BRAUN INTERTEC

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September 15, 2011 Project FA-11-05310

Mr. Gary Brennan, PE
Brosz Engineering, Inc.
109 S. Main, Box 357
Bowman, ND 58523

Re: Borrow Evaluation
ND Highway 3 Major Rehabilitation
Between Dawson and Napoleon, North Dakota
SS-1-003(034)059

Dear Mr. Brennan:

We are pleased to present this Borrow Evaluation Letter for the proposed Major Rehabilitation of North Dakota Highway 3 (ND 3), north of Napoleon, North Dakota. This project was completed in accordance with our proposal dated August 11, 2011. The purpose of this evaluation was to assist the North Dakota Department of Transportation (NDDOT) and Brosz Engineering (Brosz) with the evaluation of borrow sources. Boring location sketches, the linear soils report, logs of boring sheets, grain size distribution curves, and proctor reports are enclosed with this letter.

Scope

Our scope of services in the above referenced proposal consisted of the following tasks and subtasks:

- Engineering and Project Management
  - Develop Scope,
  - Site reconnaissance,
  - Prepare drilling instructions,
  - Drilling oversight,
  - Oversee laboratory testing,
  - Prepare boring logs,
  - Communications,
  - Prepare summary of results and procedures,
  - Overall project management of drilling, lab testing and engineering.

- Drilling
  - Drill 26 borings to a depth of 20 feet for borrow areas,
  - Stake boring locations and coordinate with utility companies to locate buried utilities.

- Laboratory Testing
  - Conduct moisture content tests on each sample, and conduct one Atterberg Limits, one hydrometer, and one modified Proctor per boring.

Boring Logs

The locations of our borings are shown on the enclosed Boring Location Sketches. Log of Boring sheets for our test borings also accompany this letter. The logs identify and describe the geologic materials that were penetrated, present the results of laboratory tests performed on samples retrieved from them, and note the locations of groundwater measurements.

Strata boundaries were inferred from changes in the auger cuttings. The strata boundary depths are only approximate. The boundary depths likely vary away from the boring locations, and the boundaries themselves may also occur as gradual rather than abrupt transitions.

Elevations and coordinates of the boring locations were provided by Brosz.

Site Conditions

The topography along the ND 3 alignment and in the proposed borrow areas 1 through 3 consists of rolling hills. The elevations of the borings in borrow area 1 range from 2046 to 2080. Borrow area 1 is in Logan County near Reference Point (RP) 64.5 situated just east of the existing ND 3 right of way on land currently used as pastureland.

The elevations of the borings in borrow area 2 range from 2051 to 2056. Borrow area 2 is in Logan County near RP 65.4 about 800 feet west of the existing ND 3 right of way on pastureland. It is also adjacent to an area that the landowner is using as a gravel pit and waste pile.

The elevations in borrow area 3 range from 2000 to 2040. Borrow area 3 is located in Kidder County near RP 71.7 just east of the existing ND 3 right of way in area that is currently used as pastureland.

Soil Classification and Comments

We collected a total of 37 bulk samples and 232 jar samples from the borrow borings. All of the borings except for BW-2-1 and BW-2-5 were extended to a depth of about 20 feet. Borings BW-2-1 and BW-2-5 hit practical auger refusal at depths of about 11 ½ and 14 feet, respectively.

The results of our laboratory testing are shown in Tables 1 and 2 below, on the enclosed boring logs and graphs, and on the Linear Soils report.

Table 1. Summary of Classification, Moisture Content, and Maximum Dry Unit Weight Testing

AASHTO Classifications	Quantity	In Place Moisture Range (%)		In Place Moisture Average (%)	AASHTO T-180 Optimum Moisture Average (%)	AASHTO T-180 Maximum Dry Unit Weight Average (pcf)
		Min	Max			
A-1-b	1	5	6	6.5	9.4	129.7
A-2-4	4	6	20	8.9	11.3	120.7
A-2-6	2	7	26	13.3	9.7	127.8
A-6	19	10	24	17.4	11.3	120.1
A-7-6	11	15	40	22.6	14.3	113.8

As can be seen in Table 1, the A-1-b and A-2-4 soils encountered at the site were generally dry of their optimum moisture contents while the remainder of the soils were wet of the optimum moisture content as determined by AASHTO T-180. The soils classified as A-1-b and A-2-4 were generally dry about 5 percent of the optimum moisture content. The A-2-6 soils were typically within 2 to 6 percent of the optimum moisture. The A-6 soils were typically within 4 to 8 percent of the optimum moisture content and the A-7-6 soils were typically within 6 to 10 percent of the optimum moisture content.

Table 2. Summary of Atterberg Limits Testing

AASHTO Classifications	Quantity	Liquid Limit Range (%)		Liquid Limit Average (%)	Plastic Limit Range (%)		Plastic Limit Average (%)	Plastic Index Range		Plastic Index Average
		Min	Max		Min	Max		Min	Max	
A-1-b	1	21	21	21	18	18	18	3	3	3
A-2-4	4	16	23	20	13	18	16	1	5	3
A-2-6	2	29	30	30	15	17	16	13	14	14
A-6	19	28	40	36	14	18	16	11	25	20
A-7-6	11	41	81	51	13	27	18	24	59	33

The soils classified as A-7-6 had plastic indices ranging from 24 to 59 with an average PI of 33, indicating moderate swell potential. Also, the soils encountered in the borings are considered frost-susceptible. Additionally, the soils that were classified as A-7-6 soils are generally considered poor subgrade materials. A group index of 20 or greater indicates very poor subgrade materials. Of the 11 soils that were classified as A-7-6 materials, 7 have group indexes between 11 and 18, one was at 22, another at 32, and the last two had group indexes of 59 and 61.

Groundwater

Groundwater was observed in one (BW-3-14) of the 26 borrow borings at a depth of 3½ feet. The water observed was perched in a shallow sandy silt layer and was not apparent in high quantities. The borings were backfilled immediately after drilling. As the observation periods were relatively short, water can be anticipated in other locations at the time of construction. In addition, seasonal and annual fluctuations in groundwater levels should be anticipated. Elevated water levels should be anticipated following spring thaw and periods of heavy precipitation.

Thank you for making Braun Intertec your geotechnical consultant for this project. If you have questions about this report, or if there are other services that we can provide in support of our work to date, please call Ezra Ballinger or Steve Nagle at 701.232.8701.

Sincerely,

BRAUN INTERTEC CORPORATION

Ezra Ballinger, EI
Project Engineer

Professional Certification:
I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Registered Professional Engineer under the laws of the State of North Dakota.

STEVEN P. NAGLE
REGISTERED
PROFESSIONAL
PE 3894
ENGINEER
NORTH DAKOTA

9-15-11

Steven P. Nagle, PE
Principal Engineer/Vice President
Registration Number: PE-3894
September 15, 2011

Boring Location Sketches
Descriptive Terminology
Linear Soils Report
Log of Boring Sheets
Grain Size Distribution Curves
Proctor Test Results

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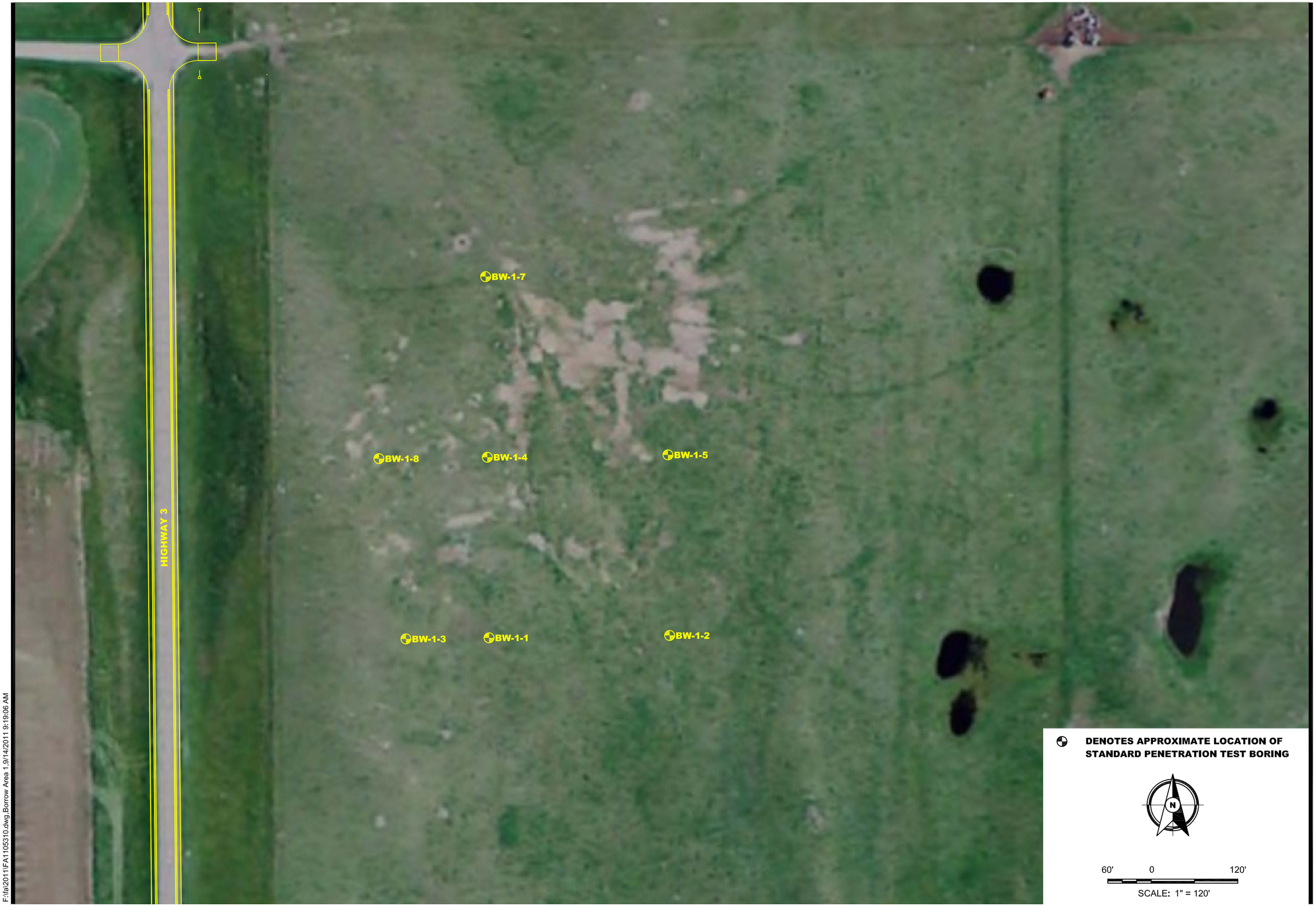

BRAUN INTERTEC

11001 Hampshire Avenue So.
Minneapolis, MN 55438
PH. (952) 995-2000
FAX (952) 995-2020

Base Dwg Provided By:
BROSZ ENGINEERING

BORING LOCATION SKETCH
BORROW AREA #1
HIGHWAY 3 REHABILITATION FROM DAWSON TO NAPOLEON
LOGAN COUNTY, NORTH DAKOTA

Project No:	FA1105310
Drawing No:	FA1105310
Scale:	1" = 120'
Drawn By:	BJB
Date Drawn:	9/13/11
Checked By:	EB
Last Modified:	9/13/11
Sheet: of	Fig:

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DENOTES APPROXIMATE LOCATION OF STANDARD PENETRATION TEST BORING

N

75' 0 150'

SCALE: 1" = 150'

BRAUN INTERTEC

11001 Hampshire Avenue So.
Minneapolis, MN 55438
PH. (952) 995-2000
FAX (952) 995-2020

Base Dwg Provided By:
BROSZ ENGINEERING

BORING LOCATION SKETCH
BORROW AREA #2
HIGHWAY 3 REHABILITATION FROM DAWSON TO NAPOLEON
LOGAN COUNTY, NORTH DAKOTA

Project No:	FA1105310
Drawing No:	FA1105310
Scale:	1" = 150'
Drawn By:	BJB
Date Drawn:	9/13/11
Checked By:	EB
Last Modified:	9/13/11

Sheet: of	Fig:

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BRAUN INTERTEC

11001 Hampshire Avenue So.
Minneapolis, MN 55438
PH. (952) 995-2000
FAX (952) 995-2020

Base Dwg Provided By:
BROSZ ENGINEERING

BORING LOCATION SKETCH
BORROW AREA #3
HIGHWAY 3 REHABILITATION FROM DAWSON TO NAPOLEON
KIDDER COUNTY, NORTH DAKOTA

Project No:	FA1105310
Drawing No:	FA1105310
Scale:	1" = 200'
Drawn By:	BJB
Date Drawn:	9/13/11
Checked By:	EB
Last Modified:	9/13/11

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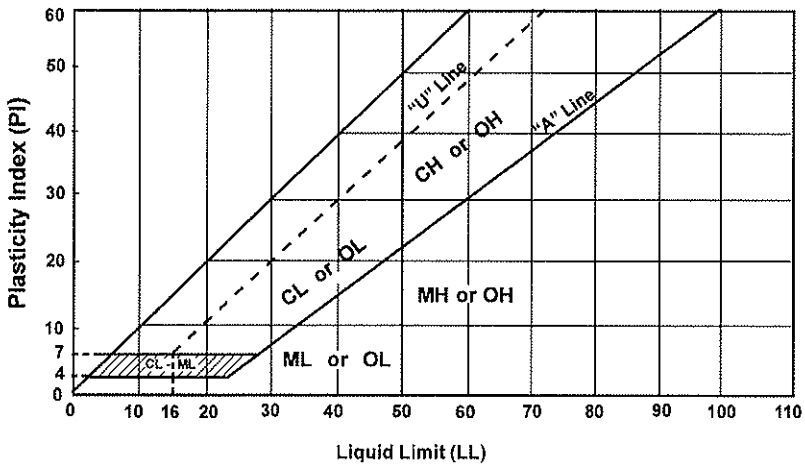
INTERTEC

Descriptive Terminology of Soil

Standard D 2487 - 00
Classification of Soils for Engineering Purposes
(Unified Soil Classification System)

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests [a]				Soils Classification	
				Group Symbol	Group Name [b]
Coarse-grained Soils more than 50% retained on No. 200 sieve	Gravels More than 50% of coarse fraction retained on No. 4 sieve	Clean Gravels 5% or less fines [e]	$C_u \geq 4$ and $1 \leq C_c \leq 3$ [c]	GW	Well-graded gravel [d]
			$C_u < 4$ and/or $1 > C_c > 3$ [c]	GP	Poorly graded gravel [d]
		Gravels with Fines More than 12% fines [e]	Fines classify as ML or MH	GM	Silty gravel [d f g]
			Fines classify as CL or CH	GC	Clayey gravel [d f g]
	Sands 50% or more of coarse fraction passes No. 4 sieve	Clean Sands 5% or less fines [i]	$C_u \geq 6$ and $1 \leq C_c \leq 3$ [c]	SW	Well-graded sand [h]
			$C_u < 6$ and/or $1 > C_c > 3$ [c]	SP	Poorly graded sand [h]
		Sands with Fines More than 12% [i]	Fines classify as ML or MH	SM	Silty sand [f g h]
			Fines classify as CL or CH	SC	Clayey sand [f g h]
Fine-grained Soils 50% or more passed the No. 200 sieve	Silts and Clays Liquid limit less than 50	Inorganic	PI > 7 and plots on or above "A" line [j]	CL	Lean clay [k l m]
			PI < 4 or plots below "A" line [j]	ML	Silt [k l m]
		Organic	Liquid limit - oven dried / Liquid limit - not dried < 0.75	OL	Organic clay [k l m n]
				OL	Organic silt [k l m o]
	Silts and clays Liquid limit 50 or more	Inorganic	PI plots on or above "A" line	CH	Fat clay [k l m]
			PI plots below "A" line	MH	Elastic silt [k l m]
		Organic	Liquid limit - oven dried / Liquid limit - not dried < 0.75	OH	Organic clay [k l m p]
				OH	Organic silt [k l m q]
Highly Organic Soils		Primarily organic matter, dark in color and organic odor		PT	Peat

a. Based on the material passing the 3-in (75mm) sieve.
b. If field sample contained cobbles or boulders, or both, add "with cobbles or boulders or both" to group name.
c. $C_u = D_{60} / D_{10}$ $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$
d. If soil contains ≥15% sand, add "with sand" to group name.
e. Gravels with 5 to 12% fines require dual symbols:
GW-GM well-graded gravel with silt
GW-GC well-graded gravel with clay
GP-GM poorly graded gravel with silt
GP-GC poorly graded gravel with clay
f. If fines classify as CL-ML, use dual symbol GC-GM or SC-SM.
g. If fines are organic, add "with organic fines" to group name.
h. If soil contains ≥ 15% gravel, add "with gravel" to group name.
i. Sands with 5 to 12% fines require dual symbols:
SW-SM well-graded sand with silt
SW-SC well-graded sand with clay
SP-SM poorly graded sand with silt
SP-SC poorly graded sand with clay
j. If Atterberg limits plot in hatched area, soil is a CL-ML, silty clay.
k. If soil contains 10 to 29% plus No. 200, add "with sand" or "with gravel" whichever is predominant.
l. If soil contains ≥ 30% plus No. 200, predominantly sand, add "sandy" to group name.
m. If soil contains ≥ 30% plus No. 200 predominantly gravel, add "gravelly" to group name.
n. PI ≥ 4 and plots on or above "A" line.
o. PI < 4 or plots below "A" line.
p. PI plots on or above "A" line.
q. PI plots below "A" line.



Laboratory Tests

DD	Dry density, pcf	OC	Organic content, %
WD	Wet density, pcf	S	Percent of saturation, %
MC	Natural moisture content, %	SG	Specific gravity
LL	Liquid limit, %	C	Cohesion, psf
PL	Plastic limit, %	∅	Angle of internal friction
PI	Plasticity index, %	qu	Unconfined compressive strength, psf
P200	% passing 200 sieve	qp	Pocket penetrometer strength, tsf

Particle Size Identification

Boulders	over 12"
Cobbles	3" to 12"
Gravel	
Coarse	3/4" to 3"
Fine	No. 4 to 3/4"
Sand	
Coarse	No. 4 to No. 10
Medium	No. 10 to No. 40
Fine	No. 40 to No. 200
Silt	< No. 200, PI < 4 or below "A" line
Clay	< No. 200, PI ≥ 4 and on or above "A" line

Relative Density of Cohesionless Soils

Very loose	0 to 4 BPF
Loose	5 to 10 BPF
Medium dense	11 to 30 BPF
Dense	31 to 50 BPF
Very dense	over 50 BPF

Consistency of Cohesive Soils

Very soft	0 to 1 BPF
Soft	2 to 3 BPF
Rather soft	4 to 5 BPF
Medium	6 to 8 BPF
Rather stiff	9 to 12 BPF
Stiff	13 to 16 BPF
Very stiff	17 to 30 BPF
Hard	over 30 BPF

Drilling Notes

Standard penetration test borings were advanced by 3 1/4" or 6 1/4" ID hollow-stem augers unless noted otherwise, Jetting water was used to clean out auger prior to sampling only where indicated on logs. Standard penetration test borings are designated by the prefix "ST" (Split Tube). All samples were taken with the standard 2" OD split-tube sampler, except where noted.

Power auger borings were advanced by 4" or 6" diameter continuous-flight, solid-stem augers. Soil classifications and strata depths were inferred from disturbed samples augered to the surface and are, therefore, somewhat approximate. Power auger borings are designated by the prefix "B."

Hand auger borings were advanced manually with a 1 1/2" or 3 1/4" diameter auger and were limited to the depth from which the auger could be manually withdrawn. Hand auger borings are indicated by the prefix "H."

BPF: Numbers indicate blows per foot recorded in standard penetration test, also known as "N" value. The sampler was set 6" into undisturbed soil below the hollow-stem auger. Driving resistances were then counted for second and third 6" increments and added to get BPF. Where they differed significantly, they are reported in the following form: 2/12 for the second and third 6" increments, respectively.

WH: WH indicates the sampler penetrated soil under weight of hammer and rods alone; driving not required.

WR: WR indicates the sampler penetrated soil under weight of rods alone; hammer weight and driving not required.

TW indicates thin-walled (undisturbed) tube sample.

Note: All tests were run in general accordance with applicable ASTM standards.

Linear Report of Tests on Soil Samples

PROJECT NO.: FA-11-05310 (Borrow Borings)
PROJECT: Highway 3 from Dawson to Napoleon
Logan and Kidder Counties
South of Dawson, North Dakota

Braun Intertec Corporation
PO Box 485, West Fargo, ND
Phone: (701) 232-8701

Boring Number	ND3-BW-1-1	ND3-BW-1-1	ND3-BW-1-1	ND3-BW-1-2	ND3-BW-1-3
Station	3399+98.98	3399+98.98	3399+98.98	3399+99.88	3339+98.57
Offset	450.0' (Right)	450.0' (Right)	450.0' (Right)	700.0' (Right)	335.0' (Right)
Elevation	2061.0	2061.0	2061.0	2046.3	2077.0
Sample Depth	1.3' - 4.5'	7.0' - 9.0'	9.0' - 16'	9.0' - 16.5'	0.5' - 12'
% Passing 3/8" Sieve	100	98	100	100	100
% Passing No. 4 Sieve	100	95	100	100	98
% Passing No. 10 Sieve	98	91	99	99	96
% Coarse Sand (-No. 10, +No. 40)	4	25	6	1	8
% Fine Sand (-No. 40, +No. 200)	19	45	74	4	21
% Silt (0.075 - 0.002 mm)	56	13	11	48	48
% Clay (<0.002 mm)	19	9	8	46	20
% Finer than 0.02 mm	36	15	13	74	47
Frost Group	F3	F3	F4	F4	F3
Liquid Limit (-No. 40)	33	30	18	81	39
Plastic Limit (-No. 40)	18	17	17	27	16
Plasticity Index (-No. 40)	15	13	1	54	23
Soil Color	Brown	Brown	Brown	Brown and Gray	Brown
USCS Classification	CL	SC	SM	CH	CL
Soil Classification (AASHTO M-15)	A-6 (10)	A-2-6 (0)	A-2-4 (0)	A-7-6 (59)	A-6 (13)
Optimum Moisture (%)	10.2	8.9	12.0	23.4	12.2
Maximum Dry Density (pcf)	123.0	128.3	120.0	96.6	118.0

Depth (ft)	**Moisture (%)**									
		2	17	7.0	14	9.5	6	9.5	39	0.5	17
						12.0	6	12.0	32	2.0	14
						14.5	8	14.5	32	4.5	14
										7	16
										9.5	15
Avg. Moisture of Sample Depth		17		14		7		34		15	

Linear Report of Tests on Soil Samples

PROJECT NO.: FA-11-05310 (Borrow Borings)
PROJECT: Highway 3 from Dawson to Napoleon
Logan and Kidder Counties
South of Dawson, North Dakota

Braun Intertec Corporation
PO Box 485, West Fargo, ND
Phone: (701) 232-8701

Boring Number	ND3-BW-1-4	ND3-BW-1-4	ND3-BW-1-5	ND3-BW-1-5	ND3-BW-1-5
Station	3402+48.98	3402+48.98	3402+49.88	3402+49.88	3402+49.88
Offset	450.0' (Right)	450.0' (Right)	700.0' (Right)	700.0' (Right)	700.0' (Right)
Elevation	2065.5	2065.5	2051.4	2051.4	2051.4
Sample Depth	1.5' - 8.0'	8.0' - 16.5'	0.6' - 6.0'	6.0' - 10'	10' - 20'
% Passing 3/8" Sieve	100	100	98	100	100
% Passing No. 4 Sieve	98	99	95	100	100
% Passing No. 10 Sieve	95	99	92	100	100
% Coarse Sand (-No. 10, +No. 40)	8	4	7	0	0
% Fine Sand (-No. 40, +No. 200)	23	77	29	61	8
% Silt (0.075 - 0.002 mm)	36	12	33	18	39
% Clay (<0.002 mm)	29	7	23	21	53
% Finer than 0.02 mm	46	12	36	31	82
Frost Group	F3	F4	F3	F3	F3
Liquid Limit (-No. 40)	39	16	42	32	81
Plastic Limit (-No. 40)	16	13	17	18	22
Plasticity Index (-No. 40)	23	3	25	14	59
Soil Color	Brown	Gray	Brown	Gray	Gray
USCS Classification	CL	SM	CL	SC	CH
Soil Classification (AASHTO M-15)	A-6 (13)	A-2-4 (0)	A-7-6 (11)	A-6 (2)	A-7-6 (61)
Optimum Moisture (%)	12.3	12.1	10.8	13.3	20.4
Maximum Dry Density (pcf)	120.8	118.5	120.0	118.3	100.8

Depth (ft)	**Moisture (%)**									
		2.0	15	9.5	9	2.0	22	7.0	22	10.0	40
		4.5	17	12.0	7	4.5	18			12.0	36
		7.0	10	14.5	10					14.5	24
										17.0	39
										19.0	33
Avg. Moisture of Sample Depth		14		9		20		22		34	

Linear Report of Tests on Soil Samples

PROJECT NO.: FA-11-05310 (Borrow Borings)
PROJECT: Highway 3 from Dawson to Napoleon
Logan and Kidder Counties
South of Dawson, North Dakota

Braun Intertec Corporation
PO Box 485, West Fargo, ND
Phone: (701) 232-8701

Boring Number	ND3-BW-1-7	ND3-BW-1-8	ND3-BW-2-1	ND3-BW-2-4	ND3-BW-2-5
Station	3404+98.99	3402+48.44	3447+96.10	3450+46.12	3450+42.86
Offset	450.0' (Right)	300.0' (Right)	1600.0 (Left)	1600.0 (Left)	1333.0 (Left)
Elevation	2066.4	2080.0	2056.0	2052.3	2056.1
Sample Depth	0.3' - 20'	0.3' - 20'	3.0' - 6.0'	0.5' - 9.0'	4.0' - 14'
% Passing 3/8" Sieve	100	97	100	100	88
% Passing No. 4 Sieve	99	92	99	99	79
% Passing No. 10 Sieve	97	86	96	96	67
% Coarse Sand (-No. 10, +No. 40)	8	13	7	6	20
% Fine Sand (-No. 40, +No. 200)	23	24	45	22	26
% Silt (0.075 - 0.002 mm)	40	29	32	41	13
% Clay (<0.002 mm)	26	21	13	28	8
% Finer than 0.02 mm	44	36	23	50	14
Frost Group	F3	F3	F4	F3	F4
Liquid Limit (-No. 40)	43	36	28	41	29
Plastic Limit (-No. 40)	13	16	17	14	15
Plasticity Index (-No. 40)	30	20	11	27	14
Soil Color	Brown	Gray	Brown and Gray	Brown	Brown
USCS Classification	CL	SC	SC	CL	SC
Soil Classification (AASHTO M-15)	A-7-6 (17)	A-6 (6)	A-6 (2)	A-7-6 (16)	A-2-6 (0)
Optimum Moisture (%)	11.1	12.1	11.8	11.8	10.4
Maximum Dry Density (pcf)	121.2	119.5	121.1	115.4	127.2

Depth (ft)	**Moisture (%)**									
	2.0	16	2.0	16	4.5	19	2.0	20	4.0	7
	4.5	15	4.5	16			4.5	20	5.0	26
	7.0	16	7.0	12			7.0	22	7.0	12
	9.5	16	9.5	18					9.5	11
	12.0	16	12.0	17					12.0	10
	14.5	16	14.5	18						
	17.0	16	17.0	18						
	19.0	16	19.0	13						
Avg. Moisture of Sample Depth	16		16		19		21		13	

Linear Report of Tests on Soil Samples

PROJECT NO.: FA-11-05310 (Borrow Borings)
PROJECT: on Soil Samples
Logan and Kidder Counties
South of Dawson, North Dakota

Braun Intertec Corporation
PO Box 485, West Fargo, ND
Phone: (701) 232-8701

Boring Number	ND3-BW-2-7	ND3-BW-2-7	ND3-BW-2-7	ND3-BW-2-8	ND3-BW-2-9
Station	3452+96.14	3452+96.14	3452+96.14	3452+92.88	3452+89.63
Offset	1600.0 (Left)	1600.0 (Left)	1600.0 (Left)	1350.0 (Left)	1100.0 (Left)
Elevation	2051.8	2051.8	2051.8	2054.3	2053.6
Sample Depth	0.4' - 6.5'	6.5' - 11.5'	11.5' - 20'	1.3' - 14'	0' - 20'
% Passing 3/8" Sieve	99	93	99	98	85
% Passing No. 4 Sieve	98	89	97	96	80
% Passing No. 10 Sieve	94	81	93	92	71
% Coarse Sand (-No. 10, +No. 40)	11	47	8	6	20
% Fine Sand (-No. 40, +No. 200)	31	19	21	20	34
% Silt (0.075 - 0.002 mm)	30	10	41	36	12
% Clay (<0.002 mm)	23	6	23	31	5
% Finer than 0.02 mm	38	11	42	52	10
Frost Group	F3	F4	F3	F3	F4
Liquid Limit (-No. 40)	39	21	37	53	23
Plastic Limit (-No. 40)	14	18	16	17	18
Plasticity Index (-No. 40)	25	3	21	36	5
Soil Color	Brown and Gray	Brown	Brown	Brown	Brown
USCS Classification	CL	SM	CL	CH	SC-SM
Soil Classification (AASHTO M-15)	A-6 (9)	A-1-b (0)	A-6 (11)	A-7-6 (22)	A-2-4 (0)
Optimum Moisture (%)	9.5	9.4	10.8	13.4	10.8
Maximum Dry Density (pcf)	117.8	129.7	118.5	116.1	128.7

Depth (ft)	**Moisture (%)**									
		2.0	19	7.0	6	12.0	19	2.0	19	2.0	6
		4.5	16	9.5	5	14.5	19	4.5	23	4.5	8
						17.0	20	7.0	24	7.0	8
						19.0	22	9.5	22	9.5	10
								12.0	26	12.0	7
										14.5	11
										17.0	8
										19.0	7
Avg. Moisture of Sample Depth		18		6		20		23		8	

Linear Report of Tests on Soil Samples

PROJECT NO.: FA-11-05310 (Borrow Borings)
PROJECT: Highway 3 from Dawson to Napoleon
Logan and Kidder Counties
South of Dawson, North Dakota

Braun Intertec Corporation
PO Box 485, West Fargo, ND
Phone: (701) 232-8701

Boring Number	ND3-BW-3-5	ND3-BW-3-5	ND3-BW-3-6	ND3-BW-3-7	ND3-BW-3-8
Station	3770+24.90	3770+24.90	3770+01.91	3768+79.90	3768+75.05
Offset	788.3' (Right)	788.3' (Right)	1059.76' (Right)	1320.77' (Right)	1567.49' (Right)
Elevation	2005.1	2005.1	2027.6	2017.7	2013.2
Sample Depth	0.9' - 7.0'	9.0' - 18.5'	3.0' - 20'	3.0' - 20'	1.5' - 20'
% Passing 3/8" Sieve	100	100	99	100	99
% Passing No. 4 Sieve	99	100	97	99	95
% Passing No. 10 Sieve	98	100	94	98	92
% Coarse Sand (-No. 10, +No. 40)	4	0	8	6	7
% Fine Sand (-No. 40, +No. 200)	19	2	27	24	25
% Silt (0.075 - 0.002 mm)	53	61	35	39	33
% Clay (<0.002 mm)	23	38	24	29	28
% Finer than 0.02 mm	42	70	42	49	46
Frost Group	F3	F3	F3	F3	F3
Liquid Limit (-No. 40)	34	49	36	37	44
Plastic Limit (-No. 40)	18	19	16	14	19
Plasticity Index (-No. 40)	16	30	20	23	25
Soil Color	Brown	Brown	Brown	Brown	Brown
USCS Classification	CL	CL	CL	CL	CL
Soil Classification (AASHTO M-15)	A-6 (11)	A-7-6 (32)	A-6 (9)	A-6 (13)	A-7-6 (13)
Optimum Moisture (%)	11.5	16.2	11.8	10.6	13.1
Maximum Dry Density (pcf)	120.1	112.2	117.9	121.5	117.0

Depth (ft)	**Moisture (%)**									
		2.0	16	9.5	28	4.5	18	3.0	17	2.0	19
		4.5	19	12.0	24	7.0	18	4.5	17	4.5	21
				14.5	30	9.5	17	7.0	17	7.0	18
				17.0	25	12.0	20	9.5	17	9.5	18
						14.5	18	12.0	16	12.0	16
						17.0	17	14.5	16	14.5	17
						19.0	17	17.0	16	17.0	18
								19.0	15	19.0	18
Avg. Moisture of Sample Depth		18		27		18		16		18	

Linear Report of Tests on Soil Samples

PROJECT NO.: FA-11-05310 (Borrow Borings)
PROJECT: Highway 3 from Dawson to Napoleon
Logan and Kidder Counties
South of Dawson, North Dakota

Braun Intertec Corporation
PO Box 485, West Fargo, ND
Phone: (701) 232-8701

BRAUN INTERTEC

Boring Number	ND3-BW-3-9	ND3-BW-3-9A	ND3-BW-3-10	ND3-BW-3-10	ND3-BW-3-10A
Station	3777+37.40	3776+42.19	3773+75.12	3773+75.12	3772+57.10
Offset	677.47' (Right)	272.49' (Right)	1067.49' (Right)	1067.49' (Right)	731.67' (Right)
Elevation	2016.7	2000.5	2040.3	2040.3	2002.8
Sample Depth	0.5' - 6.5'	0.6' - 20'	0.5' - 4.5'	6.0' - 20'	3.0' - 12.5'
% Passing 3/8" Sieve	100	100	97	100	98
% Passing No. 4 Sieve	99	99	96	99	98
% Passing No. 10 Sieve	96	96	94	96	97
% Coarse Sand (-No. 10, +No. 40)	6	6	5	7	7
% Fine Sand (-No. 40, +No. 200)	21	24	25	30	25
% Silt (0.075 - 0.002 mm)	40	40	35	37	39
% Clay (<0.002 mm)	29	27	29	24	26
% Finer than 0.02 mm	50	49	45	42	44
Frost Group	F3	F3	F3	F3	F3
Liquid Limit (-No. 40)	43	39	29	37	40
Plastic Limit (-No. 40)	13	16	14	15	15
Plasticity Index (-No. 40)	30	23	15	22	25
Soil Color	Brown	Brown	Brown	Brown	Brown
USCS Classification	CL	CL	CL	CL	CL
Soil Classification (AASHTO M-15)	A-7-6 (18)	A-6 (13)	A-6 (7)	A-6 (10)	A-6 (14)
Optimum Moisture (%)	11.9	11.5	10.0	10.3	12.1
Maximum Dry Density (pcf)	119.5	118.4	120.7	124.2	118.5

Depth (ft)	**Moisture (%)**									
		2.0	17	2.0	23	0.5	16	7.0	18	3.0	16
		4.5	17	4.5	18	2.0	18	9.5	18	4.5	15
				7.0	18			12.0	17	7.0	17
				9.5	19			14.5	18	9.5	19
				12.0	16			17.0	17		
				14.5	16			19.0	18		
				17.0	16						
				19.0	17						
Avg. Moisture of Sample Depth		17		18		17		18		17	

Linear Report of Tests on Soil Samples

PROJECT NO.: FA-11-05310 (Borrow Borings)
PROJECT: Highway 3 from Dawson to Napoleon
Logan and Kidder Counties
South of Dawson, North Dakota

Braun Intertec Corporation
PO Box 485, West Fargo, ND
Phone: (701) 232-8701

BRAUN INTERTEC

Boring Number	ND3-BW-3-10A	ND3-BW-3-11	ND3-BW-3-12	ND3-BW-3-13	ND3-BW-3-14
Station	3772+57.10	3774+32.10	3773+75.05	3780+13.59	3778+75.12
Offset	731.67' (Right)	1302.04' (Right)	1567.49' (Right)	266.59' (Right)	1067.49' (Right)
Elevation	2002.8	2039.1	2024.1	2005.8	2012.4
Sample Depth	14' - 20'	1.1' - 20'	3.0' - 10'	0.4' - 7.0'	1.5' - 6.0'
% Passing 3/8" Sieve	100	100	100	100	100
% Passing No. 4 Sieve	100	100	100	99	100
% Passing No. 10 Sieve	100	97	99	96	100
% Coarse Sand (-No. 10, +No. 40)	1	6	4	5	6
% Fine Sand (-No. 40, +No. 200)	20	27	37	23	81
% Silt (0.075 - 0.002 mm)	59	37	29	40	8
% Clay (<0.002 mm)	21	27	29	28	5
% Finer than 0.02 mm	37	48	46	47	9
Frost Group	F3	F3	F3	F3	F4
Liquid Limit (-No. 40)	31	40	42	43	16
Plastic Limit (-No. 40)	16	17	18	17	15
Plasticity Index (-No. 40)	15	23	24	26	1
Soil Color	Brown	Brown	Brown	Brown	Dark Brown
USCS Classification	CL	CL	CL	CL	SM
Soil Classification (AASHTO M-15)	A-6 (10)	A-6 (12)	A-7-6 (11)	A-7-6 (16)	A-2-4 (0)
Optimum Moisture (%)	11.9	10.3	12.6	13.0	10.1
Maximum Dry Density (pcf)	119.8	121.1	116.0	117.3	115.6

Depth (ft)	**Moisture (%)**									
	14.5	24	2.0	15	4.5	22	2.0	21	2.0	12
	17.0	17	4.5	17	7.0	23	4.5	23	4.5	20
	19.0	16	7.0	18	9.5	22				
			9.5	17						
			12.0	17						
			14.5	17						
			17.0	17						
			19.0	18						
Avg. Moisture of Sample Depth	19		17		22		22		16	

Linear Report of Tests on Soil Samples

PROJECT NO.: FA-11-05310 (Borrow Borings)
PROJECT: Highway 3 from Dawson to Napoleon
Logan and Kidder Counties
South of Dawson, North Dakota

Braun Intertec Corporation
PO Box 485, West Fargo, ND
Phone: (701) 232-8701

Boring Number		ND3-BW-3-14	ND3-BW-3-15	
Station		3778+75.12	3778+75.05	
Offset		1067.49' (Right)	1567.49' (Right)	
Elevation		2012.4	2023.9	
Sample Depth		6.0' - 20'	0.5' - 20'	
% Passing 3/8" Sieve		100	97	
% Passing No. 4 Sieve		99	94	
% Passing No. 10 Sieve		96	89	
% Coarse Sand (-No. 10, +No. 40)		8	11	
% Fine Sand (-No. 40, +No. 200)		31	29	
% Silt (0.075 - 0.002 mm)		32	29	
% Clay (<0.002 mm)		25	21	
% Finer than 0.02 mm		41	36	
Frost Group		F3	F3	
Liquid Limit (-No. 40)		38	38	
Plastic Limit (-No. 40)		16	16	
Plasticity Index (-No. 40)		22	22	
Soil Color		Brown	Brown	
USCS Classification		CL	SC	
Soil Classification (AASHTO M-15)		A-6 (9)	A-6 (7)	
Optimum Moisture (%)		9.9	12.0	
Maximum Dry Density (pcf)		123.4	119.6	
Depth (ft)	**Moisture (%)**	7.0	23	2.0	20
		9.5	18	4.5	16
		12.0	18	7.0	18
		14.5	18	9.5	21
		17.0	18	12.0	18
		19.0	18	14.5	17
				17.0	17
				19.0	17
Avg. Moisture of Sample Depth		19	18	

BRAUN INTERTEC

LOG OF BORING

Braun Project FA-11-05310
Borrow Borings
Highway 3 from Dawson to Napoleon
Logan and Kidder Counties
South of Dawson, North Dakota

BORING: **ND3-BW-1-1**

LOCATION: Station 3399+98.98; Offset 450.0' Right

DRILLER: K. Miller | METHOD: Power Auger | DATE: **8/18/11** | SCALE: **1" = 4'**

Elev. feet 2061.0	Depth feet 0.0	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	BPF	WL	MC %	qp tsf	Tests or Notes
2059.7	1.3	CL	LEAN CLAY, with roots and organics, black, moist. (Topsoil)	FA		29		
2056.5	4.5	CL	LEAN CLAY with SAND, brown, moist. (Glacial Till) A-6 (10) MDD = 123.0 pcf; OMC = 10.2%.	FA		17	2 1/2	LL=33, PL=18, PI=15, P200=75.6%
2055.5	5.5	SP	POORLY GRADED SAND, a little Gravel, brown, moist. (Glacial Till)	FA		5		
2054.0	7.0	CL	SANDY LEAN CLAY, with Gravel, brown, moist. (Glacial Till)	FA		14		
2052.0	9.0	SC	CLAYEY SAND, a little fine-grained Gravel, brown, moist. (Glacial Till) A-2-6 (0) MDD = 128.3 pcf; OMC = 8.9%.	FA		14		LL=30, PL=17, PI=13, P200=21.3%
		SM	SILTY SAND, trace Gravel, brown, moist. (Glacial Till) A-2-4 (0) MDD = 120.0 pcf; OMC = 12.0%.	FA		6		LL=18, PL=17, PI=1, P200=18.9%
				FA		6		
2045.0	16.0			FA		8		
2041.0	20.0	SM	SILTY SAND, with fine-grained Gravel, brown, moist. (Glacial Till)	FA		13		
				FA		11		
			END OF BORING. Water not observed to a cave-in depth of 19 feet immediately after auger removed after last sample. Bag samples collected from 2 to 4 1/2 feet, 7 to 8 1/2 feet, and from 9 to 16 feet. Boring then backfilled.					

(See Descriptive Terminology sheet for explanation of abbreviations)

NDDOT LOG 05310.GPJ BRAUN.GDT 9/15/11 11:40

BRAUN INTERTEC

LOG OF BORING

Braun Project FA-11-05310
Borrow Borings
Highway 3 from Dawson to Napoleon
Logan and Kidder Counties
South of Dawson, North Dakota

BORING: **ND3-BW-1-2**

LOCATION: Station 3399+99.88; Offset 700.0' Right

DRILLER: K. Miller | METHOD: Power Auger | DATE: **8/18/11** | SCALE: **1" = 4'**

Elev. feet 2046.3	Depth feet 0.0	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	BPF	WL	MC %	qp tsf	Tests or Notes
2044.8	1.5	CL	LEAN CLAY, with roots and organics, black, moist. (Topsoil)	FA		22		
2041.3	5.0	CL	LEAN CLAY, a little fine-grained Sand, dark brown, moist. (Glacial Till)	FA		18		
			-light brown at 3 1/2 feet.	FA		18		
				FA		20		
2037.3	9.0	SC	CLAYEY SAND, a little fine-grained Gravel, brown and gray, moist. (Glacial Till)	FA		11		
				FA		7		
2029.8	16.5	CH	FAT CLAY, trace fine-grained Sand and Gravel, gray and brown, moist. (Glacial Till) A-7-6 (59) MDD = 96.6 pcf; OMC = 23.4%.	FA		39	2 1/4	LL=81, PL=27, PI=54, P200=93.7%
			-with iron-staining below 12 feet.	FA		32	3	
				FA		32	3	
2026.3	20.0	CL	LEAN CLAY, trace fine-grained Sand and Gravel, gray and brown with iron-staining, moist. (Glacial Till)	FA		24	3	
				FA		22		
			END OF BORING. Water not observed to a cave-in depth of 18 feet immediately after auger removed after last sample. Bag sample collected from 9 to 13 feet. Boring then backfilled.					

(See Descriptive Terminology sheet for explanation of abbreviations)

NDDOT LOG 05310.GPJ BRAUN.GDT 9/15/11 11:40

BRAUN INTERTEC

LOG OF BORING

Braun Project FA-11-05310
Borrow Borings
Highway 3 from Dawson to Napoleon
Logan and Kidder Counties
South of Dawson, North Dakota

BORING: **ND3-BW-1-3**

LOCATION: Station 3339+98.57; Offset 335.0' Right

DRILLER: K. Miller | METHOD: Power Auger | DATE: **8/18/11** | SCALE: **1" = 4'**

Elev. feet 2077.0	Depth feet 0.0	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	BPF	WL	MC %	qp tsf	Tests or Notes
2076.5	0.5	CL	LEAN CLAY, with roots and organics, black, moist. (Topsoil)	FA		17		LL=39, PL=16, PI=23, P200=67.8%
		CL	SANDY LEAN CLAY, trace fine-grained Gravel, brown, moist. (Glacial Till) A-6 (13) MDD = 118.0 pcf; OMC = 12.2%.	FA		14	4 1/4	
			-with iron-staining at 4 1/2 feet.	FA		14	4.5+	
				FA		16	4.5+	
				FA		15	4 1/2	
2065.0	12.0	SC	CLAYEY SAND, trace fine-grained Gravel, brown, moist. (Glacial Till)	FA		6		
2063.0	14.0	CL	SANDY LEAN CLAY, trace fine-grained Gravel, brown with iron-staining, moist. (Glacial Till)	FA		15	4.5+	
				FA		15	3 1/2	
2057.0	20.0			FA		15	4.5+	

END OF BORING.

Water not observed to a cave-in depth of 19 1/2 feet immediately after auger removed after last sample.

Bag sample collected from 3 to 7 feet.

Boring then backfilled.

(See Descriptive Terminology sheet for explanation of abbreviations)

NDDOT LOG 05310.GPJ BRAUN.GDT 9/15/11 11:40

BRAUN INTERTEC

LOG OF BORING

Braun Project FA-11-05310
Borrow Borings
Highway 3 from Dawson to Napoleon
Logan and Kidder Counties
South of Dawson, North Dakota

BORING: **ND3-BW-1-4**

LOCATION: Station 3402+48.98; Offset 450.0' Right

DRILLER: K. Miller | METHOD: Power Auger | DATE: **8/19/11** | SCALE: **1" = 4'**

Elev. feet 2065.5	Depth feet 0.0	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	BPF	WL	MC %	qp tsf	Tests or Notes
2064.0	1.5	CL	LEAN CLAY, with roots and organics, black, moist. (Topsoil)	FA		26		
2057.5	8.0	CL	SANDY LEAN CLAY, trace fine-grained Gravel, brown, moist. (Glacial Till) A-6 (13) MDD = 120.8 pcf; OMC = 12.3%.	FA		15	3 1/2	LL=39, PL=16, PI=23, P200=65.7%
			-with iron-staining from 4 1/2 to 6 feet.	FA		17	2 3/4	
				FA		10		
2049.0	16.5	SM	SILTY SAND, with Lean Clay seams, gray, moist. (Glacial Till) A-2-4 (0) MDD = 118.5 pcf; OMC = 12.1%.	FA		9		LL=16, PL=13, PI=3, P200=18.5%
				FA		7		
				FA		10		
2045.5	20.0	CL	SANDY LEAN CLAY, trace fine-grained Gravel, brown and gray with iron-staining, moist. (Glacial Till)	FA		16	4 1/2	
				FA		18	3	

END OF BORING.

Water not observed to a cave-in depth of 19 feet immediately after auger removed after last sample.

Bag samples collected from 3 to 7 feet and from 8 to 13 feet.

Boring then backfilled.

(See Descriptive Terminology sheet for explanation of abbreviations)

NDDOT LOG 05310.GPJ BRAUN.GDT 9/15/11 11:40

BRAUN INTERTEC

LOG OF BORING

Braun Project FA-11-05310
Borrow Borings
Highway 3 from Dawson to Napoleon
Logan and Kidder Counties
South of Dawson, North Dakota

BORING: **ND3-BW-1-5**

LOCATION: Station 3402+49.88; Offset 700.0' Right

DRILLER: K. Miller | METHOD: Power Auger | DATE: **8/19/11** | SCALE: **1" = 4'**

Elev. feet	Depth feet	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	BPF	WL	MC %	qp tsf	Tests or Notes
2051.4	0.0							
2050.8	0.6	CL	LEAN CLAY, with roots and organics, black, moist. (Topsoil)	FA		19		LL=42, PL=17, PI=25, P200=55.9%
		CL	SANDY LEAN CLAY, a little fine-grained Gravel, brown, moist. (Glacial Till) A-7-6 (11) MDD = 120.0 pcf; OMC = 10.8%. -cobbles at 2 1/2 feet.	FA		22		
			-gray at 4 1/2 feet.	FA		18		
2045.4	6.0	SC	CLAYEY SAND, trace Gravel, gray, moist. (Glacial Till) A-6 (2) MDD = 118.3 pcf; OMC = 13.3%.	FA		22		LL=32, PL=18, PI=14, P200=39.3%
2041.4	10.0	CH	FAT CLAY, a little Sand, gray, moist. (Glacial Till) A-7-6 (61) MDD = 100.8 pcf; OMC = 20.4%.	FA		40	2 1/4	LL=81, PL=22, PI=59, P200=92.3%
			-with iron-staining at 12 to 13 1/2 feet.	FA		36	2 3/4	
			-trace fine-grained Gravel at 14 1/2 to 16 feet.	FA		24	2 1/2	
			-dark gray at 17 to 18 1/2 feet.	FA		39	4.5+	
2031.4	20.0		-light brown and light gray at 9 to 20 feet.	FA		33		

END OF BORING.

Water not observed to a cave-in depth of 19 feet immediately after auger removed after last sample.

Bag samples collected from 2 to 5 feet, 6 to 10 feet, and from 10 1/2 to 14 feet.

Boring then backfilled.

(See Descriptive Terminology sheet for explanation of abbreviations)

NDDOT LOG 05310.GPJ BRAUN.GDT 9/15/11 11:40

BRAUN INTERTEC

LOG OF BORING

Braun Project FA-11-05310
Borrow Borings
Highway 3 from Dawson to Napoleon
Logan and Kidder Counties
South of Dawson, North Dakota

BORING: **ND3-BW-1-7**

LOCATION: Station 3404+98.99; Offset 450.0' Right

DRILLER: K. Miller | METHOD: Power Auger | DATE: **8/19/11** | SCALE: **1" = 4'**

Elev. feet 2066.4	Depth feet 0.0	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	BPF	WL	MC %	qp tsf	Tests or Notes
2066.1	0.3	CL	LEAN CLAY, with roots and organics, black, moist. (Topsoil)	FA		20		LL=43, PL=13, PI=30, P200=66.3%
		CL	SANDY LEAN CLAY, trace fine-grained Gravel, brown, moist. (Glacial Till) A-7-6 (17) MDD = 121.2 pcf; OMC = 11.1%.	FA		16	4.5+	
			-with iron-staining below 4 1/2 feet.	FA		15		
				FA		16	3 1/4	
				FA		16	4.5+	
				FA		16	4	
				FA		16	4 1/2	
				FA		16	4.5+	
2046.4	20.0			FA		16	4	
			END OF BORING. Water not observed to a cave-in depth of 18 feet immediately after auger removed after last sample. Bag sample collected from 3 to 7 feet. Boring then backfilled.					

