



1810 North 12th Street  
Toledo, Ohio 43624  
(419) 241-7175

Registered  
Engineers,  
Chemists and  
Geologists

Jerry Chabler, president  
Neil R. Blaksley, P.E., general manager

Founded in 1927

## Toledo Testing Laboratory, Inc.

January 28, 1980

City of Napoleon  
255 Riverview Avenue  
Napoleon, Ohio 43545

MUNICIPAL SERVICE & STORAGE BUILDING  
NAPOLEON, OHIO

Attention: Mr. Von Eric Berlin, P.E.  
City Engineer

JOB NO. DR-3771

*M/S  
Industrial*

Gentlemen:

We are submitting our Report of Subsurface Ground Investigation and Laboratory Test Results for the above indicated project (site).

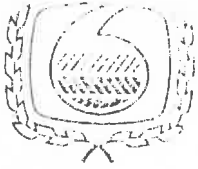
The exploration included seven (7) soil borings placed according to the locations noted on the boring logs. Descriptive classifications of the soil substrata, recordings of groundwater observations, sampling depths, laboratory test results and other pertinent data are shown on the boring logs. Sampling depths and identifications with laboratory test results are shown in tabular form. Graphical representations of moisture-density relationship and load-penetration test performances are included in the report.

As can be seen in the boring logs the subsurface conditions encountered at the site did not vary appreciably with boring location. In general aside from the thin layer of topsoil (8" - 12" thick) silty clay of varying color and consistency was encountered. The blow counts obtained in this material indicate it is stiff to hard in consistency. Groundwater observations made at the time of the boring operation indicate the water table level corresponds roughly to the coloration change from brown to grey.

Allowable bearing capacities for this site depend on the depth of bearing. For spread footings founded on soil which is between 3'6" and 6'6" below grade we recommend an allowable bearing capacity of 3,000 psf be utilized. If greater bearing capacities are needed the footings can be founded in the hard silty clay which lie about 7 feet below grade and proportioned using a bearing capacity of 5,000 psf.

Only one (1) CBR test was performed as only one (1) type soil was encountered.

No problems are foreseen in the construction of the foundation or other earthwork activities on this site that would be caused by subsurface conditions.



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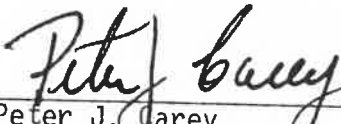
MUNICIPAL SERVICE & STORAGE BUILDING  
NAPOLEON, OHIO

JOB NO. DR-3771

We hope the report inclusions will be serviceable to the planning of the project. Your inquiry or requests for additional services will be promptly acknowledged.

Very truly yours,

TOLEDO TESTING LABORATORY, INC.

  
Peter J. Carey,  
Chief Soils Engineer

PJC/dr  
3 - Mr. Von Eric Berlin, P.E.





# SOIL BORING LOG

## Toledo Testing Laboratory, Inc.

1810 North 12th Street  
Toledo, Ohio 43624  
(419) 241-7175

Project: MUNICIPAL SERVICE AND STORAGE BUILDING - NAPOLEON, OHIO

Boring Location: 433' west of centerline of Industrial Dr. & 160' north of south property line

Job No. DR-3771

Date JANUARY 10, 1980

Soil Boring No. 1

Sample & Type	Depth (Ft.-In.)	Soil Description	Blows Per 6"	Moisture Content (%)	Dry Unit Weight (P.C.F.)	Unconfined Compressive Strength (P.S.F.)	Allowable Bearing Strength (P.S.F.)
	0'8"	Topsoil					
NO.1 J	3'6" 5'0"	Stiff brown silty clay, trace of fine sand and gravel	(2) (5) (9)				
NO.2 J	8'6" 10'0"	Hard brown silty clay, trace of fine sand and gravel	(14) (19) (31)				
NO.3 J	13'6" 15'0" 16'0"	Very stiff grey silty clay, trace of fine sand and gravel NOTE: Brown silty clay veins in strata	(9) (12) (16)				
NO.4 J	18'6" 20'0"	Hard grey silty clay, trace of fine sand and gravel STRATA CONTINUES ON PAGE 3	(12) (16) (21)				

