November 18, 2020

La Plata Communities
1755 Telstar Drive, Suite 211
Colorado Springs, Colorado

Attention: Steve Rossoll, P.E.

Subject: Supplemental Geologic Hazards Evaluation and
Preliminary Geotechnical Investigation
The Ranch aka Silver Cross Ranch
Northeast of Link Road and Squirrel Creek Road
El Paso County, Colorado
Project No. CS19053.001-115 L1

The Ranch aka Silver Cross Ranch is located southeast of the intersection of Link Road and Squirrel Creek Road in Fountain, Colorado. The site consists of 400 acres of vacant ranch land with various ranch out buildings. The ranch house was recently removed from the property. We conducted a geological hazards evaluation and preliminary geotechnical investigation in April 2019 for this site (Project No. CS19053.001-115).

Our 2019 investigation included the drilling of 11 widely spaced borings. A supplemental investigation was requested to include drilling additional thirty-two (32) exploratory borings to better evaluate subsurface conditions at the site. The supplemental investigation identified subsurface soils, groundwater, and bedrock present at the site and their potential impact to future site grading and development of the property. Furthermore, our investigation evaluated the properties of the subsurface soils and bedrock and their impact to future construction. This letter was prepared as an update to the previous geological hazard evaluation, as requested by the city of Fountain, Colorado.

The letter summarizes the conditions found in our recent exploratory borings and summarizes our conclusions regarding geological hazards and supplemental preliminary geotechnical investigation. We believe the work was completed in accordance with the scope outlined in our service agreement dated February 14, 2020 (Proposal No. CS-19-0014_CM2 and CM3).

PREVIOUS INVESTIGATIONS

We completed a Geological Hazards Evaluation and Preliminary Geotechnical Investigations for the site, CTL Thompson Project No. CS19053.001-115, dated April 1, 2019. The report was prepared for 318 acres of vacant land. The report was prepared based on eleven very widely spaced exploratory borings. One boring encountered bedrock at a depth of 30 feet. At the time of the field investigation, the scope excluded the east 1,000 plus feet of the site. The report has been previously submitted and is attached in Appendix C of this letter.

SUBSURFACE CONDITIONS

Subsurface conditions were previously investigated by drilling eleven (11) more widely spaced borings. Locations of the previous borings are presented in Fig. 1 with logs presented in Appendix A. This supplemental investigation included drilling thirty-two (32), more closely spaced borings. Select samples of the subsurface soils and bedrock obtained were subjected to laboratory testing to identify the properties of the subsurface soils and bedrock and their potential impact to development and construction at the site. The additional borings were located and spaced on a center to center spacing of about 600 to 800 feet. In addition, we located borings at obvious high and low points across the site to help identify the impact of bedrock and groundwater to the future site grading. The subsurface conditions identified during our field investigation and laboratory test are discussed in this letter.

The near-surface soils encountered in our exploratory borings generally consisted of sand, clay, and clay fill materials. The soils extended to the maximum depths explored of 45 feet in twenty-three of the borings. Claystone and shale bedrock were encountered in nine of the thirty-two additional borings drilled to depths of between 35 and 45 feet. Groundwater was encountered in thirteen of the thirty-two borings drilled. The following sections discuss the conditions encountered in more detail.

Fill

Fill encountered in one area at the site located near the ranch house and outbuildings near the southwest corner of the property during our previous investigation. No new fill was found during this current evaluation. The fill consisted of sandy clay and was judged to be stiff based on field penetration testing results. The fill was encountered at the ground surface and extended to a depth of 5 feet in TH-1. Based on our experience, we believe the sandy clay fill will be non-expansive or possess low swell potential. Records regarding the placement of the fill are not available for review.

Natural Soils

The natural soils encountered at the site consist of clayey sand with interbedded clay and sandy clay with interbedded sand. The soils encountered classify as slightly sandy to very sandy clay or slightly silty to very silty or clayey to very clayey sand. The natural soils found in the recent borings are similar to those previously found.

Granular soils were encountered at the ground surface or underlying naturally occurring clay materials at depths ranging from 6 to 22 feet and extending to depths of about up to 45 feet. The granular soils are generally judged to be loose to very dense and the clay soils are generally judged to be medium stiff to very stiff based on field penetration resistance testing. Sixty samples of the granular materials were subjected to sieve analysis and contained between 8 and 49 percent silt and clay sized particles (passing the No. 200 sieve). Thirty-five samples were subjected to Atterberg limits testing. Plasticity indices ranged from 2 to 19 and liquid limits ranged from 21 to 37. Eight samples exhibit non-plastic properties. Eighteen samples of the clayey sand subjected to swell/consolidation testing exhibited swells of up to 2.5 percent or did not swell when wetted under approximate overburden pressures.

Thirty-eight samples of the clay soils were subjected to sieve analysis and contained 50 to 92 percent silt and clay sized particles. Thirty-one samples were subjected to Atterberg limits testing. Plasticity indices ranged from 9 to 33 and liquid limits ranged from 25 to 54. Thirteen samples obtained from the site were subjected to swell consolidation testing in our laboratory when wetted under estimated overburden pressures. Six samples exhibited swell values of between 0.2 to 4.4 percent and seven samples of the clay did not exhibit swell when wetted.

Bedrock

Claystone bedrock was encountered in eight of the thirty-two new borings at depths between 17 and 37 feet and extended to the maximum depths drilled of 40 feet. The claystone was similar to previously found. The claystone bedrock was judged to be medium hard to very hard and classified as slightly sandy to sandy claystone. The upper 3 to 4 feet of the bedrock surface was judged to be weathered in two of the borings. A total of six samples of the bedrock were subjected to laboratory testing. Three samples exhibited swell values of between 0.1 to 1.1 percent. Six samples contained between 79 and 99 percent fines. Four samples were subjected to Atterberg limits testing and exhibited plasticity indices of between 20 and 32 and liquid limits between 37 and 56.

Shale was encountered in three of the thirty-two borings drilled. The shale was encountered underlying the claystone bedrock at depths between 31 and 42 feet and extended to the maximum depths explored of 45 feet. The shale was judged to be very hard and fissile. Based on experience, we anticipate the shale to exhibit slight expiative properties or be non-expansive.

Groundwater

At the time of drilling, groundwater was encountered in twelve of the thirty-two borings. The groundwater was measured at depths between 12 and 38 feet below the existing ground surface. Our holes were drilled during the late winter to early spring season when groundwater levels tend to be nearing their seasonal lows. Water levels should be expected to fluctuate in response to altered surface drainage patterns, seasonal precipitation, and irrigation of landscaping commonly associated with residential development.

SITE GEOLOGY, GEOLOGIC HAZARDS, AND ENGINEERING CONSTRAINTS

We prepared a Geologic Hazards Evaluation and Preliminary Geotechnical Investigation report mentioned in the Previous Investigation section of this letter. Based on our review of the April 1, 2019 report and the additional thirty-two borings drilled at the site, our opinions and conclusions for site geology, geologic hazards, and engineering constraints present at the site remain unchanged with the exception of the west boundary of Kp (Pierre Shale). Our revised limit is presented on Fig. 2. Site geology, geological hazards, and engineering constraints not discussed in this letter are discussed in the previously published report.

SITE DEVELOPMENT CONSIDERATIONS

Following the completion of our drilling of thirty-two (32) additional borings across the site, we believe the recommendations presented in our previously provided report remain valid. Proposed site grading plans have not been developed at the time of this investigation. When plans become available, we should be provided the opportunity to review the grading plans to evaluate the potential impacts of subsurface conditions to the proposed site grading. We do not anticipate bedrock and groundwater to significantly impact the development of the site when proposed site grading does not include deep cuts of more than 20 feet overall. Site grading will likely include cutting of the higher elevations (hills) and filling of lower lying elevations (valleys) to establish a more consistent, comparatively flat and level ground surface across the site. We measured groundwater at a depth of 12 feet in the southwestern portion of the site. Comparatively shallow groundwater in this area may impact proposed site grading to include cuts that exceed more than 10 feet below the existing grades. Basement construction may be impacted in this portion of the site. Site development considerations not discussed in this letter are discussed in our previously published report.

LIMITATIONS

This letter was prepared as a supplemental letter to the previously prepared report. The recommendations and conclusions presented in this letter were prepared based on conditions disclosed by our exploratory borings, geologic reconnaissance, engineering analysis, and our experience. Variations in the subsurface conditions not indicated by the borings are possible and should be expected.

We believe this level of investigation was conducted with that level of skill and care normally used by geotechnical engineers practicing under similar conditions. No warranty, express or implied, is made.

If we can be of further service in discussing the contents of this letter or in the analysis of the influence of the subsurface conditions on the design of the project, please call.

Very truly yours,

CTL | THOMPSON, INC.

Patrick Foley, EIT
Staff Engineer

Reviewed by:

William C. Hoffmann, Jr., P.E.
Senior Engineering Consultant

David A. Glater
Principal Geological Engineer

PF:WCH:DAG:cw
Via email: SRossoll@laplatallc.com

Edited 8/1/17

COLORADO SPRINGS
OLYMPIC CITY USA

Geologic Hazard Study Report

Applicant:	La Plata Communities, LLC	Telephone:	719-867-2256
Address:	9540 Federal Drive	Email:	chumphrey@laplatallc.com
City/State:	Colorado Springs, Colorado 80921	Fax:	
Zip Code:	80921		

The following documents have been included and considered as part of this report (checked off by individual(s) preparing the geologic report):

- [x] Development Plan
- [ ] Landscape Plan (if applicable)
- [ ] Grading Plan
- [ ] Drainage Report (necessary if debris and/or mud flow hazard is present)

ENGINEER'S STATEMENT

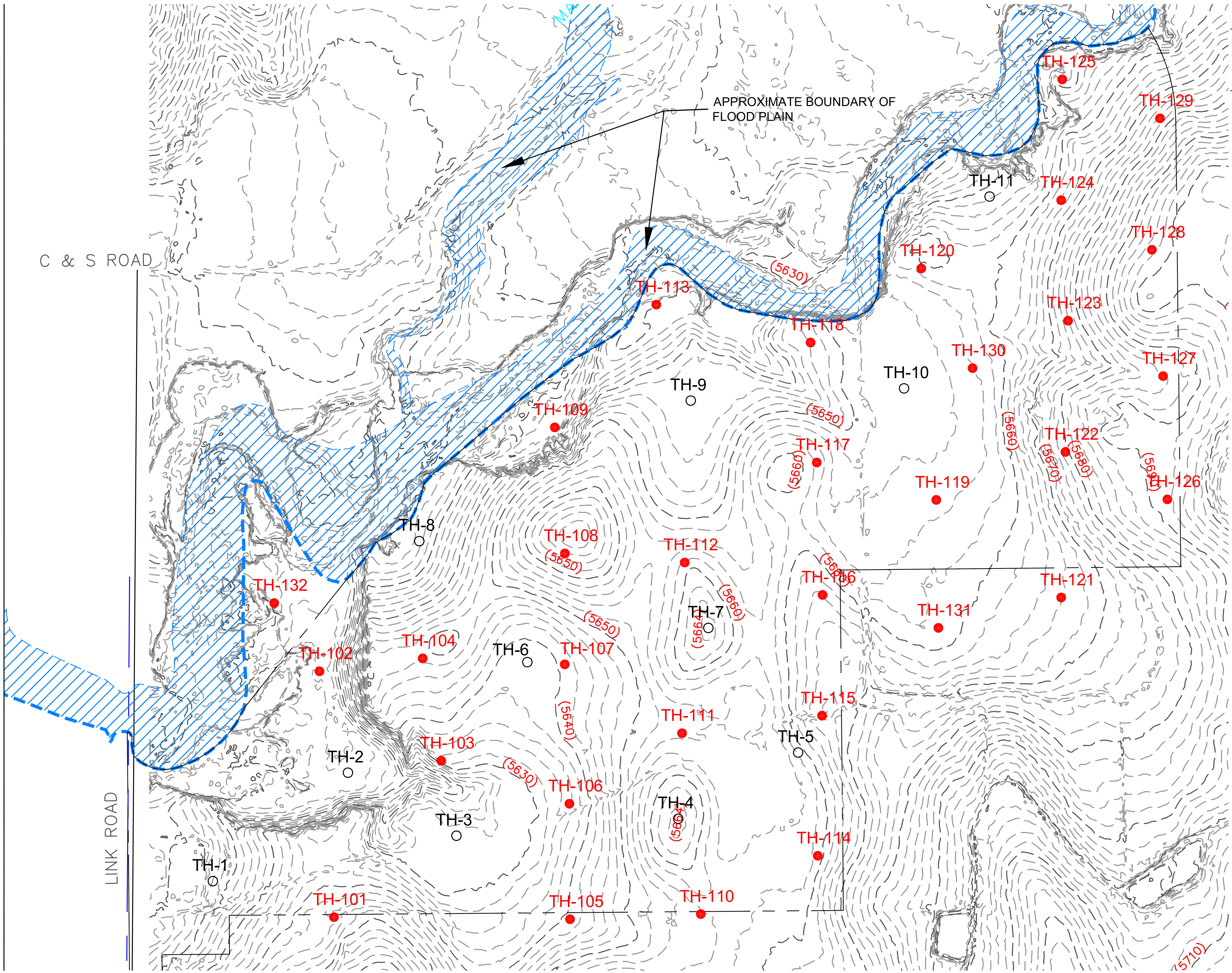
I hereby attest that I am qualified to prepare a Geologic Hazard Study in accordance with the provisions of Section 504 of the Geologic Hazards Ordinance of Colorado Springs. I am qualified as:

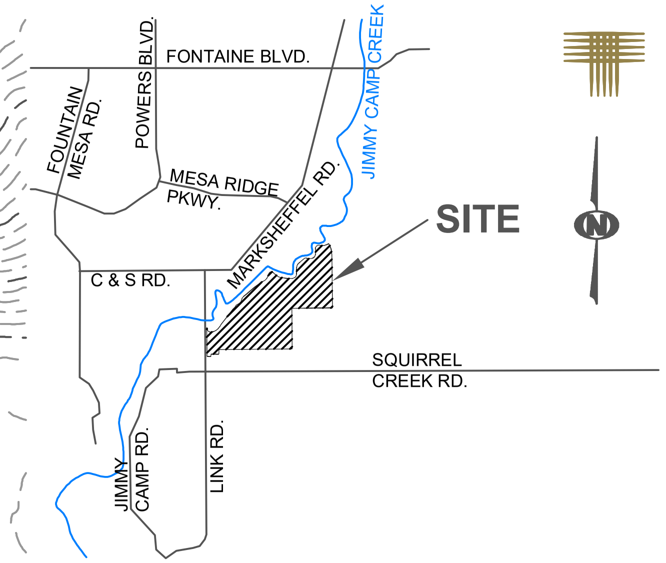
- [ ] A Professional Geologist as defined by CRS 34-1-201(3); or,
- [x] A Professional Engineer as defined by Board Policy Statement 50.2 - "Engineers in Natural Hazard Areas" of the Colorado State Board of Registration for Professional Engineers and Professional Land Surveyors. Board authority as defined by CRS 12-25-107(1).

Submitted by: CTL|Thompson, Inc. (Willaim C. Hoffmann, Jr.) Date: May 11, 2022

This Geologic Hazard Study is filed in accordance with the Zoning Code of Colorado Springs, 2001, as amended.

City Engineer **Date** **Planning & Development Manager** **Date**





VICINITY MAP

(NOT TO SCALE)

LEGEND:

TH-101 ●	APPROXIMATE LOCATION OF EXPLORATORY BORING DRILLED FOR THIS REPORT.
TH-1 ○	APPROXIMATE LOCATION OF EXPLORATORY BORING DRILLED UNDER CTL|T PROJECT NO. CS19053.000-115, DATED APRIL 1, 2019.
(contour lines)	EXISTING TOPOGRAPHY
— — — —	PROJECT BOUNDARY

NOTE:
BASE DRAWING WAS PROVIDED BY CLASSIC CONSULTING (PROJECT NO. 2550.00, DATED FEBRUARY 19, 2019).

