REPORT NO. 3
CONTRACT NO. 3Z6248
(REPORT NO. 252, MRCE SERIES)
SECTIONS G4 AND G5, ADDISON ROUTE
PRELIMINARY SUBSURFACE INVESTIGATION

Washington Metropolitan Area Transit Authority
600 Fifth Street, NW
Washington, DC 20001

DeLeuw, Cather and Company
1550 Wilson Boulevard
Arlington, VA 22209

Mueser Rutledge Consulting Engineers
708 Third Avenue
New York, New York 10017

May 16, 2000

BIBLIOGRAPHIC DATA SHEET	1. Report No. MRCE-00-252	2.	3. Recipient's Accession No.

4. Title and Subtitle

Final Report
Preliminary Subsurface Investigation
Sections G4 and G5, Addison Route

5. Report Date May 16, 2000

6.

7. Author(s) Mueser Rutledge Consulting Engineers

8. Performing Organization Rept. No.

9. Performing Organization Name and Address

Mueser Rutledge Consulting Engineers
708 Third Avenue
New York, NY 10017

10. Project/Task/Work Unit No.

11. Contract/Grant No. 3Z6248

12. Sponsoring Organization Name and Address

Washington Metropolitan Area Transit Authority
Washington, DC 20001

13. Type of Report & Period Covered

14.

15. Supplementary Notes

Preliminary Report on June 16, 1998

16. Abstracts

Results are summarized herein of 14 supplementary borings and 6 test pits to investigate subsurface conditions along the subway alignment at the Large Town Center Station and at the parking lots of the Summerfield and Largo Town Center Stations. The report contains geological sections, logs of borings, results of laboratory tests on samples recovered, and text describing design and construction problems.

17. Key Words and Document Analysis. 17a. Descriptors

Urban Transportation
Mass Transportation
Urban Planning
Rock Mechanics
Soil Mechanics
Foundation Engineering

17b. Identifiers/Open-Ended Terms

Foundation Engineering

17c. COSATI Field/Group

18. Availability Statement

Release Unlimited

19. Security Class (This Report) UNCLASSIFIED

20. Security Class (This Page UNCLASSIFIED

21. No. of Pages

22. Price

Mueser Rutledge Consulting Engineers

708 Third Avenue • New York, NY 10017-4144
Tel: (212) 490-7110 • Fax: (212) 490-6654

May 16, 2000

Mr. Robert Feng
DeLeuw, Cather & Company
1550 Wilson Boulevard, Suite 300
Arlington, VA 22209

Re: Sections G4 and G5, Addison Route
Final Report
Preliminary Subsurface Investigation
MRCE File No. 8435A

Dear Mr. Feng:

In accordance with our schedule, we submit herewith three copies of this final report for the subsurface investigation of Sections G4 and G5 of Addison Route, covering the planned Largo Town Center Station, and parking lots for the Summerfield Station and Largo Town Center Stations. Ten copies of this report have been sent to WMATA under separate cover. A draft of this report was submitted on June 16, 1998. No comments were received on the draft report. We believe that this completes all of the planned preliminary geotechnical investigations for this portion of the Addison Route.

Very truly yours,

MUESER RUTLEDGE CONSULTING ENGINEERS

By: _____
Hugh S. Lacy

DWC:HSL:bee9170*LTR-1*

REPORT NO. 3
CONTRACT NO. 3Z6248
(REPORT NO. 252, MRCE SERIES)
SECTIONS G4 AND G5, ADDISON ROUTE
PRELIMINARY SUBSURFACE INVESTIGATION

EXHIBITS

Table No. 1	Survey Data for Borings (Sections G4 and G5 - Addison Route)
Table No. 2	Summary of Laboratory Test Data
Table No. 3	Summary of Rising and Falling Head Permeability Tests in Boreholes and Observation Wells (Section G- Addison Route)
Table No. 4	Representative Permeability Values
Table No. 5	Representative Permeability Values
Plate No. 1	Plasticity Chart-Strata P1, Es and Ec
Plate No. 2	Gradation Curves - Stratum Es
Plate No. 3	Gradation Curves - Stratum Es
Plate No. 4	Gradation Curves - Stratum Cs, Es and Ms
Plate No. 5	Summary of Strength Tests - Boring No. MR-43U
Plate No. 6	Summary of Strength Tests - Boring No. MR-43U and 45U
Plate No. 7	Summary of Strength Tests - Boring No. MR-45U
Plate No. 8	CBR Test Results
Plate No. 9	Compaction Diagram - Test Pits Nos TP-2, TP-3 & TP-6
Drawing No. SK-1	Topographic Survey of Site - 1957
Drawing No. SK-2	Topographic Survey of Site - 1971
Drawing No. SK-3	Topographic Survey of Site - 1993
Drawing No. F-1	Subsurface Investigation General Information Drawing
Drawing No. GPG-SO-151	Plan and Geological Section - Sta 626+00 to Sta 367+00
Drawing No. GPG-SO-290	Summerfield Station Parking Lot - Boring and Test Pit Location Plan
Drawing No. GPG-SO-300	Largo Town Center Station Parking Lot - Boring and Test Pit Location Plan
Drawing No. GPG-SO-310	Largo Town Center Station Parking Lot - Boring and Test Pit Location Plan
Drawing No. GPG-SO-320	Summerfield Station Parking Lot - Geological Sections A-A and B-B
Drawing No. GPG-SO-330	Summerfield and Largo Town Center Station Parking Lots- Geological Sections C-C and D-D
Drawing No. GPG-SO-340	Largo Town Center Station Parking Lot - Geological Sections E-E and F-F
Drawing No. GPG-SO-350	Largo Town Center Station Parking Lot- Geological Sections G-G, H-H, and J-J
Drawing No. GPG-SO-360	Logs of MR-Series Borings MR- 18 to MR-21
Drawing No. GPG-SO-370	Logs of MR- Series Borings MR- 22 to MR-26
Drawing No. GPG-SO-380	Logs of MR- Series Borings MR - 43U to MR- 47
Drawing No. GPG-SO-390	Logs of MR- Series Borings MR-Test Pits TP-1 to TP-6
Appendix	Corrosion Testing Results

REPORT NO. 3
CONTRACT NO. 3Z6248
(REPORT NO. 252, MRCE SERIES)
SECTIONS G4 AND G5, ADDISON ROUTE
PRELIMINARY SUBSURFACE INVESTIGATION

1.0 INTRODUCTION

1.1 Authorization

Contract No. 3Z6248 between DeLeuw Cather & Company (DCCo) and Mueser Rutledge Consulting Engineers (MRCE) provides for subsurface investigations, laboratory testing and summary reports relating to certain sections of the Rapid Transit system. One portion of that report covers the making of 14 borings and six test pits as part of Phase II of preliminary subsurface investigation to provide geotechnical information in connection with the preparation of general plan drawings and preliminary design at 30% level. Three of the borings were drilled along the alignment of Largo Town Center station. The remaining 11 borings were drilled and six test pits were excavated at the planned locations of the Summerfield Station and Largo Town Center Station parking lots.

The following MRCE reports contain exploratory data obtained previously in Addison Route or information relevant to this section:

1. Final Report, Subsurface Investigation, Addison Route, Station 290 (G002) to 488 (G003), dated November, 1973 (MRWJ Series Report No. 95).

2. Supplementary Subsurface Investigation, Addison Route Section G003, dated November 22, 1974 (MRWJ Series Report No. 118).

3. Report on Pumping Test, Addison Route Section G003, dated July 7, 1975 (MRWJ Series Report No. 135).

4. Preliminary Subsurface Investigation, G-Route Addison Road to Largo Town Center, dated November 14, 1996 (MRCE Series Report No. 249).

1.2 Scope of Work

The scope of work comprises the subsurface investigation for the planned Largo Town Center Station, and parking lots for Summerfield and Largo Town Center Stations. The completed field work consists of a group of 14 borings and six test pits along the subway alignment and parking lots. A previous investigation along the subway alignment was performed in 1996 and the results published in MRCE Series Report No. 249. Borings Nos. MR-43U, MR-44 and MR-45U were drilled at the location of the planned Largo Town Center Station. Borings Nos. MR-18 through MR-

22 and Test Pits Nos. TP-1 and TP-2 were made in the Summerfield Station parking lot, and Borings Nos. MR-23 through MR-26, MR-46, MR-47 and Test Pits Nos. TP-3 through TP-6 were made in the Largo Town Center Station parking lot. Planned Boring No. MR-7 was deleted from the program because we were unable to obtain permission to access the site.

Boring operations commenced on March 30, 1998 following WMATA authorization to proceed, and the borings were completed on April 29, 1998. The test pits were excavated and backfilled on May 7, 1998. All borings were made by GeoServices Corporation under subcontract to Geotech Engineers Inc. and were inspected and logged by GeoServices. All test pits were made under subcontract to Geotech Engineers, Inc. and were inspected and logged by Geotech Engineers, Inc. An MRCE representative was present on a part time basis at the site during the borings and test pit operations to insure that the work was performed in accordance with Metro standards. The boreholes were made by conventional soil boring methods utilizing a tricone roller bit with the aid of casing and water to advance the hole. The test pits were excavated with a backhoe loader. Observation wells were installed in ten of the borings for continuing measurement of the groundwater levels. All borings with the exception of those containing observation wells were grouted at completion. All test pits were excavated and backfilled the same day. Corrosion tests on soil samples recovered from selected borings were performed by ARTECH Testing, LLC of Chantilly, VA under subcontract to Geotech Engineers, Inc. The results of these tests are included in the Appendix to this report.

All soil samples recovered from borings and test pits were transported to our New York City laboratory for examination, check of field classifications and performance of identification testing and engineering properties tests. Soil samples remaining after laboratory testing was completed were returned to Washington, DC and placed in the designated storage facility.

2.0 TEST BORING AND LABORATORY PROGRAM

2.1 Presentation of Boring Data

Locations of all 14 borings and six test pits are shown on Drawings Nos. GPG-SO-151, GPG-SO-290 and GPG-SO-310. Locations of the geological sections, as well as the general configuration of the Summerfield and Largo Town Center Stations and their corresponding parking lots are also shown on these drawings. Information from the completed borings of Largo Town Center Station as well as earlier borings is plotted in one geological section along the outbound track and is presented on Drawing No. GPG-SO-151. This drawing was originally presented in MRCE Series Report No. 249, dated November 9, 1996 and has been revised to incorporate data from current Borings Nos. MR-43U, MR-44 and MR-45U. Nine geological sections, Nos. A-A through J-J through the stations parking lots are presented on Drawings Nos. GPG-SO-320, GPG-SO-330, GPG-SO-340 and GPG-SO-350. All geological sections are drawn to scale distortion of one to four.

Soil data plotted on the geological sections include sample number designation and position, standard sample penetration resistance, Unified Soil Classification, water contents of fine grained soils, Atterberg Limits and shear strength in ksf. Also shown on the sections are the results of grain size tests on representative soil samples from the borings and test pits, giving the percentage by weight of particles passing the Nos. 200 and 40 sieves and of the gravel retained upon the No. 4 sieve. The legend explaining these test symbols is shown on the bottom of Drawing No. GPG-SO-320.

Final logs of the 14 borings and six test pits are presented on four Drawings Nos. GPG-SO-360 through GPG-SO-390. These logs are based on laboratory examinations of soil samples and identification testing, and they may differ in detailed interpretations from the driller's logs.

Coordinate locations and ground surface elevations of the borings and test pits are listed in Table No. 1. General Information Drawing No. F-1 presents notes and legend applicable to both the geological sections and boring log drawings. This drawing also summarizes the sequence of the principal subsurface strata with their general descriptions. The general strata descriptions of soils encountered in this design section are presented on the upper right corner of Drawing No. GPG-SO-320.

2.2 Laboratory Testing Program

Three- inch undisturbed samples were recovered by pushing thin Shelby tubes. Accepted samples were transported to our New York City laboratory for testing of engineering properties. Those tests comprised determination of shear strength by unconsolidated-undrained triaxial shear tests. In addition, Atterberg limit tests and grain size determinations were performed. The results of these tests are listed in Table No. 2, Summary of Laboratory Test Data. All split spoon samples were examined in the laboratory, classifications were checked and water content determined for clayey soils. Results of the plasticity tests are plotted on Plate No. 1. A total of 13 grain size determinations were performed on Tertiary soils of Strata Cs and Es and upper Cretaceous soils of Monmouth formation of Stratum Ms. Results are plotted on Plates Nos. 2 through 4. Eleven unconsolidated-undrained triaxial shear tests were performed on Tertiary soils of Stratum Es and Upper Cretaceous of Stratum Ms. Results of ten tests are presented on Plates Nos. 5 through 7. Three CBR tests were performed on materials of Aquia formation of Stratum Es. Results are presented on Plates Nos. 8 and 9.

2.3 Field Permeability Tests

Ten falling head permeability tests were performed in the borings with observation wells, and two falling head permeability tests were performed in the open borehole of Boring No. MR-22. Results are plotted in Table No. 3, which gives basic information on the circumstances of the test, stratum tested, and an average computed coefficient of permeability. The highest computed permeability

value is equal to 1.1×10^{-4} feet per minute in materials of Stratum Es. Because of muddy conditions in the borehole and in filter material of observation wells, the resulting values of estimated permeability tend to be lower than actual. They are not comparable in reliability to field pumping test results. Table No. 4 lists generalized coefficients of permeabilities of Pleistocene Terrace and Cretaceous soils based on full-scale, deep well pumping tests in earlier WMATA studies. Table No. 5 lists generalized coefficients of permeability of Tertiary and upper Cretaceous strata extrapolated from full-scale pumping tests on Pleistocene and Terrace soils based on a comparison of identification properties. The values on these two tables chiefly reflect the horizontal coefficients because of the flow conditions to the test wells. They are regarded as more realistic values than those given by the small scale tests in the individual boreholes.

2.4 Potential Corrosion Characteristics

Tests relating to potential corrosion characteristics included pH, resistivity, chlorides, sulfates, and total sulfur. Results of that testing are presented in the appendix to this report. Test on soil samples from Borings Nos. MR-18, MR-19, and MR-20 exhibited highly acidic pH values, and soil samples from Borings Nos. MR-43U and MR-44 exhibited total sulfur in excess of 500 ppm.

2.5 Groundwater Conditions

Water levels measured in observation wells installed in earlier borings and borings made for this investigation are indicated on the geological sections by a solid triangle symbol for the current borings and by an open triangle symbol for the earlier borings. An average water table position estimated from this group of readings is indicated by a dashed line on the geological sections. In general, the groundwater level is a subdued reflection of the ground surface. The groundwater level in the Summerfield Station parking lot rises from the east from about Elev. 185 in the vicinity of Summerfield Boulevard to about Elev. 205 near Boring No. MR-21. The groundwater level in the Largo Town Center Station parking lot rises to the north from about Elev. 130 in the vicinity of Boring No. MR-46 to about Elev. 165 near Arena Drive.

3.0 SUBSURFACE CONDITIONS

3.1 Subsoil Stratification

The subsoil stratification for the Addison Route comprising the entire subway alignment between stations 485+00 to 651+70.55 was summarized in MRCE Series Report No. 249, dated November 14, 1996. The principal materials encountered at the site of the planned Largo Town Center Station and parking lots for the Summerfield and Largo Town Center Stations comprise man-made fills, Tertiary Marine deposits of Calvert sands and clays of Strata Cs and Cc, Aquia sands and clays of Strata Es and Ec, upper Cretaceous Monmouth sands and clays of Strata Ms and Mc and Cretaceous clays and sands of Strata P1 and P2.

3.1.1 Stratum F-Fill Drawings Nos. SK-1, SK-2 and SK-3 show the existing ground surface at the site, in the years 1957, 1971, and 1993, respectively. These drawings indicate that very little fill has been added at the site, except in the northern portion of the Largo Town Center Station parking lot where up to about 23 feet of fill has been added. The fill is generally loose to medium compact sands and silts and medium to very stiff clays that are difficult to distinguish from the underlying soils from which they are derived, except where artificial materials are added. The thickness of fill generally varies between two and five feet except in the areas centered on Borings Nos. MR-43U and MR-46 where the fill ranges between about 18 and 23 feet.

3.1.2 Stratum Cc (Calvert) Plastic Clay, Silty and Sandy Clay or Clayey Silt This is a medium to stiff dark gray, green, brown, and yellow orange plastic clay, silty and sandy clay or clayey silt, trace fine sand, gravel. The Calvert is a Tertiary marine deposit laid down under changing depositional conditions. This clay was encountered only in Boring No. MR-14, located west of the Summerfield Station. The Calvert clays are substantially overconsolidated to stresses of 7 to 12 tsf and shear strength increases with depth from about 1.5 to 2.5 ksf.

3.1.3 Stratum Cs (Calvert) Fine Sand, Trace to some Silty Clay and Silty or Clayey Fine Sand Stratum Cs consists of loose to medium compact dark gray, olive gray, green brown and yellow orange fine sand, trace to some silt, clay and silty or clayey fine sand, trace gravel. This stratum was encountered in Borings Nos. MR-14, MR-15U and MR-21 overlying the Es sands. Standard penetration test resistance is in the range of 5 to 16 blows per foot. The low blow count is apparently due to sampling techniques and does not represent a variation in the density of the stratum. Although the stratum is rated as loose to medium compact based on the standard penetration resistance recorded in the borings, the actual consistency can be classified as medium compact.

3.1.4 Stratum Ec (Aquia) Plastic to Silty and Sandy Clay or Clayey Silt This stratum consists of medium to stiff gray, green, olive gray plastic clay to silty and sandy clay or clayey silt, trace lignite with occasional slightly organic fine sandy and silty clay layers, trace shells. This is the oldest of the Tertiary marine sediments and it was encountered in Borings Nos. MR-16U, MR-19 and MR-25 at the Summerfield Station structure and parking lot, and in Boring No. MR-48U located near the east end of the Largo Town Center Station platform. The clay is preconsolidated in the range of 7 to 8 tsf, and shear strengths increase with depth from about 2 to 3.5 ksf.

3.1.5 Stratum Es (Aquia) Silty and Clayey Fine Sand This stratum consists of loose to medium compact green, olive gray silty and clayey fine sand, trace shells, mica with occasional slightly organic silty and clayey fine sand layers. This stratum was encountered throughout Summerfield and Largo Town Center Stations and their parking lots, overlying the Monmouth formation of Stratum Ms. Standard penetration resistance apparently is low due to sampling techniques, and does not represent a true variation in consistency. Although the stratum is rated as loose to medium compact based on the standard penetration resistance recorded in the borings, the actual consistency can be classified as medium compact based on the results of strength tests on undisturbed samples of Es sands, conducted for earlier WMATA investigations.

3.1.6 Stratum Mc (Monmouth) Slightly Organic Fine Sandy Silt and Clayey Silt This material comprises loose to very compact dark green slightly organic micaceous fine sandy silt, and very stiff to hard clayey silt, trace shells, occasionally cemented. This stratum belongs to the upper Cretaceous deposits and it was found in Boring No. MR-16U at the Summerfield Station, and in Borings Nos. MR-43U, MR-44 and MR-45U located at and west of the Largo Town Center Station. This formation is heavily preconsolidated in excess of 10 tsf. Shear strengths generally range between 3 and 3.5 ksf based on tests performed earlier for other WMATA design sections.

3.1.7 Stratum Ms (Monmouth) Slightly Organic Micaceous Silt, Fine Sand and Clayey Fine Sand This stratum consists of loose to very compact dark green slightly organic micaceous silty fine sand, trace clay and clayey fine sand, trace to some shells, occasionally cemented, and with cemented sand layers. This sandy material is present east of Station 492 and it is continuous until the end of the alignment at Station 632 and overlies the Cretaceous deposits. Standard penetration resistance is generally between 10 and 30 blows per foot, and in a few instances exceeds 100 blows per foot, reflecting the presence of cemented shell and cemented sand pockets and lenses.

Although the Monmouth formation of Strata Mc and Ms is classified as loose to very compact based on the standard penetration resistance, the actual consistency can be classified as medium to very compact, based on results of strength tests and its high degree of preconsolidation and significant cementation.

3.1.8 Stratum P1 (Cretaceous) Plastic Clay Primarily stiff to hard red-brown and gray or light gray plastic clay, silty clay, CH or CL by the Unified Soil Classification System. This stratum is present generally below about Elev. 110 underlying the Monmouth formation. It was found in deep Borings Nos. MR-40 through MR-45. The distinctive characteristics of these mottled red-brown and gray clays is that they are frequently fissured or slickensided. Shear strengths of intact samples tested generally ranged between 3 and 7 ksf. This stratum is not continuous throughout the alignment and it is frequently interlayered with materials of Strata P1 (CL) and P2.

3.1.9 Stratum P1 (CL) (Cretaceous) Sandy Clay Stiff to hard gray silty or sandy clay, with some fine sand layers, trace to some cemented sand and lignite fragments. Shear strengths have a narrower range than the plastic clays of Stratum P1 since slickensides are not particularly numerous. This stratum is frequently interlayered with plastic clays of Stratum P1, and sands of Stratum P2.

3.1.10 Stratum P2 (Cretaceous) Silty or Clayey Sand The P2 stratum consists of compact to very compact, light gray, brown or tan fine to medium sand, some clay, silt or clayey fine to medium sand, trace cemented sand layers, gravel, lignite. It is interlayered with materials of Strata P1 (CL) and P2 (SP-SM).

4.0 SUMMARY OF DESIGN AND CONSTRUCTION PROBLEMS

4.1 Largo Town Center Station

Location of the Largo Town Center Station is shown in geological section on Drawing No. GPG-SO-151. Subsurface conditions consist of a layer of fill ranging in thickness between about five and 18 feet thick overlying in order of depth, Aquia sands and clays of Strata Es and Ec, Monmouth sands and clays of strata Ms and Mc and Cretaceous clays and sands of Strata P1, P1(CL), and P2. The groundwater level is a subdued reflection of the ground surface, ranging between about Elev. 127 and Elev. 158. Because of the presence of a relatively thick layer of loose to medium fill, spread bearing foundations on new embankment for support of the station structure are not indicated; therefore, pile support of the station appears necessary.

Piles of up to 70 ton capacity could consist of steel H-piles, closed-end pipe or precast concrete piles. We estimate 70 ton pile penetrations below the top of the Monmouth formation of Stratum Ms of about 15 to 20 feet for pipe piles and precast concrete piles and about five to ten feet deeper for H-piles. Fills of up to 13 to 14 feet will be required at the western end of the station. Pile design should include an analysis of the potential downdrag created by these fills.

4.2 Summerfield Station Parking Lot

General configuration of the planned parking lot and borings and test pits in the area are depicted on the general location plan on Drawing No. GPG-SO-290. Geological Sections Nos. A-A and B-B are presented on Drawing No. GPG-SO-320, and Geological Section C-C is shown on Drawing No. GPG-SO-330. Subsurface conditions consist of a relatively thin layer of fill averaging five feet thick overlying in order of depth, Calvert sands of Strata Cs, Aquia sands and clays of Strata Es and Ec followed by Monmouth sands and clays of Strata Ms and Mc. The groundwater level is about one to five feet below existing ground surface. Subgrade will be primarily on a new fill and in certain localized areas will be on a shallow cut. Fill heights are generally less than 6 feet, with a maximum of 10 feet in the northeastern portion of the lot.

In cut areas, the surface of the existing materials should be throughly proofrolled before placing the pavement base. In fill areas, the unsuitable materials should be removed from the existing ground surface, and the areas proofrolled before placing the controlled fill. The new fill should consist of "materials for embankment fill" meeting WMATA specifications, Section 204, Article 2.1A. For the sake of uniformity, a CBR of 7 can be used for the design of the flexible pavement in cut and fill areas even though a CBR equal to ten was obtained in the laboratory test on Aquia sands of Stratum Es recovered in Test Pit No. TP-2.

4.3. Largo Town Center Station Parking Lot

General configuration of the planned parking lot and borings and test pits in the area are shown on the general location plans on Drawings Nos. GPG-SO-300 and GPG-SO-310. A group of six geological sections Nos. D-D through J-J depict the subsurface conditions through the parking lot. Geological Section D-D is presented on the bottom panel of Drawing No. GPG-SO-330. Geological Sections Nos. E-E and F-F are depicted on Drawing No. GPG-SO-340 and Geological Sections Nos.

G-G through J-J on Drawing No. GPG-SO-350. Subsurface conditions consist of a layer fill ranging in thickness roughly between two feet and 23 feet as disclosed by Boring No. MR-46. The fill thickness appears to increase from east to west. The fill overlies in order of depth Aquia sands and clays of Strata Es and Ec, Monmouth sands and clays of Strata Ms and Mc followed by Cretaceous clays and sands of Strata P1, P1(CL) and P2. The groundwater level is in general between two and fifteen feet below the ground surface. As shown on the plan on Drawing No. GPG-SO-300, a stream is present the northern limit of the western parking lot which would have to be piped prior to the construction of the parking lot.

Subgrade of the lot will be primarily on a new controlled fill of up to 12 feet in thickness, with exception of localized areas that will be in cut. Proposed grades in the northeast parking lot are not well defined at this time, but fills in this area could reach 20 feet. This will require a retaining wall around three sides of the parking lot. In fill areas, the unsuitable materials and old pavement should be removed from the existing ground surface, including the material from an undercut of about five feet of loose fill in the general area of Boring No. MR-46, and the old stream, and then the area proofrolled before placing the controlled fill. The new fill should consist of "materials for embankment fill" meeting WMATA Specifications, Section 204, Article 2.1.A. A CBR of 7 for the controlled fill can be used for the design of the flexible pavement in cut and fill areas. CBR tests were performed in the laboratory on representative samples of Aquia sands of Stratum Es recovered from Test Pit Nos. 3 and 6 at about two feet below the existing ground surface. The results of the tests disclosed a CBR equal to 10 and 14 . Because most of the parking lot area will be on a new controlled fill, the use of CBR of 7 for the entire lot is justified.

TABLE NO. 1, SURVEY DATA FOR BORINGS (SECTIONS G4 AND G5 - ADDISON ROUTE)

BORING NUMBER	HORIZONTAL CONTROL COORDINATES:		VERTICAL CONTROL: GROUND SURFACE ELEVATION (FT)	STATUS OF OBSERVATION WELLS		
	NORTH	EAST		INSTALLED	TYPE	PRESENT CONDITION
MR-7	DELETED					
MR-18	446,505	1,349,554	206.8	04-23-98	1-1/2"	F
MR-19	446,694	1,349,954	197.9	04-27-98	1-1/2"	F
MR-20	446,107	1,349,742	208.5	04-24-98	1-1/2"	F
MR-21	446,076	1,350,060	210.4	04-29-98	1-1/2"	F
MR-22	446,505	1,350,228	195.0	04-28-98	1-1/2"	F
MR-23	449,018	1,356,475	152.5			
MR-24	449,207	1,356,769	155.0	04-06-98	1-1/2"	F
MR-25	450,098	1,357,155	149.4	04-22-98	1-1/2"	F
MR-26	450,518	1,356,911	173.1			
MR-43U	449,735	1,356,380	145.4	04-21-98	1-1/2"	F
MR-44	449,946	1,356,499	149.8			
MR-45U	450,179	1,356,606	158.4			
MR-46	449,326	1,355,858	142.4	04-06-98	1-1/2"	F
MR-47	448,841	1,356,125	147.4	04-03-98	1-1/2"	F
TP-1	446,463	1,349,777	204.8			
TP-2	446,294	1,349,888	203.0			
TP-3	449,326	1,356,507	146.5			
TP-4	449,737	1,356,898	145.4			

TABLE NO. 1, SURVEY DATA FOR BORINGS (SECTIONS G4 AND G5 - ADDISON ROUTE - CONT'D)

BORING NUMBER	HORIZONTAL CONTROL COORDINATES:		VERTICAL CONTROL: GROUND SURFACE	STATUS OF OBSERVATION WELLS		
	NORTH	EAST	ELEVATION (FT)	INSTALLED	TYPE	PRESENT CONDITION
TP-5	449,980	1,356,671	152.5			
TP-6	450,361	1,357,000	162.1			

LEGEND

F - Indicates observation well functioning in 1998.