(See Descriptive Terminology sheet for explanation of abbreviations)

NDDOT LOG 05310.GPJ BRAUN.GDT 9/15/11 11:40

BRAUN INTERTEC

LOG OF BORING

Braun Project FA-11-05310
Borrow Borings
Highway 3 from Dawson to Napoleon
Logan and Kidder Counties
South of Dawson, North Dakota

BORING: **ND3-BW-1-8**

LOCATION: Station 3402+48.44; Offset 300.0' Right

DRILLER: K. Miller | METHOD: Power Auger | DATE: **8/19/11** | SCALE: **1" = 4'**

Elev. feet 2080.0	Depth feet 0.0	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	BPF	WL	MC %	qp tsf	Tests or Notes
2079.7	0.3	CL	LEAN CLAY, with roots and organics, black, moist. (Topsoil)	FA		21		LL=36, PL=16, PI=20, P200=49.6%
		SC	CLAYEY SAND, a little fine- to medium-grained Gravel, gray, moist. (Glacial Till) A-6 (6) MDD = 119.5 pcf; OMC = 12.1%.	FA		16	3 1/2	
			-iron-stained below 5 feet.	FA		16	3 3/4	
				FA		12		
				FA		18	2 1/2	
				FA		17	3 1/2	
				FA		18	2 1/2	
				FA		18	3 1/2	
			-with Sand lenses at 19 to 20 feet.	FA		13		
2060.0	20.0		END OF BORING.					

Water not observed to a cave-in depth of 18 feet immediately after auger removed after last sample.

Bag sample collected from 3 to 7 feet.

Boring then backfilled.

(See Descriptive Terminology sheet for explanation of abbreviations)

NDDOT LOG 05310.GPJ BRAUN.GDT 9/15/11 11:40

BRAUN INTERTEC

LOG OF BORING

Braun Project FA-11-05310
Borrow Borings
Highway 3 from Dawson to Napoleon
Logan and Kidder Counties
South of Dawson, North Dakota

BORING: **ND3-BW-2-1**

LOCATION: Station 3447+96.10; Offset 1600.0' Left

DRILLER: K. Miller | METHOD: Power Auger | DATE: **8/18/11** | SCALE: **1" = 4'**

Elev. feet	Depth feet	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	BPF	WL	MC %	Tests or Notes
2056.0	0.0						
2055.5	0.5	CL	LEAN CLAY, with roots and organics, black, moist. (Topsoil)	FA		18	
		CL	SANDY LEAN CLAY, trace fine-grained Gravel, gray, moist. (Glacial Outwash)	FA		10	
2053.0	3.0	SC	CLAYEY SAND, trace Gravel, brown and gray, moist. (Glacial Outwash) A-6 (2) MDD = 121.1 pcf; OMC = 11.8%.	FA		19	LL=28, PL=17, PI=11, P200=44.9%
2050.0	6.0						
2049.0	7.0	CL-ML	SILTY CLAY, trace Sand and Gravel, brown, wet. (Glacial Outwash)				
		CL	SANDY LEAN CLAY, trace Gravel, brown, wet. (Glacial Outwash)	FA		21	
2047.0	9.0						
		SP	POORLY GRADED SAND, with fine- to coarse-grained Gravel, brown and gray, moist. (Glacial Outwash)	FA		8	
2044.5	11.5		-Boulder at 11 1/2 feet.				

END OF BORING.

The power auger met "refusal" at a depth of 11 1/2 feet. The auger was not advanced below this depth.

Water not observed to a cave-in depth of 8 1/2 feet immediately after auger removed after last sample.

Bag sample collected from 3 to 6 feet.

Boring then backfilled.

(See Descriptive Terminology sheet for explanation of abbreviations)

NDDOT LOG 05310.GPJ BRAUN.GDT 9/15/11 11:40

BRAUN INTERTEC

LOG OF BORING

Braun Project FA-11-05310
Borrow Borings
Highway 3 from Dawson to Napoleon
Logan and Kidder Counties
South of Dawson, North Dakota

BORING: **ND3-BW-2-4**

LOCATION: Station 3450+46.12; Offset 1600.0' Left

DRILLER: K. Miller | METHOD: Power Auger | DATE: **8/18/11** | SCALE: **1" = 4'**

Elev. feet	Depth feet	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	BPF	WL	MC %	qp tsf	Tests or Notes
2052.3	0.0							
2051.8	0.5	CL	LEAN CLAY, with roots and organics, black, moist. (Topsoil)	FA		29		LL=41, PL=14, PI=27, P200=68.5%
		CL	SANDY LEAN CLAY, trace fine-grained Gravel, brown, moist. (Glacial Till) A-7-6 (16) MDD = 115.4 pcf; OMC = 11.8%.	FA		20		
				FA		20	2	
				FA		22	2	
2043.3	9.0							
2042.3	10.0	SP	POORLY GRADED SAND, trace Silt, brown and gray, moist. (Glacial Till)	FA		10		
		CL	SANDY LEAN CLAY, trace fine-grained Gravel, brown, moist. (Glacial Till)	FA		16	3 1/2	
				FA		17	3 1/4	
			-with iron-staining below 17 feet.	FA		19	3	
2032.3	20.0			FA		18	4 1/4	

END OF BORING.

Water not observed to a cave-in depth of 18 feet immediately after auger removed after last sample.

Bag sample collected from 3 to 7 feet.

Boring then backfilled.

(See Descriptive Terminology sheet for explanation of abbreviations)

NDDOT LOG 05310.GPJ BRAUN.GDT 9/15/11 11:40

BRAUN INTERTEC

LOG OF BORING

Braun Project FA-11-05310
Borrow Borings
Highway 3 from Dawson to Napoleon
Logan and Kidder Counties
South of Dawson, North Dakota

BORING: **ND3-BW-2-5**

LOCATION: Station 3450+42.86; Offset 1333.0' Left

DRILLER: K. Miller | METHOD: Power Auger | DATE: **8/18/11** | SCALE: **1" = 4'**

Elev. feet	Depth feet	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	BPF	WL	MC %	qp tsf	Tests or Notes
2056.1	0.0							
2055.6	0.5	CL	LEAN CLAY, with roots and organics, black, moist. (Topsoil)	FA		25		
		SC	CLAYEY SAND, trace fine-grained Gravel, brown and gray, moist. (Glacial Outwash)	FA		15	1	
2052.1	4.0							
		SC	CLAYEY SAND with GRAVEL, brown, moist. (Glacial Outwash)	FA		7		LL=29, PL=15, PI=14, P200=21.0%
			A-2-6 (0) MDD = 127.2 pcf; OMC = 10.4%.	FA		26		
				FA		12		
				FA		11		
				FA		10		
2042.1	14.0							
			-Cobbles at 14 feet.					

END OF BORING.

The power auger met "refusal" at a depth of 14 feet. The auger was not advanced below this depth.

Water not observed to a cave-in depth of 11 feet immediately after auger removed after last sample.

Bag sample collected from 7 to 9 1/2 feet.

Boring then backfilled.

(See Descriptive Terminology sheet for explanation of abbreviations)

NDDOT LOG 05310.GPJ BRAUN.GDT 9/15/11 11:40

BRAUN INTERTEC

LOG OF BORING

Braun Project FA-11-05310
Borrow Borings
Highway 3 from Dawson to Napoleon
Logan and Kidder Counties
South of Dawson, North Dakota

BORING: **ND3-BW-2-7**

LOCATION: Station 3452+96.14; Offset 1600.0' Left

DRILLER: K. Miller | METHOD: Power Auger | DATE: **8/18/11** | SCALE: **1" = 4'**

Elev. feet 2051.8	Depth feet 0.0	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	BPF	WL	MC %	qp tsf	Tests or Notes
2051.4	0.4	CL	LEAN CLAY, with roots and organics, black, moist. (Topsoil)	FA		31		LL=39, PL=14, PI=25, P200=52.8%
		CL	SANDY LEAN CLAY, a little fine-grained Gravel, brown and gray, moist. (Glacial Till) A-6 (9) MDD = 117.8 pcf; OMC = 9.5%.	FA		19	2	
				FA		16	2	
2045.3	6.5	SM	SILTY SAND, with medium- to fine-grained Gravel, brown, moist. (Glacial Till) A-1-b (0) MDD = 129.7 pcf; OMC = 9.4%.	FA		6		LL=21, PL=18, PI=3, P200=15.6%
				FA		5		
2040.3	11.5	CL	SANDY LEAN CLAY, a little fine-grained Gravel, brown with iron-staining, moist. (Glacial Till) A-6 (11) MDD = 118.5 pcf; OMC = 10.8%.	FA		19	3 3/4	LL=37, PL=16, PI=21, P200=64.1%
				FA		19	3 1/4	
				FA		20	2 1/4	
2031.8	20.0			FA		22	3 1/4	

END OF BORING.

Water not observed to a cave-in depth of 11 feet immediately after auger removed after last sample.

Bag samples collected from 3 to 6 1/2 feet, from 6 1/2 to 11 1/2 feet and from 13 1/2 to 16 1/2 feet.

Boring then backfilled.

(See Descriptive Terminology sheet for explanation of abbreviations)

NDDOT LOG 05310.GPJ BRAUN.GDT 9/15/11 11:40

BRAUN INTERTEC

LOG OF BORING

Braun Project FA-11-05310
Borrow Borings
Highway 3 from Dawson to Napoleon
Logan and Kidder Counties
South of Dawson, North Dakota

BORING: **ND3-BW-2-8**

LOCATION: Station 3452+92.88; Offset 1350.0' Left

DRILLER: K. Miller | METHOD: Power Auger | DATE: **8/18/11** | SCALE: **1" = 4'**

Elev. feet	Depth feet	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	BPF	WL	MC %	qp tsf	Tests or Notes
2054.3	0.0							
2053.0	1.3	CL	LEAN CLAY, with roots and organics, black, moist. (Topsoil)	FA		38		
		CH	SANDY FAT CLAY, a little fine-grained Gravel, brown, moist. (Glacial Till) A-7-6 (22) MDD = 116.1 pcf; OMC = 13.4%. -cobbles at 2 feet.	FA		19	3 3/4	LL=53, PL=17, PI=36, P200=66.9%
				FA		23	2 3/4	
			-iron-staining from 7 to 11 feet.	FA		24	2	
				FA		22	1 1/2	
				FA		26	3	
2040.3	14.0							
		CL	LEAN CLAY, trace fine-grained Sand and Gravel, brown, moist. (Glacial Till)	FA		23	1 1/2	
				FA		25	1 1/2	
2035.3	19.0							
2034.3	20.0	SP	POORLY GRADED SAND, with fine-grained Gravel, brown and gray, moist. (Glacial Till)	FA		10		

END OF BORING.

Water not observed to a cave-in depth of 19 feet immediately after auger removed after last sample.

Bag sample collected from 3 to 7 feet.

Boring then backfilled.

(See Descriptive Terminology sheet for explanation of abbreviations)

NDDOT LOG 05310.GPJ BRAUN.GDT 9/15/11 11:40

BRAUN INTERTEC

LOG OF BORING

Braun Project FA-11-05310
Borrow Borings
Highway 3 from Dawson to Napoleon
Logan and Kidder Counties
South of Dawson, North Dakota

BORING: **ND3-BW-2-9**

LOCATION: Station 3452+89.63; Offset 1100.0' Left

DRILLER: K. Miller | METHOD: Power Auger | DATE: **8/18/11** | SCALE: **1" = 4'**

Elev. feet	Depth feet	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	BPF	WL	MC %	Tests or Notes
2053.6	0.0	SC-SM	SILTY, CLAYEY SAND with GRAVEL, brown, moist. (Glacial Outwash) A-2-4 (0) MDD = 128.7 pcf; OMC = 10.8%.	FA		8	LL=23, PL=18, PI=5, P200=17.0%
				FA		6	
				FA		8	
				FA		8	
				FA		10	
				FA		7	
				FA		11	
				FA		8	
2033.6	20.0			FA		7	
			END OF BORING. Water not observed to a cave-in depth of 16 feet immediately after auger removed after last sample. Bag sample collected from 3 to 7 feet. Boring then backfilled.				

(See Descriptive Terminology sheet for explanation of abbreviations)

NDDOT LOG 05310.GPJ BRAUN.GDT 9/15/11 11:40

BRAUN INTERTEC

LOG OF BORING

Braun Project FA-11-05310
Borrow Borings
Highway 3 from Dawson to Napoleon
Logan and Kidder Counties
South of Dawson, North Dakota

BORING: **ND3-BW-3-5**

LOCATION: Station 3770+24.90; Offset 788.3' Right

DRILLER: K. Miller | METHOD: Power Auger | DATE: **8/17/11** | SCALE: **1" = 4'**

Elev. feet	Depth feet	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	BPF	WL	MC %	qp tsf	Tests or Notes
2005.1	0.0							
2004.2	0.9	CL	LEAN CLAY, with roots and organics, black, wet. (Topsoil)	FA		27		
		CL	LEAN CLAY with SAND, trace fine-grained Gravel and roots, brown, moist. (Glacial Till) A-6 (11) MDD = 120.1 pcf; OMC = 11.5%.	FA		16	2 1/4	LL=34, PL=18, PI=16, P200=75.5%
				FA		19	2 1/4	
1998.1	7.0	CL-ML	SILTY CLAY, trace fine-grained Sand, brown, moist. (Glacial Till)	FA		20		
1996.1	9.0	CL	LEAN CLAY, trace fine-grained Sand, brown, moist. (Glacial Till) A-7-6 (32) MDD = 112.2 pcf; OMC = 16.2%.	FA		28	3 1/4	LL=49, PL=19, PI=30, P200=98.4%
				FA		24	2	
				FA		30	3	
				FA		25	3 3/4	
1986.6	18.5							
1986.1	19.0	SM	SILTY SAND, brown, moist. (Glacial Till)	FA		8		
1985.1	20.0	CL-ML	SILTY CLAY, trace fine-grained Sand, brown, moist. (Glacial Till)	FA		22		

END OF BORING.

Water not observed to a cave-in depth of 19 1/2 feet immediately after auger removed after last sample.

Bag samples collected from 3 to 7 feet and from 15 to 18 1/2 feet.

Boring then backfilled.

(See Descriptive Terminology sheet for explanation of abbreviations)

NDDOT LOG 05310.GPJ BRAUN.GDT 9/15/11 11:41

BRAUN INTERTEC

LOG OF BORING

Braun Project FA-11-05310
Borrow Borings
Highway 3 from Dawson to Napoleon
Logan and Kidder Counties
South of Dawson, North Dakota

BORING: **ND3-BW-3-6**

LOCATION: Station 3770+01.91; Offset 1059.76' Right

DRILLER: K. Miller | METHOD: Power Auger | DATE: **8/17/11** | SCALE: **1" = 4'**

Elev. feet 2027.6	Depth feet 0.0	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	BPF	WL	MC %	qp tsf	Tests or Notes
2027.2	0.4	CL	LEAN CLAY, with roots and organics, black, wet. (Topsoil)	FA		27		
		CL	LEAN CLAY, trace fine-grained Sand and Gravel, brown, moist. (Glacial Till)	FA		22	2 1/4	
2024.6	3.0	CL	SANDY LEAN CLAY, a little fine-grained Gravel, brown with iron-staining, moist. (Glacial Till) A-6 (9) MDD = 117.9 pcf; OMC = 11.8%.	FA		18	2 1/2	LL=36, PL=16, PI=20, P200=59.5%
				FA		18	2 1/4	
				FA		17	3	
				FA		20	4	
				FA		18	3 1/2	
				FA		17	4	
2007.6	20.0			FA		17		

END OF BORING.

Water not observed to a cave-in depth of 19 1/2 feet immediately after auger removed after last sample.

Bag sample collected from 3 to 7 feet.

Boring then backfilled.

(See Descriptive Terminology sheet for explanation of abbreviations)

NDDOT LOG 05310.GPJ BRAUN.GDT 9/15/11 11:41

BRAUN INTERTEC

LOG OF BORING

Braun Project FA-11-05310
Borrow Borings
Highway 3 from Dawson to Napoleon
Logan and Kidder Counties
South of Dawson, North Dakota

BORING: **ND3-BW-3-7**

LOCATION: Station 3768+79.90; Offset 1320.77' Right

DRILLER: K. Miller | METHOD: Power Auger | DATE: **8/17/11** | SCALE: **1" = 4'**

Elev. feet 2017.7	Depth feet 0.0	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	BPF	WL	MC %	qp tsf	Tests or Notes
2017.3	0.4	CL	SANDY LEAN CLAY, with roots and organics, black, wet. (Topsoil)	FA		21		
2014.7	3.0	CL	LEAN CLAY, trace fine-grained Sand and Gravel, brown, moist. (Glacial Till)	FA		17	4 1/4	LL=37, PL=14, PI=23, P200=67.9%
		CL	SANDY LEAN CLAY, trace fine-grained Gravel, brown with iron-staining, moist. (Glacial Till) A-6 (13) MDD = 121.5 pcf; OMC = 10.6%.	FA		17	3	
				FA		17	3 1/2	
				FA		17	4 1/2	
				FA		16	4 1/2	
				FA		16	4 1/2	
				FA		16	4	
1997.7	20.0			FA		15		

END OF BORING.

Water not observed to a cave-in depth of 19 feet immediately after auger removed after last sample.

Bag sample collected from 3 to 7 feet.

Boring then backfilled.

(See Descriptive Terminology sheet for explanation of abbreviations)

NDDOT LOG 05310.GPJ BRAUN.GDT 9/15/11 11:41

BRAUN INTERTEC

LOG OF BORING

Braun Project FA-11-05310
Borrow Borings
Highway 3 from Dawson to Napoleon
Logan and Kidder Counties
South of Dawson, North Dakota

BORING: **ND3-BW-3-8**

LOCATION: Station 3768+75.05; Offset 1567.49' Right

DRILLER: K. Miller | METHOD: Power Auger | DATE: **8/17/11** | SCALE: **1" = 4'**

Elev. feet 2013.2	Depth feet 0.0	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	BPF	WL	MC %	qp tsf	Tests or Notes
2012.4	0.8	SP-SM	POORLY GRADED SAND with SILT, with roots and organics, black, moist.	FA		9		
2011.7	1.5	SM	SILTY SAND, fine- to medium-grained, brown, moist. (Glacial Outwash)					
		CL	SANDY LEAN CLAY, a little fine-grained Gravel, brown, moist. (Glacial Till) A-7-6 (13) MDD = 117.0 pcf; OMC = 13.1%.	FA		19	3 3/4	LL=44, PL=19, PI=25, P200=60.5%
				FA		21	2 1/2	
				FA		18	2 1/2	
			-iron-staining at 7 to 8 1/2 feet.	FA		18	3 1/2	
				FA		16	3 1/2	
				FA		17	4	
				FA		18	1 3/4	
			-iron-staining at 17 to 18 1/2 feet.	FA		18	2 3/4	
1993.2	20.0		END OF BORING.					

Water not observed to a cave-in depth of 18 1/2 feet immediately after auger removed after last sample.

Bag sample collected from 3 to 7 feet.

Boring then backfilled.

(See Descriptive Terminology sheet for explanation of abbreviations)

NDDOT LOG 05310.GPJ BRAUN.GDT 9/15/11 11:41

BRAUN INTERTEC

LOG OF BORING

Braun Project FA-11-05310
Borrow Borings
Highway 3 from Dawson to Napoleon
Logan and Kidder Counties
South of Dawson, North Dakota

BORING: **ND3-BW-3-9**

LOCATION: Station 3777+37.40; Offset 677.47' Right

DRILLER: K. Miller | METHOD: Power Auger | DATE: **8/16/11** | SCALE: **1" = 4'**

Elev. feet	Depth feet	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	BPF	WL	MC %	qp tsf	Tests or Notes
2016.7	0.0							
2016.2	0.5	CL	LEAN CLAY, with roots and organics, black, moist. (Topsoil)	FA		25		LL=43, PL=13, PI=30, P200=68.6%
		CL	SANDY LEAN CLAY, trace fine-grained Gravel, brown, moist. (Glacial Till) A-7-6 (18) MDD = 119.5 pcf; OMC = 11.9%.	FA		17		
				FA		17		
2010.2	6.5							
		CL	SANDY LEAN CLAY, trace to with Gravel, brown, moist. (Glacial Till)	FA		18		
			-iron-stained at 10 feet.	FA		17		
				FA		17	3 1/2	
				FA		19	2	
				FA		16	3 1/2	
1996.7	20.0			FA		17	3 1/2	

END OF BORING.

Water not observed to a depth of 20 feet immediately after auger removed after last sample.

Bag sample collected from 3 to 7 feet.

Boring then backfilled.

(See Descriptive Terminology sheet for explanation of abbreviations)

NDDOT LOG 05310.GPJ BRAUN.GDT 9/15/11 11:41

BRAUN INTERTEC

LOG OF BORING

Braun Project FA-11-05310
Borrow Borings
Highway 3 from Dawson to Napoleon
Logan and Kidder Counties
South of Dawson, North Dakota

BORING: **ND3-BW-3-9A**

LOCATION: Station 3776+42.19; Offset 272.49' Right

DRILLER: K. Miller | METHOD: Power Auger | DATE: **8/17/11** | SCALE: **1" = 4'**

Elev. feet 2000.5	Depth feet 0.0	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	BPF	WL	MC %	qp tsf	Tests or Notes
1999.9	0.6	CL	LEAN CLAY, with roots and organics, black, wet. (Topsoil)					
		CL	SANDY LEAN CLAY, trace fine-grained Gravel, brown, moist. (Glacial Till) A-6 (13) MDD = 118.4 pcf; OMC = 11.5%.	FA		31		LL=39, PL=16, PI=23, P200=67.0%
				FA		23	1 3/4	
			-with Sand lenses at 4 1/2 feet.	FA		18	3	
				FA		18	2 1/4	
				FA		19	3 3/4	
				FA		16	2 1/4	
				FA		16		
				FA		16	3 1/2	
1980.5	20.0			FA		17	4 1/2	
			END OF BORING. Water not observed to a cave-in depth of 19 feet immediately after auger removed after last sample. Bag sample collected from 3 to 7 feet. Boring then backfilled.					

(See Descriptive Terminology sheet for explanation of abbreviations)

NDDOT LOG 05310.GPJ BRAUN.GDT 9/15/11 11:41

BRAUN INTERTEC

LOG OF BORING

Braun Project FA-11-05310
Borrow Borings
Highway 3 from Dawson to Napoleon
Logan and Kidder Counties
South of Dawson, North Dakota

BORING: **ND3-BW-3-10**

LOCATION: Station 3773+75.12; Offset 1067.49' Right

DRILLER: K. Miller | METHOD: Power Auger | DATE: **8/17/11** | SCALE: **1" = 4'**

Elev. feet 2040.3	Depth feet 0.0	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	BPF	WL	MC %	qp tsf	Tests or Notes
2039.8	0.5	CL	SANDY LEAN CLAY, with Gravel, trace roots and organics, black, moist. (Topsoil)	FA		16		LL=29, PL=14, PI=15, P200=63.7%
		CL	SANDY LEAN CLAY, a little fine-grained Gravel, brown, moist. (Glacial Outwash) A-6 (7) MDD = 120.7 pcf; OMC = 10.0%.	FA		18	3 1/2	
2035.8	4.5	SM	SILTY SAND, brown, moist. (Glacial Outwash)	FA		8		
2034.3	6.0	CL	SANDY LEAN CLAY, trace fine-grained Gravel, brown, moist. (Glacial Till) A-6 (10) MDD = 124.2 pcf; OMC = 10.3%.	FA		18	2 1/2	LL=37, PL=15, PI=22, P200=60.8%
				FA		18	3	
				FA		17	2 3/4	
			-with iron-staining from 14 1/2 to 16 feet.	FA		18	4 1/4	
				FA		17	2 1/2	
2020.3	20.0		-with iron-staining from 19 to 20 feet.	FA		18	3 1/2	

END OF BORING.

Water not observed to a cave-in depth of 19 1/2 feet immediately after auger removed after last sample.

Bag samples collected from 1/2 to 4 1/2 feet and from 6 to 10 feet.

Boring then backfilled.

(See Descriptive Terminology sheet for explanation of abbreviations)

NDDOT LOG 05310.GPJ BRAUN.GDT 9/15/11 11:42

BRAUN INTERTEC

LOG OF BORING

Braun Project FA-11-05310
Borrow Borings
Highway 3 from Dawson to Napoleon
Logan and Kidder Counties
South of Dawson, North Dakota

BORING: **ND3-BW-3-10A**

LOCATION: Station 3772+57.10; Offset 731.67' Right

DRILLER: K. Miller | METHOD: Power Auger | DATE: **8/17/11** | SCALE: **1" = 4'**

(See Descriptive Terminology sheet for explanation of abbreviations)

Elev. feet	Depth feet	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	BPF	WL	MC %	qp tsf	Tests or Notes
2002.8	0.0							
2002.3	0.5	CL	SANDY LEAN CLAY, with roots and organics, black, moist. (Topsoil)	FA		26		
		CL	LEAN CLAY, trace fine-grained Gravel, with roots, brown, moist. (Glacial Till)	FA		16	3 1/4	
1999.8	3.0	CL	SANDY LEAN CLAY, trace fine-grained Gravel, brown with iron-staining, moist. (Glacial Till) A-6 (14) MDD = 118.5 pcf; OMC = 12.1%.	FA		15	4 1/2	LL=40, PL=15, PI=25, P200=64.8%
				FA		17	4 1/2	
				FA		19	3 1/2	
1990.3	12.5	SM	SILTY SAND, gray and brown, moist. (Glacial Till)	FA		12		
1988.8	14.0	CL	LEAN CLAY with SAND, trace Gravel, brown with iron-staining, moist. (Glacial Till) A-6 (10) MDD = 119.8 pcf; OMC = 11.9%. -gray below 16 1/2 feet.	FA		24	2 1/4	LL=31, PL=16, PI=15, P200=79.7%
				FA		17		
1982.8	20.0			FA		16		

END OF BORING.

Water not observed to a cave-in depth of 18 1/2 feet immediately after auger removed after last sample.

Bag samples collected from 3 to 7 feet and from 16 1/2 to 20 feet.

Boring then backfilled.

NDDOT LOG 05310.GPJ BRAUN.GDT 9/15/11 11:42

BRAUN INTERTEC

LOG OF BORING

Braun Project FA-11-05310
Borrow Borings
Highway 3 from Dawson to Napoleon
Logan and Kidder Counties
South of Dawson, North Dakota

BORING: **ND3-BW-3-11**

LOCATION: Station 3774+32.10; Offset 1302.04' Right

DRILLER: K. Miller | METHOD: Power Auger | DATE: **8/17/11** | SCALE: **1" = 4'**

Elev. feet 2039.1	Depth feet 0.0	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	BPF	WL	MC %	qp tsf	Tests or Notes
2038.0	1.1	CL	SANDY LEAN CLAY, with roots and organics, black, moist. (Topsoil)	FA		15		
		CL	SANDY LEAN CLAY, trace fine-grained Gravel, brown with iron-staining, moist. (Glacial Till) A-6 (12) MDD = 121.1 pcf; OMC = 10.3%.	FA		15	4	LL=40, PL=17, PI=23, P200=64.2%
				FA		17	2 3/4	
				FA		18	2 1/4	
				FA		17	3 3/4	
				FA		17	3 1/2	
				FA		17	4 1/4	
				FA		17	3 1/4	
2019.1	20.0			FA		18	3	

END OF BORING.

Water not observed to a cave-in depth of 19 feet immediately after auger removed after last sample.

Bag sample collected from 3 to 7 feet.

Boring then backfilled.

(See Descriptive Terminology sheet for explanation of abbreviations)

NDDOT LOG 05310.GPJ BRAUN.GDT 9/15/11 11:42

BRAUN INTERTEC

LOG OF BORING

Braun Project FA-11-05310
Borrow Borings
Highway 3 from Dawson to Napoleon
Logan and Kidder Counties
South of Dawson, North Dakota

BORING: **ND3-BW-3-12**

LOCATION: Station 3773+75.05; Offset 1567.49' Right

DRILLER: K. Miller | METHOD: Power Auger | DATE: **8/17/11** | SCALE: **1" = 4'**

Elev. feet 2024.1	Depth feet 0.0	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	BPF	WL	MC %	qp tsf	Tests or Notes
2022.6	1.5	CL	SANDY LEAN CLAY, with roots and organics, black, moist. (Topsoil)	FA		19		
2021.1	3.0	SC	CLAYEY SAND, with roots, brown, moist. (Glacial Outwash)	FA		8		
		CL	SANDY LEAN CLAY, trace fine-grained Gravel, brown, moist. (Glacial Till)					LL=42, PL=18, PI=24, P200=58.0%
			A-7-6 (11) MDD = 116.0 pcf; OMC = 12.6%.	FA		22	3	
				FA		23	1 1/2	
2014.1	10.0			FA		22	2 1/2	
2012.1	12.0	CL	LEAN CLAY, trace fine-grained Sand and Gravel, brown, moist. (Glacial Till)					
		CL	SANDY LEAN CLAY, trace fine-grained Gravel, brown with iron-staining, moist. (Glacial Till)	FA		18	3	
			-with fine- to coarse-grained Gravel at 14 1/2 to 16 feet.	FA		16	2 3/4	
				FA		17	3 1/4	
2004.1	20.0			FA		16	3 1/4	
			END OF BORING.					
			Water not observed to a cave-in depth of 19 feet immediately after auger removed after last sample.					
			Bag sample collected from 3 to 7 feet.					
			Boring then backfilled.					

(See Descriptive Terminology sheet for explanation of abbreviations)

NDDOT LOG 05310.GPJ BRAUN.GDT 9/15/11 11:42

BRAUN INTERTEC

LOG OF BORING

Braun Project FA-11-05310
Borrow Borings
Highway 3 from Dawson to Napoleon
Logan and Kidder Counties
South of Dawson, North Dakota

BORING: **ND3-BW-3-13**

LOCATION: Station 3780+13.59; Offset 266.59' Right

DRILLER: K. Miller | METHOD: Power Auger | DATE: **8/17/11** | SCALE: **1" = 4'**

Elev. feet 2005.8	Depth feet 0.0	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	BPF	WL	MC %	qp tsf	Tests or Notes
2005.4	0.4	CL	LEAN CLAY, with roots and organics, dark brown, moist. (Topsoil)	FA		31		LL=43, PL=17, PI=26, P200=68.0%
		CL	SANDY LEAN CLAY, trace fine-grained Gravel, brown, moist. (Glacial Till) A-7-6 (16) MDD = 117.3 pcf; OMC = 13.0%.	FA		21	2 1/4	
				FA		23	1 1/2	
1998.8	7.0							
		CL	SANDY LEAN CLAY, trace fine-grained Gravel, brown with iron-staining, moist. (Glacial Till)	FA		17	3 1/2	
				FA		17	3	
				FA		17	2 1/2	
				FA		16	3 1/2	
				FA		18	2 3/4	
1985.8	20.0			FA		17	4	
			END OF BORING. Water not observed to a cave-in depth of 19 feet immediately after auger removed after last sample. Bag sample collected from 3 to 7 feet. Boring then backfilled.					

(See Descriptive Terminology sheet for explanation of abbreviations)

NDDOT LOG 05310.GPJ BRAUN.GDT 9/15/11 11:42

BRAUN INTERTEC

LOG OF BORING

Braun Project FA-11-05310
Borrow Borings
Highway 3 from Dawson to Napoleon
Logan and Kidder Counties
South of Dawson, North Dakota

BORING: **ND3-BW-3-14**

LOCATION: Station 3778+75.12; Offset 1067.49' Right

DRILLER: K. Miller | METHOD: Power Auger | DATE: **8/17/11** | SCALE: **1" = 4'**

Elev. feet 2012.4	Depth feet 0.0	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	BPF	WL	MC %	qp tsf	Tests or Notes
2010.9	1.5	SC	CLAYEY SAND, with roots and organics, black, moist. (Topsoil)	FA		22		
2006.4	6.0	SM	SILTY SAND, trace fine-grained Gravel, with roots, dark brown, moist. (Glacial Outwash) A-2-4 (0) MDD = 115.6 pcf; OMC = 10.1%.	FA	▽	12		LL=16, PL=15, PI=1, P200=12.6%
			-waterbearing at 4 1/2 to 6 feet.	FA		20		
1992.4	20.0	CL	SANDY LEAN CLAY, trace fine-grained Gravel, brown with iron-staining, moist. (Glacial Till) A-6 (9) MDD = 123.4 pcf; OMC = 9.9%.	FA		23	1 3/4	LL=38, PL=16, PI=22, P200=57.3%
				FA		18	2 3/4	
				FA		18	3 1/4	
				FA		18	2 1/2	
				FA		18	2 3/4	
				FA		18	2 1/2	

END OF BORING.

Water observed at a depth of 3 1/2 feet when auger removed to obtain sample at 10 feet.

Water not observed to a cave-in depth of 4 3/4 feet immediately after auger removed after last sample.

Bag samples collected from 1 1/2 to 6 feet and from 6 to 10 feet.

Boring then backfilled.

(See Descriptive Terminology sheet for explanation of abbreviations)

NDDOT LOG 05310.GPJ BRAUN.GDT 9/15/11 11:42

BRAUN INTERTEC

LOG OF BORING

Braun Project FA-11-05310
Borrow Borings
Highway 3 from Dawson to Napoleon
Logan and Kidder Counties
South of Dawson, North Dakota

BORING: **ND3-BW-3-15**

LOCATION: Station 3778+75.05; Offset 1567.49' Right

DRILLER: K. Miller | METHOD: Power Auger | DATE: **8/17/11** | SCALE: **1" = 4'**

Elev. feet 2023.9	Depth feet 0.0	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	BPF	WL	MC %	qp tsf	Tests or Notes
2023.4	0.5	CL SC	SANDY LEAN CLAY, trace roots and organics, black, moist. (Topsoil)	FA		27		LL=38, PL=16, PI=22, P200=49.9%
			CLAYEY SAND, a little medium- to fine-grained Gravel, brown, moist. (Glacial Till) A-6 (7) MDD = 119.6 pcf; OMC = 12.0%.	FA		20		
				FA		16		
			-with iron-staining from 7 to 11 feet.	FA		18	2 3/4	
				FA		21	2 1/2	
				FA		18	4	
				FA		17	4	
				FA		17	3 3/4	
2003.9	20.0			FA		17	3 1/4	

END OF BORING.

Water not observed to a cave-in depth of 19 feet immediately after auger removed after last sample.

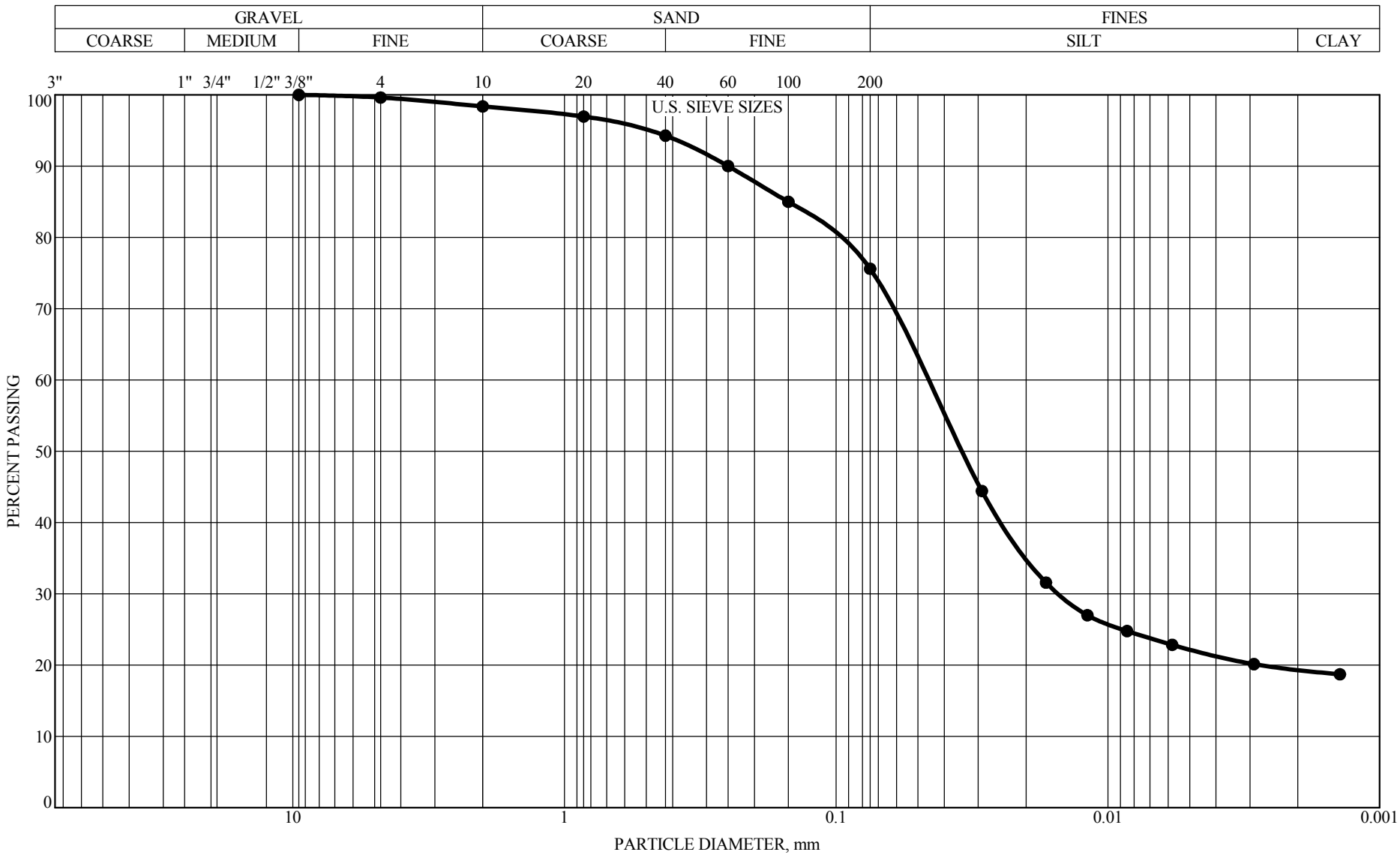
Bag sample collected from 3 to 7 feet.

Boring then backfilled.

(See Descriptive Terminology sheet for explanation of abbreviations)

NDDOT LOG 05310.GPJ BRAUN.GDT 9/15/11 11:42

GRAIN SIZE ACCUMULATION CURVE (AASHTO)



Braun Project FA-11-05310
Borrow Borings
Highway 3 from Dawson to Napoleon
Logan and Kidder Counties
South of Dawson, North Dakota

BORING: ND3-BW-1-1 DEPTH: 1.3'-4.5'

GRAVEL	1.6%
SAND	22.8%
SILT	56.2%
CLAY	19.4%

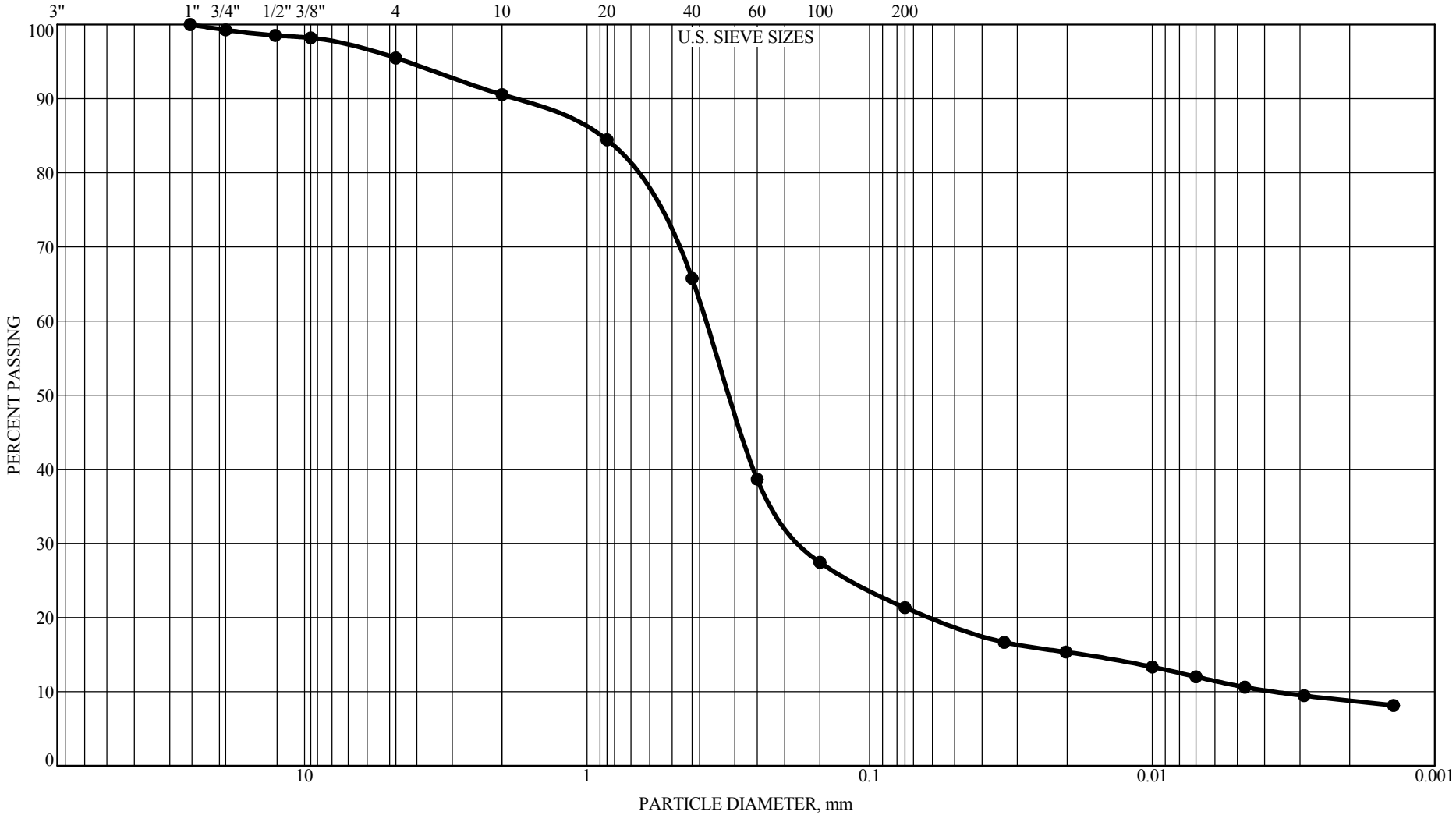
CLASSIFICATION:
A-6 (10), Brown
LEAN CLAY with SAND(CL)

LL=33, PL=18, PI=15, P200=75.6%

GS AASHTO 05310.GPJ BRAUN.GDT 9/15/11 11:45

GRAIN SIZE ACCUMULATION CURVE (AASHTO)

GRAVEL			SAND		FINES	
COARSE	MEDIUM	FINE	COARSE	FINE	SILT	CLAY



BRAUN INTERTEC

Braun Project FA-11-05310
Borrow Borings
Highway 3 from Dawson to Napoleon
Logan and Kidder Counties
South of Dawson, North Dakota

BORING: ND3-BW-1-1 DEPTH: 7.0'-9.0'

GRAVEL	9.5%
SAND	69.2%
SILT	12.6%
CLAY	8.8%

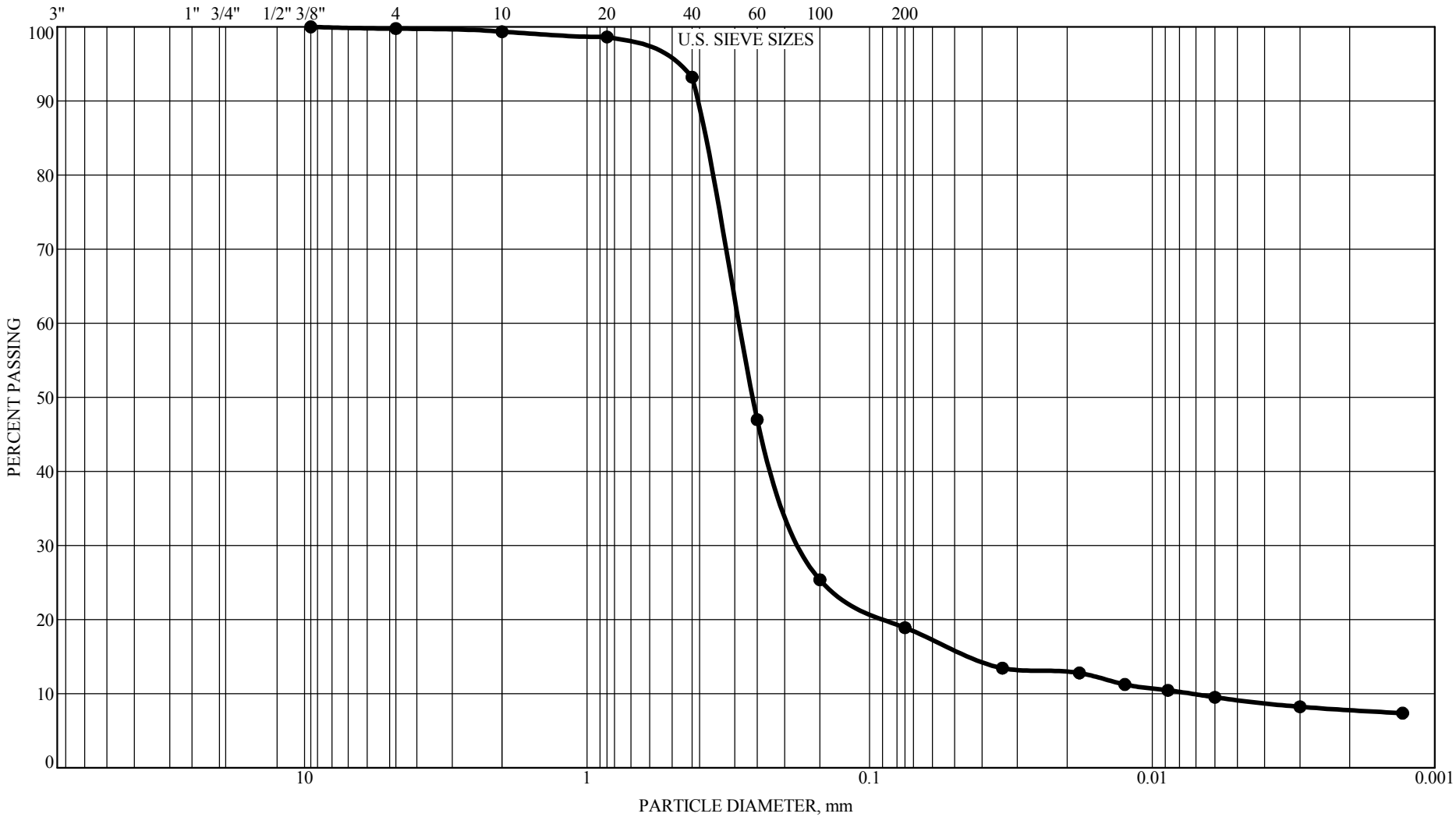
CLASSIFICATION:
A-2-6 (0), Brown
CLAYEY SAND(SC)

LL=30, PL=17, PI=13, P200=21.3%

GS AASHTO 05310.GPJ BRAUN.GDT 9/15/11 11:45

GRAIN SIZE ACCUMULATION CURVE (AASHTO)

GRAVEL			SAND		FINES	
COARSE	MEDIUM	FINE	COARSE	FINE	SILT	CLAY



BRAUN INTERTEC

Braun Project FA-11-05310
Borrow Borings
Highway 3 from Dawson to Napoleon
Logan and Kidder Counties
South of Dawson, North Dakota

BORING: ND3-BW-1-1 DEPTH: 9.0'-16.0'

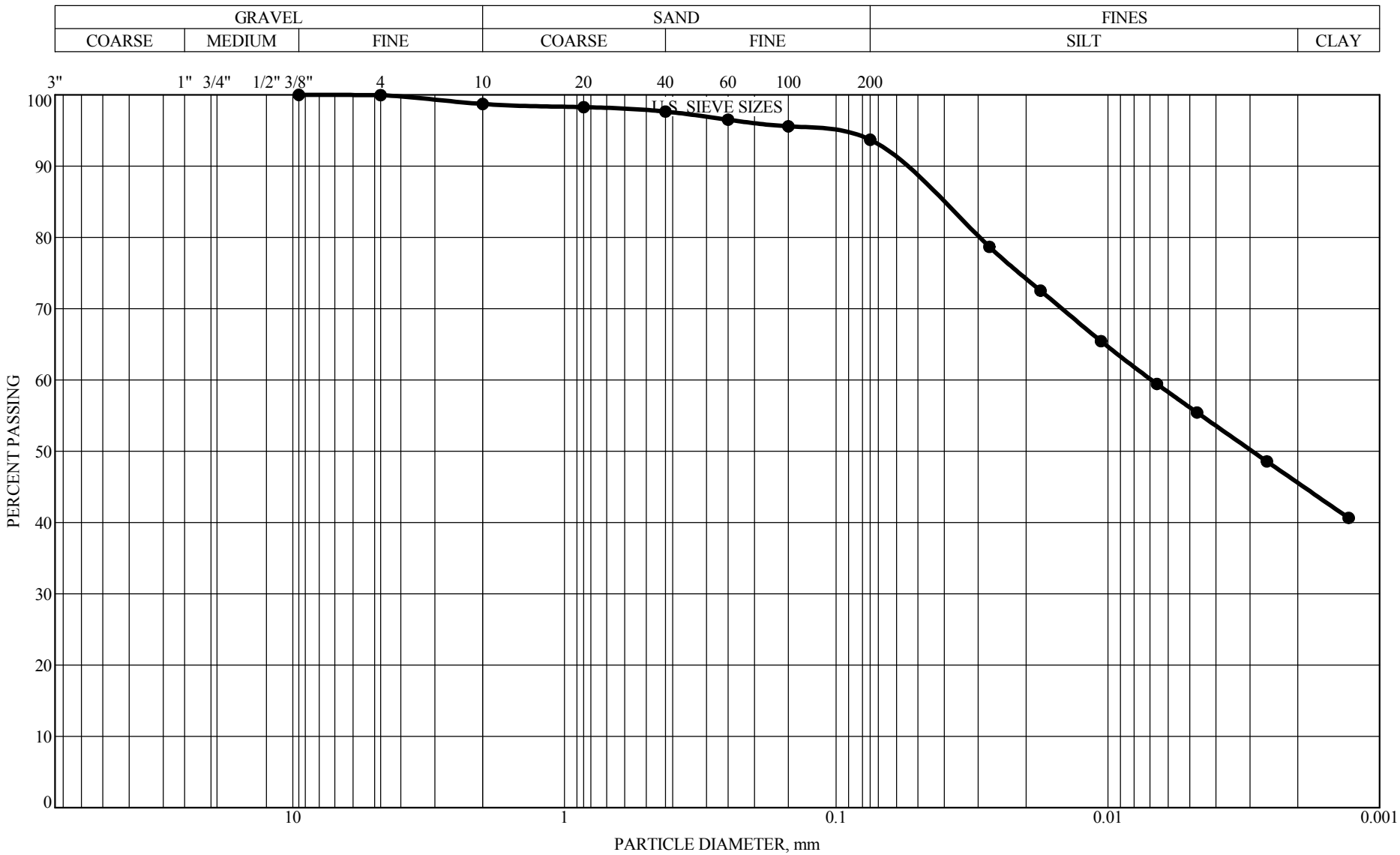
GRAVEL	0.7%
SAND	80.4%
SILT	11.1%
CLAY	7.8%

