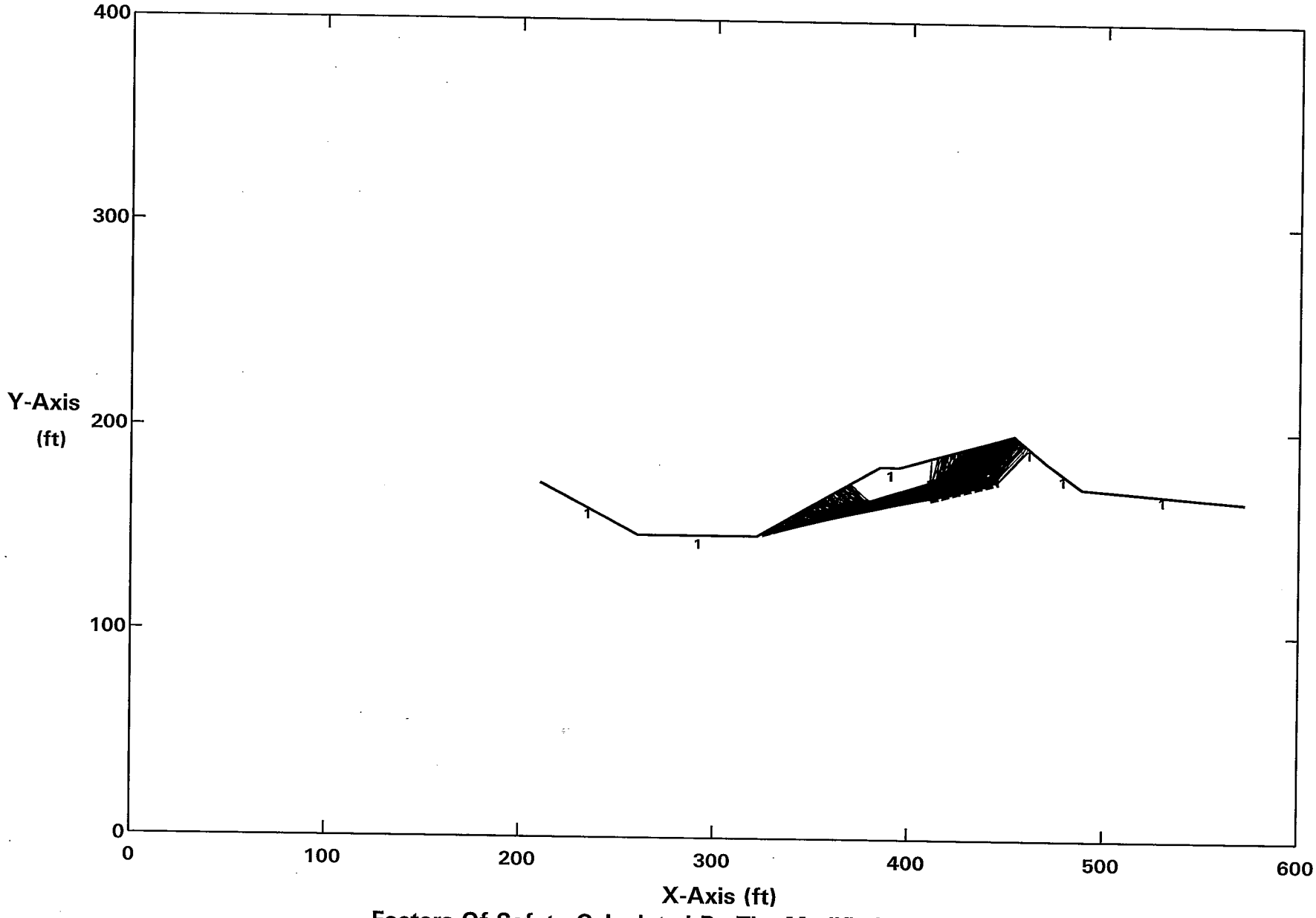
PCSTABL5M FSmin = 1.63 X-Axis (ft)

Factors Of Safety Calculated By The Modified Janbu Method

Run # 23

TT52584-Hasley Cny-Sec.13-13'- Cut slope CS-18 -Ridge top cut-Toe area-Static

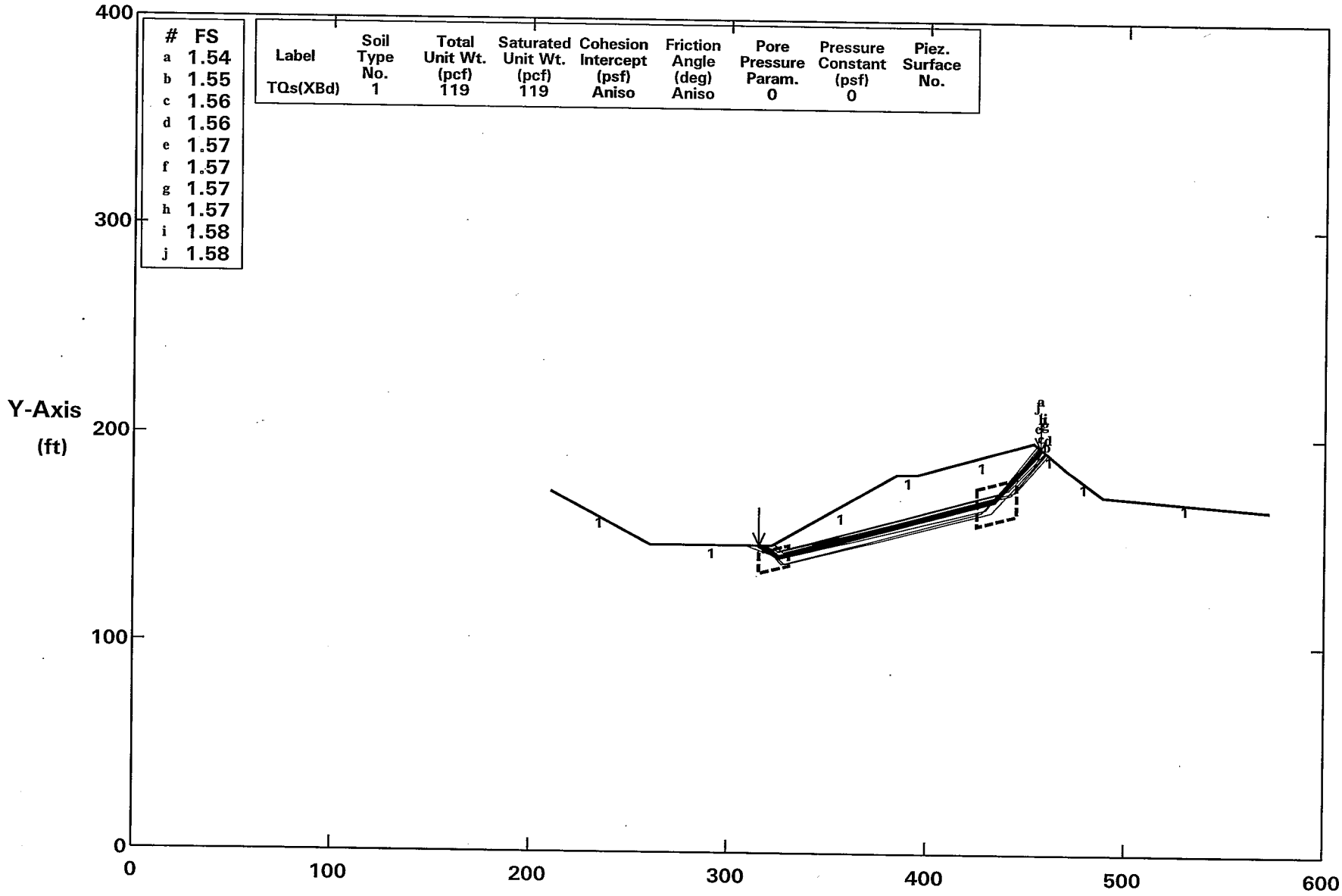
All surfaces evaluated. C:HAS13D.PLT By: EC 1/12/99 4:53pm



Factors Of Safety Calculated By The Modified Janbu Method

Run # 23

TT52584-Hasley Cny-Sec.13-13'- Cut slope CS-18 -Ridge top cut-Lower area-Static
Ten Most Critical. C:HAS13E.PLT By: EC 1/12/99 5:46pm

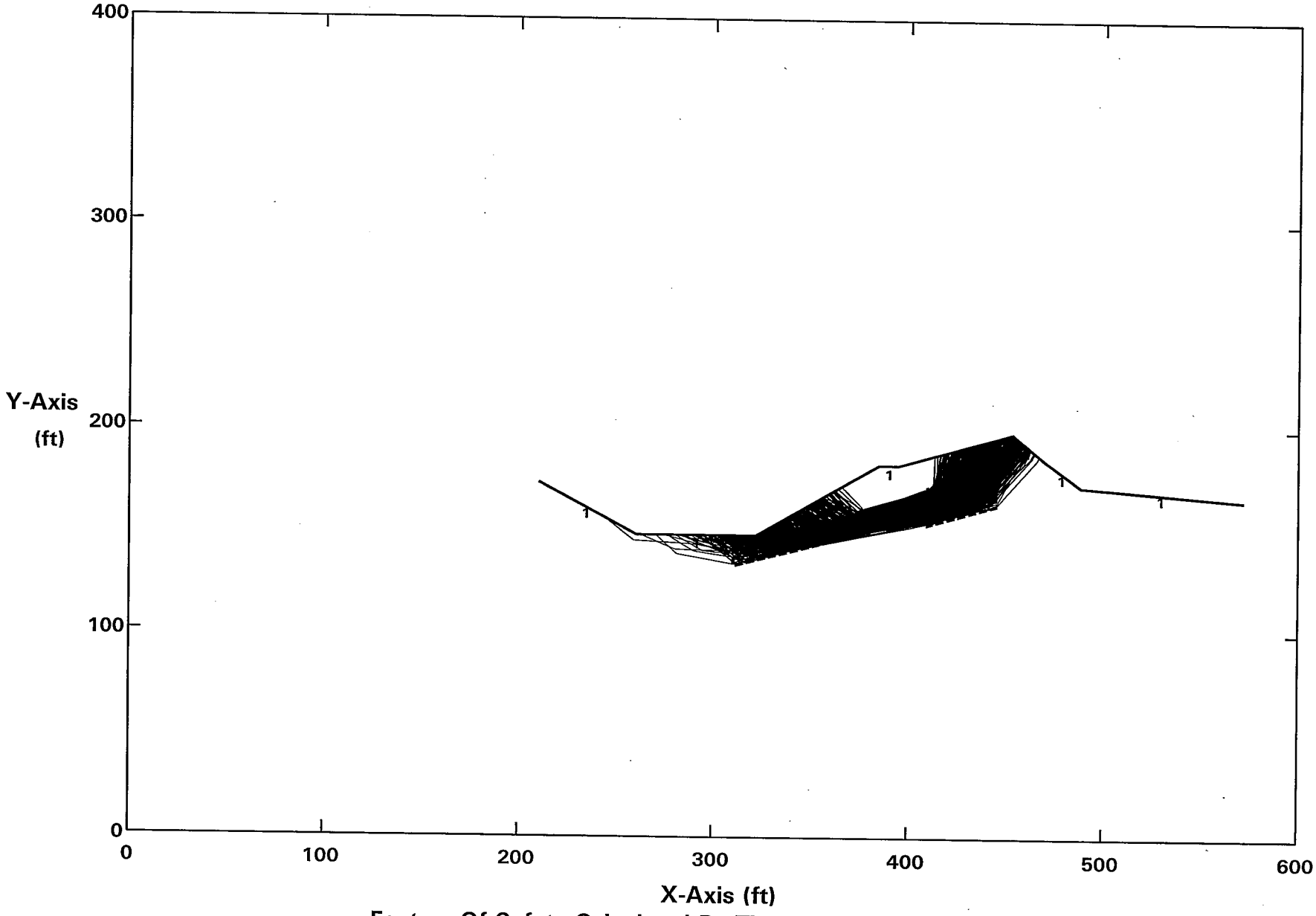


PCSTABL5M FSmin = 1.54 X-Axis (ft)
Factors Of Safety Calculated By The Modified Janbu Method

Run #24

TT52584-Hasley Cny-Sec.13-13'- Cut slope CS-18 -Ridge top cut-Lower area-Static

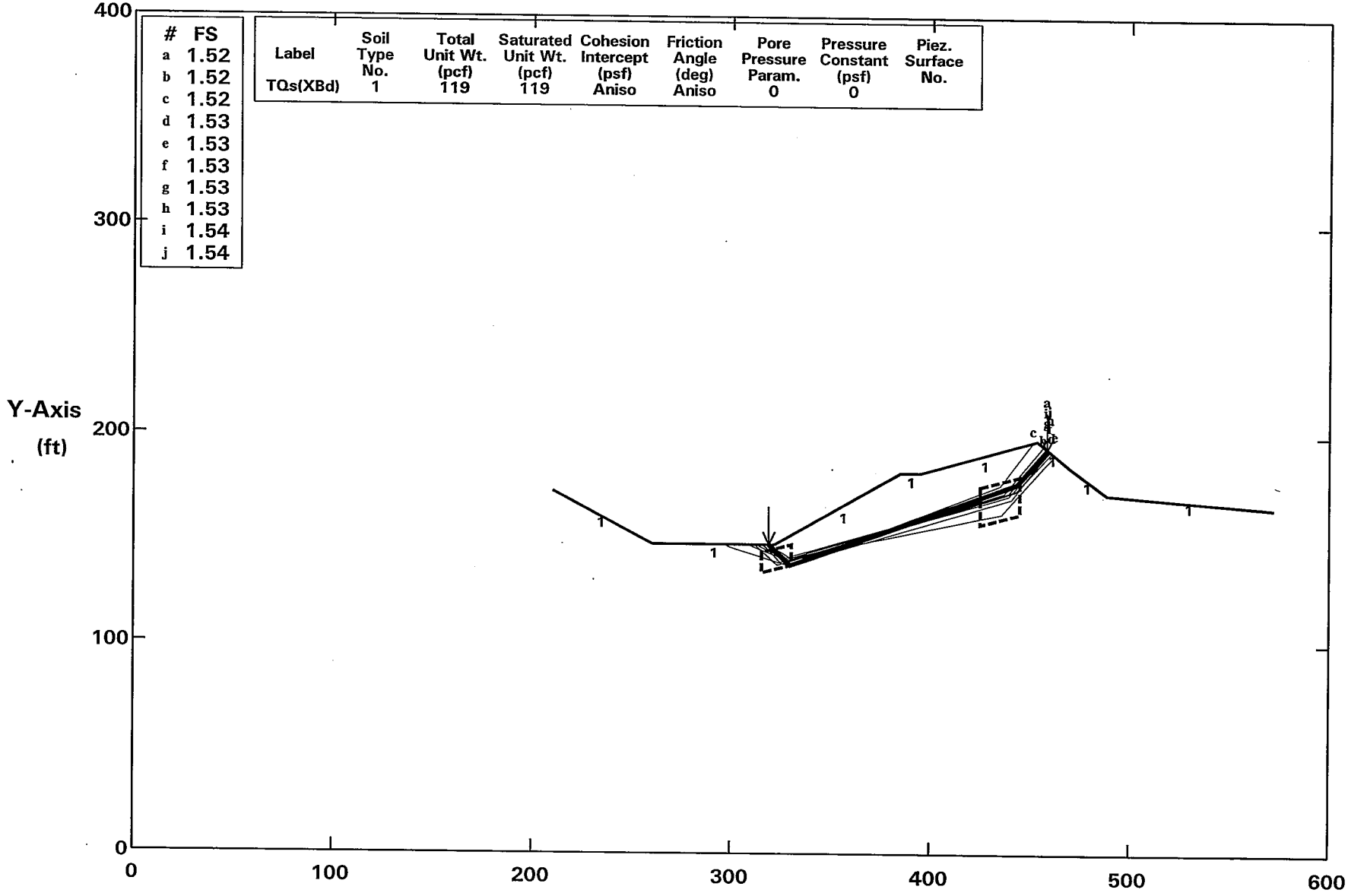
All surfaces evaluated. C:HAS13E.PLT By: EC 1/12/99 5:30pm



Factors Of Safety Calculated By The Modified Janbu Method

Run #24

TT52584-Hasley Cny-Sec.13-13'- Cut slope CS-18 -Ridge top cut-Lower area-Seismic
Ten Most Critical. C:HAS13E'.PLT By: EC 1/12/99 6:04pm



PCSTABL5M FSmin = 1.52 X-Axis (ft)
Factors Of Safety Calculated By The Modified Janbu Method

Run #25

Run #24

** PCSTABL5M **

by
Purdue University

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date:	1/12/99
Time of Run:	5:46pm
Run By:	EC
Input Data Filename:	C:HAS13E.IN
Output Filename:	C:HAS13E.OUT
Plotted Output Filename:	C:HAS13E.PLT

PROBLEM DESCRIPTION TT52584-Hasley Cny-Sec.13-13'- Cut slope
CS-18 -Ridge top cut-Lower area-Static

BOUNDARY COORDINATES

8 Top Boundaries
8 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	210.00	173.00	260.00	148.00	1
2	260.00	148.00	322.00	148.00	1
3	322.00	148.00	385.00	182.00	1
4	385.00	182.00	395.00	182.00	1
5	395.00	182.00	453.00	198.00	1
6	453.00	198.00	470.00	185.00	1
7	470.00	185.00	488.00	172.00	1
8	488.00	172.00	572.00	166.00	1

ISOTROPIC SOIL PARAMETERS

1 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	119.0	119.0	320.0	24.6	.00	.0	0

Run #24

ANISOTROPIC STRENGTH PARAMETERS
1 soil type(s)

Soil Type 1 Is Anisotropic

Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	13.0	320.0	24.6
2	15.0	200.0	17.4
3	90.0	320.0	24.6

Janbus Empirical Coef is being used for the case of c & phi both > 0

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Sliding Block Surfaces, Has Been Specified.

500 Trial Surfaces Have Been Generated.

2 Boxes Specified For Generation Of Central Block Base

Length Of Line Segments For Active And Passive Portions Of Sliding Block Is 30.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	315.00	139.20	330.00	143.00	10.00
2	425.00	166.70	445.00	171.70	18.00

Factor Of Safety Calculation Has Gone Through Ten Iterations

The Trial Failure Surface In Question Is Defined By The Following 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)

Run #24

1	316.26	148.00
2	326.75	137.67
3	426.52	159.63
4	426.82	189.62
5	428.10	191.13

Factor Of Safety For The Preceding Specified Surface = 4.516

Factor Of Safety Calculation Has Gone Through Ten Iterations

The Trial Failure Surface In Question Is Defined
By The Following 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	314.89	148.00
2	319.27	143.71
3	426.07	163.82
4	426.46	190.68

Factor Of Safety For The Preceding Specified Surface = 4.915

Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Examined. They Are Ordered - Most Critical
First.

* * Safety Factors Are Calculated By The Modified Janbu Method * *

Failure Surface Specified By 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	315.40	148.00
2	324.98	142.28
3	433.26	170.03
4	453.95	191.76
5	456.55	195.28

Run #24

*** 1.543 ***

Individual data on the 8 slices

Slice No.	Width Ft (m)	Weight Lbs (kg)	Water Force Top Lbs (kg)	Water Force Bot Lbs (kg)	Tie Force Norm Lbs (kg)	Tie Force Tan Lbs (kg)	Earthquake Force Hor Lbs (kg)	Earthquake Force Ver Lbs (kg)	Surcharge Load Lbs (kg)
1	6.6	1546.3	.0	.0	.0	.0	.0	.0	.0
2	3.0	1998.8	.0	.0	.0	.0	.0	.0	.0
3	60.0	113067.4	.0	.0	.0	.0	.0	.0	.0
4	10.0	27433.8	.0	.0	.0	.0	.0	.0	.0
5	38.3	100832.2	.0	.0	.0	.0	.0	.0	.0
6	19.7	34946.6	.0	.0	.0	.0	.0	.0	.0
7	.9	718.5	.0	.0	.0	.0	.0	.0	.0
8	2.6	854.2	.0	.0	.0	.0	.0	.0	.0

Failure Surface Specified By 4 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	316.94	148.00
2	324.14	142.31
3	441.70	173.19
4	459.47	193.05

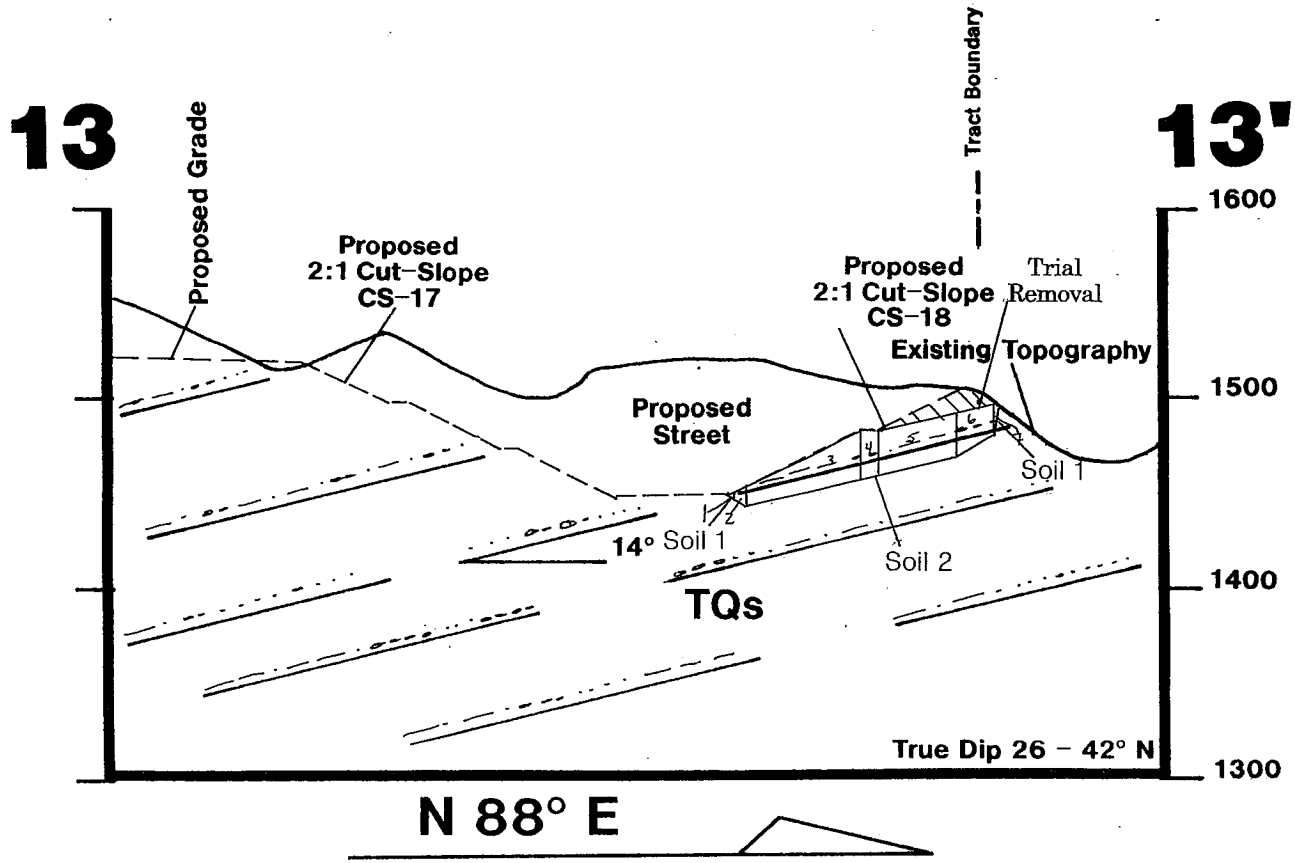
*** 1.552 ***

Failure Surface Specified By 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	307.93	148.00
2	326.67	141.48
3	433.99	169.31
4	454.05	191.61
5	456.72	195.16

*** 1.557 ***

CROSS SECTION
OMS STABILITY ANALYSIS



	Static		Pseudostatic	
	C	Ø	C	Ø
Soil 1 (TQs)	320	24.6	440	24.3
Soil 2 (Bedding Plane)	200	17.4	290	30

ALLAN E. SEWARD
ENGINEERING GEOLOGY

JOB NUMBER: 98-1617-4		DATE: 1/15/99	
SCALE: 1"=100'		DRAWN BY: Staff	
		REVISED:	

Run # 26 + 27

LOS ANGELES COUNTY
DEPARTMENT OF PUBLIC WORKS
LAND DEVELOPMENT DIVISION
GEOTECHNICAL ENGINEERING
ORDINARY METHOD OF SLICES USED FOR ANALYSIS

PROJECT: T.T. 52584 - Hasley Canyon
CONSULTANT: AES
REPORT DATE: 1/15/99
SECTION: 13-13' - CS-18 and Top Flattened CIRCLE: Lower Area (From Janbu's) - Static DATE: 1/15/99 BY: NAO

SLICE	HEIGHT(1)	HEIGHT(2)	WIDTH	AREA	WEIGHT	UNIT WT
1.	0.00	4.00	3.00	6.00	0.71	119.0
2.	4.00	10.00	6.00	42.00	5.00	119.0
3.	10.00	26.00	60.00	1080.00	131.76	122.0
4.	26.00	22.00	10.00	240.00	29.28	122.0
5.	22.00	22.00	40.00	880.00	107.36	122.0
6.	22.00	13.00	19.00	332.50	39.57	119.0
7.	13.00	0.00	4.00	26.00	3.09	119.0

SLOPE STABILITY DATA

SEISMIC COEFFICIENT = 0.00 g

SLICE NO.	1 SLICE WEIGHT W (kips)	2 FAILURE PLANE ANGLE i(deg)	3 ANGLE OF INT. FRICTION phi(deg)	4 COHE-SION C (ksf)	5 LENGTH OF ARC L (ft)	6 W (1-Ru) COS i / COS i TAN phi	7 C L COS i	8 g W (1-Ru) SINi COSi TAN phi	9 W SIN i / COS i	10 g W COS i / COS i
1.	0.71	-29.00	24.60	0.320	3.43	0.25	0.96	0.00	-0.30	0.00
2.	5.00	-29.00	24.60	0.320	6.86	1.75	1.92	0.00	-2.12	0.00
3.	131.76	14.00	17.40	0.200	61.84	38.87	12.00	0.00	30.93	0.00
4.	29.28	14.00	17.40	0.200	10.31	8.64	2.00	0.00	6.87	0.00
5.	107.36	14.00	17.40	0.200	41.22	31.68	8.00	0.00	25.20	0.00
6.	39.57	32.00	24.60	0.320	22.40	13.03	6.08	0.00	17.78	0.00
7.	3.09	77.00	24.60	0.320	17.78	0.07	1.28	0.00	0.68	0.00
SUMMATION:						94.29	32.24	0.00	79.04	0.00

STATIC SAFETY FACTOR = 1.60

Run #26

LOS ANGELES COUNTY
DEPARTMENT OF PUBLIC WORKS
LAND DEVELOPMENT DIVISION
GEOTECHNICAL ENGINEERING
ORDINARY METHOD OF SLICES USED FOR ANALYSIS

PROJECT: T.T. 52584 - Hasley Canyon
CONSULTANT: AES
REPORT DATE: 1/15/99
SECTION: 13-13' - CS-18 and Top Flattened CIRCLE: Lower Area (From Janbu's) - Pseudostatic DATE: 1/15/99 BY: NAO

SLICE	HEIGHT(1)	HEIGHT(2)	WIDTH	AREA	WEIGHT	UNIT WT
1.	0.00	4.00	3.00	6.00	0.71	119.0
2.	4.00	10.00	6.00	42.00	5.00	119.0
3.	10.00	26.00	60.00	1080.00	131.76	122.0
4.	26.00	22.00	10.00	240.00	29.28	122.0
5.	22.00	22.00	40.00	880.00	107.36	122.0
6.	22.00	13.00	19.00	332.50	39.57	119.0
7.	13.00	0.00	4.00	26.00	3.09	119.0

SLOPE STABILITY DATA

SEISMIC COEFFICIENT = 0.15 g

SLICE NO.	1 SLICE WEIGHT W (kips)	2 FAILURE PLANE ANGLE i(deg)	3 ANGLE OF INT. FRICTION phi(deg)	4 COHE-SION C (ksf)	5 LENGTH OF ARC L (ft)	6 W (1-Ru) COS i / COS i TAN phi	7 C L COS i	8 g W (1-Ru) SINi COSi TAN phi	9 W SIN i COS i	10 g W COS i COS i
1.	0.71	-29.00	24.30	0.440	3.43	0.25	1.32	-0.02	-0.30	0.08
2.	5.00	-29.00	24.30	0.440	6.86	1.73	2.64	-0.14	-2.12	0.57
3.	131.76	14.00	30.00	0.290	61.84	71.62	17.40	2.68	30.93	18.61
4.	29.28	14.00	30.00	0.290	10.31	15.92	2.90	0.60	6.87	4.13
5.	107.36	14.00	30.00	0.290	41.22	58.36	11.60	2.18	25.20	15.16
6.	39.57	32.00	24.30	0.440	22.40	12.85	8.36	1.20	17.78	4.27
7.	3.09	77.00	24.30	0.440	17.78	0.07	1.76	0.05	0.68	0.02
SUMMATION:						160.78	45.98	6.54	79.04	42.85

~~STATIC SAFETY FACTOR = 2.62~~

Run #27

Run # 27

SEISMIC SAFETY FACTOR = 1.64

STABILITY ANALYSIS

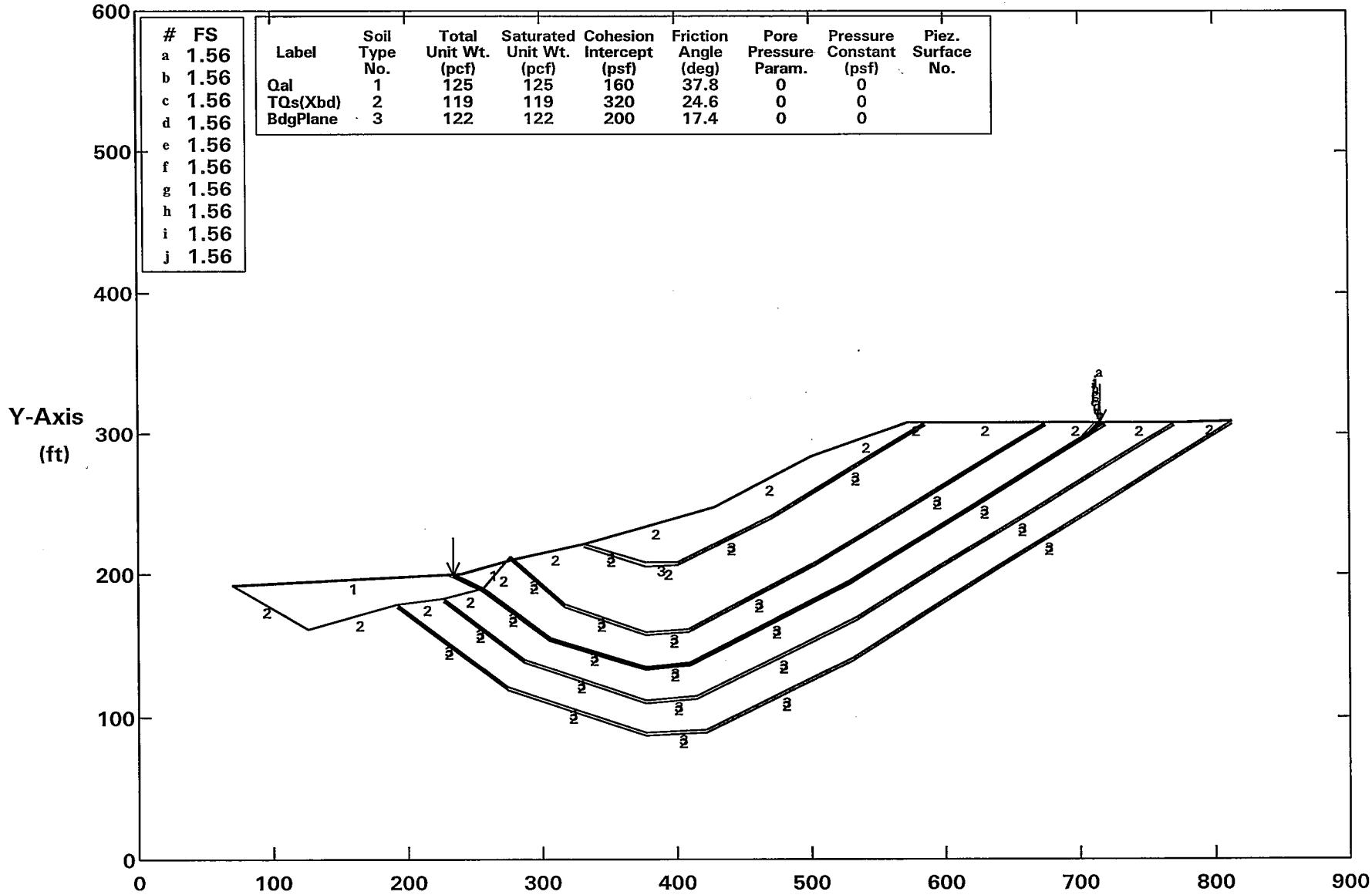
FOR CROSS SECTION 14-14'

TT52584-Hasley Cny-Sec.14-14'-3rd plane from top-Static

Ten Most Critical. C:HAS14A.PLT By: EC 1/12/99 9:43am

#	FS
a	1.56
b	1.56
c	1.56
d	1.56
e	1.56
f	1.56
g	1.56
h	1.56
i	1.56
j	1.56

Label	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
Qal	1	125	125	160	37.8	0	0	
TQs(Xbd)	2	119	119	320	24.6	0	0	
BdgPlane	3	122	122	200	17.4	0	0	



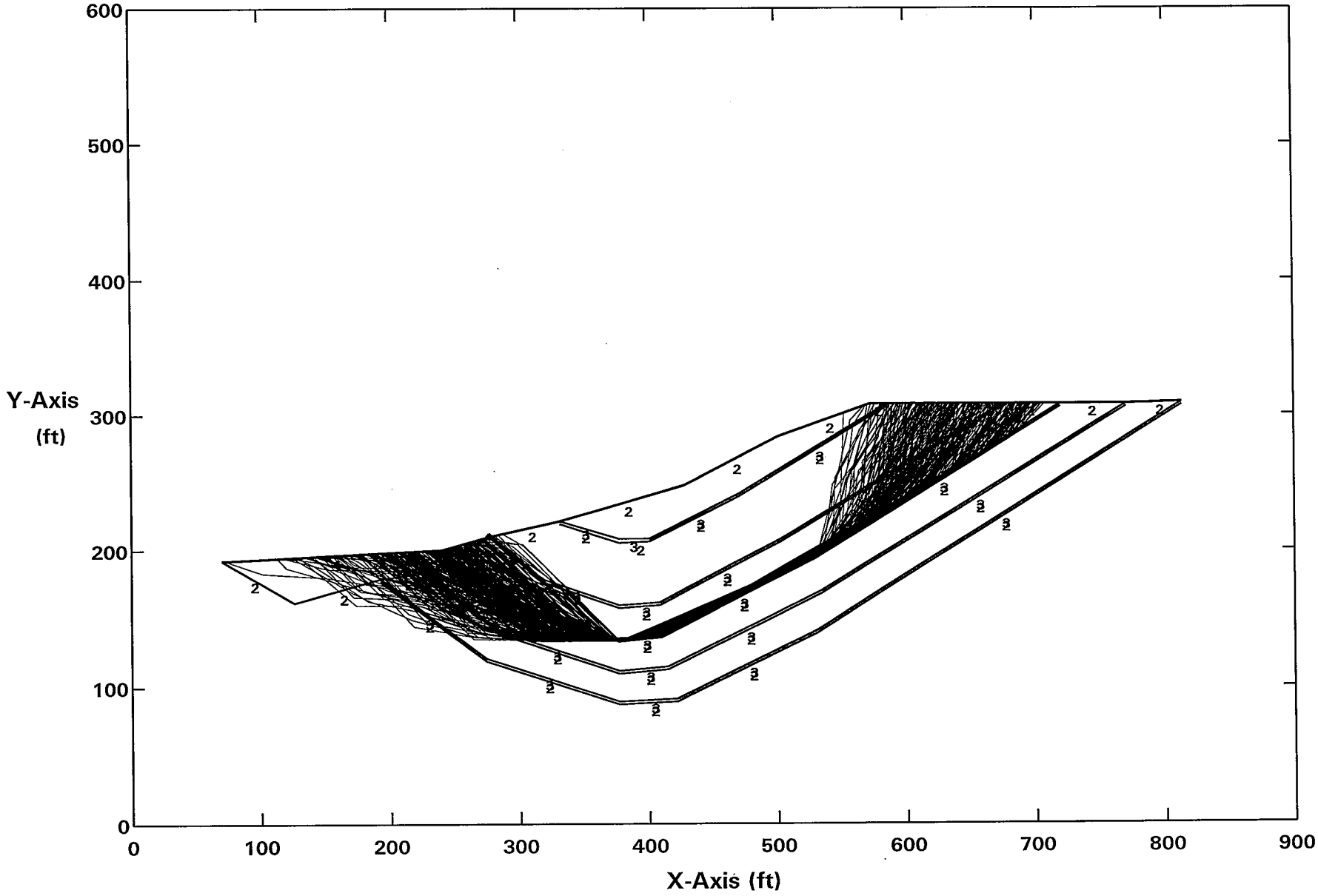
PCSTABL5M FSmin = 1.56 X-Axis (ft)

Factors Of Safety Calculated By The Modified Janbu Method

Run #28

TT52584-Hasley Cny-Sec.14-14'-3rd plane from top-Static

All surfaces evaluated. C:HAS14A.PLT By: EC 1/12/99 9:22am



Factors Of Safety Calculated By The Modified Janbu Method

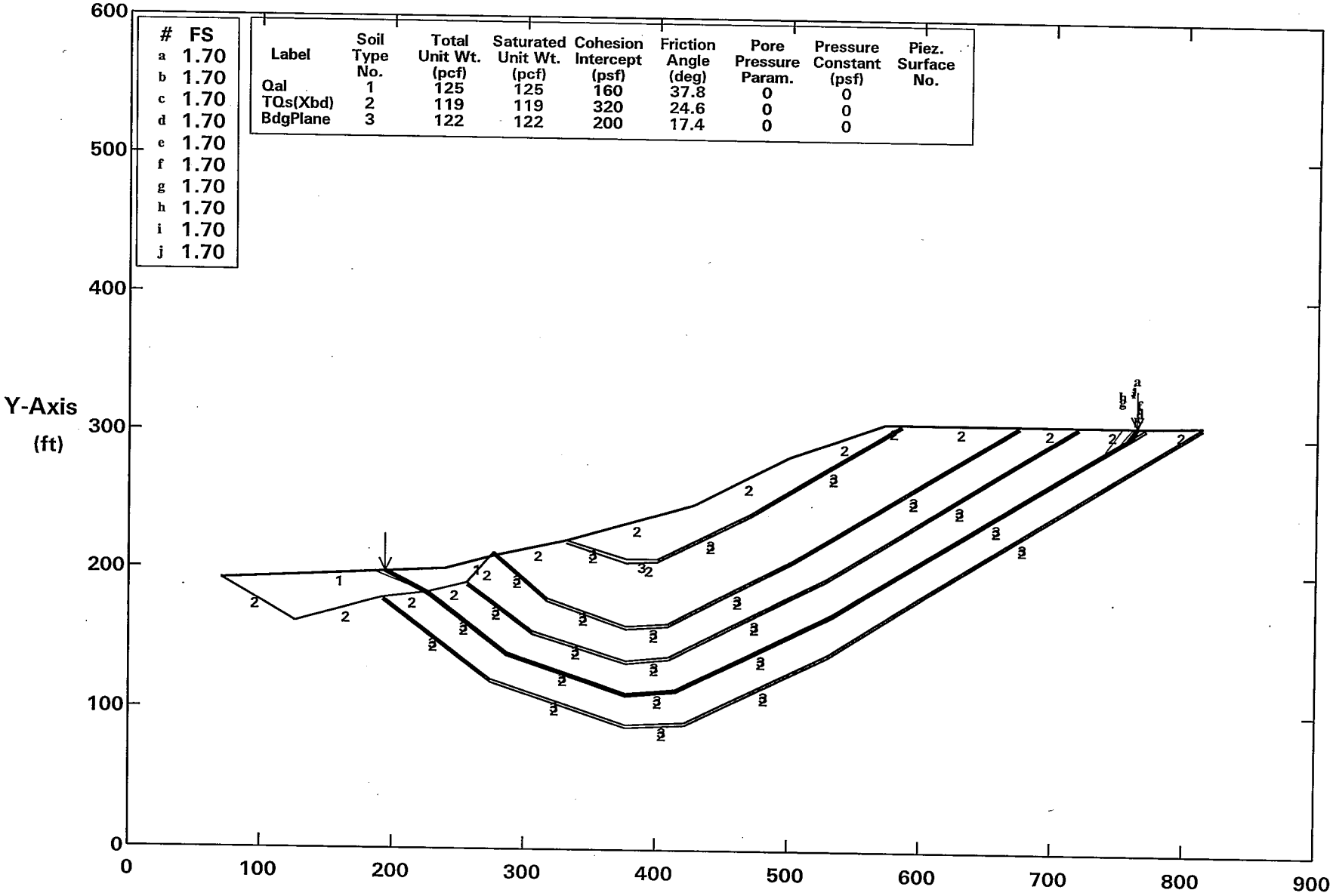
Ron #28

TT52584-Hasley Cny-Sec.14-14'-4th plane from top-Static

Ten Most Critical. C:HAS14B.PLT By: EC 1/12/99 10:18am

#	FS
a	1.70
b	1.70
c	1.70
d	1.70
e	1.70
f	1.70
g	1.70
h	1.70
i	1.70
j	1.70

Label	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
Qal	1	125	125	160	37.8	0	0	
TQs(Xbd)	2	119	119	320	24.6	0	0	
BdgPlane	3	122	122	200	17.4	0	0	



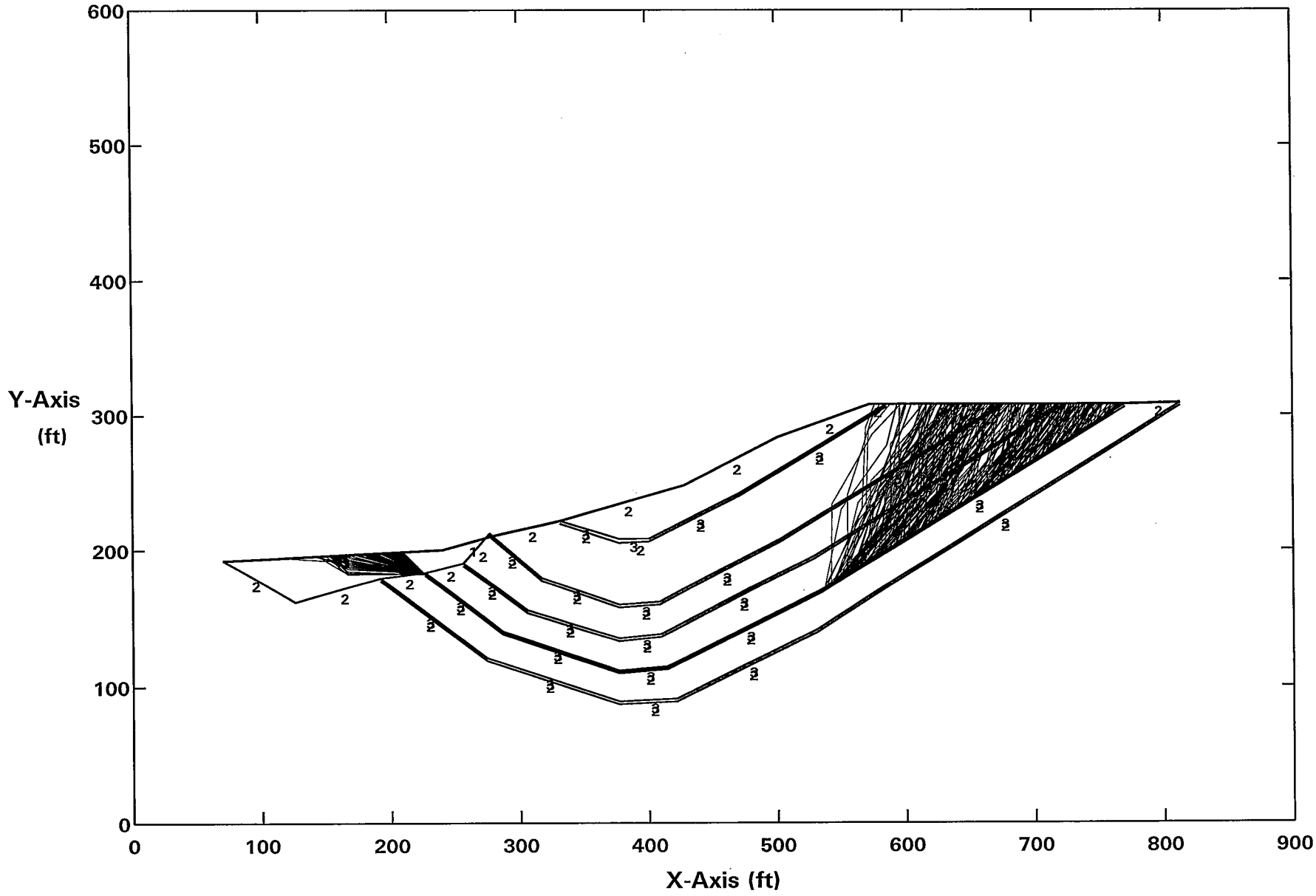
PCSTABL5M FSmin = 1.70 X-Axis (ft)

Factors Of Safety Calculated By The Modified Janbu Method

Run #29

TT52584-Hasley Cny-Sec.14-14'-4th plane from top-Static

All surfaces evaluated. C:HAS14B.PLT By: EC 1/12/99 10:02am



Factors Of Safety Calculated By The Modified Janbu Method

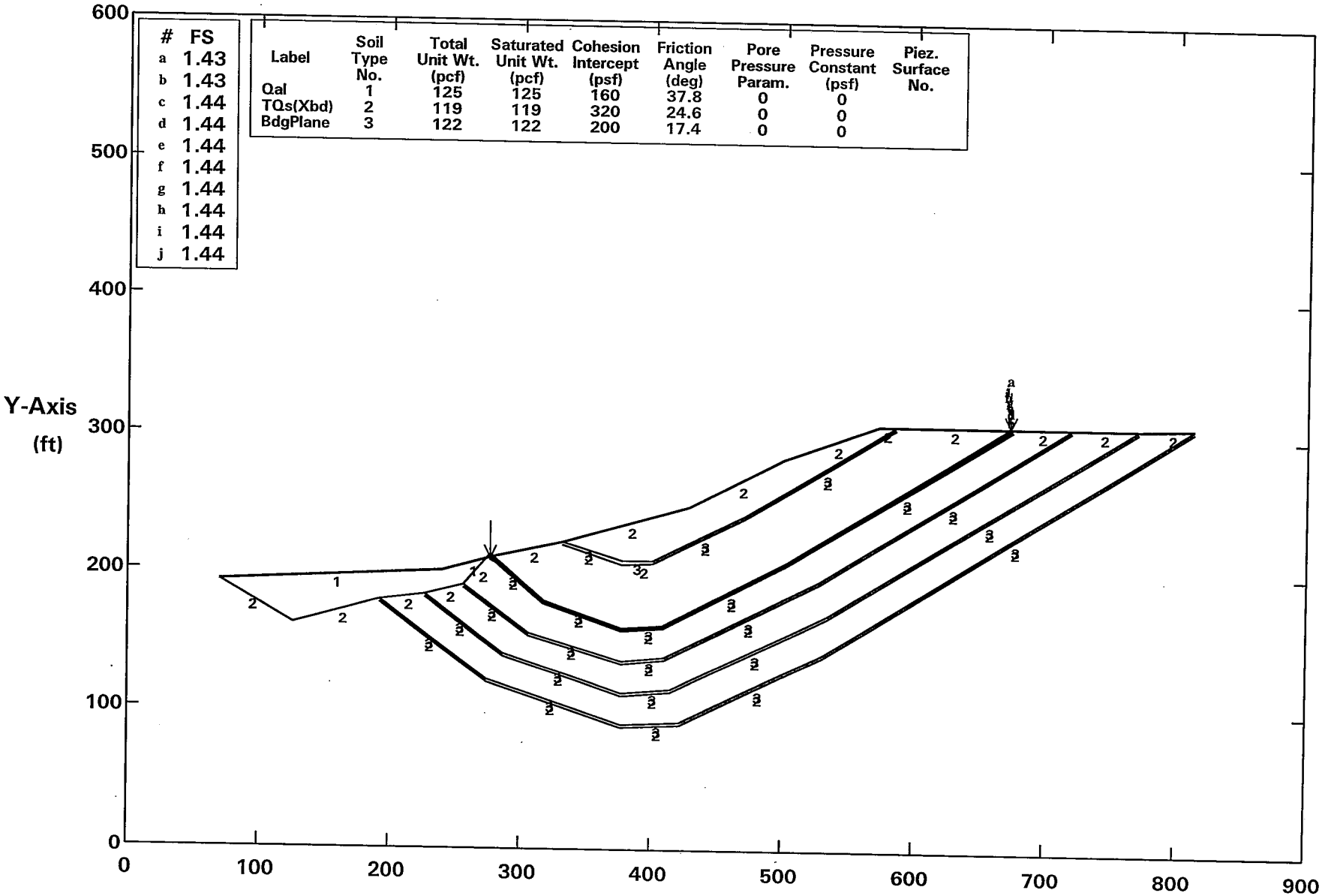
Run #29

TT52584-Hasley Cny-Sec.14-14'-2nd plane from top-Static

Ten Most Critical. C:HAS14C.PLT By: EC 1/12/99 11:59am

#	FS
a	1.43
b	1.43
c	1.44
d	1.44
e	1.44
f	1.44
g	1.44
h	1.44
i	1.44
j	1.44

Label	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
Qal	1	125	125	160	37.8	0	0	
TQs(Xbd)	2	119	119	320	24.6	0	0	
BdgPlane	3	122	122	200	17.4	0	0	



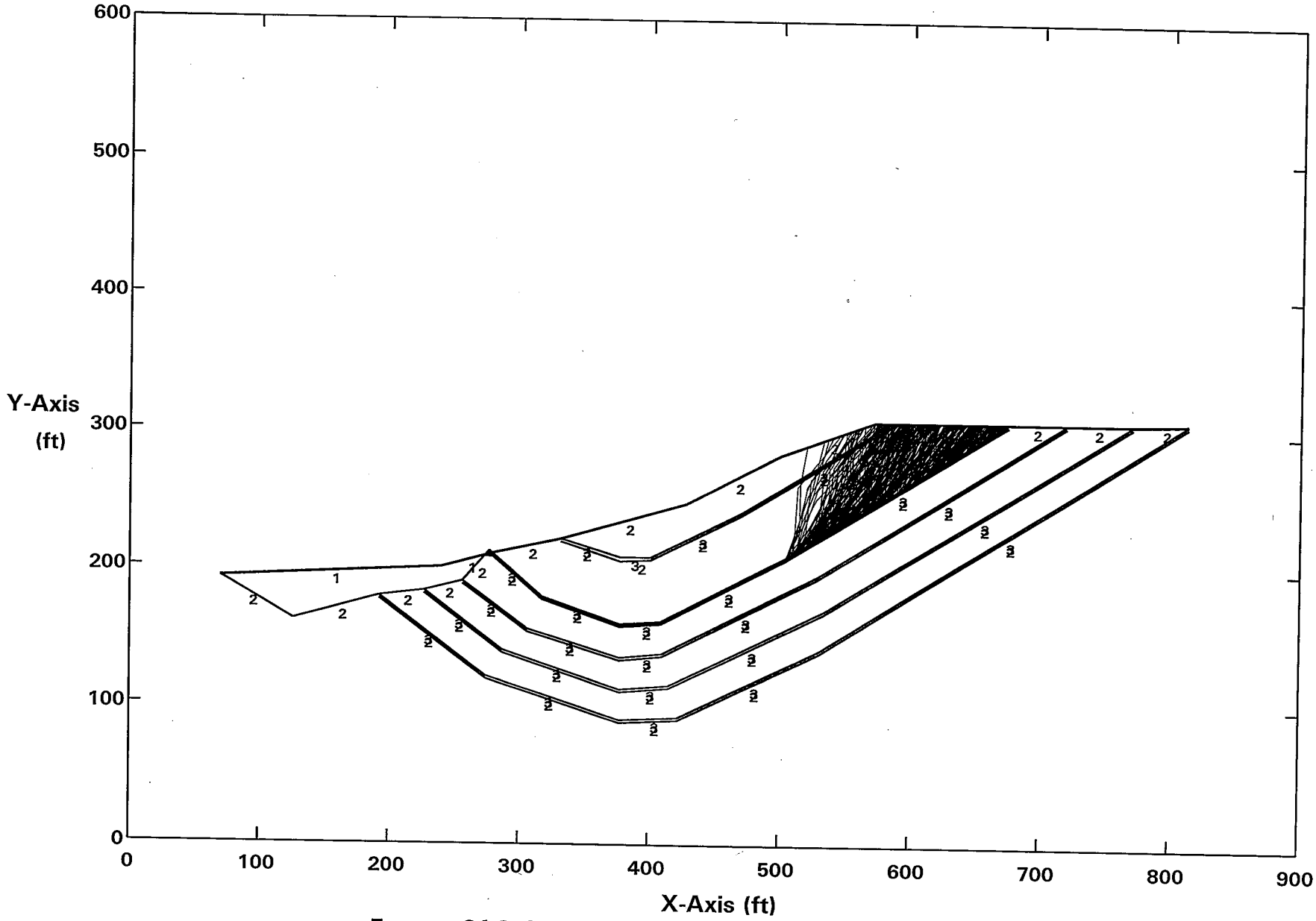
PCSTABL5M FSmin = 1.43 X-Axis (ft)

Factors Of Safety Calculated By The Modified Janbu Method

Run #30

TT52584-Hasley Cny-Sec.14-14'-2nd plane from top-Static

All surfaces evaluated. C:HAS14C.PLT By: EC 1/12/99 11:59am



Factors Of Safety Calculated By The Modified Janbu Method

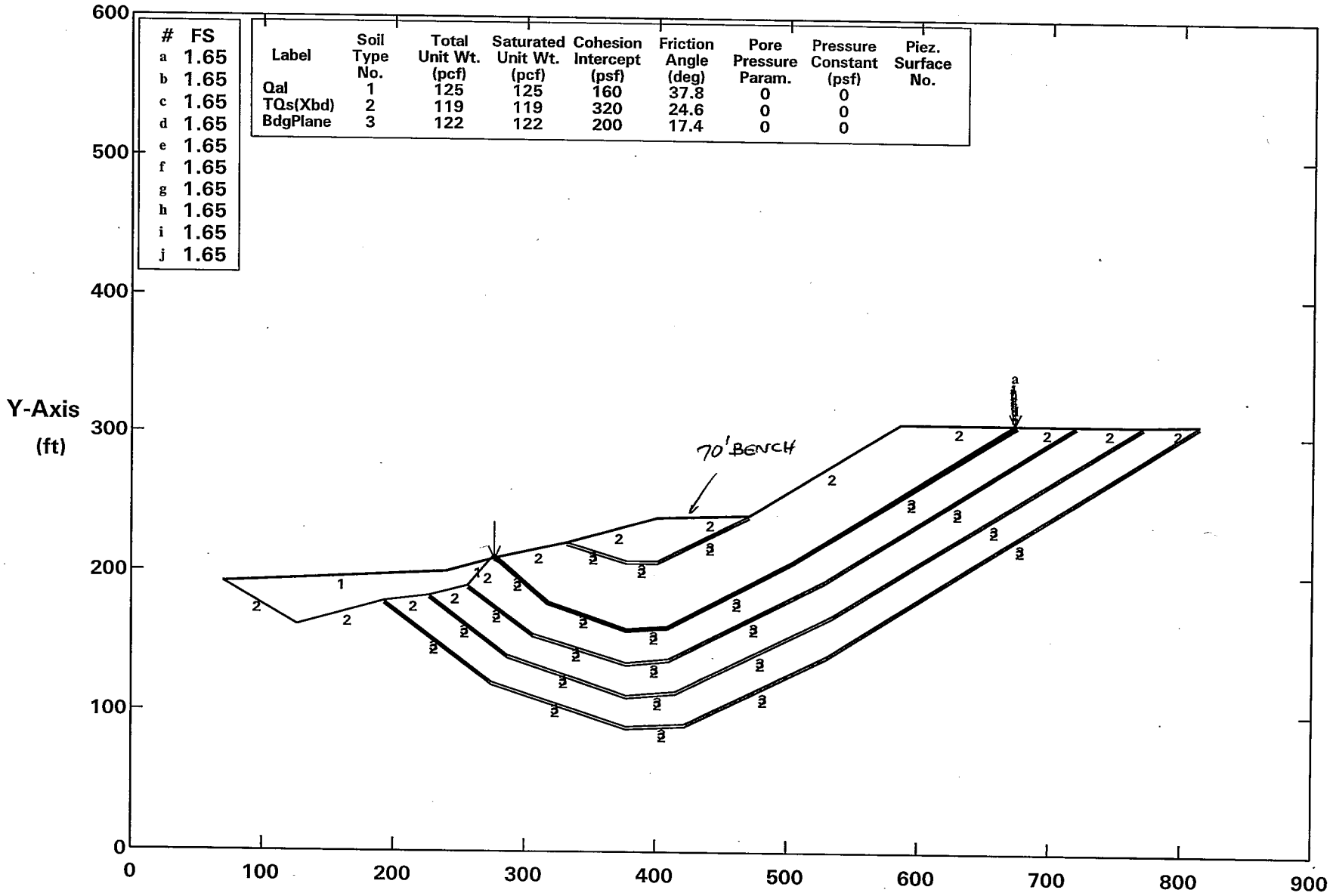
Run #30

TT52584-Hasley Cny-Sec.14-14'-Top cut w/ 70'bench-2nd plane from top-Static

Ten Most Critical. C:HAS14D.PLT By: EC 1/12/99 12:44pm

#	FS
a	1.65
b	1.65
c	1.65
d	1.65
e	1.65
f	1.65
g	1.65
h	1.65
i	1.65
j	1.65

Label	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
Qal	1	125	125	160	37.8	0	0	
TQs(Xbd)	2	119	119	320	24.6	0	0	
BdgPlane	3	122	122	200	17.4	0	0	



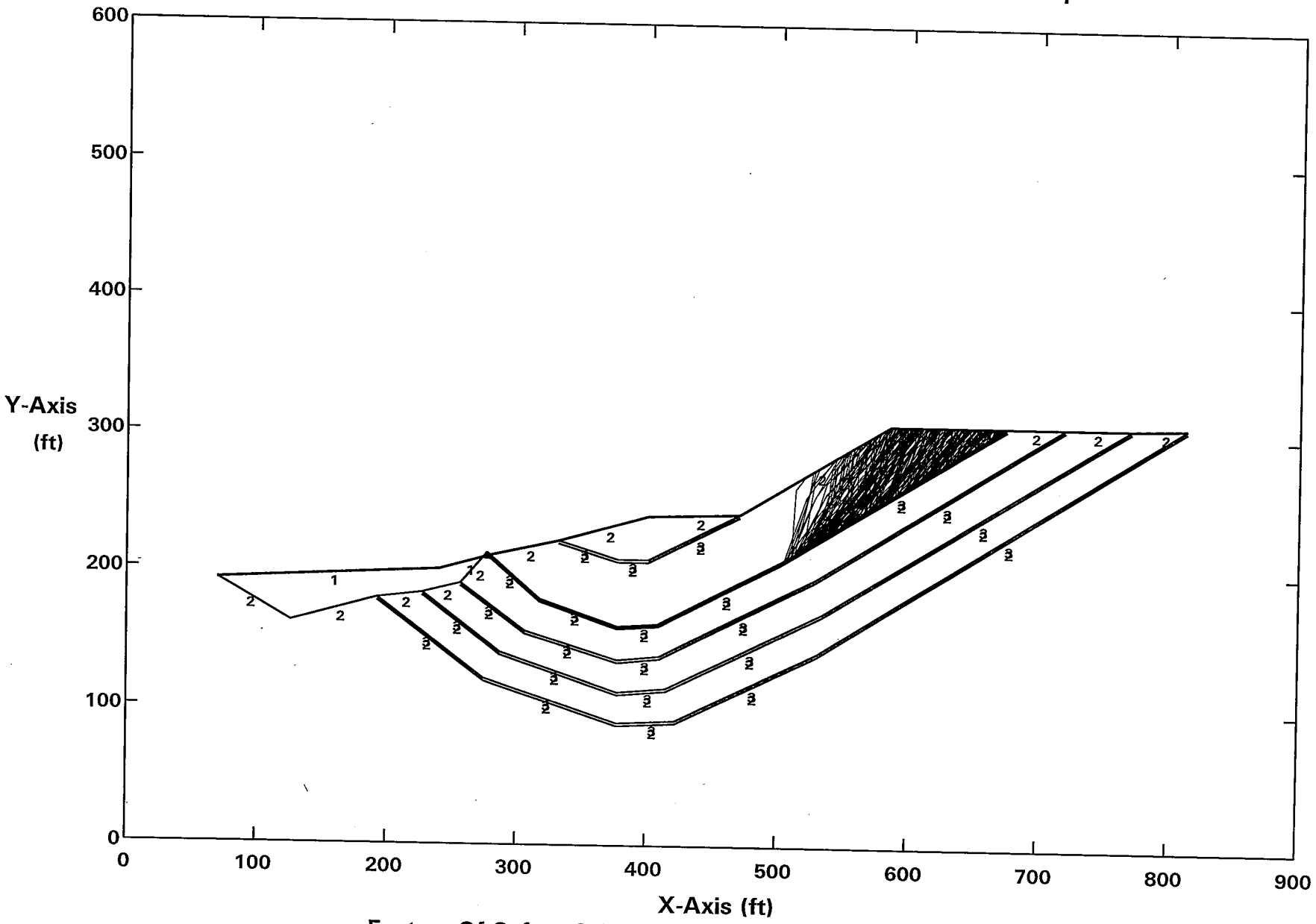
PCSTABL5M FSmin = 1.65 X-Axis (ft)

Factors Of Safety Calculated By The Modified Janbu Method

Run #31

TT52584-Hasley Cny-Sec.14-14'-Top cut w/ 70'bench-2nd plane from top-Static

All surfaces evaluated. C:HAS14D.PLT By: EC 1/12/99 12:44pm



Factors Of Safety Calculated By The Modified Janbu Method

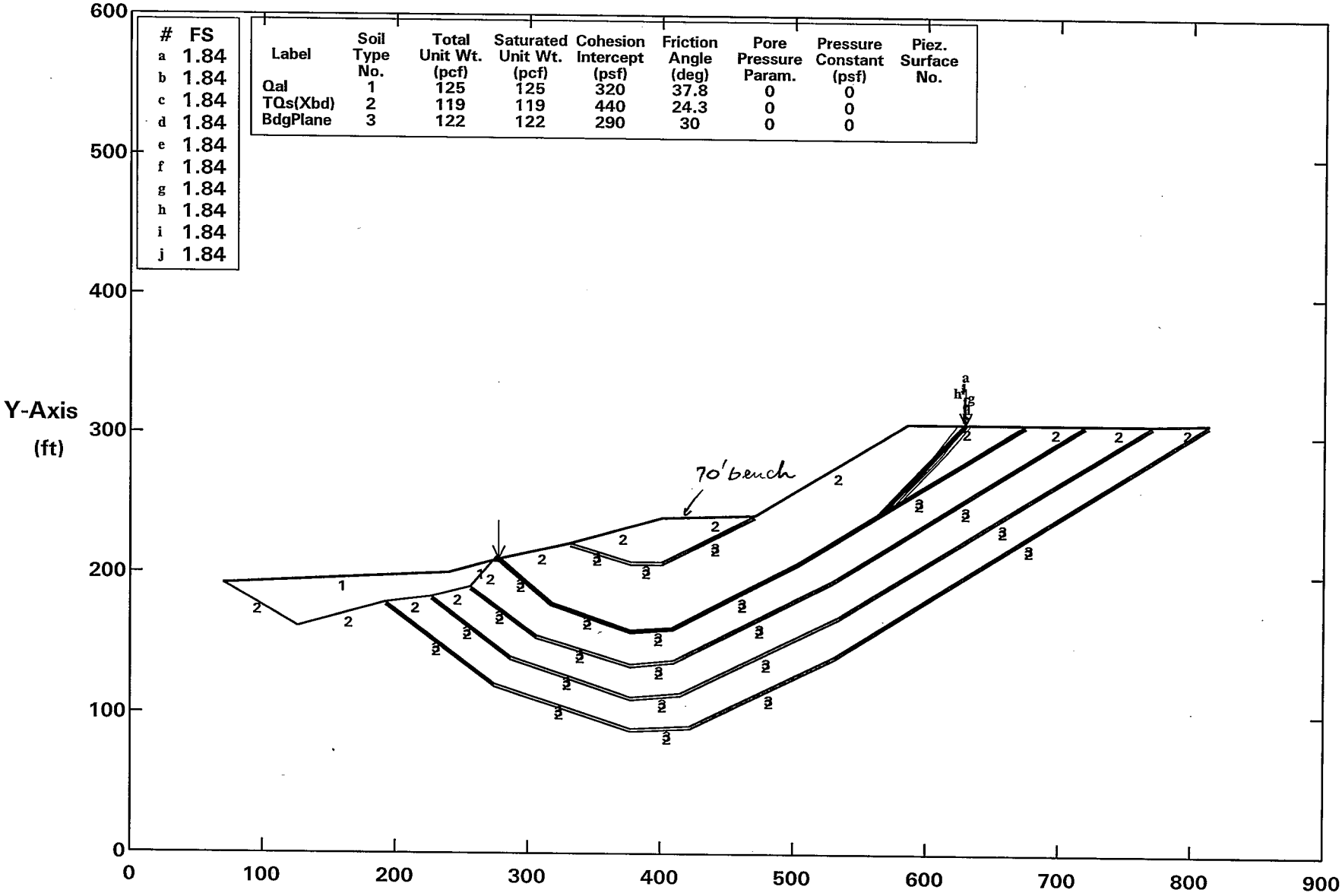
Run #31

TT52584-Hasley Cny-Sec.14-14'-Top cut w/70'bench-2nd plane from top-Pseudostatic

Ten Most Critical. C:HAS14D'.PLT By: EC 1/12/99 1:02pm

#	FS
a	1.84
b	1.84
c	1.84
d	1.84
e	1.84
f	1.84
g	1.84
h	1.84
i	1.84
j	1.84

Label	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
Qal	1	125	125	320	37.8	0	0	
TQs(Xbd)	2	119	119	440	24.3	0	0	
BdgPlane	3	122	122	290	30	0	0	



PCSTABL5M FSmin = 1.84 X-Axis (ft)

Factors Of Safety Calculated By The Modified Janbu Method

Run # 32

Run #31

** PCSTABL5M **

by
Purdue University

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date:	1/12/99
Time of Run:	12:44pm
Run By:	EC
Input Data Filename:	C:HAS14D.IN
Output Filename:	C:HAS14D.OUT
Plotted Output Filename:	C:HAS14D.PLT

PROBLEM DESCRIPTION TT52584-Hasley Cny-Sec.14-14'-Top cut w/ 70'bench-2nd plane from top-Static

BOUNDARY COORDINATES

10 Top Boundaries
61 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	70.00	192.00	240.00	200.00	1
2	240.00	200.00	278.00	210.00	1
3	278.00	210.00	331.00	222.00	2
4	331.00	222.00	400.00	240.00	2
5	400.00	240.00	471.00	242.00	2
6	471.00	242.00	585.00	308.00	2
7	585.00	308.00	675.00	308.00	2
8	675.00	308.00	720.00	308.00	2
9	720.00	308.00	769.00	308.00	2
10	769.00	308.00	813.00	309.00	2
11	331.00	222.00	377.00	208.00	3
12	377.00	208.00	400.00	208.00	3
13	400.00	208.00	471.00	242.00	3
14	331.00	220.00	377.00	206.00	2
15	377.00	206.00	400.00	206.00	2
16	400.00	206.00	471.00	240.00	2
17	276.00	212.00	317.00	179.00	3
18	317.00	179.00	377.00	160.00	3
19	377.00	160.00	409.00	162.00	3
20	409.00	162.00	503.00	208.00	3
21	503.00	208.00	675.00	308.00	3
22	276.00	210.00	317.00	177.00	2

Run #31

23	317.00	177.00	377.00	158.00	2
24	377.00	158.00	409.00	160.00	2
25	409.00	160.00	503.00	206.00	2
26	503.00	206.00	675.00	306.00	2
27	256.00	190.00	276.00	212.00	2
28	256.00	190.00	306.00	155.00	3
29	306.00	155.00	377.00	135.00	3
30	377.00	135.00	410.00	138.00	3
31	410.00	138.00	528.00	195.00	3
32	528.00	195.00	720.00	308.00	3
33	256.00	188.00	306.00	153.00	2
34	306.00	153.00	377.00	133.00	2
35	377.00	133.00	410.00	136.00	2
36	410.00	136.00	528.00	193.00	2
37	528.00	193.00	720.00	306.00	2
38	227.00	183.00	256.00	190.00	2
39	227.00	183.00	287.00	140.00	3
40	287.00	140.00	377.00	112.00	3
41	377.00	112.00	415.00	115.00	3
42	415.00	115.00	534.00	170.00	3
43	534.00	170.00	770.00	308.00	3
44	227.00	181.00	287.00	138.00	2
45	287.00	138.00	377.00	110.00	2
46	377.00	110.00	415.00	113.00	2
47	415.00	113.00	534.00	168.00	2
48	534.00	168.00	770.00	306.00	2
49	192.00	179.00	227.00	183.00	2
50	192.00	179.00	274.00	121.00	3
51	274.00	121.00	377.00	89.00	3
52	377.00	89.00	422.00	91.00	3
53	422.00	91.00	530.00	141.00	3
54	530.00	141.00	813.00	309.00	3
55	192.00	177.00	274.00	119.00	2
56	274.00	119.00	377.00	87.00	2
57	377.00	87.00	422.00	89.00	2
58	422.00	89.00	530.00	139.00	2
59	530.00	139.00	813.00	307.00	2
60	70.00	192.00	126.00	162.00	2
61	126.00	162.00	192.00	179.00	2

ISOTROPIC SOIL PARAMETERS

3 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	125.0	125.0	160.0	37.8	.00	.0	0
2	119.0	119.0	320.0	24.6	.00	.0	0
3	122.0	122.0	200.0	17.4	.00	.0	0

Janbus Empirical Coef is being used for the case of c & phi both > 0

Run #31

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Sliding Block Surfaces, Has Been Specified.

500 Trial Surfaces Have Been Generated.

6 Boxes Specified For Generation Of Central Block Base

Length Of Line Segments For Active And Passive Portions Of Sliding Block Is 50.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	280.00	207.80	280.00	207.80	.00
2	317.00	178.00	317.00	178.00	.00
3	377.00	159.00	377.00	159.00	.00
4	409.00	161.00	409.00	161.00	.00
5	503.00	207.00	503.00	207.00	.00
6	504.00	207.60	670.00	305.10	.10

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Modified Janbu Method * *

Failure Surface Specified By 8 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	276.50	209.61
2	280.00	207.80
3	317.00	178.00
4	377.00	159.00
5	409.00	161.00
6	503.00	207.00
7	668.86	304.39
8	672.41	308.00

*** 1.648 ***

Run #31

Individual data on the 13 slices

Slice No.	Width Ft(m)	Weight Lbs(kg)	Water Force Top Lbs(kg)	Water Force Bot Lbs(kg)	Tie Force Norm Lbs(kg)	Tie Force Tan Lbs(kg)	Earthquake Force Hor Lbs(kg)	Earthquake Force Ver Lbs(kg)	Surcharge Load Lbs(kg)
1	1.5	101.5	.0	.0	.0	.0	.0	.0	.0
2	2.0	462.3	.0	.0	.0	.0	.0	.0	.0
3	37.0	95837.8	.0	.0	.0	.0	.0	.0	.0
4	14.0	74398.5	.0	.0	.0	.0	.0	.0	.0
5	46.0	338251.1	.0	.0	.0	.0	.0	.0	.0
6	23.0	211725.8	.0	.0	.0	.0	.0	.0	.0
7	9.0	85127.0	.0	.0	.0	.0	.0	.0	.0
8	62.0	479807.4	.0	.0	.0	.0	.0	.0	.0
9	32.0	198465.9	.0	.0	.0	.0	.0	.0	.0
10	82.0	519183.5	.0	.0	.0	.0	.0	.0	.0
11	83.9	281731.4	.0	.0	.0	.0	.0	.0	.0
12	.1	31.9	.0	.0	.0	.0	.0	.0	.0
13	3.5	731.3	.0	.0	.0	.0	.0	.0	.0

Failure Surface Specified By 8 Coordinate Points

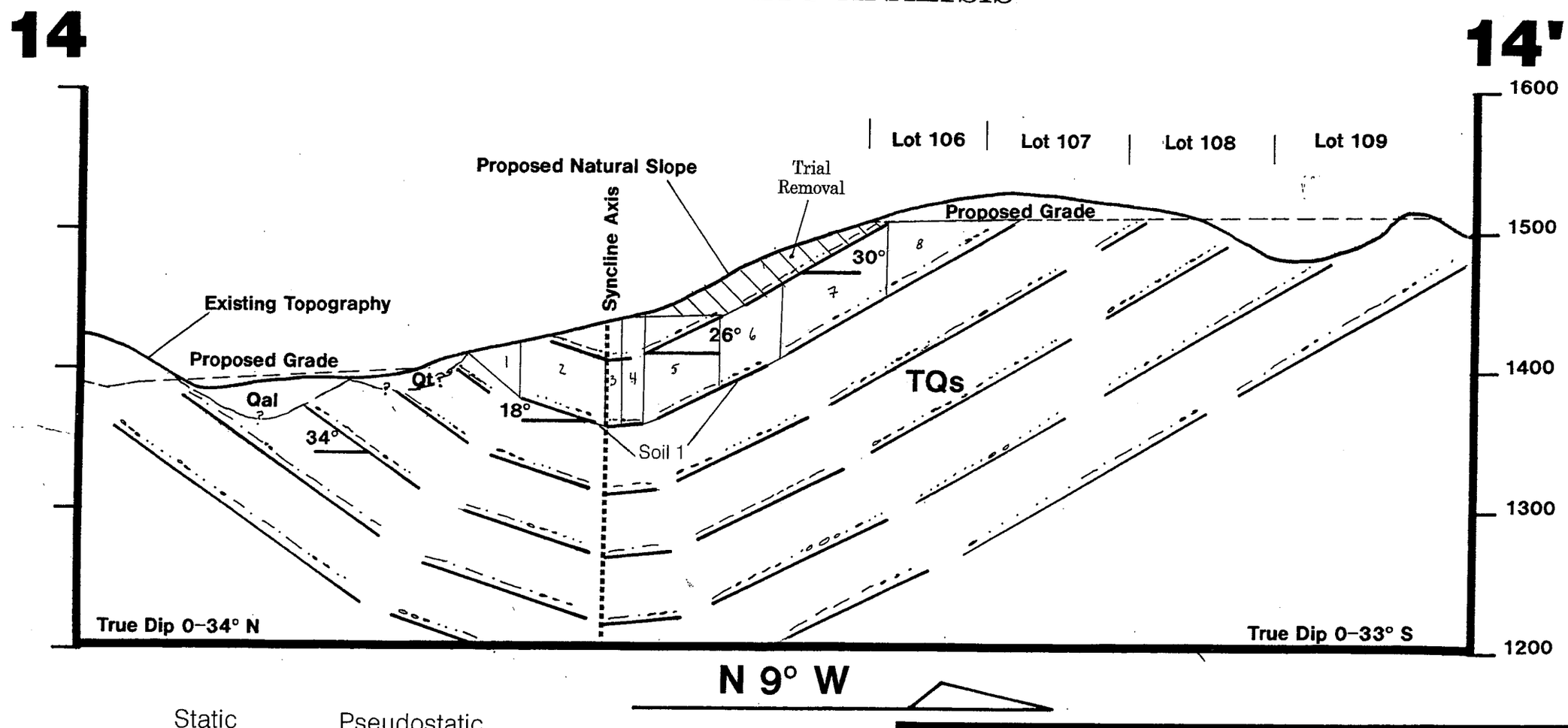
Point No.	X-Surf (ft)	Y-Surf (ft)
1	276.50	209.61
2	280.00	207.80
3	317.00	178.00
4	377.00	159.00
5	409.00	161.00
6	503.00	207.00
7	668.86	304.39
8	672.41	308.00

*** 1.648 ***

Failure Surface Specified By 8 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	277.04	209.75
2	280.00	207.80
3	317.00	178.00
4	377.00	159.00
5	409.00	161.00
6	503.00	207.00
7	668.81	304.36
8	672.31	308.00

CROSS SECTION
OMS STABILITY ANALYSIS



	Static		Pseudostatic	
	C	Ø	C	Ø
Soil 1 (Bedding Plane)	200	17.4	290	30

ALLAN E. SEWARD
ENGINEERING GEOLOGY

JOB NUMBER: 98-1617-4		DATE: 1/15/99	
SCALE: 1"=100'		DRAWN BY: Staff	
		REVISED:	

Run # 33

LOS ANGELES COUNTY
DEPARTMENT OF PUBLIC WORKS
LAND DEVELOPMENT DIVISION
GEOTECHNICAL ENGINEERING
ORDINARY METHOD OF SLICES USED FOR ANALYSIS

PROJECT: T.T. 52584 - Hasley Canyon
CONSULTANT: AES
REPORT DATE: 1/15/99
SECTION: 14-14' - Uper half Cut w/70' Mid Bench CIRCLE: Second Plane from top - Static DATE: 1/15/99 BY: NAO

SLICE	HEIGHT(1)	HEIGHT(2)	WIDTH	AREA	WEIGHT	UNIT WT
1.	0.00	41.00	40.00	820.00	100.04	122.0
2.	41.00	75.00	60.00	3480.00	424.56	122.0
3.	75.00	76.00	12.00	906.00	110.53	122.0
4.	76.00	74.00	17.00	1275.00	155.55	122.0
5.	74.00	49.00	53.00	3259.50	397.66	122.0
6.	49.00	52.00	42.00	2121.00	258.76	122.0
7.	52.00	51.00	78.00	4017.00	490.07	122.0
8.	51.00	0.00	92.00	2346.00	286.21	122.0

SLOPE STABILITY DATA

SEISMIC COEFFICIENT = 0.00 g

SLICE NO.	1 SLICE WEIGHT W (kips)	2 FAILURE PLANE ANGLE i(deg)	3 ANGLE OF INT. FRICTION phi(deg)	4 COHE-SION C (ksf)	5 LENGTH OF ARC L (ft)	6 W (1-Ru) COS i COS i TAN phi	7 C L COS i	8 g W (1-Ru) SINi COSi TAN phi	9 W SIN i COS i	10 g W COS i COS i
1.	100.04	-39.00	17.40	0.200	51.47	18.93	8.00	0.00	-48.93	0.00
2.	424.56	-18.00	17.40	0.200	63.09	120.34	12.00	0.00	-124.78	0.00
3.	110.53	6.00	17.40	0.200	12.07	34.26	2.40	0.00	11.49	0.00
4.	155.55	6.00	17.40	0.200	17.09	48.21	3.40	0.00	16.17	0.00
5.	397.66	26.00	17.40	0.200	58.97	100.67	10.60	0.00	156.68	0.00
6.	258.76	26.00	17.40	0.200	46.73	65.51	8.40	0.00	101.95	0.00
7.	490.07	30.00	17.40	0.200	90.07	115.18	15.60	0.00	212.21	0.00
8.	286.21	30.00	17.40	0.200	106.23	67.27	18.40	0.00	123.93	0.00
SUMMATION:						570.39	78.80	0.00	448.73	0.00

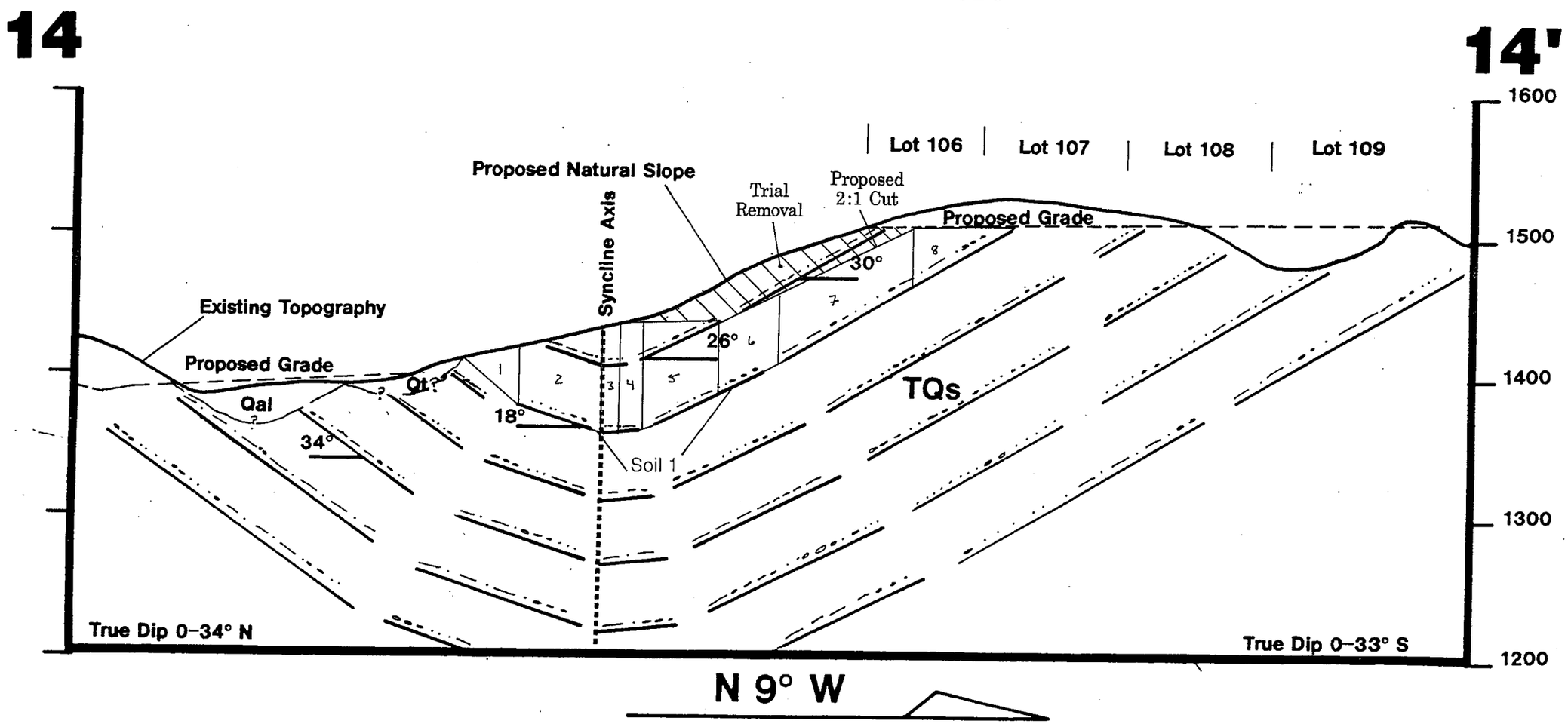
Run # 33

STATIC SAFETY FACTOR = 1.45

~~SEISMIC SAFETY FACTOR = 1.45~~

Run # 33

CROSS SECTION
OMS STABILITY ANALYSIS



	Static		Pseudostatic	
	c	ø	c	ø
Soil 1 (Bedding Plane)	200	17.4	290	30

ALLAN E. SEWARD
ENGINEERING GEOLOGY

JOB NUMBER: 98-1617-4		DATE: 1/15/99	
SCALE: 1"=100'		DRAWN BY: Staff	
		REVISED:	

Run # 34 & 35

14-14'

LOS ANGELES COUNTY
DEPARTMENT OF PUBLIC WORKS
LAND DEVELOPMENT DIVISION
GEOTECHNICAL ENGINEERING
ORDINARY METHOD OF SLICES USED FOR ANALYSIS

PROJECT: TT 52584 - Hasley Canyon
CONSULTANT: AES
REPORT DATE: 1/ /99
SECTION: 14-14'-Upper half cut @ 2:1 & 70' mid bench CIRCLE: Second plane from top - Static DATE: 1/14/99 BY: EC

SLICE	HEIGHT(1)	HEIGHT(2)	WIDTH	AREA	WEIGHT	UNIT WT
1.	0.00	41.00	40.00	820.00	100.04	122.0
2.	41.00	75.00	60.00	3480.00	424.56	122.0
3.	75.00	76.00	12.00	906.00	110.53	122.0
4.	76.00	74.00	17.00	1275.00	155.55	122.0
5.	74.00	49.00	53.00	3259.50	397.66	122.0
6.	49.00	50.00	42.00	2079.00	253.64	122.0
7.	50.00	41.00	97.00	4413.50	538.45	122.0
8.	41.00	0.00	72.00	1476.00	180.07	122.0

SLOPE STABILITY DATA

SEISMIC COEFFICIENT = 0.00 g

SLICE NO.	1 SLICE WEIGHT W (kips)	2 FAILURE PLANE ANGLE i(deg)	3 ANGLE OF INT. FRICTION phi(deg)	4 COHE-SION C (ksf)	5 LENGTH OF ARC L (ft)	6 W (1-Ru) COS i / COS i TAN phi	7 C L COS i	8 g W (1-Ru) SINi COSi / TAN phi	9 W SIN i / COS i	10 g W COS i / COS i
1.	100.04	-39.00	17.40	0.200	51.47	18.93	8.00	0.00	-48.93	0.00
2.	424.56	-18.00	17.40	0.200	63.09	120.34	12.00	0.00	-124.78	0.00
3.	110.53	6.00	17.40	0.200	12.07	34.26	2.40	0.00	11.49	0.00
4.	155.55	6.00	17.40	0.200	17.09	48.21	3.40	0.00	16.17	0.00
5.	397.66	26.00	17.40	0.200	58.97	100.67	10.60	0.00	156.68	0.00
6.	253.64	26.00	17.40	0.200	46.73	64.21	8.40	0.00	99.93	0.00
7.	538.45	30.00	17.40	0.200	112.01	126.55	19.40	0.00	233.15	0.00
8.	180.07	30.00	17.40	0.200	83.14	42.32	14.40	0.00	77.97	0.00
SUMMATION:						555.51	78.60	0.00	421.70	0.00

Run # 34

14-14'

STATIC SAFETY FACTOR = 1.50

~~SEISMIC SAFETY FACTOR = 1.50~~

Run #34

LOS ANGELES COUNTY
DEPARTMENT OF PUBLIC WORKS
LAND DEVELOPMENT DIVISION
GEOTECHNICAL ENGINEERING
ORDINARY METHOD OF SLICES USED FOR ANALYSIS

PROJECT: TT 52584 - Hasley Canyon
CONSULTANT: AES
REPORT DATE: 1/ /99
SECTION: 14-14'-Upper half cut @ 2:1 & 70' mid bench CIRCLE: Second plane from top - Pseudostatic DATE: 1/14/99 BY: EC

SLICE	HEIGHT(1)	HEIGHT(2)	WIDTH	AREA	WEIGHT	UNIT WT
1.	0.00	41.00	40.00	820.00	100.04	122.0
2.	41.00	75.00	60.00	3480.00	424.56	122.0
3.	75.00	76.00	12.00	906.00	110.53	122.0
4.	76.00	74.00	17.00	1275.00	155.55	122.0
5.	74.00	49.00	53.00	3259.50	397.66	122.0
6.	49.00	50.00	42.00	2079.00	253.64	122.0
7.	50.00	41.00	97.00	4413.50	538.45	122.0
8.	41.00	0.00	72.00	1476.00	180.07	122.0

SLOPE STABILITY DATA

SEISMIC COEFFICIENT = 0.15 g

SLICE NO.	1 SLICE WEIGHT W (kips)	2 FAILURE PLANE ANGLE i(deg)	3 ANGLE OF INT. FRICTION phi(deg)	4 COHE-SION C (ksf)	5 LENGTH OF ARC L (ft)	6 W (1-Ru) COS i COS i TAN phi	7 C L COS i	8 g W (1-Ru) SINi COSi TAN phi	9 W SIN i COS i	10 g W COS i COS i
1.	100.04	-39.00	30.00	0.290	51.47	34.88	11.60	-4.24	-48.93	9.06
2.	424.56	-18.00	30.00	0.290	63.09	221.71	17.40	-10.81	-124.78	57.60
3.	110.53	6.00	30.00	0.290	12.07	63.12	3.48	1.00	11.49	16.40
4.	155.55	6.00	30.00	0.290	17.09	88.83	4.93	1.40	16.17	23.08
5.	397.66	26.00	30.00	0.290	58.97	185.47	15.37	13.57	156.68	48.19
6.	253.64	26.00	30.00	0.290	46.73	118.30	12.18	8.65	99.93	30.73
7.	538.45	30.00	30.00	0.290	112.01	233.15	28.13	20.19	233.15	60.58
8.	180.07	30.00	30.00	0.290	83.14	77.97	20.88	6.75	77.97	20.26
SUMMATION:						1023.43	113.97	36.52	421.70	265.90

Run # 35

14-14'

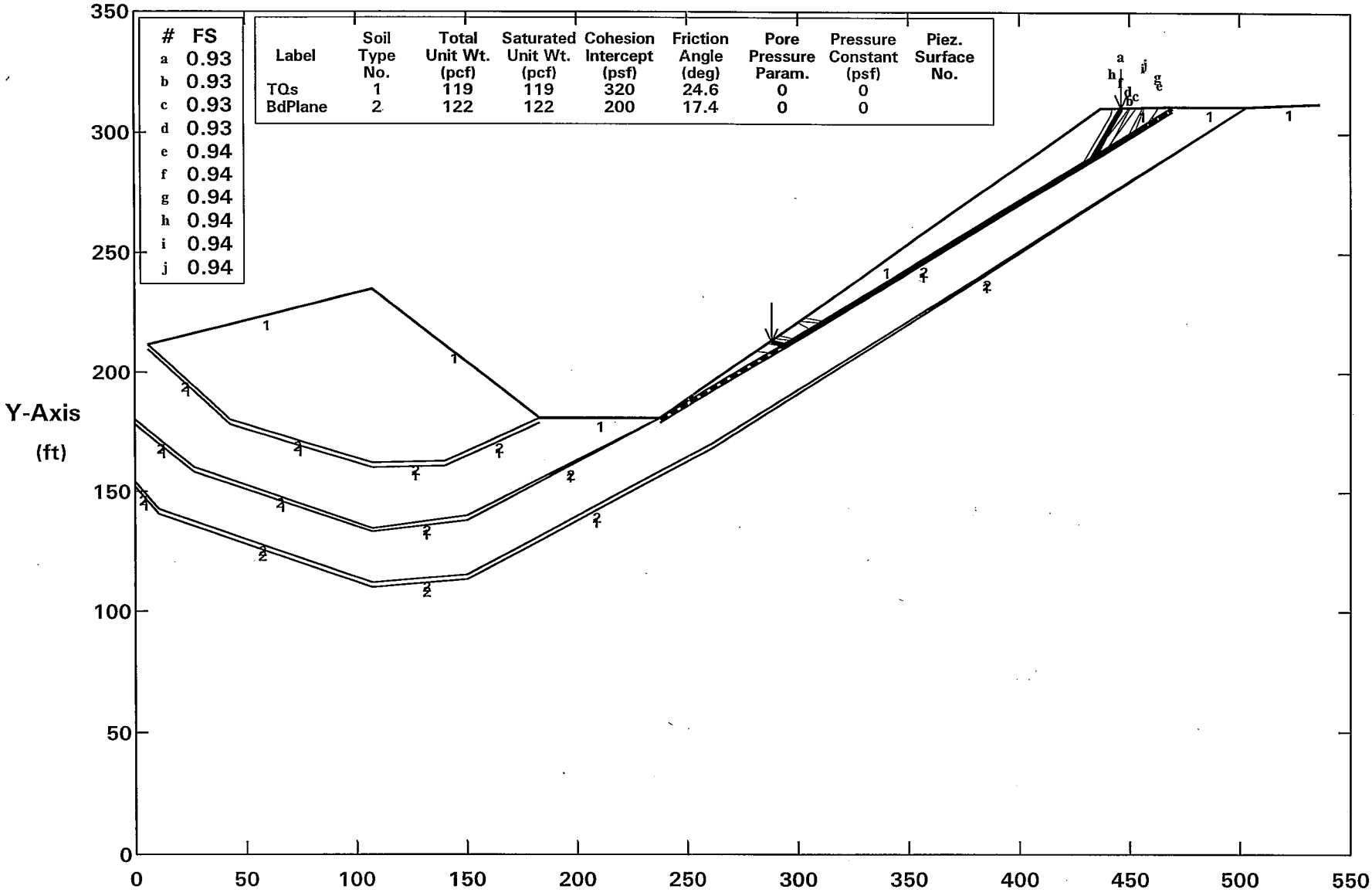
~~STATIC SAFETY FACTOR = 2.70~~

SEISMIC SAFETY FACTOR = 1.60

Run #35

TT52584 Sect.14-14'-Temp.Stab.Buttress-3rd Bedding Plane from Top

Ten Most Critical. C:HAS14E.PLT By: MAS 1/28/99 2:33pm



#	FS
a	0.93
b	0.93
c	0.93
d	0.93
e	0.94
f	0.94
g	0.94
h	0.94
i	0.94
j	0.94

Label	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
TQs	1	119	119	320	24.6	0	0	
BdPlane	2	122	122	200	17.4	0	0	

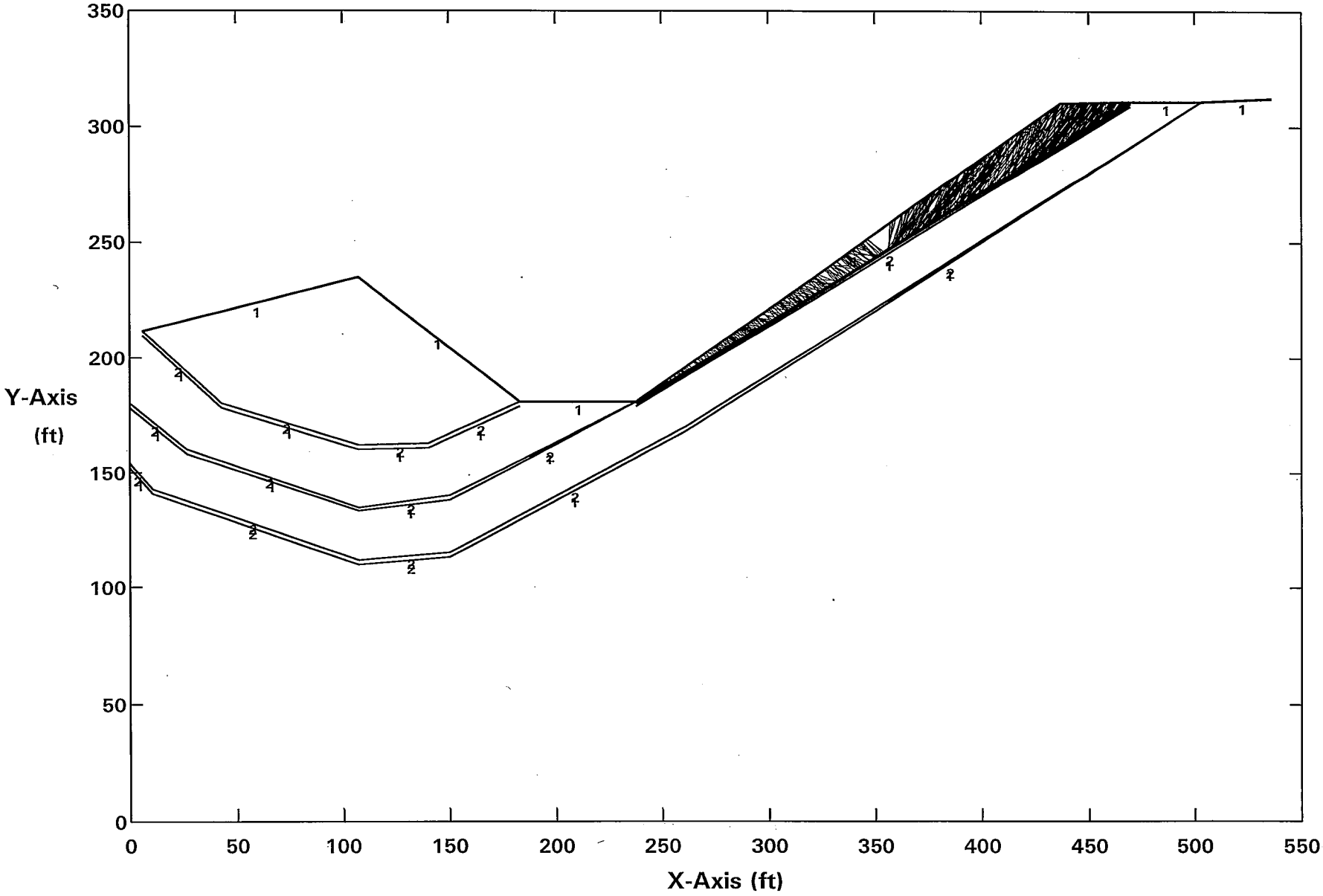
PCSTABL5M FSmin = 0.93 X-Axis (ft)

Factors Of Safety Calculated By The Modified Janbu Method

Run # 36

TT52584 Sect.14-14'-Temp.Stab.Buttress 3rd Bedding Plane from Top

All surfaces evaluated. C:HAS14E.PLT By: MAS 1/28/99 2:33pm

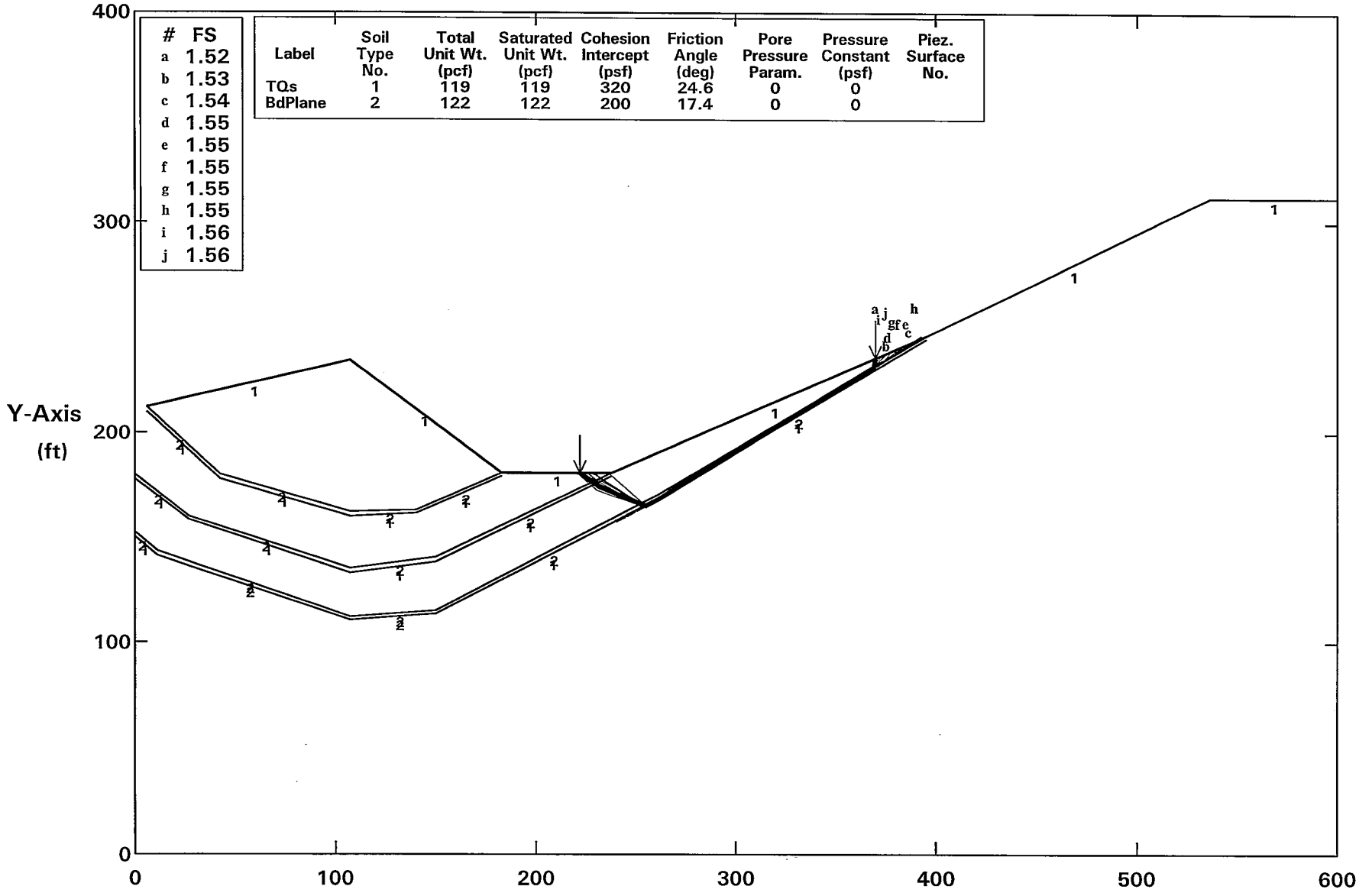


Factors Of Safety Calculated By The Modified Janbu Method

Run #36

TT52584 Sect.14-14'-Temp.Stab.Buttress-Fourth bedding Plane

Ten Most Critical. C:HAS14F.PLT By: mas 1/29/99 3:46pm



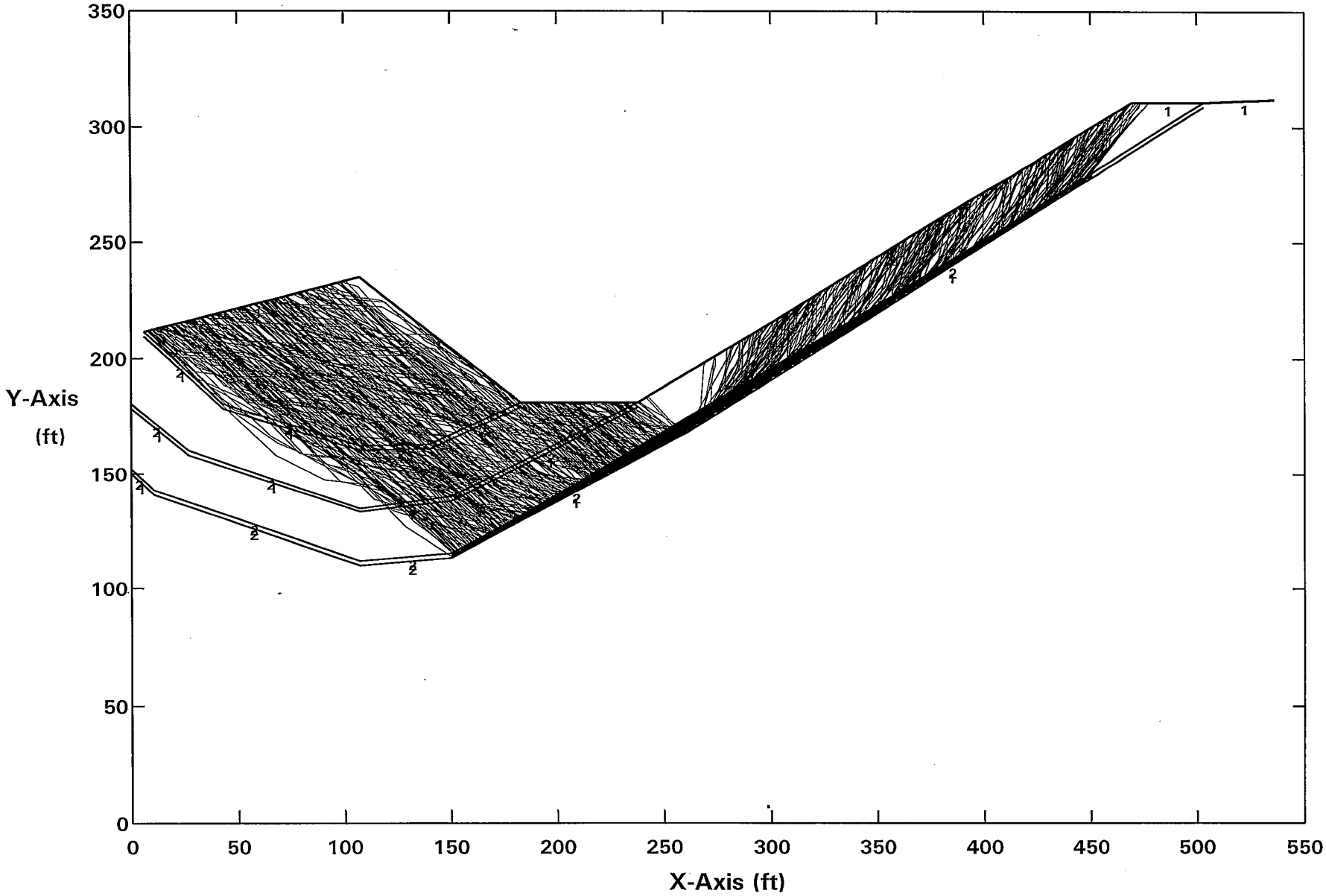
PCSTABL5M FSmin = 1.52 X-Axis (ft)

Factors Of Safety Calculated By The Modified Janbu Method

Run # 37

TT52584 Sect.14-14'-Temp.Stab.Buttress - 4th Bedding Plane

All surfaces evaluated. C:HAS14F.PLT By: mas 1/28/99 5:30pm



Factors Of Safety Calculated By The Modified Janbu Method

Run # 37

Run #37

** PCSTABL5M **

by
Purdue University

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer's Method of Slices

Run Date: 1/29/99
Time of Run: 3:46pm
Run By: mas
Input Data Filename: C:HAS14F.IN
Output Filename: C:HAS14F.OUT
Plotted Output Filename: C:HAS14F.PLT

PROBLEM DESCRIPTION TT52584 Sect.14-14'-Temp.Stab.Buttress
Fourth bedding Plane

BOUNDARY COORDINATES

4 Top Boundaries
32 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	6.00	212.00	107.00	235.00	1
2	107.00	235.00	183.00	181.00	1
3	183.00	181.00	238.00	181.00	1
4	238.00	181.00	395.00	247.00	1
5	395.00	247.00	536.00	312.00	1
6	536.00	312.00	600.00	312.00	1
7	6.00	212.00	43.00	180.00	2
8	43.00	180.00	107.00	162.00	2
9	107.00	162.00	140.00	163.00	2
10	140.00	163.00	183.00	181.00	2
11	6.00	210.00	43.00	178.00	1
12	43.00	178.00	107.00	160.00	1
13	107.00	160.00	140.00	161.00	1
14	140.00	161.00	183.00	179.00	1
15	.00	180.00	27.00	160.00	2
16	27.00	160.00	107.00	135.00	2
17	107.00	135.00	150.00	140.00	2
18	150.00	140.00	238.00	181.00	2
19	.00	178.00	27.00	158.00	1
20	27.00	158.00	107.00	133.00	1
21	107.00	133.00	150.00	138.00	1
22	150.00	138.00	238.00	179.00	1

Run # 37

23	.00	152.00	11.00	143.00	2
24	11.00	143.00	107.00	112.00	2
25	107.00	112.00	150.00	115.00	2
26	150.00	115.00	261.00	170.00	2
27	261.00	170.00	395.00	247.00	2
28	.00	150.00	11.00	141.00	1
29	11.00	141.00	107.00	110.00	2
30	107.00	110.00	150.00	113.00	2
31	150.00	113.00	261.00	168.00	1
32	261.00	168.00	395.00	245.00	1

ISOTROPIC SOIL PARAMETERS

2 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	119.0	119.0	320.0	24.6	.00	.0	0
2	122.0	122.0	200.0	17.4	.00	.0	0

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Sliding Block Surfaces, Has Been Specified.