TABLE NO. 2

SUMMARY OF LABORATORY TEST DATA

SAMPLE IDENTIFICATION				CLASSIFICATION PROPERTIES									PHYSICAL PROPERTIES													
										UNIFIED SOIL CLASSIFICATION SYSTEM			STRENGTH								CONSOLIDATION					
													UNCONFINED COMPRESSION			TRIAXIAL COMPRESSION										
BORING NUMBER	SAMPLE NUMBER	DEPTH FT.	STRATUM DESIGNATION	NATURAL WATER CONTENT % (W) AVERAGE OF ENTIRE SAMPLE	LIQUID LIMIT (W_L)	PLASTICITY INDEX (Ip)	NATURAL WATER CONTENT OF LIMIT SAMPLE, Wn,%	SPECIFIC GRAVITY OF SOLIDS (G_s)	DRY DENSITY, PCF	SOIL TYPE	% SAND (<# 4 >#200 SIEVE)	% FINES (<#200 SIEVE)	COMPRESSIVE STRENGTH TSF	WATER CONTENT AT END OF TEST, %	STRAIN AT FAILURE, %	TYPE OF TEST	DEVIATOR STRESS (σ_1,σ_3), TSF	CONFINING PRESSURE (σ_3), TSF	NATURAL WATER CONTENT, Wn, %	WATER CONTENT AT END OF TEST, Wf, %	NATURAL WATER CONTENT, Wn, %	EXISTING OVERBURDEN STRESS P_o, TSF	ESTIMATED PRECONSOLIDATION STRESS, P_c, TSF	COMPRESSION INDEX, C_c	SWELLING INDEX, C_s	VOID RATIO AT START OF SWELL, e_r
MR-43U	9U	17	F	33					92	SM-SC						Q	0.79	0.5	34	34						
			ES	34						SM-SC						Q	1.61	0.99	34	34						
	11U	21	MS	27					98	SM-SC	63	37				Q	2.22	0.5	27	27						
										SM-SC						Q	3.52	1.00	25	26						
										SM-SC						Q	4.41	2.00	27	27						
MR-45U	6U	11	ES	37					83	SM	69	31				Q	1.48	0.50	38	38						
										SM						Q	1.03	1.00	36	37						
										SM						Q	1.94	2.00	36	37						
	10U	18.9	MS	25				2.72		SP-SM	90	10				Q	2.66	0.50	25	26						
										SP-SM						Q	3.02	1.00	24	25						
	13U	26.8	MS	27						SM-SC						Q	3.70	2.00	26	27						

1. ALL TESTS SUMMARIZED ABOVE WERE PERFORMED IN THE SOILS LABORATORY OF MUESER RUTLEDGE CONSULTING ENGINEERS.
2. THE SAMPLE DEPTH LISTED ABOVE IS THE AVERAGE DEPTH OF THE SAMPLE RECOVERED.
3. FOR GROUND SURFACE ELEVATIONS AT THE BORINGS SEE TABLE NO. 1. FOR GENERALIZED STRATA DESCRIPTIONS SEE DRAWING NO. F-1.
4. "NATURAL WATER CONTENT OF THE ENTIRE SAMPLE" IS A WEIGHTED AVERAGE OF ALL MATERIAL TYPES RECOVERED.
5. THE TRIAXIAL COMPRESSION TESTS PERFORMED WERE:
   - Q - QUICK TESTS (UU - UNCONSOLIDATED UNDRAINED TESTS)
   - Qc - CONSOLIDATED QUICK TESTS (CU - CONSOLIDATED UNDRAINED TESTS)
6. STRENGTH TESTS WERE PERFORMED ON PISTON TYPE SAMPLES (U) APPROXIMATELY 2.9 INCHES IN DIAMETER AND ON SHELBY TYPE SAMPLES (S) APPROXIMATELY 1.8 INCHES IN DIAMETER. THE RATIO OF HEIGHT TO DIAMETER OF ALL STRENGTH TEST SPECIMENS WAS APPROXIMATELY 2.0.
7. THE TRIAXIAL COMPRESSION TESTS WERE PERFORMED AT A RATE OF STRAIN OF APPROXIMATELY 1 PER CENT PER MINUTE.
8. THE DIRECT SHEAR TESTS WERE PERFORMED AT A CONSTANT RATE OF STRAIN EQUAL TO A HORIZONTAL DISPLACEMENT OF 0.02 INCHES PER HOUR. THE SPECIMENS WERE OF APPROXIMATELY 1/2 INCH THICKNESS.
9. COMPRESSION INDEX Cc - STRAIGHT LINE PORTION OF THE VIRGIN CURVE OF CONSOLIDATION TEST: $e = e_o - C_c \log P/P_o$
10. SWELLING INDEX Cs - STRAIGHT LINE PORTION OF THE REBOUND CURVE OF CONSOLIDATION TEST: $e = e_o - C_s \log P/P_o$

MUESER RUTLEDGE CONSULTING ENGINEERS
708 THIRD AVENUE, NEW YORK, N.Y., 10017

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY
DELEUW, CATHER AND COMPANY
GENERAL ENGINEERING CONSULTANTS

TABLE NO. 3, SUMMARY OF RISING AND FALLING HEAD PERMEABILITY TESTS IN BOREHOLES AND OBSERVATION WELLS (SECTION G - ADDISON ROUTE)

BORING NO.	MR-18 (OBSERVATION WELL)	MR-19 (OBSERVATION WELL)	MR-20 (OBSERVATION WELL)	MR-21 (OBSERVATION WELL)	MR-22 (OBSERVATION WELL)	MR-22 (BOREHOLE)
TYPE OF TEST	FALLING HEAD	FALLING HEAD	FALLING HEAD	FALLING HEAD	FALLING HEAD	FALLING HEAD TEST NO. 1
ELEVATION OF TOP AND BOTTOM OF OPENING TESTED	+ 183.8 + 166.8	+ 184.9 + 167.9	+ 195.5 + 178.5	+ 197.4 + 180.4	+ 182.0 + 165.0	+ 190.3 + 179.5
LENGTH OF OPENING IN FEET	17.0	17.0	17.0	17.0	17.0	10.8
AVERAGE COMPUTED PERMEABILITY, FEET/MINUTE	2.7×10^{-5}	2.3×10^{-5}	1.0×10^{-5}	3.0×10^{-5}	8.6×10^{-5}	1.1×10^{-4}
STRATUM TESTED	Ms	Es & Ms	Es & Ms	Es & Ms	Es & Ms	Es

BORING NO.	MR-22 (BOREHOLE)	MR-24 (OBSERVATION WELL)	MR-25 (OBSERVATION WELL)	MR-43U (OBSERVATION WELL)	MR-46 (OBSERVATION WELL)	MR-47 (OBSERVATION WELL)
TYPE OF TEST	FALLING HEAD TEST NO. 2	FALLING HEAD	FALLING HEAD	FALLING HEAD	FALLING HEAD	FALLING HEAD
ELEVATION OF TOP AND BOTTOM OF OPENING TESTED	+ 176.5 + 174.5	+ 142.0 + 125.0	+ 136.4 + 119.4	+ 82.9 + 65.4	+ 129.4 + 112.4	+ 132.4 + 117.4
LENGTH OF OPENING IN FEET	2.0	17.0	17.0	17.5	17.0	15.0
AVERAGE COMPUTED PERMEABILITY, FEET/MINUTE	2.5×10^{-5}	1.2×10^{-5}	5.6×10^{-5}	6.9×10^{-7}	4.4×10^{-6}	2.0×10^{-6}
STRATUM TESTED	Ms	Ms	Ms	P1, P1,CL & P2	F, Es & Ms	Es & Ms

TABLE NO. 4

REPRESENTATIVE PERMEABILITY VALUES

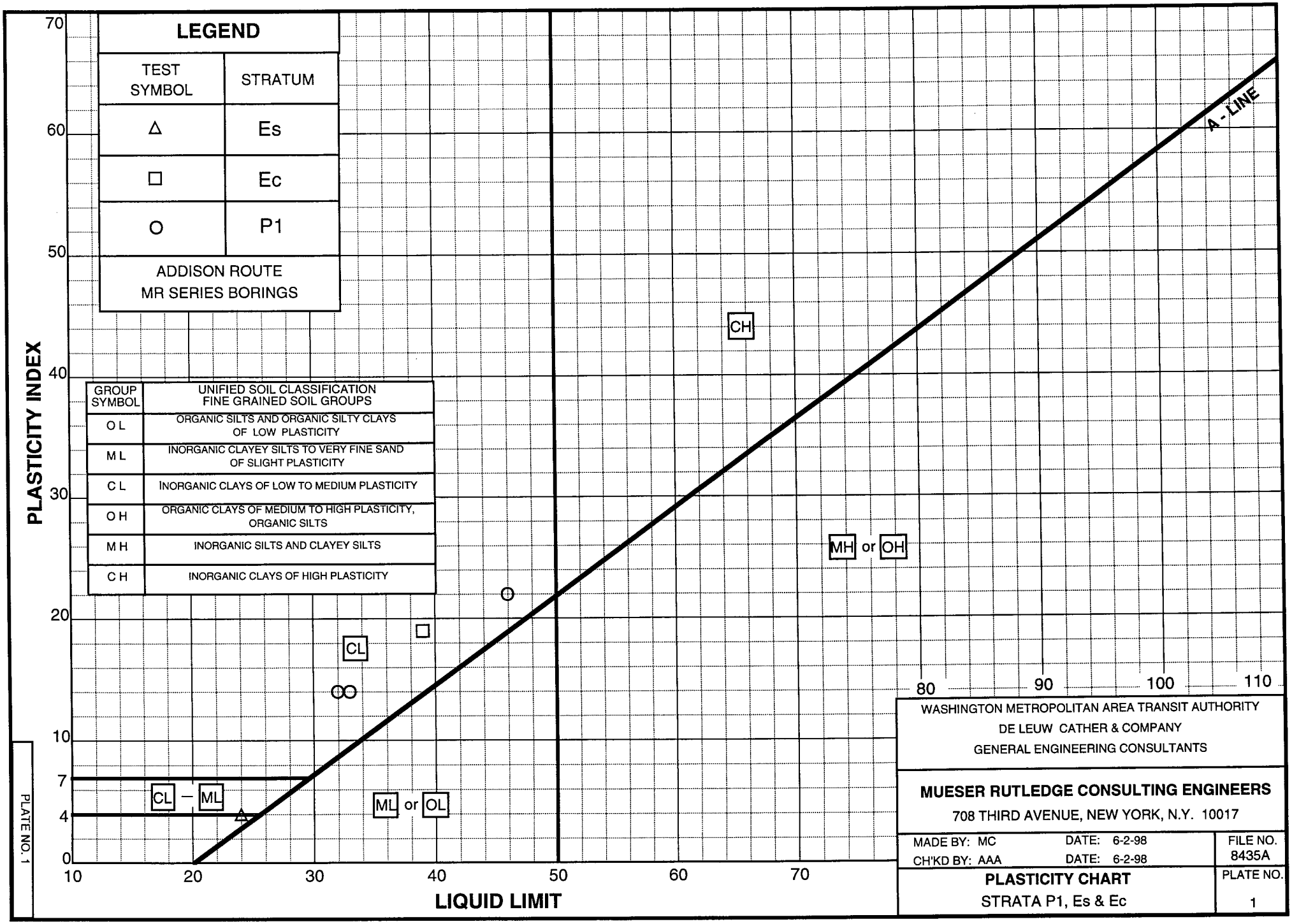
STRATUM	SOIL TYPE	COEFFICIENT OF PERMEABILITY K, (FT/MIN)
A1	Organic Clay	10^{-5} to 10^{-6}
A2	Silty Sand	10^{-3} to 10^{-4}
TO	Organic Clay	10^{-5} to 10^{-6}
T1	Silty Clay	10^{-5} to 10^{-6}
T2	Silty Sand	10^{-3} to 10^{-5}
T3	Gravelly Sand	$5x10^{-2}$ to 10^{-3}
T4	Silty Sand	10^{-3} to 10^{-4}
T5	Gravelly Sand	$5x10^{-2}$ to 10^{-3}
P1	Clay	10^{-7} Typical
P2	Clayey Sand	10^{-3} to 10^{-5}
P3	Sandy Clay	10^{-4} to 10^{-6}

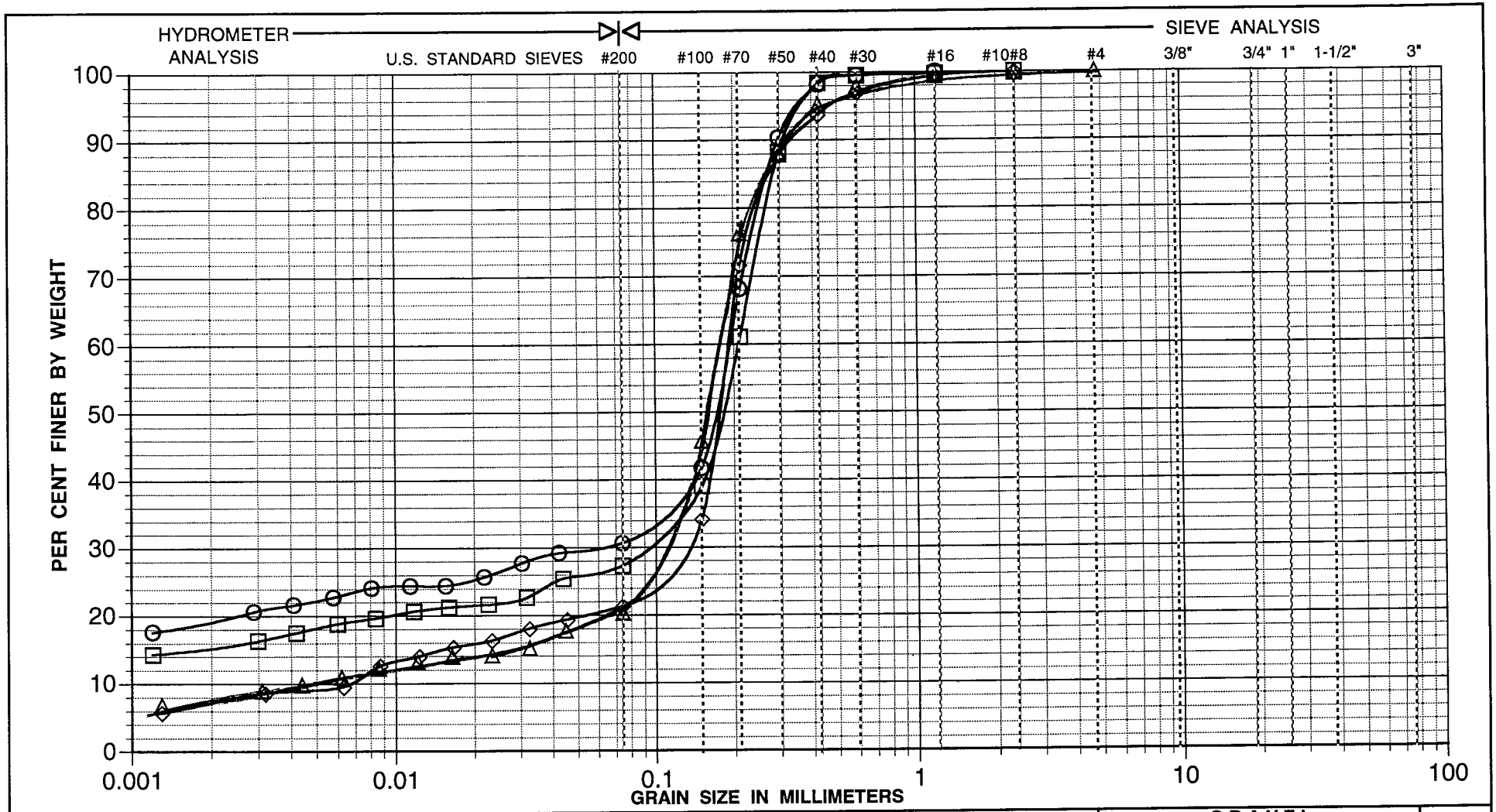
NOTE:

Range of permeabilities shown in this table is a general summary based on full scale pumping tests in earlier WMATA studies. The permeability values determine from small samples of the various strata or from borehole permeability tests frequently fall outside of the range noted.

TABLE NO. 5
REPRESENTATIVE PERMEABILITY VALUES

STRATUM	SOIL TYPE	COEFFICIENT OF PERMEABILITY K, (FT/MIN)
Q2	Fine to coarse sand, some medium to coarse gravel	5×10^{-2} to 10^{-3}
Cc	Plastic clay, silty and sandy clay or clayey silt	10^{-6} to 10^{-7}
Cs	Fine sand, trace to some silt, clay and clayey fine sand	10^{-3} to 10^{-5}
Ec	Plastic clay to silty and sandy clay or clayey silt	10^{-6} to 10^{-7}
Es	Silty and clayey fine sand	10^{-3} to 10^{-5}
Mc	Slightly organic fine sandy silt and clayey silt	10^{-5} to 10^{-6}
Ms	Slightly organic micaceous silty or clayey fine sand	10^{-3} to 10^{-5}


LEGEND
TEST SYMBOL
STRATUM
Δ
Es
□
Ec
O
P1
ADDISON ROUTE
MR SERIES BORINGS
GROUP SYMBOL
UNIFIED SOIL CLASSIFICATION FINE GRAINED SOIL GROUPS
O L
ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
M L
INORGANIC CLAYEY SILTS TO VERY FINE SAND OF SLIGHT PLASTICITY
C L
INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY
O H
ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
M H
INORGANIC SILTS AND CLAYEY SILTS
C H
INORGANIC CLAYS OF HIGH PLASTICITY
A - LINE
CH
MH or OH
CL
CL – ML
ML or OL
PLASTICITY INDEX
LIQUID LIMIT
70
60
50
40
30
20
10
7
4
0
10
20
30
40
50
60
70
80
90
100
110
PLATE NO. 1
WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY
DE LEUW CATHER & COMPANY
GENERAL ENGINEERING CONSULTANTS
MUESER RUTLEDGE CONSULTING ENGINEERS
708 THIRD AVENUE, NEW YORK, N.Y. 10017
MADE BY: MC DATE: 6-2-98
CH'KD BY: AAA DATE: 6-2-98
FILE NO. 8435A
PLASTICITY CHART
STRATA P1, Es & Ec
PLATE NO. 1



UNIFIED SOILS CLASSIFICATION	CLAY OR SILT	SAND			GRAVEL		COBBLES
		FINE	MEDIUM	COARSE	FINE	COARSE	

PLATE NO. 2

SYMBOL	BORING	SAMPLE	DESCRIPTION OF SAMPLE
○	MR-18	4D	STRATUM (Es)
□	MR-20	3D	
△	MR-25	5DTOP	
◇	MR-26	3D	

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY
DeLEUW, CATHER AND COMPANY
GENERAL ENGINEERING CONSULTANTS

MUESER RUTLEDGE CONSULTING ENGINEERS

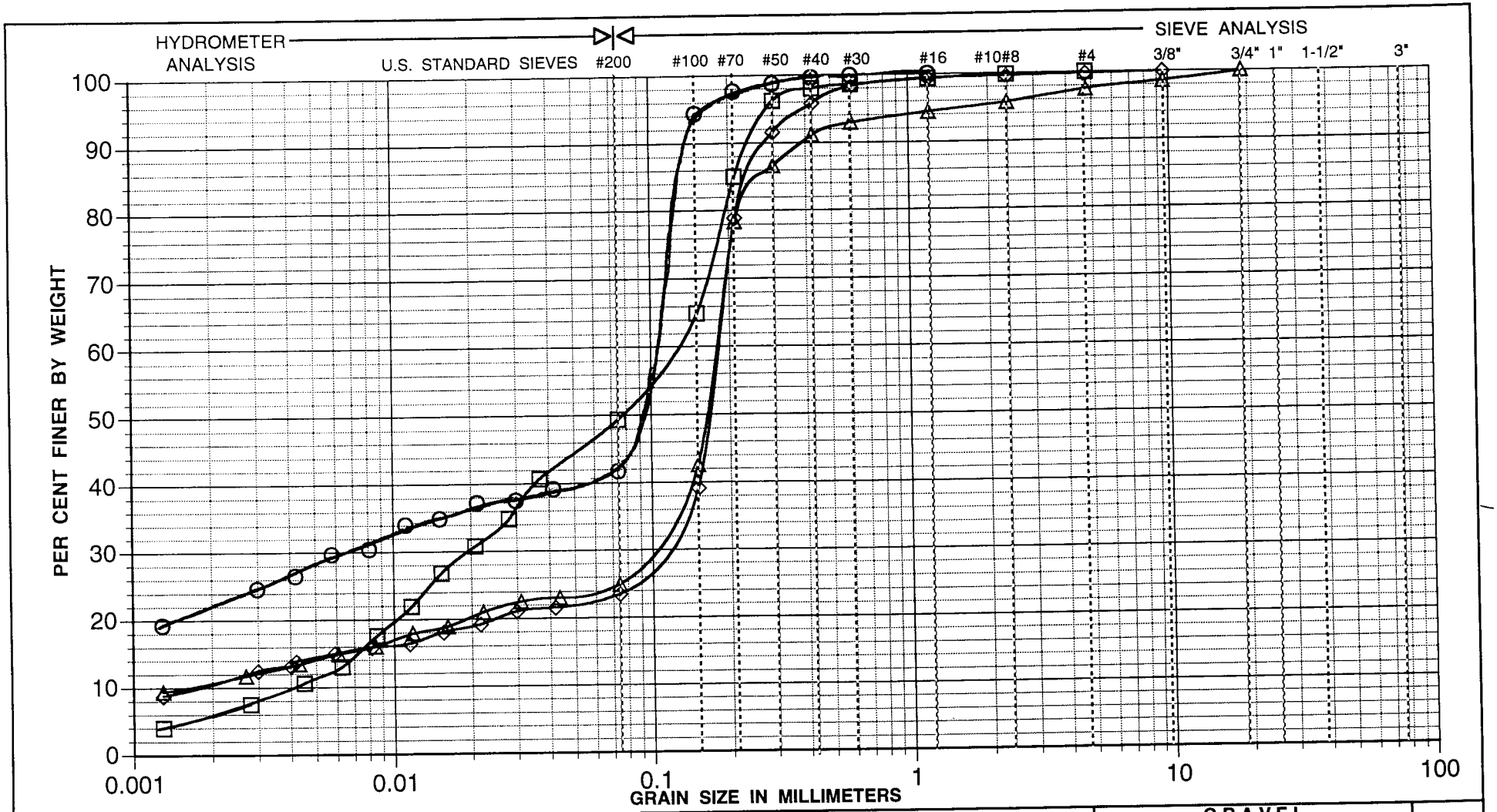
708 THIRD AVENUE, NEW YORK, N.Y. 10017

MADE BY: MC DATE: 5-26-98
CH'KD BY: AAA DATE: 5-26-98

FILE NO. 8435A

GRADATION CURVES
STRATUM (Es)

PLATE NO. 2



UNIFIED SOILS CLASSIFICATION	CLAY OR SILT	SAND			GRAVEL		COBBLES
		FINE	MEDIUM	COARSE	FINE	COARSE	

SYMBOL	BORING	SAMPLE
○	MR-24	4D
□	TP-2	1B
△	TP-3	1B
◇	TP-6	1B

DESCRIPTION OF SAMPLE

STRATUM (Es)

PLATE NO. 3

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY
DeLEUW, CATHER AND COMPANY
GENERAL ENGINEERING CONSULTANTS

MUESER RUTLEDGE CONSULTING ENGINEERS

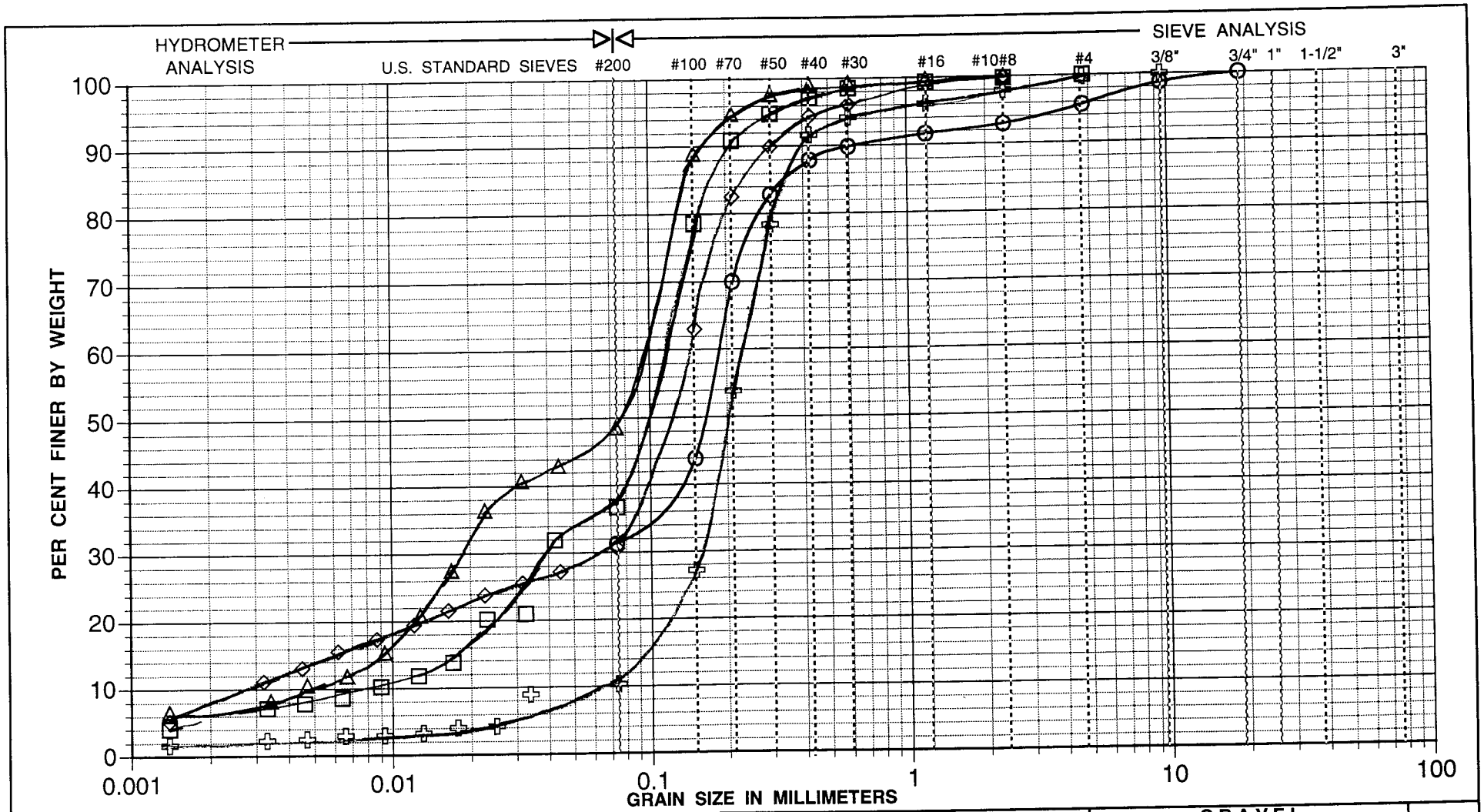
708 THIRD AVENUE, NEW YORK, N.Y. 10017

MADE BY: MC DATE: 6-4-98
CH'KD BY: AAA DATE: 6-4-98

FILE NO. 8435A

GRADATION CURVES
STRATUM (Es)