CLASSIFICATION:
A-2-4 (0), Brown
SILTY SAND(SM)

LL=18, PL=17, PI=1, P200=18.9%

GS AASHTO 05310.GPJ BRAUN.GDT 9/15/11 11:45

GRAIN SIZE ACCUMULATION CURVE (AASHTO)



BRAUN INTERTEC

Braun Project FA-11-05310
Borrow Borings
Highway 3 from Dawson to Napoleon
Logan and Kidder Counties
South of Dawson, North Dakota

BORING: ND3-BW-1-2 DEPTH: 9.0'-16.5'

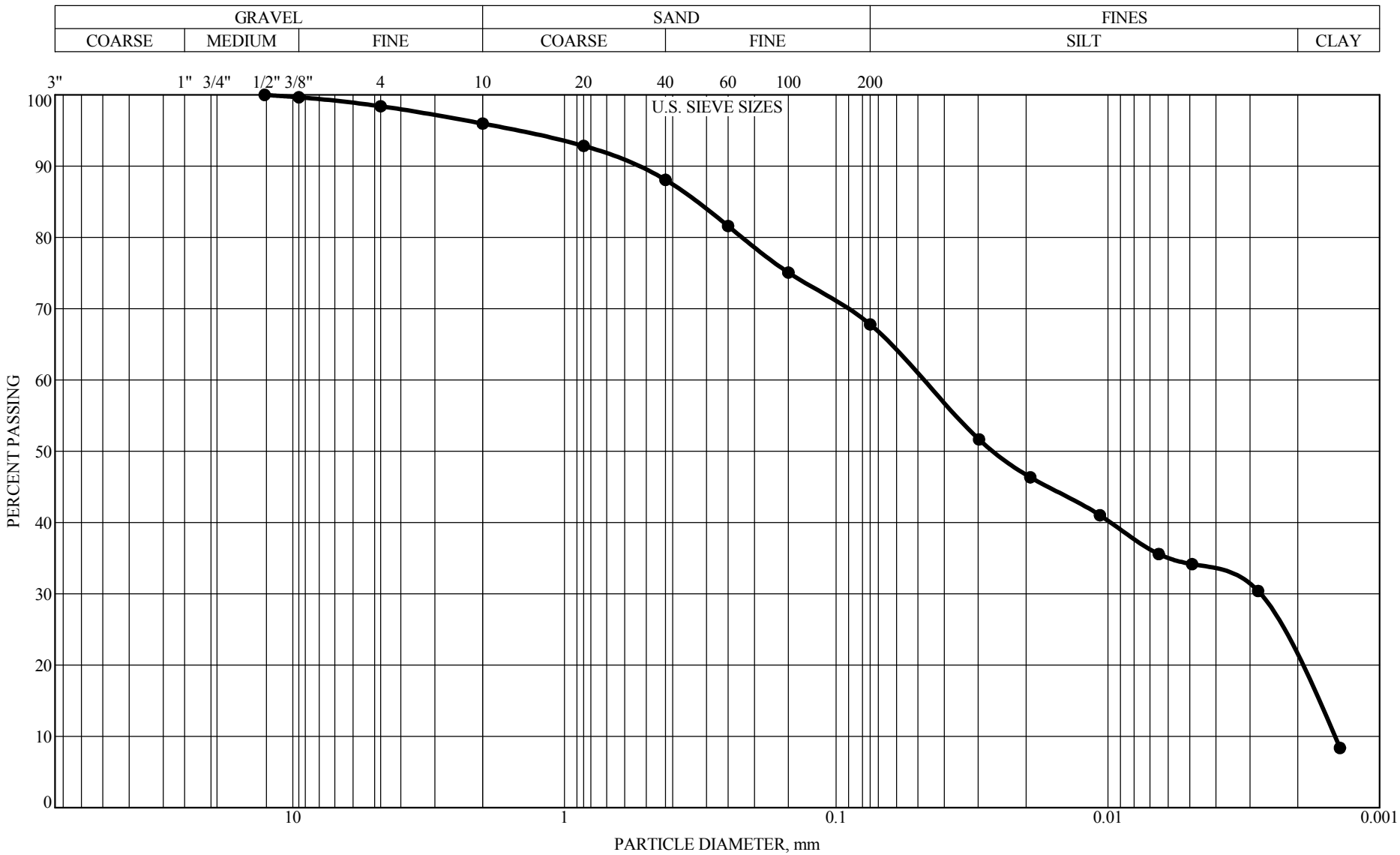
GRAVEL	1.3%
SAND	5.0%
SILT	48.1%
CLAY	45.6%

CLASSIFICATION:
A-7-6 (59), Gray and Brown
FAT CLAY(CH)

LL=81, PL=27, PI=54, P200=93.7%

GS AASHTO 05310.GPJ BRAUN.GDT 9/15/11 11:45

GRAIN SIZE ACCUMULATION CURVE (AASHTO)



Braun Project FA-11-05310
Borrow Borings
Highway 3 from Dawson to Napoleon
Logan and Kidder Counties
South of Dawson, North Dakota

BORING: ND3-BW-1-3 DEPTH: 0.5'-12.0'

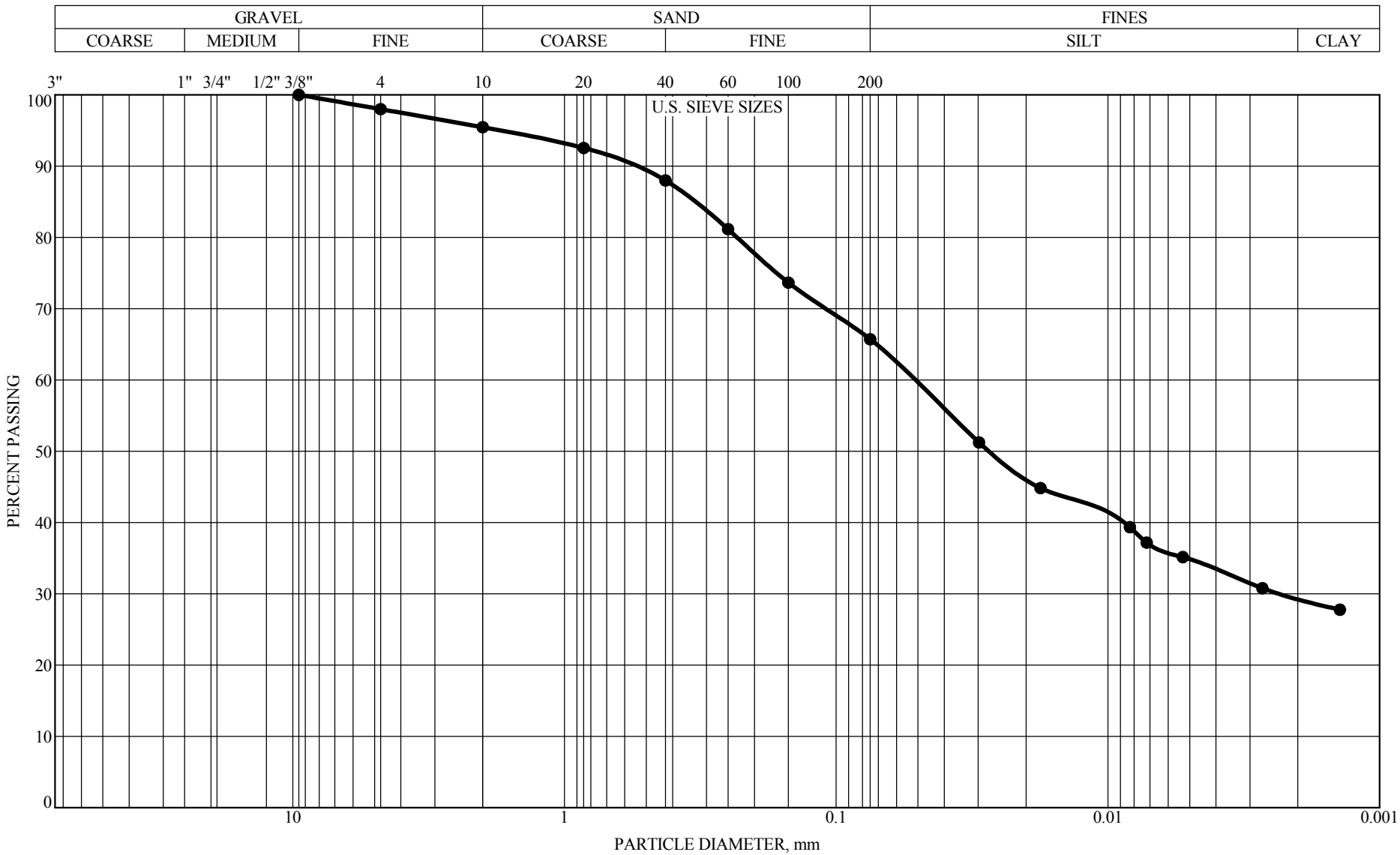
GRAVEL	4.0%
SAND	28.2%
SILT	48.1%
CLAY	19.7%

CLASSIFICATION:
A-6 (13), Brown
SANDY LEAN CLAY(CL)

LL=39, PL=16, PI=23, P200=67.8%

GS AASHTO 05310.GPJ BRAUN.GDT 9/15/11 11:45

GRAIN SIZE ACCUMULATION CURVE (AASHTO)



Braun Project FA-11-05310
Borrow Borings
Highway 3 from Dawson to Napoleon
Logan and Kidder Counties
South of Dawson, North Dakota

BORING: ND3-BW-1-4 DEPTH: 1.5'-8.0'

GRAVEL	4.5%
SAND	29.7%
SILT	36.3%
CLAY	29.4%

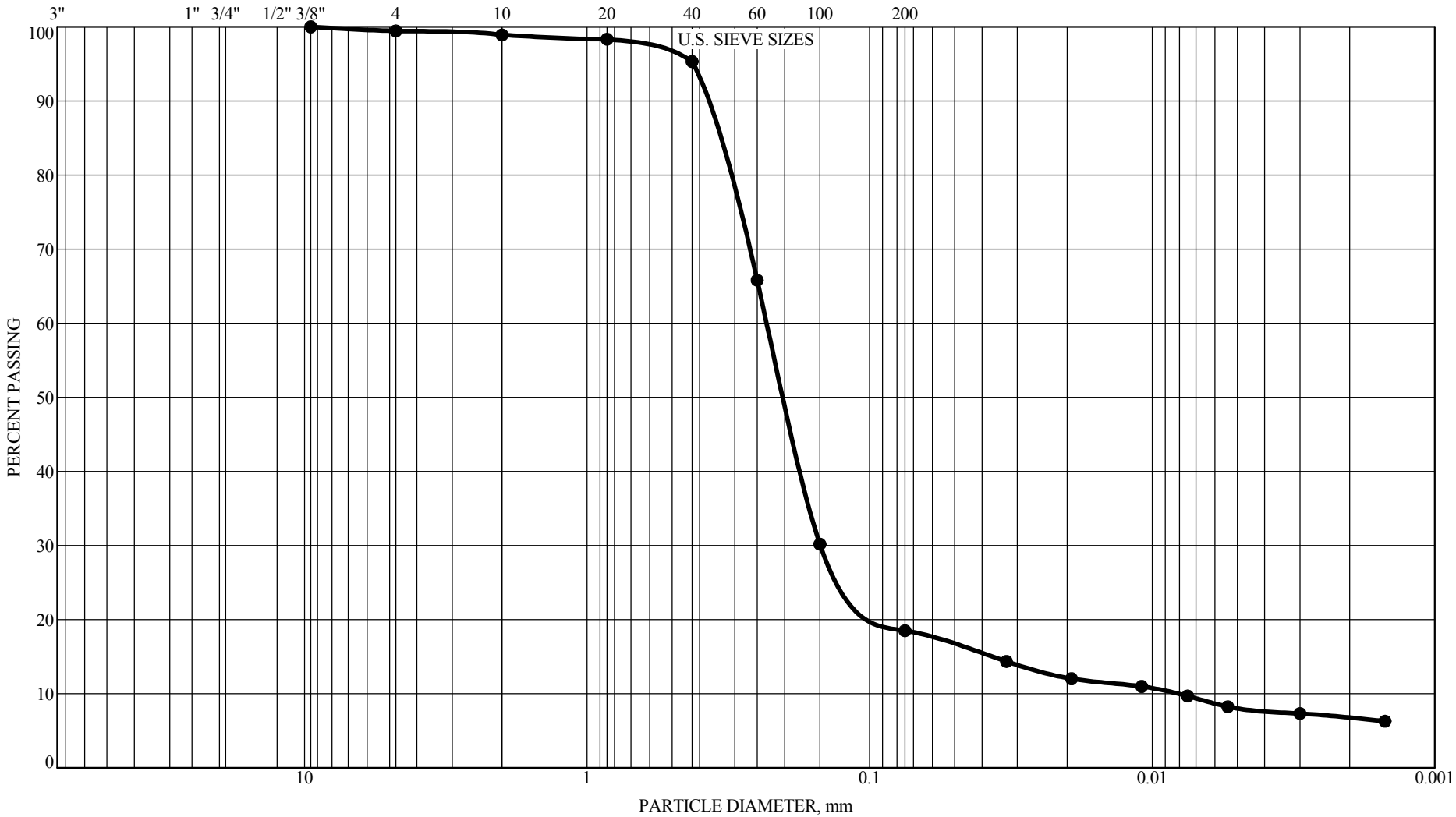
CLASSIFICATION:
A-6 (13), Brown
SANDY LEAN CLAY(CL)

LL=39, PL=16, PI=23, P200=65.7%

GS AASHTO 05310.GPJ BRAUN.GDT 9/15/11 11:45

GRAIN SIZE ACCUMULATION CURVE (AASHTO)

GRAVEL			SAND		FINES	
COARSE	MEDIUM	FINE	COARSE	FINE	SILT	CLAY



BRAUN INTERTEC

Braun Project FA-11-05310
Borrow Borings
Highway 3 from Dawson to Napoleon
Logan and Kidder Counties
South of Dawson, North Dakota

BORING: ND3-BW-1-4 DEPTH: 8.0'-16.5'

GRAVEL	1.1%
SAND	80.4%
SILT	11.8%
CLAY	6.7%

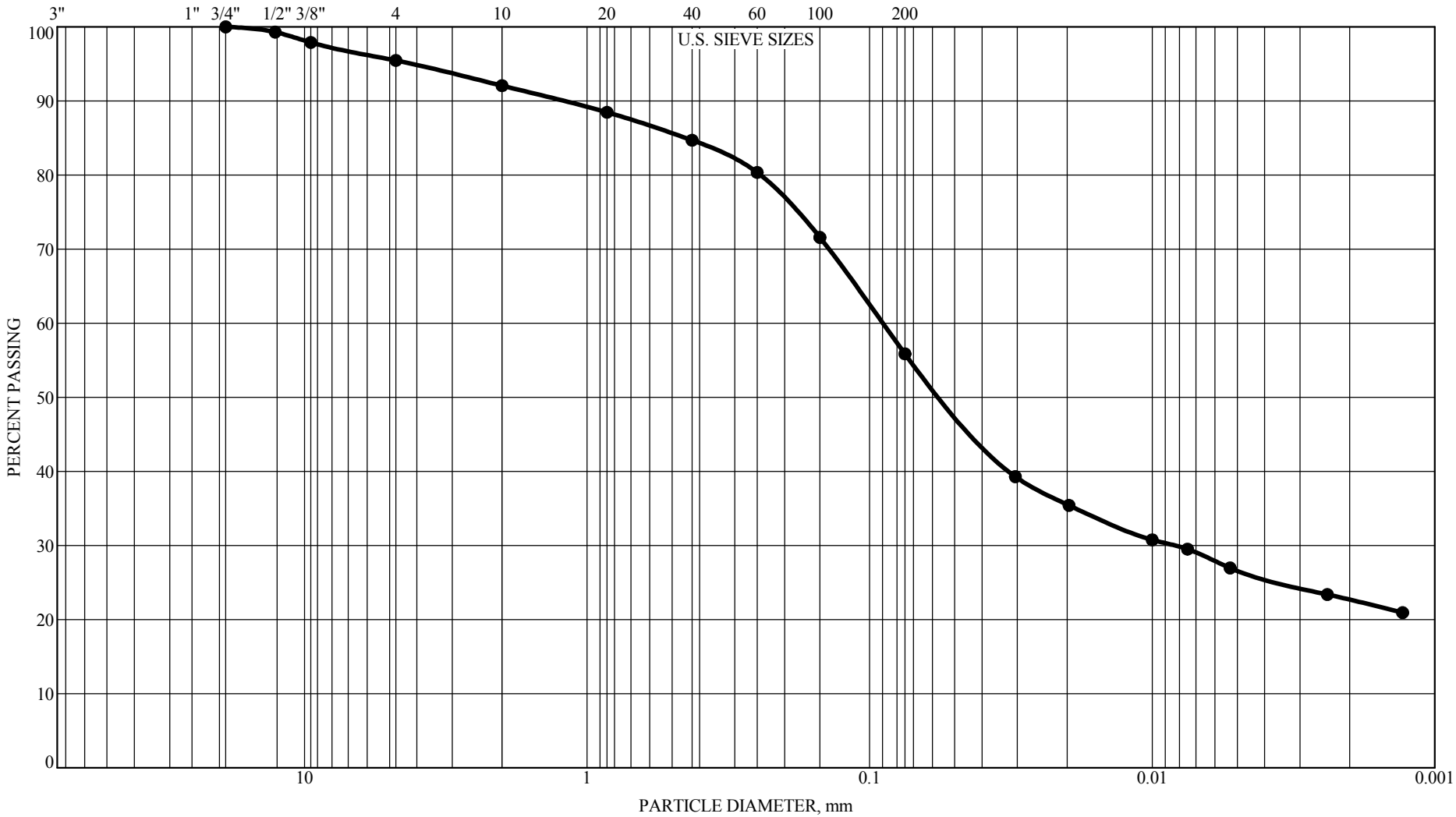
CLASSIFICATION:
A-2-4 (0), Gray
SILTY SAND(SM)

LL=16, PL=13, PI=3, P200=18.5%

GS AASHTO 05310.GPJ BRAUN.GDT 9/15/11 11:45

GRAIN SIZE ACCUMULATION CURVE (AASHTO)

GRAVEL			SAND		FINES	
COARSE	MEDIUM	FINE	COARSE	FINE	SILT	CLAY



BRAUN INTERTEC

Braun Project FA-11-05310
Borrow Borings
Highway 3 from Dawson to Napoleon
Logan and Kidder Counties
South of Dawson, North Dakota

BORING: ND3-BW-1-5 DEPTH: 0.6'-6.0'

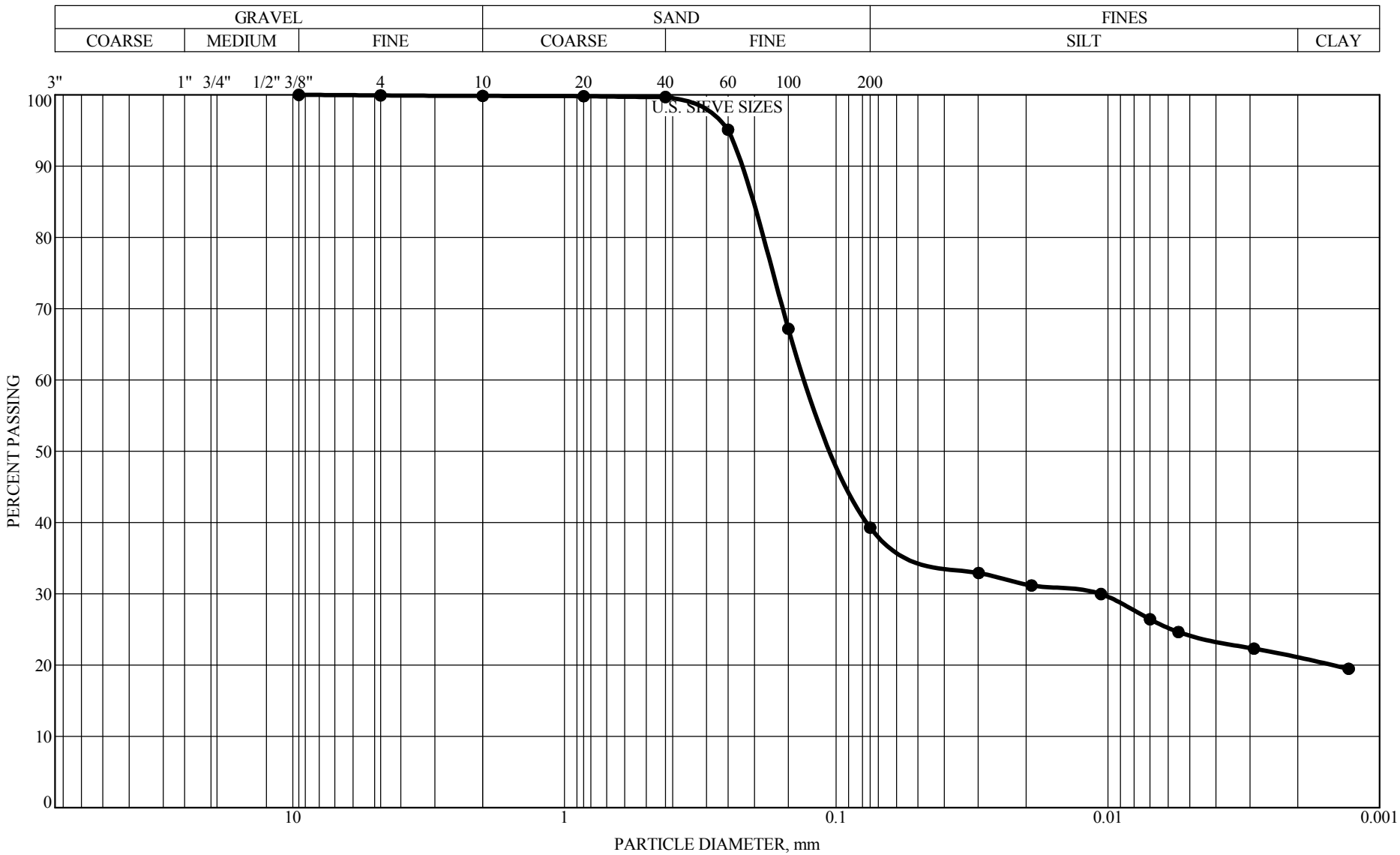
GRAVEL	7.9%
SAND	36.2%
SILT	33.2%
CLAY	22.7%

CLASSIFICATION:
A-7-6 (11), Brown
SANDY LEAN CLAY(CL)

LL=42, PL=17, PI=25, P200=55.9%

GS AASHTO 05310.GPJ BRAUN.GDT 9/15/11 11:45

GRAIN SIZE ACCUMULATION CURVE (AASHTO)



Braun Project FA-11-05310
Borrow Borings
Highway 3 from Dawson to Napoleon
Logan and Kidder Counties
South of Dawson, North Dakota

BORING: ND3-BW-1-5 DEPTH: 6.0'-10.0'

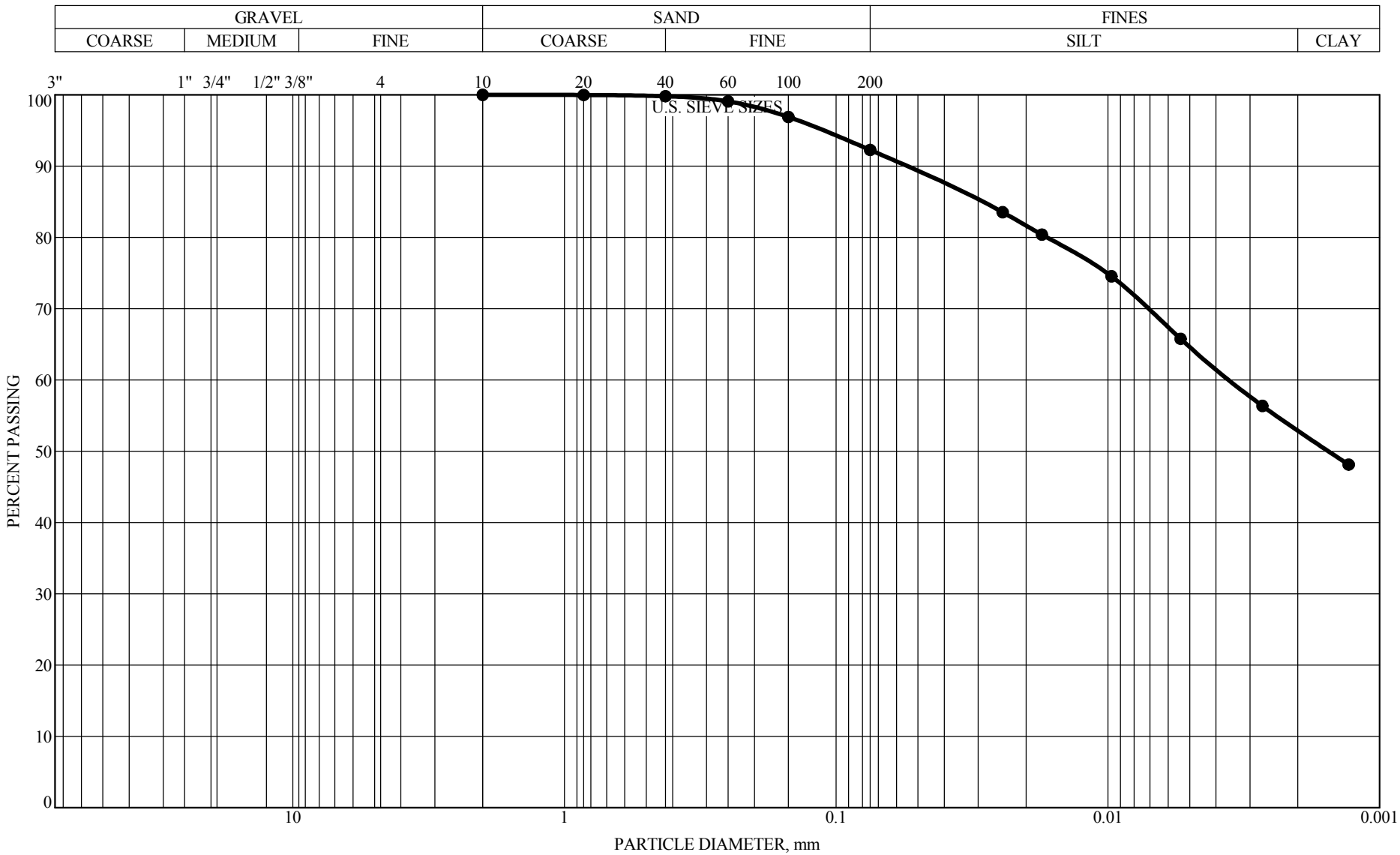
GRAVEL	0.1%
SAND	60.6%
SILT	18.3%
CLAY	21.0%

CLASSIFICATION:
A-6 (2), Gray
CLAYEY SAND(SC)

LL=32, PL=18, PI=14, P200=39.3%

GS AASHTO 05310.GPJ BRAUN.GDT 9/15/11 11:45

GRAIN SIZE ACCUMULATION CURVE (AASHTO)



BRAUN INTERTEC

Braun Project FA-11-05310
Borrow Borings
Highway 3 from Dawson to Napoleon
Logan and Kidder Counties
South of Dawson, North Dakota

BORING: ND3-BW-1-5 DEPTH: 10.0'-20.0'

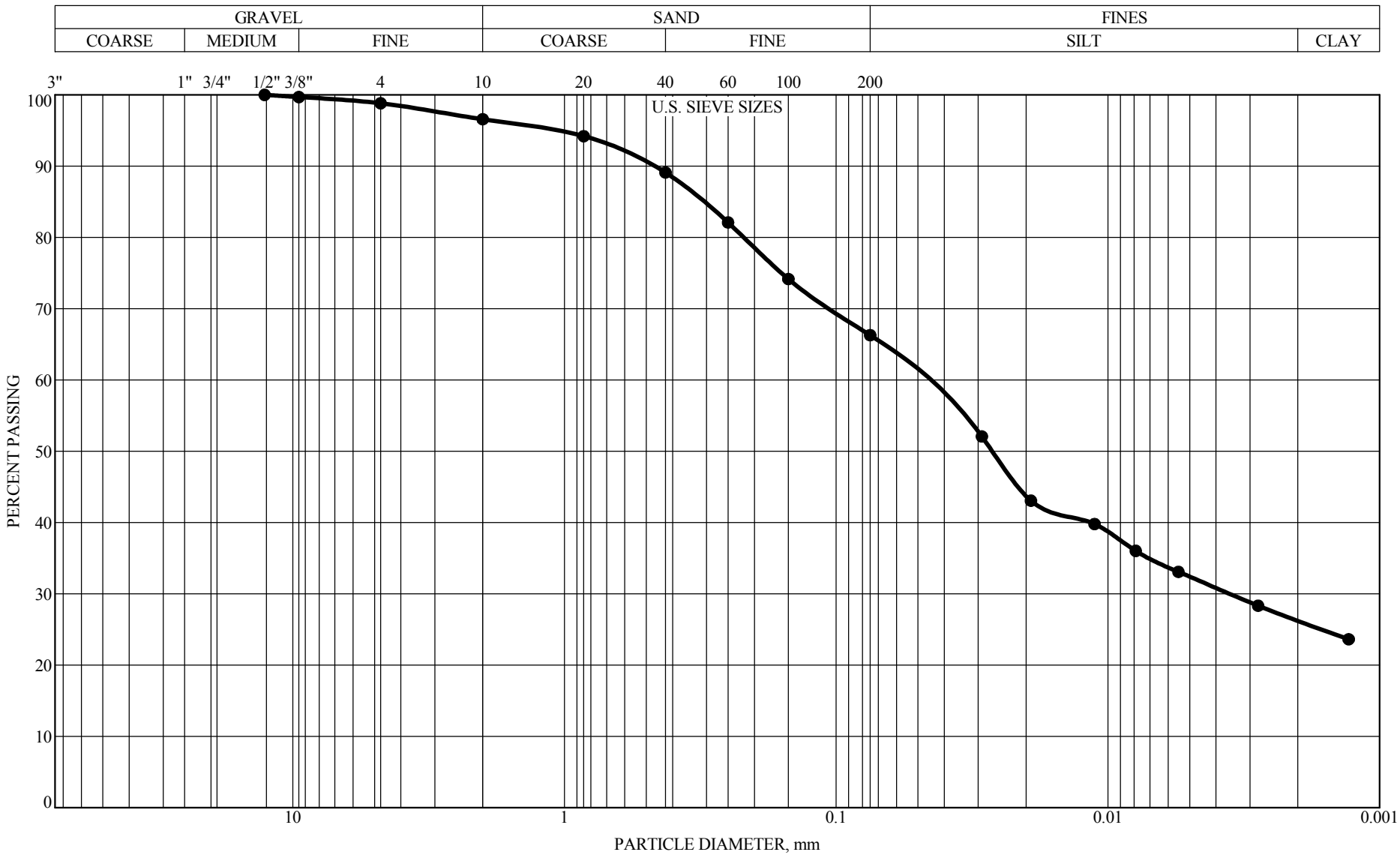
GRAVEL	0.0%
SAND	7.7%
SILT	39.3%
CLAY	53.0%

CLASSIFICATION:
A-7-6 (61), Gray
FAT CLAY(CH)

LL=81, PL=22, PI=59, P200=92.3%

GS AASHTO 05310.GPJ BRAUN.GDT 9/15/11 11:45

GRAIN SIZE ACCUMULATION CURVE (AASHTO)



Braun Project FA-11-05310
Borrow Borings
Highway 3 from Dawson to Napoleon
Logan and Kidder Counties
South of Dawson, North Dakota

BORING: ND3-BW-1-7 DEPTH: 0.3'-20.0'

GRAVEL	3.4%
SAND	30.3%
SILT	40.0%
CLAY	26.3%

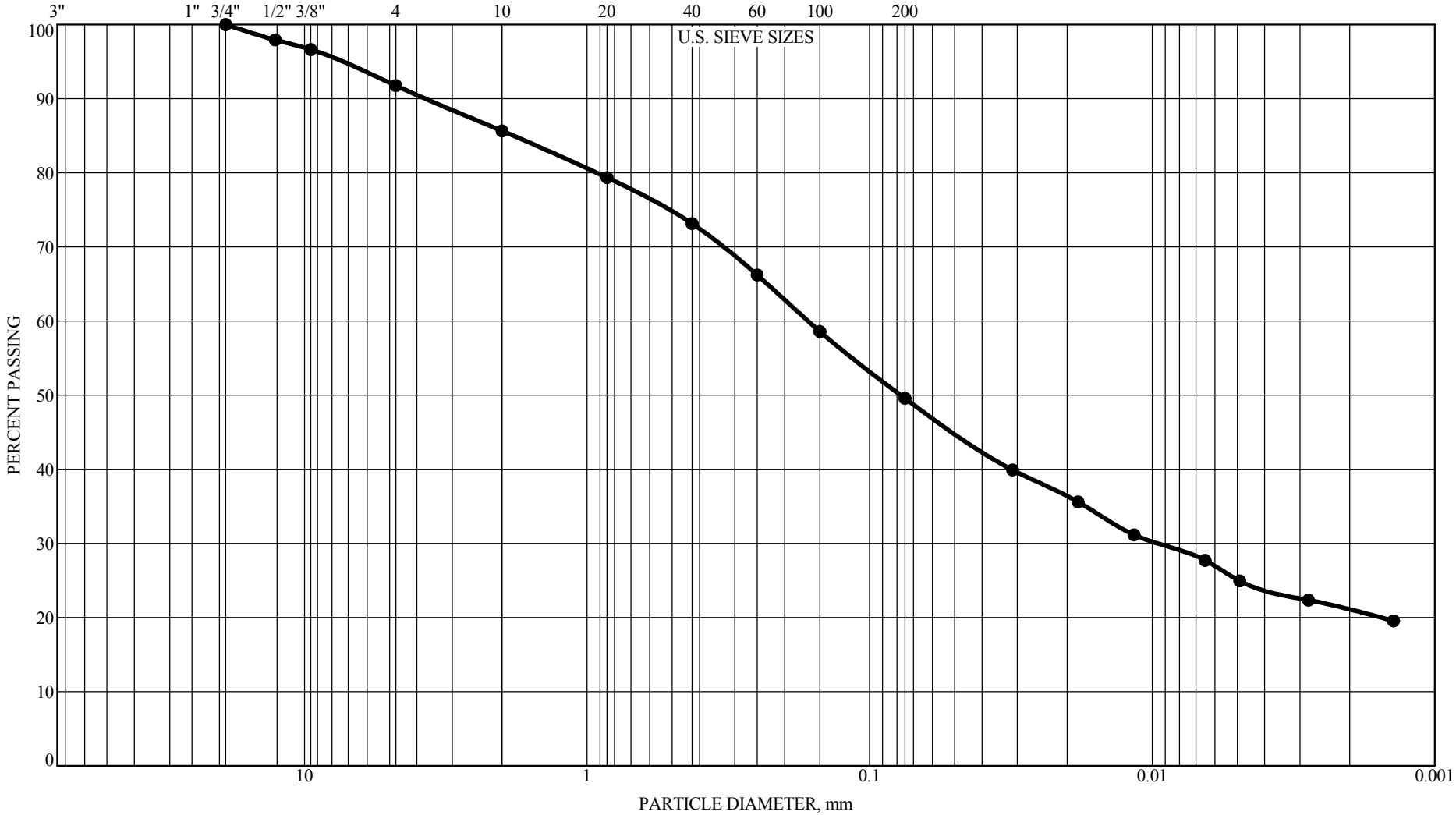
CLASSIFICATION:
A-7-6 (17), Brown
SANDY LEAN CLAY(CL)

LL=43, PL=13, PI=30, P200=66.3%

GS AASHTO 05310.GPJ BRAUN.GDT 9/15/11 11:45

GRAIN SIZE ACCUMULATION CURVE (AASHTO)

GRAVEL			SAND		FINES	
COARSE	MEDIUM	FINE	COARSE	FINE	SILT	CLAY



BRAUN INTERTEC

Braun Project FA-11-05310
Borrow Borings
Highway 3 from Dawson to Napoleon
Logan and Kidder Counties
South of Dawson, North Dakota

BORING: ND3-BW-1-8 DEPTH: 0.3'-20.0'

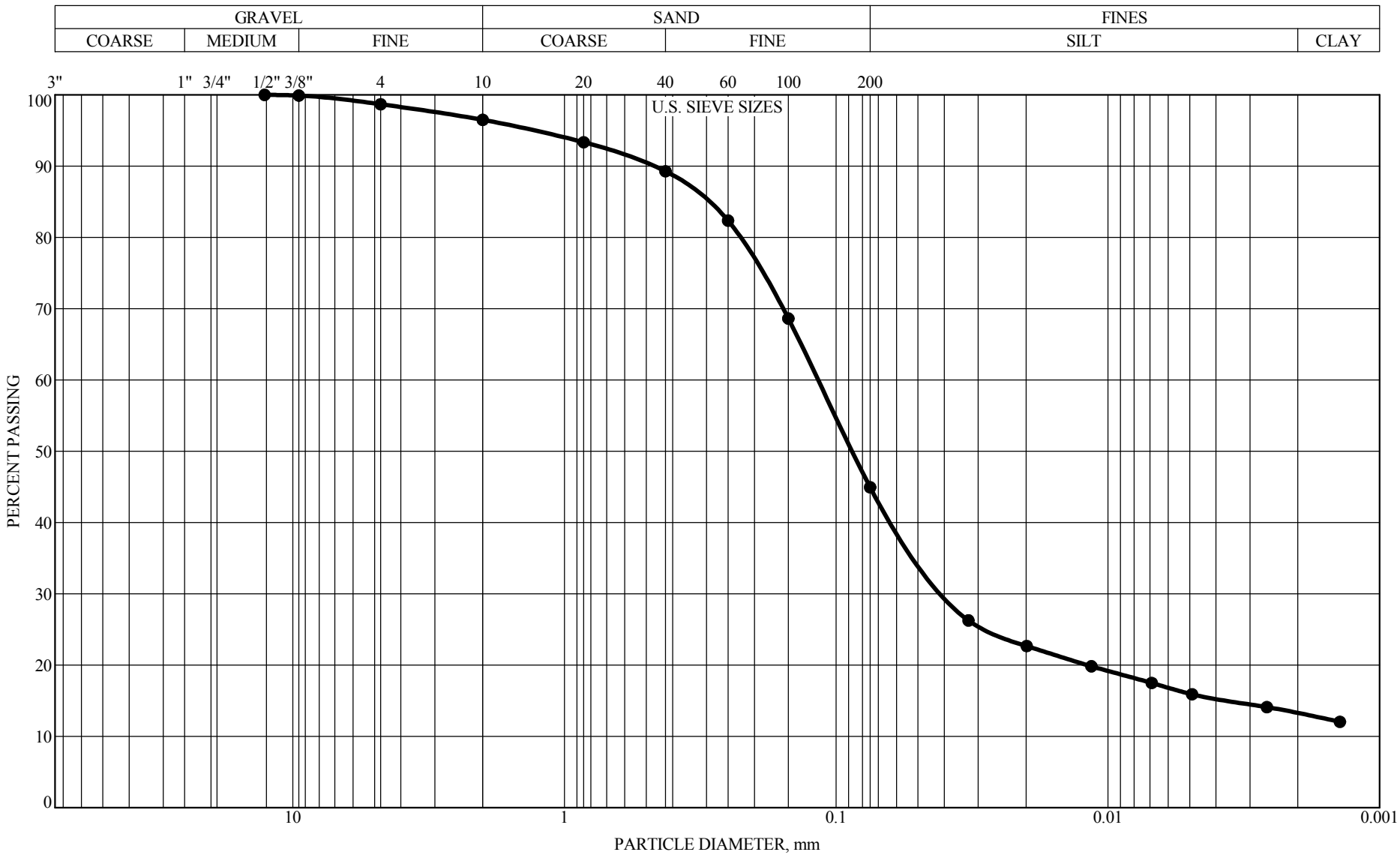
GRAVEL	14.3%
SAND	36.1%
SILT	28.6%
CLAY	21.0%

CLASSIFICATION:
A-6 (6), Gray
CLAYEY SAND(SC)

LL=36, PL=16, PI=20, P200=49.6%

GS AASHTO 05310.GPJ BRAUN.GDT 9/15/11 11:45

GRAIN SIZE ACCUMULATION CURVE (AASHTO)



Braun Project FA-11-05310
Borrow Borings
Highway 3 from Dawson to Napoleon
Logan and Kidder Counties
South of Dawson, North Dakota

BORING: ND3-BW-2-1 DEPTH: 3.0'-6.0'

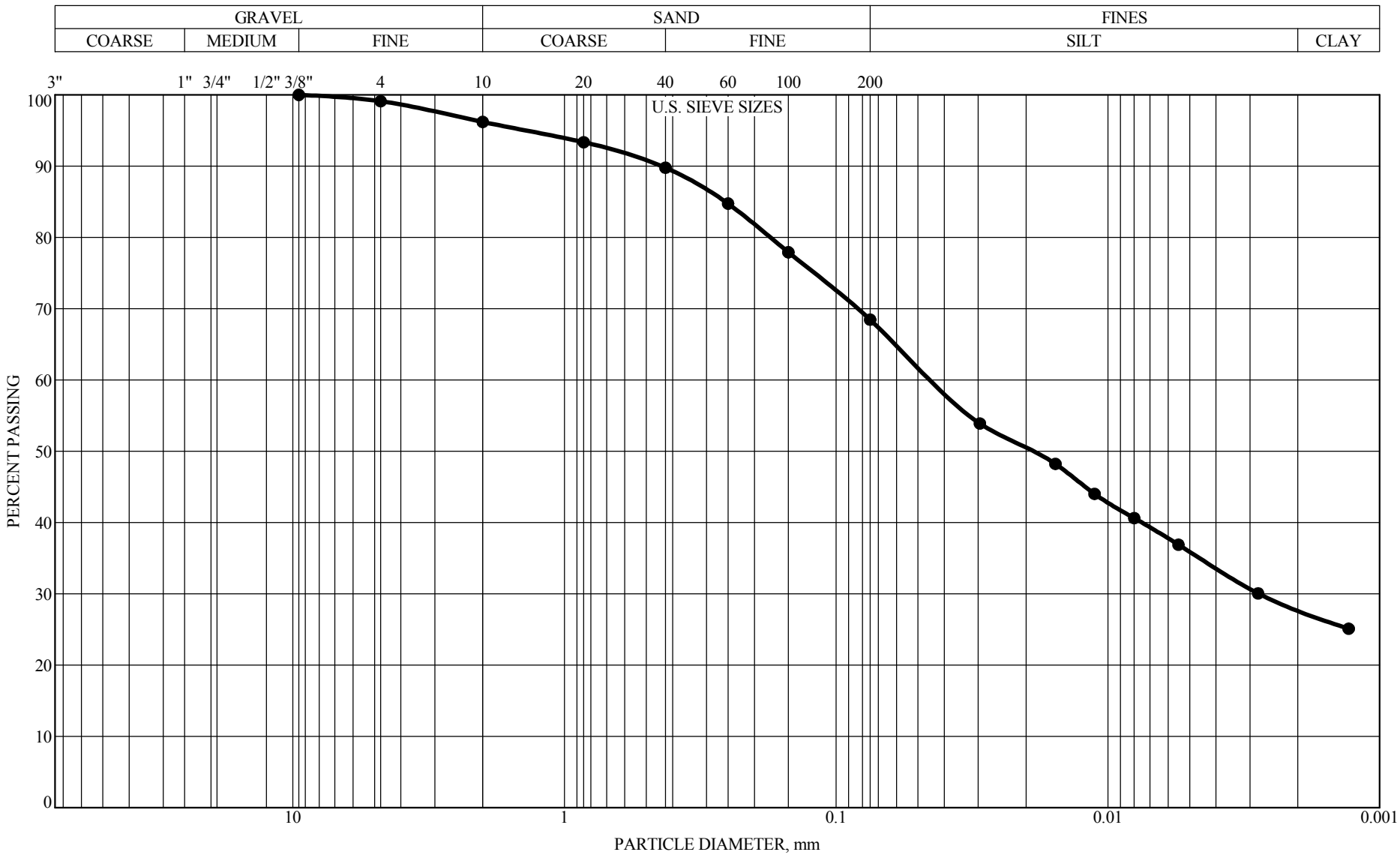
GRAVEL	3.5%
SAND	51.5%
SILT	31.7%
CLAY	13.2%

CLASSIFICATION:
A-6 (2), Brown and Gray
CLAYEY SAND(SC)

LL=28, PL=17, PI=11, P200=44.9%

GS AASHTO 05310.GPJ BRAUN.GDT 9/15/11 11:45

GRAIN SIZE ACCUMULATION CURVE (AASHTO)



BRAUN INTERTEC

Braun Project FA-11-05310
Borrow Borings
Highway 3 from Dawson to Napoleon
Logan and Kidder Counties
South of Dawson, North Dakota

BORING: ND3-BW-2-4 DEPTH: 0.5'-9.0'

GRAVEL	3.8%
SAND	27.7%
SILT	40.6%
CLAY	27.9%

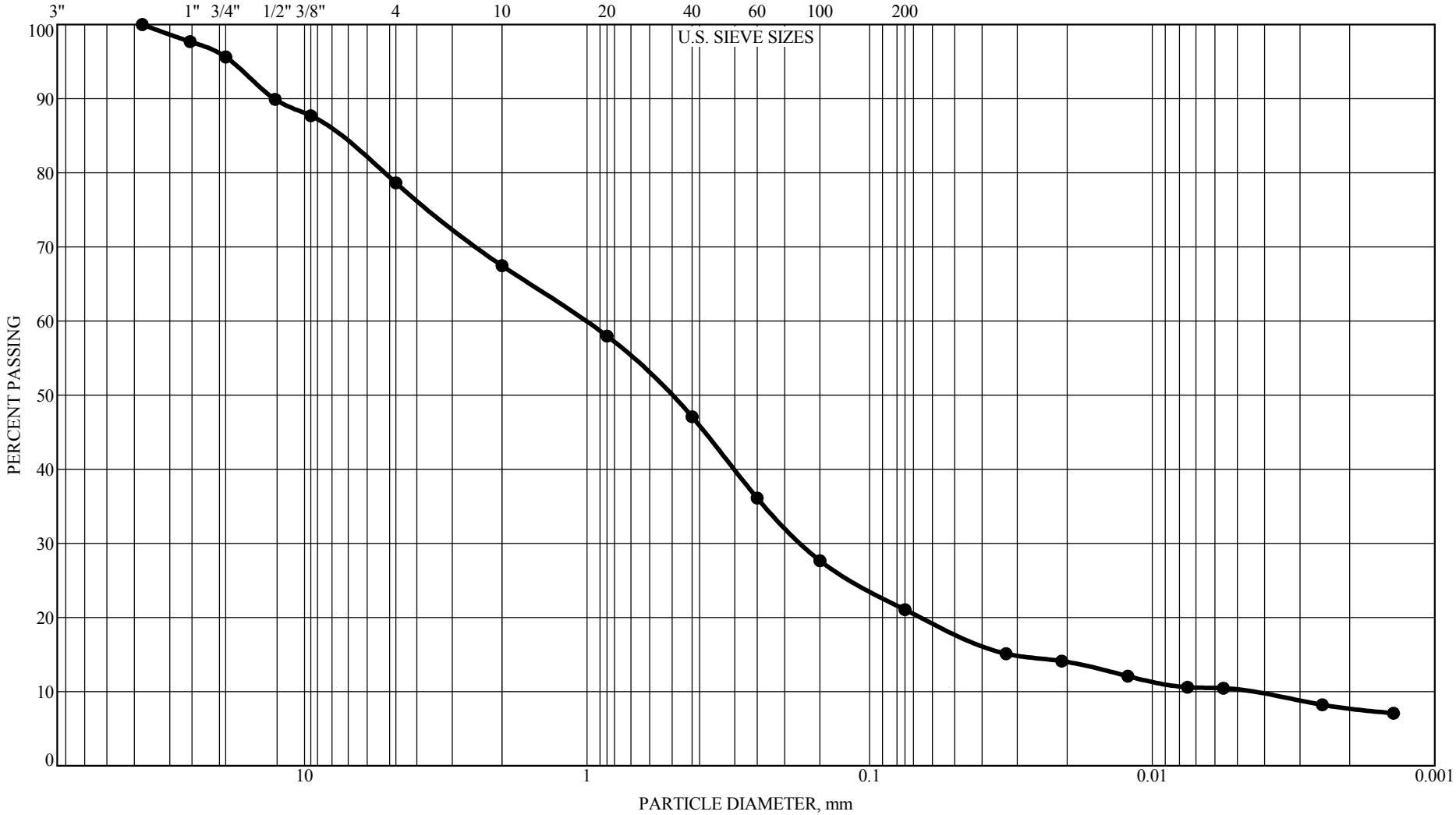
CLASSIFICATION:
A-7-6 (16), Brown
SANDY LEAN CLAY(CL)

LL=41, PL=14, PI=27, P200=68.5%

GS AASHTO 05310.GPJ BRAUN.GDT 9/15/11 11:45

GRAIN SIZE ACCUMULATION CURVE (AASHTO)

GRAVEL			SAND		FINES	
COARSE	MEDIUM	FINE	COARSE	FINE	SILT	CLAY



BRAUN INTERTEC

Braun Project FA-11-05310
Borrow Borings
Highway 3 from Dawson to Napoleon
Logan and Kidder Counties
South of Dawson, North Dakota

BORING: ND3-BW-2-5 DEPTH: 4.0'-14.0'