0 300' 600'
SCALE: 1" = 600'

Location of Exploratory Borings

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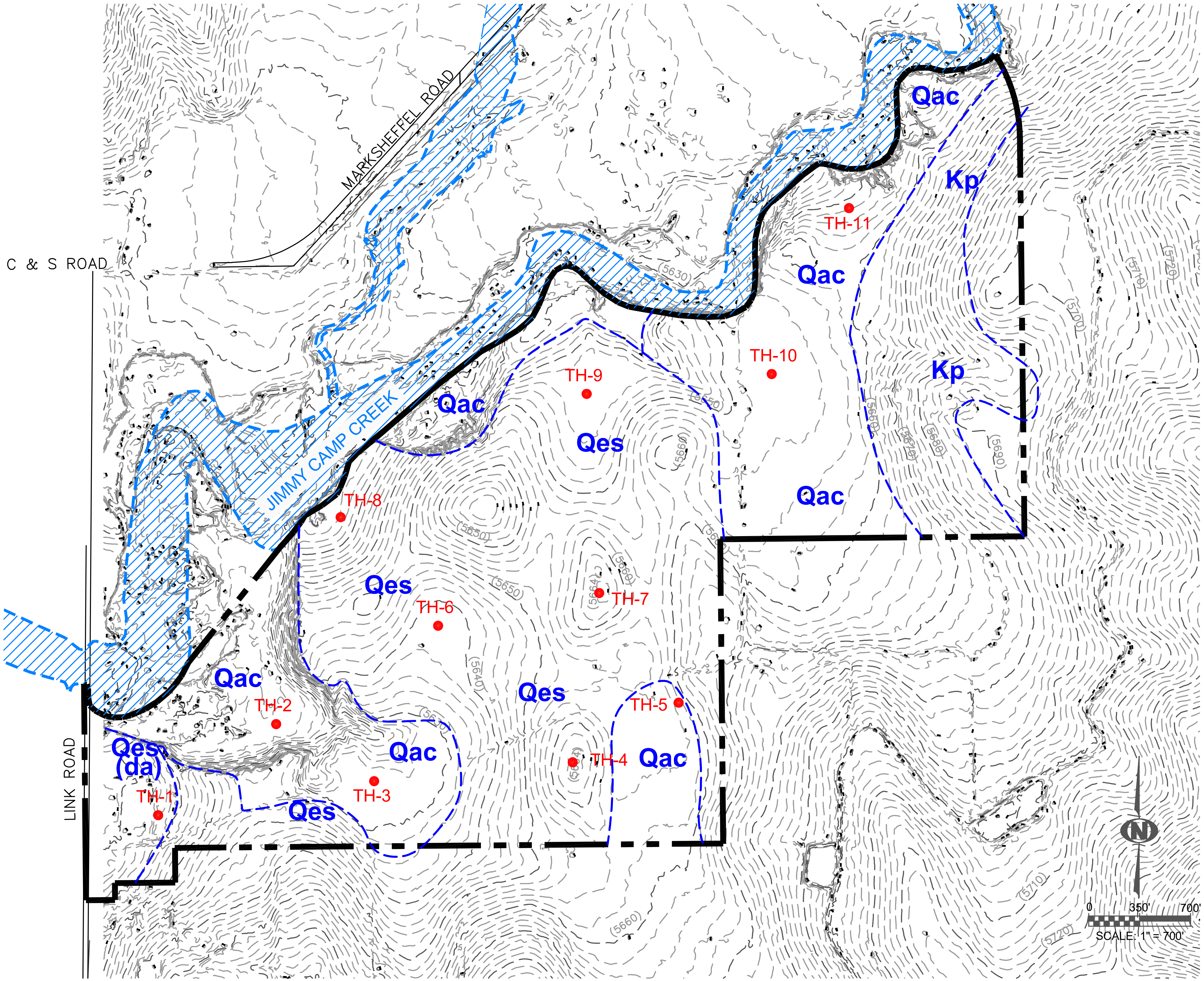
CTL|T PROJECT NO. CS19053.001

FIG. 1



LEGEND:

TH-1 ●	APPROXIMATE LOCATION OF EXPLORATORY BORING.
▬ ▬ ▬	PROJECT BOUNDARY
≈≈	EXISTING TOPOGRAPHY

GEOLOGIC UNITS AND (MODIFIERS)

‒ ‒ ‒	SURFICIAL GEOLOGIC CONTACTS
(da)	DISTURBED AREA.
Qac	ALLUVIUM (CLAYEY AND SILTY SAND, AND SANDY, CLAY) DEPOSITED IN PRESENT STREAM VALLEYS AND SLOPE WASH COLLUVIUM. HOLOCENE AGE.
Qes	FINE TO COARSE GRAINED SAND AND CLAY DEPOSITED BY WIND. EARLY HOLOCENE.
Kp	PIERRE SHALE. GRAY, BLACK AND OLIVE COLORED, SILICEOUS CLAYSTONE OVER FISSILE SHALE. LATE CRETACEOUS.

NOTES:

1. BASE DRAWING WAS PROVIDED BY CLASSIC CONSULTING (PROJECT NO. 2550.00, DATED FEBRUARY 19, 2019).
2. ALL BOUNDARIES SHOWN SHOULD BE CONSIDERED APPROXIMATE. THEY ARE BASED UPON A SUBJECTIVE INTERPRETATION OF PUBLISHED MAPS, AERIAL PHOTOGRAPHS AND A BRIEF FIELD RECONNAISSANCE. CHANGES IN THE MAPPED BOUNDARIES SHOWN ARE POSSIBLE AND SHOULD BE EXPECTED WITH MORE DETAILED WORK AND FURTHER INFORMATION. ALL INTERPRETATIONS AND CONDITIONS SHOWN ARE PRELIMINARY AND FOR LAND-USE PLANNING ONLY.

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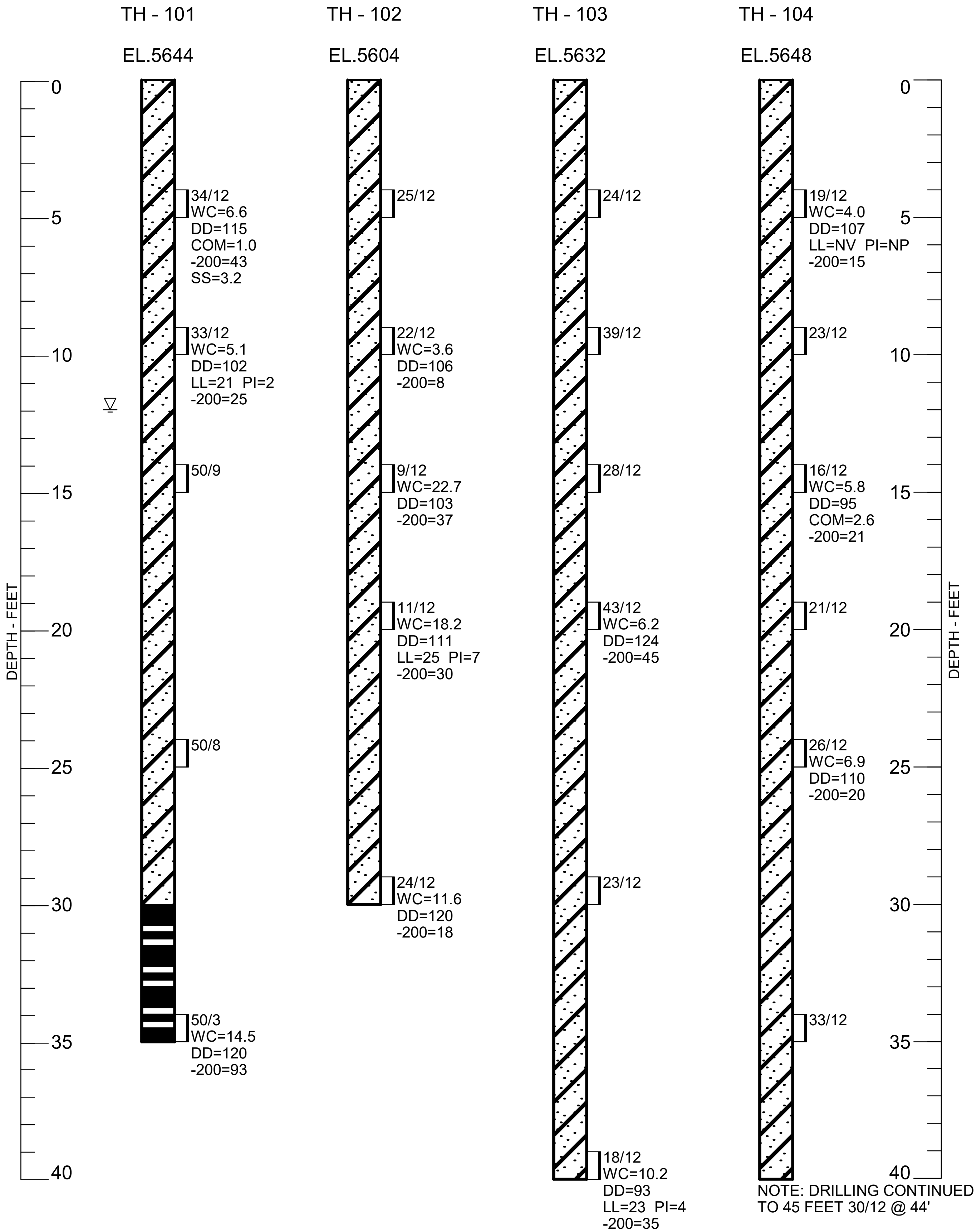
Surficial Geologic Conditions

FIG. 2

APPENDIX A

LOGS OF EXPLORATORY BORINGS



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THE RANCH AKA SILVER CROSS RANCH
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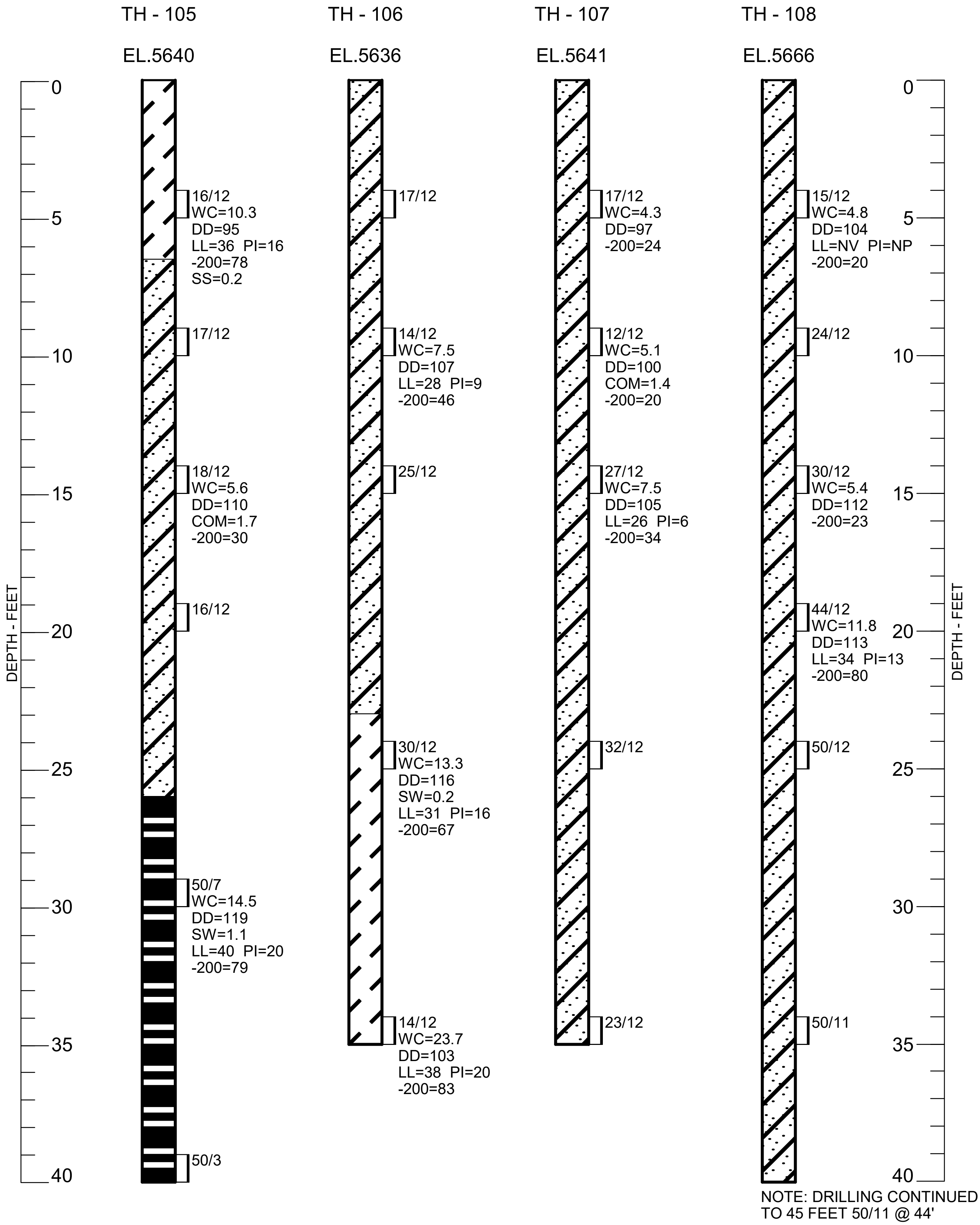
Summary Logs of Exploratory Borings

FIG. A-1



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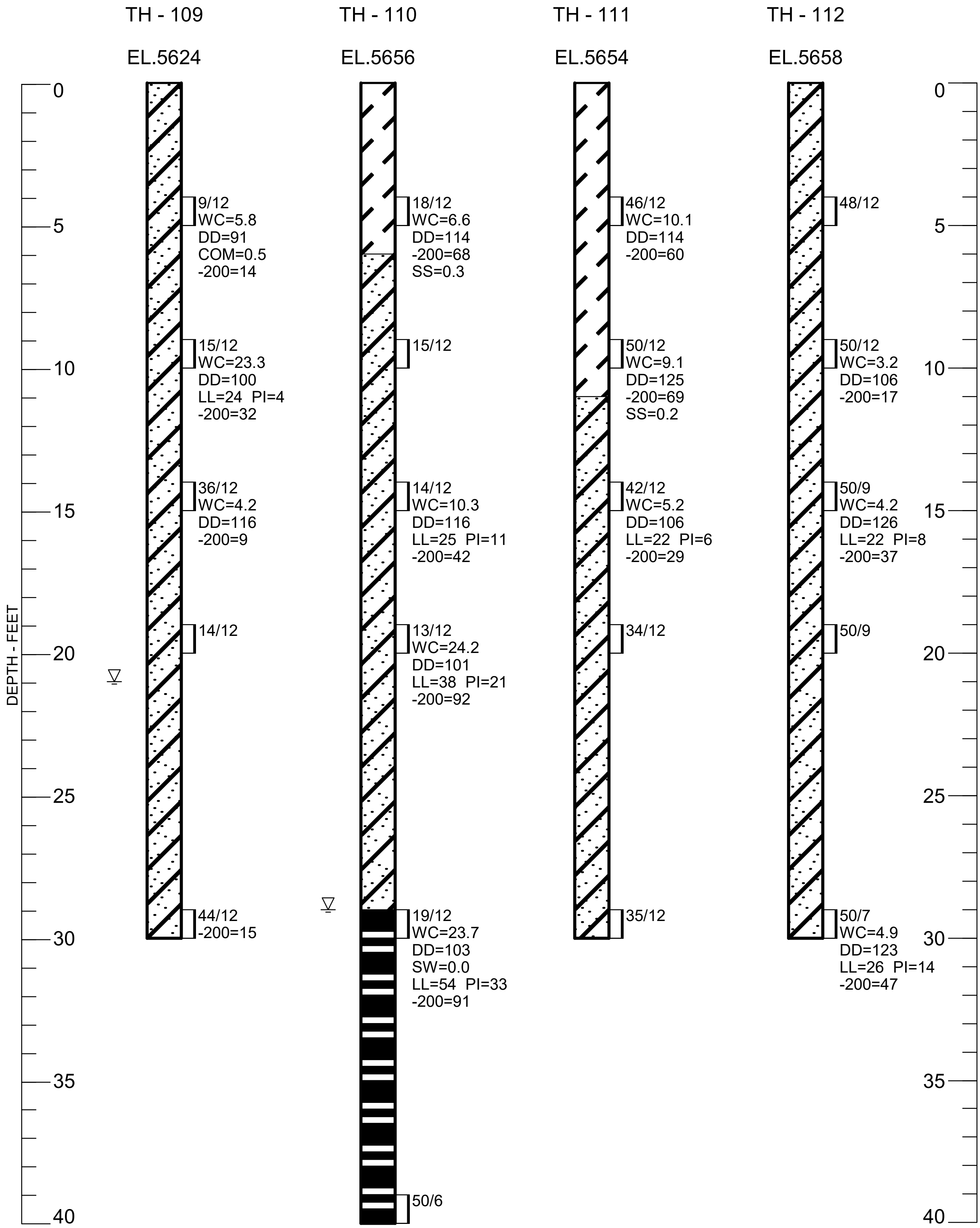
Summary Logs of Exploratory Borings