PLATE NO. 3



UNIFIED SOILS CLASSIFICATION	CLAY OR SILT	SAND			GRAVEL		COBBLES
		FINE	MEDIUM	COARSE	FINE	COARSE	

PLATE NO. 4

SYMBOL	BORING	SAMPLE	STRATA
○	MR-21	2D	Cs
□	MR-43U	11U	Ms
△	MR-44	10D	Ms
◇	MR-45U	6U	Es
✣	MR-45U	10U	Ms

DESCRIPTION OF SAMPLE

STRATA (Cs), (Es) & (Ms)

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY
DeLEUW, CATHER AND COMPANY
GENERAL ENGINEERING CONSULTANTS

MUESER RUTLEDGE CONSULTING ENGINEERS

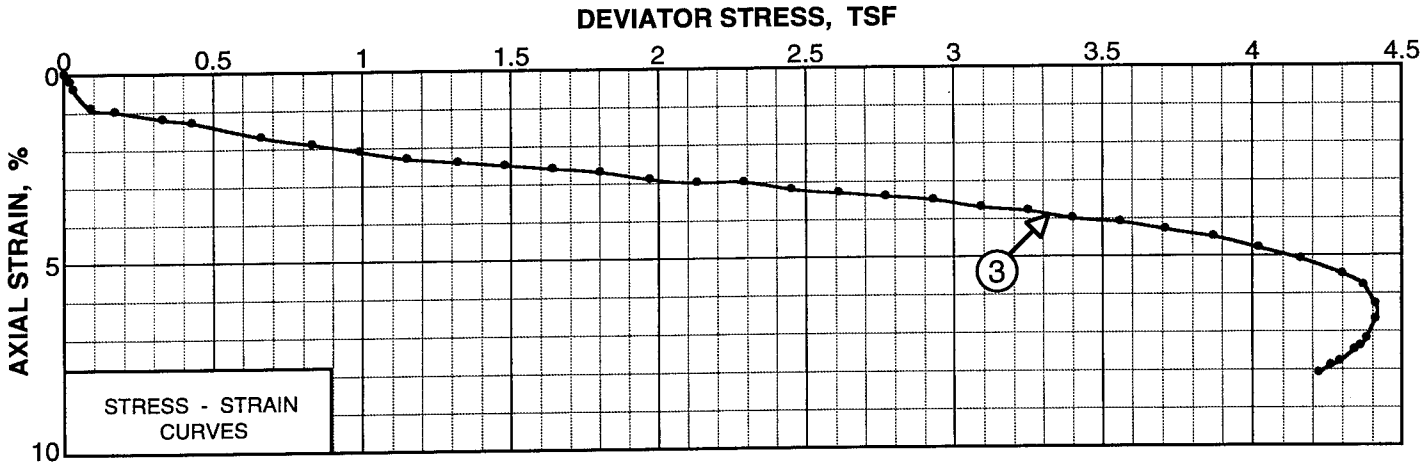
708 THIRD AVENUE, NEW YORK, N.Y. 10017

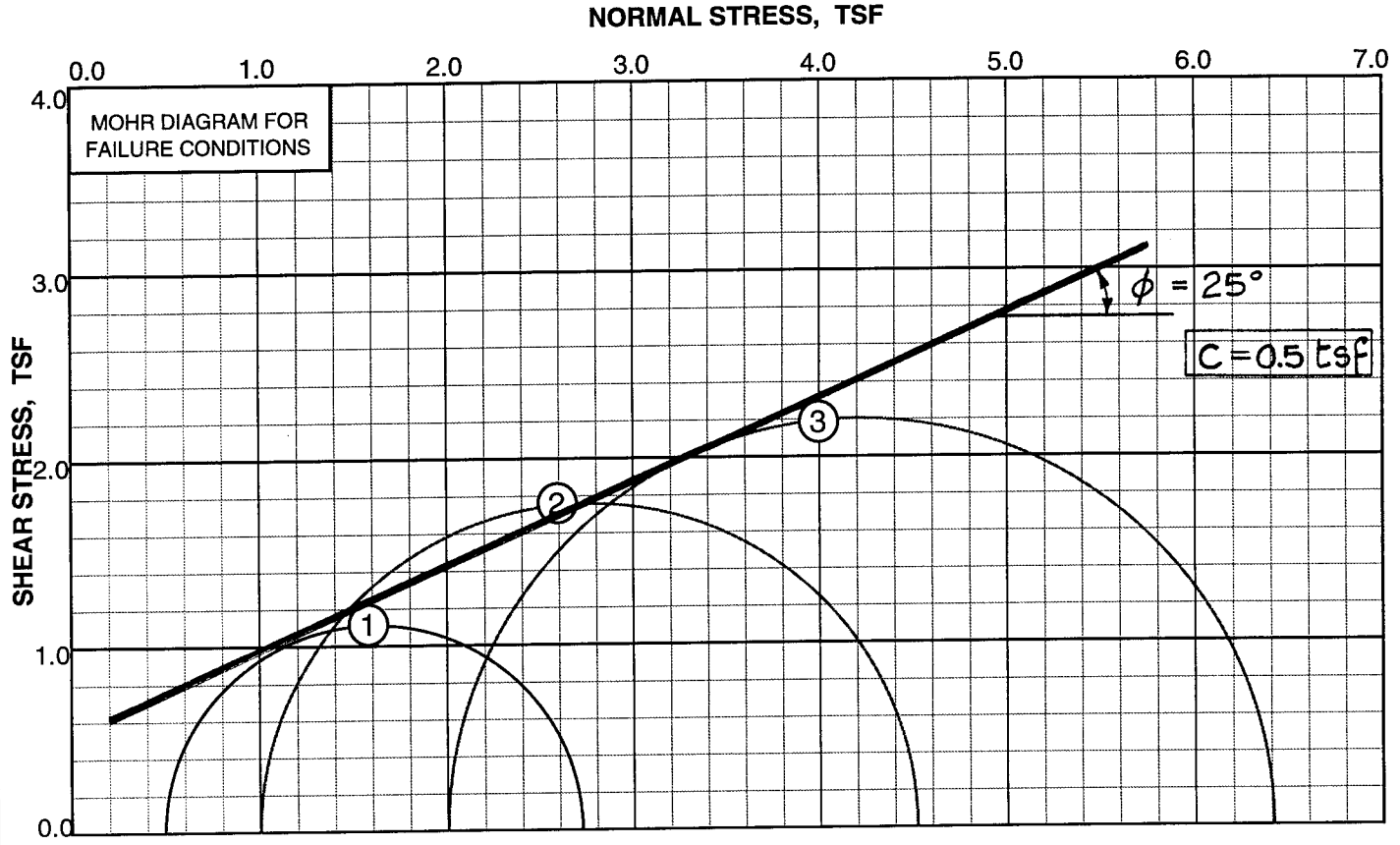
MADE BY: MC DATE: 5-27-98
CH'KD BY: AAA DATE: 5-27-98

FILE NO. 8435A

GRADATION CURVES
STRATA (Cs), (Es) & (Ms)

PLATE NO. 4





DESCRIPTION OF MATERIAL TESTED

DARK GRAY SLIGHTLY ORGANIC MICACEOUS SILTY FINE SAND, TRACE CLAY, SHELLS, MEDIUM TO COARSE SAND, SHELL LAYERS, GRAVEL STRATUM (MS)

KEY	BORING NO.	SAMPLE NO.	SOIL TYPE	TEST TYPE	LATERAL PRESSURE TSF	WATER CONTENT-%		DEGREE OF SATURATION-%		DEVIATOR STRESS TSF	AXIAL STRAIN %
						INITIAL	FINAL	INITIAL	FINAL		
1	MR-43U	11U	SM-SC	Q	0.50	27	27			2.22	8
2	MR-43U	11U	SM-SC	Q	1.0	25	26			3.52	5
3	MR-43U	11U	SM-SC	Q	2.0	27	27			4.41	6

SYMBOLS FOR TEST TYPES

Q - UNCONSOLIDATED UNDRAINED TRIAXIAL SHEAR TEST

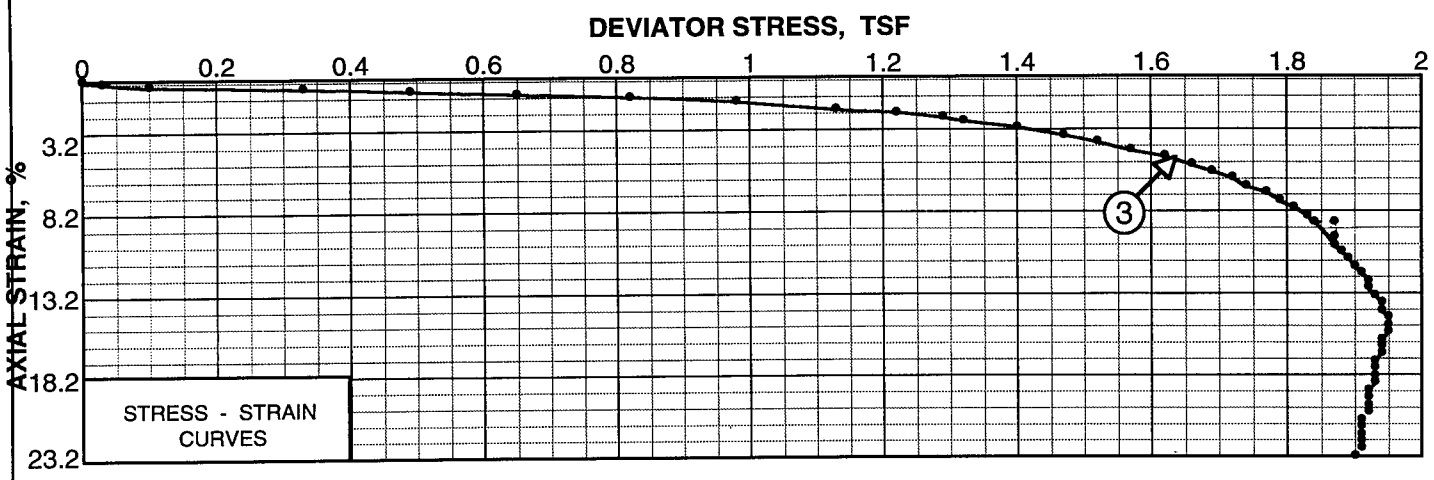
WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY
DE LEUW, CATHER & COMPANY
GENERAL ENGINEERING CONSULTANTS

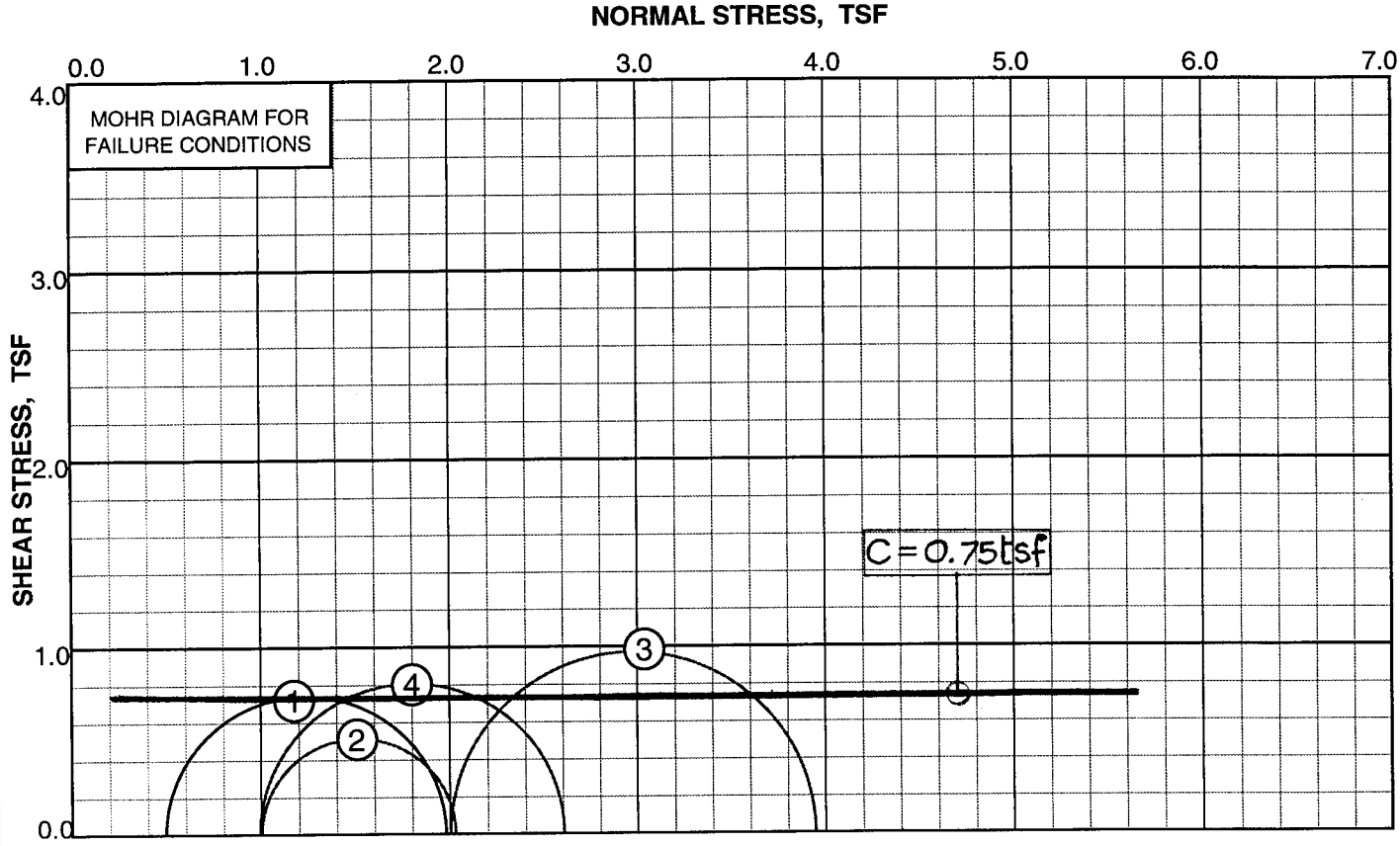
MUESER RUTLEDGE CONSULTING ENGINEERS
708 THIRD AVENUE, NEW YORK, N.Y. 10017

MADE BY: MC	DATE: 5-27-98	FILE NO. 8435A
CH'KD BY: AAA	DATE: 6-1-98	

SUMMARY OF STRENGTH TESTS
BORING NO. MR-43U

PLATE NO. 5





DESCRIPTION OF MATERIAL TESTED

DARK GRAY GREEN SLIGHTLY ORGANIC MICACEOUS SILTY FINE SAND, TRACE CLAY, CLAY SEAMS, MEDIUM TO COARSE SAND, SHELLS
STRATUM (ES)

KEY	BORING NO.	SAMPLE NO.	SOIL TYPE	TEST TYPE	LATERAL PRESSURE TSF	WATER CONTENT-%		DEGREE OF SATURATION-%		DEVIATOR STRESS TSF	AXIAL STRAIN %
						INITIAL	FINAL	INITIAL	FINAL		
1	MR-45U	6U	SM	Q	0.50	38	38			1.48	22
2	MR-45U	6U	SM	Q	1.0	36	37			1.03	2
3	MR-45U	6U	SM	Q	2.0	36	37			1.94	15
4	MR-43U	9U BOT	SM	Q	0.99	34	34			1.61	20

SYMBOLS FOR TEST TYPES

Q - UNCONSOLIDATED UNDRAINED TRIAXIAL SHEAR TEST

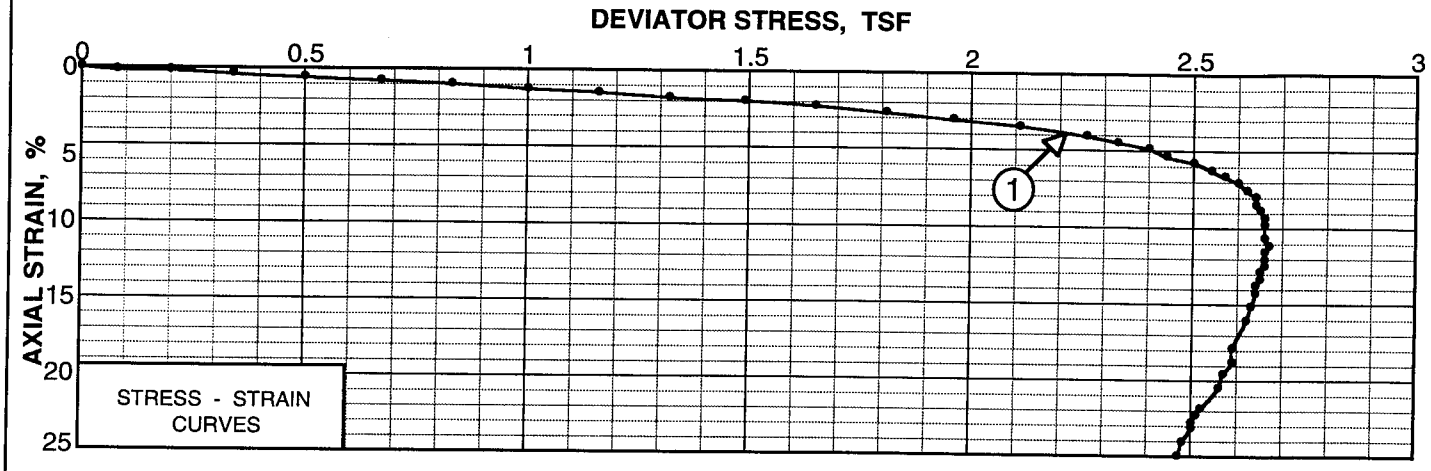
WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY
DE LEUW, CATHER & COMPANY
GENERAL ENGINEERING CONSULTANTS

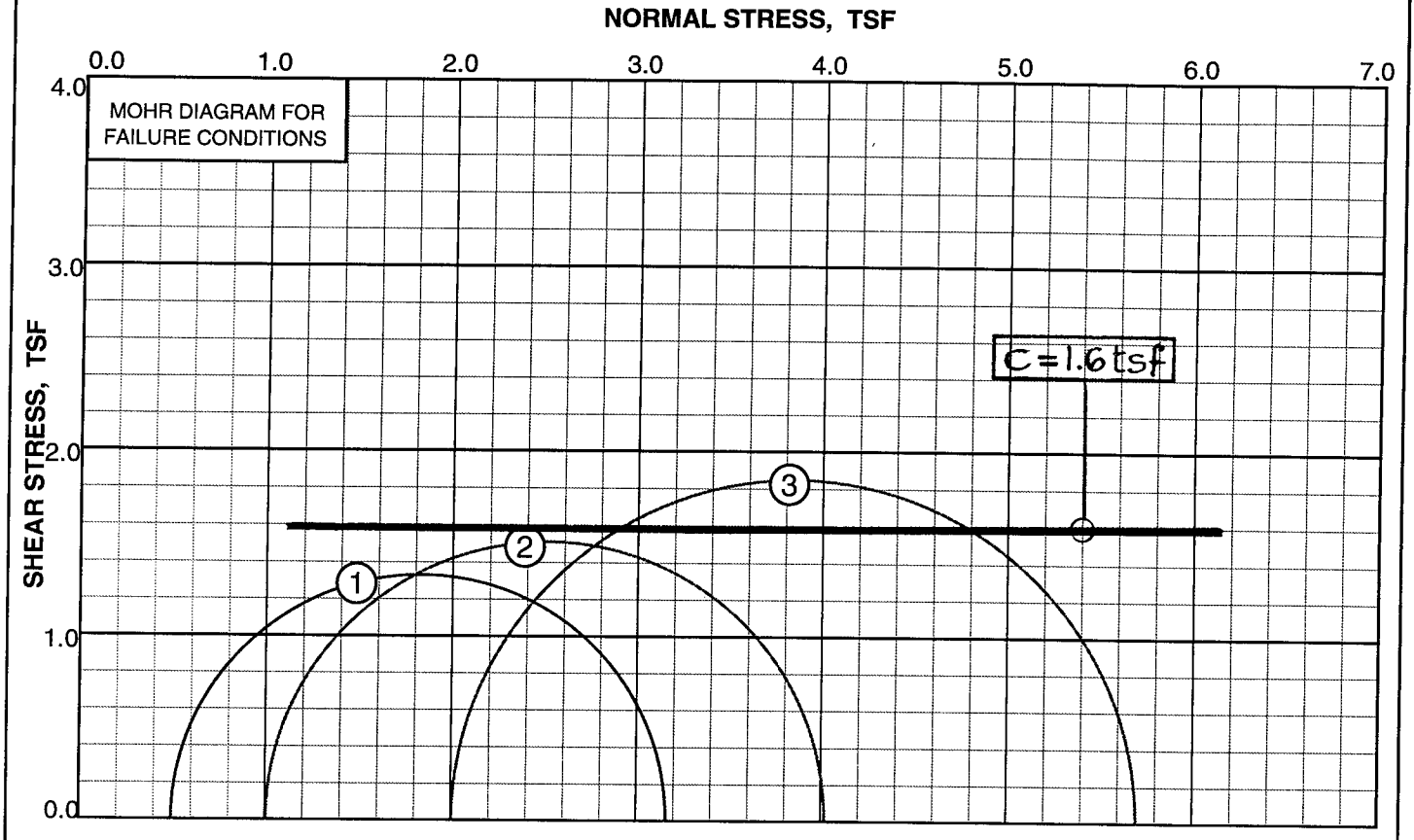
MUESER RUTLEDGE CONSULTING ENGINEERS
708 THIRD AVENUE, NEW YORK, N.Y. 10017

MADE BY: MC	DATE: 5-27-98	FILE NO.
CH'KD BY: AAA	DATE: 6-1-98	8435A

SUMMARY OF STRENGTH TESTS
BORING NOS. MR-43U AND 45U

PLATE NO. 6





DESCRIPTION OF MATERIAL TESTED

GRAY FINE SAND, TRACE SILT AND DARK GRAY SLIGHTLY ORGANIC MICACEOUS SILTY FINE SAND, TRACE CLAY, SHELLS, SHELL LAYERS
STRATUM (MS)

KEY	BORING NO.	SAMPLE NO.	SOIL TYPE	TEST TYPE	LATERAL PRESSURE TSF	WATER CONTENT-%		DEGREE OF SATURATION-%		DEVIATOR STRESS TSF	AXIAL STRAIN %
						INITIAL	FINAL	INITIAL	FINAL		
1	MR-45U	10U	SP-SM	Q	0.50	25	26			2.66	11
2	MR-45U	10U	SP-SM	Q	1.0	24	25			3.02	6
3	MR-45U	13U	SM-SC	Q	2.0	26	27			3.70	7

SYMBOLS FOR TEST TYPES

Q - UNCONSOLIDATED UNDRAINED TRIAXIAL SHEAR TEST

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY
DE LEUW, CATHER & COMPANY
GENERAL ENGINEERING CONSULTANTS

MUESER RUTLEDGE CONSULTING ENGINEERS
708 THIRD AVENUE, NEW YORK, N.Y. 10017

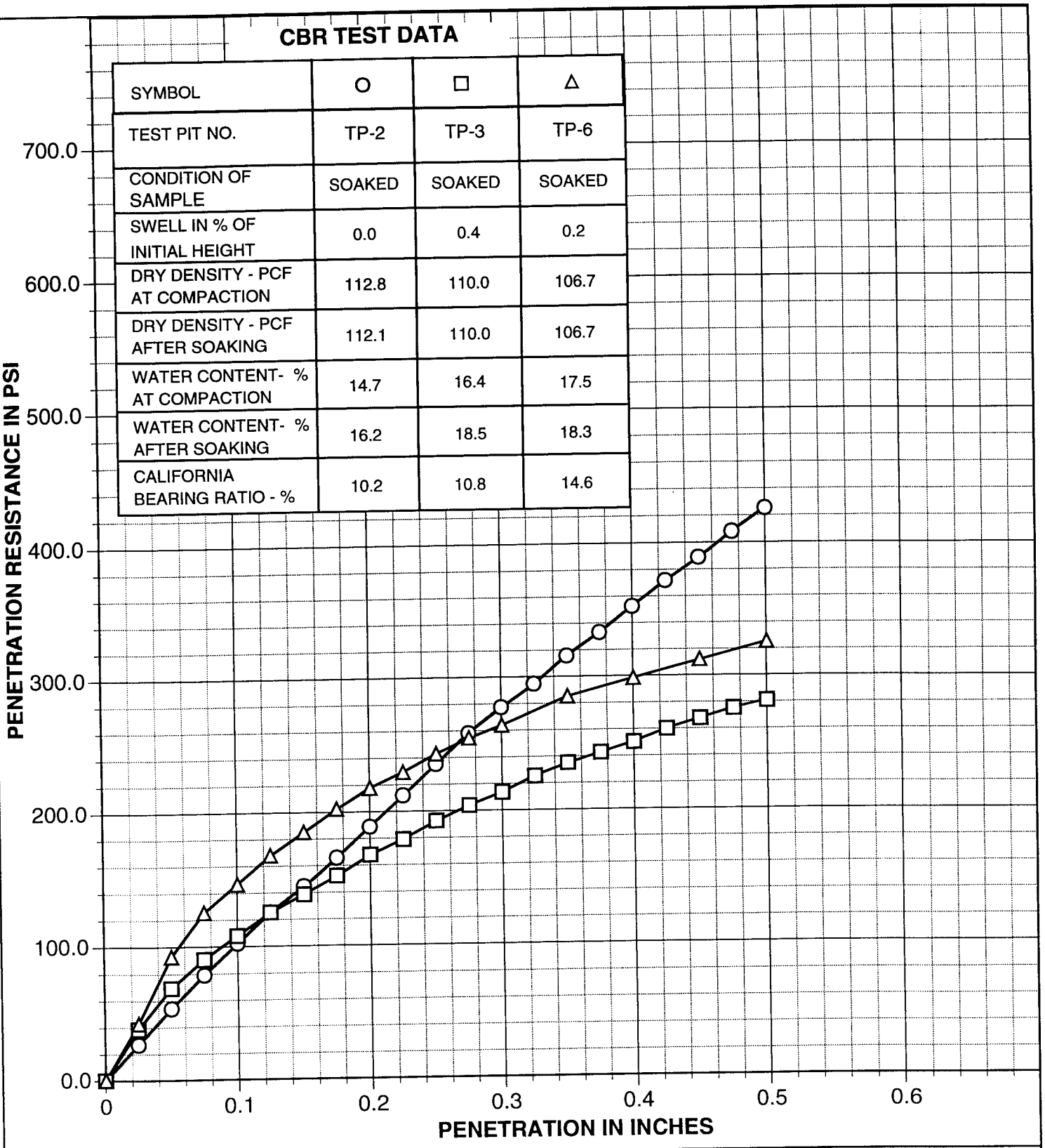
MADE BY: MC	DATE: 5-27-98	FILE NO.
CH'KD BY: AAA	DATE: 6-1-98	8435A

SUMMARY OF STRENGTH TESTS — PLATE NO.

