Geotechnical Evaluation Report

New Town Northwest Truck Reliever Route
New Town, North Dakota
NH-7-023(041)048, PCN 19862

Prepared for

KLJ

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.

Ezra Ballinger, PE
Principal/Senior Engineer
Registration Number: PE-7328
August 18, 2017

Project B1500957

Braun Intertec Corporation

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August 18, 2017

Project B1500957

Jessica Karls, PE
KLJ
3203 32nd Avenue South, Suite 201
Fargo, ND 58106-9767

Re: Geotechnical Evaluation Report
New Town Northwest Truck Reliever Route
New Town, North Dakota
NH-7-023(041)048, PCN 19862

Dear Ms. Karls:

We are pleased to present this Geotechnical Evaluation Report for the proposed Truck Reliever Route around the northwest side of the New Town, North Dakota. This project was completed in accordance with our scope of work dated February 2, 2015.

In the Appendix of this report we present the Linear Soils Report which summarizes the results of laboratory testing in borings along the proposed alignment. The Appendix also contains the Boring Logs, Grain Size Accumulation Curves and Proctors. This information is being provided to KLJ and the North Dakota Department of Transportation's (NDDOT) Construction Division, Materials and Research Division and the Williston District to assist in the roadway design and determination of quantities.

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 contact Ezra Ballinger by phone at 701.232.8701 or by email at eballinger@braunintertec.com.

Sincerely,

BRAUN INTERTEC CORPORATION

Ezra Ballinger, PE
Principal/Senior Engineer

Steven P. Nagle, PE
Vice President/Principal Engineer

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A. Introduction

A.1. Project Description

The North Dakota Department of Transportation (NDDOT) is planning the construction of a truck reliever route around the northwest side of New Town. The proposed route will begin from a new intersection with the proposed ND Highway 23 located about 1/2-mile west of Highway 1804. The route will proceed to the north and then northeast across the current golf course and undeveloped land for about 1 1/4 miles, joining up at the intersection of the existing New Town Northeast Bypass and Highway 1804. New intersections will be constructed or reconfigured at either end of the roadway as well as at several intermediate roadways. This project has been given NDDOT project number NH-7-023(041)048, PCN 19862.

The proposed project alignment will bisect the Edgewater Country Club golf course and cross United States Army Corps of Engineers (USACE) land within the north ditch of Highway 23 where the new intersection will be constructed. As part of the project a new clubhouse will be constructed for the Edgewater Country Club in addition to several new holes. Earlier project alignments considered a crossing farther to the west to avoid the golf course and cross through Sanish Bay on the edge of Lake Sakakawea. At the time of this report authorization had not been given to perform any borings on the USACE property, including the existing Highway 23 alignment and Sanish Bay, or the existing golf course.

It is our understanding that the proposed roadway will typically be a two lane highway with one lane for each direction with turn lanes where required. Based on the preliminary plan and profile for the route, the existing topography is highly variable along the proposed alignment and the construction will require as much as 35 feet of cut or fill. It is our understanding that a new box culvert will be constructed for access to the golf course across beneath the new roadway.

The scope of our geotechnical evaluation was to provide KLJ and the NDDOT with a linear soils survey for the route and an evaluation of the settlement potential under the deep fill areas. It is our understanding that the pavement section will be determined by the NDDOT.

A.2. Purpose

The purpose of this geotechnical evaluation is to assist KLJ and the NDDOT with the design of the project.

A.3. Scope of Services

We submitted a proposal to Ms. Karls of KLJ on February 2, 2015. Our scope of services in the proposal consisted of the following tasks and subtasks:

- Engineering and Project Management
  - Project kickoff meeting
  - Staking
  - USACE coordination
  - Ice reconnaissance
  - Prepare drilling instructions/call in utility locates
  - Drilling oversight
  - Traffic control
  - Oversee laboratory testing
  - Prepare boring logs
  - Preliminary evaluation of Sanish Bay alternatives
  - Roadway design with regard to the encountered soils
  - Attend design meetings/conference calls,
  - Prepare a draft geotechnical report
  - Prepare final geotechnical report
  - Overall project management of drilling, laboratory testing, and engineering

- Drilling
  - Drill nine (9) standard penetration test borings to depths of 40 to 100 feet along proposed roadway alignments over Sanish Bay
  - 12 flight auger borings to an average depth of 15 feet at approximately 500 feet spacing along the new roadway alignment and at approximately 1000 feet spacing along the existing roadway
  - Select boring locations and coordinate with utility companies to locate buried utilities

- Laboratory Testing
  - Conduct an average of 20 moisture contents, 3 Atterberg limits, 3 grain size analyses, 3 unconfined compressive strength tests and 2 one-dimensional consolidation tests within the 100 feet deep borings

- Conduct an average of 10 moisture contents, 2 Atterberg limits, 2 grain size analyses and 2 unconfined compressive strength tests within the 40 feet deep borings
- Conduct an average of 15 moisture contents, one modified Proctor, one Atterberg limit, and one grain size analysis test for each of the linear soils survey borings

Our scope of work was modified as the project progressed:

- Engineering
  - KLJ performed the staking of the borings at locations we selected.
  - Traffic control was not utilized as borings were not performed along the existing roadways.
  - The preliminary evaluation of the Sanish Bay alternatives was submitted in a DRAFT memo to KLJ and the NDDOT on May 7, 2015. We did not receive comments back on the memo and that aspect of the project was subsequently removed as the Sanish Bay alignments were not selected, thus the information within the memo is not reproduced within this report.
  - We also performed an evaluation and prepared recommendations for support of the new Edgewater Country Club golf course clubhouse.
- Drilling
  - The USACE did not provide authorization for the project to perform any drilling on their land, thus the standard penetration test borings planned for the Sanish Bay alternatives were not performed nor borings planned along Highway 23 leading up to the proposed new intersection.
  - Borings were performed at approximately 250 feet spacing along the new roadway alignment in accordance with direction from NDDOT for linear soils survey's performed for new roadway alignments.
  - Based on the preliminary design information that was available at the time of our drilling, more extensive cuts and fills were planned than were anticipated during the proposal phase. Consequently, deeper borings were required in several locations. The deeper borings were performed using SPT methods to provide information to aid in performing settlement calculations for the proposed roadway embankment. Settlement calculations were performed based on blow counts, soil textural classification and natural moisture content.
  - We performed three standard penetration test borings to 30 feet deep to evaluate soils in the vicinity of the new clubhouse.

B. Results

B.1. Borings

Log of Boring sheets for our test borings are included in the Appendix. The logs identify and describe the geologic materials that were penetrated, and present the results of penetration resistance tests (if any) performed within them, laboratory tests performed on samples retrieved from them, and groundwater measurements. The borings were performed using a truck- or ATV-mounted drill rig equipped with hollow stem or power flight auger.

The borings performed for the linear soils survey are labeled LSS-01 through LSS-21 (sequentially proceeding north and then northeast). The borings performed for the clubhouse are numbered CH-01 through CH-03.

The borings were staked and surveyed by KLJ and the horizontal coordinates and elevations were provided to us. Our drillers measured the horizontal and vertical offsets from the staked locations where offsets were necessary.

Strata boundaries were inferred from changes in the auger cuttings. In the deeper borings sampling was not performed continuously and 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.

B.2. Geology

A review of geologic information in the vicinity of the site indicates that the soils are predominantly glacial deposits associated with the Coleharbor Formation. Specifically, *The Descriptive Geologic Map of Mountrail County*, by Lee Clayton, 1972, indicates the soils consist primarily of the Sand and Gravel member and Silt and Clay member of the Coleharbor Formation.

The Coleharbor Formation is described as “Interlayered pebbly, sandy, silty clay, sand and gravel, and silt and clay; organic material scarce or absent; 3 to more than 300 feet thick; deposited mostly during the ice ages, several hundred thousand to about 9000 year ago (late Pleistocene Epoch).” The Sand and Gravel member is described as “Sandy gravel, gravelly sand, and dirty sandy gravel;…the minerology indicates that it was ultimately derived from the northeast in Canada; most was deposited by large rivers during glacial times, but not necessarily be meltwater rivers; some deposited on beaches of lakes.” The

Silt and Clay member is described as "Silty clay, clayey silt, and clay that is free of pebbles; deposited in lakes whose basins were at least in part enclosed by glacial ice."

For the project, the predominant soil types encountered were A-2-4 and A-1-b soils.

B.3. Site Reconnaissance

We have visited the project on several occasions during 2014 to 2017 in conjunction with our work on the project for the preliminary route selection for the project, ice reconnaissance when drilling was still considered for the Sanish Bay areas, and evaluation for the site cuts and fills. The topography along the alignment was typically undulating with isolated steeper terrain. The majority of the alignment north of the golf course currently exists mainly as agricultural land. A gravel pit is located at the north end of the project just southeast of the project connection to Highway 1804.

B.4. Soil Classification and Comments

We collected a total of 31 bulk samples and 383 moisture content samples from the flight auger or in conjunction with standard penetration test samples. The linear soils survey borings were extended to depths of 10 to 50 feet (average depth of about 28 feet) depending on the amount of cut or fill anticipated at the location.

The results of our laboratory testing for the linear soils survey are shown in Tables 1 and 2 below and on the boring logs, laboratory results sheets, and Linear Soils Report which are provided in the Appendix.

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

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	9	1	16	5.4	8.9	127.9
A-2-4	8	2	15	6.4	10.6	120.9
A-2-6	1	4	9	6.0	6.0	139.0
A-3	2	2	9	2.0	9.5	120.5
A-4	1	4	9	6.8	9.0	129.0
A-6	4	4	32	16.5	11.0	122.5
A-7-6	6	8	30	19.6	12.7	119.0

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]	1	20	20	20	14	14	14	6	6	6
A-2-4	8	NP[2]	NP	NP	NP	NP	NP	NP	NP	NP
A-2-6	1	26	26	26	14	14	14	12	12	12
A-3	2	NP	NP	NP	NP	NP	NP	NP	NP	NP
A-4[3]	1	26	26	26	18	18	18	8	8	8
A-6	4	30	37	34	16	18	16	12	21	17
A-7-6	6	41	50	44	16	20	18	24	30	27

1. 8 of the samples tested were Non-Plastic and are excluded from the quantities and values provided.
2. NP indicates the samples tests were Non-Plastic.

As can be seen in Table 1, the majority of the predominantly granular soils (A-1-b, A-2-4, A-2-6, A-3 and A-4) encountered in the borings were generally 2 to 6 percent dry of their optimum moisture contents as determined by AASHTO T-180. The predominantly cohesive soils (A-6 and A-7-6) on the other hand were on the average, 6 to 7 percent above their average optimum moisture content.

The soils encountered in the borings are considered moderately to highly frost-susceptible. Soils classified as A-6 and A-7-6 soils are generally considered fair to poor subgrade materials. A group index of 20 or greater indicates very poor subgrade materials. Table 3 below provides a summary of the group indices for the A-6 and A-7-6 soils. The poorest subgrade soils were located at the south end of the project area explored in Borings LSS-01 in LSS-06.

Table 3. Summary of Group Indices

AASHTO Classifications	Quantity	Group Index		Group Index Average
		Min	Max	
A-6	4	7	19	14
A-7-6	6	23	32	26

B.5. Groundwater

Groundwater was observed in Boring LSS-01 only at a depth of 20 feet below existing grade. The water level during drilling is noted on the attached Log of Boring sheets. The observation periods were relatively short for all of the borings and 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.

C. Analyses and Recommendations

C.1. Proposed Construction

We have been provided with and reviewed preliminary plan and profile drawings for the roadway. It is our understanding that the proposed roadway will typically be a two lane highway with one lane for each direction with turn lanes where required.

As the route traverses undeveloped land, the vertical alignment of the roadway relative to the existing grades will be highly variable. Based on the preliminary plan and profile for the route the construction will require as much as 35 feet of cut or fill. The southern approximate eight tenths of a mile will be predominantly grade raises, gradually increases in depth from the south end of the project to as much as about 35 feet or more at about Station 48898+00 then gradually reducing again to near zero at about Station 48915+00. The remaining portion of the project is generally a cut condition, with a maximum amount of about 35 feet near Station 49830+00.

The width of the new roadway embankment is typically about 60 feet wide, two 12' lanes and 8' shoulders, though is wider where needed to accommodate turning lanes. The in-slopes of the new embankment are planned to be either 6:1 (Horizontal:Vertical) or 4:1 as required to meet NDDOT design requirements.

It is our understanding that the pavement section for the new roadway will be developed by the NDDOT and that all work on the site will be performed in accordance with NDDOT Standard Specifications.

C.2. Treatment of Organic Soils

Organic soils are present in the ditches for the portions of the alignment adjacent existing roads and in the entire roadway area where the route will involve entirely new construction. We recommend that all vegetation, root zones and organic topsoils be removed prior to subgrade preparation and placement of new fill in these areas. After the removal of organics, the subgrade should be prepared as indicated in Section C.3. Organic soils that are removed should not be reused as embankment fill; however they could be stockpiled and may be used as dressing on the new embankment slopes.

C.3. Subgrade Preparation

After vegetation and topsoils have been removed, we recommend 12 inches of subgrade preparation in cut areas, and in fill areas where less than 18 inches of fill will be placed. In fill areas where greater than 18 inches of fill will be placed, it is not necessary to perform subgrade preparation beyond topsoil stripping. Subgrade preparation should comply with NDDOT Specification 230.04 D (Type A).

Compaction control for subgrade preparation should be in accordance with AASHTO T-180 and Specification 203.04 e.2.a (Type A).

If unstable soils are present below the topsoil, scarification and drying or overexcavation and replacement of the unsuitable soils could be considered.

C.4. Subgrade Remediation

Based on the conditions encountered in our borings, we do not anticipate that subgrade remediation will be necessary along the project. If localized soft spots are encountered during the course of construction, we recommend they be remediated at the discretion of the NDDOT Project Engineer.

If it is required, subgrade remediation should be performed with a backhoe using a smooth cutting edge to reduce the disturbance of the underlying soils. A 20H:1V transition shall be constructed prior to entering and exiting subcut excavations. Construction equipment should not be allowed to operate on the exposed subgrades. We anticipate that the majority of any subgrade remediation could be performed by removing the existing soft soil and replacing it with embankment fills. If very soft subgrades are encountered and this approach will not work, the subcutting (removal and backfill with imported aggregate) should be performed in accordance with NDDOT Specification 203.02 C.

C.5. Subgrade Drainage

We recommend that drainage be provided for aggregate base placed over the on-site soils or similar soils used to construct new embankments. Drainage should be provided by sloping the subgrade and daylighting the aggregate base to the shoulders. Loosely placed topsoil over the aggregate slough generally will not impede the flow of water out of the aggregate base layer provided the subgrade is sloped to drain to the ditches. Water should not be allowed to infiltrate clay subgrades but instead flow down the in-slopes and be collected and routed through ditches and culverts on either side of the road.

C.6. Unsuitable Materials

Based on the soils encountered in our borings, we anticipate that the soils encountered in excavations for the project will generally be suitable for construction of the widened roadway embankment. As discussed in Section C.3, organic soil deposits should not be used as embankment fill. We recommend that the balance of imported soils used as borrow be similar to the existing subgrade soils in the area. Any soils encountered or imported that cannot be moisture conditioned and compacted according to the recommendations of this report should not be used.

C.7. Settlement

Settlement will occur due to compression of the soils underlying the new roadway embankments (the foundation soils), as well as settlement of the embankment fill itself. There is the potential for settlements to be substantial due to the relatively high new embankments planned in some areas.

C.7.a. Foundation Soils

We have reviewed the plan and profile developed by KLJ in April 2017. The soils along the roadway are generally a mix of sands and clays with low to moderate compressibility. Based on the cross sections, the new fills along the project will be highly variable due to the variability of the existing terrain. We performed calculations at various locations along the alignment with deeper fills based on the result of borings at the specific location. Calculations were performed using correlations of 1D consolidation settlement properties to blow counts, moisture content, Atterberg limits, and soil type. The results of our calculations can be summarized as follows:

- Where fills of less than about 5 feet are planned, we anticipate post construction foundation soil settlements will be less than 2 inches.
- Where fills of 5 to 15 feet are planned, we anticipate post construction foundation soil settlement of 2 to 4 inches may occur.
- Where fills of 15 to 25 feet are planned, we anticipate post construction foundation soil settlement of 4 to 6 inches may be anticipated.
- Where fills of 25 to 35 feet are planned, we anticipate post construction foundation soil settlement of 6 to 8 inches may be anticipated.
- Where fills of greater than 35 feet are planned (in the vicinity of Boring LSS-03 only, near Station 48898+00), we anticipate post construction settlements of as foundation soil settlement of as much as 1 foot may occur.

The soils encountered across the project site are predominantly clayey beneath the fill soils except at the north end of the fill zone where they transition to sandy soils. Settlements in sands typically occur relatively quickly, while clays can take significantly longer. In our experience in the New Town area, the clays often experience much of the predicted settlements within about one year. The most cost effective solution for mitigating the anticipated settlement would be to construct the deep fill areas as early as possible and allow them to sit while the remainder of the project is constructed. It is our understanding that the project will be let in early 2018 and the roadway will not be opened until late 2018 or early 2019. We recommend that the deep fill areas be constructed as early as possible in the construction schedule. We anticipate that a portion of the predicted settlements will occur prior to the placement of pavements and traffic on the roadway in late 2018 or early 2019.

The utilities and culvert crossings under the roadway would also need to be designed to experience the potential settlements or be installed after the fills have been in place for 6 months to a year. If the culverts will be installed prior to the complete fill placement, consideration should be given to placing 3 feet of Class 5 beneath the culverts and crowning them in the center of the alignment where the settlement is likely the deepest. This option will help to reduce differential settlement and bowl-shaped culverts after settlement has occurred.

C.7.b. Settlement of Embankment Fill

When fill is placed, it will compress under its own weight, resulting in settlement. In clean sand soils, this settlement occurs rapidly (typically during construction), however, with clayey soils, this settlement may occur over many years. We anticipate that some of the soils used as embankment fill for this project will be clayey. Compacted clay embankments will generally experience secondary consolidation (post-construction settlements) on the order of 0.2 to 0.4 percent of the total backfill thickness per logarithmic cycle of time. Based on this relationship the anticipated embankment fill settlements are as follows:

- 10 feet of embankment fill may experience ¼- to ½-inch of settlement
- 15 feet of embankment fill may experience ½- to ¾-inch of settlement
- 20 feet of embankment fill may experience ½- to 1-inch of settlement
- 25 feet of embankment fill may experience ¾- to 1 ¼-inch of settlement
- 35 feet of embankment fill may experience 1 to 2 inches of settlement

The reported settlements are per logarithmic cycle of time, i.e. they are anticipated to occur from 10 to 100 days following fill placement, again from 100 to 1000 days following fill placement, an again from 1000 to 10000 days following fill placement, etc. Poor or reduced compaction of the clayey backfills will exacerbate the settlement. This settlement is in addition to the settlements of the foundation soils.

C.7.c. Settlement Monitoring

We recommend the monitoring of settlements using settlement plates for all embankments that are over 20 feet high. The purpose of the settlement plates is to aid the project team in understanding how much settlement has occurred and whether the rate of settlement is decreasing such that the timing for placing surfacing materials can be appropriately evaluated. The settlement plates should be installed at the native grades at 200 foot intervals under the centerline of the new embankments. Based on the plans we have reviewed, we anticipate that embankments over 20 feet high will be constructed from approximate Station 48895+50 to 48901+00 and approximate Station 48906+50 to 48911+00.

The settlement plates should consist of steel or wooden plates with a dimension of 2 feet square, fitted with a floor flange able to fit a ¾-inch diameter steel pit. Once set over a level spot, the top of the plate should be staked into the ground and surveyed. Riser pipe in 3- to 6-foot section lengths should be fitted to the settlement plate, with additional sections added with subsequent lifts of fill. A 2-inch diameter PVC pipe should be placed around the riser pipe to protect the pipe and reduce friction along the sides of the pipe. We recommend the PVC pipe extend a minimum of 3 vertical feet above grades at all times and be painted and flagged to notify equipment operators of their presence. Survey measurements must be taken of the steel riser upon attaching each lead section in order to back-calculate the corresponding top of plate elevation.

The settlement plates should be surveyed according to the following schedule:

- At installation and with each additional section of steel riser
- Immediately after the embankment has been constructed to finished grade
- 2, 4, 7, 14 and 21 days after embankment construction and bi-weekly to follow
- At monthly intervals with the direction of the Geotechnical Engineer

C.8. Backslopes

We understand the proposed construction includes cutting the existing soil back to a 4:1 slope outside of the ditches. We understand that the NDDOT would prefer to use 4:1 backslopes wherever possible. If cases exist where it is not possible to use a 4:1, a 3:1 back-slope may be adequate from a stability standpoint, however, site specific evaluations should be performed for any areas under considerations for steepening beyond a 4:1.

Benching of the backslopes is not required for 4:1 slopes. For slopes as steep as 3:1, if any, we recommend benching for any backslopes that are greater than 20 feet tall. Benches about 10 feet wide

should be constructed no more than 20 vertical feet apart to reduce the potential for erosion due to water flowing down the slope face. We also recommend that the backslopes be planted with native grasses/shrubs, where possible, as a further protection against erosion. We anticipate that excavation can be performed with typical excavation equipment.

C.9. Box Culvert

The access for the golf course beneath the roadway will be through an approximately 18' x 12' reinforced concrete box culvert that will be approximately 125 feet long. The bottom of the box culvert will bear approximately 4 to 6 feet below the existing grade at the location. The roadway grade will be approximately 8 feet higher than existing grades at the box culvert. Our Boring LSS-01 was performed approximately 175 feet north of the box culvert location as we were not allowed access to the location at the time of the exploration. Recommendations for the box culvert design and construction are provided in the following sections.

C.9.a. General Removals

The existing topsoils, vegetation and root zones should be removed from below all areas that will receive new fills. Organic soils should be treated in accordance with Section C.2.

C.9.b. Excavation Support

The native soils are Type C Soils under OSHA (Occupational Safety and Health Administration) guidelines. Unsupported excavations in Type C soils should be maintained at a gradient no steeper than 1 ½:1 (horizontal:vertical).

C.9.c. Dewatering

In Boring LSS-01 groundwater was encountered at a depth well below the anticipated excavation, thus we do not anticipate major dewatering will be required during construction. If any surface water or seepage into the excavation occurs, we recommend removing the water from the excavations as it is encountered. Sumps and pumps should be suitable for dewatering needs.

C.9.d. Subgrade Preparation

Based on the soils encountered in Boring LSS-01 and the assumed invert elevation, we anticipate the box culvert will bear on soft lean clay soils that will be susceptible to disturbance. To provide support for construction traffic and limit the amount of down time due to soft and weak soils, we recommend a minimum overexcavation of 1 foot below the base of the box culvert. We also recommend that the overexcavation extend a minimum of 1 foot horizontally beyond the outside edges of the box culvert.

After the overexcavation has been completed, we recommend the excavation be fully enveloped in a Type S1 Geotextile fabric (NDDOT Specification Section 858). We recommend the overexcavation be backfilled with NDDOT Specification 816.02 Class 5 or Class 7.

C.9.e. Excavation Backfilling

After the box culvert has been constructed the excavation will need to be backfilled. The soils placed around the box culvert and above it to the bottom of the pavement section should consist of soils meeting the following requirements:

- Mineral soil with an organic content of less than 3 percent by mass
- Free of rocks larger than 4 inches in its longest dimension where placed within the top 1 foot of the finished subgrade
- Classified in accordance with ASTM guidelines with a prefix letter of S, C or G (e.g. SP, SC, CH, GP, etc.), with exception to materials classified as CL-ML (silty clay) and SC-SM (silty clayey sand)
- Liquid limit (LL) ≤ 50 percent

Compaction control for subgrade preparation should be in accordance with AASHTO T-180 and NDDOT Specification 203.04 E.2.a (Type A).

C.9.f. Settlement

Based on the anticipated fill around the box culvert to reach design roadway grades, we anticipate the box may experience settlement of about 2 to 4 inches following construction. It is our understanding that the box culvert can be designed for this settlement.

C.10. Clubhouse

The project will include the construction of a new Clubhouse for the relocated golf course. Table 4 provides the building details. Recommendations for the building design and construction are provided in the following sections.

Table 4. Building Description

Aspect	Description
Below grade levels	1 – the cart garage, mechanical electrical, and storage areas will be in a walk-out basement.
Above grade levels	1 – the main facility will be on a single floor at grade on one side and with a wooden deck overhanging the basement level on the other side.
Lowest level floor elevation	Assumed at about 10 feet below existing grades.
Column loads (kips)	Assumed to be less than 150.
Wall loads (kips)	Assumed to be less than 10.
Cuts or fills	Assumed about 10 feet of cut for the basement, and less than about 3 feet of fill for the walkup on the opposite side.
Tolerable building settlement	Assumed to be less than about 1 ½ inches.
Nature of construction	The building will have a concrete slab on grade basement floor and exterior patio, poured concrete basement walls and wood framing first floor walls and roof. The foundations will be cast in place concrete spread footings below columns and walls.

C.10.a. Building Subgrade Preparations

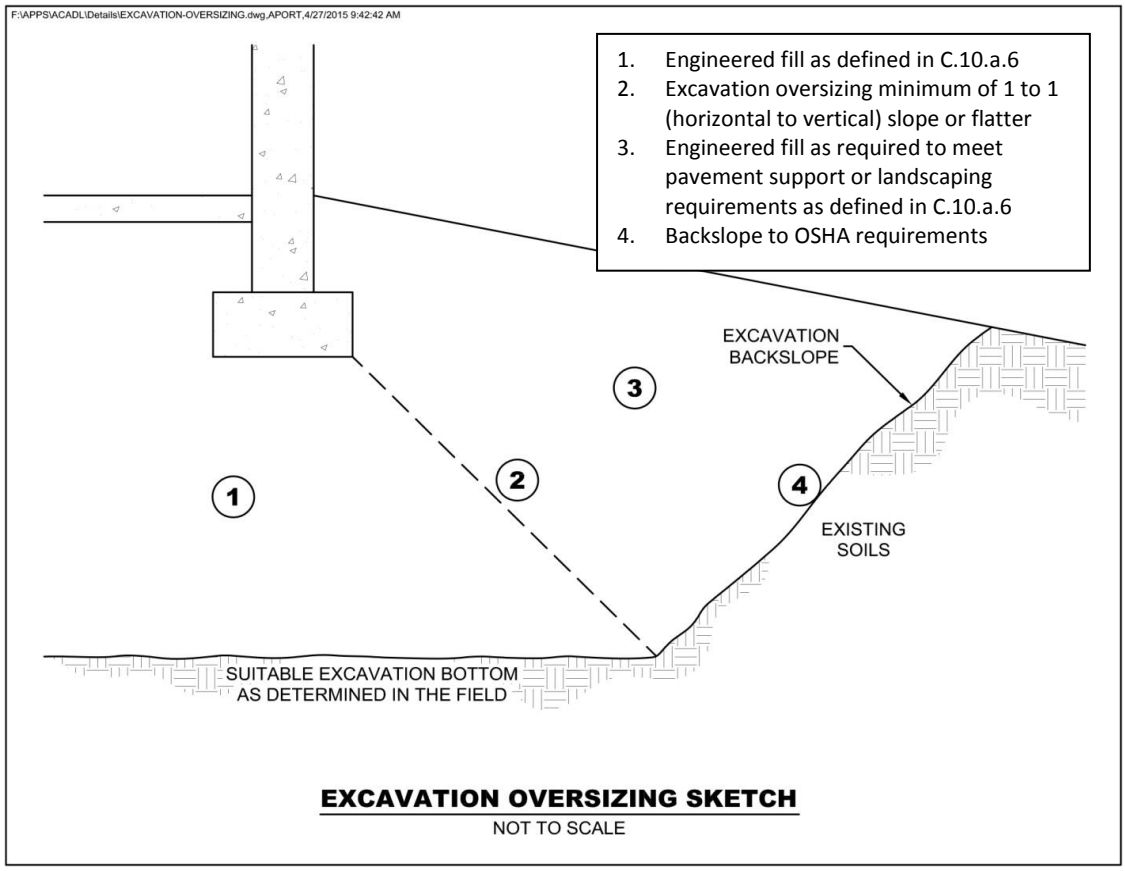
C.10.a.1. Excavations

We recommend removing topsoil below the proposed foundations and in their oversize areas. Based on the borings, we do not anticipate soil corrections below the proposed footing and basement floor slab elevations. We recommend having a geotechnical engineer, or an engineering technician working under the direction of a geotechnical engineer, (geotechnical representative) evaluate the suitability of exposed subgrade soils to support the proposed structure.

C.10.a.2. Excavation Oversizing

When removing unsuitable materials below structures, if necessary for the project, we recommend the excavation extend outward and downward at a slope of 1H:1V (horizontal:vertical) or flatter. See Figure 1 for an illustration of excavation oversizing.

Figure 1. Generalized Illustration of Oversizing



C.10.a.3. Excavated Slopes

Based on the borings, we anticipate on-site soils in excavations will consist of siltstone and claystone weathered bedrock. These soils are typically considered Type B Soil under OSHA guidelines. OSHA guidelines indicate unsupported excavations in Type B soils should have a gradient no steeper than 1H:1V. Slopes constructed in this manner may still exhibit surface sloughing. OSHA requires an engineer to evaluate slopes or excavations over 20 feet in depth.

An OSHA-approved qualified person should review the soil classification in the field. Excavations must comply with the requirements of OSHA 29 CFR, Part 1926, Subpart P, "Excavations and Trenches." This document states excavation safety is the responsibility of the contractor. The project specifications should reference these OSHA requirements.

C.10.a.4. Excavation Dewatering

We recommend removing any water that collects within the excavations. Project planning should include temporary sumps and pumps for excavations in the low-permeability clay and silt soils.

C.10.a.5. Exterior Slab Subgrade Preparation

We recommend the following steps for exterior slab subgrade preparation, understanding the site will have a grade change of 10 feet or less. Note that project planning may need to require additional subcuts to limit frost heave.

1. Ensure that all unsuitable soils consisting of topsoil, organic soils and vegetation have been removed from within 3 feet of the surface of the proposed slab grade.
2. Have a geotechnical representative observe the excavated subgrade to evaluate if additional subgrade improvements are necessary.
3. Slope subgrade soils to allow the removal of accumulating water from beneath the pavements.

   Place pavement engineered fill to grade, if required, and compact in accordance with Section C.10.a.6 to bottom of exterior slab section. See Section C.10.e for additional considerations related to frost heave.

C.10.a.6. Engineered Fill Materials and Compaction

Table 5 below contains our recommendations for engineered fill materials.

Table 5. Engineered Fill Materials*

Locations To Be Used	Engineered Fill Classification	Possible Soil Type Descriptions	Gradation	Additional Requirements
▪ Below foundations ▪ Below interior slabs	Structural fill	All except CH	100% passing 2-inch sieve	< 2% Organic Content (OC) Liquid Limit < 40%
▪ Drainage layer ▪ Non-frost-susceptible	▪ Free-draining ▪ Non-frost-susceptible fill	GP, GW, SP, SW	100% passing 1-inch sieve < 50% passing #40 sieve < 5% passing #200 sieve	< 2% OC
Behind below-grade walls, beyond drainage layer	Retained fill	SP, SW, SP-SM, SW-SM, SM	100% passing 3-inch sieve < 20% passing #200 sieve	< 2% OC Plasticity Index (PI) < 4%
Below landscaped surfaces, where subsidence is not a concern	Non-structural fill	All	100% passing 6-inch sieve	< 10% OC

* More select soils comprised of coarse sands with < 5% passing #200 sieve may be needed to accommodate work occurring in periods of wet or freezing weather.

We recommend spreading engineered fill in loose lifts of approximately 6 inches thick. We recommend compacting engineered fill in accordance with the criteria presented below in Table 6. The project documents should specify relative compaction of engineered fill, based on the structure located above the engineered fill, and vertical proximity to that structure.

Table 6. Compaction Recommendations Summary

Reference	Relative Compaction, percent (ASTM D698 – Standard Proctor)	Moisture Content Variance from Optimum, percentage points	
		< 12% Passing #200 Sieve (typically SP, SP-SM)	> 12% Passing #200 Sieve (typically CL, SC, ML, SM)
Below foundations and oversizing zones	98	±3	-1 to +3
Below interior slabs	98	±3	-1 to +3
Below exterior slabs on grade	95	±3	±3
Below landscaped surfaces	90	±5	±4
Adjacent to below-grade wall	95*	±3	-1 to +3

*Increase compaction requirement to meet compaction required for structure supported by this engineered fill.

The project documents should not allow the contractor to use frozen material as engineered fill or to place engineered fill on frozen material. Frost should not penetrate under foundations during construction.

We recommend performing density tests in engineered fill to evaluate if the contractors are effectively compacting the soil and meeting project requirements.

C.10.c. Spread Footings

Table 7 below contains our recommended parameters for foundation design.

Table 7. Recommended Spread Footing Design Parameters

Item	Description
Maximum net allowable bearing pressure (psf)	2500
Minimum factor of safety for bearing capacity failure	3.0
Minimum embedment below final exterior grade for perimeter footings of heated structures (inches) (Interior footings may be placed immediately below floor slabs)	60
Minimum embedment below final exterior grade for unheated structures or for footings not protected from freezing temperatures during construction (inches)	72
Total estimated settlement (inches)	~ 1 inch
Differential settlement	Typically about 2/3 of total settlement*

* Actual differential settlement amounts will depend on final loads and foundation layout. We can evaluate differential settlement based on final foundation plans and loadings.

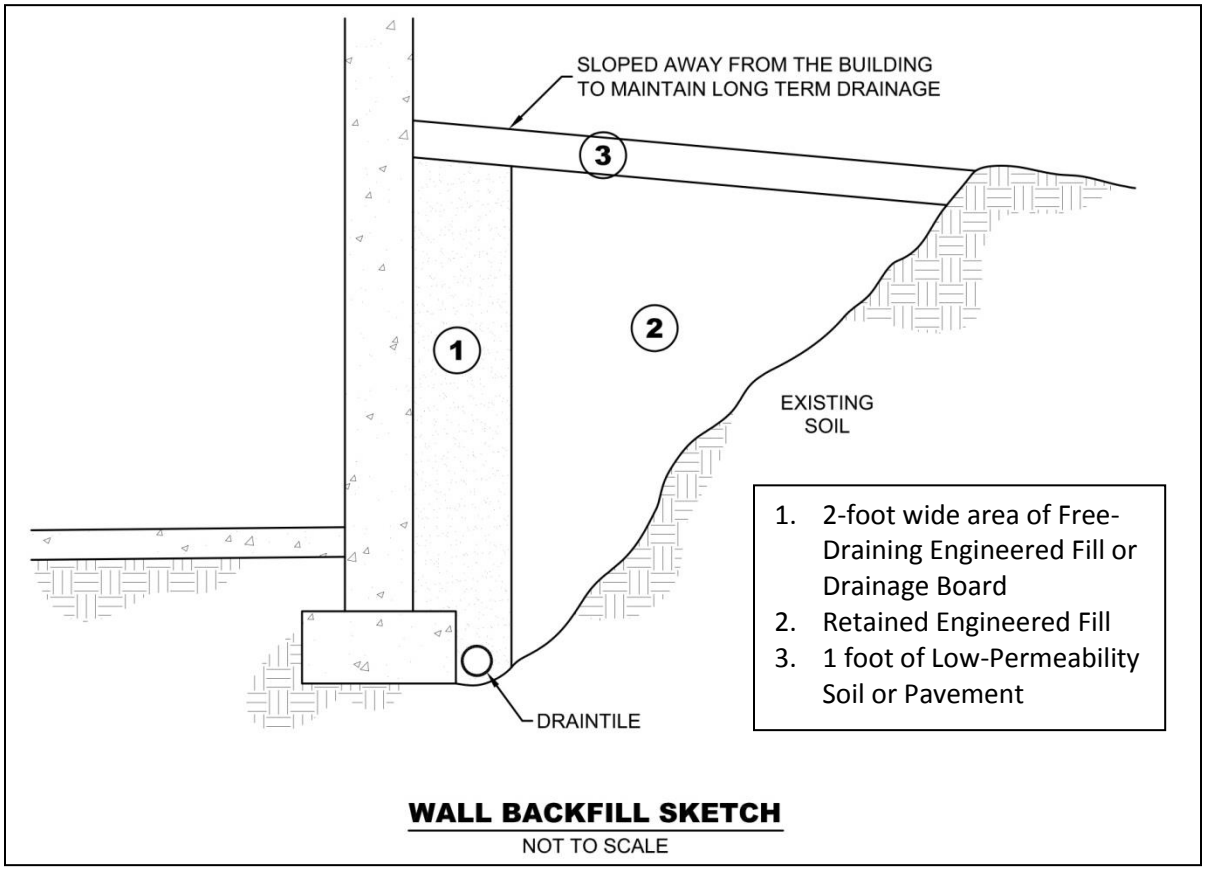
C.10.d. Below Grade Walls

C.10.d.1. Drainage Control

We recommend installing drain tile to remove water behind the below-grade walls, at the location shown in Figure 2. The below-grade wall drainage system should also incorporate free-draining, engineered fill or a drainage board placed against the wall and connected to the drain tile.

Even with the use of free-draining, engineered fill, we recommend general waterproofing of below-grade walls that surround occupied or potentially occupied areas because of the potential cost impacts related to seepage after construction is complete.

Figure 2. Generalized Illustration of Wall Engineered Fill



The materials listed in the sketch should meet the definitions in Section C.10.a.6. Low-permeability material is capable of directing water away from the wall, like clay, topsoil or pavement. The project documents should indicate if the contractor should brace the walls prior to filling and allowable unbalanced fill heights.

As shown in Figure 2, we recommend Zone 2 consist of retained, engineered fill, and this material will control lateral pressures on the wall. However, we are also providing design parameters for using other engineered fill material. If final design uses non-sand material for engineered fill, project planning should account for the following items:

- Other engineered fill material may result in higher lateral pressure on the wall.
- Other engineered fill material may be more difficult to compact.

- Post-construction consolidation of other engineered fill material may result in settlement-related damage to the structures or slabs supported on the engineered fill. Post-construction settlement of other engineered fill material may also cause drainage towards the structure. The magnitude of consolidation could be up to about 3 percent of the wall fill thickness.

C.10.d.2. Configuring and Resisting Lateral Loads

Below-grade wall design can use active earth pressure conditions, if the walls can rotate slightly. If the wall design cannot tolerate rotation, then design should use at-rest earth pressure conditions. Rotation up to 0.002 times the wall height is generally required for walls supporting sand. Rotation up to 0.02 times the wall height is required when wall supports clay.

Table 8 presents our recommended lateral coefficients and equivalent fluid pressures for wall design of active, at-rest and passive earth pressure conditions. The table also provides recommended wet unit weights and internal friction angles. Designs should also consider the slope of any engineered fill and dead or live loads placed behind the walls within a horizontal distance that is equal to the height of the walls. Our recommended values assume the wall design provides drainage so water cannot accumulate behind the walls. The construction documents should clearly identify what soils the contractor should use for engineered fill of walls.

Table 8. Recommended Below-Grade Wall Design Parameters – Drained Conditions

Retained Soil	Wet Unit Weight, pcf	Friction Angle, degrees	Active Equivalent Fluid Pressure* (pcf)	At-Rest Equivalent Fluid Pressure* (pcf)	Passive Equivalent Fluid Pressure* (pcf)
Retained Fill	125	30	42	63	375
Compacted Lean Clay with Sand	120	24	51	71	285

* Based on Rankine model for soils in a region behind the wall extending at least 2 horizontal feet beyond the bottom outer edges of the wall footings and then rising up and away from the wall at an angle no steeper than 60 degrees from horizontal.

Sliding resistance between the bottom of the footing and the soil can also resist lateral pressures. We recommend assuming a sliding coefficient equal to 0.35 between the concrete and soil.

The values presented in this section are un-factored.

C.10.e. Interior Slabs

C.10.e.1. Subgrade Modulus

The anticipated floor subgrade is lean clay or silt. We recommend using a modulus of subgrade reaction, k, of 75 pounds per square inch per inch of deflection (pci) to design the slabs. If the slab design includes placing at least 6 inches of compacted crushed aggregate base immediately below the slab, the subgrade may be instead considered to provide a k-value of 150 pci. We recommend that the aggregate base materials be free of bituminous. In addition to improving the modulus of subgrade reaction, an aggregate base facilitates construction activities and is less weather sensitive.

C.10.e.2. Moisture Vapor Protection

Excess transmission of water vapor could cause floor dampness, certain types of floor bonding agents to separate, or mold to form under floor coverings. If project planning includes using floor coverings or coatings, we recommend placing a vapor retarder or vapor barrier immediately beneath the slab. We also recommend consulting with floor covering manufacturers regarding the appropriate type, use and installation of the vapor retarder or barrier to preserve warranty assurances.

C.10.f. Frost Protection

C.10.f.1. General

Lean clays or silts will underlie all or some of the exterior slabs. We consider these soils moderately frost susceptible. Soils of this type can retain moisture and heave upon freezing. In general, this characteristic is not an issue unless these soils become saturated, due to surface runoff or infiltration, or are excessively wet in situ. Once frozen, unfavorable amounts of general and isolated heaving of the soils and the surface structures supported on them could develop. This type of heaving could affect design drainage patterns and the performance of exterior slabs as well as any isolated exterior footings and piers.

Note that general runoff and infiltration from precipitation are not the only sources of water that can saturate subgrade soils and contribute to frost heave. Roof drainage and irrigation of landscaped areas in close proximity to exterior slabs, pavements, and isolated footings and piers, contribute as well.

C.10.f.2. Frost Heave Mitigation

To address most of the heave related issues, we recommend setting general site grades and grades for exterior surface features to direct surface drainage away from buildings, across large paved areas and away from walkways. Such grading will limit the potential for saturation of the subgrade and subsequent

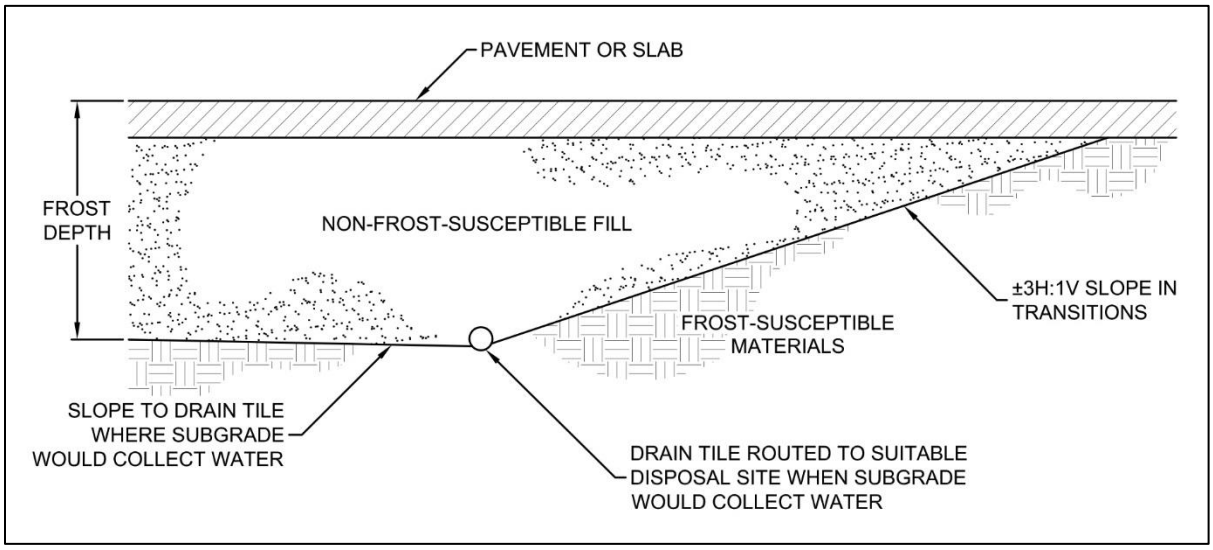
heaving. General grades should also have enough “slope” to tolerate potential larger areas of heave, which may not fully settle after thawing.
Even small amounts of frost-related differential movement at walkway joints or cracks can create tripping hazards. Project planning can explore several subgrade improvement options to address this condition.

One of the more conservative subgrade improvement options to mitigate potential heave is removing any frost-susceptible soils present below the exterior slab areas down to a minimum depth of 5 feet below subgrade elevations. We recommend filling the resulting excavation with non-frost-susceptible fill. We also recommend sloping the bottom of the excavation toward one or more collection points to remove any water entering the engineered fill. This approach will not be effective in controlling frost heave without removing the water.

An important geometric aspect of the excavation and replacement approach described above is sloping the banks of the excavations to create a more gradual transition between the unexcavated soils considered frost susceptible and the engineered fill in the excavated area, which is not frost susceptible. The slope allows attenuation of differential movement that may occur along the excavation boundary. We recommend slopes that are 3H:1V, or flatter, along transitions between frost-susceptible and non-frost-susceptible soils.

Figure 3 shows an illustration summarizing some of the recommendations.

Figure 3. Frost Protection Geometry Illustration



Another option is to limit frost heave in critical areas, such as doorways and entrances, via frost-depth footings or localized excavations with sloped transitions between frost-susceptible and non-frost-susceptible soils, as described above.

Over the life of slabs cracks will develop and joints will open up, which will expose the subgrade and allow water to enter from the surface and either saturate or perch atop the subgrade soils. This water intrusion increases the potential for frost heave or moisture-related distress near the crack or joint. Therefore, we recommend implementing a detailed maintenance program to seal and/or fill any cracks and joints. The maintenance program should give special attention to areas where dissimilar materials abut one another, where construction joints occur and where shrinkage cracks develop.

C.10.g. Equipment Support

The recommendations included in the report may not be applicable to equipment used for the construction and maintenance of this project. We recommend evaluating subgrade conditions in areas of shoring, scaffolding, cranes, pumps, lifts and other construction equipment prior to mobilization to evaluate if the exposed materials are suitable for equipment support, or require some form of subgrade improvement. We also recommend project planning consider the effect that loads applied by such equipment may have on structures they bear on or surcharge – including pavements, buried utilities, below-grade walls, etc. We can assist you in this evaluation.

D. Construction

D.1. Excavation

Bedrock that impeded our drilling equipment was not encountered in the majority of our borings, therefore it is our opinion that the soils in the borings can be excavated with standard equipment such as scrapers, earth movers and backhoes. Depending on the time of construction, the subgrades may be excessively wet. It may be necessary to limit the activities of rubber-tired equipment directly on the embankment until the soils are dried.

