GEOSCIENCE CORP.

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February 12, 1990

Richard Brazell
New York State Department of Environmental Conservation
615 Erie Boulevard West
Syracuse, New York 13204

Director, Division of Environmental Enforcement
New York State Department of Environmental Conservation
50 Wolf Road
Albany, New York 12233-5500

Director, Division of Hazardous Waste Remediation
New York State Department of Environmental Conservation
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Division of Environmental Enforcement
Albany Field Unit
50 Wolf Road - Room 415
Albany, New York 12233-5501
Attn: Frank V. Bifera, Esq.

Director, Bureau of Environmental Exposure Investigation
New York State Department of Health
2 University Place
Albany, New York 12203

NYS Department of Environmental Conservation
615 Erie Boulevard West
Syracuse, New York 13204-2400
ATTN: Tom Male

Dear Sirs:

Enclosed is a copy of a letter, and its attachments, prepared by Dunn Geoscience Corporation and dated January 9, 1990 regarding the vertical groundwater gradients at the Carousel Center site. This package was previously forwsarded to the Department. However, we want toensure that this information is available for your consideration as part of the review of the Supplemental Feasibility Study submitted last week.

FEB 1 5

Please consider this information along with the information and approach presented in the Supplemental Feasibility Study.

If you have any questions regarding this matter, please feel free to contact me.

Sincerely,

Thomas M. Johnson/ce

Thomas M. Johnson
Associate Hydrogeologist

TMJ:ce
attachment

cc: N. Sullivan
W. LaRow
R. Heerkins
M. O'Toole

DUNN
GEOSCIENCE CORP.

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January 9, 1990

Mr. Richard Brazell, P.E.
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615 Erie Boulevard West
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ATTN: Frank V. Bifera, Esq.
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Albany Field Unit
50 Wolf Road - Room 415
Albany, New York 12233-5501

ATTN: Tom Male
NYS Department of Environmental Conservation
615 Erie Boulevard West
Syracuse, New York 13204-2400

RE: Hydraulic Gradient-Clark Site

Dear Mr. Brazell:

This letter is to provide you with the information that was requested regarding substantiation of vertical upward gradients at the Clark site and surrounding areas. Attached are relevant portions of a report dated August 1961 by Moran, Proctor, Muser & Rutledge Consulting Engineers for the Onondaga County Metro Sewage Treatment Plant, and water level measurements in piezometers from borings B-18P and B-20P at the Carousel Center Site.

The stratigraphy at the Metro Plant and the Carousel Center Site are generally consistent. In both areas, fill material overlies a silty, sandy layer (S-1) which overlies a thick silty clay layer, generally distinguished by three layers (C-1, C-2, C-3) which vary slightly in their composition. Beneath this silty clay confining layer is a water bearing sand and gravel unit. It is the confined hydraulic pressures within this unit which create the upward gradient through the overlying silty clay.

The Muser, Rutledge Report identifies the sand underlying the thick clay strata as the S-2 unit. At the Carousel Center Site, John P. Stopen Engineers has designated this same strata as S-3. Examples of the head present in this sand unit are provided by water level measurements such as those made in boring number 111U at the Metro Plant where a head of approximately 220 feet was measured. Similarly, at the Carousel Center Site, the head above the S-3 sand unit measured at piezometer B-18 was in excess of 175 feet, and the head measured in piezometer B-20 was approximately 108 feet.

The attached excerpts, as described above, substantiate the existence of a significant upward gradient through the confining silt and clays at the Clark Site.

If you have any questions or would like to review this data with me, please feel free to contact me.