FIG. A-2



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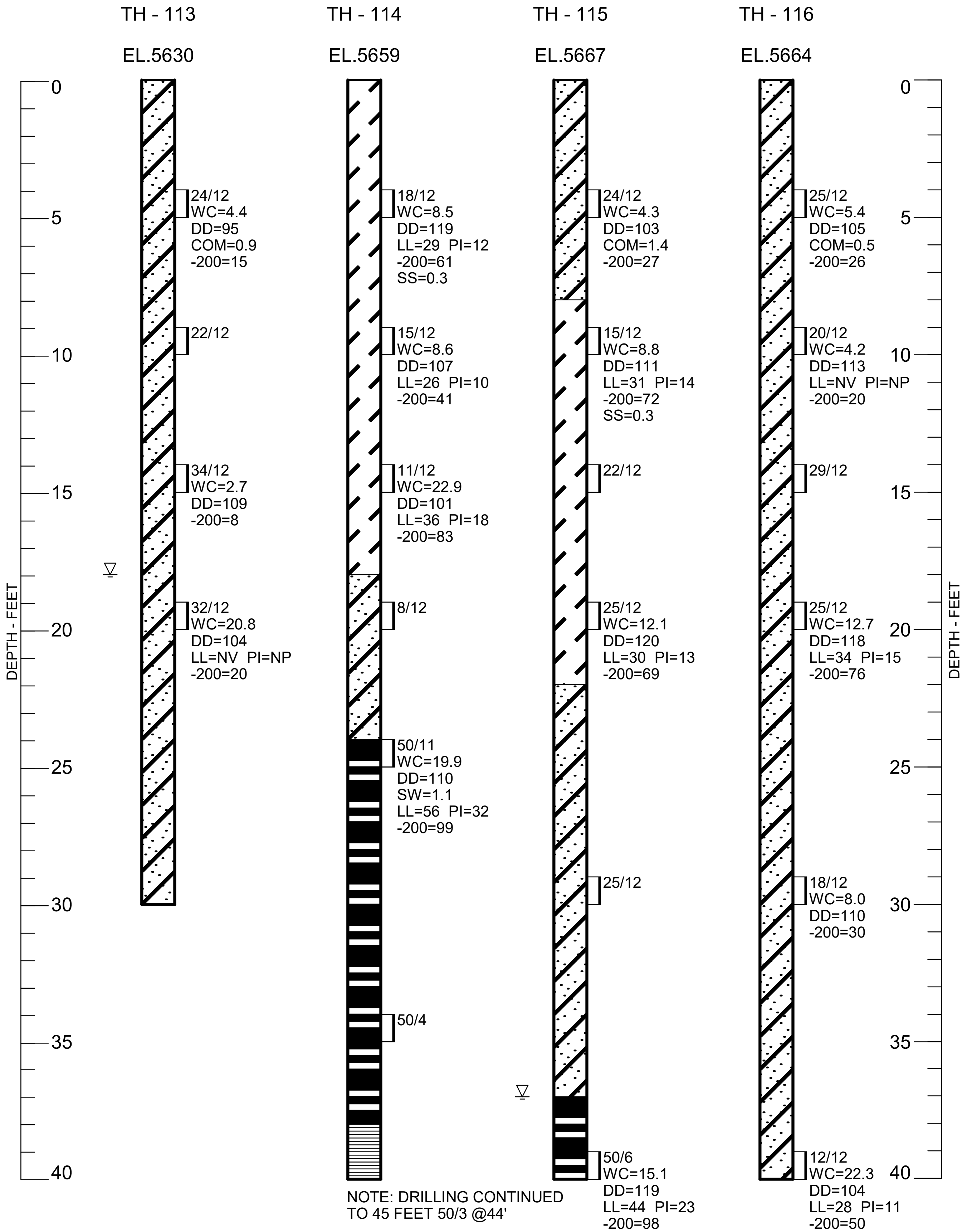
Summary Logs of Exploratory Borings

FIG. A-3



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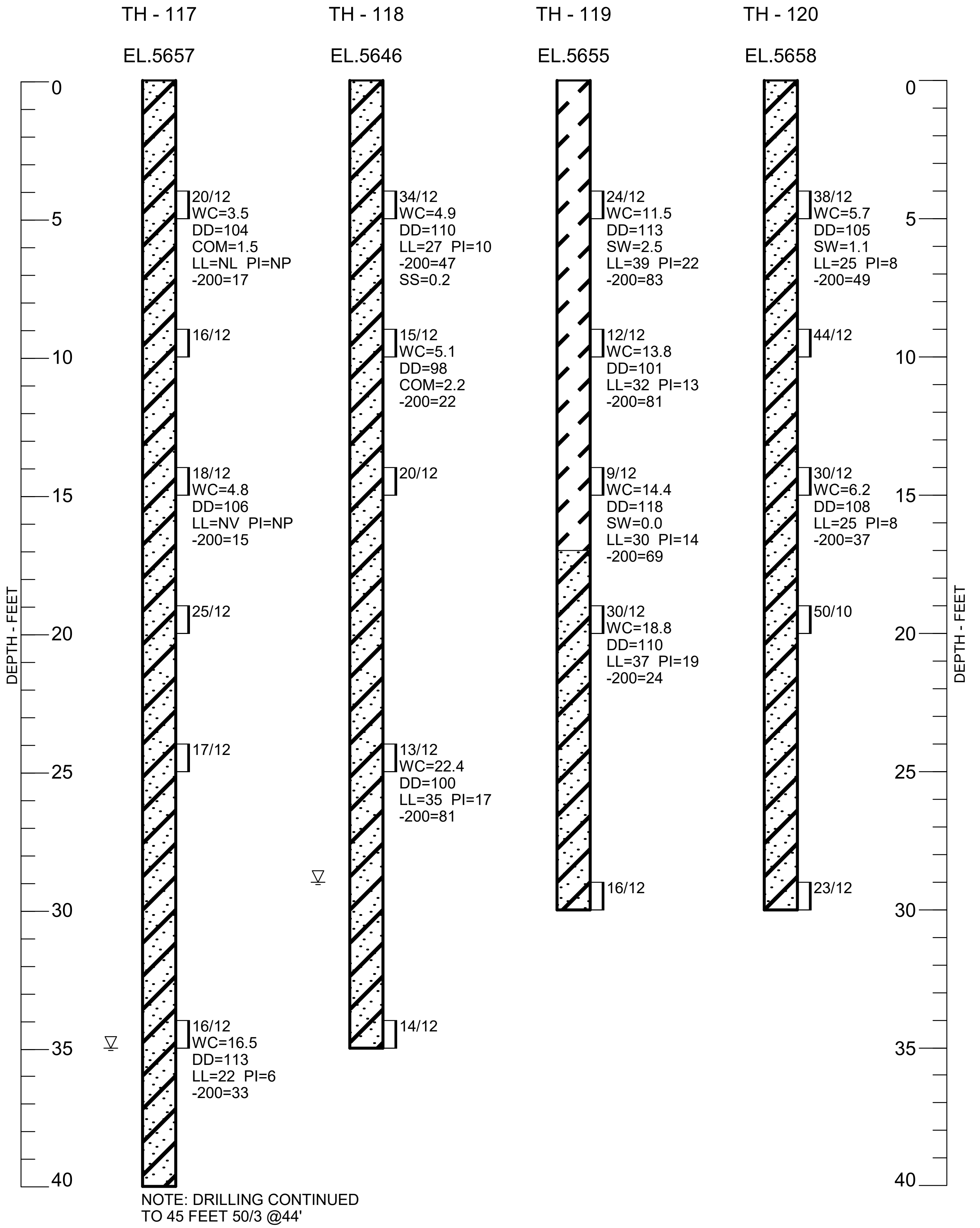
Summary Logs of Exploratory Borings

FIG. A-4



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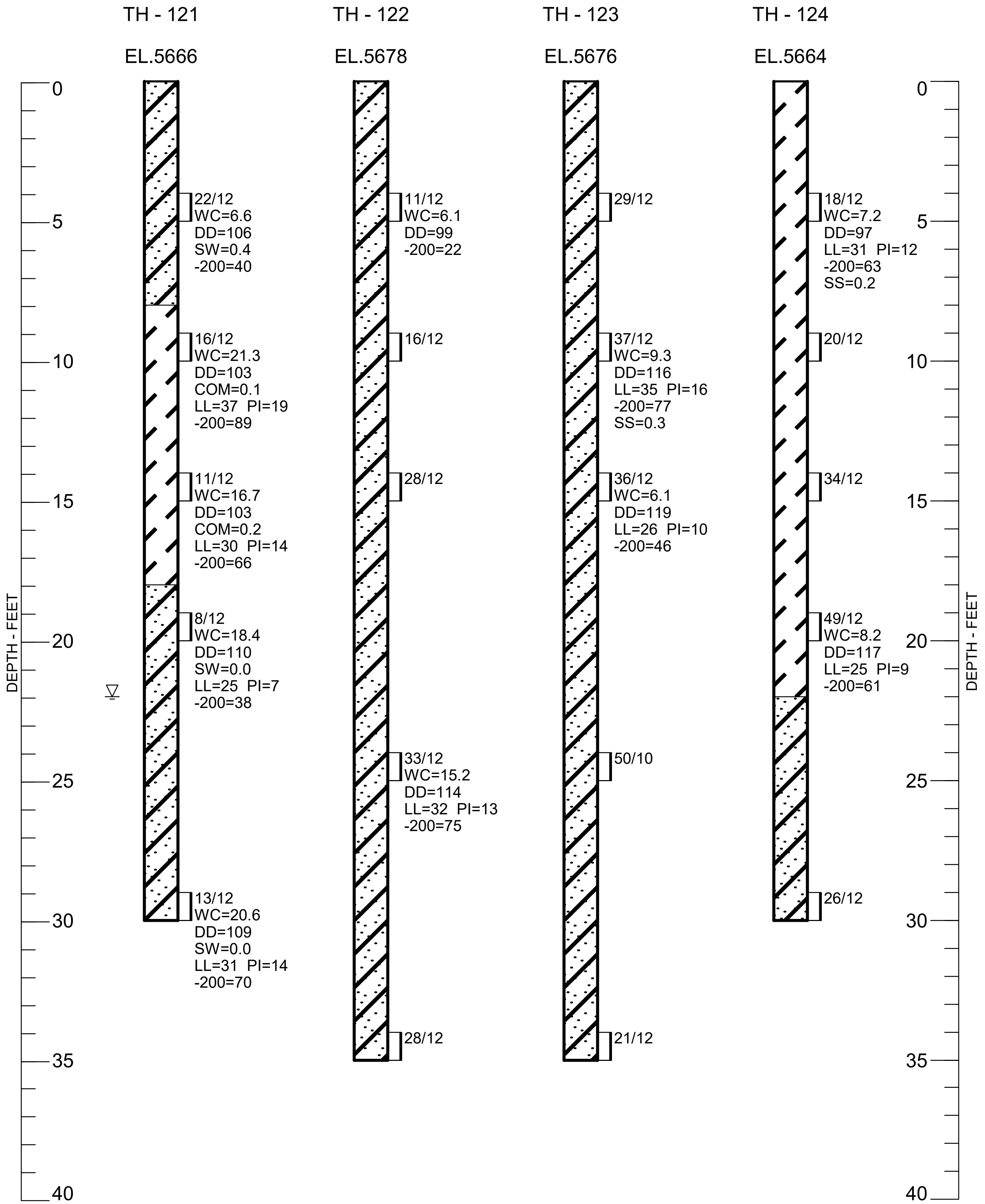
Summary Logs of Exploratory Borings

FIG. A-5



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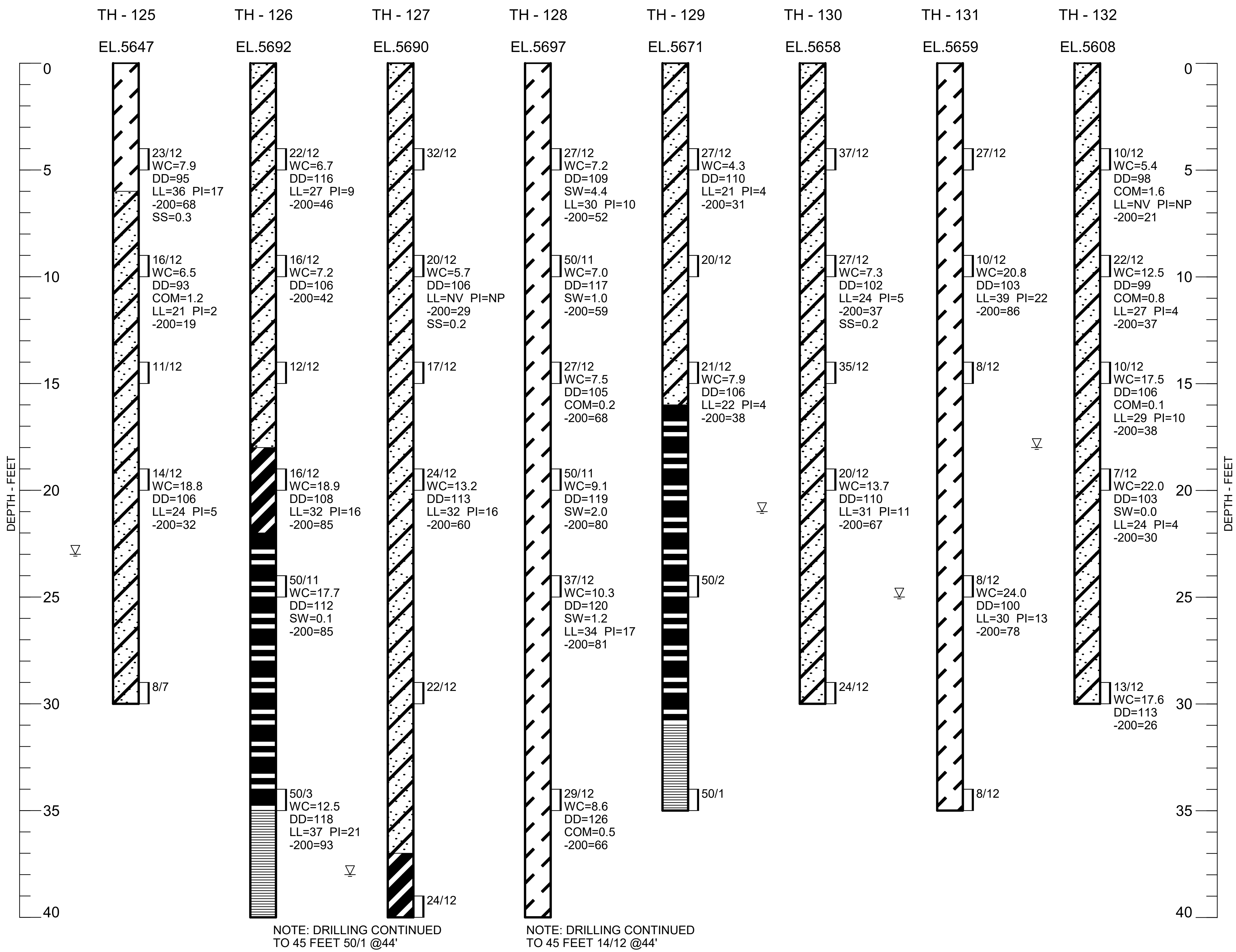
THE RANCH AKA SILVER CROSS RANCH
CTL | T PROJECT NO. CS19053.001-115

Summary Logs of Exploratory Borings

FIG. A-6



LEGEND:

SAND, SILTY TO VERY SILTY AND SAND, VERY CLAYEY, LOOSE TO VERY DENSE AND VERY STIFF, LENSES OF CLAY, SLIGHTLY MOIST BECOMING WET BELOW GROUNDWATER SURFACE, LIGHT BROWN TO BROWN. (SP-SM, SW-SM, SP, SW, SM)

CLAY, SLIGHTLY SANDY TO VERY SANDY, STIFF TO VERY STIFF, SLIGHTLY MOIST TO WET WITH DEPTH, LIGHT BROWN TO BROWN, WITH CLAYEY SAND LENSES, CLAYEY SAND LENSES. (CL)

WEATHERED CLAYSTONE BEDROCK, SANDY, MEDIUM HARD, MOIST, GRAY BROWN.

