SUBSURFACE EXPLORATION REPORT
CACHE LA POUDRE MIDDLE SCHOOL – PROPOSED TENNIS COURTS
3515 LARIMER COUNTY ROAD (LCR) 54G
LAPORTE, COLORADO
EEC PROJECT NO. 1232019

Prepared for:

Poudre School District
2445 LaPorte Avenue
Fort Collins, Colorado 80521

Attn: Mr. Brad Aurigemma (baurigem@psdschools.org)
Construction Project Coordinator

Earth Engineering Consultants, LLC
4396 Greenfield Drive
Windsor, Colorado 80550

April 6, 2023

EARTH ENGINEERING CONSULTANTS, LLC

Poudre School District
2445 LaPorte Avenue
Fort Collins, Colorado 80521

Attn: Mr. Brad Aurigemma (baurigem@psdschools.org)
Construction Project Coordinator

Re: Geotechnical Engineering Subsurface Exploration Report
Poudre School District – Cache La Poudre Middle School - Proposed Tennis Courts
3515 Larimer County Road (LCR) 54G
LaPorte, Colorado
EEC Project No. 1232019

Mr. Aurigemma:

Enclosed, herewith, are the results of the geotechnical subsurface exploration completed by Earth Engineering Consultants, LLC personnel for the referenced project. The proposed site is within the southwest portion of the existing Cache La Poudre Middle School campus located at 3515 Larimer County Road (LCR) 54G in La Porte Colorado. For this exploration, a total of five (5) soil borings were drilled at pre-determined locations and were extended to depths of approximately 5 to 10 feet below existing site grades. This exploration was completed in general accordance with our proposal dated January 6, 2023.

In summary, the subsurface soils encountered in the test borings generally consisted of 1 to 2 feet of brown slightly cohesive clayey sand soils which extended to the underlying granular poorly/well graded sand/gravel with various amounts of silt. The clayey sand soils were generally dry, loose to dense and exhibited low swell potential. Poorly to well graded sand/gravel with various amounts of silt were encountered below the slightly cohesive clayey sand soils and extended to the depth explored, approximately 5 to 10 feet below the existing site grades and were generally medium dense to dense. Groundwater was not encountered in any of the completed borings which advanced to maximum depths of approximately 5 to 10 feet below the existing grades.

Based on the encountered subsurface conditions, in our opinion, the proposed tennis courts could be supported on a zone of scarified, moisture conditioned and recompacted native subsoils

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utilizing a post-tensioned-slab (PTS) concept. Recommendations concerning the design and construction of the proposed tennis courts are provided within the attached report.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning the enclosed report, or if we can be of further service to you in any other way, please do not hesitate to contact us.

Very truly yours,
Earth Engineering Consultants, LLC

Ali Khorasani
Project Engineer

Reviewed by:

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PROFESSIONAL ENGINEER

David A. Richer, P.E.
Senior Geotechnical Engineer

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INTRODUCTION

The subsurface exploration for the proposed tennis court planned for construction in a vacant lot within the campus of the Cache La Poudre Middle School located at 3515 County Road (CR) 54G, in LaPorte, Colorado has been completed. For this exploration, five (5) soil borings were advanced within the proposed improvement area to obtain information on existing subsurface conditions. The completed test borings were advanced to depths of approximately 5 to 10 feet below present site grades. Individual boring logs and site diagrams indicating the approximate boring locations are provided with this report. This exploration was completed in general accordance with our proposal dated January 6, 2023.

We understand this project will consist of the design and construction of three (3) proposed tennis within a vacant lot located at the southwest portion of the campus of the Cache La Poudre Middle School as indicated on the enclosed site plan schematics provided to us by a representative with the Poudre School District (PSD) on January 5, 2023. We also understand the proposed tennis courts will be constructed as post-tensioned-slab (PTS) courts. Small grade changes are expected to develop site grades for the proposed improvements.

The purpose of this report is to describe the subsurface conditions encountered in the test borings, analyze and evaluate the field and laboratory test data and provide geotechnical recommendations concerning PTS design criteria for the three (3) proposed tennis courts.

EXPLORATION AND TESTING PROCEDURES

The boring locations were established in the field by representatives from EEC by pacing and estimating angles from identifiable site features as well as with the aid of a hand-held GPS Unit using appropriate Google Earth Coordinates. Those approximate boring locations are indicated on the attached boring location diagram. The locations of the borings should be considered accurate only to the degree implied by the methods used to make the field measurements.

The test borings were completed using a truck mounted, CME 55 drill rig equipped with a hydraulic head employed in drilling and sampling operations. The boreholes were advanced using 4-inch diameter continuous flight augers. Samples of the subsurface materials encountered were obtained using split-barrel and California barrel sampling procedures in general accordance with ASTM Specifications D1586 and D3550, respectively.

In the split-barrel and California barrel sampling procedures, standard sampling spoons are advanced into the ground with a 140-pound hammer falling a distance of 30 inches. The number of blows required to advance the split-barrel and California barrel samplers is recorded and is used to estimate the in-situ relative density of cohesionless soils and, to a lesser degree of accuracy, the consistency of cohesive soils and hardness of weathered bedrock. In the California barrel sampling procedure, relatively intact samples are obtained in removable brass liners. All samples obtained in the field were sealed and returned to our laboratory for further examination, classification, and testing.

Laboratory moisture content tests were completed on each of the recovered samples. Atterberg limits and washed sieve analysis tests were completed on select samples to evaluate the quantity and plasticity of fines in the subgrade samples. Swell/consolidation tests were completed on select samples to evaluate the potential for the subgrade materials to change volume with variation in moisture and load. A water-soluble sulfate test was completed on a select sample to evaluate potential adverse reactions to site-cast concrete. Results of the outlined tests are indicated on the attached boring logs and summary sheets.

As part of the testing program, all samples were examined in the laboratory by an engineer and classified in general accordance with the attached General Notes and the Unified Soil Classification System, based on the soil's texture and plasticity. The estimated group symbol for the Unified Soil Classification System is indicated on the boring logs and a brief description of that classification system is included with this report.

SITE AND SUBSURFACE CONDITIONS

The three (3) proposed tennis courts are planned for construction within a vacant lot located at the southwest portion of Cache La Poudre Middle School campus, west of the existing football field and north of Poudre Trail, in Laporte, Colorado. The court locations are indicated on the attached site diagram. At the time our drilling operations were conducted, the proposed improvement area was

covered with grass sod. The site appeared relatively flat. Site photos taken by EEC personnel at the time of our field exploration are included with this report.

An EEC field engineer was on site during drilling to evaluate the subsurface conditions encountered and direct the drilling activities. Field logs prepared by EEC site personnel were based on visual and tactual observation of disturbed samples and auger cuttings. The final boring logs included with this report may contain modifications to the field logs based on the results of laboratory testing and evaluation. Based on the results of the field borings and laboratory evaluation, subsurface conditions can be generalized as follows.

The topsoil/sod was underlain by 1 to 2 feet of brown slightly cohesive clayey sand soils which extended to the underlying granular poorly/well graded sand/gravel with various amounts of silt. The clayey sand soils were generally dry, loose to dense and exhibited low swell potential. Poorly to well graded sand/gravel with various amounts of silt were encountered below the slightly cohesive clayey sand soils and extended to the depth explored, approximately 5 to 10 feet below the existing site grades and were generally medium dense to dense.

The stratification boundaries indicated on the boring logs represent the approximate locations of changes in soil types; in-situ, the transition of materials may be gradual and indistinct.

GROUNDWATER CONDITIONS

Observations were made while drilling and after completion of the borings to detect the presence and depth of hydrostatic groundwater. Groundwater was not encountered in any of the completed borings which advanced to maximum depths of exploration of approximately 5 to 10 feet below the ground surface. The borings were backfilled upon completion of the drilling operations; therefore, subsequent groundwater measurements were not obtained.

Fluctuations in groundwater levels can occur over time depending on variations in hydrologic conditions, irrigation demands on and/or adjacent to the site and other conditions not apparent at the time of this report. Longer term monitoring of water levels in cased wells, which are sealed from the influence of surface water would be required to more accurately evaluate fluctuations in groundwater levels at the site. We have typically noted deepest groundwater levels in late winter and shallowest groundwater levels in mid to late summer. Zones of perched and/or trapped water can be encountered at times throughout the

year in more permeable zones in the subgrade soils and perched water is commonly observed in subgrade soils immediately above lower permeability bedrock.

ANALYSIS AND RECOMMENDATIONS

Swell – Consolidation Test Results

The swell-consolidation test is performed to evaluate the swell or collapse potential of soils or bedrock to help determine foundation, floor slab, and pavement design criteria. In this test, relatively intact samples obtained directly from the California barrel sampler are placed in a laboratory apparatus and inundated with water under a predetermined load. All inundated samples are monitored for swell and consolidation. The swell-index is the resulting amount of swell or collapse after inundation, expressed as a percent of the sample's initial thickness. After the initial inundation period, additional incremental loads are applied to evaluate the swell pressure and consolidation.

For this assessment, we conducted three (3) swell-consolidation tests on samples recovered from various intervals/depths. The (+) test results indicate the soil materials swell potential characteristics while the (-) test results indicate the soils materials collapse potential characteristics when inundated with water. The following table summarizes the swell-consolidation laboratory test results for samples obtained during our field explorations for the subject site.