GRAVEL	32.5%
SAND	46.4%
SILT	13.3%
CLAY	7.8%

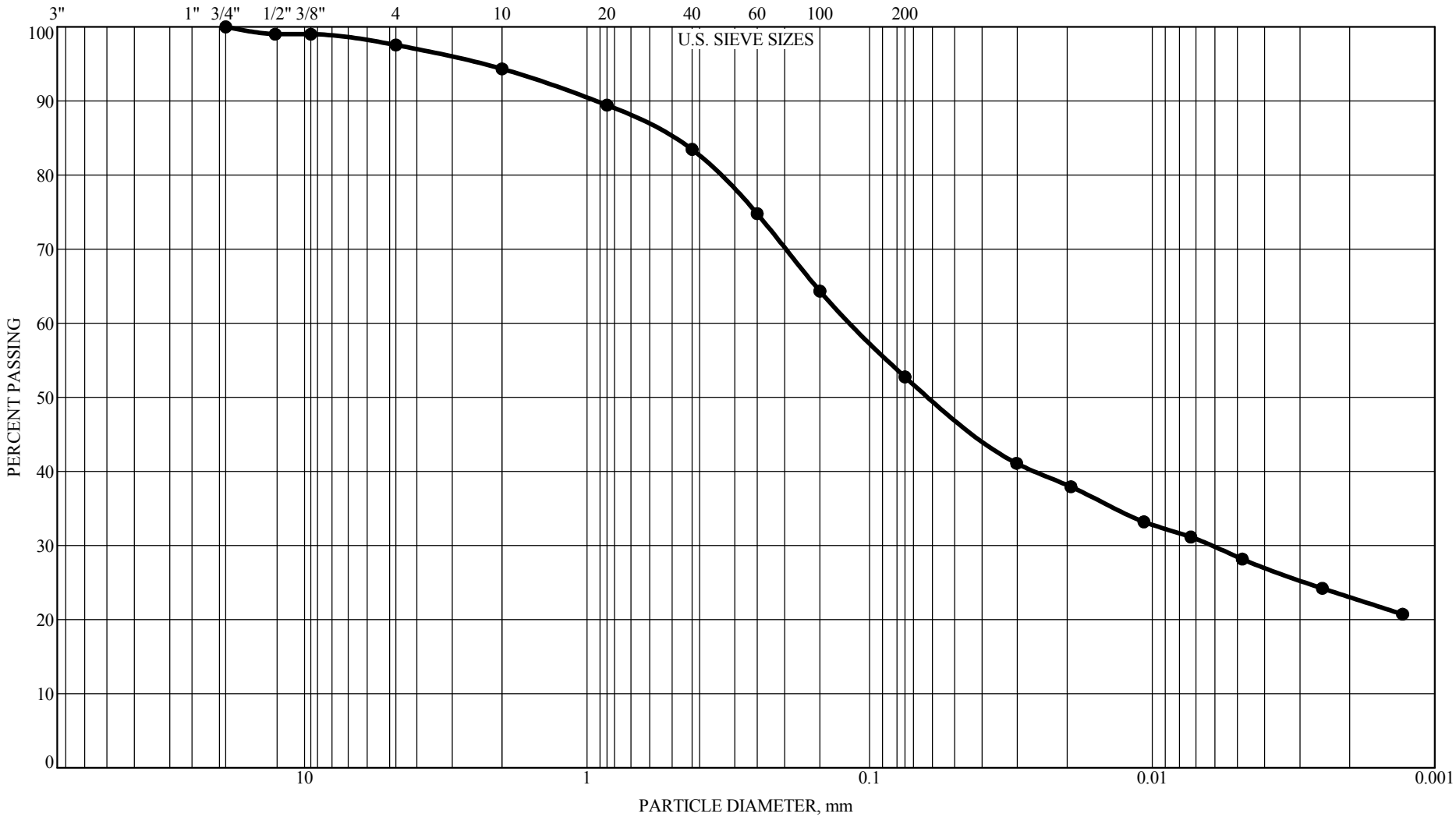
CLASSIFICATION:
A-2-6 (0), Brown
CLAYEY SAND with GRAVEL(SC)

LL=29, PL=15, PI=14, P200=21.0%

GS AASHTO 05310.GPJ BRAUN.GDT 9/15/11 11:45

GRAIN SIZE ACCUMULATION CURVE (AASHTO)

GRAVEL			SAND		FINES	
COARSE	MEDIUM	FINE	COARSE	FINE	SILT	CLAY



BRAUN INTERTEC

Braun Project FA-11-05310
Borrow Borings
Highway 3 from Dawson to Napoleon
Logan and Kidder Counties
South of Dawson, North Dakota

BORING: ND3-BW-2-7 DEPTH: 0.4'-6.5'

GRAVEL	5.7%
SAND	41.6%
SILT	29.7%
CLAY	23.0%

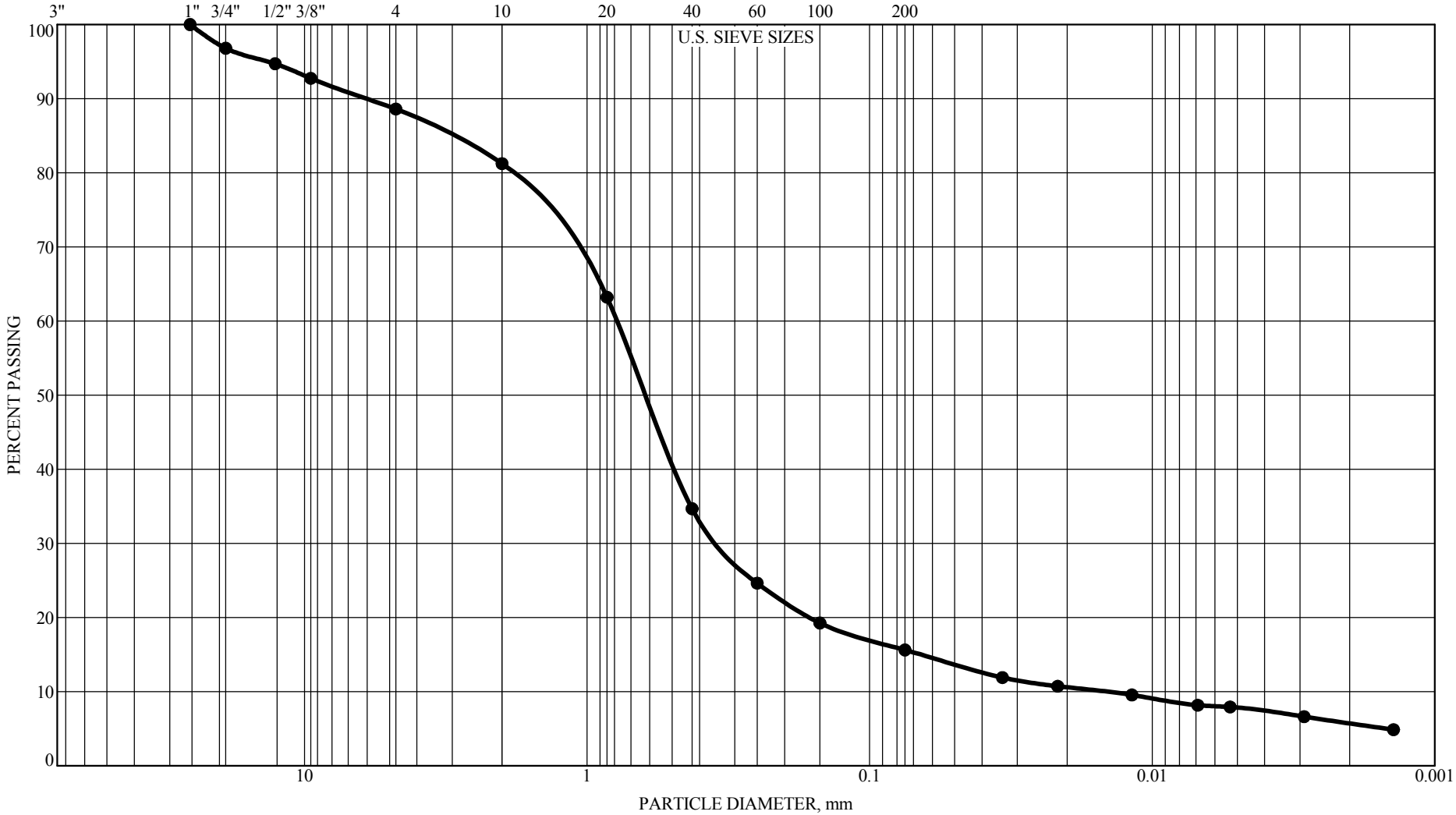
CLASSIFICATION:
A-6 (9), Brown and Gray
SANDY LEAN CLAY(CL)

LL=39, PL=14, PI=25, P200=52.8%

GS AASHTO 05310.GPJ BRAUN.GDT 9/15/11 11:45

GRAIN SIZE ACCUMULATION CURVE (AASHTO)

GRAVEL			SAND		FINES	
COARSE	MEDIUM	FINE	COARSE	FINE	SILT	CLAY



BRAUN INTERTEC

Braun Project FA-11-05310
Borrow Borings
Highway 3 from Dawson to Napoleon
Logan and Kidder Counties
South of Dawson, North Dakota

BORING: ND3-BW-2-7 DEPTH: 6.5'-11.5'

GRAVEL	18.8%
SAND	65.6%
SILT	9.9%
CLAY	5.7%

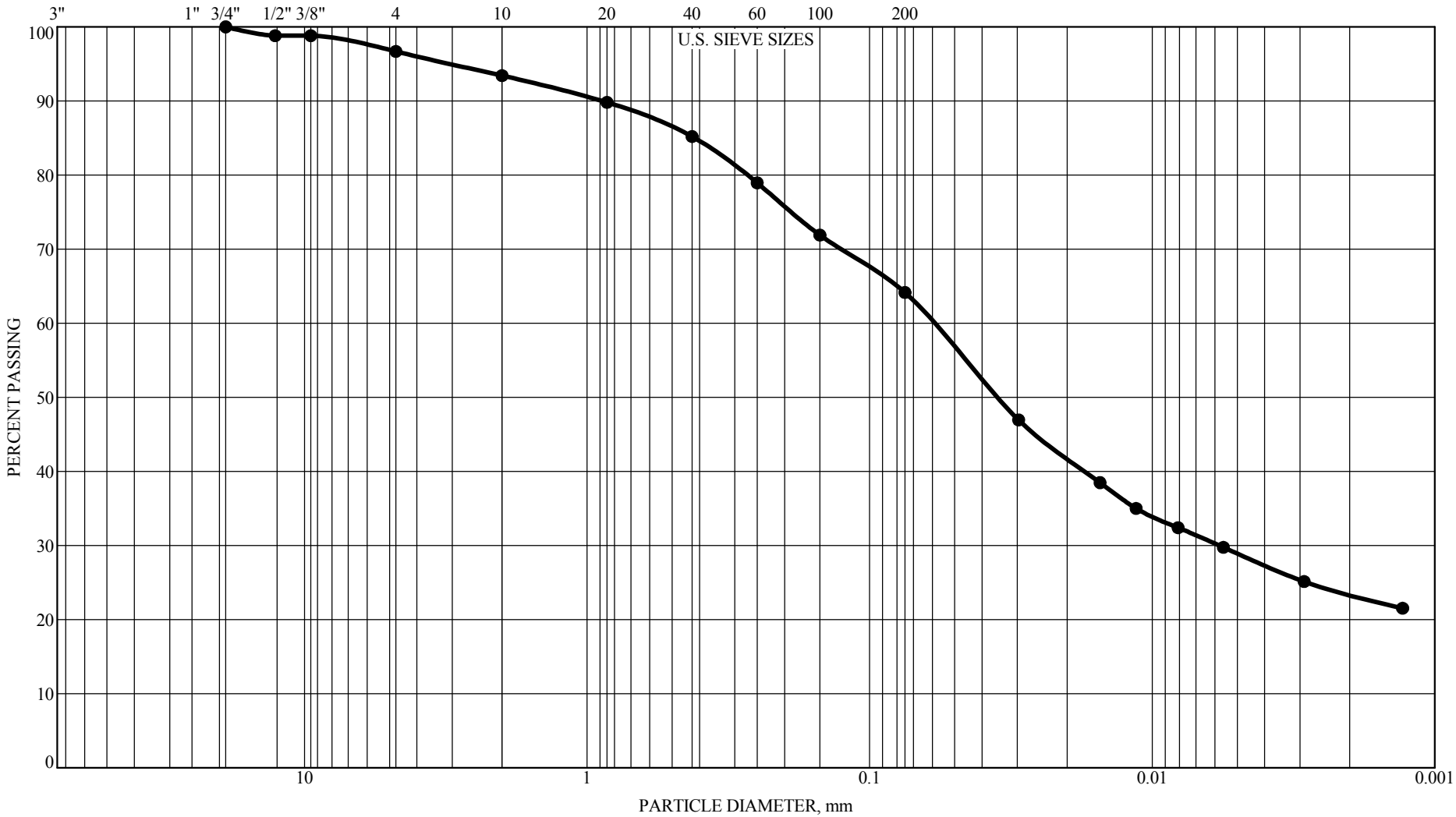
CLASSIFICATION:
A-1-b (0), Brown
SILTY SAND(SM)

LL=21, PL=18, PI=3, P200=15.6%

GS AASHTO 05310.GPJ BRAUN.GDT 9/15/11 11:45

GRAIN SIZE ACCUMULATION CURVE (AASHTO)

GRAVEL			SAND		FINES	
COARSE	MEDIUM	FINE	COARSE	FINE	SILT	CLAY



BRAUN INTERTEC

Braun Project FA-11-05310
Borrow Borings
Highway 3 from Dawson to Napoleon
Logan and Kidder Counties
South of Dawson, North Dakota

BORING: ND3-BW-2-7 DEPTH: 11.5'-20.0'

GRAVEL	6.6%
SAND	29.3%
SILT	40.7%
CLAY	23.5%

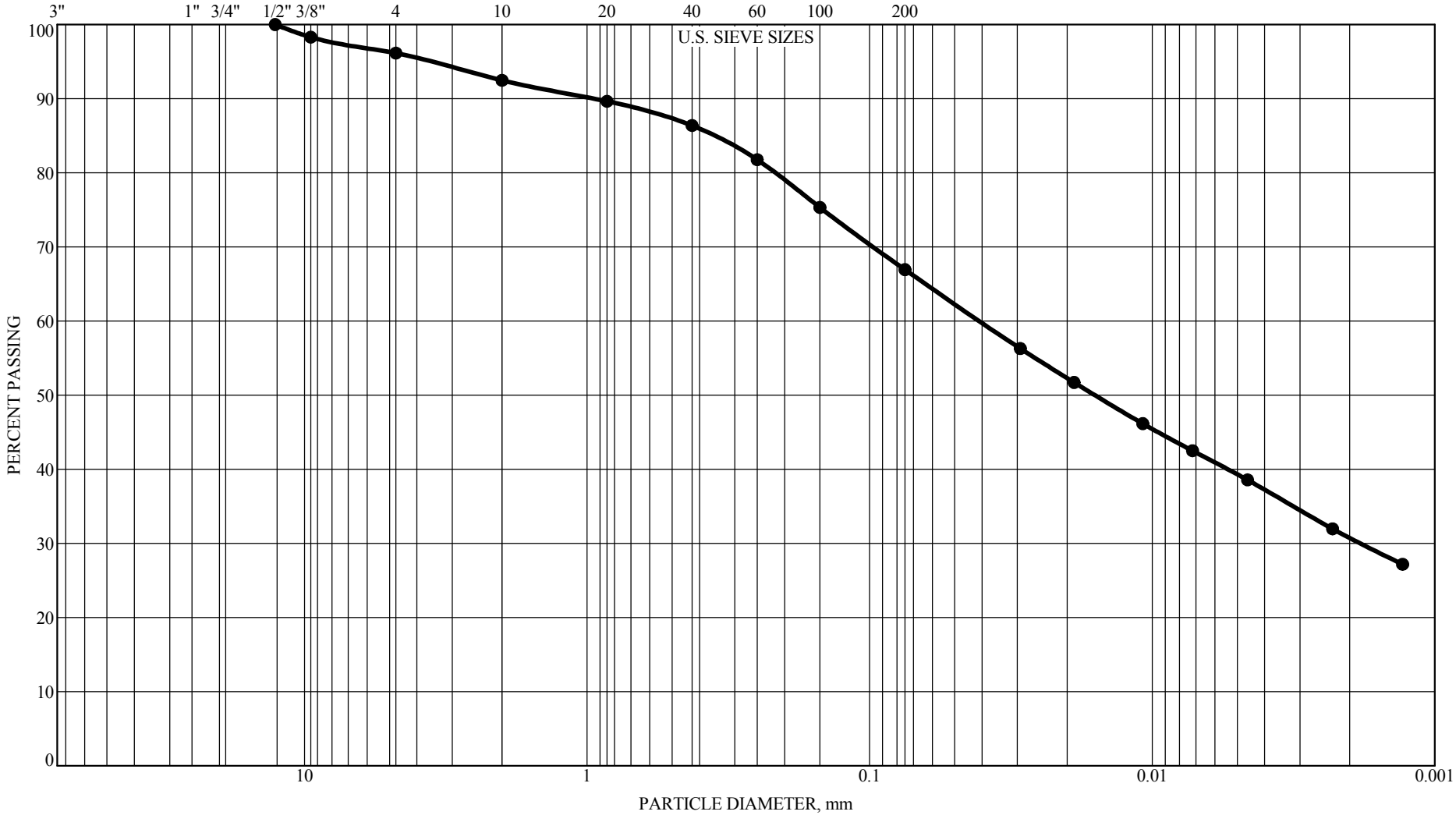
CLASSIFICATION:
A-6 (11), Brown
SANDY LEAN CLAY(CL)

LL=37, PL=16, PI=21, P200=64.1%

GS AASHTO 05310.GPJ BRAUN.GDT 9/15/11 11:45

GRAIN SIZE ACCUMULATION CURVE (AASHTO)

GRAVEL			SAND		FINES	
COARSE	MEDIUM	FINE	COARSE	FINE	SILT	CLAY



BRAUN INTERTEC

Braun Project FA-11-05310
Borrow Borings
Highway 3 from Dawson to Napoleon
Logan and Kidder Counties
South of Dawson, North Dakota

BORING: ND3-BW-2-8 DEPTH: 1.3'-14.0'

GRAVEL	7.5%
SAND	25.5%
SILT	36.1%
CLAY	30.8%

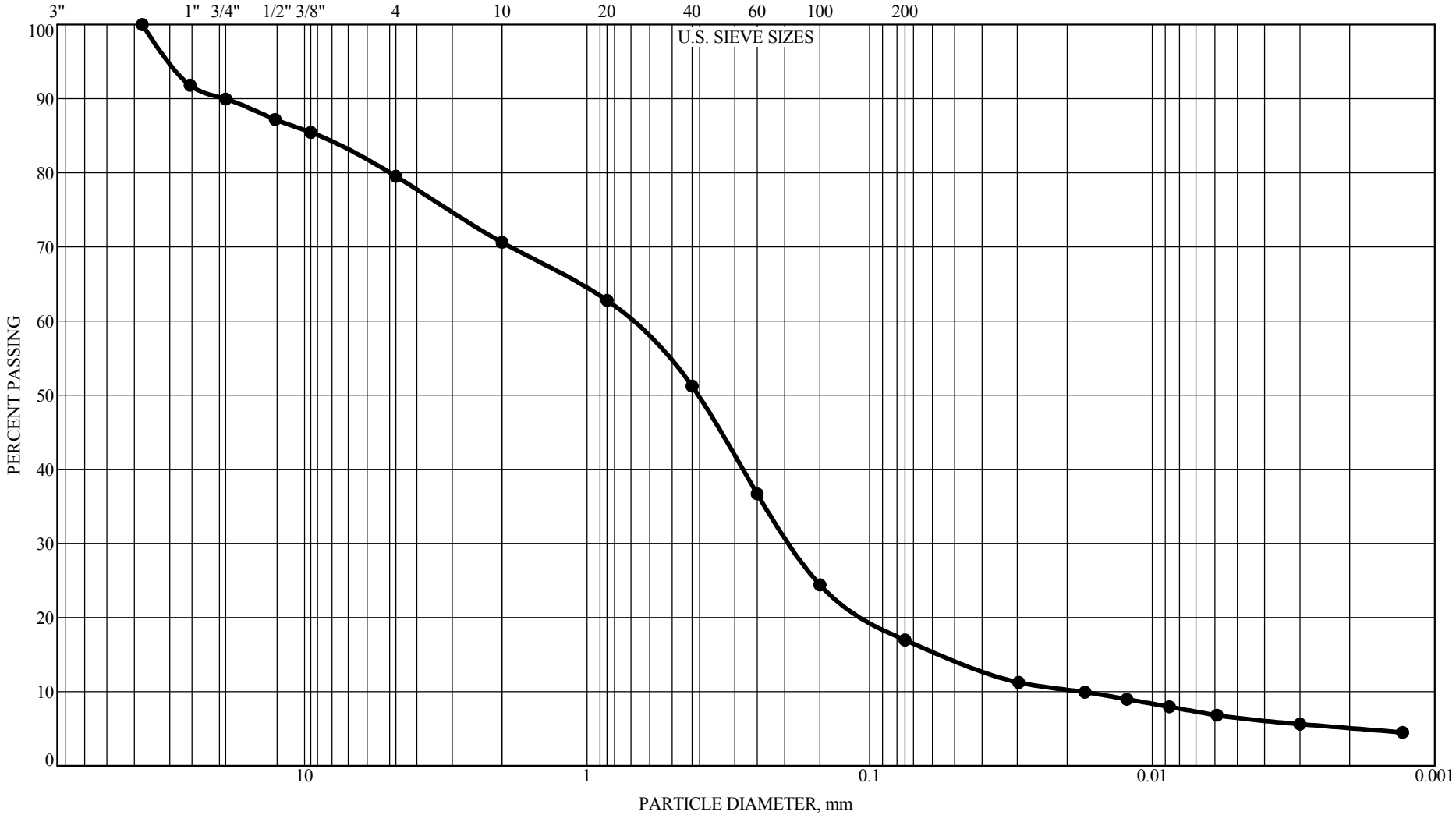
CLASSIFICATION:
A-7-6 (22), Brown
SANDY FAT CLAY(CH)

LL=53, PL=17, PI=36, P200=66.9%

GS AASHTO 05310.GPJ BRAUN.GDT 9/15/11 11:45

GRAIN SIZE ACCUMULATION CURVE (AASHTO)

GRAVEL			SAND		FINES	
COARSE	MEDIUM	FINE	COARSE	FINE	SILT	CLAY



BRAUN INTERTEC

Braun Project FA-11-05310
Borrow Borings
Highway 3 from Dawson to Napoleon
Logan and Kidder Counties
South of Dawson, North Dakota

BORING: ND3-BW-2-9 DEPTH: 0.0'-20.0'

GRAVEL	29.4%
SAND	53.6%
SILT	11.9%
CLAY	5.1%

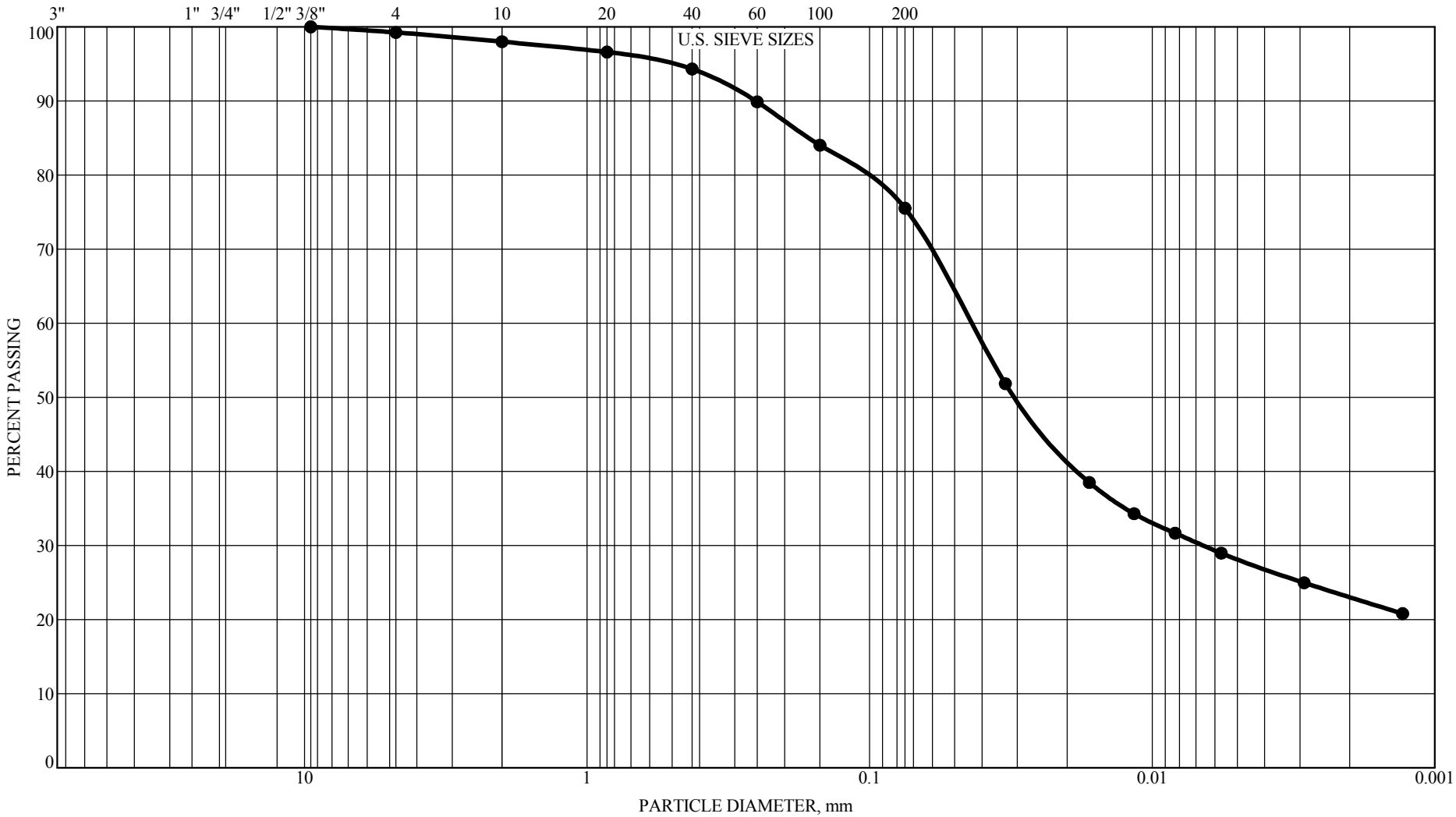
CLASSIFICATION:
A-2-4 (0), Brown
SILTY, CLAYEY SAND with GRAVEL(SC-SM)

LL=23, PL=18, PI=5, P200=17.0%

GS AASHTO 05310.GPJ BRAUN.GDT 9/15/11 11:45

GRAIN SIZE ACCUMULATION CURVE (AASHTO)

GRAVEL			SAND		FINES	
COARSE	MEDIUM	FINE	COARSE	FINE	SILT	CLAY



BRAUN INTERTEC

Braun Project FA-11-05310
Borrow Borings
Highway 3 from Dawson to Napoleon
Logan and Kidder Counties
South of Dawson, North Dakota

BORING: ND3-BW-3-5 DEPTH: 0.9'-7.0'

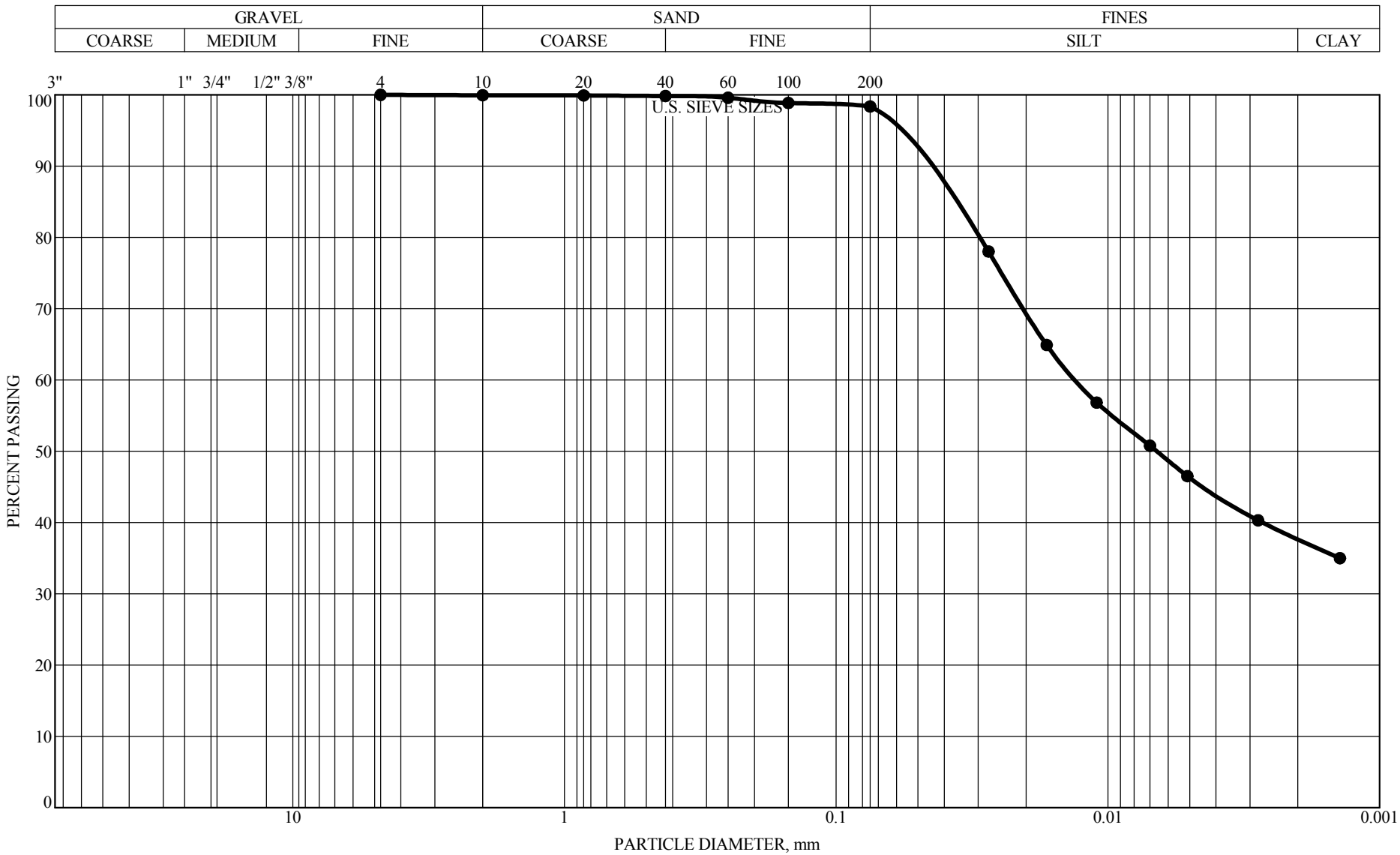
GRAVEL	2.0%
SAND	22.5%
SILT	52.5%
CLAY	23.0%

CLASSIFICATION:
A-6 (11), Brown
LEAN CLAY with SAND(CL)

LL=34, PL=18, PI=16, P200=75.5%

GS AASHTO 05310.GPJ BRAUN.GDT 9/15/11 11:46

GRAIN SIZE ACCUMULATION CURVE (AASHTO)



Braun Project FA-11-05310
Borrow Borings
Highway 3 from Dawson to Napoleon
Logan and Kidder Counties
South of Dawson, North Dakota

BORING: ND3-BW-3-5 DEPTH: 9.0'-18.5'

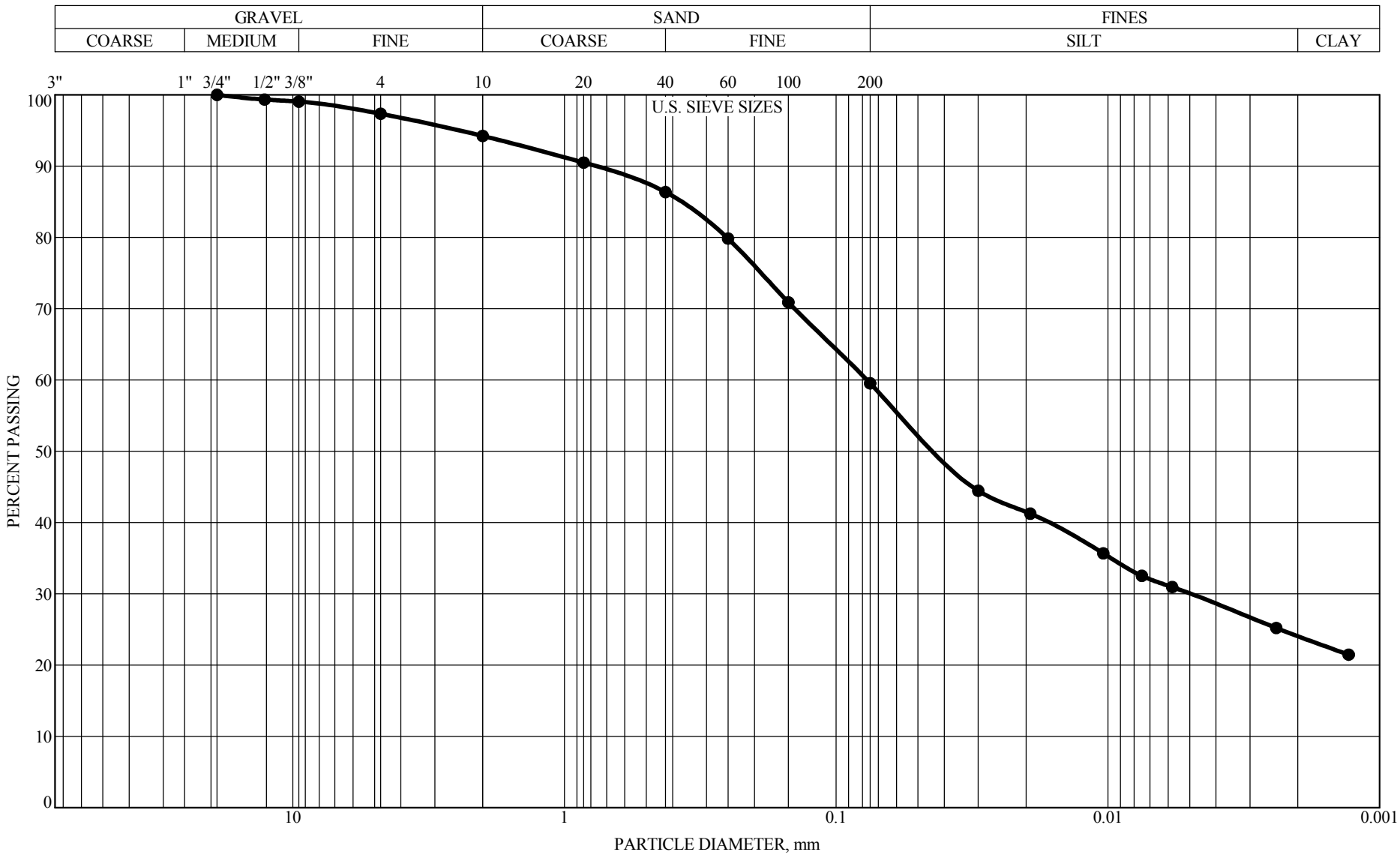
GRAVEL	0.1%
SAND	1.6%
SILT	60.6%
CLAY	37.7%

CLASSIFICATION:
A-7-6 (32), Brown
LEAN CLAY(CL)

LL=49, PL=19, PI=30, P200=98.4%

GS AASHTO 05310.GPJ BRAUN.GDT 9/15/11 11:46

GRAIN SIZE ACCUMULATION CURVE (AASHTO)



BRAUN INTERTEC

Braun Project FA-11-05310
Borrow Borings
Highway 3 from Dawson to Napoleon
Logan and Kidder Counties
South of Dawson, North Dakota

BORING: ND3-BW-3-6 DEPTH: 3.0'-20.0'

GRAVEL	5.8%
SAND	34.7%
SILT	35.4%
CLAY	24.1%

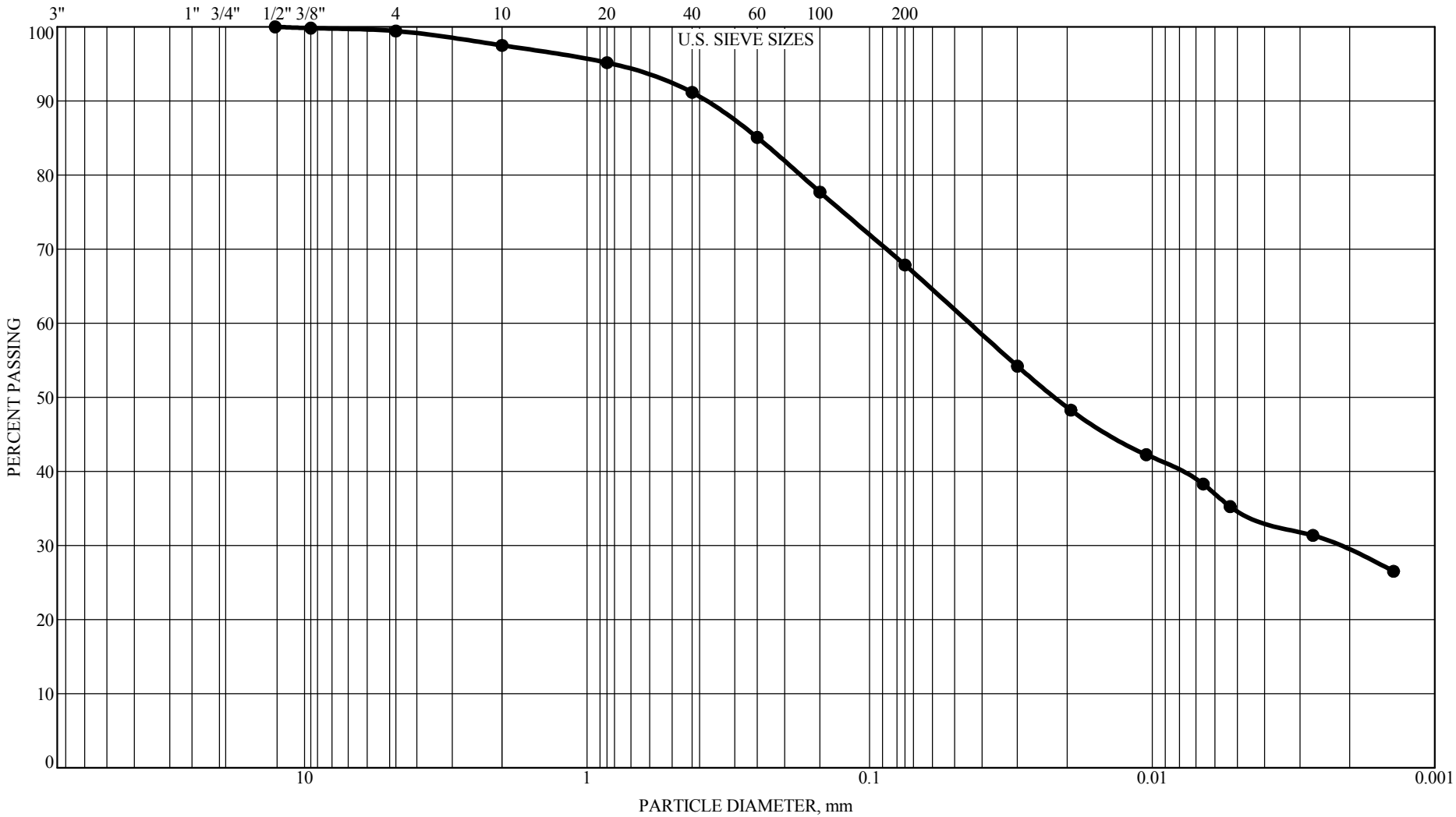
CLASSIFICATION:
A-6 (9), Brown
SANDY LEAN CLAY(CL)

LL=36, PL=16, PI=20, P200=59.5%

GS AASHTO 05310.GPJ BRAUN.GDT 9/15/11 11:46

GRAIN SIZE ACCUMULATION CURVE (AASHTO)

GRAVEL			SAND		FINES	
COARSE	MEDIUM	FINE	COARSE	FINE	SILT	CLAY



BRAUN INTERTEC

Braun Project FA-11-05310
Borrow Borings
Highway 3 from Dawson to Napoleon
Logan and Kidder Counties
South of Dawson, North Dakota

BORING: ND3-BW-3-7 DEPTH: 3.0'-20.0'

GRAVEL	2.5%
SAND	29.6%
SILT	38.7%
CLAY	29.1%

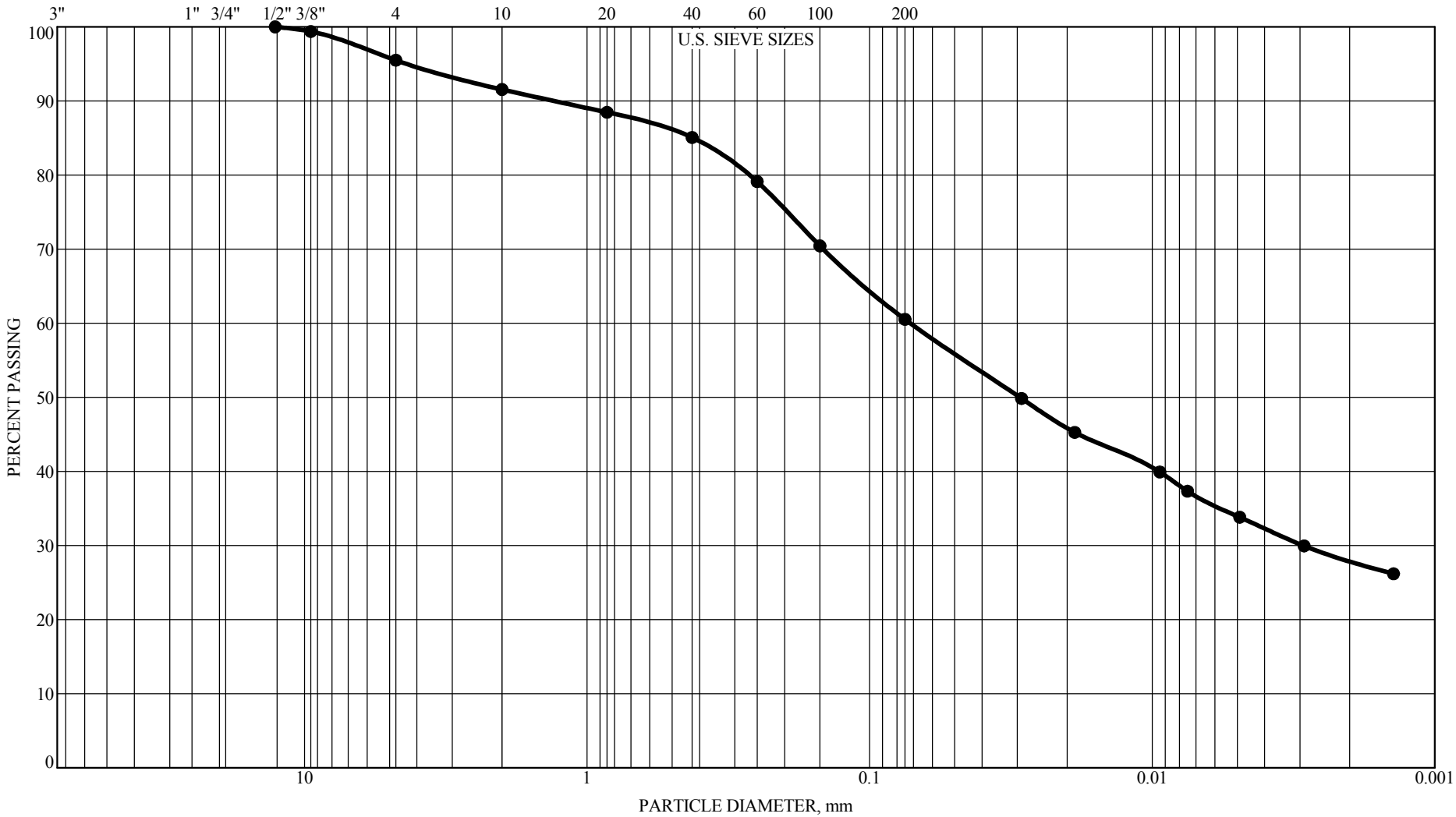
CLASSIFICATION:
A-6 (13), Brown
SANDY LEAN CLAY(CL)

LL=37, PL=14, PI=23, P200=67.9%

GS AASHTO 05310.GPJ BRAUN.GDT 9/15/11 11:46

GRAIN SIZE ACCUMULATION CURVE (AASHTO)

GRAVEL			SAND		FINES	
COARSE	MEDIUM	FINE	COARSE	FINE	SILT	CLAY



BRAUN INTERTEC

Braun Project FA-11-05310
Borrow Borings
Highway 3 from Dawson to Napoleon
Logan and Kidder Counties
South of Dawson, North Dakota

BORING: ND3-BW-3-8 DEPTH: 1.5'-20.0'

GRAVEL	8.4%
SAND	31.0%
SILT	32.5%
CLAY	28.0%

CLASSIFICATION:
A-7-6 (13), Brown
SANDY LEAN CLAY(CL)

LL=44, PL=19, PI=25, P200=60.5%

GS AASHTO 05310.GPJ BRAUN.GDT 9/15/11 11:46

GRAIN SIZE ACCUMULATION CURVE (AASHTO)

BRAUN INTERTEC

Braun Project FA-11-05310
Borrow Borings
Highway 3 from Dawson to Napoleon
Logan and Kidder Counties
South of Dawson, North Dakota

BORING: ND3-BW-3-9 DEPTH: 0.5'-6.5'

GRAVEL	4.4%
SAND	27.0%
SILT	40.1%
CLAY	28.5%

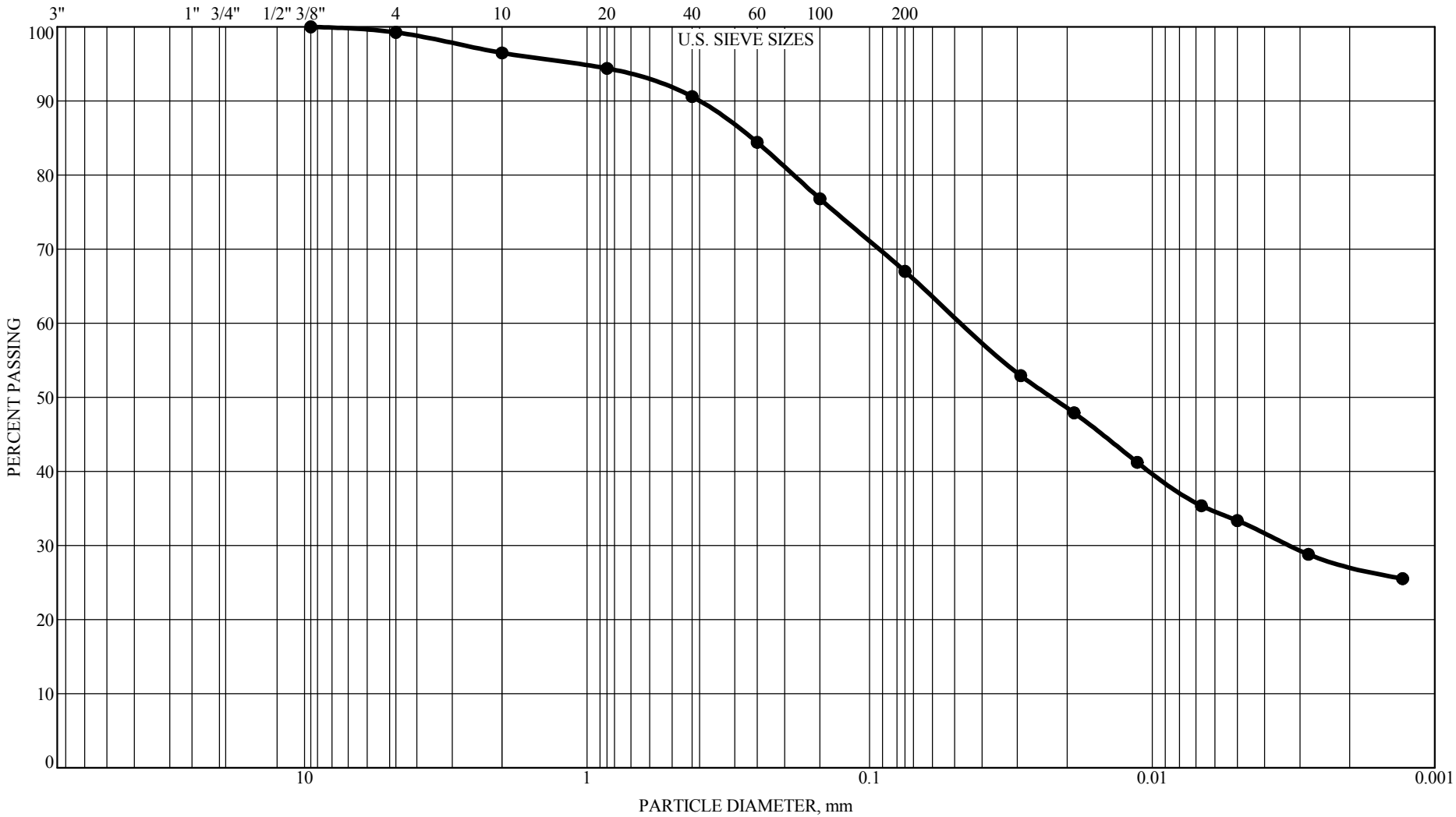
CLASSIFICATION:
A-7-6 (18), Brown
SANDY LEAN CLAY(CL)

LL=43, PL=13, PI=30, P200=68.6%

GS AASHTO 05310.GPJ BRAUN.GDT 9/15/11 11:46

GRAIN SIZE ACCUMULATION CURVE (AASHTO)

GRAVEL			SAND		FINES	
COARSE	MEDIUM	FINE	COARSE	FINE	SILT	CLAY



BRAUN INTERTEC

Braun Project FA-11-05310
Borrow Borings
Highway 3 from Dawson to Napoleon
Logan and Kidder Counties
South of Dawson, North Dakota

BORING: ND3-BW-3-9A DEPTH: 0.6'-20.0'