D.2. Testing

We recommend density testing of backfill and fill placed for the roadway. As indicated above, we recommend the use of AASHTO T180 as per NDDOT supplemental specifications. The testing frequency should follow NDDOT requirements.

E. Procedures

E.1. Penetration Test Borings

The standard penetration test borings were drilled with a truck- or flotation tire-mounted core and auger drill equipped with hollow-stem auger. The borings were performed in accordance with ASTM D 1586. Penetration test samples were taken at 2 ½ foot intervals. Bulk samples were also collected from each of the roadway borings. Actual sample intervals and corresponding depths are shown on the boring logs.

E.2. Power Auger Borings

We performed the power auger borings with the same equipment as our penetration test borings and in general accordance with ASTM D1452. We inferred the soil classifications and strata depths from the cuttings brought to the surface by dead pulling the auger after screwing it to selected depths in the ground. The auger was advanced at 1 or 2 foot intervals and "dead-pulled" to collect moisture content samples off of the auger at 1-foot spacings. Bulk samples were collected from each of the borings. Sample intervals and corresponding depths are shown on the boring logs.

E.3. Exploration Logs

E.3.a. Log of Boring Sheets

The Appendix includes Log of Boring Sheets for our penetration test and power auger borings. The logs identify and describe the penetrated materials, and present the results of penetration resistance tests where they were performed. The logs also present the results of laboratory tests performed on penetration test samples and auger cuttings, and groundwater measurements.

We inferred strata boundaries from changes in the penetration test samples and the auger cuttings. Because we did not perform continuous sampling, the strata boundary depths are only approximate. The boundary depths likely vary away from the boring locations, and the boundaries themselves may occur as gradual rather than abrupt transitions.

E.3.b. Geologic Origins

We assigned geologic origins to the materials encountered in the structure borings shown on the logs and referenced within this report, based on: (1) a review of the background information and reference documents cited above, (2) visual classification of the various geologic material samples retrieved during the course of our subsurface exploration, (3) penetration resistance testing performed for

the project, (4) laboratory test results, and (5) available common knowledge of the geologic processes and environments that have impacted the site and surrounding area in the past.

E.4. Material Classification and Testing

E.4.a. Visual and Manual Classification

We visually and manually classified the geologic materials encountered in accordance with ASTM D2488. The Appendix includes a chart explaining the classification system.

E.4.b. Laboratory Testing

The exploration logs in the Appendix note most of the results of the laboratory tests performed on geologic material samples. The remaining laboratory test results follow the exploration logs. We performed the tests in general accordance with AASHTO procedures.

E.5. Groundwater Measurements

The drillers checked for groundwater as the borings were advanced, and again after auger withdrawal. The boreholes were then backfilled.

F. Qualifications

F.1. Variations in Subsurface Conditions

F.1.a. Material Strata

We developed our evaluation, analyses and recommendations from a limited amount of site and subsurface information. It is not standard engineering practice to retrieve material samples from exploration locations continuously with depth. Therefore, we must infer strata boundaries and thicknesses to some extent. Strata boundaries may also be gradual transitions, and project planning should expect the strata to vary in depth, elevation and thickness, away from the exploration locations.

Variations in subsurface conditions present between exploration locations may not be revealed until performing additional exploration work, or starting construction. If future activity for this project reveals any such variations, you should notify us so that we may reevaluate our recommendations. Such variations could increase construction costs, and we recommend including a contingency to accommodate them.

F.1.b. Groundwater Levels

We made groundwater measurements under the conditions reported herein and shown on the exploration logs, and interpreted in the text of this report. Note that the observation periods were relatively short, and project planning can expect groundwater levels to fluctuate in response to rainfall, flooding, irrigation, seasonal freezing and thawing, surface drainage modifications and other seasonal and annual factors.

F.2. Continuity of Professional Responsibility

F.2.a. Plan Review

We based this report on a limited amount of information, and we made a number of assumptions to help us develop our recommendations. We should be retained to review the geotechnical aspects of the designs and specifications. This review will allow us to evaluate whether we anticipated the design correctly, if any design changes affect the validity of our recommendations, and if the design and specifications correctly interpret and implement our recommendations.

F.2.b. Construction Observations and Testing

We recommend retaining us to perform the required observations and testing during construction. This will allow us to correlate the subsurface conditions encountered during construction with those encountered by the borings and provide professional continuity from the design phase to the construction phase.

F.3. Use of Report

This report is for the exclusive use of the addressed parties. Without written approval, we assume no responsibility to other parties regarding this report. Our evaluation, analyses and recommendations may not be appropriate for other parties or projects.

F.4. Standard of Care

In performing its services, Braun Intertec used that degree of care and skill ordinarily exercised under similar circumstances by reputable members of its profession currently practicing in the same locality. No warranty, express or implied, is made.

Appendix

DENOTES APPROXIMATE LOCATION OF STANDARD PENETRATION TEST BORING

250' 0 500'

SCALE: 1" = 500'

BRAUN INTERTEC
The Science You Build On.
11001 Hampshire Avenue S
Minneapolis, MN 55438
PH. (952) 995-2000
FAX (952) 995-2020

Base Dwg Provided By:
KLJ ENGINEERING

SOIL BORING LOCATION SKETCH

GEOTECHNICAL EVALUATION
NORTHWEST TRUCK RELIEVER ROUTE / BYPASS
HIGHWAY 23 TO HIGHWAY 1806 - 7-023(041)048-NH-CPU; PCN 19862
NEW TOWN, NORTH DAKOTA

Project No:	B1500957
Drawing No:	B1500957
Scale:	1" = 500'
Drawn By:	BJB
Date Drawn:	4/10/17
Checked By:	EB
Last Modified:	4/10/17
Sheet: of	Fig:

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Linear Report of Tests on Soil Samples

PROJECT NO.: B1500957
PROJECT: New Town Truck Reliever Rte NW
Higway 1804
New Town, North Dakota

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

Boring Number	LSS-01	LSS-01	LSS-02	LSS-02	LSS-03
Northing	365803.456	365803.456	366053.014	366053.014	366302.644
Easting	1477750.596	1477750.596	1477735.879	1477735.879	1477720.734
Elevation	1908.3	1908.3	1911.4	1911.4	1889.4
Sample Depth	1' - 11.5'	11.5' - 31'	0.5' - 6.5'	6.5' - 31'	0.5' - 26.5'
% Passing 3/8" Sieve	100	100	100	100	100
% Passing No. 4 Sieve	100	100	100	100	100
% Passing No. 10 Sieve	100	99	100	100	100
% Coarse Sand (-No. 10, +No. 40)	1	2	0	0	1
% Fine Sand (-No. 40, +No. 200)	8	12	2	2	9
% Silt (0.075 - 0.002 mm)	65	64	67	65	59
% Clay (<0.002 mm)	27	22	32	33	32
% Finer than 0.02 mm	54	44	75	71	59
Frost Group	F3	F3	F3	F3	F3
Liquid Limit (-No. 40)	42	35	50	45	37
Plastic Limit (-No. 40)	18	17	20	18	16
Plasticity Index (-No. 40)	24	18	30	27	21
Soil Color	Dark Brown	Brown	Brown	Brown	Brown
USCS Classification	CL	CL	CH	CL	CL
Soil Classification (AASHTO M-15)	A-7-6 (23)	A-6 (15)	A-7-6 (32)	A-7-6 (28)	A-6 (19)
Optimum Moisture (%)	13.0	10.0	15.0	13.0	12.0
Maximum Dry Density (pcf)	117.0	128.0	116.0	121.0	121.0

Depth (ft) Top 8 samples	Moisture (%) Top 8 samples									
2.5	17	12.5	26	0.5	26	7.5	14	2.5	11
5.0	14	15.0	26	2.5	23	10.0	16	5.0	12
7.5	17	17.5	29	5.0	23	12.5	21	7.5	11
10.0	21	20.0	30			15.0	18	10.0	16
		22.5	32			17.5	19	12.5	19
		25.0	27			20.0	17	15.0	16
		27.5	28			22.5	14	17.5	17
		30.0	27			25.0	15	20.0	19
Avg. Moisture of Sample Depth (all)	17	28		24		16		16	

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PROJECT: New Town Truck Reliever Rte NW
Higway 1804
New Town, North Dakota

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

Boring Number	LSS-04	LSS-05	LSS-05	LSS-06	LSS-06
Northing	366552.036	366801.689	366801.689	367051.091	367051.091
Easting	1477705.451	1477690.366	1477690.366	1477675.163	1477675.163
Elevation	1898.5	1917.1	1917.1	1920.9	1920.9
Sample Depth	1.5' - 6.5'	1' - 17'	17' - 41'	1' - 12'	12' - 51'
% Passing 3/8" Sieve	100	100	100	99	100
% Passing No. 4 Sieve	100	100	100	98	100
% Passing No. 10 Sieve	100	99	100	97	100
% Coarse Sand (-No. 10, +No. 40)	0	1	0	3	0
% Fine Sand (-No. 40, +No. 200)	3	25	5	16	5
% Silt (0.075 - 0.002 mm)	64	55	62	56	62
% Clay (<0.002 mm)	33	19	33	23	33
% Finer than 0.02 mm	69	39	70	43	70
Frost Group	F3	F3	F3	F3	F3
Liquid Limit (-No. 40)	41	30	43	34	44
Plastic Limit (-No. 40)	16	18	17	16	17
Plasticity Index (-No. 40)	25	12	26	18	27
Soil Color	Brown	Brown	Gray	Brown	Gray
USCS Classification	CL	CL	CL	CL	CL
Soil Classification (AASHTO M-15)	A-7-6 (25)	A-6 (7)	A-7-6 (26)	A-6 (13)	A-7-6 (27)
Optimum Moisture (%)	12.0	12.0	11.0	10.0	12.0
Maximum Dry Density (pcf)	121.0	120.0	119.0	121.0	120.0

Depth (ft) Top 8 samples	Moisture (%) Top 8 samples									
2.5	21	2.5	11	17.5	19	2.5	7	12.5	28
5.0	21	5.0	5	20.0	24	5.0	8	15.0	27
		7.5	4	22.5	21	7.5	9	17.5	30
		10.0	5	25.0	18	10.0	7	20.0	8
		12.5	11	27.5	17			22.5	21
		15.0	9	30.0	16			25.0	18
				32.5	16			27.5	20
				35.0	27			30.0	26

Avg. Moisture of Sample Depth (all)	21	8	21	8	21

Linear Report of Tests on Soil Samples

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PROJECT: New Town Truck Reliever Rte NW
Higway 1804
New Town, North Dakota

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

Boring Number	LSS-07	LSS-07	LSS-08	LSS-08	LSS-09
Northing	367300.719	367300.719	367550.225	367550.225	367800.099
Easting	1477660.046	1477660.046	1477645.417	1477645.417	1477651.238
Elevation	1934.6	1934.6	1940.2	1940.2	1960.2
Sample Depth	0.5' - 16.5'	16.5' - 27'	1' - 17'	17' - 32'	1' - 20'
% Passing 3/8" Sieve	100	100	100	99	98
% Passing No. 4 Sieve	100	100	99	97	96
% Passing No. 10 Sieve	100	100	98	94	93
% Coarse Sand (-No. 10, +No. 40)	2	0	8	9	48
% Fine Sand (-No. 40, +No. 200)	67	34	57	66	38
% Silt (0.075 - 0.002 mm)	22	49	23	12	4
% Clay (<0.002 mm)	9	17	10	7	3
% Finer than 0.02 mm	15	31	18	12	7
Frost Group	F3	F4	F3	F2	F2
Liquid Limit (-No. 40)	NP	26	NP	NP	NP
Plastic Limit (-No. 40)	NP	18	NP	NP	NP
Plasticity Index (-No. 40)	NP	8	NP	NP	NP
Soil Color	Brown	Brown	Brown	Brown	Brown
USCS Classification	SM	CL	SM	SM	SP-SM
Soil Classification (AASHTO M-15)	A-2-4 (0)	A-4 (3)	A-2-4 (0)	A-2-4 (0)	A-1-b (0)
Optimum Moisture (%)	11.0	9.0	10.0	10.0	11.0
Maximum Dry Density (pcf)	123.0	129.0	127.0	125.0	118.0

Depth (ft) Top 8 samples	Moisture (%) Top 8 samples									
		0.5	8	17.5	7	2.5	9	17.5	2	1.0	10
		2.5	12	20.0	4	5.0	4	20.0	4	2.0	8
		5.0	9	22.5	9	7.5	3	22.5	3	3.0	7
		7.5	11	25.0	7	10.0	2	25.0	4	4.0	11
		10.0	10			12.5	5	27.5	3	5.0	5
		12.5	10			15.0	3	30.0	4	6.0	6
		15.0	9							7.0	6
										8.0	6
Avg. Moisture of Sample Depth (all)		10		7		4		3		7	

Linear Report of Tests on Soil Samples

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Higway 1804
New Town, North Dakota

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

Boring Number	LSS-10	LSS-11	LSS-11	LSS-12	LSS-13
Northing	368047.692	368289.859	368289.859	368523.562	368745.775
Easting	1477685.065	1477746.603	1477746.603	1477835.078	1477949.351
Elevation	1984.0	2004.0	2004.0	2002.5	1993.0
Sample Depth	1' - 10'	2' - 10'	10' - 29'	1' - 20'	2' - 20'
% Passing 3/8" Sieve	100	88	95	93	89
% Passing No. 4 Sieve	100	78	91	85	80
% Passing No. 10 Sieve	97	64	85	72	67
% Coarse Sand (-No. 10, +No. 40)	15	37	25	18	35
% Fine Sand (-No. 40, +No. 200)	68	21	51	40	22
% Silt (0.075 - 0.002 mm)	11	4	6	13	7
% Clay (<0.002 mm)	3	2	3	1	3
% Finer than 0.02 mm	9	5	6	3	6
Frost Group	F2	S2	F2	S2	F2
Liquid Limit (-No. 40)	NP	NP	NP	NP	NP
Plastic Limit (-No. 40)	NP	NP	NP	NP	NP
Plasticity Index (-No. 40)	NP	NP	NP	NP	NP
Soil Color	Brown	Brown	Brown	Brown	Brown
USCS Classification	SM	SP-SM	SP-SM	SM	SW-SM
Soil Classification (AASHTO M-15)	A-2-4 (0)	A-1-b (0)	A-3 (0)	A-2-4 (0)	A-1-b (0)
Optimum Moisture (%)	12.0	9.0	8.0	10.0	10.0
Maximum Dry Density (pcf)	117.0	130.0	125.0	125.0	128.0
Depth (ft) Top 8 samples / Moisture (%) Top 8 samples	1.0 / 7	2.5 / 3	10.0 / 6	1.0 / 4	2.0 / 7
	2.0 / 5	5.0 / 4	12.5 / 3	2.0 / 4	3.0 / 4
	3.0 / 4	7.5 / 7	15.0 / 9	3.0 / 3	4.0 / 3
	4.0 / 3		17.5 / 5	4.0 / 3	5.0 / 4
	5.0 / 3		20.0 / 3	5.0 / 9	6.0 / 5
	6.0 / 3		22.5 / 4	6.0 / 5	7.0 / 4
	7.0 / 3		25.0 / 5	7.0 / 3	8.0 / 3
	8.0 / 5		27.5 / 7	8.0 / 3	9.0 / 3
Avg. Moisture of Sample Depth (all)	4	5	5	6	5

Linear Report of Tests on Soil Samples

PROJECT NO.: B1500957
PROJECT: New Town Truck Reliever Rte NW
Higway 1804
New Town, North Dakota

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

Boring Number	LSS-14	LSS-14	LSS-15	LSS-16	LSS-16
Northing	368953.503	368953.503	369144.378	369315.766	369315.766
Easting	1478088.058	1478088.058	1478249.299	1478430.961	1478430.961
Elevation	2010.2	2010.2	2010.6	2018.8	2018.8
Sample Depth	2' - 11'	11' - 31'	2' - 31'	2' - 15'	15' - 31'
% Passing 3/8" Sieve	82	96	97	94	99
% Passing No. 4 Sieve	69	93	85	88	97
% Passing No. 10 Sieve	57	87	69	79	95
% Coarse Sand (-No. 10, +No. 40)	33	37	43	43	34
% Fine Sand (-No. 40, +No. 200)	18	42	19	26	52
% Silt (0.075 - 0.002 mm)	3	5	5	7	5
% Clay (<0.002 mm)	2	3	2	4	3
% Finer than 0.02 mm	4	6	5	7	7
Frost Group	S2	F2	S2	F2	F2
Liquid Limit (-No. 40)	NP	NP	NP	NP	NP
Plastic Limit (-No. 40)	NP	NP	NP	NP	NP
Plasticity Index (-No. 40)	NP	NP	NP	NP	NP
Soil Color	Brown	Brown	Dark Brown	Brown	Brown
USCS Classification	SP-SM	SP-SM	SW-SM	SW-SM	SP-SM
Soil Classification (AASHTO M-15)	A-1-b (0)	A-1-b (0)	A-1-b (0)	A-1-b (0)	A-3 (0)
Optimum Moisture (%)	8.0	10.0	10.0	8.0	11.0
Maximum Dry Density (pcf)	130.0	120.0	128.0	127.0	116.0

Depth (ft) Top 8 samples	Moisture (%) Top 8 samples									
		2.5	3	12.5	4	2.5	4	2.5	6	15.0	3
		5.0	3	15.0	4	5.0	4	5.0	4	17.5	3
		7.5	4	17.5	4	7.5	4	7.5	3	20.0	5
		10.0	6	20.0	2	10.0	3	10.0	5	22.5	2
				22.5	1	12.5	5	12.5	3	25.0	2
				25.0	3	15.0	2			27.5	2
				27.5	3	17.5	6			30.0	2
				30.0	4	20.0	3				
Avg. Moisture of Sample Depth (all)		4		3		4		4		3	

Linear Report of Tests on Soil Samples

PROJECT NO.: B1500957
PROJECT: New Town Truck Reliever Rte NW
Higway 1804
New Town, North Dakota

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

Boring Number	LSS-17	LSS-18	LSS-19	LSS-19	LSS-20
Northing	369465.670	369592.020	369703.042	369703.042	369813.828
Easting	1478630.974	1478846.541	1479070.592	1479070.592	1479294.828
Elevation	1988.8	1979.2	1987.3	1987.3	1963.0
Sample Depth	6' - 20'	2' - 15'	0' - 4'	4' - 31'	1' - 10'
% Passing 3/8" Sieve	100	97	88	99	98
% Passing No. 4 Sieve	100	90	74	97	98
% Passing No. 10 Sieve	100	77	57	93	97
% Coarse Sand (-No. 10, +No. 40)	13	36	30	18	5
% Fine Sand (-No. 40, +No. 200)	75	29	15	63	78
% Silt (0.075 - 0.002 mm)	11	10	8	6	13
% Clay (<0.002 mm)	1	2	5	6	2
% Finer than 0.02 mm	5	5	10	10	6
Frost Group	S2	S2	F2	F2	F2
Liquid Limit (-No. 40)	NP	NP	20	NP	NP
Plastic Limit (-No. 40)	NP	NP	14	NP	NP
Plasticity Index (-No. 40)	NP	NP	6	NP	NP
Soil Color	Brown	Brown	Brown	Brown	Brown
USCS Classification	SP-SM	SW-SM	SC-SM	SM	SM
Soil Classification (AASHTO M-15)	A-2-4 (0)	A-1-b (0)	A-1-b (0)	A-2-4 (0)	A-2-4 (0)
Optimum Moisture (%)	13.0	8.0	6.0	6.0	13.0
Maximum Dry Density (pcf)	114.0	130.0	140.0	121.0	115.0
Depth (ft) Top 8 samples / Moisture (%) Top 8 samples	6.0 / 9	2.0 / 7	0.5 / 9	5.0 / 7	1.0 / 6
	7.0 / 5	3.0 / 4	2.5 / 4	7.5 / 5	2.0 / 4
	8.0 / 5	4.0 / 4		10.0 / 7	3.0 / 6
	9.0 / 5	5.0 / 4		12.5 / 4	4.0 / 13
	10.0 / 6	6.0 / 4		15.0 / 7	5.0 / 13
	11.0 / 5	7.0 / 3		17.5 / 11	6.0 / 10
	12.0 / 13	8.0 / 4		20.0 / 4	7.0 / 9
	13.0 / 10	9.0 / 16		22.5 / 6	8.0 / 11
Avg. Moisture of Sample Depth (all)	7	8	7	6	9

Linear Report of Tests on Soil Samples

PROJECT NO.: B1500957
PROJECT: New Town Truck Reliever Rte NW
Higway 1804
New Town, North Dakota

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

Boring Number	LSS-21
Northing	369924.455
Easting	1479518.877
Elevation	1958.2
Sample Depth	4' - 10'

% Passing 3/8" Sieve	74
% Passing No. 4 Sieve	66
% Passing No. 10 Sieve	54
% Coarse Sand (-No. 10, +No. 40)	23
% Fine Sand (-No. 40, +No. 200)	14
% Silt (0.075 - 0.002 mm)	11
% Clay (<0.002 mm)	6

% Finer than 0.02 mm	11
Frost Group	F2

Liquid Limit (-No. 40)	26
Plastic Limit (-No. 40)	14
Plasticity Index (-No. 40)	12
Soil Color	Brown
USCS Classification	SC
Soil Classification (AASHTO M-15)	A-2-6 (0)

Optimum Moisture (%)		6.0	
Maximum Dry Density (pcf)		139.0	
Depth (ft) Top 8 samples	**Moisture (%) Top 8 samples**	4.0	9
		5.0	6
		6.0	4
		7.0	5
		8.0	4
		9.0	5
Avg. Moisture of Sample Depth (all)		6	

BRAUN INTERTEC

LOG OF BORING

Braun Project B1500957
Geotechnical Evaluation
New Town Truck Reliever Rte NW
Highway 1804
New Town, North Dakota

BORING: **LSS-01**

LOCATION: N365803.456, E1477750.596 See sketch.

DRILLER: S. Wenko | METHOD: 3 1/4" HSA, Autohammer | DATE: **2/14/17** | SCALE: **1" = 4'**

Elev. feet	Depth feet	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	BPF	WL	MC %	Tests or Notes
1908.3	0.0						
1907.3	1.0	CL	LEAN CLAY, contains some root matter, black, moist.	4*		22	*Frost from 2 to 4 feet. LL=42, PL=18, PI=24, P200=92%
		CL	LEAN CLAY, a little Sand, trace Gravel, dark brown, moist. A-7-6 (23) MDD = 117.0 pcf; OMC = 13.0%.	4		17	
				4		14	
				5		17	
				4		21	
1896.8	11.5						
		CL	LEAN CLAY, a little Sand, trace Gravel, brown, wet. A-6 (15) MDD = 128.0 pcf; OMC = 10.0%.	5		26	LL=35, PL=17, PI=18, P200=86%
				4		26	
				4		29	
				4	▽	30	
				3		32	
				4		27	
				6		28	
1877.3	31.0			6		27	
			END OF BORING.				

(See Descriptive Terminology sheet for explanation of abbreviations)

NDDOT LOG 00957.GPJ BRAUN.GDT 5/1/17 09:17

BRAUN INTERTEC

LOG OF BORING

Braun Project B1500957
Geotechnical Evaluation
New Town Truck Reliever Rte NW
Highway 1804
New Town, North Dakota

BORING: **LSS-01 (cont.)**

LOCATION: N365803.456, E1477750.596 See sketch.

DRILLER: S. Wenko | METHOD: 3 1/4" HSA, Autohammer | DATE: **2/14/17** | SCALE: **1" = 4'**

Elev. feet 1876.3	Depth feet 32.0	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	BPF	WL	MC %	Tests or Notes
			Bag samples collected from 1 to 11 1/2 feet and 11 1/2 to 31 feet. Water observed at a depth of 20 feet while drilling. Water observed at a depth of 28 feet with a cave-in depth of 28 feet immediately after withdrawal of auger. Boring then backfilled.				

(See Descriptive Terminology sheet for explanation of abbreviations)

NDDOT LOG 00957.GPJ BRAUN.GDT 5/1/17 09:17

BRAUN INTERTEC

LOG OF BORING

Braun Project B1500957
Geotechnical Evaluation
New Town Truck Reliever Rte NW
Highway 1804
New Town, North Dakota

BORING: **LSS-02**

LOCATION: N366053.014, E1477735.879 See sketch.

DRILLER: S. Wenko | METHOD: 3 1/4" HSA, Autohammer | DATE: **2/14/17** | SCALE: **1" = 4'**

Elev. feet	Depth feet	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	BPF	WL	MC %	Tests or Notes
1911.4	0.0						
1910.9	0.5	CL/CH	LEAN CLAY, contains some root matter, brown, moist when thawed.	17*		26	LL=50, PL=20, PI=30, P200=98%
		CH	FAT CLAY, trace Sand and Gravel, brown, moist. A-7-6 (32) MDD = 116.0 pcf; OMC = 15.0%.	8*		23	*Frost to 4 1/2 feet.
				6		23	
1904.9	6.5	CL	LEAN CLAY, trace Sand and Gravel, brown, moist. A-7-6 (28) MDD = 121.0 pcf; OMC = 13.0%.	9		14	LL=45, PL=18, PI=27, P200=98%
				11		16	
				8		21	
				6		18	
				11		19	
				15		17	
				13		14	
				16		15	
				19		14	
				17		15	
1880.4	31.0		END OF BORING.				

(See Descriptive Terminology sheet for explanation of abbreviations)

NDDOT LOG 00957.GPJ BRAUN.GDT 5/1/17 09:17

BRAUN INTERTEC

LOG OF BORING

Braun Project B1500957
Geotechnical Evaluation
New Town Truck Reliever Rte NW
Highway 1804
New Town, North Dakota

BORING: **LSS-02 (cont.)**

LOCATION: N366053.014, E1477735.879 See sketch.

DRILLER: S. Wenko | METHOD: 3 1/4" HSA, Autohammer | DATE: **2/14/17** | SCALE: **1" = 4'**

Elev. feet 1879.4	Depth feet 32.0	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	BPF	WL	MC %	Tests or Notes
			Bag samples collected from 1/2 to 6 1/2 feet and 6 1/2 to 31 feet. Water not observed with 29 1/2 feet of hollow stem auger in the ground. Boring then backfilled.				

(See Descriptive Terminology sheet for explanation of abbreviations)

NDDOT LOG 00957.GPJ BRAUN.GDT 5/1/17 09:17

BRAUN INTERTEC

LOG OF BORING

Braun Project B1500957
Geotechnical Evaluation
New Town Truck Reliever Rte NW
Highway 1804
New Town, North Dakota

BORING: **LSS-03**

LOCATION: N366302.644, E1477720.734 See sketch.

DRILLER: G. Bevre | METHOD: 3 1/4" HSA, Autohammer | DATE: **2/27/17** | SCALE: **1" = 4'**

Elev. feet	Depth feet	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	BPF	WL	MC %	Tests or Notes
1889.4	0.0						
1888.9	0.5	CL	LEAN CLAY with SAND, trace roots, dark brown, wet when thawed.	12		28	LL=37, PL=16, PI=21, P200=91%
		CL	LEAN CLAY, a little Sand, trace Gravel, brown, moist. A-6 (19) MDD = 121.0 pcf; OMC = 12.0%.	15		11	
				24		12	
				19		11	
				19		16	
				20		19	
				24		16	
				16		17	
				16		19	
				16		21	
				15		18	
1862.9	26.5						
		CH	FAT CLAY, trace Sand, brown, moist.	17		26	
				16		28	

(See Descriptive Terminology sheet for explanation of abbreviations)

NDDOT LOG 00957.GPJ BRAUN.GDT 5/1/17 09:17

BRAUN INTERTEC

LOG OF BORING

Braun Project B1500957
Geotechnical Evaluation
New Town Truck Reliever Rte NW
Highway 1804
New Town, North Dakota

BORING: **LSS-03 (cont.)**

LOCATION: N366302.644, E1477720.734 See sketch.

DRILLER: G. Bevre | METHOD: 3 1/4" HSA, Autohammer | DATE: **2/27/17** | SCALE: **1" = 4'**

Elev. feet	Depth feet	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	BPF	WL	MC %	Tests or Notes
1857.4	32.0		FAT CLAY, trace Sand, brown, moist. *(continued)*	16		21	
				15		23	
				14		19	
				13		22	
				15		22	
			-gray and wet below 45 feet.	9		26	
				9		27	
1838.4	51.0			8		26	
			END OF BORING.				
			Bag sample collected from 1/2 to 26 1/2 feet.				
			Water not observed with 49 1/2 feet of hollow stem auger in the ground.				
			Boring then backfilled.				

(See Descriptive Terminology sheet for explanation of abbreviations)

NDDOT LOG 00957.GPJ BRAUN.GDT 5/1/17 09:17

BRAUN INTERTEC

LOG OF BORING

Braun Project B1500957
Geotechnical Evaluation
New Town Truck Reliever Rte NW
Highway 1804
New Town, North Dakota

BORING: **LSS-04**

LOCATION: N366552.036, E1477705.451 See sketch.

DRILLER: G. Bevre | METHOD: 3 1/4" HSA, Autohammer | DATE: **2/28/17** | SCALE: **1" = 4'**

Elev. feet	Depth feet	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	BPF	WL	MC %	Tests or Notes
1898.5	0.0	CL	LEAN CLAY with SAND, trace roots, dark brown, moist.	11		38	
1897.0	1.5	CL	LEAN CLAY, trace Sand, brown, moist. A-7-6 (25) MDD = 121.0 pcf; OMC = 12.0%.	15		21	LL=41, PL=16, PI=25, P200=97%
				19		21	
1892.0	6.5	ML	SILT with SAND, contains Lean Clay lenses, brown, moist.	19		12	
				22		14	
1887.0	11.5	CL	LEAN CLAY, trace Sand, brown, moist to wet.	17		16	
				17		21	
				15		25	
				15		21	
				17		28	
				12		24	
				12		34	
				14		19	

(See Descriptive Terminology sheet for explanation of abbreviations)

NDDOT LOG 00957.GPJ BRAUN.GDT 5/1/17 09:17

BRAUN INTERTEC

LOG OF BORING

Braun Project B1500957
Geotechnical Evaluation
New Town Truck Reliever Rte NW
Highway 1804
New Town, North Dakota

BORING: **LSS-04 (cont.)**

LOCATION: N366552.036, E1477705.451 See sketch.

DRILLER: G. Bevre | METHOD: 3 1/4" HSA, Autohammer | DATE: **2/28/17** | SCALE: **1" = 4'**

Elev. feet	Depth feet	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	BPF	WL	MC %	Tests or Notes
1866.5	32.0		LEAN CLAY, trace Sand, brown, moist to wet. *(continued)*	15		22	
				13		28	
1862.0	36.5	ML	SILT with SAND, contains Lean Clay lenses, brown, moist.	16		22	
				14		25	
1857.0	41.5	CH	FAT CLAY, trace Sand, gray, moist.	7		25	
				10		26	
				12		28	
1847.5	51.0			8		28	
			END OF BORING.				
			Bag sample colected from 1 1/2 to 6 1/2 feet.				
			Water not observed with 49 1/2 feet of hollow stem auger in the ground.				
			Boring then backfilled.				

(See Descriptive Terminology sheet for explanation of abbreviations)

NDDOT LOG 00957.GPJ BRAUN.GDT 5/1/17 09:17

BRAUN INTERTEC

LOG OF BORING

Braun Project B1500957
Geotechnical Evaluation
New Town Truck Reliever Rte NW
Highway 1804
New Town, North Dakota

BORING: **LSS-05**

LOCATION: N366801.689, E1477690.366 See sketch.

DRILLER: S. Wenko | METHOD: 3 1/4" HSA, Autohammer | DATE: **2/14/17** | SCALE: **1" = 4'**

Elev. feet	Depth feet	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	BPF	WL	MC %	Tests or Notes
1916.1	1.0	SM	SILTY SAND, fine-grained, contains root matter, black, wet.	14*		19	*Frost to 2 feet.
		CL	LEAN CLAY with SAND, contains layers of Silt, brown, damp to moist. A-6 (7) MDD = 120.0 pcf; OMC = 12.0%.	3		11	LL=30, PL=18, PI=12, P200=74%
				8		5	
				16		4	
				22		5	
				14		11	
				12		9	
1900.1	17.0						
		CL	LEAN CLAY, a little Sand, gray, moist to wet. A-7-6 (26) MDD = 119.0 pcf; OMC = 11.0%.	13		19	LL=43, PL=17, PI=26, P200=95%
				9		24	
				11		21	
				14		18	
				12		17	
				14		16	

(See Descriptive Terminology sheet for explanation of abbreviations)

NDDOT LOG 00957.GPJ BRAUN.GDT 5/1/17 09:17

BRAUN INTERTEC

LOG OF BORING

Braun Project B1500957
Geotechnical Evaluation
New Town Truck Reliever Rte NW
Highway 1804
New Town, North Dakota

BORING: **LSS-05 (cont.)**

LOCATION: N366801.689, E1477690.366 See sketch.

DRILLER: S. Wenko | METHOD: 3 1/4" HSA, Autohammer | DATE: **2/14/17** | SCALE: **1" = 4'**

Elev. feet	Depth feet	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	BPF	WL	MC %	Tests or Notes
1885.1	32.0		LEAN CLAY, a little Sand, gray, moist to wet. A-7-6 (26) MDD = 119.0 pcf; OMC = 11.0%. *(continued)*	13		16	
				12		27	
				11		23	
1876.1	41.0			14		27	
			END OF BORING. Bag samples collected from 1 to 17 feet and 17 to 41 feet. Water not observed with 39 1/2 feet of hollow stem auger in the ground. Boring then backfilled.				

(See Descriptive Terminology sheet for explanation of abbreviations)

NDDOT LOG 00957.GPJ BRAUN.GDT 5/1/17 09:17

BRAUN INTERTEC

LOG OF BORING

Braun Project B1500957
Geotechnical Evaluation
New Town Truck Reliever Rte NW
Highway 1804
New Town, North Dakota

BORING: **LSS-06**

LOCATION: N367051.091, E1477675.163 See sketch.

DRILLER: S. Wenko | METHOD: 3 1/4" HSA, Autohammer | DATE: **2/14/17** | SCALE: **1" = 4'**

Elev. feet	Depth feet	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	BPF	WL	MC %	Tests or Notes
1920.9	0.0						
1919.9	1.0	SM	SILTY SAND, fine-grained, with roots, dark brown, moist.	17*		20	*Frost to 4 feet. LL=34, PL=16, PI=18, P200=79%
		CL	LEAN CLAY with SAND, trace Gravel, contains Silt layers, brown, moist. A-6 (13) MDD = 121.0 pcf; OMC = 10.0%.	9*		7	
				14		8	
				15		9	
				16		7	
1908.9	12.0						
		CL	LEAN CLAY, trace Sand and Gravel, occasional Sand layers, gray, moist. A-7-6 (27) MDD = 120.0 pcf; OMC = 12.0%.	8		28	LL=44, PL=17, PI=27, P200=95%
				7		27	
				8		30	
			-Sand layer at 20 feet.	13		8	
				11		21	
				12		18	
				14		20	
				13		26	

(See Descriptive Terminology sheet for explanation of abbreviations)

NDDOT LOG 00957.GPJ BRAUN.GDT 5/1/17 09:17

BRAUN INTERTEC

LOG OF BORING

Braun Project B1500957
Geotechnical Evaluation
New Town Truck Reliever Rte NW
Highway 1804
New Town, North Dakota

BORING: **LSS-06 (cont.)**

LOCATION: N367051.091, E1477675.163 See sketch.

DRILLER: S. Wenko | METHOD: 3 1/4" HSA, Autohammer | DATE: **2/14/17** | SCALE: **1" = 4'**

Elev. feet	Depth feet	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	BPF	WL	MC %	Tests or Notes
1888.9	32.0		LEAN CLAY, trace Sand and Gravel, occasional Sand layers, gray, moist. A-7-6 (27) MDD = 120.0 pcf; OMC = 12.0%. *(continued)*	16		20	
				14		17	
				18		16	
				17		17	
				16		16	
				14		22	
				13		19	
1869.9	51.0			12		23	
			END OF BORING. Bag samples collected from 1 to 12 feet and 12 to 51 feet. Water not observed with 49 1/2 feet of hollow stem auger in the ground. Boring then backfilled.				

(See Descriptive Terminology sheet for explanation of abbreviations)

NDDOT LOG 00957.GPJ BRAUN.GDT 5/1/17 09:17

BRAUN INTERTEC

LOG OF BORING

Braun Project B1500957
Geotechnical Evaluation
New Town Truck Reliever Rte NW
Highway 1804
New Town, North Dakota

BORING: **LSS-07**

LOCATION: N367300.719, E1477660.046 See sketch.

DRILLER: S. Wenko | METHOD: 3 1/4" HSA, Autohammer | DATE: **2/13/17** | SCALE: **1" = 4'**

Elev. feet	Depth feet	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	BPF	WL	MC %	Tests or Notes
1934.6	0.0						
1934.1	0.5	SM	SILTY SAND, fine-grained, contains root matter, dark brown, moist when thawed.	21*		8	LL=NP, PL=NP, PI=NP, P200=31%
		SM	SILTY SAND, fine-grained, brown, moist. A-2-4 (0) MDD = 123.0 pcf; OMC = 11.0%.	13*		12	*Frost to 4 feet.
				4		9	
				5		11	
				4		10	
				5		10	
				4		9	
1918.1	16.5	CL	SANDY LEAN CLAY, contains layers of Silty Sand, brown, moist. A-4 (3) MDD = 129.0 pcf; OMC = 9.0%.	19		7	LL=26, PL=18, PI=8, P200=66%
				12		4	
				12		9	
				13		7	
1907.6	27.0	CL	LEAN CLAY, brown, moist.	14		18	
				15		18	
1903.6	31.0		END OF BORING.				

(See Descriptive Terminology sheet for explanation of abbreviations)

NDDOT LOG 00957.GPJ BRAUN.GDT 5/1/17 09:17

BRAUN INTERTEC

LOG OF BORING

Braun Project B1500957
Geotechnical Evaluation
New Town Truck Reliever Rte NW
Highway 1804
New Town, North Dakota

BORING: **LSS-07 (cont.)**

LOCATION: N367300.719, E1477660.046 See sketch.

DRILLER: S. Wenko | METHOD: 3 1/4" HSA, Autohammer | DATE: **2/13/17** | SCALE: **1" = 4'**

Elev. feet 1902.6	Depth feet 32.0	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	BPF	WL	MC %	Tests or Notes
			Bag samples collected from 1/2 to 16 1/2 feet and from 16 1/2 to 27 feet. Water not observed with 29 1/2 feet of hollow stem auger in the ground. Boring then backfilled.				

(See Descriptive Terminology sheet for explanation of abbreviations)

NDDOT LOG 00957.GPJ BRAUN.GDT 5/1/17 09:17

BRAUN INTERTEC

LOG OF BORING

Braun Project B1500957
Geotechnical Evaluation
New Town Truck Reliever Rte NW
Highway 1804
New Town, North Dakota

BORING: **LSS-08**

LOCATION: N367550.225, E1477645.417 See sketch.

DRILLER: S. Wenko | METHOD: 3 1/4" HSA, Autohammer | DATE: **2/13/17** | SCALE: **1" = 4'**

Elev. feet	Depth feet	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	BPF	WL	MC %	Tests or Notes
1940.2	0.0						
1939.2	1.0	CL	SANDY LEAN CLAY, trace roots, dark brown, wet.	9*		21	*Frost to 1 foot.
		SM	SILTY SAND, trace Gravel, fine-grained, brown, damp to moist. A-2-4 (0) MDD = 127.0 pcf; OMC = 10.0%.	5		9	LL=NP, PL=NP, PI=NP, P200=33%
				13		4	
				14		3	
				12		2	
				7		5	
				11		3	
1923.2	17.0						
		SM	SILTY SAND, a little Gravel, fine-grained, brown, damp. A-2-4 (0) MDD = 125.0 pcf; OMC = 10.0%.	17		2	LL=NP, PL=NP, PI=NP, P200=19%
				9		4	
				12		3	
				9		4	
				14		3	
				10		4	
1908.2	32.0						

(See Descriptive Terminology sheet for explanation of abbreviations)

NDDOT LOG 00957.GPJ BRAUN.GDT 5/1/17 09:17

BRAUN INTERTEC

LOG OF BORING

Braun Project B1500957
Geotechnical Evaluation
New Town Truck Reliever Rte NW
Highway 1804
New Town, North Dakota

BORING: **LSS-08 (cont.)**

LOCATION: N367550.225, E1477645.417 See sketch.

DRILLER: S. Wenko | METHOD: 3 1/4" HSA, Autohammer | DATE: **2/13/17** | SCALE: **1" = 4'**

Elev. feet	Depth feet	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	BPF	WL	MC %	Tests or Notes
1908.2	32.0	SM	SILTY SAND, fine-grained, brown, moist.	15		8	
				18		11	
				30		12	
1899.2	41.0			18		12	
			END OF BORING.				
			Bag samples collected from 1 to 17 feet and 17 to 32 feet.				
			Water not observed with 39 1/2 feet of hollow stem auger in the ground.				
			Boring then backfilled.				

(See Descriptive Terminology sheet for explanation of abbreviations)

NDDOT LOG 00957.GPJ BRAUN.GDT 5/1/17 09:17

BRAUN INTERTEC

LOG OF BORING

Braun Project B1500957
Geotechnical Evaluation
New Town Truck Reliever Rte NW
Highway 1804
New Town, North Dakota

BORING: **LSS-09**

LOCATION: N367800.099, E1477651.238 See sketch.

DRILLER: S. Wenko | METHOD: 3 1/4" HSA, Autohammer | DATE: **2/13/17** | SCALE: **1" = 4'**

Elev. feet	Depth feet	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	BPF	WL	MC %	Tests or Notes
1960.2	0.0						
1959.2	1.0	CL	LEAN CLAY, trace roots, black, wet.			18	
		SP-SM	POORLY GRADED SAND with SILT, a little Gravel, fine- to coarse-grained, brown, moist. A-1-b (0) MDD = 118.0 pcf; OMC = 11.0%.			10	LL=NP, PL=NP, PI=NP, P200=7%
						8	
						7	
						11	
						5	
						6	
						6	
						6	
						7	
						6	
						6	
						6	
						14	
						5	
						7	
						3	
						7	
						4	
1940.2	20.0					5	
			END OF BORING. Bag sample collected from 1 to 20 feet. Water not observed with 20 feet of power auger in the ground. Boring then backfilled.				

(See Descriptive Terminology sheet for explanation of abbreviations)

NDDOT LOG 00957.GPJ BRAUN.GDT 5/1/17 09:17

BRAUN INTERTEC

LOG OF BORING

Braun Project B1500957
Geotechnical Evaluation
New Town Truck Reliever Rte NW
Highway 1804
New Town, North Dakota

BORING: **LSS-10**

LOCATION: N368047.692, E1477685.065 See sketch.

DRILLER: S. Wenko | METHOD: 3 1/4" HSA, Autohammer | DATE: **2/13/17** | SCALE: **1" = 4'**

Elev. feet	Depth feet	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	BPF	WL	MC %	Tests or Notes
1984.0	0.0						
1983.0	1.0	CL	SANDY LEAN CLAY, trace roots, black and dark brown, moist.			19	
		SM	SILTY SAND, trace Gravel, fine-grained, brown, damp. A-2-4 (0) MDD = 117.0 pcf; OMC = 12.0%.			7	LL=NP, PL=NP, PI=NP, P200=14%
						5	
						4	
						3	
						3	
						3	
						3	
						5	
1974.0	10.0					4	
			END OF BORING.				
			Bag sample collected from 1 to 10 feet.				
			Water not observed with 10 feet of power auger in the ground.				
			Boring then backfilled.				

(See Descriptive Terminology sheet for explanation of abbreviations)

NDDOT LOG 00957.GPJ BRAUN.GDT 5/1/17 09:17

BRAUN INTERTEC

LOG OF BORING

Braun Project B1500957
Geotechnical Evaluation
New Town Truck Reliever Rte NW
Highway 1804
New Town, North Dakota

BORING: **LSS-11**

LOCATION: N368289.859, E1477746.603 (Moved 90' SE of stake) See sketch.

DRILLER: S. Wenko | METHOD: 3 1/4" HSA, Autohammer | DATE: **2/13/17** | SCALE: **1" = 4'**

Elev. feet	Depth feet	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	BPF	WL	MC %	Tests or Notes
2004.0	0.0	SM	SILTY SAND, fine- to medium-grained, trace Gravel, trace roots, brown, moist.	FA*		7	*Frost to 3 1/2 feet.
2002.0	2.0	SP-SM	POORLY GRADED SAND with SILT and GRAVEL, fine- to coarse-grained, brown, damp to moist. A-1-b (0) MDD = 130.0 pcf; OMC = 9.0%.	23		3	LL=NP, PL=NP, PI=NP, P200=7%
				6		4	
				7		7	
1994.0	10.0	SP-SM	POORLY GRADED SAND with SILT, a little Gravel, fine- to coarse-grained, brown, damp to moist. A-3 (0) MDD = 125.0 pcf; OMC = 8.0%.	6		6	LL=NP, PL=NP, PI=NP, P200=10%
				4		3	
				5		9	
				6		5	
				6		3	
				5		4	
				8		5	
1975.0	29.0			8		7	
		CL	LEAN CLAY with SAND, trace Gravel, brown, moist.				
1973.0	31.0			9		13	
			END OF BORING.				

(See Descriptive Terminology sheet for explanation of abbreviations)

NDDOT LOG 00957.GPJ BRAUN.GDT 5/1/17 09:17

BRAUN INTERTEC

LOG OF BORING

Braun Project B1500957
Geotechnical Evaluation
New Town Truck Reliever Rte NW
Highway 1804
New Town, North Dakota

BORING: **LSS-11 (cont.)**

LOCATION: N368289.859, E1477746.603 (Moved 90' SE of stake) See sketch.

DRILLER: S. Wenko | METHOD: 3 1/4" HSA, Autohammer | DATE: **2/13/17** | SCALE: **1" = 4'**

Elev. feet 1972.0	Depth feet 32.0	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	BPF	WL	MC %	Tests or Notes
			Bag samples collected from 2 to 10 feet and 10 to 29 feet.				
			Water not observed with 29 1/2 feet of hollow stem auger in the ground.				
			Boring then backfilled.				