Table I – Laboratory Swell-Consolidation Test Results

No of Samples Tested	Pre-Load / Inundation Pressure, PSF	Description of Material	In-Situ Characteristics				Range of Swell – Index Test Results	
			Range of Moisture Contents, %		Range of Dry Densities, PCF			
			Low End, %	High End, %	Low End, PCF	High End, PCF	Low End (+/-) %	High End, (+/-) %
3	150	Lean Clay to Clayey Sand	3.5	8.7	92.6	105.9	(+) 0.7	(+) 1.6

Colorado Association of Geotechnical Engineers (CAGE) uses the following information presented below to provide uniformity in terminology between geotechnical engineers to provide a relative correlation of performance risk to measured swell. "The representative percent swell values are not necessarily measured values; rather, they are a judgment of the swell of the soil and/or bedrock profile likely to influence slab performance." Geotechnical engineers use this information to also evaluate the swell potential risks for foundation performance based on the risk categories.

Table II - Recommended Representative Swell Potential Descriptions and Corresponding Slab Performance Risk Categories

Slab Performance Risk Category	Representative Percent Swell (500 psf Surcharge)	Representative Percent Swell (1000 psf Surcharge)
Low	0 to < 3	0 < 2
Moderate	3 to < 5	2 to < 4
High	5 to < 8	4 to < 6
Very High	> 8	> 6

Based on the laboratory test results, the swell samples analyzed for this project at current moisture contents and dry densities conditions were generally within low range of swell potential.

General Consideration

As evident on the boring logs and swell consolidation test results, the subgrades encountered in the completed borings appear suitable for construction of the proposed tennis courts provided the recommendations described herein are adhered to.

Site Preparation

Prior to placement of any fill and/or improvements, we recommend any existing topsoil, vegetation, any potential tree roots, undocumented fill, and any unsuitable materials be removed from the planned development areas. Care should be taken to remove any previously placed fill material with unknown origin or compaction verification within the proposed building footprints and tennis court locations. Those conditions can best be evaluated in open excavations at the time of construction. Additionally, uniform materials should be used for the support of the proposed tennis courts. All over excavations to remove undocumented fill materials should be extended 8 inches laterally for every 12 inches of over excavation depth. Close evaluation will be required at the time of foundation excavation to determine the suitability/acceptance of the remaining in-place material.

After removal of all topsoil, vegetation, over excavation, and removal of unacceptable or unsuitable subsoils and prior to placement of fill, the exposed soils should be scarified to a depth of 9 inches, adjusted in moisture content to within ±2% of standard Proctor optimum moisture content and compacted to at least 95% of the material's standard Proctor maximum dry density as determined in accordance with ASTM Specification D698.

Fill materials used to replace any over excavated zone, if needed, and to establish grades in the tennis court, after the initial zone has been prepared as recommended above, should consist of an approved low volume change material. In our opinion, soils similar to the site clayey sand or courses sand/gravel with silt soils or imported granular structural fill material could be used. Imported granular materials should be graded similarly to a CDOT Class 5, 6 or 7 aggregate base. Fill materials should be placed in loose lifts not to exceed 9 inches thick, adjusted in moisture content to within ±2% of standard Proctor optimum moisture content and compacted to at least 95% of the material's standard Proctor maximum dry density as determined in accordance with ASTM Specification D698.

Care should be exercised after preparation of the subgrades to avoid disturbing the subgrade materials. Materials which are loosened or disturbed should be reworked prior to placement of foundations/flatwork.

Tennis Courts Subgrade

It is our understanding that the new tennis courts are planned as a post-tensioned concrete slab. It is our understanding the post-tensioned slabs would be designed in accordance with United States Tennis Association (USTA) and American Sports Builders Association (ASBA) guidelines.

Fill soil used to redevelop the supporting subgrade should consist of approved, low-volume change materials which are free from organic matter and debris. In our opinion, the clayey sand soils and coarser sand/gravel with silt soils could be used as fill material. We recommend all fill materials and be placed in loose lifts not to exceed 9 inches thick and adjusted in moisture content, within ±2% of optimum for cohesive soils and within ±3% for cohesionless granular soils and compacted to at least 98% of the material's standard Proctor maximum dry density for the imported structural fill material and 95% for cohesive soils. An aggregate base course, if recommended by the USTA or ASBA, could be used in lieu of the site soils for a portion of fill material immediately beneath the post-tensioned slab.

After placement of any fill material, care should be taken to avoid disturbing those soils. Soils which are loosened or disturbed by the construction activities or materials which become dry and desiccated or wet and softened should be removed and replaced or densified in-place prior to placement of the new post-tensioned slabs.

Post-Tension Slab (PTS) – Sport Courts

For design of the post-tensioned slab-on-grade supported on the over excavated and replaced fill (outlined above in the section "Tennis Courts Subgrade"), we recommend using a net allowable total load soil bearing pressure not to exceed 2,000 psf. The net bearing pressure refers to the pressure at foundation bearing level in excess of the minimum surrounding overburden pressure. Total load should include full dead and live loads.

No unusual problems are anticipated in completing the excavations required for the construction of the post-tensioned slabs. We estimate the long-term settlement of the post-tensioned slabs, supported as outlined above, would be less than ½ inch.

To improve the performance of the post-tensioned slabs, care will be needed in providing drainage away from the tennis courts. We recommend a drain be installed around the perimeter of the tennis and pickleball courts.

In general, a perimeter drain system should consist of perforated metal or plastic pipe, placed around perimeter of the courts and sloped to drain to a sump or daylighted or an outfall where reverse flow cannot occur into the system. The top of the drain line should be installed at an elevation below the bottom of the post-tensioned slab or the bottom of the aggregate base course elevation, which ever results in the greater depth. The drain line should be surrounded by a minimum of 6 inches of appropriately sized granular filter soil. The filter soil or the drain line should be surrounded by a filter fabric to reduce the potential for an influx of fines into the system.

Backfill placed above the perimeter drain should consist of an approved, low-volume-change material which is free from organic matter and debris. Free draining granular fill should be used above the perimeter drain. EEC can provide additional design concepts and/or details upon request.

Tennis Courts – Post Tensioned Slab Recommendations

The new tennis courts are planned as post-tensioned concrete slab-on-grade. The post-tensioned courts would be designed in accordance with the Post-Tensioning Institute, *Design of Post-Tensioned Slabs-on-Ground*, Third Edition (PTI 2004). Recommendations for design of the PTS are provided in Table III. The analysis and recommendations in Table III are based on the site conditions, improvements to

the site, and preparation of the site described in this report. If the site conditions vary, it may be necessary to re-evaluate the recommendations of this report.

Table III - Recommendations for PTS design based on PTI, Design of Post-Tensioned Slabs-on-Ground, 3rd Edition.

PTS Parameters	Center Lift	Edge Lift
Edge Moisture Variation Distance, e_m	9.0 ft	4.3 ft
Differential Soil Movement, y_m	0.31 in	0.76 in
Maximum Allowable Bearing Pressure, q_{all}	2,000 psf	
Recommended minimum slab thickness	5 inches	
Recommended ABC/Gravel beneath PTS	6 inches	

Water Soluble Sulfates (SO_4)

The water-soluble sulfate (SO_4) content of the on-site overburden subsoils, taken during our subsurface exploration at random locations and intervals are provided below. Based on reported sulfate content test results, the Class/severity of sulfate exposure for concrete in contact with the on-site subsoils is provided in this report.

Table IV - Water Soluble Sulfate Test Results

Sample Location	Description	Soluble Sulfate Content %
B-4, S-1 at 1/2’	Clayey Sand (SC)	0.06

Based on the results as presented above, ACI 318, Section 4.2 indicates the site overburden soils have a low risk of sulfate attack on Portland cement concrete. Therefore, Class S0 requirement could be used for concrete on and below site grades within the overburden soils. Foundation concrete should be designed in accordance with the provisions of the ACI Design Manual, Section 318, Chapter 4. These results are being compared to the following table.

TABLE V - Requirements to Protect Against Damage to Concrete by Sulfate Attack from External Sources of Sulfate

Severity of Sulfate exposure	Water-soluble sulfate (SO4) in dry soil, percent	Water-cement ratio, maximum	Cementitious material Requirements
Class 0	0.00 to 0.10%	0.45	Class 0
Class 1	0.11 to 0.20%	0.45	Class 1
Class 2	0.21 to 2.00%	0.45	Class 2
Class 3	2.01 of greater	0.45	Class 3

Other Considerations

Positive drainage should be developed away from the structure and pavement areas with a minimum slope of 1-inch per foot for the first 10 feet away from the improvements in landscape areas. Care should be taken in planning of landscaping (if required) adjacent to the buildings to avoid features which would pond water adjacent to the foundations or stemwalls. Placement of plants which require irrigation systems or could result in fluctuations of the moisture content of the subgrade material should be avoided adjacent to site improvements. Irrigation systems should not be placed within 5 feet of the perimeter of the buildings and parking areas. Spray heads should be designed not to spray water on or immediately adjacent to the structures or site pavements. Roof drains should be designed to discharge at least 5 feet away from the structures and away from the pavement areas.

Excavations into the on-site clayey sand can be expected to stand on relatively steep, temporary slopes during construction, while excavations into the underlying granular soils may experience sloughing/caving. The individual contractor(s) should be made responsible for designing and constructing stable, temporary excavations as required to maintain stability of both the excavation sides and bottom. All excavations should be sloped or shored in the interest of safety following local and federal regulations, including current OSHA excavation and trench safety standards.