CLAYSTONE BEDROCK, SLIGHTLY SANDY TO SANDY, HARD TO VERY HARD, MOIST, RUST, GRAY, BROWN.

SHALE, FISSILE, VERY HARD, MOIST, GRAY TO DARK GRAY.

DRIVE SAMPLE. THE SYMBOL 34/12 INDICATES 34 BLOWS OF A 140-POUND HAMMER FALLING 30 INCHES WERE REQUIRED TO DRIVE A 2.5-INCH O.D. SAMPLER 12 INCHES.

GROUNDWATER LEVEL MEASURED AT TIME OF DRILLING.

NOTES:

1. THE BORINGS WERE DRILLED MARCH 10, 11, 13, and 17, 2020 USING A 4-INCH DIAMETER, CONTINUOUS-FLIGHT AUGER AND A CME-55, TRUCK-MOUNTED DRILL RIG.
2. THESE LOGS ARE SUBJECT TO THE EXPLANATIONS, LIMITATIONS, AND CONCLUSIONS AS CONTAINED IN THIS REPORT.
4. WC - INDICATES MOISTURE CONTENT. (%)
   DD - INDICATES DRY DENSITY. (PCF)
   SW - INDICATES SWELL WHEN WETTED UNDER ESTIMATED OVERBURDEN PRESSURE. (%)
   COM - INDICATES COMPRESSION WHEN WETTED UNDER ESTIMATED OVERBURDEN PRESSURE. (%)
   LL - INDICATES LIQUID LIMIT. (%) (NV : NO VALUE)
   PI - INDICATES PLASTICITY INDEX. (%) (NP : NON-PLASTIC)
   -200 - INDICATES PASSING NO. 200 SIEVE. (%)
   SS - INDICATES WATER-SOLUBLE SULFATE CONTENT. (%)

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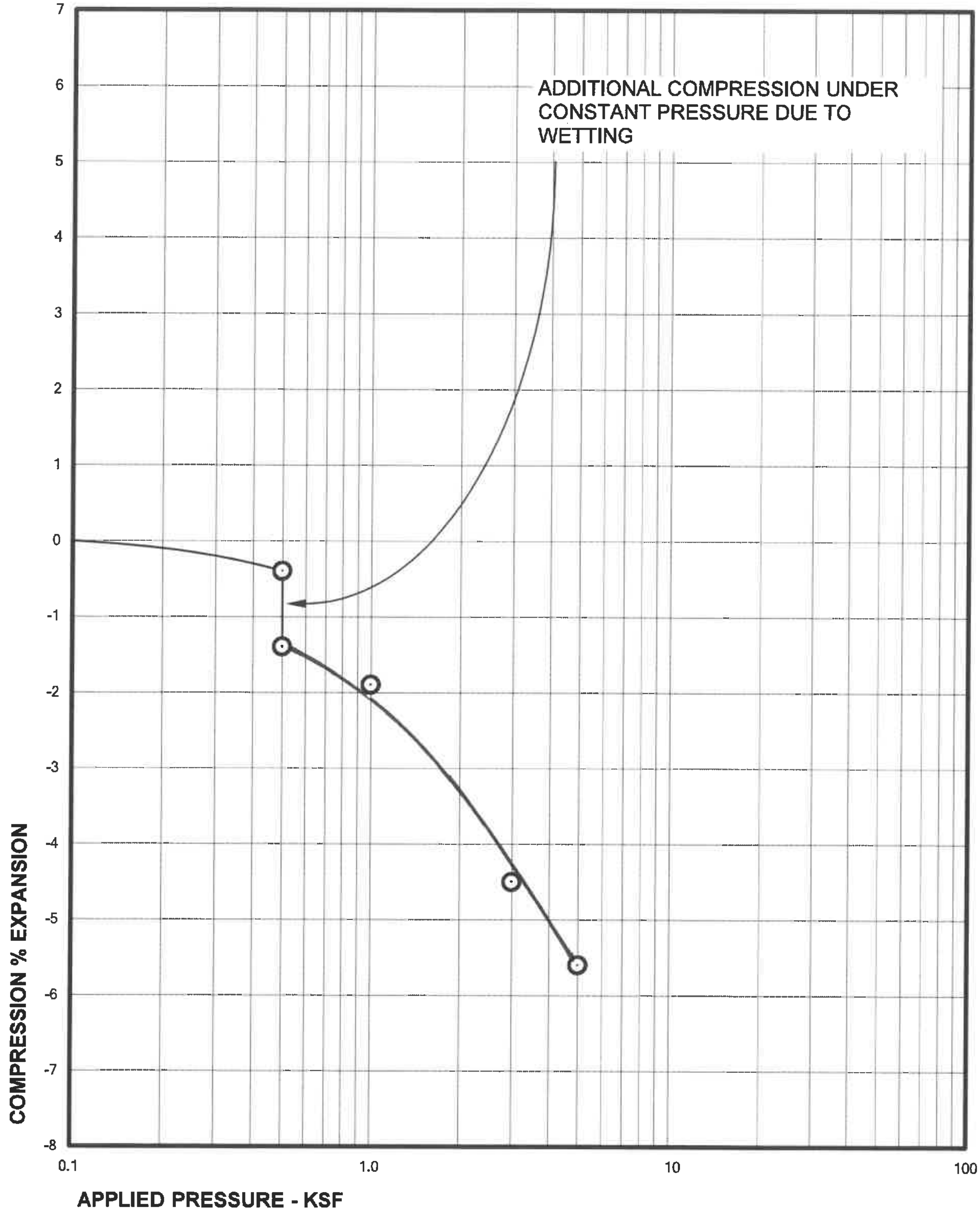
Summary Logs of Exploratory Borings

APPENDIX B

LABORATORY TESTING



Sample of SAND, VERY CLAYEY (SC)

From TH-101 AT 4 FEET

DRY UNIT WEIGHT= 115 PCF

MOISTURE CONTENT= 6.6 %

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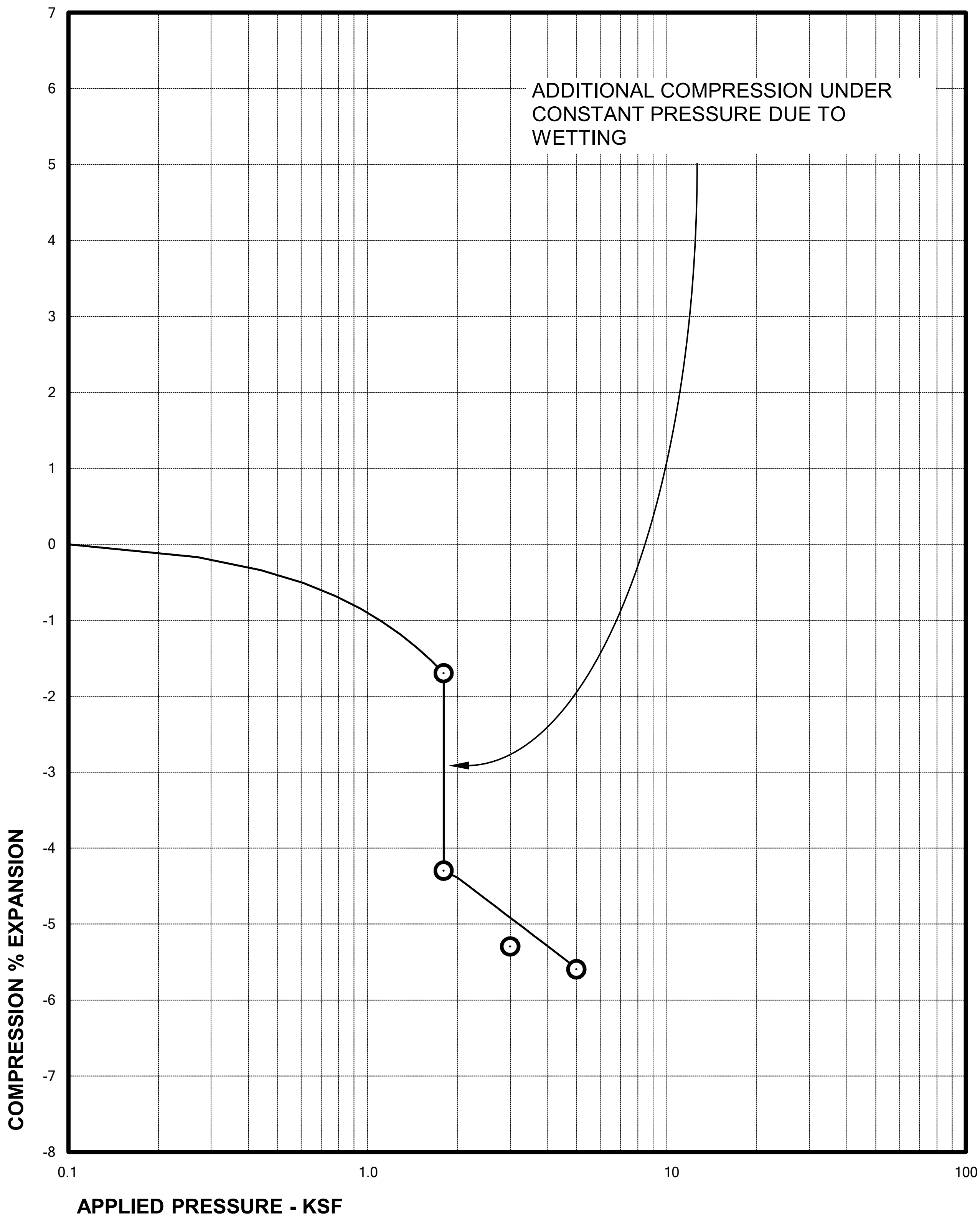
Swell Consolidation Test Results

FIG. B-1



Sample of	SAND, SILTY (SM)		DRY UNIT WEIGHT=	95	PCF
From	TH-104 AT 14 FEET		MOISTURE CONTENT=	5.8	%

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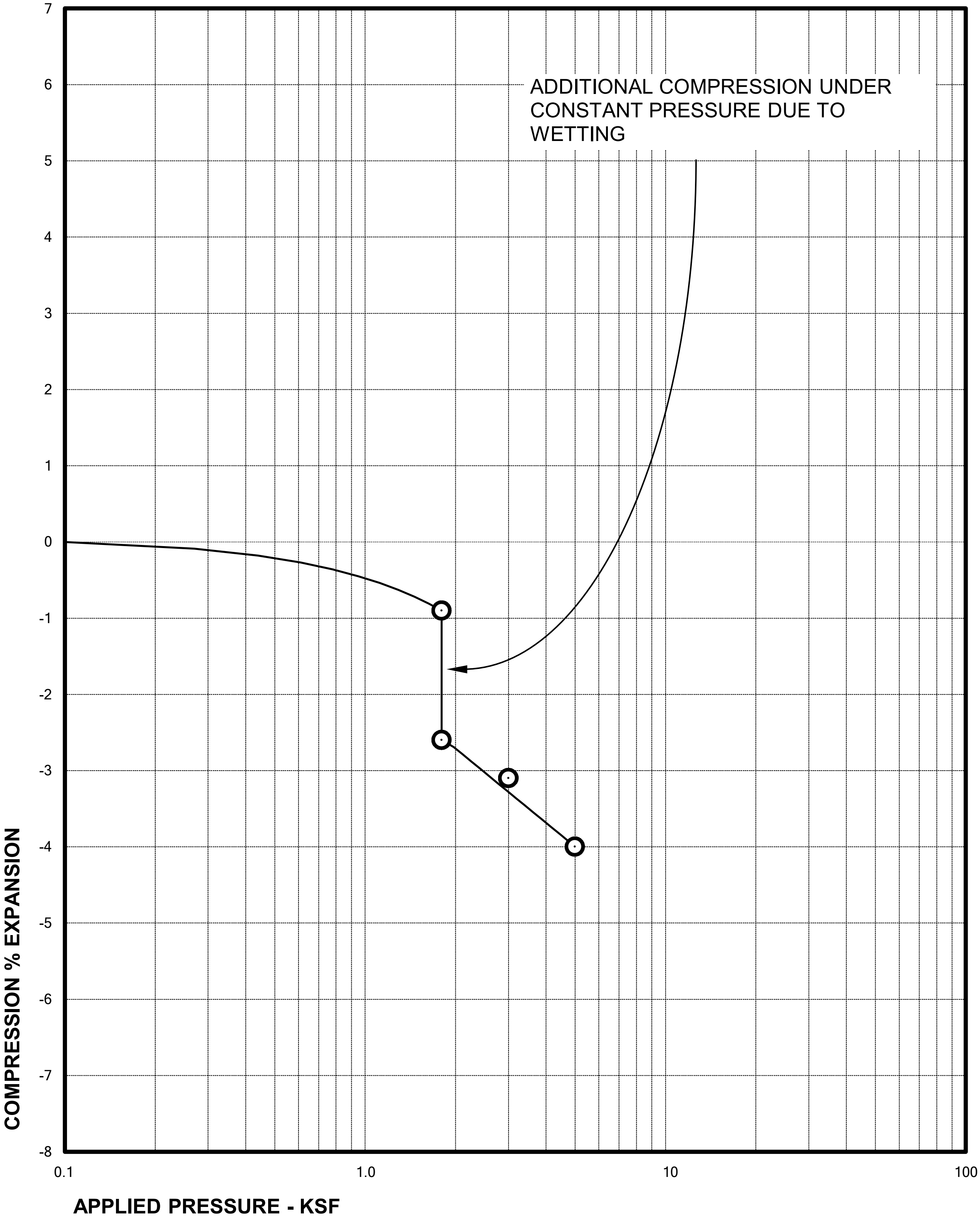
Swell Consolidation Test Results