BORING NO. MR-45U — 7

CBR TEST DATA

SYMBOL	○	□	△
TEST PIT NO.	TP-2	TP-3	TP-6
CONDITION OF SAMPLE	SOAKED	SOAKED	SOAKED
SWELL IN % OF INITIAL HEIGHT	0.0	0.4	0.2
DRY DENSITY - PCF AT COMPACTION	112.8	110.0	106.7
DRY DENSITY - PCF AFTER SOAKING	112.1	110.0	106.7
WATER CONTENT- % AT COMPACTION	14.7	16.4	17.5
WATER CONTENT- % AFTER SOAKING	16.2	18.5	18.3
CALIFORNIA BEARING RATIO - %	10.2	10.8	14.6



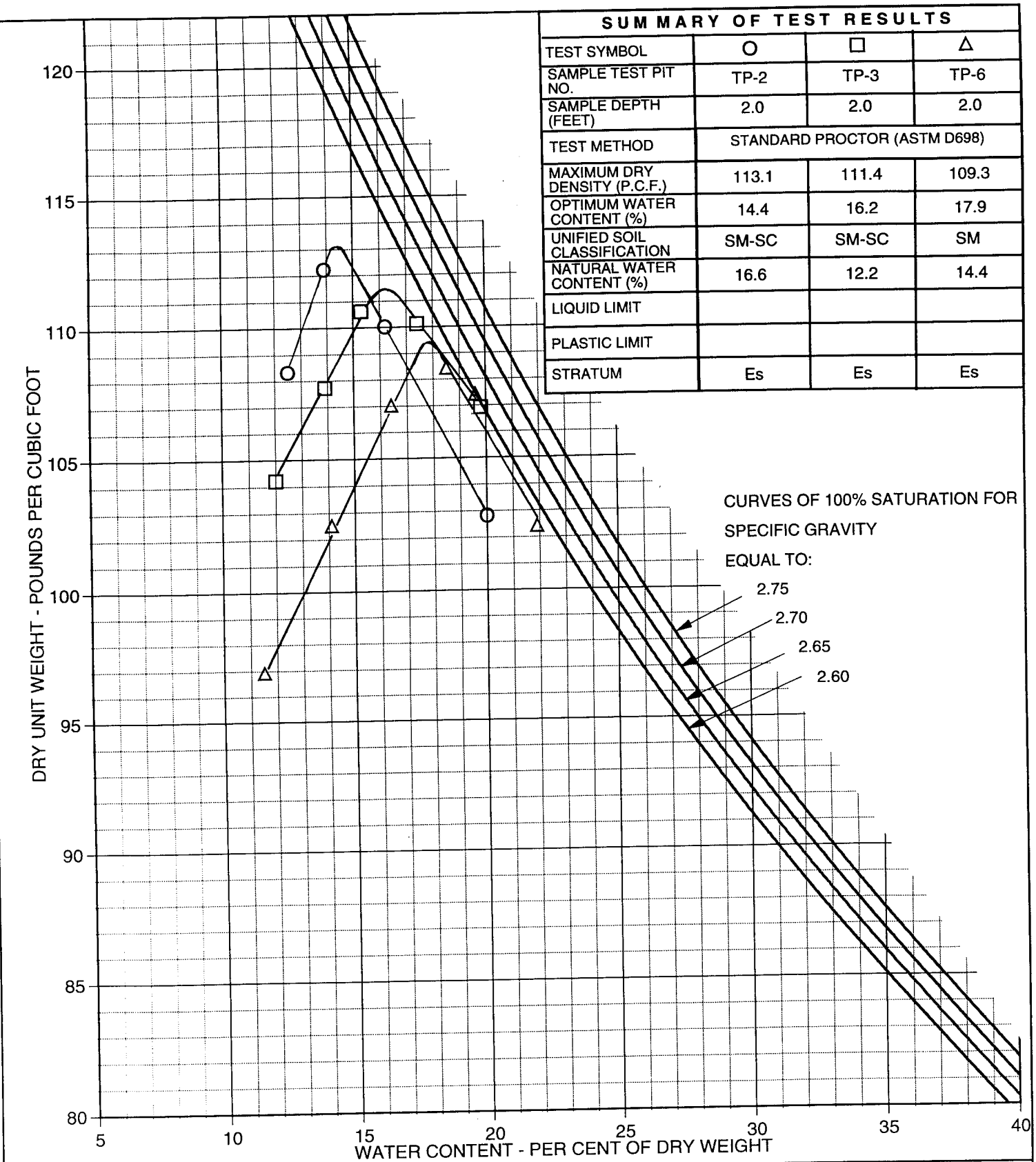
NOTES:

1. FOR COMPACTION TEST DATA, SEE PLATE NO. 9
2. FOR GRAIN SIZE DISTRIBUTION CURVE, SEE PLATE NO. 3

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY
DeLEUW, CATHER AND COMPANY
GENERAL ENGINEERING CONSULTANTS

MUESER RUTLEDGE CONSULTING ENGINEERS
708 THIRD AVENUE, NEW YORK, NY 10017

MADE BY: WEK	DATE: 6-4-98	FILE NO.	8435
CH'KD BY: FW	DATE: 6-5-98		
CBR TEST RESULTS		PLATE NO.	8



SUMMARY OF TEST RESULTS			
TEST SYMBOL	O	□	△
SAMPLE TEST PIT NO.	TP-2	TP-3	TP-6
SAMPLE DEPTH (FEET)	2.0	2.0	2.0
TEST METHOD	STANDARD PROCTOR (ASTM D698)		
MAXIMUM DRY DENSITY (P.C.F.)	113.1	111.4	109.3
OPTIMUM WATER CONTENT (%)	14.4	16.2	17.9
UNIFIED SOIL CLASSIFICATION	SM-SC	SM-SC	SM
NATURAL WATER CONTENT (%)	16.6	12.2	14.4
LIQUID LIMIT			
PLASTIC LIMIT			
STRATUM	Es	Es	Es

DESCRIPTION OF TESTS

TEST METHODS	STANDARD PROCTOR	MODIFIED PROCTOR	HARVARD MINIATURE		
VOLUME OF CYLINDER (CU. FT.)	1/30	1/30	1/454		
HAMMER WEIGHT (LBS.)	5 1/2	10	SPRING LB		
HAMMER DROP (IN.)	12	18	—		
HAMMER BLOWS PER LAYER	25	25	TAMPS		
NUMBER OF LAYERS	3	5			
COMPACTION ENERGY (FT. LBS. PER CU. FT.)	12,400	56,300			

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY
DeLEUW, CATHER AND COMPANY
GENERAL ENGINEERING CONSULTANTS

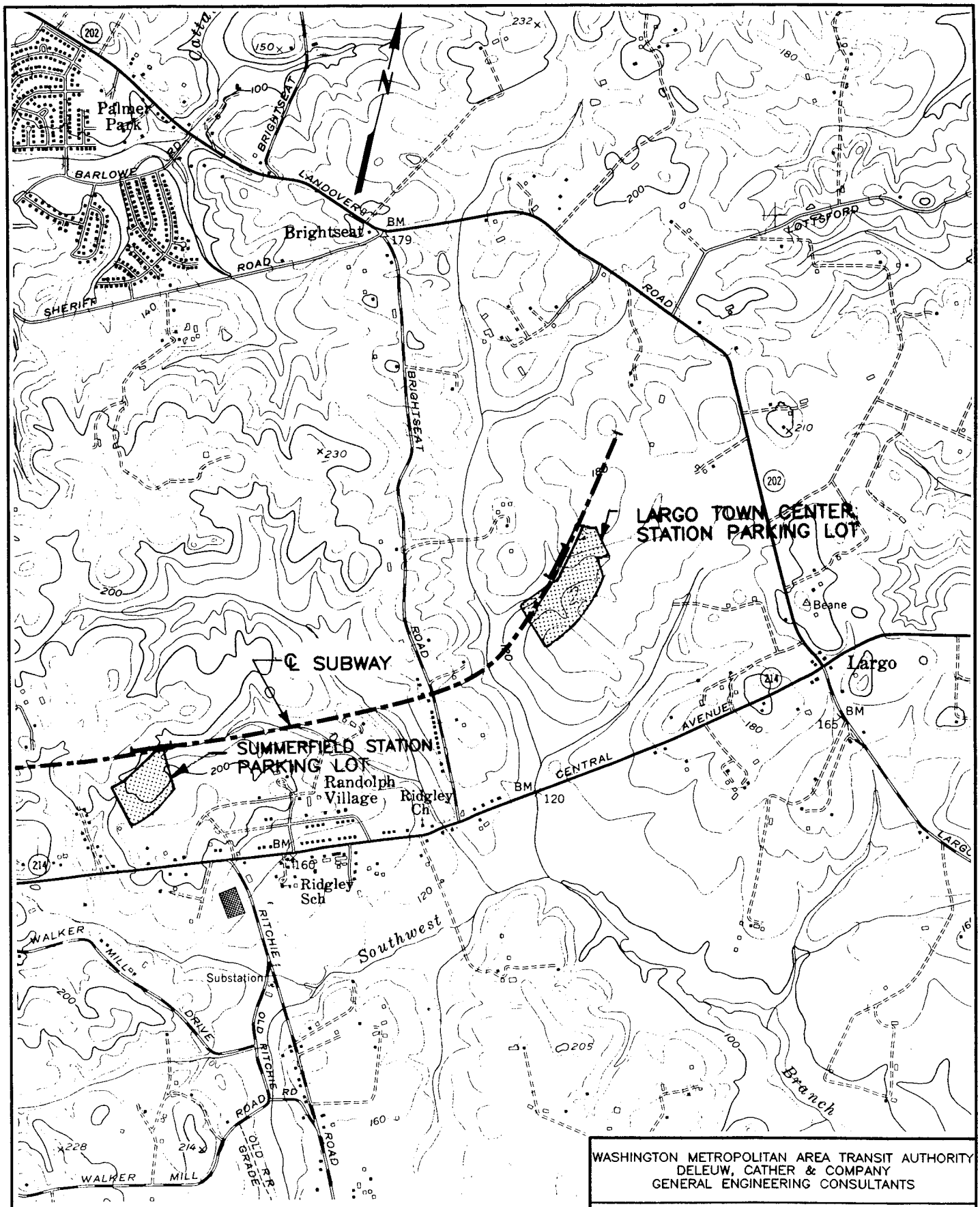
MUESER RUTLEDGE CONSULTING ENGINEERS

708 THIRD AVENUE, NEW YORK, N.Y. 10017

SCALE	MADE BY: MC	DATE: 6-8-98	FILE NO.
---	CH'KD BY:	DATE:	8435A

COMPACTION DIAGRAM — PLATE NO. 9

TEST PITS NOS. TP-2, TP-3 & TP-6



PORTION OF MAP TITLED:
USGS LANHAM QUADRANGLE
CONTOUR INTERVAL 20FT–
MEAN SEA LEVEL DATUM

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY
DELEUW, CATHER & COMPANY
GENERAL ENGINEERING CONSULTANTS

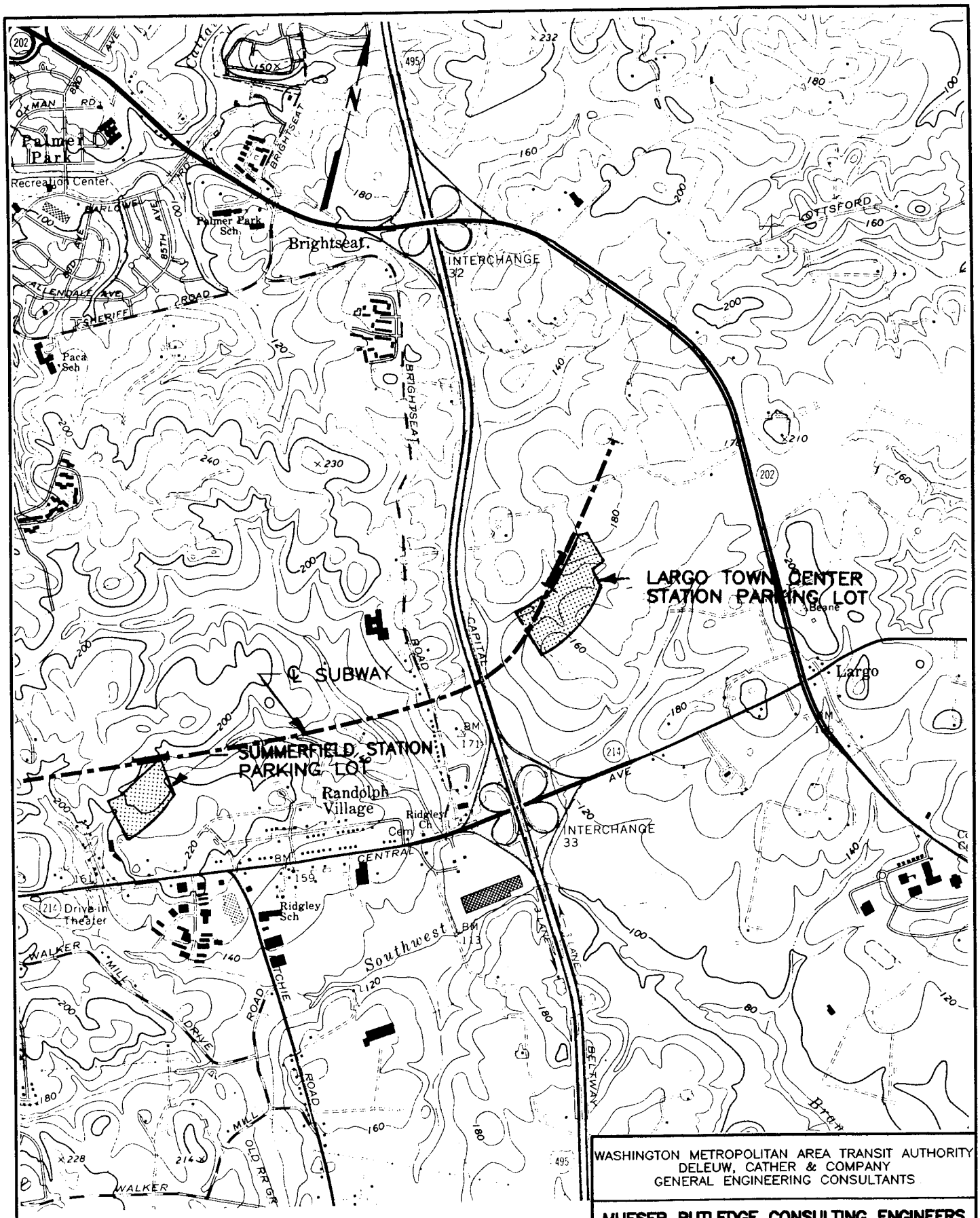
MUESER RUTLEDGE CONSULTING ENGINEERS

708 THIRD AVENUE, NEW YORK, N.Y. 10017

SCALE	MADE BY A.P.	DATE 6-98	FILE NO.
1"=2000'	CH'KD BY S.L.T.	DATE 6-98	8435a

TOPOGRAPHIC SURVEY
OF SITE – 1957

DRAWING NO.
SK–1



PORTION OF MAP TITLED:
USGS LANHAM QUADRANGLE
CONTOUR INTERVAL 20FT–
MEAN SEA LEVEL DATUM

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY
DELEUW, CATHER & COMPANY
GENERAL ENGINEERING CONSULTANTS

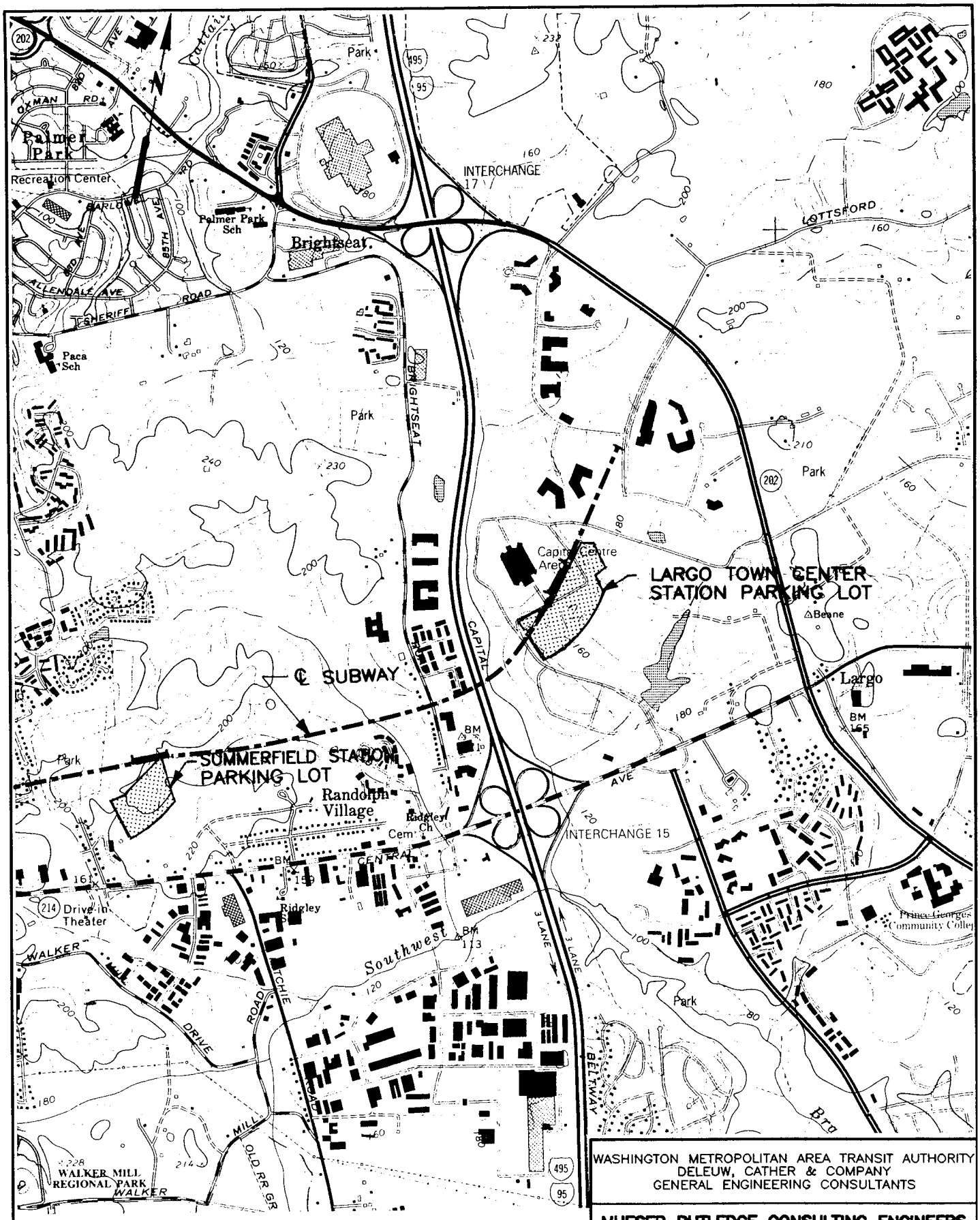
MUESER RUTLEDGE CONSULTING ENGINEERS

708 THIRD AVENUE, NEW YORK, N.Y. 10017

SCALE	MADE BY A.P.	DATE 6-98	FILE NO.
1"=2000'	CH'KD BY S.L.T.	DATE 6-98	8435a

TOPOGRAPHIC SURVEY
OF SITE – 1971

DRAWING NO.
SK–2



PORTION OF MAP TITLED:
USGS LANHAM QUADRANGLE
CONTOUR INTERVAL 20FT–
MEAN SEA LEVEL DATUM

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY
DELEUW, CATHER & COMPANY
GENERAL ENGINEERING CONSULTANTS

MUESER RUTLEDGE CONSULTING ENGINEERS

708 THIRD AVENUE, NEW YORK, N.Y. 10017

SCALE	MADE BY A.P.	DATE 6-98	FILE NO.
1"=2000'	CH'KD BY S.L.T.	DATE 6-98	8435a

TOPOGRAPHIC SURVEY
OF SITE – 1993

DRAWING NO.
SK–3

GENERAL NOTES

1. THIS DRAWING CONTAINS REFERENCE INFORMATION FOR ANY SUBSURFACE INVESTIGATION PERFORMED FOR THE WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY (WMATA). SPECIFIC DETAILS WHICH PERTAIN TO INDIVIDUAL INVESTIGATIONS ARE CONTAINED ON BORING LOG DRAWINGS OR GEOLOGICAL SECTIONS IN A SERIES OF TECHNICAL REPORTS.

2. THE BORINGS WHOSE DETAILED LOGS ARE CONTAINED IN THESE REPORTS WERE MADE BY A BORING CONTRACTOR UNDER THE CONTINUOUS INSPECTION OF RESIDENT ENGINEERS OF MUESER, RUTLEDGE, WENTWORTH & JOHNSTON (MRWJ). THESE DETAILED LOGS WERE DERIVED FROM MRWJ FIELD BORING LOGS AFTER EXAMINATION AND CHECK OF SOIL CLASSIFICATION IN THE LABORATORY. SOIL DESCRIPTIONS MAY NOT AGREE WITH THE ORIGINAL MRWJ FIELD LOGS OR WITH THE BORING CONTRACTOR'S LOGS, COPIES OF WHICH ARE ON FILE AT WMATA. THESE SOURCES SHOULD BE CONSULTED FOR ADDITIONAL DETAILS REGARDING BORING OPERATIONS AND THE NATURE OF MATERIALS ENCOUNTERED.

3. SOIL SAMPLES AND ROCK CORES RECOVERED IN BORINGS MADE FOR WMATA WHICH REMAINED AFTER LABORATORY TESTING HAVE BEEN STORED IN WASHINGTON D.C. AT THE WMATA WAREHOUSE AND ARE AVAILABLE FOR INSPECTION.

4. ELEVATIONS SHOWN ON THE DRAWINGS OR NOTED ON THE BORING LOGS REFER TO USC&GS MEAN SEA LEVEL DATUM OF 1929, WHICH IS DESIGNATED AS PROJECT DATUM. COORDINATES LISTED FOR BORING LOCATIONS REFER TO THE COORDINATE SYSTEMS EMPLOYED ON THIS PROJECT WHICH GENERALLY COMPRISE THE MARYLAND STATE PLANE COORDINATE SYSTEM OR THE VIRGINIA STATE PLANE COORDINATE SYSTEM, ADJUSTED FOR SCALE AND ELEVATION TO THE PROJECT GRID.

5. THE PLAN AND PROFILE ON GEOLOGICAL SECTION DRAWINGS GENERALLY SHOW THE CENTERLINE OF THE SUBWAY OUTBOUND TRACK, STATIONING ON THAT CENTERLINE, THE POSITION OF TOP OF RAIL IN PROFILE, AND, IN SOME INSTANCES, THE TOP AND BOTTOM OF THE EXTERIOR OF THE SUBWAY STRUCTURE IN PROFILE. THESE DATA WERE OBTAINED FROM THE DE LEUW, CATHER AND COMPANY GENERAL PLANS WHICH WERE AVAILABLE AT THE DATE OF THE REPORT. THE SUBWAY PLAN AND PROFILE WHICH ARE SHOWN IN REPORTS MADE PRIOR TO CONSTRUCTION ARE SUBJECT TO CHANGE IN FINAL PLANS.

6. GEOLOGICAL SECTION DRAWINGS DEPICT THE OVERALL SUBSURFACE STRATIFICATION, DIVIDING MATERIALS INTO THE BROAD CATEGORIES LISTED UNDER "GENERALIZED STRATA DESCRIPTIONS". THE LINES SEPARATING STRATA ARE NECESSARILY INTERPOLATED BETWEEN BORINGS AND MAY OR MAY NOT REPRESENT ACTUAL SUBSURFACE CONDITIONS.

7. IN CERTAIN INSTANCES THE SUBSURFACE INVESTIGATIONS FOR WMATA HAVE UTILIZED BORING DATA AND REPORTS PREPARED BY OTHER ORGANIZATIONS FOR OTHER PROJECTS. COPIES OF THESE ORIGINAL DATA AND REPORTS ARE ON FILE AT WMATA AND SHOULD BE CONSULTED FOR FURTHER DETAILS.

8. THE GROUND WATER LEVELS NOTED ON THE DETAILED BORING LOGS AND PLOTTED ON THE GEOLOGICAL SECTIONS REPRESENT AVERAGE OR TYPICAL VALUES OBSERVED DURING THE PERIOD OF THE BORING OPERATION OR SHORTLY AFTER COMPLETION OF A BORE HOLE. THESE OBSERVATIONS MAY NOT REFLECT SEASONAL CHANGES IN THE WATER TABLE OR THE EFFECTS OF INTENSE RAINFALL OR RUNOFF. IN ANY EXCAVATION TRICKLING FLOW OR SEEPAGE MAY BE ENCOUNTERED FROM PERCHED WATER WHICH IS AT LEVELS ABOVE THE WATER TABLE OBSERVED IN THE BORINGS.

9. OBSERVATION WELLS OR PIEZOMETERS CONSISTING OF A STEEL OR PVC STANDPIPE WITH A PERFORATED INTAKE POINT HAVE BEEN INSTALLED IN CERTAIN OF THE TEST BORINGS, AS NOTED ON THE BORING LOGS. MEASUREMENTS OF WATER LEVELS HAVE BEEN MADE IN CERTAIN OF THESE STANDPIPES AT VARIOUS TIMES. THESE DATA ARE ON FILE AT WMATA AND SHOULD BE CONSULTED FOR AN INDICATION OF SEASONAL FLUCTUATIONS OF GROUND WATER LEVELS.

