ALLEGHENY COUNTY SANITARY AUTHORITY

July 8, 2021

CONTRACT NO. 1739 G & E

ELECTRICAL DISTRIBUTION SYSTEM UPGRAGE

ADDENDUM NO. 2

All bidders bidding Contract No. 1739 G & E shall read and take note of this Addendum No. 2. The Contract Documents for **Contract No. 1739 G & E – Electrical Distribution System Upgrade** are hereby revised and/or clarified as stated below.

Acknowledgement of Contract No. 1739 G & E Addendum No. 2
The Acknowledgement attached to Addendum No. 2 is to be signed and returned immediately via email to Kathleen P. Uniatowski at contract.clerks@alcosan.org and acknowledged with Bidder's Proposal.

Kimberly Kennedy, P.E.
Director – Engineering and Construction

ACKNOWLEDGEMENT OF

CONTRACT NO. 1739 G & E
ELECTRICAL DISTRIBUTION SYSTEM UPGRADE

ADDENDUM NUMBER 2

FIRM NAME: _____

SIGNATURE: _____

TITLE: _____

DATE: _____

July 9, 2021

CONTRACT NO. 1739 G & E

ELECTRICAL DISTRIBUTION SYSTEM UPGRADE

ADDENDUM NO. 2

A. Contract Documents – Volume 1

No Revisions.

B. Contract Specifications – Volume 2

1. SUMMARY OF WORK (Section 01 11 00)

    a) Page 011100 – 2, Paragraph 1.2.A.1.d.: Add "7) Demolition of concrete foundations and steel trestles for section of overhead cable tray to Bldg 410 (cable tray and conduit demolition by EC).

    b) Page 011100 – 3, Paragraph 1.2.A.2.a.: Revise second sentence to read "Includes reinforcing, spacers, concrete, gravel subbase and warning tape for concrete encase ductbanks; sand fill and marking tape for direct buried conduits; and frames covers and stone subbase for manholes and handholes (where applicable).

2. MULTIPLE CONTRACT CONSTRUCTION SEQUENCING (Section 01 31 16)

    c) Page 013116 - 8, Paragraph DCS Communication Cabling (High Priority): Remove "High Priority status from this item.

3. CONSTRUCTION FACILITIES TEMPROARY CONTROLS AND UTILITIES (Section 01 50 00)

    a) Page 015000 – 3, Paragraph 1.6.A.3.: Delete "The Owner will pay an initial payment for plan review. This payment is approximately 20% of the Engineers estimate. This amount will be credited toward the Building Permit amount."

4. MULTIPLE CONTRACT CONSTRUCTION SEQUENCING

    a) Page 013116 – 5, Part 4, Underground Duct and Manhole System (High Priority): General Construction; ADD "1.i. EMH028 to EM107A; 1.j. Bldg 650 to EM1.

b) Page 013116 -5, Part 4, Underground Duct and Manhole System (Normal Priority): General Construction; DELETE "1.b Bldg 650 to EM1" and "1.d EMH028 to EM107A"

C. Contract Drawings

1. 000-G-01 (COVER SHEET)

    a) Replace cover sheet with signed cover sheet attached to this addendum.

2. 650-C-05

    a) Change referenced silt sock length from 1400LF to 366LF.

3. 000-E-02

    a) Add GENERAL NOTE: 37. Unless noted otherwise, all underground conduits and/or ductbanks shall be reinforced concrete encased and constructed in accordance with the typical details on Drawing 000-ED-02.

4. 000-ESL-02

    a) Add "EM113" between EMH043 and OVERHEAD CABLE TRAY BLDG 410 (EXISTING)

5. 000-ESP-04

    a) KEYNOTES 1 and 2 – Change 4" Conduits to 3.5" Conduits

6. 410-ET-02

    Plan 1/410-ESP-02:

    a) Change 2-5" RGS CONDUITS TO CABLE TRAY FOR NEW SWG004 FEEDERS to 4-5"

    b) Change 4-5" CONDUITS FROM EM113 (2 SPARE) to 6-5"

    c) Change "36" x 12" CONCRETE RISER STRUCTURE" to "48" x 12" CONDUIT RISER STRUCTURE"

    Detail 4/410-ESP-02:

    a) Change 3'-0" +/- to 4'-0" +/- and conduit quantity from 4 to 6.

7. 500-ET-01

    Conduit Routing Schedule:

    a) Change CONDUIT FILL for CONDUIT I-500100 from (5) 2/C #18 STP to (5) 2/C #16 STP.

8. 510-ESL-01

   Plan 1/510-ESL-01:

   a) Change conduit sizes on one-line for P-MCC003A-510 and P-MCC003B-510 from 4" to 3 ½".

9. 650-ET-02

   Plan 1/650-ET-02:

   a) Move location of EX. / NEW CONTROL CABLE DUCTBANK TO EMH004 to exterior of north wall near stairs and change EMH004 to "EMH044"

   b) Add to note 4.16KV DUCTBANK TOP DUCT EL. 729'-0" the following, "12-4" PVC CONDUITS BETWEEN NEW 4.16KV VAULT AND EXISTING 13.8KV VAULT, 5 ACTIVE, 7 SPARE. (TYPICAL 2 PLACES)

10. 650-ET-04

    Plan 1/650-ET-04:

    a) Change P-106008 to "C-106008" at upper right of SWG008-650

    b) Add Conduit "P-106008" to center section of SWG008-650

11. 650-ES-01

    Low-Voltage Power And Control Cable Schedule (Substation):

    a) Add Cable C-08010-650; 4/C #12; 52-B4T (SWG004-650)

    b) C-08006-650: Change ROUTING FROM Column from 52-B4T to 52-A4T and ROUTING TO Column from 52-MB to 52-MA

    c) C-08007-650: Change ROUTING FROM Column from 52-A4T to 52-B4T and ROUTING TO Column from 52-MA to 52-MB

    Conduit Routing Schedule (Substation):

    a) Change CONDUIT NO. F-106501 thru F106512 to "F-106001thru F-106012"

    Conduit Routing Schedule (Substation):

    a) Conduit No. C-106007: Change CONDUIT FILL from C-008008-650 to C-008010-650 and delete notation in FILL DESCRIPTION COLUMN

    b) Change ROUTING FROM column from CONDUIT NO. P-106001 & P106002 from SGW008 to "SGW008-650"

    c) Add: Cable No. P-106007; 1.5"; BLDG 651; 13.8KV SUB VAULT; 2-#2; DC STATION SERVICE

    d) Add: Cable No. P-106008; 1.5"; SWG008; 13.8KV SUB VAULT; 2-#2; DC STATION SERVICE

12. 000-ED-02

Details 2/000-ED-02 and 3/000-ED-02:

a) Revise Note to read: "Provide 3" minimum compacted gravel … runs."

Details 5/000-ED-02 and 6/000-ED-02:

a) Add note to each detail: "All new manhole interior dimensions shall be a minimum of 6'L x 4'W x 6'D.

D. Questions

25. Reference Drawing 500-ET-01; There doesn't seem to be any direction as to which duct banks require concrete encasement or sand encasement. Please advise.

    RESPONSE: Except for single fiber conduits to Bldgs. 130, 140 & 150, and conduits installed in pipe/stream trenches, all conduits are to be in concrete encased ductbanks. All concrete encased ductbanks shall be installed per Detail 2/000-ED-02 and 3/000-ED-02. All direct buried conduits shall be installed per Detail 1/000-ED-02.

26. Specification 01 11 00-8, section 1.13.B indicates the soil is not expected to contain hazardous substances. Drawing 20 (000-S-01) FOUNDATION AND CONCRETE NOTES item 18 indicates that the soil is "Unclassified." Article 2, section 2.15.C.4.a states "All excavated soils and other excavated materials are assumed to be Residual Waste." Past projects have considered the soil as "Residual Waste" and has required all excavated soil to be sampled, tested, permitted, and properly disposed of at an approved landfill. Please clarify what is to be considered for the excavated material on this project.

    RESPONSE: Please refer to Article 2, section 2.15.C regarding excavated soil, which supersedes Specification 01 11 00-8, section 1.13.B & Drawing 20 (000-S-01) FOUNDATION AND CONCRETE NOTES item 8.

27. Specification 01 11 00-8, section 1.13.A indicates lead paint may be present at the site. Article 2, section 1.15.A states "The Owner has concluded that no lead or Chromium based paint will be disturbed during the work on this Contract. Please clarify if lead paint is to be expected and, if so, how we are to price this work. If lead paint is expected, it would be best to handle this via allowance.

    RESPONSE: Refer to Addendum No. 1

28. Referencing drawing 68 (600-ETD-01), SUMMARY OF WORK indicates we are to demolish all concrete foundations. Please provide foundation details for the Metering and Control House, transformers, and 5kV switchgear.

    RESPONSE: 600-ETD-01 indicates to demo foundations to 36" below grade.

29. Referencing drawing 68 (600-ETD-01), please clarify who is to modify the cable tray leading to Bldg 410, and who is to demolish the cable tray directly adjacent to the 5kV metalclad switchgear. Please provide additional information on the trestle supports and foundations.

    RESPONSE: The Electrical (E) Contractor shall remove the cable tray and associated conduit and cables. General (G) contractor shall remove the trestle supports and associated foundations. Foundation removal to 36" below grade.

30. Referencing spec 01 11 00-2, section 1.2.b.2 the General contract is to install excavation support and dewatering systems. Please provide geotechnical information for this area.

    RESPONSE: Geotechnical information is being furnished as part of Addendum No. 2 (see attached).

31. Referencing drawing 57 (410-ET-01), KEYED NOTE 6 indicates "the removal of the bldg. exterior wall panel system and light duty framing for equipment installation" may be required. This is not indicated in either the General or Electrical scope of work within section 01 11 00 SUMMARY OF WORK. Please indicate:

    a) Are we to include this in the base pricing?

       RESPONSE: Yes

    b) If required, what contract (General or Electrical) is the removal and replacement of this panel system to be included?

       RESPONSE: Electrical (E) Contractor

    c) If required, how much paneling and framing is to be removed?
    d) If required, please provide details of the panels and framing.

       RESPONSE c) & d): Electrical (E) Contractor to determine existing site conditions and coordinate with equipment removals and installations.

32. Referencing drawing 84 (716-ET-01) there is a concrete encasement pad called out. Please note that currently the SUMMARY OF WORK has no work identified for Bldg 716 for the General Contract. In addition, the prebid indicates no specified GC work for this building. Please verify this is by the Electrical Contractor.

RESPONSE: Concrete encasement pad is considered an extension of the concrete encased duct bank and is therefore the responsibility of the Electrical (E) Contractor.

33. Referencing drawing 58 (410-ET-02), please verify in which scope the 2 EA bollards and concrete riser structure is to be included. These are not indicated in the SUMMARY OF WORK, and the bollard detail is located in the electrical drawings, on drawing 107 (000-ED-01).

    RESPONSE: Electrical (E) Contractor

34. Referencing drawing 108 (000-ED-02), note 4 indicates "Carefully remove concrete around ducts using a small chipping hammer to 23" beyond the proposed locations of the manholes outside walls." Please verify in which scope this work falls.

    RESPONSE: Electrical (E) Contractor

35. Referencing drawing 11 (650-C-05), under EROSION AND SEDIMENT CONTROLS it indicates we are to install 1400 LF of 12" silt sock. The quantity indicated on the drawings is significantly less than 1400 LF. Please confirm what we are to use as the basis of our bid.

    RESPONSE: Silt sock estimated length is 366'.

36. Reference Specification Section 01 11 00-3 and Drawings 000-ESP-06,000-ESP-07 and 000-ESP-08; In accordance with the SUMMARY OF WORK Page 01 11 00-3 2. Electrical Construction. Contract 1739E a. General Plant Site, duct and manhole systems: 1) Furnish and installing new ductbanks and manholes. Includes reinforcing and concrete for concrete encased ductbanks and frames and covers for manholes (Excavation, trenching and site restoration by General Contractor)

    a) Should the E-Contract base its concrete encasement quantities strictly on the ductbank dimensions as detailed on Drawings 000-ESP-06, 000-ESP-07, 000-ESP-09 and 000-ESP-10?

       RESPONSE: Minimum concrete encasements are described in specification 26 05 43 UNDERGROUND DUCTS AND RACEWAYS FOR ELECTRICAL SYSTEMS.

    b) Is the G-Contract responsible for stabilizing, de-watering and shoring of the ductbank and manhole excavations?

       RESPONSE: Yes

c) Is the G-Contract responsible for the backfill required from the top of the ductbank concrete encasement to finished grade?

RESPONSE: Yes

37. Drawing 000-FS-01 and drawing 000-FS-02 shows existing duct banks between new EMH206 to EMH104 and new EMH207 to EMH105. The duct bank section drawings and site electrical drawings show no reference to these duct banks and manholes. Also, are the new EMH206 and EMH207 to intercept existing duct banks? Please clarify.

RESPONSE: Yes, new manholes EMH206 & EMH207 intercept existing duct banks. No ductbanks sections to EMH104 & EMH105 were provided. New Fiber will be pulled through existing conduits to/from EMH206 & EMH207 and EMH104 & EMH105. Existing duct bank between EMH 102 and EMH 104 consists of 8-2" conduits (3 active, 5 spare). Existing duct bank between EMH 103 and EMH 105 consists of 8-2" conduits (1 active, 7 spare).

38. Drawing 000-FS-02 (Addendum #1) shows existing raceways from the new EMH206 and EMH207, via the steam trench to the admin annex building 110. The duct bank section drawings and site electrical drawings show no reference to the duct banks. Please clarify.

RESPONSE: There are new duct banks from the existing steam trench to EMH206 and EMH207 per detail 20/000-ESP-20. 4-2" conduits to each EMH from the steam trench.

39. Drawing 000-FS-000-FS-01 and 000-FS-000-FS-01 shows system installation schematic routing plan with no scale, is it possible to have drawings to scale issued?

RESPONSE: Refer to 000-ESP drawings and Addendum No. 1 ESK-01 sketch for locations of manholes, ductbanks, and buildings.

40. In Article 3, Section 4-2E indicates substantial completion at 1,260 Calendar days. In Article 2, Page 24 in bold indicates substantial completion at 540 calendar days. Please advise which is correct?

RESPONSE: Refer to Addendum No. 1 page 4 of 12.

41. Reference Specification Section 260513 and Drawing Number 000-ESL-02 (CONDUIT ROUTING SCHEDULE FOR FEEDERS F-SWGR004-410A AND F-SWGR004-410B/NEW SUBSTATION); Can a conduit schedule be provided for new Feeders F-SWG004-410 A &B, no conduit /tray routing schedule has been provided

in the EFR 410 Building Drawings to confirm the routing. On Drawings 000-ESP-09 (Sheet 44 of 108) Detail 4 shows a duct bank from EM113 to Bldg. 410 Riser. We cannot find the conduits in this duct bank on the Conduit Routing schedule.

RESPONSE: These conduits are not in the Conduit Routing Schedule. The same feeders on the Conduit Routing Schedule from EMH043 to EMH113 will continue between EMH113 to BLDG 410 leaving 2 spare conduits to BLDG 410 and will continue in new/existing cable trays to SWG004.

42. Reference Specification Section 260513 and Drawing Number 000-ESL-02 (CONDUIT ROUTING SCHEDULE FOR FEEDERS F-SWGR004-410A AND F-SWGR004-410B/NEW SUBSTATION); The conduit numbers on the Conduit Routing Schedule (Substation) on Drawing 650-ES-01 (Sheet 82 of 108) do not match the Switchgear and Transformer Templates shown on Drawing 650-ET-04 (Sheet 77 of 108). The conduit schedule has conduits F-106501-512. The templates show conduits F106001 thru 012. Can you verify that these conduits are numbered wrong on one of these drawings?

    RESPONSE: Conduit numbers revised per drawing Addendum items above.

43. Reference Specification Section 260513 and Drawing Number 000-ESL-02 (CONDUIT ROUTING SCHEDULE FOR FEEDERS F-SWGR004-410A AND F-SWGR004-410B/NEW SUBSTATION); On Drawing 000-ESP-009 Ductbank Sections (Sheet 44 of 108). All existing duct banks that are scheduled to be used as part of this project are on the Conduit Schedule. There are some Existing Ductbanks that are marked (REF. Only). There are other Existing Ductbanks that are not on the Conduit schedule and are NOT MARKED (REF. Only), the Ductbanks we are referencing are shown in Detail 6, 7 and 9. Can you verify if these Ductbanks are also for reference only?

    RESPONSE: That is correct

44. Reference Specification Section 260913.10 and Drawing Number 500-ET-01 (CONDUIT ROUTING SCHEDULE); The CONDUIT ROUTING SCHEDULE details the FILL DESCRIPTION for Conduits C-500100, C500101, C500103 and C500104 as being Drawing 650-ET-05. This Drawing does not exist and was not included in the Drawing Index 000-G-12; can the Conduit Fill be provided for the above conduits?

    RESPONEE: See Addendum No 1 – C. Contract Drawings, 8.a)

45. Would a Blown Fiber be considered to be used in lieu of conventional copper Fiber. We feel that a properly designed and installed eABF solution would not only help with meeting schedule requirements, but would help in future projects. This product is available in fiber counts from 2-96 Strands. The blown Fiber eliminates intermediate patching which is usually equals problems and trouble shooting. The solution is faster to install.

    RESPONSE: Bid as specified.

46. Under bid documents volume 2 page 01 311 16-8 DCS Communications Cabling (High Priority) No date in description. Please clarify date.

    RESPONSE: DCS fiber is not a high priority and status revised per addendum item above.

47. The only painting/coating specification included is section 099123: INTERIOR PAINTING. Furthermore, the paint schedule provided indicates "Interior Paint Schedule" and does not indicate what areas are to receive painting, but rather indicates the painting systems to be used on various substrates. Among the substrates listed are as follows:
    a. Concrete, Nontraffic Surfaces – the only interior concrete we have for this project are equipment curbs/pads.
    b. Concrete, Traffic Surfaces – we have no interior concrete traffic surfaces on this project.
    c. CMU – we have no CMU on this project.
    d. Steel – we have no interior steel.
    e. Galvanized-Metal – the only interior galvanized metal we have on the project would be the edge angle and ladders located within the cable vaults on drawing 22 (650-S-01).

    In specification 01 11 00, section 1.2.A.1.f indicates there is painting in EFW Building 900. It is unclear what painting is to be painted in this building. In addition, it is our understanding the canopy structural steel is only to be hot dipped galvanized, and does not required painting. Please verify what painting is required for this project.

    RESPONSE: Only touchup painting required around area of demolition or other disturbed area.

Attachments:

Specifications:

1. *(No Items)*

Drawings

1. *000-G-01 Cover Sheet*

Other:

1. *Geotechnical Reports*

*** * * * END OF ADDENDUM NO. 2 * * * ***

Allegheny County Sanitary Authority
3300 Preble Avenue
Pittsburgh, PA 15233

Contract No. 1739
ELECTRICAL DISTRIBUTION SYSTEM UPGRADE

Contract G: General
Contract E: Electrical

ISSUED FOR BIDS
MAY 25, 2021

alcosan
allegheny county sanitary authority

MEMBERS OF THE BOARD

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Rep. Harry Readshaw	- Vice-Chairperson
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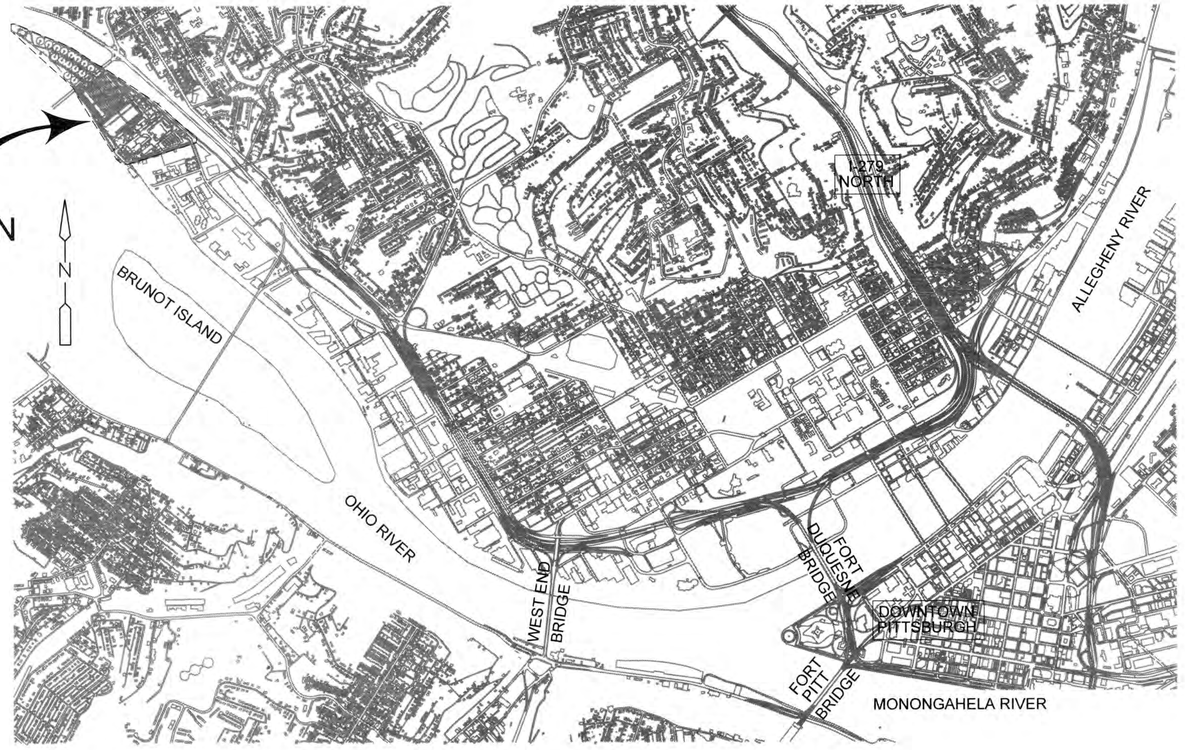
APPROVED	
EXECUTIVE DIRECTOR	DATE 7/1/2021
DIRECTOR OF ENGINEERING AND CONSTRUCTION	DATE 7/1/2021
MANAGER OF CAPITAL PROJECTS	DATE 7/1/2021
PROJECT ENGINEER	DATE 7/1/2021



SITE LOCATION PLAN
N.T.S.

Quad3 Architecture Engineering Environmental Services
The Bathhouse
3495 Butler Street
Pittsburgh, PA 15201
phone 412.781.1344
fax 412.781.1389
web www.quad3.com

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
EDWARD J. SULLIVAN
ENGINEER
040761-E

DESIGN SCALE
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

GARVIN

BOWARD BEITKO

BUILT ON REPUTATION

CONSULTING GEOTECHNICAL,
FORENSIC & ENVIRONMENTAL
ENGINEERS

GEOTECHNICAL ENGINEERING ANALYSIS & REPORT

PROPOSED ADDITION TO
ALCOSAN SUBSTATION BUILDING
3300 PREBLE AVENUE
CITY OF PITTSBURGH, PENNSYLVANIA

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For:

QUAD3 GROUP, INC.
3495 BUTLER STREET, SUITE 102
PITTSBURGH, PENNSYLVANIA 15201

Garvin Boward Beitko Engineering, Inc.
180 Bilmar Drive
Suite IV
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Phone: (412) 922-4440
Fax: (412) 922-3223

December 14, 2020
GBBE 20159

GARVIN
BOWARD BEITKO

BUILT ON REPUTATION

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December 14, 2020

Quad3 Group, Inc.
3495 Butler Street, Suite 102
Pittsburgh, PA 15201

Attn: Edward Sullivan, P.E.
Principal / Director, Pittsburgh Operations

Subject: Geotechnical Engineering Analysis and Report
Proposed Addition to ALCOSAN Substation Building
3300 Preble Avenue, City of Pittsburgh, Pennsylvania
Garvin Boward Beitko Project 20159

Pursuant to your authorization to proceed, we completed our geotechnical engineering analysis for the subject project. This report summarizes our engineering analysis and presents geotechnical engineering recommendations for the design and construction of foundations to support the proposed, approximately 23-ft-wide by 83-ft-long, one-story addition to the existing electrical substation building, situated at the ALCOSAN facility, as shown on the Google Earth® aerial image (Image), with the proposed addition superimposed in red, provided by you to us.

1.0 – SITE LOCATION AND CONDITIONS

The site, as shown on the Site Location Plan of Figure 1, is occupied by the existing electrical substation building, situated about 50 ft east of the east bank of the Ohio River, within the ALCOSAN facility in the City of Pittsburgh, Allegheny County, Pennsylvania. The ground surface within the proposed addition area, to abut the southern wall of the existing electrical substation building, varies between about elevations 720 ft and 724 feet. The site is located on the Ohio River floodplain.

Elevations discussed herein are based on ground surface elevations at the test borings, as gleaned from the *Records of Subsurface Exploration* (a.k.a. test boring logs), included in the April 1997, Geotechnical Data ALCOSAN Capital Improvement Program report (Report), by Camp Dresser & McKee CH^{2}MHill (CDM), provided to us by you; and ground surface elevations obtained by us via the Google Earth® website. The elevations appear to be referenced to United States Geological Survey datum.

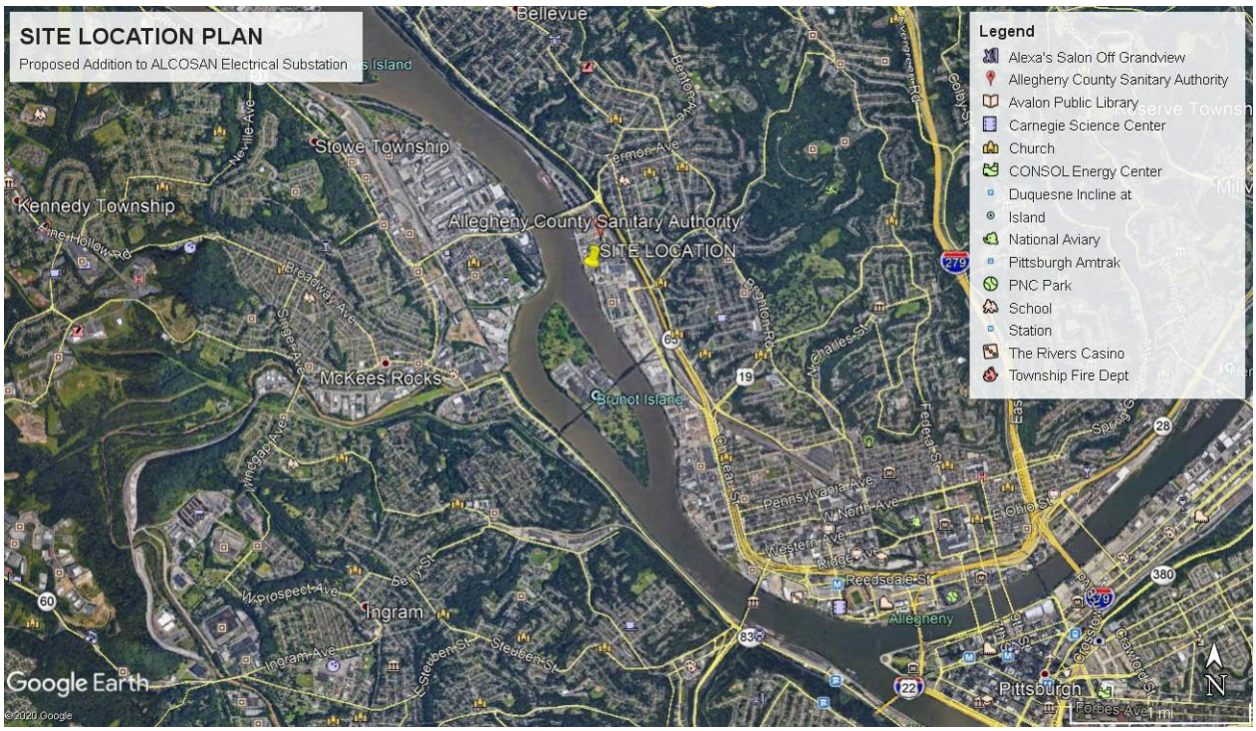

FIGURE 1 – SITE LOCATION PLAN (from Google Earth®)

2.0 – SUBSURFACE EXPLORATIONS

We used the aforementioned 1997 CDM Report boring logs, provided by you, as the basis to evaluate subsurface conditions at the site. Of course, as we were not present during test boring operations and did not have the opportunity to examine the boring samples, we will not assume any responsibility for the accuracy of the boring log characterizations of the subsurface strata. Such responsibility should be maintained with the author(s) of the CDM Report. For our herein-summarized engineering analysis, we used the CDM boring data in good faith with respect to its accuracy.

We approximated the CDM Report locations for Borings 273, 274, 276, 279, and 281, using the Boring Location Plan drawing from that Report, onto the aforementioned Image, herein included as Figure 2, Plan of CDM Boring Locations. According the CDM logs, the borings were drilled during June 10 thru 13, 1996. The CDM test boring contractor conducted standard penetration tests (SPTs) at five-foot vertical intervals in the soil mantle. It appears that the SPTs were conducted in general compliance with American Society for Testing and Materials (ASTM) standards at that time. These tests provide a measure of the shearing resistance, or strength, of cohesive soils and the relative density of granular soils; they also provide soil specimens for laboratory evaluation. Those five borings were extended to SPT or

auger refusal on bedrock, from which level 10 ft of continuous rock cores were procured from each of those borings, except for Boring 274.

As current ground surface elevations appear to differ for every CDM boring location, except Boring 281, it appears that fill was placed at the site, raising the ground surface, between 1996 (when the borings were drilled) and 2019 (the Google Earth® ground surface elevation data). It appears that between two feet and six feet of fill was placed at the locations of Borings 273, 274, 276, and 279. Using the CDM boring data, combined with the apparent additionally-placed fill at the site since the borings were drilled in 1996, it appears that the 46-ft- to 49-ft-thick soil mantle at the borings is composed, in descending order, of approximately: 21 ft to 30 ft of fill; zero to 11 ft of alluvial (relatively recent-geologically-deposited river) soil; and 13 ft to 19 ft of glacio-fluvial soil deposited during the last ice age that ended about 12,000 years ago. The fill reported in the CDM borings, but not including apparent fill placed at the site since the borings were drilled in 1996, is a heterogeneous anisotropic mixture of gravel, slag, cinders, silt, sand, brickbats, "cement" (assumed to be concrete fragments), glass fragments, and cobbles. According to our scale of soil material classifications, dependent on the "N" values determined via the SPT results, as included in the appended geotechnical terminology, the fill reported in the CDM borings varies from very loose to medium dense in relative density, a relative measure of the density and strength of predominately granular materials. The alluvial soil, composed of sand, gravel, and silt, ranges from loose to medium dense, while the glacio-fluvial soil – mostly sand, gravel, and cobbles – varies from firm to very dense. It overlies interbedded sandstone, siltstone, shale, and claystone bedrock that is soft to hard and extremely to occasionally broken. CDM reported that the bedrock core exhibited rock quality designations (RQDs) between 10 percent and 40 percent. The following table summarizes subsurface explorations at the borings.

SUMMARY OF SUBSURFACE EXPLORATIONS

CDM Boring	CDM-Recorded Ground Surface Elevation During 1996 (ft)	Estimated Approx. Ground Surface Elevation According to Google Earth® (9/2019) (ft)	Apparent Fill Thickness (ft)	Alluvial Soil Thickness (ft)	Glacio-Fluvial Soil Thickness (ft)	Depth to Bedrock Surface (ft)	Approx. Bedrock Surface Elevation (ft)	Groundwater Surface Elevation Reported by CDM (ft)
273	725	727	21	9	19	49	706	708
274	725	728	28	0	18	46	707	707
276	726	729	30	5	13	48	713	711
279	726	732	29	0	17	46	709	710
281	726	726	24	11	14	49	712	708

The CDM records for Borings 273, 274, 276, 279, and 281, summarizing the soils and rocks encountered and reported by CDM, are appended.

The CDM boring logs indicate that observations for groundwater were conducted during the progress of subsurface explorations and upon completion of boring operations. At the time of test drilling, the borings intercepted the phreatic surface between elevations 707 and 711. These elevations are reasonable with respect to normal pool elevation 710 of the Ohio River at this area. However, it should be understood that the groundwater surface is controlled by the nearby Ohio River. Thus, it will vary with seasonal and regional precipitation.

3.0 – DISCUSSION AND RECOMMENDATIONS

We reviewed the November 12, 1996, *As-Built* drawings, originally completed by CDM and L. Robert Kimball and Associates. Those drawings show that the existing electrical substation building is supported with a structural concrete mat foundation with 12-ft-square thickened slab sections, placed in a grid pattern spaced at 20 ft intervals, which are apparently intended to essentially act akin to isolated spread (column) footing foundations. The foundation system appears to extend four feet below adjacent exterior perimeter grade about the building. The building final concrete floor extends 10 ft above the top of the mat foundation via 18-in.-dia columns centered at each of the aforementioned thickened floor slab "column footings." The mat foundation subgrade was provided with compacted granular fill. The type of granular fill (i.e., crushed stone or gravel of certain size and gradation, etc.) was not specified. The graphical sections on the drawings show that the compacted granular fill was supposed to be up to five feet thick, while Dwg. No. 000-S-01, Structural Notes (Notes) indicates that the granular fill should be "6"" (sic, feet) in thickness. The Notes specify that the granular fill was to be compacted to "…a minimum of 95% of relative density per ASTM D1557." However, this is a misnomer, as ASTM D1557 specifies the procedure for the modified proctor test, which should only be used for fine-grained cohesive soils. It does not apply to granular soils. The Notes indicate that "All footings shall be supported on compacted granular fill having a net safe bearing capacity of 2,000 psf." We assume the word, "safe," is meant to portray an allowable bearing capacity, as "safe" is not typically applied to foundation bearing requirements/analyses. Finally, the structural mat foundation does not actually behave like footing foundations. Nonetheless, we used this basic design/construction condition as the basis for our initial geotechnical engineering analyses. We understand that others recommended that the addition be supported with deep pile foundations, but that project decision makers want to avoid deep foundations.

Thus, we initially considered shallow foundation support for the proposed building addition, as discussed in Section 3.1 of this report.

Regardless of the type of foundation system chosen to support the proposed building addition, it should be designed to resist uplift forces imposed on it via the 100-yr flood level of the nearby Ohio River.

3.1 – Shallow Foundation Considerations

We analyzed the proposed building addition based on support via a conventional shallow foundation system, bearing on an undercut zone backfilled with properly-compacted crushed stone. As the existing subgrade, as well as the undercut and backfilled zone, are predominately granular, we analyzed this foundation option using the Schmertmann immediate settlement method. Although the desired allowable net total combined (dead and live) load maximum contact bearing pressure (CBP) of 2000 lb/sq ft, as was used for the exiting building as discussed above, can be readily achieved via undercutting and backfilling the foundation subgrade with crushed stone, the addition will experience settlements. Our analysis indicates that the addition, supported with conventional isolated spread (column) and continuous line (wall) footings, will experience a maximum total settlement on the order of about two inches and differential settlements, across its width, approaching one and one-half inch. "Floating" structural mat foundation support, similar to that used for the existing building, should somewhat reduce the addition differential settlement, possibly to as little as one inch, although it may reach 1.25 in. based on some variables that can only be assumed. A factor worth noting and considering is that granular material typically experiences what is termed, "immediate settlement," akin to elastic compression, although this is only a loosely-applied relative term. As such, typically between 20 and 50 percent of foundation subgrade settlements occur during building construction. Unfortunately, the settlement can, nonetheless, detrimentally impact building addition design and performance. It should be realized that settlements will be concentrated at the interface of the existing building, which years ago should have stopped settling, and the addition. Thus, the existing building to addition interface will experience on the order of two inches of settlement, which will likely be beyond typical structural tolerances. Therefore, we recommend that any structural members spanning from the existing building to the addition, as well as connections between the two, be designed to withstand such movements/strains, and resulting stresses, or the addition and existing building be structurally divorced. If such members are not designed to withstand such movements then both the addition and existing building may experience associated distresses. Regardless of structural design actions taken, differential settlements will potentially result in tripping hazards at the

interface of the addition to existing building floors, although floor settlements will likely be of lesser magnitude than those predicted and presented in this report.

If fill is placed to raise the proposed addition floor elevation, settlements will be greater than herein predicted. Further, such fill placed adjacent to the existing building could result in down-drag forces on its foundations, leading to distresses to it.

If conventional column and wall footing support is chosen for building addition support, their "footprint," plus a minimum three-foot-wide perimeter strip, should be undercut to a depth of at least five feet below final footing bearing elevation. The exposed undercut surface should be evaluated by our personnel via proof-rolling with a suitable vibratory roller compactor exerting a minimum compactive centrifugal force of 3500 pounds. All loose or soft surfaces revealed via proof-rolling, as delineated by us, should be undercut to a competent subgrade, as determined by us, or to an additional depth of two feet, whichever is first encountered. All slag and materials deemed unsuitable by us should be removed from the undercut zones. All undercut surfaces should be compacted to a condition approved by us. The vacated volumes should be backfilled to final footing bearing level with suitable inert (non-expansive) crushed limestone meeting the size and grading for AASHTO No. 57. All structural backfill should be placed in maximum eight-inch-thick loose lifts, compacted to at least 70 percent relative density as by ASTM Test Designations: D4253-16 and D4254-16. With proper implementation of footing bearing subgrade enhancement, as described above, the proposed addition may be supported with conventional column and wall footings designed for a CBP of 2000 lb/sq foot. Addition perimeter footings, as well as any other footings potentially exposed to below-freezing ambient air temperatures, should extend at least 42 in. below final adjacent exterior grade for frost protection.

Should the project decision makers choose to support the addition with a structural mat foundation, the same undercut and backfill procedure, as above described for the conventional footing option, should be implemented. The structural mat, bearing on a properly-prepared bearing subgrade, should be designed for a CBP of 2000 lb/sq foot. It should be provided with perimeter frost walls extending at least 42 in. below final adjacent exterior grade for frost protection.

Due to the above-predicted settlements, we recommend that utilities between the existing building and the addition, as well as utilities extending from the addition, be provided with flexible couplings that are able to withstand the settlement-induced deformations/movements.

With either of these shallow foundation options, the undercut zone will extend below the existing building foundation system. Hence, temporary existing foundation underpinning and/or shoring and bracing of the excavation sidewalls – at least those adjacent to the existing building, as well as any other excavations nearby movement-sensitive structures/utilities/pavements/appurtenances – should be installed to prevent sidewall collapse and undermining of the existing foundations and site elements of concern. Temporary shoring and bracing should be designed based on the following estimated soil parameters.

Soil Density, γ = 130 lb/cu ft
Soil Angle of Internal Friction, $\varphi = 28°$
Soil Cohesion, c = 0

As the ground surface at and about the proposed addition area appears to be relatively flat, temporary shoring and bracing can be designed for an equivalent fluid density of 47 lb/cu ft (based on the active retaining wall force condition), plus any applicable surcharge loads, including existing building foundation pressures. Likewise, appropriate hydrostatic pressures should be included in the temporary shoring and bracing design.

Regardless of the shallow foundation system potentially chosen, the footings should extend to the same elevation of the existing building footings to prevent superimposition of proposed footing pressures onto them.

3.2 – Alternative Subgrade Improvement Option

In lieu of the undercutting and backfilling scheme presented in Section 3.1, the addition subgrade can be enhanced, and settlements further mitigated, by installing rammed aggregate piers (RAPs) in the existing subgrade after any necessary fill is placed. However, we recommend minimizing fill placement with this option.

RAPs are considered “intermediate foundation systems” to enhance poor subgrade conditions. RAP elements are conventionally constructed by densely compacting successive lifts of high-quality crushed rock – or similar aggregates – in 18-in.- to 36-in.-dia shafts of varying depths using patented ramming equipment. The vertical ramming action increases the lateral stress within the subgrade, reportedly improving the soils between the RAPs. Proper implementation of RAP installation can control foundation settlement and provide enhanced bearing capacity for design. RAPs are typically installed in a

grid pattern throughout poor subgrade areas designated for proposed structure construction. The final configuration/geometry/quantity/details of RAP requirements should be determined by a specialty RAP designer. Typically, RAPs are concentrated at proposed shallow footing foundation areas. Once the RAPs are installed, conventional footings are constructed atop them, as planned. RAPs can, and often are, used to enhance proposed floor slab subgrade conditions, as well. When RAPs are used to enhance floor subgrades, the RAP designer is typically involved with floor slab design. In those cases, the floor slab is often designed to be slightly thicker than a conventional floor slab-on-grade, but not as thick/reinforced as a structural floor slab. However, for this case, considering the granular nature of the soil mantle and the relatively shallow groundwater regimen, Impact® Piers appear to be a better option than conventional RAPs. Impact® Piers, developed by Geopier, create RAP elements using a patented vertical ramming process. The Geopier Impact system uses a displacement mandrel to reinforce relatively poor soils, including loose sand, soft silt, and clay, mixed soil layers, uncontrolled fill, contaminated soils, and soils below the groundwater table. The displacement process allows for installation with no spoils and eliminates the need for casing. Its performance and cost-effective qualities make it an ideal solution for soils that are subject to caving, such as the looser granular soils, and soils below the groundwater table, at this site. The RAP elements are constructed by applying direct vertical ramming energy to densely-compacted successive lifts of high-quality crushed stone to form high-stiffness engineered elements. The vertical ramming action also increases the lateral stress and improves the soils surrounding the cavity, which results in foundation settlement control and greater foundation design bearing pressures. During installation, cement grout is introduced into the hollow mandrel and filled to a prescribed depth. Aggregate is then placed into the mandrel and the combined grout/aggregate solution is used in RAP element construction. The ramming of the grouted aggregate causes pre-stressing and pre-straining of the matrix soils, improves the density of the granular materials, and increases the lateral stress in surrounding soil. Based on our experience with RAPs, we suspect that they will decrease total settlements to as little as one-half inch. However, this may continue to present challenges at the existing building to proposed addition interface, where settlements will be concentrated. Consultations with GeoStructures, a specialty design-build contractor that installs RAPs and Impact Piers, and with whom we have collaborated with before on similar projects, reveals that this project would likely require 20-in.-dia Impact Piers extending to about 30 ft deep. With proper design, by a specialty design-build contractor such as GeoStructures, it preliminarily appears that the footings can be designed based on a composite Impact Pier and soil subgrade bearing CBP of 5000 lb/sq foot. The structural mat option will require the installation of more piers than the conventional footing support option.

An advantage of Impact Piers is that they will avoid the undercut excavation required for the conventional footing foundation option presented in Section 3.1. This will, correspondingly, avoid the temporary shoring and bracing and/or underpinning of existing building foundations.

GeoStructures estimates that Impact Piers for conventional footings will entail costs between $100,000 and $150,00 to install for the addition at this site.

Proposed additions to existing buildings can, and often do, present challenges with respect to RAP installation. It is sometimes essentially impossible to access the area closest to the existing building with the pier installation equipment. Further, it is obvious that Impact Piers cannot be installed below the existing building, which would be required to fully control settlements at the addition to existing building interface. Therefore, another specialty design-build contractor option is available to address these challenges, as presented in Section 3.3 of this report.

3.3 – Ductile Iron Pipe Piles

Although we understand that the project decision makers are interested in avoiding a deep foundation system, ductile iron piles (DIPs) are substantially less expensive than tradition driven piles. DIPs are a pre-fabricated driven pile system utilizing high-strength ductile iron pipes that transfer the load from a footing or pile cap, or heavily-loaded slabs, including a structural mat foundation, to a stiff soil or rock layer to control settlement of a structure. DIPs can be designed for end-bearing or skin friction depending on the stratigraphy and loading conditions. In this case, considering that the only strata considered reliable for skin friction is the glacio-fluvial soil, which is as little as 13 ft thick prior to reaching bedrock, we recommend that the DIPs extend to suitable competent bedrock.

DIPs can be used in conjunction with conventional footings, or combined with typical pile caps and grade beams. Its high-frequency tamper exerts marginal vibrations, which is an advantage when compared to the significantly higher vibrations caused by conventional driven pile foundations. DIPs can be the most cost-effective option for foundation support of buildings when:

- Access is limited,
- Vibrations are a concern, which will likely be a consideration with respect to driving piles adjacent to the existing building,
- New footing construction abuts existing footings, which is clearly a concern for this project, and
- New foundations abut existing or future utilities.

As with the Impact Pier option, an advantage of DIPs is that they will avoid the undercut excavation required for the conventional footing foundation option presented in Section 3.1. This will, correspondingly, avoid the temporary shoring and bracing and/or underpinning of existing building foundations.

Consultations with GeoStructures reveals that DIPs for this project will likely be on the order of 4.5 in. in diameter and driven to refusal on bedrock, where they can be preliminarily designed for a working capacity of 40 tons each. The DIPs should extend through soft claystone and soft shale layers.

We would be pleased to further consult with you and your specialty design-build contractor regarding this option, if you are interested.

3.4 – Conventional Driven Piles

The addition can also be supported with conventional end-bearing driven pile foundations, including H-piles or pipe piles. Drilled piles, such as micropiles, could also be used for proposed building addition support. However, these options will likely be substantially more expensive than Impact Piers or DIPs, presented in Sections 3.2 and 3.3 of this report, respectively. We understand that the project decision makers want to avoid conventional driven pile foundations. Hence, we are not further discussing this option in this report. However, should you want to further explore this option, we would be pleased to discuss the engineering analysis and associated costs required to address it.

3.5 – Below-Grade Structural Walls

As described in Section 3.0, the existing building is supported with a structural mat foundation that extends below grade by about four feet. The existing building floor slab, supported on columns extending between it and the structural mat, is set approximately 10 ft above the mat base. Hence, its below-grade "foundation walls" are subjected to lateral earth pressures. Should such below-grade walls be included with proposed addition construction, they should be provided with full-face aggregate foundation drains, as depicted on Figure 3. However, as they may be subjected to flood conditions from the nearby Ohio River, they should be able to sustain flood-driven hydrostatic pressures. Hence, they should be designed as retaining walls able to sustain an equivalent fluid density of 98 lb/cu ft, plus any applicable surcharge loads. This value is based on the at-rest lateral earth pressure condition, as the below-grade walls will be pinned at the top and bottom, such that they will not be able to mobilize the active lateral earth pressure case.

3.6 – Slab-On-Grade and Fill/Backfill Recommendations

The conventional footing foundation option, as well as the DIP option, will require the installation of a conventional floor slab-on-grade for the proposed addition area. The Impact Pier option may include piers for the floor area, in which case the recommendations herein presented for the floor slab will not apply. If, however, the floor subgrade area is not stabilized with Impact Piers, then this report section will apply.

To provide for conventional floor slab-on-grade construction, all topsoil, pavements, organics, potentially expansive materials (i.e., carbonaceous materials, pyrite, marcasite, and slag), wet and/or soft soils, frozen materials, water, rubble, debris, trash, rock fragments larger than three inches, and all other deleterious materials should be removed from the exposed floor subgrade area, as judged adequate by our field personnel. The floor subgrade should be proof-rolled, to the satisfaction of our field personnel monitoring it, with a suitable ten-ton (static weight) steel-wheeled vibratory roller compactor, such as a Raygo 400A, Caterpillar CS563D, or equal compacting equipment accepted by us. Compactor vibrators should be disengaged when within about 10 ft of the existing building to avoid excessive vibrations imposed on it. All loose or soft zones delineated by proof-rolling should be undercut to competent material or to a depth of three feet below final floor subgrade elevation, whichever is first encountered. If our field personnel deem the exposed undercut surface as incompetent to receive backfill, it should be enhanced by "punching" suitable inert (non-expansive, non-slag) crushed limestone, meeting the size and grading requirements for AASHTO No. 1, into it until adequate shear strength is achieved, as approved by us. This may require backfilling part, or all, of the vacated voids with crushed limestone. The AASHTO No. 1 crushed limestone should be capped with at least six inches of suitable inert AASHTO No. 57 crushed limestone. The remaining vacated voids should be backfilled to final floor subgrade elevation with suitable inert on- or off-site fill materials. We should be provided with the opportunity to evaluate all proposed fill materials, whether obtained from on- or off-site sources. Fill materials should be free of organics, topsoil, wet soils, ice, potentially expansive materials, carbonaceous materials, pyrite, marcasite, frozen materials, high plasticity (fat; Unified Soil Classification System CH) clay, trash, boulders, rock fragments larger than three inches, slag, and all other deleterious materials. Further, fill and backfill materials should consist of low-plasticity soil with a liquid limit less than 45 and a plasticity index of less than 25. All cohesive fill/backfill should be compacted to at least 95 percent of its maximum modified proctor dry density as determined by ASTM Test Designation: D1557-12e1, at water contents within three percent (±3%) of the optimum water content established by that test. Granular fill/backfill, including crushed stone, should be compacted to a minimum of 70 percent relative density as

recommended in Section 3.1 of this report. Depending on the exposed subgrade condition, a portion or all of the undercut volume may need to be backfilled with crushed stone to achieve adequate strength, as approved by our field personnel. Prior to fill/backfill placement, all subgrades should be scarified, as approved by us. Loose lifts of fill should not exceed eight inches in thickness, except where approved by our field personnel. All fill and backfill should be placed so that they can be quantitatively tested for compaction with conventional field-testing equipment, such as nuclear densometers. At least one field compaction test should be performed for every 2000 sq ft of area in each lift of fill or backfill. At least two tests should be performed for each lift, regardless of the area it encompasses. Tests should be completed at 50 ft intervals in each lift of backfill in narrow trenches, such as utility trenches.

With proper subgrade preparation, floor areas should be suitable for conventional floor slab-on-grade construction designed for a modulus of subgrade reaction of 100 lb/cu inch. Non-bearing partition walls may be supported directly on thickened floor slab sections. The floor slabs and non-bearing elements should be divorced from all load-bearing members with isolation joints. Concrete floor slabs should be provided with properly-spaced and -constructed control joints.

The surfaces of fill/backfill lifts should be near horizontal or retrograde to the proposed final slope grade. At the end of each day of earthwork operations, fill surfaces should be graded with adequate fall to an area that will allow potential storm runoff to drain or collect so that the entire lift of fill is not detrimentally affected. Such water should be removed and the saturated fill zone reworked and/or the wet/saturated fill material removed, as required to achieve proper compaction. Further, it would be prudent for the earthmoving contractor to “seal” the surface of the final lift of fill at the end of each work day with a smooth-drum roller compactor, or equal means, to mitigate infiltration of potential precipitation into the fill.

All subgrade areas disturbed by construction equipment/activities and/or precipitation should be recompacted. However, depending on the degree of “damage” inflicted on such subgrade areas, additional measures - such as deeper cuts, crushed stone backfill and/or geotextile stabilization fabric - may be required to properly repair them. It is not possible at this time to determine remedial measures required for such potential subgrade damage until the actual damage occurs. All such disturbed subgrade areas should be evaluated by us in the field.

3.7 – Seismic Considerations

Our evaluation indicates that the foundation subgrade material for the proposed structures correlates to "stiff soil," or Site Class "D," according to the International Building Code.

3.8 – Field Verification Recommendations

It is imperative that all foundation construction and earthwork operations be monitored on a full-time basis by our field personnel to verify that the recommended foundation bearing horizons, subgrade preparations/enhancements, and fill/backfill compaction are consistently achieved. All recommendations herein are contingent upon such field verifications.

4.0 – REPORT CONSIDERATIONS

This report has been prepared using field and laboratory techniques and analysis methods conforming to commonly accepted geotechnical engineering practices. All recommendations and/or conclusions herein, which should be verified by us in the field, pertain only to this specific project and should not be used or interpreted by others for modifications to this project, or for other projects or sites. Even within the project context, subsurface conditions depicted herein are representative only at the boring locations; actual conditions between/beyond the borings will vary. Due in part to such variability in subsurface conditions, the implementation of recommended measures must be field-evaluated by our personnel under the direction of one of our professional (licensed) geotechnical engineers to confirm that the subsurface conditions encountered during construction are consistent with the test borings and our engineering analysis, and verify that the subgrades and all other geomaterials used are behaving as anticipated. Some conditions or material/subgrade behavior and/or performance may require modifications to our recommendations, which can typically only be determined "on-the-spot" by one of our engineers. Therefore, we will assume **no** responsibility or professional liability for the performance and/or suitability of any slopes, foundations, structures, slabs, appurtenances, or related project areas affected by geotechnical elements inspected and/or evaluated by others. The selected construction-phase field evaluation/testing agency must take full responsibility and professional liability, regardless of their status as a professional services firm, for proper selection and performance of the project geotechnical recommendations implemented on the site. We will not assume any responsibility for this project if an engineering firm or testing agency other than us is engaged to perform geotechnical construction-phase services.

We sincerely appreciate the opportunity to be of service to you on this project. Should you have any questions regarding our findings or recommendations, please feel free to contact us.

Respectfully submitted,

GARVIN BOWARD BEITKO ENGINEERING, INC.

Joseph F. Boward, P.E., F.NSPE
Principal Engineer

GARVIN
BOWARD BEITKO

APPENDIX

- **Pertinent Geotechnical Terminology**
- **Test Boring Records by CDM**

GARVIN
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DEFINITION OF SOIL AND ROCK CLASSIFICATION TERMS

SOIL

Consistency and Relative Density of soils, based on the Standard Penetration Test[1] (SPT) blow counts over the last foot of penetration, N, are generally determined as follows:

Consistency of Cohesive Soils

CONSISTENCY	N (blows/foot)	UNCONFINED COMPRESSIVE STRENGTH, Q_u(tsf)
Very soft	0 – 2	<0.25
Soft	3 – 4	0.25 – 0.5
Medium	5 – 7	0.5 – 1.0
Stiff	8 – 15	1.0 – 2.0
Very stiff	16 – 30	2.0 – 4.0
Extremely stiff	>30	>4.0
Hard (if friable or brittle)	>30	>4.0

Relative Density of Granular Soils

RELATIVE DENSITY	N (blows/foot)
Very loose	0 – 4
Loose	5 – 10
Firm	11 – 14
Medium dense	15 – 30
Dense	31 – 50
Very dense	>50

The percents by weight of constituents present in soil are as follows:

Trace:	indicates particles are present, but estimated to be less than 5%
Few:	indicates 5 to 10%
Little:	indicates 15 to 25%
Some:	indicates 30 to 45%
Mostly (and):	indicates 50 to 100%

Criteria for describing moisture content:

MOISTURE CONDITION	CRITERIA
Dry (Humid)	Absence of moisture, dusty, dry to touch
Damp	Apparent moisture in soil
Moist	Moist to touch, but no visible water
Wet	Visible free water

ROCK

Hardness of rock is based on the following:

Very soft – crushes under finger pressure
Soft – crushes easily under one hammer blow
Medium hard – breaks under one hammer blow
Hard – resistant to breaking under hammer blow
Very hard – resisting to breaking under several hammer blows

	SPACING OF FRACTURES AND/OR DISCONTINUITES
Extremely or very broken	<1”
Moderately broken	1” – 3”
Occasionally broken or blocky	3” – 6”
Massive	>6”

[1] STANDARD PENETRATION TEST (SPT) – defined as the number of blows (N) required to drive a two-inch outside diameter split-barrel sampling tube a depth of one foot with a 140-pound hammer falling 30 in. in accordance with American Society of Testing and Materials (ASTM) Test Designation: D1586.

RECORD OF SUBSURFACE EXPLORATION

ALCOSAN - EPM

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM

Client: ALCOSAN Proj No:

Boring: 273 Date Started: 6/13/96 Date Completed: 6/13/96

Location: See Site Plan

140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop

ELEVATIONS
Ground Surface: 725.0'
End of Boring: 666.0'

WATER LEVELS
While Drilling: 17.3'
At 0 hrs After Core: 7.2'
After 24 Hours: 13.0'

▨ = Shelby Tube ▨ = NX Rock Core SS= Split Spoon ST= Shelby Tube, DB = Diamond Bit

Soil Description	Depth	Elev	Sample Nb	Sample Type	N	Qu	Qp	Mc	γ_d
Brown Gravel & Sand	1.0		1	SS	6,15, 12,14				
Grey/Black FILL, w/ Gravel & Slag	5	720.0	2	SS	8,10 4,14				
9.0									
Brown Sand, Gravel, Slag Trace Cinders, FILL	10	715.0	3	SS	2,4, 5,8				
NOTE: Difficult auguring from 11.0 -19.0 ft.	15	710.0	4	SS	5,5 6,8				
GW									
19.0									
Black Gravel & Sand, Med. Dense, Wet, Trace Slag	20	705.0	5	SS	5,5, 5,5				
GW	25	700.0	6	SS	6,5 3,2				
NOTE: Large cobbles returned to surface by augur when head was at 29 ft	30	695.0	7	SS	2,7, 15,12				
33.0									
Very Dense Brown Gravel, Some SAND	35	690.0	8	SS	16,19 24,20				
GW									
40.0									
Very Fine Grey/Brown SILT & SAND, Wet, Dense ML	40	685.0	9	SS	3,5,6 16			20.2	
44.0									
Hard Grey/Brwn GRAVEL, some Sand	45	680.0	10	SS	12,35 37,41				
GW			Roller Bit	DB					

RECORD OF SUBSURFACE EXPLORATION

ALCOSAN - EPM

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM

Client: ALCOSAN Proj No:

Boring: 273 Date Started: 6/13/96 Date Completed: 6/13/96

Location: See Site Plan

140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop

ELEVATIONS
Ground Surface: 725.0'
End of Boring: 666.0'

WATER LEVELS
While Drilling: 17.3'
At 0 Hrs After Coring: 7.2'
After 24 Hours: 13.0'

▨ = Shelby Tube ▧ = NX Rock Core SS= Split Spoon ST= Shelby Tube, DB = Diamond Bit

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
Grey SILTSTONE,Med. Hard-Hard Extremely Broken, RQD = 0.10 54.0	55	669.0		DB					
Grey SILTSTONE, Hard Occasionally Broken, RQD = 0.40 59.0	60	665.0							
End of Boring @ 59.0 FT.	65								
NOTE: 7" Sample of SILTSTONE taken from 58 ft for testing									

Coring Data

Depth	Recovery
49.0-59.0	10.0'

RECORD OF SUBSURFACE EXPLORATION

ALCOSAN - EPM

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM

Client: ALCOSAN Proj No:

Boring: 274 Date Started: 6/13/96 Date Completed: 6/13/96

Location: See Site Plan

140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop

ELEVATIONS
Ground Surface: 725.0'
End of Boring: 677.5'

WATER LEVELS
While Drilling: 18'
At 0 hrs After Core: 10.2'
After 24 Hours: 15.3'

▨ = Shelby Tube ▧ = NX Rock Core SS= Split Spoon ST= Shelby Tube, DB = Diamond Bit

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
Grey/Black FILL, w/ Gravel & Slag			1	SS	12,14 12,18				
Red Bricks in sample #2	5	720.0	2	SS	6,7 9,11				
9.0									
Brown Sand, Gravel, Slag Trace Cinders, FILL GW	10	715.0	3	SS	6,7 9,14				
	15	710.0	4	SS	12,9 9,8				
SP 19.5 F/Med. Brwn SAND Some Gravel,Wet	20	705.0	5	SS	2,5 7,9				
Black Cinders w/Slag, med. Sand & Gravel GP 25.0	25	700.0	6	SS	10,18 27,17				
Very Dense Grey/Brown SANDY GRAVEL, Wet SP 30.5	30	695.0	7	SS	6,7, 6,5				
Med. Coarse Grey SAND w/ Gravel, Trace Clay,Med. Dense, Wet SM 34.0	35	690.0	8	SS	10,11 7,8				
GRAVEL,Dense,Wet, Trace SAND GW 40.0	40	685.0	9	SS	4,7,8 13				
Very Fine Grey/Brown SAND, Trace Silt, Wet, Dense SM 44.0									
Hard Grey/Brwn GRAVEL, some Sand SP	45	680.0	10	SS	30,60 44,66				
Sandstone pieces in end of sample #10 46.0									
CLAYSTONE, Soft									

Augur Refusal @ 47.5 ft

RECORD OF SUBSURFACE EXPLORATION

ALCOSAN - EPM

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM

Client: ALCOSAN Proj No:

Boring: 276 Date Started: 6/12/96 Date Completed: 6/12/96

Location: See Site Plan

140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop

ELEVATIONS
Ground Surface: 725.5'
End of Boring: 667.5'

WATER LEVELS
While Drilling: 15.5'
At 0 hrs After Core: 15.7'
After 24 Hours: 15.8'

= Shelby Tube = NX Rock Core SS= Split Spoon ST= Shelby Tube, DB = Diamond Bit

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
Gravel, Sand, FILL	1.0								
Cement, Sand, Gravel, Slag, FILL V. Dense to Hard, Dry to Moist — Difficult Auguring	5	720.5	1	SS	7,9,9 24				
	10	715.5	2	SS	14, 7, 5,5				
Red Bricks in #3	15	710.5	3	SS	12,12, 7,50				
20.0	20	705.5	4	SS	6,4 5,3				
Med. Dense GRAVEL, Wet GP 24.0									
F/Med. Coarse Blk.SAND,Dense,Wet Traces of Red Brick & Wood SP 27.0	25	700.5	5	SS	0,0,0,0				
Lrg. GRAVEL, Loose, Wet GP 30.0			6	SS	1,1, 2,3				
GRAVEL,Some Sand, Very Dense, Wet GP	30	695.5							
40.0	35	690.5	7	SS	21,11 13				
Very Dense Brown/Tan SAND & GRAVEL SP-SM 44.0	40	685.5	8	SS	13,16, 13				
V. Dense Grey/Brown SANDSTONE & Gravel GP 48.0	45	680.5	9 Roller Bit	SS	55,30				
	49.0			DB					

Grey SILTSTONE,Weathered,Extremely Broken,Soft
Grey SILTSTONE,Moderately Broken,Med. Hard-Hard
Some Interbedded Clay at 55.8, RQD = 0.27

RECORD OF SUBSURFACE EXPLORATION

ALCOSAN - EPM

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM

Client: ALCOSAN Proj No:

Boring: 276 Date Started: 6/12/96 Date Completed: 6/12/96

Location: See Site Plan

140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop

ELEVATIONS
Ground Surface: 725.5'
End of Boring: 667.5'

WATER LEVELS
While Drilling: 15.5'
At 0 Hrs After Coring: 15.7'
After 24 Hours: 15.8'

▨ = Shelby Tube ▧ = NX Rock Core SS= Split Spoon ST= Shelby Tube, DB = Diamond Bit

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
Grey SILTSTONE,Moderately Broken, Med. Hard-Hard,Some Interbedded Clay at 55.8, RQD = 0.27	55	670.5		DB					
57.8	58.0								
Grey LIMESTONE, V. Hard, Occassionally Broken	60								
	65								
End of Boring @ 58.0 FT.									

Coring Data

Depth	Recovery
48.0 - 58.0	8.9 ft

RECORD OF SUBSURFACE EXPLORATION

ALCOSAN - EPM

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM

Client: ALCOSAN Proj No:

Boring: 279 Date Started: 6/10/96 Date Completed: 6/11/96

Location: See Site Plan

140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop

ELEVATIONS

Ground Surface: 725.5'

End of Boring: 669.5'

WATER LEVELS

While Drilling: 16'

O hrs after Coring: 11.0'

After 24 Hours: 11.0'

= Shelby Tube = NX Rock Core SS= Split Spoon ST= Shelby Tube, DB = Diamond Bit

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
Very Dense Brown Gravel,Some Sand	0.5								
Slag, Gravel, Sand, Glass, Bricks, FILL	3.0		1	SS	2,3, 3,2				
Large Cobbles Returned to surface by auger 9.0	5	720.5	2	SS	8, 11, 8,10				
Brown Sand&Gravel, Med. Dense, Moist SP 19.0	10	715.5	3	SS	3,4, 4,6				
	15	710.5	4	SS	3,4, 5,6				
Grey Sand & Gravel, Wet SP-SM 24.0	20	705.5	5	SS	2,5 3,5				
PETROLEUM ODOR Black Cinders & Slag, some Gravel,Wet 29.5	25	700.5	6	SS	5,.4, 5,20				
	26.5								
Grey/Brown GRAVEL & SAND, Very Dense. Dense,Wet GW 35.5	30	695.5	7	SS	8,20, 20,33				
Fine/Med. Brown SAND, Trace GRAVEL, Dense, Wet SM 39.5	35	690.5	8	SS	13,13 10,14				
Blue/grey SANDSTONE & Gravel, Weathered SP 46.0	40	685.5	9	SS	4,40, 42,53				
White SANDSTONE. Hard 46.3	45	680.5	10	SS	50,56, 66, 50/.2				
Grey Silty SHALE, Weathered Med. Hard, Extremely Broken RQD=0.0				DB					

RECORD OF SUBSURFACE EXPLORATION

ALCOSAN - EPM

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM

Client: ALCOSAN Proj No:

Boring: 279 Date Started: 6/10/96 Date Completed: 6/11/96

Location: See Site Plan

140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop

ELEVATIONS
Ground Surface: 725.5'
End of Boring: 669.5'

WATER LEVELS
While Drilling: 16'
At 0 Hrs After Coring: 11.0'
After 24 Hours: 11.0'

▨ = Shelby Tube ▨ = NX Rock Core SS= Split Spoon ST= Shelby Tube, DB = Diamond Bit

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
Grey SILTSTONE W/ interbedded clay seams,Med. Hard,Extremely to Moderately Broken, RQD = 0.13	51.0			DB					
	55	669.5							
56.0 End of Boring @ 56.0 FT.	60								
	65								

Coring Data

Depth	Recovery
46.0-51.0	2.6'
51.0-56.0	4.5'

RECORD OF SUBSURFACE EXPLORATION

ALCOSAN - EPM

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM

Client: ALCOSAN Proj No:

Boring: 281 Date Started: 6/11/96 Date Completed: 6/11/96

Location: See Site Plan

140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop

ELEVATIONS

Ground Surface: 725.7'

End of Boring: 665.7'

WATER LEVELS

While Drilling: 18'

O hrs after Coring: 12.6'

After 24 Hours: 12.0'

▨ = Shelby Tube ▧ = NX Rock Core SS= Split Spoon ST= Shelby Tube, DB = Diamond Bit

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
Brown Gravel, Slag, Sand, Bricks, FILL			1	SS	1,7, 12,10				
	5	720.7	2	SS	12, 7, 5,5				
10.0									
Fine/Med. Coarse Brown SAND SP w/ Gravel, Slightly Compact, Moist	10	715.7	3	SS	1,8, 3,3				
14.0									
Grey/Brwn Clayey SAND&GRAVEL, Damp SM	15	710.7	4	SS	9,9, 7,8			16.1	
Black Slag, Cinders, Sand, FILL	20	705.7	5	SS	7,9 8,4				
24.0									
V. Fine Grey/Black Silty SAND, Moist, Slightly Compact SM	25	700.7	6	SS	2,3, 3,4				
3" SILT Seam @25.0, Q_p= 1.0									
30.0	30	695.7	7	SS	3,5, 7,8				
Dense Brown SAND, Some Gravel SP-SM									
34.0									
V. Dense Brown GRAVEL, Wet GW	35	690.7	8	SS	7,13, 13				
39.0									
ML Grey Sandy SILT, Firm, Moist 40.5	40	685.7	9	SS	6,7, 10,14		1.00	21.2	
Grey/Brown SANDSTONE & Gravel, Trace Silt, Dense SM									
45.0	45	680.7	10	SS	19,31, 44				
Very Dense SANDSTONE & Gravel GP			11	SS	50/.2				
Grey SILTSTONE, Extremely Broken									

RECORD OF SURFACE EXPLORATION

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM
Client: ALCOSAN Proj #
Boring: 281 Date Started: 6/11/96 Date Completed: 6/11/96
Location: See Site Plan
140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop

ELEVATIONS
Ground Surface: 725.7'
End of Boring: 665.7'

WATER LEVELS
While Drilling: 18.0'
At 0 Hrs After Coring: 12.6'
After 24 Hours: 12.0'

▨ = Shelby Tube ▧ = NX Rock Core SS= Split Spoon ST= Shelby Tube, DB = Diamond Bit

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
Grey SILTSTONE W/ Interbedded clay seams,Med. Hard,Extremely to Moderately Broken. RQD = 0.10	52.5								
Grey LIMESTONE, Very Hard, Occassionally Broken, RQD = 0.37	55	670.7		DB					
60.0	60	665.7							
End of Boring @ 60.0 FT.	65								
5.5" sample of Limestone taken for testing from 54 ft									

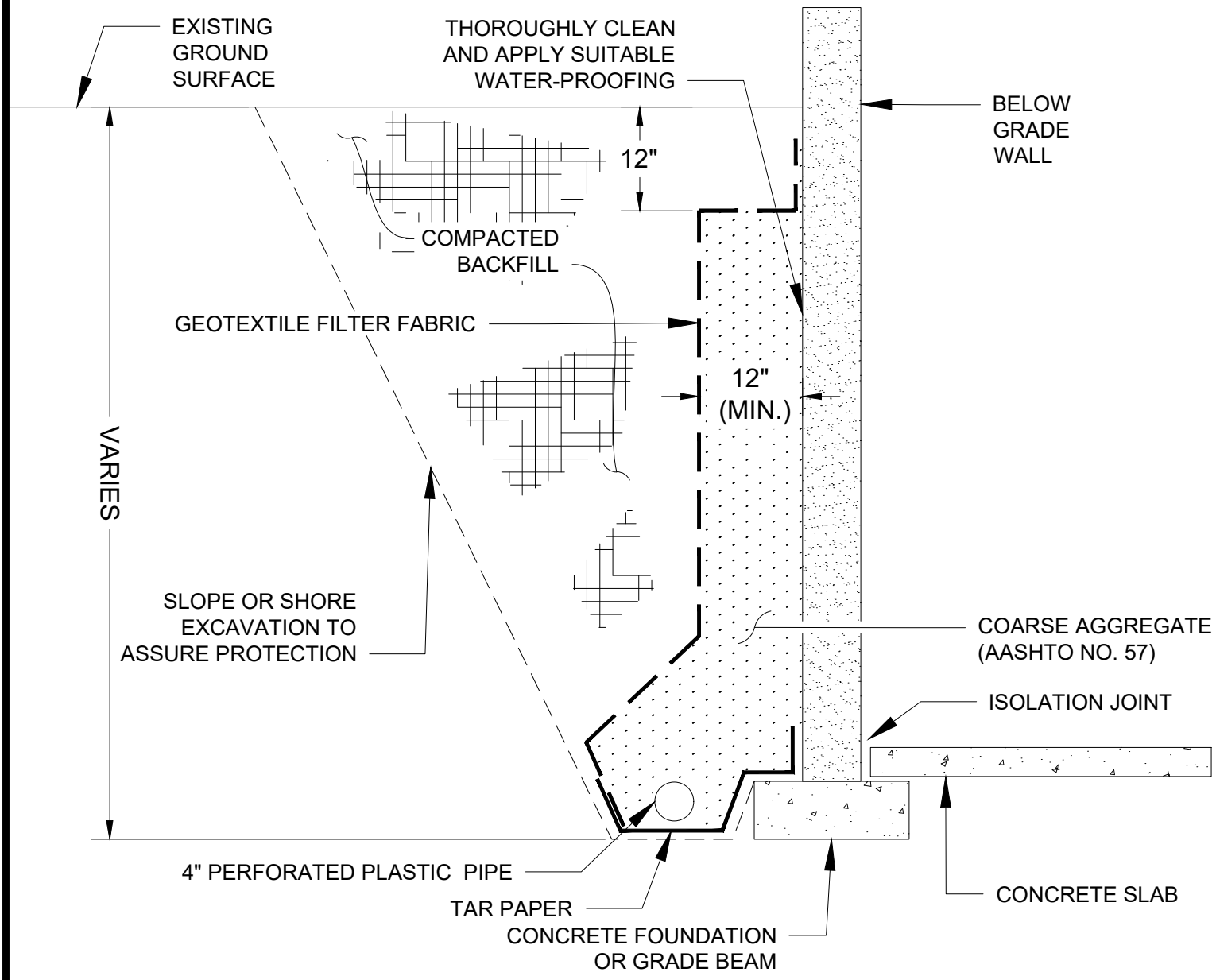
Coring Data

Depth	Recovery
50.0-56.5	4.9'
56.5-60.0	3.3'

PLAN OF CDM BORING LOCATIONS

GBBE PROJECT 20159

PROPOSED ADDITION TO ALCOSAN ELECTRICAL SUBSTATION



FULL FACE AGGREGATE FOUNDATION DRAIN

(NOT TO SCALE)

FIGURE 3

GARVIN BOWARD BEITKO

GARVIN BOWARD BEITKO ENGINEERING, INC.
PITTSBURGH, PA

PROPOSED ADDITION TO ALCOSAN SUBSTATION BUILDING

DWG. NO.: 20159.3

CAMP DRESSER & McKEE
CH2M HILL
ALCOSAN EPM Project Office

3300 Preble Avenue
Pittsburgh, PA 15233 - 1092
Office: (412) 761 - 1051
Fax: (412) 761 - 2764

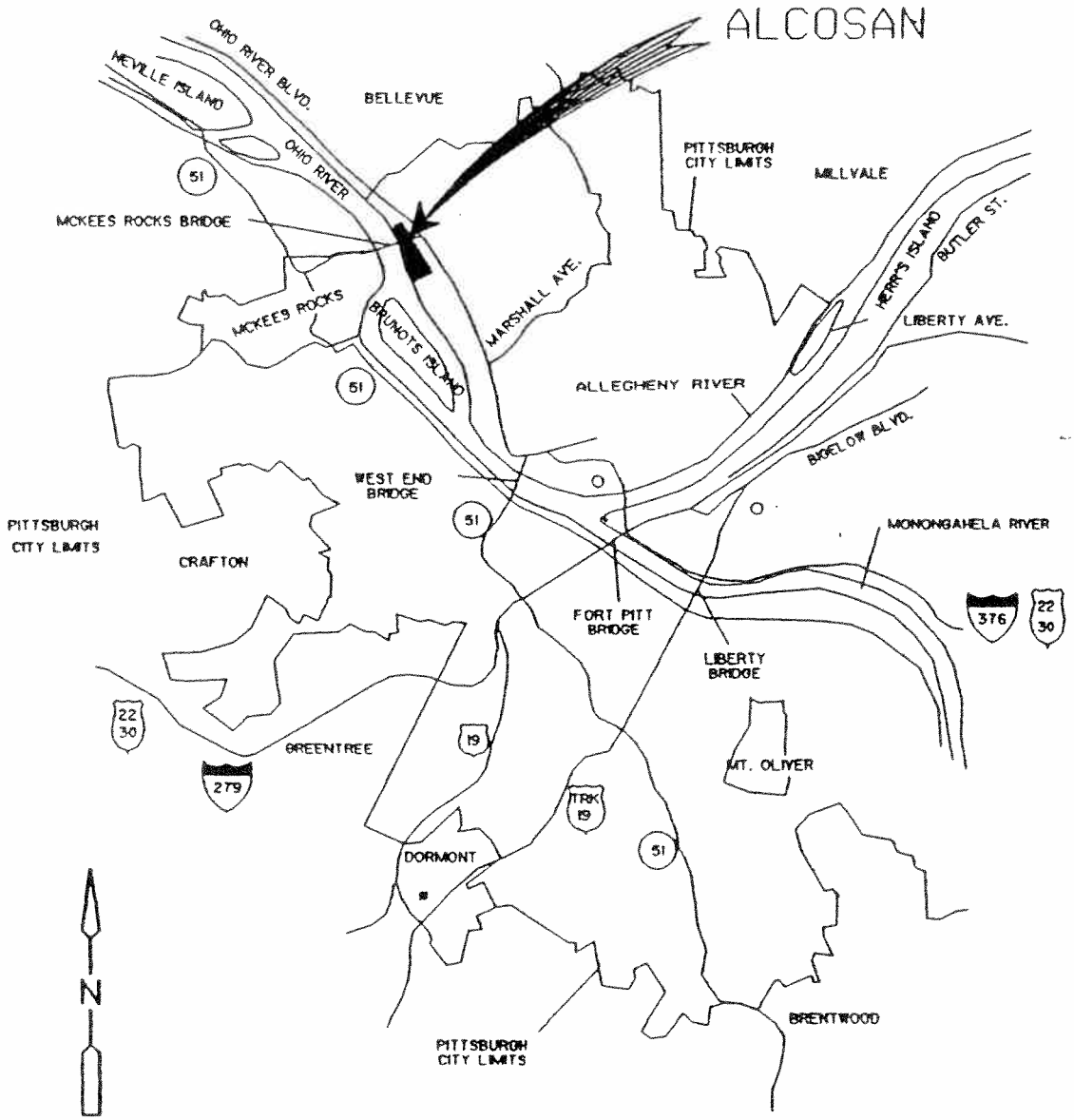
GEOTECHNICAL DATA

ALCOSAN CAPITAL IMPROVEMENT PROGRAM

APRIL 1997

Prepared for the

Allegheny County Sanitary Authority
3300 Preble Avenue
Pittsburgh, Pennsylvania 15233



SITE LOCATION PLAN

FIGURE 1

Purpose and Scope

This report represents the results of the geotechnical investigation for the ALCOSAN Capital Improvement Program in Pittsburgh, Pennsylvania. The geotechnical investigation was conducted to garner data describing subsurface conditions at the wastewater treatment plant. The scope of the investigation included:

1. Soil Borings as located on the Boring Location Plans.
2. Soil Stratigraphy Profiles as interpreted from the Boring Logs.
3. Shelby Tubes, some of which are stored at the plant, as shown on the Shelby Tube Log Sheet.
4. Atterberg Limits Test Results and USC Soil Classifications.
5. Grain Size Distribution Test Results and Sieve Analyses Results.
6. Results from Tests performed at Professional Service Industries Laboratories in Pittsburgh.
    A. Chemical Test Results for pH, Chloride Content, Sulfate Content, and Resistivity.
    B. Rock Compression Test Results.
    C. Unconfined Compression Tests on Claystone Type Materials.
    D. Consolidation Test Results.
    E. Triaxial Shear Test Results.
    F. Permeability Test Results.

This report includes both factual and interpretive information. Factual information is defined as objective data based on direct observation, such as boring logs and laboratory test results. Interpretive information is defined as subjective conclusions, opinions, or criteria and is based upon judgment or extrapolation of the factual information presented in the report. Cross sections of soil stratigraphy have been interpreted from boring logs, and there is no knowledge as to the degree of strata uniformity between the borings.

Limitations

This report has been prepared for the exclusive use of ALCOSAN for specific application to the 1200 series projects of the Capital Improvement Program. No expressed or implied warranty is made.

At the locations of the soil borings, the passage of time is expected to change the subsurface conditions. This natural fact is aggravated by the loose nature of the cinder fill materials which predominate the site.

Site Description

The site is relatively level and is located on the east bank of the Ohio River where the river flows north a few miles downstream of the confluence of the Allegheny and Monongahela Rivers. The site is bordered by Preble Avenue and CONRAIL to the east, Tracy Street to the south, and the Ohio River to the west. The site pinnacles to the north where the CONRAIL property abuts the harbor line. The McKees Rocks Bridge spans over the plant site, connecting the bluffs above the east border of the plant with the west side of the river.

Construction Considerations

1. Contractors can expect to encounter obstacles during excavations. There is evidence of old foundations below the ground surface. As noted in the boring logs, brick, wood, and metals were found in the split spoon samples. In a test pit immediately north of the northeasternmost Final Clarifier, an existing concrete foundation was uncovered. During the construction of the mixed liquor channels, existing foundations were encountered. This site was previously residential subdivisions, foundry sites, and railroad yards. All excavation work can encounter foundation materials, intact structures, and piping.

2. Dewatering system capacities must be greater than normal, and cut-off walls will likely be necessary. The predominant subsurface feature is the cinder fill. It can range from very loose to very stiff, if not cemented. The material is very permeable. Consequently, any dewatering system will require extreme capacities, due to the close proximity of the Ohio River. In the construction of the Aeration Basins and the Final Clarifiers, well points connected to a suction manifold were employed. There were sections of the excavations that required concrete cut-off walls to reduce the excavation inflow to a pumpable amount.

3. The Ohio River can be expected to reach flood stage repeatedly. The following data describes the river's discharge characteristics:

Discharge Condition	USGS Elevation
Normal Pool	710
25 Year Flood	720
100 Year Flood	726
500 Year Flood	730

Commonly, the Ohio River stage reaches levels between the predicted 25 Year and 100 Year flood stage predictions on an annual basis, and the rise in the river occurs very swiftly. Hence, as an example, if the excavation extends to Elevation 705, normally approximately five feet of unbalanced water head will exist. Overnight, this unbalanced head can increase to approximately eighteen feet. All excavations and work therein must be planned for flood contingencies, and dewatering systems must have excess capacities.

4. The loose nature of the cinder fills will effect sideslope stability and active lateral pressures against bracing. Steep sideslopes will not remain stable. Benching of sideslopes and temporary earth retaining structures will be required to maintain excavations. Larger than normal lateral pressures can be expected against retaining systems due to the loose nature of the fill.

5. **All proposed foundations which are not pile and caisson supported will require subgrade preparation work.** Existing materials will have to be compacted using heavy vibratory equipment for sands, gravels, or cinders and using sheepsfoot rollers for silts and clays. The settlements which will occur due to this reconsolidation process will have to be compensated with the placement of compacted PennDOT 2A fill.

6. **It will be necessary to monitor the performance of dewatering systems with observations wells.** The operation of dewatering systems on this site require monitoring by the Contractor of the river stage and groundwater levels around the excavations. Rises in river stage and groundwater levels must be compared to predict excavation flooding or quick conditions arising in the excavation bottoms.

7. **Pile driving equipment will likely require the addition of a rock subgrade and/or cribbing.** At the bottom of excavations for basins and deep foundations, the existing materials will likely not support construction equipment.

8. **Voids can be encountered during excavations.** As an example, please refer to Boring Log 266, which was drilled near the existing Ash Pits. The sampler rod was advanced from six feet below grade to nineteen feet below grade by the weight of the rod only.

9. **No foundations can bear upon claystone or redbed material.** The claystones and redbeds are generally extremely hard in their buried and confined conditions. The danger is that exposure to water or air can cause rapid deterioration of the strength properties. To avoid settlements, no caissons shall be founded in these materials.

GENERAL NOTES

SOIL PROPERTY SYMBOLS

N: Standard "N" penetration: Blows per foot of a 140 pound hammer falling 30 inches on a 2 inch O.D. split spoon.
Qu: Unconfined compressive strength, TSF.
Qp: Penetrometer value, unconfined compressive strength, TSF.
Mc: Water content, %
LL: Liquid limit, %
PI: Plasticity Index, %
d: Natural dry density, PCF

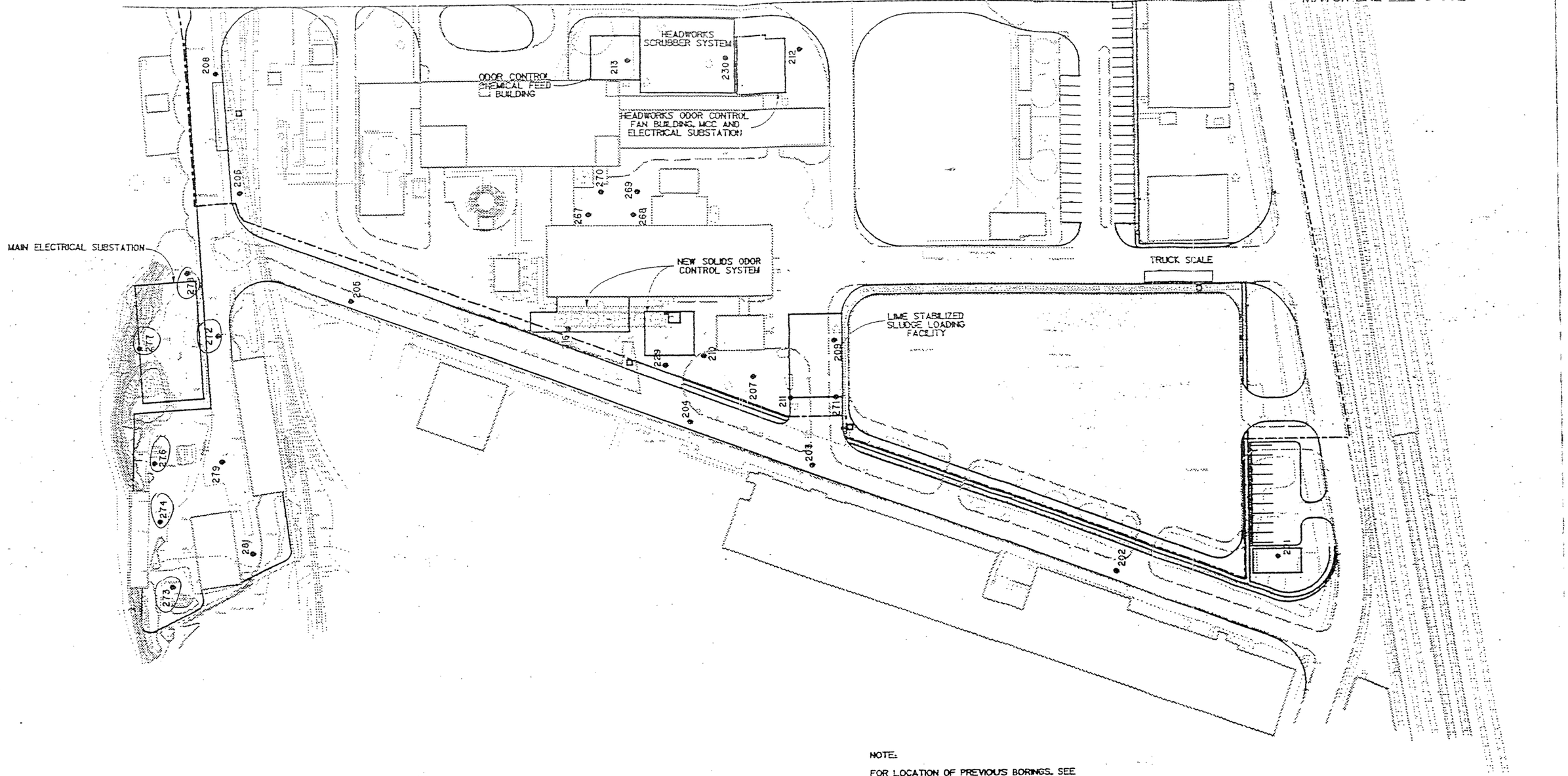
DRILLING AND SAMPLING SYMBOLS

SS: Split-Spoon - 1 3/8" I.D., 2" O.D., except where noted.
ST: Shelby Tube - 3" O.D., except where noted.
AU: Augur Sample.
DB: Diamond Bit.
CB: Carbide Bit.
WS: Wash Sample.

RELATIVE DENSITY AND CONSISTENCY CLASSIFICATION

TERM (NON-COHESIVE SOILS)	STANDARD PENETRATION RESISTANCE
Very Loose	0-2
Loose	2-4
Slightly Compact	4-8
Medium Dense	8-16
Dense	16-26
Very Dense	Over 26

TERM (COHESIVE SOILS)	Qu -(TSF)
Very Soft	0-0.25
Soft	0.25-0.50
Firm (Medium)	0.50-1.00
Stiff	1.00-2.00
Very Stiff	2.00-4.00
Hard	4.00+



NOTE:

FOR LOCATION OF PREVIOUS BORINGS, SEE ALCOSAN DESIGN STANDARDS TECHNICAL MEMORANDUM DS-5.

BORINGS 2, 3, 4 AND 5 DOWN CENTERLINE OF ROAD

REV.	DESCRIPTION	DATE	APP.
0			
1			
2			
3			
4			

APPROVED

EXECUTIVE DIRECTOR _____ DATE

DIRECTOR OF ENGR. & CONST., PAPE-HAYDEN _____ DATE

PROJECT MANAGER _____ DATE

DRAWN BY:

CHECKED BY:

EXAMINED BY:

ALCOSAN EXAMINED BY:

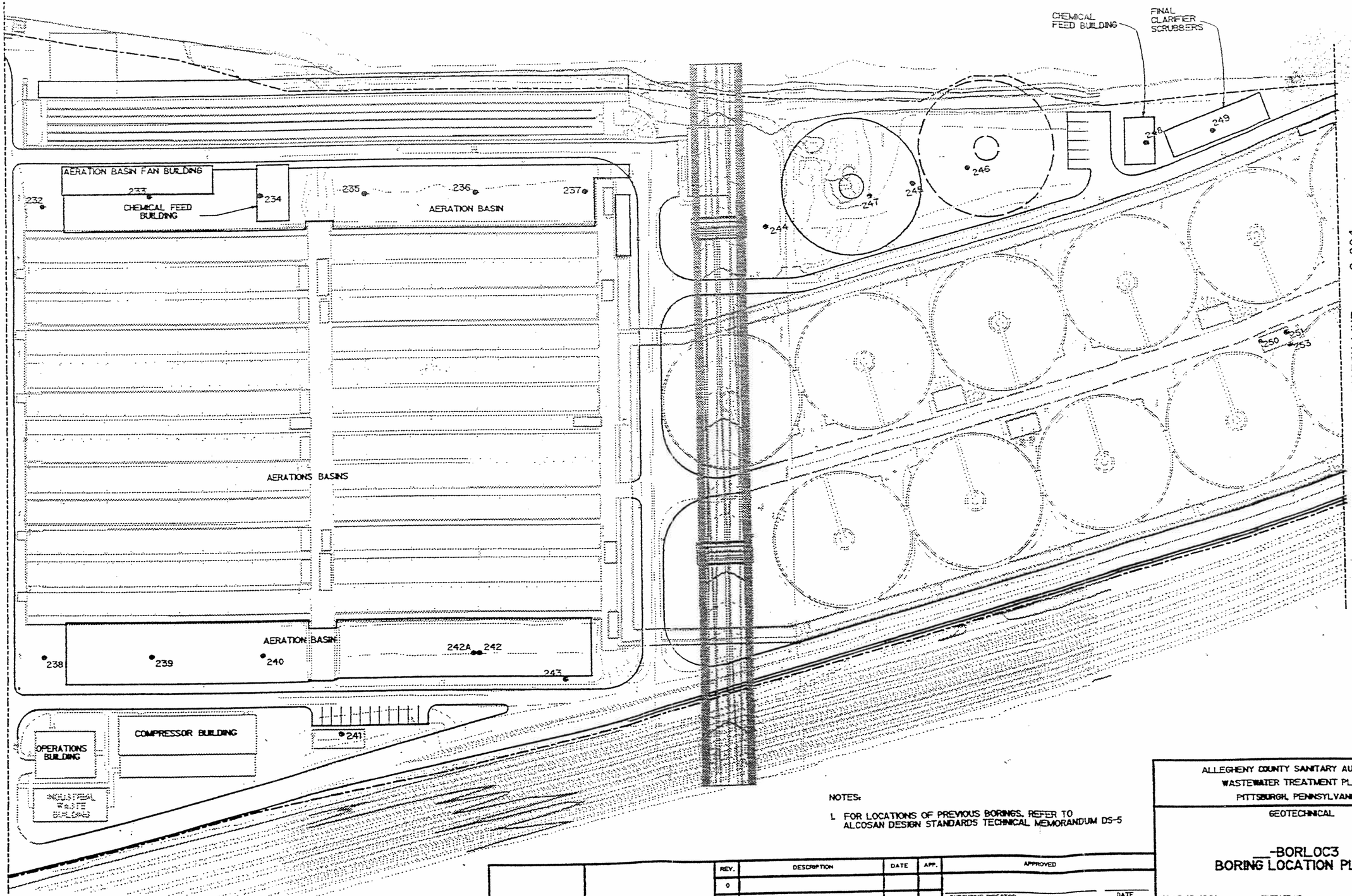
ALLEGHENY COUNTY SANITARY AUTHORITY
WASTEWATER TREATMENT PLANT
PITTSBURGH, PENNSYLVANIA

GEOTECHNICAL

___-BORLOC1
BORING LOCATION PLAN

SCALE: 1"=100' CONTRACT NO. SHEET OF

FILENAME: BORLOC1.DGN
DATE PLOTTED: 6/21/96



NOTES:

1. FOR LOCATIONS OF PREVIOUS BORINGS, REFER TO ALCOSAN DESIGN STANDARDS TECHNICAL MEMORANDUM DS-5

REV.	DESCRIPTION	DATE	APP.
0			
1			
2			
3			
4			

APPROVED

EXECUTIVE DIRECTOR ____ DATE

DIRECTOR OF ENGR. & CONST., P.A.P.E.-19592E ____ DATE

PROJECT MANAGER ____ DATE

ALLEGHENY COUNTY SANITARY AUTHORITY
WASTEWATER TREATMENT PLANT
PITTSBURGH, PENNSYLVANIA

GEOTECHNICAL

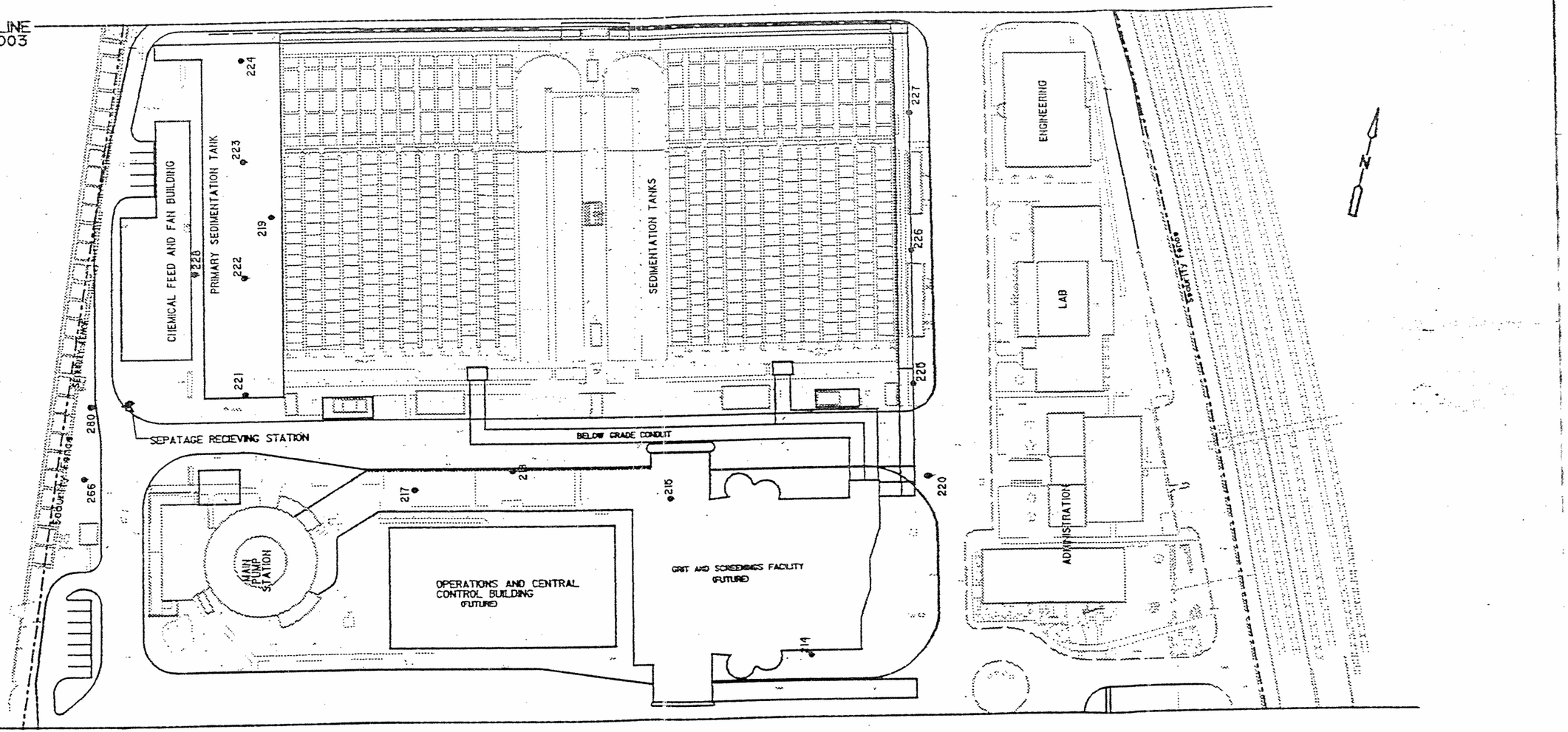
___-BORLOC3
BORING LOCATION PLAN

SCALE: 1" = 100'. CONTRACT NO. SHEET OF

FILENAME: BORLOC3.DGN
DATE PLOTTED: 6/21/96

DRAWN BY:
CHECKED BY:
EXAMINED BY:
ALCOSAN EXAMINED BY:

MATCH LINE
—C-003



MATCH LINE
—C-001

NOTES:

1. FOR LOCATIONS OF PREVIOUS BORINGS, REFER TO ALCOSAN DESIGN STANDARDS TECHNICAL MEMORANDUM DS-5

REV.	DESCRIPTION	DATE	APP.
0			
1			
2			
3			
4			

APPROVED

EXECUTIVE DIRECTOR ____ DATE

DIRECTOR OF ENGR. & CONST. PAPE-[illegible] ____ DATE

PROJECT MANAGER ____ DATE

DRAWN BY:

CHECKED BY:

EXAMINED BY:

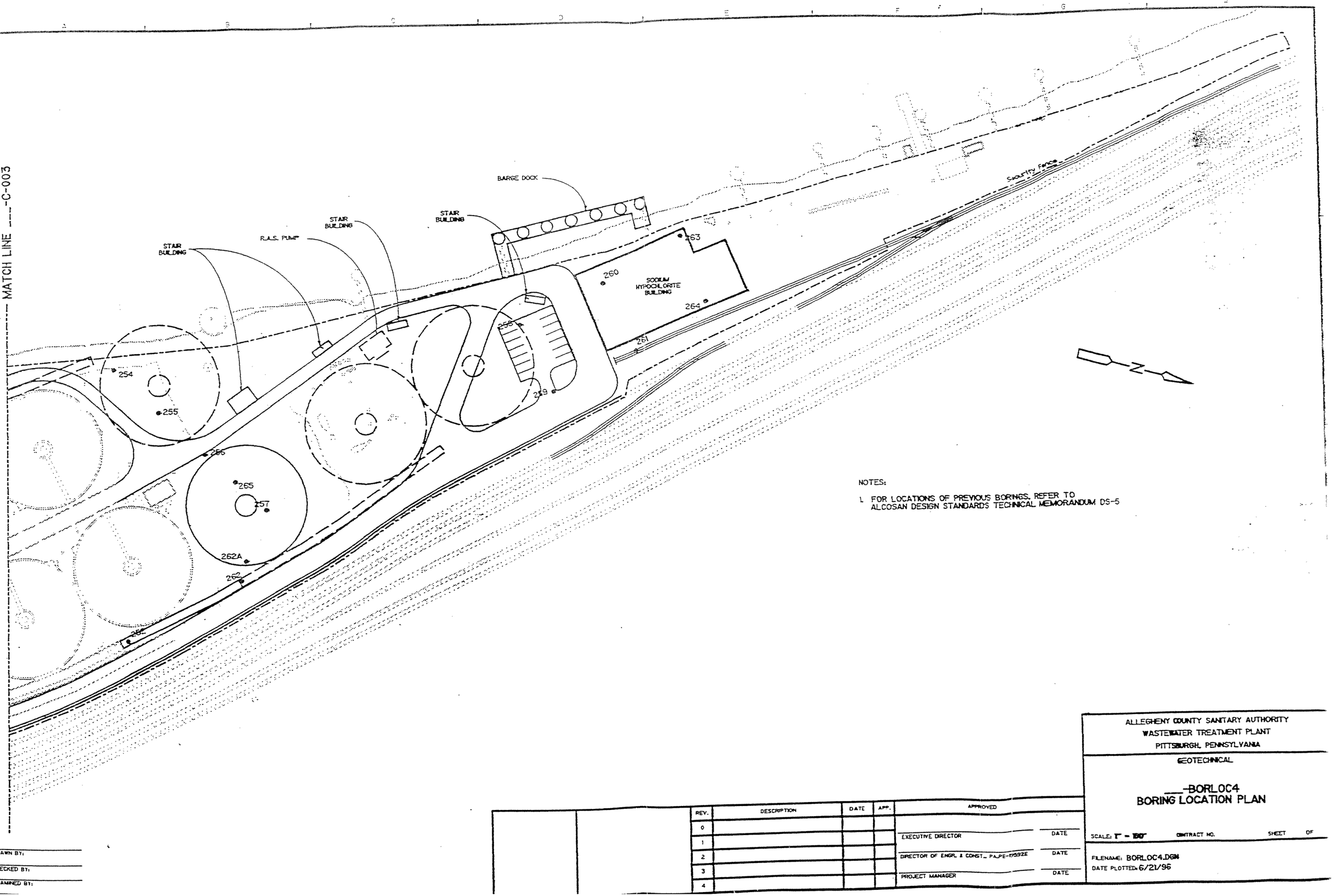
ALLEGHENY COUNTY SANITARY AUTHORITY
WASTEWATER TREATMENT PLANT
PITTSBURGH, PENNSYLVANIA

GEOTECHNICAL

—BORLOC2
BORING LOCATION PLAN

SCALE: 1" = 100' CONTRACT NO. SHEET OF

FILENAME: BORLOC2.DGN
DATE PLOTTED: 6/21/96



NOTES:

1. FOR LOCATIONS OF PREVIOUS BORINGS, REFER TO ALCOSAN DESIGN STANDARDS TECHNICAL MEMORANDUM DS-5

DRAWN BY:

CHECKED BY:

EXAMINED BY:

REV.	DESCRIPTION	DATE	APP.
0			
1			
2			
3			
4			

APPROVED

EXECUTIVE DIRECTOR _____ DATE

DIRECTOR OF ENGR. & CONST., PAPE-DAWSON _____ DATE

PROJECT MANAGER _____ DATE

ALLEGHENY COUNTY SANITARY AUTHORITY
WASTEWATER TREATMENT PLANT
PITTSBURGH, PENNSYLVANIA

GEOTECHNICAL

BORLOC4
BORING LOCATION PLAN

SCALE: 1" = 150' CONTRACT NO. SHEET OF

FILENAME: BORLOC4.DGN
DATE PLOTTED: 6/21/96

SOIL BORING LOG SHEETS

RECORD OF SUBSURFACE EXPLORATION

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM
Client: ALCOSAN Proj No: MAW37229.PD.07
Boring: 201 Date Started: 6/20/95 Date Completed: 6/20/95
Location: See Site Plan
140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop

ELEVATIONS
Ground Surface: 725.4'
End of Boring: 691.9'

WATER LEVELS
While Drilling: 18'
At Completion: 30.5'
After 24 Hours 12.5'

* Indicates pH, Chloride, Sulfate Sample Collected

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
Brown Silty Clay w/ Gravel and organics									
2" large gravel @ 4.5'	5		1	SS	5,2,1				
Coal Cinder Fill									
	10	715.4	2*	SS	1,4,5				
Brown Sand & Gravel			3	SS	24,17, 8				
Grey Shale	15								
NOTE: Slight Petroleum Odor									
Grey Sand & Gravel									
Grey/Black Silty Clay - #4 (Slight Petroleum Odor)	20	705.4	4*	SS	3,4,4	1.42	1.25	22.3	
Brown Sandy Gravel	25		5	SS	4,4,5				
3" Grey Clay Seam @ 25'									
Crushed Coal Cinders									
Grey Sandy Gravel w/ Coal	30	695.4	6	SS	10,11 13	3.00	3.25	14.6	
Grey Clayey Silt w/ Shale									
Hard Grey Silt	35		7	SS	11,30, 50/4"	2.56	4.5	15.8	
	40								
	45								
	50								

ALCOSAN - EPM TEAM

RECORD OF SUBSURFACE EXPLORATION

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM
Client: ALCOSAN Proj No: MAW37229.PD.07
Boring: 202 Date Started: 6/20/95 Date Completed: 6/20/95
Location: East End of Tracy Street, See Site Plan
140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop

ELEVATIONS
Ground Surface: 725.5
End of Boring: 681.4

WATER LEVELS
While Drilling: 18.0'
At Completion: 23.5'
After 24 Hours N/A

* Indicates pH, Chloride, Sulfate Sample Collected

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
4" Asphalt Med. Coarse Brown SAND	5		1	SS	1,1,1				
3" Brown Clay w/ Gravel - #2 Grey/Black Clayey FILL w/ Coal Cinders & Red Brick	10	715.5	2*	SS	4,3,4	1.35	1.50	19.5	
	15		3	SS	5,6,7			16.2	
Black/Grey CLAY w/ Sand & Gravel, Traces of Coal	20	705.5	4*	SS	5,6,5			16.3	
Brown SANDY GRAVEL	25		5	SS	17,25,31				
	30	695.5	6	SS	10,11,24				
	35		7	SS	11,16,25				
	40	685.5	8	SS	11,5,6				
Grey SHALE @ 44.1'	45		9	SS	12,50@1"				
	50								

ALCOSAN - EPM TEAM

RECORD OF SUBSURFACE EXPLORATION

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM
Client: ALCOSAN Proj No: MAW37229.PD.07
Boring: 203 Date Started: 6/19/95 Date Completed: 6/19/95
Location: Tracy Street, See Site Plan
140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop

ELEVATIONS
Ground Surface: 726.6'
End of Boring: 679.1'

WATER LEVELS
While Drilling: 23.0'
At Completion: 23.0'
After 24 Hours N/A

* Indicates pH, Chloride, and Sulfate Sample Collected

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
4" Asphalt									
Brown/Black Sandy FILL w/Gravel, traces of red brick, and coal cinders	5		1	SS	5,4,4				
Piece of scrap metal brought to surface by augur.	10	716.6	2*	SS	1,2,3				
	15		3	SS	4,4,5				
Grey Silty CLAY with traces of Coal cinders (SHELBY TUBE #203-1, 15'-17')	20	706.6	4*	SS	3,3,3	0.98	1.50	23.8	
Black Silty CLAY with traces of Coal (SHELBY TUBE #203-2, 20'-22')	25		5*	SS	2,2,3	0.38	0.25	36.6	
Grey/Black Silty CLAY with strong Petroleum Odor	30	696.6	6	SS	16,27, 24	0.30	0.25	25.9	
Brown Sandy GRAVEL	35		7	SS	3,4,4				
Medium Coarse Brown SAND	40	686.6	8*	SS	7,8,10				
	45		9	SS	8,8,9				
Grey SHALE @ 47.5'	50		10	SS	50/1"				

ALCOSAN - EPM TEAM

RECORD OF SUBSURFACE EXPLORATION

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM
Client: ALCOSAN Proj No: MAW37229.PD.07
Boring: 204 Date Started: 6/19/95 Date Completed: 6/19/95
Location: Tracy Street, See Site Plan
140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop

ELEVATIONS
Ground Surface: 727.5'
End of Boring 677.5'

WATER LEVELS
While Drilling: 23'
At Completion: 24.5'
After 24 Hours N/A

* Indicates pH, Chloride, Sulfate Sample Collected

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
4" ASPHALT									
Brown Sandy Clayey FILL w/Traces of RED BRICK	5		1	SS	4,5,6				
3" Grey SHALE, 3" RED BRICK 3" COAL CINDERS	10	717.5	2*	SS	3,4,1				
Black Silty CLAY w/Gravel & COAL CINDERS									
Brown/Tan Mottled Silty CLAY with traces of coal cinders and med. size pebbles	15		3	SS	2,2,1	1.28	1.25	23.2	
	20	707.5	4*	SS	1,1,1	0.30	0.25	13.3	
Grey Clayey SILT w/Traces of COAL	25		5	SS	5,6,9			28.1	
Brown SILT w/ SHALE Fragments									
Grey Silty CLAY	30	697.5	6	SS	2,2,1	0.52	0.25	32.8	
SHELBY TUBE #204-1 (30'-32')									
#7 NO SAMPLE RECOVERED FROM SAMPLER SPOON	35		7	SS	2,4,3				
	40	687.5	8	SS	5,6,6				
Fine to Medium Coarse Brown SAND	45		9	SS	1 over 12",1				
Grey SHALE @ 50'	50	677.5	10	SS	50@1"				

ALCOSAN - EPM TEAM

RECORD OF SUBSURFACE EXPLORATION

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM
Client: ALCOSAN Proj No: MAW37229.PD.07
Boring: 205 Date Started: 6/15/95 Date Completed: 6/15/95
Location: West End of Tracy Street
140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop

ELEVATIONS
Ground Surface: 726.2'
End of Boring 673.2'

WATER LEVELS
While Drilling: 18'
At Completion: 24.5'
After ___ Hours ___

* Indicates pH, Chloride, Sulfate Soil Sample Collected

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
5" ASPHALT 3" Sandy Gravel Subbase									
Brown Sandy Clayey FILL w/Gravel (Auger Impacts Concrete @ 6.5')	5		1	SS	5,4,4			10.9	
Damp Brown Clayey Sandy FILL w/COAL Cinders & Gravel Traces of RED BRICK	10	716.2	*2	SS	2,3,2			7.3	
	15		3	SS	3,3,4			4.0	
Wet Sandy GRAVEL	20	706.2	4	SS	4,5,7				
Grey/Brown Clayey FILL w/ COAL Cinders	25		5	SS	3,4,6			22.5	
Brown Sandy Clayey FILL w/Gravel	30	696.2	6	SS	6,6,7				
Grey SHALE									
3"Fine Brown SAND@Top of Spoon Wet Grey Clayey SAND w/Gravel	35		7	SS	3,5,5				
Fine Brown Sand w/Traces of COAL Cinders	40	686.2	8	SS	9,13,11				
	45		9	SS	3,5,6				
Hard Grey SILT	50	676.2	10	SS	13,15,19				

ALCOSAN - EPM TEAM

RECORD OF SUBSURFACE EXPLORATION

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM
Client: ALCOSAN Proj No: MAW37229.PD.07
Boring: 205 Date Started: 6/15/95 Date Completed: 6/15/95
Location: West End of Tracy Street
140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop

ELEVATIONS
Ground Surface: 726.2
End of Boring: 673.2

WATER LEVELS
While Drilling: 18'
At Completion: 24.5'
After ___ Hours _____

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
Fine Brown SAND									
SHALE @ 53' (Auger Refusal)	55		11		50@2"				

ALCOSAN - EPM TEAM

RECORD OF SUBSURFACE EXPLORATION

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM
Client: ALCOSAN Proj No: MAW37229.PD.07
Boring: 206 Date Started: 11/2/95 Date Completed: 11/2/95
Location: See Location Plan
140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop

ELEVATIONS
Ground Surface: 726.0
End of Boring: 677.2

WATER LEVELS
While Drilling: 16.0'
At Completion: 23.5'
After 24 Hours Caved in @ 6.0'

* Indicates pH, Chloride, Sulfate Sample Collected

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
Loose, Large Gravel w/ Brown SAND (Fill)									
No Sample #1 Retrieved	5		1	SS	1,1, 2,1				
Cinders & Slag FILL	10	716.0	*2	SS	4,1 10,15				
	15		3	SS	2,1, 1,1				
	20	706.0	*4	SS	2,2, 3,2				
	25		5	SS	2,1 2,1	--	1.0		
Wet, Grey/Blk. Clayey SILT w/ Trace of Fine Sand									
PETROLEUM ODOR in Sample 6	30	696.0	*6	SS	8,11, 29,33	0.45	0.50	32.7	
Fine Grey SAND	35		7	SS	11,5, 4,4				
Brown SANDY GRAVEL									
2" Tan Sandstone @ 41.0'	40	686.0	*8	SS	14,17, 27,50/.1'				
Very Dense Fine Grey SAND									
	45		9	SS	21,17, 29,30				
Grey Sandstone and Shale									
Augur Refusal @ 48.0'			10	SS	37,50/.2'				
Hard Grey SILT	50								

ALCOSAN - EPM TEAM

RECORD OF SUBSURFACE EXPLORATION

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM

Client: ALCOSAN Proj No:

Boring: 207 Date Started: 3/5/96 Date Completed: 3/5/96

Location: See Site Plan

140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop (SET #1)

ELEVATIONS
Ground Surface: 727.1'
End of Boring: 667.9'

WATER LEVELS
While Drilling: 24'
At Completion: 13.0'
After 24 Hours 15.0'

= Shelby Tube = NX Rock Core SS= Split Spoon ST= Shelby Tube, DB = Diamond Bit

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
Brown Silty Fill w/Organics (Topsoil) 1.0									
Black Silty Fill w/Gravel 6.0	5	721.1	1	SS	2,2, 1,3				
Black Cinder Fill	10		2	SS	3,3, 3,4				
	15		3	SS	2,1, 2,3				
20.0	20	707.1	4	SS	3,4, 3,4				
Brown/Black Fill w/Slag, Gravel Shelby Tube #207-1, 28.0-29.0. 0.7 Recovery 25.0	25	702.1	5	SS	3,4, 5,8		0.75	25.1	98 PCF
Green/Black Silty CLAY *Petroleum Odor in #5 29.4				ST					
	30	697.7	6	SS	9,7, 11,6			11.5	
Wet Grey Gravel, Trace CLAY *Petroleum Odor in #6 36.0	35	691.1	7	SS	5,10, 13,15				
6"Grey Silty CLAY 36.5									
Fine/Medium Coarse Brown SAND 45.0	40		8	SS	6,8, 9,15			27.0	
	45	682.1	9	SS	9,8, 11,12			10.4	
Fine/Medium Coarse Brown SAND & GRAVEL Augur Refusal @ 49.0' 49.0			10						
Grey CLAYSTONE		678.1		SS	50/.2				

Begin NX Rock Core @ 49.2'

RECORD OF SUBSURFACE EXPLORATION

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM
Client: ALCOSAN Proj No:
Boring: 207 Date Started: 3/5/96 Date Completed: 3/5/96
Location: See Site Plan
140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop (SET #1)

ELEVATIONS
Ground Surface: 727.1'
End of Boring: 667.9'

WATER LEVELS
While Drilling: 24'
At Completion: 13.0'
After 24 Hours 15.0'

▨ = Shelby Tube ▨ = NX Rock Core SS= Split Spoon ST= Shelby Tube, DB = Diamond Bit

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
Grey SHALE RQD = 0.0 53.5									
	55	673.6		DB			>4.5		
Hard Grey CLAYSTONE RQD = 0.18									
End of Boring @ 59.2'	60	667.9							

1.0 FT. Sample Cut for Unconfined Compression Testing, 58.2 - 59.2 FT.

Coring Data

Depth	Time Elapsed	Pull Down Pressure
0	0:00	200 psi
2	18:00	200 psi
4	39:00	200 psi
6	51:00	200 psi
8	1:15	200 psi
10	1:35	200 psi

RECORD OF SUBSURFACE EXPLORATION

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM
Client: ALCOSAN Proj No: MAW37229.PD.07
Boring: 208 Date Started: 11/2/95 Date Completed: 11/2/95
Location: See Location Plan
140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop

ELEVATIONS
Ground Surface: 726.8
End of Boring: 677.8

WATER LEVELS
While Drilling: 21.0'
At Completion: 24.5'
After 24 Hours Caved in @ 5.5'

* Indicates pH, Chloride, Sulfate Sample Collected

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
Loose, Large Gravel w/ Brown SAND (Fill)									
Brown Sandy Gravel (FILL)	5		1	SS	2,1, 2,2				
	10	716.8	*2	SS	3,5, 4,3				
Brown Sandy Gravel w/ Coal Cinders (FILL)	15		3	SS	2,1, 1,1				
6" Grey Gravel & Sand w/Slag	20	706.8	*4	SS	3,3, 4,3				
2" Coal Cinders @ 21.0' Brown Sand & Gravel	25		5	SS	4,4, 3,3	1.12	--	37.2	
Wet, Grey/Blk. Clayey SILT w/ Coal Cinders Fine to Med Coarse Grey Sand	30	696.8	*6	SS	3,4, 4,5				
Fine Coarse Gre/Black Silty SAND w/ Traces of Coal	35		7	SS	7,12, 14,10				
Dense Brown SANDY GRAVEL	40	686.8	*8	SS	3,5, 5,6				
Med. Dense Grey Brown Sand w/ Gravel	45		9	SS	26,38, 37,50/5"				
Grey Sandstone									
Augur Refusal @ 49.0'	50								

ALCOSAN - EPM TEAM

RECORD OF SUBSURFACE EXPLORATION

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM
Client: ALCOSAN Proj No:
Boring: 209 Date Started: 3/4/96 Date Completed: 3/4/96
Location: See Site Plan
140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop (SET #2)

ELEVATIONS
Ground Surface: 726.3'
End of Boring: 670.9'

WATER LEVELS
While Drilling: 15.0'
At Completion: 13.2'
After 24 Hours: 9.8'

▨ = Shelby Tube ▨ = NX Rock Core SS= Split Spoon ST= Shelby Tube, DB = Diamond Bit

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
Brown Gravel FILL 1.0									
Black Cinder & Slag FILL	5	721.3	1	SS	3,4, 4,4				
Traces of Red Brick in #2	10	716.3	2	SS	4,9, 2,2				
16.0	15	711.3	3	SS	3,4, 3,3	1.05	0.25	23.4	94 PCF
Green/Black Mottled Silty CLAY				ST					
Shelby Tube #209-1, 17.0-19.0, Full Recovery	20	706.3	4	SS	1,2, 5,5	1.05	0.75	36.6	93 PCF
Shelby Tube #209-2, 22.0-23.1, 0.80 Recovery 23.1				ST					
Wet Grey/Black GRAVEL Trace SAND	25	701.3	5	SS	9,10, 10			10.1	
Rock in End of Spoon for #6, No Sample Recovered	30	696.3	6	SS	19,13 12,17				
36.5	35	691.3	7	SS	7,9 3,5			17.5	
Wet Medium Coarse Brown SAND - Sample #7	40	686.3	8	SS	5,6 7,9			13.9	
Some Gravel in #8									
46.0	45								
Drv Grev CLAYSTONE			9	SS	6,14, 60/.4				
Grev SHALE 47.0		679.9							
5" Grev CLAY w/Shale 48.0									
Grey SHALE									

Rock Core

RECORD OF SUBSURFACE EXPLORATION

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM
Client: ALCOSAN Proj No:
Boring: 209 Date Started: 3/4/96 Date Completed: 3/4/96
Location: See Site Plan
140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop (SET #2)

ELEVATIONS
Ground Surface: 726.3'
End of Boring: 670.9'

WATER LEVELS
While Drilling: 15.0'
At Completion: 13.2'
After 24 Hours 9.8'

▨ = Shelby Tube ▨ = NX Rock Core SS= Split Spoon ST= Shelby Tube, DB = Diamond Bit

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
Hard Grey/Brown Mottled CLAYSTONE RQD= 0.70	55	670.9		DB			>4.5		
End of Boring @ 55.4 FT.	60								

NX Rock Coring
Begin: 46.4 FT
End: 55.4 FT

Coring Data

Depth	Time Elapsed	Pull Down Pressure
0	0:00	200 psi
1	9:00	200 psi
2	25:00	200 psi
4	40:00	200 psi
6	51:00	350 psi
8	56:00	350 psi
10	1:10	350 psi

3 Samples Cut From Rock Core Between 52-53.5 FT. For Unconfined Compression Testing

RECORD OF SUBSURFACE EXPLORATION

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM
Client: ALCOSAN Proj No:
Boring: 210 Date Started: 3/11/96 Date Completed: 3/11/96
Location: See Site Plan
140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop (Baker #1)

ELEVATIONS
Ground Surface: 726.0'
End of Boring: 665.8'

WATER LEVELS
While Drilling: 20.0'
Prior to Core: 23.8', After Core: 16.3'
After 24 Hours: 9.8'

▨ = Shelby Tube ▨ = NX Rock Core SS= Split Spoon ST= Shelby Tube, DB = Diamond Bit

Soil Description	Depth	Elev	Sample No	Sample Type	N	Q_u	Q_p	Mc	γ_d
Brown FILL with Gravel Brick and Cinders									
Slag in Sample #1	5	721.0	1	SS	5,8, 11,15				
10.0	10	716.0	2	SS	5,4 3,5				
Coal CINDERS									
Slag in Sample #3	15	711.0	3	SS	23,20 15,8				
Petroleum Odor in Sample #4	20	706.0	4	SS	1,3 4,3	1.28	--	--	
21.5				ST					
Soft Grey/Black Silty CLAY	25	701.0	5	SS	1,0 2,3	1.0	0.50	28.7	93.6 pcf
Shelby Tube #210-1, 22.0-24.0, 2.0' Recovery	30	696.0	6	SS	11,7 5,11	0.75	0.50	28.7	93.6 pcf
35.0	35	691.0	7	SS	2,3 5,7			15.0	
Wet, Dense Fine/Medium Coarse Brown SAND	40	686.0	8	SS	16,21 25,32			11.0	
46.5	45	679.0	9	SS	9,10 12,8			10.7	
Dense Brown SANDY GRAVEL									

RECORD OF SUBSURFACE EXPLORATION

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM
Client: ALCOSAN Proj No:
Boring: 210 Date Started: 3/11/96 Date Completed: 3/11/96
Location: See Site Plan
140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop (Baker #1)

ELEVATIONS
Ground Surface: 726.0'
End of Boring: 665.8'

WATER LEVELS
While Drilling: 20.0'
Prior to Coring: 23.8, After Coring: 16.3
After 24 Hours 11.1'

▨ = Shelby Tube ▨ = NX Rock Core SS= Split Spoon ST= Shelby Tube, DB = Diamond Bit

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
Grey CLAYSTONE 50.2				SS	50/0.2				
Hard Grey SHALE, Broken RQD = 0.0	55	10		DB					
57.2									
Red/Grey CLAYSTONE, Hard (1 sample taken for testing) 60.2	60	665.8							
End of Boring @ 60.2 FT.									
RQD = 0.10									

Coring Data

Depth	Time	Pull Down Pressure
0	0:00	200 psi
2	14:00	200 psi
4	22:00	200 psi
6	19:00	200 psi
8	43:00	200 psi
10	34:00	200 psi

Begin Core: 50.2 ft
End Core: 60.2 ft

RECORD OF SUBSURFACE EXPLORATION

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM
Client: ALCOSAN Proj No: MAW37229.PD.07
Boring: 211 Date Started: 11/2/95 Date Completed: 11/3/95
Location: See Location Plan
140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop

ELEVATIONS
Ground Surface: 727.1
End of Boring: 677.9

WATER LEVELS
While Drilling: 20.0'
At Completion: 29.2'
After 48 Hours Caved in @ 4.0 ft

* Indicates pH, Chloride, Sulfate Sample Collected

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
Brown Silty Clay w/ Gravel (topsoil)									
Black Clay w/ Cinders FILL	5		1	SS	4,8, 11,6				
Black Cinders w/ Kiln Bricks & Red Bricks	10	717.1	*2	SS	8,9, 10,10				
2" Fine Brown SAND @ 15' 4" Black Cinders	15		3	SS	6,5, 4,4				
Grey Silt w/ Shale Fragements	20	707.1	4	SS	2,2, 2,2				
No Sample #4 Retrieved	25		*5	SS	2,2, 6,7				
Black/Grey Clayey SILT PETROLEUM ODOR	30	697.1	*6	SS	9,12 23,16				
Very Dense Brown Sandy Gravel	35		7	SS	3,4, 6,6				
Med. Dense Med. Coarse Brown Sand, Some Gravel	40	687.1	*8	SS	8,7, 6,8				
	45		9	SS	26,38, 37,50/5"				
Lt. Brown Sandstone & Gravel									
Hard Grey Silt	50		10	SS	50/.2FT				

ALCOSAN - EPM TEAM

RECORD OF SUBSURFACE EXPLORATION

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM
Client: ALCOSAN Proj No: MAW37229.PD.07
Boring: 212 Date Started: 6/29/95 Date Completed: 6/29/95
Location: See Site Plan
140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop

ELEVATIONS
Ground Surface: 727.4
End of Boring: 678.4

WATER LEVELS
While Drilling: 13.0
At Completion: 19.5
After 24 Hours 9.5

* Indicates pH, Chloride, Sulfate Sample Collected

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
Brown Silty Clay w/ Gravel									
Coal Cinders & Slag FILL	5		1	SS	50/6"				
Brown Clayey Silty FILL w/ Kiln Bricks	10	717.4	2	SS	4,3,3			16.2	
Coal Cinders & Gravel FILL	15		3	SS	4,7,5				
Loose Fine Grey Silty SAND	20	707.4	4*	SS	1,1,2				
Soft Grey SILT w/ Traces of Sand Shelby Tube #212-1,25'-27' Recovery = 2.0	25		5	SS	2,2,2			23.9	
Brown Silty Clayey SAND w/Gravel	30	697.4	6*	SS	6,6,8				
Dense Brown SANDY GRAVEL	35		7	SS	7,8,13				
Dense Med. Coarse Brown SAND	40	687.4	8	SS	4,6,17				
Very Dense Med. Coarse Brown SAND w/ Gravel	45		9	SS	8,16,31				
Hard Grey SILT	50		10	SS	21,50/3				

ALCOSAN - EPM TEAM

RECORD OF SUBSURFACE EXPLORATION

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM
Client: ALCOSAN Proj No: MAW37229.PD.07
Boring: 213 Date Started: 6/29/95 Date Completed: 6/29/95
Location: See Site Plan
140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop

ELEVATIONS
Ground Surface: 726.6
End of Boring: 677.1

WATER LEVELS
While Drilling: 18.0
At Completion: 26.0
After 24 Hours CAVED IN @ 8.0

* Indicates pH, Chloride, Sulfate Sample Collected

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
Brown Silty CLAY w/ Gravel Traces of Red Brick (FILL)									
Coal Cinders w/ Traces of Kiln Bricks	5		1	SS	11,9, 14				
Crushed Red Brick in Sample	10	716.6	2	SS	5,5,6				
Brown Sandy FILL with Traces of Red Brick & Wood	15		3	SS	4,2,1				
Coal Cinder FILL	20	706.6	4*	SS	4,5,6				
Very Soft Black/Grey Clayey SILT Shelby Tube #213-1, 25'-27' NO RECOVERY	25		5*	SS	2,2,2	0.30	0.25	25.9	
Very Loose to Loose Fine to Med. Coarse Grey SAND	30	696.6	6	SS	1,2,1				
Loose Brown Sandy Gravel	35		7	SS	3,3,3				
Dense Grey SAND with Gravel									
Very Dense fine to med. coarse red/brown SAND w/ Gravel	40	686.6	8	SS	18,47, 39				
Dense Med. Coarse Brown Silty SAND w/ Gravel	45		9	SS	8,12 15				
Grey SHALE	50		10	SS	50/1"				

RECORD OF SUBSURFACE EXPLORATION

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM
Client: ALCOSAN Proj No: MAW37229.PD.07
Boring: 214 Date Started: 6/30/95 Date Completed: 6/30/95
Location: See Site Plan
140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop

ELEVATIONS
Ground Surface: 727.0
End of Boring: 679.5

WATER LEVELS
While Drilling: 13.0
At Completion: 28.0
After 24 Hours Unavailable

* Indicates pH, Chloride, Sulfate Sample Collected

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
Brown Silty Clay w/ Gravel & Organics									
Black Cinder FILL w/ gravel & Traces of Red Brick	5		1	SS	5,6, 18				
Brown Clayey FILL w/ gravel & traces of Red Brick	10	717.0	2*	SS	3,2,2			17.5	
Grey Sandy FILL w/ Gravel, Red Brick & Coal Cinders	15		3	SS	5,6,6				
Soft Brown Clayey SILT Shelby Tube #214-1, 20'-22' Recovery = 2.0'	20	707.0	4*	SS	3,3,5		0.25	25.9	
Med. Dense Brown Silty SAND with Gravel	25		5	SS	5,6,9				
Very Dense Brown Sandy Gravel	30	697.0	6	SS	5,11, 24				
	35		7	SS	8,11, 15				
Large Size Gravel in Sampler	40	687.0	8	SS	6,7,5				
Dense Med. Coarse Brown SAND w/ Med. Size Pebbles	45		9*	SS	6,7,8				
Hard Grey SILT	50		10	SS	50/3				

ALCOSAN - EPM TEAM

RECORD OF SUBSURFACE EXPLORATION

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM
Client: ALCOSAN Proj No: MAW37229.PD.07
Boring: 215 Date Started: 6/28/95 Date Completed: 6/28/95
Location: See Site Plan
140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop

ELEVATIONS
Ground Surface: 727.3
End of Boring: 677.8

WATER LEVELS
While Drilling: 13.0
At Completion: 19.0
After 24 Hours 9.5

* Indicates pH, Chloride, Sulfate Sample Collected

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
Brown Silty Clay w/ Gravel Coal Cinder & Slag FILL	5		1	SS	10,16,25				
Brown Sandy FILL w/ Gravel Coal Cinders	10	717.3	2	SS	2,2,3				
Loose Fine Grey Silty SAND	15		3*	SS	1,2,2				
Soft Brown Sandy SILT Shelby Tube #215-1, 20'-22' Recovery = 2.0'	20	707.3	4	SS	2,2,2				
	25		5	SS	2,2,3	0.45	0.50	25.5	
Medium Dense Brown Silty SAND Tan Clayey SILT in bottom of Sampler Spoon	30	697.3	6*	SS	4,5,5				
Dense to Very Dense Grey/Brown SAND w/ Gravel Very Dense Brown Sandy Gravel	35		7	SS	16,16,16				
Dense Fine Coarse Brown/Tan Mottled Sand w/ Gravel	40	687.3	8	SS	8,12,9				
Dense Fine to Med. Coarse Grey Sand w/ Pebbles Dense Brown Sand w/ Gravel	45		9	SS	8,11,10				
Hard Grey SILT	50		10	SS	15,16 50/5"				

RECORD OF SUBSURFACE EXPLORATION

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM
Client: ALCOSAN Proj No:
Boring: 216 Date Started: 3/12/96 Date Completed: 3/12/96
Location: See Site Plan
140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop (Baker #4)

ELEVATIONS
Ground Surface: 725.6'
End of Boring: 665.6'

WATER LEVELS
While Drilling: 20.0'
Prior to Core: 26.4', After Core: 12.8'
After 24 Hours: N/A

▨ = Shelby Tube ▨ = NX Rock Core SS= Split Spoon ST= Shelby Tube, DB = Diamond Bit

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
4" Concrete									
Black Cinder FILL with Slag	5	720.6	1	SS	3,5, 5,4				
	10	715.6	2	SS	4,7 9,4				
	15	710.6	3	SS	1,3 7,4				
Shelby Tube #216-1, 22.0-24.0, 2.0' Recovery	20	705.6	4	SS	0>1ft 0>1ft				
22.0 Soft Grey/Black Silty CLAY Trace Sand, Very Soft To Soft 24.0				ST					
Very Fine Grey Silty SAND, Trace Silt	25	700.6	5	SS	0,1,1			30.8	
30.0 Dense Brown SAND & GRAVEL	30	695.6	6	SS	6,8 9,10			13.6	
	35	690.6	7	SS	13,19 23,32			9.8	
	40	685.6	8	SS	16,19 15,17			12.2	
	45		9	SS	11,13 11,12			9.0	
48.0 Grey SHALE		670.6							

RECORD OF SUBSURFACE EXPLORATION

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM
Client: ALCOSAN Proj No:
Boring: 216 Date Started: 3/12/96 Date Completed: 3/12/96
Location: See Site Plan
140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop (Baker #4)

ELEVATIONS
Ground Surface: 725.6'
End of Boring: 665.6'

WATER LEVELS
While Drilling: 20.0'
Prior to Coring: 26.4, After Coring: 12.8
After 24 Hours N/A

▨ = Shelby Tube ▨ = NX Rock Core SS= Split Spoon ST= Shelby Tube, DB = Diamond Bit

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
Red/Grey CLAYSTONE Med. Hard, Broken (3 samples taken for Compression Testing) RQD = 0.23	55		10	SS	50/0.				
59.0				DB					
60.0 Grey LIMESTONE, Very Broken	60	665.6							
End of Boring @ 60.0 FT.									

Coring Data

Depth	Time	Pull Down Pressure
0-2	18:00	200 psi
2-4	45:00	200 psi
4-6	13:00	200 psi
6-8	24:00	300 psi
8-10	16:00	200 psi

Rock Core Recovery = 7.8 ft

RECORD OF SUBSURFACE EXPLORATION

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM
Client: ALCOSAN Proj No: MAW37229.PD.07
Boring: 217 Date Started: 11/3/95 Date Completed: 11/3/95
Location: See Site Plan
140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop

ELEVATIONS
Ground Surface: 726.7
End of Boring: 720.9

WATER LEVELS
While Drilling: Dry
At Completion: Dry
After 24 Hours N/A

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
Brown Silty CLAY w/ Gravel Coal Cinders & Slag FILL	5	721.2	1	SS	11, 14/.3ft				
Augur Refusal @ 5.5'									
BORING TERMINATED @ 5.8ft	10								
Red Bricks in Sample #1 Augur Believed to have encountered old foundation	15								
	20								
	25								
	30								
	35								
	40								
	45								
	50								

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RECORD OF SUBSURFACE EXPLORATION

ect: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM

nt: ALCOSAN Proj No: MAW37229.PD.07

Boring: 218 Date Started: 6/29/95 Date Completed: 6/29/95

Location: See Site Plan

140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop

ELEVATIONS

Ground Surface: 726.7

End of Boring: 721.2

WATER LEVELS

While Drilling: Dry

At Completion: Dry

After 24 Hours N/A

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
Brown Silty CLAY w/ Gravel									
Coal Cinders & Slag FILL			1	SS	50/6"				
	5	721.2							
Augur Refusal @ 5.5'									
	10								
	15								
	20								
	25								
	30								
	35								
	40								
	45								
	50								

ALCOSAN - EPM TEAM

RECORD OF SUBSURFACE EXPLORATION

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM
Client: ALCOSAN Proj No:
Boring: 219 Date Started: 3/11/96 Date Completed: 3/12/96
Location: See Site Plan
140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop

(HDR #1)

ELEVATIONS
Ground Surface: 726.6'
End of Boring: 665.6'

WATER LEVELS
While Drilling: 17.2'
Prior to Core: 26.3', After Core: 5.7'
After 24 Hours: 15.9'

▨ = Shelby Tube ▨ = NX Rock Core SS= Split Spoon ST= Shelby Tube, DB = Diamond Bit

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
Brown Clayey FILL			1		2,1,2				
Black/Brown FILL w/ Cinders and Slag	5	721.6	2	SS	3,7,8				
	10	716.6	3	SS	17,15 18				
	15	711.6	4	SS	8,4,3				
Coal Cinders	20	706.6	5	SS	1,2,2				
Coal Cinders, some gravel	25	701.6	6	SS	2,1,2				
30.5	30	696.6	7	SS	6,3,6			32.5	
Very Fine Grey Silty SAND									
35.0	35	691.6	8	SS	9,15, 10			12.1	
Wet, Med. Dense Brown SAND & GRAVEL									
40.0	40	686.6	9	SS	12,20, 50			8.3	
Moist, Dense Brown SAND & GRAVEL									
45.0	45	681.6	10	SS	7,11; 15			12.6	
Wet, Med. Dense Brown SAND w/ Trace of Gravel									

RECORD OF SUBSURFACE EXPLORATION

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM
Client: ALCOSAN Proj No:
Boring: 219 Date Started: 3/11/96 Date Completed: 3/12/96
Location: See Site Plan
140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop (HDR #1)

ELEVATIONS
Ground Surface: 726.6'
End of Boring: 665.6'

WATER LEVELS
While Drilling: 17.2'
Prior to Coring: 26.3, After Coring: 5.7'
After 24 Hours 15.9'

▨ = Shelby Tube ▨ = NX Rock Core SS= Split Spoon ST= Shelby Tube, DB = Diamond Bit

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
Grey Silty CLAYSTONE,Dense,Dry	50.5		11	SS	20,50				
Grey/Red Silty CLAYSTONE, Soft Extremely Broken 53.5	51.0								
Med. Hard to Hard Grey Silty SHALE, Moderately Broken RQD=0.67 (2 Samples Taken for Compression Testing) 61.0	55			DB					
End of Boring @ 61.0 FT.	60	665.6							

Coring Data

Depth	Time	Pull Down Pressure	Recovery
51-53.5	2:00	500 psi	1.3'
53.5-58.5	10:00	500 psi	5.0'
58.5-61.0	8:00	500 psi	2.5'

Rock Core Recovery = 8.8 ft

RECORD OF SUBSURFACE EXPLORATION

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM
Client: ALCOSAN Proj No: MAW37229.PD.07
Boring: 220 Date Started: 11/2/95 Date Completed: 11/2/95
Location: See Site Plan
140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop

ELEVATIONS
Ground Surface: 727.4
End of Boring: 723.4

WATER LEVELS
While Drilling:
At Completion:
After ___ Hours _____

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
Brown Silty Clay w/ Gravel & Organics (Topsoil)									
Black Cinder FILL	5								
Augur Encountered Concrete @ 4.0 Feet, Boring Aborted	10								

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RECORD OF SUBSURFACE EXPLORATION

ect: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM
nt: ALCOSAN Proj No: MAW37229.PD.07
Boring: 221 Date Started: 11/3/95 Date Completed: 11/3/95
Location: See Location Plan
140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop

ELEVATIONS
Ground Surface: 726.4
End of Boring: 675.4

WATER LEVELS
While Drilling: 21.0'
At Completion: 18.2'
After 48 Hours: 15.9'

* Indicates pH, Chloride, Sulfate Sample Collected

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
Topsoil									
Dk. Brown Silty Clayey FILL w/ Gravel	5		1	SS	2,3, 5,5				
	10	716.4	*2	SS	2,2, 2,3				
Black Cinder FILL	15		3	SS	2,3, 2,1				
	20	706.4	*4	SS	1,1 1,1				
	25		5	SS	2,1, 1,2				
	30	696.4	*6	SS	2,2, 3,3	--	--	40.8	
6" Grey Sandy SILT									
Fine Grey SAND	35		7	SS	7,6, 5,2				
Grey Sandstone Fragments w/ Gravel	40	686.4	*8	SS	3,5, 7,12				
	45		9	SS	13,26 33,29				
Lt. Tan Sandstone w/ Gravel	50		10	SS	16,56				
Hard Grey Silt @ 50.0'									
END OF BORING @ 51.0'									

ALCOSAN - EPM TEAM

RECORD OF SUBSURFACE EXPLORATION

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM
Client: ALCOSAN Proj No: MAW37229.PD.07
Boring: 222 Date Started: 6/23/95 Date Completed: 6/23/95
Location: See Site Plan
140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop

ELEVATIONS
Ground Surface: 726.8
End of Boring: 674.8

WATER LEVELS
While Drilling: 18.0
At Completion: 16.5
After 24 Hours 16.0

* Indicates pH, Chloride, Sulfate Sample Collected

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
Brown Silty Clay w/Gravel NOTE: Augur encountered concrete at 3.0' #1- No Sample Retrieved	5		1	SS	11,6,3				
Brown Sandy FILL with gravel and Coal Cinders	10	716.8	2	SS	2,2,1				
Coal Cinder FILL	15		3*	SS	1,2,4				
	20	706.8	4	SS	1,1,2				
Grey Clayey SILT Fine Grey Clayey SAND 4" Clayey SILT Seam @ 28.5'	25		5	SS	1,1,3		0.50	31.9	
	30	696.8	6*	SS	2,8,21				
SHELBY TUBE #222-1, 40'-42' Recovery = 2.0'	35		7	SS	3,2,4				
Brown SANDY GRAVEL	40	686.8	8	SS	4,5,6				
Grey Clayey SILT Fine Grey SAND Dense SANDY GRAVEL	45		9	SS	12,27,27				
	50		10	SS	15,15,20				

ALCOSAN - EPM TEAM

RECORD OF SUBSURFACE EXPLORATION

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM
Client: ALCOSAN Proj No: MAW37229.PD.07
Boring: 222 Date Started: 6/23/95 Date Completed: 6/23/95
Location: See Site Plan
140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop

ELEVATIONS
Ground Surface: 726.8
End of Boring: 674.8

WATER LEVELS
While Drilling: 18.0
At Completion: 16.5
After 24 Hours 16.0

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
Hard Grey/Brown SILT	55 60	674.8	11	SS	22, 50/5"				

ALCOSAN - EPM TEAM

RECORD OF SUBSURFACE EXPLORATION

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM
Client: ALCOSAN Proj No: MAW37229.PD.07
Boring: 223 Date Started: 6/22/95 Date Completed: 6/23/95
Location: See Site Plan
140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop

ELEVATIONS
Ground Surface: 726.7
End of Boring: 675.7

WATER LEVELS
While Drilling: 18.0
At Completion: 16.0
After 24 Hours 16.5

* Indicates pH, Chloride, Sulfate Sample Collected

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
Brown Silty Clay w/Gravel									
Black Clayey FILL w/ Coal Cinders & Gravel	5		1	SS	50/0"				
Green Slag encountered @ 3.5' (Sample #1)									
Augur encountered concrete at 4.0-5.0 ft	10	716.7	2	SS	4,4,5				
Large fragments of slag returned to surface by augur									
Coal Cinder & Gravel FILL	15		3	SS	3,3,2				
Grey/Black Clayey FILL w/ coal cinders & Gravel	20	706.7	4*	SS	3,4, 13			25.6	
Pieces of Rubber in Sampler									
Coal Cinder FILL	25		5	SS	3,2,3				
Black/Grey Clayey SILT w/ traces of Fine Sand	30	696.7	6*	SS	2,2,3			38.4	
SHELBY TUBE #223-1, 30'-32'									
Grey SAND & GRAVEL			7	SS	5,4,4		0.25	41.9	
6" Clayey SILT Seam - 7	35								
3" Wood @ 35' - 7A									
Fine Grey Sand w/ Wood Fibers	40	686.7	8	SS	8,11, 4				
Fine to med. Coarse Grey SAND									
	45		9	SS	22,35, 46				
Dense SANDY GRAVEL									
	50		10	SS	20,30 23				

RECORD OF SUBSURFACE EXPLORATION

ect: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM
nt: ALCOSAN Proj No: MAW37229.PD.07
Boring: 223 Date Started: 6/22/95 Date Completed: 6/23/95
Location: See Site Plan
140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop

ELEVATIONS
Ground Surface: 726.8
End of Boring: 674.8

WATER LEVELS
While Drilling: 18.0
At Completion: 16.0
After 24 Hours 16.5

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
Hard Grey/Red SILT		675.7	11	SS	58/6"				
	55								
	60								

ALCOSAN - EPM TEAM

RECORD OF SUBSURFACE EXPLORATION

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM
Client: ALCOSAN Proj No:
Boring: 224 Date Started: 3/14/96 Date Completed: 3/14/96
Location: See Site Plan
140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop

(HDR #2)

ELEVATIONS
Ground Surface: 726.9'
End of Boring: 662.8'

WATER LEVELS
While Drilling: 20.0'
Prior to Core: 21.2', After Core: 15.7'
After 24 Hours: 16.0'

= Shelby Tube = NX Rock Core SS= Split Spoon ST= Shelby Tube, DB = Diamond Bit

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
Brown Silty Clayey FILL with Gravel 1.0									
Coal Cinders and Gravel FILL 5.0	5	721.9	1	SS	3,4 4,3				
Coal Cinders, FILL, Loose, Moist	10	716.9	2	SS	1,1 1,2				
15.0	15	711.9	3	SS	1,1 1,1				
Coal Cinders, FILL, Loose, Wet	20	706.9	4	SS	3,3 5,4				
25.0	25	701.9	5	SS	1,1 2,4			28.1	
Green/Grey Fine Silty SAND, Wet	30	696.9	6	SS	1,1 2,4			28.1	
Traces of Wood and Coal in Samples 5,6,7	35	691.9	7	SS	11,5 9,4			28.1	
40.0	40	686.9	8	SS	7,6 5,5			14.8	
Grey SAND and SILT,w/ Gravel 42.5	45	681.9	9	SS	19,27 36,48			7.7	
Med. Dense Brown/Grey SANDY GRAVEL									

RECORD OF SUBSURFACE EXPLORATION

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM
Client: ALCOSAN Proj No:
Boring: 224 Date Started: 3/14/96 Date Completed: 3/14/96
Location: See Site Plan
140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop (HDR #2)

ELEVATIONS
Ground Surface: 726.9'
End of Boring: 662.8'

WATER LEVELS
While Drilling: 20.0'
Prior to Coring: 21.2', After Coring: 15.7'
After 24 Hours 16.0'

▽▽▽ = Shelby Tube ▨ = NX Rock Core SS= Split Spoon ST= Shelby Tube, DB = Diamond Bit

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
Grey Silty SHALE	51.1		10	SS	27,42, 50/.1				
Grey CLAYSTONE,Extremely Broken	52.1								
Grey SHALE, Broken, Hard Wobble of Cutting Bit is Believed to have Broken Rock Samples	55								
Estimated RQD = 0.50 2 Samples sent for Compression Testing	60	665.6		DB					
64.1									
End of Boring @ 64.1 FT.	65								

Coring Data

Depth	Time (min)	Pull Down Pressure
0-2	13	200 psi
2-4	8	200 psi
4-6	9	200 psi
6-8	14	200 psi
8-10	10	200 psi
10-12	22	300 psi

Begin Rock Core at 52.1 ft
End Rock Core at 64.1 ft

RECORD OF SUBSURFACE EXPLORATION

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM
Client: ALCOSAN Proj No: MAW37229.PD.07
Boring: 225 Date Started: 11/3/95 Date Completed: 11/3/95
Location: See Location Plan
140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop

ELEVATIONS
Ground Surface: 727.3
End of Boring: 679.0

WATER LEVELS
While Drilling: 10.0'
At Completion: 27.7'
After 48 Hours: 9.0'

* Indicates pH, Chloride, Sulfate Sample Collected

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
Brown Silty CLAY w/ Gravel									
Coal Cinder FILL w/ Kiln Bricks & Slag	5		1	SS	8,26 50/.4	ft			
No Sample #2 Retrieved	10	717.3	2	SS	3,2, 2,2				
	15		*3	SS	4,3, 4,4				
Soft Brown Silty CLAY, Wet									
Brown/Grey Mottled Silty CLAY w/ Wood Fibers	20	707.3	*4	SS	4,5, 6,10	3.00	1.75 2.25	24.8	
Some Gravel in Clay at Bottom of Sample #5	25		5	SS	5,6, 6,3	1.95	1.75	20.6	
Brown Clayey SAND	30	697.3	*6	SS	8,21, 14,20				
Dense Brown Sandy Gravel	35		7	SS	7,12, 9,11				
	40	687.3	*8	SS	5,5 4,5				
	45		9	SS	5,8, 11,11				
Fine to Med. Coarse Brwn. Sand									
Grey Siltstone	50		10	SS	50/0.3	ft			

Augur Refusal @ 48.0 ft

ALCOSAN - EPM TEAM

RECORD OF SUBSURFACE EXPLORATION

oject: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM
ent: ALCOSAN Proj No: MAW37229.PD.07
Boring: 226 Date Started: 6/27/95 Date Completed: 6/27/95
Location: See Site Plan
140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop

ELEVATIONS
Ground Surface: 727.2
End of Boring : 679.2

WATER LEVELS
While Drilling: 18.0
At Completion: 25.5
After 24 Hours 9.0

* Indicates pH, Chloride, Sulfate Sample Collected

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
Brown Silty CLAY w/Gravel Traces of Red Brick									
Grey Clayey Silty FILL w/Gravel & Traces of Coal Cinders	5		1	SS	7,9, 11			15.0	
	10	717.2	2*	SS	26,15, 16			15.0	
Brn/Black Clayey FILL w/Gravel, Crushed Red Brick, Kiln Bricks, & Coal Cinders	15		3	SS	8,9, 11			17.9	
			4	SS	6,7,7				
Grey Slag w/ Gravel	20	707.2							
Brown Silty CLAY Shelby Tube #226-1,25'-27' Recovery = 2.0	25		5*	SS	6,7,7	1.50	1.0	25.3	
			6	SS	1,2,2				
Brown Silty Sand w/ Gravel	30	697.2							
			7*	SS	9,11, 12				
Dense Brown Clayey Sandy GRAVEL	35								
			8	SS	11,13, 12				
Dense Brown Sandy GRAVEL	40	687.2							
			9	SS	36,47, 37				
Very Dense Brown SANDY GRAVEL	45								
		679.2							
Small Piece of Grey Shale in end of Sampler	50		10	SS	50/0"				

ALCOSAN - EPM TEAM

RECORD OF SUBSURFACE EXPLORATION

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM
Client: ALCOSAN Proj No: MAW37229.PD.07
Boring: 227 Date Started: 6/28/95 Date Completed: 6/28/95
Location: See Site Plan
140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger 30" Drop

ELEVATIONS
Ground Surface: 726.7
End of Boring: 678.7

WATER LEVELS
While Drilling: 13.0
At Completion: 24.5
After 24 Hours 8.0

* Indicates pH, Chloride, Sulfate Sample Collected

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
Brown Silty Clay w/ gravel									
2" Concrete Mortar @ 4' Black SIlty Clayey FILL w/Gravel, Traces of Red Brick & Coal Cinders	5		1	SS	27,23, 18				
	10	716.7	2*	SS	9,18, 27			15.0	
Grey Black Silty FILL w/ Gravel	15		3	SS	7,5,5			16.9	
Stiff to Very Stiff Brown Clayey SILT Shelby Tube #227-1, 20'-22' Recovery = 2.0'	20	706.7	4*	SS	4,7, 10	2.85	3.25	20.4	
	25		5	SS	5,7, 10	2.64	2.25	20.9	
Firm Brown Sandy SILT w/ Gravel	30	696.7	6	SS	0,8, 10	0.75	1.0	20.4	
Dense Brown Sandy GRAVEL	35		7*	SS	12,12, 15				
Very Dense Brown SAND w/ Gravel and Sandstone	40	686.7	8	SS	19,31, 37				
Grey Sandstone in Bottom of sampler for #8									
Med. Dense Grey Sand & Gravel	45		9	SS	3,4,5				
Med. Dense Brown SAND									
Hard Grey SILT	50		10	SS	50/2				

RECORD OF SUBSURFACE EXPLORATION

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM
Client: ALCOSAN Proj No:
Boring: 228 Date Started: 3/12/96 Date Completed: 3/13/96
Location: See Site Plan
140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop (Baker #2)

ELEVATIONS
Ground Surface: 725.3'
End of Boring: 663.3'

WATER LEVELS
While Drilling: 16.5'
Prior to Core: 18.6', After Core: 16.1'
After 24 Hours: Caved in and Dry 12.9

▨ = Shelby Tube ▨ = NX Rock Core SS= Split Spoon ST= Shelby Tube, DB = Diamond Bit

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
Brown Silty Clayey FILL, Moist 0.8			1		2,5,10				
Black Cinders, Trace Slag & Coal, FILL, Loose, Damp	5	720.3	2	SS	6,6,5				
	10	715.3	3	SS	1,1,2				
16.5	15	710.3	4	SS	4,3,5				
Black Cinders, FILL, Loose, Wet	20	705.3	5	SS	2,2,2				
	25	700.3	6	SS	2,2,3				
30.0	30	695.3	7	SS	1,2,32				
Grey Silty Clay, Soft, Damp 31.0									
Brown/Grey SAND & GRAVEL, DENSE, WET 35.0	35	690.3	8	SS	17,44 15			9.8	
Wet, Med. Dense Brown SAND & GRAVEL 40.0	40	685.3	9	SS	4,4,4			17.8	
Brown/Grey Silty SAND, Loose to Med. Dense , Wet	45	680.3	10	SS	7,7,6			17.8	

RECORD OF SUBSURFACE EXPLORATION

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM
Client: ALCOSAN Proj No:
Boring: 228 Date Started: 3/12/96 Date Completed: 3/13/96
Location: See Site Plan
140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop (Baker #2)

ELEVATIONS
Ground Surface: 725.3'
End of Boring: 663.3'

WATER LEVELS
While Drilling: 16.5'
Prior to Coring: 16.5', After Coring: 16.1'
After 24 Hours: Caved in and Dry 12.9

▨ = Shelby Tube ▨ = NX Rock Core SS= Split Spoon ST= Shelby Tube, DB = Diamond Bit

Soil Description	Depth	Elev.	Sample No	Sample Type	N	Q_u	Q_p	Mc	γ_d
Dense,Wet Grey/Brown SAND&GRAVEL	51.4		11	SS	18,15, 50/.4				
Grey Silty CLAYSTONE Extremely Broken	53.1								
Grey Silty SHALE, RQD = 0.71	55			DB					
Grey Silty SHALE w/ Trace of Limestone, RQD=0.44	60								
62.0									
End of Boring @ 62.0 FT.									