GRAVEL	3.5%
SAND	29.5%
SILT	39.6%
CLAY	27.4%

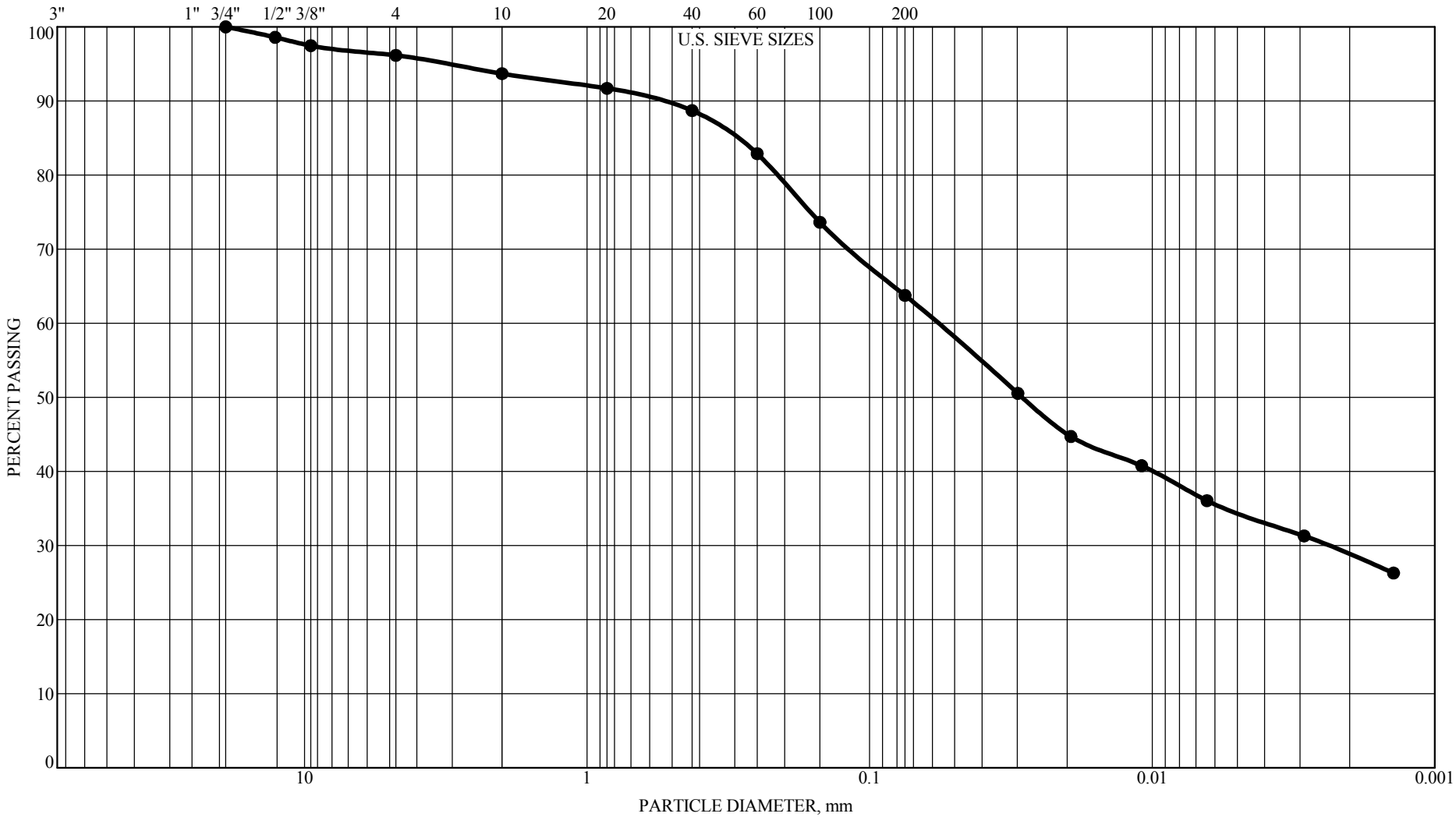
CLASSIFICATION:
A-6 (13), Brown
SANDY LEAN CLAY(CL)

LL=39, PL=16, PI=23, P200=67.0%

GS AASHTO 05310.GPJ BRAUN.GDT 9/15/11 11:46

GRAIN SIZE ACCUMULATION CURVE (AASHTO)

GRAVEL			SAND		FINES	
COARSE	MEDIUM	FINE	COARSE	FINE	SILT	CLAY



BRAUN INTERTEC

Braun Project FA-11-05310
Borrow Borings
Highway 3 from Dawson to Napoleon
Logan and Kidder Counties
South of Dawson, North Dakota

BORING: ND3-BW-3-10 DEPTH: 0.5'-4.5'

GRAVEL	6.3%
SAND	29.9%
SILT	35.0%
CLAY	28.7%

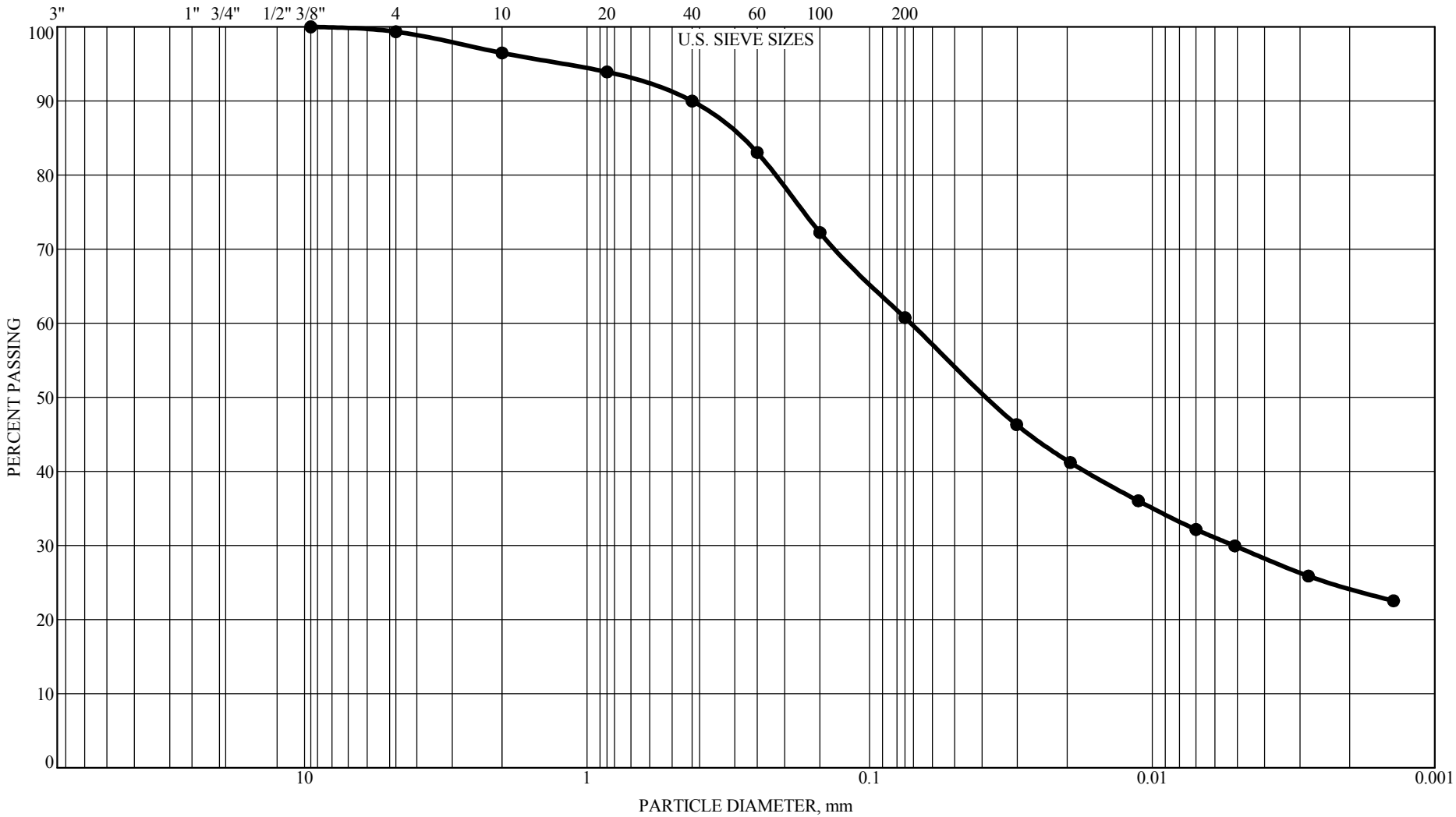
CLASSIFICATION:
A-6 (7), Brown
SANDY LEAN CLAY(CL)

LL=29, PL=14, PI=15, P200=63.7%

GS AASHTO 05310.GPJ BRAUN.GDT 9/15/11 11:47

GRAIN SIZE ACCUMULATION CURVE (AASHTO)

GRAVEL			SAND		FINES	
COARSE	MEDIUM	FINE	COARSE	FINE	SILT	CLAY



BRAUN INTERTEC

Braun Project FA-11-05310
Borrow Borings
Highway 3 from Dawson to Napoleon
Logan and Kidder Counties
South of Dawson, North Dakota

BORING: ND3-BW-3-10 DEPTH: 6.0'-20.0'

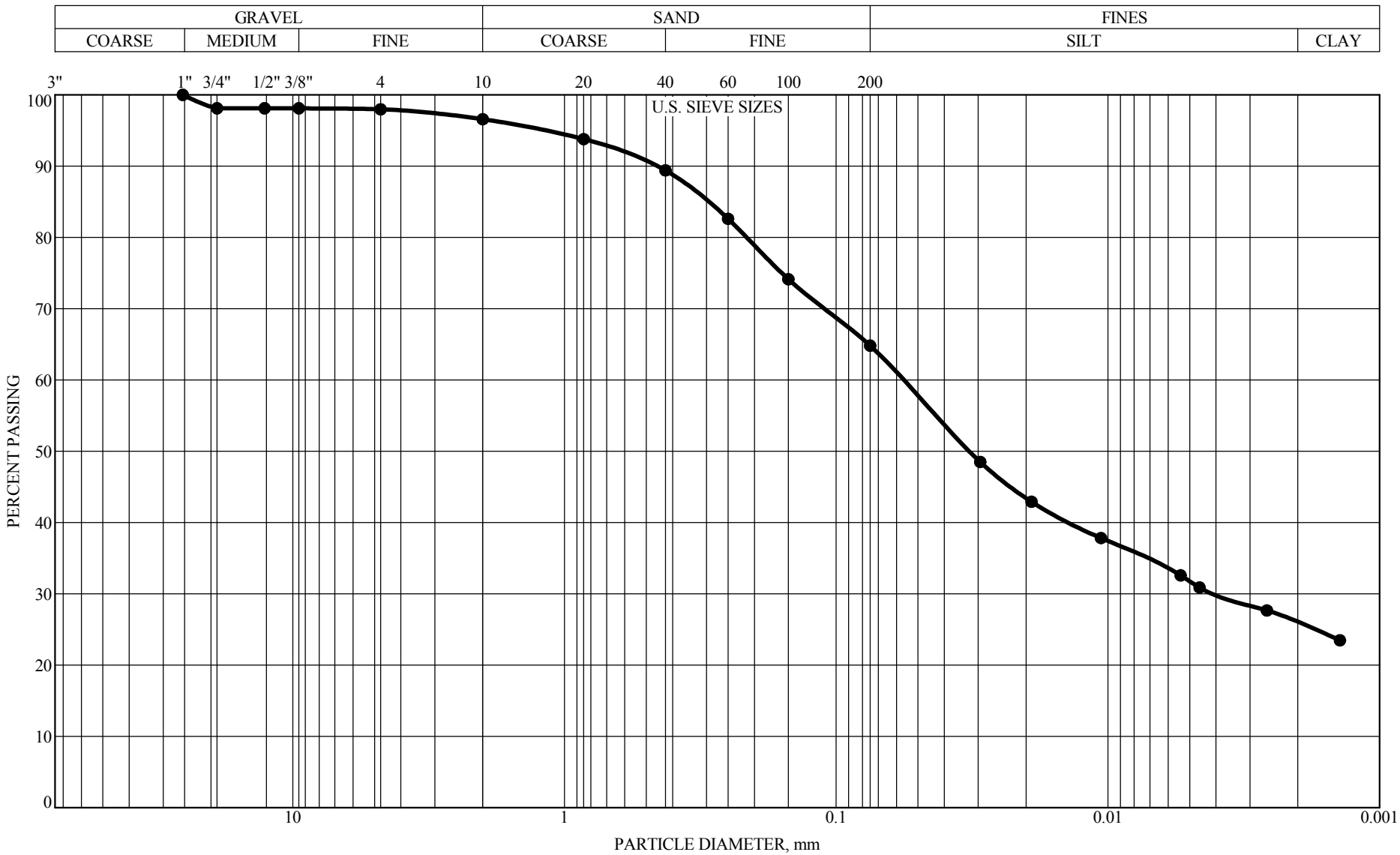
GRAVEL	3.5%
SAND	35.7%
SILT	36.5%
CLAY	24.3%

CLASSIFICATION:
A-6 (10), Brown
SANDY LEAN CLAY(CL)

LL=37, PL=15, PI=22, P200=60.8%

GS AASHTO 05310.GPJ BRAUN.GDT 9/15/11 11:47

GRAIN SIZE ACCUMULATION CURVE (AASHTO)



Braun Project FA-11-05310
Borrow Borings
Highway 3 from Dawson to Napoleon
Logan and Kidder Counties
South of Dawson, North Dakota

BORING: ND3-BW-3-10A DEPTH: 3.0'-12.5'

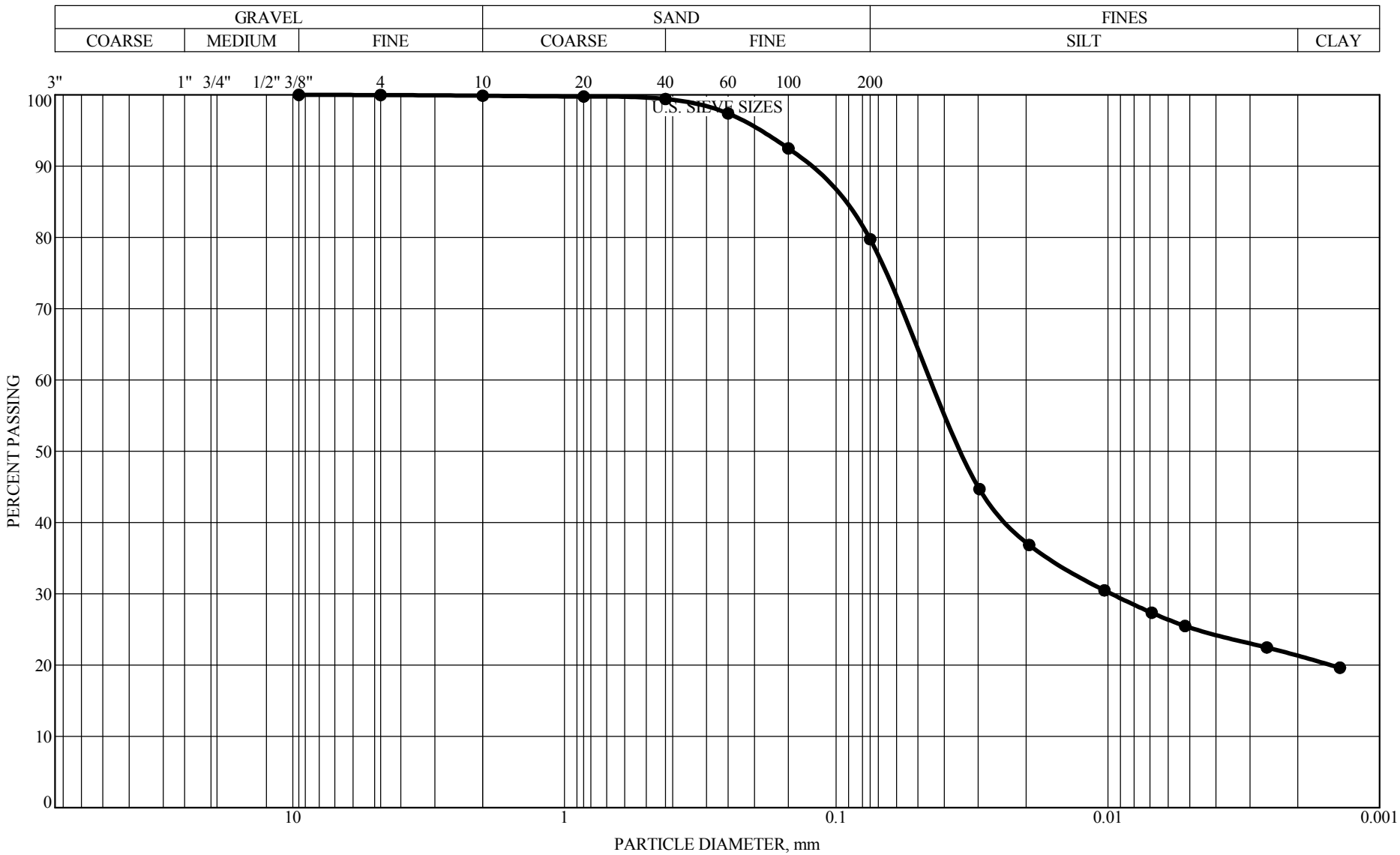
GRAVEL	3.4%
SAND	31.8%
SILT	38.9%
CLAY	25.9%

CLASSIFICATION:
A-6 (14), Brown
SANDY LEAN CLAY(CL)

LL=40, PL=15, PI=25, P200=64.8%

GS AASHTO 05310.GPJ BRAUN.GDT 9/15/11 11:47

GRAIN SIZE ACCUMULATION CURVE (AASHTO)



Braun Project FA-11-05310
Borrow Borings
Highway 3 from Dawson to Napoleon
Logan and Kidder Counties
South of Dawson, North Dakota

BORING: ND3-BW-3-10A DEPTH: 14.0'-20.0'

GRAVEL	0.1%
SAND	20.1%
SILT	58.5%
CLAY	21.3%

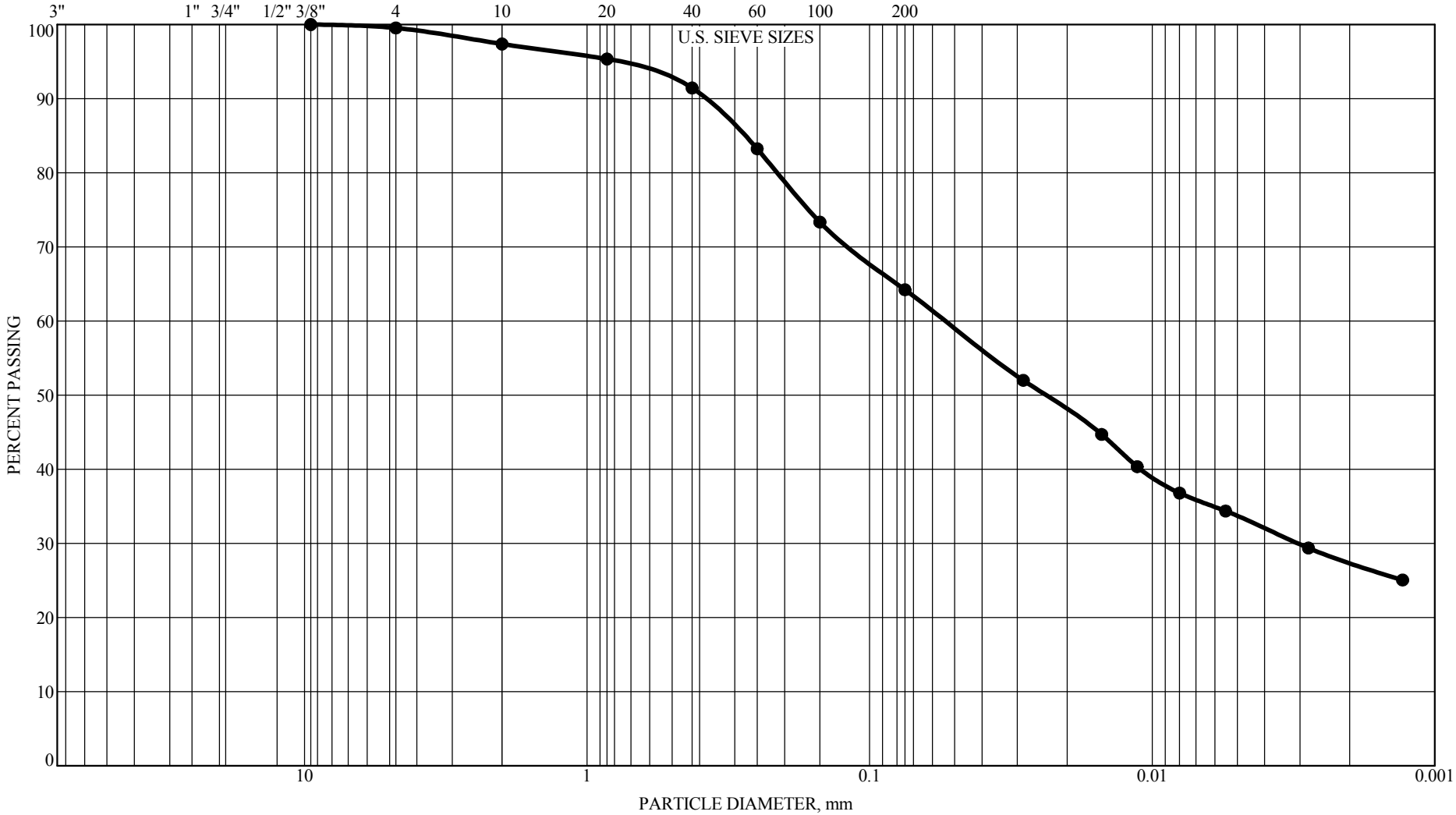
CLASSIFICATION:
A-6 (10), Brown
LEAN CLAY with SAND(CL)

LL=31, PL=16, PI=15, P200=79.7%

GS AASHTO 05310.GPJ BRAUN.GDT 9/15/11 11:47

GRAIN SIZE ACCUMULATION CURVE (AASHTO)

GRAVEL			SAND		FINES	
COARSE	MEDIUM	FINE	COARSE	FINE	SILT	CLAY



BRAUN INTERTEC

Braun Project FA-11-05310
Borrow Borings
Highway 3 from Dawson to Napoleon
Logan and Kidder Counties
South of Dawson, North Dakota

BORING: ND3-BW-3-11 DEPTH: 1.1'-20.0'

GRAVEL	2.6%
SAND	33.2%
SILT	36.7%
CLAY	27.5%

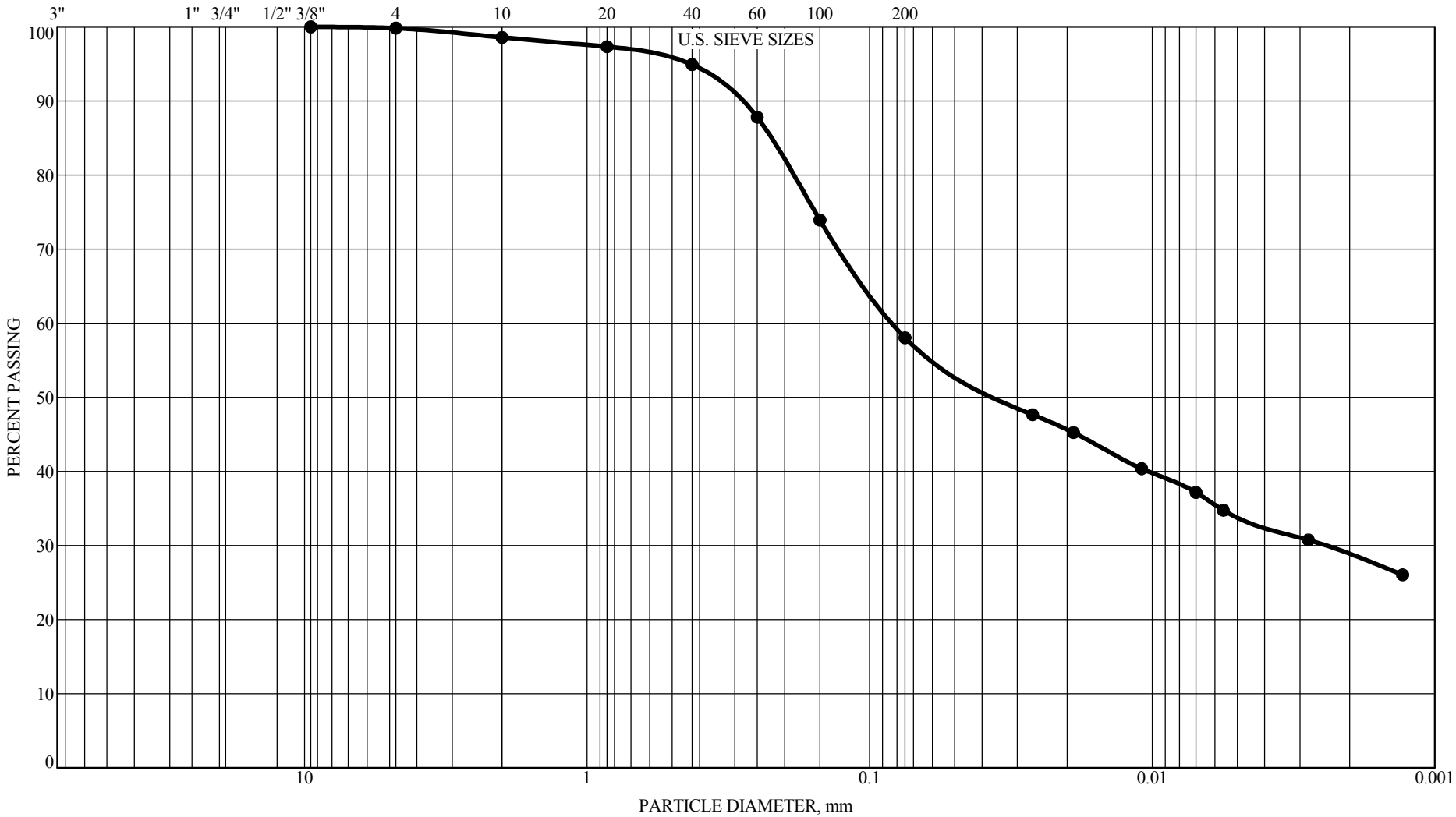
CLASSIFICATION:
A-6 (12), Brown
SANDY LEAN CLAY(CL)

LL=40, PL=17, PI=23, P200=64.2%

GS AASHTO 05310.GPJ BRAUN.GDT 9/15/11 11:47

GRAIN SIZE ACCUMULATION CURVE (AASHTO)

GRAVEL			SAND		FINES	
COARSE	MEDIUM	FINE	COARSE	FINE	SILT	CLAY



BRAUN INTERTEC

Braun Project FA-11-05310
Borrow Borings
Highway 3 from Dawson to Napoleon
Logan and Kidder Counties
South of Dawson, North Dakota

BORING: ND3-BW-3-12 DEPTH: 3.0'-10.0'

GRAVEL	1.4%
SAND	40.5%
SILT	29.4%
CLAY	28.7%

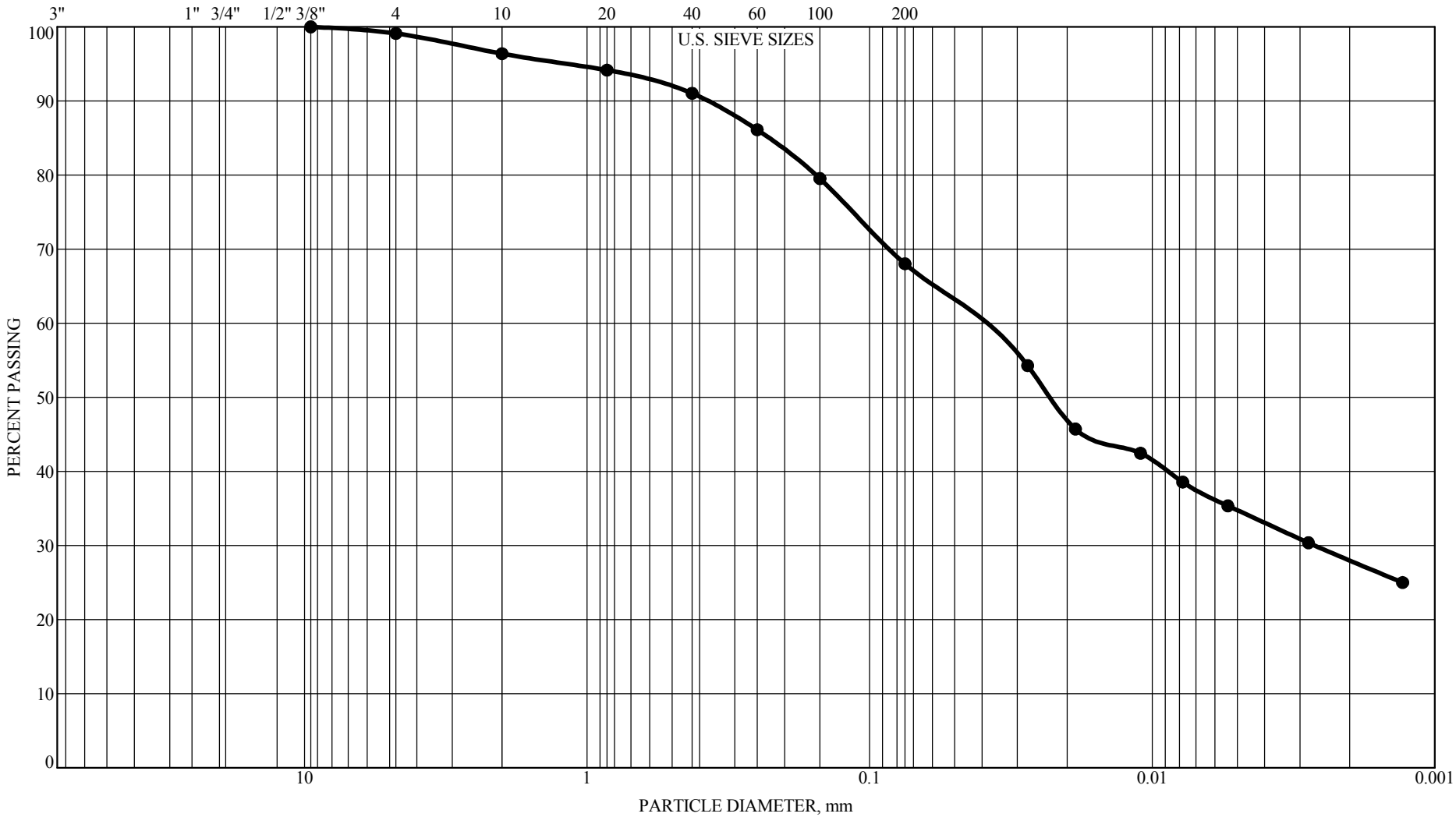
CLASSIFICATION:
A-7-6 (11), Brown
SANDY LEAN CLAY(CL)

LL=42, PL=18, PI=24, P200=58.0%

GS AASHTO 05310.GPJ BRAUN.GDT 9/15/11 11:47

GRAIN SIZE ACCUMULATION CURVE (AASHTO)

GRAVEL			SAND		FINES	
COARSE	MEDIUM	FINE	COARSE	FINE	SILT	CLAY



BRAUN INTERTEC

Braun Project FA-11-05310
Borrow Borings
Highway 3 from Dawson to Napoleon
Logan and Kidder Counties
South of Dawson, North Dakota

BORING: ND3-BW-3-13 DEPTH: 0.4'-7.0'

GRAVEL	3.6%
SAND	28.4%
SILT	40.0%
CLAY	28.0%

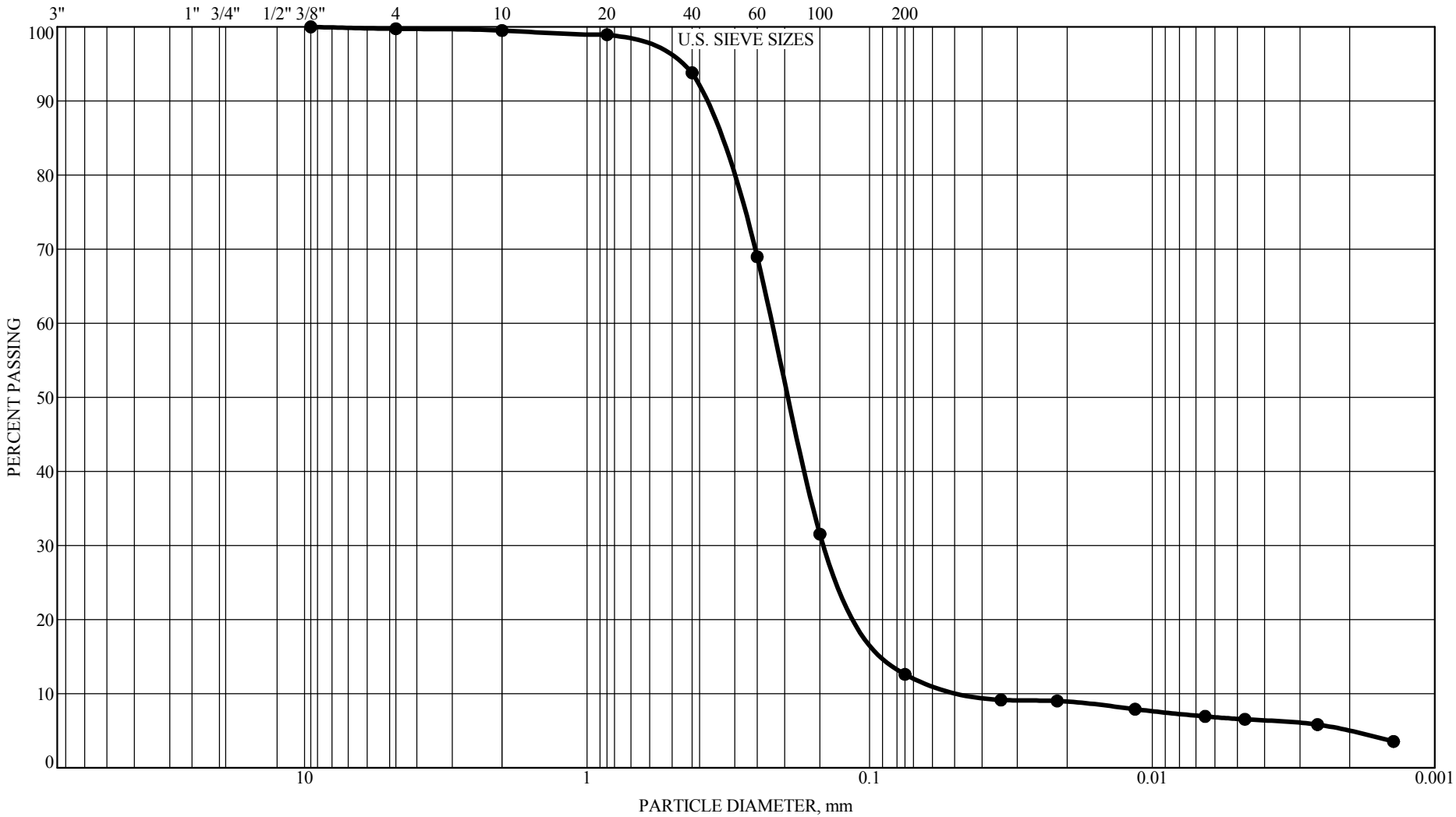
CLASSIFICATION:
A-7-6 (16), Brown
SANDY LEAN CLAY(CL)

LL=43, PL=17, PI=26, P200=68.0%

GS AASHTO 05310.GPJ BRAUN.GDT 9/15/11 11:47

GRAIN SIZE ACCUMULATION CURVE (AASHTO)

GRAVEL			SAND		FINES	
COARSE	MEDIUM	FINE	COARSE	FINE	SILT	CLAY



BRAUN INTERTEC

Braun Project FA-11-05310
Borrow Borings
Highway 3 from Dawson to Napoleon
Logan and Kidder Counties
South of Dawson, North Dakota

BORING: ND3-BW-3-14 DEPTH: 1.5'-6.0'

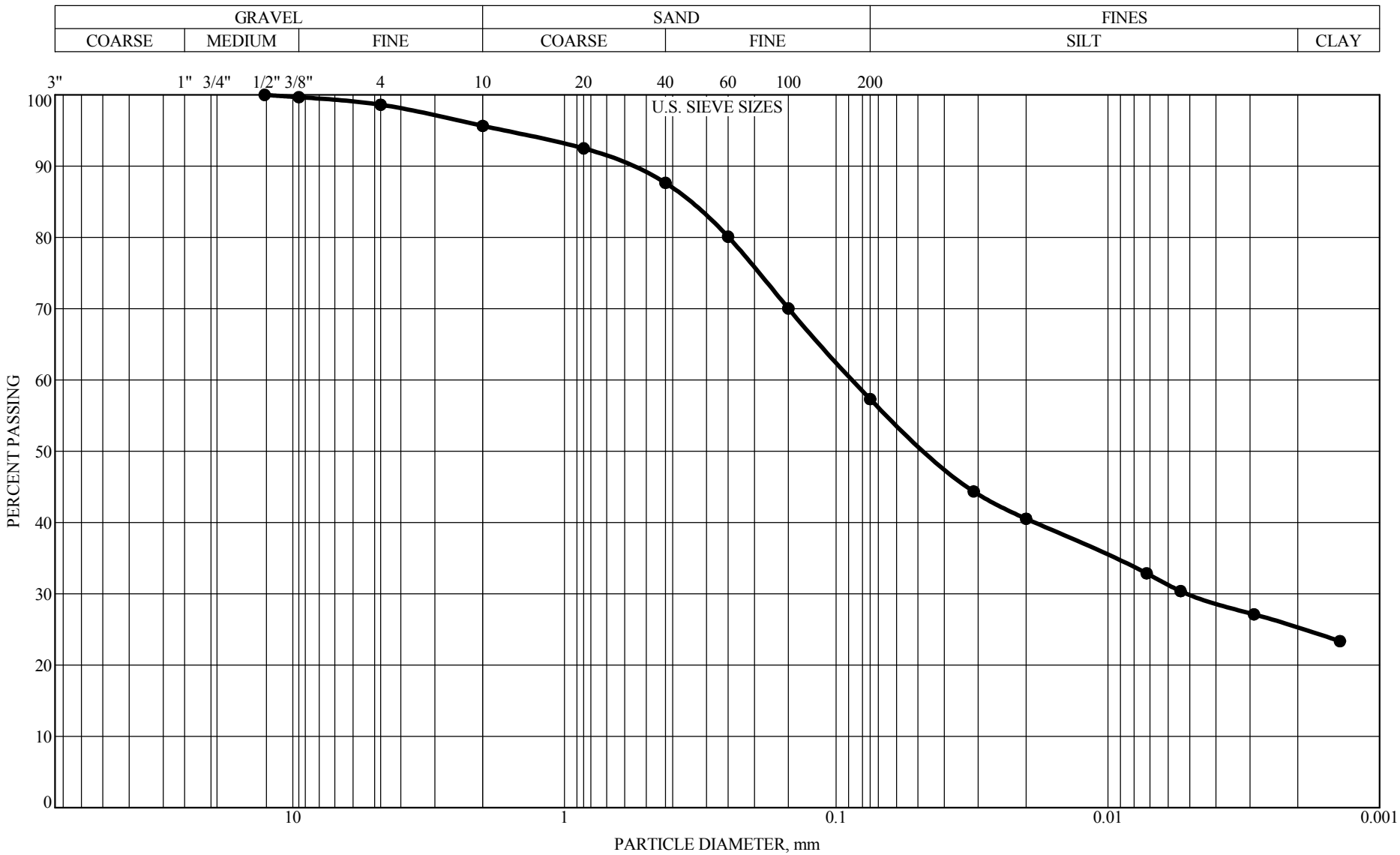
GRAVEL	0.5%
SAND	86.9%
SILT	7.7%
CLAY	4.9%

CLASSIFICATION:
A-2-4 (0), Dark Brown
SILTY SAND(SM)

LL=16, PL=15, PI=1, P200=12.6%

GS AASHTO 05310.GPJ BRAUN.GDT 9/15/11 11:47

GRAIN SIZE ACCUMULATION CURVE (AASHTO)



BRAUN INTERTEC

Braun Project FA-11-05310
Borrow Borings
Highway 3 from Dawson to Napoleon
Logan and Kidder Counties
South of Dawson, North Dakota

BORING: ND3-BW-3-14 DEPTH: 6.0'-20.0'

GRAVEL	4.4%
SAND	38.3%
SILT	32.1%
CLAY	25.2%

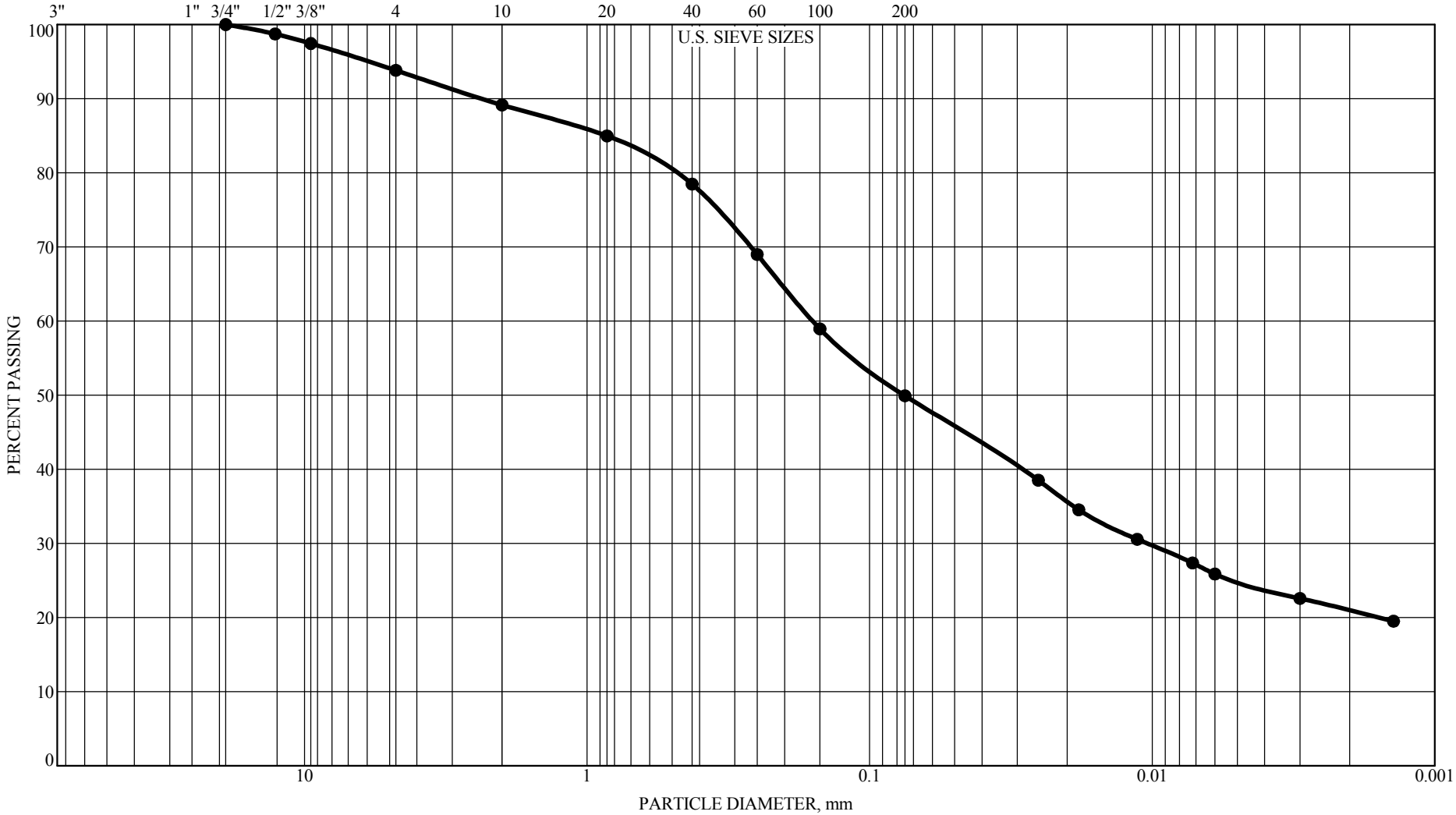
CLASSIFICATION:
A-6 (9), Brown
SANDY LEAN CLAY(CL)

LL=38, PL=16, PI=22, P200=57.3%

GS AASHTO 05310.GPJ BRAUN.GDT 9/15/11 11:47

GRAIN SIZE ACCUMULATION CURVE (AASHTO)

GRAVEL			SAND		FINES	
COARSE	MEDIUM	FINE	COARSE	FINE	SILT	CLAY



BRAUN INTERTEC

Braun Project FA-11-05310
Borrow Borings
Highway 3 from Dawson to Napoleon
Logan and Kidder Counties
South of Dawson, North Dakota

BORING: ND3-BW-3-15 DEPTH: 0.5'-20.0'

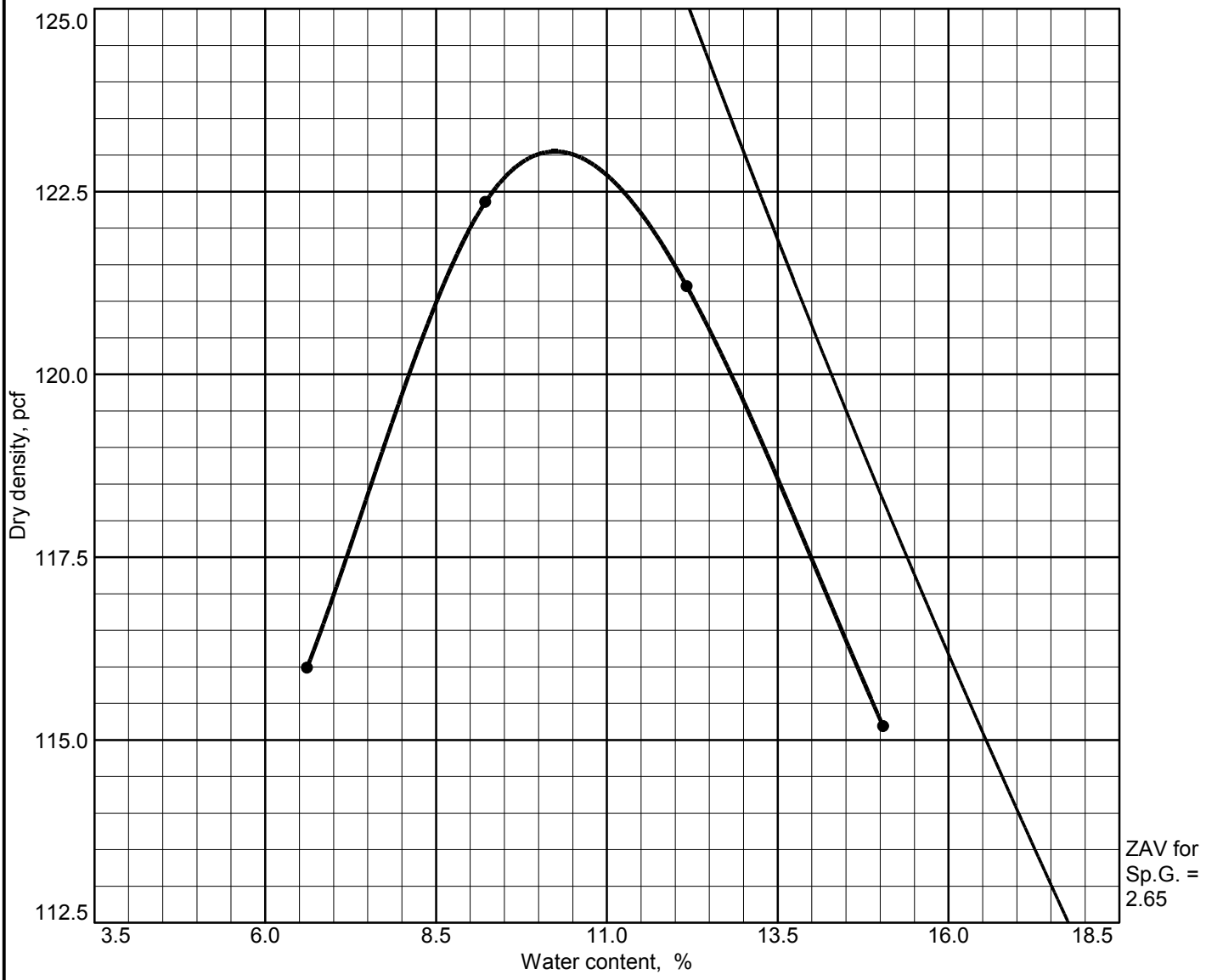
GRAVEL	10.9%
SAND	39.2%
SILT	29.0%
CLAY	20.9%

CLASSIFICATION:
A-6 (7), Brown
CLAYEY SAND(SC)

LL=38, PL=16, PI=22, P200=49.9%

GS AASHTO 05310.GPJ BRAUN.GDT 9/15/11 11:47

Moisture-Density Relationship



Test specification: AASHTO T 180-01 Method A Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
1.3'-4.5'	CL	A-6 (10)		Assumed	33	15	2.0	76

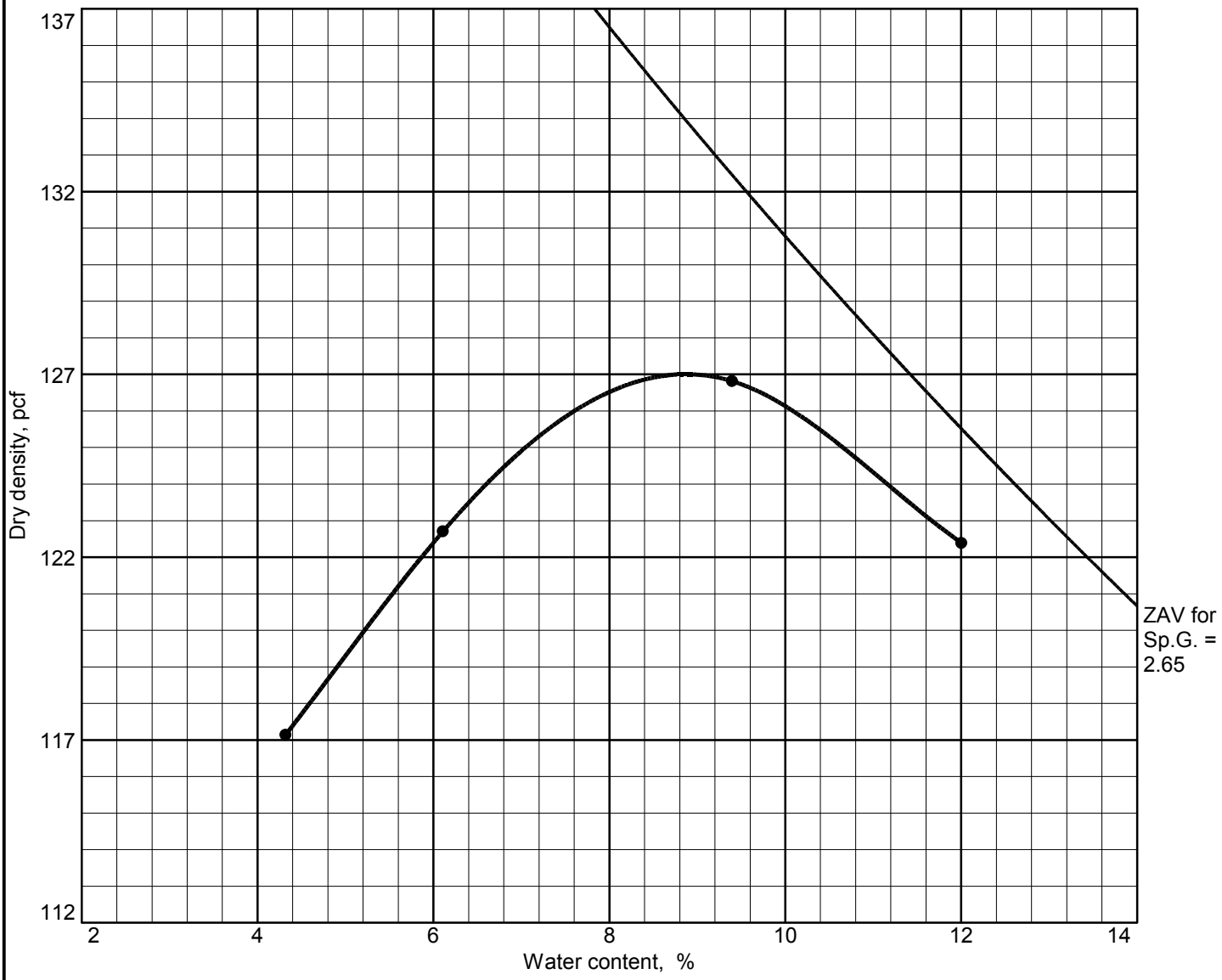
TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 123.0 pcf Optimum moisture = 10.2 %	LEAN CLAY with SAND (CL)

Project No.: FA-11-05310 **Client:** Brosz Engineering, Inc.
Project: Highway 3 from Dawson to Napoleon
South of Dawson, ND
● **Location:** BW-1-1

Remarks:
ND3-BW-1-1

BRAUN INTERTEC

Moisture-Density Relationship



Test specification: AASHTO T 180-01 Method A Modified
Oversize correction applied to final results

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
7.0'-9.0'	SC	A-2-6 (0)		Assumed	30	13	6.0	21

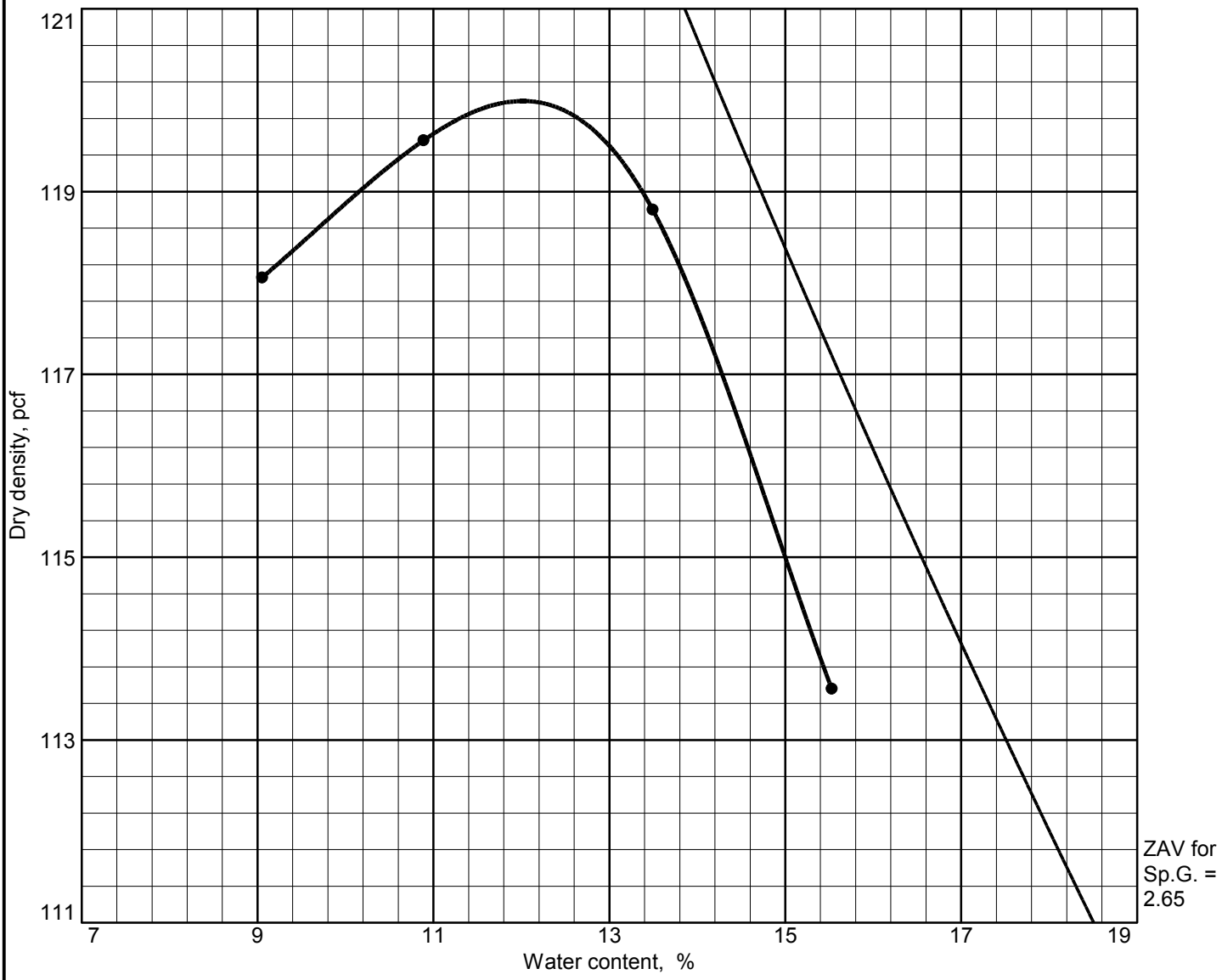
TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 128.3 pcf Optimum moisture = 8.9 %	CLAYEY SAND (SC)

Project No.: FA-11-05310 **Client:** Brosz Engineering, Inc.
Project: Highway 3 from Dawson to Napoleon
South of Dawson, ND
● **Location:** BW-1-1

Remarks:
ND3-BW-1-1

BRAUN INTERTEC

Moisture-Density Relationship



Test specification: AASHTO T 180-01 Method A Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
9.0'-16'	SM	A-2-4 (0)		Assumed	18	1	1.0	19

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 120.0 pcf Optimum moisture = 12.0 %	SILTY SAND (SM)

Project No.: FA-11-05310 **Client:** Brosz Engineering, Inc.