300 Trial Surfaces Have Been Generated.

3 Boxes Specified For Generation Of Central Block Base

Length Of Line Segments For Active And Passive Portions Of Sliding Block Is 25.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	240.00	157.50	255.00	165.00	.10
2	261.00	168.00	261.00	168.00	.00
3	365.00	229.60	394.00	246.50	.10

The Factor Of Safety For The Trial Failure Surface Defined By The Coordinates Listed Below Is Misleading.

Failure Surface Defined By 12 Coordinate Points

Run #37

Point No.	X-Surf (ft)	Y-Surf (ft)
1	67.87	226.09
2	79.59	214.74
3	97.36	197.16
4	120.14	186.85
5	144.81	182.85
6	169.66	180.04
7	192.13	169.09
8	216.10	161.98
9	240.76	157.87
10	261.00	168.00
11	390.79	244.67
12	391.38	245.48

Factor Of Safety For The Preceding Specified Surface =-14.339

The Factor Of Safety For The Trial Failure Surface Defined
By The Coordinates Listed Below Is Misleading.

Failure Surface Defined By 12 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	62.94	224.97
2	77.42	212.56
3	101.99	207.95
4	124.01	196.12
5	146.91	186.09
6	171.13	179.90
7	196.10	178.69
8	219.54	169.99
9	241.67	158.36
10	261.00	168.00
11	373.64	234.67
12	377.73	239.74

Factor Of Safety For The Preceding Specified Surface =*******

The Factor Of Safety For The Trial Failure Surface Defined
By The Coordinates Listed Below Is Misleading.

Failure Surface Defined By 13 Coordinate Points

Run #37

Point No.	X-Surf (ft)	Y-Surf (ft)
1	61.27	224.59
2	68.47	218.18
3	86.30	200.66
4	111.25	199.11
5	130.77	183.48
6	155.66	181.22
7	180.65	180.54
8	205.65	180.37
9	229.96	174.53
10	252.51	163.72
11	261.00	168.00
12	370.91	233.05
13	377.49	239.64

Factor Of Safety For The Preceding Specified Surface =-17.665

The Factor Of Safety For The Trial Failure Surface Defined
By The Coordinates Listed Below Is Misleading.

Failure Surface Defined By 12 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	72.76	227.20
2	86.82	215.28
3	106.50	199.87
4	125.07	183.12
5	149.98	180.97
6	174.94	179.65
7	198.54	171.41
8	223.01	166.30
9	247.51	161.30
10	261.00	168.00
11	366.24	230.28
12	367.59	235.48

Factor Of Safety For The Preceding Specified Surface = -9.835

The Factor Of Safety For The Trial Failure Surface Defined
By The Coordinates Listed Below Is Misleading.

Run #37

Failure Surface Defined By 12 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	84.90	229.97
2	88.45	227.38
3	106.79	210.38
4	124.53	192.77
5	148.96	187.46
6	167.92	171.18
7	192.89	169.90
8	217.17	163.95
9	241.53	158.30
10	261.00	168.00
11	379.82	238.19
12	381.88	241.49

Factor Of Safety For The Preceding Specified Surface =-13.623

The Factor Of Safety For The Trial Failure Surface Defined
By The Coordinates Listed Below Is Misleading.

Failure Surface Defined By 12 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	66.25	225.72
2	84.46	221.10
3	104.82	206.60
4	122.70	189.12
5	144.96	177.74
6	169.95	177.27
7	191.26	164.20
8	216.22	162.70
9	240.74	157.83
10	261.00	168.00
11	393.81	246.37
12	394.02	246.59

Factor Of Safety For The Preceding Specified Surface = -9.914

Run #37

The Factor Of Safety For The Trial Failure Surface Defined
By The Coordinates Listed Below Is Misleading.

Failure Surface Defined By 12 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	77.57	228.30
2	87.00	220.25
3	106.29	204.34
4	129.84	195.95
5	153.10	186.79
6	171.03	169.36
7	194.23	160.06
8	219.23	159.99
9	244.23	159.57
10	261.00	168.00
11	392.40	245.58
12	392.57	245.98

Factor Of Safety For The Preceding Specified Surface =-21.705

Factor Of Safety Calculation Has Gone Through Ten Iterations

The Trial Failure Surface In Question Is Defined
By The Following 12 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	85.57	230.12
2	90.68	228.98
3	108.45	211.40
4	126.13	193.73
5	145.05	177.38
6	166.79	165.03
7	191.58	161.84
8	216.54	160.39
9	241.45	158.20
10	261.00	168.00
11	369.92	232.45
12	370.15	236.55

Run #37

Factor Of Safety For The Preceding Specified Surface = .602

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Modified Janbu Method * *

Failure Surface Specified By 6 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	222.24	181.00
2	231.73	174.21
3	254.98	165.02
4	261.00	168.00
5	368.78	231.80
6	369.65	236.34

*** 1.524 ***

Individual data on the 10 slices

Slice No.	Width Ft(m)	Weight Lbs(kg)	Water Force Top Lbs(kg)	Water Force Bot Lbs(kg)	Tie Force Norm Lbs(kg)	Tie Force Tan Lbs(kg)	Earthquake Force Hor Lbs(kg)	Earthquake Force Ver Lbs(kg)	Surcharge Load Lbs(kg)
1	6.2	1645.0	.0	.0	.0	.0	.0	.0	.0
2	1.7	1023.0	.0	.0	.0	.0	.0	.0	.0
3	1.6	1182.1	.0	.0	.0	.0	.0	.0	.0
4	6.3	6033.3	.0	.0	.0	.0	.0	.0	.0
5	14.7	26792.6	.0	.0	.0	.0	.0	.0	.0
6	2.2	5933.8	.0	.0	.0	.0	.0	.0	.0
7	6.0	16444.8	.0	.0	.0	.0	.0	.0	.0
8	107.8	172506.6	.0	.0	.0	.0	.0	.0	.0
9	.0	14.0	.0	.0	.0	.0	.0	.0	.0
10	.8	201.8	.0	.0	.0	.0	.0	.0	.0

Failure Surface Specified By 6 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	218.35	181.00
2	232.33	176.70

Run#37

3	254.23	164.65
4	261.00	168.00
5	369.72	232.33
6	375.26	238.70

*** 1.534 ***

Failure Surface Specified By 6 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	227.29	181.00
2	232.38	178.32
3	252.84	163.96
4	261.00	168.00
5	385.49	241.58
6	386.31	243.35

*** 1.537 ***

Failure Surface Specified By 6 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	228.92	181.00
2	233.09	177.64
3	254.52	164.78
4	261.00	168.00
5	368.35	231.51
6	375.46	238.79

*** 1.546 ***

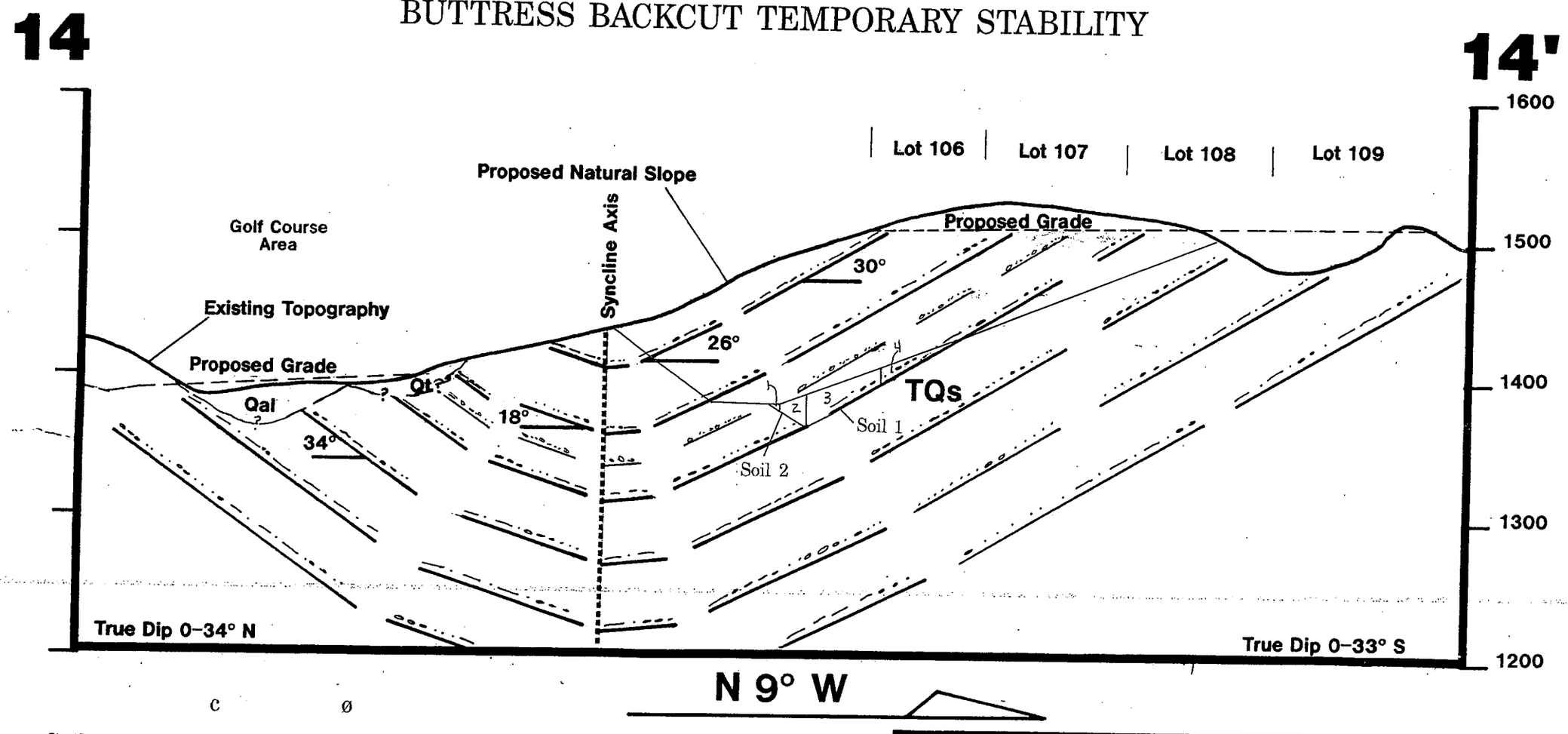
Failure Surface Specified By 6 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	220.24	181.00

Run # 38

CROSS SECTION

OMS STABILITY ANALYSIS
BUTTRESS BACKCUT TEMPORARY STABILITY



	c	ø
Soil 1 (Bedding Plane)	200	17.4
Soil 2 (TQs)	320	24.6

ALLAN E. SEWARD
ENGINEERING GEOLOGY

JOB NUMBER: 98-1617-4		DATE: 1/15/99	
SCALE: 1"=100'		DRAWN BY: Staff	
		REVISED:	

LOS ANGELES COUNTY
DEPARTMENT OF PUBLIC WORKS
LAND DEVELOPMENT DIVISION
GEOTECHNICAL ENGINEERING
ORDINARY METHOD OF SLICES USED FOR ANALYSIS

PROJECT: TT 52584 - Hasley Canyon (Palmer Investments)
CONSULTANT: AES
REPORT DATE:
SECTION: 14-14' - Large buttress backcut-temporary stability CIRCLE: Fourth bedding plane from top-static DATE: 1/29/99 BY: NAO

SLICE	HEIGHT(1)	HEIGHT(2)	WIDTH	AREA	WEIGHT	UNIT WT
1.	0.00	3.00	6.00	9.00	1.07	119.0
2.	3.00	21.00	19.00	228.00	27.13	119.0
3.	21.00	12.00	52.00	858.00	104.68	122.0
4.	12.00	0.00	63.00	378.00	46.12	122.0

SLOPE STABILITY DATA

SEISMIC COEFFICIENT = 0.00 g

SLICE NO.	1 SLICE WEIGHT W (kips)	2 FAILURE PLANE ANGLE i(deg)	3 ANGLE OF INT. FRICTION phi(deg)	4 COHE-SION C (ksf)	5 LENGTH OF ARC L (ft)	6 W (1-Ru) COS i COS i TAN phi	7 C L COS i	8 g W (1-Ru) SINi COSi TAN phi	9 W SIN i COS i	10 g W COS i COS i
1.	1.07	-32.00	24.60	0.320	7.08	0.35	1.92	0.00	-0.48	0.00
2.	27.13	-32.00	24.60	0.320	22.40	8.93	6.08	0.00	-12.19	0.00
3.	104.68	30.00	17.40	0.200	60.04	24.60	10.40	0.00	45.33	0.00
4.	46.12	30.00	17.40	0.200	72.75	10.84	12.60	0.00	19.97	0.00
SUMMATION:						44.73	31.00	0.00	52.62	0.00

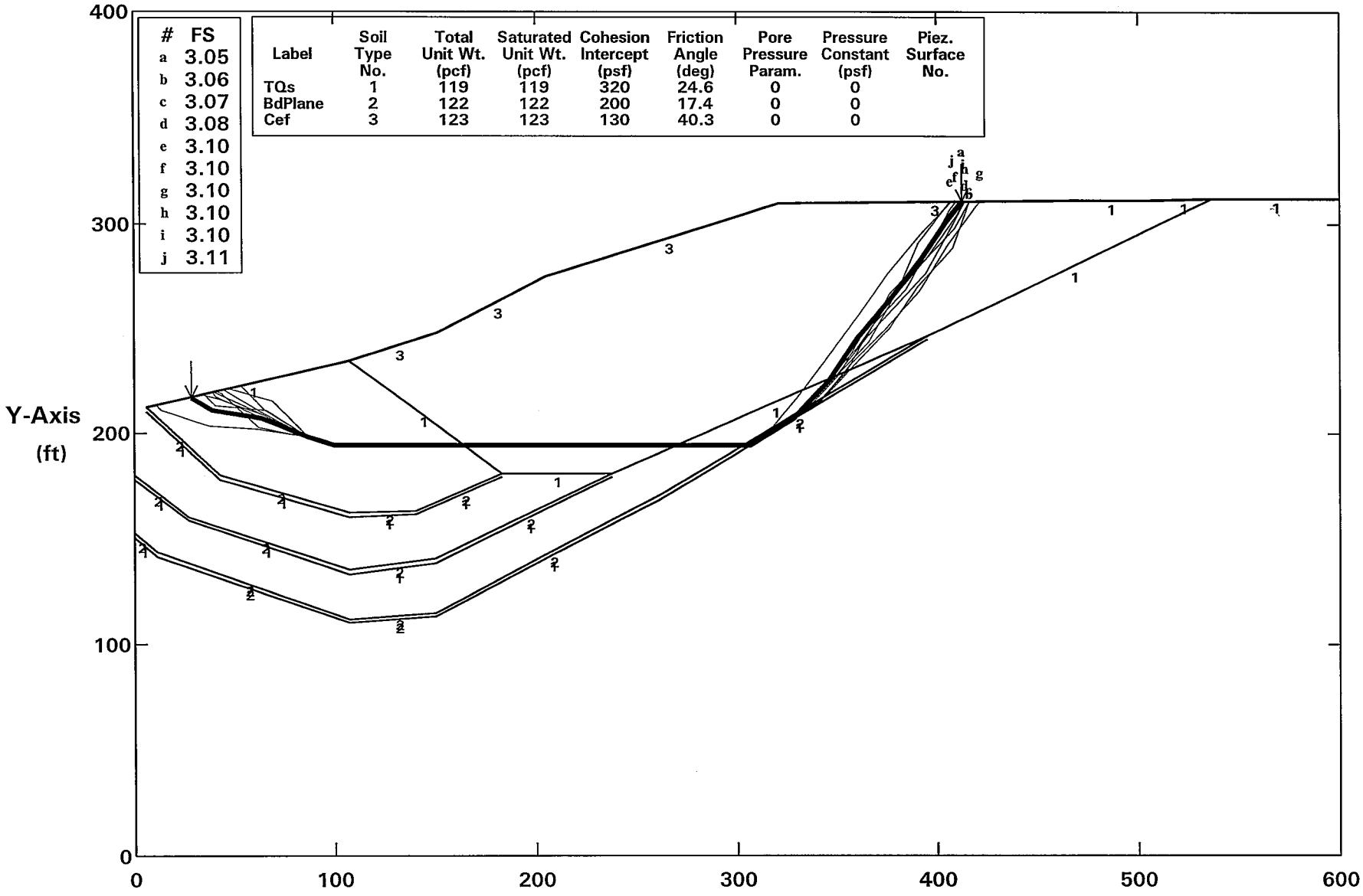
STATIC SAFETY FACTOR = 1.44

[redacted]

Run # 3B

TT52584 Sect.14-14'- Stability Through Buttress - Static

Ten Most Critical. C:HAS14G.PLT By: mas 1/29/99 5:27pm



Label	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
TQs	1	119	119	320	24.6	0	0	
BdPlane	2	122	122	200	17.4	0	0	
Cef	3	123	123	130	40.3	0	0	

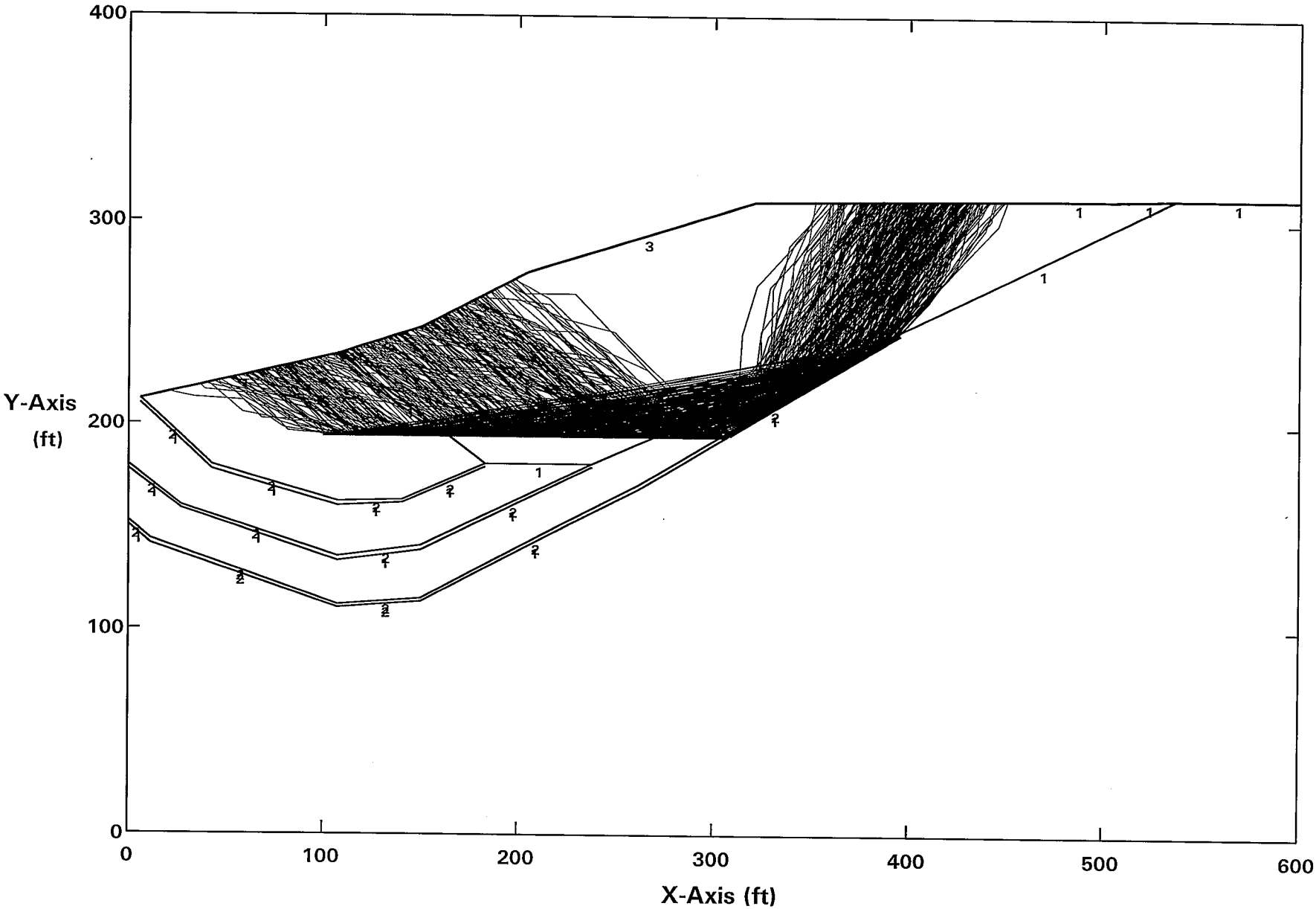
PCSTABL5M FSmin=3.05 X-Axis (ft)

Factors Of Safety Calculated By The Modified Janbu Method

Run #39

TT52584 Sect.14-14'- Stability Through Buttress - Static

All surfaces evaluated. C:HAS14G1.PLT By: mas 1/29/99 5:13pm

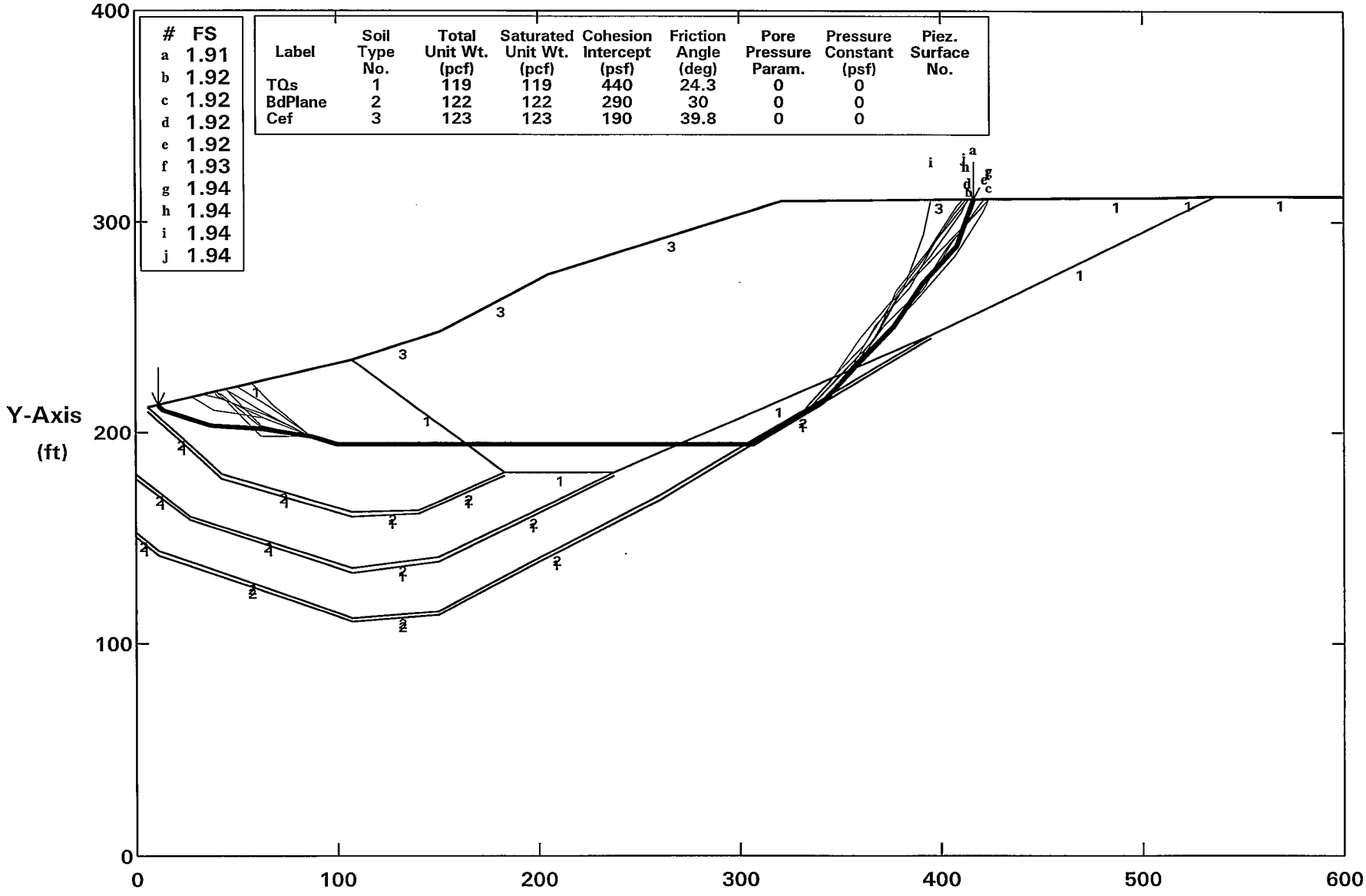


Factors Of Safety Calculated By The Modified Janbu Method

Run # 39

TT52584 Sect.14-14'- Stability Through Buttress - Pseudostatic

Ten Most Critical. C:HAS14G'.PLT By: mas 1/29/99 5:31pm



#	FS
a	1.91
b	1.92
c	1.92
d	1.92
e	1.92
f	1.93
g	1.94
h	1.94
i	1.94
j	1.94

Label	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
TQs	1	119	119	440	24.3	0	0	
BdPlane	2	122	122	290	30	0	0	
Cef	3	123	123	190	39.8	0	0	

PCSTABL5M FSmin = 1.91 X-Axis (ft)

Factors Of Safety Calculated By The Modified Janbu Method

Run #40

Run #39

** PCSTABL5M **

by
Purdue University

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer's Method of Slices

Run Date: 1/29/99
Time of Run: 5:27pm
Run By: mas
Input Data Filename: C:HAS14G.IN
Output Filename: C:HAS14G.OUT
Plotted Output Filename: C:HAS14G.PLT

PROBLEM DESCRIPTION TT52584 Sect.14-14'- Stability Through Buttress - Static

BOUNDARY COORDINATES

8 Top Boundaries
38 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	6.00	212.00	107.00	235.00	1
2	107.00	235.00	151.00	248.00	3
3	151.00	248.00	205.00	275.00	3
4	205.00	275.00	321.00	310.00	3
5	321.00	310.00	470.00	311.00	3
6	470.00	311.00	503.00	311.00	1
7	503.00	311.00	536.00	312.00	1
8	536.00	312.00	600.00	312.00	1
9	107.00	235.00	183.00	181.00	1
10	183.00	181.00	238.00	181.00	1
11	238.00	181.00	395.00	247.00	1
12	395.00	247.00	536.00	312.00	1
13	6.00	212.00	43.00	180.00	2
14	43.00	180.00	107.00	162.00	2
15	107.00	162.00	140.00	163.00	2
16	140.00	163.00	183.00	181.00	2
17	6.00	210.00	43.00	178.00	1
18	43.00	178.00	107.00	160.00	1
19	107.00	160.00	140.00	161.00	1
20	140.00	161.00	183.00	179.00	1
21	.00	180.00	27.00	160.00	2
22	27.00	160.00	107.00	135.00	2

Run #39

23	107.00	135.00	150.00	140.00	2
24	150.00	140.00	238.00	181.00	2
25	.00	178.00	27.00	158.00	1
26	27.00	158.00	107.00	133.00	1
27	107.00	133.00	150.00	138.00	1
28	150.00	138.00	238.00	179.00	1
29	.00	152.00	11.00	143.00	2
30	11.00	143.00	107.00	112.00	2
31	107.00	112.00	150.00	115.00	2
32	150.00	115.00	261.00	170.00	2
33	261.00	170.00	395.00	247.00	2
34	.00	150.00	11.00	141.00	1
35	11.00	141.00	107.00	110.00	2
36	107.00	110.00	150.00	113.00	2
37	150.00	113.00	261.00	168.00	1
38	261.00	168.00	395.00	245.00	1

ISOTROPIC SOIL PARAMETERS

3 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	119.0	119.0	320.0	24.6	.00	.0	0
2	122.0	122.0	200.0	17.4	.00	.0	0
3	123.0	123.0	130.0	40.3	.00	.0	0

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Sliding Block Surfaces, Has Been Specified.

300 Trial Surfaces Have Been Generated.

4 Boxes Specified For Generation Of Central Block Base

Length Of Line Segments For Active And Passive Portions Of Sliding Block Is 25.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	87.00	198.00	87.00	198.00	.00
2	100.00	194.40	100.00	194.40	.00
3	307.00	194.40	307.00	194.40	.00
4	313.00	197.90	343.00	215.10	.10

Run #39

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Modified Janbu Method * *

Failure Surface Specified By 13 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	28.19	217.05
2	39.02	210.93
3	63.74	207.15
4	87.00	198.00
5	100.00	194.40
6	307.00	194.40
7	328.32	206.73
8	345.51	224.89
9	360.18	245.13
10	376.57	264.00
11	391.90	283.75
12	406.48	304.06
13	412.25	310.61

*** 3.048 ***

Individual data on the 23 slices

Slice No.	Width Ft(m)	Weight Lbs(kg)	Water Force Top Lbs(kg)	Water Force Bot Lbs(kg)	Tie Force Norm Lbs(kg)	Tie Force Tan Lbs(kg)	Earthquake Force Hor Lbs(kg)	Earthquake Force Ver Lbs(kg)	Surcharge Load Lbs(kg)
1	10.8	5537.1	.0	.0	.0	.0	.0	.0	.0
2	24.7	39087.9	.0	.0	.0	.0	.0	.0	.0
3	23.3	69825.2	.0	.0	.0	.0	.0	.0	.0
4	13.0	55267.7	.0	.0	.0	.0	.0	.0	.0
5	7.0	33155.9	.0	.0	.0	.0	.0	.0	.0
6	44.0	250510.8	.0	.0	.0	.0	.0	.0	.0
7	13.1	91698.8	.0	.0	.0	.0	.0	.0	.0
8	40.9	353734.0	.0	.0	.0	.0	.0	.0	.0
9	64.9	721264.9	.0	.0	.0	.0	.0	.0	.0
10	33.6	433820.3	.0	.0	.0	.0	.0	.0	.0
11	3.5	47251.7	.0	.0	.0	.0	.0	.0	.0
12	.1	779.8	.0	.0	.0	.0	.0	.0	.0
13	8.9	119703.8	.0	.0	.0	.0	.0	.0	.0
14	5.1	68023.1	.0	.0	.0	.0	.0	.0	.0
15	7.3	94581.5	.0	.0	.0	.0	.0	.0	.0

Run #39

16	4.1	50321.7	.0	.0	.0	.0	.0	.0	.0
17	13.1	148574.4	.0	.0	.0	.0	.0	.0	.0
18	1.4	14157.9	.0	.0	.0	.0	.0	.0	.0
19	13.3	121581.3	.0	.0	.0	.0	.0	.0	.0
20	16.4	112393.1	.0	.0	.0	.0	.0	.0	.0
21	15.3	68915.3	.0	.0	.0	.0	.0	.0	.0
22	14.6	29801.1	.0	.0	.0	.0	.0	.0	.0
23	5.8	2312.2	.0	.0	.0	.0	.0	.0	.0

Failure Surface Specified By 13 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	11.17	213.18
2	13.48	210.92
3	37.34	203.46
4	62.28	201.74
5	87.00	198.00
6	100.00	194.40
7	307.00	194.40
8	341.46	214.25
9	358.60	232.45
10	376.27	250.13
11	390.51	270.68
12	408.00	288.55
13	416.61	310.64

*** 3.057 ***

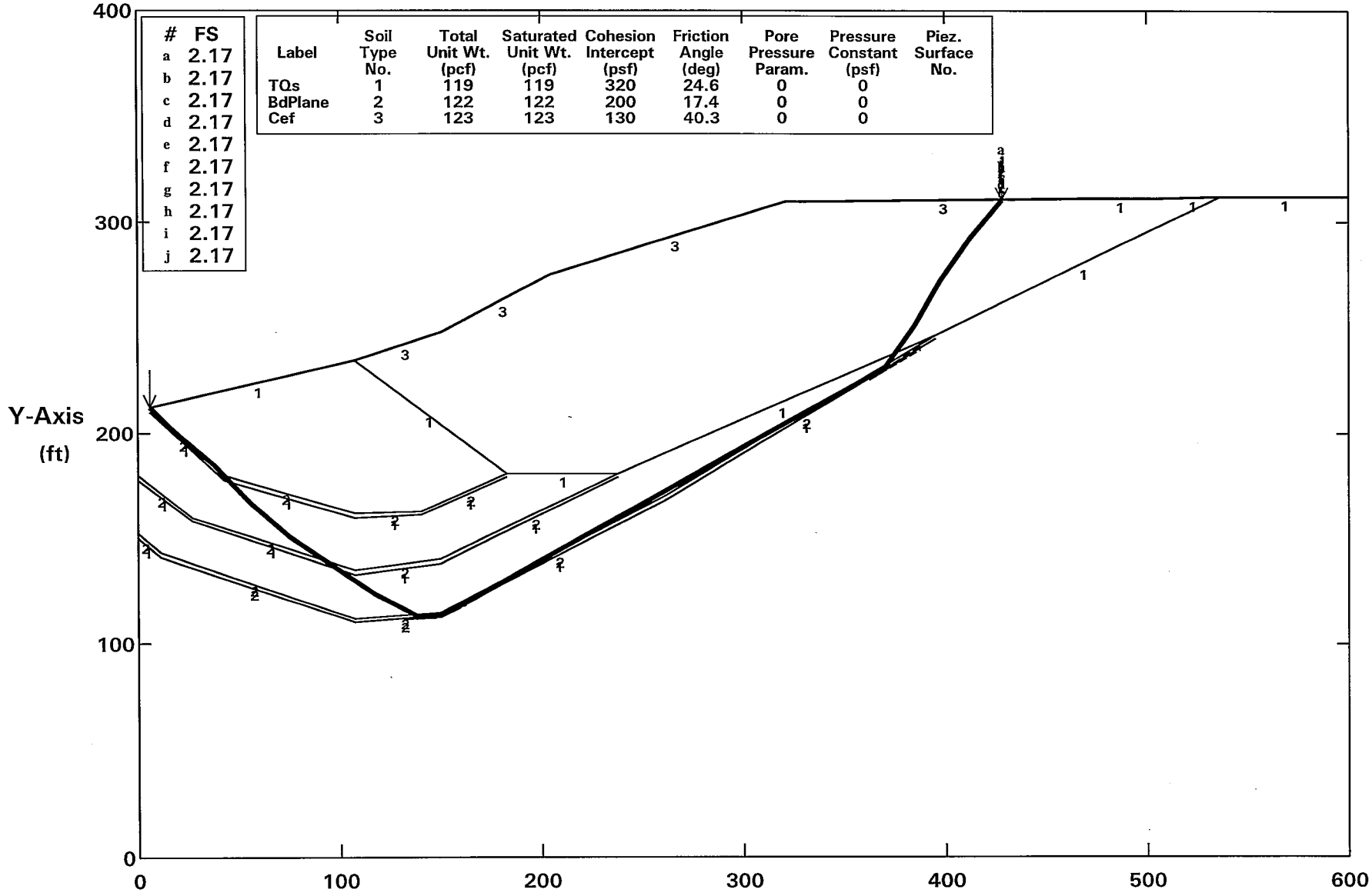
Failure Surface Specified By 13 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	41.32	220.04
2	43.53	218.80
3	62.39	202.39
4	87.00	198.00
5	100.00	194.40
6	307.00	194.40
7	325.02	204.82
8	342.41	222.78
9	360.09	240.46
10	374.72	260.73
11	390.83	279.84
12	408.44	297.59
13	416.52	310.64

*** 3.071 ***

TT52584 Sect.14-14'- Stability Below Buttress - Static

Ten Most Critical. C:HAS14H.PLT By: mas 1/29/99 6:44pm



#	FS
a	2.17
b	2.17
c	2.17
d	2.17
e	2.17
f	2.17
g	2.17
h	2.17
i	2.17
j	2.17

Label	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
TQs	1	119	119	320	24.6	0	0	
BdPlane	2	122	122	200	17.4	0	0	
Cef	3	123	123	130	40.3	0	0	

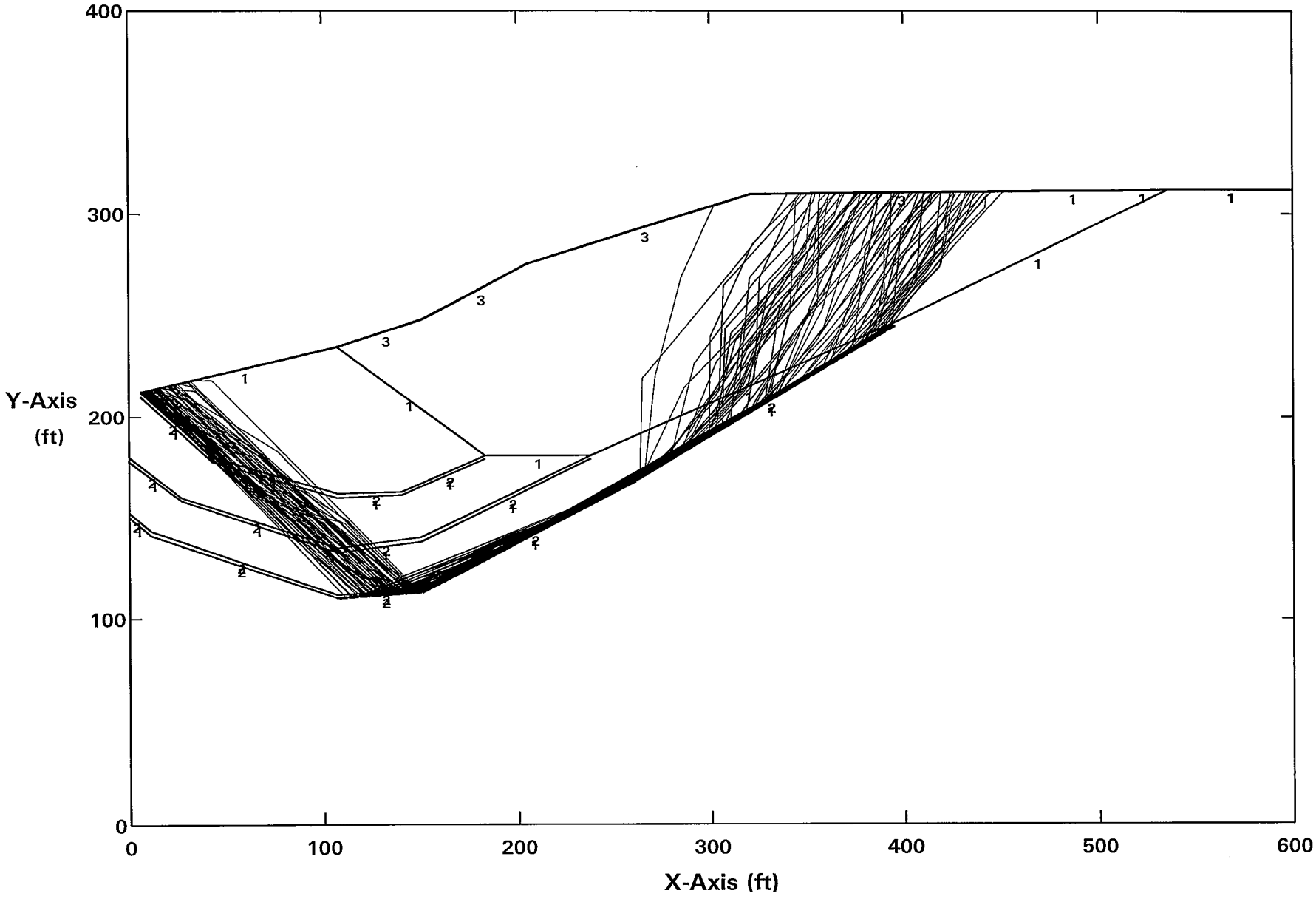
PCSTABL5M FSmin = 2.17 X-Axis (ft)

Factors Of Safety Calculated By The Modified Janbu Method

Run #41

TT52584 Sect.14-14'- Stability Below Buttress - Static

All surfaces evaluated. C:HAS14H1.PLT By: mas 1/29/99 6:17pm

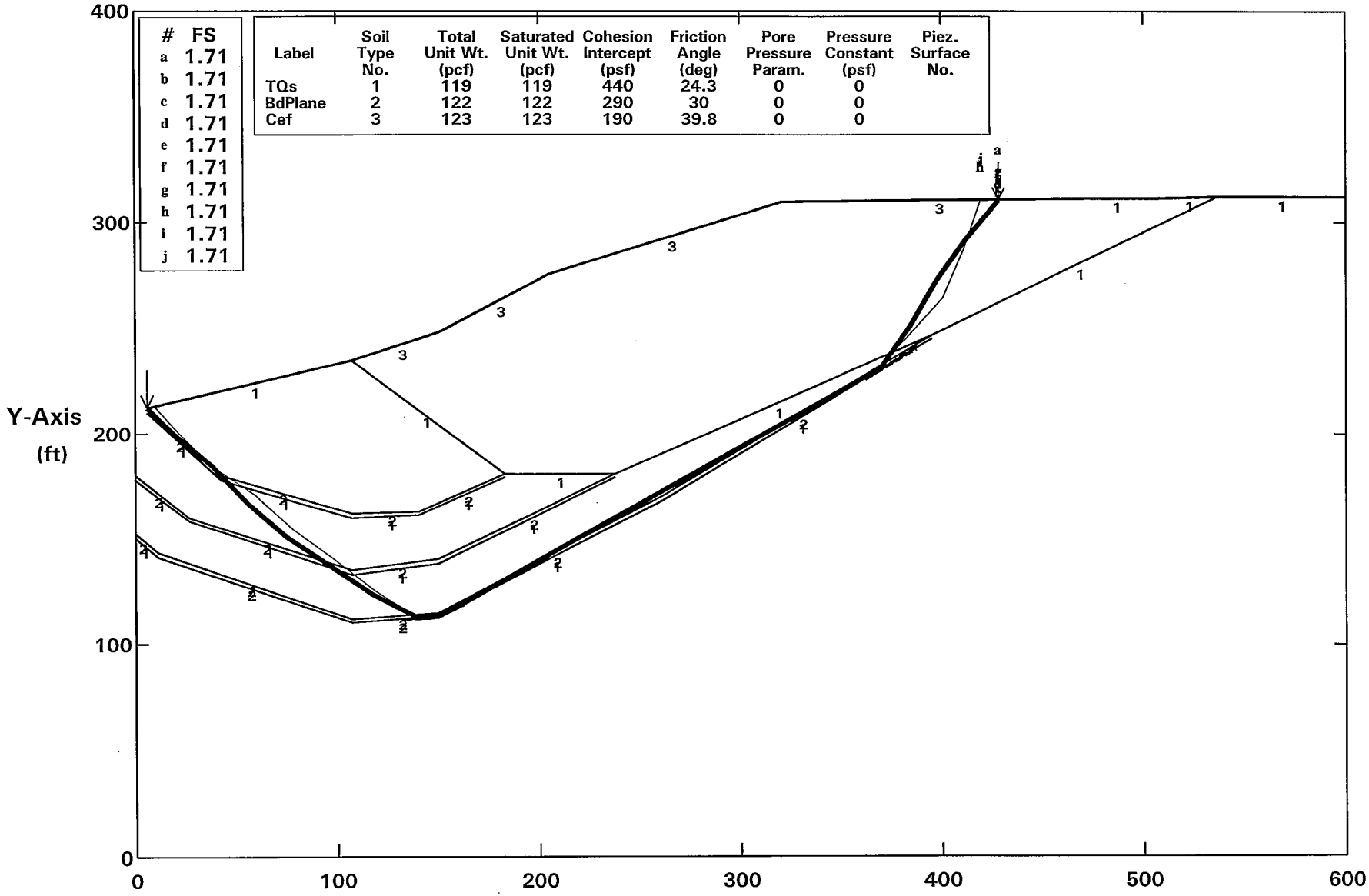


Factors Of Safety Calculated By The Modified Janbu Method

Run #41

TT52584 Sect.14-14'- Stability Below Buttress - Pseudostatic

Ten Most Critical. C:HAS14H'.PLT By: mas 1/29/99 6:04pm



#	FS
a	1.71
b	1.71
c	1.71
d	1.71
e	1.71
f	1.71
g	1.71
h	1.71
i	1.71
j	1.71

Label	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
TQs	1	119	119	440	24.3	0	0	
BdPlane	2	122	122	290	30	0	0	
Cef	3	123	123	190	39.8	0	0	

PCSTABL5M FSmin = 1.71 X-Axis (ft)

Factors Of Safety Calculated By The Modified Janbu Method

Run # 42

Run #41

** PCSTABL5M **

by
Purdue University

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer's Method of Slices

Run Date: 1/29/99
Time of Run: 6:44pm
Run By: mas
Input Data Filename: C:HAS14H.IN
Output Filename: C:HAS14H.OUT
Plotted Output Filename: C:HAS14H.PLT

PROBLEM DESCRIPTION TT52584 Sect.14-14'- Stability Below Buttress - Static

BOUNDARY COORDINATES

8 Top Boundaries
38 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	6.00	212.00	107.00	235.00	1
2	107.00	235.00	151.00	248.00	3
3	151.00	248.00	205.00	275.00	3
4	205.00	275.00	321.00	310.00	3
5	321.00	310.00	470.00	311.00	3
6	470.00	311.00	503.00	311.00	1
7	503.00	311.00	536.00	312.00	1
8	536.00	312.00	600.00	312.00	1
9	107.00	235.00	183.00	181.00	1
10	183.00	181.00	238.00	181.00	1
11	238.00	181.00	395.00	247.00	1
12	395.00	247.00	536.00	312.00	1
13	6.00	212.00	43.00	180.00	2
14	43.00	180.00	107.00	162.00	2
15	107.00	162.00	140.00	163.00	2
16	140.00	163.00	183.00	181.00	2
17	6.00	210.00	43.00	178.00	1
18	43.00	178.00	107.00	160.00	1
19	107.00	160.00	140.00	161.00	1
20	140.00	161.00	183.00	179.00	1
21	.00	180.00	27.00	160.00	2
22	27.00	160.00	107.00	135.00	2

Run #41

23	107.00	135.00	150.00	140.00	2
24	150.00	140.00	238.00	181.00	2
25	.00	178.00	27.00	158.00	1
26	27.00	158.00	107.00	133.00	1
27	107.00	133.00	150.00	138.00	1
28	150.00	138.00	238.00	179.00	1
29	.00	152.00	11.00	143.00	2
30	11.00	143.00	107.00	112.00	2
31	107.00	112.00	150.00	115.00	2
32	150.00	115.00	261.00	170.00	2
33	261.00	170.00	395.00	247.00	2
34	.00	150.00	11.00	141.00	1
35	11.00	141.00	107.00	110.00	2
36	107.00	110.00	150.00	113.00	2
37	150.00	113.00	261.00	168.00	1
38	261.00	168.00	395.00	245.00	1

ISOTROPIC SOIL PARAMETERS

3 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	119.0	119.0	320.0	24.6	.00	.0	0
2	122.0	122.0	200.0	17.4	.00	.0	0
3	123.0	123.0	130.0	40.3	.00	.0	0

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Sliding Block Surfaces, Has Been Specified.

400 Trial Surfaces Have Been Generated.

4 Boxes Specified For Generation Of Central Block Base

Length Of Line Segments For Active And Passive Portions Of Sliding Block Is 25.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	132.00	111.70	149.00	112.90	.10
2	150.00	113.00	150.00	113.00	.00
3	151.00	113.50	162.00	118.90	.10
4	362.00	226.00	387.00	240.40	.10

Run # 41

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Modified Janbu Method * *

Failure Surface Specified By 15 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	6.15	212.03
2	19.02	200.34
3	38.16	184.26
4	55.97	166.71
5	75.25	150.80
6	96.09	137.00
7	117.24	123.66
8	139.47	112.23
9	150.00	113.00
10	160.64	118.27
11	370.07	230.63
12	384.68	250.92
13	397.72	272.25
14	412.67	292.28
15	427.91	310.72

*** 2.166 ***

Individual data on the 37 slices

Slice No.	Width Ft (m)	Weight Lbs (kg)	Water Force Top Lbs (kg)	Water Force Bot Lbs (kg)	Tie Force Norm Lbs (kg)	Tie Force Tan Lbs (kg)	Earthquake Force Hor Lbs (kg)	Earthquake Force Ver Lbs (kg)	Surcharge Load Lbs (kg)
1	3.8	961.9	.0	.0	.0	.0	.0	.0	.0
2	9.1	10238.1	.0	.0	.0	.0	.0	.0	.0
3	16.1	44647.7	.0	.0	.0	.0	.0	.0	.0
4	3.0	11950.8	.0	.0	.0	.0	.0	.0	.0
5	.6	2599.9	.0	.0	.0	.0	.0	.0	.0
6	4.2	19290.9	.0	.0	.0	.0	.0	.0	.0
7	2.1	10643.4	.0	.0	.0	.0	.0	.0	.0
8	10.8	64728.8	.0	.0	.0	.0	.0	.0	.0
9	19.3	153414.4	.0	.0	.0	.0	.0	.0	.0
10	16.8	168944.7	.0	.0	.0	.0	.0	.0	.0
11	4.0	45124.0	.0	.0	.0	.0	.0	.0	.0
12	1.8	21135.3	.0	.0	.0	.0	.0	.0	.0
13	9.1	109078.2	.0	.0	.0	.0	.0	.0	.0

Run #41

14	10.2	133857.8	.0	.0	.0	.0	.0	.0	.0
15	18.7	273735.1	.0	.0	.0	.0	.0	.0	.0
16	3.4	53849.5	.0	.0	.0	.0	.0	.0	.0
17	.1	1017.1	.0	.0	.0	.0	.0	.0	.0
18	.5	8436.7	.0	.0	.0	.0	.0	.0	.0
19	10.0	160662.0	.0	.0	.0	.0	.0	.0	.0
20	.0	24.5	.0	.0	.0	.0	.0	.0	.0
21	1.0	16210.7	.0	.0	.0	.0	.0	.0	.0
22	9.6	156348.0	.0	.0	.0	.0	.0	.0	.0
23	22.4	363587.3	.0	.0	.0	.0	.0	.0	.0
24	22.0	357017.0	.0	.0	.0	.0	.0	.0	.0
25	4.4	70637.8	.0	.0	.0	.0	.0	.0	.0
26	28.6	449418.1	.0	.0	.0	.0	.0	.0	.0
27	78.6	********	.0	.0	.0	.0	.0	.0	.0
28	4.4	57538.7	.0	.0	.0	.0	.0	.0	.0
29	48.1	548035.0	.0	.0	.0	.0	.0	.0	.0
30	1.0	9839.5	.0	.0	.0	.0	.0	.0	.0
31	.0	459.4	.0	.0	.0	.0	.0	.0	.0
32	2.5	23533.8	.0	.0	.0	.0	.0	.0	.0
33	3.6	32413.4	.0	.0	.0	.0	.0	.0	.0
34	8.5	68643.2	.0	.0	.0	.0	.0	.0	.0
35	13.0	78433.7	.0	.0	.0	.0	.0	.0	.0
36	14.9	52033.4	.0	.0	.0	.0	.0	.0	.0
37	15.2	17177.4	.0	.0	.0	.0	.0	.0	.0

Failure Surface Specified By 15 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	6.15	212.03
2	19.02	200.34
3	38.16	184.26
4	55.97	166.71
5	75.25	150.80
6	96.09	137.00
7	117.24	123.66
8	139.47	112.23
9	150.00	113.00
10	160.64	118.27
11	370.07	230.63
12	384.68	250.92
13	397.72	272.25
14	412.67	292.28
15	427.91	310.72

*** 2.166 ***

Failure Surface Specified By 15 Coordinate Points

Point	X-Surf	Y-Surf

STABILITY ANALYSIS

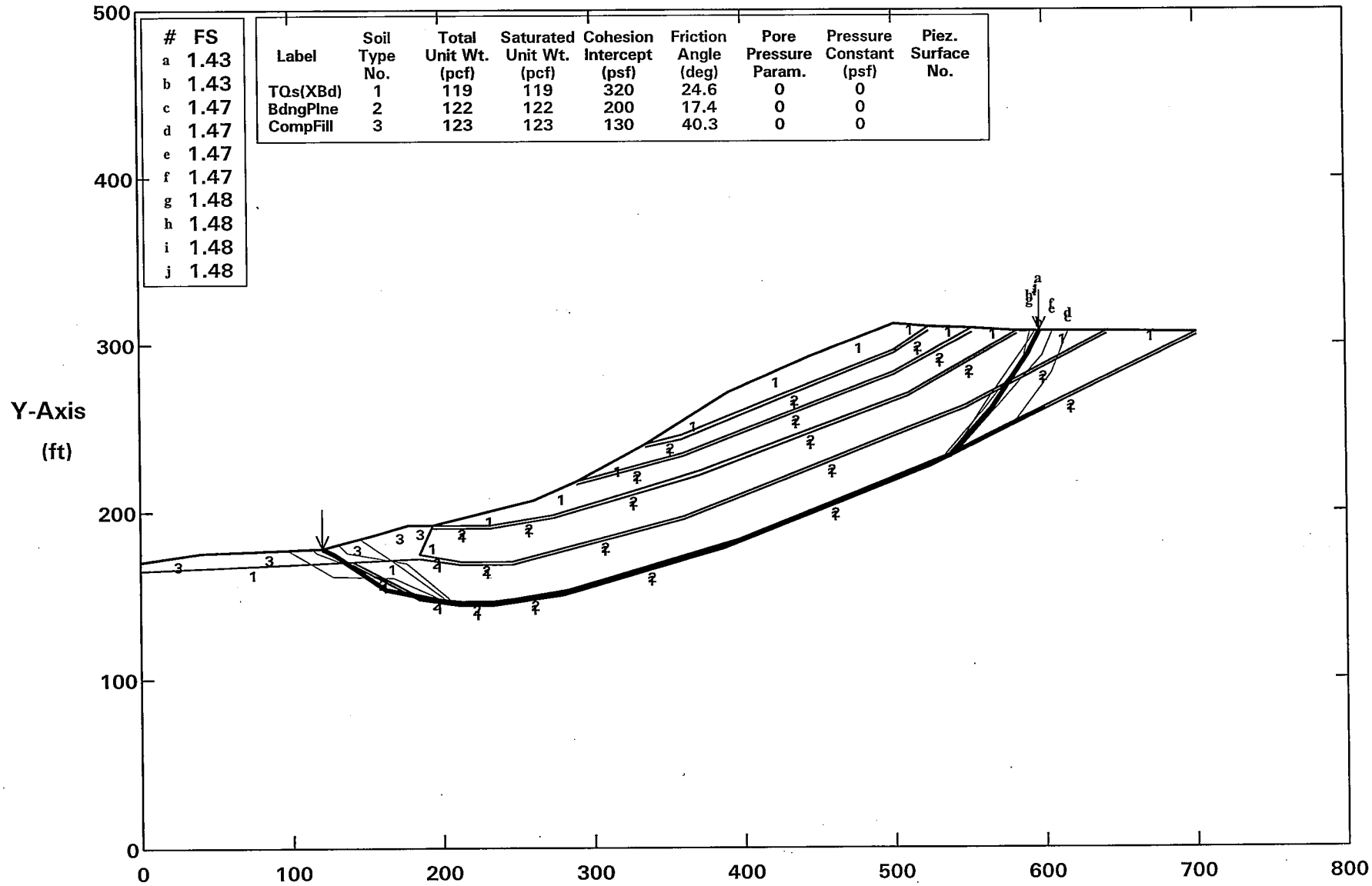
FOR CROSS SECTION 15-15'

TT52584-Hasley Cny-Sect.15-15'-Lower plane-Static

Ten Most Critical. C:HAS15A.PLT By: EC 1/07/99 6:09pm

#	FS
a	1.43
b	1.43
c	1.47
d	1.47
e	1.47
f	1.47
g	1.48
h	1.48
i	1.48
j	1.48

Label	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
TQs(XBd)	1	119	119	320	24.6	0	0	
BdngPlne	2	122	122	200	17.4	0	0	
CompFill	3	123	123	130	40.3	0	0	



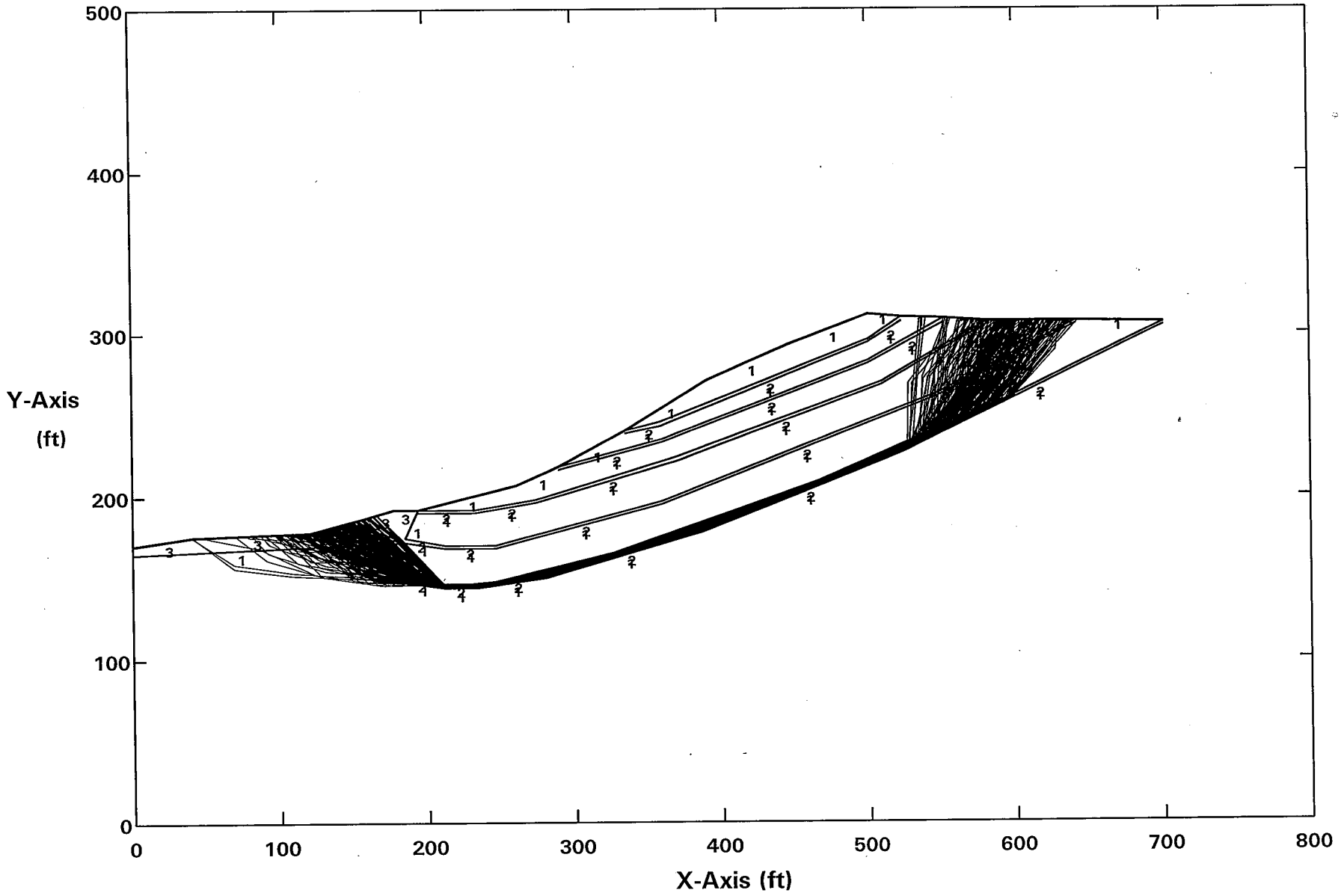
PCSTABL5M FSmin = 1.43 X-Axis (ft)

Factors Of Safety Calculated By The Modified Janbu Method

Run #43

TT52584-Hasley Cny-Sect.15-15'-Lower pla ne-Static

All surfaces evaluated. C:HAS15A.PLT By: EC 1/07/99 5:51pm



Factors Of Safety Calculated By The Modified Janbu Method

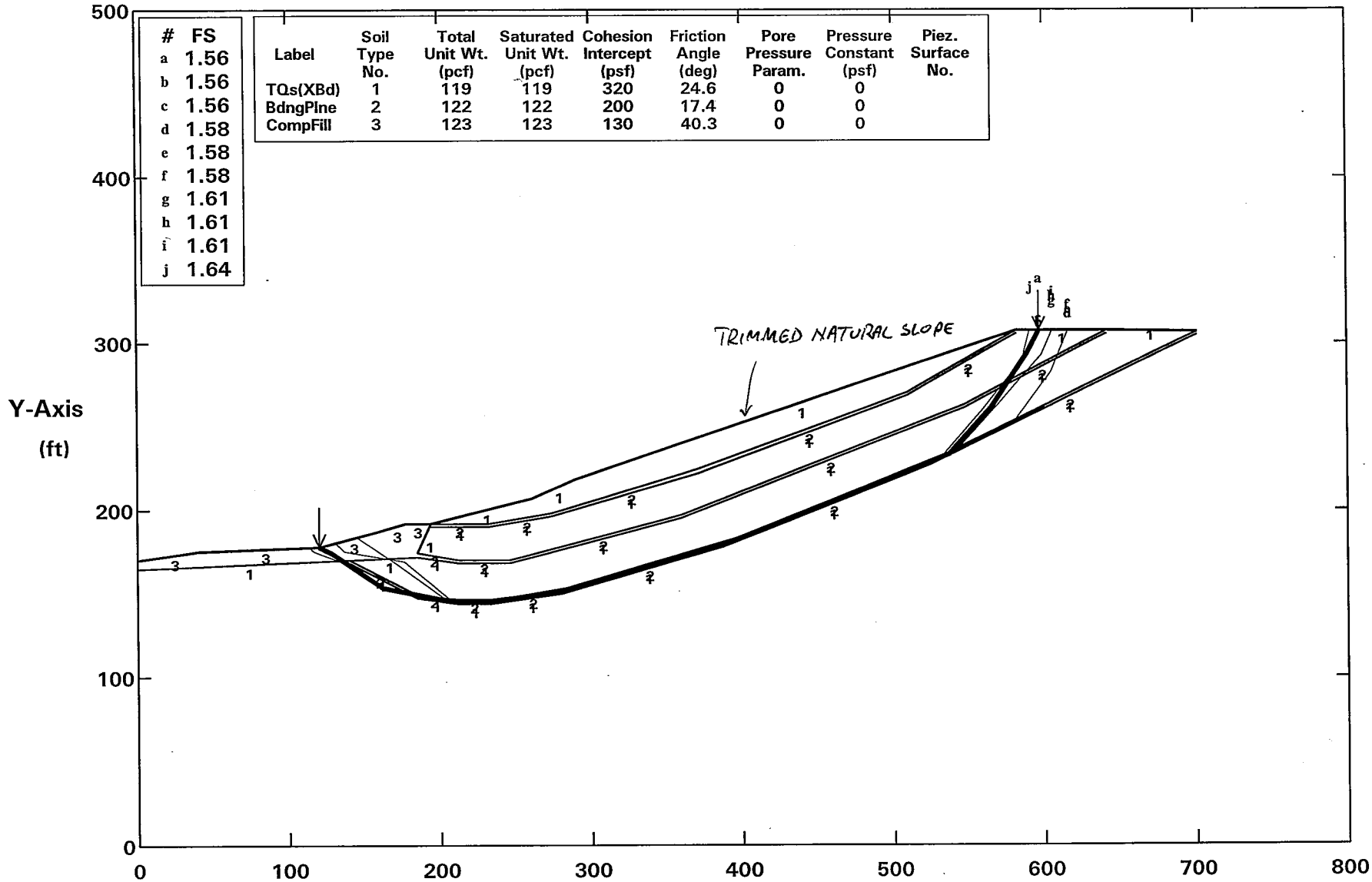
Run #43

TT52584-Hasley Cny-Sect.15-15'-Lower pla ne-Slope top trimmed-Static

Ten Most Critical. C:HAS15B.PLT By: EC 1/07/99 7:10pm

#	FS
a	1.56
b	1.56
c	1.56
d	1.58
e	1.58
f	1.58
g	1.61
h	1.61
i	1.61
j	1.64

Label	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
TQs(XBd)	1	119	119	320	24.6	0	0	
BdngPlne	2	122	122	200	17.4	0	0	
CompFill	3	123	123	130	40.3	0	0	



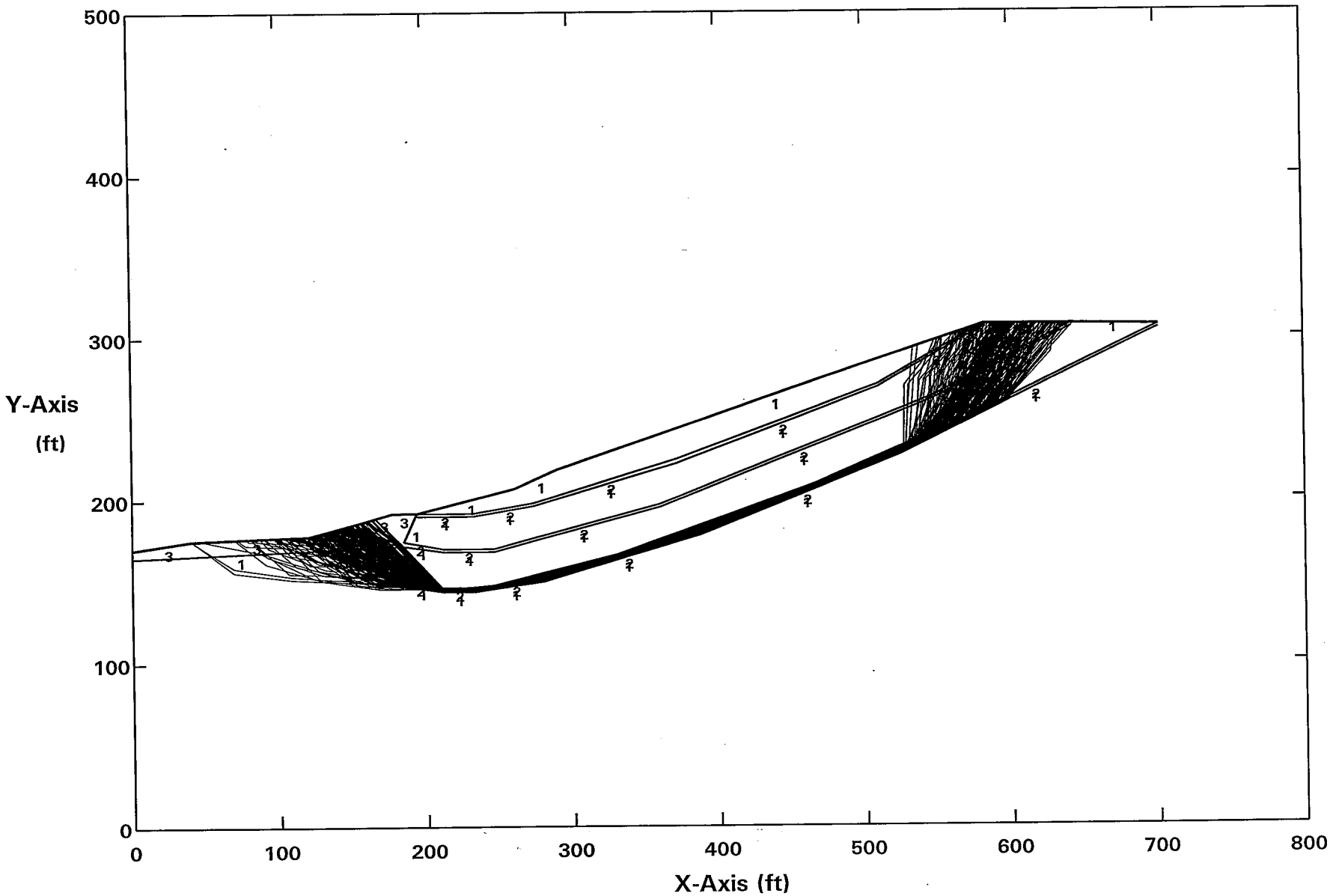
PCSTABL5M FSmin = 1.56 X-Axis (ft)

Factors Of Safety Calculated By The Modified Janbu Method

Run #44

TT52584-Hasley Cny-Sect.15-15'-Lower pla ne-Slope top trimmed-Static

All surfaces evaluated. C:HAS15B.PLT By: EC 1/07/99 7:10pm



Factors Of Safety Calculated By The Modified Janbu Method

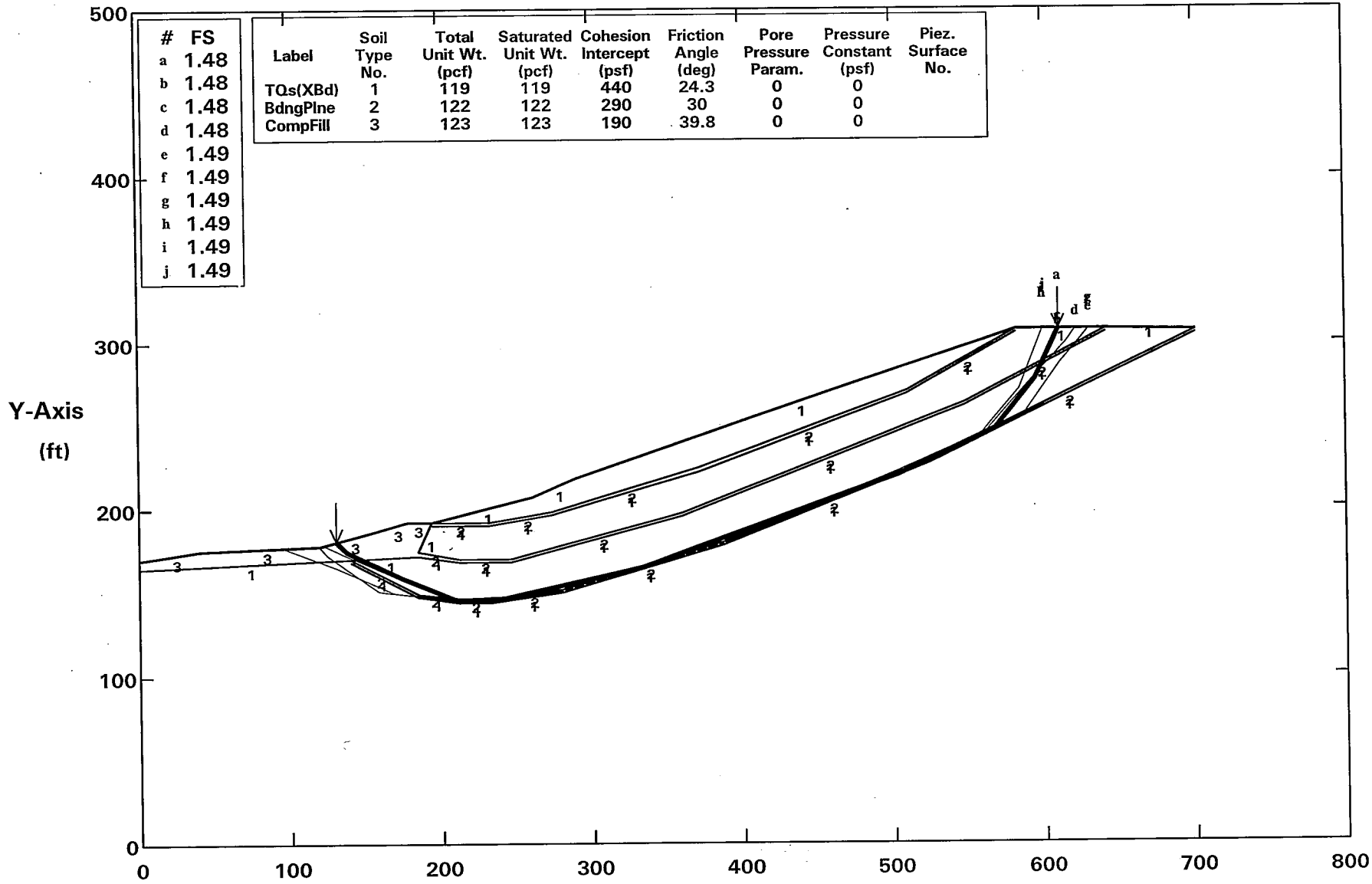
Run # 44

TT52584-Hasley Cny-Sect.15-15'-Lower pla ne-Slope top trimmed-Pseudostatic

Ten Most Critical. C:HAS15B'.PLT By: EC 1/07/99 7:34pm

#	FS
a	1.48
b	1.48
c	1.48
d	1.48
e	1.49
f	1.49
g	1.49
h	1.49
i	1.49
j	1.49

Label	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
TQs(XBd)	1	119	119	440	24.3	0	0	
BdngPlne	2	122	122	290	30	0	0	
CompFill	3	123	123	190	39.8	0	0	



PCSTABL5M FSmin = 1.48 X-Axis (ft)

Factors Of Safety Calculated By The Modified Janbu Method

Run #45

Run #44

** PCSTABL5M **

by
Purdue University

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date:	1/07/99
Time of Run:	7:10pm
Run By:	EC
Input Data Filename:	C:HAS15B.IN
Output Filename:	C:HAS15B.OUT
Plotted Output Filename:	C:HAS15B.PLT

PROBLEM DESCRIPTION TT52584-Hasley Cny-Sect.15-15'-Lower pla
ne-Slope top trimmed-Static

BOUNDARY COORDINATES

10 Top Boundaries
47 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	.00	170.00	40.00	175.00	3
2	40.00	175.00	120.00	178.00	3
3	120.00	178.00	157.00	187.00	3
4	157.00	187.00	177.00	192.00	3
5	177.00	192.00	194.00	192.00	3
6	194.00	192.00	260.00	207.00	1
7	260.00	207.00	289.00	218.00	1
8	289.00	218.00	582.00	308.00	1
9	582.00	308.00	641.00	308.00	1
10	641.00	308.00	701.00	307.00	1
11	194.00	192.00	232.00	192.00	2
12	232.00	192.00	273.00	198.00	2
13	273.00	198.00	371.00	224.00	2
14	371.00	224.00	509.00	270.00	2
15	509.00	270.00	582.00	308.00	2
16	194.00	190.00	232.00	190.00	1
17	232.00	190.00	273.00	196.00	1
18	273.00	196.00	371.00	222.00	1
19	371.00	222.00	509.00	268.00	1
20	509.00	268.00	582.00	306.00	1
21	185.00	174.00	194.00	192.00	1
22	185.00	174.00	212.00	170.00	2

Run #44

23	212.00	170.00	246.00	170.00	2
24	246.00	170.00	360.00	197.00	2
25	360.00	197.00	548.00	263.00	2
26	548.00	263.00	641.00	308.00	2
27	185.00	172.00	212.00	168.00	1
28	212.00	168.00	246.00	168.00	1
29	246.00	168.00	360.00	195.00	1
30	360.00	195.00	548.00	261.00	1
31	548.00	261.00	641.00	306.00	1
32	140.00	170.00	185.00	172.00	1
33	140.00	170.00	185.00	149.00	2
34	185.00	149.00	212.00	146.00	2
35	212.00	146.00	233.00	146.00	2
36	233.00	146.00	280.00	152.00	2
37	280.00	152.00	387.00	180.00	2
38	387.00	180.00	525.00	229.00	2
39	525.00	229.00	701.00	307.00	2
40	140.00	168.00	185.00	147.00	1
41	185.00	147.00	212.00	144.00	1
42	212.00	144.00	233.00	144.00	1
43	233.00	144.00	280.00	150.00	1
44	280.00	150.00	387.00	178.00	1
45	387.00	178.00	525.00	227.00	1
46	525.00	227.00	701.00	305.00	1
47	.00	165.00	140.00	170.00	1

ISOTROPIC SOIL PARAMETERS

3 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	119.0	119.0	320.0	24.6	.00	.0	0
2	122.0	122.0	200.0	17.4	.00	.0	0
3	123.0	123.0	130.0	40.3	.00	.0	0

Janbus Empirical Coef is being used for the case of c & phi both > 0

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Sliding Block Surfaces, Has Been Specified.

800 Trial Surfaces Have Been Generated.

6 Boxes Specified For Generation Of Central Block Base

Length Of Line Segments For Active And Passive Portions Of

Run #44

Sliding Block Is 40.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	185.00	148.00	212.00	145.00	.10
2	213.00	145.00	233.00	145.00	.10
3	234.00	145.10	280.00	151.00	.10
4	281.00	151.30	387.00	179.00	.10
5	388.00	179.40	525.00	228.00	.10
6	526.00	228.40	600.00	261.20	.10

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Modified Janbu Method * *

Failure Surface Specified By 12 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	120.10	178.03
2	127.88	173.95
3	161.95	153.00
4	201.37	146.21
5	223.44	144.98
6	243.88	146.41
7	284.05	152.14
8	395.89	182.20
9	536.73	233.19
10	564.99	261.50
11	588.52	293.85
12	596.91	308.00

*** 1.562 ***

Individual data on the 38 slices

Slice No.	Width Ft(m)	Weight Lbs(kg)	Water Force Top Lbs(kg)	Water Force Bot Lbs(kg)	Tie Force Norm Lbs(kg)	Tie Force Tan Lbs(kg)	Earthquake Force Hor Lbs(kg)	Earthquake Force Ver Lbs(kg)	Surcharge Load Lbs(kg)
1	7.8	2852.2	.0	.0	.0	.0	.0	.0	.0
2	6.7	7339.9	.0	.0	.0	.0	.0	.0	.0
3	5.4	9273.4	.0	.0	.0	.0	.0	.0	.0

Run #44

4	17.0	48956.9	.0	.0	.0	.0	.0	.0	.0
5	5.0	19870.1	.0	.0	.0	.0	.0	.0	.0
6	15.0	70004.3	.0	.0	.0	.0	.0	.0	.0
7	1.1	5573.1	.0	.0	.0	.0	.0	.0	.0
8	6.8	34827.8	.0	.0	.0	.0	.0	.0	.0
9	.1	523.2	.0	.0	.0	.0	.0	.0	.0
10	.5	2515.6	.0	.0	.0	.0	.0	.0	.0
11	8.5	44720.9	.0	.0	.0	.0	.0	.0	.0
12	7.4	40456.5	.0	.0	.0	.0	.0	.0	.0
13	10.6	62080.7	.0	.0	.0	.0	.0	.0	.0
14	11.4	71062.2	.0	.0	.0	.0	.0	.0	.0
15	8.6	55527.2	.0	.0	.0	.0	.0	.0	.0
16	1.0	6574.2	.0	.0	.0	.0	.0	.0	.0
17	10.9	72749.1	.0	.0	.0	.0	.0	.0	.0
18	2.1	14416.3	.0	.0	.0	.0	.0	.0	.0
19	14.0	96333.4	.0	.0	.0	.0	.0	.0	.0
20	13.0	92740.9	.0	.0	.0	.0	.0	.0	.0
21	7.0	51905.7	.0	.0	.0	.0	.0	.0	.0
22	4.0	30642.6	.0	.0	.0	.0	.0	.0	.0
23	5.0	37945.3	.0	.0	.0	.0	.0	.0	.0
24	71.0	557707.6	.0	.0	.0	.0	.0	.0	.0
25	11.0	88452.0	.0	.0	.0	.0	.0	.0	.0
26	16.0	129637.6	.0	.0	.0	.0	.0	.0	.0
27	8.9	72503.7	.0	.0	.0	.0	.0	.0	.0
28	113.1	883547.3	.0	.0	.0	.0	.0	.0	.0
29	16.0	118212.6	.0	.0	.0	.0	.0	.0	.0
30	11.7	85595.4	.0	.0	.0	.0	.0	.0	.0
31	1.8	12919.2	.0	.0	.0	.0	.0	.0	.0
32	9.5	63664.4	.0	.0	.0	.0	.0	.0	.0
33	17.0	95549.7	.0	.0	.0	.0	.0	.0	.0
34	8.7	37892.6	.0	.0	.0	.0	.0	.0	.0
35	2.2	8258.7	.0	.0	.0	.0	.0	.0	.0
36	6.1	19189.1	.0	.0	.0	.0	.0	.0	.0
37	6.5	14456.0	.0	.0	.0	.0	.0	.0	.0
38	8.4	7063.4	.0	.0	.0	.0	.0	.0	.0

Failure Surface Specified By 12 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	120.10	178.03
2	127.88	173.95
3	161.95	153.00
4	201.37	146.21
5	223.44	144.98
6	243.88	146.41
7	284.05	152.14
8	395.89	182.20
9	536.73	233.19
10	564.99	261.50
11	588.52	293.85
12	596.91	308.00

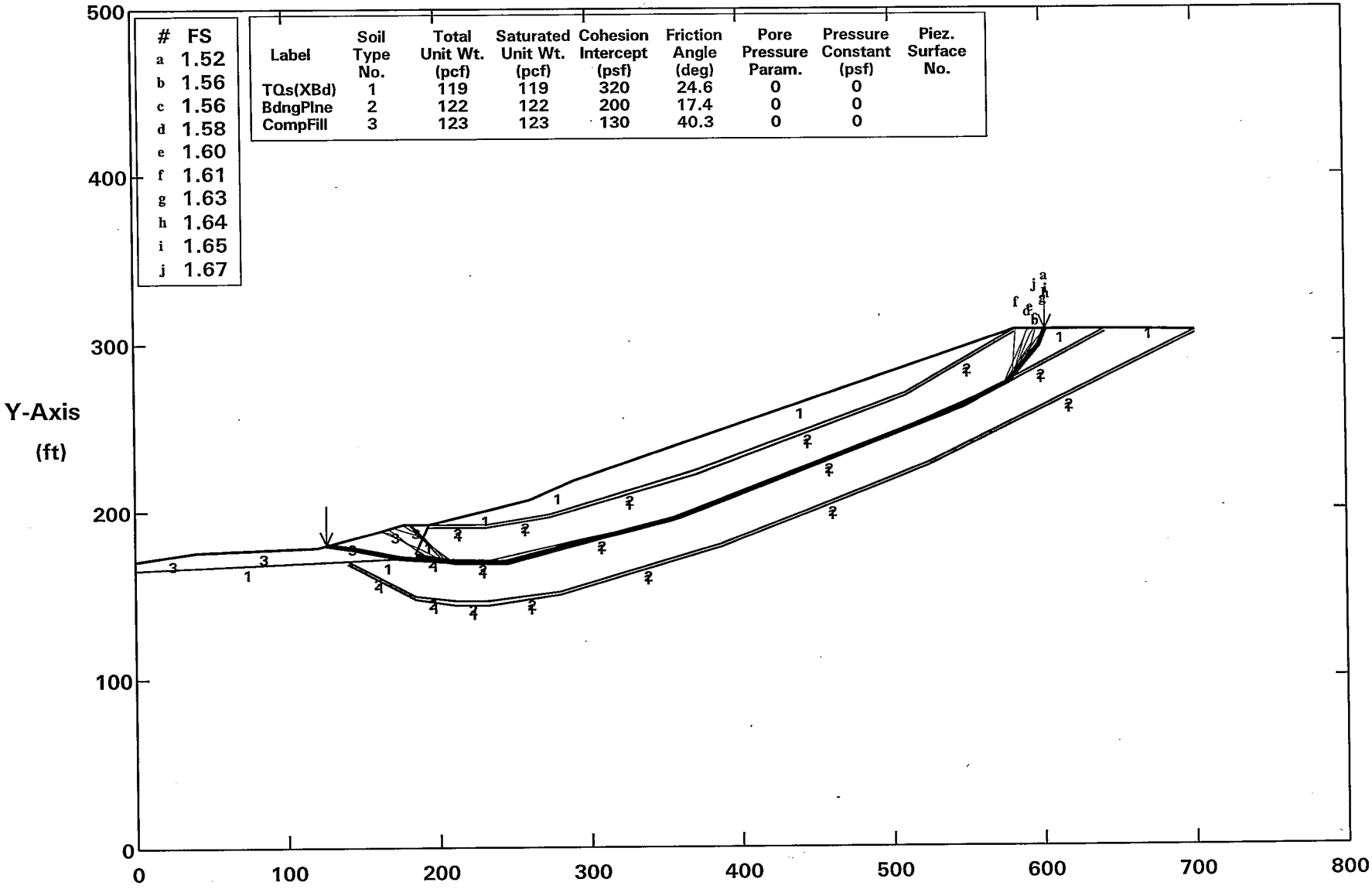
*** 1.562 ***

TT52584-Hasley Cny-Sect.15-15'-Plane 20' below toe-Slope top trimmed-Static

Ten Most Critical. C:HAS15C.PLT By: EC 1/08/99 10:36am

#	FS
a	1.52
b	1.56
c	1.56
d	1.58
e	1.60
f	1.61
g	1.63
h	1.64
i	1.65
j	1.67

Label	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
TQs(XBd)	1	119	119	320	24.6	0	0	
BdngPlne	2	122	122	200	17.4	0	0	
CompFill	3	123	123	130	40.3	0	0	



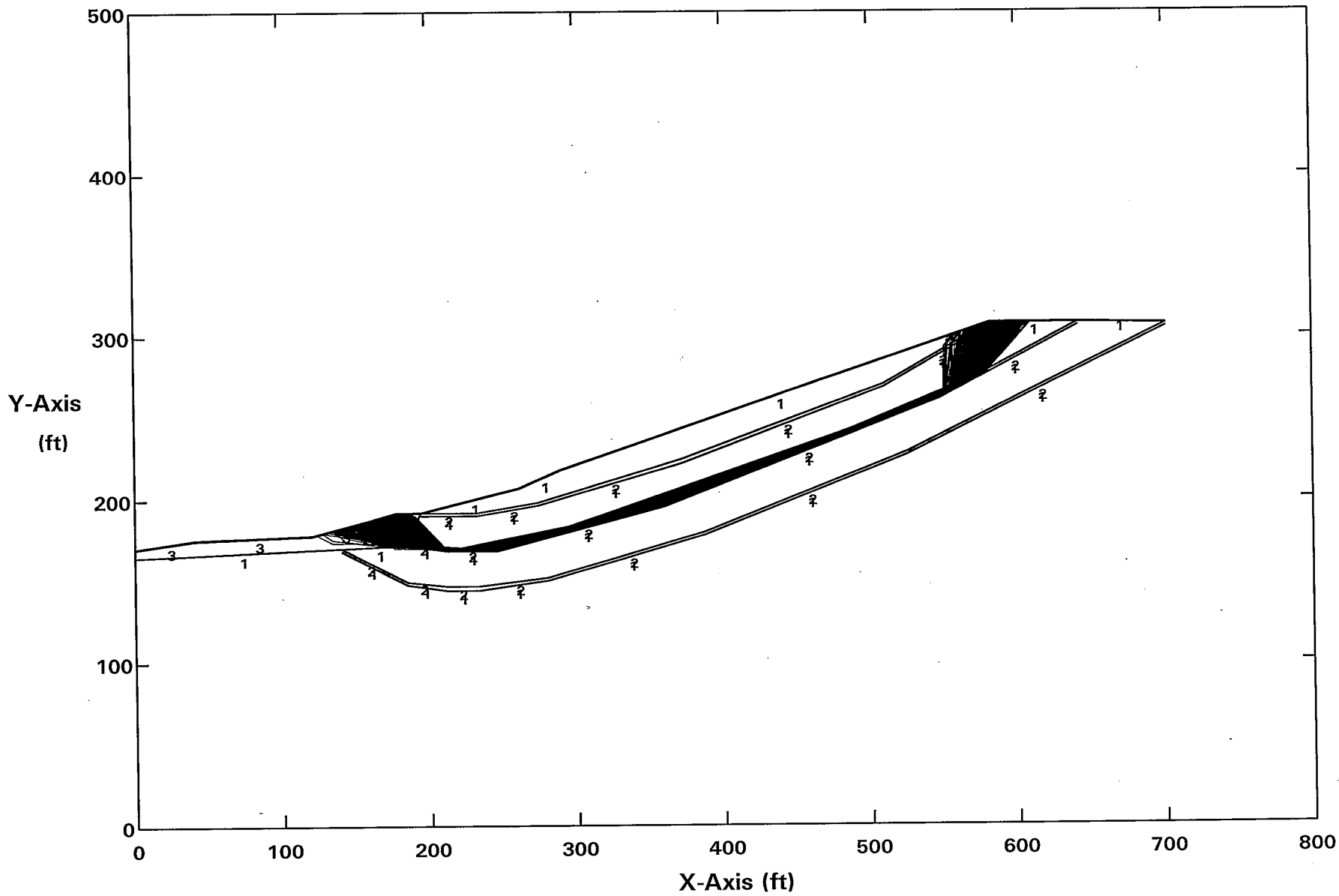
PCSTABL5M FSmin = 1.52 X-Axis (ft)

Factors Of Safety Calculated By The Modified Janbu Method

Run # 46

TT52584-Hasley Cny-Sect.15-15'-Plane 20' below toe-Slope top trimmed-Static

All surfaces evaluated. C:HAS15C.PLT By: EC 1/08/99 10:23am



Factors Of Safety Calculated By The Modified Janbu Method

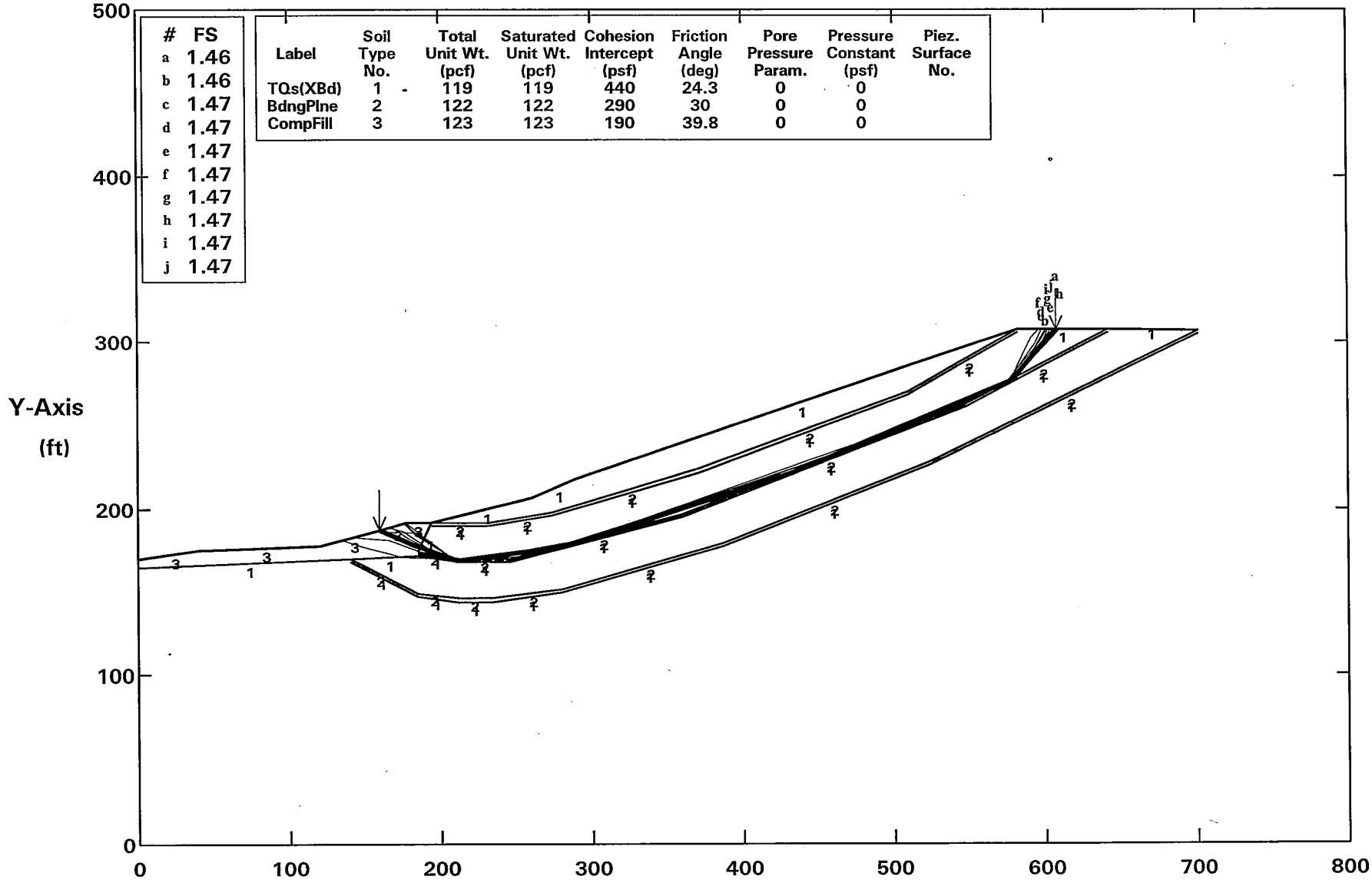
Run #46

TT52584-Hasley Cny-Sect.15-15'-Plane 20'below toe-Slope top trimmed-Pseudostatic

Ten Most Critical. C:HAS15C'.PLT By: EC 1/08/99 10:40am

#	FS
a	1.46
b	1.46
c	1.47
d	1.47
e	1.47
f	1.47
g	1.47
h	1.47
i	1.47
j	1.47

Label	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
TQs(XBd)	1	119	119	440	24.3	0	0	
BdngPlne	2	122	122	290	30	0	0	
CompFill	3	123	123	190	39.8	0	0	



PCSTABL5M FSmin = 1.46 X-Axis (ft)

Factors Of Safety Calculated By The Modified Janbu Method

Run #17

Run #46

** PCSTABL5M **

by
Purdue University

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date:	1/08/99
Time of Run:	10:31am
Run By:	EC
Input Data Filename:	C:HAS15C.IN
Output Filename:	C:HAS15C.OUT
Plotted Output Filename:	C:HAS15C.PLT

PROBLEM DESCRIPTION TT52584-Hasley Cny-Sect.15-15'-Plane 20' below toe-Slope top trimmed-Static

BOUNDARY COORDINATES

10 Top Boundaries
47 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	.00	170.00	40.00	175.00	3
2	40.00	175.00	120.00	178.00	3
3	120.00	178.00	157.00	187.00	3
4	157.00	187.00	177.00	192.00	3
5	177.00	192.00	194.00	192.00	3
6	194.00	192.00	260.00	207.00	1
7	260.00	207.00	289.00	218.00	1
8	289.00	218.00	582.00	308.00	1
9	582.00	308.00	641.00	308.00	1
10	641.00	308.00	701.00	307.00	1
11	194.00	192.00	232.00	192.00	2
12	232.00	192.00	273.00	198.00	2
13	273.00	198.00	371.00	224.00	2
14	371.00	224.00	509.00	270.00	2
15	509.00	270.00	582.00	308.00	2
16	194.00	190.00	232.00	190.00	1
17	232.00	190.00	273.00	196.00	1
18	273.00	196.00	371.00	222.00	1
19	371.00	222.00	509.00	268.00	1
20	509.00	268.00	582.00	306.00	1
21	185.00	174.00	194.00	192.00	1
22	185.00	174.00	212.00	170.00	2

Run #46

23	212.00	170.00	246.00	170.00	2
24	246.00	170.00	360.00	197.00	2
25	360.00	197.00	548.00	263.00	2
26	548.00	263.00	641.00	308.00	2
27	185.00	172.00	212.00	168.00	1
28	212.00	168.00	246.00	168.00	1
29	246.00	168.00	360.00	195.00	1
30	360.00	195.00	548.00	261.00	1
31	548.00	261.00	641.00	306.00	1
32	140.00	170.00	185.00	172.00	1
33	140.00	170.00	185.00	149.00	2
34	185.00	149.00	212.00	146.00	2
35	212.00	146.00	233.00	146.00	2
36	233.00	146.00	280.00	152.00	2
37	280.00	152.00	387.00	180.00	2
38	387.00	180.00	525.00	229.00	2
39	525.00	229.00	701.00	307.00	2
40	140.00	168.00	185.00	147.00	1
41	185.00	147.00	212.00	144.00	1
42	212.00	144.00	233.00	144.00	1
43	233.00	144.00	280.00	150.00	1
44	280.00	150.00	387.00	178.00	1
45	387.00	178.00	525.00	227.00	1
46	525.00	227.00	701.00	305.00	1
47	.00	165.00	140.00	170.00	1

ISOTROPIC SOIL PARAMETERS

3 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	119.0	119.0	320.0	24.6	.00	.0	0
2	122.0	122.0	200.0	17.4	.00	.0	0
3	123.0	123.0	130.0	40.3	.00	.0	0

Janbus Empirical Coef is being used for the case of c & phi both > 0

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Sliding Block Surfaces, Has Been Specified.