Coring Data

Depth	Time (min)	Pull Down Pressure	Recovery
52-57	16	500 psi	4.5
57-62	16	500 psi	5.0

2 Samples and 1 Spare Collected for Compression Testing, Average Depth = 58 ft

RECORD OF SUBSURFACE EXPLORATION

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM
Client: ALCOSAN Proj No:
Boring: 229 Date Started: 3/12/96 Date Completed: 3/15/96
Location: See Site Plan
140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop (Baker #3)

ELEVATIONS
Ground Surface: 729.4'
End of Boring: 660.2'

WATER LEVELS
While Drilling: 15.0'
Prior to Core: 15.0', After Core: 4.0'
After 24 Hours: N/A

▨ = Shelby Tube ▨ = NX Rock Core SS= Split Spoon ST= Shelby Tube, DB = Diamond Bit

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
4" Concrete									
Black/Brown FILL w/ Cinders and Slag	5	724.4	1	SS	3,4 4,4				
	10	719.4	2	SS	3,1 2,7				
15.0									
Coal Cinders, FILL, Loose, Wet	15	714.4	3	SS	3,4 6,5				
20.0									
Grey/Black Fine Silty SAND, Wet *Petroleum Odor in Sample #4 & #5	20	709.4	4	SS	1,2 2,3			24.2	
3" Grey/Black Silty Clay Seam @ 25'	25	704.4	5	SS	3,4 7,33			24.2	
31.0	30	699.4	6	SS	26,11 17,16			10.5	
Dense, Wet, Brown Fragmented SANDSTONE and GRAVEL									
35.0	35	694.4	7	SS	2,3 3,4			10.5	
Brown SAND & GRAVEL, Wet, Loose - Slightly Compact									
40.0	40	689.4	8	SS	9,7 9,12			13.0	
Med. Dense, med. Coarse Brown SAND, Trace Gravel	45	684.4	9	SS	7,12 16,23			13.0	
Large Rock in End of Sample Spoon for Sample #9			10	SS					
49.2				DB	50/0				
Grey CLAYSTONE Augur Refusal at 49.2									

RECORD OF SUBSURFACE EXPLORATION

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM
Client: ALCOSAN Proj No:
Boring: 229 Date Started: 3/12/96 Date Completed: 3/15/96
Location: See Site Plan
140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop (Baker #2)

ELEVATIONS
Ground Surface: 729.4'
End of Boring: 660.2'

WATER LEVELS
While Drilling: 15.0'
Prior to Coring: 15.0', After Coring: 4.0'
After 24 Hours N/A

▨ = Shelby Tube ▨ = NX Rock Core SS= Split Spoon ST= Shelby Tube, DB = Diamond Bit

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
Soft Grey SHALE, Very Fragmented Trace Clay, RQD = 0.0 54.0									
Red/Grey CLAYSTONE Moderately-Extremely Broken RQD = 0.14 0.5' Sample cut, 58.7-59.2 for Compression Testing 61.8	55	674.4		DB					
Grey/Brown CLAYSTONE Moderately-Extremely Broken 64.2	60	669.4							
Grey Silty SHALE, Hard Moderately Broken*, RQD =0.30 *Many breaks due to wobble of core bit 69.2	65	664.4							
2 - 4" Samples of SHALE sent for Compression Testing	70	660.2							
End of Boring at 69.2 ft									

Coring Data

Depth	Time (min)	Pull Down Pressure
0-2	16	200 psi
2-4	14	200 psi
4-6	13	200 psi
6-8	15	200 psi
8-10	14	200 psi
10-12	16	200 psi
12-14	22	200 psi
14-16	15	200 psi
16-18	7	300 psi
18-20	8	300 psi

Begin Rock Core at 49.2 ft
End Rock Core at 69.2 ft

CORE RUNS
49.2-56.1, Recovery = 4.0
56.1-59.2, Recovery = 3.0
59.2-69.2, Recovery = 9.0

Total Recovery = 16.0

RECORD OF SUBSURFACE EXPLORATION

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM
Client: ALCOSAN Proj No:
Boring: 230 Date Started: 3/14/96 Date Completed: 3/14/96
Location: See Site Plan
140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop (Baker #5)

ELEVATIONS
Ground Surface: 727.0'
End of Boring: 667.6'

WATER LEVELS
While Drilling: 20.0'
Prior to Core: 19.3', After Core: 8.5'
After 24 Hours: N/A

= Shelby Tube = NX Rock Core SS= Split Spoon ST= Shelby Tube, DB = Diamond Bit

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
Brown Silty Clayey FILL,Loose, Damp	1.0		1		2,7,13				
Brown/Grey Silty Clayey FILL, Cinders, Slag, Damp, Med. Dense	5	722.0	2	SS	23,23 12				
Black Cinders, Brick, Rock, Slag, FILL Dense, Dry	10.0								
	10	717.0	3	SS	2,2,2				
Brown Silty Clayey FILL, Cinders Loose, Damp	15	712.0	4	SS	2,2,2				
	20.0								
	20	707.0	5	SS	1,1,2				
Brown Silty SAND, Loose, Wet	23.5								
	25	702.0	6	SS	4,4,4	--	0.50	26.2	95.6 pcf
				ST					
Brown/Grey Sandy Silty CLAY Soft, Moist Shelby Tube 230-1 25.0-27.0, Recovery=2.0	30	697.0	7	SS	3,3,4	0.90	0.50	25.4	95.6 pcf
	36.4								
	35	692.0	8	SS	8,7,6		<0.25		
Brown Silty CLAY w/ Gravel	41.0								
	40	687.0	9	SS	11,12 14			19.9	
Wet, Med. Dense Brown SAND & GRAVEL	45.0								
	45	682.0	10	SS	8,7,9			14.4	
Brown SAND,Trace Gravel, Med. Dense , Wet	48.5		11	SS	50/.4				
Brwn/Grey/Red Silty CLAYSTONE				DB					

RECORD OF SUBSURFACE EXPLORATION

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM
Client: ALCOSAN Proj No:
Boring: 230 Date Started: 3/14/96 Date Completed: 3/14/96
Location: See Site Plan
140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop (Baker #2)

ELEVATIONS
Ground Surface: 727.0'
End of Boring: 667.6'

WATER LEVELS
While Drilling: 20.0'
Prior to Coring: 19.3', After Coring: 8.5'
After 24 Hours: N/A

▨ = Shelby Tube ▨ = NX Rock Core SS= Split Spoon ST= Shelby Tube, DB = Diamond Bit

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γd
Grey/Red/Brown Silty CLAYSTONE, Extremely Broken RQD = 0.17	55			DB					
56.8									
Grey Silty SHALE, Hard Occasionally Broken, RQD = 0.90	59.4								
	60								
End of Boring @ 59.4 FT.									
2 Samples of SHALE taken for Compression Testing									

Coring Data

Depth	Time (min)	Pull Down Pressure	Recovery
49.4-54.4	23	500 psi	4.3'
54.4-59.4	18	500 psi	5.0'

RECORD OF SUBSURFACE EXPLORATION

ALCOSAN - EPM

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM

Client: ALCOSAN Proj No:

Boring: 232 Date Started: 6/4/96 Date Completed: 6/4/96

Location: See Site Plan

140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop

ELEVATIONS

Ground Surface: 728.0'

End of Boring: 662.5'

WATER LEVELS

While Drilling: 19.0'

0 hrs After Core: 15.0'

After 36 Hours: 11.7

= Shelby Tube = NX Rock Core SS= Split Spoon ST= Shelby Tube, DB = Diamond Bit

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
Brown Silty Clay w/ Organics(topsoil)	1.0		1	SS	1, 4, 37,50/.1				
Black Cinders, Slag, FILL	5	723.0	2	SS	4, 5, 6,6				
6" Hard Slag 10.0 - 10.5ft	10	718.0	3	SS	12,21 46,18				
	15	713.0	4	SS	2,2, 2,2				
	20	708.0	5	SS	6,10 4,4				
	23.0								
Grey/Black Clayey SILT, Firm, Trace V. Fine Sand, Damp Trace wood ML	25	703.0	6	SS	2,2, 2,4	0.45	1.0	31.1	81.1PCF
	28.0			ST	Recovery = 1.5 ft				
Grey/Black V.Fine SAND,Trace Silt, Med. Dense, Moist SM	30	698.0	7	SS	2,2, 3,6				
	35.0								
Brown SANDY GRAVEL, Very Dense, Wet SP	35	693.0	8	SS	8,23, 17,19				
	40.0			SS					
Med. Dense, Med. Coarse Brown SAND, some Gravel SM	40	688.0	9	SS	27,19 27,13				
	45	681.0	10	SS	1,2, 5,13				
	49.7		11	SS	8, 50/.4				
Brown Siltstone, Weathered Extremely Broken				DB					

RECORD OF SUBSURFACE EXPLORATION

ALCOSAN - EPM

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM

Client: ALCOSAN Proj No:

Boring: 232 Date Started: 6/4/96 Date Completed: 6/4/96

Location: See Site Plan

140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop

ELEVATIONS

Ground Surface: 728.0'

End of Boring: 662.5'

WATER LEVELS

While Drilling: 19.0'

0 hrs after Coring: 15.0'

After 36 Hours: 11.7

▽▽▽ = Shelby Tube ▨ = NX Rock Core SS= Split Spoon ST= Shelby Tube, DB = Diamond Bit

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
Grey/Red Clayey SILTSTONE, Soft to Med.Hard, Moderately Broken, RQD = 0.71	51.0								
	55	673.0		DB					
55.5 Grey CLAYSTONE, Med.Hard, Moderately Broken, RQD = 0.58									
60.5 Grey Clayey SILTSTONE, Soft, Occ. Broken	60	668.0							
61.8 Grey SANDSTONE, Hard, Very Broken, w/ Lime Nodules @ 61.8-62.3, RQD = 0.0	64.2								
65.5 Grey SILTSTONE, Hard, Occasionally Broken, RQD = 0.32	65								
End of Boring @ 65.5 FT.									
1 Sample of SILTSTONE taken from 65' for Compression Testing									

Coring Data

Depth	Recovery
50.0-55.5	5.0'
55.5-60.5	4.7'
60.5-65.5	4.9

RECORD OF SUBSURFACE EXPLORATION

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM
Client: ALCOSAN Proj No: MAW37229.PD.07
Boring: 233 Date Started: 6/22/95 Date Completed: 6/22/95
Location: See Site Plan
140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop

ELEVATIONS
Ground Surface: 728.0
End of Boring: 677.0

WATER LEVELS
While Drilling: 22.0
At Completion: 24.0
After 24 Hours 17.0

* Indicates pH, Chloride, Sulfate Samples collected

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
Brown Silty CLAY w/ Gravel									
Dense Black Clayey FILL w/ Coal Cinders	5		1	SS	55,30, 33			14.1	
Loose Coal Cinder FILL	10	718.0	2*	SS	2,2,2				
	15		3	SS	1,2,4				
	20	708.0	4	SS	1,1,1				
Grey/Black Clayey SILT (SHELBY TUBE #233-1, 25'-27' Recovery = 2.0')	25		5*	SS	1,2,3		1.0	36.2	
Grey Silty SAND	30	698.0	6	SS	2,3,4				
6" Soft Grey Clayey SILT Seam @34.0 - 34.5', Qp=0.0	35		-	SS	17,30, 47			37.7	
Brown Sandy GRAVEL	40	688.0	8*	SS	8,22, 15				
Med. Coarse Brown/Grey SAND	45		9	SS	7,6, 15				
Brown Sandy Gravel	50	678.0	10	SS	14,14, 8				

RECORD OF SUBSURFACE EXPLORATION

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM
Client: ALCOSAN Proj No: MAW37229.PD.07
Boring: 233 Date Started: 6/22/95 Date Completed: 6/22/95
Location: See Site Plan
140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop

ELEVATIONS
Ground Surface: 728.0
End of Boring: 677.0

WATER LEVELS
While Drilling: 22.0
At Completion: 24.0
After 24 Hours 17.0

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
Hard Grey SILT	55	677.0	11	SS	48, 50/1"				
	60								

ALCOSAN - EPM TEAM

RECORD OF SUBSURFACE EXPLORATION

ALCOSAN - EPM

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM

Client: ALCOSAN Proj No:

Boring: 234 Date Started: 6/5/95 Date Completed: 6/5/96

Location: See Site Plan

140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop

ELEVATIONS

Ground Surface: 728.0'

End of Boring: 662.7'

WATER LEVELS

While Drilling: 16.7'

Prior to Core: 16.7', After Core: 12.8'

After 48 Hours: 16.4

▨ = Shelby Tube ▨ = NX Rock Core SS= Split Spoon ST= Shelby Tube, DB = Diamond Bit

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
Brown Silty Clay w/ Organics(topsoil)	0.6		1	SS	2, 11, 20,29				
Black Cinders, Slag, FILL	5	723.0	2	SS	4, 15, 16,19				
6" Brown Clay Seam @ 15 ft	10	718.0	3	SS	47,71 58,35				
	15	713.0	4	SS	3,3, 9,8				
	19.0								
SM Grey/Brown Mottled Silty Clay w/ Gravel & Cinders, WET	20.0	708.0	5	SS	2,3 3,6	0.90	0.75	24.1	110pcf
Grey Cinders & Slag w/ Gravel, FILL WET	24.0								
Grey Clayey Sand SM Traces of Red Bricks & wood, WET	25	703.0	6	SS	5,4, 6,4				
	28.0		7	SS	3,3, 3,5				
Grey/Black V.Fine Sandy SILT, Med. Dense, Wet SM	30	698.0	8	SS	2,4, 7,7				
	35.0								
Brown SANDY GRAVEL, Very Dense, Wet, some sandstone fragments GP	35	693.0	9	SS	18,37 24,20				
	40.5								
Dense, Med. Coarse Brown SAND, Wet Trace Coal Cinders SW	40	688.0	10	SS	5,11, 14,12				
	45.0								
Dense, Med. Coarse Reddish Brown SAND SP-SM	45	681.0	11	SS	5,11, 14,13				
			12	SS	15,24, 50/.3				

RECORD OF SUBSURFACE EXPLORATION

ALCOSAN - EPM

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM

Client: ALCOSAN Proj No:

Boring: 234 Date Started: 6/5/96 Date Completed: 6/5/96

Location: See Site Plan

140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop

ELEVATIONS

Ground Surface: 728.0'

End of Boring: 662.7'

WATER LEVELS

While Drilling: 16.7'

Prior to Coring: 16.7', After Coring: 12.8'

After 48 Hours: 16.4

= Shelby Tube = NX Rock Core SS= Split Spoon ST= Shelby Tube, DB = Diamond Bit

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
Red/Grey CLAYSTONE, Weathered	51.3								
Grey Silty SHALE, Med. Hard, Ext. Brkn.	52.3								
Grey CLAYSTONE,Soft, Mod. Brkn.	55.3								
Grey Silty SHALE, Med. Hard, Ext. Brkn.	55	673.0		DB					
Grey SANDSTONE, Med.Hard, Mod. Brkn; RQD = 0.29, some lime nodules @ 57'	56.1 / 57.7								
Grey Silty SHALE, Med. Hard, Ext. Brkn.	60	668.0							
Grey Clayey SILTSTONE, Med. Hard, Ext. Brkn., RQD=0.0	60.3 / 63.8								
	65								
Grey SANDSTONE, Hard, Mod. Broken, Interbedded Clay layers RQD = 0.10	65.3								
End of Boring @ 65.3 FT.									

Coring Data

Depth	Recovery
50.3-55.3	3.6'
55.3-60.3	4.4'
60.3-65.3	4.7

RECORD OF SUBSURFACE EXPLORATION

ALCOSAN - EPM

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM

Client: ALCOSAN Proj No:

Boring: 235 Date Started: 6/17/96 Date Completed: 6/17/96

Location: See Site Plan

140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop

ELEVATIONS

Ground Surface: 728.0'

End of Boring: 666.3'

WATER LEVELS

While Drilling: 17.1'

Prior to Core: 17.4'

After 24 Hours: 16.1'

= Shelby Tube = NX Rock Core SS= Split Spoon ST= Shelby Tube, DB = Diamond Bit

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γd (pcf)
Brown Silty Clay w/ Organics(topsoil)	0.6		1	SS	4, 6, 27,43				
Black Cinders,Slag,Sand,FILL	5	723.3	2	SS	11, 24, 22,21				
Trace Bricks in #3	10	718.3	3	SS	4,21, 35,39				
	15	713.3	4	SS	3,2, 2,2				
	20	708.3	5	SS	4,6 4,6				
	24.0		6	SS	2,2 1,1	0.45	0.50	42.1	68.1
Soft Grey/Black Clayey SILT, Moist MH	25	703.3		ST	2.0 Recovery				
	27.0		7	SS	2,3, 3,3				
Grey/Black V.Fine SAND & SILT, Wet ML	30	698.3							
	35.0		8	SS	15,24 24,28				
Brown SANDY GRAVEL, Very Dense, Wet SP	35	693.3							
	40.5		9	SS	18,15 10,10				
Dense, Med. Coarse Brown SAND, Some Gravel, Wet SW-SM	40	688.3							
	45	681.3	10	SS	8,8 14,19				
			11	SS	40,60				

RECORD OF SUBSURFACE EXPLORATION

ALCOSAN - EPM

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM

Client: ALCOSAN Proj No:

Boring: 235 Date Started: 6/17/96 Date Completed: 6/17/96

Location: See Site Plan

140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop

ELEVATIONS
Ground Surface: 727.3'
End of Boring: 666.3'

WATER LEVELS
While Drilling: 17.1'
Prior to Coring: 17.4'
After 24 Hours: 16.2'

= Shelby Tube = NX Rock Core SS= Split Spoon ST= Shelby Tube, DB = Diamond Bit

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
Grey Siltstone, Ext. Brkn.,Weathered, Soft	51.5								
Grey Sandy Siltstone w/ Lime Nodules & Interbedded Clay layers, Mod.-Ext. Brkn, Med. Hard, RQD=0.10	53.5								
Grey Sandstone, Hard,Moderately Brkn., RQD=0.27	55	672.3		DB					
	56.3								
Grey Siltstone w/ Lime Nodules & Interbedded Clay layers, Mod.-Ext. Brkn, Med. Hard, RQD=0.22	59.1								
Grey Sandstone, Ocassionally Brkn., Hard, RQD = 0.57	60	667.3							
	61.0								
End of Boring @ 61.0 FT.	65								

5" Sample of Grey Sandstone taken from 55 ft for testing

Coring Data

Depth	Recovery
51.0-61.0	10.0'

RECORD OF SUBSURFACE EXPLORATION

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM
Client: ALCOSAN Proj No: MAW37229.PD.07
Boring: 236 Date Started: 6/21/95 Date Completed:
Location: 135' S. of Existing Pump Station #6, See Site Plan
140# Hammer, 3.25" I.D. Auger, 7' O.D. Auger, 30" Drop

ELEVATIONS
Ground Surface: 727.5
End of Boring: 676.5

WATER LEVELS
While Drilling: 17.0
At Completion: 22.0
After 24 Hours 17.0

* Indicates pH, Chloride, Sulfate Sample Collected

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
Brown Sandy CLAY w/ gravel & Coal Cinders (FILL)									
	5		1	SS	17,11, 8			16.5	
Coal Cinder FILL									
	10	717.5	2*	SS	3,4,3				
	15		3	SS	2,2,3				
	20	707.5	4	SS	2,2,1				
Grey/Black Clayey SILT (SHELBY TUBE #236-1, 25'-27' Recovery = 2.0')	25		5	SS	1,1,1		0.75	36.2	
Fine Grey SAND	30	697.5	6*	SS	2,6,8				
3" Fine Grey CLAY SEAM @ 35.0', Qp=0.50. Note: Fragments of Sandstone in bottom of sampler @ 35.0'	35		7	SS	2,18 36				
Grey SAND & GRAVEL	40	687.5	8	SS	8,11, 10				
Fine Grey SAND									
Brown Sandy GRAVEL	45		9	SS	7,11, 13				
Med. Coarse Brown SAND	50		10	SS	8,10, 15				

ALCOSAN - EPM TEAM

RECORD OF SUBSURFACE EXPLORATION

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM
Client: ALCOSAN Proj No: MAW37229.PD.07
Boring: 236 Date Started: 6/22/95 Date Completed: 6/22/95
Location: See Site Plan
140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop

ELEVATIONS
Ground Surface: 727.5
End of Boring: 676.5

WATER LEVELS
While Drilling: 17.0
At Completion: 22.0
After 24 Hours 17.0

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
Hard Grey SILT	55 60	676.5	11	SS	57/6"				

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RECORD OF SUBSURFACE EXPLORATION

ALCOSAN - EPM

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM

Client: ALCOSAN Proj No:

Boring: 237 Date Started: 6/17/96 Date Completed: 6/18/96

Location: See Site Plan

140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop

ELEVATIONS
Ground Surface: 727.3'
End of Boring: 662.3'

WATER LEVELS
While Drilling: 17.2'
At 0 hours after coring: 9.5'
After 24 Hours: 14.8'

▨ = Shelby Tube ▨ = NX Rock Core SS= Split Spoon ST= Shelby Tube, DB = Diamond Bit

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
Brown Silty Clay w/ Organics(topsoil) 0.6			1	SS	2, 5, 5,6				
Black Cinders,Slag,Sand,FILL	5	723.3	2	SS	8, 3, 4,3				
Trace Clay in #2 9.5									
Olive SILT w/ Traces of Cinders & Bricks ML 11.5	10	718.3	3	SS	5,2,4,6		2.50	23.1	
			4	SS	5,6,7,8				
Dk. Brown Clayey Sandy FILL w/ Slag & Trace Bricks	15	713.3							
	20	708.3	5	SS	4,6 14,15				
24.0						0.60			
Soft Grey/Black Clayey SILT, Moist MH 27.0	25	703.3	6	SS	2,2,2,4		0.50	43.0	
				ST	2.0 Recovery				
Grey V.Fine Silty SAND, Trace Coal and Slag, Med. Dense, Wet SM	30	698.3	7	SS	3,4, 3,7				
34.5									
Grey/Brown SANDY GRAVEL, Dense, Wet SP 35.5	35	693.3	8	SS	11,13 26,46				
Brown GRAVEL, Very Dense, Damp GW 39.0									
Dense, Brown GRAVEL, Some Med. Coarse Sand, Wet GW	40	688.3	9	SS	4,6 6,9				
44.0									
Med. Coarse Brown SAND w/ Some small Gravel, Med. Dense, Wet SW-SM	45	681.3	10	SS	7,6,7,8		No Recovery in #10		
			11	SS	6,5,6,5				

RECORD OF SUBSURFACE EXPLORATION

ALCOSAN - EPM

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM

Client: ALCOSAN Proj No:

Boring: 237 Date Started: 6/17/96 Date Completed: 6/18/96

Location: See Site Plan

140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop

ELEVATIONS
Ground Surface: 727.3'
End of Boring: 662.3'

WATER LEVELS
While Drilling: 17.1'
Prior to Coring: 9.5'
After 24 Hours: 14.8'

= Shelby Tube = NX Rock Core SS= Split Spoon ST= Shelby Tube, DB = Diamond Bit

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
			12	SS	50/.3				
Coring Data	55	672.3		DB					
Depth | Recovery	60	667.3							
50.3-57.0 4.7'	65	662.3							
57.0-65.0 7.8'									
End of Boring @ 65.0 FT.									

50.0-51.0	Grey Silty Shale, Weathered, Extremely Broken
51.0-53.6	Grey Claystone, Soft
53.6-54.1	Grey Siltstone, Med. Hard, Extremely Broken
54.1-54.9	Grey Sandstone, Hard, Occassionally Broken, RQD = 0.70
54.9-55.3	Grey Claystone, Soft
55.3-56.3	Grey Siltstone w/ Lime Nodules & Interbedded Clay Layers, Hard, RQD = 0.33
56.3-56.7	Grey Sandstone, Hard, RQD = 0.95
56.7-57.1	Grey Silty Shale, Extremely Broken, Soft-Med. Hard
57.1-62.9	Grey Sandstone, Moderately Broken, Hard, RQD = 0.49
62.9-65.0	Grey Sandy Siltstone, Med. Hard to Hard, Moderatley Broken, RQD = 0.13

RECORD OF SUBSURFACE EXPLORATION

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM
Client: ALCOSAN Proj No: MAW37229.PD.07
Boring: 238 Date Started: 11/6/95 Date Completed: 11/6/95
Location: See Location Plan
140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop

ELEVATIONS
Ground Surface: 727.8
End of Boring: 679.4

WATER LEVELS
While Drilling: 25.0'
At Completion: 24.7'
After 24 Hours: N/A

* Indicates pH, Chloride, Sulfate Sample Collected

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
Brown Silty CLAY w/ Organics									
Black Cinder FILL									
6" SLAG @ 5.0 ft	5		1	SS	3,33, 34, 50/.2				
Black Cinder FILL									
Brown Clayey FILL w/ Slag & Coal Cinders	10	717.8	*2	SS	1,2, 2,2				
Brown Silty CLAY	15		3	SS	4,3, 5,6	3.68	3.0 Lab 2.0 Field	21.9	
Brown/Grey Mottled Clayey SILT	20	707.8	*4	SS	4,7, 10,10	1.92	2.0	19.6	
Brown Silty SAND, Wet	25		5	SS	1,2, 2,1				
Dense Brown SAND & Gravel, Wet	30	697.8	*6	SS	19,19 19,20				
Med. Dense Brown Gravel, Wet	35		7	SS	9,9, 8,8				
Dense Brown Sandy Gravel w/ Shale Fragments, Wet	40	687.8	*8	SS	9,14, 16,24				
Med. Dense, Med. Coarse Brown SAND, Wet	45		9	SS	2,3, 4,5				
Hard Grey SILT	50		*	SS	50/0.4				

RECORD OF SUBSURFACE EXPLORATION

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM
Client: ALCOSAN Proj No: MAW37229.PD.07
Boring: 239 Date Started: 6/26/95 Date Completed: 6/27/95
Location: See Site Plan
140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop

ELEVATIONS
Ground Surface: 727.8
End of Boring: 678.1

WATER LEVELS
While Drilling: 28.0
At Completion: 19.0
After 24 Hours 16.0

* Indicates pH, Chloride, Sulfate Sample Collected

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γd
Brown Silty CLAY w/ Gravel									
Black Clayey FILL w/ Gravel	5		1	SS	7,10, 14			15.0	
Brown Clayey SILT	10	717.8	2*	SS	5,7,6	0.51	0.25	15.8	
Shelby Tube #239-1, 10'-12' Recovery = 2.0	15		3	SS	2,2,5	0.98	0.50	23.4	
Fine Grey SAND	20	707.8	4*	SS	3,3,3				
Fine to Medium Coarse Brown SAND	25		5*	SS	3,3,5				
Dense Medium Brown SAND & Gravel	30	697.8	6	SS	4,3, 10				
Very Dense Brown SAND & GRAVEL w/ Traces of Coal	35		7	SS	23,29 26				
Sandstone & Gravel	40	687.8	8	SS	42, 50/6"				
Dense Med. Coarse Brown SAND	45		9	SS	5,7, 10				
Hard Grey SILT @ 49.7'	50		10	SS	7,9 50/2"				

ALCOSAN - EPM TEAM

RECORD OF SUBSURFACE EXPLORATION

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM
Client: ALCOSAN Proj No: MAW37229.PD.07
Boring: 240 Date Started: 11/1/95 Date Completed: 11/1/95
Location: See Location Plan
140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop

ELEVATIONS
Ground Surface: 728.0
End of Boring: 677.7

WATER LEVELS
While Drilling: 21.0'
At Completion: 33.1'
After 24 Hours: 16.5'

* Indicates pH, Chloride, Sulfate Sample Collected

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
Dk. Brn. Silty CLAY w/ Gravel & Organics (Topsoil)									
	5		1	SS	5,4, 5,4				
Med. Dense Blk. Cinder FILL w/ Traces of Kiln Bricks									
	10	718.0	*2	SS	4,5, 8,9	0.40	2.25	17.9	
Stiff to Very Stiff Brown Silty CLAY									
	15		3	SS	2,3, 3,4	0.96	1.75	18.2	
	20	708.0	*4	SS	2,3, 5,6	0.52	0.0	23.1	
Med. Dense, Wet, Fine Coarse Brown Clayey SAND	25		5	SS	2,6, 6,6				
	30	698.0	*6	SS	9,18, 21,11				
Very Dense, Wet, Brown SAND & GRAVEL	35		7	SS	20,24 35,35				
No Sample #8 Retrieved in Spoon	40	688.0	8	SS	50/0				
Brown SAND & GRAVEL	45		*9	SS	3,6, 7,8				
Hard Grey SILT @ 50.0'	50		10	SS	50/3"				

END OF BORING @ 50.3'

ALCOSAN - EPM TEAM

RECORD OF SUBSURFACE EXPLORATION

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM
Client: ALCOSAN Proj No: MAW37229.PD.07
Boring: 241 Date Started: 6/26/95 Date Completed: 6/26/95
Location: See Site Plan
140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop

ELEVATIONS
Ground Surface: 728.2
End of Boring: 688.2

WATER LEVELS
While Drilling: 25.0
At Completion: 37.0
After 24 Hours 13.5

* Indicates pH, Chloride, Sulfate Sample Collected

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
Brown Silty CLAY w/ Gravel									
Brown Clayey FILL w/ Gravel, Slag, Coal Cinders, & Traces of Red Brick	5		1	SS	6,7,9			17.0	
	10	718.2	2*	SS	2,3,3			18.6	
Brown/Tan Mottled Silty CLAY	15		3	SS	3,4,5	1.42	1.0	21.8	
Shelby Tube #241-1, 15'-17' No Recovery									
Loose Fine Brown Silty SAND	20	708.2	4	SS	2,3,2			23.0	
Very Dense Grey/Tan Mottled Silty Clayey SAND	25		5*	SS	5,31, 6				
Dense Brown Sandy Gravel	30	698.2	6	SS	10,11, 15				
Very Dense Brown Clayey SAND w/ Gravel	35		7	SS	9,19, 11				
	40	688.2	8	SS	21,37, 50/.2	ft			
Hard Grey/Purple SILT	45								
	50								

ALCOSAN - EPM TEAM

RECORD OF SUBSURFACE EXPLORATION

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM
Client: ALCOSAN Proj No: MAW37229.PD.07
Boring: 242 Date Started: 6/23/95 Date Completed: 6/26/95
Location: See Site Plan
140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop

ELEVATIONS
Ground Surface: 728.2
End of Boring: 680.2

WATER LEVELS
While Drilling: 18.0
At Completion: 28.0
After 24 Hours 16.0

* Indicates pH, Chloride, Sulfate Sample Collected

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
Brown Silty CLAY w/ Gravel & Traces of Red Brick	5		1	SS	12,14, 12				
Crushed Red Brick									
Brown/Black Mottled Clayey FILL	10	718.2	2	SS	1,2,2			27.7	
Brown Silty CLAY	15		3*	SS	5,5,5	0.98	0.75	27.4	
Shelby Tube #242-1, 15'-17' Recovery = 1.5'									
Soft Grey Sandy CLAY	20	708.2	4	SS	1,1,1		0.0	22.0	
Shelby Tube #242-2, 20'-22' Recovery = 2.0'									
Grey Silty SAND	25		5	SS	2,2,3				
Grey Silty SAND w/Gravel	30	698.2	6	SS	4,5, 11				
Grey Clayey SILT w/ Gravel	35		7	SS	16,11, 11	3.12	3.75	12.8	
Grey Sandy SILT w/ Gravel	40	688.2	8	SS	2,2,2		1.50	18.8	
Shelby Tube #243-3, 40'-42' No Recovery									
Grey SHALE	45		9*	SS	43,10 11				
Hard Grey SILT w/ Shale	50		10	SS	50/0.2ft				

ALCOSAN - EPM TEAM

RECORD OF SUBSURFACE EXPLORATION

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM
Client: ALCOSAN Proj No: MAW37229.PD.07
Boring: 242-A Date Started: 11/1/95 Date Completed: 11/1/95
Location: See Location Plan

140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop

ELEVATIONS
Ground Surface: 728.2
End of Boring: 686.2

WATER LEVELS
While Drilling: 21.0'
At Completion: 31

* Indicates pH, Chloride, Sulfate Sample Collected

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
Brown Silty CLAY	10	718.2	*1	SS	3,2, 2,3	1.35	1.00	26.0	
Fine Grey Clayey SAND, Wet	20	708.2	*2	SS	0,1, 1,1				
Dense to Very Dense Grey SANDY GRAVEL w/ Trace of Red Gravel in end of Sampler	30	698.2	*3	SS	8,11, 12,11				
	40	688.2	*4	SS	1,1, 1,5				

ALCOSAN - EPM TEAM

RECORD OF SUBSURFACE EXPLORATION

ALCOSAN - EPM

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM

Client: ALCOSAN Proj No:

Boring: 243 Date Started: 6/18/96 Date Completed: 6/18/96

Location: See Site Plan

140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop

ELEVATIONS

Ground Surface: 728.1'

End of Boring: 662.3'

WATER LEVELS

While Drilling: 16.0'

At 0 hours after coring: 0.00'

After 24 Hours: 0.00'

= Shelby Tube = NX Rock Core SS= Split Spoon ST= Shelby Tube, DB = Diamond Bit

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
Brown Silty Clay w/ Organics(topsoil) 0.6			1	SS	3, 8, 14,11				
Black Cinders,Slag,Sand,FILL 9.0	5	723.1	2	SS	5, 4, 4,6				
Grey Clayey SILT, Stiff, Moist ML 14.0	10	718.1	3	SS	4,6, 8,10	1.72	1.75	21.7	106pcf
CL Grey/Brown Sandy CLAY 15.0	15	713.1	4	SS	3,5, 4,6	0.90	--	21.0	
Brown Clayey Fine SAND, Slightly Compact, Damp SM 25.0	20	708.1	5	SS	3,3 2,2				
Loose Fine Grey Clayey SAND, Wet SP-SC 29.0	25	703.1	6	SS	0,1,2,1				
Grey V.Fine Silty SAND, Dense, Wet SM 35.0	30	698.1	7	SS	8,15, 11,9				
3" Weathered Sandstone 35.3	35	693.1	8	SS	5,10 15,33				
See Page 2 for Rock Core Information	40	688.1	9	SS	13,17 50/.3				
	45	681.1		DB					

RECORD OF SUBSURFACE EXPLORATION

ALCOSAN - EPM

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM

Client: ALCOSAN Proj No:

Boring: 243 Date Started: 6/18/96 Date Completed: 6/18/96

Location: See Site Plan

140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop

ELEVATIONS

Ground Surface: 728.1'

End of Boring: 662.3'

WATER LEVELS

While Drilling: 16.0'

Prior to Coring: 0.0'

After 24 Hours: 0.0'

▽▽▽ = Shelby Tube ▨ = NX Rock Core SS= Split Spoon ST= Shelby Tube, DB = Diamond Bit

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
Coring Data Depth / Recovery 40.3-49.3 / 8.3' 59.3-53.3 / 3.8' End of Boring @ 53.3 FT.	55 60 65	673.1	▨	DB					

40.3-41.6 Grey Siltstone, Weathered, Extremely Broken, Soft

41.6-47.7 Grey Sandstone, Hard, Moderately Broken, RQD = 0.28

47.7-49.1 Grey Sandstone w/ Mica, Very Hard, Occasionally Broken, RQD = 0.71

49.1-50.7 Grey/Black Shale, Med. Hard, Moderately-Extremely Broken

50.7-53.3 Grey Sandstone, Some Mica, Very Hard, Occassionally Broken, RQD = 0.38

2" Clayseam At 52.0 feet

11.5" Grey Sandstone w/ Mica Sample taken from 48 ft for testing

RECORD OF SUBSURFACE EXPLORATION

ect: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM

it: ALCOSAN Proj No: MAW37229.PD.07

Boring: 244 Date Started: 6/16/95 Date Completed: 6/21/95

Location: 20' N. of Pier @ McKees-Rock Bridge, See Site Plan

140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop

ELEVATIONS

Ground Surface: 727.5

End of Boring: 679.5

WATER LEVELS

While Drilling: 25.0

At Completion: 27.5

After 24 Hours 16.5

* Indicates pH, Chloride, Sulfate Sample Collected

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
Brown Silty CLAY w/ Gravel									
Brown/Black Sandy FILL w/ Gravel & Coal Cinders	5		1	SS	5,6,2				
	10	717.5	2*	SS	2,2,2			31.9	
COAL CINDER FILL	15		3	SS	3,3,2				
	20	707.5	4	SS	1,1,1				
Brown/Grey Sandy FILL	25		5	SS	6,6,6				
Black/Grey Silty CLAY w/ Gravel & Traces of Coal	30	697.5	6	SS	4,5,9			26.6	
Fine Grey/Black SAND	35		7*	SS	9,22, 35				
Grey Sandy Gravel	40	687.5	8	SS	8,9, 13				
Fine to Med. Coarse Grey SAND	45		9	SS	9,8, 14				
REFUSAL, No Sample Retrieved	50				50/1"				

ALCOSAN - EPM TEAM

RECORD OF SUBSURFACE EXPLORATION

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM
Client: ALCOSAN Proj No: MAW37229.PD.07
Boring: 245 Date Started: 11/1/95 Date Completed: 11/1/95
Location: See Location Plan
140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop

ELEVATIONS
Ground Surface: 727.5
End of Boring: 679.0

WATER LEVELS
While Drilling: 21.0'
At Completion: 17.6'
After 24 Hours: 16.5'

* Indicates pH, Chloride, Sulfate Sample Collected

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
Brn. Silty CLAY w/ Gravel & Organics (Topsoil)									
Black Clayey FILL	5		1	SS	2,3, 2,2				
Black Cinders & Slag FILL	10	717.5	*2	SS	11,6, 5,3				
Traces of Red Brick in Sample #3	15		3	SS	1,2, 1,1				
	20	707.5	*4	SS	1,0, 1,1				
	25		5	SS	1,2, 1,2				
	30	697.5	*6	SS	10,2, 3,2				
Grey/Brown SANDSTONE w/ Shale Fragments, Wet	35		7	SS	18,15, 16,10				
Grey/Brown SANDY GRAVEL, Wet	40	687.5	*8	SS	11,23 21,14				
Grey SANDSTONE & Fragments of SHALE, Wet	45		9	SS	18,7, 9,9				
Dense Brown SAND w/gravel #9									
Dense Grey SAND w/ Gravel #9A									
AUGUR REFUSAL @ 48.5'	50								

END OF BORING @ 50.3'

ALCOSAN - EPM TEAM

RECORD OF SUBSURFACE EXPLORATION

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM
Client: ALCOSAN Proj No: MAW37229.PD.07
Boring: 246 Date Started: 6/21/95 Date Completed: 6/21/95
Location: 230' N. of Pier @ McKees-Rock Bridge, See Site Plan
140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop

ELEVATIONS
Ground Surface: 727.4
End of Boring: 678.9

WATER LEVELS
While Drilling: 18.0
At Completion: 17.0
After 24 Hours 18.0'

* Indicates pH, Chloride, Sulfate Sample Collected

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
Brown Silty CLAY w/ Gravel & traces of Coal Cinders									
Brown Sandy Gravel (FILL)	5		1	SS	4,7,7				
* @ 9'									
	10	717.4	2	SS	3,4,4				
Coal Cinders & Gravel FILL									
	15		3	SS	2,2,1				
	20	707.4	4	SS	1,1,1				
	25		5	SS	1,1,2				
	30	697.4	6	SS	4,3,3				
(Pieces of Kiln Brick in End of Sampler)	35		7	SS	2,3, 22				
Grey Silty CLAY w/ Gravel	40	687.4	8*	SS	2,2,2	0.30	0.25	25.0	
SHELBY TUBE #246-1, 40'-42' 1.7' Recovery	45		9	SS	2,20, 33		0.75	25.7	
Sandstone @ 48.5'	50			SS	50/0"				

ALCOSAN - EPM TEAM

RECORD OF SUBSURFACE EXPLORATION

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM
Client: ALCOSAN Proj No:
Boring: 247 Date Started: 3/13/96 Date Completed: 3/13/96
Location: See Site Plan
140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop (GF#1)

ELEVATIONS
Ground Surface: 727.5'
End of Boring: 669.0'

WATER LEVELS
While Drilling: 19.0'
Prior to Core: 18.0', After Core: 17.5'
After 24 Hours:Caved in, Dry 14.2'

▨ = Shelby Tube ▨ = NX Rock Core SS= Split Spoon ST= Shelby Tube, DB = Diamond Bit

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
Brown Silty FILL,Med. Dense, Moist	1.0		1	SS	1,4,8				
	5	722.5	2	SS	1,2,2				
Black Cinders, FILL, Trace Sand, Loose	10	717.5	3	SS	3,4,4				
	15	712.5	4	SS	2,1,2				
20.0	20	707.5	5	SS	1,1,2				
Black Cinders, FILL, Loose, Wet	25	702.5	6	SS	4,3,4				
	30	697.5	7	SS	4,4,3				
36.0	35	692.5	8	SS	14,9,8			13.3	
			9	SS	2,6,3			13.3	
Wet, Med. Dense Grey/Brown SAND & GRAVEL 41.0	40	687.5	10	SS	2,4,9			13.3	
Grey Gravel,Trace Sand, Dense , Wet 46.0	45	682.5	11	SS	6,7,8				
Dense Brown SAND & GRAVEL 47.5			12	SS	7,12				
Grey CLAYSTONE	48.5								
Grey SANDSTONE, RQD = 0.69			▨	DB	50/.3				

AUGUR REFUSAL AT 48.5
BEGIN ROCK CORE AT 48.5

RECORD OF SUBSURFACE EXPLORATION

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM
Client: ALCOSAN Proj No:
Boring: 247 Date Started: 3/13/96 Date Completed: 3/13/96
Location: See Site Plan
140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop (GF#1)

ELEVATIONS
Ground Surface: 727.5'
End of Boring: 669.0'

WATER LEVELS
While Drilling: 19.0'
Prior to Coring: 18.0', After Coring: 17.5'
After 24 Hours:Caved in, Dry 14.2'

▨ = Shelby Tube ▨ = NX Rock Core SS= Split Spoon ST= Shelby Tube, DB = Diamond Bit

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
Grey SANDSTONE RQD = 0.69 53.5									
Grey SANDSTONE RQD = 0.76 58.5	55			DB					
End of Boring @ 58.5 FT.	60	669.0							
0.1' Grey Claystone seam 56.2-56.3									
0.3' Grey Claystone seam 57.5-57.8									

Coring Data

Depth	Time (min)	Pull Down Pressure	Redovery
48.5-53.5	9	500 psi	5.0
53.5-58.5	9	500 psi	5.0

RECORD OF SUBSURFACE EXPLORATION

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM
Client: ALCOSAN Proj No: MAW37229.PD.07
Boring: 248 Date Started: 6/16/95 Date Completed: 6/16/95
Location: See site Plan
140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop

ELEVATIONS
Ground Surface: 727.5
End of Boring 677.5

WATER LEVELS
While Drilling: 20'
At Completion: 23'
After 80 Hours Hole caved in @ 10'

* Indicates pH, Chloride, Sulfate Sample Collected

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
Brown Silty Sandy CLAY w/ Gravel									
6" Grey Sandy Clayey FILL 2" Brown Sandy Clayey FILL	5		1	SS	6,5,5			9.7	
Black Sandy FILL w/ Coal 1"Brown/Tan Mottled Fine Sand in bottom of sampler	10	717.5	2	SS	1,1,1			6.4	
Fine Black Sandy FILL w/ Coal Cinders									
	15		3	SS	1@18"				
Fine Brown Sandy Silty FILL w/ traces of Coal	20	707.5	4*	SS	2,1,1				
Brown Sand & Gravel FILL w/ traces of Coal NOTE: Large (>4" DIA) Pieces of slag encountered by augur @ 33'	25		5	SS	1,1,6				
	30	697.5	6	SS	4,3,4				
	35		7	SS	4,20,13				
Damp Grey Clayey SILT Attempted Shelby tube #248-1 from 40'-42', NO RECOVERY.	40	687.5	8*	SS	2,2,2	0.45	0.50	18.2	
Fine Wet Grey Clayey Sand	45		9	SS	2,4,9				
Grey Sandstone @ 50 FT	50	677.5	10		50@0"				

ALCOSAN - EPM TEAM

RECORD OF SUBSURFACE EXPLORATION

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM
Client: ALCOSAN Proj No: MAW37229.PD.07
Boring: 249 Date Started: 6/16/95 Date Completed: 6/16/95
Location: See Site Plan
140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop

ELEVATIONS
Ground Surface: 727.5
End of Boring 677.0'

WATER LEVELS
While Drilling: 18.5'
At Completion: 20'
After 80 Hours 17'

* Indicates pH, Chloride & Sulfate Test Sample Collected

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
Brown Silty Clayey FILL w/ Gravel & Traces of Organics & COAL CINDERS	5		1	SS	18,12, 10			9.0	
	10	717.5	2*	SS	3,5, 10			12.2	
(Sample #3) 4"Crushed RED BRICK @ 14.5'	15		3	SS	16,11 6				
COAL CINDERS & Sandy FILL	20	707.5	4	SS	1,1,1				
	25		5	SS	1,1,1				
	30	697.5	6	SS	2,2,2				
Large Rock Recovered in Bottom End Of Sampler	35		7	SS	2,5, 15				
			8*	SS	1,3,1		0.25	21.5	
Wet Grey Clayey SILT SHELBY TUBE #249-1 (40'-42')	40	687.5							
Fine Silty SAND			9	SS	2,3,4			19.6	
Wet Grey Clayey SILT	45								
Grey Clayey Sand w/Gravel SHELBY TUBE #249-2 (43.5-44.4')			10	SS	9,13, 14				
Grey SANDSTONE @ 50.5'	50	677	11	SS	53@6"				

RECORD OF SUBSURFACE EXPLORATION

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM

Client: ALCOSAN Project Number: MAW37229.PD.07

Boring: 250 Date Started: 6/13/95 Date Completed: 6/13/95

Location: See Site Plan

140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop

ELEVATIONS
Ground Surface: 727.8'
End of Boring: 678.8'

WATER LEVELS
While Drilling: 27'
At Completion: 32.5'
After 24 Hours: 18'

* Indicates pH, Chloride, Sulfate Sample Collected

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
2" ASPHALT									
Firm Dark Brown Silty Sandy CLAY w/gravel	5	722.8	1	SS	3,2,2	--	1.0	19.3	
			*2	SS	11,15, 12	--	--	12.2	
Brown Sandy Silty FILL w/Traces of COAL & Gravel	10	717.8							
Dk.Brown Silty Sandy CLAY								20.3	#3
4" Lt.Brown CLAY-3A	15		3,3A	SS	2,14, 27	--	1.5	19.0	#3A
COAL FILL									
Dk.Brown Sandy Clayey FILL w/Gravel	20	707.8	4	SS	10,17, 16	--	1.0	14.8	
6" Dk.Brown Sandy Clayey FILL	25		5	SS	12, 50@1"	--	--	13.4	
Sandy GRAVEL	30	697.8	6	SS	6,6,6	--	--	18.7	
3" Fine Brown SAND									
Clean Fine Brown Clayey SAND	35		7A,7B	SS	15,27, 31	--	--	27.9	#7B
6" COAL-7A									
6" Grey SAND-7B	40	687.8	8	SS	54, 50@3"	--	--	--	
Fine Clayey Sandy GRAVEL									
			9	SS	4,6,11	1.05	1.25	25.6	
Grey Silty CLAY	45								
Grey Clayey SAND w/Gravel									
Fine Brown SAND			10	SS	70@4"	--	--	--	
ROCK @ 49.0	50	678.8							

ALCOSAN - EPM TEAM

RECORD OF SUBSURFACE EXPLORATION

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM
Client: ALCOSAN Project Number: MAW37229.PD.07
Boring: 251 Date Started: 6/13/95 Date Completed: 6/13/95
Location: Between existing EF S-4 & EF S-5, See site plan
140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop

ELEVATIONS
Ground Surface: 727.8'
End of Boring: 679.8'

WATER LEVELS
While Drilling: 23.5 feet
At Completion: 28.67 feet
After 24 Hours 18.0 feet

* Indicate pH, Chloride, Sulfate sample collected

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
2" ASPHALT									
Dk.Brown Sandy Silty CLAY w/gravel	5		1	SS	3,5,4		0.25	17.4	
Blk/Brown FILL- 2A (Some COAL cinders)									
3" Soft Shale ROCK-2B			*2	SS	12,11, 10			15.0	
Brown Sandy Clayey FILL Material	10	717.8							
Grey/Brown Sandy Clayey FILL (3" COAL Cinder Seam @ 14.5')	15		3	SS	12,11, 12			17.2	
	20		4	SS	14,14, 15			16.5	
		707.8							
Brown Sandy Clayey FILL w/ Gravel	25		5	SS	2,2,2			22.9	
Brown Sandy GRAVEL-6A									
COAL cinders-6B	30	697.8	6	SS	3,3,4				
Fine Grey SAND-7A									
Fine SAND w/Large Gravel-7B	35		7A,B	SS	43,50, 54				
Grey Brown SAND w/Gravel	40	687.8	8	SS	7,15, 8				
Grey Silty CLAY w/Gravel	45		9	SS	2,5,5		0.50	20.5	
Fine Brown Clayey SAND-10A					38				
Sandstone ROCK-10B	50	679.8	10A,B	SS	55@2"				

ALCOSAN - EPM TEAM

RECORD OF SUBSURFACE EXPLORATION

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM
Client: ALCOSAN Proj No:
Boring: 252 Date Started: 3/6/96 Date Completed: 3/6/96
Location: See Site Plan
140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop (GF #5)

ELEVATIONS
Ground Surface: 727.2'
End of Boring: 691.8'

WATER LEVELS
While Drilling: 30.0'
At Completion: 30.4'
After 24 Hours: 22.0'

SS = SPLIT SPOON, ST = SHELBY TUBE, DB = DIAMOND BIT

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
4" Asphalt , 6" Brown Fill w/SAND & Gravel 0.8									
Grey Fill w/Slag & Gravel, Trace CLAY 6.5	5	722.2	1	SS	5,3, 2,1				
Grey/Black/Tan Mottled Silty Clayey Fill 10.0	10	717.2	2	SS	2,2 3,5				
Brown Clayey FILL w/Gravel, Coal & Trace of Slag	15	712.2	3	SS	3,2, 1,1				
21.0	20	707.2	4	SS	1,1, 1,1	--	0.0	23.5	97 PCF
Very Soft Damp, Brown Silty CLAY	25	702.2	5	SS	1,2, 2,3	--	0.0	23.5	97 PCF
31.5	30	697.2	6	SS	9,25, 19,48			6.3	
Very Dense Grey GRAVEL w/CLAY Large Rock 6" Up from Bottom of Spoon in Sample #6 35.0	35	692.2	7	SS	50/.4				
Red/Grey/Tan CLAYSTONE 35.4									
Augur Refusal @ 35.4 FT.	40								
	45								
	50								

RECORD OF SUBSURFACE EXPLORATION

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM
Client: ALCOSAN PROJECT NO.: MAW37229.PD.07
Boring: 253 Date Started: 6/14/95 Date Completed: 6/14/95
Location: Between Existing EFS-4 & EFS-5 Tanks, East of Road
140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop

ELEVATIONS
Ground Surface: 727.8'
End of Boring: 680.1'

WATER LEVELS
While Drilling: 20'
At Completion: 39'
After 24 Hours 19'

* Indicates pH, Chloride, Sulfate Sample Collected

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
2" ASPHALT									
Brown Sandy Silty Clayey FILL w/Traces of COAL Cinders	5		1	SS	4,7,9			17.7	
	10	717.8	*2	SS	7,8, 14			13.7	
	15		3	SS	9,12, 21			15.2	
Brown Sandy Clayey FILL w/SANDSTONE Fragments	20	707.8	4	SS	19,26, 22				
Brown Silty Clayey FILL w/PEBBLES & Traces of COAL Cinders & Red BRICK	25		5	SS	11,25, 50@2"			14.7	
Fine-Med. Coarse Black SAND	30	697.8	6	SS	2,2,2				
COAL Cinders									
4"Fine Brown Clayey SAND @34'			7	SS	14,21, 22				
Dense Fine Brown SAND w/Large Size GRAVEL	35								
#8 NO SAMPLE RECOVERED	40	687.8	8	SS	8,10, 14				
Sandy GRAVEL									
Grey Silty CLAY w/Small PEBBLES	45		9	SS	4,6,9		1.0	20.4	
SANDSTONE ROCK @ 47'9"	50	680.1	10	SS	50@3"				

ALCOSAN - EPM TEAM

RECORD OF SUBSURFACE EXPLORATION

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM
Client: ALCOSAN Proj No: MAW37229.PD.07
Boring: 254 Date Started: 6/14/95 Date Completed: 6/15/95
Location:
140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop

ELEVATIONS
Ground Surface: 726.3'
End of Boring: 679.8'

WATER LEVELS
While Drilling: 20'
At Completion: 17.7'
After 24 Hours 18.0

* Indicates pH, Chloride, Sulfate Sample Collected

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
8"Brown Sandy Silty CLAY w/Gravel & Organics(TOPSOIL)									
3" COAL Cinders	5		1	SS	10,23, 19				
4"Fine to Med. Coarse Crushed RED BRICK									
3"Coal Cinders Gravel @ 9'			*2	SS	11,5, 5				
Crushed RED BRICK	10	716.3							
Brown Sandy Clayey FILL w/Traces of RED BRICK & COAL CINDERS	15		3	SS	5,7, 12			17.4	
Grey Sandy FILL w/SANDSTONE Fragments & Gravel	20	706.3	4	SS	1,1,1				
7" Seam of Fine Sandy FILL@24' w/COAL CINDERS	25		5	SS	1,1,2				
COAL CINDERS w/Gravel	30	696.3	6	SS	2,3,2			42.6	
	35		7	SS	21,40, 30				
Brown Sandy GRAVEL									
Grey Sandy GRAVEL	40	686.3	8	SS	2,2,2				
Grey Silty CLAY In Tip Of Sampler									
Fine Grey SAND-9A	45		9A,9B	SS	5,7,8			11.3	#9B
Grey Sandy CLAY-9B SHELBY TUBE #254-1 FROM 45'-45.9'									
Grey SANDSTONE @ 46.4'	50	679.8	10	SS	65@6"				

ALCOSAN - EPM TEAM

RECORD OF SUBSURFACE EXPLORATION

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM
Client: ALCOSAN Proj. No. MAW37229.PD.07
Boring: 255 Date Started: 6/14/95 Date Completed: 6/14/95
Location: 33' North of Access Road Around Tanks W6 & E6
140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop

ELEVATIONS
Ground Surface: 726.3'
End of Boring: 679.5'

WATER LEVELS
While Drilling: 20'
At Completion: 20.9'
After 24 Hours 16'

* Indicates pH, Chloride, Sulfate Sample Collected

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
Black Silty CLAY w/Gravel&Organics (TOP SOIL)									
Brown Silty CLAY w/Gravel & Organics	5		1	SS	3,2,2			21.8	
COAL Cinders & Fine SAND w/gravel (FILL)	10	716.3	*2	SS	1,1 over 12"				
	15		3	SS	1,1 over 12"				
COAL Cinders & Gravel w/Some SANDSTONE Fragments	20	706.3	4	SS	1,1,2				
Very Fine Silty Sandy Grey FILL w/Some Gravel	25		5	SS	1 over 12",3				
	30	696.3	6	SS	3,3,4			28.3	
Grey Sandy Silty FILL w/Gravel & Traces of WOOD	35		7	SS	17,25, 31			29.7	
Grey Clayey SILT	40	686.3	8	SS	4,6,7		1.25	19.9	
SHELBY TUBE #255-1 PUSHED FROM 45'-46.5'	45		9	SS	4,5,5		0.5	21.9	
SANDSTONE @ 46'9"	50		10		57@3"				

ALCOSAN - EPM TEAM

RECORD OF SUBSURFACE EXPLORATION

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM
Client: ALCOSAN Proj No: MAW37229.PD.07
Boring: 256 Date Started: 10/31/95 Date Completed: 10/31/95
Location: See Location Plan
140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop

ELEVATIONS
Ground Surface: 726.7
End of Boring: 688.5

WATER LEVELS
While Drilling: 21.0'
At Completion: 23.0'
After 24 Hours: 16.5'

* Indicates pH, Chloride, Sulfate Sample Collected

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
6" Dense Brown Gravel FILL									
Dk. Brown FILL w/ Gravel and Coal Cinders	5		1	SS	8,3, 1,1				
	10	716.7	*2	SS	3,4, 7,8				
Lt. Tan SLAG FILL	15		3	SS	2,3, 2,1				
PETROLEUM ODOR	20	706.7	*4	SS	1,0, 1,1				
Coal Cinder FILL	25		5	SS	1,1, 1,1	0.75	0.40	46..6	
Damp Grey Clayey SILT									
SHELBY TUBE #256-1,27'-29' RECOVERY = 0.0 ft	30	696.7	*6	SS	1,1, 1,1	--	0.25	59.4	
	35		7	SS	9,15, 28,30				
Wet Grey/Brown SANDSTONE w/ Fragments of Shale									
Augur Refusal @ 38.2'	40	686.7							
	45								
	50								

ALCOSAN - EPM TEAM

RECORD OF SUBSURFACE EXPLORATION

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM
Client: ALCOSAN Proj No: MAW37229.PD.07
Boring: 257 Date Started: 10/31/95 Date Completed: 10/31/95
Location: See Location Plan
140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop

ELEVATIONS
Ground Surface: 727.5
End of Boring: 686.5

WATER LEVELS
While Drilling: 21.0'
At Completion: 31.2'
After 24 Hours: Caved in @ 7 ft

* Indicates pH, Chloride, Sulfate Sample Collected

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
Brn. FILL w/ Coal Cinders, Gravel, Traces of Slag, & Kiln Bricks	5		1	SS	1,1, 1,1				
2" Red Brick @ 11.0'	10	717.5	*2	SS	6,8, 11,5				
	15		3	SS	1,1, 1,1				
STRONG PETROLEUM ODOR in SAMPLE #4	20	707.5	*4	SS	1,5, 3,9				
Black Slag & Cinders, Wet	25		5	SS	1,1, 1,1	0.75	0.50	42.5	
Grey Clayey SILT, Wet									
SHELBY TUBE #257-1,27'-29' RECOVERY = 2.0 ft	30	697.5	*6	SS	0,0, 2,1	--	--	48.7	
Grey/Brown SANDSTONE w/ Shale Fragments	35		7	SS	18,20, 19,33				
Tan/Grey CLAYSTONE	40	687.5	*8	SS	30, 55/5"				
End of Boring @ 41.0'	45								
	50								

ALCOSAN - EPM TEAM

RECORD OF SUBSURFACE EXPLORATION

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM
Client: ALCOSAN Proj No: MAW37229.PD.07
Boring: 259 Date Started: 10/30/95 Date Completed: 10/30/95
Location: See Location Plan
140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop

ELEVATIONS
Ground Surface: 726.5
End of Boring: 696.2

WATER LEVELS
While Drilling: 21.0'
At Completion: 17.5'
After 24 Hours: 15.9'

* Indicates pH, Chloride, Sulfate Sample Collected

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
Cinder FILL w/ Gravel	5		1	SS	4,4, 5,7				
Dk. Brown Clayey Sandy FILL w/ Traces of Slag	10	716.5	*2	SS	3,4, 3,3				
2" Grey Sandstone @ 15.0'	15		3	SS	2,1, 2,4				
Brown Clayey SAND w/ Med. Size Gravel Traces of Brick @ 20' PETROLEUM ODOR	20	706.5	*4	SS	4,7, 6,2	--	--	35.8	
Grey Clayey SILT SHELBY TUBE #259-1, 22'-24' RECOVERY = 2.0 ft	25		5	SS	2,2, 2,3	--	0.0	38.5	
Grey Clayey SILT w/ Gravel	30	696.5	6	SS	50/3"				
Grey SANDSTONE	35								
	40								
	45								
	50								

ALCOSAN - EPM TEAM

RECORD OF SUBSURFACE EXPLORATION

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM
Client: ALCOSAN Proj No: MAW37229.PD.07
Boring: 261 Date Started: 10/30/95 Date Completed: 10/30/95
Location: See Location Plan
140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop

ELEVATIONS
Ground Surface: 725.5
End of Boring: 691.3

WATER LEVELS
While Drilling: 21.0'
At Completion: 21.0'
After 24 Hours: 16.1'

* Indicates pH, Chloride, Sulfate Sample Collected

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
Coal Cinder FILL w/ Gravel									
	5		1	SS	6,6, 3,2				
Dk. Brown Sandy FILL w/ Traces of Slag & Coal									
PETROLEUM ODOR	10	715.5	*2	SS	2,1, 1,2				
	15		3	SS	2,1, 2,2				
6" Grey/Brown Sandstone									
Traces of Red Brick @ 20'	20	705.5	*4	SS	8,11 4,3				
Grey Clayey SILT									
SHELBY TUBE #261-1, 22'-24' RECOVERY = 2.0 ft	25		5	SS	0,1, 2,2	0.68	0.50	41.1	
	30	695.5	*6	SS	4,6, 7,8	--	0.0	43.0	
Grey SANDSTONE			7		50/3"				
End of Boring	35								
	40								
	45								
	50								

ALCOSAN - EPM TEAM

RECORD OF SUBSURFACE EXPLORATION

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM
Client: ALCOSAN Proj No:
Boring: 262 Date Started: 3/8/96 Date Completed: 3/8/96
Location: See Site Plan
140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop

(GF #6)

ELEVATIONS
Ground Surface: 728.3'
End of Boring: 662.8'

WATER LEVELS
While Drilling: DRY
Prior to Core: DRY
After 24 Hours: N/A

= Shelby Tube = NX Rock Core SS= Split Spoon ST= Shelby Tube, DB = Diamond Bit

Soil Description	Depth	Elev	Sample No	Sample Type	N	Q_u	Q_p	Mc	γ_d
Brown Silty Clayey FILL with Gravel 2.0									
Coal Cinders, Slag, Concrete, Old Foundations	5	721.9	1	SS	1,1 1,1				
	10	716.9	2	SS	1,2 1,1				
15.0 Augur Refusal at 15.0, Trial #3	15	711.9	3	SS	50/0				
Three holes located within 8 feet of original location were attempted.	20								
Trial #1 Augur Refusal at 3.0 ft	25								
Trial #2 Augur Encountered Concrete 4.0-7.0, Boring Terminated at 7.0	30								
Trial #3 Augur Refusal at 15.0	35								
	40								
	45								

RECORD OF SUBSURFACE EXPLORATION

ALCOSAN - EPM

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM

Client: ALCOSAN Proj No:

Boring: 262-A Date Started: 6/19/96 Date Completed: 6/19/96

Location: See Site Plan

140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop

ELEVATIONS

Ground Surface: 728.3'

End of Boring: 678.7'

WATER LEVELS

While Drilling: 16.5'

O hrs after Coring: 16.6'

After 24 Hours: N/A

▨ = Shelby Tube ▨ = NX Rock Core SS= Split Spoon ST= Shelby Tube, DB = Diamond Bit

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
6" Topsoil	0.5								
			1	SS	14,16 18,8				
Cinders & Slag, FILL	5	723.3	2	SS	1,1 1,0				
9.0									
Dk. Brown SAND w/ Slag trace bricks, Loose, FILL GW	10	718.3	3	SS	2,1, 1,1				
14.0									
Dk. Brown Sandy GRAVEL, Trace Clay, Wet, Slightly Compact GW	15	713.3	4	SS	1,1, 0,1				
19.0									
Grey Clayey Gravel, Med. Dense 20.0									
Brown Clayey Gravel, Med. Dense, Wet GW	20	708.3	5	SS	1,1, 1,1				
Trace Cinders	25	703.3	6	SS	5,6, 16,43				
30.0									
Grey Very Fine Sand & SILT, Loose, Wet ML	30	698.3	7	SS	8,7 8,10				
34.0									
Slight Petroleum Odor at 34.0 ft	35	693.3	8	SS	50/.1				
Grey SILTSTONE, Weathered									
	40	688.3	9	SS	50/.1				
				DB					

CORE INFORMATION

39.6-40.1 Grey Sandy Siltstone, Hard, RQD=1.0

40.1-41.1 Grey Siltstone w/ Lime Nodules, Med. Hard, Mod. Brkn., RQD=0.34

41.1-43.3 Grey Sandstone w/ lime nodules, Hard, Occasionally Brkn., RQD=0.81

43.3-43.7 Grey Silty Shale, Soft, Broken, RQD=0.0

43.7-45.5 Grey Sandy Siltstone, Mod. Brkn, Hard RQD=0.65

45.5-49.6 Grey Sandstone w/ Mica, Very Hard, Rqd=0.60

RECORD OF SUBSURFACE EXPLORATION

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM
Client: ALCOSAN Proj No:
Boring: 263 Date Started: 3/6/96 Date Completed: 3/7/96
Location: See Site Plan
140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop (GF #3)

ELEVATIONS
Ground Surface: 729.4'
End of Boring: 681.3'

WATER LEVELS
While Drilling: 21.0'
At Completion: 31.2'
AFTER 48 Hours: Caved in and dry at 20.4

SS = SPLIT SPOON, ST = SHELBY TUBE, DB = DIAMOND BIT
▨ = SHELBY TUBE ▨ = NX ROCK CORE

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
Black CinderFILL w/Gravel & Slag	5	724.4	1	SS	6,8, 9,6				
	10	719.4	2	SS	3,3, 2,2				
	15	714.4	3	SS	2,5, 15,12				
Petroleum Odor in #4	20	709.4	4	SS	4,4, 4,6				
Petroleum Odor in #5	25	704.4	5	SS	2,3, 3,4				
3" Wood @ 31.5'	30	699.4	6	SS	1,10, 5,2				
32.0 Grey Silty CLAY				ST					
Shelby Tube #263-1, 32.0-34.0, 1.8 Recovery 34.0	35	694.4	7	SS	1,4, 7,6				
Grey/Green SANDSTONE 40.0	40	689.4	8	SS	1,5, 23,27				
Wet Very Soft Grey Silty CLAY w/Wood Fibers 46.0	45	684.4	9	SS	11,13 12,28				
Brown SANDSTONE 48.0			10	SS	50/.1				
Grey SANDSTONE 48.1									

Augur Refusal @ 48.0'
End of Boring @ 48.1'

RECORD OF SUBSURFACE EXPLORATION

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM
Client: ALCOSAN Proj No:
Boring: 264 Date Started: 3/6/96 Date Completed: 3/6/96
Location: See Site Plan
140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop (GF #4)

ELEVATIONS
Ground Surface: 726.1'
End of Boring: 693.3'

WATER LEVELS
While Drilling: 20.0'
At Completion: 23.5'
After 24 Hours: 19.5'

SS = SPLIT SPOON, ST = SHELBY TUBE, DB = DIAMOND BIT
▨ = SHELBY TUBE

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
Black Cinder FILL w/Gravel									
5.0	5	721.1							
Black/Brown FILL w/Cinders, Slag & Gravel			1	SS	15,15 5,3				
	10	716.1	2	SS	1>1FT 1,1				
	15	711.1	3	SS	1>1FT 1,1				
Petroleum Odor in Sample #3									
	20	706.1	4	SS	1,2 2,2				
Petroleum Odor in Sample #4									
25.0	25	701.1	5	SS	1,2 2,3		0.0	42.0	
Very Soft Grey Silty CLAY									
Shelby Tube #264-1, 27.0-29.0, 0.3 Recovery			▨	ST					
Sample Discarded	30	696.1	▨	ST					
Repushed Tube 29.0-31.0 2.0 Recovery			6	SS	1>1FT				
32.5					4,				
4" WOOD 32.8	35	691.1			50/.2				
Grey SANDSTONE									
Augur Refusal @ 32.8 FT.	40								
End of Boring @ 32.8 FT									
	45								
	50								

RECORD OF SUBSURFACE EXPLORATION

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM
Client: ALCOSAN Proj No:
Boring: 265 Date Started: 3/7/96 Date Completed: 3/8/96
Location: See Site Plan
140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop (GF #2)

ELEVATIONS
Ground Surface: 727.3'
End of Boring: 669.3'

WATER LEVELS
While Drilling: 20.0'
At Completion: 31.6' prior to coring
18.5' after coring
After 48 Hours: 18.0'

SS = SPLIT SPOON, ST = SHELBY TUBE, DB = DIAMOND BIT
= NX Rock Core = Shelby Tube

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
Brown Sandy Fill w/Gravel 2.5									
Brown/Black Cinder & Slag FILL	5	722.3	1	SS	2,2 2,4				
	10	717.3	2	SS	4,3, 2,2				
	15	712.3	3	SS	1,1 1,1				
No Sample #4 Retrieved	20	707.3	4	SS	1,0 1,0				
25.0 Very Soft Grey Silty CLAY	25	702.3	5	SS	1,1 1,2		0.00	35.8	75.8 PCF
Shelby Tube #265-1, 27.0-29.0, 1.5 Recovery				ST					
	30	697.3	6	SS	1,0, 2,2		0.00	36.0	75.8 PCF
36.0 Grey/Brown Very Dense SAND & GRAVEL	35	692.3	7	SS	17,20 29,26			8.7	
40.0 Med. Coarse Brown SAND	40	687.3	8	SS	5,5 9,12			12.4	
46.0 Dense Grey/Brown SAND & GRAVEL	45	682.3	9	SS	23,16 20,18			12.4	
48.0 Grey SANDSTONE				DB					

Augur Refusal @ 48.0 FT.

RECORD OF SUBSURFACE EXPLORATION

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM
Client: ALCOSAN Proj No:
Boring: 265 Date Started: 3/7/96 Date Completed: 3/8/96
Location: See Site Plan
140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop (GF #2)

ELEVATIONS
Ground Surface: 727.3'
End of Boring: 669.3'

WATER LEVELS
While Drilling: 20.0'
At Completion: 31.6' prior to coring
18.5' after coring
After 48 Hours: 18.0'

▨ = NX Rock Core
SS = SPLIT SPOON, ST = SHELBY TUBE, DB = DIAMOND BIT

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
Grey SANDSTONE 50.7									
Hard Grey CLAY 52.2									
Grey SANDSTONE RQD = 0.65	55	672.3	▨	DB					
58.0									
End of Boring @ 58.0 FT.	60								

Begin: 48.0 FT
End: 58.0 FT

Coring Data

Depth	Time Elapsed	Pull Down Pressure
0	0:00	300 psi
5	16:00	300 psi
6	19:00	300 psi
7	20:30	300 psi
8	21:40	300 psi
9	22:50	300 psi
10	24:50	300 psi

RECORD OF SUBSURFACE EXPLORATION

ALCOSAN - EPM

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM

Client: ALCOSAN Proj No:

Boring: 266 Date Started: 6/14/96 Date Completed: 6/17/96

Location: See Site Plan

140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop

ELEVATIONS

Ground Surface: 726.8'

End of Boring: 672.4'

WATER LEVELS

While Drilling: 16.0'

O hrs after Coring: 16.5'

After 24 Hours: Caved at 11.5'

▨ = Shelby Tube ▨ = NX Rock Core SS= Split Spoon ST= Shelby Tube, DB = Diamond Bit

Soil Description	Depth	Elev	Sample No	Sample Type	N	q_u	q_p	Mc	γ_d
4" Asphalt Pavement	0.3								
Cinders & Slag, FILL	2.5		1	SS	14,16 18,8				
Very Loose Brown Gravel, Slag, Sand, Bricks, FILL	5	721.8	2	SS	1,1 1,0				
NOTE: Weight of Rod advanced sample spoon to 19.5'	10	716.8							
	15	711.8							
	20.0								
Very Loose Black Cinders and Slag, Wet	20	706.8	3	SS	2,1, 1,1				
	25	701.8	4	SS	1,1, 0,1				
	30	696.8	5	SS	1,1, 1,1				
	32.0		6	SS	5,6, 16,43				
Very Dense Brown GRAVEL w/ Sand & Traces of Sandstone, Wet	35	691.8							
GW	39.0								
Very Fine Brown SAND, Dense, Wet	40	686.8	7	SS	8,7 8,10				
SP-SM	44.0								
	45	681.8	8	SS	50/.1				
Very Dense Sandy GRAVEL w/ traces of Sandstone Fragments, Wet									
GW			9	SS	25,38 35,72				

RECORD OF SUBSURFACE EXPLORATION

ALCOSAN - EPM

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM

Client: ALCOSAN Proj No:

Boring: 266 Date Started: 6/14/96 Date Completed: 6/17/96

Location: See Site Plan

140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop

ELEVATIONS
Ground Surface: 726.8'
End of Boring: 672.4'

WATER LEVELS
While Drilling: 16.0'
At 0 Hrs After Coring: 16.5'
After 24 Hours: Caved at 11.5'

= Shelby Tube = NX Rock Core SS= Split Spoon ST= Shelby Tube, DB = Diamond Bit

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
Grey CLAYSTONE, Soft									
54.0			10						
54.4	55	671.8		SS	50/.4				
Grey/Red CLAYSTONE, Soft	60	666.8							
End of Boring @ 54.4 FT.	65								

RECORD OF SUBSURFACE EXPLORATION

ALCOSAN - EPM

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM

Client: ALCOSAN Proj No:

Boring: 267 Date Started: 5/28/96 Date Completed: 5/28/96

Location: See Site Plan

140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop

ELEVATIONS

Ground Surface: 727.0'

End of Boring: 663.0'

WATER LEVELS

While Drilling: 13.0'

Prior to Core: 12.6', After Core: 12.6'

After 24 Hours: 14.2'

▨ = Shelby Tube ▨ = NX Rock Core SS= Split Spoon ST= Shelby Tube, DB = Diamond Bit

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
Concrete 0.67									
Slag FILL 3.5			1		11,29, 30,23				
Black Cinders, Red Bricks, Slag, FILL	5	722.0	2	SS	2, 4, 2,3				
	10	717.0	3	SS	1,4, 3,3				
	15	712.0	4	SS	2,2, 2,2				
18.8									
Very Soft, Wet Grey/Black/Olive SILT, Some Clay ML 20.5	20	707.0	5	SS	2,1, 2,2	0.52	0.50	29.2	102 PCF
Very Loose Grey/Black Fine Silty SAND, Wet to Moist SP-SM	25	702.0	6	SS	0,1, 2,2				
30.5	30	697.0	7	SS	9,11, 7,5				
Med. Dense Brown SAND & GRAVEL Moist to Wet SP	35	692.0	8	SS	5,10, 13,15				
	40	687.0	9	SS	15,12, 12,12				
	45	682.0	10	SS	9,15, 17				
48.0			11	SS	50/0				
Grey Silty SHALE, Weathered Moderately-Extremely Broken, RQD = 0.15				DB					

RECORD OF SUBSURFACE EXPLORATION

ALCOSAN - EPM

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM

Client: ALCOSAN Proj No:

Boring: 267 Date Started: 5/28/96 Date Completed: 5/29/96

Location: See Site Plan

140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop

ELEVATIONS

Ground Surface: 727.0'

End of Boring: 663.0'

WATER LEVELS

While Drilling: 13.0'

Prior to Coring: 12.6, After Coring: 12.6'

After 24 Hours: 14.2'

▨ = Shelby Tube ▨ = NX Rock Core SS= Split Spoon ST= Shelby Tube, DB = Diamond Bit

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
52.6									
Grey CLAYSTONE,Soft Extremely Broken, Weathered 54.6	55	672.0		DB					
Grey/Red CLAYSTONE,Soft Moderately Broken, Weathered 59.3	60	667.0							
Grey Silty SHALE/SILTSTONE, Hard Occasionally Broken, RQD = 0.67 64.0	65								
End of Boring @ 64.0 FT.									
1 Sample of SILTY SHALE/SILTSTONE taken from 61' for Compression Testing									

Coring Data

Depth	Recovery
49.0-54.0	4.6'
54.0-59.0	4.8'
59.0-64.0	4.8'

RECORD OF SUBSURFACE EXPLORATION

ALCOSAN - EPM

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM

Client: ALCOSAN Proj No:

Boring: 268 Date Started: 6/3/96 Date Completed: 6/3/96

Location: See Site Plan

140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop

ELEVATIONS

Ground Surface: 727.0'

End of Boring: 663.0'

WATER LEVELS

While Drilling: 9.0'

Prior to Core: 15.6', After Core: 11.5'

After 24 Hours: 15.3'

▨ = Shelby Tube ▨ = NX Rock Core SS= Split Spoon ST= Shelby Tube, DB = Diamond Bit

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
Concrete 0.67	1.0								
Brown Gravel & Sand FILL 3.0									
Black Cinders, Red Bricks, Slag, FILL	5	722.0	1	SS	5,7, 10,10				
	10	717.0	2	SS	2,3, 2,4				
	15	712.0	3	SS	2,2, 3,4				
Strong Sewage Odor 19.0									
	20	707.0	4	SS	0,0, 0,1	0.95	0.00	27.1	102 PCF
Very Soft, Wet Grey/Black/Olive Clayey SILT, Trace Sand ML 23.0			5	SS	0,0, 0,0				
Very Loose Grey/Black Fine SAND & SILT, Wet SP-SM	25	702.0							
	30	697.0							
SP-SM 34.0									
Very Fine Grey SAND, Wet 35.8	35	692.0	6	SS	3,4, 4,10				
Med. Coarse Brown SAND & GRAVEL, Wet SW 39.0									
Dense to Very Dense Med. Coarse Brown SAND & GRAVEL, Trace Sandstone, Wet SW 45.8	40	687.0	7	SS	8,13, 18,20				
Grey Claystone, Trace Sandstone, Weathered 46.4	45	682.0	8	SS	7,18 21,14				
			9	SS	50/.4				
Grey Silty SHALE, Weathered Moderately-Extremely Broken, RQD = 0.20				DB					

RECORD OF SUBSURFACE EXPLORATION

ALCOSAN - EPM

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM

Client: ALCOSAN Proj No:

Boring: 268 Date Started: 6/3/96 Date Completed: 6/3/96

Location: See Site Plan

140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop

ELEVATIONS

Ground Surface: 727.0'

End of Boring: 663.0'

WATER LEVELS

While Drilling: 9.0'

Prior to Coring: 15.6, After Coring: 11.5'

After 24 Hours: 15.3'

▨ = Shelby Tube ▨ = NX Rock Core SS= Split Spoon ST= Shelby Tube, DB = Diamond Bit

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
51.9									
Grey/Red Silty CLAYSTONE,Soft Extremely Broken, Weathered	55	672.0		DB					
58.0									
Grey SHALE w/ Lime Nodules, Med. Hard, Fissured at 59.0	60	667.0							
Grey Sandy SHALE,Extremely Broken, Weathered, RQD = 0.10									
61.0									
Grey Silty SHALE/SILTSTONE, Hard Occasionally Broken, RQD = 0.95	65								
64.0									
End of Boring @ 64.0 FT.									
1 Sample of SILTY SHALE/SILTSTONE taken from 62' for Compression Testing									

Coring Data

Depth	Recovery
46.4-51.4	3.7'
51.4-58.0	4.8'
58.0-64.0	5.7'

RECORD OF SUBSURFACE EXPLORATION

ALCOSAN - EPM

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM

Client: ALCOSAN Proj No:

Boring: 269 Date Started: 5/31/96 Date Completed: 5/31/96

Location: See Site Plan

140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop

ELEVATIONS
Ground Surface: 727.0'
End of Boring: 662.9'

WATER LEVELS
While Drilling: 15.5'
Prior to Core: 14.6', After Core: 14.6'
After 24 Hours: N/A

= Shelby Tube = NX Rock Core SS= Split Spoon ST= Shelby Tube, DB = Diamond Bit

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
Concrete 0.9									
Black Cinders, Red Bricks, Slag, FILL	5	722.0	1	SS	10, 4, 4,5				
	10	717.0	2	SS	4,3, 2,3				
	15	712.0	3	SS	1,1, 3,3				
19.5									
Very Soft, Wet Grey/Black/Olive Clayey SILT, Some Sand ML 24.0	20	707.0	4	SS	1,1, 1,1	1.00	0.75	35.2	102 PCF
				ST	Recovery = 1.7 ft				
Very Loose Grey/Black Fine Silty SAND, Wet to Moist SP-SM 30.5	25	702.0	5	SS	0,0, 1,1				
Brown Silty SAND w/ some Gravel SP-SM 35.0	30	697.0	6	SS	1,4, 3,2				
	35	692.0	7	SS	2,1, 3,6				
			8	SS	14,17, 28,25				
V.Fine, V. Dense, Med. Coarse Brown SAND, Some Gravel SP 46.5	40	687.0							
	45	682.0	9 10	SS SS	5,7, 12,10				
Grey Silty SHALE, Weathered Extremely Broken, RQD = 0.00				DB	50/0				

RECORD OF SUBSURFACE EXPLORATION

ALCOSAN - EPM

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM

Client: ALCOSAN Proj No:

Boring: 269 Date Started: 5/31/96 Date Completed: 5/31/96

Location: See Site Plan

140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop

ELEVATIONS
Ground Surface: 727.0'
End of Boring: 662.9'

WATER LEVELS
While Drilling: 15.5'
Prior to Coring: 14.6, After Coring: 14.6'
After 24 Hours: N/A

▨ = Shelby Tube ▨ = NX Rock Core SS= Split Spoon ST= Shelby Tube, DB = Diamond Bit

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
51.6									
Grey/Red CLAYSTONE,Soft to Med. Hard, Moderately Broken, Weathered 56.0	55	672.0		DB					
Grey Silty SHALE/SILTSTONE, Very Hard, Occasionally Broken, RQD = 0.95	60	667.0							
64.1	65								
End of Boring @ 64.0 FT.									
1 Sample of SILTY SHALE/SILTSTONE taken from 61' for Compression Testing									

Coring Data

Depth	Recovery
49.6-54.1	3.7'
54.1-64.1	10.0'

RECORD OF SUBSURFACE EXPLORATION

ALCOSAN - EPM

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM

Client: ALCOSAN Proj No:

Boring: 270 Date Started: 5/29/96 Date Completed: 5/29/96

Location: See Site Plan

140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop

ELEVATIONS

Ground Surface: 727.0'

End of Boring: 663.0'

WATER LEVELS

While Drilling: 17.0'

Prior to Core: 11.5', After Core: 14.9'

After 24 Hours: 14.8

= Shelby Tube = NX Rock Core SS= Split Spoon ST= Shelby Tube, DB = Diamond Bit

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
Concrete 0.8									
Black Cinders, Red Bricks, Slag, Loose, Wet FILL	5	722.0	1	SS	2, 11, 8,9				
	10	717.0	2	SS	2,3, 4,3				
	15	712.0	3	SS	1,1,2,2				
17.7			4	SS	1,2,3,3				
Very Loose, Wet Grey/Black/Olive Clayey, Silty Very Fine SAND **SM** **STRONG PETROLEUM ODOR**	20	707.0		ST	Recovery = 0.0 ft				
23.0 Grey/Brown Clayey SILT **ML** 24.0			5	SS	1,1, 1,2	--	0.0	29.4	---
Grey/Brown Fine SAND, Wet **SP-SM**	25	702.0							
30.0	30	697.0	6	SS	1,2, 7,8				
Med. Dense to Dense Brown SAND & GRAVEL, Moist to Wet **SP**	35	692.0	7	SS	6,6, 5,8				
				SS					
	40	687.0	8	SS	4,7, 7,14				
	45	682.0	9	SS	12,12, 21,10				
47.5			10	SS	50/0				
Weathered Grey Claystone 49.0				DB					
Grey Silty SHALE, Weathered Extremely Broken, RQD = 0.00									

RECORD OF SUBSURFACE EXPLORATION

ALCOSAN - EPM

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM

Client: ALCOSAN Proj No:

Boring: 270 Date Started: 5/29/96 Date Completed: 5/29/96

Location: See Site Plan

140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop

ELEVATIONS
Ground Surface: 727.0'
End of Boring: 663.0'

WATER LEVELS
While Drilling: 17.0'
Prior to Coring: 11.5, After Coring: 14.9'
After 24 Hours: 14.8'

▨ = Shelby Tube ▨ = NX Rock Core SS= Split Spoon ST= Shelby Tube, DB = Diamond Bit

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
51.5									
Grey CLAYSTONE,Soft, Weathered	55	672.0		DB					
55.4									
Red CLAYSTONE,Soft, Weathered									
60.0	60	667.0							
Grey Silty SHALE/SILTSTONE, Very Hard, Occasionally Broken, RQD = 0.95									
64.0	65								
End of Boring @ 64.0 FT.									
1 Sample of SILTY SHALE/SILTSTONE taken from 63' for Compression Testing									

Coring Data

Depth	Recovery
49.0-59.0	8.7'
59.0-64.0	4.9'

RECORD OF SUBSURFACE EXPLORATION

ALCOSAN - EPM

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM

Client: ALCOSAN Proj No:

Boring: 271 Date Started: 5/30/96 Date Completed: 5/30/96

Location: See Site Plan

140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop

ELEVATIONS

Ground Surface: 728.0'

End of Boring: 662.0'

WATER LEVELS

While Drilling: 15.0'

Prior to Core: 14.6', After Core: 14.6'

After 24 Hours: 12.2'

▽▽▽ = Shelby Tube ▨ = NX Rock Core SS= Split Spoon ST= Shelby Tube, DB = Diamond Bit

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
Augured Directly to 49.0 Ft				Augur					
Weathered Grey Claystone 47.5-49.0 49.0									
Grey Silty Shale, Extremely Broken, Soft, RQD = 0.0 51.7	50	678.0							
Grey Limestone, Hard, Mod. Broken RQD = 0.17 53.6									
Grey CLAYSTONE, Soft, Mod. Broken	55	673.0		DB					
60.5	60	668.0							
Red/Grey CLAYSTONE, Soft 61.9									
Grey SILTSTONE w/Limestone Nodules, Mod. Broken, Hard 63.8	65	663.0							
Grey Silty SHALE,Hard, Blocky, RQD = .90 66.0									
	70								

RECORD OF SUBSURFACE EXPLORATION

ALCOSAN - EPM

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM

Client: ALCOSAN Proj No:

Boring: 272 Date Started: 6/6/96 Date Completed: 6/7/96

Location: See Site Plan

140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop

ELEVATIONS

Ground Surface: 725.6'

End of Boring: 664.5'

WATER LEVELS

While Drilling: 17.2'

At 0 hrs After Core: 14.8'

After 24 Hours: 15.0'

▨ = Shelby Tube ▨ = NX Rock Core SS= Split Spoon ST= Shelby Tube, DB = Diamond Bit

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
Very Dense Brown Gravel,Some Sand Blue/Green Slag, Hard	0.5		1	SS	50/.5				
	3.0								
	5	720.6	2	SS	13, 13, 12,11				
Grey Gravel & Sand, Some Silt, Dense, Damp									
	10	715.6	3	SS	3,4, 4,2				
6" Black Shale Fragments 10.5 - 11.0ft									
14.0									
F/Med. Coarse Brown SAND & GRAVEL Moist, Slightly Compact SW	15	710.6	4	SS	1,2, 1,13				
20.0									
Black Sandy SILT w/ WOOD, Wet **PETROLEUM ODOR**	20	705.6	5	SS	3,5 20,10				
24.0									
6" Fine Black SAND,wet, 24-24.5 Blk. CINDERS,SLAG, & WOOD	25	700.6	6	SS	4,7, 9,4				
25.8									
Grey/Black GRAVEL&SAND,Wet									
29.0									
Soft Grey SILT, Trace Sand ML 30.0	30	695.6	7	SS	2,1, 2,3	--	--	40.5	--
F/Med. Grey SAND, Slightly Compact, Moist SP									
35.6	35	690.6	8	SS	2,10, 7,6				
Grey Sandy GRAVEL, Wet GW									
39.0									
Very Dense F/Med. SAND w/ GRAVEL wet SW-SM	40	685.6	9	SS	28,28 29,39				
43.3									
Brown SANDSTONE, Weathered	45	680.6	10	SS	81,60 111				
45.2									
			11	SS	50/.1				
Grey Silty SHALE, Extremely Broken, Med. Hard, RQD=0.0				DB					

RECORD OF SUBSURFACE EXPLORATION

ALCOSAN - EPM

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM

Client: ALCOSAN Proj No:

Boring: 272 Date Started: 6/6/96 Date Completed: 6/7/96

Location: See Site Plan

140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop

ELEVATIONS
Ground Surface: 725.6'
End of Boring: 664.5'

WATER LEVELS
While Drilling: 17.2'
At 0 Hrs After Coring: 14.8'
After 24 Hours: 15.0'

▨ = Shelby Tube ▨ = NX Rock Core SS= Split Spoon ST= Shelby Tube, DB = Diamond Bit

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
51.1 Grey SILTSTONE,Med. Hard,Mod. Broken,Many 30 deg. Cracks,Lime Nodules @ 55.5ft,RQD=0.17 56.9	55	670.6		DB					
Grey CLAYSTONE,Soft,Mod. Broken 60.0	60	665.6							
Red/Grey CLAYSTONE, Soft, Occassionally Broken 61.1	65								
End of Boring @ 61.1 FT.									

Coring Data

Depth	Recovery
49.1-56.1	6.7'
56.1-61.1	4.0'

RECORD OF SUBSURFACE EXPLORATION

ALCOSAN - EPM

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM

Client: ALCOSAN Proj No:

Boring: 273 Date Started: 6/13/96 Date Completed: 6/13/96

Location: See Site Plan

140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop

ELEVATIONS
Ground Surface: 725.0'
End of Boring: 666.0'

WATER LEVELS
While Drilling: 17.3'
At 0 hrs After Core: 7.2'
After 24 Hours: 13.0'

= Shelby Tube = NX Rock Core SS= Split Spoon ST= Shelby Tube, DB = Diamond Bit

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
Brown Gravel & Sand	1.0		1	SS	6,15, 12,14				
Grey/Black FILL, w/ Gravel & Slag	5	720.0	2	SS	8,10 4,14				
9.0									
Brown Sand, Gravel, Slag Trace Cinders, FILL	10	715.0	3	SS	2,4, 5,8				
NOTE: Difficult auguring from 11.0 -19.0 ft.	15	710.0	4	SS	5,5 6,8				
GW									
19.0									
Black Gravel & Sand, Med. Dense, Wet, Trace Slag	20	705.0	5	SS	5,5, 5,5				
GW	25	700.0	6	SS	6,5 3,2				
NOTE: Large cobbles returned to surface by augur when head was at 29 ft	30	695.0	7	SS	2,7, 15,12				
33.0									
Very Dense Brown Gravel, Some SAND	35	690.0	8	SS	16,19 24,20				
GW									
40.0	40	685.0	9	SS	3,5,6 16			20.2	
Very Fine Grey/Brown SILT & SAND, Wet, Dense ML									
44.0									
Hard Grey/Brwn GRAVEL, some Sand	45	680.0	10	SS	12,35 37,41				
			Roller Bit						
GW				DB					

RECORD OF SUBSURFACE EXPLORATION

ALCOSAN - EPM

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM

Client: ALCOSAN Proj No:

Boring: 273 Date Started: 6/13/96 Date Completed: 6/13/96

Location: See Site Plan

140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop

ELEVATIONS
Ground Surface: 725.0'
End of Boring: 666.0'

WATER LEVELS
While Drilling: 17.3'
At 0 Hrs After Coring: 7.2'
After 24 Hours: 13.0'

= Shelby Tube = NX Rock Core SS= Split Spoon ST= Shelby Tube, DB = Diamond Bit

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
Grey SILTSTONE,Med. Hard-Hard Extremely Broken, RQD = 0.10 54.0									
Grey SILTSTONE, Hard Occasionally Broken, RQD = 0.40 59.0	55	669.0		DB					
End of Boring @ 59.0 FT.	60	665.0							
NOTE: 7" Sample of SILTSTONE taken from 58 ft for testing	65								

Coring Data

Depth	Recovery
49.0-59.0	10.0'

RECORD OF SUBSURFACE EXPLORATION

ALCOSAN - EPM

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM

Client: ALCOSAN Proj No:

Boring: 274 Date Started: 6/13/96 Date Completed: 6/13/96

Location: See Site Plan

140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop

ELEVATIONS
Ground Surface: 725.0'
End of Boring: 677.5'

WATER LEVELS
While Drilling: 18'
At 0 hrs After Core: 10.2'
After 24 Hours: 15.3'

= Shelby Tube = NX Rock Core SS= Split Spoon ST= Shelby Tube, DB = Diamond Bit

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
Grey/Black FILL, w/ Gravel & Slag			1	SS	12,14 12,18				
Red Bricks in sample #2	5	720.0	2	SS	6,7 9,11				
9.0									
Brown Sand, Gravel, Slag Trace Cinders, FILL GW	10	715.0	3	SS	6,7 9,14				
	15	710.0	4	SS	12,9 9,6				
SP 19.5 F/Med. Brwn SAND Some Gravel,Wet	20	705.0	5	SS	2,5 7,9				
Black Cinders w/Slag, med. Sand & Gravel GP 25.0	25	700.0	6	SS	10,18 27,17				
Very Dense Grey/Brown SANDY GRAVEL, Wet SP 30.5	30	695.0	7	SS	6,7, 6,5				
Med. Coarse Grey SAND w/ Gravel, Trace Clay,Med. Dense, Wet SM 34.0	35	690.0	8	SS	10,11 7,8				
GRAVEL,Dense,Wet, Trace SAND GW 40.0	40	685.0	9	SS	4,7,8 13				
Very Fine Grey/Brown SAND, Trace Silt, Wet, Dense SM 44.0	45	680.0	10	SS	30,60 44,66				
Hard Grey/Brwn GRAVEL, some Sand SP 46.0 Sandstone pieces in end of sample #10 CLAYSTONE, Soft									

Augur Refusal @ 47.5 ft

RECORD OF SUBSURFACE EXPLORATION

ALCOSAN - EPM

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM

Client: ALCOSAN Proj No:

Boring: 276 Date Started: 6/12/96 Date Completed: 6/12/96

Location: See Site Plan

140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop

ELEVATIONS
Ground Surface: 725.5'
End of Boring: 667.5'

WATER LEVELS
While Drilling: 15.5'
At 0 hrs After Core: 15.7'
After 24 Hours: 15.8'

= Shelby Tube = NX Rock Core SS= Split Spoon ST= Shelby Tube, DB = Diamond Bit

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
Gravel, Sand, FILL	1.0								
Cement, Sand, Gravel, Slag, FILL V. Dense to Hard, Dry to Moist	5	720.5	1	SS	7,9,9 24				
Difficult Auguring	10	715.5	2	SS	14, 7, 5,5				
Red Bricks in #3	15	710.5	3	SS	12,12, 7,50				
	20.0								
Med. Dense GRAVEL, Wet GP	20	705.5	4	SS	6,4 5,3				
	24.0								
F/Med. Coarse Blk.SAND,Dense,Wet Traces of Red Brick & Wood SP	25	700.5	5	SS	0,0,0,0				
	27.0								
Lrg. GRAVEL, Loose, Wet GP			6	SS	1,1, 2,3				
	30.0	695.5							
GRAVEL,Some Sand, Very Dense, Wet GP	35	690.5	7	SS	21,11 13				
	40.0								
Very Dense Brown/Tan SAND & GRAVEL SP-SM	40	685.5	8	SS	13,16, 13				
	44.0								
V. Dense Grey/Brown SANDSTONE & Gravel GP	45	680.5	9	SS	55,30				
	48.0		Roller Bit						
	49.0			DB					

Grey SILTSTONE,Weathered,Extremely Broken,Soft
Grey SILTSTONE,Moderately Broken,Med. Hard-Hard
Some Interbedded Clay at 55.8, RQD = 0.27

RECORD OF SUBSURFACE EXPLORATION

ALCOSAN - EPM

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM

Client: ALCOSAN Proj No:

Boring: 276 Date Started: 6/12/96 Date Completed: 6/12/96

Location: See Site Plan

140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop

ELEVATIONS

Ground Surface: 725.5'

End of Boring: 667.5'

WATER LEVELS

While Drilling: 15.5'

At 0 Hrs After Coring: 15.7'

After 24 Hours: 15.8'

= Shelby Tube = NX Rock Core SS= Split Spoon ST= Shelby Tube, DB = Diamond Bit

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
Grey SILTSTONE,Moderately Broken, Med. Hard-Hard,Some Interbedded Clay at 55.8, RQD = 0.27	55	670.5		DB					
57.8	58.0								
Grey LIMESTONE, V. Hard, Occassionally Broken	60								
	65								
End of Boring @ 58.0 FT.									

Coring Data

Depth	Recovery
48.0 - 58.0	8.9 ft

RECORD OF SUBSURFACE EXPLORATION

ALCOSAN - EPM

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM

Client: ALCOSAN Proj No:

Boring: 277 Date Started: 6/6/96 Date Completed: 6/6/96

Location: See Site Plan

140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop

ELEVATIONS
Ground Surface: 724.0'
End of Boring: 661.0'

WATER LEVELS
While Drilling: 14.0'
At 0 hrs After Core: 12.8'
After 24 Hours: 14.4'

▨ = Shelby Tube ▧ = NX Rock Core SS= Split Spoon ST= Shelby Tube, DB = Diamond Bit

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
Cement, Sand, Gravel, Slag, FILL V. Dense to Hard, Dry to Moist	1.0		1	SS	49, 57, 29,37				
	5	719.0	2	SS	50/.4				
	10	714.0	3	SS	4,12, 9,40				
4" Wood 15.7 - 16.0ft 16.0	15	709.0	4	SS	1,5, 10,24				
Black Cinders, FILL, Loose, Wet 19.0									
Loose, Wet, Grey Sandy GRAVEL, Traces of Wood SP 24.0	20	704.0	5	SS	1,2 2,1				
F/Med. Coarse Brn.SAND,Dense,Wet 24.5									
GRAVEL,SAND,SLAG,& CEMENT V. Dense,Wet SP 29.0	25	699.0	6	SS	22,21 34,19				
Black Cinders, FILL, Loose, Wet	30	694.0	7	SS	1,9, 16,15				
SM Grey/Black SAND,Trace SILT, Med. Dense, Wet, Cinders 34.0									
Med.Dense.F/Med. Brwn. SAND SP 35.0	35	689.0	8	SS	1,2, 15,17				
GRAVEL,Dense,Wet, Trace SAND GP 38.5			9	SS	50/.2				
Very Dense GRAVEL w/ Sand & Sandstone fragments, wet GP 44.7	40	684.0							
Grey SANDSTONE, Weathered	45	679.0	10	SS	90, 50/.5				
Grey Silty SHALE, Extremely Broken, RQD=0.0	45.2			DB					

RECORD OF SUBSURFACE EXPLORATION

ALCOSAN - EPM

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM

Client: ALCOSAN Proj No:

Boring: 277 Date Started: 6/6/96 Date Completed: 6/6/96

Location: See Site Plan

140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop

ELEVATIONS

Ground Surface: 724.0'

End of Boring: 661.0'

WATER LEVELS

While Drilling: 14.0'

At 0 Hrs After Coring: 12.8'

After 24 Hours: 14.4'

▽▽▽ = Shelby Tube ▨ = NX Rock Core SS= Split Spoon ST= Shelby Tube, DB = Diamond Bit

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
Grey Silty SHALE,Med. Hard Extremely Broken, RQD = 0.0	55	669.0		DB					
56.0 Grey CLAYSTONE,Soft Extremely Broken	60	664.0							
62.0 Red CLAYSTONE, Soft 63.0	65								
End of Boring @ 63.0 FT.									

Coring Data

Depth	Recovery
45.0-51.0	2.5'
51.0-56.0	4.6'
56.0-61.0	0.0'
61.0-63.0	0.8'

RECORD OF SUBSURFACE EXPLORATION

ALCOSAN - EPM

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM

Client: ALCOSAN Proj No:

Boring: 278 Date Started: 6/7/96 Date Completed: 6/10/96

Location: See Site Plan

140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop

ELEVATIONS

Ground Surface: 724.6'

End of Boring: 664.1'

WATER LEVELS

While Drilling: 19.5'

O hrs after Coring: 12.5'

After 24 Hours: 11.0'

▨ = Shelby Tube ▨ = NX Rock Core SS= Split Spoon ST= Shelby Tube, DB = Diamond Bit

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
Very Dense Brown Gravel, Some Sand	0.5		1	SS	3, 50/.3				
Cement, Gravel, Sand, Hard, FILL (Difficult to advance augur)	3.0								
	5	719.6	2	SS	16, 22, 16, 17				
	10	714.6	3	SS	7, 4, 37, 50/0				
			4	SS	50/.2				
	15	709.6							
	17.2								
Brown Sand&Gravel, Slag, FILL	20.5								
	20	704.6	5	SS	8, 6, 2, 2				
Black Clayey SILT w/Cinders, Wet Wood in Sample #5 MH									
PETROLEUM ODOR	25	699.6	6	SS	1, 1, 2, 2			45.2	
				ST	No Recovery				
	26.5		7	SS	13, 12, 4, 3				
Grey/Black Silty SAND, some Gravel, Wet ML	30.0								
	30	694.6	8	SS	9, 16, 9, 15				
Grey/Black GRAVEL & SAND, Med. Dense, Wet GP-GM	35.0								
	35	689.6	9	SS	13, 15, 12, 17				
Brown Sandy GRAVEL, Wet Very Dense GW	41.0								
	40	684.6	10	SS	5, 8, 13, 12				
Reddish Brown SANDY GRAVEL, Dense, Moist, Some SILT SM	45.8								
	45	679.6	11	SS	32, 56, 85				
Blue/grey SANDSTONE, Weathered									
Augur refusal at 50.0									

RECORD OF SUBSURFACE EXPLORATION

ALCOSAN - EPM

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM

Client: ALCOSAN Proj No:

Boring: 278 Date Started: 6/7/96 Date Completed: 6/10/96

Location: See Site Plan

140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop

ELEVATIONS

Ground Surface: 724.6'

End of Boring: 664.1'

WATER LEVELS

While Drilling: 19.5'

At 0 Hrs After Coring: 12.5'

After 24 Hours: 11.0'

▽▽▽ = Shelby Tube ▨ = NX Rock Core SS= Split Spoon ST= Shelby Tube, DB = Diamond Bit

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
Grey SILTSTONE,Med. Hard Extremely Broken, RQD = 0.13	55	669.6		DB					
56.5									
Grey/Red CLAYSTONE,Soft Slightly Broken 60.5	60	664.1							
End of Boring @ 60.5 FT.	65								

Coring Data

Depth	Recovery
50.0-55.0	4.3'
55.0-60.5	5.5'

RECORD OF SUBSURFACE EXPLORATION

ALCOSAN - EPM

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM

Client: ALCOSAN Proj No:

Boring: 279 Date Started: 6/10/96 Date Completed: 6/11/96

Location: See Site Plan

140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop

ELEVATIONS

Ground Surface: 725.5'

End of Boring: 669.5'

WATER LEVELS

While Drilling: 16'

O hrs after Coring: 11.0'

After 24 Hours: 11.0'

▨ = Shelby Tube ▨ = NX Rock Core SS= Split Spoon ST= Shelby Tube, DB = Diamond Bit

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
Very Dense Brown Gravel, Some Sand	0.5								
Slag, Gravel, Sand, Glass, Bricks, FILL	3.0		1	SS	2,3, 3,2				
	5	720.5	2	SS	8, 11, 8,10				
Large Cobbles Returned to surface by auger	9.0								
	10	715.5	3	SS	3,4, 4,6				
Brown Sand&Gravel, Med. Dense, Moist SP	15	710.5	4	SS	3,4, 5,6				
	19.0								
Grey Sand & Gravel, Wet SP-SM	20	705.5	5	SS	2,5 3,5				
	24.0								
PETROLEUM ODOR Black Cinders & Slag, some Gravel, Wet	25	700.5	6	SS	5,.4, 5,20				
	26.5								
	29.5								
Grey/Brown GRAVEL & SAND, Very Dense. Dense, Wet GW	30	695.5	7	SS	8,20, 20,33				
	35.5								
Fine/Med. Brown SAND, Trace GRAVEL, Dense, Wet SM	35	690.5	8	SS	13,13 10,14				
	39.5								
Blue/grey SANDSTONE & Gravel, Weathered SP	40	685.5	9	SS	4,40, 42,53				
	45	680.5	10	SS	50,56, 66, 50/.2				
	46.0								
White SANDSTONE. Hard	46.3			DB					
Grey Silty SHALE, Weathered Med. Hard. Extremely Broken									

RQD=0.0

RECORD OF SUBSURFACE EXPLORATION

ALCOSAN - EPM

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM

Client: ALCOSAN Proj No:

Boring: 279 Date Started: 6/10/96 Date Completed: 6/11/96

Location: See Site Plan

140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop

ELEVATIONS
Ground Surface: 725.5'
End of Boring: 669.5'

WATER LEVELS
While Drilling: 16'
At 0 Hrs After Coring: 11.0'
After 24 Hours: 11.0'

= Shelby Tube = NX Rock Core SS= Split Spoon ST= Shelby Tube, DB = Diamond Bit

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
Grey SILTSTONE W/ Interbedded clay seams,Med. Hard,Extremely to Moderately Broken, RQD = 0.13	51.0			DB					
	55	669.5							
End of Boring @ 56.0 FT.	56.0								
	60								
	65								

Coring Data

Depth	Recovery
46.0-51.0	2.6'
51.0-56.0	4.5'

RECORD OF SUBSURFACE EXPLORATION

ALCOSAN - EPM

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM

Client: ALCOSAN Proj No:

Boring: 280 Date Started: 6/14/96 Date Completed: 6/14/96

Location: See Site Plan

140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop

ELEVATIONS

Ground Surface: 726.8'

End of Boring: 665.8'

WATER LEVELS

While Drilling: 16.5'

O hrs after Coring: 15.8'

After 24 Hours: Caved in at 14.4'

▨ = Shelby Tube ▨ = NX Rock Core SS= Split Spoon ST= Shelby Tube, DB = Diamond Bit

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
4" Asphalt Pavement	0.3								
Cinders & Slag	2.0		1	SS	13,11 8,8				
Brown Gravel, Slag, Sand, Bricks, FILL	5	721.8	2	SS	3,3 2,3				
Bricks returned to surface by augur during drilling.	10	716.8	3	SS	5,4 3,3				
Wood in Sample #4	15	711.8	4	SS	5,4 6,7				
	19.0								
Very Loose Black Cinders, Wet	20	706.8	5	SS	1,1, 1,1				
No Sample #6 Retrieved Traces of Bricks & Slag in #7	25	701.8	6	SS	4,2, 1,2				
			7		2,2, 1,1				
	30.0								
Grey Silty SAND, Wet, Trace Coal Cinders, Slightly Compact **ML**	30	696.8	8	SS	2,3, 3,2			35.6	
	35.0								
Grey/Brown Sandy GRAVEL, Very Dense **SP**	35	691.8	9	SS	16,15, 19,17				
	40	686.8	10	SS	14,16 21,20				
	45	681.8	11	SS	40,55, 60				
	47.5								
Grey SILTY SHALE, Weathered, Extremely Broken			▨	DB					

RECORD OF SUBSURFACE EXPLORATION

ALCOSAN - EPM

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM

Client: ALCOSAN Proj No:

Boring: 280 Date Started: 6/14/96 Date Completed: 6/17/96

Location: See Site Plan

140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop

ELEVATIONS
Ground Surface: 726.8'
End of Boring: 672.4'

WATER LEVELS
While Drilling: 16.0'
At 0 Hrs After Coring: 16.5'
After 24 Hours:Caved at 14.4'

▽▽▽ = Shelby Tube ▨ = NX Rock Core SS= Split Spoon ST= Shelby Tube, DB = Diamond Bit

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
	53.0								
Grey CLAYSTONE, Soft	55	671.8		DB					
	57.7								
Grey SILTSTONE,Med. Hard, Moderately Broken, RQD = 0.10	58.9								
	60	666.8							
	61.0								
Grey LIMESTONE, Very Hard, Occassionally Broken, RQD = 0.22	65								
End of Boring @ 61.0 FT.									
5.5" sample of Limestone taken for testing from 60 ft									

Coring Data

Depth	Recovery
47.5-56.8	No Recovery
57.7-61.0	3.0'

RECORD OF SUBSURFACE EXPLORATION

ALCOSAN - EPM

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM

Client: ALCOSAN Proj No:

Boring: 281 Date Started: 6/11/96 Date Completed: 6/11/96

Location: See Site Plan

140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop

ELEVATIONS

Ground Surface: 725.7'

End of Boring: 665.7'

WATER LEVELS

While Drilling: 18'

O hrs after Coring: 12.6'

After 24 Hours: 12.0'

= Shelby Tube = NX Rock Core SS= Split Spoon ST= Shelby Tube, DB = Diamond Bit

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
Brown Gravel, Slag, Sand, Bricks, FILL	5	720.7	1	SS	1,7, 12,10				
			2	SS	12, 7, 5,5				
10.0	10	715.7	3	SS	1,8, 3,3				
Fine/Med. Coarse Brown SAND w/ Gravel, Slightly Compact, Moist SP									
14.0 Grey/Brwn Clayey SAND&GRAVEL, Damp SM	15	710.7	4	SS	9,9, 7,8			16.1	
Black Slag, Cinders, Sand, FILL	20	705.7	5	SS	7,9 8,4				
24.0									
V. Fine Grey/Black Silty SAND, Moist, Slightly Compact SM	25	700.7	6	SS	2,3, 3,4				
3" SILT Seam @25.0, Q_p= 1.0									
30.0 Dense Brown SAND, Some Gravel SP-SM	30	695.7	7	SS	3,5, 7,8				
34.0 V. Dense Brown GRAVEL, Wet GW	35	690.7	8	SS	7,13, 13				
39.0 ML Grey Sandy SILT, Firm, Moist 40.5	40	685.7	9	SS	6,7, 10,14		1.00	21.2	
Grey/Brown SANDSTONE & Gravel, Trace Silt, Dense SM									
45.0	45	680.7	10	SS	19,31, 44				
Very Dense SANDSTONE & Gravel GP									
Grey SILTSTONE, Extremely Broken			11	SS	50/.2				

RECORD OF SURFACE EXPLORATION

Project: ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM
Client: ALCOSAN Proj No:
Boring: 281 Date Started: 6/11/96 Date Completed: 6/11/96
Location: See Site Plan
140# Hammer, 3.25" I.D. Auger, 7" O.D. Auger, 30" Drop

ELEVATIONS
Ground Surface: 725.7'
End of Boring: 665.7'

WATER LEVELS
While Drilling: 18.0'
At 0 Hrs After Coring: 12.6'
After 24 Hours: 12.0'

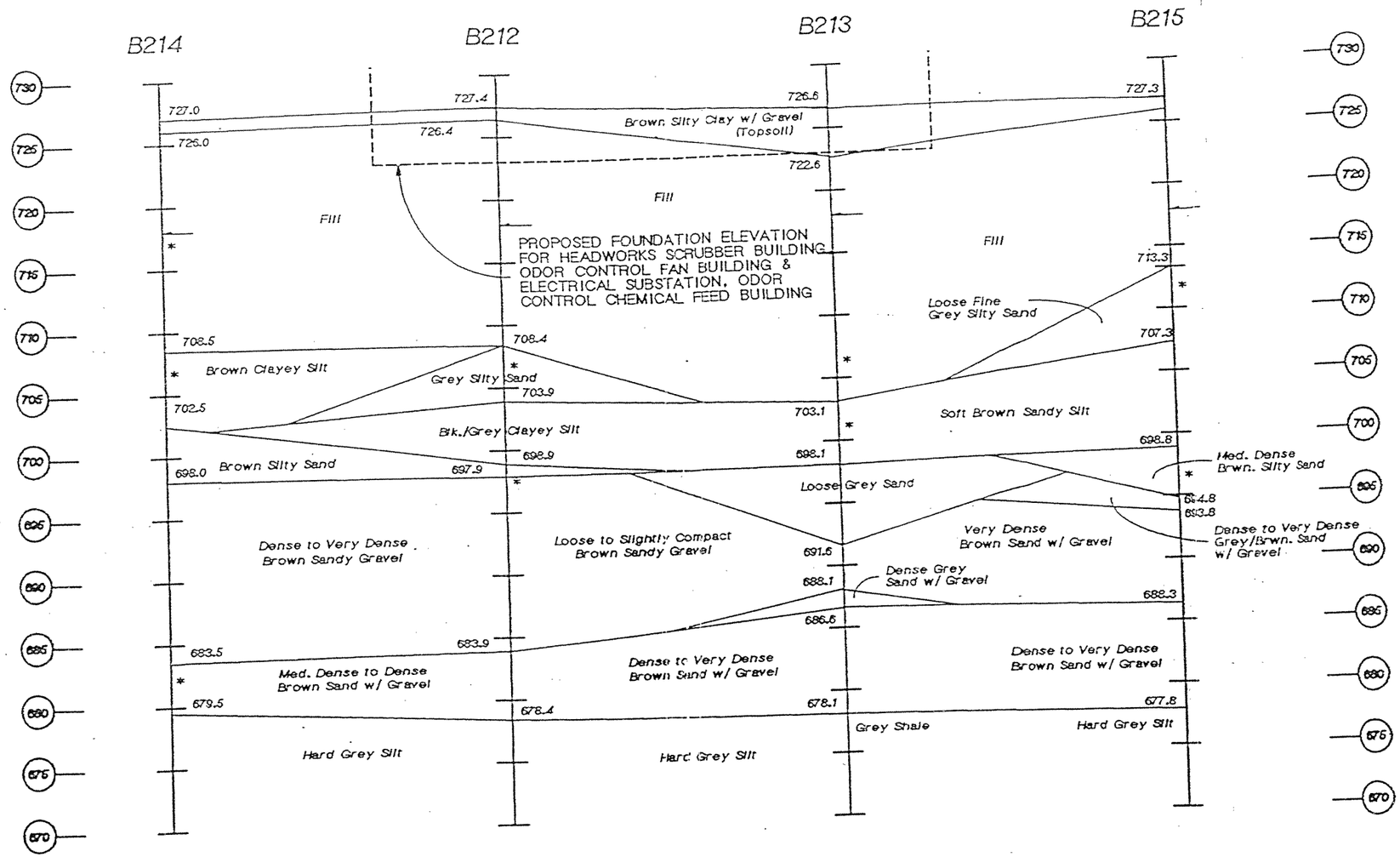
▨ = Shelby Tube ▨ = NX Rock Core SS= Split Spoon ST= Shelby Tube, DB = Diamond Bit

Soil Description	Depth	Elev	Sample No	Sample Type	N	Qu	Qp	Mc	γ_d
Grey SILTSTONE W/ Interbedded clay seams, Med. Hard, Extremely to Moderately Broken, RQD = 0.10	52.5								
	55	670.7		DB					
Grey LIMESTONE, Very Hard, Occassionally Broken, RQD = 0.37									
	60.0								
	60	665.7							
End of Boring @ 60.0 FT.									
	65								
5.5" sample of Limestone taken for testing from 54 ft									

Coring Data

Depth	Recovery
50.0-56.5	4.9'
56.5-60.0	3.3'

SOIL STRATIGRAPHY PROFILES



LOOKING SOUTH

Note: The Soil Stratigraphy Profile shown is for information only. The information shown is obtained from soil borings at discrete locations. Actual soil stratas between borings may vary. See soils report for further information and Geotechnical Data.

For information concerning previous borings, refer to ALCOSAN Design Standard, DS-5.

For Soil Boring Location, See Site Plan.

—— Water Level

* Indicates pH, Chloride, Sulfate, Corrosivity/Resistivity Results Available, See Soils Report

-- Limits of Proposed Structure

REV.	DESCRIPTION	DATE	APP.
0			
1			
2			
3			
4			

APPROVED

EXECUTIVE DIRECTOR — DATE

DIRECTOR OF ENGR. & CONST., PAJPE-ISC92E — DATE

PROJECT MANAGER — DATE

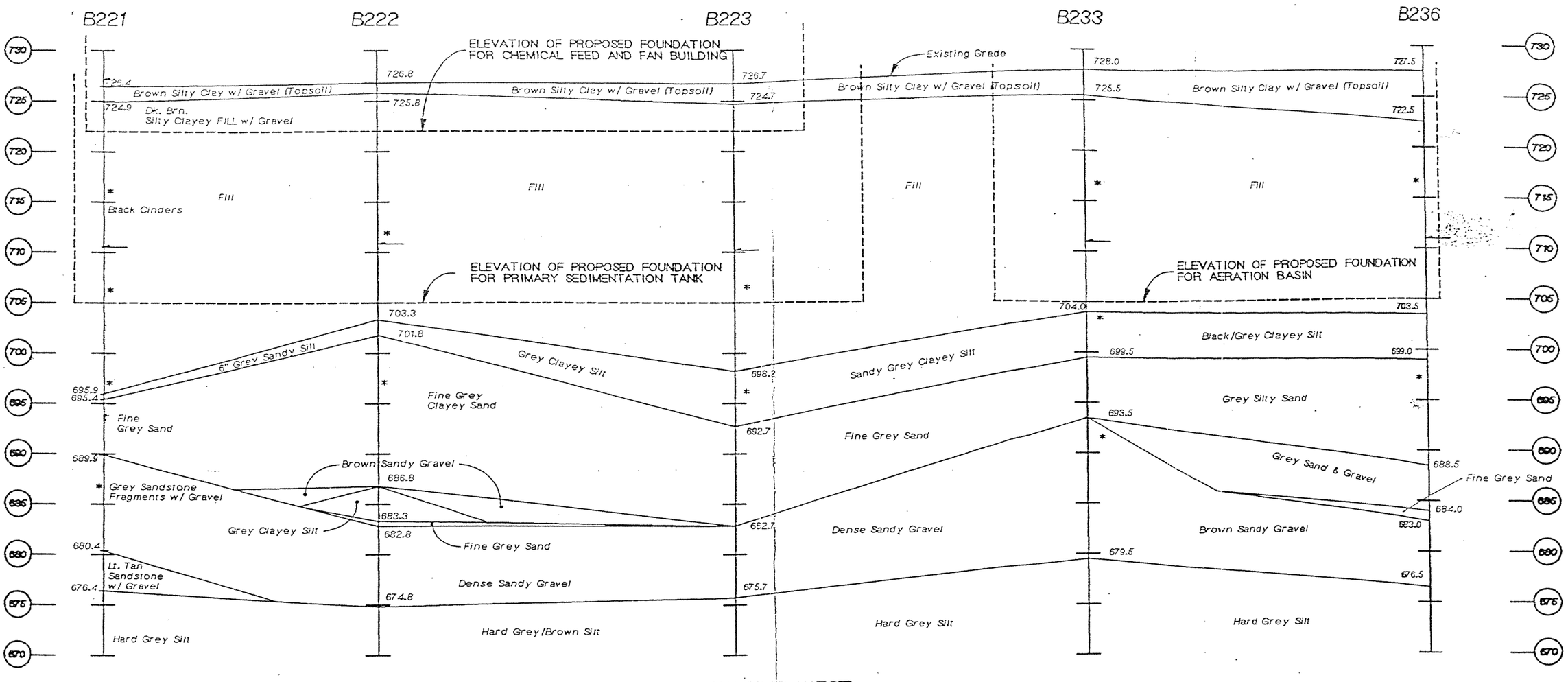
ALLEGHENY COUNTY SANITARY AUTHORITY
WASTEWATER TREATMENT PLANT
PITTSBURGH, PENNSYLVANIA

GEOTECHNICAL

SOIL PROFILE FOR PROPOSED HEADWORK SCRUBBER BUILDING, ODOR CONTROL FAND BUILDING & ELECRICAL SUBSTATIO ODOR CONTROL CHEMICAL FEED BUILDIN

SCALE: 1"=5'-0" VERT. NONE HOR. CONTRACT No. SHEET 1 OF

FILENAME: BHTSEC.DGN
DATE PLOTTED: 11/30/95



LOOKING WEST

----- Limits of Proposed Structure

—— Water Level

* Indicates pH, Chloride, Sulfate, Corrosivity/Resistivity Results Available, See Soils Report

The Soil Stratigraphy Profile shown is for information only. The information shown is obtained from soil borings at discrete locations. Actual soil stratas between borings may vary. See soils report for further information and Geotechnical Data.

For information concerning previous borings, refert to ALCOSAN Design Standard, DS-5.

For Soil Boring Location, See Site Plan.

REV.	DESCRIPTION	DATE	APP.
0			
1			
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APPROVED

EXECUTIVE DIRECTOR _____ DATE

DIRECTOR OF ENGR. & CONST., PAUL E. STOSZE _____ DATE

PROJECT MANAGER _____ DATE

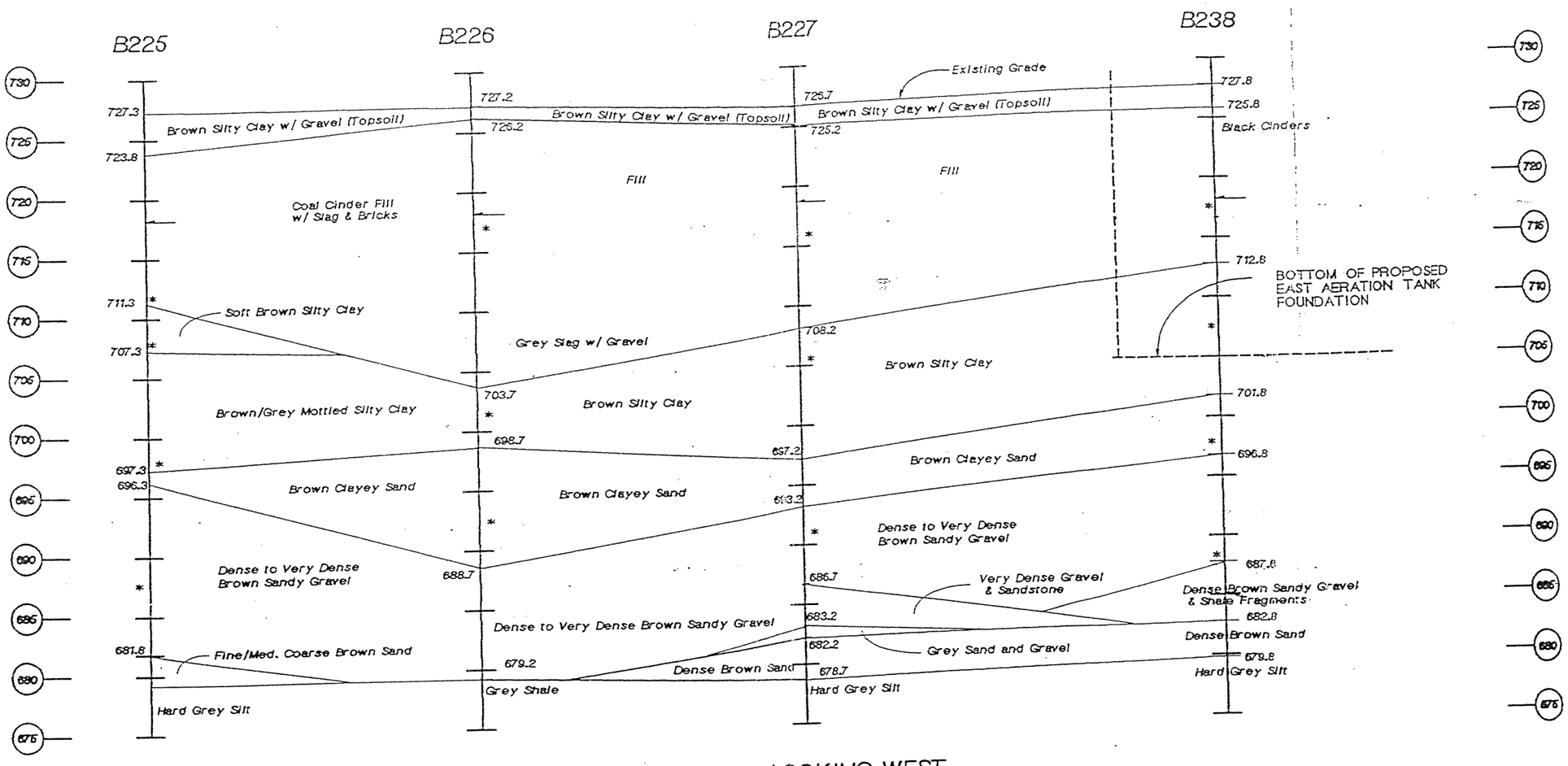
ALLEGHENY COUNTY SANITARY AUTHORITY
WASTEWATER TREATMENT PLANT
PITTSBURGH, PENNSYLVANIA

GEOTECHNICAL

SOIL PROFILE FOR PROPOSED WEST TANKS

SCALE: 1"=5' VERT., None HORIZ. CONTRACT No. SHEET 1 OF 1

FILENAME: WTANKSEC.DGN
DATE PLOTTED: 11/30/95



LOOKING WEST

—— Water Level

* Indicates pH, Chloride, Sulfate, Corrosivity/Resistivity Results Available, See Soils Report

------ Limits of Proposed Structure

Note: The Soil Stratigraphy Profile shown is for information only. The information shown is obtained from soil borings at discrete locations. Actual soil stratas between borings may vary. See soils report for further information and Geotechnical Data.

For information concerning previous borings, refer to ALCOSAN Design Standard, DS-5.

For Soil Boring Location, See Site Plan.

REV.	DESCRIPTION	DATE	APP.
0			
1			
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APPROVED

EXECUTIVE DIRECTOR — DATE

DIRECTOR OF ENGR. & CONST., PAPE-BOSKE — DATE

PROJECT MANAGER — DATE

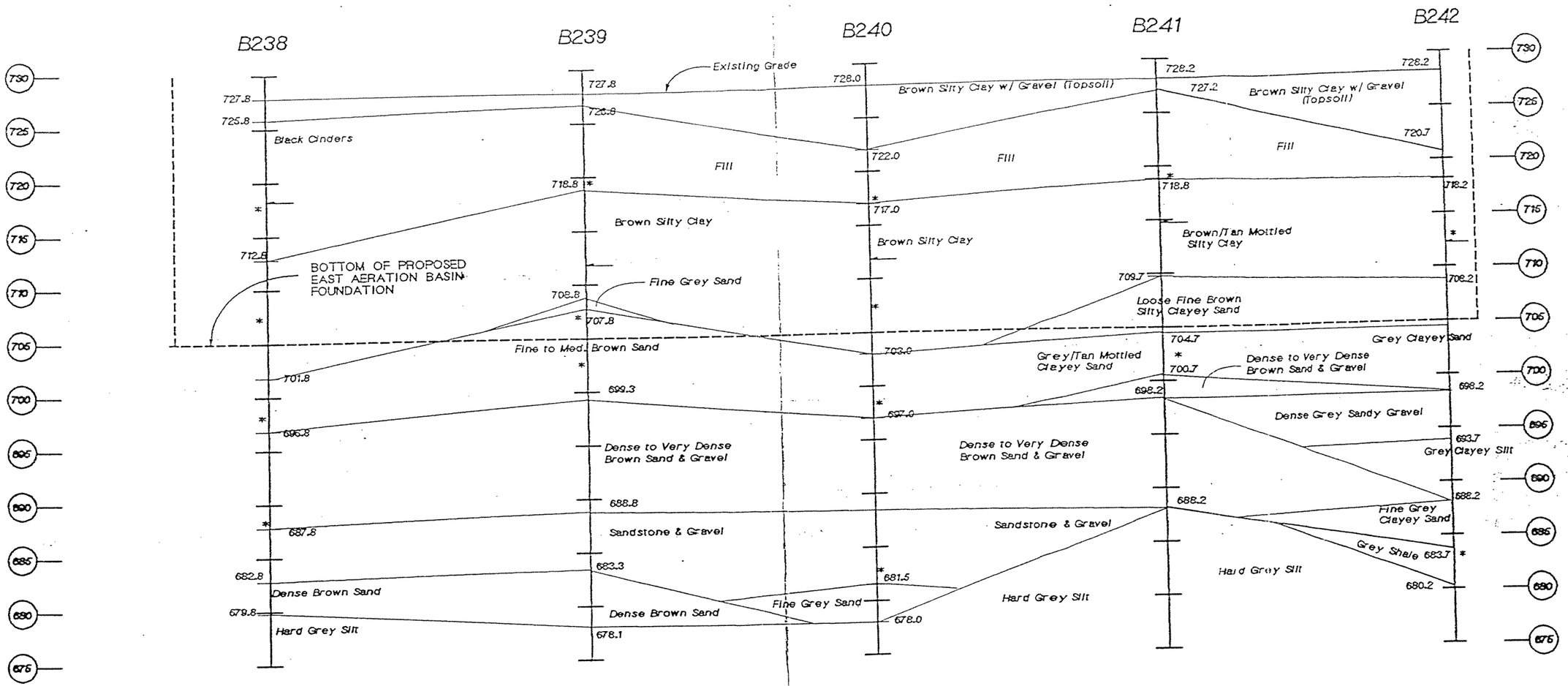
ALLEGHENY COUNTY SANITARY AUTHORITY
WASTEWATER TREATMENT PLANT
PITTSBURGH, PENNSYLVANIA

GEOTECHNICAL

SOIL PROFILE FOR PROPOSED EAST AERATION BASINS

SCALE: 1"=5'-0" VERT., NONE HOR. CONTRACT No. SHEET 1 OF 2

FILENAME: ETANKSEC.DGN
DATE PLOTTED: 11/30/95



LOOKING WEST

—— Water Level

* Indicates pH, Chloride, Sulfate, Corrosivity/Resistivity Results Available, See Soils Report

– – – – – Limits of Proposed Structure

Note: The Soil Stratigraphy Profile shown is for information only. The information shown is obtained from soil borings at discrete locations. Actual soil stratas between borings may vary. See soils report for further information and Geotechnical Data.

For information concerning previous borings, refer to ALCOSAN Design Standard, DS-5.

For Soil Boring Location, See Site Plan.

REV.	DESCRIPTION	DATE	APP.
0			
1			
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APPROVED

EXECUTIVE DIRECTOR — DATE

DIRECTOR OF ENGR. & CONST. — P.E.-15932E — DATE

PROJECT MANAGER — DATE

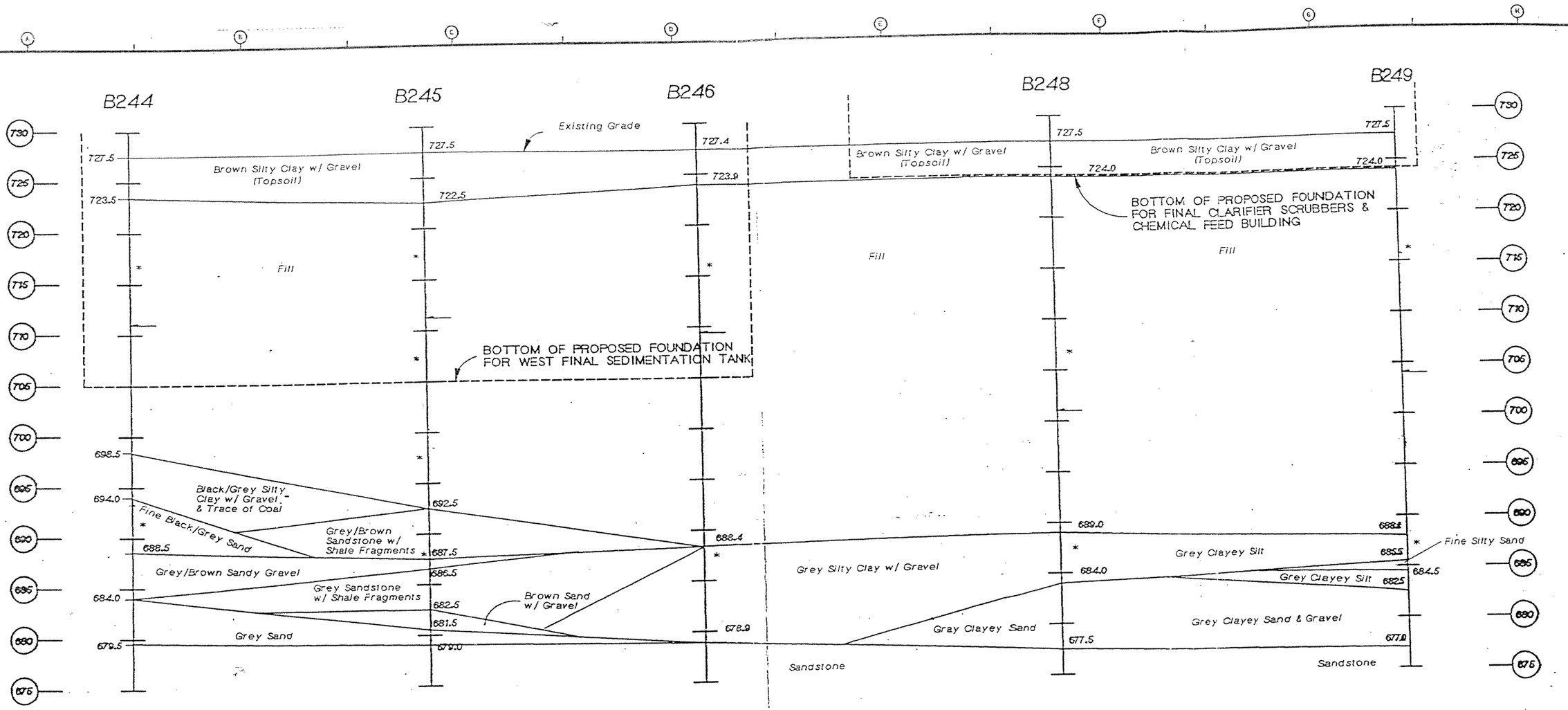
ALLEGHENY COUNTY SANITARY AUTHORITY
WASTEWATER TREATMENT PLANT
PITTSBURGH, PENNSYLVANIA

LOCATION IN PLANT OR INTERCEPTING SEWERS

SOIL PROFILE FOR PROPOSED EAST AERATION BASINS

SCALE: 1"=8'-0" VERT. NONE HOR. CONTRACT No. SHEET 2 OF 2

FILENAME: ETANKSECT.DGN
DATE PLOTTED: 8/30/95



LOOKING WEST

NOTE: The Soil Profile shown is for information only. The information shown is obtained from soil borings at discrete locations. Actual soil stratas between borings may vary. See soils report for further information and Geotechnical Data.