Project: Highway 3 from Dawson to Napoleon

South of Dawson, ND

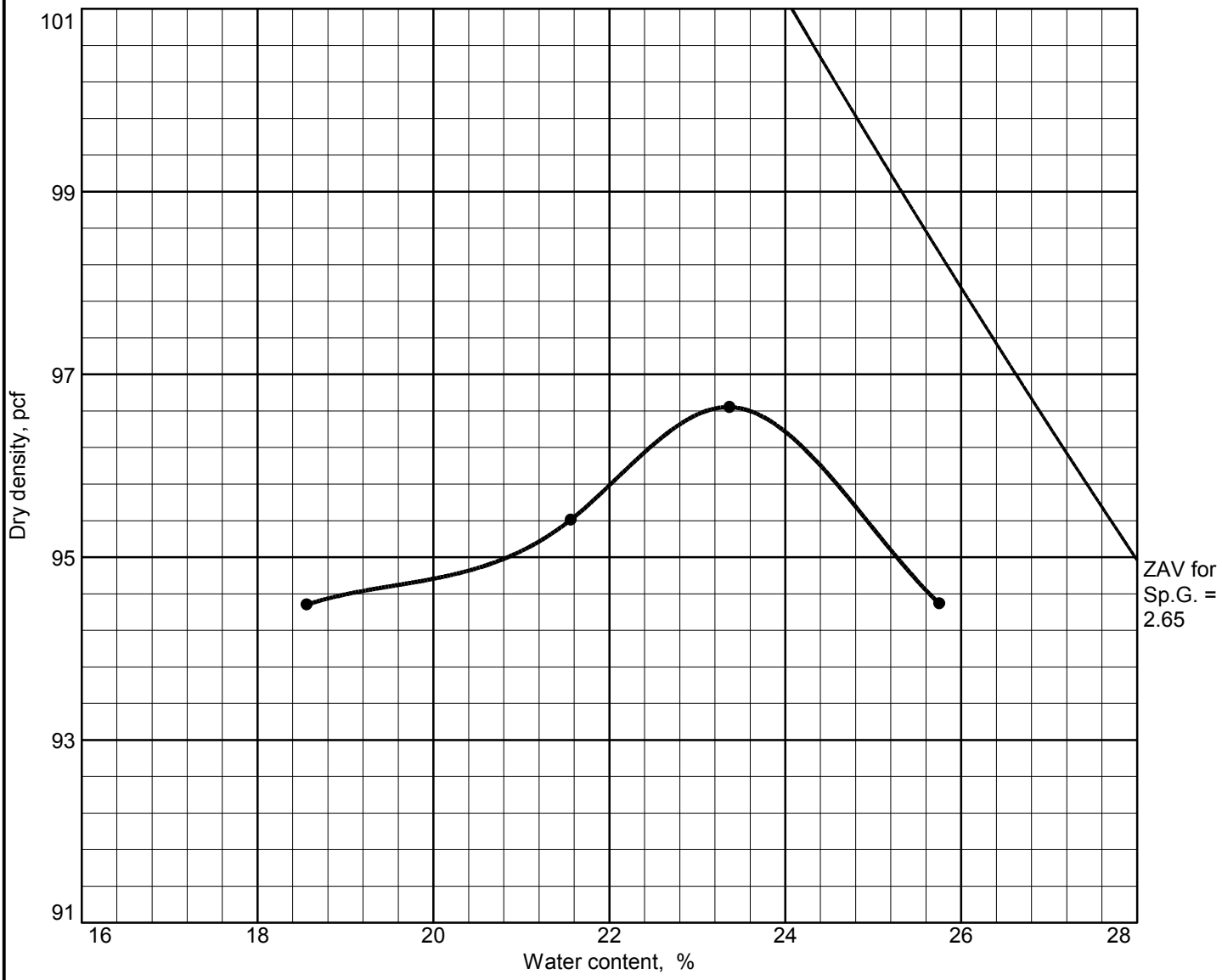
● **Location:** BW-1-1

Remarks:

ND3-BW-1-1

BRAUN INTERTEC

Moisture-Density Relationship



Test specification: AASHTO T 180-01 Method A Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
9.0'-16.5'	CH	A-7-6 (59)		Assumed	81	54	0.0	94

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 96.6 pcf Optimum moisture = 23.4 %	FAT CLAY (CH)

Project No.: FA-11-05310 **Client:** Brosz Engineering, Inc.

Project: Highway 3 from Dawson to Napoleon

South of Dawson, ND

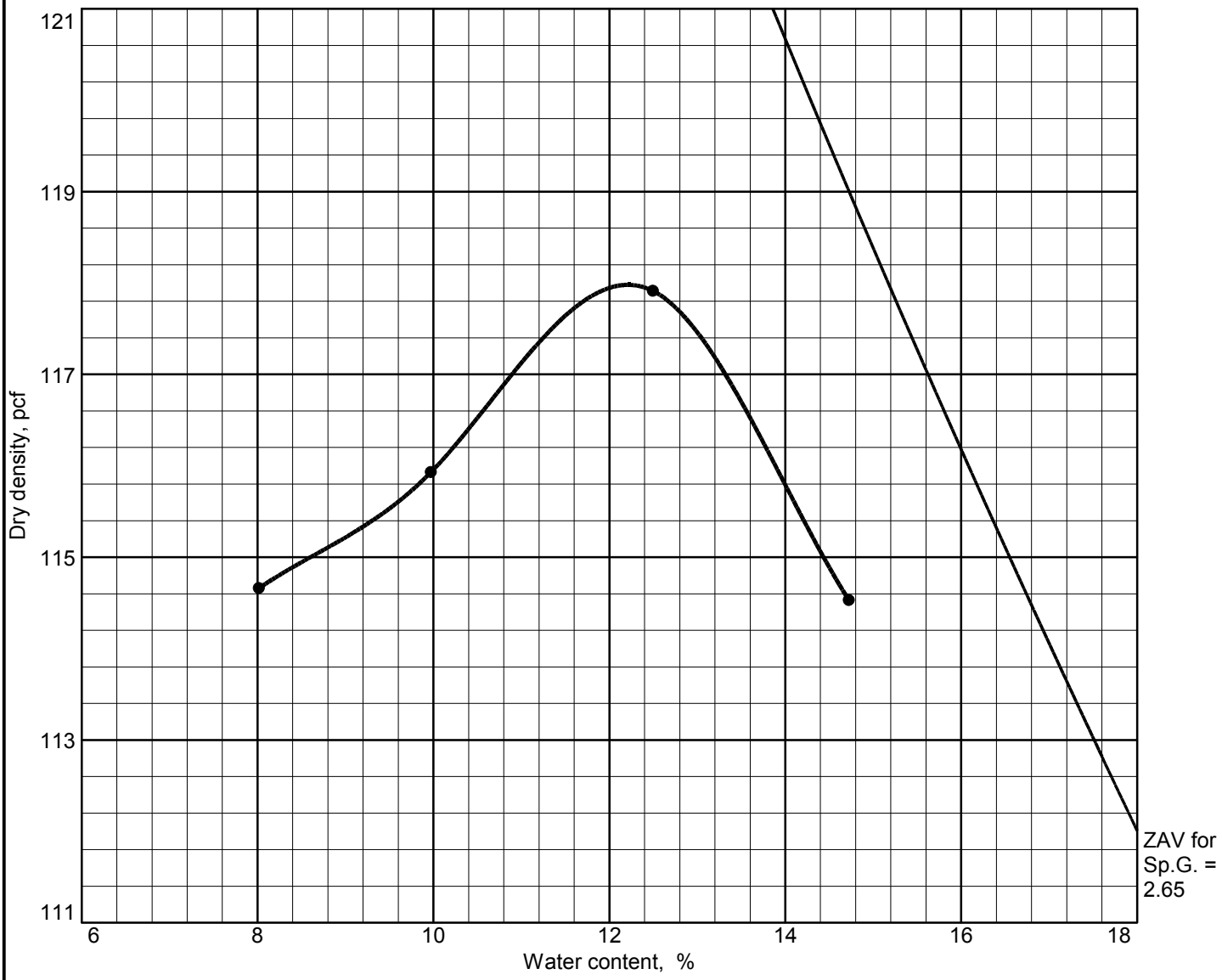
● **Location:** BW-1-2

Remarks:

ND3-BW-1-2

BRAUN INTERTEC

Moisture-Density Relationship



Test specification: AASHTO T 180-01 Method A Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
0.5'-12'	CL	A-6 (13)		Assumed	39	23	2.0	68

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 118.0 pcf Optimum moisture = 12.2 %	SANDY LEAN CLAY (CL)

Project No.: FA-11-05310 **Client:** Brosz Engineering, Inc.

Project: Highway 3 from Dawson to Napoleon

South of Dawson, ND

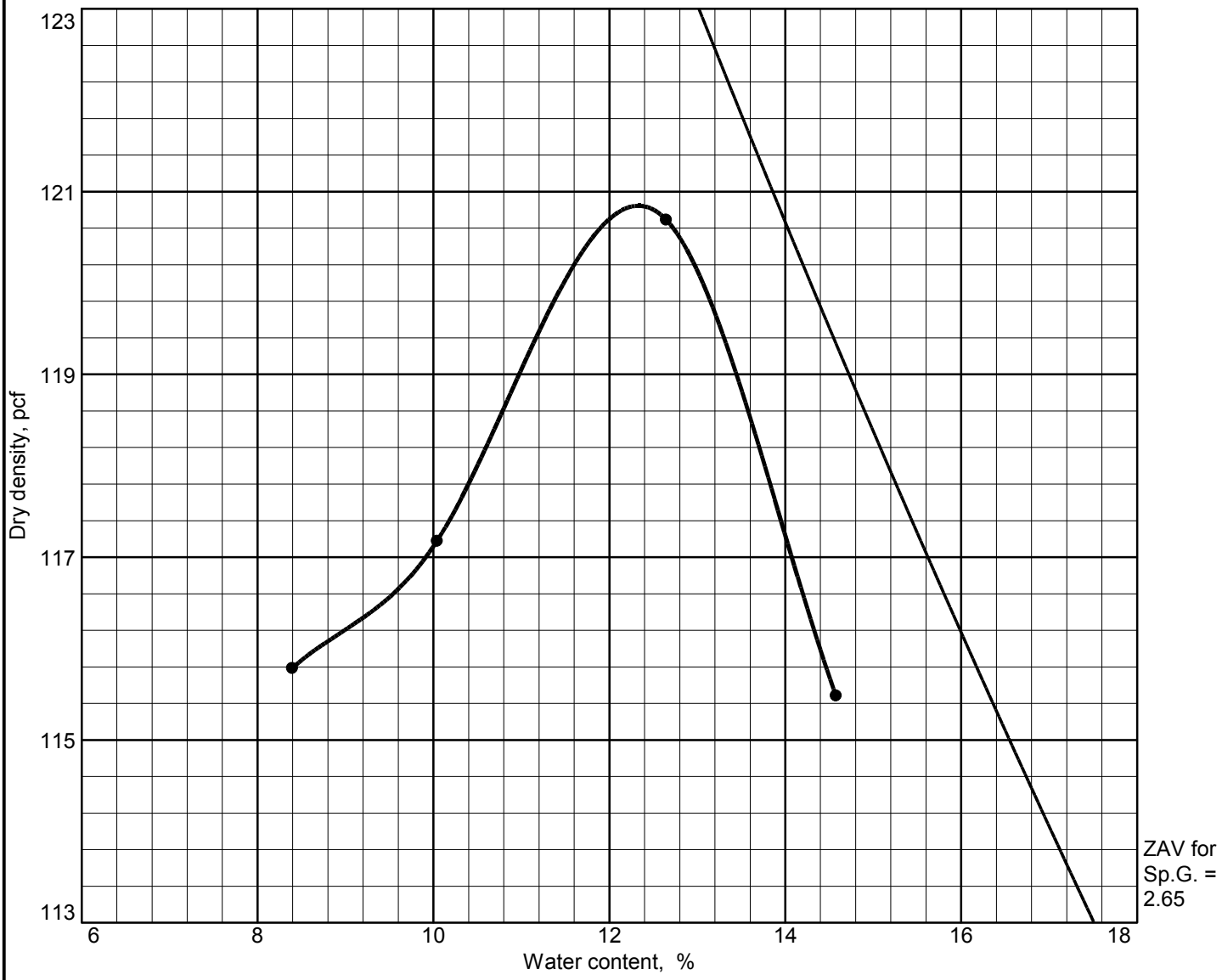
● **Location:** BW-1-3

Remarks:

ND3-BW-1-3

BRAUN INTERTEC

Moisture-Density Relationship



Test specification: AASHTO T 180-01 Method A Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
1.5'-8.0'	CL	A-6 (13)		Assumed	39	23	4.0	66

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 120.8 pcf Optimum moisture = 12.3 %	SANDY LEAN CLAY (CL)

Project No.: FA-11-05310 **Client:** Brosz Engineering, Inc.

Project: Highway 3 from Dawson to Napoleon

South of Dawson, ND

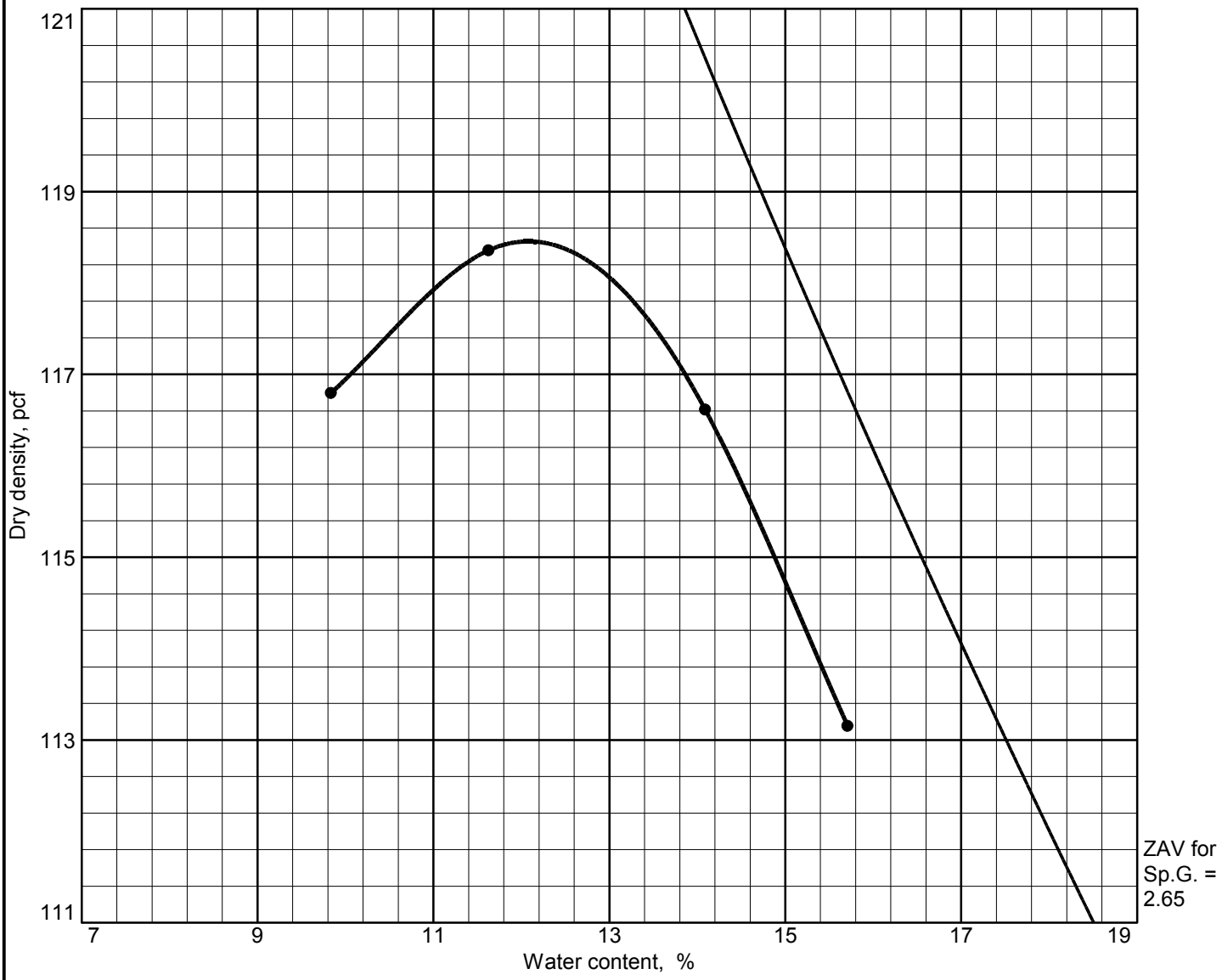
● **Location:** BW-1-4

Remarks:

ND3-BW-1-4

BRAUN INTERTEC

Moisture-Density Relationship



Test specification: AASHTO T 180-01 Method A Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
8.0'-16.5'	SM	A-2-4 (0)		Assumed	16	3	0.0	19

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 118.5 pcf Optimum moisture = 12.1 %	SILTY SAND (SM)

Project No.: FA-11-05310 **Client:** Brosz Engineering, Inc.

Project: Highway 3 from Dawson to Napoleon

South of Dawson, ND

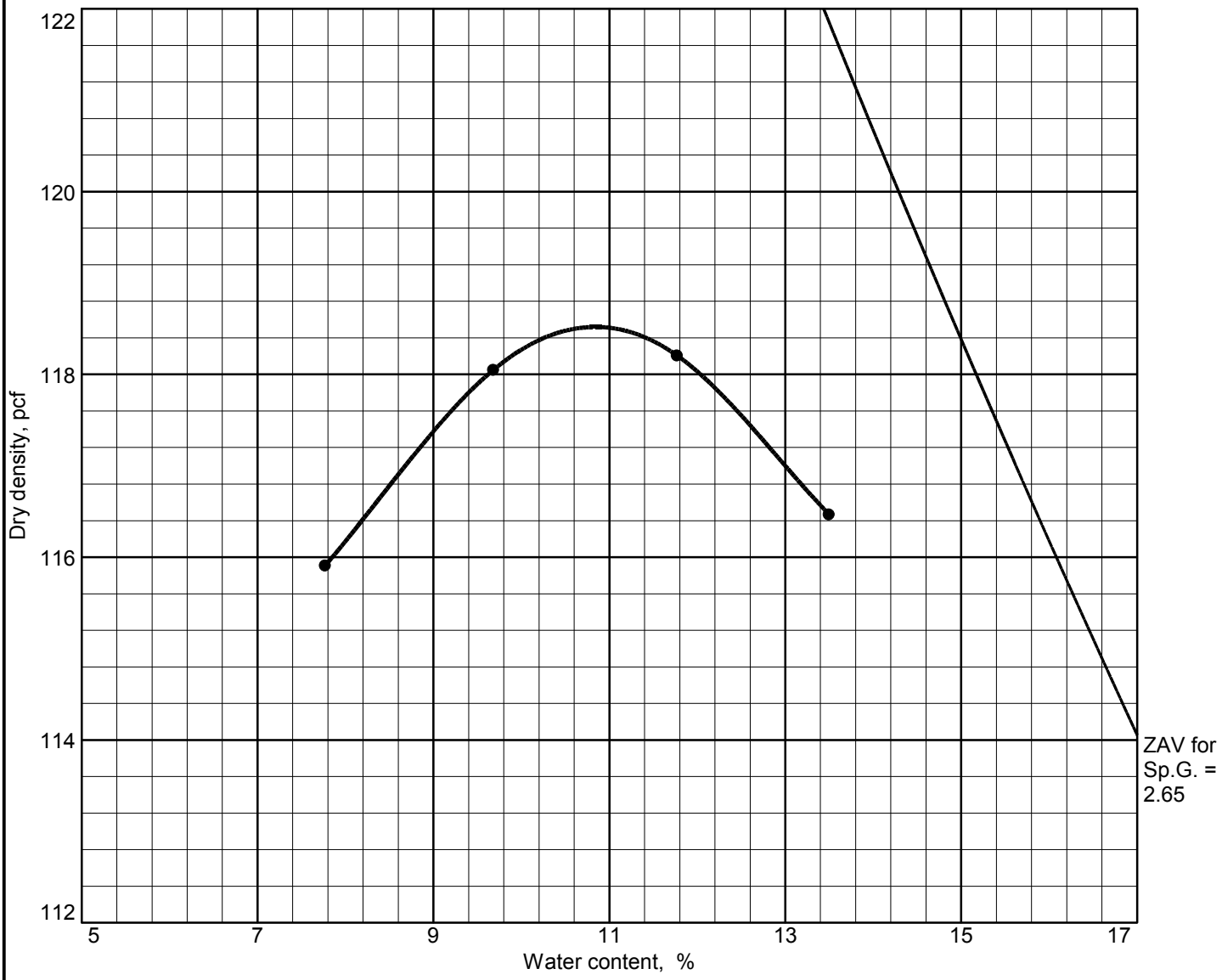
● **Location:** BW-1-4

Remarks:

ND3-BW-1-4

BRAUN INTERTEC

Moisture-Density Relationship



Test specification: AASHTO T 180-01 Method A Modified
Oversize correction applied to final results

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
0.6'-6.0'	CL	A-7-6 (11)		Assumed	42	25	5.0	56

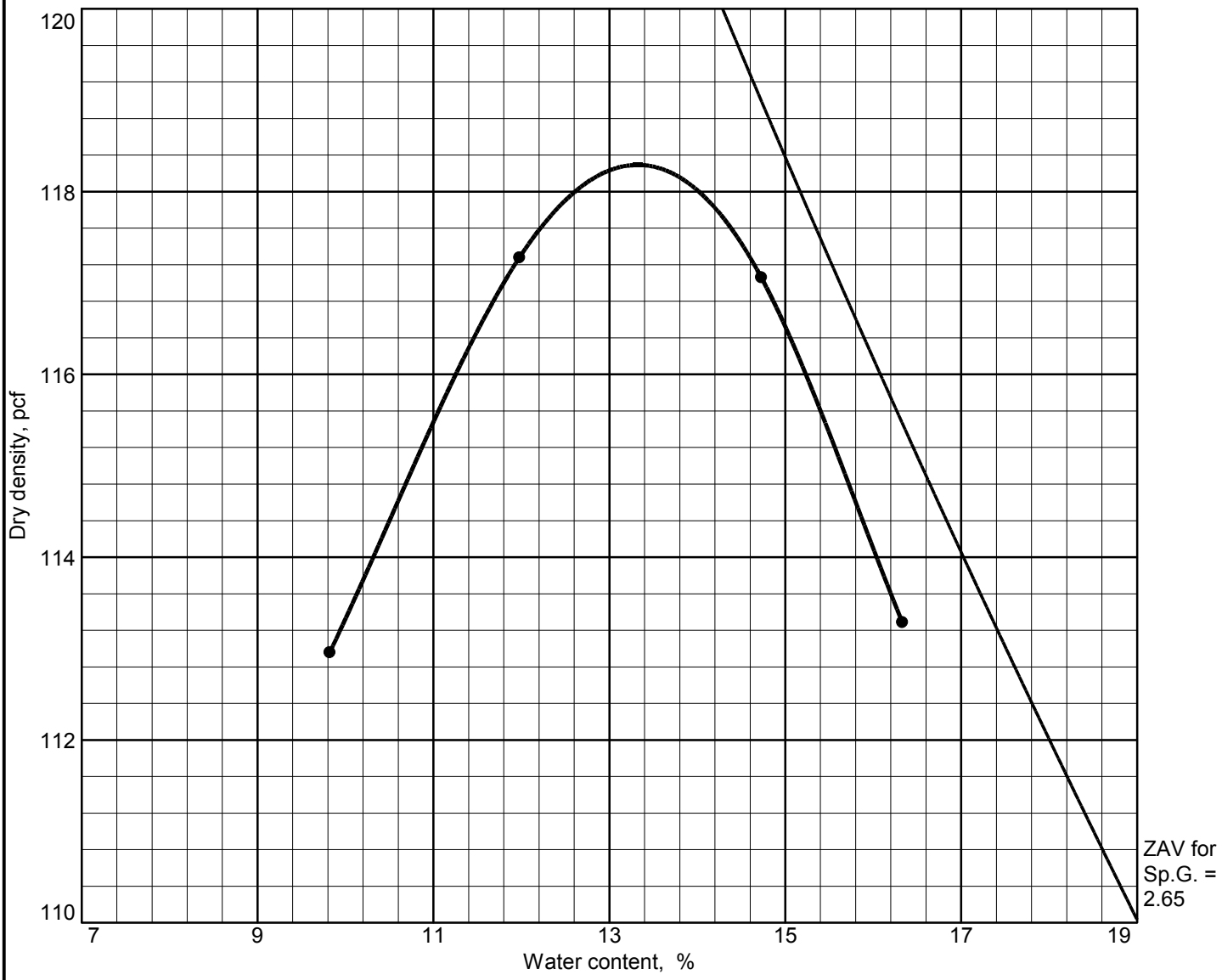
TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 120.0 pcf Optimum moisture = 10.8 %	SANDY LEAN CLAY (CL)

Project No.: FA-11-05310 **Client:** Brosz Engineering, Inc.
Project: Highway 3 from Dawson to Napoleon
South of Dawson, ND
● **Location:** BW-1-5

Remarks:
ND3-BW-1-5

BRAUN INTERTEC

Moisture-Density Relationship



Test specification: AASHTO T 180-01 Method A Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
6.0'-10'	SC	A-6 (2)		Assumed	32	14	0.0	39

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 118.3 pcf Optimum moisture = 13.3 %	CLAYEY SAND (SC)

Project No.: FA-11-05310 **Client:** Brosz Engineering, Inc.

Project: Highway 3 from Dawson to Napoleon

South of Dawson, ND

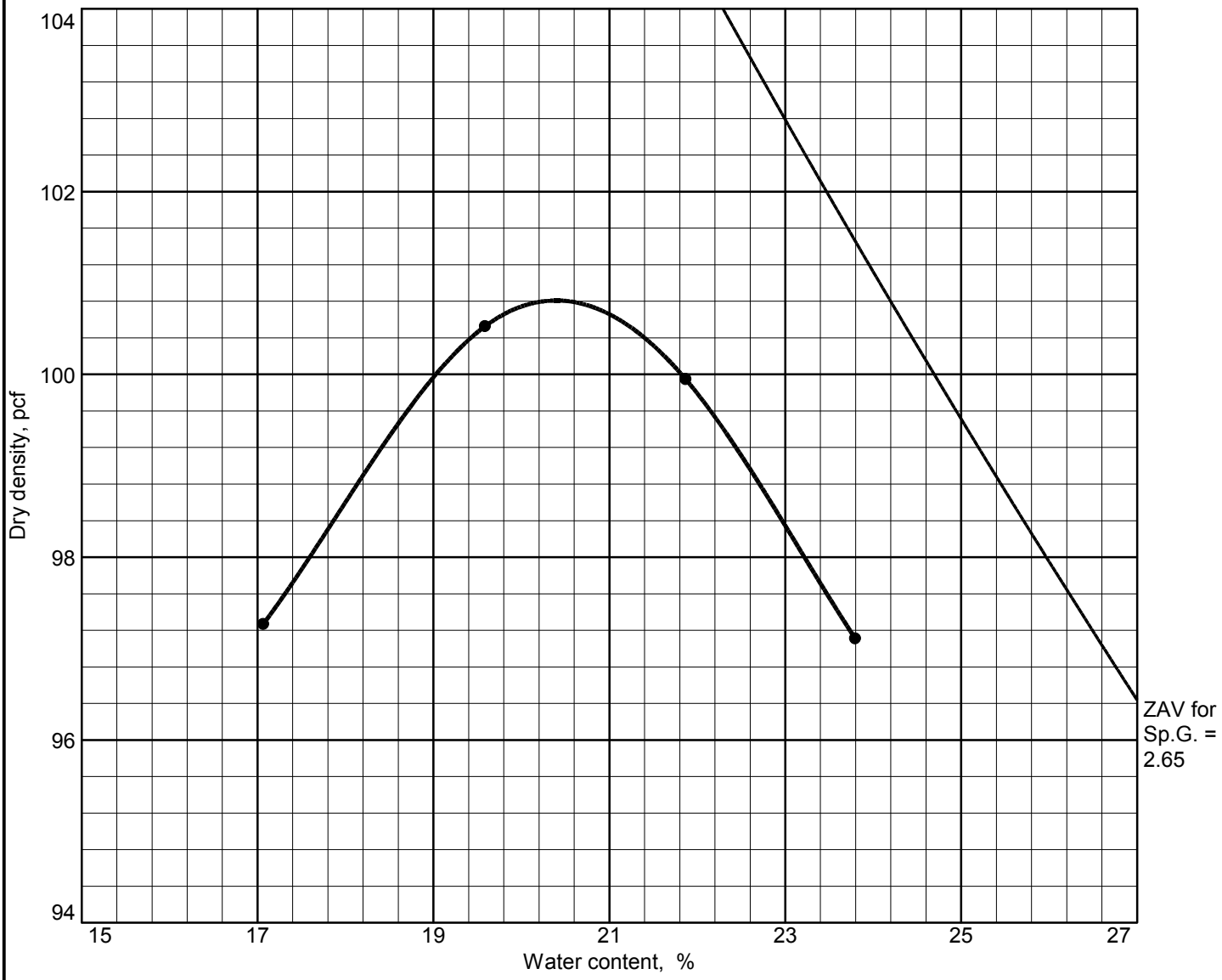
● **Location:** BW-1-5

Remarks:

ND3-BW-1-5

BRAUN INTERTEC

Moisture-Density Relationship



Test specification: AASHTO T 180-01 Method A Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
10'-20'	CH	A-7-6 (61)		Assumed	81	59	0.0	92

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 100.8 pcf Optimum moisture = 20.4 %	FAT CLAY (CH)

Project No.: FA-11-05310 **Client:** Brosz Engineering, Inc.

Project: Highway 3 from Dawson to Napoleon

South of Dawson, ND

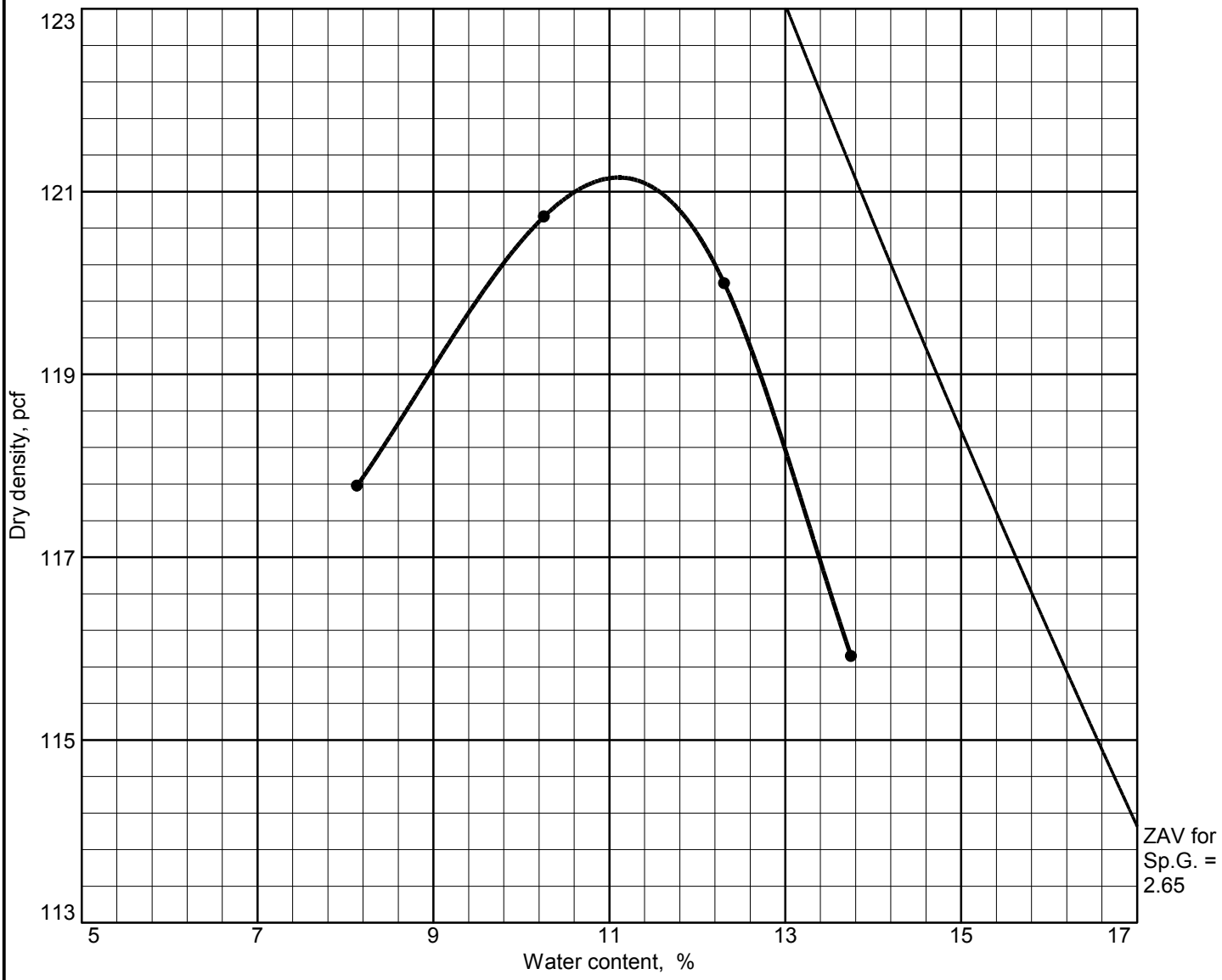
● **Location:** BW-1-5

Remarks:

ND3-BW-1-5

BRAUN INTERTEC

Moisture-Density Relationship



Test specification: AASHTO T 180-01 Method A Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
0.3'-20'	CL	A-7-6 (17)		Assumed	43	30	1.0	66

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 121.2 pcf Optimum moisture = 11.1 %	SANDY LEAN CLAY (CL)

Project No.: FA-11-05310 **Client:** Brosz Engineering, Inc.

Project: Highway 3 from Dawson to Napoleon

South of Dawson, ND

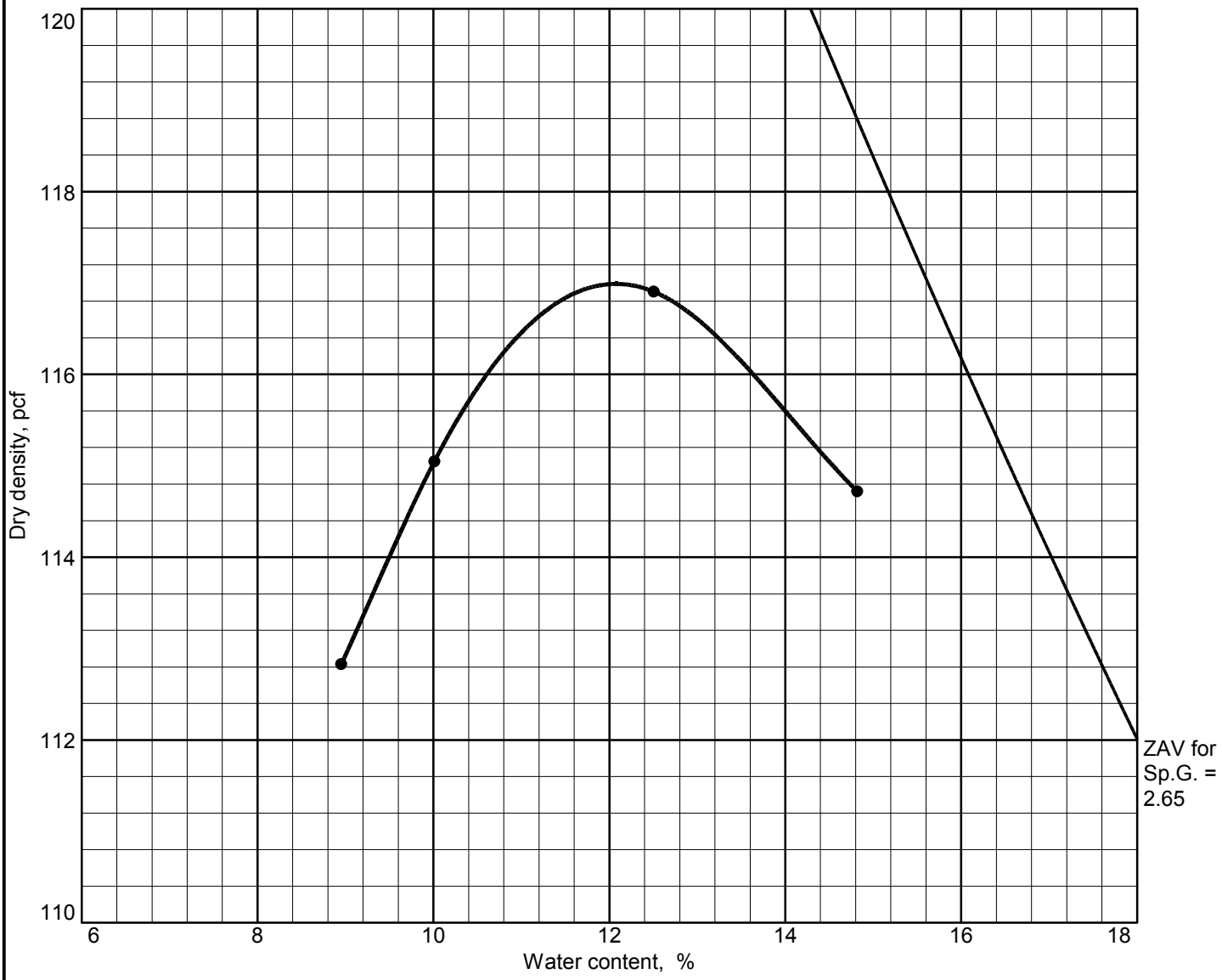
● **Location:** BW-1-7

Remarks:

ND3-BW-1-7

BRAUN INTERTEC

Moisture-Density Relationship



Test specification: AASHTO T 180-01 Method A Modified
Oversize correction applied to final results

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
0.3'-20'	SC	A-6 (6)		Assumed	36	20	8.0	50

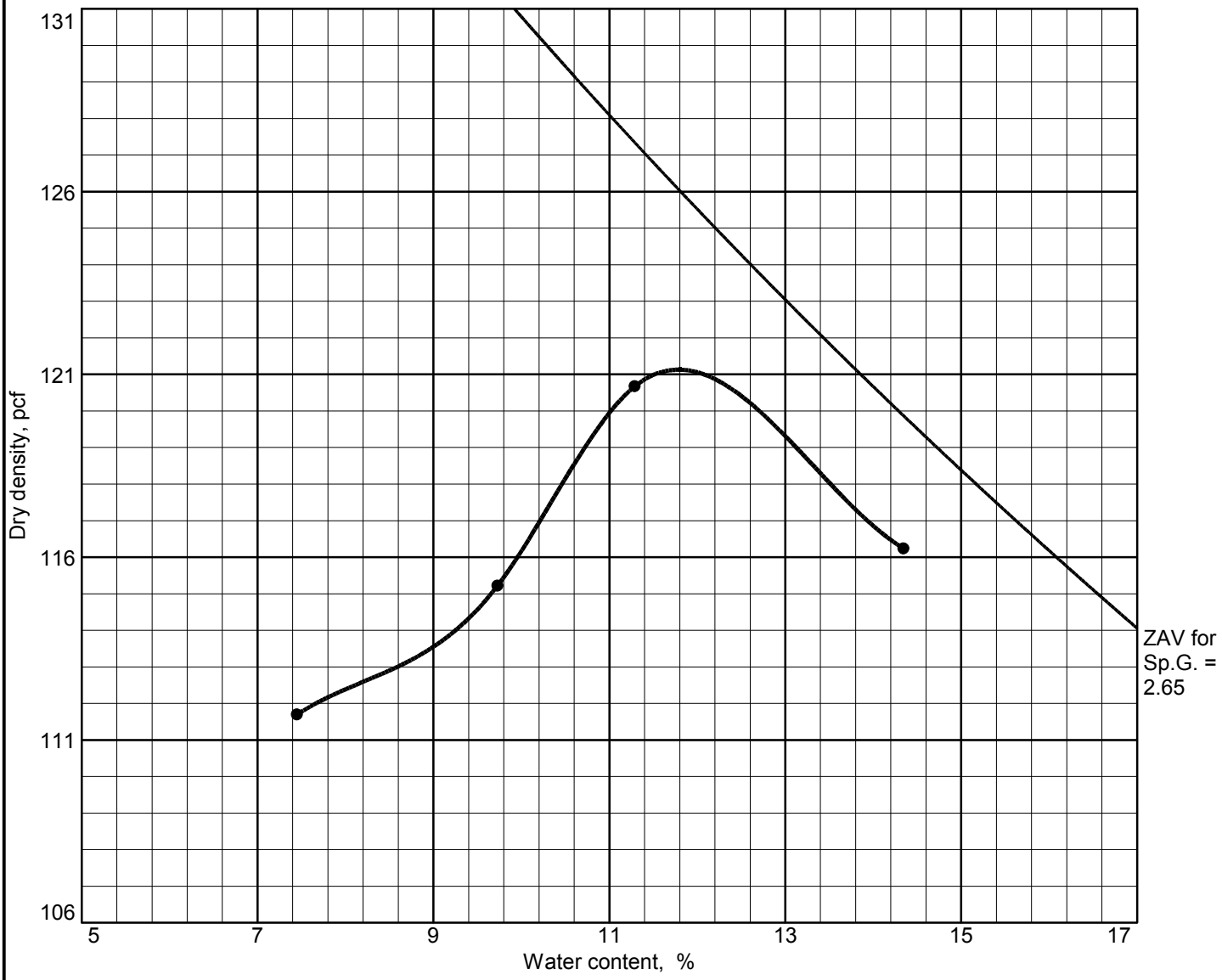
TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 119.5 pcf Optimum moisture = 12.1 %	CLAYEY SAND (SC)

Project No.: FA-11-05310 **Client:** Brosz Engineering, Inc.
Project: Highway 3 from Dawson to Napoleon
South of Dawson, ND
● **Location:** BW-1-8

Remarks:
ND3-BW-1-8

BRAUN INTERTEC

Moisture-Density Relationship



Test specification: AASHTO T 180-01 Method A Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
3.0'-6.0'	SC	A-6 (2)		Assumed	28	11	2.0	45

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 121.1 pcf Optimum moisture = 11.8 %	CLAYEY SAND (SC)

Project No.: FA-11-05310 **Client:** Brosz Engineering, Inc.