- Type of Sample**
- A Auger (Disturbed)
  - Split Tube Sampling —
  - H Thin-walled (House) Tube-Undisturbed
  - J Jar-Disturbed
  - ST Shelby Tube-Undisturbed
  - RC Rock Core
  - NR Indicates "No Recovery"

**Remarks**

Total Footage: \_\_\_\_\_

Overburden Drilled: \_\_\_\_\_

Rock Cored: \_\_\_\_\_

Drillers: \_\_\_\_\_

SEE PAGE 3

### Groundwater Observations

SEE PAGE 3

Number of Blows (Standard Penetration Test) — Numbers in parentheses not used for bearing strength determinations  
 Unconfined Compressive Strength is considered approximately equal to the allowable bearing capacity  
 Allowable Bearing Strength (an approximation) is based on the Standard Penetration Test — number of blows per foot of penetration





# SOIL BORING LOG

## Toledo Testing Laboratory, Inc.

1810 North 12th Street  
 Toledo, Ohio 43624  
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Project: MUNICIPAL SERVICE AND STORAGE BUILDING - NAPOLEON, OHIO  
 Boring Location 30' west of centerline of Industrial Dr. & 199; north of south property line  
 Job No. DR-3771  
 Date JANUARY 10, 1980  
 Soil Boring No. 2

Sample & Type	Depth (Ft.-In)	Soil Description	Blows Per 6"	Moisture Content (%)	Dry Unit Weight (P.C.F.)	Unconfined Compressive Strength (P.S.F.)	Allowable Bearing Strength (P.S.F.)
	0'9"	Topsoil					
NO.1 J	3'6"	Stiff brown and grey mottled silty clay, trace of fine sand and gravel	(4)				
	5'0"		(4)				
	6'6"		(9)				
NO.2 J	8'6"	Hard brown silty clay, trace of fine sand and gravel	(11)				
	10'0"		(15)				
	11'6"		(21)				
NO.3 J	13'6"	Hard grey silty clay, trace of fine sand and gravel	(9)				
	15'0"		(11)				
	18'6"		(19)				
NO.4 J	20'0"		(7)				
			(13)				
			(20)				

NOTE: Brown silty clay viens in upper portion of strata

- Type of Sample**
- A Auger (Disturbed)
  - Split Tube Sampling—
  - H Thin-walled (House) Tube—Undisturbed
  - J Jar-Disturbed
  - ST Shelby Tube—Undisturbed
  - RC Rock Core
  - NR Indicates "No Recovery"

**Remarks**

Total Footage: 20'0"

Overburden Drilled: 20'0"

Rock Cored: NONE

Drillers: NW-TB

**Groundwater Observations**

After 2 1/2 hours: None

Number of Blows (Standard Penetration Test) — Numbers in parentheses not used for bearing strength determinations  
 Unconfined Compressive Strength is considered approximately equal to the allowable bearing capacity  
 \*Allowable Bearing Strength (an approximation) is based on the Standard Penetration Test — number of blows per foot of penetration



# SOIL BORING LOG

## Toledo Testing Laboratory, Inc.

1810 North 12th Street  
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Project MUNICIPAL SERVICE AND STORAGE BUILDING - NAPOLEON, OHIO

Boring Location 187' west of centerline of Industrial Dr. & 160' north of south property line

Job No. DR-3771

Date JANUARY 10, 1980

Soil Boring No. 3

Sample & Type	Depth (Ft.-In.)	Soil Description	Blows Per 6"	Moisture Content (%)	Dry Unit Weight (P.C.F.)	Unconfined Compressive Strength (P.S.F.)	Allowable Bearing Strength (P.S.F.)
	0'8"	Topsoil					
NO. 1 J	3'6"	Stiff brown and grey mottled silty clay, trace of sand and gravel	(4)				
	5'0"		(6)				
	7'0"		(7)				
NO. 2 J	8'6"	Hard brown silty clay, trace of fine sand and gravel	(15)				
	10'0"		(28)				
	12'0"		(37)				
NO. 3 J	13'6"	Hard grey silty clay, trace of sand and gravel	(9)				
	15'0"		(15)				
	18'6"		(22)				
NO. 4 J	20'0"		(9)				
			(23)				
			(25)				