For information concerning previous borings, refer to ALCOSAN Design Standard, DS-5.

For Soil Boring Location, See Site Plan.

------ Limits of Proposed Structure

—— Water Level

* Indicates pH, Chloride, Sulfate, Corrosivity/Resistivity Results Available, See Soils Report

REV.	DESCRIPTION	DATE	APP.
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APPROVED

EXECUTIVE DIRECTOR — DATE

DIRECTOR OF ENGR. & CONST., P.A.P.E. 19592E — DATE

PROJECT MANAGER — DATE

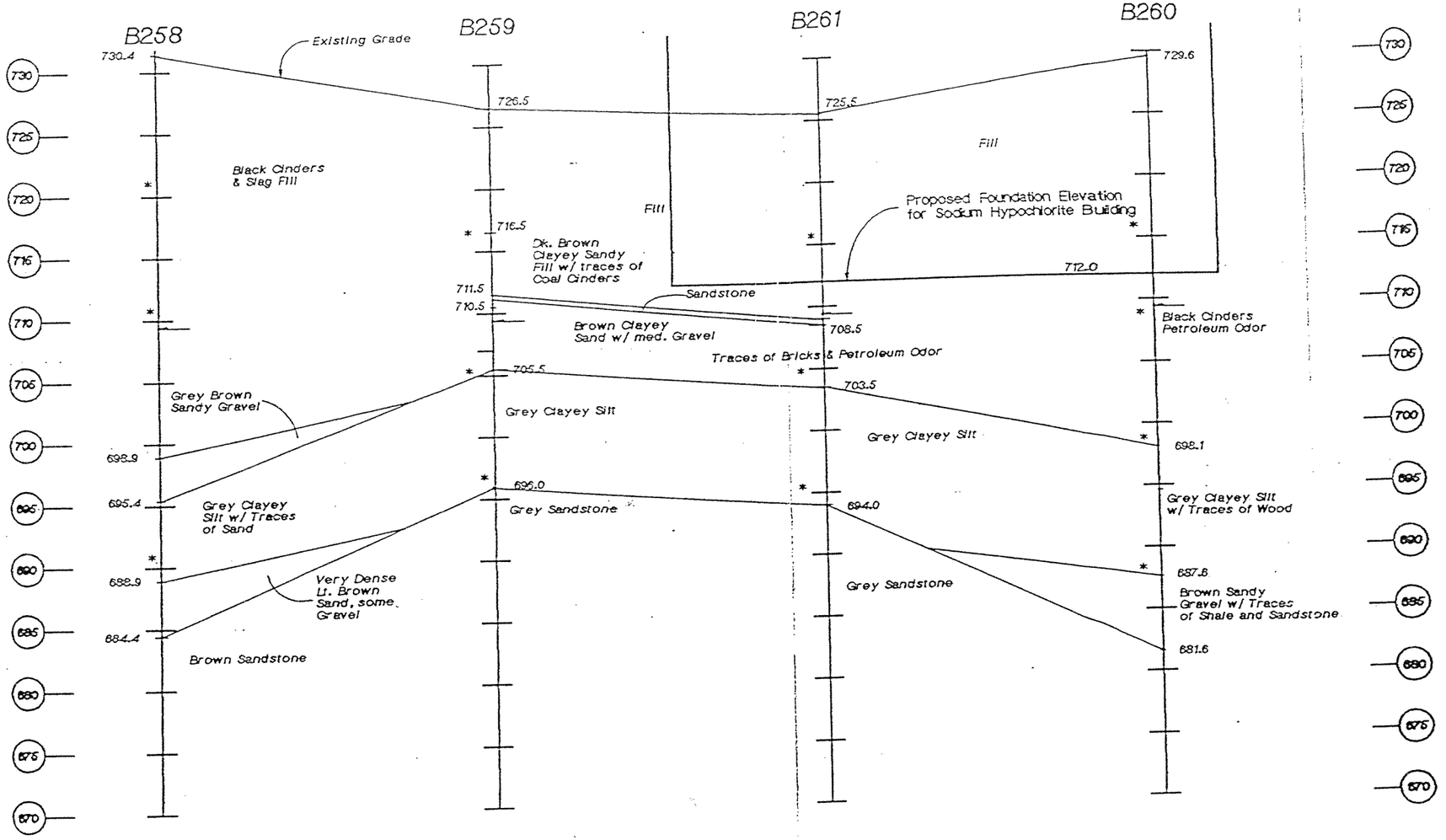
ALLEGHENY COUNTY SANITARY AUTHORITY
WASTEWATER TREATMENT PLANT
PITTSBURGH, PENNSYLVANIA

GEOTECHNICAL

SOIL PROFILE FOR PROPOSED WEST FINAL SEDIMENTATION TANK, FINAL CLARIFIER SCRUBBERS & CHEMICAL FEED BUILDING

SCALE: 1"=5' VERT., None HORIZ. CONTRACT No. SHEET 1 OF 1

FILENAME: WFCLSEC.DGN
DATE PLOTTED: 11/27/95



The Soil Stratigraphy Profile shown is for information only. The information shown is obtained from soil borings at discrete locations. Actual soil stratas between borings may vary. See soils report for further information and Geotechnical Data.

For Soil Boring Location, See Site Plan.

For Informaion concerning previous borings, refer to ALCOSAN Design Standards, DS-5.

—— Water Level @ 24 Hrs.

—— Water Level @ Completion of Drilling

* Indicates pH, Chloride, Sulfate, Corrosivity/Resistivity Results Available, See Soils Report

REV.	DESCRIPTION	DATE	APP.
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APPROVED

EXECUTIVE DIRECTOR — DATE

DIRECTOR OF ENGR. & CONST. — DATE

PROJECT MANAGER — DATE

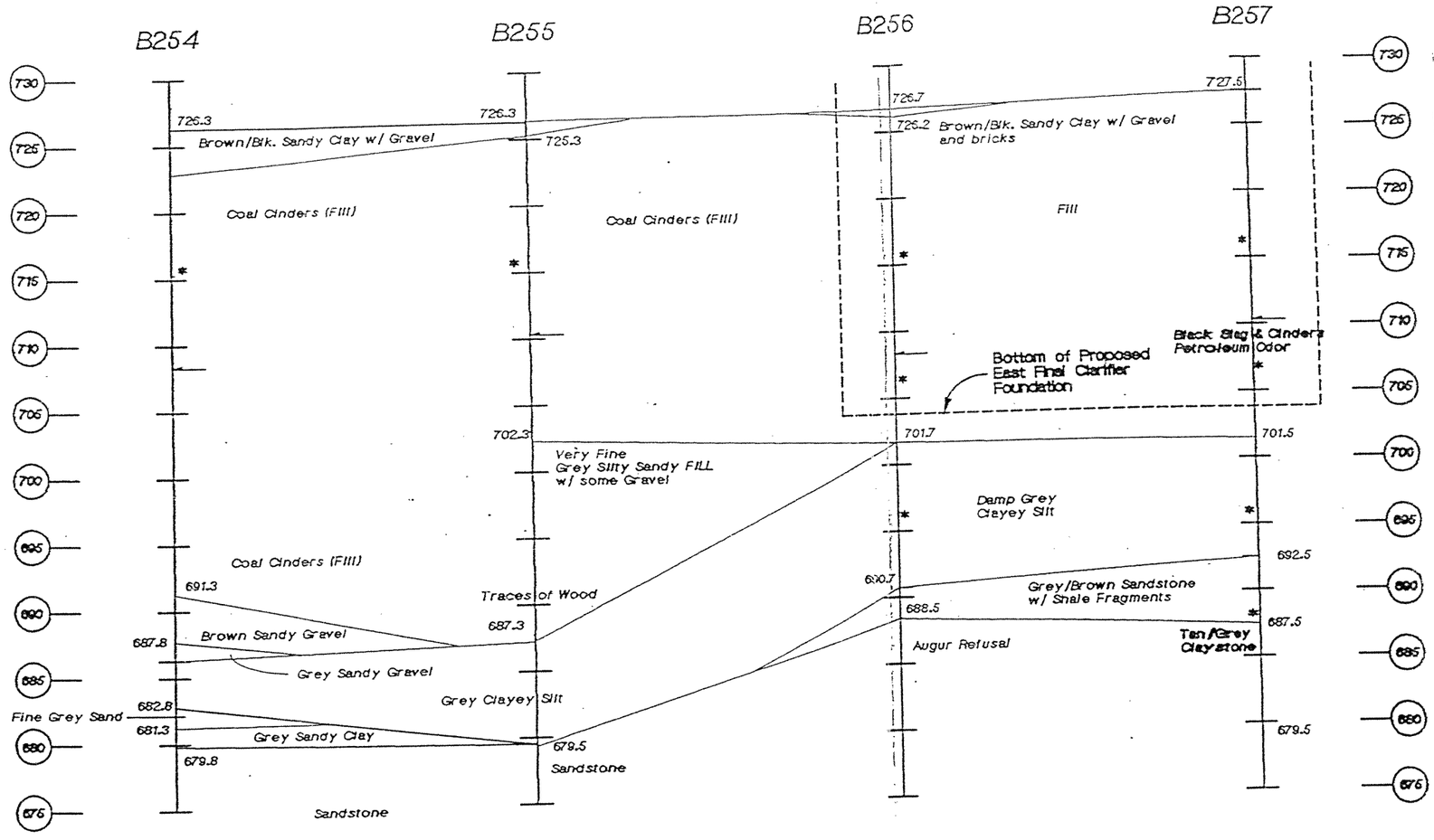
ALLEGHENY COUNTY SANITARY AUTHORITY
WASTEWATER TREATMENT PLANT
PITTSBURGH, PENNSYLVANIA

GEOTECHNICAL

SOIL PROFILE AT SODIUM HYPOCHLORITE BUILDING

SCALE: 1"=5'-0" VERT., NONE HORZ. CONTRACT No. SHEET 1 OF 1

FILENAME: HYPOSEC.DGN
DATE PLOTTED: 8/22/96



Note: The Soil Stratigraphy Profile shown is for information only. The information shown is obtained from soil borings at discrete locations. Actual soil stratas between borings may vary. See soils report for further information and Geotechnical Data.

For information concering previous borings, refer to ALCOSAN Design Standard, DS-5.

For Soil Boring Location, See Site Plan.

—— Water Level

* Indicates pH, Chloride, Sulfate, Corrosivity/Resistivity Results Available, See Soils Report

– – Limits of Proposed Structure

LOOKING NORTH

REV.	DESCRIPTION	DATE	APP.
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1			
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APPROVED

EXECUTIVE DIRECTOR — DATE

DIRECTOR OF ENGR. & CONST., P.A./P.E. LICENSE — DATE

PROJECT MANAGER — DATE

ALLEGHENY COUNTY SANITARY AUTHORITY
WASTEWATER TREATMENT PLANT
PITTSBURGH, PENNSYLVANIA

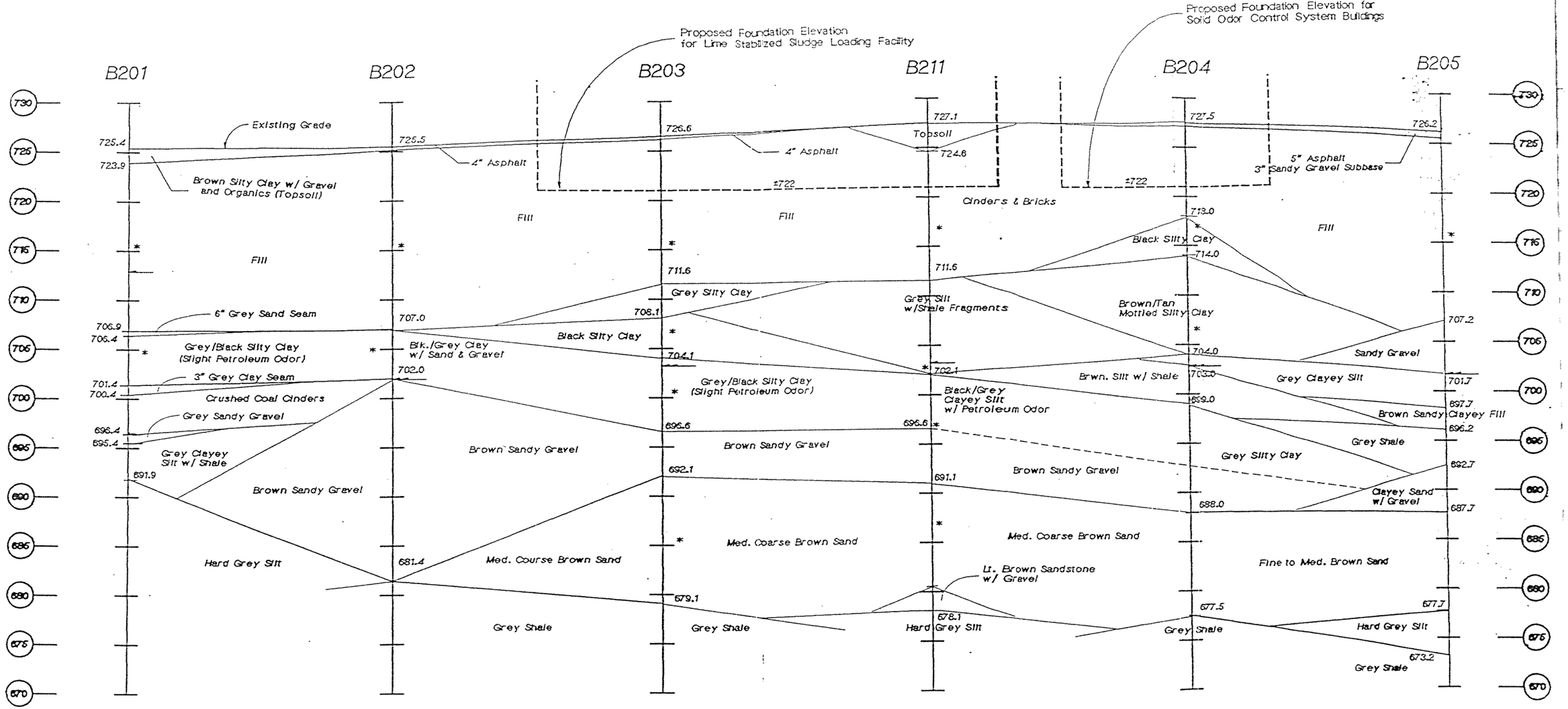
LOCATION IN PLANT OR INTERCEPTING SEWERS

SOIL PROFILE FOR PROPOSED EAST FINAL CLARIFERS

SCALE: 1"=5'-0" VERT., NONE HOR. CONTRACT No. SHEET 1 OF 1

FILENAME: NFCLSEC.DGN

DATE PLOTTED: 11/30/95



LOOKING SOUTH

The Soil Stratigraphy Profile shown is for information only. The information shown is obtained from soil borings at discrete locations. Actual soil stratas between borings may vary. See soils report for further information and Geotechnical Data.

For Soil Boring Location, See Site Plan.

For Informaion concerning previous borings, refer to ALCOSAN Design Standards, DS-5.

—— Water Level @ 24 Hrs.

—— Water Level @ Completion of Drilling

* Indicates pH, Chloride, Sulfate, Corrosivity/Resistivity Results Available, See Soils Report

REV.	DESCRIPTION	DATE	APP.
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APPROVED

EXECUTIVE DIRECTOR — DATE

DIRECTOR OF ENVR. & CONST., P.A.P.E.-ED52E — DATE

PROJECT MANAGER — DATE

ALLEGHENY COUNTY SANITARY AUTHORITY
WASTEWATER TREATMENT PLANT
PITTSBURGH, PENNSYLVANIA

GEOTECHNICAL

SOIL PROFILE NEAR TRACY STREET FOR LIME STABILIZED SLUDGE LOADING FACILITY AND SOLID ODOR CONTROL SYSTEM BUILDINGS

SCALE: None — CONTRACT No. — SHEET 1 OF 1

FILENAME: TRACYSEC.DGN
DATE PLOTTED: 8/30/95

SHELBY TUBE LOG SHEET

ALCOSAN WASTE WATER TREATMENT PLANT
Geotechnical Investigation Program

LOG OF THIN-WALLED SAMPLES & TESTING

Tube Number	Depth (ft)	Recovery (ft)	Testing Performed
203-1	15.0-17.0	2.0	
203-2	20.0-22.0	1.9	
204-1	30.0-32.0	2.0	
207-1	28.0-29.0	0.7	
209-1	17.0-19.0	2.0	
209-2	22.0-23.1	0.8	
210-1	22.0-24.0	2.0	Unit Weight, Consolidation
212-1	25.0-27.0	2.0	
213-1	25.0-27.0	0.0	
214-1	20.0-22.0	2.0	
215-1	20.0-22.0	2.0	
216-1	22.0-24.0	2.0	
222-1	40.0-42.0	2.0	
223-1	30.0-32.0	2.0	Unit Weight, Consolidation
226-1	25.0-27.0	2.0	
227-1	20.0-22.0	2.0	
230-1	25.0-27.0	2.0	
232-1	25.0-27.0	1.5	Unit Weight, Consolidation, Classification
233-1	25.0-27.0	2.0	
235-1	25.0-27.0	2.0	
236-1	25.0-27.0	2.0	
237-1	25.0-27.0	2.0	Unit Wt, Consolidation, Triaxial(CU),LL,PI Sieve Analysis, Classification
239-1	10.0-12.0	2.0	
241-1	15.0-17.0	0.0	
242-1	15.0-17.0	1.5	
242-2	20.0-22.0	2.0	
242-3	40.0-42.0	0.0	
246-1	40.0-42.0	1.7	
248-1	40.0-42.0	0.0	
249-1	40.0-42.0	2.0	Unit Weight, Permeability
249-2	43.5-44.4	2.0	
254-1	45.0-45.9	2.0	
255-1	45.0-46.5	2.0	
256-1	27.0-29.0	0.0	
257-1	27.0-29.0	2.0	Unit Weight, Permeability
258-1	37.0-39.0	2.0	
259-1	22.0-24.0	2.0	
260-1	32.0-34.0	2.0	
261-1	22.0-24.0	2.0	
263-1	32.0-34.0	1.8	Unit Weight, Consolidation
264-1	29.0-31.0	2.0	Unit Weight, Consolidation
265-1	27.0-29.00	1.5	Unit Weight, Triaxial Shear-CU
269-1	21.0-23.0	1.7	Unit Wt, Consolidation, Triaxial(CU),LL,PI Sieve Analysis, Classification
270-1	18.0-20.0	0.0	
278-1	26.0-26.5	0.0	

ATTERBERG LIMITS
USC SOIL CLASSIFICATIONS

Boring Number	Sample Number	USC Classification	Flow Index Fi	Liquid Limit	Plastic Limit	Plasticity Index, Ip
232	S-6	ML	-25.1	46.2	29.2	17.0
232	S-7,S-8	SM	-10.7	22.0	21.5	0.5
232	S-8, BOTTOM	SP	N/A	N/A	N/A	N/A
232	S-9,S-10	SM	-10.0	18.6	17.9	0.7
234	S-5	SM	-56.2	38.0	28.1	9.9
234	S-6,S-7	SM	-10.0	35.7	29.5	6.2
234	S-8	SM	-5.8	32.3	23.2	9.1
234	S-9	GP	N/A	N/A	N/A	N/A
234	S-10	SW	N/A	N/A	N/A	N/A
234	S-11	SP-SM	-8.6	20.8	17.5	3.3
235	S-6	MH	-14.3	50.3	35.8	14.5
235	S-7	ML	-13.4	39.5	27.2	12.3
235	S-8,S-9	SP	N/A	N/A	N/A	N/A
235	S-10,S-11	SW-SM	-7.1	21.2	19.0	2.2
237	S-3	ML	-8.1	34.9	23.4	11.5
237	S-6	MH	-26.8	50.5	35.8	14.7
237	S-7	SM	-7.7	22.6	22.3	0.3
237	S-8	SP	N/A	N/A	N/A	N/A
237	S-9	GW	N/A	N/A	N/A	N/A
237	S-11	SW-SM	-10.7	17.8	17.2	0.6
243	S-3	ML	-9.1	31.6	23.5	8.1
243	S-4,TOP	CL	-3.3	28.7	18.7	10.0
243	S-4,BOTTOM	SM	-11.4	27.9	23.1	4.8
243	S-6	SP-SC	-8.8	26.9	21.0	5.9
243	S-7	SM	-7.0	27.9	20.5	7.4
262-A	S-4	GW	N/A	N/A	N/A	N/A
262-A	S-5,S-6	GW	N/A	N/A	N/A	N/A
262-A	S-7	ML	-13.4	44.9	34.1	10.8
266	S-6	GW	N/A	N/A	N/A	N/A
266	S-7	SP-SM	-2.7	20.3	18.1	2.2
266	S-8,S-9	GW	N/A	N/A	N/A	N/A
267	S-5,TOP	ML	-14.2	38.4	28.1	10.3
267	S-5,BOTTOM	SP-SM	-9.7	26.3	20.4	5.9
267	S-6	SM	-8.8	21.7	20.0	1.7
267	S-8,9,10	SP	N/A	N/A	N/A	N/A
268	S-4,S-5	ML	-10.2	34.5	25.0	9.5
268	S-6	SP-SM	-8.8	21.5	20.5	1.5
268	S-7,S-8	SW	N/A	N/A	N/A	N/A
269	S-4	ML	-11.1	34.5	27.2	7.3
269	S-5,S-6	SP-SM	-10.4	22.9	18.6	4.3
269	S-8,S-9	SP	N/A	N/A	N/A	N/A
270	S-4	SM	-22.0	26.4	23.4	3.0
270	S-5,TOP	ML	-7.8	26.7	23.0	3.7

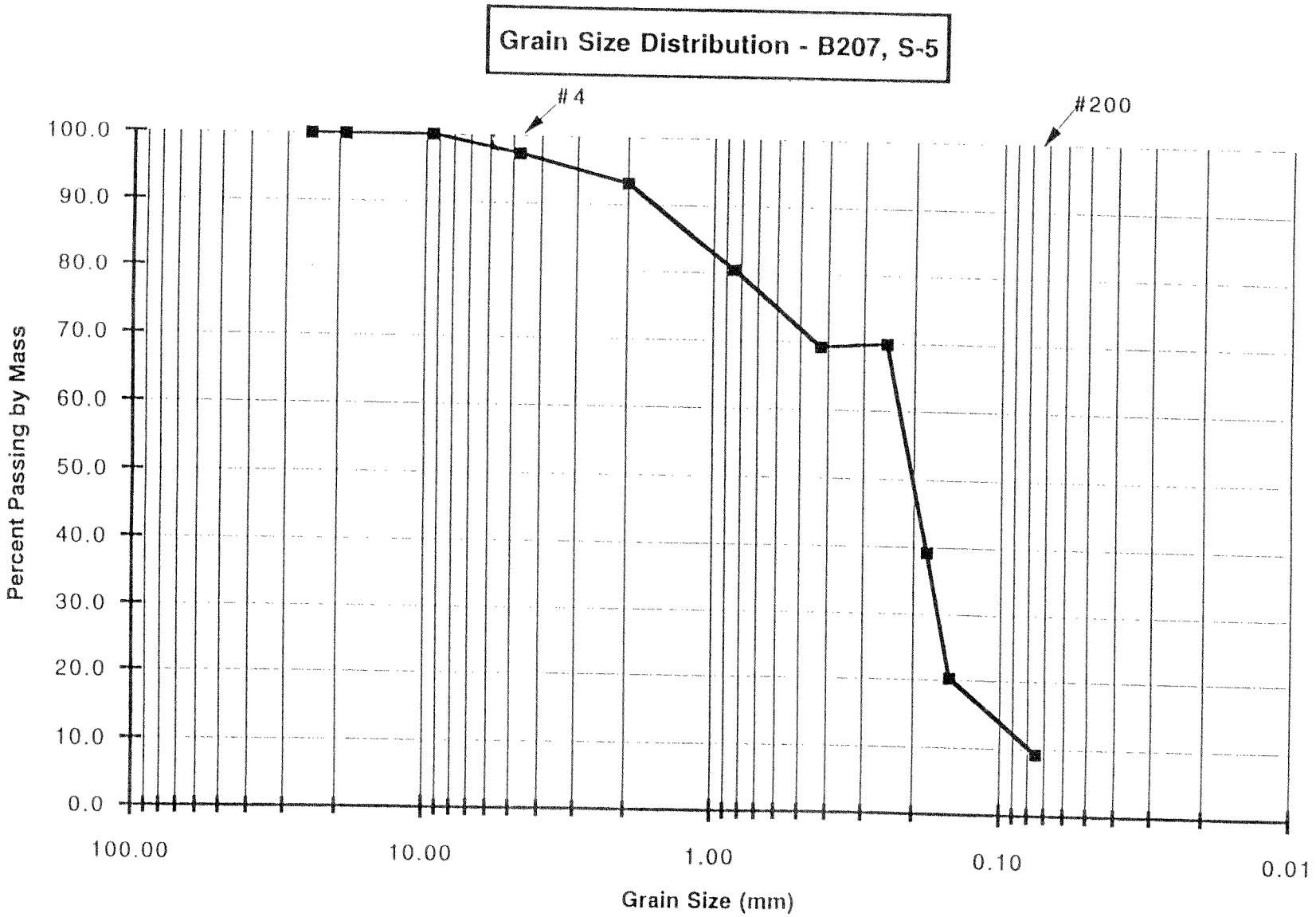
Boring Number	Sample Number	USC Classification	Flow Index Fi	Liquid Limit	Plastic Limit	Plasticity Index, Ip
270	S-5 BOT,S-6	SP-SM	-5.0	22.5	18.0	4.5
270	S-7,8,9	SP	N/A	N/A	N/A	N/A
272	S-4	SW	N/A	N/A	N/A	N/A
272	S-7	ML	-11.1	44.6	32.1	12.5
272	S-8	GW	N/A	N/A	N/A	N/A
272	S-9	SW-SM	-16.9	16.7	16.0	0.7
273	S-3,S-4	GW	N/A	N/A	N/A	N/A
273	S-5,6,7	GW	N/A	N/A	N/A	N/A
273	S-8	GW	N/A	N/A	N/A	N/A
273	S-9	ML	-7.6	21.5	17.7	3.8
273	S-10	GW	N/A	N/A	N/A	N/A
274	S-3,4	GW	N/A	N/A	N/A	N/A
274	S-5,TOP	SP	N/A	N/A	N/A	N/A
274	S-5,BOT	GP	N/A	N/A	N/A	N/A
274	S-6	SP	N/A	N/A	N/A	N/A
274	S-7	SM	-6.4	27.4	23.6	3.8
274	S-8	GW	N/A	N/A	N/A	N/A
274	S-9	SM	-8.1	18.2	16.0	2.2
274	S-10	SP	N/A	N/A	N/A	N/A
276	S-4	GP	N/A	N/A	N/A	N/A
276	S-5	SP	N/A	N/A	N/A	N/A
276	S-6	GP	N/A	N/A	N/A	N/A
276	S-7	GP	N/A	N/A	N/A	N/A
276	S-8	SP-SM	-7.1	28.5	25.9	2.6
276	S-9	GP	N/A	N/A	N/A	N/A
277	S-5	SP	N/A	N/A	N/A	N/A
277	S-6	SP	N/A	N/A	N/A	N/A
277	S-7	SM	-63.5	60.3	55.2	5.1
277	S-8,TOP	SP	N/A	N/A	N/A	N/A
277	S-8,BOTTOM	GP	N/A	N/A	N/A	N/A
277	S-9	GP	N/A	N/A	N/A	N/A
278	S-6	MH	-15.7	53.5	40.9	12.6
278	S-7	ML	-3.4	35.0	26.4	8.6
278	S-8	GP-GM	-4.0	24.2	21.8	2.4
278	S-9	GW	N/A	N/A	N/A	N/A
278	S-10	SM	-11.1	34.2	26.9	7.3
279	S-3,S-4	SP	N/A	N/A	N/A	N/A
279	S-5	SP-SM	-10.4	29.2	24.8	4.4
279	S-7	GW	N/A	N/A	N/A	N/A
279	S-8	SM	-7.1	20.2	20.3	-0.1
279	S-9	SP	N/A	N/A	N/A	N/A
280	S-8	ML	-15.1	43.8	34.8	9.0
280	S-9,10,11	SP	N/A	N/A	N/A	N/A

Boring Number	Sample Number	USC Classification	Flow Index Fi	Liquid Limit	Plastic Limit	Plasticity Index, Ip
281	S-3	SP	N/A	N/A	N/A	N/A
281	S-4,TOP	SM	-8.3	36.8	28.0	8.8
281	S-6	SM	-8.5	30.7	27.2	3.5
281	S-7	SP-SM				
281	S-8	GW	N/A	N/A	N/A	N/A
281	S-9,TOP	ML	-9.8	27.9	25.5	2.4
281	S-9,BOTTOM	SM	-8.5	25.0	21.6	3.4
281	S-10	GP	N/A	N/A	N/A	N/A

Results from Soil Samples Collected during Phase I and Phase II

Boring Number	Sample Number	USC Classification	Flow Index Fi	Liquid Limit	Plastic Limit	Plasticity Index, Ip
202	S-4	SM	-6.8	23.8	21.8	2.0
202	S-4,5,6,7,8	GW	N/A	N/A	N/A	N/A
204	S-3	ML	-6.5	30.6	25.8	4.8
206	S-5	ML	-14.9	32.6	28.5	4.1
206/208	S-7	GW	N/A	N/A	N/A	N/A
208	S-6	ML	-4.3	31.0	27.0	4.0
212	S-4	ML	-7.2	25.8	22.7	3.1
212	S-8,S-9	SP	N/A	N/A	N/A	N/A
213	S-5	ML	-5.2	30.1	25.2	4.9
213	S-6,S-7	SM-SP	-7.8	21.5	21.3	0.2
213	S-9	SP	N/A	N/A	N/A	N/A
246	S-8,S-9	ML	-8.6	23.3	20.1	3.2
258	S-6	SM-SP	-3.2	25.3	18.5	6.8
258	S-7	ML	-13.6	46.2	31.4	14.8
259	S-5	ML	-11.2	40.9	31.3	9.6
260	S-6	ML	-9.2	36.7	31.7	5.0
260	S-7	MH	-14.2	51.2	39.8	11.4
261	S-5	ML	-8.6	45.9	31.4	14.5
263	S-8	SM	-11.3	23.6	22.6	1.0

GRAIN SIZE DISTRIBUTIONS
SIEVE ANALYSIS RESULTS

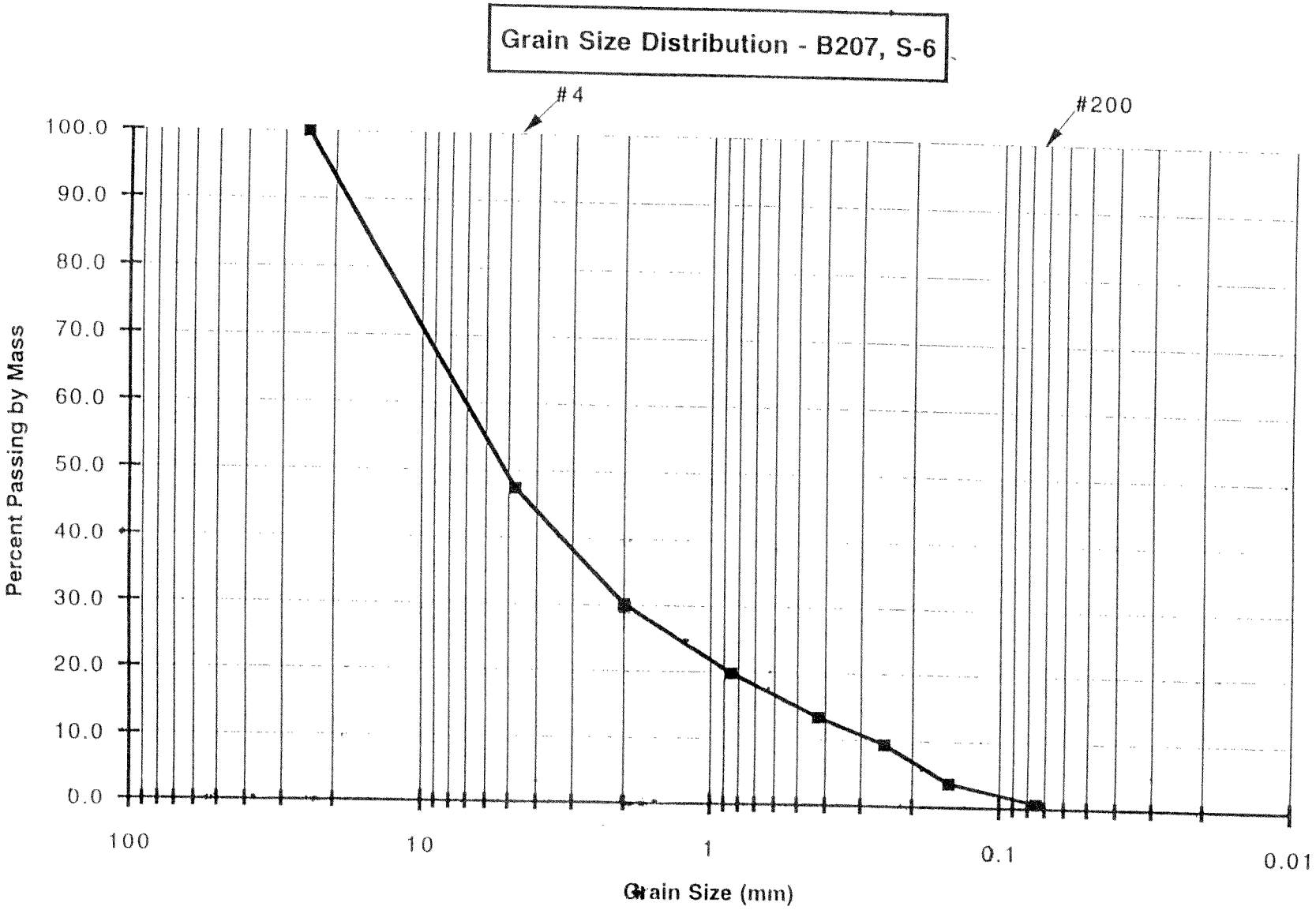

Grain Size Distribution - B207, S-5
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

Mass Dish + Sample	342
Mass of Dish	162.9
Mass Sample	179.1

BORING: B207
SAMPLE: S-5
FIELD DESCRIPTION: Green/Black Silty Clay

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	812.7	812.7	0.0	0.0	100.0
3/4"	19.00	814.8	814.8	0.0	0.0	100.0
3/8"	9.5	845.1	845.1	0.0	0.0	100.0
4	4.750	821.2	816.4	4.8	2.7	97.3
10	2.000	719.4	711.9	7.5	4.2	93.1
20	0.850	651.9	629.1	22.8	12.7	80.4
40	0.425	575.7	555.7	20.0	11.2	69.2
60	0.250	524.8	525.9	-1.1	-0.6	69.8
80	0.180	568.4	513.5	54.9	30.7	39.2
100	0.150	546.6	512.6	34.0	19.0	20.2
200	0.075	511.0	491.3	19.7	11.0	9.2
PAN		508.0	492.0	16.0	8.9	

% GRAVEL	2.7
% SAND	88.1
% SILT & CLAY	8.9

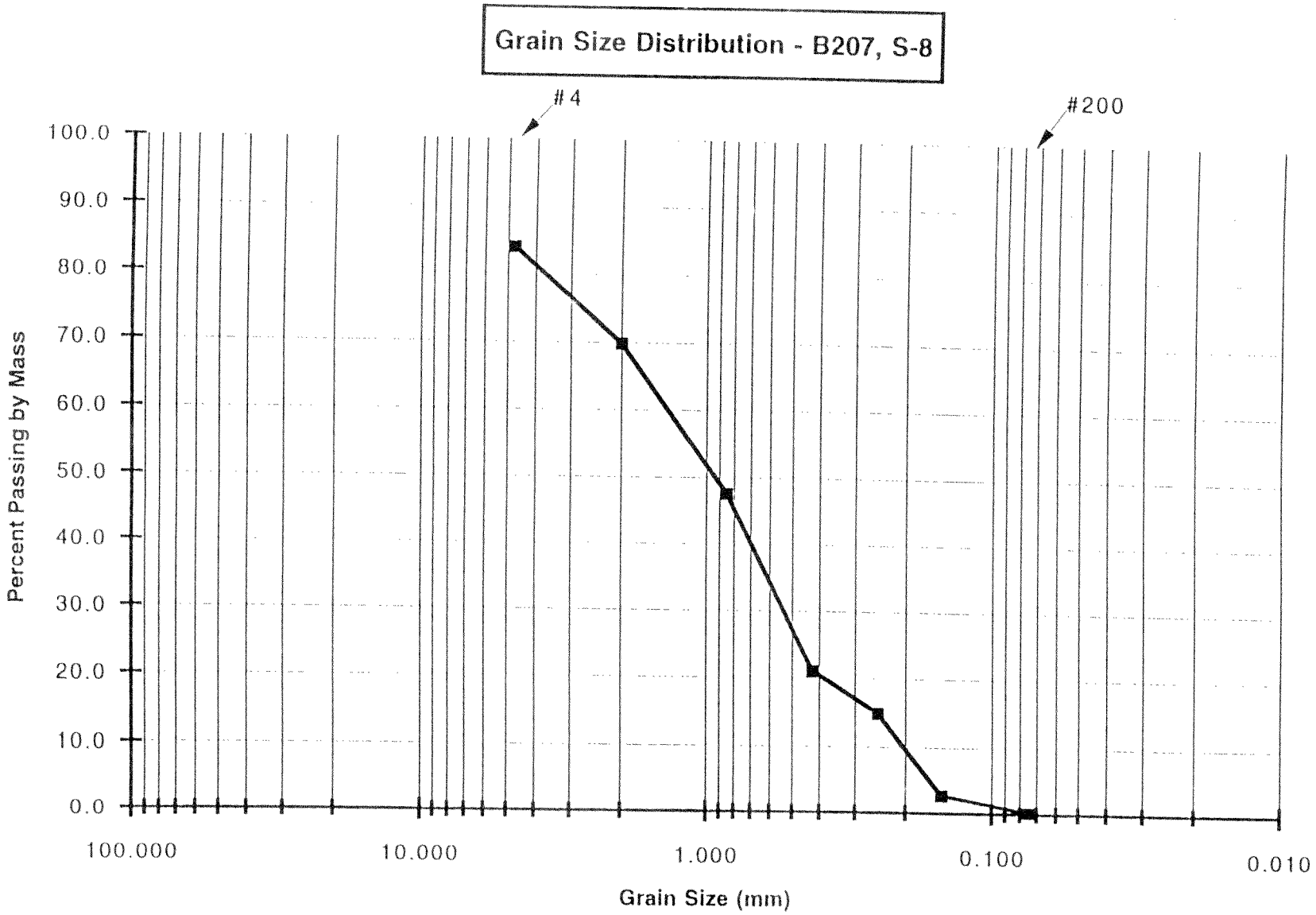

Grain Size Distribution - B207, S-6
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100
10
1
0.1
0.01
Grain Size (mm)

Mass Dish + Sample	411.3
Mass of Dish	162.9
Mass Sample	248.4

BORING: B207
SAMPLE: S-6
FIELD DESCRIPTION: Grey Gravel, Trace Clay

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25	812.7	812.7	0.0	0.0	100.0
4	4.750	946.9	816.4	130.5	52.5	47.5
10	2.000	754.9	711.9	43.0	17.3	30.2
20	0.850	654.9	629.1	25.8	10.4	19.8
40	0.425	571.9	555.7	16.2	6.5	13.2
60	0.250	535.5	525.9	9.6	3.9	9.4
100	0.150	526.9	512.6	14.3	5.8	3.6
200	0.075	498.4	491.3	7.1	2.9	0.8
PAN		493.8	492.0	1.8	0.7	

% GRAVEL	52.5
% SAND	46.7
% SILT & CLAY	0.7

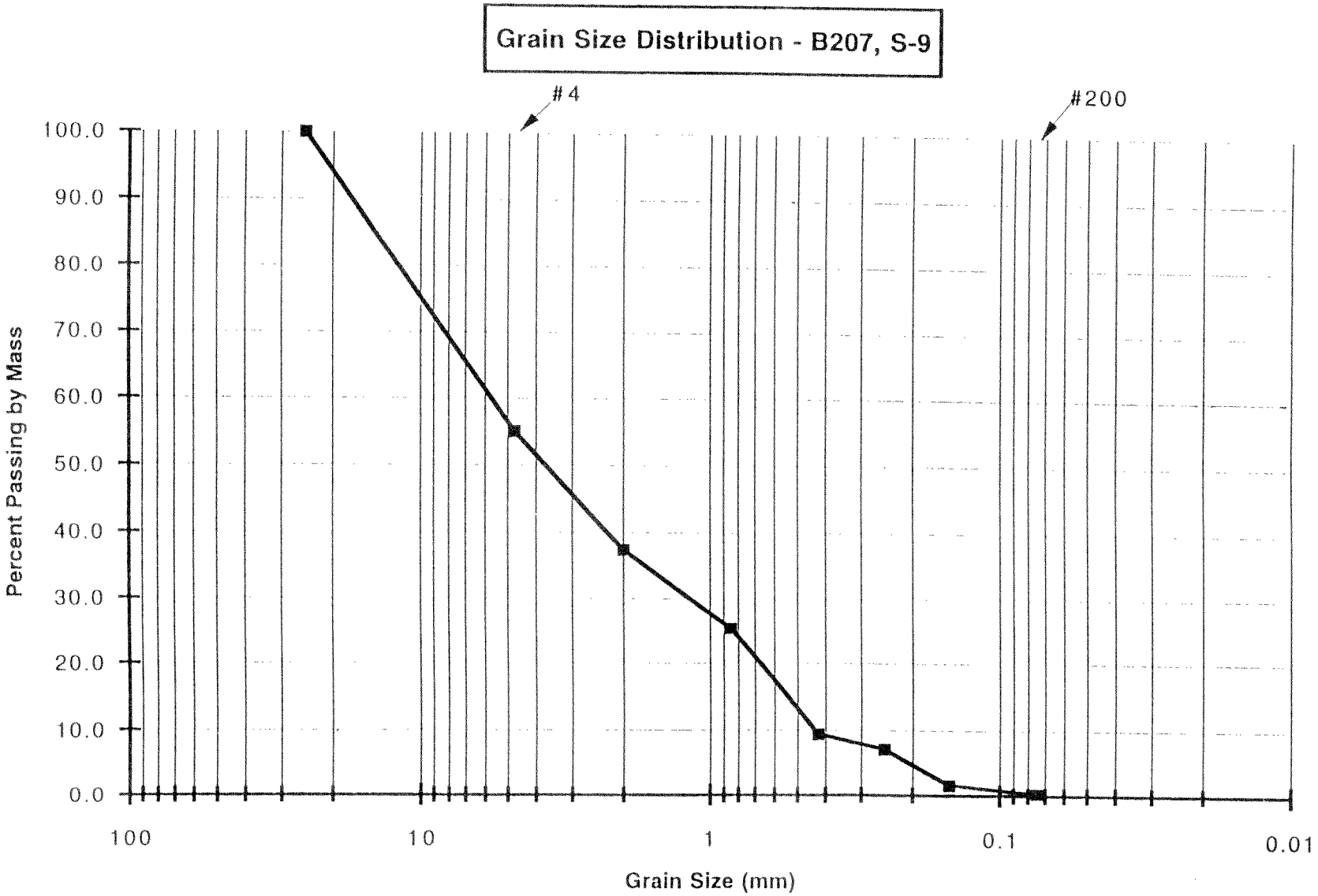

Grain Size Distribution - B207, S-8
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.000
10.000
1.000
0.100
0.010
Grain Size (mm)

Mass Dish + Sample	445.4
Mass of Dish	163.2
Mass Sample	282.2

BORING: B207
SAMPLE: S-8
FIELD DESCRIPTION: Fine/Medium Coarse Brown Sand

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
4	4.750	861.7	816.4	45.3	16.1	83.9
10	2.000	751.8	711.9	39.9	14.1	69.8
20	0.850	691.8	629.1	62.7	22.2	47.6
40	0.425	630.6	555.7	74.9	26.5	21.0
60	0.250	543.5	525.9	17.6	6.2	14.8
100	0.150	546.5	512.6	33.9	12.0	2.8
200	0.075	498.6	491.3	7.3	2.6	0.2
PAN		492.6	492.0	0.6	0.2	

% GRAVEL	16.1
% SAND	83.7
% SILT & CLAY	0.2

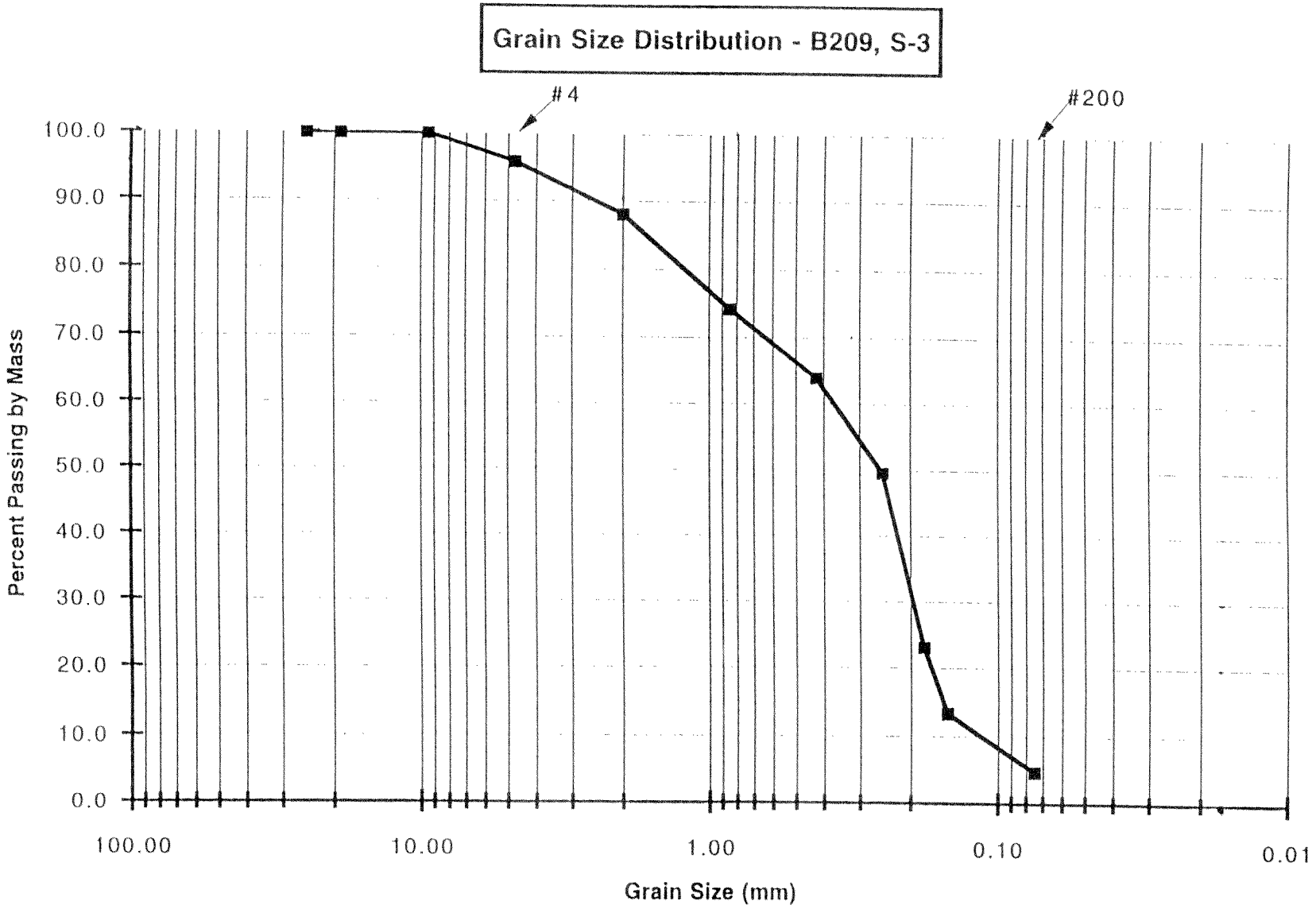

Grain Size Distribution - B207, S-9
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100
10
1
0.1
0.01
Grain Size (mm)

Mass Dish + Sample	380.5
Mass of Dish	162.9
Mass Sample	217.6

BORING: B207
SAMPLE: S-9
FIELD DESCRIPTION: Fine/Medium Coarse Brown Sand & Gravel

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25	812.7	812.7	0.0	0.0	100.0
4	4.750	914.3	816.4	97.9	45.0	55.0
10	2.000	750.3	711.9	38.4	17.6	37.4
20	0.850	655.2	629.1	26.1	12.0	25.4
40	0.425	590.5	555.7	34.8	16.0	9.4
60	0.250	530.8	525.9	4.9	2.3	7.1
100	0.150	524.6	512.6	12.0	5.5	1.6
200	0.075	494.1	491.3	2.8	1.3	0.3
PAN		492.7	492.0	0.7	0.3	

% GRAVEL	45.0
% SAND	54.7
% SILT & CLAY	0.3

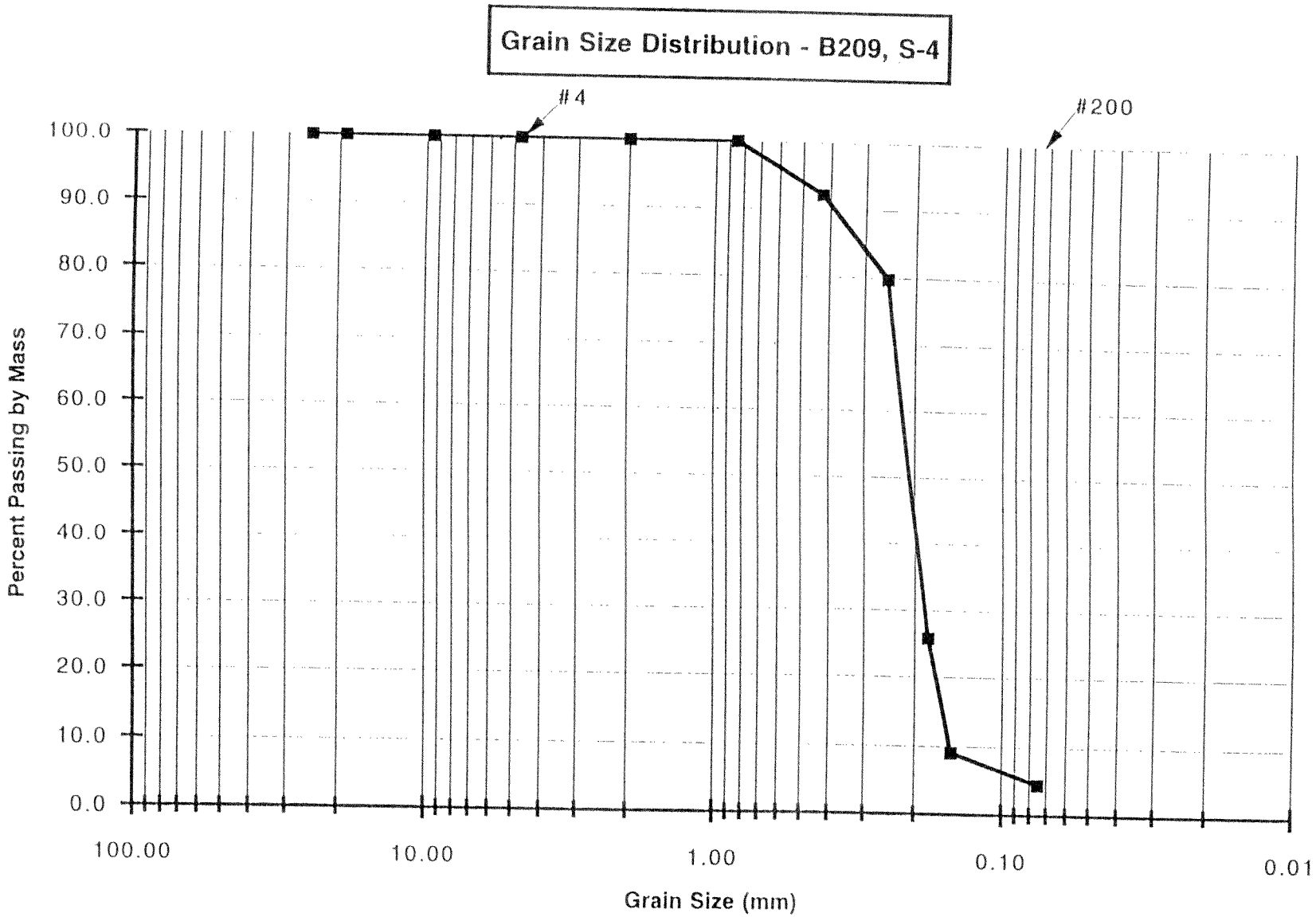

Grain Size Distribution - B209, S-3
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

Mass Dish + Sample	371
Mass of Dish	162.9
Mass Sample	208.1

BORING: B209
SAMPLE: S-3
FIELD DESCRIPTION: Green/Black Mottled Silty Clay

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	812.7	812.7	0.0	0.0	100.0
3/4"	19.00	814.8	814.8	0.0	0.0	100.0
3/8"	9.5	845.1	845.1	0.0	0.0	100.0
4	4.750	825.2	816.4	8.8	4.2	95.8
10	2.000	727.9	711.9	16.0	7.7	88.1
20	0.850	658.2	629.1	29.1	14.0	74.1
40	0.425	576.8	555.7	21.1	10.1	64.0
60	0.250	555.9	525.9	30.0	14.4	49.5
80	0.180	568.7	513.5	55.2	26.5	23.0
100	0.150	532.9	512.6	20.3	9.8	13.3
200	0.075	509.0	491.3	17.7	8.5	4.8
PAN		500.1	492.0	8.1	3.9	

% GRAVEL	4.2
% SAND	91.0
% SILT & CLAY	3.9

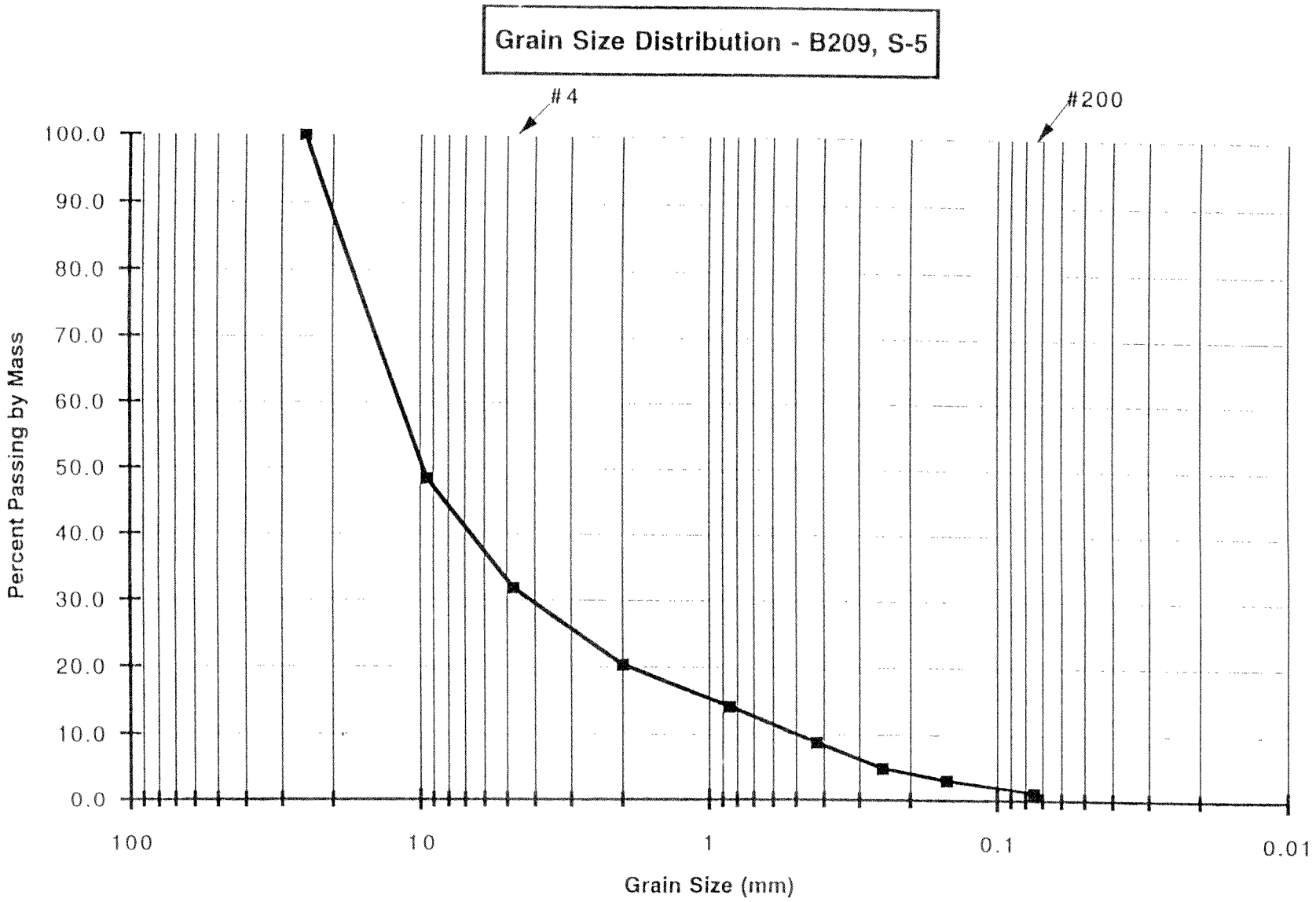

Grain Size Distribution - B209, S-4
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

Mass Dish + Sample	414.2
Mass of Dish	162.9
Mass Sample	251.3

BORING: B209
SAMPLE: S-4
FIELD DESCRIPTION: Green/Black Mottled Silty Clay

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	812.7	812.7	0.0	0.0	100.0
3/4"	19.00	814.8	814.8	0.0	0.0	100.0
3/8"	9.5	845.1	845.1	0.0	0.0	100.0
4	4.750	816.4	816.4	0.0	0.0	100.0
10	2.000	711.9	711.9	0.0	0.0	100.0
20	0.850	629.1	629.1	0.0	0.0	100.0
40	0.425	575.3	555.7	19.6	7.8	92.2
60	0.250	557.2	525.9	31.3	12.5	79.7
80	0.180	649.2	513.5	135.7	54.0	25.7
100	0.150	554.5	512.6	41.9	16.7	9.1
200	0.075	502.8	491.3	11.5	4.6	4.5
PAN		498.8	492.0	6.8	2.7	

% GRAVEL	0.0
% SAND	95.5
% SILT & CLAY	2.7

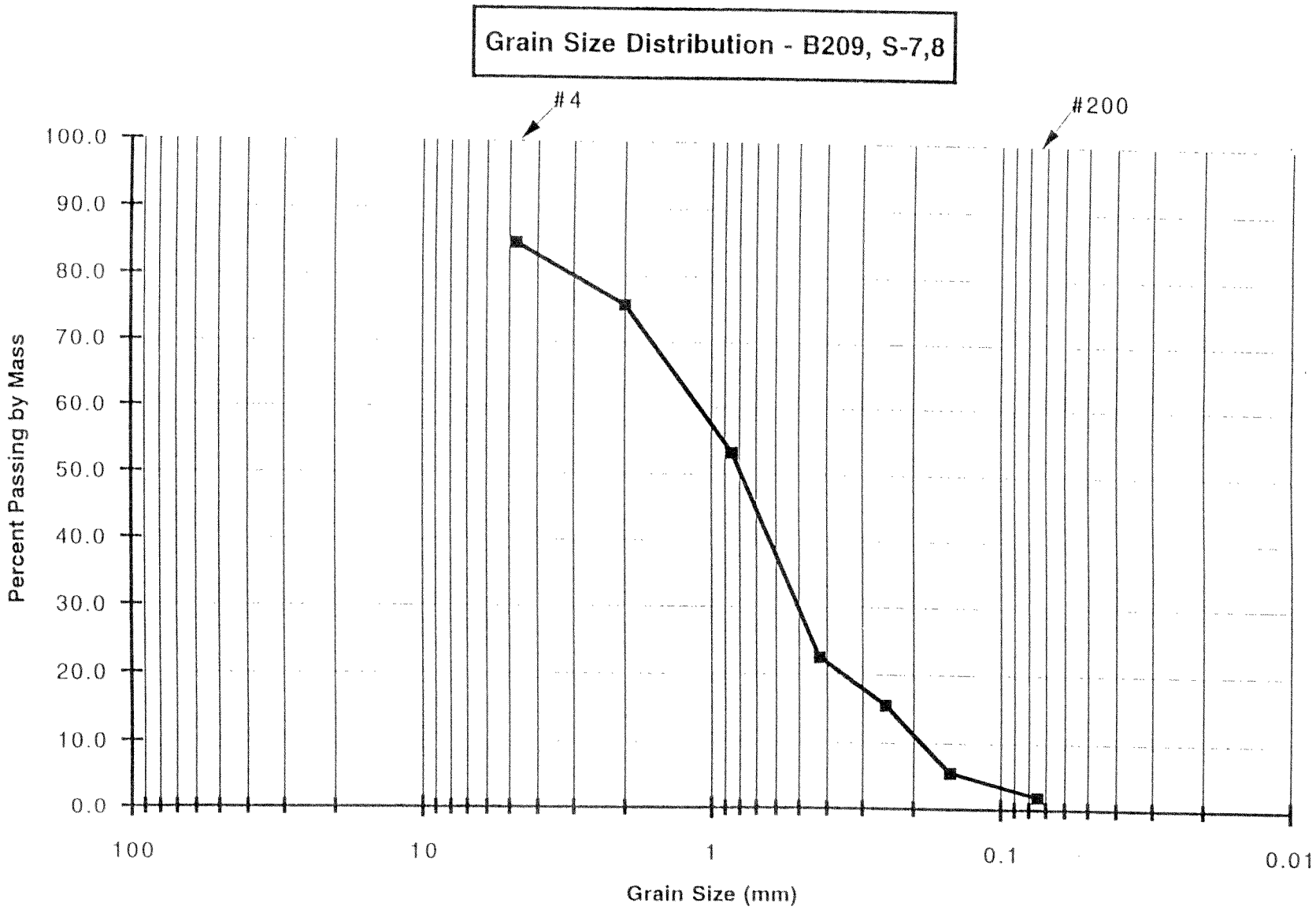

Grain Size Distribution - B209, S-5
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100
10
1
0.1
0.01
Grain Size (mm)

Mass Dish + Sample	416.4
Mass of Dish	163.2
Mass Sample	253.2

BORING: B209
SAMPLE: S-5
FIELD DESCRIPTION: Grey/Black Gravel w/ Sand

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25	812.7	812.7	0.0	0.0	100.0
3/8"	9.5	975.6	845.1	130.5	51.5	48.5
4	4.750	858.5	816.4	42.1	16.6	31.8
10	2.000	741.0	711.9	29.1	11.5	20.3
20	0.850	645.1	629.1	16.0	6.3	14.0
40	0.425	569.1	555.7	13.4	5.3	8.7
60	0.250	535.6	525.9	9.7	3.8	4.9
100	0.150	517.2	512.6	4.6	1.8	3.1
200	0.075	495.9	491.3	4.6	1.8	1.3
PAN		495.2	492.0	3.2	1.3	

% GRAVEL	68.2
% SAND	30.6
% SILT & CLAY	1.3

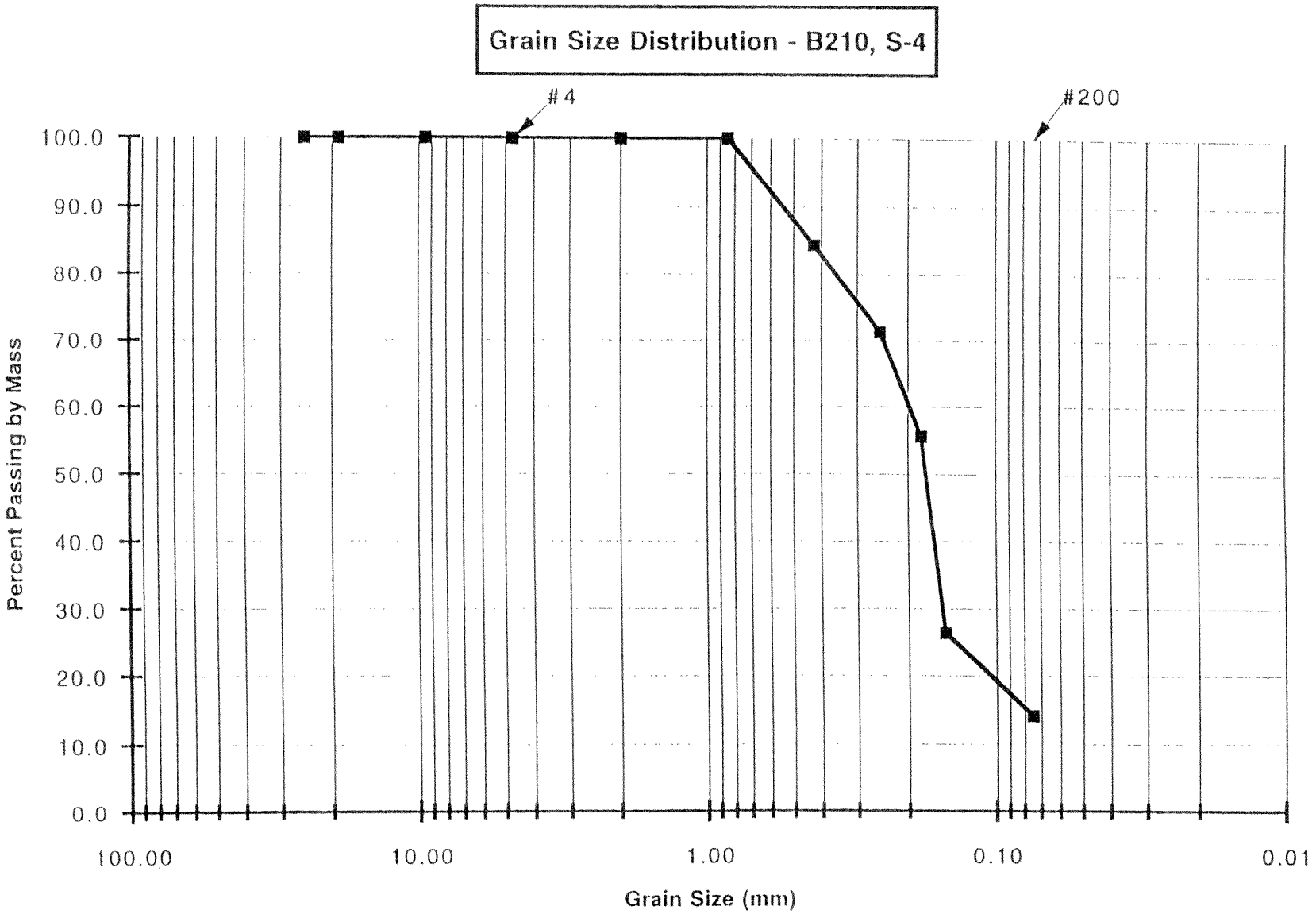

Grain Size Distribution - B209, S-7,8
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100
10
1
0.1
0.01
Grain Size (mm)

Mass Dish + Sample	642.9
Mass of Dish	163.2
Mass Sample	479.7

BORING: B209
SAMPLE: S-7,8
FIELD DESCRIPTION: Medium Coarse Brown Sand

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
4	4.750	888.7	816.4	72.3	15.1	84.9
10	2.000	756.7	711.9	44.8	9.3	75.6
20	0.850	736.4	629.1	107.3	22.4	53.2
40	0.425	703.2	555.7	147.5	30.7	22.5
60	0.250	559.4	525.9	33.5	7.0	15.5
100	0.150	560.2	512.6	47.6	9.9	5.6
200	0.075	508.7	491.3	17.4	3.6	1.9
PAN		499.8	492.0	7.8	1.6	

% GRAVEL	15.1
% SAND	83.0
% SILT & CLAY	1.6

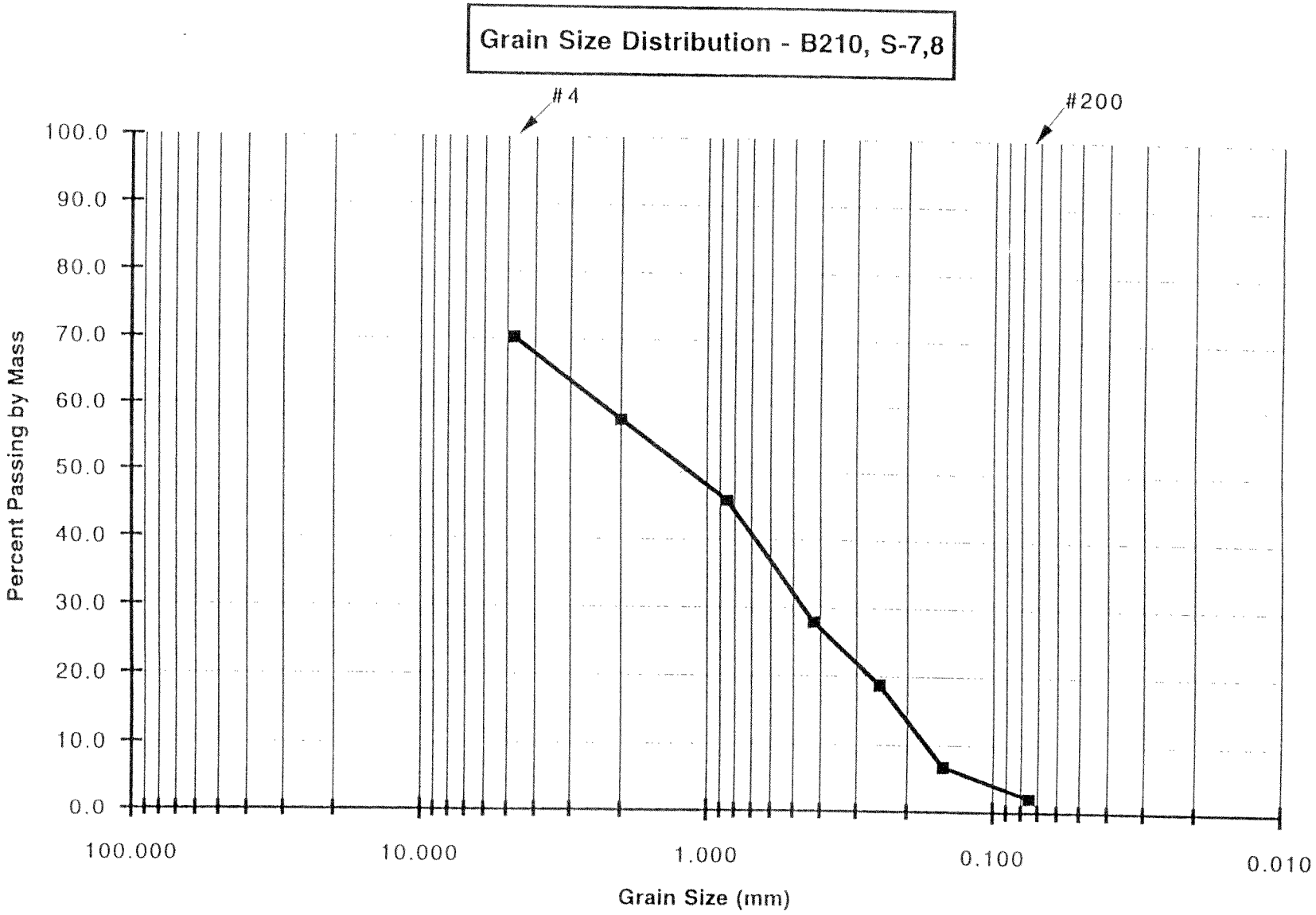

Grain Size Distribution - B210, S-4
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

Mass Dish + Sample	341
Mass of Dish	162.9
Mass Sample	178.1

BORING: B210
SAMPLE: S-4
FIELD DESCRIPTION: Grey/Black Silty Clay

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	812.7	812.7	0.0	0.0	100.0
3/4"	19.00	814.8	814.8	0.0	0.0	100.0
3/8"	9.5	845.1	845.1	0.0	0.0	100.0
4	4.750	816.4	816.4	0.0	0.0	100.0
10	2.000	711.9	711.9	0.0	0.0	100.0
20	0.850	629.1	629.1	0.0	0.0	100.0
40	0.425	583.6	555.7	27.9	15.7	84.3
60	0.250	549.2	525.9	23.3	13.1	71.3
80	0.180	541.4	513.5	27.9	15.7	55.6
100	0.150	564.6	512.6	52.0	29.2	26.4
200	0.075	513.2	491.3	21.9	12.3	14.1
PAN		514.8	492.0	22.8	12.8	

% GRAVEL	0.0
% SAND	85.9
% SILT & CLAY	12.8

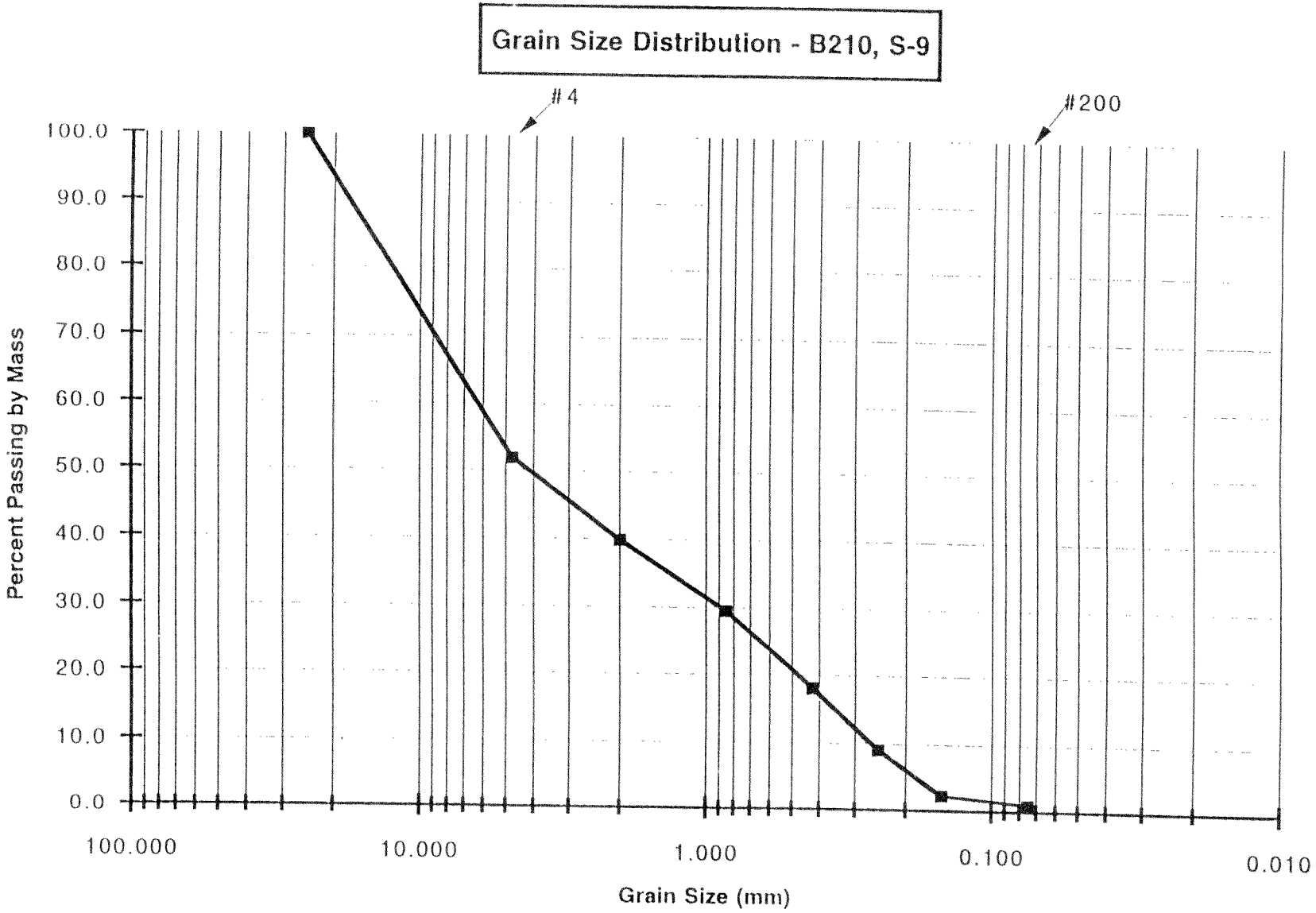

Grain Size Distribution - B210, S-7,8
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.000
10.000
1.000
0.100
0.010
Grain Size (mm)

Mass Dish + Sample	735.1
Mass of Dish	163.2
Mass Sample	571.9

BORING: B210
SAMPLE: S-7,8
FIELD DESCRIPTION: Fine/Med. Coarse Brown Sand

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
4	4.750	987.0	816.4	170.6	29.8	70.2
10	2.000	782.1	711.9	70.2	12.3	57.9
20	0.850	698.4	629.1	69.3	12.1	45.8
40	0.425	658.0	555.7	102.3	17.9	27.9
60	0.250	578.7	525.9	52.8	9.2	18.7
100	0.150	580.6	512.6	68.0	11.9	6.8
200	0.075	517.7	491.3	26.4	4.6	2.2
PAN		502.7	492.0	10.7	1.9	

% GRAVEL	29.8
% SAND	68.0
% SILT & CLAY	1.9

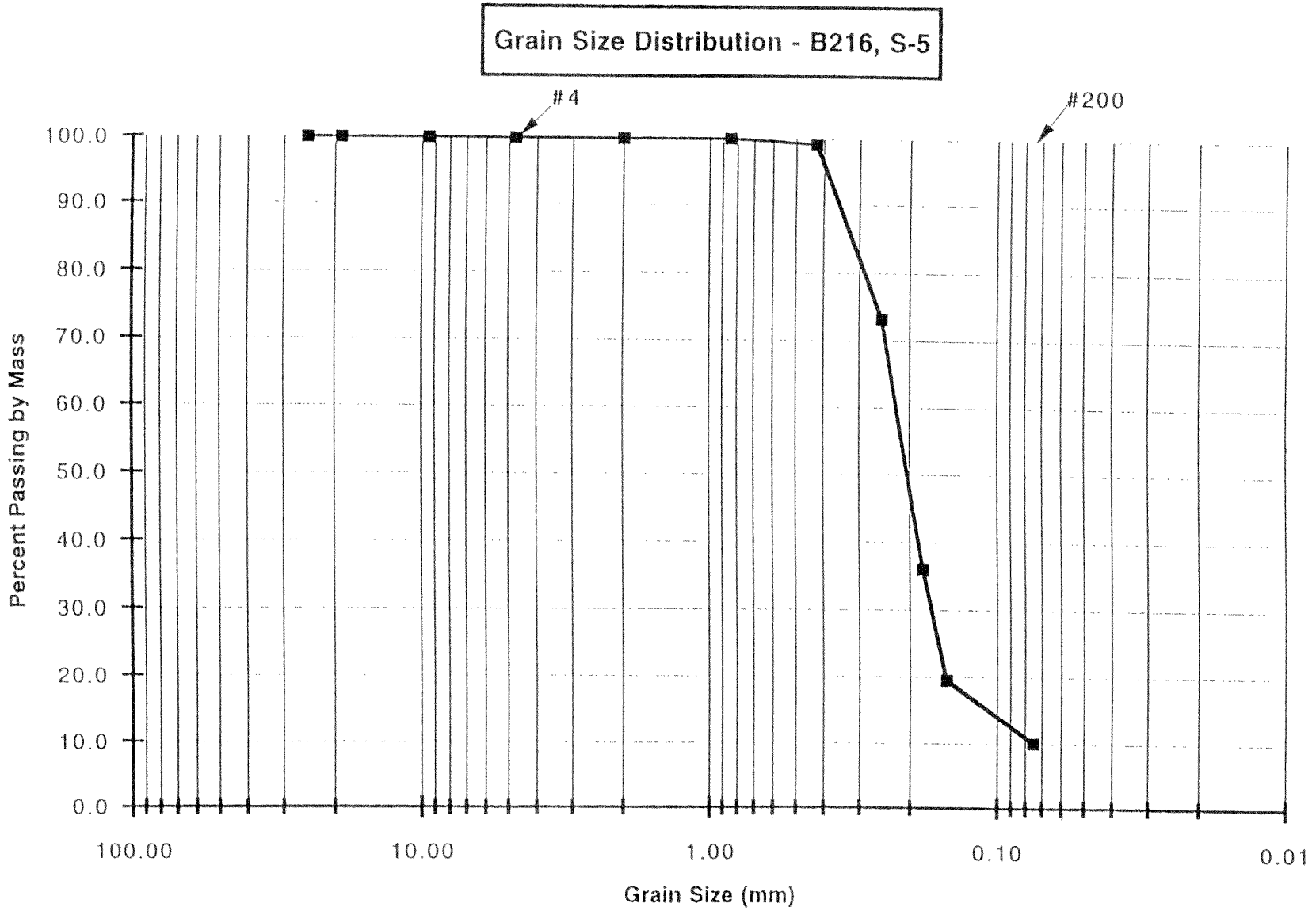

Grain Size Distribution - B210, S-9
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.000
10.000
1.000
0.100
0.010
Grain Size (mm)

Mass Dish + Sample	406.1
Mass of Dish	162.9
Mass Sample	243.2

BORING: B210
SAMPLE: S-9
FIELD DESCRIPTION: Brown Sandy Gravel

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.000	812.7	812.7	0.0	0.0	100.0
4	4.750	933.4	816.4	117.0	48.1	51.9
10	2.000	741.1	711.9	29.2	12.0	39.9
20	0.850	654.4	629.1	25.3	10.4	29.5
40	0.425	583.6	555.7	27.9	11.5	18.0
60	0.250	547.7	525.9	21.8	9.0	9.0
100	0.150	528.9	512.6	16.3	6.7	2.3
200	0.075	494.6	491.3	3.3	1.4	1.0
PAN		492.3	492.0	0.3	0.1	

% GRAVEL	48.1
% SAND	50.9
% SILT & CLAY	0.1

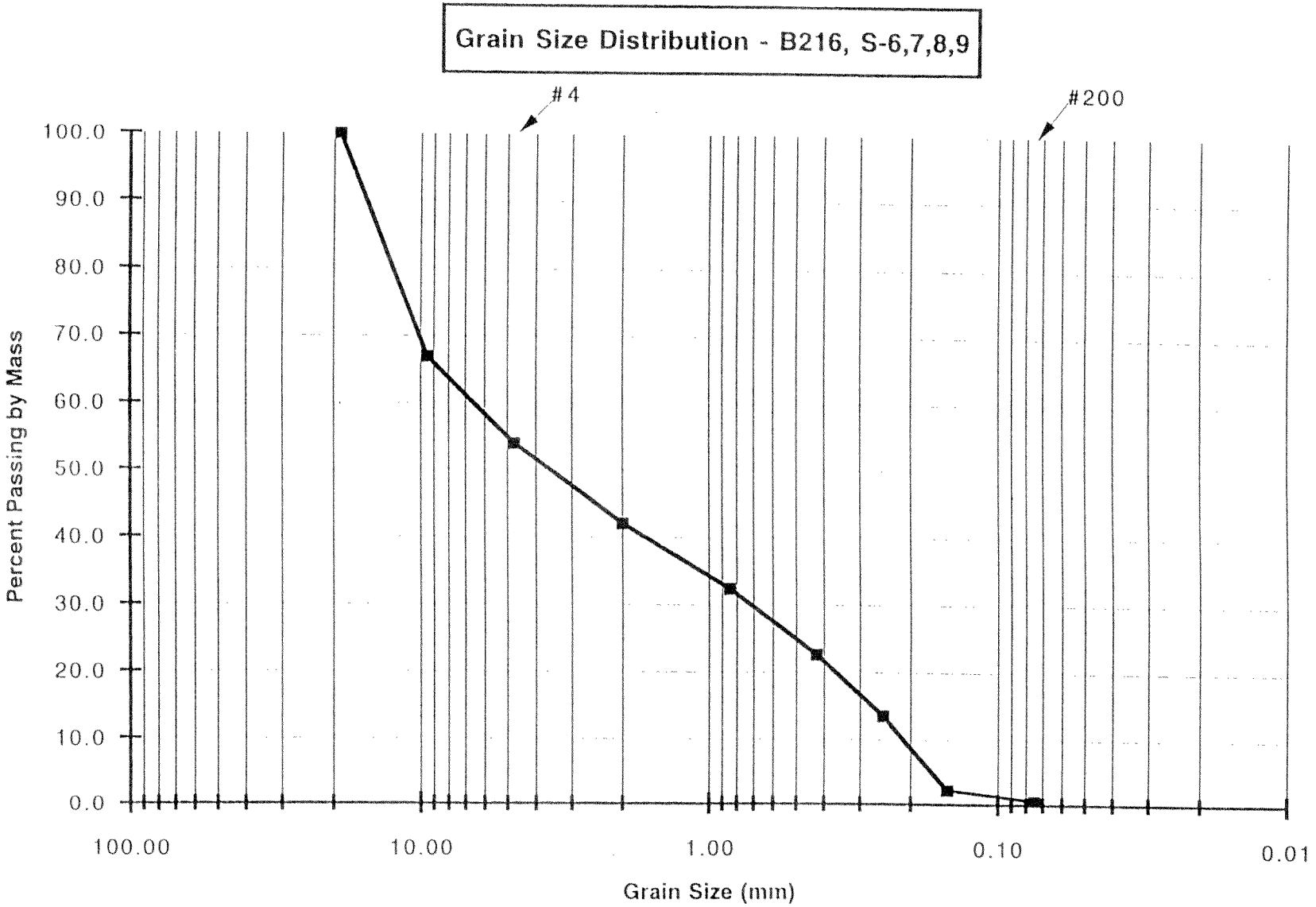

Grain Size Distribution - B216, S-5
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

Mass Dish + Sample	426.2
Mass of Dish	162.9
Mass Sample	263.3

BORING: B216
SAMPLE: S-5
FIELD DESCRIPTION: Very Fine Sand, Trace Silt

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	812.7	812.7	0.0	0.0	100.0
3/4"	19.00	814.8	814.8	0.0	0.0	100.0
3/8"	9.5	845.1	845.1	0.0	0.0	100.0
4	4.750	816.4	816.4	0.0	0.0	100.0
10	2.000	711.9	711.9	0.0	0.0	100.0
20	0.850	629.1	629.1	0.0	0.0	100.0
40	0.425	557.9	555.7	2.2	0.8	99.2
60	0.250	594.3	525.9	68.4	26.0	73.2
80	0.180	611.5	513.5	98.0	37.2	36.0
100	0.150	556.2	512.6	43.6	16.6	19.4
200	0.075	516.0	491.3	24.7	9.4	10.0
PAN		516.1	492.0	24.1	9.2	

% GRAVEL	0.0
% SAND	90.0
% SILT & CLAY	9.2

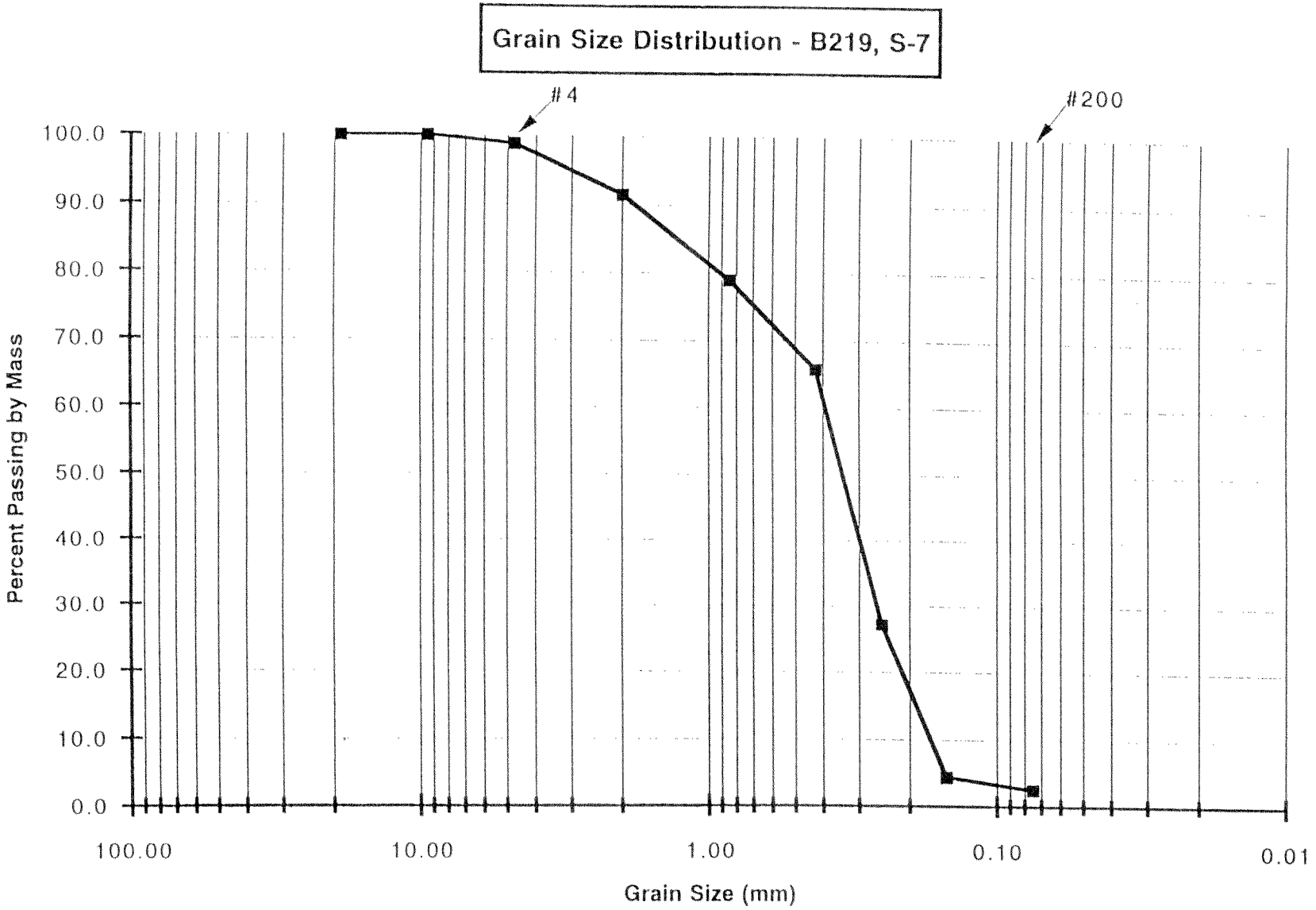

Grain Size Distribution - B216, S-6,7,8,9
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

Mass Dish + Sample	1220.6
Mass of Dish	163.2
Mass Sample	1057.4

BORING: B216
SAMPLE: S-6,7,8,9
FIELD DESCRIPTION: Brown Sand & Gravel

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
3/4"	19.00	814.8	814.8	0.0	0.0	100.0
3/8"	9.5	1194.5	845.1	349.4	33.0	67.0
4	4.750	953.2	816.4	136.8	12.9	54.0
10	2.000	838.3	711.9	126.4	12.0	42.1
20	0.850	731.9	629.1	102.8	9.7	32.3
40	0.425	658.6	555.7	102.9	9.7	22.6
60	0.250	622.1	525.9	96.2	9.1	13.5
100	0.150	631.8	512.6	119.2	11.3	2.2
200	0.075	508.8	491.3	17.5	1.7	0.6
PAN		496.7	492.0	4.7	0.4	

% GRAVEL	46.0
% SAND	53.4
% SILT & CLAY	0.4

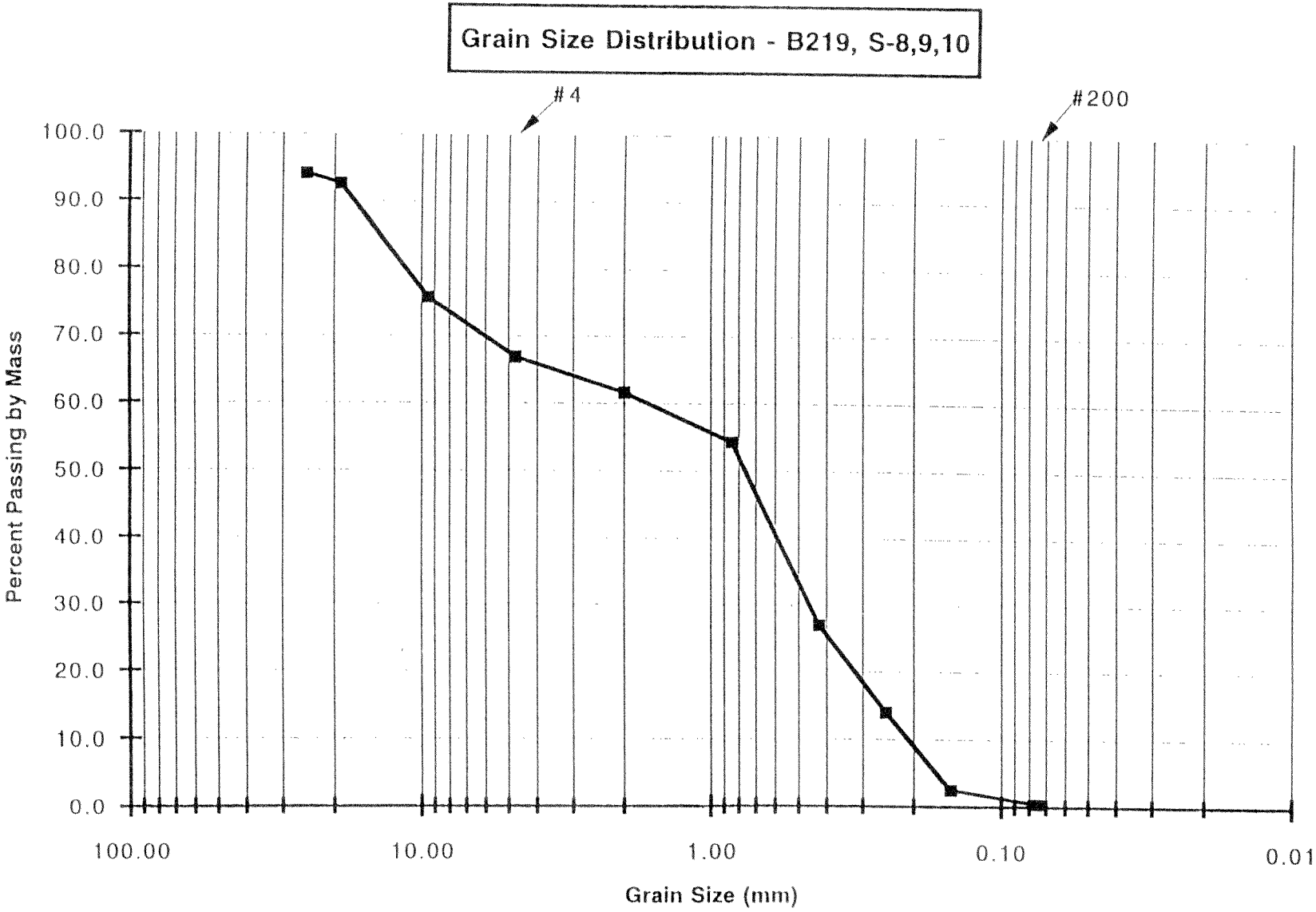

Grain Size Distribution - B219, S-7
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

Mass Dish + Sample	346.26
Mass of Dish	162.9
Mass Sample	183.36

BORING: B219
SAMPLE: S-7
FIELD DESCRIPTION: Very Fine Grey Silty Sand

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
3/4"	19.00	814.8	814.8	0.0	0.0	100.0
3/8"	9.5	845.1	845.1	0.0	0.0	100.0
4	4.750	818.5	816.4	2.1	1.1	98.9
10	2.000	725.4	711.9	13.5	7.4	91.5
20	0.850	652.2	629.1	23.1	12.6	78.9
40	0.425	579.8	555.7	24.1	13.1	65.8
60	0.250	596.8	525.9	70.9	38.7	27.1
100	0.150	554.1	512.6	41.5	22.6	4.5
200	0.075	494.8	491.3	3.5	1.9	2.5
PAN		494.1	492.0	2.1	1.1	

% GRAVEL	1.1
% SAND	96.3
% SILT & CLAY	1.1

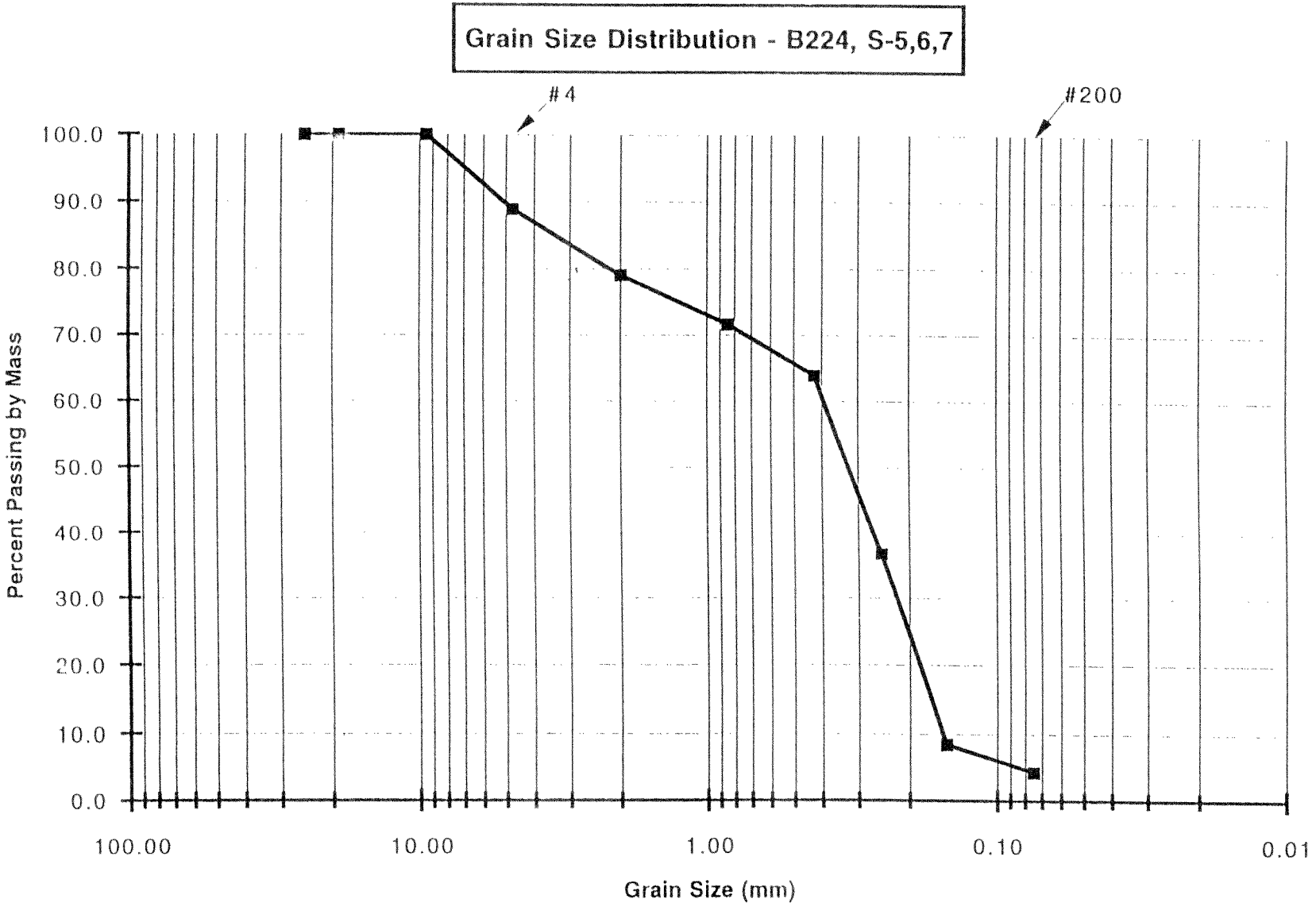

Grain Size Distribution - B219, S-8,9,10
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

Mass Dish + Sample	942.2
Mass of Dish	162.9
Mass Sample	779.3

BORING: B219
SAMPLE: S-8,9,10
FIELD DESCRIPTION: Brown Sand and Gravel

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	859	812.7	46.3	5.9	94.1
3/4"	19.00	826.5	814.8	11.7	1.5	92.6
3/8"	9.5	976.8	845.1	131.7	16.9	75.7
4	4.750	885.3	816.4	68.9	8.8	66.8
10	2.000	752.7	711.9	40.8	5.2	61.6
20	0.850	685.9	629.1	56.8	7.3	54.3
40	0.425	769.0	555.7	213.3	27.4	26.9
60	0.250	627.2	525.9	101.3	13.0	13.9
100	0.150	601.4	512.6	88.8	11.4	2.5
200	0.075	507.3	491.3	16.0	2.1	0.5
PAN		494.0	492.0	2.0	0.3	

% GRAVEL	27.2
% SAND	66.3
% SILT & CLAY	0.3

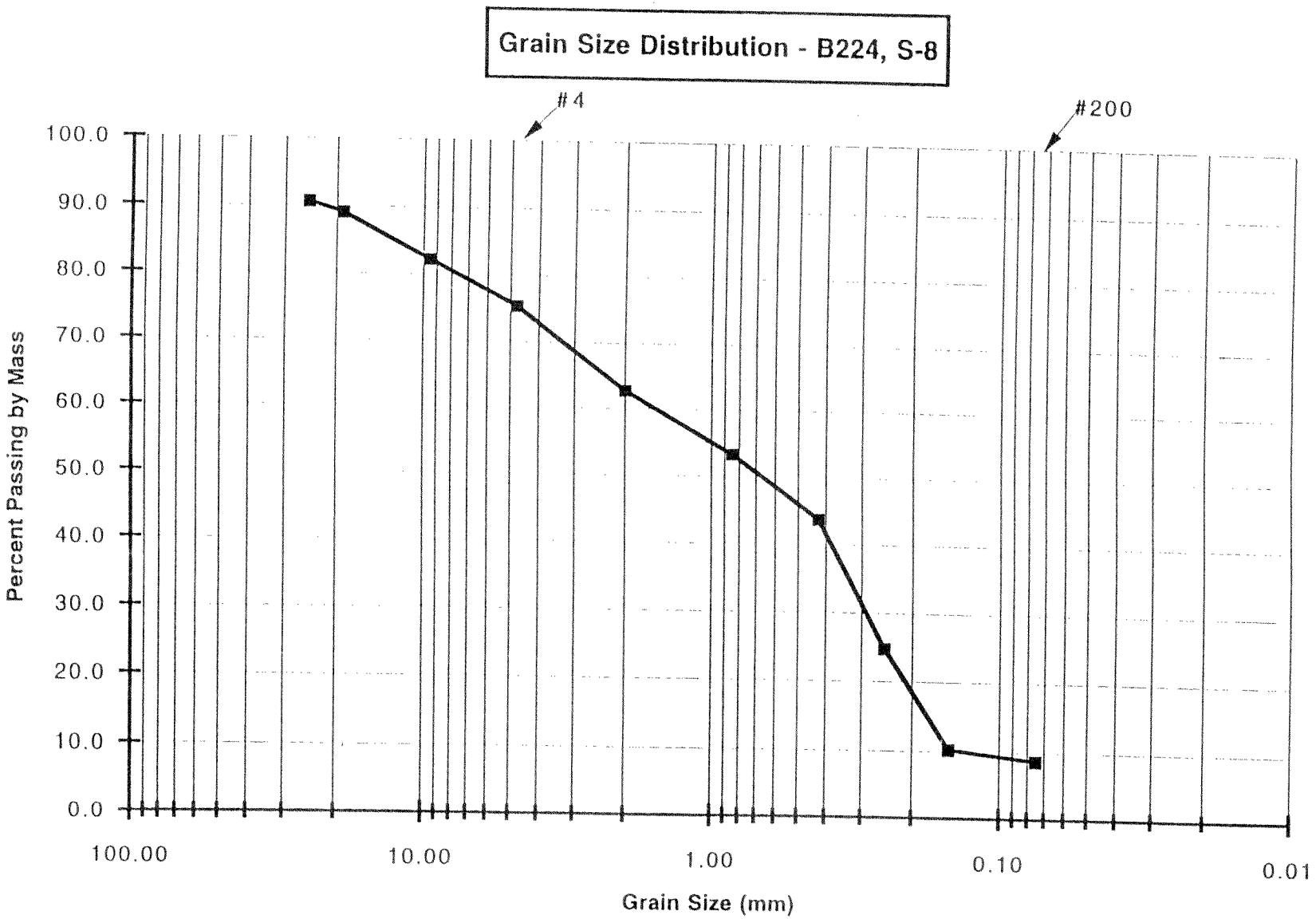

Grain Size Distribution - B224, S-5,6,7
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

Mass Dish + Sample	732.5
Mass of Dish	162.9
Mass Sample	589.6

BORING: B224
SAMPLE: S-5,6,7
FIELD DESCRIPTION: Green/Grey Fine Silty Sand

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	812.7	812.7	0.0	0.0	100.0
3/4"	19.00	814.8	814.8	0.0	0.0	100.0
3/8"	9.5	845.1	845.1	0.0	0.0	100.0
4	4.750	882.1	816.4	65.7	11.1	88.9
10	2.000	770.4	711.9	58.5	9.9	78.9
20	0.850	672.5	629.1	43.4	7.4	71.6
40	0.425	601.0	555.7	45.3	7.7	63.9
60	0.250	686.2	525.9	160.3	27.2	36.7
100	0.150	679.5	512.6	166.9	28.3	8.4
200	0.075	515.6	491.3	24.3	4.1	4.3
PAN		494.8	492.0	2.8	0.5	

% GRAVEL	11.1
% SAND	84.6
% SILT & CLAY	0.5

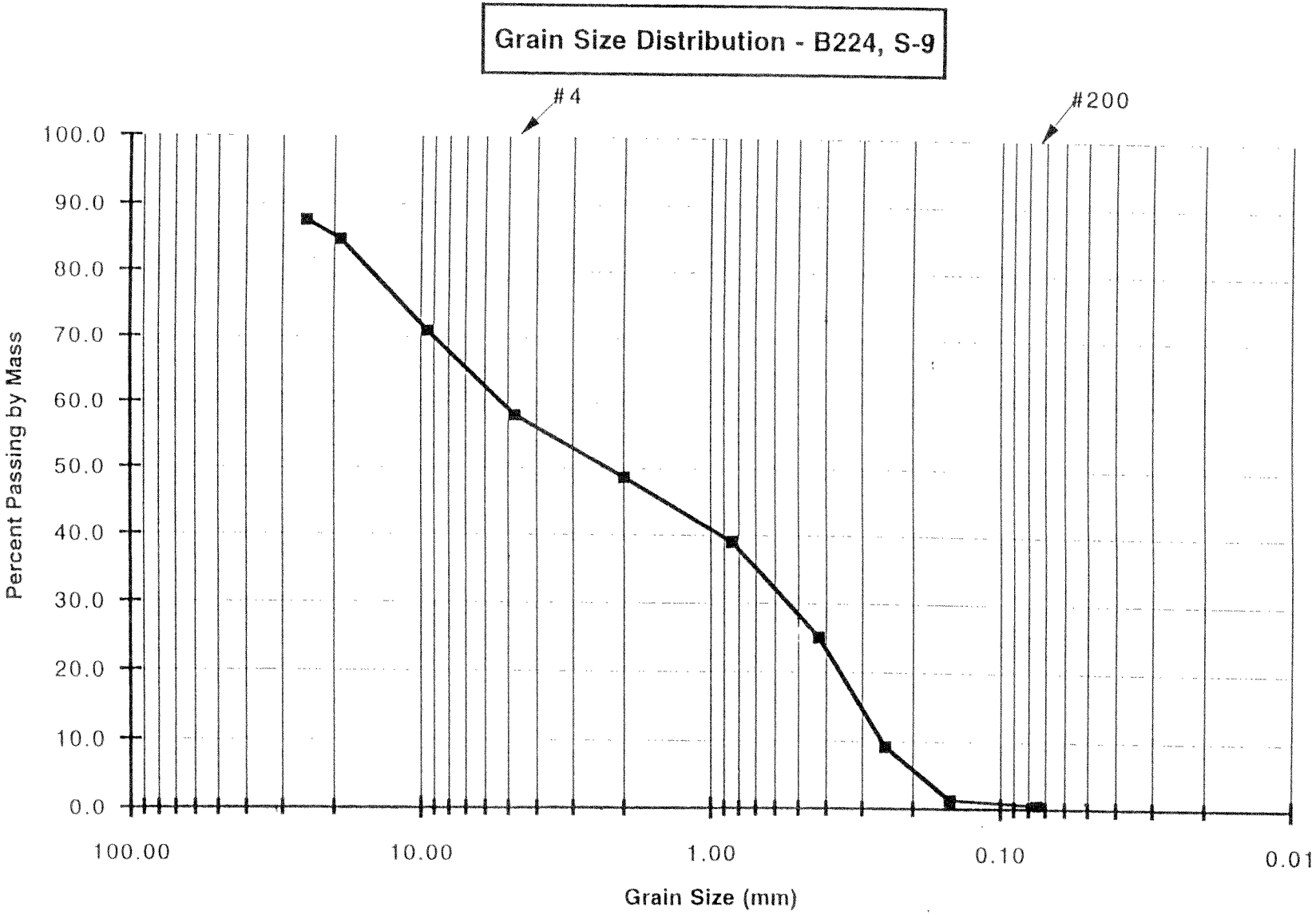

Grain Size Distribution - B224, S-8
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

Mass Dish + Sample	662.1
Mass of Dish	162.9
Mass Sample	499.2

BORING: B224
SAMPLE: S-8
FIELD DESCRIPTION: Grey Sandy Silt w/ Gravel

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	859.7	812.7	47.0	9.4	90.6
3/4"	19.00	822.3	814.8	7.5	1.5	89.1
3/8"	9.5	879.5	845.1	34.4	6.9	82.2
4	4.750	850.8	816.4	34.4	6.9	75.3
10	2.000	774.8	711.9	62.9	12.6	62.7
20	0.850	676.1	629.1	47.0	9.4	53.3
40	0.425	603.7	555.7	48.0	9.6	43.7
60	0.250	620.4	525.9	94.5	18.9	24.7
100	0.150	585.1	512.6	72.5	14.5	10.2
200	0.075	499.0	491.3	7.7	1.5	8.7
PAN		493.0	492.0	1.0	0.2	

% GRAVEL	15.3
% SAND	66.6
% SILT & CLAY	0.2

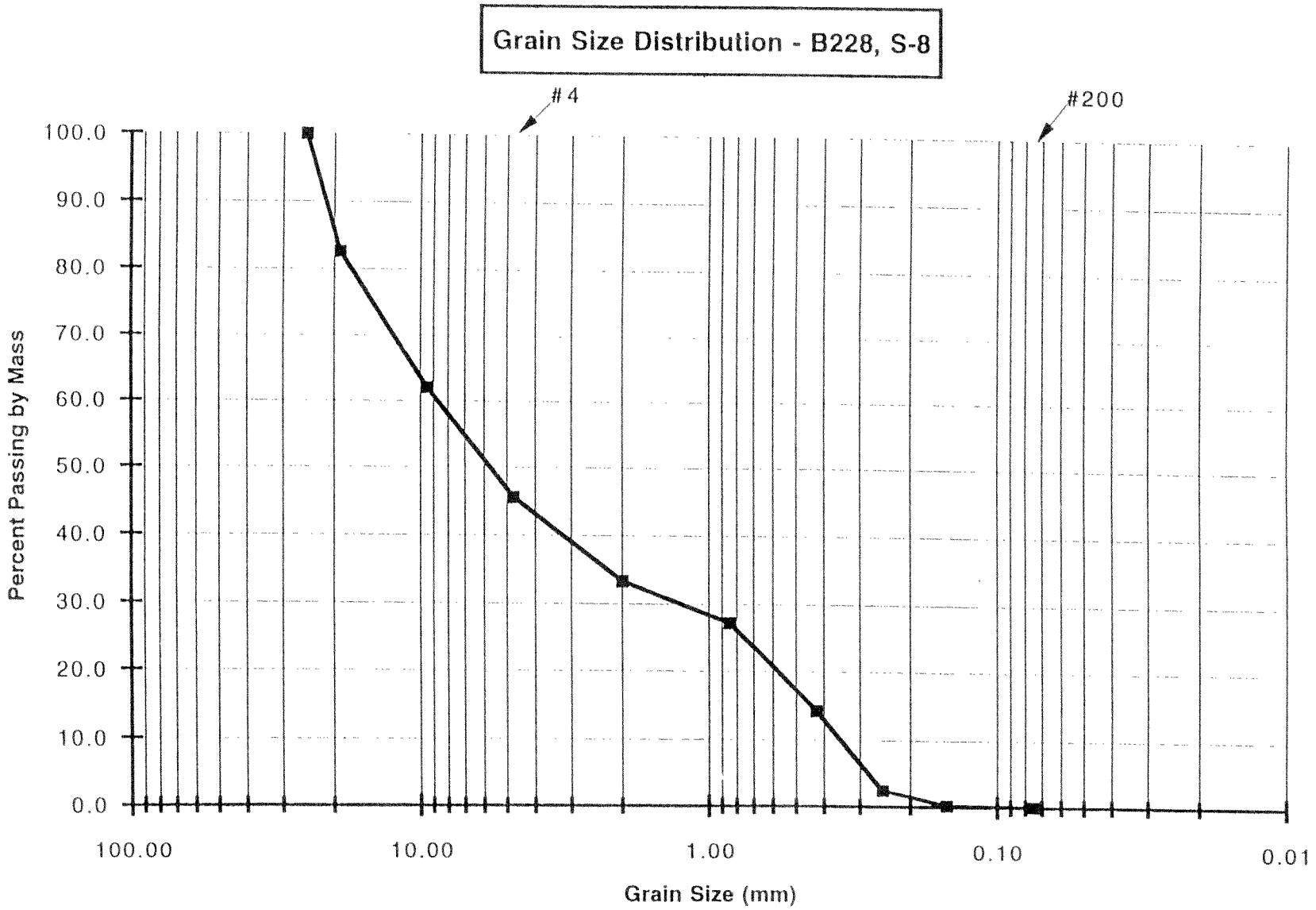

Grain Size Distribution - B224, S-9
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

Mass Dish + Sample	631.4
Mass of Dish	162.9
Mass Sample	468.5

BORING: B224
SAMPLE: S-9
FIELD DESCRIPTION: Brown/Grey Sandy Gravel

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	870.8	812.7	58.1	12.4	87.6
3/4"	19.00	828.4	814.8	13.6	2.9	84.7
3/8"	9.5	909.8	845.1	64.7	13.8	70.9
4	4.750	876.5	816.4	60.1	12.8	58.1
10	2.000	756.2	711.9	44.3	9.5	48.6
20	0.850	674.2	629.1	45.1	9.6	39.0
40	0.425	620.6	555.7	64.9	13.9	25.1
60	0.250	600.5	525.9	74.6	15.9	9.2
100	0.150	549.4	512.6	36.8	7.9	1.3
200	0.075	494.7	491.3	3.4	0.7	0.6
PAN		492.5	492.0	0.5	0.1	

% GRAVEL	29.5
% SAND	57.4
% SILT & CLAY	0.1

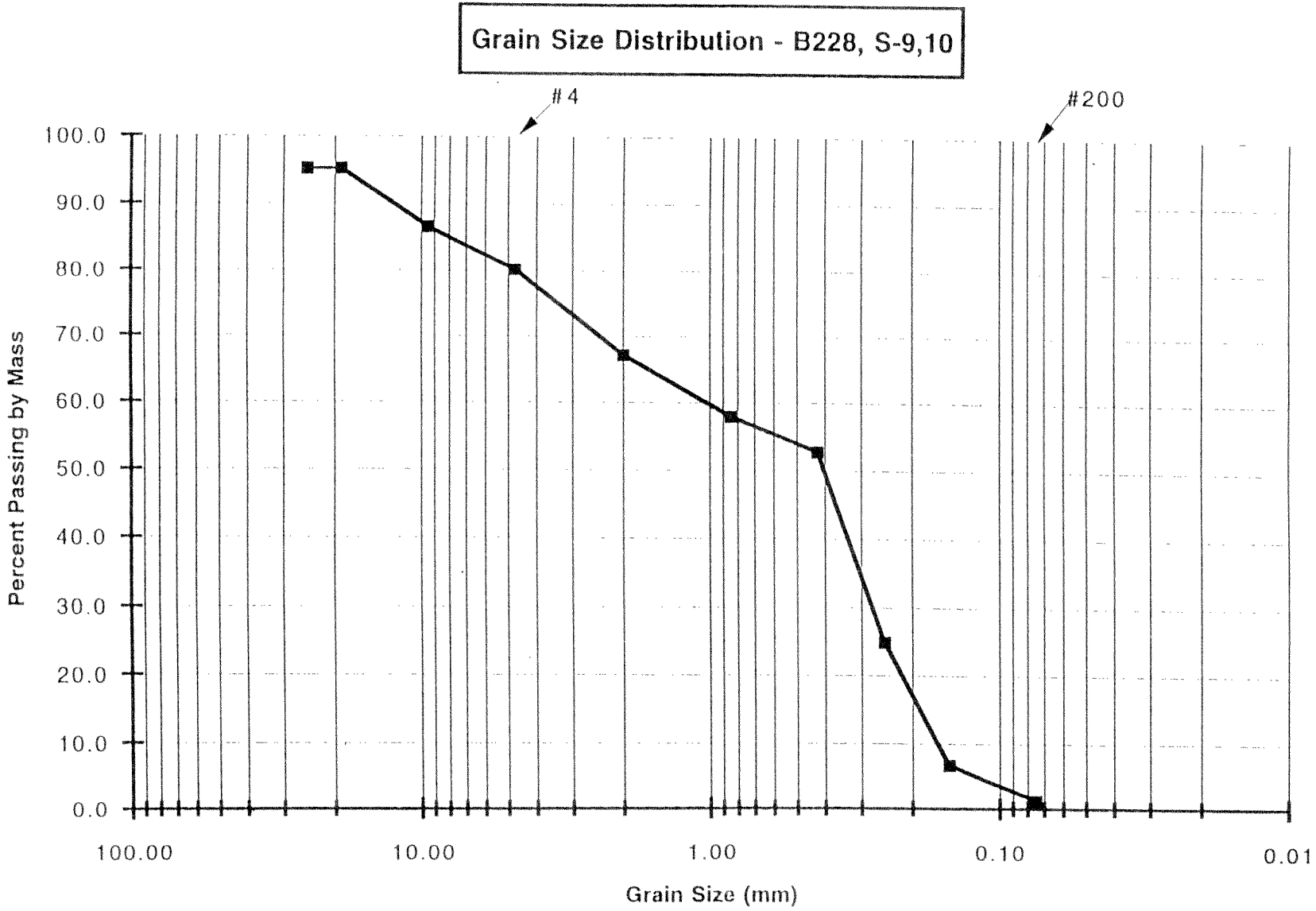

Grain Size Distribution - B228, S-8
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

Mass Dish + Sample	718.8
Mass of Dish	162.9
Mass Sample	555.9

BORING: B228
SAMPLE: S-8
FIELD DESCRIPTION: Brown/Grey Sandy Gravel

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	812.7	812.7	0.0	0.0	100.0
3/4"	19.00	911.5	814.8	96.7	17.4	82.6
3/8"	9.5	959.4	845.1	114.3	20.6	62.0
4	4.750	908.0	816.4	91.6	16.5	45.6
10	2.000	780.1	711.9	68.2	12.3	33.3
20	0.850	663.0	629.1	33.9	6.1	27.2
40	0.425	627.8	555.7	72.1	13.0	14.2
60	0.250	591.4	525.9	65.5	11.8	2.4
100	0.150	525.1	512.6	12.5	2.2	0.2
200	0.075	492.2	491.3	0.9	0.2	0.0
PAN		492.2	492.0	0.2	0.0	

% GRAVEL	54.4
% SAND	45.5
% SILT & CLAY	0.0

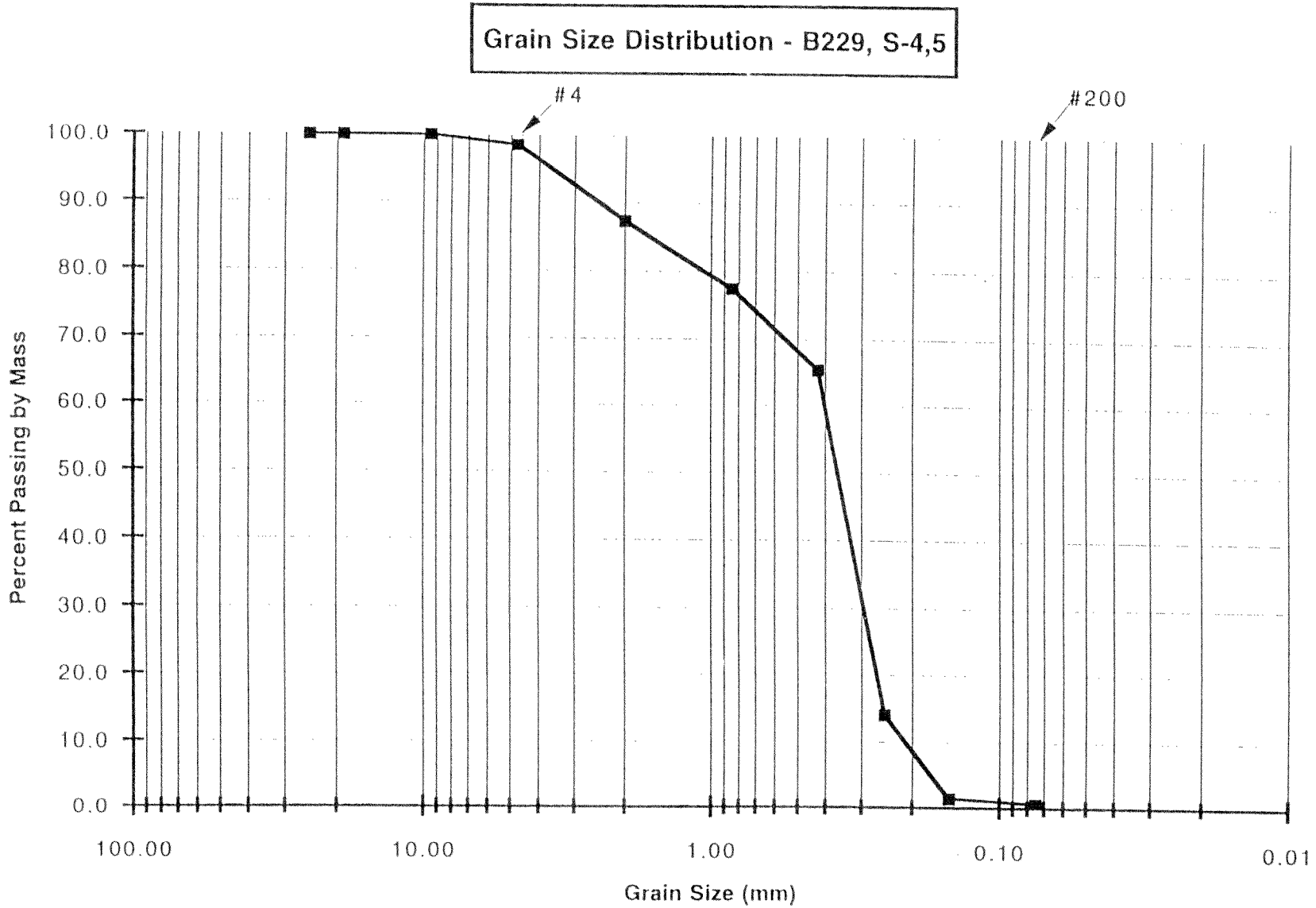

Grain Size Distribution - B228, S-9,10
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

Mass Dish + Sample	679.6
Mass of Dish	162.9
Mass Sample	516.7

BORING: B228
SAMPLE: S-9,10
FIELD DESCRIPTION: Brown/Grey Sandy Gravel

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	837.3	812.7	24.6	4.8	95.2
3/4"	19.00	814.8	814.8	0.0	0.0	95.2
3/8"	9.5	889.8	845.1	44.7	8.7	86.6
4	4.750	849.9	816.4	33.5	6.5	80.1
10	2.000	779.2	711.9	67.3	13.0	67.1
20	0.850	676.2	629.1	47.1	9.1	58.0
40	0.425	582.4	555.7	26.7	5.2	52.8
60	0.250	670.2	525.9	144.3	27.9	24.9
100	0.150	606.6	512.6	94.0	18.2	6.7
200	0.075	519.1	491.3	27.8	5.4	1.3
PAN		496.3	492.0	4.3	0.8	

% GRAVEL	15.1
% SAND	78.8
% SILT & CLAY	0.8

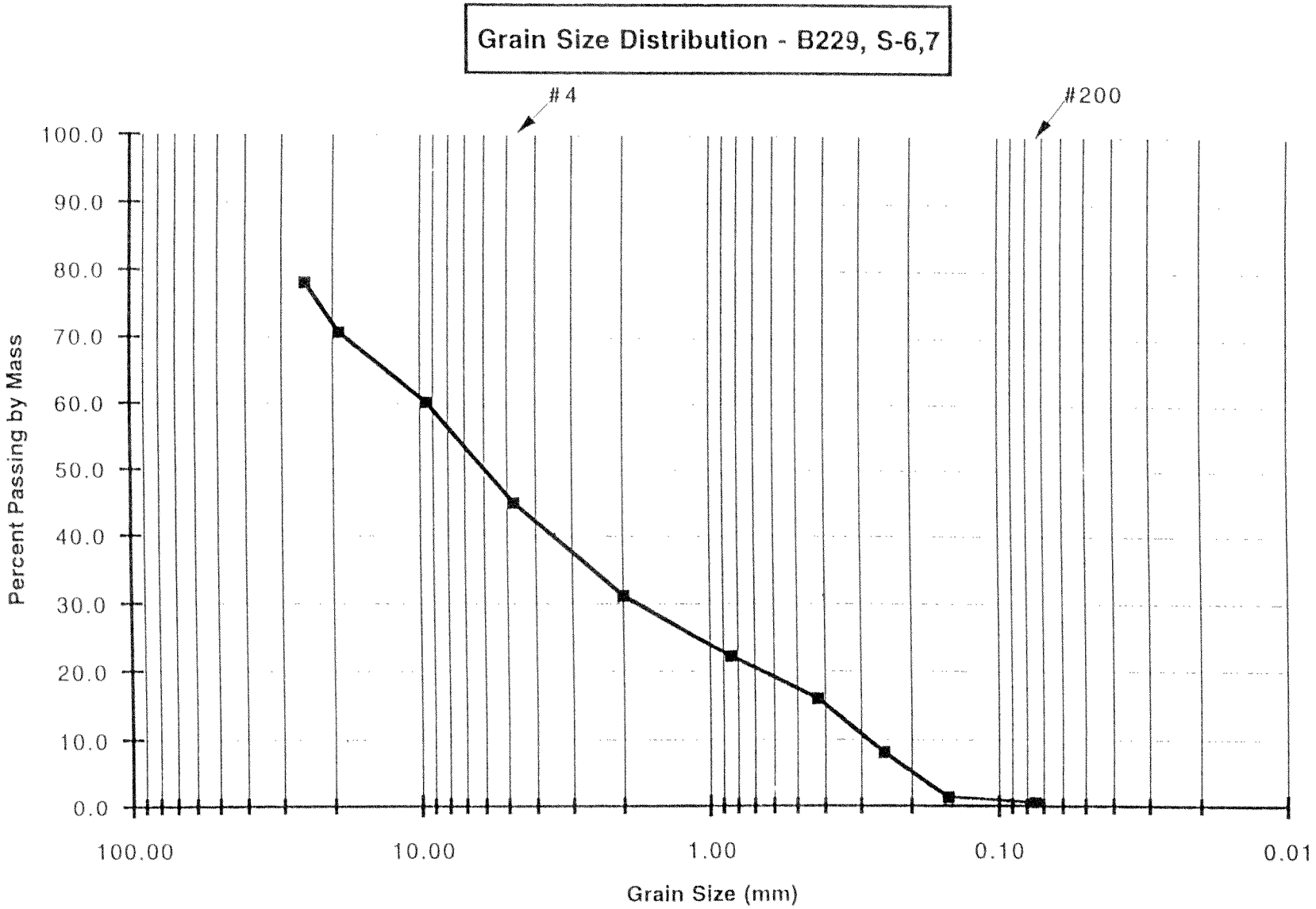

Grain Size Distribution - B229, S-4,5
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

Mass Dish + Sample	588.4
Mass of Dish	162.9
Mass Sample	425.5

BORING: B229
SAMPLE: S-4,5
FIELD DESCRIPTION: Fine Grey/Black Silty Sand

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	812.7	812.7	0.0	0.0	100.0
3/4"	19.00	814.8	814.8	0.0	0.0	100.0
3/8"	9.5	845.1	845.1	0.0	0.0	100.0
4	4.750	822.7	816.4	6.3	1.5	98.5
10	2.000	759.8	711.9	47.9	11.3	87.3
20	0.850	671.1	629.1	42.0	9.9	77.4
40	0.425	606.9	555.7	51.2	12.0	65.4
60	0.250	744.5	525.9	218.6	51.4	14.0
100	0.150	565.9	512.6	53.3	12.5	1.5
200	0.075	494.6	491.3	3.3	0.8	0.7
PAN		492.3	492.0	0.3	0.1	

% GRAVEL	1.5
% SAND	97.8
% SILT & CLAY	0.1

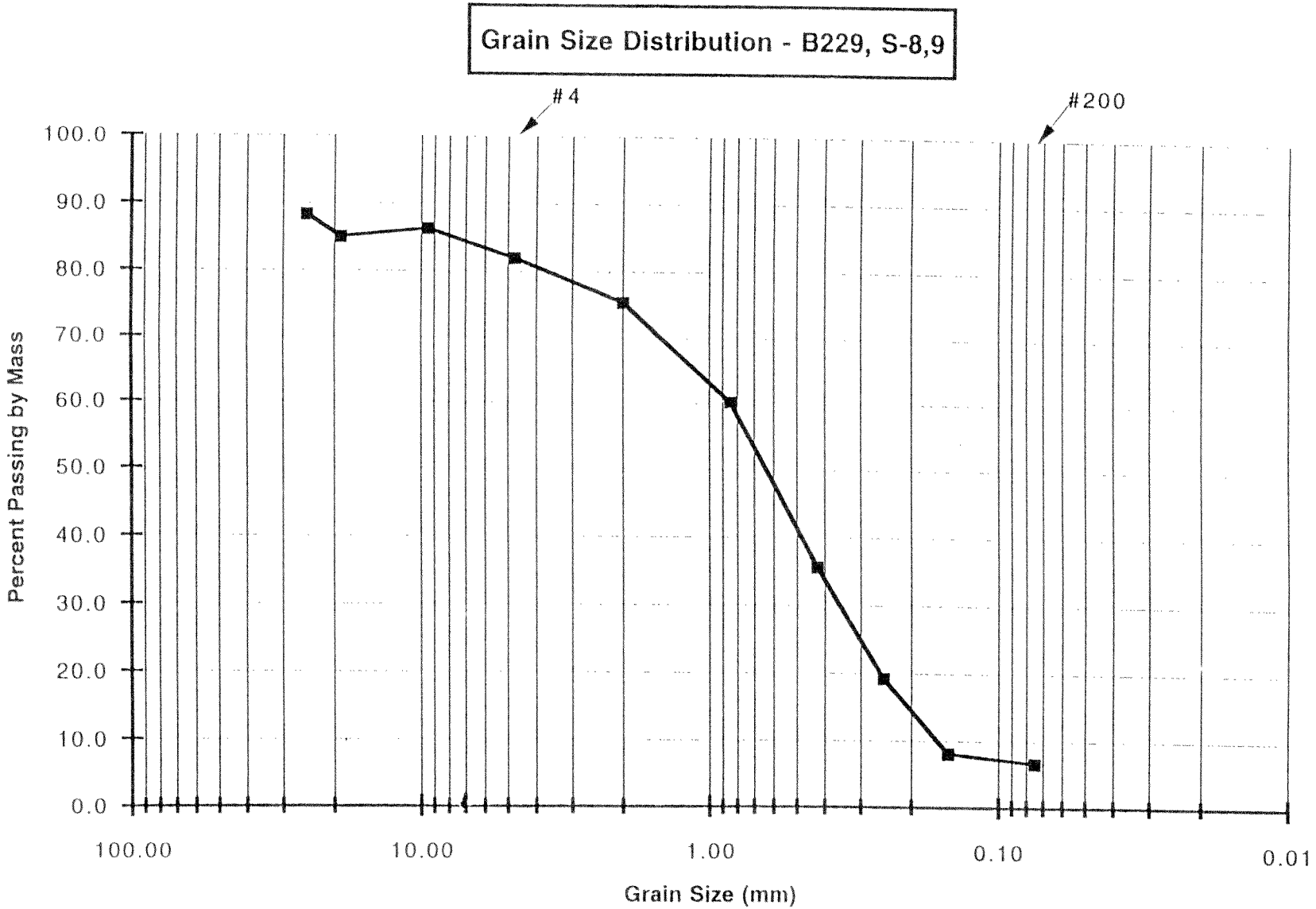

Grain Size Distribution - B229, S-6,7
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

Mass Dish + Sample	616.7
Mass of Dish	162.9
Mass Sample	453.8

BORING: B229
SAMPLE: S-6,7
FIELD DESCRIPTION: Brown Sandstone and Gravel

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	912.4	812.7	99.7	22.0	78.0
3/4"	19.00	848.3	814.8	33.5	7.4	70.6
3/8"	9.5	892.6	845.1	47.5	10.5	60.2
4	4.750	885.7	816.4	69.3	15.3	44.9
10	2.000	774.1	711.9	62.2	13.7	31.2
20	0.850	670.0	629.1	40.9	9.0	22.2
40	0.425	584.3	555.7	28.6	6.3	15.9
60	0.250	561.3	525.9	35.4	7.8	8.1
100	0.150	542.9	512.6	30.3	6.7	1.4
200	0.075	495.0	491.3	3.7	0.8	0.6
PAN		492.6	492.0	0.6	0.1	

% GRAVEL	33.1
% SAND	44.3
% SILT & CLAY	0.1

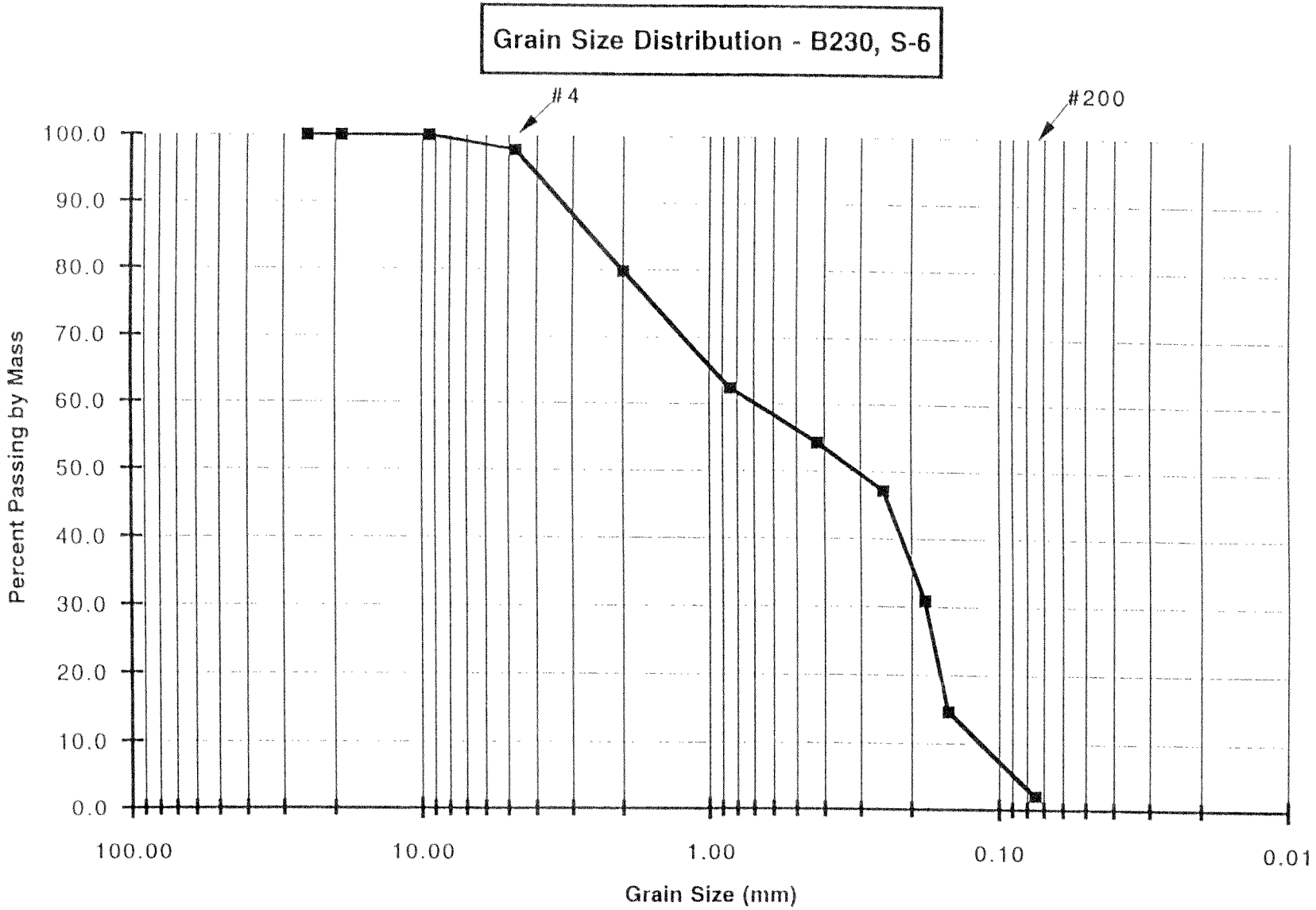

Grain Size Distribution - B229, S-8,9
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

Mass Dish + Sample	738.2
Mass of Dish	162.9
Mass Sample	575.3

BORING: B229
SAMPLE: S-8,9
FIELD DESCRIPTION: Medium Coarse Brown Sand

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	880.2	812.7	67.5	11.7	88.3
3/4"	19.00	833.7	814.8	18.9	3.3	85.0
3/8"	9.5	837.8	845.1	-7.3	-1.3	86.3
4	4.750	841.1	816.4	24.7	4.3	82.0
10	2.000	750.4	711.9	38.5	6.7	75.3
20	0.850	715.7	629.1	86.6	15.1	60.2
40	0.425	697.7	555.7	142.0	24.7	35.5
60	0.250	619.6	525.9	93.7	16.3	19.2
100	0.150	576.6	512.6	64.0	11.1	8.1
200	0.075	499.3	491.3	8.0	1.4	6.7
PAN		492.8	492.0	0.8	0.1	