800 Trial Surfaces Have Been Generated.

5 Boxes Specified For Generation Of Central Block Base

Length Of Line Segments For Active And Passive Portions Of

Run #46

Sliding Block Is 30.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	185.00	173.00	212.00	169.00	.10
2	213.00	169.00	246.00	169.00	.10
3	247.00	169.20	360.00	196.00	.10
4	361.00	196.40	548.00	262.00	.10
5	570.00	272.60	580.00	277.50	.10

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Modified Janbu Method * *

Failure Surface Specified By 10 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	126.22	179.51
2	145.80	176.95
3	175.37	171.91
4	205.31	170.01
5	243.16	168.99
6	353.98	194.54
7	537.58	258.34
8	577.50	276.24
9	597.92	298.23
10	601.95	308.00

*** 1.522 ***

Individual data on the 28 slices

Slice No.	Width Ft(m)	Weight Lbs(kg)	Water Force Top Lbs(kg)	Water Force Bot Lbs(kg)	Tie Force Norm Lbs(kg)	Tie Force Tan Lbs(kg)	Earthquake Force Hor Lbs(kg)	Earthquake Force Ver Lbs(kg)	Surcharge Load Lbs(kg)
1	19.6	8822.3	.0	.0	.0	.0	.0	.0	.0
2	11.2	13280.4	.0	.0	.0	.0	.0	.0	.0
3	18.4	35759.6	.0	.0	.0	.0	.0	.0	.0
4	1.6	3987.8	.0	.0	.0	.0	.0	.0	.0
5	1.5	3686.0	.0	.0	.0	.0	.0	.0	.0
6	6.5	16426.8	.0	.0	.0	.0	.0	.0	.0

Run #46

7	8.3	21017.7	.0	.0	.0	.0	.0	.0	.0
8	.7	1837.4	.0	.0	.0	.0	.0	.0	.0
9	11.3	30970.9	.0	.0	.0	.0	.0	.0	.0
10	6.7	20267.6	.0	.0	.0	.0	.0	.0	.0
11	20.0	68699.2	.0	.0	.0	.0	.0	.0	.0
12	11.2	43619.8	.0	.0	.0	.0	.0	.0	.0
13	2.8	11566.7	.0	.0	.0	.0	.0	.0	.0
14	14.0	57001.1	.0	.0	.0	.0	.0	.0	.0
15	13.0	54391.8	.0	.0	.0	.0	.0	.0	.0
16	16.0	71053.1	.0	.0	.0	.0	.0	.0	.0
17	65.0	317037.0	.0	.0	.0	.0	.0	.0	.0
18	6.0	31069.7	.0	.0	.0	.0	.0	.0	.0
19	11.0	56302.5	.0	.0	.0	.0	.0	.0	.0
20	138.0	657120.7	.0	.0	.0	.0	.0	.0	.0
21	28.6	124691.9	.0	.0	.0	.0	.0	.0	.0
22	10.3	43251.3	.0	.0	.0	.0	.0	.0	.0
23	.5	2137.9	.0	.0	.0	.0	.0	.0	.0
24	29.1	112628.4	.0	.0	.0	.0	.0	.0	.0
25	1.7	6187.7	.0	.0	.0	.0	.0	.0	.0
26	2.7	9168.5	.0	.0	.0	.0	.0	.0	.0
27	15.9	34744.6	.0	.0	.0	.0	.0	.0	.0
28	4.0	2348.2	.0	.0	.0	.0	.0	.0	.0

Failure Surface Specified By 9 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	176.21	191.80
2	183.60	187.88
3	207.42	169.64
4	245.93	169.01
5	348.21	193.24
6	546.66	261.49
7	575.08	275.05
8	593.20	298.96
9	595.59	308.00

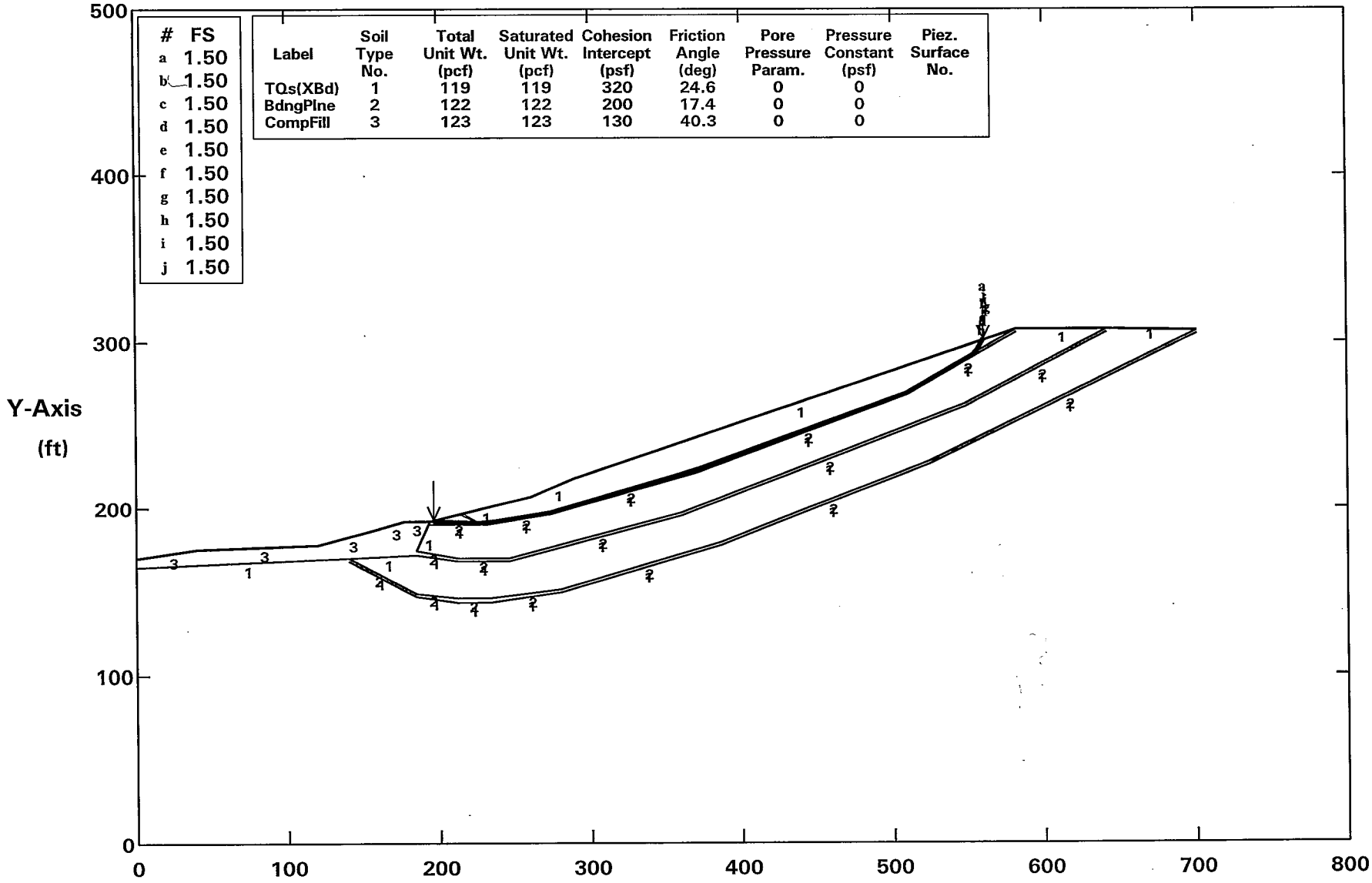
*** 1.556 ***

Failure Surface Specified By 9 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	176.21	191.80
2	183.60	187.88
3	207.42	169.64
4	245.93	169.01
5	348.21	193.24
6	546.66	261.49

TT52584-Hasley Cny-Sect.15-15'-Toe plane -Slope top trimmed-Static

Ten Most Critical. C:HAS15D.PLT By: EC 1/08/99 12:11pm



#	FS
a	1.50
b	1.50
c	1.50
d	1.50
e	1.50
f	1.50
g	1.50
h	1.50
i	1.50
j	1.50

Label	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
TQs(XBd)	1	119	119	320	24.6	0	0	
BdngPlne	2	122	122	200	17.4	0	0	
CompFill	3	123	123	130	40.3	0	0	

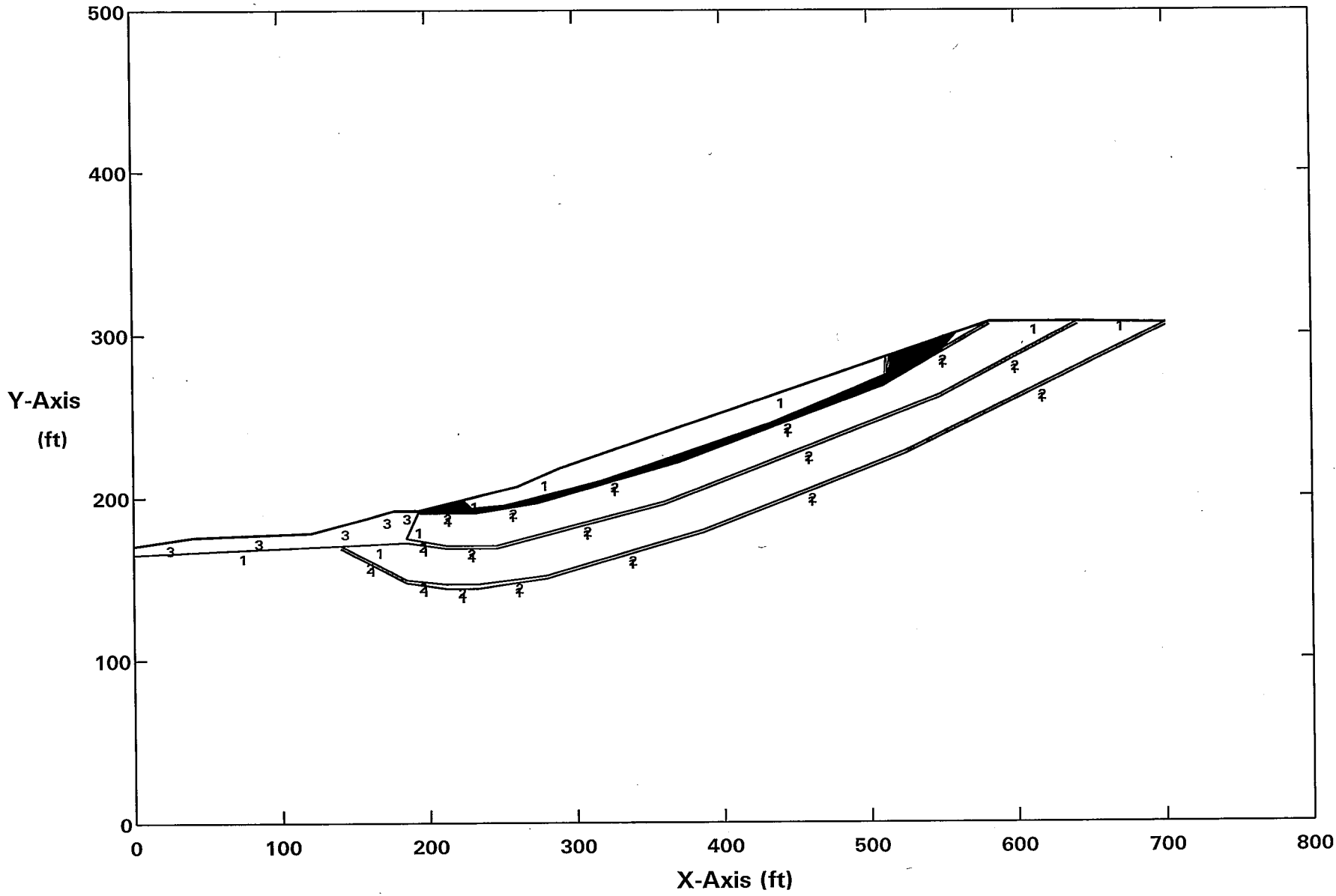
PCSTABL5M FSmin = 1.50 X-Axis (ft)

Factors Of Safety Calculated By The Modified Janbu Method

Run #48

TT52584-Hasley Cny-Sect.15-15'-Toe plane -Slope top trimmed-Static

All surfaces evaluated. C:HAS15D.PLT By: EC 1/08/99 11:57am

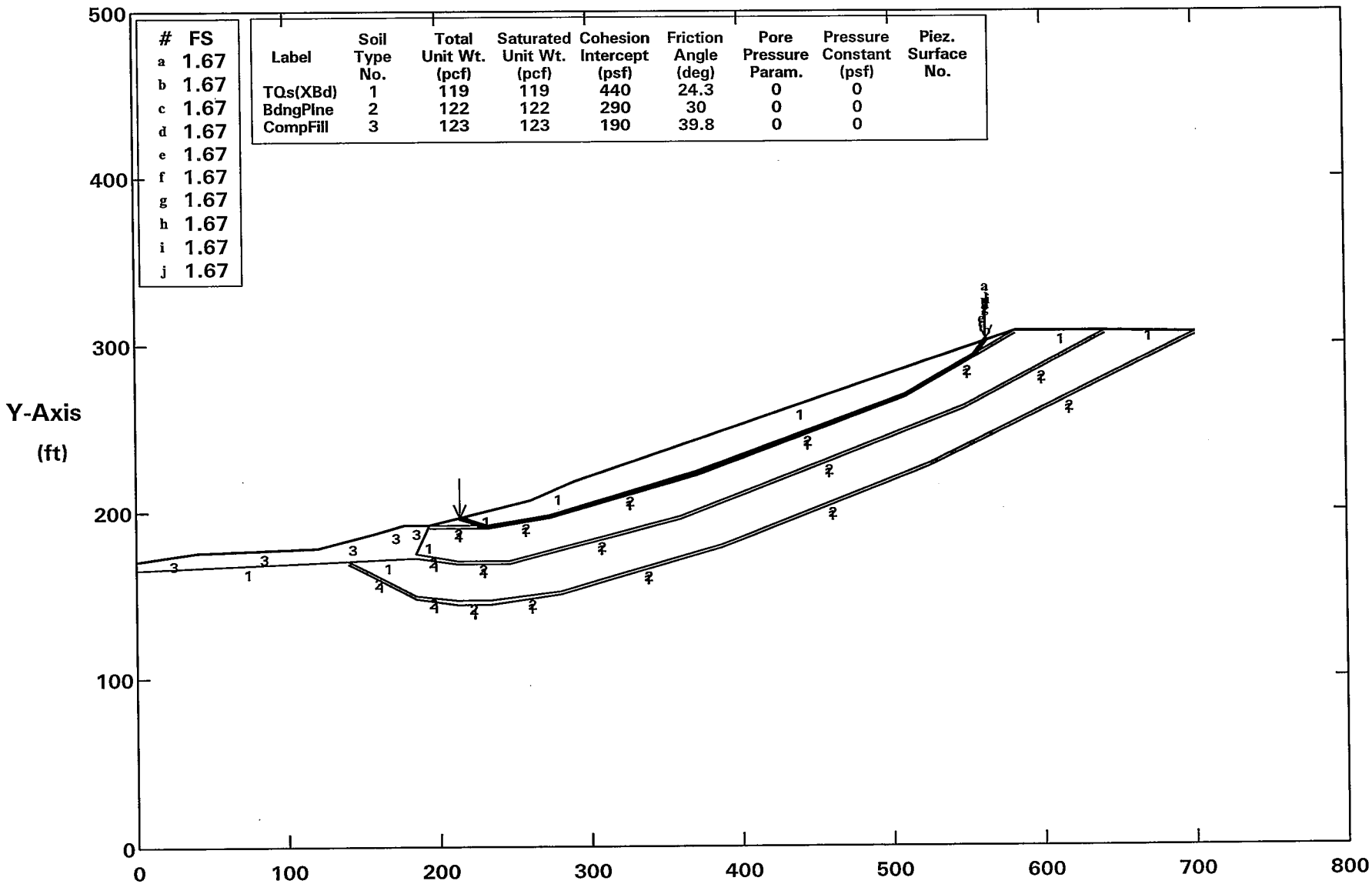


Factors Of Safety Calculated By The Modified Janbu Method

Run #48

TT52584-Hasley Cny-Sect.15-15'-Toe plane -Slope top trimmed-Pseudostatic

Ten Most Critical. C:HAS15D'.PLT By: EC 1/08/99 3:13pm



#	FS
a	1.67
b	1.67
c	1.67
d	1.67
e	1.67
f	1.67
g	1.67
h	1.67
i	1.67
j	1.67

Label	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
TQs(XBd)	1	119	119	440	24.3	0	0	
BdngPlne	2	122	122	290	30	0	0	
CompFill	3	123	123	190	39.8	0	0	

PCSTABL5M FSmin = 1.67 X-Axis (ft)

Factors Of Safety Calculated By The Modified Janbu Method

Run #49

Run #48

** PCSTABL5M **

by
Purdue University

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date:	1/08/99
Time of Run:	12:11pm
Run By:	EC
Input Data Filename:	C:HAS15D.IN
Output Filename:	C:HAS15D.OUT
Plotted Output Filename:	C:HAS15D.PLT

PROBLEM DESCRIPTION TT52584-Hasley Cny-Sect.15-15'-Toe plane
-Slope top trimmed-Static

BOUNDARY COORDINATES

10 Top Boundaries
47 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	.00	170.00	40.00	175.00	3
2	40.00	175.00	120.00	178.00	3
3	120.00	178.00	157.00	187.00	3
4	157.00	187.00	177.00	192.00	3
5	177.00	192.00	194.00	192.00	3
6	194.00	192.00	260.00	207.00	1
7	260.00	207.00	289.00	218.00	1
8	289.00	218.00	582.00	308.00	1
9	582.00	308.00	641.00	308.00	1
10	641.00	308.00	701.00	307.00	1
11	194.00	192.00	232.00	192.00	2
12	232.00	192.00	273.00	198.00	2
13	273.00	198.00	371.00	224.00	2
14	371.00	224.00	509.00	270.00	2
15	509.00	270.00	582.00	308.00	2
16	194.00	190.00	232.00	190.00	1
17	232.00	190.00	273.00	196.00	1
18	273.00	196.00	371.00	222.00	1
19	371.00	222.00	509.00	268.00	1
20	509.00	268.00	582.00	306.00	1
21	185.00	174.00	194.00	192.00	1
22	185.00	174.00	212.00	170.00	2

Run #48

23	212.00	170.00	246.00	170.00	2
24	246.00	170.00	360.00	197.00	2
25	360.00	197.00	548.00	263.00	2
26	548.00	263.00	641.00	308.00	2
27	185.00	172.00	212.00	168.00	1
28	212.00	168.00	246.00	168.00	1
29	246.00	168.00	360.00	195.00	1
30	360.00	195.00	548.00	261.00	1
31	548.00	261.00	641.00	306.00	1
32	140.00	170.00	185.00	172.00	1
33	140.00	170.00	185.00	149.00	2
34	185.00	149.00	212.00	146.00	2
35	212.00	146.00	233.00	146.00	2
36	233.00	146.00	280.00	152.00	2
37	280.00	152.00	387.00	180.00	2
38	387.00	180.00	525.00	229.00	2
39	525.00	229.00	701.00	307.00	2
40	140.00	168.00	185.00	147.00	1
41	185.00	147.00	212.00	144.00	1
42	212.00	144.00	233.00	144.00	1
43	233.00	144.00	280.00	150.00	1
44	280.00	150.00	387.00	178.00	1
45	387.00	178.00	525.00	227.00	1
46	525.00	227.00	701.00	305.00	1
47	.00	165.00	140.00	170.00	1

ISOTROPIC SOIL PARAMETERS

3 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	119.0	119.0	320.0	24.6	.00	.0	0
2	122.0	122.0	200.0	17.4	.00	.0	0
3	123.0	123.0	130.0	40.3	.00	.0	0

Janbus Empirical Coef is being used for the case of c & phi both > 0

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Sliding Block Surfaces, Has Been Specified.

800 Trial Surfaces Have Been Generated.

6 Boxes Specified For Generation Of Central Block Base

Length Of Line Segments For Active And Passive Portions Of

Run #48

Sliding Block Is 30.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	225.00	191.00	232.00	191.00	.10
2	233.00	191.10	240.00	192.20	.10
3	273.00	197.00	273.00	197.00	.00
4	371.00	223.00	371.00	223.00	.00
5	509.00	269.00	509.00	269.00	.00
6	540.00	285.10	555.00	292.90	.10

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Modified Janbu Method * *

Failure Surface Specified By 9 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	196.20	192.50
2	197.18	191.63
3	227.17	191.01
4	237.12	191.75
5	273.00	197.00
6	371.00	223.00
7	509.00	269.00
8	554.66	292.72
9	560.16	301.29

*** 1.495 ***

Individual data on the 13 slices

Slice No.	Width Ft(m)	Weight Lbs(kg)	Water Force Top Lbs(kg)	Water Force Bot Lbs(kg)	Tie Force Norm Lbs(kg)	Tie Force Tan Lbs(kg)	Earthquake Force Hor Lbs(kg)	Earthquake Force Ver Lbs(kg)	Surcharge Load Lbs(kg)
1	.6	20.8	.0	.0	.0	.0	.0	.0	.0
2	.4	43.0	.0	.0	.0	.0	.0	.0	.0
3	30.0	17245.2	.0	.0	.0	.0	.0	.0	.0
4	4.8	5128.4	.0	.0	.0	.0	.0	.0	.0
5	5.1	5901.9	.0	.0	.0	.0	.0	.0	.0
6	22.9	29960.0	.0	.0	.0	.0	.0	.0	.0

Run #4B

7	13.0	20795.8	.0	.0	.0	.0	.0	.0	.0
8	16.0	30213.2	.0	.0	.0	.0	.0	.0	.0
9	82.0	180490.0	.0	.0	.0	.0	.0	.0	.0
10	138.0	302287.5	.0	.0	.0	.0	.0	.0	.0
11	45.7	63873.6	.0	.0	.0	.0	.0	.0	.0
12	1.0	751.9	.0	.0	.0	.0	.0	.0	.0
13	4.5	1499.9	.0	.0	.0	.0	.0	.0	.0

Failure Surface Specified By 9 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	195.82	192.41
2	196.91	191.33
3	226.91	191.00
4	236.93	191.70
5	273.00	197.00
6	371.00	223.00
7	509.00	269.00
8	553.44	292.12
9	559.31	301.03

*** 1.496 ***

Failure Surface Specified By 9 Coordinate Points

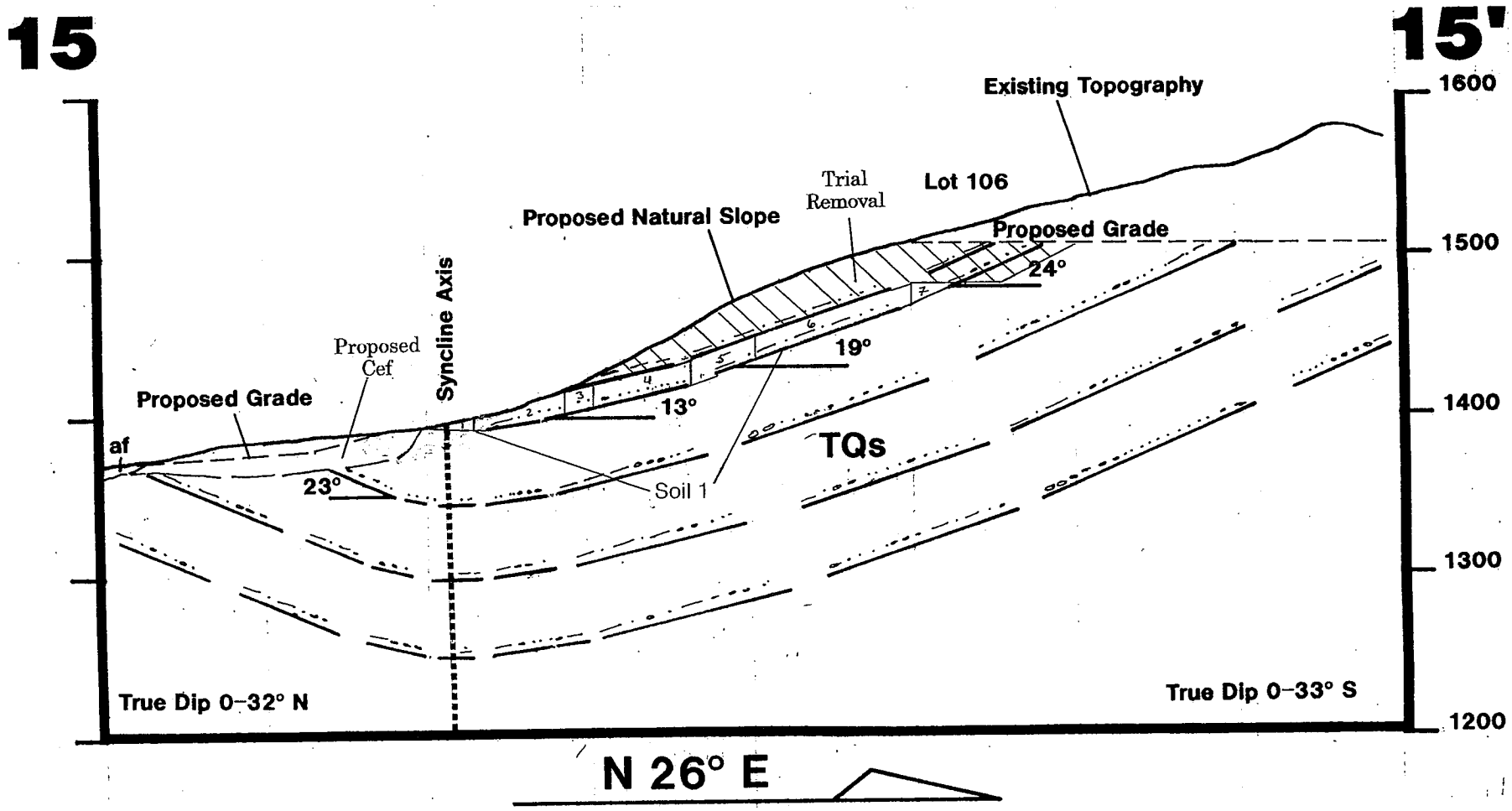
Point No.	X-Surf (ft)	Y-Surf (ft)
1	195.82	192.41
2	196.91	191.33
3	226.91	191.00
4	236.93	191.70
5	273.00	197.00
6	371.00	223.00
7	509.00	269.00
8	553.44	292.12
9	559.31	301.03

*** 1.496 ***

Failure Surface Specified By 8 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)

CROSS SECTION
OMS STABILITY ANALYSIS



	Static		Pseudostatic	
	c	ø	c	ø
Soil 1 (Bedding Plane)	200	17.4	290	30

ALLAN E. SEWARD
ENGINEERING GEOLOGY

JOB NUMBER:	98-1617-4	DATE:	1/15/99
SCALE:	1"=100'	DRAWN BY:	Staff
		REVISED:	

Run #50 & 51

LOS ANGELES COUNTY
DEPARTMENT OF PUBLIC WORKS
LAND DEVELOPMENT DIVISION
GEOTECHNICAL ENGINEERING
ORDINARY METHOD OF SLICES USED FOR ANALYSIS

PROJECT: TT 52584 - Hasley Canyon (Palmer Investments)
CONSULTANT: AES
REPORT DATE: 1/29/99
SECTION: 15-15' - Slope trimmed w/upper 50' bench CIRCLE: Toe Plane - Static DATE: 1/22/99 BY: NAO

SLICE	HEIGHT(1)	HEIGHT(2)	WIDTH	AREA	WEIGHT	UNIT WT
1.	0.00	7.00	30.00	105.00	12.81	122.0
2.	7.00	12.00	56.00	532.00	64.90	122.0
3.	12.00	16.00	18.00	252.00	30.74	122.0
4.	16.00	14.00	60.00	900.00	109.80	122.0
5.	14.00	14.00	41.00	574.00	70.03	122.0
6.	14.00	14.00	95.00	1330.00	162.26	122.0
7.	14.00	0.00	30.00	210.00	25.62	122.0

SLOPE STABILITY DATA

SEISMIC COEFFICIENT = 0.00 g

SLICE NO.	1 SLICE WEIGHT W (kips)	2 FAILURE PLANE ANGLE i (deg)	3 ANGLE OF INT. FRICTION phi (deg)	4 COHE-SION C (ksf)	5 LENGTH OF ARC L (ft)	6 W (1-Ru) COS i / COS i TAN phi	7 C L COS i	8 g W (1-Ru) SINi COSi TAN phi	9 W SIN i / COS i	10 g W COS i / COS i
1.	12.81	-1.00	17.40	0.200	30.00	4.01	6.00	0.00	-0.22	0.00
2.	64.90	7.00	17.40	0.200	56.42	20.04	11.20	0.00	7.85	0.00
3.	30.74	13.00	17.40	0.200	18.47	9.15	3.60	0.00	6.74	0.00
4.	109.80	13.00	17.40	0.200	61.58	32.67	12.00	0.00	24.07	0.00
5.	70.03	19.00	17.40	0.200	43.36	19.62	8.20	0.00	21.56	0.00
6.	162.26	19.00	17.40	0.200	100.47	45.46	19.00	0.00	49.95	0.00
7.	25.62	24.00	17.40	0.200	32.84	6.70	6.00	0.00	9.52	0.00
SUMMATION:						137.65	66.00	0.00	119.46	0.00

STATIC SAFETY FACTOR = 1.70

Run #50

LOS ANGELES COUNTY
DEPARTMENT OF PUBLIC WORKS
LAND DEVELOPMENT DIVISION
GEOTECHNICAL ENGINEERING
ORDINARY METHOD OF SLICES USED FOR ANALYSIS

PROJECT: TT 52584 - Hasley Canyon (Palmer Investments)
CONSULTANT: AES
REPORT DATE: 1/29/99
SECTION: 15-15' - Slope trimmed w/upper 50' bench CIRCLE: Toe Plane - Pseudostatic DATE: 1/22/99 BY: NAO

SLICE	HEIGHT(1)	HEIGHT(2)	WIDTH	AREA	WEIGHT	UNIT WT
1.	0.00	7.00	30.00	105.00	12.81	122.0
2.	7.00	12.00	56.00	532.00	64.90	122.0
3.	12.00	16.00	18.00	252.00	30.74	122.0
4.	16.00	14.00	60.00	900.00	109.80	122.0
5.	14.00	14.00	41.00	574.00	70.03	122.0
6.	14.00	14.00	95.00	1330.00	162.26	122.0
7.	14.00	0.00	30.00	210.00	25.62	122.0

SLOPE STABILITY DATA

SEISMIC COEFFICIENT = 0.15 g

SLICE NO.	1 SLICE WEIGHT W (kips)	2 FAILURE PLANE ANGLE i(deg)	3 ANGLE OF INT. FRICTION phi(deg)	4 COHE-SION C (ksf)	5 LENGTH OF ARC L (ft)	6 W (1-Ru) COS i / COS i TAN phi	7 C L COS i	8 g W (1-Ru) SINi COSi / TAN phi	9 W SIN i / COS i	10 g W COS i / COS i
1.	12.81	-1.00	30.00	0.290	30.00	7.39	8.70	-0.02	-0.22	1.92
2.	64.90	7.00	30.00	0.290	56.42	36.92	16.24	0.68	7.85	9.59
3.	30.74	13.00	30.00	0.290	18.47	16.85	5.22	0.58	6.74	4.38
4.	109.80	13.00	30.00	0.290	61.58	60.19	17.40	2.08	24.07	15.64
5.	70.03	19.00	30.00	0.290	43.36	36.15	11.89	1.87	21.56	9.39
6.	162.26	19.00	30.00	0.290	100.47	83.75	27.55	4.33	49.95	21.76
7.	25.62	24.00	30.00	0.290	32.84	12.34	8.70	0.82	9.52	3.21
SUMMATION:						253.59	95.70	10.35	119.46	65.88

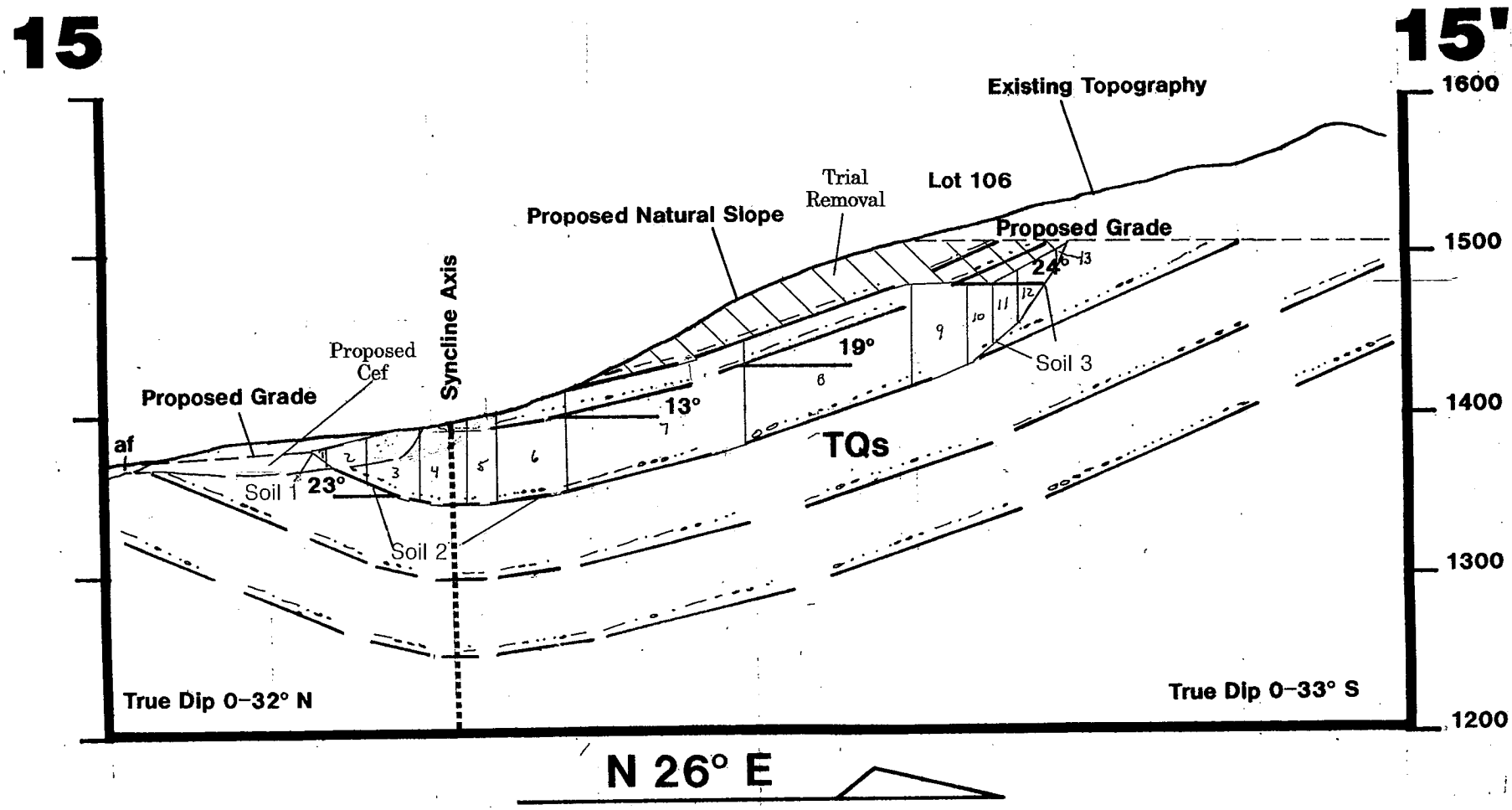
~~STATIC SAFETY FACTOR = 2.93~~

Run #51

SEISMIC SAFETY FACTOR = 1.83

Run #51

CROSS SECTION
OMS STABILITY ANALYSIS



	Static		Pseudostatic	
	C	Ø	C	Ø
Soil 1 (Cef)	130	40.3	190	39.8
Soil 2 (Bedding Plane)	200	17.4	290	30
Soil 3 (TQs)	320	24.6	440	24.3

ALLAN E. SEWARD
ENGINEERING GEOLOGY

JOB NUMBER: 98-1617-4		DATE: 1/15/99	
SCALE: 1"=100'		DRAWN BY: Staff	
		REVISED:	

Run # 52 & 53

LOS ANGELES COUNTY
DEPARTMENT OF PUBLIC WORKS
LAND DEVELOPMENT DIVISION
GEOTECHNICAL ENGINEERING
ORDINARY METHOD OF SLICES USED FOR ANALYSIS

PROJECT: TT 52584 - Hasley Canyon (Palmer Investments)
CONSULTANT: AES
REPORT DATE: 1/29/98
SECTION: 15-15' - Slope trimmed & w/upper 50' bench CIRCLE: Lower Plane - Static DATE: 1/22/98 BY: NAO

SLICE	HEIGHT(1)	HEIGHT(2)	WIDTH	AREA	WEIGHT	UNIT WT
1.	0.00	12.00	9.00	54.00	6.64	123.0
2.	12.00	33.00	23.00	517.50	63.13	122.0
3.	33.00	46.00	33.00	1303.50	159.03	122.0
4.	46.00	52.00	29.00	1421.00	173.36	122.0
5.	52.00	55.00	20.00	1070.00	130.54	122.0
6.	55.00	63.00	42.00	2478.00	302.32	122.0
7.	63.00	68.00	111.00	7270.50	887.00	122.0
8.	68.00	60.00	100.00	6400.00	780.80	122.0
9.	60.00	46.00	35.00	1855.00	226.31	122.0
10.	46.00	32.00	13.00	507.00	60.33	119.0
11.	32.00	29.00	15.00	457.50	54.44	119.0
12.	29.00	8.00	21.00	388.50	46.23	119.0
13.	8.00	0.00	8.00	32.00	3.81	119.0

SLOPE STABILITY DATA

SEISMIC COEFFICIENT = 0.00 g

SLICE NO.	1 SLICE WEIGHT W (kips)	2 FAILURE PLANE ANGLE i(deg)	3 ANGLE OF INT. FRICTION phi(deg)	4 COHE-SION C (ksf)	5 LENGTH OF ARC L (ft)	6 W (1-Ru) COS i / COS i TAN phi	7 C L COS i	8 g W (1-Ru) SINi COSi / TAN phi	9 W SIN i / COS i	10 g W COS i / COS i
1.	6.64	-47.00	40.30	0.130	13.20	2.62	1.17	0.00	-3.31	0.00
2.	63.13	-23.00	17.40	0.200	24.99	16.76	4.60	0.00	-22.71	0.00
3.	159.03	-14.00	17.40	0.200	34.01	46.92	6.60	0.00	-37.33	0.00
4.	173.36	-3.00	17.40	0.200	29.04	54.18	5.80	0.00	-9.06	0.00
5.	130.54	3.00	17.40	0.200	20.03	40.80	4.00	0.00	6.82	0.00
6.	302.32	9.00	17.40	0.200	42.52	92.42	8.40	0.00	46.71	0.00

Run #52

7.	887.00	15.00	17.40	0.200	114.92	259.35	22.20	0.00	221.75	0.00
8.	780.80	19.00	17.40	0.200	105.76	218.75	20.00	0.00	240.35	0.00
9.	226.31	19.00	17.40	0.200	37.02	63.40	7.00	0.00	69.67	0.00
10.	60.33	44.00	24.60	0.320	18.07	14.29	4.16	0.00	30.15	0.00
11.	54.44	44.00	24.60	0.320	20.85	12.90	4.80	0.00	27.20	0.00
12.	46.23	55.00	24.60	0.320	36.61	6.96	6.72	0.00	21.72	0.00
13.	3.81	63.00	24.60	0.320	17.62	0.36	2.56	0.00	1.54	0.00
						---	---	---	---	---
SUMMATION:						829.72	98.01	0.00	593.51	0.00

STATIC SAFETY FACTOR = 1.56

~~SEISMIC SAFETY FACTOR = 1.56~~

Run #52

LOS ANGELES COUNTY
DEPARTMENT OF PUBLIC WORKS
LAND DEVELOPMENT DIVISION
GEOTECHNICAL ENGINEERING
ORDINARY METHOD OF SLICES USED FOR ANALYSIS

PROJECT: TT 52584 - Hasley Canyon (Palmer Investments)
CONSULTANT: AES
REPORT DATE: 1/29/98
SECTION: 15-15' - Slope trimmed & w/upper 50' bench CIRCLE: Lower Plane - Pseudostatic DATE: 1/22/98 BY: NAO

SLICE	HEIGHT(1)	HEIGHT(2)	WIDTH	AREA	WEIGHT	UNIT WT
1.	0.00	12.00	9.00	54.00	6.64	123.0
2.	12.00	33.00	23.00	517.50	63.13	122.0
3.	33.00	46.00	33.00	1303.50	159.03	122.0
4.	46.00	52.00	29.00	1421.00	173.36	122.0
5.	52.00	55.00	20.00	1070.00	130.54	122.0
6.	55.00	63.00	42.00	2478.00	302.32	122.0
7.	63.00	68.00	111.00	7270.50	887.00	122.0
8.	68.00	60.00	100.00	6400.00	780.80	122.0
9.	60.00	46.00	35.00	1855.00	226.31	122.0
10.	46.00	32.00	13.00	507.00	60.33	119.0
11.	32.00	29.00	15.00	457.50	54.44	119.0
12.	29.00	8.00	21.00	388.50	46.23	119.0
13.	8.00	0.00	8.00	32.00	3.81	119.0

SLOPE STABILITY DATA

SEISMIC COEFFICIENT = 0.15 g

SLICE NO.	1 SLICE WEIGHT W (kips)	2 FAILURE PLANE ANGLE i(deg)	3 ANGLE OF INT. FRICTION phi(deg)	4 COHE-SION C (ksf)	5 LENGTH OF ARC L (ft)	6 W (1-Ru) COS i / COS i TAN phi	7 C L / COS i	8 g W (1-Ru) SINi COSi / TAN phi	9 W SIN i / COS i	10 g W COS i / COS i
1.	6.64	-47.00	39.80	0.190	13.20	2.57	1.71	-0.41	-3.31	0.46
2.	63.13	-23.00	30.00	0.290	24.99	30.89	6.67	-1.97	-22.71	8.02
3.	159.03	-14.00	30.00	0.290	34.01	86.44	9.57	-3.23	-37.33	22.46
4.	173.36	-3.00	30.00	0.290	29.04	99.82	8.41	-0.78	-9.06	25.93
5.	130.54	3.00	30.00	0.290	20.03	75.16	5.80	0.59	6.82	19.53
6.	302.32	9.00	30.00	0.290	42.52	170.27	12.18	4.05	46.71	44.24

Run #53

7.	887.00	15.00	30.00	0.290	114.92	477.81	32.19	19.20	221.75	124.14
8.	780.80	19.00	30.00	0.290	105.76	403.01	29.00	20.82	240.35	104.71
9.	226.31	19.00	30.00	0.290	37.02	116.81	10.15	6.03	69.67	30.35
10.	60.33	44.00	24.30	0.440	18.07	14.10	5.72	2.04	30.15	4.68
11.	54.44	44.00	24.30	0.440	20.85	12.72	6.60	1.84	27.20	4.23
12.	46.23	55.00	24.30	0.440	36.61	6.87	9.24	1.47	21.72	2.28
13.	3.81	63.00	24.30	0.440	17.62	0.35	3.52	0.10	1.54	0.12
						---	---	---	---	---
SUMMATION:						1496.82	140.76	49.75	593.51	391.14

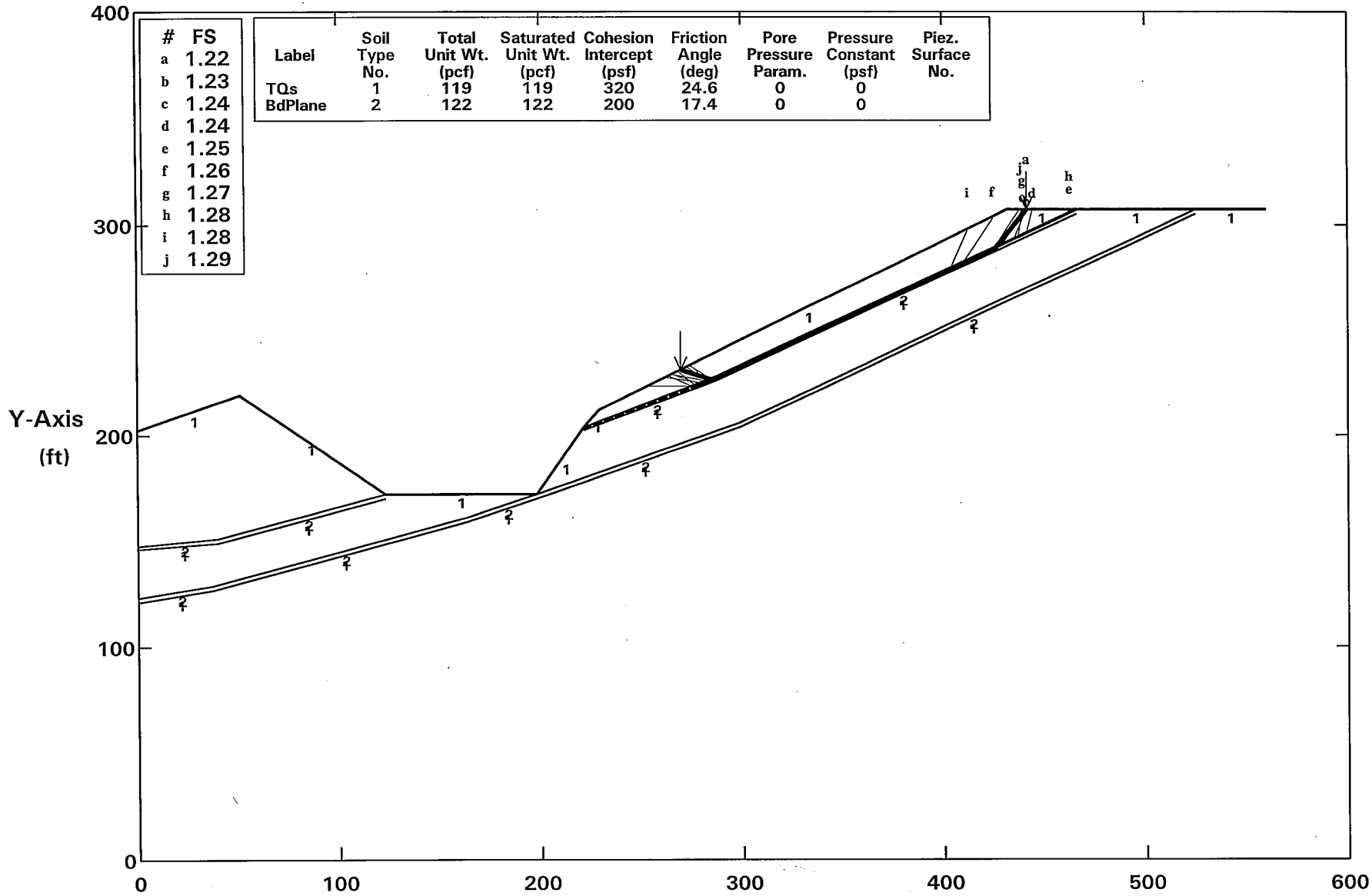
~~STATIC SAFETY FACTOR = 2.75~~

SEISMIC SAFETY FACTOR = 1.61

Run #53

TT52584-Hasley Cyn-Sec.15-15'-Temporary Stability for buttress-Lower plane

Ten Most Critical. C:HAS15E.PLT By: mas 1/28/99 10:13am



#	FS
a	1.22
b	1.23
c	1.24
d	1.24
e	1.25
f	1.26
g	1.27
h	1.28
i	1.28
j	1.29

Label	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
TQs	1	119	119	320	24.6	0	0	
BdPlane	2	122	122	200	17.4	0	0	

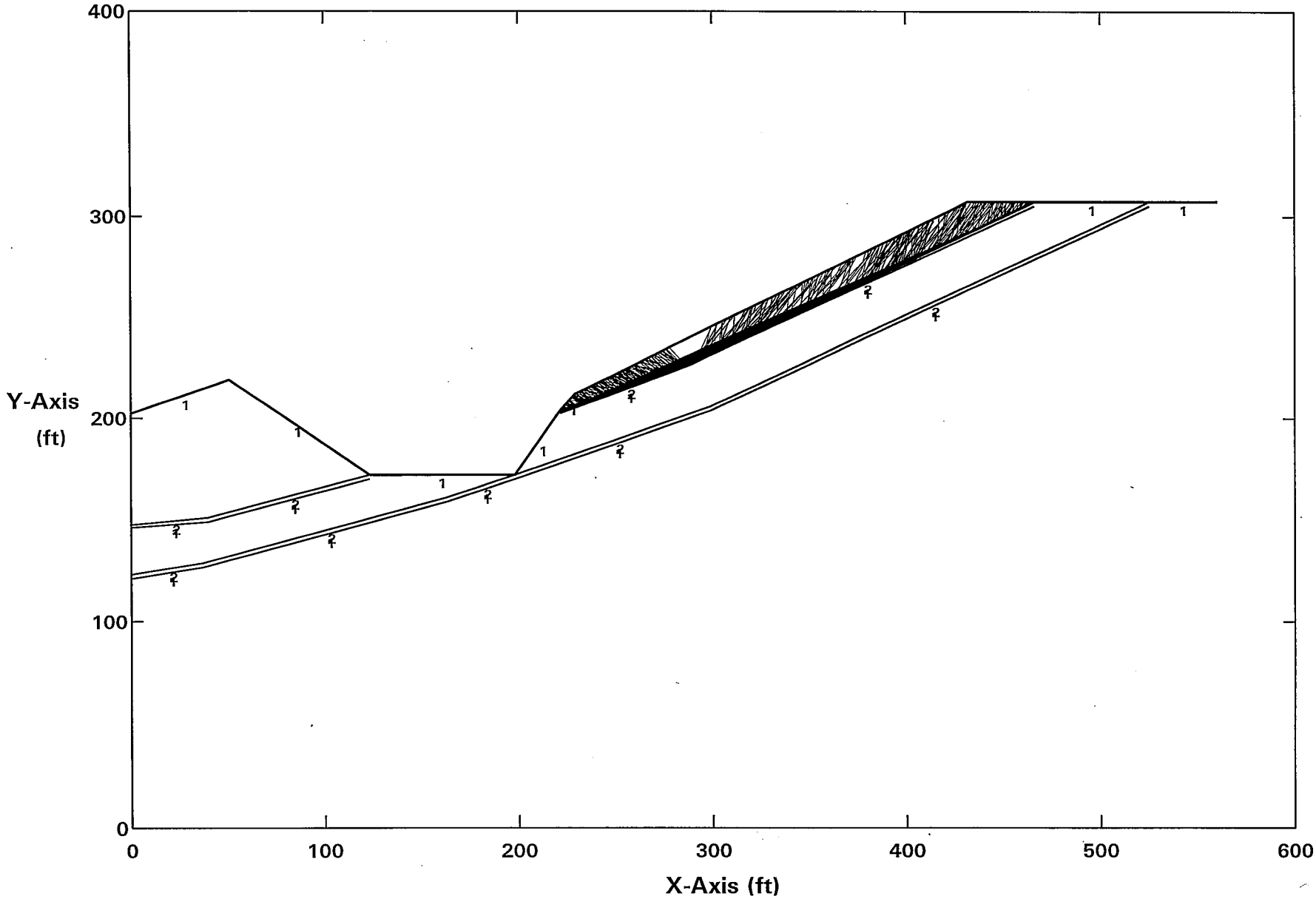
PCSTABL5M FSmin = 1.22 X-Axis (ft)

Factors Of Safety Calculated By The Modified Janbu Method

Run #54

TT52584-Hasley Cyn-Sec.15-15'-Temporary Stability for buttress-Lower plane

All surfaces evaluated. C:HAS15E.PLT By: mas 1/28/99 10:13am

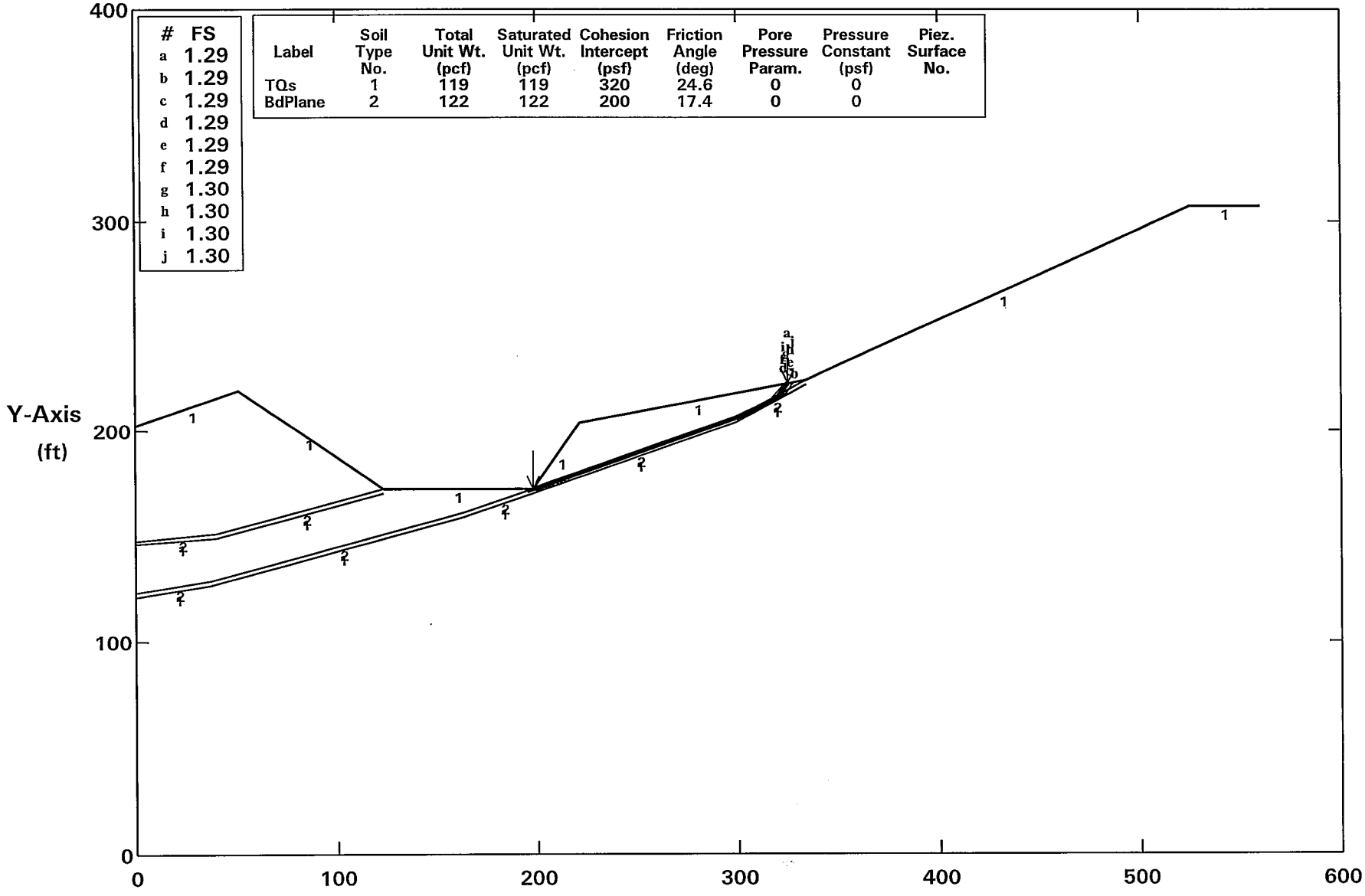


Factors Of Safety Calculated By The Modified Janbu Method

Run # 54

TT52584-Sec.15-15'-Backcut Temp. Stab. Bedding plane @ key's inner corner

Ten Most Critical. C:HAS15F.PLT By: mas 1/28/99 7:57pm



#	FS
a	1.29
b	1.29
c	1.29
d	1.29
e	1.29
f	1.29
g	1.30
h	1.30
i	1.30
j	1.30

Label	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
TQs	1	119	119	320	24.6	0	0	
BdPlane	2	122	122	200	17.4	0	0	

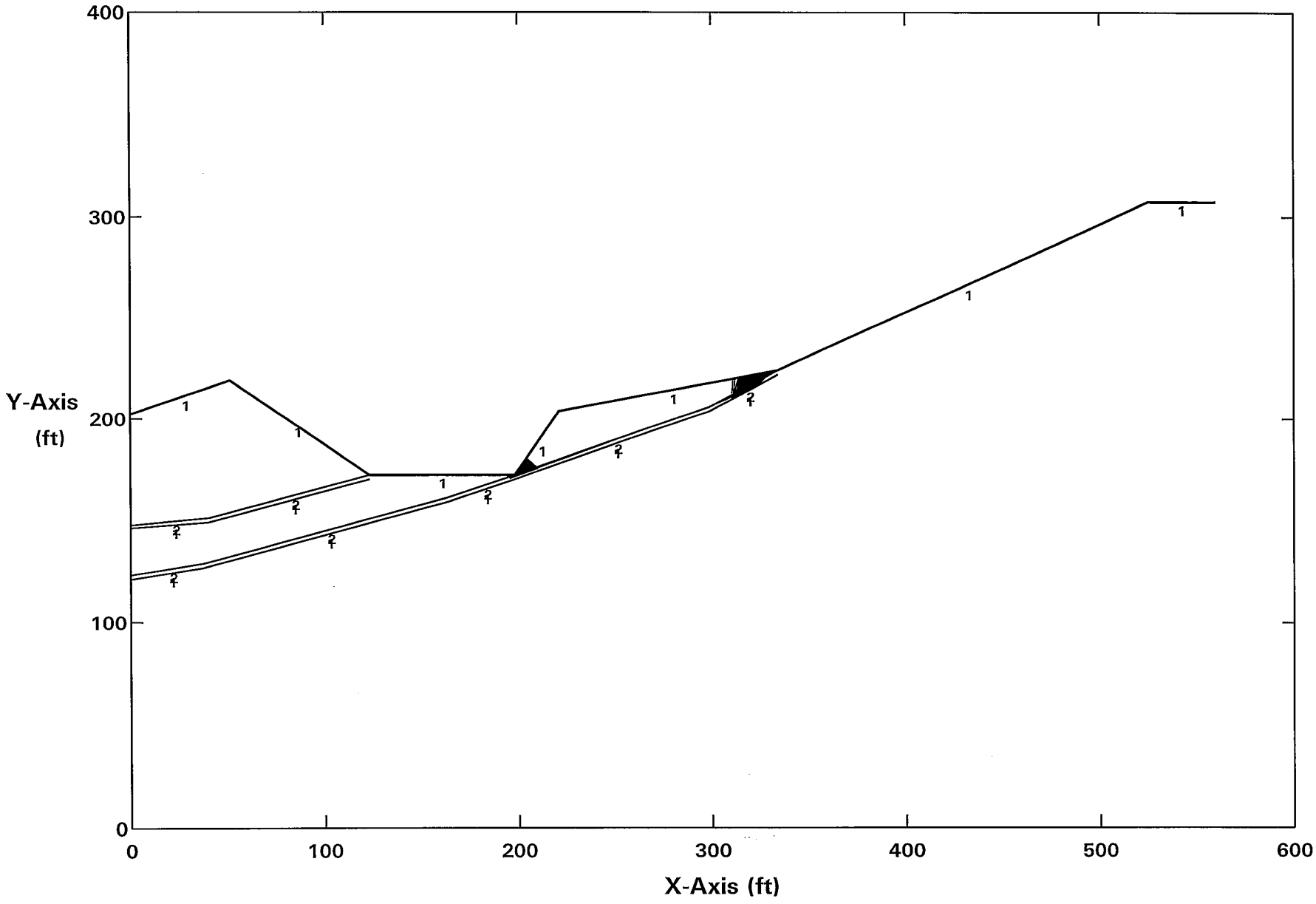
PCSTABL5M FSmin = 1.29 X-Axis (ft)

Factors Of Safety Calculated By The Modified Janbu Method

Run # 55

TT52584-Sec.15-15'-Backcut Temp. Stab. Bedding plane @ key's inner corner

All surfaces evaluated. C:HAS15F.PLT By: mas 1/28/99 7:57pm



Factors Of Safety Calculated By The Modified Janbu Method

Run #55

Run #65

** PCSTABL5M **

by
Purdue University

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer's Method of Slices

Run Date:	1/28/99
Time of Run:	7:57pm
Run By:	mas
Input Data Filename:	C:HAS15F.IN
Output Filename:	C:HAS15F.OUT
Plotted Output Filename:	C:HAS15F.PLT

PROBLEM DESCRIPTION TT52584-Sec.15-15'-Backcut Temp. Stab.
Bedding plane @ key's inner corner

BOUNDARY COORDINATES

7 Top Boundaries
21 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	.00	202.00	51.00	219.00	1
2	51.00	219.00	123.00	172.00	1
3	123.00	172.00	198.00	172.00	1
4	198.00	172.00	221.00	204.00	1
5	221.00	204.00	334.00	224.00	1
6	334.00	224.00	525.00	307.00	1
7	525.00	307.00	560.00	307.00	1
8	198.00	172.00	299.00	206.00	2
9	299.00	206.00	334.00	224.00	2
10	.00	148.00	40.00	151.00	2
11	40.00	151.00	123.00	172.00	2
12	.00	146.00	40.00	149.00	1
13	40.00	149.00	123.00	170.00	1
14	.00	123.00	37.00	129.00	2
15	37.00	129.00	163.00	161.00	2
16	163.00	161.00	198.00	172.00	2
17	.00	121.00	37.00	127.00	1
18	37.00	127.00	163.00	159.00	1
19	163.00	159.00	198.00	170.00	1
20	198.00	170.00	299.00	204.00	1
21	299.00	204.00	334.00	222.00	1

Run #55

ISOTROPIC SOIL PARAMETERS

2 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	119.0	119.0	320.0	24.6	.00	.0	0
2	122.0	122.0	200.0	17.4	.00	.0	0

Janbus Empirical Coef is being used for the case of c & phi both > 0

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Sliding Block Surfaces, Has Been Specified.

200 Trial Surfaces Have Been Generated.

3 Boxes Specified For Generation Of Central Block Base

Length Of Line Segments For Active And Passive Portions Of Sliding Block Is 26.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	195.00	171.00	210.00	175.70	.10
2	299.00	206.00	299.00	206.00	.00
3	310.00	210.90	325.00	217.60	.10

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Modified Janbu Method * *

Failure Surface Specified By 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	198.18	172.25

Run #55

2	198.83	172.15
3	299.00	206.00
4	319.26	214.99
5	324.91	222.39

*** 1.292 ***

Individual data on the 8 slices

Slice No.	Width Ft (m)	Weight Lbs (kg)	Water Force Top Lbs (kg)	Water Force Bot Lbs (kg)	Tie Force Norm Lbs (kg)	Tie Force Tan Lbs (kg)	Earthquake Force Hor Lbs (kg)	Earthquake Force Ver Lbs (kg)	Surcharge Load Lbs (kg)
1	.4	13.9	.0	.0	.0	.0	.0	.0	.0
2	.3	24.4	.0	.0	.0	.0	.0	.0	.0
3	22.2	33458.4	.0	.0	.0	.0	.0	.0	.0
4	78.0	167834.3	.0	.0	.0	.0	.0	.0	.0
5	.0	2.4	.0	.0	.0	.0	.0	.0	.0
6	20.3	21986.3	.0	.0	.0	.0	.0	.0	.0
7	1.8	1151.4	.0	.0	.0	.0	.0	.0	.0
8	3.9	1001.7	.0	.0	.0	.0	.0	.0	.0

Failure Surface Specified By 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	198.05	172.06
2	198.15	171.99
3	299.00	206.00
4	322.81	216.59
5	328.29	222.99

*** 1.293 ***

Failure Surface Specified By 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	198.30	172.42
2	198.80	172.18
3	299.00	206.00
4	318.76	214.77
5	325.62	222.52

Run #55

*** 1.294 ***

Failure Surface Specified By 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	198.55	172.76
2	200.32	172.62
3	299.00	206.00
4	314.66	213.01
5	322.55	221.97

*** 1.294 ***

Failure Surface Specified By 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	197.74	172.00
2	197.89	171.88
3	299.00	206.00
4	318.32	214.59
5	326.23	222.62

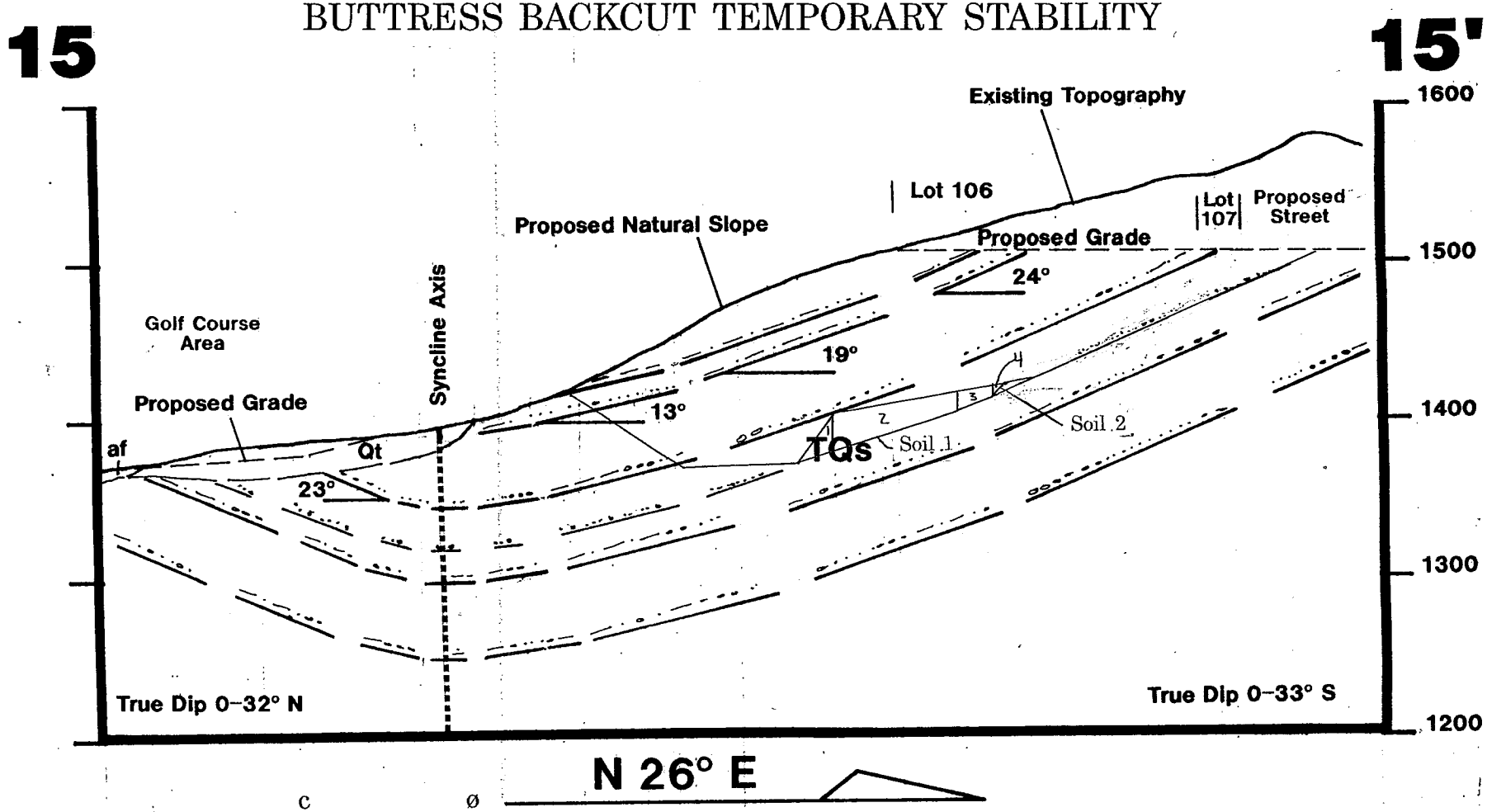
*** 1.294 ***

Failure Surface Specified By 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	198.43	172.59
2	199.44	172.38
3	299.00	206.00
4	314.72	213.05
5	322.91	222.04

*** 1.294 ***

CROSS SECTION
OMS STABILITY ANALYSIS
BUTTRESS BACKCUT TEMPORARY STABILITY



	c	ø
Soil 1 Bedding Plane	200	17.4
Soil 2 TQs	320	24.6

ALLAN E. SEWARD
ENGINEERING GEOLOGY

JOB NUMBER: 98-1617-4		DATE: 1/15/99	
SCALE: 1"=100'		DRAWN BY: Staff	
		REVISED:	

Run # 56

LOS ANGELES COUNTY
DEPARTMENT OF PUBLIC WORKS
LAND DEVELOPMENT DIVISION
GEOTECHNICAL ENGINEERING
ORDINARY METHOD OF SLICES USED FOR ANALYSIS

PROJECT: TT 52584 - Hasley Canyon (Palmer Investments)
CONSULTANT: AES
REPORT DATE:
SECTION: 15-15' - Buttress backcut for large buttress - temporary stability CIRCLE: Bedding Plane at key's inner corner - Static DATE: 1/29/99 BY: NAO

SLICE	HEIGHT(1)	HEIGHT(2)	WIDTH	AREA	WEIGHT	UNIT WT
1.	0.00	22.00	22.00	242.00	29.52	122.0
2.	22.00	11.00	78.00	1287.00	157.01	122.0
3.	11.00	7.00	21.00	189.00	23.06	122.0
4.	7.00	0.00	8.00	28.00	3.33	119.0

SLOPE STABILITY DATA

SEISMIC COEFFICIENT = 0.00 g

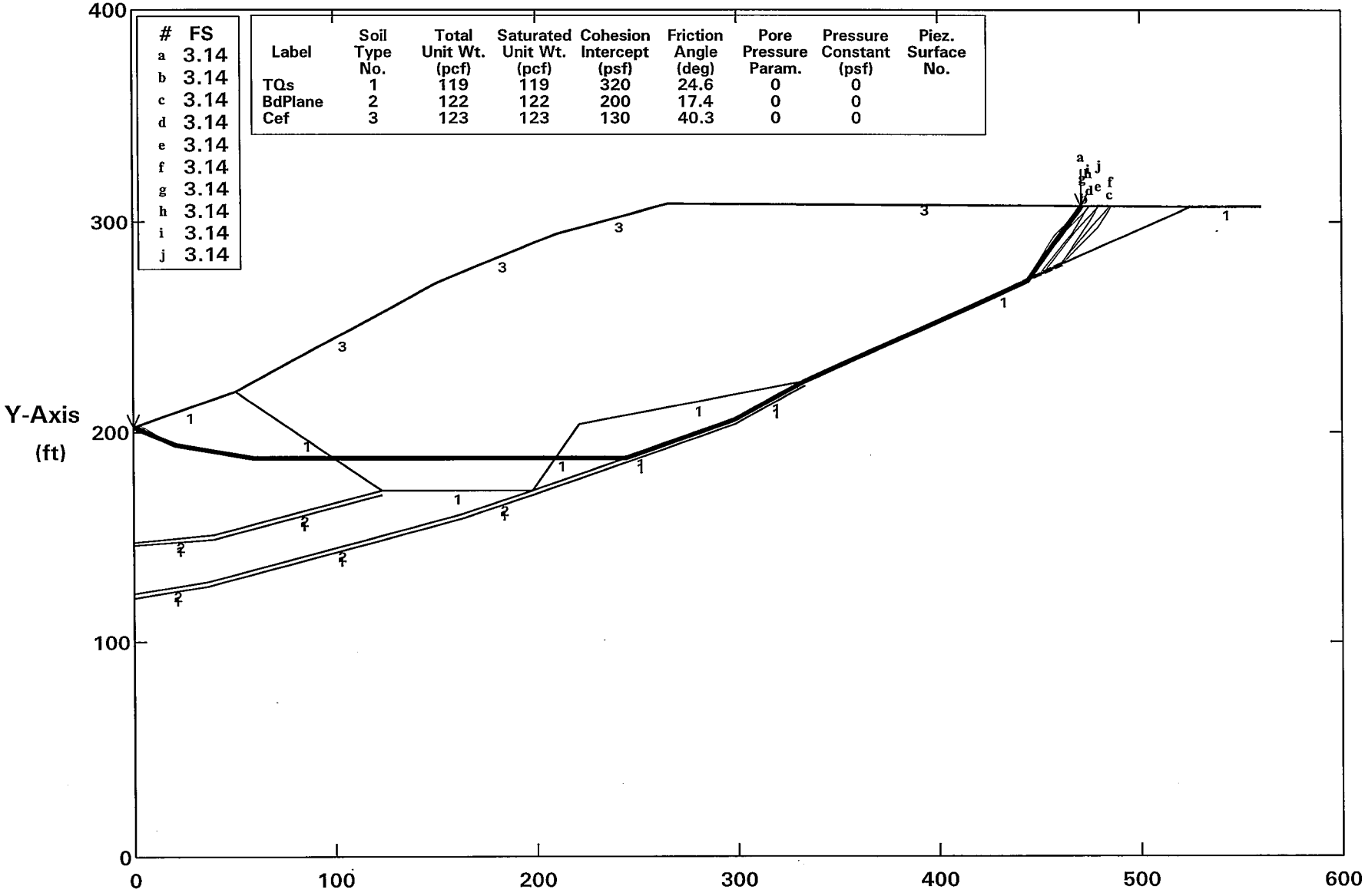
SLICE NO.	1 SLICE WEIGHT W (kips)	2 FAILURE PLANE ANGLE i(deg)	3 ANGLE OF INT. FRICTION phi(deg)	4 COHE-SION C (ksf)	5 LENGTH OF ARC L (ft)	6 W (1-Ru) COS i COS i TAN phi	7 C L COS i	8 g W (1-Ru) SINi COSi TAN phi	9 W SIN i COS i	10 g W COS i COS i
1.	29.52	19.00	17.40	0.200	23.27	8.27	4.40	0.00	9.09	0.00
2.	157.01	19.00	17.40	0.200	82.49	43.99	15.60	0.00	48.33	0.00
3.	23.06	24.00	17.40	0.200	22.99	6.03	4.20	0.00	8.57	0.00
4.	3.33	47.00	24.60	0.320	11.73	0.71	2.56	0.00	1.66	0.00
SUMMATION:						59.00	26.76	0.00	67.65	0.00

STATIC SAFETY FACTOR = 1.27
~~SEISMIC SAFETY FACTOR = 1.27~~

Run #56

TT52584-Sec.15-15'-Stability Through Buttress - Static

Ten Most Critical. C:HAS15G.PLT By: mas 1/29/99 3:01pm



Label	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
TQs	1	119	119	320	24.6	0	0	
BdPlane	2	122	122	200	17.4	0	0	
Cef	3	123	123	130	40.3	0	0	

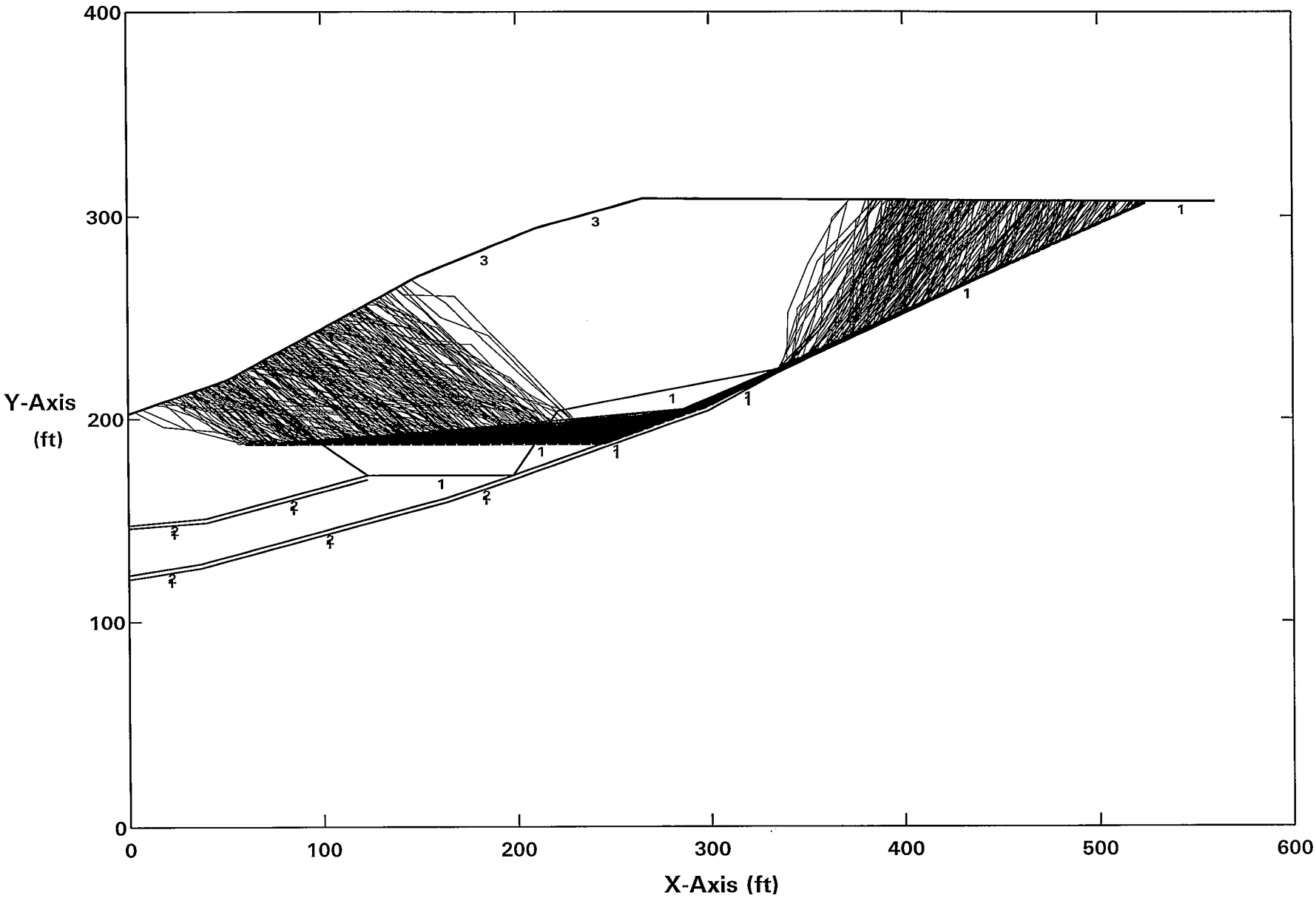
PCSTABL5M FSmin = 3.14 X-Axis (ft)

Factors Of Safety Calculated By The Modified Janbu Method

Run #5-7

TT52584-Sec.15-15'-Stability Through Buttress and Deeper Bedding Plane

All surfaces evaluated. C:HAS15G.PLT By: mas 1/29/99 2:24pm

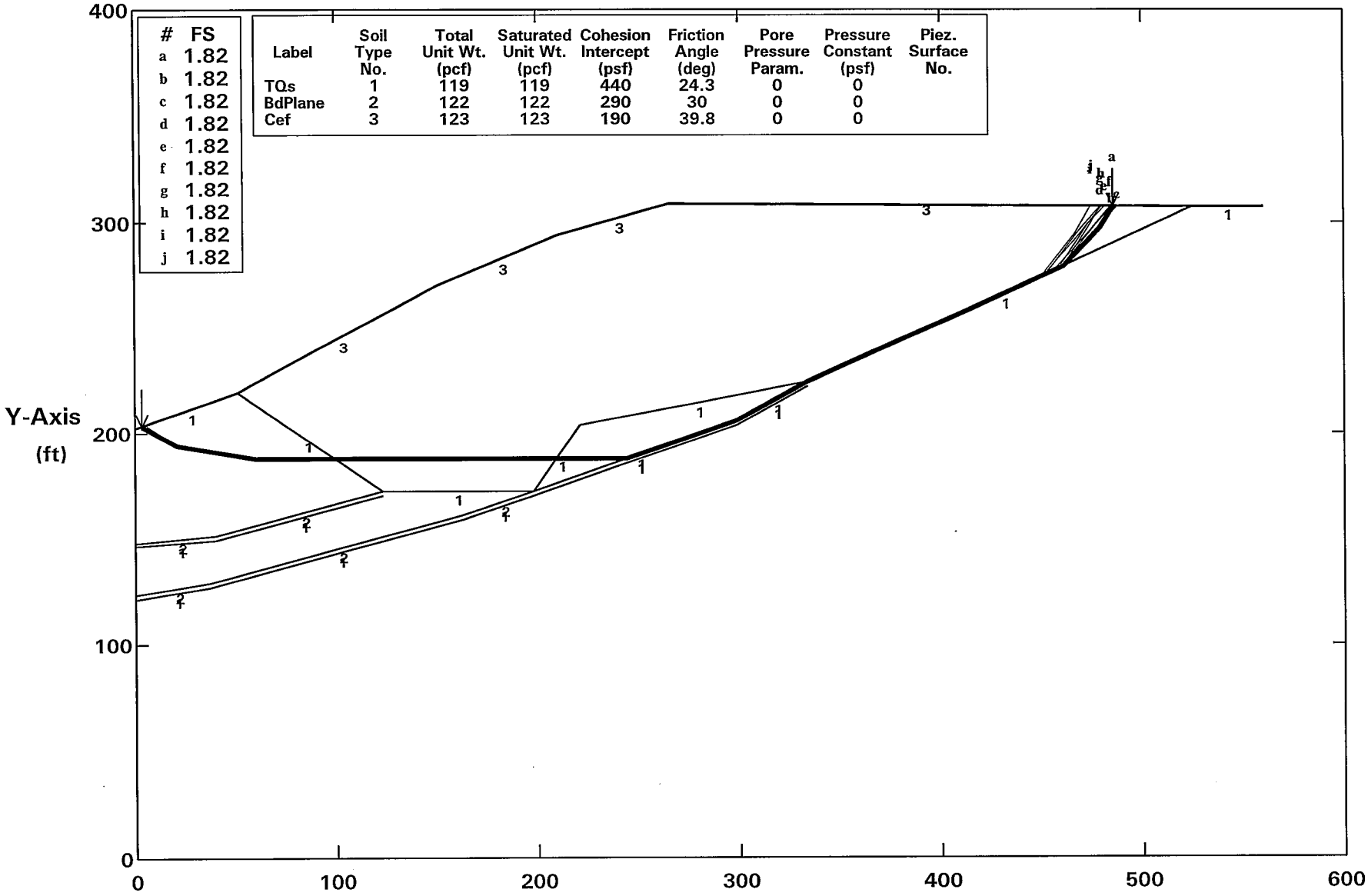


Factors Of Safety Calculated By The Modified Janbu Method

Run #57

TT52584-Sec.15-15'-Stability Through Buttress - Pseudostatic

Ten Most Critical. C:HAS15G'.PLT By: mas 1/29/99 2:55pm



Label	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
TQs	1	119	119	440	24.3	0	0	
BdPlane	2	122	122	290	30	0	0	
Cef	3	123	123	190	39.8	0	0	

PCSTABL5M FSmin = 1.82 X-Axis (ft)

Factors Of Safety Calculated By The Modified Janbu Method

Run #52

Run #57

** PCSTABL5M **

by
Purdue University

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer's Method of Slices

Run Date: 1/29/99
Time of Run: 3:01pm
Run By: mas
Input Data Filename: C:HAS15G.IN
Output Filename: C:HAS15G.OUT
Plotted Output Filename: C:HAS15G.PLT

PROBLEM DESCRIPTION TT52584-Sec.15-15'-Stability Through Buttress - Static

BOUNDARY COORDINATES

6 Top Boundaries
25 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	.00	202.00	51.00	219.00	1
2	51.00	219.00	150.00	270.00	3
3	150.00	270.00	210.00	294.00	3
4	210.00	294.00	265.00	309.00	3
5	265.00	309.00	525.00	307.00	3
6	525.00	307.00	560.00	307.00	1
7	51.00	219.00	123.00	172.00	1
8	123.00	172.00	198.00	172.00	1
9	198.00	172.00	221.00	204.00	1
10	221.00	204.00	334.00	224.00	1
11	334.00	224.00	525.00	307.00	1
12	.00	148.00	40.00	151.00	2
13	40.00	151.00	123.00	172.00	2
14	.00	146.00	40.00	149.00	1
15	40.00	149.00	123.00	170.00	1
16	.00	123.00	37.00	129.00	2
17	37.00	129.00	163.00	161.00	2
18	163.00	161.00	198.00	172.00	2
19	.00	121.00	37.00	127.00	1
20	37.00	127.00	163.00	159.00	1
21	163.00	159.00	198.00	170.00	1
22	198.00	172.00	299.00	206.00	1

Run #57

23	299.00	206.00	334.00	224.00	1
24	198.00	170.00	299.00	204.00	1
25	299.00	204.00	334.00	222.00	1

ISOTROPIC SOIL PARAMETERS

3 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	119.0	119.0	320.0	24.6	.00	.0	0
2	122.0	122.0	200.0	17.4	.00	.0	0
3	123.0	123.0	130.0	40.3	.00	.0	0

Janbus Empirical Coef is being used for the case of c & phi both > 0

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Sliding Block Surfaces, Has Been Specified.

300 Trial Surfaces Have Been Generated.

6 Boxes Specified For Generation Of Central Block Base

Length Of Line Segments For Active And Passive Portions Of Sliding Block Is 26.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	21.00	194.00	21.00	194.00	.00
2	60.00	187.50	60.00	187.50	.00
3	244.00	187.50	244.00	187.50	.00
4	299.00	206.00	299.00	206.00	.00
5	334.00	224.00	334.00	224.00	.00
6	437.00	268.70	462.00	279.60	.10

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Modified Janbu Method * *

Run #57

Failure Surface Specified By 9 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	.29	202.10
2	21.00	194.00
3	60.00	187.50
4	244.00	187.50
5	299.00	206.00
6	334.00	224.00
7	444.19	271.87
8	459.97	292.54
9	471.14	307.41

*** 3.136 ***

Individual data on the 16 slices

Slice No.	Width Ft(m)	Weight Lbs(kg)	Water Force Top Lbs(kg)	Water Force Bot Lbs(kg)	Tie Force Norm Lbs(kg)	Tie Force Tan Lbs(kg)	Earthquake Force Hor Lbs(kg)	Earthquake Force Ver Lbs(kg)	Surcharge Load Lbs(kg)
1	20.7	18480.0	.0	.0	.0	.0	.0	.0	.0
2	30.0	80325.0	.0	.0	.0	.0	.0	.0	.0
3	9.0	35605.2	.0	.0	.0	.0	.0	.0	.0
4	39.3	221290.3	.0	.0	.0	.0	.0	.0	.0
5	50.7	433350.3	.0	.0	.0	.0	.0	.0	.0
6	59.1	686170.8	.0	.0	.0	.0	.0	.0	.0
7	.9	11237.2	.0	.0	.0	.0	.0	.0	.0
8	11.0	145734.7	.0	.0	.0	.0	.0	.0	.0
9	23.0	316943.0	.0	.0	.0	.0	.0	.0	.0
10	21.0	295727.7	.0	.0	.0	.0	.0	.0	.0
11	34.0	452138.6	.0	.0	.0	.0	.0	.0	.0
12	35.0	402138.6	.0	.0	.0	.0	.0	.0	.0
13	110.2	814701.8	.0	.0	.0	.0	.0	.0	.0
14	.0	58.0	.0	.0	.0	.0	.0	.0	.0
15	15.8	49118.7	.0	.0	.0	.0	.0	.0	.0
16	11.2	10279.0	.0	.0	.0	.0	.0	.0	.0

Failure Surface Specified By 9 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	.06	202.02
2	21.00	194.00
3	60.00	187.50
4	244.00	187.50
5	299.00	206.00

Run #57

6	334.00	224.00
7	442.15	270.92
8	459.61	290.18
9	472.83	307.40

*** 3.136 ***

Failure Surface Specified By 9 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	3.57	203.19
2	21.00	194.00
3	60.00	187.50
4	244.00	187.50
5	299.00	206.00
6	334.00	224.00
7	459.94	278.69
8	476.99	298.32
9	485.12	307.31

*** 3.137 ***

Failure Surface Specified By 9 Coordinate Points

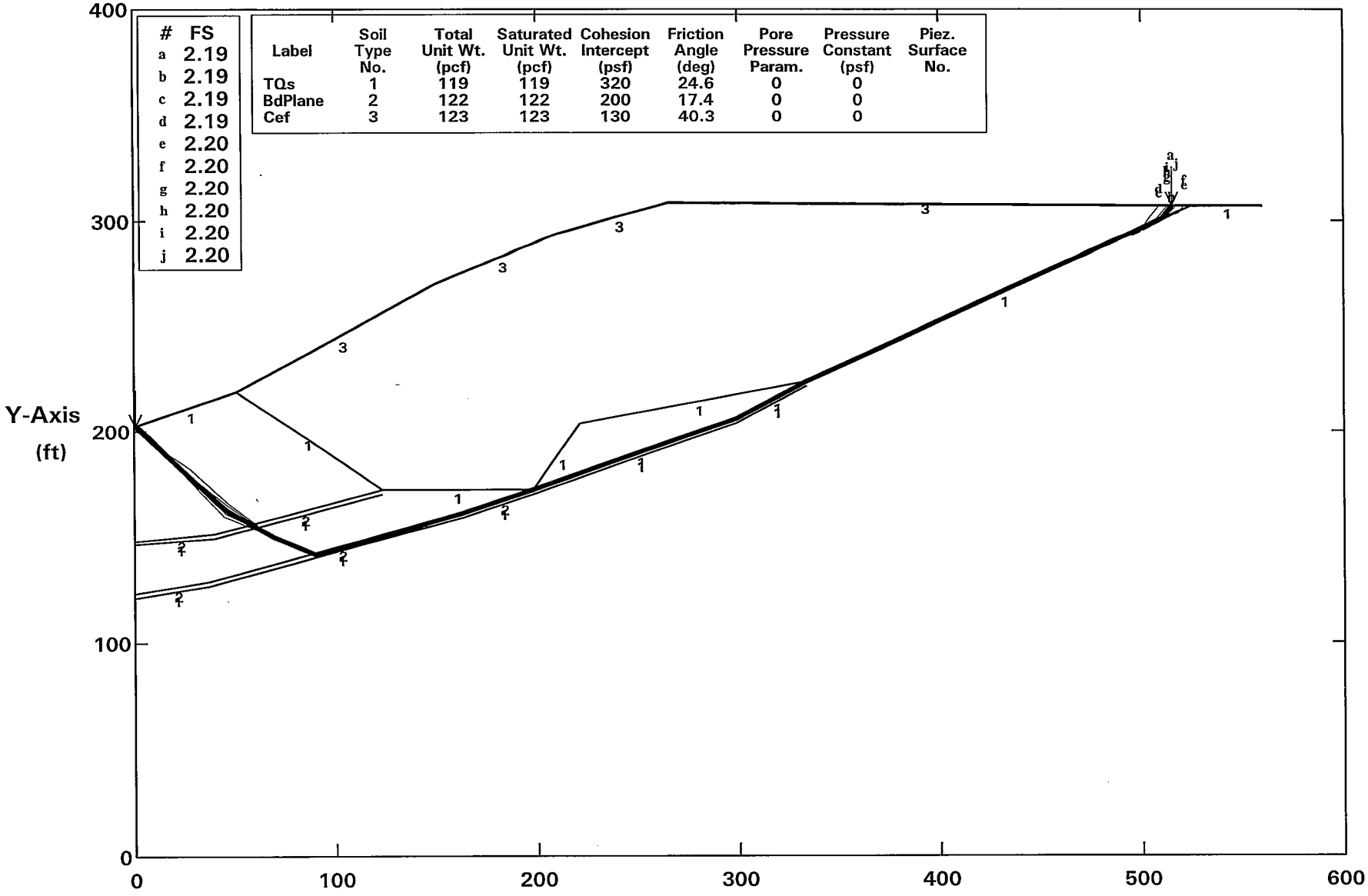
Point No.	X-Surf (ft)	Y-Surf (ft)
1	1.99	202.66
2	21.00	194.00
3	60.00	187.50
4	244.00	187.50
5	299.00	206.00
6	334.00	224.00
7	445.88	272.54
8	461.53	293.30
9	475.51	307.38

*** 3.137 ***

Failure Surface Specified By 9 Coordinate Points

TT52584-Sec.15-15'-Stability Below Buttress - Static

Ten Most Critical. C:HAS15H.PLT By: mas 1/29/99 4:13pm



Label	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
TQs	1	119	119	320	24.6	0	0	
BdPlane	2	122	122	200	17.4	0	0	
Cef	3	123	123	130	40.3	0	0	

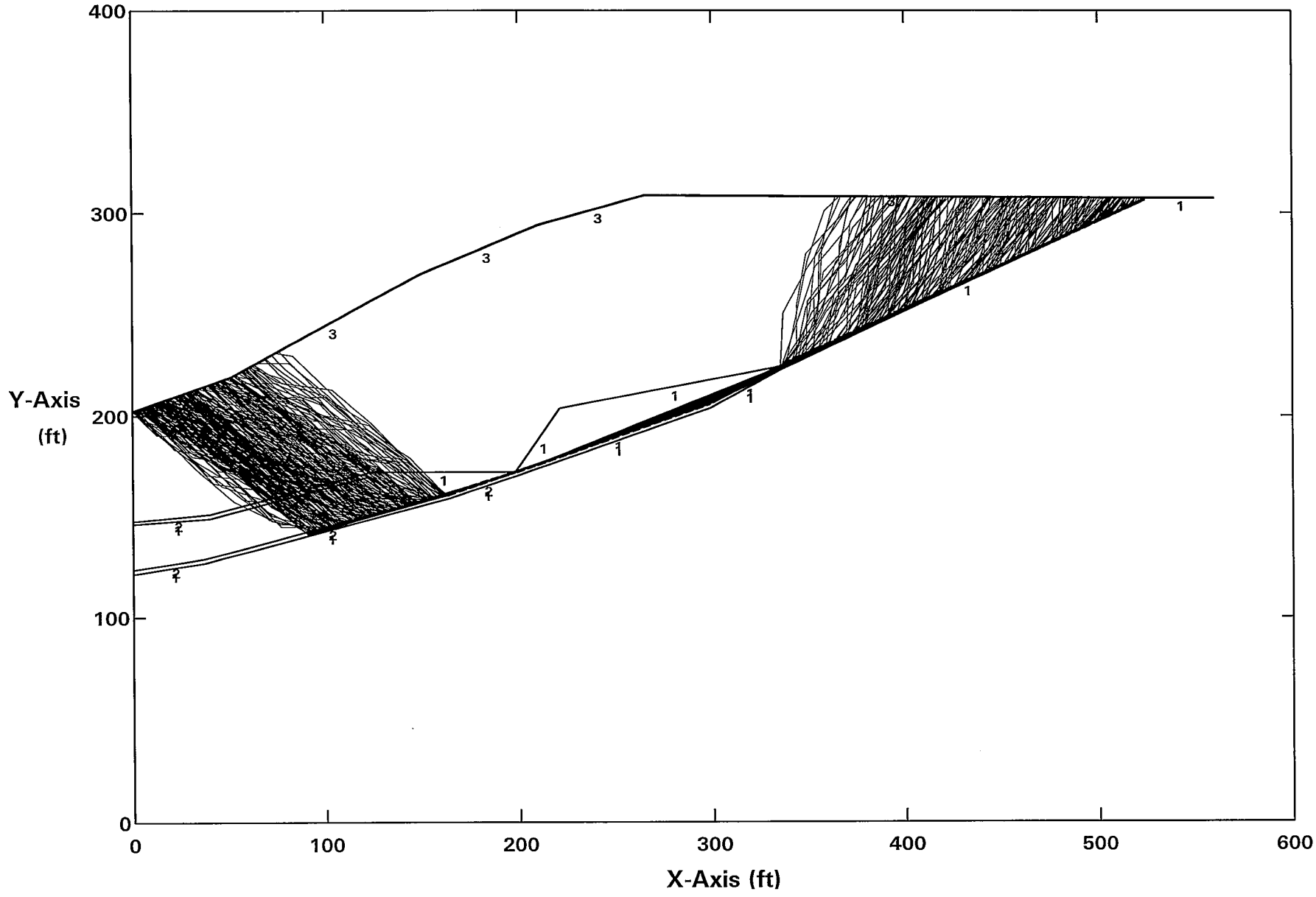
PCSTABL5M FSmin = 2.19 X-Axis (ft)

Factors Of Safety Calculated By The Modified Janbu Method

Run #59

TT52584-Sec.15-15'-Stability Below Buttress - Static

All surfaces evaluated. C:HAS15H1.PLT By: mas 1/29/99 3:54pm

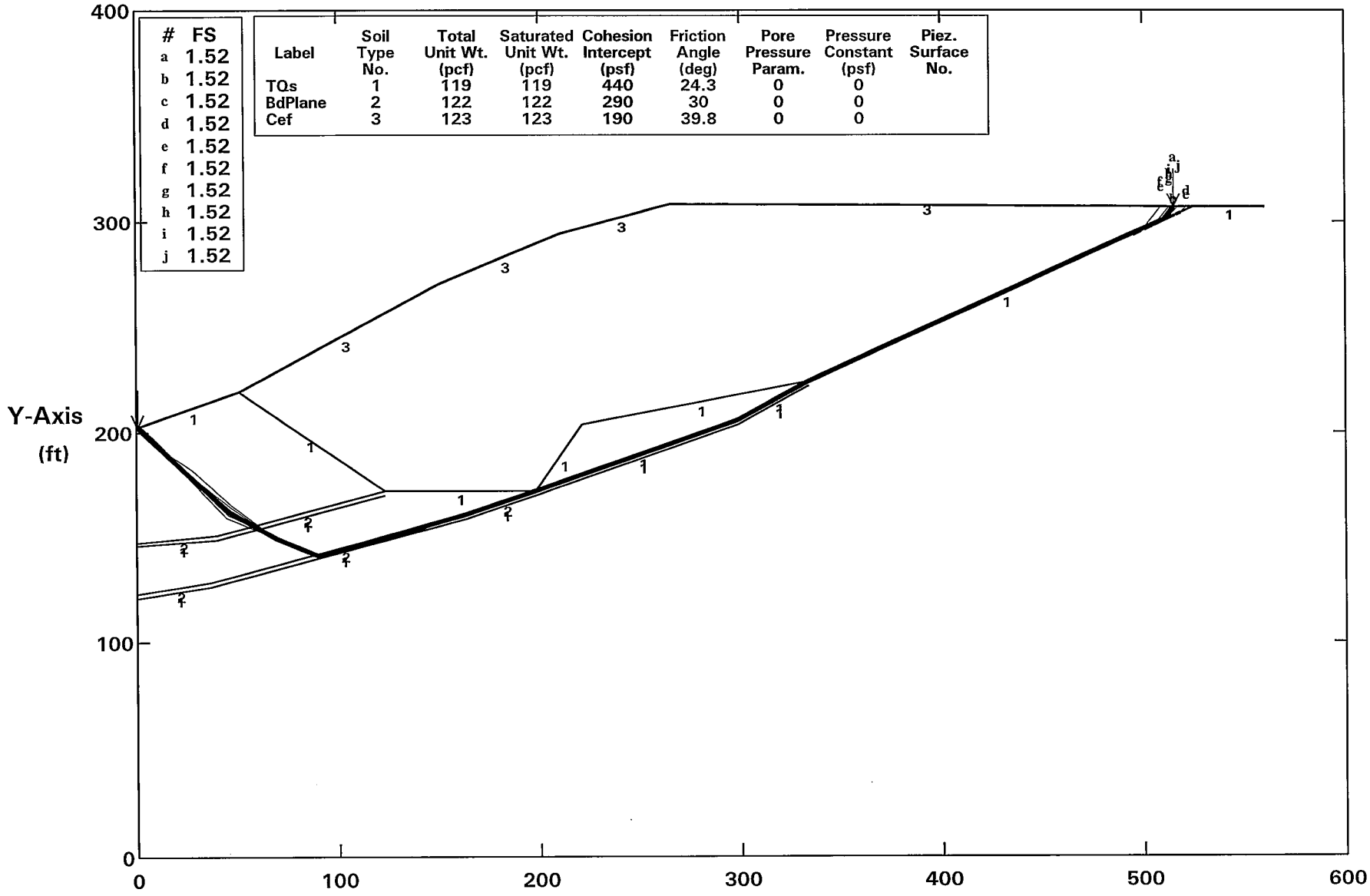


Factors Of Safety Calculated By The Modified Janbu Method

Run #59

TT52584-Sec.15-15'-Stability Below Buttress - Pseudostatic

Ten Most Critical. C:HAS15H'.PLT By: mas 1/29/99 4:18pm



#	FS
a	1.52
b	1.52
c	1.52
d	1.52
e	1.52
f	1.52
g	1.52
h	1.52
i	1.52
j	1.52

Label	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
TQs	1	119	119	440	24.3	0	0	
BdPlane	2	122	122	290	30	0	0	
Cef	3	123	123	190	39.8	0	0	

PCSTABL5M FSmin = 1.52 X-Axis (ft)

Factors Of Safety Calculated By The Modified Janbu Method

Run #60

Run # 59

** PCSTABL5M **

by
Purdue University

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer's Method of Slices

Run Date: 1/29/99
Time of Run: 4:13pm
Run By: mas
Input Data Filename: C:HAS15H.IN
Output Filename: C:HAS15H.OUT
Plotted Output Filename: C:HAS15H.PLT

PROBLEM DESCRIPTION TT52584-Sec.15-15'-Stability Below Buttress - Static

BOUNDARY COORDINATES

6 Top Boundaries
25 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	.00	202.00	51.00	219.00	1
2	51.00	219.00	150.00	270.00	3
3	150.00	270.00	210.00	294.00	3
4	210.00	294.00	265.00	309.00	3
5	265.00	309.00	525.00	307.00	3
6	525.00	307.00	560.00	307.00	1
7	51.00	219.00	123.00	172.00	1
8	123.00	172.00	198.00	172.00	1
9	198.00	172.00	221.00	204.00	1
10	221.00	204.00	334.00	224.00	1
11	334.00	224.00	525.00	307.00	1
12	.00	148.00	40.00	151.00	2
13	40.00	151.00	123.00	172.00	2
14	.00	146.00	40.00	149.00	1
15	40.00	149.00	123.00	170.00	1
16	.00	123.00	37.00	129.00	2
17	37.00	129.00	163.00	161.00	2
18	163.00	161.00	198.00	172.00	2
19	.00	121.00	37.00	127.00	1
20	37.00	127.00	163.00	159.00	1
21	163.00	159.00	198.00	170.00	1
22	198.00	172.00	299.00	206.00	1

Run #59

23	299.00	206.00	334.00	224.00	1
24	198.00	170.00	299.00	204.00	1
25	299.00	204.00	334.00	222.00	1

ISOTROPIC SOIL PARAMETERS

3 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	119.0	119.0	320.0	24.6	.00	.0	0
2	122.0	122.0	200.0	17.4	.00	.0	0
3	123.0	123.0	130.0	40.3	.00	.0	0

Janbus Empirical Coef is being used for the case of c & phi both > 0

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Sliding Block Surfaces, Has Been Specified.