(See Descriptive Terminology sheet for explanation of abbreviations)

NDDOT LOG 00957.GPJ BRAUN.GDT 5/1/17 09:17

BRAUN INTERTEC

LOG OF BORING

Braun Project B1500957
Geotechnical Evaluation
New Town Truck Reliever Rte NW
Highway 1804
New Town, North Dakota

BORING: **LSS-12**

LOCATION: N368523.562, E1477835.078 (Moved 30' NW of stake) See sketch.

DRILLER: S. Wenko | METHOD: 3 1/4" HSA, Autohammer | DATE: **2/10/17** | SCALE: **1" = 4'**

Elev. feet	Depth feet	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	BPF	WL	MC %	Tests or Notes
2002.5	0.0						
2001.5	1.0	CL	LEAN CLAY with SAND, brown and gray, with roots, brown, moist.			17	*Frost to 2 feet.
		SM	SILTY SAND with GRAVEL, fine- to coarse-grained, brown, damp to moist. A-2-4 (0) MDD = 125.0 pcf; OMC = 10.0%.			4	LL=NP, PL=NP, PI=NP, P200=15%
						4	
						3	
						3	
						9	
						5	
						3	
						3	
						3	
						3	
						4	
						4	
						11	
						8	
						12	
						8	
						15	
						11	
1982.5	20.0					10	
			END OF BORING. Bag sample collected from 1 to 20 feet. Water not observed with 20 feet of power auger in the ground. Boring then backfilled.				

(See Descriptive Terminology sheet for explanation of abbreviations)

NDDOT LOG 00957.GPJ BRAUN.GDT 5/1/17 09:17

BRAUN INTERTEC

LOG OF BORING

Braun Project B1500957
Geotechnical Evaluation
New Town Truck Reliever Rte NW
Highway 1804
New Town, North Dakota

BORING: **LSS-13**

LOCATION: N368745.775, E1477949.351 See sketch.

DRILLER: S. Wenko | METHOD: 3 1/4" HSA, Autohammer | DATE: **2/10/17** | SCALE: **1" = 4'**

Elev. feet	Depth feet	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	BPF	WL	MC %	Tests or Notes
1993.0	0.0						
1992.0	1.0	CL	SANDY LEAN CLAY, with roots, brown, wet.			20	*Frost to 2 feet.
1991.0	2.0	CL	LEAN CLAY, brown, moist.			16	
		SW-SM	WELL-GRADED SAND with SILT and GRAVEL, fine- to coarse-grained, brown, damp to moist. A-1-b (0) MDD = 128.0 pcf; OMC = 10.0%.			7	LL=NP, PL=NP, PI=NP, P200=10%
						4	
						3	
						4	
						5	
						4	
						3	
						3	
						5	
						10	
						5	
						5	
						4	
						3	
						4	
						4	
						7	
1973.0	20.0					8	
			END OF BORING. Bag sample collected from 2 to 20 feet. Water not observed with 20 feet of power auger in the ground. Boring then backfilled.				

(See Descriptive Terminology sheet for explanation of abbreviations)

NDDOT LOG 00957.GPJ BRAUN.GDT 5/1/17 09:17

BRAUN INTERTEC

LOG OF BORING

Braun Project B1500957
Geotechnical Evaluation
New Town Truck Reliever Rte NW
Highway 1804
New Town, North Dakota

BORING: **LSS-14**

LOCATION: N368953.503, E1478088.058 See sketch.

DRILLER: S. Wenko | METHOD: 3 1/4" HSA, Autohammer | DATE: **2/10/17** | SCALE: **1" = 4'**

Elev. feet 2010.2	Depth feet 0.0	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	BPF	WL	MC %	Tests or Notes
		SM	SILTY SAND, fine-grained, trace Gravel, brown, frozen, wet when thawed.	FA		19	
2008.2	2.0						
		SP-SM	POORLY GRADED SAND with SILT and GRAVEL, fine- to coarse-grained, brown, damp. A-1-b (0) MDD = 130.0 pcf; OMC = 8.0%.	38*		3	LL=NP, PL=NP, PI=NP, P200=5% *Frost at 3 1/2 to 4 1/2 feet.
				13		3	
				12		4	
1999.2	11.0			7		6	
		SP-SM	POORLY GRADED SAND with SILT, a little Gravel, fine- to coarse-grained, brown, damp. A-1-b (0) MDD = 120.0 pcf; OMC = 10.0%.	9		4	LL=NP, PL=NP, PI=NP, P200=8%
				11		4	
				15		4	
				8		2	
				8		1	
				7		3	
				8		3	
1979.2	31.0			10		4	
			END OF BORING.				

(See Descriptive Terminology sheet for explanation of abbreviations)

NDDOT LOG 00957.GPJ BRAUN.GDT 5/1/17 09:17

BRAUN INTERTEC

LOG OF BORING

Braun Project B1500957
Geotechnical Evaluation
New Town Truck Reliever Rte NW
Highway 1804
New Town, North Dakota

BORING: **LSS-14 (cont.)**

LOCATION: N368953.503, E1478088.058 See sketch.

DRILLER: S. Wenko | METHOD: 3 1/4" HSA, Autohammer | DATE: **2/10/17** | SCALE: **1" = 4'**

Elev. feet 1978.2	Depth feet 32.0	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	BPF	WL	MC %	Tests or Notes
			Bag samples collected from 2 to 11 feet and 11 to 31 feet. Water not observed with 29 1/2 feet of hollow stem auger in the ground. Boring then backfilled.				

(See Descriptive Terminology sheet for explanation of abbreviations)

NDDOT LOG 00957.GPJ BRAUN.GDT 5/1/17 09:17

BRAUN INTERTEC

LOG OF BORING

Braun Project B1500957
Geotechnical Evaluation
New Town Truck Reliever Rte NW
Highway 1804
New Town, North Dakota

BORING: **LSS-15**

LOCATION: N369144.378, E1478249.299 See sketch.

DRILLER: S. Wenko | METHOD: 3 1/4" HSA, Autohammer | DATE: **2/9/17** | SCALE: **1" = 4'**

Elev. feet 2010.6	Depth feet 0.0	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	BPF	WL	MC %	Tests or Notes
		GM	SILTY GRAVEL, fine-grained, brown and dark brown, moist.	FA		2	
2008.6	2.0	SW-SM	WELL-GRADED SAND with SILT and GRAVEL, fine- to coarse-grained, dark brown, damp to moist. A-1-b (0) MDD = 128.0 pcf; OMC = 10.0%.	34*		4	LL=NP, PL=NP, PI=NP, P200=7% *Frost from 3 1/2 to 4 1/2 feet.
				3		4	
				2		4	
				4		3	
				9		5	
				7		2	
				6		6	
				6		3	
				7		8	
				5		4	
				8		4	
				10		5	
1979.6	31.0		END OF BORING.				

(See Descriptive Terminology sheet for explanation of abbreviations)

NDDOT LOG 00957.GPJ BRAUN.GDT 5/1/17 09:17

BRAUN INTERTEC

LOG OF BORING

Braun Project B1500957
Geotechnical Evaluation
New Town Truck Reliever Rte NW
Highway 1804
New Town, North Dakota

BORING: **LSS-15 (cont.)**

LOCATION: N369144.378, E1478249.299 See sketch.

DRILLER: S. Wenko | METHOD: 3 1/4" HSA, Autohammer | DATE: **2/9/17** | SCALE: **1" = 4'**

Elev. feet 1978.6	Depth feet 32.0	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	BPF	WL	MC %	Tests or Notes
			Bag sample collected from 2 to 31 feet. Water not observed with 29 1/2 feet of hollow stem auger in the ground. Boring then backfilled.				

(See Descriptive Terminology sheet for explanation of abbreviations)

NDDOT LOG 00957.GPJ BRAUN.GDT 5/1/17 09:17

BRAUN INTERTEC

LOG OF BORING

Braun Project B1500957
Geotechnical Evaluation
New Town Truck Reliever Rte NW
Highway 1804
New Town, North Dakota

BORING: **LSS-16**

LOCATION: N369315.766, E1478430.961 (Moved 75' SW of stake) See sketch.

DRILLER: S. Wenko | METHOD: 3 1/4" HSA, Autohammer | DATE: **2/9/17** | SCALE: **1" = 4'**

Elev. feet	Depth feet	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	BPF	WL	MC %	Tests or Notes
2018.8	0.0	SM	SILTY SAND, fine-grained, with Gravel, brown, moist, medium dense.	FA*		3	*Frost from 3 1/2 to 4 feet.
2016.8	2.0	SW-SM	WELL-GRADED SAND with SILT, a little Gravel, fine- to coarse-grained, brown, moist. A-1-b (0) MDD = 127.0 pcf; OMC = 8.0%.	26*		6	LL=NP, PL=NP, PI=NP, P200=10%
				10		4	
				6		3	
				6		5	
				17		3	
2003.8	15.0	SP-SM	POORLY-GRADED SAND with SILT, trace Gravel, fine-grained, brown, moist. A-3 (0) MDD = 116.0 pcf; OMC = 11.0%.	13		3	LL=NP, PL=NP, PI=NP, P200=9%
				8		3	
				8		5	
				9		2	
				8		2	
				18		2	
1987.8	31.0			12		2	
			END OF BORING.				

(See Descriptive Terminology sheet for explanation of abbreviations)

NDDOT LOG 00957.GPJ BRAUN.GDT 5/1/17 09:17

BRAUN INTERTEC

LOG OF BORING

Braun Project B1500957
Geotechnical Evaluation
New Town Truck Reliever Rte NW
Highway 1804
New Town, North Dakota

BORING: **LSS-16 (cont.)**

LOCATION: N369315.766, E1478430.961 (Moved 75' SW of stake) See sketch.

DRILLER: S. Wenko | METHOD: 3 1/4" HSA, Autohammer | DATE: **2/9/17** | SCALE: **1" = 4'**

Elev. feet 1986.8	Depth feet 32.0	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	BPF	WL	MC %	Tests or Notes
			Bag samples collected from 2 to 15 feet and 15 to 31 feet.				
			Water not observed with 29 1/2 feet of hollow stem auger in the ground.				
			Boring then backfilled.				

(See Descriptive Terminology sheet for explanation of abbreviations)

NDDOT LOG 00957.GPJ BRAUN.GDT 5/1/17 09:17

BRAUN INTERTEC

LOG OF BORING

Braun Project B1500957
Geotechnical Evaluation
New Town Truck Reliever Rte NW
Highway 1804
New Town, North Dakota

BORING: **LSS-17**

LOCATION: N369465.670, E1478630.974 See sketch.

DRILLER: S. Wenko | METHOD: 3 1/4" HSA, Autohammer | DATE: **2/9/17** | SCALE: **1" = 4'**

Elev. feet	Depth feet	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	BPF	WL	MC %	Tests or Notes
1988.8	0.0	CL	SANDY LEAN CLAY, trace Gravel, brown, moist.			11	*Frost to 3 1/2 feet.
1986.8	2.0	SM	SILTY SAND, fine-grained, trace Gravel, brown, moist.			9	
1984.8	4.0	CL	LEAN CLAY with SAND, trace Gravel, brown, moist.			7	
1982.8	6.0	SP-SM	POORLY GRADED SAND with SILT, trace Gravel, fine-grained, brown, moist. A-2-4 (0) MDD = 114.0 pcf; OMC = 13.0%.			15	
						13	
						9	LL=NP, PL=NP, PI=NP, P200=12%
						5	
						5	
						5	
						6	
						5	
						13	
						10	
						7	
						6	
						4	
						10	
						6	
1968.8	20.0					7	
			END OF BORING. Bag sample collected from 6 to 20 feet. Water not observed with 20 feet of power auger in the ground. Boring then backfilled.				

(See Descriptive Terminology sheet for explanation of abbreviations)

NDDOT LOG 00957.GPJ BRAUN.GDT 5/1/17 09:17

BRAUN INTERTEC

LOG OF BORING

Braun Project B1500957
Geotechnical Evaluation
New Town Truck Reliever Rte NW
Highway 1804
New Town, North Dakota

BORING: **LSS-18**

LOCATION: N369592.020, E1478846.541 See sketch.

DRILLER: S. Wenko | METHOD: 3 1/4" HSA, Autohammer | DATE: **2/9/17** | SCALE: **1" = 4'**

Elev. feet	Depth feet	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	BPF	WL	MC %	Tests or Notes
1979.2	0.0	SM	SILTY SAND with GRAVEL, fine- to medium-grained, brown, moist.			6	
1977.2	2.0					7	
		SW-SM	WELL-GRADED SAND with SILT, a little Gravel, fine- to coarse-grained, brown, moist. A-1-b (0) MDD = 130.0 pcf; OMC = 8.0%.			7	LL=NP, PL=NP, PI=NP, P200=12%
						4	
						4	
						4	
						4	
						3	
						4	
			-dark brown and black, trace Lignite at 10 feet.			16	
						9	
						8	
						9	
			-dark gray and black from 13 to 15 feet.			10	
1964.2	15.0					16	
			END OF BORING. Bag sample collected from 2 to 15 feet. Water not observed with 15 feet of power auger in the ground. Boring then backfilled.				

(See Descriptive Terminology sheet for explanation of abbreviations)

NDDOT LOG 00957.GPJ BRAUN.GDT 5/1/17 09:17

BRAUN INTERTEC

LOG OF BORING

Braun Project B1500957
Geotechnical Evaluation
New Town Truck Reliever Rte NW
Highway 1804
New Town, North Dakota

BORING: **LSS-19**

LOCATION: N369703.042, E1479070.592 See sketch.

DRILLER: S. Wenko | METHOD: 3 1/4" HSA, Autohammer | DATE: **2/9/17** | SCALE: **1" = 4'**

Elev. feet	Depth feet	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	BPF	WL	MC %	Tests or Notes
1987.3	0.0	SC-SM	SILTY, CLAYEY SAND with GRAVEL, fine- to coarse-grained, brown, moist. A-1-b (0) MDD = 140.0 pcf; OMC = 6.0%.	FA		9	LL=20, PL=14, PI=6, P200=13%
				16		4	
1983.3	4.0	SM	SILTY SAND, fine-grained, brown, moist. A-2-4 (0) MDD = 121.0 pcf; OMC = 6.0%.				LL=NP, PL=NP, PI=NP, P200=12%
				3		7	
				4		5	
				5		7	
				8		4	
				6		7	
				7		11	
				7		4	
				8		6	
				8		7	
				13		5	
1956.3	31.0			8		4	
			END OF BORING.				

(See Descriptive Terminology sheet for explanation of abbreviations)

NDDOT LOG 00957.GPJ BRAUN.GDT 5/1/17 09:17

BRAUN INTERTEC

LOG OF BORING

Braun Project B1500957
Geotechnical Evaluation
New Town Truck Reliever Rte NW
Highway 1804
New Town, North Dakota

BORING: **LSS-19 (cont.)**

LOCATION: N369703.042, E1479070.592 See sketch.

DRILLER: S. Wenko | METHOD: 3 1/4" HSA, Autohammer | DATE: **2/9/17** | SCALE: **1" = 4'**

Elev. feet 1955.3	Depth feet 32.0	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	BPF	WL	MC %	Tests or Notes
			Bag samples collected from 0 to 4 feet and 4 to 31 feet. Water not observed with 29 1/2 feet of hollow stem auger in the ground. Boring then backfilled.				

(See Descriptive Terminology sheet for explanation of abbreviations)

NDDOT LOG 00957.GPJ BRAUN.GDT 5/1/17 09:17

BRAUN INTERTEC

LOG OF BORING

Braun Project B1500957
Geotechnical Evaluation
New Town Truck Reliever Rte NW
Highway 1804
New Town, North Dakota

BORING: **LSS-20**

LOCATION: N369813.828, E1479294.828 See sketch.

DRILLER: S. Wenko | METHOD: 3 1/4" HSA, Autohammer | DATE: **2/10/17** | SCALE: **1" = 4'**

Elev. feet	Depth feet	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	BPF	WL	MC %	Tests or Notes
1963.0	0.0						
1962.0	1.0	SM	SILTY SAND, trace Gravel, fine-grained, brown, wet.			17	
		SM	SILTY SAND, fine-grained, brown, moist. A-2-4 (0) MDD = 115.0 pcf; OMC = 13.0%.			6	LL=NP, PL=NP, PI=NP, P200=15%
						4	
						6	
						13	
						13	
						10	
						9	
						11	
1953.0	10.0					9	
			END OF BORING. Bag sample collected from 1 to 10 feet. Water not observed with 10 feet of power auger in the ground. Boring then backfilled.				

(See Descriptive Terminology sheet for explanation of abbreviations)

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BRAUN INTERTEC

LOG OF BORING

Braun Project B1500957
Geotechnical Evaluation
New Town Truck Reliever Rte NW
Highway 1804
New Town, North Dakota

BORING: **LSS-21**

LOCATION: N369924.455, E1479518.877 See sketch.

DRILLER: S. Wenko | METHOD: 3 1/4" HSA, Autohammer | DATE: **2/10/17** | SCALE: **1" = 4'**

Elev. feet	Depth feet	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	BPF	WL	MC %	Tests or Notes
1958.2	0.0	SM	SILTY SAND, fine- to medium-grained, trace Gravel, brown, wet.			9	
1956.2	2.0	CL	LEAN CLAY with SAND, trace Gravel, brown, wet.			7 29	
1954.2	4.0	SC	CLAYEY SAND with GRAVEL, fine- to coarse-grained, brown, moist. A-2-6 (0) MDD = 139.0 pcf; OMC = 6.0%.			28 9 6 4 5 4	LL=26, PL=14, PI=12, P200=16%
1948.2	10.0		END OF BORING. Bag sample collected from 4 to 10 feet. Water not observed with 10 feet of power auger in the ground. Boring then backfilled.			5	

(See Descriptive Terminology sheet for explanation of abbreviations)

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LOG OF BORING

Braun Project B1500957
Geotechnical Evaluation
New Town Truck Reliever Rte NW
Highway 1804
New Town, North Dakota

BORING: **CH-01**

LOCATION: N366072.177, E1476750.753 See sketch.

DRILLER: G. Bevre | METHOD: 3 1/4" HSA, Autohammer | DATE: **2/28/17** | SCALE: **1" = 4'**

(See Descriptive Terminology sheet for explanation of abbreviations)

Elev. feet	Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	MC %	qp tsf	Tests or Notes
1917.0	0.0							
		CL	LEAN CLAY with SAND, trace roots, dark brown, moist. (Topsoil)	18		19		
1915.5	1.5	CLST	SENTINEL BUTTE FORMATION, CLAYSTONE, brown, moist, decomposed, very soft, very fine-grained, with Sand, interbedded with Siltstone, hand deformed sample classified as "Lean Clay with Sand (CL)".	23		14	4.5+	
				22		10	4.5+	
				25		11	4.5+	
				19		9	4.5+	
				19		13	4.5+	
				25		15	4.5+	
				18		16	4.5+	
				19		14	4.5+	
1895.5	21.5	SIS	SENTINEL BUTTE FORMATION, SILTSTONE, brown, moist, decomposed, very soft, very fine-grained, interbedded with Sandstone and Claystone, sample retrieved as non-cemented "Silt with Sand (ML)".	19		13		
				15		13		
				18		14		
1886.0	31.0			21		13		
			END OF BORING.					

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BRAUN INTERTEC

LOG OF BORING

Braun Project B1500957
Geotechnical Evaluation
New Town Truck Reliever Rte NW
Highway 1804
New Town, North Dakota

BORING: **CH-01 (cont.)**

LOCATION: N366072.177, E1476750.753 See sketch.

DRILLER: G. Bevre | METHOD: 3 1/4" HSA, Autohammer | DATE: **2/28/17** | SCALE: **1" = 4'**

Elev. feet 1885.0	Depth feet 32.0	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	MC %	qp tsf	Tests or Notes
			Water not observed with 29 1/2 feet of hollow stem auger in the ground. Boring then backfilled.					

(See Descriptive Terminology sheet for explanation of abbreviations)

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BRAUN INTERTEC

LOG OF BORING

Braun Project B1500957
Geotechnical Evaluation
New Town Truck Reliever Rte NW
Highway 1804
New Town, North Dakota

BORING: **CH-02**

LOCATION: N365990.885, E1476709.160 See sketch.

DRILLER: G. Bevre | METHOD: 3 1/4" HSA, Autohammer | DATE: **2/28/17** | SCALE: **1" = 4'**

(See Descriptive Terminology sheet for explanation of abbreviations)

Elev. feet	Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	MC %	qp tsf	Tests or Notes
1917.3	0.0							
1916.3	1.0	CL	LEAN CLAY with SAND, trace roots, brown, moist. (Topsoil)	6		16		
		SIS	SENTINEL BUTTE FORMATION, SILTSTONE, brown, moist, decomposed, very soft, very fine-grained, interbedded with Sandstone and Claystone, sample retrieved as non-cemented "Silt with Sand (ML)".	10		16		
				14		15		
				16		7		
				15		11		
1903.3	14.0			17		11		
		CLST	SENTINEL BUTTE FORMATION, CLAYSTONE, brown, moist, decomposed, very soft, very fine-grained, with Sand, hand deformed sample classified as "Lean Clay with Sand (CL)".	22		12	4.5+	
				19		11	4.5+	
1895.8	21.5			21		11	4.5+	
		SIS	SENTINEL BUTTE FORMATION, SILTSTONE, brown, moist, decomposed, very soft, very fine-grained, interbedded with Siltstone and Sandstone, sample retrieved as non-cemented "Silt with Sand (ML)".	19		13		
				21		14		
				18		23		
1886.3	31.0			21		13		
			END OF BORING.					

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BRAUN INTERTEC

LOG OF BORING

Braun Project B1500957
Geotechnical Evaluation
New Town Truck Reliever Rte NW
Highway 1804
New Town, North Dakota

BORING: **CH-02 (cont.)**

LOCATION: N365990.885, E1476709.160 See sketch.

DRILLER: G. Bevre | METHOD: 3 1/4" HSA, Autohammer | DATE: **2/28/17** | SCALE: **1" = 4'**

Elev. feet 1885.3	Depth feet 32.0	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	MC %	qp tsf	Tests or Notes
			Water not observed with 29 1/2 feet of hollow stem auger in the ground. Boring then backfilled.					

(See Descriptive Terminology sheet for explanation of abbreviations)

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BRAUN INTERTEC

LOG OF BORING

Braun Project B1500957
Geotechnical Evaluation
New Town Truck Reliever Rte NW
Highway 1804
New Town, North Dakota

BORING: **CH-03**

LOCATION: N366016.129, E1476775.735 See sketch.

DRILLER: G. Bevre | METHOD: 3 1/4" HSA, Autohammer | DATE: **2/27/17** | SCALE: **1" = 4'**

Elev. feet	Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	MC %	qp tsf	Tests or Notes
1917.9	0.0							
		CL	LEAN CLAY with SAND, trace roots, brown, moist. (Topsoil)	18		21		
1916.4	1.5	CLST	SENTINEL BUTTE FORMATION, CLAYSTONE, brown, moist, decomposed, very soft, very fine-grained, with Sand, hand deformed sample classified as "Lean Clay with Sand (CL)".	14		10	4.5+	
				22		13	4.5+	
				30		7	4.5+	
				23		12	4.5+	
				19		11	4.5+	
				21		12	4.5+	
				17		14	4.5+	
				19		12	4.5+	
				30		13	4.5+	
1893.9	24.0	SIS	SENTINEL BUTTE FORMATION, SILTSTONE, brown, moist, decomposed, very soft, very fine-grained, interbedded with Sandstone and Claystone, sample retrieved as non-cemented "Silt with Sand (ML)".	22		15		
				23		10		
1886.9	31.0			20		13		
			END OF BORING.					

(See Descriptive Terminology sheet for explanation of abbreviations)

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BRAUN INTERTEC

LOG OF BORING

Braun Project B1500957
Geotechnical Evaluation
New Town Truck Reliever Rte NW
Highway 1804
New Town, North Dakota

BORING: **CH-03 (cont.)**

LOCATION: N366016.129, E1476775.735 See sketch.

DRILLER: G. Bevre | METHOD: 3 1/4" HSA, Autohammer | DATE: **2/27/17** | SCALE: **1" = 4'**

Elev. feet 1885.9	Depth feet 32.0	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	MC %	qp tsf	Tests or Notes
			Water not observed with 29 1/2 feet of hollow stem auger in the ground. Boring then backfilled.					

(See Descriptive Terminology sheet for explanation of abbreviations)

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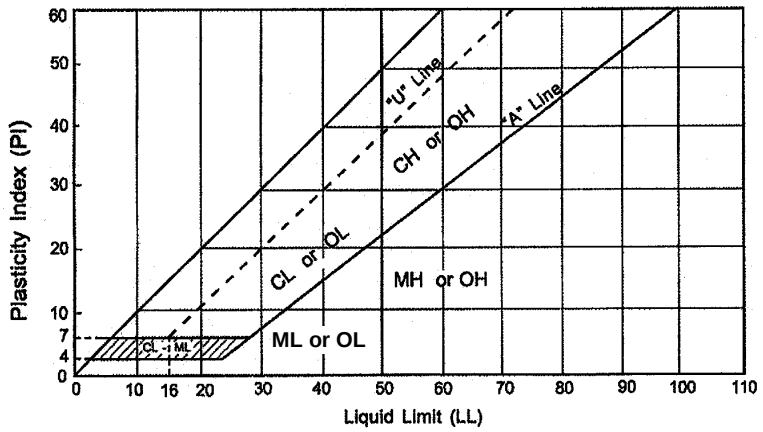
BRAUN INTERTEC

Descriptive Terminology of Soil

Standard D 2487
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 Less than 5% 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 Less than 5% 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-inch (75mm) sieve.
b. If field sample contained cobbles or boulders, or both, add "with cobbles or boulders or both" to group name.
c. $C_u = D_{60}/D_{10}$ $C_c = \frac{(D30)^2}{D_{10} \times D_{60}}$
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. Sand 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" lines.
q. PI plots below "A" line.



Laboratory Tests

DD	Dry density, pcf	**OC**	Organic content, %
WD	Wet density, pcg	**S**	Percent of saturation, %
MC	Natural moisture content, %	**SG**	Specific gravity
LL	Liquid limit, %	**C**	Cohesion, psf
PL	Plastic limits, %	**Ø**	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 about "A" line

Relative Density of Cohesionless Soils

Very Loose..... 0 to 4 BPF
Loose..... 5 to 10 BPF
Medium dense ..... 11 to 30 PPF
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. All samples were taken with the standard 2" OD split-tube samples, except where noted.

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

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.

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.

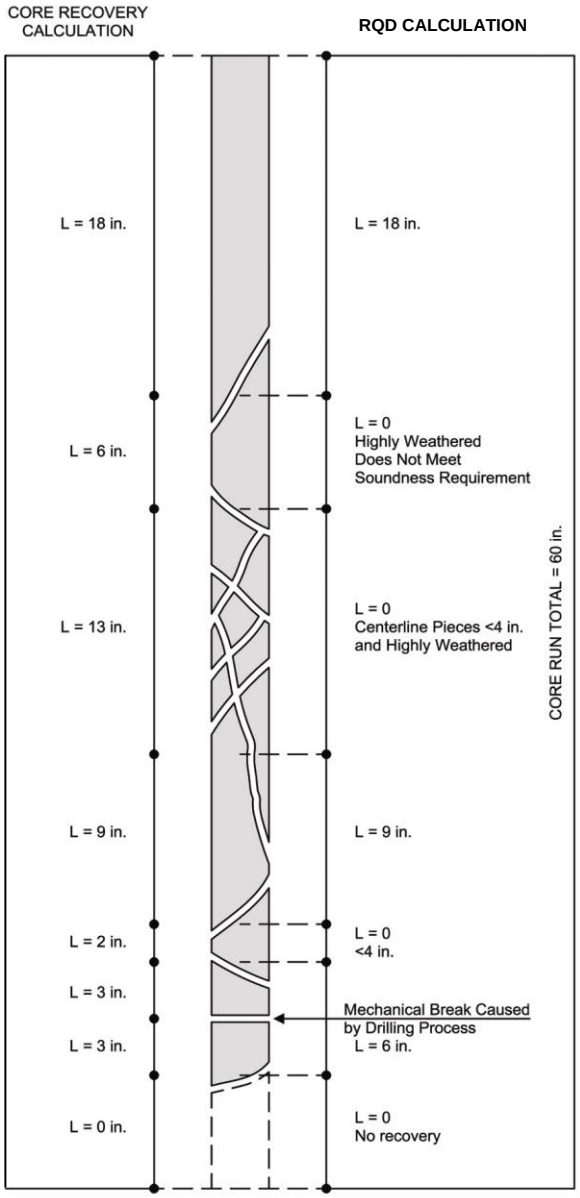
WR: WR indicates the sampler penetrated soil under weight of rods alone; hammer weight, and driving not required.

TW: TW indicates thin-walled (undisturbed) tube sample.

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

Descriptive Terminology of Rock

Based on U.S. Army Corps of Engineers EM 1110-1-2908



Example Calculations

Core Recovery, CR = $\frac{\text{Total length of rock recovered}}{\text{Total core run length}}$

Example:CR = $\frac{(18 + 6 + 13 + 9 + 2 + 3 + 3)}{(60)}$

CR = 90%

RQD = $\frac{\text{Sum of sound pieces 4 inches or larger}}{\text{Total core run length}}$

RQD Percent	Rock Quality
< 25	very poor
25 < 50	poor
50 < 75	fair
75 < 90	good
90 < 100	excellent

Example: RQD = $\frac{(18 + 9 + 6)}{(60)}$

RQD = 55%

Weathering

Unweathered: No evidence of chemical or mechanical alteration.

Slightly weathered: Slight discoloration on surface, slight alteration along discontinuities, less than 10% of rock volume altered.

Moderately Weathered: Discoloration evident, surface pitted and altered with alteration penetrating well below rock surfaces, weathering halos evident, 10% to 50% of the rock altered.

Highly Weathered: Entire mass discolored, alteration pervading nearly all of the rock, with some pockets of slightly weathered rock noticeable, some mineral leached away.

Decomposed: Rock reduced to a soil consistency with relict rock texture, generally molded and crumbled by hand.

Hardness

Very soft:	Can be deformed by hand
Soft:	Can be scratched with a fingernail
Moderately hard:	Can be scratched easily with a knife
Hard:	Can be scratched with difficulty with a knife
Very hard:	Cannot be scratched with a knife

Texture

Sedimentary Rocks:	*Grain Size*
Coarse grained	2 – 5 mm
Medium grained	0.4 – 2 mm
Fine grained	0.1 – 0.4 mm
Very fine grained	< 0.1 mm

Igneous and Metamorphic Rocks:	
Coarse grained	5 mm
Medium grained	1 – 5 mm
Fine grained	0.1 – 1 mm
Aphanitic	< 0.1 mm

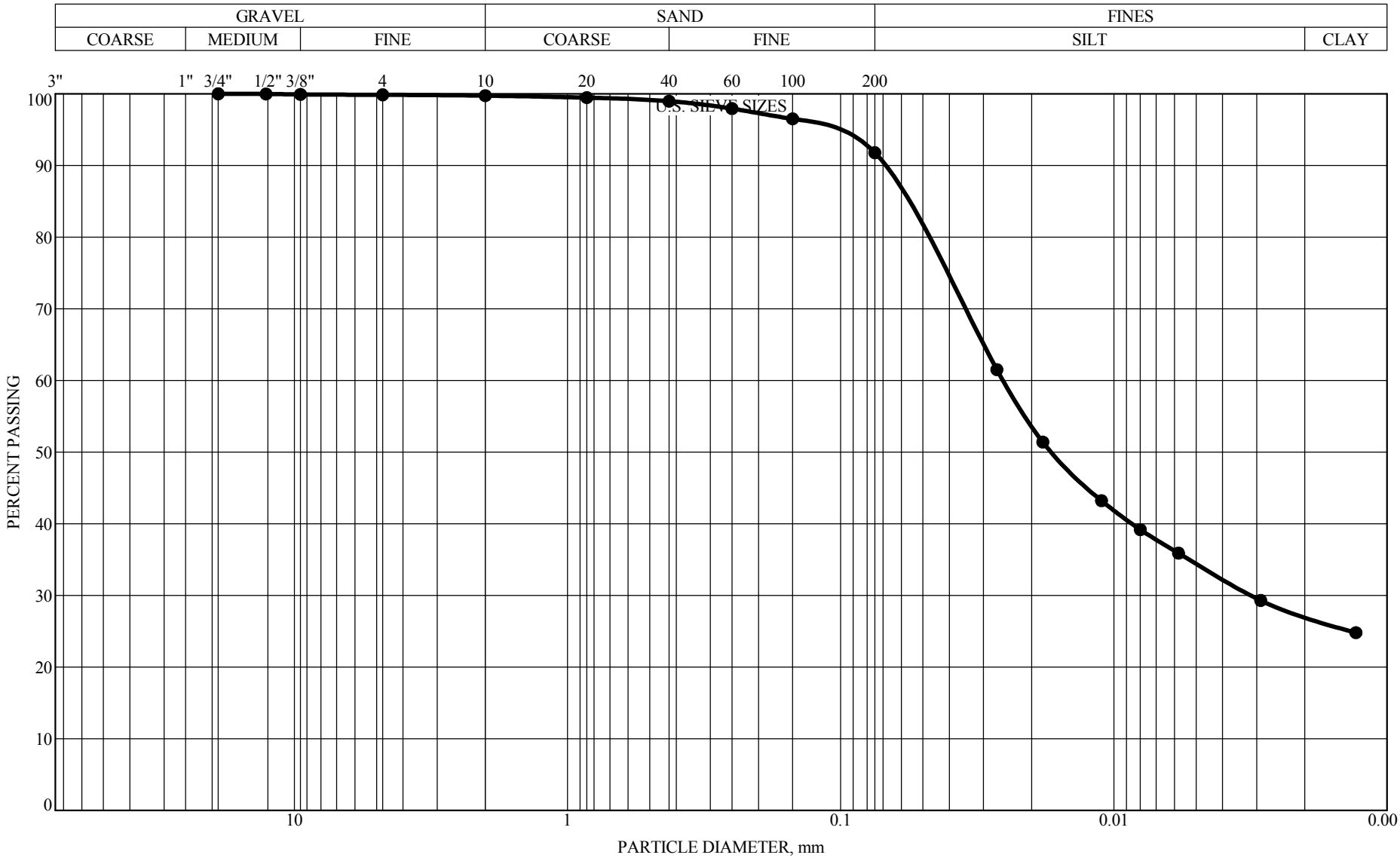
Thickness of Bedding

Massive:	3 ft. thick or greater
Thick bedded:	1 to 3 ft. thick
Medium bedded:	4 in. to 1 ft. thick
Thin bedded:	4 in. thick or less

Degree of Fracturing (Jointing)

Unfractured:	Fracture spacing 6 ft. of more
Slightly fractured:	Fracture spacing 2 to 6 ft.
Moderately fractured:	Fracture spacing 8 in. to 2 ft.
Highly fractured:	Fracture spacing 2 in. to 8 in.
Intensely fractured:	Fracture spacing 2 in. or less

GRAIN SIZE ACCUMULATION CURVE (AASHTO)



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Highway 1804
New Town, North Dakota

BORING: LSS-01 DEPTH: 1.0'-11.5'

GRAVEL	0.3%
SAND	8.0%
SILT	64.6%
CLAY	27.2%

CLASSIFICATION:
A-7-6 (23), Dark Brown
LEAN CLAY(CL)

LL=42, PL=18, PI=24, P200=92%

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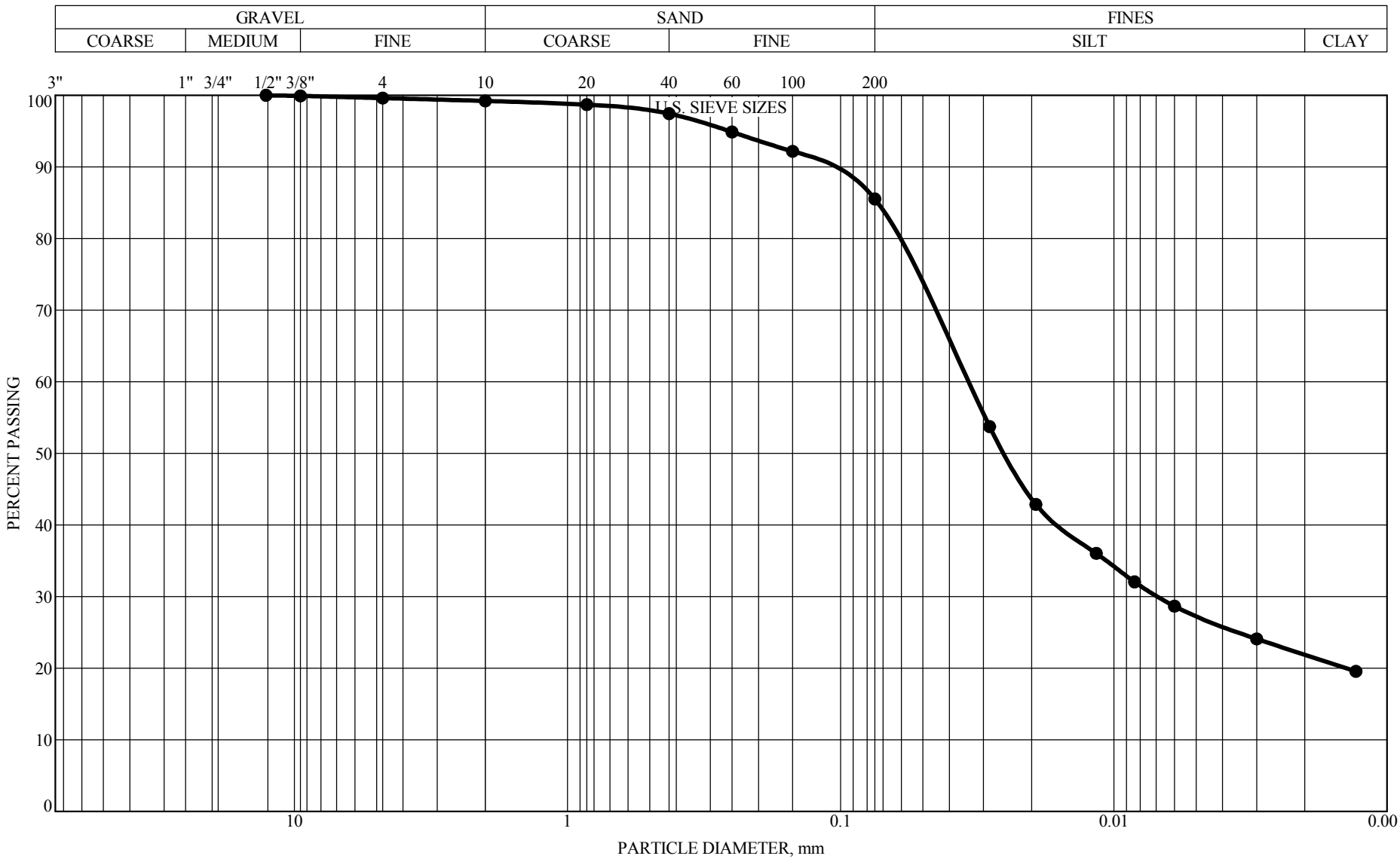
GRAIN SIZE ACCUMULATION CURVE (AASHTO)



BRAUN INTERTEC

Braun Project B1500957
Geotechnical Evaluation
New Town Truck Reliever Rte NW
Highway 1804
New Town, North Dakota

BORING: LSS-01 DEPTH: 11.5'-31.0'

GRAVEL	0.8%
SAND	13.7%
SILT	63.6%
CLAY	21.9%

CLASSIFICATION:
A-6 (15), Brown
LEAN CLAY(CL)

LL=35, PL=17, PI=18, P200=86%

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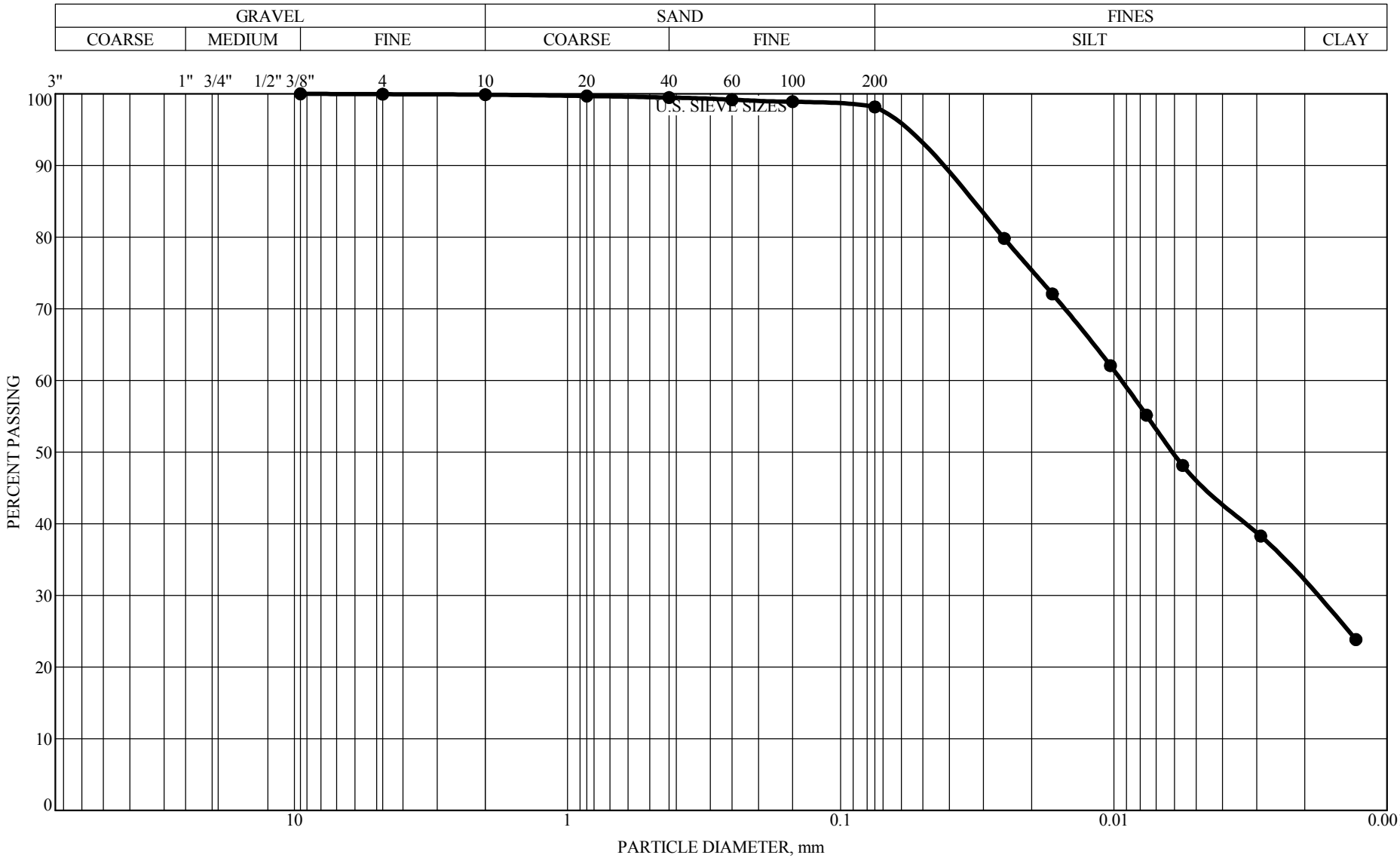
GRAIN SIZE ACCUMULATION CURVE (AASHTO)



BRAUN INTERTEC

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Geotechnical Evaluation
New Town Truck Reliever Rte NW
Highway 1804
New Town, North Dakota

BORING: LSS-02 DEPTH: 0.5'-6.5'

GRAVEL	0.1%
SAND	1.7%
SILT	66.6%
CLAY	31.6%

CLASSIFICATION:
A-7-6 (32), Brown
FAT CLAY(CH)

LL=50, PL=20, PI=30, P200=98%

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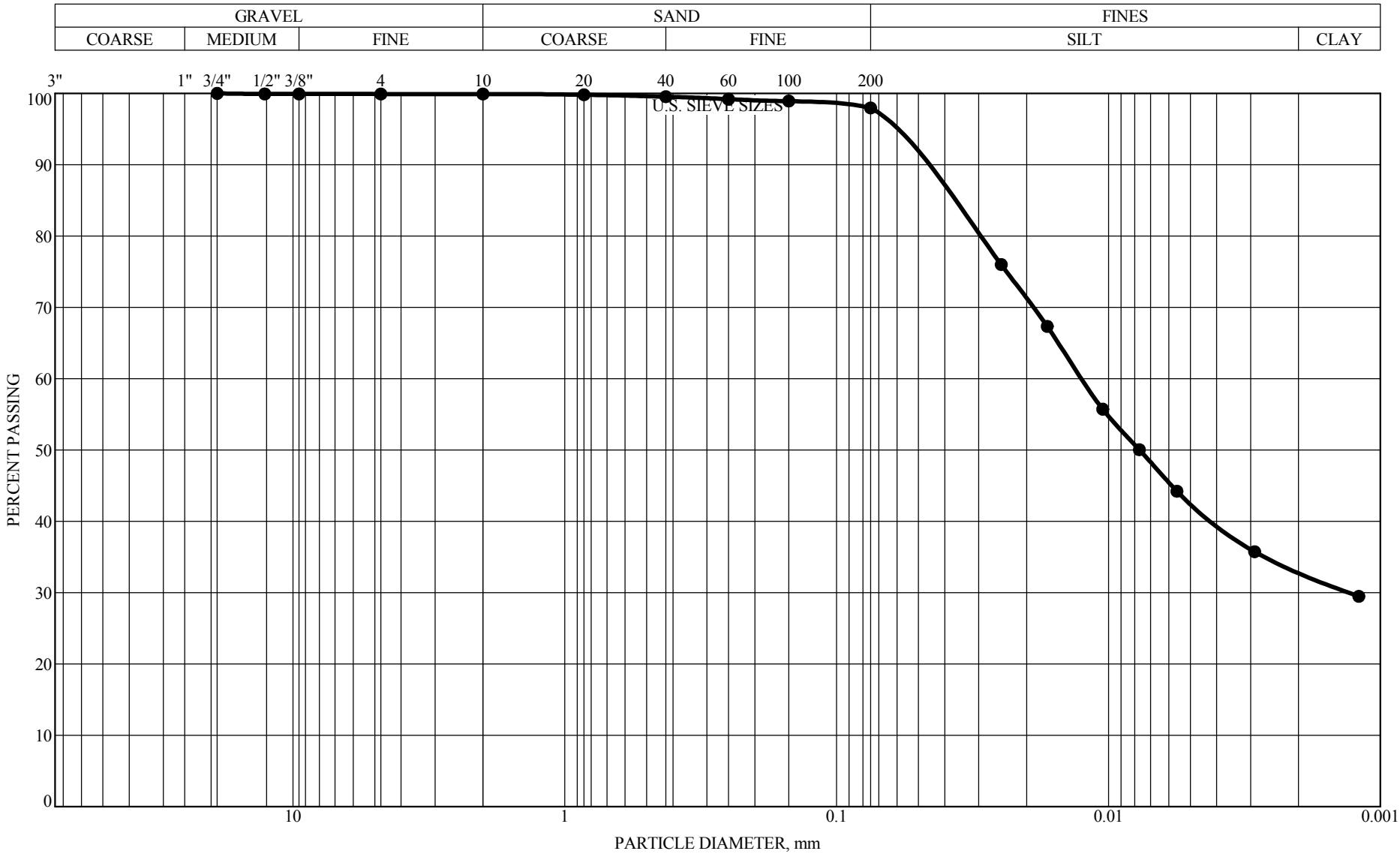
GRAIN SIZE ACCUMULATION CURVE (AASHTO)