Project: Highway 3 from Dawson to Napoleon

South of Dawson, ND

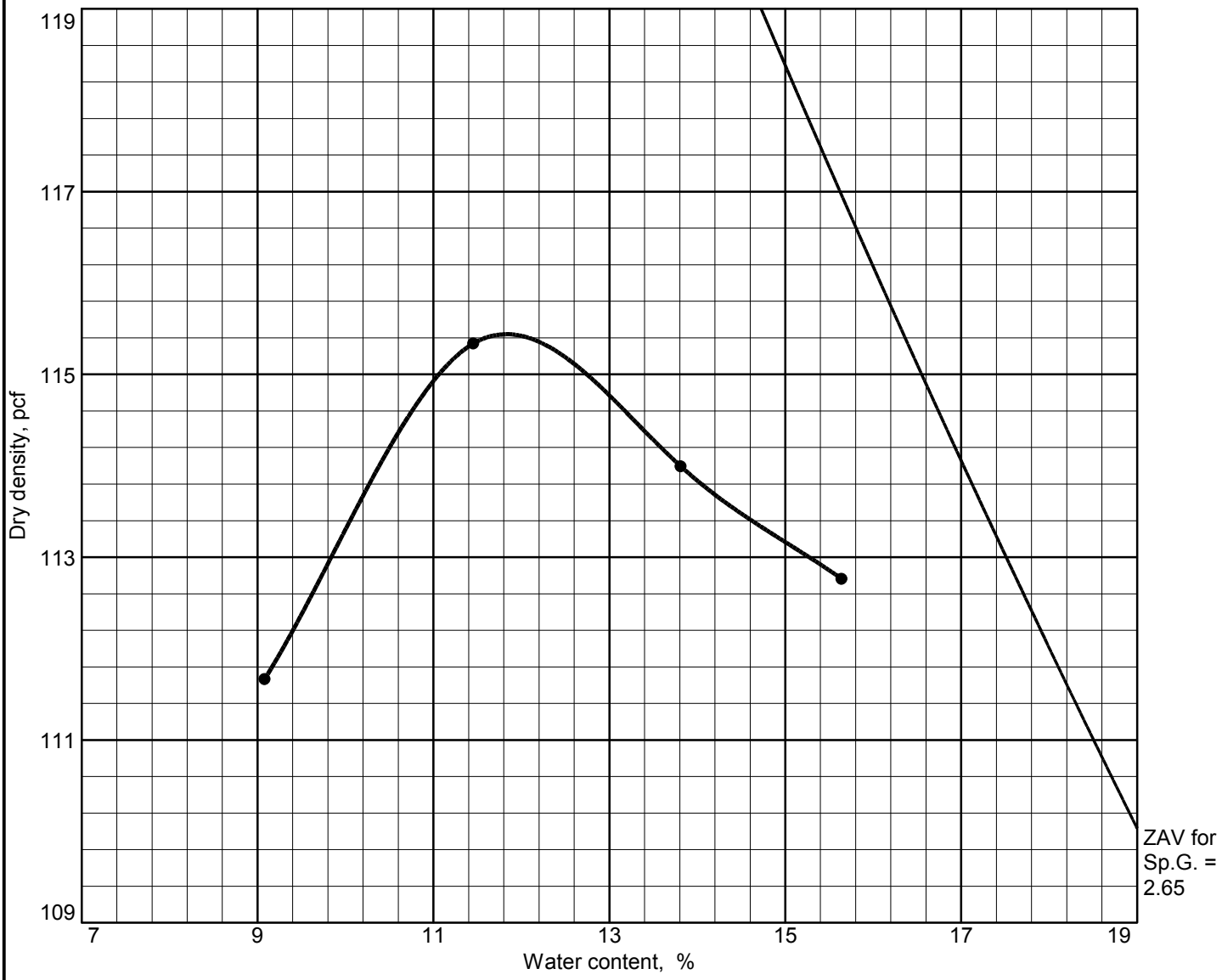
● **Location:** BW-2-1

Remarks:

ND3-BW-2-1

BRAUN INTERTEC

Moisture-Density Relationship



Test specification: AASHTO T 180-01 Method A Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
0.5'-9.0'	CL	A-7-6 (16)		Assumed	41	27	2.0	69

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 115.4 pcf Optimum moisture = 11.8 %	SANDY LEAN CLAY (CL)

Project No.: FA-11-05310 **Client:** Brosz Engineering, Inc.

Project: Highway 3 from Dawson to Napoleon

South of Dawson, ND

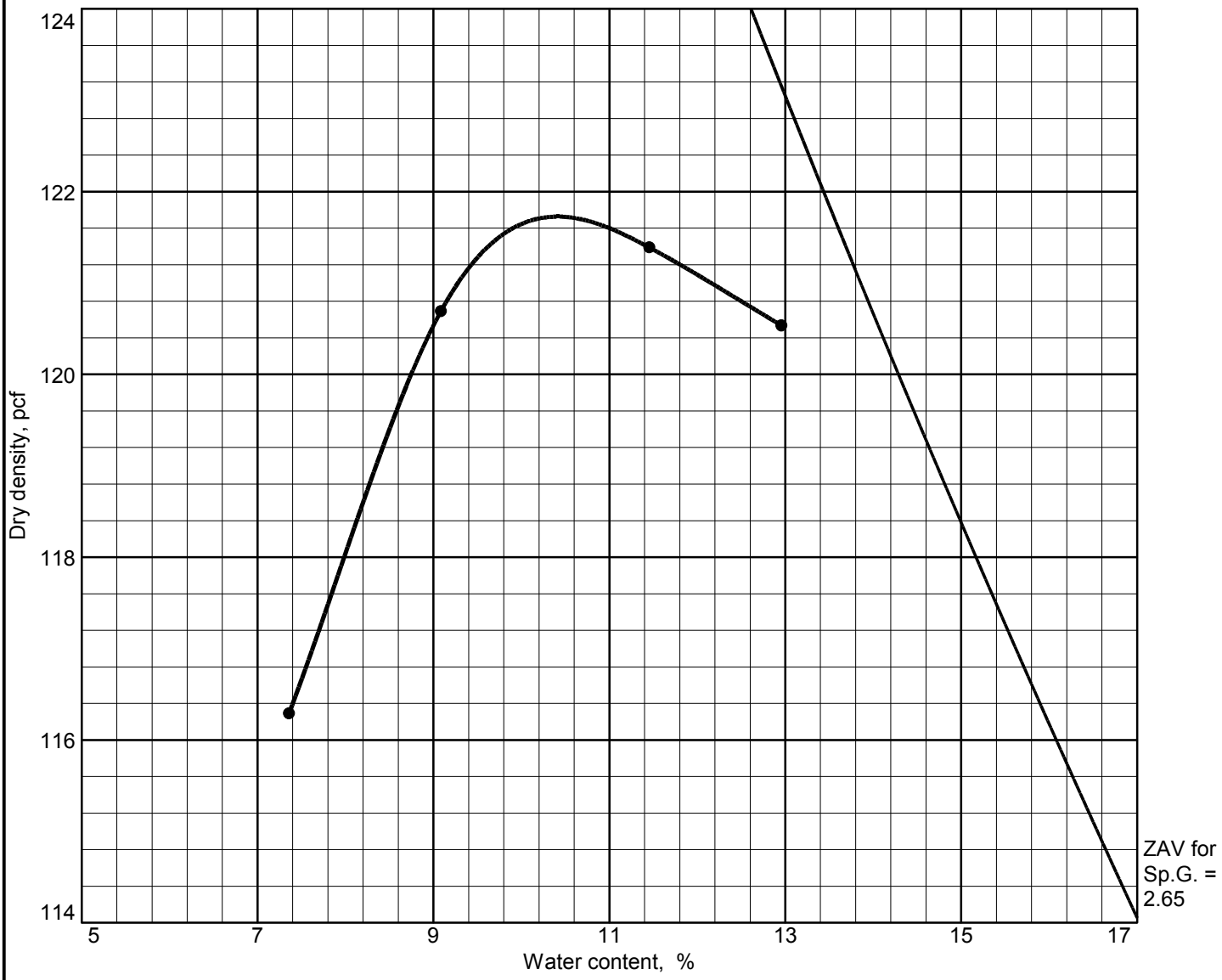
● **Location:** BW-2-4

Remarks:

ND3-BW-2-4

BRAUN INTERTEC

Moisture-Density Relationship



Test specification: AASHTO T 180-01 Method A Modified
Oversize correction applied to final results

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
4.0'-14'	SC	A-2-6 (0)		Assumed	29	14	20	21

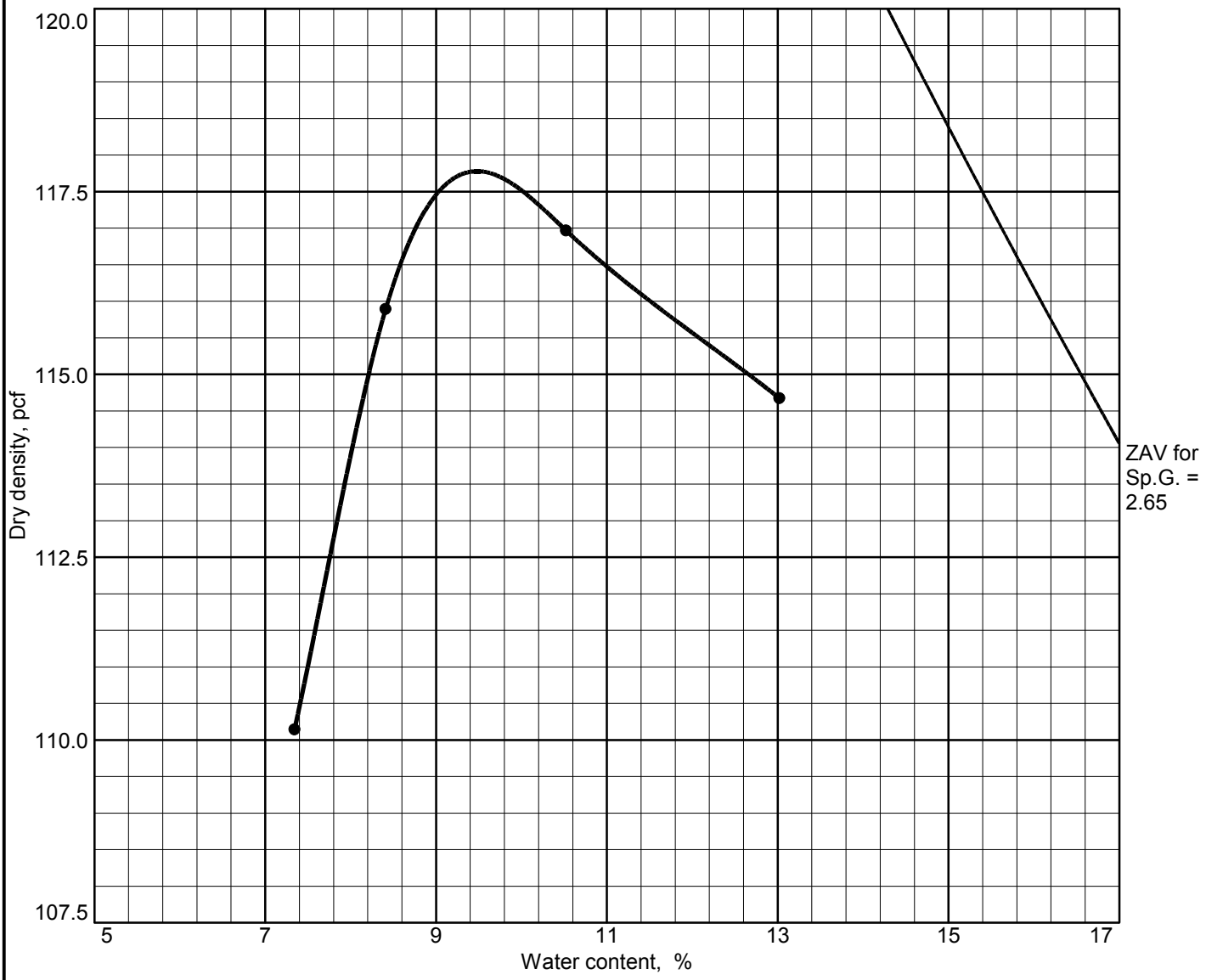
TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 127.2 pcf Optimum moisture = 10.4 %	CLAYEY SAND with GRAVEL (SC)

Project No.: FA-11-05310 **Client:** Brosz Engineering, Inc.
Project: Highway 3 from Dawson to Napoleon
South of Dawson, ND
● **Location:** BW-2-5

Remarks:
ND3-BW-2-5

BRAUN INTERTEC

Moisture-Density Relationship



Test specification: AASHTO T 180-01 Method A Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
0.4'-6.5'	CL	A-6 (9)		Assumed	39	25	2.0	53

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 117.8 pcf Optimum moisture = 9.5 %	SANDY LEAN CLAY (CL)

Project No.: FA-11-05310 **Client:** Brosz Engineering, Inc.

Project: Highway 3 from Dawson to Napoleon

South of Dawson, ND

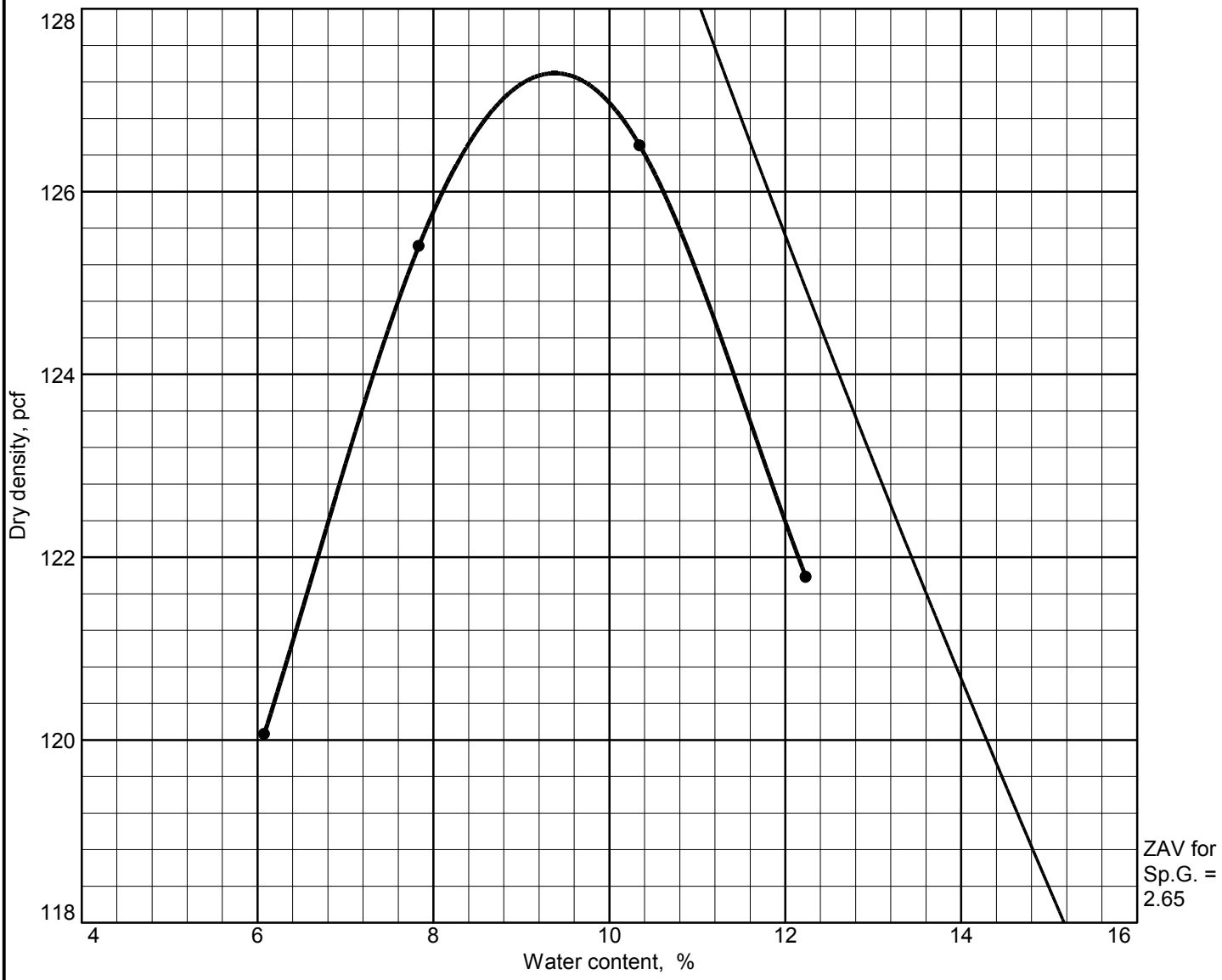
● **Location:** BW-2-7

Remarks:

ND3-BW-2-7

BRAUN INTERTEC

Moisture-Density Relationship



Test specification: AASHTO T 180-01 Method A Modified
Oversize correction applied to final results

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
6.5'-11.5'	SM	A-1-b (0)		Assumed	21	3	11.0	16

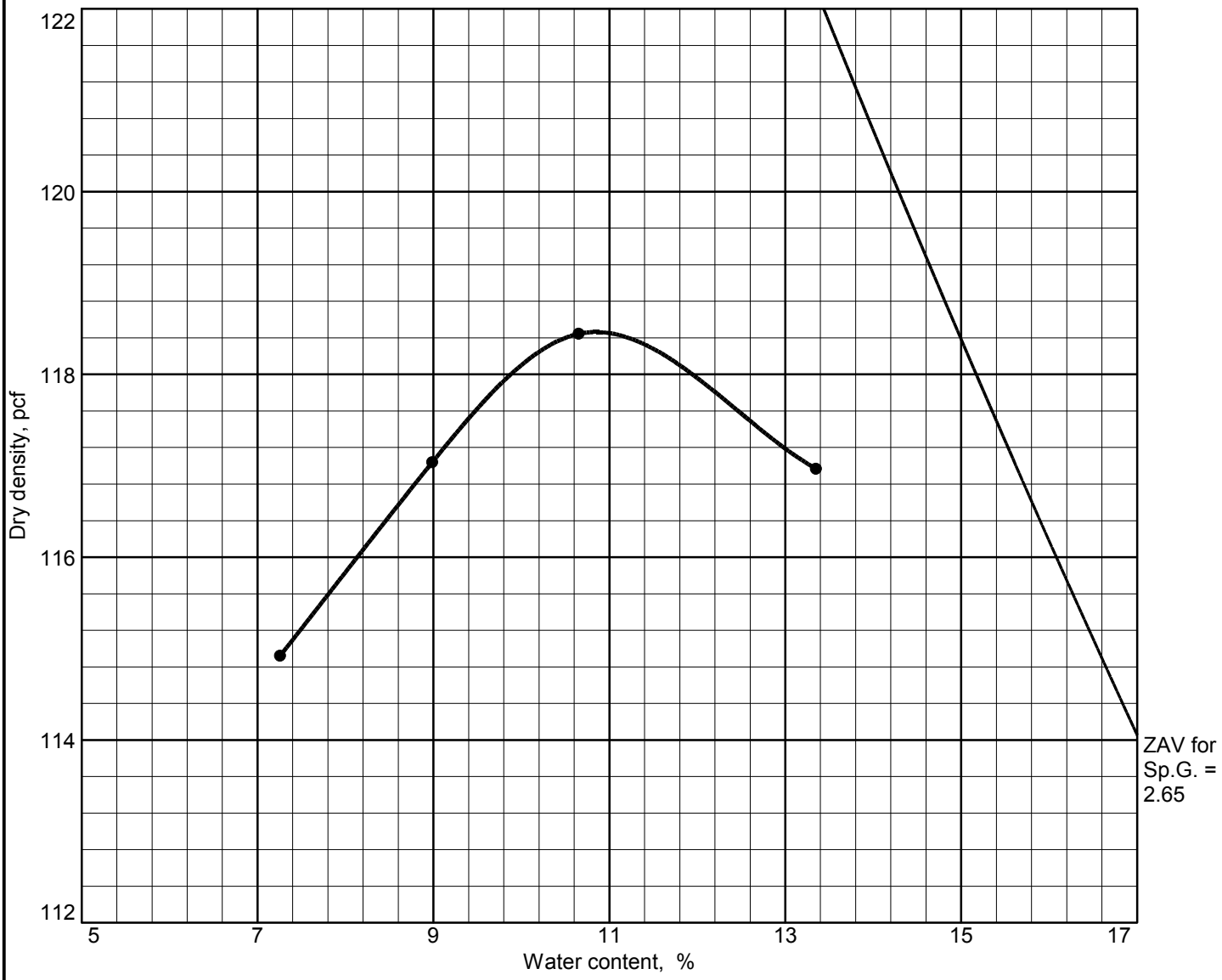
TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 129.7 pcf Optimum moisture = 9.4 %	SILTY SAND (SM)

Project No.: FA-11-05310 **Client:** Brosz Engineering, Inc.
Project: Highway 3 from Dawson to Napoleon
South of Dawson, ND
● **Location:** BW-2-7

Remarks:
ND3-BW-2-7

BRAUN INTERTEC

Moisture-Density Relationship



Test specification: AASHTO T 180-01 Method A Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
11.5'-20'	CL	A-6 (11)		Assumed	37	21	2.0	64

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 118.5 pcf Optimum moisture = 10.8 %	SANDY LEAN CLAY (CL)

Project No.: FA-11-05310 **Client:** Brosz Engineering, Inc.

Project: Highway 3 from Dawson to Napoleon

South of Dawson, ND

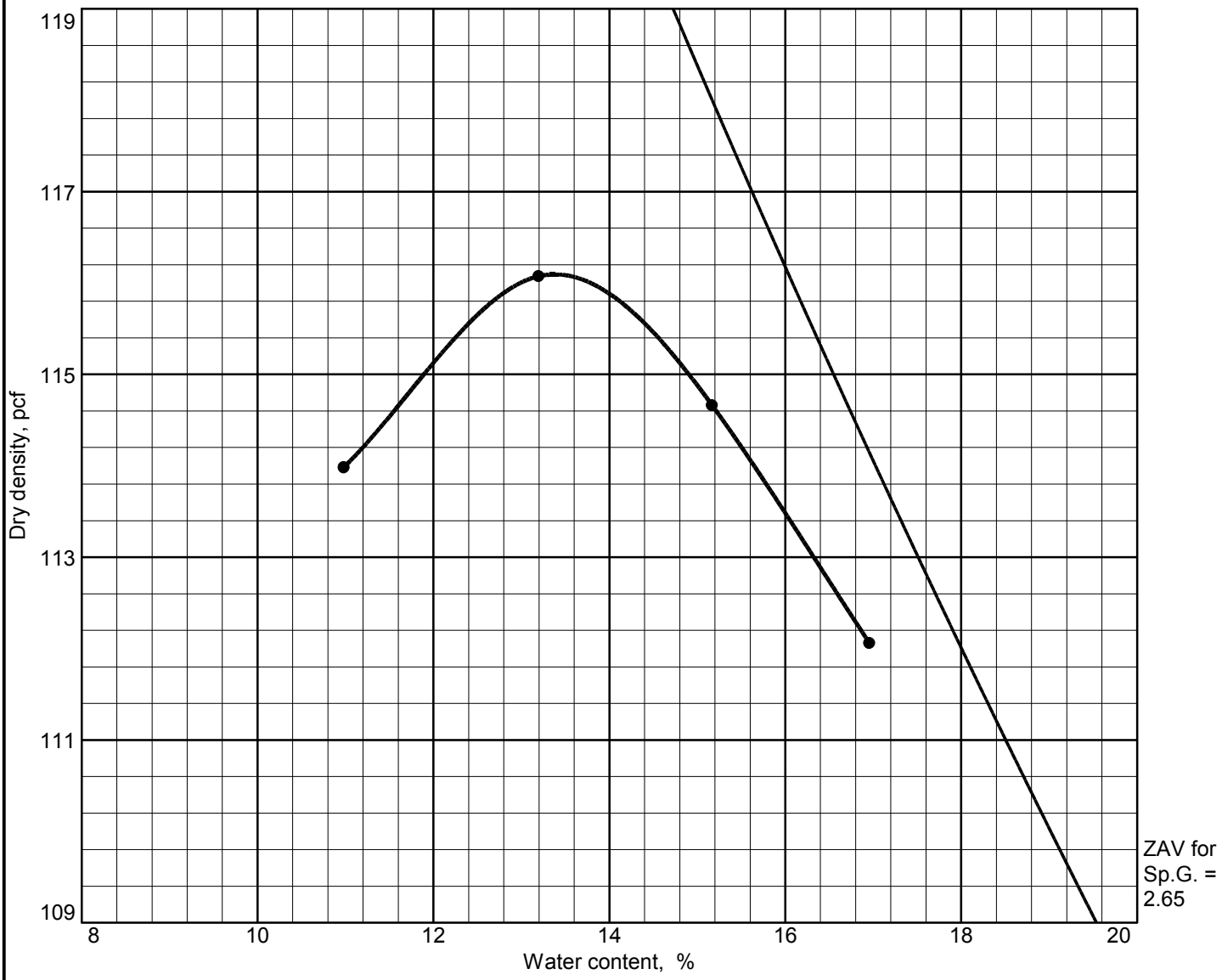
● **Location:** BW-2-7

Remarks:

ND3-BW-2-7

BRAUN INTERTEC

Moisture-Density Relationship



Test specification: AASHTO T 180-01 Method A Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
1.3'-14'	CH	A-7-6 (22)		Assumed	53	36	4.0	67

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 116.1 pcf Optimum moisture = 13.4 %	SANDY FAT CLAY (CH)

Project No.: FA-11-05310 **Client:** Brosz Engineering, Inc.

Project: Highway 3 from Dawson to Napoleon

South of Dawson, ND

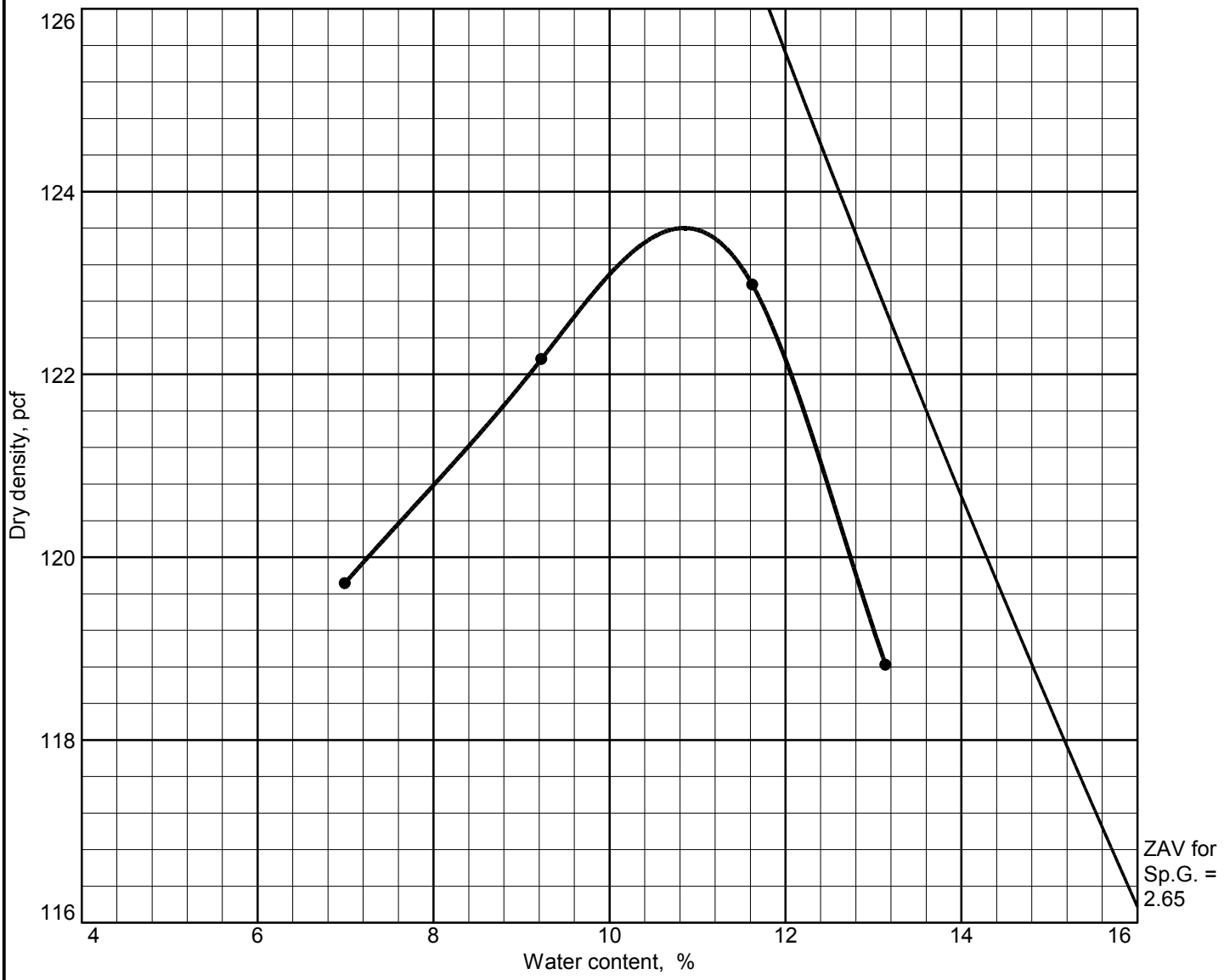
● **Location:** BW-2-8

Remarks:

ND3-BW-2-8

BRAUN INTERTEC

Moisture-Density Relationship



Test specification: AASHTO T 180-01 Method A Modified
Oversize correction applied to final results

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
0'-20'	SC-SM	A-2-4 (0)		Assumed	23	5	20.0	17

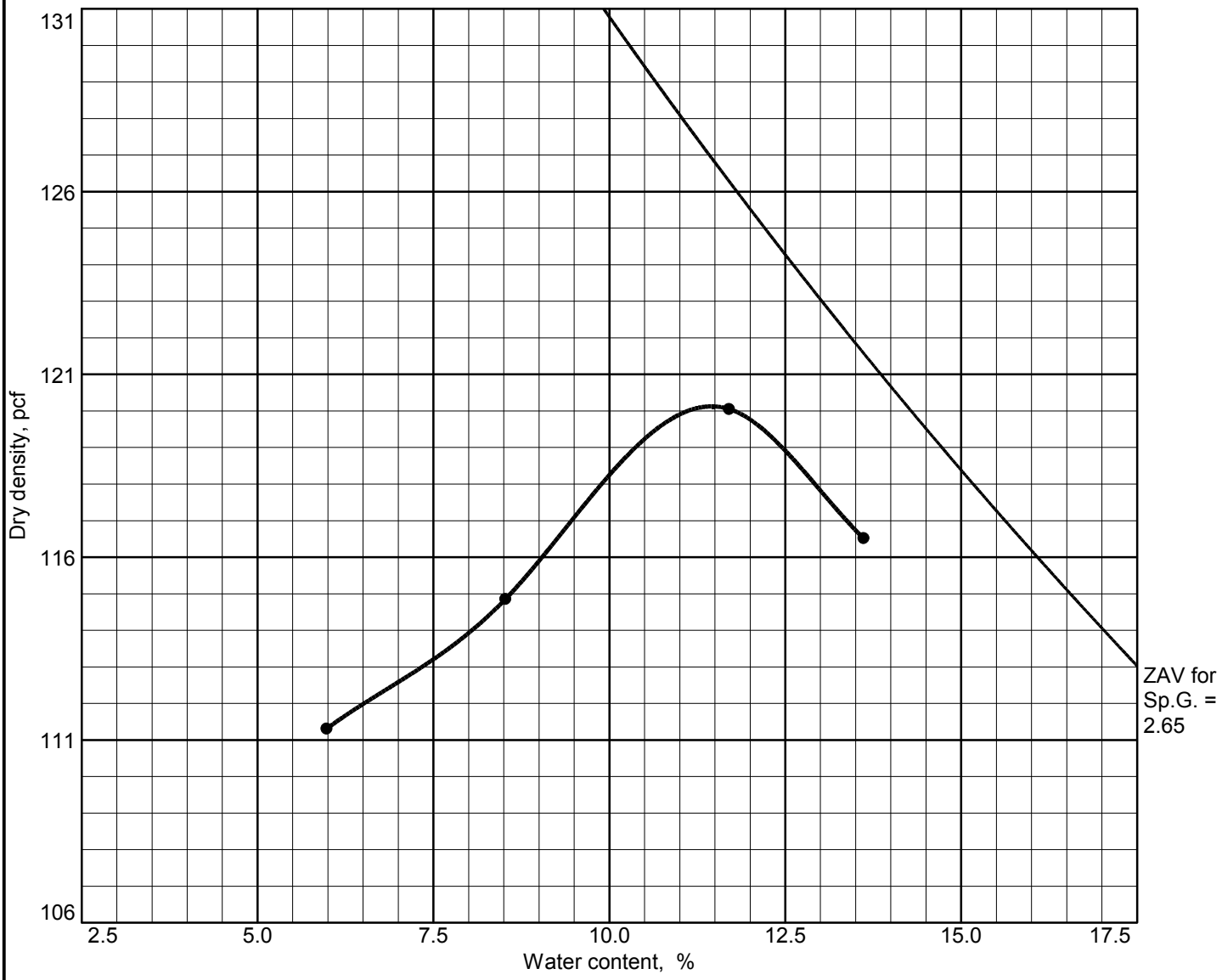
TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 128.7 pcf Optimum moisture = 10.8 %	SILTY, CLAYEY SAND with GRAVEL (SC-SM)

Project No.: FA-11-05310 **Client:** Brosz Engineering, Inc.
Project: Highway 3 from Dawson to Napoleon
South of Dawson, ND
● **Location:** BW-2-9

Remarks:
ND3-BW-2-9

BRAUN INTERTEC

Moisture-Density Relationship



Test specification: AASHTO T 180-01 Method A Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
0.9'-7.0'	CL	A-6 (11)		Assumed	34	16	1.0	76

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 120.1 pcf Optimum moisture = 11.5 %	LEAN CLAY with SAND (CL)

Project No.: FA-11-05310 **Client:** Brosz Engineering, Inc.

Project: Highway 3 from Dawson to Napoleon

South of Dawson, ND

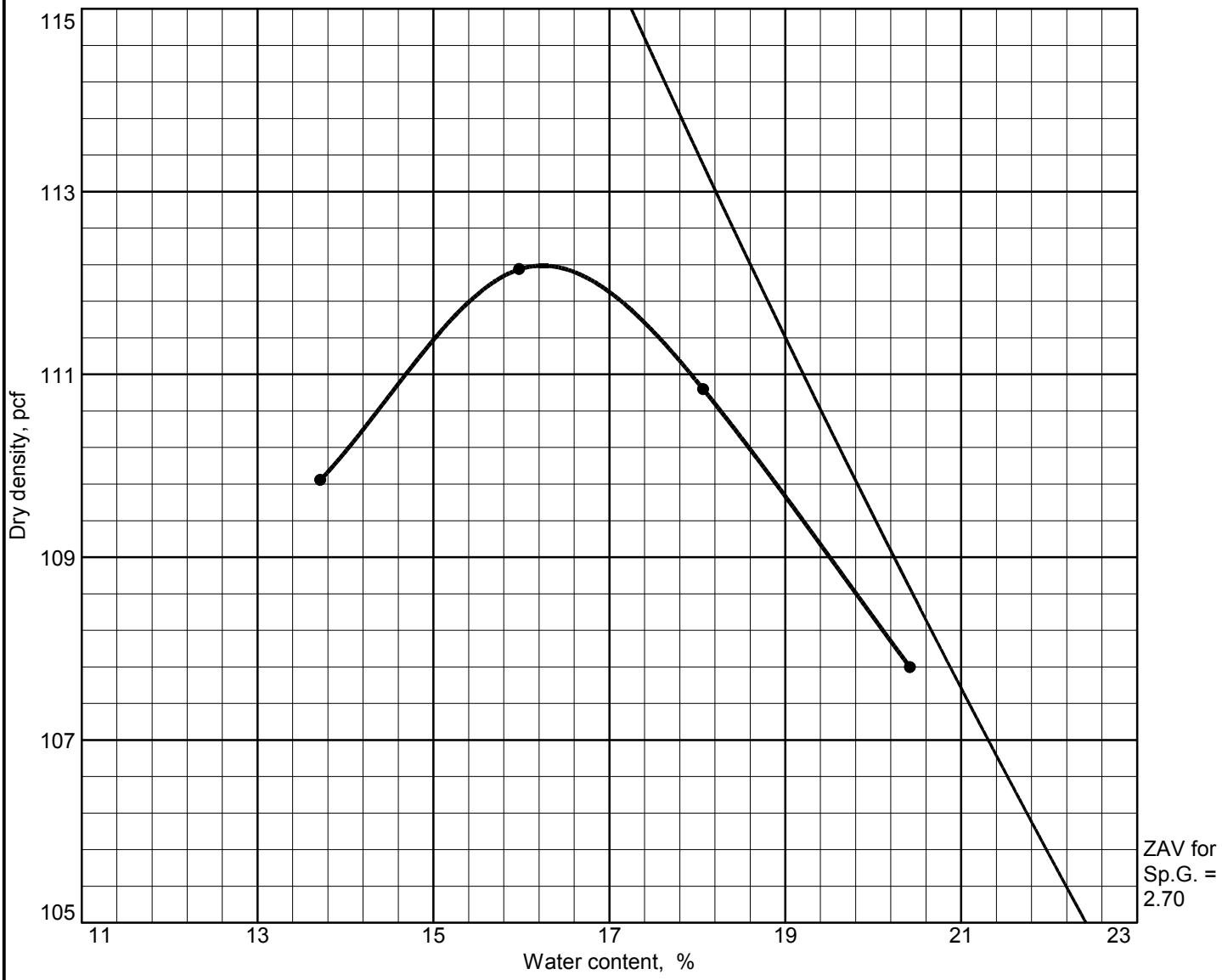
● **Location:** BW-3-5

Remarks:

ND3-BW-3-5

BRAUN INTERTEC

Moisture-Density Relationship



Test specification: AASHTO T 180-01 Method A Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
9.0'-18.5'	CL	A-7-6 (32)		Assumed	49	30	0.0	98

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 112.2 pcf Optimum moisture = 16.2 %	LEAN CLAY (CL)

Project No.: FA-11-05310 **Client:** Brosz Engineering, Inc.

Project: Highway 3 from Dawson to Napoleon

South of Dawson, ND

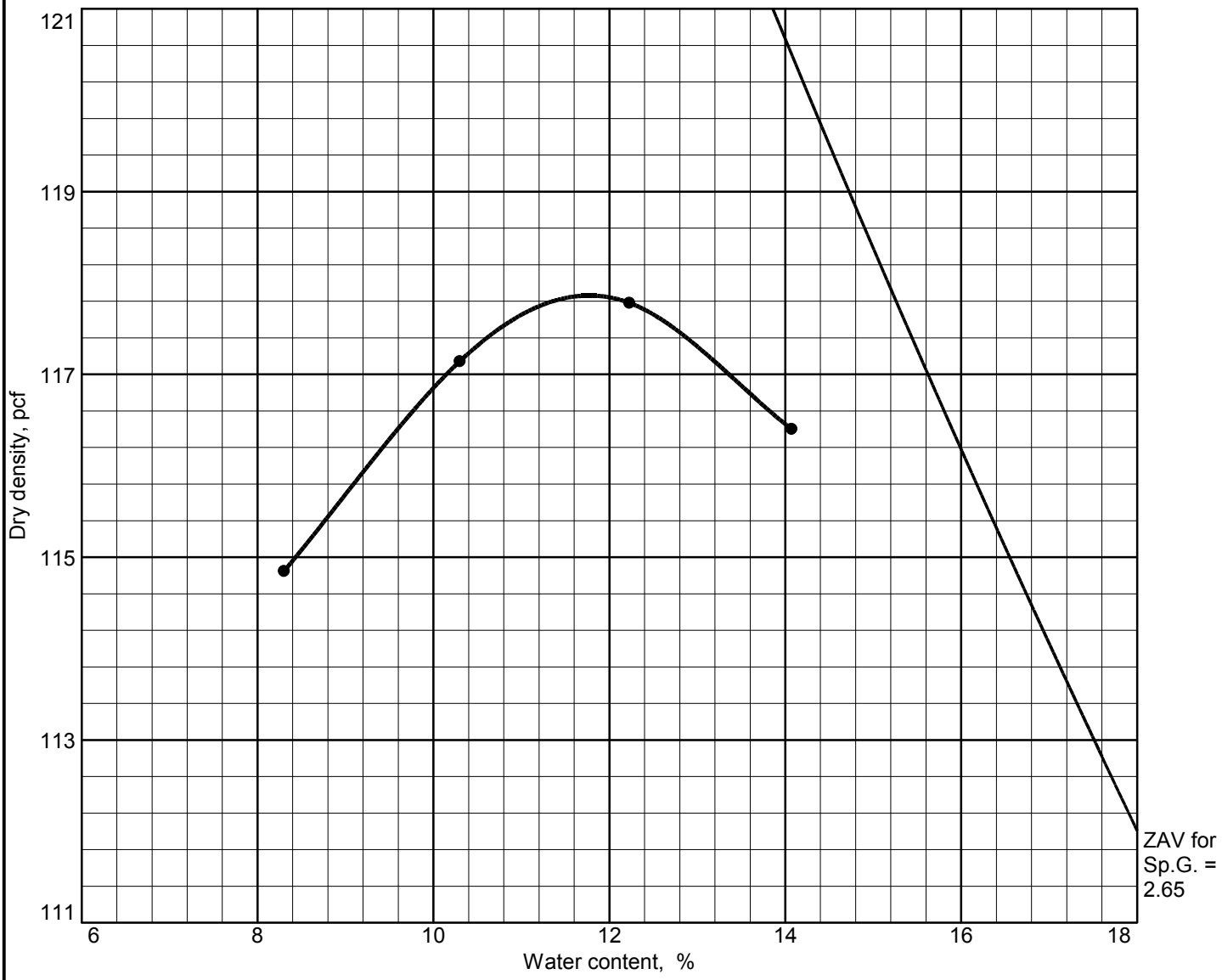
● **Location:** BW-3-5

Remarks:

ND3-BW-3-5

BRAUN INTERTEC

Moisture-Density Relationship



Test specification: AASHTO T 180-01 Method A Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
3.0'-20'	CL	A-6 (9)		Assumed	36	20	2.0	60

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 117.9 pcf Optimum moisture = 11.8 %	SANDY LEAN CLAY (CL)

Project No.: FA-11-05310 **Client:** Brosz Engineering, Inc.

Project: Highway 3 from Dawson to Napoleon

South of Dawson, ND

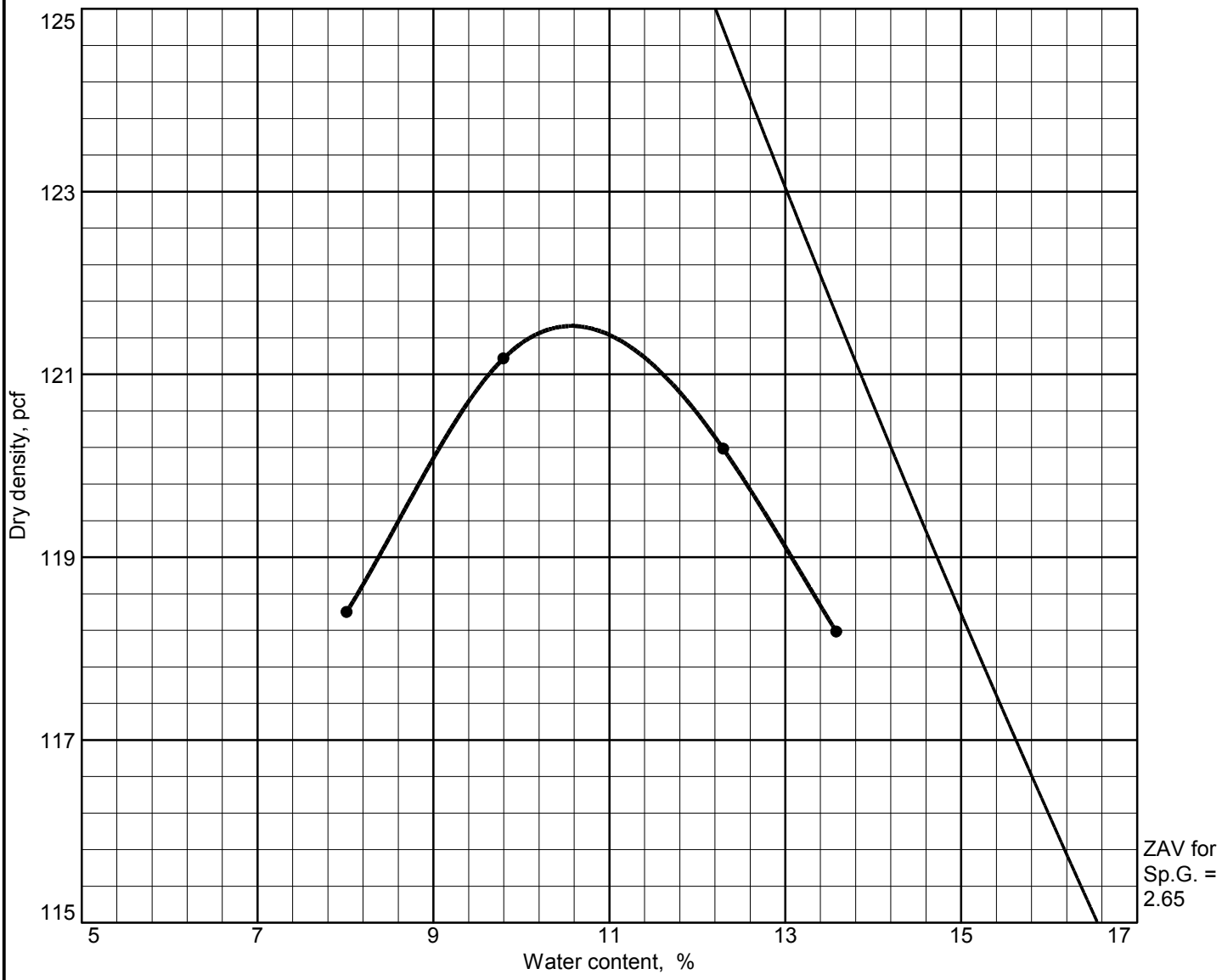
● **Location:** BW-3-6

Remarks:

ND3-BW-3-6

BRAUN INTERTEC

Moisture-Density Relationship



Test specification: AASHTO T 180-01 Method A Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
3.0'-20'	CL	A-6 (13)		Assumed	37	23	1.0	68

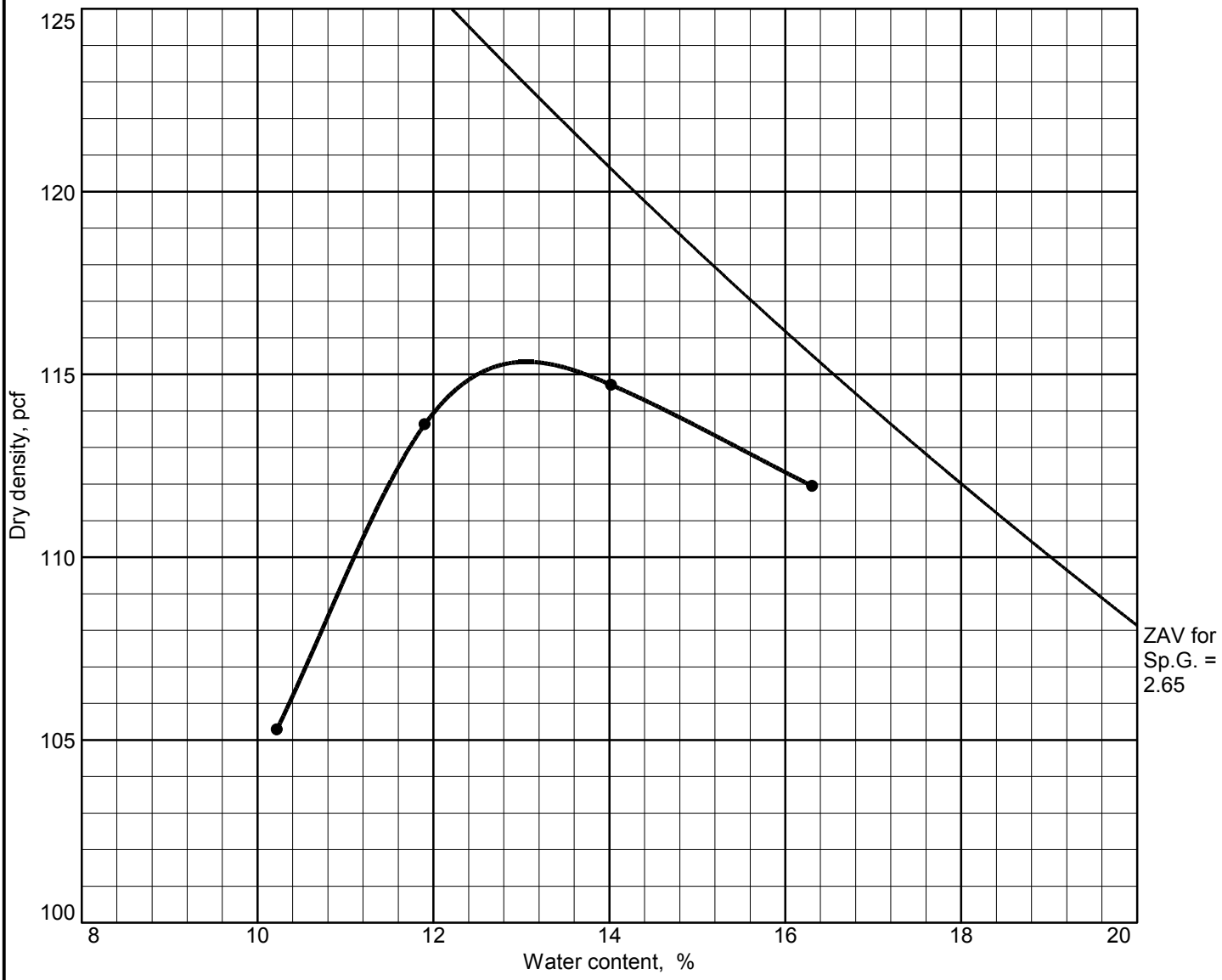
TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 121.5 pcf Optimum moisture = 10.6 %	SANDY LEAN CLAY (CL)

Project No.: FA-11-05310 **Client:** Brosz Engineering, Inc.
Project: Highway 3 from Dawson to Napoleon
South of Dawson, ND
● **Location:** BW-3-7

Remarks:
ND3-BW-3-7

BRAUN INTERTEC

Moisture-Density Relationship



Test specification: AASHTO T 180-01 Method A Modified
Oversize correction applied to final results

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
1.5'-20'	CL	A-7-6 (13)		Assumed	44	25	5.0	61

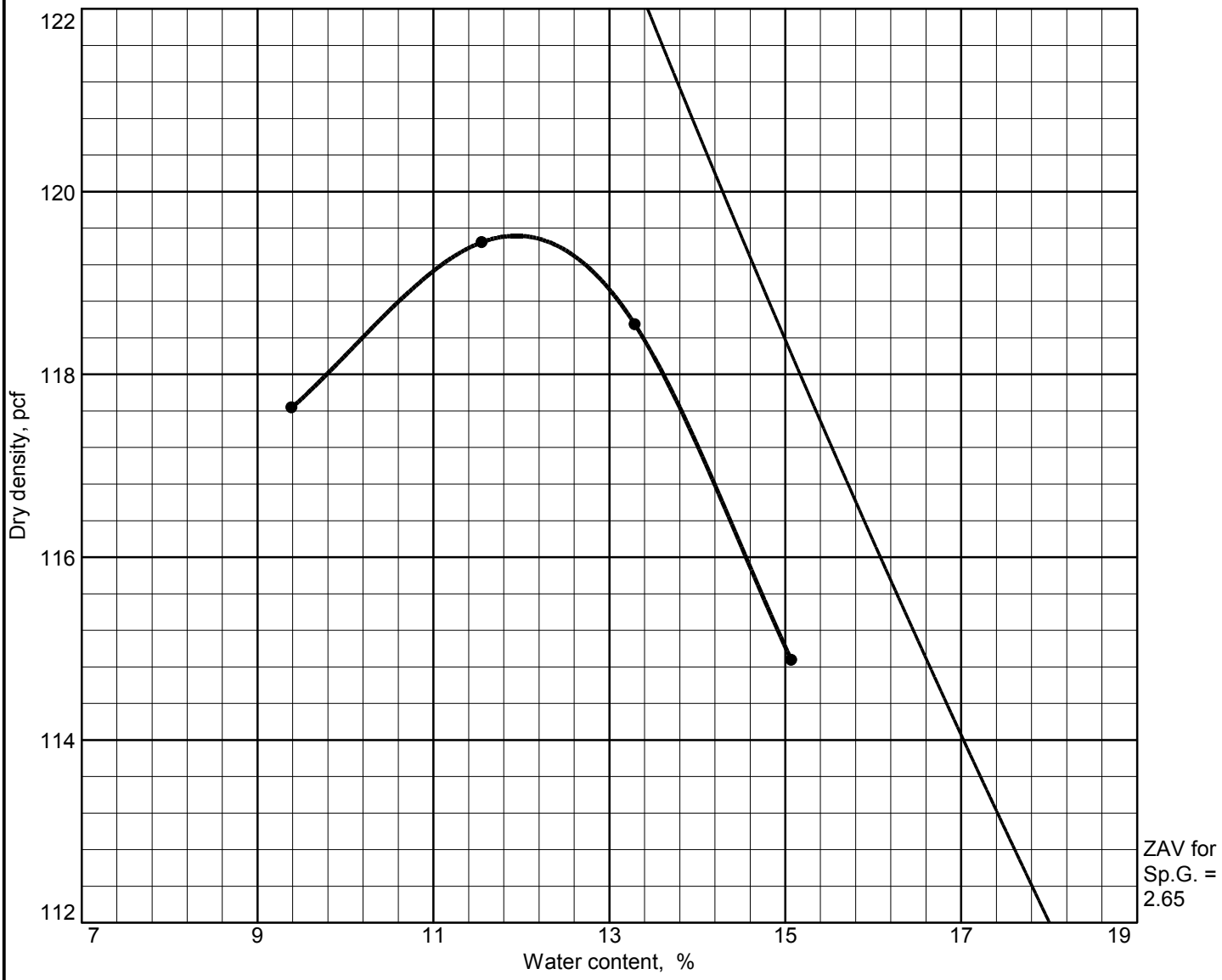
TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 117.0 pcf Optimum moisture = 13.1 %	SANDY LEAN CLAY(CL)

Project No.: FA-11-05310 **Client:** Brosz Engineering, Inc.
Project: Highway 3 from Dawson to Napoleon
South of Dawson, ND
● **Location:** BW-3-8

Remarks:
ND3-BW-3-8

BRAUN INTERTEC

Moisture-Density Relationship



Test specification: AASHTO T 180-01 Method A Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
0.5'-6.5'	CL	A-7-6 (18)		Assumed	43	30	1.0	69

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 119.5 pcf Optimum moisture = 11.9 %	SANDY LEAN CLAY (CL)

Project No.: FA-11-05310 **Client:** Brosz Engineering, Inc.