GENERAL COMMENTS

The analysis and recommendations presented in this report are based upon the data obtained from the soil borings performed at the indicated locations and from any other information discussed in this report. This report does not reflect any variations which may occur between borings or across the site. The nature and extent of such variations may not become evident until construction. If variations appear evident, it will be necessary to re-evaluate the recommendations of this report.

It is recommended that the geotechnical engineer be retained to review the plans and specifications so that comments can be made regarding the interpretation and implementation of our geotechnical recommendations in the design and specifications. It is further recommended that the geotechnical engineer be retained for testing and observations during earthwork and foundation construction phases to help determine that the design requirements are fulfilled.

This report has been prepared for the exclusive use of Poudre School District for specific application to the project discussed and has been prepared in accordance with generally accepted geotechnical

engineering practices. No warranty, express or implied, is made. In the event that any changes in the nature, design, or location of the project as outlined in this report are planned, the conclusions and recommendations contained in this report shall not be considered valid unless the changes are reviewed and the conclusions of this report are modified or verified in writing by the geotechnical engineer.

DRILLING AND EXPLORATION

DRILLING & SAMPLING SYMBOLS:

SS: Split Spoon - 13/8" I.D., 2" O.D., unless otherwise noted
ST: Thin-Walled Tube - 2" O.D., unless otherwise noted
R: Ring Barrel Sampler - 2.42" I.D., 3" O.D. unless otherwise noted
PA: Power Auger
HA: Hand Auger
DB: Diamond Bit = 4", N, B
AS: Auger Sample
HS: Hollow Stem Auger
PS: Piston Sample
WS: Wash Sample
FT: Fish Tail Bit
RB: Rock Bit
BS: Bulk Sample
PM: Pressure Meter
WB: Wash Bore

Standard "N" Penetration: Blows per foot of a 140 pound hammer falling 30 inches on a 2-inch O.D. split spoon, except where noted.

WATER LEVEL MEASUREMENT SYMBOLS:

WL : Water Level
WCI: Wet Cave in
DCI: Dry Cave in
AB : After Boring
WS : While Sampling
WD : While Drilling
BCR: Before Casing Removal
ACR: After Casting Removal

Water levels indicated on the boring logs are the levels measured in the borings at the time indicated. In pervious soils, the indicated levels may reflect the location of ground water. In low permeability soils, the accurate determination of ground water levels is not possible with only short term observations.

DESCRIPTIVE SOIL CLASSIFICATION

Soil Classification is based on the Unified Soil Classification system and the ASTM Designations D-2488. Coarse Grained Soils have move than 50% of their dry weight retained on a #200 sieve; they are described as: boulders, cobbles, gravel or sand. Fine Grained Soils have less than 50% of their dry weight retained on a #200 sieve; they are described as : clays, if they are plastic, and silts if they are slightly plastic or non-plastic. Major constituents may be added as modifiers and minor constituents may be added according to the relative proportions based on grain size. In addition to gradation, coarse grained soils are defined on the basis of their relative in-place density and fine grained soils on the basis of their consistency. Example: Lean clay with sand, trace gravel, stiff (CL); silty sand, trace gravel, medium dense (SM).

CONSISTENCY OF FINE-GRAINED SOILS

Unconfined Compressive Strength, Qu, psf	Consistency
< 500	Very Soft
500 - 1,000	Soft
1,001 - 2,000	Medium
2,001 - 4,000	Stiff
4,001 - 8,000	Very Stiff
8,001 - 16,000	Very Hard

RELATIVE DENSITY OF COARSE-GRAINED SOILS:

N-Blows/ft	Relative Density
0-3	Very Loose
4-9	Loose
10-29	Medium Dense
30-49	Dense
50-80	Very Dense
80 +	Extremely Dense

PHYSICAL PROPERTIES OF BEDROCK

DEGREE OF WEATHERING:

Slight	Slight decomposition of parent material on joints. May be color change.
Moderate	Some decomposition and color change throughout.
High	Rock highly decomposed, may be extremely broken.

HARDNESS AND DEGREE OF CEMENTATION:

Limestone and Dolomite:

Hard	Difficult to scratch with knife.
Moderately Hard	Can be scratched easily with knife.
Hard	Cannot be scratched with fingernail.
Soft	Can be scratched with fingernail.

Shale, Siltstone and Claystone:

Hard	Can be scratched easily with knife, cannot be scratched with fingernail.
Moderately Hard	Can be scratched with fingernail.
Soft	Can be easily dented but not molded with fingers.

Sandstone and Conglomerate:

Well Cemented	Capable of scratching a knife blade.
Cemented	Can be scratched with knife.
Poorly Cemented	Can be broken apart easily with fingers.

UNIFIED SOIL CLASSIFICATION SYSTEM

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests					Soil Classification: Group Symbol	Soil Classification: Group Name
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	Cu≥4 and 1<Cc≤3[E]		GW	Well-graded gravel [F]
			Cu<4 and/or 1>Cc>3[E]		GP	Poorly-graded gravel [F]
		Gravels with Fines more than 12% fines	Fines classify as ML or MH		GM	Silty gravel [G,H]
			Fines Classify as CL or CH		GC	Clayey Gravel [F,G,H]
	Sands 50% or more coarse fraction passes No. 4 sieve	Clean Sands Less than 5% fines	Cu≥6 and 1<Cc≤3[E]		SW	Well-graded sand [I]
			Cu<6 and/or 1>Cc>3[E]		SP	Poorly-graded sand [I]
		Sands with Fines more than 12% fines	Fines classify as ML or MH		SM	Silty sand [G,H,I]
			Fines classify as CL or CH		SC	Clayey sand [G,H,I]
Fine-Grained Soils 50% or more passes the No. 200 sieve	Silts and Clays Liquid Limit less than 50	inorganic	PI>7 and plots on or above "A" Line		CL	Lean clay [K,L,M]
			PI<4 or plots below "A" Line		ML	Silt [K,L,M]
		organic	Liquid Limit - oven dried / Liquid Limit - not dried	<0.75	OL	Organic clay [K,L,M,N] / 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] / Organic silt [K,L,M,O]
Highly organic soils		Primarily organic matter, dark in color, and organic odor			PT	Peat

[A]Based on the material passing the 3-in. (75-mm) sieve

[B]If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

[C]Gravels with 5 to 12% fines required 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

[D]Sands with 5 to 12% fines require dual symbols:
SW-SM well-graded sand with silt
SW-SC well-graded sand with clay
SP-SM poorly graded sand with silt
SP-SC poorly graded sand with clay

[E]$Cu=D_{60}/D_{10}$ $Cc=\frac{(D_{30})^2}{D_{10} \times D_{60}}$

[F]If soil contains ≥15% sand, add "with sand" to

[G]If fines classify as CL-ML, use dual symbol GC-CM, or SC-SM.

[H]If fines are organic, add "with organic fines" to group name

[I]If soil contains >15% gravel, add "with gravel" to group name

[J]If Atterberg limits plots shaded area, soil is a CL-ML, Silty clay

[K]if soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel", whichever is predominant.

[L]If soil contains ≥ 30% plus No. 200 predominantly sand, add "sandy" to group name.

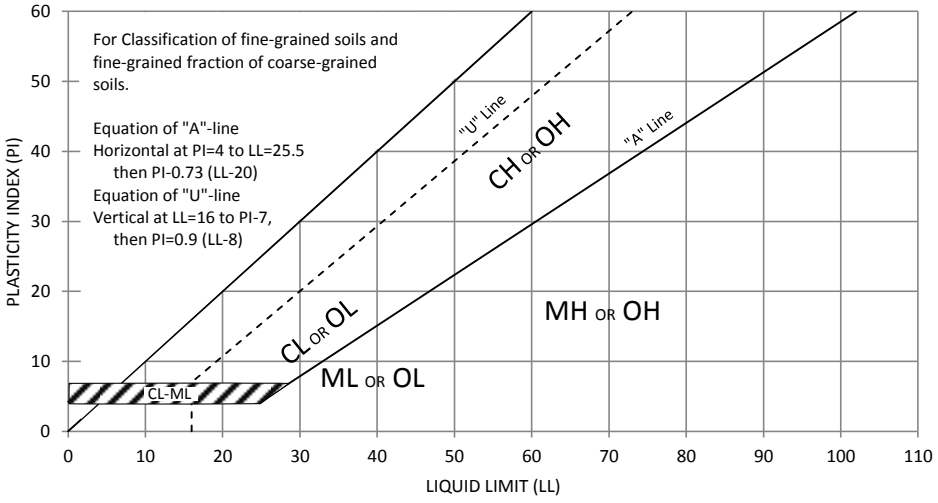
[M]If soil contains ≥30% plus No. 200 predominantly gravel, add "gravelly" to group name.

[N]PI≥4 and plots on or above "A" line.

[O]PI≤4 or plots below "A" line.

[P]PI plots on or above "A" line.

[Q]PI plots below "A" line.