UNIFIED CLASSIFICATION SYSTEM

COARSE GRAINED SOILS (MORE THAN HALF LARGER THAN NO.200 SIEVE)	GRAVELS AND GRAVELLY SOILS (MORE THAN HALF OF COARSE FRACTION IS LARGER THAN NO.4)	CLEAN (LESS THAN 5% SMALLER THAN NO.200)	GW GP GP-GM	WELL GRADED GRAVEL, LITTLE OR NO FINES. SINGLE-SIZE, NARROWLY GRADED GRAVEL, FEW FINES GRAVEL WITH MODERATE FINES, 5% TO 12% PASSING NO.200.
		DIRTY (MORE THAN 12% SMALLER THAN NO.200)	GM GC GM-GC	SILTY GRAVEL, GRAVEL-SAND-SILT MIXTURES. CLAYEY GRAVEL, GRAVEL-SAND-CLAY MIXTURES. GRAVEL-SAND MIX WITH SILTY CLAY OR CLAYEY SILT FINES.
	SANDS AND SANDY SOILS (MORE THAN HALF OF COARSE FRACTION IS SMALLER THAN NO.4)	CLEAN (LESS THAN 5% SMALLER THAN NO.200)	SW SP SP-SM	WELL GRADED SAND, LITTLE OR NO FINES. SINGLE-SIZE NARROWLY GRADED LEVEL, FEW FINES. SAND WITH MODERATE FINES, 5% TO 12% PASSING NO.200.
		DIRTY (MORE THAN 12% SMALLER THAN NO.200)	SM SC SM-SC	SILTY SAND, SAND-SILT MIXTURES. CLAYEY SAND, SAND-CLAY MIXTURES SAND WITH SILTY CLAY OR CLAYEY SILT FINES.
FINE GRAINED SOILS (MORE THAN HALF SMALLER THAN NO.200 SIEVE)	SILTS AND CLAYS LL<50		ML CL OL	INORGANIC SILT, ROCK FLOUR, CLAYEY SILT (LIMITS PLOT BELOW A-LINE) INORGANIC CLAY OF LOW TO MEDIUM PLASTICITY (LIMITS PLOT ABOVE A-LINE) ORGANIC SILT AND SILTY CLAY OF LOW PLASTICITY LIMITS PLOT BELOW A-LINE)
	SILTS AND CLAYS LL>50		MH CH OH	INORGANIC SILT, SPONGY, TALCY, MICACEOUS SILT (LIMITS PLOT BELOW A-LINE) INORGANIC PLASTIC CLAY, TOUGH AND FAT CLAY (LIMITS PLOT ABOVE A-LINE) ORGANIC CLAY OF MEDIUM TO HIGH PLASTICITY (LIMITS PLOT BELOW A-LINE
	PEAT AND HIGHLY ORGANIC		PT	PEAT, HIGHLY ORGANIC SOIL, SPONGY, COMPRESSIBLE, DARK COLOR, FIBROUS. DISTINCT ORGANIC ODOR (LIMITS PLOT BELOW A-LINE)

NOTES AND LEGEND FOR PLANS AND GEOLOGICAL SECTIONS

SYMBOLS UTILIZED ON LOCATION PLANS AND STRIP MAPS

1. BORINGS MADE IN THIS INVESTIGATION FOR WMATA UNDER THE CONTINUOUS INSPECTION OF MRWJ RESIDENT ENGINEERS ARE SHOWN THUS:

   ON LOCATION PLANS AND STRIP MAPS:
   BORINGS WITHOUT UNDISTURBED SAMPLES:
   BORINGS WITH UNDISTURBED SAMPLES:

   ON GEOLOGICAL SECTIONS:
   BORINGS WITHOUT UNDISTURBED SAMPLES:
   BORINGS WITH UNDISTURBED SAMPLES:

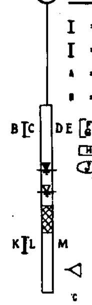
2. BORINGS WHICH HAVE BEEN MADE BY OTHER ORGANIZATIONS FOR OTHER PROJECTS AND ARE UTILIZED IN THIS INVESTIGATION ARE SHOWN THUS:

   ON LOCATION PLANS AND STRIP MAPS:
   ON GEOLOGICAL SECTIONS:

   THE GENERAL LOCATION OF THESE PROJECTS IN PLAN ARE SHOWN WITH A NUMBER DESIGNATION WITHIN A DIAMOND SYMBOL: ◇5

3. LOCATION AND ORIENTATION OF GEOLOGICAL SECTIONS GENERALLY ARE SHOWN ON THE PLAN ON WHICH BORING LOCATIONS ARE PLOTTED.

(A) SYMBOLS UTILIZED ON GEOLOGICAL SECTIONS



I = LOCATION AND LENGTH OF SOIL SAMPLE
I = LOCATION AND LENGTH OF ROCK CORE RUN
A = NUMBER AND LOCATION OF BORING.
B = NUMBER AND TYPE OF SOIL SAMPLE:
- SUFFIX "D" = DRY SAMPLE TAKEN WITH 2" OD SPLIT SPOON;
- SUFFIX "S" = SHELBY SAMPLE TAKEN WITH 2" OD THIN TUBE;
- SUFFIX "U" = UNDISTURBED SAMPLE TAKEN WITH 3" OD THIN TUBE USING PISTON SAMPLER;
- SUFFIX "R" = SAMPLE TAKEN WITH OPEN-END DRILL ROD;
- SUFFIX "UD" OR "SD" = THIN TUBE SAMPLE DISTURBED IN SAMPLING;
- "NR" = SAMPLE ATTEMPTED BUT NOT RECOVERED;
- SUFFIX "C" = ROCK CORE RUN USING NX SIZE DOUBLE TUBE DIAMOND CORE BARREL, PRODUCING CORE APPROXIMATELY 2-1/8" ⌀;
- "CORE" = CORING IN OVERBURDEN OR CORING IN BEDROCK WITH SAWTOOTH BIT OR ROTARY DRILLING BIT.

C = SAMPLER PENETRATION RESISTANCE IN BLOWS PER FOOT EXCEPT WHERE SPECIFIC DISTANCE IS NOTED.
SAMPLER DRIVEN WITH 140 LB. HAMMER FALLING 30".
P = THIN TUBE SAMPLE ADVANCED BY PUSHING
T = THIN TUBE SAMPLE ADVANCED BY TAPPING.
WR = SAMPLER ADVANCED UNDER WEIGHT OF RODS
WH = SAMPLER ADVANCED UNDER WEIGHT OF RODS AND HAMMER
(R SAMPLES DRIVEN WITH 300 LB. HAMMER FALLING 18")

D = SAMPLE CLASSIFICATION ACCORDING TO UNIFIED SOIL CLASSIFICATION SYSTEM
E = SAMPLE NATURAL WATER CONTENT IN PERCENT OF DRY WEIGHT
[F] = ATTERBERG LIQUID LIMIT VALUE.
[G] = ATTERBERG PLASTIC LIMIT VALUE.
[H] = SHEAR STRENGTH IN KSF DETERMINED FROM UNCONFINED COMPRESSION TEST FOR SOIL SAMPLES OR COMPRESSIVE STRENGTH IN KSI FOR ROCK CORES.
(J) = SHEAR STRENGTH IN KSF DETERMINED FROM UNCONSOLIDATED-UNDRAINED TRIAXIAL SHEAR TEST.
K = NUMBER DESIGNATION OF NX SIZE ROCK CORE RUN.
L = LENGTH OF ROCK CORE RECOVERY EXPRESSED AS A PERCENT OF LENGTH OF CORE RUN
M = ROCK QUALITY DESIGNATION (RQD) IN PERCENT.
▽ = GROUND WATER LEVELS OBSERVED DURING THE PERIOD OF THIS FIELD INVESTIGATION PROGRAM.
▽ = GROUND WATER LEVELS OBSERVED AT AN EARLIER TIME IN BORINGS NOT MADE FOR THIS INVESTIGATION.
⊠ = POSITION OF POROUS BACKFILL SURROUNDING OBSERVATION WELL IN BORINGS MADE FOR WMATA.
M.L. = POSITION OF MATCH LINE BETWEEN GEOLOGICAL SECTIONS.
◁S = CORROSION TEST OF SOIL SAMPLE.
◁W = CORROSION TEST OF WATER SAMPLE.

NOTES AND LEGEND FOR BORING LOG DRAWINGS

(A) | (B) | (C) | (D) | (E) | (F)

A = DEPTH BELOW GROUND SURFACE IN FEET

B = NUMBER OF BLOWS OF 300 LB. HAMMER FALLING 18" REQUIRED TO DRIVE CASING OF THE SIZE NOTED ONE FOOT.

C = NUMBER AND TYPE OF SAMPLE
- SUFFIX "D" = DRY SAMPLE TAKEN WITH 2" OD SPLIT SPOON;
- SUFFIX "S" = SHELBY SAMPLE TAKEN WITH 2" OD THIN TUBE;
- SUFFIX "U" = UNDISTURBED SAMPLE TAKEN WITH 3" OD THIN TUBE USING PISTON SAMPLER;
- SUFFIX "R" = SAMPLE TAKEN WITH OPEN-END DRILL ROD;
- SUFFIX "UD" OR "SD" = THIN TUBE SAMPLE DISTURBED IN SAMPLING;
- "NR" = SAMPLE ATTEMPTED BUT NOT RECOVERED;
- SUFFIX "C" = ROCK CORE RUN USING NX SIZE DOUBLE TUBE DIAMOND CORE BARREL, PRODUCING CORE APPROXIMATELY 2-1/8" ⌀;
- "CORE" = CORING IN OVERBURDEN OR CORING IN BEDROCK WITH SAWTOOTH BIT OR ROTARY DRILLING BIT.

D = SAMPLER PENETRATION RESISTANCE IN BLOWS PER 6" OF DRIVING EXCEPT WHERE SPECIFIC DISTANCE IS NOTED.
SAMPLER DRIVEN WITH 140 LB. HAMMER FALLING 30"
P = THIN TUBE SAMPLE ADVANCED BY PUSHING
T = THIN TUBE SAMPLE ADVANCED BY TAPPING
WR = SAMPLER ADVANCED UNDER WEIGHT OF RODS
WH = SAMPLER ADVANCED UNDER WEIGHT OF RODS AND HAMMER
(R SAMPLES DRIVEN WITH 300 LB. HAMMER FALLING 18")
78/25 — LENGTH OF ROCK CORE RECOVERY EXPRESSED AS A PERCENT OF LENGTH OF CORE RUN; ROCK QUALITY DESIGNATION (RQD) IN PERCENT

E = DESCRIPTION OF INDIVIDUAL SOIL SAMPLE, INCLUDING UNIFIED SOIL CLASSIFICATION SYMBOL, OR DESCRIPTION OF INDIVIDUAL ROCK CORE RUN.

F = DESCRIPTION OF PRINCIPAL SOIL STRATA OR PRINCIPAL DIVISIONS OF BEDROCK. STRATA DIVISION LINES ARE NOTED WITH DEPTH BELOW GROUND SURFACE.

CONSISTENCY OR COMPACTNESS FROM SAMPLER PENETRATION RESISTANCE

THE DEGREE OF CONSISTENCY OR COMPACTNESS OF SAMPLES IS NOT GIVEN IN THE BORING LOG DESCRIPTIONS BUT IS INDICATED BY THE FOLLOWING VALUES OF STANDARD SAMPLER PENETRATION RESISTANCE IN BLOWS PER FOOT:

FINE GRAINED SOILS, SILTS AND CLAYS:		COARSE GRAINED SOILS, SANDS AND GRAVELS:	
LESS THAN 2 BPF	= VERY SOFT	LESS THAN 4 BPF	= VERY LOOSE
2 TO 4 BPF	= SOFT	4 TO 10 BPF	= LOOSE
4 TO 8 BPF	= MEDIUM STIFF	10 TO 30 BPF	= MEDIUM COMPACT
8 TO 15 BPF	= STIFF	30 TO 50 BPF	= COMPACT
15 TO 30 BPF	= VERY STIFF	GREATER THAN 50	= VERY COMPACT
GREATER THAN 30	= HARD		

ABBREVIATIONS

MISCELLANEOUS

BOTTOM	= BOT.
CARBONACEOUS	= CARB.
CAVITIES	= CVTS.
CEMENTED	= CEM.
CONCRETIONS	= CONC.
DITTO	= Do.
FRAGMENTS	= FGMTS.
INTERBEDDED	= INTRBD.
INTERLAYERED	= INLRD.
LAYERS	= LYRS.
LENSES	= LNS.
MATERIAL	= MTL.
MATTER	= MTR.
MEADOW MAT	= MDW.MT.
MICACEOUS	= MIC.
MISCELLANEOUS	= MISC.
NUMEROUS	= NUM.
OCCASIONAL	= OCC.
ORGANIC	= ORG.
PARTICLES	= PCLS.
PEAT	= PT.
PIECES	= PCS.
POCKET	= PKT.
PROBABLY	= PROB.
ROOTS	= RTS.
SEAMS	= SMS.
SLICKENSIDED	= SLKS.
SLIGHTLY	= SL.
SOME	= SM.
TRACE	= TR.
VEGETATION	= VEG.
VERY	= V
WITH	= W/

GRAIN SIZE AND SHAPE

ANGULAR	= ANG.
COARSE	= C
COARSE TO FINE	= C-F
COARSE TO MEDIUM	= C-M
FINE	= F
FINE TO COARSE	= F-C
FINE TO MEDIUM	= F-M
MEDIUM	= M
MEDIUM TO COARSE	= M-C
MEDIUM TO FINE	= M-F
SMALL	= SML.

CONSISTENCY

COMPACT	= CPT.
MEDIUM COMPACT	= MED.CPT.
DECAYED	= DCYD.
DECOMPOSED	= DEC.
DISINTEGRATED	= DSNTG.
FRACTURED	= FRCT.
HARD	= HD.
MEDIUM	= MED.
RELATIVELY SOUND	= REL.SND.
SOFT	= SFT.
SOUND	= SND.
STIFF	= STF.
WEATHERED	= WTHRD.

COLOR

BLACK	= BLK.
BLUE	= BL.
BROWN	= BRN.
DARK	= DK.
GRAY	= GRY.
GREEN	= GRN.
LIGHT	= LT.
MOTTLED	= MTLD.
PURPLE	= PRP.
ORANGE	= OR.
WHITE	= WHT.
YELLOW	= YEL.

SOIL OR ROCK TYPE

BOULDER	= BLDR.
BRICK	= BRK.
CINDERS	= CNDR.
CLAY	= CL.
CLAYEY SAND	= CL.SA.
CLAYEY SILT	= CL.SI.
COBBLE	= CBL.
GNEISS	= GNS.
GRANITE	= GRT.
GRAVEL	= GVL.
LIGNITE	= LIGN.
SAND	= SA.
SANDY CLAY	= SA.CL.
SANDY SILT	= SA.SI.
SCHIST	= SCH.
SHALE	= SH.
SHELLS	= SLS.
SILT	= SI.
SILTY CLAY	= SI.CL.
SILTY SAND	= SI.SA.

GENERALIZED STRATA DESCRIPTIONS

SYMBOL	DESCRIPTION	UNIFIED SOIL CLASSIFICATION PRIMARY	UNIFIED SOIL CLASSIFICATION SECONDARY	SOURCE AND AGE
(F)	FILL, GENERALLY COMPOSED OF INORGANIC SOIL OBTAINED FROM NEARBY NATURAL MATERIALS. MAY BE DERIVED FROM TERRACE, CRETACEOUS SOILS OR DECOMPOSED ROCK.	ML SM	SC CL	MAN-MADE IN HISTORIC TIMES
(A1)	VERY SOFT TO MEDIUM STIFF DARK GRAY AND BROWN ORGANIC CLAY WITH LENSES OF HIGHLY ORGANIC MATERIAL (WHERE LOCATED UNDER WATER). SOFT TO STIFF MOTTLED GRAY-BROWN SLIGHTLY ORGANIC SILTY OR SANDY CLAY (WHERE LOCATED ON LAND).	CL CH OH	OL PT	RIVER ALLUVIUM OF POST-GLACIAL TIMES
(A2)	LOOSE TO MEDIUM COMPACT GRAY OR DARK BROWN SILTY FINE TO MEDIUM SAND WITH OCCASIONAL POCKETS OR LENSES OF SMALL GRAVEL. MAY BE SLIGHTLY TO MODERATELY ORGANIC.	SM	SP	
(T1)	STIFF TO MEDIUM STIFF LIGHT BROWN OR GRAY OR MOTTLED BROWN-GRAY SILTY CLAY OR CLAYEY SILT WITH LENSES OF BROWN SILTY FINE SAND. IN SOME AREAS, SEVERAL SEPARATE LAYERS OF PLEISTOCENE CLAYS HAVE BEEN ENCOUNTERED, WHICH ARE DISTINGUISHED BY A LETTER SUFFIX: T1A, T1C, ETC.	CL ML CH	LENSES OF SM OR SC	PORTIONS OF THE "25-FOOT" "50-FOOT" AND "90-FOOT" TERRACES, DEPOSITED BY RIVERS IN PLEISTOCENE TIMES
(T0)	MEDIUM STIFF TO STIFF DARK GRAY ORGANIC CLAY WITH NUMEROUS WOOD FRAGMENTS. USUALLY FOUND INTERLENSED WITH STRATUM T4.	CL OL	CH OH	
(T2)	MEDIUM COMPACT TO COMPACT BROWN AND RED-BROWN SILTY OR CLAYEY FINE TO MEDIUM SAND WITH TRACE OF GRAVEL AND OCCASIONAL BOULDERS.	SM SC	SP SW	
(T3)	COMPACT TO VERY COMPACT BROWN AND RED-BROWN FINE TO COARSE SAND WITH SOME SILT AND GRAVEL AND VARIABLE AMOUNTS OF COBBLES AND BOULDERS.	SW SM	SP GM	
(T4)	MEDIUM COMPACT TO COMPACT GRAY AND GRAY-BROWN FINE TO MEDIUM SAND WITH SOME SILT AND SMALL GRAVEL, CONTAINING LENSES OF DARK GRAY CLAY, OCCASIONALLY SLIGHTLY ORGANIC.	SM SP	SW	
(T5)	COMPACT TO VERY COMPACT GRAY AND GRAY-BROWN FINE TO COARSE SAND WITH SOME GRAVEL, SOME TO TRACE OF SILT AND VARIABLE AMOUNTS OF COBBLES AND BOULDERS, OFTEN CONCENTRATED AT BASE OF LAYER.	SW SM	SP GM	
(Q1)	LOOSE TO MEDIUM COMPACT LIGHT BROWN SILTY OR CLAYEY FINE TO MEDIUM SAND WITH TRACE OF SMALL GRAVEL.	SM SC		BRANDYWINE FORMATION OF EARLY PLEISTOCENE OR PLIOCENE TIMES
(Q2)	LOOSE TO MEDIUM COMPACT LIGHT BROWN OR TAN SILTY OR CLAYEY MEDIUM TO FINE SAND WITH SOME SMALL GRAVEL.	SM SC	SP	
(C)	MEDIUM COMPACT GRAY AND TAN SILTY FINE SAND OR MEDIUM STIFF TO STIFF DARK GRAY TO OLIVE-GREEN CLAY. CALVERT FORMATION OF MIOCENE AGE.	SM CH	SP CL	MARINE DEPOSITS OF TERTIARY OR UPPER CRETACEOUS PERIODS
(E)	MEDIUM STIFF DARK GREEN OR BROWN CLAY AND SILTY CLAY. AQUIA FORMATION OF EOCENE AGE.	MH CH	ML CL	
(M)	MEDIUM STIFF TO STIFF GREEN OR BROWN SILT AND CLAY. MONMOUTH FORMATION OF UPPER CRETACEOUS AGE.	MH CL	ML CH	
(P1)	HARD MOTTLED RED-BROWN AND GRAY OR LIGHT GRAY AND TAN PLASTIC CLAY WITH OCCASIONAL POCKETS OF FINE SAND. GENERALLY CONSISTS OF PATAPSCO FORMATION BUT MAY INCLUDE RARITAN FORMATION AT UPPER LEVELS.	CH	CL	POTOMAC GROUP OF CRETACEOUS PERIOD
(P2)	COMPACT TO VERY COMPACT LIGHT GRAY OR TAN SILTY OR CLAYEY FINE TO MEDIUM SAND WITH POCKETS OF SILTY CLAY AND TRACE OF SMALL GRAVEL, OCCASIONAL LIGNITE FRAGMENTS. ALSO INCLUDES MAGOTHY FORMATION OF UPPER CRETACEOUS AGE.	SM SC SP	SP	
(P3)	HARD GRAY-GREEN OR GRAY-BLUE-GREEN SILTY OR SANDY CLAY AND VERY COMPACT SILTY OR CLAYEY FINE TO MEDIUM SAND WITH OCCASIONAL SMALL GRAVEL AND SCATTERED BOULDERS.	CL SC	ML SM	
(P4)	VERY COMPACT MOTTLED LIGHT GRAY, TAN, BUFF OR WHITE SILTY OR CLAYEY FINE TO MEDIUM SAND WITH SOME GRAVEL AND SCATTERED LIGNITE FRAGMENTS, FREQUENTLY WITH DENSE NESTS AND POCKETS OF ANGULAR ROCK FRAGMENTS, COBBLES AND BOULDERS.	SM SW SC	SP GM	

NOTE

THE GENERALIZED STRATA DESCRIPTIONS NOTED IN THIS COLUMN AND GIVEN IN THE TEXT OF THE MRJD REPORTS ON SUBSURFACE INVESTIGATIONS ARE INTENDED TO COVER THE TYPICAL RANGE OF MATERIALS GROUPED WITHIN A PARTICULAR STRATUM.

FOR A DETAILED BREAKDOWN OF THE ACTUAL CONSTITUENT MATERIALS WITHIN THAT STRATUM, REFERENCE SHOULD BE MADE TO BORING AND LABORATORY TEST INFORMATION RELEVANT TO ANY SPECIFIC LOCATION.

DEFINITION OF MODIFYING ADJECTIVES USED TO DESCRIBE SOIL CONSTITUENTS IN SAMPLE AND STRATA DESCRIPTIONS

CONSTITUENT	PROPORTIONS OF SOIL CONSTITUENTS	PERCENTAGE BY DRY WEIGHT
MAJOR	NOUN FORM: GRAVEL, SAND, SILT, ETC.	50 OR MORE
MINOR	ADJECTIVE FORM: GRAVELLY, SANDY, ETC	31 TO 49
	SOME: SOME SAND SOME SILT, ETC.	13 TO 30
	TRACE: TRACE GRAVEL, TRACE CLAY	1 TO 12
	AND: SAND AND GRAVEL	USE FOR EQUAL AMOUNTS
	WITH: WITH ROCK FRAGMENTS WITH ORGANIC MATTER	INDICATES PRESENCE ONLY

DESIGNED ______ DATE
DRAWN ______ DATE
CHECKED ______ DATE
APPROVED ______ DATE

REVISIONS

DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION
3-86	JPG.	Revised Abbreviations	3-76	JPG	Revised Generalized Strata Descriptions
5-93	JPG	Revised Percentage limits of Soil adjectives "trace" and "Some".	5-80	JPG	Revised General Notes and Sampler Penetration Resistance.
			3-81	JPG.	Added Note on Generalized Strata Descriptions and Definition of Soil Adjectives.

DISTRICT OF COLUMBIA — WILLIAM H. MUESER — 4070

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY

MUESER · RUTLEDGE · WENTWORTH & JOHNSTON
CONSULTING ENGINEERS
415 MADISON AVE., NEW YORK 17, N.Y.

DE LEUW, CATHER & COMPANY
GENERAL ENGINEERING CONSULTANT ☐

HARRY WEESE & ASSOCIATES
GENERAL ARCHITECTURAL CONSULTANT ☐

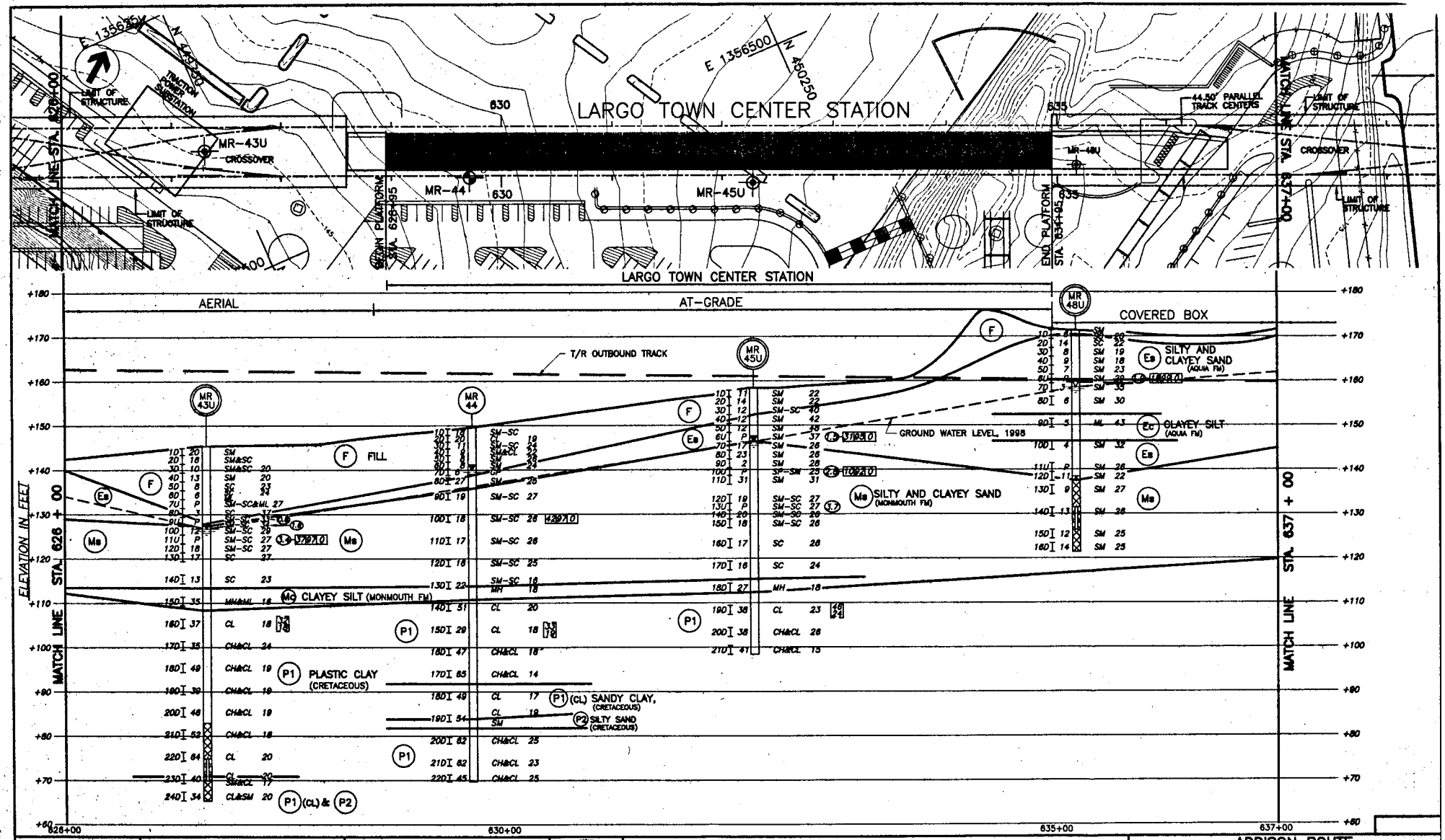
SUBMITTED William H. Mueser

APPROVED ______

SUBSURFACE INVESTIGATION
GENERAL INFORMATION DRAWING

SCALE

DRAWING NO. F-1



REFERENCE DRAWING		REVISIONS		
NUMBER	DESCRIPTION	DATE	BY	DESCRIPTION
F-1, GPG-SO-200 & GPG-SO-300	GENERAL NOTES, LEGEND AND GENERAL STRATA DESCRIPTIONS	5-98	B.L.T.	ADDED BORINGS NOS. MR-43U THROUGH MR-48U AND REVISED STRATIFICATION ACCORDINGLY.