FIG. B-2



Sample of	SAND, SILTY (SM)	DRY UNIT WEIGHT=	110	PCF
From	TH-105 AT 14 FEET	MOISTURE CONTENT=	5.6	%

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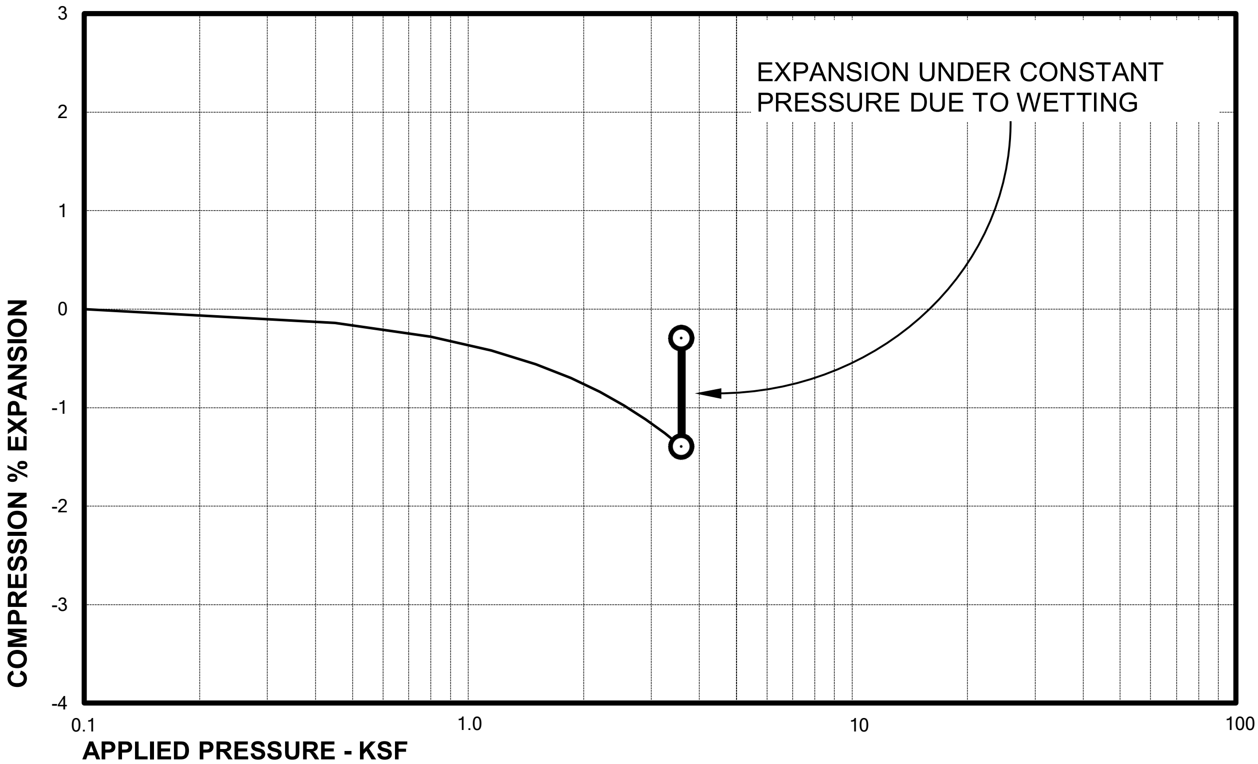
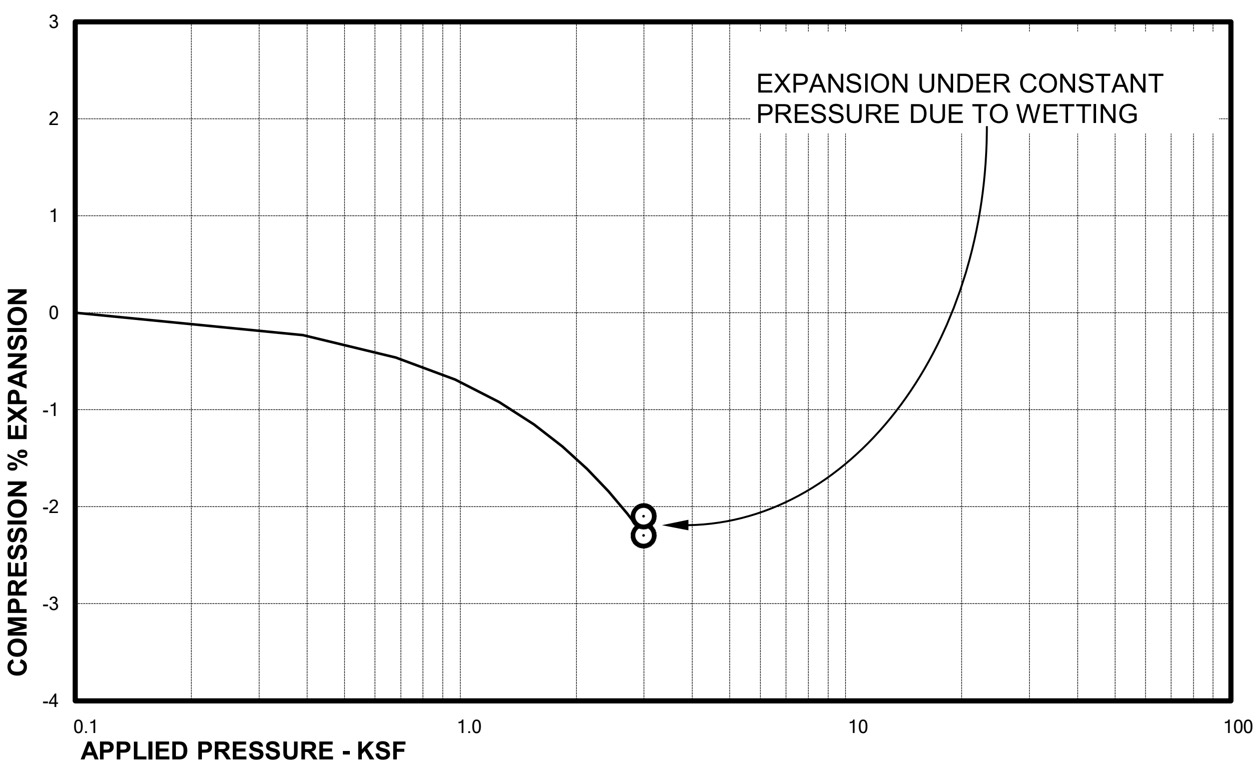
CTL|T PROJECT NO. CS19053.001-115

Swell Consolidation Test Results

FIG. B-3



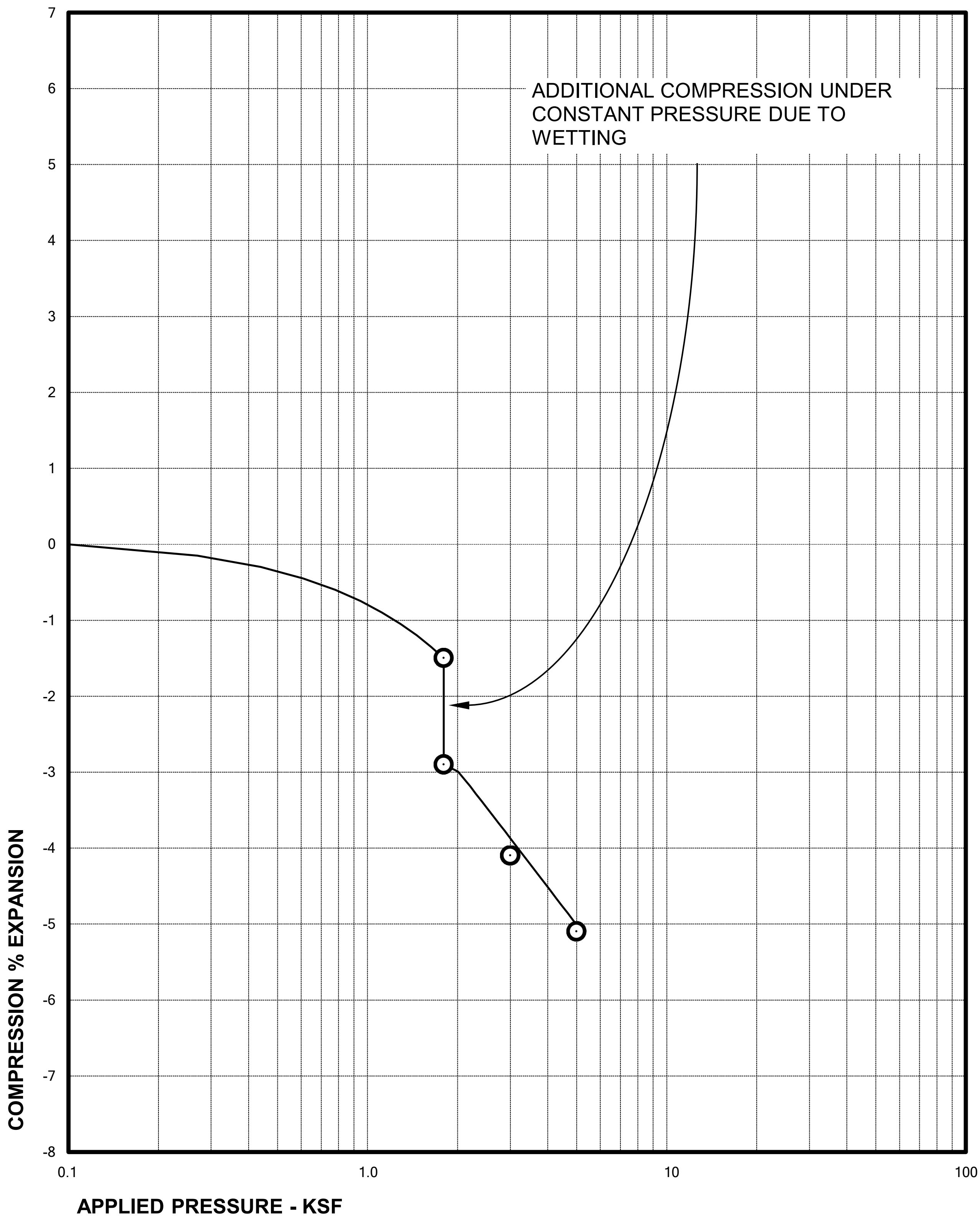
Sample of	CLAYSTONE, SANDY	DRY UNIT WEIGHT=	119	PCF
From	TH-105 AT 29 FEET	MOISTURE CONTENT=	14.5	%



Sample of	CLAY, SANDY (CL)	DRY UNIT WEIGHT=	116	PCF
From	TH-106 AT 24 FEET	MOISTURE CONTENT=	13.3	%

Swell Consolidation Test Results

FIG. B-4



Sample of SAND, SILTY (SM)
From TH-107 AT 9 FEET

DRY UNIT WEIGHT= 100 PCF
MOISTURE CONTENT= 5.1 %

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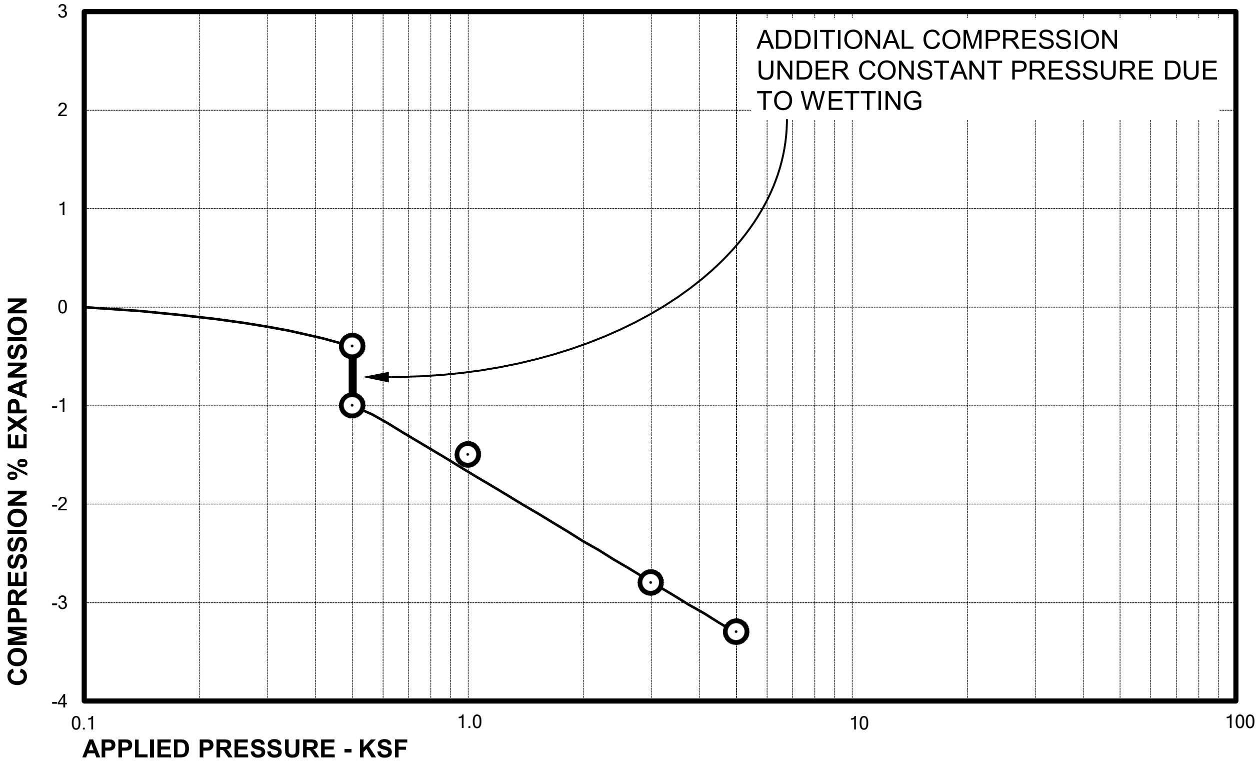
Swell Consolidation Test Results

FIG. B-5

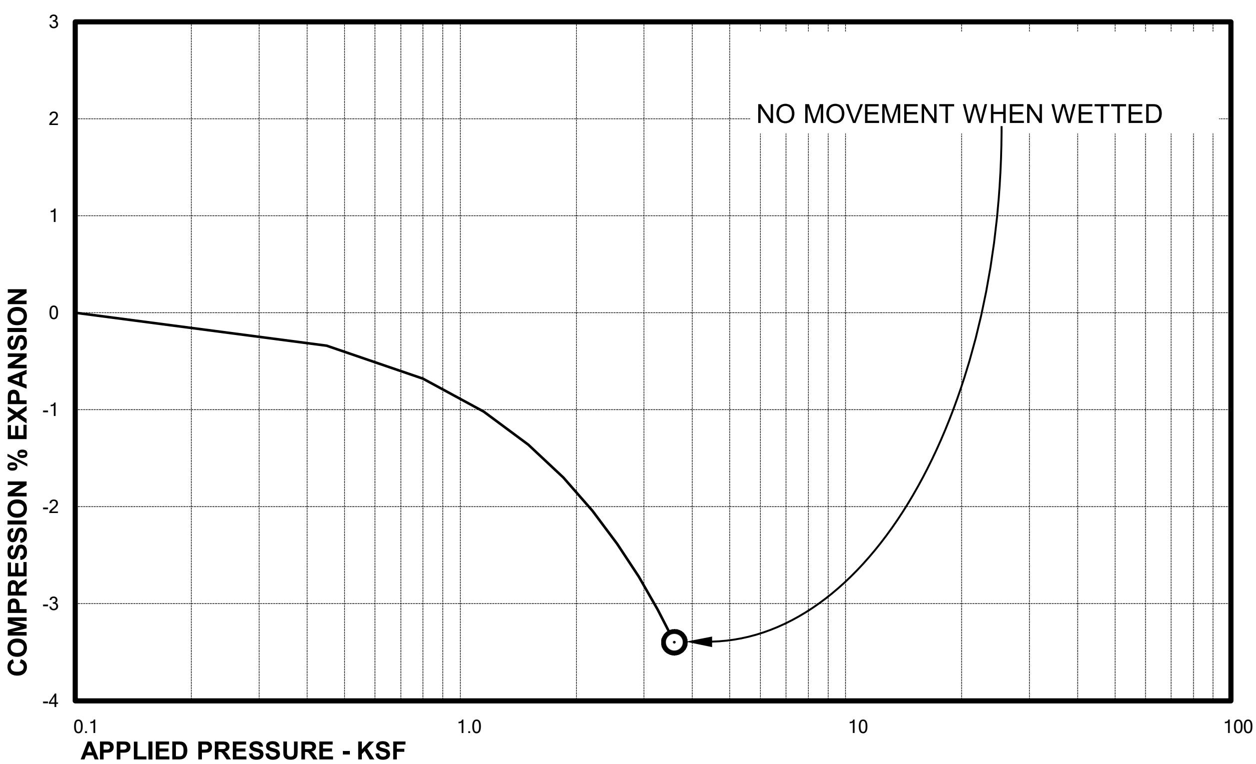


Sample of SAND, SILTY (SM)

From TH-109 AT 4 FEET

DRY UNIT WEIGHT= 91 PCF

MOISTURE CONTENT= 5.8 %



Sample of CLAY, SLIGHTLY SANDY (CH)