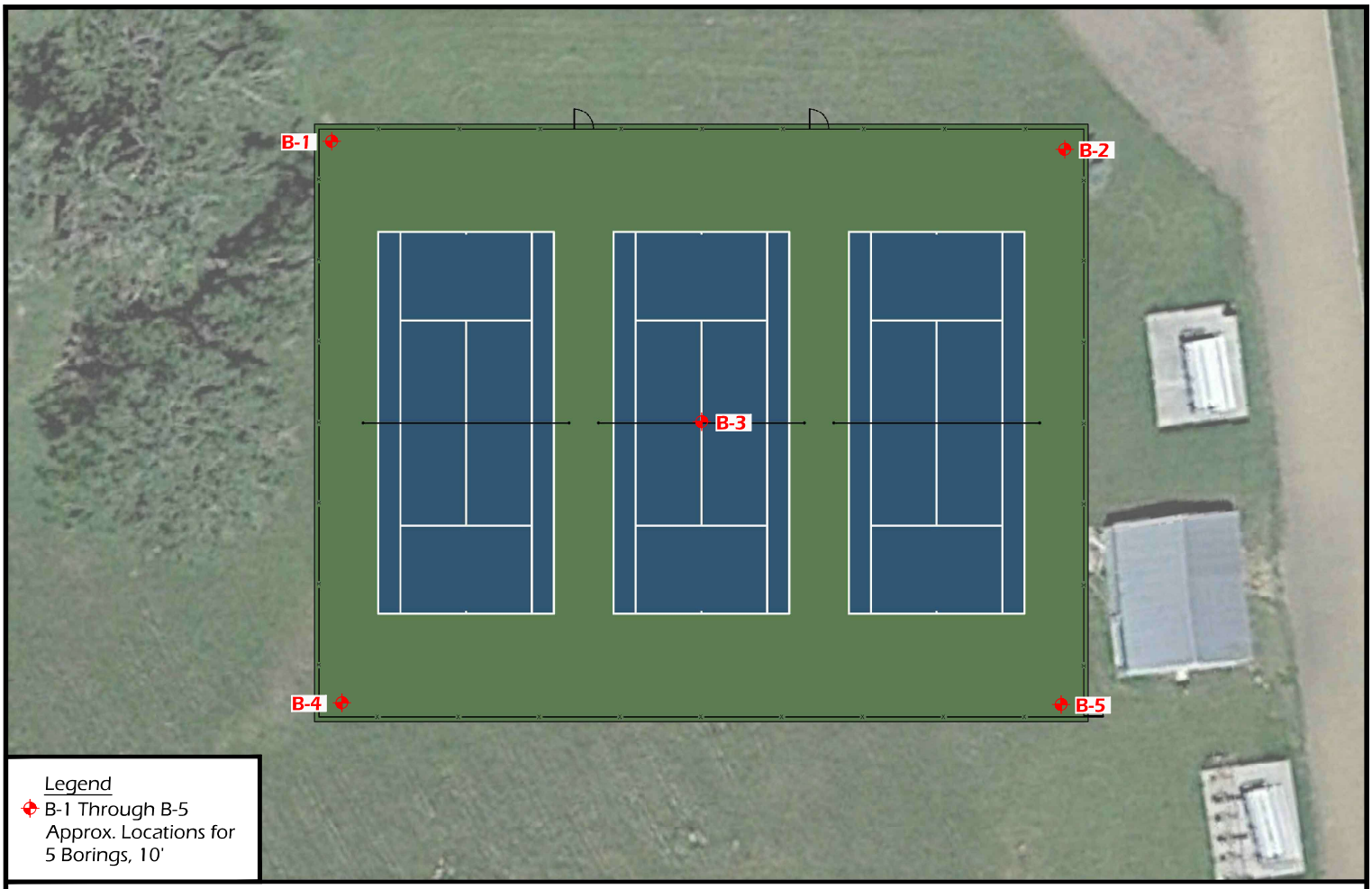


Figure 2: Proposed Boring Location Diagram
Poudre School District - Cache La Poudre Middle School Proposed Tennis Courts
Laporte, Colorado
January 2023

EARTH ENGINEERING CONSULTANTS, LLC

PHOTO # 1

PHOTO # 2

CACHE LA POUDRE SCHOOL – TENNIS COURTS
LA PORTE, COLORADO
EEC PROJECT NO. 1232019
MARCH 2023

CACHE LA POUDRE MIDDLE SCHOOL TENNIS COURTS
LAPORTE, COLORADO

PROJECT NO: 1232019	**LOG OF BORING B-1**	**DATE: APRIL 2023**	
RIG TYPE: CME55	*SHEET 1 OF 1*	**WATER DEPTH**	
FOREMAN: DG	**START DATE 3/16/2023**	**WHILE DRILLING**	**None**
AUGER TYPE: 4" CFA	**FINISH DATE 3/16/2023**	**AFTER DRILLING**	**N/A**
SPT HAMMER: AUTOMATIC	**SURFACE ELEV N/A**	**24 HOUR**	**N/A**

SOIL DESCRIPTION	TYPE	D (FEET)	N (BLOWS/FT)	QU (PSF)	MC (%)	DD (PCF)	A-LIMITS LL	A-LIMITS PI	-200 (%)	SWELL PRESSURE	SWELL % @ 500 PSF
SOD											
CLAYEY SAND (SC)											
SAND WITH SILT AND GRAVEL (SP-SM)											
brown/red/white											
medium debse	CS	3	**16**		**5.3**	**124.6**					
		4									
	SS	**5**	**25**		**2.7**				**9.7**		
		6									
		7									
		8									
BOTTOM OF BORING DEPTH 8'		9									
		10									
		11									
		12									
		13									
		14									
		15									
		16									
		17									
		18									
		19									
		20									
		21									
		22									
		23									
		24									
		25									

CACHE LA POUDRE MIDDLE SCHOOL TENNIS COURTS
LAPORTE, COLORADO

PROJECT NO: 1232019	**LOG OF BORING B-2**	**DATE: APRIL 2023**	
RIG TYPE: CME55	*SHEET 1 OF 1*	**WATER DEPTH**	
FOREMAN: DG	**START DATE** 3/16/2023	**WHILE DRILLING**	**None**
AUGER TYPE: 4" CFA	**FINISH DATE** 3/16/2023	**AFTER DRILLING**	**N/A**
SPT HAMMER: AUTOMATIC	**SURFACE ELEV** N/A	**24 HOUR**	**N/A**

SOIL DESCRIPTION	TYPE	D (FEET)	N (BLOWS/FT)	QU (PSF)	MC (%)	DD (PCF)	A-LIMITS LL	A-LIMITS PI	-200 (%)	SWELL PRESSURE	SWELL % @ 500 PSF
SOD											
CLAYEY SAND (SC)		1									
SAND WITH SILT AND GRAVEL (SW-SM)		2									
brown/red/white											
dense	CS	3	**19**		**7.7**	**117.1**					
		4									
	SS	**5**	**32**		**2.3**				**8.2**		
		6									
		7									
		8									
		9									
			Caved in								
	SS	**10**			**1.2**						
BOTTOM OF BORING DEPTH 10.5'		11									
		12									
		13									
		14									
		15									
		16									
		17									
		18									
		19									
		20									
		21									
		22									
		23									
		24									
		25									

CACHE LA POUDRE MIDDLE SCHOOL TENNIS COURTS
LAPORTE, COLORADO

PROJECT NO: 1232019	**LOG OF BORING B-3**	**DATE: APRIL 2023**	
RIG TYPE: CME55	*SHEET 1 OF 1*	**WATER DEPTH**	
FOREMAN: DG	**START DATE** 3/16/2023	**WHILE DRILLING**	**None**
AUGER TYPE: 4" CFA	**FINISH DATE** 3/16/2023	**AFTER DRILLING**	**N/A**
SPT HAMMER: AUTOMATIC	**SURFACE ELEV** N/A	**24 HOUR**	**N/A**

SOIL DESCRIPTION	TYPE	D (FEET)	N (BLOWS/FT)	QU (PSF)	MC (%)	DD (PCF)	A-LIMITS LL	A-LIMITS PI	-200 (%)	SWELL PRESSURE	SWELL % @ 500 PSF	SWELL % @ 150 PSF
SOD												
CLAYEY SAND (SC)	CS	1	**29**		**3.7**		**42**	**16**	**23.2**	**200 PSF**	**0.7%**	
brown, medium dense		2										
SAND WITH SILT AND GRAVEL (SP-SM)		3										
brown/red/white		4										
medium dense												
	SS	**5**	**21**		**2.4**							
BOTTOM OF BORING DEPTH 5.5'		6										
		7										
		8										
		9										
		10										
		11										
		12										
		13										
		14										
		15										
		16										
		17										
		18										
		19										
		20										
		21										
		22										
		23										
		24										
		25										

CACHE LA POUDRE MIDDLE SCHOOL TENNIS COURTS
LAPORTE, COLORADO

PROJECT NO: 1232019	**LOG OF BORING B-4**	**DATE: APRIL 2023**	
RIG TYPE: CME55	*SHEET 1 OF 1*	**WATER DEPTH**	
FOREMAN: DG	**START DATE** 3/16/2023	**WHILE DRILLING**	**None**
AUGER TYPE: 4" CFA	**FINISH DATE** 3/16/2023	**AFTER DRILLING**	**N/A**
SPT HAMMER: AUTOMATIC	**SURFACE ELEV** N/A	**24 HOUR**	**N/A**