Sincerely,

DUNN GEOSCIENCE CORPORATION

Thomas M. Johnson/ce

Thomas M. Johnson
Associate Hydrogeologist

cc: Jim Stewart
Joe Slack

attachments

TMJ:ce
File #: 2371-1-455

JOHN P. STOPEN ENGINEERING PARTNERSHIP
103 EAST WATER STREET • SYRACUSE, NEW YORK 13202 • 315-472-8238

SUBJECT	JOB NO.	BY	DATE	SHEET
CAROUSEL CENTER WATER LEVEL ELEVATIONS IN STRATUM S3	487159.00	JMS	1/5/90	1 OF 1

WATER LEVELS* IN PIEZOMETERS
SCREENED IN STRATUM S_3
(DEEP SAND AND GRAVEL)

* Relative to C.H. of Syracuse Datum.

DATE	B-18P – EL. 10.3' TIP EL. -180 FT	B-20P – EL. 13.2' TIP EL. -105 FT.	NOTES
8/29/88	el. 16.19 ft		B-18P filled with tap water
8/31	16.44		
9/1	16.69		
9/2	16.73	el. 10.44 ft.	
9/6	16.52	11.02	
9/8	16.49*	10.36	*After reading B-18P, well to overflow at el. +12.2
9/9	13.90	10.67	
9/10	13.96	10.65	
9/13	13.63	10.19	
9/17	13.96	10.61	
9/23	14.07	—	Top of S-3 Unit B-18P –166.7' B-20P – 97.8'
9/24	—	10.69	
9/26	14.08	10.65	
10/17	13.99	10.19	
11/21/88	13.27	11.11	
3/[illegible]/89	13.04	10.95	
3/28/89	12.36	10.99	
4/15/89	—	11.23	
1/5/90	11.52	—	

V - GROUND WATER

The borings and piezometer observations have determined that there are two different ground water levels at this site. The first is an upper or surface ground water which is found in the soils overlying the clay strata and which has the greatest significance in terms of construction operations and plant settlements. The second is an artesian water pressure in the S_2 sands underlying the thick clay strata. *

The borings made in 1956 and earlier and the observation wells installed in connection with the construction ground water lowering operations showed that the ground water surface prior to the 1958 construction was generally in the range from Elev. 368 to Elev. 370. During construction the wellpoint installations lowered the ground water generally to the range of Elev. 354 to 355 in the area of the Digester Tanks and to the range of Elev. 349 to 352 in the area of the Settling Tanks. Plots of individual observation well readings during the construction ground water lowering on Plate No. 1 show the time history of this ground water lowering.

Observations for levels of the upper ground water made in the piezometers installed during the recent exploration program show a practically level ground water surface in the range Elev. 368 to 369. upper. Piezometer observations are plotted against time on Plate No. 2 and contours of these observations as of June 12, 1961 are plotted on Plate No. 3. The observations and contours show no effects of leakage into the pipe galleries and, as a result, such leakage need not be considered a factor in plant settlements. In comparison with the observed upper ground water levels, the water levels in Lake Onondaga have varied in the range from Elev. 366 to Elev. 363.

During the making of Boring No. 111U and the installation of the piezometer at a depth of 214 feet in the lower sand, it was found that the ground water in this sand was under artesian pressure. The boring casing had to be extended ten feet above the ground surface and water rose to approximately Elev. 380 in the casing before the installation of the piezometer. Unfortunately, this piezometer has proved to be defective and reliable readings have not been obtained from it subsequent to its installation. However, it is estimated that the artesian head must be as much as 20 feet. The piezometer installed at a depth of 96 feet in the C_2 silty clay has shown water level readings in the range from Elev. 377 to 378, in other words, 8 feet to 9 feet above the upper ground water level. These observations indicate a continuous upward flow of ground water from the underlying rock and compact sand. This condition is