BRAUN INTERTEC

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Geotechnical Evaluation
New Town Truck Reliever Rte NW
Highway 1804
New Town, North Dakota

BORING: LSS-02 DEPTH: 6.5'-31.0'

GRAVEL	0.1%
SAND	2.0%
SILT	64.9%
CLAY	33.1%

CLASSIFICATION:
A-7-6 (28), Brown
LEAN CLAY(CL)

LL=45, PL=18, PI=27, P200=98%

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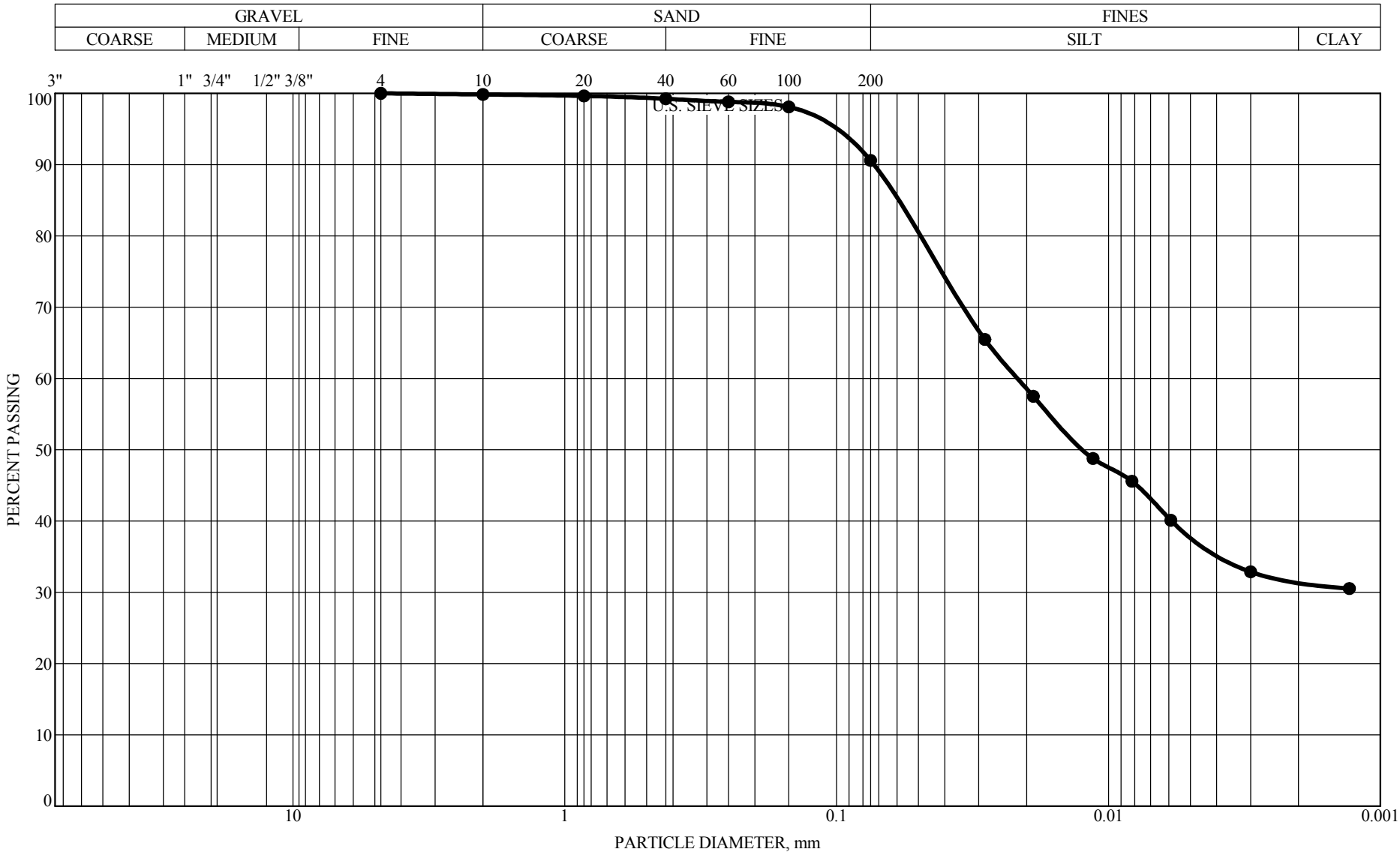
GRAIN SIZE ACCUMULATION CURVE (AASHTO)



BRAUN INTERTEC

Braun Project B1500957
Geotechnical Evaluation
New Town Truck Reliever Rte NW
Highway 1804
New Town, North Dakota

BORING: LSS-03 DEPTH: 0.5'-26.5'

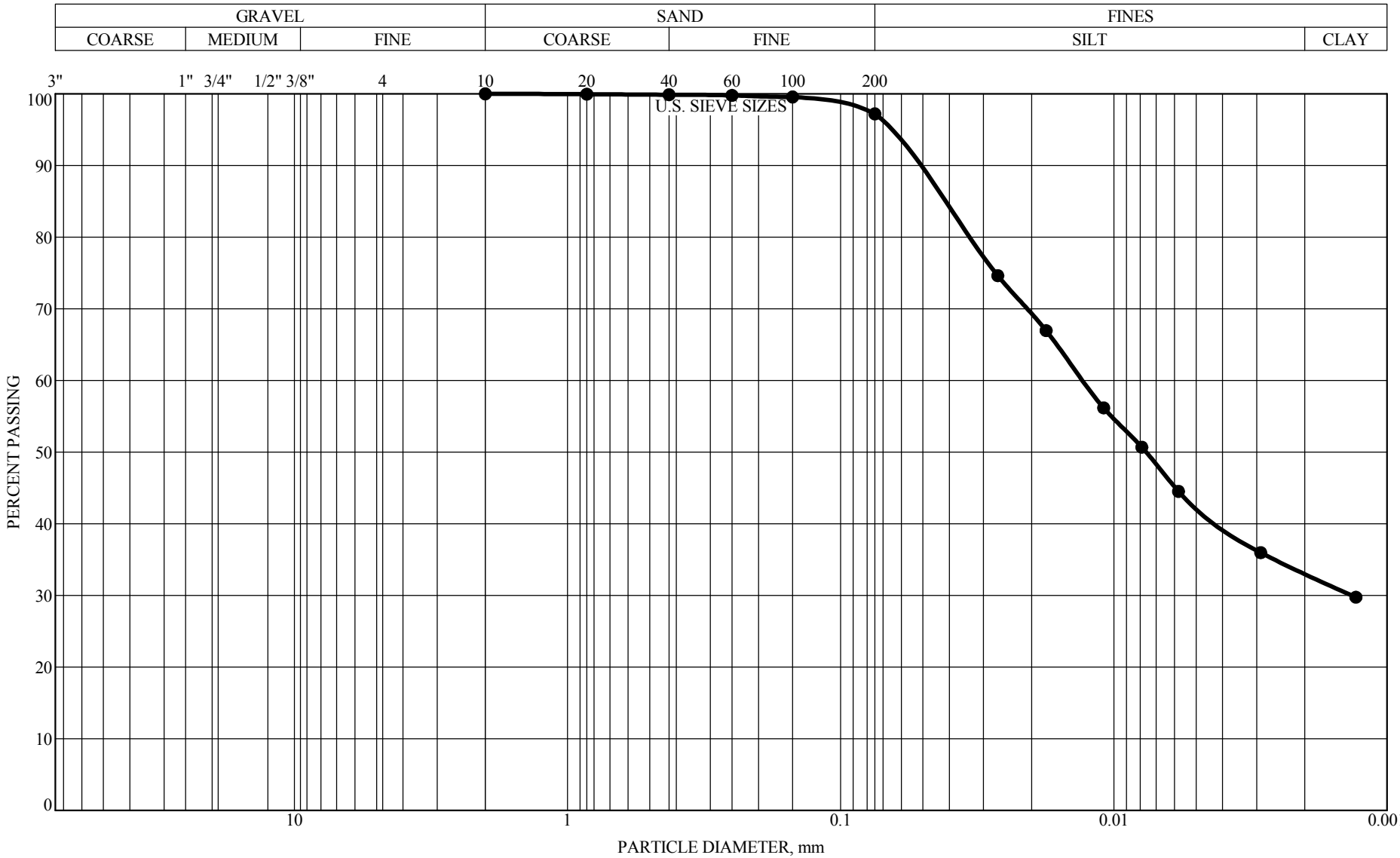
GRAVEL	0.2%
SAND	9.3%
SILT	58.8%
CLAY	31.7%

CLASSIFICATION:
A-6 (19), Brown
LEAN CLAY(CL)

LL=37, PL=16, PI=21, P200=91%

GS AASHTO 00957.GPJ BRAUN.GDT 5/1/17 09:18

GRAIN SIZE ACCUMULATION CURVE (AASHTO)



BRAUN INTERTEC

Braun Project B1500957
Geotechnical Evaluation
New Town Truck Reliever Rte NW
Highway 1804
New Town, North Dakota

BORING: LSS-04 DEPTH: 1.5'-6.5'

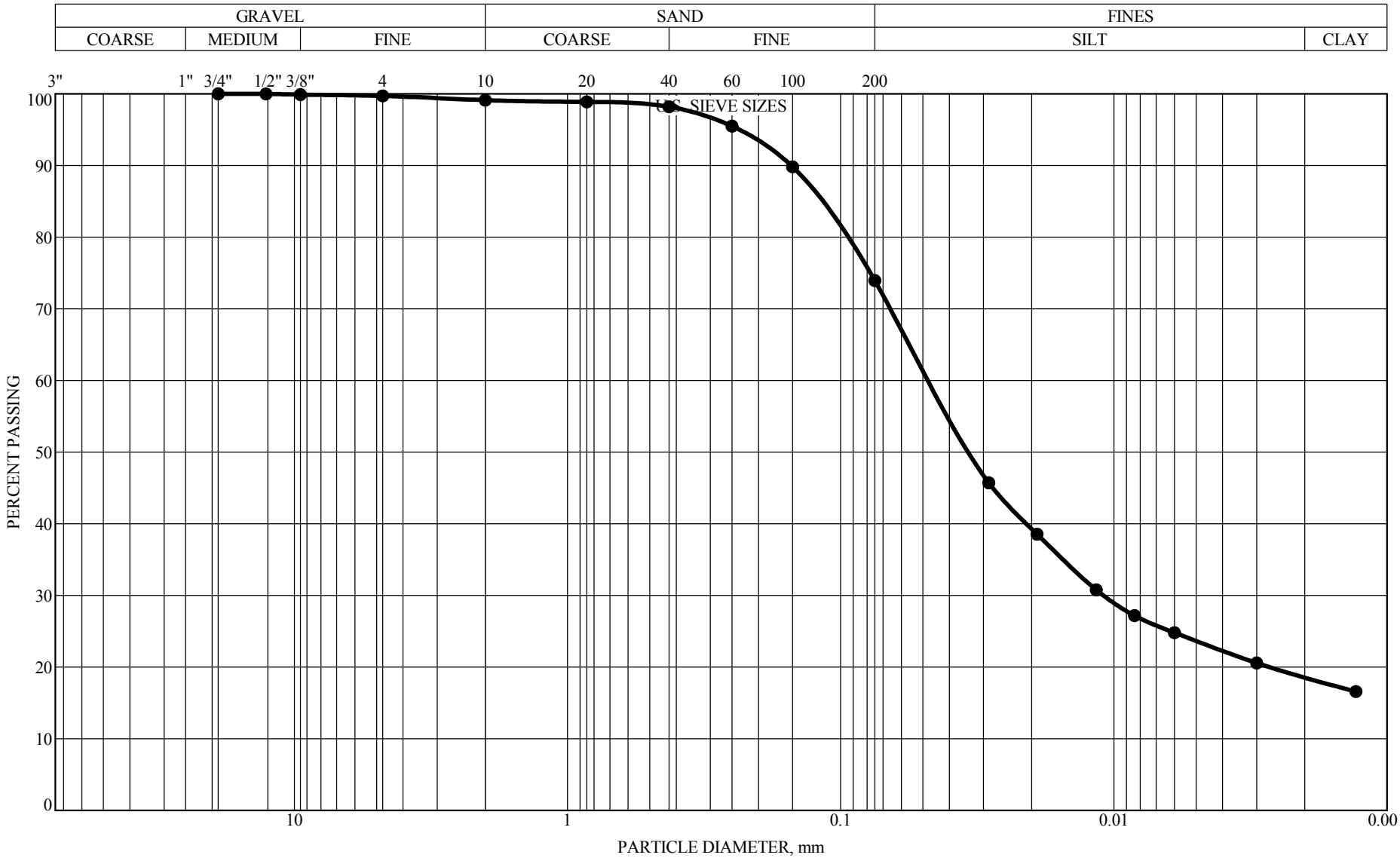
GRAVEL	0.0%
SAND	2.8%
SILT	64.1%
CLAY	33.1%

CLASSIFICATION:
A-7-6 (25), Brown
LEAN CLAY(CL)

LL=41, PL=16, PI=25, P200=97%

GS AASHTO 00957.GPJ BRAUN.GDT 5/1/17 09:18

GRAIN SIZE ACCUMULATION CURVE (AASHTO)



BRAUN INTERTEC

Braun Project B1500957
Geotechnical Evaluation
New Town Truck Reliever Rte NW
Highway 1804
New Town, North Dakota

BORING: LSS-05 DEPTH: 1.0'-17.0'

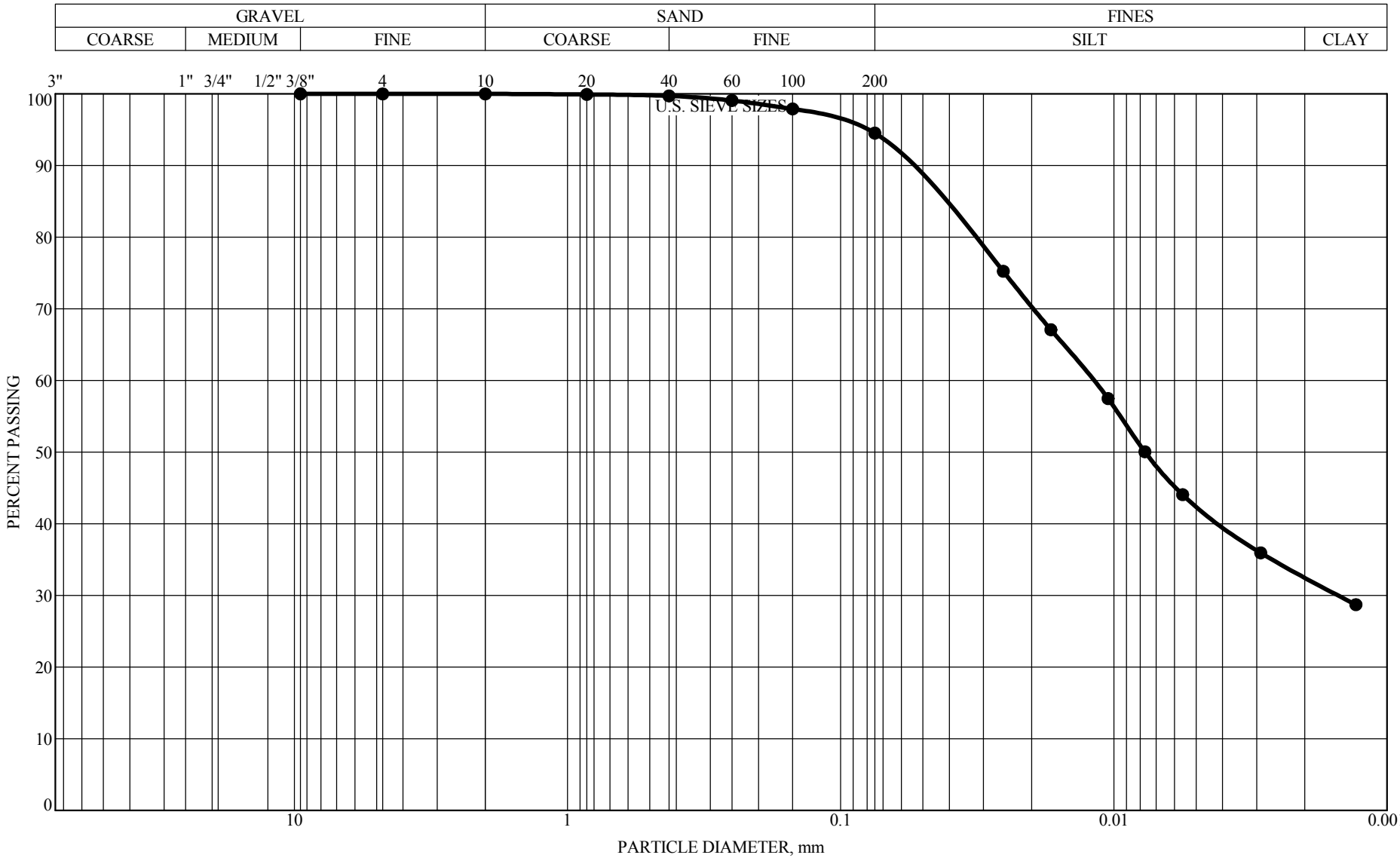
GRAVEL	0.9%
SAND	25.2%
SILT	55.3%
CLAY	18.6%

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

LL=30, PL=18, PI=12, P200=74%

GS AASHTO 00957.GPJ BRAUN.GDT 5/1/17 09:18

GRAIN SIZE ACCUMULATION CURVE (AASHTO)



BRAUN INTERTEC

Braun Project B1500957
Geotechnical Evaluation
New Town Truck Reliever Rte NW
Highway 1804
New Town, North Dakota

BORING: LSS-05 DEPTH: 17.0'-41.0'

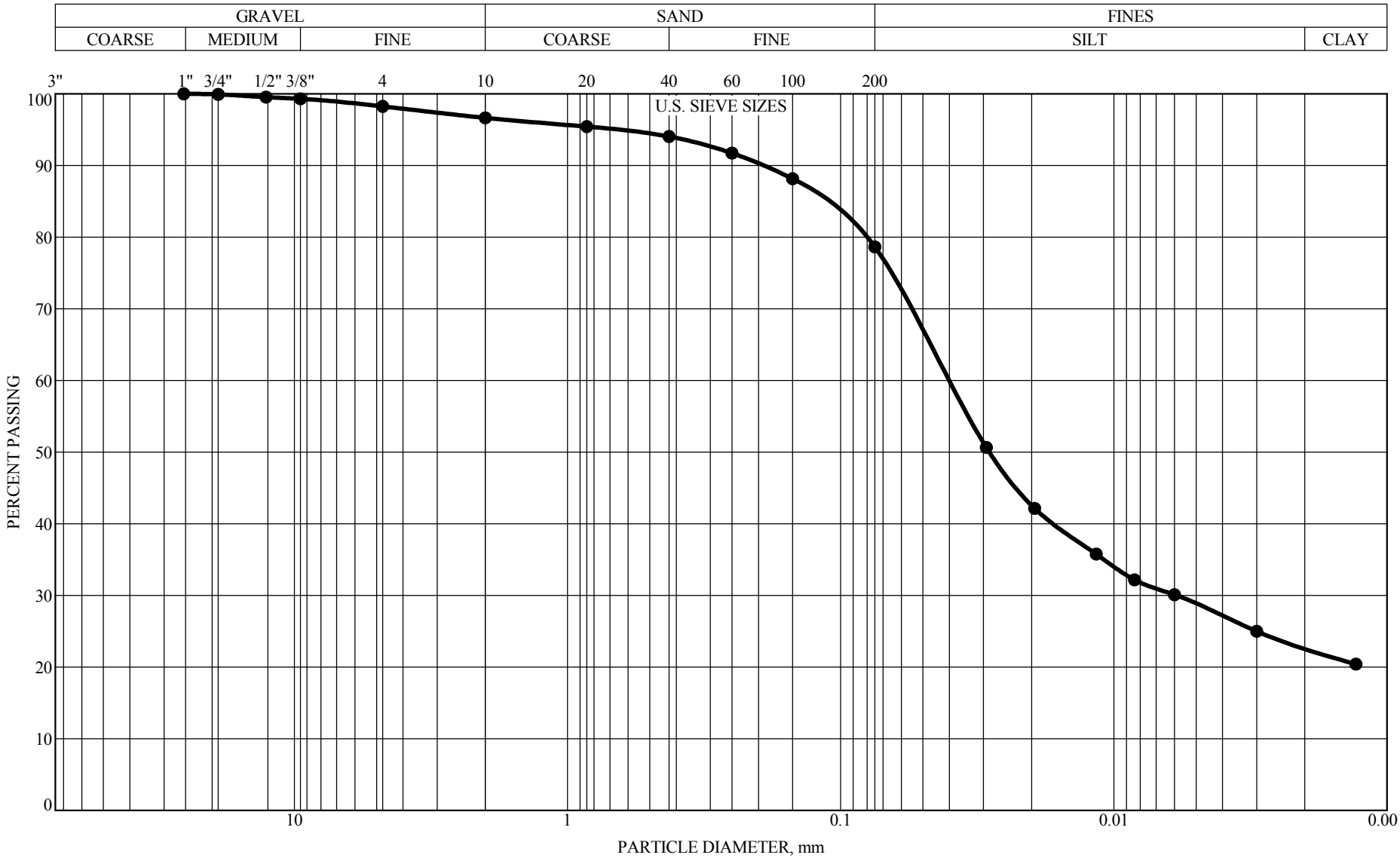
GRAVEL	0.0%
SAND	5.5%
SILT	61.9%
CLAY	32.6%

CLASSIFICATION:
A-7-6 (26), Gray
LEAN CLAY(CL)

LL=43, PL=17, PI=26, P200=95%

GS AASHTO 00957.GPJ BRAUN.GDT 5/1/17 09:18

GRAIN SIZE ACCUMULATION CURVE (AASHTO)



BRAUN INTERTEC

Braun Project B1500957
Geotechnical Evaluation
New Town Truck Reliever Rte NW
Highway 1804
New Town, North Dakota

BORING: LSS-06 DEPTH: 1.0'-12.0'

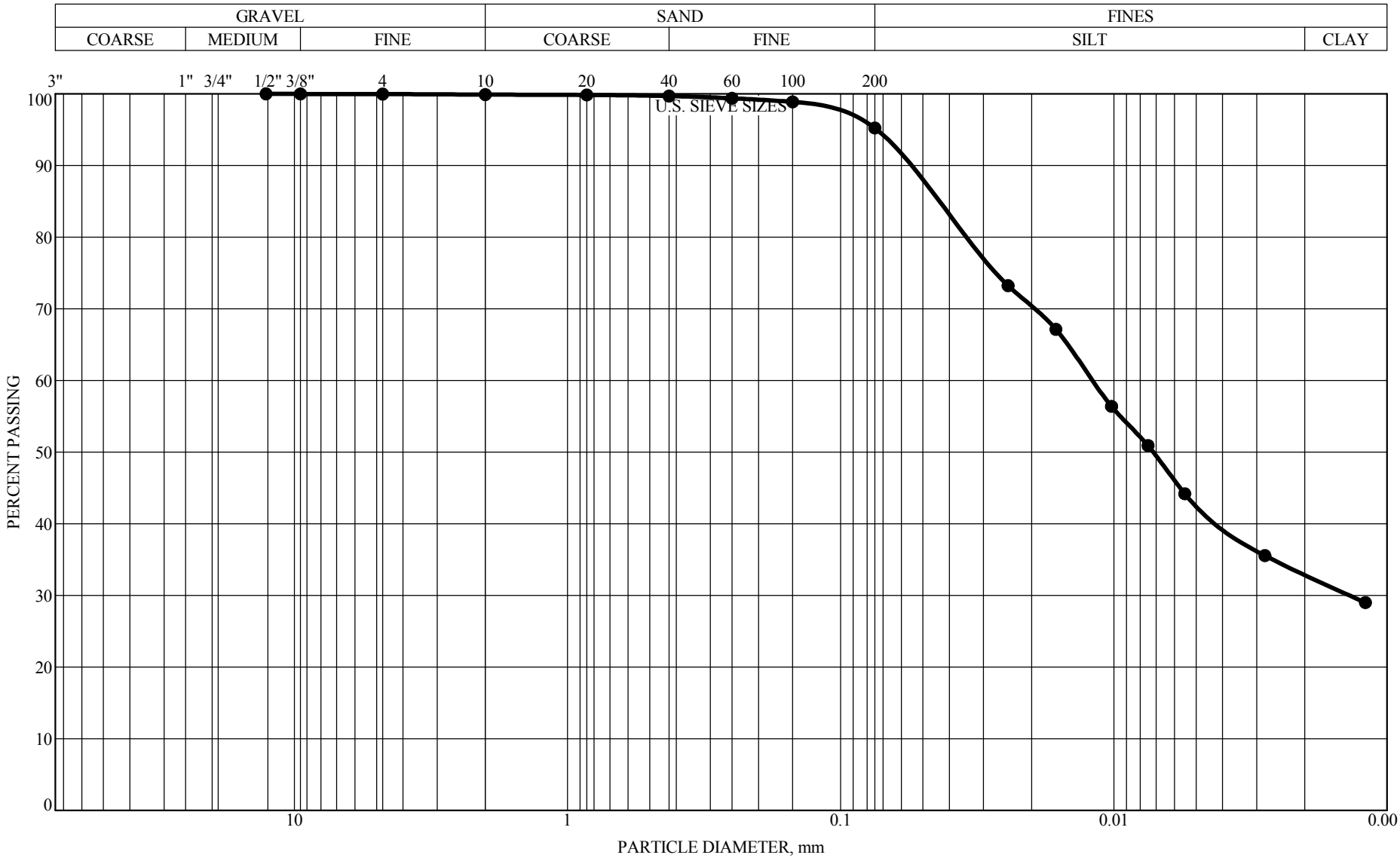
GRAVEL	3.4%
SAND	18.0%
SILT	55.9%
CLAY	22.8%

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

LL=34, PL=16, PI=18, P200=79%

GS AASHTO 00957.GPJ BRAUN.GDT 5/1/17 09:18

GRAIN SIZE ACCUMULATION CURVE (AASHTO)



BRAUN INTERTEC

Braun Project B1500957
Geotechnical Evaluation
New Town Truck Reliever Rte NW
Highway 1804
New Town, North Dakota

BORING: LSS-06 DEPTH: 12.0'-51.0'

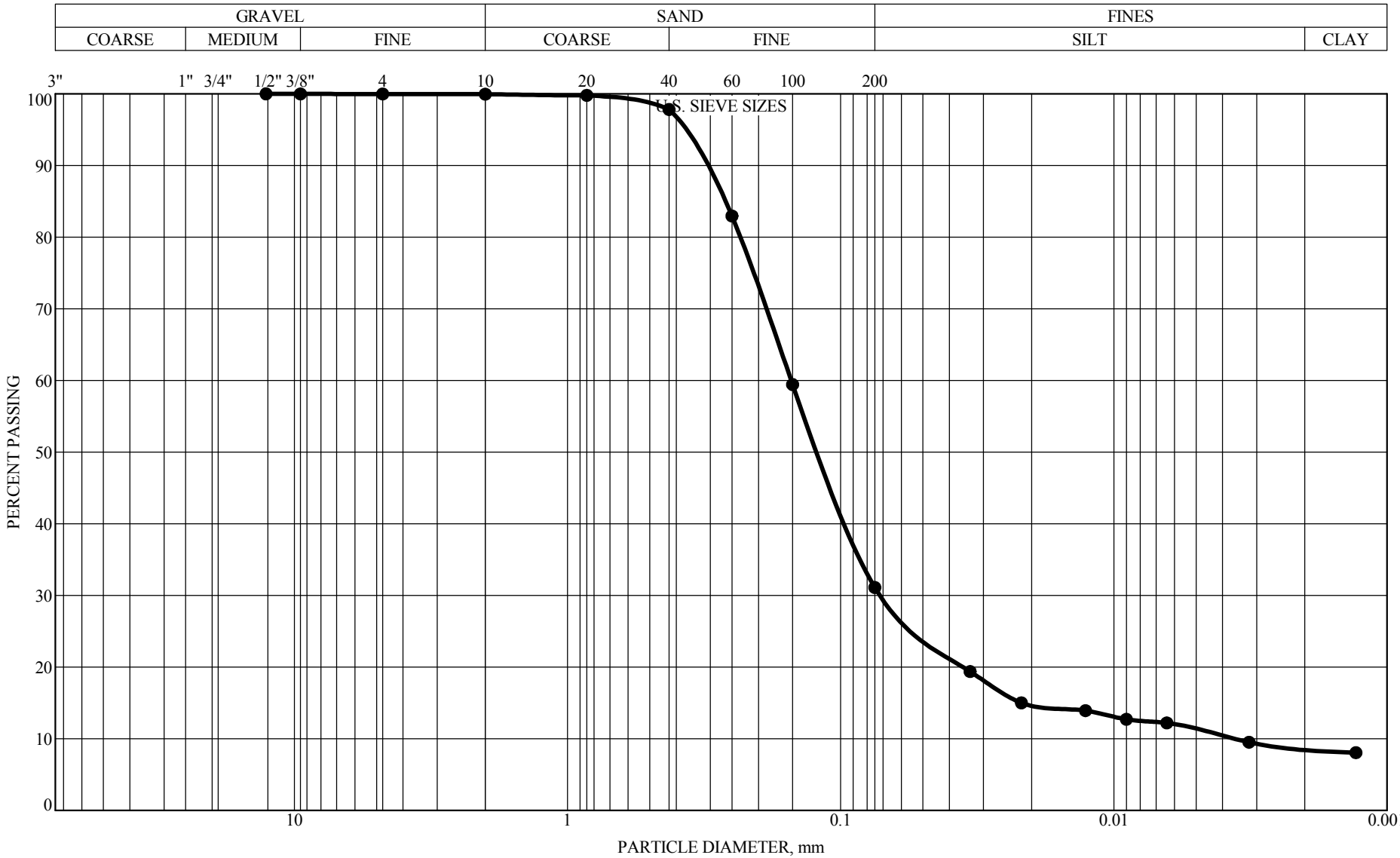
GRAVEL	0.1%
SAND	4.7%
SILT	62.3%
CLAY	33.0%

CLASSIFICATION:
A-7-6 (27), Gray
LEAN CLAY(CL)

LL=44, PL=17, PI=27, P200=95%

GS AASHTO 00957.GPJ BRAUN.GDT 5/1/17 09:18

GRAIN SIZE ACCUMULATION CURVE (AASHTO)



BRAUN INTERTEC

Braun Project B1500957
Geotechnical Evaluation
New Town Truck Reliever Rte NW
Highway 1804
New Town, North Dakota

BORING: LSS-07 DEPTH: 0.5'-16.5'

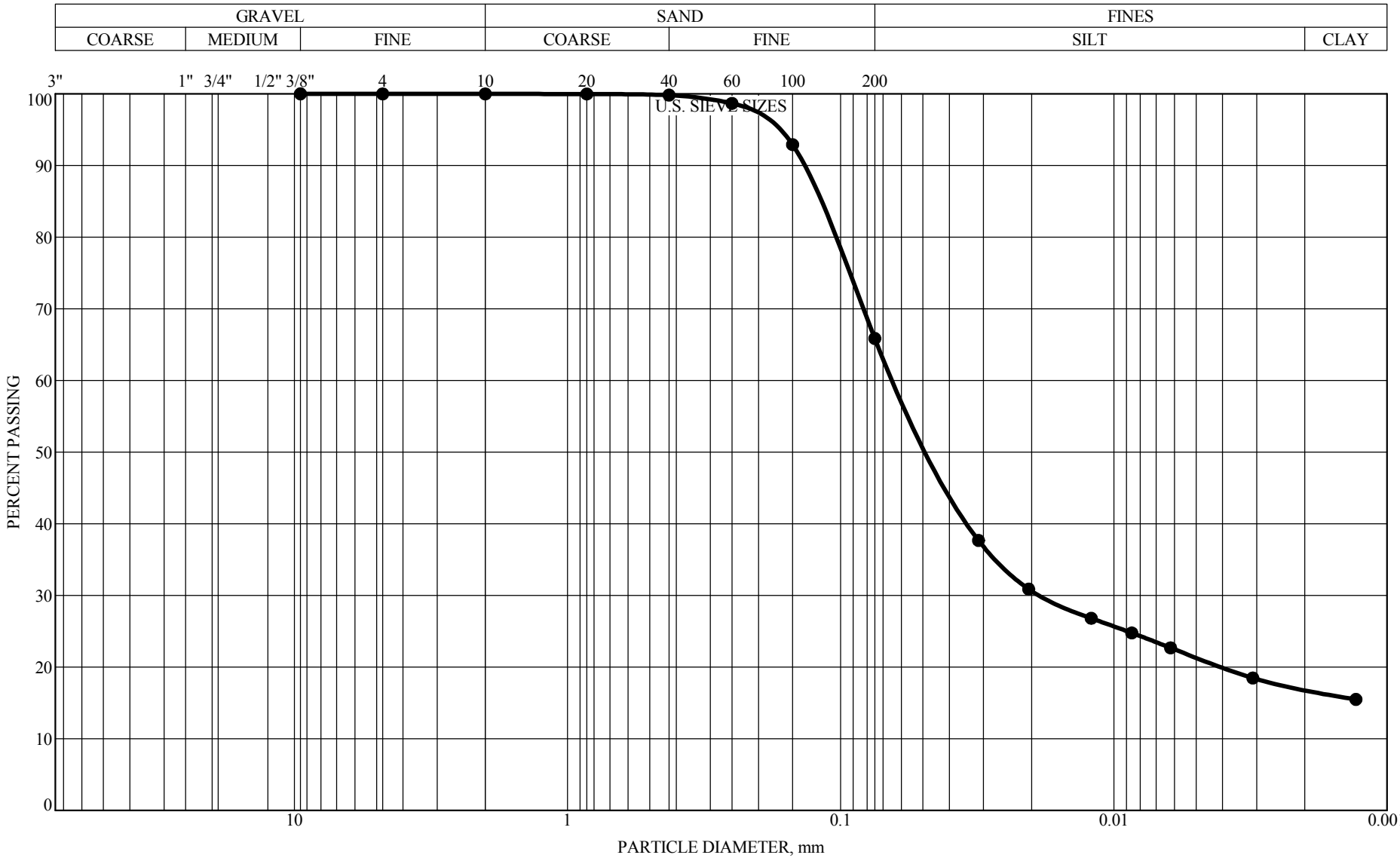
GRAVEL	0.0%
SAND	68.8%
SILT	22.4%
CLAY	8.8%

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

LL=NP, PL=NP, PI=NP, P200=31%

GS AASHTO 00957.GPJ BRAUN.GDT 5/1/17 09:18

GRAIN SIZE ACCUMULATION CURVE (AASHTO)



BRAUN INTERTEC

Braun Project B1500957
Geotechnical Evaluation
New Town Truck Reliever Rte NW
Highway 1804
New Town, North Dakota

BORING: LSS-07 DEPTH: 16.5'-27.0'

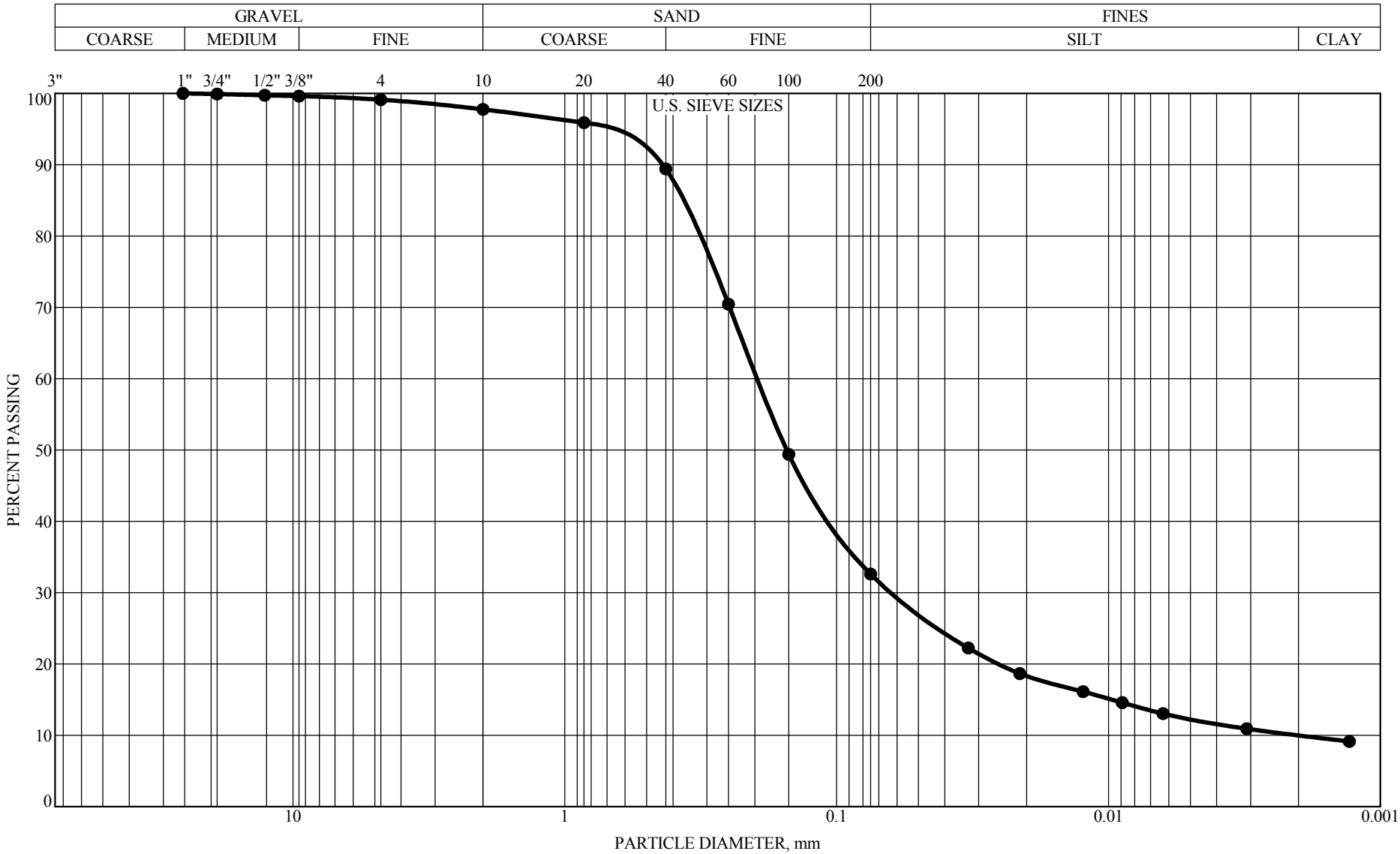
GRAVEL	0.0%
SAND	34.1%
SILT	48.9%
CLAY	17.0%

CLASSIFICATION:
A-4 (3), Brown
SANDY LEAN CLAY(CL)

LL=26, PL=18, PI=8, P200=66%

GS AASHTO 00957.GPJ BRAUN.GDT 5/1/17 09:18

GRAIN SIZE ACCUMULATION CURVE (AASHTO)



BRAUN INTERTEC

Braun Project B1500957
Geotechnical Evaluation
New Town Truck Reliever Rte NW
Highway 1804
New Town, North Dakota

BORING: LSS-08 DEPTH: 1.0'-17.0'

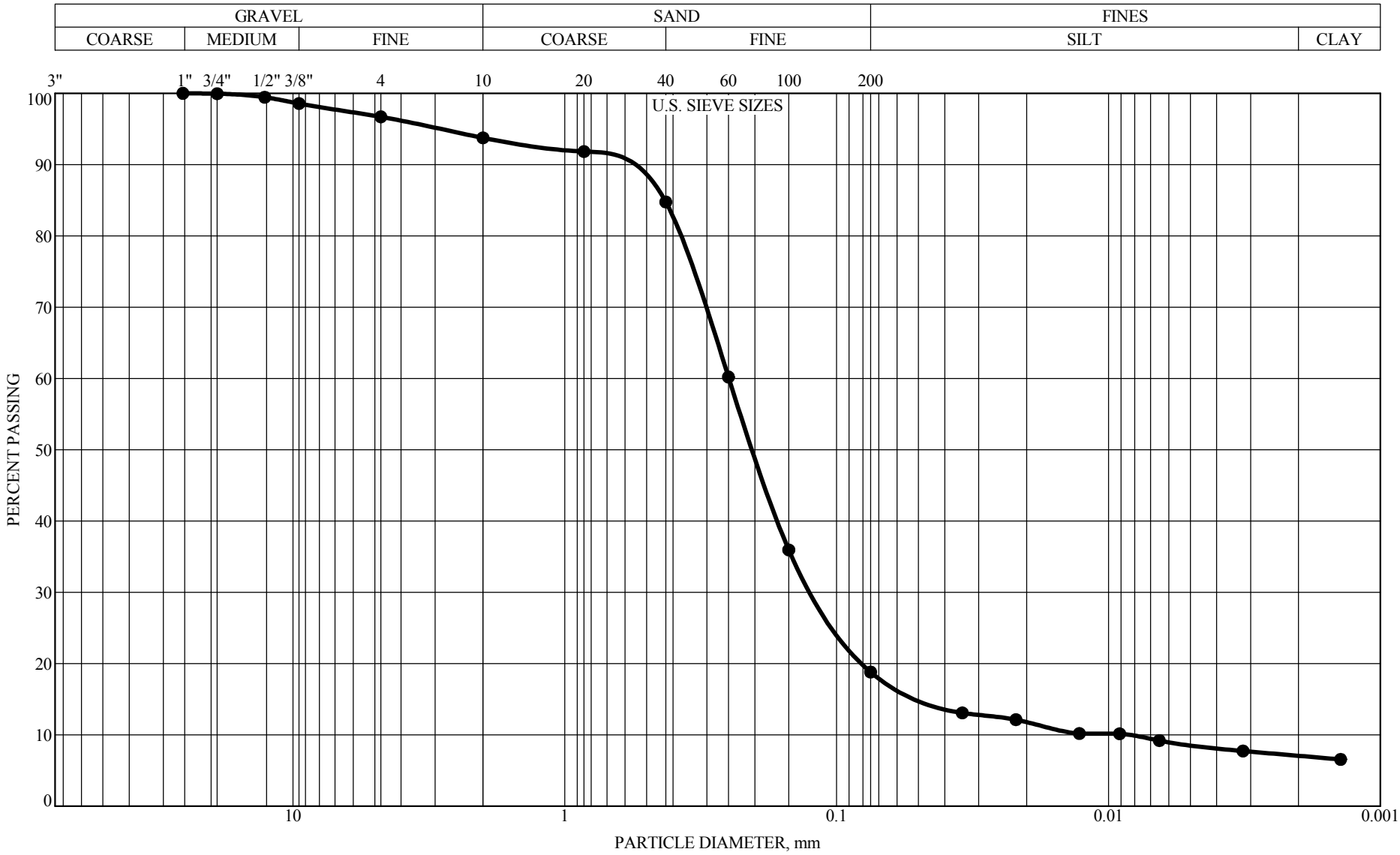
GRAVEL	2.2%
SAND	65.1%
SILT	22.6%
CLAY	10.0%

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

LL=NP, PL=NP, PI=NP, P200=33%

GS AASHTO 00957.GPJ BRAUN.GDT 5/1/17 09:18

GRAIN SIZE ACCUMULATION CURVE (AASHTO)



BRAUN INTERTEC

Braun Project B1500957
Geotechnical Evaluation
New Town Truck Reliever Rte NW
Highway 1804
New Town, North Dakota

BORING: LSS-08 DEPTH: 17.0'-32.0'