DESIGNED ____ DATE
DRAWN IY/AP 6-98 DATE
CHECKED HSL, SLT, AAA 6-98 DATE
APPROVED ____ DATE

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY

MUESER RUTLEDGE CONSULTING ENGINEERING
708 THIRD AVENUE, NEW YORK, N.Y. 10017
SUBMITTED

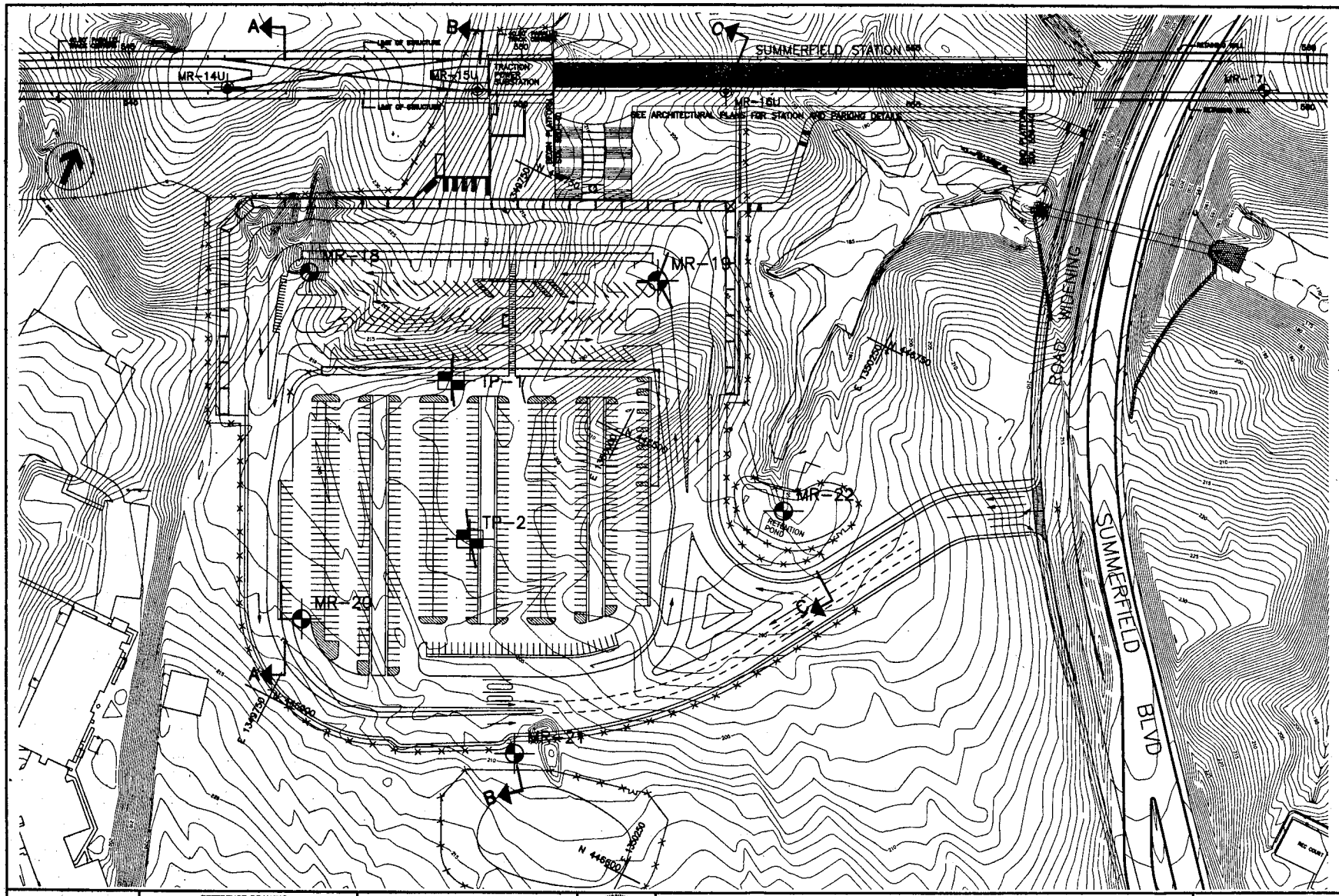
DE LEUW, CATHER & COMPANY
GENERAL ENGINEERING CONSULTANT

HARRY WEESE & ASSOCIATES
GENERAL ARCHITECTURAL CONSULTANT

ADDISON ROUTE
PLAN AND GEOLOGICAL SECTION STA. 626+00 to STA. 637+00 TANGENT ALIGNMENT

SCALE HORIZ. 0 40' 80' VERT. 0 10' 20'

DRAWING NO. GPG-SO-151



LEGEND

- $2\frac{1}{2}$" AND $3\frac{1}{2}$" DIA. MR-SERIES DRY SAMPLE BORINGS (WITH OBSERVATION WELLS IN $3\frac{1}{2}$" DIA. BORINGS) MADE AS PART OF THE CURRENT INVESTIGATION.
- $3\frac{1}{2}$" DIA. MR-SERIES BORINGS WITH UNDISTURBED SAMPLING AND OR OBSERVATION WELLS MADE AS PART OF THE CURRENT INVESTIGATION.
- TEST PIT MADE AS PART OF THE CURRENT INVESTIGATION.
- BORINGS MADE FOR WMATA PRIOR TO THIS INVESTIGATION.

DESIGNED		DATE
DRAWN	IY/AP	6-98 DATE
CHECKED	HSL, SLT, AAA	6-98 DATE
APPROVED		DATE

REFERENCE DRAWING	
NUMBER	DESCRIPTION
F-1	GENERAL NOTES AND LEGEND
GPG-SO-330	GEOLOGICAL SECTIONS
a GPG-SO-330	

REVISIONS		
DATE	BY	DESCRIPTION

COMMONWEALTH OF VIRGINIA — HARRY T. GOUGH — LICENSED PROFESSIONAL ENGINEER

SUBMITTED

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY

MUESER RUTLEDGE CONSULTING ENGINEERING
708 THIRD AVENUE, NEW YORK, N.Y. 10017

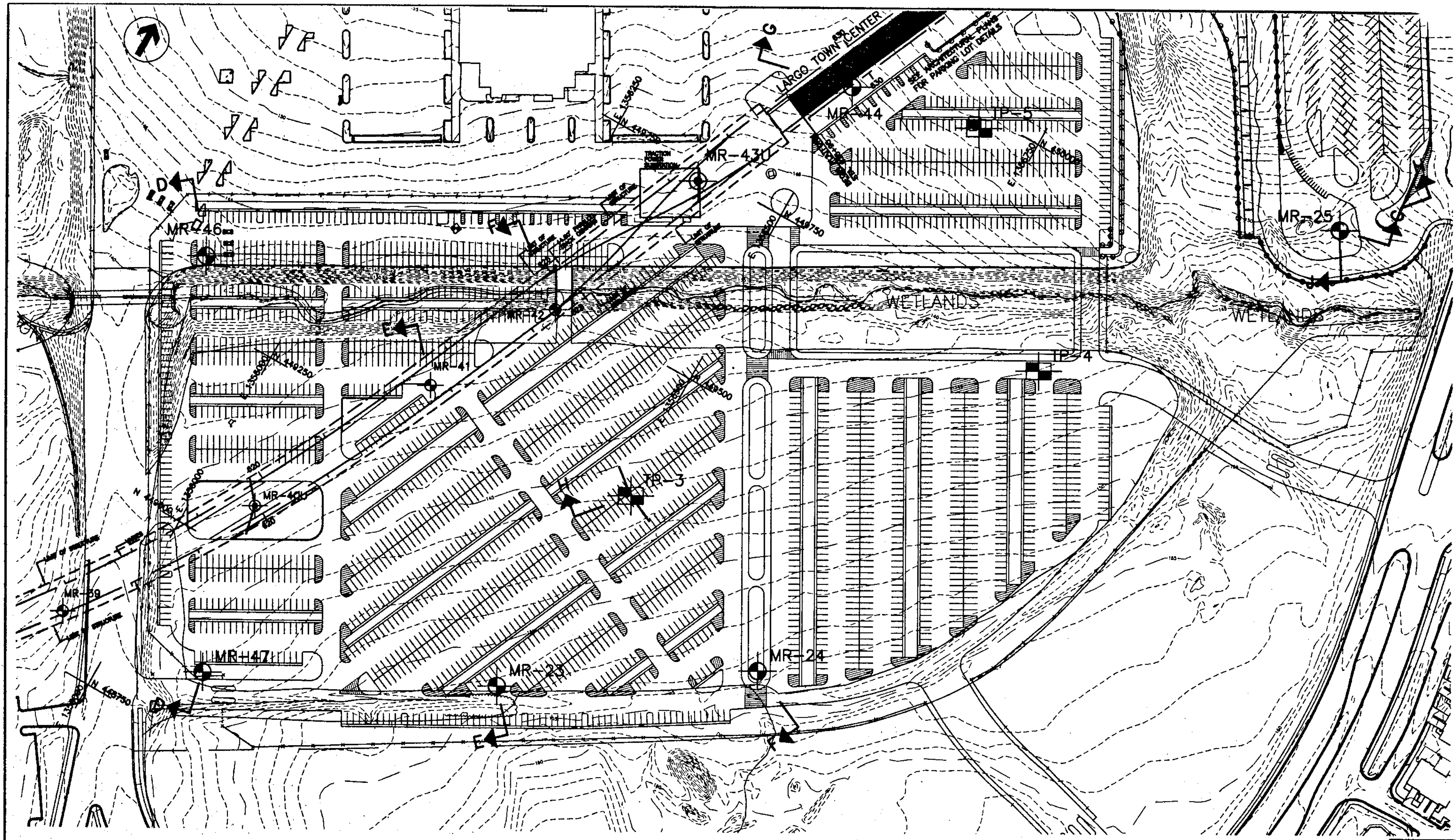
DE LEUW, CATHER & COMPANY
GENERAL ENGINEERING CONSULTANT

HARRY WEESE & ASSOCIATES
GENERAL ARCHITECTURAL CONSULTANT

ADDISON ROUTE
SUMMERFIELD STATION PARKING LOT
BORING AND TEST PIT LOCATION PLAN

SCALE 0 60' 120'

DRAWING NO. GPG-SO-290



DESIGNED		DATE
DRAW	IY/AP	6-98
CHECKED	HSL, SLT, AAA	6-98
APPROVED		

REFERENCE DRAWING

NUMBER	DESCRIPTION
F-1 &	GENERAL NOTES AND LEGEND
GPG-SO-290	
GPG-SO-330	GEOLOGICAL SECTIONS
GPG-SO-340	
GPG-SO-350	
& GPG-SO-181	

REVISIONS

DATE	BY	DESCRIPTION

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY

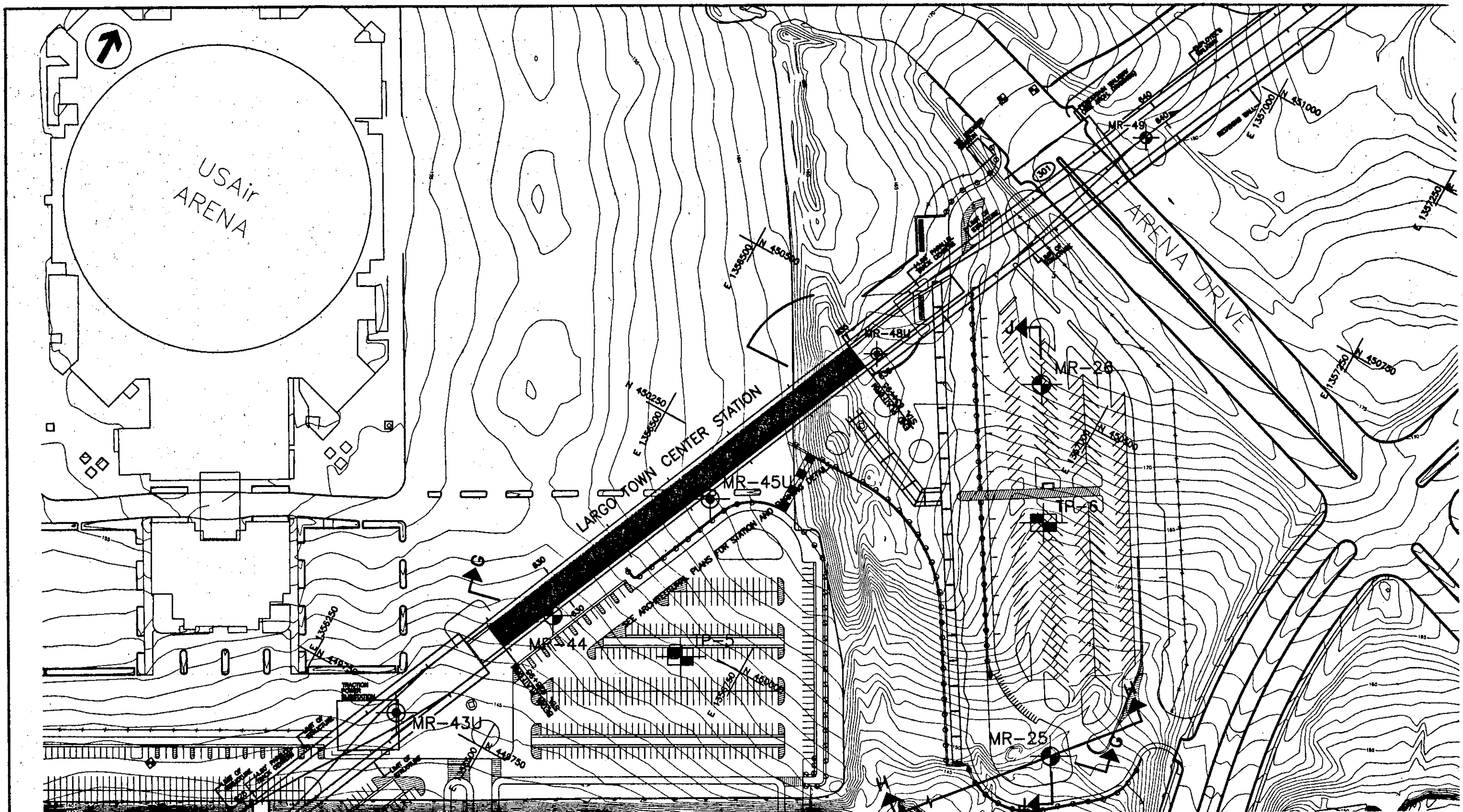
MUESER RUTLEDGE CONSULTING ENGINEERING
708 THIRD AVENUE, NEW YORK, N.Y. 10017
SUBMITTED

DE LEUW, CATHER & COMPANY
GENERAL ENGINEERING CONSULTANT
HARRY WEESE & ASSOCIATES
GENERAL ARCHITECTURAL CONSULTANT

ADDISON ROUTE
LARGO TOWN CENTER STATION PARKING LOT
BORING AND TEST PIT LOCATION PLAN

SCALE 0 60' 120'

DRAWING NO. GPG-SO-300



REFERENCE DRAWING		REVISIONS		
NUMBER	DESCRIPTION	DATE	BY	DESCRIPTION
F-1 &	GENERAL NOTES AND LEGEND			
GPG-SO-280				
GPG-SO-350	GEOLOGICAL SECTIONS			
& GPG-SO-151				

DESIGNED ______ DATE

DRAW IY/AP 6-98 DATE

CHECKED HSL, SLT, AAA 6-98 DATE

APPROVED ______ DATE

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY

MUESER RUTLEDGE CONSULTING ENGINEERING

708 THIRD AVENUE, NEW YORK, N.Y. 10017

SUBMITTED [signature]

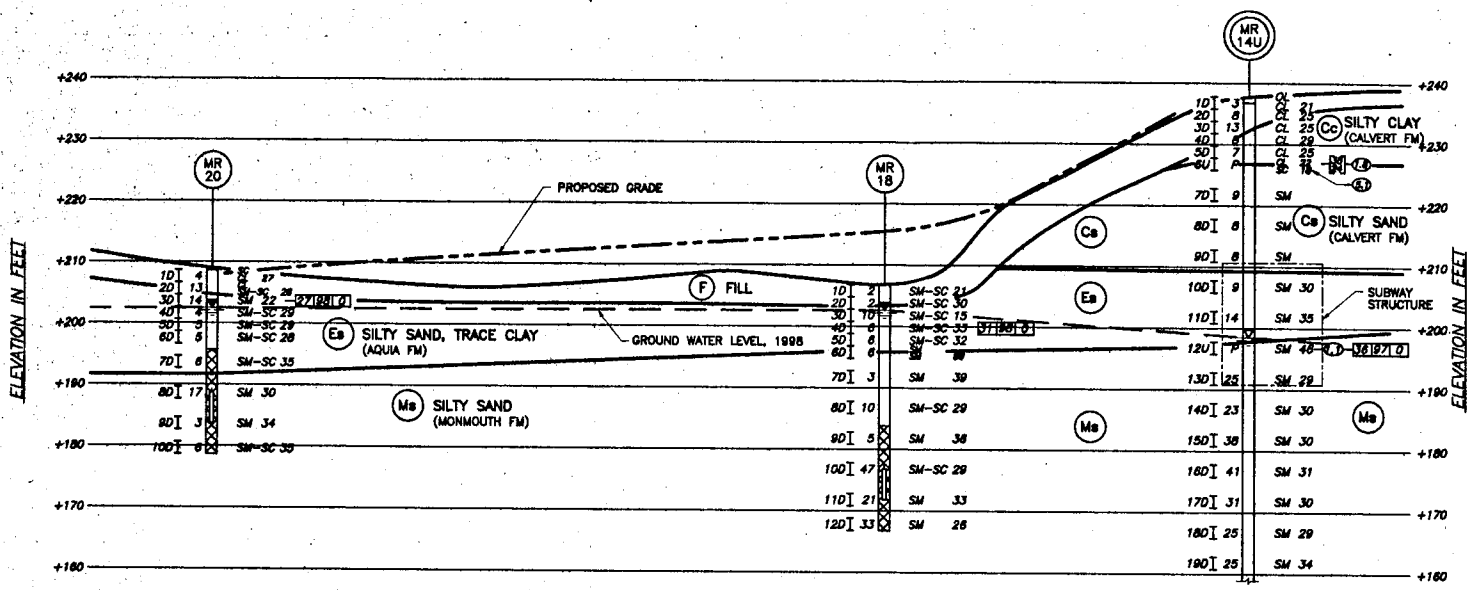
DE LEUW, CATHER & COMPANY
GENERAL ENGINEERING CONSULTANT

HARRY WEESE & ASSOCIATES
GENERAL ARCHITECTURAL CONSULTANT

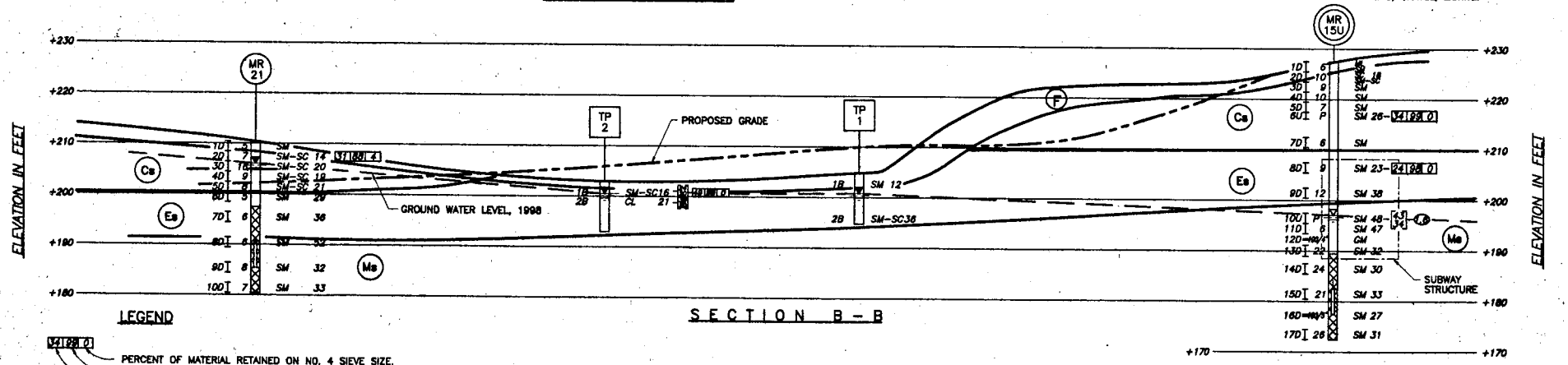
ADDISON ROUTE
LARGO TOWN CENTER STATION PARKING LOT BORING AND TEST PIT LOCATION PLAN

SCALE 0 60' 120'

DRAWING NO. GPG-SO-310



SECTION A-A



SECTION B-B

GENERAL STRATA DESCRIPTIONS

STRATUM Cc (CALVERT), PLASTIC CLAY, SILTY AND SANDY CLAY OR CLAYEY SILT: MEDIUM TO STIFF DARK GRAY, GREEN, BROWN AND YELLOW ORANGE PLASTIC CLAY, SILTY AND SANDY CLAY OR CLAYEY SILT, TRACE FINE SAND, GRAVEL.

STRATUM Cs (CALVERT), FINE SAND, TRACE TO SOME SILT, CLAY AND SILTY OR CLAYEY FINE SAND: LOOSE TO MEDIUM COMPACT DARK GRAY, OLIVE GRAY, GREEN BROWN AND YELLOW ORANGE FINE SAND, TRACE TO SOME SILT, CLAY AND SILTY OR CLAYEY FINE SAND, TRACE GRAVEL.

STRATUM Es (AQUIA), PLASTIC TO SILTY AND SANDY CLAY OR CLAYEY SILT: MEDIUM TO STIFF GRAY, GREEN, OLIVE GRAY PLASTIC CLAY TO SILTY AND SANDY CLAY OR CLAYEY SILT, TRACE LIGNITE WITH OCCASIONAL SLIGHTLY ORGANIC FINE SANDY AND SILTY CLAY LAYERS, TRACE SHELLS.

STRATUM Es (AQUIA), SILTY AND CLAYEY FINE SAND: LOOSE TO MEDIUM COMPACT GRAY GREEN, OLIVE GRAY SILTY AND CLAYEY FINE SAND, TRACE SHELLS WITH OCCASIONAL SLIGHTLY ORGANIC SILTY AND CLAYEY FINE SAND LAYERS.

STRATUM Mc (MONMOUTH), SLIGHTLY ORGANIC MICACEOUS FINE SANDY SILT AND CLAYEY SILT: LOOSE TO VERY COMPACT DARK GREEN SLIGHTLY ORGANIC MICACEOUS FINE SANDY SILT, AND VERY STIFF TO HARD CLAYEY SILT, TRACE SHELLS, OCCASIONALLY CEMENTED.

STRATUM Ms (MONMOUTH), SLIGHTLY ORGANIC MICACEOUS SILTY FINE SAND AND CLAYEY FINE SAND: LOOSE TO VERY COMPACT DARK GREEN SLIGHTLY ORGANIC MICACEOUS SILTY FINE SAND, TRACE CLAY AND CLAYEY FINE SAND, AND FINE SAND, SOME SILT, TRACE TO SOME SHELLS, OCCASIONALLY CEMENTED, CEMENTED SAND LAYERS.

STRATUM P1 (CRETACEOUS), PLASTIC CLAY: STIFF TO HARD MOTTLED RED-BROWN AND GRAY OR LIGHT GRAY PLASTIC CLAY TO SILTY CLAY, TRACE FINE SAND, SILT POCKETS, SAND POCKETS, CEMENTED SAND, LIGNITE, GENERALLY SLICKENSIDED.

STRATUM P1(CL) (CRETACEOUS), SANDY CLAY: STIFF TO HARD GRAY SILTY CLAY, SOME FINE SAND LAYERS TO SANDY CLAY, TRACE CEMENTED SAND, LIGNITE.

STRATUM P2 (CRETACEOUS), SAND, SOME SILT, CLAY: COMPACT TO VERY COMPACT, LIGHT GRAY, BROWN OR TAN FINE TO MEDIUM SAND, SOME SILT, CLAY TO SILTY OR CLAYEY FINE TO MEDIUM SAND, TRACE CEMENTED SAND LAYERS, GRAVEL, LIGNITE.

LEGEND

34 | 98 | 0 — PERCENT OF MATERIAL RETAINED ON NO. 4 SIEVE SIZE. PERCENT OF MATERIAL PASSING THE NO. 40 SIEVE SIZE. PERCENT OF MATERIAL PASSING THE NO. 200 SIEVE SIZE.

INDICATES POSITION OF POROUS INTAKE IN THE OBSERVATION WELL.