20 feet above ground
Actually 220 feet
above S2 Sand! *

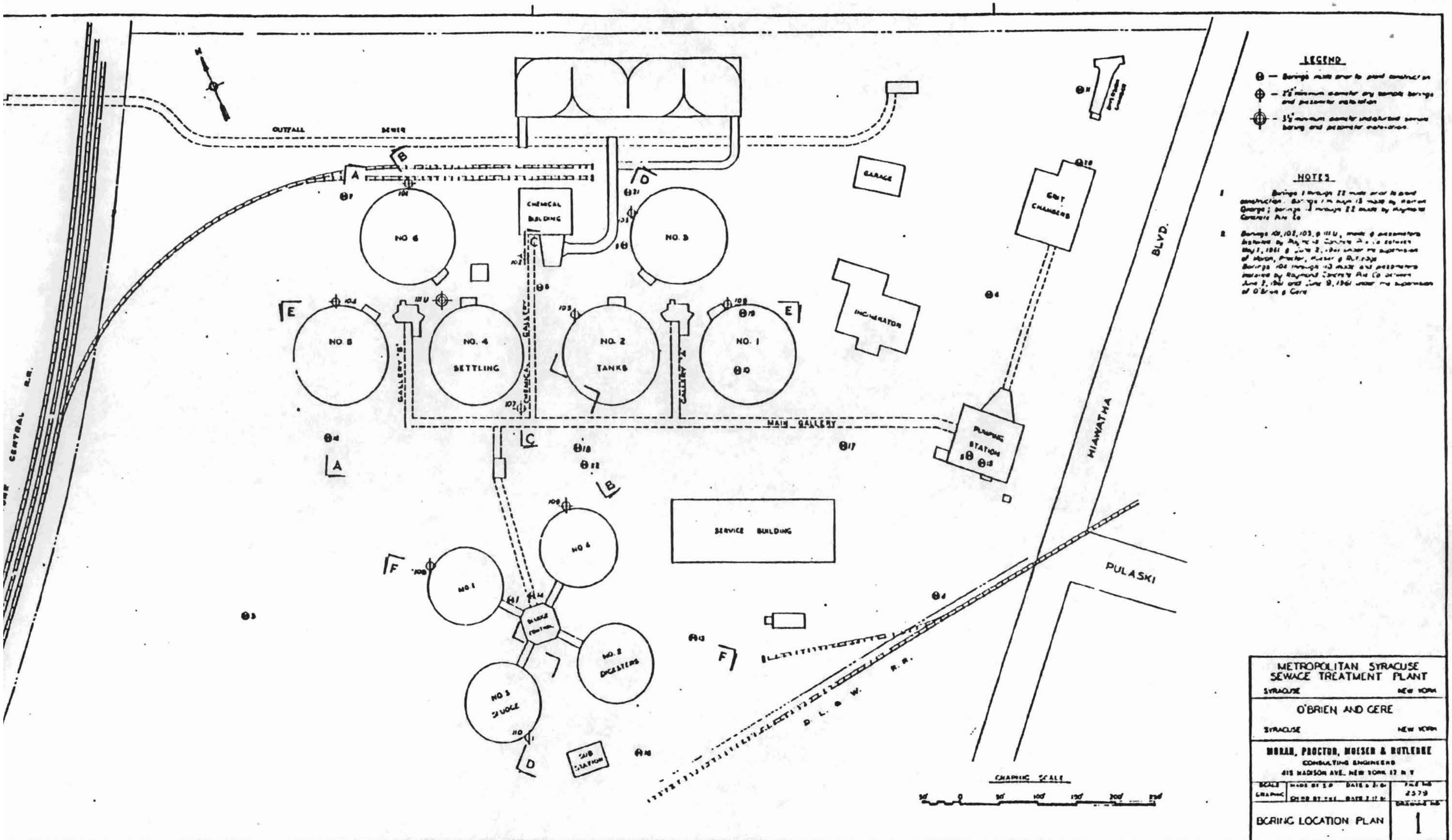
substantiated by the presence of salt in the clay beds, indicating an upward leaching from the rock, and by the red coloring of the deep sands resulting from leaching of ferric oxide out of the underlying shales. Higher lying ground on all sides of the deep valley fill makes the presence of artesian water pressures in the rock and the lower sand reasonable. It is believed, however, that these artesian pressures have little, if any, practical effect on the plant settlements. The existence of artesian water pressures which are maximum at the bottom of the C_3 clay and decrease to zero with respect to the upper water table at the top of the clay strata have been considered in evaluating the results of the laboratory tests.