300 Trial Surfaces Have Been Generated.

7 Boxes Specified For Generation Of Central Block Base

Length Of Line Segments For Active And Passive Portions Of Sliding Block Is 26.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	69.00	150.00	69.00	150.00	.00
2	90.00	141.30	90.00	141.30	.00
3	163.00	161.00	163.00	161.00	.00
4	198.00	172.00	198.00	172.00	.00
5	299.00	206.00	299.00	206.00	.00
6	334.00	224.00	334.00	224.00	.00
7	496.00	294.40	519.00	304.40	.10

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Modified Janbu Method * *

Run #59

Failure Surface Specified By 12 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	.96	202.32
2	7.09	196.62
3	26.37	179.18
4	46.00	162.13
5	69.00	150.00
6	90.00	141.30
7	163.00	161.00
8	198.00	172.00
9	299.00	206.00
10	334.00	224.00
11	510.61	300.75
12	515.43	307.07

*** 2.189 ***

Individual data on the 20 slices

Slice No.	Width Ft (m)	Weight Lbs (kg)	Water Force Top Lbs (kg)	Water Force Bot Lbs (kg)	Tie Force Norm Lbs (kg)	Tie Force Tan Lbs (kg)	Earthquake Force Hor Lbs (kg)	Earthquake Force Ver Lbs (kg)	Surcharge Load Lbs (kg)
1	6.1	2825.9	.0	.0	.0	.0	.0	.0	.0
2	19.3	45149.4	.0	.0	.0	.0	.0	.0	.0
3	19.6	101398.3	.0	.0	.0	.0	.0	.0	.0
4	5.0	34109.5	.0	.0	.0	.0	.0	.0	.0
5	7.3	55259.0	.0	.0	.0	.0	.0	.0	.0
6	2.6	20991.7	.0	.0	.0	.0	.0	.0	.0
7	8.1	72124.2	.0	.0	.0	.0	.0	.0	.0
8	19.3	202554.7	.0	.0	.0	.0	.0	.0	.0
9	1.7	20361.9	.0	.0	.0	.0	.0	.0	.0
10	33.0	408761.6	.0	.0	.0	.0	.0	.0	.0
11	27.0	360716.5	.0	.0	.0	.0	.0	.0	.0
12	13.0	180596.0	.0	.0	.0	.0	.0	.0	.0
13	35.0	497316.9	.0	.0	.0	.0	.0	.0	.0
14	12.0	173244.4	.0	.0	.0	.0	.0	.0	.0
15	11.0	158312.8	.0	.0	.0	.0	.0	.0	.0
16	44.0	623337.1	.0	.0	.0	.0	.0	.0	.0
17	34.0	452157.2	.0	.0	.0	.0	.0	.0	.0
18	35.0	402138.6	.0	.0	.0	.0	.0	.0	.0
19	176.6	986587.9	.0	.0	.0	.0	.0	.0	.0
20	4.8	1885.6	.0	.0	.0	.0	.0	.0	.0

Failure Surface Specified By 12 Coordinate Points

Run #59

Point No.	X-Surf (ft)	Y-Surf (ft)
1	.96	202.32
2	7.09	196.62
3	26.37	179.18
4	46.00	162.13
5	69.00	150.00
6	90.00	141.30
7	163.00	161.00
8	198.00	172.00
9	299.00	206.00
10	334.00	224.00
11	510.61	300.75
12	515.43	307.07

*** 2.189 ***

Failure Surface Specified By 12 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	.77	202.26
2	7.91	196.04
3	26.33	177.69
4	44.73	159.32
5	69.00	150.00
6	90.00	141.30
7	163.00	161.00
8	198.00	172.00
9	299.00	206.00
10	334.00	224.00
11	500.83	296.49
12	508.59	307.13

*** 2.194 ***

Failure Surface Specified By 12 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	.77	202.26
2	7.91	196.04
3	26.33	177.69
4	44.73	159.32

STABILITY ANALYSIS

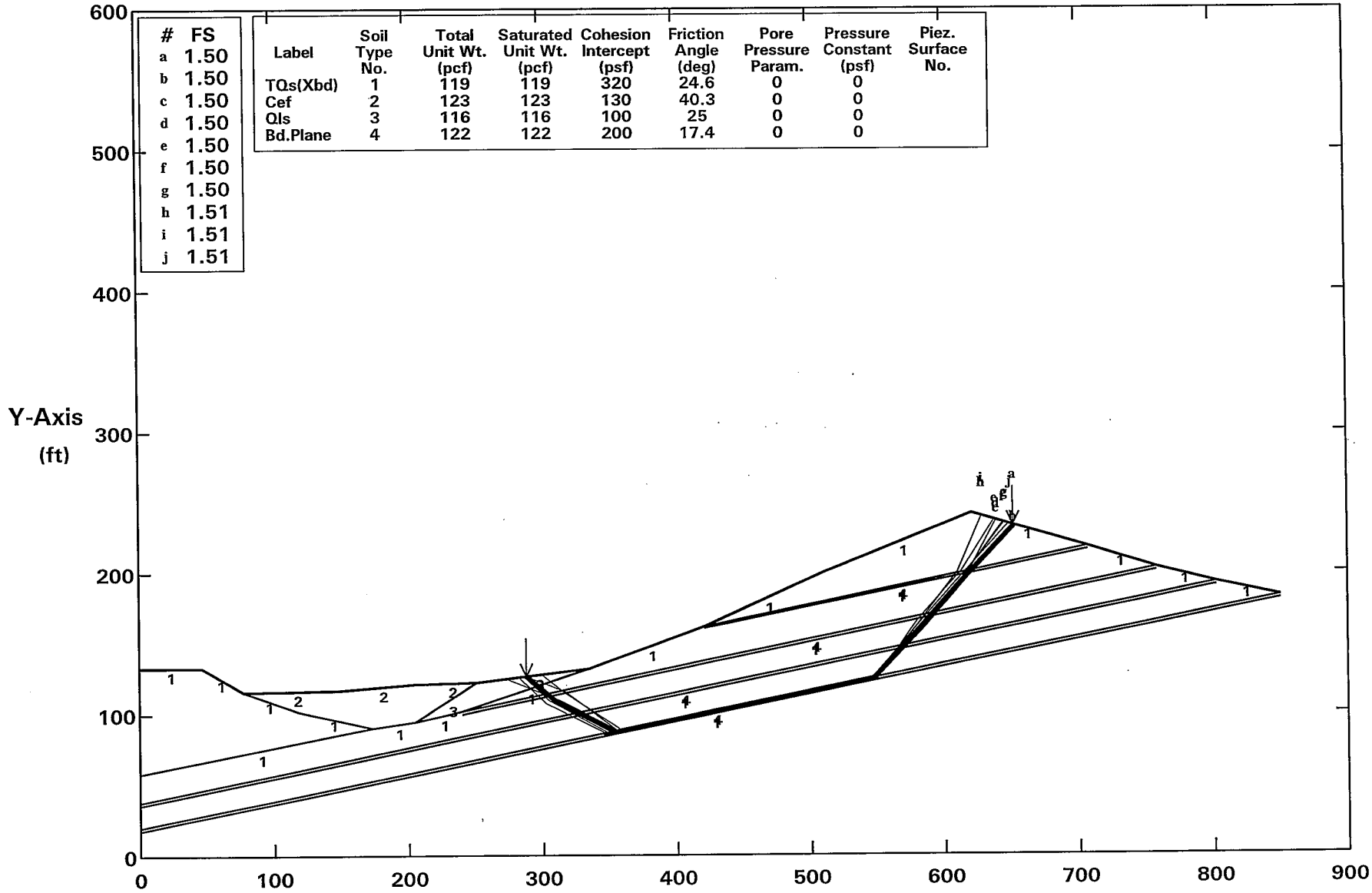
FOR CROSS SECTION 17-17'

TT52584-Hasley Cny-Sect.17-17'w/lndslide removed-Plane 60'below toe-Static

Ten Most Critical. C:HAS17A.PLT By: EC 1/11/99 11:08am

#	FS
a	1.50
b	1.50
c	1.50
d	1.50
e	1.50
f	1.50
g	1.50
h	1.51
i	1.51
j	1.51

Label	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
TQs(Xbd)	1	119	119	320	24.6	0	0	
Cef	2	123	123	130	40.3	0	0	
Qls	3	116	116	100	25	0	0	
Bd.Plane	4	122	122	200	17.4	0	0	



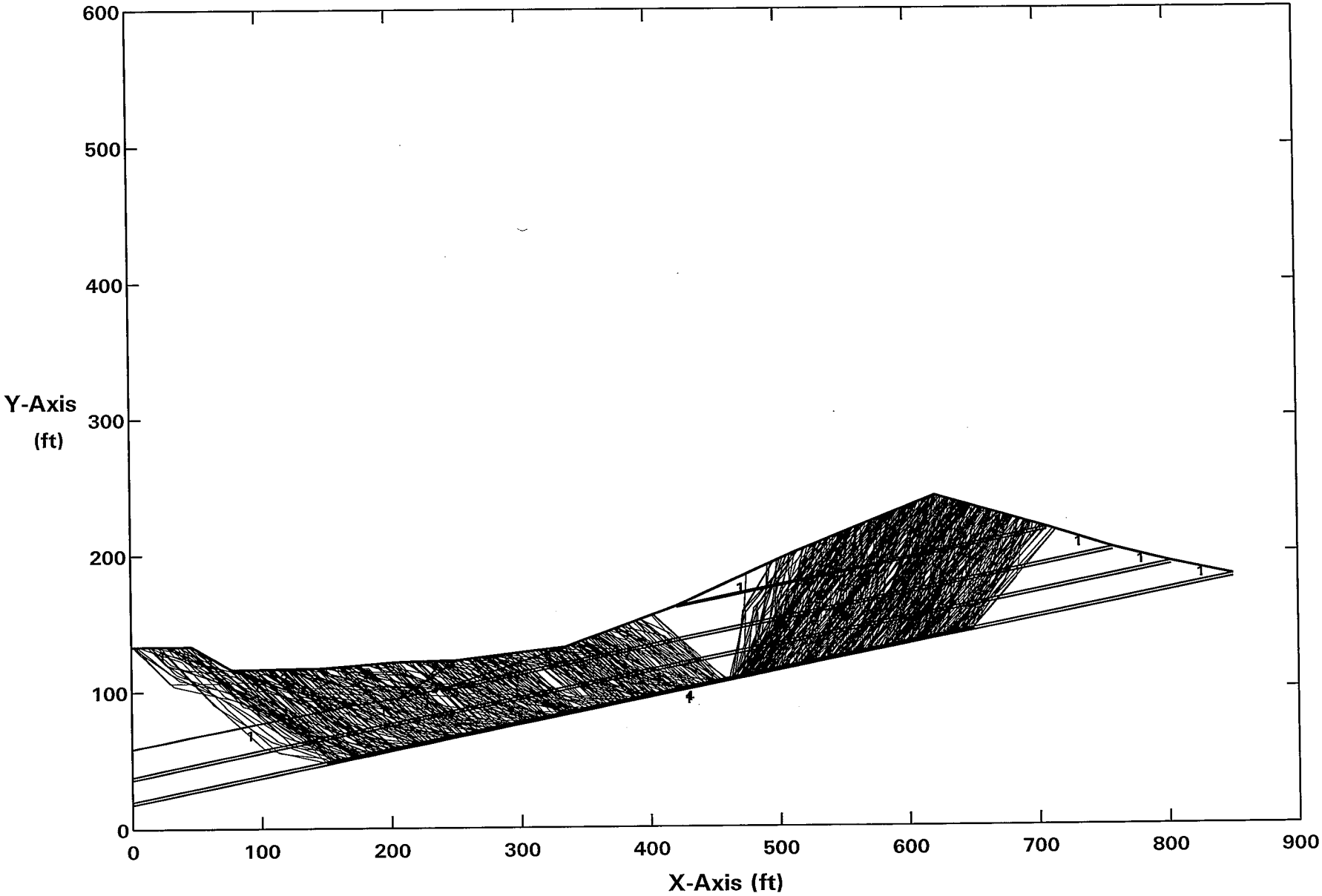
PCSTABL5M FSmin = 1.50 X-Axis (ft)

Factors Of Safety Calculated By The Modified Janbu Method

Run #61

TT52584-Hasley Cny-Sect.17-17'w/Indslide removed-Plane 60'below toe-Static

All surfaces evaluated. C:HAS17A.PLT By: EC 1/11/99 10:58am



Factors Of Safety Calculated By The Modified Janbu Method

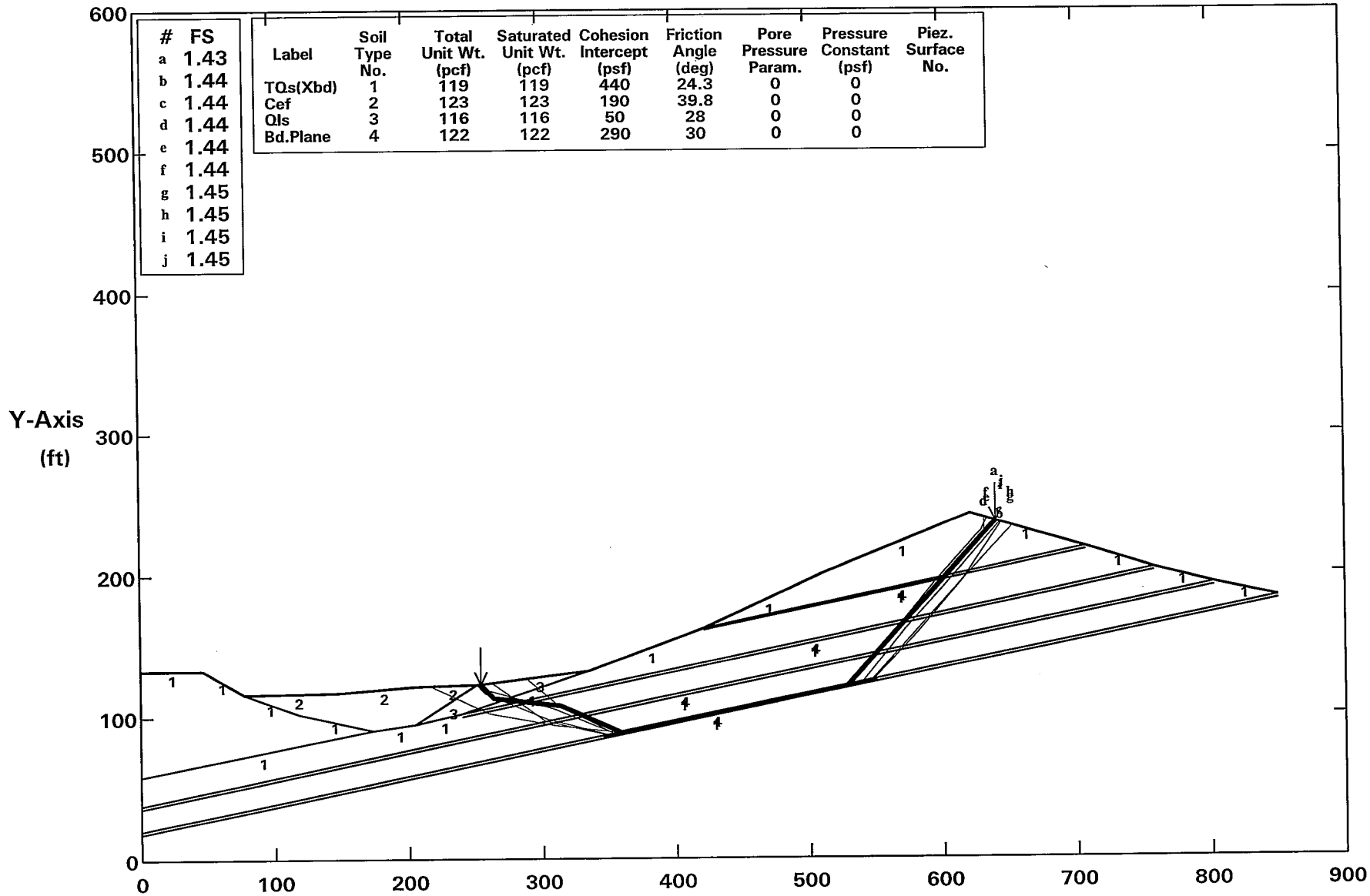
Run #61

TT52584-Hasley Cny-Sect.17-17'w/Indslide removed-Plane 60'below toe-Pseudostatic

Ten Most Critical. C:HAS17A'.PLT By: EC 1/11/99 11:15am

#	FS
a	1.43
b	1.44
c	1.44
d	1.44
e	1.44
f	1.44
g	1.45
h	1.45
i	1.45
j	1.45

Label	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
TQs(Xbd)	1	119	119	440	24.3	0	0	
Cef	2	123	123	190	39.8	0	0	
Qls	3	116	116	50	28	0	0	
Bd.Plane	4	122	122	290	30	0	0	



PCSTABL5M FSmin = 1.43 X-Axis (ft)

Factors Of Safety Calculated By The Modified Janbu Method

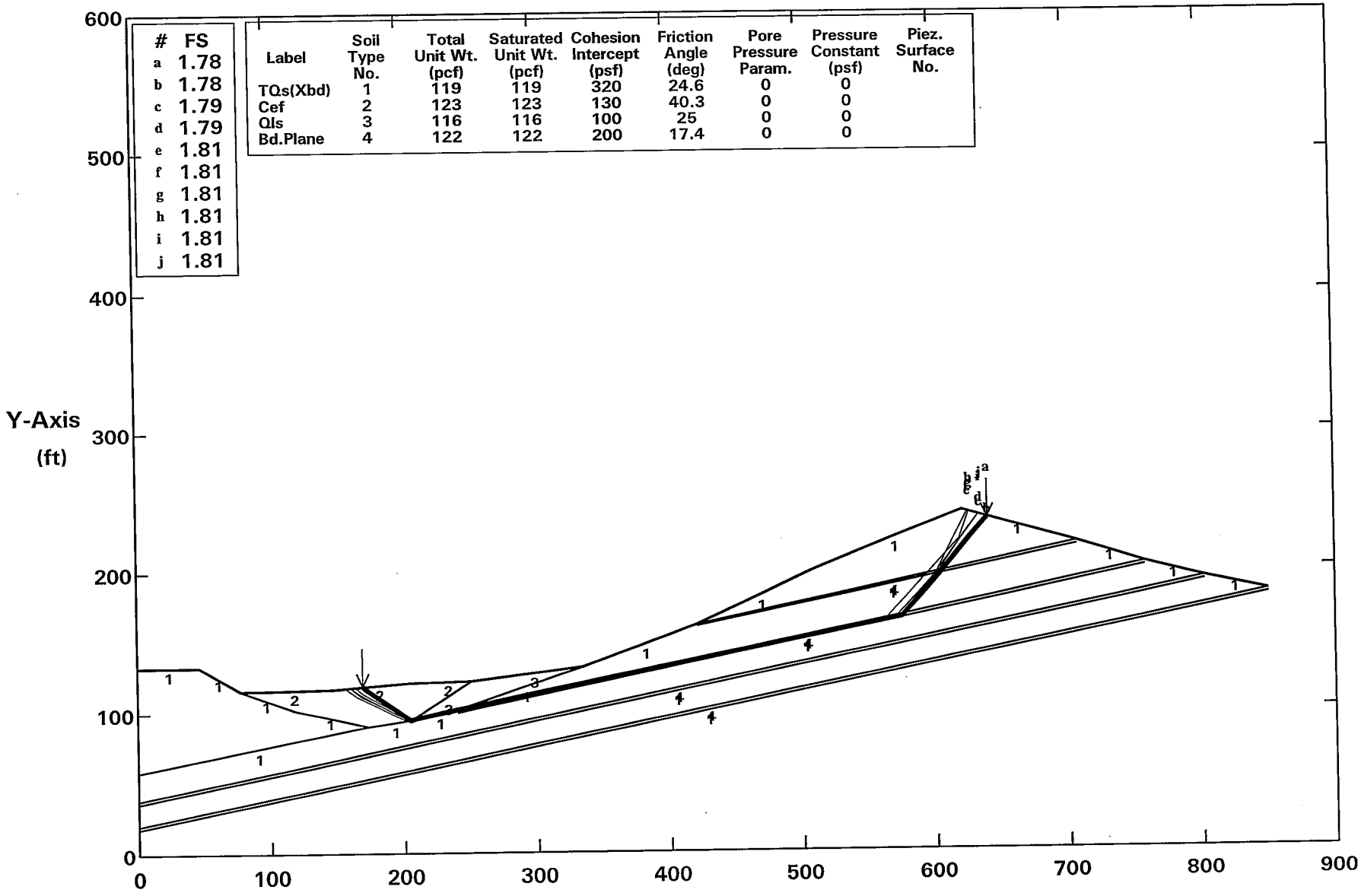
Run #62

TT52584-Hasley Cny-Sect.17-17'w/Indslide removed-Toe Plane-Static

Ten Most Critical. C:HAS17B.PLT By: EC 1/11/99 5:14pm

#	FS
a	1.78
b	1.78
c	1.79
d	1.79
e	1.81
f	1.81
g	1.81
h	1.81
i	1.81
j	1.81

Label	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
TQs(Xbd)	1	119	119	320	24.6	0	0	
Cef	2	123	123	130	40.3	0	0	
Qls	3	116	116	100	25	0	0	
Bd.Plane	4	122	122	200	17.4	0	0	



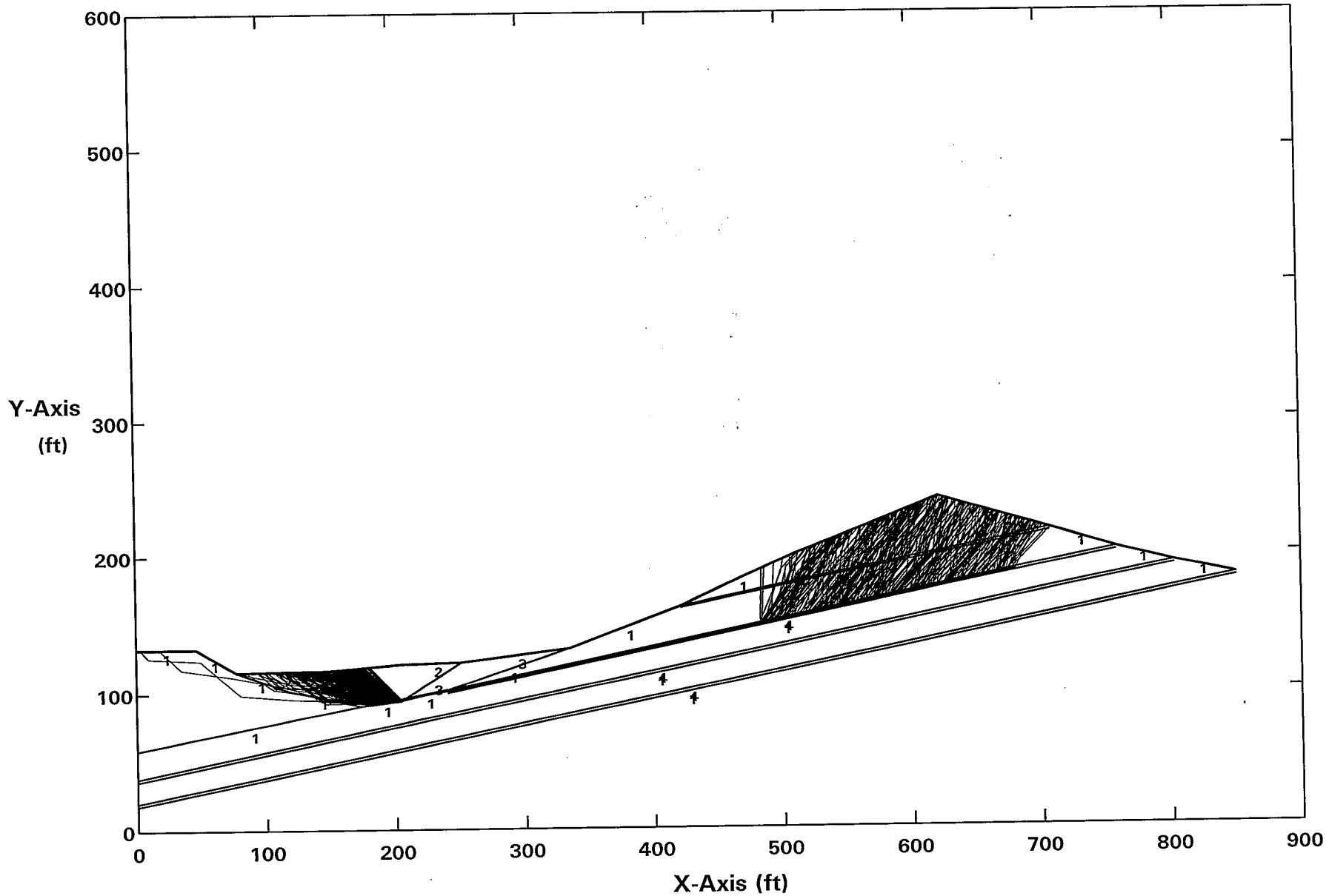
PCSTABL5M FSmin = 1.78 X-Axis (ft)

Factors Of Safety Calculated By The Modified Janbu Method

Run # 63

TT52584-Hasley Cny-Sect.17-17'w/Indslide removed-Toe Plane-Static

All surfaces evaluated. C:HAS17B.PLT By: EC 1/11/99 12:21pm



Factors Of Safety Calculated By The Modified Janbu Method

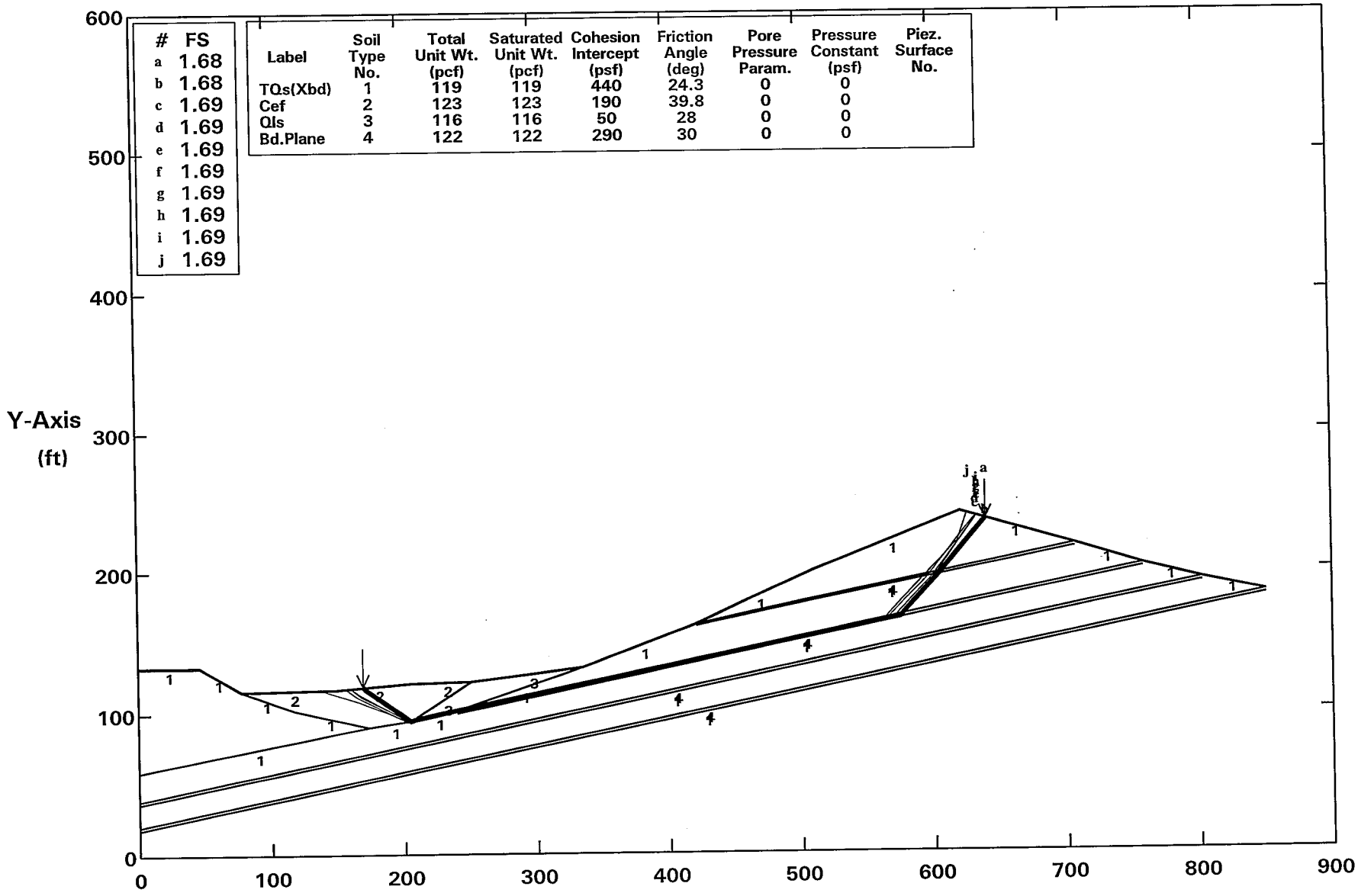
Run #63

TT52584-Hasley Cny-Sect.17-17'w/Indslide removed-Toe Plane-Pseudostatic

Ten Most Critical. C:HAS17B'.PLT By: EC 1/11/99 12:45pm

#	FS
a	1.68
b	1.68
c	1.69
d	1.69
e	1.69
f	1.69
g	1.69
h	1.69
i	1.69
j	1.69

Label	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
TQs(Xbd)	1	119	119	440	24.3	0	0	
Cef	2	123	123	190	39.8	0	0	
Qls	3	116	116	50	28	0	0	
Bd.Plane	4	122	122	290	30	0	0	



PCSTABL5M FSmin = 1.68 X-Axis (ft)

Factors Of Safety Calculated By The Modified Janbu Method

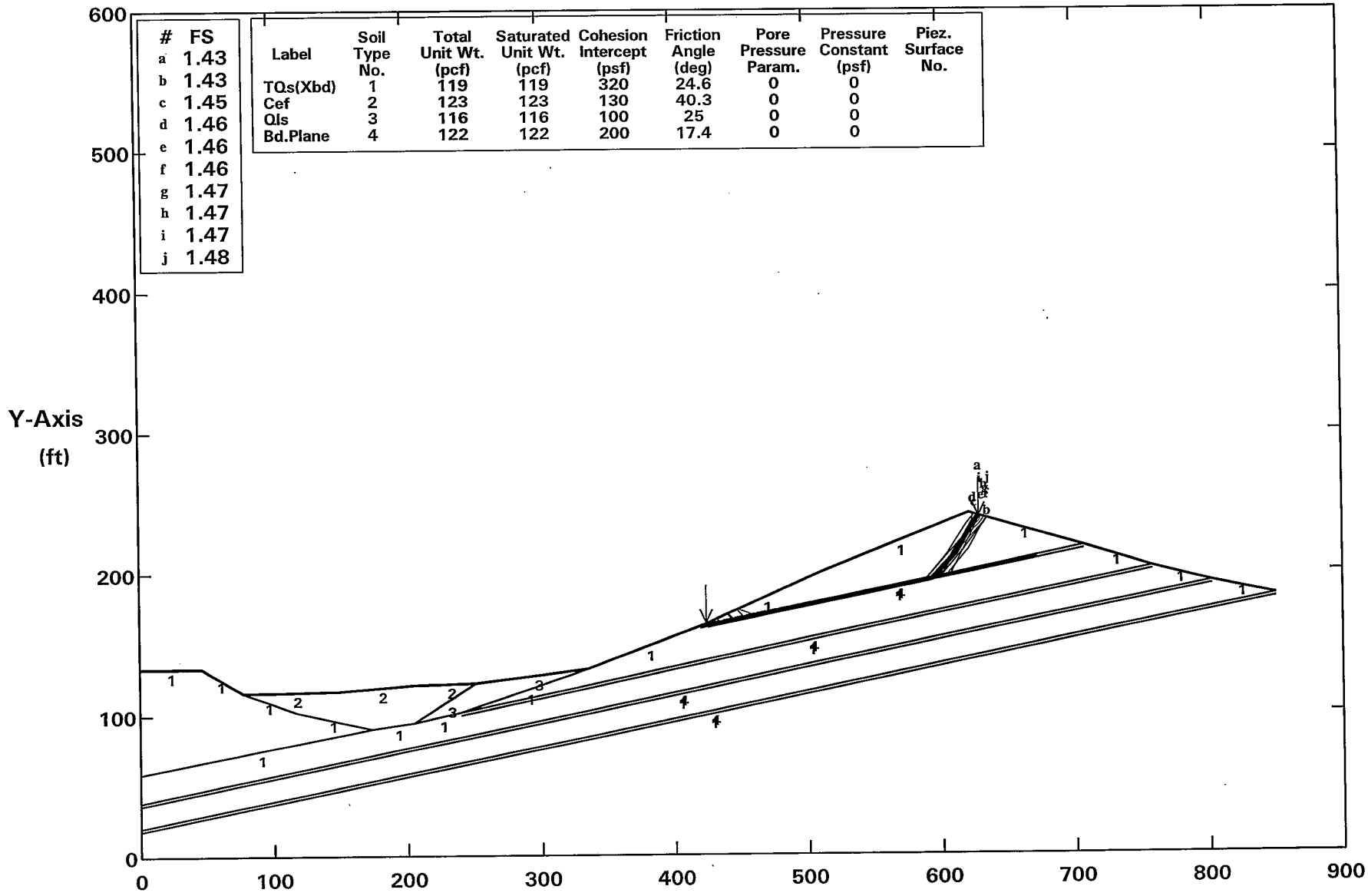
Run #64

TT52584-Hasley Cny-Sect.17-17'w/Indslide removed-Upper Plane-Static

Ten Most Critical. C:HAS17C.PLT By: EC 1/11/99 12:58pm

#	FS
a	1.43
b	1.43
c	1.45
d	1.46
e	1.46
f	1.46
g	1.47
h	1.47
i	1.47
j	1.48

Label	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
TQs(Xbd)	1	119	119	320	24.6	0	0	
Cef	2	123	123	130	40.3	0	0	
Qls	3	116	116	100	25	0	0	
Bd.Plane	4	122	122	200	17.4	0	0	



PCSTABL5M FSmin = 1.43 X-Axis (ft)

Factors Of Safety Calculated By The Modified Janbu Method

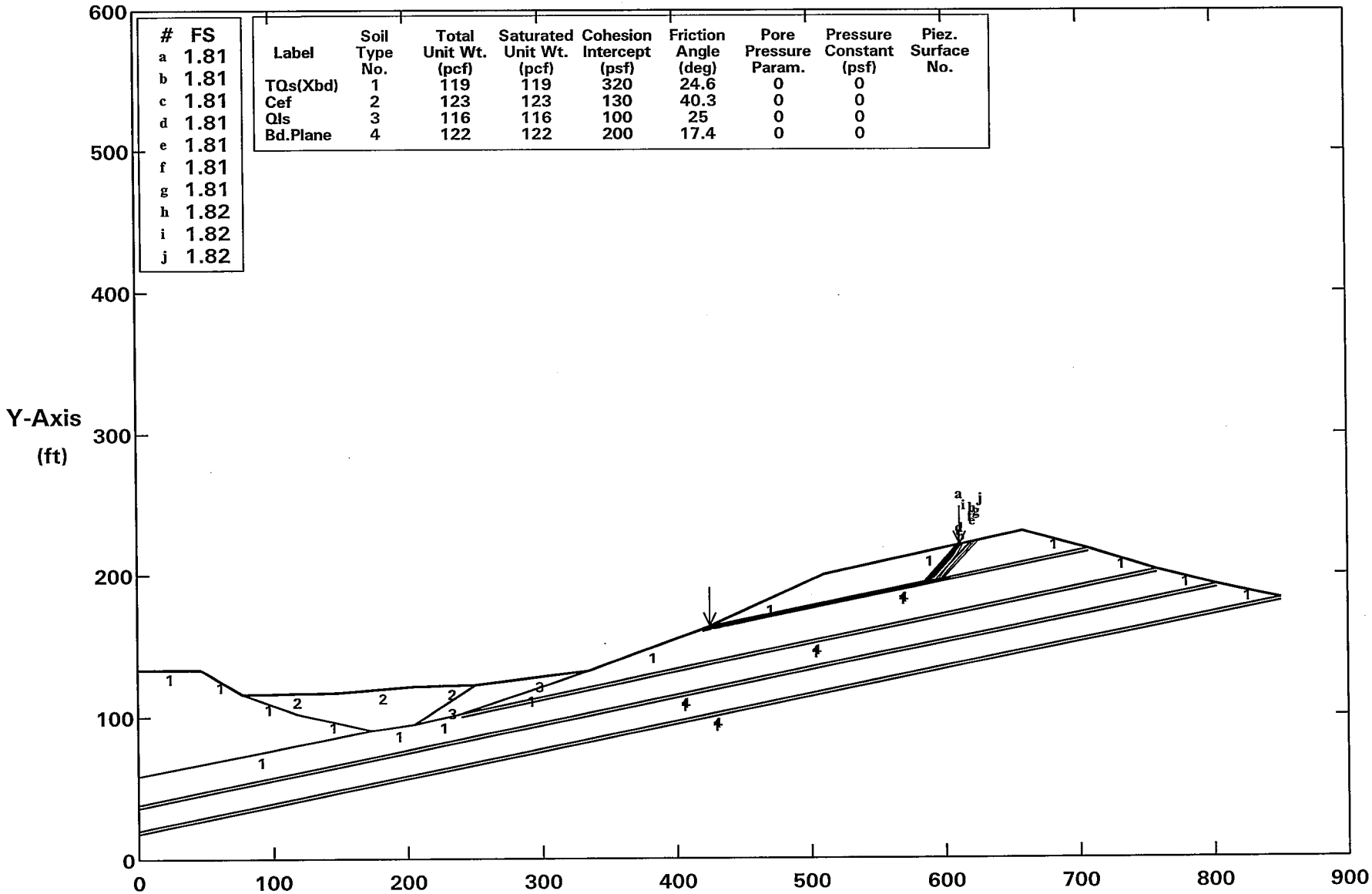
Run #65

TT52584-Hasley Cny-Sect.17-17'w/lndslide & ridge pk.removed-Upper Plane-Static

Ten Most Critical. C:HAS17D.PLT By: EC 1/11/99 1:24pm

#	FS
a	1.81
b	1.81
c	1.81
d	1.81
e	1.81
f	1.81
g	1.81
h	1.82
i	1.82
j	1.82

Label	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
TQs(Xbd)	1	119	119	320	24.6	0	0	
Cef	2	123	123	130	40.3	0	0	
Qls	3	116	116	100	25	0	0	
Bd.Plane	4	122	122	200	17.4	0	0	



PCSTABL5M FSmin = 1.81 X-Axis (ft)

Factors Of Safety Calculated By The Modified Janbu Method

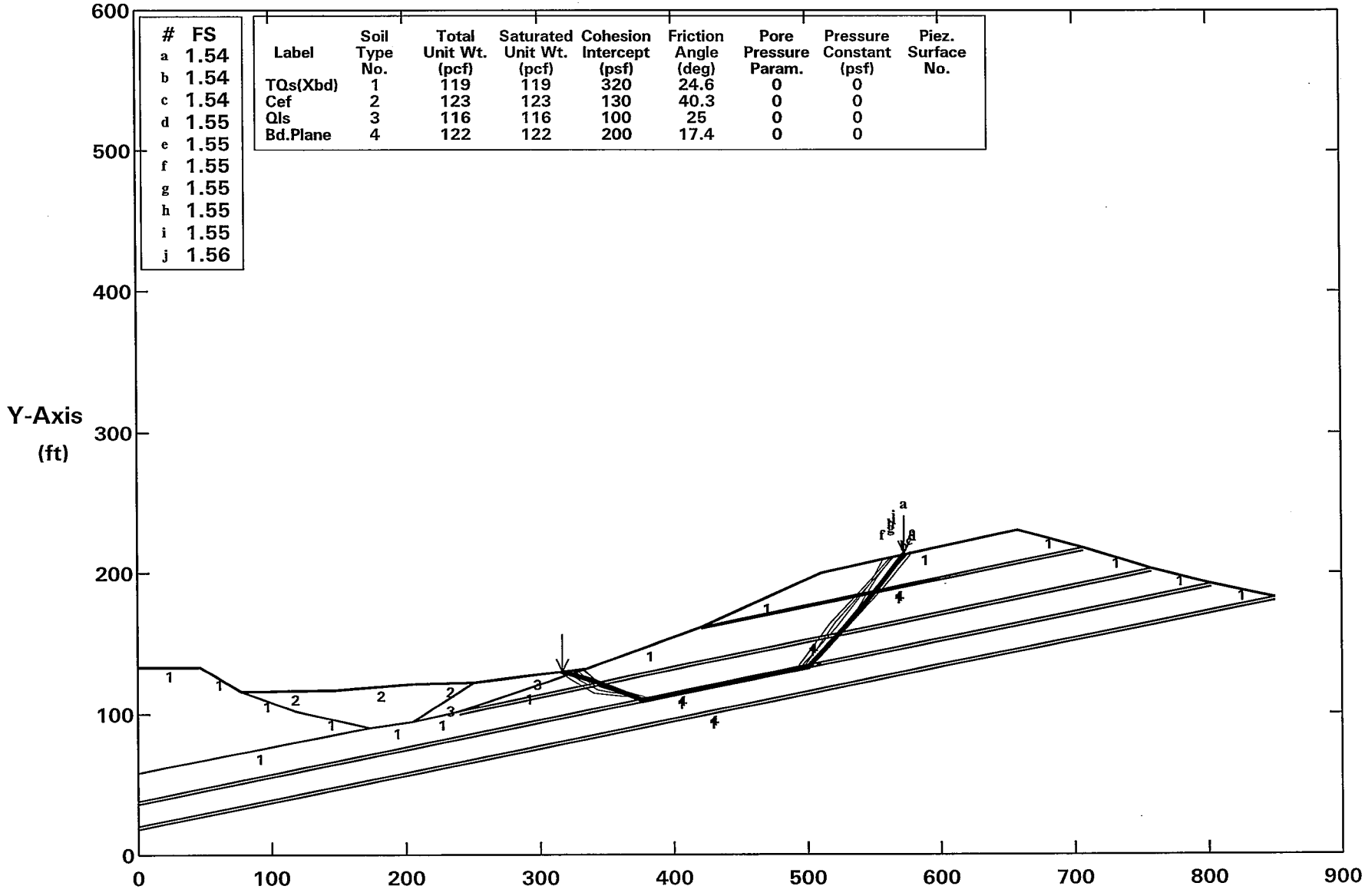
Run #66

TT52584-Hasley Cny-Sect.17-17'w/lndslide & ridge pk.removed-Mid.low Plane-Static

Ten Most Critical. C:HAS17E.PLT By: EC 1/11/99 5:19pm

#	FS
a	1.54
b	1.54
c	1.54
d	1.55
e	1.55
f	1.55
g	1.55
h	1.55
i	1.55
j	1.56

Label	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
TQs(Xbd)	1	119	119	320	24.6	0	0	
Cef	2	123	123	130	40.3	0	0	
Qls	3	116	116	100	25	0	0	
Bd.Plane	4	122	122	200	17.4	0	0	



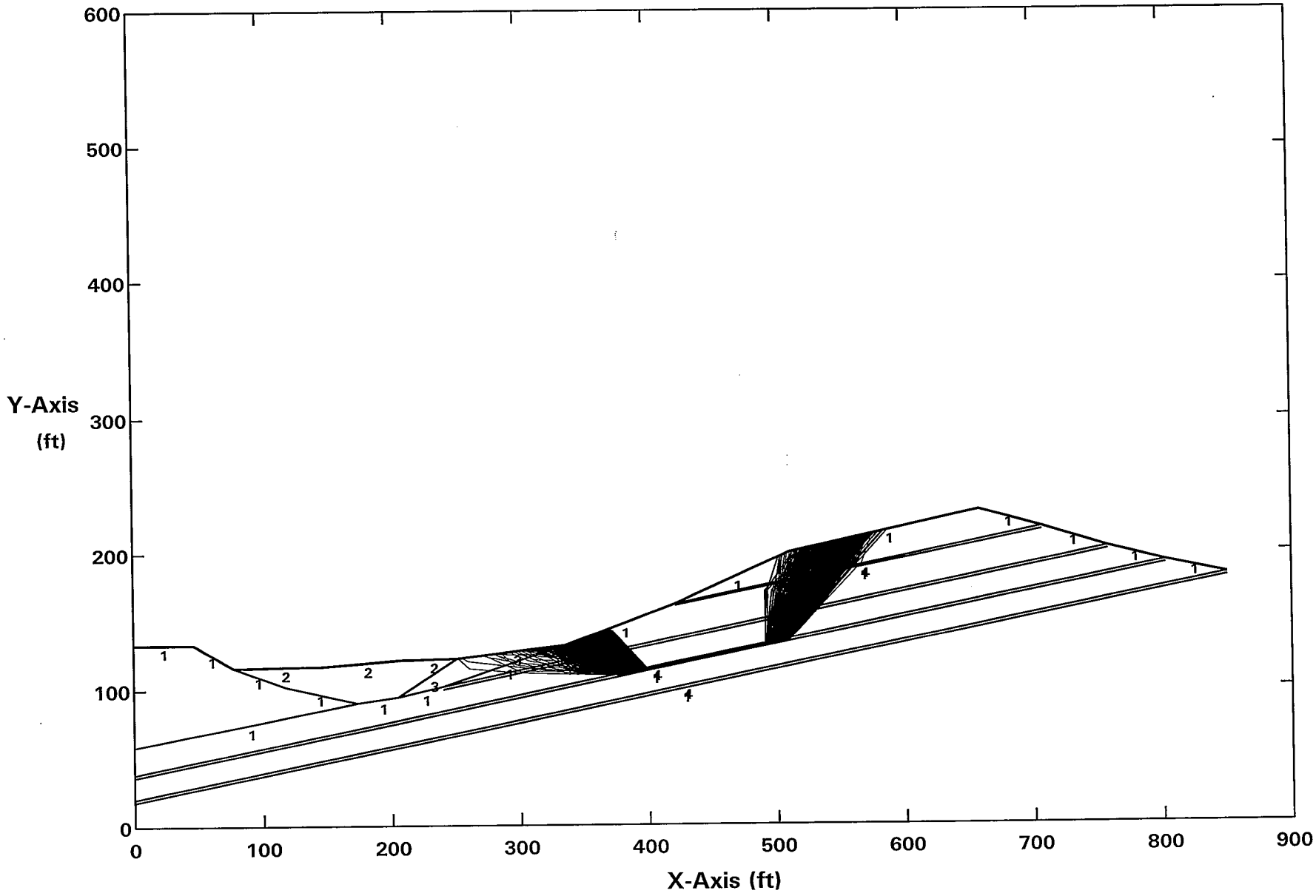
PCSTABL5M FSmin = 1.54 X-Axis (ft)

Factors Of Safety Calculated By The Modified Janbu Method

Kim #67

TT52584-Hasley Cny-Sect.17-17'w/lndslide & ridge pk.removed-Mid.low Plane-Static

All surfaces evaluated. C:HAS17E.PLT By: EC 1/11/99 5:19pm



Factors Of Safety Calculated By The Modified Janbu Method

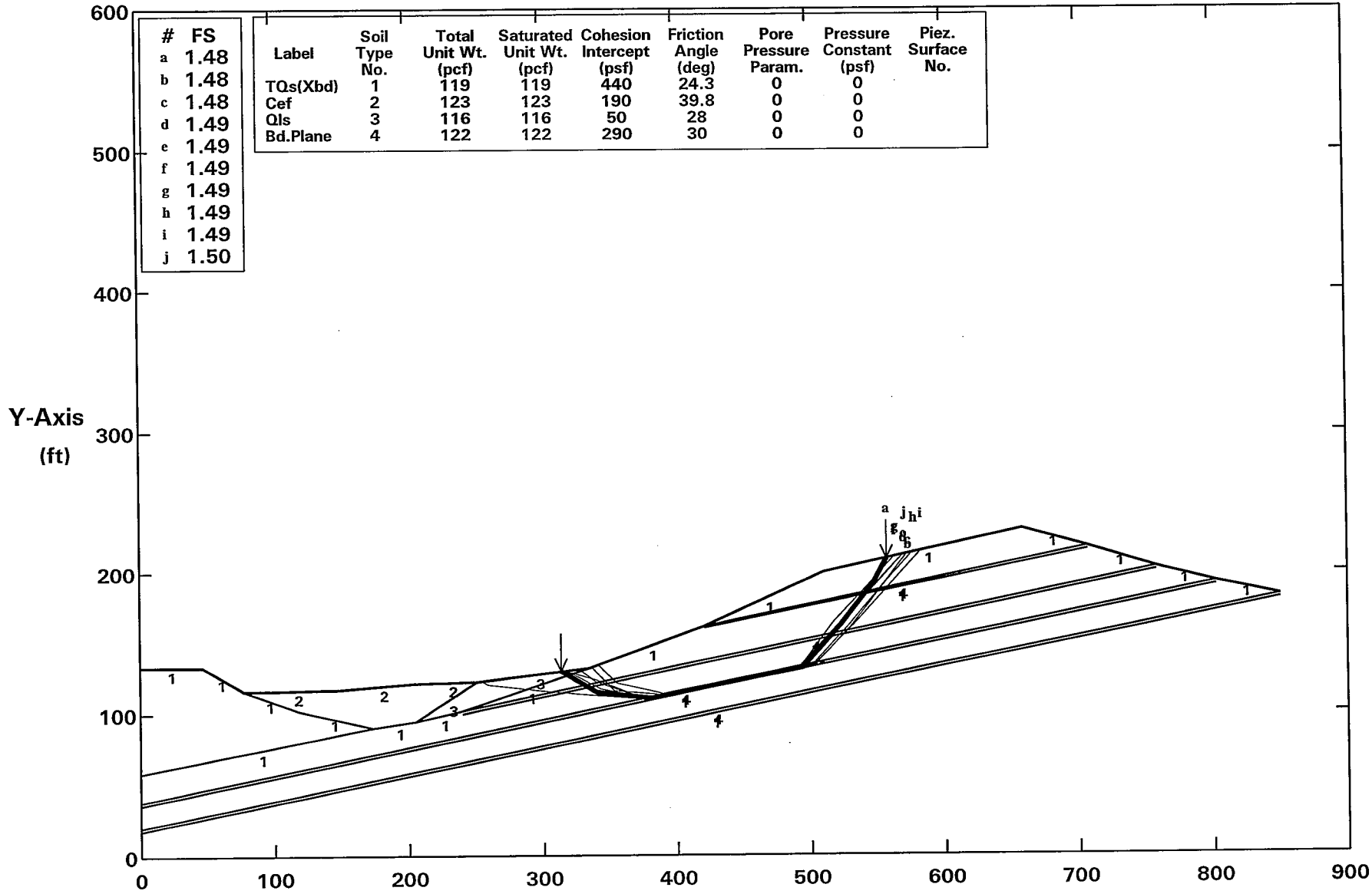
Run #67

TT52584-Hasley Cny-Sect.17-17'w/lndslide& ridge pk.removed-Mid.low Plane-Seismic

Ten Most Critical. C:HAS17E'.PLT By: EC 1/11/99 7:09pm

#	FS
a	1.48
b	1.48
c	1.48
d	1.49
e	1.49
f	1.49
g	1.49
h	1.49
i	1.49
j	1.50

Label	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
TQs(Xbd)	1	119	119	440	24.3	0	0	
Cef	2	123	123	190	39.8	0	0	
Qls	3	116	116	50	28	0	0	
Bd.Plane	4	122	122	290	30	0	0	



PCSTABL5M FSmin = 1.48 X-Axis (ft)

Factors Of Safety Calculated By The Modified Janbu Method

Run #68

Run #67

** PCSTABL5M **

by
Purdue University

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date:	1/11/99
Time of Run:	5:19pm
Run By:	EC
Input Data Filename:	C:HAS17E.IN
Output Filename:	C:HAS17E.OUT
Plotted Output Filename:	C:HAS17E.PLT

PROBLEM DESCRIPTION TT52584-Hasley Cny-Sect.17-17'w/lndslide & ridge pk.removed-Mid.low Plane-Static

BOUNDARY COORDINATES

13 Top Boundaries
28 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	.00	133.00	47.00	133.00	1
2	47.00	133.00	78.00	116.00	1
3	78.00	116.00	148.00	117.00	2
4	148.00	117.00	205.00	121.00	2
5	205.00	121.00	251.00	122.00	2
6	251.00	122.00	335.00	132.00	3
7	335.00	132.00	421.00	162.00	1
8	421.00	162.00	510.00	200.00	1
9	510.00	200.00	658.00	231.00	1
10	658.00	231.00	707.00	218.00	1
11	707.00	218.00	758.00	203.00	1
12	758.00	203.00	802.00	192.00	1
13	802.00	192.00	850.00	183.00	1
14	421.00	162.00	707.00	218.00	4
15	421.00	160.00	707.00	216.00	1
16	78.00	116.00	118.00	102.00	1
17	118.00	102.00	173.00	90.00	1
18	173.00	90.00	205.00	95.00	1
19	205.00	95.00	251.00	122.00	3
20	205.00	95.00	240.00	102.00	1
21	240.00	102.00	335.00	132.00	1
22	240.00	102.00	758.00	203.00	4

Run #67

23	240.00	100.00	758.00	201.00	1
24	.00	58.00	173.00	90.00	1
25	.00	38.00	802.00	192.00	4
26	.00	36.00	802.00	190.00	1
27	.00	20.00	850.00	183.00	4
28	.00	18.00	850.00	181.00	1

ISOTROPIC SOIL PARAMETERS

4 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	119.0	119.0	320.0	24.6	.00	.0	0
2	123.0	123.0	130.0	40.3	.00	.0	0
3	116.0	116.0	100.0	25.0	.00	.0	0
4	122.0	122.0	200.0	17.4	.00	.0	0

Janbus Empirical Coef is being used for the case of c & phi both > 0

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Sliding Block Surfaces, Has Been Specified.

700 Trial Surfaces Have Been Generated.

2 Boxes Specified For Generation Of Central Block Base

Length Of Line Segments For Active And Passive Portions Of Sliding Block Is 40.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	375.00	109.00	400.00	113.80	.10
2	490.00	131.10	510.00	134.90	.10

Factor Of Safety Calculation Has Gone Through Ten Iterations

The Trial Failure Surface In Question Is Defined By The Following 6 Coordinate Points

Run #67

Point No.	X-Surf (ft)	Y-Surf (ft)
1	348.04	136.55
2	361.24	128.19
3	398.44	113.50
4	500.54	133.14
5	501.11	173.14
6	520.05	202.10

Factor Of Safety For The Preceding Specified Surface = 3.770

Factor Of Safety Calculation Has Gone Through Ten Iterations

The Trial Failure Surface In Question Is Defined
By The Following 6 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	356.17	139.39
2	362.15	133.57
3	396.56	113.17
4	502.74	133.47
5	503.51	173.47
6	520.83	202.27

Factor Of Safety For The Preceding Specified Surface = 3.703

Factor Of Safety Calculation Has Gone Through Ten Iterations

The Trial Failure Surface In Question Is Defined
By The Following 6 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	359.39	140.51

Run #67

2	366.31	136.63
3	398.99	113.56
4	493.05	131.64
5	493.36	171.64
6	501.87	196.53

Factor Of Safety For The Preceding Specified Surface = 5.581

Factor Of Safety Calculation Has Gone Through Ten Iterations

The Trial Failure Surface In Question Is Defined
By The Following 6 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	359.30	140.48
2	360.05	139.74
3	388.50	111.62
4	490.99	131.24
5	491.39	171.24
6	517.09	201.49

Factor Of Safety For The Preceding Specified Surface = 4.715

Factor Of Safety Calculation Has Gone Through Ten Iterations

The Trial Failure Surface In Question Is Defined
By The Following 7 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	344.36	135.27
2	356.40	126.61
3	393.87	112.62
4	492.16	131.53
5	492.80	171.53
6	520.61	200.27
7	520.75	202.25

Run #67

Factor Of Safety For The Preceding Specified Surface = 3.732

Factor Of Safety Calculation Has Gone Through Ten Iterations

The Trial Failure Surface In Question Is Defined
By The Following 6 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	313.85	129.48
2	351.53	117.34
3	391.18	112.07
4	501.57	133.29
5	502.09	173.28
6	512.45	200.51

Factor Of Safety For The Preceding Specified Surface = 3.425

Factor Of Safety Calculation Has Gone Through Ten Iterations

The Trial Failure Surface In Question Is Defined
By The Following 6 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	363.39	141.90
2	364.68	140.68
3	393.07	112.50
4	499.37	132.86
5	499.69	172.85
6	511.76	200.37

Factor Of Safety For The Preceding Specified Surface = 4.932

Run #67

Factor Of Safety Calculation Has Gone Through Ten Iterations

The Trial Failure Surface In Question Is Defined
By The Following 6 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	348.04	136.55
2	361.24	128.19
3	398.44	113.50
4	500.54	133.14
5	501.11	173.14
6	520.05	202.10

Factor Of Safety For The Preceding Specified Surface = 3.770

Factor Of Safety Calculation Has Gone Through Ten Iterations

The Trial Failure Surface In Question Is Defined
By The Following 6 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	356.17	139.39
2	362.15	133.57
3	396.56	113.17
4	502.74	133.47
5	503.51	173.47
6	520.83	202.27

Factor Of Safety For The Preceding Specified Surface = 3.703

Factor Of Safety Calculation Has Gone Through Ten Iterations

Run #67

The Trial Failure Surface In Question Is Defined
By The Following 6 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	359.39	140.51
2	366.31	136.63
3	398.99	113.56
4	493.05	131.64
5	493.36	171.64
6	501.87	196.53

Factor Of Safety For The Preceding Specified Surface = 5.581

Factor Of Safety Calculation Has Gone Through Ten Iterations

The Trial Failure Surface In Question Is Defined
By The Following 6 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	359.30	140.48
2	360.05	139.74
3	388.50	111.62
4	490.99	131.24
5	491.39	171.24
6	517.09	201.49

Factor Of Safety For The Preceding Specified Surface = 4.715

Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Examined. They Are Ordered - Most Critical
First.

* * Safety Factors Are Calculated By The Modified Janbu Method * *

Failure Surface Specified By 7 Coordinate Points

HAS17E.

Run #67

Point No.	X-Surf (ft)	Y-Surf (ft)
1	316.89	129.84
2	339.83	122.87
3	377.53	109.51
4	500.30	133.03
5	528.56	161.34
6	554.78	191.54
7	573.12	213.22

*** 1.537 ***

Failure Surface

Individual data on the 18 slices

Slice No.	Width Ft (m)	Weight Lbs (kg)	Water Force Top Lbs (kg)	Water Force Bot Lbs (kg)	Tie Force Norm Lbs (kg)	Tie Force Tan Lbs (kg)	Earthquake Force Hor Lbs (kg)	Earthquake Force Ver Lbs (kg)	Surcharge Load Lbs (kg)
1	5.7	810.7	.0	.0	.0	.0	.0	.0	.0
2	12.4	7380.9	.0	.0	.0	.0	.0	.0	.0
3	4.8	5308.9	.0	.0	.0	.0	.0	.0	.0
4	2.6	3561.1	.0	.0	.0	.0	.0	.0	.0
5	3.6	6030.4	.0	.0	.0	.0	.0	.0	.0
6	29.7	90731.4	.0	.0	.0	.0	.0	.0	.0
7	1.8	7883.7	.0	.0	.0	.0	.0	.0	.0
8	43.5	211157.8	.0	.0	.0	.0	.0	.0	.0
9	79.3	506002.5	.0	.0	.0	.0	.0	.0	.0
10	1.3	9556.1	.0	.0	.0	.0	.0	.0	.0
11	8.4	59891.2	.0	.0	.0	.0	.0	.0	.0
12	12.3	76627.9	.0	.0	.0	.0	.0	.0	.0
13	2.5	13754.9	.0	.0	.0	.0	.0	.0	.0
14	3.8	19999.9	.0	.0	.0	.0	.0	.0	.0
15	20.6	80740.9	.0	.0	.0	.0	.0	.0	.0
16	2.1	5515.3	.0	.0	.0	.0	.0	.0	.0
17	3.5	8113.4	.0	.0	.0	.0	.0	.0	.0
18	18.3	19465.4	.0	.0	.0	.0	.0	.0	.0

Failure Surface Specified By 7 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	316.89	129.84
2	339.83	122.87
3	377.53	109.51
4	500.30	133.03
5	528.56	161.34
6	554.78	191.54
7	573.12	213.22

Run #67

*** 1.537 ***

Failure Surface Specified By 7 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	327.29	131.08
2	338.83	121.84
3	376.82	109.32
4	503.32	133.66
5	531.35	162.19
6	556.87	193.00
7	577.32	214.10

*** 1.540 ***

Failure Surface Specified By 7 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	332.90	131.75
2	339.06	125.86
3	375.39	109.12
4	502.22	133.38
5	530.47	161.70
6	558.33	190.39
7	579.00	214.45

*** 1.546 ***

Failure Surface Specified By 7 Coordinate Points

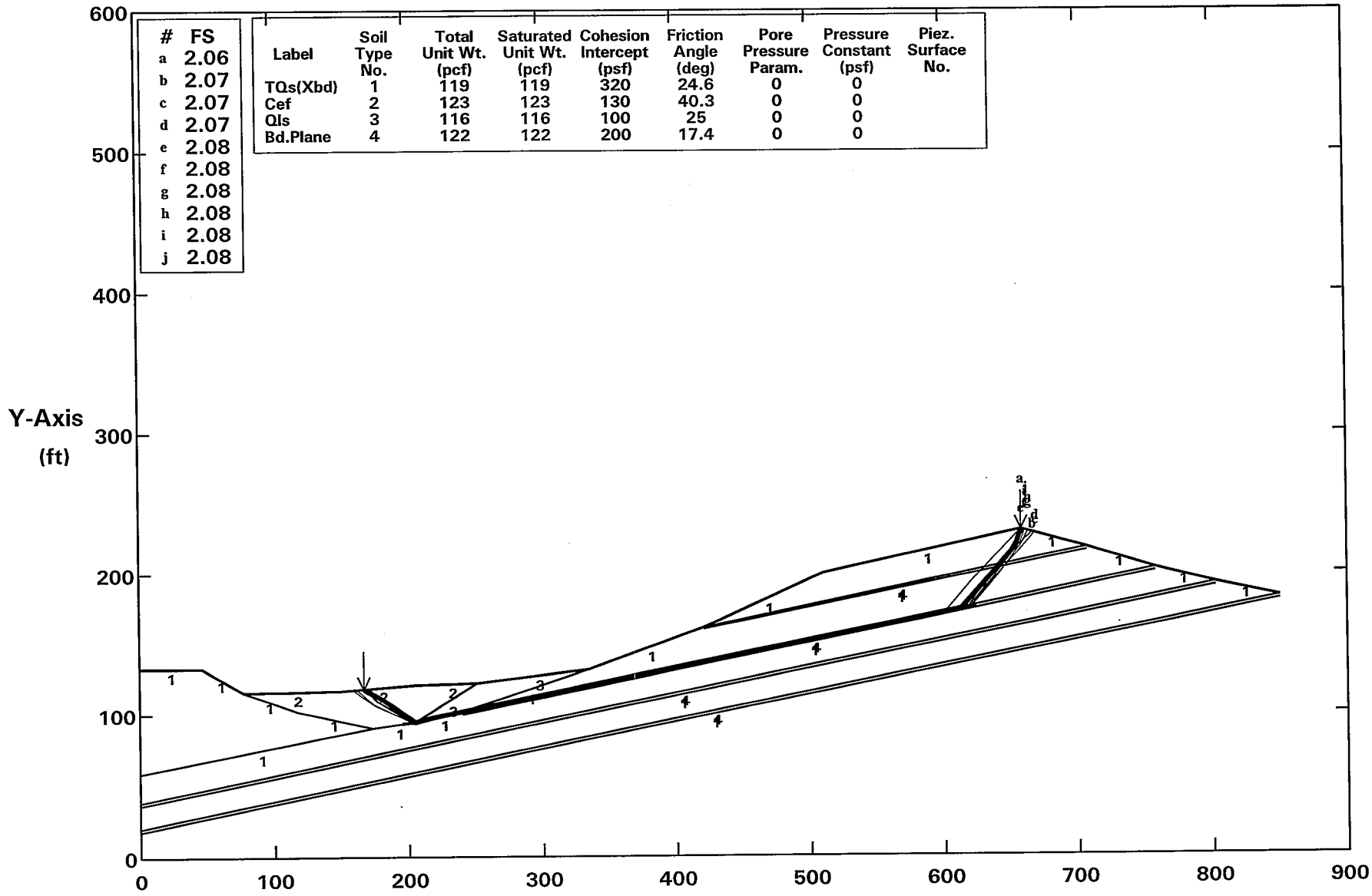
Point No.	X-Surf (ft)	Y-Surf (ft)
1	332.90	131.75
2	339.06	125.86
3	375.39	109.12
4	502.22	133.38

TT52584-Hasley Cny-Sect.17-17'w/Indslide & ridge pk.removed-Toe Plane-Static

Ten Most Critical. C:HAS17F.PLT By: EC 1/11/99 6:18pm

#	FS
a	2.06
b	2.07
c	2.07
d	2.07
e	2.08
f	2.08
g	2.08
h	2.08
i	2.08
j	2.08

Label	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
TQs(Xbd)	1	119	119	320	24.6	0	0	
Cef	2	123	123	130	40.3	0	0	
Qls	3	116	116	100	25	0	0	
Bd.Plane	4	122	122	200	17.4	0	0	



PCSTABL5M FSmin = 2.06 X-Axis (ft)

Factors Of Safety Calculated By The Modified Janbu Method

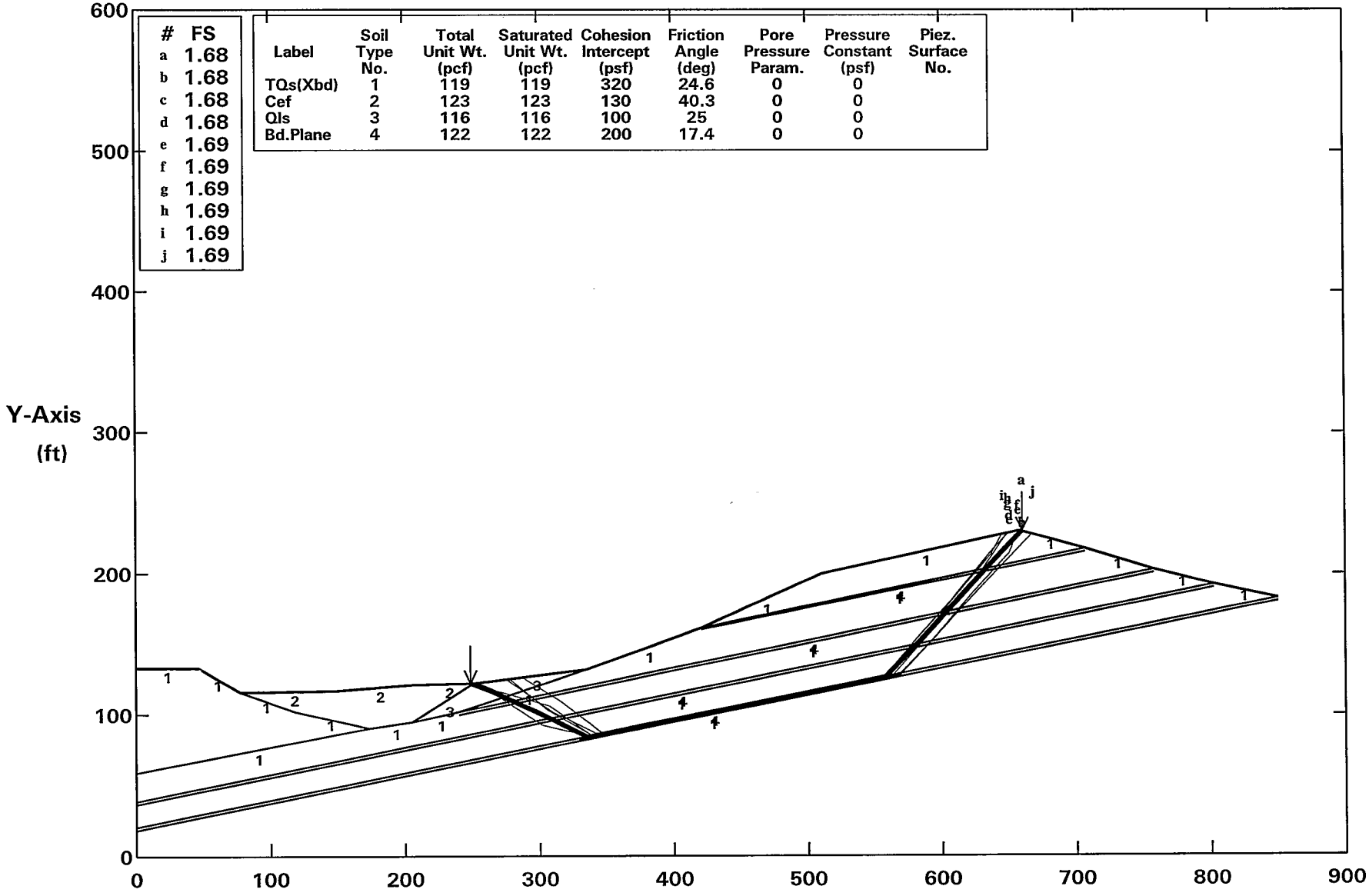
Run #69

TT52584-Hasley Cny-Sect.17-17'w/Indslide & ridge pk.removed-Lower Plane-Static

Ten Most Critical. C:HAS17G.PLT By: EC 1/11/99 7:04pm

#	FS
a	1.68
b	1.68
c	1.68
d	1.68
e	1.69
f	1.69
g	1.69
h	1.69
i	1.69
j	1.69

Label	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
TQs(Xbd)	1	119	119	320	24.6	0	0	
Cef	2	123	123	130	40.3	0	0	
Qls	3	116	116	100	25	0	0	
Bd.Plane	4	122	122	200	17.4	0	0	



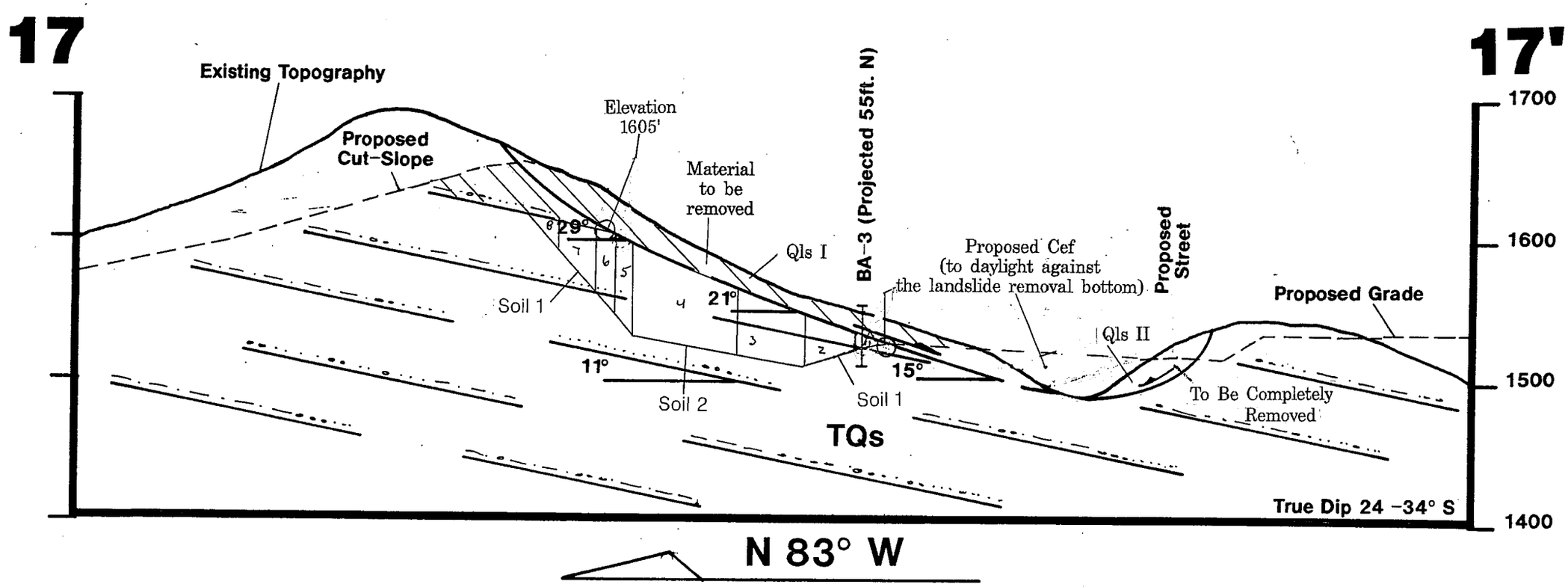
PCSTABL5M FSmin = 1.68 X-Axis (ft)

Factors Of Safety Calculated By The Modified Janbu Method

Run #70

Run # 71 & 72

CROSS SECTION
OMS STABILITY ANALYSIS



	Static		Pseudostatic	
	C	Ø	C	Ø
Soil 1 (TQs)	320	24.6	440	24.3
Soil 2 (Bedding Plane)	200	17.4	290	30

ALLAN E. SEWARD
ENGINEERING GEOLOGY

JOB NUMBER: 98-1617-4		DATE: 1/15/99	
SCALE: 1"=100'		DRAWN BY: Staff	
		REVISED:	

LOS ANGELES COUNTY
DEPARTMENT OF PUBLIC WORKS
LAND DEVELOPMENT DIVISION
GEOTECHNICAL ENGINEERING
ORDINARY METHOD OF SLICES USED FOR ANALYSIS

PROJECT: TT52584 - Hasley Canyon (Palmer Investments)
CONSULTANT: AES
REPORT DATE: 1/29/99
SECTION: 17-17' - With Landslide & Ridge Pk. Removed CIRCLE: Mid-Lower Plane (Janbu's) - Static DATE: 1/22/99 BY: NAO

SLICE	HEIGHT(1)	HEIGHT(2)	WIDTH	AREA	WEIGHT	UNIT WT
1.	0.00	11.00	24.00	132.00	15.71	119.0
2.	11.00	37.00	37.00	888.00	105.67	119.0
3.	37.00	46.00	49.00	2033.50	248.09	122.0
4.	46.00	64.00	78.00	4290.00	523.38	122.0
5.	64.00	53.00	13.00	760.50	90.50	119.0
6.	53.00	48.00	13.00	656.50	78.12	119.0
7.	48.00	20.00	28.00	952.00	113.29	119.0
8.	20.00	0.00	20.00	200.00	23.80	119.0

SLOPE STABILITY DATA

SEISMIC COEFFICIENT = 0.00 g

SLICE NO.	1 SLICE WEIGHT W (kips)	2 FAILURE PLANE ANGLE i(deg)	3 ANGLE OF INT. FRICTION phi(deg)	4 COHE-SION C (ksf)	5 LENGTH OF ARC L (ft)	6 W (1-Ru) COS i COS i TAN phi	7 C L COS i	8 g W (1-Ru) SINi COSi TAN phi	9 W SIN i COS i	10 g W COS i COS i
1.	15.71	-11.00	24.60	0.320	24.45	6.93	7.68	0.00	-2.94	0.00
2.	105.67	-18.00	24.60	0.320	38.90	43.76	11.84	0.00	-31.06	0.00
3.	248.09	10.00	17.40	0.200	49.76	75.40	9.80	0.00	42.43	0.00
4.	523.38	10.00	17.40	0.200	79.20	159.07	15.60	0.00	89.50	0.00
5.	90.50	57.00	24.60	0.320	23.87	12.29	4.16	0.00	41.34	0.00
6.	78.12	57.00	24.60	0.320	23.87	10.61	4.16	0.00	35.68	0.00
7.	113.29	58.00	24.60	0.320	52.84	14.57	8.96	0.00	50.91	0.00
8.	23.80	60.00	24.60	0.320	40.00	2.72	6.40	0.00	10.31	0.00
SUMMATION:						325.35	68.60	0.00	236.17	0.00

Run #71

STATIC SAFETY FACTOR = 1.67

~~SEISMIC SAFETY FACTOR = 1.67~~

Run #71

LOS ANGELES COUNTY
DEPARTMENT OF PUBLIC WORKS
LAND DEVELOPMENT DIVISION
GEOTECHNICAL ENGINEERING
ORDINARY METHOD OF SLICES USED FOR ANALYSIS

PROJECT: TT52584 - Hasley Canyon (Palmer Investments)
CONSULTANT: AES
REPORT DATE: 1/29/99
SECTION: 17-17' - With Landslide & Ridge Pk. Removed CIRCLE: Mid-Lower Plane (Janbu's) - Pseudostatic DATE: 1/22/99 BY: NAO

SLICE	HEIGHT(1)	HEIGHT(2)	WIDTH	AREA	WEIGHT	UNIT WT
1.	0.00	11.00	24.00	132.00	15.71	119.0
2.	11.00	37.00	37.00	888.00	105.67	119.0
3.	37.00	46.00	49.00	2033.50	248.09	122.0
4.	46.00	64.00	78.00	4290.00	523.38	122.0
5.	64.00	53.00	13.00	760.50	90.50	119.0
6.	53.00	48.00	13.00	656.50	78.12	119.0
7.	48.00	20.00	28.00	952.00	113.29	119.0
8.	20.00	0.00	20.00	200.00	23.80	119.0

SLOPE STABILITY DATA

SEISMIC COEFFICIENT = 0.15 g

SLICE NO.	1 SLICE WEIGHT W (kips)	2 FAILURE PLANE ANGLE i(deg)	3 ANGLE OF INT. FRICTION phi(deg)	4 COHE-SION C (ksf)	5 LENGTH OF ARC L (ft)	6 W (1-Ru) COS i COS i TAN phi	7 C L COS i	8 g W (1-Ru) SINi COSi TAN phi	9 W SIN i COS i	10 g W COS i COS i
1.	15.71	-11.00	24.30	0.440	24.45	6.83	10.56	-0.20	-2.94	2.27
2.	105.67	-18.00	24.30	0.440	38.90	43.16	16.28	-2.10	-31.06	14.34
3.	248.09	10.00	30.00	0.290	49.76	138.91	14.21	3.67	42.43	36.09
4.	523.38	10.00	30.00	0.290	79.20	293.06	22.62	7.75	89.50	76.14
5.	90.50	57.00	24.30	0.440	23.87	12.12	5.72	2.80	41.34	4.03
6.	78.12	57.00	24.30	0.440	23.87	10.46	5.72	2.42	35.68	3.48
7.	113.29	58.00	24.30	0.440	52.84	14.36	12.32	3.45	50.91	4.77
8.	23.80	60.00	24.30	0.440	40.00	2.69	8.80	0.70	10.31	0.89
SUMMATION:						521.60	96.23	18.49	236.17	142.01

Run # 172

~~STATIC SAFETY FACTOR = 2.62~~

SEISMIC SAFETY FACTOR = 1.58

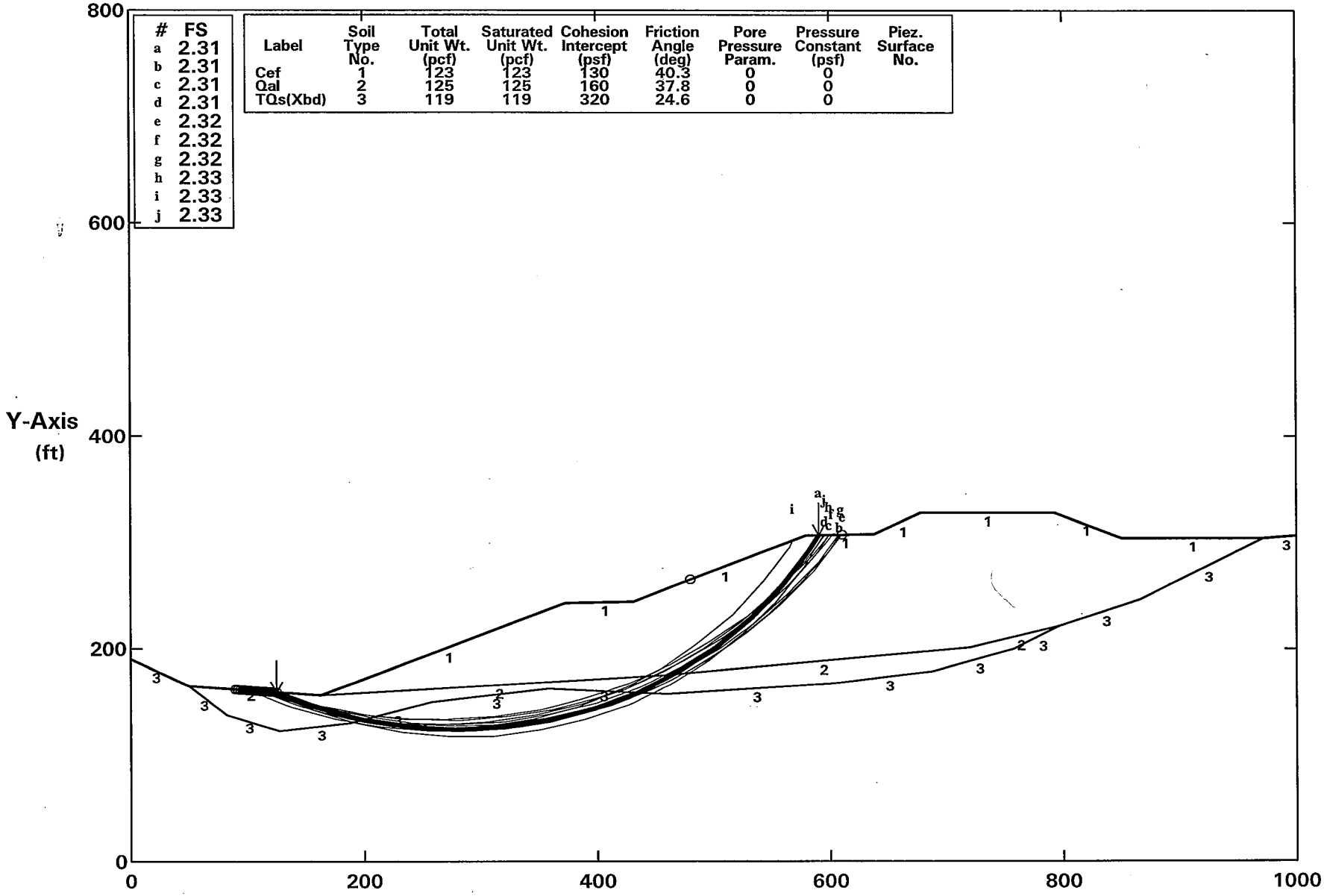
Run # 72

STABILITY ANALYSIS

FOR CROSS SECTION 18-18'

TT52584-Hasley Cny-Sec.18-18'- Highest fill slope- Gross stability - Static

Ten Most Critical. C:HAS18FA.PLT By: EC 1/19/99 12:31pm



#	FS
a	2.31
b	2.31
c	2.31
d	2.31
e	2.32
f	2.32
g	2.32
h	2.33
i	2.33
j	2.33

Label	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
Cef	1	123	123	130	40.3	0	0	
Qal	2	125	125	160	37.8	0	0	
TQs(Xbd)	3	119	119	320	24.6	0	0	

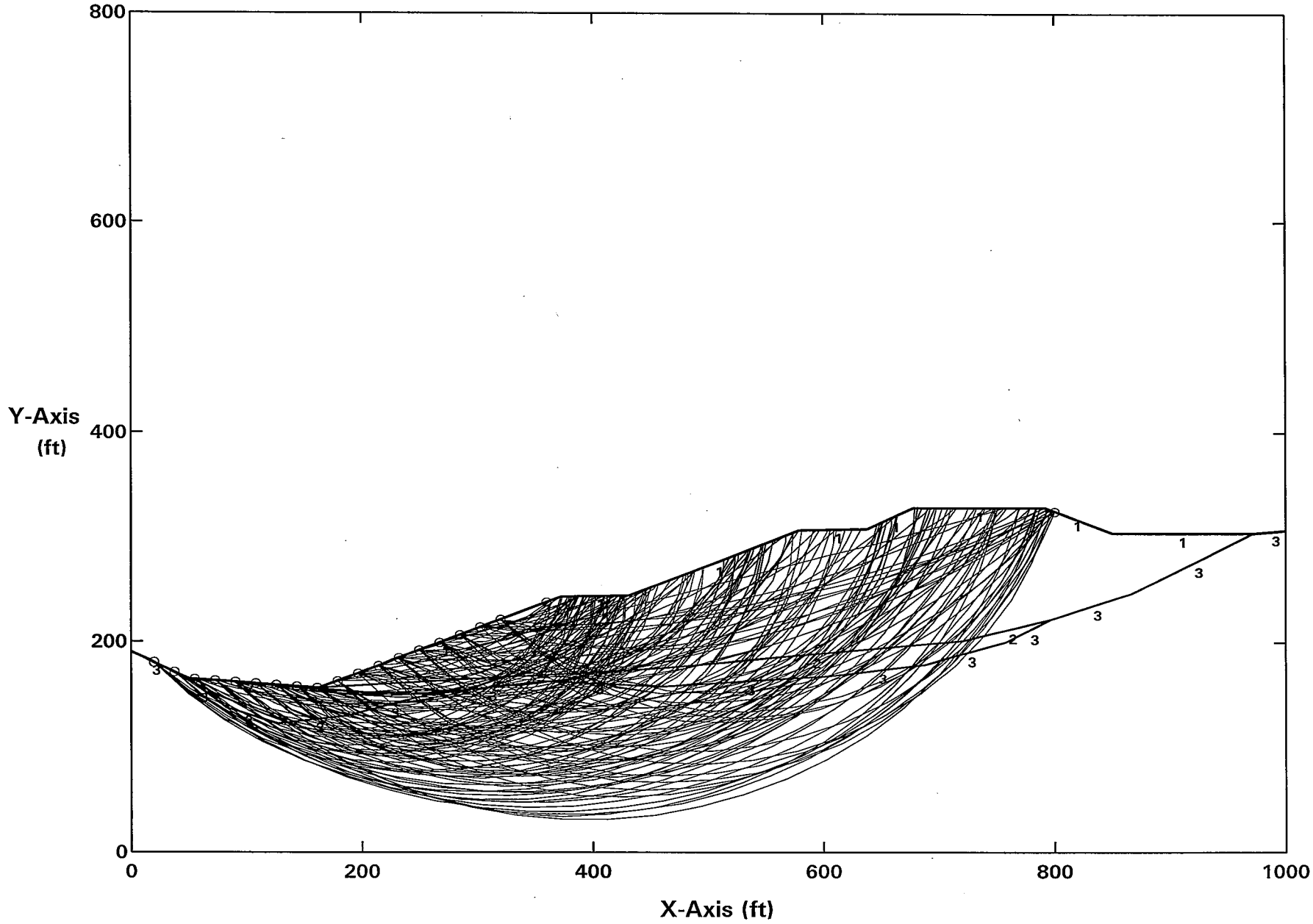
PCSTABL5M FSmin = 2.31 X-Axis (ft)

Factors Of Safety Calculated By The Modified Bishop Method

Run # 71

TT52584-Hasley Cny-Sec.18-18'- Highest fill slope- Gross stability - Static

All surfaces evaluated. C:HAS18FA.PLT By: EC 1/19/99 12:16pm

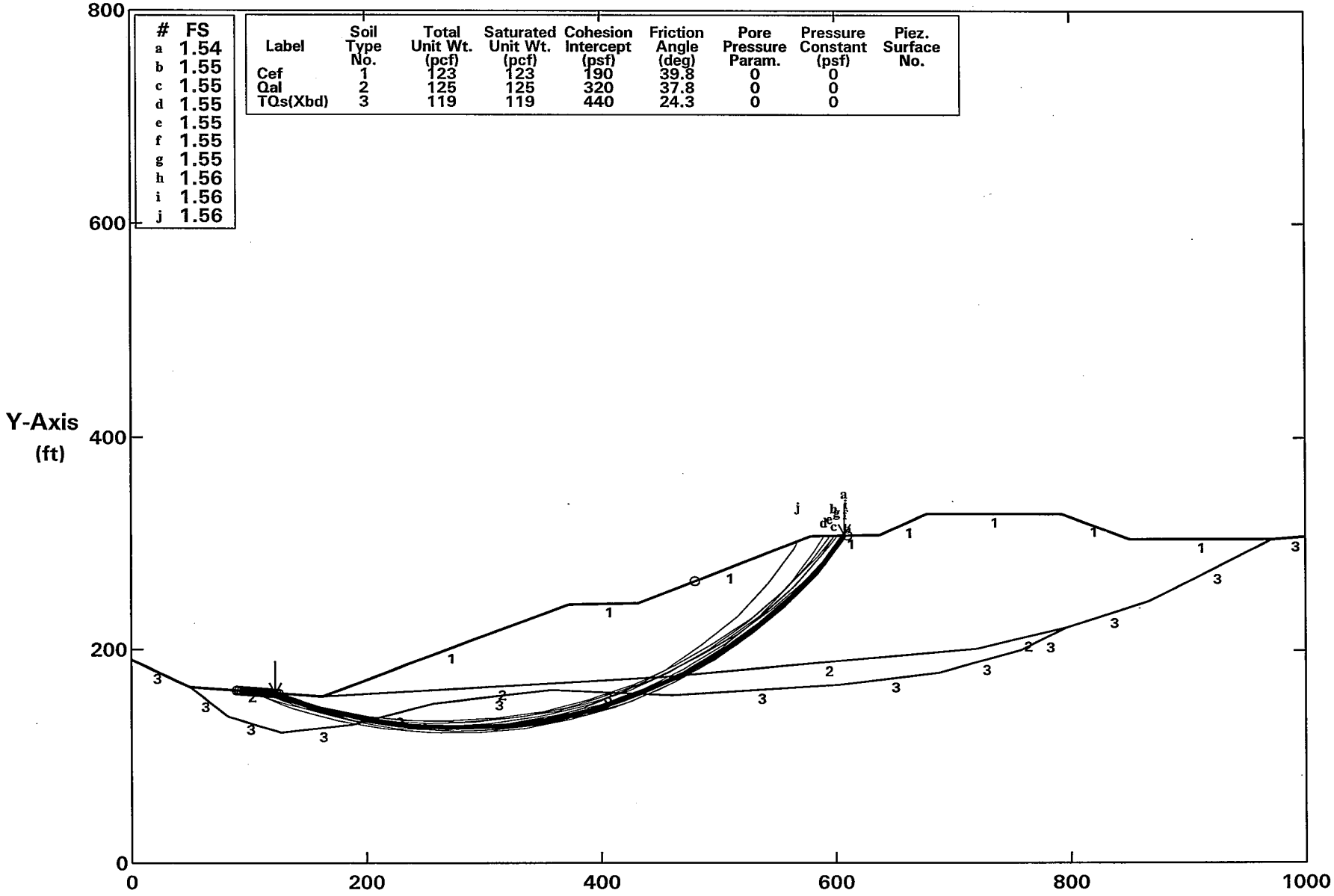


Factors Of Safety Calculated By The Modified Bishop Method

Run #71

TT52584-Hasley Cny-Sec.18-18'- Highest fill slope- Gross stability - Seismic

Ten Most Critical. C:HAS18FA'.PLT By: EC 1/19/99 12:50pm



#	FS
a	1.54
b	1.55
c	1.55
d	1.55
e	1.55
f	1.55
g	1.55
h	1.56
i	1.56
j	1.56

Label	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
Cef	1	123	123	190	39.8	0	0	
Qal	2	125	125	320	37.8	0	0	
TQs(Xbd)	3	119	119	440	24.3	0	0	

PCSTABL5M FSmin = 1.54 X-Axis (ft)

Factors Of Safety Calculated By The Modified Bishop Method

Run # 72

Run # 71

** PCSTABL5M **

by
Purdue University

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date:	1/19/99
Time of Run:	12:31pm
Run By:	EC
Input Data Filename:	C:HAS18FA.IN
Output Filename:	C:HAS18FA.OUT
Plotted Output Filename:	C:HAS18FA.PLT

PROBLEM DESCRIPTION TT52584-Hasley Cny-Sec.18-18'- Highest fill slope- Gross stability - Static

BOUNDARY COORDINATES

11 Top Boundaries
26 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	.00	190.00	50.00	165.00	3
2	50.00	165.00	163.00	156.00	2
3	163.00	156.00	372.00	242.00	1
4	372.00	242.00	431.00	244.00	1
5	431.00	244.00	579.00	306.00	1
6	579.00	306.00	637.00	308.00	1
7	637.00	308.00	677.00	327.00	1
8	677.00	327.00	792.00	327.00	1
9	792.00	327.00	850.00	304.00	1
10	850.00	304.00	971.00	304.00	1
11	971.00	304.00	1000.00	306.00	3
12	163.00	156.00	457.00	175.00	2
13	457.00	175.00	720.00	201.00	2
14	720.00	201.00	796.00	221.00	2
15	796.00	221.00	866.00	246.00	3
16	866.00	246.00	971.00	304.00	3
17	50.00	165.00	82.00	138.00	3
18	82.00	138.00	128.00	122.00	3
19	128.00	122.00	188.00	130.00	3
20	188.00	130.00	257.00	150.00	3
21	257.00	150.00	358.00	162.00	3
22	358.00	162.00	460.00	157.00	3

Run # 71

23	460.00	157.00	603.00	167.00	3
24	603.00	167.00	688.00	179.00	3
25	688.00	179.00	758.00	200.00	3
26	758.00	200.00	796.00	221.00	3

ISOTROPIC SOIL PARAMETERS

3 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	123.0	123.0	130.0	40.3	.00	.0	0
2	125.0	125.0	160.0	37.8	.00	.0	0
3	119.0	119.0	320.0	24.6	.00	.0	0

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Circular Surfaces, Has Been Specified.

180 Trial Surfaces Have Been Generated.

10 Surfaces Initiate From Each Of 18 Points Equally Spaced Along The Ground Surface Between X = 90.00 ft.
and X = 125.00 ft.

Each Surface Terminates Between X = 480.00 ft.
and X = 610.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation At Which A Surface Extends Is Y = .00 ft.

40.00 ft. Line Segments Define Each Trial Failure Surface.

Restrictions Have Been Imposed Upon The Angle Of Initiation. The Angle Has Been Restricted Between The Angles Of -45.0 And 21.0 deg.

