NEYER, TISEO & HINDO, LTD.
CONSULTING ENGINEERS
30999 Ten Mile Road • Farmington Hills, Michigan 48024 • (313) 471-0750

JEROME C. NEYER P.E.
BENEDICT TISEO P.E.
KAL R. HINDO P.E.
DAVE NONA P.E.
LINDA L. BENNETT
DANIEL L. HANSON P.E.
GEORGE R. KUNKLE Ph.D.

JOHN A. BALCONI P.E.
WAYNE R. BERGSTROM P.E.
GERALD J. HILL P.E.
M. V. MATHERS
HARRY R. PRICE P.E.
JAMES M. SHOVELY P.E.
J. M. SMALLEY P.E.
FERNANDO SOUTO P.E.
KEITH M. SWAFFAR P.E.

July 24, 1984
Project No. 84272 OG

B & V Construction Company
25301 Novi Road
Novi, Michigan 48050

US EPA RECORDS CENTER REGION 5
406754

Attn: Mr. Donald J. Treder

Re: Clay Cap Material Evaluation
BASF Wyandotte-Riverview Landfill
Riverview, Michigan

Dear Mr. Treder:

This letter presents the results of permeability tests performed on compacted samples of Bag Number 2 material (brown-gray silty clay) that is being considered for use as a clay cap for the above referenced project. A preliminary evaluation of this material for use as a clay cap was presented in a previous letter dated July 6, 1984. The material was obtained from a stockpile at the southeastern part of the Wayne County Sewage Abatement site at Goddard and Moran Roads in Taylor, Michigan. The stockpile material was reportedly excavated from approximately elevation 597.

Three permeability tests were performed on samples of the silty clay that were prepared and compacted in brass liners (3-inch long and 1-3/8-inch in diameter). The soil was compacted to a density of approximately 90 percent of the Modified Proctor value and at different moisture contents. The liner soil samples were then subjected to a falling head permeability test using a water column and 10 pounds per square inch (psi) of air pressure. The test results are as follows:

Sample* No.	Remolded Density (psf)	Percent Compaction	Percent Moisture	Coefficient Permeability (cm/sec)
1	105.7	90.2	13.6	4.8×10^{-8}
2	105.4	89.9	15.6	4.3×10^{-8}
3	105.1	89.8	20.2	2.6×10^{-8}

*Modified Proctor density for Bag Number 2 material is 117.2 pcf and optimum moisture content 15.7 percent.

The results indicate that Bag No. 2 material has a coefficient of permeability that is less than the required value of $1X10^{-7}$ cm/sec. The results also indicate that the coefficient of permeability decreases as the moisture content of the soil sample increases provided that the dry density is not changed.

On this basis, the Bag Number 2 material can be [redacted] As much as practicable, however, it is considered desirable to place material for the clay cap at a moisture content that is higher than the optimum value to minimize permeability. As required by current MDNR regulations, in no case should the moisture content exceed 5 points above the optimum value to minimize the potential for shrinkage cracking.

As for the requirements for placement and compaction of the clay cap, it is recommended that the fill material be placed in no more than 12-inch thick layers and compacted to a density of not less than 90 percent of the Modified Proctor value (ASTM D-1557).
Consent Decree states 9" max.

If you have any questions about this letter or if we can be of further assistance to you in any respect, please call.

Very truly yours,

NEYER, TISEO & HINDO, LTD.