% GRAVEL	6.3
% SAND	75.2
% SILT & CLAY	0.1

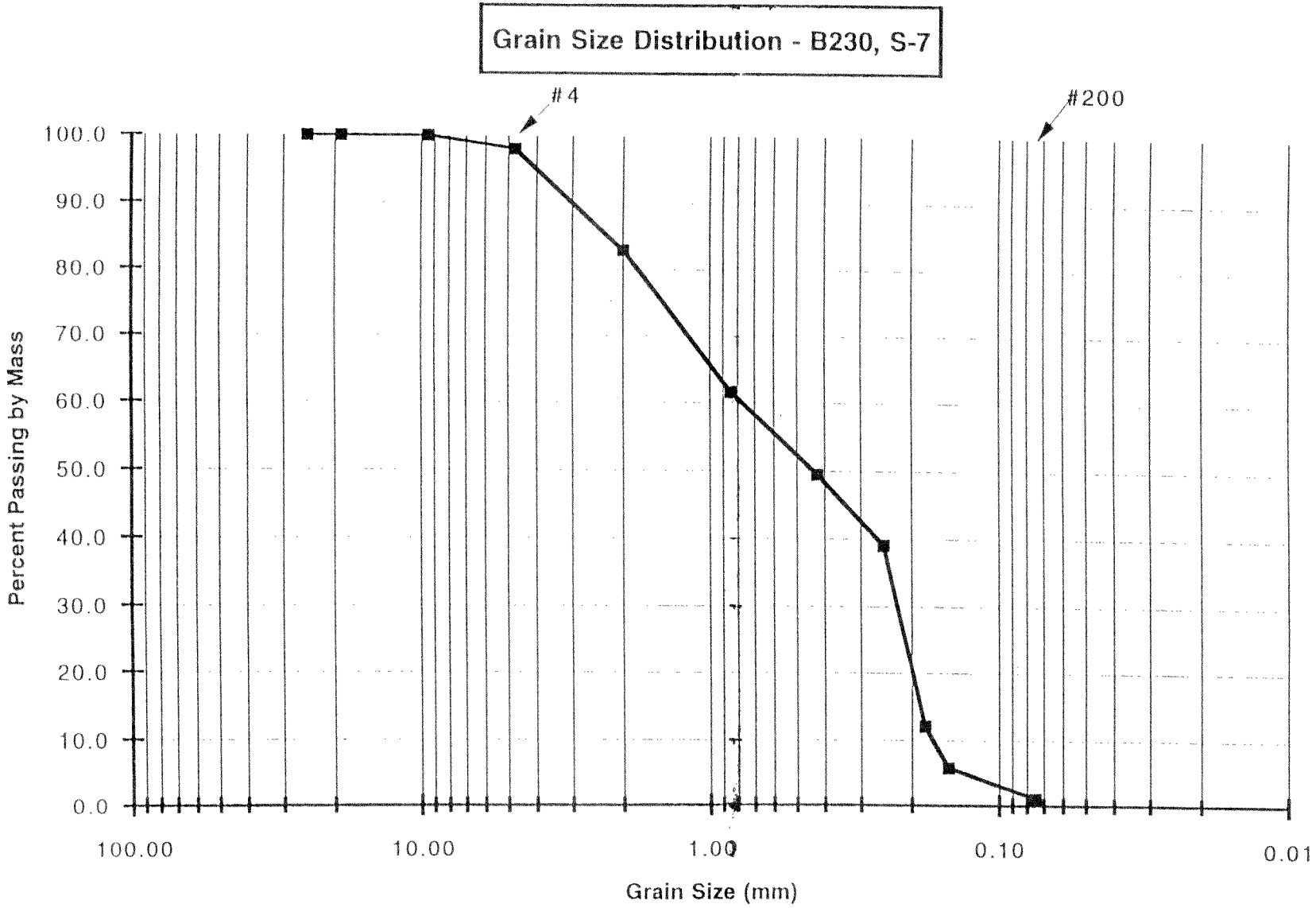

Grain Size Distribution - B230, S-6
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

Mass Dish + Sample	428
Mass of Dish	162.9
Mass Sample	265.1

BORING: B230
SAMPLE: S-6
FIELD DESCRIPTION: Brown/Grey Sandy Silty Clay

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	812.7	812.7	0.0	0.0	100.0
3/4"	19.00	814.8	814.8	0.0	0.0	100.0
3/8"	9.5	845.1	845.1	0.0	0.0	100.0
4	4.750	822.2	816.4	5.8	2.2	97.8
10	2.000	759.7	711.9	47.8	18.0	79.8
20	0.850	675.2	629.1	46.1	17.4	62.4
40	0.425	577.3	555.7	21.6	8.1	54.2
60	0.250	544.8	525.9	18.9	7.1	47.1
80	0.180	556.6	513.5	43.1	16.3	30.9
100	0.150	555.7	512.6	43.1	16.3	14.6
200	0.075	524.2	491.3	32.9	12.4	2.2
PAN		495.4	492.0	3.4	1.3	

% GRAVEL	2.2
% SAND	95.6
% SILT & CLAY	1.3

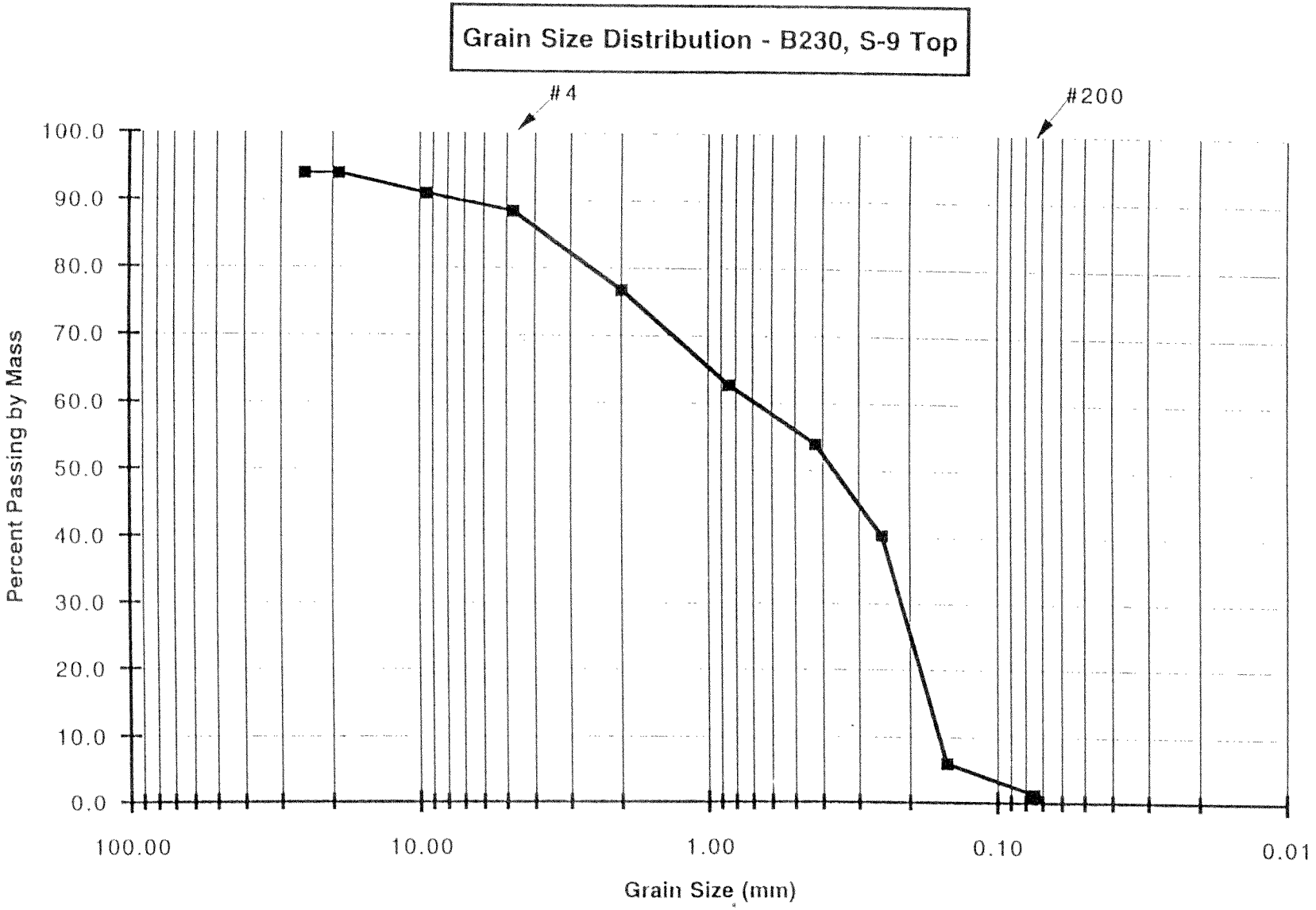

Grain Size Distribution - B230, S-7
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

Mass Dish + Sample	665.7
Mass of Dish	162.9
Mass Sample	502.8

BORING: B230
SAMPLE: S-7
FIELD DESCRIPTION: Brown/Grey Sandy Silty Clay

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	812.7	812.7	0.0	0.0	100.0
3/4"	19.00	814.8	814.8	0.0	0.0	100.0
3/8"	9.5	845.1	845.1	0.0	0.0	100.0
4	4.750	826.2	816.4	9.8	1.9	98.1
10	2.000	788.2	711.9	76.3	15.2	82.9
20	0.850	736.3	629.1	107.2	21.3	61.6
40	0.425	616.5	555.7	60.8	12.1	49.5
60	0.250	578.5	525.9	52.6	10.5	39.0
80	0.180	649.0	513.5	135.5	26.9	12.1
100	0.150	543.9	512.6	31.3	6.2	5.8
200	0.075	514.8	491.3	23.5	4.7	1.2
PAN		495.6	492.0	3.6	0.7	

% GRAVEL	1.9
% SAND	96.9
% SILT & CLAY	0.7

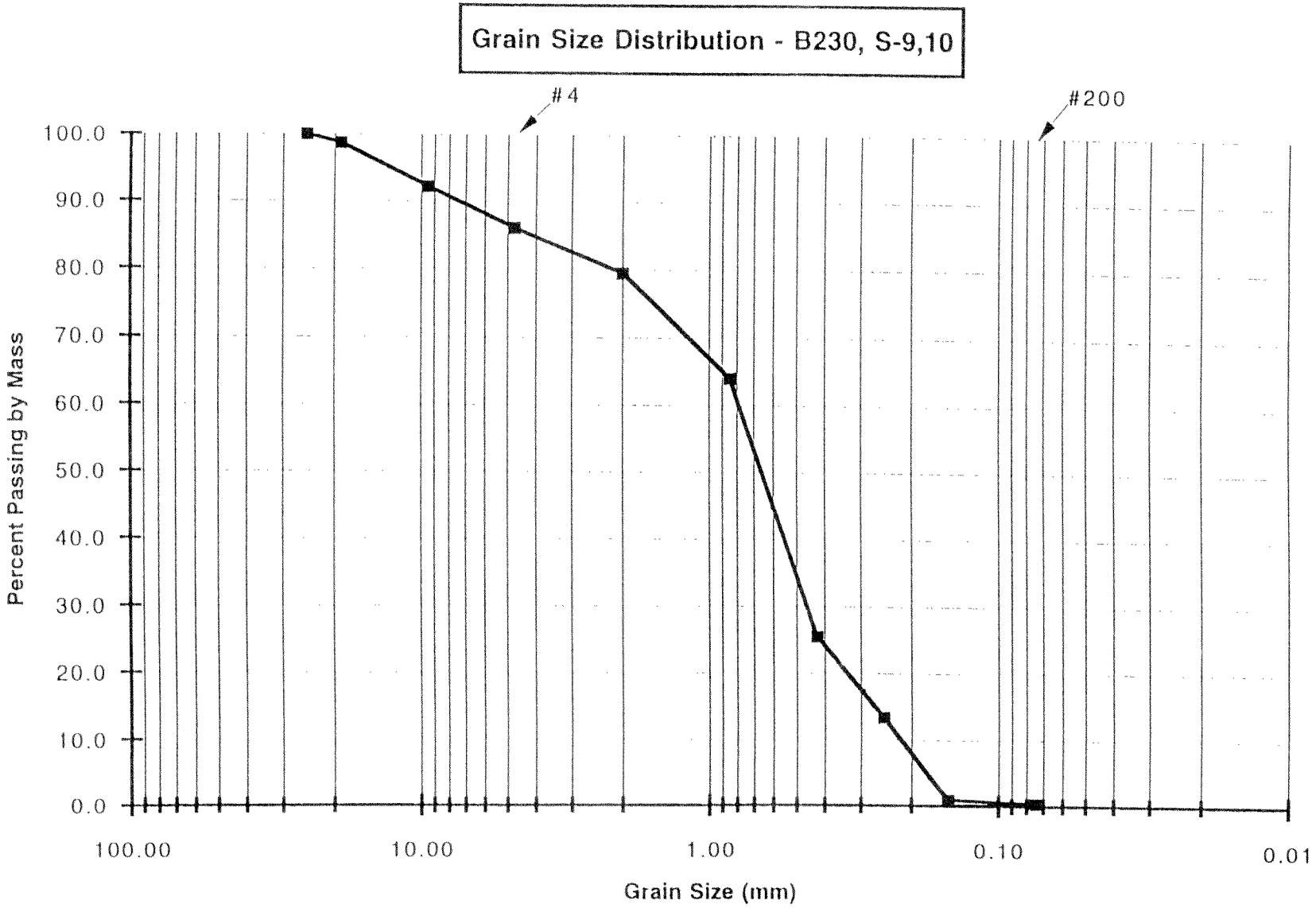

Grain Size Distribution - B230, S-9 Top
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

Mass Dish + Sample	562.9
Mass of Dish	162.9
Mass Sample	400

BORING: B230
SAMPLE: S-9 Top
FIELD DESCRIPTION: Brown Sand and Gravel

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	837	812.7	24.3	6.1	93.9
3/4"	19.00	814.8	814.8	0.0	0.0	93.9
3/8"	9.5	857.1	845.1	12.0	3.0	90.9
4	4.750	826.6	816.4	10.2	2.6	88.4
10	2.000	758.7	711.9	46.8	11.7	76.7
20	0.850	685.0	629.1	55.9	14.0	62.7
40	0.425	590.7	555.7	35.0	8.8	54.0
60	0.250	580.8	525.9	54.9	13.7	40.2
100	0.150	649.6	512.6	137.0	34.3	6.0
200	0.075	510.0	491.3	18.7	4.7	1.3
PAN		494.8	492.0	2.8	0.7	

% GRAVEL	5.6
% SAND	87.1
% SILT & CLAY	0.7


Grain Size Distribution - B230, S-9,10
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

Mass Dish + Sample	1246.8
Mass of Dish	162.9
Mass Sample	1083.9

BORING: B230
SAMPLE: S-9,10
FIELD DESCRIPTION: Brown Sand and Gravel

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	812.7	812.7	0.0	0.0	100.0
3/4"	19.00	829.4	814.8	14.6	1.3	98.7
3/8"	9.5	914.9	845.1	69.8	6.4	92.2
4	4.750	883.0	816.4	66.6	6.1	86.1
10	2.000	783.6	711.9	71.7	6.6	79.5
20	0.850	796.5	629.1	167.4	15.4	64.0
40	0.425	973.6	555.7	417.9	38.6	25.5
60	0.250	657.2	525.9	131.3	12.1	13.3
100	0.150	647.1	512.6	134.5	12.4	0.9
200	0.075	497.7	491.3	6.4	0.6	0.3
PAN		493.2	492.0	1.2	0.1	

% GRAVEL	13.9
% SAND	85.7
% SILT & CLAY	0.1

Mass Dish + Sample	340.1
Mass of Dish	163.53
Mass Sample	176.57

BORING: B232
SAMPLE: S-6
FIELD DESCRIPTION: Grey/Black Clayey Silt, Trace Sand Some Wood Fibers

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	812.7	812.7	0.0	0.0	100.0
3/4"	19.00	814.8	814.8	0.0	0.0	100.0
3/8"	9.5	845.1	845.1	0.0	0.0	100.0
4	4.750	817.8	816.4	1.4	0.8	99.2
10	2.000	712.2	711.9	0.3	0.2	99.0
20	0.850	630.8	629.1	1.7	1.0	98.1
40	0.425	582.4	555.7	26.7	15.1	83.0
60	0.250	543.7	525.9	17.8	10.1	72.9
100	0.150	533.8	512.6	21.2	12.0	60.9
200	0.075	516.3	491.3	25.0	14.2	46.7
PAN		572.6	492.0	80.6	45.6	0.0

% GRAVEL	0.8
% SAND	52.5
% SILT & CLAY	45.6

Mass Dish + Sample	620.6
Mass of Dish	163.53
Mass Sample	457.07

BORING: B232
SAMPLE: S-7,S-8
FIELD DESCRIPTION: Very Fine Brown Silty Sand, Trace Silt

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	812.7	812.7	0.0	0.0	100.0
3/4"	19.00	814.8	814.8	0.0	0.0	100.0
3/8"	9.5	845.1	845.1	0.0	0.0	100.0
4	4.750	818.0	816.4	1.6	0.4	99.6
10	2.000	715.8	711.9	3.9	0.9	98.8
20	0.850	645.0	629.1	15.9	3.5	95.3
40	0.425	575.7	555.7	20.0	4.4	90.9
60	0.250	610.2	525.9	84.3	18.4	72.5
100	0.150	679.3	512.6	166.7	36.5	36.0
200	0.075	554.2	491.3	62.9	13.8	22.3
PAN		592.4	492.0	100.4	22.0	0.0

% GRAVEL	0.4
% SAND	77.4
% SILT & CLAY	22.0

SM


Grain Size Distribution - B232, S-7 & S-8
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

Mass Dish + Sample	503.5
Mass of Dish	163.53
Mass Sample	339.97

BORING: B232
SAMPLE: S-8, Bottom
FIELD DESCRIPTION: Brown Sandy Gravel

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	869.8	812.7	57.1	16.8	83.2
3/4"	19.00	831.9	814.8	17.1	5.0	78.2
3/8"	9.5	895	845.1	49.9	14.7	63.5
4	4.750	860.6	816.4	44.2	13.0	50.5
10	2.000	739.8	711.9	27.9	8.2	42.3
20	0.850	658.8	629.1	29.7	8.7	33.6
40	0.425	583.4	555.7	27.7	8.1	25.4
60	0.250	565.8	525.9	39.9	11.7	13.7
100	0.150	528.8	512.6	16.2	4.8	8.9
200	0.075	503.9	491.3	12.6	3.7	5.2
PAN		508.7	492.0	16.7	4.9	0.0

$D_{10} = .17$

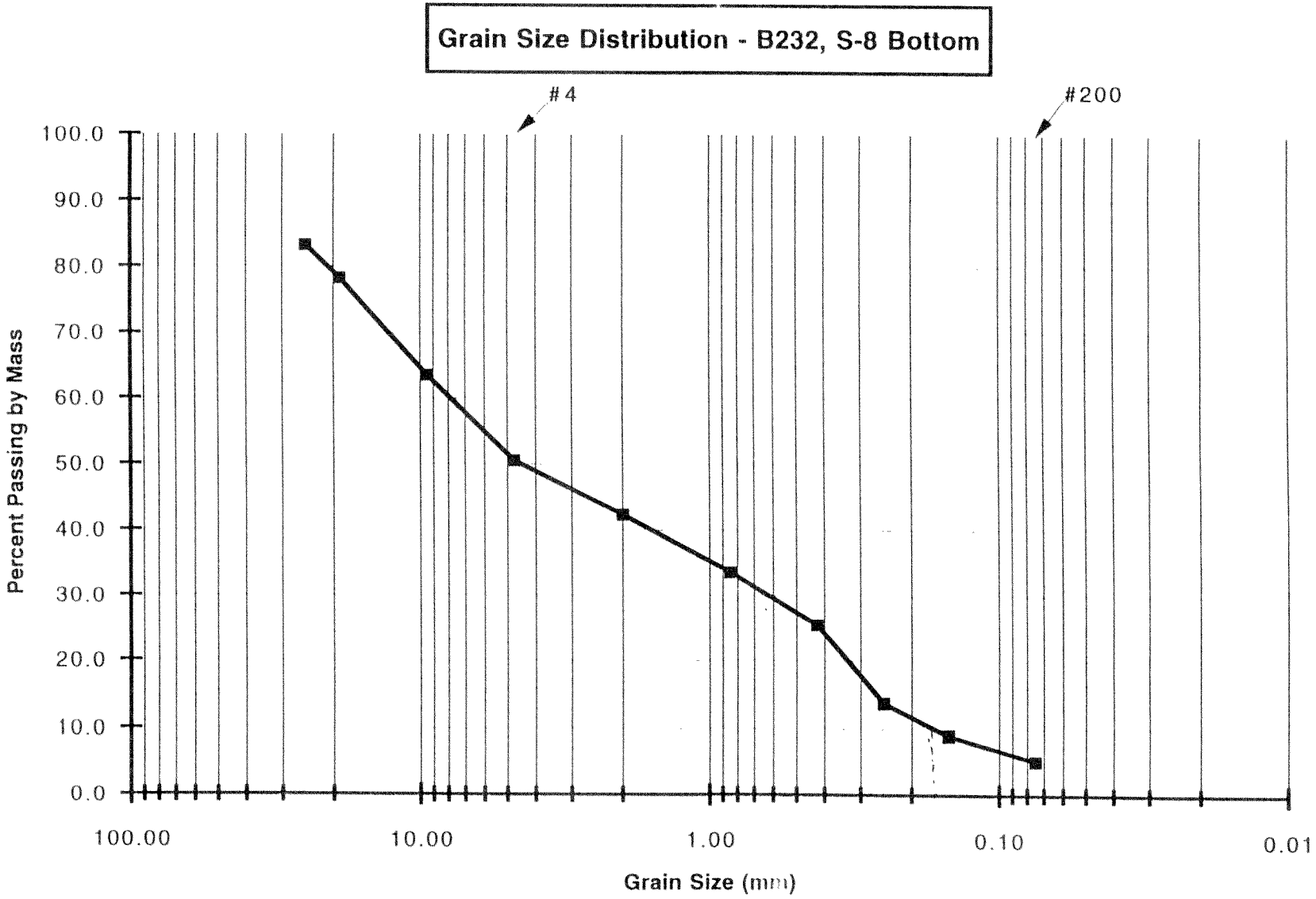
$P_{30} = .62$

$D_{60} = 8$

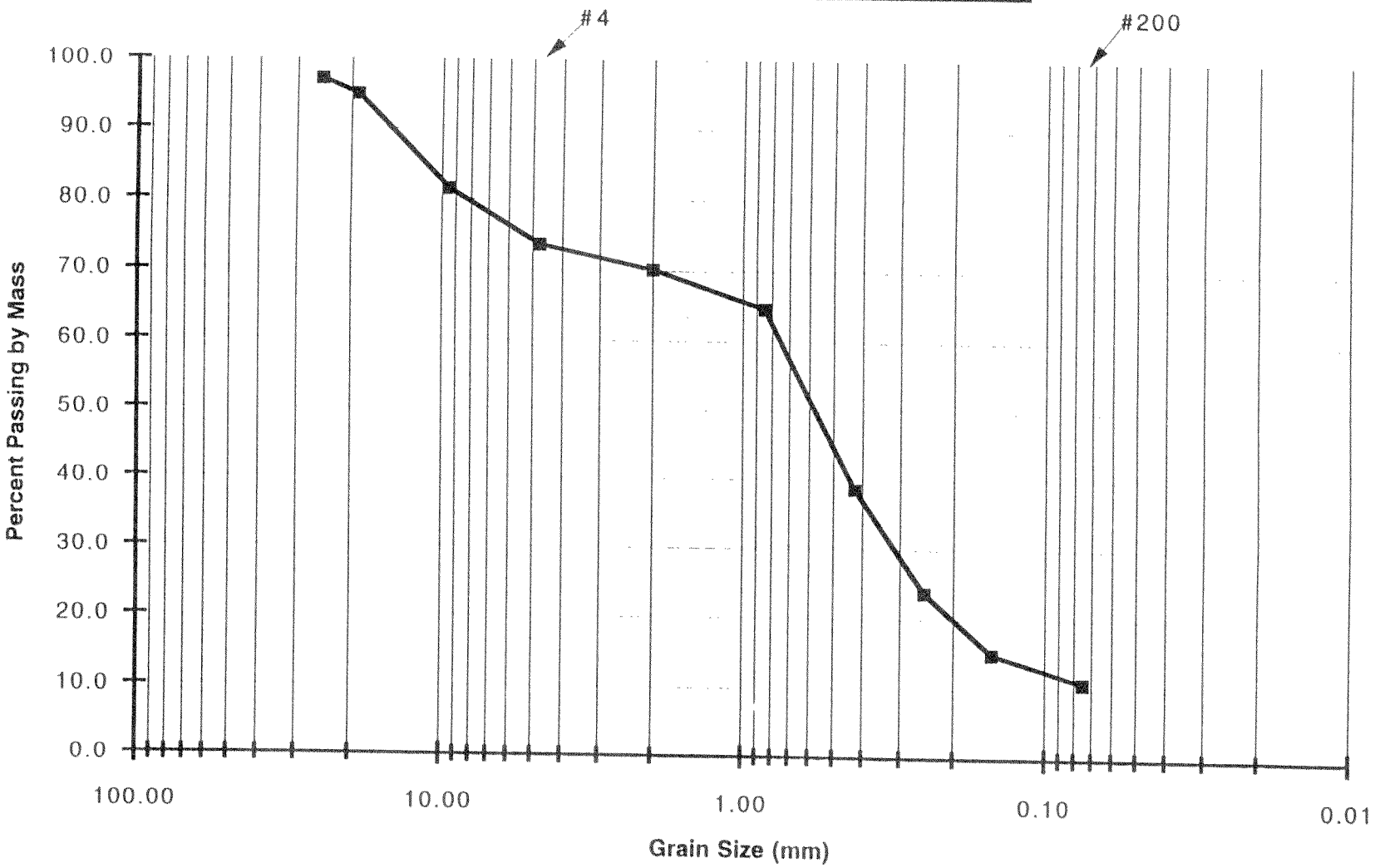
$C_c = 0.283 < 1$

% GRAVEL	32.7
% SAND	45.3
% SILT & CLAY	4.9

SP


Grain Size Distribution - B232, S-8 Bottom
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

Grain Size Distribution - B232, S-9, S-10



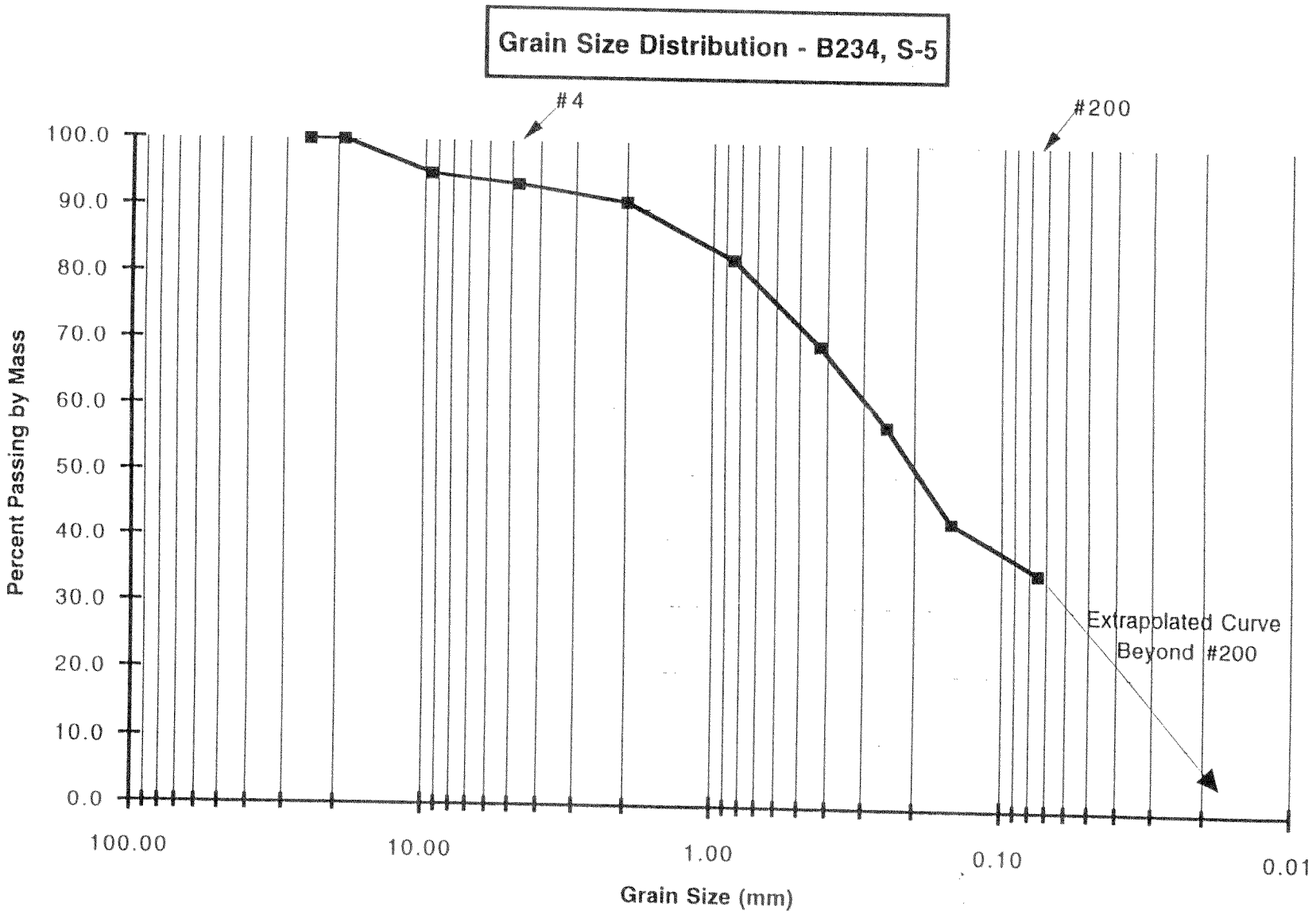
Mass Dish + Sample	799.2
Mass of Dish	163.53
Mass Sample	635.67

BORING: B232
SAMPLE: S-9, S-10
FIELD DESCRIPTION: Med. Brown Sand, Some Gravel

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	831.6	812.7	18.9	3.0	97.0
3/4"	19.00	828.7	814.8	13.9	2.2	94.8
3/8"	9.5	930.5	845.1	85.4	13.4	81.4
4	4.750	865.9	816.4	49.5	7.8	73.6
10	2.000	734.7	711.9	22.8	3.6	70.0
20	0.850	663.9	629.1	34.8	5.5	64.6
40	0.425	721.4	555.7	165.7	26.1	38.5
60	0.250	620.1	525.9	94.2	14.8	23.7
100	0.150	567.9	512.6	55.3	8.7	15.0
200	0.075	516.3	491.3	25.0	3.9	11.0
PAN		561.3	492.0	69.3	10.9	0.0

% GRAVEL	23.4
% SAND	62.6
% SILT & CLAY	10.9

UCS → SM


Grain Size Distribution - B234, S-5
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)
Extrapolated Curve
Beyond #200

Mass Dish + Sample	354
Mass of Dish	163.53
Mass Sample	190.47

BORING: B234
SAMPLE: S-5
FIELD DESCRIPTION: Grey/Brown Mottled Silty Clay w/ Gravel

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	812.7	812.7	0.0	0.0	100.0
3/4"	19.00	814.8	814.8	0.0	0.0	100.0
3/8"	9.5	854.6	845.1	9.5	5.0	95.0
4	4.750	819.3	816.4	2.9	1.5	93.5
10	2.000	716.8	711.9	4.9	2.6	90.9
20	0.850	645.2	629.1	16.1	8.5	82.5
40	0.425	580.3	555.7	24.6	12.9	69.5
60	0.250	548.7	525.9	22.8	12.0	57.6
100	0.150	540.5	512.6	27.9	14.6	42.9
200	0.075	506.0	491.3	14.7	7.7	35.2
PAN		557.6	492.0	65.6	34.4	0.0

% GRAVEL	6.5
% SAND	58.3
% SILT & CLAY	34.4

SM

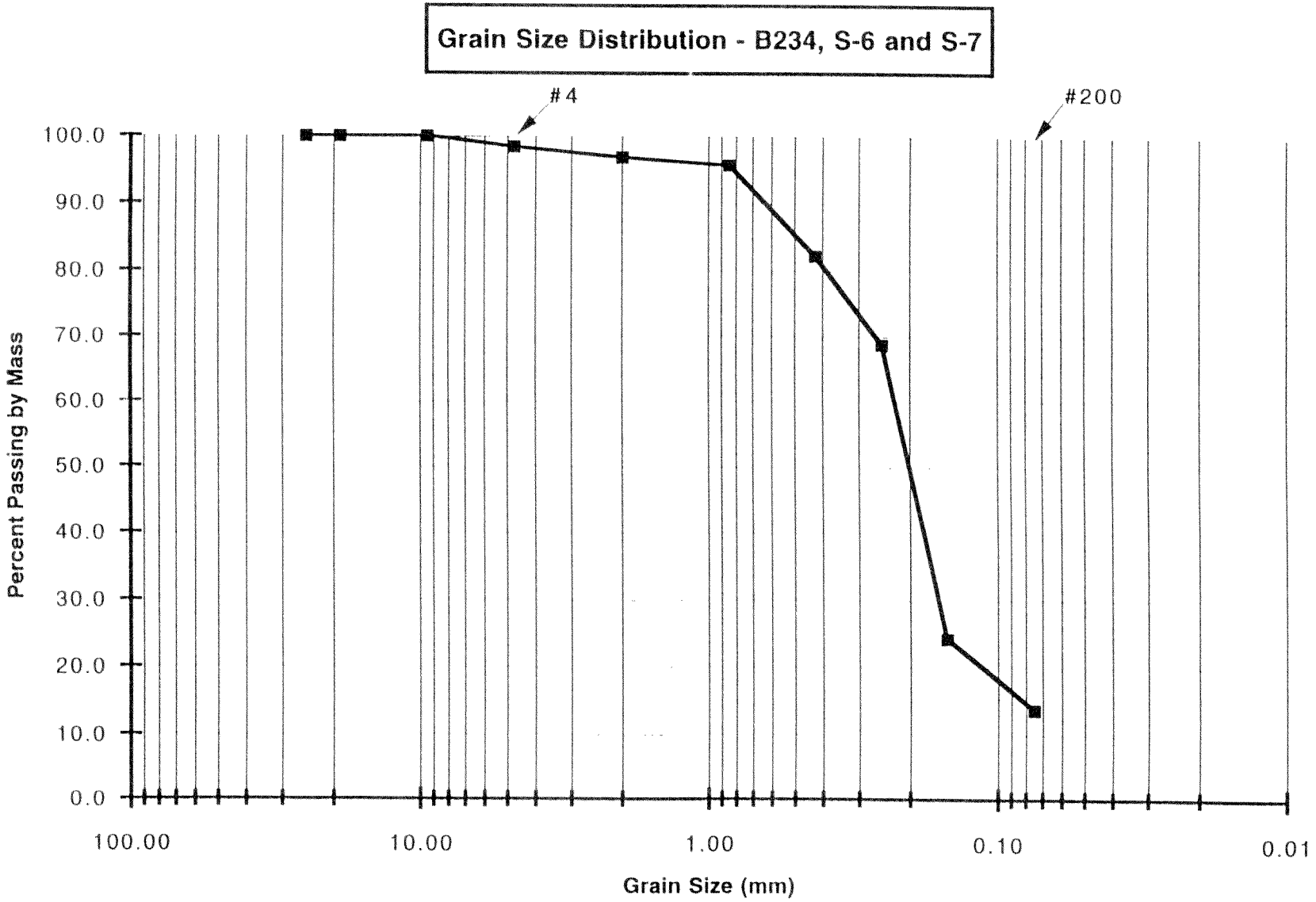
Mass Dish + Sample	538.2
Mass of Dish	163.53
Mass Sample	374.67

BORING: B234
SAMPLE: S-6,S-7
FIELD DESCRIPTION: Grey Sandy Clayey Fill
Trace Bricks, Wood

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	812.7	812.7	0.0	0.0	100.0
3/4"	19.00	814.8	814.8	0.0	0.0	100.0
3/8"	9.5	845.1	845.1	0.0	0.0	100.0
4	4.750	822.2	816.4	5.8	1.5	98.5
10	2.000	717.9	711.9	6.0	1.6	96.9
20	0.850	633.4	629.1	4.3	1.1	95.7
40	0.425	606.5	555.7	50.8	13.6	82.1
60	0.250	576.4	525.9	50.5	13.5	68.7
100	0.150	679.0	512.6	166.4	44.4	24.3
200	0.075	530.6	491.3	39.3	10.5	13.8
PAN		541.5	492.0	49.5	13.2	0.0

% GRAVEL	1.5
% SAND	84.7
% SILT & CLAY	13.2

SM


Grain Size Distribution - B234, S-6 and S-7
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

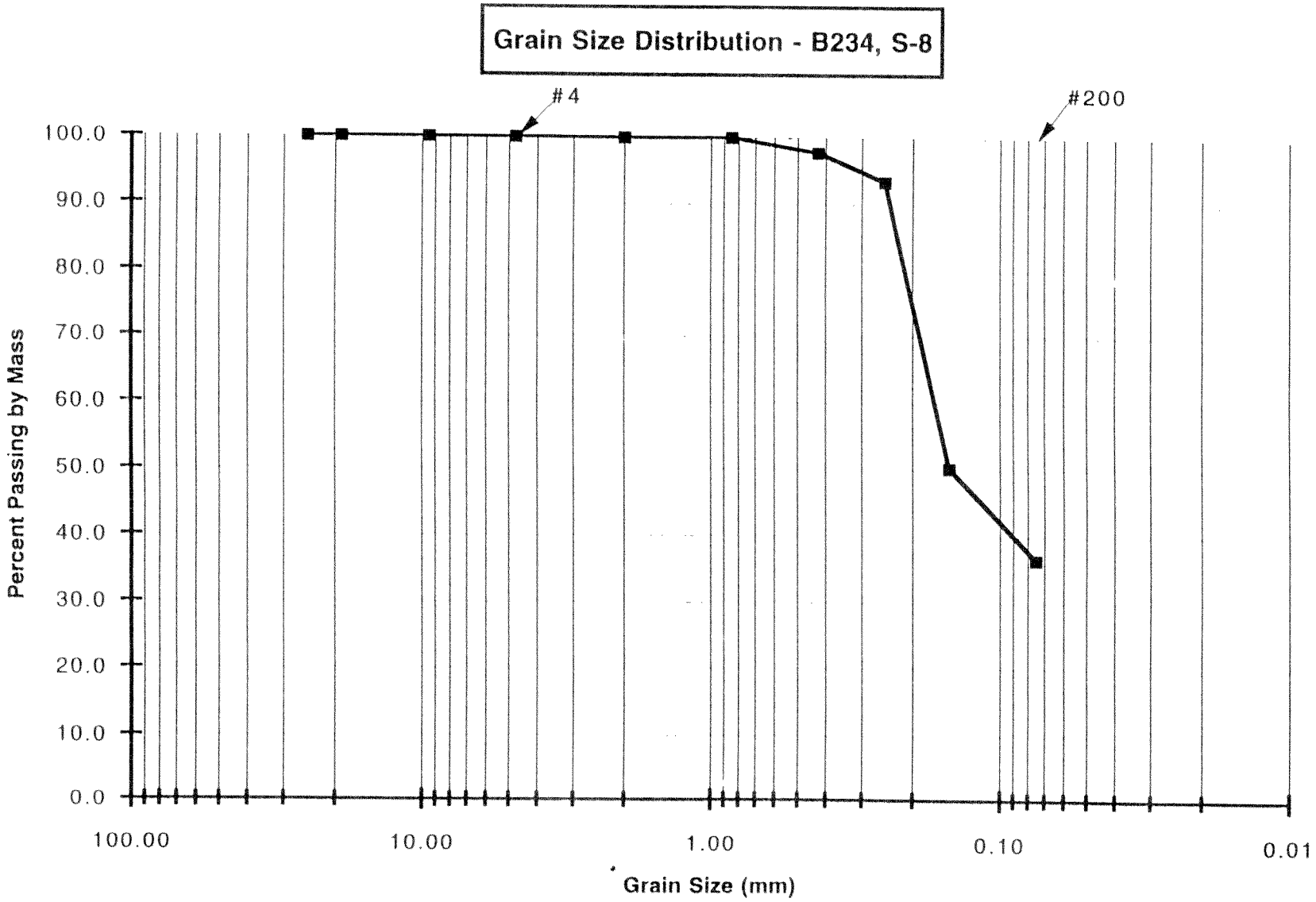
Mass Dish + Sample	413.7
Mass of Dish	163.53
Mass Sample	250.17

BORING: B234
SAMPLE: S-8
FIELD DESCRIPTION: Grey/Black Very Fine Sandy Silt [redacted]

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	812.7	812.7	0.0	0.0	100.0
3/4"	19.00	814.8	814.8	0.0	0.0	100.0
3/8"	9.5	845.1	845.1	0.0	0.0	100.0
4	4.750	816.4	816.4	0.0	0.0	100.0
10	2.000	712.0	711.9	0.1	0.0	100.0
20	0.850	629.2	629.1	0.1	0.0	99.9
40	0.425	561.4	555.7	5.7	2.3	97.6
60	0.250	536.9	525.9	11.0	4.4	93.2
100	0.150	620.3	512.6	107.7	43.1	50.2
200	0.075	525.7	491.3	34.4	13.8	36.4
PAN		581.3	492.0	89.3	35.7	0.0

% GRAVEL	0.0
% SAND	63.6
% SILT & CLAY	35.7

SM


Grain Size Distribution - B234, S-8
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

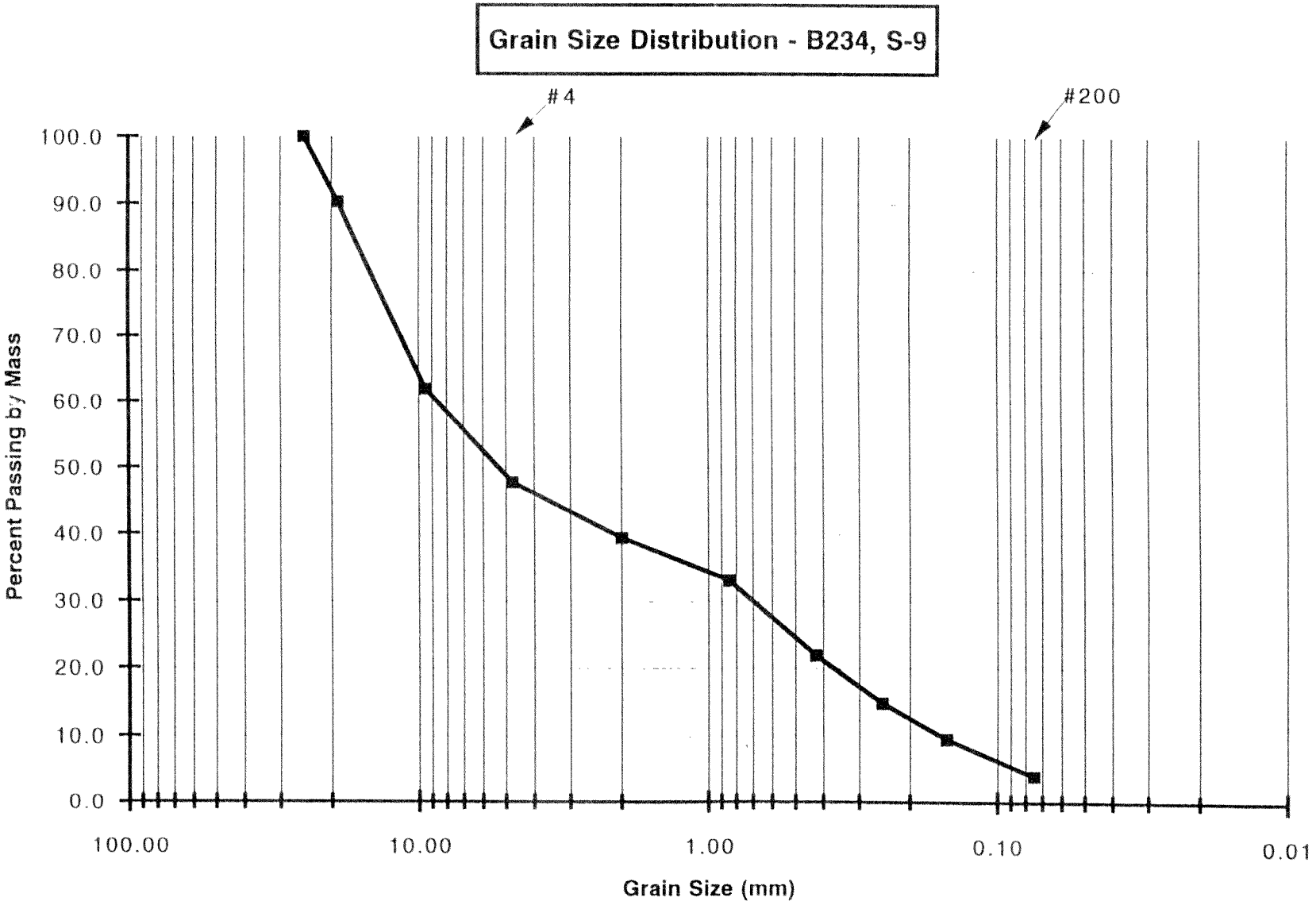
Mass Dish + Sample	505.3
Mass of Dish	163.53
Mass Sample	341.77

BORING: B234
SAMPLE: S-9
FIELD DESCRIPTION: Brown Sandy Gravel

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	812.7	812.7	0.0	0.0	100.0
3/4"	19.00	848.3	814.8	33.5	9.8	90.2
3/8"	9.5	941.7	845.1	96.6	28.3	61.9
4	4.750	864.8	816.4	48.4	14.2	47.8
10	2.000	740.6	711.9	28.7	8.4	39.4
20	0.850	650.6	629.1	21.5	6.3	33.1
40	0.425	593.9	555.7	38.2	11.2	21.9
60	0.250	550.2	525.9	24.3	7.1	14.8
100	0.150	530.3	512.6	17.7	5.2	9.6
200	0.075	510.0	491.3	18.7	5.5	4.1
PAN		504.7	492.0	12.7	3.7	0.0

% GRAVEL	52.2
% SAND	43.6
% SILT & CLAY	3.7

GP


Grain Size Distribution - B234, S-9
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

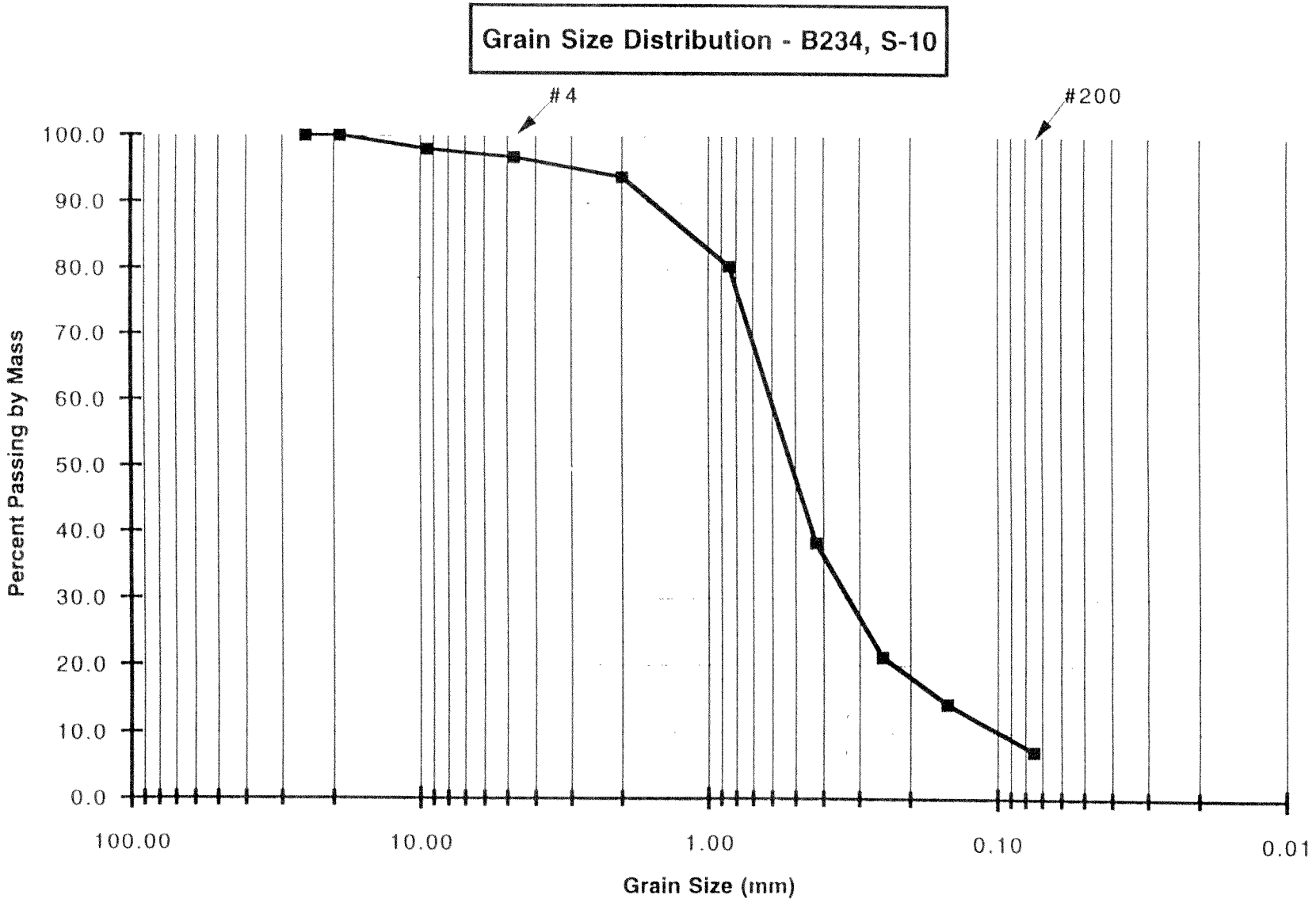
Mass Dish + Sample	449.1
Mass of Dish	163.53
Mass Sample	285.57

BORING: B234
SAMPLE: S-10
FIELD DESCRIPTION: Med. Coarse Brown Sand

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	812.7	812.7	0.0	0.0	100.0
3/4"	19.00	814.8	814.8	0.0	0.0	100.0
3/8"	9.5	850.8	845.1	5.7	2.0	98.0
4	4.750	819.9	816.4	3.5	1.2	96.8
10	2.000	720.3	711.9	8.4	2.9	93.8
20	0.850	667.5	629.1	38.4	13.4	80.4
40	0.425	675.8	555.7	120.1	42.1	38.3
60	0.250	575.0	525.9	49.1	17.2	21.1
100	0.150	532.4	512.6	19.8	6.9	14.2
200	0.075	511.4	491.3	20.1	7.0	7.2
PAN		510.9	492.0	18.9	6.6	0.0

% GRAVEL	3.2
% SAND	89.6
% SILT & CLAY	6.6

SW


Grain Size Distribution - B234, S-10
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

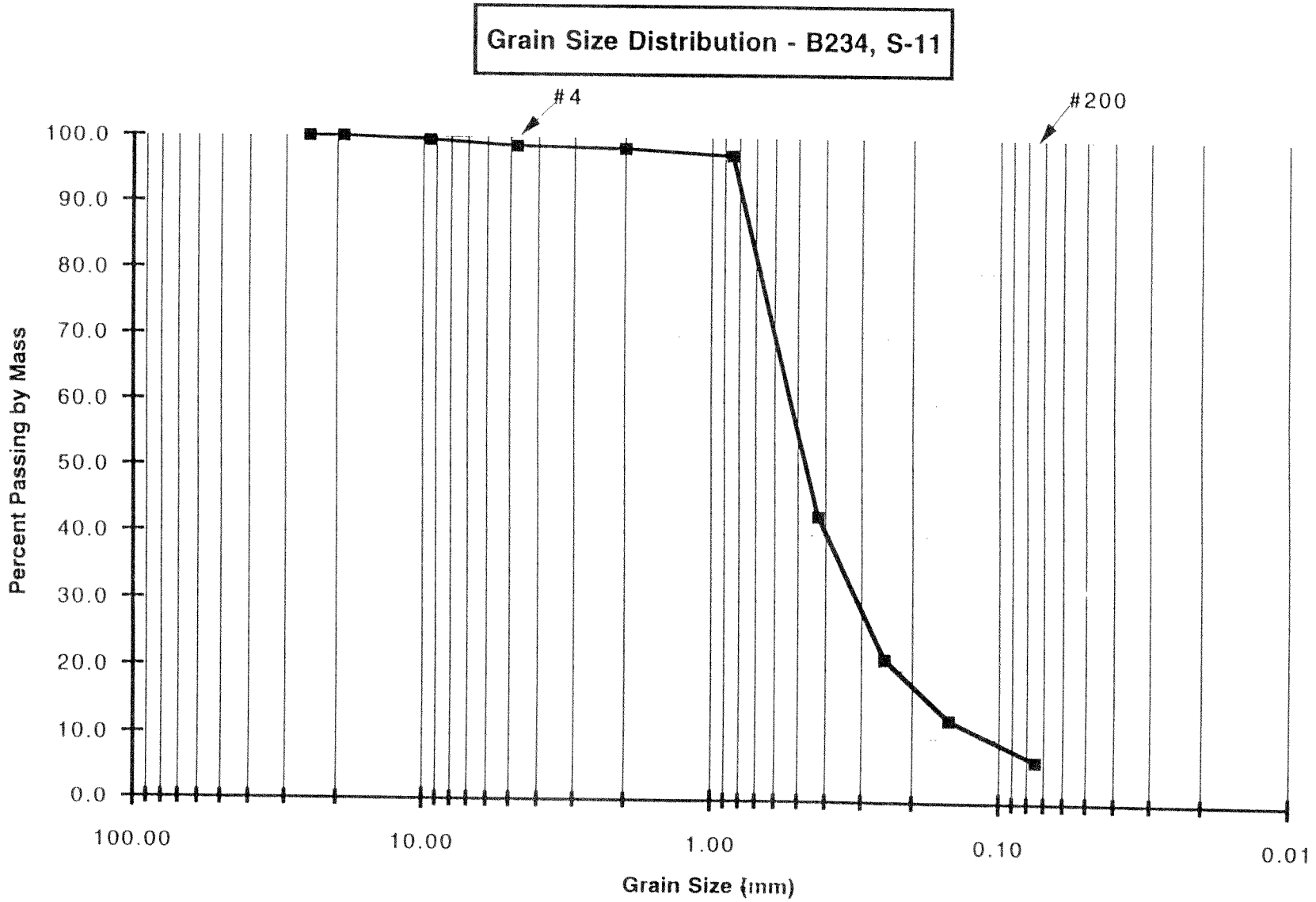
Mass Dish + Sample	472.9
Mass of Dish	163.53
Mass Sample	309.37

BORING: B234
SAMPLE: S-11
FIELD DESCRIPTION: Med. Coarse Reddish Brown Sand

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	812.7	812.7	0.0	0.0	100.0
3/4"	19.00	814.8	814.8	0.0	0.0	100.0
3/8"	9.5	846.7	845.1	1.6	0.5	99.5
4	4.750	819.0	816.4	2.6	0.8	98.6
10	2.000	712.9	711.9	1.0	0.3	98.3
20	0.850	632.4	629.1	3.3	1.1	97.3
40	0.425	724.5	555.7	168.8	54.6	42.7
60	0.250	591.4	525.9	65.5	21.2	21 5
100	0.150	540.0	512.6	27.4	8.9	12.7
200	0.075	510.2	491.3	18.9	6.1	6.6
PAN		510.7	492.0	18.7	6.0	0.0

% GRAVEL	1.4
% SAND	92.1
% SILT & CLAY	6.0

SP - SM


Grain Size Distribution - B234, S-11
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

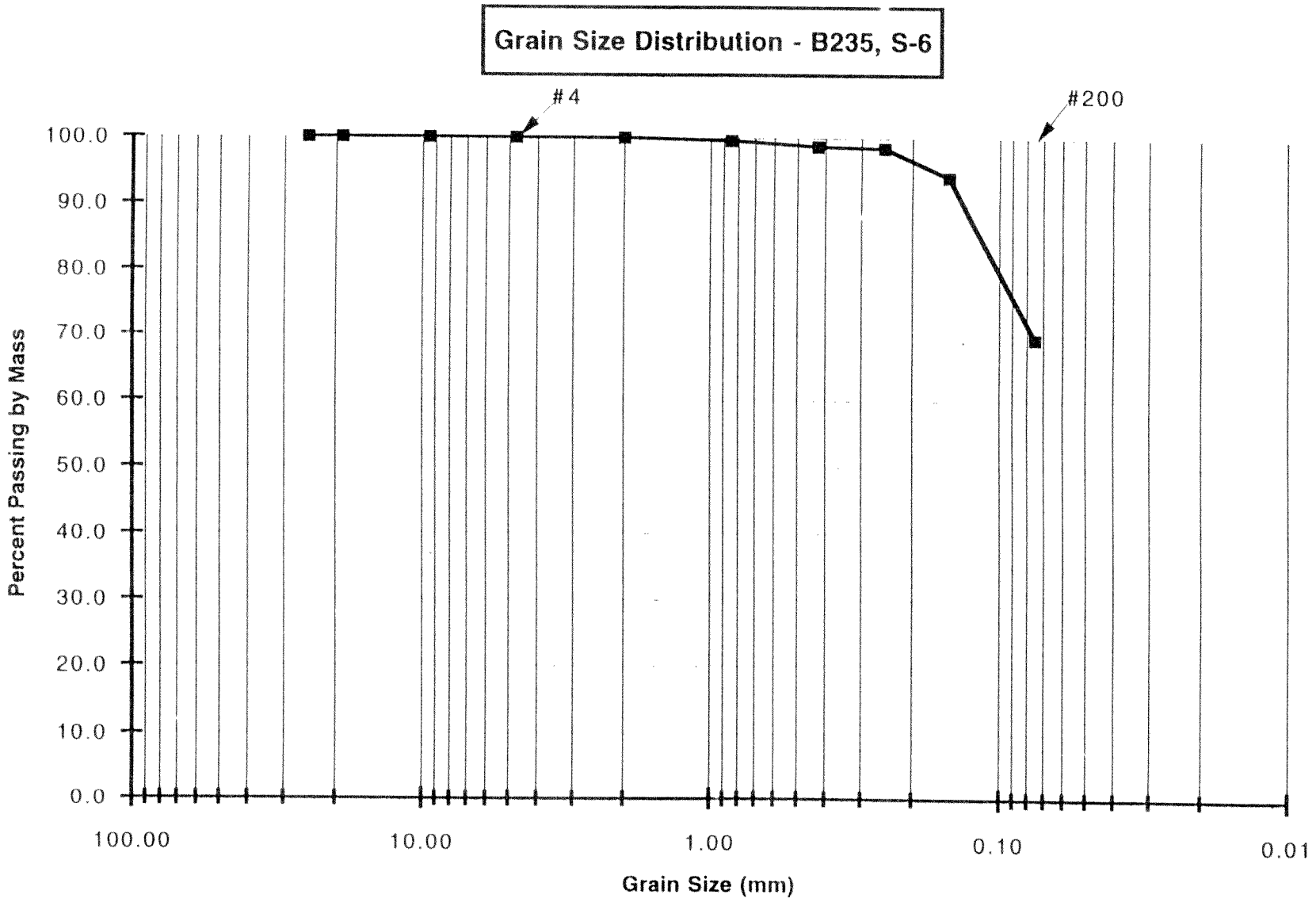
Mass Dish + Sample	322.2
Mass of Dish	162.9
Mass Sample	159.3

BORING: B235
SAMPLE: S-6
FIELD DESCRIPTION: Soft Grey/Black Clayey Silt Trace Coal

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	812.7	812.7	0.0	0.0	100.0
3/4"	19.00	814.8	814.8	0.0	0.0	100.0
3/8"	9.5	845.1	845.1	0.0	0.0	100.0
4	4.750	816.4	816.4	0.0	0.0	100.0
10	2.000	711.9	711.9	0.0	0.0	100.0
20	0.850	629.8	629.1	0.7	0.4	99.6
40	0.425	557.1	555.7	1.4	0.9	98.7
60	0.250	526.3	525.9	0.4	0.3	98.4
100	0.150	519.6	512.6	7.0	4.4	94.0
200	0.075	530.6	491.3	39.3	24.7	69.4
PAN		601.4	492.0	109.4	68.7	0.0

% GRAVEL	0.0
% SAND	30.6
% SILT & CLAY	68.7

MH


Grain Size Distribution - B235, S-6
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

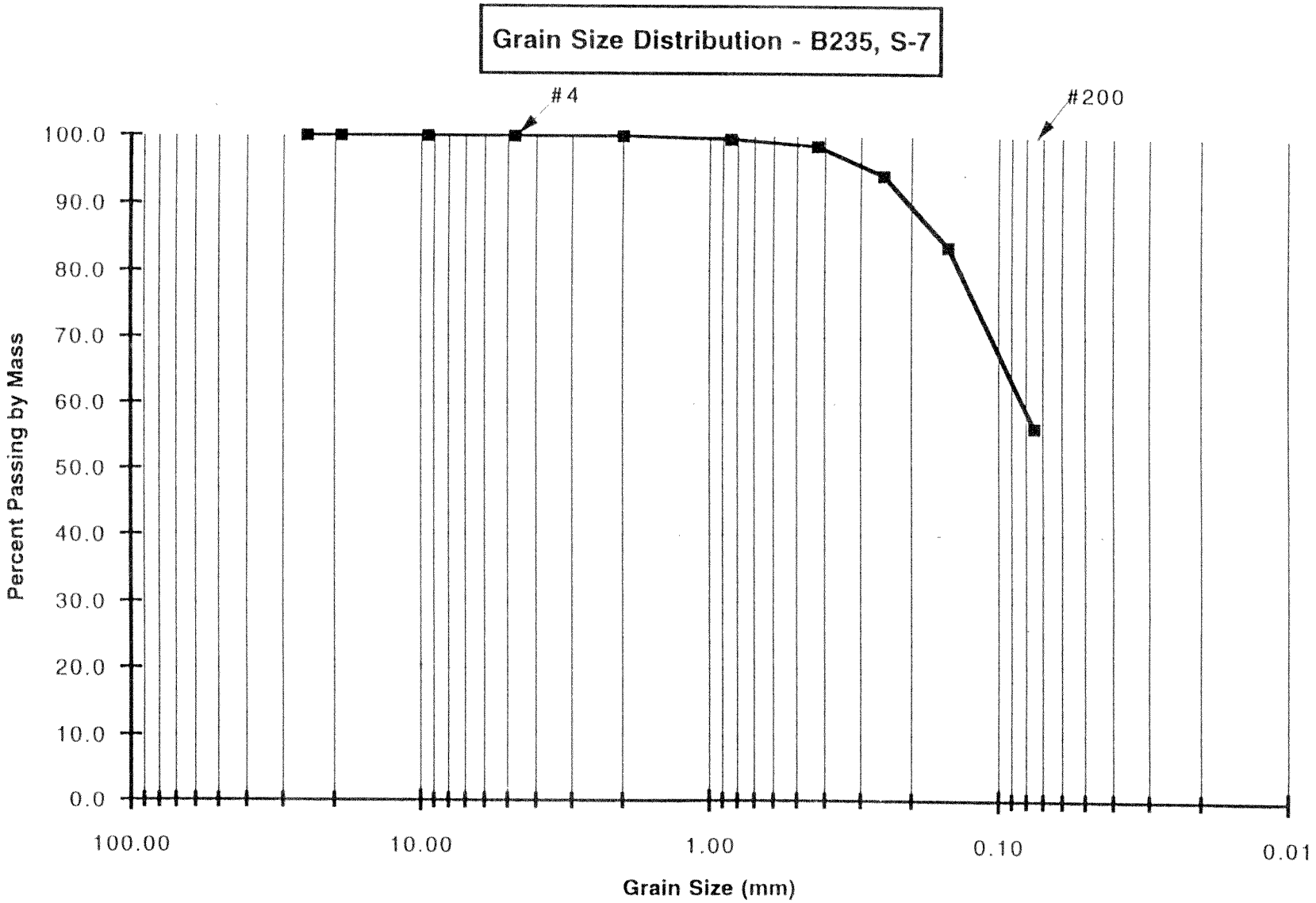
Mass Dish + Sample	309.0
Mass of Dish	162.9
Mass Sample	146.1

BORING: B235
SAMPLE: S-7
FIELD DESCRIPTION: Grey/Black Very Fine Silty Sand Trace Coal

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	812.7	812.7	0.0	0.0	100.0
3/4"	19.00	814.8	814.8	0.0	0.0	100.0
3/8"	9.5	845.1	845.1	0.0	0.0	100.0
4	4.750	816.4	816.4	0.0	0.0	100.0
10	2.000	711.9	711.9	0.0	0.0	100.0
20	0.850	629.8	629.1	0.7	0.5	99.5
40	0.425	557.1	555.7	1.4	1.0	98.6
60	0.250	532.3	525.9	6.4	4.4	94.2
100	0.150	528.0	512.6	15.4	10.5	83.6
200	0.075	531.1	491.3	39.8	27.2	56.4
PAN		571.0	492.0	79.0	54.1	0.0

% GRAVEL	0.0
% SAND	43.6
% SILT & CLAY	54.1

ML


Grain Size Distribution - B235, S-7
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

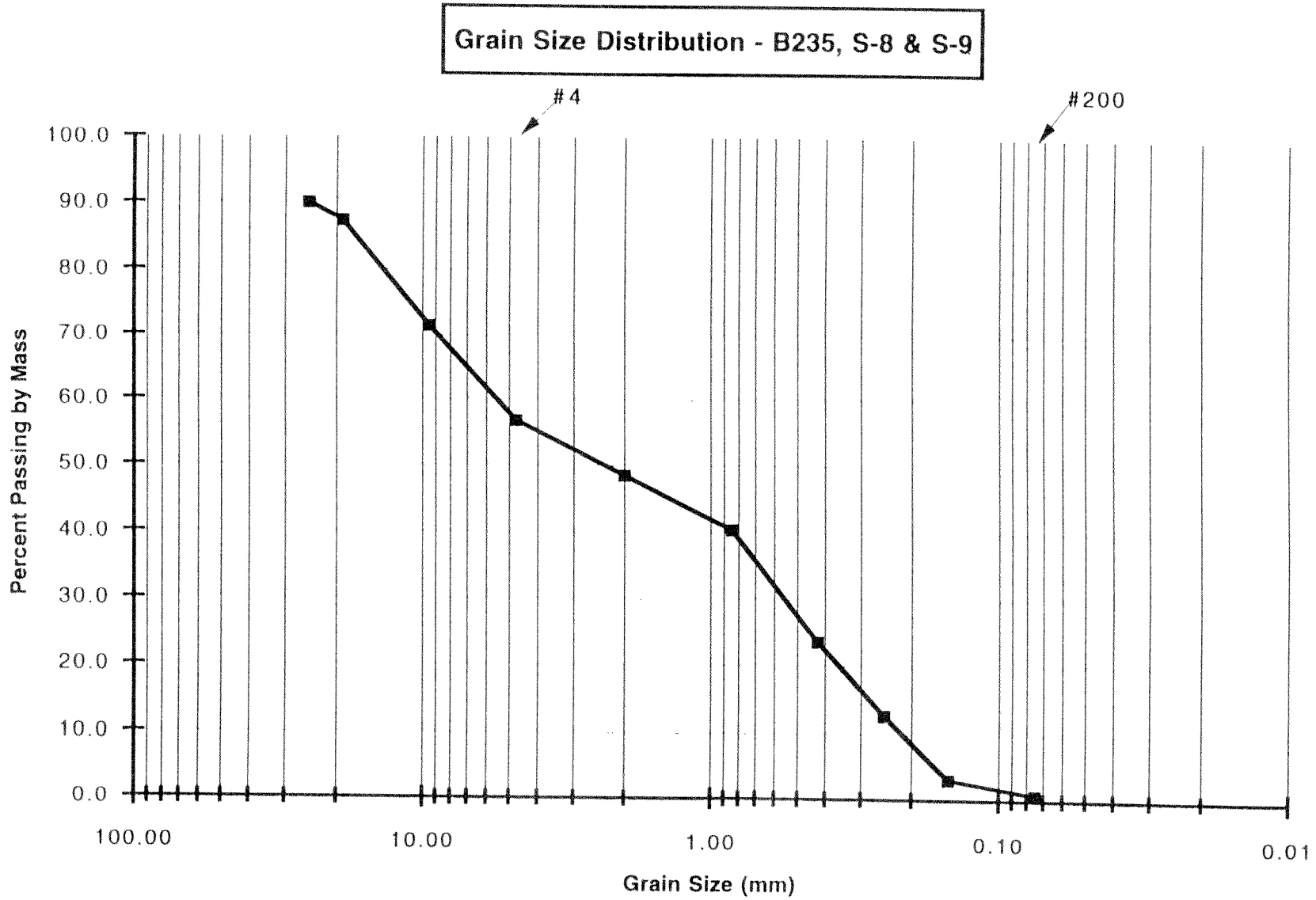
Mass Dish + Sample	787.8
Mass of Dish	162.9
Mass Sample	624.9

BORING: B235
SAMPLE: S-8, S-9
FIELD DESCRIPTION: Brown Sandy Gravel

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	875.6	812.7	62.9	10.1	89.9
3/4"	19.00	831.3	814.8	16.5	2.6	87.3
3/8"	9.5	945.1	845.1	100.0	16.0	71.3
4	4.750	907.4	816.4	91.0	14.6	56.7
10	2.000	763.4	711.9	51.5	8.2	48.5
20	0.850	680.1	629.1	51.0	8.2	40.3
40	0.425	660.6	555.7	104.9	16.8	23.5
60	0.250	594.1	525.9	68.2	10.9	12.6
100	0.150	571.7	512.6	59.1	9.5	3.2
200	0.075	506.1	491.3	14.8	2.4	0.8
PAN		494.7	492.0	2.7	0.4	0.0

% GRAVEL	33.2
% SAND	55.9
% SILT & CLAY	0.4

SP


Grain Size Distribution - B235, S-8 & S-9
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

Mass Dish + Sample	780.0
Mass of Dish	162.9
Mass Sample	617.1

BORING: B235
SAMPLE: S-10, S-11
FIELD DESCRIPTION: Med. Coarse Brn. Sand, Some Gravel

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	812.7	812.7	0.0	0.0	100.0
3/4"	19.00	864.3	814.8	49.5	8.0	92.0
3/8"	9.5	900.5	845.1	55.4	9.0	83.0
4	4.750	866.4	816.4	50.0	8.1	74.9
10	2.000	745.2	711.9	33.3	5.4	69.5
20	0.850	664.1	629.1	35.0	5.7	63.8
40	0.425	772.3	555.7	216.6	35.1	28.7
60	0.250	599.2	525.9	73.3	11.9	16.9
100	0.150	554.9	512.6	42.3	6.9	10.0
200	0.075	516.3	491.3	25.0	4.1	5.9
PAN		526.3	492.0	34.3	5.6	0.0

% GRAVEL	25.1
% SAND	69.0
% SILT & CLAY	5.6

SW-SM

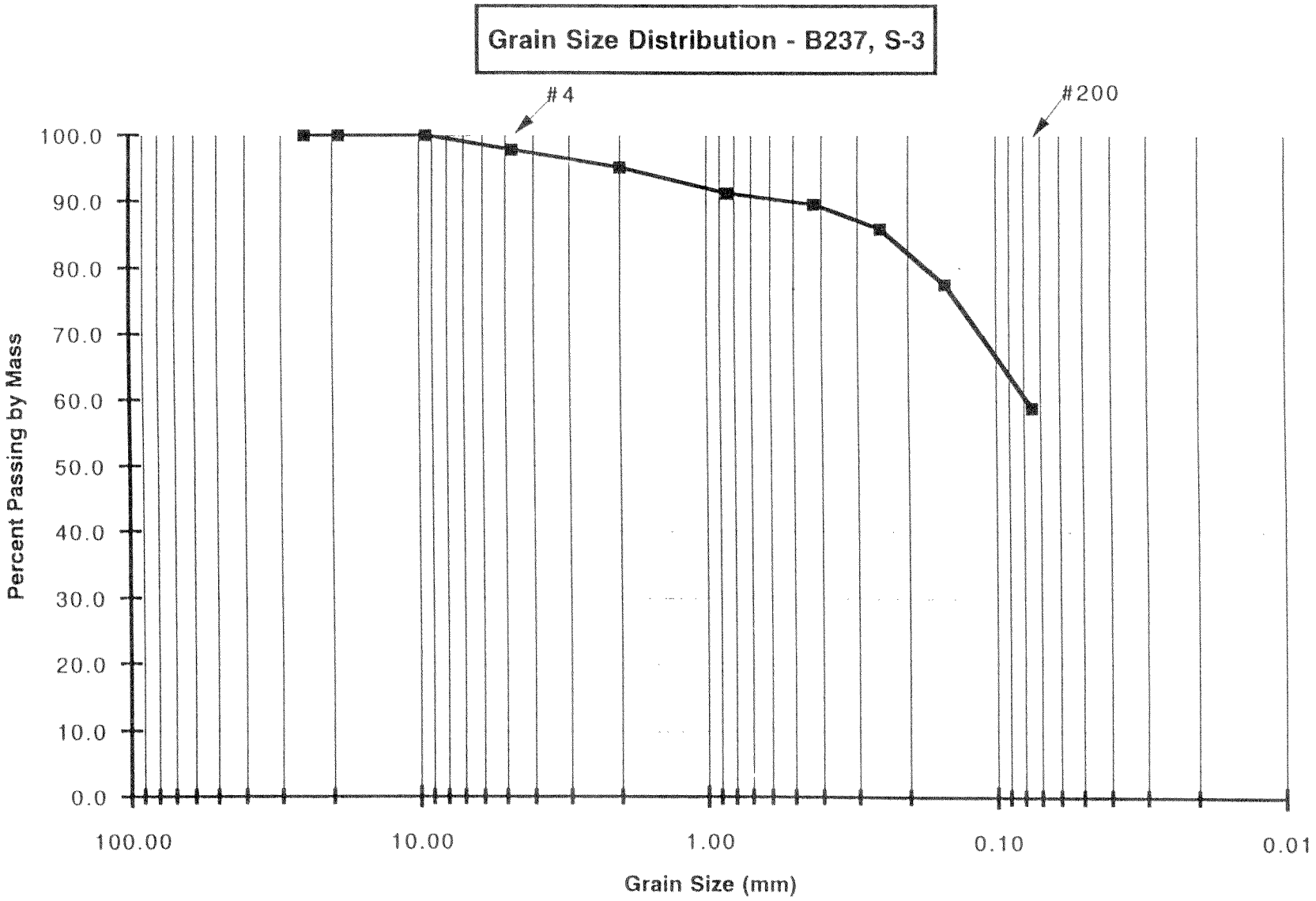
Mass Dish + Sample	386.4
Mass of Dish	162.9
Mass Sample	223.46

BORING: B237
SAMPLE: S-3
FIELD DESCRIPTION: Olive Silt w/ traces of Cinders & Bricks

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	812.7	812.7	0.0	0.0	100.0
3/4"	19.00	814.8	814.8	0.0	0.0	100.0
3/8"	9.5	845.1	845.1	0.0	0.0	100.0
4	4.750	821.2	816.4	4.8	2.1	97.9
10	2.000	717.9	711.9	6.0	2.7	95.2
20	0.850	637.8	629.1	8.7	3.9	91.3
40	0.425	559.5	555.7	3.8	1.7	89.6
60	0.250	534.1	525.9	8.2	3.7	85.9
100	0.150	531.0	512.6	18.4	8.2	77.7
200	0.075	533.4	491.3	42.1	18.8	58.8
PAN		618.6	492.0	126.6	56.7	0.0

% GRAVEL	2.1
% SAND	39.0
% SILT & CLAY	56.7

ML


Grain Size Distribution - B237, S-3
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

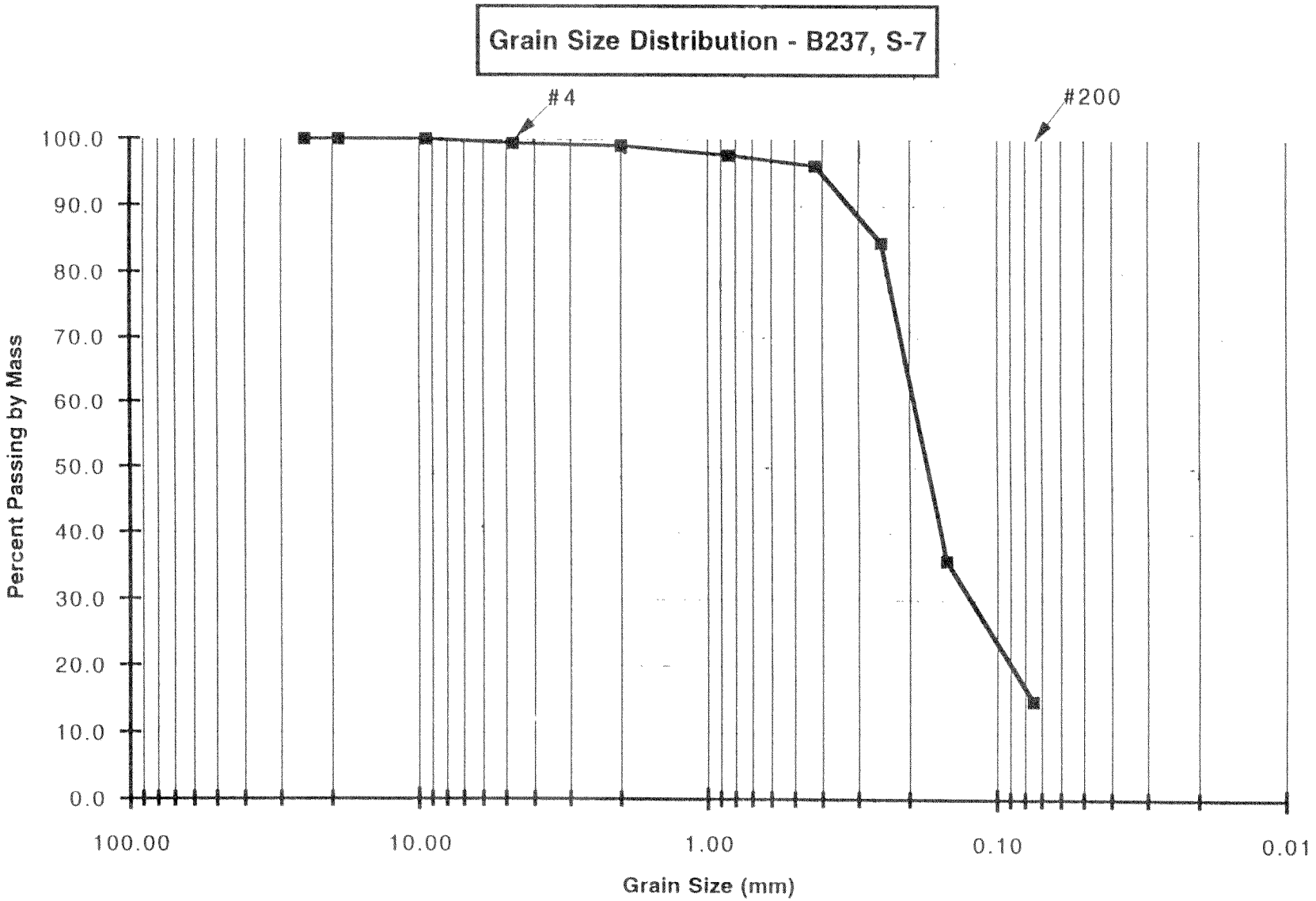
Mass Dish + Sample	472.2
Mass of Dish	162.9
Mass Sample	309.3

BORING: B237
SAMPLE: S-7
FIELD DESCRIPTION: Very Fine Grey Silty Sand Trace Coal & Slag

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	812.7	812.7	0.0	0.0	100.0
3/4"	19.00	814.8	814.8	0.0	0.0	100.0
3/8"	9.5	845.1	845.1	0.0	0.0	100.0
4	4.750	818.4	816.4	2.0	0.6	99.4
10	2.000	712.9	711.9	1.0	0.3	99.0
20	0.850	633.5	629.1	4.4	1.4	97.6
40	0.425	560.5	555.7	4.8	1.6	96.1
60	0.250	562.0	525.9	36.1	11.7	84.4
100	0.150	662.9	512.6	150.3	48.6	35.8
200	0.075	556.0	491.3	64.7	20.9	14.9
PAN		535.0	492.0	43.0	13.9	0.0

% GRAVEL	0.6
% SAND	84.5
% SILT & CLAY	13.9

SM


Grain Size Distribution - B237, S-7
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

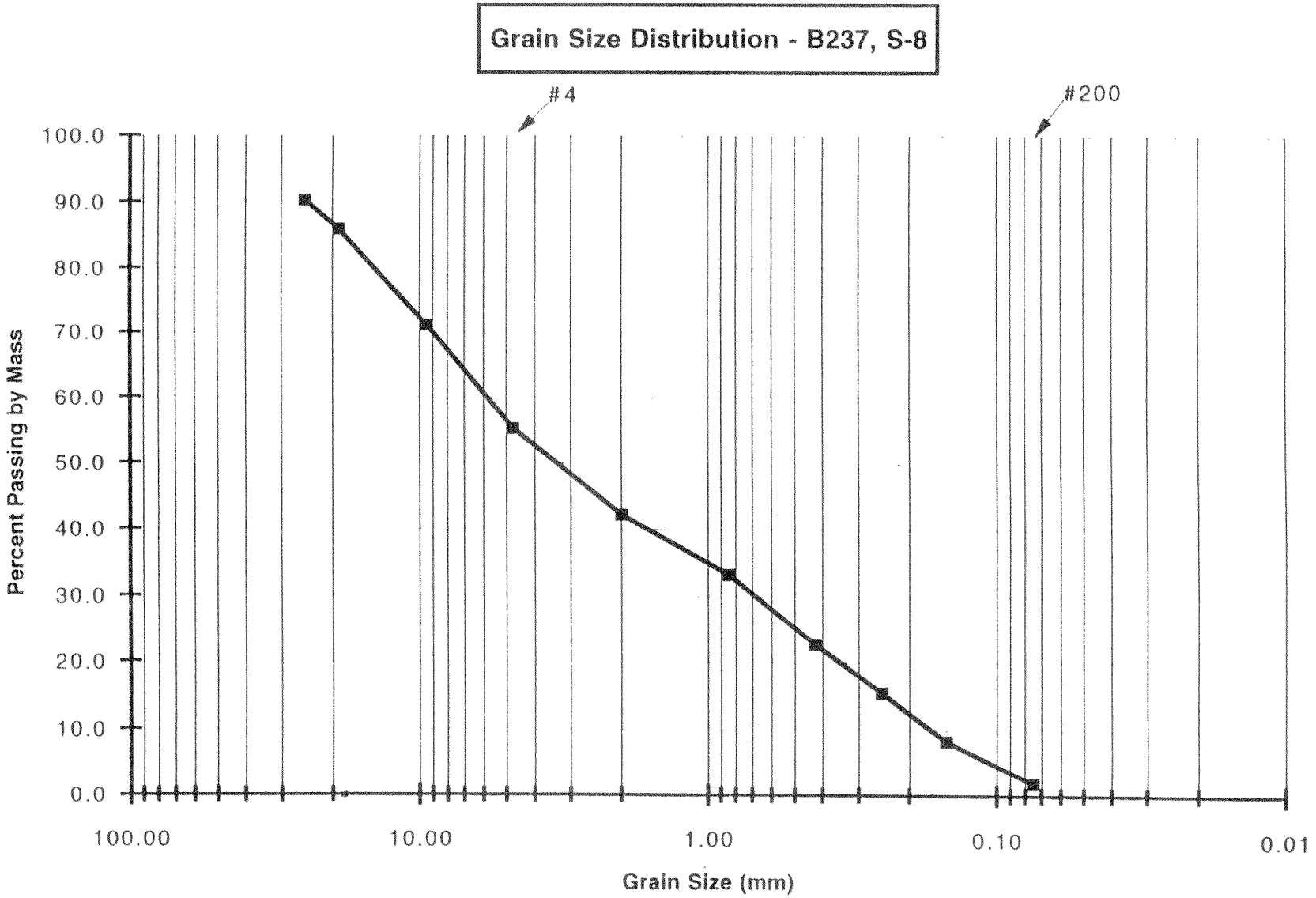
Mass Dish + Sample	503.7
Mass of Dish	162.9
Mass Sample	340.8

BORING: B237
SAMPLE: S-8
FIELD DESCRIPTION: Brown Gravel, Some Sand

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	846	812.7	33.3	9.8	90.2
3/4"	19.00	829.4	814.8	14.6	4.3	85.9
3/8"	9.5	895.7	845.1	50.6	14.8	71.1
4	4.750	870.3	816.4	53.9	15.8	55.3
10	2.000	756.7	711.9	44.8	13.1	42.1
20	0.850	659.5	629.1	30.4	8.9	33.2
40	0.425	591.8	555.7	36.1	10.6	22.6
60	0.250	550.6	525.9	24.7	7.2	15.4
100	0.150	536.9	512.6	24.3	7.1	8.2
200	0.075	512.8	491.3	21.5	6.3	1.9
PAN		496.3	492.0	4.3	1.3	0.0

% GRAVEL	34.9
% SAND	53.3
% SILT & CLAY	1.3

SP


Grain Size Distribution - B237, S-8
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

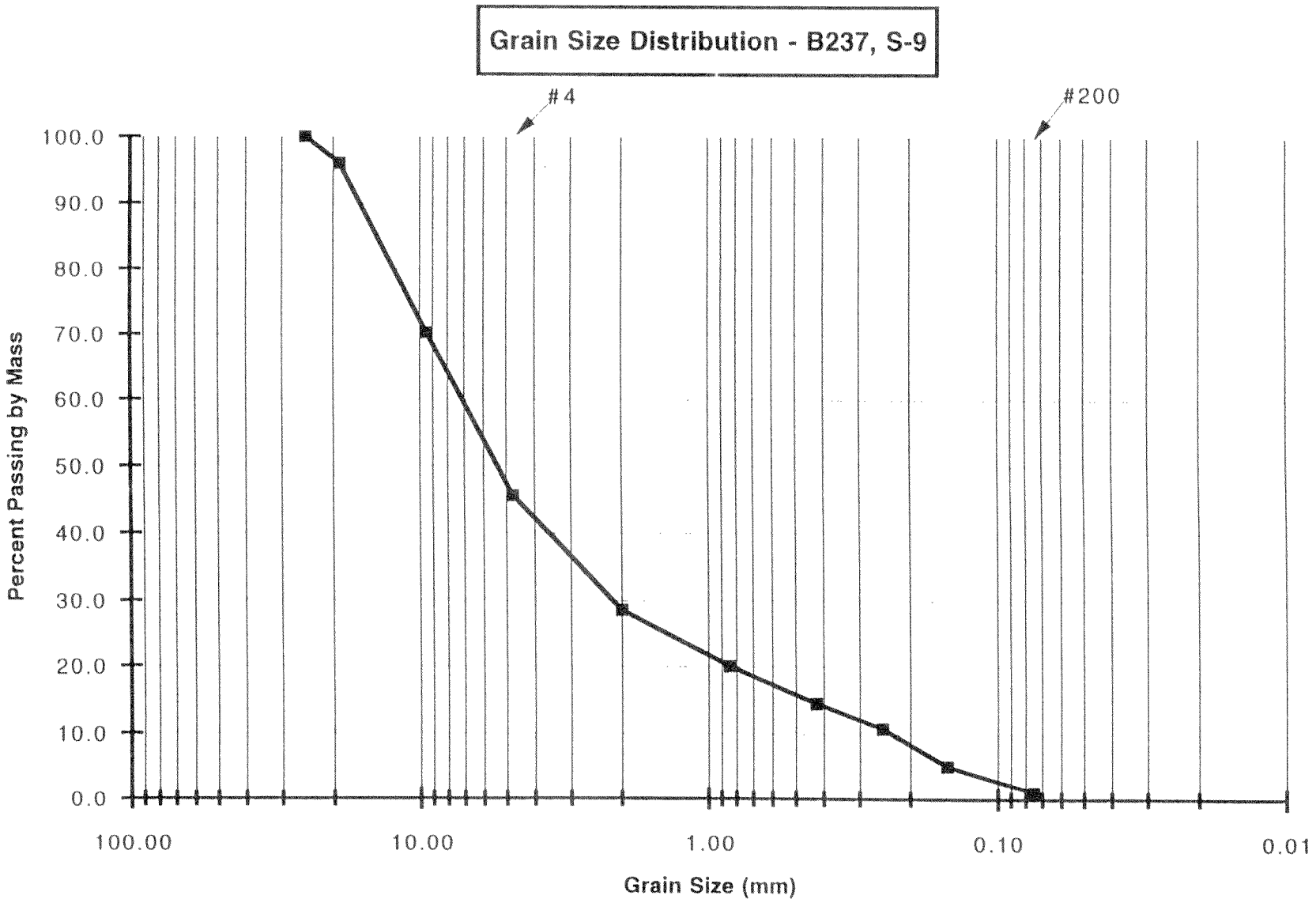
Mass Dish + Sample	536.9
Mass of Dish	162.9
Mass Sample	374

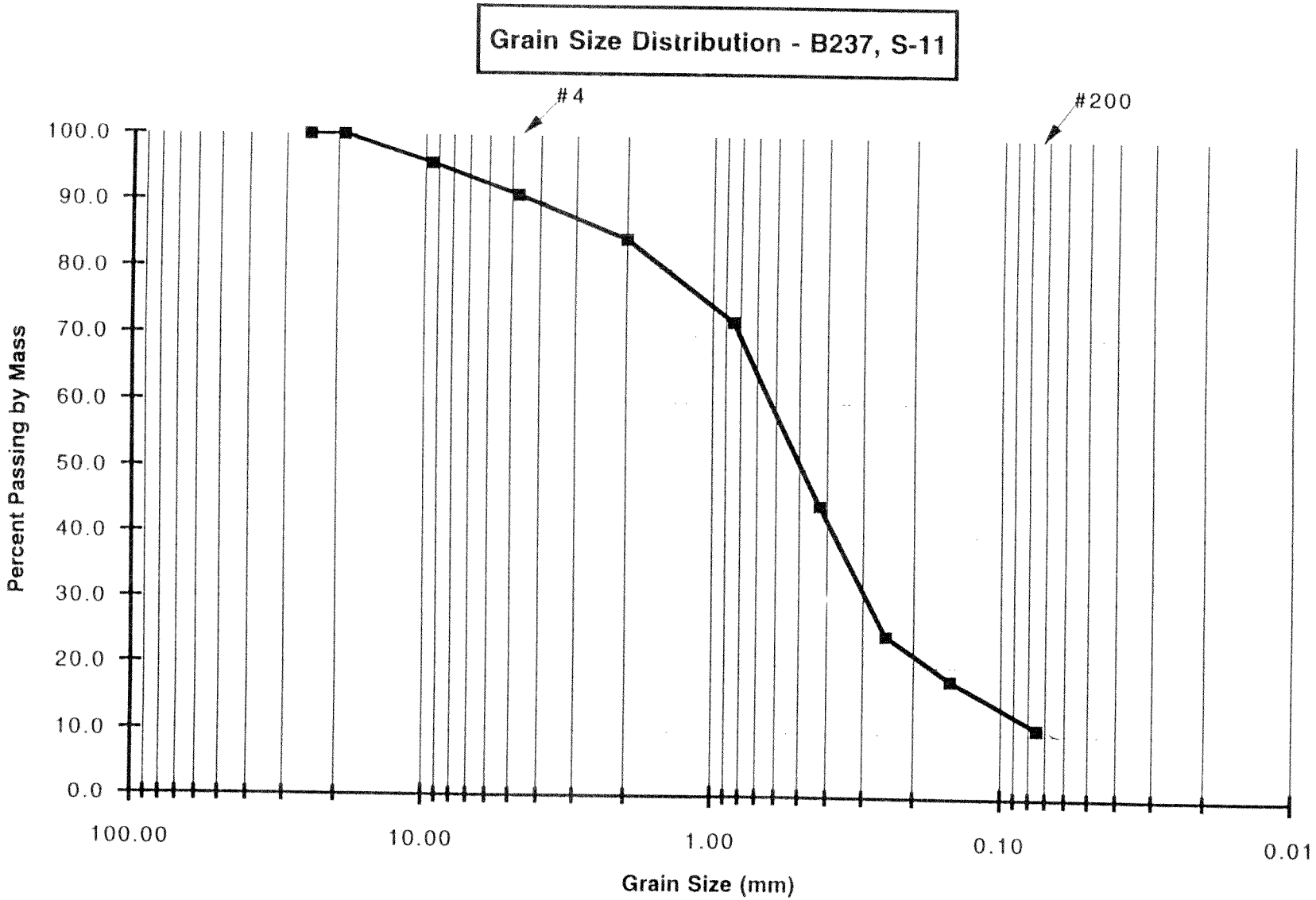
BORING: B237
SAMPLE: S-9
FIELD DESCRIPTION: Reddish Brown Gravel, Some Sand

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	812.7	812.7	0.0	0.0	100.0
3/4"	19.00	829.7	814.8	14.9	4.0	96.0
3/8"	9.5	941.7	845.1	96.6	25.8	70.2
4	4.750	908.4	816.4	92.0	24.6	45.6
10	2.000	775.7	711.9	63.8	17.1	28.5
20	0.850	660.9	629.1	31.8	8.5	20.0
40	0.425	576.6	555.7	20.9	5.6	14.4
60	0.250	539.6	525.9	13.7	3.7	10.8
100	0.150	533.7	512.6	21.1	5.6	5.1
200	0.075	506.4	491.3	15.1	4.0	1.1
PAN		493.9	492.0	1.9	0.5	0.0

% GRAVEL	54.4
% SAND	44.5
% SILT & CLAY	0.5

GW


Grain Size Distribution - B237, S-9
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)


Grain Size Distribution - B237, S-11
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

Mass Dish + Sample	484.6
Mass of Dish	162.9
Mass Sample	321.7

BORING: B237
SAMPLE: S-11
FIELD DESCRIPTION: Med. Coarse Brown Sand, Some Gravel

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	812.7	812.7	0.0	0.0	100.0
3/4"	19.00	814.8	814.8	0.0	0.0	100.0
3/8"	9.5	858.9	845.1	13.8	4.3	95.7
4	4.750	831.8	816.4	15.4	4.8	90.9
10	2.000	733.0	711.9	21.1	6.6	84.4
20	0.850	669.1	629.1	40.0	12.4	71.9
40	0.425	644.5	555.7	88.8	27.6	44.3
60	0.250	589.7	525.9	63.8	19.8	24.5
100	0.150	534.0	512.6	21.4	6.7	17.8
200	0.075	514.0	491.3	22.7	7.1	10.8
PAN		524.6	492.0	32.6	10.1	0.0

% GRAVEL	9.1
% SAND	80.1
% SILT & CLAY	10.1

SW - SM

Mass Dish + Sample	463.2
Mass of Dish	162.9
Mass Sample	300.3

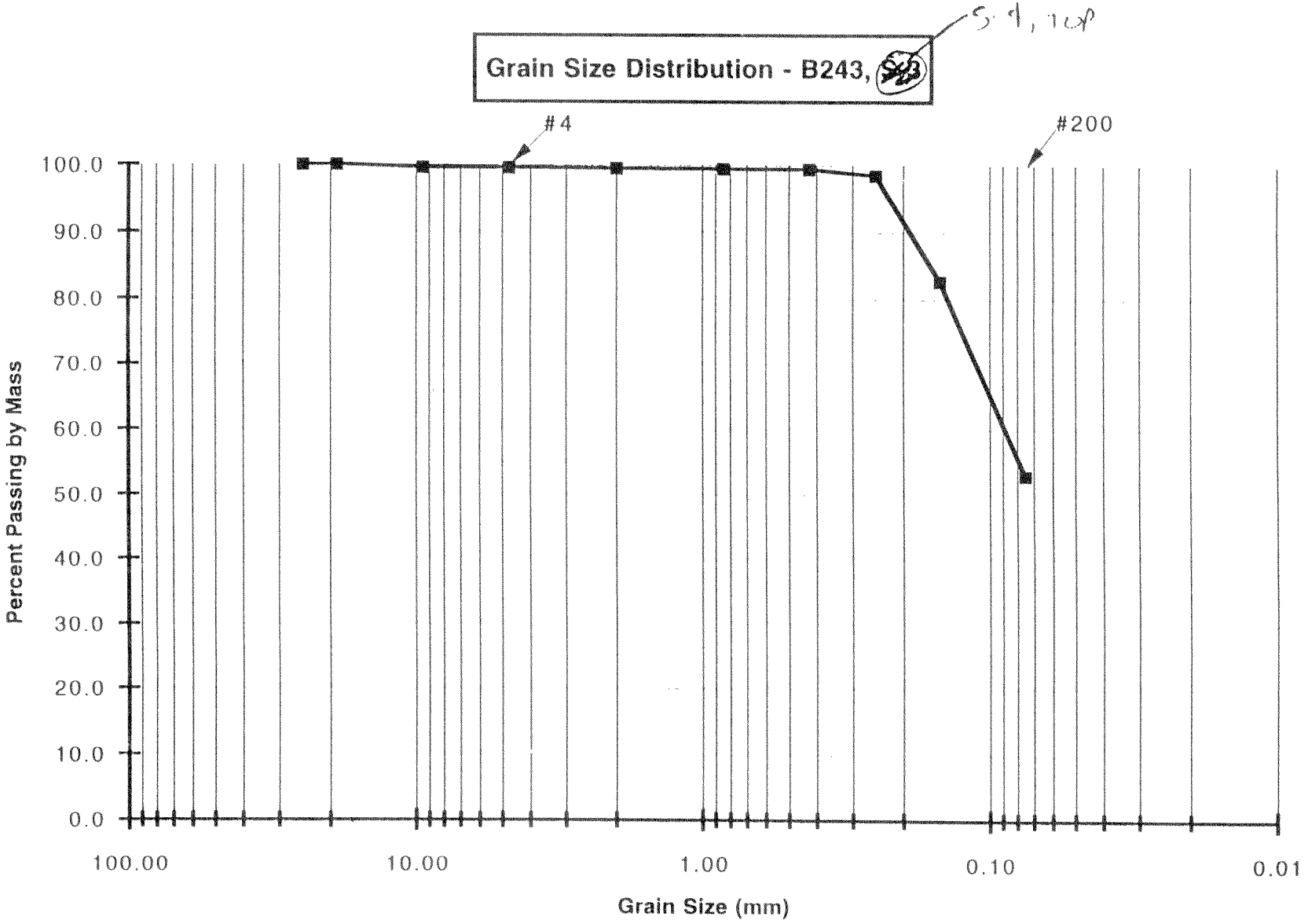
BORING: B243
SAMPLE: S-[illegible] 1, Top
FIELD DESCRIPTION: Grey/Brown Sandy Clay

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	812.7	812.7	0.0	0.0	100.0
3/4"	19.00	814.8	814.8	0.0	0.0	100.0
3/8"	9.5	846.6	845.1	1.5	0.5	99.5
4	4.750	816.4	816.4	0.0	0.0	99.5
10	2.000	712.0	711.9	0.1	0.0	99.5
20	0.850	629.3	629.1	0.2	0.1	99.4
40	0.425	555.7	555.7	0.0	0.0	99.4
60	0.250	528.8	525.9	2.9	1.0	98.4
100	0.150	560.1	512.6	47.5	15.8	82.6
200	0.075	580.4	491.3	89.1	29.7	52.9
PAN		646.6	492.0	154.6	51.5	0.0

% GRAVEL	0.5
% SAND	46.6
% SILT & CLAY	51.5

CL

S-1, Top


Grain Size Distribution - B243, S-3
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

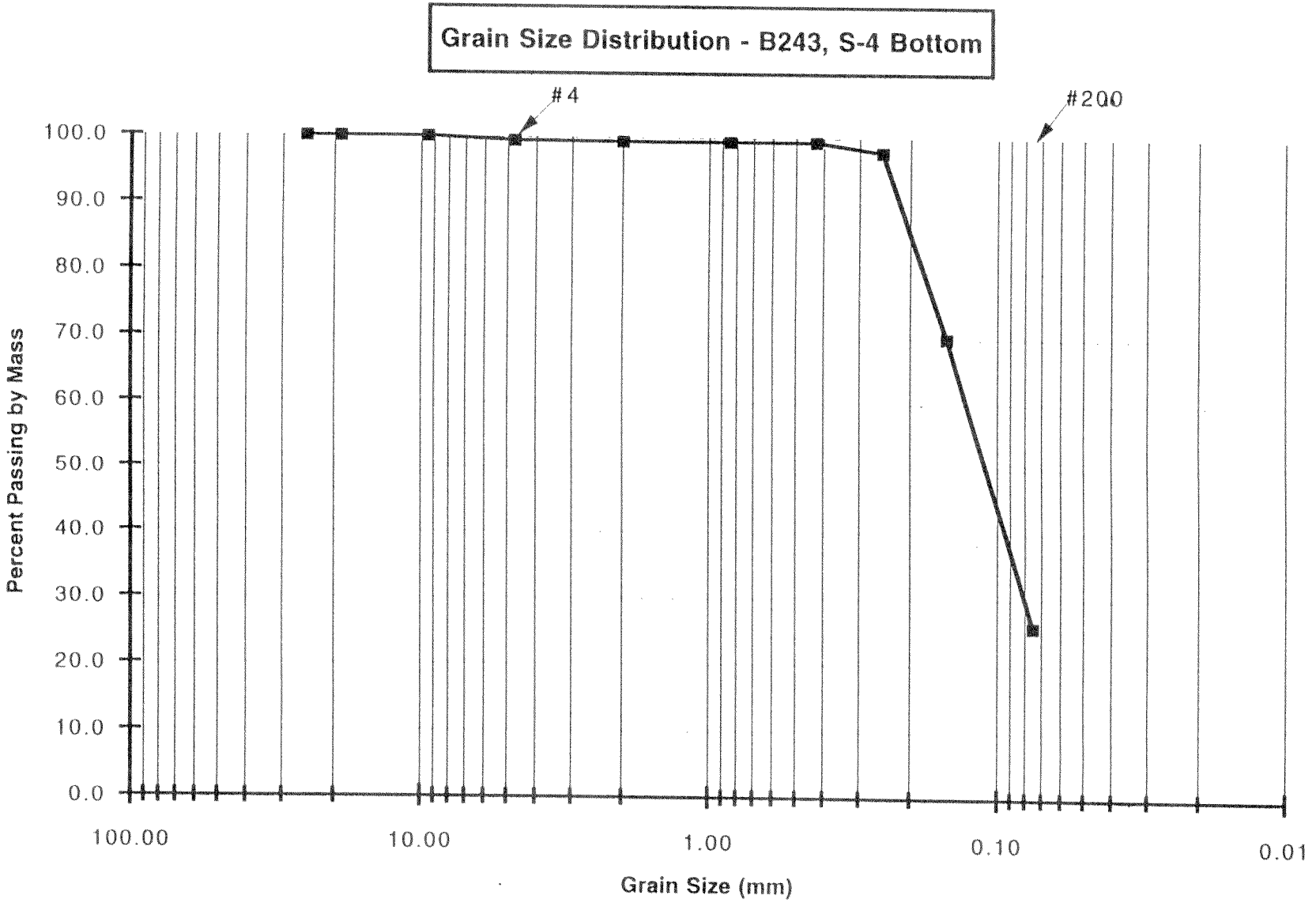
Mass Dish + Sample	378.0
Mass of Dish	162.9
Mass Sample	215.1

BORING: B243
SAMPLE: S-4 Bottom
FIELD DESCRIPTION: Brown Clayey Fine Sand

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	812.7	812.7	0.0	0.0	100.0
3/4"	19.00	814.8	814.8	0.0	0.0	100.0
3/8"	9.5	845.1	845.1	0.0	0.0	100.0
4	4.750	817.8	816.4	1.4	0.7	99.3
10	2.000	712.0	711.9	0.1	0.0	99.3
20	0.850	629.1	629.1	0.0	0.0	99.3
40	0.425	555.7	555.7	0.0	0.0	99.3
60	0.250	529.3	525.9	3.4	1.6	97.7
100	0.150	572.3	512.6	59.7	27.8	70.0
200	0.075	586.1	491.3	94.8	44.1	25.9
PAN		544.8	492.0	52.8	24.5	0.0

% GRAVEL	0.7
% SAND	73.5
% SILT & CLAY	24.5

SM


Grain Size Distribution - B243, S-4 Bottom
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

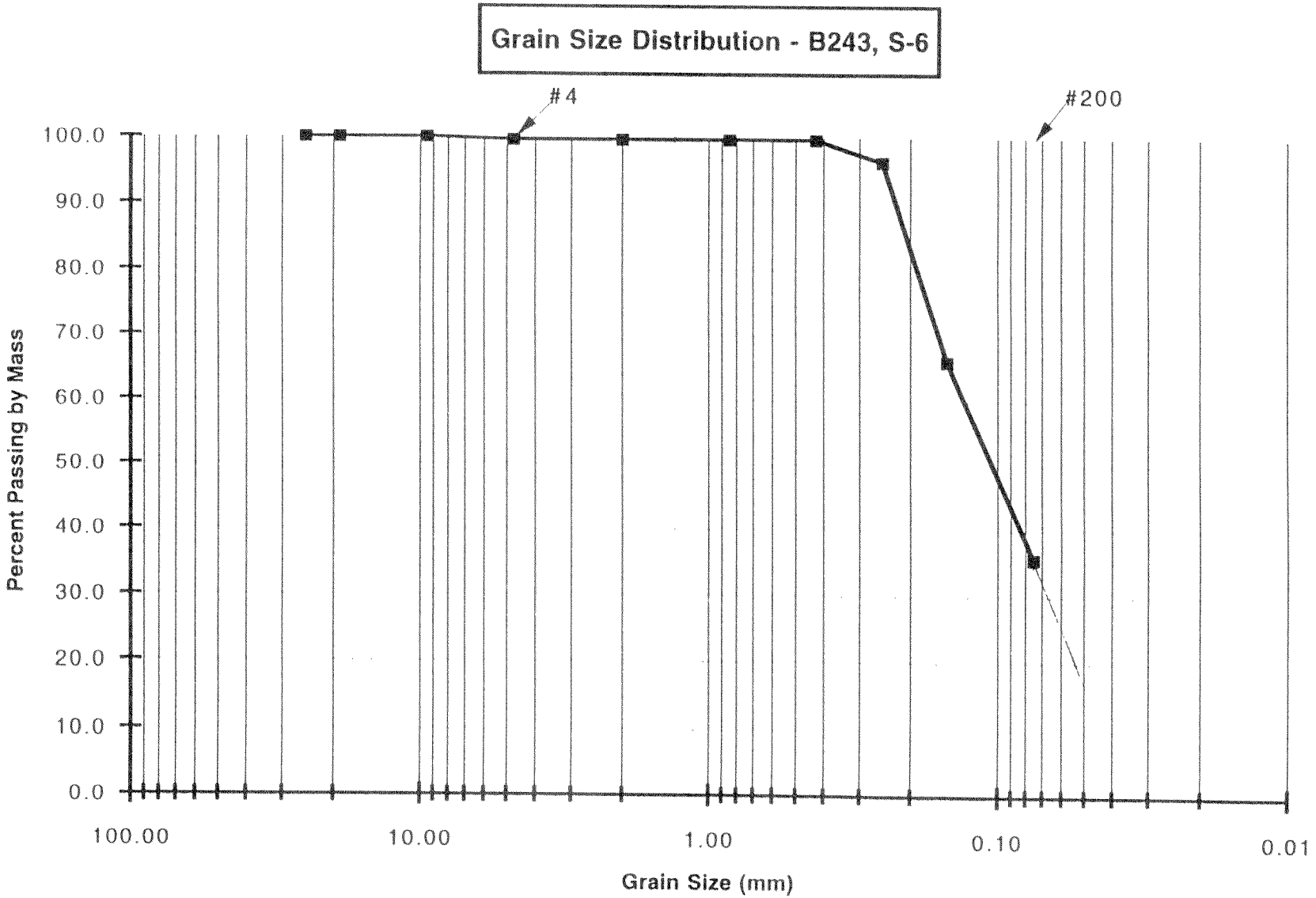
Mass Dish + Sample	481.5
Mass of Dish	162.9
Mass Sample	318.6

BORING: B243
SAMPLE: S-6
FIELD DESCRIPTION: Fine Grey Clayey Sand

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	812.7	812.7	0.0	0.0	100.0
3/4"	19.00	814.8	814.8	0.0	0.0	100.0
3/8"	9.5	845.1	845.1	0.0	0.0	100.0
4	4.750	817.7	816.4	1.3	0.4	99.6
10	2.000	711.9	711.9	0.0	0.0	99.6
20	0.850	629.1	629.1	0.0	0.0	99.6
40	0.425	555.7	555.7	0.0	0.0	99.6
60	0.250	536.4	525.9	10.5	3.3	96.3
100	0.150	608.9	512.6	96.3	30.2	66.1
200	0.075	588.4	491.3	97.1	30.5	35.6
PAN		601.8	492.0	109.8	34.5	0.0

% GRAVEL	0.4
% SAND	64.0
% SILT & CLAY	34.5

SP-SC


Grain Size Distribution - B243, S-6
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

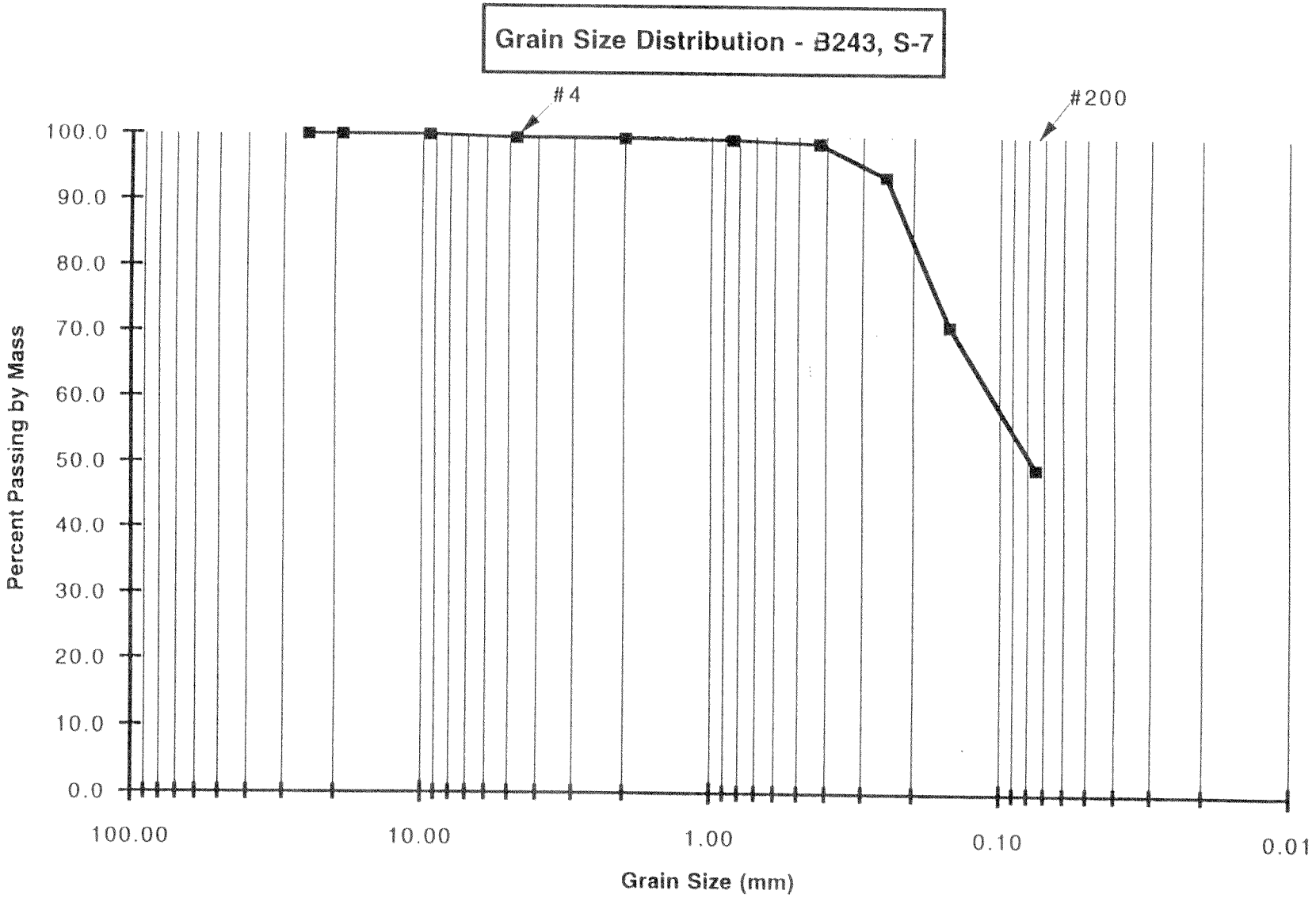
Mass Dish + Sample	504.5
Mass of Dish	162.9
Mass Sample	341.6

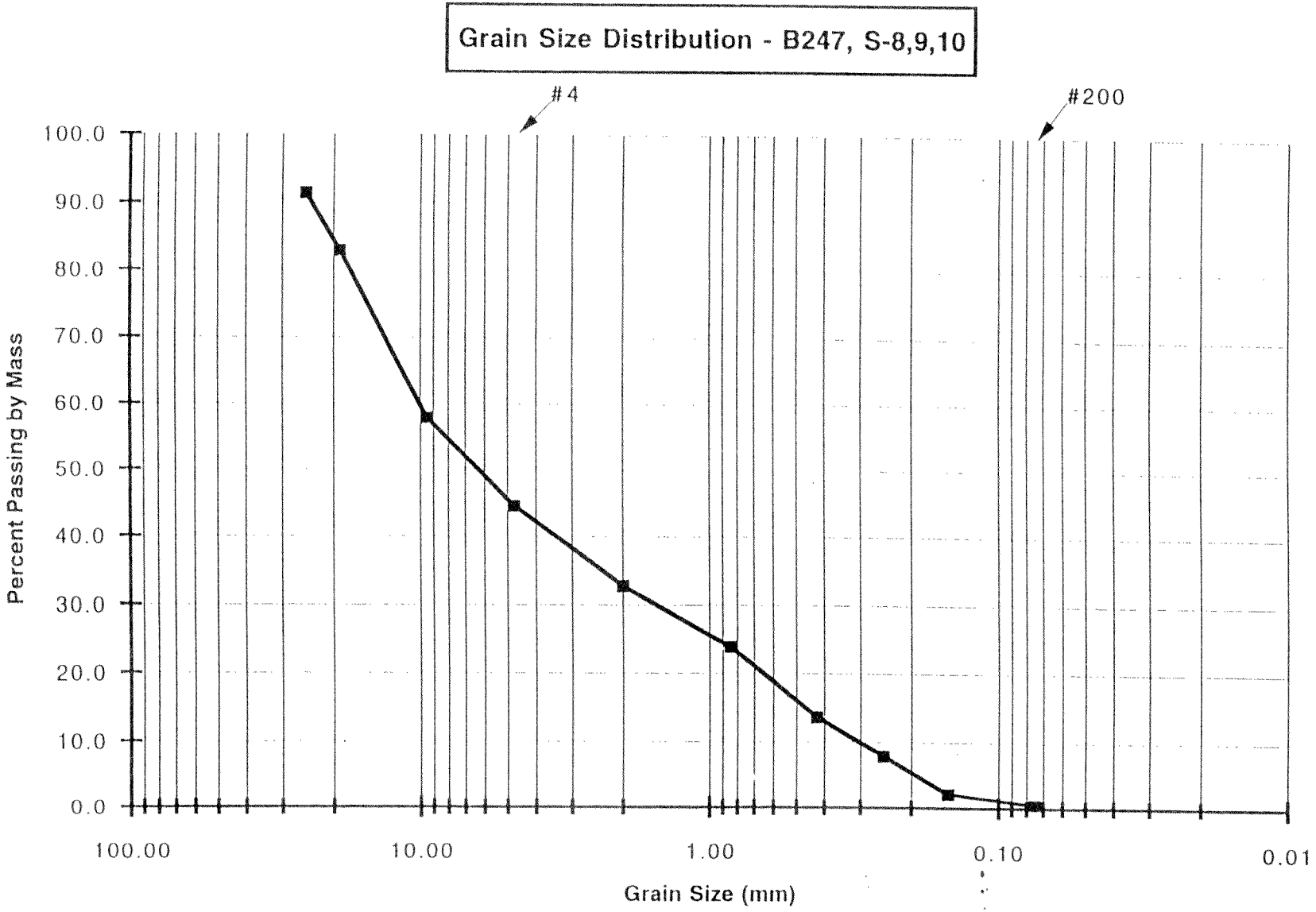
BORING: B243
SAMPLE: S-7
FIELD DESCRIPTION: Very Fine Grey Silty Sand

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	812.7	812.7	0.0	0.0	100.0
3/4"	19.00	814.8	814.8	0.0	0.0	100.0
3/8"	9.5	845.1	845.1	0.0	0.0	100.0
4	4.750	817.6	816.4	1.2	0.4	99.6
10	2.000	712.2	711.9	0.3	0.1	99.6
20	0.850	629.8	629.1	0.7	0.2	99.4
40	0.425	557.6	555.7	1.9	0.6	98.8
60	0.250	542.8	525.9	16.9	4.9	93.9
100	0.150	590.3	512.6	77.7	22.7	71.1
200	0.075	565.3	491.3	74.0	21.7	49.4
PAN		656.9	492.0	164.9	48.3	0.0

% GRAVEL	0.4
% SAND	50.2
% SILT & CLAY	48.3

SM


Grain Size Distribution - B243, S-7
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

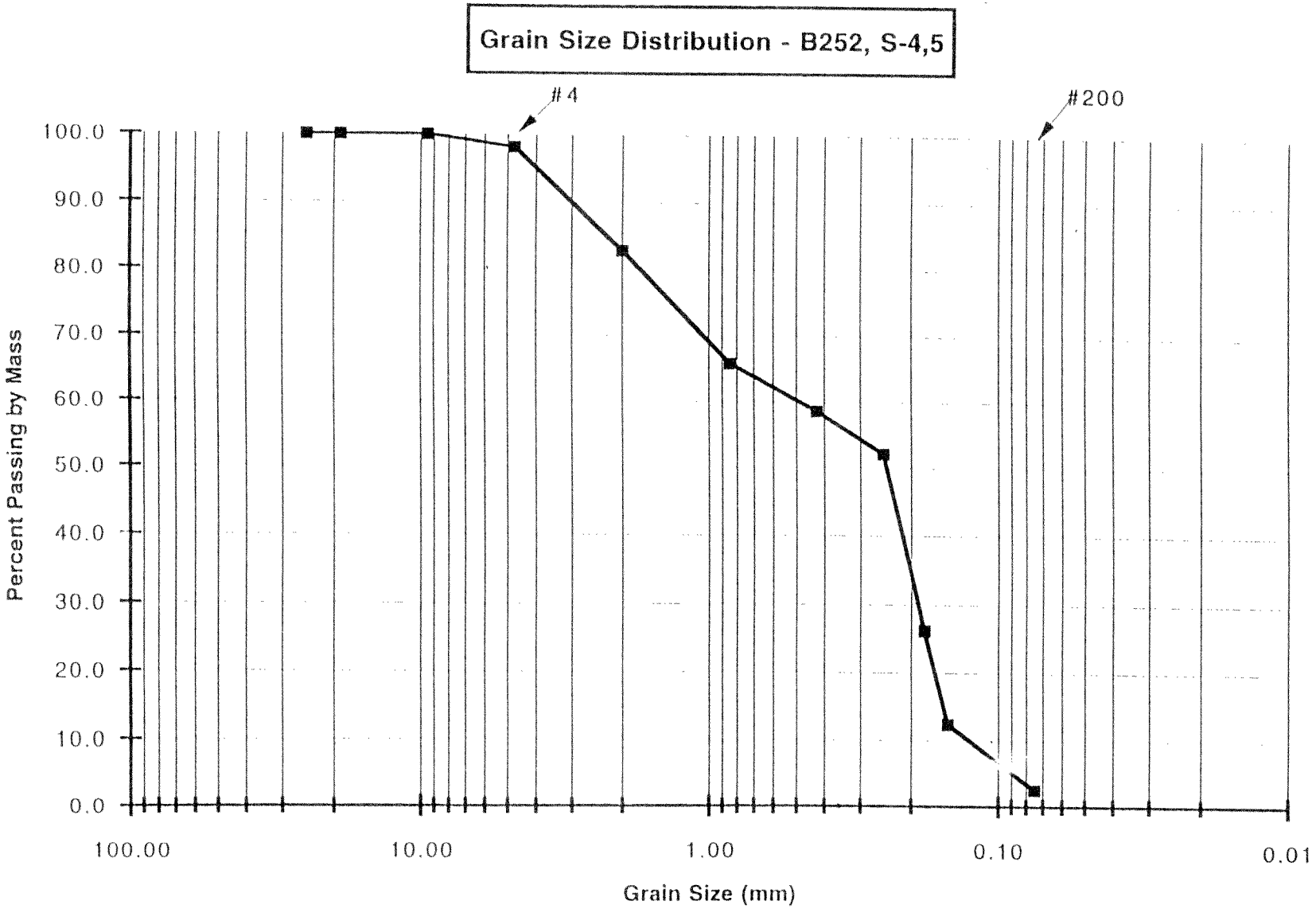

Grain Size Distribution - B247, S-8,9,10
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

Mass Dish + Sample	1083.6
Mass of Dish	162.9
Mass Sample	920.7

BORING: B247
SAMPLE: S-8,9,10
FIELD DESCRIPTION: Grey/Brown Sand and Gravel

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	892	812.7	79.3	8.6	91.4
3/4"	19.00	893.4	814.8	78.6	8.5	82.9
3/8"	9.5	1074.9	845.1	229.8	25.0	57.9
4	4.750	939.4	816.4	123.0	13.4	44.5
10	2.000	820.6	711.9	108.7	11.8	32.7
20	0.850	710.3	629.1	81.2	8.8	23.9
40	0.425	651.1	555.7	95.4	10.4	13.5
60	0.250	578.3	525.9	52.4	5.7	7.9
100	0.150	565.3	512.6	52.7	5.7	2.1
200	0.075	505.9	491.3	14.6	1.6	0.5
PAN		494.8	492.0	2.8	0.3	

% GRAVEL	46.9
% SAND	44.0
% SILT & CLAY	0.3

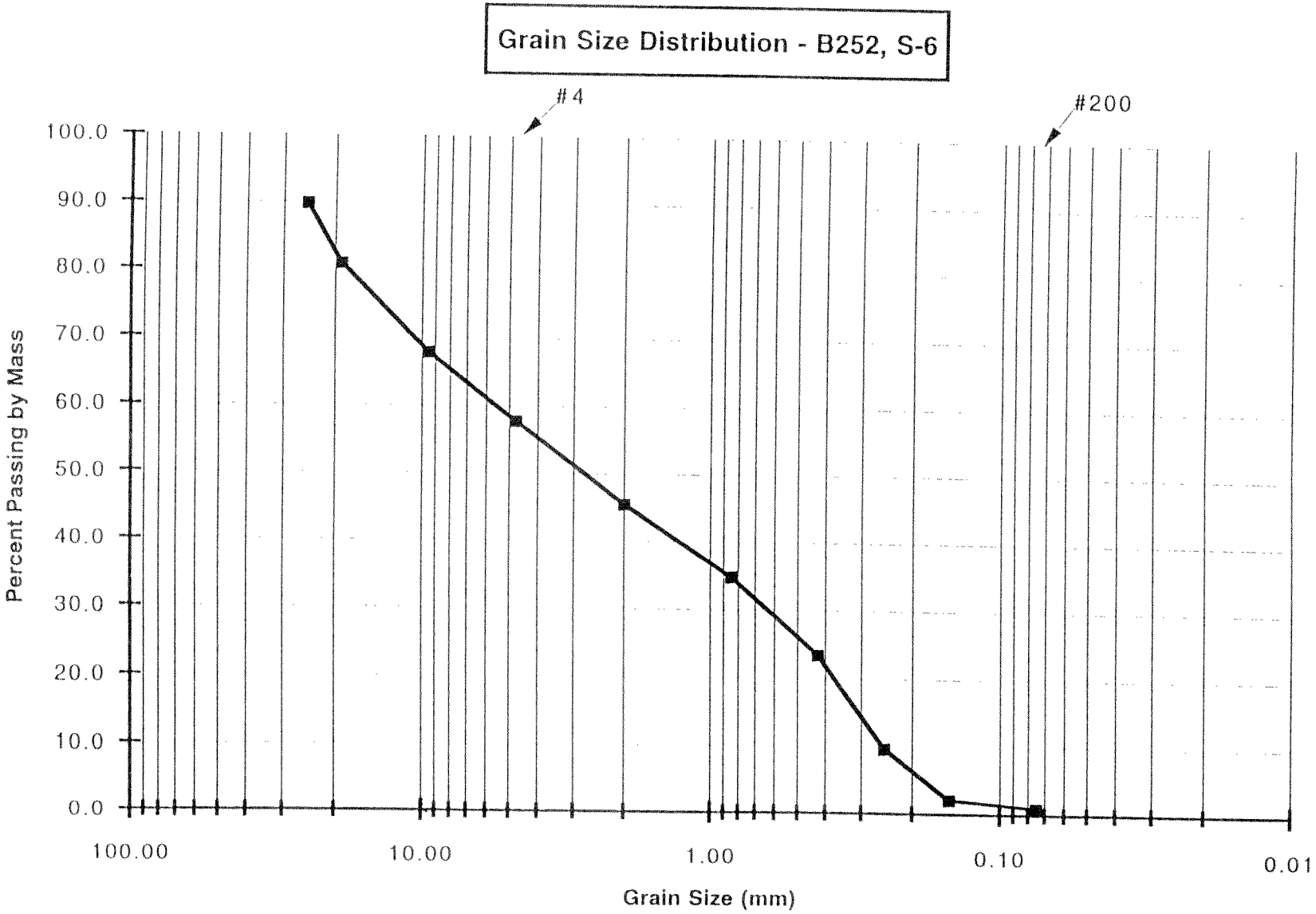

Grain Size Distribution - B252, S-4,5
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

Mass Dish + Sample	502.9
Mass of Dish	162.9
Mass Sample	340

BORING: B252
SAMPLE: S-4,5
FIELD DESCRIPTION: Damp Brown Silty Clay

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	812.7	812.7	0.0	0.0	100.0
3/4"	19.00	814.8	814.8	0.0	0.0	100.0
3/8"	9.5	845.1	845.1	0.0	0.0	100.0
4	4.750	822.7	816.4	6.3	1.9	98.1
10	2.000	764.2	711.9	52.3	15.4	82.8
20	0.850	686.7	629.1	57.6	16.9	65.8
40	0.425	580.4	555.7	24.7	7.3	58.6
60	0.250	548.0	525.9	22.1	6.5	52.1
80	0.180	601.3	513.5	87.8	25.8	26.2
100	0.150	559.8	512.6	47.2	13.9	12.4
200	0.075	524.4	491.3	33.1	9.7	2.6
PAN		498.6	492.0	6.6	1.9	

% GRAVEL	1.9
% SAND	95.5
% SILT & CLAY	1.9


Grain Size Distribution - B252, S-6
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

Mass Dish + Sample	397.4
Mass of Dish	162.9
Mass Sample	234.5

BORING: B252
SAMPLE: S-6
FIELD DESCRIPTION: Grey Gravel w/ Clay

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	836.6	812.7	23.9	10.2	89.8
3/4"	19.00	835.9	814.8	21.1	9.0	80.8
3/8"	9.5	875.7	845.1	30.6	13.0	67.8
4	4.750	840.0	816.4	23.6	10.1	57.7
10	2.000	740.5	711.9	28.6	12.2	45.5
20	0.850	654.2	629.1	25.1	10.7	34.8
40	0.425	582.6	555.7	26.9	11.5	23.3
60	0.250	557.9	525.9	32.0	13.6	9.7
100	0.150	530.3	512.6	17.7	7.5	2.1
200	0.075	493.9	491.3	2.6	1.1	1.0
PAN		492.2	492.0	0.2	0.1	

% GRAVEL	32.1
% SAND	56.7
% SILT & CLAY	0.1

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Mass Dish + Sample	390.3
Mass of Dish	162.9
Mass Sample	227.4

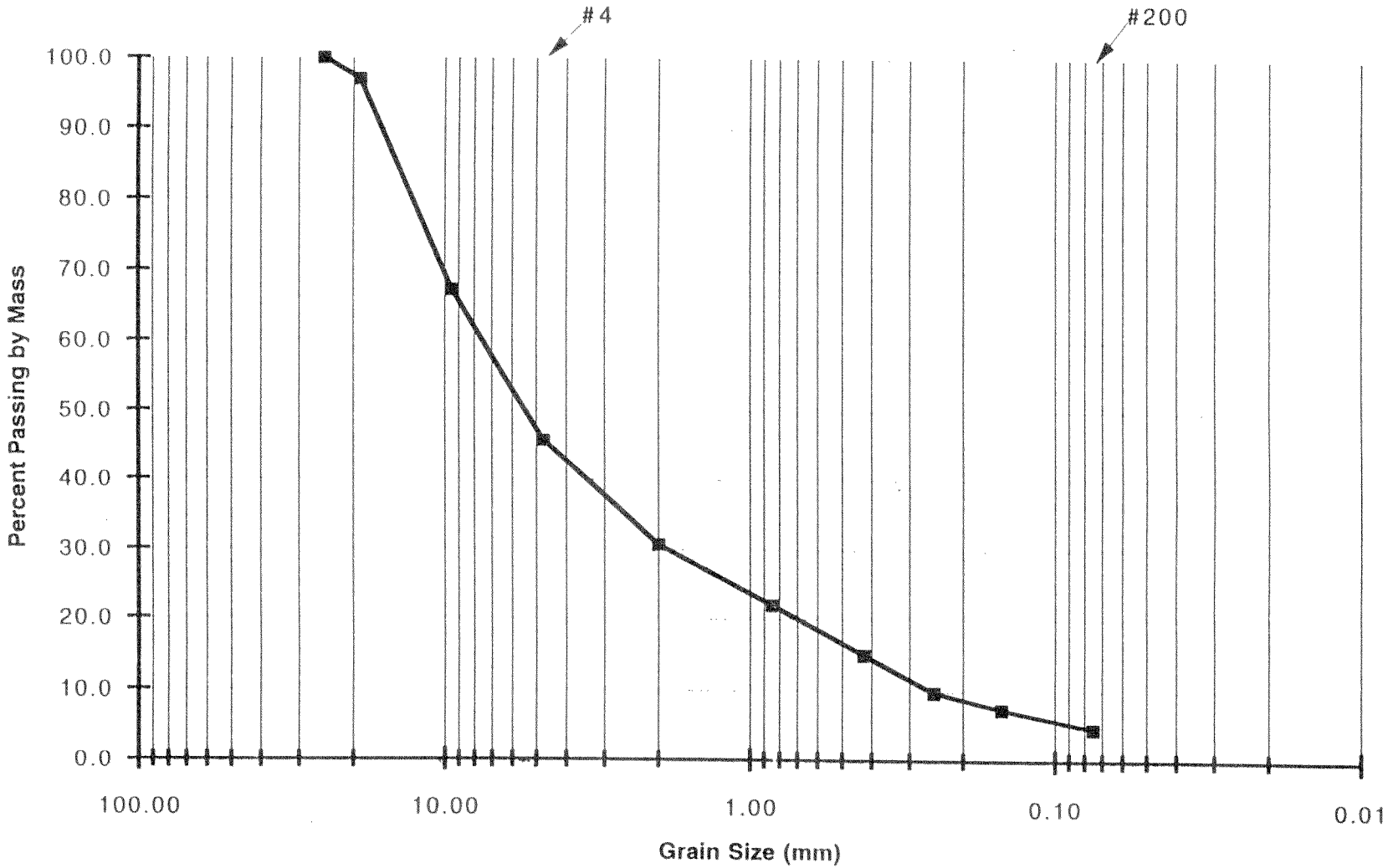
BORING: B262-A
SAMPLE: S-4
FIELD DESCRIPTION: Dk. Brown Sandy Gravel, Trace Clay

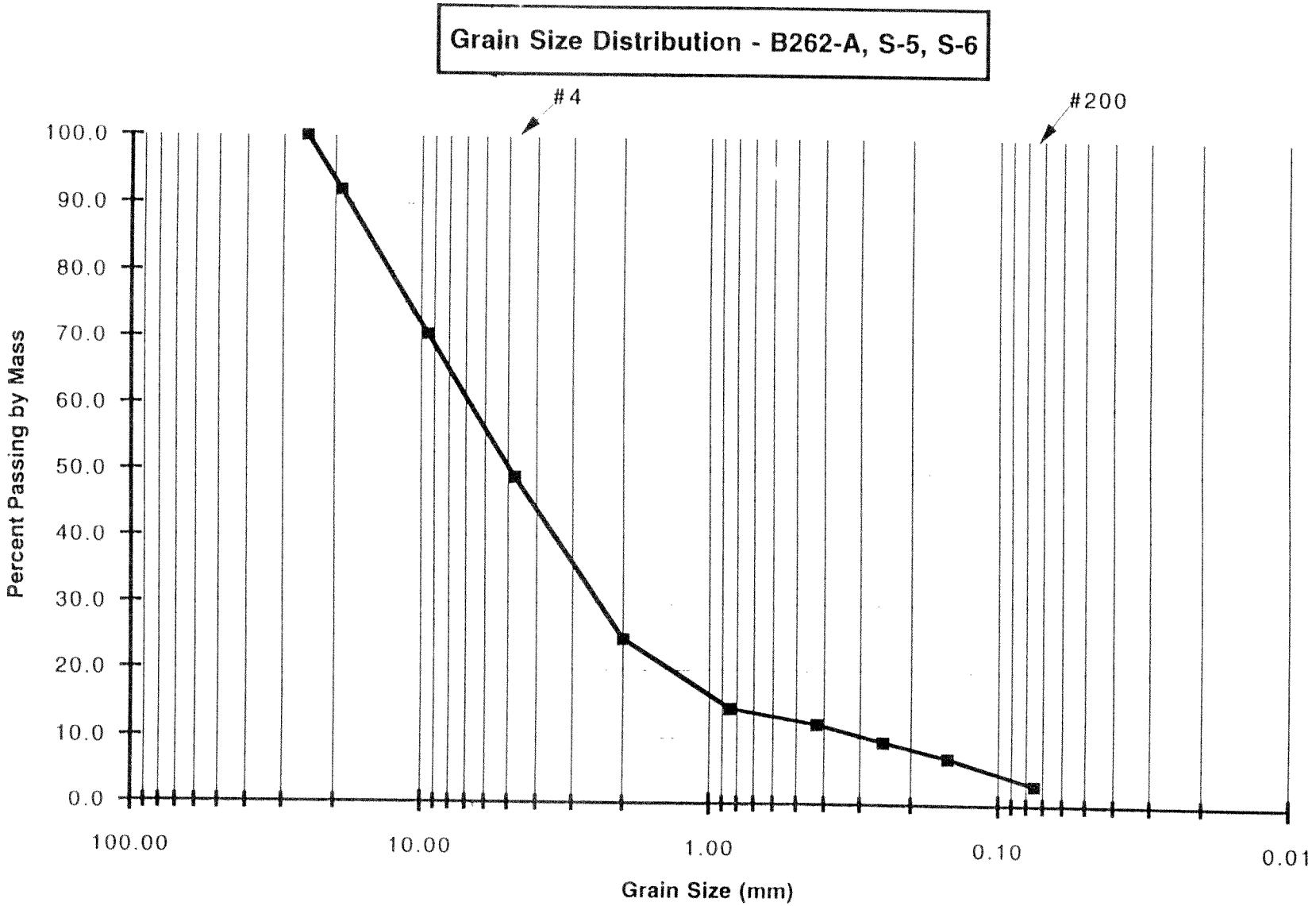
Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	812.7	812.7	0.0	0.0	100.0
3/4"	19.00	821.8	814.8	7.0	3.1	96.9
3/8"	9.5	912.6	845.1	67.5	29.7	67.2
4	4.750	865.5	816.4	49.1	21.6	45.6
10	2.000	746.1	711.9	34.2	15.0	30.6
20	0.850	649.0	629.1	19.9	8.8	21.9
40	0.425	571.4	555.7	15.7	6.9	15.0
60	0.250	537.7	525.9	11.8	5.2	9.8
100	0.150	518.0	512.6	5.4	2.4	7.4
200	0.075	497.4	491.3	6.1	2.7	4.7
PAN		500.0	492.0	8.0	3.5	0.0

% GRAVEL	54.4
% SAND	40.9
% SILT & CLAY	3.5

GW

Grain Size Distribution - B262-A, S-4




Grain Size Distribution - B262-A, S-5, S-6
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

Mass Dish + Sample	463.7
Mass of Dish	162.9
Mass Sample	300.8

BORING: B262-A
SAMPLE: S-5,S-6
FIELD DESCRIPTION: Brown Clayey Gravel

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	812.7	812.7	0.0	0.0	100.0
3/4"	19.00	839.1	814.8	24.3	8.1	91.9
3/8"	9.5	909.6	845.1	64.5	21.4	70.5
4	4.750	881.2	816.4	64.8	21.5	48.9
10	2.000	785.0	711.9	73.1	24.3	24.6
20	0.850	660.3	629.1	31.2	10.4	14.3
40	0.425	562.4	555.7	6.7	2.2	12.0
60	0.250	533.6	525.9	7.7	2.6	9.5
100	0.150	519.7	512.6	7.1	2.4	7.1
200	0.075	503.3	491.3	12.0	4.0	3.1
PAN		498.9	492.0	6.9	2.3	0.0

% GRAVEL	51.1
% SAND	45.8
% SILT & CLAY	2.3

GW

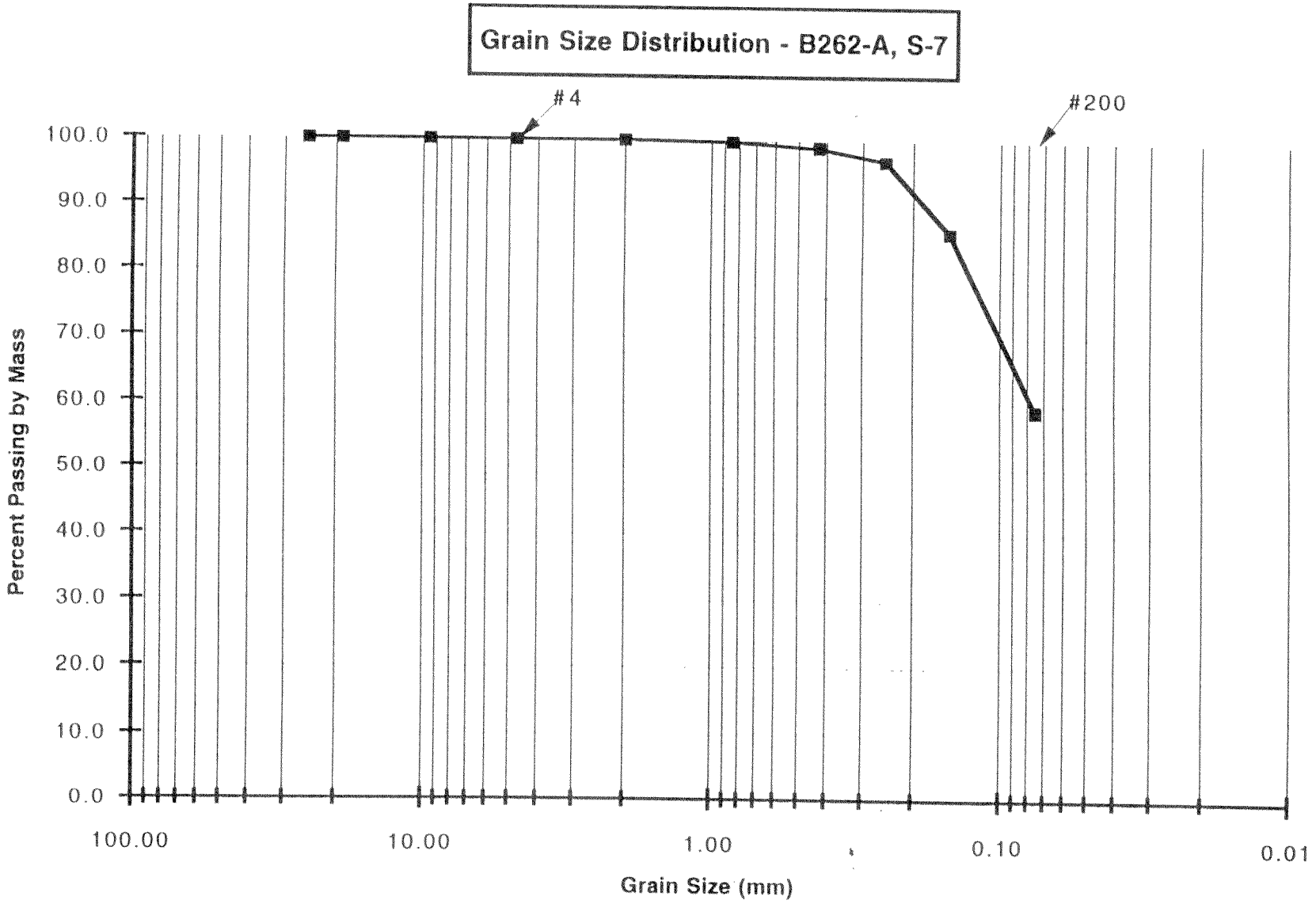
Mass Dish + Sample	339.6
Mass of Dish	162.9
Mass Sample	176.65