SOIL DESCRIPTION	TYPE	D (FEET)	N (BLOWS/FT)	QU (PSF)	MC (%)	DD (PCF)	A-LIMITS LL	A-LIMITS PI	-200 (%)	SWELL PRESSURE	SWELL % @ 500 PSF	SWELL % @ 150 PSF
SOD												
CLAYEY SAND (SC)	CS	1	**9**		**3.5**	**100.8**				**450 PSF**	**1.3%**	
brown, dry, with organics			**Water-Soluble Sulfate Content = 0.06%**									
loose		2										
		3										
SILTY SAND WITH GRAVEL (SM)												
brown/red/white												
medium dense		4										
	SS	**5**	**16**		**0.5**							
		6										
		7										
		8										
		9										
			Caved in									
	SS	**10**										
		11										
BOTTOM OF BORING DEPTH 10.5'		12										
		13										
		14										
		15										
		16										
		17										
		18										
		19										
		20										
		21										
		22										
		23										
		24										
		25										

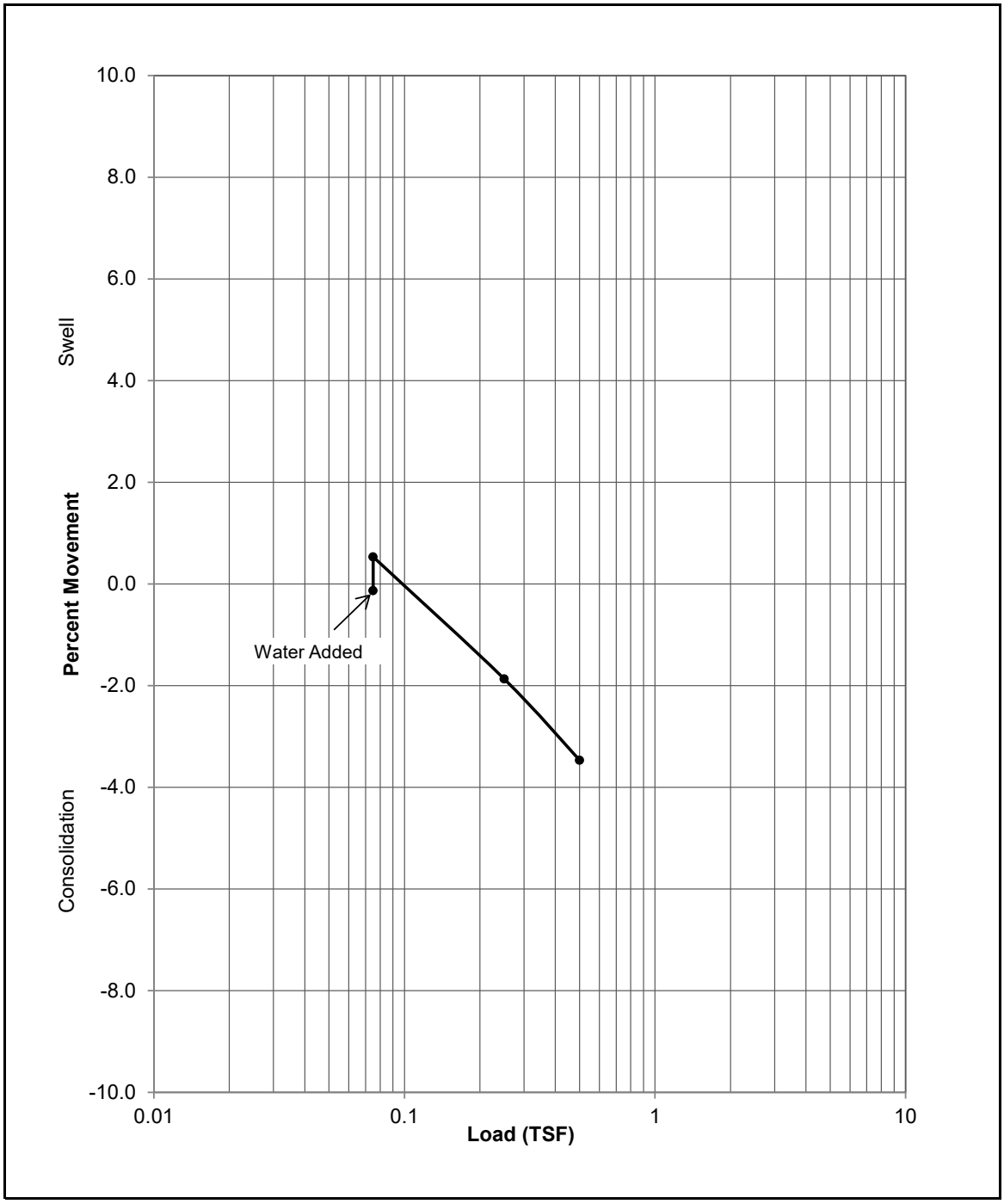
CACHE LA POUDRE MIDDLE SCHOOL TENNIS COURTS
LAPORTE, COLORADO

PROJECT NO: 1232019	**LOG OF BORING B-5**	**DATE: APRIL 2023**	
RIG TYPE: CME55	*SHEET 1 OF 1*	**WATER DEPTH**	
FOREMAN: DG	**START DATE 3/16/2023**	**WHILE DRILLING**	**None**
AUGER TYPE: 4" CFA	**FINISH DATE 3/16/2023**	**AFTER DRILLING**	**N/A**
SPT HAMMER: AUTOMATIC	**SURFACE ELEV N/A**	**24 HOUR**	**N/A**

SOIL DESCRIPTION	TYPE	D (FEET)	N (BLOWS/FT)	QU (PSF)	MC (%)	DD (PCF)	A-LIMITS LL	A-LIMITS PI	-200 (%)	SWELL PRESSURE	SWELL % @ 500 PSF	SWELL % @ 150 PSF
SOD												
CLAYEY SAND (SC)	CS	1	**32**	**6500**	**8.7**	**114.9**				**800 PSF**	**1.6%**	
brown, with organics, dense		2										
GRAVEL WITH SILT AND SAND (GW-GM)		3										
brown/red/white		4										
dense	SS	**5**	**50**									
BOTTOM OF BORING DEPTH 5.5'		6										
		7										
		8										
		9										
		10										
		11										
		12										
		13										
		14										
		15										
		16										
		17										
		18										
		19										
		20										
		21										
		22										
		23										
		24										
		25										

SWELL / CONSOLIDATION TEST RESULTS

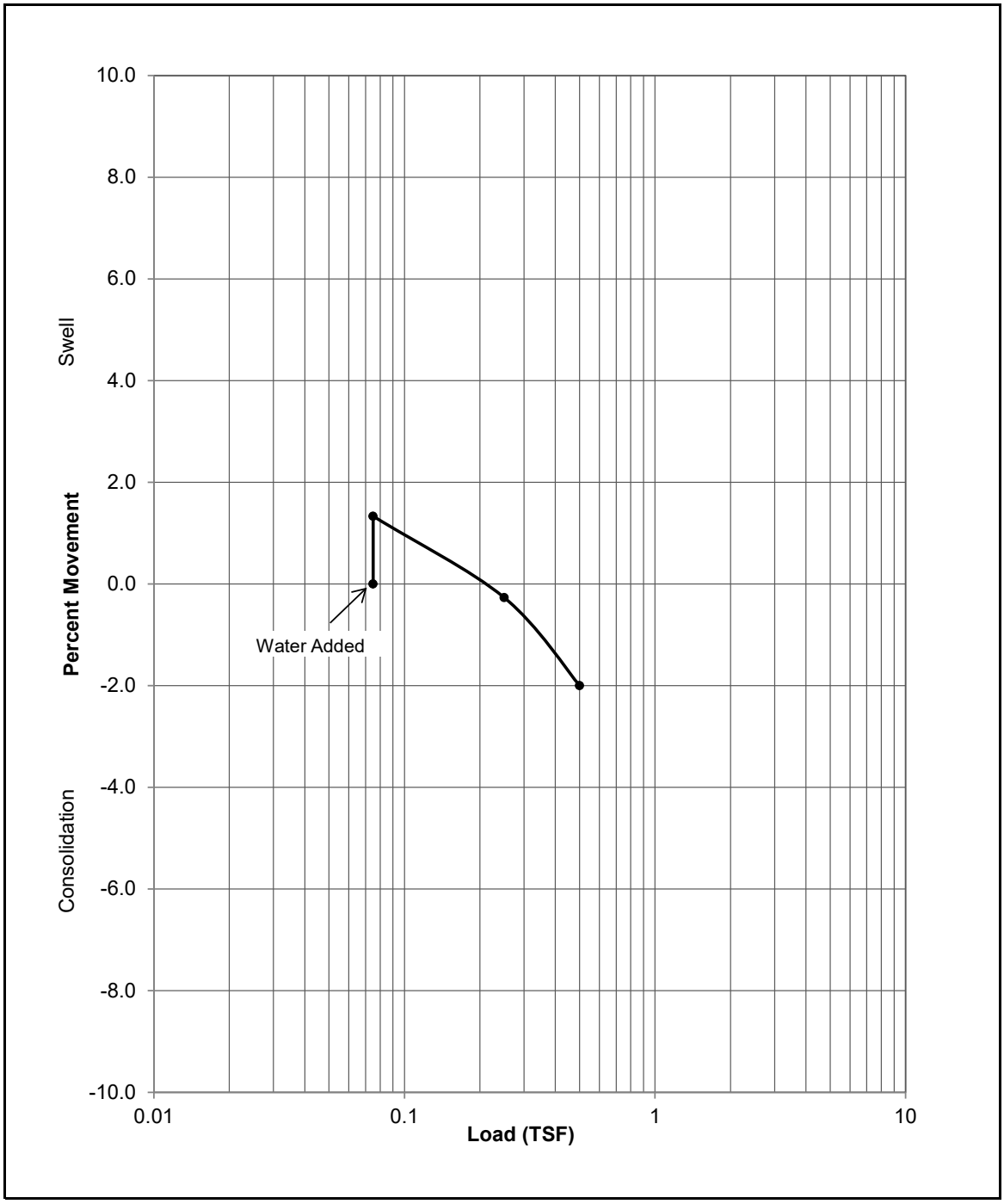
Material Description: Clayey Sand (SC)		
Sample Location: Boring 3, Sample 1, Depth 0.5'		
Liquid Limit: 42	Plasticity Index: 16	% Passing #200: 23.2%
Beginning Moisture: 3.7%	Dry Density: 104.9 pcf	Ending Moisture: 25.5%
Swell Pressure: 200 psf	% Swell @ 150: 0.7%	