D. Nona

D. Nona, P.E.

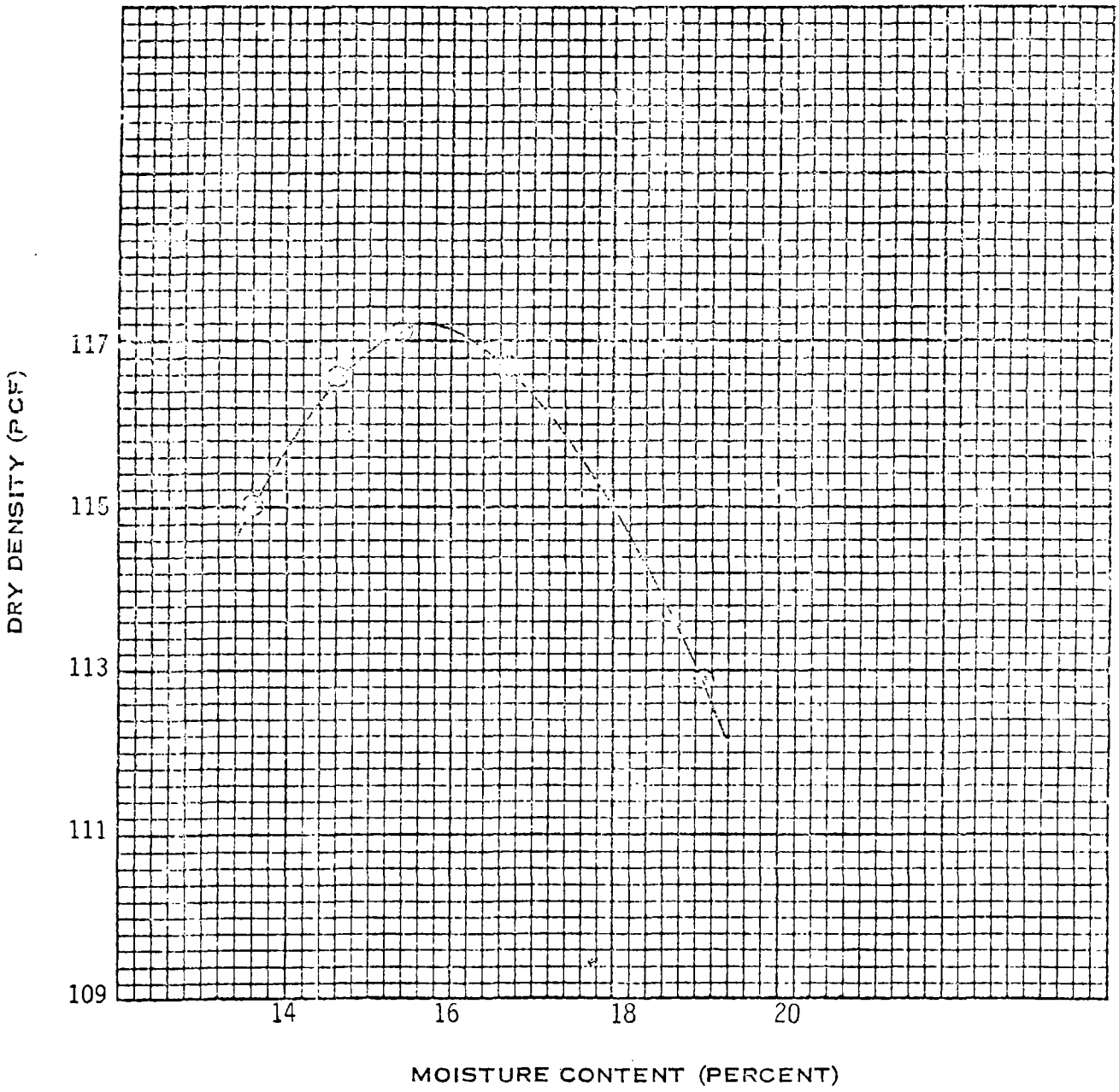
DN/tal

NEYER, TISEO & HINDO, LTD.

NEYER, TISEO & HINDO, LTD.
CONSULTING ENGINEERS

MOISTURE - DENSITY RELATIONS

PROJECT NO. 84272 OC PROJECT: BASF WYANDOTTE
PROJECT LOCATION WYANDOTTE, MICHIGAN
BAG SAMPLE NO. NUMBER 2 SAMPLE DEPTH
SAMPLE DESCRIPTION Brown SILTY CLAY with Trace of Sand.
METHOD OF COMPACTION ASTM D-1557 Method A
MOLD: NO. A DIA. 4 IN., HT. 4.584 IN., VOLUME .0333 CU. FT., WT. 9.32 LBS.
TESTED BY: K.S. CHECKED BY: E. W. DATE: June 29, 1984



MAXIMUM DRY DENSITY 117.2 PCF OPTIMUM MOISTURE CONTENT 15.7 %
REMARKS:

Figure 2

NEYER, TISEO & HINDO, LTD.