### Type of Sample

- A Auger (Disturbed)
- Split Tube Sampling
- H Thin-walled (Housel) Tube-Undisturbed
- J Jar-Disturbed
- ST Shelby Tube-Undisturbed
- RC Rock Core
- NR Indicates "No Recovery"

### Remarks

Total Footage: 20'0"  
 Overburden Drilled: 20'0"  
 Rock Cored: NONE  
 Drillers: NW-TB

### Groundwater Observations

After 1 hour: None

Number of Blows (Standard Penetration Test) — Numbers in parentheses not used for bearing strength determinations

Unconfined Compressive Strength is considered approximately equal to the allowable bearing capacity

\*Allowable Bearing Strength (an approximation) is based on the Standard Penetration Test — number of blows per foot of penetration



# SOIL BORING LOG

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Project MUNICIPAL SERVICE AND STORAGE BUILDING - NAPOLEON, OHIO

Boring Location 433' west of centerline of Industrial Dr. & 60' north of south property line

Job No. DR-3771

Date JANUARY 10, 1980

Soil Boring No. 4

Sample & Type	Depth (Ft.-In.)	Soil Description	Blows Per 6"	Moisture Content (%)	Dry Unit Weight (P.C.F.)	Unconfined Compressive Strength (P.S.F.)	Allowable Bearing Strength (P.S.F.)
	0'9"	Topsoil					
NO.1 J	3'6"	Stiff brown and grey mottled silty clay, trace of sand and gravel	(4)				
	5'0"		(4)				
			(9)				
	8'0"	Hard brown silty clay, trace of fine sand and gravel					
NO.2 J	8'6"		(9)				
	9'6"		(15)				
	10'0"		(20)				
	13'6"	Hard grey silty clay, trace of sand and gravel					
NO.3 J	15'0"		(6)				
			(11)				
	18'6"		(18)				
NO.4 J	20'0"	STRATA CONTINUES ON PAGE 7	(12)				
			(12)				
			(19)				

- Type of Sample**
- A Auger (Disturbed)
  - Split Tube Sampling —
  - H Thin-walled (House)
  - Tube-Undisturbed
  - J Jar-Disturbed
  - ST Shelby Tube-Undisturbed
  - RC Rock Core
  - NR Indicates "No Recovery"

**Remarks**

Total Footage: \_\_\_\_\_

Overburden Drilled: \_\_\_\_\_

Rock Cored: \_\_\_\_\_

Drillers: \_\_\_\_\_

### Groundwater Observations

SEE PAGE 7

SEE PAGE 7

Number of Blows (Standard Penetration Test) — Numbers in parentheses not used for bearing strength determinations  
 Unconfined Compressive Strength is considered approximately equal to the allowable bearing capacity  
 \*Allowable Bearing Strength (an approximation) is based on the Standard Penetration Test — number of blows per foot of penetration







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Project MUNICIPAL SERVICE AND STORAGE BUILDING - NAPOLEON, OHIO

Boring Location 310' west of centerline of Industrial Dr. & 60' north of south property line

Job No. DRO3771

Date JANUARY 9, 1980

Soil Boring No. 5

Sample & Type	Depth (Ft.-In.)	Soil Description	Blows Per 6"	Moisture Content (%)	Dry Unit Weight (P.C.F.)	Unconfined Compressive Strength (P.S.F.)	Allowable Bearing Strength (P.S.F.)
	0'10"	Topsoil					
NO.1 J	3'6" 5'0"	Stiff brown and grey mottled silty clay, trace of fine sand	(6) (6) (7)				
NO.2 J	7'6" 8'6" 10'0"	Hard brown silty clay, trace of fine sand and gravel	(19) (26) (35)				
NO.3 J	11'6" 13'6" 15'0"	Hard grey silty clay, trace of fine sand and gravel	(11) (19) (27)				
NO.4 J	18'6" 20'0"	STRATA CONTINUES ON PAGE 9	(12) (19) (25)				