Project: Cache la Poudre Middle School Tennis Courts
Location: Laporte, Colorado
Project #: 1232019
Date: April 2023

SWELL / CONSOLIDATION TEST RESULTS

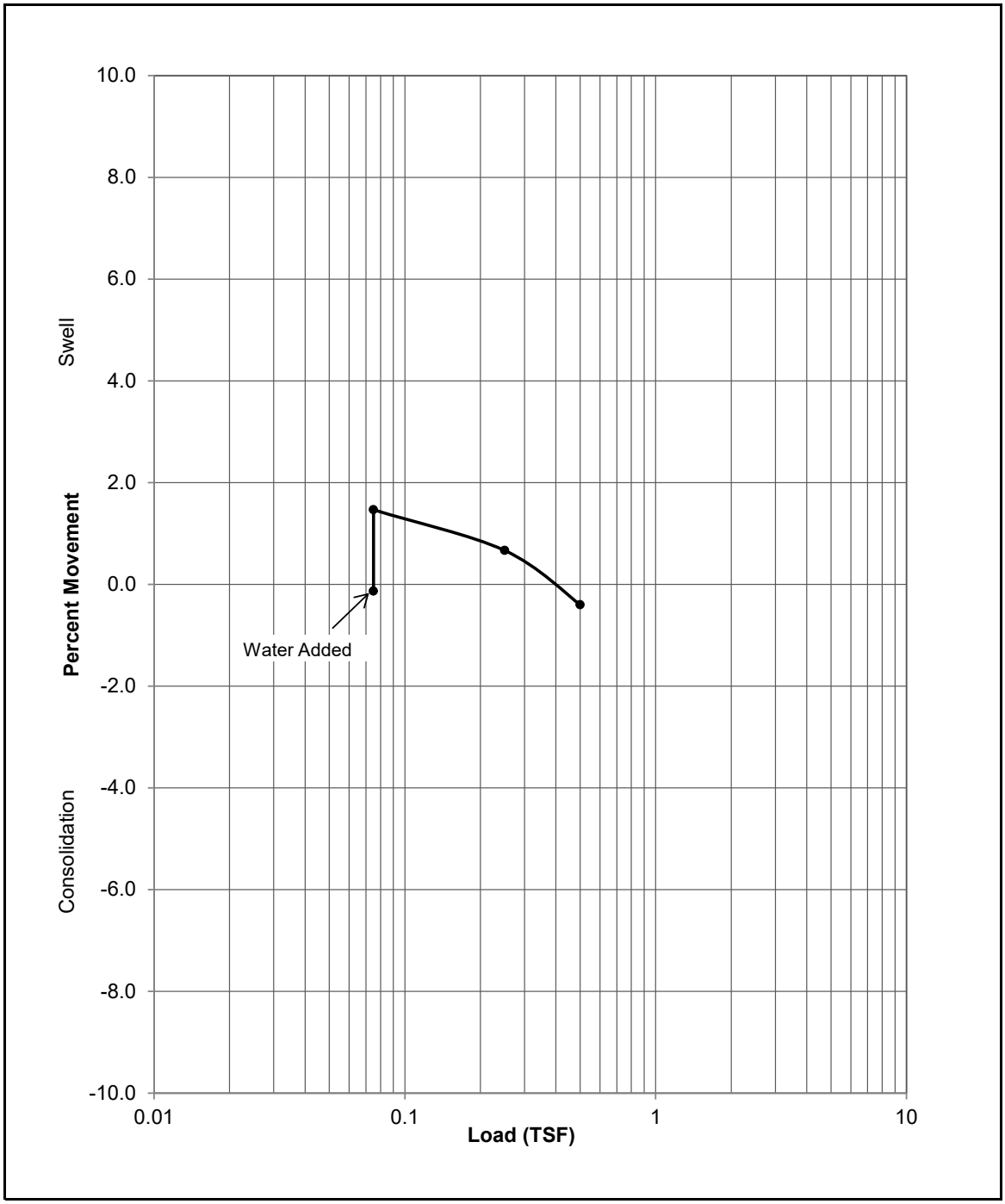
Material Description: Clayey Sand (SC)		
Sample Location: Boring 4, Sample 1, Depth 0.5'		
Liquid Limit: - -	Plasticity Index: - -	% Passing #200: - -
Beginning Moisture: 3.5%	Dry Density: 92.6 pcf	Ending Moisture: 32.9%
Swell Pressure: 450 psf	% Swell @ 150: 1.3%	



Project: Cache la Poudre Middle School Tennis Courts
Location: Laporte, Colorado
Project #: 1232019
Date: April 2023

SWELL / CONSOLIDATION TEST RESULTS

Material Description: Clayey Sand (SC)		
Sample Location: Boring 5, Sample 1, Depth 0.5'		
Liquid Limit: - -	Plasticity Index: - -	% Passing #200: - -
Beginning Moisture: 8.7%	Dry Density: 105.9 pcf	Ending Moisture: 24.2%
Swell Pressure: 800 psf	% Swell @ 150: 1.6%	



Project: Cache la Poudre Middle School Tennis Courts
Location: Laporte, Colorado
Project #: 1232019
Date: April 2023

EARTH ENGINEERING CONSULTANTS, LLC

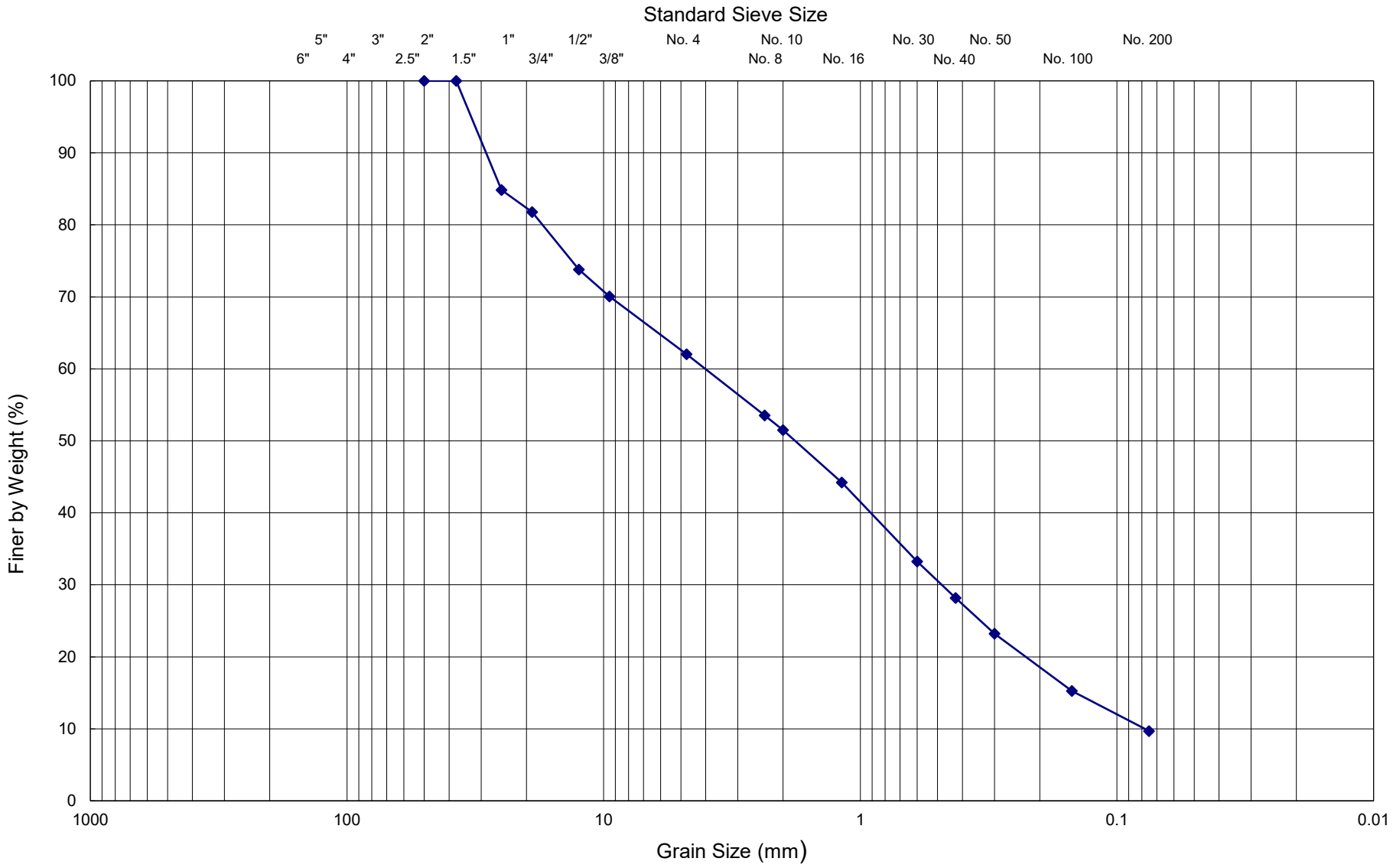
SUMMARY OF LABORATORY TEST RESULTS

Sieve Analysis (AASHTO T 11 & T 27 / ASTM C 117 & C 136)		
Sieve Size		Percent Passing
2 1/2"	(63 mm)	100
2"	(50 mm)	100
1 1/2"	(37.5 mm)	100
1"	(25 mm)	85
3/4"	(19 mm)	82
1/2"	(12.5 mm)	74
3/8"	(9.5 mm)	70
No. 4	(4.75 mm)	62
No. 8	(2.36 mm)	54
No. 10	(2 mm)	51
No. 16	(1.18 mm)	44
No. 30	(0.6 mm)	33
No. 40	(0.425 mm)	28
No. 50	(0.3 mm)	23
No. 100	(0.15 mm)	15
No. 200	(0.075 mm)	9.7