GRAIN SIZE DISTRIBUTION CURVE

PROJECT NO. 84272 OC LAB SAMPLE NO. _____ SOURCE BASF WYANDOTTE

PROJECT LOCATION WYANDOTTE, MICHIGAN FOR _____

BORING NO. _____ FIELD SAMPLE NO. Bag No. 2 SAMPLE DEPTH _____ SAMPLE ELEV. (TIP) _____

SAMPLE DESCRIPTION Gray CLAYEY SILT with Trace of Fine Sand.

DATE SAMPLED _____ BY B & V DATE TESTED 6-26-84 BY R.S.L. CHECKED BY E.W.

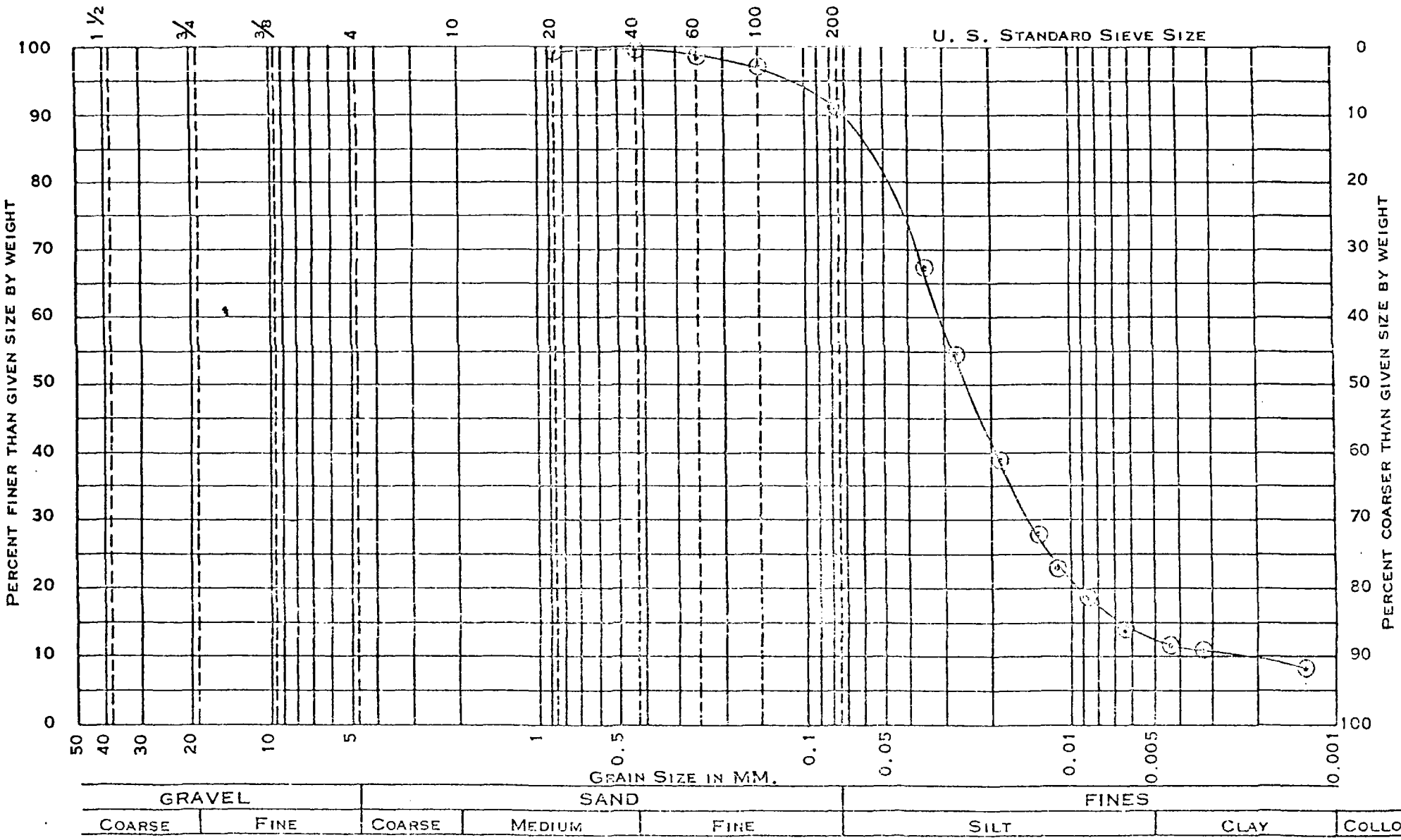


Figure 4

NEYER, TISEO & HINDO, LTD.
CONSULTING ENGINEERS

SOIL CONSTANTS

LAB. SAMPLE NO. _____ PROJECT NO. 84272 FOR BASF WYANDOTTE
PROJECT LOCATION _____
BORING NO. _____ FIELD SAMPLE NO. Bag 2 SAMPLE DEPTH _____ SAMPLE ELEV. (TIP) _____
SAMPLE DESCRIPTION Brown and Gray SILTY CLAY.

TESTED BY: S. Y. CHECKED BY: E. W. DATE June 29, 1984

MOISTURE CONTENT

SPECIMEN DESIGNATION								
TARE NUMBER								
WET WEIGHT + TARE (GR)								