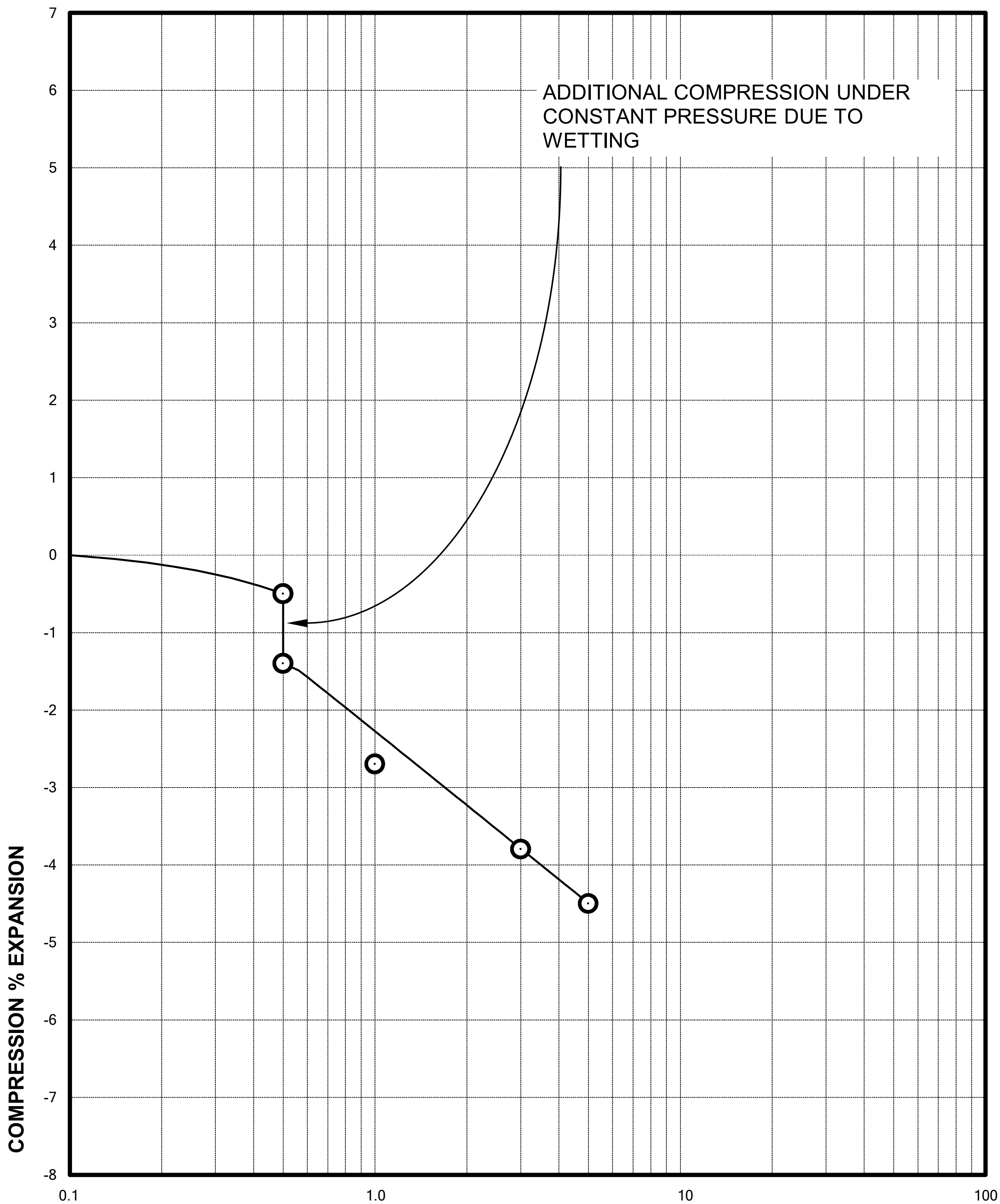
From TH-110 AT 29 FEET

DRY UNIT WEIGHT= 103 PCF

MOISTURE CONTENT= 23.7 %

Swell Consolidation Test Results

FIG. B-6



Sample of SAND, SILTY (SM)

From TH-113 AT 4 FEET

DRY UNIT WEIGHT= 95 PCF

MOISTURE CONTENT= 4.4 %

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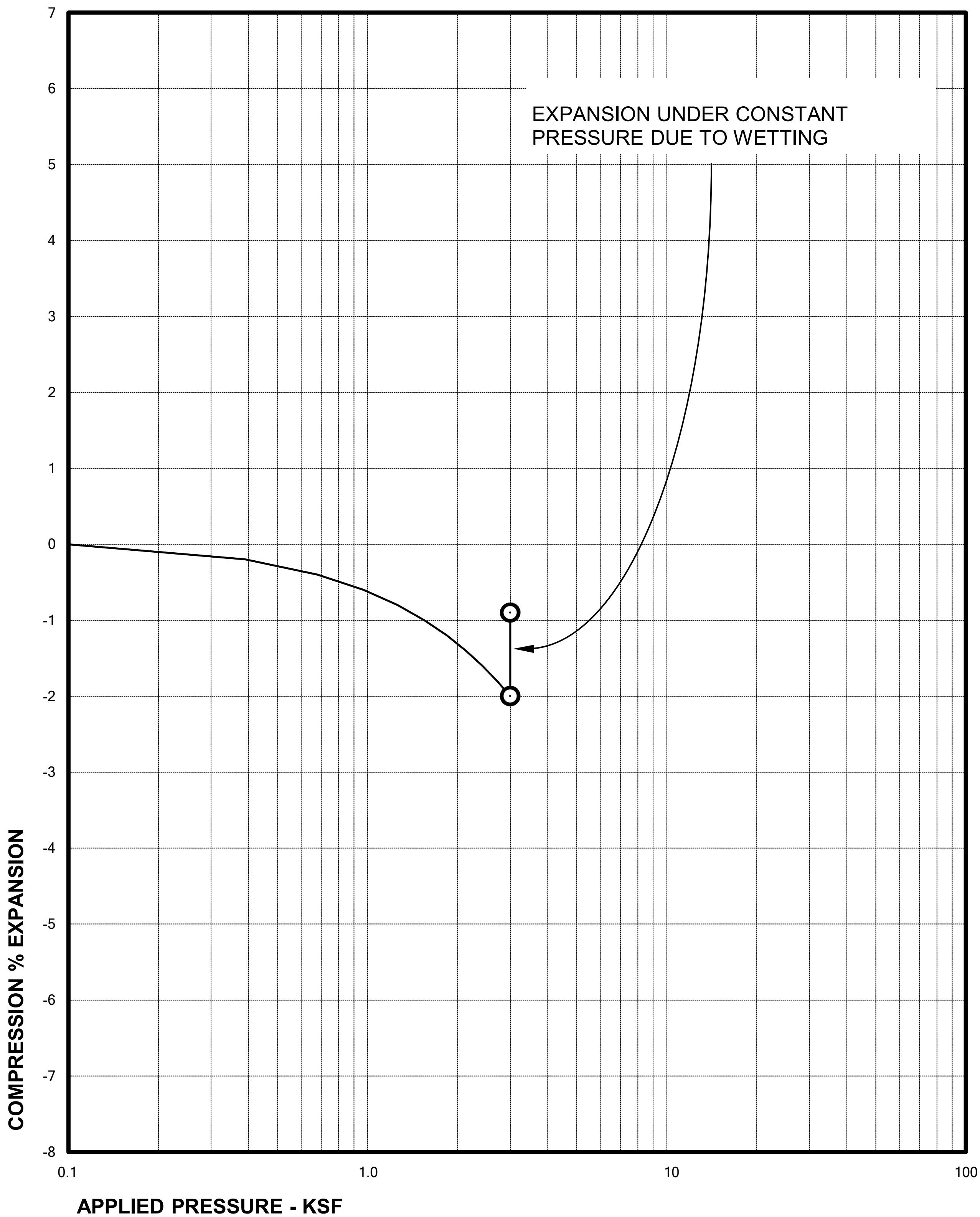
Swell Consolidation Test Results

FIG. B-7



Sample of	CLAYSTONE	DRY UNIT WEIGHT=	110	PCF
From	TH-114 AT 24 FEET	MOISTURE CONTENT=	19.9	%

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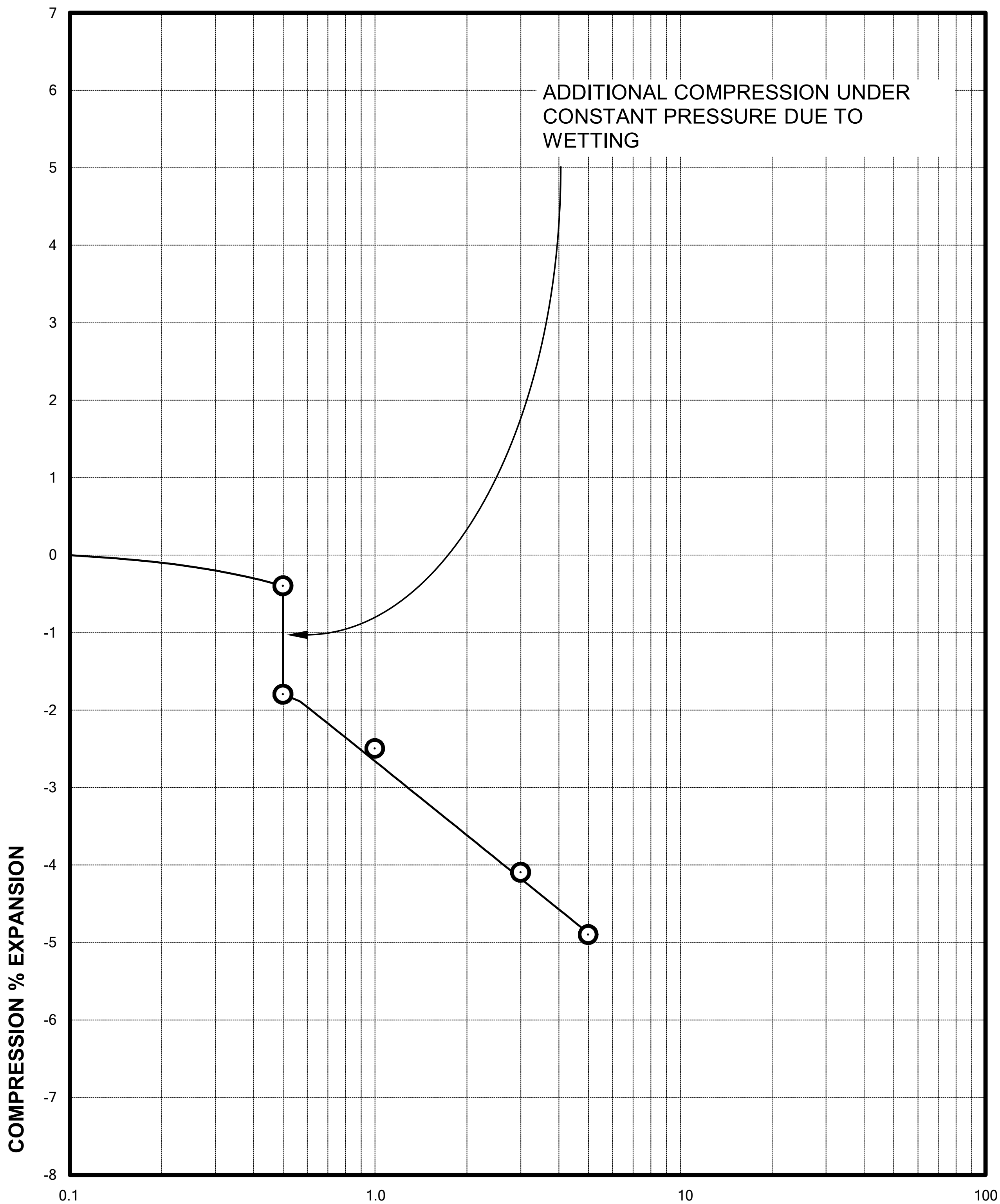
Swell Consolidation Test Results