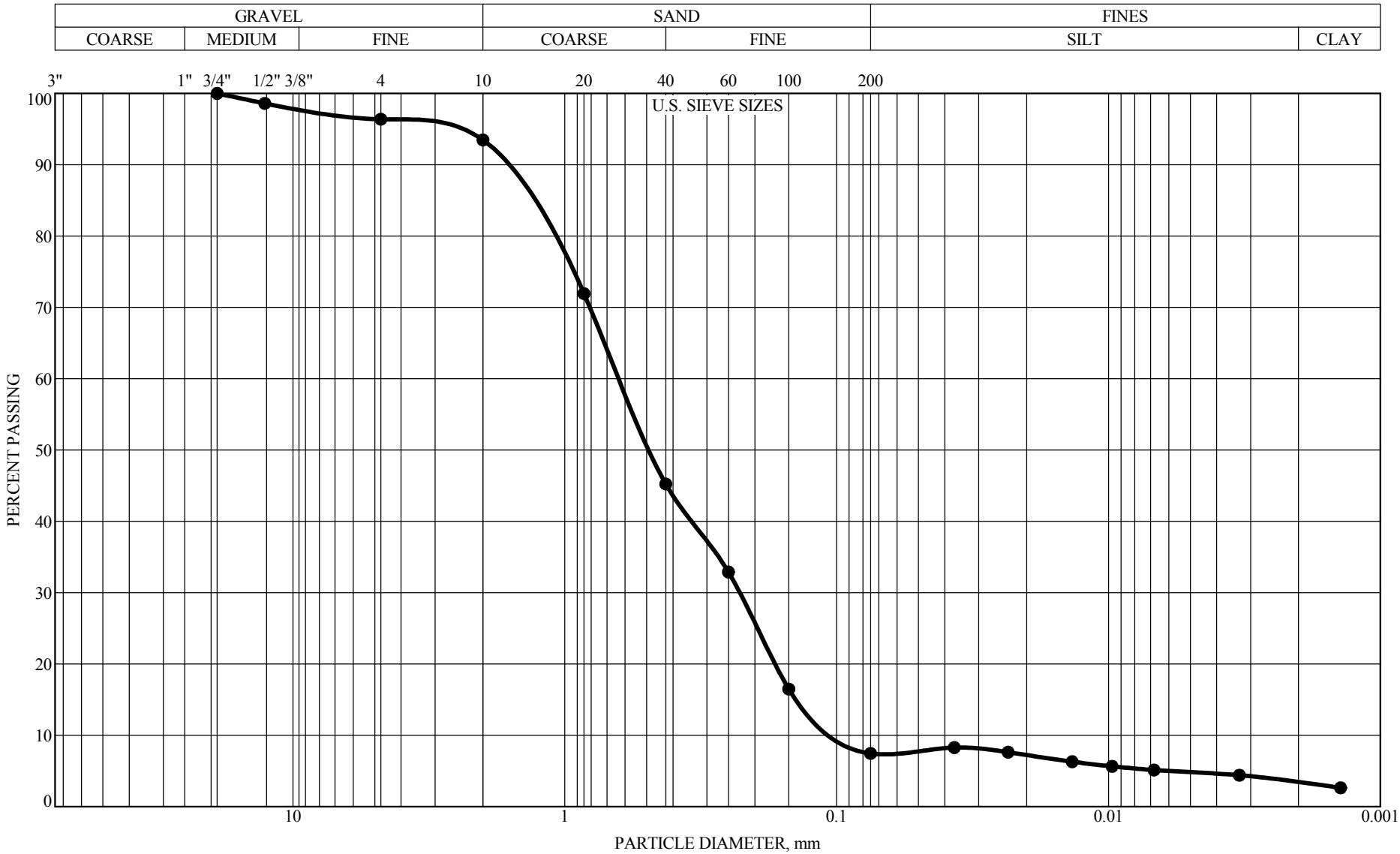
GRAVEL	6.2%
SAND	74.9%
SILT	11.7%
CLAY	7.1%

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

LL=NP, PL=NP, PI=NP, P200=19%

GS AASHTO 00957.GPJ BRAUN.GDT 5/1/17 09:18

GRAIN SIZE ACCUMULATION CURVE (AASHTO)



BRAUN INTERTEC

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Geotechnical Evaluation
New Town Truck Reliever Rte NW
Highway 1804
New Town, North Dakota

BORING: LSS-09 DEPTH: 1.0'-20.0'

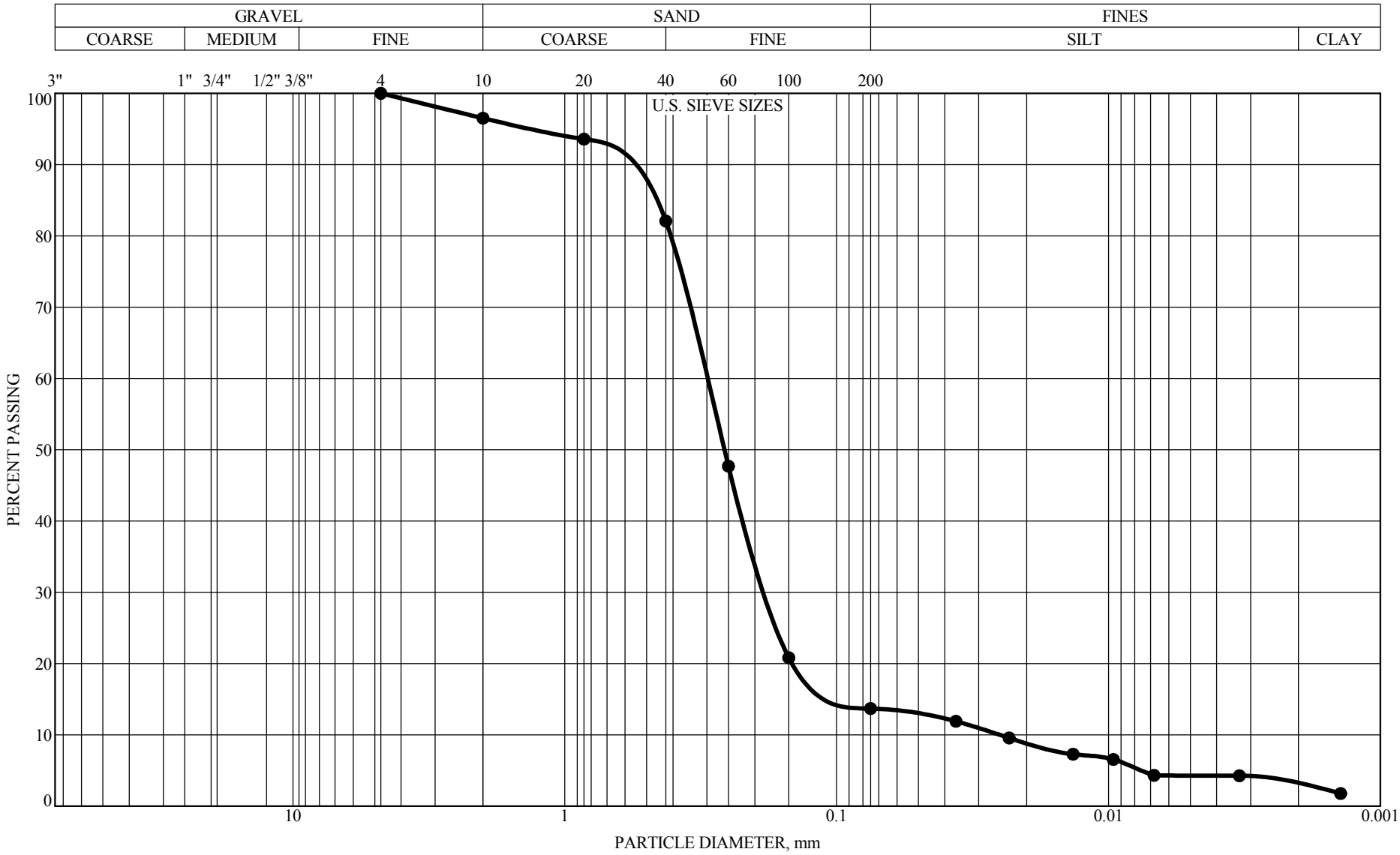
GRAVEL	6.5%
SAND	86.0%
SILT	4.1%
CLAY	3.4%

CLASSIFICATION:
A-1-b (0), Brown
POORLY GRADED SAND with SILT(SP-SM)

LL=NP, PL=NP, PI=NP, P200=7%

GS AASHTO 00957.GPJ BRAUN.GDT 5/1/17 09:18

GRAIN SIZE ACCUMULATION CURVE (AASHTO)



BRAUN INTERTEC

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Geotechnical Evaluation
New Town Truck Reliever Rte NW
Highway 1804
New Town, North Dakota

BORING: LSS-10 DEPTH: 1.0'-10.0'

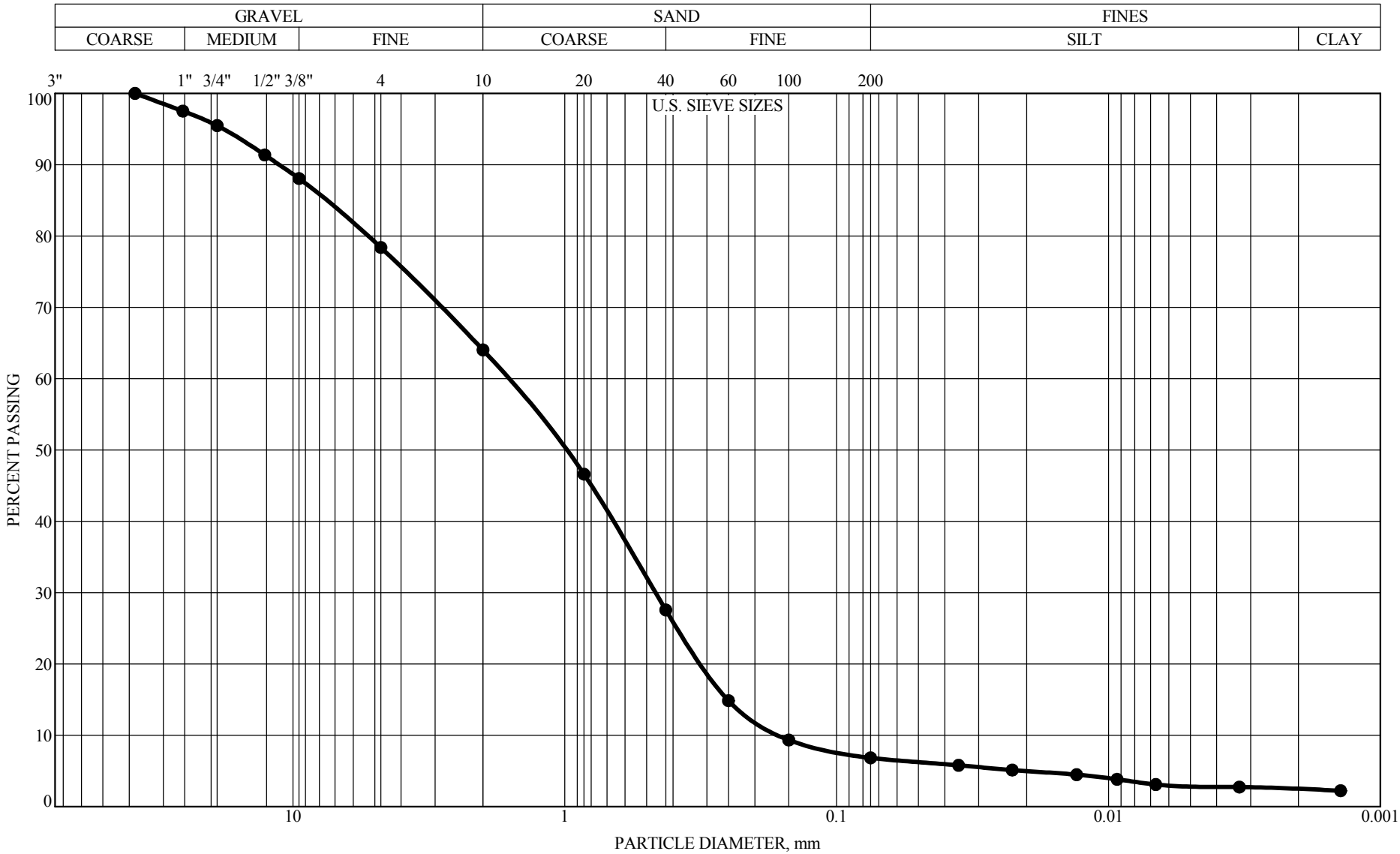
GRAVEL	3.5%
SAND	82.8%
SILT	10.9%
CLAY	2.8%

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

LL=NP, PL=NP, PI=NP, P200=14%

GS AASHTO 00957.GPJ BRAUN.GDT 5/1/17 09:18

GRAIN SIZE ACCUMULATION CURVE (AASHTO)



BRAUN INTERTEC

Braun Project B1500957
Geotechnical Evaluation
New Town Truck Reliever Rte NW
Highway 1804
New Town, North Dakota

BORING: LSS-11 DEPTH: 2.0'-10.0'

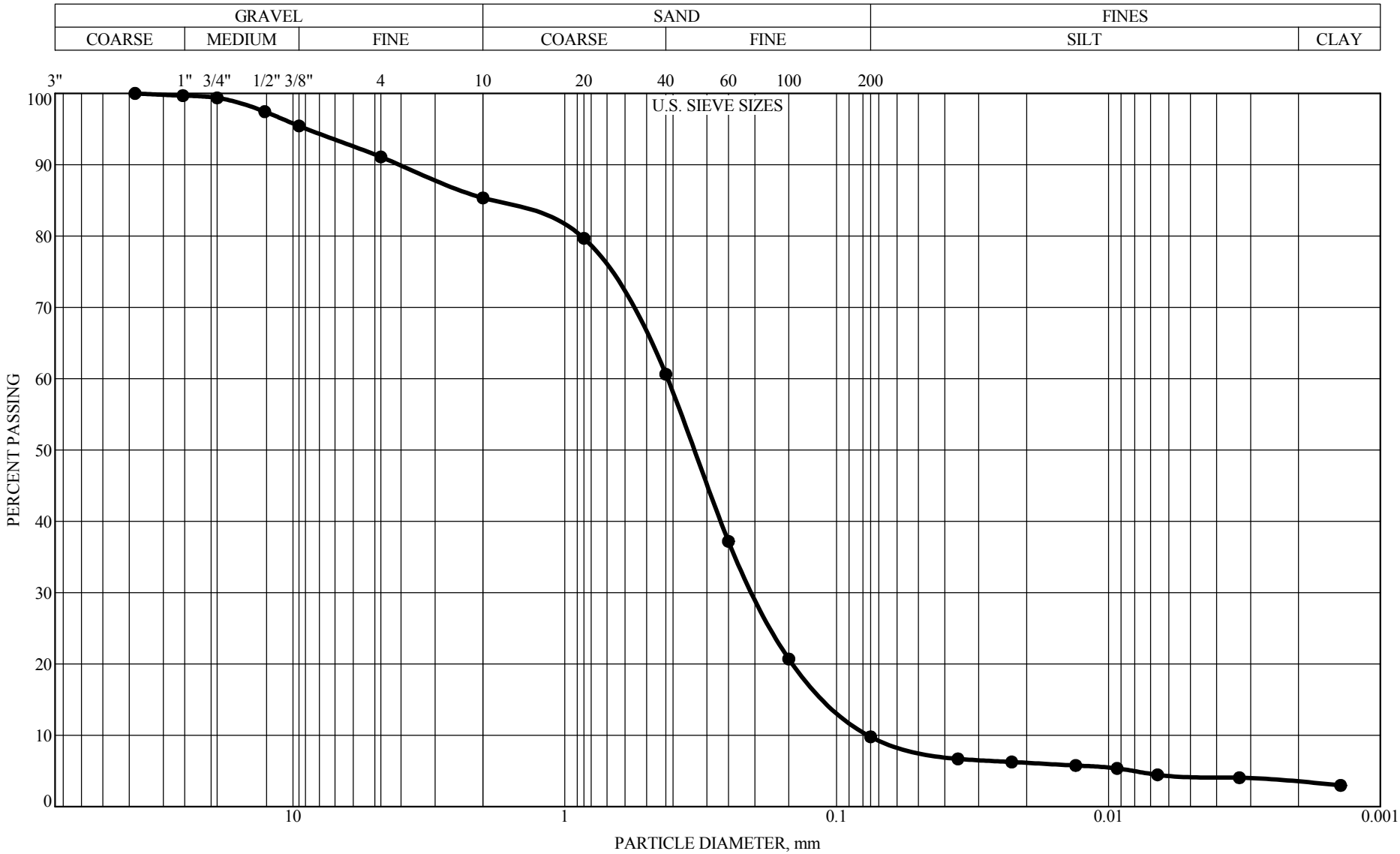
GRAVEL	36.0%
SAND	57.2%
SILT	4.4%
CLAY	2.4%

CLASSIFICATION:
A-1-b (0), Brown
POORLY GRADED SAND with SILT and GRAVEL(SP-SM)

LL=NP, PL=NP, PI=NP, P200=7%

GS AASHTO 00957.GPJ BRAUN.GDT 5/1/17 09:18

GRAIN SIZE ACCUMULATION CURVE (AASHTO)



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Braun Project B1500957
Geotechnical Evaluation
New Town Truck Reliever Rte NW
Highway 1804
New Town, North Dakota

BORING: LSS-11 DEPTH: 10.0'-29.0'

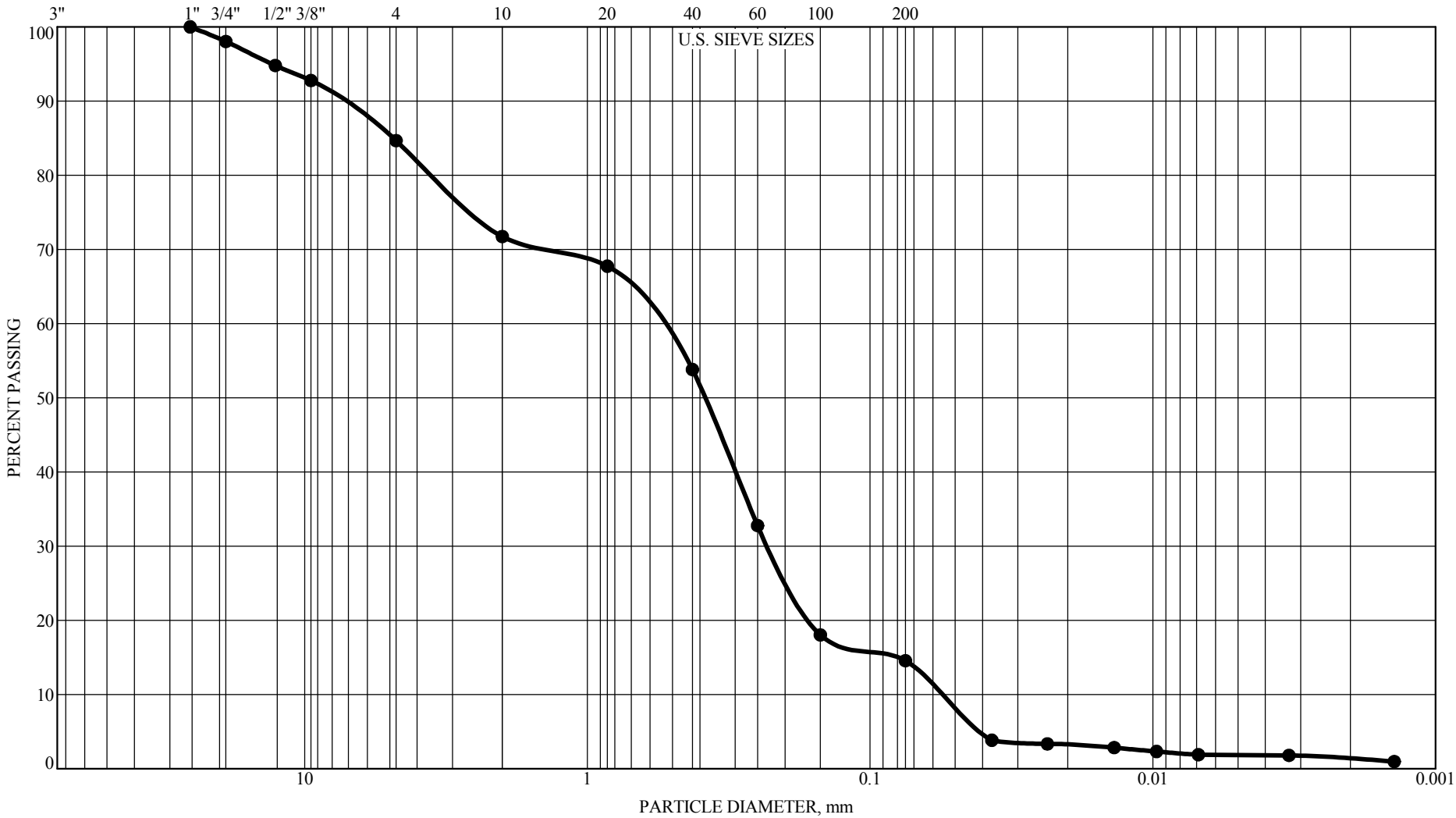
GRAVEL	14.7%
SAND	75.6%
SILT	6.4%
CLAY	3.4%

CLASSIFICATION:
A-3 (0), Brown
POORLY GRADED SAND with SILT(SP-SM)

LL=NP, PL=NP, PI=NP, P200=10%

GS AASHTO 00957.GPJ BRAUN.GDT 5/1/17 09:18

GRAIN SIZE ACCUMULATION CURVE (AASHTO)



BRAUN INTERTEC

Braun Project B1500957
Geotechnical Evaluation
New Town Truck Reliever Rte NW
Highway 1804
New Town, North Dakota

BORING: LSS-12 DEPTH: 1.0'-20.0'

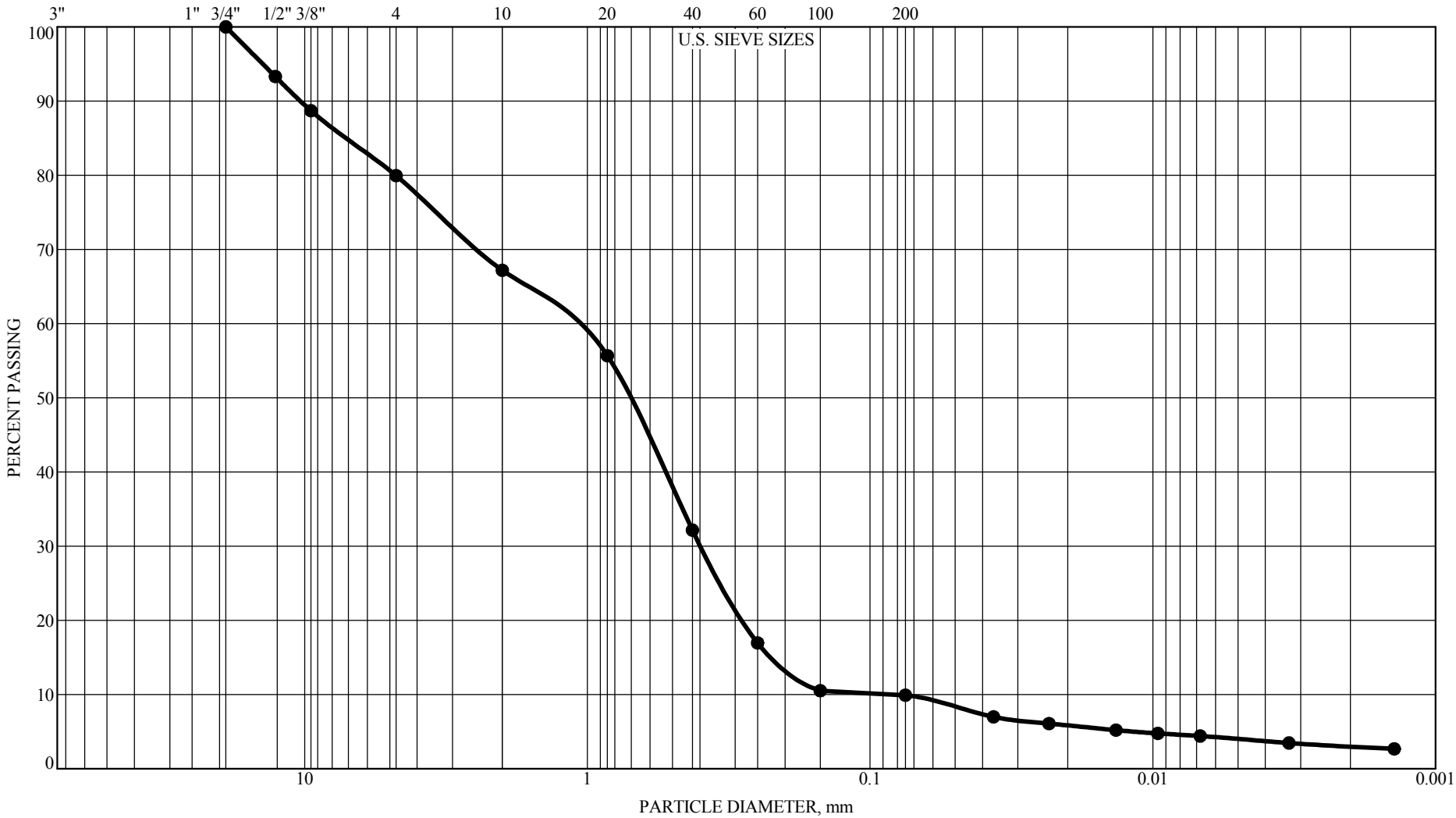
GRAVEL	28.3%
SAND	57.2%
SILT	13.3%
CLAY	1.3%

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

LL=NP, PL=NP, PI=NP, P200=15%

GS AASHTO 00957.GPJ BRAUN.GDT 5/1/17 09:18

GRAIN SIZE ACCUMULATION CURVE (AASHTO)



BRAUN INTERTEC

Braun Project B1500957
Geotechnical Evaluation
New Town Truck Reliever Rte NW
Highway 1804
New Town, North Dakota

BORING: LSS-13 DEPTH: 2.0'-20.0'

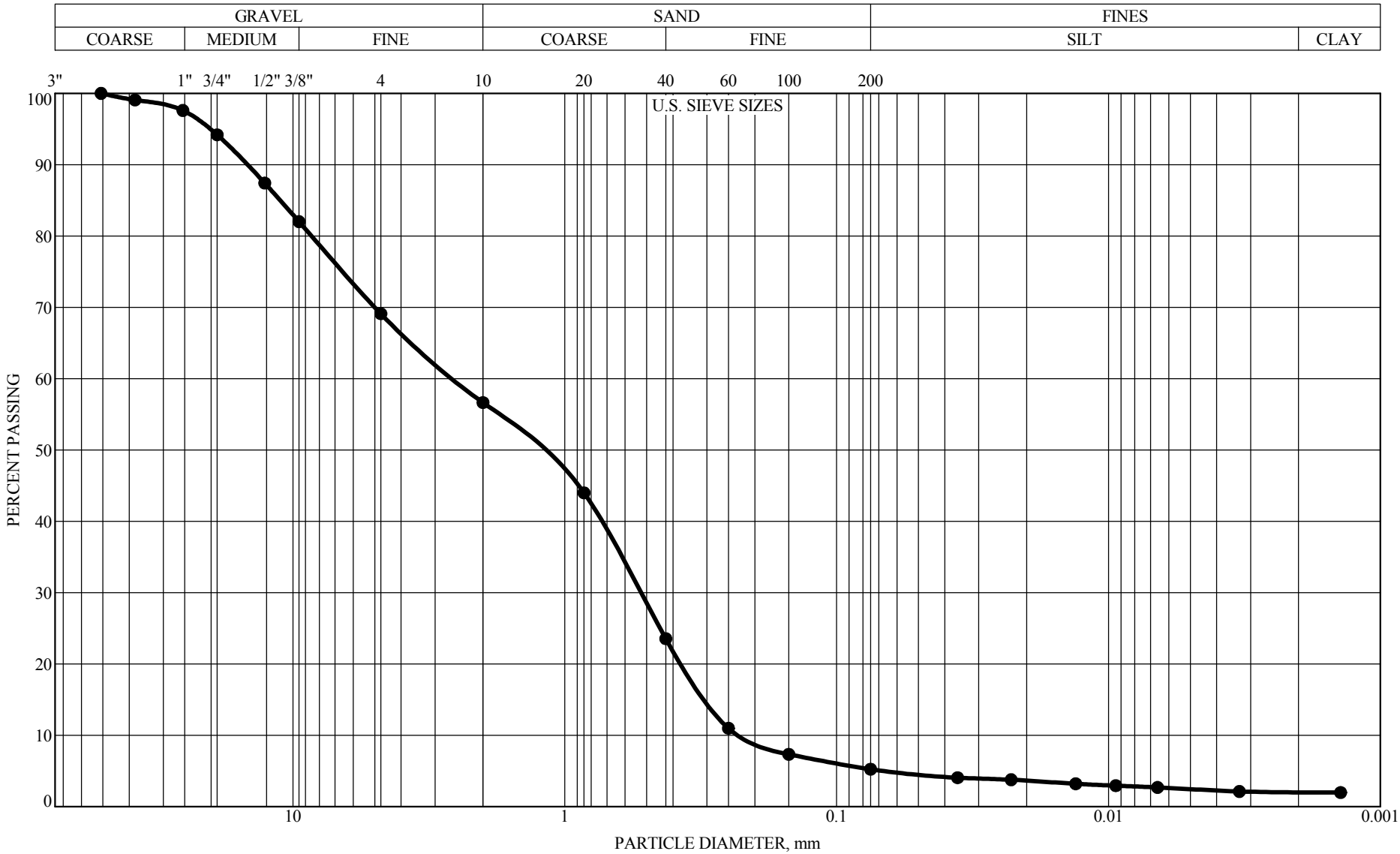
GRAVEL	32.8%
SAND	57.3%
SILT	6.9%
CLAY	3.0%

CLASSIFICATION:
A-1-b (0), Brown
WELL-GRADED SAND with SILT and GRAVEL(SW-SM)

LL=NP, PL=NP, PI=NP, P200=10%

GS AASHTO 00957.GPJ BRAUN.GDT 5/1/17 09:18

GRAIN SIZE ACCUMULATION CURVE (AASHTO)



BRAUN INTERTEC

Braun Project B1500957
Geotechnical Evaluation
New Town Truck Reliever Rte NW
Highway 1804
New Town, North Dakota

BORING: LSS-14 DEPTH: 2.0'-11.0'

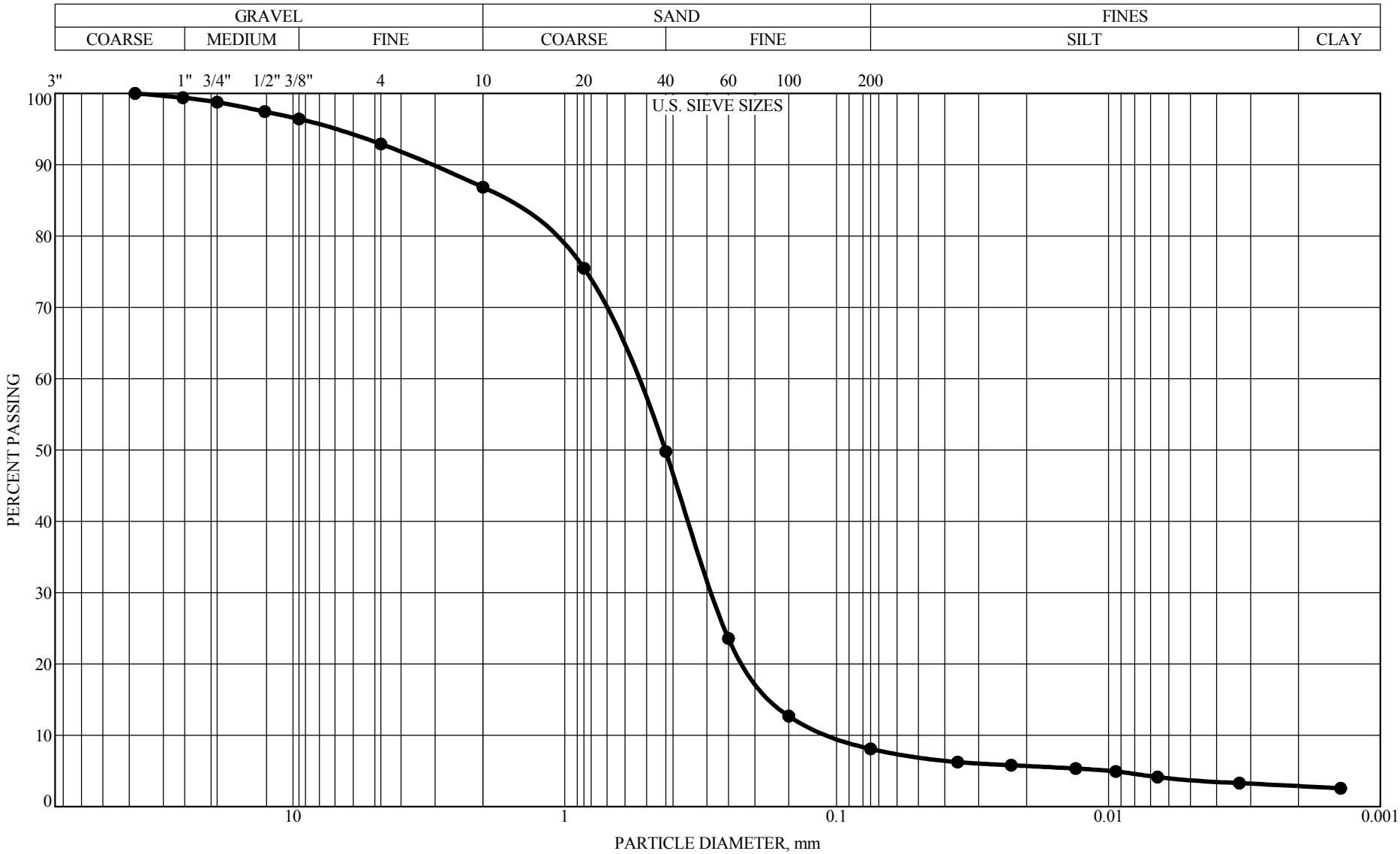
GRAVEL	43.3%
SAND	51.4%
SILT	3.2%
CLAY	2.0%

CLASSIFICATION:
A-1-b (0), Brown
POORLY GRADED SAND with SILT and GRAVEL(SP-SM)

LL=NP, PL=NP, PI=NP, P200=5%

GS AASHTO 00957.GPJ BRAUN.GDT 5/1/17 09:18

GRAIN SIZE ACCUMULATION CURVE (AASHTO)



BRAUN INTERTEC

Braun Project B1500957
Geotechnical Evaluation
New Town Truck Reliever Rte NW
Highway 1804
New Town, North Dakota

BORING: LSS-14 DEPTH: 11.0'-31.0'

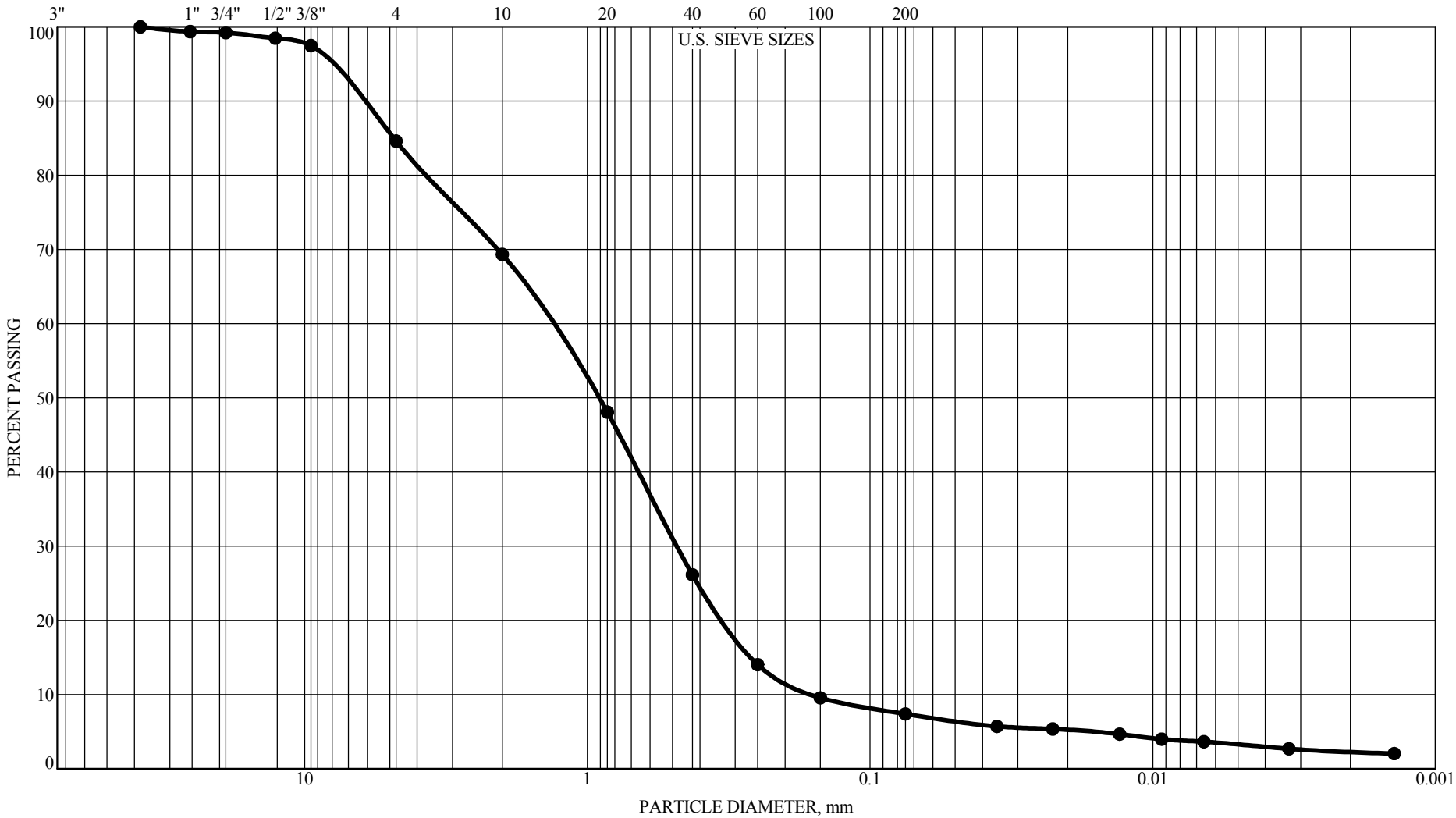
GRAVEL	13.2%
SAND	78.7%
SILT	5.2%
CLAY	2.9%

CLASSIFICATION:
A-1-b (0), Brown
POORLY GRADED SAND with SILT(SP-SM)

LL=NP, PL=NP, PI=NP, P200=8%

GS AASHTO 00957.GPJ BRAUN.GDT 5/1/17 09:18

GRAIN SIZE ACCUMULATION CURVE (AASHTO)



BRAUN INTERTEC

Braun Project B1500957
Geotechnical Evaluation
New Town Truck Reliever Rte NW
Highway 1804
New Town, North Dakota

BORING: LSS-15 DEPTH: 2.0'-31.0'

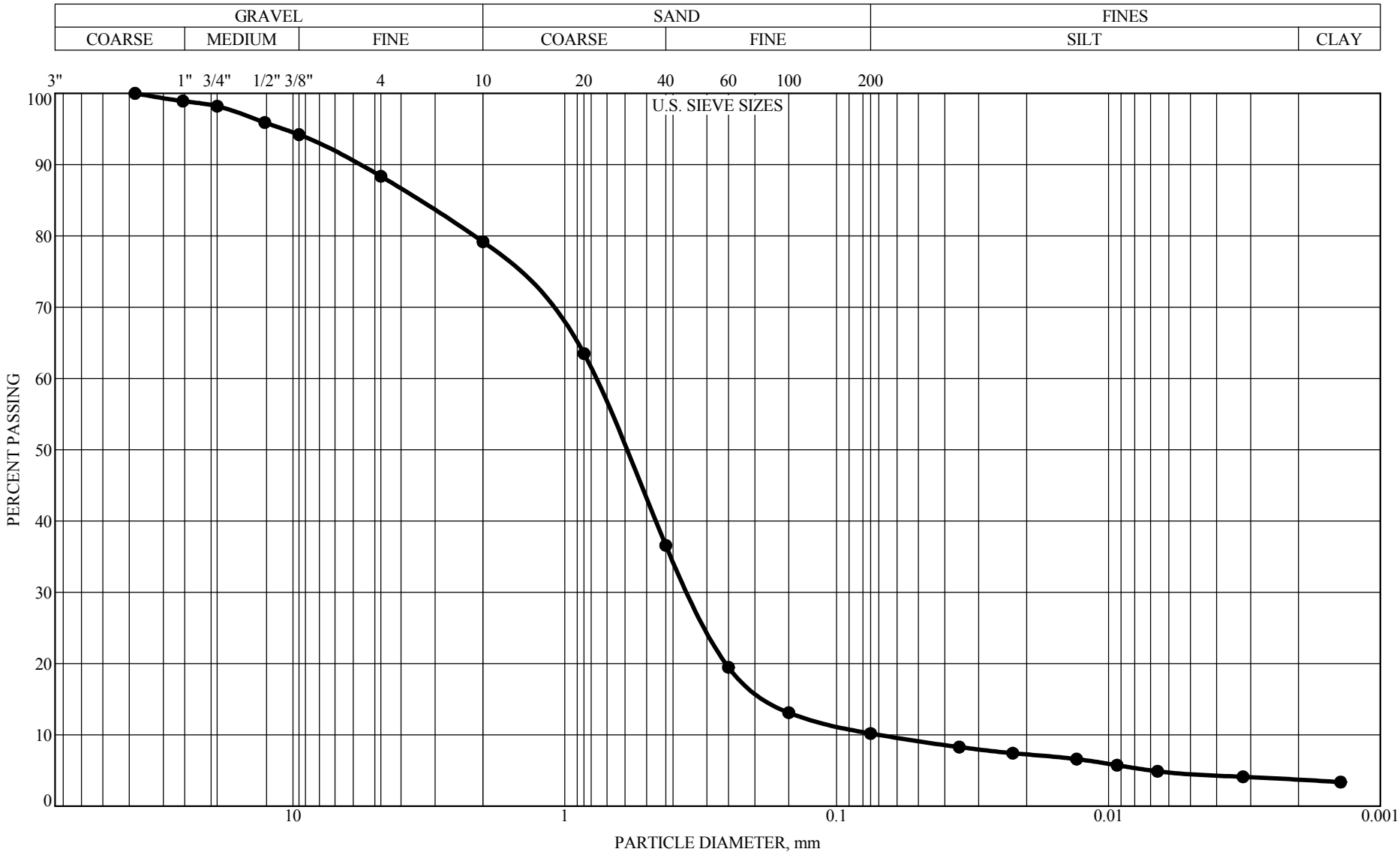
GRAVEL	30.7%
SAND	61.9%
SILT	5.1%
CLAY	2.3%

CLASSIFICATION:
A-1-b (0), Dark Brown
WELL-GRADED SAND with SILT and GRAVEL(SW-SM)

LL=NP, PL=NP, PI=NP, P200=7%

GS AASHTO 00957.GPJ BRAUN.GDT 5/1/17 09:18

GRAIN SIZE ACCUMULATION CURVE (AASHTO)



BRAUN INTERTEC

Braun Project B1500957
Geotechnical Evaluation
New Town Truck Reliever Rte NW
Highway 1804
New Town, North Dakota

BORING: LSS-16 DEPTH: 2.0'-15.0'

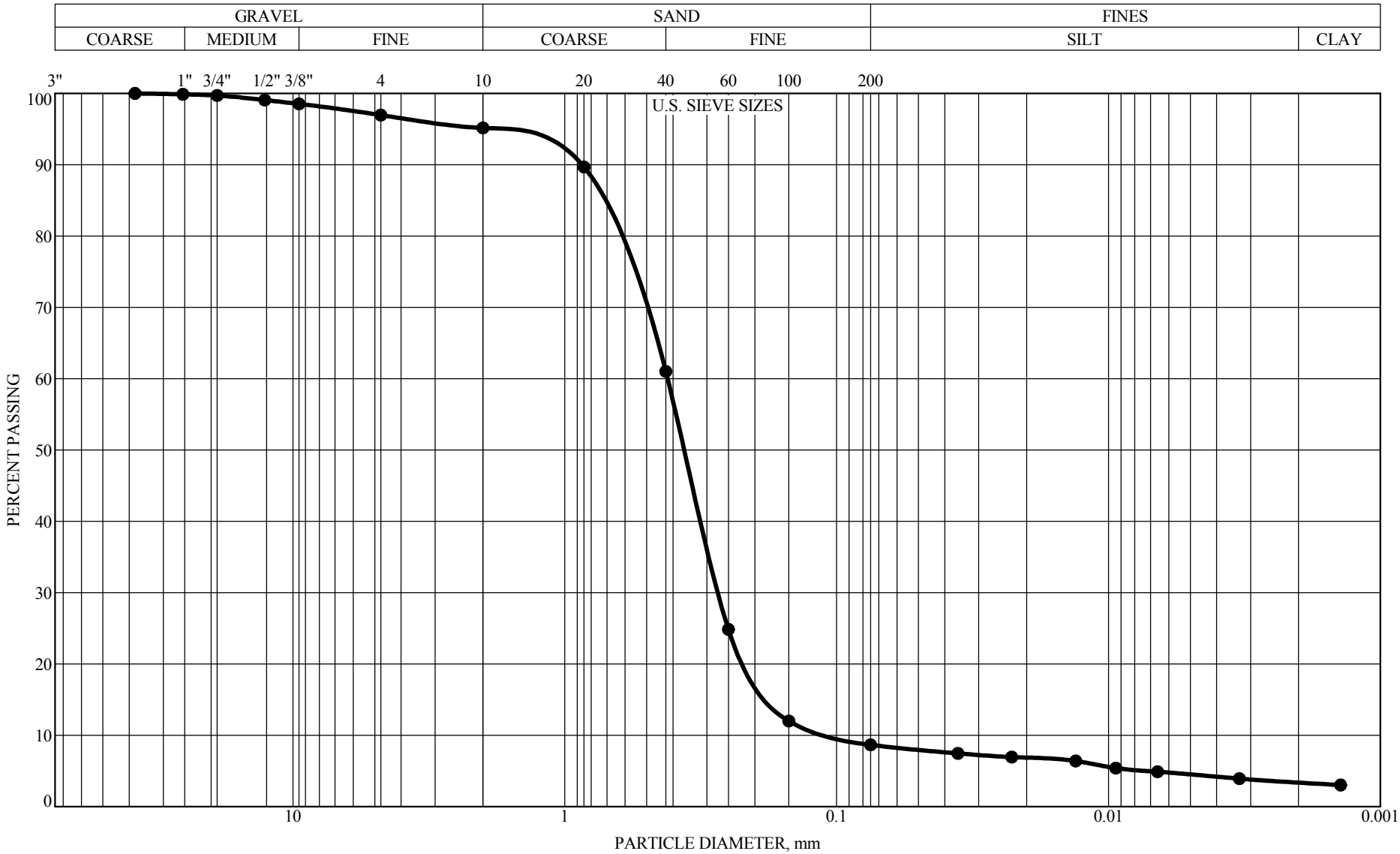
GRAVEL	20.8%
SAND	69.0%
SILT	6.5%
CLAY	3.7%

CLASSIFICATION:
A-1-b (0), Brown
WELL-GRADED SAND with SILT(SW-SM)

LL=NP, PL=NP, PI=NP, P200=10%

GS AASHTO 00957.GPJ BRAUN.GDT 5/1/17 09:18

GRAIN SIZE ACCUMULATION CURVE (AASHTO)



BRAUN INTERTEC

Braun Project B1500957
Geotechnical Evaluation
New Town Truck Reliever Rte NW
Highway 1804
New Town, North Dakota

BORING: LSS-16 DEPTH: 15.0'-31.0'