DRY WEIGHT + TARE (GR)								
WEIGHT OF MOISTURE (GR)								
WEIGHT OF TARE (GR)								
DRY WEIGHT (GR)								
MOISTURE CONTENT (%)								

LIQUID AND PLASTIC LIMITS

PURPOSE OF TEST								
NUMBER OF BLOWS	28	26						
TARE NUMBER	A-4	A-42	A-40					
WET WEIGHT + TARE (GR)	25.98	28.02	22.40					
DRY WEIGHT + TARE (GR)	21.34	22.83	20.28					
WEIGHT OF MOISTURE (GR)								
WEIGHT OF TARE (GR)	10.83	11.34	10.99					
DRY WEIGHT (GR)								
MOISTURE CONTENT (%)	44.1 44.8	45.2 45.4	23.2					

SPECIFIC GRAVITY $G = G_0 W_0 \div (W_0 - W_1 + W_2)$

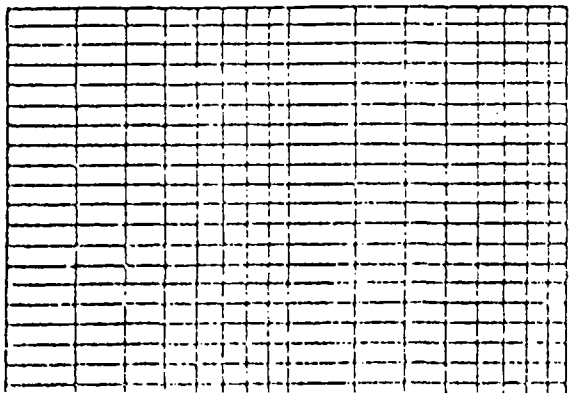
SPECIMEN DESIGNATION		
PYCNOMETER NUMBER		
WT. PYC., SOIL, WATER (W_1) (GR)		
TEMPERATURE (DEGREES CENT.)		
WT. PYC., WATER (W_2) (GR)		
TARE NUMBER		
DRY WEIGHT + TARE (GR)		
WEIGHT OF TARE (GR)		
DRY WEIGHT (W_0) (GR)		
SPECIFIC GRAVITY, WATER (G_0)		
SPECIFIC GRAVITY, SOIL (G)		