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

Run # 71

* * Safety Factors Are Calculated By The Modified Bishop Method * *

Failure Surface Specified By 15 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	125.00	159.03
2	161.98	143.78
3	200.43	132.76
4	239.88	126.11
5	279.82	123.92
6	319.75	126.20
7	359.18	132.93
8	397.61	144.02
9	434.56	159.34
10	469.57	178.70
11	502.19	201.85
12	532.02	228.50
13	558.68	258.31
14	581.84	290.92
15	590.41	306.39

Circle Center At X = 279.5 ; Y = 481.2 and Radius, 357.3

*** 2.311 ***

Individual data on the 24 slices

Slice No.	Width Ft(m)	Weight Lbs(kg)	Water Force Top Lbs(kg)	Water Force Bot Lbs(kg)	Tie Force Norm Lbs(kg)	Tie Force Tan Lbs(kg)	Earthquake Force Hor Lbs(kg)	Earthquake Force Ver Lbs(kg)	Surcharge Load Lbs(kg)
1	37.0	28430.7	.0	.0	.0	.0	.0	.0	.0
2	1.0	1580.4	.0	.0	.0	.0	.0	.0	.0
3	36.0	112275.1	.0	.0	.0	.0	.0	.0	.0
4	1.5	6910.3	.0	.0	.0	.0	.0	.0	.0
5	39.4	243012.3	.0	.0	.0	.0	.0	.0	.0
6	17.1	136958.6	.0	.0	.0	.0	.0	.0	.0
7	22.8	208084.6	.0	.0	.0	.0	.0	.0	.0
8	39.9	424449.9	.0	.0	.0	.0	.0	.0	.0
9	38.2	461278.1	.0	.0	.0	.0	.0	.0	.0
10	1.2	14944.1	.0	.0	.0	.0	.0	.0	.0
11	12.8	163711.5	.0	.0	.0	.0	.0	.0	.0
12	25.6	320084.1	.0	.0	.0	.0	.0	.0	.0
13	33.4	379592.7	.0	.0	.0	.0	.0	.0	.0
14	1.2	12726.1	.0	.0	.0	.0	.0	.0	.0
15	2.4	25110.1	.0	.0	.0	.0	.0	.0	.0
16	22.4	234010.0	.0	.0	.0	.0	.0	.0	.0
17	7.2	72781.6	.0	.0	.0	.0	.0	.0	.0

Run #71

18	5.4	54445.9	.0	.0	.0	.0	.0	.0	.0
19	32.6	307821.4	.0	.0	.0	.0	.0	.0	.0
20	29.8	238116.2	.0	.0	.0	.0	.0	.0	.0
21	26.7	159057.9	.0	.0	.0	.0	.0	.0	.0
22	20.3	72797.5	.0	.0	.0	.0	.0	.0	.0
23	2.8	5993.2	.0	.0	.0	.0	.0	.0	.0
24	8.6	7992.0	.0	.0	.0	.0	.0	.0	.0

Failure Surface Specified By 15 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	122.94	159.19
2	160.43	145.24
3	199.14	135.18
4	238.68	129.12
5	278.63	127.12
6	318.58	129.21
7	358.10	135.37
8	396.79	145.52
9	434.25	159.56
10	470.07	177.35
11	503.90	198.70
12	535.37	223.39
13	564.16	251.16
14	589.96	281.72
15	607.21	306.97

Circle Center At X = 278.2 ; Y = 518.8 and Radius, 391.7

*** 2.311 ***

Failure Surface Specified By 15 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	125.00	159.03
2	162.60	145.38
3	201.42	135.72
4	241.02	130.13
5	281.00	128.68
6	320.91	131.38
7	360.32	138.21
8	398.81	149.09
9	435.97	163.90
10	471.39	182.49
11	504.68	204.65
12	535.51	230.15
13	563.52	258.70

STABILITY ANALYSIS

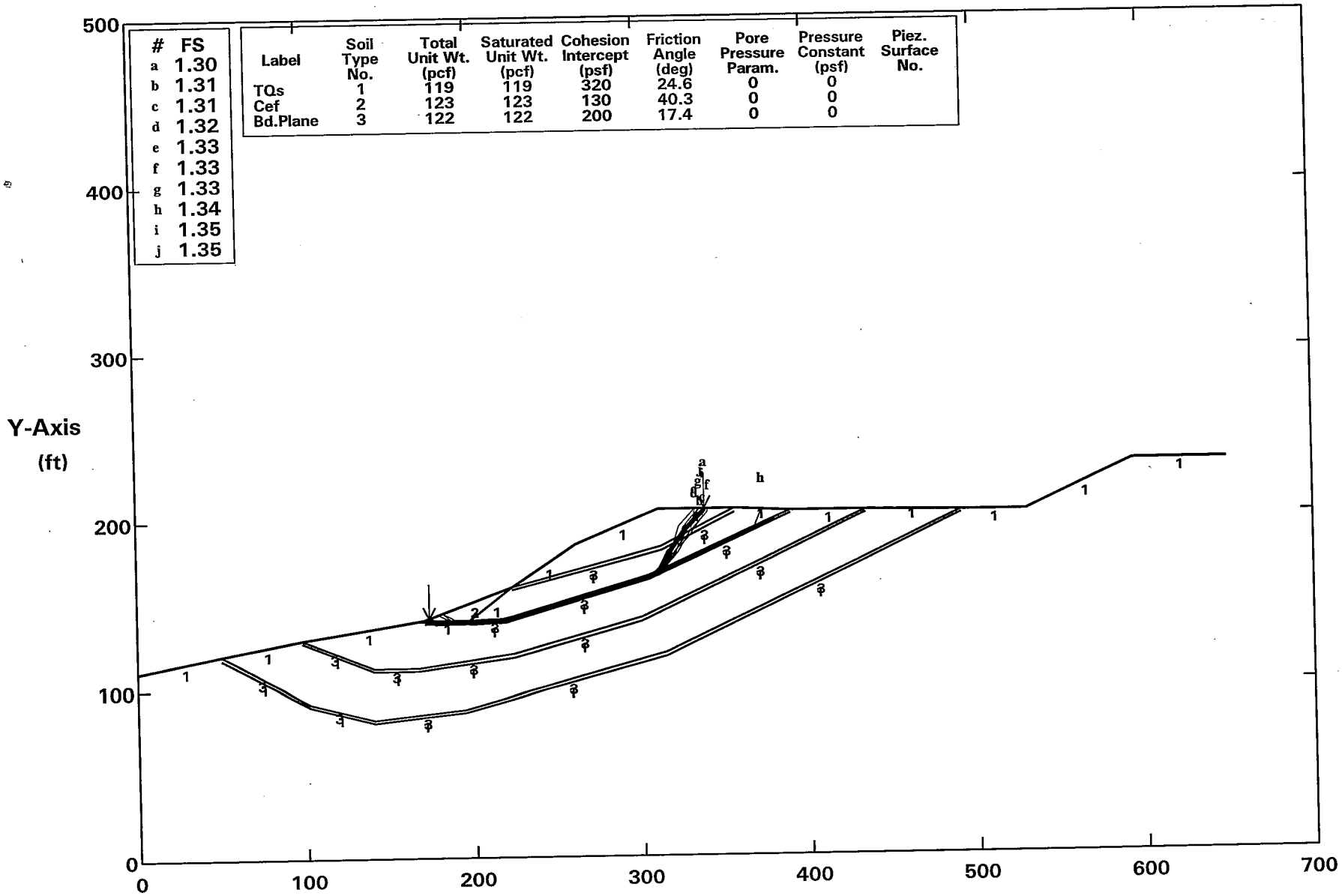
FOR CROSS SECTION 26-26'

TT52584-Hasley Cny-Sec.26-26'- Toe Plane -Static

Ten Most Critical. C:HAS26A.PLT By: EC 1/26/99 3:07pm

#	FS
a	1.30
b	1.31
c	1.31
d	1.32
e	1.33
f	1.33
g	1.33
h	1.34
i	1.35
j	1.35

Label	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
TQs	1	119	119	320	24.6	0	0	
Cef	2	123	123	130	40.3	0	0	
Bd.Plane	3	122	122	200	17.4	0	0	



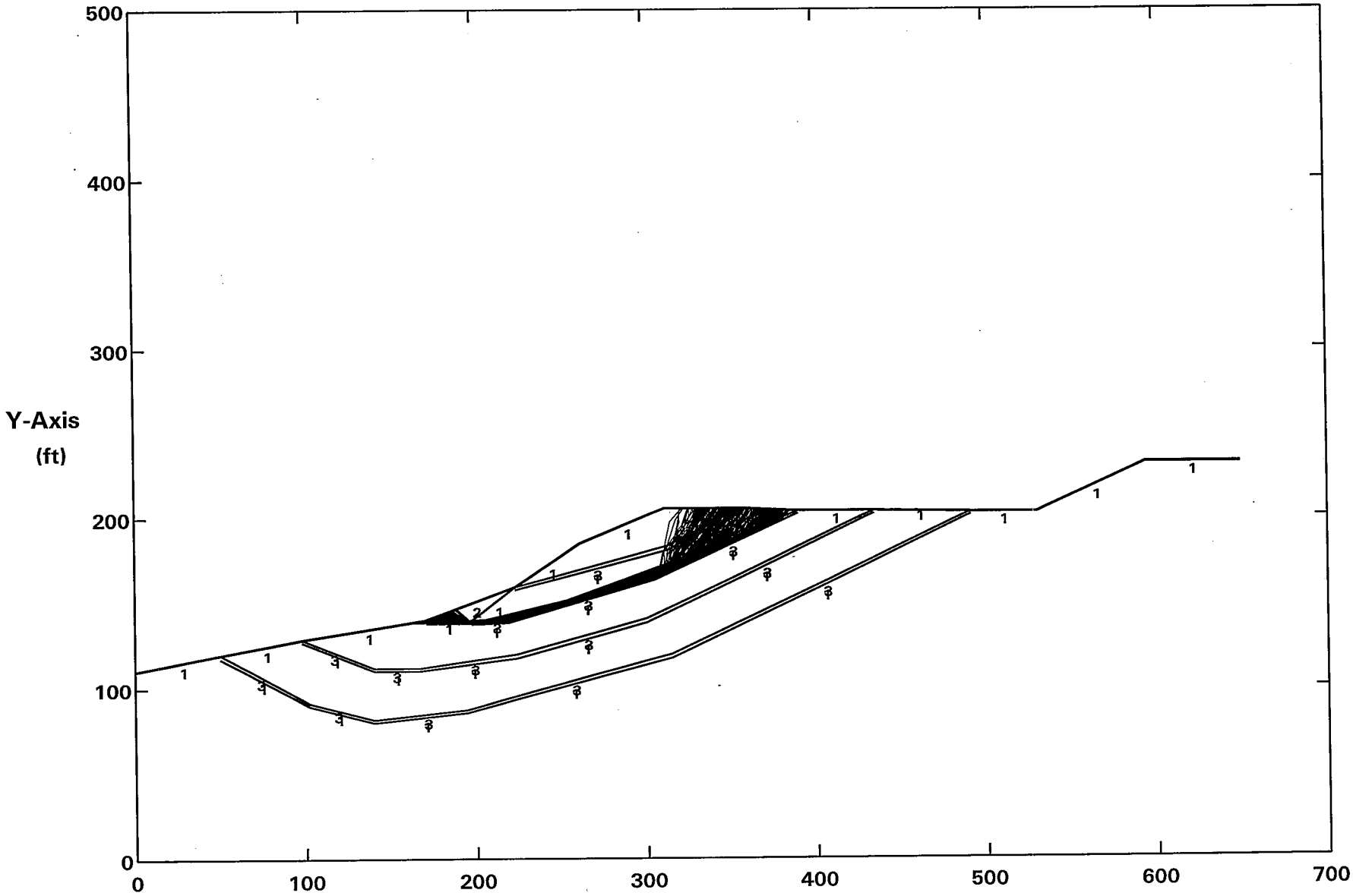
PCSTABL5M FSmin = 1.30 X-Axis (ft)

Factors Of Safety Calculated By The Modified Janbu Method

Run #75

TT52584-Hasley Cny-Sec.26-26'- Toe Plane -Static

All surfaces evaluated. C:HAS26A.PLT By: EC 1/26/99 3:07pm



Factors Of Safety Calculated By The Modified Janbu Method

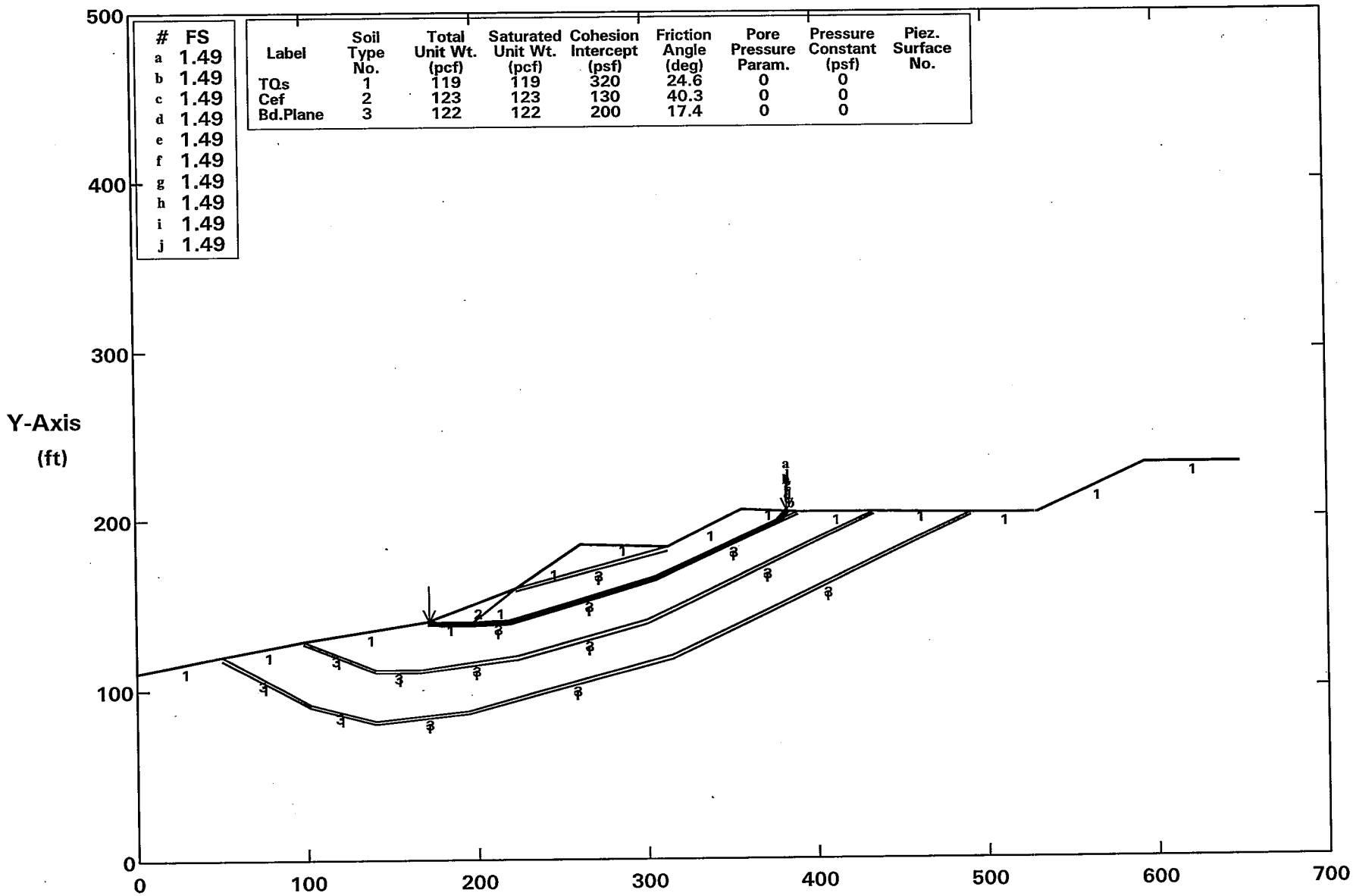
Run #75

TT52584-Hasley Cny-Sec.26-26'-w/55'bench & 2:1 cut at top - Toe plane - Static

Ten Most Critical. C:HAS26B.PLT By: EC 1/26/99 4:18pm

#	FS
a	1.49
b	1.49
c	1.49
d	1.49
e	1.49
f	1.49
g	1.49
h	1.49
i	1.49
j	1.49

Label	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
TQs	1	119	119	320	24.6	0	0	
Cef	2	123	123	130	40.3	0	0	
Bd.Plane	3	122	122	200	17.4	0	0	



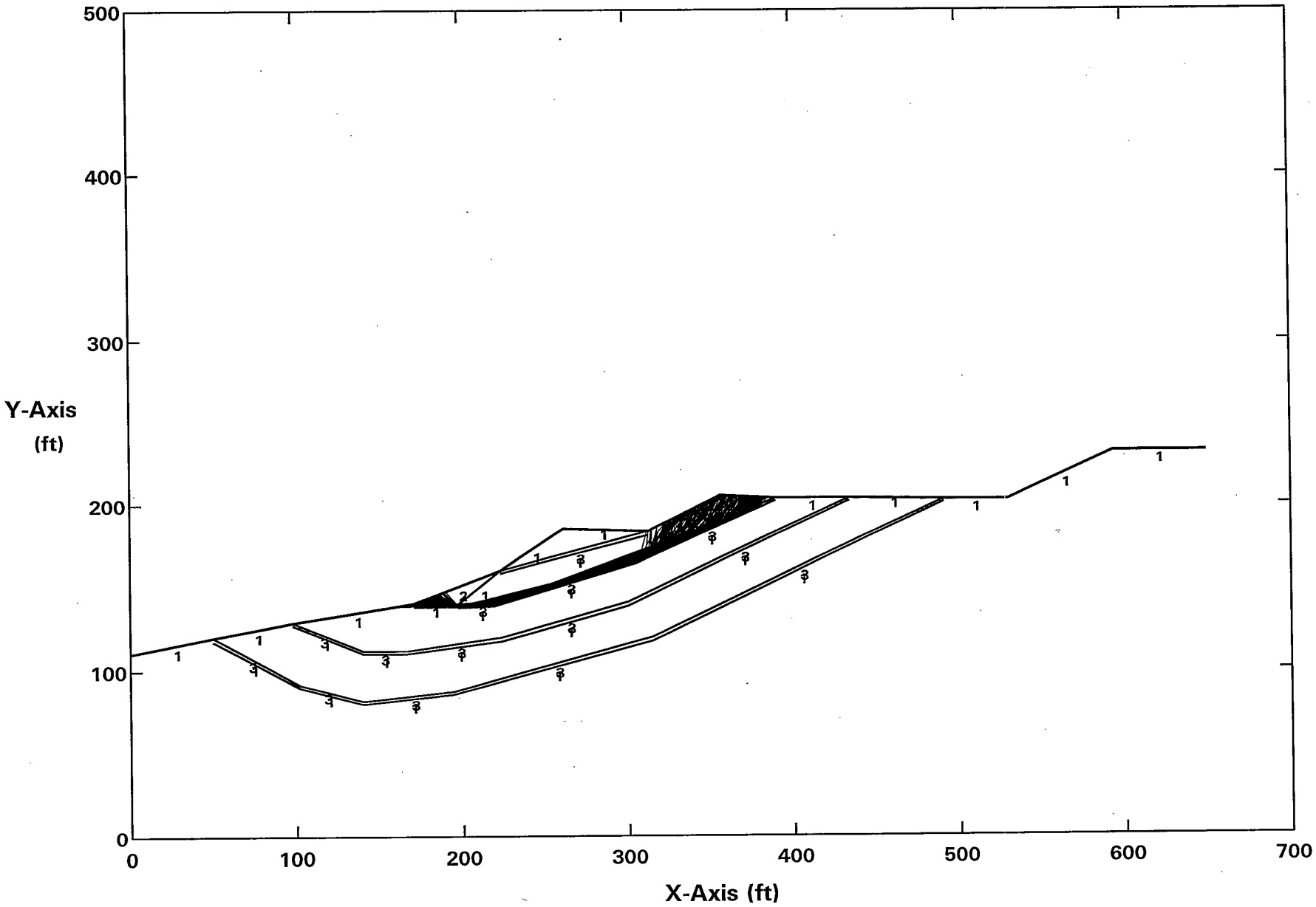
PCSTABL5M FSmin = 1.49 X-Axis (ft)

Factors Of Safety Calculated By The Modified Janbu Method

Run # 76

TT52584-Hasley Cny-Sec.26-26'-w/55'bench & 2:1 cut at top - Toe plane - Static

All surfaces evaluated. C:HAS26B.PLT By: EC 1/26/99 3:55pm



Factors Of Safety Calculated By The Modified Janbu Method

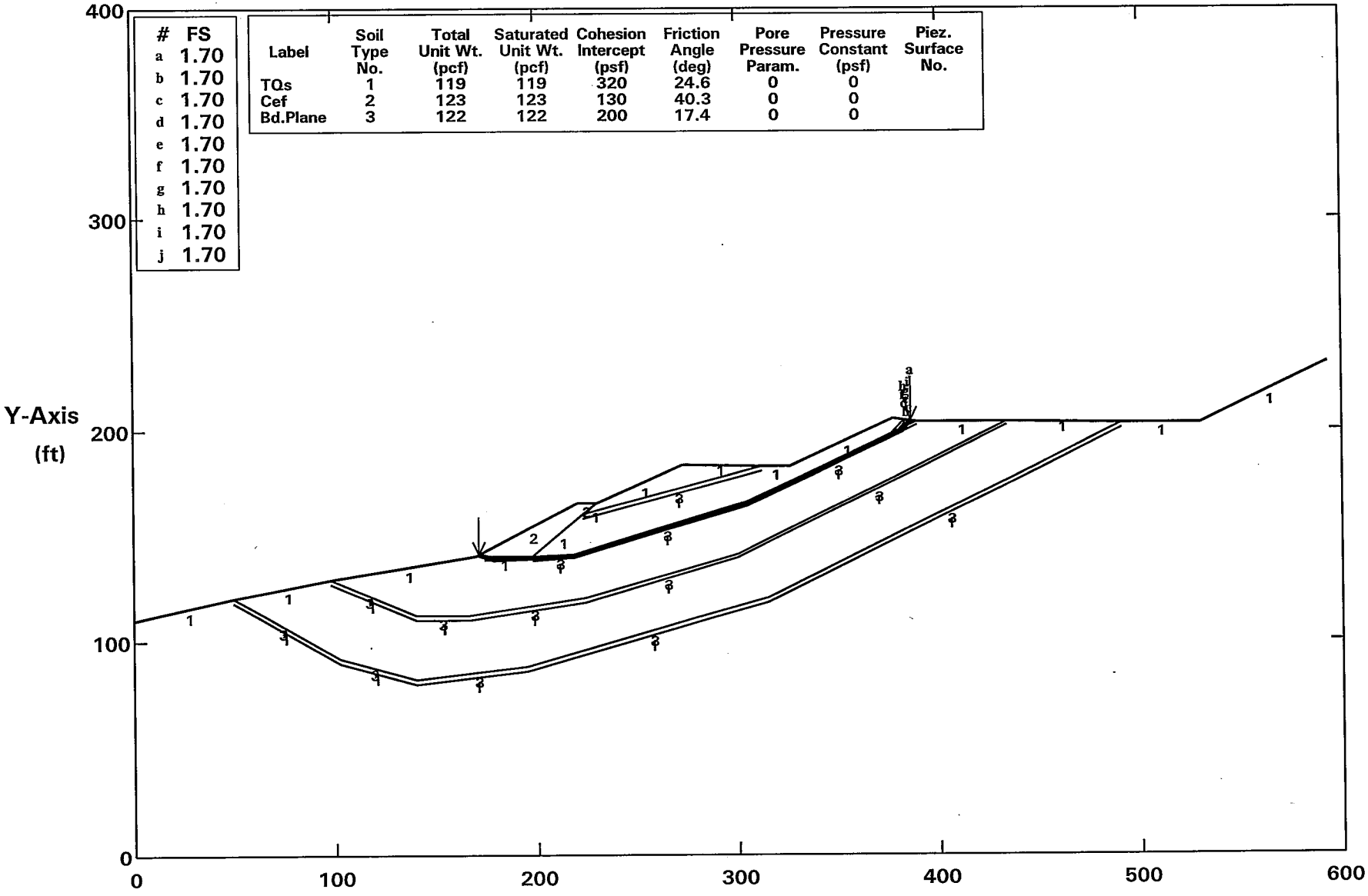
Run #76

TT52584-Hasley Cny-Sec.26-26'-w/10'& 50'benches&three 2:1 slopes-Toe plane-Static

Ten Most Critical. C:HAS26C.PLT By: EC 1/26/99 7:15pm

#	FS
a	1.70
b	1.70
c	1.70
d	1.70
e	1.70
f	1.70
g	1.70
h	1.70
i	1.70
j	1.70

Label	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
TQs	1	119	119	320	24.6	0	0	
Cef	2	123	123	130	40.3	0	0	
Bd.Plane	3	122	122	200	17.4	0	0	



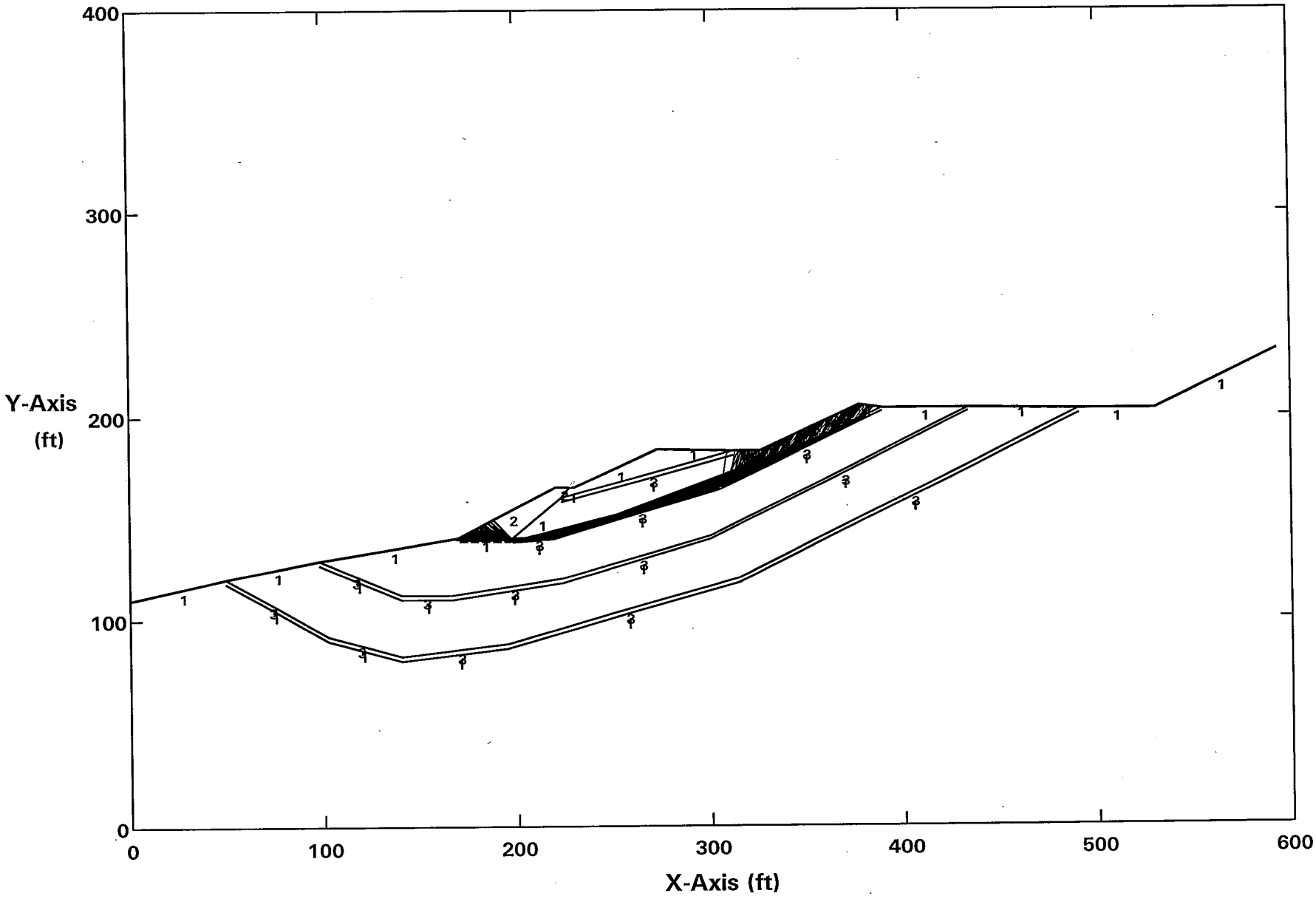
PCSTABL5M FSmin = 1.70 X-Axis (ft)

Factors Of Safety Calculated By The Modified Janbu Method

Run # 717

TT52584-Hasley Cny-Sec.26-26'-w/10'& 50'benches&three 2:1 slopes-Toe plane-Stati

All surfaces evaluated. C:HAS26C.PLT By: EC 1/26/99 6:42pm



Factors Of Safety Calculated By The Modified Janbu Method

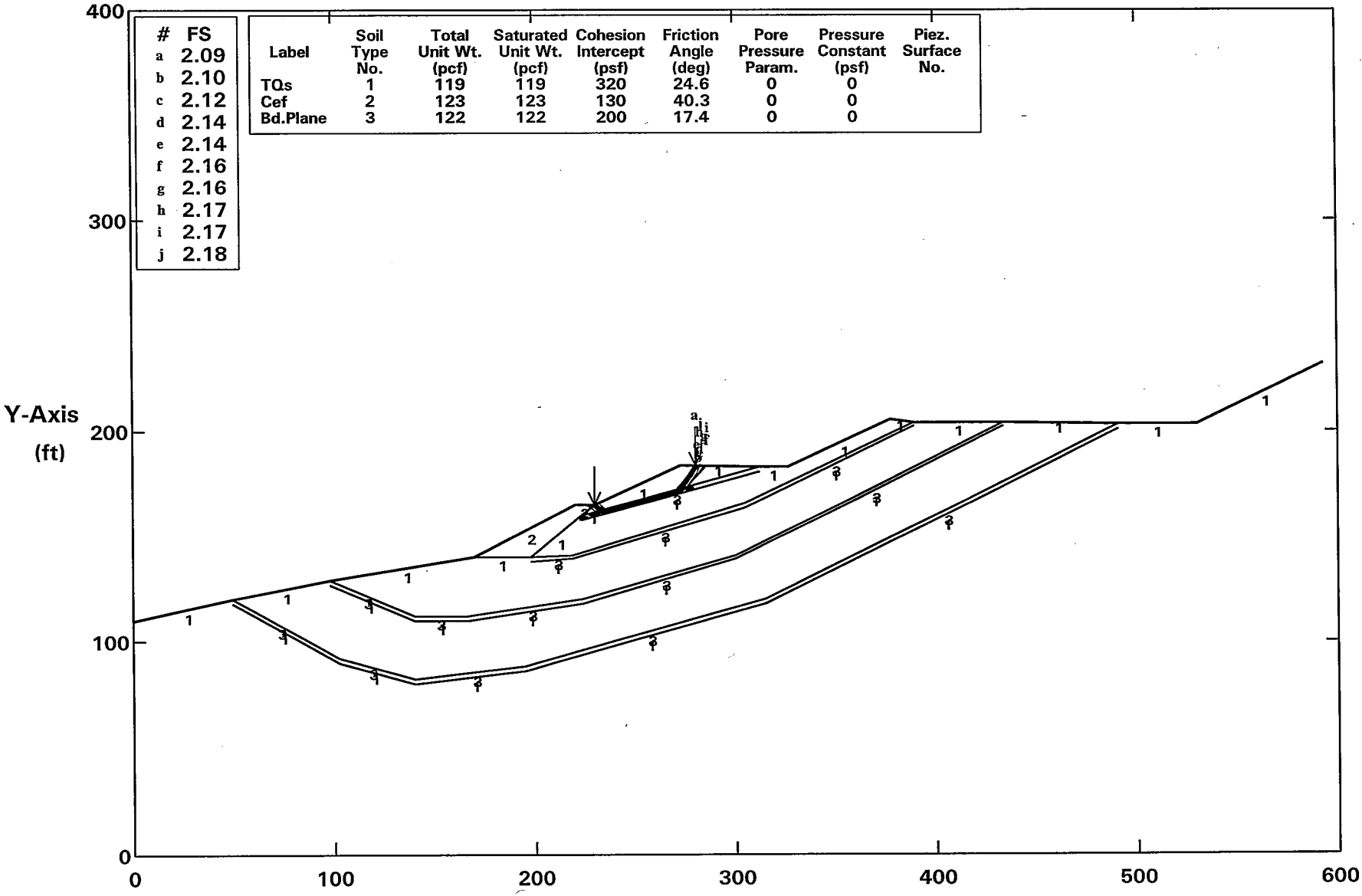
Run #77

TT52584-Hasley Cny-Sec.26-26'-w/10'& 50'benches&three 2:1 slopes-High plane-Stat

Ten Most Critical. C:HAS26D.PLT By: EC 1/26/99 7:40pm

#	FS
a	2.09
b	2.10
c	2.12
d	2.14
e	2.14
f	2.16
g	2.16
h	2.17
i	2.17
j	2.18

Label	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
TQs	1	119	119	320	24.6	0	0	
Cef	2	123	123	130	40.3	0	0	
Bd.Plane	3	122	122	200	17.4	0	0	



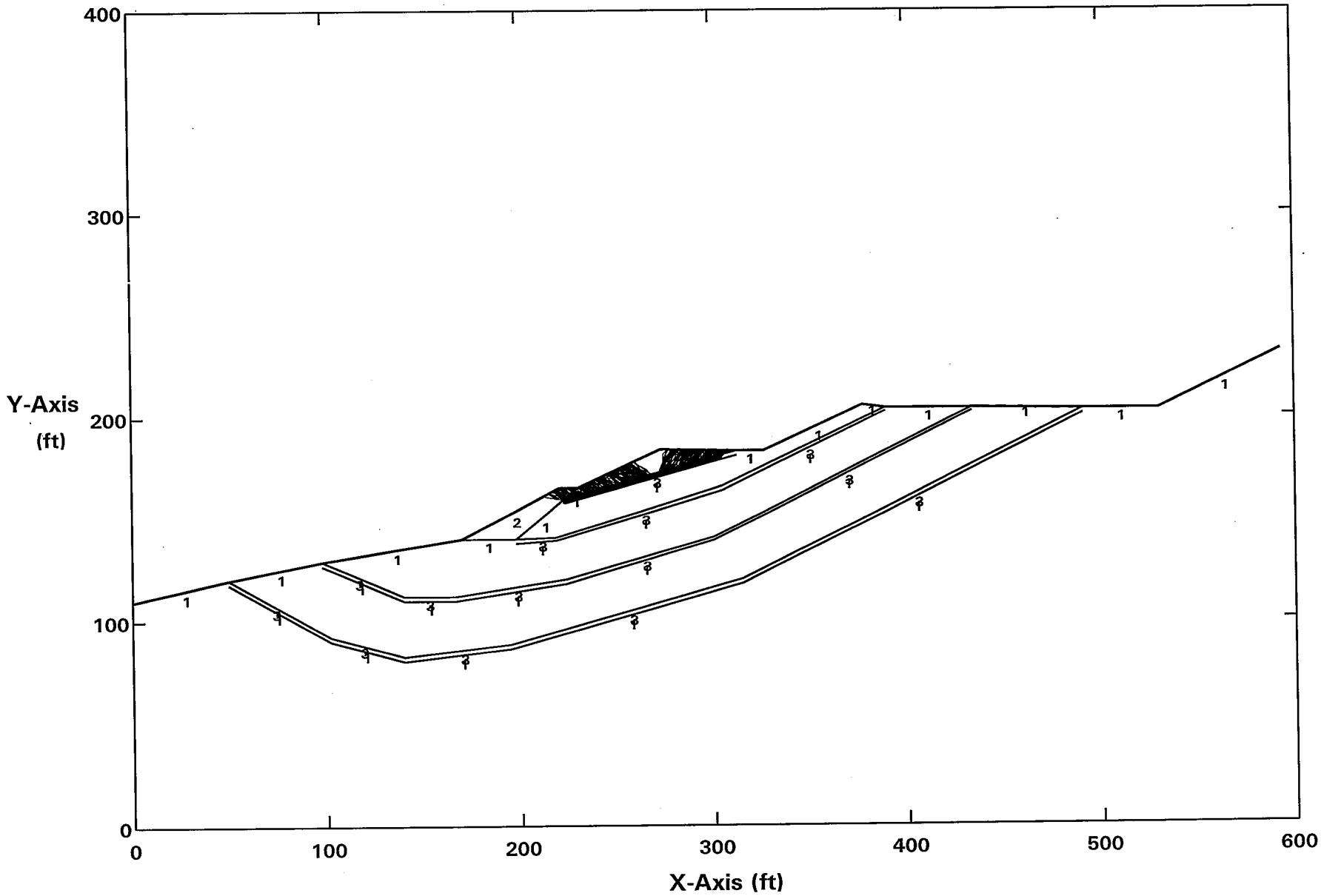
PCSTABL5M FSmin = 2.09 X-Axis (ft)

Factors Of Safety Calculated By The Modified Janbu Method

Run # 78

TT52584-Hasley Cny-Sec.26-26'-w/10'& 50'benches&three 2:1 slopes-High plane-Stat

All surfaces evaluated. C:HAS26D.PLT By: EC 1/26/99 7:34pm

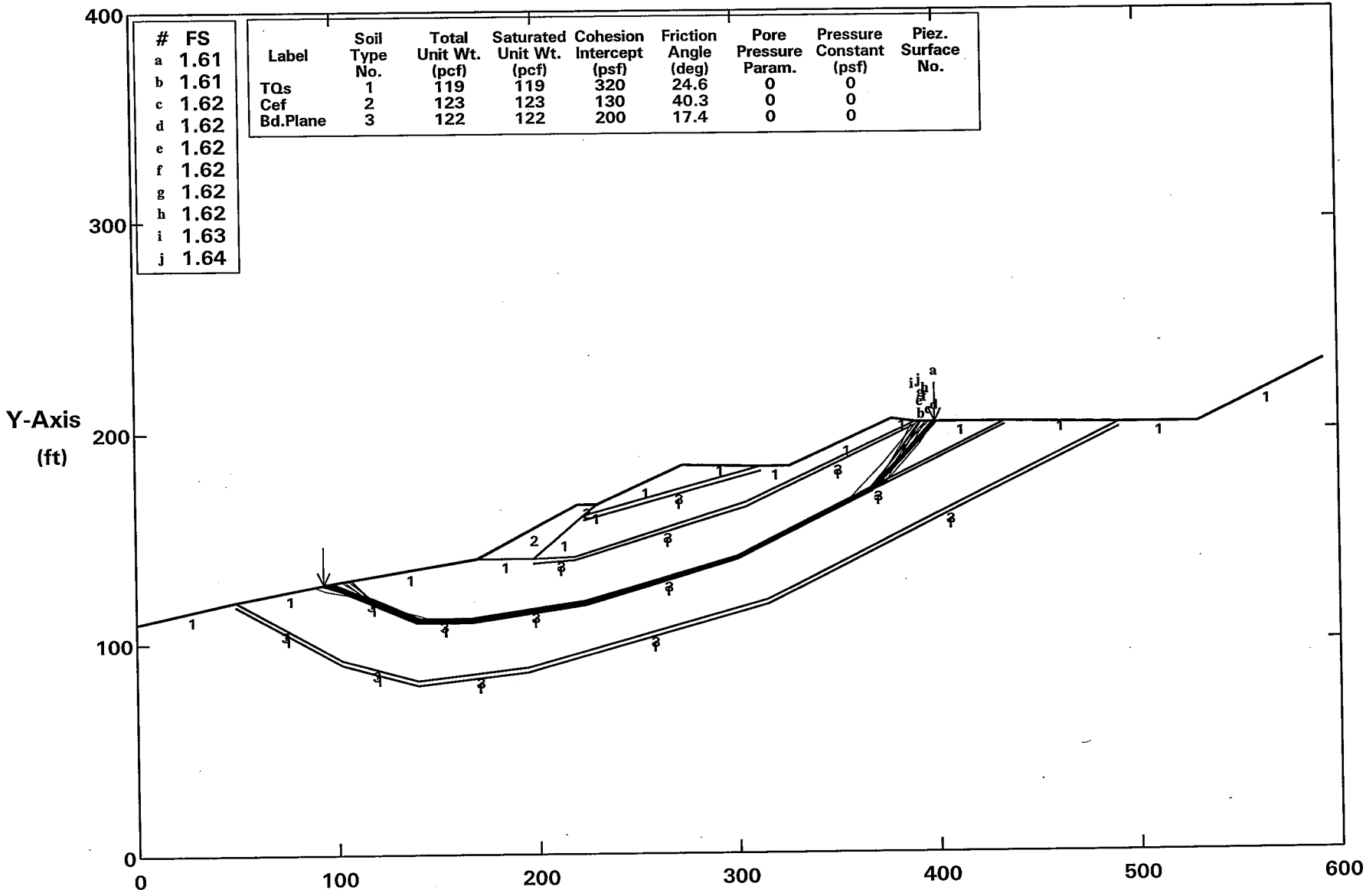


Factors Of Safety Calculated By The Modified Janbu Method

Run #78

Hasley Cny-Sec.26-26'-w/10'& 50'benches&three 2:1 slopes-Plane 30'below toe-Static

Ten Most Critical. C:HAS26E.PLT By: EC 1/26/99 8:15pm



#	FS
a	1.61
b	1.61
c	1.62
d	1.62
e	1.62
f	1.62
g	1.62
h	1.62
i	1.63
j	1.64

Label	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
TQs	1	119	119	320	24.6	0	0	
Cef	2	123	123	130	40.3	0	0	
Bd.Plane	3	122	122	200	17.4	0	0	

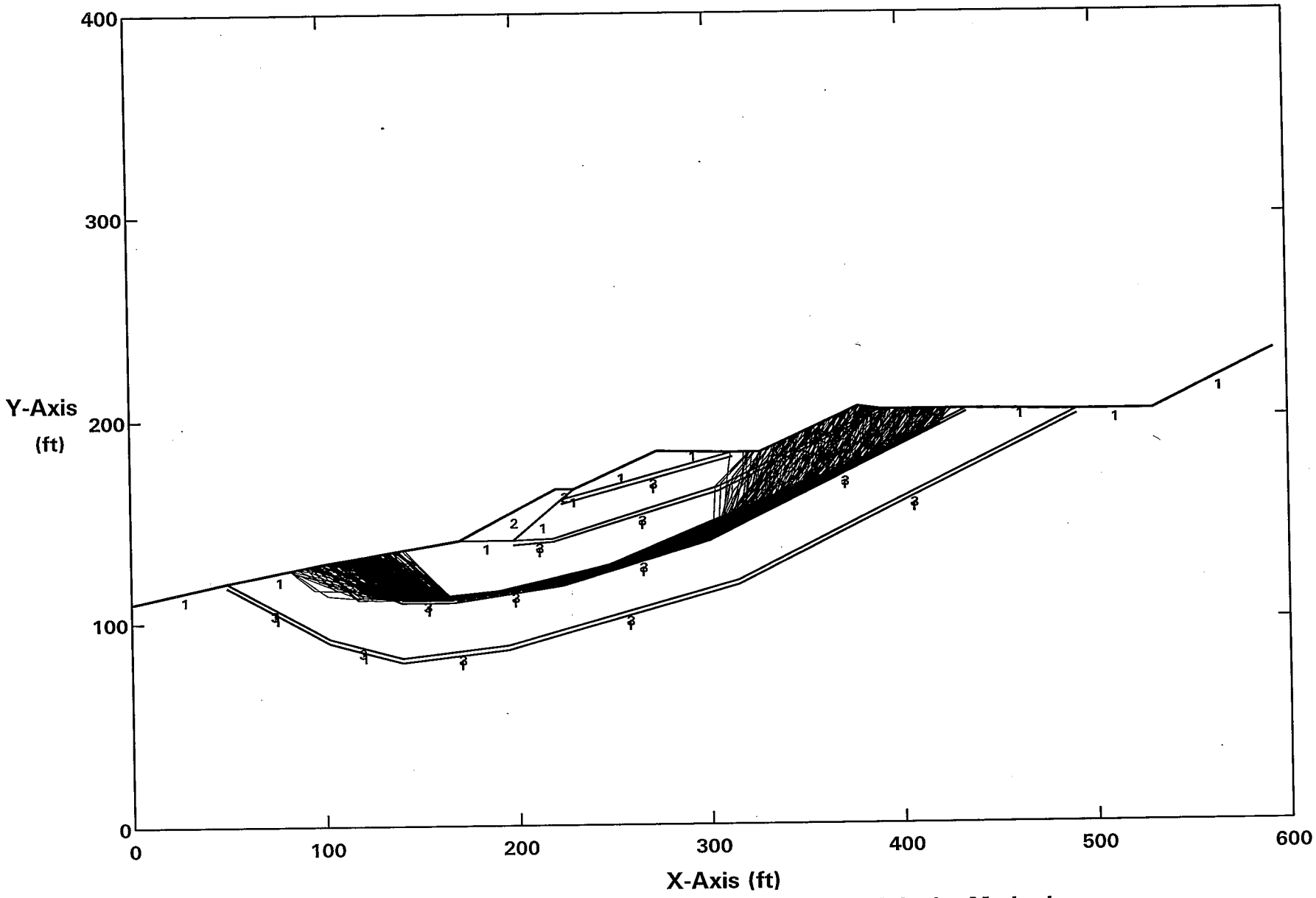
PCSTABL5M FSmin = 1.61 X-Axis (ft)

Factors Of Safety Calculated By The Modified Janbu Method

Run #79

Hasley Cny-Sec.26-26'-w/10'& 50'benches&three 2:1 slopes-Plane 30'below toe-Stat

All surfaces evaluated. C:HAS26E.PLT By: EC 1/26/99 8:06pm



Factors Of Safety Calculated By The Modified Janbu Method

Run #29

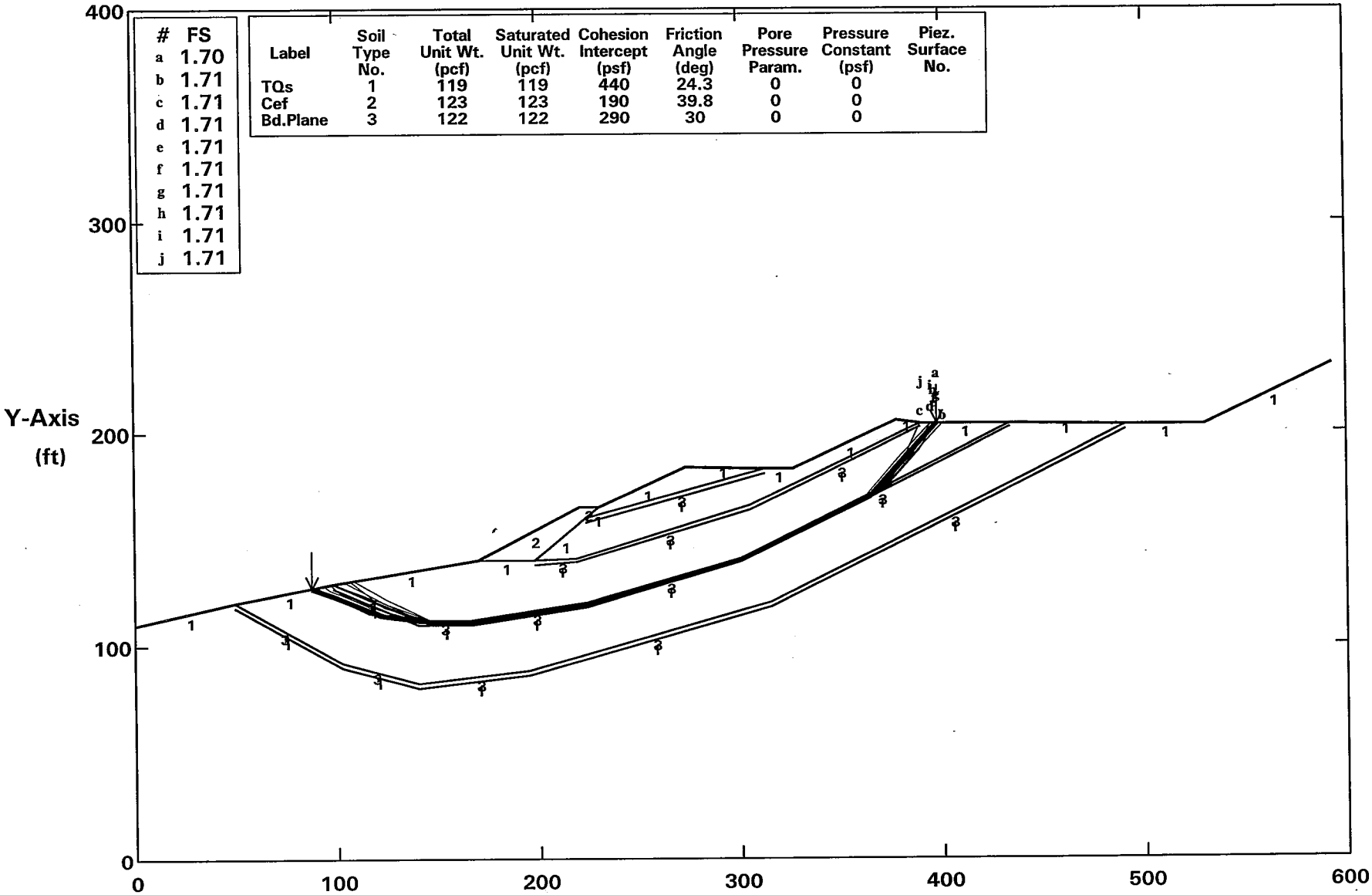
PSEUDOSTATIC

Hasley Cny-Sec.26-26'-w/10'& 50'benches&three 2:1 slopes-Plane 30'below toe-PsSt

Ten Most Critical. C:HAS26E'.PLT By: EC 1/26/99 8:36pm

#	FS
a	1.70
b	1.71
c	1.71
d	1.71
e	1.71
f	1.71
g	1.71
h	1.71
i	1.71
j	1.71

Label	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
TQs	1	119	119	440	24.3	0	0	
Cef	2	123	123	190	39.8	0	0	
Bd.Plane	3	122	122	290	30	0	0	



PCSTABL5M FSmin = 1.70 X-Axis (ft)

Factors Of Safety Calculated By The Modified Janbu Method

Run #80

Run #79

** PCSTABL5M **

by
Purdue University

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer`s Method of Slices

Run Date:	1/26/99
Time of Run:	8:15pm
Run By:	EC
Input Data Filename:	C:HAS26E.IN
Output Filename:	C:HAS26E.OUT
Plotted Output Filename:	C:HAS26E.PLT

PROBLEM DESCRIPTION Hasley Cny-Sec.26-26'-w/10'& 50'benches& three 2:1 slopes-Plane 30'below toe-Stat

BOUNDARY COORDINATES

14 Top Boundaries
45 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	.00	110.00	50.00	120.00	1
2	50.00	120.00	98.00	129.00	1
3	98.00	129.00	170.00	140.00	1
4	170.00	140.00	220.00	165.00	2
5	220.00	165.00	230.00	165.00	2
6	230.00	165.00	273.00	184.00	1
7	273.00	184.00	312.00	183.00	1
8	312.00	183.00	326.00	183.00	1
9	326.00	183.00	377.00	205.00	1
10	377.00	205.00	389.00	204.00	1
11	389.00	204.00	434.00	204.00	1
12	434.00	204.00	491.00	203.00	1
13	491.00	203.00	530.00	203.00	1
14	530.00	203.00	593.00	232.00	1
15	223.00	160.00	230.00	165.00	1
16	223.00	160.00	312.00	183.00	3
17	223.00	158.00	312.00	181.00	1
18	198.00	140.00	223.00	160.00	1
19	198.00	140.00	219.00	141.00	3
20	219.00	141.00	305.00	166.00	3
21	305.00	166.00	389.00	204.00	3
22	170.00	140.00	198.00	140.00	1

Run #79

23	198.00	138.00	219.00	139.00	1
24	219.00	139.00	305.00	164.00	1
25	305.00	164.00	389.00	202.00	1
26	98.00	129.00	140.00	112.00	3
27	140.00	112.00	167.00	112.00	3
28	167.00	112.00	224.00	120.00	3
29	224.00	120.00	300.00	141.00	3
30	300.00	141.00	434.00	204.00	3
31	98.00	127.00	140.00	110.00	1
32	140.00	110.00	167.00	110.00	1
33	167.00	110.00	224.00	118.00	1
34	224.00	118.00	300.00	139.00	1
35	300.00	139.00	434.00	202.00	1
36	50.00	120.00	102.00	92.00	3
37	102.00	92.00	140.00	82.00	3
38	140.00	82.00	195.00	88.00	3
39	195.00	88.00	315.00	120.00	3
40	315.00	120.00	491.00	203.00	3
41	50.00	118.00	102.00	90.00	1
42	102.00	90.00	140.00	80.00	1
43	140.00	80.00	195.00	86.00	1
44	195.00	86.00	315.00	118.00	1
45	315.00	118.00	491.00	201.00	1

ISOTROPIC SOIL PARAMETERS

3 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	119.0	119.0	320.0	24.6	.00	.0	0
2	123.0	123.0	130.0	40.3	.00	.0	0
3	122.0	122.0	200.0	17.4	.00	.0	0

Janbus Empirical Coef is being used for the case of c & phi both > 0

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Sliding Block Surfaces, Has Been Specified.

400 Trial Surfaces Have Been Generated.

5 Boxes Specified For Generation Of Central Block Base

Length Of Line Segments For Active And Passive Portions Of Sliding Block Is 25.0

Run #79

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	140.00	111.00	150.00	111.00	.10
2	167.00	111.00	167.00	111.00	.00
3	224.00	119.00	224.00	119.00	.00
4	300.00	140.00	300.00	140.00	.00
5	355.00	165.90	375.00	175.30	.10

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Modified Janbu Method * *

Failure Surface Specified By 10 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	93.63	128.18
2	93.94	128.00
3	117.96	121.07
4	140.83	110.98
5	167.00	111.00
6	224.00	119.00
7	300.00	140.00
8	367.09	171.56
9	384.76	189.25
10	398.64	204.00

*** 1.610 ***

Individual data on the 27 slices

Slice No.	Width Ft(m)	Weight Lbs(kg)	Water Force Top Lbs(kg)	Water Force Bot Lbs(kg)	Tie Force Norm Lbs(kg)	Tie Force Tan Lbs(kg)	Earthquake Force Hor Lbs(kg)	Earthquake Force Ver Lbs(kg)	Surcharge Load Lbs(kg)
1	.3	4.5	.0	.0	.0	.0	.0	.0	.0
2	4.1	584.7	.0	.0	.0	.0	.0	.0	.0
3	1.5	459.4	.0	.0	.0	.0	.0	.0	.0
4	17.2	13579.8	.0	.0	.0	.0	.0	.0	.0
5	1.3	1642.6	.0	.0	.0	.0	.0	.0	.0
6	4.1	5986.3	.0	.0	.0	.0	.0	.0	.0
7	17.9	39993.8	.0	.0	.0	.0	.0	.0	.0
8	.8	2409.5	.0	.0	.0	.0	.0	.0	.0

Run #79

9	26.2	82766.0	.0	.0	.0	.0	.0	.0	.0
10	3.0	10205.0	.0	.0	.0	.0	.0	.0	.0
11	28.0	112870.0	.0	.0	.0	.0	.0	.0	.0
12	21.0	107121.6	.0	.0	.0	.0	.0	.0	.0
13	1.0	5558.6	.0	.0	.0	.0	.0	.0	.0
14	3.0	16648.7	.0	.0	.0	.0	.0	.0	.0
15	1.0	5515.9	.0	.0	.0	.0	.0	.0	.0
16	6.0	32393.6	.0	.0	.0	.0	.0	.0	.0
17	43.0	245756.0	.0	.0	.0	.0	.0	.0	.0
18	27.0	152650.1	.0	.0	.0	.0	.0	.0	.0
19	5.0	25105.2	.0	.0	.0	.0	.0	.0	.0
20	7.0	32668.2	.0	.0	.0	.0	.0	.0	.0
21	14.0	56874.3	.0	.0	.0	.0	.0	.0	.0
22	41.1	146918.2	.0	.0	.0	.0	.0	.0	.0
23	1.9	6328.3	.0	.0	.0	.0	.0	.0	.0
24	8.1	24789.5	.0	.0	.0	.0	.0	.0	.0
25	7.8	17877.5	.0	.0	.0	.0	.0	.0	.0
26	4.2	6421.5	.0	.0	.0	.0	.0	.0	.0
27	9.6	5873.0	.0	.0	.0	.0	.0	.0	.0

Failure Surface Specified By 9 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	104.08	129.93
2	119.35	118.60
3	143.16	110.97
4	167.00	111.00
5	224.00	119.00
6	300.00	140.00
7	370.49	173.17
8	385.16	193.42
9	391.98	204.00

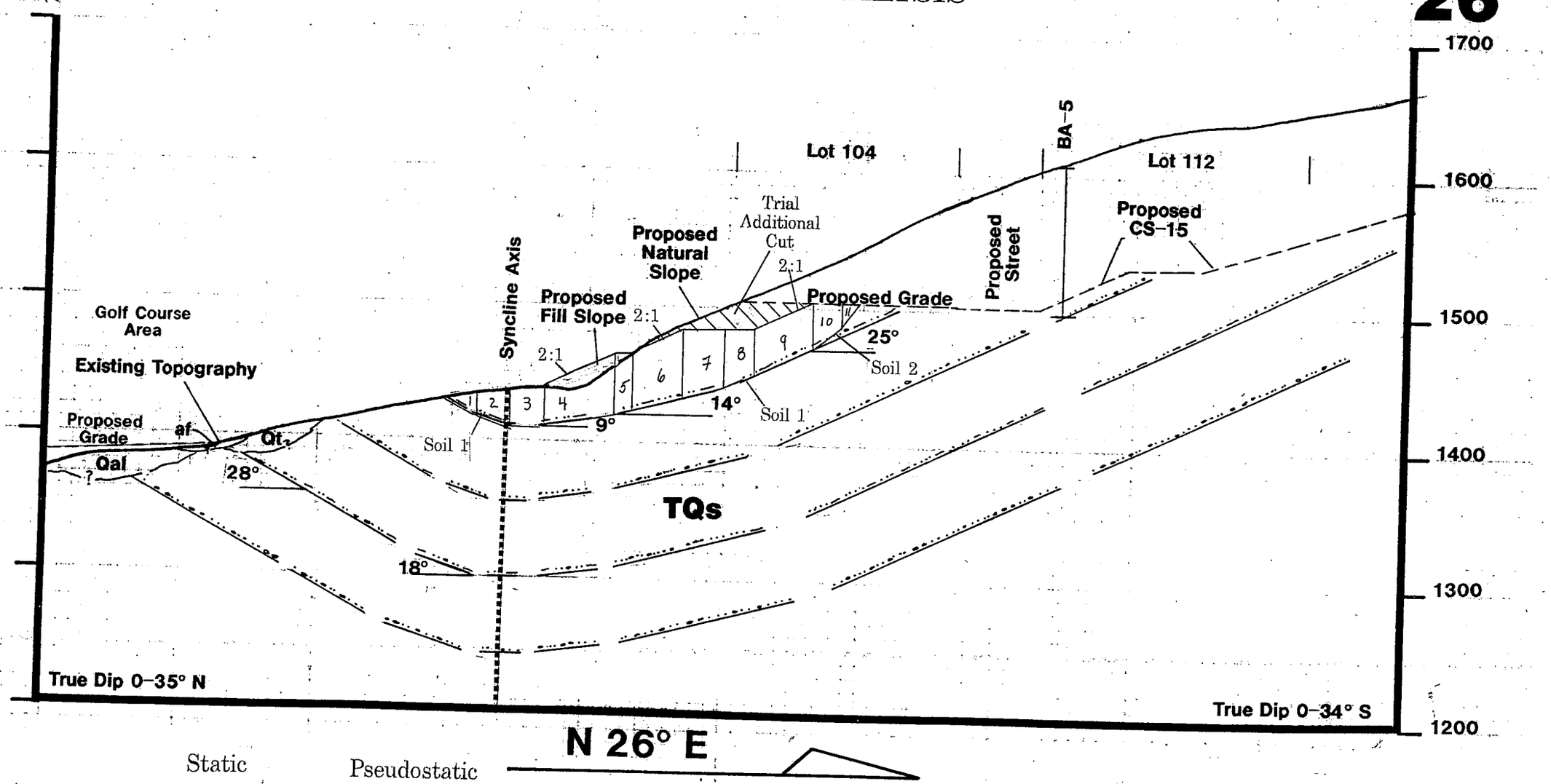
*** 1.610 ***

Failure Surface Specified By 9 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	105.22	130.10
2	118.89	119.86
3	142.27	111.02
4	167.00	111.00
5	224.00	119.00
6	300.00	140.00
7	366.07	171.14
8	382.29	190.17
9	396.05	204.00

Run # 81 + 82

CROSS SECTION
OMS STABILITY ANALYSIS



	Static c	Static ø	Pseudostatic c	Pseudostatic ø
Soil 1 (Bedding Plane)	200	17.4	290	30
Soil 2 (TQs)	320	24.6	440	24.3

ALLAN E. SEWARD
ENGINEERING GEOLOGY

JOB NUMBER: 98-1617-4		DATE: 1/15/99	
SCALE: 1"=100'		DRAWN BY: Staff	
		REVISED:	

LOS ANGELES COUNTY
DEPARTMENT OF PUBLIC WORKS
LAND DEVELOPMENT DIVISION
GEOTECHNICAL ENGINEERING
ORDINARY METHOD OF SLICES USED FOR ANALYSIS

PROJECT: TT 52584 - Hasley Canyon (Palmer Investments)
CONSULTANT: AES
REPORT DATE: O
SECTION: 26-26' w 10' & 50' benches and three 2:1 slopes CIRCLE: Plane 30' below toe - Static DATE: 1/27/99 BY: NAO

SLICE	HEIGHT(1)	HEIGHT(2)	WIDTH	AREA	WEIGHT	UNIT WT
1.	0.00	18.00	27.00	243.00	29.65	122.0
2.	18.00	28.00	26.00	598.00	72.96	122.0
3.	28.00	30.00	25.00	725.00	88.45	122.0
4.	30.00	45.00	51.00	1912.50	233.32	122.0
5.	45.00	42.00	11.00	478.50	58.38	122.0
6.	42.00	50.00	37.00	1702.00	207.64	122.0
7.	50.00	42.00	31.00	1426.00	173.97	122.0
8.	42.00	32.00	21.00	777.00	94.79	122.0
9.	32.00	33.00	42.00	1365.00	166.53	122.0
10.	33.00	17.00	21.00	525.00	62.47	119.0
11.	17.00	0.00	12.00	102.00	12.14	119.0

SLOPE STABILITY DATA

SEISMIC COEFFICIENT = 0.00 g

SLICE NO.	1 SLICE WEIGHT W (kips)	2 FAILURE PLANE ANGLE i(deg)	3 ANGLE OF INT. FRICTION phi(deg)	4 COHE-SION C (ksf)	5 LENGTH OF ARC L (ft)	6 W (1-Ru) COS i / COS i TAN phi	7 C L / COS i	8 g W (1-Ru) SINi COSi / TAN phi	9 W SIN i / COS i	10 g W COS i / COS i
1.	29.65	-26.00	17.40	0.200	30.04	7.51	5.40	0.00	-11.68	0.00
2.	72.96	-16.00	17.40	0.200	27.05	21.13	5.20	0.00	-19.33	0.00
3.	88.45	-1.50	17.40	0.200	25.01	27.70	5.00	0.00	-2.31	0.00
4.	233.32	9.00	17.40	0.200	51.64	71.33	10.20	0.00	36.05	0.00
5.	58.38	14.00	17.40	0.200	11.34	17.22	2.20	0.00	13.70	0.00
6.	207.64	14.00	17.40	0.200	38.13	61.26	7.40	0.00	48.74	0.00
7.	173.97	14.00	17.40	0.200	31.95	51.33	6.20	0.00	40.84	0.00
8.	94.79	25.00	17.40	0.200	23.17	24.40	4.20	0.00	36.31	0.00
9.	166.53	25.00	17.40	0.200	46.34	42.87	8.40	0.00	63.78	0.00

Run #81

10.	62.47	41.00	24.60	0.320	27.83	16.29	6.72	0.00	30.93	0.00
11.	12.14	52.50	24.60	0.320	19.71	2.06	3.84	0.00	5.86	0.00
						---	---	---	---	---
SUMMATION:						343.10	64.76	0.00	242.90	0.00

STATIC SAFETY FACTOR = 1.68

~~SEISMIC SAFETY FACTOR = 1.68~~

Run #81

LOS ANGELES COUNTY
DEPARTMENT OF PUBLIC WORKS
LAND DEVELOPMENT DIVISION
GEOTECHNICAL ENGINEERING
ORDINARY METHOD OF SLICES USED FOR ANALYSIS

PROJECT: TT 52584 - Hasley Canyon (Palmer Investments)
CONSULTANT: AES
REPORT DATE: O
SECTION: 26-26' w 10' & 50' benches and three 2:1 slopes CIRCLE: Plane 30' below toe - Pseudostatic DATE: 1/27/99 BY: NAO

SLICE	HEIGHT(1)	HEIGHT(2)	WIDTH	AREA	WEIGHT	UNIT WT
1.	0.00	18.00	27.00	243.00	29.65	122.0
2.	18.00	28.00	26.00	598.00	72.96	122.0
3.	28.00	30.00	25.00	725.00	88.45	122.0
4.	30.00	45.00	51.00	1912.50	233.32	122.0
5.	45.00	42.00	11.00	478.50	58.38	122.0
6.	42.00	50.00	37.00	1702.00	207.64	122.0
7.	50.00	42.00	31.00	1426.00	173.97	122.0
8.	42.00	32.00	21.00	777.00	94.79	122.0
9.	32.00	33.00	42.00	1365.00	166.53	122.0
10.	33.00	17.00	21.00	525.00	62.47	119.0
11.	17.00	0.00	12.00	102.00	12.14	119.0

SLOPE STABILITY DATA

SEISMIC COEFFICIENT = 0.15 g

SLICE NO.	1 SLICE WEIGHT W (kips)	2 FAILURE PLANE ANGLE i(deg)	3 ANGLE OF INT. FRICTION phi(deg)	4 COHE-SION C (ksf)	5 LENGTH OF ARC L (ft)	6 W (1-Ru) COS i COS i TAN phi	7 C L COS i	8 g W (1-Ru) SINi COSi TAN phi	9 W SIN i COS i	10 g W COS i COS i
1.	29.65	-26.00	30.00	0.290	30.04	13.83	7.83	-1.01	-11.68	3.59
2.	72.96	-16.00	30.00	0.290	27.05	38.92	7.54	-1.67	-19.33	10.11
3.	88.45	-1.50	30.00	0.290	25.01	51.03	7.25	-0.20	-2.31	13.26
4.	233.32	9.00	30.00	0.290	51.64	131.41	14.79	3.12	36.05	34.14
5.	58.38	14.00	30.00	0.290	11.34	31.73	3.19	1.19	13.70	8.24
6.	207.64	14.00	30.00	0.290	38.13	112.87	10.73	4.22	48.74	29.32
7.	173.97	14.00	30.00	0.290	31.95	94.56	8.99	3.54	40.84	24.57
8.	94.79	25.00	30.00	0.290	23.17	44.95	6.09	3.14	36.31	11.68

Run #82

9.	166.53	25.00	30.00	0.290	46.34	78.97	12.18	5.52	63.78	20.52
10.	62.47	41.00	24.30	0.440	27.83	16.07	9.24	2.10	30.93	5.34
11.	12.14	52.50	24.30	0.440	19.71	2.03	5.28	0.40	5.86	0.67
						---	---	---	---	---
SUMMATION:						616.38	93.11	20.34	242.90	161.45

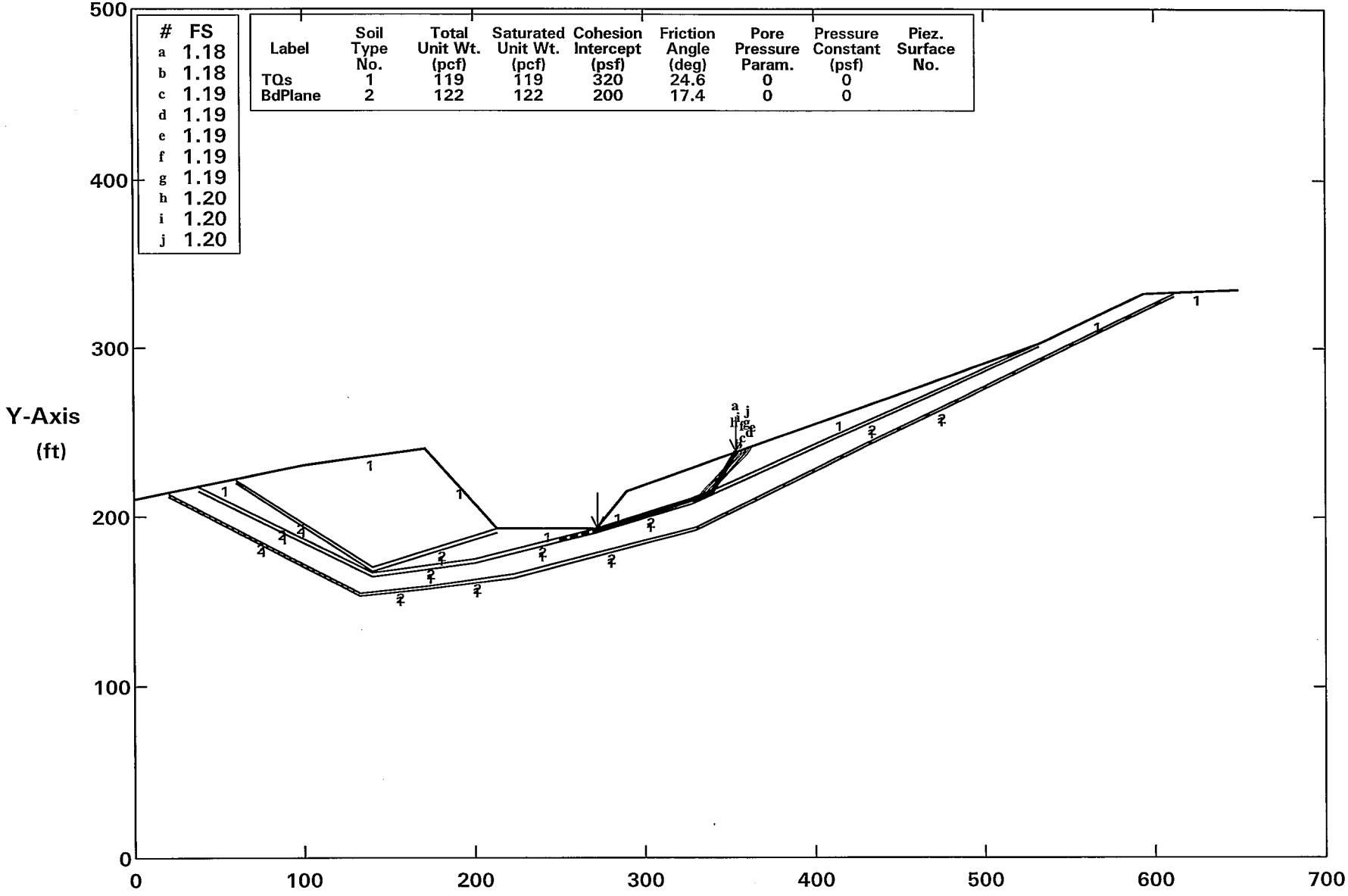
~~STATIC SAFETY FACTOR = 2.92~~

SEISMIC SAFETY FACTOR = 1.70

Run #83

TT52584 Sect.26-26'-Temp.Stab.Buttress @ key's inner corner

Ten Most Critical. C:HAS26X.PLT By: mas 1/28/99 8:48pm



#	FS
a	1.18
b	1.18
c	1.19
d	1.19
e	1.19
f	1.19
g	1.19
h	1.20
i	1.20
j	1.20

Label	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
TQs	1	119	119	320	24.6	0	0	
BdPlane	2	122	122	200	17.4	0	0	

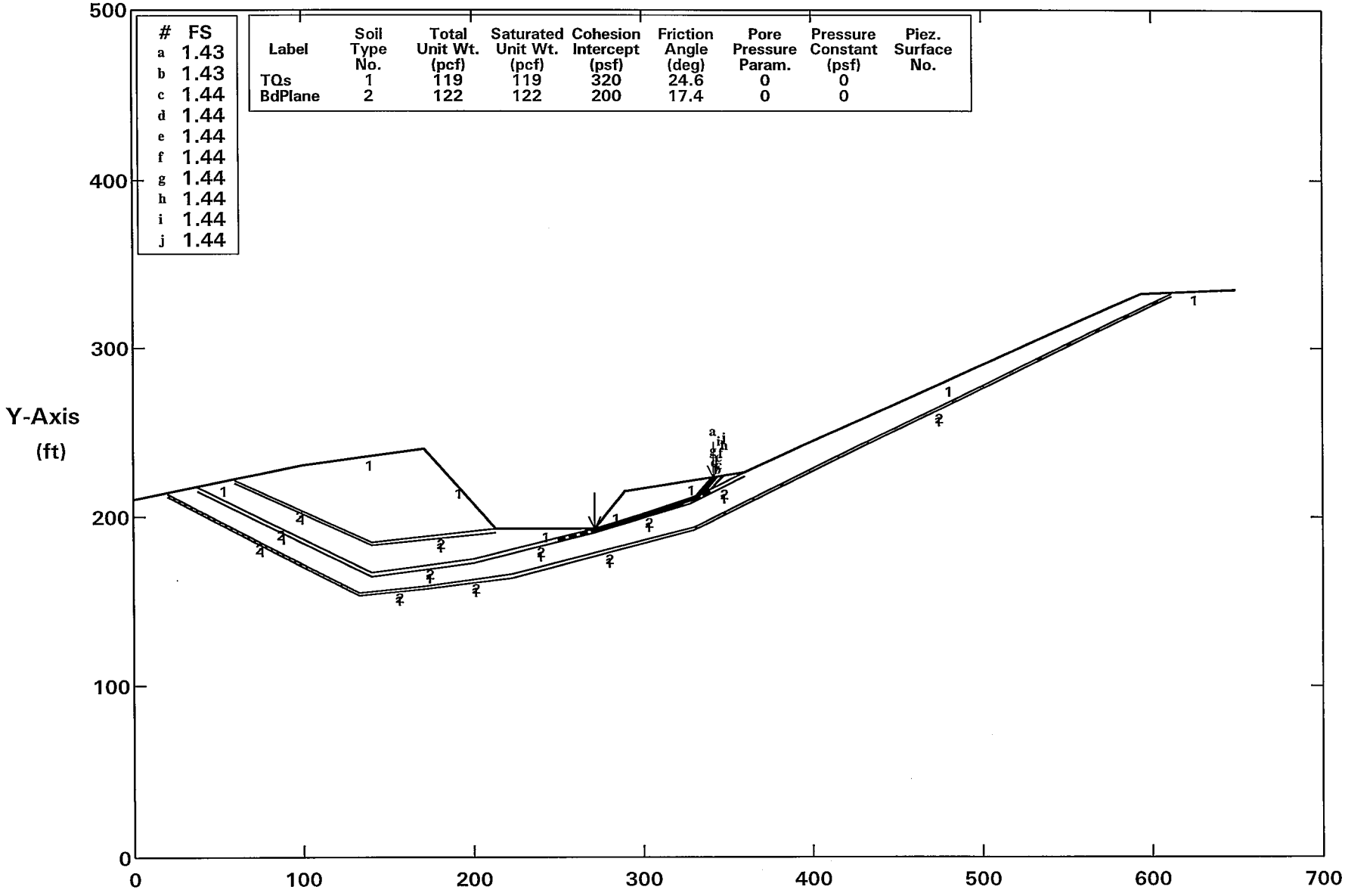
PCSTABL5M FSmin = 1.18 X-Axis (ft)

Factors Of Safety Calculated By The Modified Janbu Method

Run # 84

TT52584 Sect.26-26'-Temp.Stab.Buttress @ key's inner corner

Ten Most Critical. C:HAS26F.PLT By: mas 1/29/99 8:41am



#	FS
a	1.43
b	1.43
c	1.44
d	1.44
e	1.44
f	1.44
g	1.44
h	1.44
i	1.44
j	1.44

Label	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
TQs	1	119	119	320	24.6	0	0	
BdPlane	2	122	122	200	17.4	0	0	

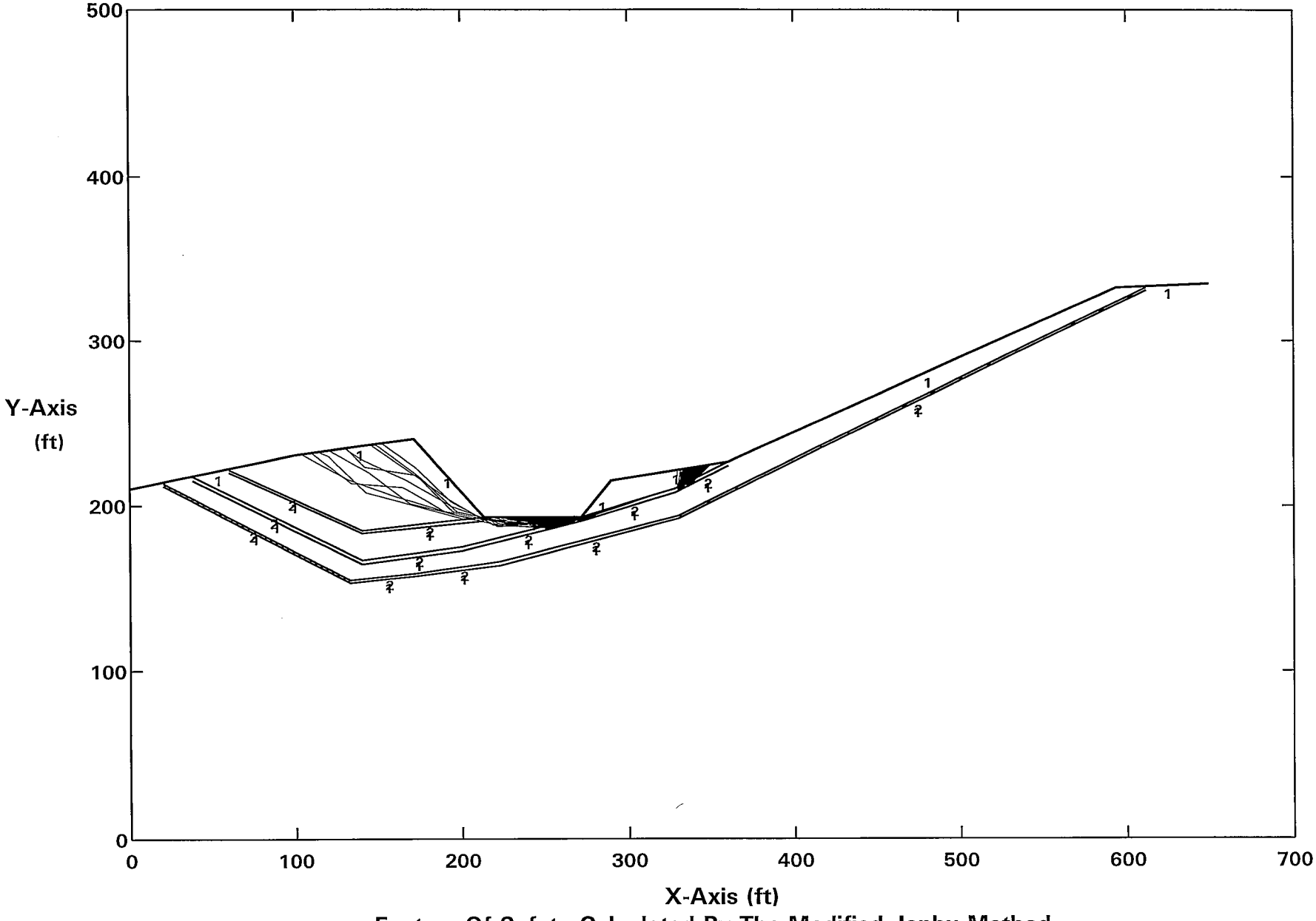
PCSTABL5M FSmin = 1.43 X-Axis (ft)

Factors Of Safety Calculated By The Modified Janbu Method

Run # 85

TT52584 Sect.26-26'-Temp.Stab.Buttress @ key's inner corner

All surfaces evaluated. C:HAS26F.PLT By: mas 1/29/99 8:41am



Factors Of Safety Calculated By The Modified Janbu Method

Run #85

Run #85

** PCSTABL5M **

by
Purdue University

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer's Method of Slices

Run Date: 1/28/99
Time of Run: 9:02pm
Run By: mas
Input Data Filename: C:HAS26F.IN
Output Filename: C:HAS26F.OUT
Plotted Output Filename: C:HAS26F.PLT

PROBLEM DESCRIPTION TT52584 Sect.26-26'-Temp.Stab.Buttress
@ key's inner corner

BOUNDARY COORDINATES

8 Top Boundaries
32 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	.00	210.00	100.00	230.00	1
2	100.00	230.00	171.00	240.00	1
3	171.00	240.00	213.00	193.00	1
4	213.00	193.00	272.00	193.00	1
5	272.00	193.00	290.00	215.00	1
6	290.00	215.00	360.00	226.00	1
7	360.00	226.00	594.00	333.00	1
8	594.00	333.00	649.00	335.00	1
9	60.00	221.50	140.00	170.00	2
10	140.00	170.00	213.00	193.00	2
11	60.00	219.50	140.00	168.00	1
12	140.00	168.00	213.00	191.00	1
13	38.00	217.30	140.00	167.00	2
14	140.00	167.00	200.00	175.00	2
15	200.00	175.00	272.00	193.00	2
16	272.00	193.00	328.00	210.00	2
17	328.00	210.00	360.00	226.00	2
18	38.00	215.30	140.00	165.00	1
19	140.00	165.00	200.00	173.00	1
20	200.00	173.00	272.00	191.00	1
21	272.00	191.00	328.00	208.00	1
22	328.00	208.00	360.00	224.00	1

Run #85

23	20.00	213.50	133.00	155.00	2
24	133.00	155.00	172.00	159.00	2
25	172.00	159.00	223.00	166.00	2
26	223.00	166.00	330.00	194.00	2
27	330.00	194.00	612.00	333.00	2
28	20.00	211.50	133.00	153.00	1
29	133.00	153.00	172.00	157.00	1
30	172.00	157.00	223.00	164.00	1
31	223.00	164.00	330.00	192.00	1
32	330.00	192.00	612.00	331.00	1

ISOTROPIC SOIL PARAMETERS

2 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	119.0	119.0	320.0	24.6	.00	.0	0
2	122.0	122.0	200.0	17.4	.00	.0	0

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Sliding Block Surfaces, Has Been Specified.

300 Trial Surfaces Have Been Generated.

3 Boxes Specified For Generation Of Central Block Base

Length Of Line Segments For Active And Passive Portions Of Sliding Block Is 31.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	250.00	186.30	275.00	192.90	.10
2	328.00	210.00	328.00	210.00	.00
3	329.00	210.40	340.00	215.40	.10

The Factor Of Safety For The Trial Failure Surface Defined By The Coordinates Listed Below Is Misleading.

Failure Surface Defined By 9 Coordinate Points

Run #85

Point No.	X-Surf (ft)	Y-Surf (ft)
1	104.74	230.67
2	131.75	215.76
3	161.01	205.50
4	190.58	196.20
5	221.08	190.69
6	251.84	186.77
7	328.00	210.00
8	334.82	213.06
9	343.36	223.39

Factor Of Safety For The Preceding Specified Surface = -4.604

The Factor Of Safety For The Trial Failure Surface Defined
By The Coordinates Listed Below Is Misleading.

Failure Surface Defined By 10 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	114.71	232.07
2	120.27	229.40
3	142.73	208.03
4	172.58	199.65
5	202.58	191.86
6	233.57	191.15
7	264.56	190.14
8	328.00	210.00
9	336.47	213.80
10	339.53	222.78

Factor Of Safety For The Preceding Specified Surface = -4.228

The Factor Of Safety For The Trial Failure Surface Defined
By The Coordinates Listed Below Is Misleading.

Failure Surface Defined By 8 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)

Run #85

1	145.97	236.47
2	167.09	221.85
3	192.02	203.43
4	219.08	188.29
5	250.01	186.29
6	328.00	210.00
7	330.80	211.21
8	342.10	223.19

Factor Of Safety For The Preceding Specified Surface = -5.830

The Factor Of Safety For The Trial Failure Surface Defined
By The Coordinates Listed Below Is Misleading.

Failure Surface Defined By 9 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	130.59	234.31
2	142.30	223.08
3	172.89	218.04
4	194.82	196.13
5	225.28	190.37
6	256.18	187.95
7	328.00	210.00
8	334.33	212.78
9	344.06	223.50

Factor Of Safety For The Preceding Specified Surface = -5.560

The Factor Of Safety For The Trial Failure Surface Defined
By The Coordinates Listed Below Is Misleading.

Failure Surface Defined By 9 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	121.13	232.98
2	144.13	219.78
3	169.11	201.43
4	199.10	193.59

Run #85

5	229.81	189.37
6	260.81	189.15
7	328.00	210.00
8	331.86	211.69
9	332.13	221.62

Factor Of Safety For The Preceding Specified Surface = -2.675

The Factor Of Safety For The Trial Failure Surface Defined
By The Coordinates Listed Below Is Misleading.

Failure Surface Defined By 8 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	152.10	237.34
2	171.71	223.37
3	193.88	201.70
4	221.48	187.58
5	252.47	187.00
6	328.00	210.00
7	339.57	215.21
8	341.57	223.10

Factor Of Safety For The Preceding Specified Surface = -7.363

The Factor Of Safety For The Trial Failure Surface Defined
By The Coordinates Listed Below Is Misleading.

Failure Surface Defined By 9 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	143.86	236.18
2	149.51	235.70
3	174.72	217.66
4	196.96	196.07
5	227.40	190.19
6	258.35	188.54
7	328.00	210.00
8	334.08	212.69
9	338.31	222.59

Run #85

Factor Of Safety For The Preceding Specified Surface = -5.068

The Factor Of Safety For The Trial Failure Surface Defined
By The Coordinates Listed Below Is Misleading.

Failure Surface Defined By 9 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	129.79	234.20
2	139.20	227.85
3	167.41	215.00
4	194.15	199.32
5	223.36	188.94
6	254.33	187.43
7	328.00	210.00
8	331.45	211.50
9	342.58	223.26

Factor Of Safety For The Preceding Specified Surface = -4.926

The Factor Of Safety For The Trial Failure Surface Defined
By The Coordinates Listed Below Is Misleading.

Failure Surface Defined By 9 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	110.05	231.42
2	133.79	213.47
3	164.65	210.52
4	191.58	195.17
5	221.74	188.00
6	252.73	186.98
7	328.00	210.00
8	338.74	214.85
9	345.56	223.73

Run #85

Factor Of Safety For The Preceding Specified Surface = -4.568

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Modified Janbu Method * *

Failure Surface Specified By 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	272.11	193.14
2	274.00	192.60
3	328.00	210.00
4	331.47	211.56
5	341.53	223.10

*** 1.433 ***

Individual data on the 7 slices

Slice No.	Width Ft(m)	Weight Lbs(kg)	Water Force Top Lbs(kg)	Water Force Bot Lbs(kg)	Tie Force Norm Lbs(kg)	Tie Force Tan Lbs(kg)	Earthquake Force Hor Lbs(kg)	Earthquake Force Ver Lbs(kg)	Surcharge Load Lbs(kg)
1	.2	2.9	.0	.0	.0	.0	.0	.0	.0
2	1.7	317.7	.0	.0	.0	.0	.0	.0	.0
3	16.0	19159.8	.0	.0	.0	.0	.0	.0	.0
4	38.0	63830.2	.0	.0	.0	.0	.0	.0	.0
5	3.5	4322.2	.0	.0	.0	.0	.0	.0	.0
6	.3	322.0	.0	.0	.0	.0	.0	.0	.0
7	9.8	5637.4	.0	.0	.0	.0	.0	.0	.0

Failure Surface Specified By 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	272.00	193.00
2	273.39	192.52
3	328.00	210.00
4	336.58	213.85
5	344.30	223.53

Run #85

*** 1.433 ***

Failure Surface Specified By 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	272.36	193.44
2	274.10	192.66
3	328.00	210.00
4	336.37	213.80
5	344.59	223.58

*** 1.435 ***

Failure Surface Specified By 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	272.38	193.46
2	274.83	192.82
3	328.00	210.00
4	337.68	214.37
5	342.73	223.29

*** 1.435 ***

Failure Surface Specified By 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	272.24	193.30
2	274.92	192.86
3	328.00	210.00
4	334.24	212.79
5	344.95	223.63

*** 1.438 ***

Run #85

Failure Surface Specified By 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	272.23	193.28
2	273.84	192.58
3	328.00	210.00
4	337.20	214.15
5	346.73	223.92

*** 1.438 ***

Failure Surface Specified By 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	272.12	193.15
2	273.65	192.59
3	328.00	210.00
4	335.74	213.49
5	341.16	223.04

*** 1.439 ***

Failure Surface Specified By 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	272.16	193.19
2	273.56	192.56
3	328.00	210.00
4	339.18	215.07
5	348.16	224.14

*** 1.440 ***

Run #85

Failure Surface Specified By 5 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	270.58	193.00
2	274.18	192.67
3	328.00	210.00
4	335.59	213.40
5	344.38	223.55

*** 1.441 ***

Failure Surface Specified By 5 Coordinate Points

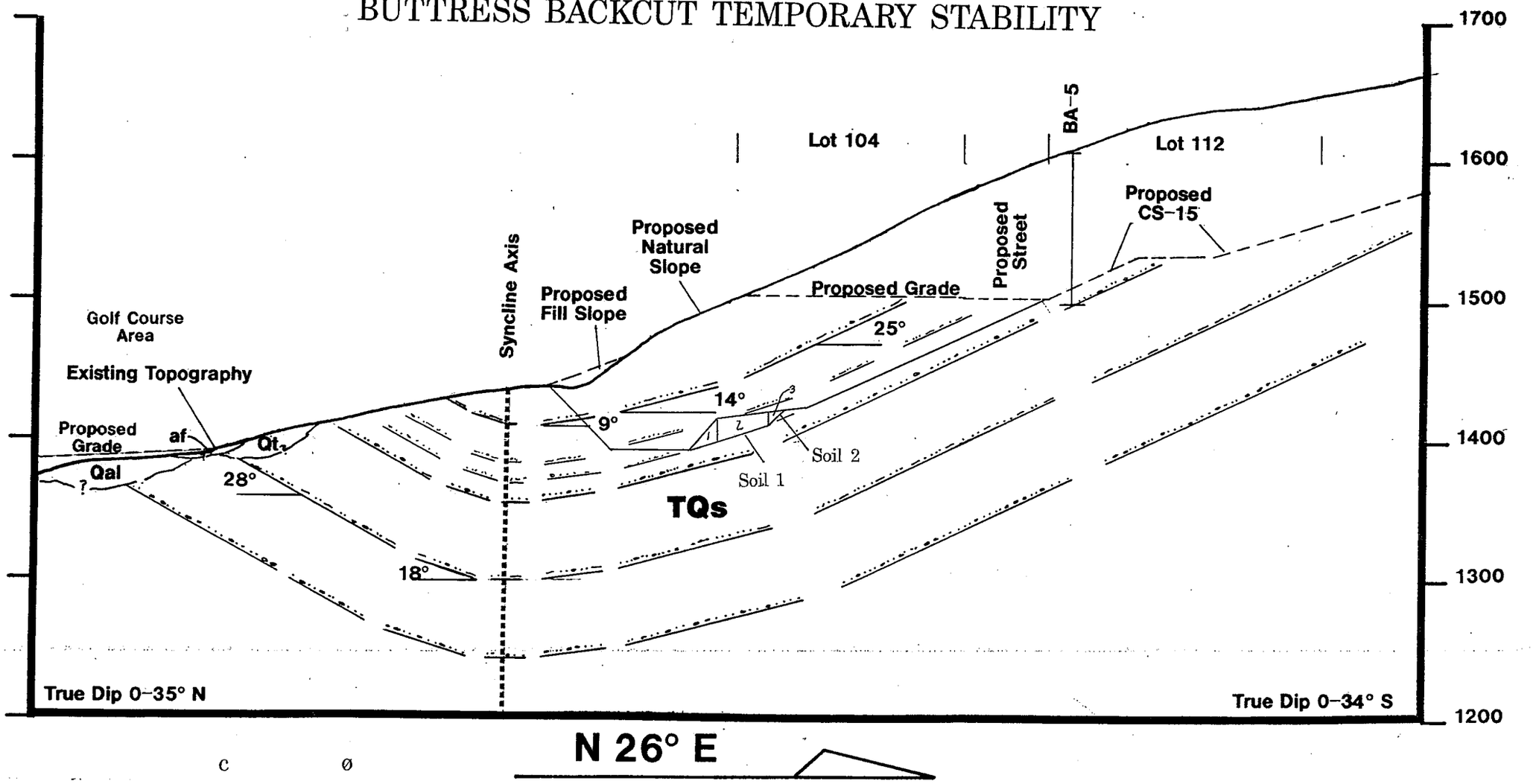
Point No.	X-Surf (ft)	Y-Surf (ft)
1	272.14	193.17
2	272.98	192.41
3	328.00	210.00
4	338.97	214.89
5	347.35	224.01

*** 1.443 ***

Run #86

CROSS SECTION

OMS STABILITY ANALYSIS
BUTTRESS BACKCUT TEMPORARY STABILITY



	c	ø
Soil 1 (Bedding Plane)	200	17.4
Soil 2 (TQs)	320	24.6

ALLAN E. SEWARD
ENGINEERING GEOLOGY

JOB NUMBER: 98-1617-4		DATE: 1/15/99	
SCALE: 1"=100'		DRAWN BY: Staff	
		REVISED:	

LOS ANGELES COUNTY
DEPARTMENT OF PUBLIC WORKS
LAND DEVELOPMENT DIVISION
GEOTECHNICAL ENGINEERING
ORDINARY METHOD OF SLICES USED FOR ANALYSIS

PROJECT: TT 52584 - Hasley Canyon (Palmer Investments)
CONSULTANT: AES
REPORT DATE:
SECTION: 26-26'-Backcut for large buttress - temporary stability CIRCLE: Bedding Plane at key's inner corner-Static DATE: 1/29/99
BY: NAO

SLICE	HEIGHT(1)	HEIGHT(2)	WIDTH	AREA	WEIGHT	UNIT WT
1.	0.00	18.00	21.00	189.00	23.06	122.0
2.	18.00	10.00	36.00	504.00	61.49	122.0
3.	10.00	0.00	14.00	70.00	8.33	119.0

SLOPE STABILITY DATA

SEISMIC COEFFICIENT = 0.00 g

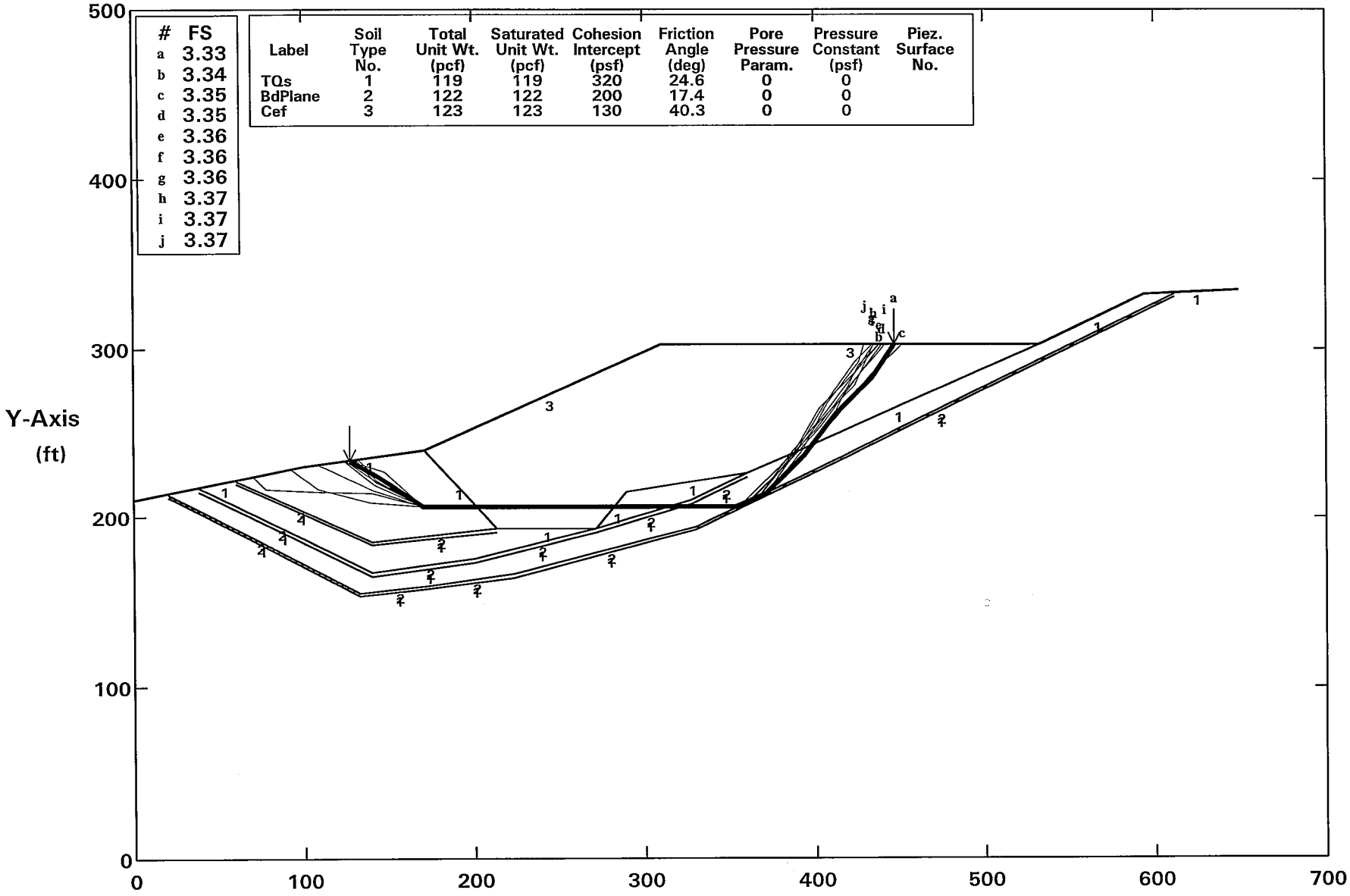
SLICE NO.	1 SLICE WEIGHT W (kips)	2 FAILURE PLANE ANGLE i(deg)	3 ANGLE OF INT. FRICTION phi(deg)	4 COHE-SION C (ksf)	5 LENGTH OF ARC L (ft)	6 W (1-Ru) COS i COS i TAN phi	7 C L COS i	8 g W (1-Ru) SINi COSi TAN phi	9 W SIN i COS i	10 g W COS i COS i
1.	23.06	18.00	17.40	0.200	22.08	6.54	4.20	0.00	6.78	0.00
2.	61.49	18.00	17.40	0.200	37.85	17.43	7.20	0.00	18.07	0.00
3.	8.33	42.00	24.60	0.320	18.84	2.11	4.48	0.00	4.14	0.00
SUMMATION:						26.07	15.88	0.00	28.99	0.00

STATIC SAFETY FACTOR = 1.45
[redacted]

Run #86

TT52584 Sect.26-26'-Stability Through Buttress

Ten Most Critical. C:HAS26G.PLT By: mas 1/29/99 9:16am



#	FS
a	3.33
b	3.34
c	3.35
d	3.35
e	3.36
f	3.36
g	3.36
h	3.37
i	3.37
j	3.37

Label	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
TQs	1	119	119	320	24.6	0	0	
BdPlane	2	122	122	200	17.4	0	0	
Cef	3	123	123	130	40.3	0	0	

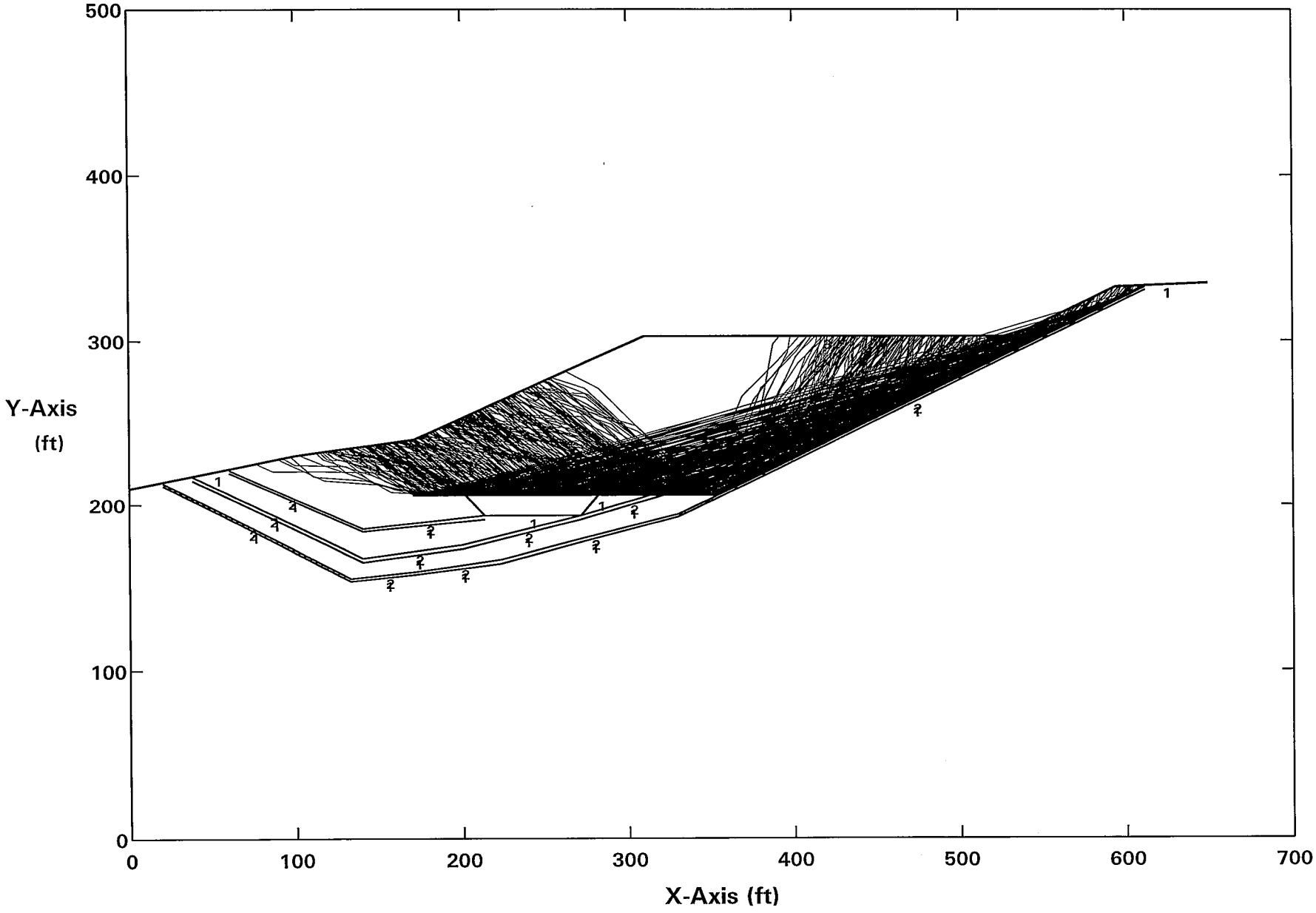
PCSTABL5M FSmin = 3.33 X-Axis (ft)

Factors Of Safety Calculated By The Modified Janbu Method

Run # 87

TT52584 Sect.26-26'-Buttress Stability (THRU BUTTRESS)

All surfaces evaluated. C:HAS26G.PLT By: mas 1/29/99 9:00am

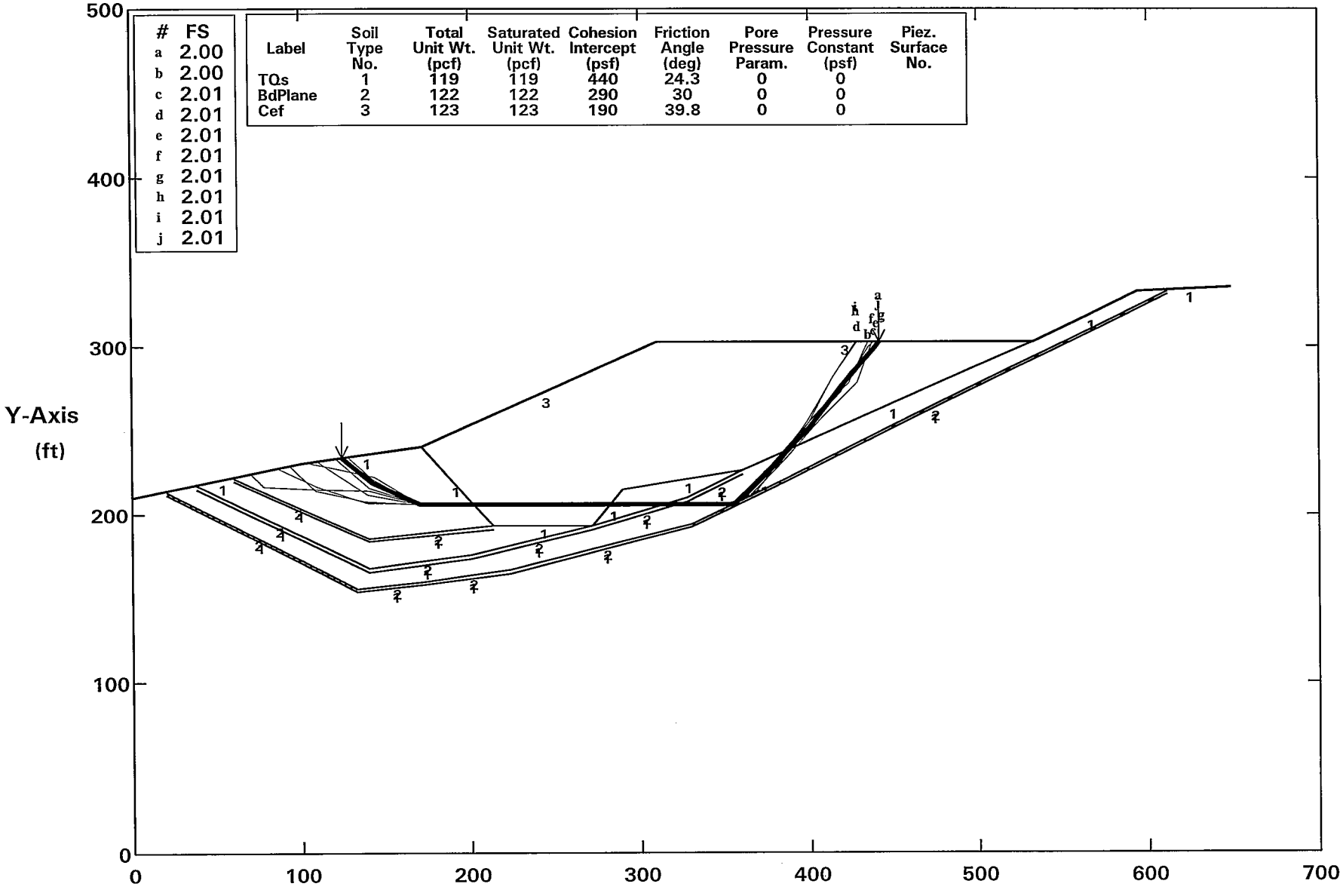


Factors Of Safety Calculated By The Modified Janbu Method

Run #87

TT52584 Sect.26-26'-Stability Through Buttress-Pseudostatic

Ten Most Critical. C:HAS26G'.PLT By: mas 1/29/99 9:20am



#	FS
a	2.00
b	2.00
c	2.01
d	2.01
e	2.01
f	2.01
g	2.01
h	2.01
i	2.01
j	2.01

Label	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
TQs	1	119	119	440	24.3	0	0	
BdPlane	2	122	122	290	30	0	0	
Cef	3	123	123	190	39.8	0	0	

PCSTABL5M FSmin = 2.00 X-Axis (ft)

Factors Of Safety Calculated By The Modified Janbu Method

Run # 88

Run #87

** PCSTABL5M **

by
Purdue University

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer's Method of Slices

Run Date: 1/29/99
Time of Run: 9:16am
Run By: mas
Input Data Filename: C:HAS26G.IN
Output Filename: C:HAS26G.OUT
Plotted Output Filename: C:HAS26G.PLT

PROBLEM DESCRIPTION TT52584 Sect.26-26'-Stability Through Buttress

BOUNDARY COORDINATES

6 Top Boundaries
35 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	.00	210.00	100.00	230.00	1
2	100.00	230.00	171.00	240.00	1
3	171.00	240.00	310.00	303.00	3
4	310.00	303.00	532.00	303.00	3
5	532.00	303.00	594.00	333.00	1
6	594.00	333.00	649.00	335.00	1
7	171.00	240.00	213.00	193.00	1
8	213.00	193.00	272.00	193.00	1
9	272.00	193.00	290.00	215.00	1
10	290.00	215.00	360.00	226.00	1
11	360.00	226.00	532.00	303.00	1
12	60.00	221.50	140.00	185.00	2
13	140.00	185.00	213.00	193.00	2
14	60.00	219.50	140.00	183.00	1
15	140.00	183.00	213.00	191.00	1
16	38.00	217.30	140.00	167.00	2
17	140.00	167.00	200.00	175.00	2
18	200.00	175.00	272.00	193.00	2
19	272.00	193.00	328.00	210.00	2
20	328.00	210.00	360.00	226.00	2
21	38.00	215.30	140.00	165.00	1
22	140.00	165.00	200.00	173.00	1

Run #87

23	200.00	173.00	272.00	191.00	1
24	272.00	191.00	328.00	208.00	1
25	328.00	208.00	360.00	224.00	1
26	20.00	213.50	133.00	155.00	2
27	133.00	155.00	172.00	159.00	2
28	172.00	159.00	223.00	166.00	2
29	223.00	166.00	330.00	194.00	2
30	330.00	194.00	612.00	333.00	2
31	20.00	211.50	133.00	153.00	1
32	133.00	153.00	172.00	157.00	1
33	172.00	157.00	223.00	164.00	1
34	223.00	164.00	330.00	192.00	1
35	330.00	192.00	612.00	331.00	1

ISOTROPIC SOIL PARAMETERS

3 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	119.0	119.0	320.0	24.6	.00	.0	0
2	122.0	122.0	200.0	17.4	.00	.0	0
3	123.0	123.0	130.0	40.3	.00	.0	0

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Sliding Block Surfaces, Has Been Specified.