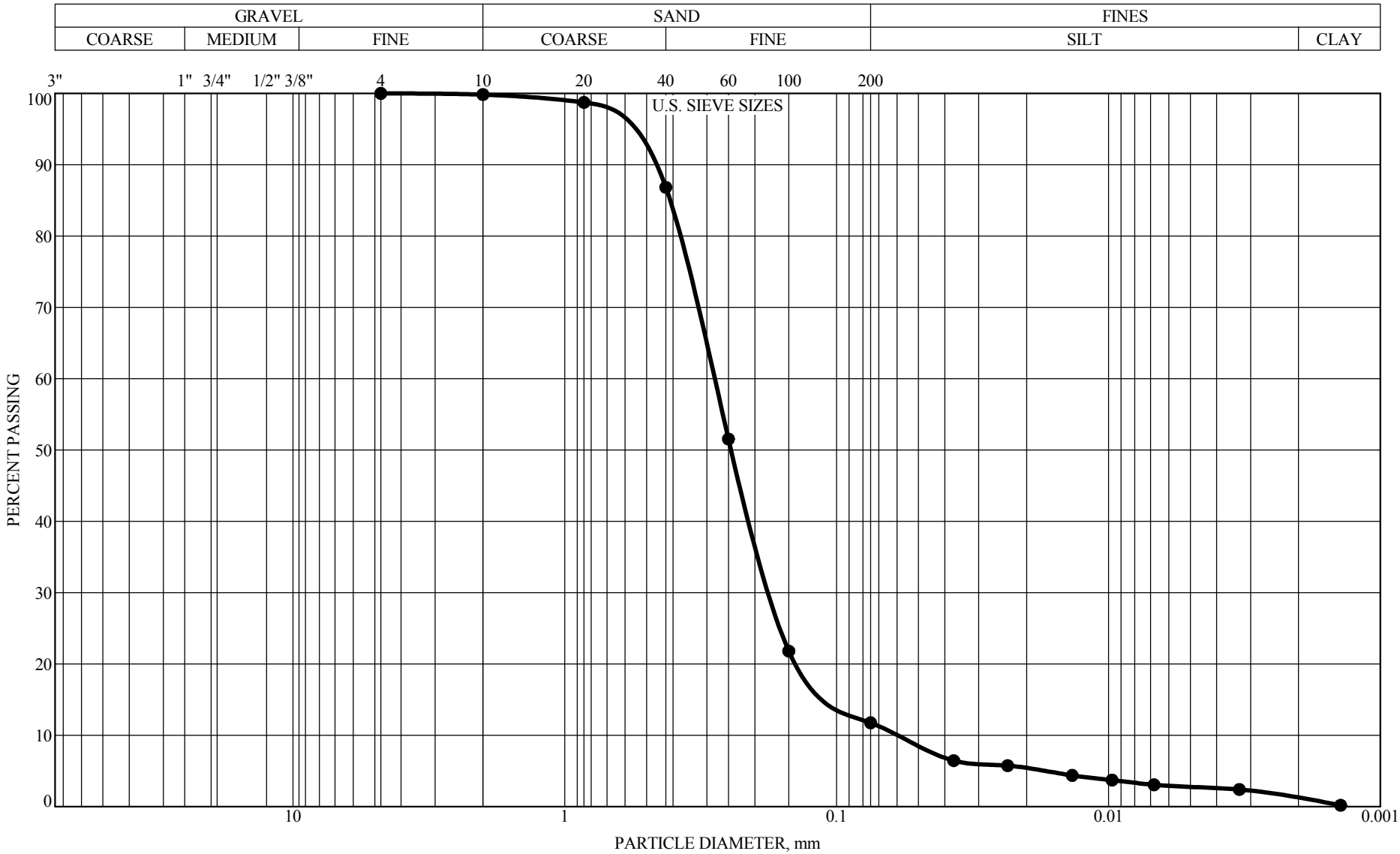
GRAVEL	4.8%
SAND	86.5%
SILT	5.3%
CLAY	3.4%

CLASSIFICATION:
A-3 (0), Brown
POORLY GRADED SAND with SILT(SP-SM)

LL=NP, PL=NP, PI=NP, P200=9%

GS AASHTO 00957.GPJ BRAUN.GDT 5/1/17 09:18

GRAIN SIZE ACCUMULATION CURVE (AASHTO)



BRAUN INTERTEC

Braun Project B1500957
Geotechnical Evaluation
New Town Truck Reliever Rte NW
Highway 1804
New Town, North Dakota

BORING: LSS-17 DEPTH: 6.0'-20.0'

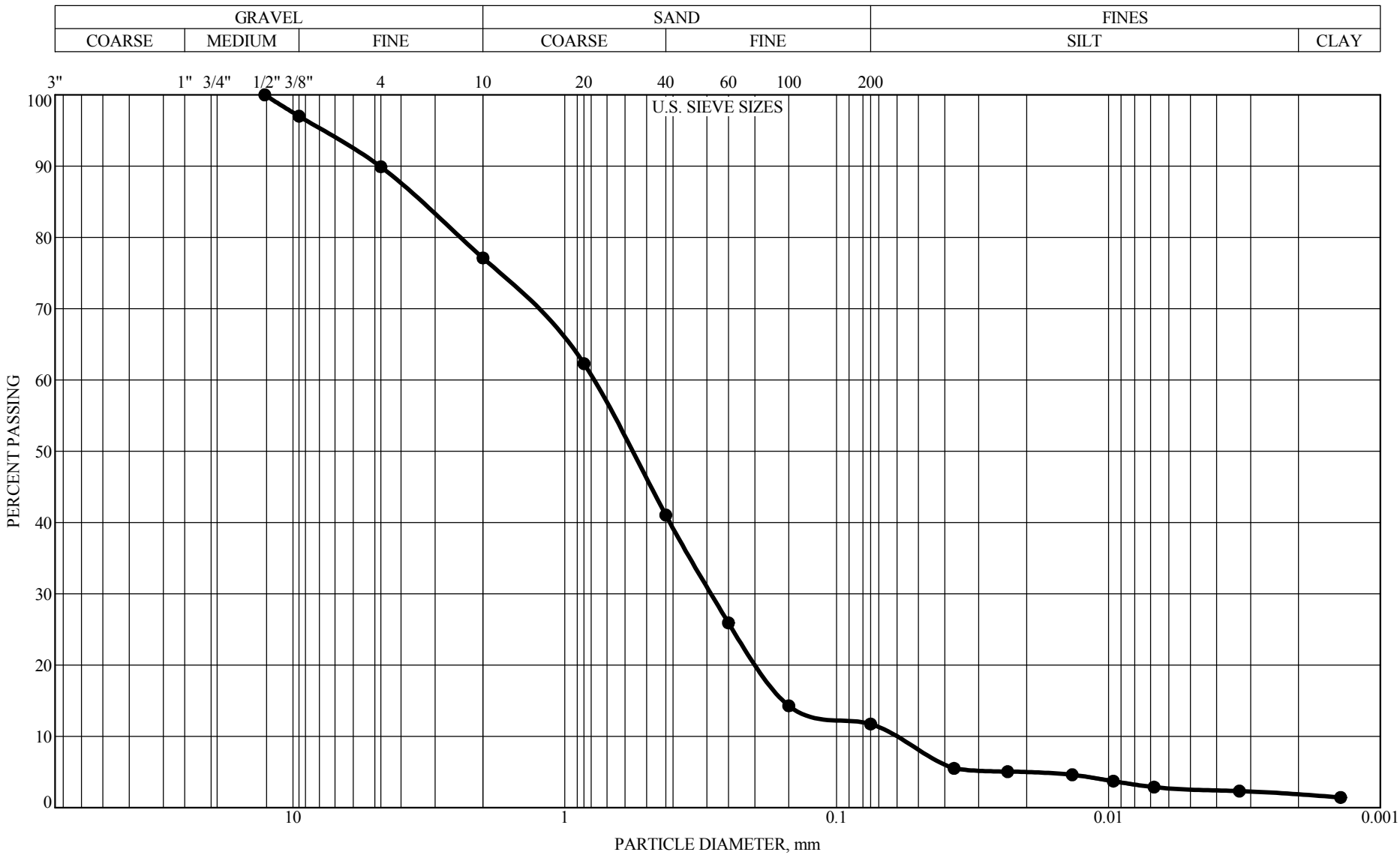
GRAVEL	0.2%
SAND	88.1%
SILT	10.6%
CLAY	1.1%

CLASSIFICATION:
A-2-4 (0), Brown
POORLY GRADED SAND with SILT(SP-SM)

LL=NP, PL=NP, PI=NP, P200=12%

GS AASHTO 00957.GPJ BRAUN.GDT 5/1/17 09:18

GRAIN SIZE ACCUMULATION CURVE (AASHTO)



BRAUN INTERTEC

Braun Project B1500957
Geotechnical Evaluation
New Town Truck Reliever Rte NW
Highway 1804
New Town, North Dakota

BORING: LSS-18 DEPTH: 2.0'-15.0'

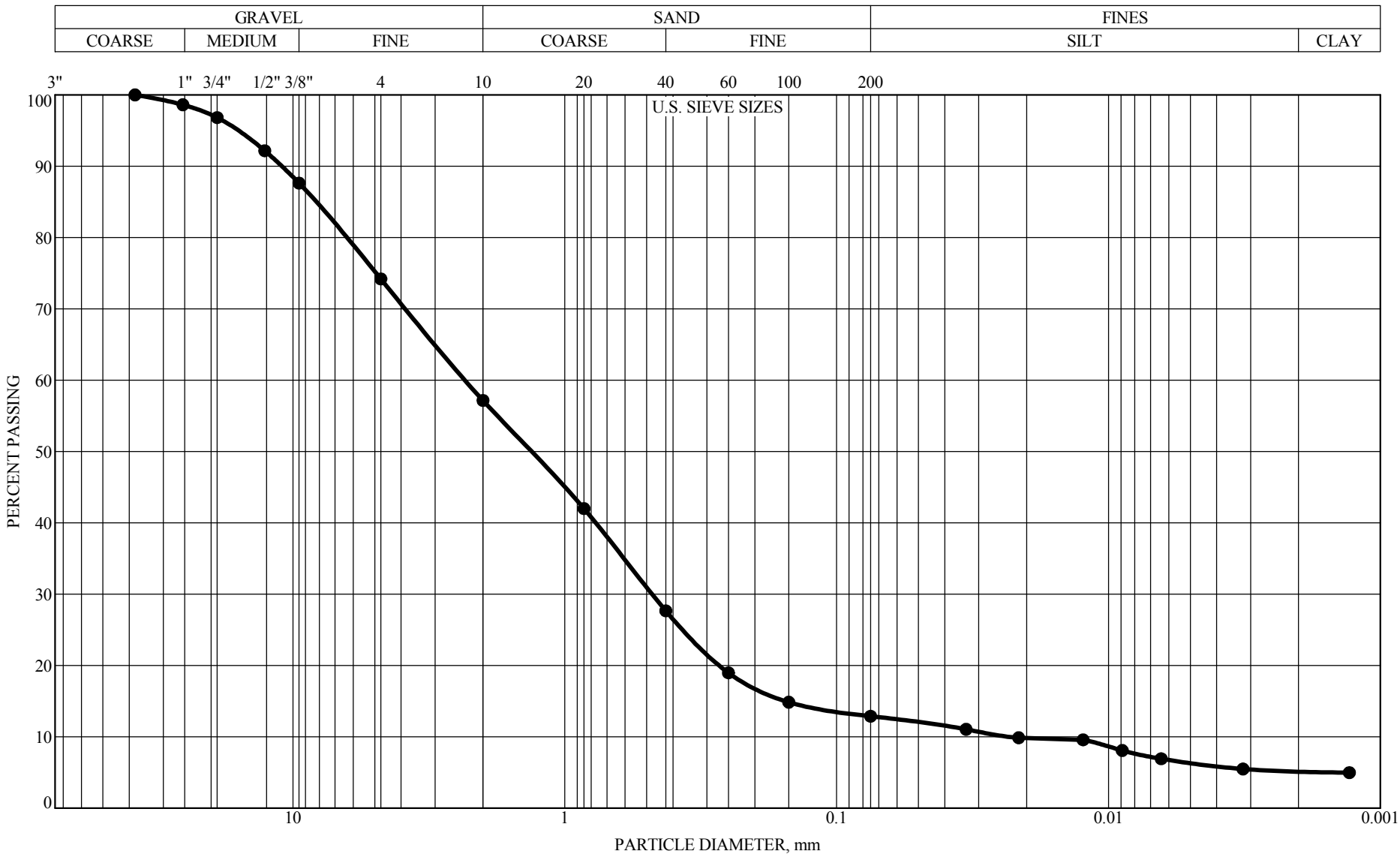
GRAVEL	22.9%
SAND	65.4%
SILT	9.9%
CLAY	1.8%

CLASSIFICATION:
A-1-b (0), Brown
WELL-GRADED SAND with SILT(SW-SM)

LL=NP, PL=NP, PI=NP, P200=12%

GS AASHTO 00957.GPJ BRAUN.GDT 5/1/17 09:18

GRAIN SIZE ACCUMULATION CURVE (AASHTO)



BRAUN INTERTEC

Braun Project B1500957
Geotechnical Evaluation
New Town Truck Reliever Rte NW
Highway 1804
New Town, North Dakota

BORING: LSS-19 DEPTH: 0.0'-4.0'

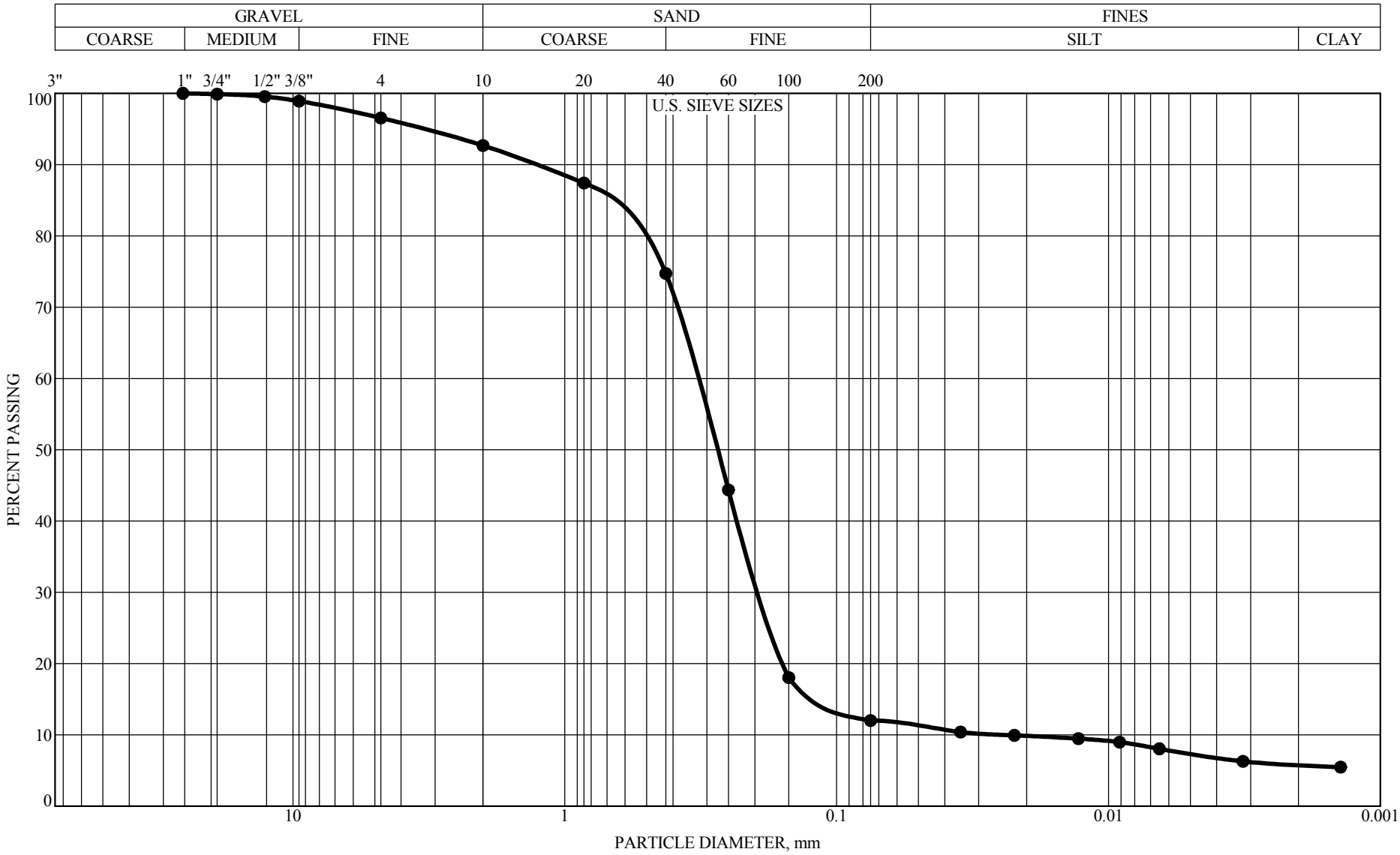
GRAVEL	42.8%
SAND	44.3%
SILT	7.7%
CLAY	5.2%

CLASSIFICATION:
A-1-b (0), Brown
SILTY, CLAYEY SAND with GRAVEL(SC-SM)

LL=20, PL=14, PI=6, P200=13%

GS AASHTO 00957.GPJ BRAUN.GDT 5/1/17 09:18

GRAIN SIZE ACCUMULATION CURVE (AASHTO)



BRAUN INTERTEC

Braun Project B1500957
Geotechnical Evaluation
New Town Truck Reliever Rte NW
Highway 1804
New Town, North Dakota

BORING: LSS-19 DEPTH: 4.0'-31.0'

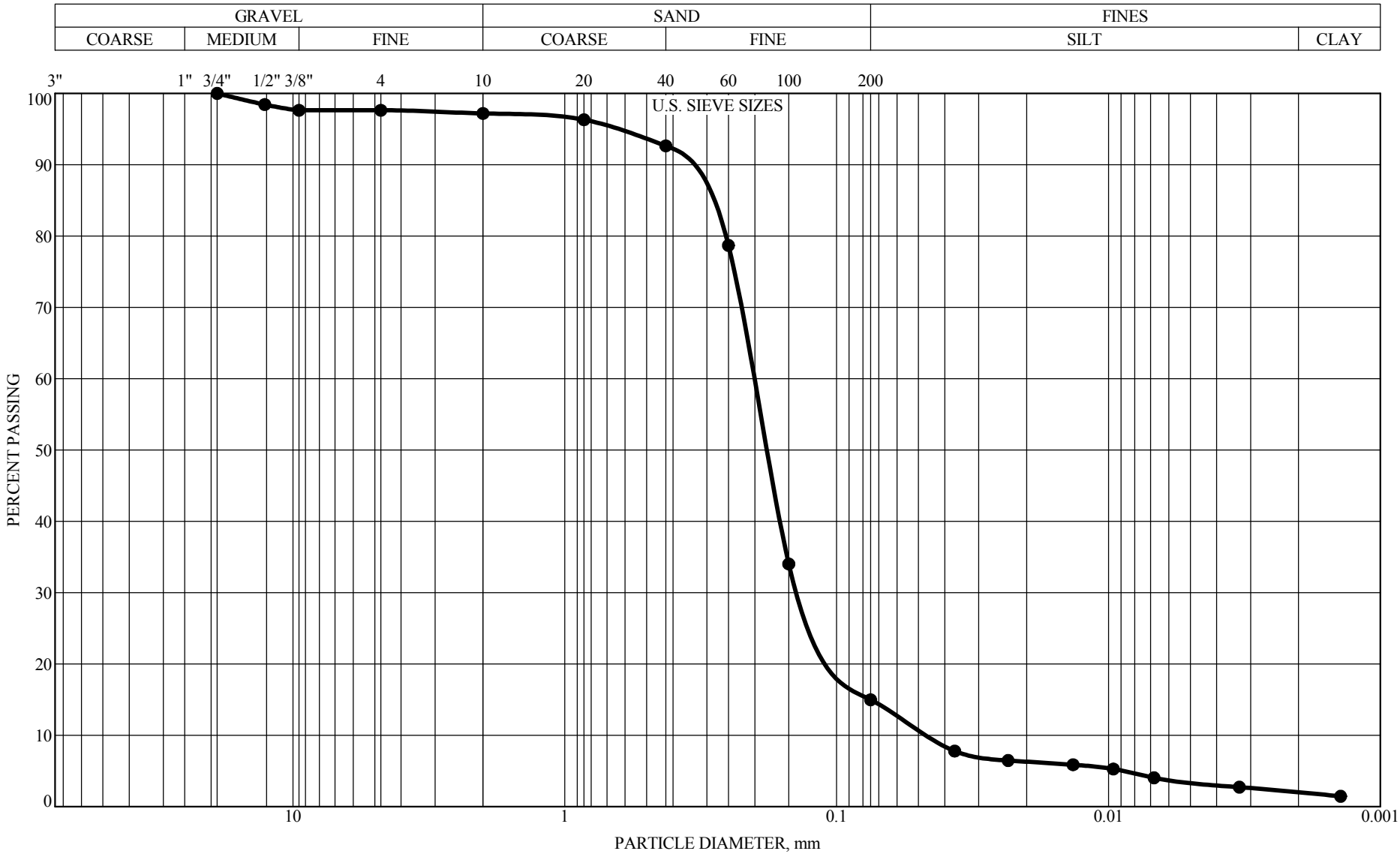
GRAVEL	7.3%
SAND	80.7%
SILT	6.2%
CLAY	5.8%

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

LL=NP, PL=NP, PI=NP, P200=12%

GS AASHTO 00957.GPJ BRAUN.GDT 5/1/17 09:18

GRAIN SIZE ACCUMULATION CURVE (AASHTO)



BRAUN INTERTEC

Braun Project B1500957
Geotechnical Evaluation
New Town Truck Reliever Rte NW
Highway 1804
New Town, North Dakota

BORING: LSS-20 DEPTH: 1.0'-10.0'

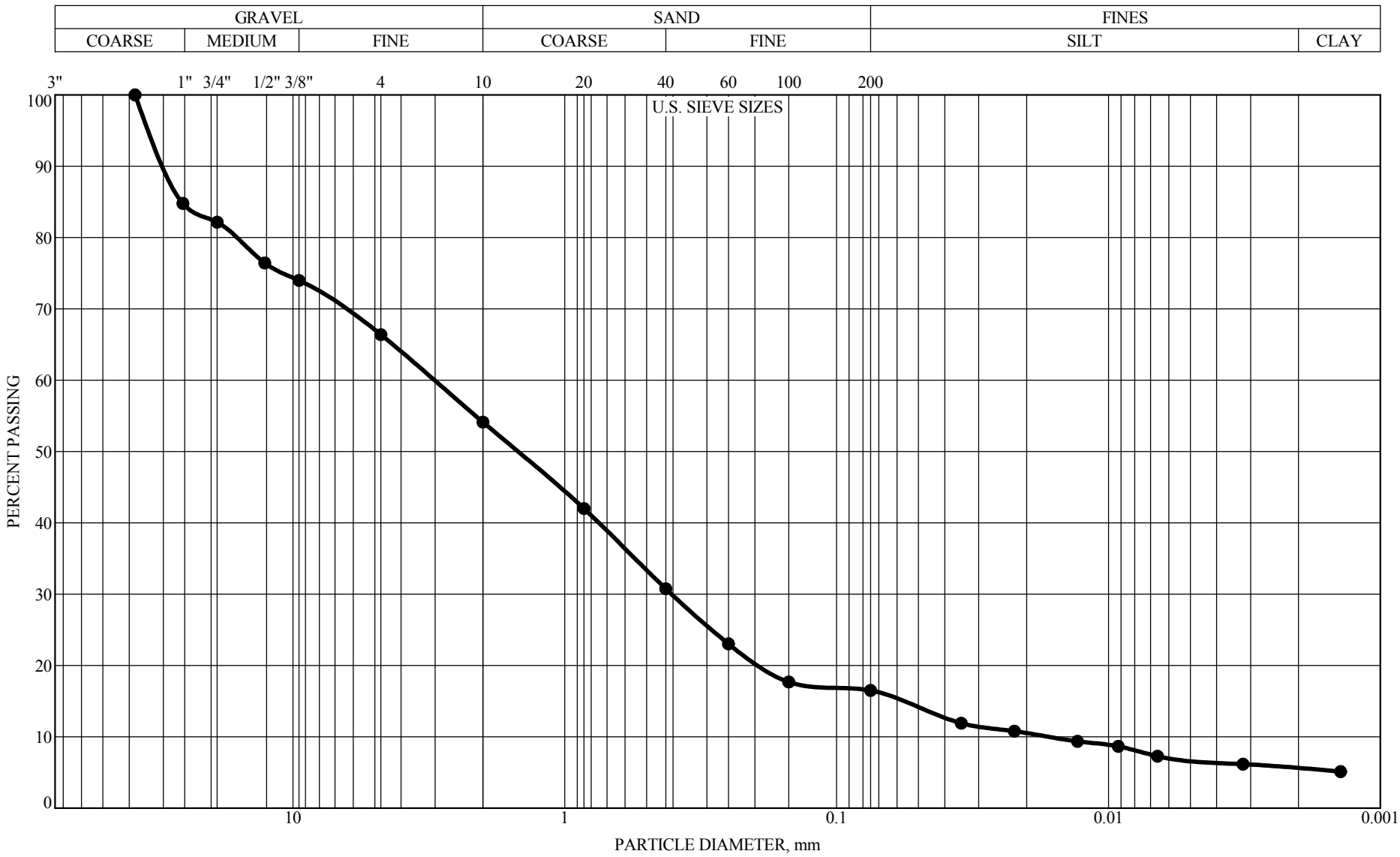
GRAVEL	2.8%
SAND	82.2%
SILT	13.0%
CLAY	2.0%

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

LL=NP, PL=NP, PI=NP, P200=15%

GS AASHTO 00957.GPJ BRAUN.GDT 5/1/17 09:18

GRAIN SIZE ACCUMULATION CURVE (AASHTO)



BRAUN INTERTEC

Braun Project B1500957
Geotechnical Evaluation
New Town Truck Reliever Rte NW
Highway 1804
New Town, North Dakota

BORING: LSS-21 DEPTH: 4.0'-10.0'

GRAVEL	45.9%
SAND	37.6%
SILT	10.9%
CLAY	5.6%

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

LL=26, PL=14, PI=12, P200=16%

GS AASHTO 00957.GPJ BRAUN.GDT 5/1/17 09:18

Braun Intertec Corporation
1341 South 20th Street, Suite 5, P.O. Box 1836
Bismarck, ND 58504
Phone: 701.255.7180

Proctor Report

Report No: PTR:W17-000474-S1
Issue No: 1

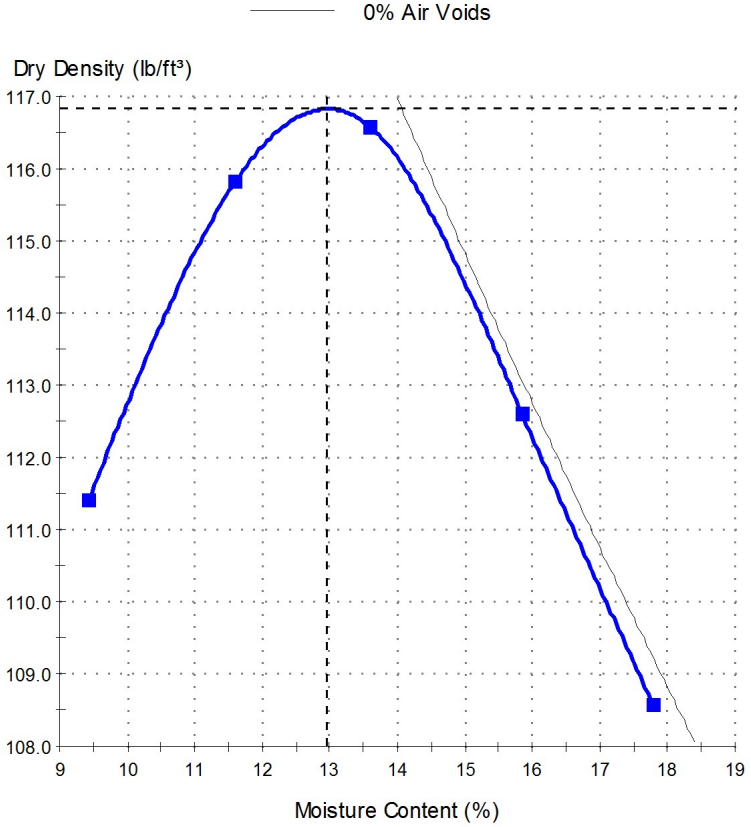
Client: Travis Weiber
KLJ
3203 32nd Ave S., Suite 201
Fargo, ND, 58103
Project: B1500957
New Town Truck Reliever Rte NW
Highway 1804
New Town, ND, 58763
TR: Carey Yoder, cyoder@braunintertec.com

Andrew Lage
Laboratory Coordinator
Date of Issue: 4/28/2017

Sample Details

Sample ID:	W17-000474-S1	**Alternate Sample ID:**	LSS-01; 1'-11.5'
Date Sampled:	2/14/2017	**Date Submitted:**	3/13/2017
Sampled By:	Drill Crew	**Sampling Method:**	Auger Cuttings
Source:	Onsite Material		
Material:	Lean Clay(CL); A-7-6(23)		
Specification:	For Informational Purposes Only		
Location:	LSS-01; 1'-11.5'		
Date Tested:	3/16/2017		

Dry Density - Moisture Content Relationship



Test Results

AASHTO T 180 - 01

Maximum Dry Density (lb/ft³):	**117**
Corrected Maximum Dry Density (lb/ft³):	**117**
Optimum Moisture Content (%):	**13**
Corrected Optimum Moisture Content (%):	**13**
Method:	A
Material on 19.0mm Sieve:	Removed
Visual Description:	Dark Brown

Comments

Assumed Specific Gravity = 2.54
Percent Retained on #4 Sieve = 0.2%
Percent Passing #200 Sieve = 92%
LL=42, PL=18, PI=24

Braun Intertec Corporation
1341 South 20th Street, Suite 5, P.O. Box 1836
Bismarck, ND 58504
Phone: 701.255.7180

Proctor Report

Report No: PTR:W17-000474-S2
Issue No: 1

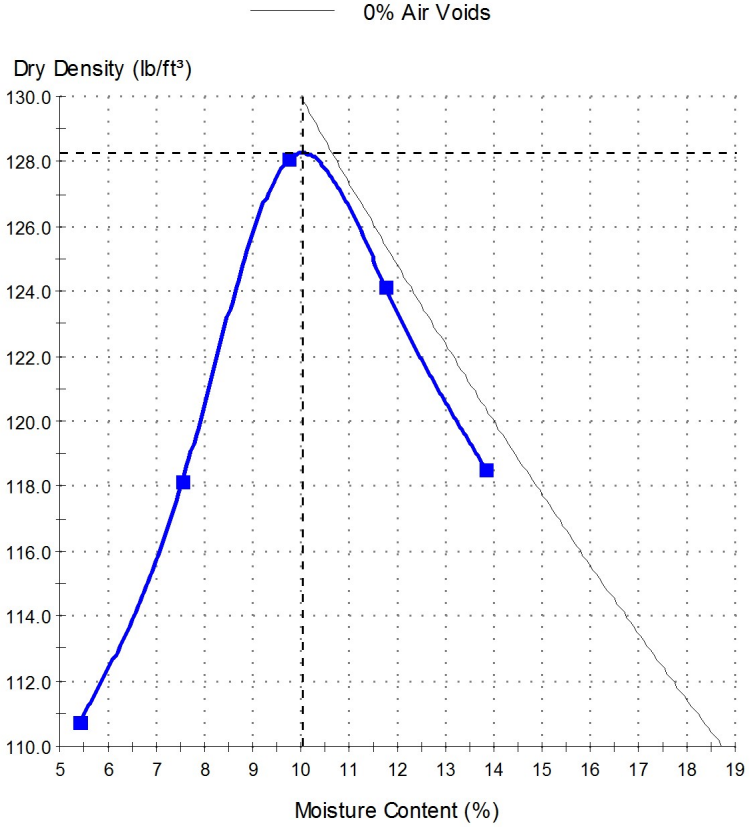
Client: Travis Weiber
KLJ
3203 32nd Ave S., Suite 201
Fargo, ND, 58103
Project: B1500957
New Town Truck Reliever Rte NW
Highway 1804
New Town, ND, 58763
TR: Carey Yoder, cyoder@braunintertec.com

Andrew Lage
Laboratory Coordinator
Date of Issue: 4/28/2017

Sample Details

Sample ID:	W17-000474-S2	**Alternate Sample ID:**	LSS-01; 11.5'-31'
Date Sampled:	2/14/2017	**Date Submitted:**	3/13/2017
Sampled By:	Drill Crew	**Sampling Method:**	Auger Cuttings
Source:	Onsite Material		
Material:	Lean Clay(CL); A-6(15)		
Specification:	For Informational Purposes Only		
Location:	LSS-01; 11.5'-31'		
Date Tested:	3/16/2017		

Dry Density - Moisture Content Relationship



Test Results

AASHTO T 180 - 01

Maximum Dry Density (lb/ft³):	**128**
Corrected Maximum Dry Density (lb/ft³):	**128**
Optimum Moisture Content (%):	**10**
Corrected Optimum Moisture Content (%):	**10**
Method:	A
Material on 19.0mm Sieve:	Removed
Visual Description:	Brown

Comments

Assumed Specific Gravity = 2.63
Percent Retained on #4 Sieve = 0.3%
Percent Passing #200 Sieve = 86%
LL=35, PL=17, PI=18

Braun Intertec Corporation
1341 South 20th Street, Suite 5, P.O. Box 1836
Bismarck, ND 58504
Phone: 701.255.7180

Proctor Report

Report No: PTR:W17-000474-S3
Issue No: 1

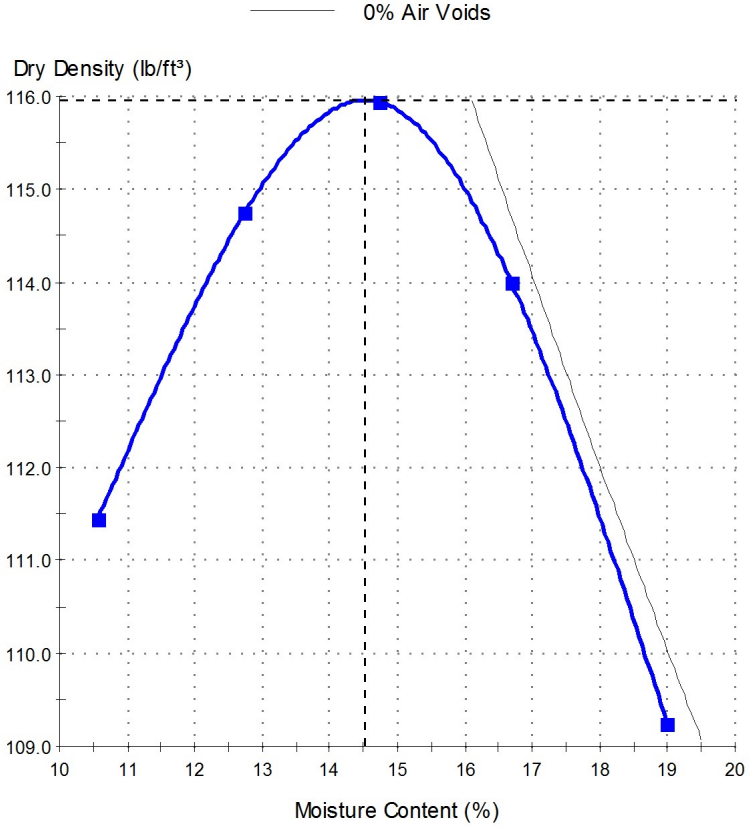
Client: Travis Weiber
KLJ
3203 32nd Ave S., Suite 201
Fargo, ND, 58103
Project: B1500957
New Town Truck Reliever Rte NW
Highway 1804
New Town, ND, 58763
TR: Carey Yoder, cyoder@braunintertec.com

Andrew Lage
Laboratory Coordinator
Date of Issue: 4/28/2017

Sample Details

Sample ID:	W17-000474-S3	**Alternate Sample ID:**	LSS-02; 0.5'-6.5'
Date Sampled:	2/14/2017	**Date Submitted:**	3/13/2017
Sampled By:	Drill Crew	**Sampling Method:**	Auger Cuttings
Source:	Onsite Material		
Material:	Fat Clay(CH); A-7-6(32)		
Specification:	For Informational Purposes Only		
Location:	LSS-02; 0.5'-6.5'		
Date Tested:	3/31/2017		

Dry Density - Moisture Content Relationship



Test Results

AASHTO T 180 - 01

Maximum Dry Density (lb/ft³):	**116**
Corrected Maximum Dry Density (lb/ft³):	**116**
Optimum Moisture Content (%):	**15**
Corrected Optimum Moisture Content (%):	**15**
Method:	A
Material on 19.0mm Sieve:	Removed
Visual Description:	Brown

Comments

Assumed Specific Gravity = 2.65
Percent Retained on #4 Sieve = 0.1%
Percent Passing #200 Sieve = 98%
LL=50, PL= 20, PI=30

Braun Intertec Corporation
1341 South 20th Street, Suite 5, P.O. Box 1836
Bismarck, ND 58504
Phone: 701.255.7180

Proctor Report

Report No: PTR:W17-000474-S4
Issue No: 1

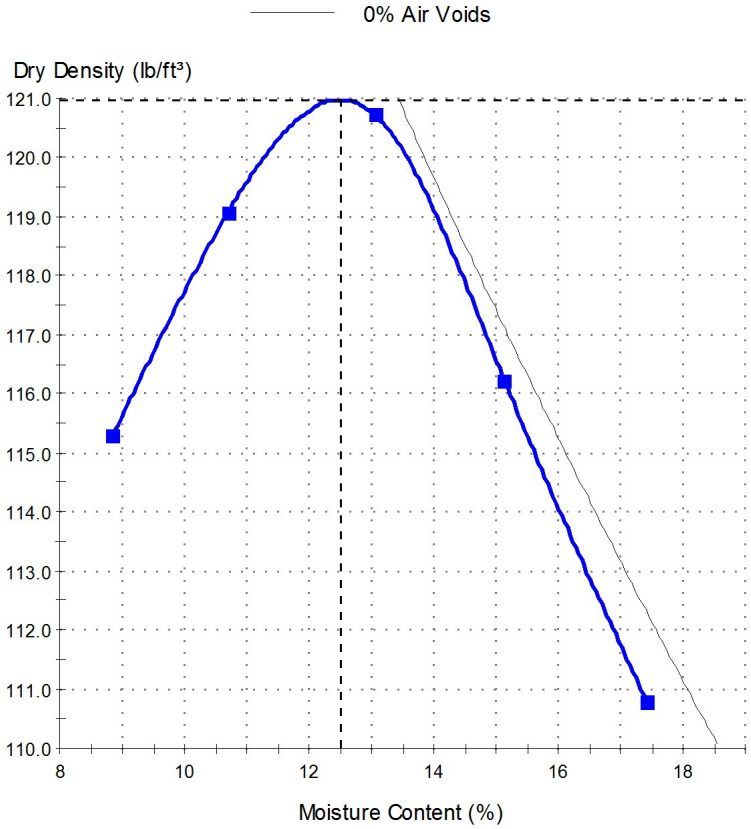
Client: Travis Weiber
KLJ
3203 32nd Ave S., Suite 201
Fargo, ND, 58103
Project: B1500957
New Town Truck Reliever Rte NW
Highway 1804
New Town, ND, 58763
TR: Carey Yoder, cyoder@braunintertec.com

Andrew Lage
Laboratory Coordinator
Date of Issue: 4/28/2017

Sample Details

Sample ID:	W17-000474-S4	**Alternate Sample ID:**	LSS-02; 6.5'-31'
Date Sampled:	2/14/2017	**Date Submitted:**	3/13/2017
Sampled By:	Drill Crew	**Sampling Method:**	Auger Cuttings
Source:	Onsite Material		
Material:	Lean Clay(CL); A-7-6(28)		
Specification:	For Informational Purposes Only		
Location:	LSS-02; 6.5'-31'		
Date Tested:	3/15/2017		

Dry Density - Moisture Content Relationship



Test Results

AASHTO T 180 - 01

Maximum Dry Density (lb/ft³):	**121**
Corrected Maximum Dry Density (lb/ft³):	**121**
Optimum Moisture Content (%):	**13**
Corrected Optimum Moisture Content (%):	**13**
Method:	A
Material on 19.0mm Sieve:	Removed
Visual Description:	Brown

Comments

Assumed Specific Gravity = 2.62
Percent Retained on #4 Sieve = 0.1%
Percent Passing #200 Sieve = 98%
LL=45, PL=18, PI=27

Braun Intertec Corporation
526 10th Street NE, Suite 300
West Fargo, ND 58078
Phone: 701.232.8701

Proctor Report

Report No: PTR:W17-000837-S4
Issue No: 1

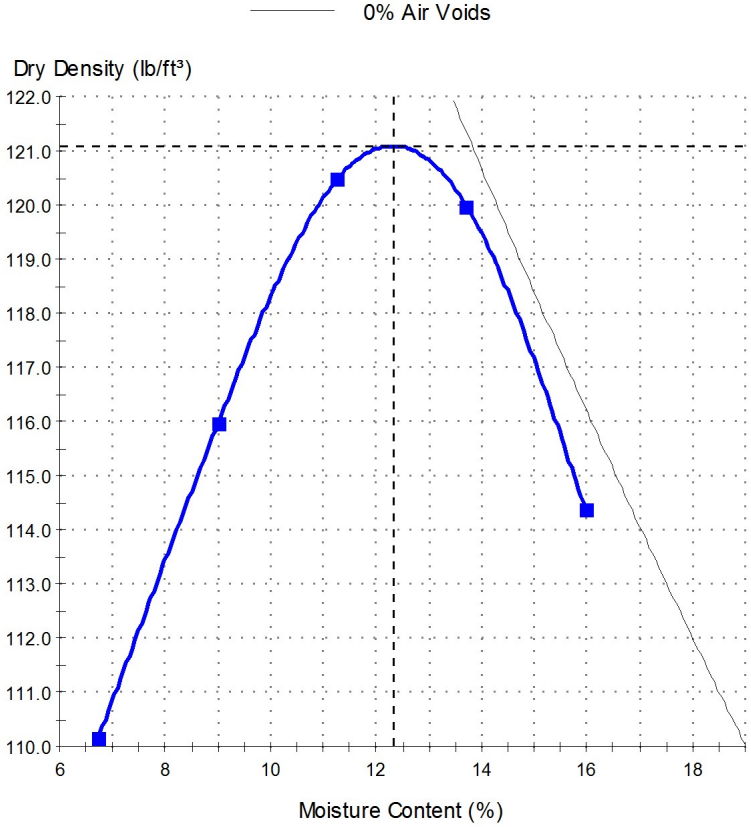
Client: Travis Weiber
KLJ
3203 32nd Ave S., Suite 201
Fargo, ND, 58103
Project: B1500957
New Town Truck Reliever Rte NW
Highway 1804
New Town, ND, 58763
TR: Carey Yoder, cyoder@braunintertec.com

Andrew Lage
Laboratory Coordinator
Date of Issue: 4/28/2017

Sample Details

Sample ID:	W17-000837-S4	**Alternate Sample ID:**	LSS-03; 0.5'-26.5'
Date Sampled:	2/27/2017	**Date Submitted:**	4/10/2017
Sampled By:	Drill Crew	**Sampling Method:**	Auger Cuttings
Source:	Onsite Material		
Material:	Lean Clay(CL); A-6(19)		
Specification:	For Informational Purpose Only		
Location:	LSS-03; 0.5'-26.5'		
Date Tested:	4/12/2017		

Dry Density - Moisture Content Relationship



Test Results

AASHTO T 180 - 01

Maximum Dry Density (lb/ft³):	**121**
Corrected Maximum Dry Density (lb/ft³):	**121**
Optimum Moisture Content (%):	**12**
Corrected Optimum Moisture Content (%):	**12**
Method:	A
Material on 19.0mm Sieve:	Removed
Visual Description:	Brown

Comments

Assumed Specific Gravity = 2.65
Percent Retained on #4 Sieve = 0%
Percent Passing #200 Sieve = 91%
LL=37, PL=16, PI=21

Braun Intertec Corporation
526 10th Street NE, Suite 300
West Fargo, ND 58078
Phone: 701.232.8701

Proctor Report

Report No: PTR:W17-000837-S5
Issue No: 1

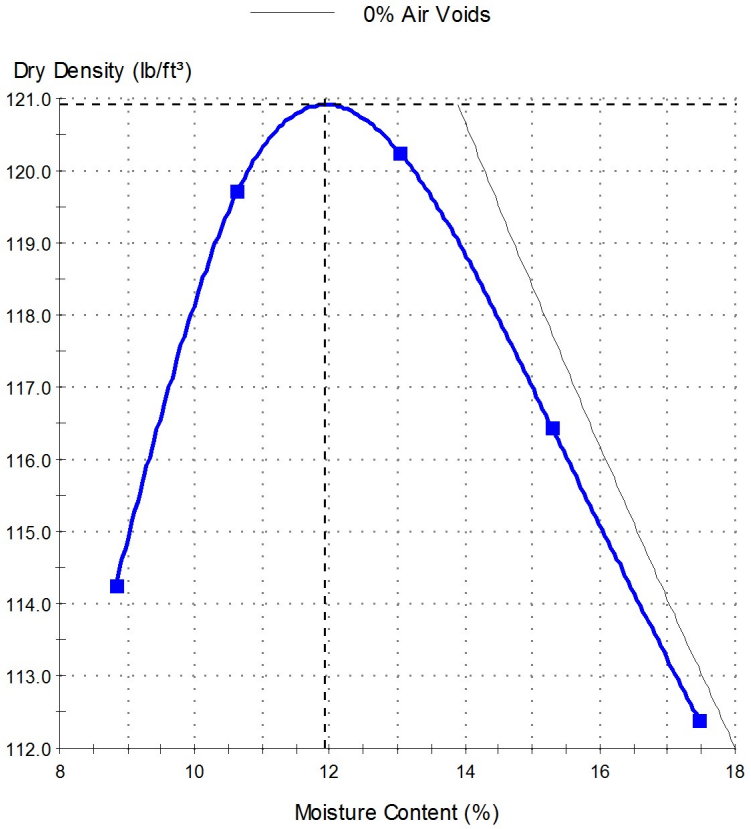
Client: Travis Weiber
KLJ
3203 32nd Ave S., Suite 201
Fargo, ND, 58103
Project: B1500957
New Town Truck Reliever Rte NW
Highway 1804
New Town, ND, 58763
TR: Carey Yoder, cyoder@braunintertec.com