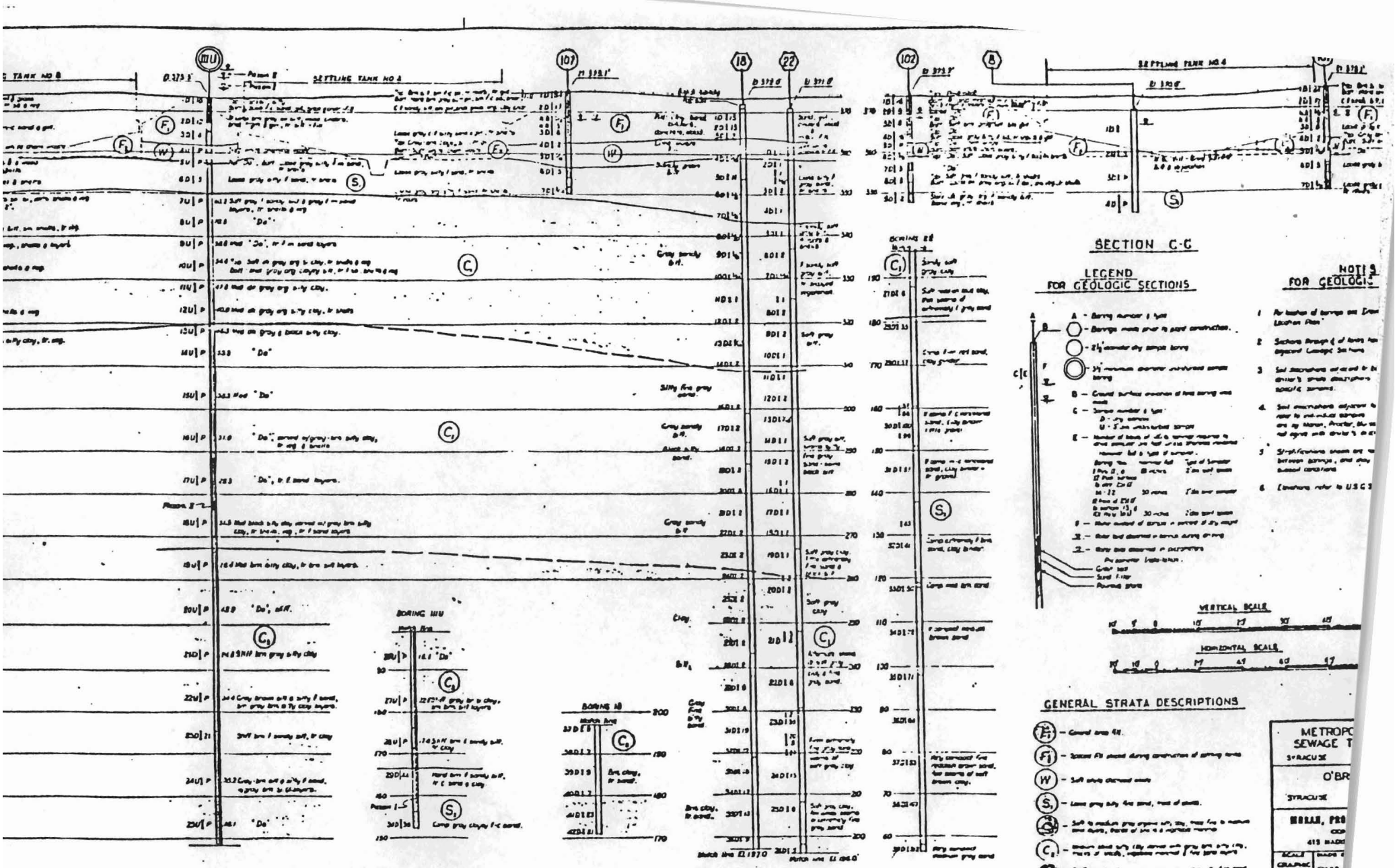
VI - LABORATORY TEST RESULTS

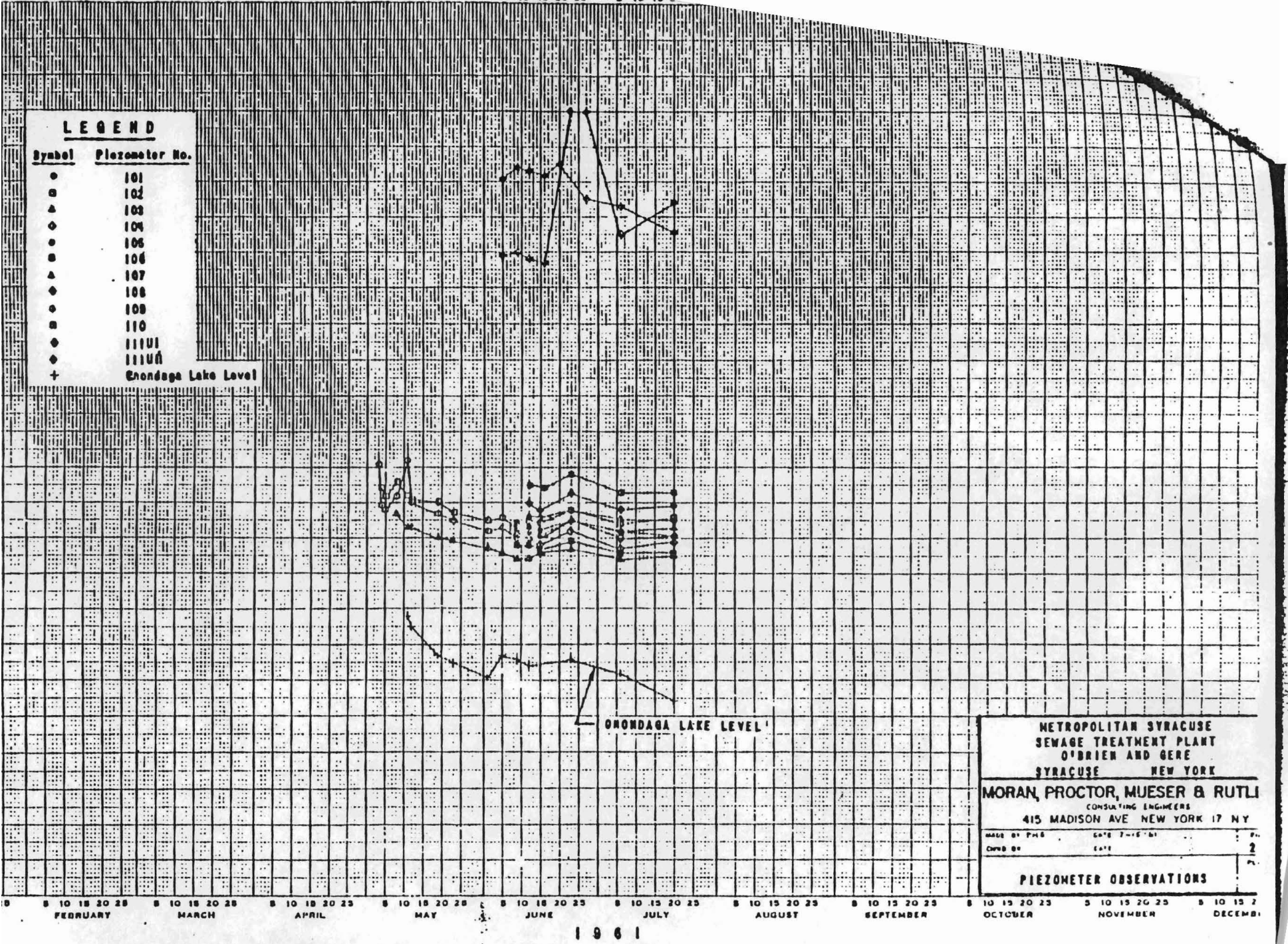
Laboratory tests performed on samples recovered from Boring No. 111U included determinations of natural water content and Atterberg plasticity limit water contents for identification and classification purposes, determinations of compressive strengths in the upper C_1 stratum to investigate possible bearing capacity overloading during the water testing of the tanks and consolidation tests to determine the settlement properties of all of the underlying clays.