Project: Cache La Poudre Middle School Tennis Courts
Location: LaPorte, Colorado
Project No: 1232019
Sample ID: B1 S2 4
Sample Desc.: Poorly Graded Sand with Silt and Gravel (SP-SM)
Date: April 2023

EARTH ENGINEERING CONSULTANTS, LLC

Summary of Washed Sieve Analysis Tests (ASTM C117 & C136)



Cobble	Gravel		Sand			Silt or Clay
	Coarse	Fine	Coarse	Medium	Fine	

Project: Cache La Poudre Middle School Tennis Courts
Location: LaPorte, Colorado
Project No: 1232019
Sample ID: B1 S2 4
Sample Desc.: Poorly Graded Sand with Silt and Gravel (SP-SM)
Date: April 2023

D_{100}	D_{60}	D_{50}	D_{30}	D_{10}	C_u	C_C
37.50	4.18	1.83	0.49	0.08	52.92	0.72

EARTH ENGINEERING CONSULTANTS, LLC

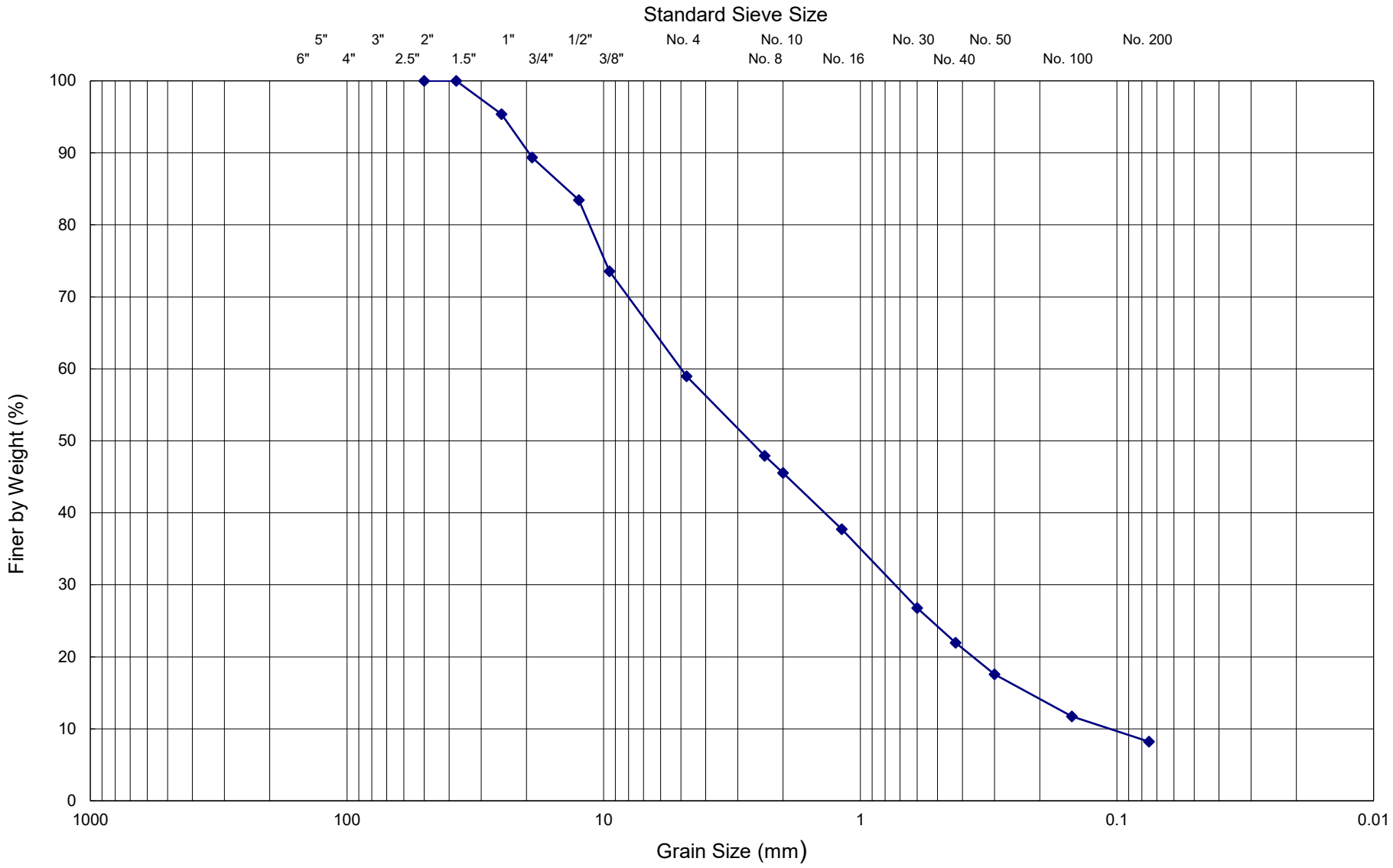
SUMMARY OF LABORATORY TEST RESULTS

Sieve Analysis (AASHTO T 11 & T 27 / ASTM C 117 & C 136)		
Sieve Size		Percent Passing
2 1/2"	(63 mm)	100
2"	(50 mm)	100
1 1/2"	(37.5 mm)	100
1"	(25 mm)	95
3/4"	(19 mm)	89
1/2"	(12.5 mm)	83
3/8"	(9.5 mm)	74
No. 4	(4.75 mm)	59
No. 8	(2.36 mm)	48
No. 10	(2 mm)	46
No. 16	(1.18 mm)	38
No. 30	(0.6 mm)	27
No. 40	(0.425 mm)	22
No. 50	(0.3 mm)	18
No. 100	(0.15 mm)	12
No. 200	(0.075 mm)	8.2

Project: Cache La Poudre Middle School Tennis Courts
Location: LaPorte, Colorado
Project No: 1232019
Sample ID: B2 S2 4
Sample Desc.: Well Graded Sand with Silt and Gravel (SW-SM)
Date: April 2023

EARTH ENGINEERING CONSULTANTS, LLC

Summary of Washed Sieve Analysis Tests (ASTM C117 & C136)



Cobble	Gravel		Sand			Silt or Clay
	Coarse	Fine	Coarse	Medium	Fine	

Project: Cache La Poudre Middle School Tennis Courts
Location: LaPorte, Colorado
Project No: 1232019
Sample ID: B2 S2 4
Sample Desc.: Well Graded Sand with Silt and Gravel (SW-SM)
Date: April 2023