FIG. B-8

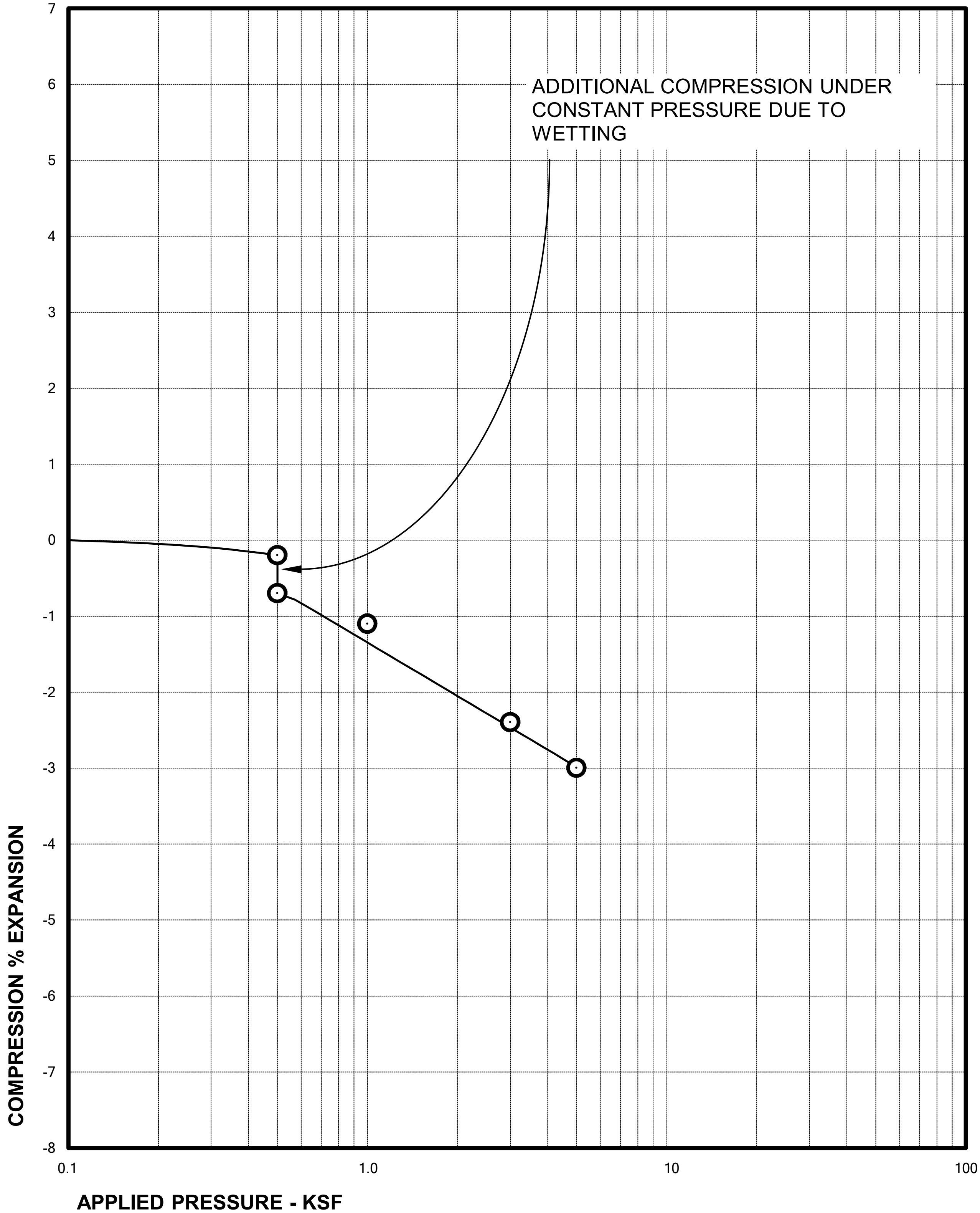


Sample of	SAND, SILTY (SM)	DRY UNIT WEIGHT=	103	PCF
From	TH-115 AT 4 FEET	MOISTURE CONTENT=	4.3	%

LA PLATA COMMUNITIES
SILVER CROSS RANCH
CTL|T PROJECT NO. CS19053.001-115

Swell Consolidation Test Results

FIG. B-9



Sample of SAND, SILTY (SM)
From TH-116 AT 4 FEET

DRY UNIT WEIGHT= 105 PCF
MOISTURE CONTENT= 5.4 %

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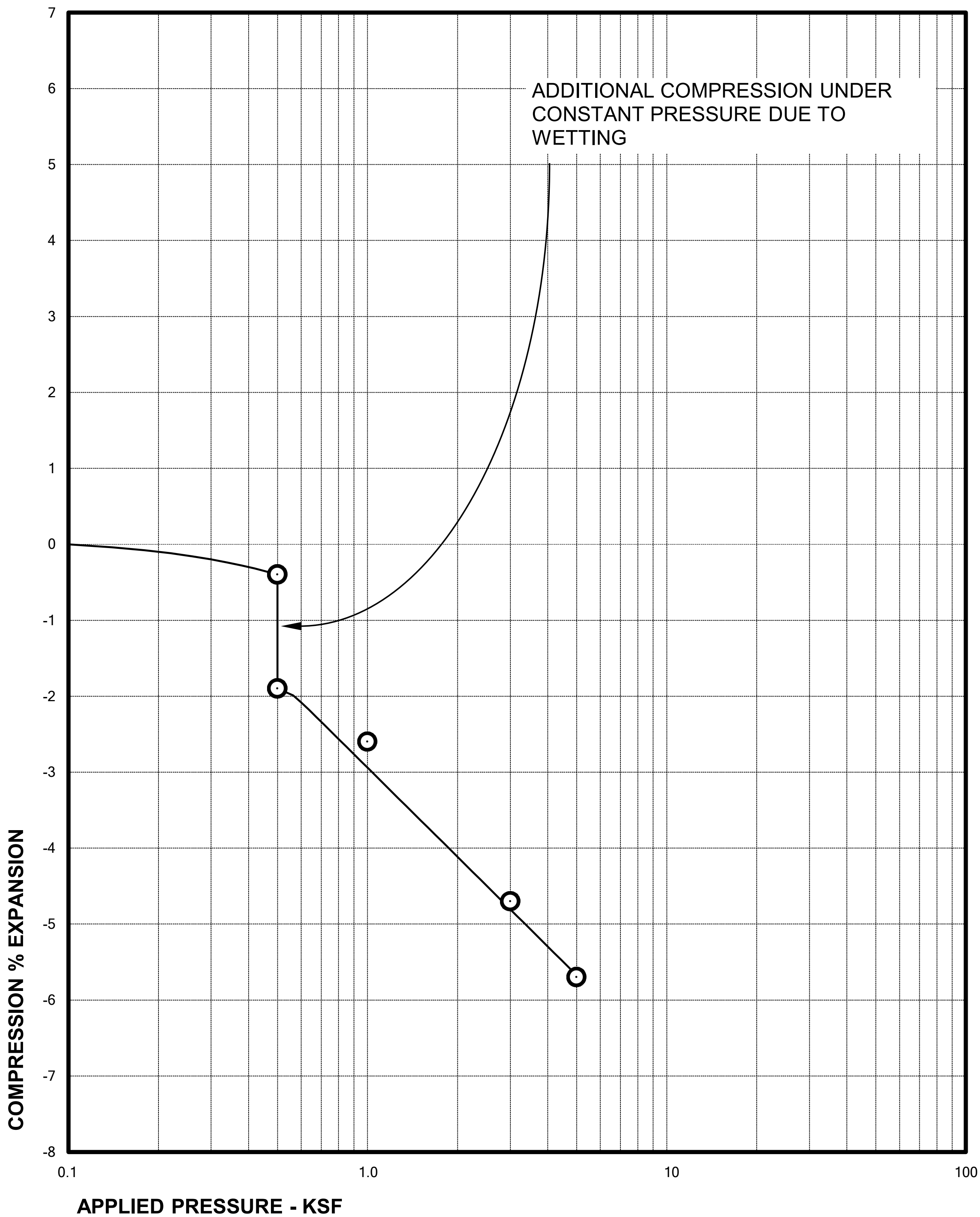
Swell Consolidation Test Results

FIG. B-10



Sample of SAND, SILTY (SM)

From TH-117 AT 4 FEET

DRY UNIT WEIGHT= 104 PCF

MOISTURE CONTENT= 3.5 %

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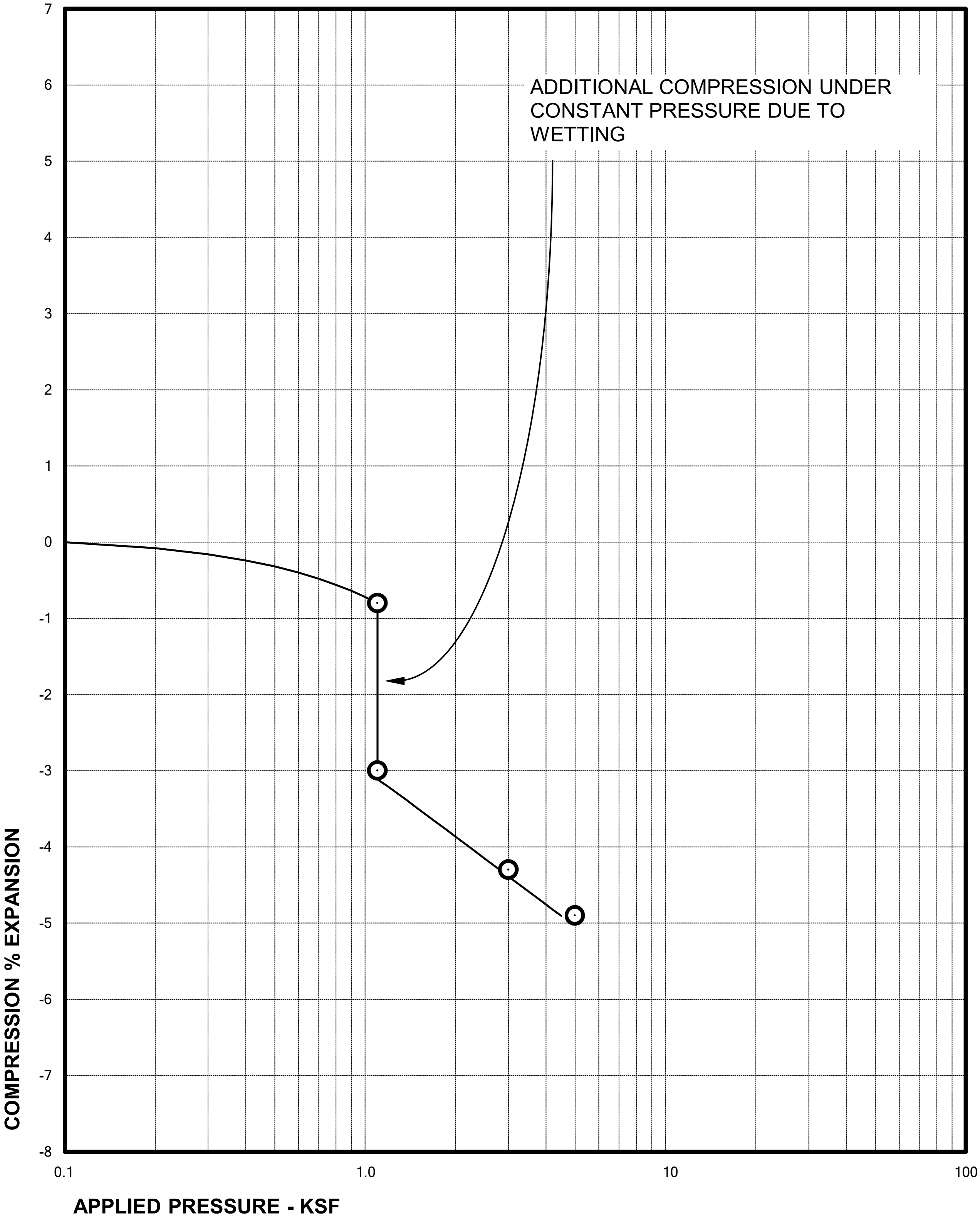
SILVER CROSS RANCH
CTL|T PROJECT NO. CS19053.001-115

Swell Consolidation Test Results

FIG. B-11



Sample of SAND, SILTY (SM)

From TH-118 AT 9 FEET

DRY UNIT WEIGHT= 98 PCF

MOISTURE CONTENT= 5.1 %

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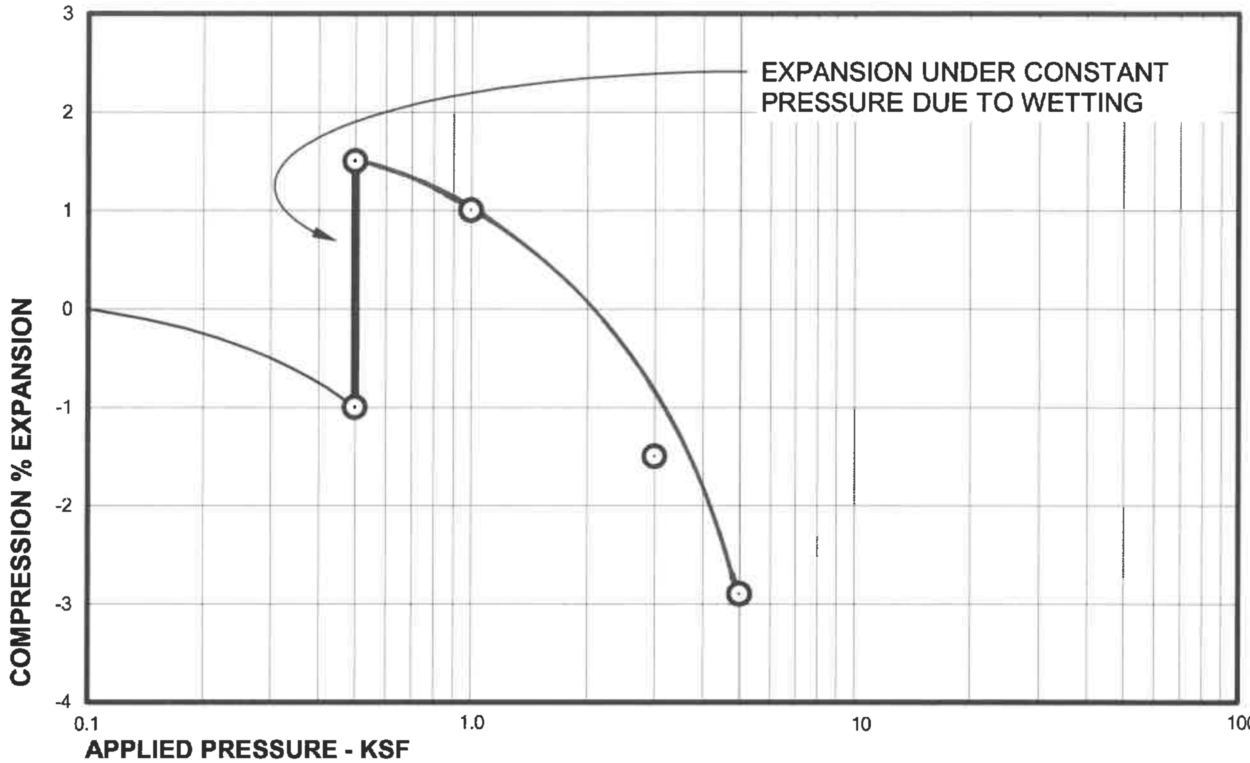
SILVER CROSS RANCH
CTL|T PROJECT NO. CS19053.001-115

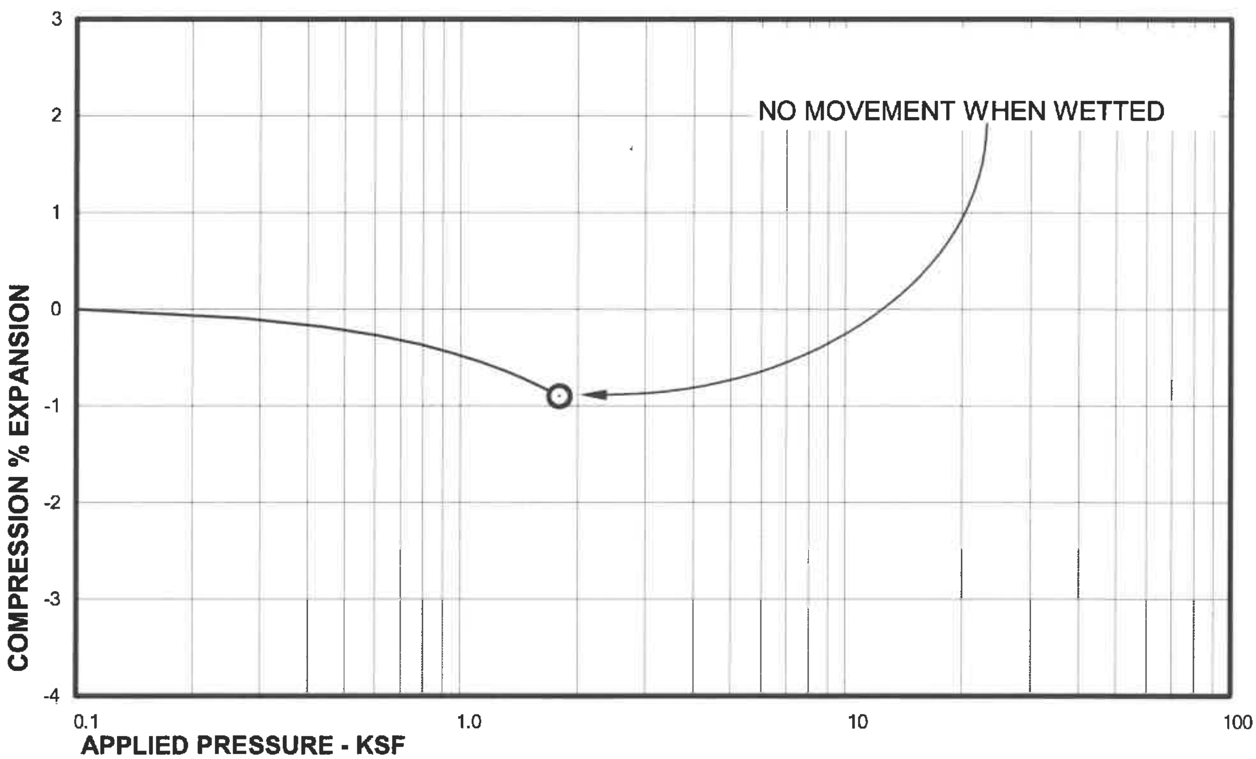
Swell Consolidation Test Results

FIG. B-12



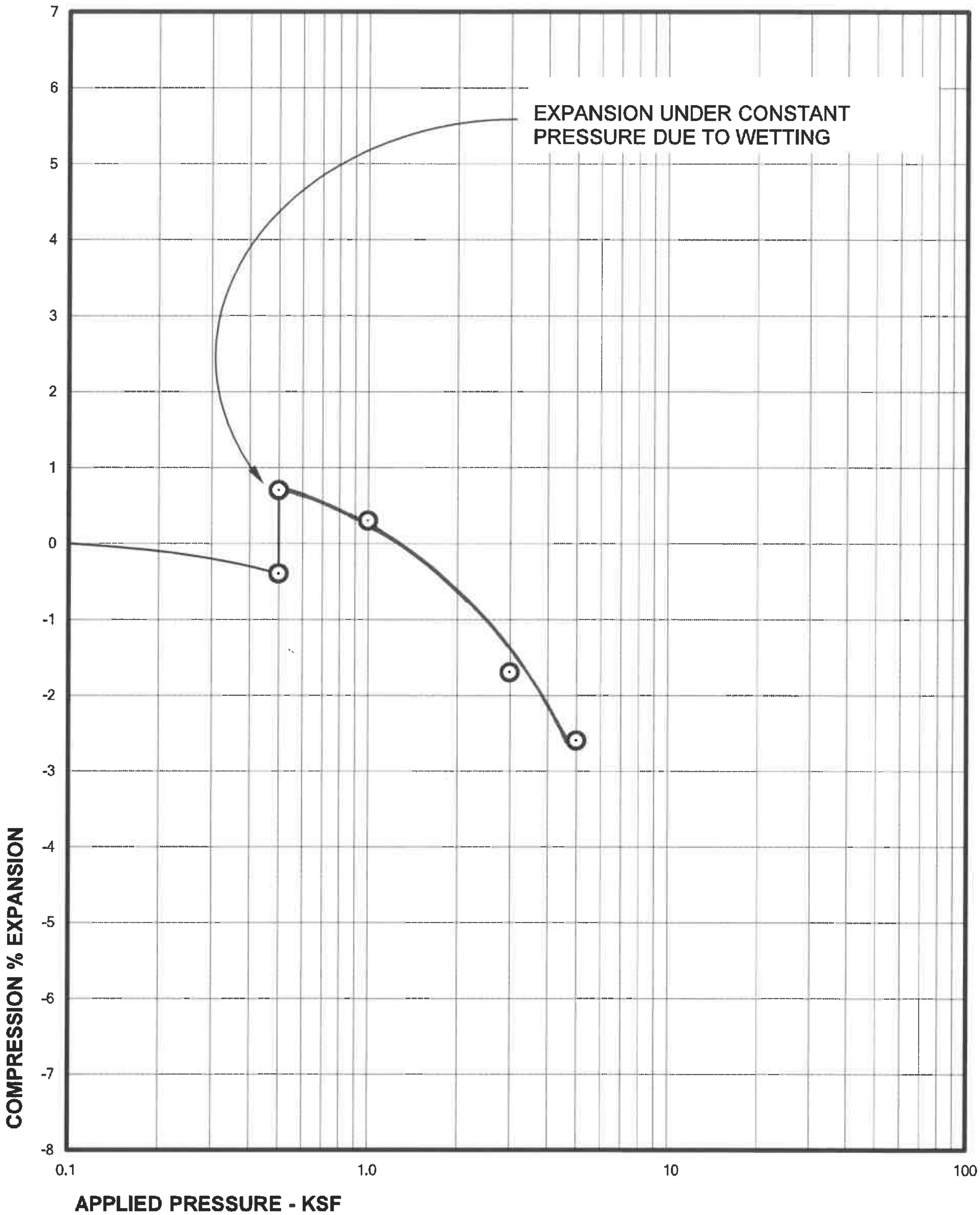
Sample of CLAY, SANDY (CL)
From TH-119 AT 4 FEET