300 Trial Surfaces Have Been Generated.

4 Boxes Specified For Generation Of Central Block Base

Length Of Line Segments For Active And Passive Portions Of Sliding Block Is 31.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	170.00	205.80	170.00	205.80	.00
2	334.10	205.80	353.90	205.80	.10
3	354.00	205.80	354.00	205.80	.00
4	354.10	205.90	374.00	215.70	.10

Factor Of Safety Calculation Has Gone Through Ten Iterations

Run #87

The Trial Failure Surface In Question Is Defined
By The Following 10 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	122.65	233.19
2	141.44	217.85
3	170.00	205.80
4	341.29	205.80
5	354.00	205.80
6	358.12	207.83
7	359.90	238.78
8	360.47	269.77
9	372.43	298.37
10	376.65	303.00

Factor Of Safety For The Preceding Specified Surface = 7.154

Factor Of Safety Calculation Has Gone Through Ten Iterations

The Trial Failure Surface In Question Is Defined
By The Following 10 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	136.27	235.11
2	146.81	226.37
3	170.00	205.80
4	339.13	205.82
5	354.00	205.80
6	356.11	206.90
7	356.38	237.89
8	372.72	264.24
9	393.76	287.01
10	399.15	303.00

Factor Of Safety For The Preceding Specified Surface = 6.730

Run #87

Factor Of Safety Calculation Has Gone Through Ten Iterations

The Trial Failure Surface In Question Is Defined
By The Following 11 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	108.30	231.17
2	112.25	228.33
3	141.29	217.49
4	170.00	205.80
5	338.96	205.76
6	354.00	205.80
7	363.08	210.28
8	363.58	241.28
9	385.14	263.56
10	387.23	294.49
11	395.74	303.00

Factor Of Safety For The Preceding Specified Surface = 6.724

Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Examined. They Are Ordered - Most Critical
First.

* * Safety Factors Are Calculated By The Modified Janbu Method * *

Failure Surface Specified By 10 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	127.46	233.87
2	144.80	223.86
3	170.00	205.80
4	350.82	205.79
5	354.00	205.80
6	371.74	214.54
7	393.49	236.64
8	411.93	261.55
9	433.82	283.50
10	447.40	303.00

Run #87

*** 3.327 ***

Individual data on the 21 slices

Slice No.	Width Ft (m)	Weight Lbs (kg)	Water Force Top Lbs (kg)	Water Force Bot Lbs (kg)	Tie Force Norm Lbs (kg)	Tie Force Tan Lbs (kg)	Earthquake Force Hor Lbs (kg)	Earthquake Force Ver Lbs (kg)	Surcharge Load Lbs (kg)
1	17.3	12846.5	.0	.0	.0	.0	.0	.0	.0
2	25.2	69724.1	.0	.0	.0	.0	.0	.0	.0
3	1.0	4061.4	.0	.0	.0	.0	.0	.0	.0
4	30.6	152515.2	.0	.0	.0	.0	.0	.0	.0
5	80.9	660675.7	.0	.0	.0	.0	.0	.0	.0
6	7.5	79929.2	.0	.0	.0	.0	.0	.0	.0
7	20.0	227114.2	.0	.0	.0	.0	.0	.0	.0
8	4.1	49336.1	.0	.0	.0	.0	.0	.0	.0
9	6.6	78423.7	.0	.0	.0	.0	.0	.0	.0
10	7.3	86527.8	.0	.0	.0	.0	.0	.0	.0
11	22.8	271430.0	.0	.0	.0	.0	.0	.0	.0
12	3.1	37081.2	.0	.0	.0	.0	.0	.0	.0
13	.1	721.8	.0	.0	.0	.0	.0	.0	.0
14	6.0	70241.0	.0	.0	.0	.0	.0	.0	.0
15	11.7	131110.9	.0	.0	.0	.0	.0	.0	.0
16	.1	638.7	.0	.0	.0	.0	.0	.0	.0
17	21.7	205504.7	.0	.0	.0	.0	.0	.0	.0
18	4.8	37373.4	.0	.0	.0	.0	.0	.0	.0
19	13.6	84856.8	.0	.0	.0	.0	.0	.0	.0
20	21.9	82074.1	.0	.0	.0	.0	.0	.0	.0
21	13.6	16283.8	.0	.0	.0	.0	.0	.0	.0

Failure Surface Specified By 10 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	129.83	234.20
2	143.01	221.05
3	170.00	205.80
4	351.60	205.78
5	354.00	205.80
6	372.60	214.97
7	393.75	237.63
8	412.27	262.49
9	426.10	290.23
10	438.04	303.00

*** 3.335 ***

Run #87

Failure Surface Specified By 10 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	128.21	233.97
2	147.78	227.42
3	170.00	205.80
4	353.24	205.77
5	354.00	205.80
6	370.83	214.12
7	392.06	236.71
8	413.30	259.29
9	432.48	283.64
10	451.67	303.00

*** 3.348 ***

Failure Surface Specified By 10 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	130.71	234.33
2	143.48	221.84
3	170.00	205.80
4	352.84	205.76
5	354.00	205.80
6	361.49	209.49
7	383.26	231.56
8	404.25	254.37
9	422.32	279.56
10	439.77	303.00

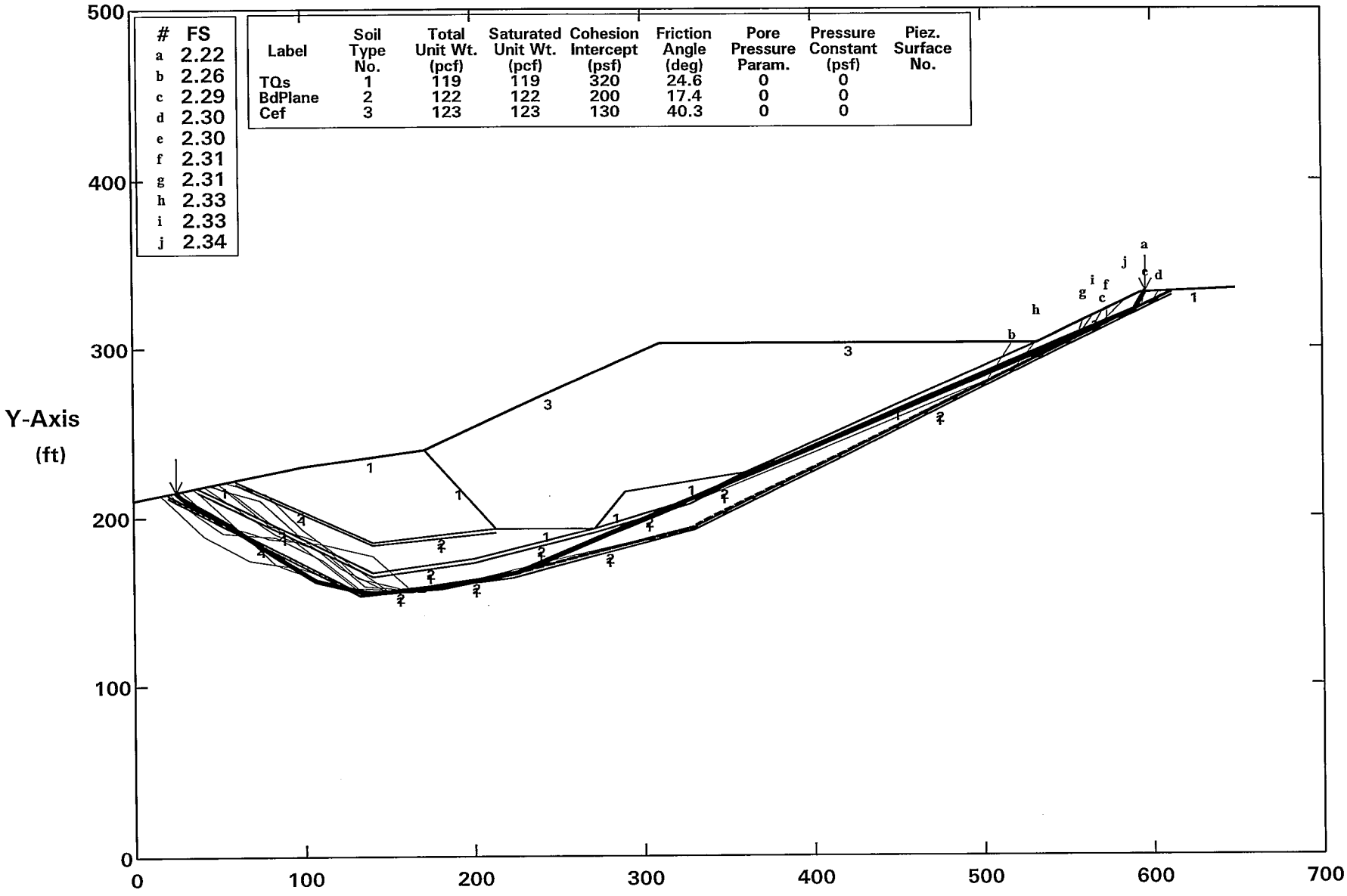
*** 3.350 ***

Failure Surface Specified By 11 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	92.20	228.44
2	109.06	216.29
3	139.15	208.84
4	170.00	205.80
5	338.77	205.77

TT52584 Sect.26-26'-Stability Below Buttress - Static

Ten Most Critical. C:HAS26H.PLT By: mas 1/29/99 12:03pm



#	FS
a	2.22
b	2.26
c	2.29
d	2.30
e	2.30
f	2.31
g	2.31
h	2.33
i	2.33
j	2.34

Label	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
TQs	1	119	119	320	24.6	0	0	
BdPlane	2	122	122	200	17.4	0	0	
Cef	3	123	123	130	40.3	0	0	

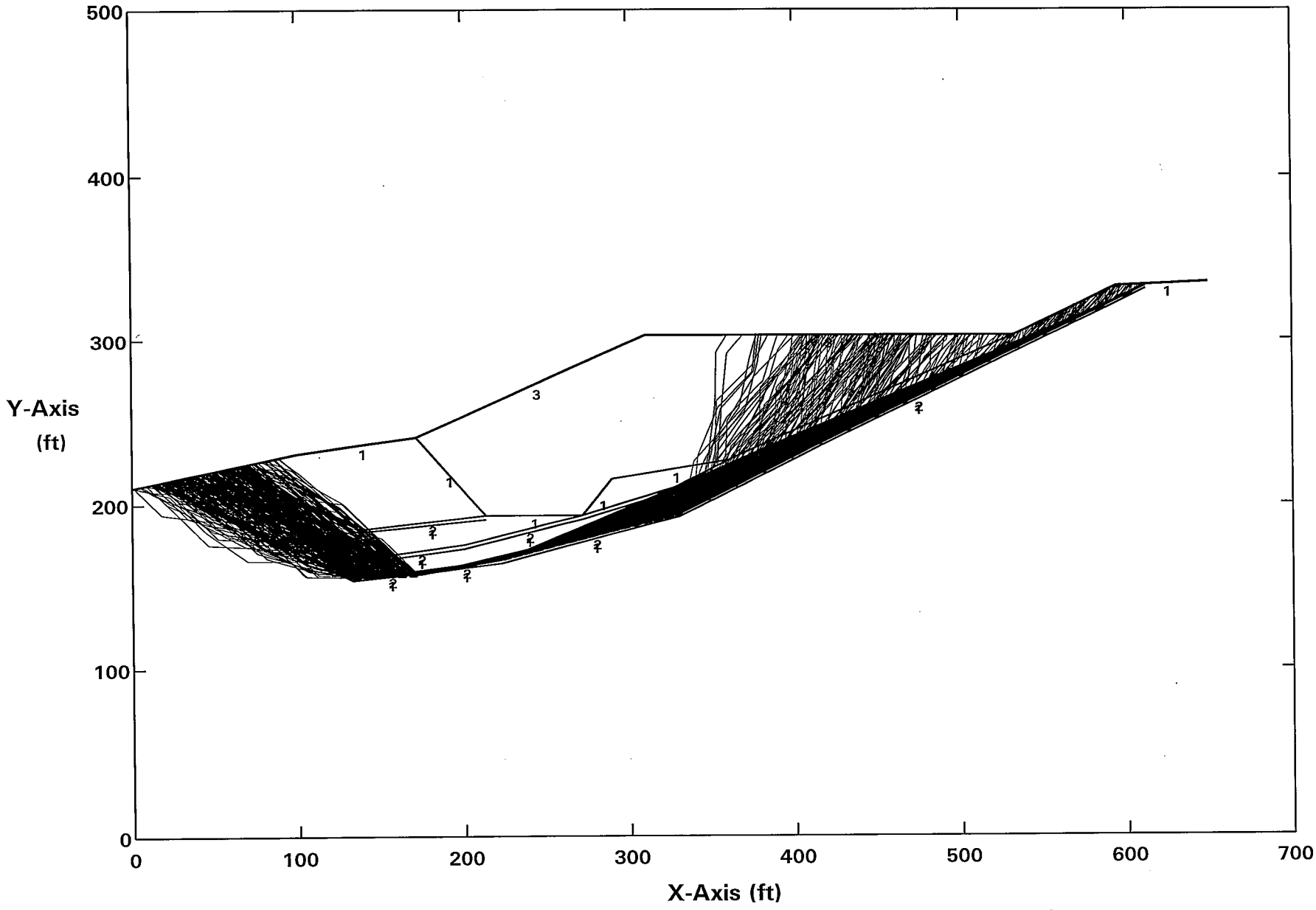
PCSTABL5M FSmin = 2.22 X-Axis (ft)

Factors Of Safety Calculated By The Modified Janbu Method

Run #39

TT52584 Sect.26-26'-Stability Below Buttress - Static

All surfaces evaluated. C:HAS26H.PLT By: mas 1/29/99 12:03pm

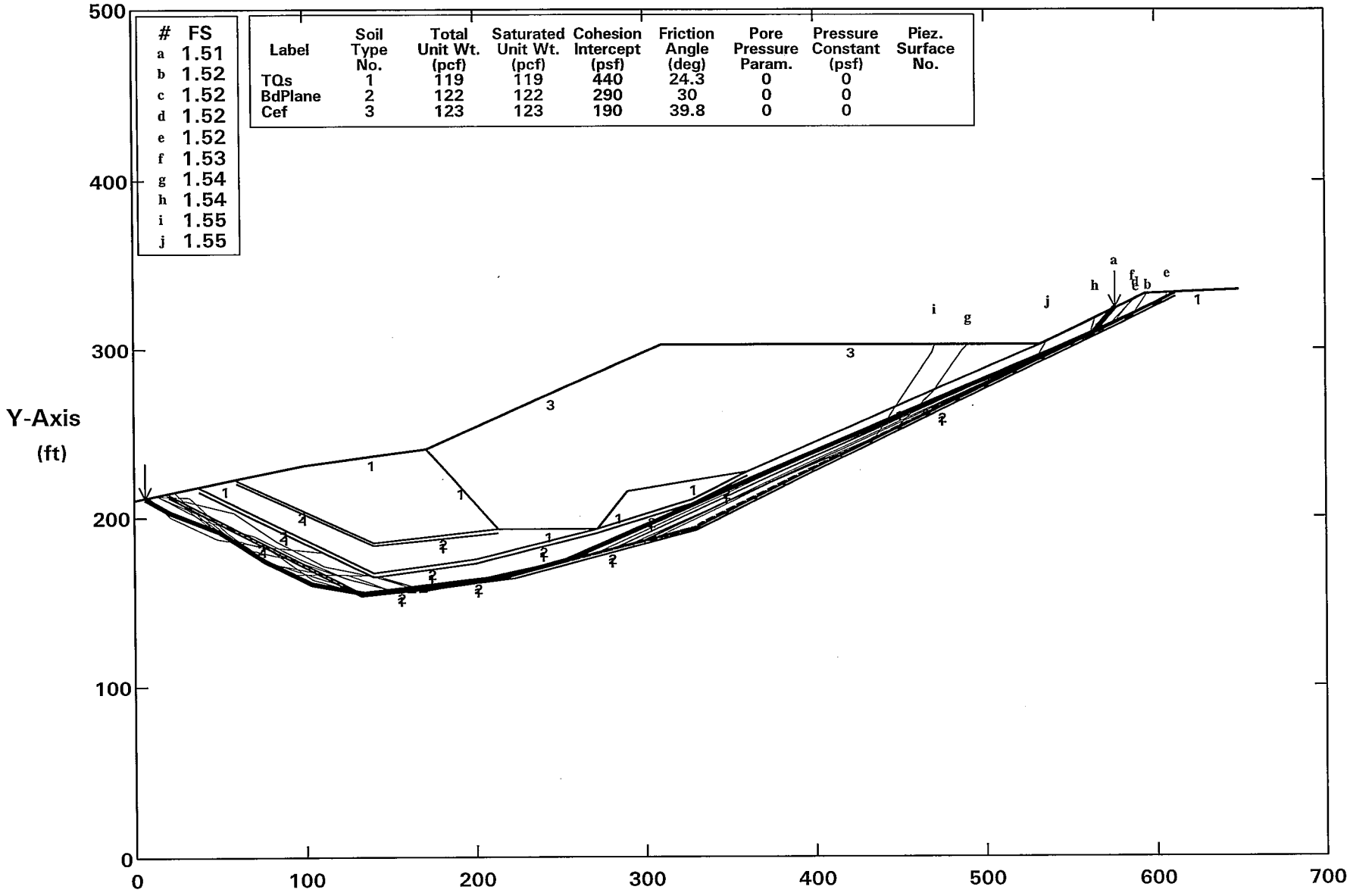


Factors Of Safety Calculated By The Modified Janbu Method

Run #89

TT52584 Sect.26-26'-Stability Below Buttress-Pseudostatic

Ten Most Critical. C:HAS26H'.PLT By: mas 1/29/99 11:13am



#	FS
a	1.51
b	1.52
c	1.52
d	1.52
e	1.52
f	1.53
g	1.54
h	1.54
i	1.55
j	1.55

Label	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
TQs	1	119	119	440	24.3	0	0	
BdPlane	2	122	122	290	30	0	0	
Cef	3	123	123	190	39.8	0	0	

PCSTABL5M FSmin = 1.51 X-Axis (ft)

Factors Of Safety Calculated By The Modified Janbu Method

Run # 90

Run #89

** PCSTABL5M **

by
Purdue University

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer's Method of Slices

Run Date: 1/29/99
Time of Run: 12:03pm
Run By: mas
Input Data Filename: C:HAS26H.IN
Output Filename: C:HAS26H.OUT
Plotted Output Filename: C:HAS26H.PLT

PROBLEM DESCRIPTION TT52584 Sect.26-26'-Stability Below Buttress - Static

BOUNDARY COORDINATES

6 Top Boundaries
35 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	.00	210.00	100.00	230.00	1
2	100.00	230.00	171.00	240.00	1
3	171.00	240.00	310.00	303.00	3
4	310.00	303.00	532.00	303.00	3
5	532.00	303.00	594.00	333.00	1
6	594.00	333.00	649.00	335.00	1
7	171.00	240.00	213.00	193.00	1
8	213.00	193.00	272.00	193.00	1
9	272.00	193.00	290.00	215.00	1
10	290.00	215.00	360.00	226.00	1
11	360.00	226.00	532.00	303.00	1
12	60.00	221.50	140.00	185.00	2
13	140.00	185.00	213.00	193.00	2
14	60.00	219.50	140.00	183.00	1
15	140.00	183.00	213.00	191.00	1
16	38.00	217.30	140.00	167.00	2
17	140.00	167.00	200.00	175.00	2
18	200.00	175.00	272.00	193.00	2
19	272.00	193.00	328.00	210.00	2
20	328.00	210.00	360.00	226.00	2
21	38.00	215.30	140.00	165.00	1
22	140.00	165.00	200.00	173.00	1

Run #89

23	200.00	173.00	272.00	191.00	1
24	272.00	191.00	328.00	208.00	1
25	328.00	208.00	360.00	224.00	1
26	20.00	213.50	133.00	155.00	2
27	133.00	155.00	172.00	159.00	2
28	172.00	159.00	223.00	166.00	2
29	223.00	166.00	330.00	194.00	2
30	330.00	194.00	612.00	333.00	2
31	20.00	211.50	133.00	153.00	1
32	133.00	153.00	172.00	157.00	1
33	172.00	157.00	223.00	164.00	1
34	223.00	164.00	330.00	192.00	1
35	330.00	192.00	612.00	331.00	1

ISOTROPIC SOIL PARAMETERS

3 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	119.0	119.0	320.0	24.6	.00	.0	0
2	122.0	122.0	200.0	17.4	.00	.0	0
3	123.0	123.0	130.0	40.3	.00	.0	0

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Sliding Block Surfaces, Has Been Specified.

300 Trial Surfaces Have Been Generated.

4 Boxes Specified For Generation Of Central Block Base

Length Of Line Segments For Active And Passive Portions Of Sliding Block Is 31.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	133.00	155.00	172.00	157.00	.10
2	173.00	157.20	223.00	166.00	.10
3	224.00	166.30	330.00	194.00	.10
4	331.00	194.50	611.00	332.50	.10

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical

Run #89

First.

* * Safety Factors Are Calculated By The Modified Janbu Method * *

Failure Surface Specified By 10 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	24.80	214.96
2	28.66	211.74
3	55.43	196.10
4	81.06	178.67
5	107.37	162.27
6	137.56	155.23
7	180.77	158.52
8	225.93	166.83
9	589.72	322.00
10	596.23	333.08

*** 2.220 ***

Individual data on the 34 slices

Slice No.	Width Ft(m)	Weight Lbs(kg)	Water Force Top Lbs(kg)	Water Force Bot Lbs(kg)	Tie Force Norm Lbs(kg)	Tie Force Tan Lbs(kg)	Earthquake Force Hor Lbs(kg)	Earthquake Force Ver Lbs(kg)	Surcharge Load Lbs(kg)
1	3.9	917.1	.0	.0	.0	.0	.0	.0	.0
2	9.3	8514.7	.0	.0	.0	.0	.0	.0	.0
3	17.4	37749.5	.0	.0	.0	.0	.0	.0	.0
4	4.6	14724.7	.0	.0	.0	.0	.0	.0	.0
5	1.2	4252.3	.0	.0	.0	.0	.0	.0	.0
6	12.3	52194.4	.0	.0	.0	.0	.0	.0	.0
7	7.5	39816.6	.0	.0	.0	.0	.0	.0	.0
8	18.9	125080.0	.0	.0	.0	.0	.0	.0	.0
9	7.4	57969.9	.0	.0	.0	.0	.0	.0	.0
10	14.1	119690.9	.0	.0	.0	.0	.0	.0	.0
11	7.0	63168.1	.0	.0	.0	.0	.0	.0	.0
12	8.4	78120.9	.0	.0	.0	.0	.0	.0	.0
13	.7	6821.5	.0	.0	.0	.0	.0	.0	.0
14	2.4	23316.4	.0	.0	.0	.0	.0	.0	.0
15	31.0	300065.7	.0	.0	.0	.0	.0	.0	.0
16	1.0	9825.5	.0	.0	.0	.0	.0	.0	.0
17	8.8	88397.6	.0	.0	.0	.0	.0	.0	.0
18	19.2	205127.8	.0	.0	.0	.0	.0	.0	.0
19	13.0	146693.1	.0	.0	.0	.0	.0	.0	.0
20	3.8	43917.0	.0	.0	.0	.0	.0	.0	.0
21	9.1	107996.3	.0	.0	.0	.0	.0	.0	.0

Run #89

22	46.1	556410.7	.0	.0	.0	.0	.0	.0	.0
23	18.0	219501.0	.0	.0	.0	.0	.0	.0	.0
24	18.8	229635.1	.0	.0	.0	.0	.0	.0	.0
25	1.2	15145.0	.0	.0	.0	.0	.0	.0	.0
26	15.0	178762.2	.0	.0	.0	.0	.0	.0	.0
27	7.9	89728.0	.0	.0	.0	.0	.0	.0	.0
28	27.0	281229.5	.0	.0	.0	.0	.0	.0	.0
29	172.0	892341.6	.0	.0	.0	.0	.0	.0	.0
30	57.4	49677.8	.0	.0	.0	.0	.0	.0	.0
31	.3	292.3	.0	.0	.0	.0	.0	.0	.0
32	.0	16.0	.0	.0	.0	.0	.0	.0	.0
33	4.3	3201.3	.0	.0	.0	.0	.0	.0	.0
34	2.2	492.3	.0	.0	.0	.0	.0	.0	.0

Failure Surface Specified By 10 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	28.00	215.60
2	49.84	197.27
3	79.12	187.09
4	109.97	184.04
5	140.20	177.19
6	163.32	156.53
7	183.53	159.07
8	329.92	193.93
9	502.36	278.95
10	517.30	303.00

*** 2.256 ***

Failure Surface Specified By 10 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	21.61	214.32
2	27.46	208.82
3	52.51	190.56
4	83.44	188.54
5	111.13	174.59
6	135.27	155.15
7	198.16	161.65
8	226.35	166.96
9	564.57	309.60
10	571.25	321.99

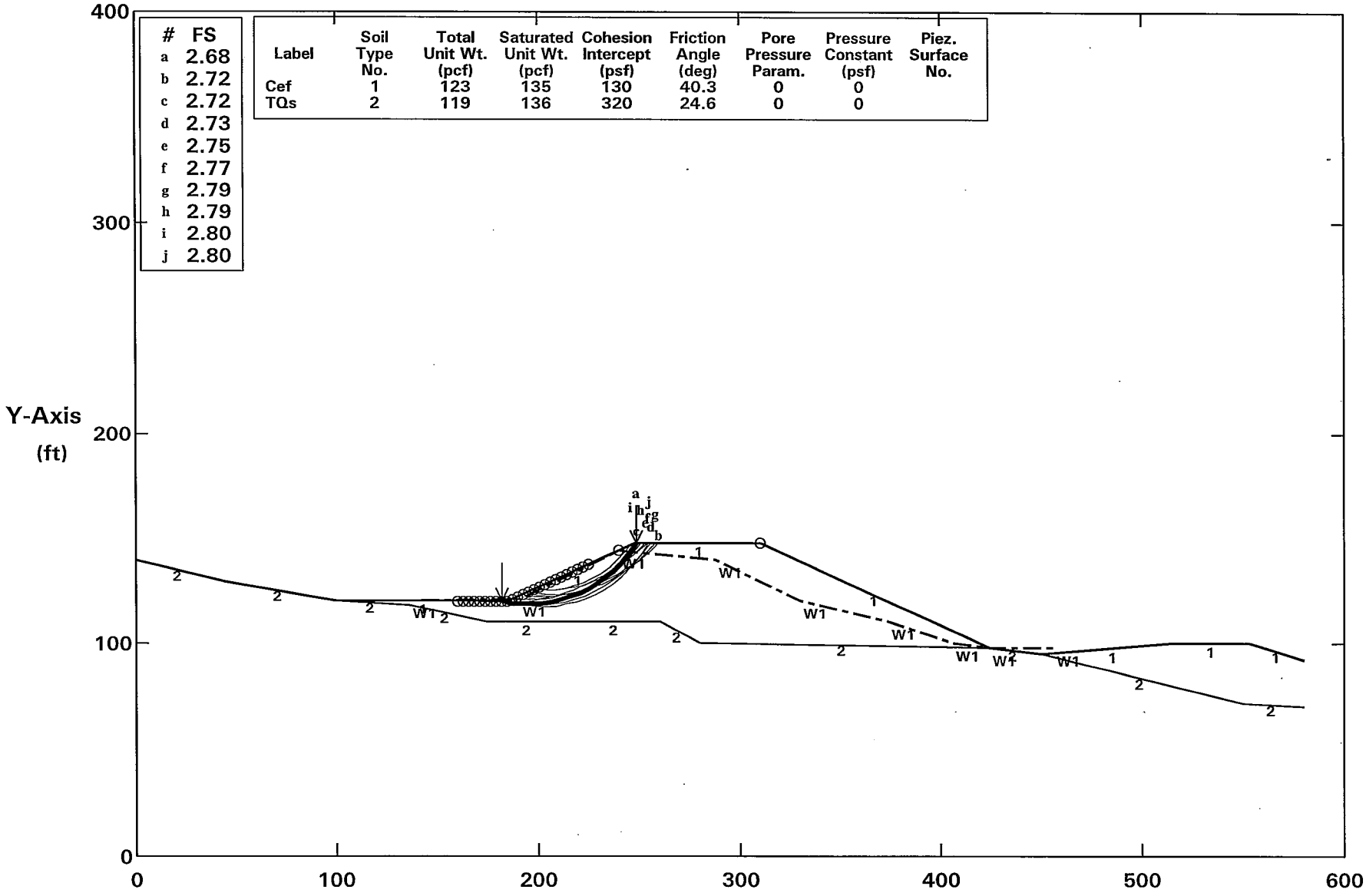
*** 2.294 ***

STABILITY ANALYSIS

FOR CROSS SECTION 25-25'

T.T. 52584 Sec. 25-25' Desilting Basin Upstream Slope/Rapid Drawdown

Ten Most Critical. C:HAS25.PLT By: EJS 1/27/99 11:53am



Label	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
Cef	1	123	135	130	40.3	0	0	
TQs	2	119	136	320	24.6	0	0	

PCSTABL5M FSmin = 2.68 X-Axis (ft)

Factors Of Safety Calculated By The Modified Bishop Method

Run #91

Run #91

** PCSTABL5M **

by
Purdue University

--Slope Stability Analysis--
Simplified Janbu, Simplified Bishop
or Spencer's Method of Slices

Run Date:	1/27/99
Time of Run:	11:58am
Run By:	EJS
Input Data Filename:	C:HAS25
Output Filename:	C:HAS25.OUT
Plotted Output Filename:	C:HAS25.PLT

PROBLEM DESCRIPTION T.T. 52584 Sec. 25-25' Desilting Basin
Upstream Slope/Rapid Drawdown

BOUNDARY COORDINATES

10 Top Boundaries
18 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	.00	140.00	44.00	130.00	2
2	44.00	130.00	100.00	120.00	2
3	100.00	120.00	185.00	120.00	1
4	185.00	120.00	248.00	148.00	1
5	248.00	148.00	310.00	148.00	1
6	310.00	148.00	424.00	98.00	1
7	424.00	98.00	450.00	95.00	2
8	450.00	95.00	514.00	100.00	1
9	514.00	100.00	553.00	100.00	1
10	553.00	100.00	580.00	92.00	1
11	100.00	120.00	136.00	118.00	2
12	136.00	118.00	174.00	110.00	2
13	174.00	110.00	214.00	110.00	2
14	214.00	110.00	260.00	110.00	2
15	260.00	110.00	280.00	100.00	2
16	280.00	100.00	424.00	98.00	2
17	450.00	95.00	550.00	72.00	2
18	550.00	72.00	580.00	70.00	2

ISOTROPIC SOIL PARAMETERS

Run #91

2 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	123.0	135.0	130.0	40.3	.00	.0	0
2	119.0	136.0	320.0	24.6	.00	.0	0

---

1 PIEZOMETRIC SURFACE(S) HAVE BEEN SPECIFIED

Unit Weight of Water = 62.40

Piezometric Surface No. 1 Specified by 9 Coordinate Points

Point No.	X-Water (ft)	Y-Water (ft)
1	136.00	120.00
2	191.00	121.00
3	240.00	144.00
4	288.00	140.00
5	330.00	120.00
6	374.00	110.00
7	406.00	100.00
8	424.00	98.00
9	456.00	98.00

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Circular Surfaces, Has Been Specified.

625 Trial Surfaces Have Been Generated.

25 Surfaces Initiate From Each Of 25 Points Equally Spaced
Along The Ground Surface Between X = 160.00 ft.
and X = 225.00 ft.

Each Surface Terminates Between X = 248.00 ft.
and X = 310.00 ft.

Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = .00 ft.

Run # 91

5.00 ft. Line Segments Define Each Trial Failure Surface.

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Examined. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Modified Bishop Method * *

Failure Surface Specified By 18 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	181.67	120.00
2	186.60	119.18
3	191.58	118.69
4	196.57	118.55
5	201.57	118.75
6	206.54	119.29
7	211.46	120.17
8	216.31	121.39
9	221.07	122.93
10	225.71	124.80
11	230.20	126.98
12	234.54	129.46
13	238.70	132.24
14	242.66	135.29
15	246.41	138.61
16	249.91	142.17
17	253.16	145.97
18	254.68	148.00

Circle Center At X = 196.2 ; Y = 191.4 and Radius, 72.9

*** 2.689 ***

Individual data on the 22 slices

Slice No.	Width Ft (m)	Weight Lbs (kg)	Water Force Top Lbs (kg)	Water Force Bot Lbs (kg)	Tie Force Norm Lbs (kg)	Tie Force Tan Lbs (kg)	Earthquake Force Hor Lbs (kg)	Earthquake Force Ver Lbs (kg)	Surcharge Load Lbs (kg)
1	3.3	114.1	.0	.0	.0	.0	.0	.0	.0
2	1.6	205.6	.0	.0	.0	.0	.0	.0	.0
3	4.4	1475.9	.0	.0	.0	.0	.0	.0	.0

Run #91

4	.6	288.3	.0	.0	.0	.0	.0	.0	.0
5	5.0	3326.9	.0	.0	.0	.0	.0	.0	.0
6	5.0	4672.4	.0	.0	.0	.0	.0	.0	.0
7	5.0	5775.8	.0	.0	.0	.0	.0	.0	.0
8	4.9	6619.2	.0	.0	.0	.0	.0	.0	.0
9	4.8	7192.5	.0	.0	.0	.0	.0	.0	.0
10	4.8	7493.2	.0	.0	.0	.0	.0	.0	.0
11	4.6	7526.5	.0	.0	.0	.0	.0	.0	.0
12	4.5	7305.3	.0	.0	.0	.0	.0	.0	.0
13	4.3	6849.7	.0	.0	.0	.0	.0	.0	.0
14	4.2	6186.6	.0	.0	.0	.0	.0	.0	.0
15	1.3	1819.8	.0	.0	.0	.0	.0	.0	.0
16	2.7	3529.5	.0	.0	.0	.0	.0	.0	.0
17	3.7	4376.4	.0	.0	.0	.0	.0	.0	.0
18	1.6	1613.2	.0	.0	.0	.0	.0	.0	.0
19	1.9	1598.1	.0	.0	.0	.0	.0	.0	.0
20	.8	527.2	.0	.0	.0	.0	.0	.0	.0
21	2.5	1044.5	.0	.0	.0	.0	.0	.0	.0
22	1.5	188.5	.0	.0	.0	.0	.0	.0	.0

Failure Surface Specified By 18 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	184.38	120.00
2	189.29	119.07
3	194.26	118.51
4	199.25	118.33
5	204.25	118.52
6	209.22	119.09
7	214.13	120.03
8	218.95	121.34
9	223.67	123.01
10	228.24	125.03
11	232.65	127.39
12	236.87	130.07
13	240.88	133.06
14	244.65	136.34
15	248.16	139.90
16	251.39	143.72
17	254.33	147.76
18	254.48	148.00

Circle Center At X = 199.2 ; Y = 184.7 and Radius, 66.4

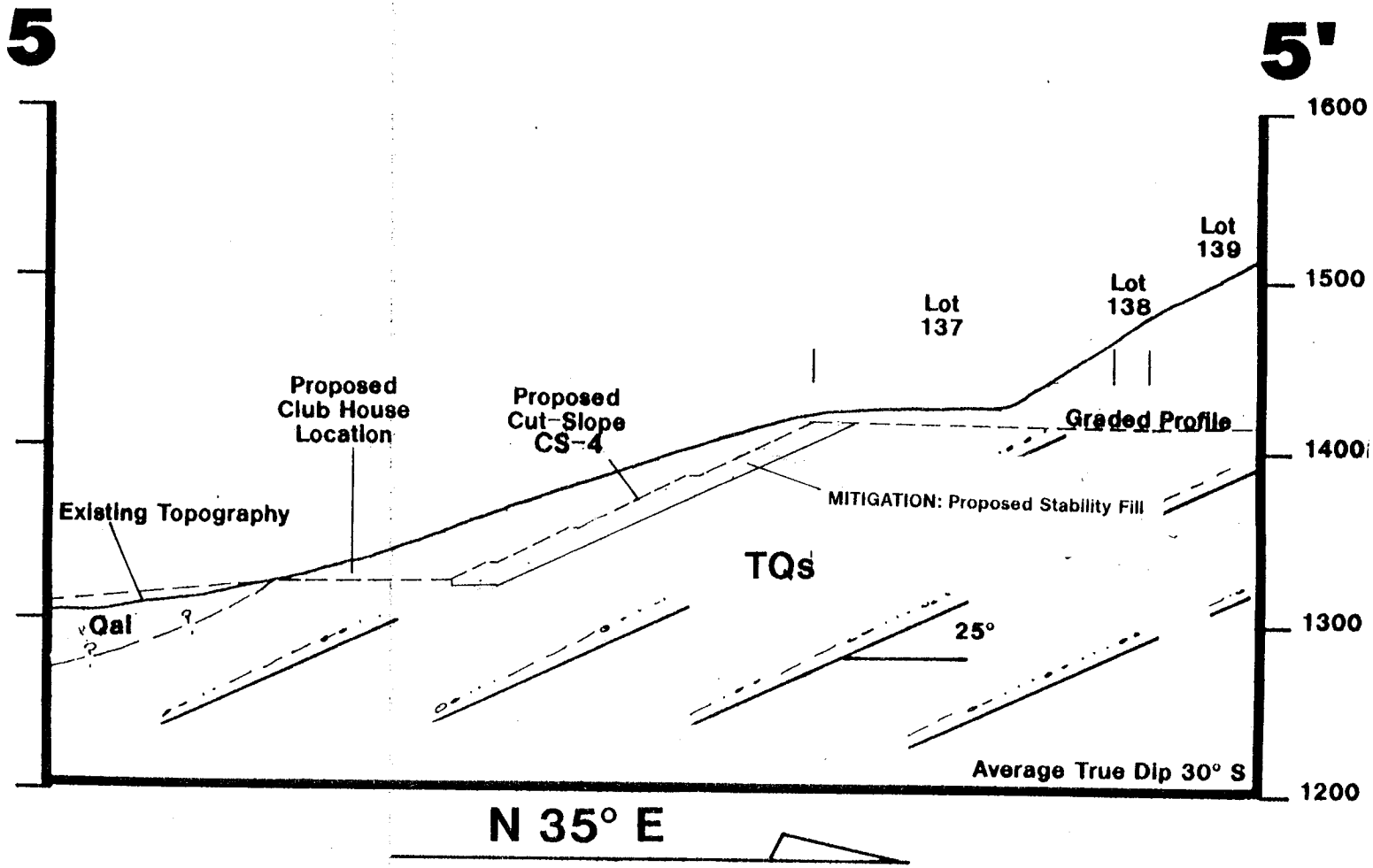
*** 2.722 ***

Failure Surface Specified By 19 Coordinate Points

Point	X-Surf	Y-Surf

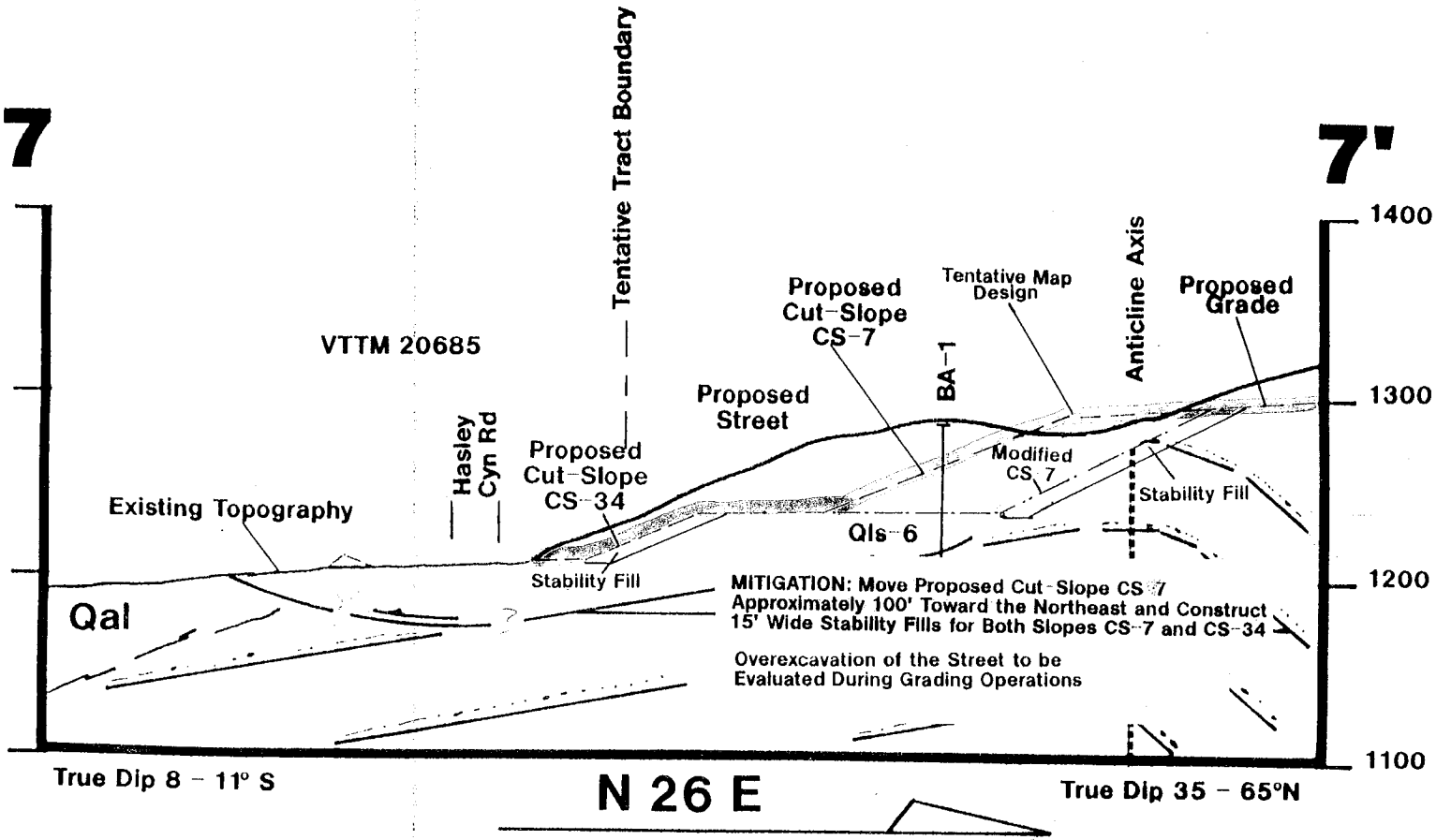
Appendix G

CROSS SECTION



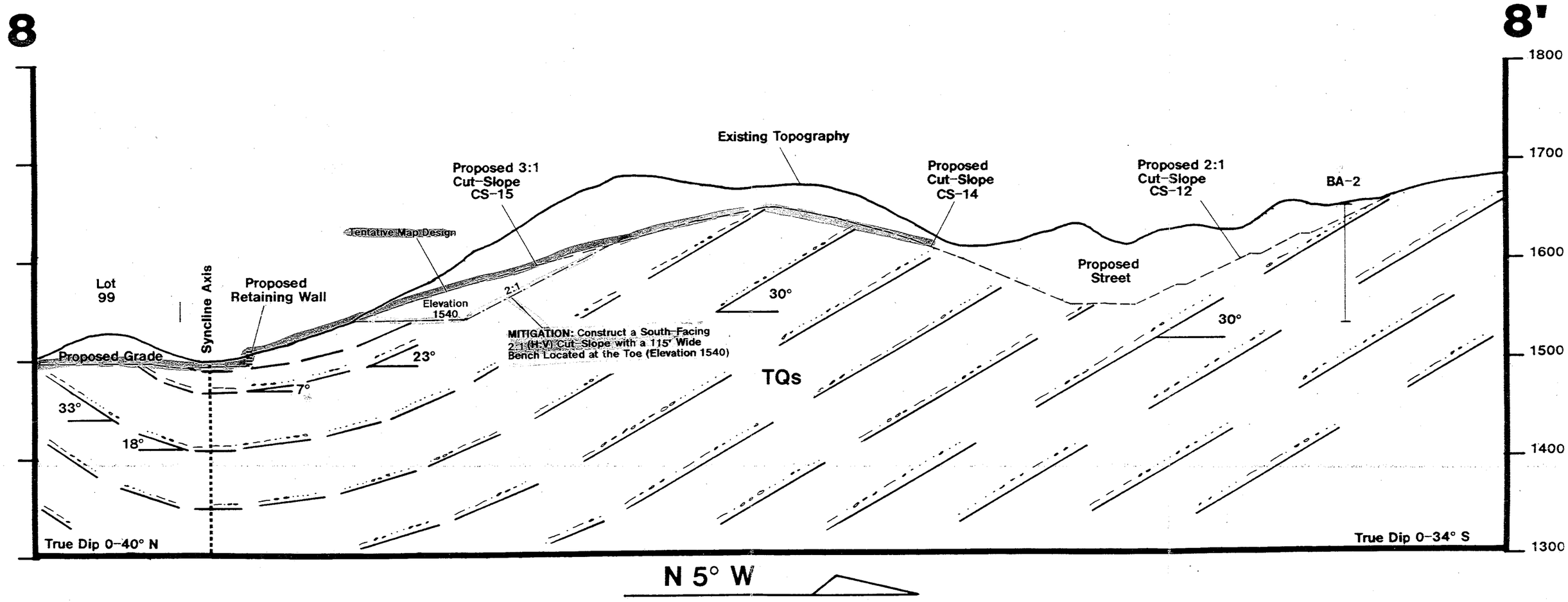
ALLAN E. SEWARD ENGINEERING GEOLOGY		
JOB NUMBER: 98-1617-4	DATE: 1/15/99	
SCALE: 1"=100'		DRAWN BY: Staff REVISED:

CROSS SECTION



ALLAN E. SEWARD ENGINEERING GEOLOGY		
JOB NUMBER: 98-1617-4	DATE: 1/15/99	
SCALE: 1"=100'		DRAWN BY: Staff REVISED:

CROSS SECTION

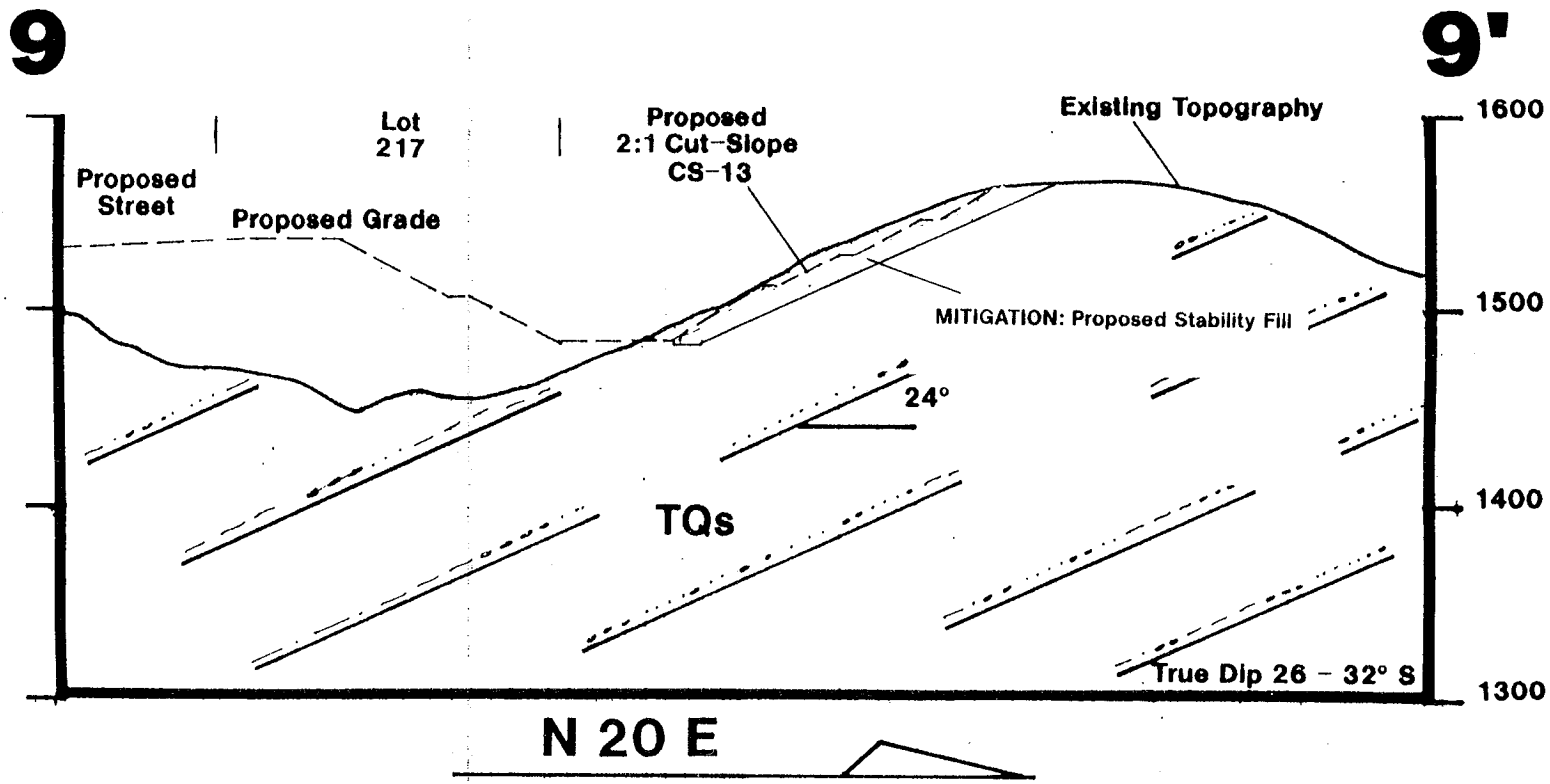


SUBMITTED WITH REPORT

DATED 1/15/99 JN 96-1617-9

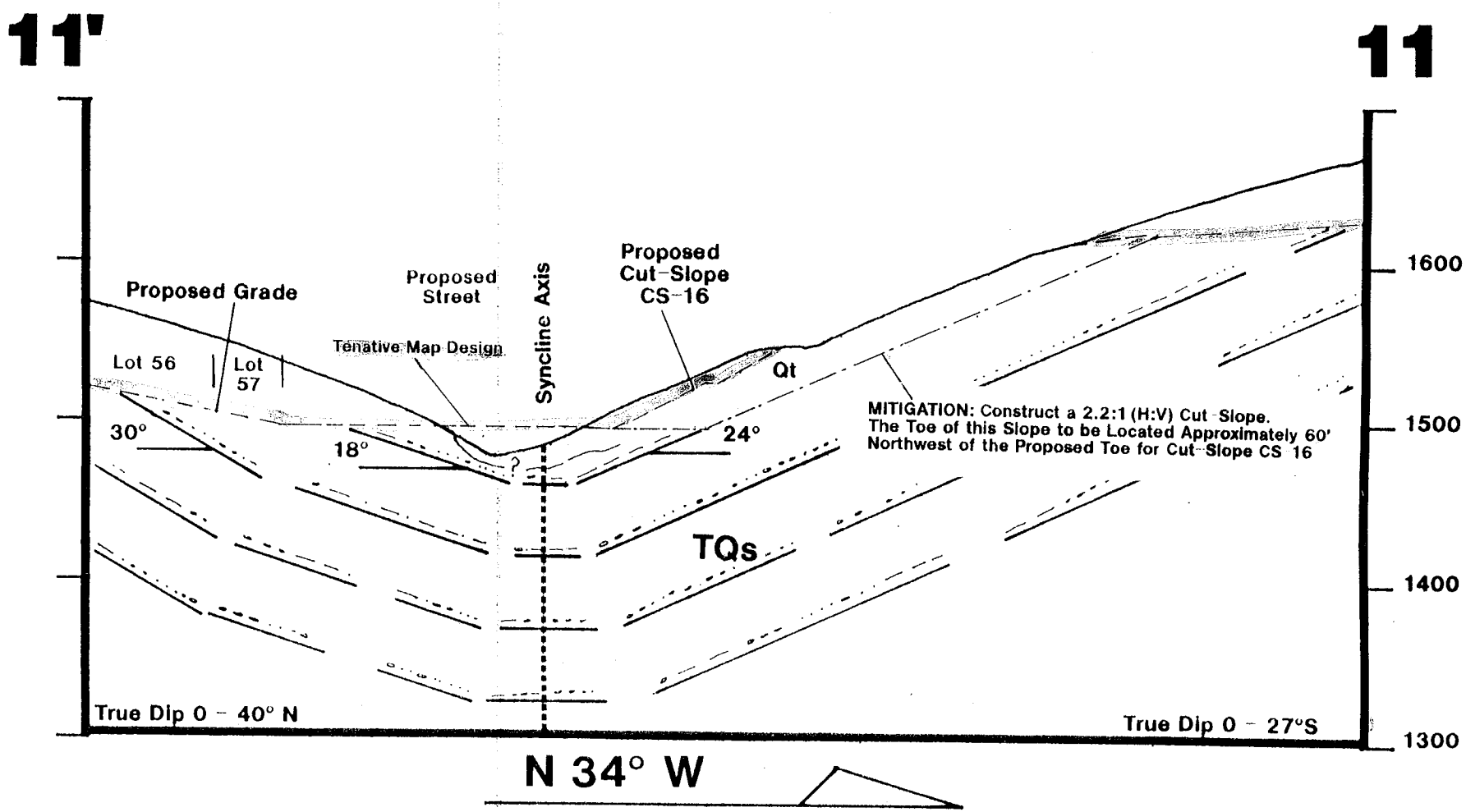
ALLAN E. SEWARD ENGINEERING GEOLOGY, INC.

CROSS SECTION



ALLAN E. SEWARD ENGINEERING GEOLOGY			
JOB NUMBER: 98-1617-4		DATE: 1/15/99	
SCALE: 1"=100'		DRAWN BY: Staff	
		REVISED:	

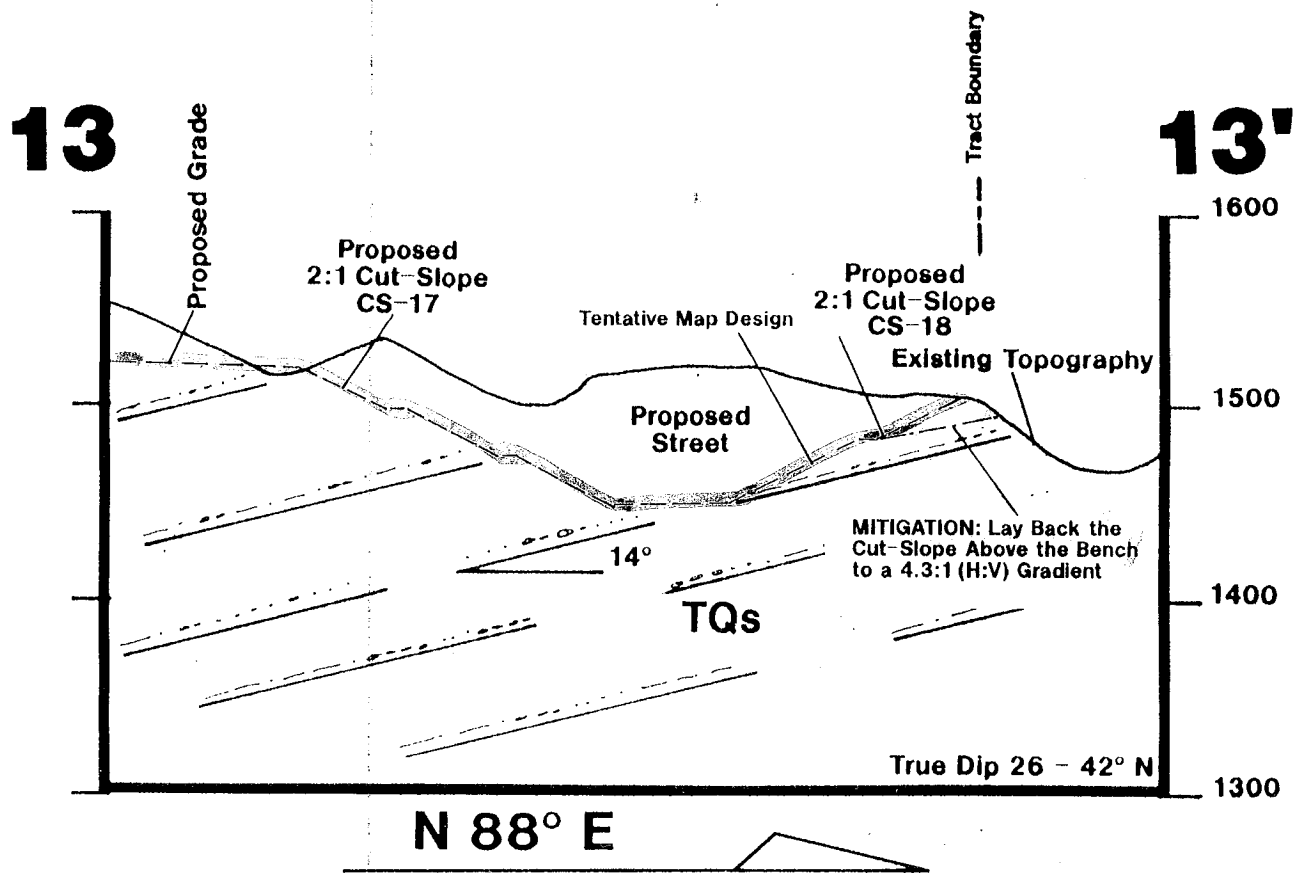
CROSS SECTION



ALLAN E. SEWARD
ENGINEERING GEOLOGY

JOB NUMBER: 98-1617-4		DATE: 1/15/99	
SCALE: 1"=100'		DRAWN BY: Staff	
		REVISED:	

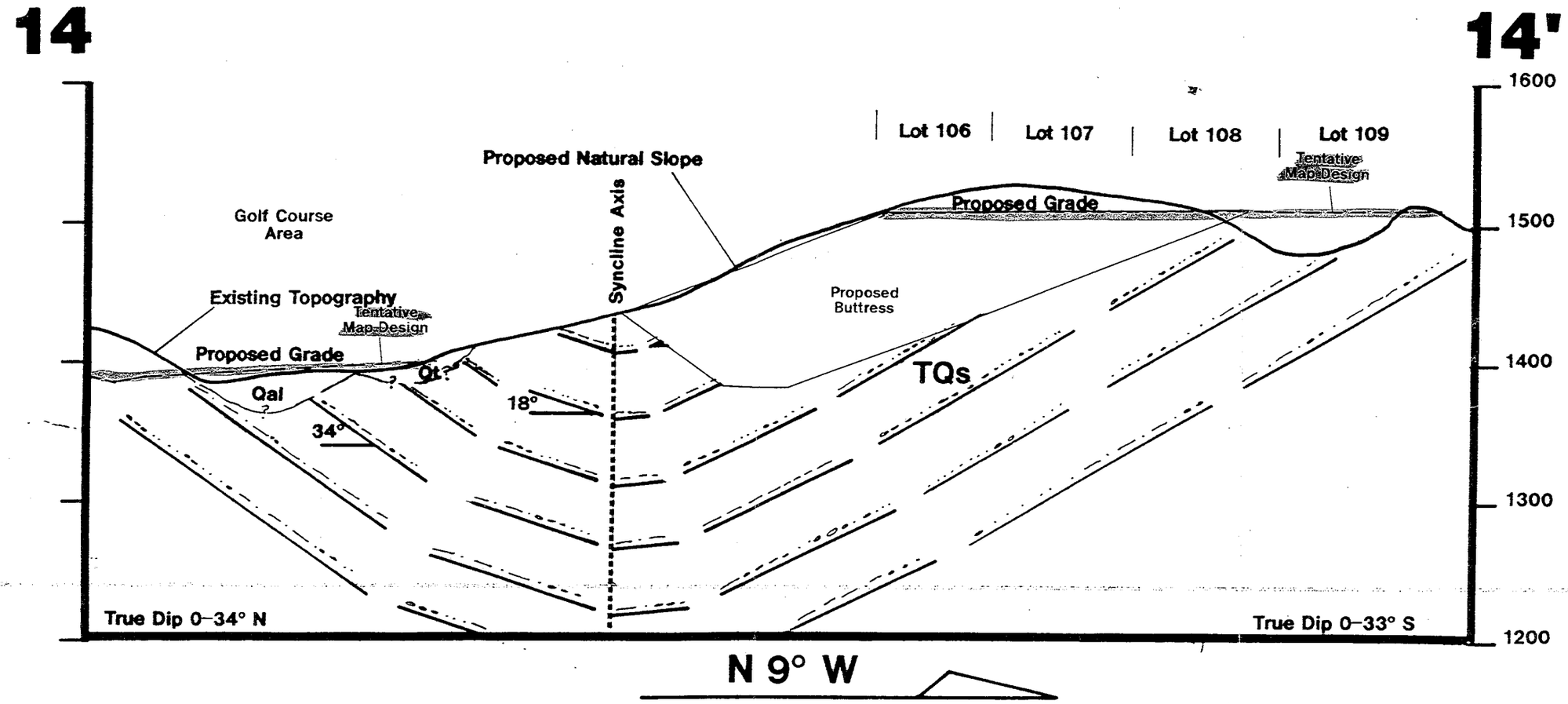
CROSS SECTION



ALLAN E. SEWARD ENGINEERING GEOLOGY		
JOB NUMBER: 98-1617-4		DATE: 1/15/99
SCALE: 1"=100'		DRAWN BY: Staff REVISED:

CROSS SECTION

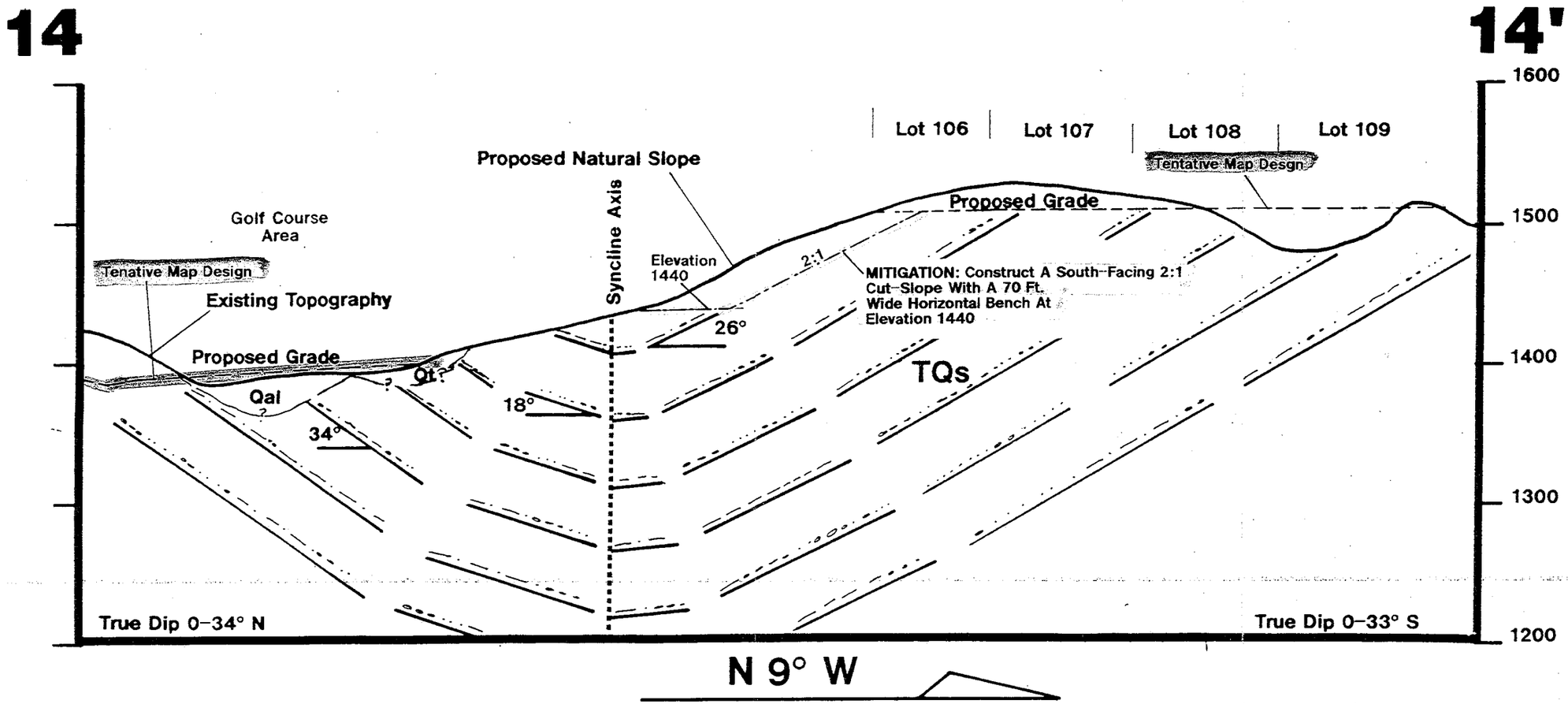
Alternate 2



ALLAN E. SEWARD ENGINEERING GEOLOGY			
JOB NUMBER: 98-1617-4		DATE: 1/15/99	
SCALE: 1"=100'		DRAWN BY: Staff	
		REVISED:	

CROSS SECTION

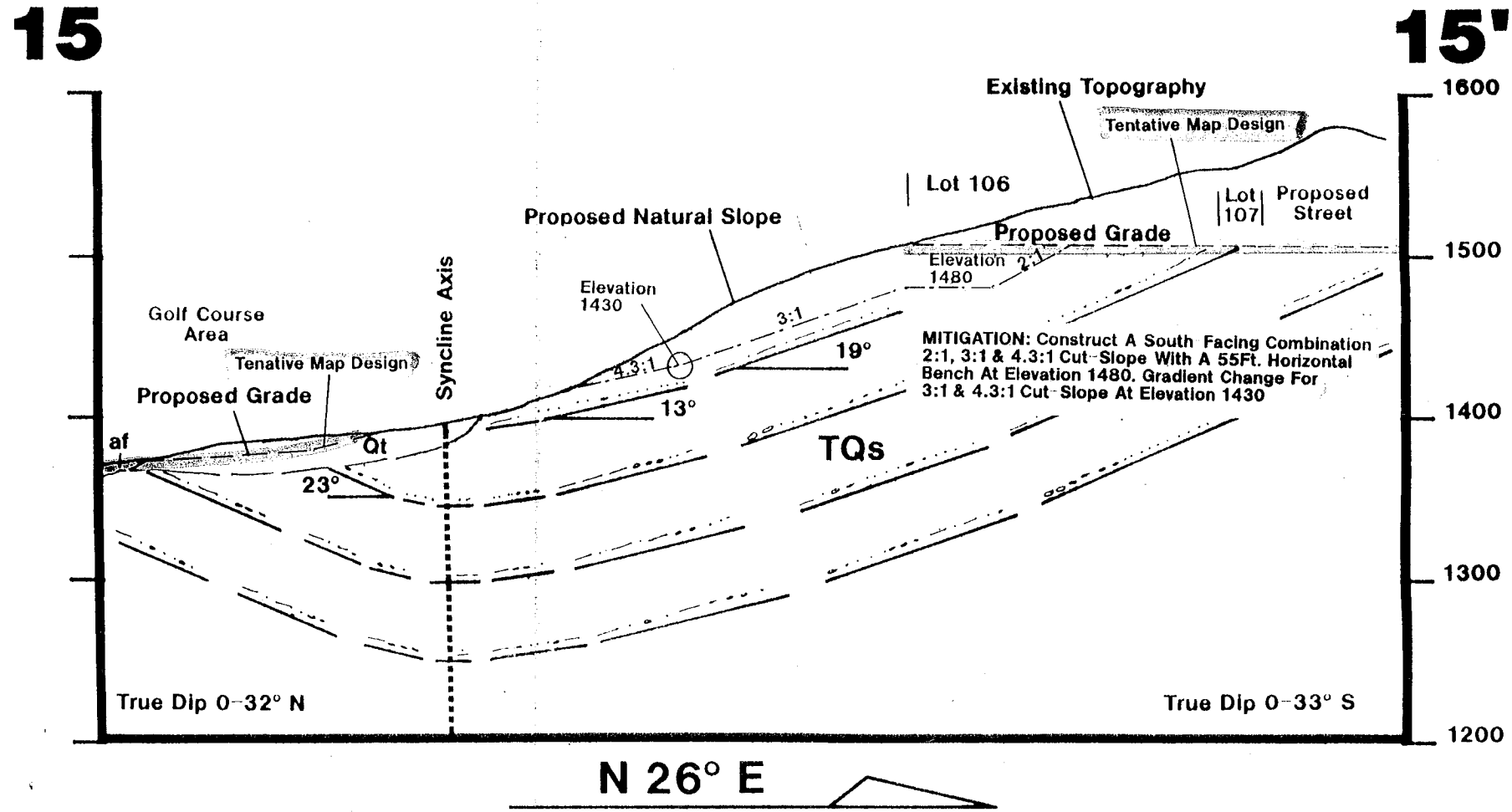
Alternate 1



ALLAN E. SEWARD ENGINEERING GEOLOGY		
JOB NUMBER: 98-1617-4	DATE: 1/15/99	
SCALE: 1"=100'		DRAWN BY: Staff REVISED:

CROSS SECTION

Alternate 1



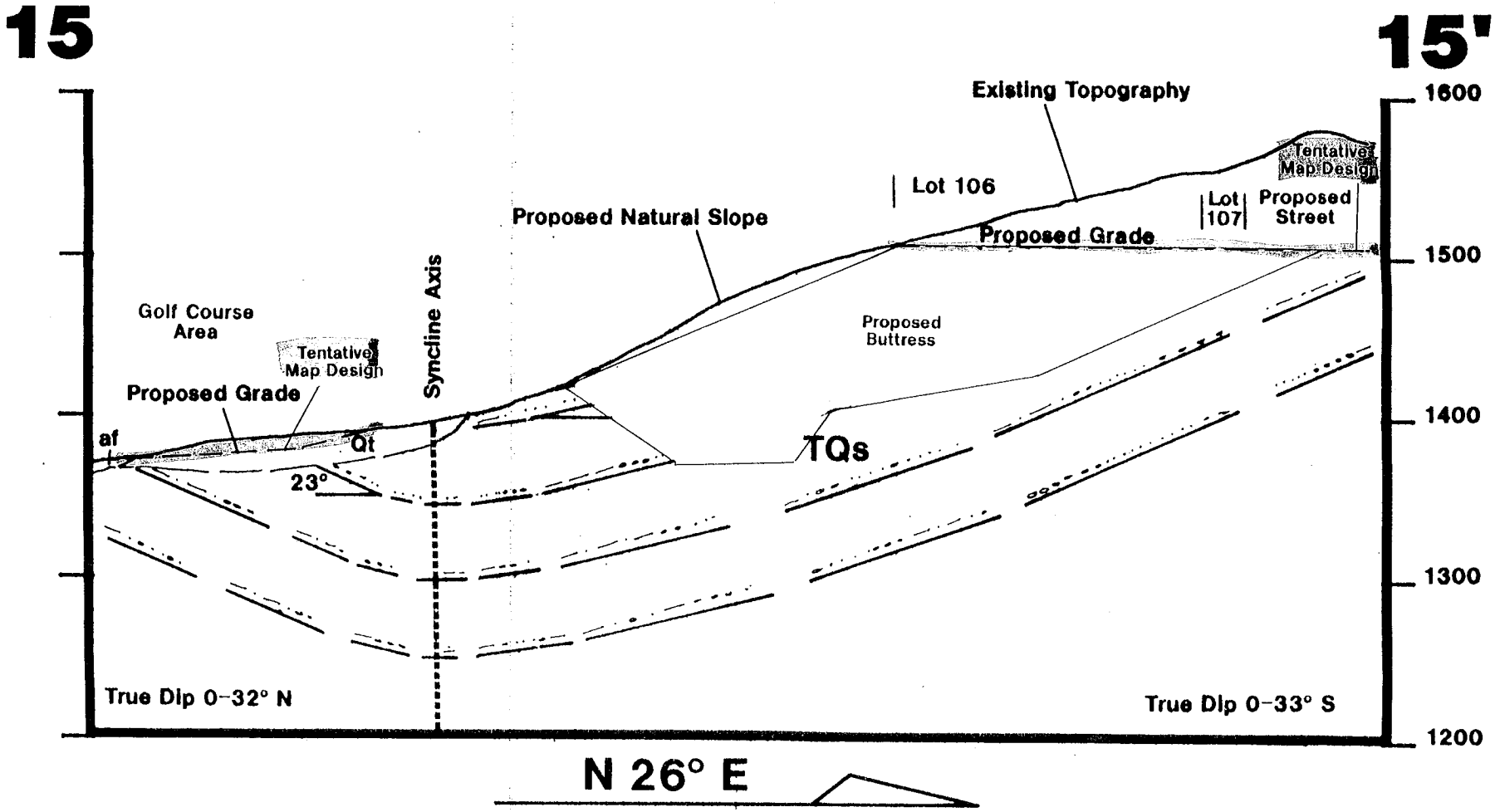
N 26° E

ALLAN E. SEWARD
ENGINEERING GEOLOGY

JOB NUMBER: 98-1617-4		DATE: 1/15/99	
SCALE: 1"=100'		DRAWN BY: Staff	
		REVISED:	

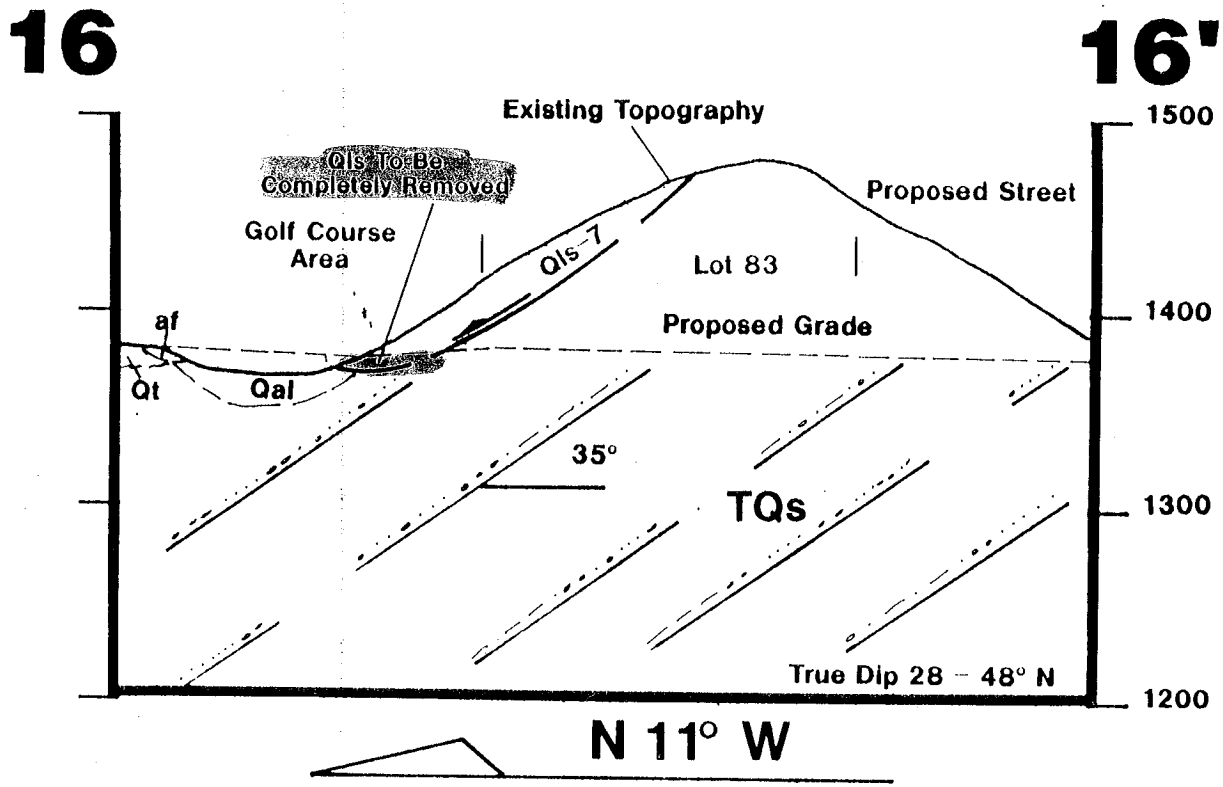
CROSS SECTION

Alternate 2



ALLAN E. SEWARD ENGINEERING GEOLOGY		
JOB NUMBER: 98-1617-4	DATE: 1/15/99	
SCALE: 1"=100'		DRAWN BY: Staff REVISED:

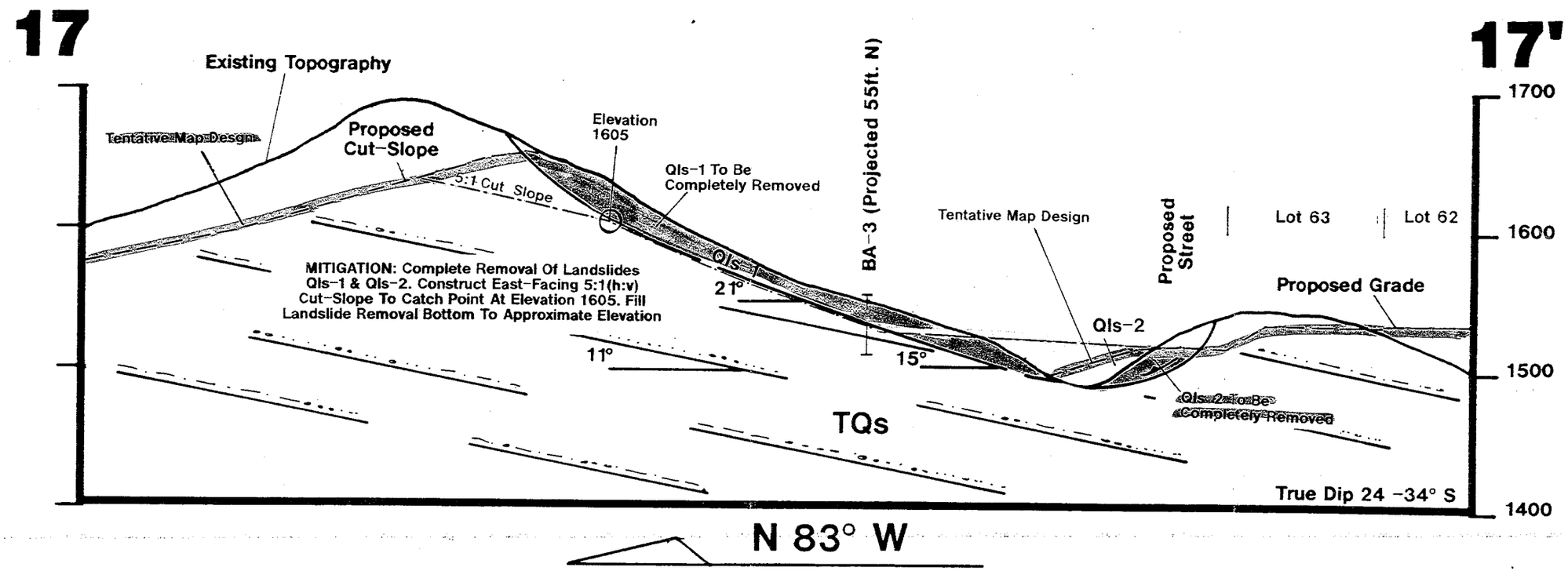
CROSS SECTION



ALLAN E. SEWARD
ENGINEERING GEOLOGY

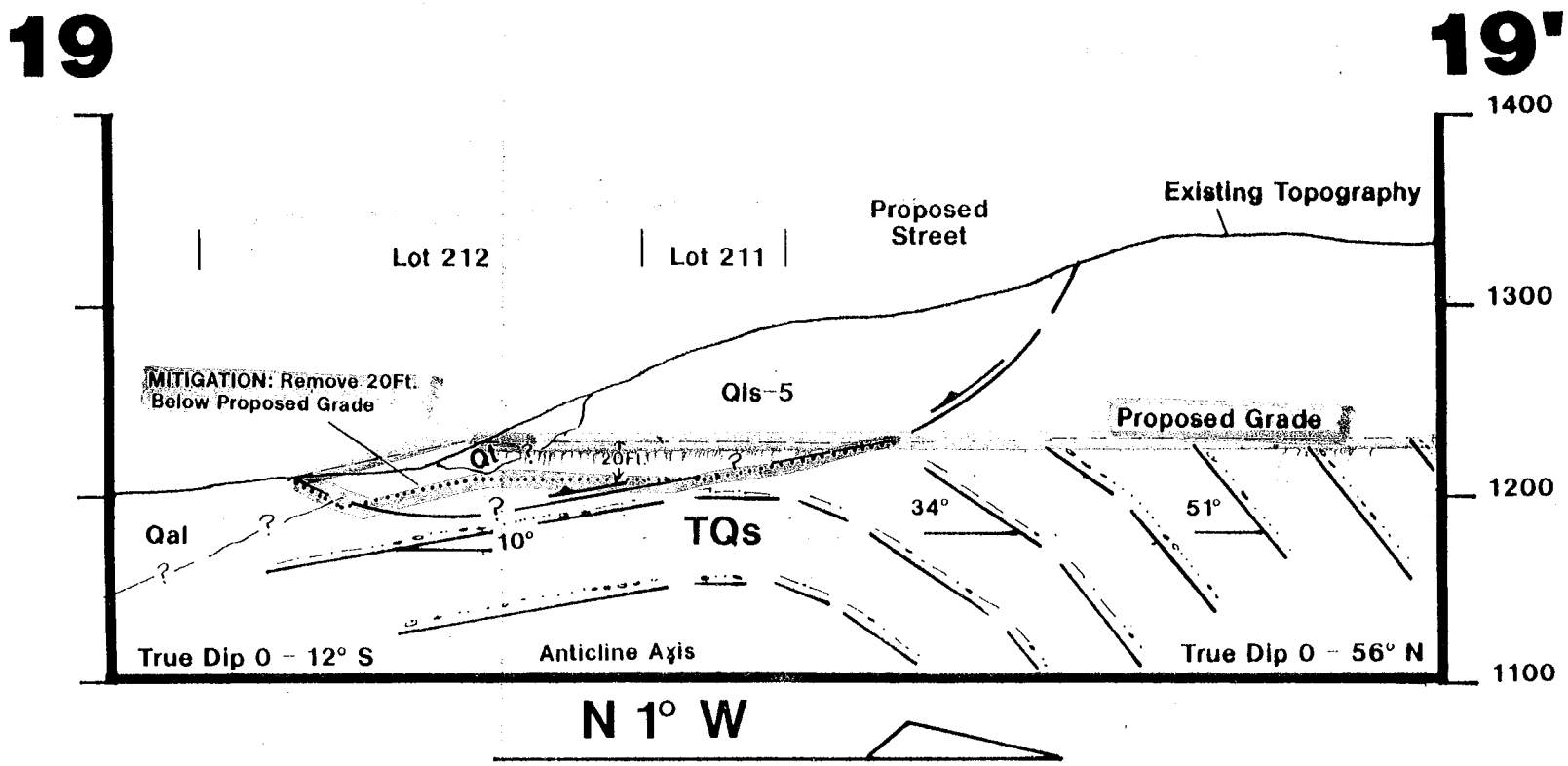
JOB NUMBER: 98-1617-4		DATE: 1/15/99	
SCALE: 1"-100'		DRAWN BY: Staff	
		REVISED:	

CROSS SECTION



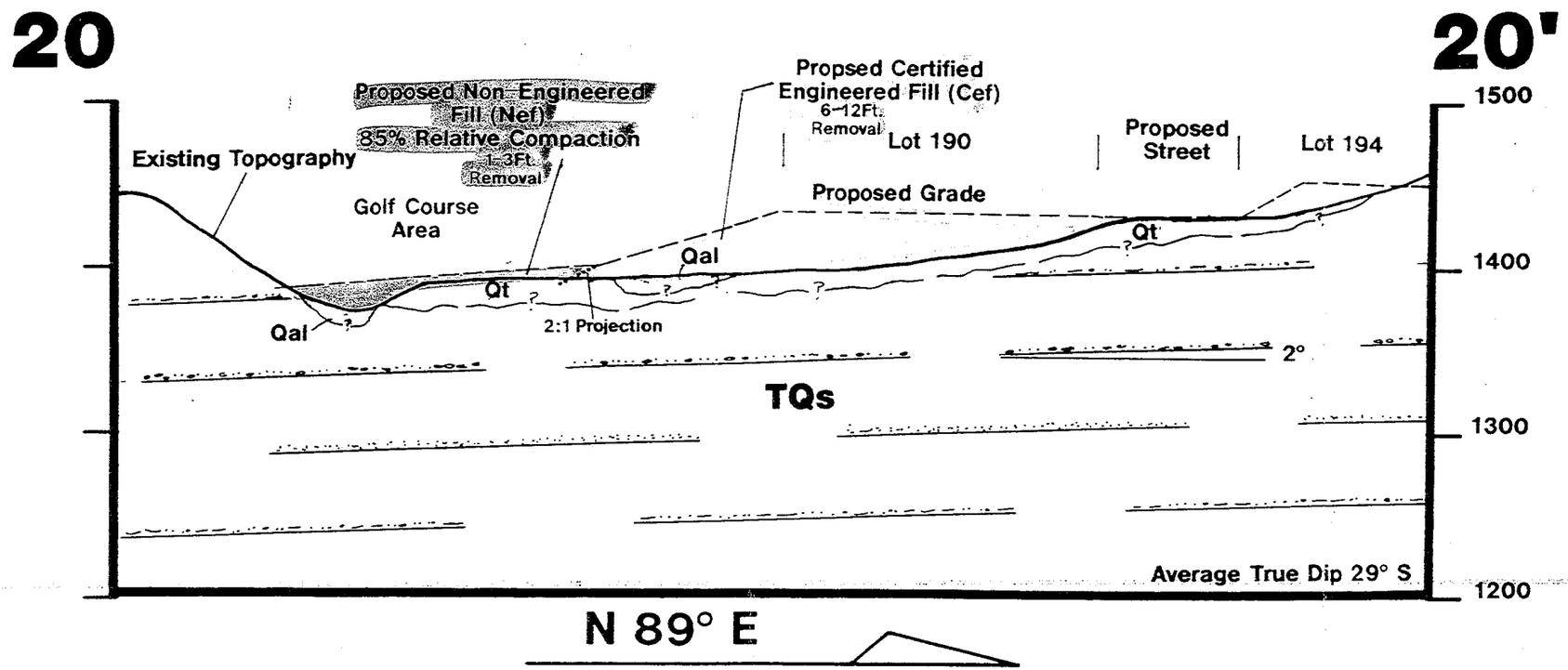
ALLAN E. SEWARD ENGINEERING GEOLOGY		
JOB NUMBER: 98-1617-4	DATE: 1/15/99	
SCALE: 1"=100'		DRAWN BY: Staff REVISED:

CROSS SECTION



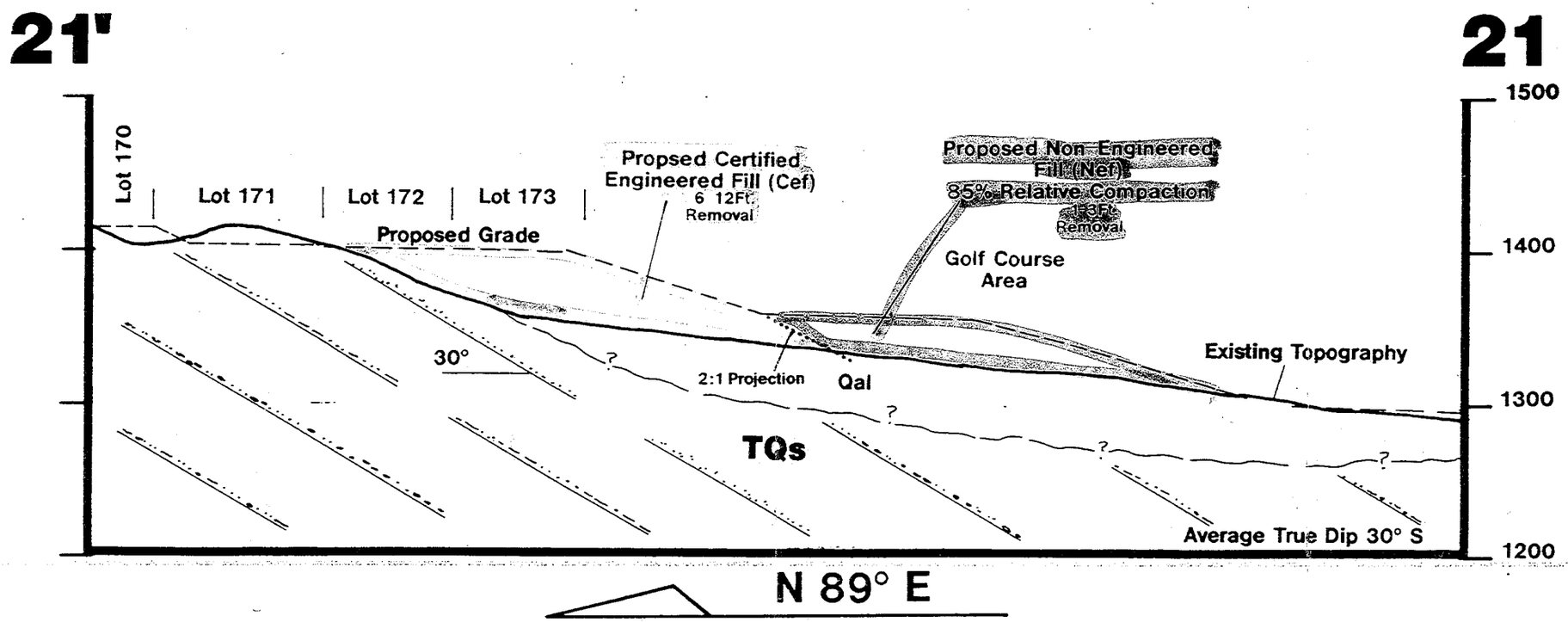
ALLAN E. SEWARD ENGINEERING GEOLOGY		
JOB NUMBER: 98-1617-4	DATE: 1/15/99	
SCALE: 1"-100'		DRAWN BY: Staff REVISED:

CROSS SECTION



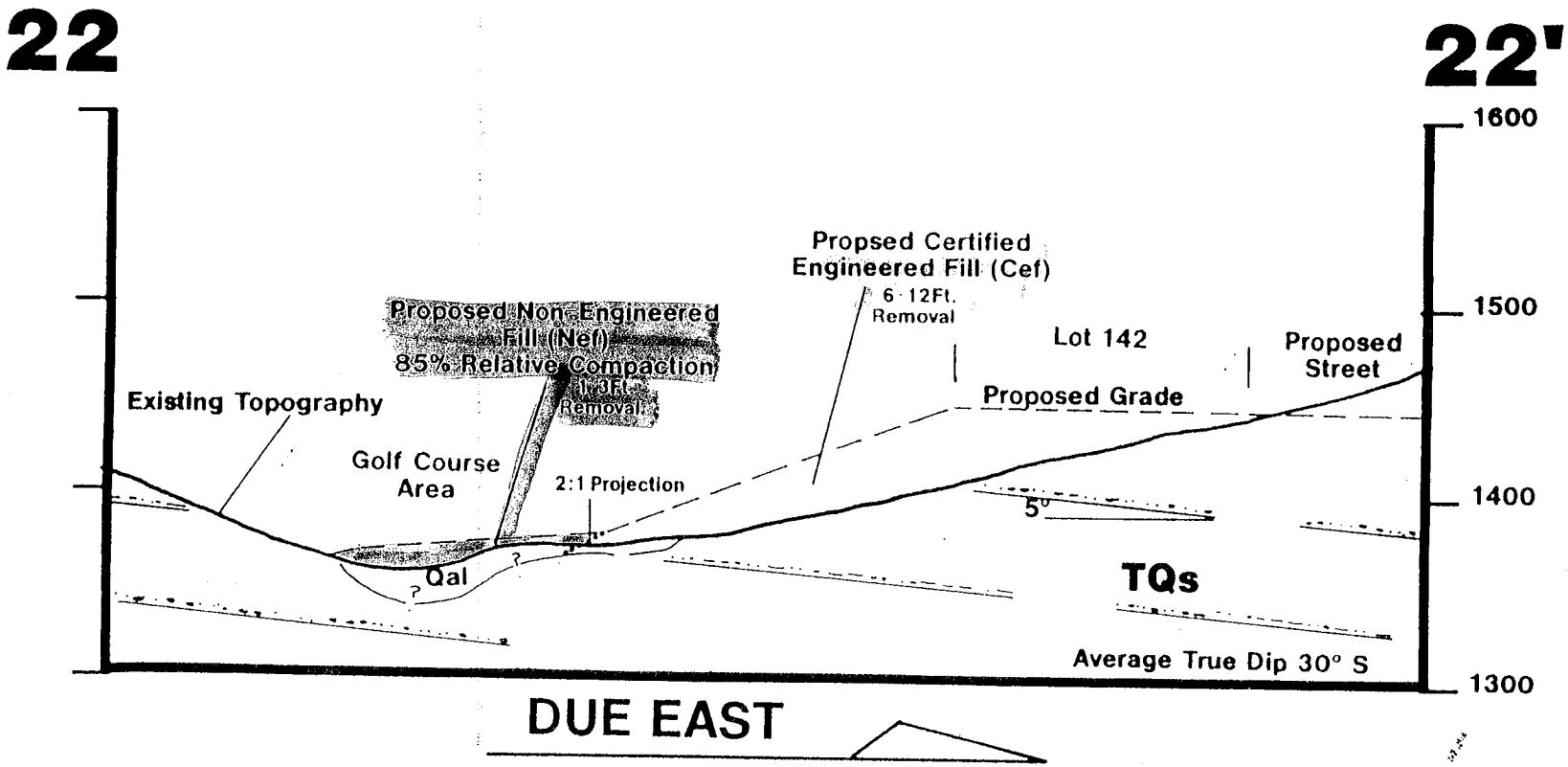
ALLAN E. SEWARD ENGINEERING GEOLOGY		
JOB NUMBER: 98-1617-4	DATE: 1/15/99	
SCALE: 1"=100'		DRAWN BY: Staff REVISED

CROSS SECTION



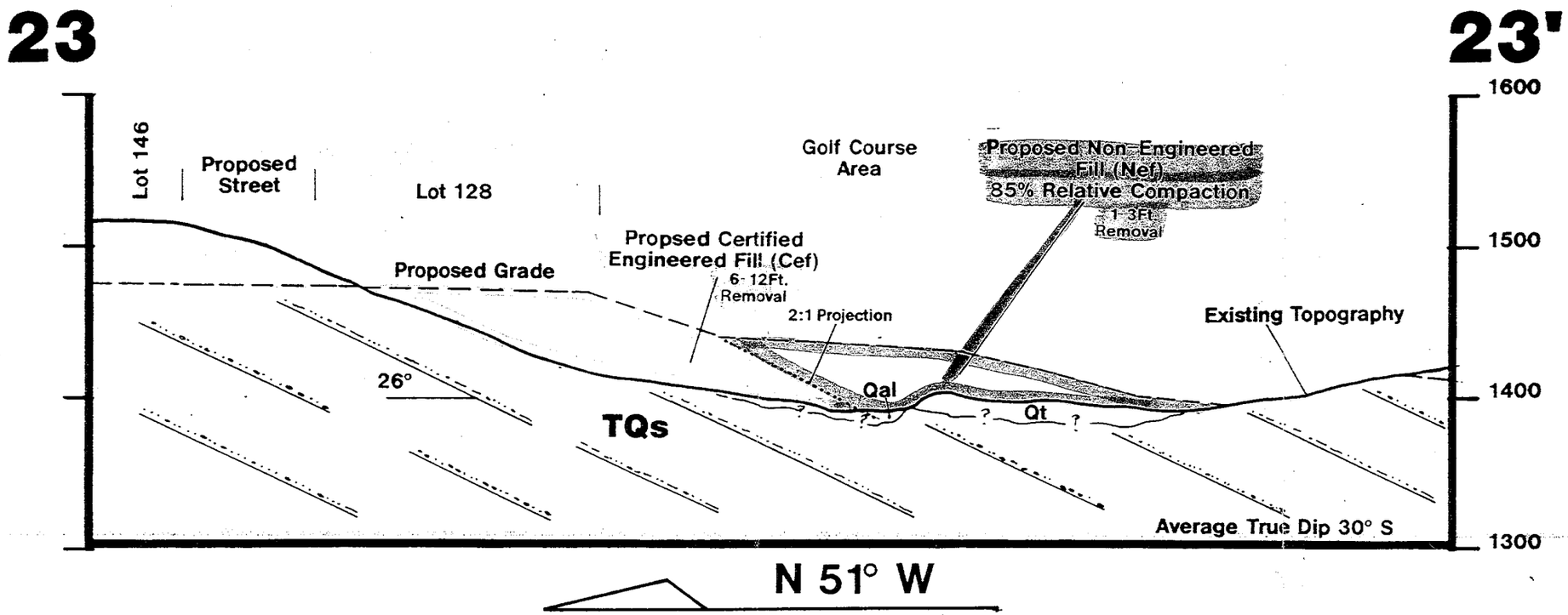
ALLAN E. SEWARD ENGINEERING GEOLOGY		
JOB NUMBER: 98-1617-4	DATE: 1/15/99	
SCALE: 1"=100'		DRAWN BY: Staff REVISED:

CROSS SECTION



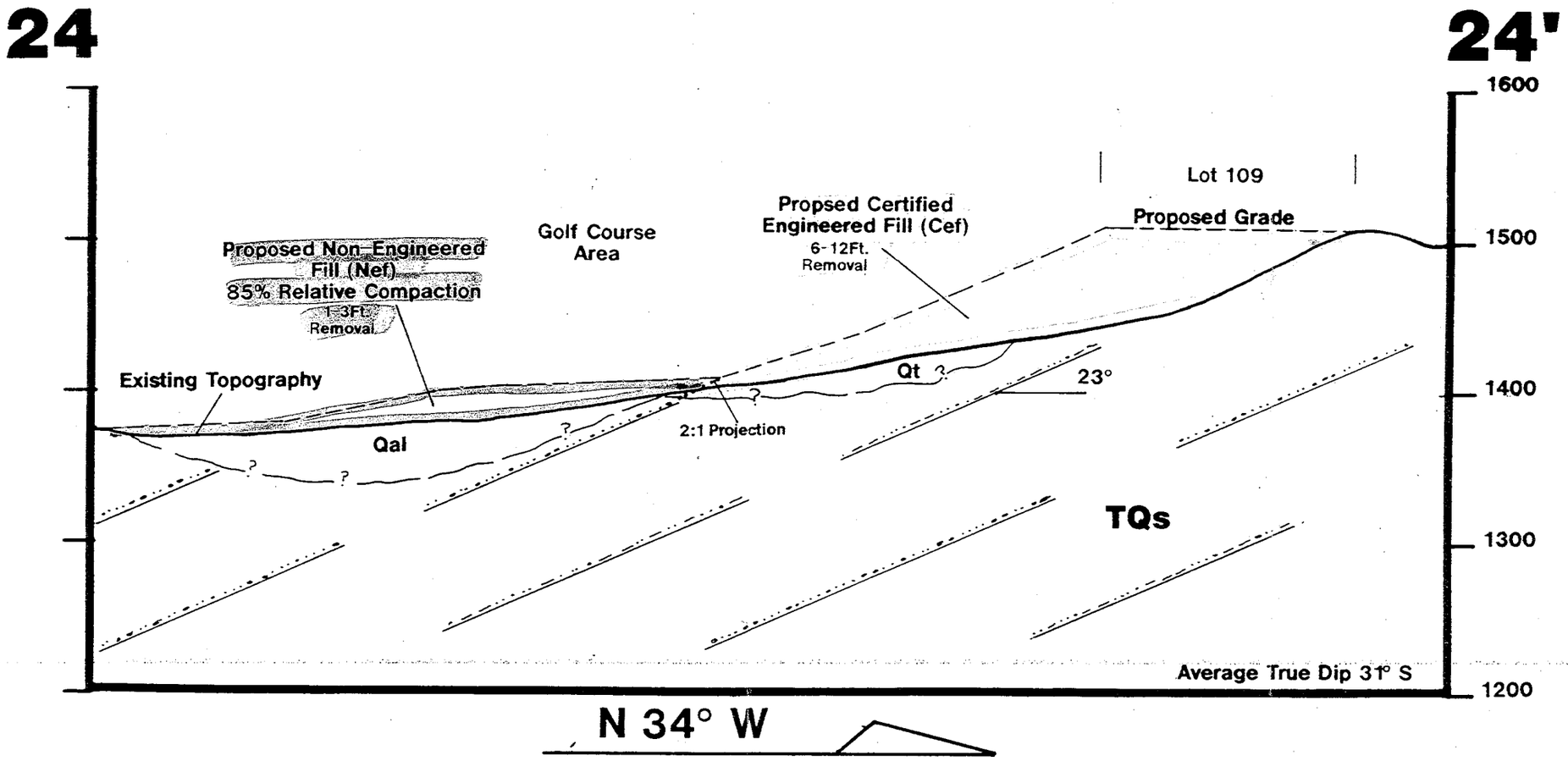
ALLAN E. SEWARD ENGINEERING GEOLOGY			
JOB NUMBER: 98-1617-4		DATE: 1/15/99	
SCALE: 1"=100'		DRAWN BY: Staff	
		REVISED:	

CROSS SECTION



ALLAN E. SEWARD ENGINEERING GEOLOGY		
JOB NUMBER: 98-1617-4	DATE: 1/15/99	
SCALE: 1"=100'		DRAWN BY: Staff REVISED

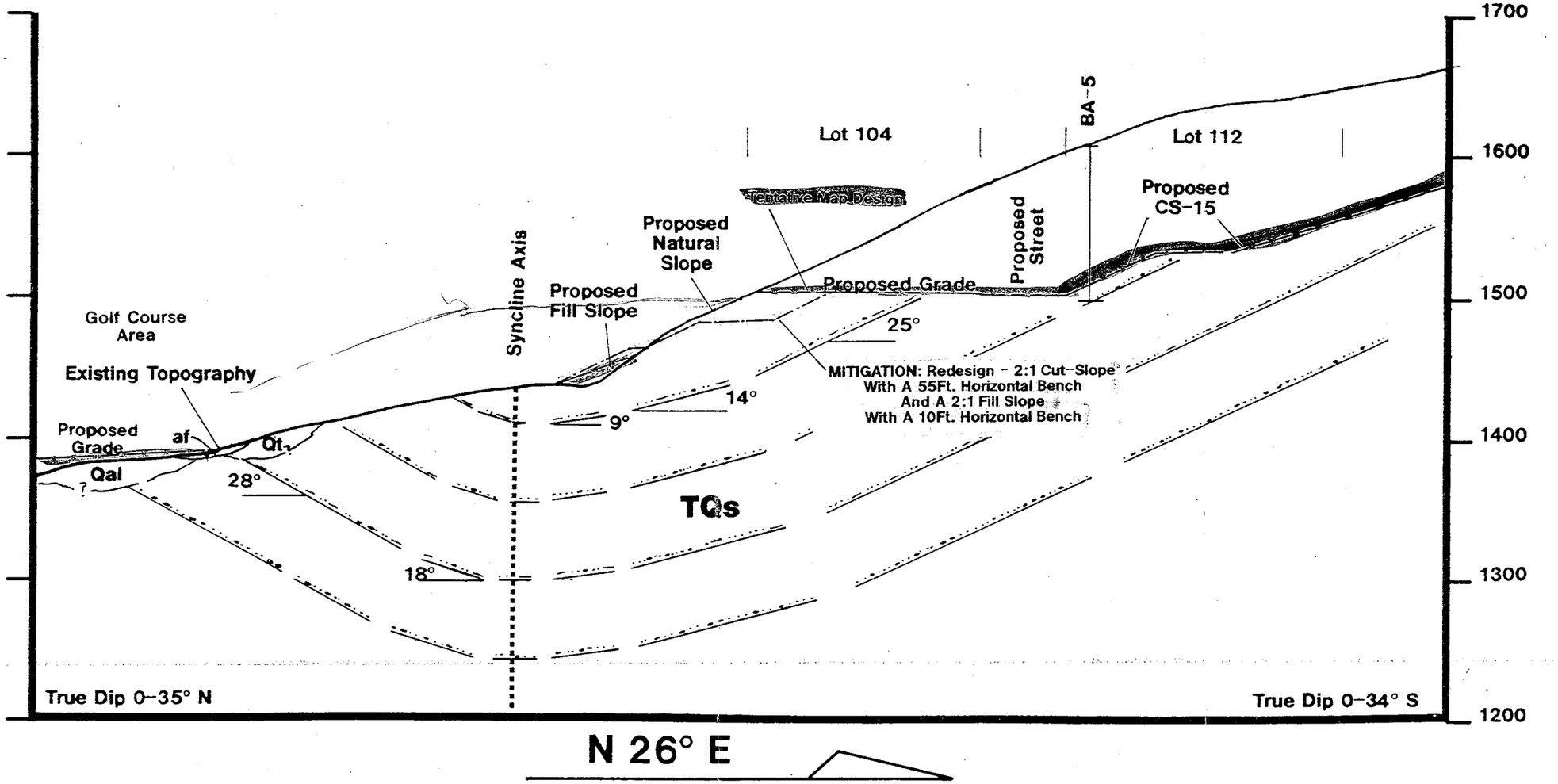
CROSS SECTION



ALLAN E. SEWARD ENGINEERING GEOLOGY		
JOB NUMBER: 98-1617-4	DATE: 1/15/99	
SCALE: 1"=100'		DRAWN BY: Staff REVISED:

CROSS SECTION

Alternate 1



N 26° E

ALLAN E. SEWARD
ENGINEERING GEOLOGY

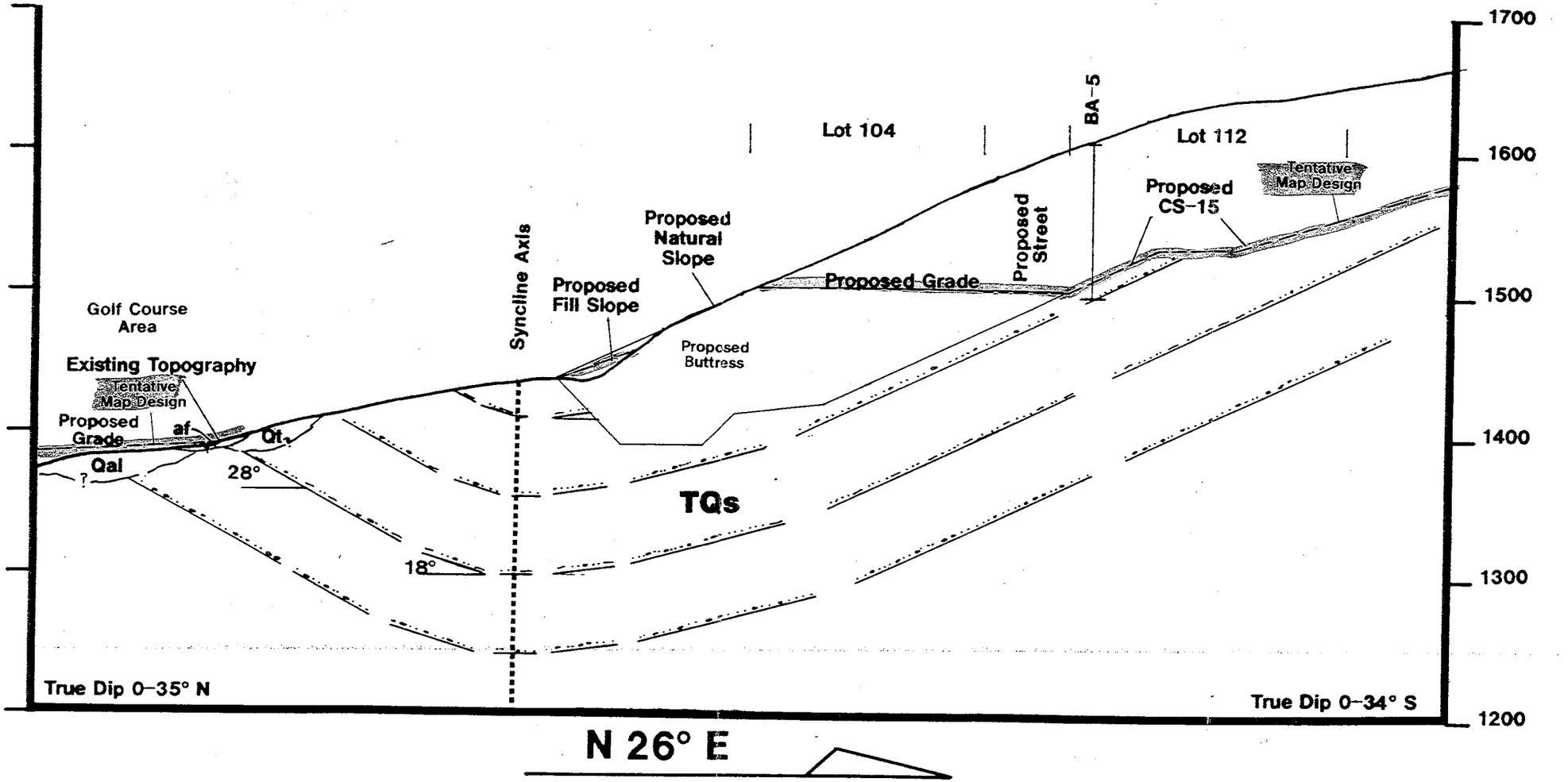
JOB NUMBER: 98-1617-4		DATE: 1/15/99	
SCALE: 1"=100'		DRAWN BY: Staff	
		REVISED:	

CROSS SECTION

Alternate 2

26

26'



N 26° E

ALLAN E. SEWARD ENGINEERING GEOLOGY		
JOB NUMBER: 98-1617-4	DATE: 1/15/99	
SCALE: 1"=100'		DRAWN BY: Staff REVISED:

ALLAN E. SEWARD
ENGINEERING GEOLOGY, INC.
Geological And Geotechnical Consultants

GEOLOGIC AND GEOTECHNICAL REPORT

Vesting Tentative Tract 52584

Castaic, California

VOLUME IV OF V

Prepared For:

Hasley Canyon Land Company, L.L.C.