D_{100}	D_{60}	D_{50}	D_{30}	D_{10}	C_u	C_C
37.50	5.08	2.81	0.77	0.11	44.94	1.03

EARTH ENGINEERING CONSULTANTS, LLC

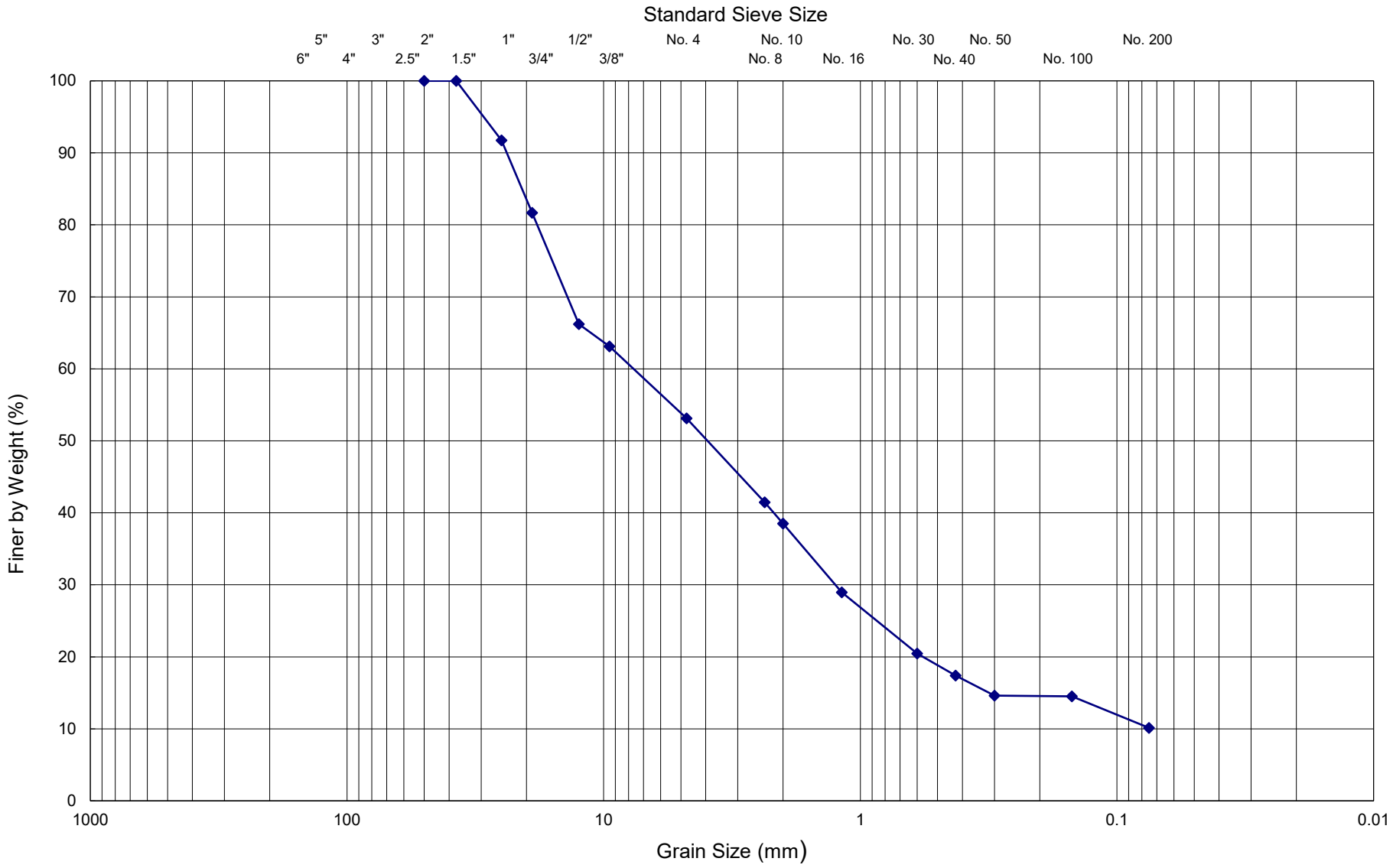
SUMMARY OF LABORATORY TEST RESULTS

Sieve Analysis (AASHTO T 11 & T 27 / ASTM C 117 & C 136)		
Sieve Size		Percent Passing
2 1/2"	(63 mm)	100
2"	(50 mm)	100
1 1/2"	(37.5 mm)	100
1"	(25 mm)	92
3/4"	(19 mm)	82
1/2"	(12.5 mm)	66
3/8"	(9.5 mm)	63
No. 4	(4.75 mm)	53
No. 8	(2.36 mm)	41
No. 10	(2 mm)	38
No. 16	(1.18 mm)	29
No. 30	(0.6 mm)	20
No. 40	(0.425 mm)	17
No. 50	(0.3 mm)	15
No. 100	(0.15 mm)	15
No. 200	(0.075 mm)	10.1

Project: Cache La Poudre Middle School Tennis Courts
Location: LaPorte, Colorado
Project No: 1232019
Sample ID: B4 S2 4
Sample Desc.: Silty Sand with Gravel (SM)
Date: April 2023

EARTH ENGINEERING CONSULTANTS, LLC

Summary of Washed Sieve Analysis Tests (ASTM C117 & C136)



Cobble	Gravel		Sand			Silt or Clay
	Coarse	Fine	Coarse	Medium	Fine	

Project: Cache La Poudre Middle School Tennis Courts
Location: LaPorte, Colorado
Project No: 1232019
Sample ID: B4 S2 4
Sample Desc.: Silty Sand with Gravel (SM)
Date: April 2023

D_{100}	D_{60}	D_{50}	D_{30}	D_{10}	C_u	C_C
37.50	8.02	4.11	1.27	---	---	---

EARTH ENGINEERING CONSULTANTS, LLC

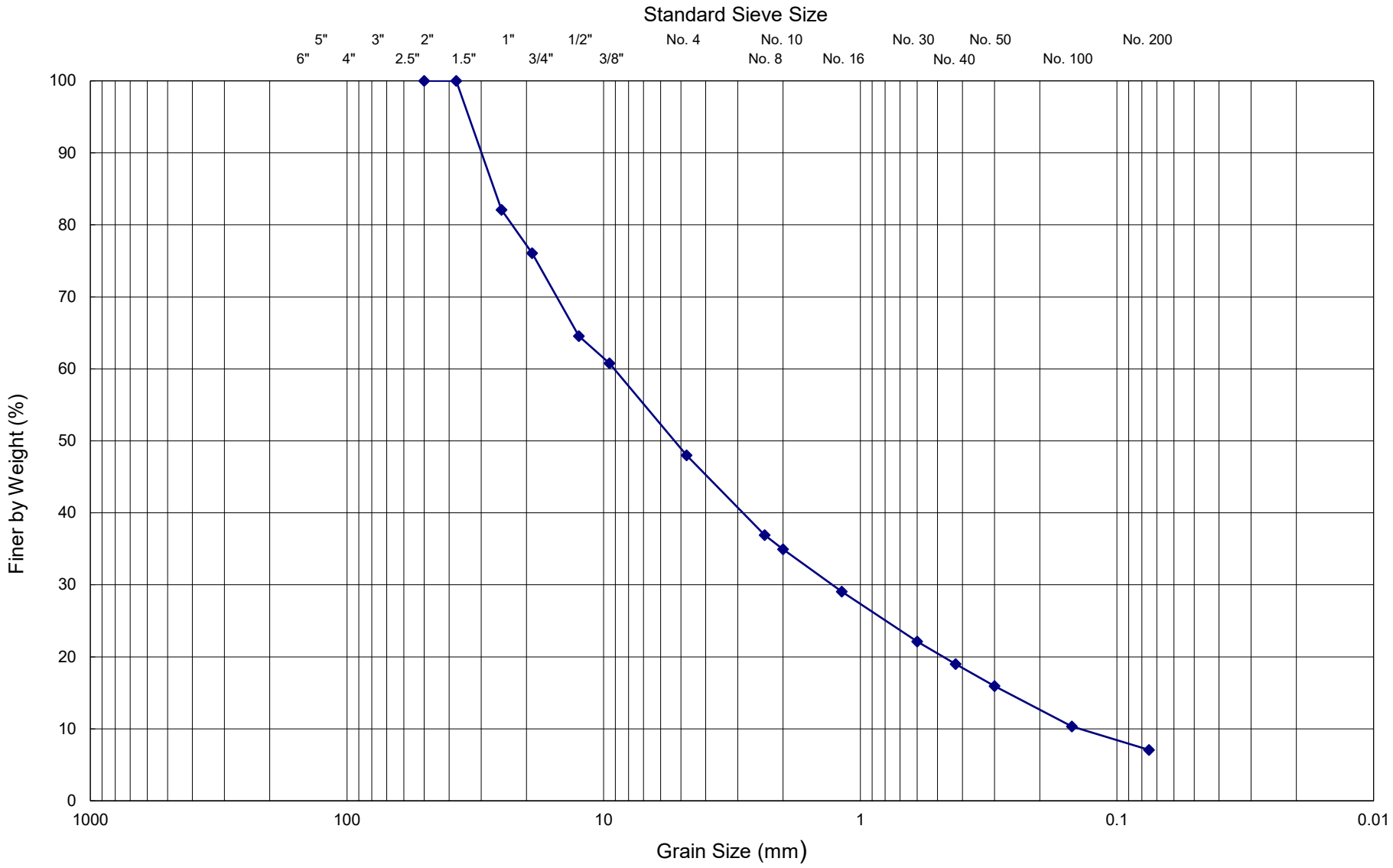
SUMMARY OF LABORATORY TEST RESULTS

Sieve Analysis (AASHTO T 11 & T 27 / ASTM C 117 & C 136)		
Sieve Size		Percent Passing
2 1/2"	(63 mm)	100
2"	(50 mm)	100
1 1/2"	(37.5 mm)	100
1"	(25 mm)	82
3/4"	(19 mm)	76
1/2"	(12.5 mm)	65
3/8"	(9.5 mm)	61
No. 4	(4.75 mm)	48
No. 8	(2.36 mm)	37
No. 10	(2 mm)	35
No. 16	(1.18 mm)	29
No. 30	(0.6 mm)	22
No. 40	(0.425 mm)	19
No. 50	(0.3 mm)	16
No. 100	(0.15 mm)	10
No. 200	(0.075 mm)	7.1

Project: Cache La Poudre Middle School Tennis Courts
Location: LaPorte, Colorado
Project No: 1232019
Sample ID: B5 S2 9
Sample Desc.: Well Graded Gravel with Silt and Sand (GW-GM)
Date: April 2023

EARTH ENGINEERING CONSULTANTS, LLC

Summary of Washed Sieve Analysis Tests (ASTM C117 & C136)



Cobble	Gravel		Sand			Silt or Clay
	Coarse	Fine	Coarse	Medium	Fine	

Project: Cache La Poudre Middle School Tennis Courts
Location: LaPorte, Colorado
Project No: 1232019
Sample ID: B5 S2 9
Sample Desc.: Well Graded Gravel with Silt and Sand (GW-GM)
Date: April 2023

D_{100}	D_{60}	D_{50}	D_{30}	D_{10}	C_u	C_C
37.50	9.21	5.50	1.31	0.14	64.71	1.31