**Type of Sample**  
 A Auger (Disturbed)  
 — Split Tube Sampling —  
 H Thin-walled (Housel) Tube-Undisturbed  
 J Jar-Disturbed  
 ST Shelby Tube-Undisturbed  
 RC Rock Core  
 NR Indicates "No Recovery"

**Remarks**  
 Total Footage: \_\_\_\_\_  
 Overburden Drilled: \_\_\_\_\_  
 Rock Cored: \_\_\_\_\_  
 Drillers: \_\_\_\_\_

**Groundwater Observations**

SEE PAGE 9

SEE PAGE 9

Number of Blows (Standard Penetration Test) — Numbers in parentheses not used for bearing strength determinations  
 Unconfined Compressive Strength is considered approximately equal to the allowable bearing capacity  
 \*Allowable Bearing Strength (an approximation) is based on the Standard Penetration Test — number of blows per foot of penetration





# SOIL BORING LOG

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Project MUNICIPAL SERVICE AND STORAGE BUILDING - NAPOLEON, OHIO  
 Boring Location 187' west of centerline of Industrial Dr. & 60' north of south property line Job No. DR-3771  
 Date JANUARY 9, 1980 Soil Boring No. 6

Sample & Type	Depth (Ft -In )	Soil Description	Blows Per 6"	Moisture Content (%)	Dry Unit Weight (P.C.F.)	Unconfined Compressive Strength (P.S.F.)	Allowable Bearing Strength (P.S.F.)
	1'0"	Topsoil					
NO. 1 J	3'6" 5'0"	Stiff brown and grey mottled silty clay, trace of fine sand	(6) (5) (6)				
NO. 2 J	8'6" 10'0"	Hard brown clay, trace of fine sand and gravel	(15) (30) (38)				
NO. 3 J	13'6" 15'0"	Hard grey silty clay, trace of fine sand and gravel	(10) (14) (26)				
NO. 4 J	18'6" 20'0"	STRATA CONTINUES ON PAGE 11	(15) (15) (20)				

- Type of Sample**  
 A Auger (Disturbed)  
 S Split Tube Sampling  
 H Thin-walled (Housel) Tube-Undisturbed  
 J Jar-Disturbed  
 ST Shelby Tube-Undisturbed  
 RC Rock Core  
 NR Indicates "No Recovery"

**Remarks**  
 Total Footage: \_\_\_\_\_  
 Overburden Drilled: \_\_\_\_\_  
 Rock Cored: \_\_\_\_\_  
 Drillers: \_\_\_\_\_

**Groundwater Observations**

SEE PAGE 11

SEE PAGE 11

Number of Blows (Standard Penetration Test) — Numbers in parentheses not used for bearing strength determinations  
 Unconfined Compressive Strength is considered approximately equal to the allowable bearing capacity  
 Allowable Bearing Strength (an approximation) is based on the Standard Penetration Test — number of blows per foot of penetration





JANUARY 28, 1980

JOB NO. DR-3771

TABLE NO. 1

NATURAL MOISTURE CONTENT, MECHANICAL ANALYSIS (SIEVE AND HYDROMETER) AND  
COMPOSITION OF SOIL

BORING NUMBER	DEPTH (FT.-IN.)	NATURAL MOISTURE CONTENT (%)	S I E V E   A N A L Y S I S					
			PERCENT PASSING SIEVE SIZES AND NUMBERS					
			1/2"	3/8"	NO.4	NO.10	NO.40	NO.200
CBR-1	1'0"-6'0"	14.6	100.00	100.00	100.00	100.00	98.62	91.38

COMPOSITION OF SOIL

BORING NUMBER	GRAVEL (%)	SAND (%)	SILT (%)	FINES	
				CLAY (%)	
CBR-1	0	8.62	43.52	47.86	

TABLE NO. 2

ATTERBERG LIMITS (L.L., P.L., P.I.), GROUP DESIGNATION AND GROUP INDEX

BORING NUMBER	DEPTH (FT.-IN.)	LIQUID LIMIT L.L. (%)	PLASTIC LIMIT P.L. (%)	PLASTICITY INDEX P.I.	GROUP DESIGNATION, GROUP INDEX AND SOIL DESCRIPTION