C/o Palmer Investments

1999 Avenue of the Stars

15th Floor

Los Angeles, California 90067

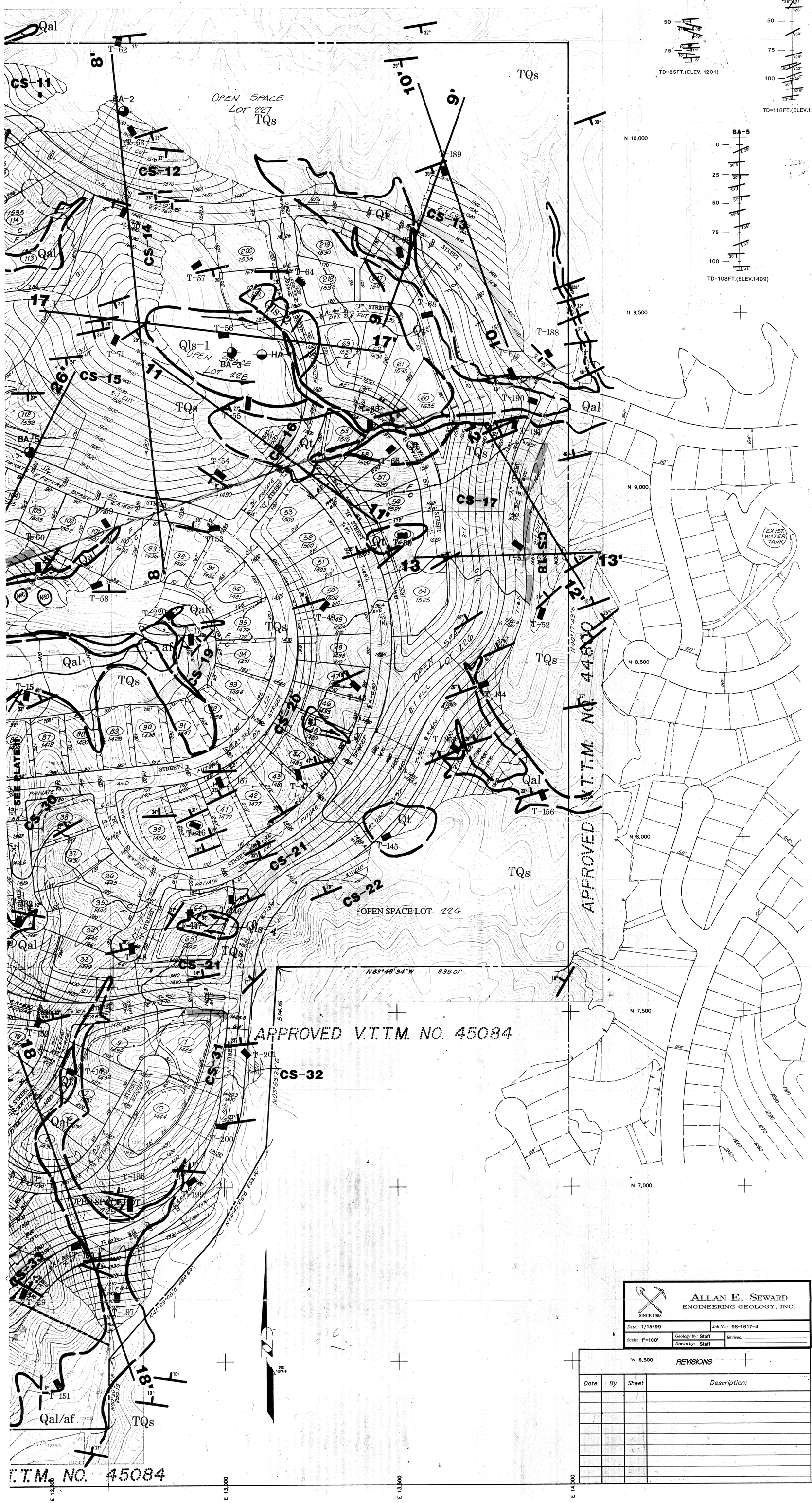
January 15, 1999

27825 Smyth Drive, Valencia, California 91355 661-294-0065 FAX 661-294-0833

Appendix H

PLATE I
GEOLOGIC/GEOTECHNICAL MAP

For Legend See Plate VII



ALLAN E. SEWARD
ENGINEERING GEOLOGY, INC.
SINCE 1958

Date: 1/15/99		Job No.: 98-1617-4
Scale: 1"=100'	Geology by: Staff Drawn by: Staff	Revised:

REVISIONS

Date	By	Sheet	Description:

SCALE IN FEET: 0 100 200 300

Developer:
PALMER INVESTMENTS
1999 AVENUE OF THE STARS, 15TH FLOOR
LOS ANGELES, CALIFORNIA 90067
Ph.: (310) 772-7799
Fax: (310) 772-7790

Owner:
HASLEY CANYON LAND COMPANY, L.L.C.
1999 AVENUE OF THE STARS, 15TH FLOOR
LOS ANGELES, CALIFORNIA 90067

Legal Description:
PORTION OF THE NORTHWEST QUARTER OF SECTION 2 & THE NORTHEAST QUARTER OF SECTION 3, T4N, R17W, SBM IN THE COUNTY OF LOS ANGELES, STATE OF CALIFORNIA.

VESTING TENTATIVE TRACT MAP NO.

52584

IN THE UNINCORPORATED TERRITORY OF LOS ANGELES COUNTY
COUNTY CASE NO. _____

Prepared by:
LAND DESIGN CONSULTANTS, INC.
Land Planning Civil Engineering, Surveying & Environmental Services
225 South Lake Ave., Suite 600, Pasadena, California 91101
Ph. (626) 578-7000 Fax: (626) 578-7373
http://www.ldcla.com

R.C.E. No. 21649 Robert R. Sims — April 1998 Date

LDC

Proj. No.: 97017-005

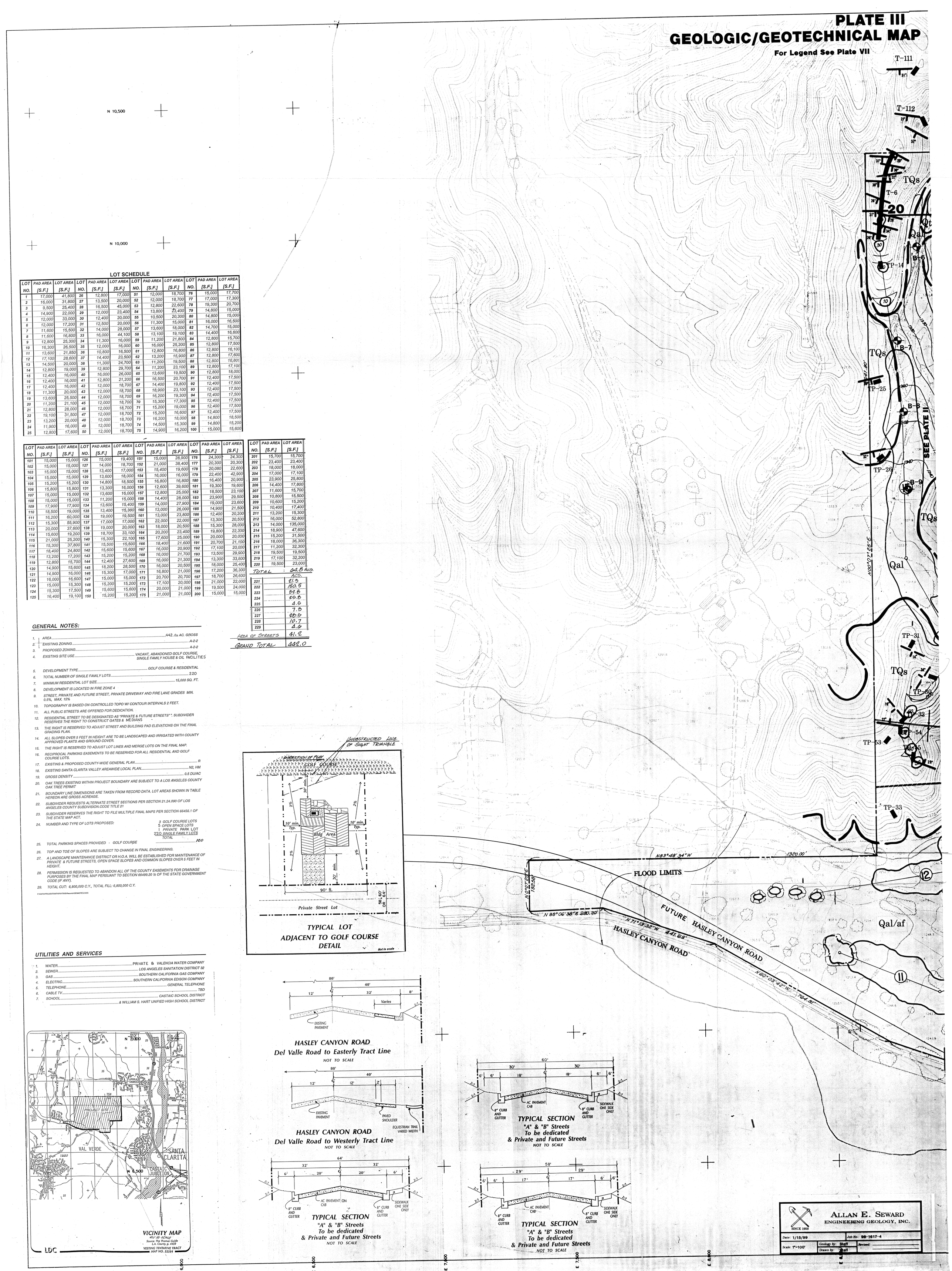
Sht: 1 of 1

PLATE II
GEOLOGIC/GEOTECHNICAL MAP

For Legend See Plate VII

PLATE III
GEOLOGIC/GEOTECHNICAL MAP

For Legend See Plate VII



LOT SCHEDULE

LOT NO.	PAD AREA [S.F.]	LOT AREA [S.F.]	LOT NO.	PAD AREA [S.F.]	LOT AREA [S.F.]	LOT NO.	PAD AREA [S.F.]	LOT AREA [S.F.]	LOT NO.	PAD AREA [S.F.]	LOT AREA [S.F.]
1	17,000	41,800	26	12,800	17,000	51	12,000	18,700	76	15,000	17,700
2	16,000	31,800	27	13,500	20,000	52	12,000	18,700	77	17,000	17,300
3	9,500	25,400	28	16,500	45,000	53	12,800	22,600	78	19,300	20,700
4	14,900	22,000	29	12,000	23,400	54	13,800	23,400	79	14,800	15,000
5	12,000	33,000	30	12,400	20,000	55	10,500	20,300	80	14,800	15,000
6	12,000	17,200	31	12,500	20,000	56	11,300	15,000	81	16,000	16,500
7	11,600	15,500	32	14,000	28,000	57	13,600	18,000	82	14,700	15,000
8	11,600	16,800	33	16,000	44,100	58	13,100	19,100	83	14,400	16,600
9	12,800	25,300	34	11,300	16,000	59	11,200	21,800	84	12,800	15,700
10	16,300	26,500	35	12,000	16,000	60	16,000	25,200	85	12,800	17,500
11	13,600	21,850	36	10,800	16,500	61	12,800	16,800	86	12,800	16,100
12	17,100	28,600	37	14,400	23,500	62	13,200	15,900	87	12,800	17,600
13	14,500	20,000	38	11,300	24,700	63	11,200	19,500	88	12,800	16,800
14	12,800	19,000	39	12,800	29,700	64	11,200	23,100	89	12,800	17,100
15	12,400	16,000	40	16,000	26,000	65	13,600	19,500	90	12,800	18,000
16	12,400	16,000	41	12,800	21,200	66	16,500	20,700	91	12,400	17,500
17	12,400	16,000	42	12,000	18,700	67	14,400	19,800	92	12,400	17,500
18	11,300	20,000	43	12,000	18,700	68	18,900	23,100	93	12,400	17,500
19	13,600	25,500	44	12,000	18,700	69	16,200	19,300	94	12,400	17,500
20	11,200	21,100	45	12,000	18,700	70	15,300	17,300	95	12,400	17,500
21	12,800	28,000	46	12,000	18,700	71	15,200	19,000	96	12,400	17,500
22	19,100	31,500	47	12,000	18,700	72	15,200	16,600	97	12,400	17,500
23	13,200	20,000	48	12,000	18,700	73	16,200	18,000	98	14,800	18,500
24	11,900	16,000	49	12,000	18,700	74	14,500	15,300	99	14,800	15,200
25	12,800	17,600	50	12,000	18,700	75	14,900	16,200	100	15,000	15,600

LOT NO.	PAD AREA [S.F.]	LOT AREA [S.F.]	LOT NO.	PAD AREA [S.F.]	LOT AREA [S.F.]	LOT NO.	PAD AREA [S.F.]	LOT AREA [S.F.]	LOT NO.	PAD AREA [S.F.]	LOT AREA [S.F.]
101	15,000	15,000	126	15,000	19,400	151	15,000	28,900	176	24,300	24,300
102	15,000	15,000	127	14,000	18,700	152	21,000	38,400	177	20,300	20,300
103	15,000	15,000	128	13,400	17,000	153	15,400	19,600	178	20,080	22,600
104	15,000	15,000	129	13,600	18,000	154	16,000	16,000	179	22,400	42,900
105	15,200	15,200	130	14,800	18,500	155	16,800	16,800	180	16,400	20,900
106	15,800	15,800	131	13,300	16,000	156	12,600	39,600	181	19,300	19,600
107	15,000	15,000	132	13,600	16,000	157	12,800	25,000	182	18,500	23,100
108	15,000	15,000	133	11,200	15,000	158	14,400	28,000	183	23,900	29,500
109	17,900	17,900	134	13,600	15,400	159	14,000	27,900	184	19,000	23,600
110	18,500	19,000	135	13,400	15,300	160	13,000	26,000	185	14,900	21,500
111	16,200	60,000	136	19,000	19,500	161	13,000	23,800	186	12,400	20,200
112	15,300	55,900	137	17,000	17,000	162	22,000	22,000	187	13,300	20,500
113	20,000	37,600	138	19,000	20,000	163	18,000	20,500	188	15,300	28,000
114	15,600	19,200	139	18,700	33,100	164	20,200	23,400	189	19,800	22,300
115	21,000	25,200	140	15,300	22,100	165	17,600	25,000	190	20,000	20,000
116	15,300	37,800	141	15,500	15,500	166	18,400	21,600	191	20,700	21,100
117	18,400	24,800	142	15,600	15,600	167	16,000	20,900	192	17,100	20,000
118	13,200	17,200	143	15,200	15,200	168	16,000	21,700	193	13,500	29,900
119	12,800	15,700	144	12,400	27,600	169	16,000	21,300	194	13,300	33,600
120	14,900	15,600	145	18,200	28,500	170	16,000	20,500	195	18,000	25,400
121	14,900	16,000	146	15,300	17,000	171	16,800	21,000	196	17,200	36,300
122	16,000	16,600	147	15,000	15,000	172	20,700	20,700	197	18,700	26,600
123	15,000	15,300	148	15,200	15,200	173	17,100	20,000	198	21,000	22,000
124	15,300	17,500	149	15,600	15,600	174	20,000	21,000	199	19,500	24,000
125	16,400	19,100	150	15,200	15,200	175	21,000	21,000	200	15,000	15,000

LOT NO.	PAD AREA [S.F.]	LOT AREA [S.F.]
201	15,700	15,700
202	23,400	23,400
203	18,000	18,000
204	17,000	17,100
205	23,900	25,800
206	14,400	17,800
207	11,600	15,700
208	10,800	15,500
209	10,600	15,200
210	10,400	17,400
211	13,200	15,300
212	16,000	52,800
213	14,000	135,000
214	18,900	47,600
215	15,200	31,500
216	18,000	36,300
217	11,200	32,300
218	19,500	19,500
219	17,100	32,200
220	19,500	23,000
TOTAL		64.8 ACS.

	ACS.
221	21.3
222	150.5
223	88.8
224	29.8
225	4.5
226	7.3
227	28.9
228	10.7
229	4.6
AREA OF STREETS	41.2
GRAND TOTAL	442.0

GENERAL NOTES:

1. AREA ..... 442.0± AC. GROSS
2. EXISTING ZONING A-2-2
3. PROPOSED ZONING A-2-2
4. EXISTING SITE USE ..... VACANT, ABANDONED GOLF COURSE, SINGLE FAMILY HOUSE & OIL FACILITIES
5. DEVELOPMENT TYPE ..... GOLF COURSE & RESIDENTIAL
6. TOTAL NUMBER OF SINGLE FAMILY LOTS 220
7. MINIMUM RESIDENTIAL LOT SIZE ..... 15,000 SQ. FT.
8. DEVELOPMENT IS LOCATED IN FIRE ZONE 4
9. STREET, PRIVATE AND FUTURE STREET, PRIVATE DRIVEWAY AND FIRE LANE GRADES MIN. 0.5%, MAX. 15%
10. TOPOGRAPHY IS BASED ON CONTROLLED TOPO W/ CONTOUR INTERVALS 2 FEET.
11. ALL PUBLIC STREETS ARE OFFERED FOR DEDICATION.
12. RESIDENTIAL STREET TO BE DESIGNATED AS "PRIVATE & FUTURE STREETS" ". SUBDIVIDER RESERVES THE RIGHT TO CONSTRUCT GATES & MEDIANS
13. THE RIGHT IS RESERVED TO ADJUST STREET AND BUILDING PAD ELEVATIONS ON THE FINAL GRADING PLAN.
14. ALL SLOPES OVER 5 FEET IN HEIGHT ARE TO BE LANDSCAPED AND IRRIGATED WITH COUNTY APPROVED PLANTS AND GROUND COVER.
15. THE RIGHT IS RESERVED TO ADJUST LOT LINES AND MERGE LOTS ON THE FINAL MAP.
16. RECIPROCAL PARKING EASEMENTS TO BE RESERVED FOR ALL RESIDENTIAL AND GOLF COURSE LOTS.
17. EXISTING & PROPOSED COUNTY-WIDE GENERAL PLAN ..... R
18. EXISTING SANTA CLARITA VALLEY AREAWIDE LOCAL PLAN ..... N2, HM
19. GROSS DENSITY ..... 0.5 DU/AC
20. OAK TREES EXISTING WITHIN PROJECT BOUNDARY ARE SUBJECT TO A LOS ANGELES COUNTY OAK TREE PERMIT
21. BOUNDARY LINE DIMENSIONS ARE TAKEN FROM RECORD DATA. LOT AREAS SHOWN IN TABLE HEREON ARE GROSS ACREAGE.
22. SUBDIVIDER REQUESTS ALTERNATE STREET SECTIONS PER SECTION 21.24.090 OF LOS ANGELES COUNTY SUBDIVISION.CODE TITLE 21
23. SUBDIVIDER RESERVES THE RIGHT TO FILE MULTIPLE FINAL MAPS PER SECTION 66456.1 OF THE STATE MAP ACT.
24. NUMBER AND TYPE OF LOTS PROPOSED:
    - 3 GOLF COURSE LOTS
    - 5 OPEN SPACE LOTS
    - 1 PRIVATE PARK LOT
    - 220 SINGLE FAMILY LOTS
    - TOTAL
25. TOTAL PARKING SPACES PROVIDED - GOLF COURSE 120
26. TOP AND TOE OF SLOPES ARE SUBJECT TO CHANGE IN FINAL ENGINEERING.
27. A LANDSCAPE MAINTENANCE DISTRICT OR H.O.A. WILL BE ESTABLISHED FOR MAINTENANCE OF PRIVATE & FUTURE STREETS, OPEN SPACE SLOPES AND COMMON SLOPES OVER 5 FEET IN HEIGHT.
28. PERMISSION IS REQUESTED TO ABANDON ALL OF THE COUNTY EASEMENTS FOR DRAINAGE PURPOSES BY THE FINAL MAP PERSUANT TO SECTION 66499.20 ½ OF THE STATE GOVERNMENT CODE (IF ANY).
29. TOTAL CUT: 6,800,000 C.Y., TOTAL FILL: 6,800,000 C.Y.

F:\DATA\PROJECTS\97\97017005\Reports\GENNOTES.DOC

UTILITIES AND SERVICES

1. WATER ..... PRIVATE & VALENCIA WATER COMPANY
2. SEWER ..... LOS ANGELES SANITATION DISTRICT 32
3. GAS ..... SOUTHERN CALIFORNIA GAS COMPANY
4. ELECTRIC ..... SOUTHERN CALIFORNIA EDISON COMPANY
5. TELEPHONE ..... GENERAL TELEPHONE
6. CABLE TV ..... TBD
7. SCHOOL ..... CASTAIC SCHOOL DISTRICT
   ..... & WILLIAM S. HART UNIFIED HIGH SCHOOL DISTRICT

VICINITY MAP
NOT TO SCALE
Source: The Thomas Guide L.A. County, p. 4459
VESTING TENTATIVE TRACT MAP NO. 52584

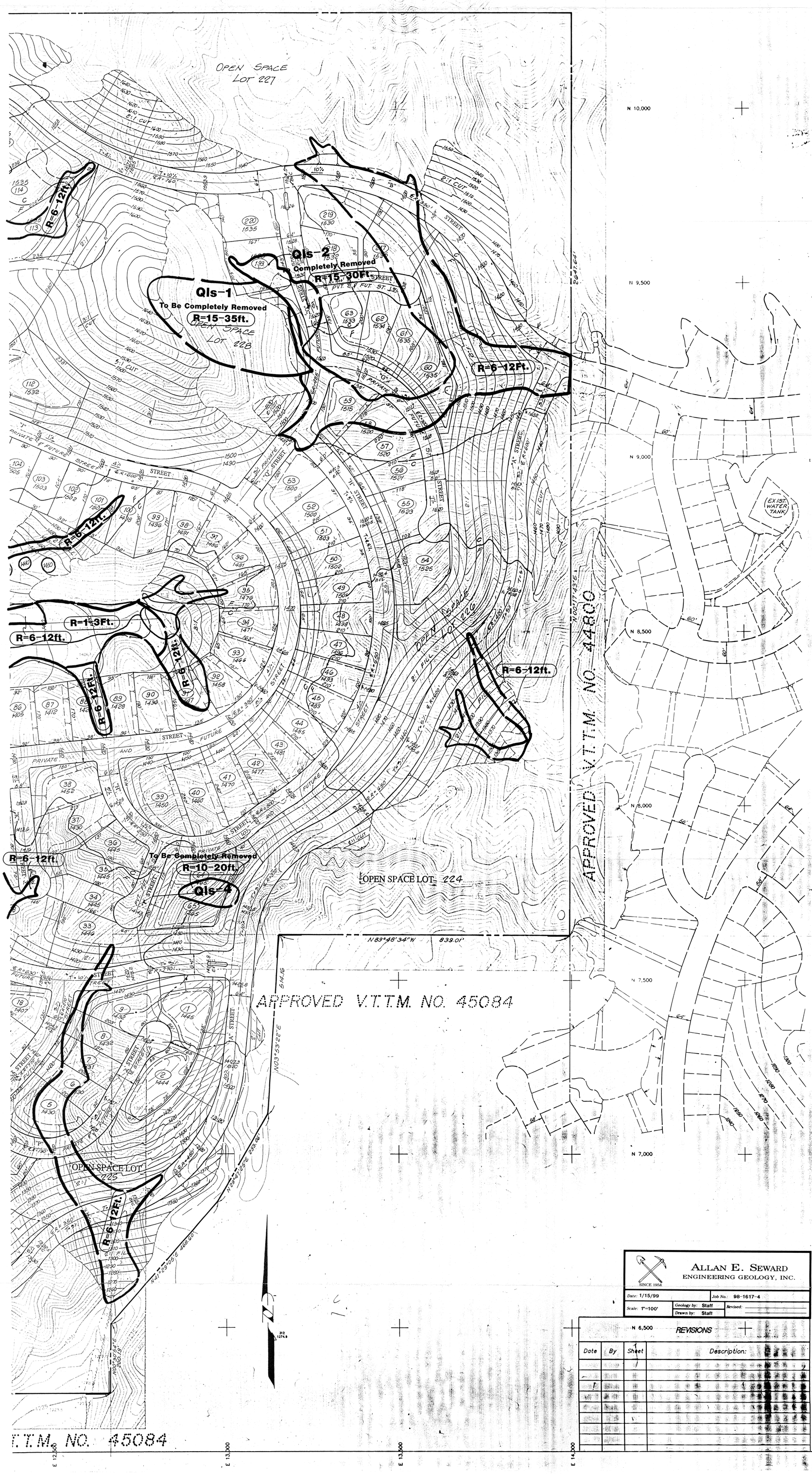
LDC

ALLAN E. SEWARD
ENGINEERING GEOLOGY, INC.
SINCE 1958

Date: 1/15/99	Job No.: 98-1617-4
Scale: 1"=100'	Geology by: Staff; Drawn by: Staff; Revised:

PLATE IV
GEOLOGIC/GEOTECHNICAL REMOVAL MAP

For Legend See Plate VII



SCALE IN FEET: 0 100 200 300

Developer:
PALMER INVESTMENTS
1999 AVENUE OF THE STARS, 15TH FLOOR
LOS ANGELES, CALIFORNIA 90067
Ph.: (310) 772-7799
Fax: (310) 772-7790

Owner:
HASLEY CANYON LAND COMPANY, L.L.C.
1999 AVENUE OF THE STARS, 15TH FLOOR
LOS ANGELES, CALIFORNIA 90067

Legal Description:
PORTION OF THE NORTHWEST QUARTER OF SECTION 2 & THE NORTHEAST QUARTER OF SECTION 3, T4N, R17W, SBM IN THE COUNTY OF LOS ANGELES, STATE OF CALIFORNIA.

ALLAN E. SEWARD
ENGINEERING GEOLOGY, INC.
SINCE 1958

Date: 1/15/99	Job No.: 98-1617-4
Scale: 1"=100'	Geology by: Staff / Drawn by: Staff / Revised:

REVISIONS

Date	By	Sheet	Description:

VESTING TENTATIVE TRACT MAP NO.

52584

IN THE UNINCORPORATED TERRITORY OF LOS ANGELES COUNTY
COUNTY CASE NO. _____

Prepared by:
LAND DESIGN CONSULTANTS, INC.
Land Planning Civil Engineering, Surveying & Environmental Services
225 South Lake Ave., Suite 600, Pasadena, California 91101
Ph. (626) 578-7000 Fax: (626) 578-7373
http://www.ldcla.com

R.C.E. No. 21649 Robert R. Sims — April 1998 Date

LDC

Proj. No.: 97017-005
Sht: 1 of 1

PLATE V
GEOLOGIC/GEOTECHNICAL REMOVAL MAP

For Legend See Plate VII

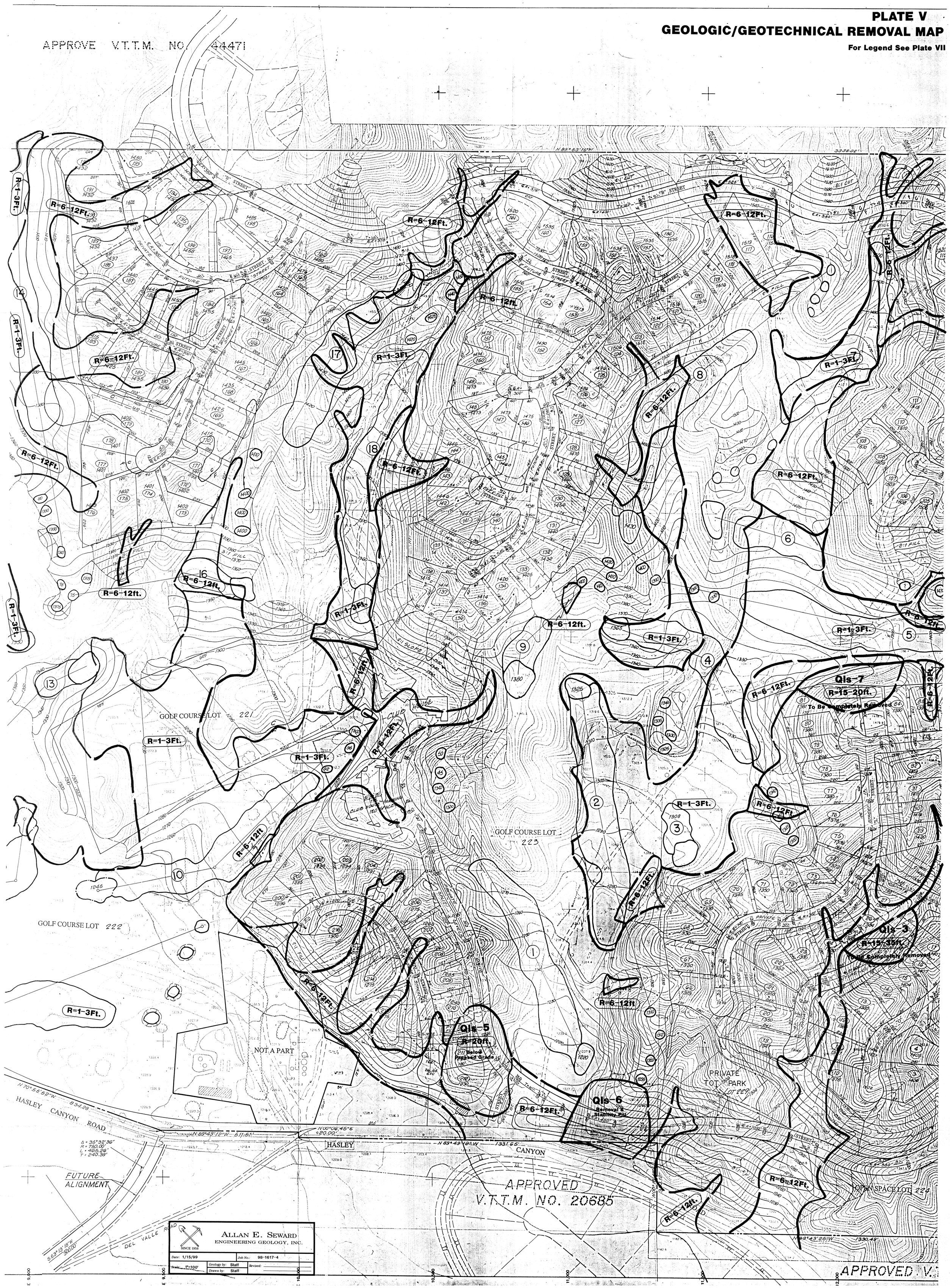
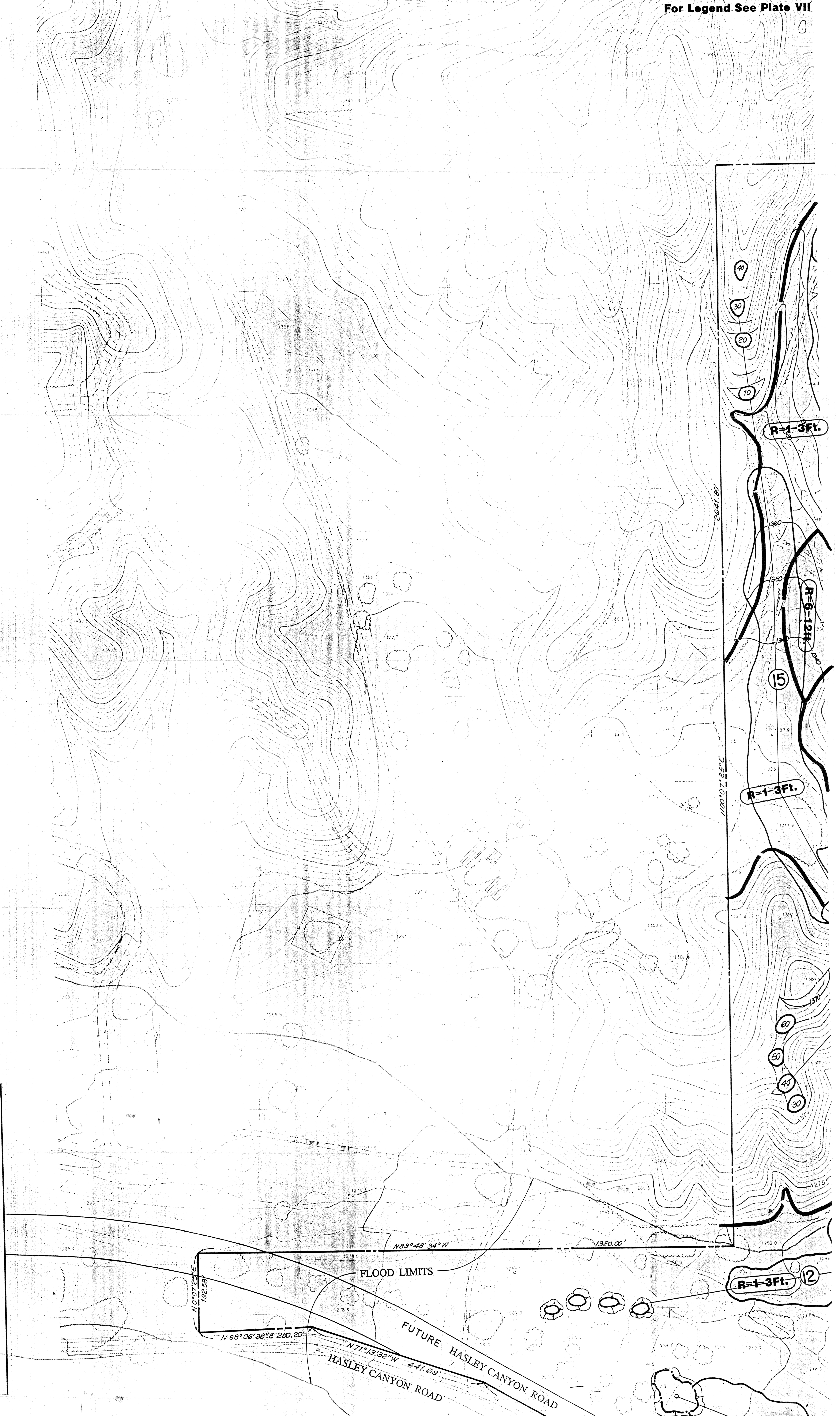


PLATE VI
GEOLOGIC/GEOTECHNICAL REMOVAL MAP
For Legend See Plate VII

N 10,500

N 10,000



LOT SCHEDULE

LOT NO.	PAD AREA [S.F.]	LOT AREA [S.F.]	LOT NO.	PAD AREA [S.F.]	LOT AREA [S.F.]	LOT NO.	PAD AREA [S.F.]	LOT AREA [S.F.]	LOT NO.	PAD AREA [S.F.]	LOT AREA [S.F.]
1	17,000	41,800	26	12,800	17,000	51	12,000	18,700	76	15,000	17,700
2	16,000	31,800	27	13,500	20,000	52	12,000	18,700	77	17,000	17,300
3	9,500	25,400	28	16,500	45,000	53	12,800	22,600	78	19,300	20,700
4	14,900	22,000	29	12,000	23,400	54	13,800	23,400	79	14,800	15,000
5	12,000	33,000	30	12,400	20,000	55	10,500	20,300	80	14,800	15,000
6	12,000	17,200	31	12,500	20,000	56	11,300	15,000	81	16,000	16,500
7	11,600	15,500	32	14,000	28,000	57	13,600	18,000	82	14,700	15,000
8	11,600	16,800	33	16,000	44,100	58	13,100	19,100	83	14,400	16,600
9	12,800	25,300	34	11,300	16,000	59	11,200	21,800	84	12,800	15,700
10	16,300	26,500	35	12,000	16,000	60	16,000	25,200	85	12,800	17,500
11	13,600	21,850	36	10,800	16,500	61	12,800	16,800	86	12,800	16,100
12	17,100	28,600	37	14,400	23,500	62	13,200	15,900	87	12,800	17,600
13	14,500	20,000	38	11,300	24,700	63	11,200	19,500	88	12,800	16,800
14	12,800	19,000	39	12,800	29,700	64	11,200	23,100	89	12,800	17,100
15	12,400	16,000	40	16,000	26,000	65	13,600	19,500	90	12,800	18,000
16	12,400	16,000	41	12,800	21,200	66	16,500	20,700	91	12,400	17,500
17	12,400	16,000	42	12,000	18,700	67	14,400	19,800	92	12,400	17,500
18	11,300	20,000	43	12,000	18,700	68	18,900	23,100	93	12,400	17,500
19	13,600	25,500	44	12,000	18,700	69	16,200	19,300	94	12,400	17,500
20	11,200	21,100	45	12,000	18,700	70	15,300	17,300	95	12,400	17,500
21	12,800	28,000	46	12,000	18,700	71	15,200	19,000	96	12,400	17,500
22	19,100	31,500	47	12,000	18,700	72	15,200	16,600	97	12,400	17,500
23	13,200	20,000	48	12,000	18,700	73	16,200	18,000	98	14,800	18,500
24	11,900	16,000	49	12,000	18,700	74	14,500	15,300	99	14,800	15,200
25	12,800	17,600	50	12,000	18,700	75	14,900	16,200	100	15,000	15,600

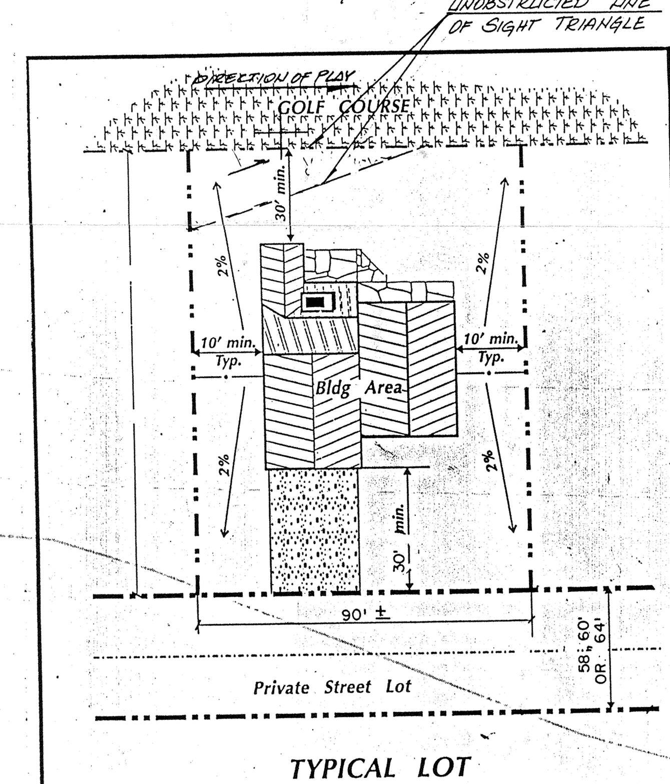
LOT NO.	PAD AREA [S.F.]	LOT AREA [S.F.]	LOT NO.	PAD AREA [S.F.]	LOT AREA [S.F.]	LOT NO.	PAD AREA [S.F.]	LOT AREA [S.F.]	LOT NO.	PAD AREA [S.F.]	LOT AREA [S.F.]
101	15,000	15,000	126	15,000	19,400	151	15,000	28,900	176	24,300	24,300
102	15,000	15,000	127	14,000	18,700	152	21,000	38,400	177	20,300	20,300
103	15,000	15,000	128	13,400	17,000	153	15,400	19,600	178	20,080	22,600
104	15,000	15,000	129	13,600	18,000	154	16,000	16,000	179	22,400	42,900
105	15,200	15,200	130	14,800	18,500	155	16,800	16,800	180	16,400	20,900
106	15,800	15,800	131	13,300	16,000	156	12,600	39,600	181	19,300	19,600
107	15,000	15,000	132	13,600	16,000	157	12,800	25,000	182	18,500	23,100
108	15,000	15,000	133	11,200	15,000	158	14,400	28,000	183	23,900	29,500
109	17,900	17,900	134	13,600	15,400	159	14,000	27,900	184	19,000	23,600
110	18,500	19,000	135	13,400	15,300	160	13,000	26,000	185	14,900	21,500
111	16,200	60,000	136	19,000	19,500	161	13,000	23,800	186	12,400	20,200
112	15,300	55,900	137	17,000	17,000	162	22,000	22,000	187	13,300	20,500
113	20,000	37,600	138	19,000	20,000	163	18,000	20,500	188	15,300	28,000
114	15,600	19,200	139	18,700	33,100	164	20,200	23,400	189	19,800	22,300
115	21,000	25,200	140	15,300	22,100	165	17,600	25,000	190	20,000	20,000
116	15,300	37,800	141	15,500	15,500	166	18,400	21,600	191	20,700	21,100
117	18,400	24,800	142	15,600	15,600	167	16,000	20,900	192	17,100	20,000
118	13,200	17,200	143	15,200	15,200	168	16,000	21,700	193	13,500	29,900
119	12,800	15,700	144	12,400	27,600	169	16,000	21,300	194	13,300	33,800
120	14,900	15,600	145	18,200	28,500	170	16,000	20,500	195	18,000	25,400
121	14,900	16,000	146	15,300	17,000	171	16,800	21,000	196	17,200	36,300
122	16,000	16,600	147	15,000	15,000	172	20,700	20,700	197	18,700	26,600
123	15,000	15,300	148	15,200	15,200	173	17,100	20,000	198	21,000	22,000
124	15,300	17,500	149	15,600	15,600	174	20,000	21,000	199	19,500	24,000
125	16,400	19,100	150	15,200	15,200	175	21,000	21,000	200	15,000	15,000

LOT NO.	PAD AREA [S.F.]	LOT AREA [S.F.]
201	15,700	15,700
202	23,400	23,400
203	18,000	18,000
204	17,000	17,100
205	23,900	25,800
206	14,400	17,800
207	11,600	15,700
208	10,800	15,500
209	10,600	15,200
210	10,400	17,400
211	13,200	15,300
212	16,000	52,800
213	14,000	135,000
214	18,900	47,600
215	15,200	31,500
216	18,000	36,300
217	11,200	32,300
218	19,500	19,500
219	17,100	32,200
220	19,500	23,000
TOTAL	:	64.8 ACS.
		ACS.
221		21.3
222		150.5
223		82.8
224		25.8
225		4.5
226		7.3
227		28.5
228		10.7
229		4.6
AREA OF STREETS		41.2
GRAND TOTAL		442.0

GENERAL NOTES:

1. AREA .... 442.0± AC. GROSS
2. EXISTING ZONING A-2-2
3. PROPOSED ZONING A-2-2
4. EXISTING SITE USE .... VACANT, ABANDONED GOLF COURSE, SINGLE FAMILY HOUSE & OIL FACILITIES
5. DEVELOPMENT TYPE .... GOLF COURSE & RESIDENTIAL
6. TOTAL NUMBER OF SINGLE FAMILY LOTS 220
7. MINIMUM RESIDENTIAL LOT SIZE .... 15,000 SQ. FT.
8. DEVELOPMENT IS LOCATED IN FIRE ZONE 4
9. STREET, PRIVATE AND FUTURE STREET, PRIVATE DRIVEWAY AND FIRE LANE GRADES MIN. 0.5%, MAX. 15%
10. TOPOGRAPHY IS BASED ON CONTROLLED TOPO W/ CONTOUR INTERVALS 2 FEET.
11. ALL PUBLIC STREETS ARE OFFERED FOR DEDICATION.
12. RESIDENTIAL STREET TO BE DESIGNATED AS "PRIVATE & FUTURE STREETS". SUBDIVIDER RESERVES THE RIGHT TO CONSTRUCT GATES & MEDIANS
13. THE RIGHT IS RESERVED TO ADJUST STREET AND BUILDING PAD ELEVATIONS ON THE FINAL GRADING PLAN.
14. ALL SLOPES OVER 5 FEET IN HEIGHT ARE TO BE LANDSCAPED AND IRRIGATED WITH COUNTY APPROVED PLANTS AND GROUND COVER.
15. THE RIGHT IS RESERVED TO ADJUST LOT LINES AND MERGE LOTS ON THE FINAL MAP.
16. RECIPROCAL PARKING EASEMENTS TO BE RESERVED FOR ALL RESIDENTIAL AND GOLF COURSE LOTS.
17. EXISTING & PROPOSED COUNTY-WIDE GENERAL PLAN .... R
18. EXISTING SANTA CLARITA VALLEY AREAWIDE LOCAL PLAN .... N2, HM
19. GROSS DENSITY .... 0.5 DU/AC
20. OAK TREES EXISTING WITHIN PROJECT BOUNDARY ARE SUBJECT TO A LOS ANGELES COUNTY OAK TREE PERMIT
21. BOUNDARY LINE DIMENSIONS ARE TAKEN FROM RECORD DATA. LOT AREAS SHOWN IN TABLE HEREON ARE GROSS ACREAGE.
22. SUBDIVIDER REQUESTS ALTERNATE STREET SECTIONS PER SECTION 21.24.090 OF LOS ANGELES COUNTY SUBDIVISION.CODE TITLE 21
23. SUBDIVIDER RESERVES THE RIGHT TO FILE MULTIPLE FINAL MAPS PER SECTION 66456.1 OF THE STATE MAP ACT.
24. NUMBER AND TYPE OF LOTS PROPOSED: 3 GOLF COURSE LOTS, 5 OPEN SPACE LOTS, 1 PRIVATE PARK LOT, 220 SINGLE FAMILY LOTS, TOTAL
25. TOTAL PARKING SPACES PROVIDED - GOLF COURSE 120
26. TOP AND TOE OF SLOPES ARE SUBJECT TO CHANGE IN FINAL ENGINEERING.
27. A LANDSCAPE MAINTENANCE DISTRICT OR H.O.A. WILL BE ESTABLISHED FOR MAINTENANCE OF PRIVATE & FUTURE STREETS, OPEN SPACE SLOPES AND COMMON SLOPES OVER 5 FEET IN HEIGHT.
28. PERMISSION IS REQUESTED TO ABANDON ALL OF THE COUNTY EASEMENTS FOR DRAINAGE PURPOSES BY THE FINAL MAP PERSUANT TO SECTION 66499.20 ½ OF THE STATE GOVERNMENT CODE (IF ANY).
29. TOTAL CUT: 6,800,000 C.Y., TOTAL FILL: 6,800,000 C.Y.

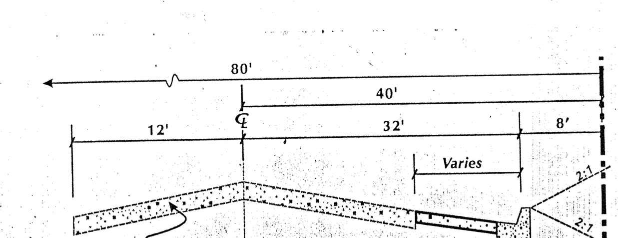
F:\DATA\PROJECTS\97\97017005\Reports\GENNOTES.DOC



TYPICAL LOT
ADJACENT TO GOLF COURSE
DETAIL
Not to scale

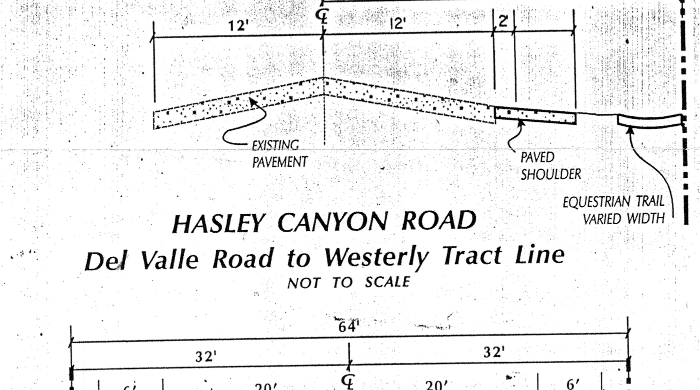
UTILITIES AND SERVICES

1. WATER .... PRIVATE & VALENCIA WATER COMPANY
2. SEWER .... LOS ANGELES SANITATION DISTRICT 32
3. GAS .... SOUTHERN CALIFORNIA GAS COMPANY
4. ELECTRIC .... SOUTHERN CALIFORNIA EDISON COMPANY
5. TELEPHONE .... GENERAL TELEPHONE
6. CABLE TV .... TBD
7. SCHOOL .... CASTAIC SCHOOL DISTRICT .... & WILLIAM S. HART UNIFIED HIGH SCHOOL DISTRICT

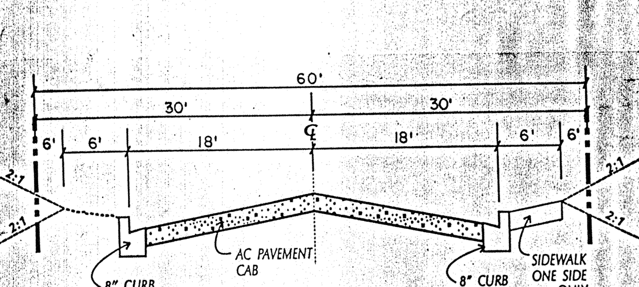


HASLEY CANYON ROAD
Del Valle Road to Easterly Tract Line
NOT TO SCALE

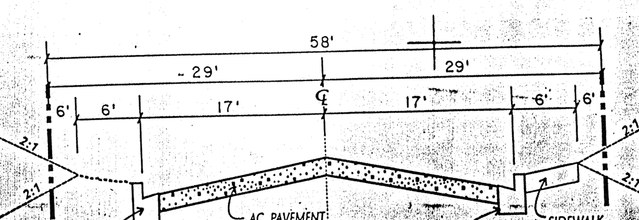
HASLEY CANYON ROAD
Del Valle Road to Westerly Tract Line
NOT TO SCALE



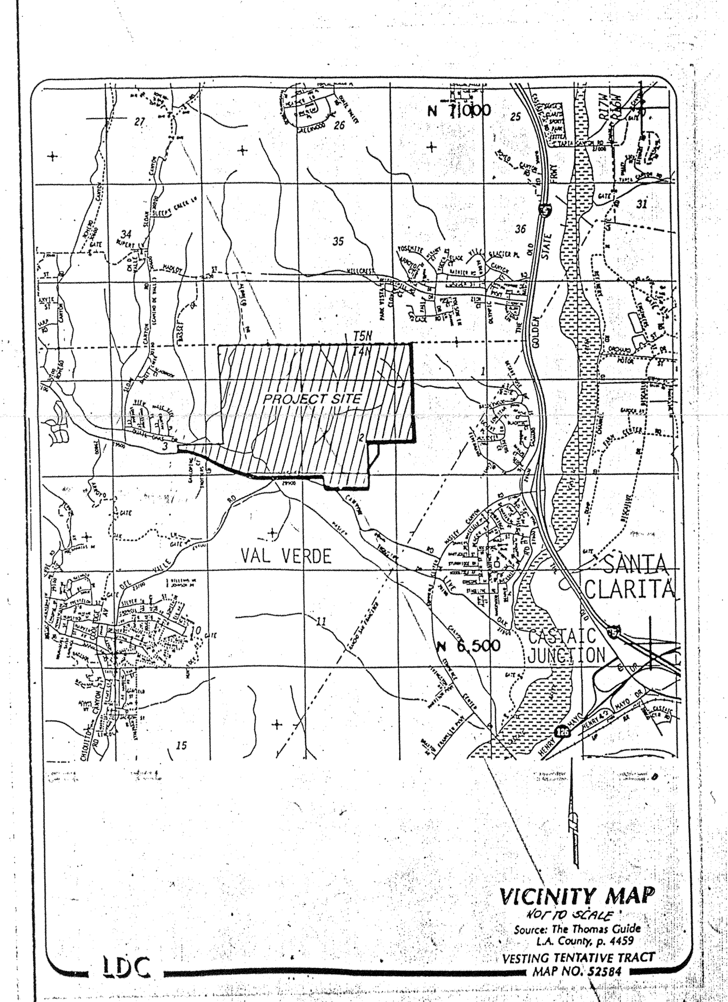
TYPICAL SECTION
"A" & "B" Streets
To be dedicated
& Private and Future Streets
NOT TO SCALE



TYPICAL SECTION
"A" & "B" Streets
To be dedicated
& Private and Future Streets
NOT TO SCALE



TYPICAL SECTION
"A" & "B" Streets
To be dedicated
& Private and Future Streets
NOT TO SCALE



VICINITY MAP
NOT TO SCALE
Source: The Thomas Guide L.A. County, p. 4459
VESTING TENTATIVE TRACT MAP NO. 52584
LDC

E 6,000 E 6,500 E 7,000 E 7,500 E 8,000 E 8,500

ALLAN E. SEWARD
ENGINEERING GEOLOGY, INC.
SINCE 1958

Date: 1/15/99		Job No.: 98-1617-4
Scale: 1"=100'	Geology by: Staff / Drawn by: Staff	Revised:

PLATE VII

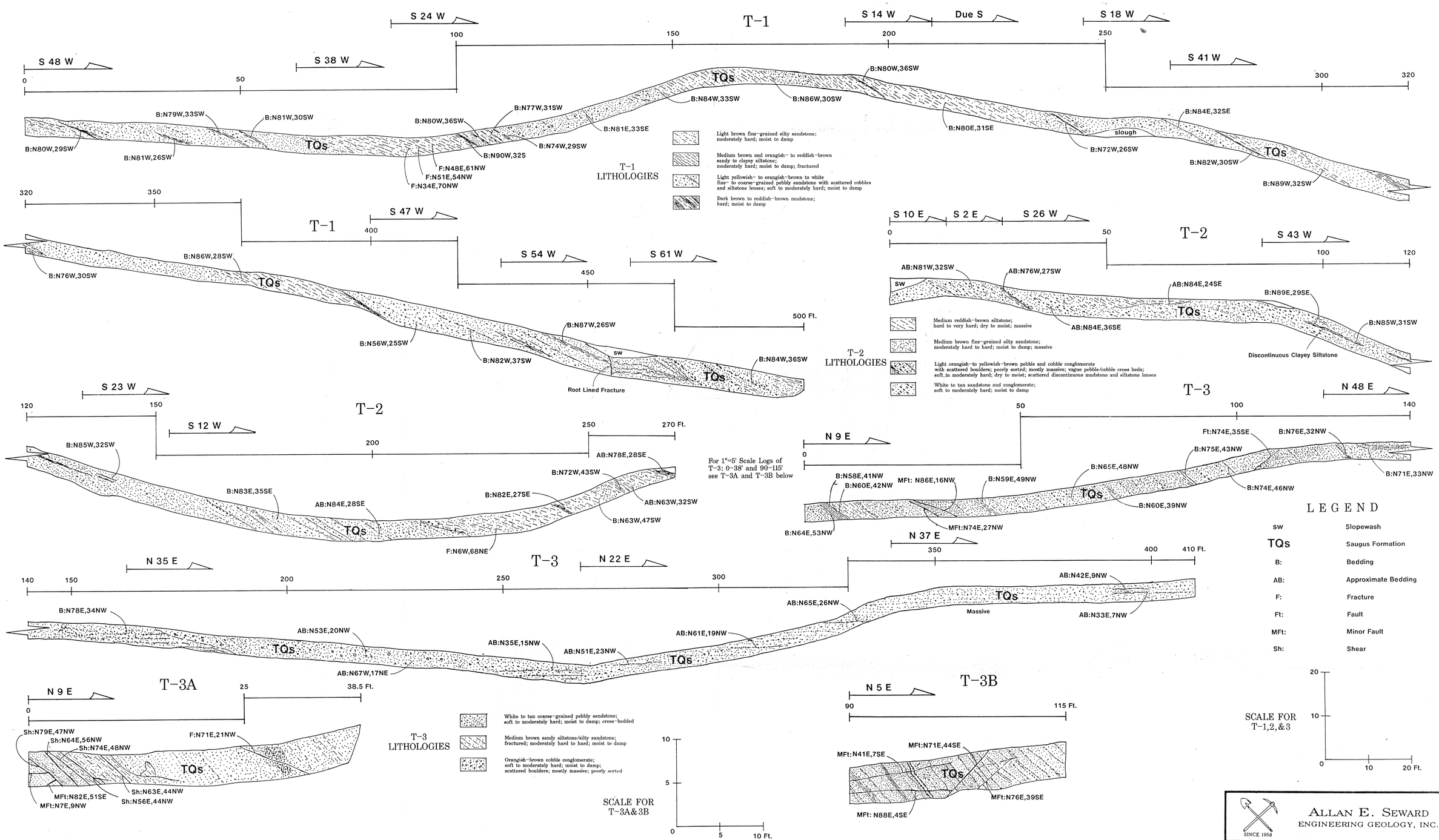
GEOLOGIC/GEOTECHNICAL LEGEND

af	Artificial Fill	55° 55° 10°	Orientation of Fault; Shear; Slip Surface	12	Approximate Location of Existing Oil/Gas Well
Cef	Certified Engineered Fill		Approximate Location of Surface Trace of Axis of Syncline; Anticline; Dotted Where Inferred	CS-40	Proposed Cut-Slope with Designation
Qal	Quaternary Alluvium	T-220	Approximate Location of Exploratory Trench	26 26'	Cross Section
sf	Surficial Failure	TP-55	Approximate Location of Test Pit from AES Report dated 10/30/87		Geologic Contact; Dotted Where Concealed
Qls-8	Quaternary Landslide	RW-1	Approximate Location of Rotary Wash Boring		Recommended Building Setback
Qt	Quaternary Terrace	BA-6	Approximate Location of Exploratory Bucket Auger Boring	R=6-12Ft.	Recommended Removal Depth per Designated Area (Alluvial or Landslide Material)
TQs	Saugus Formation	HS-5	Approximate Location of Hollow Stem Auger Boring		Proposed Stability Fill (Color Coded Green)
35° 66° 85°	Orientation of Bedding; Approximate Bedding; Overturned Bedding	HA-1	Approximate Location of Hand Auger Boring		Proposed Buttress (Color Coded Red)
		B-18	Approximate Location of Exploratory Bucket Auger Boring from AES Report dated 10/30/87		

ALLAN E. SEWARD
ENGINEERING GEOLOGY, INC.
SINCE 1958

Date: 1/15/99		Job No.: 98-1617-4	
Scale: N/A	Geology by: N/A	Revised:	
	Drawn by: Staff		

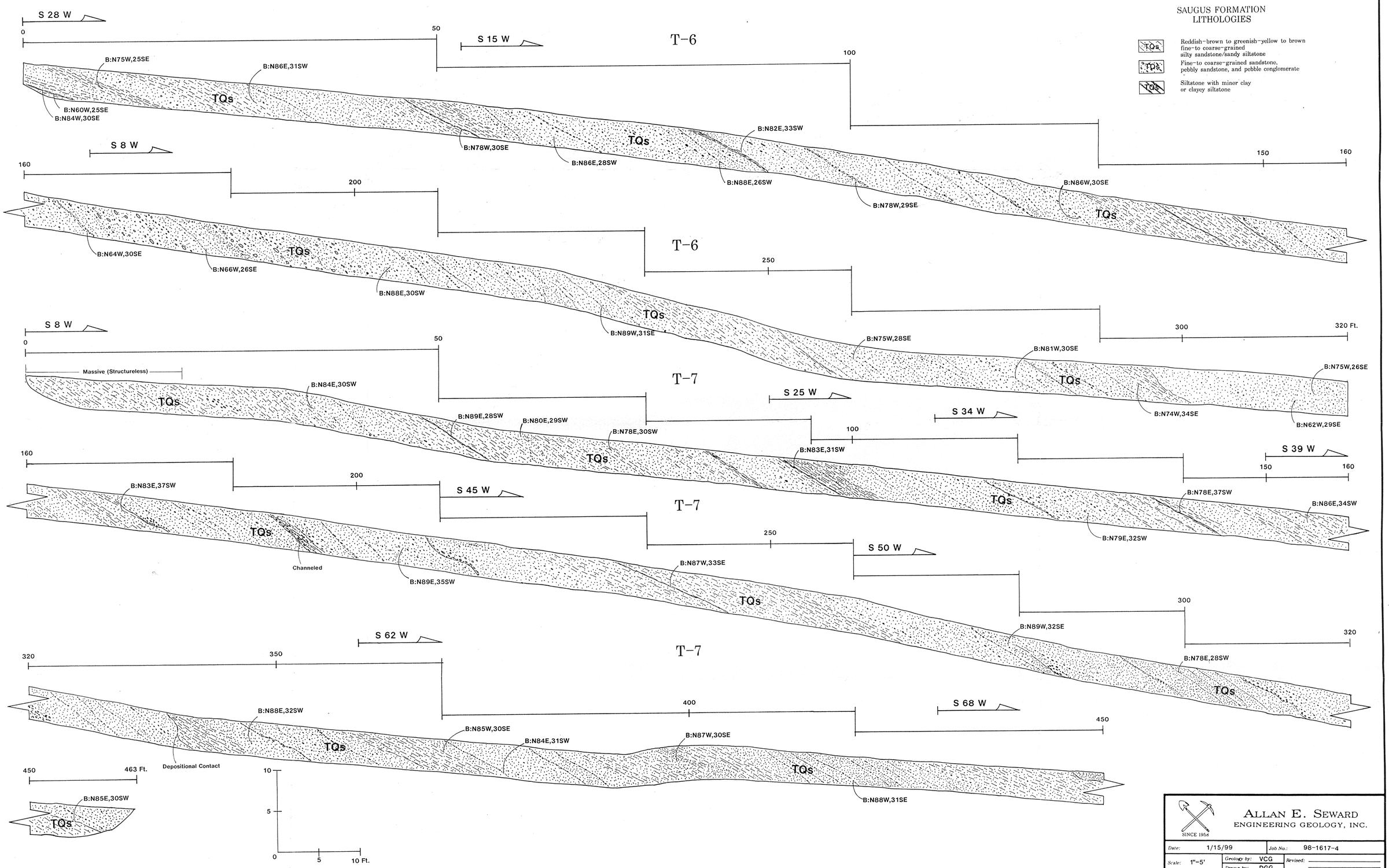
PLATE IX



ALLAN E. SEWARD
ENGINEERING GEOLOGY, INC.
SINCE 1958

Date: 1/15/99		Job No.: 98-1617-4	
Scale: As Shown	Geology by: MJD	Revised:	
	Drawn by: DGG		

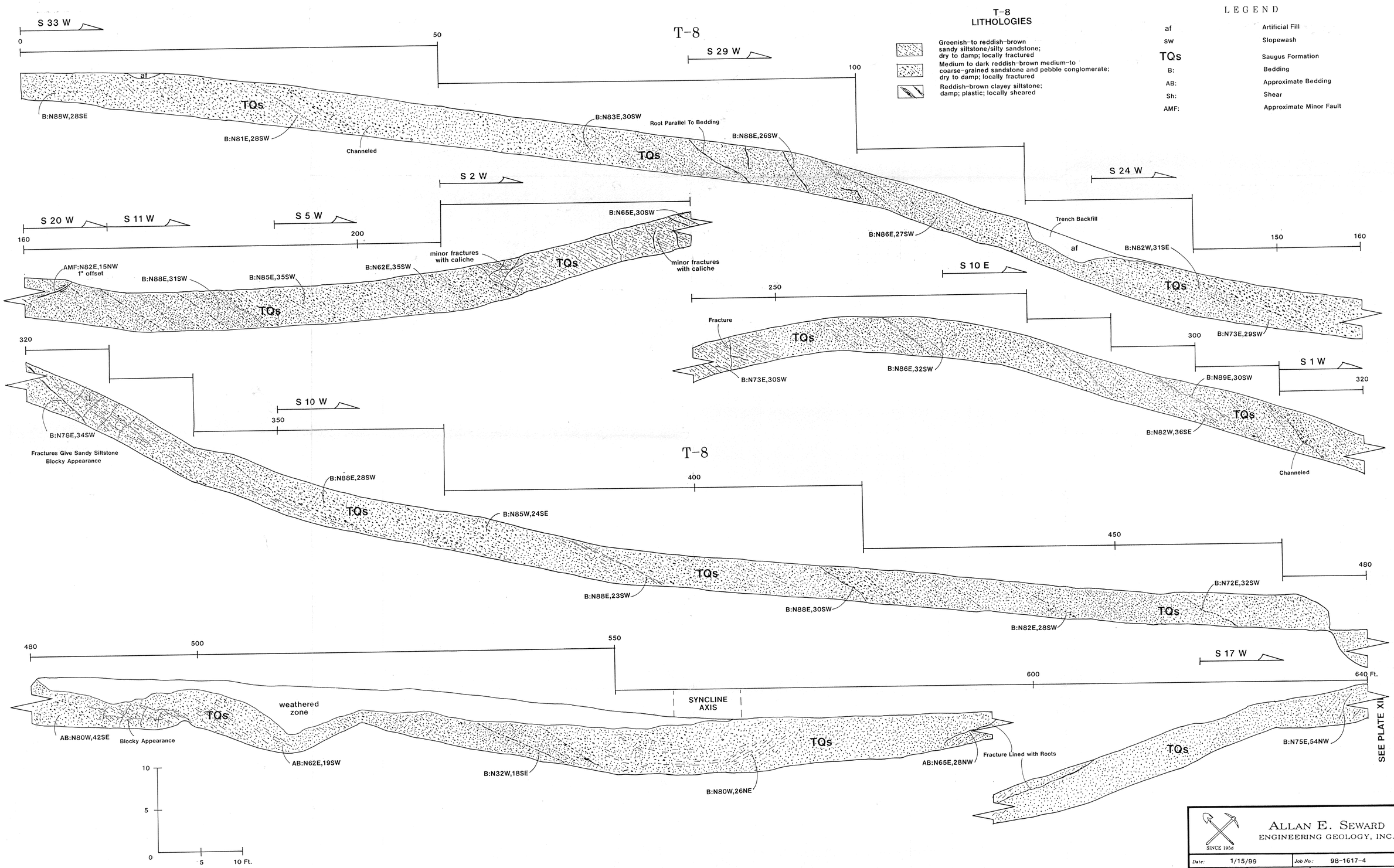
PLATE X



ALLAN E. SEWARD
ENGINEERING GEOLOGY, INC.
SINCE 1958

Date: 1/15/99		Job No.: 98-1617-4	
Scale: 1"=5'	Geology by: VCG	Revised:	
	Drawn by: DGG		

PLATE XI



ALLAN E. SEWARD
ENGINEERING GEOLOGY, INC.
SINCE 1958

Date: 1/15/99		Job No.: 98-1617-4	
Scale: 1"=5'	Geology by: VCG	Revised:	
	Drawn by: DGG		

PLATE XII

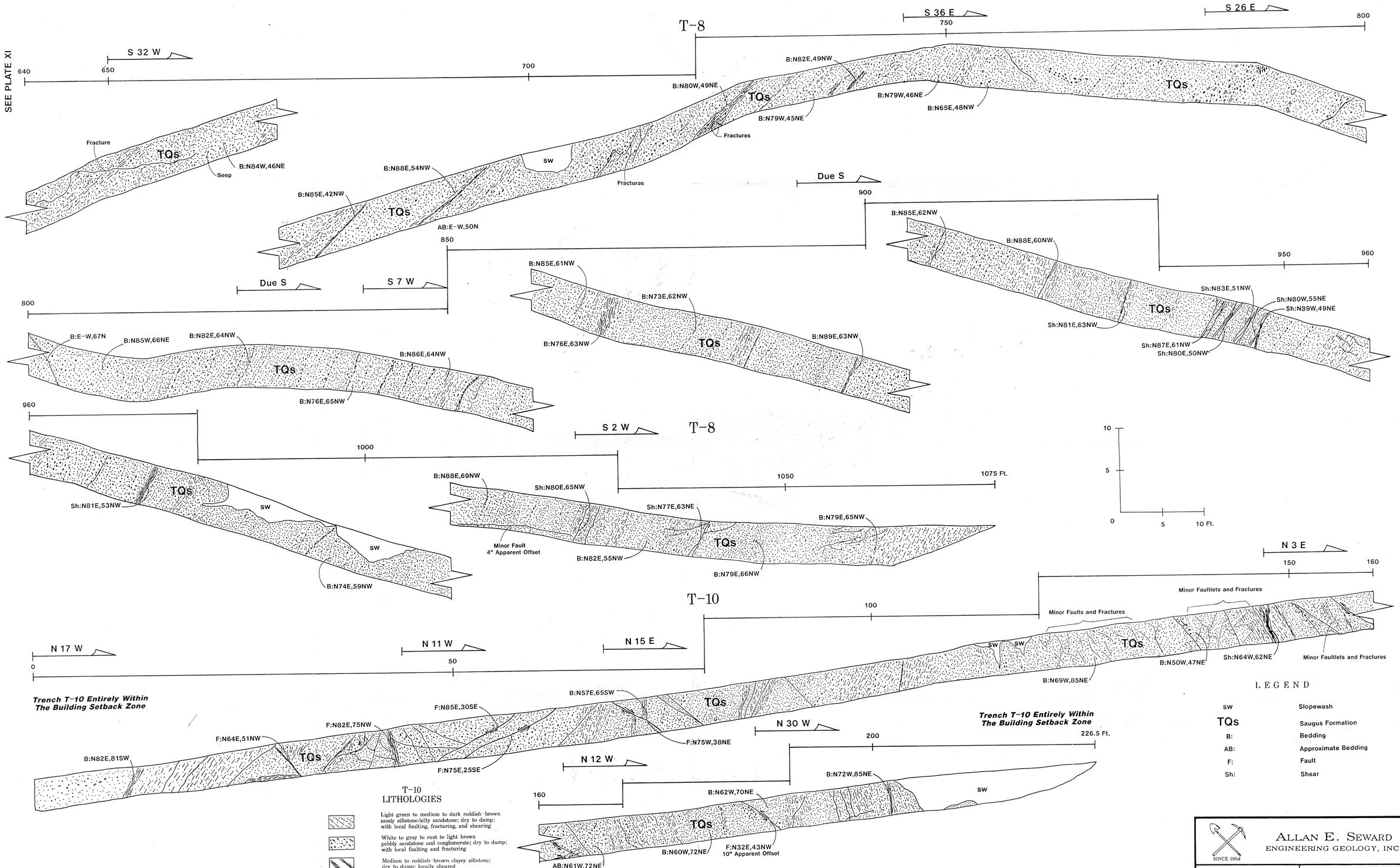
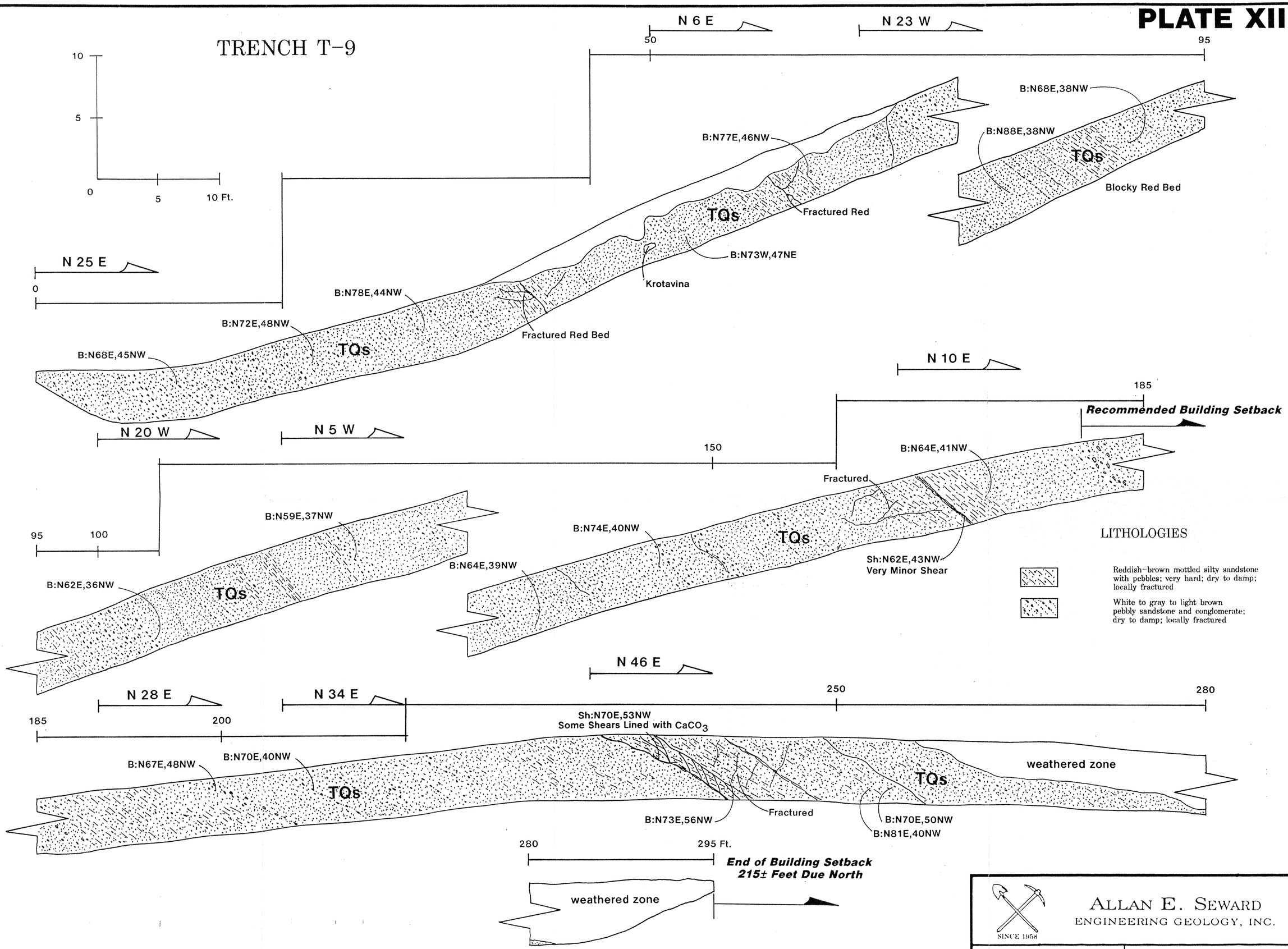

SEE PLATE XI
S 32 W
640
650
700
Fracture
TQs
Seep
B:N84W,46NE
T-8
S 36 E
750
S 26 E
800
B:N82E,49NW
B:N80W,49NE
TQs
B:N79W,46NE
B:N65E,48NW
B:N79W,45NE
Fractures
SW
B:N88E,54NW
B:N85E,42NW
TQs
AB:E-W,50N
Fractures
Due S
900
B:N85E,62NW
B:N88E,60NW
950
960
Sh:N83E,51NW
Sh:N80W,55NE
Sh:N89W,49NE
TQs
Sh:N81E,63NW
Sh:N87E,61NW
Sh:N80E,50NW
Due S
S 7 W
850
800
B:N85E,61NW
B:N73E,62NW
B:N76E,63NW
TQs
B:N89E,63NW
B:E-W,67N
B:N85W,66NE
B:N82E,64NW
TQs
B:N86E,64NW
B:N76E,65NW
960
S 2 W
T-8
1000
TQs
Sh:N81E,53NW
SW
SW
B:N74E,59NW
B:N88E,69NW
Sh:N80E,65NW
1050
1075 Ft.
Sh:N77E,63NE
B:N79E,65NW
Minor Fault
4" Apparent Offset
TQs
B:N82E,55NW
B:N79E,66NW
10
5
0
5
10 Ft.
N 3 E
150
160
Minor Faultlets and Fractures
T-10
100
Minor Faults and Fractures
N 17 W
N 11 W
N 15 E
0
50
SW
SW
TQs
B:N50W,47NE
Sh:N64W,62NE
Minor Faultlets and Fractures
B:N69W,85NE
Trench T-10 Entirely Within
The Building Setback Zone
B:N57E,65SW
TQs
F:N85E,30SE
F:N82E,75NW
F:N64E,51NW
TQs
F:N75W,38NE
B:N82E,81SW
F:N75E,25SE
N 30 W
Trench T-10 Entirely Within
The Building Setback Zone
200
226.5 Ft.
N 12 W
160
B:N72W,85NE
B:N62W,70NE
SW
TQs
B:N60W,72NE
F:N32E,43NW
10" Apparent Offset
AB:N61W,72NE
T-10
LITHOLOGIES
Light green to medium to dark reddish-brown sandy siltstone/silty sandstone; dry to damp; with local faulting, fracturing, and shearing
White to gray to rust to light brown pebbly sandstone and conglomerate; dry to damp; with local faulting and fracturing
Medium to reddish-brown clayey siltstone; dry to damp; locally sheared
LEGEND
SW Slopewash
TQs Saugus Formation
B: Bedding
AB: Approximate Bedding
F: Fault
Sh: Shear
SINCE 1958
ALLAN E. SEWARD
ENGINEERING GEOLOGY, INC.
Date: 1/15/99
Job No.: 98-1617-4
Scale: 1"=5'
Geology by: VCG
Drawn by: DGG
Revised:

PLATE XIII

TRENCH T-9



LITHOLOGIES

Reddish-brown mottled silty sandstone with pebbles; very hard; dry to damp; locally fractured

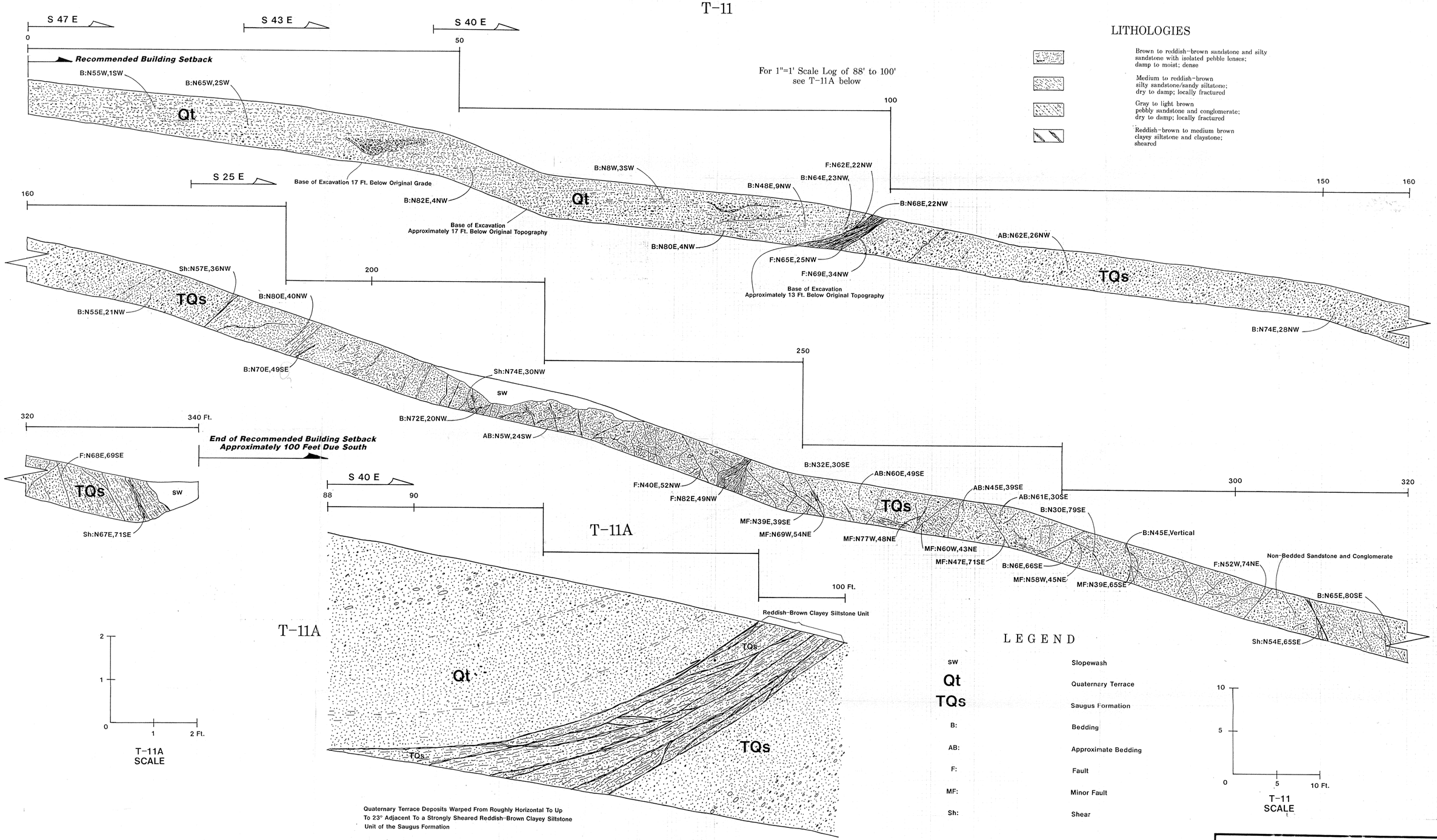
White to gray to light brown pebbly sandstone and conglomerate; dry to damp; locally fractured

ALLAN E. SEWARD
ENGINEERING GEOLOGY, INC.
SINCE 1958

Date: 1/15/99		Job No.: 98-1617-4	
Scale: 1"=5'	Geology by: VCG	Revised:	
	Drawn by: DGG		

PLATE XIV

T-11



For 1"=1' Scale Log of 88' to 100'
see T-11A below

LITHOLOGIES

- Brown to reddish-brown sandstone and silty sandstone with isolated pebble lenses; damp to moist; dense
- Medium to reddish-brown silty sandstone/sandy siltstone; dry to damp; locally fractured
- Gray to light brown pebbly sandstone and conglomerate; dry to damp; locally fractured
- Reddish-brown to medium brown clayey siltstone and claystone; sheared

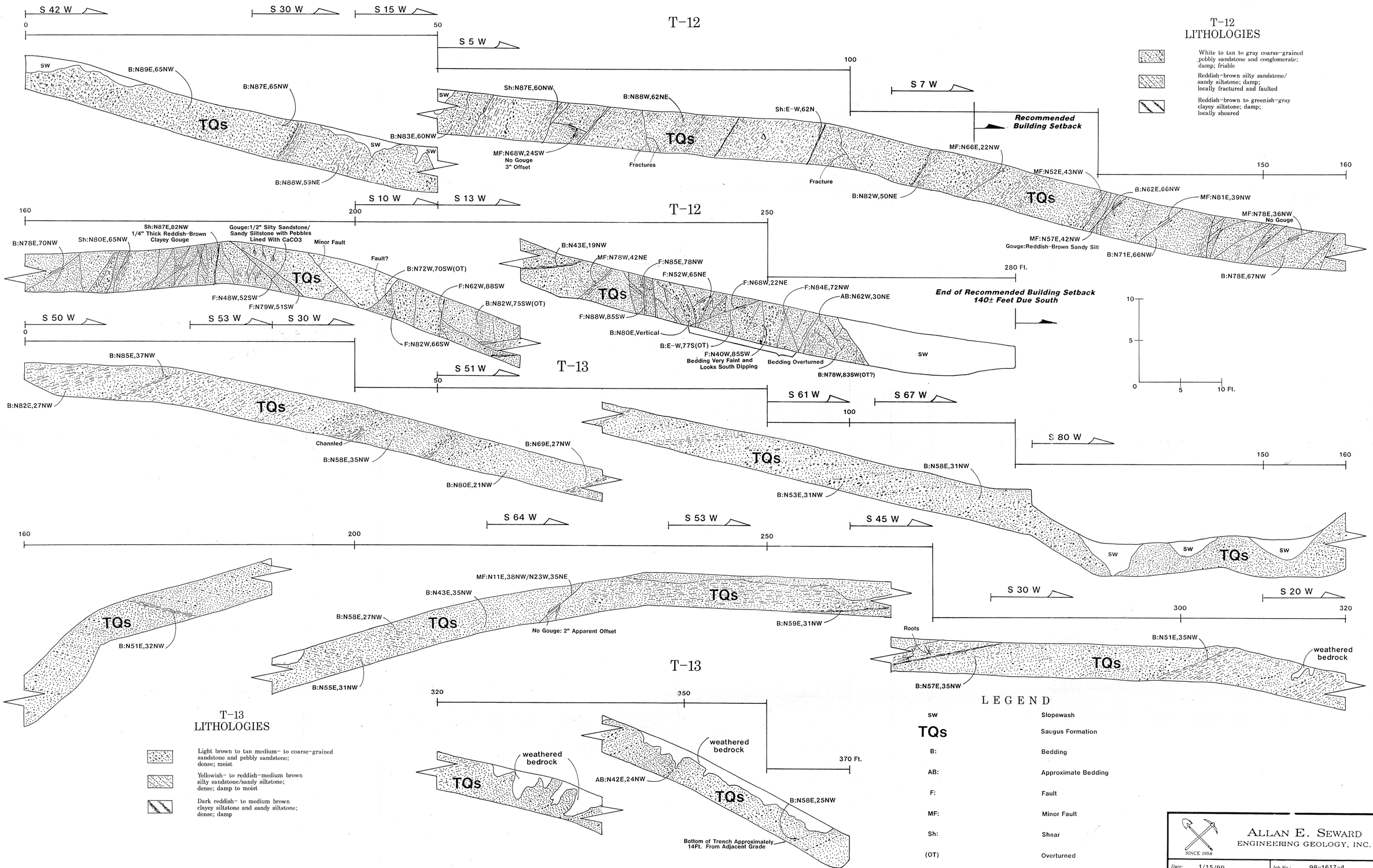
LEGEND

SW	Slopewash
Qt	Quaternary Terrace
TQs	Saugus Formation
B:	Bedding
AB:	Approximate Bedding
F:	Fault
MF:	Minor Fault
Sh:	Shear

ALLAN E. SEWARD
ENGINEERING GEOLOGY, INC.
SINCE 1956

Date: 1/15/99		Job No.: 98-1617-4	
Scale: As Shown	Geology by: VCG	Revised:	
	Drawn by: DGG		

PLATE XV



T-12 LITHOLOGIES

- White to tan to gray coarse-grained pebbly sandstone and conglomerate; damp; friable
- Reddish-brown silty sandstone/ sandy siltstone; damp; locally fractured and faulted
- Reddish-brown to greenish-gray clayey siltstone; damp; locally sheared

T-13 LITHOLOGIES

- Light brown to tan medium- to coarse-grained sandstone and pebbly sandstone; dense; moist
- Yellowish- to reddish-medium brown silty sandstone/sandy siltstone; dense; damp to moist
- Dark reddish- to medium brown clayey siltstone and sandy siltstone; dense; damp

LEGEND

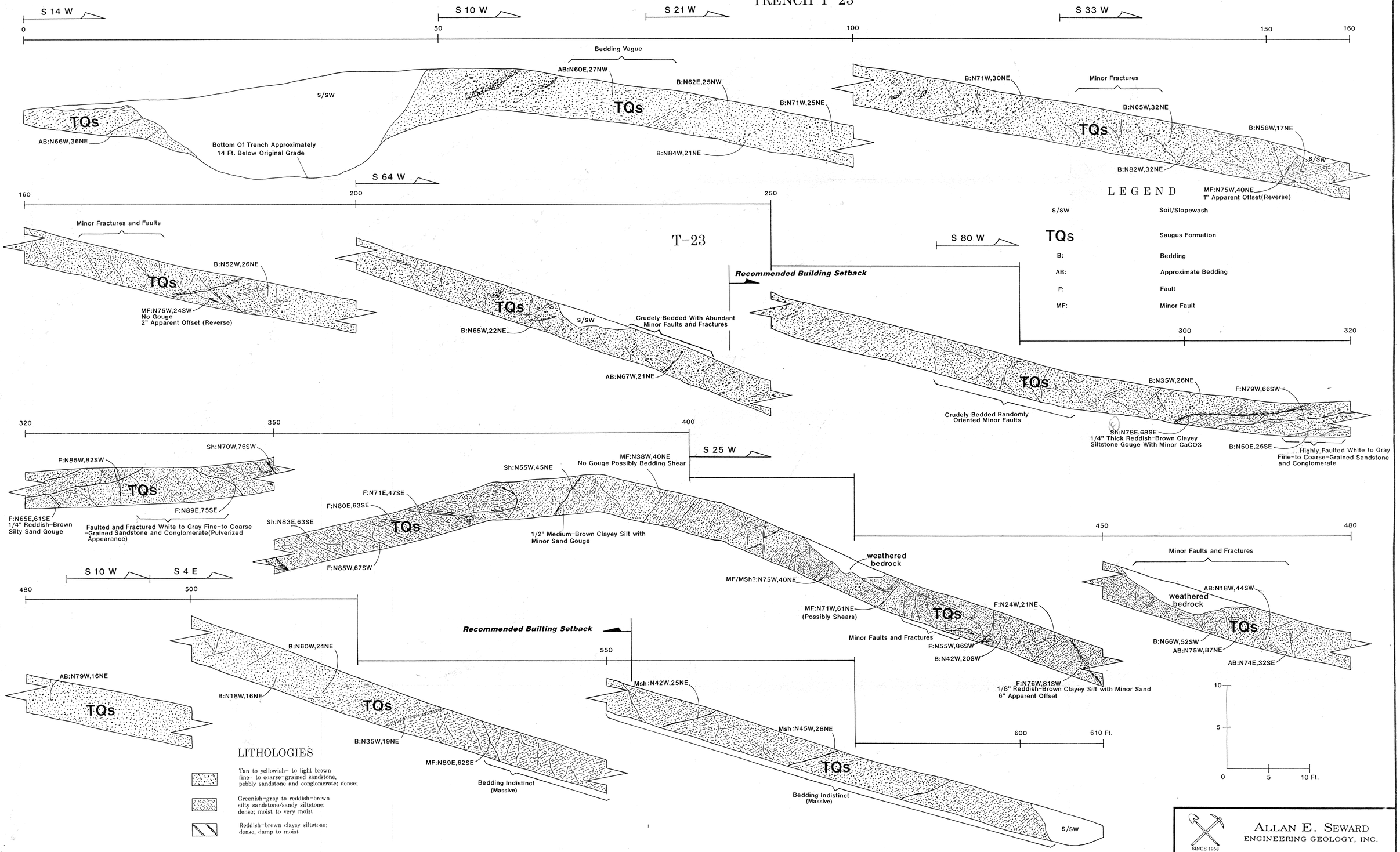
SW	Slopewash
TQs	Saugus Formation
B:	Bedding
AB:	Approximate Bedding
F:	Fault
MF:	Minor Fault
Sh:	Shear
(OT)	Overturned

ALLAN E. SEWARD
ENGINEERING GEOLOGY, INC.
SINCE 1958

Date: 1/15/99		Job No.: 98-1617-4	
Scale: 1"=5'	Geology by: VCG	Revised:	
	Drawn by: DGG		

PLATE XVI

TRENCH T-23



LITHOLOGIES

Tan to yellowish- to light brown fine- to coarse-grained sandstone, pebbly sandstone and conglomerate; dense;

Greenish-gray to reddish-brown silty sandstone/sandy siltstone; dense; moist to very moist

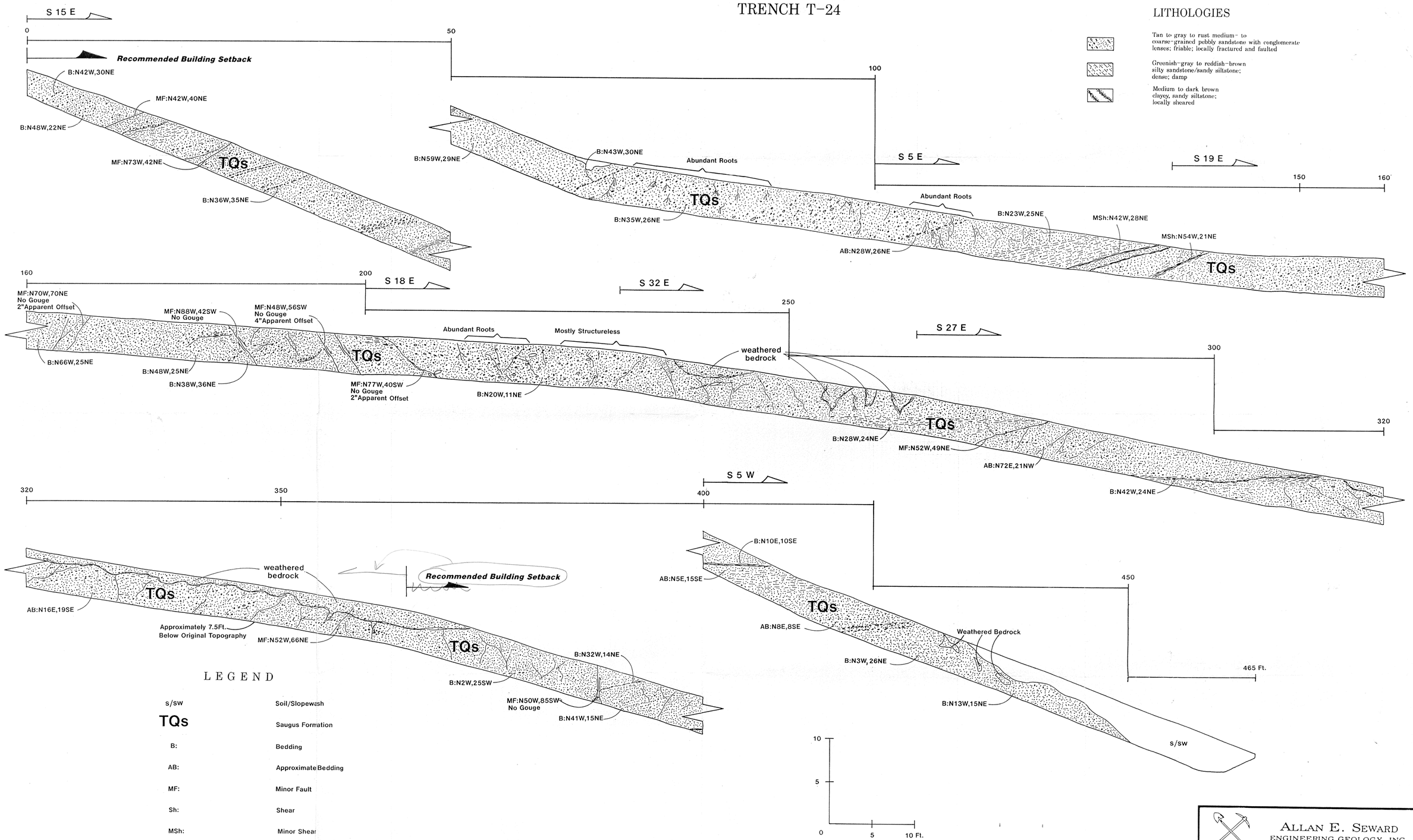
Reddish-brown clayey siltstone; dense, damp to moist

ALLAN E. SEWARD
ENGINEERING GEOLOGY, INC.
SINCE 1958

Date: 1/15/99		Job No.: 98-1617-4	
Scale: 1"=5'	Geology by: VCG	Revised:	
	Drawn by: DGG		

PLATE XVII

TRENCH T-24



LITHOLOGIES

- Tan to gray to rust medium- to coarse-grained pebbly sandstone with conglomerate lenses; friable; locally fractured and faulted
- Greenish-gray to reddish-brown silty sandstone/sandy siltstone; dense; damp
- Medium to dark brown clayey, sandy siltstone; locally sheared

LEGEND

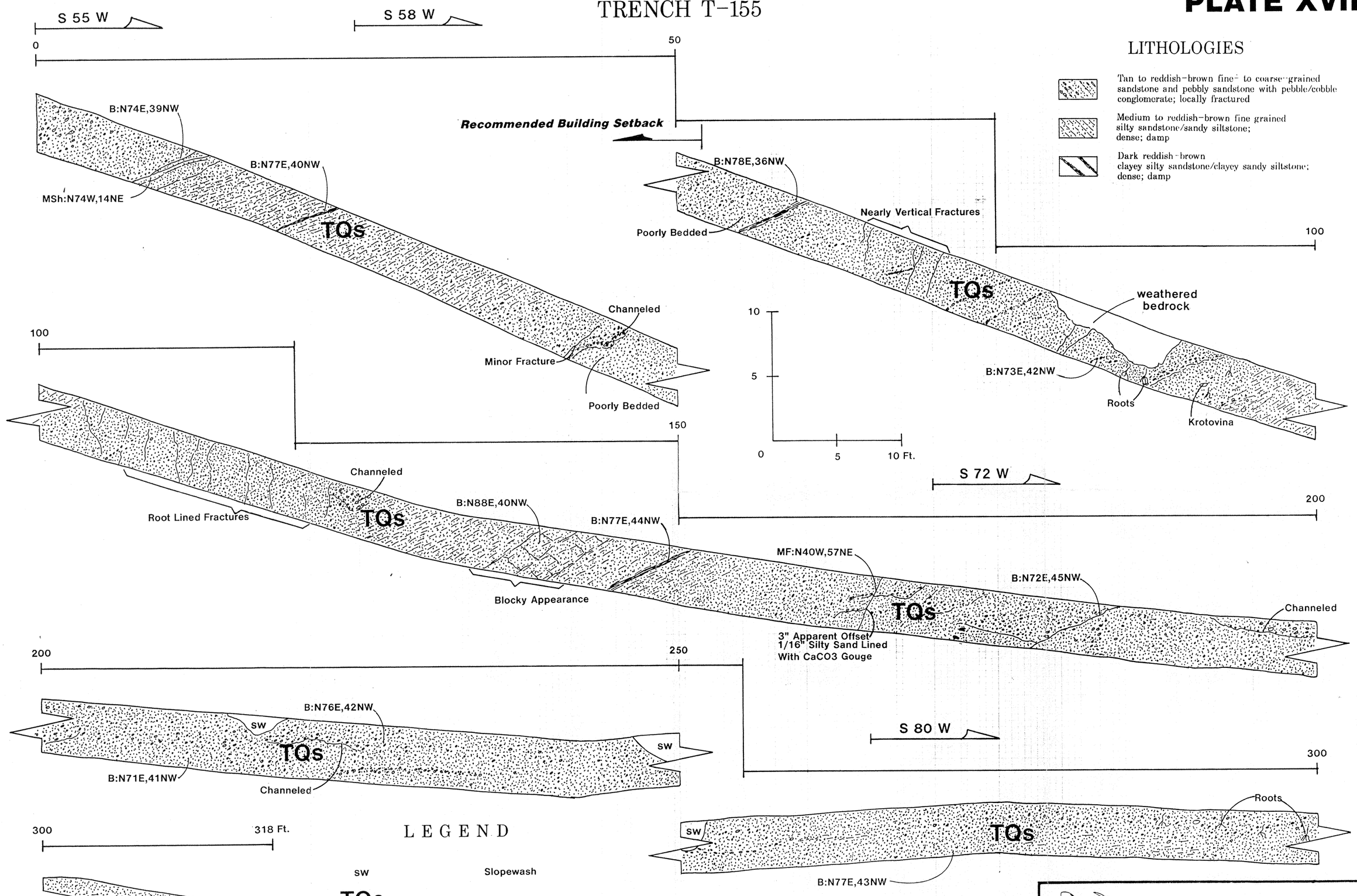
s/sw	Soil/Slopewash
TQs	Saugus Formation
B:	Bedding
AB:	Approximate Bedding
MF:	Minor Fault
Sh:	Shear
MSh:	Minor Shear

ALLAN E. SEWARD
ENGINEERING GEOLOGY, INC.
SINCE 1968

Date: 1/15/99		Job No.: 98-1617-4	
Scale: 1"=5'	Geology by: VCG	Revised:	
	Drawn by: DGG		

PLATE XVIII

TRENCH T-155



LITHOLOGIES

- Tan to reddish-brown fine- to coarse-grained sandstone and pebbly sandstone with pebble/cobble conglomerate; locally fractured
- Medium to reddish-brown fine grained silty sandstone/sandy siltstone; dense; damp
- Dark reddish-brown clayey silty sandstone/clayey sandy siltstone; dense; damp

LEGEND

SW	Slopewash
TQs	Saugus Formation
B:	Bedding
MF:	Minor Fault

ALLAN E. SEWARD
ENGINEERING GEOLOGY, INC.
SINCE 1958

Date: 1/15/99		Job No.: 98-1617-4	
Scale: 1"=5'	Geology by: VCG	Revised:	
	Drawn by: DGG		

ALLAN E. SEWARD
ENGINEERING GEOLOGY, INC.
Geological And Geotechnical Consultants

GEOLOGIC AND GEOTECHNICAL REPORT

Vesting Tentative Tract 52584

Castaic, California

VOLUME V OF V

Prepared For:

Hasley Canyon Land Company, L.L.C.