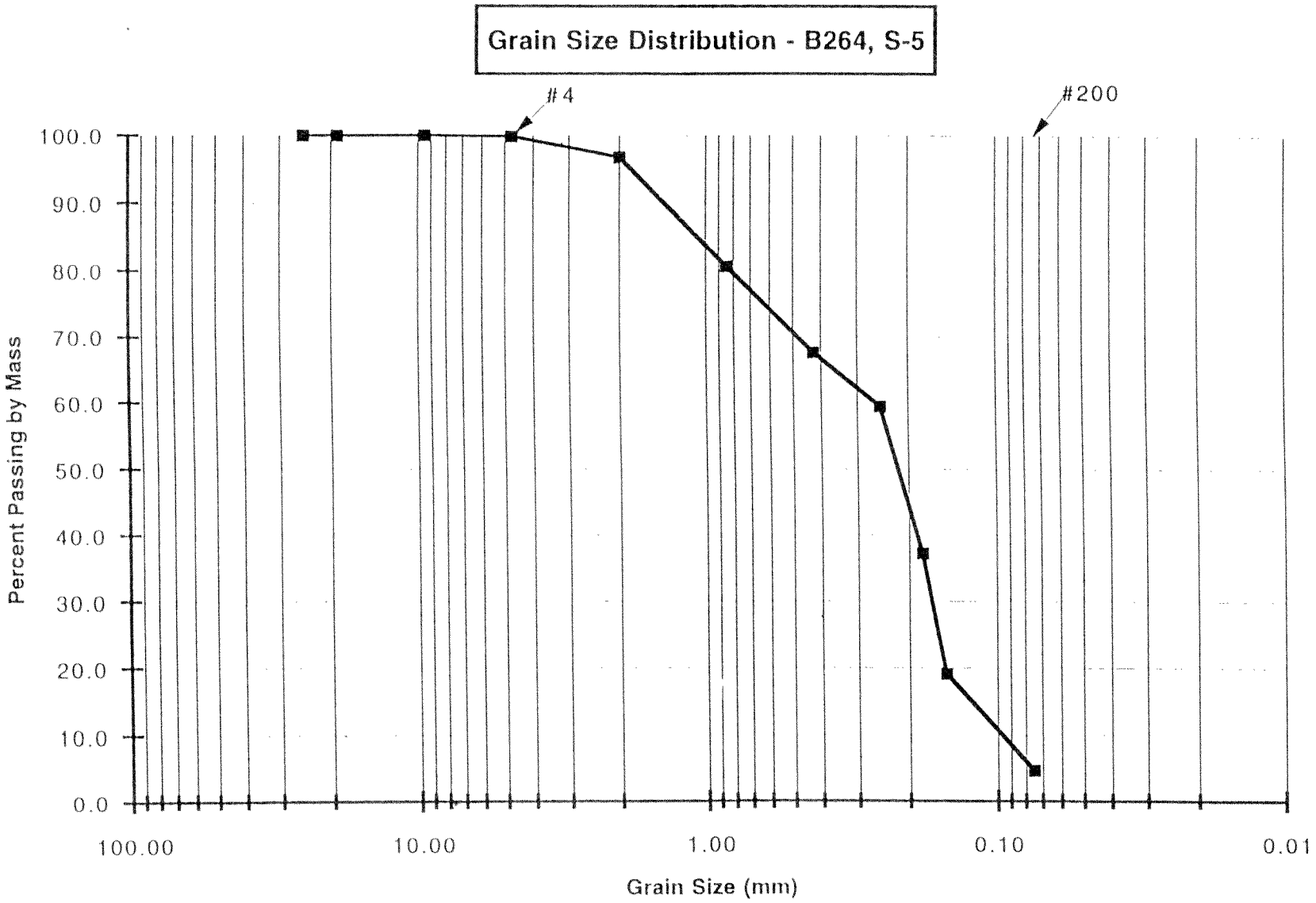
BORING: B262-A
SAMPLE: S-7
FIELD DESCRIPTION: Very Fine Silty Sand

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	812.7	812.7	0.0	0.0	100.0
3/4"	19.00	814.8	814.8	0.0	0.0	100.0
3/8"	9.5	845.1	845.1	0.0	0.0	100.0
4	4.750	816.4	816.4	0.0	0.0	100.0
10	2.000	711.9	711.9	0.0	0.0	100.0
20	0.850	629.5	629.1	0.4	0.2	99.8
40	0.425	557.3	555.7	1.6	0.9	98.9
60	0.250	529.6	525.9	3.7	2.1	96.8
100	0.150	532.0	512.6	19.4	11.0	85.8
200	0.075	538.9	491.3	47.6	26.9	58.8
PAN		592.2	492.0	100.2	56.7	0.0

% GRAVEL	0.0
% SAND	41.2
% SILT & CLAY	56.7

ML


Grain Size Distribution - B262-A, S-7
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

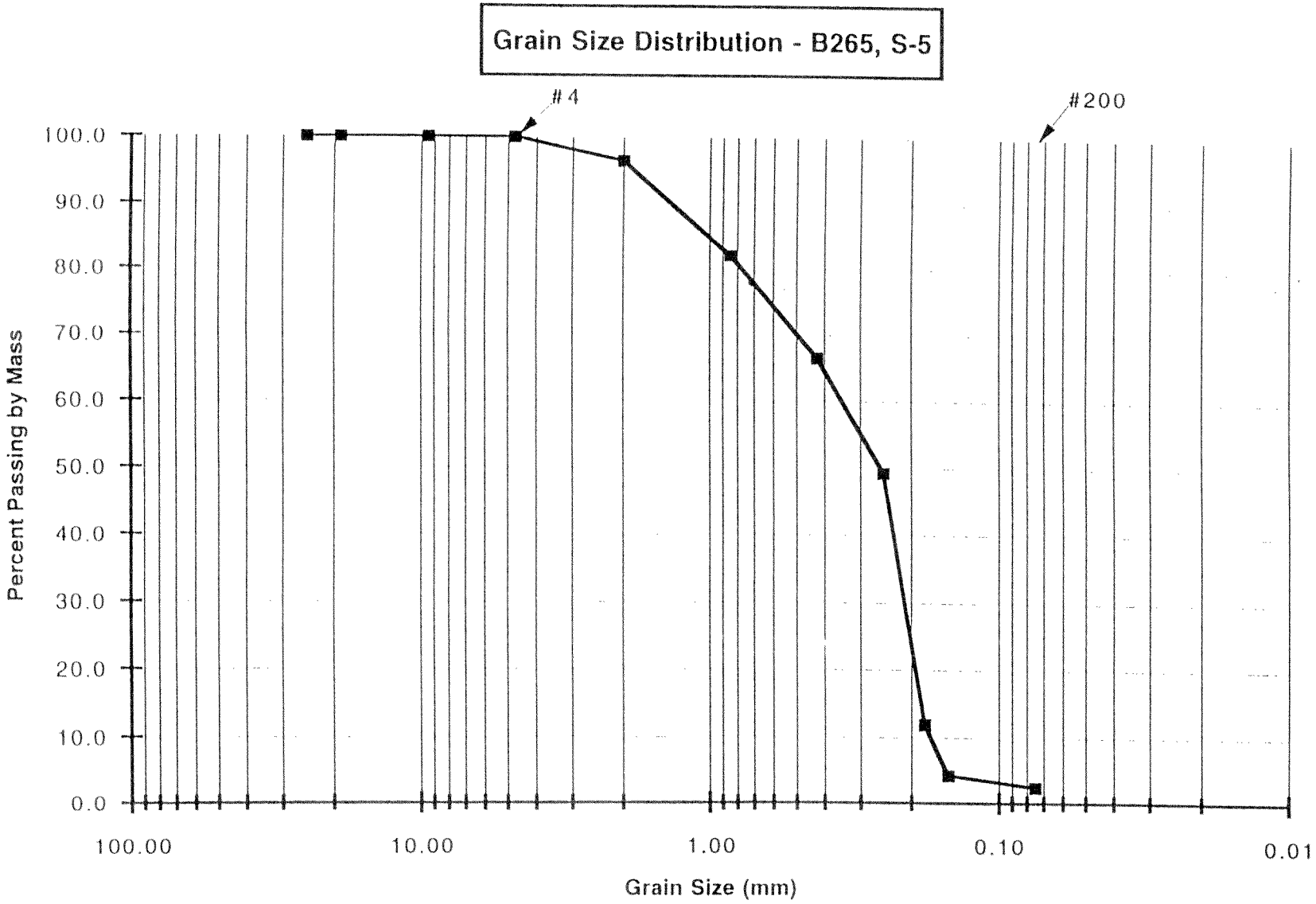

Grain Size Distribution - B264, S-5
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

Mass Dish + Sample	323.1
Mass of Dish	162.9
Mass Sample	160.2

BORING: B264
SAMPLE: S-5
FIELD DESCRIPTION: Very Soft Grey Silty Clay

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	812.7	812.7	0.0	0.0	100.0
3/4"	19.00	814.8	814.8	0.0	0.0	100.0
3/8"	9.5	845.1	845.1	0.0	0.0	100.0
4	4.750	816.6	816.4	0.2	0.1	99.9
10	2.000	716.9	711.9	5.0	3.1	96.8
20	0.850	654.9	629.1	25.8	16.1	80.6
40	0.425	576.7	555.7	21.0	13.1	67.5
60	0.250	538.9	525.9	13.0	8.1	59.4
80	0.180	549.1	513.5	35.6	22.2	37.2
100	0.150	541.7	512.6	29.1	18.2	19.0
200	0.075	514.3	491.3	23.0	14.4	4.7
PAN		504.8	492.0	12.8	8.0	

% GRAVEL	0.1
% SAND	95.2
% SILT & CLAY	8.0

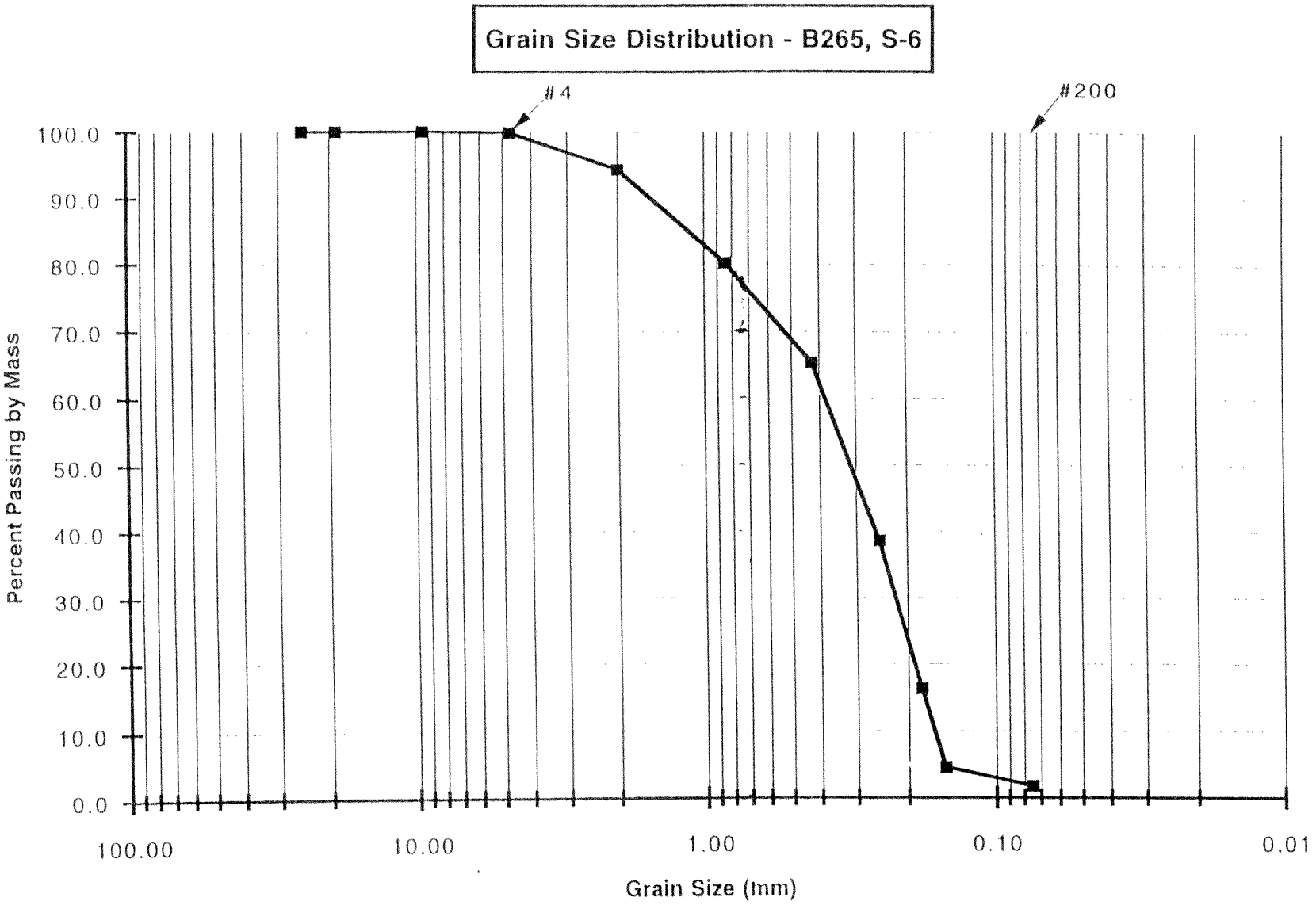

Grain Size Distribution - B265, S-5
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

Mass Dish + Sample	328.88
Mass of Dish	162.9
Mass Sample	165.98

BORING: B265
SAMPLE: S-5
FIELD DESCRIPTION: Very Soft Grey Silty Clay

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	812.7	812.7	0.0	0.0	100.0
3/4"	19.00	814.8	814.8	0.0	0.0	100.0
3/8"	9.5	845.1	845.1	0.0	0.0	100.0
4	4.750	816.4	816.4	0.0	0.0	100.0
10	2.000	717.7	711.9	5.8	3.5	96.5
20	0.850	653.2	629.1	24.1	14.5	82.0
40	0.425	581.5	555.7	25.8	15.5	66.4
60	0.250	554.4	525.9	28.5	17.2	49.3
80	0.180	575.6	513.5	62.1	37.4	11.9
100	0.150	525.2	512.6	12.6	7.6	4.3
200	0.075	494.3	491.3	3.0	1.8	2.5
PAN		493.9	492.0	1.9	1.1	

% GRAVEL	0.0
% SAND	97.5
% SILT & CLAY	1.1

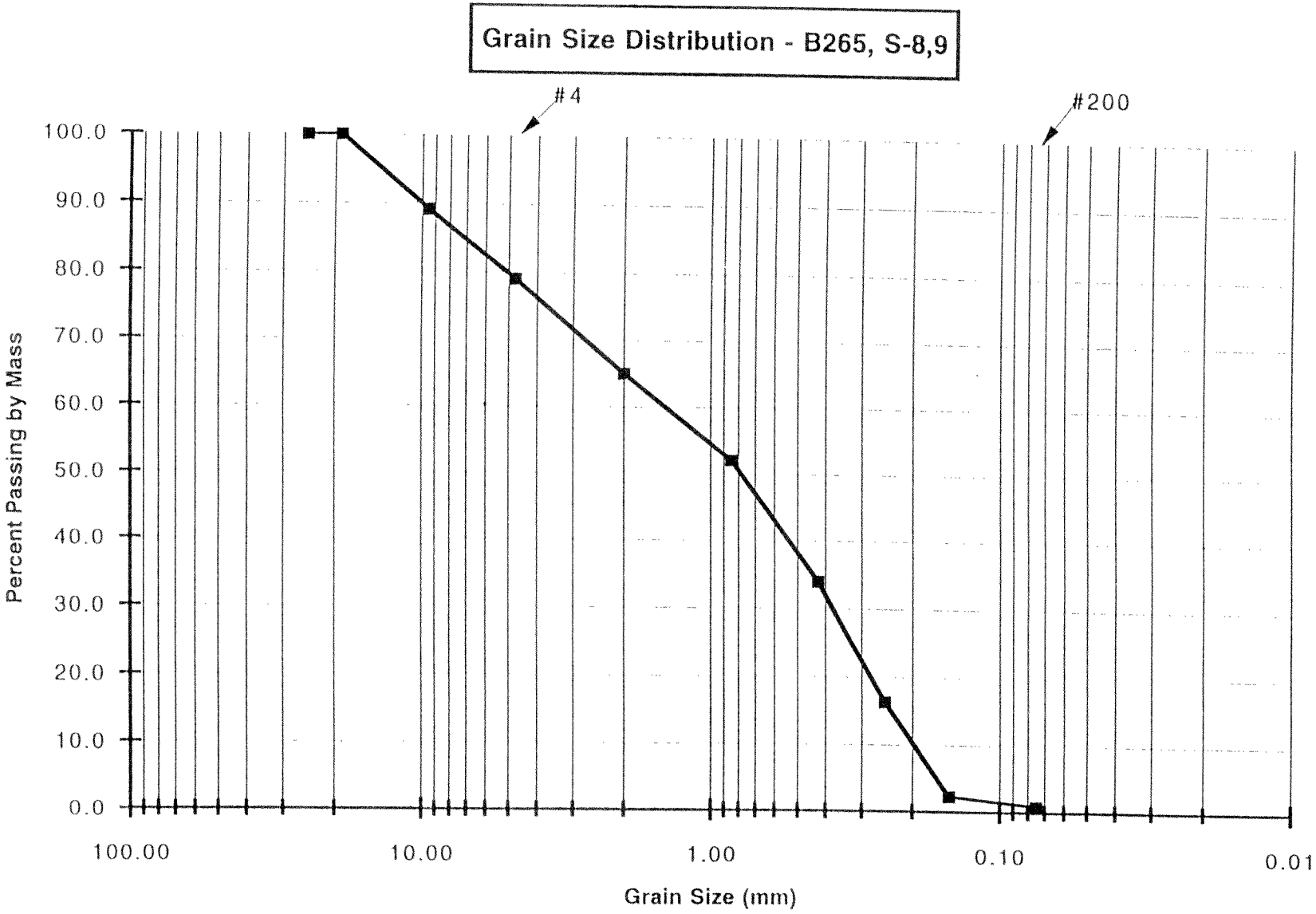

Grain Size Distribution - B265, S-6
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

Mass Dish + Sample	665.9
Mass of Dish	162.9
Mass Sample	503

BORING: B265
SAMPLE: S-7
FIELD DESCRIPTION: Grey/Brown Sand and Gravel

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	839.7	812.7	27.0	5.4	94.6
3/4"	19.00	859	814.8	44.2	8.8	85.8
3/8"	9.5	930.9	845.1	85.8	17.1	68.8
4	4.750	877.6	816.4	61.2	12.2	56.6
10	2.000	751.3	711.9	39.4	7.8	48.8
20	0.850	664.4	629.1	35.3	7.0	41.8
40	0.425	627.2	555.7	71.5	14.2	27.6
60	0.250	587.4	525.9	61.5	12.2	15.3
100	0.150	575.1	512.6	62.5	12.4	2.9
200	0.075	500.9	491.3	9.6	1.9	1.0
PAN		494.2	492.0	2.2	0.4	

% GRAVEL	38.0
% SAND	55.6
% SILT & CLAY	0.4


Grain Size Distribution - B265, S-8,9
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

Mass Dish + Sample	650.6
Mass of Dish	162.9
Mass Sample	487.7

BORING: B265
SAMPLE: S-8,9
FIELD DESCRIPTION: Grey/Brown Sand and Gravel

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	812.7	812.7	0.0	0.0	100.0
3/4"	19.00	814.8	814.8	0.0	0.0	100.0
3/8"	9.5	898.2	845.1	53.1	10.9	89.1
4	4.750	865.5	816.4	49.1	10.1	79.0
10	2.000	780.5	711.9	68.6	14.1	65.0
20	0.850	692.2	629.1	63.1	12.9	52.0
40	0.425	644.1	555.7	88.4	18.1	33.9
60	0.250	611.6	525.9	85.7	17.6	16.3
100	0.150	580.8	512.6	68.2	14.0	2.4
200	0.075	498.5	491.3	7.2	1.5	0.9
PAN		493.8	492.0	1.8	0.4	

% GRAVEL	21.0
% SAND	78.2
% SILT & CLAY	0.4

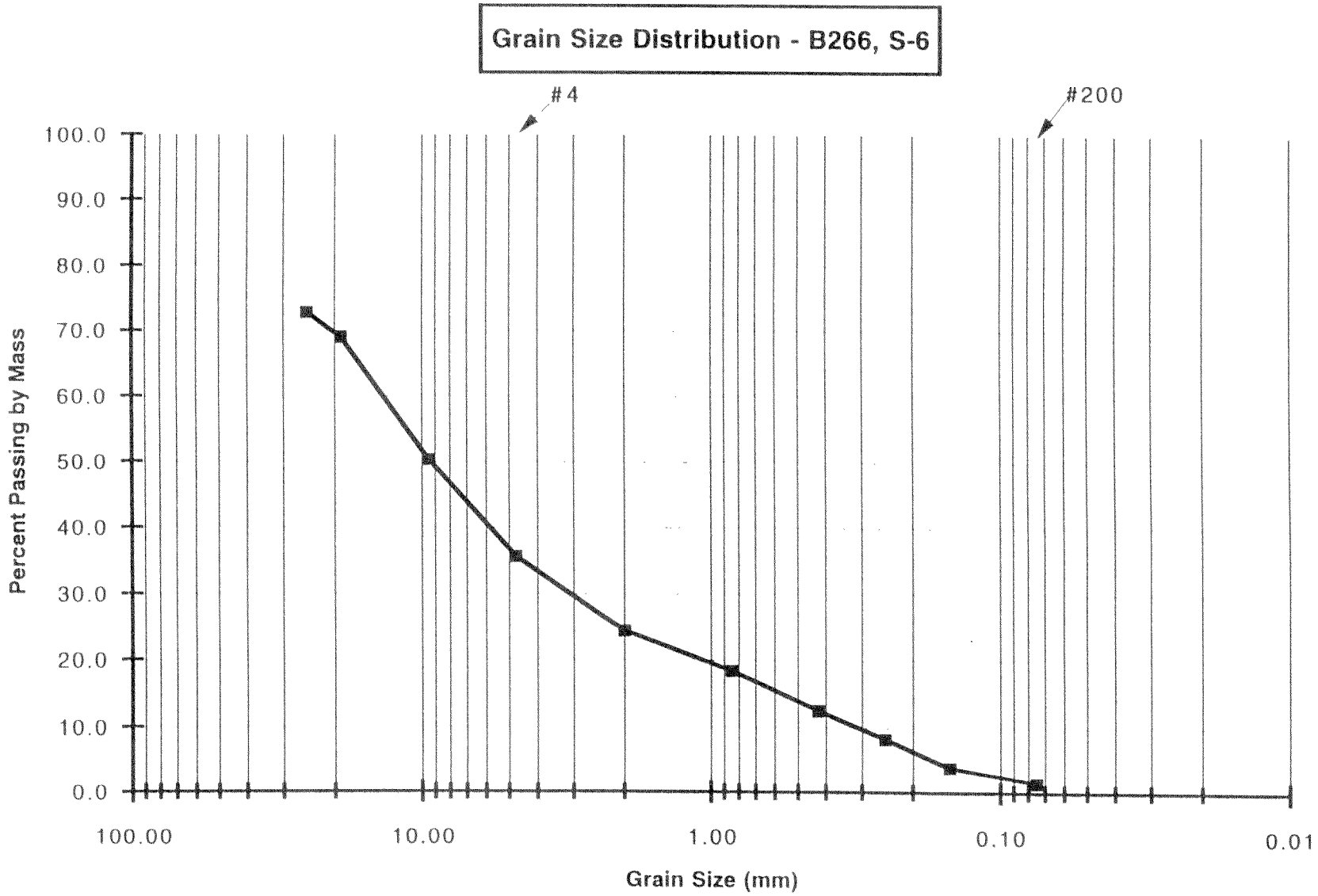
Mass Dish + Sample	394.8
Mass of Dish	162.9
Mass Sample	231.92

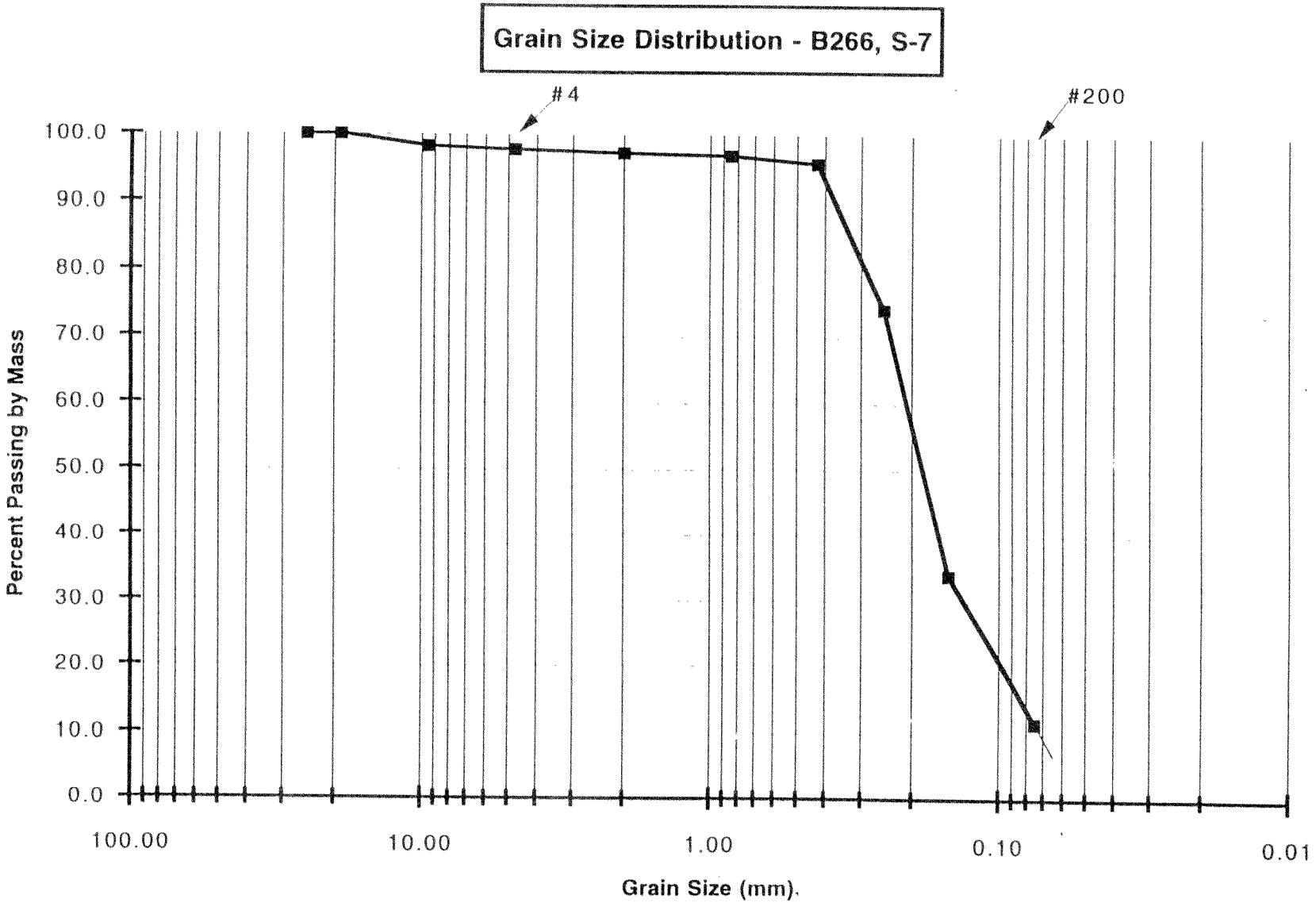
BORING: B266
SAMPLE: S-6
FIELD DESCRIPTION: Brown Gravel w/ Sand
Some Sandstone Fragments

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	875.9	812.7	63.2	27.3	72.7
3/4"	19.00	823.7	814.8	8.9	3.8	68.9
3/8"	9.5	888.4	845.1	43.3	18.7	50.2
4	4.750	850.5	816.4	34.1	14.7	35.5
10	2.000	737.9	711.9	26.0	11.2	24.3
20	0.850	643.2	629.1	14.1	6.1	18.2
40	0.425	569.2	555.7	13.5	5.8	12.4
60	0.250	535.8	525.9	9.9	4.3	8.2
100	0.150	522.7	512.6	10.1	4.4	3.8
200	0.075	496.8	491.3	5.5	2.4	1.4
PAN		493.1	492.0	1.1	0.5	0.0

% COBBLES	27.3
% GRAVEL	37.2
% SAND	34.1
% SILT & CLAY	0.5

GW


Grain Size Distribution - B266, S-6
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)


Grain Size Distribution - B266, S-7
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm).

Mass Dish + Sample	516.5
Mass of Dish	162.9
Mass Sample	353.6

BORING: B266
SAMPLE: S-7
FIELD DESCRIPTION: Very Fine Brown Sand

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	812.7	812.7	0.0	0.0	100.0
3/4"	19.00	814.8	814.8	0.0	0.0	100.0
3/8"	9.5	851.5	845.1	6.4	1.8	98.2
4	4.750	818.1	816.4	1.7	0.5	97.7
10	2.000	713.5	711.9	1.6	0.5	97.3
20	0.850	630.4	629.1	1.3	0.4	96.9
40	0.425	559.8	555.7	4.1	1.2	95.7
60	0.250	602.4	525.9	76.5	21.6	74.1
100	0.150	654.7	512.6	142.1	40.2	33.9
200	0.075	570.2	491.3	78.9	22.3	11.6
PAN		530.5	492.0	38.5	10.9	0.0

% GRAVEL	2.3
% SAND	86.1
% SILT & CLAY	10.9

SP - SM

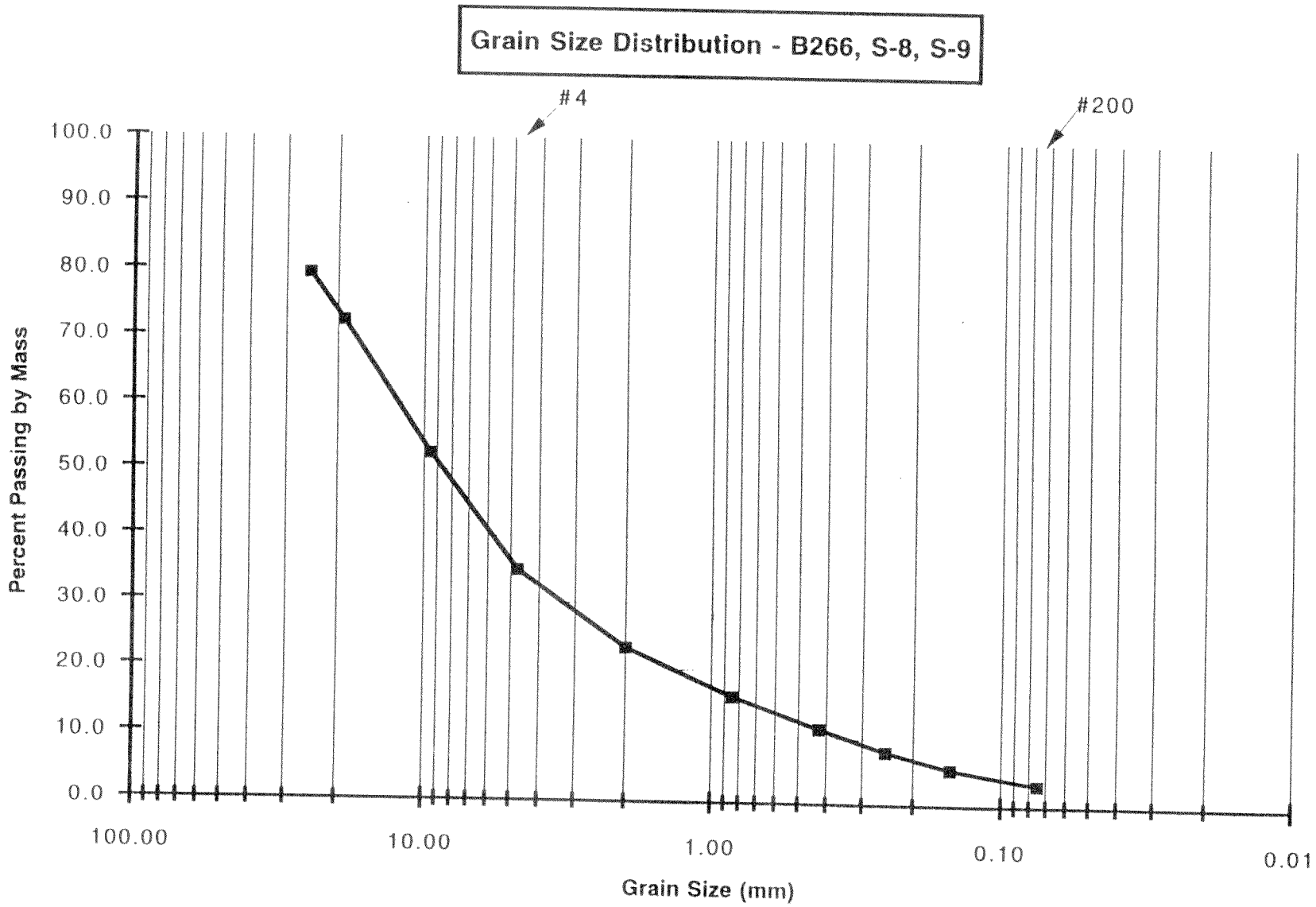
Mass Dish + Sample	612.3
Mass of Dish	162.9
Mass Sample	449.4

BORING: B266
SAMPLE: S-8,S-9
FIELD DESCRIPTION: Brown Sandy Gravel
Some Sandstone Fragments

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	905	812.7	92.3	20.5	79.5
3/4"	19.00	847	814.8	32.2	7.2	72.3
3/8"	9.5	934.4	845.1	89.3	19.9	52.4
4	4.750	895.4	816.4	79.0	17.6	34.8
10	2.000	764.4	711.9	52.5	11.7	23.2
20	0.850	661.6	629.1	32.5	7.2	15.9
40	0.425	576.4	555.7	20.7	4.6	11.3
60	0.250	540.9	525.9	15.0	3.3	8.0
100	0.150	523.8	512.6	11.2	2.5	5.5
200	0.075	500.9	491.3	9.6	2.1	3.4
PAN		502.7	492.0	10.7	2.4	0.0

% GRAVEL	44.6
% SAND	31.5
% SILT & CLAY	2.4

GW


Grain Size Distribution - B266, S-8, S-9
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

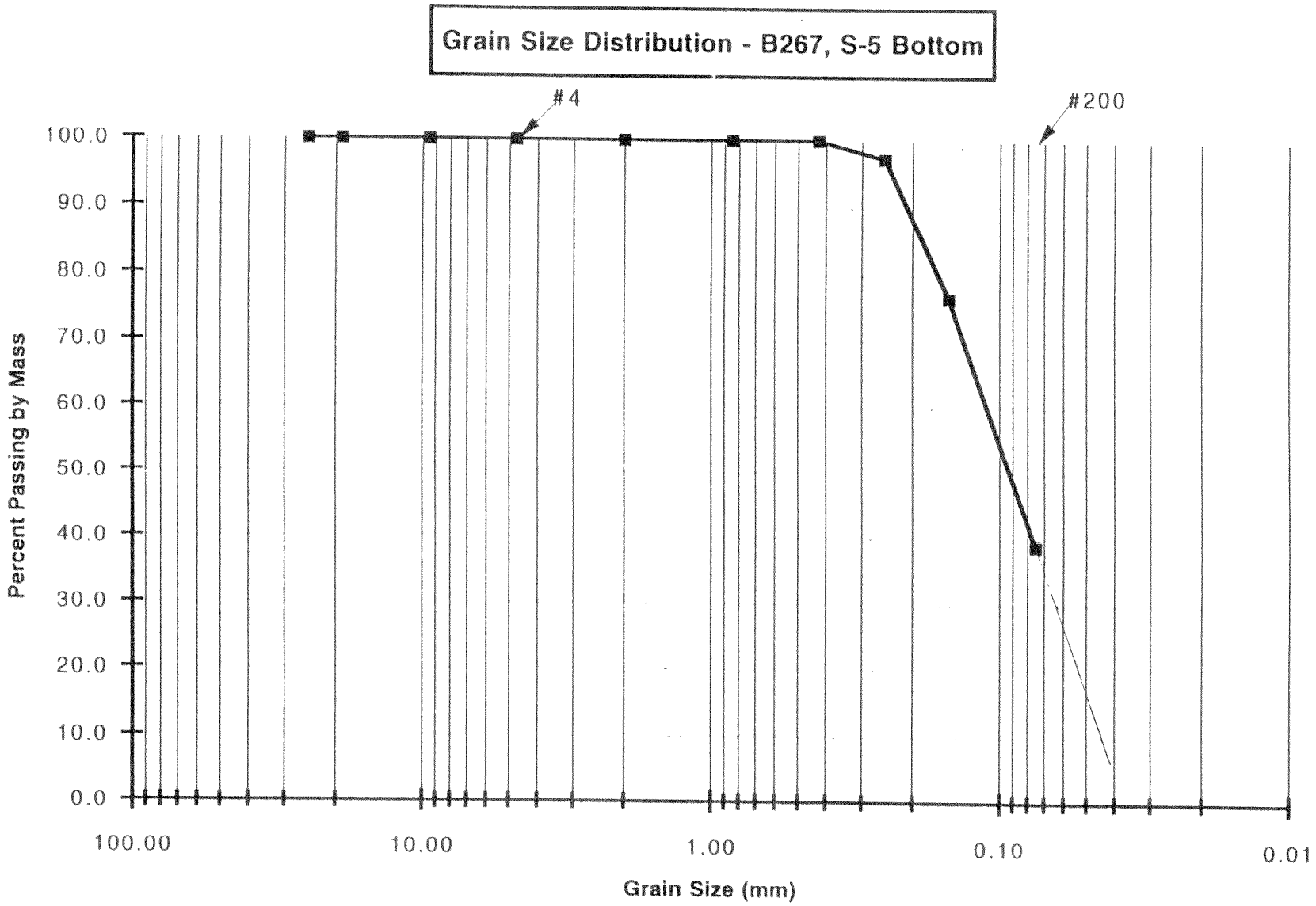
Mass Dish + Sample	312.4
Mass of Dish	162.9
Mass Sample	149.5

BORING: B267
SAMPLE: S-5, Bottom
FIELD DESCRIPTION: Very Fine Grey/Black Silty Sand

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	812.7	812.7	0.0	0.0	100.0
3/4"	19.00	814.8	814.8	0.0	0.0	100.0
3/8"	9.5	845.1	845.1	0.0	0.0	100.0
4	4.750	816.4	816.4	0.0	0.0	100.0
10	2.000	711.9	711.9	0.0	0.0	100.0
20	0.850	629.1	629.1	0.0	0.0	100.0
40	0.425	555.7	555.7	0.0	0.0	100.0
60	0.250	530.0	525.9	4.1	2.7	97.3
100	0.150	543.6	512.6	31.0	20.7	76.5
200	0.075	547.7	491.3	56.4	37.7	38.8
PAN		547.6	492.0	55.6	37.2	0.0

% GRAVEL	0.0
% SAND	61.2
% SILT & CLAY	37.2

SP-SM


Grain Size Distribution - B267, S-5 Bottom
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

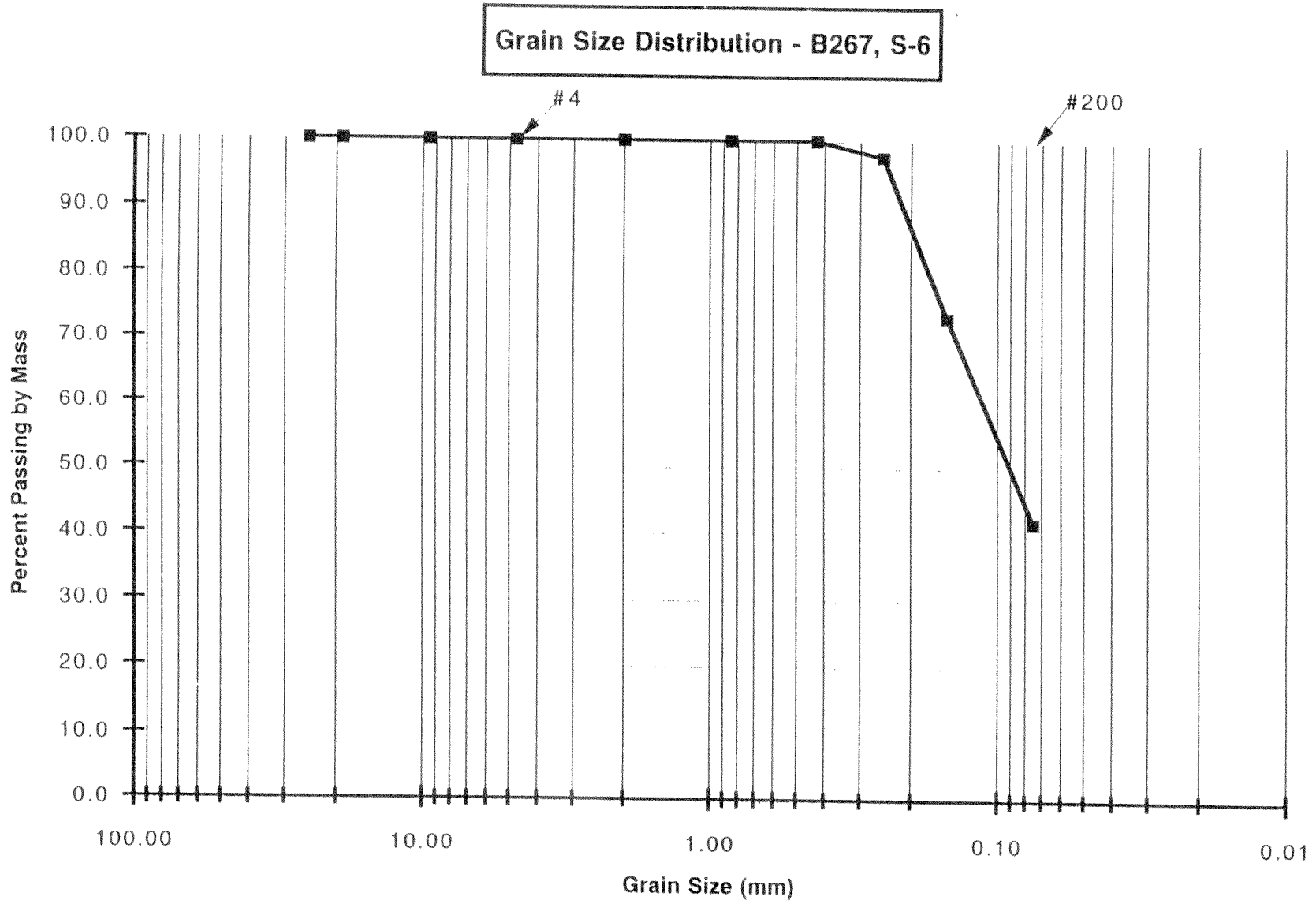
Mass Dish + Sample	416.6
Mass of Dish	162.9
Mass Sample	253.7

BORING: B267
SAMPLE: S-6
FIELD DESCRIPTION: Very Fine Grey/Black Silty Sand

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	812.7	812.7	0.0	0.0	100.0
3/4"	19.00	814.8	814.8	0.0	0.0	100.0
3/8"	9.5	845.1	845.1	0.0	0.0	100.0
4	4.750	816.4	816.4	0.0	0.0	100.0
10	2.000	711.9	711.9	0.0	0.0	100.0
20	0.850	629.1	629.1	0.0	0.0	100.0
40	0.425	555.7	555.7	0.0	0.0	100.0
60	0.250	532.1	525.9	6.2	2.4	97.6
100	0.150	574.2	512.6	61.6	24.3	73.3
200	0.075	571.3	491.3	80.0	31.5	41.7
PAN		594.3	492.0	102.3	40.3	0.0

% GRAVEL	0.0
% SAND	58.3
% SILT & CLAY	40.3

SM


Grain Size Distribution - B267, S-6
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

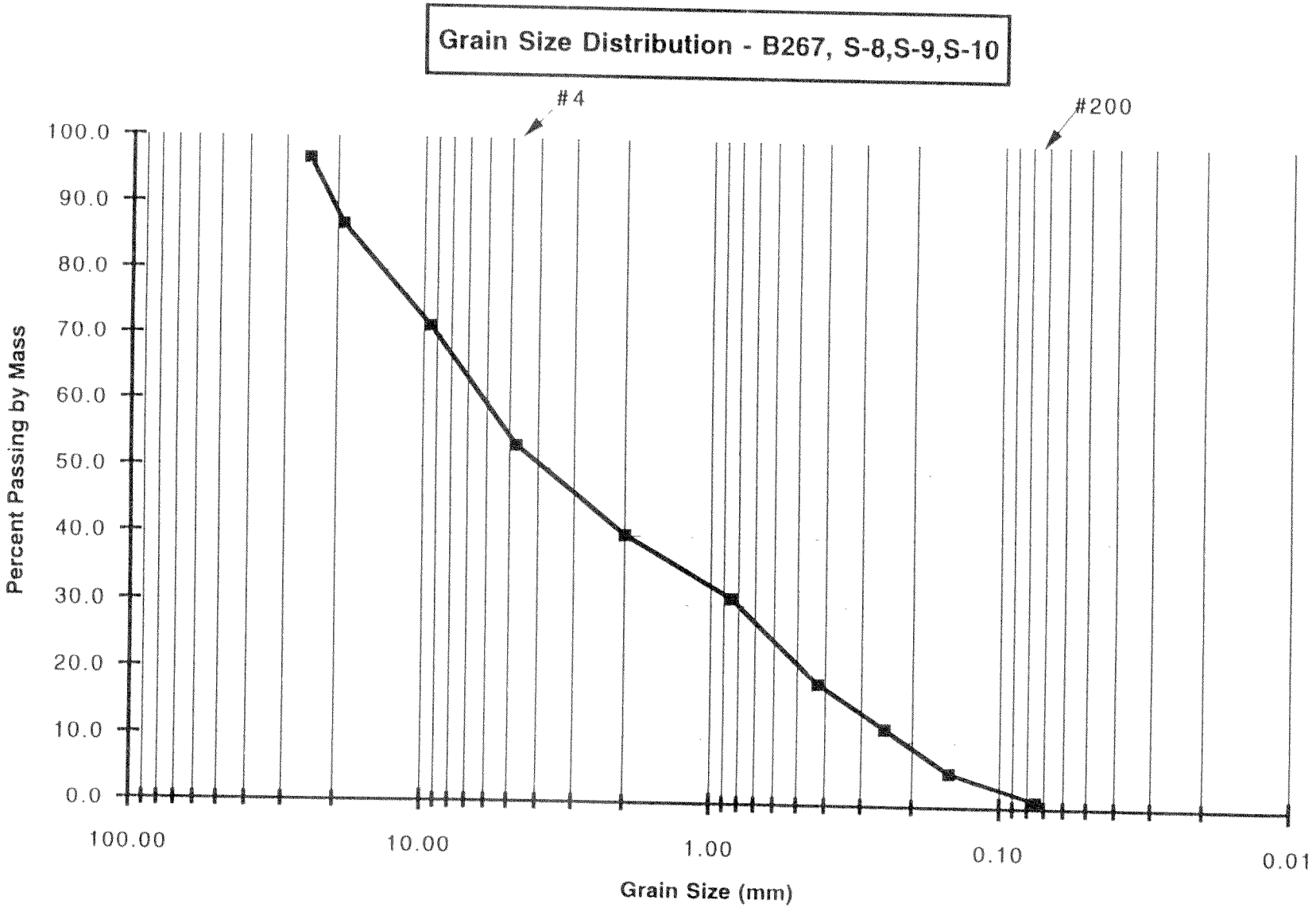
Mass Dish + Sample	1038.9
Mass of Dish	162.9
Mass Sample	876

BORING: B267
SAMPLE: S-8,S-9,S-10
FIELD DESCRIPTION: Brown Gravel, Some Sand

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	841.3	812.7	28.6	3.3	96.7
3/4"	19.00	902	814.8	87.2	10.0	86.8
3/8"	9.5	979.9	845.1	134.8	15.4	71.4
4	4.750	974.3	816.4	157.9	18.0	53.4
10	2.000	828.9	711.9	117.0	13.4	40.0
20	0.850	708.5	629.1	79.4	9.1	30.9
40	0.425	665.9	555.7	110.2	12.6	18.4
60	0.250	583.6	525.9	57.7	6.6	11.8
100	0.150	569.2	512.6	56.6	6.5	5.3
200	0.075	528.7	491.3	37.4	4.3	1.1
PAN		501.2	492.0	9.2	1.1	0.0

% GRAVEL	43.4
% SAND	52.3
% SILT & CLAY	1.1

SP


Grain Size Distribution - B267, S-8,S-9,S-10
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

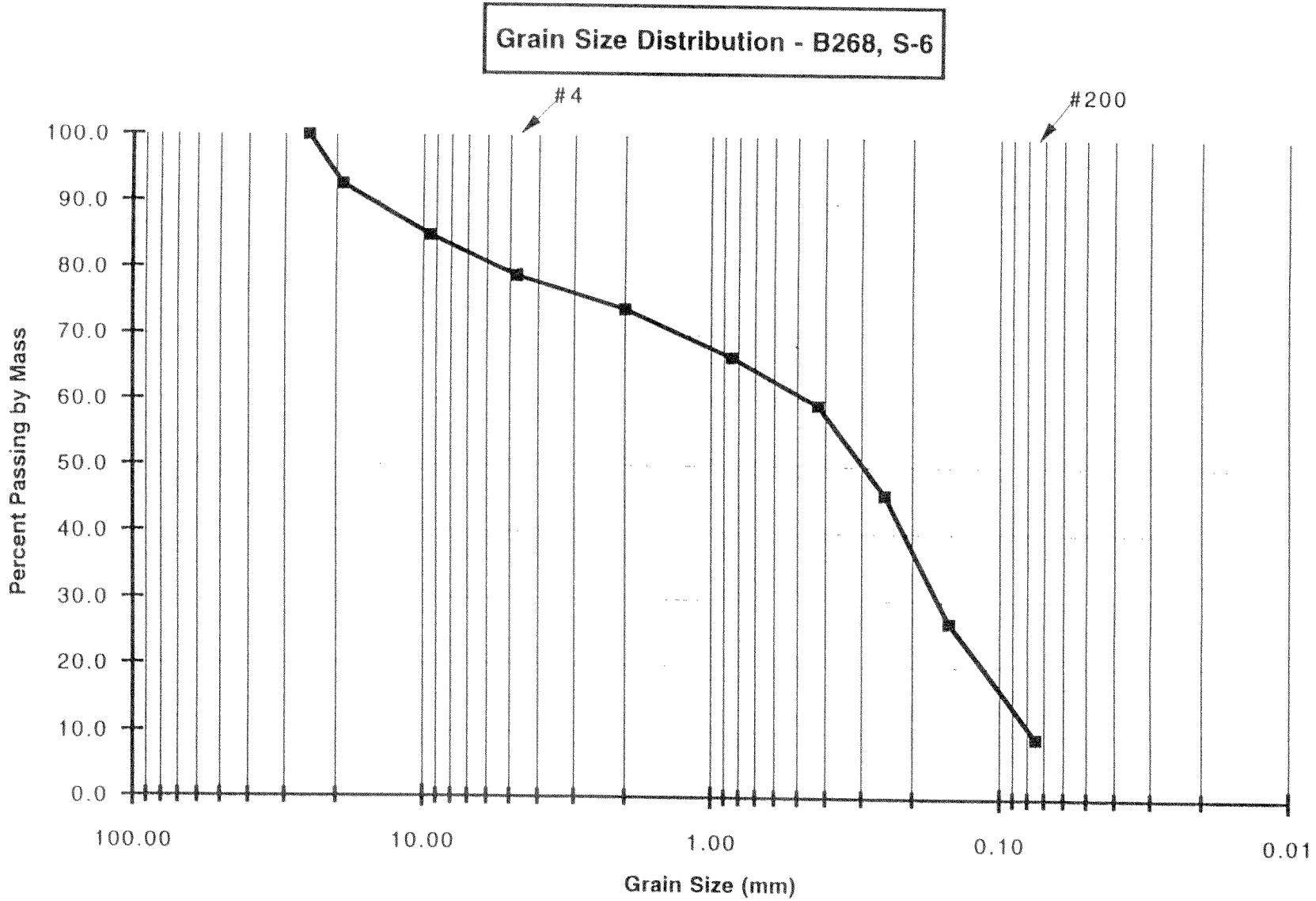
Mass Dish + Sample	395.0
Mass of Dish	162.9
Mass Sample	232.1

BORING: B268
SAMPLE: S-6
FIELD DESCRIPTION: Med. Brown Sand & Gravel

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	812.7	812.7	0.0	0.0	100.0
3/4"	19.00	832.1	814.8	17.3	7.5	92.5
3/8"	9.5	862.8	845.1	17.7	7.6	84.9
4	4.750	830.6	816.4	14.2	6.1	78.8
10	2.000	723.5	711.9	11.6	5.0	73.8
20	0.850	646.0	629.1	16.9	7.3	66.5
40	0.425	572.6	555.7	16.9	7.3	59.2
60	0.250	557.4	525.9	31.5	13.6	45.7
100	0.150	556.9	512.6	44.3	19.1	26.6
200	0.075	531.3	491.3	40.0	17.2	9.3
PAN		511.0	492.0	19.0	8.2	0.0

% GRAVEL	21.2
% SAND	69.5
% SILT & CLAY	8.2

SP - SM


Grain Size Distribution - B268, S-6
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

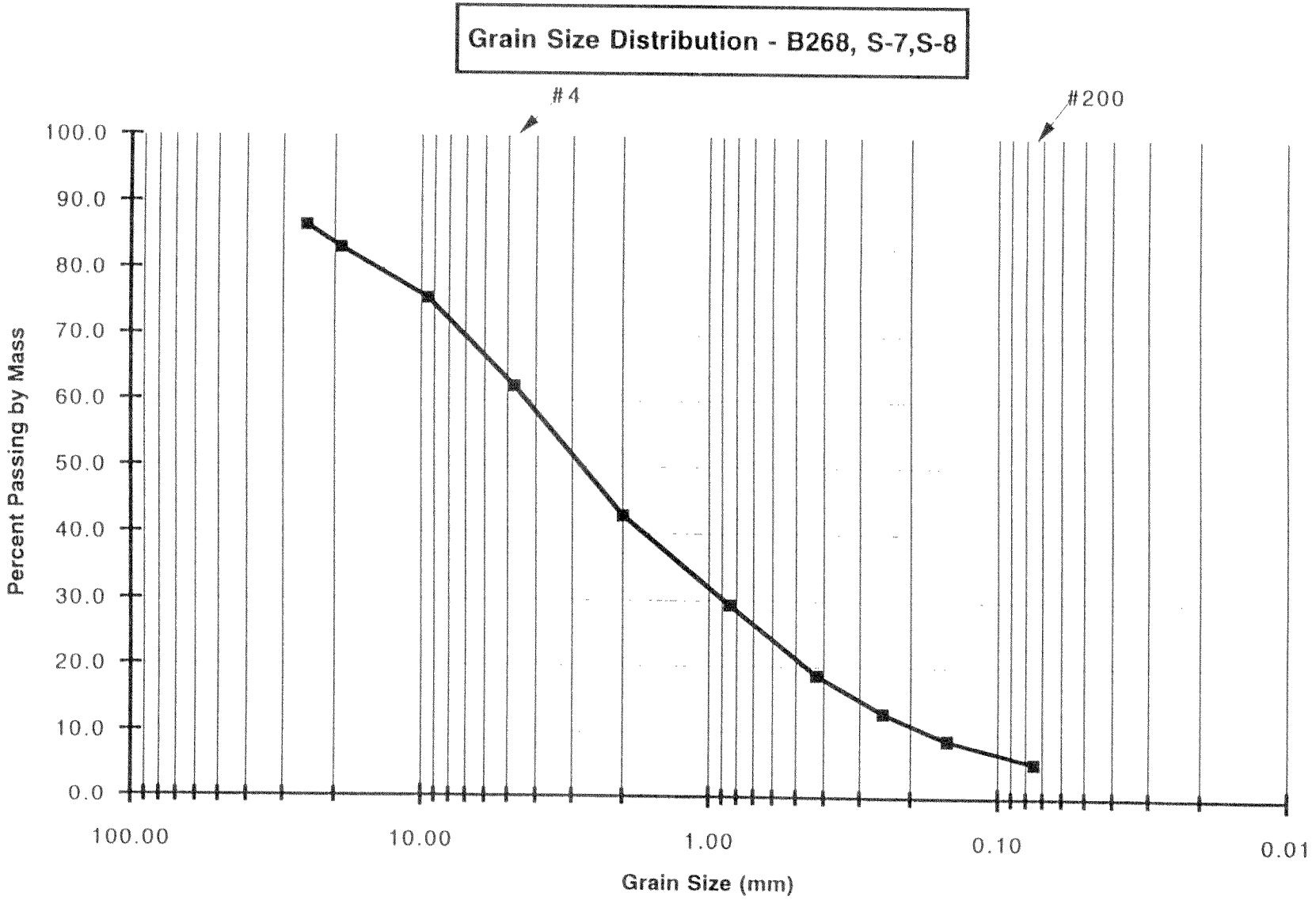
Mass Dish + Sample	542.1
Mass of Dish	162.9
Mass Sample	379.2

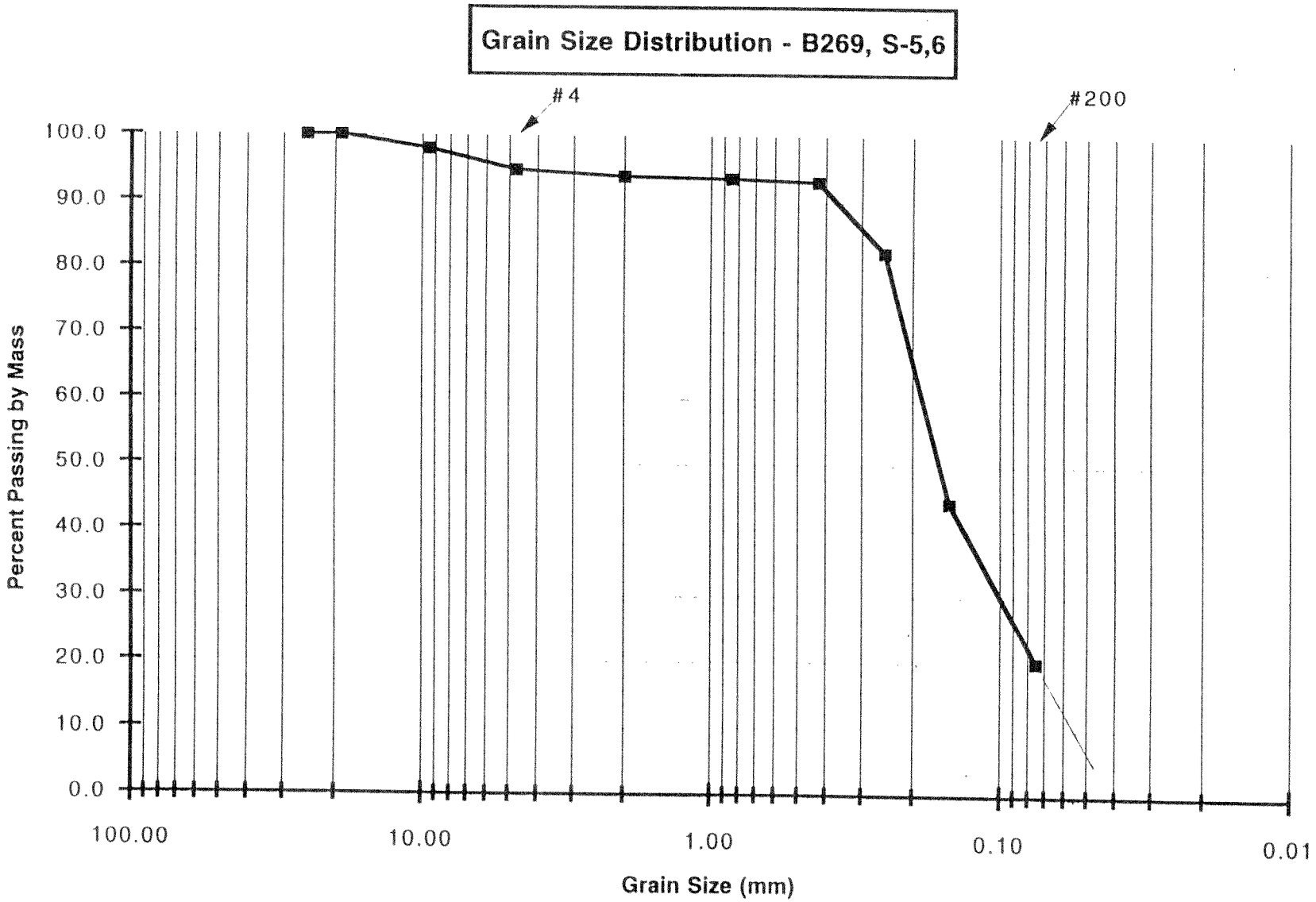
BORING: B268
SAMPLE: S-7,S-8
FIELD DESCRIPTION: Brown Sand & Gravel

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	864	812.7	51.3	13.5	86.5
3/4"	19.00	827.6	814.8	12.8	3.4	83.1
3/8"	9.5	874.2	845.1	29.1	7.7	75.4
4	4.750	866.6	816.4	50.2	13.2	62.2
10	2.000	786.1	711.9	74.2	19.6	42.6
20	0.850	679.5	629.1	50.4	13.3	29.3
40	0.425	596.5	555.7	40.8	10.8	18.6
60	0.250	547.2	525.9	21.3	5.6	12.9
100	0.150	527.9	512.6	15.3	4.0	8.9
200	0.075	504.2	491.3	12.9	3.4	5.5
PAN		510.3	492.0	18.3	4.8	0.0

% COBBLES	13.5
% GRAVEL	24.3
% SAND	56.7
% SILT & CLAY	4.8

SW


Grain Size Distribution - B268, S-7,S-8
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)


Grain Size Distribution - B269, S-5,6
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

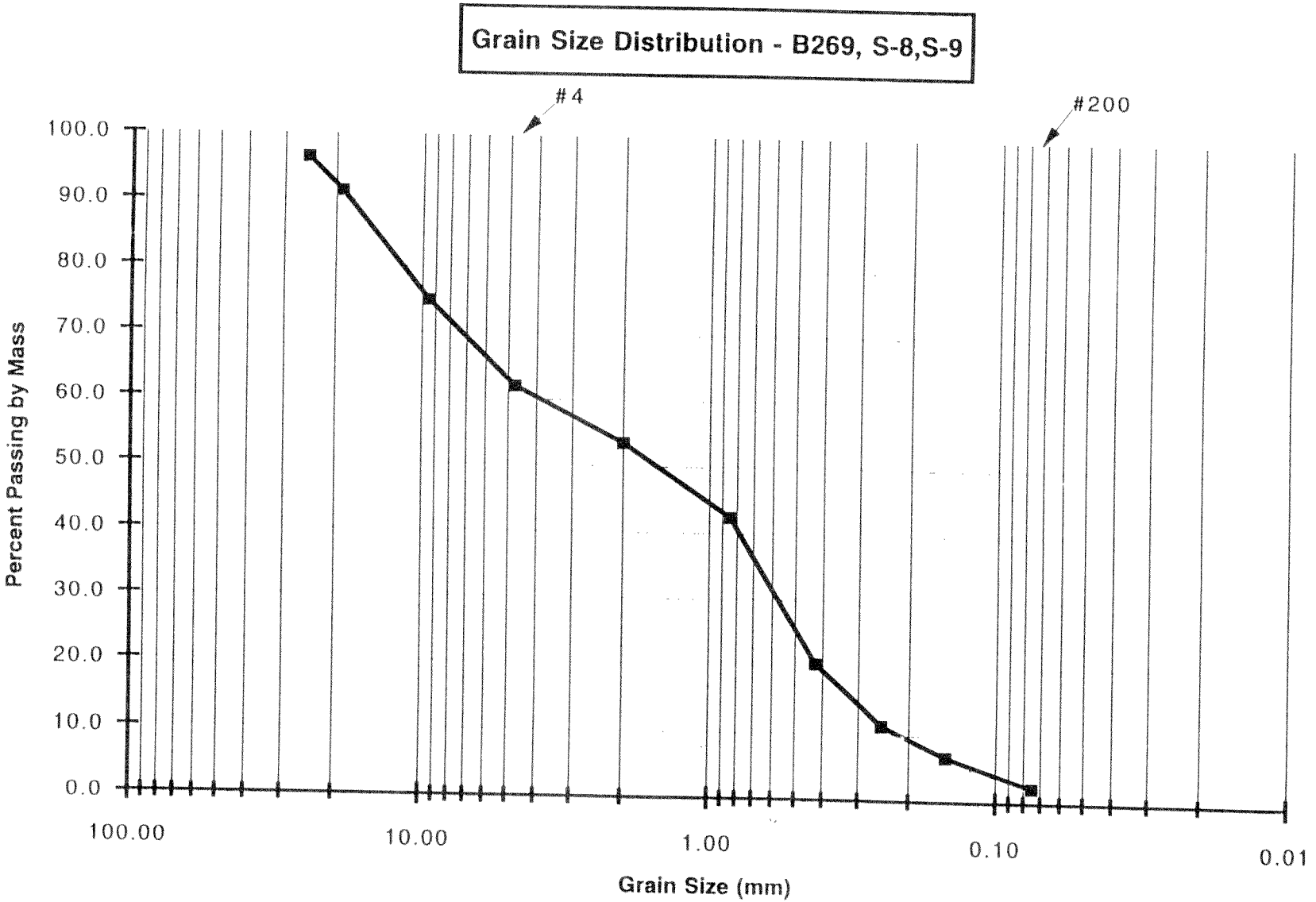
Mass Dish + Sample	560.0
Mass of Dish	162.9
Mass Sample	397.1

BORING: B269
SAMPLE: S-5,6
FIELD DESCRIPTION: Grey/Black Silty Sand

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	812.7	812.7	0.0	0.0	100.0
3/4"	19.00	814.8	814.8	0.0	0.0	100.0
3/8"	9.5	853.4	845.1	8.3	2.1	97.9
4	4.750	828.8	816.4	12.4	3.1	94.8
10	2.000	715.6	711.9	3.7	0.9	93.9
20	0.850	630.3	629.1	1.2	0.3	93.6
40	0.425	557.7	555.7	2.0	0.5	93.0
60	0.250	568.4	525.9	42.5	10.7	82.3
100	0.150	664.2	512.6	151.6	38.2	44.2
200	0.075	587.1	491.3	95.8	24.1	20.0
PAN		568.0	492.0	76.0	19.1	0.0

% GRAVEL	5.2
% SAND	74.7
% SILT & CLAY	19.1

SP-SM


Grain Size Distribution - B269, S-8,S-9
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

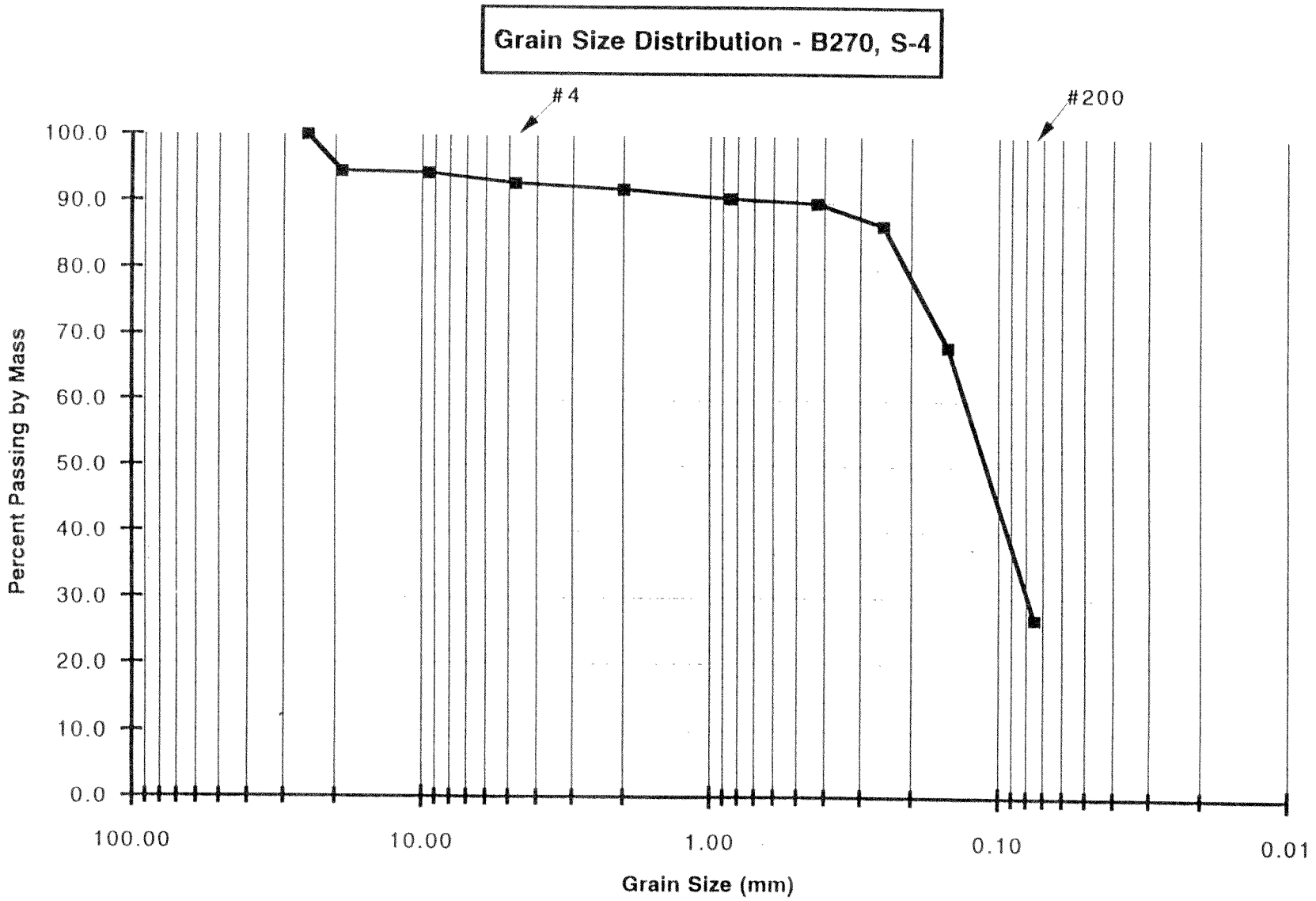
Mass Dish + Sample	781.2
Mass of Dish	162.9
Mass Sample	618.3

BORING: B269
SAMPLE: S-8,S-9
FIELD DESCRIPTION: Brown Gravel, Some Sand

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	835.1	812.7	22.4	3.6	96.4
3/4"	19.00	846.3	814.8	31.5	5.1	91.3
3/8"	9.5	946.6	845.1	101.5	16.4	74.9
4	4.750	896.2	816.4	79.8	12.9	62.0
10	2.000	764.5	711.9	52.6	8.5	53.5
20	0.850	697.5	629.1	68.4	11.1	42.4
40	0.425	692.6	555.7	136.9	22.1	20.2
60	0.250	581.7	525.9	55.8	9.0	11.2
100	0.150	540.0	512.6	27.4	4.4	6.8
200	0.075	518.9	491.3	27.6	4.5	2.3
PAN		504.9	492.0	12.9	2.1	0.0

% GRAVEL	34.4
% SAND	59.6
% SILT & CLAY	2.1

SP


Grain Size Distribution - B270, S-4
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

Mass Dish + Sample	417.8
Mass of Dish	162.9
Mass Sample	254.9

BORING: B270
SAMPLE: S-4
FIELD DESCRIPTION: Grey/Blk/Olive Clayey Silty V. Fine Sand Traces of Slag

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	812.7	812.7	0.0	0.0	100.0
3/4"	19.00	829	814.8	14.2	5.6	94.4
3/8"	9.5	845.7	845.1	0.6	0.2	94.2
4	4.750	820.2	816.4	3.8	1.5	92.7
10	2.000	714.1	711.9	2.2	0.9	91.8
20	0.850	632.5	629.1	3.4	1.3	90.5
40	0.425	557.3	555.7	1.6	0.6	89.9
60	0.250	534.6	525.9	8.7	3.4	86.5
100	0.150	559.0	512.6	46.4	18.2	68.3
200	0.075	597.0	491.3	105.7	41.5	26.8
PAN		557.4	492.0	65.4	25.7	0.0

% GRAVEL	7.3
% SAND	65.9
% SILT & CLAY	25.7

SM

ALCOSAN GEOTECHNICAL INVESTIGATION PROGRAM

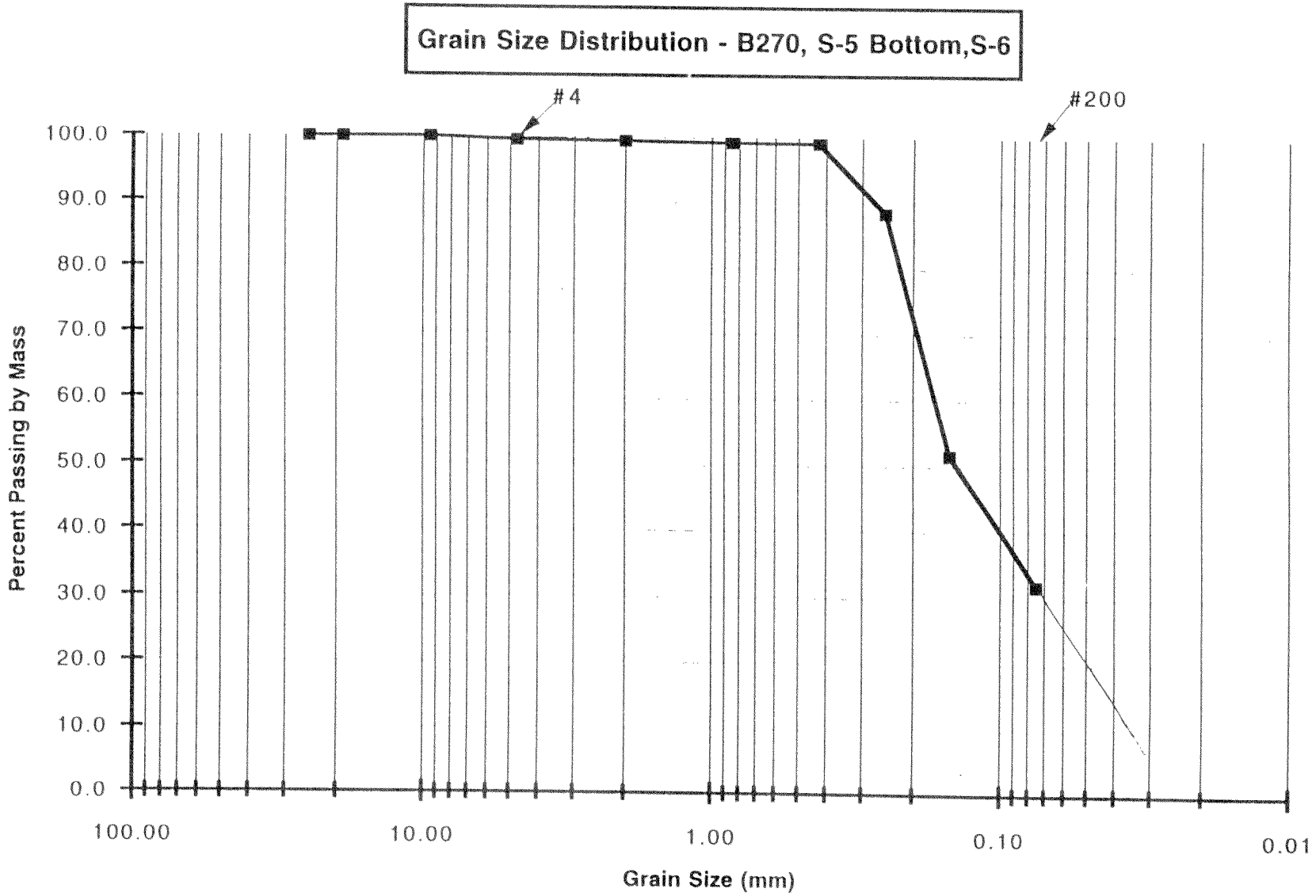
Mass Dish + Sample	460.8
Mass of Dish	162.9
Mass Sample	297.9

BORING: B270
SAMPLE: S-5 Bottom, S-6
FIELD DESCRIPTION: Grey/Brown Fine Sand

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	812.7	812.7	0.0	0.0	100.0
3/4"	19.00	814.8	814.8	0.0	0.0	100.0
3/8"	9.5	845.1	845.1	0.0	0.0	100.0
4	4.750	817.7	816.4	1.3	0.4	99.6
10	2.000	712.5	711.9	0.6	0.2	99.4
20	0.850	629.7	629.1	0.6	0.2	99.2
40	0.425	555.9	555.7	0.2	0.1	99.1
60	0.250	558.0	525.9	32.1	10.8	88.3
100	0.150	622.1	512.6	109.5	36.8	51.6
200	0.075	549.9	491.3	58.6	19.7	31.9
PAN		538.3	492.0	46.3	15.5	0.0

% GRAVEL	0.4
% SAND	67.7
% SILT & CLAY	15.5

SP-SM


Grain Size Distribution - B270, S-5 Bottom,S-6
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

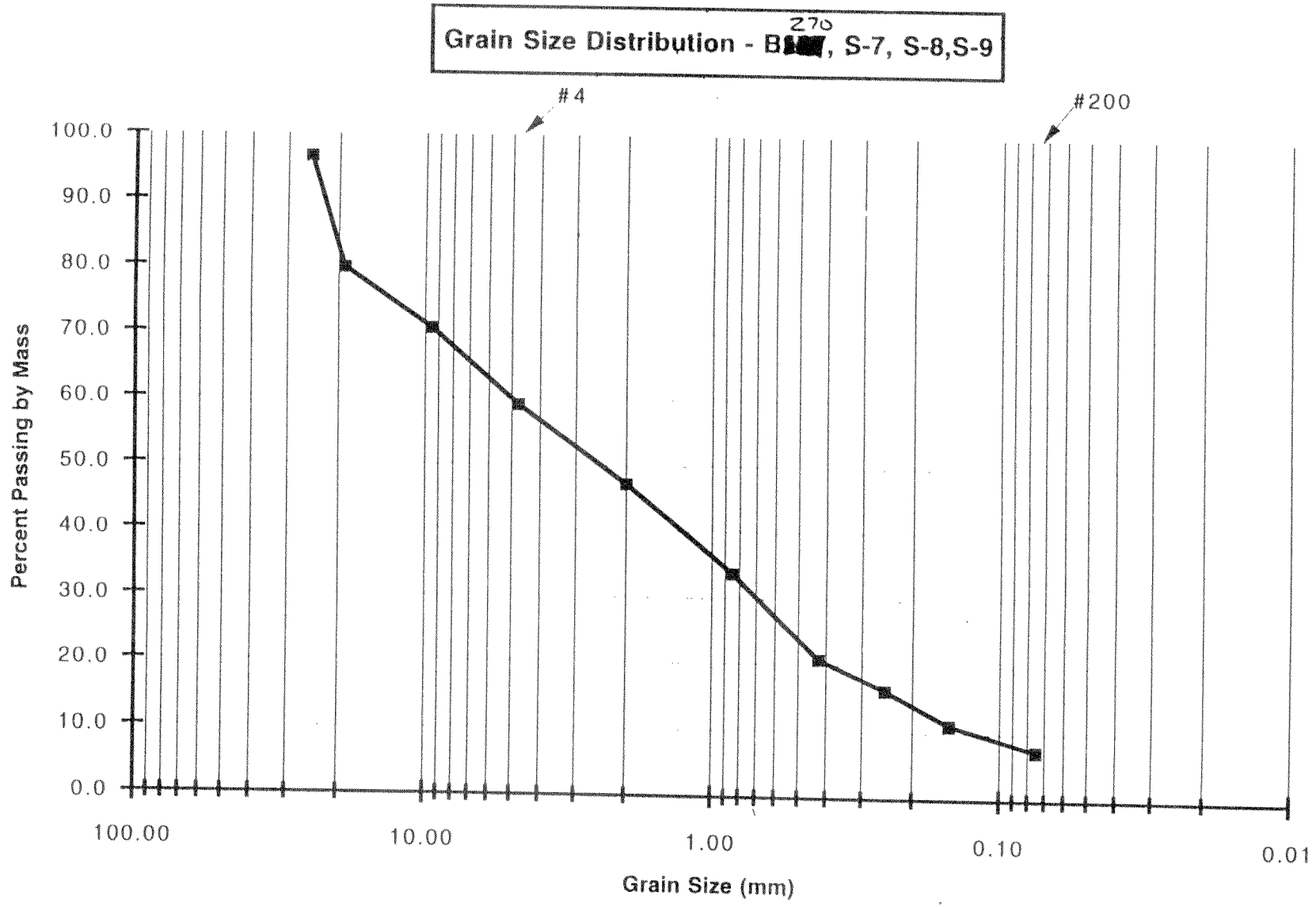
Mass Dish + Sample	1131.0
Mass of Dish	162.9
Mass Sample	968.1

BORING: B270
SAMPLE: S-7,8,9
FIELD DESCRIPTION: Brown Gravel, Some Sand

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	846.1	812.7	33.4	3.5	96.5
3/4"	19.00	977.8	814.8	163.0	16.8	79.7
3/8"	9.5	933.7	845.1	88.6	9.2	70.6
4	4.750	927.1	816.4	110.7	11.4	59.1
10	2.000	828.3	711.9	116.4	12.0	47.1
20	0.850	759.0	629.1	129.9	13.4	33.7
40	0.425	681.3	555.7	125.6	13.0	20.7
60	0.250	570.9	525.9	45.0	4.6	16.1
100	0.150	560.6	512.6	48.0	5.0	11.1
200	0.075	526.9	491.3	35.6	3.7	7.4
PAN		501.8	492.0	9.8	1.0	0.0

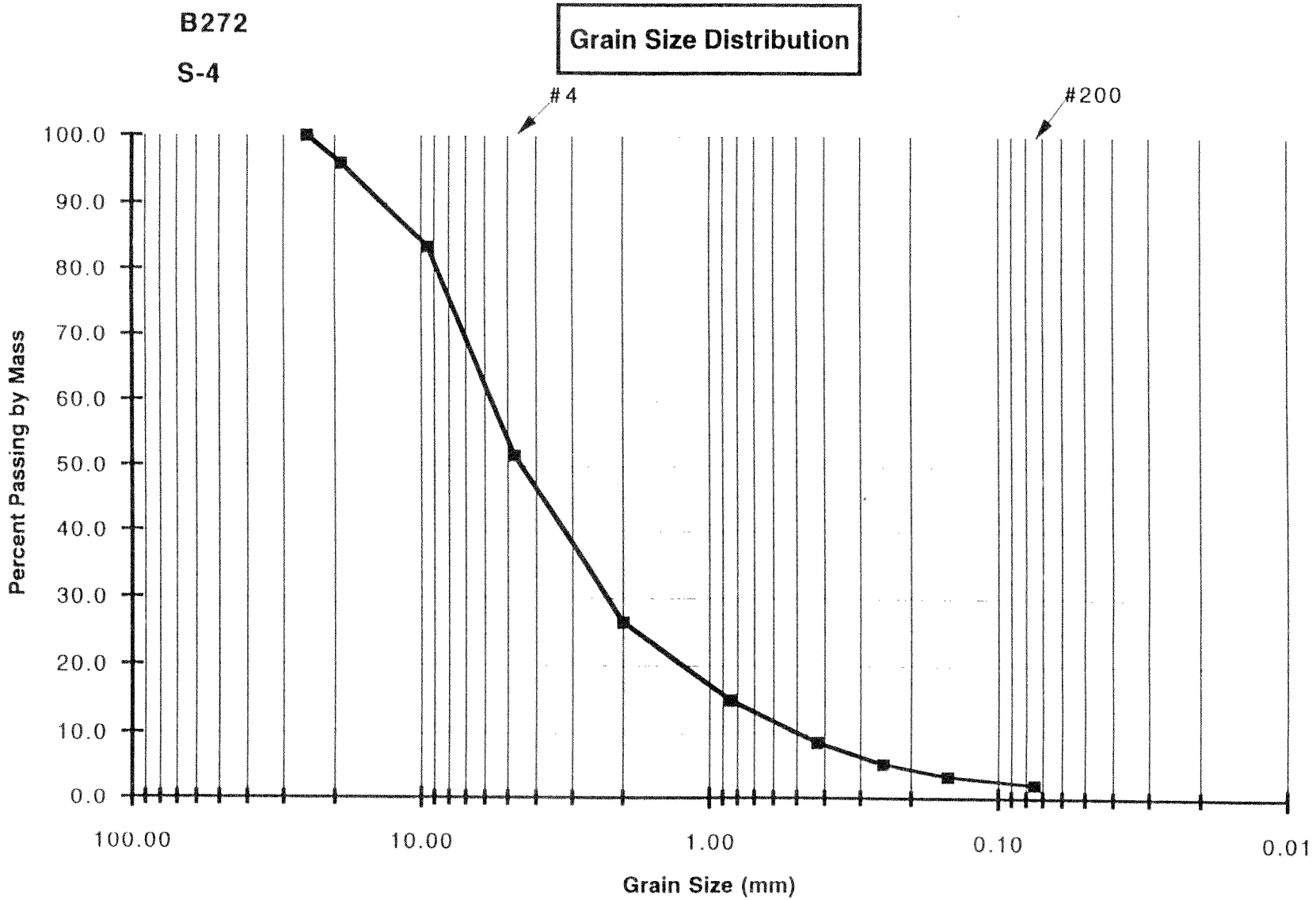
% GRAVEL	37.4
% SAND	51.7
% SILT & CLAY	1.0

SP


Grain Size Distribution - B270, S-7, S-8,S-9
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

B272

S-4


Grain Size Distribution
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

Mass Dish + Sample	425.8
Mass of Dish	162.9
Mass Sample	262.9

BORING: B272
SAMPLE: S-4
FIELD DESCRIPTION: Fine/Med. Brown Sand & Gravel

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	812.7	812.7	0.0	0.0	100.0
3/4"	19.00	825.6	814.8	10.8	4.1	95.9
3/8"	9.5	878	845.1	32.9	12.5	83.4
4	4.750	899.9	816.4	83.5	31.8	51.6
10	2.000	778.3	711.9	66.4	25.3	26.4
20	0.850	659.4	629.1	30.3	11.5	14.8
40	0.425	571.9	555.7	16.2	6.2	8.7
60	0.250	534.6	525.9	8.7	3.3	5.4
100	0.150	517.7	512.6	5.1	1.9	3.4
200	0.075	494.7	491.3	3.4	1.3	2.1
PAN		495.7	492.0	3.7	1.4	0.0

% GRAVEL	48.4
% SAND	49.5
% SILT & CLAY	1.4

SW

Mass Dish + Sample	499.7
Mass of Dish	162.9
Mass Sample	336.8

BORING: B272
SAMPLE: S-8
FIELD DESCRIPTION: Grey Sandy Gravel

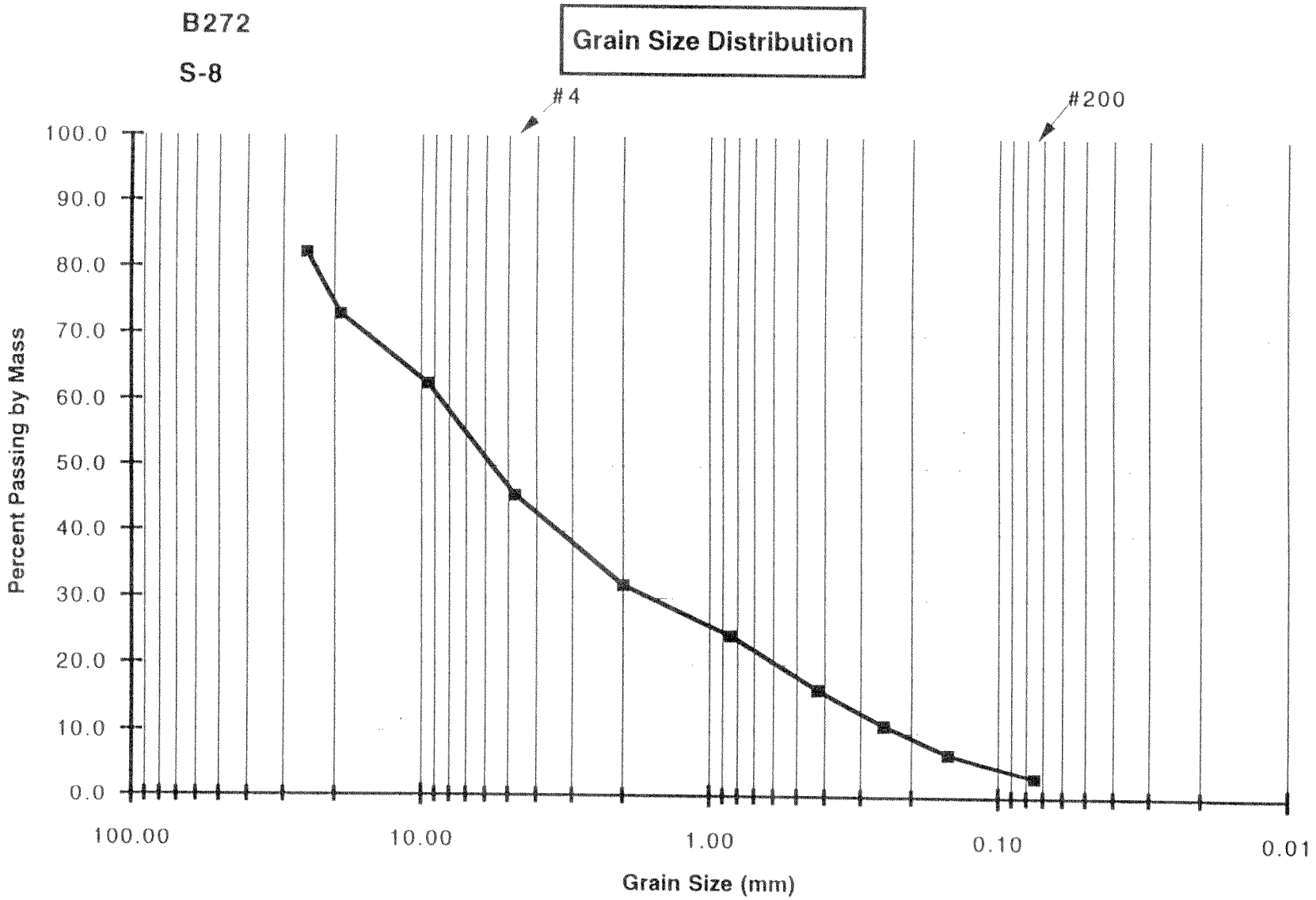
Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	872.6	812.7	59.9	17.8	82.2
3/4"	19.00	846.4	814.8	31.6	9.4	72.8
3/8"	9.5	880.1	845.1	35.0	10.4	62.4
4	4.750	873.6	816.4	57.2	17.0	45.5
10	2.000	757.7	711.9	45.8	13.6	31.9
20	0.850	654.7	629.1	25.6	7.6	24.3
40	0.425	582.7	555.7	27.0	8.0	16.2
60	0.250	543.6	525.9	17.7	5.3	11.0
100	0.150	527.0	512.6	14.4	4.3	6.7
200	0.075	503.4	491.3	12.1	3.6	3.1
PAN		500.2	492.0	8.2	2.4	0.0

% Cobbles	17.8
% GRAVEL	36.8
% SAND	42.3
% SILT & CLAY	2.4

GW

B272

S-8


Grain Size Distribution
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

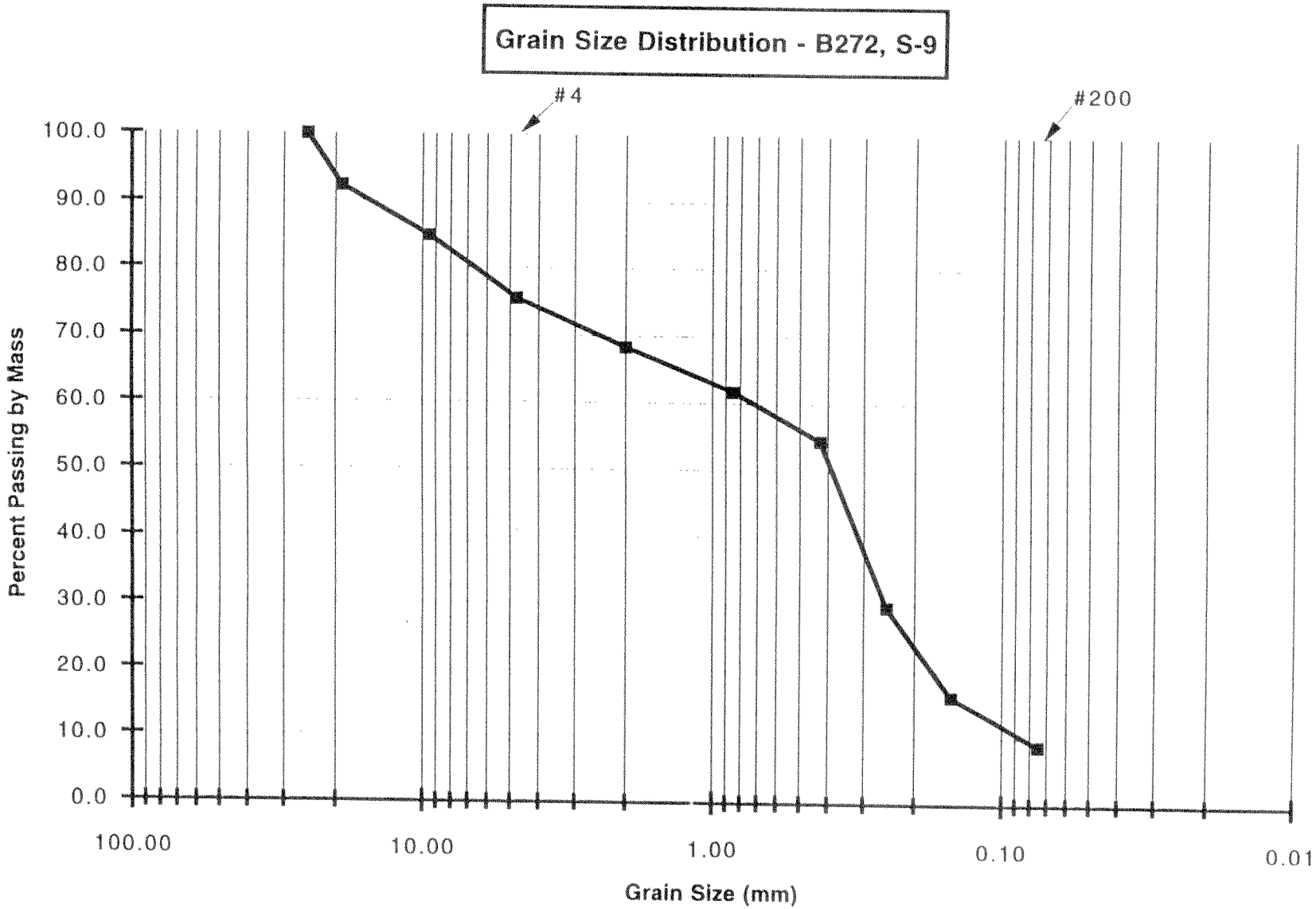
Mass Dish + Sample	491.5
Mass of Dish	162.9
Mass Sample	328.6

BORING: B272
SAMPLE: S-9
FIELD DESCRIPTION: Fine/Medium Sand w/ Gravel

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	812.7	812.7	0.0	0.0	100.0
3/4"	19.00	839.6	814.8	24.8	7.5	92.5
3/8"	9.5	869.7	845.1	24.6	7.5	85.0
4	4.750	847.5	816.4	31.1	9.5	75.5
10	2.000	735.2	711.9	23.3	7.1	68.4
20	0.850	650.6	629.1	21.5	6.5	61.9
40	0.425	579.7	555.7	24.0	7.3	54.6
60	0.250	607.8	525.9	81.9	24.9	29.6
100	0.150	556.7	512.6	44.1	13.4	16.2
200	0.075	515.4	491.3	24.1	7.3	8.9
PAN		519.1	492.0	27.1	8.2	0.0

% GRAVEL	24.5
% SAND	66.6
% SILT & CLAY	8.2

SW-SM


Grain Size Distribution - B272, S-9
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

Mass Dish + Sample	692.1
Mass of Dish	162.9
Mass Sample	529.2

BORING: B273
SAMPLE: S-3,S-4
FIELD DESCRIPTION: Brown Sand & Gravel, Slag & Cinders

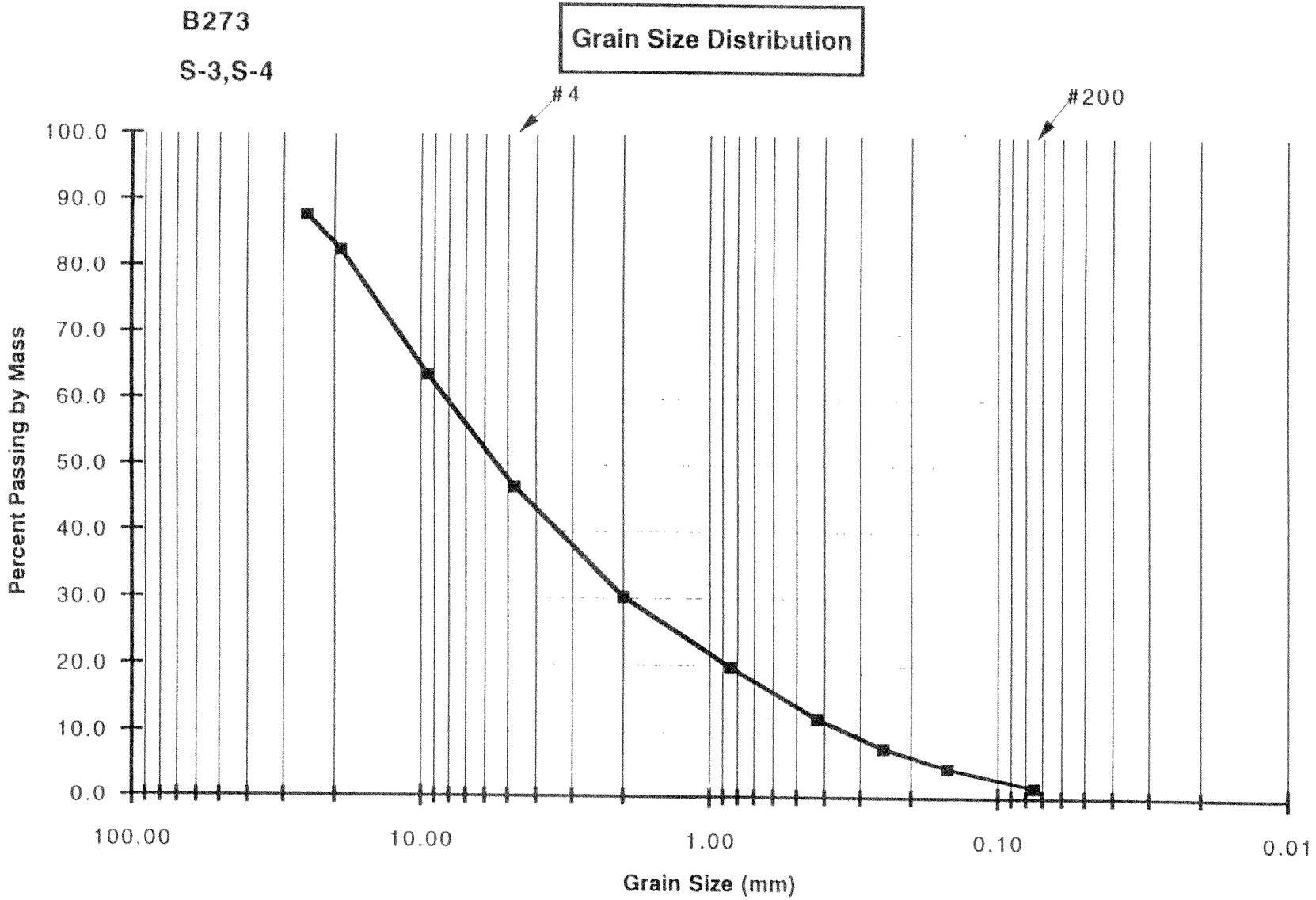
Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	878	812.7	65.3	12.3	87.7
3/4"	19.00	842.6	814.8	27.8	5.3	82.4
3/8"	9.5	944.7	845.1	99.6	18.8	63.6
4	4.750	906.5	816.4	90.1	17.0	46.6
10	2.000	799.2	711.9	87.3	16.5	30.1
20	0.850	684.6	629.1	55.5	10.5	19.6
40	0.425	595.7	555.7	40.0	7.6	12.0
60	0.250	548.9	525.9	23.0	4.3	7.7
100	0.150	528.9	512.6	16.3	3.1	4.6
200	0.075	507.1	491.3	15.8	3.0	1.6
PAN		498.4	492.0	6.4	1.2	0.0

% Cobbles	12.3
% GRAVEL	41.1
% SAND	45.0
% SILT & CLAY	1.2

GW

B273

S-3,S-4


Grain Size Distribution
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

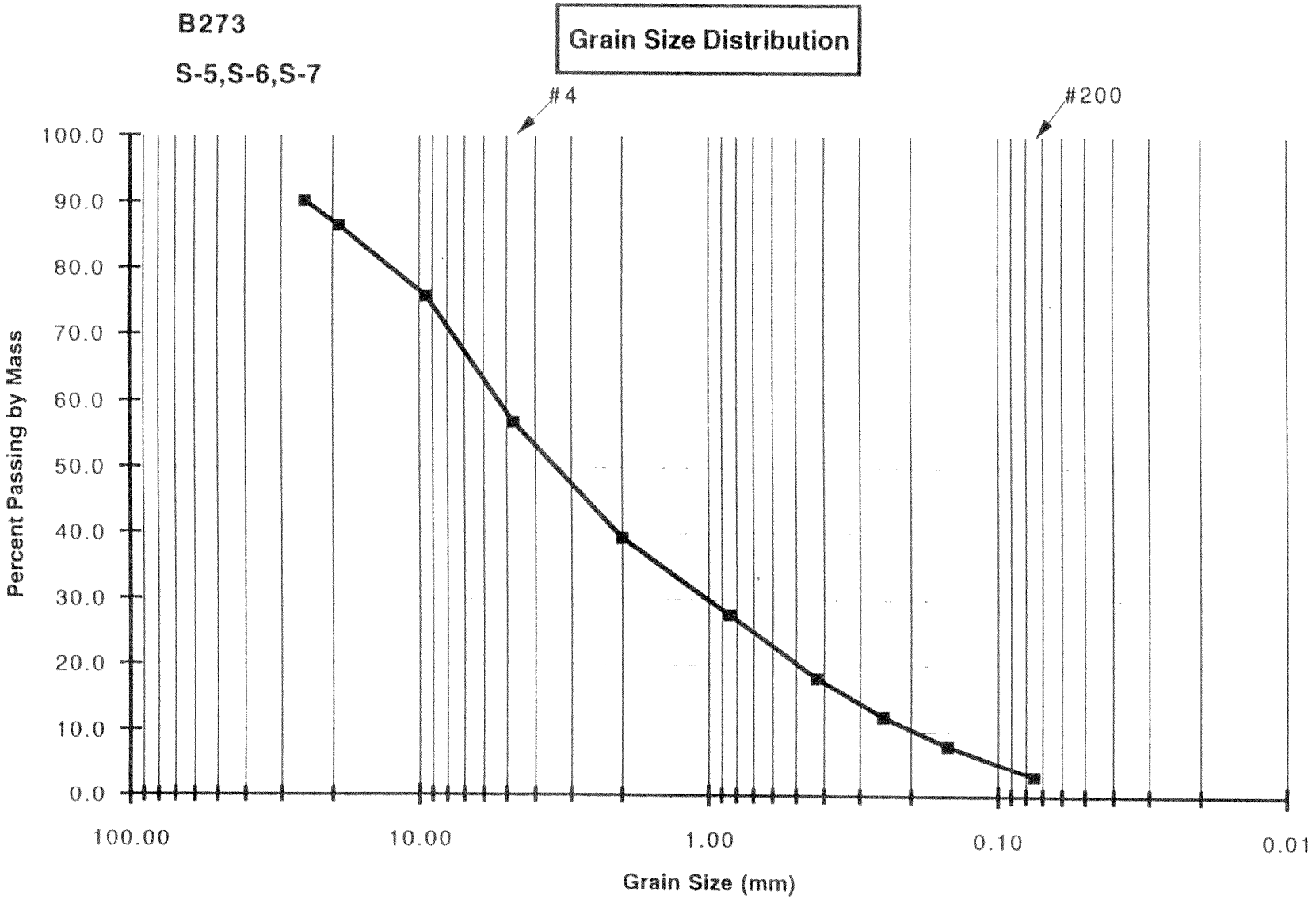
Mass Dish + Sample	1079.8
Mass of Dish	162.9
Mass Sample	916.9

BORING: B273
SAMPLE: S-5,S-6,S-7
FIELD DESCRIPTION: Gravel & Sand

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	903.2	812.7	90.5	9.9	90.1
3/4"	19.00	848.8	814.8	34.0	3.7	86.4
3/8"	9.5	943.1	845.1	98.0	10.7	75.7
4	4.750	989.4	816.4	173.0	18.9	56.9
10	2.000	874.0	711.9	162.1	17.7	39.2
20	0.850	735.4	629.1	106.3	11.6	27.6
40	0.425	645.0	555.7	89.3	9.7	17.9
60	0.250	578.6	525.9	52.7	5.7	12.1
100	0.150	552.9	512.6	40.3	4.4	7.7
200	0.075	533.4	491.3	42.1	4.6	3.1
PAN		517.8	492.0	25.8	2.8	0.0

% COBBLES	9.9
% GRAVEL	33.3
% SAND	53.7
% SILT & CLAY	2.8

GW


B273
S-5,S-6,S-7
Grain Size Distribution
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

Mass Dish + Sample	506.0
Mass of Dish	162.9
Mass Sample	343.1

BORING: B273
SAMPLE: S-8
FIELD DESCRIPTION: Brown Gravel, Some Sand

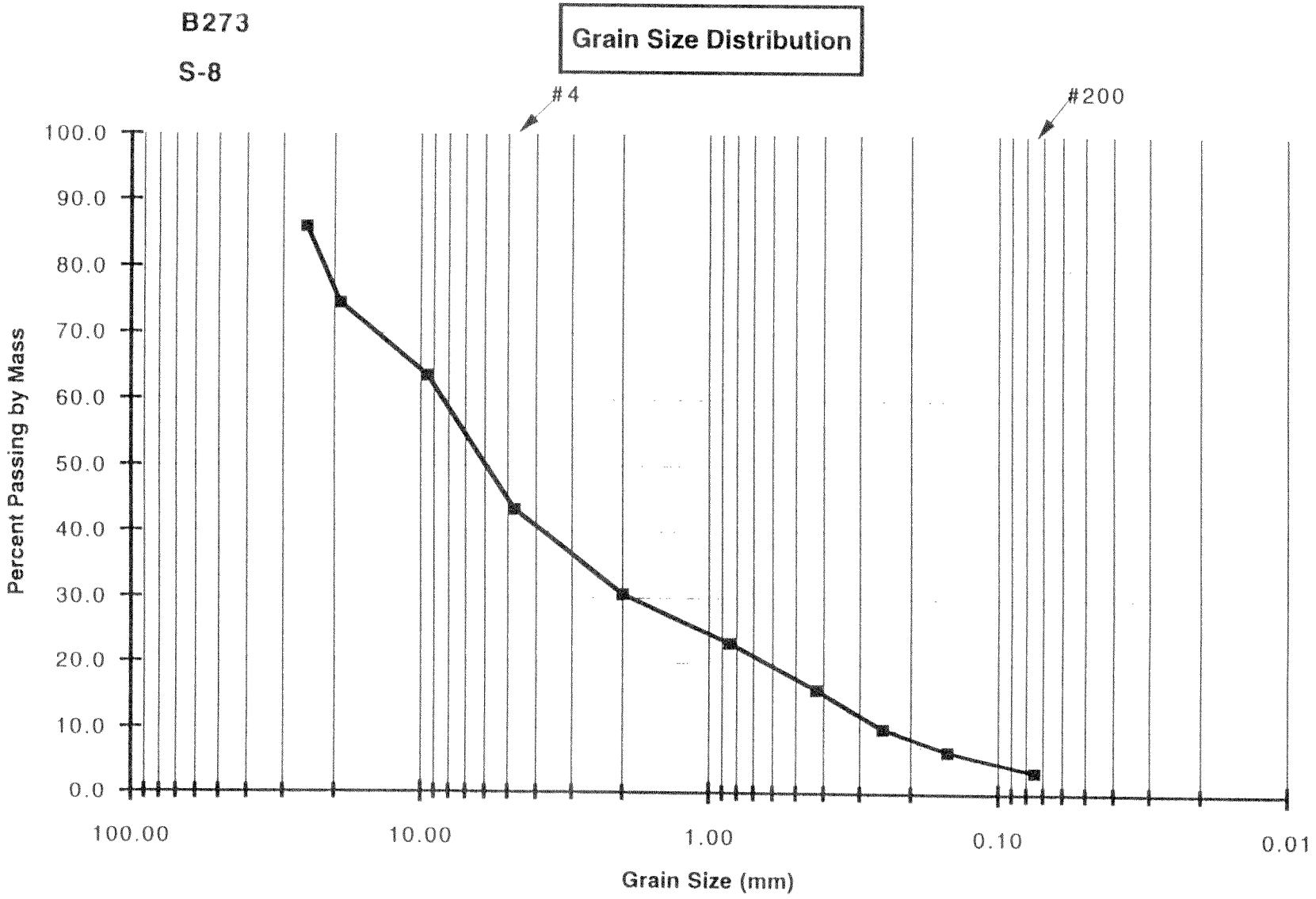
Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	861.1	812.7	48.4	14.1	85.9
3/4"	19.00	853.8	814.8	39.0	11.4	74.5
3/8"	9.5	882.7	845.1	37.6	11.0	63.6
4	4.750	885.9	816.4	69.5	20.3	43.3
10	2.000	756.0	711.9	44.1	12.9	30.5
20	0.850	654.7	629.1	25.6	7.5	23.0
40	0.425	580.3	555.7	24.6	7.2	15.8
60	0.250	545.7	525.9	19.8	5.8	10.1
100	0.150	524.3	512.6	11.7	3.4	6.6
200	0.075	502.0	491.3	10.7	3.1	3.5
PAN		501.6	492.0	9.6	2.8	0.0

% Cobbles	14.1
% GRAVEL	42.6
% SAND	39.8
% SILT & CLAY	2.8

GW

B273

S-8


Grain Size Distribution
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

Mass Dish + Sample	443.1
Mass of Dish	162.9
Mass Sample	280.2

BORING: B273
SAMPLE: S-9
FIELD DESCRIPTION: V. Fine Grey/Brown Silty Sand

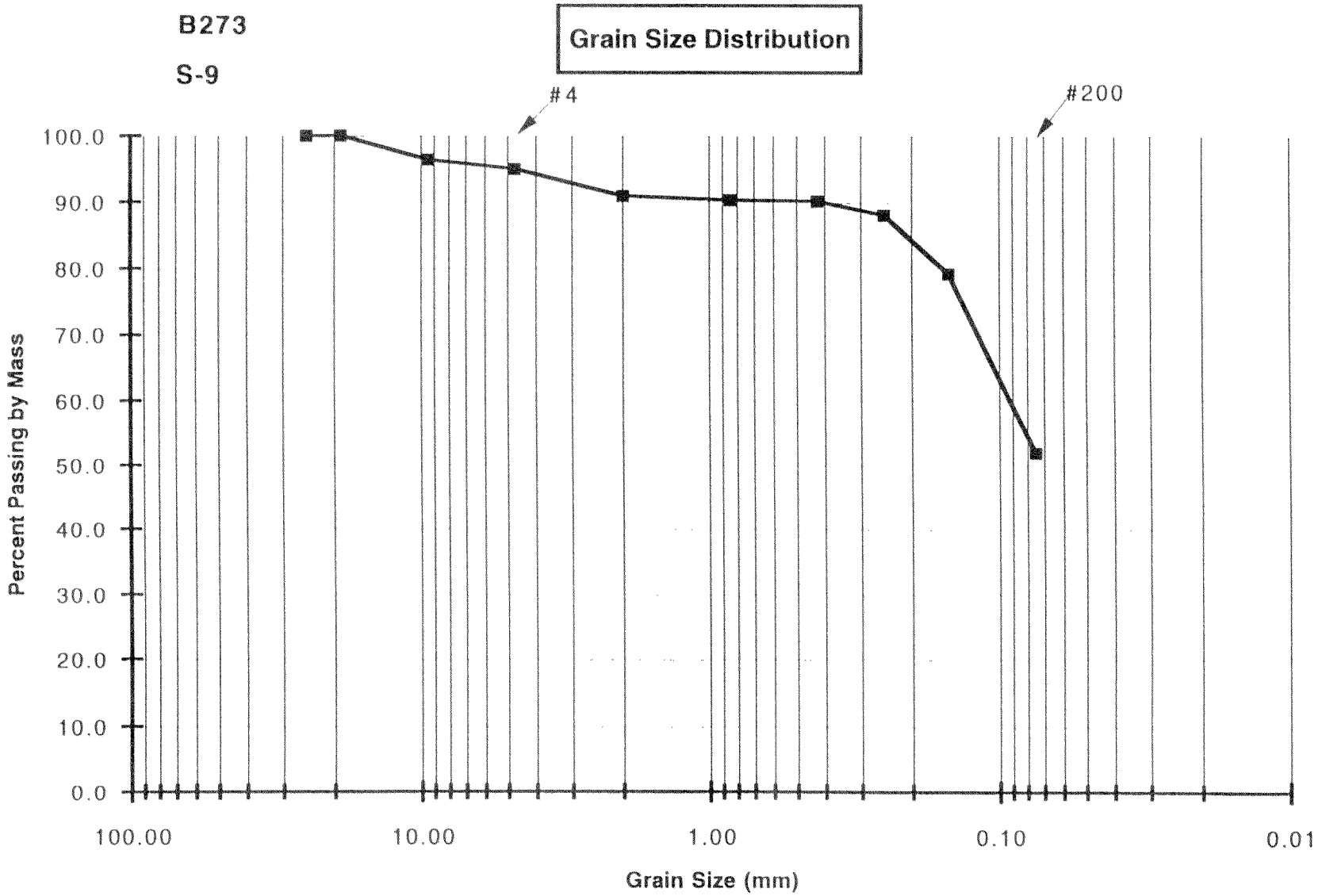
Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	812.7	812.7	0.0	0.0	100.0
3/4"	19.00	814.8	814.8	0.0	0.0	100.0
3/8"	9.5	855.1	845.1	10.0	3.6	96.4
4	4.750	820.3	816.4	3.9	1.4	95.0
10	2.000	723.3	711.9	11.4	4.1	91.0
20	0.850	630.9	629.1	1.8	0.6	90.3
40	0.425	556.3	555.7	0.6	0.2	90.1
60	0.250	531.7	525.9	5.8	2.1	88.0
100	0.150	537.3	512.6	24.7	8.8	79.2
200	0.075	567.8	491.3	76.5	27.3	51.9
PAN		634.5	492.0	142.5	50.9	0.0

% GRAVEL	5.0
% SAND	43.1
% SILT & CLAY	50.9

ML

B273

S-9


Grain Size Distribution
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

Mass Dish + Sample	393.5
Mass of Dish	162.9
Mass Sample	230.6

BORING: B273
SAMPLE: S-10
FIELD DESCRIPTION: Grey/Brown Gravel, Some Sand

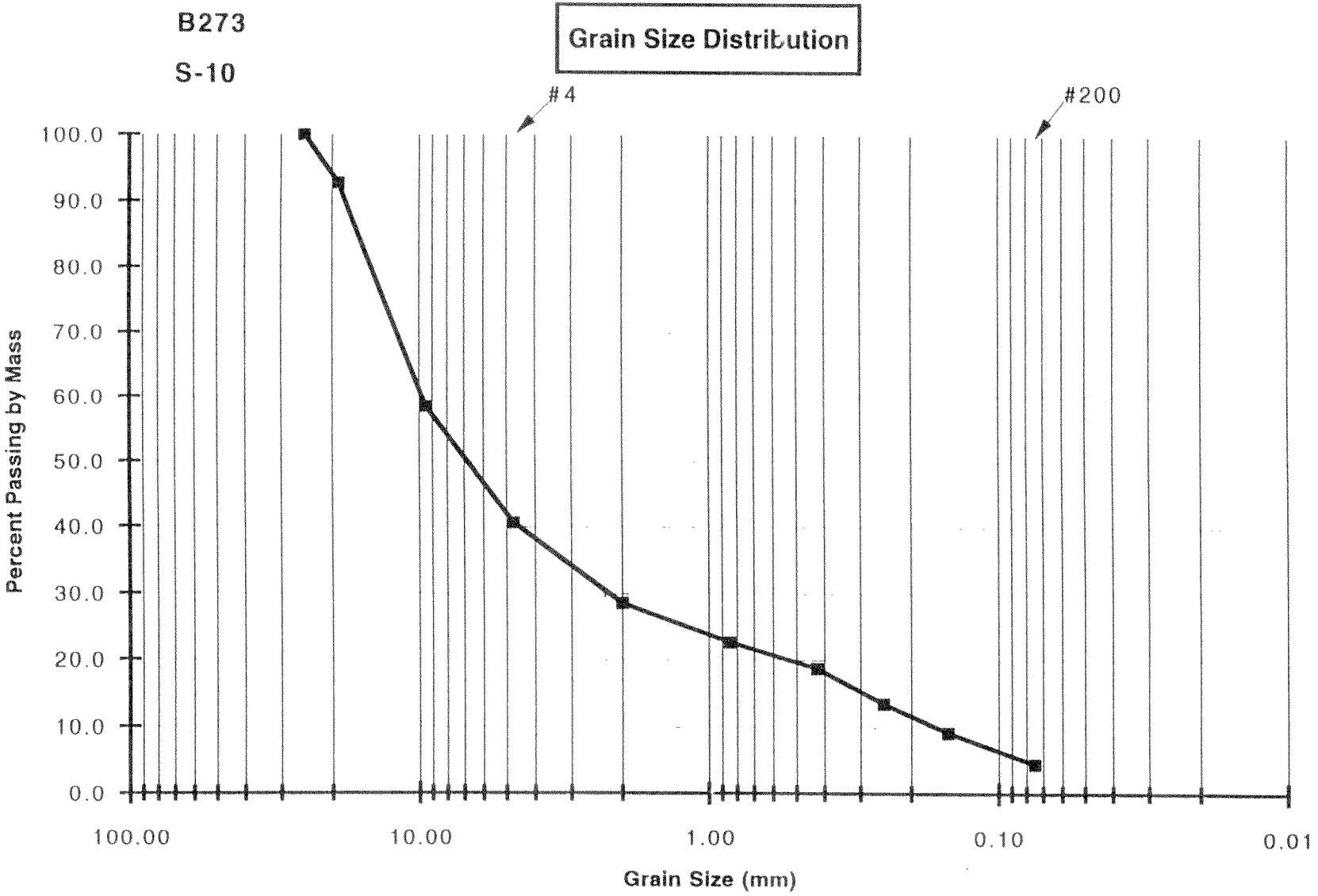
Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	812.7	812.7	0.0	0.0	100.0
3/4"	19.00	831.5	814.8	16.7	7.2	92.8
3/8"	9.5	924.1	845.1	79.0	34.3	58.5
4	4.750	857.7	816.4	41.3	17.9	40.6
10	2.000	739.7	711.9	27.8	12.1	28.5
20	0.850	642.9	629.1	13.8	6.0	22.5
40	0.425	564.7	555.7	9.0	3.9	18.6
60	0.250	538.0	525.9	12.1	5.2	13.4
100	0.150	522.4	512.6	9.8	4.2	9.2
200	0.075	502.1	491.3	10.8	4.7	4.5
PAN		499.9	492.0	7.9	3.4	0.0

% GRAVEL	59.4
% SAND	36.1
% SILT & CLAY	3.4

GW

B273

S-10


Grain Size Distribution
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

Mass Dish + Sample	730.7
Mass of Dish	162.9
Mass Sample	567.8

BORING: B274
SAMPLE: S-3,4
FIELD DESCRIPTION: Brown Sand, Gravel

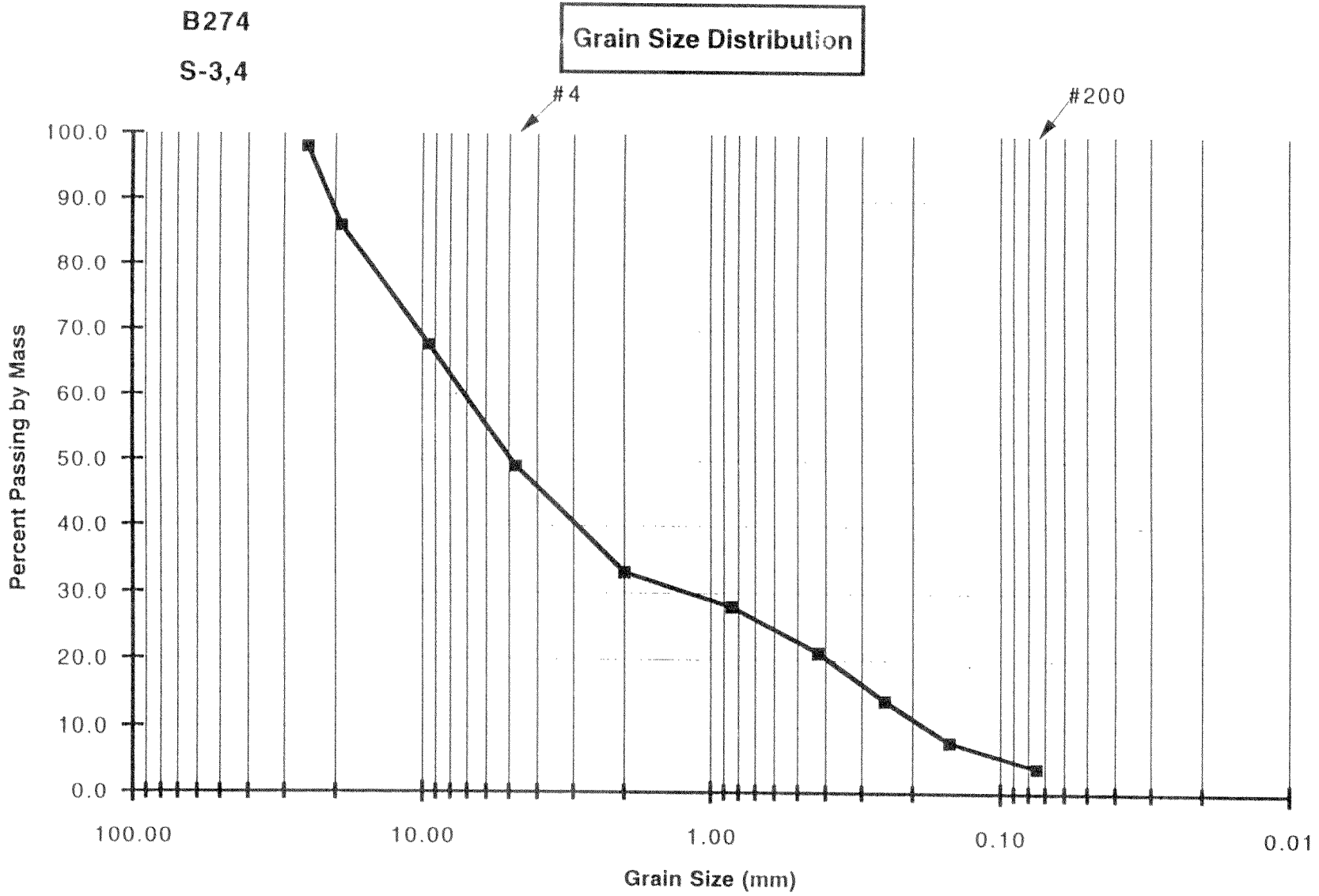
Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	823.6	812.7	10.9	1.9	98.1
3/4"	19.00	883.1	814.8	68.3	12.0	86.1
3/8"	9.5	949.2	845.1	104.1	18.3	67.7
4	4.750	922.4	816.4	106.0	18.7	49.0
10	2.000	803.1	711.9	91.2	16.1	33.0
20	0.850	658.0	629.1	28.9	5.1	27.9
40	0.425	594.9	555.7	39.2	6.9	21.0
60	0.250	566.2	525.9	40.3	7.1	13.9
100	0.150	546.6	512.6	34.0	6.0	7.9
200	0.075	513.5	491.3	22.2	3.9	4.0
PAN		512.6	492.0	20.6	3.6	0.0

% COBBLES	1.9
% GRAVEL	49.0
% SAND	45.1
% SILT & CLAY	3.6

GW

B274

S-3,4


Grain Size Distribution
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

Mass Dish + Sample	505.9
Mass of Dish	162.9
Mass Sample	343

BORING: B274
SAMPLE: S-5, Top
FIELD DESCRIPTION: Fine/Med. Brown Sand, Some Gravel

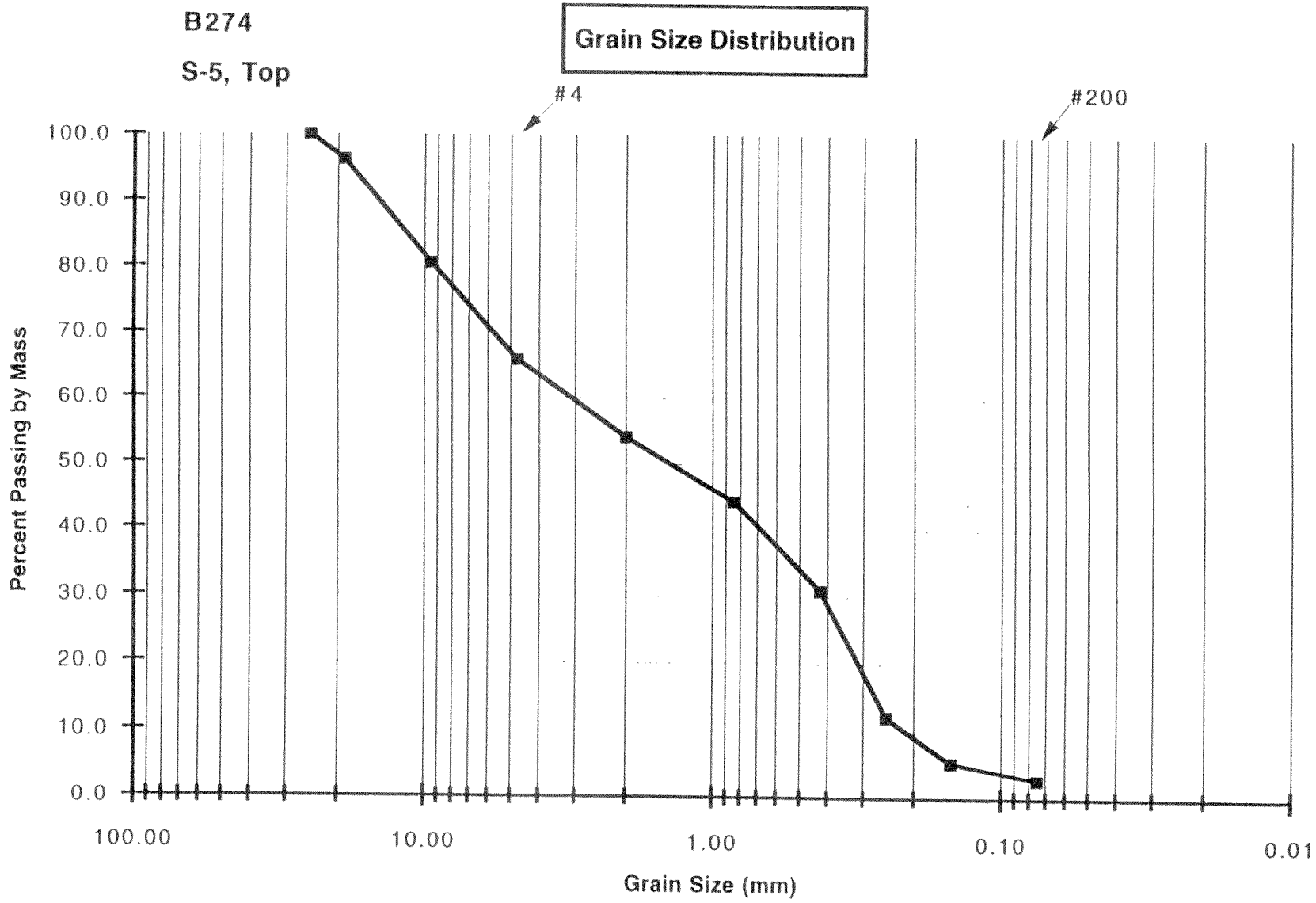
Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	812.7	812.7	0.0	0.0	100.0
3/4"	19.00	827.6	814.8	12.8	3.7	96.3
3/8"	9.5	899.1	845.1	54.0	15.7	80.5
4	4.750	866.9	816.4	50.5	14.7	65.8
10	2.000	752.3	711.9	40.4	11.8	54.0
20	0.850	663.0	629.1	33.9	9.9	44.1
40	0.425	601.5	555.7	45.8	13.4	30.8
60	0.250	589.6	525.9	63.7	18.6	12.2
100	0.150	535.9	512.6	23.3	6.8	5.4
200	0.075	500.1	491.3	8.8	2.6	2.9
PAN		499.5	492.0	7.5	2.2	0.0

% GRAVEL	34.2
% SAND	62.9
% SILT & CLAY	2.2

SP

B274

S-5, Top


Grain Size Distribution
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

Mass Dish + Sample	445.6
Mass of Dish	162.9
Mass Sample	282.7

BORING: B274
SAMPLE: S-5, Bottom
FIELD DESCRIPTION: Gravel, Sand

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	873.6	812.7	60.9	21.5	78.5
3/4"	19.00	863.3	814.8	48.5	17.2	61.3
3/8"	9.5	856.9	845.1	11.8	4.2	57.1
4	4.750	846.7	816.4	30.3	10.7	46.4
10	2.000	743.4	711.9	31.5	11.1	35.3
20	0.850	647.9	629.1	18.8	6.7	28.6
40	0.425	583.1	555.7	27.4	9.7	18.9
60	0.250	543.6	525.9	17.7	6.3	12.7
100	0.150	523.7	512.6	11.1	3.9	8.7
200	0.075	500.5	491.3	9.2	3.3	5.5
PAN		504.8	492.0	12.8	4.5	0.0

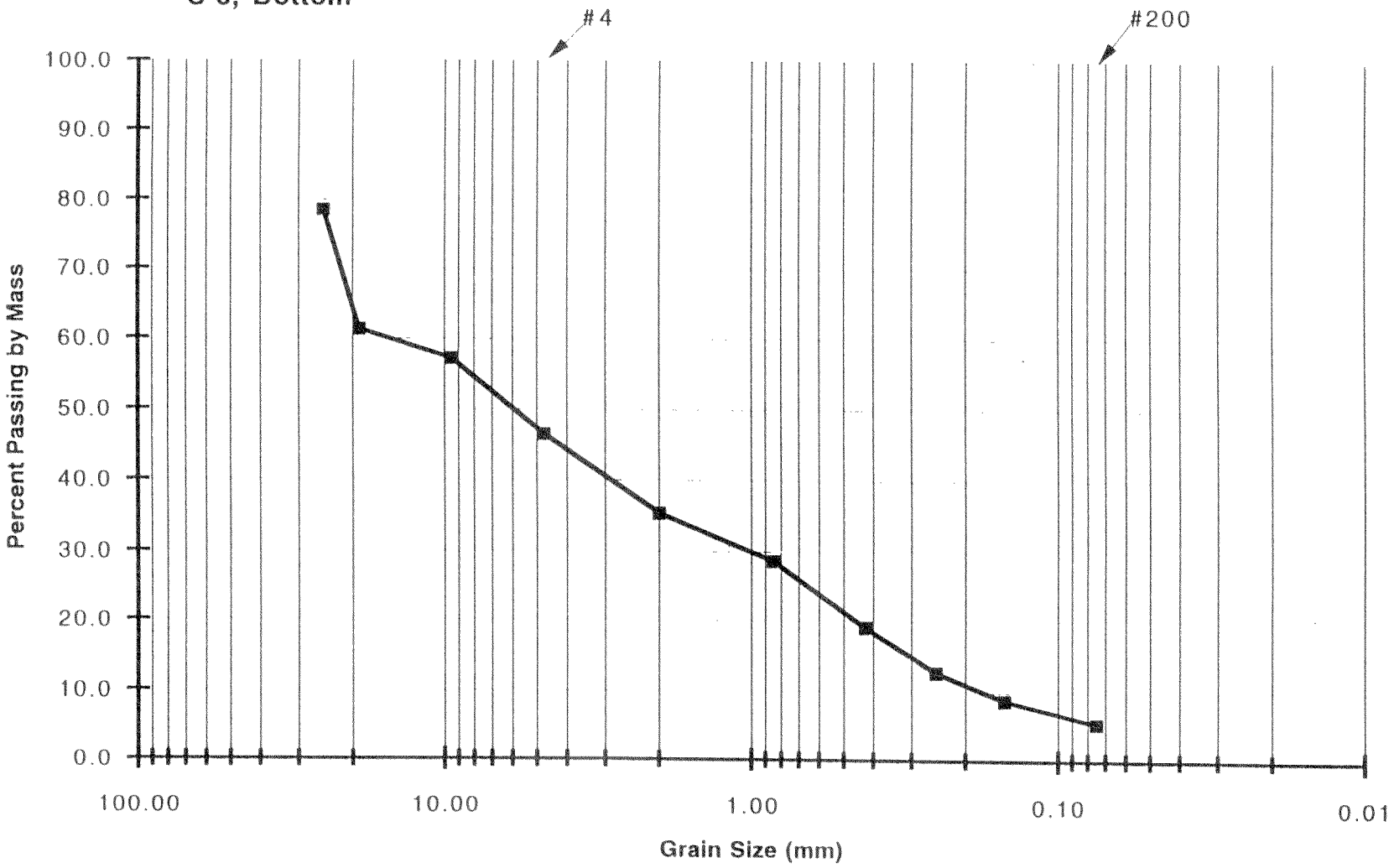
% COBBLES	21.5
% GRAVEL	32.0
% SAND	40.9
% SILT & CLAY	4.5

GP

B274

S-5, Bottom

Grain Size Distribution



Mass Dish + Sample	474.9
Mass of Dish	162.9
Mass Sample	312

BORING: B274
SAMPLE: S-6
FIELD DESCRIPTION: Grey/Brown Sandy Gravel

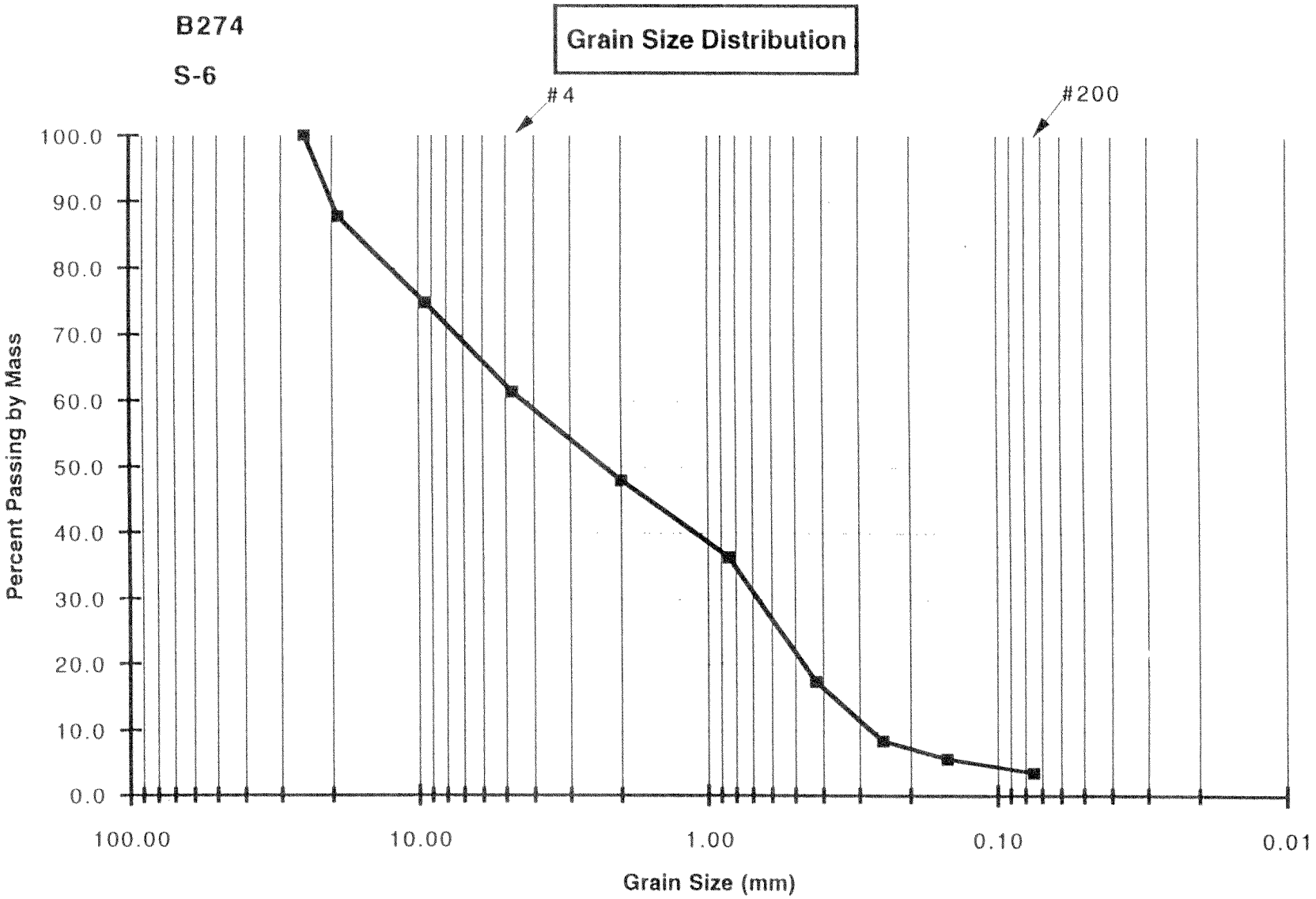
Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	812.7	812.7	0.0	0.0	100.0
3/4"	19.00	853.4	814.8	38.6	12.4	87.6
3/8"	9.5	885.2	845.1	40.1	12.9	74.8
4	4.750	858.3	816.4	41.9	13.4	61.3
10	2.000	753.9	711.9	42.0	13.5	47.9
20	0.850	665.0	629.1	35.9	11.5	36.4
40	0.425	615.0	555.7	59.3	19.0	17.4
60	0.250	553.5	525.9	27.6	8.8	8.5
100	0.150	521.3	512.6	8.7	2.8	5.7
200	0.075	498.0	491.3	6.7	2.1	3.6
PAN		500.6	492.0	8.6	2.8	0.0

% GRAVEL	38.7
% SAND	57.8
% SILT & CLAY	2.8

SP

B274

S-6


Grain Size Distribution
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

Mass Dish + Sample	484.0
Mass of Dish	162.9
Mass Sample	321.1

BORING: B274
SAMPLE: S-7
FIELD DESCRIPTION: Med. Grey Sand w/Gravel, Trace Clay

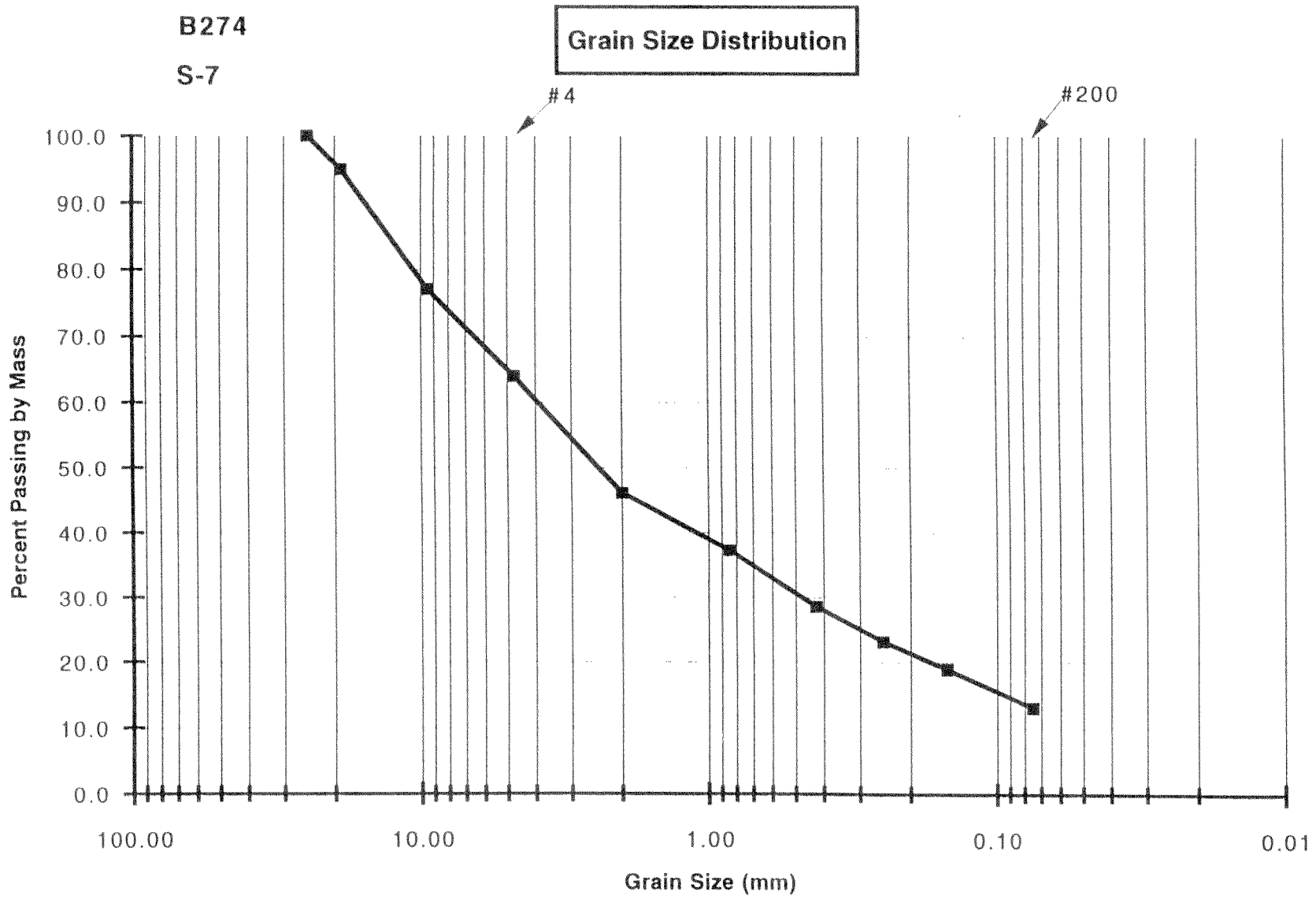
Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	812.7	812.7	0.0	0.0	100.0
3/4"	19.00	831	814.8	16.2	5.0	95.0
3/8"	9.5	902.8	845.1	57.7	18.0	77.0
4	4.750	858.3	816.4	41.9	13.0	63.9
10	2.000	769.3	711.9	57.4	17.9	46.1
20	0.850	657.4	629.1	28.3	8.8	37.2
40	0.425	583.6	555.7	27.9	8.7	28.6
60	0.250	543.7	525.9	17.8	5.5	23.0
100	0.150	526.0	512.6	13.4	4.2	18.8
200	0.075	510.0	491.3	18.7	5.8	13.0
PAN		531.1	492.0	39.1	12.2	0.0

% GRAVEL	36.1
% SAND	50.9
% SILT & CLAY	12.2

SM

B274

S-7


Grain Size Distribution
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

Mass Dish + Sample	504.8
Mass of Dish	162.9
Mass Sample	341.9

BORING: B274
SAMPLE: S-8
FIELD DESCRIPTION: Gravel, Trace Sand

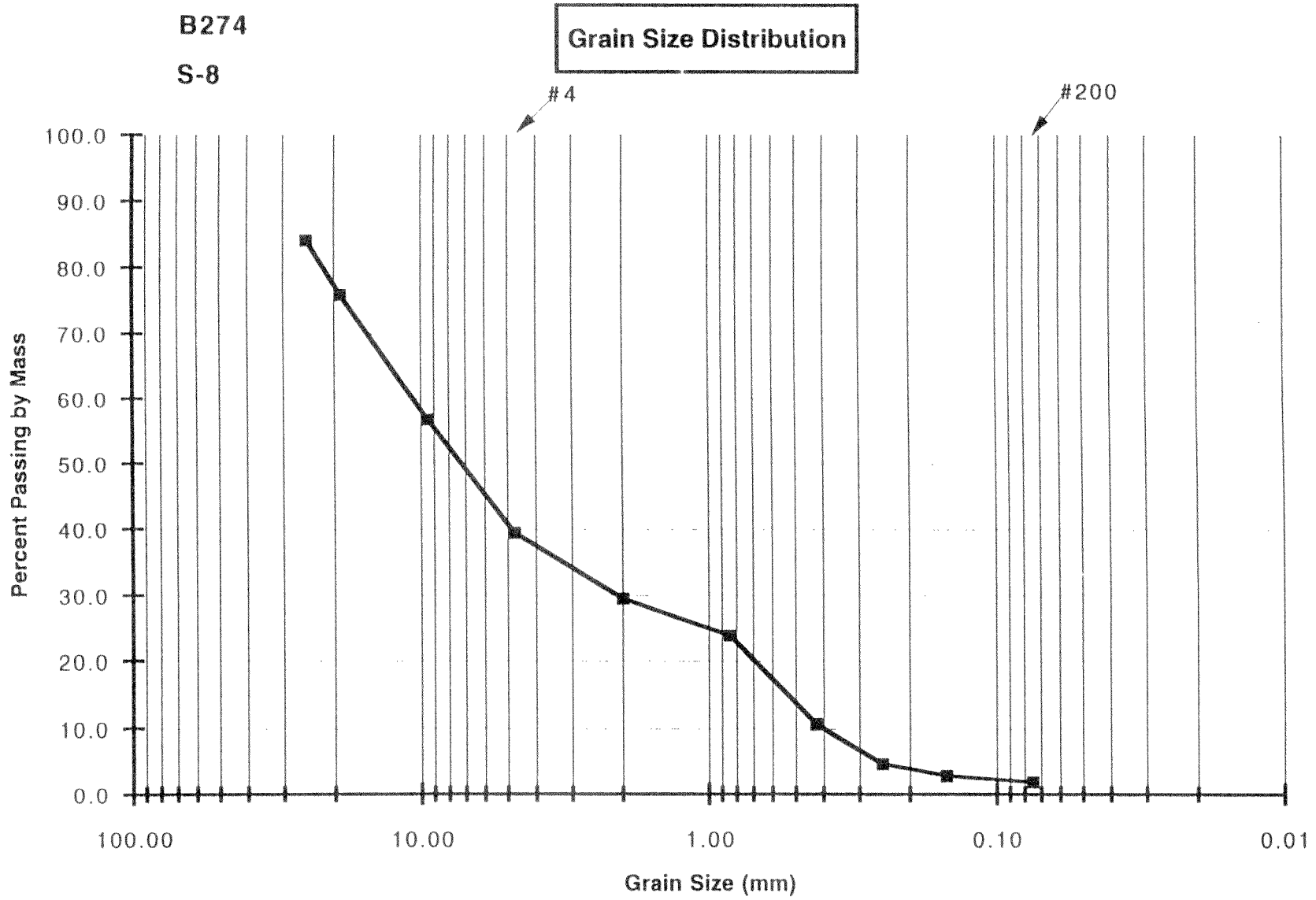
Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	867.3	812.7	54.6	16.0	84.0
3/4"	19.00	843.2	814.8	28.4	8.3	75.7
3/8"	9.5	910	845.1	64.9	19.0	56.7
4	4.750	875.6	816.4	59.2	17.3	39.4
10	2.000	745.9	711.9	34.0	9.9	29.5
20	0.850	648.6	629.1	19.5	5.7	23.8
40	0.425	600.6	555.7	44.9	13.1	10.6
60	0.250	546.6	525.9	20.7	6.1	4.6
100	0.150	518.8	512.6	6.2	1.8	2.8
200	0.075	494.5	491.3	3.2	0.9	1.8
PAN		495.8	492.0	3.8	1.1	0.0

% COBBLES	16.0
% GRAVEL	44.6
% SAND	37.6
% SILT & CLAY	1.1

GW

B274

S-8


Grain Size Distribution
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

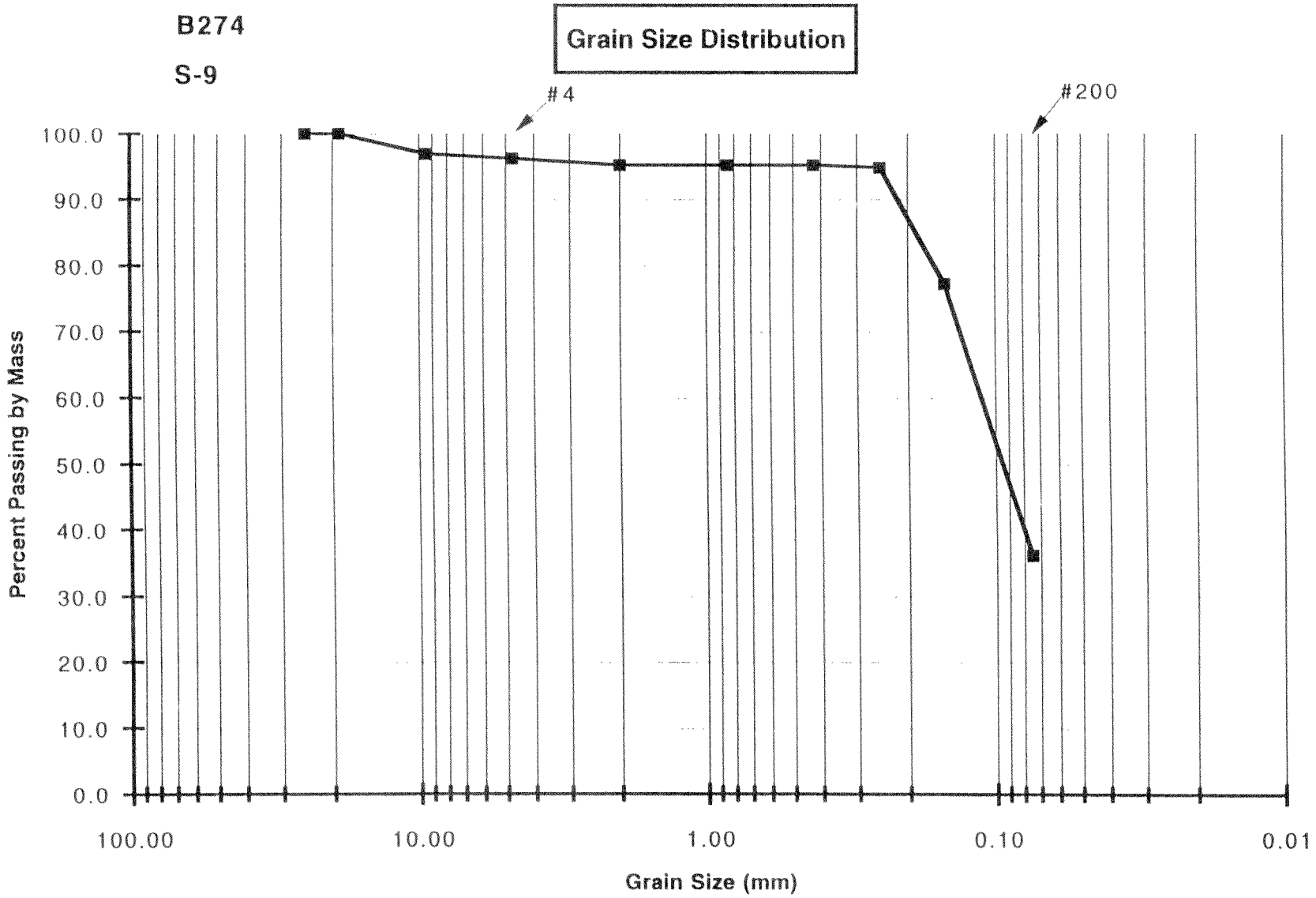
Mass Dish + Sample	473.2
Mass of Dish	162.9
Mass Sample	310.3

BORING: B274
SAMPLE: S-9
FIELD DESCRIPTION: V. Fine Grey/Brown Sand, Trace Silt

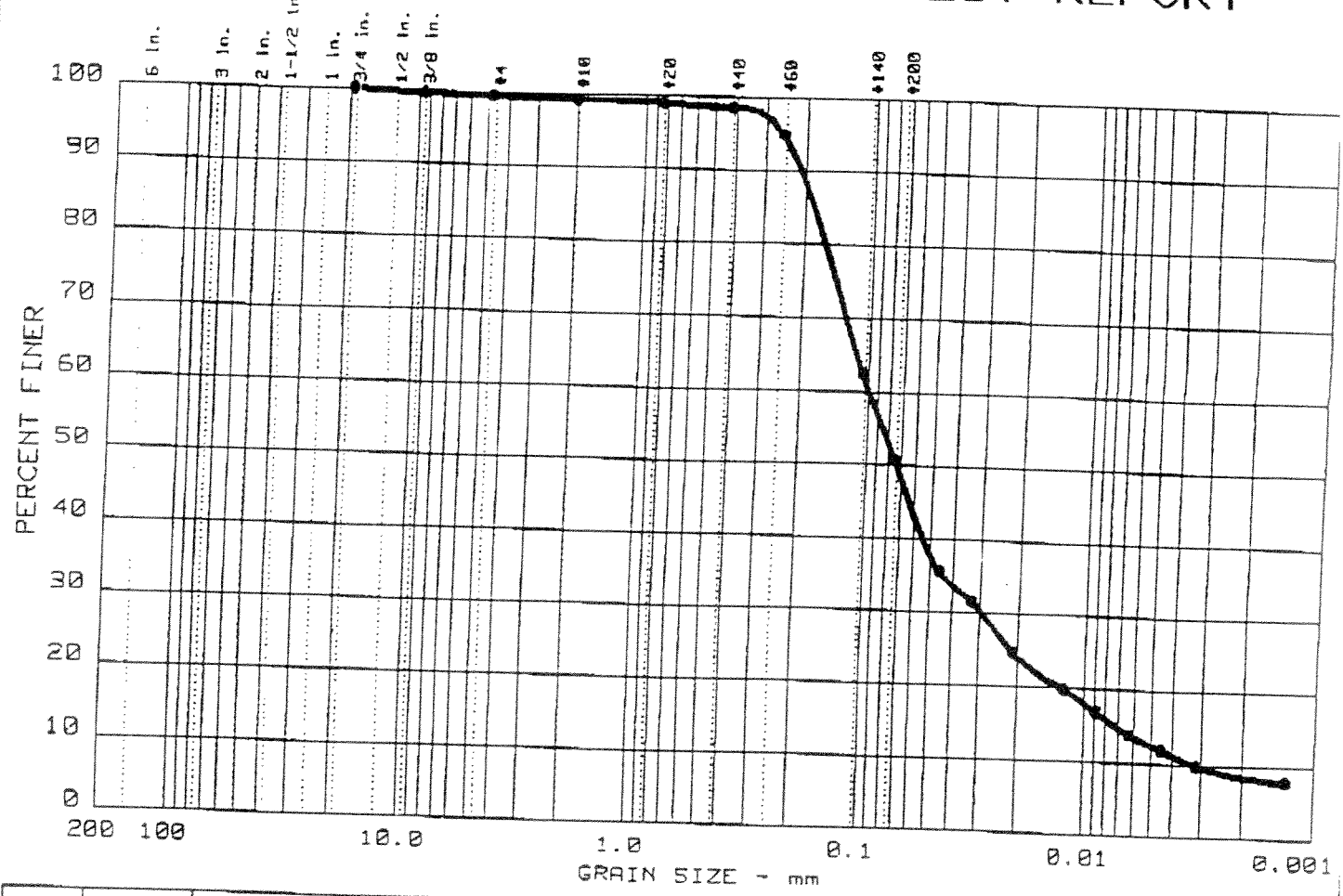
Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	812.7	812.7	0.0	0.0	100.0
3/4"	19.00	814.8	814.8	0.0	0.0	100.0
3/8"	9.5	854.9	845.1	9.8	3.2	96.8
4	4.750	818.4	816.4	2.0	0.6	96.2
10	2.000	715.1	711.9	3.2	1.0	95.2
20	0.850	629.1	629.1	0.0	0.0	95.2
40	0.425	555.7	555.7	0.0	0.0	95.2
60	0.250	527.2	525.9	1.3	0.4	94.7
100	0.150	567.2	512.6	54.6	17.6	77.2
200	0.075	618.5	491.3	127.2	41.0	36.2
PAN		601.0	492.0	109.0	35.1	0.0

% GRAVEL	3.8
% SAND	60.0
% SILT & CLAY	35.1

SM


B274
S-9
Grain Size Distribution
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+75 mm	% GRAVEL	% SAND	% SILT	% CLAY
●	B	0.0	0.6	48.8	38.1	12.5

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●	N\P	N\P	0.18	0.10	0.07	0.029	0.0073	0.0032	2.68	31.0

MATERIAL DESCRIPTION	USCS	AASHTO
● SANDY SILT	ML	

Project No.: 812-50351
Project: ALCOSAN
● Location: TB-242, 20.0'-22.0'

Date: 7-9-1996

Remarks:

RUST
North Tank
East Aeration

GRAIN SIZE DISTRIBUTION TEST REPORT
PSI, Inc.