JANUARY 28, 1980

JOB NO. DR-3771

TABLE NO. 3

MOISTURE-DENSITY RELATIONSHIP  
(STANDARD PROCTOR)  
ASTM D 698

BORING NUMBER	DEPTH (FT.-IN.)	COMPACTION CHARACTERISTICS	
		MAXIMUM DRY DENSITY (LBS./CU.FT.)	OPTIMUM MOISTURE CONTENT (%)
CBR-1	1'0"-6'0"	104.9	17.0

TABLE NO. 4

CALIFORNIA BEARING RATIO  
LOAD-PENETRATION DETERMINATIONS  
(ASTM D 1883)

BORING NUMBER	NUMBER OF BLOWS PER LAYER	DRY DENSITY FROM STANDARD PROCTOR (LBS./CU.FT.)	SWELL (%)	CBR VALUES AT INDICATED PENETRATION		MOISTURE CONTENT AFTER PENETRATION (%)
				0.1" (%)	0.2" (%)	
CBR-1	56	104.9	0.87	6.00	5.78	19.1

CALIFORNIA BEARING RATIO  
LOAD-PENETRATION DETERMINATIONS  
(ASTM D 1883)

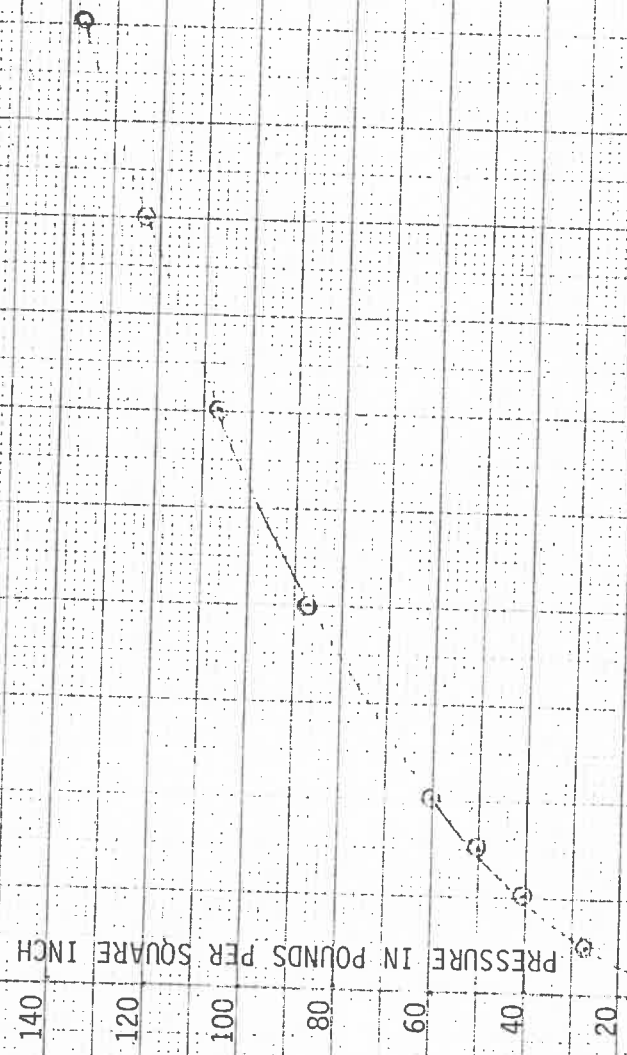
BORING NO. CBR-1  
DEPTH: 1'-0"-6'0"