DESIGNED ____ DATE
DRAWN IY, AP 6-88 DATE
CHECKED HSL, SLT, AAA 6-88 DATE
APPROVED ____ DATE

REFERENCE DRAWING	
NUMBER	DESCRIPTION
F-1	GENERAL NOTES AND LEGEND
GPG-SO-320	BORING AND TEST PIT LOCATION PLAN

REVISIONS		
DATE	BY	DESCRIPTION

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY

MUESER RUTLEDGE CONSULTING ENGINEERING
708 THIRD AVENUE, NEW YORK, N.Y. 10017
SUBMITTED

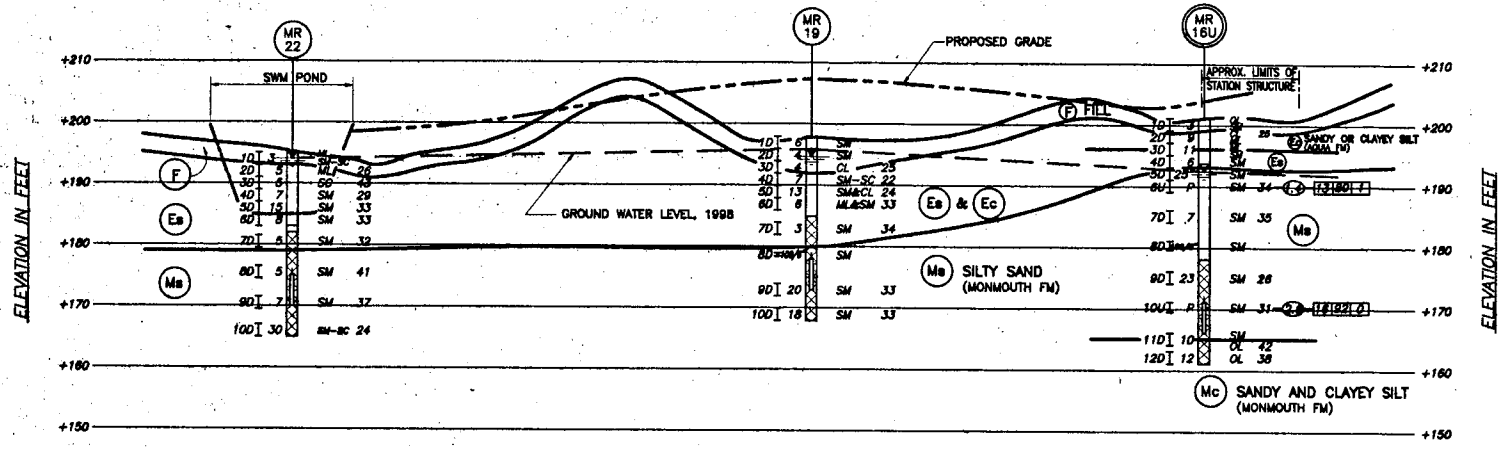
DE LEUW, CATHER & COMPANY
GENERAL ENGINEERING CONSULTANT

HARRY WEESE & ASSOCIATES
GENERAL ARCHITECTURAL CONSULTANT

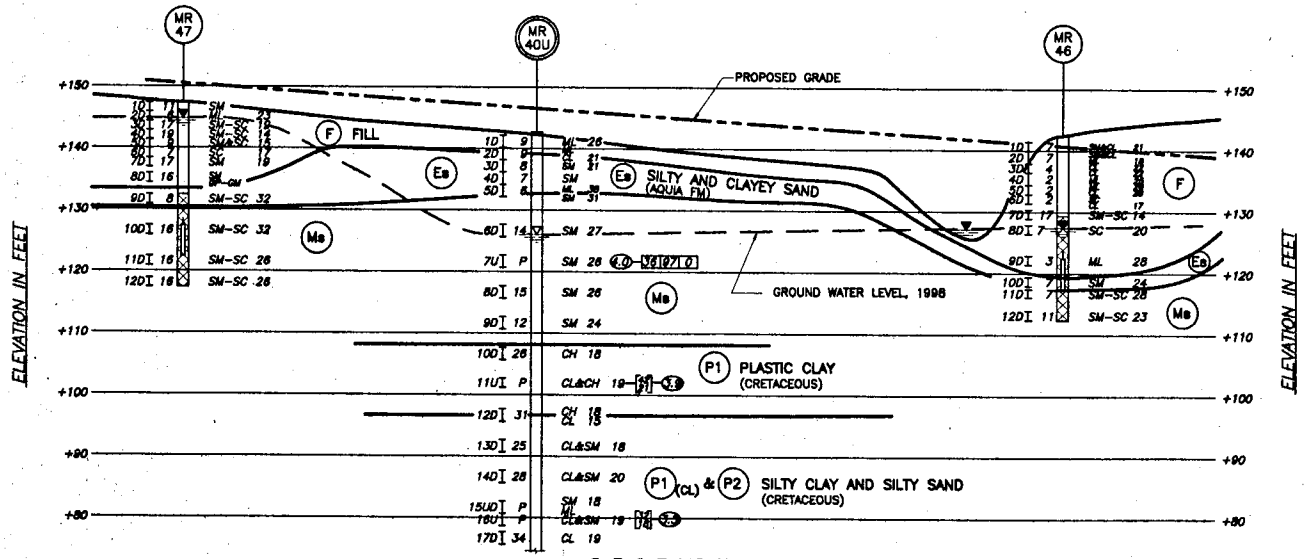
ADDISON ROUTE
SUMMERFIELD STATION PARKING LOT
GEOLOGICAL SECTIONS A-A AND B-B

SCALE HORZ. 0 40' 80' VERT. 0 10' 20'

DRAWING NO. GPG-SO-320



SECTION C – C



SECTION D – D

DESIGNED		DATE
DRAWN	IY/AP	6-98 DATE
CHECKED	HSL, SLT, AAA	6-98 DATE
APPROVED		DATE

REFERENCE DRAWING

NUMBER	DESCRIPTION
F-1 &	GENERAL NOTES, LEGEND AND GENERAL STRATA
GPG-SO-320	DESCRIPTIONS
GPG-SO-330 &	BORING AND TEST PIT LOCATION PLANS
GPG-SO-300	

REVISIONS

DATE	BY	DESCRIPTION

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY

MUESER RUTLEDGE CONSULTING ENGINEERING
708 THIRD AVENUE, NEW YORK, N.Y. 10017
SUBMITTED

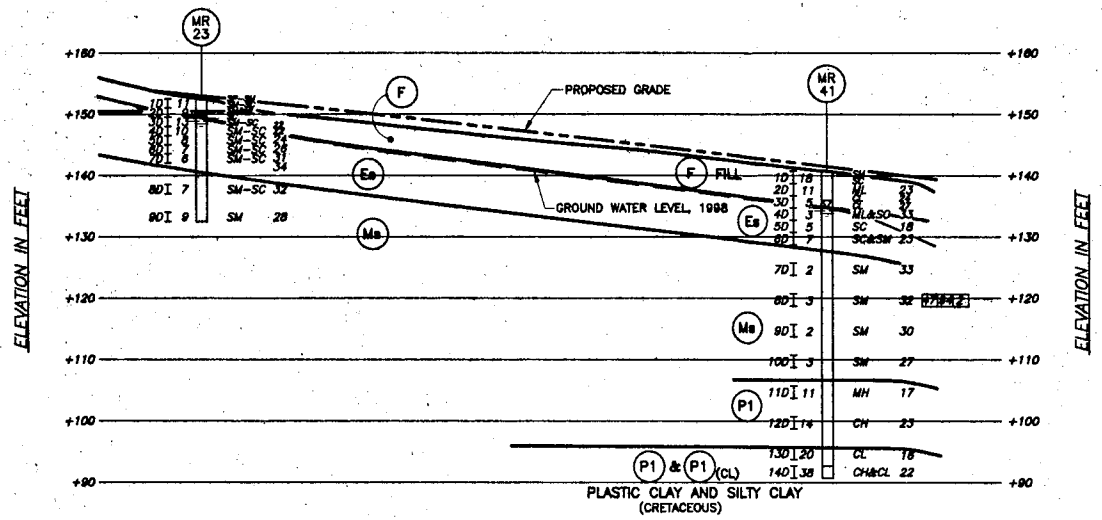
DE LEUW, CATHER & COMPANY
GENERAL ENGINEERING CONSULTANT

HARRY WEESE & ASSOCIATES
GENERAL ARCHITECTURAL CONSULTANT

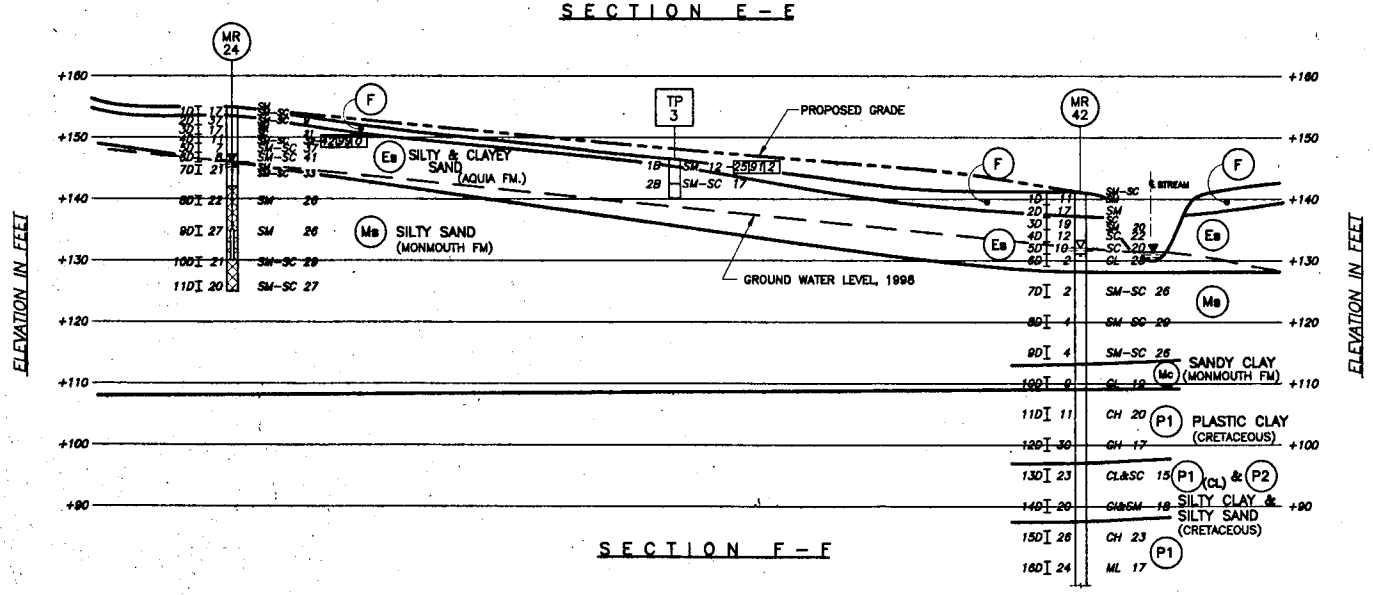
ADDISON ROUTE
SUMMERFIELD AND LARGO TOWN CENTER STATIONS PARKING LOTS
GEOLOGICAL SECTIONS C–C AND D–D

SCALE HORIZ. 0 40' 80' VERT. 0 10' 20'

DRAWING NO. GPG-SO-330



SECTION E-E



SECTION F-F

DESIGNED		DATE	
DRAWN	I.Y.	DATE	6-98
CHECKED	HSL, SLT, AAA	DATE	6-98
APPROVED		DATE	

REFERENCE DRAWING

NUMBER	DESCRIPTION
F-1 &	GENERAL NOTES, LEGEND AND GENERAL STRATA
GPG-SO-320	DESCRIPTIONS
GPG-SO-330	BORING AND TEST PIT LOCATION PLAN

REVISIONS

DATE	BY	DESCRIPTION

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY

MUESER RUTLEDGE CONSULTING ENGINEERING
708 THIRD AVENUE, NEW YORK, N.Y. 10017

SUBMITTED

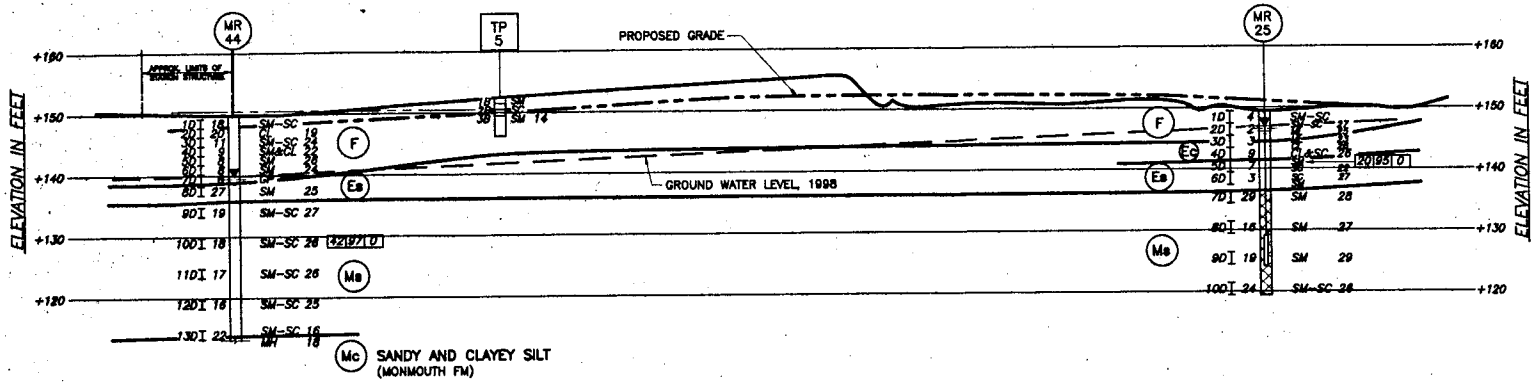
DE LEUW, CATHER & COMPANY
GENERAL ENGINEERING CONSULTANT

HARRY WEESE & ASSOCIATES
GENERAL ARCHITECTURAL CONSULTANT

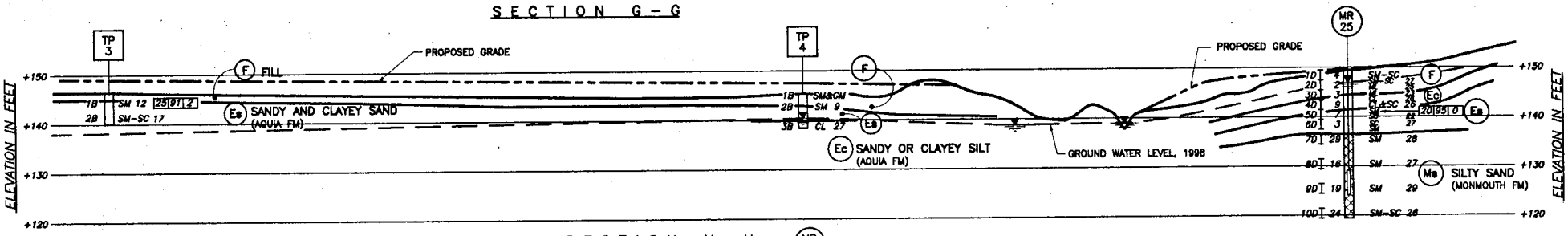
ADDISON ROUTE
LARGO TOWN CENTER STATION PARKING LOT
GEOLOGICAL SECTIONS E-E AND F-F

SCALE HORIZ. 0 40' 80'
VERT. 0 10' 20'

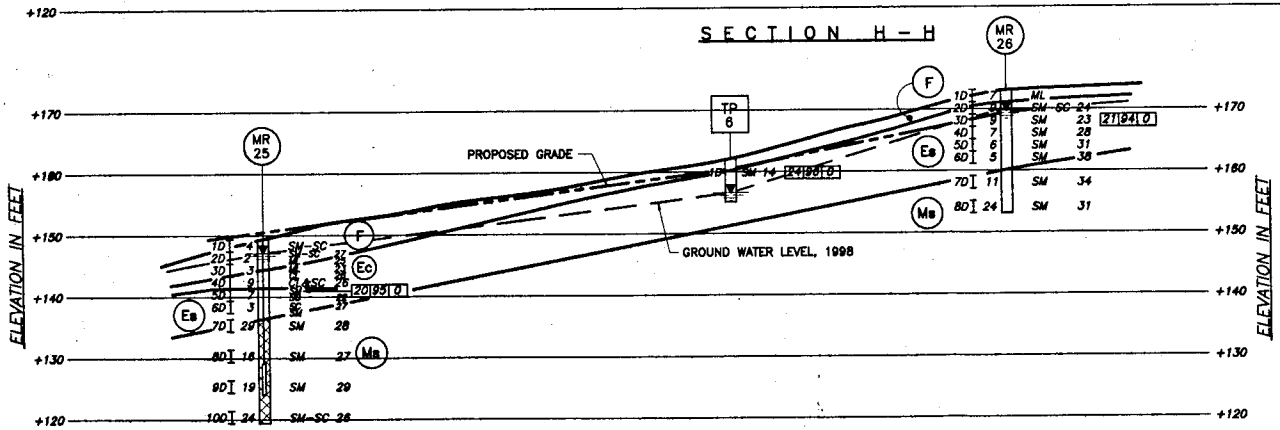
DRAWING NO. GPG-SO-340



SECTION G – G



SECTION H – H



SECTION J – J

DESIGNED		DATE
DRAWN	I.Y.	6-98
CHECKED	HSL, SLT, AAA	6-98
APPROVED		

REFERENCE DRAWING

NUMBER	DESCRIPTION
Y-1 & GPG-SO-350	GENERAL NOTES, LEGEND AND GENERAL STRATA DESCRIPTIONS
GPG-SO-300 & GPG-SO-310	BORING AND TEST PIT LOCATION PLANS

REVISIONS

DATE	BY	DESCRIPTION

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY

MUESER RUTLEDGE CONSULTING ENGINEERING
708 THIRD AVENUE, NEW YORK, N.Y. 10017
SUBMITTED

DE LEUW, CATHER & COMPANY
GENERAL ENGINEERING CONSULTANT

HARRY WEESE & ASSOCIATES
GENERAL ARCHITECTURAL CONSULTANT

ADDISON ROUTE
LARGO TOWN CENTER STATION PARKING LOT
GEOLOGICAL SECTIONS G–G, H–H AND J–J

SCALE HORIZ. 0 40' 80' VERT. 0 10' 20'

DRAWING NO. GPG-SO-350

BORING NUMBER MR-18

Ground surface elevation +206.8

DEPTH BELOW GROUND SURFACE, FEET

Depth					
0	2	1D	1/12",2,3	Gray brown silty fine sand, trace clay, wood (FILL) (SM-SC)	FILL 4.0'
	3			Top: Do 1D (FILL) (SM-SC)	
	3	2D	1,1,1,2	Bot: Brn grn sl f sa, tr cl, rts, o/ sand(SM-SC)	
5	7			Brown gray green silty fine sand, tr clay, clay seams, medium sand, roots (SM-SC)	LOOSE BROWN GRAY GREEN SILTY FINE SAND, TR CLAY, CLAY SEAMS, SHELLS, CEMENTED SAND ROOTS 11.0'
		3D	2,2,4,5	Do 3D (SM-SC)	
		5D	3,3,3,4	Top: Do 3D, trace cemented sand (SM-SC)	
10		6D	2,3,3,4	Bot: Gry sl f sand, tr cl, mica, shells (SM)	
				Top: Do 5D., Bet (SM)	
				Bot: Dark gray slightly organic silty fine sand, trace clay (SM)	
15		7D	1,1,2,1	Dark gray slightly micaceous silty fine sand, trace clay, shells, cemented sand (SM)	
		8D	3,3,7,8	Dark gray slightly organic micaceous silty fine sand, trace clay, shells (SM-SC)	LOOSE TO COMPACT DARK GRAY SLIGHTLY ORGANIC MICACEOUS SILTY FINE SAND, TRACE CLAY, SHELLS, CEMENTED SAND, SHELL LAYERS
20		9D	2,2,2,3	Dark gray slightly organic micaceous silty fine sand, trace shells, clay (SM)	
		10D	18,34,23,21	Gray slightly organic micaceous silty fine sand, trace shells, shell layers, clay, cemented sand (SM-SC)	
25		11D	7,8,15,18	Dark gray slightly organic micaceous silty fine sand, trace clay, shells (SM)	
		12D	8,13,39,39	Do 11D (SM)	40.0'
30					
35					
40					

Boring started 4-22-96 completed 4-23-96
Final depths:
Boring = 40.0' Casing = 4.0'
Casing diameter = 4"
Average depth of ground water observed in the boring = 4.2' =El. +202.6

REMARKS:

Used 140 lb. automatic hammer to drive 2-inch O.D. split spoon sampler.

Used water below 4' depth to maintain hole open.

Observation well consisting of 1-1/2" PVC pipe installed with tip at 35' depth.

Borehole was grouted between 0' and 20' depth.

BORING NUMBER MR-19

Ground surface elevation +197.9

Depth					
0	9	1D	1,3,3,4	Gray brown silty fine sand (FILL) (SM)	FILL 6.0'
	17				
	13	2D	2,3,1,2	Do 1D (FILL) (SM)	
5	11				
	6/6"	3D	2,2,2,2	Medium stiff brown & gray fine sandy clay, an clayey f sand lyrs (Possible Fill) (CL)	LOOSE TO MED CPT GRAY BRN SILTY FINE SAND, SM MEDIUM CLAYEY SILT AND FINE SANDY CLAY LAYERS, TR CEMENTED SAND GRAVEL, GRAVEL LAYERS 18.0'
		4D	2,3,4,7	Gray brown silty fine sand, trace clay, clay layers, mica (SM-SC)	
		5D	7,6,7,7	Brown & gray silty fine to medium sand, some fine sandy clay layers (SM&CL)	
10		6D	2,3,3,3	Medium gray brown clayey silt, some fine sand, silty fine sand layers, trace cemented sand (ML&SM)	
		7D	1/12",2,3	Orange gray black silty fine sand, trace gravel, gravel layers, clay (SM)	
15					
		8D	50/6"	Gray fine to medium sand, some silt, cemented sand, trace cemented sand layers (SM)	V CPT GRY F-M SAND, SM SILT, CEMENTED SAND, CEMENTED SAND LAYERS 23.0'
20		9D	6,8,12,14	Gray slightly organic micaceous silty fine sand, trace shells, clay (SM)	MED CPT GRAY SLIGHTLY ORGANIC MICACEOUS SILTY FINE SAND, TRACE SHELLS, CLAY 30.0'
		10D	6,7,11,17	Do 8D (SM)	
25					
30					

Boring started 4-24-96 completed 4-27-96
Final depths:
Boring = 30.0' Casing = 4.5'
Casing diameter = 4"
Average depth of ground water observed in the boring = 3.3' =El. +194.5

REMARKS:

Used 140 lb. automatic hammer to drive 2-inch O.D. split spoon sampler.

Used water below 4.5' depth to maintain hole open.

Encountered cemented sand layers from 18.4' to 19.8' and 21.8' to 23' depths.

Observation well consisting of 1-1/2" PVC pipe installed with tip at 25' depth.

Borehole was grouted between 0' and 10' depth.

BORING NUMBER MR-20

Ground surface elevation +208.5

Depth					
0	8	1D	1,3,3,3	Top: Brn clayey f sand, tr roots (FILL) (SC)	FILL 4.0'
	12			Bot: V stiff brn sl clay, tr f sand (FILL) (CL)	
	25	2D	2,5,8,8	Top: Do 1D, Bot, tr root (FILL) (CL)	
	47			Bot: Brn sl f sand, tr cl, cl seams (SM-SC)	
5	23/6"	3D	7,8,8,5	Gray green fine sand, sm silt, tr clay, clay seams, medium to coarse sand (SM)	LOOSE TO MED CPT BROWN GREEN SILTY FINE SAND TO FINE SAND, SOME SILT, TRACE CLAY, CLAY SEAMS, MICA 17.0'
		4D	1,2,2,3	Brown green silty fine sand, trace clay, clay seams, mica (SM-SC)	
		5D	2,2,3,4	Do 4D (SM-SC)	
10		6D	2,2,3,4	Do 4D (SM-SC)	
		7D	1,3,3,3	Do 4D, trace dark gray slightly organic micaceous silty fine sand pockets (SM-SC)	
15					
		8D	4,7,10,12	Dark gray black slightly organic micaceous silty fine sand, trace clay (SM)	LOOSE TO MED COMPACT DARK GRAY BLACK SLIGHTLY ORGANIC MICACEOUS SILTY FINE SAND, TRACE CLAY, SHELLS, CEMENTED SAND, CLAY POCKETS 30.0'
20		9D	1,1,2,3	Do 8D (SM)	
		10D	2,2,4,11	Do 8D, tr shells, sl pbls, com sand(SM-SC)	
25					
30					

Boring started 4-24-96 completed 4-24-96
Final depths:
Boring = 30.0' Casing = 4.5'
Casing diameter = 4"
Average depth of ground water observed in the boring = 6.2' =El. +202.3

REMARKS:

Used 140 lb. automatic hammer to drive 2-inch O.D. split spoon sampler.

Used water below 4.5' depth to maintain hole open.

Observation well consisting of 1-1/2" PVC pipe installed with tip at 25' depth.

Borehole was grouted between 0' and 10' depth.

BORING NUMBER MR-21

Ground surface elevation +210.4

Depth					
0	4	1D	1,2,2,3	Brown silty fine sand, trace clay, gravel, roots (FILL) (SM)	FILL 2.0'
	6				
	9	2D	2,3,4,6	Brown silty fine sand, trace clay, m-c sand, clay layers, gravel, roots (SM-SC)	LOOSE TO MED CPT BRN SILTY FINE SAND, TRACE CLAY, CLAY LYRS, GRAVEL, ROOTS, MICA 10.0'
5	12				
		3D	3,8,8,9	Do 2D (SM-SC)	
		4D	4,5,4,4	Brown silty fine sand, trace clay, mica (SM-SC)	
		5D	3,4,4,5	Do 4D, trace gravel, clay seams, roots (SM-SC)	
10		6D	2,2,3,3	Brown gray green silty fine sand, trace clay, clay seams, mica (SM)	LOOSE BROWN GRAY GREEN SILTY FINE SAND, TRACE CLAY SEAMS, MICA 18.0'
		7D	2,3,3,3	Do 6D (SM)	
15					
		8D	2,2,4,4	Dark gray slightly organic micaceous silty fine sand, trace clay (SM)	
20		9D	2,4,4,6	Do 8D (SM)	LOOSE DARK GRAY SLIGHTLY ORGANIC MICACEOUS SILTY FINE SAND, TRACE CLAY 30.0'
		10D	2,3,4,5	Do 8D (SM)	
25					
30					

Boring started 4-29-96 completed 4-30-96
Final depths:
Boring = 30.0' Casing = 4.0'
Casing diameter = 4"
Average depth of ground water observed in the boring = 4.4' =El. +206.0

REMARKS:

Used 140 lb. automatic hammer to drive 2-inch O.D. split spoon sampler.

Used water below 4' depth to maintain hole open.

Observation well consisting of 1-1/2" PVC pipe installed with tip at 25' depth.

Borehole was grouted between 0' and 10' depth.

NOTES:

1. BORINGS NOS. MR-18 THROUGH MR-21, MR-22 THROUGH MR-26, AND MR-43U THROUGH MR-47 WERE MADE BY GEOSERVICES CORPORATION UNDER SUBCONTRACT TO GEOTECH ENGINEERS, INC. BETWEEN MARCH 30, 1996 AND APRIL 29,1996. THE BORINGS WERE INSPECTED AND LOGGED BY GEOSERVICES CORPORATION.
2. TEST PITS NOS. TP-1 THROUGH TP-6 WERE MADE BY GEOTECH ENGINEERS, INC. ON MAY 7, 1996. THEY ALSO INSPECTED AND LOGGED THE TEST PITS.
3. BORING NO. MR-7 WAS DELETED FROM THE PROGRAM BECAUSE WE WERE UNABLE TO OBTAIN PERMISSION TO ACCESS THE SITE.
4. COORDINATES LOCATIONS OF THE BORINGS ARE LISTED ON TABLE NO. 1 OF MRCE SERIES REPORT NO. 252.