Figure No.

Mass Dish + Sample	462.5
Mass of Dish	162.9
Mass Sample	299.6

BORING: B274
SAMPLE: S-10
FIELD DESCRIPTION: Grey/Brown Gravel

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	841.5	812.7	28.8	9.6	90.4
3/4"	19.00	836.1	814.8	21.3	7.1	83.3
3/8"	9.5	890.4	845.1	45.3	15.1	68.2
4	4.750	855.5	816.4	39.1	13.1	55.1
10	2.000	749.5	711.9	37.6	12.6	42.6
20	0.850	660.4	629.1	31.3	10.4	32.1
40	0.425	586.3	555.7	30.6	10.2	21.9
60	0.250	550.3	525.9	24.4	8.1	13.8
100	0.150	526.1	512.6	13.5	4.5	9.2
200	0.075	507.7	491.3	16.4	5.5	3.8
PAN		500.9	492.0	8.9	3.0	0.0

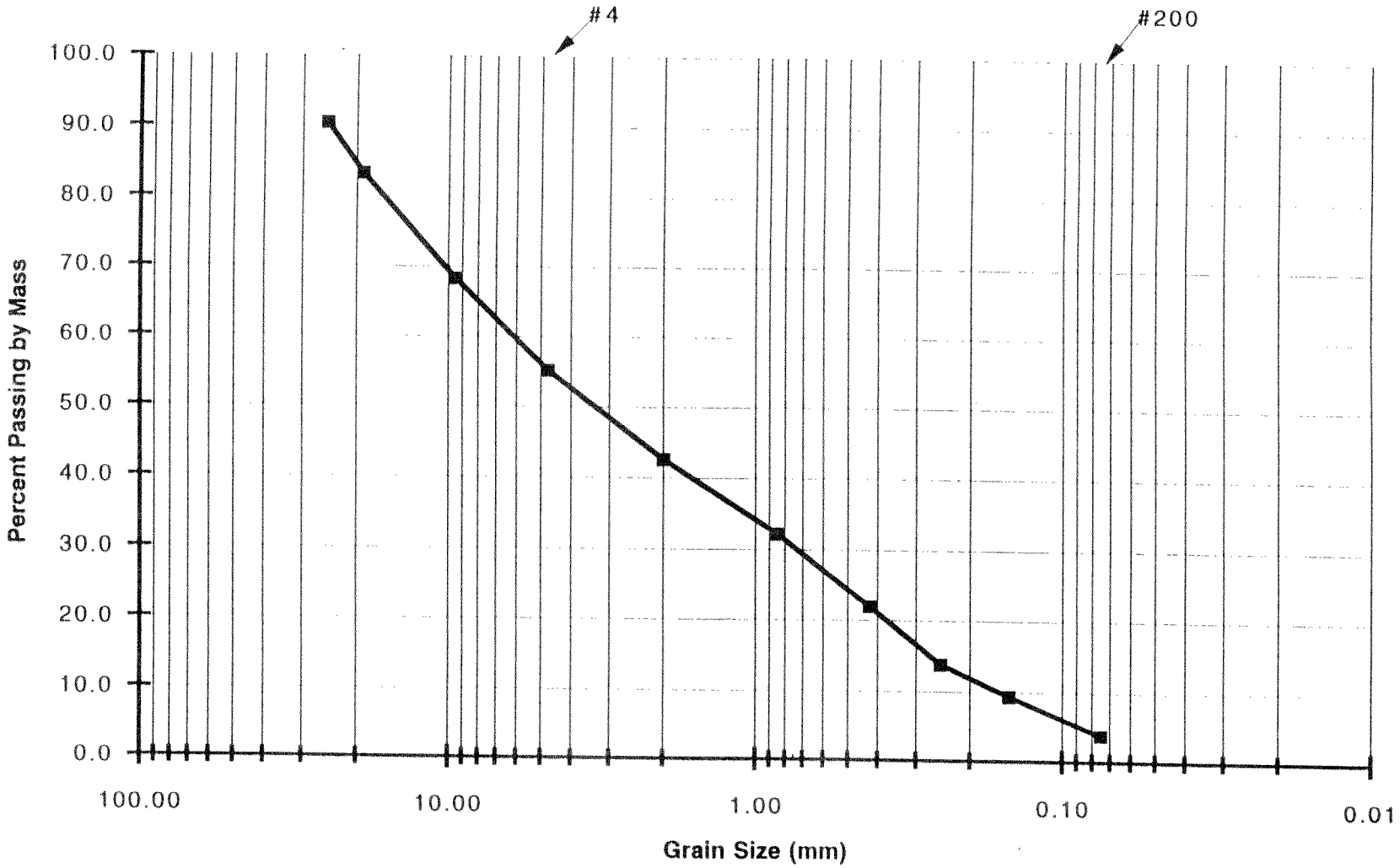
% COBBLES	9.6
% GRAVEL	35.3
% SAND	51.3
% SILT & CLAY	3.0

SP

B274

S-10

Grain Size Distribution



Mass Dish + Sample	404.0
Mass of Dish	162.9
Mass Sample	241.1

BORING: B276
SAMPLE: S-4
FIELD DESCRIPTION: Gravel

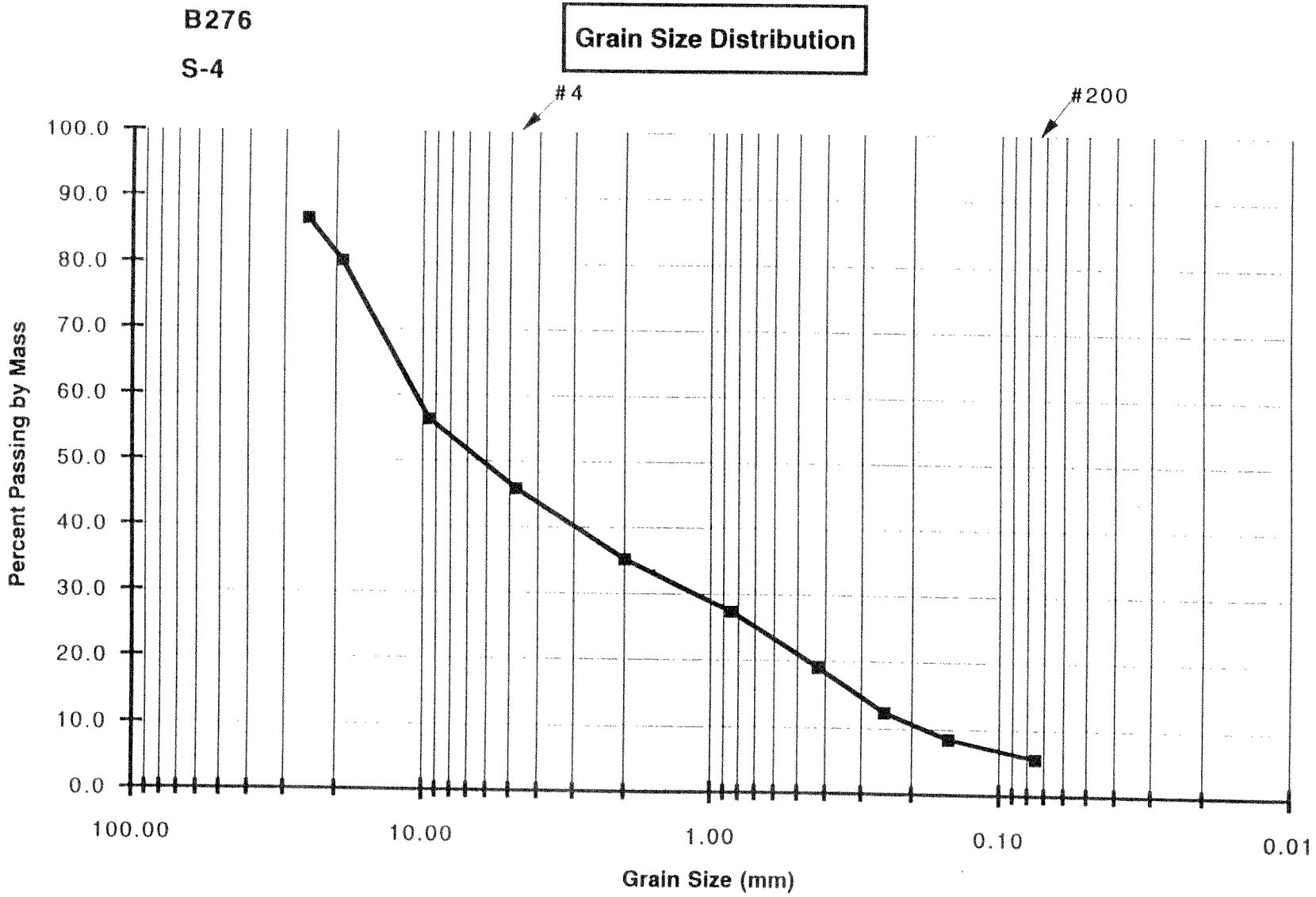
Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	845	812.7	32.3	13.4	86.6
3/4"	19.00	830.2	814.8	15.4	6.4	80.2
3/8"	9.5	902.8	845.1	57.7	23.9	56.3
4	4.750	841.7	816.4	25.3	10.5	45.8
10	2.000	737.6	711.9	25.7	10.7	35.1
20	0.850	648.1	629.1	19.0	7.9	27.3
40	0.425	575.9	555.7	20.2	8.4	18.9
60	0.250	541.8	525.9	15.9	6.6	12.3
100	0.150	521.9	512.6	9.3	3.9	8.4
200	0.075	498.1	491.3	6.8	2.8	5.6
PAN		503.2	492.0	11.2	4.6	0.0

% Cobbles	13.4
% GRAVEL	40.8
% SAND	40.2
% SILT & CLAY	4.6

GP

B276

S-4


Grain Size Distribution
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

Mass Dish + Sample	439.5
Mass of Dish	162.9
Mass Sample	276.6

BORING: B276
SAMPLE: S-5
FIELD DESCRIPTION: Fine/Med. Black Sand

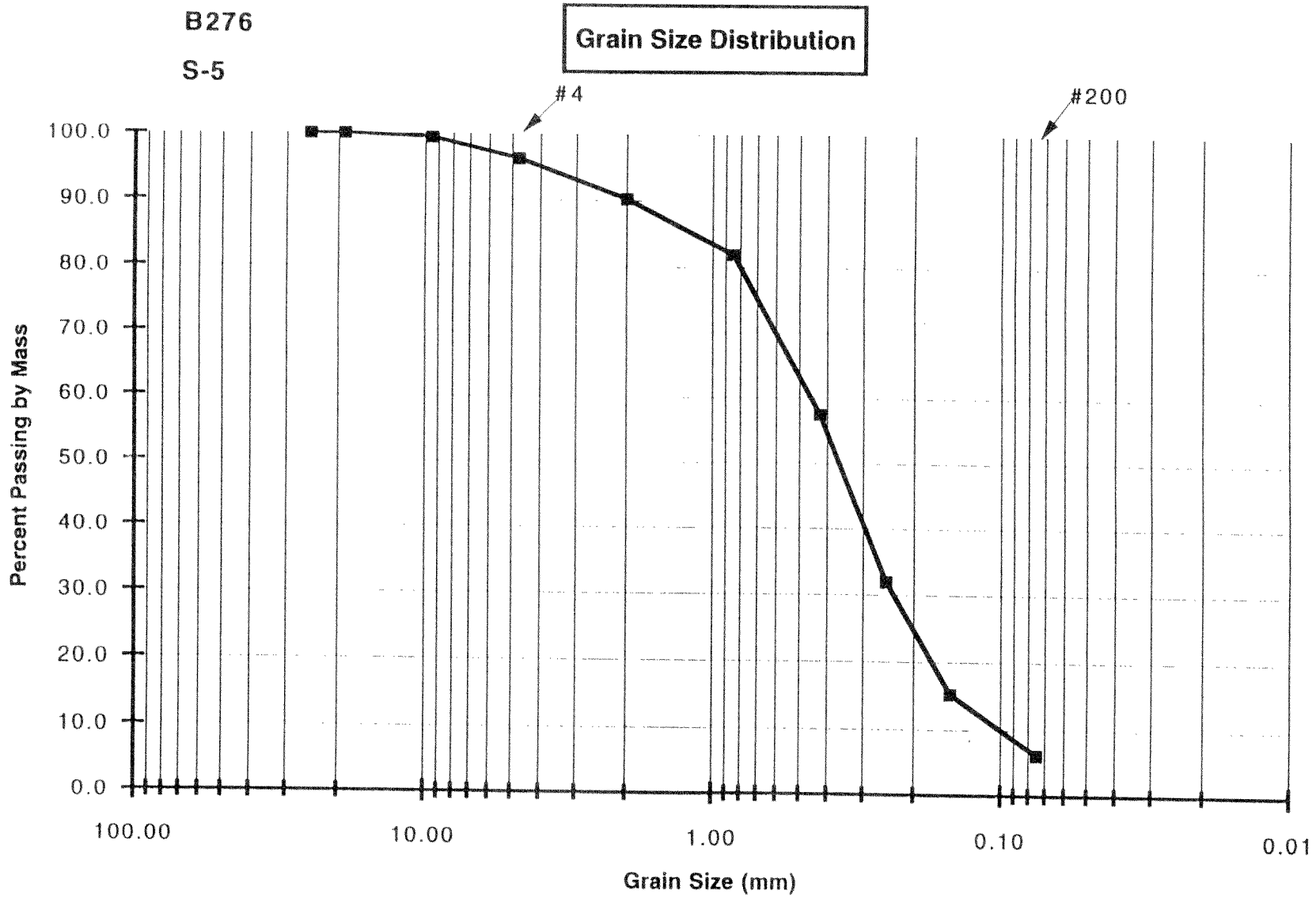
Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	812.7	812.7	0.0	0.0	100.0
3/4"	19.00	814.8	814.8	0.0	0.0	100.0
3/8"	9.5	846.8	845.1	1.7	0.6	99.4
4	4.750	825.0	816.4	8.6	3.1	96.3
10	2.000	728.9	711.9	17.0	6.1	90.1
20	0.850	652.0	629.1	22.9	8.3	81.9
40	0.425	623.1	555.7	67.4	24.4	57.5
60	0.250	596.8	525.9	70.9	25.6	31.9
100	0.150	558.9	512.6	46.3	16.7	15.1
200	0.075	515.9	491.3	24.6	8.9	6.2
PAN		506.4	492.0	14.4	5.2	0.0

% GRAVEL	3.7
% SAND	90.1
% SILT & CLAY	5.2

SP

B276

S-5


Grain Size Distribution
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

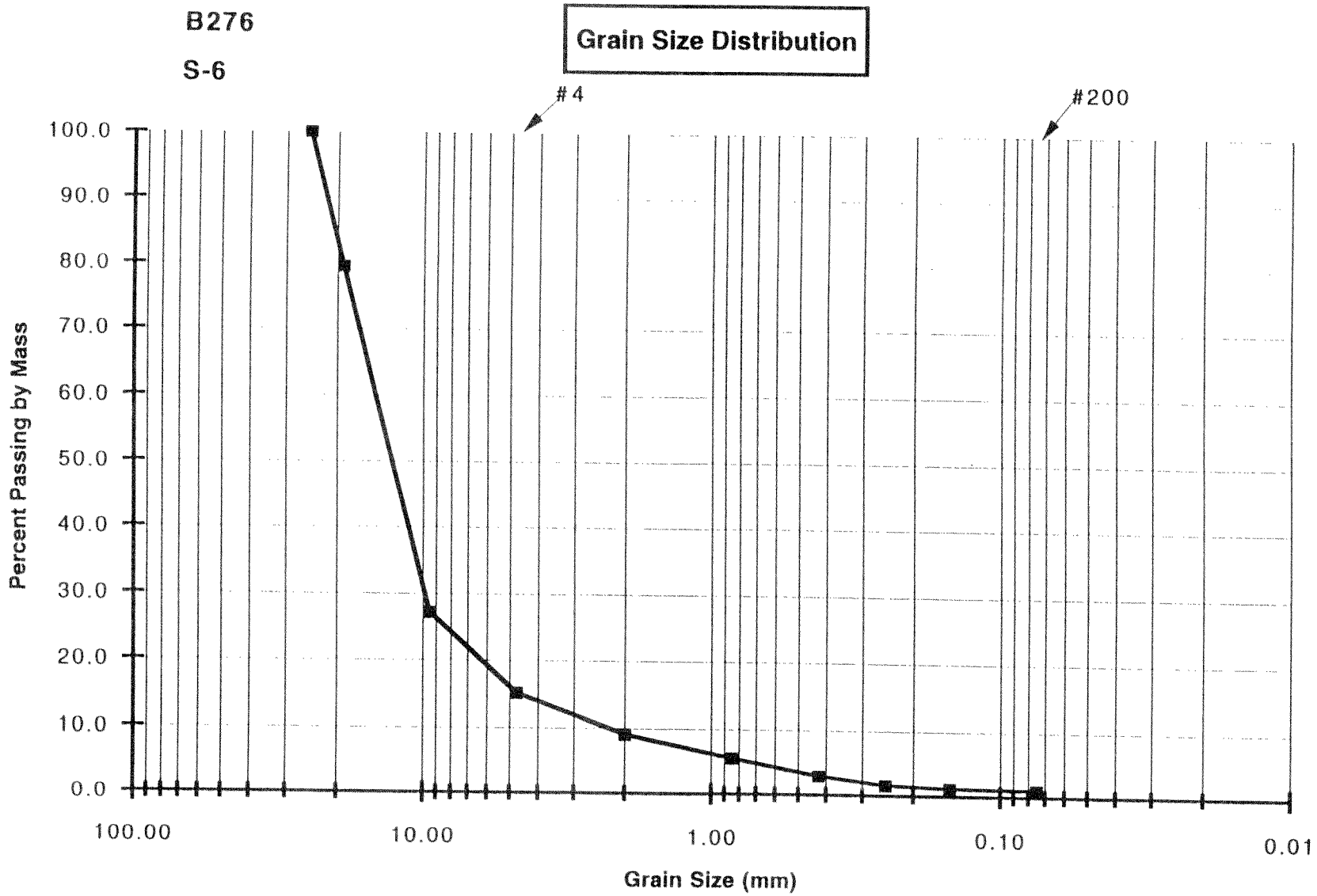
Mass Dish + Sample	449.9
Mass of Dish	162.9
Mass Sample	287

BORING: B276
SAMPLE: S-6
FIELD DESCRIPTION: Large Gravel

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	812.7	812.7	0.0	0.0	100.0
3/4"	19.00	873.7	814.8	58.9	20.5	79.5
3/8"	9.5	995.4	845.1	150.3	52.4	27.1
4	4.750	850.9	816.4	34.5	12.0	15.1
10	2.000	729.3	711.9	17.4	6.1	9.0
20	0.850	639.0	629.1	9.9	3.4	5.6
40	0.425	563.2	555.7	7.5	2.6	3.0
60	0.250	529.8	525.9	3.9	1.4	1.6
100	0.150	513.7	512.6	1.1	0.4	1.2
200	0.075	491.8	491.3	0.5	0.2	1.0
PAN		492.9	492.0	0.9	0.3	0.0

% GRAVEL	84.9
% SAND	14.0
% SILT & CLAY	0.3

GP


B276
S-6
Grain Size Distribution
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

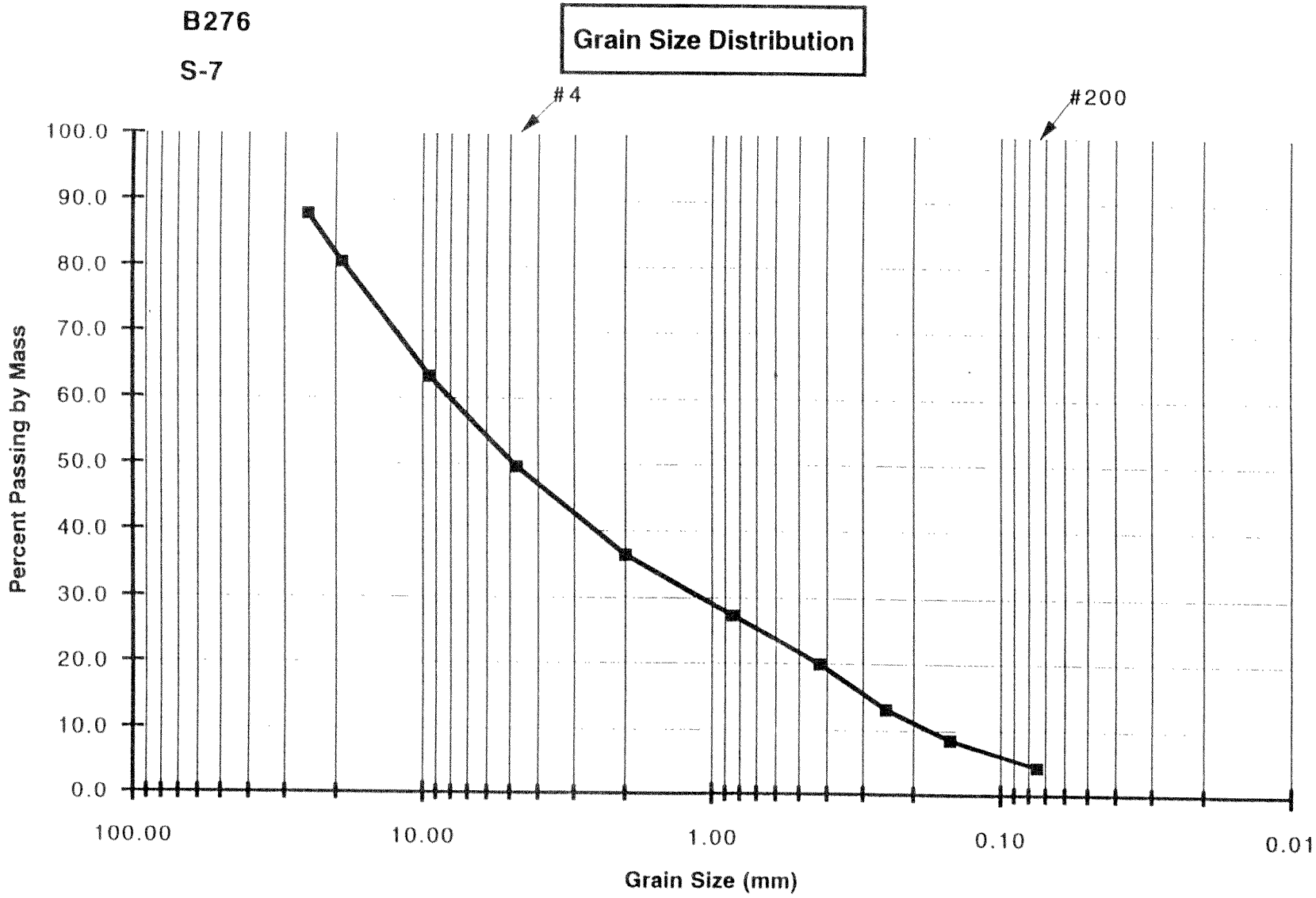
Mass Dish + Sample	527.3
Mass of Dish	162.9
Mass Sample	364.4

BORING: B276
SAMPLE: S-7
FIELD DESCRIPTION: Brown Gravel, Some Sand

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	857	812.7	44.3	12.2	87.8
3/4"	19.00	841.3	814.8	26.5	7.3	80.6
3/8"	9.5	908.4	845.1	63.3	17.4	63.2
4	4.750	866.1	816.4	49.7	13.6	49.6
10	2.000	760.1	711.9	48.2	13.2	36.3
20	0.850	662.0	629.1	32.9	9.0	27.3
40	0.425	582.9	555.7	27.2	7.5	19.8
60	0.250	550.8	525.9	24.9	6.8	13.0
100	0.150	529.1	512.6	16.5	4.5	8.5
200	0.075	506.4	491.3	15.1	4.1	4.3
PAN		505.4	492.0	13.4	3.7	0.0

% COBBLES	12.2
% GRAVEL	38.3
% SAND	45.2
% SILT & CLAY	3.7

GP


B276
S-7
Grain Size Distribution
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

Mass Dish + Sample	380.0
Mass of Dish	162.9
Mass Sample	217.1

BORING: B276
SAMPLE: S-8
FIELD DESCRIPTION: Brown/Tan Sand and Gravel

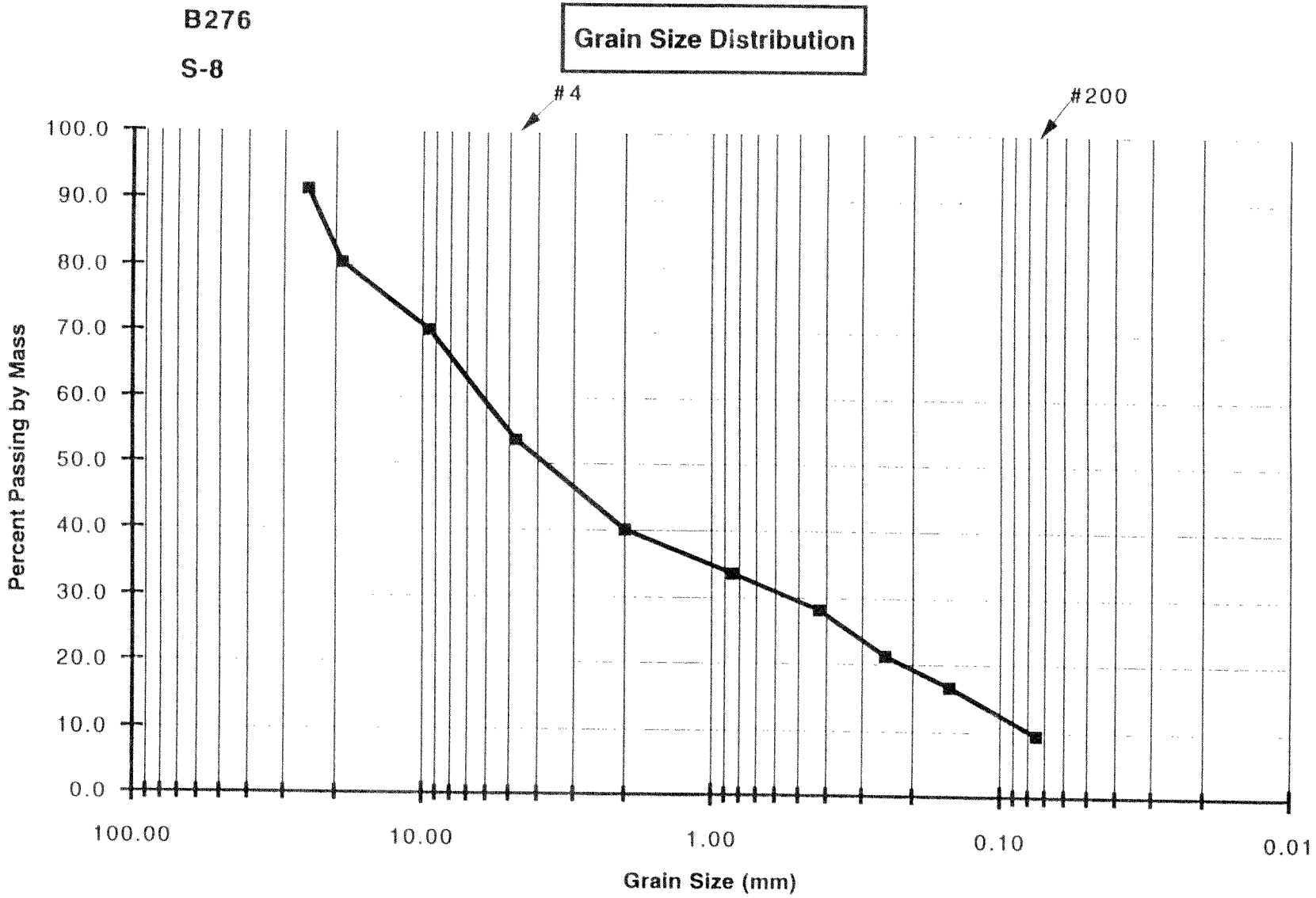
Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	831.7	812.7	19.0	8.8	91.2
3/4"	19.00	838.4	814.8	23.6	10.9	80.4
3/8"	9.5	867.3	845.1	22.2	10.2	70.2
4	4.750	852.4	816.4	36.0	16.6	53.6
10	2.000	741.3	711.9	29.4	13.5	40.0
20	0.850	643.3	629.1	14.2	6.5	33.5
40	0.425	567.4	555.7	11.7	5.4	28.1
60	0.250	540.9	525.9	15.0	6.9	21.2
100	0.150	522.9	512.6	10.3	4.7	16.4
200	0.075	506.5	491.3	15.2	7.0	9.4
PAN		510.1	492.0	18.1	8.3	0.0

% COBBLES	8.8
% GRAVEL	37.7
% SAND	44.1
% SILT & CLAY	8.3

SP - SM

B276

S-8


Grain Size Distribution
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

Mass Dish + Sample	378.3
Mass of Dish	162.9
Mass Sample	215.4

BORING: B276
SAMPLE: S-9
FIELD DESCRIPTION: Grey/Brown Sandstone and Gravel

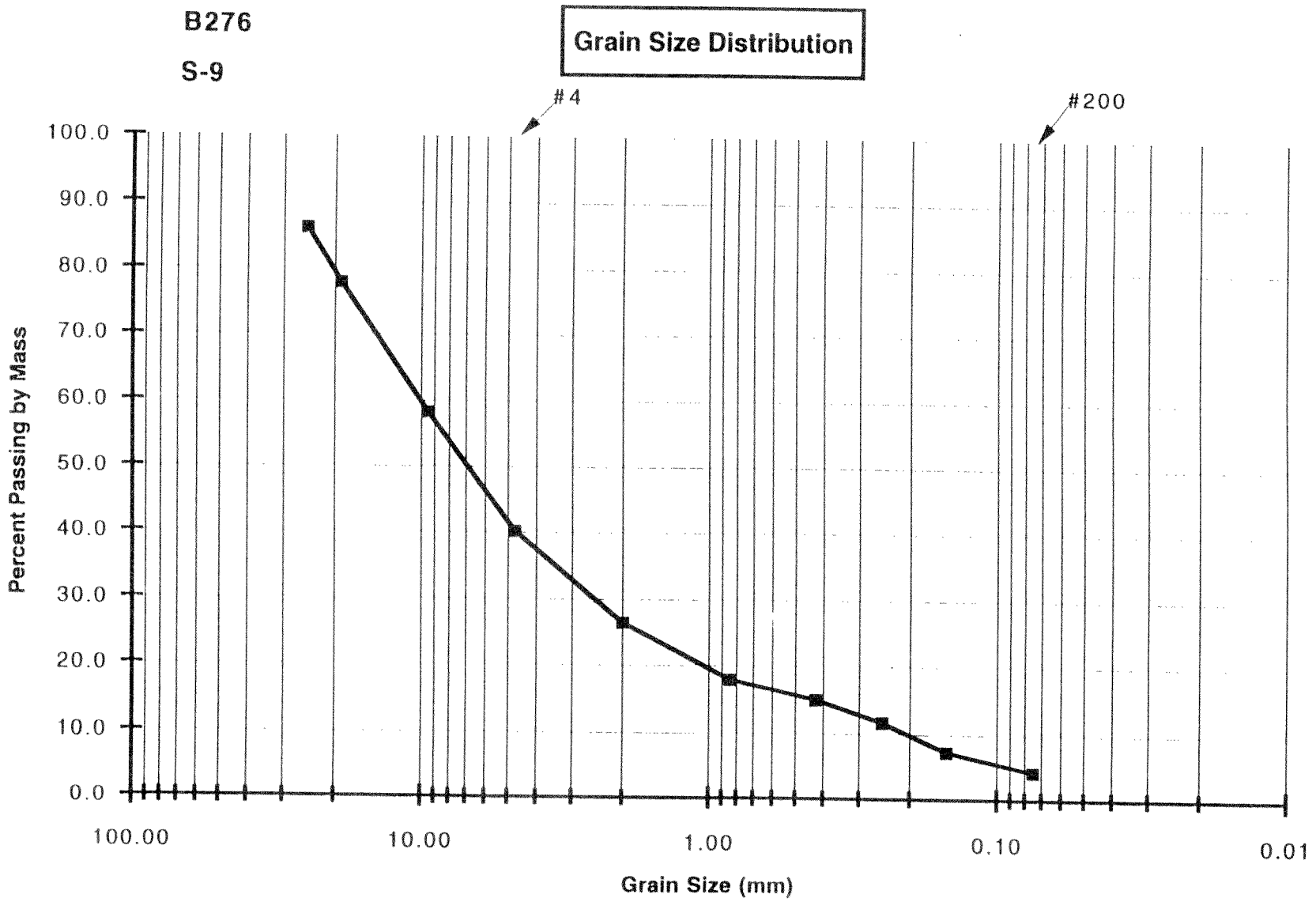
Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	842.7	812.7	30.0	13.9	86.1
3/4"	19.00	832.7	814.8	17.9	8.3	77.8
3/8"	9.5	887.1	845.1	42.0	19.5	58.3
4	4.750	855.6	816.4	39.2	18.2	40.1
10	2.000	741.3	711.9	29.4	13.6	26.4
20	0.850	647.7	629.1	18.6	8.6	17.8
40	0.425	561.8	555.7	6.1	2.8	14.9
60	0.250	533.0	525.9	7.1	3.3	11.7
100	0.150	522.1	512.6	9.5	4.4	7.2
200	0.075	497.7	491.3	6.4	3.0	4.3
PAN		498.9	492.0	6.9	3.2	0.0

% COBBLES	13.9
% GRAVEL	46.0
% SAND	35.8
% SILT & CLAY	3.2

GP

B276

S-9


Grain Size Distribution
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

Mass Dish + Sample	322.9
Mass of Dish	162.9
Mass Sample	160

BORING: B277
SAMPLE: S-5
FIELD DESCRIPTION: Grey Sandy Gravel, Traces of Wood

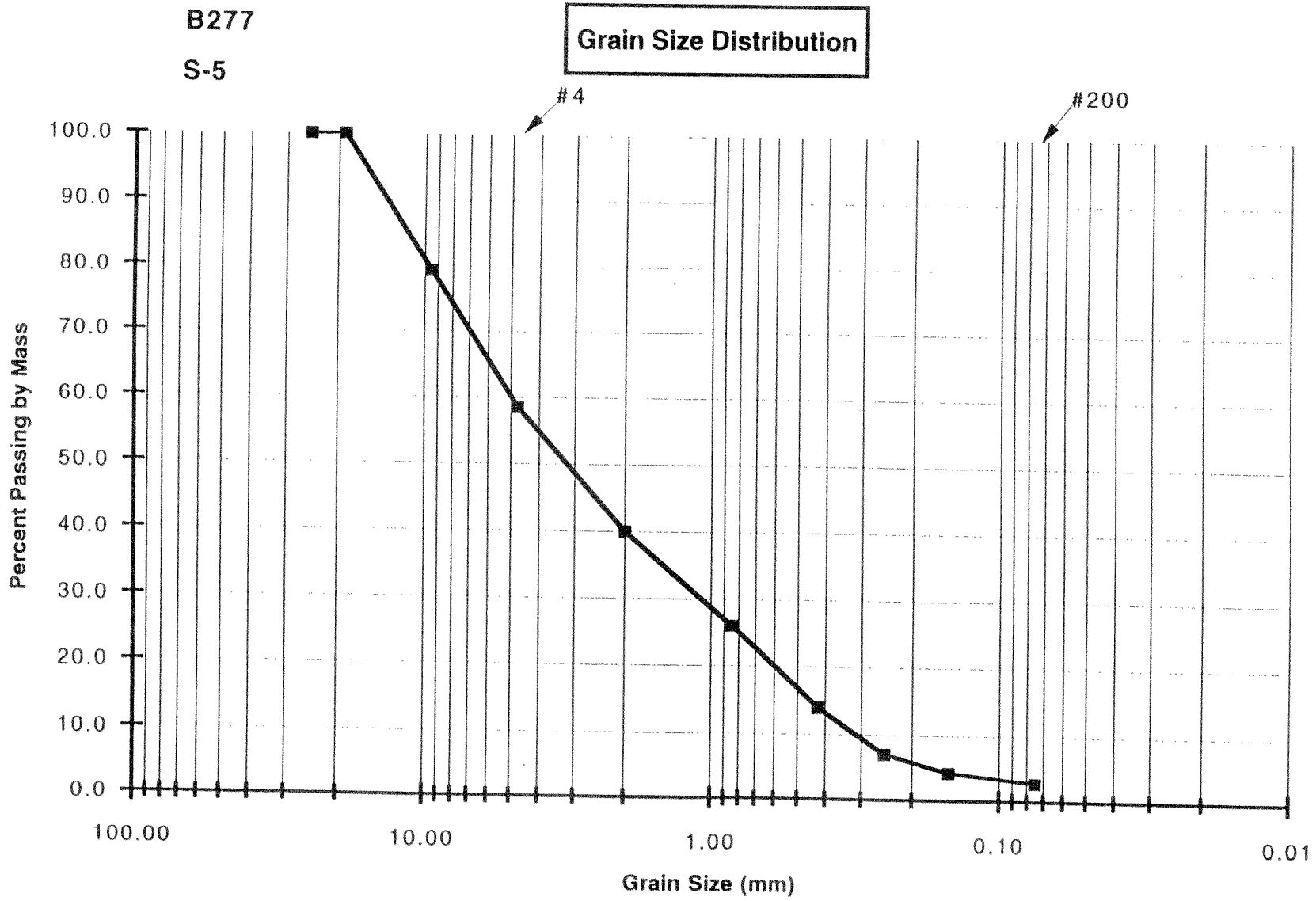
Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	812.7	812.7	0.0	0.0	100.0
3/4"	19.00	814.8	814.8	0.0	0.0	100.0
3/8"	9.5	878.2	845.1	33.1	20.7	79.3
4	4.750	849.7	816.4	33.3	20.8	58.5
10	2.000	741.6	711.9	29.7	18.6	39.9
20	0.850	651.5	629.1	22.4	14.0	25.9
40	0.425	575.1	555.7	19.4	12.1	13.8
60	0.250	536.8	525.9	10.9	6.8	7.0
100	0.150	517.0	512.6	4.4	2.7	4.2
200	0.075	493.6	491.3	2.3	1.4	2.8
PAN		494.0	492.0	2.0	1.3	0.0

% GRAVEL	41.5
% SAND	55.7
% SILT & CLAY	1.3

SP

B277

S-5


Grain Size Distribution
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

Mass Dish + Sample	377.3
Mass of Dish	162.9
Mass Sample	214.4

BORING: B277
SAMPLE: S-6
FIELD DESCRIPTION: Gravel, Sand

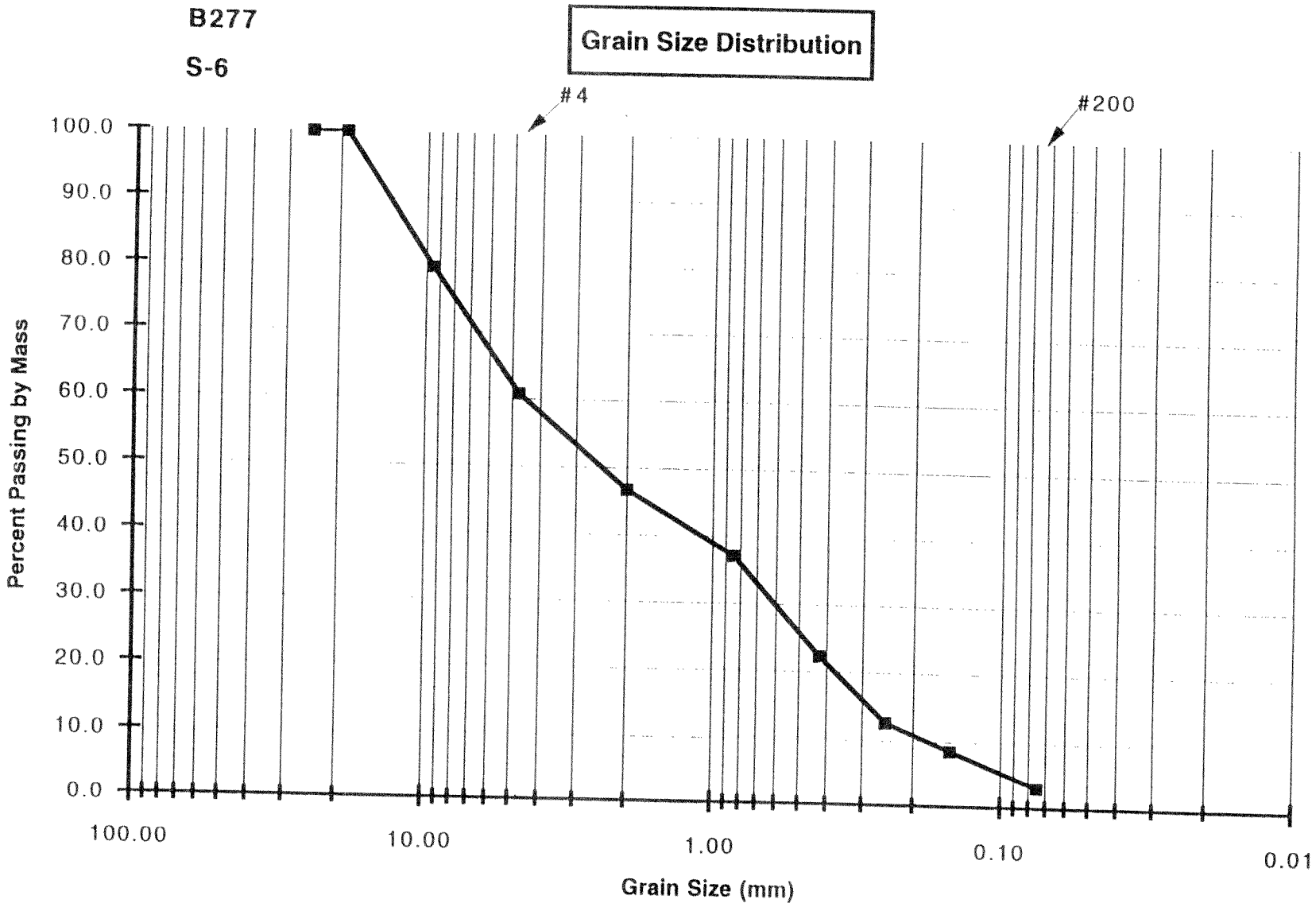
Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	812.7	812.7	0.0	0.0	100.0
3/4"	19.00	814.8	814.8	0.0	0.0	100.0
3/8"	9.5	888.9	845.1	43.8	20.4	79.6
4	4.750	856.8	816.4	40.4	18.8	60.7
10	2.000	742.0	711.9	30.1	14.0	46.7
20	0.850	649.8	629.1	20.7	9.7	37.0
40	0.425	587.6	555.7	31.9	14.9	22.2
60	0.250	546.5	525.9	20.6	9.6	12.5
100	0.150	521.3	512.6	8.7	4.1	8.5
200	0.075	502.9	491.3	11.6	5.4	3.1
PAN		496.2	492.0	4.2	2.0	0.0

% GRAVEL	39.3
% SAND	57.6
% SILT & CLAY	2.0

SP

B277

S-6


Grain Size Distribution
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

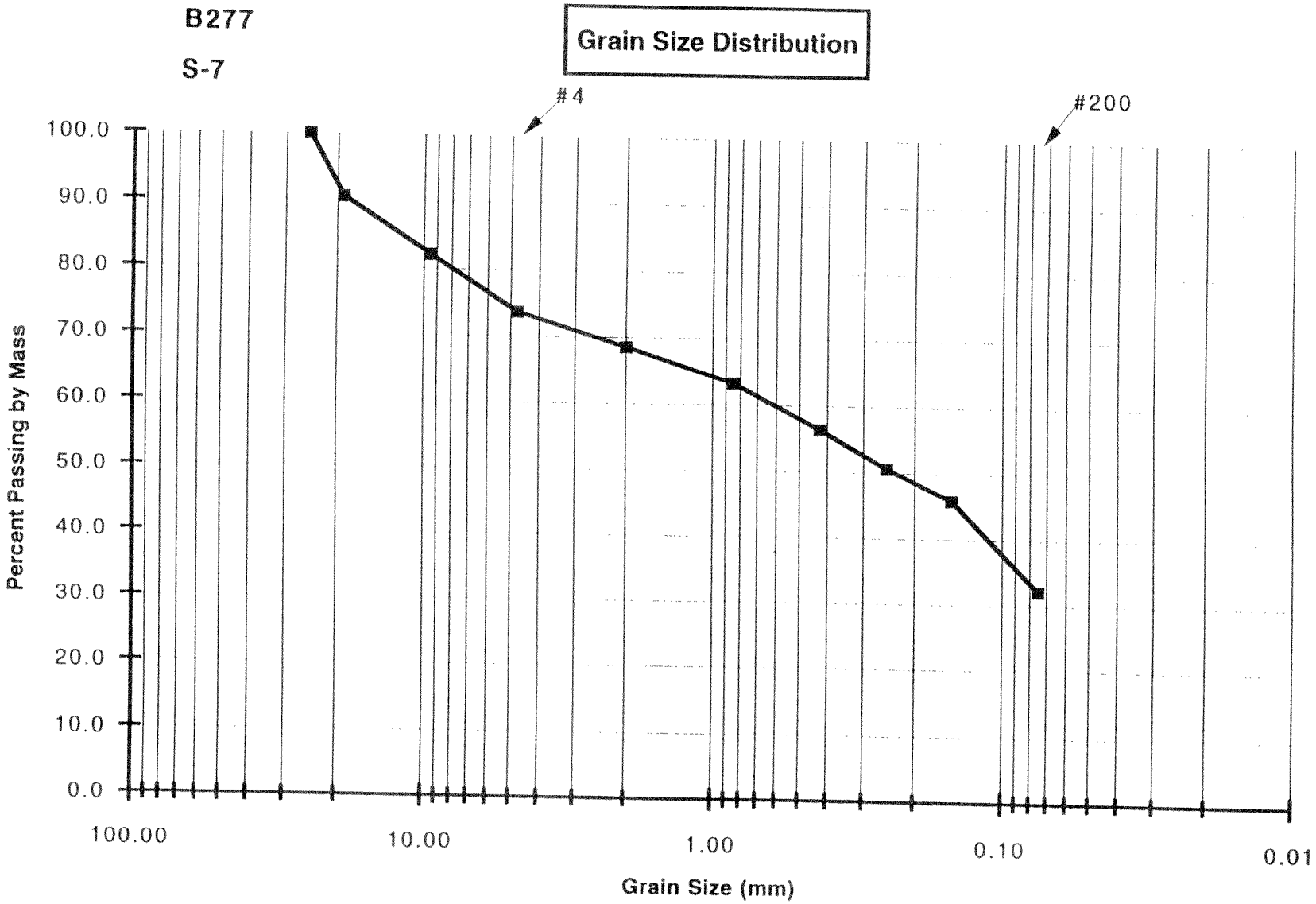
Mass Dish + Sample	326.7
Mass of Dish	162.9
Mass Sample	163.8

BORING: B277
SAMPLE: S-7
FIELD DESCRIPTION: Grey/Black Gravel, Trace Clay

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	812.7	812.7	0.0	0.0	100.0
3/4"	19.00	830.3	814.8	15.5	9.5	90.5
3/8"	9.5	859	845.1	13.9	8.5	82.1
4	4.750	830.3	816.4	13.9	8.5	73.6
10	2.000	720.4	711.9	8.5	5.2	68.4
20	0.850	637.6	629.1	8.5	5.2	63.2
40	0.425	566.8	555.7	11.1	6.8	56.4
60	0.250	535.4	525.9	9.5	5.8	50.6
100	0.150	520.4	512.6	7.8	4.8	45.8
200	0.075	513.8	491.3	22.5	13.7	32.1
PAN		541.9	492.0	49.9	30.5	0.0

% GRAVEL	26.4
% SAND	41.5
% SILT & CLAY	30.5

SM


B277
S-7
Grain Size Distribution
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

Mass Dish + Sample	453.3
Mass of Dish	162.9
Mass Sample	290.4

BORING: B277
SAMPLE: S-8, Top
FIELD DESCRIPTION: Fine/Med. Brown Sand

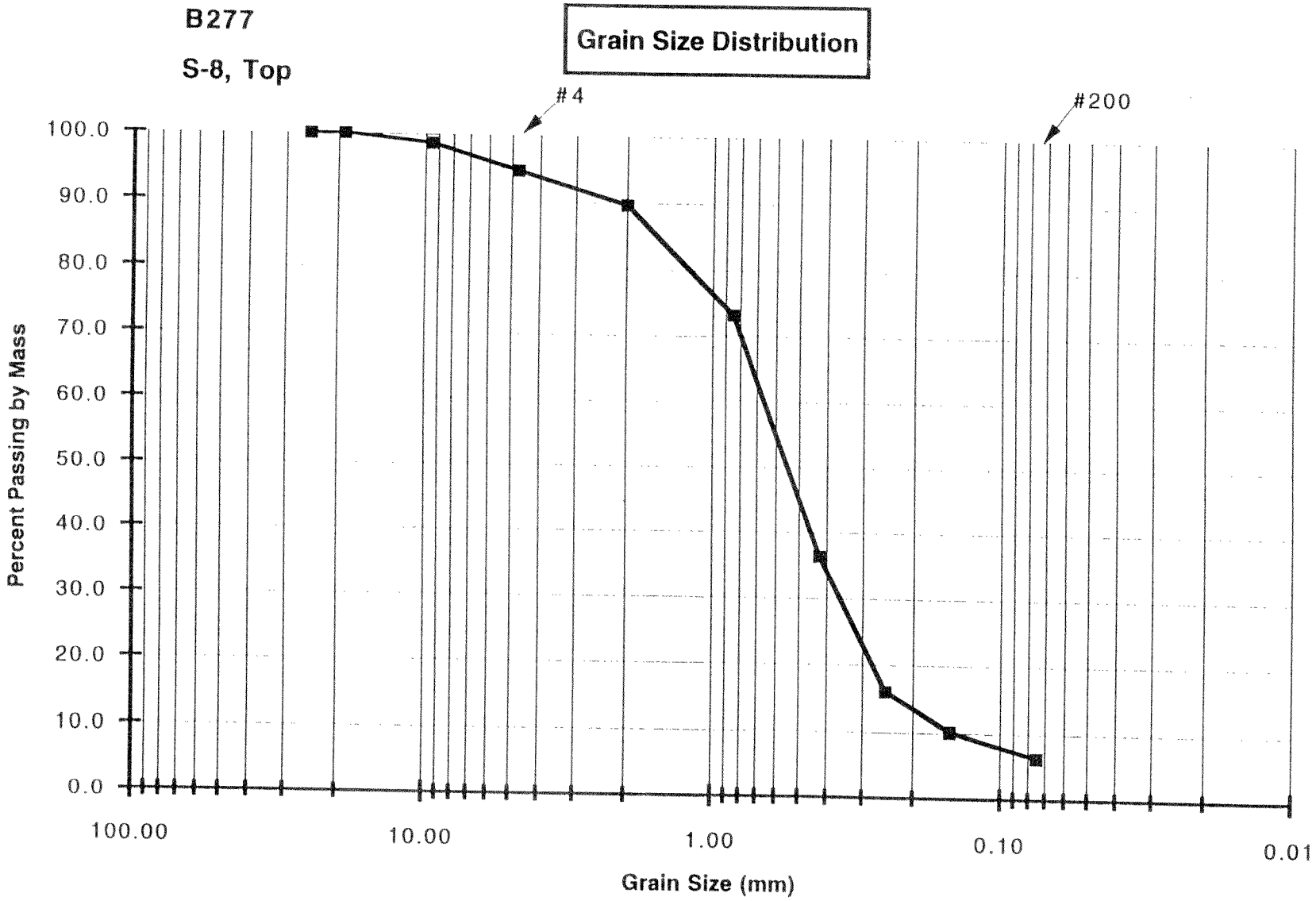
Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	812.7	812.7	0.0	0.0	100.0
3/4"	19.00	814.8	814.8	0.0	0.0	100.0
3/8"	9.5	849.1	845.1	4.0	1.4	98.6
4	4.750	828.1	816.4	11.7	4.0	94.6
10	2.000	726.3	711.9	14.4	5.0	89.6
20	0.850	677.0	629.1	47.9	16.5	73.1
40	0.425	662.9	555.7	107.2	36.9	36.2
60	0.250	584.8	525.9	58.9	20.3	15.9
100	0.150	529.7	512.6	17.1	5.9	10.1
200	0.075	501.9	491.3	10.6	3.7	6.4
PAN		507.9	492.0	15.9	5.5	0.0

% GRAVEL	5.4
% SAND	88.2
% SILT & CLAY	5.5

SP

B277

S-8, Top


Grain Size Distribution
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

Mass Dish + Sample	452.4
Mass of Dish	162.9
Mass Sample	289.5

BORING: B277
SAMPLE: S-8, Bottom
FIELD DESCRIPTION: Gravel, Trace Sand

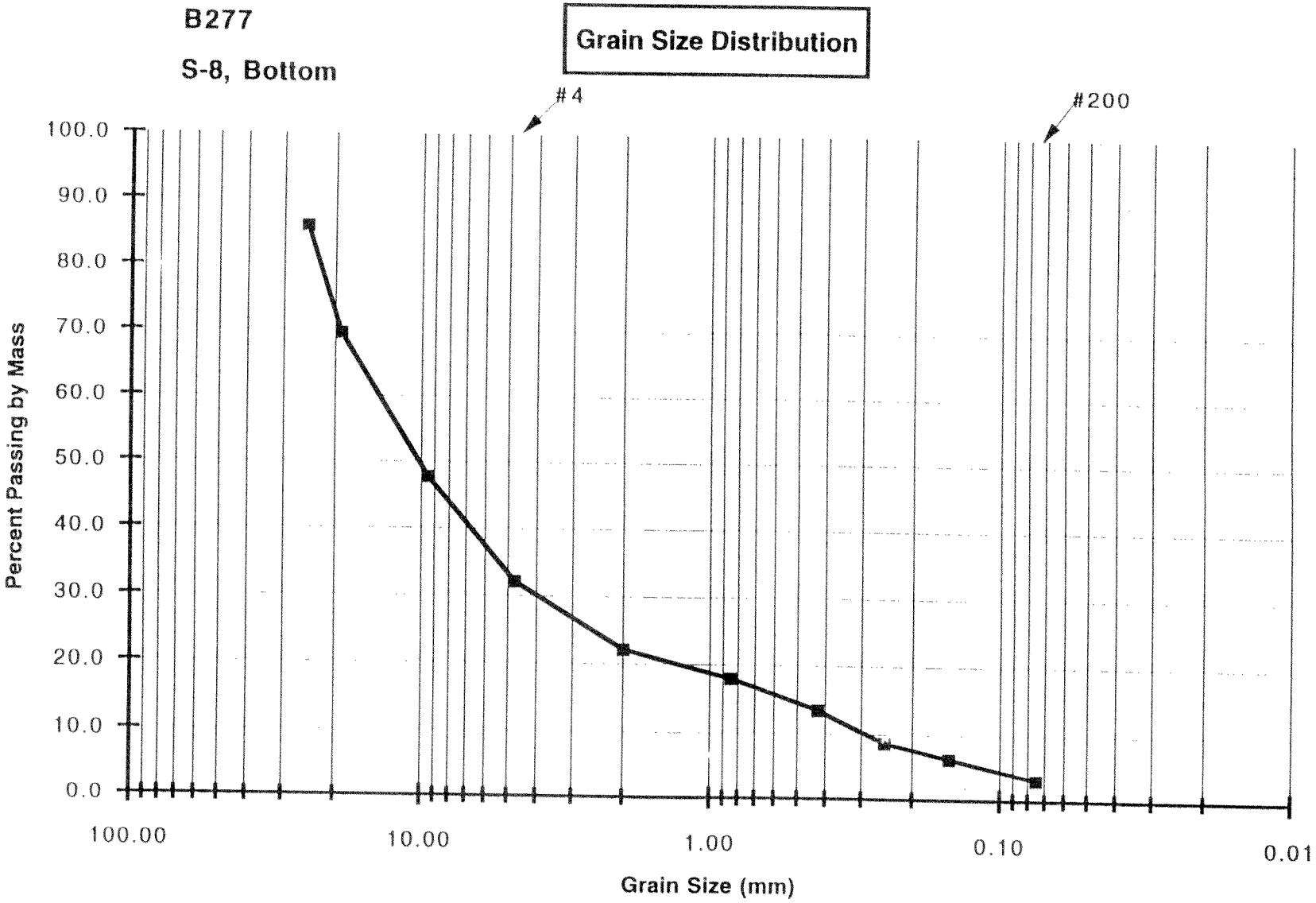
Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	853.6	812.7	40.9	14.1	85.9
3/4"	19.00	862.3	814.8	47.5	16.4	69.5
3/8"	9.5	908.2	845.1	63.1	21.8	47.7
4	4.750	861.6	816.4	45.2	15.6	32.1
10	2.000	740.9	711.9	29.0	10.0	22.0
20	0.850	641.1	629.1	12.0	4.1	17.9
40	0.425	568.8	555.7	13.1	4.5	13.4
60	0.250	539.7	525.9	13.8	4.8	8.6
100	0.150	519.2	512.6	6.6	2.3	6.3
200	0.075	500.4	491.3	9.1	3.1	3.2
PAN		498.9	492.0	6.9	2.4	0.0

% COBBLES	14.1
% GRAVEL	53.8
% SAND	28.9
% SILT & CLAY	2.4

GP

B277

S-8, Bottom



Mass Dish + Sample	363.0
Mass of Dish	162.9
Mass Sample	200.1

BORING: B277
SAMPLE: S-9
FIELD DESCRIPTION: Gravel w/ Sand, Sandstone Fragments

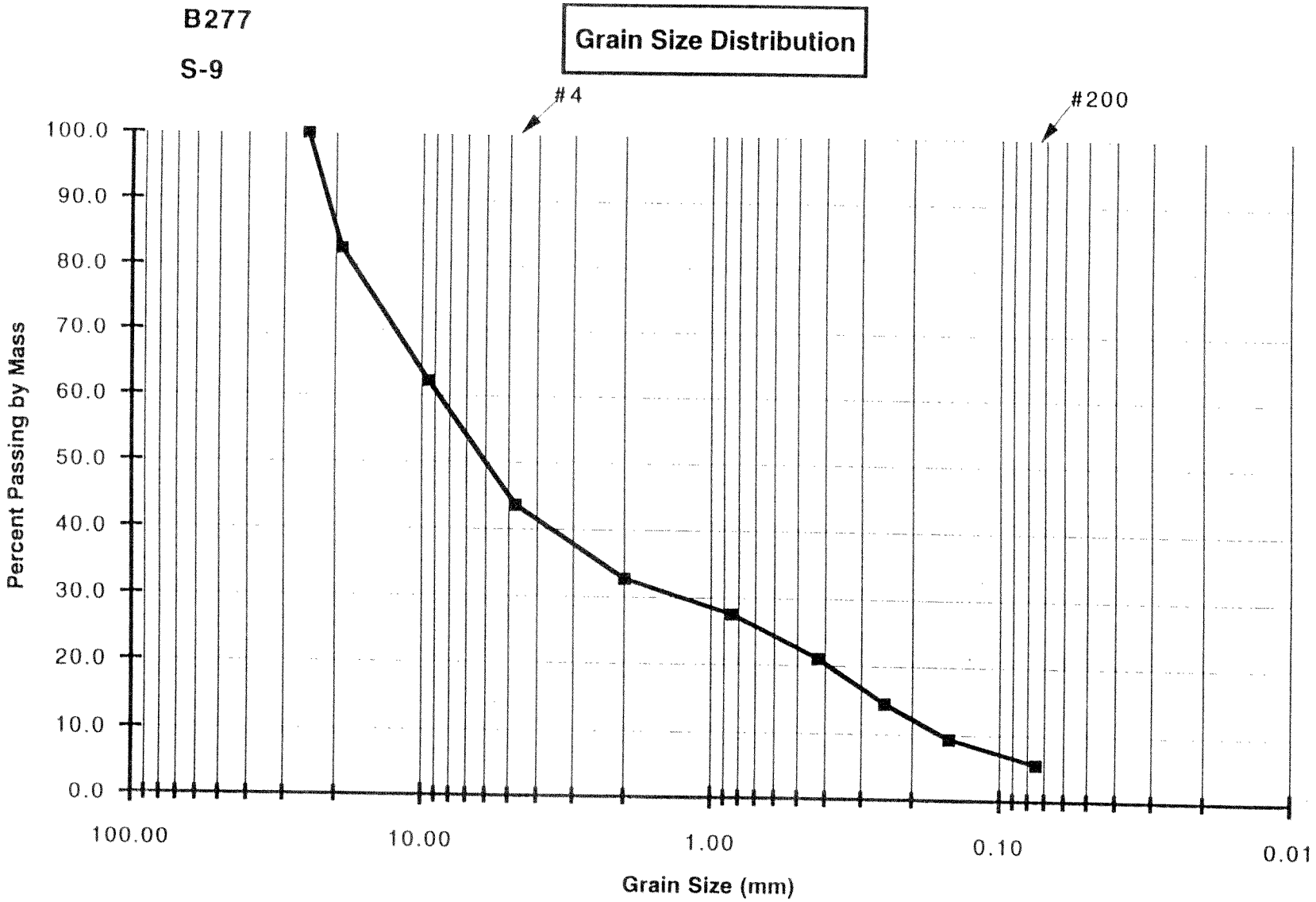
Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	812.7	812.7	0.0	0.0	100.0
3/4"	19.00	849.8	814.8	35.0	17.5	82.5
3/8"	9.5	885.7	845.1	40.6	20.3	62.2
4	4.750	853.8	816.4	37.4	18.7	43.5
10	2.000	733.6	711.9	21.7	10.8	32.7
20	0.850	639.4	629.1	10.3	5.1	27.5
40	0.425	568.9	555.7	13.2	6.6	20.9
60	0.250	539.1	525.9	13.2	6.6	14.3
100	0.150	522.7	512.6	10.1	5.0	9.3
200	0.075	498.7	491.3	7.4	3.7	5.6
PAN		500.8	492.0	8.8	4.4	0.0

% GRAVEL	56.5
% SAND	37.9
% SILT & CLAY	4.4

GP

B277

S-9


Grain Size Distribution
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

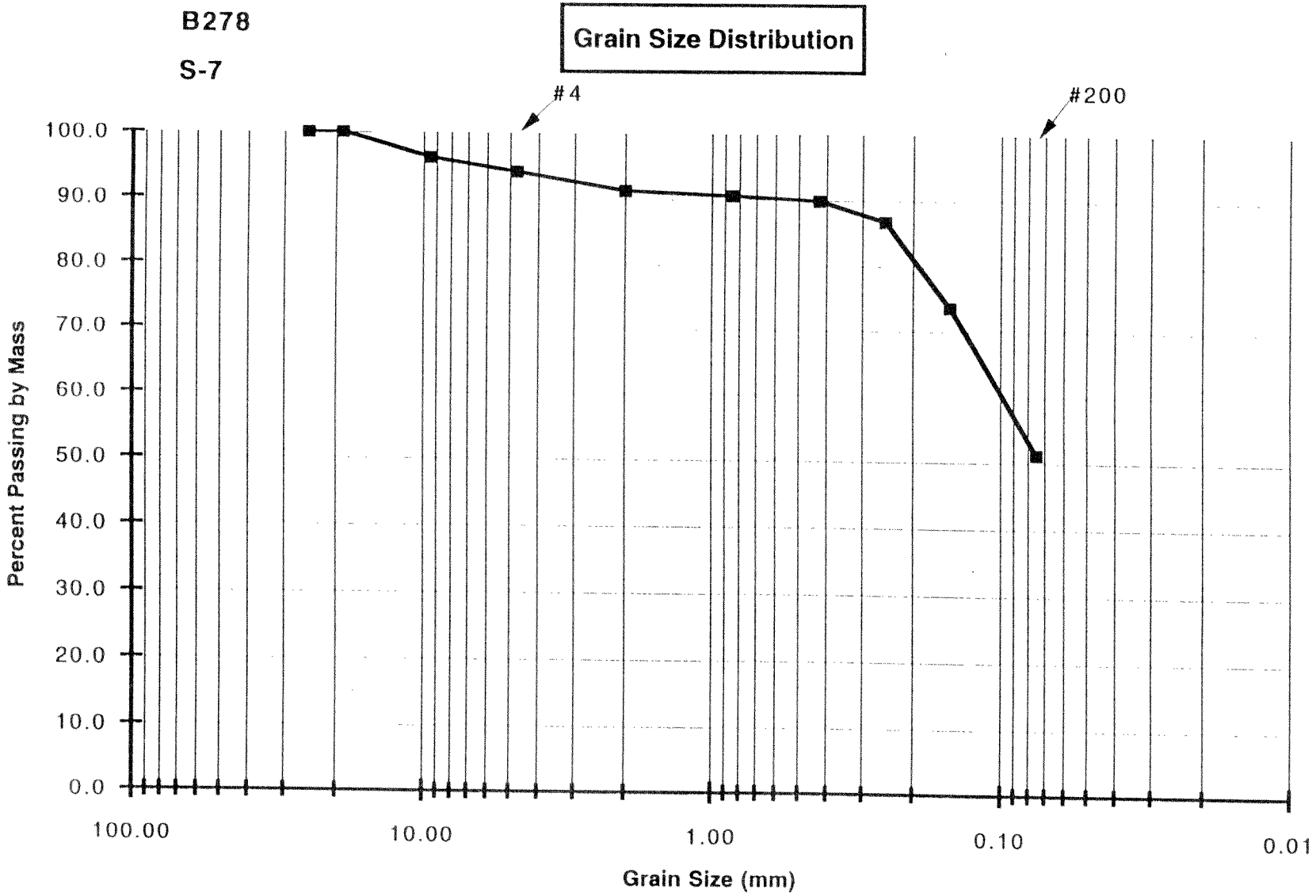
Mass Dish + Sample	346.4
Mass of Dish	162.9
Mass Sample	183.5

BORING: B278
SAMPLE: S-7
FIELD DESCRIPTION: Grey/Black Silty Sand, Some Gravel

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	812.7	812.7	0.0	0.0	100.0
3/4"	19.00	814.8	814.8	0.0	0.0	100.0
3/8"	9.5	852.1	845.1	7.0	3.8	96.2
4	4.750	820.3	816.4	3.9	2.1	94.1
10	2.000	717.0	711.9	5.1	2.8	91.3
20	0.850	630.4	629.1	1.3	0.7	90.6
40	0.425	557.1	555.7	1.4	0.8	89.8
60	0.250	531.6	525.9	5.7	3.1	86.7
100	0.150	536.7	512.6	24.1	13.1	73.6
200	0.075	532.4	491.3	41.1	22.4	51.2
PAN		582.7	492.0	90.7	49.4	0.0

% GRAVEL	5.9
% SAND	42.9
% SILT & CLAY	49.4

ML


B278
S-7
Grain Size Distribution
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

Mass Dish + Sample	519.8
Mass of Dish	162.9
Mass Sample	356.9

BORING: B278
SAMPLE: S-8
FIELD DESCRIPTION: Grey/Black Gravel & Sand

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	906.2	812.7	93.5	26.2	73.8
3/4"	19.00	826.6	814.8	11.8	3.3	70.5
3/8"	9.5	883.5	845.1	38.4	10.8	59.7
4	4.750	858.6	816.4	42.2	11.8	47.9
10	2.000	741.3	711.9	29.4	8.2	39.7
20	0.850	643.4	629.1	14.3	4.0	35.7
40	0.425	571.8	555.7	16.1	4.5	31.2
60	0.250	554.7	525.9	28.8	8.1	23.1
100	0.150	539.6	512.6	27.0	7.6	15.5
200	0.075	518.0	491.3	26.7	7.5	8.0
PAN		518.1	492.0	26.1	7.3	0.0

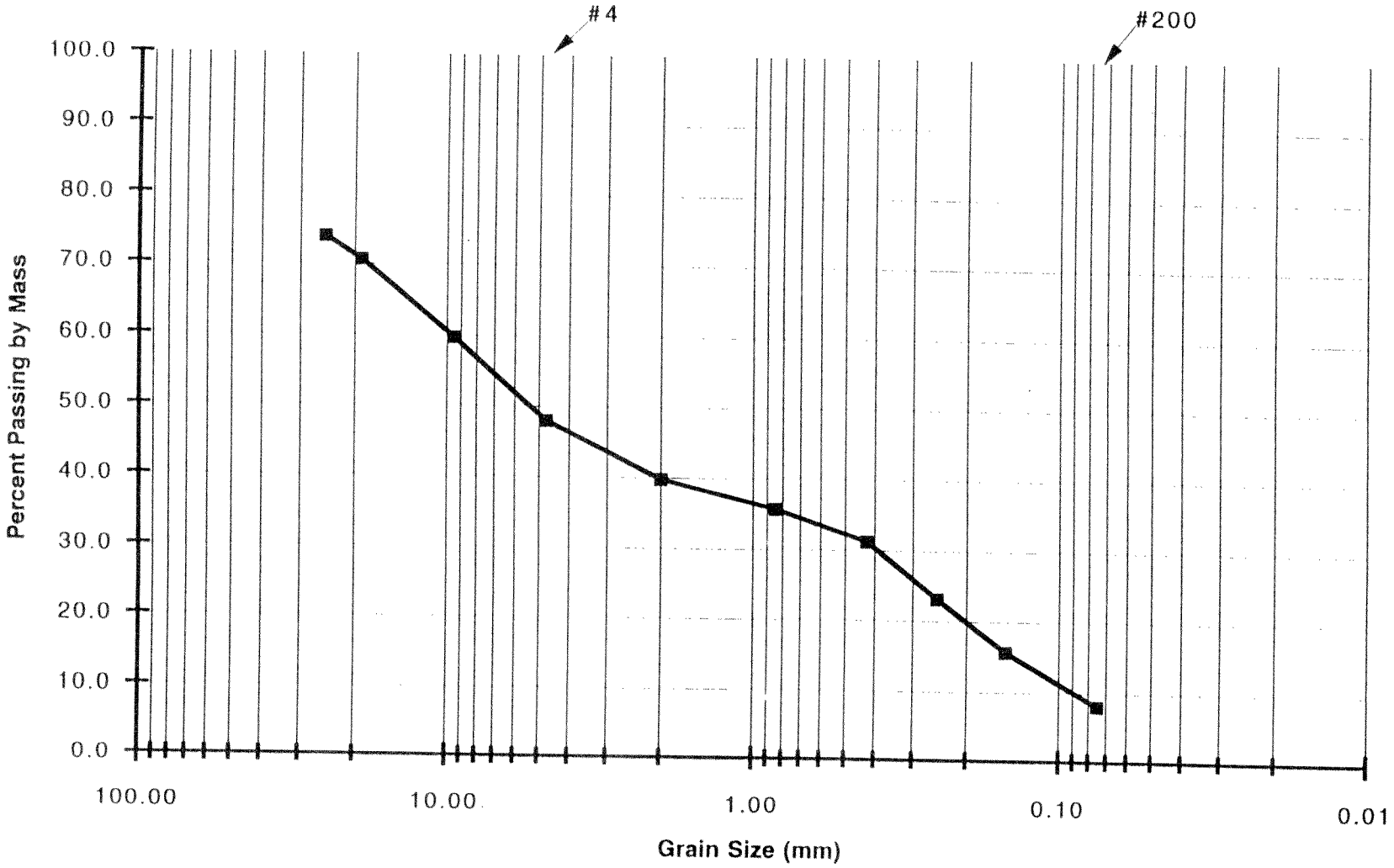
% COBBLES	26.2
% GRAVEL	25.9
% SAND	39.9
% SILT & CLAY	7.3

GP - GM

B278

S-8

Grain Size Distribution



Mass Dish + Sample	499.3
Mass of Dish	162.9
Mass Sample	336.4

BORING: B278
SAMPLE: S-9
FIELD DESCRIPTION: Brown Sandy Gravel

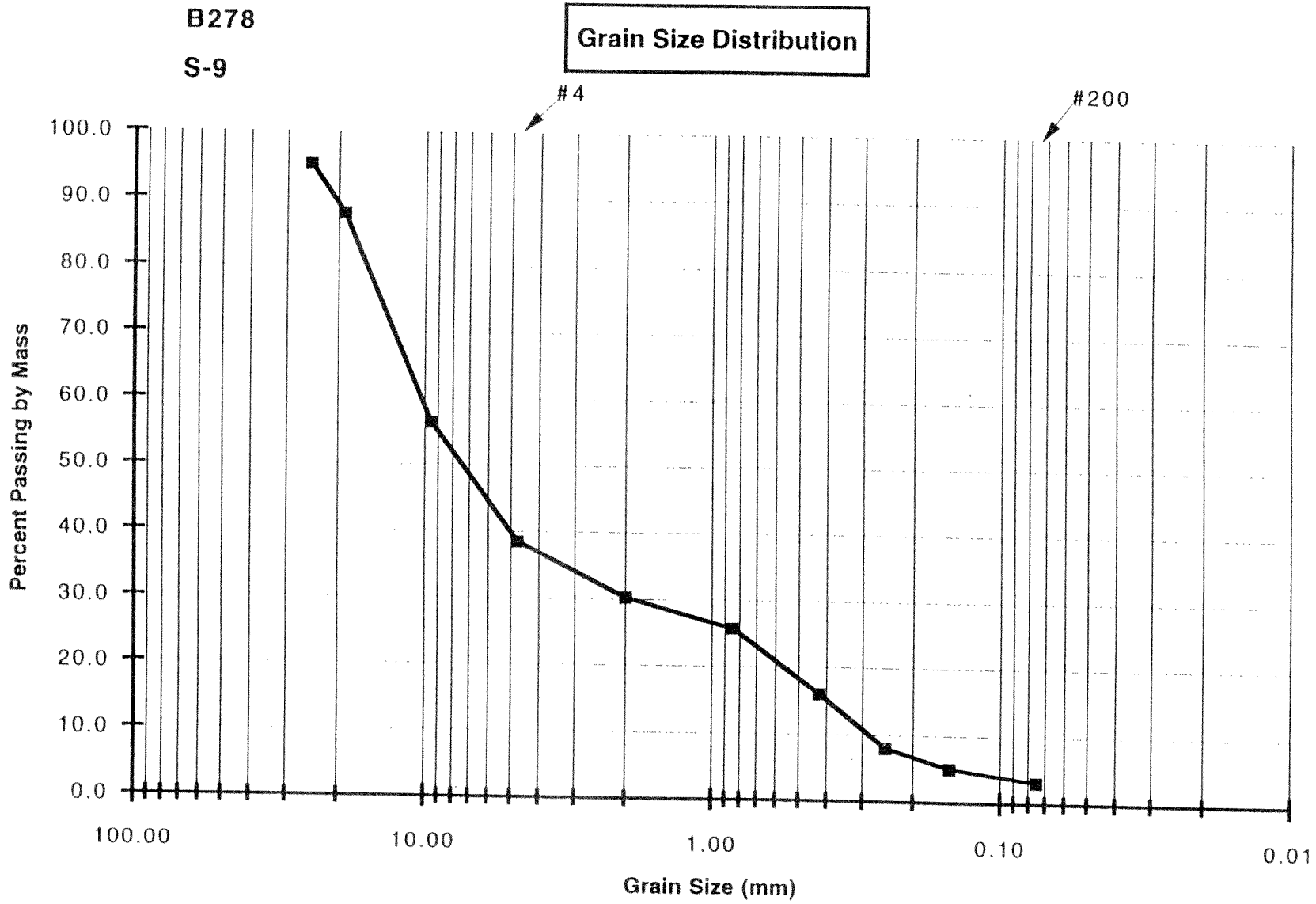
Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	829.2	812.7	16.5	4.9	95.1
3/4"	19.00	839.7	814.8	24.9	7.4	87.7
3/8"	9.5	950.4	845.1	105.3	31.3	56.4
4	4.750	877.1	816.4	60.7	18.0	38.3
10	2.000	739.5	711.9	27.6	8.2	30.1
20	0.850	644.2	629.1	15.1	4.5	25.7
40	0.425	588.8	555.7	33.1	9.8	15.8
60	0.250	552.3	525.9	26.4	7.8	8.0
100	0.150	522.6	512.6	10.0	3.0	5.0
200	0.075	497.7	491.3	6.4	1.9	3.1
PAN		499.8	492.0	7.8	2.3	0.0

% Cobbles	4.9
% GRAVEL	56.7
% SAND	35.3
% SILT & CLAY	2.3

GW

B278

S-9


Grain Size Distribution
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

Mass Dish + Sample	430.4
Mass of Dish	162.9
Mass Sample	267.5

BORING: B278
SAMPLE: S-10
FIELD DESCRIPTION: Reddish/Brown Sandy Gravel

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	812.7	812.7	0.0	0.0	100.0
3/4"	19.00	824.9	814.8	10.1	3.8	96.2
3/8"	9.5	868.2	845.1	23.1	8.6	87.6
4	4.750	854.0	816.4	37.6	14.1	73.5
10	2.000	750.5	711.9	38.6	14.4	59.1
20	0.850	654.1	629.1	25.0	9.3	49.8
40	0.425	580.2	555.7	24.5	9.2	40.6
60	0.250	552.4	525.9	26.5	9.9	30.7
100	0.150	525.0	512.6	12.4	4.6	26.1
200	0.075	508.9	491.3	17.6	6.6	19.5
PAN		541.8	492.0	49.8	18.6	0.0

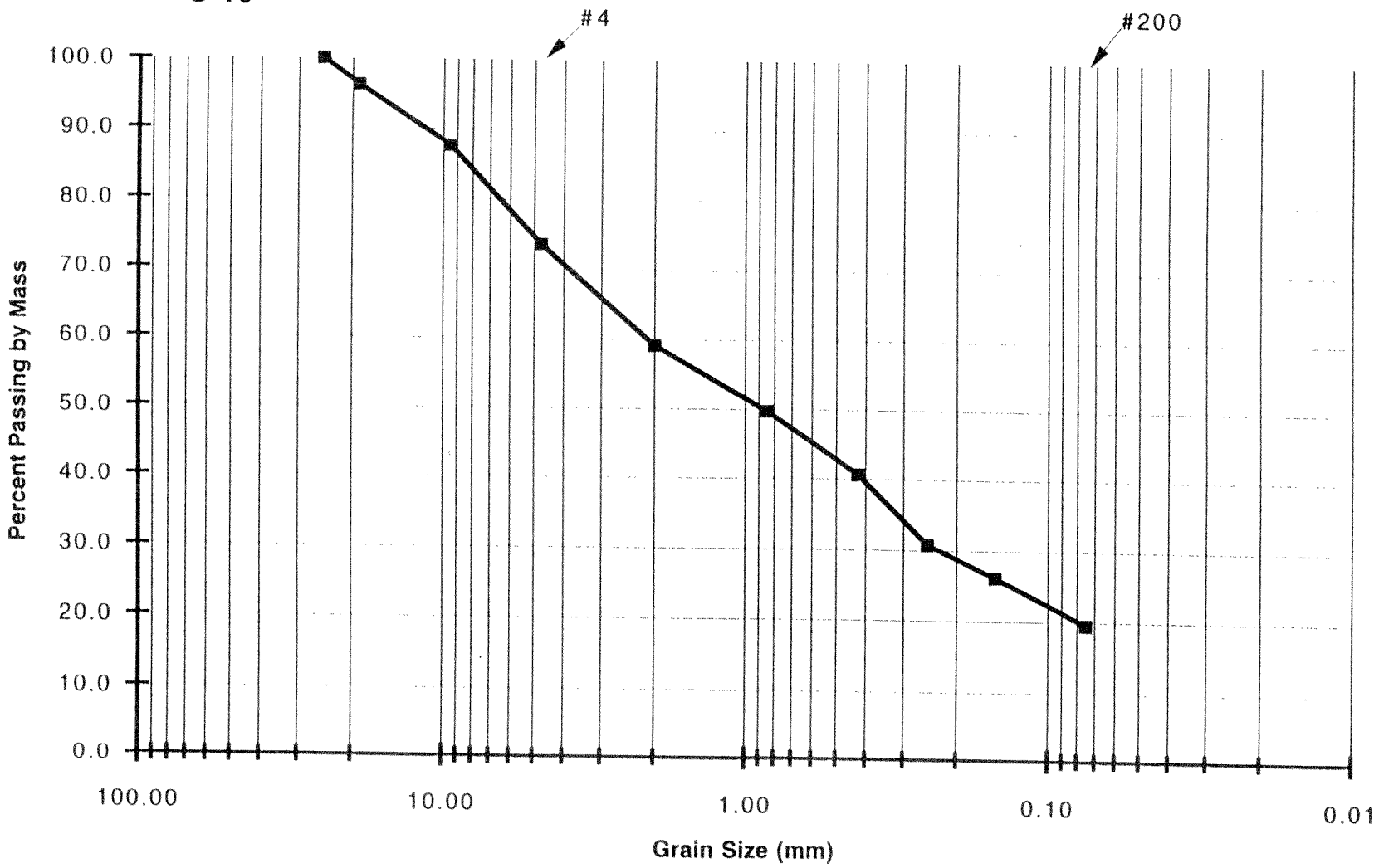
% GRAVEL	26.5
% SAND	54.1
% SILT & CLAY	18.6

SM

B278

S-10

Grain Size Distribution



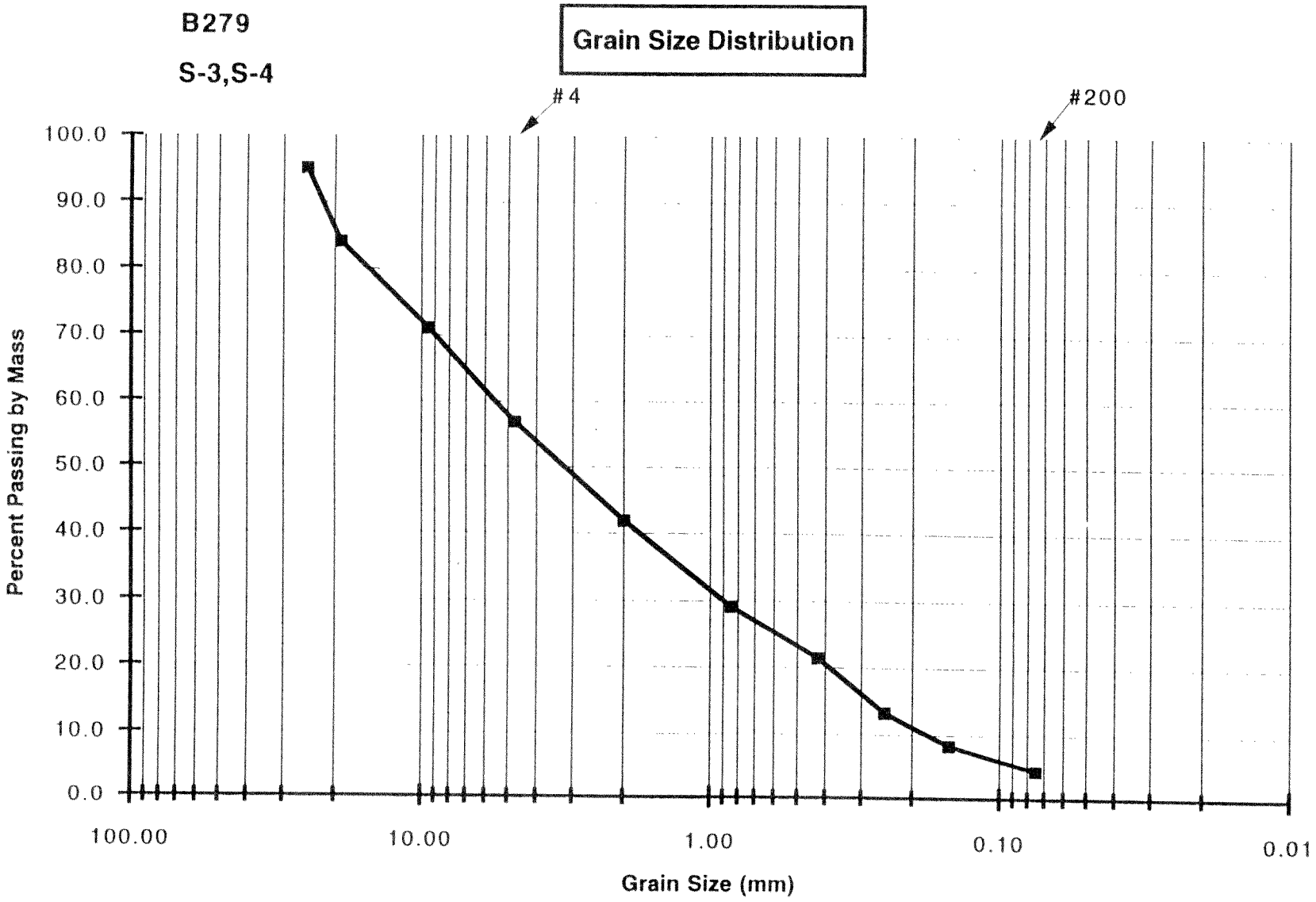
Mass Dish + Sample	750.5
Mass of Dish	162.9
Mass Sample	587.6

BORING: B279
SAMPLE: S-3,S-4
FIELD DESCRIPTION: Brown Sand & Gravel

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	842.1	812.7	29.4	5.0	95.0
3/4"	19.00	879.8	814.8	65.0	11.1	83.9
3/8"	9.5	921.2	845.1	76.1	13.0	71.0
4	4.750	899.9	816.4	83.5	14.2	56.8
10	2.000	799.6	711.9	87.7	14.9	41.8
20	0.850	704.3	629.1	75.2	12.8	29.1
40	0.425	601.0	555.7	45.3	7.7	21.3
60	0.250	573.6	525.9	47.7	8.1	13.2
100	0.150	541.9	512.6	29.3	5.0	8.2
200	0.075	514.1	491.3	22.8	3.9	4.4
PAN		514.7	492.0	22.7	3.9	0.0

% Cobbles	5.0
% GRAVEL	38.2
% SAND	52.4
% SILT & CLAY	3.9

SP


B279
S-3,S-4
Grain Size Distribution
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

Mass Dish + Sample	421.7
Mass of Dish	162.9
Mass Sample	258.8

BORING: B279
SAMPLE: S-5
FIELD DESCRIPTION: Grey Sand & Gravel

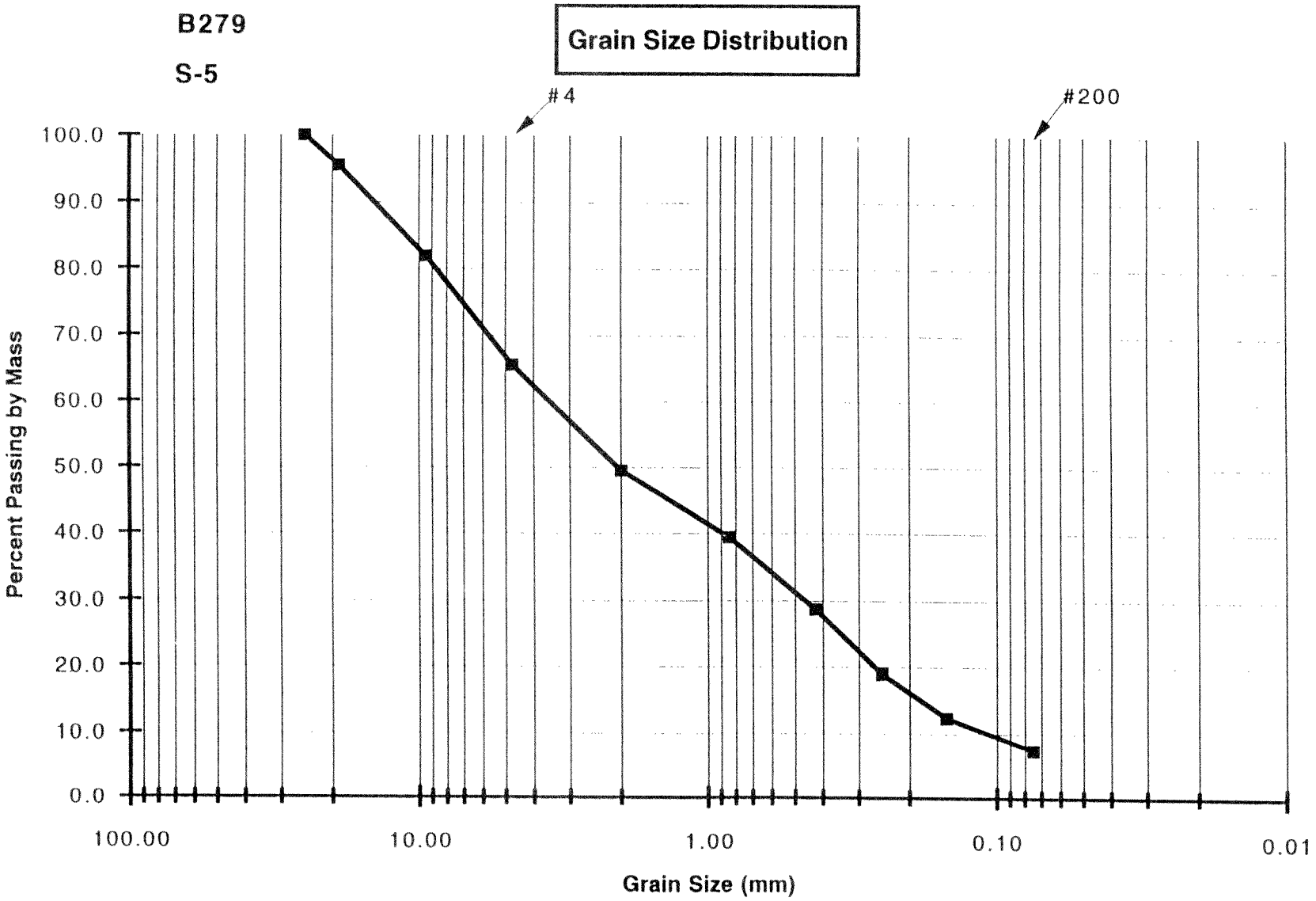
Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	812.7	812.7	0.0	0.0	100.0
3/4"	19.00	826.4	814.8	11.6	4.5	95.5
3/8"	9.5	880.5	845.1	35.4	13.7	81.8
4	4.750	858.6	816.4	42.2	16.3	65.5
10	2.000	753.4	711.9	41.5	16.0	49.5
20	0.850	655.2	629.1	26.1	10.1	39.4
40	0.425	583.5	555.7	27.8	10.7	28.7
60	0.250	551.3	525.9	25.4	9.8	18.9
100	0.150	529.7	512.6	17.1	6.6	12.2
200	0.075	503.8	491.3	12.5	4.8	7.4
PAN		508.7	492.0	16.7	6.5	0.0

% GRAVEL	34.5
% SAND	58.1
% SILT & CLAY	6.5

SP-SM

B279

S-5


Grain Size Distribution
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

Mass Dish + Sample	499.8
Mass of Dish	162.9
Mass Sample	336.9

BORING: B279
SAMPLE: S-7
FIELD DESCRIPTION: Grey/Brown Gravel & Sand

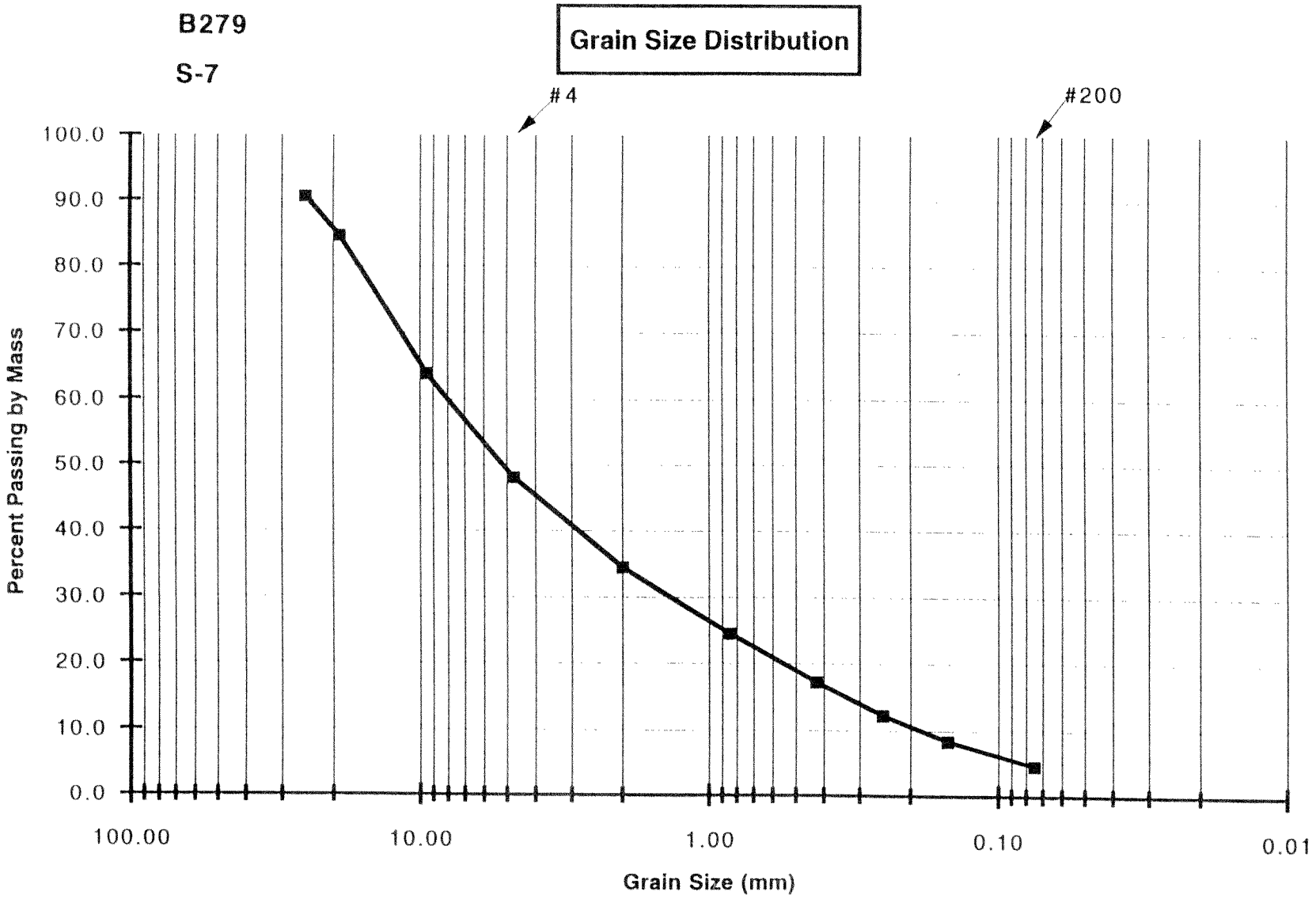
Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	844.7	812.7	32.0	9.5	90.5
3/4"	19.00	834.6	814.8	19.8	5.9	84.6
3/8"	9.5	915.3	845.1	70.2	20.8	63.8
4	4.750	869.7	816.4	53.3	15.8	48.0
10	2.000	757.7	711.9	45.8	13.6	34.4
20	0.850	662.7	629.1	33.6	10.0	24.4
40	0.425	580.2	555.7	24.5	7.3	17.1
60	0.250	542.6	525.9	16.7	5.0	12.2
100	0.150	525.6	512.6	13.0	3.9	8.3
200	0.075	503.6	491.3	12.3	3.7	4.7
PAN		505.1	492.0	13.1	3.9	0.0

% GRAVEL	42.5
% SAND	43.3
% SILT & CLAY	3.9

GW

B279

S-7


Grain Size Distribution
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

Mass Dish + Sample	359.6
Mass of Dish	162.9
Mass Sample	196.7

BORING: B279
SAMPLE: S-8
FIELD DESCRIPTION: Fine/Med. Brown Sand, Trace Gravel

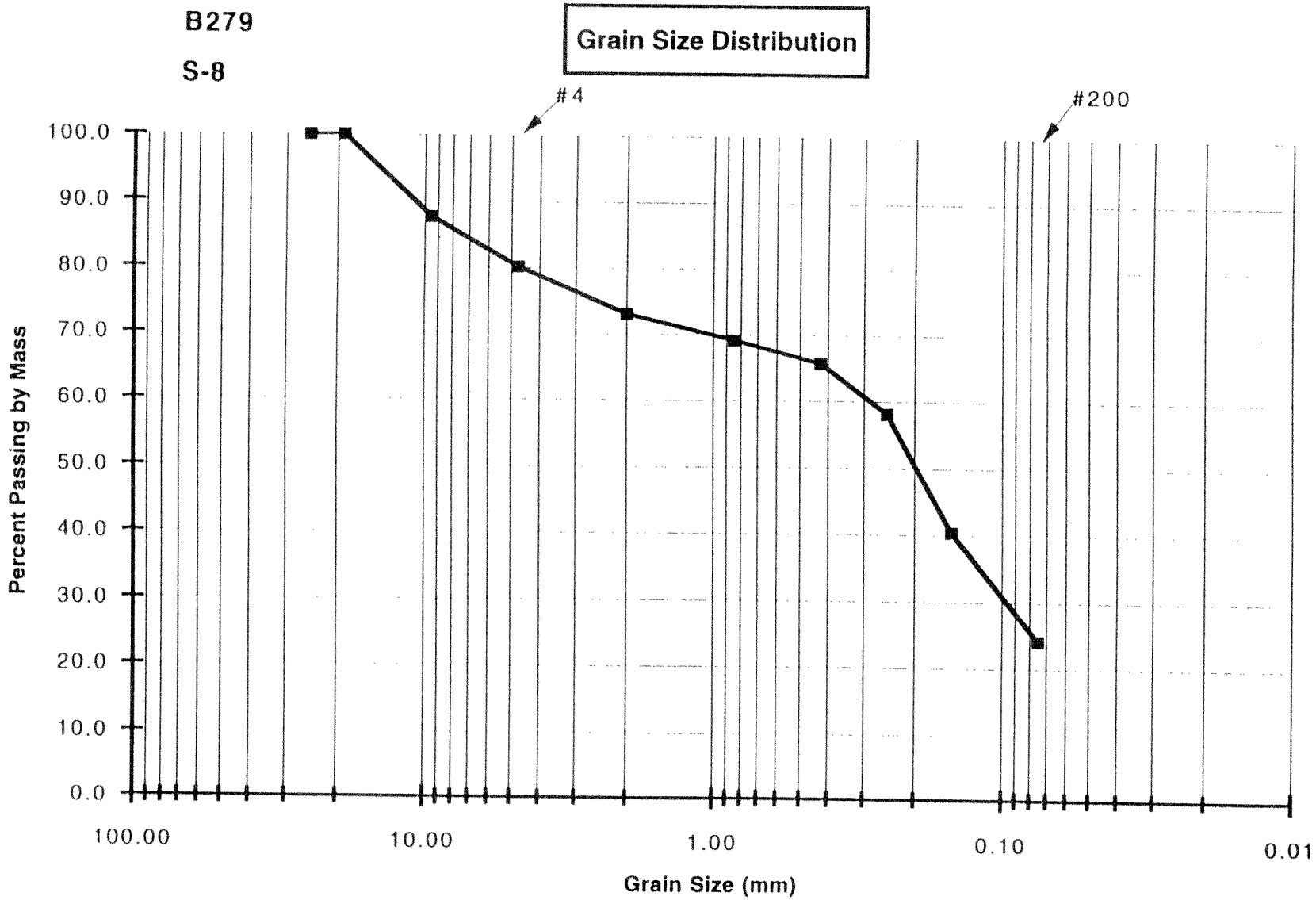
Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	812.7	812.7	0.0	0.0	100.0
3/4"	19.00	814.8	814.8	0.0	0.0	100.0
3/8"	9.5	869.5	845.1	24.4	12.4	87.6
4	4.750	831.2	816.4	14.8	7.5	80.1
10	2.000	726.0	711.9	14.1	7.2	72.9
20	0.850	636.7	629.1	7.6	3.9	69.0
40	0.425	562.5	555.7	6.8	3.5	65.6
60	0.250	540.6	525.9	14.7	7.5	58.1
100	0.150	547.5	512.6	34.9	17.7	40.4
200	0.075	523.4	491.3	32.1	16.3	24.0
PAN		536.3	492.0	44.3	22.5	0.0

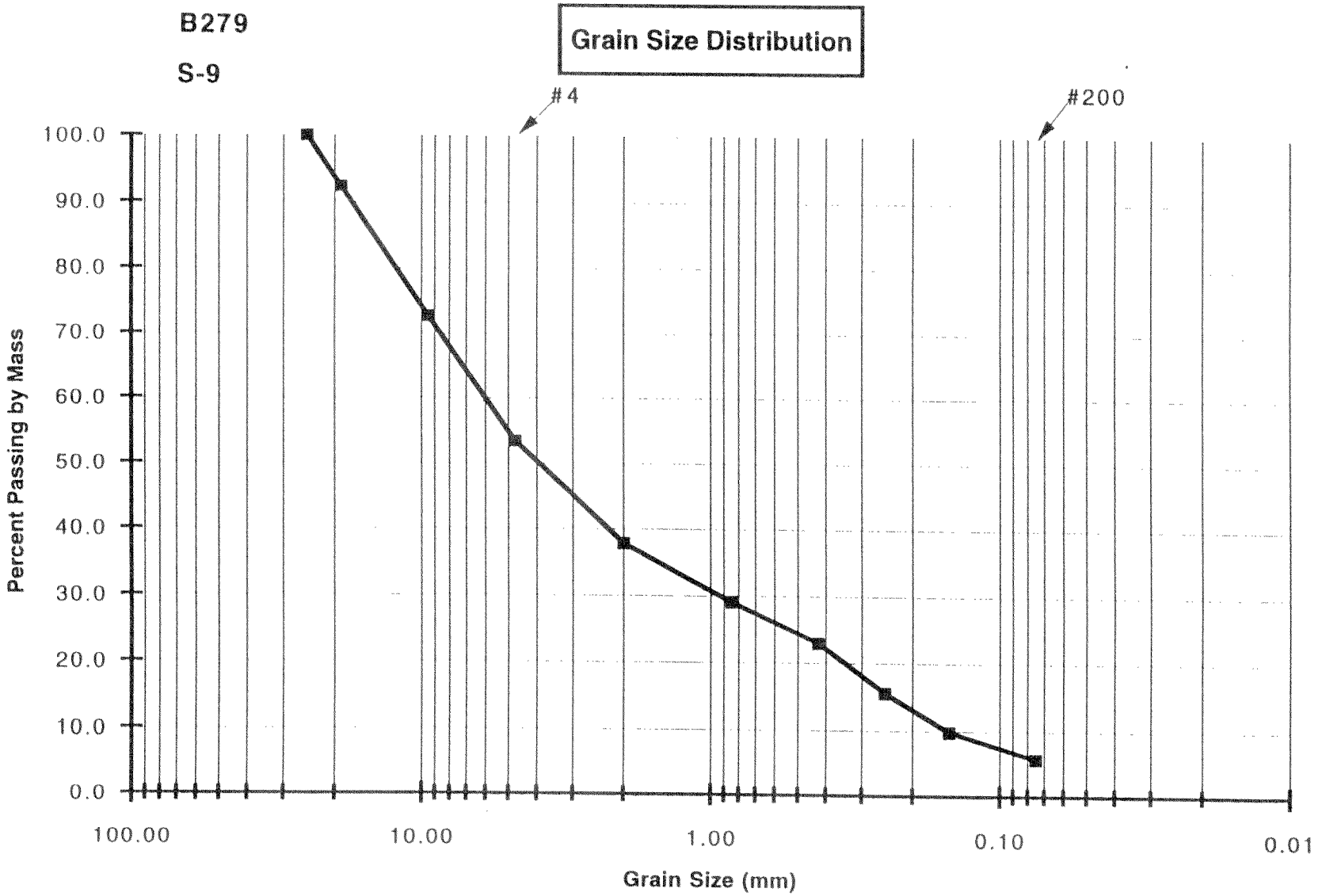
% GRAVEL	19.9
% SAND	56.0
% SILT & CLAY	22.5

SM

B279

S-8


Grain Size Distribution
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)


B279
S-9
Grain Size Distribution
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

Mass Dish + Sample	392.5
Mass of Dish	162.9
Mass Sample	229.6

BORING: B279
SAMPLE: S-9
FIELD DESCRIPTION: Sandstone & Gravel

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	812.7	812.7	0.0	0.0	100.0
3/4"	19.00	832.3	814.8	17.5	7.6	92.4
3/8"	9.5	890.5	845.1	45.4	19.8	72.6
4	4.750	860.6	816.4	44.2	19.3	53.4
10	2.000	747.8	711.9	35.9	15.6	37.7
20	0.850	649.1	629.1	20.0	8.7	29.0
40	0.425	569.8	555.7	14.1	6.1	22.9
60	0.250	543.0	525.9	17.1	7.4	15.4
100	0.150	525.6	512.6	13.0	5.7	9.8
200	0.075	500.5	491.3	9.2	4.0	5.7
PAN		502.8	492.0	10.8	4.7	0.0

% GRAVEL	46.6
% SAND	47.6
% SILT & CLAY	4.7

SP

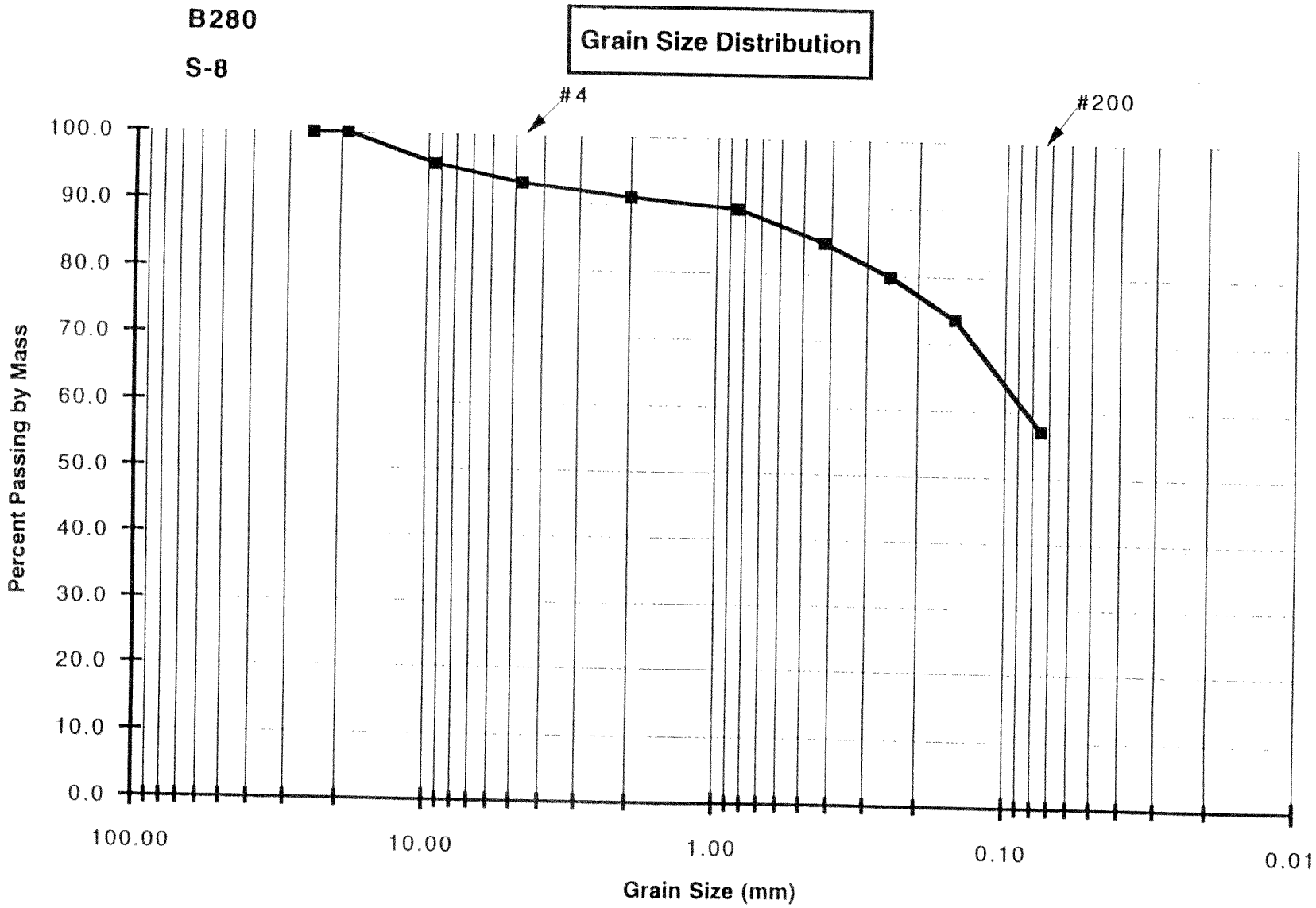
Mass Dish + Sample	304.9
Mass of Dish	162.9
Mass Sample	142

BORING: B280
SAMPLE: S-8
FIELD DESCRIPTION: Grey Silty Sand, Trace Coal Cinders

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	812.7	812.7	0.0	0.0	100.0
3/4"	19.00	814.8	814.8	0.0	0.0	100.0
3/8"	9.5	851.4	845.1	6.3	4.4	95.6
4	4.750	820.2	816.4	3.8	2.7	92.9
10	2.000	714.7	711.9	2.8	2.0	90.9
20	0.850	631.3	629.1	2.2	1.5	89.4
40	0.425	562.5	555.7	6.8	4.8	84.6
60	0.250	532.7	525.9	6.8	4.8	79.8
100	0.150	521.5	512.6	8.9	6.3	73.5
200	0.075	514.7	491.3	23.4	16.5	57.0
PAN		569.6	492.0	77.6	54.6	0.0

% GRAVEL	7.1
% SAND	35.8
% SILT & CLAY	54.6

ML


B280
S-8
Grain Size Distribution
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

Mass Dish + Sample	1076.6
Mass of Dish	162.9
Mass Sample	913.7

BORING: B280
SAMPLE: S-9,S-10,S-11
FIELD DESCRIPTION: Grey/Brown Sandy Gravel

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	843.4	812.7	30.7	3.4	96.6
3/4"	19.00	895	814.8	80.2	8.8	87.9
3/8"	9.5	1029.3	845.1	184.2	20.2	67.7
4	4.750	970.1	816.4	153.7	16.8	50.9
10	2.000	846.5	711.9	134.6	14.7	36.1
20	0.850	676.9	629.1	47.8	5.2	30.9
40	0.425	628.4	555.7	72.7	8.0	23.0
60	0.250	593.0	525.9	67.1	7.3	15.6
100	0.150	578.7	512.6	66.1	7.2	8.4
200	0.075	538.4	491.3	47.1	5.2	3.2
PAN		518.9	492.0	26.9	2.9	0.0

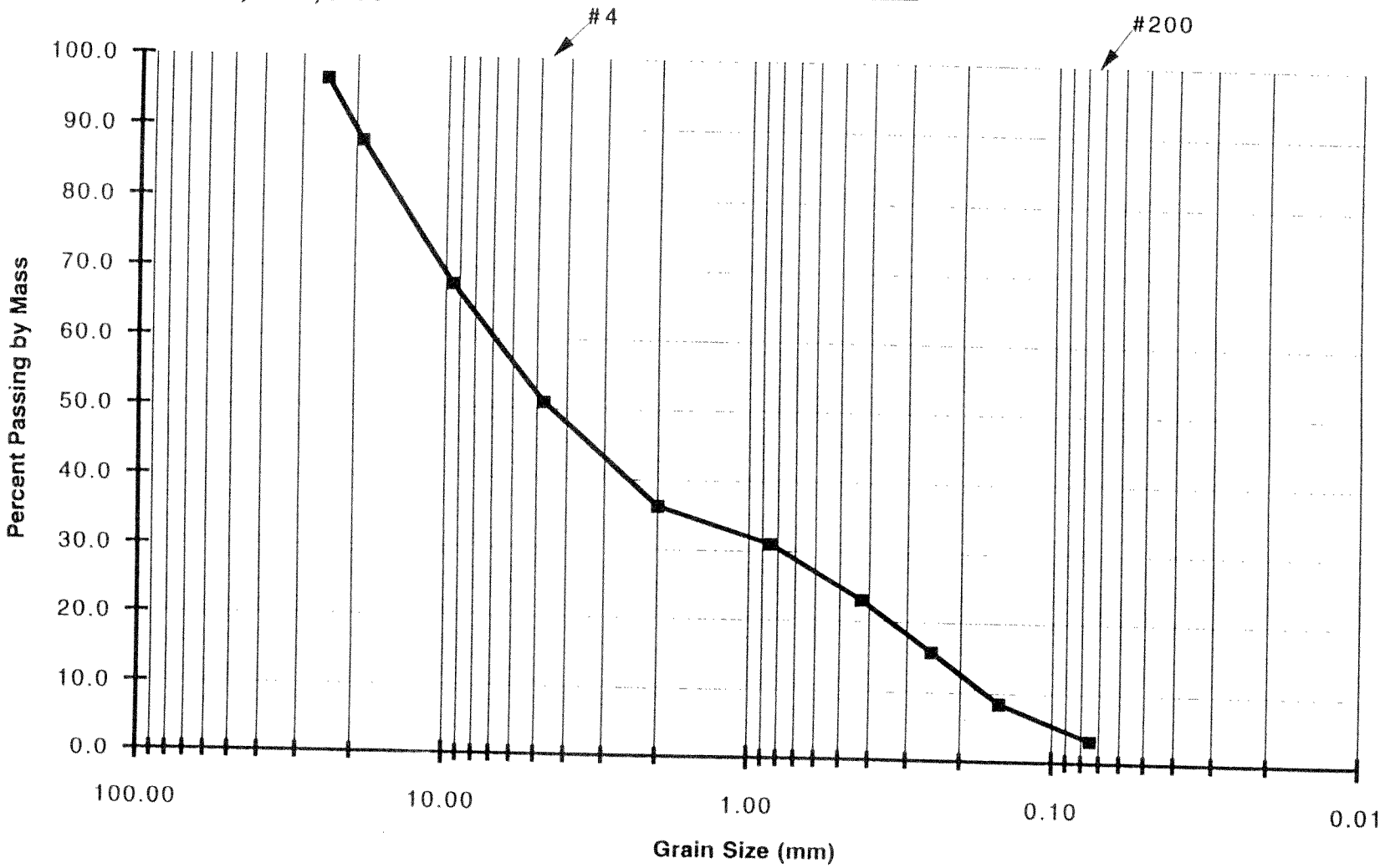
% COBBLES	3.4
% GRAVEL	45.8
% SAND	47.7
% SILT & CLAY	2.9

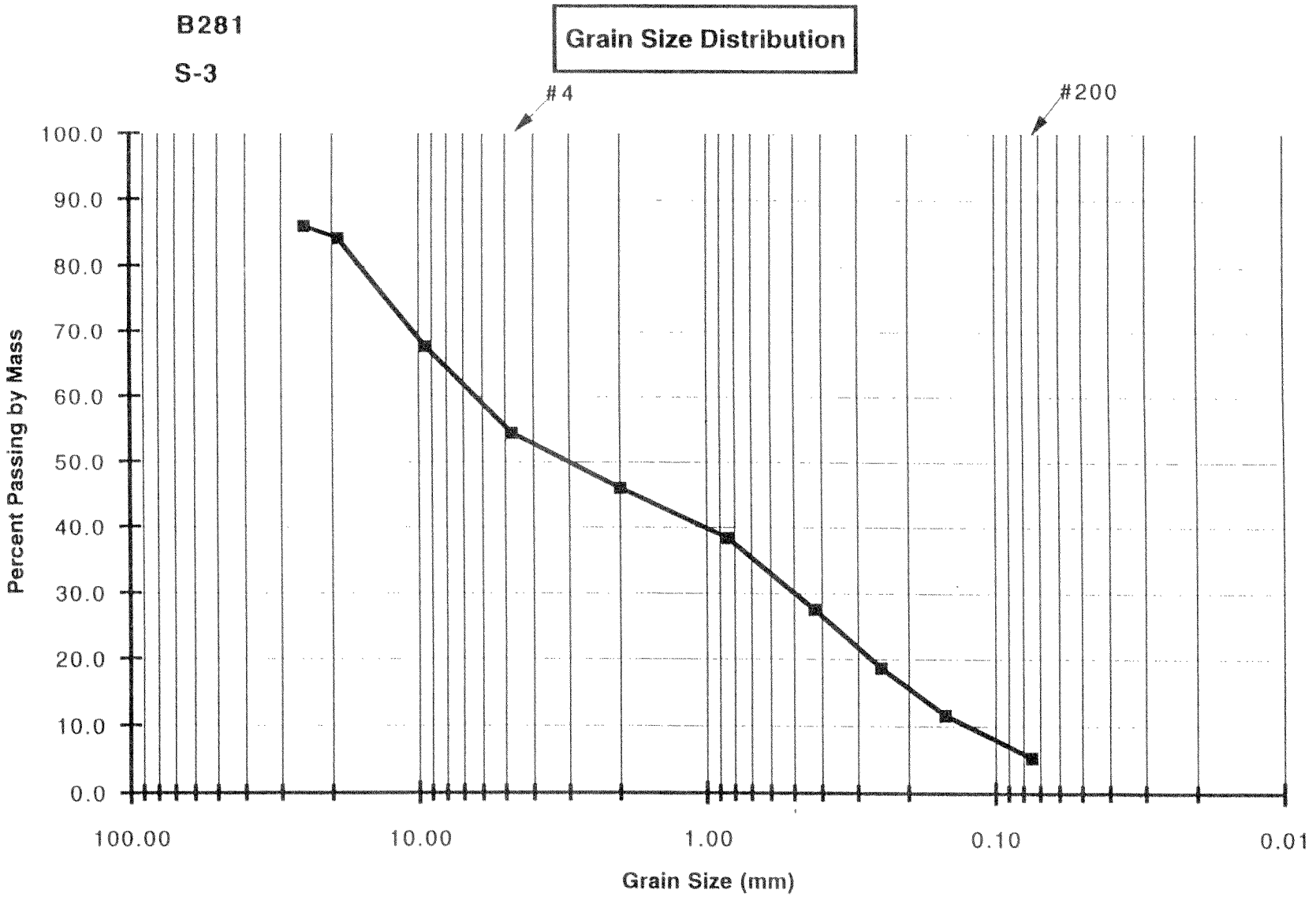
SP

B280

S-9,S-10,S-11

Grain Size Distribution




B281
S-3
Grain Size Distribution
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

Mass Dish + Sample	377.2
Mass of Dish	162.9
Mass Sample	214.3

BORING: B281
SAMPLE: S-3
FIELD DESCRIPTION: Fine/Med. Brown Sand & Gravel

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	842.8	812.7	30.1	14.0	86.0
3/4"	19.00	818.8	814.8	4.0	1.9	84.1
3/8"	9.5	880.3	845.1	35.2	16.4	67.7
4	4.750	844.7	816.4	28.3	13.2	54.5
10	2.000	730.1	711.9	18.2	8.5	46.0
20	0.850	645.6	629.1	16.5	7.7	38.3
40	0.425	578.8	555.7	23.1	10.8	27.5
60	0.250	544.9	525.9	19.0	8.9	18.6
100	0.150	527.7	512.6	15.1	7.0	11.6
200	0.075	504.7	491.3	13.4	6.3	5.3
PAN		500.8	492.0	8.8	4.1	0.0

% COBBLES	14.0
% GRAVEL	31.5
% SAND	49.1
% SILT & CLAY	4.1

SP

Mass Dish + Sample	526.9
Mass of Dish	162.9
Mass Sample	364

BORING: B281
SAMPLE: S-4, Top
FIELD DESCRIPTION: Grey/Brown Clayey Sand & Gravel

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	812.7	812.7	0.0	0.0	100.0
3/4"	19.00	814.8	814.8	0.0	0.0	100.0
3/8"	9.5	890.3	845.1	45.2	12.4	87.6
4	4.750	844.0	816.4	27.6	7.6	80.0
10	2.000	724.9	711.9	13.0	3.6	76.4
20	0.850	636.1	629.1	7.0	1.9	74.5
40	0.425	579.7	555.7	24.0	6.6	67.9
60	0.250	559.7	525.9	33.8	9.3	58.6
100	0.150	558.9	512.6	46.3	12.7	45.9
200	0.075	542.0	491.3	50.7	13.9	32.0
PAN		605.3	492.0	113.3	31.1	0.0

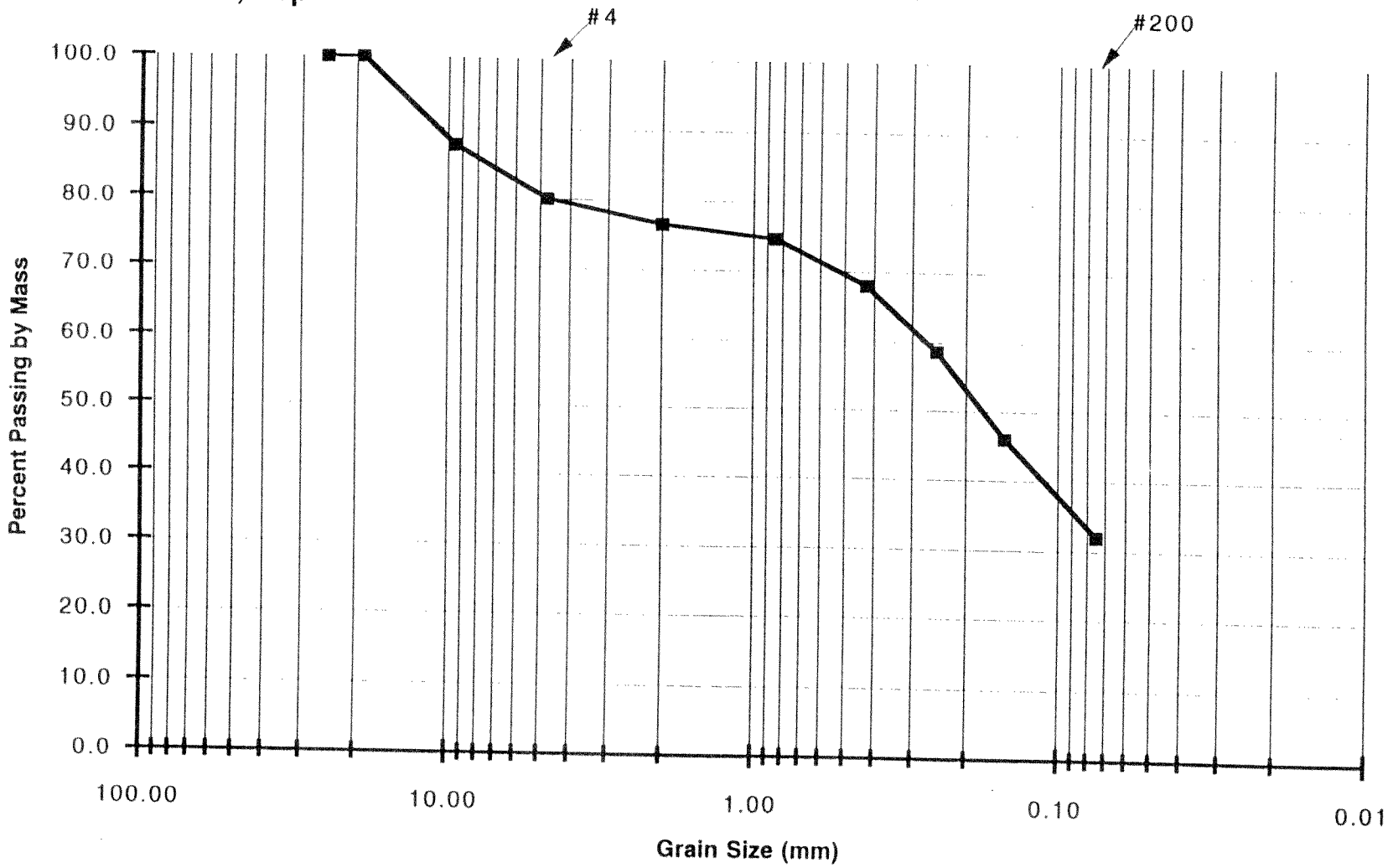
% GRAVEL	20.0
% SAND	48.0
% SILT & CLAY	31.1

SM

B281

S-4, Top

Grain Size Distribution



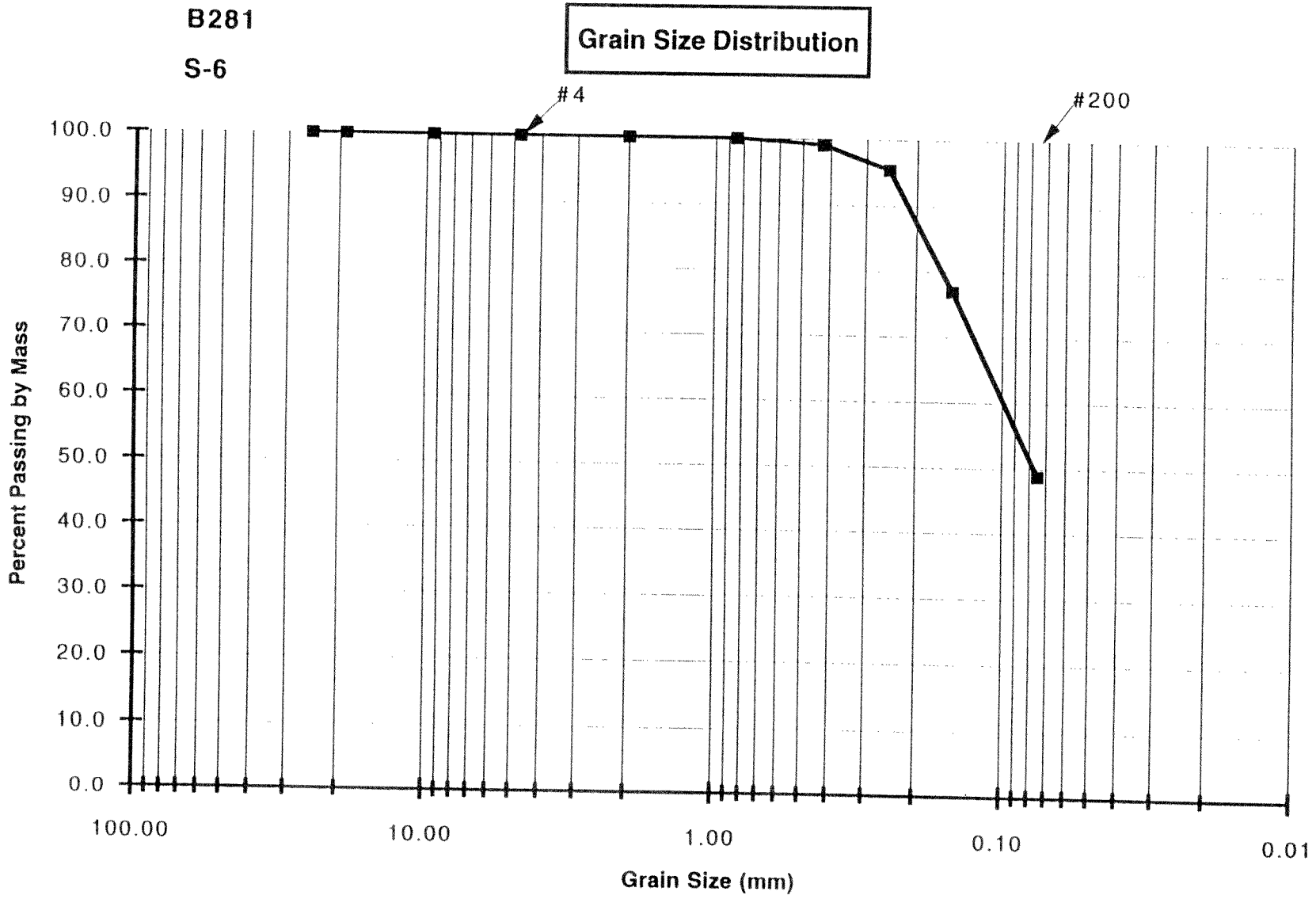
Mass Dish + Sample	369.7
Mass of Dish	162.9
Mass Sample	206.8