Andrew Lage
Laboratory Coordinator
Date of Issue: 4/28/2017

Sample Details

Sample ID:	W17-000837-S5	**Alternate Sample ID:**	LSS-04; 1.5'-6.5'
Date Sampled:	2/28/2017	**Date Submitted:**	4/10/2017
Sampled By:	Drill Crew	**Sampling Method:**	Auger Cuttings
Source:	Onsite Material		
Material:	Lean Clay(CL); A-7-6(25)		
Specification:	For Informational Purpose Only		
Location:	LSS-04; 1.5'-6.5'		
Date Tested:	4/12/2017		

Dry Density - Moisture Content Relationship



Test Results

AASHTO T 180 - 01

Maximum Dry Density (lb/ft³):	**121**
Corrected Maximum Dry Density (lb/ft³):	**121**
Optimum Moisture Content (%):	**12**
Corrected Optimum Moisture Content (%):	**12**
Method:	A
Material on 19.0mm Sieve:	Removed
Visual Description:	Brown

Comments

Assumed Specific Gravity = 2.65
Percent Retained on #4 Sieve = 0%
Percent Passing #200 Sieve = 97%
LL=41, PL=16, PI=25

Braun Intertec Corporation
1341 South 20th Street, Suite 5, P.O. Box 1836
Bismarck, ND 58504
Phone: 701.255.7180

Proctor Report

Report No: PTR:W17-000474-S5
Issue No: 1

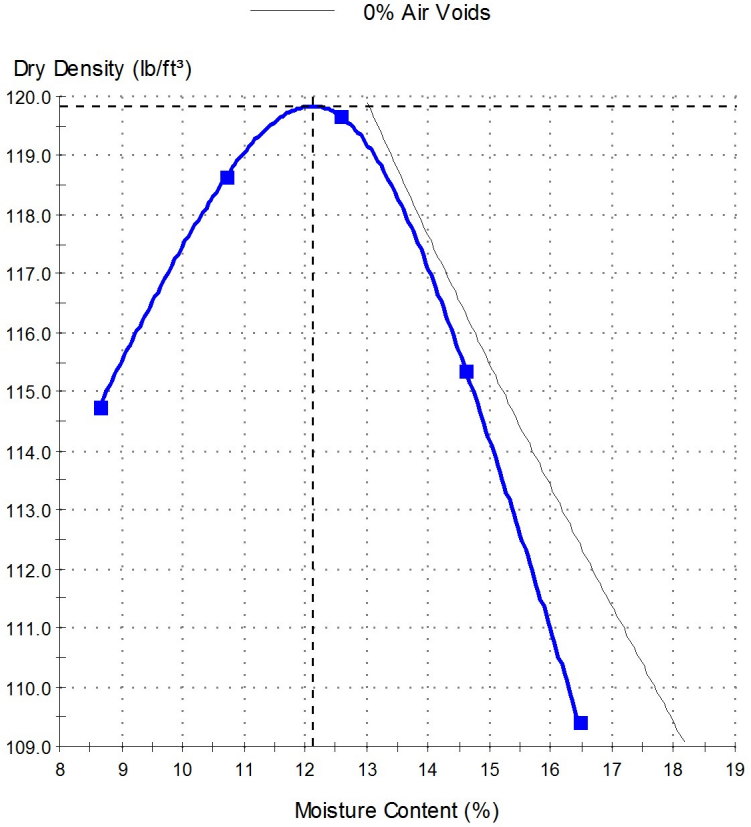
Client: Travis Weiber
KLJ
3203 32nd Ave S., Suite 201
Fargo, ND, 58103
Project: B1500957
New Town Truck Reliever Rte NW
Highway 1804
New Town, ND, 58763
TR: Carey Yoder, cyoder@braunintertec.com

Andrew Lage
Laboratory Coordinator
Date of Issue: 4/28/2017

Sample Details

Sample ID:	W17-000474-S5	**Alternate Sample ID:**	LSS-05; 1'-17'
Date Sampled:	2/14/2017	**Date Submitted:**	3/13/2017
Sampled By:	Drill Crew	**Sampling Method:**	Auger Cuttings
Source:	Onsite Material		
Material:	Lean Clay with Sand(CL); A-6(7)		
Specification:	For Informational Purposes Only		
Location:	LSS-05; 1'-17'		
Date Tested:	3/20/2017		

Dry Density - Moisture Content Relationship



Test Results

AASHTO T 180 - 01

Maximum Dry Density (lb/ft³):	**120**
Corrected Maximum Dry Density (lb/ft³):	**120**
Optimum Moisture Content (%):	**12**
Corrected Optimum Moisture Content (%):	**12**
Method:	A
Material on 19.0mm Sieve:	Removed
Visual Description:	Brown

Comments

Assumed Specific Gravity = 2.56
Percent Retained on #4 Sieve = 0.2%
Percent Passing #200 Sieve = 74%
LL=30, PL=18, PI=12

Braun Intertec Corporation
1341 South 20th Street, Suite 5, P.O. Box 1836
Bismarck, ND 58504
Phone: 701.255.7180

Proctor Report

Report No: PTR:W17-000474-S6
Issue No: 1

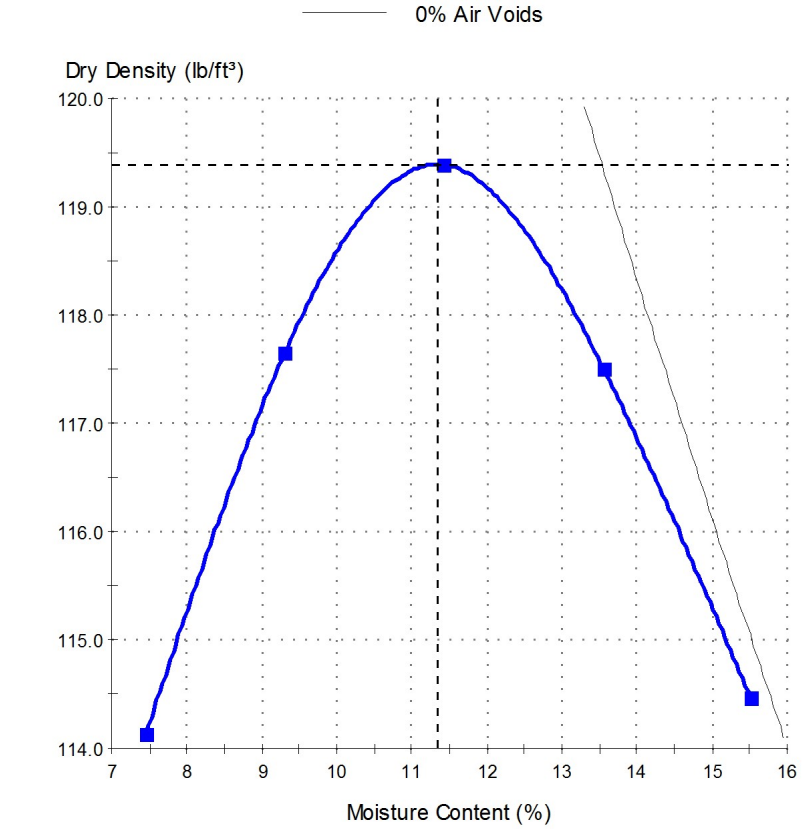
Client: Travis Weiber
KLJ
3203 32nd Ave S., Suite 201
Fargo, ND, 58103
Project: B1500957
New Town Truck Reliever Rte NW
Highway 1804
New Town, ND, 58763
TR: Carey Yoder, cyoder@braunintertec.com

Andrew Lage
Laboratory Coordinator
Date of Issue: 4/28/2017

Sample Details

Sample ID:	W17-000474-S6	**Alternate Sample ID:**	LSS-05; 17'-41'
Date Sampled:	2/14/2017	**Date Submitted:**	3/13/2017
Sampled By:	Drill Crew	**Sampling Method:**	Auger Cuttings
Source:	Onsite Material		
Material:	Lean Clay(CL) A-7-6(26)		
Specification:	For Informational Purposes Only		
Location:	LSS-05; 17'-41'		
Date Tested:	3/20/2017		

Dry Density - Moisture Content Relationship



Test Results

AASHTO T 180 - 01

Maximum Dry Density (lb/ft³):	**119**
Corrected Maximum Dry Density (lb/ft³):	**119**
Optimum Moisture Content (%):	**11**
Corrected Optimum Moisture Content (%):	**11**
Method:	A
Material on 19.0mm Sieve:	Removed
Visual Description:	Gray

Comments

Assumed Specific Gravity = 2.58
Percent Retained on #4 Sieve = 0.0%
Percent Passing #200 Sieve = 95%
LL=43, PL=17, PI=26

Braun Intertec Corporation
1341 South 20th Street, Suite 5, P.O. Box 1836
Bismarck, ND 58504
Phone: 701.255.7180

Proctor Report

Report No: PTR:W17-000474-S7
Issue No: 1

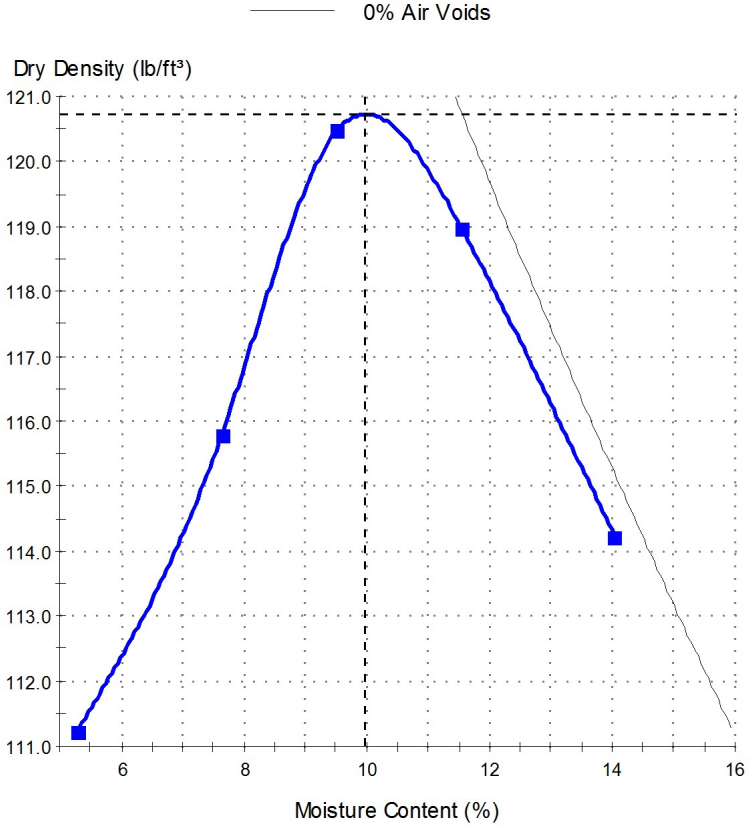
Client: Travis Weiber
KLJ
3203 32nd Ave S., Suite 201
Fargo, ND, 58103
Project: B1500957
New Town Truck Reliever Rte NW
Highway 1804
New Town, ND, 58763
TR: Carey Yoder, cyoder@braunintertec.com

Andrew Lage
Laboratory Coordinator
Date of Issue: 4/28/2017

Sample Details

Sample ID:	W17-000474-S7	**Alternate Sample ID:**	LSS-06; 1'-12'
Date Sampled:	2/13/2017	**Date Submitted:**	3/13/2017
Sampled By:	Drill Crew	**Sampling Method:**	Auger Cuttings
Source:	Onsite Material		
Material:	Lean Clay with Sand(CL); A-6(13)		
Specification:	For Informational Purposes Only		
Location:	LSS-06; 1'-12'		
Date Tested:	3/27/2017		

Dry Density - Moisture Content Relationship



Test Results

AASHTO T 180 - 01

Maximum Dry Density (lb/ft³):	**121**
Corrected Maximum Dry Density (lb/ft³):	**121**
Optimum Moisture Content (%):	**10**
Corrected Optimum Moisture Content (%):	**10**
Method:	A
Material on 19.0mm Sieve:	Removed
Visual Description:	Brown

Comments

Assumed Specific Gravity = 2.49
Percent Retained on #4 Sieve = 2.0%
Percent Passing #200 Sieve = 79%
LL=34, PL=16, PI=18

Braun Intertec Corporation
1341 South 20th Street, Suite 5, P.O. Box 1836
Bismarck, ND 58504
Phone: 701.255.7180

Proctor Report

Report No: PTR:W17-000474-S8
Issue No: 1

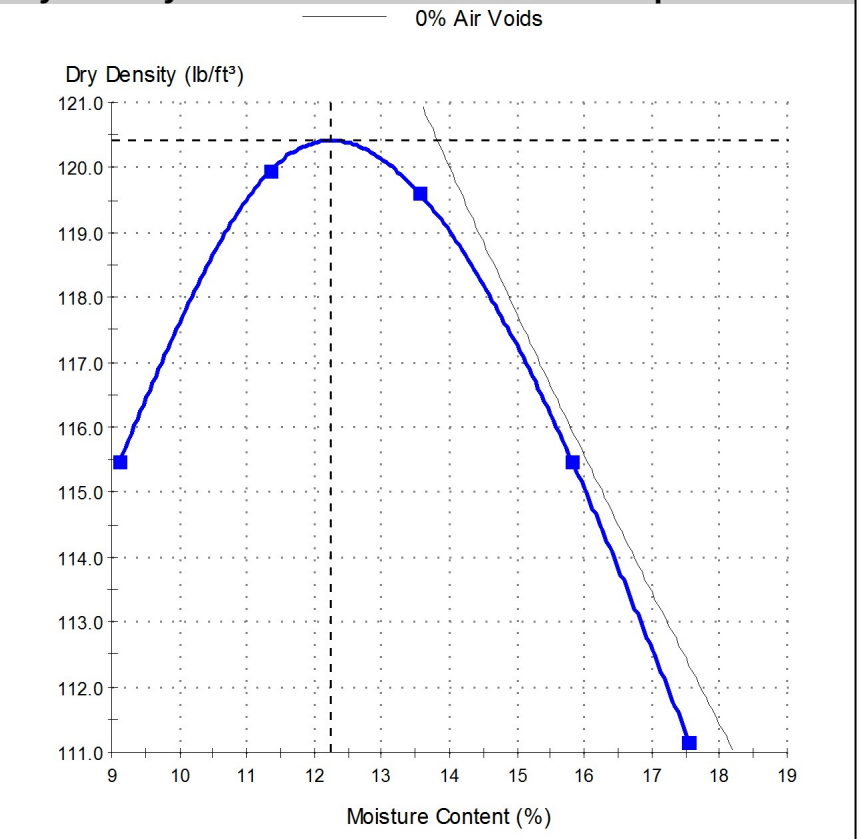
Client: Travis Weiber
KLJ
3203 32nd Ave S., Suite 201
Fargo, ND, 58103
Project: B1500957
New Town Truck Reliever Rte NW
Highway 1804
New Town, ND, 58763
TR: Carey Yoder, cyoder@braunintertec.com

Andrew Lage
Laboratory Coordinator
Date of Issue: 4/28/2017

Sample Details

Sample ID:	W17-000474-S8	**Alternate Sample ID:**	LSS-06; 12'-51'
Date Sampled:	2/14/2017	**Date Submitted:**	3/13/2017
Sampled By:	Drill Crew	**Sampling Method:**	Auger Cuttings
Source:	Onsite Material		
Material:	Lean Clay(CL); A-7-6(27)		
Specification:	For Informational Purposes Only		
Location:	LSS-06; 12'-51'		
Date Tested:	3/16/2017		

Dry Density - Moisture Content Relationship



Test Results

AASHTO T 180 - 01

Maximum Dry Density (lb/ft³):	**120**
Corrected Maximum Dry Density (lb/ft³):	**120**
Optimum Moisture Content (%):	**12**
Corrected Optimum Moisture Content (%):	**12**
Method:	A
Material on 19.0mm Sieve:	Removed
Visual Description:	Gray

Comments

Assumed Specific Gravity = 2.63
Percent Retained on #4 Sieve = 0.1%
Percent Passing #200 Sieve = 95%
LL=44, PL=17, PI=27

Braun Intertec Corporation
1341 South 20th Street, Suite 5, P.O. Box 1836
Bismarck, ND 58504
Phone: 701.255.7180

Proctor Report

Report No: PTR:W17-000474-S9
Issue No: 1

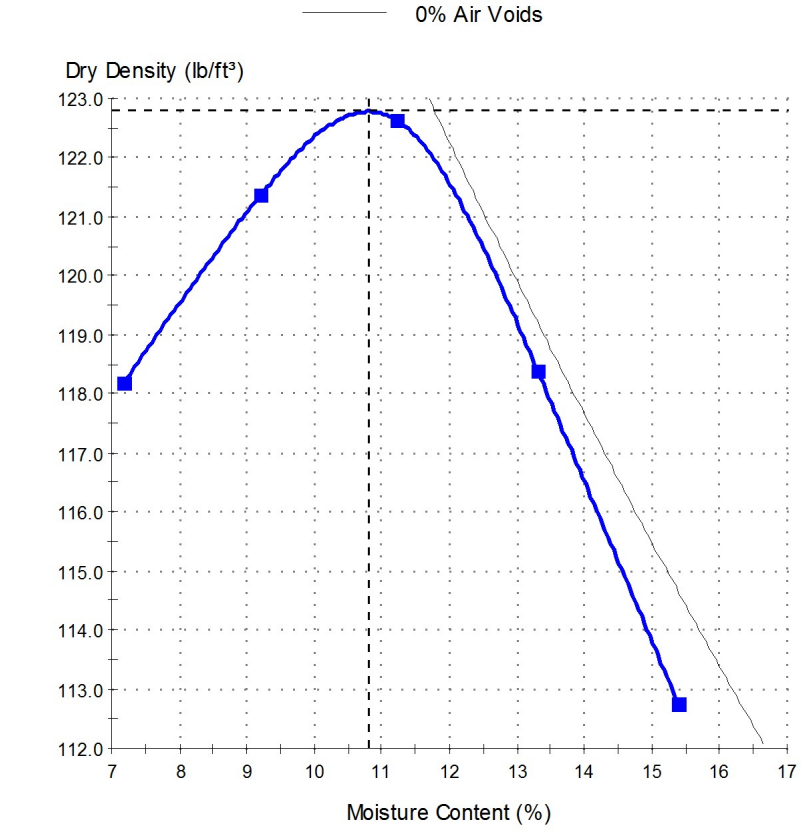
Client: Travis Weiber
KLJ
3203 32nd Ave S., Suite 201
Fargo, ND, 58103
Project: B1500957
New Town Truck Reliever Rte NW
Highway 1804
New Town, ND, 58763
TR: Carey Yoder, cyoder@braunintertec.com

Andrew Lage
Laboratory Coordinator
Date of Issue: 4/28/2017

Sample Details

Sample ID:	W17-000474-S9	**Alternate Sample ID:**	LSS-07; 0.5'-16.5'
Date Sampled:	2/13/2017	**Date Submitted:**	3/13/2017
Sampled By:	Drill Crew	**Sampling Method:**	Auger Cuttings
Source:	Onsite Material		
Material:	Silty Sand(SM); A-2-4(0)		
Specification:	For Informational Purposes Only		
Location:	LSS-07; 0.5'-16.5'		
Date Tested:	3/15/2017		

Dry Density - Moisture Content Relationship



Test Results

AASHTO T 180 - 01

Maximum Dry Density (lb/ft³):	**123**
Corrected Maximum Dry Density (lb/ft³):	**123**
Optimum Moisture Content (%):	**11**
Corrected Optimum Moisture Content (%):	**11**
Method:	A
Material on 19.0mm Sieve:	Removed
Visual Description:	Brown

Comments

Assumed Specific Gravity = 2.56
Percent Retained on #4 Sieve = 0.2%
Percent Passing #200 Sieve = 31%
Non Plastic

Braun Intertec Corporation
1341 South 20th Street, Suite 5, P.O. Box 1836
Bismarck, ND 58504
Phone: 701.255.7180

Proctor Report

Report No: PTR:W17-000474-S10
Issue No: 1

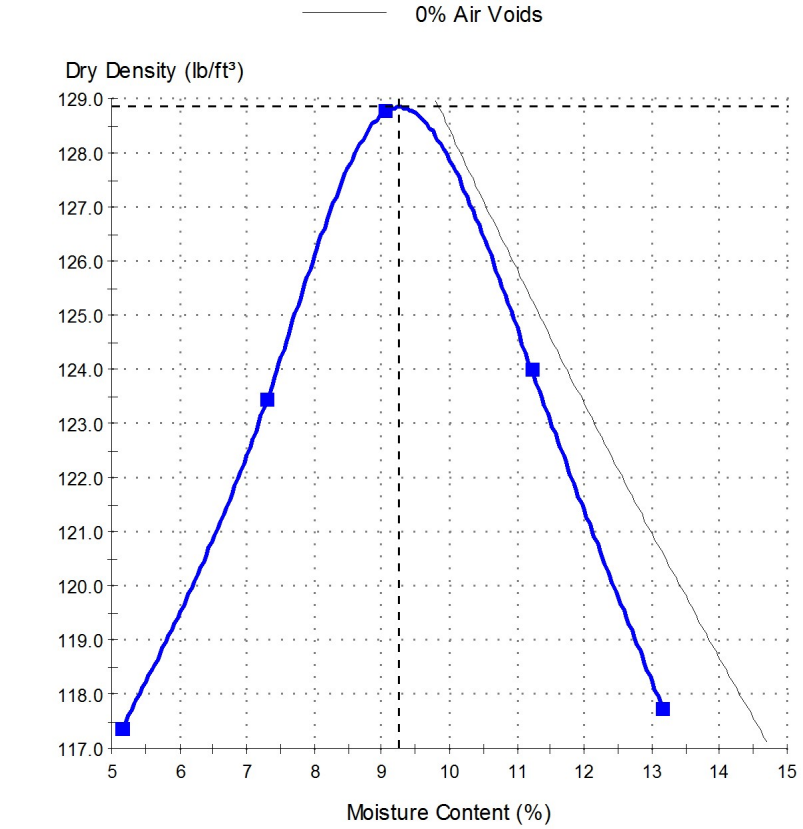
Client: Travis Weiber
KLJ
3203 32nd Ave S., Suite 201
Fargo, ND, 58103
Project: B1500957
New Town Truck Reliever Rte NW
Highway 1804
New Town, ND, 58763
TR: Carey Yoder, cyoder@braunintertec.com

Andrew Lage
Laboratory Coordinator
Date of Issue: 4/28/2017

Sample Details

Sample ID:	W17-000474-S10	**Alternate Sample ID:**	LSS-07; 16.5'-27'
Date Sampled:	2/13/2017	**Date Submitted:**	3/13/2017
Sampled By:	Drill Crew	**Sampling Method:**	Auger Cuttings
Source:	Onsite Material		
Material:	Sandy Lean Clay(CL); A-4(3)		
Specification:	For Informational Purposes Only		
Location:	LSS-07; 16.5'-27'		
Date Tested:	3/15/2017		

Dry Density - Moisture Content Relationship



Test Results

AASHTO T 180 - 01

Maximum Dry Density (lb/ft³):	**129**
Corrected Maximum Dry Density (lb/ft³):	**129**
Optimum Moisture Content (%):	**9**
Corrected Optimum Moisture Content (%):	**9**
Method:	A
Material on 19.0mm Sieve:	Removed
Visual Description:	Brown

Comments

Assumed Specific Gravity = 2.59
Percent Retained on #4 Sieve = 0.1%
Percent Passing #200 Sieve = 66%
LL=26, PL=18, PI=8

Braun Intertec Corporation
1341 South 20th Street, Suite 5, P.O. Box 1836
Bismarck, ND 58504
Phone: 701.255.7180

Proctor Report

Report No: PTR:W17-000474-S12
Issue No: 1

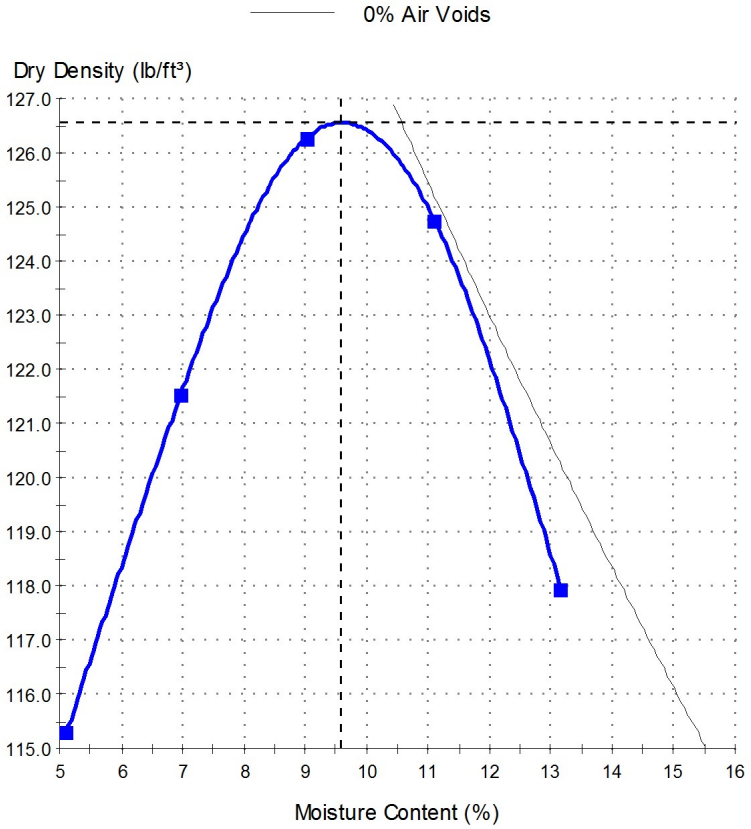
Client: Travis Weiber
KLJ
3203 32nd Ave S., Suite 201
Fargo, ND, 58103
Project: B1500957
New Town Truck Reliever Rte NW
Highway 1804
New Town, ND, 58763
TR: Carey Yoder, cyoder@braunintertec.com

Andrew Lage
Laboratory Coordinator
Date of Issue: 4/28/2017

Sample Details

Sample ID:	W17-000474-S12	**Alternate Sample ID:**	LSS-8; 1'-17'
Date Sampled:	2/13/2017	**Date Submitted:**	3/13/2017
Sampled By:	Drill Crew	**Sampling Method:**	Auger Cuttings
Source:	Onsite Material		
Material:	Silty Sand(SM); A-2-4(0)		
Specification:	For Informational Purposes Only		
Location:	LSS-8; 1'-17'		
Date Tested:	3/27/2017		

Dry Density - Moisture Content Relationship



Test Results

AASHTO T 180 - 01

Maximum Dry Density (lb/ft³):	**127**
Corrected Maximum Dry Density (lb/ft³):	**127**
Optimum Moisture Content (%):	**10**
Corrected Optimum Moisture Content (%):	**10**
Method:	A
Material on 19.0mm Sieve:	Removed
Visual Description:	Brown

Comments

Assumed Specific Gravity = 2.65
Percent Retained on #4 Sieve = 1.0%
Percent Passing #200 Sieve = 33%
Non Plastic

Braun Intertec Corporation
1341 South 20th Street, Suite 5, P.O. Box 1836
Bismarck, ND 58504
Phone: 701.255.7180

Proctor Report

Report No: PTR:W17-000474-S11
Issue No: 1

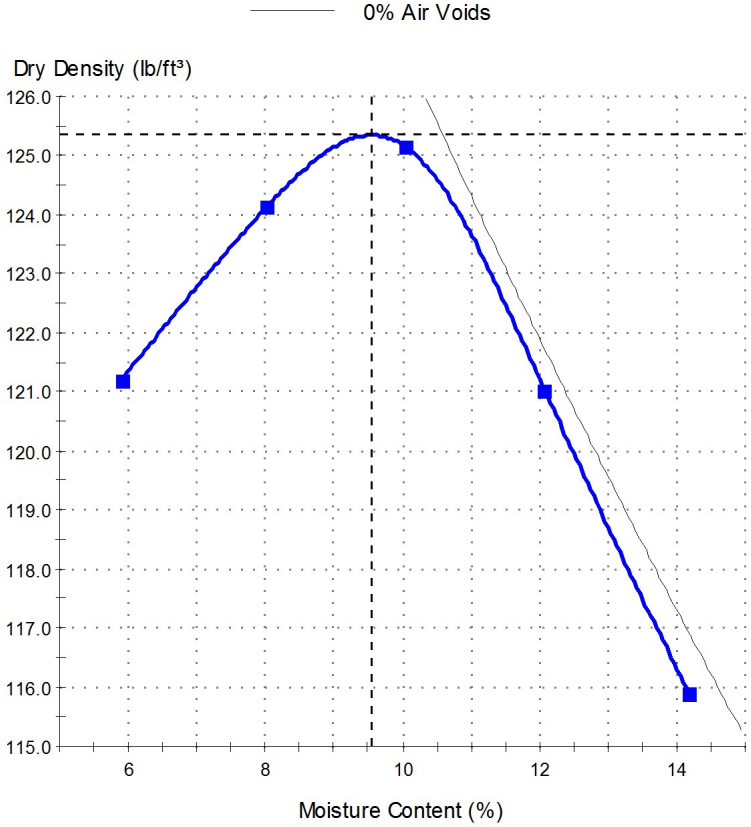
Client: Travis Weiber
KLJ
3203 32nd Ave S., Suite 201
Fargo, ND, 58103
Project: B1500957
New Town Truck Reliever Rte NW
Highway 1804
New Town, ND, 58763
TR: Carey Yoder, cyoder@braunintertec.com

Andrew Lage
Laboratory Coordinator
Date of Issue: 4/28/2017

Sample Details

Sample ID:	W17-000474-S11	**Alternate Sample ID:**	LSS-8; 17'-32'
Date Sampled:	2/13/2017	**Date Submitted:**	3/13/2017
Sampled By:	Drill Crew	**Sampling Method:**	Auger Cuttings
Source:	Onsite Material		
Material:	Silty Sand(SM); A-2-4(0)		
Specification:	For Informational Purposes Only		
Location:	LSS-8; 17'-32'		
Date Tested:	3/21/2017		

Dry Density - Moisture Content Relationship



Test Results

AASHTO T 180 - 01

Maximum Dry Density (lb/ft³):	**125**
Corrected Maximum Dry Density (lb/ft³):	**125**
Optimum Moisture Content (%):	**10**
Corrected Optimum Moisture Content (%):	**10**
Method:	A
Material on 19.0mm Sieve:	Removed
Visual Description:	Brown

Comments

Assumed Specific Gravity = 2.55
Percent Retained on #4 Sieve = 3.3%
Percent Passing #200 Sieve = 19%
Non Plastic

Braun Intertec Corporation
526 10th Street NE, Suite 300
West Fargo, ND 58078
Phone: 701.232.8701

Proctor Report

Report No: PTR:W17-000837-S2
Issue No: 1

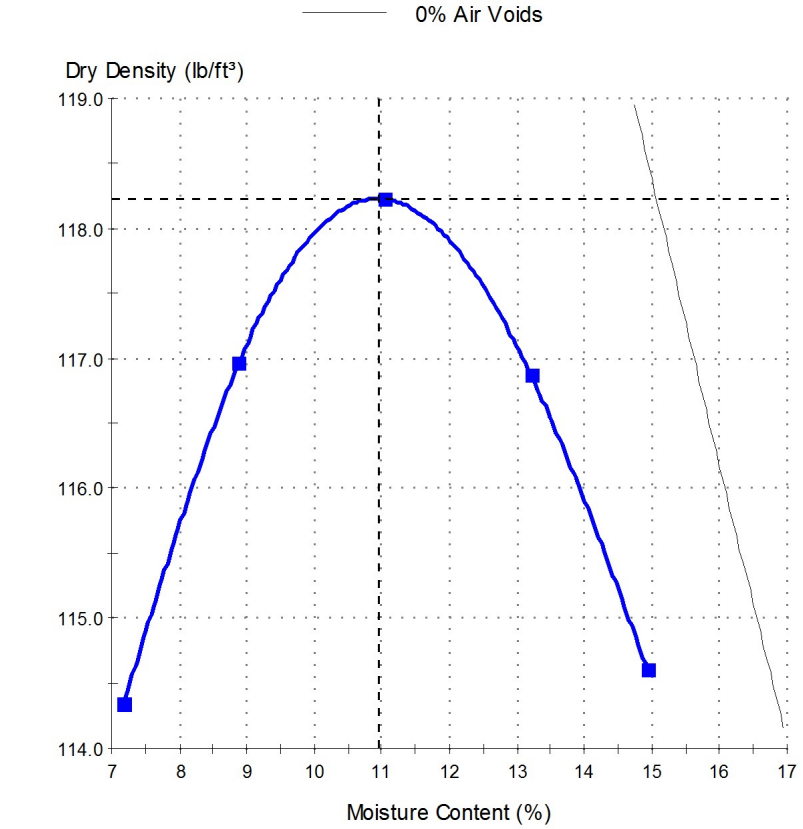
Client: Travis Weiber
KLJ
3203 32nd Ave S., Suite 201
Fargo, ND, 58103
Project: B1500957
New Town Truck Reliever Rte NW
Highway 1804
New Town, ND, 58763
TR: Carey Yoder, cyoder@braunintertec.com

Andrew Lage
Laboratory Coordinator
Date of Issue: 4/28/2017

Sample Details

Sample ID:	W17-000837-S2	**Alternate Sample ID:**	LSS-09; 1'-20'
Date Sampled:	2/13/2017	**Date Submitted:**	4/10/2017
Sampled By:	Drill Crew	**Sampling Method:**	Auger Cuttings
Source:	Onsite Material		
Material:	Poorly Graded Sand with Silt(SP-SM); A-1-b(0)		
Specification:	For Informational Purpose Only		
Location:	LSS-09; 1'-20'		
Date Tested:	4/11/2017		

Dry Density - Moisture Content Relationship



Test Results

AASHTO T 180 - 01

Maximum Dry Density (lb/ft³):	**118**
Corrected Maximum Dry Density (lb/ft³):	**118**
Optimum Moisture Content (%):	**11**
Corrected Optimum Moisture Content (%):	**11**
Method:	A
Material on 19.0mm Sieve:	Removed
Visual Description:	Brown

Comments

Assumed Specific Gravity = 2.65
Percent Retained on #4 Sieve = 3.7%
Percent Passing #200 Sieve = 7%
Non Plastic

Braun Intertec Corporation
526 10th Street NE, Suite 300
West Fargo, ND 58078
Phone: 701.232.8701

Proctor Report

Report No: PTR:W17-000837-S1
Issue No: 1

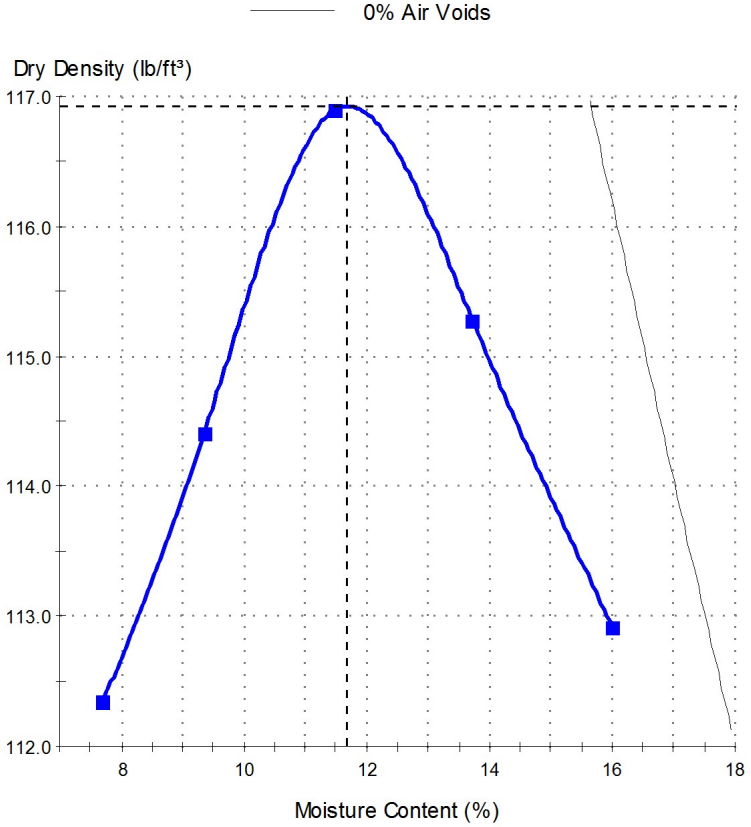
Client: Travis Weiber
KLJ
3203 32nd Ave S., Suite 201
Fargo, ND, 58103
Project: B1500957
New Town Truck Reliever Rte NW
Highway 1804
New Town, ND, 58763
TR: Carey Yoder, cyoder@braunintertec.com

Andrew Lage
Laboratory Coordinator
Date of Issue: 4/28/2017

Sample Details

Sample ID:	W17-000837-S1	**Alternate Sample ID:**	LSS-10; 1'-10'
Date Sampled:	2/13/2017	**Date Submitted:**	4/10/2017
Sampled By:	Drill Crew	**Sampling Method:**	Auger Cuttings
Source:	Onsite Material		
Material:	Silty Sand(SM); A-2-4(0)		
Specification:	For Informational Purpose Only		
Location:	LSS-10; 1'-10'		
Date Tested:	4/11/2017		

Dry Density - Moisture Content Relationship



Test Results

AASHTO T 180 - 01

Maximum Dry Density (lb/ft³):	**117**
Corrected Maximum Dry Density (lb/ft³):	**117**
Optimum Moisture Content (%):	**12**
Corrected Optimum Moisture Content (%):	**12**
Method:	A
Material on 19.0mm Sieve:	Removed
Visual Description:	Brown

Comments

Assumed Specific Gravity = 2.65
Percent Retained on #4 Sieve = 0%
Percent Passing #200 Sieve = 14%
Non Plastic

Braun Intertec Corporation
1341 South 20th Street, Suite 5, P.O. Box 1836
Bismarck, ND 58504
Phone: 701.255.7180

Proctor Report

Report No: PTR:W17-000474-S13
Issue No: 1

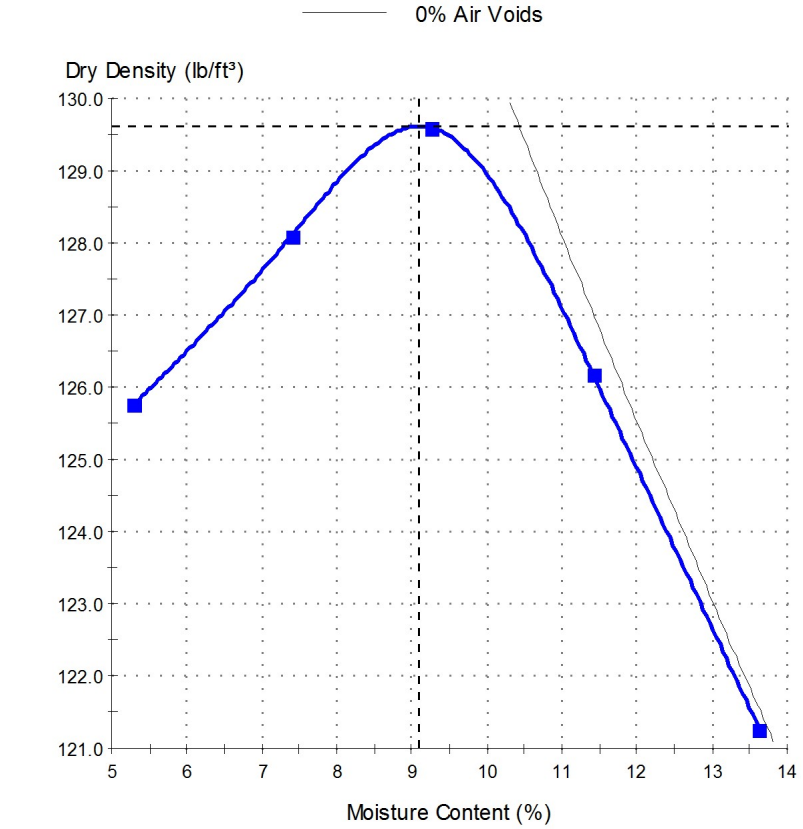
Client: Travis Weiber
KLJ
3203 32nd Ave S., Suite 201
Fargo, ND, 58103
Project: B1500957
New Town Truck Reliever Rte NW
Highway 1804
New Town, ND, 58763
TR: Carey Yoder, cyoder@braunintertec.com

Andrew Lage
Laboratory Coordinator
Date of Issue: 4/28/2017

Sample Details

Sample ID:	W17-000474-S13	**Alternate Sample ID:**	LSS-11; 2'-10'
Date Sampled:	2/13/2017	**Date Submitted:**	3/13/2017
Sampled By:	Drill Crew	**Sampling Method:**	Auger Cuttings
Source:	Onsite Material		
Material:	(SP-SM); A-1-b(0)		
Specification:	For Informational Purposes Only		
Location:	LSS-11; 2'-10'		
Date Tested:	3/15/2017		

Dry Density - Moisture Content Relationship



Test Results

AASHTO T 180 - 01

Maximum Dry Density (lb/ft³):	**130**
Corrected Maximum Dry Density (lb/ft³):	**130**
Optimum Moisture Content (%):	**9**
Corrected Optimum Moisture Content (%):	**9**
Method:	C
Material on 19.0mm Sieve:	Removed
Visual Description:	Poorly Graded Sand with Silt and Gravel, Brown

Comments

Assumed Specific Gravity = 2.65
Percent Retained on #4 Sieve = 22%
Percent Passing #200 Sieve = 7%
Non Plastic

Braun Intertec Corporation
1341 South 20th Street, Suite 5, P.O. Box 1836
Bismarck, ND 58504
Phone: 701.255.7180

Proctor Report

Report No: PTR:W17-000474-S14
Issue No: 1

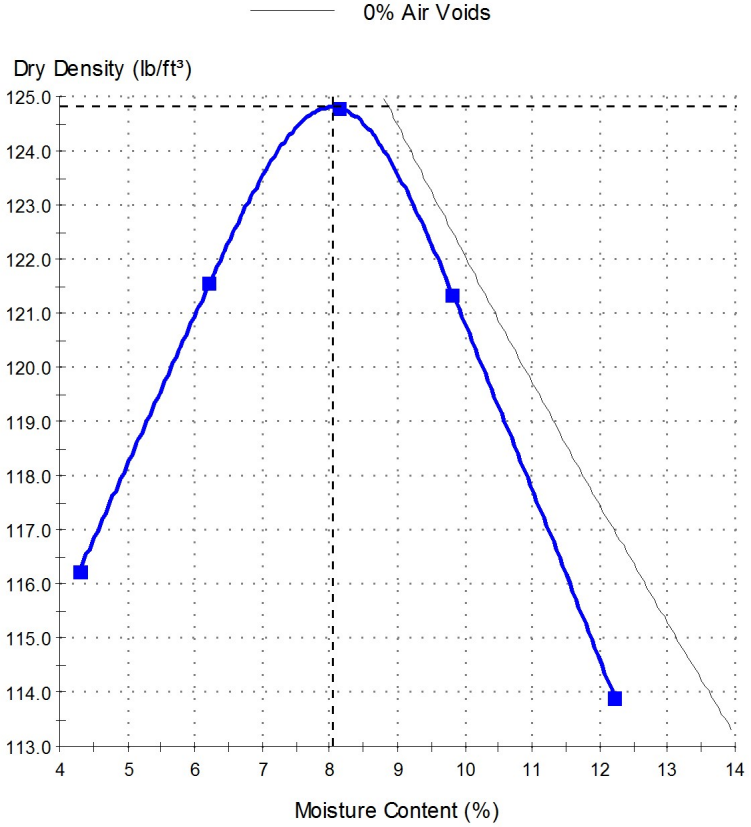
Client: Travis Weiber
KLJ
3203 32nd Ave S., Suite 201
Fargo, ND, 58103
Project: B1500957
New Town Truck Reliever Rte NW
Highway 1804
New Town, ND, 58763
TR: Carey Yoder, cyoder@braunintertec.com

Andrew Lage
Laboratory Coordinator
Date of Issue: 4/28/2017

Sample Details

Sample ID:	W17-000474-S14	**Alternate Sample ID:**	LSS-11; 10'-29'
Date Sampled:	2/13/2017	**Date Submitted:**	3/13/2017
Sampled By:	Drill Crew	**Sampling Method:**	Auger Cuttings
Source:	Onsite Material		
Material:	Poorly Graded Sand with Silt(SP-SM); A-3(0)		
Specification:	For Informational Purposes Only		
Location:	LSS-11; 10'-29'		
Date Tested:	3/27/2017		

Dry Density - Moisture Content Relationship



Test Results

AASHTO T 180 - 01

Maximum Dry Density (lb/ft³):	**125**
Corrected Maximum Dry Density (lb/ft³):	**125**
Optimum Moisture Content (%):	**8**
Corrected Optimum Moisture Content (%):	**8**
Method:	C
Material on 19.0mm Sieve:	Removed
Visual Description:	Brown

Comments

Assumed Specific Gravity = 2.43
Percent Retained on #4 Sieve = 9%
Percent Passing #200 Sieve = 10%
Non Plastic

Braun Intertec Corporation
526 10th Street NE, Suite 300
West Fargo, ND 58078
Phone: 701.232.8701