PROJECT: MUNICIPAL SERVICE AND STORAGE BUILDING  
NAPOLEON, OHIO  
JOB NO. DR-3771

140  
120  
100  
80  
60  
40  
20  
PRESSURE IN POUNDS PER SQUARE INCH

PISTON PENETRATION IN INCHES

0.0 0.1 0.2 0.3 0.4 0.5





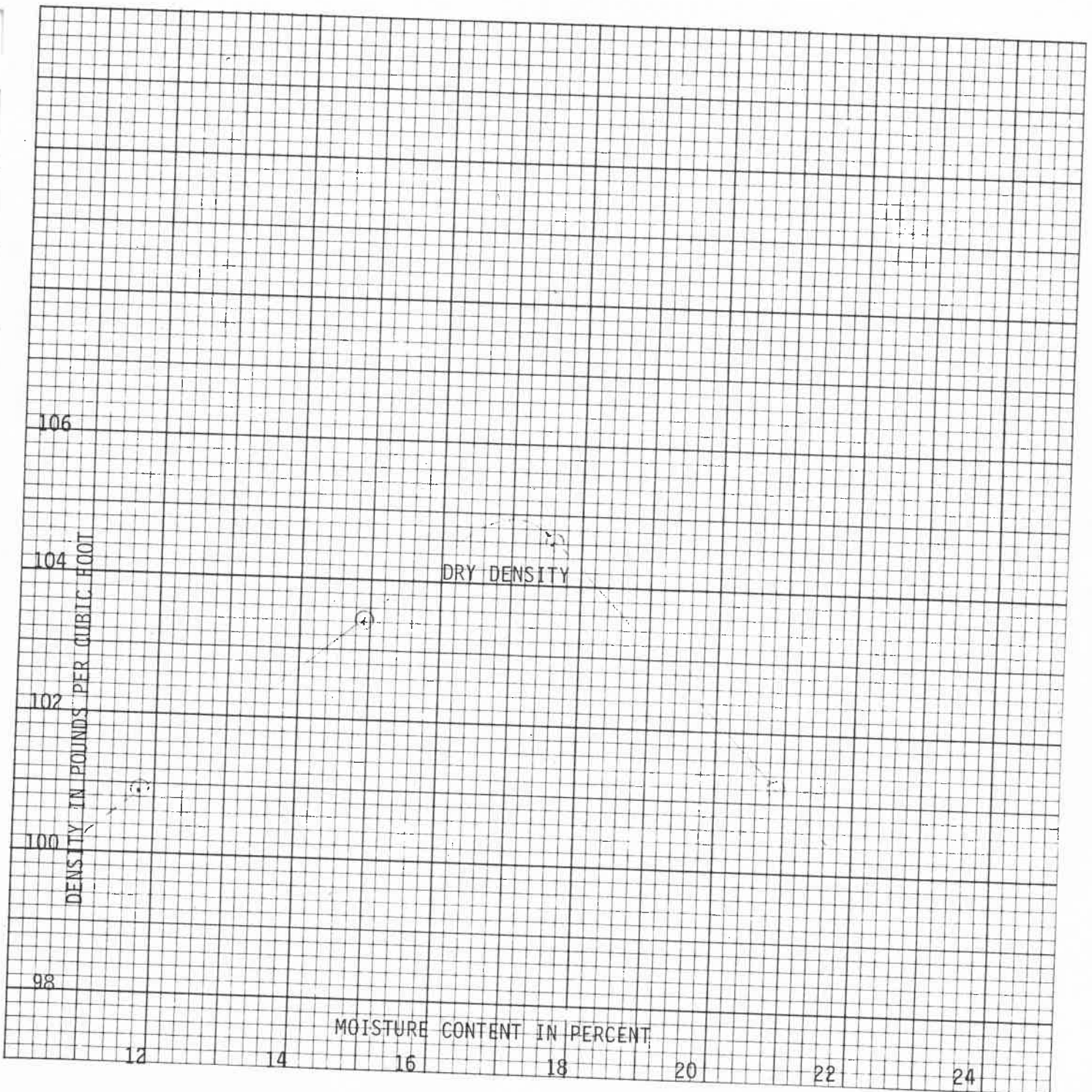
Job No.: DR-3771 Date: JANUARY 28, 1980  
Project: MUNICIPAL SERVICE AND STORAGE BUILDING  
NAPOLEON, OHIO