BORING: B281
SAMPLE: S-6
FIELD DESCRIPTION: V. Fine Grey/Black Silty Sand

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	812.7	812.7	0.0	0.0	100.0
3/4"	19.00	814.8	814.8	0.0	0.0	100.0
3/8"	9.5	845.1	845.1	0.0	0.0	100.0
4	4.750	816.4	816.4	0.0	0.0	100.0
10	2.000	711.9	711.9	0.0	0.0	100.0
20	0.850	629.2	629.1	0.1	0.0	100.0
40	0.425	557.5	555.7	1.8	0.9	99.1
60	0.250	533.6	525.9	7.7	3.7	95.4
100	0.150	550.8	512.6	38.2	18.5	76.9
200	0.075	549.4	491.3	58.1	28.1	48.8
PAN		589.3	492.0	97.3	47.1	0.0

% GRAVEL	0.0
% SAND	51.2
% SILT & CLAY	47.1

SM


B281
S-6
Grain Size Distribution
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

Mass Dish + Sample	355.5
Mass of Dish	162.9
Mass Sample	192.6

BORING: B281
SAMPLE: S-7
FIELD DESCRIPTION: Brown Sand, Some Gravel

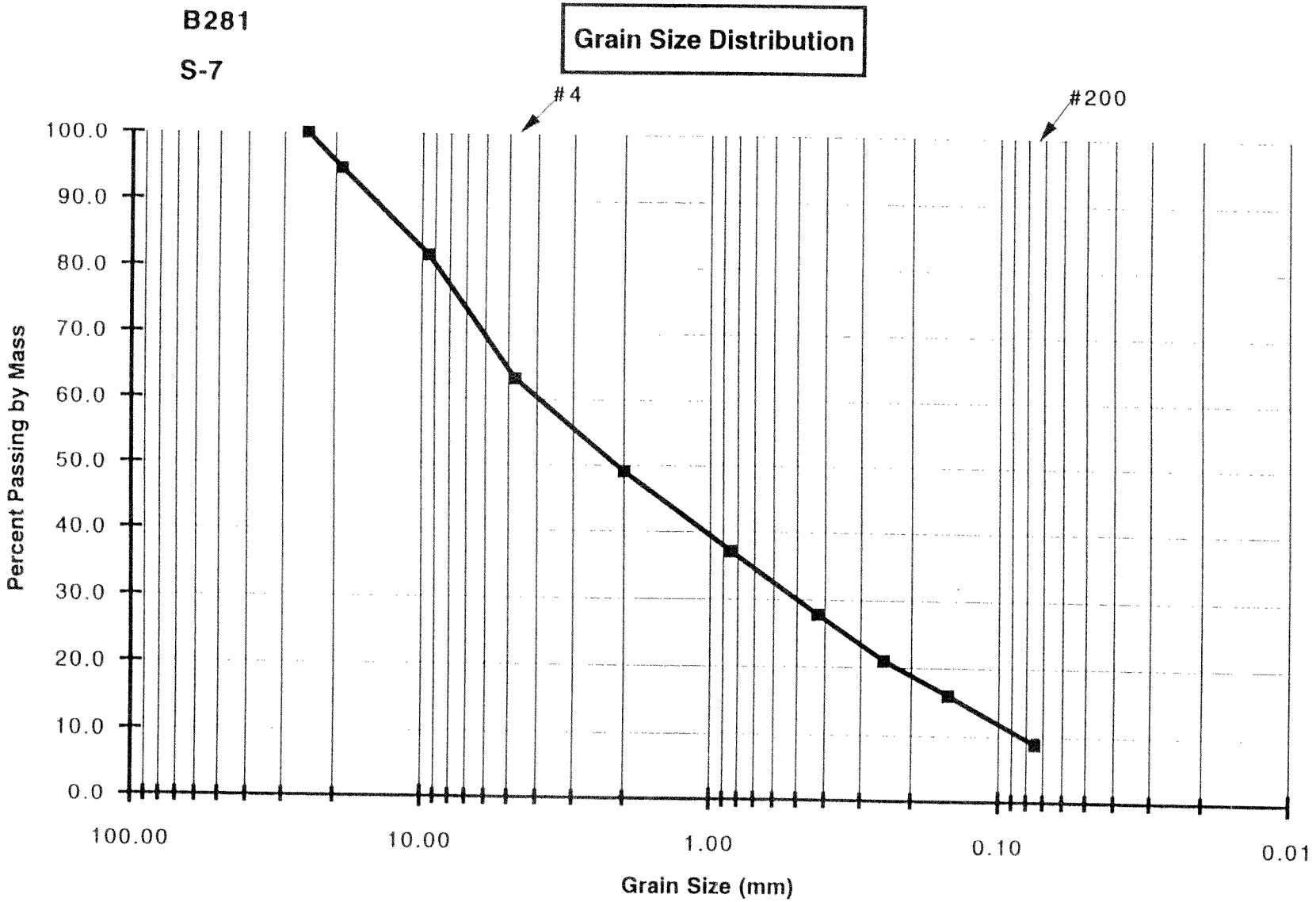
Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	812.7	812.7	0.0	0.0	100.0
3/4"	19.00	825	814.8	10.2	5.3	94.7
3/8"	9.5	870.1	845.1	25.0	13.0	81.7
4	4.750	852.3	816.4	35.9	18.6	63.1
10	2.000	739.0	711.9	27.1	14.1	49.0
20	0.850	652.2	629.1	23.1	12.0	37.0
40	0.425	573.5	555.7	17.8	9.2	27.8
60	0.250	539.1	525.9	13.2	6.9	20.9
100	0.150	522.4	512.6	9.8	5.1	15.8
200	0.075	504.9	491.3	13.6	7.1	8.8
PAN		506.6	492.0	14.6	7.6	0.0

% GRAVEL	36.9
% SAND	54.3
% SILT & CLAY	7.6

SP-SM

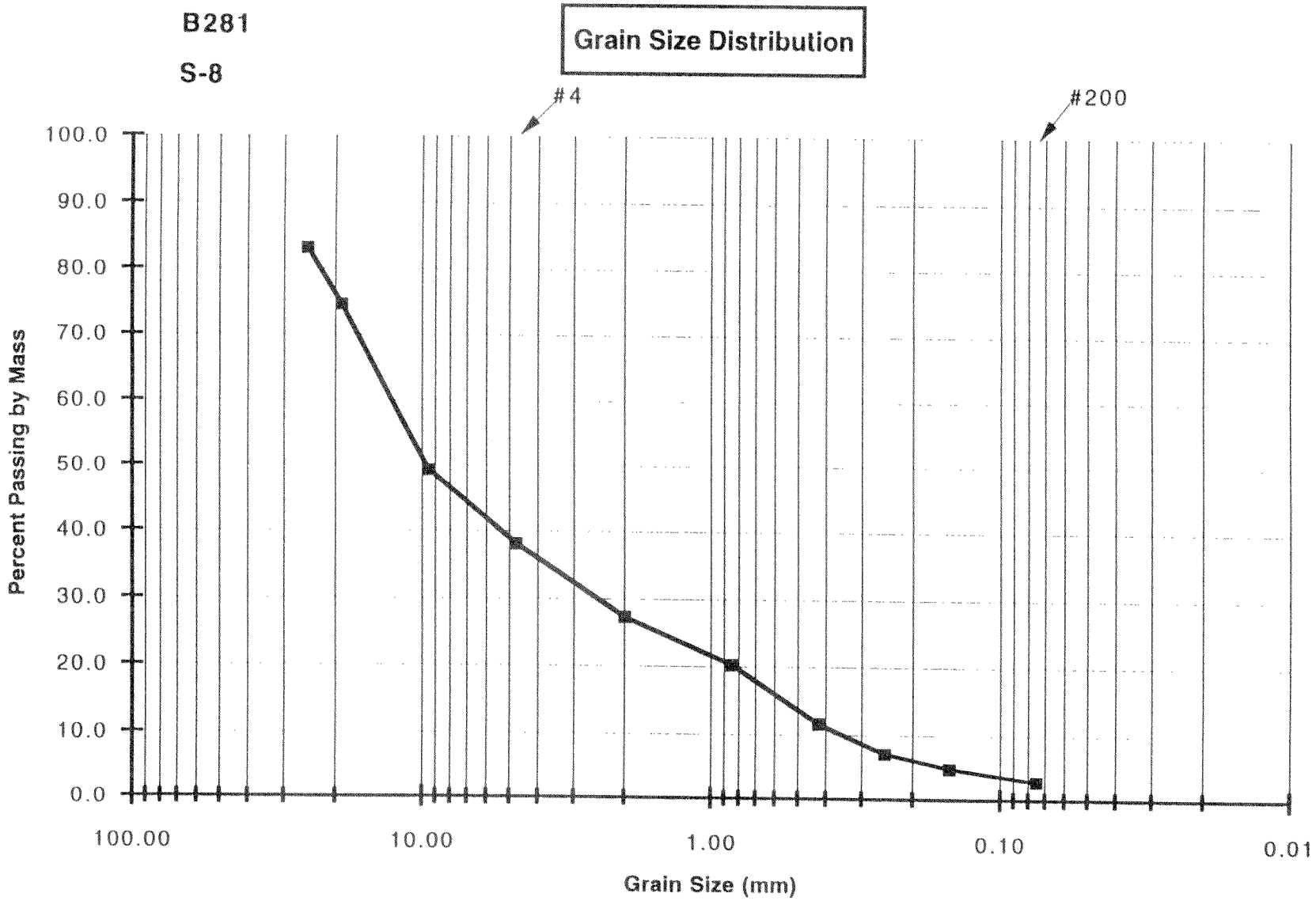
B281

S-7


Grain Size Distribution
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

B281

S-8


Grain Size Distribution
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

Mass Dish + Sample	509.4
Mass of Dish	162.9
Mass Sample	346.5

BORING: B281
SAMPLE: S-8
FIELD DESCRIPTION: Brown Gravel

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	871.2	812.7	58.5	16.9	83.1
3/4"	19.00	844.5	814.8	29.7	8.6	74.5
3/8"	9.5	932.8	845.1	87.7	25.3	49.2
4	4.750	855.2	816.4	38.8	11.2	38.0
10	2.000	749.2	711.9	37.3	10.8	27.3
20	0.850	653.9	629.1	24.8	7.2	20.1
40	0.425	585.3	555.7	29.6	8.5	11.6
60	0.250	541.6	525.9	15.7	4.5	7.0
100	0.150	520.6	512.6	8.0	2.3	4.7
200	0.075	498.0	491.3	6.7	1.9	2.8
PAN		499.2	492.0	7.2	2.1	0.0

% COBBLES	16.9
% GRAVEL	45.1
% SAND	35.2
% SILT & CLAY	2.1

GW

Mass Dish + Sample	464.9
Mass of Dish	162.9
Mass Sample	302

BORING: B281
SAMPLE: S-9, Bottom
FIELD DESCRIPTION: Grey/Brown Sandstone and Gravel

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	812.7	812.7	0.0	0.0	100.0
3/4"	19.00	830.7	814.8	15.9	5.3	94.7
3/8"	9.5	888.7	845.1	43.6	14.4	80.3
4	4.750	878.0	816.4	61.6	20.4	59.9
10	2.000	736.9	711.9	25.0	8.3	51.6
20	0.850	639.2	629.1	10.1	3.3	48.3
40	0.425	574.2	555.7	18.5	6.1	42.2
60	0.250	538.8	525.9	12.9	4.3	37.9
100	0.150	539.5	512.6	26.9	8.9	29.0
200	0.075	526.9	491.3	35.6	11.8	17.2
PAN		540.2	492.0	48.2	16.0	0.0

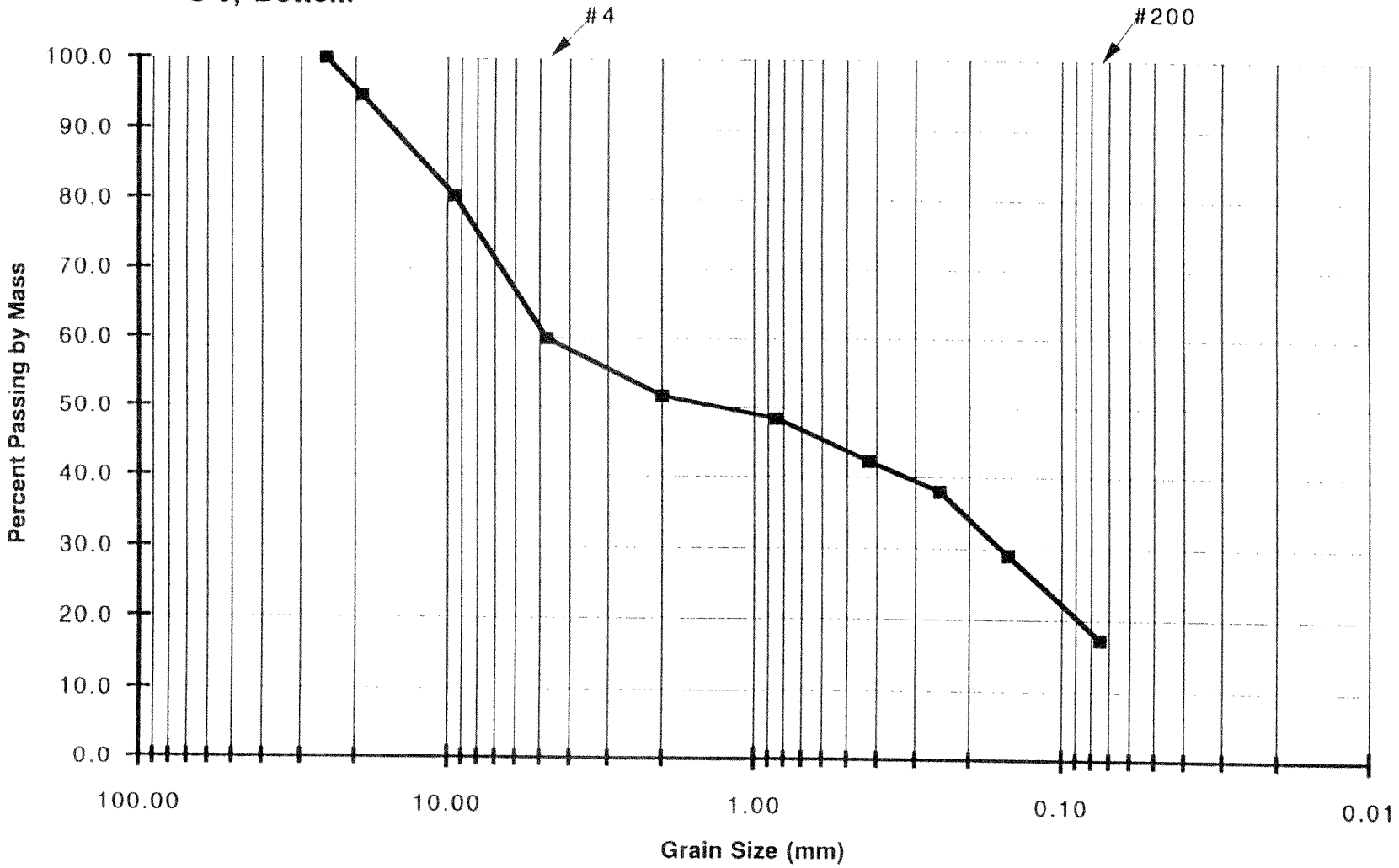
% GRAVEL	40.1
% SAND	42.7
% SILT & CLAY	16.0

SM

B281

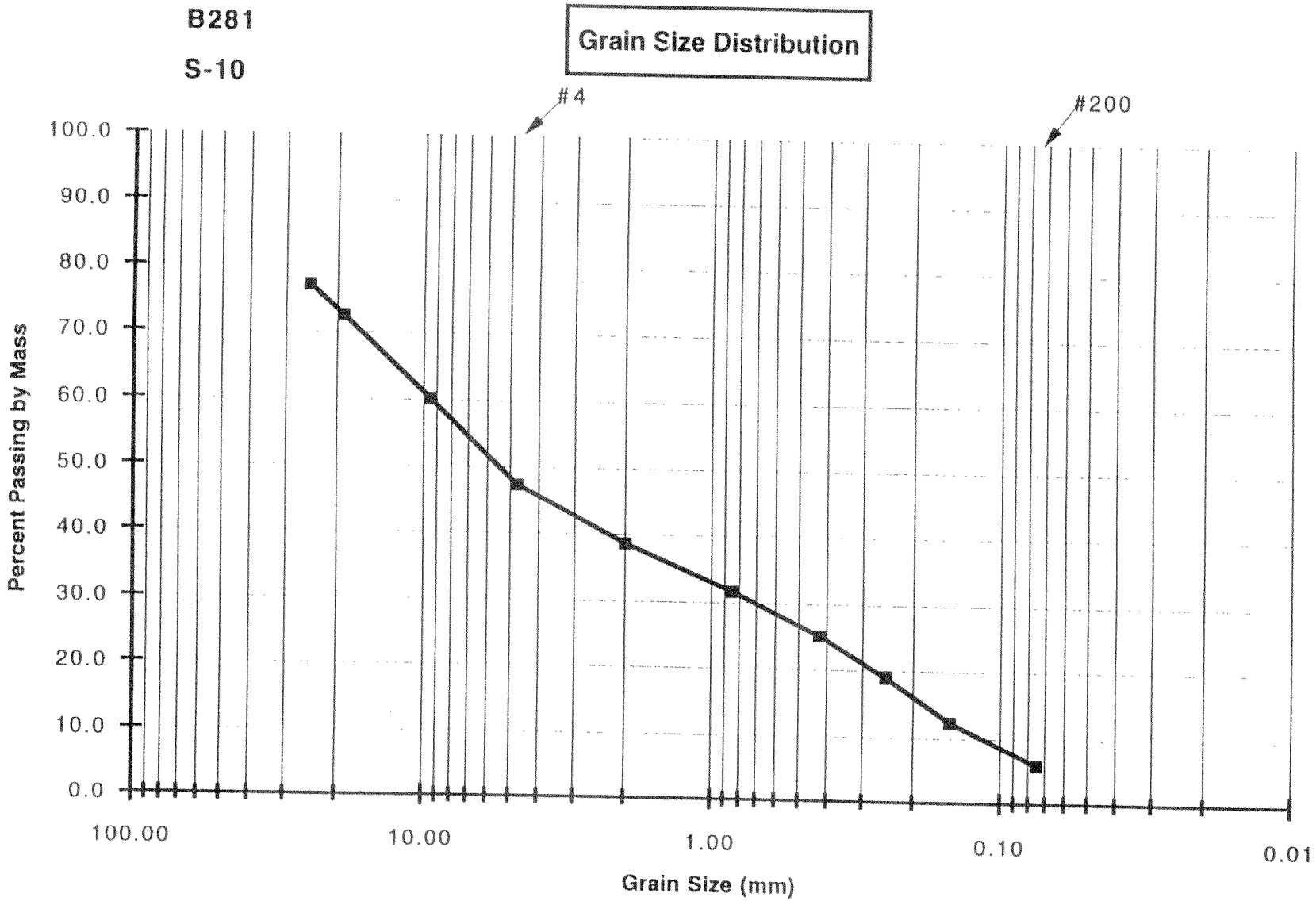
S-9, Bottom

Grain Size Distribution



B281

S-10


Grain Size Distribution
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

Mass Dish + Sample	412.4
Mass of Dish	162.9
Mass Sample	249.5

BORING: B281
SAMPLE: S-10
FIELD DESCRIPTION: Sandstone and Gravel

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	869.9	812.7	57.2	22.9	77.1
3/4"	19.00	826.3	814.8	11.5	4.6	72.5
3/8"	9.5	875.7	845.1	30.6	12.3	60.2
4	4.750	848.7	816.4	32.3	12.9	47.3
10	2.000	733.6	711.9	21.7	8.7	38.6
20	0.850	646.4	629.1	17.3	6.9	31.6
40	0.425	572.0	555.7	16.3	6.5	25.1
60	0.250	541.5	525.9	15.6	6.3	18.8
100	0.150	529.1	512.6	16.5	6.6	12.2
200	0.075	506.8	491.3	15.5	6.2	6.0
PAN		503.9	492.0	11.9	4.8	0.0

% Cobbles	22.9
% GRAVEL	29.8
% SAND	41.2
% SILT & CLAY	4.8

GP

Mass Dish + Sample	340.1
Mass of Dish	162.9
Mass Sample	177.2

BORING: B202
SAMPLE: S-4
FIELD DESCRIPTION: Blk/Grey Clay w/Sand and Gravel

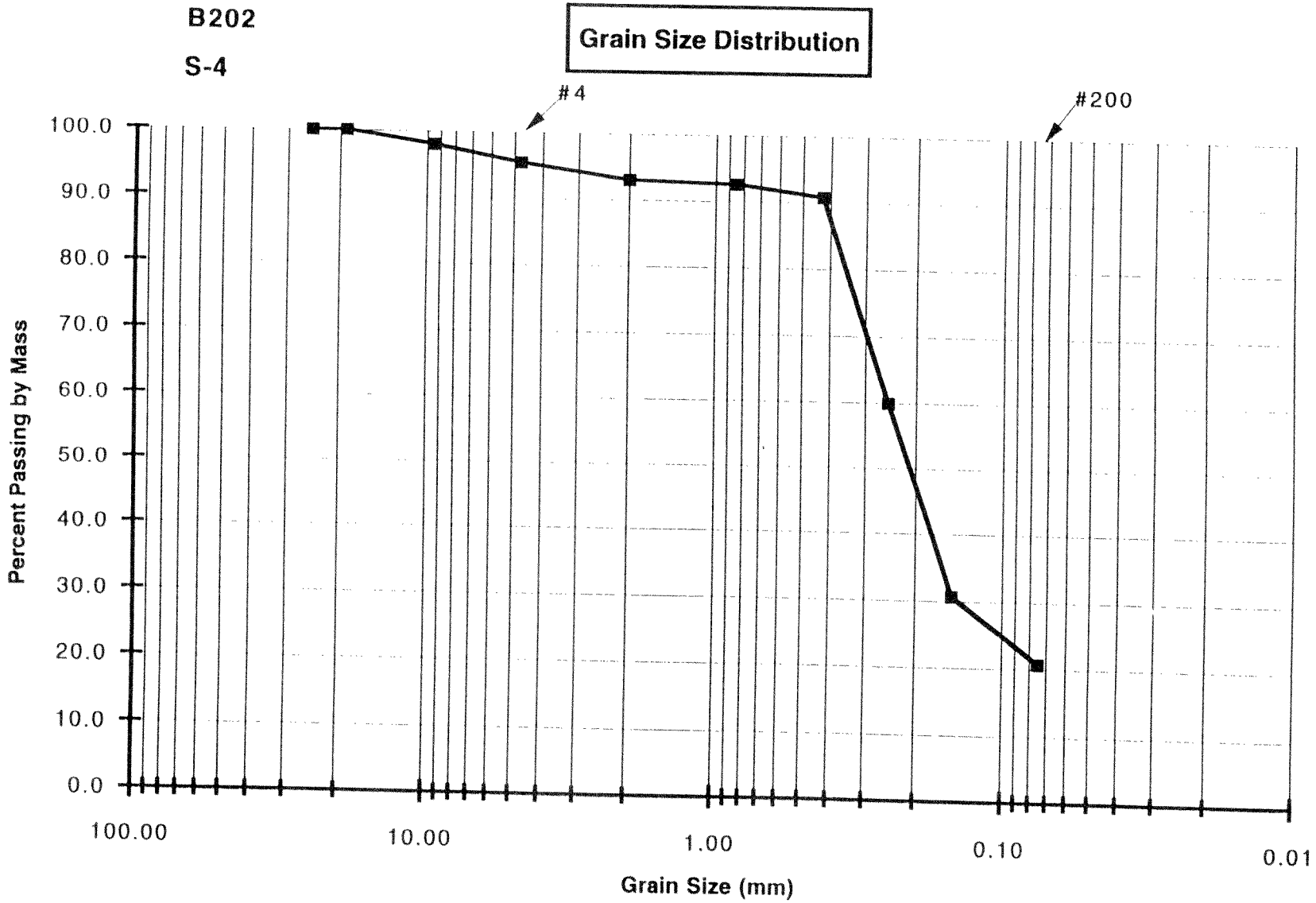
Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	812.7	812.7	0.0	0.0	100.0
3/4"	19.00	814.8	814.8	0.0	0.0	100.0
3/8"	9.5	848.7	845.1	3.6	2.0	98.0
4	4.750	821.0	816.4	4.6	2.6	95.4
10	2.000	716.1	711.9	4.2	2.4	93.0
20	0.850	630.0	629.1	0.9	0.5	92.5
40	0.425	558.9	555.7	3.2	1.8	90.7
60	0.250	580.4	525.9	54.5	30.8	59.9
100	0.150	563.4	511.5	51.9	29.3	30.6
200	0.075	509.0	491.3	17.7	10.0	20.7
PAN		526.6	492.0	34.6	19.5	0.0

% GRAVEL	4.6
% SAND	74.7
% SILT & CLAY	19.5

SM

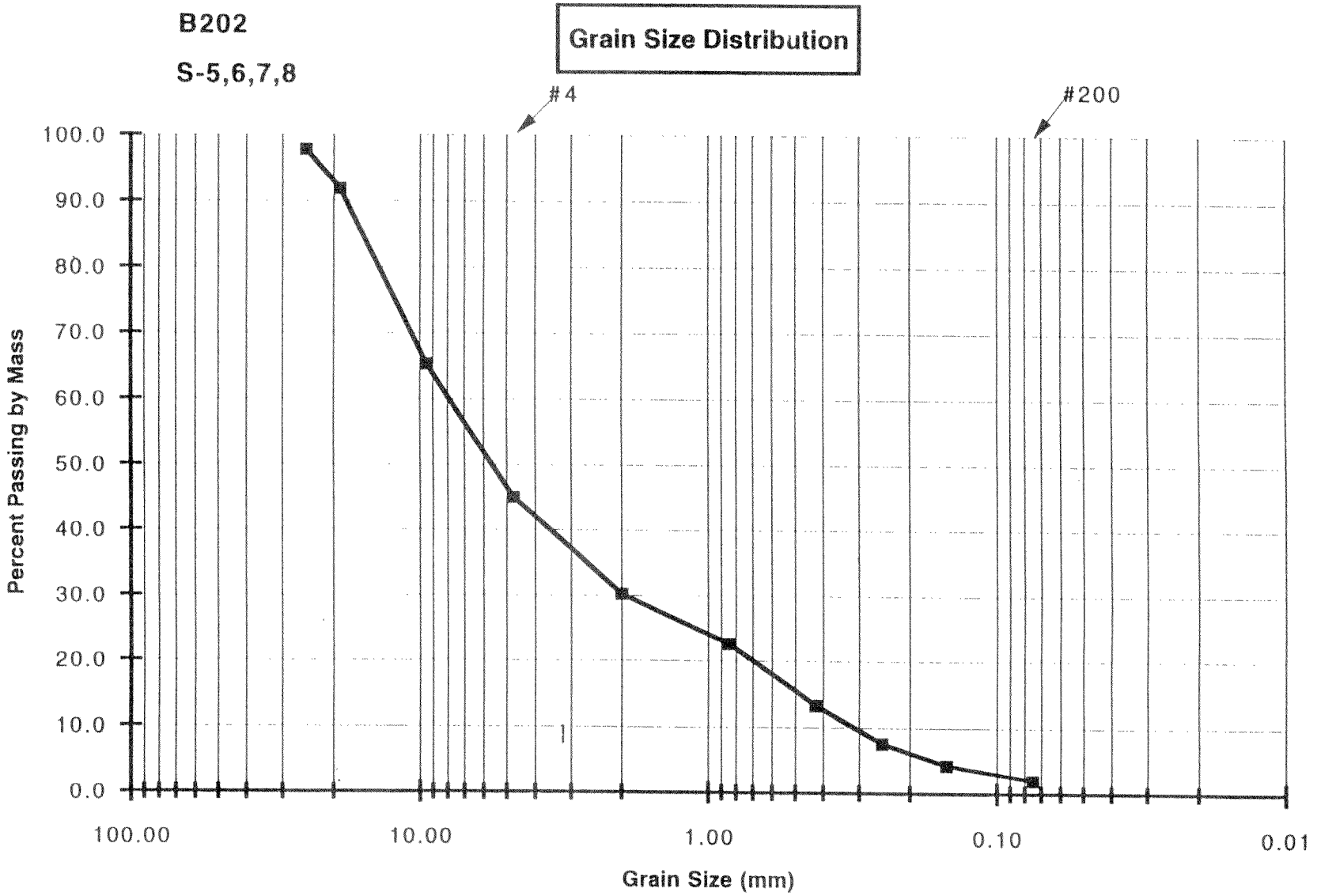
B202

S-4


Grain Size Distribution
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

B202

S-5,6,7,8


Grain Size Distribution
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

Mass Dish + Sample	1024.3
Mass of Dish	162.9
Mass Sample	861.4

BORING: B202
SAMPLE: S-5,6,7,8
FIELD DESCRIPTION: Brown Sandy Gravel

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	831.9	812.7	19.2	2.2	97.8
3/4"	19.00	866.2	814.8	51.4	6.0	91.8
3/8"	9.5	1073.3	845.1	228.2	26.5	65.3
4	4.750	992.1	816.4	175.7	20.4	44.9
10	2.000	839.1	711.9	127.2	14.8	30.1
20	0.850	695.2	629.1	66.1	7.7	22.5
40	0.425	635.8	555.7	80.1	9.3	13.2
60	0.250	574.4	525.9	48.5	5.6	7.5
100	0.150	539.5	511.5	28.0	3.3	4.3
200	0.075	510.9	491.3	19.6	2.3	2.0
PAN		507.4	492.0	15.4	1.8	0.0

% COBBLES	2.2
% GRAVEL	52.9
% SAND	42.9
% SILT & CLAY	1.8

GW

Mass Dish + Sample	620.9
Mass of Dish	162.9
Mass Sample	458

BORING: B206, B208
SAMPLE: S-7
FIELD DESCRIPTION: Brown Sandy Gravel

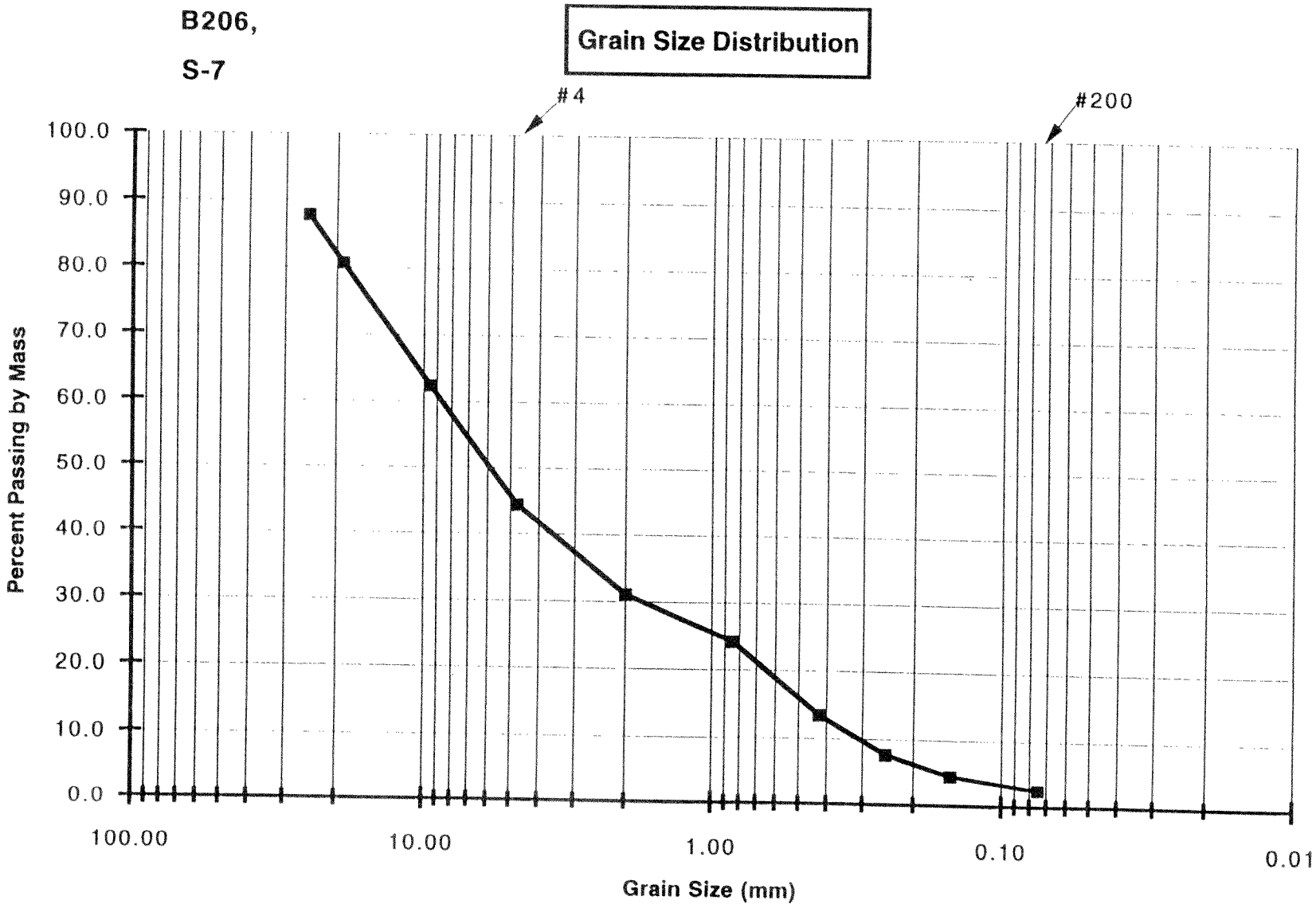
Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	868.5	812.7	55.8	12.2	87.8
3/4"	19.00	847.6	814.8	32.8	7.2	80.7
3/8"	9.5	929	845.1	83.9	18.3	62.3
4	4.750	898.9	816.4	82.5	18.0	44.3
10	2.000	772.8	711.9	60.9	13.3	31.0
20	0.850	661.0	629.1	31.9	7.0	24.1
40	0.425	604.8	555.7	49.1	10.7	13.3
60	0.250	551.9	525.9	26.0	5.7	7.7
100	0.150	525.8	511.5	14.3	3.1	4.5
200	0.075	500.9	491.3	9.6	2.1	2.4
PAN		501.4	492.0	9.4	2.1	0.0

% COBBLES	12.2
% GRAVEL	43.5
% SAND	41.9
% SILT & CLAY	2.1

GW

B206,

S-7


Grain Size Distribution
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

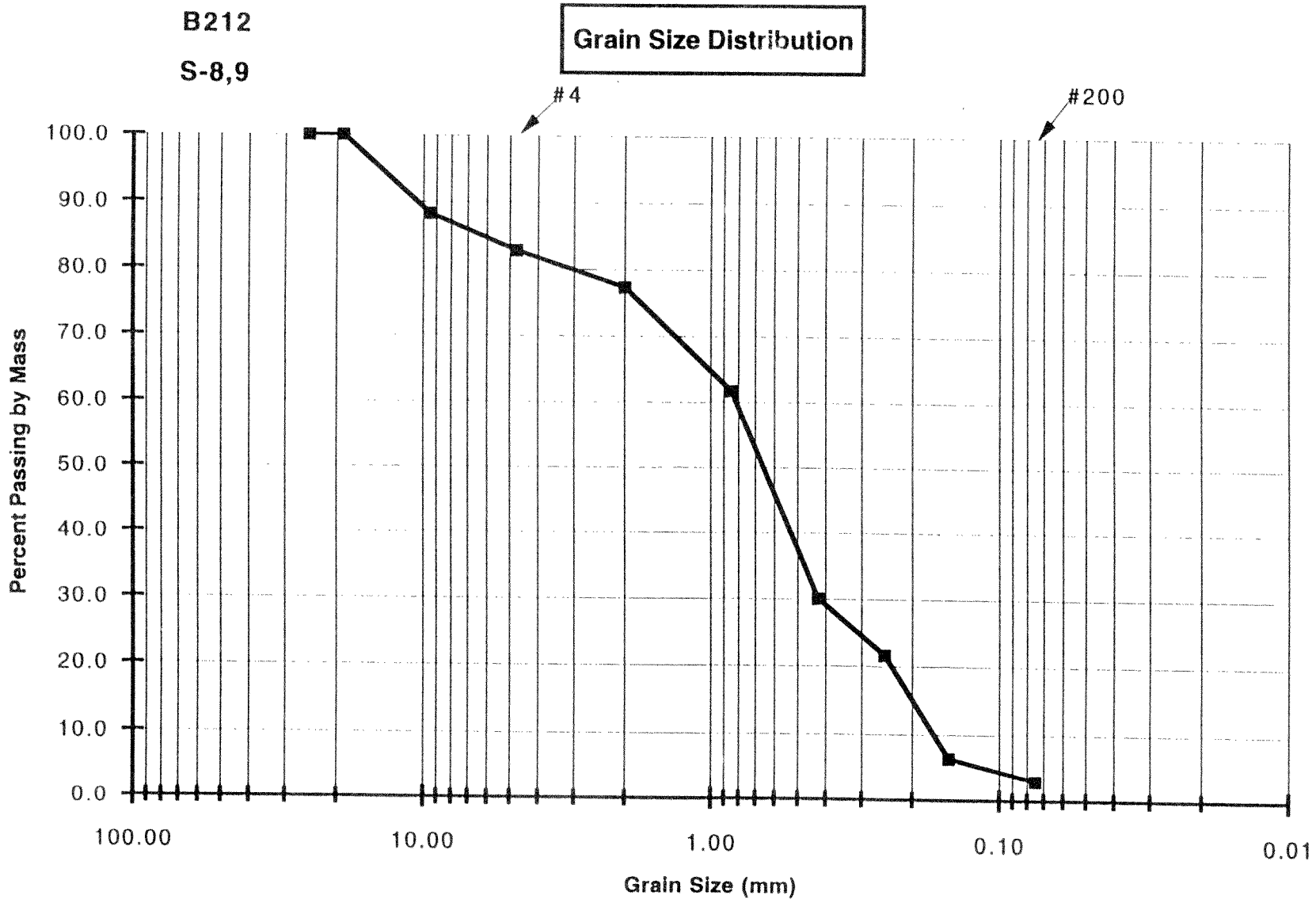
Mass Dish + Sample	506.2
Mass of Dish	162.7
Mass Sample	343.5

BORING: B212
SAMPLE: S-8,9
FIELD DESCRIPTION: Dense Med. Coarse Brown Sand

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	812.7	812.7	0.0	0.0	100.0
3/4"	19.00	814.8	814.8	0.0	0.0	100.0
3/8"	9.5	885.6	845.1	40.5	11.8	88.2
4	4.750	835.2	816.4	18.8	5.5	82.7
10	2.000	730.9	711.9	19.0	5.5	77.2
20	0.850	682.3	629.1	53.2	15.5	61.7
40	0.425	664.7	555.7	109.0	31.7	30.0
60	0.250	554.9	525.9	29.0	8.4	21.5
100	0.150	563.5	511.5	52.0	15.1	6.4
200	0.075	503.2	491.3	11.9	3.5	2.9
PAN		500.0	492.0	8.0	2.3	0.0

% GRAVEL	17.3
% SAND	79.8
% SILT & CLAY	2.3

SP


B212
S-8,9
Grain Size Distribution
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

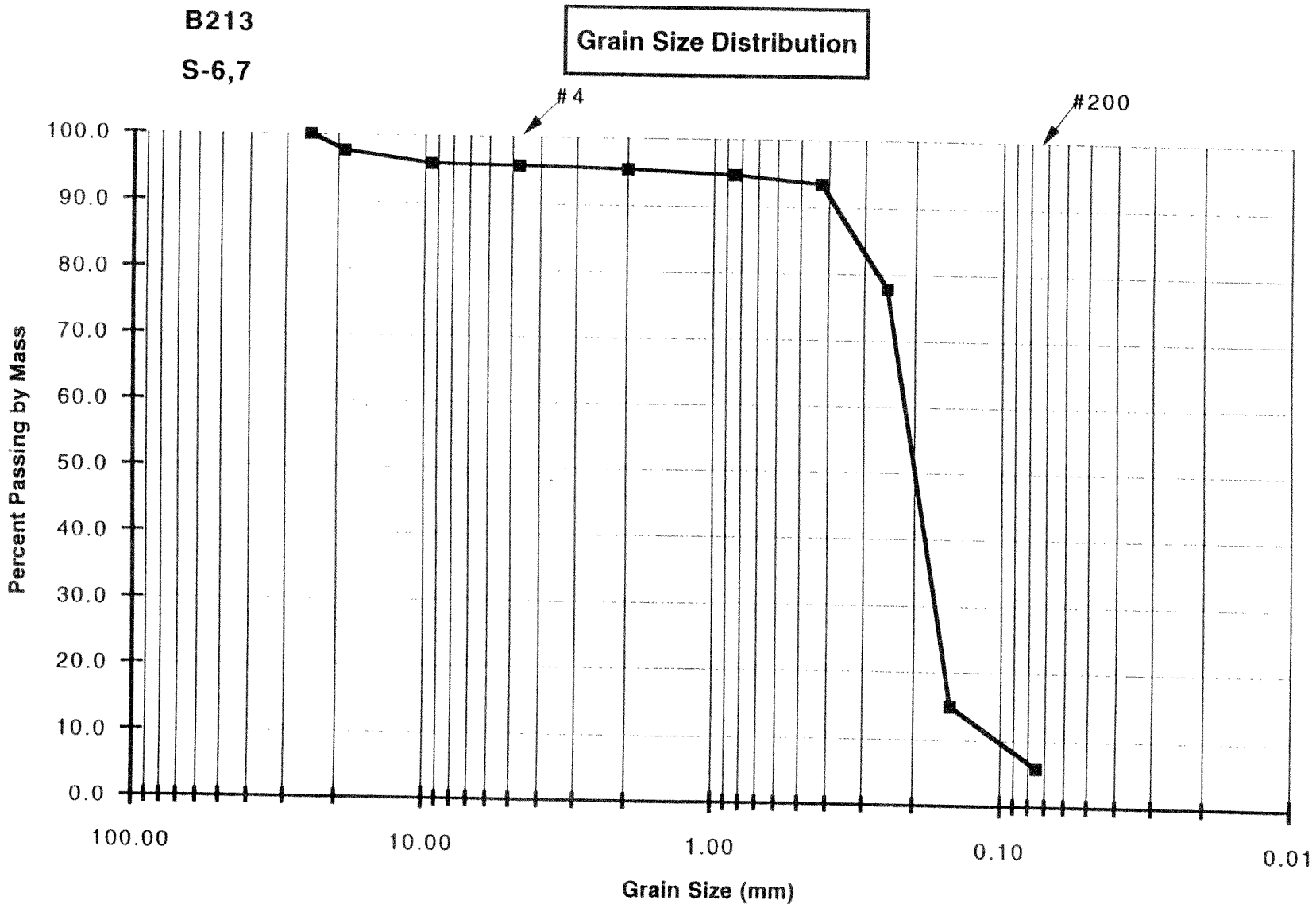
Mass Dish + Sample	589.8
Mass of Dish	162.7
Mass Sample	427.1

BORING: B213
SAMPLE: S-6,7
FIELD DESCRIPTION: Loose Fine/Med. Coarse Grey Sand

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	812.7	812.7	0.0	0.0	100.0
3/4"	19.00	825.3	814.8	10.5	2.5	97.5
3/8"	9.5	852.7	845.1	7.6	1.8	95.8
4	4.750	817.0	816.4	0.6	0.1	95.6
10	2.000	713.1	711.9	1.2	0.3	95.3
20	0.850	632.3	629.1	3.2	0.7	94.6
40	0.425	560.9	555.7	5.2	1.2	93.4
60	0.250	592.8	525.9	66.9	15.7	77.7
100	0.150	780.0	511.5	268.5	62.9	14.8
200	0.075	529.7	491.3	38.4	9.0	5.9
PAN		517.0	492.0	25.0	5.9	0.0

% GRAVEL	4.4
% SAND	89.8
% SILT & CLAY	5.9

SM-SP


B213
S-6,7
Grain Size Distribution
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

Mass Dish + Sample	404.0
Mass of Dish	162.7
Mass Sample	241.3

BORING: B213
SAMPLE: S-9
FIELD DESCRIPTION: Dense Med. Coarse Brown Silty Sand w/Gravel

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	844.6	812.7	31.9	13.2	86.8
3/4"	19.00	822.6	814.8	7.8	3.2	83.5
3/8"	9.5	867	845.1	21.9	9.1	74.5
4	4.750	839.7	816.4	23.3	9.7	64.8
10	2.000	729.7	711.9	17.8	7.4	57.4
20	0.850	645.1	629.1	16.0	6.6	50.8
40	0.425	594.5	555.7	38.8	16.1	34.7
60	0.250	552.9	525.9	27.0	11.2	23.5
100	0.150	544.3	511.5	32.8	13.6	9.9
200	0.075	508.1	491.3	16.8	7.0	3.0
PAN		499.2	492.0	7.2	3.0	0.0

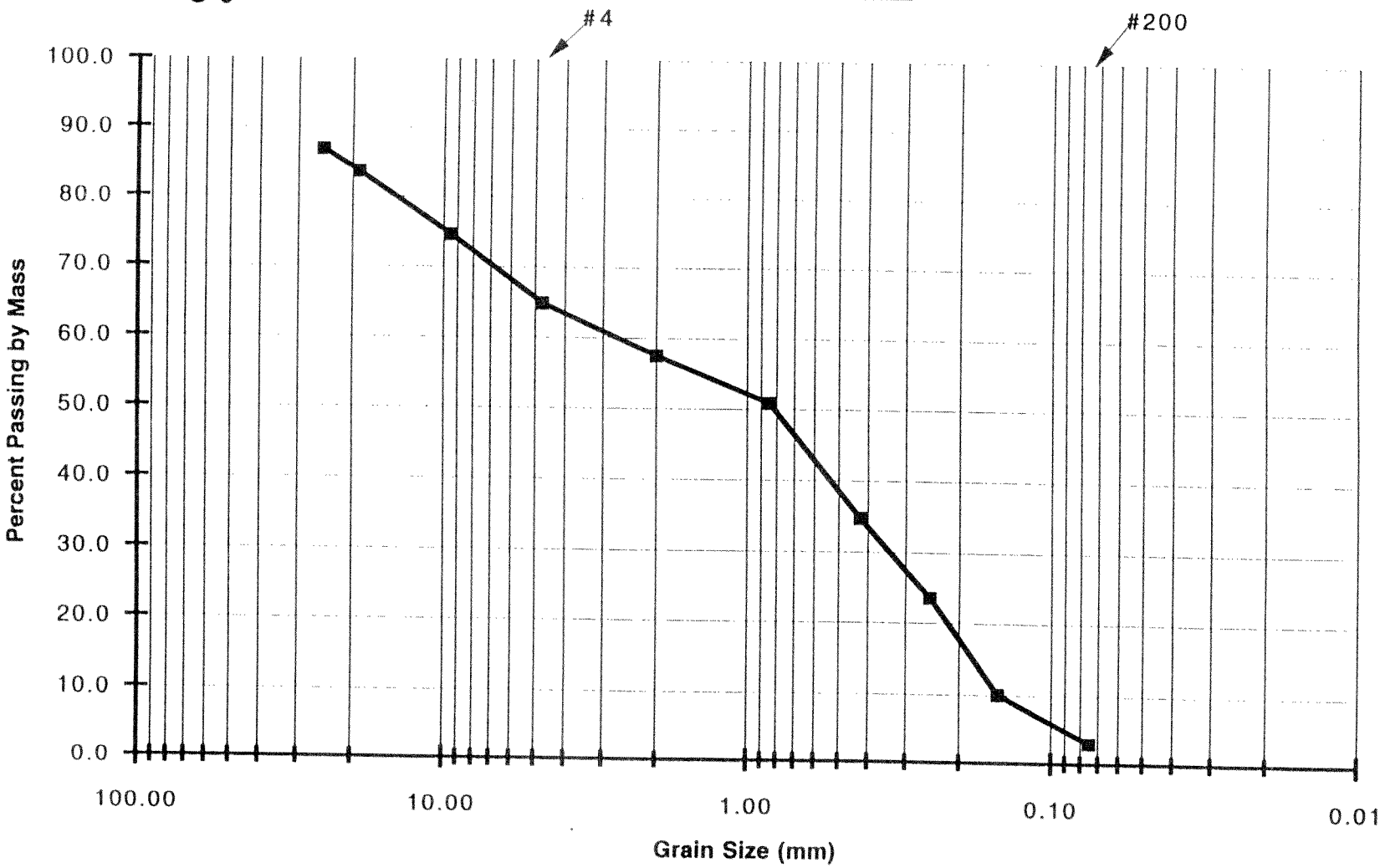
% COBBLES	13.2
% GRAVEL	22.0
% SAND	61.8
% SILT & CLAY	3.0

SP

B213

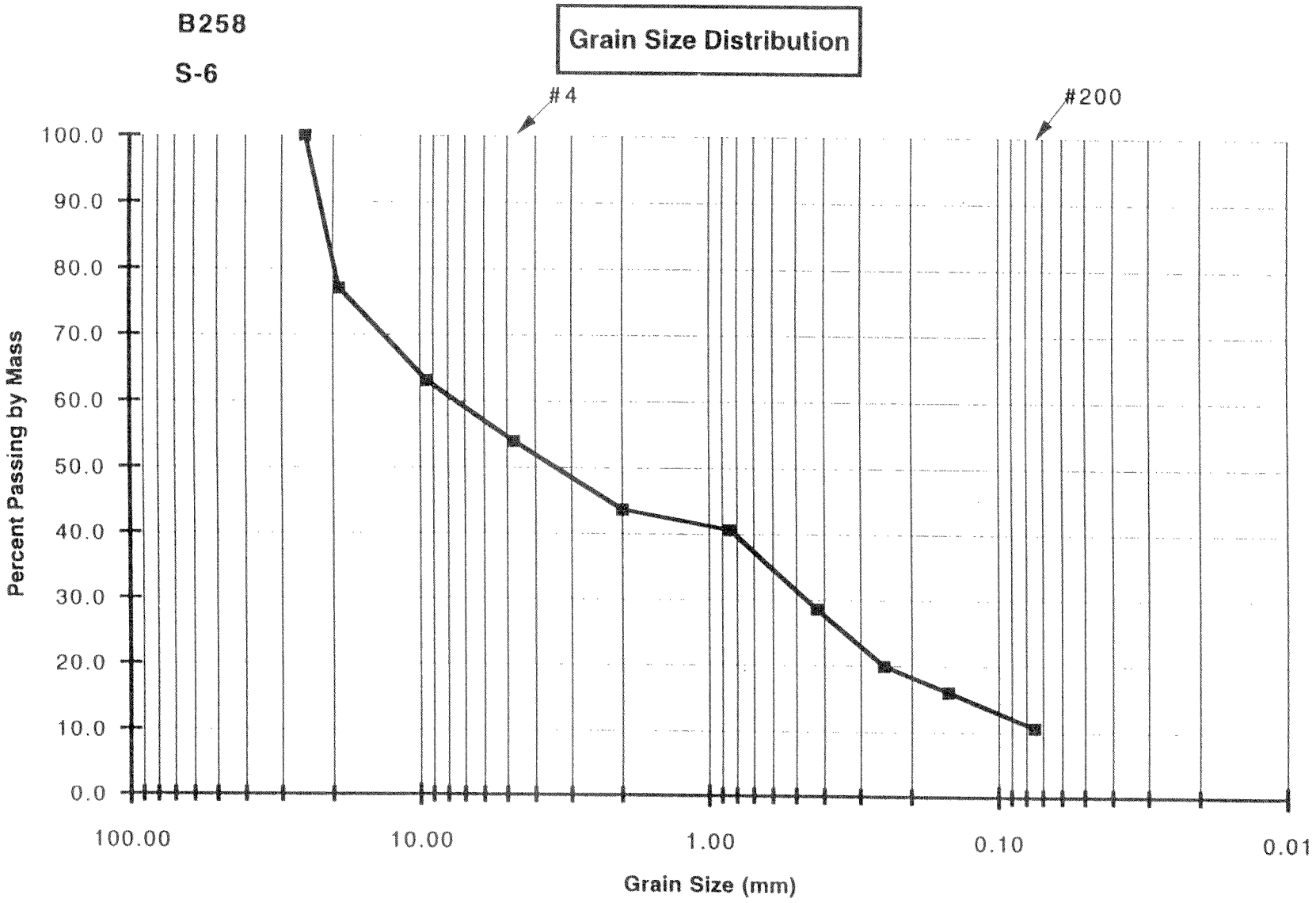
S-9

Grain Size Distribution



B258

S-6


Grain Size Distribution
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

Mass Dish + Sample	347.1
Mass of Dish	162.9
Mass Sample	184.2

BORING: B258
SAMPLE: S-6
FIELD DESCRIPTION: Grey/Brown Sandy Gravel

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	812.7	812.7	0.0	0.0	100.0
3/4"	19.00	857.3	814.8	42.5	23.1	76.9
3/8"	9.5	870.7	845.1	25.6	13.9	63.0
4	4.750	833.1	816.4	16.7	9.1	54.0
10	2.000	730.9	711.9	19.0	10.3	43.6
20	0.850	634.8	629.1	5.7	3.1	40.6
40	0.425	577.9	555.7	22.2	12.1	28.5
60	0.250	541.8	525.9	15.9	8.6	19.9
100	0.150	518.7	511.5	7.2	3.9	16.0
200	0.075	501.2	491.3	9.9	5.4	10.6
PAN		509.7	492.0	17.7	9.6	0.0

% GRAVEL	46.0
% SAND	43.4
% SILT & CLAY	9.6

SM - SP

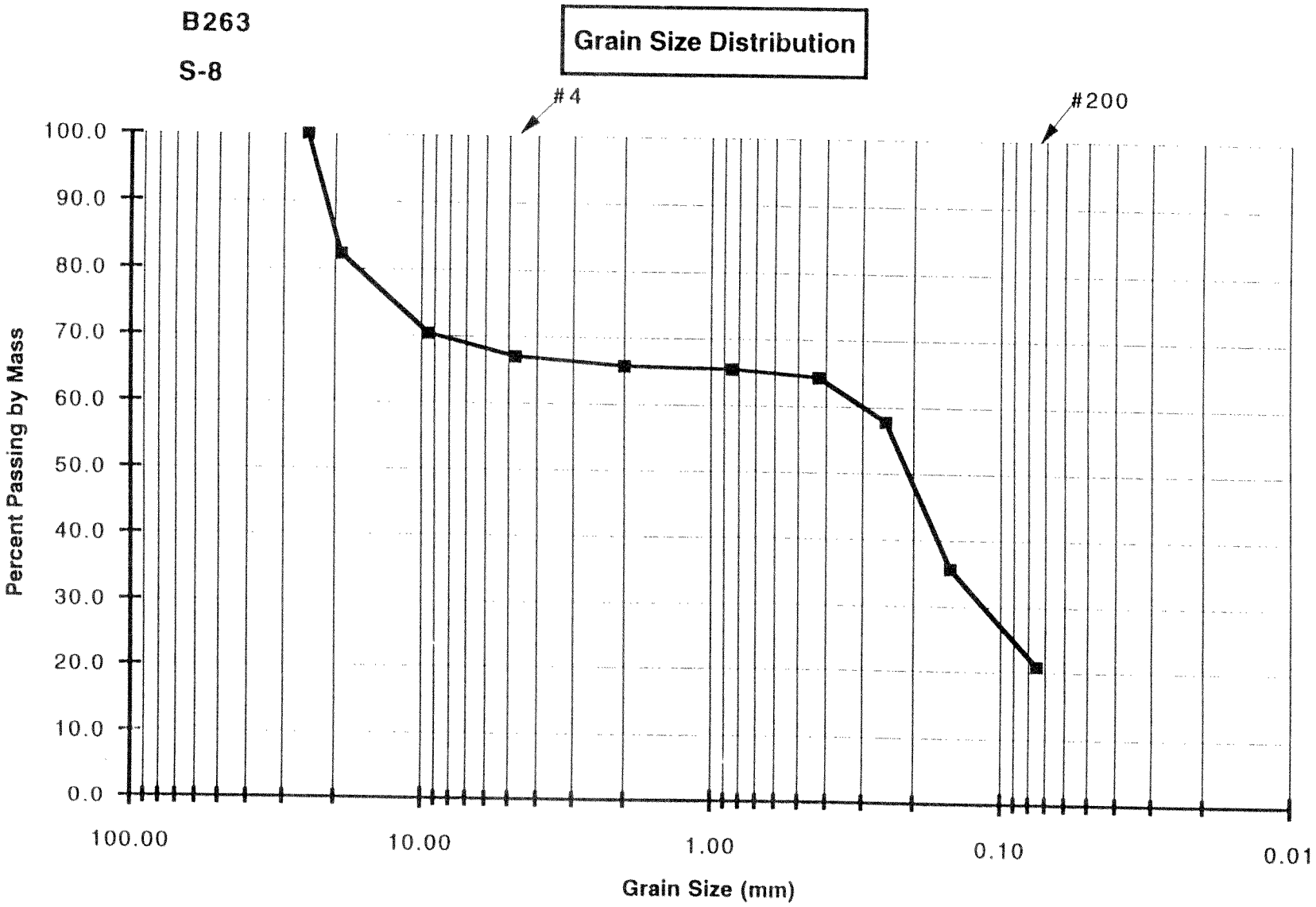
Mass Dish + Sample	383.3
Mass of Dish	162.9
Mass Sample	220.4

BORING: B263
SAMPLE: S-8
FIELD DESCRIPTION: Grey Silty Clay

Sieve Number	Diam. (mm)	Mass Sieve plus Soil, g	Mass of Sieve, g	Mass Soil Retained	% Retained by mass	% Passing by mass
1"	25.00	812.7	812.7	0.0	0.0	100.0
3/4"	19.00	854.1	814.8	39.3	17.8	82.2
3/8"	9.5	871.3	845.1	26.2	11.9	70.3
4	4.750	823.8	816.4	7.4	3.4	66.9
10	2.000	714.6	711.9	2.7	1.2	65.7
20	0.850	629.9	629.1	0.8	0.4	65.3
40	0.425	558.1	555.7	2.4	1.1	64.2
60	0.250	540.2	525.9	14.3	6.5	57.8
100	0.150	560.3	511.5	48.8	22.1	35.6
200	0.075	524.0	491.3	32.7	14.8	20.8
PAN		536.8	492.0	44.8	20.3	0.0

% GRAVEL	33.1
% SAND	46.1
% SILT & CLAY	20.3

SM


B263
S-8
Grain Size Distribution
#4
#200
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
Percent Passing by Mass
100.00
10.00
1.00
0.10
0.01
Grain Size (mm)

LABORATORY TEST RESULTS

PROFESSIONAL SERVICE INDUSTRIES
PITTSBURGH, PA

ALCOSAN WASTEWATER TREATEMENT PLANT
1995 Geotechnical Investigation Program
pH, Chloride, Sulfate, Resistivity Laboratory Results

Boring #	Depth (ft)	Material Description	pH	Chloride (mg/kg)	Sulfate (mg/kg)	Resistivity (ohms-cm)
201	10	Coal Cinder Fill	7.6	175.8	440	3,250
	20	Grey Sand & Gravel	8.5	126.3	365	3,100
202	10	Grey/Blk Clayey FILL	8.1	149.5	305	3,150
	20	Grey/Blk Clay w/Sand&Gravel	7.3	112.5	390	3,100
203	10	Brwn/Blk. Sandy FILL	8.2	147.5	1,460	1,250
	20	Black Silty Clay Trace Coal	7.6	72.8	420	7,300
	25	Grey/Black Silty Clay (odor)	7.2	92.9	330	4,000
	40	Med. Coarse Brown Sand	7.4	116.2	320	2,850
204	10	Black FILL Material	7.5	325.6	15,000	880
	20	Brown/Tan Silty Clay w/ Coal	7.6	157.4	1,320	1,700
205	10	Brown Sandy Clayey Fill	8.4	95.8	5,507	1,800
206	10	Coal Cinders & Slag FILL	8.4	23.7	600	6,600
	20	Coal Cinders & Slag FILL	9.5	107.2	405	3,400
	30	Grey/Blk Clayey SILT	6.5	92.1	450	2,500
	40	Brown Sandy Gravel	6.9	25.5	98	10,000
208	10	Brown Sandy Gravel FILL	7.9	40.2	68	17,000
	20	Brown Sandy Gravel FILL	9.6	23.6	593	2,600
	30	Grey/Blk. Silty SAND w/ Traces Coal	6.5	85.8	255	2,900
	40	Brown Sand & Gravel	7.3	39.6	30	9,900
211	10	Black Cinders w/ Bricks	7.4	20.7	110	5,000
	25	Blk./Grey Clayey SILT	7.3	63.4	660	4,200
	30	Brown Sandy Gravel	7.8	27.9	29	14,000
	40	Brown SAND, some Gravel	7.4	39.3	90	8,700
212	20	Fine Grey Silty Sand	6.9	42.0	225	4,400
	30	Soft Grey Silt w/ Sand	7.0	92.3	315	4,700
213	20	Coal Cinder Fill	6.2	133.3	970	*
	25	Black/Grey Clayey Silt	5.8	30.3	530	3,000
214	10	Brown Clayey Fill	8.3	161.5	12,320	2,000
	20	Brown Clayey Silt	7.0	72.4	525	3,400
	45	Med. Coarse Brown Sand	7.1	52.0	405	4,500

Boring #	Depth (ft)	Material Description	pH	Chloride (mg/kg)	Sulfate (mg/kg)	Resistivity (ohms-cm)
215	15	Fine Grey Silty Sand	7.1	71.2	550	3,500
	30	Brown Silty Sand	7.4	62.1	585	2,800
221	10	Black Cinder FILL	7.1	11.7	156	4,000
	20	Black Cinder FILL	8.0	64.8	204	1,200
	30	Fine Grey Sand	6.6	26.7	129	7,700
	40	Grey Sandstone Fragments, w/ Grave	7.0	22.2	65	13,000
222	15	Coal Cinder Fill	6.5	186.4	1,280	680
	30	Fine Grey Clayey Sand	7.0	83.4	310	9,100
223	20	Grey/Blk Clayey FILL w/ Gravel	8.0	123.2	1,190	2,050
	30	Black/Grey Clayey Silt	7.6	93.0	440	3,100
226	10	Brn/Blk Clayey FILL w/Gravel	8.0	53.7	8,000	1,500
	25	Brown Silty CLAY	7.8	31.7	940	2,500
	35	Brown Sandy Gravel	7.3	35.1	305	7,000
225	15	Brown Silty CLAY	8.5	23.9	585	2,700
	20	Brown/Grey Silty CLAY	7.4	25.8	233	2,900
	30	Brown Clayey SAND	7.3	41.4	122	12,000
	40	Dense Brown Sandy Gravel	6.7	39.3	114	8,900
227	10	Black Silty Clayey FILL	7.4	30.9	190	5,500
	20	Brown Clayey Silt	7.3	53.0	585	3,100
	35	Brown Sandy Gravel	7.6	41.2	150	5,100
233	10	Loose Coal Cinder Fill	7.2	248.4	820	1,650
	25	Grey/Black Clayey Silt	6.9	80.6	790	2,000
	40	Brown Sandy Gravel	7.6	69.0	420	7,400
236	10	Coal Cinder Fill	7.0	149.0	1,480	1,250
	30	Fine Grey Sand	7.3	105.7	770	2,900
238	10	Brown Clayey FILL w/ Slag & Cinders	8.1	25.8	99	9,000
	20	Brown/Grey Mottled Clayey SILT	5.8	27.3	180	6,700
	30	Dense Brown Sand & Gravel	6.5	52.5	57	16,000
	40	Dense Brown Sandy Gravel w/ Shale	6.5	35.4	72	7,400
239	10	Brown Clayey SILT	8.0	53.6	7,360	1,300
	20	Brown Clayey SILT	5.5	61.0	945	3,000
	25	Fine/Med. Coarse Brown Sand	7.1	61.0	265	4,000

Boring #	Depth (ft)	Material Description	pH	Chloride (mg/kg)	Sulfate (mg/kg)	Resistivity (ohms-cm)
'0	10	Brown Silty CLAY	4.8	9.3	458	5,300
	20	Brown Silty CLAY	4.8	18.4	300	5,700
	30	Brown Sand & Gravel	6.6	29.2	81	24,000
	45	Brown Sand & Gravel	7.0	39.3	72	8,700
241	10	Brown Clayey FILL w/Gravel	5.4	39.2	900	2,500
	25	Grey/Tan Mottled Silty Clayey SAND	6.7	31.4	680	3,700
242	15	Brown Silty CLAY	7.3	51.8	530	3,100
	44	Grey Sandy SILT w/Gravel	8.5	61.8	2,840	2,400
242-A	10	Brown Silty CLAY	7.0	18.6	219	4,700
	20	Grey Clayey SAND	7.5	14.4	66	6,300
	30	Grey Sandy Gravel	7.0	38.4	104	14,000
	40	Fine Grey Clayey Sand	6.7	18.6	33	8,200
244	10	Black Clayey Fill	7.9	191.1	3,360	750
	35		7.6	154.1	540	2,700
245	10	Black Cinders & Slag FILL	7.3	7.8	120	7,100
	20	Black Cinders & Slag FILL	7.2	49.1	177	470
	30	Black Cinders & Slag FILL	5.6	26.1	222	2,900
	40	Grey Sandstone & Shale	6.6	35.1	180	3,700
246	9	Brown Sandy Gravel (Fill)	8.1	119.4	910	2,600
	40	Grey Silty Clay w/ Gravel	6.9	83.6	695	3,050
248	20	Brown Sandy Fill	7.5	176.8	960	1,300
	40	Damp Grey Clayey Silt	7.4	74.9	320	10,000
249	10	Brown Clayey Fill	8.3	72.0	6,700	1,000
	40	Grey Clayey Silt	7.7	72.3	470	6,500
250	10	Brwn. Sandy Silty Fill w/coal	9.3	36.7	2,531	2,200
251	10	Brwn. Sandy Silty Fill w/coal	8.6	57.0	5,279	2,400
253	10	Brwn. Sandy Silty Fill w/coal	9.0	54.7	6,344	1,400
254	10	Brwn. Sandy Silty Fill w/coal	9.7	64.8	11,220	1,100
255	10	Coal Cinders & Fine Sand (FILL)	8.6	91.4	1,383	1,000

Boring #	Depth (ft)	Material Description	pH	Chloride (mg/kg)	Sulfate (mg/kg)	Resistivity (ohms-cm)
256	10	Dk. Brown Fill w/ Gravel & Cinders	7.8	15.7	18,000	2,000
	20	Coal Cinder FILL	7.3	85.5	1,720	150
	30	Grey Clayey Silt	7.1	24.0	80	4,300
257	10	Brwn. FILL w/ Coal Cinders	7.0	8.6	3,200	4,900
	20	Black Cinder FILL	8.9	415.5	8,500	2,400
	30	Grey Clayey SILT	6.7	50.6	135	2,700
	40	Tan/Grey Claystone	8.3	5.3	9	5,500
258	10	Black Cinder FILL	7.4	24.0	1,330	3,600
	20	Black Cinder FILL	9.6	47.3	1,000	1,200
	30	Black Cinder FILL	8.4	61.1	15	2,800
	40	Grey Clayey Silt	7.6	19.9	9	7,100
259	10	Dk. Brwn Sandy Clayey FILL w/Slag	8.3	22.9	7,200	3,100
	20	Brn. Clayey Sand w/ Gravel	7.4	22.5	420	2,300
	30	Grey Clayey Silt w/ Gravel	7.1	17.2	1	4,500
260	10	Coal Cinder & Slag FILL	7.4	41.6	5,600	2,900
	20	Black Coal Cinder FILL	7.1	214.4	520	1,600
	30	Black Coal Cinder FILL	7.1	42.0	63	5,000
	40	Grey Silt w/ Traces of Wood Fibers	7.3	16.9	36	4,500
261	10	Brown Sandy FILL w/ Trace of Coal	7.2	29.2	1,000	4,600
	20	Brown Sandy FILL w/ Trace of Coal	7.1	13.1	800	4,400
	30	Brown Sandy FILL w/ Trace of Coal	6.9	10.9	18	4,700

Professional Service Industries, Inc.

TESTED FOR: Alcosan
c/oEPM Team
3300 Preble Avenue
Pittsburgh, PA 15233

PROJECT: 831-5T219-3

Attention: John Frauenhoffer

DATE RECEIVED: June 21, 1995

REPORT DATE: July 20, 1995

PA CERTIFIED ID NO.: 02-349

LABORATORY NO.: IN051315

REMARKS: P. O. # MAW 37229.PD.07

Sample Description : Eleven (11) Samples of Soil

Submitted By : Client

Method of Test : SW 846 Method 9045, AASHTO T260, CAL DOT 417M, ASTM G57

Results

Determination	#1 B201, S-2	#2 B201, S-4	#3 B202, S-2	#4 B202, S-4
al Chloride, mg/kg	175.8	126.3	149.5	112.5
al Sulfate, mg/kg	440	365	305	390
pH (Standard Units)	7.6	8.5	8.1	7.3
Resistivity, ohms-cm	3,250	3,100	3,150	3,100

Determination	#5 B203, S2	#6 B203, S4	#7 B203, S5	#8 B203, S8
Total Chloride, mg/kg	147.5	72.8	92.9	116.2
Total Sulfate, mg/kg	1,460	420	330	320
pH (Standard Units)	8.2	7.6	7.2	7.4
Resistivity, ohms-cm	1,250	7,300	4,000	2,850

Determination	#9 B244, S-7	#10 B246, S-2	#11 B246, S-8
Total Chloride, mg/kg	154.1	119.4	83.6
Total Sulfate, mg/kg	540	910	695
pH (Standard Units)	7.6	8.1	6.9
Resistivity, ohms-cm	2,700	2,600	3,050

Respectfully submitted,
PROFESSIONAL SERVICE IND., INC.

Chris Mendoza, Level II
Chemistry Department Manager

1-Client
jcv/9766

Professional Service Industries, Inc.

TESTED FOR: Alcosan
c/oEPM Team
3300 Preble Avenue
Pittsburgh, PA 15233

PROJECT: 831-5T219-2

Attention: John Frauenhoffer

DATE RECEIVED: June 19, 1995

REPORT DATE: June 30, 1995

PA CERTIFIED ID NO.: 02-349

LABORATORY NO.: INO51292

REMARKS: P. O. # MAW 37229.PD.07

Sample Description : Seven (7) Samples of Soil

Submitted By : Client

Method of Test : SW 846 Method 9045, AASHTO T260, CAL DOT 417M, ASTM G57

Results

Determination	#1 B204, S-2	#2 B204, S-4	#3 B244, S-2	#4 B248, S-4
Total Chloride, mg/kg	325.6	157.4	191.1	176.8
Total Sulfate, mg/kg	15,000	1,320	3,360	960
pH (Standard Units)	7.5	7.6	7.9	7.5
Resistivity, ohms-cm	880	1,700	750	1,300

	#5 B248, S-8	#6 B249, S-2	#7 B249, S-8
Total Chloride, mg/kg	74.9	72.0	72.3
Total Sulfate, mg/kg	320	6,700	470
pH (Standard Units)	7.4	8.3	7.7
Resistivity, ohms-cm	10,000	1,000	6,500

Respectfully submitted,
PROFESSIONAL SERVICE IND., INC.

Chris Mendoza, Level II
Chemistry Department Manager

1-Client
jcv/9686

Professional Service Industries, Inc.
Pittsburgh Testing Laboratory Division

PROJECT: 831-5T219-1

ESTED FOR: Alcosan
3300 Preble Avenue
%EPM Office
Pittsburgh, PA 15233

DATE RECEIVED: June 15, 1995

ttention: John Frauenhoffer

REPORT DATE: June 23, 1995

A CERTIFIED ID NO.: 02-349

LABORATORY NO.: INO51258

REMARKS: ASR

Sample Description : Six (6) Bottles Soil

Submitted By : Client

Method of Test : SW 846 Method 9045, AASHTO T260, CAL DOT 417, ASTM G57

Results

mination	#1 B205-S2	#2 B250-S2	#3 B251-S2
pH (Standard Units)	8.4	9.3	8.6
Chloride, mg/kg	95.8	36.7	57.0
Sulfate, mg/kg	5,507	2,531	5,279
Resistivity, ohms-cm	1,800	2,200	2,400

	#4 B253-S2	#5 B254-S2	#6 B255-S2
pH (Standard Units)	9.0	9.7	8.6
Chloride, mg/kg	54.7	64.8	91.4
Sulfate, mg/kg	6,344	11,220	1,383
Resistivity, ohms-cm	1,400	1,100	1,000

Respectfully submitted,
PROFESSIONAL SERVICE IND., INC.

Chris Mendoza, Level II
Chemistry Department Manager

1-Client

jcv/9660

Professional Service Industries, Inc.

PROJECT: 831-5T219-5

ED FOR: Alcosan
%EPM Team
3300 Preble Avenue
Pittsburgh, PA 15233

DATE RECEIVED: June 28, 1995

ention: John Frauenhoffer

REPORT DATE: July 11, 1995

CERTIFIED ID NO.: 02-349

LABORATORY NO.: IN051363

MARKS: P. O. # MAW37229.PD.07
COC Dated 6/28/95

Sample Description : Thirteen (13) Samples of Soil

Submitted By : Client

Method of Test : SW 846 Method 9045, AASHTO T260, CAL DOT 417, ASTM G57

Results

Determination	#1 B226 S-2	#2 B226 S-5	#3 B226 S-7	#4 B239 S-2	#5 B239 S-4
Total Chloride, mg/kg	53.7	31.7	35.1	53.6	61.0
Total Sulfate, mg/kg	8,000	940	305	7,360	945
pH (Standard Units)	8.0	7.8	7.3	8.0	5.5
Resistivity, ohms-cm	1,500	2,500	7,000	1,300	3,000

Determination	#6 B239 S-5	#7 B241 S-2	#8 B241 S-5	#9 B242 S-3	#10 B242 S-9
Total Chloride, mg/kg	61.0	39.2	31.4	51.8	61.8
Total Sulfate, mg/kg	265	900	680	530	2,840
pH (Standard Units)	7.1	5.4	6.7	7.3	8.5
Resistivity, ohms-cm	4,000	2,500	3,700	3,100	2,400

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mination

Results

	#11 B227 S-2	#12 B227 S-4	#13 B227 S-7
l Chloride, mg/kg	30.9	53.0	41.2
l Sulfate, mg/kg	190	585	150
(Standard Units)	7.4	7.3	7.6
istivity, ohms-cm	5,500	3,100	5,100

Respectfully submitted,
PROFESSIONAL SERVICE IND., INC.

Chris Mendoza

Chris Mendoza, Level II
Chemistry Department Manager

1-Client
cv/9983

Professional Service Industries, Inc.
Pittsburgh Testing Laboratory Division

PROJECT: 831-5T219-4

FOR: Alcosan
%EPM Team
3300 Preble Avenue
Pittsburgh, PA 15233

on: John Frauenhoffer

DATE RECEIVED: June 23, 1995

REPORT DATE: June 30, 1995

RTIFIED ID NO.: 02-349

LABORATORY NO.: IN051331

RKS: P. O. # MAW 37229.PD.07

Sample Description : Nine (9) Samples of Soil

Submitted By : Client

Method of Test : SW 846 Method 9045, AASHTO T260, CAL DOT 417M, ASTM G57

Results

rmination

	#1 B222, S-3	#2 B222, S-6	#3 B223, S-4
l Chloride, mg/kg	186.4	83.4	123.2
l Sulfate, mg/kg	1,280	310	1,190
(Standard Units)	6.5	7.0	8.0
stivity, ohms-cm	680	9,100	2,050

	#4 B223, S-6	#5 B233, S-2	#6 B233, S-5
tal Chloride, mg/kg	93.0	248.4	80.6
l Sulfate, mg/kg	440	820	790
. (Standard Units)	7.6	7.2	6.9
esistivity, ohms-cm	3,100	1,650	2,000

	#7 B233, S-8	#8 B236, S-2	#9 B236, S-6
Total Chloride, mg/kg	69.0	149.0	105.7
Total Sulfate, mg/kg	420	1,480	770
pH (Standard Units)	7.6	7.0	7.3
Resistivity, ohms-cm	7,400	1,250	2,900

Respectfully submitted,
PROFESSIONAL SERVICE IND., INC.

Chris Mendoza, Level II
Chemistry Department Manager

1- lent
JCN 9899

Professional Service Industries, Inc.

PROJECT: B31-5T219-6

ED FOR: Alcosan
%EPM Team
3300 Preble Avenue
Pittsburgh, PA 15233

DATE RECEIVED: July 6, 1995

ntion: John Frauenhoffer

REPORT DATE: July 14, 1995

CERTIFIED ID NO.: 02-349

LABORATORY NO.: INO51405

MARKS: P. O. # MAW37229.PD.07

Sample Description : Nine (9) Samples of Soil

Submitted By : Client

Method of Test : SW 846 Method 9045, AASHTO T260, CAL DOT 417, ASTM G57

Results

Determination	#1 B212 S-4	#2 B212 S-6	#3 B213 S4	#4 B213 S5	#5 B214 S2
Total Chloride, mg/kg	42.0	92.3	133.3	30.3	161.5
Total Sulfate, mg/kg	225	315	970	530	12,320
pH (Standard Units)	6.9	7.0	6.2	5.8	8.3
Resistivity, ohms-cm	4,400	4,700	*	3,000	2,000

	#6 B214 S-4	#7 B214 S-9	#8 B215 S-3	#9 B215 S-6
Total Chloride, mg/kg	72.4	52.0	71.2	62.1
Total Sulfate, mg/kg	525	405	550	585
pH (Standard Units)	7.0	7.1	7.1	7.4
Resistivity, ohms-cm	3,400	4,500	3,500	2,800

*Insufficient Sample

Respectfully submitted,
PROFESSIONAL SERVICE IND., INC.

Chris Mendoza, Level II
Chemistry Department Manager

1-Client

PSI Environmental Geotechnical Construction
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ANALYTICAL REPORT

PROJECT: 831-5T219-7

TESTED FOR: Alcosan
c/oEPM Team
3300 Preble Avenue
Pittsburgh, PA 15233

DATE RECEIVED: October 31, 1995

Attention: John Frauenhoffer

REPORT DATE: November 17, 1995

PA CERTIFIED ID NO.: 02-349

LABORATORY NO.: IN052539

REMARKS: P. O. # MAW 37229.PD.07

Sample Description : Twenty-one (21) Samples of Soil

Submitted By : Client

Method of Test : SW846 Method 9045, AASHTO T260, CAL DOT 422, ASTM G57

Sample Identification	pH (Standard Units)	Chlorides, ppm	Sulfates, mg/kg	Resistivity, ohms-cm
1 - B256, S-2	7.8	15.7	18,000	2,000
#2 - B256, S-4	7.3	85.5	1,720	150
#3 - B256, S-6	7.1	24.0	80	4,300
#4 - B257, S-2	7.0	8.6	3,200	4,900
#5 - B257, S-4	8.9	415.5	8,500	2,400
#6 - B257, S-6	6.7	50.6	135	2,700
#7 - B257, S-8	8.3	5.3	9	5,500
#8 - B258, S-2	7.4	24.0	1,330	3,600
#9 - B258, S-4	9.6	47.3	1,000	1,200
#10 - B258, S-6	8.4	61.1	15	2,800
#11 - B258, S-8	7.6	19.9	9	7,100
#12 - B259, S-2	8.3	22.9	7,200	3,100
#13 - B259, S-4	7.4	22.5	420	2,300
#14 - B260, S-2	7.4	41.6	5,600	2,900
#15 - B260, S-4	7.1	214.4	520	1,600
#16 - B260, S-6	7.1	42.0	63	5,000
#17 - B260, S-8	7.3	16.9	36	4,500
#18 - B261, S-2	7.2	29.2	1,000	4,600
#19 - B261, S-4	7.1	13.1	800	4,400
#20 - B261, S-6	6.9	10.9	18	4,700
#21 - B259, S-6	7.1	17.2	1	4,500

Respectfully submitted,
PROFESSIONAL SERVICE IND., INC.

Chris Mendoza, Level II
Chemistry Department Manager

1-Client
1-Frauenhoffer & Associates.
jcv

Information To Build On

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Consulting • Engineering • Testing

ANALYTICAL REPORT

TESTED FOR:	Alcosan %EPM Team 3300 Preble Avenue Pittsburgh, PA 15233	**PROJECT:**	831-5T219-8
Attention:	John Frauenhoffer	**DATE RECEIVED:**	November 6, 1995
PA CERTIFIED ID NO.:	02-349	**REPORT DATE:**	November 28, 1995

REMARKS:	P. O. # MAW 37229.PD.07	**LABORATORY NO.:**	INO52596
	Sample Description :		Thirty Six (36) Samples of Soil
	Submitted By :		Client
	Method of Test :		SW846 Method 9045, CAL DOT 417 & 422, ASTM G57, ASTM D512

Sample Identification	pH (Standard Units)	Chlorides, ppm	Sulfates, mg/kg	Resistivity, ohms-cm
#1 - B240, S-2	4.8	9.30	458	5,300
#2 - B240, S-4	4.8	18.4	300	5,700
#3 - B240, S-6	6.6	29.2	81	24,000
#4 - B240, S-8	7.0	39.3	72	8,700
#5 - B242, S-1	7.0	18.6	219	4,700
#6 - B242, S-2	7.5	14.4	66	6,300
#7 - B242, S-3	7.0	38.4	104	14,000
#8 - B242, S-4	6.7	18.6	33	8,200
#9 - B245, S-2	7.3	7.8	120	7,100
#10 - B245, S-4	7.2	49.1	177	470
#11 - B245, S-6	5.6	26.1	222	2,900
#12 - B245, S-9	6.6	35.1	180	3,700
#13 - B206, S-2	8.4	23.7	600	6,600
#14 - B206, S-4	9.5	107.2	405	3,400
#15 - B206, S-6	6.5	92.1	450	2,500
#16 - B206, S-8	6.9	25.5	97.5	10,000
#17 - B208, S-2	7.9	40.2	67.5	17,000
#18 - B208, S-4	9.6	23.6	593	2,600
#19 - B208, S-6	6.5	85.8	255	2,900
#20 - B208, S-8	7.3	39.6	30	9,900
#21 - B211, S-2	7.4	20.7	110	5,000
#22 - B211, S-5	7.3	63.4	660	4,200

PSI • 850 Poplar Street • Pittsburgh, PA 15220 • Phone 412/922-4000 • Fax 412/922-4014

Sample Identification	pH (Standard Units)	Chlorides, ppm	Sulfates, mg/kg	Resistivity, ohms-cm
#23 - B211, S-6	7.8	27.9	28.5	14,000
#24 - B211, S-8	7.4	39.3	90	8,700
#25 - B221, S-2	7.1	11.7	156	4,000
#26 - B221, S-4	8.0	64.8	204	1,200
#27 - B221, S-6	6.6	26.7	129	7,700
#28 - B221, S-8	7.0	22.2	64.5	13,000
#29 - B225, S-3	8.5	23.9	585	2,700
#30 - B225, S-4	7.4	25.8	233	2,900
#31 - B225, S-6	7.3	41.4	122	12,000
#32 - B225, S-8	6.7	39.3	114	8,900
#33 - B238, S-2	8.1	25.8	99	9,000
#34 - B238, S-4	5.8	27.3	180	6,700
#35 - B238, S-6	6.5	52.5	57	16,000
#36 - B238, S-8	6.5	35.4	72	7,400

Respectfully submitted,
PROFESSIONAL SERVICE IND., INC.

Chris Mendoza, Level II
Chemistry Department Manager

1-Client
1-Frauenhoffer & Associates.
jcv/14,857

ROCK COMPRESSION TESTING DATA

Professional Service Industries, Inc
Pittsburgh, PA

TABLE OF BEARING CAPACITIES OF ROCK SAMPLES
ALCOSAN WASTEWATER TREATMENT PLANT

Boring	Depth (ft)	Rock Description	RQD	Qu (psi)	Qu'=Qu*RQD^2 (psi)	Qu' (tsf)	.10*Qu (tsf)	.33*Qu (tsf)
267	61	Grey Silty Shale	0.67	11,180	5,019	361	80	266
268	62	Grey Siltstone	0.95	8,440	7,617	548	61	201
270	63	Grey Siltstone	0.95	8,600	7,762	559	62	204
243	48	Grey Sandstone w/Mica	0.71	9,430	4,754	342	68	224
237	59	Grey Sandstone	0.49	11,080	2,660	192	80	263
280	60	Grey Limestone	0.22	8,530	413	30	61	203
235	55	Grey Sandstone	0.27	10,570	771	55	76	251
262-A	47	Grey Sandstone w/ Mica	0.65	8,920	3,769	271	64	212
281	54	Grey Limestone	0.37	8,920	1,221	88	64	212
271	64	Grey Silty Shale	0.37	4,350	596	43	31	103

Averages for Above Samples	Qu (psi)	Qu'=Qu*RQD^2 (psi)	Qu' (tsf)	.10*Qu (tsf)	.33*Qu (tsf)
Silty Shales	7765	2807	202	56	184
Siltstones	8520	7689	554	61	202
Sandstones	10000	2988	215	72	238
Limestones	8660	682	49	62	206

psi Environmental Geotechnical Construction
Consulting • Engineering • Testing

TESTED FOR: Alcosan EPM Project Office
3300 Preble Avenue
Pittsburgh, PA 15233-1092

PROJECT: Alcosan EPM

Attention: Mr. Dan Jovanovich

DATE: March 22, 1996

OUR REPORT #: 812-50351-3

Core #	Before After Capping Length (in.)	Diameter (in.)	Area (in.²)	L/D (Capped)	Correction Factor	Total Load (Lbs.)	Compressive Strength (psi)
TB224 S-1	3.54	2.0	3.1416	1.77	1.016	7,000	2190
TB224 S-2	2.80	2.0	3.1416	1.40	1.051	9,100	2760

Core Number	Locations
TB224 S-1	
TB224 S-2	

Respectfully submitted,
Professional Service Industries, Inc.

JIT:sms

Information To Build On

PSI • 850 Poplar Street • Pittsburgh, PA 15220 • Phone 412/922-4010 • Fax 412/922-4014

Environmental
Geotechnical
Construction
Consulting • Engineering • Testing

TESTED FOR: Alcosan EPM Project Office
3300 Preble Avenue
Pittsburgh, PA 15233-1092

PROJECT: Alcosan EPM

Attention: Mr. Dan Jovanovich

DATE: March 22, 1996

OUR REPORT #: 812-50351-3

Core #	Before/After Capping Length (in.)	Diameter (in.)	Area (in.²)	L/D (Capped)	Correction Factor	Total Load (Lbs.)	Compressive Strength (psi)
TB228 S-1	3.85	2.0	3.1416	1.92	1.005	8,100	2570
TB228 S-2	3.75	2.0	3.1416	1.87	1.008	9,900	3130
TB228 S-3	4.0	2.0	3.1416	2.00	1.000	7,600	2420
TB230 S-1	4.0	2.0	3.1416	2.00	1.000	6,700	2130
TB230 S-2	4.0	2.0	3.1416	2.00	1.000	10,200	3250
TB229	4.0	2.0	3.1416	2.00	1.000	10,700	3400

Cuit Number	Locations
TB228 S-1	
TB228 S-2	
TB228 S-3	
TB230 S-1	
TB230 S-2	
TB229	58.7 - 59.5

JIT:sms

Respectfully submitted,
Professional Service Industries, Inc.

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PSI Environmental Geotechnical Construction
Consulting • Engineering • Testing

TESTED FOR: Alcosan EPM Project Office
3300 Preble Avenue
Pittsburgh, PA 15233-1092

PROJECT: Alcosan EPM

Attention: Mr. Dan Jovanovich

DATE: March 22, 1996

OUR REPORT #: 812-50351-3

REMARKS: Please find results of fourteen (14) rock core specimens obtained by PSI for unconfined compressive strength testing.

Core	Before/After Capping Length (in.)	Diameter (in.)	Area (in.²)	L/D (Capped)	Correction Factor	Total Load (Lbs.)	Compressive Strength (psi)
TB265 S-2	4.0	2.0	3.1416	2.00	1.000	20,500	6530
TB265 S-1	4.0	2.0	3.1416	2.00	1.000	21,300	6780
TB247 S-1	4.0	2.0	3.1416	2.00	1.000	17,200	5470
TB247 S-2	4.0	2.0	3.1416	2.00	1.000	14,100	4490
TB219 S-1	4.0	2.0	3.1416	2.00	1.000	8,600	2730
TB219 S-2	4.0	2.0	3.1416	2.00	1.000	6,600	2100

Core Number	Locations
TB265 S-2	
TB265 S-1	
TB247 S-1	
TB247 S-2	
TB219 S-1	54' depth
TB219 S-2	54' depth

Respectfully submitted,
Professional Service Industries, Inc.

JIT:sms

Information To Build On

PSI • 850 Poplar Street • Pittsburgh, PA 15220 • Phone 412/922-4010 • Fax 412/922-4014

PSI Environmental Geotechnical Construction
Consulting • Engineering • Testing

TESTED FOR: Mr. Bob Stanley
Alcosan EPM Project Office
3300 Preble Avenue
Pittsburgh, PA 15233-1092

PROJECT: Alcosan EPM Office

DATE: July 16, 1996

OUR REPORT #: 812-50351-6

REMARKS: Please find results of three (3) rock core specimens obtained by PSI for unconfined compressive strength testing. Tests were performed according to ASTM C42-90.

Core #	Before/After Capping Length (In.)	Diameter (In.)	Area (In.^{2})	L/D (Capped)	Correction Factor	Total Load (Lbs.)	Compressive Strength (psi)
TB-270	/4.00	2.00	3.14	2.0		27000	8600
TB-267	/4.50	2.00	3.14	2.2		35100	11180
TB-268	/4.15	2.00	3.14	2.1		26500	8440
TB-232	UNABLE	TO	CUT	OR	CAP	N/A	
TB-269	UNABLE	TO	CUT	OR	CAP	N/A	
TB-271	UNABLE	TO	CUT	OR	CAP	N/A	

Core #	Locations
TB-270	DEPTH=63'-0" GRAY SHALE
TB-267	DEPTH=61'-0" GRAY SILTY SHALE
TB-268	62'-0" GRAY SILTSTONE
TB-232	65'-0" GRAY SILTSTONE;Insufficient length for Comp. Strength Testing
TB-269	60'-0"; Insufficient length for Compressive Strength Testing
TB-271	N/A ; Insufficient length for Compressive Strength Testing

COMMENTS:
A). Date Poured:
B). Nominal Maximum Size of Coarse Aggregate:
C). Curing Conditions:
☐ Limewater Bath for Minimum 40 Hours (73° F ± 3°F) Per ASTM C42-90)
☐ Air Dry for 7 Days (60°-80°F) per ACI 318, Chapter 5.

JIT:sms

Respectfully submitted, *PSI*
Information To Build On

PSI Environmental Geotechnical Construction
Consulting • Engineering • Testing

TESTED FOR: Mr. Bob Stanley
Alcosan EPM Project Office
3300 Preble Avenue
Pittsburgh, PA 15233-1092

PROJECT: Alcosan EPM Office

DATE: June 12, 1996

OUR REPORT #: 812-50351-6

REMARKS: Please find results of one (1) rock core specimens obtained by PSI for unconfined compressive strength testing. Tests were performed according to ASTM C42-90.

Core #	Before/After Capping Length (In.)	Diameter (In.)	Area ($In.^2$)	L/D (Capped)	Correction Factor	Total Load (Lbs.)	Compressive Strength (psi)
271	/4.16	2.01	3.17	2.07		13800	4350

Core Number	Locations
271	DEPTH=64' GREY SILTY SHALE

COMMENTS:

A). Date Poured:
B). Nominal Maximum Size of Coarse Aggregate:
C). Curing Conditions:
- ☐ Limewater Bath for Minimum 40 Hours (73° F ± 3°F) Per ASTM C42-90)
- ☐ Air Dry for 7 Days (60°-80°F) per ACI 318, Chapter 5.

.sms

Respectfully submitted, *PSI*

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PSI Environmental Geotechnical Construction
Consulting • Engineering • Testing

TESTED FOR: Mr. Bob Stanley
Alcosan EPM Project Office
3300 Preble Avenue
Pittsburgh, PA 15233-1092

PROJECT: Alcosan EPM Office

DATE: July 16, 1996

OUR REPORT #: 812-50351-6

REMARKS: Please find results of one (1) rock core specimens obtained by PSI for unconfined compressive strength testing. Tests were performed according to ASTM C42-90.

Core #	Before/After Capping Length (In.)	Diameter (In.)	Area ($In.^2$)	L/D (Capped)	Correction Factor	Total Load (Lbs.)	Compressive Strength (psi)
TB-281	/4.40	2.00	3.14	2.2*		28000	8920

Core Number	Locations
TB-281	DEPTH=54'-0" GREY LIMESTONE

* Rock core was not trimmed shorter. PSI was concerned that core might fracture or disintegrate during the trimming process.

COMMENTS:

A). Date Poured:
B). Nominal Maximum Size of Coarse Aggregate:
C). Curing Conditions:

- ☐ Limewater Bath for Minimum 40 Hours (73° F ± 3°F) Per ASTM C42-90)
- ☐ Air Dry for 7 Days (60°-80°F) per ACI 318, Chapter 5.

JIT:sms

Respectfully submitted, *PSI*
Information To Build On

PSI Environmental Geotechnical Construction
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TESTED FOR: Mr. Bob Stanley
Alcosan EPM Project Office
3300 Preble Avenue
Pittsburgh, PA 15233-1092

PROJECT: Alcosan EPM Office

DATE:

OUR REPORT #: 812-50351-6

REMARKS: Please find results of five (5) rock core specimens obtained by PSI for unconfined compressive strength testing. Tests were performed according to ASTM C42-90.

Core #	Before/After Capping Length (In.)	Diameter (In.)	Area ($In.^2$)	L/D (Capped)	Correction Factor	Total Load (Lbs.)	Compressive Strength (psi)
TB262A	/4.23	2.00	3.14	2.1		28000	8920
TB-235	/4.25	2.00	3.14	2.1		33200	10570
TB-243	/4.25	2.00	3.14	2.1		29600	9430
TB-280	/4.30	2.00	3.14	2.1		26800	8530
TB-237	/4.30	2.00	3.14	2.1		34800	11080
TB-273	BROKE	WHILE		CAPPING			

Core Number	Locations
TB262A	DEPTH=46.5'
TB-235	DEPTH=55'-0"
TB-243	DEPTH=48'-0"
TB-280	DEPTH=60'-0" GREY LIMESTONE
TB-237	DEPTH=59'-0" GREY SANDSTONE
TB-273	DEPTH=58'-0" GREY SILTSTONE

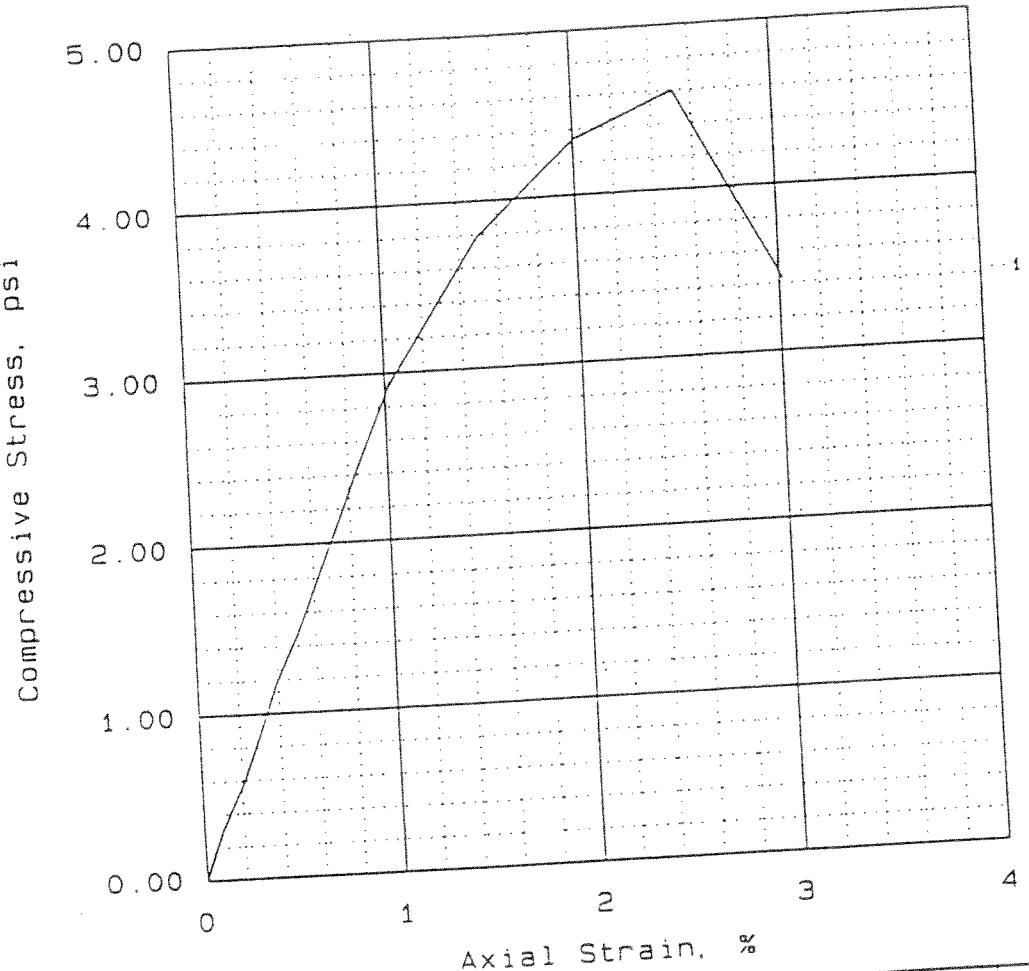
COMMENTS:
A). Date Poured:
B). Nominal Maximum Size of Coarse Aggregate:
C). Curing Conditions:
☐ Limewater Bath for Minimum 40 Hours (73° F ± 3°F) Per ASTM C42-90)
☐ Air Dry for 7 Days (60°-80°F) per ACI 318, Chapter 5.

JIT:sms

Respectfully submitted, *PSI*
Information To Build On

UNCONFINED COMPRESSION TEST RESULTS ON ROCK CORE SPECIMENS PROFESSIONAL SERVICE INDUSTRIES

UNCONFINED COMPRESSION TEST



Sample number:	1			
Unconfined strength, psi	4.60			
Undrained shear strength, psi	2.30			
Strain rate, %/min	1.000			
Water content, %	12.0			
Wet density, pcf	141.1			
Dry density, pcf	126.0			
Saturation, %	101.2			
Void ratio	0.3130			
Specimen diameter, in	2.09			
Specimen height, in	3.35			

Description: GRAY CLAYSHALE

LL = | PL = | PI = | GS = | Type: UNDISTURBED

Project No.: 812-50351

Date: 3-13-1996

Remarks:

Client: ALCOSAN

Project: EPM

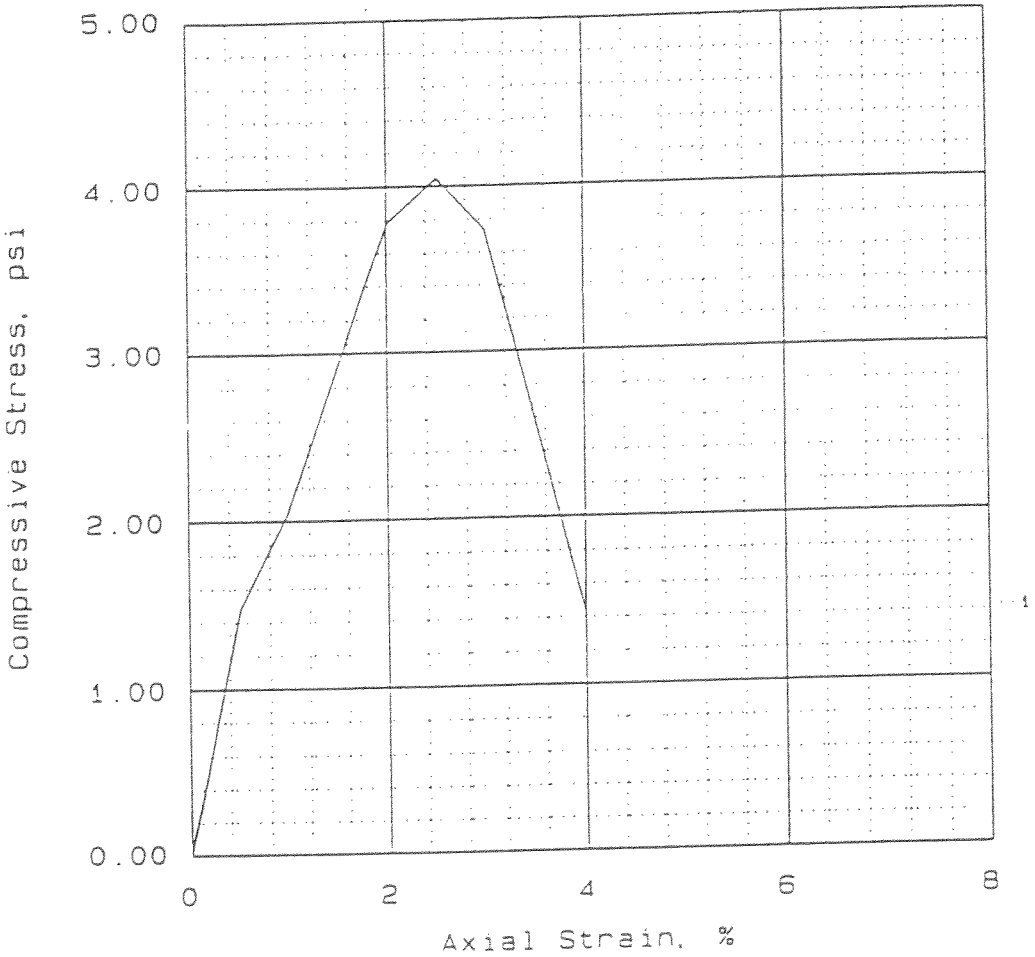
Location: B-209, S-1, 52'

UNCONFINED COMPRESSION TEST

PSI, Inc.

Fig No.

UNCONFINED COMPRESSION TEST



Sample number:	1			
Unconfined strength, psi	4.05			
Undrained shear strength, psi	2.02			
Strain rate, %/min	1.000			
Water content, %	10.6			
Wet density, pcf	141.1			
Dry density, pcf	127.6			
Saturation, %	94.8			
Void ratio	0.2964			
Specimen diameter, in	2.08			
Specimen height, in	3.95			

Description: GRAY CLAYSHALE

LL =	PL =	PI =	GS =	Type: UNDISTURBED

Project No.: 812-50351

Date: 3-13-1996

Remarks:

Client: ALCOSAN

Project: EPM

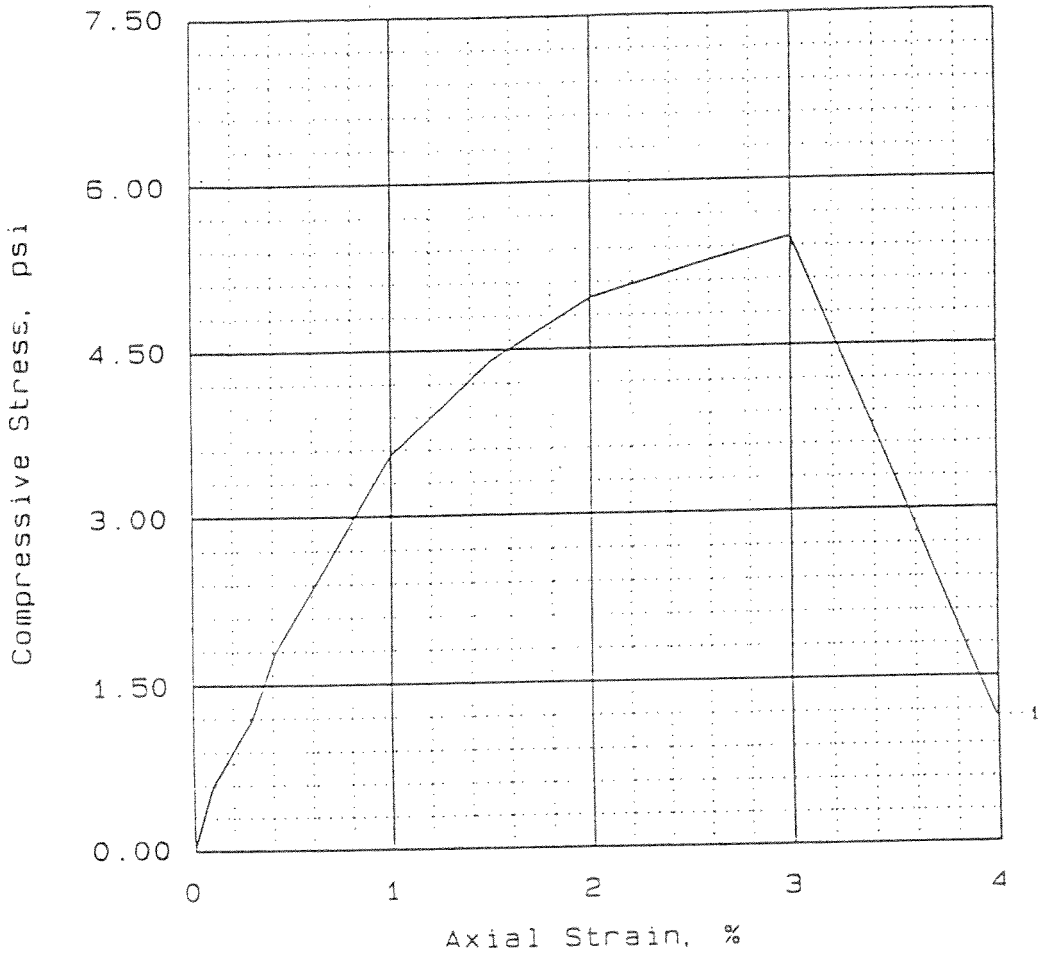
Location: B-209, S-2, 52'

UNCONFINED COMPRESSION TEST

PSI, Inc.

Fig No.

UNCONFINED COMPRESSION TEST



Sample number:	1			
Unconfined strength, psi	5.48			
Undrained shear strength, psi	2.74			
Strain rate, %/min	1.000			
Water content, %	11.5			
Wet density, pcf	143.1			
Dry density, pcf	128.3			
Saturation, %	105.3			
Void ratio	0.2894			
Specimen diameter, in	2.08			
Specimen height, in	5.14			

Description: GRAY CLAYSHALE

LL =	PL =	PI =	GS =	Type: UNDISTURBED

Project No.: 812-50351

Date: 3-13-1996

Remarks:

Client: ALCOSAN

Project: EPM

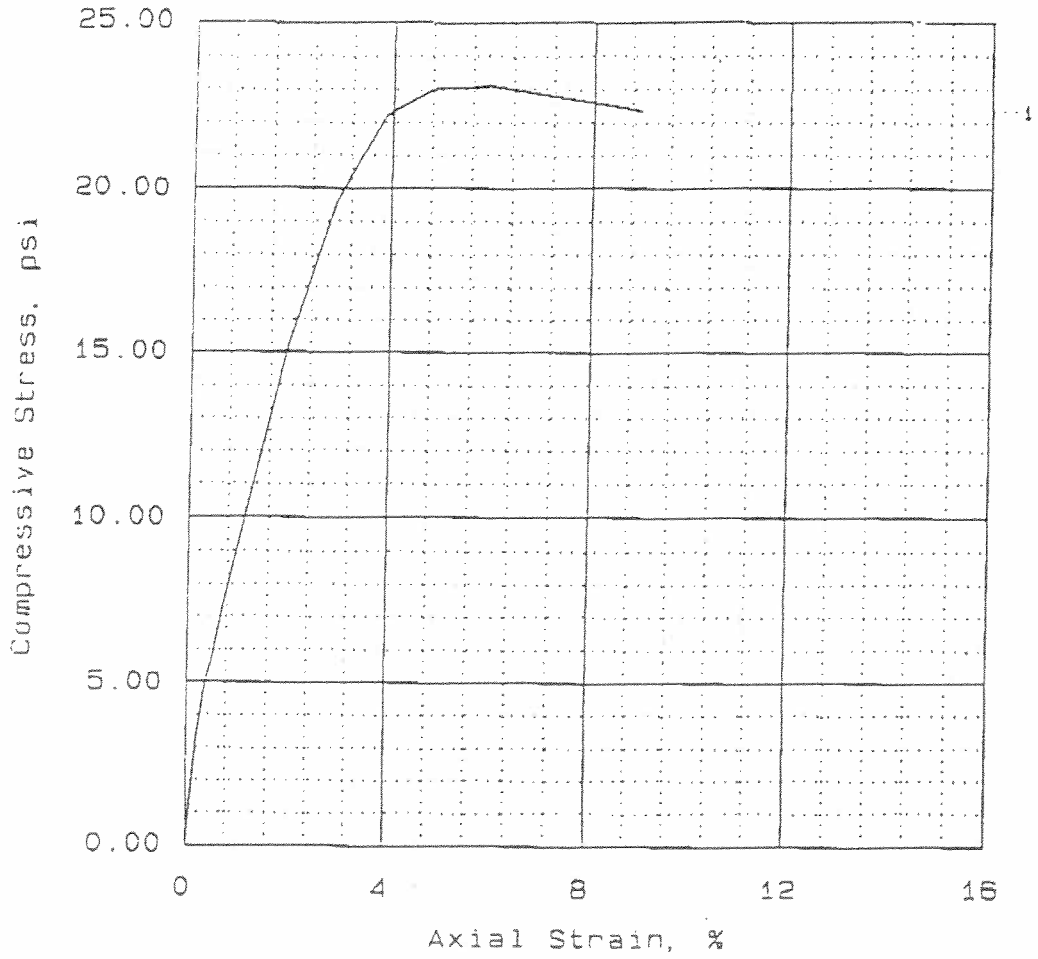
Location: B-209, S-3, 52'

UNCONFINED COMPRESSION TEST

PSI, Inc.

Fig No.

UNCONFINED COMPRESSION TEST



Sample number:	1			
Unconfined strength, psi	23.09			
Undrained shear strength, psi	11.55			
Strain rate, %/min	1.000			
Water content, %	9.5			
Wet density, pcf	118.8			
Dry density, pcf	108.5			
Saturation, %	48.2			
Void ratio	0.5250			
Specimen diameter, in	2.53			
Specimen height, in	2.07			

Description:

LL =	PL =	PI =	GS = 2.65	Type: ROCK CORE

Project No.: 812-50351
Date: 4-25-1996

Remarks:

Client: ALCOSAN

Project: EPM

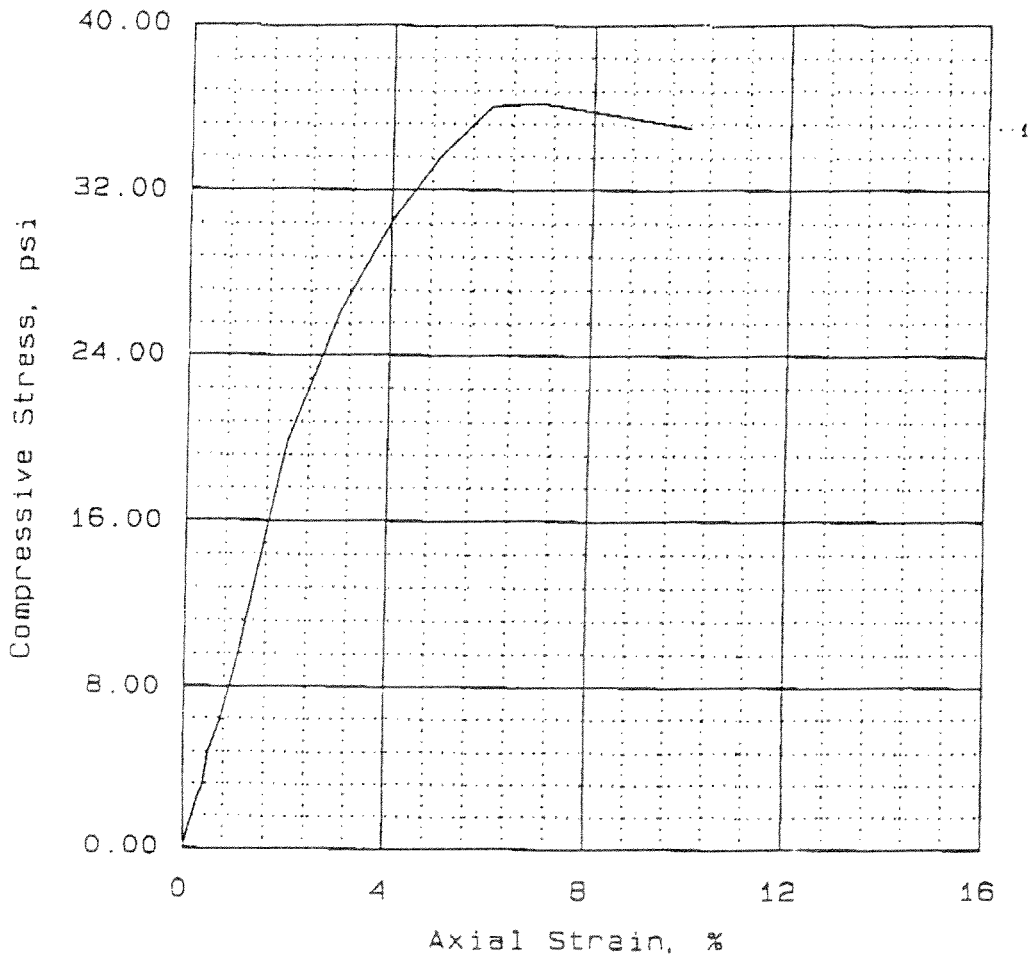
Location: TB-210

Fig No.

UNCONFINED COMPRESSION TEST

PSI, Inc.

UNCONFINED COMPRESSION TEST



Sample number:	1			
Unconfined strength, psi	36.18			
Undrained shear strength, psi	18.09			
Strain rate, %/min	1.000			
Water content, %	15.1			
Wet density, pcf	166.8			
Dry density, pcf	144.9			
Saturation, %	282.4			
Void ratio	0.1416			
Specimen diameter, in	2.09			
Specimen height, in	3.28			
Description:				

LL =	PL =	PI =	GS = 2.65	Type: ROCK CORE

Project No.: 812-50351
Date: 4-25-1995

Remarks:

Client: ALCOSAN

Project: EPM

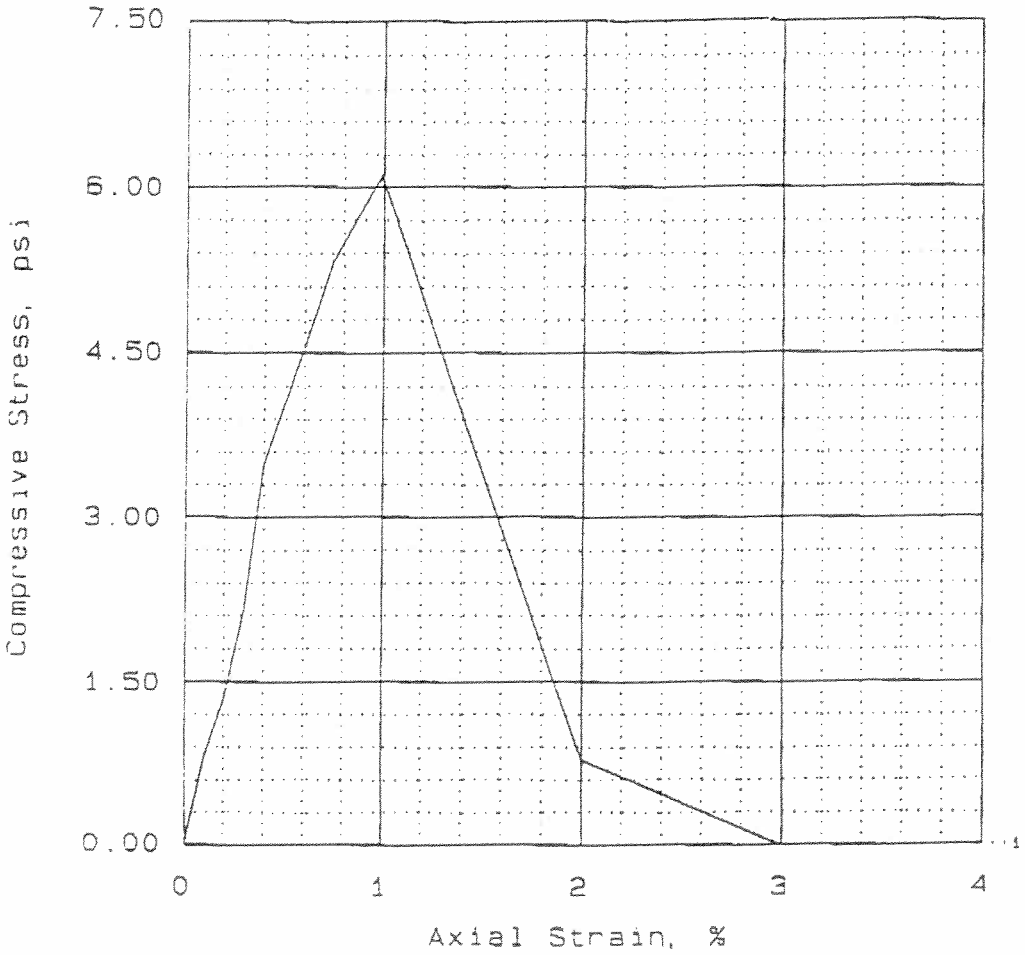
Location: TB-216, S-1

Fig No.

UNCONFINED COMPRESSION TEST

PSI, Inc.

UNCONFINED COMPRESSION TEST



Sample number:	1			
Unconfined strength, psi	6.11			
Undrained shear strength, psi	3.05			
Strain rate, %/min	1.000			
Water content, %	11.5			
Wet density, pcf	142.8			
Dry density, pcf	128.1			
Saturation, %	104.2			
Void ratio	0.2919			
Specimen diameter, in	2.08			
Specimen height, in	6.05			

Description:

LL =	PL =	PI =	GS = 2.65	Type: ROCK CORE

Project No.: 812-50351
Date: 4-25-1995
Remarks:

Client: ALCOSAN

Project: EPM

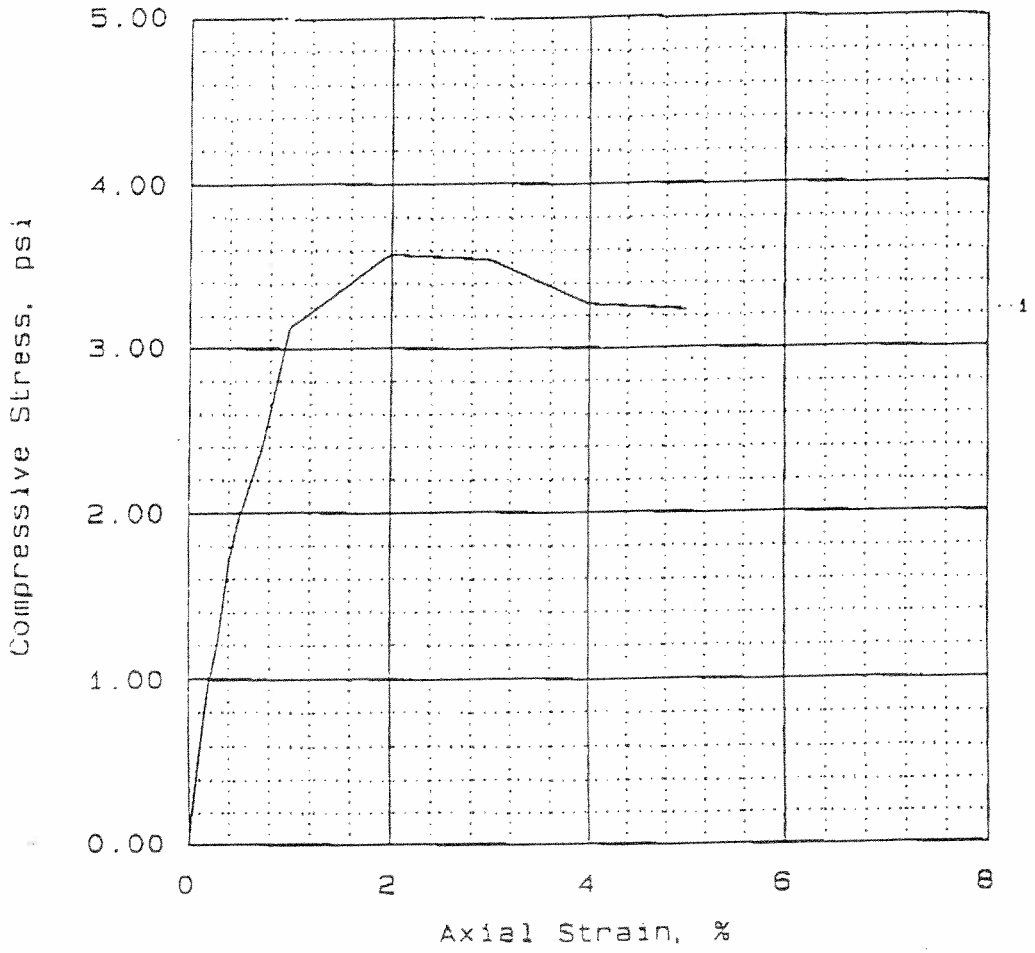
Location: TB-216, S-2

Fig No.

UNCONFINED COMPRESSION TEST

PSI, Inc.

UNCONFINED COMPRESSION TEST



Sample number:	1			
Unconfined strength, psi	3.58			
Undrained shear strength, psi	1.79			
Strain rate, %/min	1.000			
Water content, %	12.7			
Wet density, pcf	132.3			
Dry density, pcf	117.4			
Saturation, %	82.1			
Void ratio	0.4089			
Specimen diameter, in	2.19			
Specimen height, in	4.53			

Description:

LL =	PL =	PI =	GS = 2.65	Type: ROCK CORE

Project No.: 812-50351

Date: 4-25-1996

Remarks:

Client: ALCOSAN

Project:

Location: TB-229

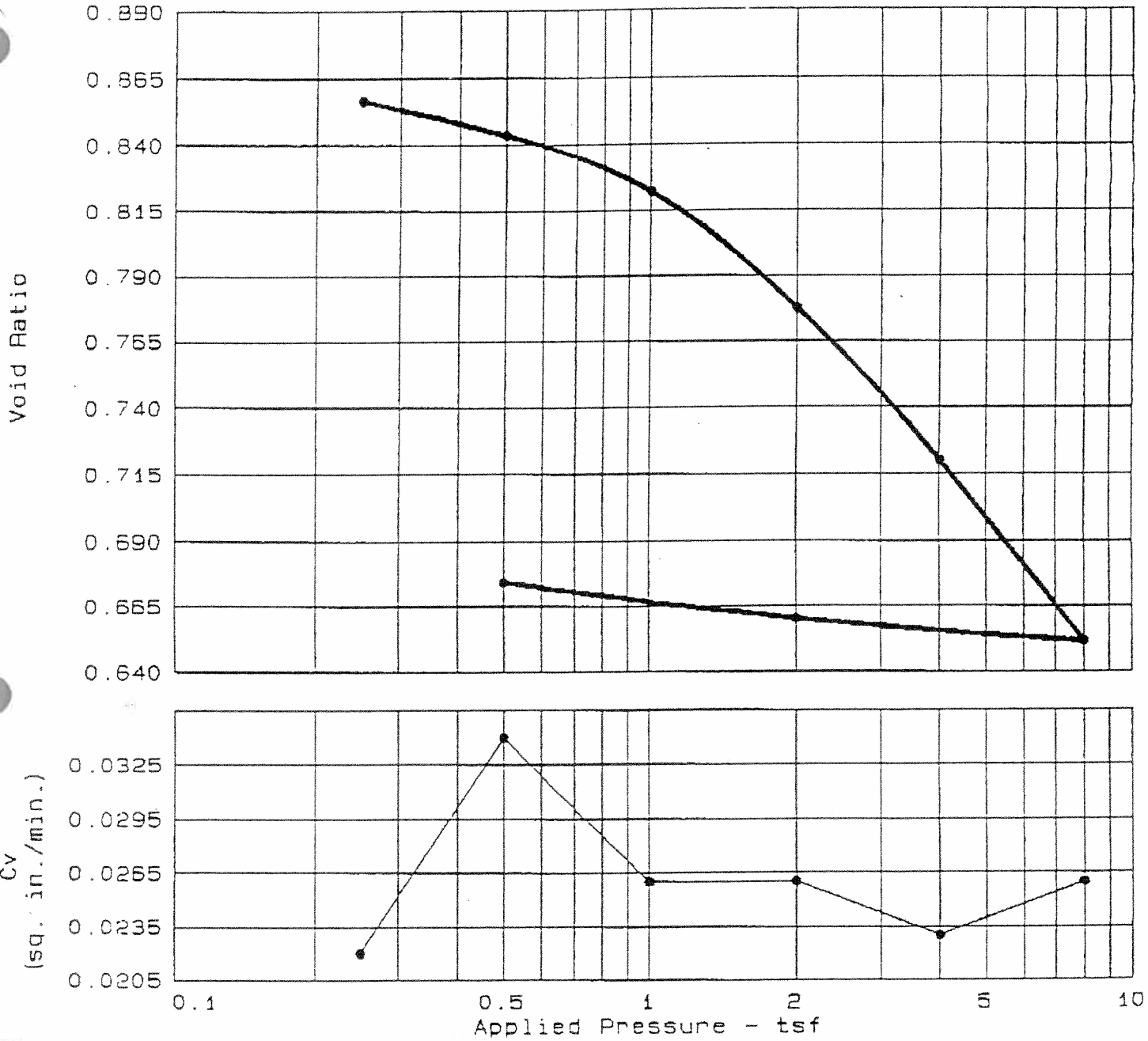
UNCONFINED COMPRESSION TEST

PSI, Inc.

Fig No.

CONSOLIDATION TEST RESULTS
PROFESSIONAL SERVICE INDUSTRIES

CONSOLIDATION TEST REPORT



Natural Saturation	Natural Moisture	Dry Dens. (pcf)	LL	PI	Sp.Gr.	Precons. (tsf)	C_c	e_o
92.5 %	29.1 %	93.1	N\A	N\A	2.810	1.65	0.23	0.8845

TEST RESULTS

Compression Index = 0.23

MATERIAL DESCRIPTION

Project No.: 812-50351
Project: ALCOSAN - EPM
Location: ST-210-1, 22.0'-24.0'

Date: 4-3-1996

Remarks:

CONSOLIDATION TEST REPORT

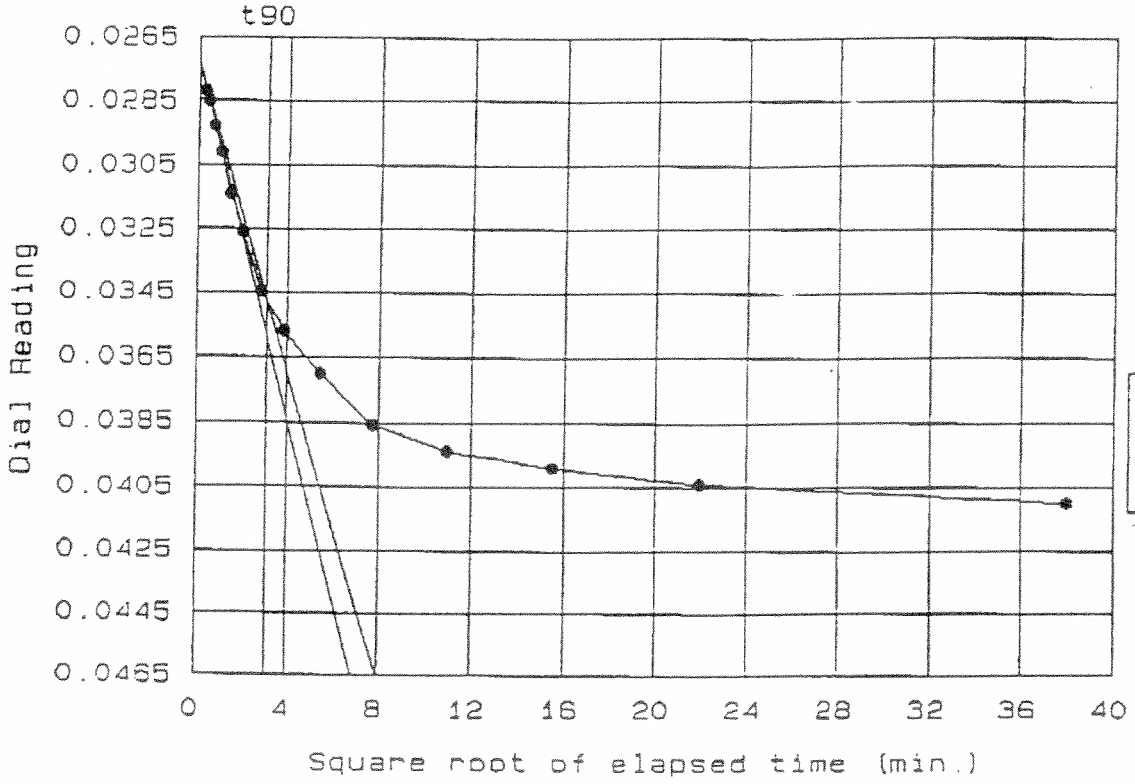
PSI, Inc.

Fig. No. N\A

Dial Reading vs. Time

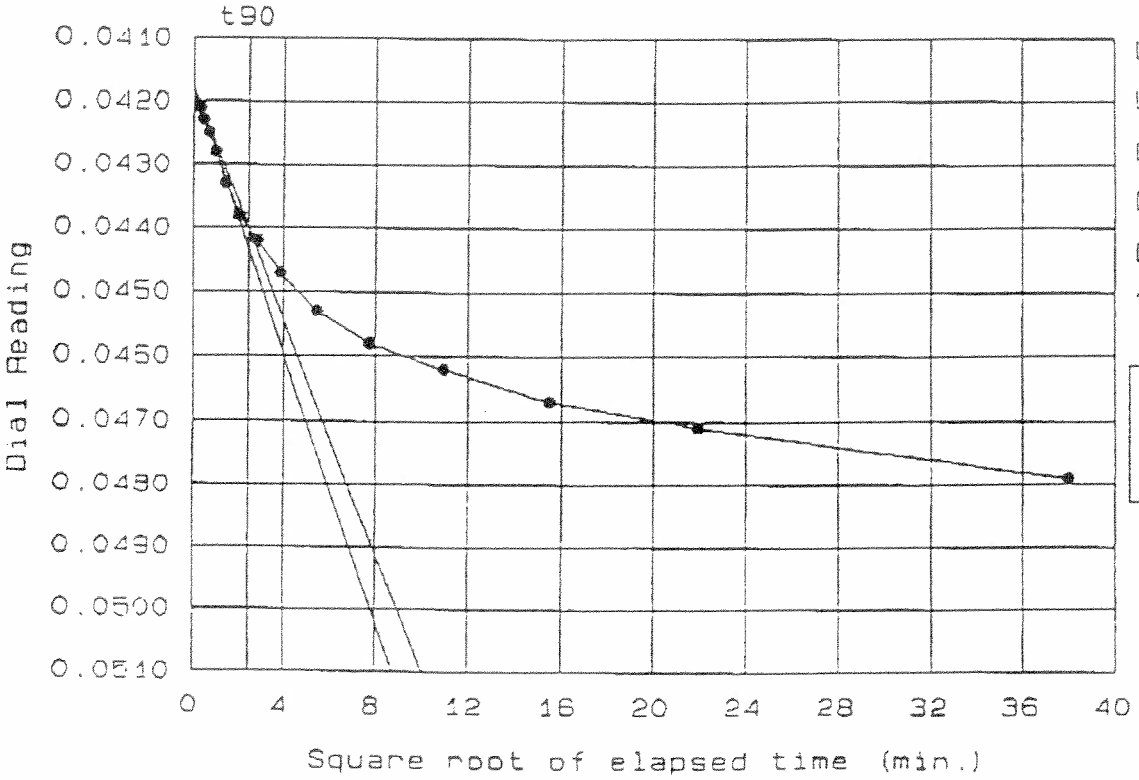
Project No.: 812-50351
Project: ALCOSAN - EPM
Location: ST-210-1, 22.0'-24.0'

Date: 4-3-1996



Load No.= 1
Load= 0.25 tsf
D_0 = 0.0273
D_{90} = 0.0348
D_{100}= 0.0356
T_{90}= 9.58 min.

C_v @ T_{90} = .022 $in.^2/min.$



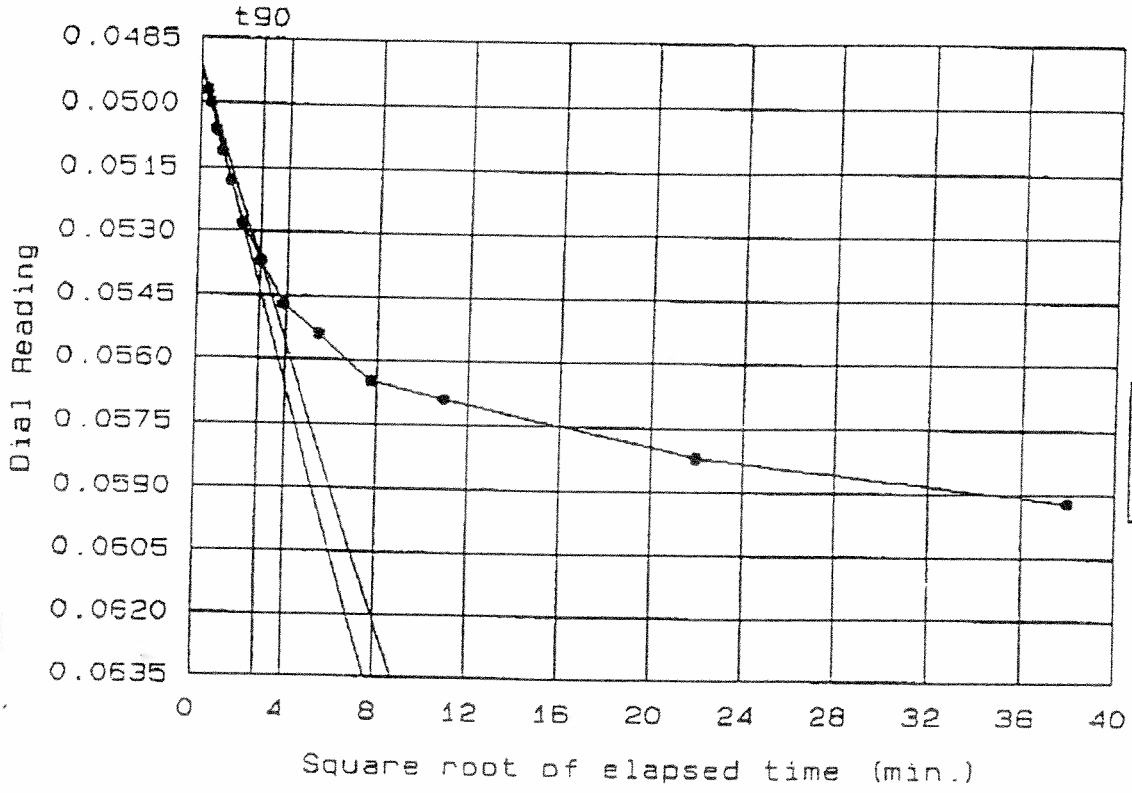
Load No.= 2
Load= 0.50 tsf
D_0 = 0.0418
D_{90} = 0.0440
D_{100}= 0.0443
T_{90}= 6.01 min.

C_v @ T_{90} = .034 $in.^2/min.$

Dial Reading vs. Time

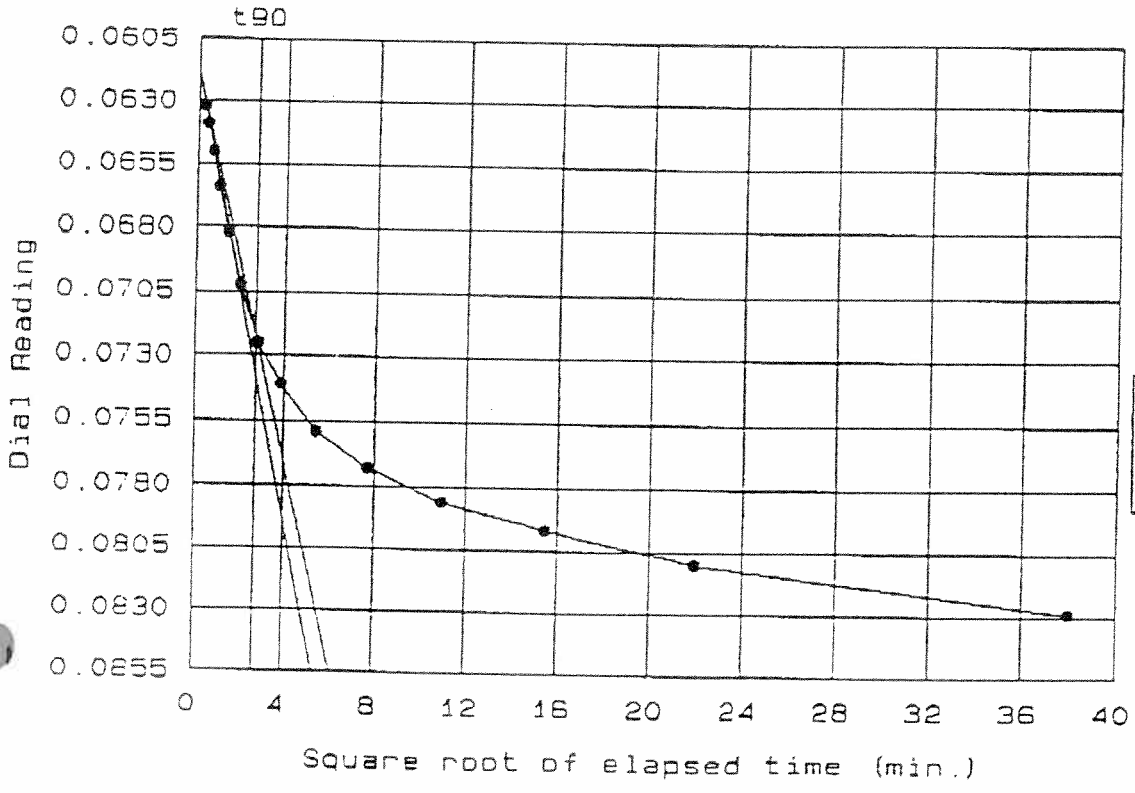
Project No.: 812-50351
Project: ALCOSAN - EPM
Location: ST-210-1, 22.0'-24.0'

Date: 4-3-1996



Load No.= 3
Load= 1.00 tsf
D_0 = 0.0491
D_{90} = 0.0536
D_{100}= 0.0541
T_{90}= 7.68 min.

C_v @ T_{90} = .026 $in.^2/min.$



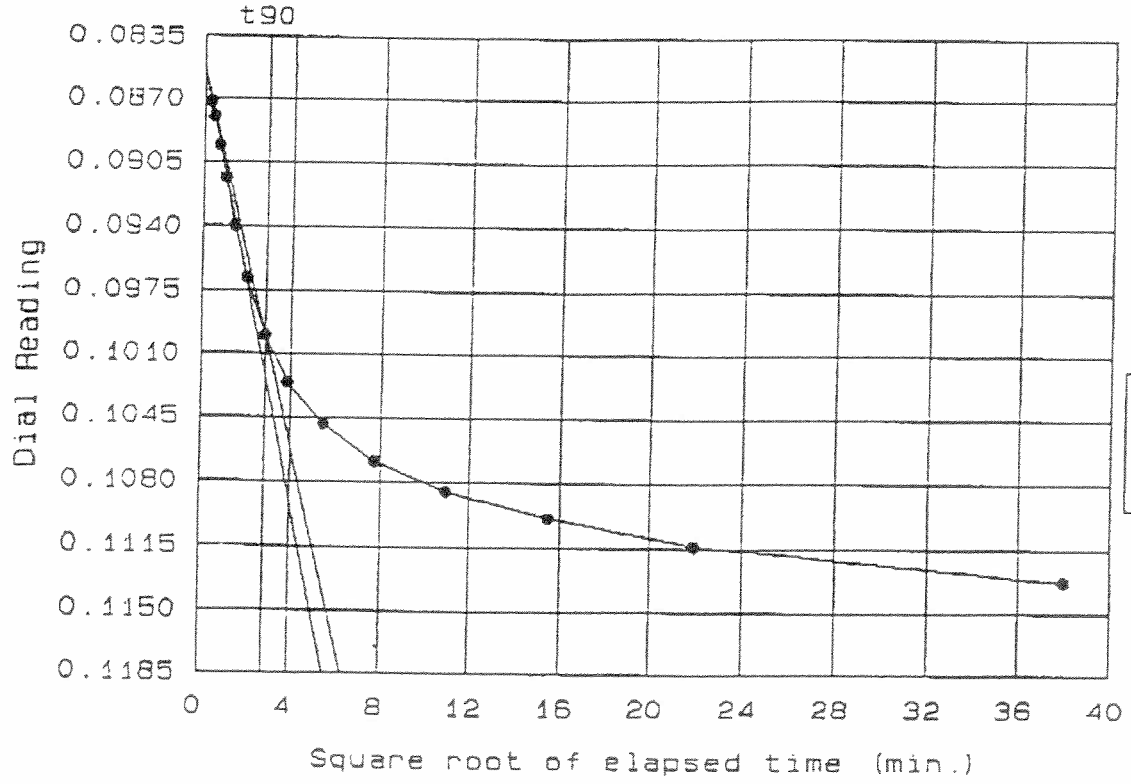
Load No.= 4
Load= 2.00 tsf
D_0 = 0.0618
D_{90} = 0.0723
D_{100}= 0.0734
T_{90}= 7.54 min.