As an adjunct to the laboratory testing operations, vertical slices from typical undisturbed samples were prepared, allowed to dry slowly to a condition of maximum color contrast and then photographed. Four such photographs are shown on Plate No. 4. The upper lefthand photograph shows a sample of the soft white chemical waste and is included only to show the general character of this material. The upper righthand photograph is a slice from the C_1 stratum of dark gray organic silty clay from a depth of 44 feet. This photograph shows black specks of decayed vegetable matter and the effects of a horizontal sand seam at the very bottom of the photograph. Otherwise, stratification is not distinctly visible in this material. The lower left photograph is from Stratum C_2 at a depth of 70 feet. This photograph shows the distinct horizontal stratifications and varving of silty clays and silts characteristic of lacustrine deposits. The black color of this soil in its natural condition changed rapidly to the grays and blues shown. The reddish colors in the silts developed from oxidation during the slow drying. The lower righthand photograph is a slice of the stiff brown silty clay of Stratum C_3 from a depth of 130 feet. This photograph also shows horizontal stratification and the interbedding of a sandy silt layer in the clay.

Basic data from all of the laboratory tests are summarized in Table I. For purposes of classification of the clays, the results of Atterberg plasticity limit tests are plotted on a Plasticity Chart on Plate No. 5. The open symbols representing tests on samples from the C_1 stratum fall


LEGEND
NOTES
OUTFALL
SEWER
CHEMICAL BUILDING
GARAGE
GRIT CHAMBERS
INCINERATOR
NO 6
NO. 3
NO 8
NO. 4
SETTLING
NO. 2
TANKS
NO. 1
GALLERY "B"
CHEMICAL GALLERY
GALLERY "A"
MAIN GALLERY
PUMPING STATION
SERVICE BUILDING
NO 4
NO 1
SLUDGE CONTROL
NO. 2
DIGESTERS
NO 3
SLUDGE
SUB STATION
HIAWATHA
BLVD.
PULASKI
D. L. & W. R.R.
CENTRAL R.R.
GRAPHIC SCALE
METROPOLITAN SYRACUSE
SEWAGE TREATMENT PLANT
SYRACUSE
NEW YORK
O'BRIEN AND GERE
SYRACUSE
NEW YORK
MORAN, PROCTOR, MUESER & RUTLEDGE
CONSULTING ENGINEERS
415 MADISON AVE., NEW YORK 17 N.Y.
BORING LOCATION PLAN
1


SETTLING TANK NO 8
SETTLING TANK NO 4
BORING MW
BORING 18
BORING 22
SECTION B-B
SECTION C-C
LEGEND FOR GEOLOGIC SECTIONS
NOTES FOR GEOLOGIC
VERTICAL SCALE
HORIZONTAL SCALE
GENERAL STRATA DESCRIPTIONS
METROPO
SEWAGE T
SYRACUSE
O'BR
SYRACUSE
GEOLOGIC
B-B



METROPOLITAN SYRACUSE
SEWAGE TREATMENT PLANT
O'BRIEN AND GERE
SYRACUSE NEW YORK

MORAN, PROCTOR, MUESER & RUTLI
CONSULTING ENGINEERS
415 MADISON AVE NEW YORK 17 N.Y.

2

PIEZOMETER OBSERVATIONS


BARGE CANAL
CLARK PROPERTY
STORAGE TANK
G/B SLURRY TRENCH
Boring Locations