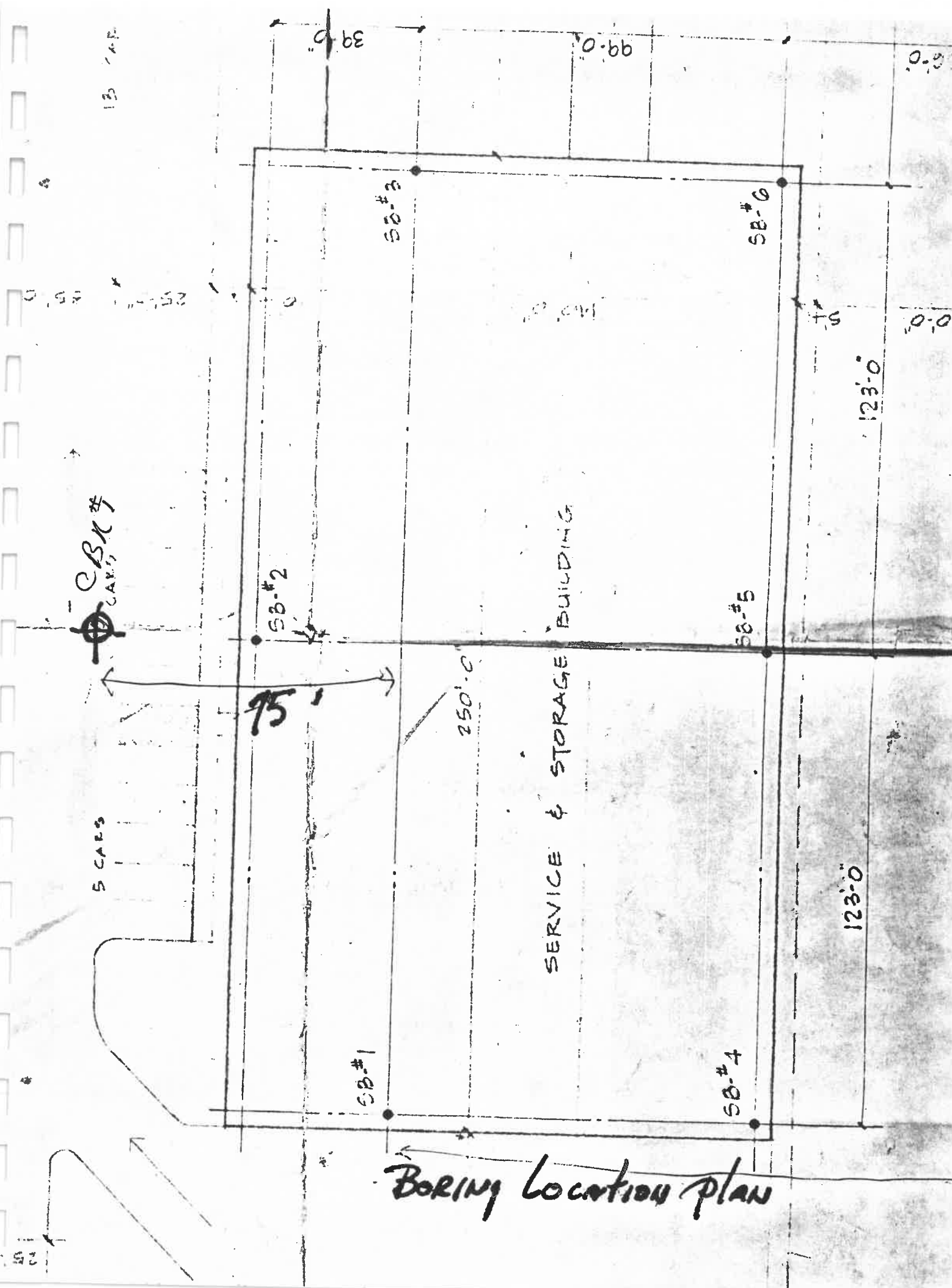
# Toledo Testing Laboratory, Inc.

1810 North 12th Street  
Toledo, Ohio 43624  
(419) 241-7175

Type Test: STANDARD PROCTOR NO. 1 - ASTM D 698  
Sample Description: BROWN SILT AND CLAY, TRACE OF SAND AND GRAVEL  
Source: BORING NO. CBR-1 DEPTH: 1'0"-6'0"  
Maximum Dry Density: 104.9 PCF Optimum Moisture Content: 17.0%

## MOISTURE-DENSITY RELATIONSHIP





BORING LOCATION PLAN