C_v @ T_{90} = .026 $in.^2/min.$

Dial Reading vs. Time

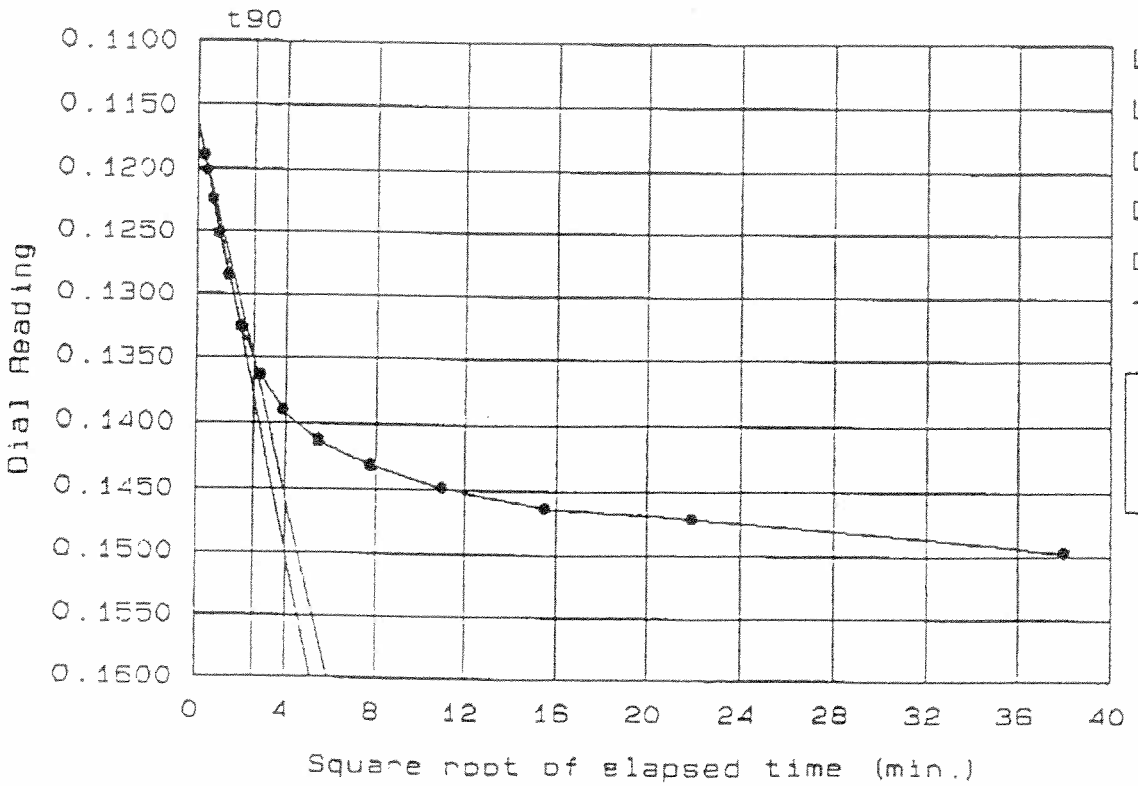
Project No.: 812-50351
Project: ALCOSAN - EPM
Location: ST-210-1, 22.0'-24.0'

Date: 4-3-1996



Load No.= 5
Load= 4.00 tsf
D_0 = 0.0853
D_{90} = 0.1000
D_{100}= 0.1016
T_{90}= 7.96 min.

C_v @ T_{90} = .023 $in.^2/min.$



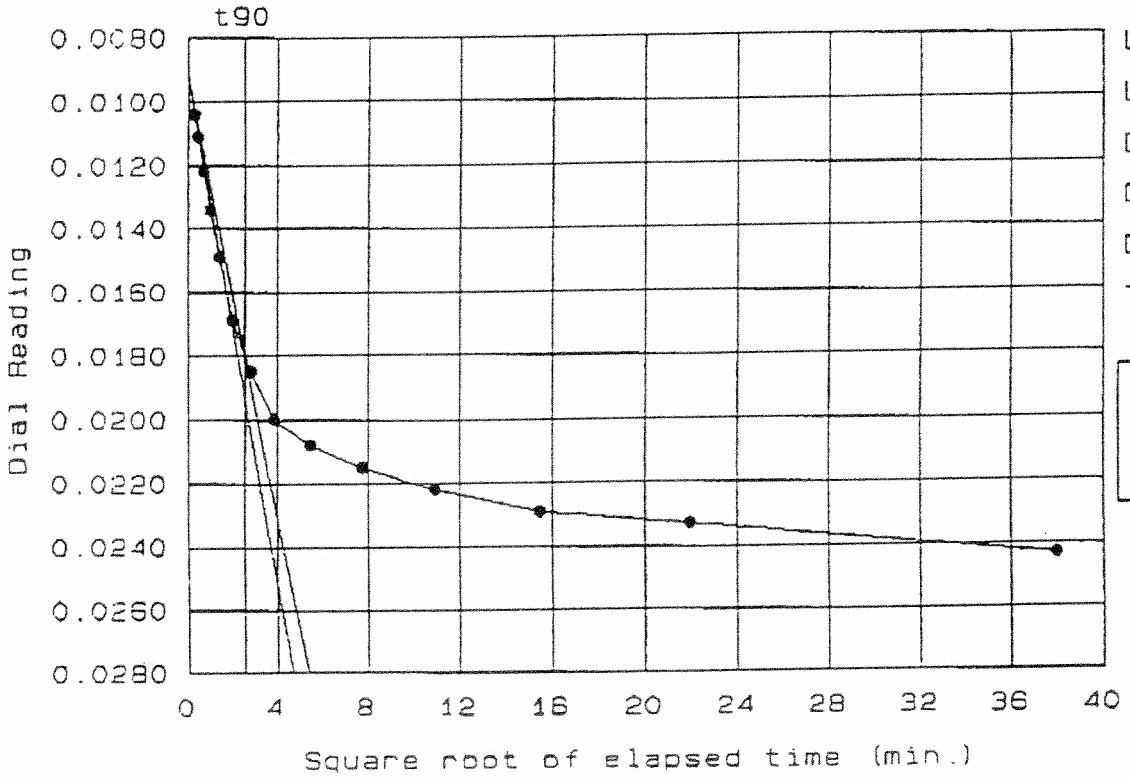
Load No.= 6
Load= 8.00 tsf
D_0 = 0.1162
D_{90} = 0.1351
D_{100}= 0.1372
T_{90}= 6.58 min.

C_v @ T_{90} = .026 $in.^2/min.$

Dial Reading vs. Time

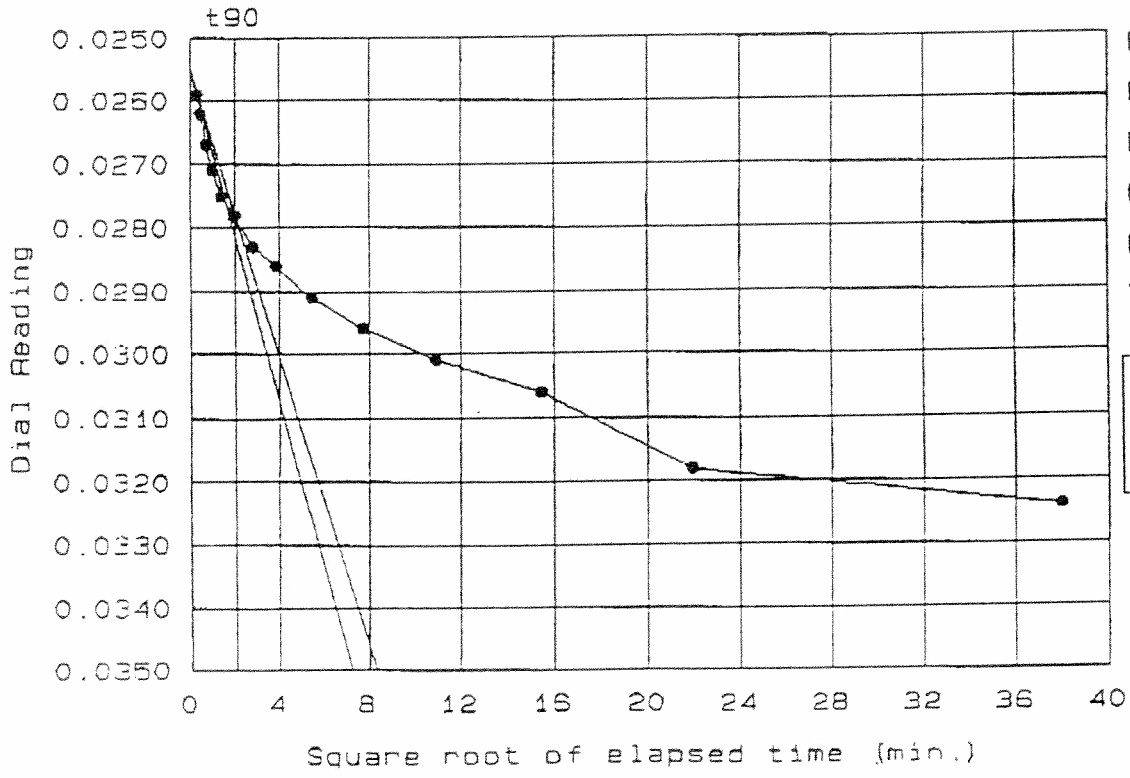
Project No.: 812-50351
Project: ALCOSAN - EPM
Location: ST- 223-1, 30.0'-32.0'

Date: 4-16-1996



Load No.= 1
Load= 0.25 tsf
D_0 = 0.0091
D_{90} = 0.0179
D_{100}= 0.0189
T_{90}= 6.40 min.

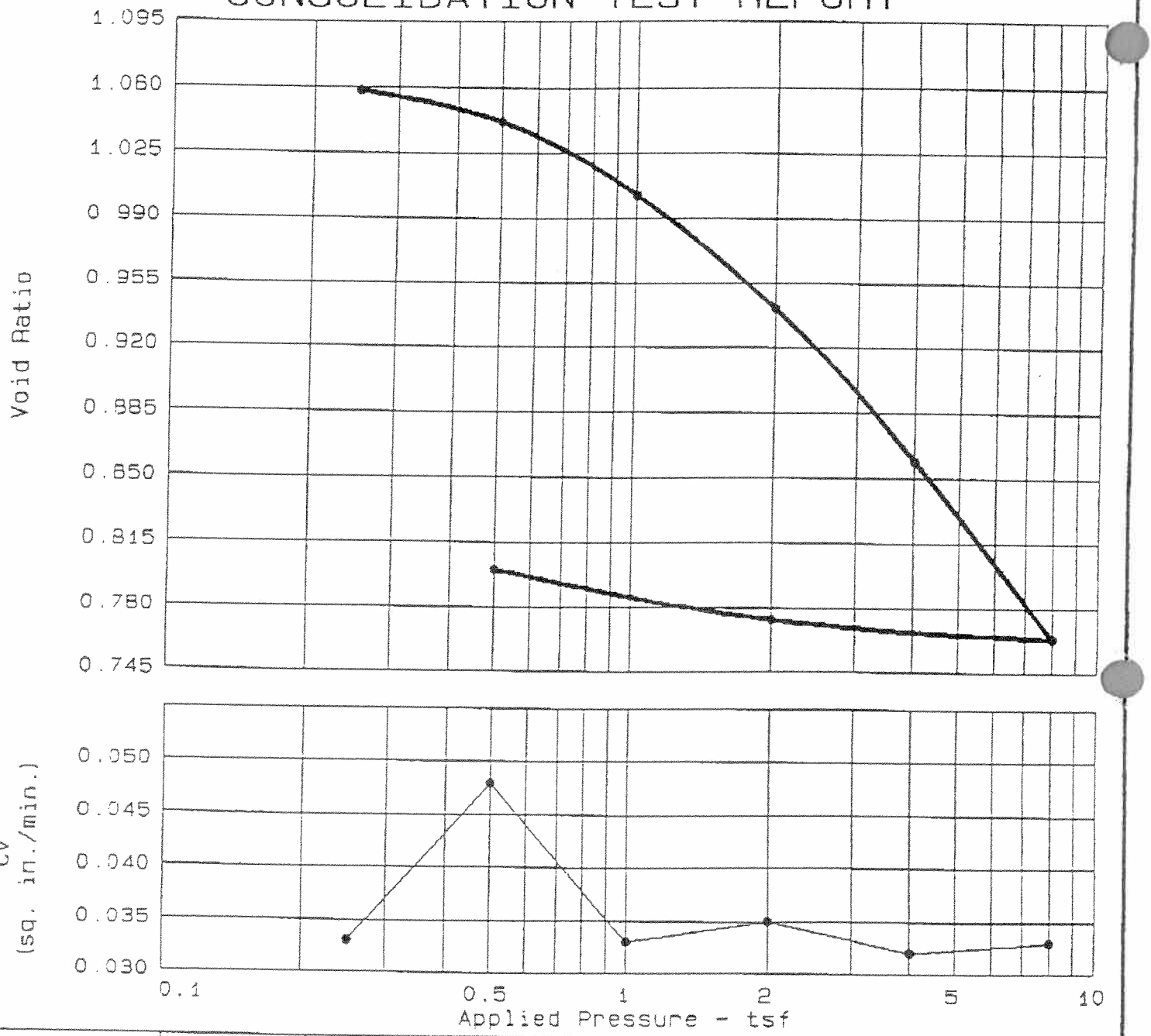
C_v @ T_{90} = .033 $in.^2/min.$



Load No.= 2
Load= 0.50 tsf
D_0 = 0.0255
D_{90} = 0.0278
D_{100}= 0.0281
T_{90}= 4.25 min.

C_v @ T_{90} = .048 $in.^2/min.$

CONSOLIDATION TEST REPORT



Natural Saturation	Natural Moisture	Dry Dens. (pcf)	LL	PI	Sp.Gr.	Precons. (tsf)	C_c	e_o
99.0 %	43.5 %	74.4			2.498	1.24	0.32	1.0964

TEST RESULTS

C_v at 1.00 tsf applied = 0.033 sq. in./min.
C_v at 6.00 tsf applied = 0.033 sq. in./min.

MATERIAL DESCRIPTION

Project No.: 812-50351
Project: ALCOSAN - EPM
Location: ST- 223-1, 30.0'-32.0'

Date: 4-16-1995

Remarks:

CONSOLIDATION TEST REPORT

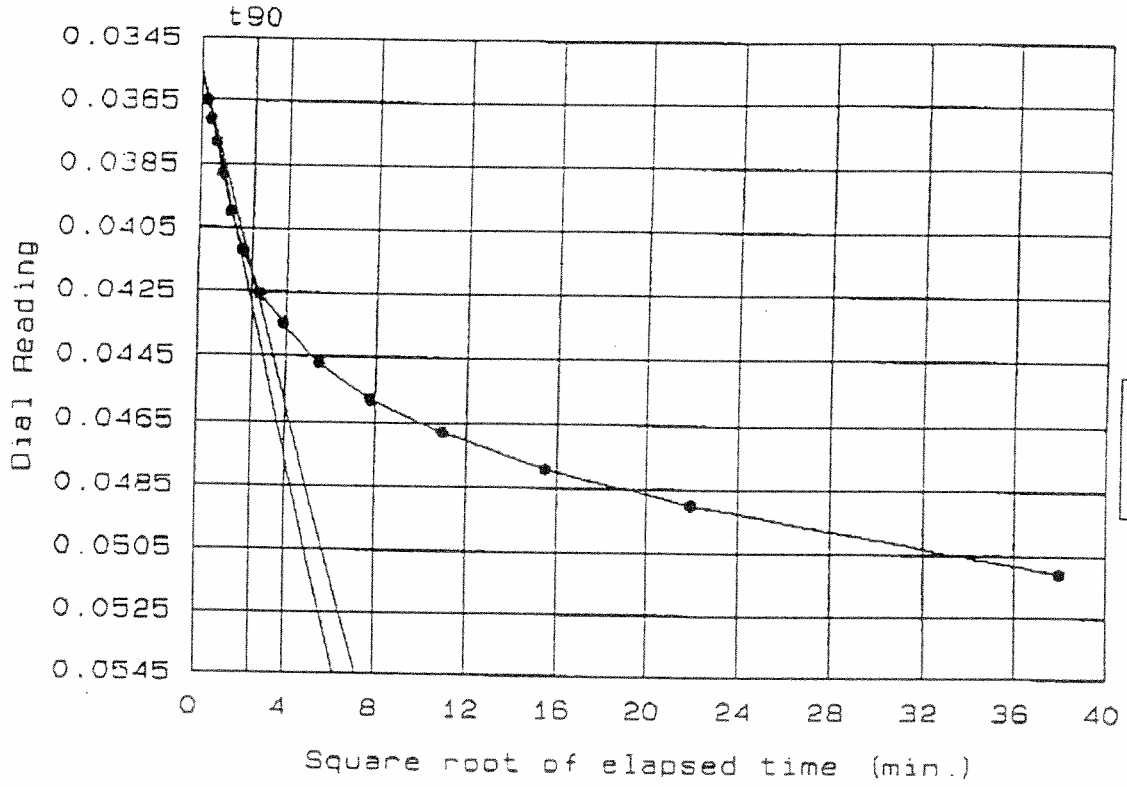
PSI, Inc.

Fig. No. _____

Dial Reading vs. Time

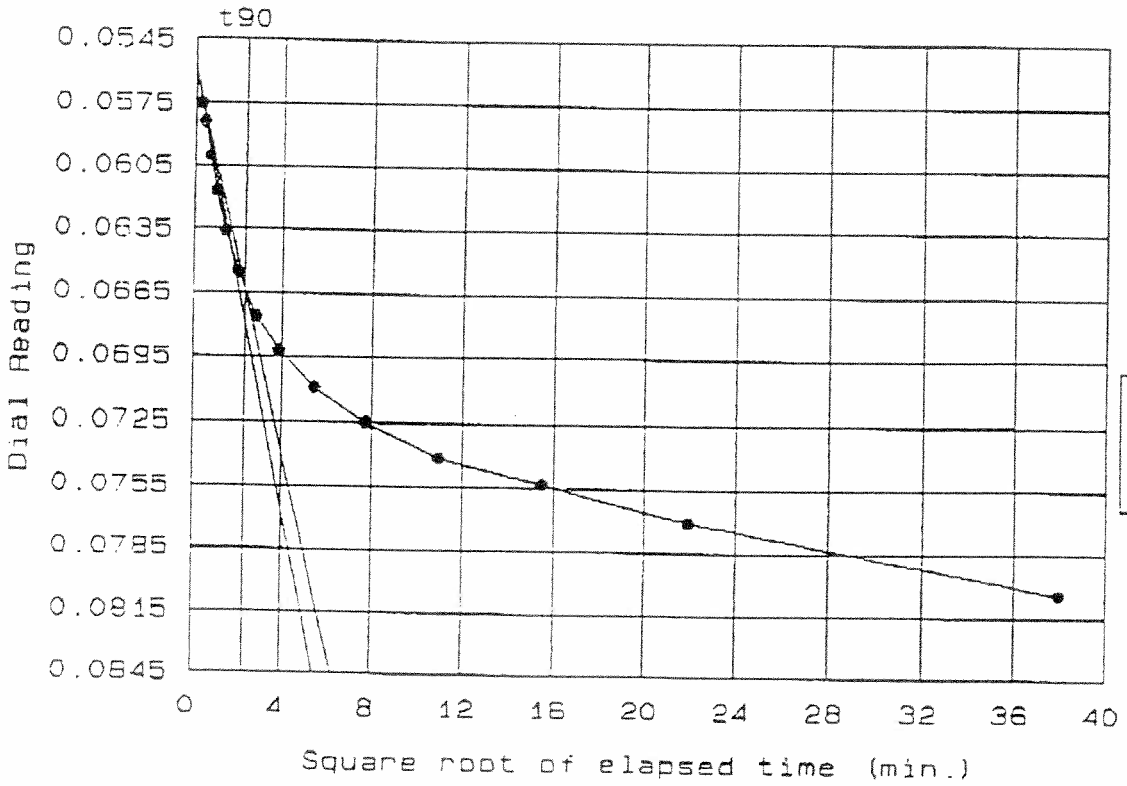
Project No.: 812-50351
Project: ALCOSAN - EPM
Location: ST- 223-1, 30.0'-32.0'

Date: 4-16-1996



Load No.= 3
Load= 1.00 tsf
D_0 = 0.0355
D_{90} = 0.0420
D_{100}= 0.0427
T_{90}= 5.98 min.

C_v @ T_{90} = .033 $in.^2/min.$



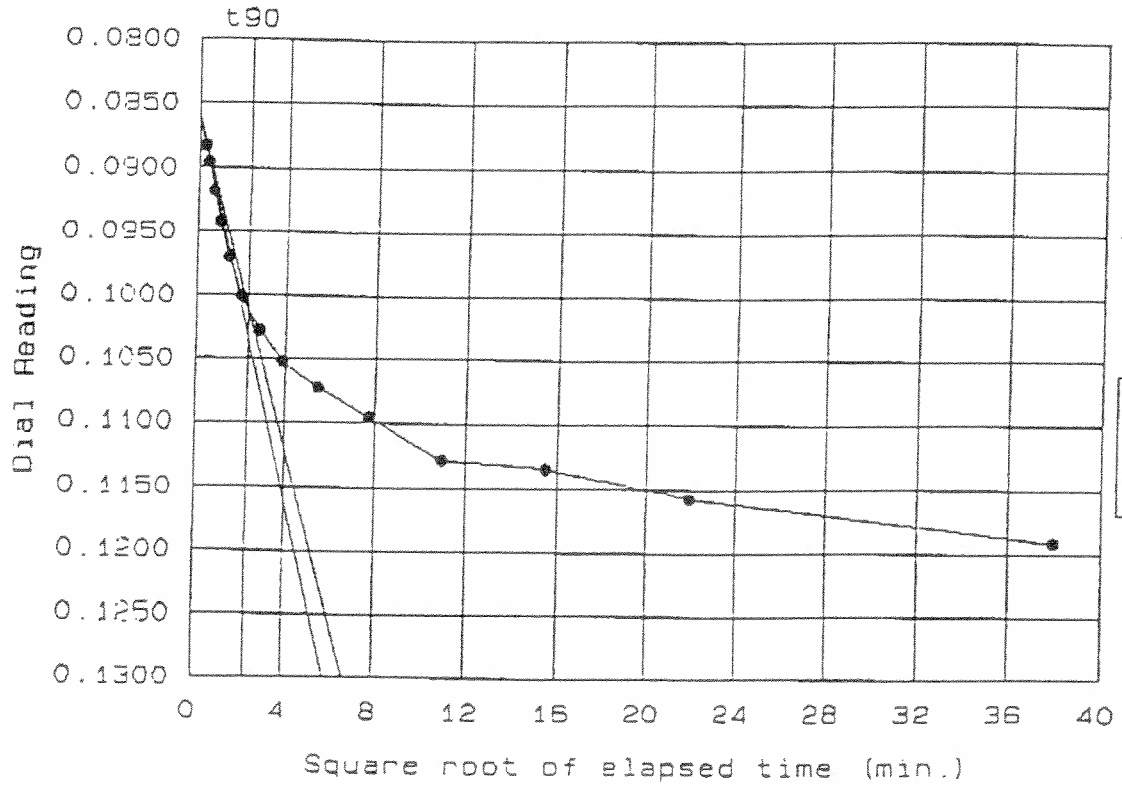
Load No.= 4
Load= 2.00 tsf
D_0 = 0.0559
D_{90} = 0.0663
D_{100}= 0.0674
T_{90}= 5.30 min.

C_v @ T_{90} = .035 $in.^2/min.$

Dial Reading vs. Time

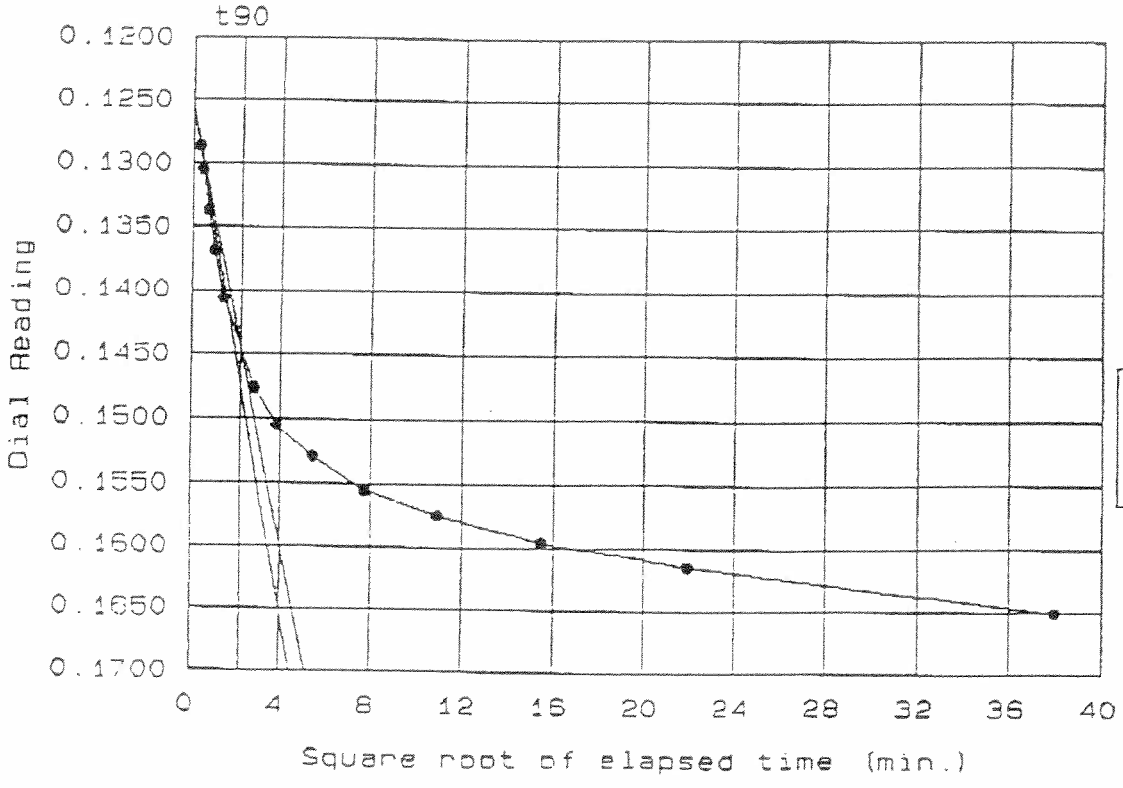
Project No.: 812-50351
Project: ALCOSAN - EPM
Location: ST- 223-1, 30.0'-32.0'

Date: 4-16-1996



Load No.= 5
Load= 4.00 tsf
D_0 = 0.0859
D_{90} = 0.1012
D_{100}= 0.1029
T_{90}= 5.46 min.

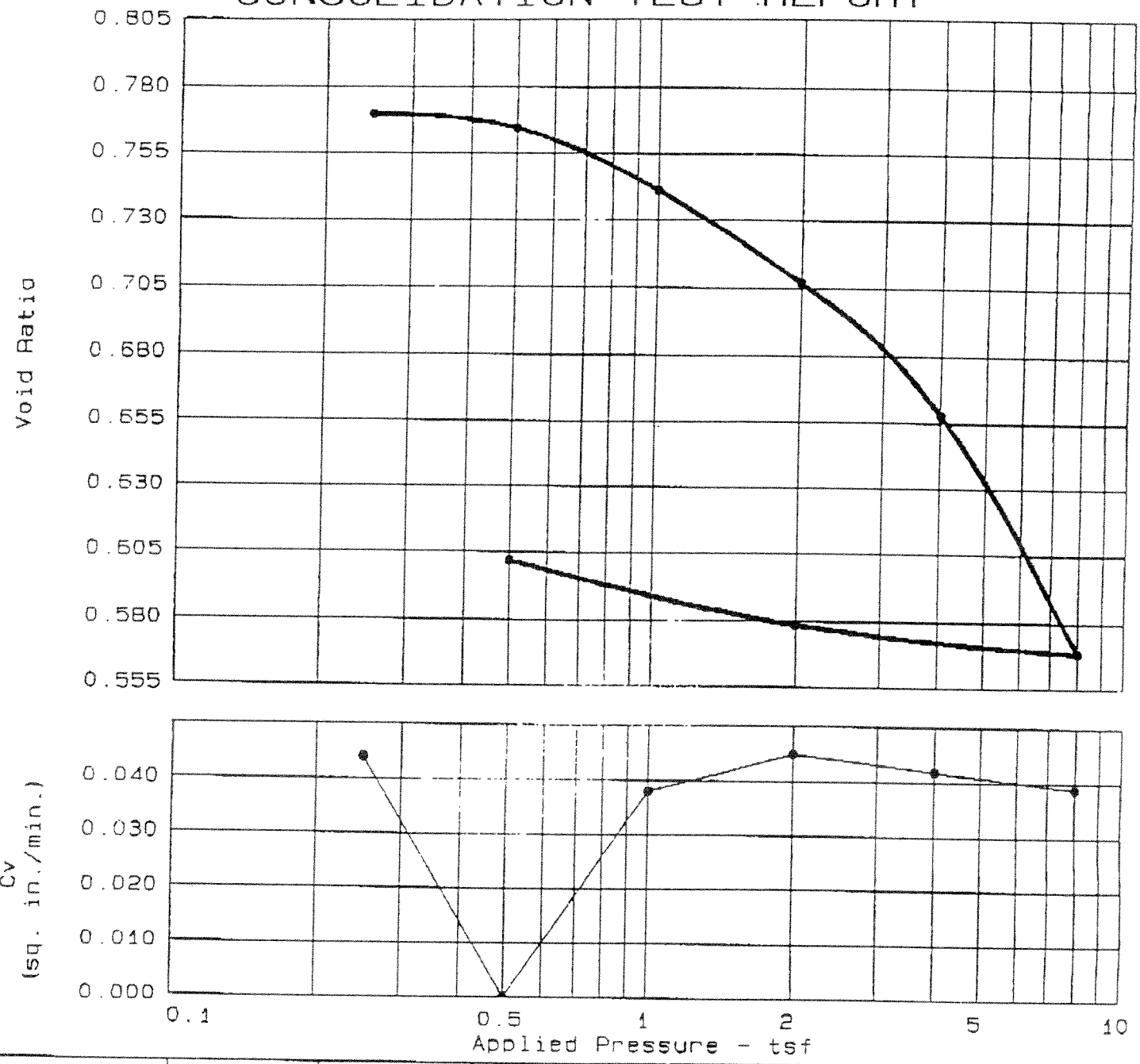
C_v @ T_{90} = .032 $in.^2/min.$



Load No.= 6
Load= 8.00 tsf
D_0 = 0.1256
D_{90} = 0.1444
D_{100}= 0.1465
T_{90}= 4.76 min.

C_v @ T_{90} = .033 $in.^2/min.$

CONSOLIDATION TEST REPORT



Natural Saturation	Natural Moisture	Dry Dens. (pcf)	LL	PI	Sp.Gr.	Precons. (tsf)	C_c	e_o
101.6 %	35.1 %	81.7	--	--	2.392	3.86	0.30	0.8273

TEST RESULTS

C_v at 2.00 tsf applied = 0.045 sq. in./min.
C_v at 8.00 tsf applied = 0.039 sq. in./min.

MATERIAL DESCRIPTION

GREY-BROWN SANDY SILT

Class: ML

Project No.: 812-50351
Project: ALCOSAN PLANT (PITTSBURGH)
Location: TB-232, TUBE-1, 23.0'-25.0'

Date: 6-21-1996

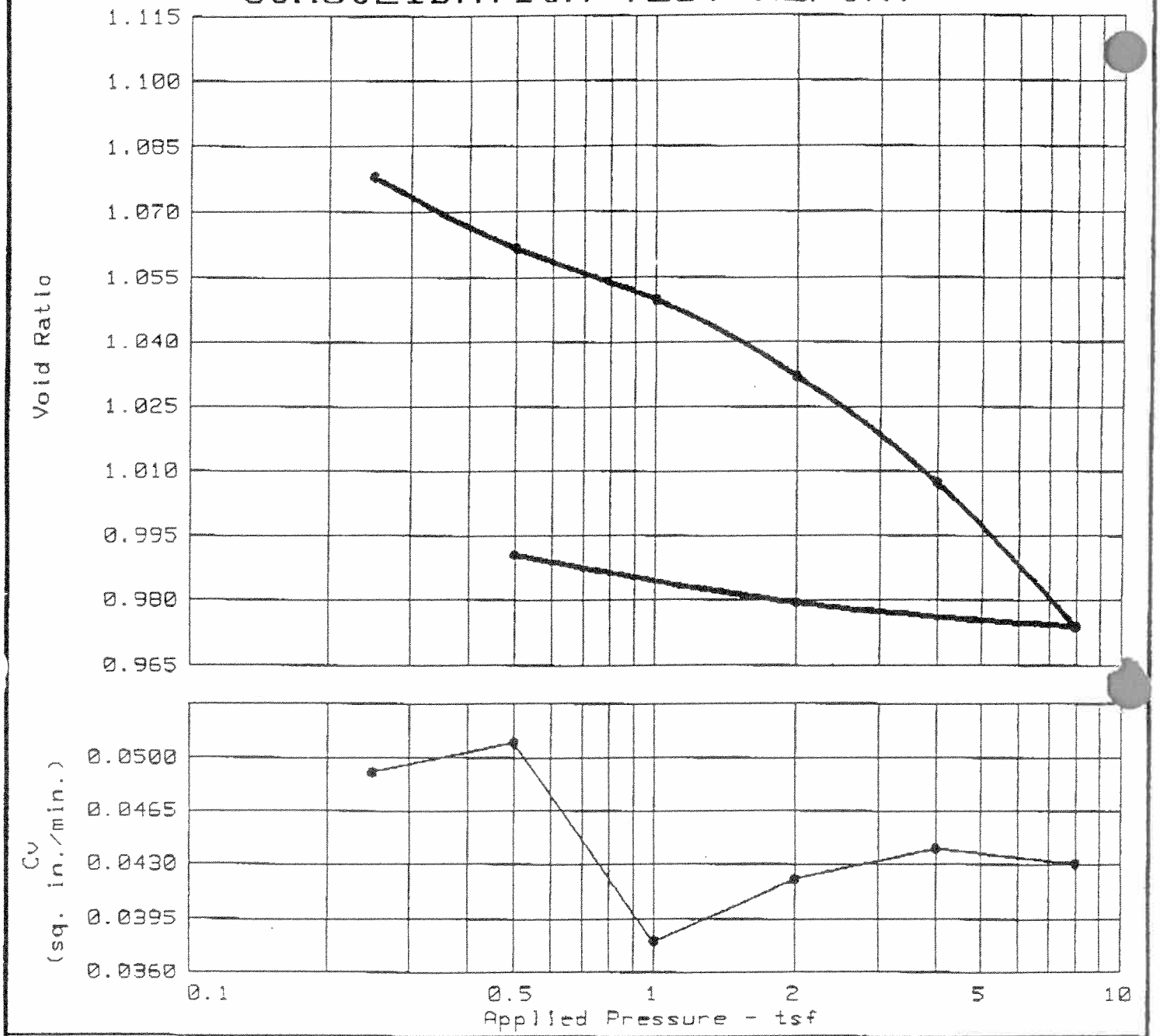
Remarks:

CONSOLIDATION TEST REPORT

PSI, Inc.

Fig. No. _____

CONSOLIDATION TEST REPORT



Natural Saturation	Natural Moisture	Dry Dens. (pcf)	LL	PI	Sp.Gr.	Precons. (tsf)	C_c	e_o
98.0 %	41.5 %	76.9	N\P	N\P	2.580	3.82	0.11	1.0932

TEST RESULTS

C_v at 2.00 tsf applied = 0.042 sq. in./min.
C_v at 8.00 tsf applied = 0.043 sq. in./min.

Project No.: 812-50351
Project: 7-16-1996
Location: TUBE-236, 25.0'-27.0'

Date: 7-16-1996

CONSOLIDATION TEST REPORT

PSI, Inc.

MATERIAL DESCRIPTION

SILT WITH SAND

Class: ML

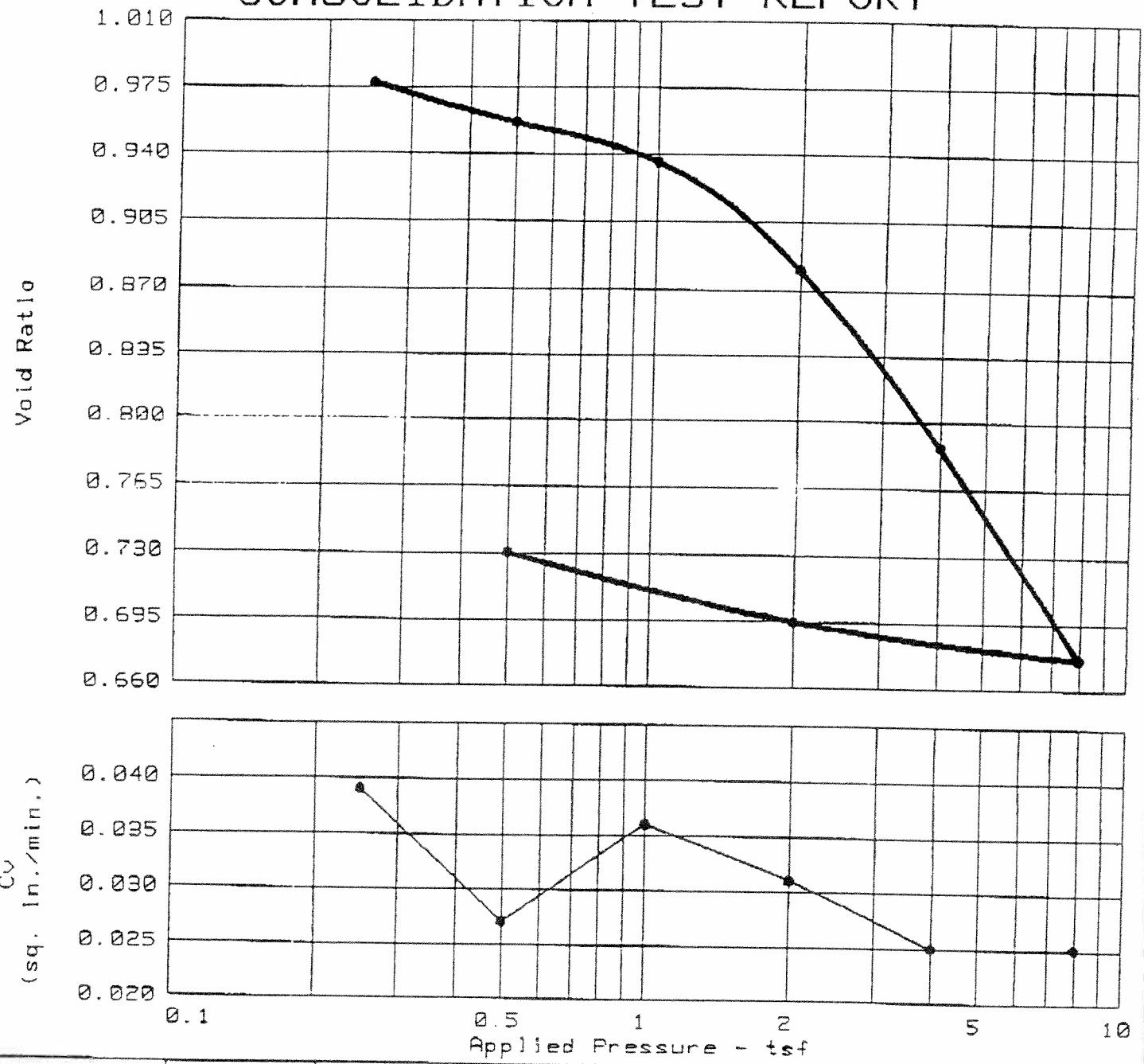
Remarks:

RUST

WEST NORTH AERATION TANK

Fig. No. 4

CONSOLIDATION TEST REPORT



Natural Saturation	Natural Moisture	Dry Dens. (pcf)	LL	PI	Sp.Gr.	Precons. (tsf)	C_c	e_o
99.6 %	39.7 %	79.5	33	9	2.590		0.37	1.0334

TEST RESULTS

C_v at 2.00 tsf applied = 0.031 sq. in./min.
C_v at 8.00 tsf applied = 0.025 sq. in./min.

MATERIAL DESCRIPTION

SILT WITH SAND

Class: ML

Project No.: 812-50351
Project: ALCOSAN
Location: TUBE-237, 25.0'-27.0'

Date: 7-16-1996

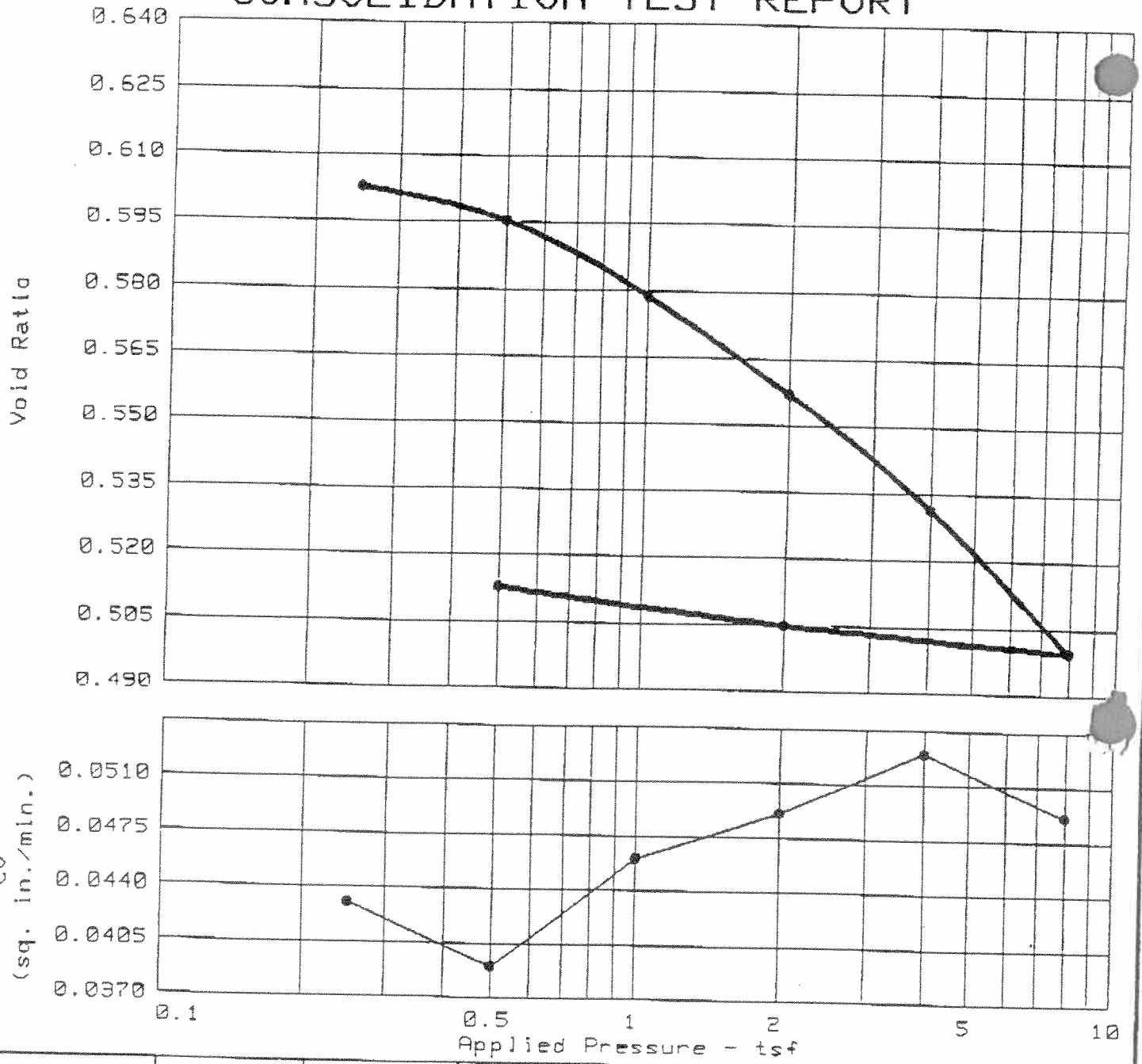
Remarks:

CONSOLIDATION TEST REPORT

PSI, Inc.

Fig. No. _____

CONSOLIDATION TEST REPORT



Natural Saturation	Natural Moisture	Dry Dens. (pcf)	LL	PI	Sp.Gr.	Precons. (tsf)	C_c	e_o
89.5 %	20.4 %	103.3	N\P	N\P	2.660		0.11	0.6070

TEST RESULTS

C_v at 2.00 tsf applied = 0.049 sq. in./min.
C_v at 8.00 tsf applied = 0.049 sq. in./min.

MATERIAL DESCRIPTION

SANDY SILT

Class: ML

Project No.: 812-50351
Project: ALCOSAN
Location: TUBE-242, 20.0'-22.0'

Date: 7-16-1996

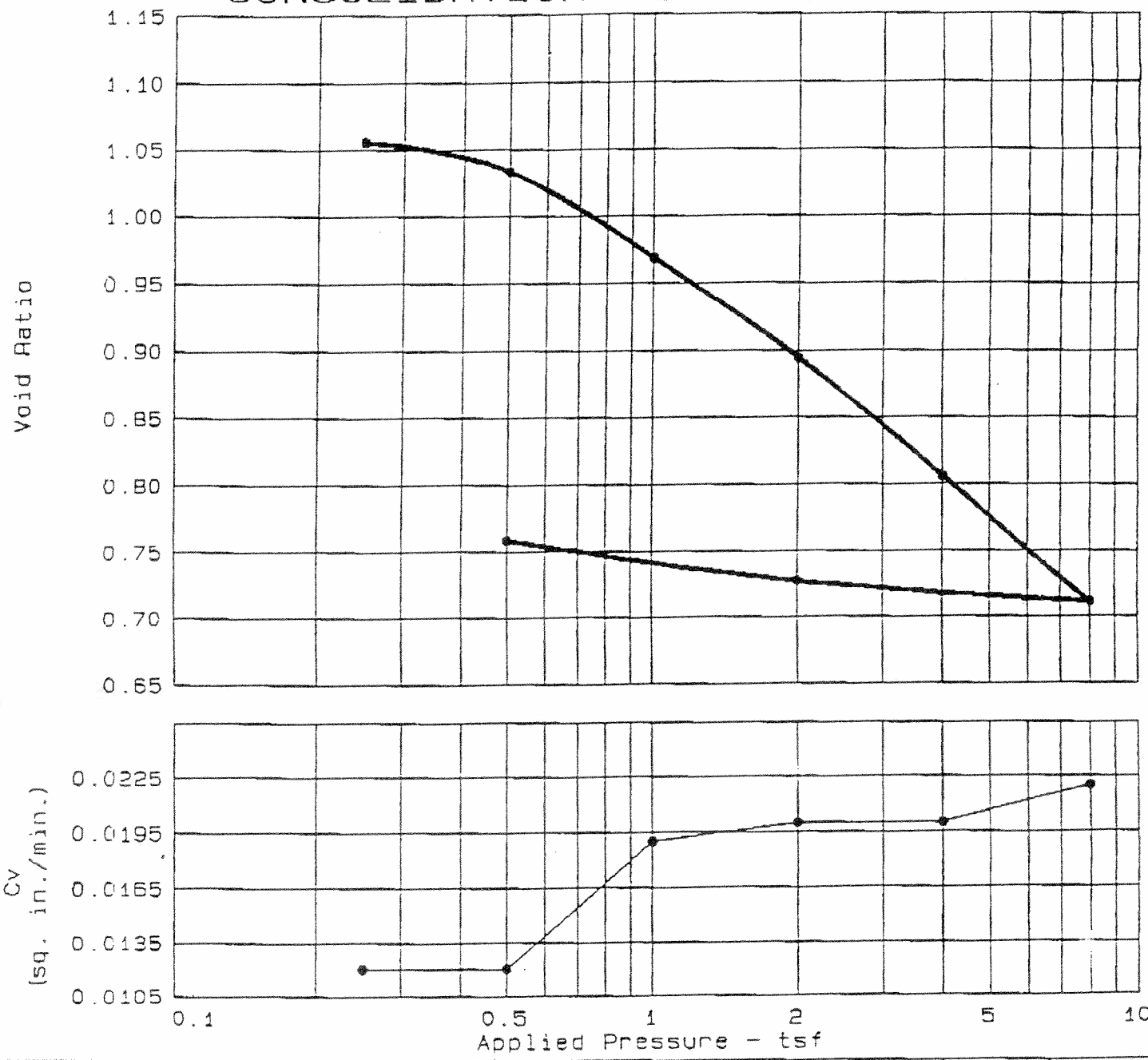
Remarks:

CONSOLIDATION TEST REPORT

PSI, Inc.

Fig. No. _____

CONSOLIDATION TEST REPORT



Natural Saturation	Natural Moisture	Dry Dens. (pcf)	LL	PI	Sp.Gr.	Precons. (tsf)	C_c	e_o
99.4 %	42.7 %	76.6	N\A	N\A	2.590	0.83	0.31	1.1119

TEST RESULTS

C_v at 2.00 tsf applied = 0.020 sq. in./min.
C_v at 8.00 tsf applied = 0.022 sq. in./min.

MATERIAL DESCRIPTION

Project No.: 812-50351
Project: ALCOSAN - EPM
Location: ST-253-1, 32.0'-34.0'

Date: 4-3-1996

Remarks:

CONSOLIDATION TEST REPORT

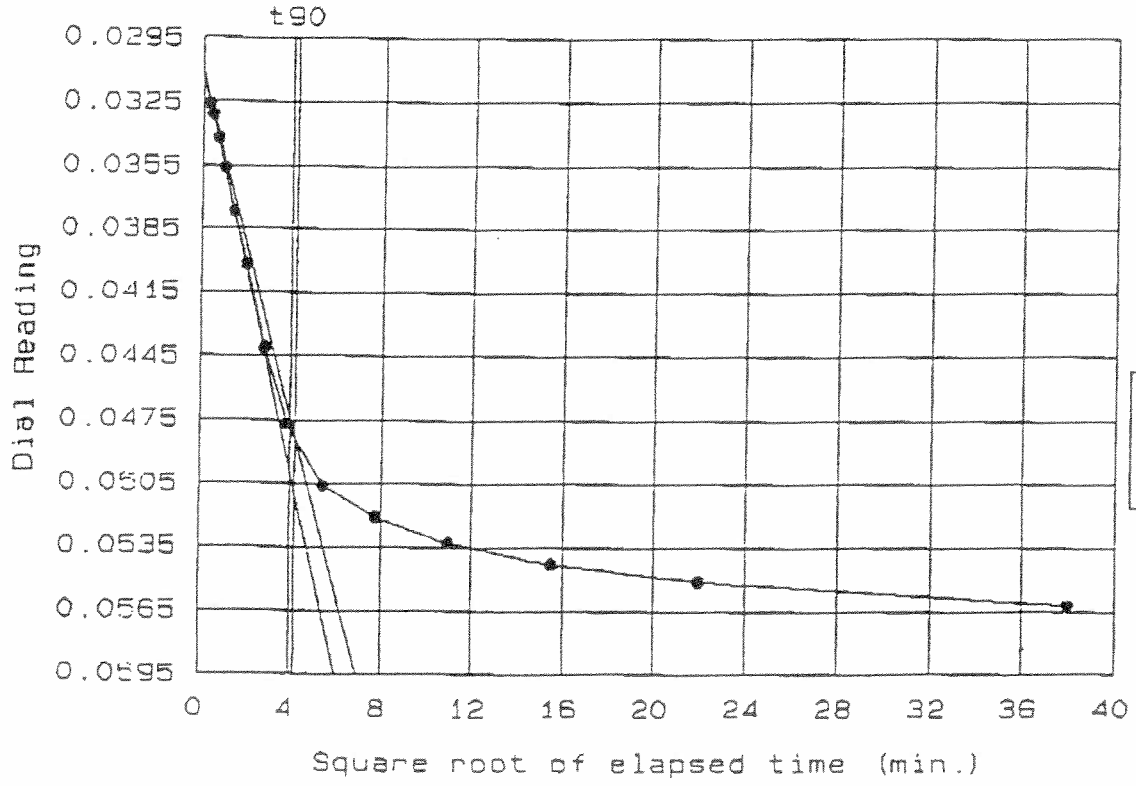
PSI, Inc.

Fig. No. N\A

Dial Reading vs. Time

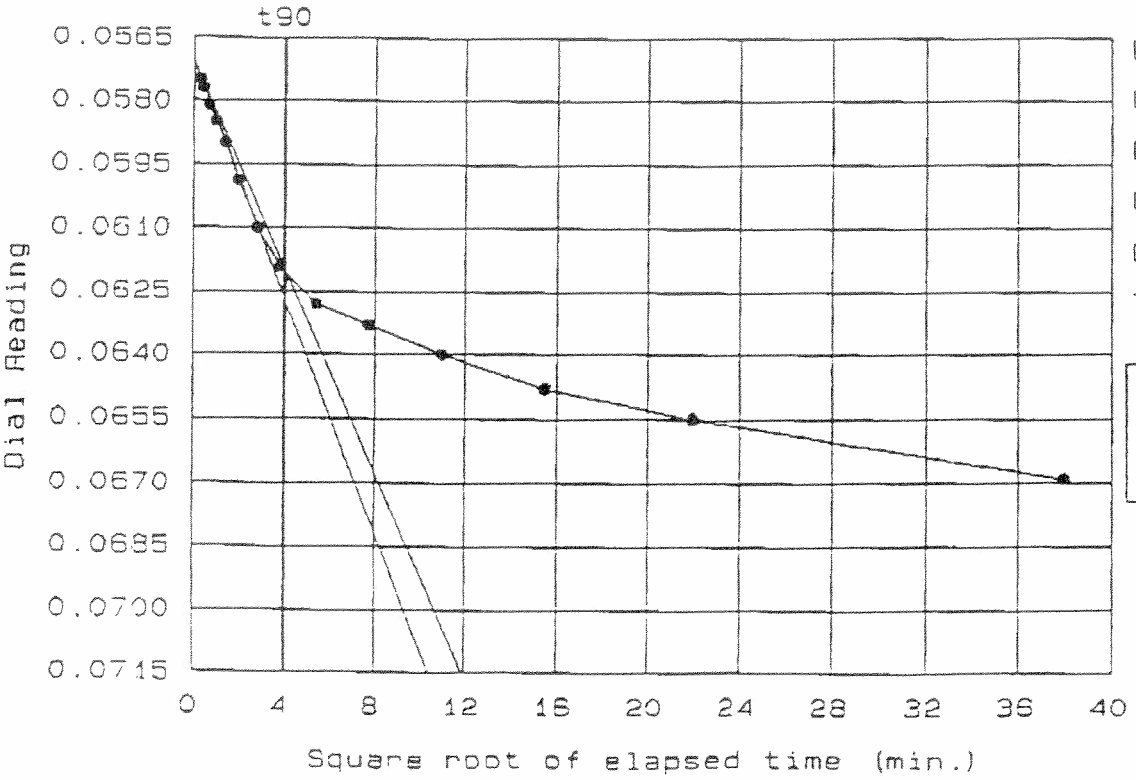
Project No.: 812-50351
Project: ALCOSAN - EPM
Location: ST-263-1, 32.0'-34.0'

Date: 4-3-1996



Load No.= 1
Load= 0.25 tsf
D_0 = 0.0311
D_{90} = 0.0483
D_{100}= 0.0502
T_{90}= 17.82 min.

C_v @ T_{90} = .012 $in.^2/min.$



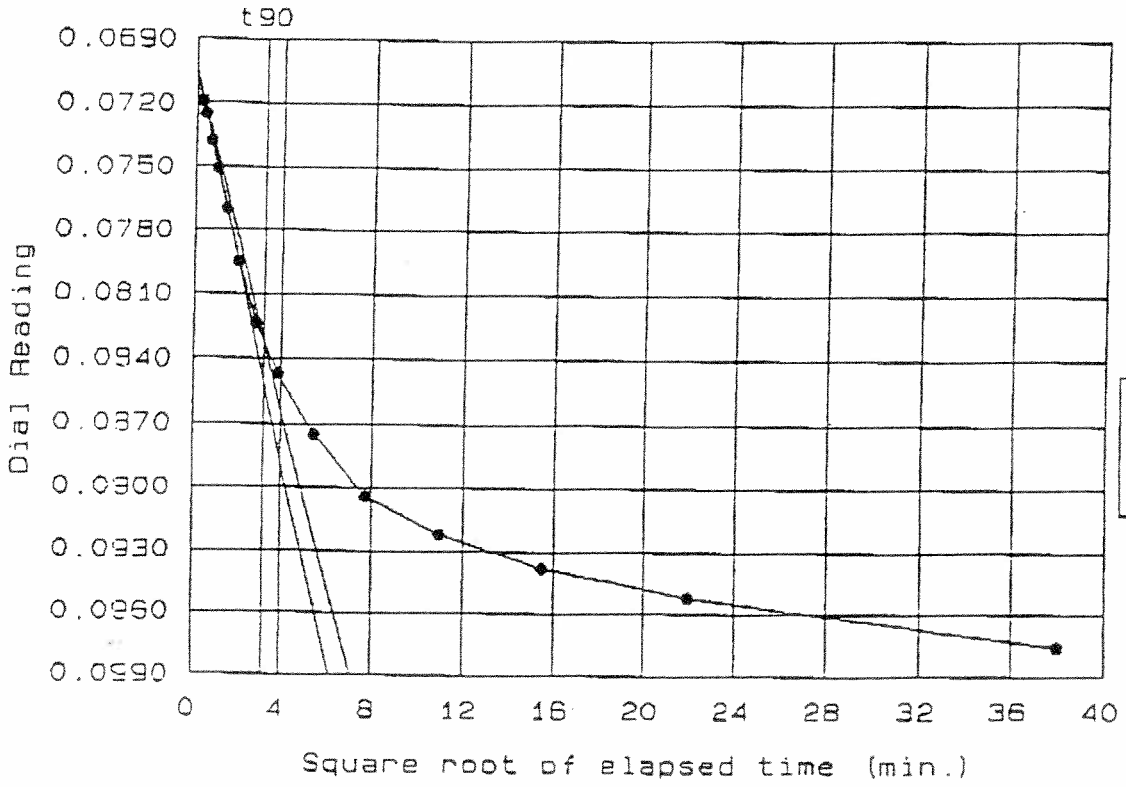
Load No.= 2
Load= 0.50 tsf
D_0 = 0.0571
D_{90} = 0.0620
D_{100}= 0.0626
T_{90}= 16.86 min.

C_v @ T_{90} = .012 $in.^2/min.$

Dial Reading vs. Time

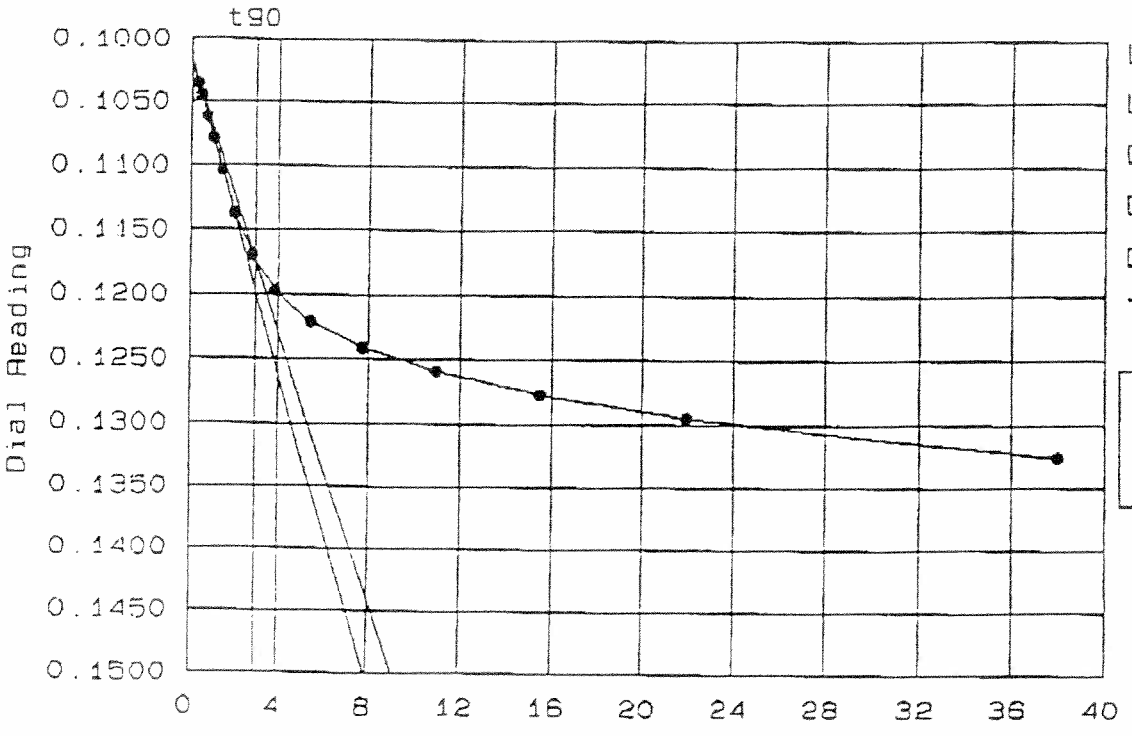
Project No.: 812-50351
Project: ALCOSAN - EPM
Location: ST-263-1, 32.0'-34.0'

Date: 4-3-1996



Load No.= 3
Load= 1.00 tsf
D_0 = 0.0704
D_{90} = 0.0832
D_{100}= 0.0846
T_{90}= 10.26 min.

C_v @ T_{90} = .019 $in.^2/min.$



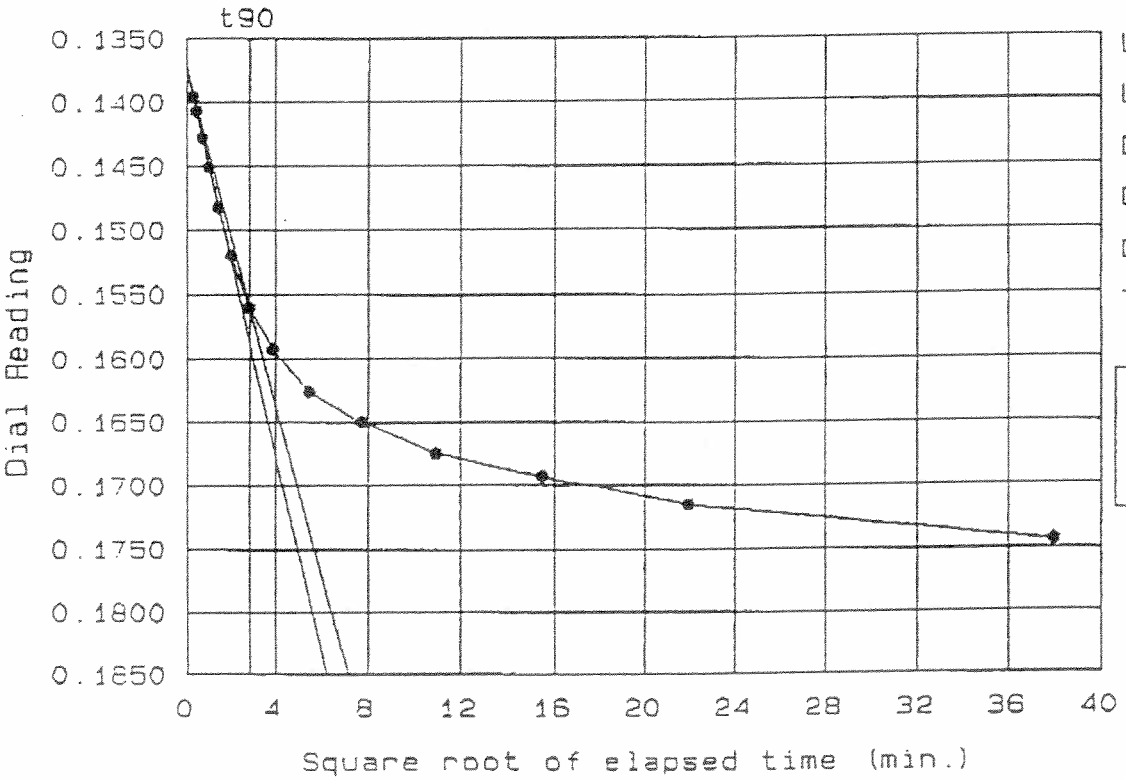
Load No.= 4
Load= 2.00 tsf
D_0 = 0.1017
D_{90} = 0.1173
D_{100}= 0.1190
T_{90}= 8.66 min.

C_v @ T_{90} = .020 $in.^2/min.$

Dial Reading vs. Time

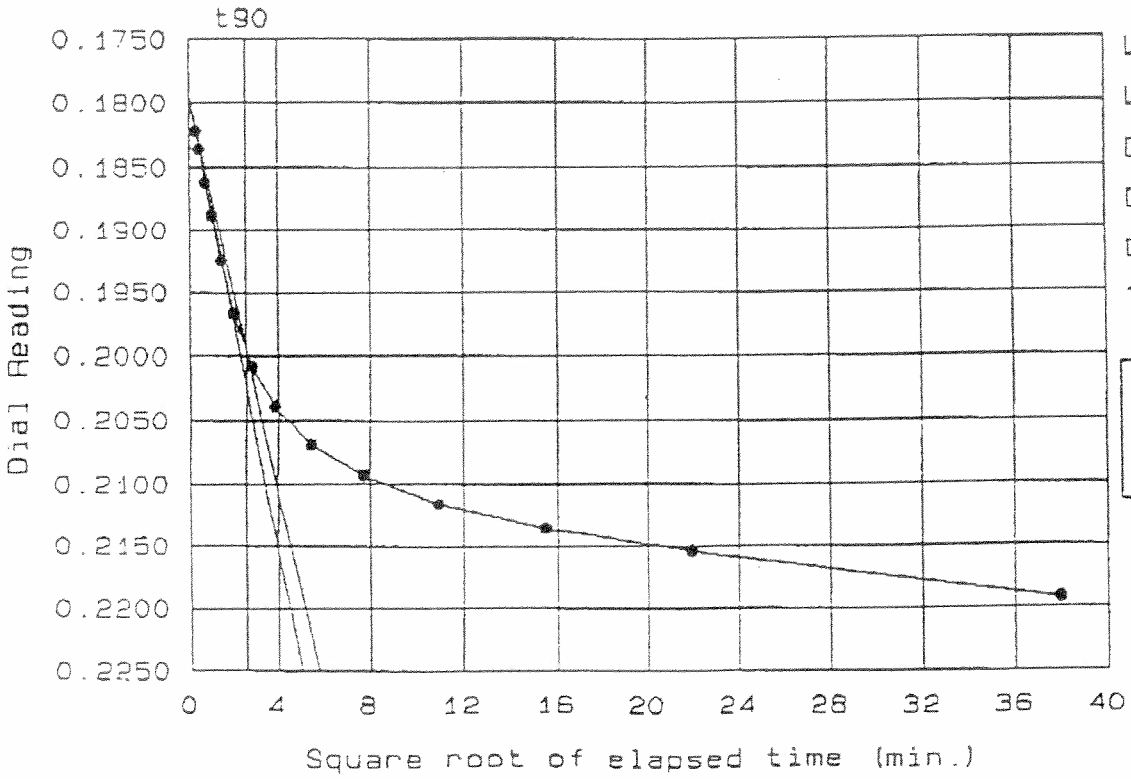
Project No.: 812-50351
Project: ALCOSAN - EPM
Location: ST-263-1, 32.0'-34.0'

Date: 4-3-1996



Load No.= 5
Load= 4.00 tsf
D_0 = 0.1372
D_{90} = 0.1560
D_{100}= 0.1581
T_{90}= 8.09 min.

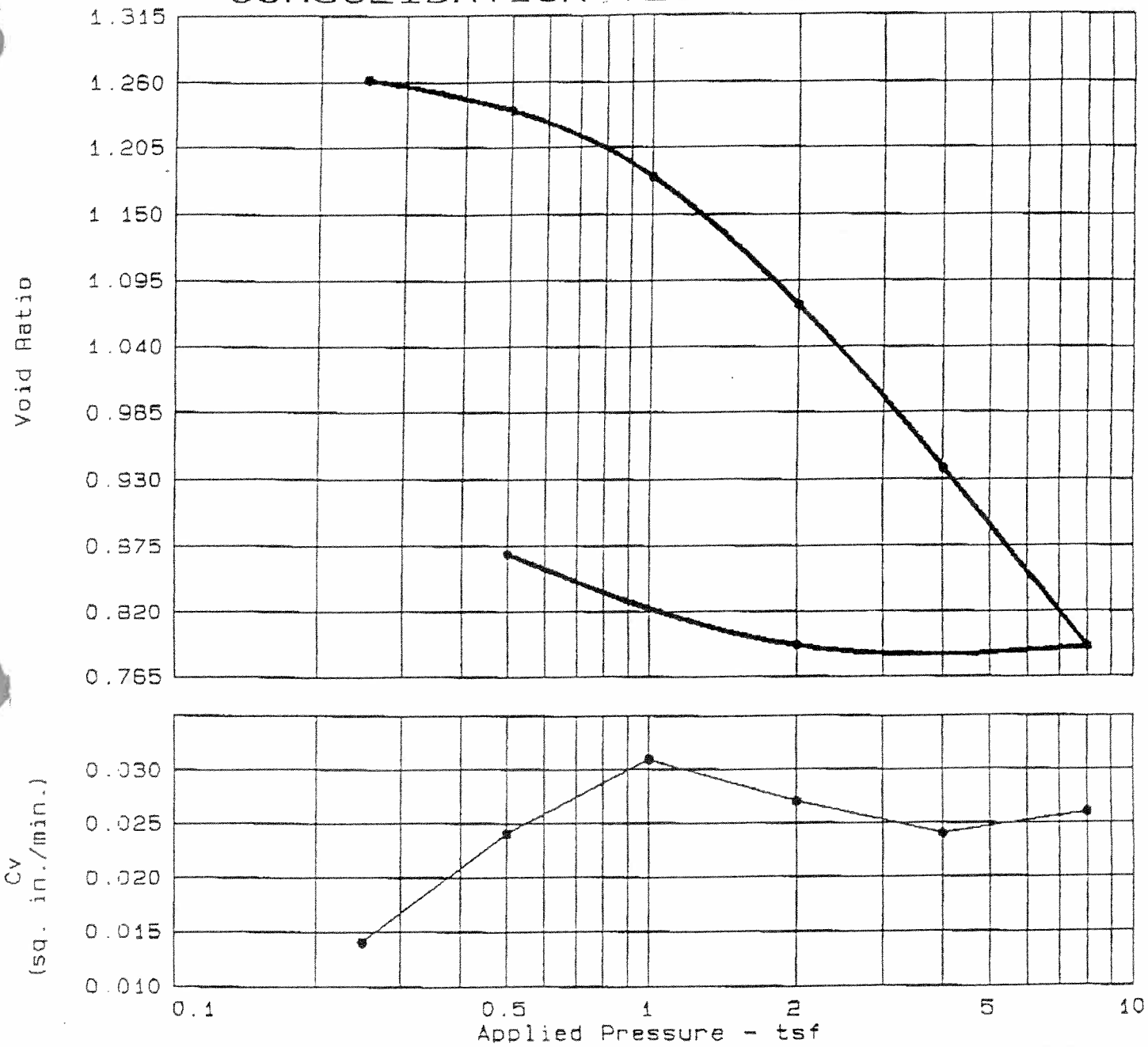
C_v @ T_{90} = .020 $in.^2/min.$



Load No.= 6
Load= 8.00 tsf
D_0 = 0.1793
D_{90} = 0.1995
D_{100}= 0.2017
T_{90}= 6.56 min.

C_v @ T_{90} = .022 $in.^2/min.$

CONSOLIDATION TEST REPORT



Natural Saturation	Natural Moisture	Dry Dens. (pcf)	LL	PI	Sp.Gr.	Precons. (tsf)	C_c	e_o
103.0 %	51.9 %	70.0	N\A	N\A	2.577	1.41	0.50	1.2997

TEST RESULTS

C_v at 2.00 tsf applied = 0.027 sq. in./min.
C_v at 8.00 tsf applied = 0.026 sq. in./min.

MATERIAL DESCRIPTION

Class: N\A

Project No.: 812-50351
Project: ALCOSAN - EPM
Location: ST-254, 29.0'-31.0'

Date: 4-4-1996

Remarks:

CONSOLIDATION TEST REPORT

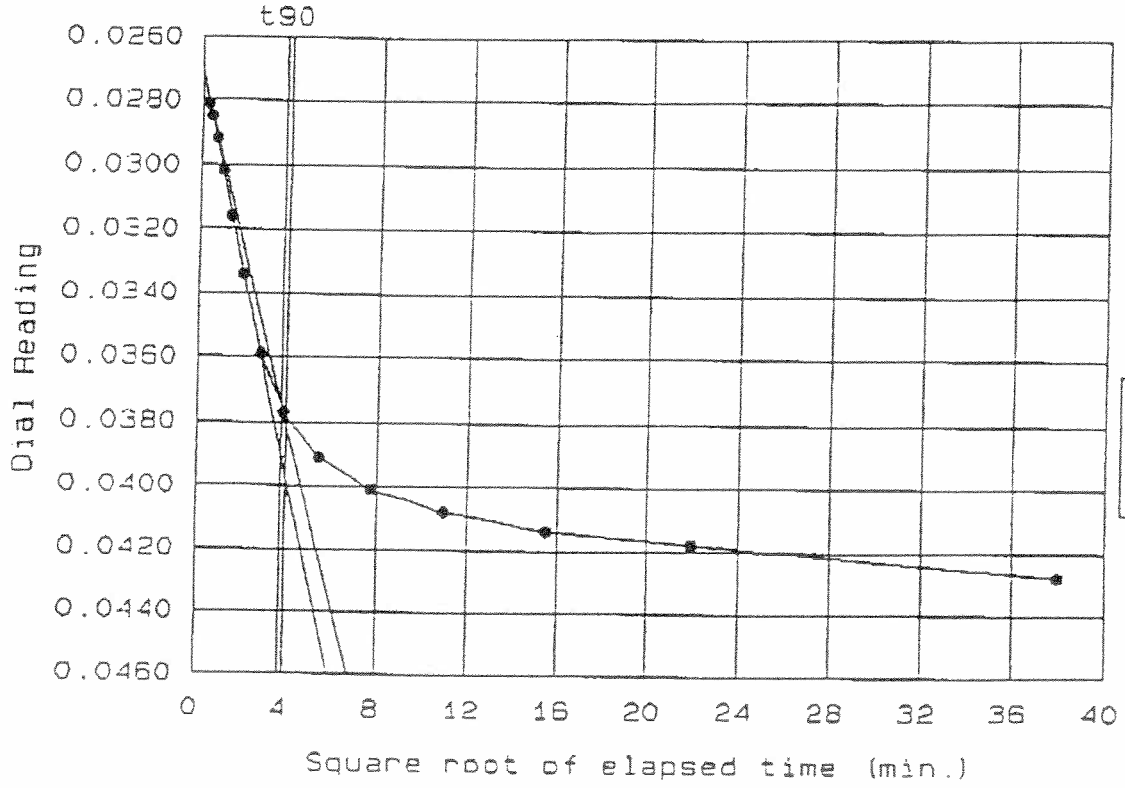
PSI, Inc.

Fig. No. N\A

Dial Reading vs. Time

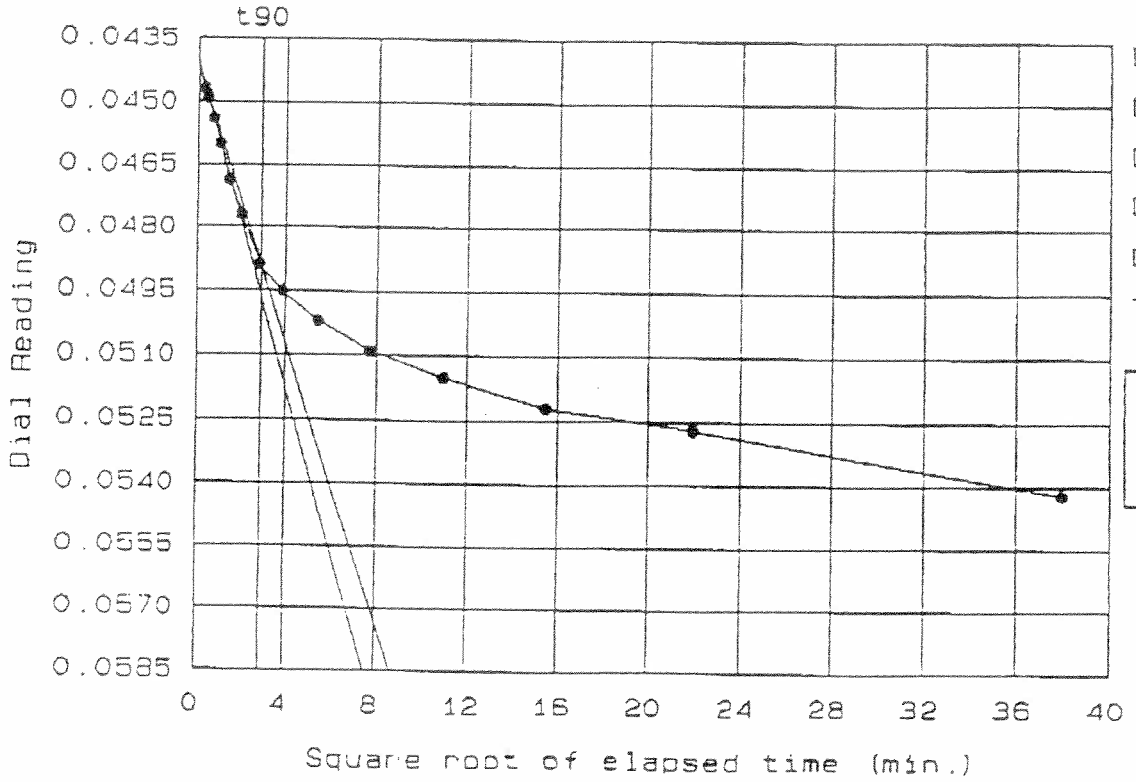
Project No.: 812-50351
Project: ALCOSAN - EPM
Location: ST-264, 29.0'-31.0'

Date: 4-4-1996



Load No.= 1
Load= 0.25 tsf
D_0 = 0.0271
D_{90} = 0.0376
D_{100}= 0.0387
T_{90}= 14.46 min.

C_v @ T_{90} = .014 $in.^2/min.$



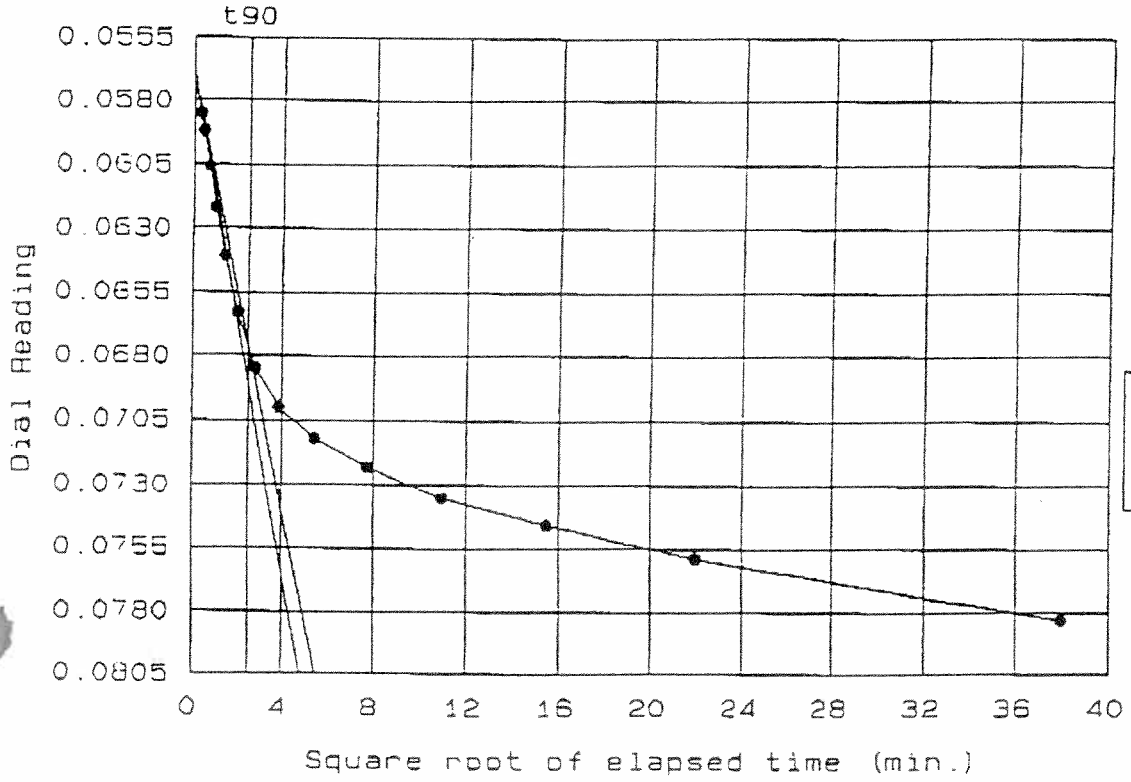
Load No.= 2
Load= 0.50 tsf
D_0 = 0.0441
D_{90} = 0.0490
D_{100}= 0.0495
T_{90}= 8.62 min.

C_v @ T_{90} = .024 $in.^2/min.$

Dial Reading vs. Time

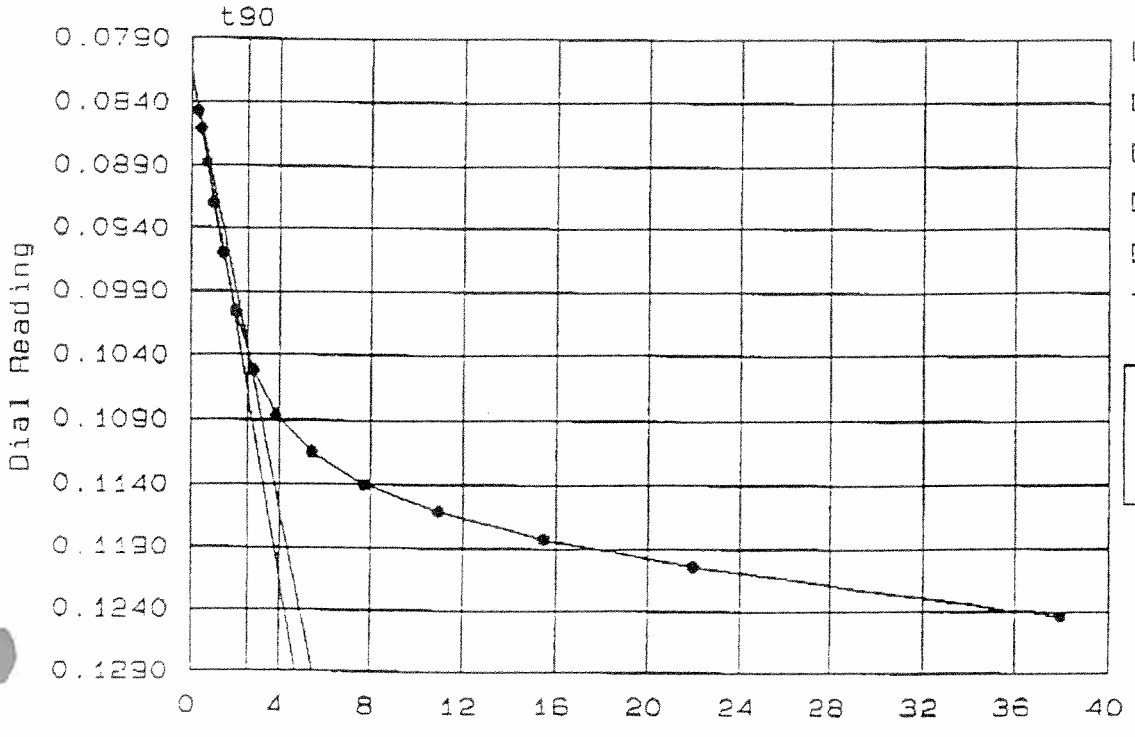
Project No.: 812-50351
Project: ALCOSAN - EPM
Location: ST-264, 29.0'-31.0'

Date: 4-4-1996



Load No.= 3
Load= 1.00 tsf
D_0 = 0.0570
D_{90} = 0.0677
D_{100}= 0.0689
T_{90}= 6.37 min.

C_v @ T_{90} =
.031 $in.^2/min.$



Load No.= 4
Load= 2.00 tsf
D_0 = 0.0816
D_{90} = 0.1038
D_{100}= 0.1063
T_{90}= 6.67 min.

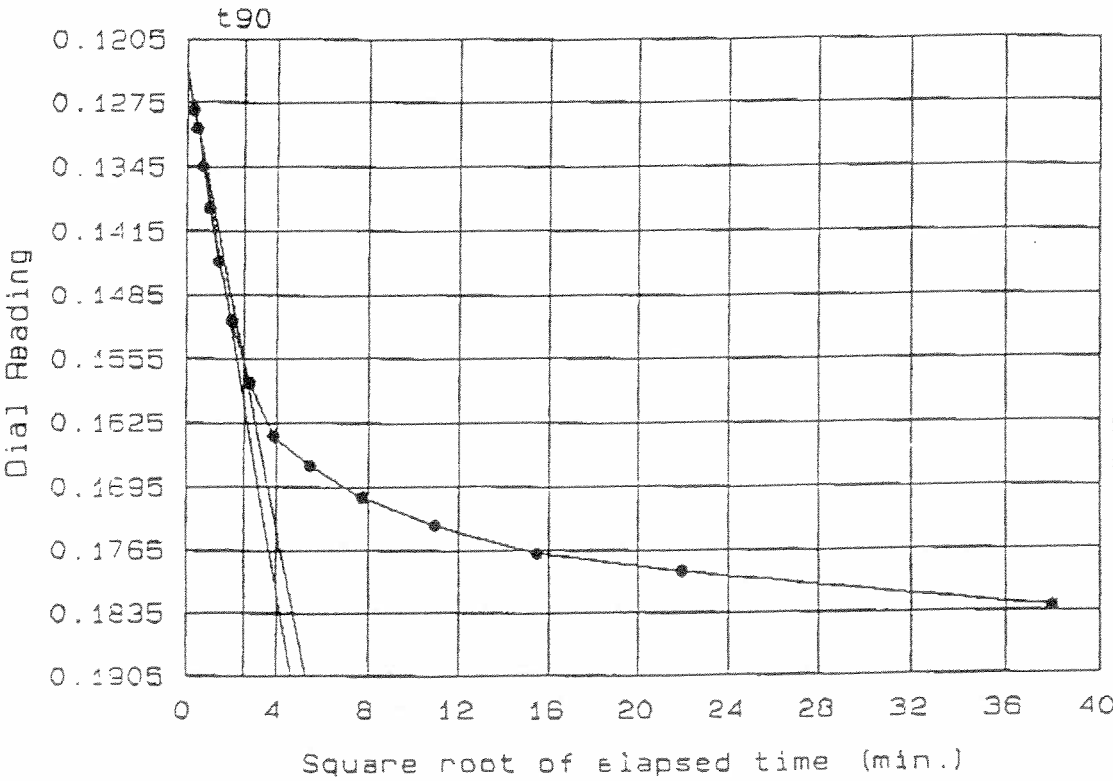
C_v @ T_{90} =
.027 $in.^2/min.$

PSI, Inc.

Dial Reading vs. Time

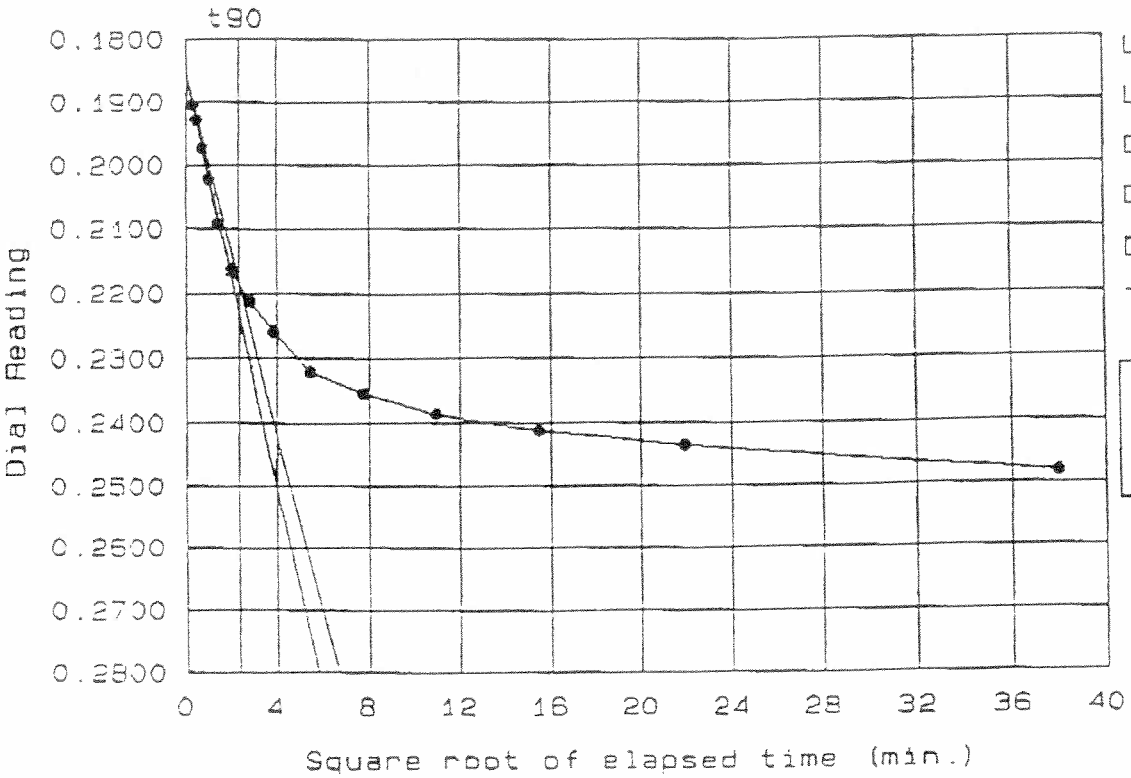
Project No.: 812-50351
Project: ALCOSAN - EPM
Location: ST-264, 29.0'-31.0'

Date: 4-4-1996



Load No.= 5
Load= 4.00 tsf
D_0 = 0.1237
D_{90} = 0.1562
D_{100}= 0.1598
T_{90}= 6.67 min.

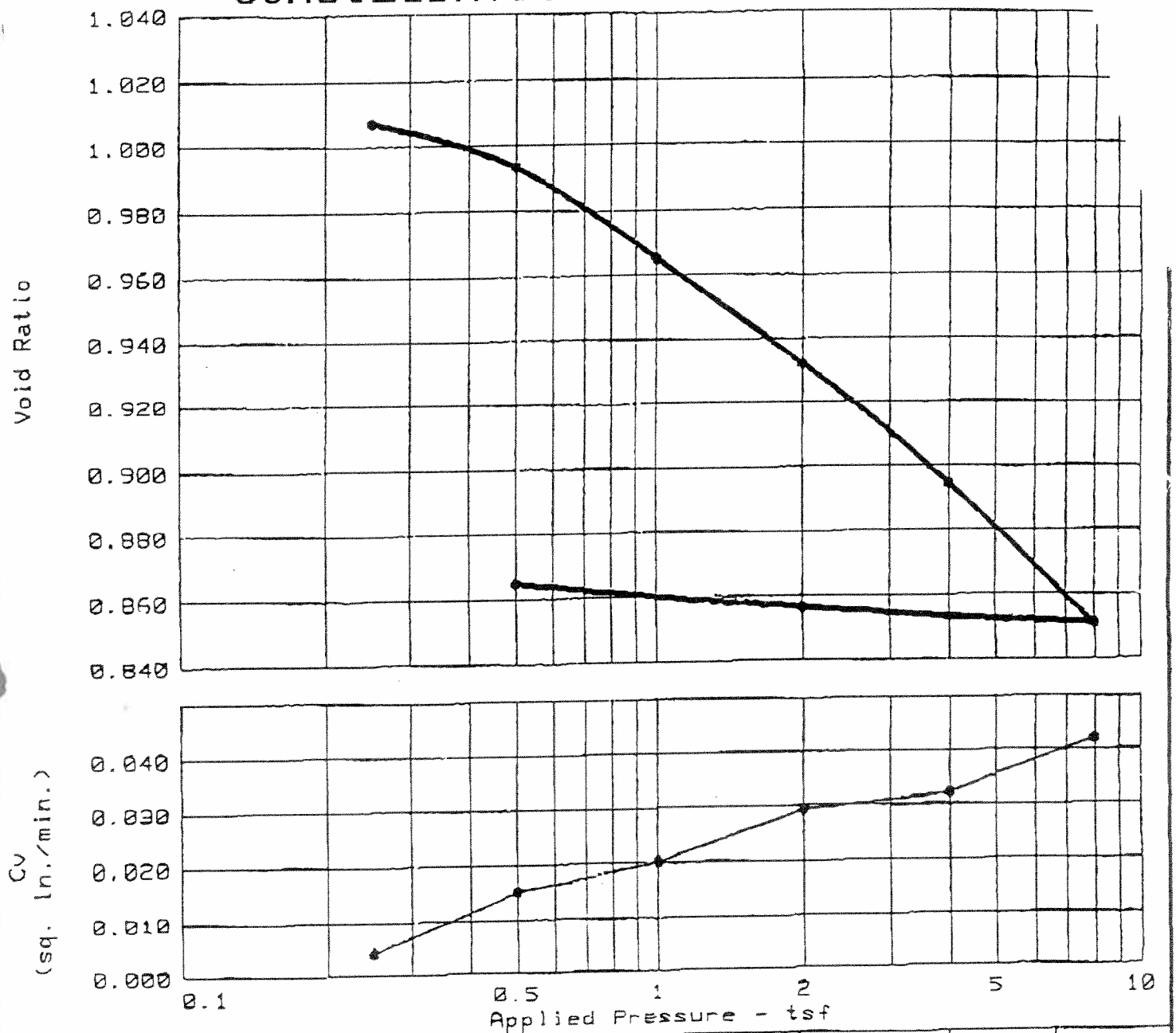
C_v @ T_{90} = .024 $in.^2/min.$



Load No.= 6
Load= 8.00 tsf
D_0 = 0.1853
D_{90} = 0.2183
D_{100}= 0.2220
T_{90}= 5.40 min.

C_v @ T_{90} = .026 $in.^2/min.$

CONSOLIDATION TEST REPORT



Natural Saturation	Natural Moisture	Dry Dens. (pcf)	LL	PI	Sp.Gr.	Precons. (tsf)	C_c	e_o
62.5 %	25.2 %	80.5			2.685	1.00	0.14	1.0826

TEST RESULTS

C_v at 2.00 tsf applied = 0.029 sq. in./min.
C_v at 8.00 tsf applied = 0.042 sq. in./min.

MATERIAL DESCRIPTION

SANDY SILT

Project No.: B12-50351
Project: ALCOSAN
Location: TUBE NO. 269-1
21.0'-23.0'
Date: 7-30-1996

Remarks:

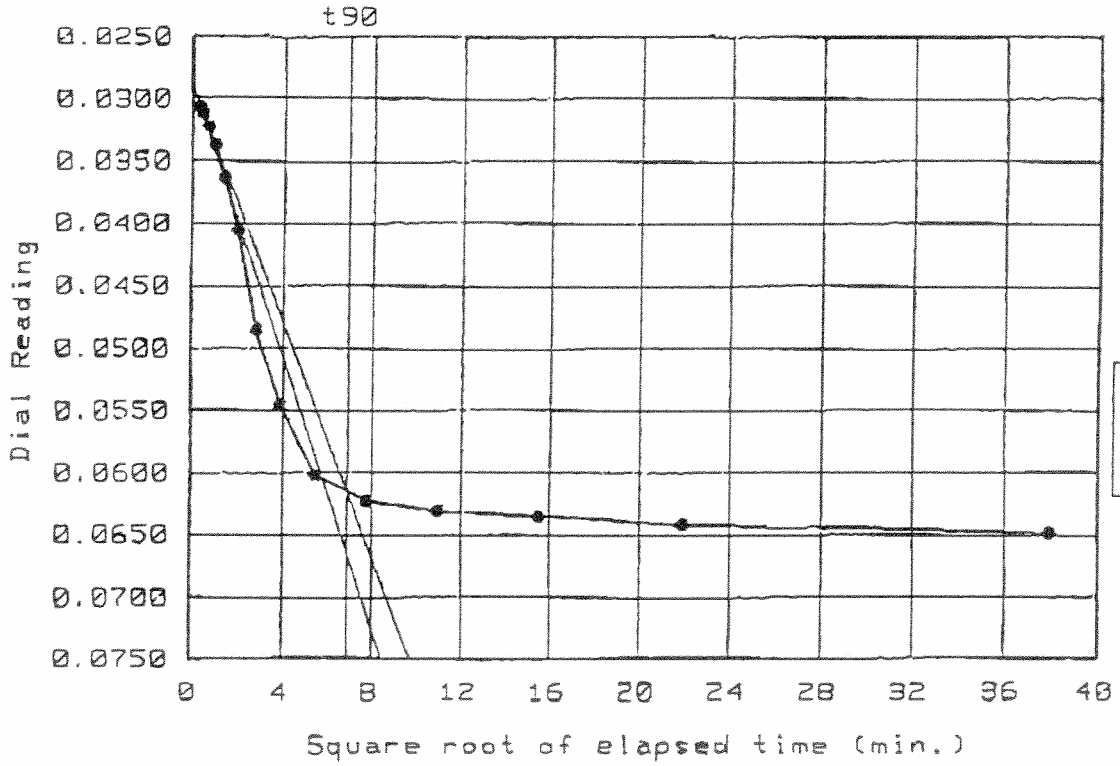
CONSOLIDATION TEST REPORT

PSI, Inc.

Fig. No. _____

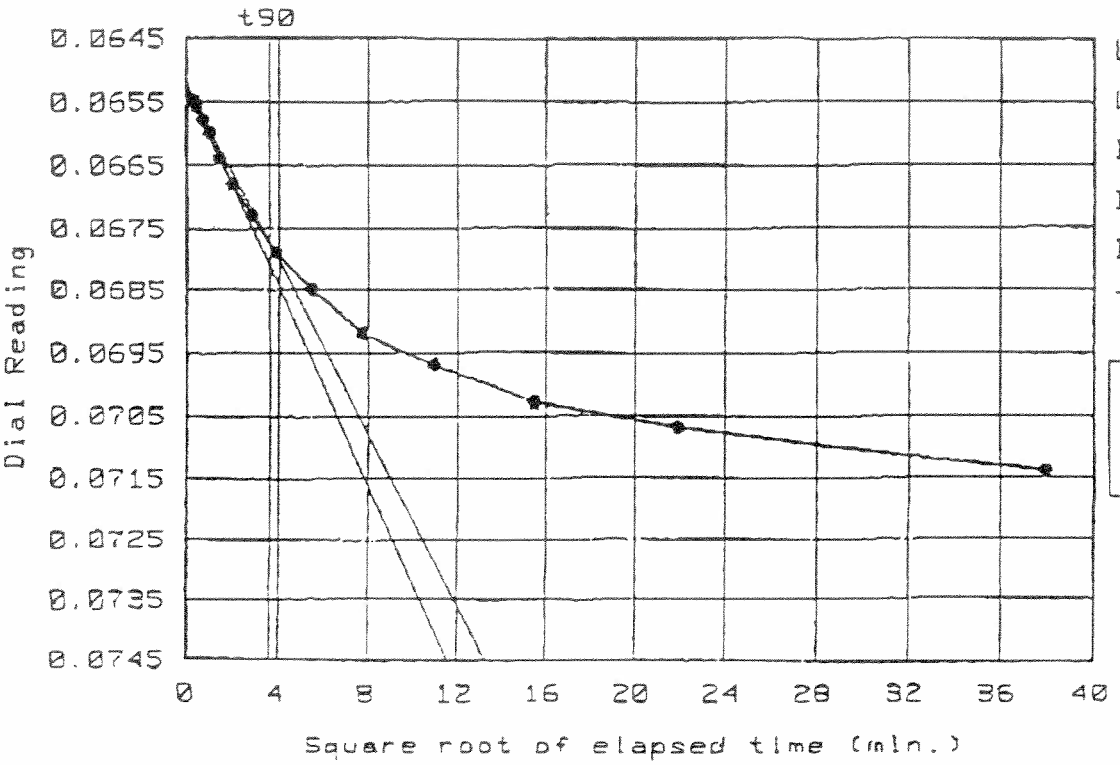
Dial Reading vs. Time

Project No.: 812-50351
Project: ALCOSAN
Location: TUBE NO. 269-1
21.0'-23.0'
Date: 7-30-1996



Load No.= 1
Load= 0.25 tsf
D_0 = 0.0291
D_{90} = 0.0616
D_{100}= 0.0652
T_{90}= 47.67 min.

C_v @ T_{90} = .004 $in.^2/min.$

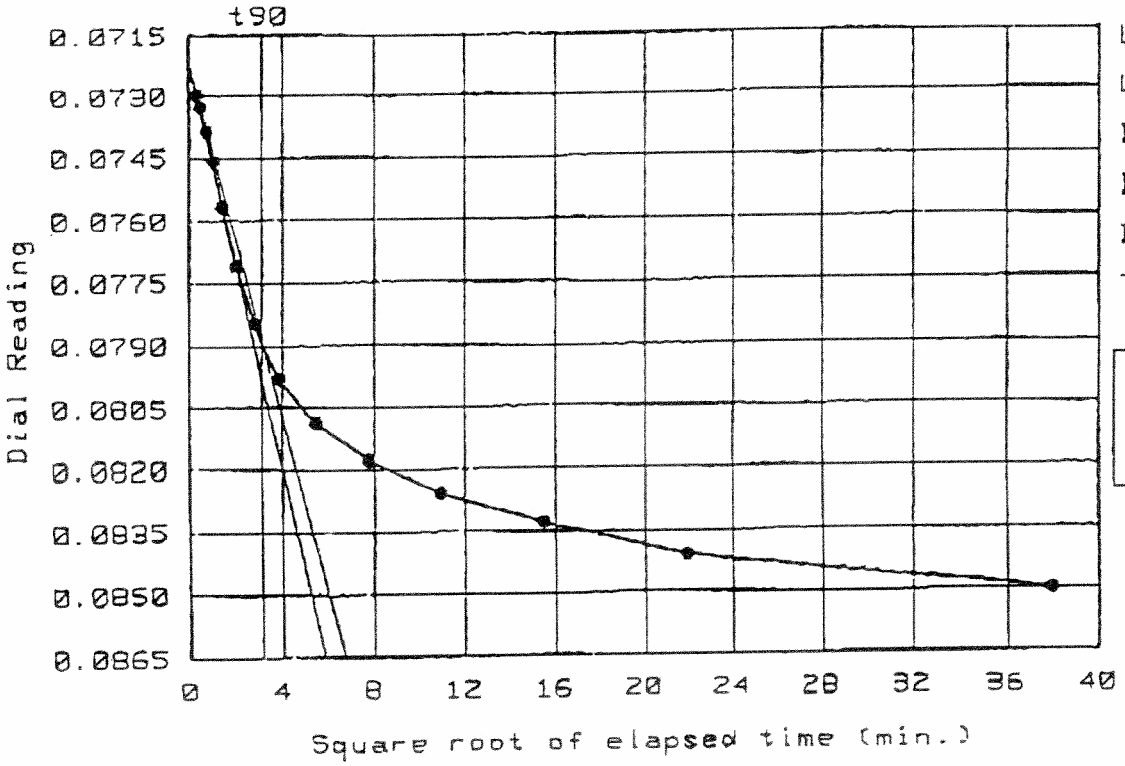


Load No.= 2
Load= 0.50 tsf
D_0 = 0.0652
D_{90} = 0.0677
D_{100}= 0.0680
T_{90}= 12.73 min.

C_v @ T_{90} = .015 $in.^2/min.$

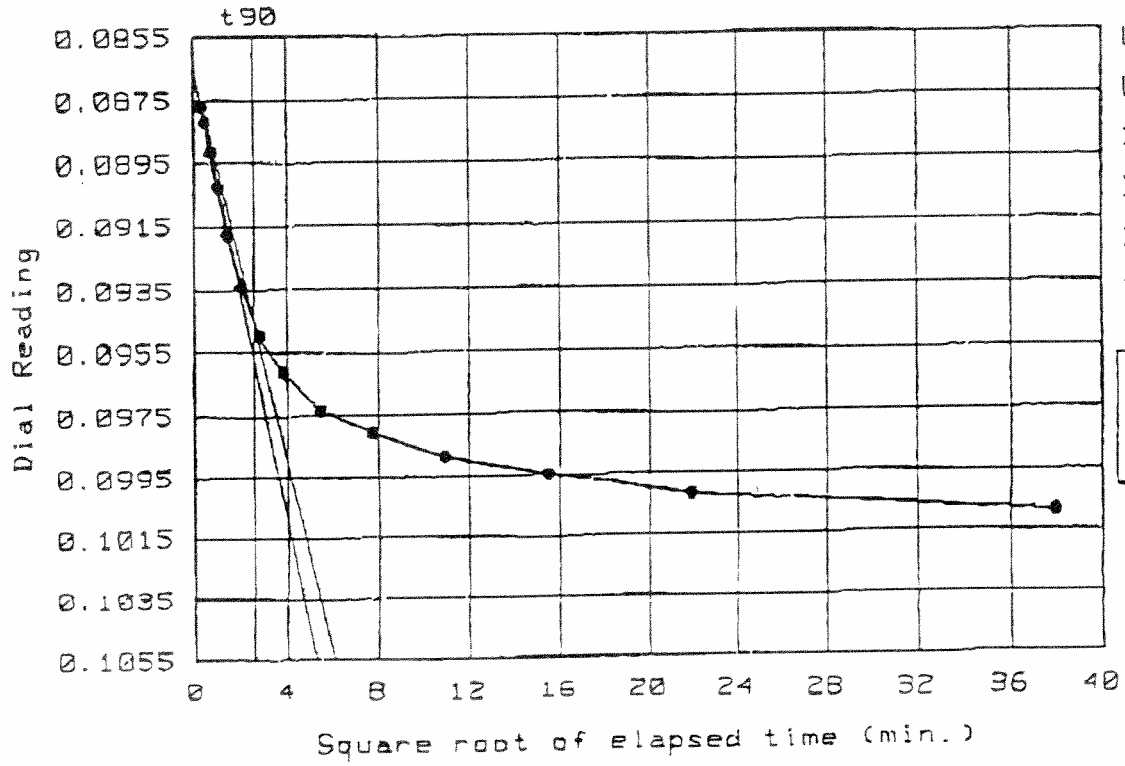
Dial Reading vs. Time

Project No.: 812-50351
Project: ALCOSAN
Location: TUBE NO. 269-1
21.0'-23.0'
Date: 7-30-1996



Load No.= 3
Load= 1.00 tsf
D_0 = 0.0722
D_{90} = 0.0789
D_{100} = 0.0796
T_{90} = 9.70 min.

C_v @ T_{90} = .020 $in.^2/min.$

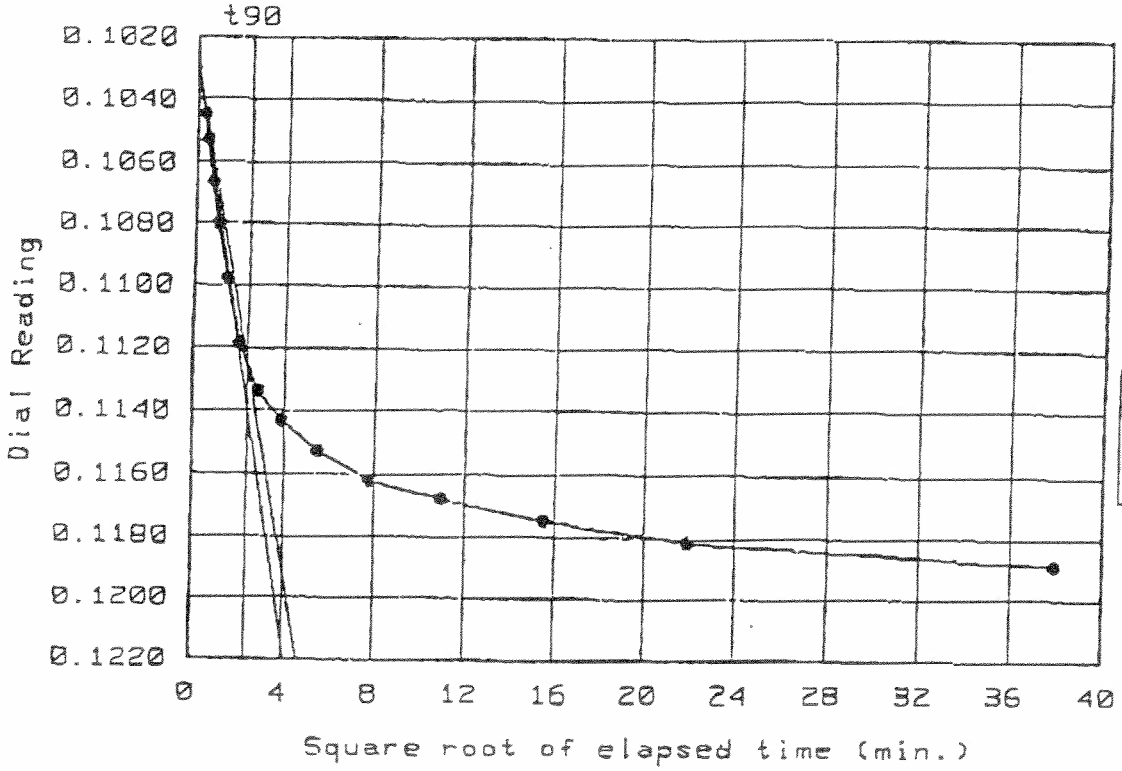


Load No.= 4
Load= 2.00 tsf
D_0 = 0.0866
D_{90} = 0.0944
D_{100} = 0.0953
T_{90} = 6.32 min.

C_v @ T_{90} = .029 $in.^2/min.$

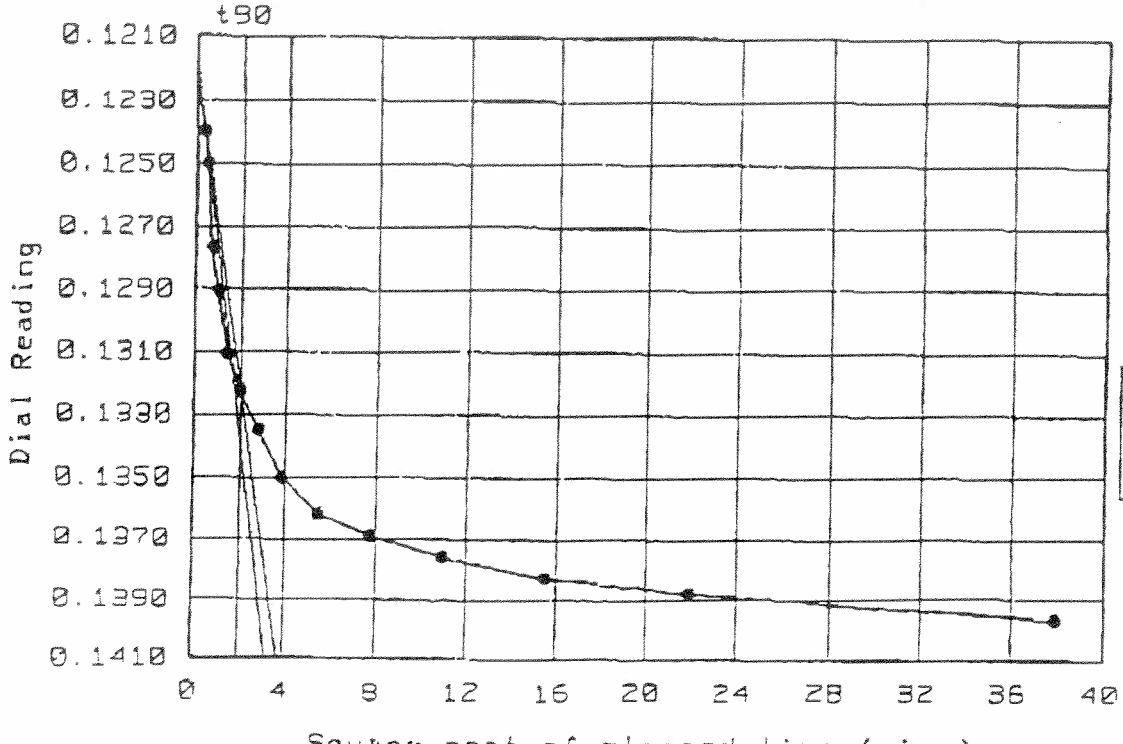
Dial Reading vs. Time

Project No.: 812-50351
Project: ALCOSAN
Location: TUBE NO. 269-1
21.0'-23.0'
Date: 7-30-1996



Load No.= 5
Load= 4.00 tsf
D_0 = 0.1030
D_{90} = 0.1126
D_{100} = 0.1136
T_{90} = 5.58 min.

C_v @ T_{90} = .032 $in.^2/min.$

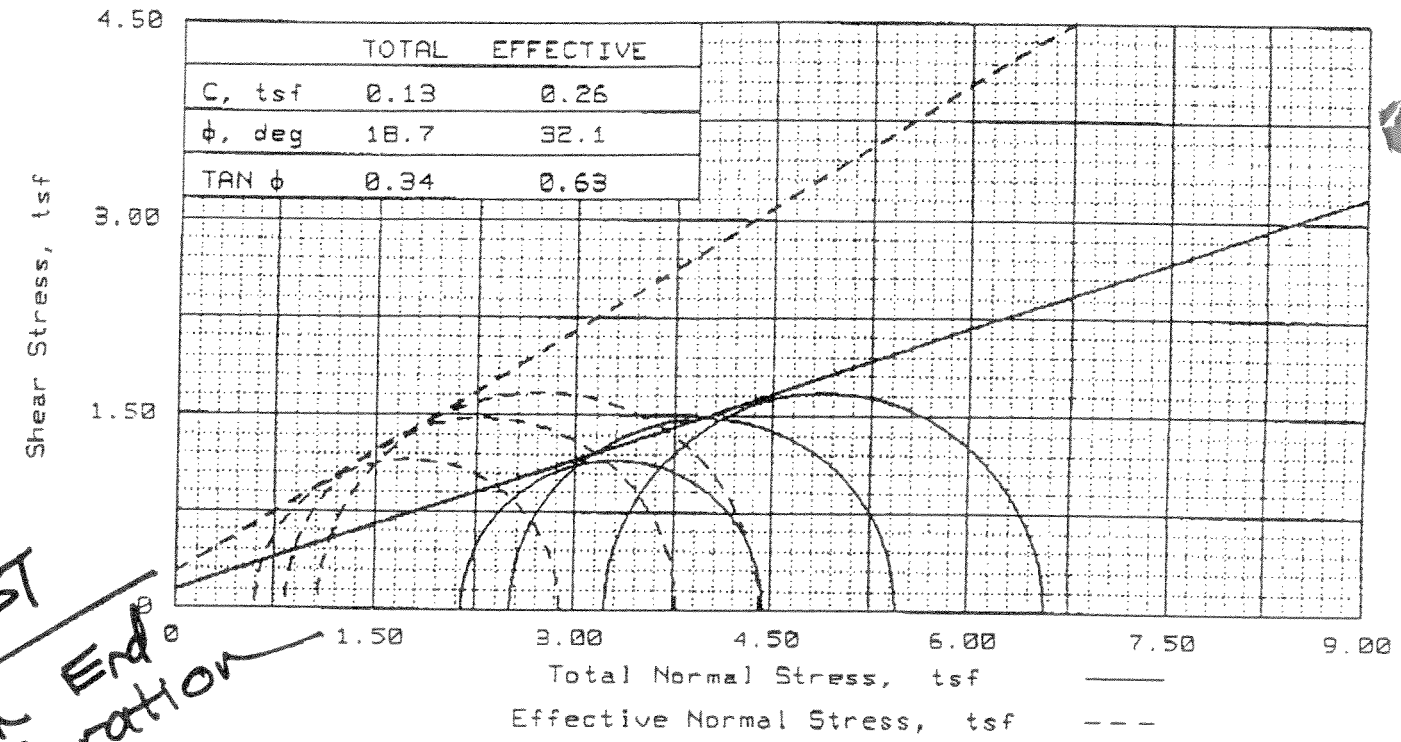


Load No.= 6
Load= 8.00 tsf
D_0 = 0.1222
D_{90} = 0.1323
D_{100} = 0.1335
T_{90} = 4.07 min.

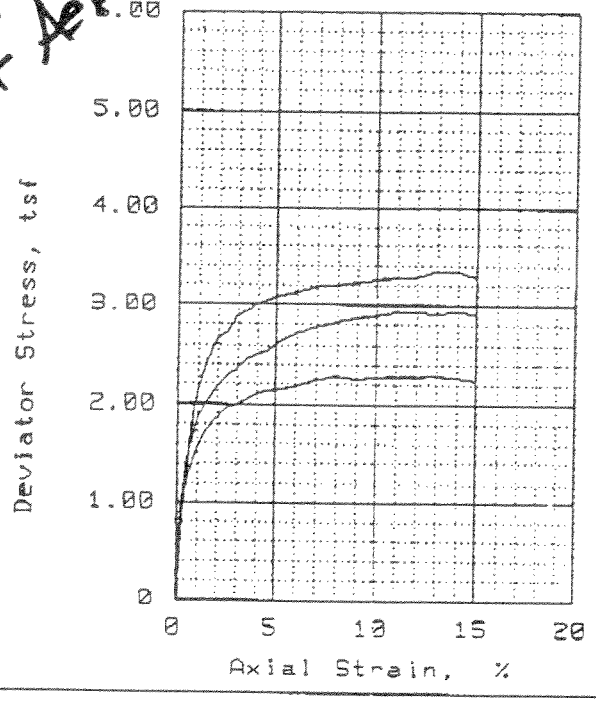
C_v @ T_{90} = .042 $in.^2/min.$

TRIAXIAL SHEAR TEST REPORTS

Professional Service Industries, Inc.
Pittsburgh, PA



RUST
North End
23' Aeration



SAMPLE NO.		1	2	3
INITIAL	WATER CONTENT, %	45.7	45.7	37.2
	DRY DENSITY, pcf	73.3	73.8	81.7
	SATURATION, %	98.3	99.5	98.4
	VOID RATIO	1.205	1.191	0.978
	DIAMETER, in	1.99	1.98	1.98
	HEIGHT, in	4.51	3.47	4.41
AT TEST	WATER CONTENT, %	41.0	36.4	31.9
	DRY DENSITY, pcf	80.0	86.3	90.0
	SATURATION, %	104.1	108.0	103.9
	VOID RATIO	1.021	0.874	0.796
	DIAMETER, in	1.93	1.88	1.92
	HEIGHT, in	4.38	3.29	4.27
BACK PRESSURE, tsf		1.80	1.80	1.80
CELL PRESSURE, tsf		3.96	4.32	5.04
FAILURE STRESS, tsf		2.29	2.94	3.34
PORE PRESSURE, tsf		3.35	3.48	3.96
STRAIN RATE, %/min.		0.096	0.113	0.096
ULTIMATE STRESS, tsf		2.28	2.93	3.34
PORE PRESSURE, tsf		3.35	3.48	3.96
$\bar{\sigma}_1$ FAILURE, tsf		2.90	3.78	4.42
$\bar{\sigma}_3$ FAILURE, tsf		0.61	0.84	1.08

TYPE OF TEST:
CU with pore pressures
SAMPLE TYPE: UNDISTURBED
DESCRIPTION: SILT WITH SAND

LL= 33 PL= 9 PI= 24.0
SPECIFIC GRAVITY= 2.59
REMARKS:

FIG. NO.

CLIENT: ALCOSAN

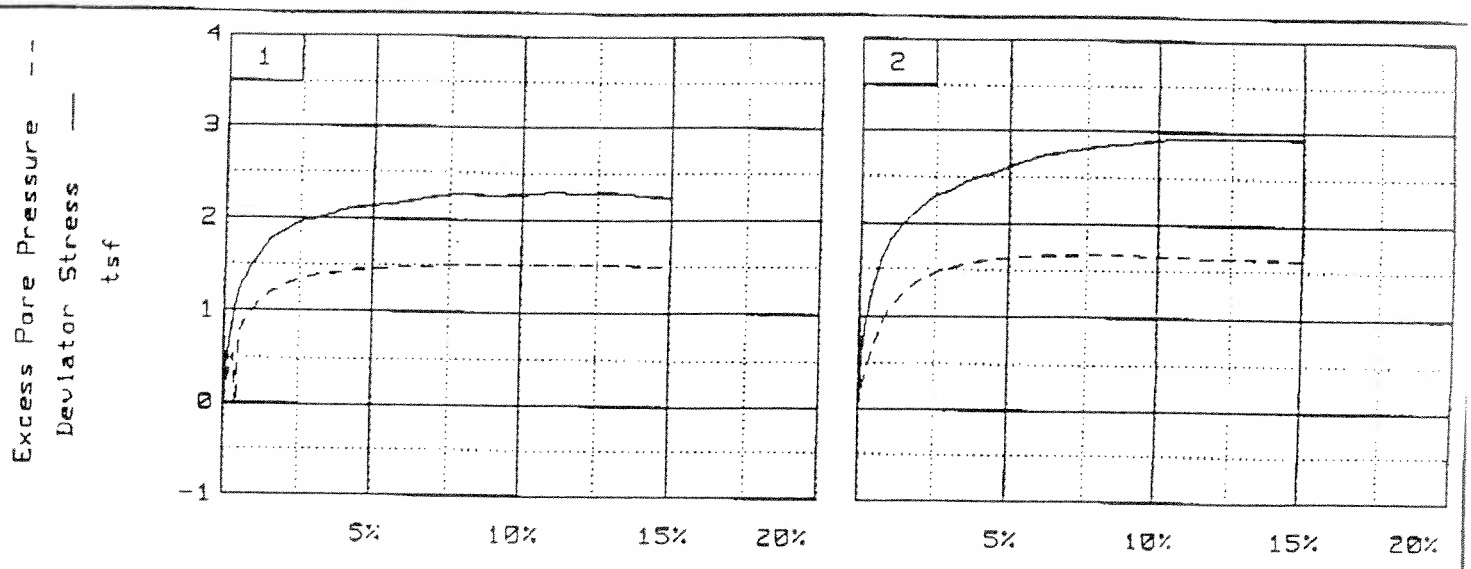
PROJECT:

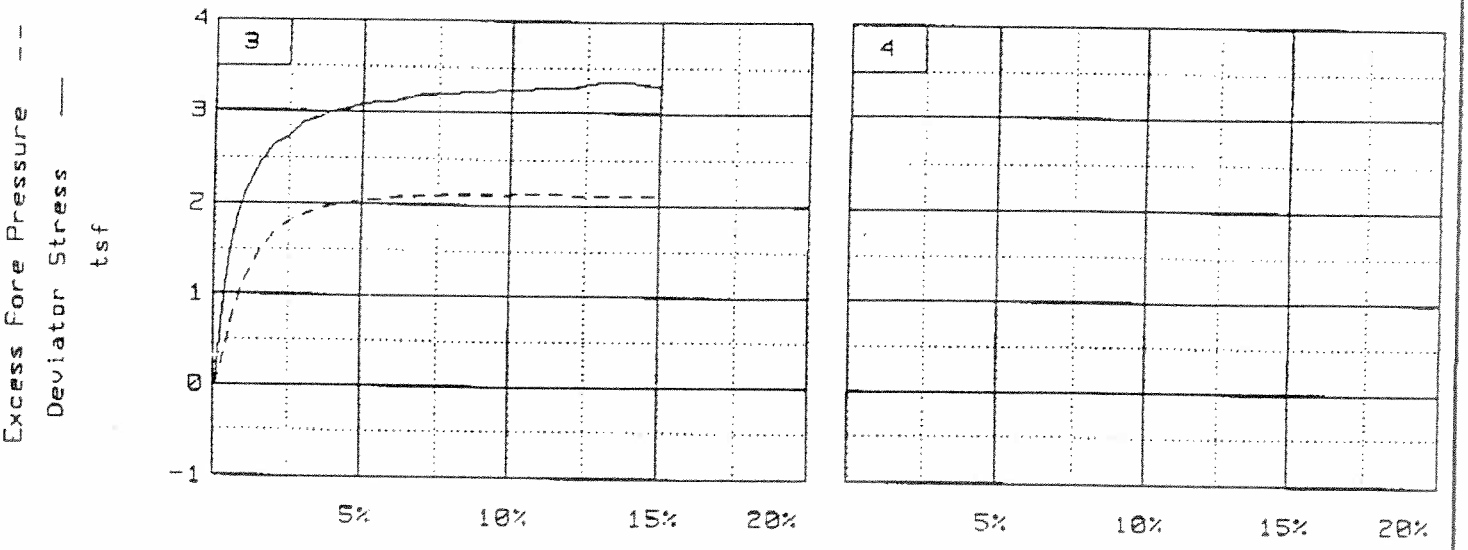
SAMPLE LOCATION: TUBE NO. 237, 25.0'-27.0'

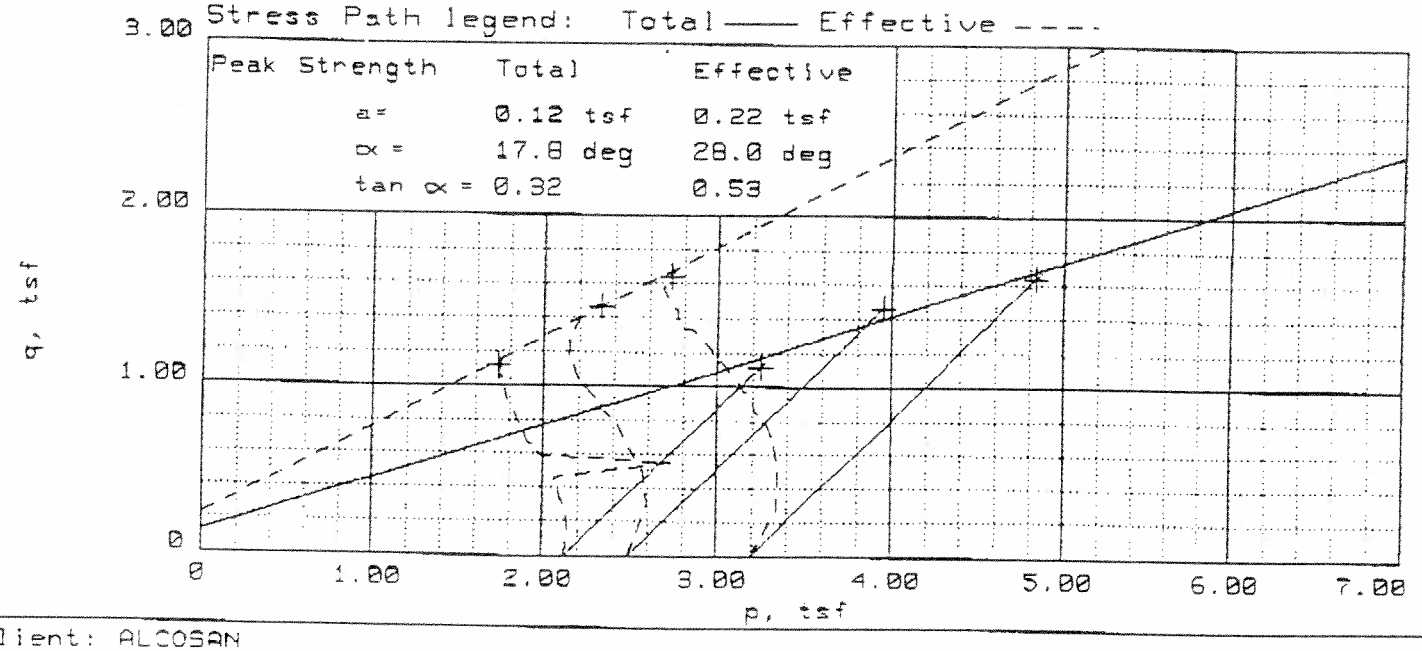
PROJ. NO.: 812-50351 DATE: 7-16-1996

TRIAXIAL COMPRESSION TEST

PSI, Inc.





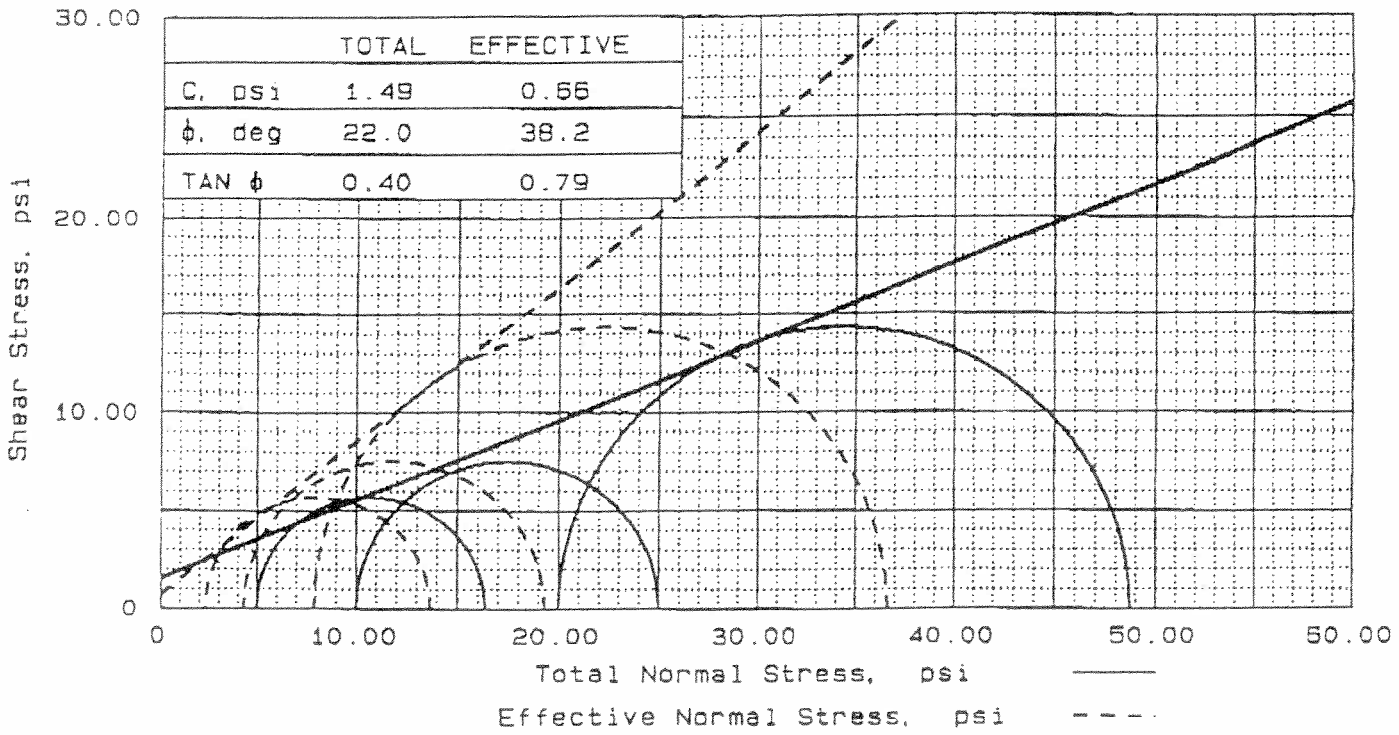


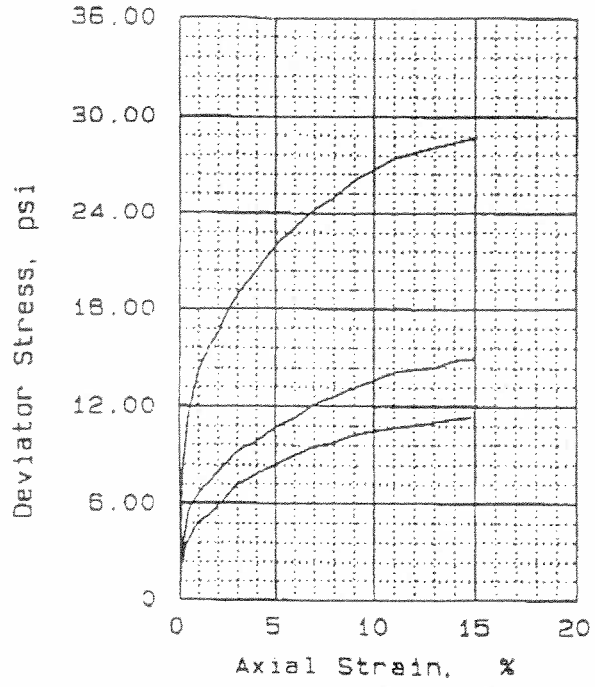
Client: ALCOSAN

Project:

Location: TUBE NO. 237, 25.0'-27.0'

File: ALCO-237 Project No.: 812-50351 Page 2/2 Fig. No. ____





SAMPLE NO.		1	2	3
INITIAL	WATER CONTENT, %	36.4	42.4	44.5
	DRY DENSITY, pcf	80.9	76.1	73.0
	SATURATION, %	92.3	95.6	93.1
	VOID RATIO	1.045	1.175	1.267
	DIAMETER, in	1.85	1.86	1.88
	HEIGHT, in	4.11	4.04	4.04
AT TEST	WATER CONTENT, %	36.3	39.6	37.8
	DRY DENSITY, pcf	84.4	80.8	82.6
	SATURATION, %	100.0	100.0	100.0
	VOID RATIO	0.961	1.048	1.002
	DIAMETER, in	1.82	1.81	1.78
	HEIGHT, in	4.08	3.99	3.98
Strain rate, %/min		0.500	0.500	0.500
BACK PRESSURE, psi		25.00	25.00	25.00
CELL PRESSURE, psi		30.00	35.00	45.00
FAILURE STRESS, psi		11.35	14.98	28.70
PORE PRESSURE, psi		27.70	30.70	37.10
ULTIMATE STRESS, psi		11.35	14.98	28.70
PORE PRESSURE, psi		27.70	30.70	37.10
$\bar{\sigma}_1$ FAILURE, psi		13.65	19.28	36.60
$\bar{\sigma}_3$ FAILURE, psi		2.3	4.3	7.9

TYPE OF TEST:
CU with pore pressures
SAMPLE TYPE: UNDISTURBED
DESCRIPTION:

LL= PL= PI=
SPECIFIC GRAVITY= 2.65
REMARKS:

FIG. NO.

CLIENT: ALCOSAN

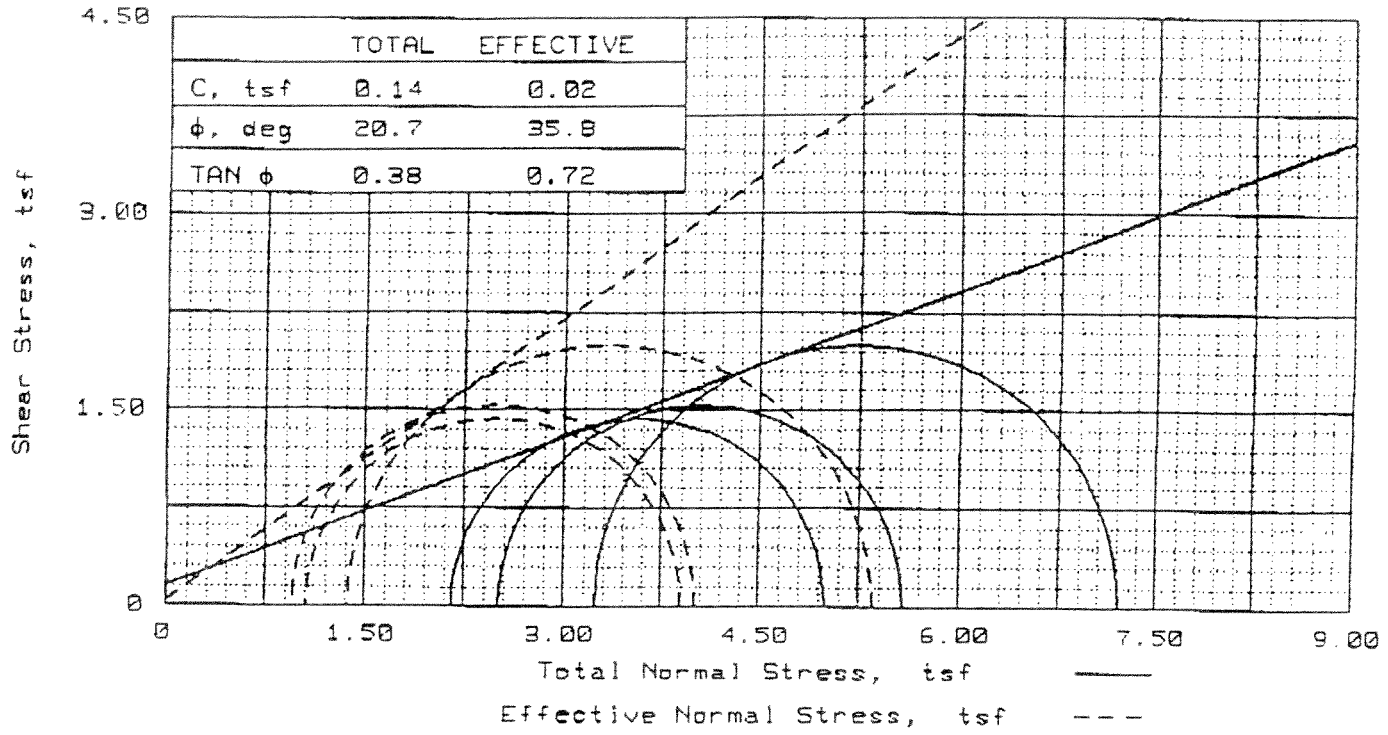
PROJECT: EPM

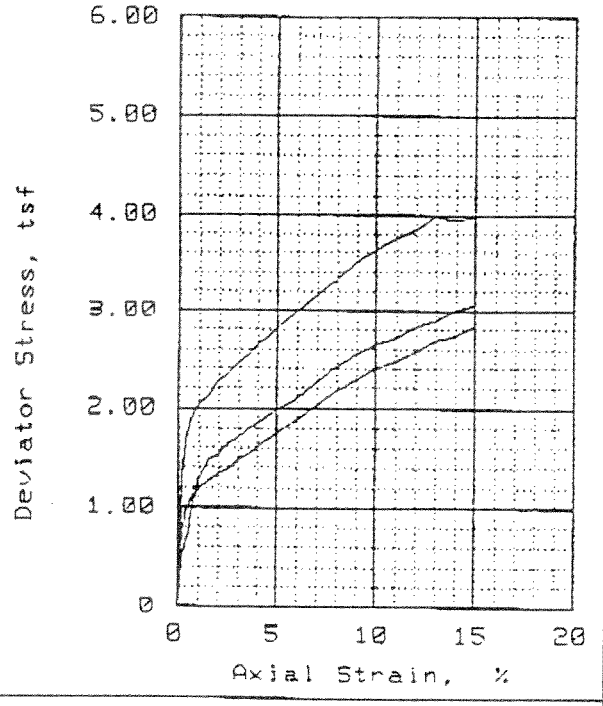
SAMPLE LOCATION: ST 265-1, 27.0'-29.0'

PROJ. NO.: 812-50351 DATE: 3-29-1996

TRIAXIAL SHEAR TEST REPORT

PSI, Inc.





SAMPLE NO.		1	2	3
INITIAL	WATER CONTENT, %	29.5	28.1	25.8
	DRY DENSITY, pcf	91.1	93.1	95.4
	SATURATION, %	95.9	95.8	93.2
	VOID RATIO	0.815	0.776	0.734
	DIAMETER, in	2.10	2.07	2.03
	HEIGHT, in	4.14	3.36	4.47
AT TEST	WATER CONTENT, %	20.4	19.8	19.3
	DRY DENSITY, pcf	98.0	106.8	103.3
	SATURATION, %	78.5	95.5	85.1
	VOID RATIO	0.689	0.548	0.602
	DIAMETER, in	2.05	1.98	1.97
	HEIGHT, in	4.04	3.21	4.35
BACK PRESSURE, tsf		2.88	2.88	2.88
CELL PRESSURE, tsf		5.04	5.40	6.12
FAILURE STRESS, tsf		2.84	3.06	3.98
PORE PRESSURE, tsf		3.97	4.44	4.74
STRAIN RATE, %/min.		0.098	0.114	0.088
ULTIMATE STRESS, tsf		2.84	3.06	3.98
PORE PRESSURE, tsf		3.97	4.44	4.74
$\bar{\sigma}_1$ FAILURE, tsf		3.91	4.02	5.35
$\bar{\sigma}_3$ FAILURE, tsf		1.07	0.96	1.38

TYPE OF TEST:
CU with pore pressures
SAMPLE TYPE: UNDISTURBED
DESCRIPTION: SANDY SILT

LL= -- PL= -- PI=
SPECIFIC GRAVITY= 2.65
REMARKS: SAMPLE WAS VERY SOFT, SOME DISTURBANCE UPON EXTRUSION AND MOUNTING IN CELL
FIG. NO.

CLIENT: ALCOSAN

PROJECT:

SAMPLE LOCATION: TUBE NO.269-1, 21.0-23.0'

PROJ. NO.: B12-50351 DATE: 7-26-96

TRIAXIAL COMPRESSION TEST

PSI, Inc.