Proctor Report

Report No: PTR:W17-000837-S7
Issue No: 1

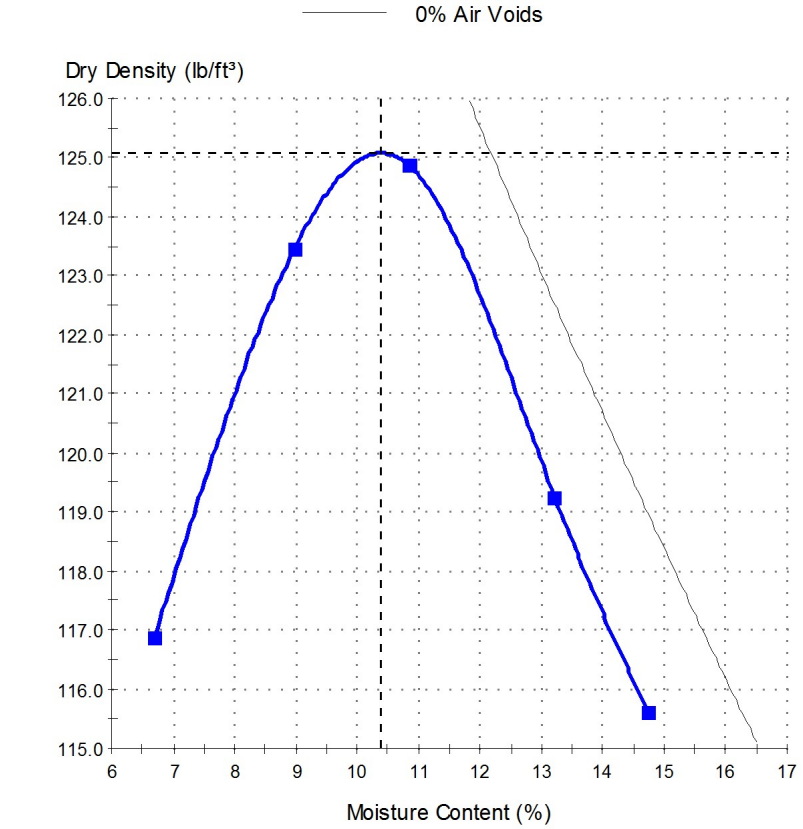
Client: Travis Weiber
KLJ
3203 32nd Ave S., Suite 201
Fargo, ND, 58103
Project: B1500957
New Town Truck Reliever Rte NW
Highway 1804
New Town, ND, 58763
TR: Carey Yoder, cyoder@braunintertec.com

Andrew Lage
Laboratory Coordinator
Date of Issue: 4/28/2017

Sample Details

Sample ID:	W17-000837-S7	**Alternate Sample ID:**	LSS-12; 1'-20'
Date Sampled:	2/10/2017	**Date Submitted:**	4/10/2017
Sampled By:	Drill Crew	**Sampling Method:**	Auger Cuttings
Source:	Onsite Material		
Material:	Silty Sand with Gravel(SM); A-2-4(0)		
Specification:	For Informational Purpose Only		
Location:	LSS-12; 1'-20'		
Date Tested:	4/13/2017		

Dry Density - Moisture Content Relationship



Test Results

AASHTO T 180 - 01

Maximum Dry Density (lb/ft³):	**125**
Corrected Maximum Dry Density (lb/ft³):	**125**
Optimum Moisture Content (%):	**10**
Corrected Optimum Moisture Content (%):	**10**
Method:	C
Material on 19.0mm Sieve:	Removed
Visual Description:	Brown

Comments

Assumed Specific Gravity = 2.65
Percent Retained on #4 Sieve = 15%
Percent Passing #200 Sieve = 15%
Non Plastic

Braun Intertec Corporation
526 10th Street NE, Suite 300
West Fargo, ND 58078
Phone: 701.232.8701

Proctor Report

Report No: PTR:W17-000837-S10
Issue No: 1

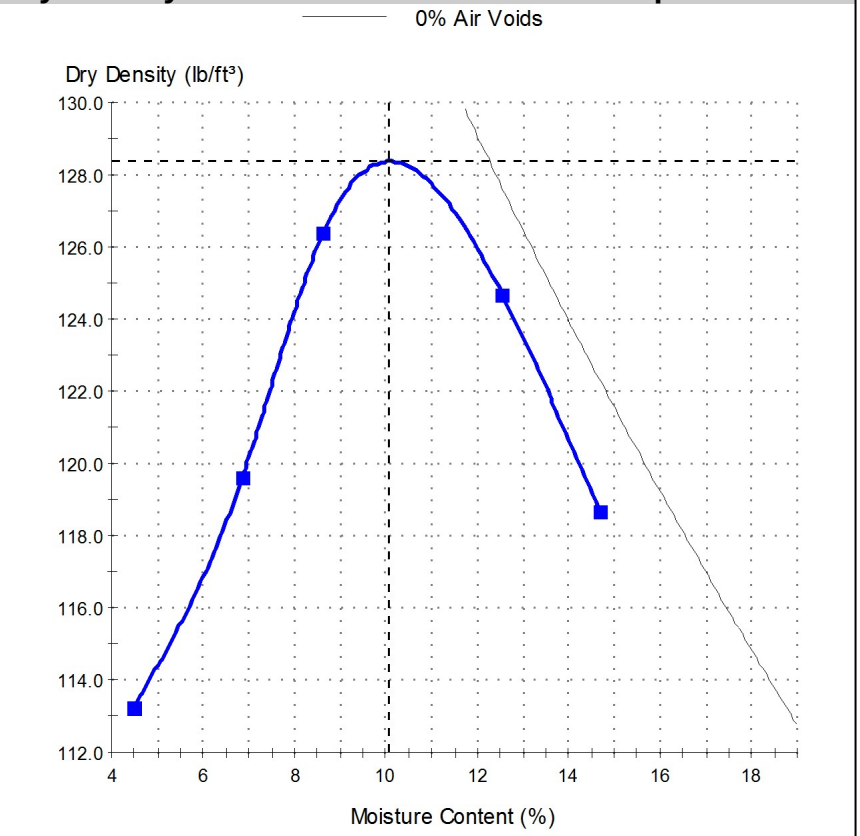
Client: Travis Weiber
KLJ
3203 32nd Ave S., Suite 201
Fargo, ND, 58103
Project: B1500957
New Town Truck Reliever Rte NW
Highway 1804
New Town, ND, 58763
TR: Carey Yoder, cyoder@braunintertec.com

Andrew Lage
Laboratory Coordinator
Date of Issue: 4/28/2017

Sample Details

Sample ID:	W17-000837-S10	**Alternate Sample ID:**	LSS-13; 2'-20'
Date Sampled:	2/10/2017	**Date Submitted:**	4/10/2017
Sampled By:	Drill Crew	**Sampling Method:**	Auger Cuttings
Source:	Onsite Material		
Material:	(SW-SM); A-1-b(0)		
Specification:	For Informational Purpose Only		
Location:	LSS-13; 2'-20'		
Date Tested:	4/14/2017		

Dry Density - Moisture Content Relationship



Test Results

AASHTO T 180 - 01

Maximum Dry Density (lb/ft³):	**128**
Corrected Maximum Dry Density (lb/ft³):	**128**
Optimum Moisture Content (%):	**10**
Corrected Optimum Moisture Content (%):	**10**
Method:	C
Material on 19.0mm Sieve:	Removed
Visual Description:	Well Graded Sand with Silt and Gravel, Brown

Comments

Assumed Specific Gravity = 2.65
Percent Retained on #4 Sieve = 20%
Percent Passing #200 Sieve = 10%
Non Plastic

Braun Intertec Corporation
131 23rd Avenue East Unit #3
Dickinson, ND 58601
Phone: 701.225.7090

Proctor Report

Report No: PTR:W17-000343-S1
Issue No: 1

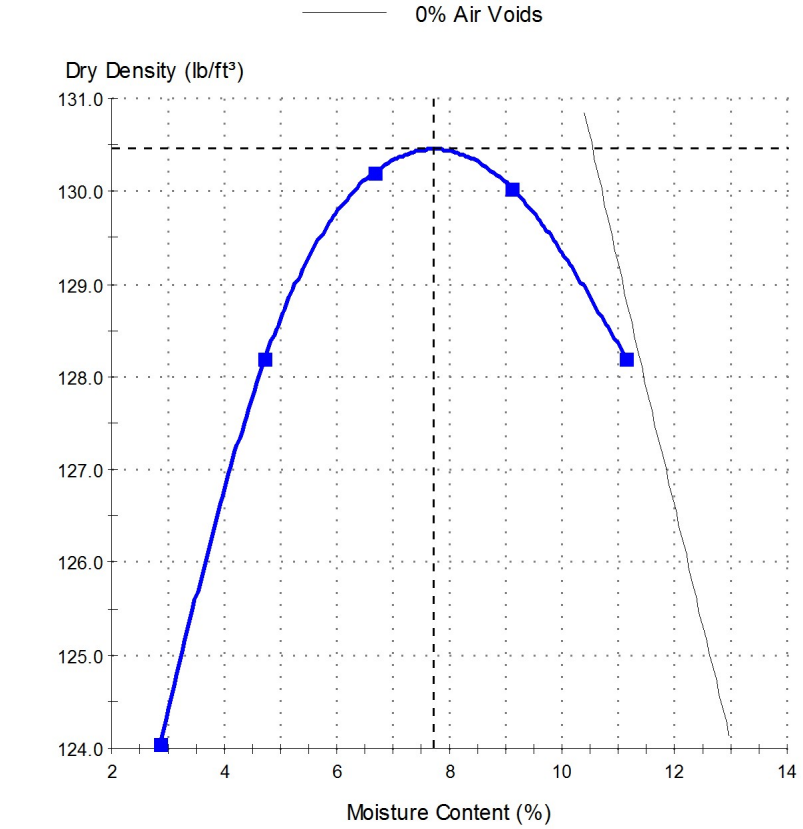
Client: Travis Weiber
KLJ
3203 32nd Ave S., Suite 201
Fargo, ND, 58103
Project: B1500957
New Town Truck Reliever Rte NW
Highway 1804
New Town, ND, 58763
TR: Carey Yoder, cyoder@braunintertec.com

Andrew Lage
Laboratory Coordinator
Date of Issue: 4/28/2017

Sample Details

Sample ID:	W17-000343-S1	**Alternate Sample ID:**	LSS-14; 2'-11'
Date Sampled:	2/10/2017	**Date Submitted:**	2/27/2017
Sampled By:	Drill Crew	**Sampling Method:**	Auger Cuttings
Source:	Onsite Material		
Material:	(SP-SM); A-1-b(0)		
Specification:	For Informational Purposes Only		
Location:	LSS-14; 2'-11'		
Date Tested:	3/7/2017		

Dry Density - Moisture Content Relationship



Test Results

AASHTO T 180 - 01

Maximum Dry Density (lb/ft³):	**130**
Corrected Maximum Dry Density (lb/ft³):	**130**
Optimum Moisture Content (%):	**8**
Corrected Optimum Moisture Content (%):	**8**
Method:	C
Material on 19.0mm Sieve:	Removed
Visual Description:	Poorly Graded Sand with Silt and Gravel, Brown

Comments

Assumed Specific Gravity = 2.68
Percent Retained on #4 Sieve = 31%
Percent Passing #200 Sieve = 5%
Non Plastic

Braun Intertec Corporation
131 23rd Avenue East Unit #3
Dickinson, ND 58601
Phone: 701.225.7090

Proctor Report

Report No: PTR:W17-000343-S2
Issue No: 1

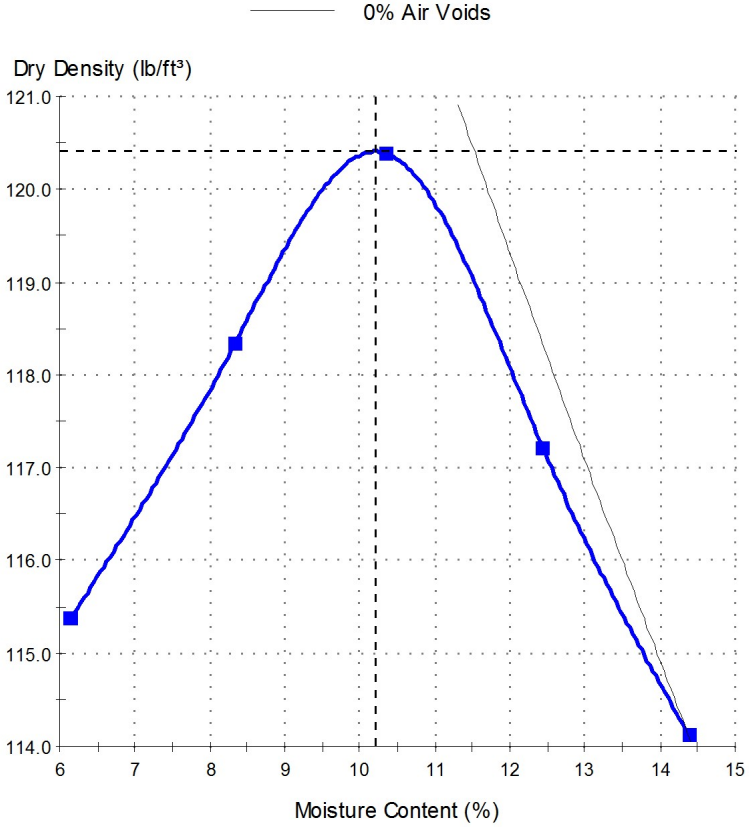
Client: Travis Weiber
KLJ
3203 32nd Ave S., Suite 201
Fargo, ND, 58103
Project: B1500957
New Town Truck Reliever Rte NW
Highway 1804
New Town, ND, 58763
TR: Carey Yoder, cyoder@braunintertec.com

Andrew Lage
Laboratory Coordinator
Date of Issue: 4/28/2017

Sample Details

Sample ID:	W17-000343-S2	**Alternate Sample ID:**	LSS-14; 11'-31'
Date Sampled:	2/10/2017	**Date Submitted:**	2/27/2017
Sampled By:	Drill Crew	**Sampling Method:**	Auger Cuttings
Source:	Onsite Material		
Material:	Poorly Graded Sand with Silt(SP-SM); A-1-b(0)		
Specification:	For Informational Purposes Only		
Location:	LSS-14; 11'-31'		
Date Tested:	3/8/2017		

Dry Density - Moisture Content Relationship



Test Results

AASHTO T 180 - 01

Maximum Dry Density (lb/ft³):	**120**
Corrected Maximum Dry Density (lb/ft³):	**120**
Optimum Moisture Content (%):	**10**
Corrected Optimum Moisture Content (%):	**10**
Method:	C
Material on 19.0mm Sieve:	Removed
Visual Description:	Brown

Comments

Assumed Specific Gravity = 2.48
Percent Retained on #4 Sieve = 7%
Percent Passing #200 Sieve = 8%
Non Plastic

Braun Intertec Corporation
131 23rd Avenue East Unit #3
Dickinson, ND 58601
Phone: 701.225.7090

Proctor Report

Report No: PTR:W17-000343-S3
Issue No: 1

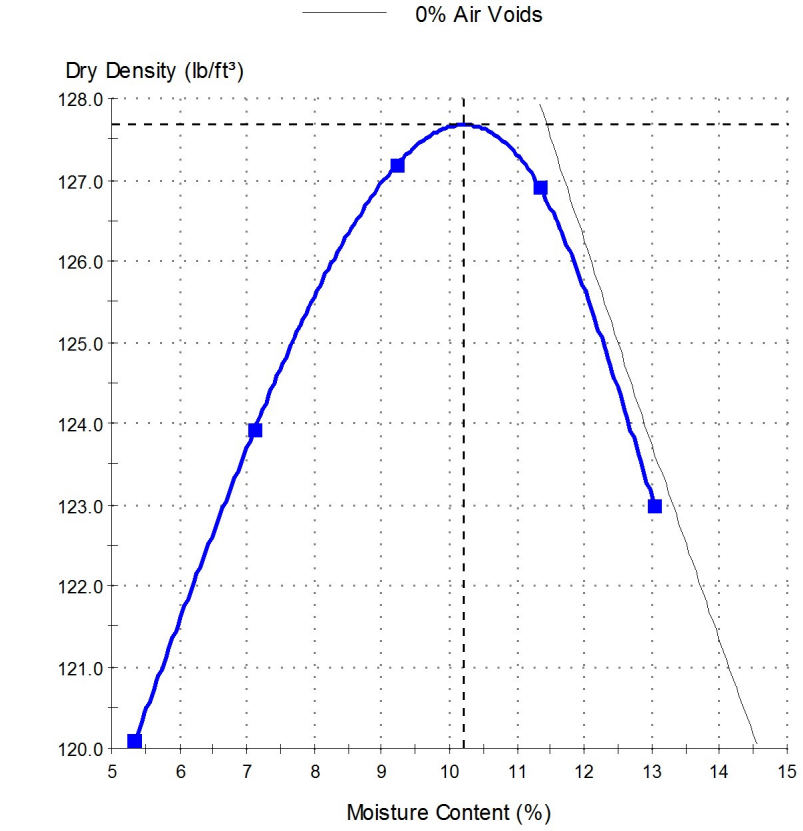
Client: Travis Weiber
KLJ
3203 32nd Ave S., Suite 201
Fargo, ND, 58103
Project: B1500957
New Town Truck Reliever Rte NW
Highway 1804
New Town, ND, 58763
TR: Carey Yoder, cyoder@braunintertec.com

Andrew Lage
Laboratory Coordinator
Date of Issue: 4/28/2017

Sample Details

Sample ID:	W17-000343-S3	**Alternate Sample ID:**	LSS-15; 2'-31'
Date Sampled:	2/9/2017	**Date Submitted:**	2/27/2017
Sampled By:	Drill Crew	**Sampling Method:**	Auger Cuttings
Source:	Onsite Material		
Material:	(SW-SM); A-1-b(0)		
Specification:	For Informational Purposes Only		
Location:	LSS-15; 2'-31'		
Date Tested:	3/7/2017		

Dry Density - Moisture Content Relationship



Test Results

AASHTO T 180 - 01

Maximum Dry Density (lb/ft³):	**128**
Corrected Maximum Dry Density (lb/ft³):	**128**
Optimum Moisture Content (%):	**10**
Corrected Optimum Moisture Content (%):	**10**
Method:	C
Material on 19.0mm Sieve:	Removed
Visual Description:	Well Graded Sand with Silt and Gravel, Dark Brown

Comments

Assumed Specific Gravity = 2.67
Percent Retained on #4 Sieve = 15%
Percent Passing #200 Sieve = 7%
Non Plastic

Braun Intertec Corporation
131 23rd Avenue East Unit #3
Dickinson, ND 58601
Phone: 701.225.7090

Proctor Report

Report No: PTR:W17-000343-S4
Issue No: 1

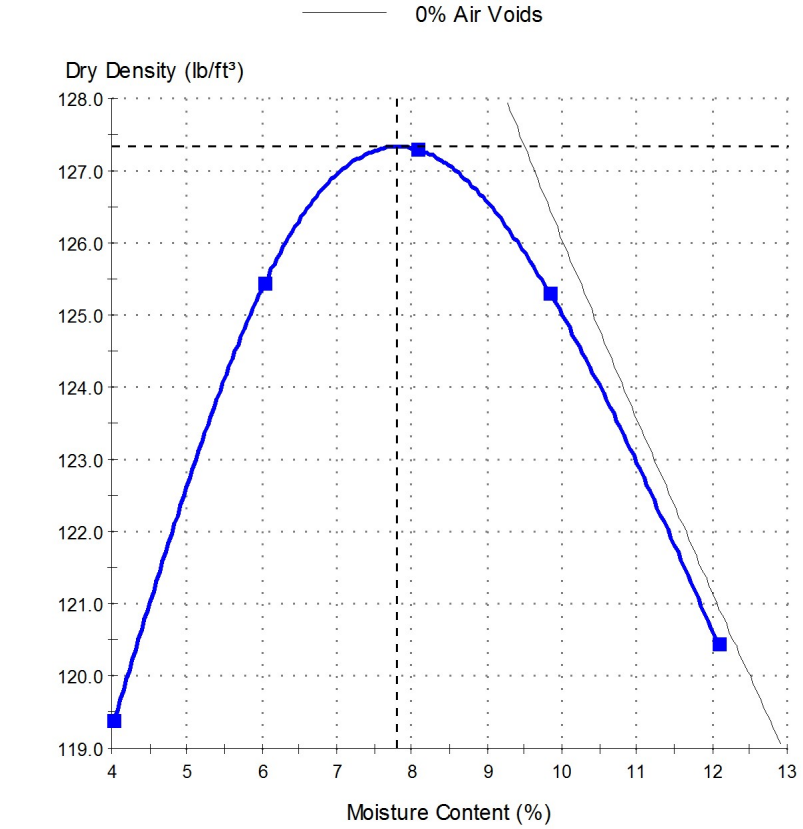
Client: Travis Weiber
KLJ
3203 32nd Ave S., Suite 201
Fargo, ND, 58103
Project: B1500957
New Town Truck Reliever Rte NW
Highway 1804
New Town, ND, 58763
TR: Carey Yoder, cyoder@braunintertec.com

Andrew Lage
Laboratory Coordinator
Date of Issue: 4/28/2017

Sample Details

Sample ID:	W17-000343-S4	**Alternate Sample ID:**	LSS-16; 2'-15'
Date Sampled:	2/9/2017	**Date Submitted:**	2/27/2017
Sampled By:	Drill Crew	**Sampling Method:**	Auger Cuttings
Source:	Onsite Material		
Material:	Well Graded Sand with Silt(SW-SM); A-1-b(0)		
Specification:	For Informational Purposes Only		
Location:	LSS-16; 2'-15'		
Date Tested:	3/7/2017		

Dry Density - Moisture Content Relationship



Test Results

AASHTO T 180 - 01

Maximum Dry Density (lb/ft³):	**127**
Corrected Maximum Dry Density (lb/ft³):	**127**
Optimum Moisture Content (%):	**8**
Corrected Optimum Moisture Content (%):	**8**
Method:	C
Material on 19.0mm Sieve:	Removed
Visual Description:	Brown

Comments

Assumed Specific Gravity = 2.53
Percent Retained on #4 Sieve = 12%
Percent Passing #200 Sieve = 10%
Non Plastic

Braun Intertec Corporation
131 23rd Avenue East Unit #3
Dickinson, ND 58601
Phone: 701.225.7090

Proctor Report

Report No: PTR:W17-000343-S5
Issue No: 1

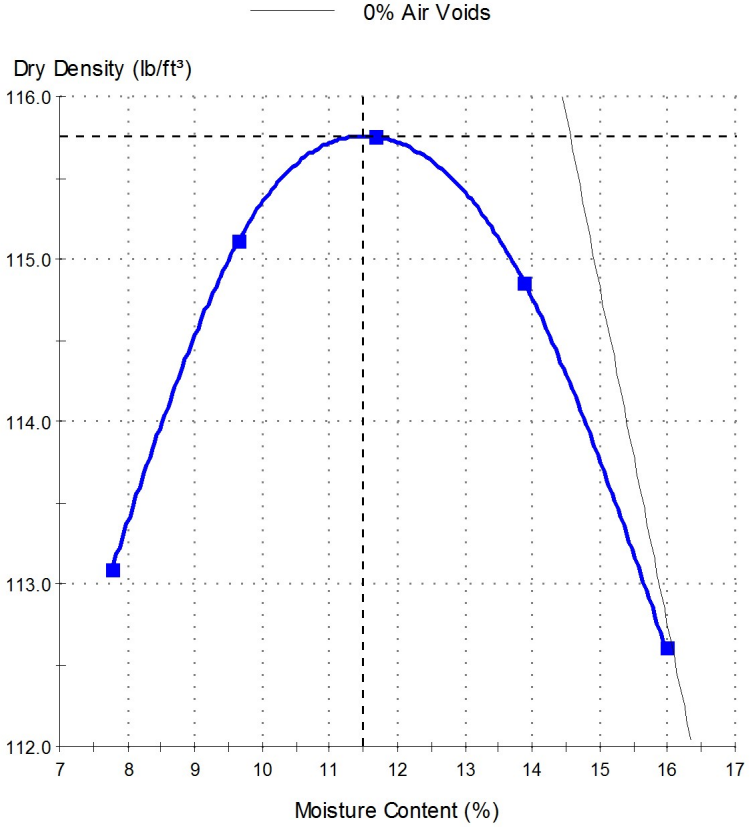
Client: Travis Weiber
KLJ
3203 32nd Ave S., Suite 201
Fargo, ND, 58103
Project: B1500957
New Town Truck Reliever Rte NW
Highway 1804
New Town, ND, 58763
TR: Carey Yoder, cyoder@braunintertec.com

Andrew Lage
Laboratory Coordinator
Date of Issue: 4/28/2017

Sample Details

Sample ID:	W17-000343-S5	**Alternate Sample ID:**	LSS-16; 15'-31'
Date Sampled:	2/9/2017	**Date Submitted:**	2/27/2017
Sampled By:	Drill Crew	**Sampling Method:**	Auger Cuttings
Source:	Onsite Material		
Material:	Poorly Graded Sand with Silt(SP-SM); A-3(0)		
Specification:	For Informational Purposes Only		
Location:	LSS-16; 15'-31'		
Date Tested:	3/8/2017		

Dry Density - Moisture Content Relationship



Test Results

AASHTO T 180 - 01

Maximum Dry Density (lb/ft³):	**116**
Corrected Maximum Dry Density (lb/ft³):	**116**
Optimum Moisture Content (%):	**11**
Corrected Optimum Moisture Content (%):	**11**
Method:	A
Material on 19.0mm Sieve:	Removed
Visual Description:	Brown

Comments

Assumed Specific Gravity = 2.54
Percent Retained on #4 Sieve = 3%
Percent Passing #200 Sieve = 9%
Non Plastic

Braun Intertec Corporation
526 10th Street NE, Suite 300
West Fargo, ND 58078
Phone: 701.232.8701

Proctor Report

Report No: PTR:W17-000837-S6
Issue No: 1

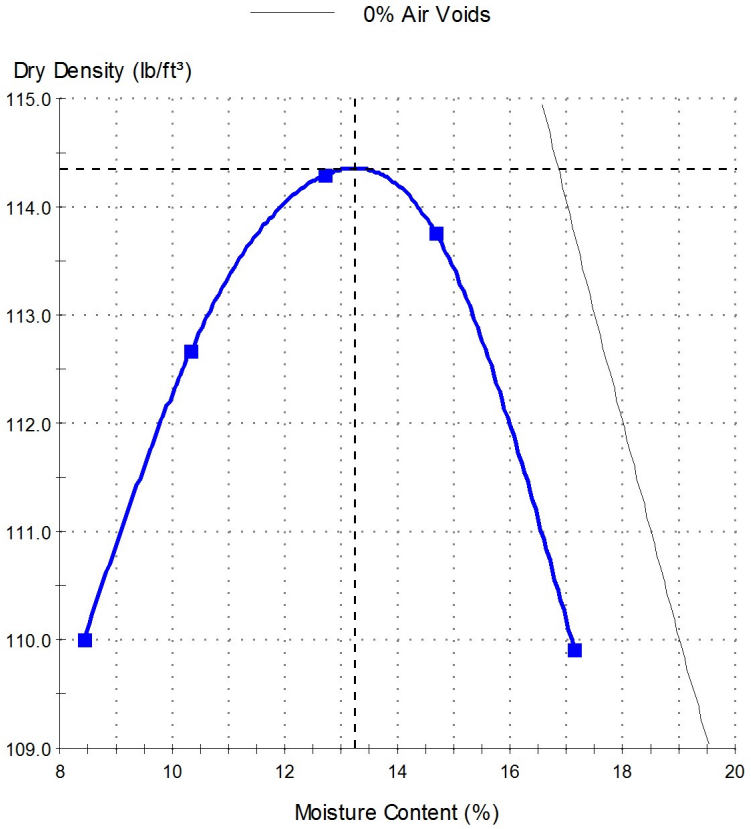
Client: Travis Weiber
KLJ
3203 32nd Ave S., Suite 201
Fargo, ND, 58103
Project: B1500957
New Town Truck Reliever Rte NW
Highway 1804
New Town, ND, 58763
TR: Carey Yoder, cyoder@braunintertec.com

Andrew Lage
Laboratory Coordinator
Date of Issue: 4/28/2017

Sample Details

Sample ID:	W17-000837-S6	**Alternate Sample ID:**	LSS-17; 6'-20'
Date Sampled:	2/9/2017	**Date Submitted:**	4/10/2017
Sampled By:	Drill Crew	**Sampling Method:**	Auger Cuttings
Source:	Onsite Material		
Material:	Poorly Graded Sand with Silt(SP-SM); A-2-4(0)		
Specification:	For Informational Purpose Only		
Location:	LSS-17; 6'-20'		
Date Tested:	4/12/2017		

Dry Density - Moisture Content Relationship



Test Results

AASHTO T 180 - 01

Maximum Dry Density (lb/ft³):	**114**
Corrected Maximum Dry Density (lb/ft³):	**114**
Optimum Moisture Content (%):	**13**
Corrected Optimum Moisture Content (%):	**13**
Method:	A
Material on 19.0mm Sieve:	Removed
Visual Description:	Brown

Comments

Assumed Specific Gravity = 2.65
Percent Retained on #4 Sieve = 0%
Percent Passing #200 Sieve = 12%
Non Plastic

Braun Intertec Corporation
526 10th Street NE, Suite 300
West Fargo, ND 58078
Phone: 701.232.8701

Proctor Report

Report No: PTR:W17-000837-S9
Issue No: 1

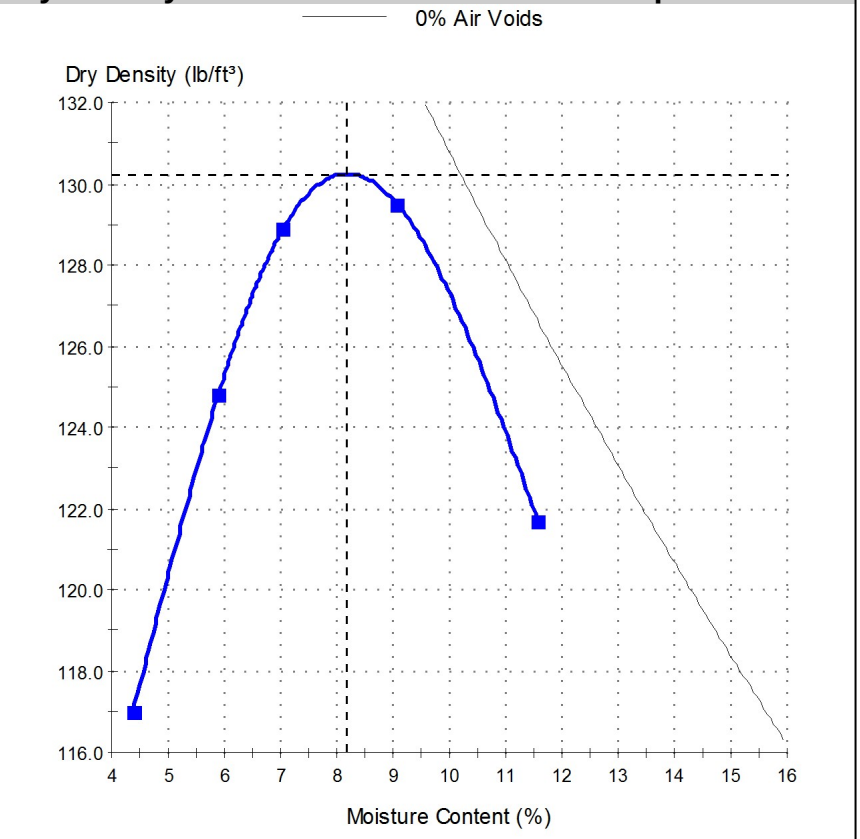
Client: Travis Weiber
KLJ
3203 32nd Ave S., Suite 201
Fargo, ND, 58103
Project: B1500957
New Town Truck Reliever Rte NW
Highway 1804
New Town, ND, 58763
TR: Carey Yoder, cyoder@braunintertec.com

Andrew Lage
Laboratory Coordinator
Date of Issue: 4/28/2017

Sample Details

Sample ID:	W17-000837-S9	**Alternate Sample ID:**	LSS-18; 2'-15'
Date Sampled:	2/9/2017	**Date Submitted:**	4/10/2017
Sampled By:	Drill Crew	**Sampling Method:**	Auger Cuttings
Source:	Onsite Material		
Material:	Well Graded Sand with Silt(SW-SM); A-1-b(0)		
Specification:	For Informational Purpose Only		
Location:	LSS-18; 2'-15'		
Date Tested:	4/13/2017		

Dry Density - Moisture Content Relationship



Test Results

AASHTO T 180 - 01

Maximum Dry Density (lb/ft³):	**130**
Corrected Maximum Dry Density (lb/ft³):	**130**
Optimum Moisture Content (%):	**8**
Corrected Optimum Moisture Content (%):	**8**
Method:	C
Material on 19.0mm Sieve:	Removed
Visual Description:	Brown

Comments

Assumed Specific Gravity = 2.65
Percent Retained on #4 Sieve = 10%
Percent Passing #200 Sieve = 12%
Non Plastic

Braun Intertec Corporation
131 23rd Avenue East Unit #3
Dickinson, ND 58601
Phone: 701.225.7090

Proctor Report

Report No: PTR:W17-000343-S6
Issue No: 1

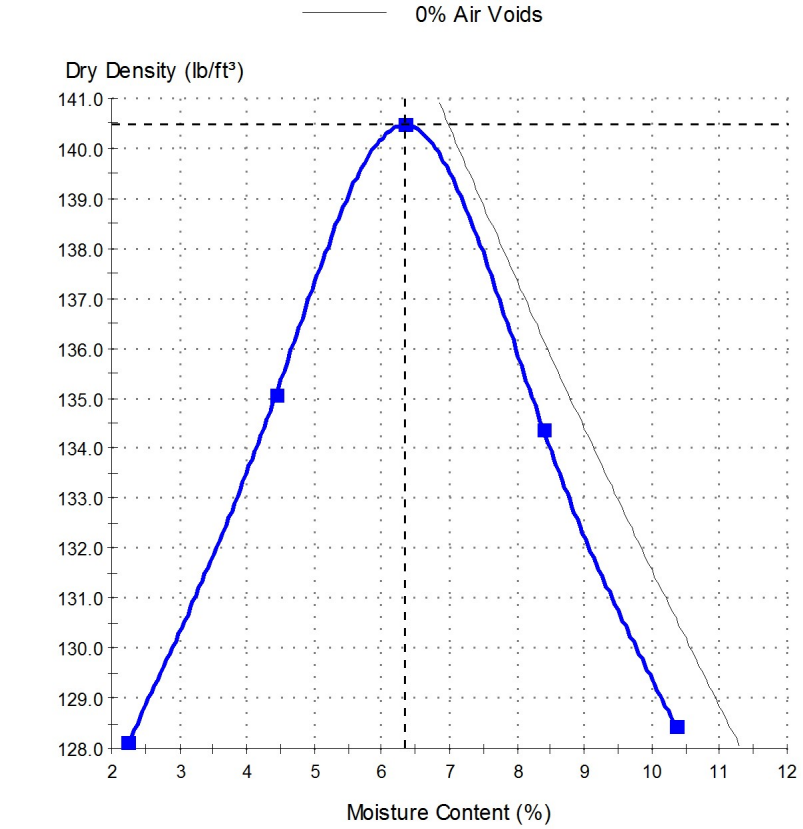
Client: Travis Weiber
KLJ
3203 32nd Ave S., Suite 201
Fargo, ND, 58103
Project: B1500957
New Town Truck Reliever Rte NW
Highway 1804
New Town, ND, 58763
TR: Carey Yoder, cyoder@braunintertec.com

Andrew Lage
Laboratory Coordinator
Date of Issue: 4/28/2017

Sample Details

Sample ID:	W17-000343-S6	**Alternate Sample ID:**	LSS-19; 0'-4'
Date Sampled:	2/9/2017	**Date Submitted:**	2/27/2017
Sampled By:	Drill Crew	**Sampling Method:**	Auger Cuttings
Source:	Onsite Material		
Material:	Silty Clayey Sand with Gravel(SC-SM); A-1-b(0)		
Specification:	For Informational Purposes Only		
Location:	LSS-19; 0'-4'		
Date Tested:	3/1/2017		

Dry Density - Moisture Content Relationship



Test Results

AASHTO T 180 - 01

Maximum Dry Density (lb/ft³):	**140**
Corrected Maximum Dry Density (lb/ft³):	**140**
Optimum Moisture Content (%):	**6**
Corrected Optimum Moisture Content (%):	**6**
Method:	C
Material on 19.0mm Sieve:	Removed
Visual Description:	Brown

Comments

Assumed Specific Gravity = 2.67
Percent Retained on #4 Sieve = 26%
Percent Passing #200 Sieve = 13%
LL=20, PL=14, PI=6

Braun Intertec Corporation
131 23rd Avenue East Unit #3
Dickinson, ND 58601
Phone: 701.225.7090

Proctor Report

Report No: PTR:W17-000343-S7
Issue No: 1

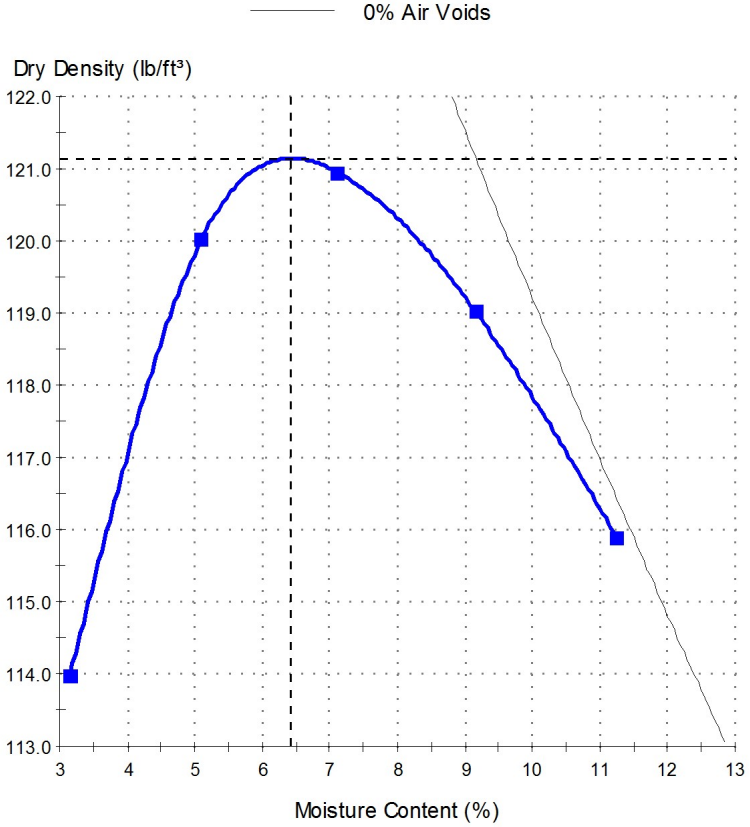
Client: Travis Weiber
KLJ
3203 32nd Ave S., Suite 201
Fargo, ND, 58103
Project: B1500957
New Town Truck Reliever Rte NW
Highway 1804
New Town, ND, 58763
TR: Carey Yoder, cyoder@braunintertec.com

Andrew Lage
Laboratory Coordinator
Date of Issue: 4/28/2017

Sample Details

Sample ID:	W17-000343-S7	**Alternate Sample ID:**	LSS-19; 4'-31'
Date Sampled:	2/9/2017	**Date Submitted:**	2/27/2017
Sampled By:	Drill Crew	**Sampling Method:**	Auger Cuttings
Source:	Onsite Material		
Material:	Silty Sand(SM); A-2-4(0)		
Specification:	For Informational Purposes Only		
Location:	LSS-19; 4'-31'		
Date Tested:	2/28/2017		

Dry Density - Moisture Content Relationship



Test Results

AASHTO T 180 - 01

Maximum Dry Density (lb/ft³):	**121**
Corrected Maximum Dry Density (lb/ft³):	**121**
Optimum Moisture Content (%):	**6**
Corrected Optimum Moisture Content (%):	**6**
Method:	A
Material on 19.0mm Sieve:	Removed
Visual Description:	Brown

Comments

Assumed Specific Gravity = 2.36
Percent Retained on #4 Sieve = 3%
Percent Passing #200 Sieve = 12%
Non Plastic

Braun Intertec Corporation
526 10th Street NE, Suite 300
West Fargo, ND 58078
Phone: 701.232.8701

Proctor Report

Report No: PTR:W17-000837-S3
Issue No: 1

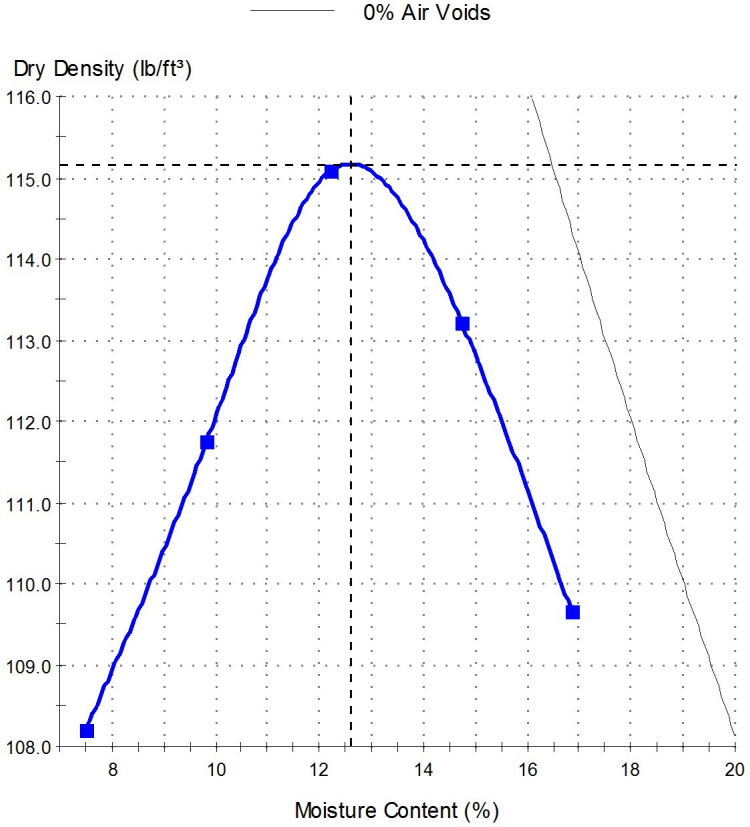
Client: Travis Weiber
KLJ
3203 32nd Ave S., Suite 201
Fargo, ND, 58103
Project: B1500957
New Town Truck Reliever Rte NW
Highway 1804
New Town, ND, 58763
TR: Carey Yoder, cyoder@braunintertec.com

Andrew Lage
Laboratory Coordinator
Date of Issue: 4/28/2017

Sample Details

Sample ID:	W17-000837-S3	**Alternate Sample ID:**	LSS-20; 1'-10'
Date Sampled:	2/10/2017	**Date Submitted:**	4/10/2017
Sampled By:	Drill Crew	**Sampling Method:**	Auger Cuttings
Source:	Onsite Material		
Material:	Silty Sand(SM); A-2-4(0)		
Specification:	For Informational Purpose Only		
Location:	LSS-20; 1'-10'		
Date Tested:	4/12/2017		

Dry Density - Moisture Content Relationship



Test Results

AASHTO T 180 - 01

Maximum Dry Density (lb/ft³):	**115**
Corrected Maximum Dry Density (lb/ft³):	**115**
Optimum Moisture Content (%):	**13**
Corrected Optimum Moisture Content (%):	**13**
Method:	A
Material on 19.0mm Sieve:	Removed
Visual Description:	Brown

Comments

Assumed Specific Gravity = 2.65
Percent Retained on #4 Sieve = 2%
Percent Passing #200 Sieve = 15%
Non Plastic

Braun Intertec Corporation
526 10th Street NE, Suite 300
West Fargo, ND 58078
Phone: 701.232.8701

Proctor Report

Report No: PTR:W17-000837-S8
Issue No: 1

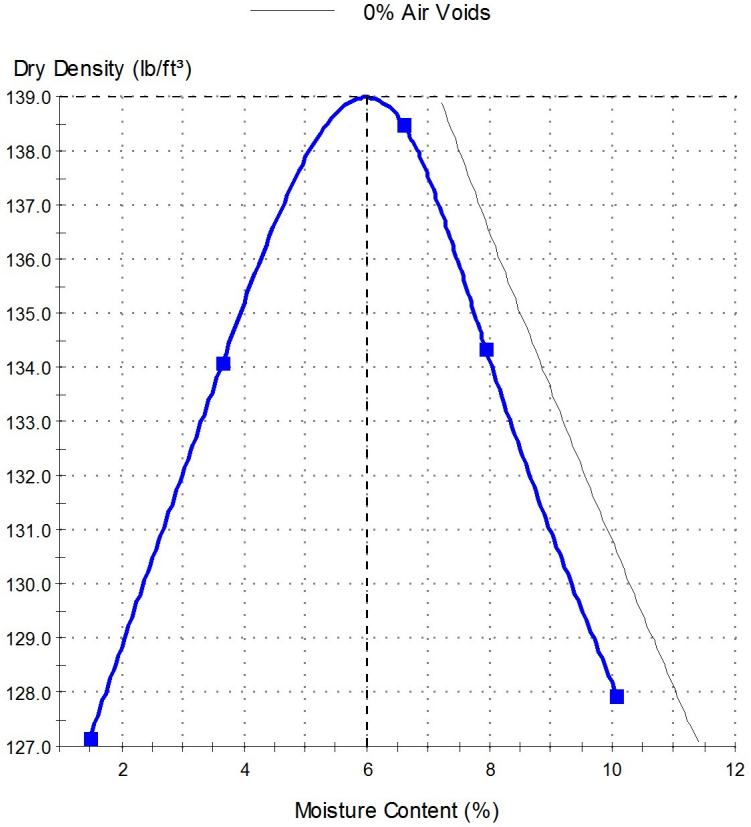
Client: Travis Weiber
KLJ
3203 32nd Ave S., Suite 201
Fargo, ND, 58103
Project: B1500957
New Town Truck Reliever Rte NW
Highway 1804
New Town, ND, 58763
TR: Carey Yoder, cyoder@braunintertec.com

Andrew Lage
Laboratory Coordinator
Date of Issue: 4/28/2017

Sample Details

Sample ID:	W17-000837-S8	**Alternate Sample ID:**	LSS-21; 4'-10'
Date Sampled:	2/10/2017	**Date Submitted:**	4/10/2017
Sampled By:	Drill Crew	**Sampling Method:**	Auger Cuttings
Source:	Onsite Material		
Material:	Clayey Sand with Gravel(SC); A-2-6(0)		
Specification:	For Informational Purpose Only		
Location:	LSS-21; 4'-10'		
Date Tested:	4/14/2017		

Dry Density - Moisture Content Relationship



Test Results

AASHTO T 180 - 01

Maximum Dry Density (lb/ft³):	**139**
Corrected Maximum Dry Density (lb/ft³):	**139**
Optimum Moisture Content (%):	**6**
Corrected Optimum Moisture Content (%):	**6**
Method:	C
Material on 19.0mm Sieve:	Removed
Visual Description:	Clayey Sand with Gravel (SC)

Comments

Assumed Specific Gravity = 2.65
Percent Retained on #4 Sieve = 34%
Percent Passing #200 Sieve = 16%
LL=26, PL=14, PI=12