UNIT DENSITIES AND VOLUMETRIC ANALYSIS

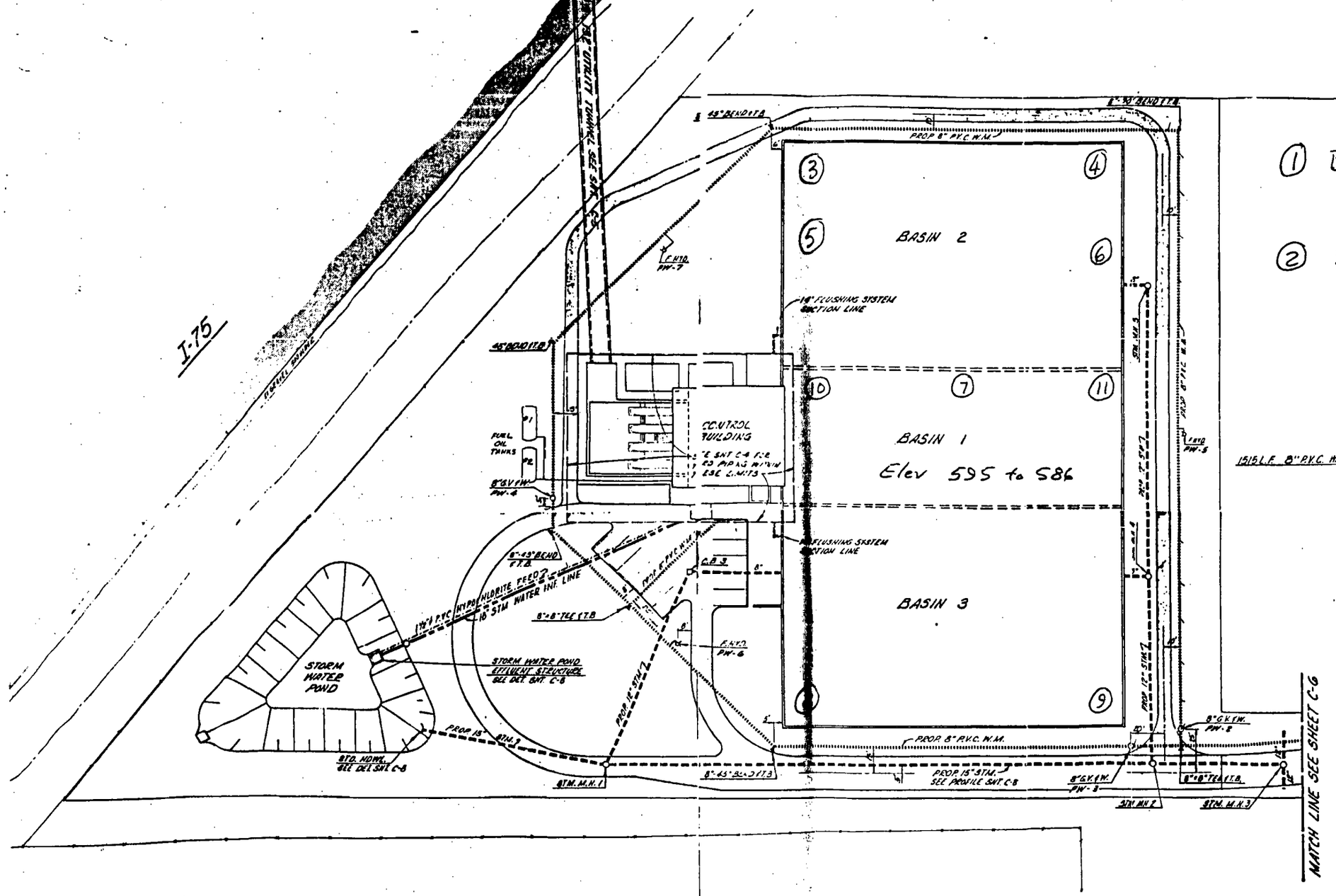
SPECIMEN DESIGNATION				
WET WEIGHT + TARE (GR)				
WEIGHT OF TARE (GR)				
WET WEIGHT (GR)				
MOISTURE CONTENT (%)				
DRY WEIGHT (GR)				
SAMPLE LENGTH (IN)				
SAMPLE DIAMETER (IN)				
SAMPLE VOLUME (CU IN)				
SAMPLE VOLUME (CC)				
WET DENSITY (GR/CC)				
DRY DENSITY (GR/CC)				
WET DENSITY (PCF)				
DRY DENSITY (PCF)				
WEIGHT OF WATER (PCF)				
SPECIFIC GRAVITY				
VOLUME OF SOLIDS (%)				
VOLUME OF LIQUIDS (%)				
VOLUME OF AIR (%)				
SATURATION (%)				

LIQUID LIMIT FLOW CURVE

MOISTURE CONTENT (%)



LIQUID LIMIT (LL)	45
PLASTIC LIMIT (PL)	23
PLASTICITY INDEX (LL - PL)	22



① Below Elev. 586

② Stockpile 595 and above

YARD PIPING

CHARLES N YOUNGBLOOD

ECORSE CREEK POLLUTION ABATEME