Project: Highway 3 from Dawson to Napoleon

South of Dawson, ND

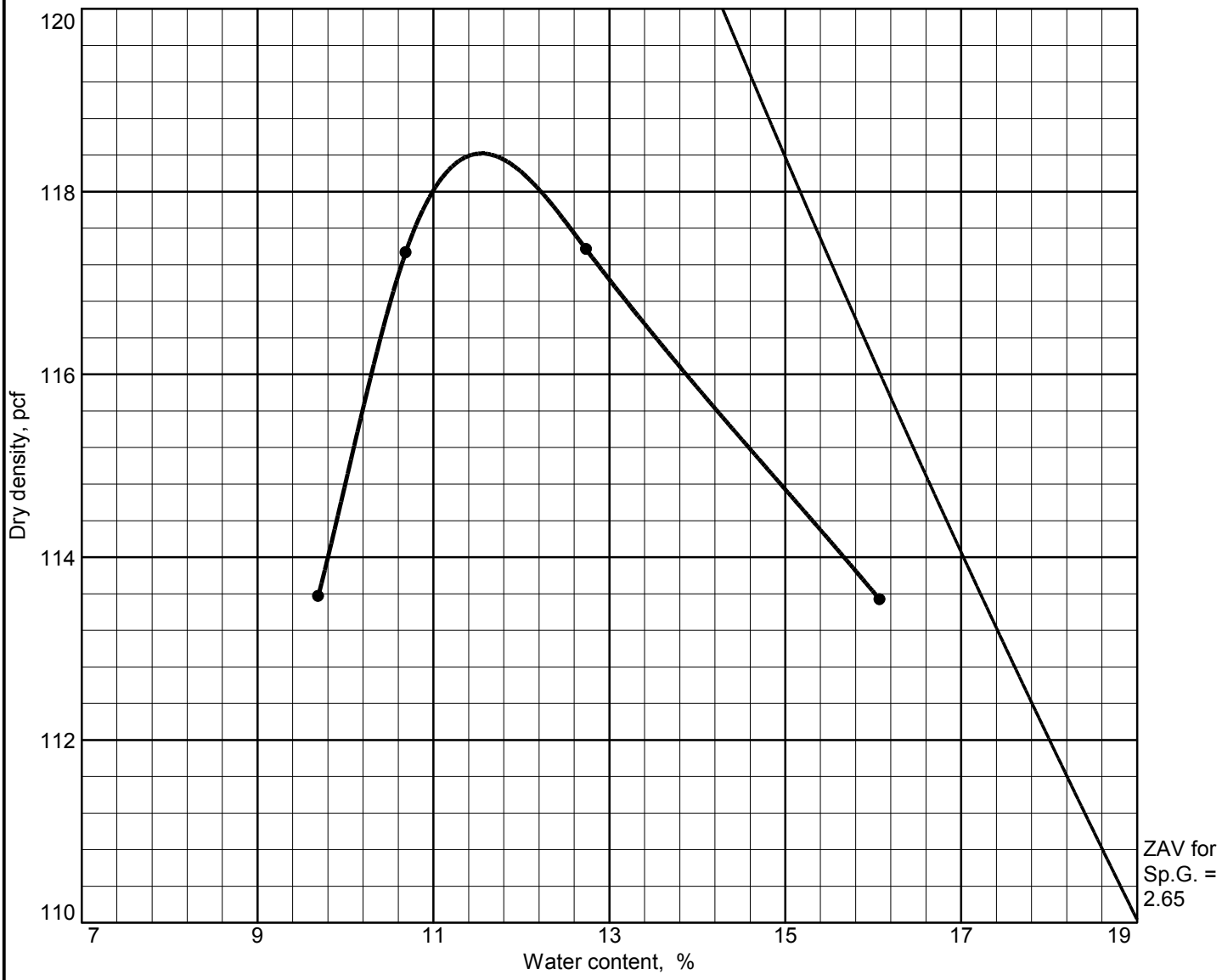
● **Location:** BW-3-9

Remarks:

ND3-BW-3-9

BRAUN INTERTEC

Moisture-Density Relationship



Test specification: AASHTO T 180-01 Method A Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
0.6'-20'	CL	A-6 (13)		Assumed	39	23	1.0	67

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 118.4 pcf Optimum moisture = 11.5 %	SANDY LEAN CLAY (CL)

Project No.: FA-11-05310 **Client:** Brosz Engineering, Inc.

Project: Highway 3 from Dawson to Napoleon

South of Dawson, ND

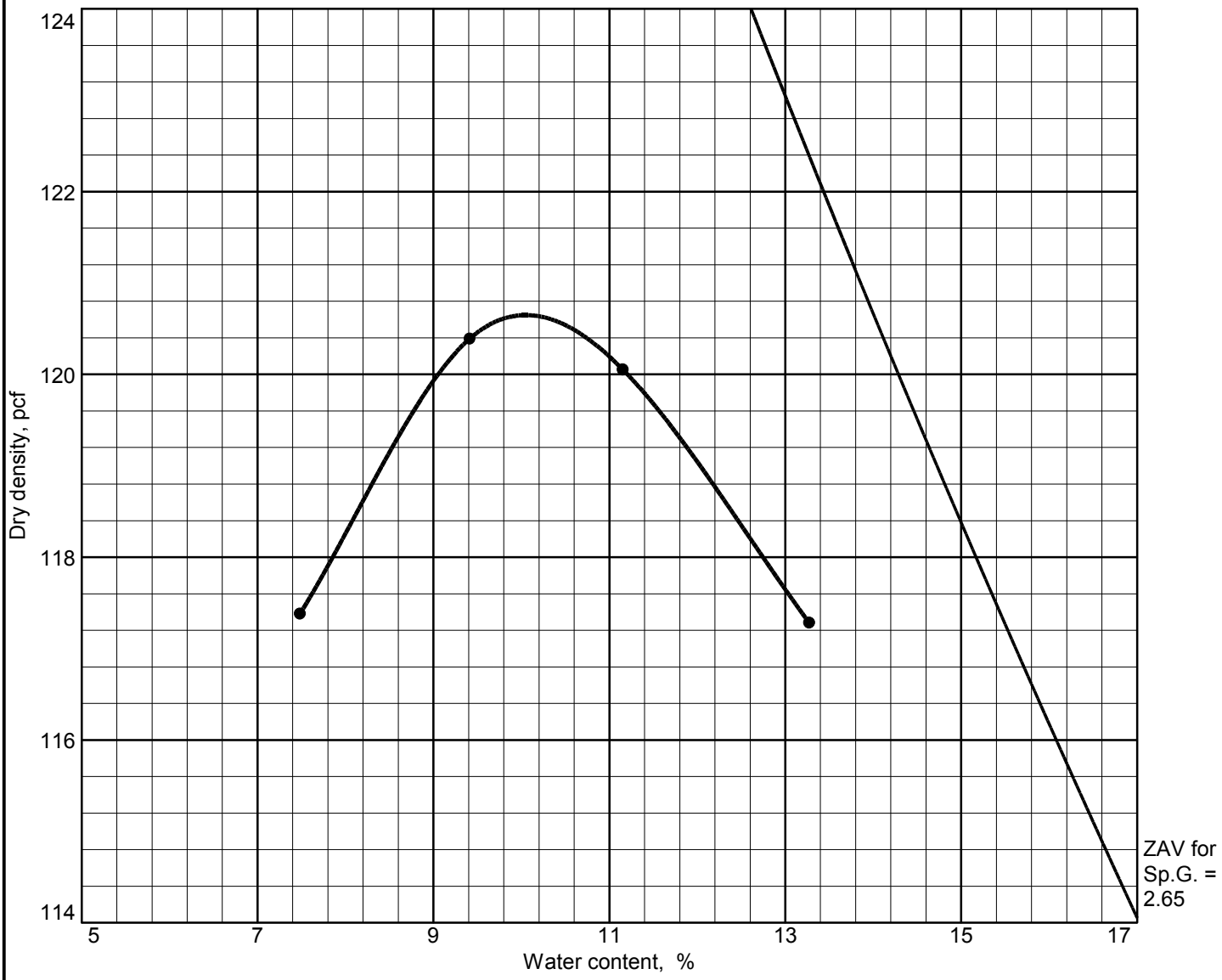
● **Location:** BW-3-9A

Remarks:

ND3-BW-3-9A

BRAUN INTERTEC

Moisture-Density Relationship



Test specification: AASHTO T 180-01 Method A Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
0.5'-4.5'	CL	A-6 (7)		Assumed	29	15	2.0	64

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 120.7 pcf Optimum moisture = 10.0 %	SANDY LEAN CLAY (CL)

Project No.: FA-11-05310 **Client:** Brosz Engineering, Inc.

Project: Highway 3 from Dawson to Napoleon

South of Dawson, ND

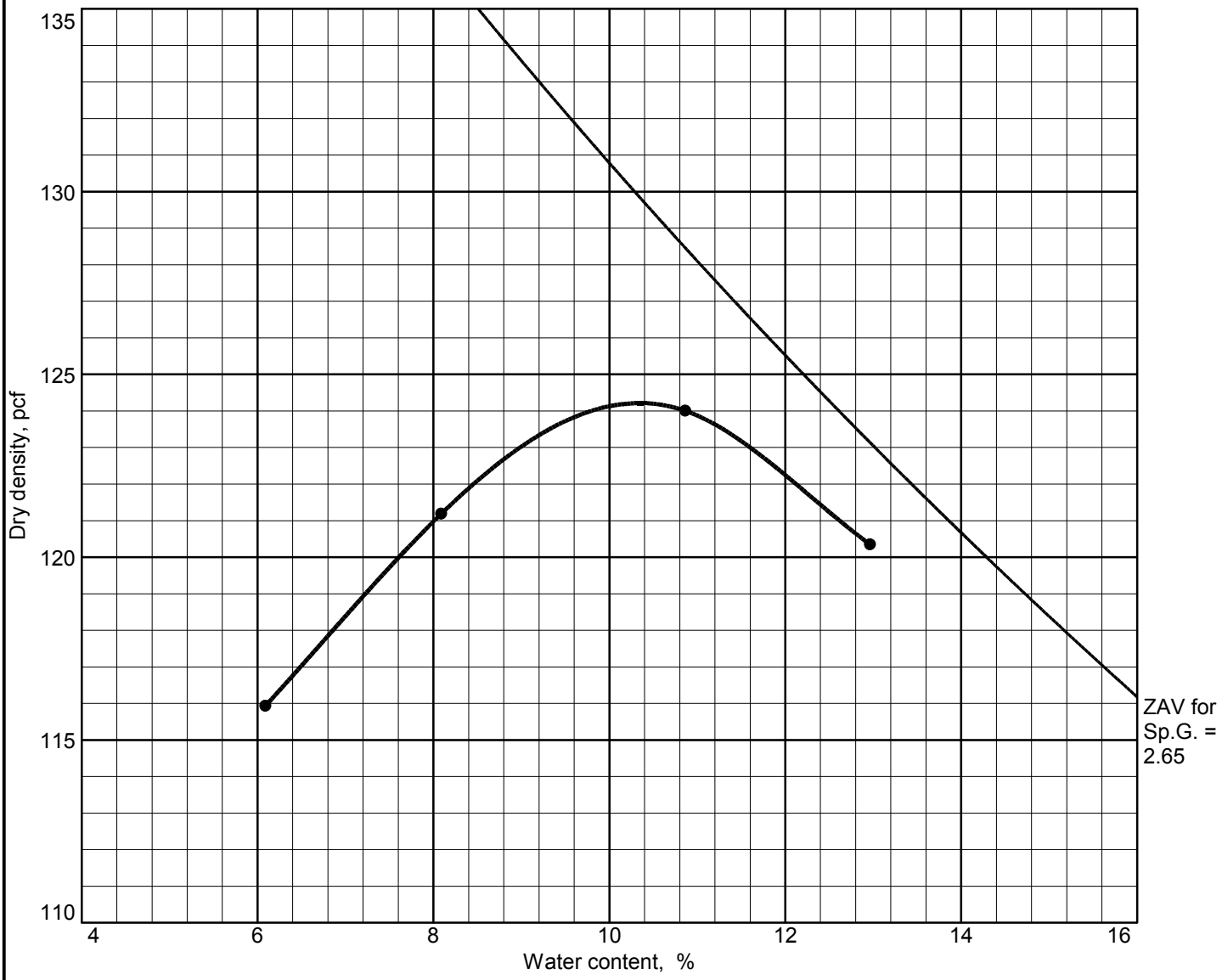
● Location: BW-3-10

Remarks:

ND3-BW-3-10

BRAUN INTERTEC

Moisture-Density Relationship



Test specification: AASHTO T 180-01 Method A Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
6.0'-20'	CL	A-6 (10)		Assumed	37	22	1.0	61

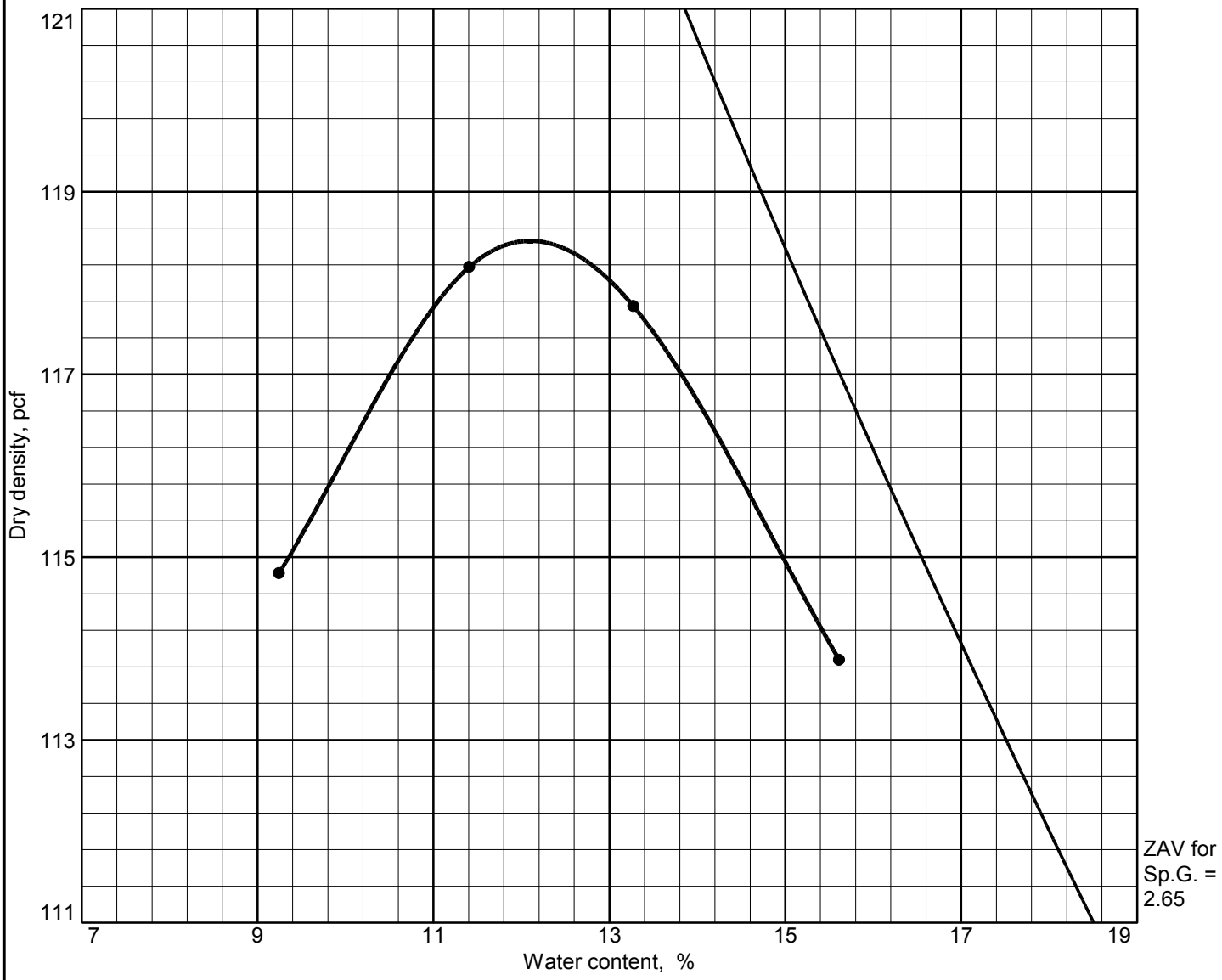
TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 124.2 pcf Optimum moisture = 10.3 %	SANDY LEAN CLAY (CL)

Project No.: FA-11-05310 **Client:** Brosz Engineering, Inc.
Project: Highway 3 from Dawson to Napoleon
South of Dawson, ND
● **Location:** BW-3-10

Remarks:
ND3-BW-3-10

BRAUN INTERTEC

Moisture-Density Relationship



Test specification: AASHTO T 180-01 Method A Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
3.0'-12.5'	CL	A-6 (14)		Assumed	40	25	2.0	65

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 118.5 pcf Optimum moisture = 12.1 %	SANDY LEAN CLAY (CL)

Project No.: FA-11-05310 **Client:** Brosz Engineering, Inc.

Project: Highway 3 from Dawson to Napoleon

South of Dawson, ND

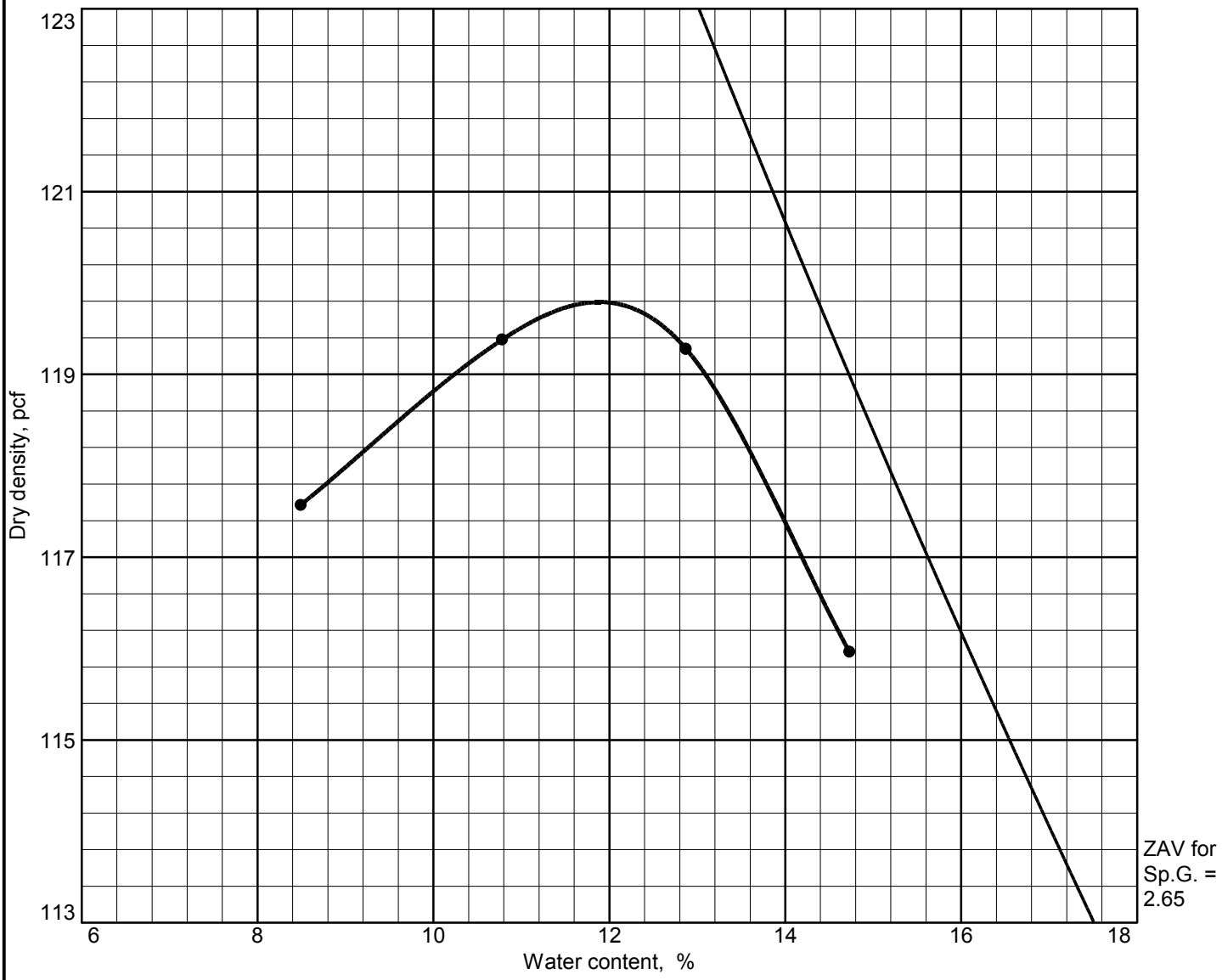
● **Location:** BW-3-10A

Remarks:

ND3-BW-3-10A

BRAUN INTERTEC

Moisture-Density Relationship



Test specification: AASHTO T 180-01 Method A Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
14'-20'	CL	A-6 (10)		Assumed	31	15	0.0	80

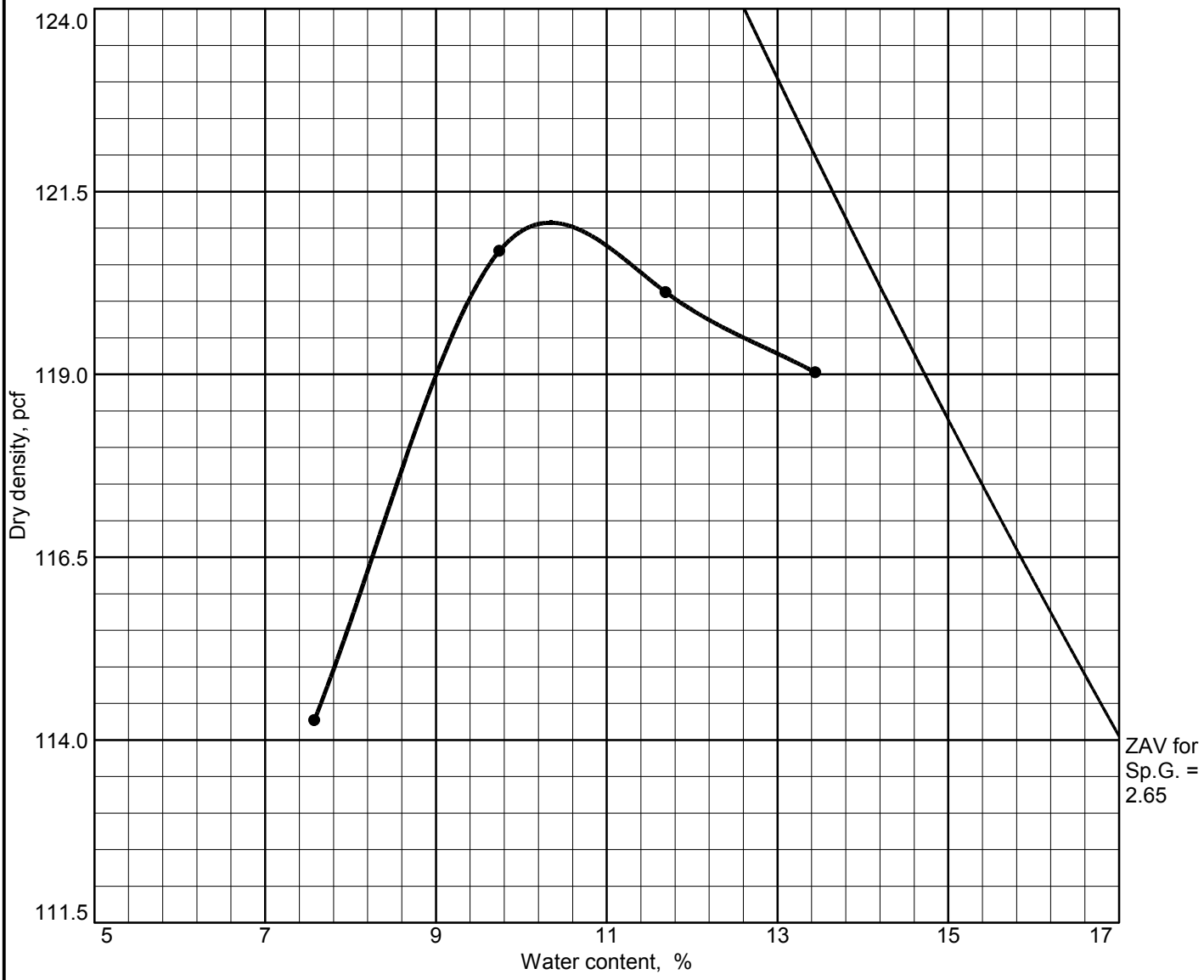
TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 119.8 pcf Optimum moisture = 11.9 %	LEAN CLAY with SAND (CL)

Project No.: FA-11-05310 **Client:** Brosz Engineering, Inc.
Project: Highway 3 from Dawson to Napoleon
South of Dawson, ND
● **Location:** BW-3-10A

Remarks:
ND3-BW-3-10A

BRAUN INTERTEC

Moisture-Density Relationship



Test specification: AASHTO T 180-01 Method A Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
1.1'-20'	CL	A-6 (12)		Assumed	40	23	1.0	64

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 121.1 pcf Optimum moisture = 10.3 %	SANDY LEAN CLAY (CL)

Project No.: FA-11-05310 **Client:** Brosz Engineering, Inc.

Project: Highway 3 from Dawson to Napoleon

South of Dawson, ND

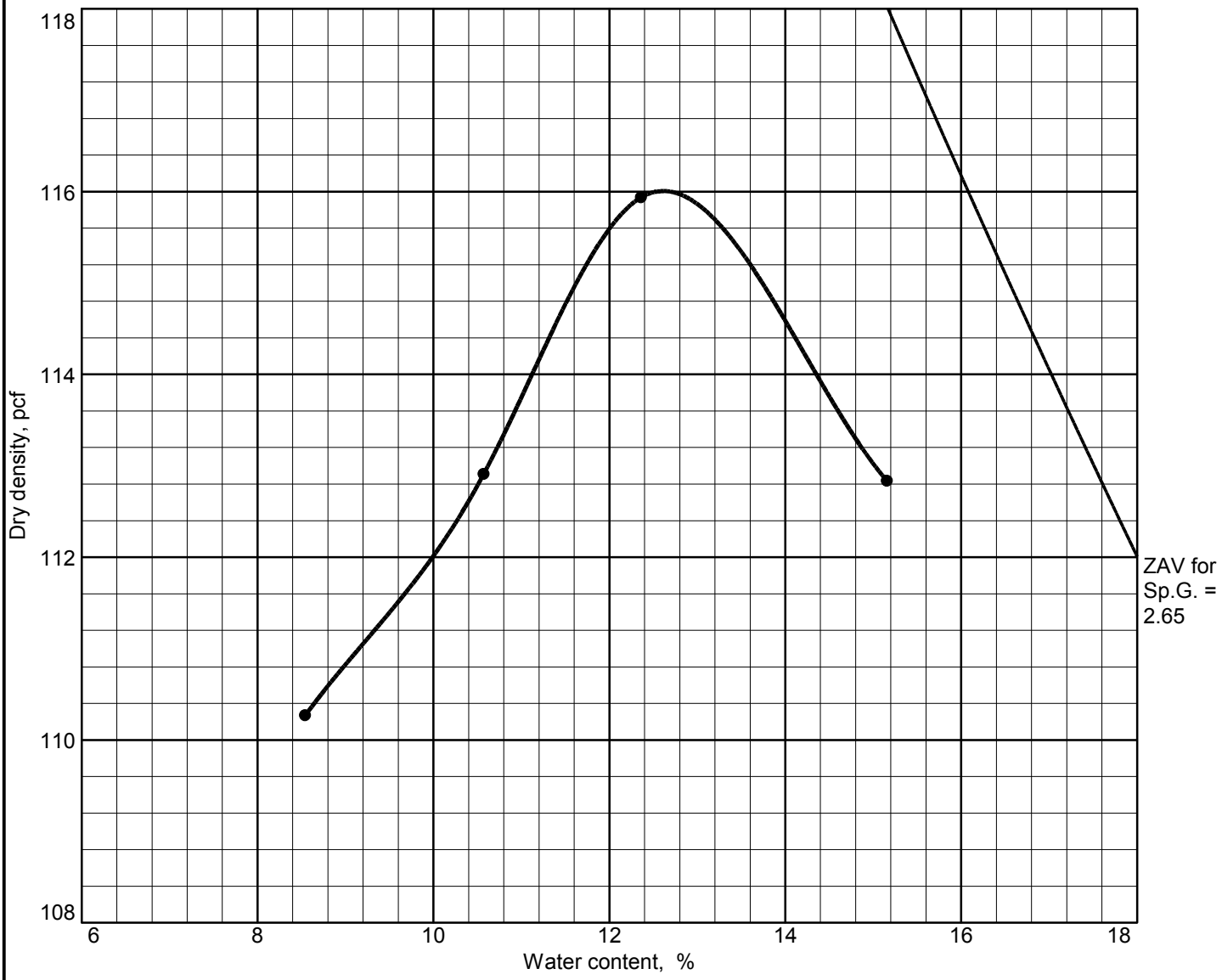
● **Location:** BW-3-11

Remarks:

ND3-BW-3-11

BRAUN INTERTEC

Moisture-Density Relationship



Test specification: AASHTO T 180-01 Method A Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
3.0'-10'	CL	A-7-6 (11)		Assumed	42	24	1.0	58

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 116.0 pcf Optimum moisture = 12.6 %	SANDY LEAN CLAY (CL)

Project No.: FA-11-05310 **Client:** Brosz Engineering, Inc.

Project: Highway 3 from Dawson to Napoleon

South of Dawson, ND

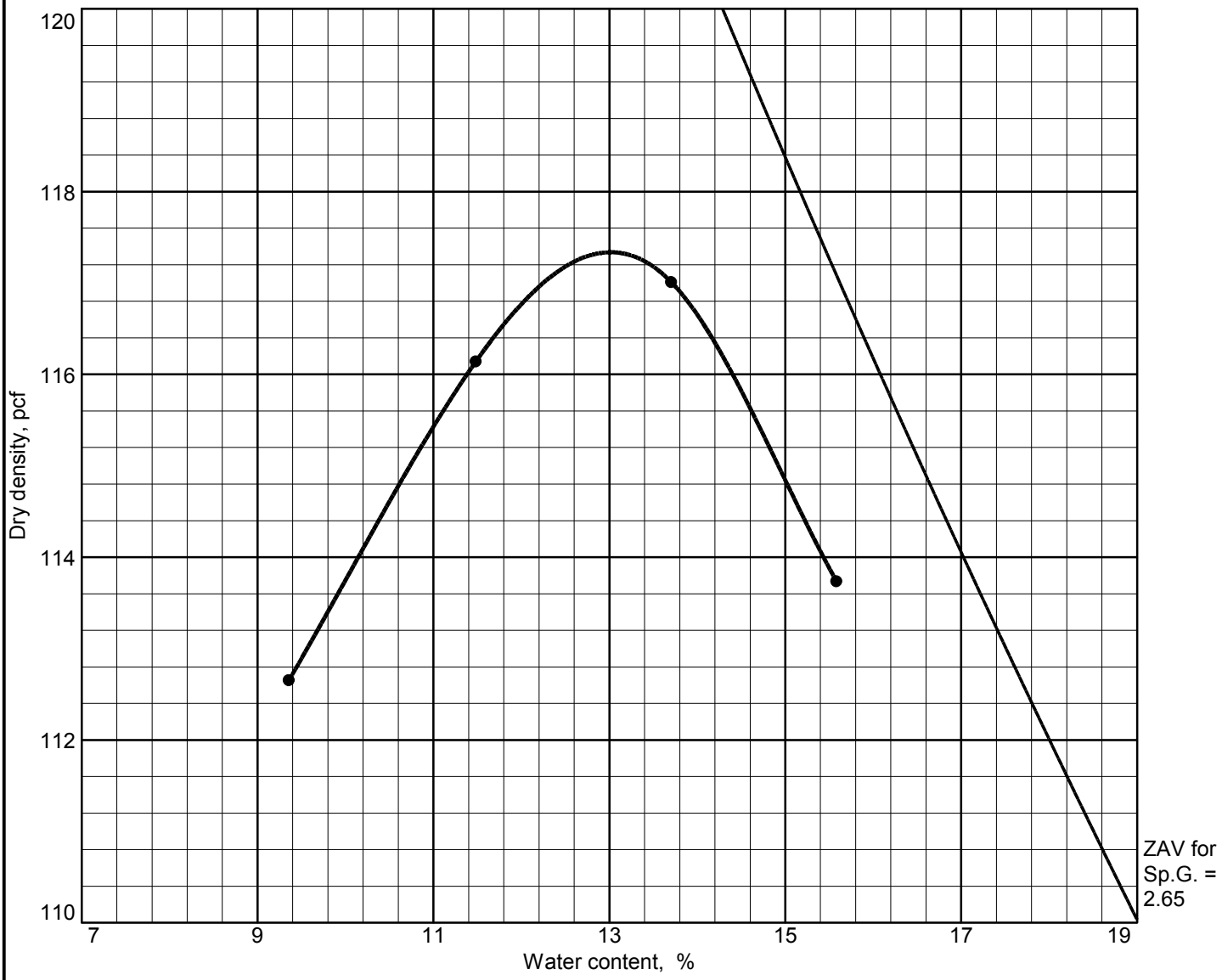
● **Location:** BW-3-12

Remarks:

ND3-BW-3-12

BRAUN INTERTEC

Moisture-Density Relationship



Test specification: AASHTO T 180-01 Method A Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
0.4'-7.0'	CL	A-7-6 (16)		Assumed	43	26	1.0	68

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 117.3 pcf Optimum moisture = 13.0 %	SANDY LEAN CLAY (CL)

Project No.: FA-11-05310 **Client:** Brosz Engineering, Inc.

Project: Highway 3 from Dawson to Napoleon

South of Dawson, ND

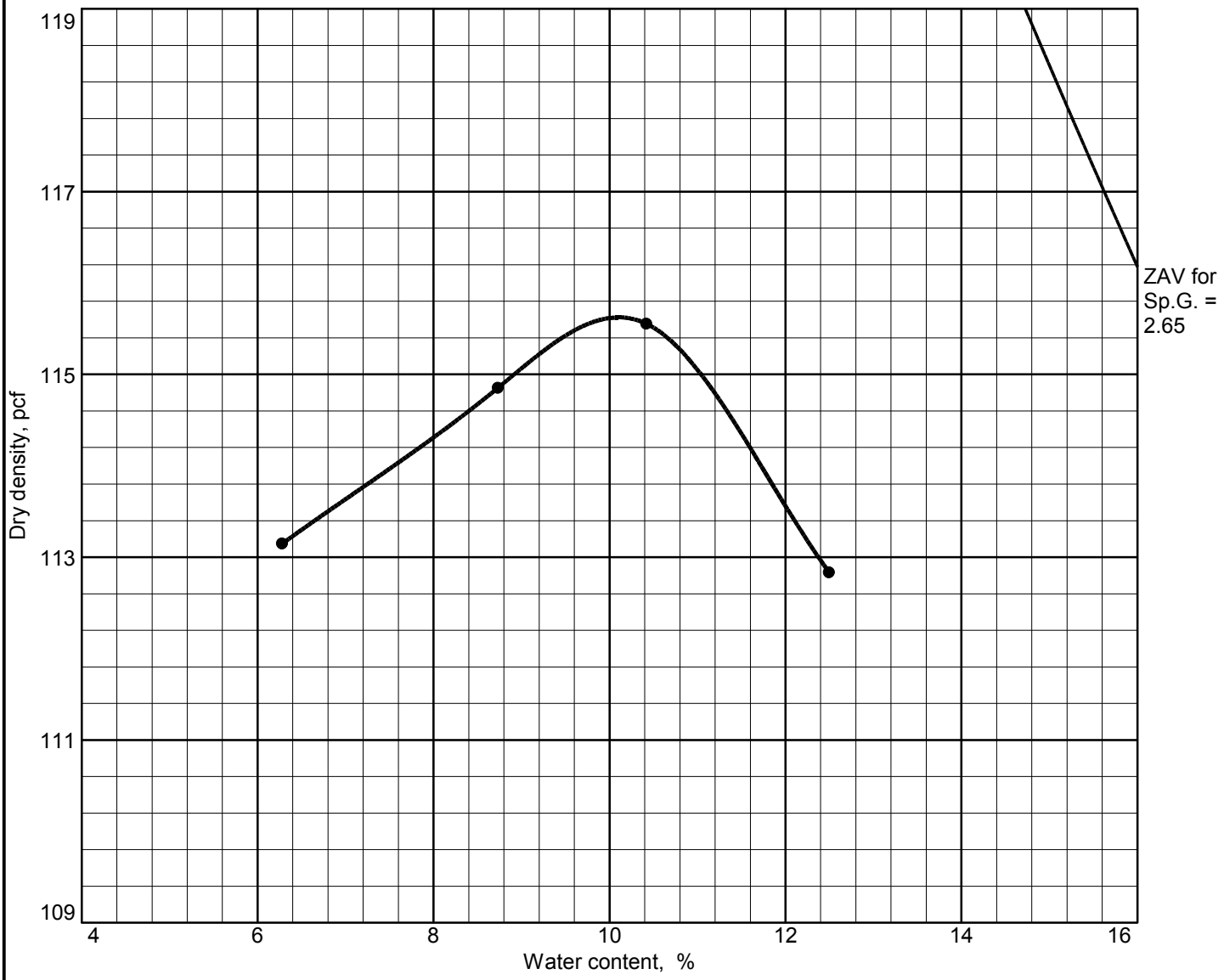
● **Location:** BW-3-13

Remarks:

ND3-BW-3-13

BRAUN INTERTEC

Moisture-Density Relationship



Test specification: AASHTO T 180-01 Method A Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
1.5'-6.0'	SM	A-2-4 (0)		Assumed	16	1	0.0	13

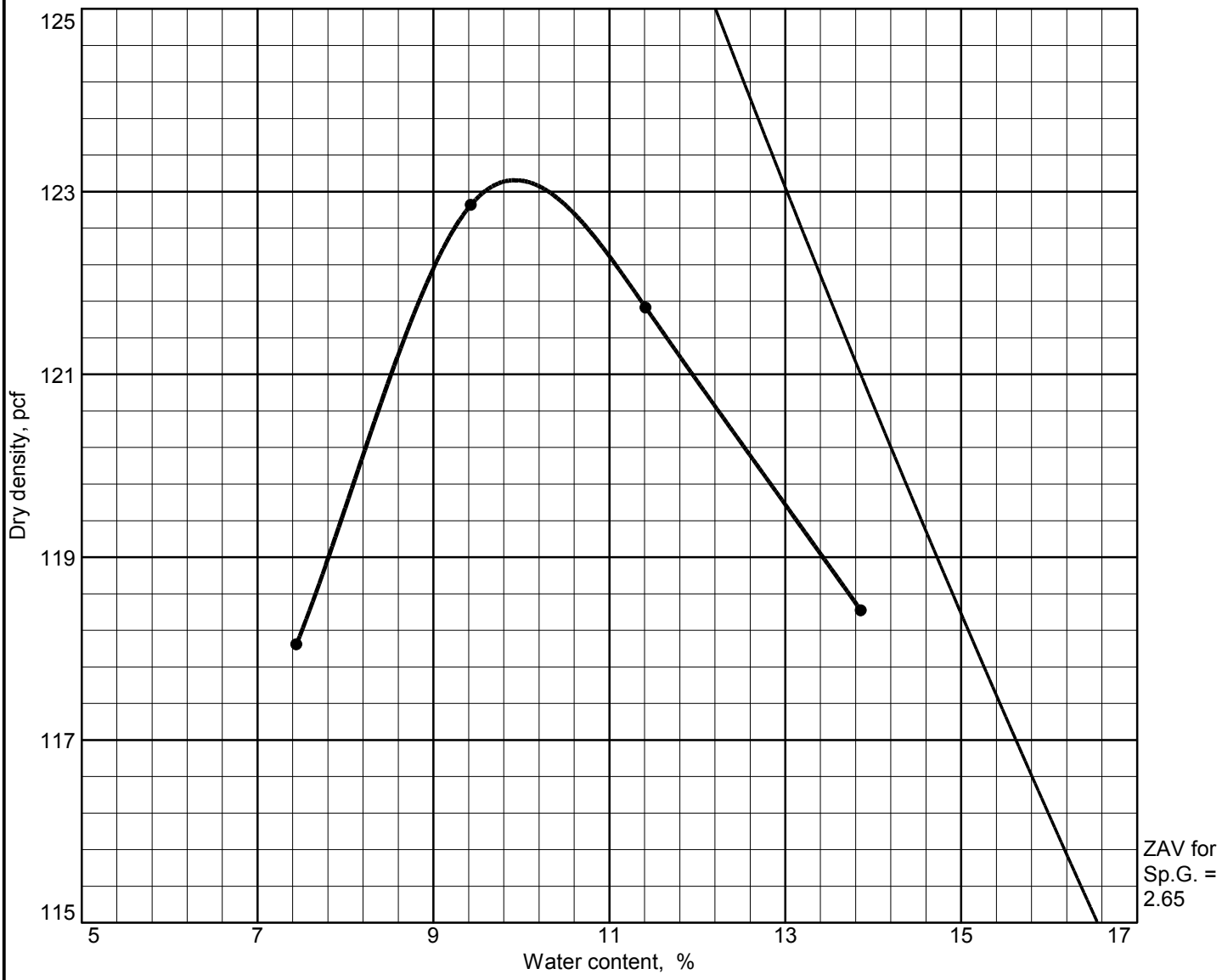
TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 115.6 pcf Optimum moisture = 10.1 %	SILTY SAND (SM)

Project No.: FA-11-05310 **Client:** Brosz Engineering, Inc.
Project: Highway 3 from Dawson to Napoleon
South of Dawson, ND
● **Location:** BW-3-14

Remarks:
ND3-BW-3-14

BRAUN INTERTEC

Moisture-Density Relationship



Test specification: AASHTO T 180-01 Method A Modified
Oversize correction applied to final results

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
6.0'-20'	CL	A-6 (9)		Assumed	38	22	1.0	57

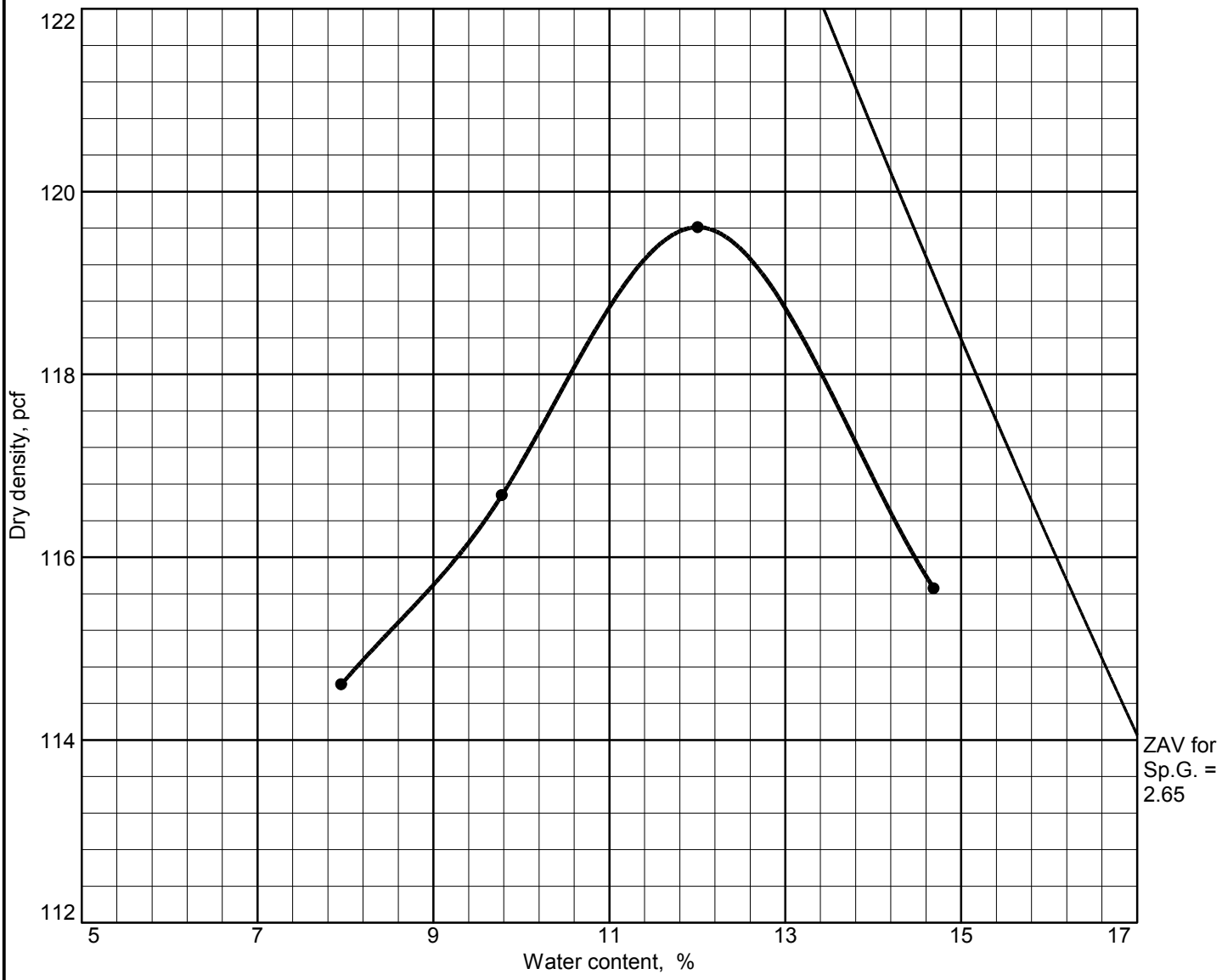
TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 123.4 pcf Optimum moisture = 9.9 %	SANDY LEAN CLAY (CL)

Project No.: FA-11-05310 **Client:** Brosz Engineering, Inc.
Project: Highway 3 from Dawson to Napoleon
South of Dawson, ND
● **Location:** BW-3-14

Remarks:
ND3-BW-3-14

BRAUN INTERTEC

Moisture-Density Relationship



Test specification: AASHTO T 180-01 Method A Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
0.5'-20'	SC	A-6 (7)		Assumed	38	22	6.0	50

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 119.6 pcf Optimum moisture = 12.0 %	CLAYEY SAND (SC)

Project No.: FA-11-05310 **Client:** Brosz Engineering, Inc.

Project: Highway 3 from Dawson to Napoleon

South of Dawson, ND

● **Location:** BW-3-15

Remarks:

ND3-BW-3-15

BRAUN INTERTEC