C/o Palmer Investments

1999 Avenue of the Stars

15th Floor

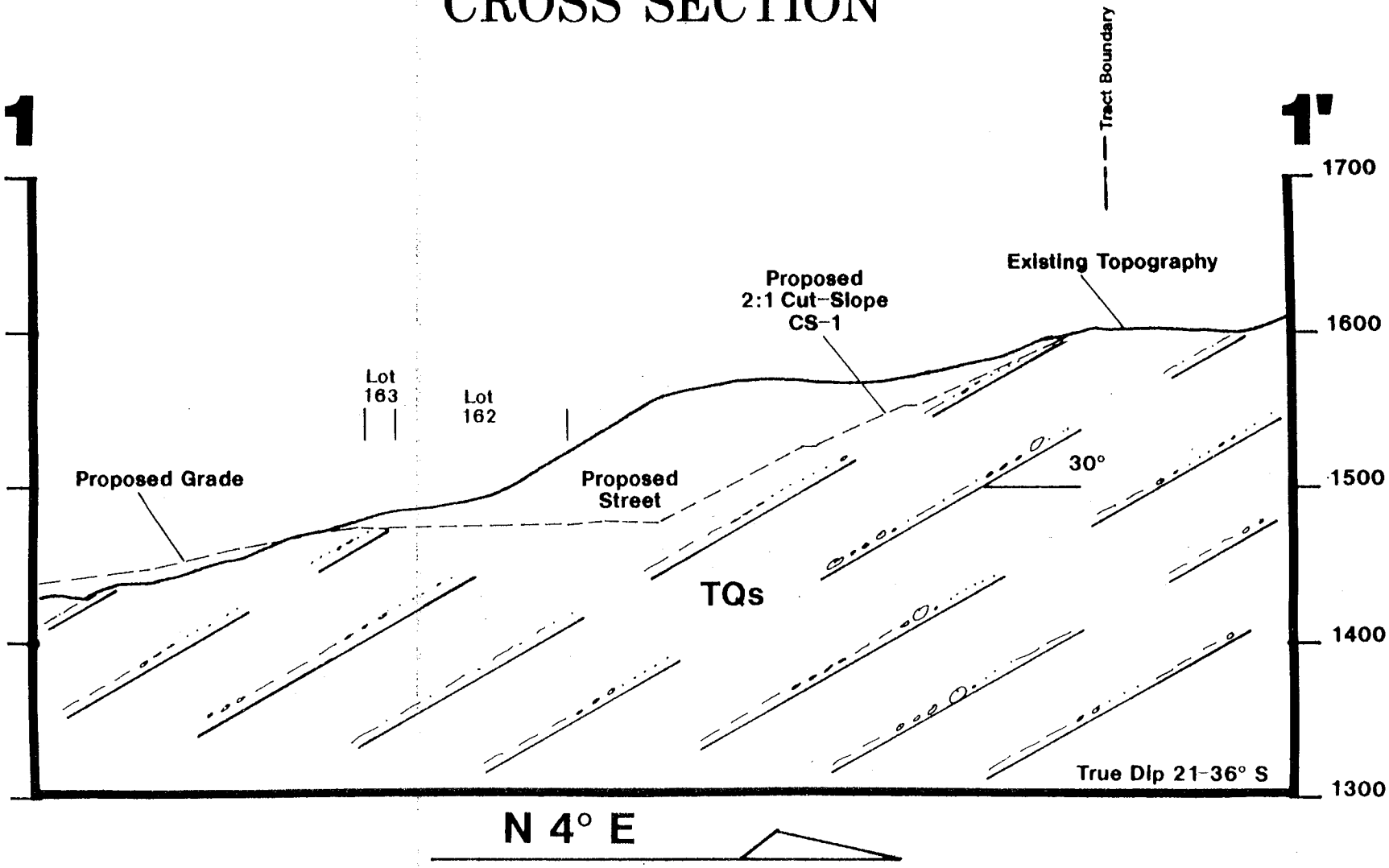
Los Angeles, California 90067

January 15, 1999

27825 Smyth Drive, Valencia, California 91355 661-294-0065 FAX 661-294-0833

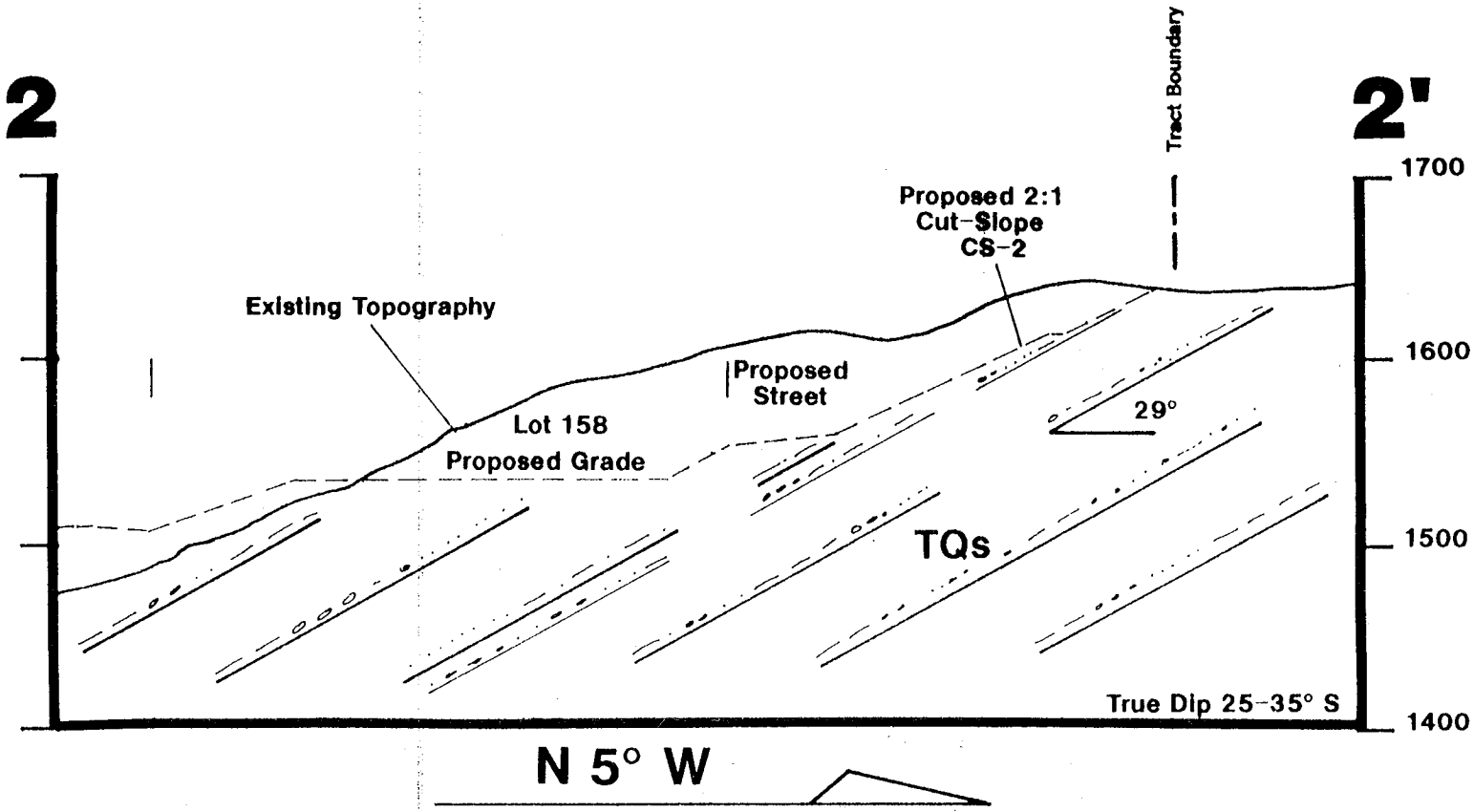
Appendix I

CROSS SECTION



ALLAN E. SEWARD ENGINEERING GEOLOGY		
JOB NUMBER: 98-1617-4	DATE: 1/15/99	
SCALE: 1"=100'		DRAWN BY: Staff REVISED:

CROSS SECTION



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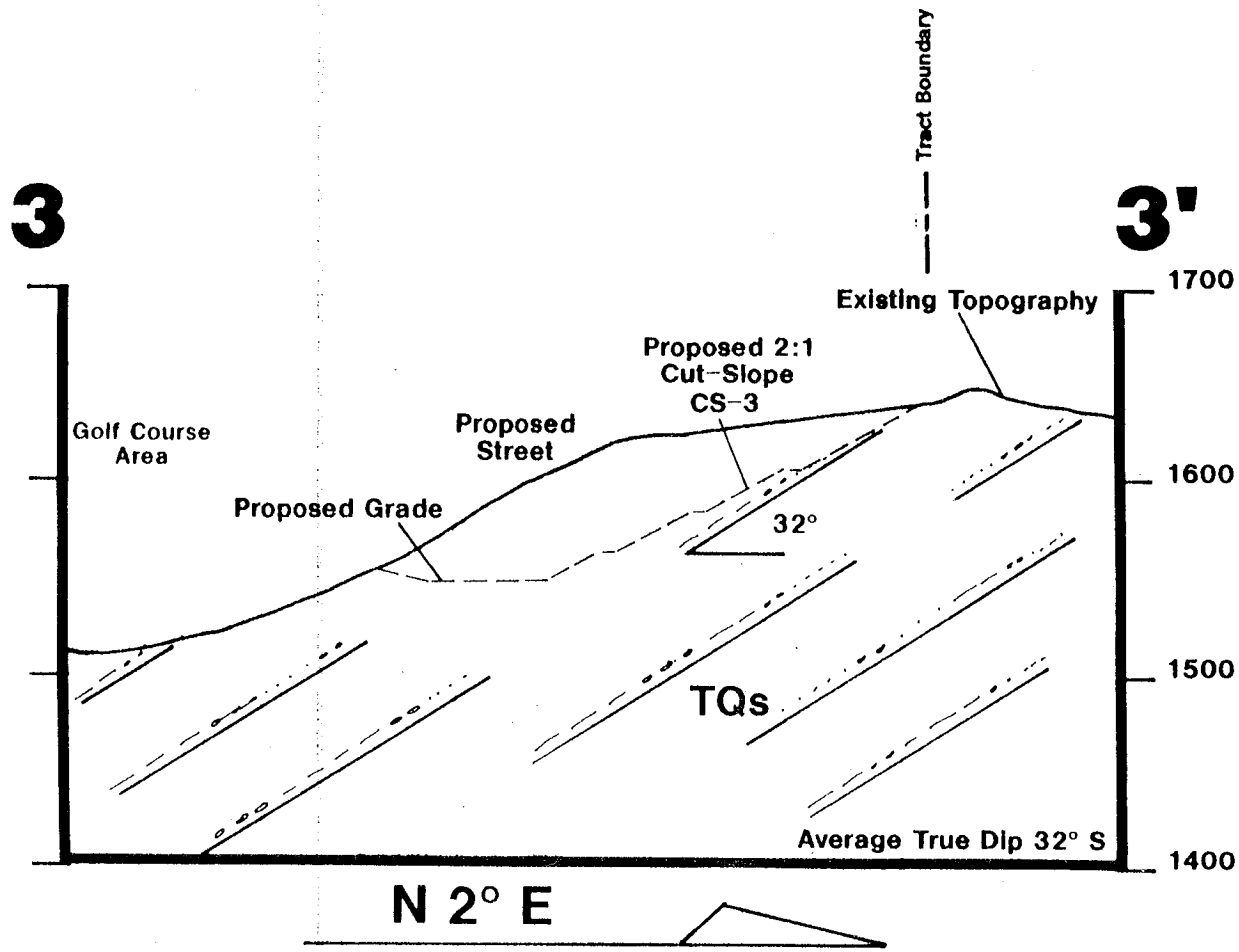
SCALE: 1"=100'		DRAWN BY:	Staff
		REVISED:	

CROSS SECTION



ALLAN E. SEWARD ENGINEERING GEOLOGY		
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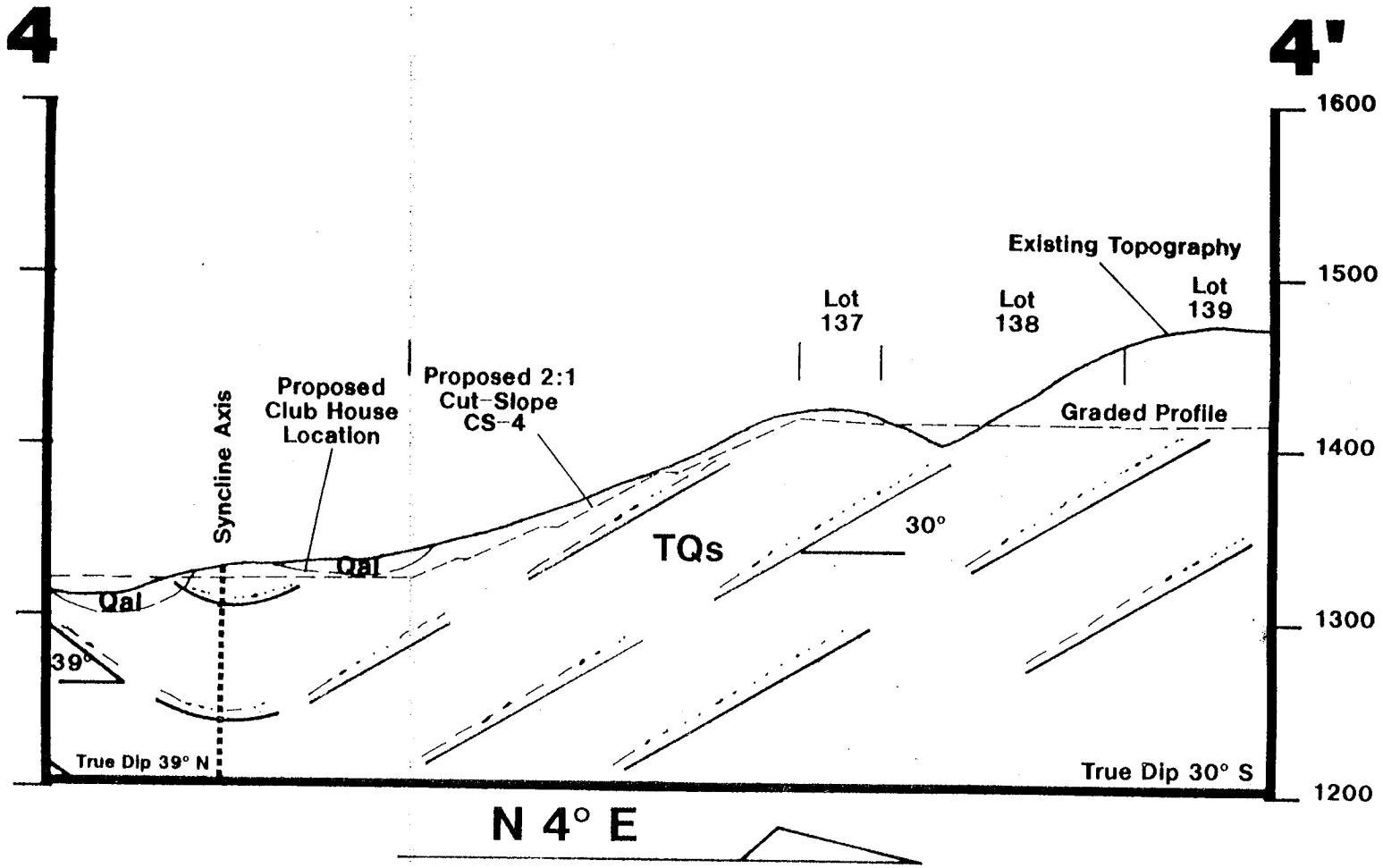

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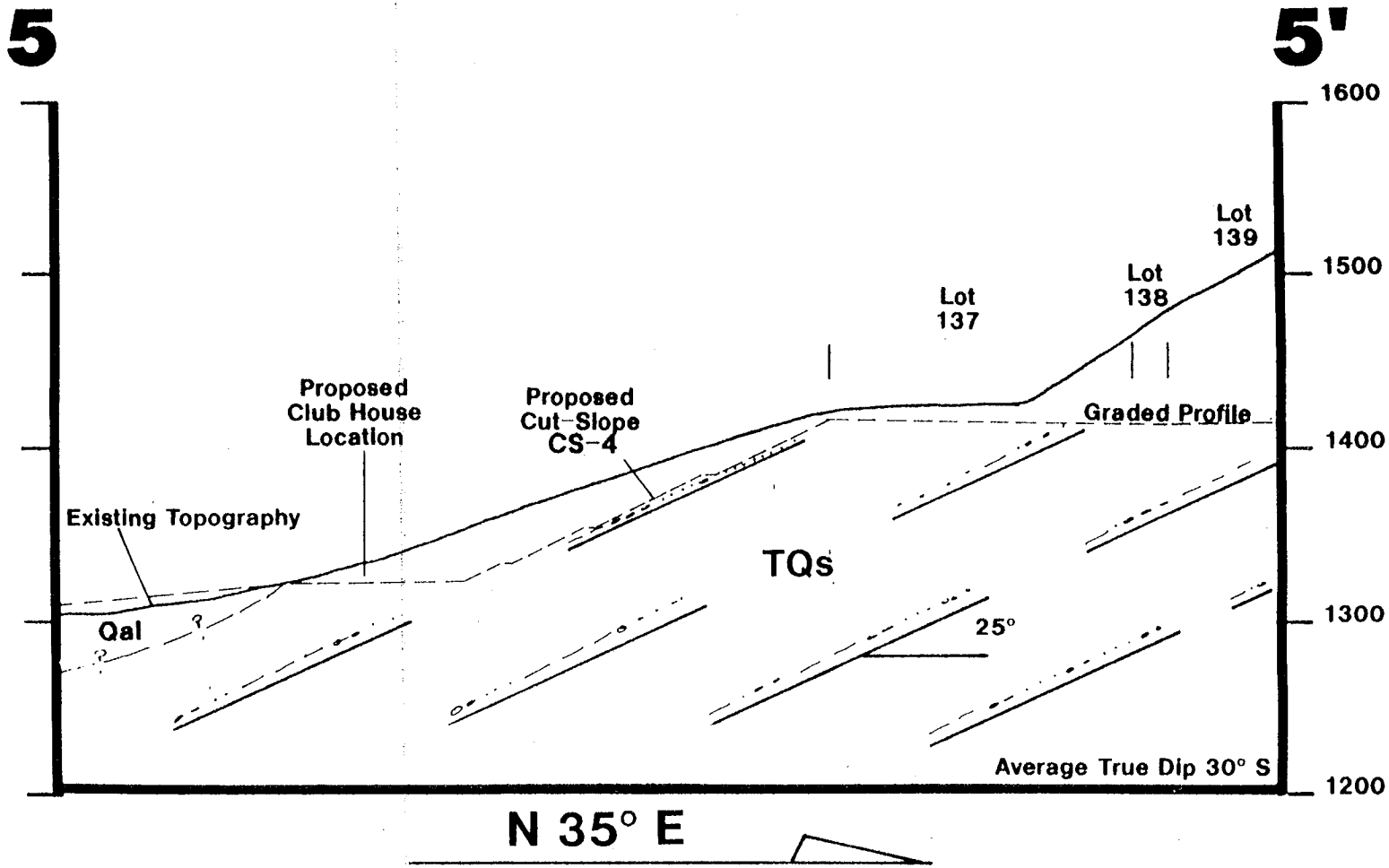
CROSS SECTION



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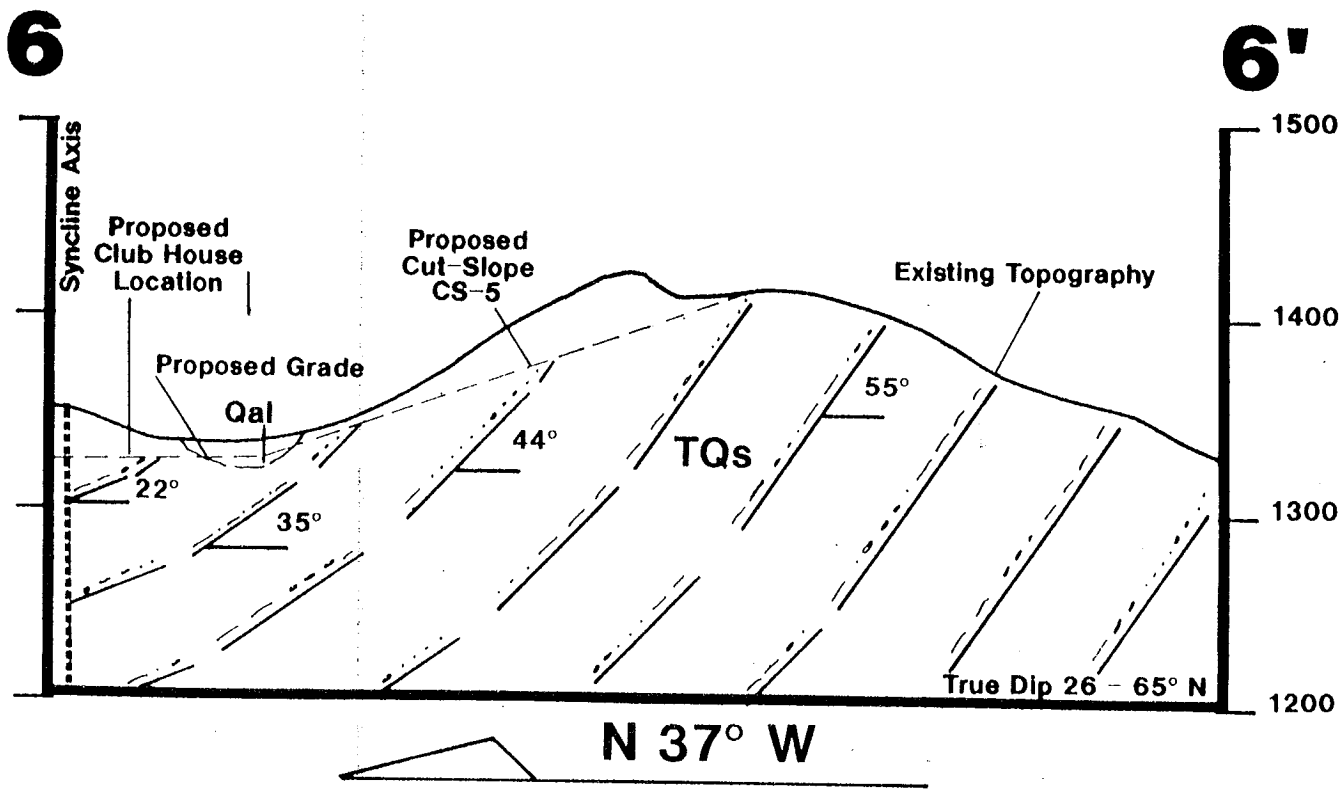

ALLAN E. SEWARD ENGINEERING GEOLOGY		
JOB NUMBER: 98-1617-4	DATE: 1/15/99	
SCALE: 1"=100'		DRAWN BY: Staff REVISED:

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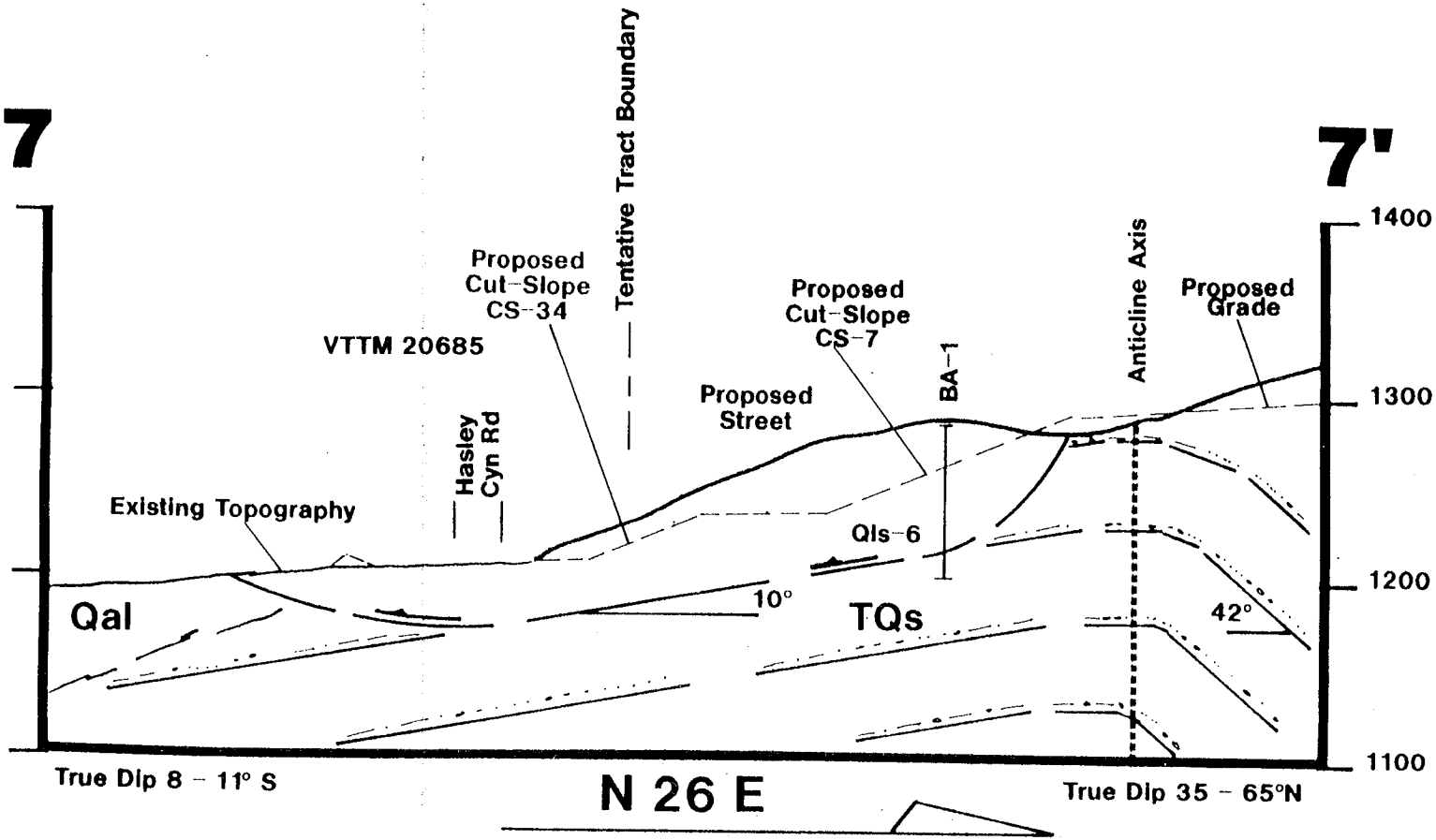

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ENGINEERING GEOLOGY

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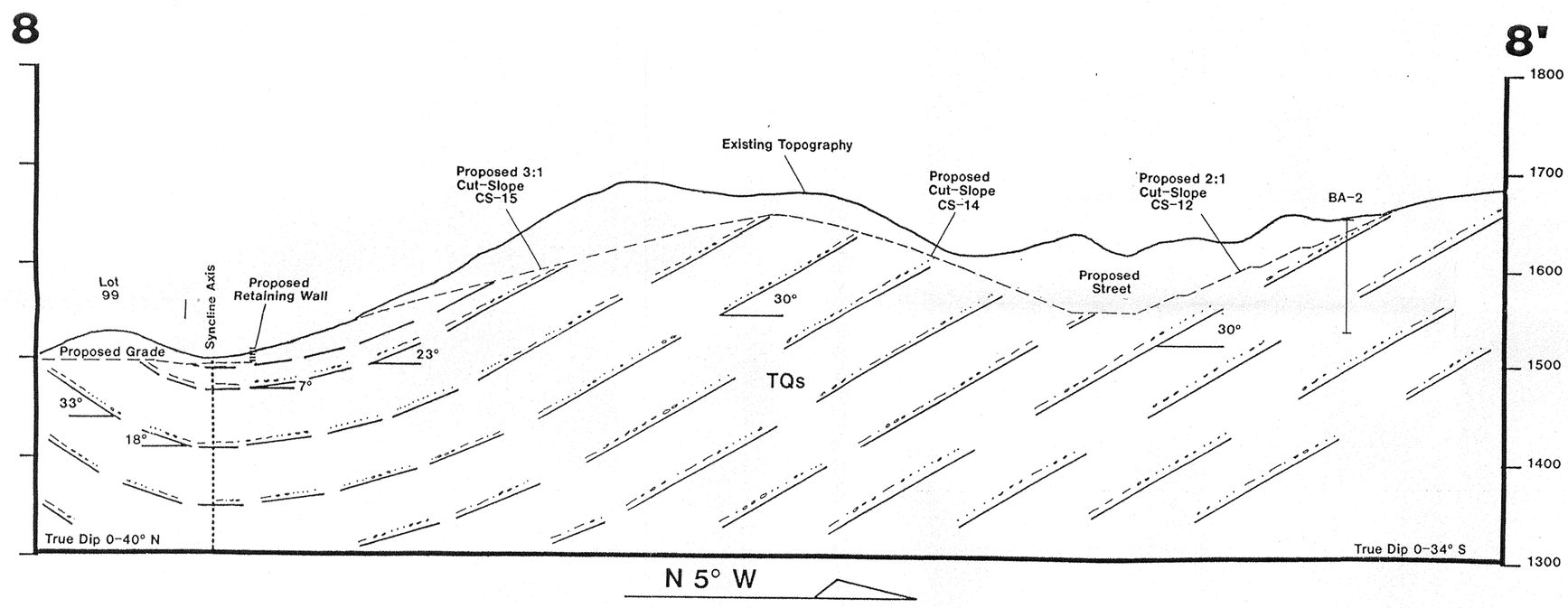
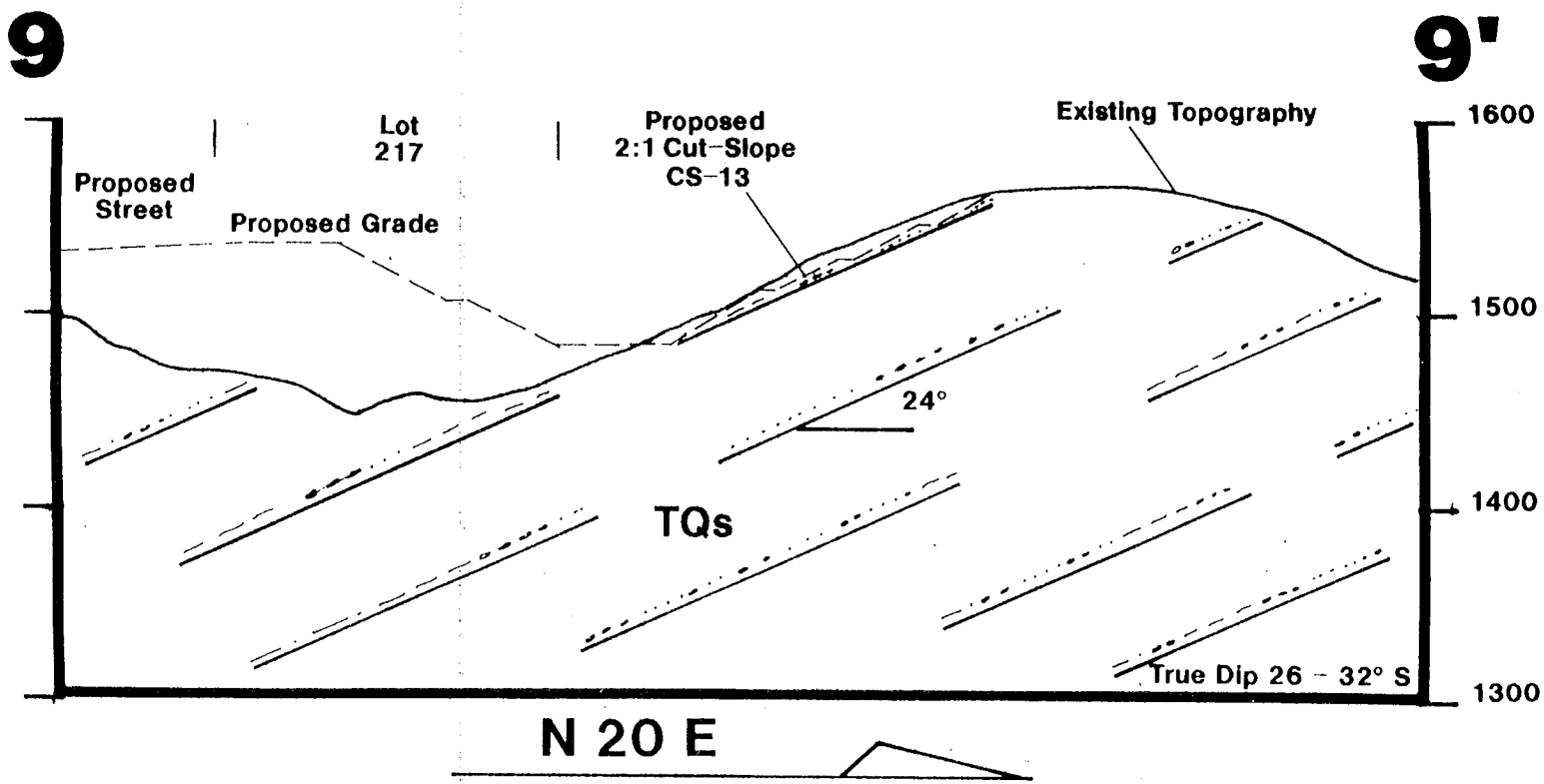


ALLAN E. SEWARD
ENGINEERING GEOLOGY, INC.
SINCE 1958

Date: 1/15/99		Job No.: 98-1617-4	
Scale: 1"=100'	Geology by: Staff	Revised:	
	Drawn by: Staff		

CROSS SECTION



ALLAN E. SEWARD ENGINEERING GEOLOGY			
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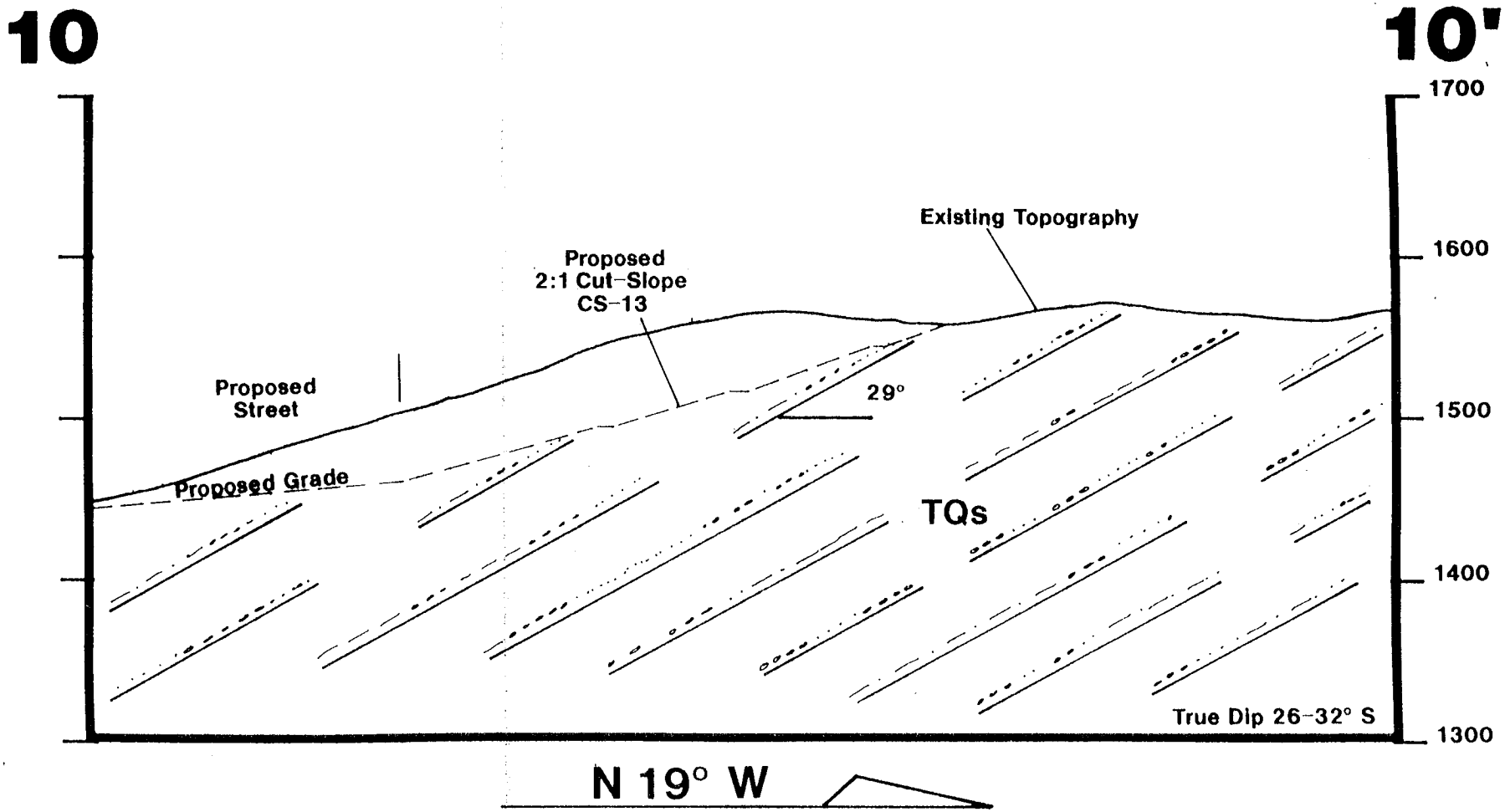
CROSS SECTION



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ENGINEERING GEOLOGY

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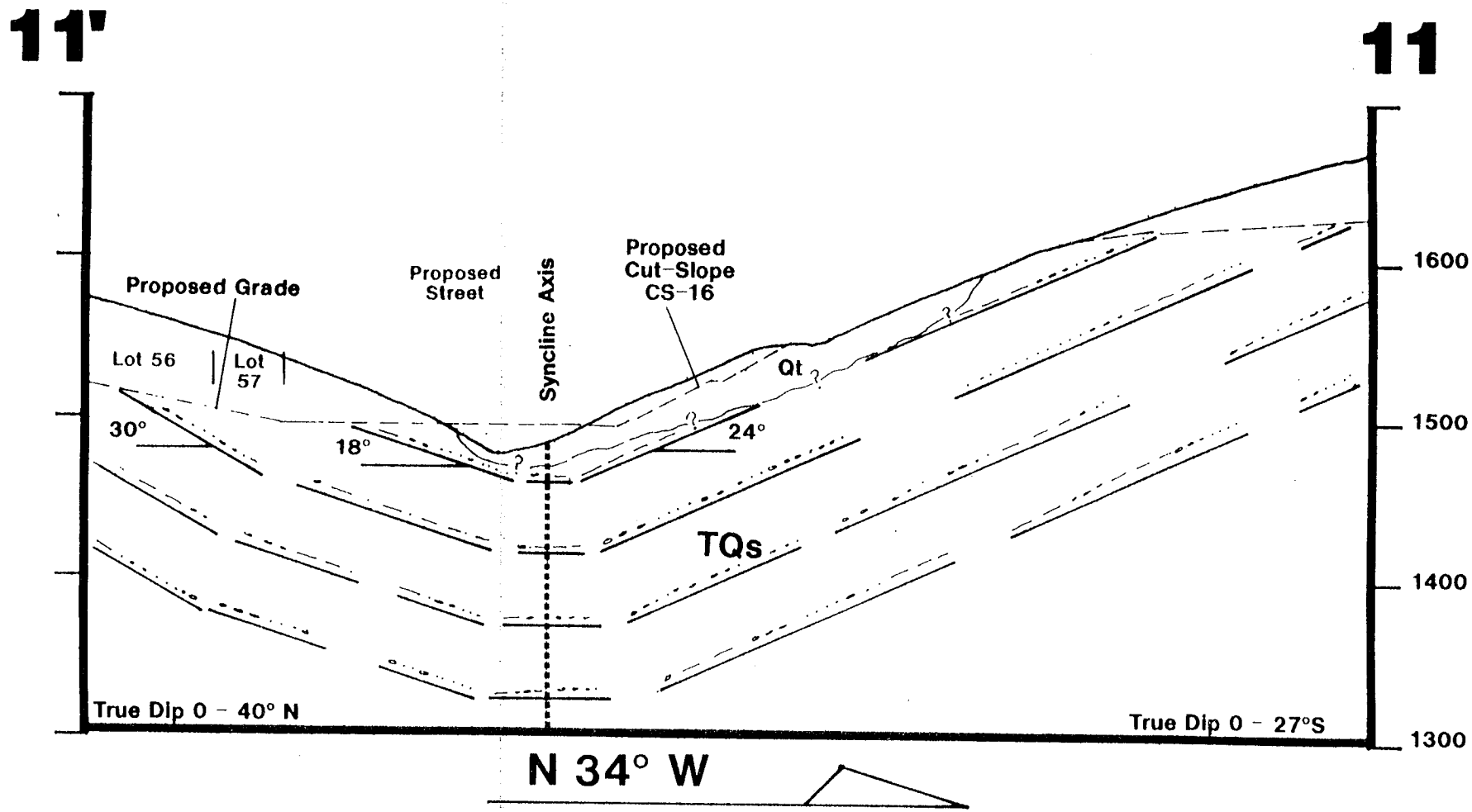
CROSS SECTION



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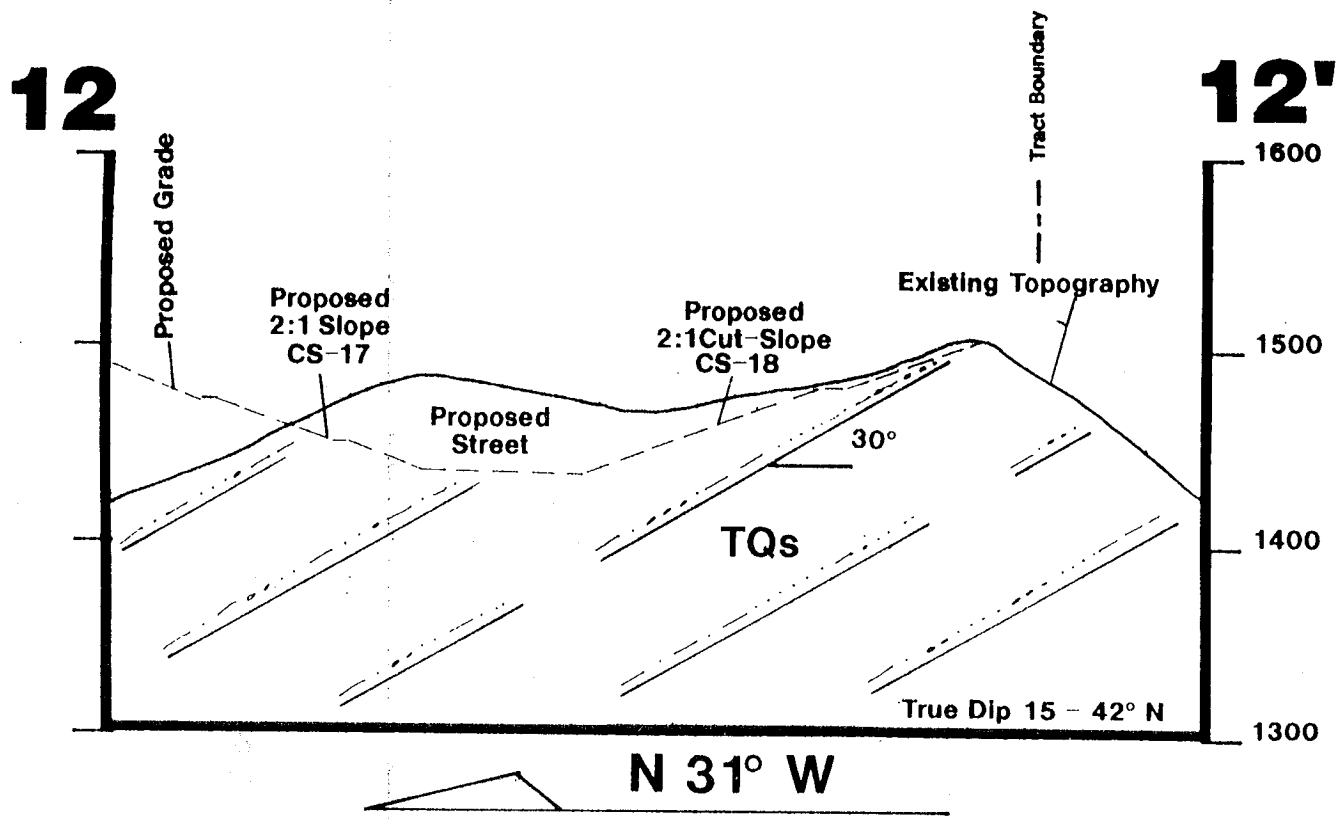
		REVISED:	

CROSS SECTION



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ENGINEERING GEOLOGY

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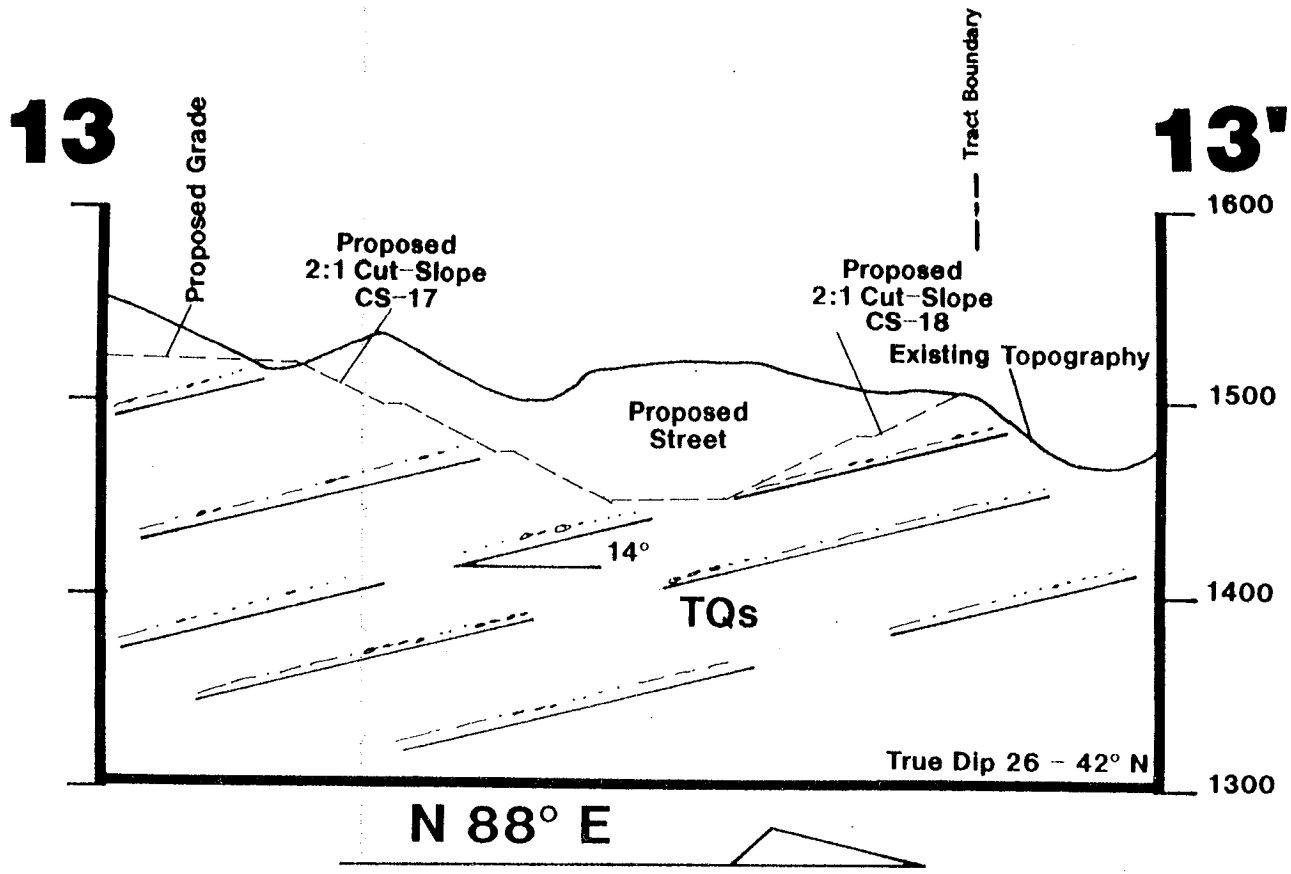

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JOB NUMBER: 98-1617-4	DATE: 1/15/99	
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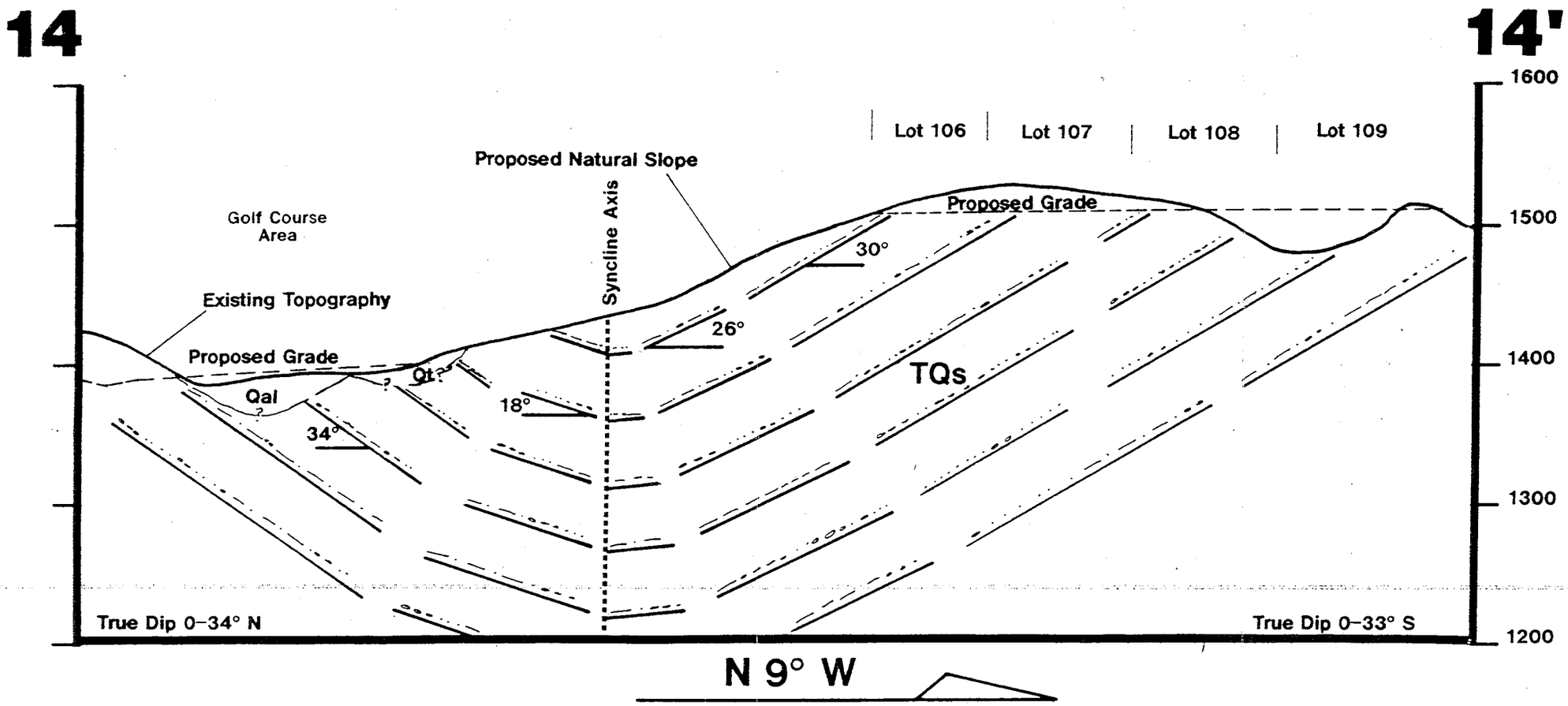

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ENGINEERING GEOLOGY

JOB NUMBER: 98-1617-4		DATE: 1/15/99	
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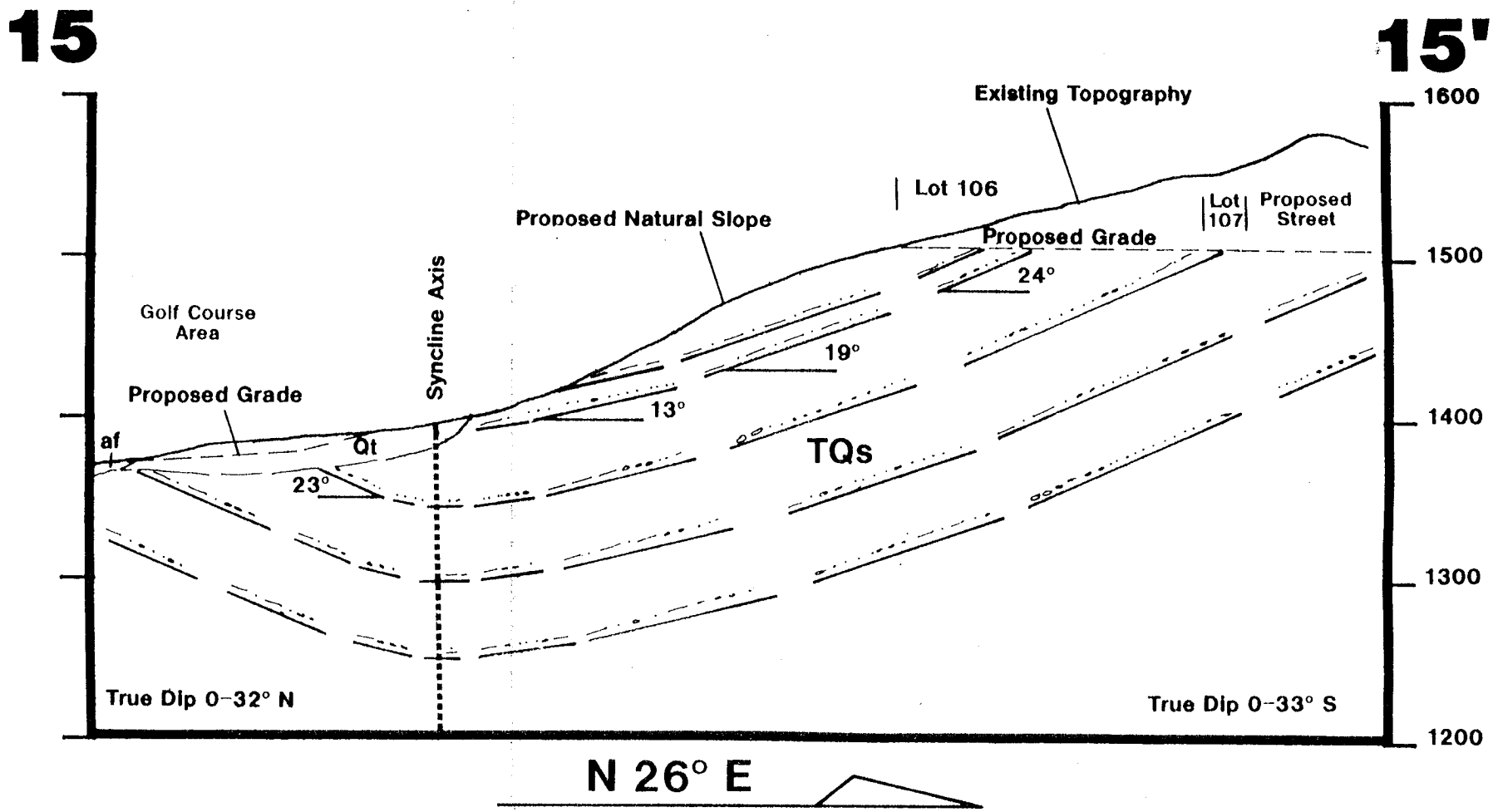

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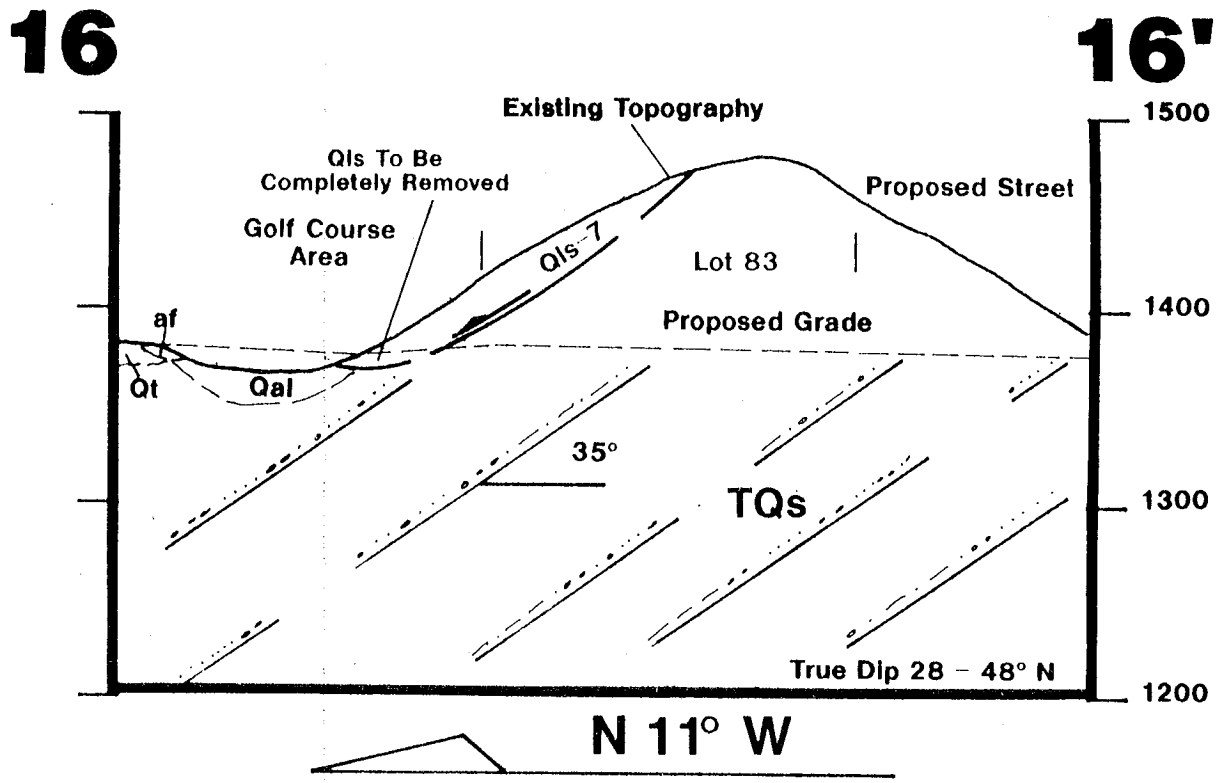

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ENGINEERING GEOLOGY

JOB NUMBER:	98-1617-4	DATE:	1/15/99
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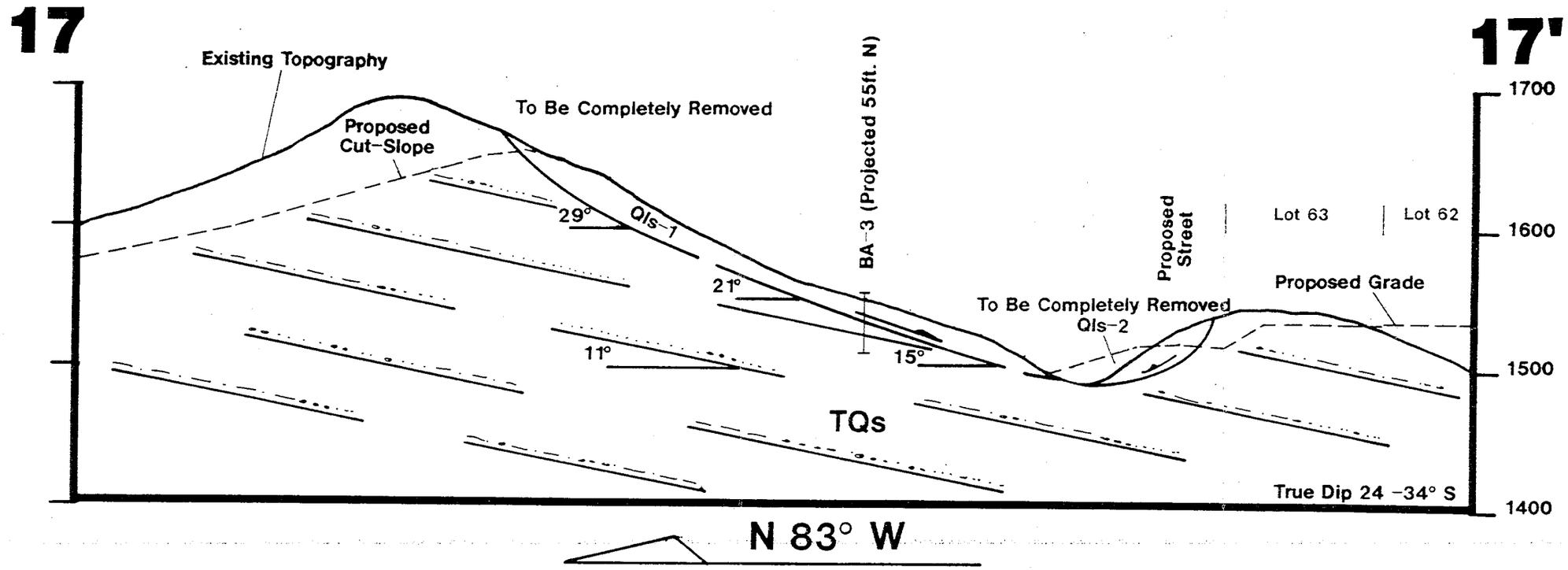

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JOB NUMBER: 98-1617-4		DATE: 1/15/99	
SCALE: 1"=100'		DRAWN BY: Staff REVISED:	

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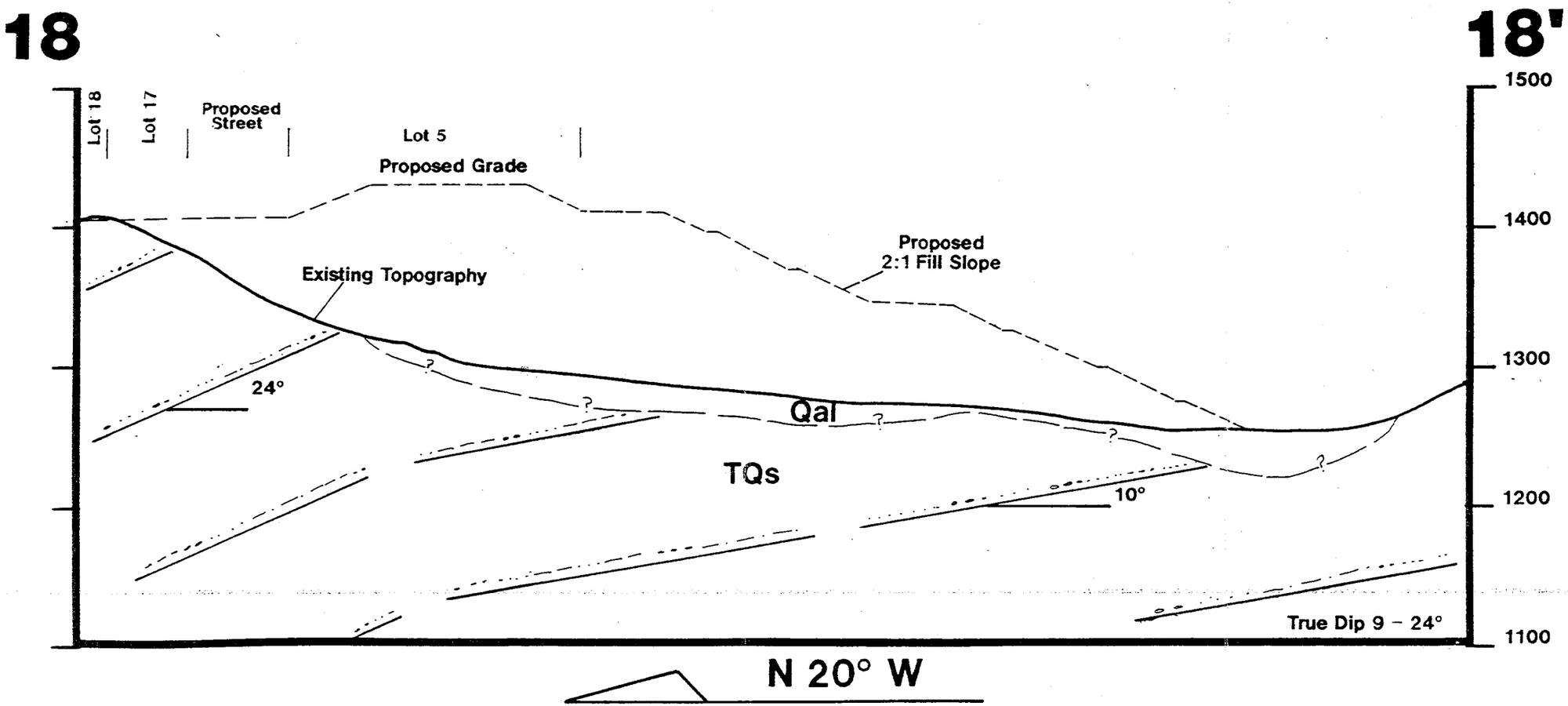

ALLAN E. SEWARD
ENGINEERING GEOLOGY

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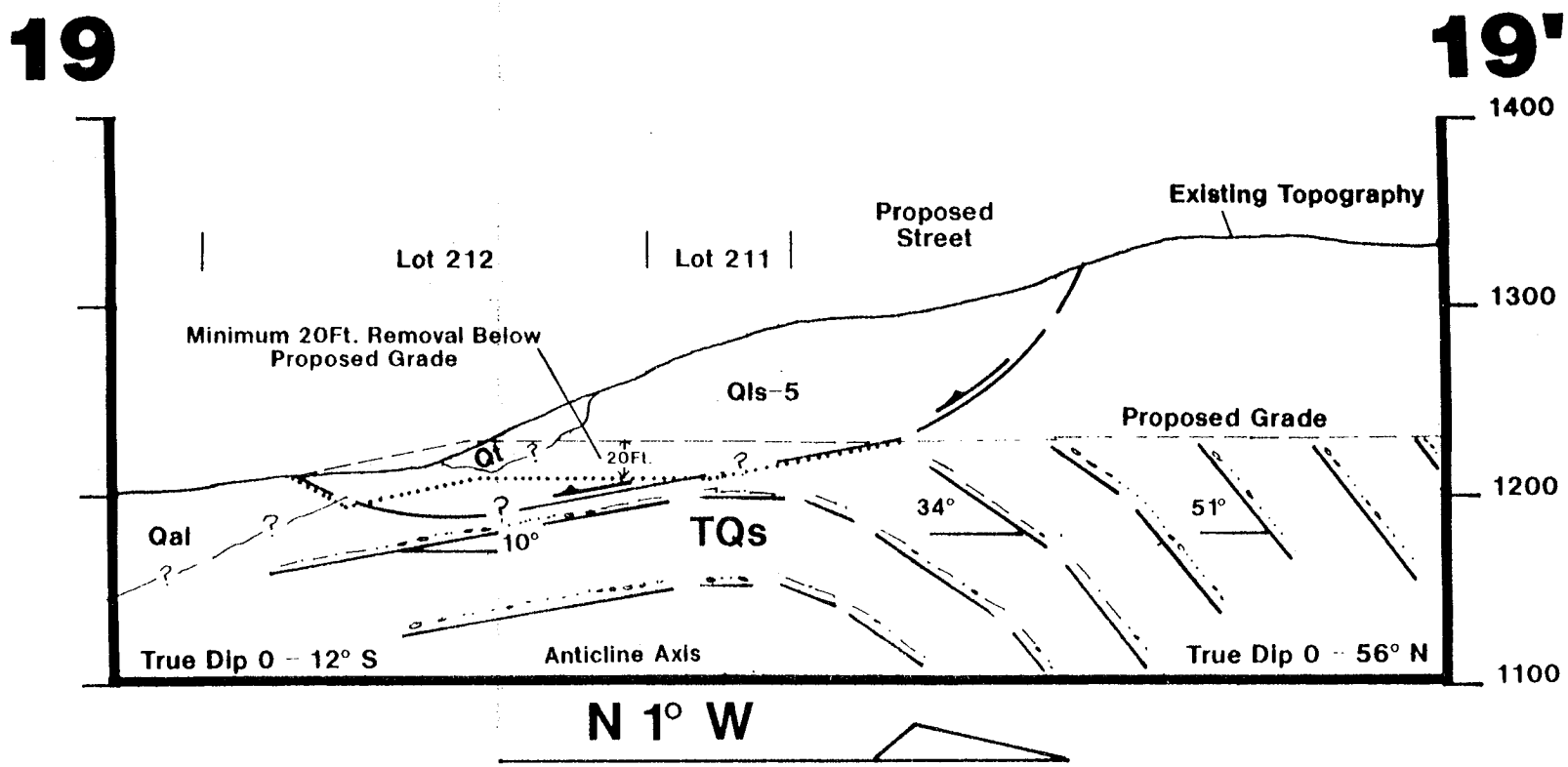
CROSS SECTION



ALLAN E. SEWARD ENGINEERING GEOLOGY			
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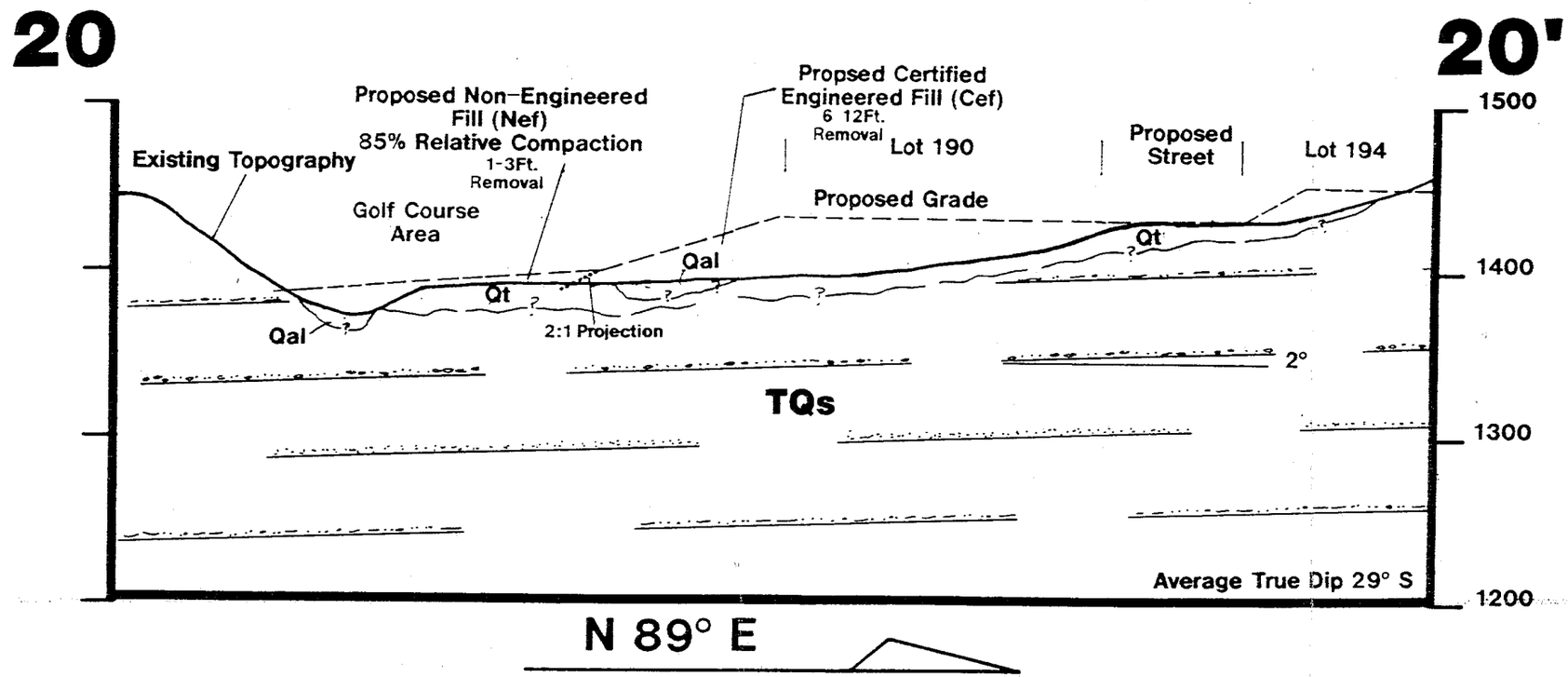
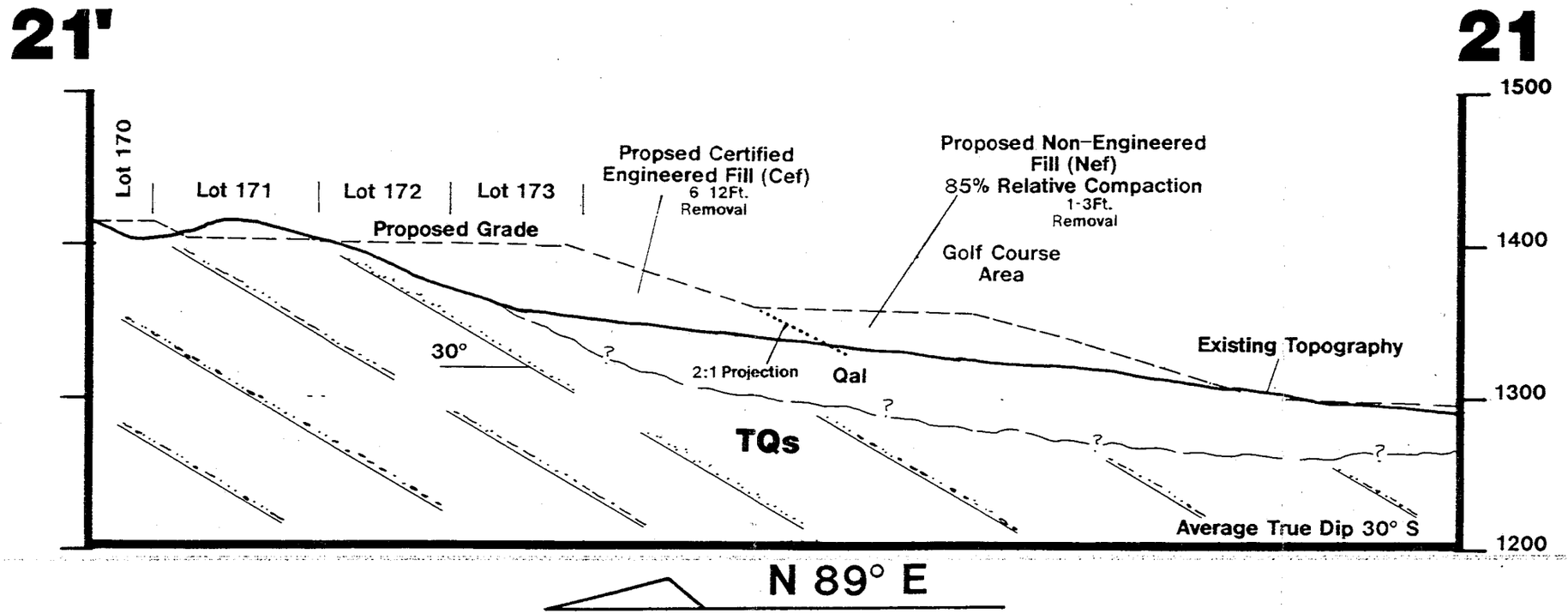
CROSS SECTION



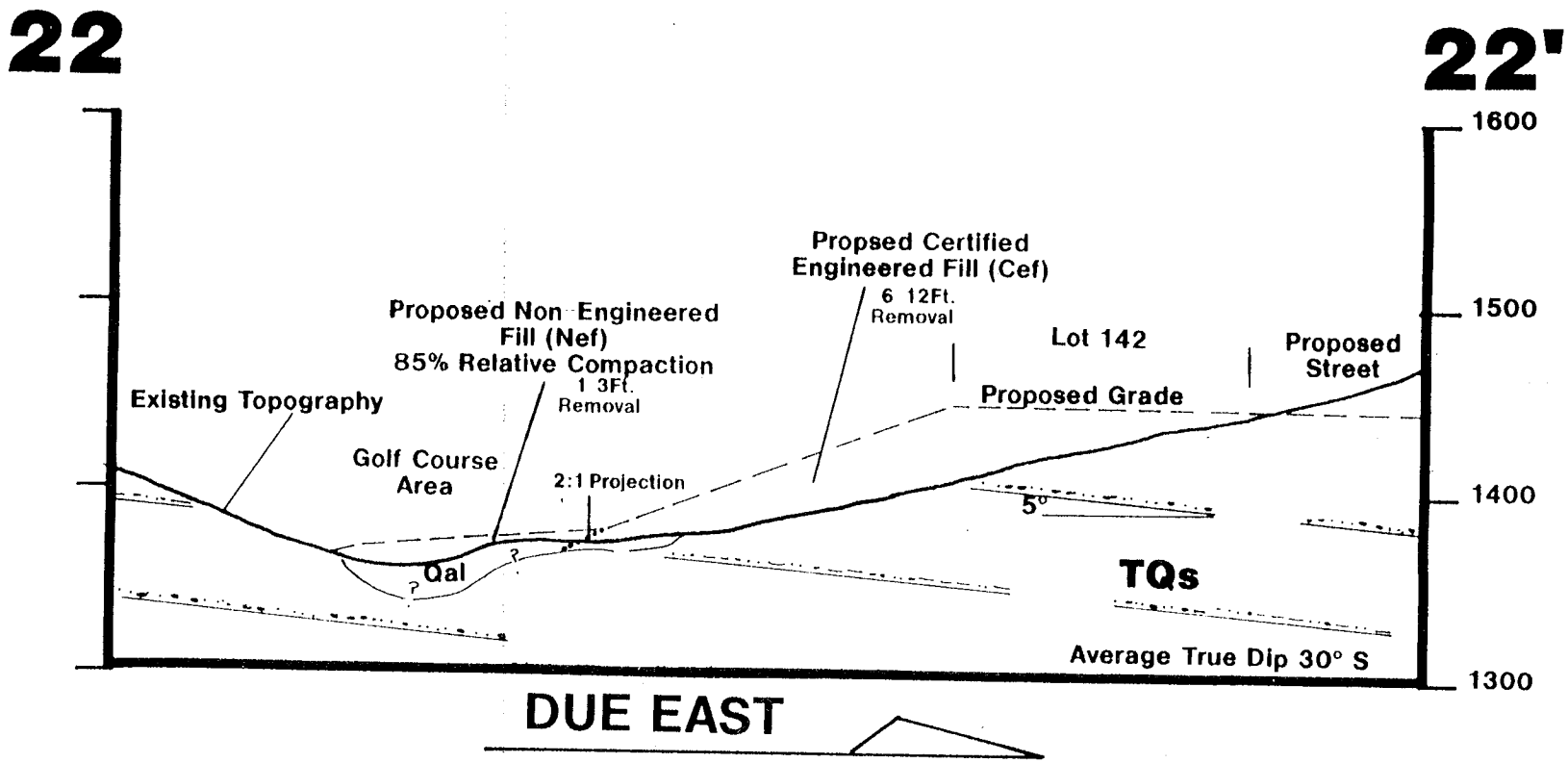
ALLAN E. SEWARD ENGINEERING GEOLOGY		
JOB NUMBER: 98-1617-4	DATE: 1/15/99	
SCALE: 1"=100'		DRAWN BY: Staff REVISED

CROSS SECTION



ALLAN E. SEWARD ENGINEERING GEOLOGY		
JOB NUMBER: 98-1617-4	DATE: 1/15/99	
SCALE: 1"=100'		DRAWN BY: Staff REVISED:

CROSS SECTION



ALLAN E. SEWARD ENGINEERING GEOLOGY		
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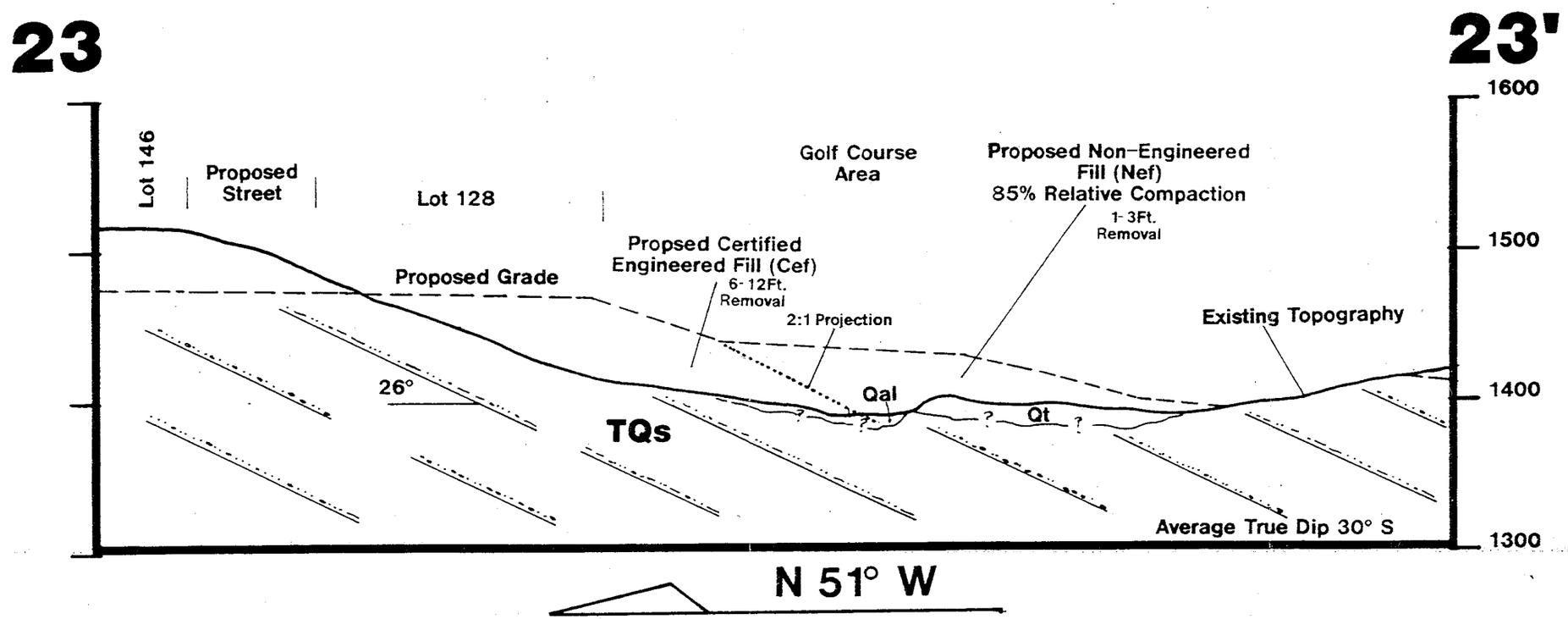
SCALE: 1"=100'		DRAWN BY: Staff REVISED:

CROSS SECTION



ALLAN E. SEWARD ENGINEERING GEOLOGY			
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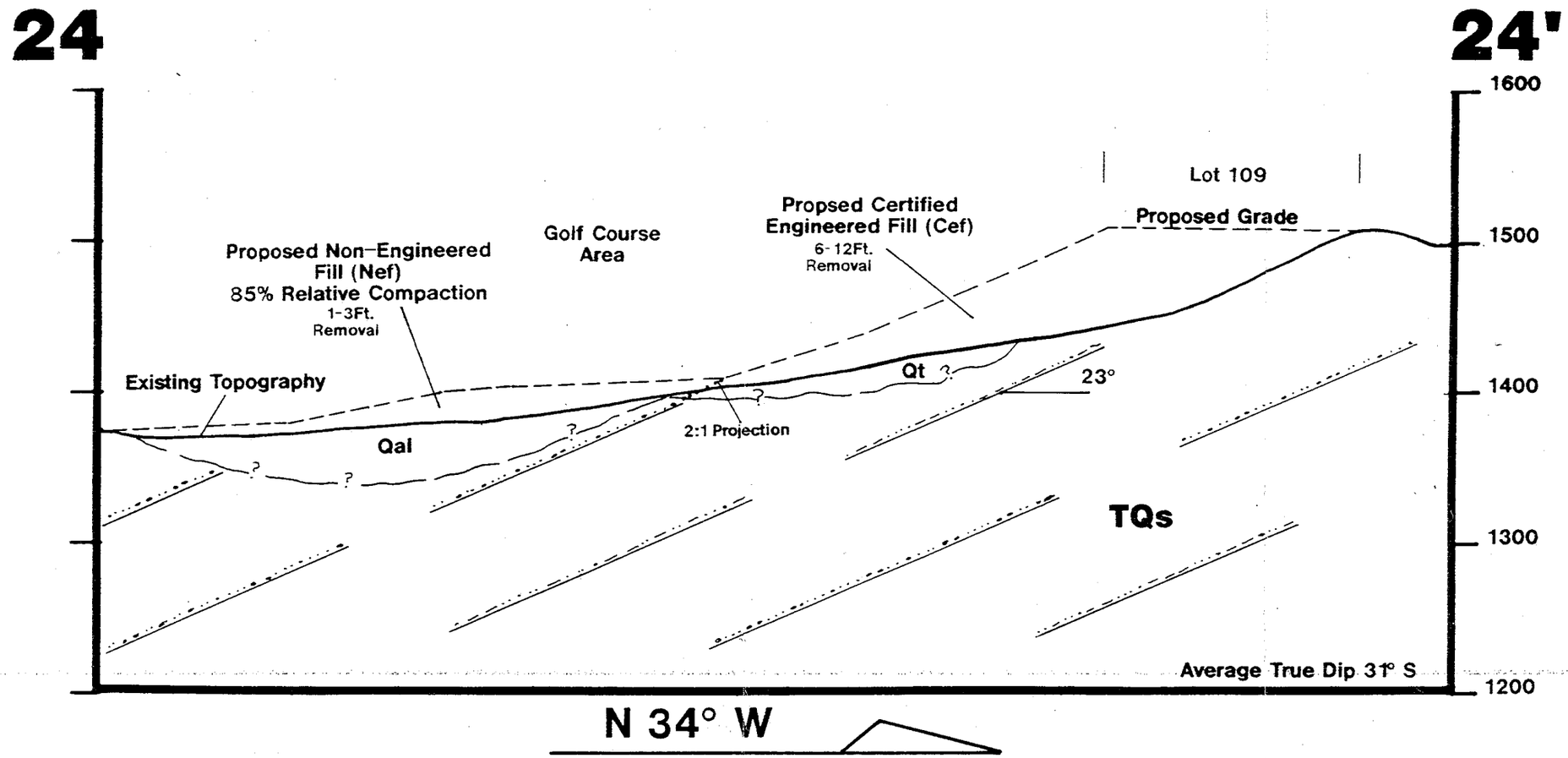
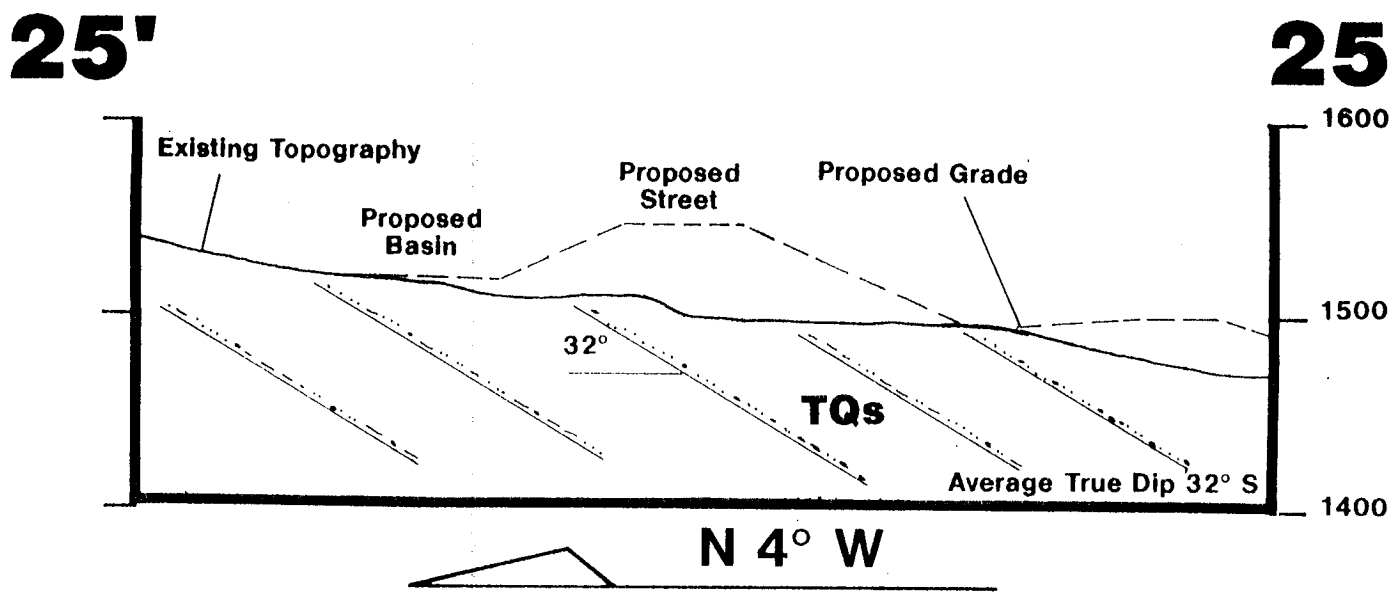
SCALE: 1"=100'		DRAWN BY: Staff	
		REVISED	

CROSS SECTION



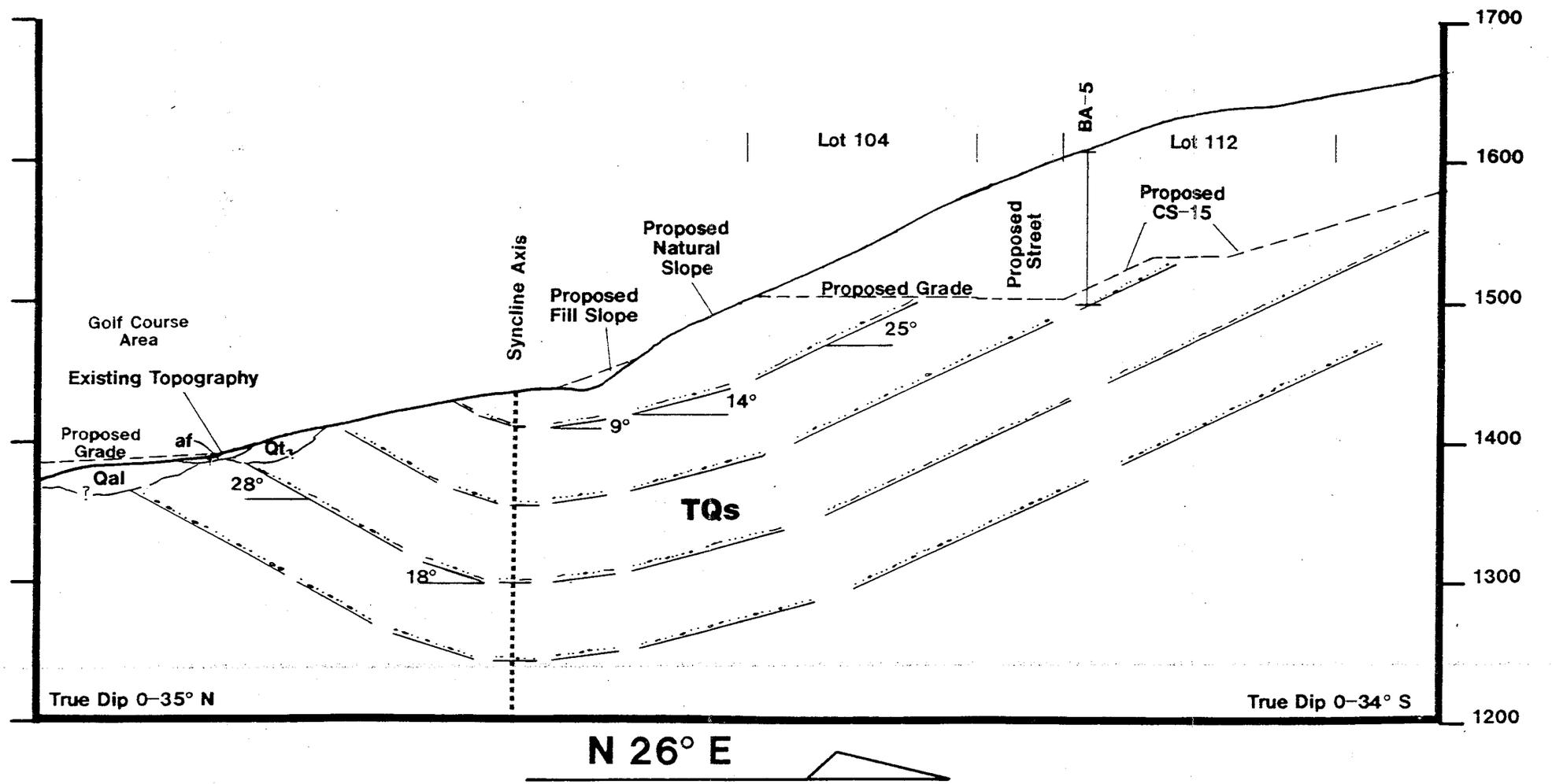
ALLAN E. SEWARD ENGINEERING GEOLOGY		
JOB NUMBER: 98-1617-4	DATE: 1/15/99	
SCALE: 1"=100'		DRAWN BY: Staff REVISED:

CROSS SECTION



ALLAN E. SEWARD ENGINEERING GEOLOGY			
JOB NUMBER: 98-1617-4		DATE: 1/15/99	
SCALE: 1"=100'		DRAWN BY: Staff	
		REVISED:	

CROSS SECTION



ALLAN E. SEWARD
ENGINEERING GEOLOGY

JOB NUMBER: 98-1617-4		DATE: 1/15/99	
SCALE: 1"=100'		DRAWN BY: Staff	
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