DESIGNED _____ DATE
DRAWN A.P DATE 6-98
CHECKED H.S.L., S.L.T. & A.A.A. DATE 6-98
APPROVED _____ DATE

REFERENCE DRAWINGS

NUMBER	DESCRIPTION
F-1	General Notes & Legend
GPG-SO-24	Boring Location Plan and
320-330	Geological Sections

REVISIONS

DATE	BY	DESCRIPTION

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY

MUESER RUTLEDGE CONSULTING ENGINEERS
708 THIRD AVENUE, NEW YORK, N.Y. 10017
SUBMITTED _____

DE LEUW, CATHER & COMPANY
GENERAL ENGINEERING CONSULTANT ☐

HARRY WEESE & ASSOCIATES
GENERAL ARCHITECTURAL CONSULTANT ☐

APPROVED _____

ADDISON ROUTE
LOGS OF MR-SERIES BORINGS
MR-18 TO MR-21

SCALE 0 3' 6' 12'

DRAWING NO. GPG-SO-360

DEPTH BELOW GROUND SURFACE, FEET

BORING NUMBER MR-22

Ground surface elevation +195.0

Casing blows: 3, 4, 6, 12, 10, 14, 12, 13, 13, 13, 9, 10, 12, 12, 11, 12, 11, 12, 7/6"

Sample	Blows	Description	Stratum
1D	1,1,2,3	Top: Brn silt, sm f sa, tr clay, wood (Fill) (ML); Bot: Brn silty fine sand, tr clay (Fill) (SM-SC)	FILL 2.0'
2D	2,2,3,4	Gray brown fine sandy silt, trace clay, clay pockets, mica, gravel, roots (ML)	LOOSE F SANDY SILT 4.0'
3D	2,2,3,4	Brown gray clayey fine sand, trace mica (SC)	LOOSE TO MED CPT BROWN GRAY AND BROWN BLACK SILTY FINE SAND, TRACE CLAY, CLAYEY FINE SAND LAYERS, MICA
4D	3,3,4,4	Brown black silty fine sand, trace clay, mica (SM)	
5D	3,6,9,9	Do 4D (SM)	
6D	2,3,4,6	Do 4D (SM)	
7D	2,2,3,3	Dark gray slightly organic micaceous silty fine sand, trace clay (SM)	16.0'
8D	1,2,3,3	Gray silty fine sand, trace cemented sand, mica, clay seams (SM)	LOOSE TO MED CPT DARK GRAY AND GRAY SLIGHTLY ORGANIC MICACEOUS SILTY FINE SAND, TRACE CLAY, CEMENTED SAND, CLAY SEAMS
9D	4,3,4,7	Dark grey slightly organic micaceous silty fine sand, trace clay (SM)	
10D	10,13,17,19	Gray micaceous silty fine sand, trace clay (SM-SC)	30.0'

Boring started 4-27-98 completed 4-28-98
Final depths:
Boring = 30.0' Casing = 18.5'
Casing diameter = 4"
Average depth of ground water observed in the boring = 1.0' =El. +194.0

REMARKS:

Used 140 lb. automatic hammer to drive 2-inch O.D. split spoon sampler.

Drove casing to 4.5' depth. Washed ahead of casing between 4.5' and 18.5' depth. -Casing blows not representative of soil consistency.

Used water below 18.5' depth to maintain hole open.

Performed one falling head test in the hole with depth of casing at 4.7' and depth of hole at 18.5'

Performed another falling head test in the hole with depth of casing at 18.5' and depth of hole at 20.5'.

Observation well consisting of 1-1/2" PVC pipe installed with tip at 25' depth.

Borehole was grouted between 0' and 10' depth.

BORING NUMBER MR-23

Ground surface elevation +152.5

Casing blows: 7, 12, 15, 19, 14

Sample	Blows	Description	Stratum
1D	6,7,4	Top: Brn f-c sand, sm grvl, tr silt (Fill) (SP-SM); Bot: Brn si f sand, tr clay, gravel, clay layers (Fill) (SM-SC)	FILL 3.0'
2D	2,3,4	Top: Brn si f sand, sm clayey silt pockets, tr gravel (Fill) (SM&ML); Bot: Brn gra cl f sand, tr mica (Fill) (SC)	LOOSE TO MED CPT BRN GRAY GREEN MICACEOUS SILTY FINE SAND, TR CLAY, CLAY SEAMS, GRAVEL
3D	6,6,7	Brn grn mic si f sand, tr cl, cl sm (SM-SC)	
4D	3,4,6	Do 3D (SM-SC)	
5D	2,3,5	Brn gray green micaceous silty fine sand, tr clay, clay seams (SM-SC)	
6D	2,3,4	Do 5D, trace gravel (SM-SC)	
7D	2,2,4	Do 5D (SM-SC)	12.0'
8D	2,3,4	Dark gray slightly organic micaceous silty fine sand, trace clay, shells (SM-SC)	LOOSE DARK GRY SLIGHTLY ORGANIC MICACEOUS SILTY FINE SAND AND F-M SAND, SM SILT, TR CLAY, SHELLS, MICA
9D	2,2,7	Dk gry f-m sand, sm si, tr shells, mica (SM)	20.0'

Boring started 4-3-98 completed 4-3-98
Final depths:
Boring = 20.0' Casing = 5.0'
Casing diameter = 4"
Average depth of ground water observed in the boring = 3.2' =El. +149.3

REMARKS:

Encountered 0.5' gravel base below 0.1' asphalt at surface.

Used water below 5' depth to maintain hole open.

Borehole was grouted upon completion

BORING NUMBER MR-24

Ground surface elevation +158.0

Casing blows: 68, 45, 59, 10, 18

Sample	Blows	Description	Stratum
1D	6,7,10	Top: Brn f-c sand, sm silt, gravel (Fill) (SM); Bot: Brn gray silty fine sand, trace clay, mica (Poss. Fill) (SM-SC)	FILL 1.5'
2D	11,23,16	Brown gray silty fine sand, trace clay, coarse sand, gravel, mica (SM-SC)	LOOSE TO CPT BRN GRN SILTY FINE SAND, TR CLAY, MICA, GRAVEL, CLAYEY FINE SAND LYRS 9.0'
3D	9,7,10	Top: Brn si f sand, tr mica, gvl, clay (SM); Bot: Brn gry clayey f sand, tr mica (SC)	
4D	4,4,7	Brn grn silty fine sand, tr cl, mica (SM-SC)	
5D	2,3,4	Do 4D (SM-SC)	
6D	3,3,5	Gray green micaceous silty fine sand, trace clay (SM-SC)	
7D	15,9,12	Top: Gray fine to coarse sand, some cemented sand, silt (SM); Bot: Dark gray slightly organic micaceous silty fine sand, trace clay, shells (SM-SC)	MEDIUM COMPACT DARK GRAY SLIGHTLY ORGANIC MICACEOUS SILTY FINE SAND, TRACE CLAY, SHELLS, MICA, CEMENTED SAND LAYER
8D	8,10,12	Gray micaceous silty fine sand, trace clay, shells (SM)	
9D	7,11,16	Gray fine to medium sand, some silt, trace shells, clay, mica (SM)	
10D	8,8,12	Dark grey slightly organic micaceous silty fine sand, trace clay, shells (SM-SC)	
11D	9,8,11	Do 10D (SM-SC)	30.0'

Boring started 4-3-98 completed 4-6-98
Final depths:
Boring = 30.0' Casing = 5.0'
Casing diameter = 4"
Average depth of ground water observed in the boring = 9.0' =El. +149.0

REMARKS:

Encountered 0.1' asphalt and gravel at surface.

Used water below 5' depth to maintain hole open

Encountered cemented sand layer between 9.3' and 9.7' depth

Observation well consisting of 1-1/2" PVC pipe installed with tip at 25' depth

Borehole was grouted between 0' and 11' depth.

BORING NUMBER MR-25

Ground surface elevation +149.4

Casing blows: 3, 8, 8, 8, 5/6"

Sample	Blows	Description	Stratum
1D	1,2,2,2	Brown silty fine sand, sm clayey fine sand layers, trace clay, veg, roots (Fill) (SM-SC)	FILL
2D	2,1,1,2	Top: Do 1D (Fill) (SM-SC); Bot: Gray clayey silt, sm fine sand (Fill) (ML)	
3D	1,1,2,3	Top: Do 2D, Bot (Fill) (ML); Bot: Medium gry brn fine sandy clay (CL)	5.0'
4D	3,4,6,8	Do 3D, Bot, some clayey fine sand layers, trace cemented sand (CL&SC)	MED F SA CLAY, SM CL F SA LYRS, TR CEM SAND 8.0'
5D	3,3,4,4	Top: Brown to gray green fine sand, some silt, trace medium to coarse sand (SM); Bot: Gray micaceous f sand, sm clay (CL)	LOOSE GRAY MICACEOUS FINE SAND, SM SILT, CLAY, TR GVL, MICA 13.0'
6D	2,1,2,3	Top: Do 5D, Bot, trace gravel (SC); Bot: Dark gray silty fine sand, tr mica (SM)	
7D	7,12,17,22	Gray fine sand, some silt, trace shells, mica (SM)	MEDIUM COMPACT DARK GRAY SLIGHTLY ORGANIC MICACEOUS SILTY FINE SAND AND GRAY FINE SAND, SOME SILT, TRACE CLAY, SHELLS, SHELL LAYERS
8D	6,7,9,12	Dark gray slightly organic micaceous silty fine sand, trace clay, shells (SM)	
9D	6,8,10,14	Do 8D, shell layers (SM)	
10D	6,11,13,17	Do 8D (SM-SC)	30.0'

Boring started 4-22-98 completed 4-22-98
Final depths:
Boring = 30.0' Casing = 4.5'
Casing diameter = 4"
Average depth of ground water observed in the boring = 2.3' =El. +147.1

REMARKS:

Used water below 4.5' depth to maintain hole open.

Observation well consisting of 1-1/2" PVC pipe installed with tip at 25.3' depth.

Borehole was grouted between 0' and 8.8' depth.

BORING NUMBER MR-26

Ground surface elevation +173.1

Casing blows: 6, 17, 25, 32, 23/3"

Sample	Blows	Description	Stratum
1D	2,3,4,3	Brown fine sandy silt, trace roots (Fill) (ML)	FILL 2.0'
2D	4,4,5,5	Brown fine sand, some silt, trace clay, mica (SM-SC)	LOOSE BROWN FINE SAND, SOME SILT, TRACE CLAY, MICA
3D	3,4,5,5	Brown fine sand, some silt, trace medium to coarse sand, mica, clay (SM)	
4D	3,3,4,3	Brown fine sand, some silt, trace mica (SM)	
5D	2,3,3,3	Do 4D, trace clay (SM)	
6D	2,2,3,3	Do 4D, trace clay (SM)	13.0'
7D	3,4,7,11	Gray brown micaceous silty fine sand, trace shells, clay (SM)	MED CPT SLIGHTLY ORGANIC MICACEOUS SILTY FINE SAND, TRACE SHELLS, CLAY 20.0'
8D	6,10,14,19	Dark gray slightly organic micaceous silty fine sand, trace shells, clay (SM)	

Boring started 4-21-98 completed 4-21-98
Final depths:
Boring = 20.0' Casing = 4.8'
Casing diameter = 4"
Average depth of ground water observed in the boring = 3.4' =El. +169.4

REMARKS:

Used water below 4.8' depth to maintain hole open.

Borehole was grouted upon completion

DESIGNED		DATE
DRAWN	A.P.	6-98
CHECKED	H.S.L., S.L.T. & A.A.A.	6-98
APPROVED		

REFERENCE DRAWINGS

NUMBER	DESCRIPTION
F-1	General Notes & Legend
GPG-SO-290, 300, 310	Boring Location Plans & Geological
330, 340	Sections.
& 350	

REVISIONS

DATE	BY	DESCRIPTION

STATE OF MARYLAND · REGISTERED PROFESSIONAL ENGINEER

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY

MUESER RUTLEDGE CONSULTING ENGINEERS
708 THIRD AVENUE, NEW YORK, N.Y. 10017

SUBMITTED [signature]

DE LEUW, CATHER & COMPANY
GENERAL ENGINEERING CONSULTANT

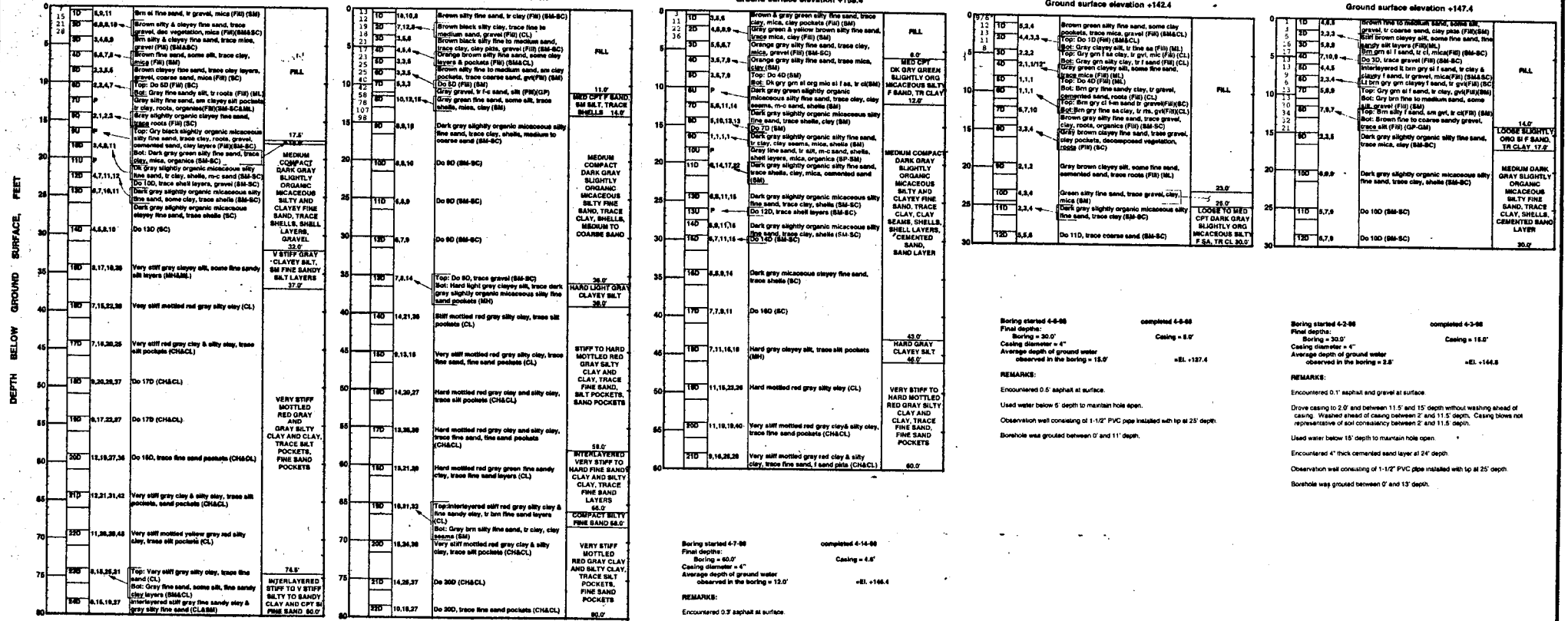
HARRY WEESE & ASSOCIATES
GENERAL ARCHITECTURAL CONSULTANT

APPROVED

ADDISON ROUTE
LOGS OF MR-SERIES BORINGS
MR-22 TO MR-26

SCALE 0 3 6 12'

DRAWING NO. GPG-SO-370



Boring started 4-14-98 **completed 4-21-98**
Final depths:
Boring = 80.0' Casing = 4.5'
Casing diameter = 4"
Average depth of ground water observed in the boring = 18.7' =El. +126.7

REMARKS:

Encountered 0.4' asphalt at surface.

Used water below 4.0' depth to maintain hole open.

Observation well consisting of 1-1/2" PVC pipe installed with tip at 75.6' depth.

Borehole was grouted between 0' and 58.8' depth.

Boring started 3-30-98 **completed 3-31-98**
Final depths:
Boring = 80.0' Casing = 16.9'
Casing diameter = 4"
Average depth of ground water observed in the boring = 9.9' =El. +139.9

REMARKS:

Encountered 0.3' asphalt at surface.

Used water below 16' depth to maintain hole open.

Borehole was grouted upon completion.

Boring started 4-7-98 **completed 4-14-98**
Final depths:
Boring = 60.0' Casing = 4.6'
Casing diameter = 4"
Average depth of ground water observed in the boring = 12.0' =El. +146.4

REMARKS:

Encountered 0.3' asphalt at surface.

Used water below 4.6' depth to maintain hole open.

Pushed 3" diameter steel tube between 16' and 18' depth with no recovery of sample. Drove spoon between 16' and 18' depth to obtain sample. The spoon blows are not representative of soil consistency.

Unable to push 3" diameter steel tube of Sample No. 13U more than 16" and the bottom of the tube bent due to probable presence of cemented sand.

Encountered cemented sand layer at 42.5' depth.

Borehole was grouted upon completion.

Boring started 4-6-98 **completed 4-8-98**
Final depths:
Boring = 30.0' Casing = 8.0'
Casing diameter = 4"
Average depth of ground water observed in the boring = 15.0' =El. +127.4

REMARKS:

Encountered 0.5' asphalt at surface.

Used water below 5' depth to maintain hole open.

Observation well consisting of 1-1/2" PVC pipe installed with tip at 25' depth.

Borehole was grouted between 0' and 11' depth.

Boring started 4-2-98 **completed 4-3-98**
Final depths:
Boring = 30.0' Casing = 15.0'
Casing diameter = 4"
Average depth of ground water observed in the boring = 2.5' =El. +144.8

REMARKS:

Encountered 0.1' asphalt and gravel at surface.

Drove casing to 2.0' and between 11.5' and 15' depth without washing ahead of casing. Washed ahead of casing between 2' and 11.5' depth. Casing blows not representative of soil consistency between 2' and 11.5 depth.

Used water below 15' depth to maintain hole open.

Encountered 4" thick cemented sand layer at 24' depth.

Observation well consisting of 1-1/2" PVC pipe installed with tip at 25' depth.

Borehole was grouted between 0' and 13' depth.

DESIGNED _____ DATE _____
DRAWN A.P. DATE 6-98
CHECKED H.S.L., S.L.T. & A.A. DATE 6-98
APPROVED _____ DATE _____

REFERENCE DRAWINGS

NUMBER	DESCRIPTION
E-1	General Notes & Legend
GPG-SO-380, 330, 350 & 131	Boring Location Plans and Geological Sections.

REVISIONS

DATE	BY	DESCRIPTION

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY

MUESER RUTLEDGE CONSULTING ENGINEERS
708 THIRD AVENUE, NEW YORK, N.Y. 10017

SUBMITTED _____

DE LEUW, CATHER & COMPANY
GENERAL ENGINEERING CONSULTANT ☐

HARRY WEESE & ASSOCIATES
GENERAL ARCHITECTURAL CONSULTANT ☐

APPROVED _____

ADDISON ROUTE
LOGS OF MR-SERIES BORINGS MR-43U THROUGH MR-47

SCALE 0 3' 6' 12'

DRAWING NO. GPG-SO-380

DEPTH BELOW GROUND SURFACE, FEET

TEST PIT NUMBER TP-1
Ground surface elevation +204.8

Material Description	Depth
Topsoil - Dark brown organic fine sandy silt, trace roots (Fill) (ML)	FILL
S #1B Brown silty fine sand, trace gravel, roots (Fill) (SM)	2.0'
S #2B Mottled gray brown silty fine sand, trace clay, clay pockets, shells roots (SM-SC)	(AQUIA FM) 10.0'

Test Pit started 5-7-98 completed 5-7-98
Final depth: 10.0'

REMARKS:

Test pit was excavated with a backhoe loader.
Bags of soil samples 1B & 2B were taken at 2' and 9' depths respectively.
Encountered groundwater inflow at 4' at south wall.
Moderate groundwater inflow at 5' depth.
Sides of test pit collapsing at 6' depth.
Backfilled test pit at completion.

TEST PIT NUMBER TP-2
Ground surface elevation +203.0

Material Description	Depth
2" Brown topsoil	FILL 1.5'
S #1B Brown silty fine sand, trace clay, gravel, medium to coarse sand (SM-SC)	
S #2B Mottled gray brown silty clay, some fine sand, trace fine sandy silt layers (CL)	(AQUIA FM) 10.0'

Test Pit started 5-7-98 completed 5-7-98
Final depth: 10.0'

REMARKS:

Test pit was excavated with a backhoe loader.
Bags of soil samples 1B & 2B were taken at 2' and 4' depths respectively.
Moderate groundwater inflows at 2.5', 3.5' depth.
Sides of test pit caving at 4.5' depth.
Sides of test pit collapsing at 2' after the completion of test pit.
Backfilled test pit at completion.

TEST PIT NUMBER TP-3
Ground surface elevation +146.5

Material Description	Depth
Brown micaceous silty fine to medium sand, trace rounded gravel (Fill) (SM)	FILL 1.5'
S #1B Brown gray green fine sand, some silt, trace medium to coarse sand, clay, clay pockets, gravel, mica (SM)	BROWN GRAY GREEN SILTY FINE SAND, TRACE CLAY, CLAY POCKETS, GRAVEL, MICA, ROOTS (AQUIA FM)
S #2B Gray brown silty fine sand, trace clay, roots, trace branches, mica (Organic Odor) (SM-SC)	6.3'

Test Pit started 5-7-98 completed 5-7-98
Final depth: 6.3'

REMARKS:

Test pit was excavated with a backhoe loader.
Encountered 3/8" gravel bed over 1-5/8" asphalt at surface.
Bags of soil samples 1B & 2B were taken at 2' and 5' depths respectively.
No groundwater was encountered in this test pit.
Backfilled test pit at completion.

TEST PIT NUMBER TP-4
Ground surface elevation +145.4

Material Description	Depth
Gray silty f-m sand, sm gvl (Crushed Stone Fill) (SM)	FILL
S#1B Org brn f-m ss & gvl, sm sl/w ang cbls 6-8" across(Fill)(SM&GM)	
S #2B Brown gray silty fine sand, trace gravel, clay pkts, roots Slightly organic odor) (Fill) (SM)	2.5'
Gray at 2.5' 4.5'-5' Gray fine sand, some silt (SM)	GRAY FINE SAND SOME SILT (AQUIA FM) 5.5'
S #3B Gray green silty clay, trace fine sand (CL)	GRAY GREEN SILTY CLAY (AQUIA FM) 7.0'

Test Pit started 5-7-98 completed 5-7-98
Final depth. 7.0'

REMARKS:

Test pit was excavated with a backhoe loader.
Encountered 3/8" gravel bed over 1-5/8" asphalt at surface.
Bags of soil samples 1B, 2B & 3B were taken at 1', 2' and 6' depths respectively.
Water appeared on bottom of test pit after about five minutes.
Clay appears to be saturated.
Backfilled test pit at completion.

DEPTH BELOW GROUND SURFACE, FEET

TEST PIT NUMBER TP-5
Ground surface elevation +152.5

Material Description	Depth
Dark brown organic silty fine to medium sand, trace gravel, roots (Fill) (SM)	FILL
S #1B Cemented/sand mix - Appears man made (Fill)	
S #2B Gray red clayey fine to medium sand, trace gravel (Fill) (SC)	2.0'
S #3B Brown silty fine sand, trace clay pockets, roots, gravel layer, between 2.3 & 3' (Possible Fill) (SM) Mottled gray brown at 5.5'	POSSIBLE FILL 6.3'

Test Pit started 5-7-98 completed 5-7-98
Final depth: 6.3'

REMARKS:

Test pit was excavated with a backhoe loader.
Bags of samples 1B, 2B & 3B were taken at 1', 2' and 3' depths respectively.
No groundwater was encountered in this test pit.
Backfilled test pit at completion.

TEST PIT NUMBER TP-6
Ground surface elevation +152.1

Material Description	Depth
Brown silty fine sand, trace roots (Fill) (SM)	FILL 1.5'
S #1B Brown silty fine sand, some silt, trace clay, clay pockets, medium to coarse sand, gravel, mica, roots (SM) Mottled gray brown at 6.5'	BROWN SILTY FINE SAND, TRACE CLAY, CLAY POCKETS, MICA, ROOTS (AQUIA FM) 7.0'

Test Pit started 5-7-98 completed 5-7-98
Final depth: 7.0'

REMARKS:

Test pit was excavated with a backhoe loader.
Bags of soil sample 1B was taken at 2' depth.
Sides of test pit caving below 4.5' depth.
Water accumulating at 5.5' depth.
Backfilled test pit at completion.

DESIGNED		DATE
DRAWN	A.P.	DATE 6-98
CHECKED	H.S.L., S.L.T. & A.A.A.	DATE 6-98
APPROVED		DATE

REFERENCE DRAWINGS

NUMBER	DESCRIPTION
F-1	General Notes & Legend
GPG-SO-280, 300, 310, 320, 340 & 350.	Boring Location Plans and Geological Sections.

REVISIONS

DATE	BY	DESCRIPTION

STATE OF MARYLAND · REGISTERED PROFESSIONAL ENGINEER

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY

MUESER RUTLEDGE CONSULTING ENGINEERS
708 THIRD AVENUE, NEW YORK, N.Y. 10017
SUBMITTED [signature]

DE LEUW, CATHER & COMPANY
GENERAL ENGINEERING CONSULTANT
HARRY WEESE & ASSOCIATES
GENERAL ARCHITECTURAL CONSULTANT
APPROVED

ADDISON ROUTE
LOGS OF TEST PITS
TP-1 TO TP-6

SCALE 0 1.5' 3' 6'

DRAWING NO. GPG-SO-390

APPENDIX

CORROSION AND CHEMICAL TESTS FOR THIS INVESTIGATION

ARTECH TESTING, L.L.C.

14554 LEE ROAD • CHANTILLY, VA 20151-1632
703 378-7263 • 800 283-7848 • FAX 703 378-7274

May 26, 1998

Mr. Paul Chung
Geotech Engineers, Inc.
11890-U Old Baltimore Pike
Beltsville, Maryland 20705

PRODUCT TESTING

FAILURE ANALYSIS

LITIGATION SUPPORT

CHEMICAL ANALYSIS

ENGINEERING CONSULTING

MATERIALS RESEARCH

BIOMATERIALS

FOOTWEAR TESTING

Subject: Analysis of Soil Samples

Reference: WMATA Boring Contract 212
ARTECH C80110A (re-issued to correct sample identifications)

pH of Soil in Water at 25°C by EPA Method 9045C
Resistivity of Soil by CA DOT Method 643
Chloride and Sulfate by EPA Method 9056
Total Sulfur Content of Soil by Combustion/Iodometric Titration

Sampled by: Geotech

Sample ID	pH	Resistivity	Chloride	Sulfate	Total Sulfur
MR-45U/0.5-2.0'	7.40	12.55 kΩ-cm	3.19 mg/kg	10.80 mg/kg	< 5.0 mg/kg
MR-18/0-2.0'	4.75	1.57 kΩ-cm	3.02 mg/kg	< 2.00 mg/kg	35.7 mg/kg
MR-19/0-2.0'	4.10	810 Ω-cm	6.55 mg/kg	8.53 mg/kg	24.8 mg/kg
MR-20/4-6.0'	3.85	557 Ω-cm	1.15 mg/kg	18.69 mg/kg	88.2 mg/kg
MR-43U/0.5-2.0'	7.10	724 Ω-cm	139.55 mg/kg	62.39 mg/kg	560.7 mg/kg
MR-44/0.5-2.0'	10.15	646 Ω-cm	81.80 mg/kg	58.30 mg/kg	514.9 mg/kg

Notes: 1) Chloride and Sulfates results are for the water soluble ions.
2) Sample identifications changed per customer request. New sample identification does not match sample jars or chain of custody form for samples MR-45U, MR-43U and MR-44.

Sincerely,
ARTECH Testing, LLC

Karl Schweier
Chemist