DRY UNIT WEIGHT= 113 PCF
MOISTURE CONTENT= 11.5 %



Sample of CLAY, SANDY (CL)
From TH-119 AT 14 FEET

DRY UNIT WEIGHT= 118 PCF
MOISTURE CONTENT= 14.4 %



Sample of SAND, VERY CLAYEY (SC)

From TH-120 AT 4 FEET

DRY UNIT WEIGHT= 105 PCF

MOISTURE CONTENT= 5.7 %

LA PLATA COMMUNITIES
SILVER CROSS RANCH
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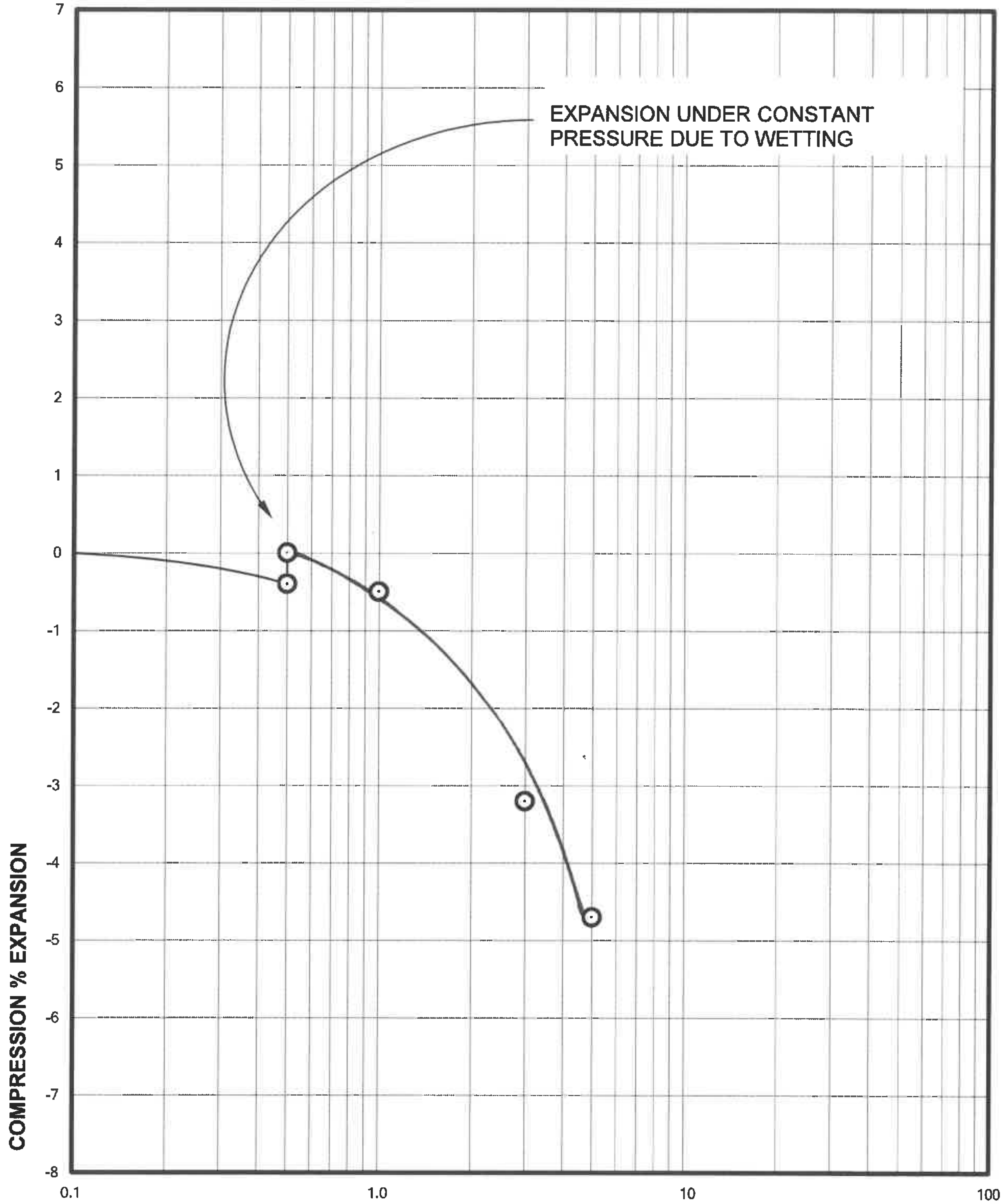
Swell Consolidation Test Results

FIG. B-14



APPLIED PRESSURE - KSF

Sample of SAND, VERY CLAYEY (SC)

From TH-121 AT 4 FEET

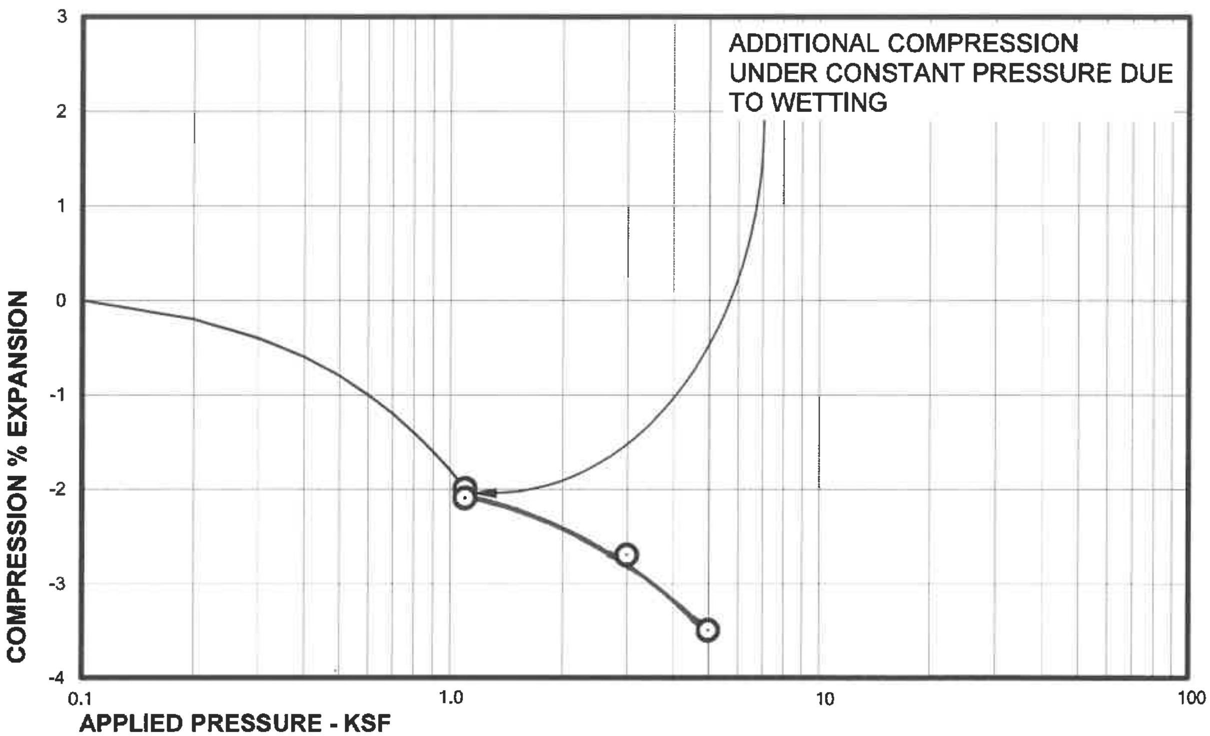
DRY UNIT WEIGHT= 106 PCF

MOISTURE CONTENT= 6.6 %

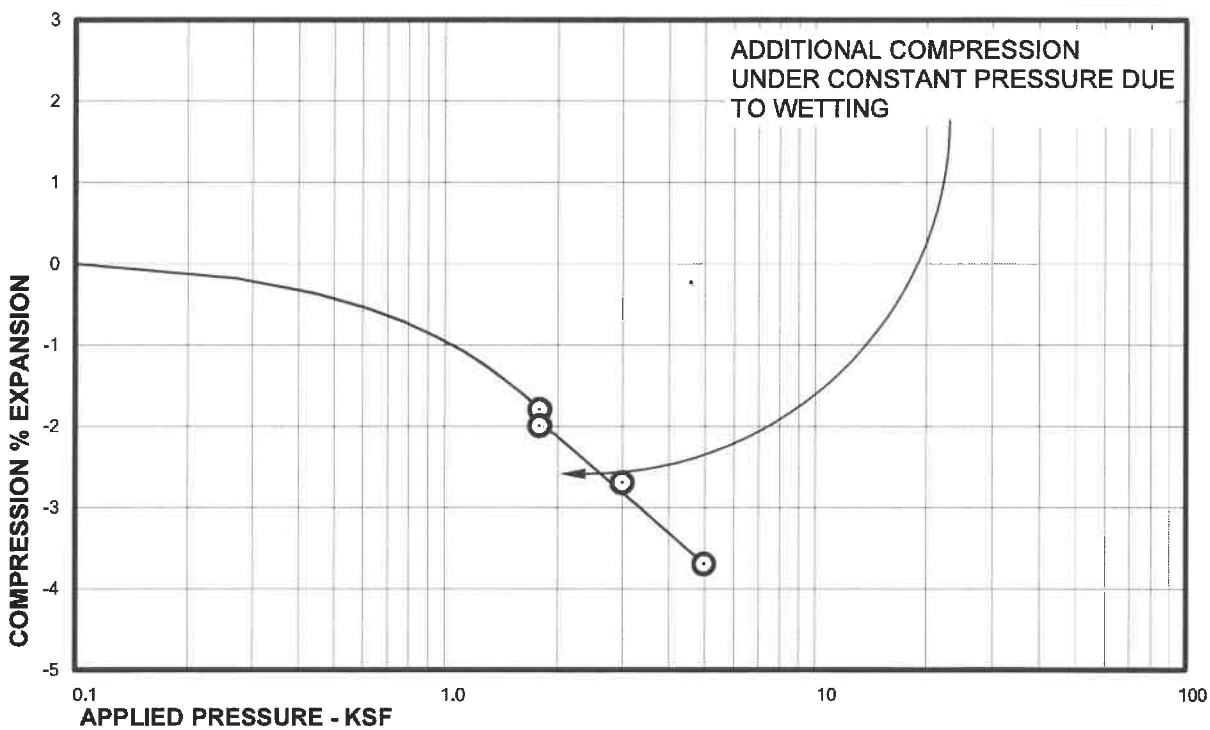
LA PLATA COMMUNITIES
SILVER CROSS RANCH
CTL|T PROJECT NO. CS19053.001-115

Swell Consolidation Test Results

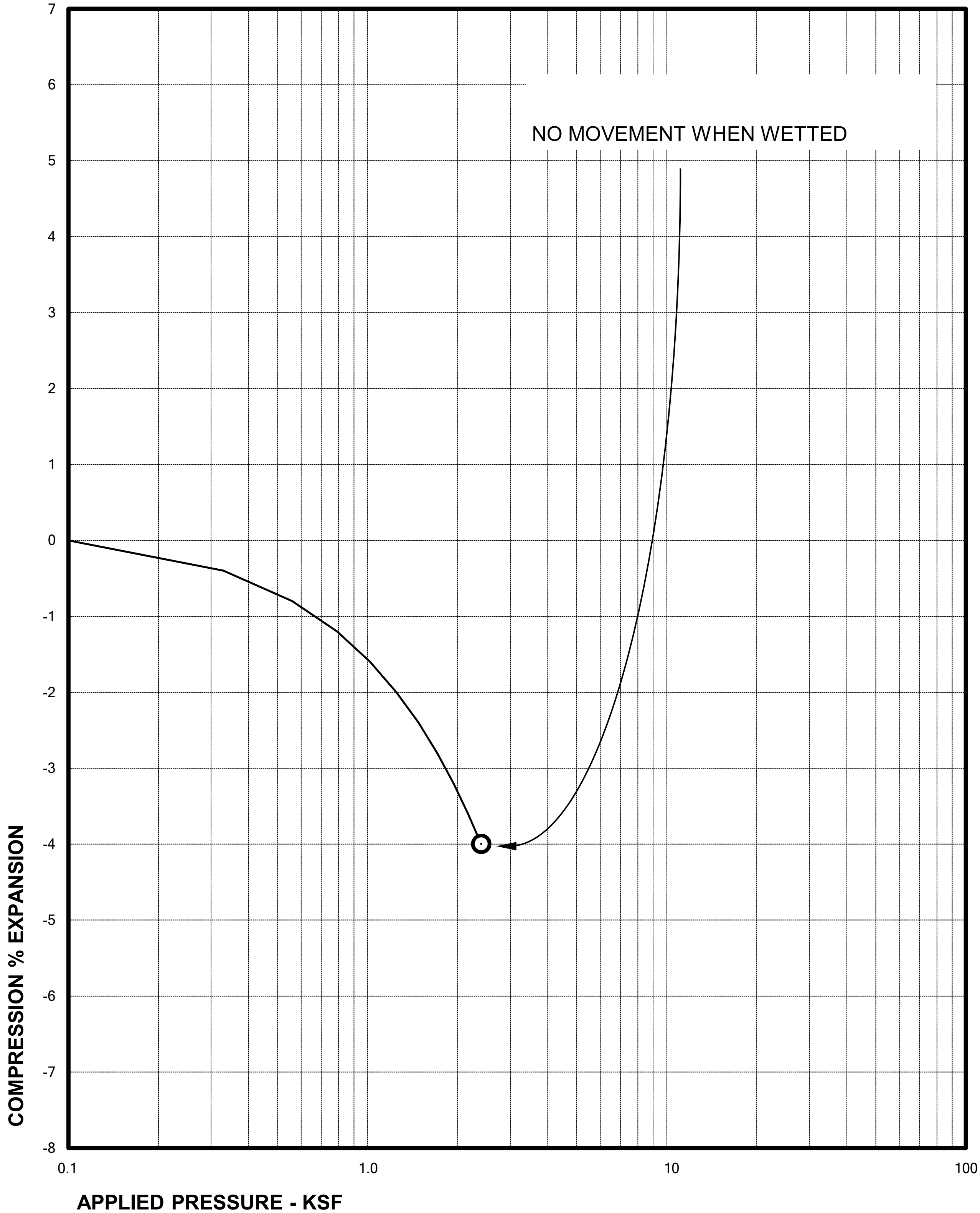
FIG. B-15



Sample of	CLAY, SANDY (CL)	DRY UNIT WEIGHT=	103	PCF
From	TH-121 AT 9 FEET	MOISTURE CONTENT=	21.3	%



Sample of	CLAY, SANDY (CL)	DRY UNIT WEIGHT=	103	PCF
From	TH-121 AT 14 FEET	MOISTURE CONTENT=	16.7	%



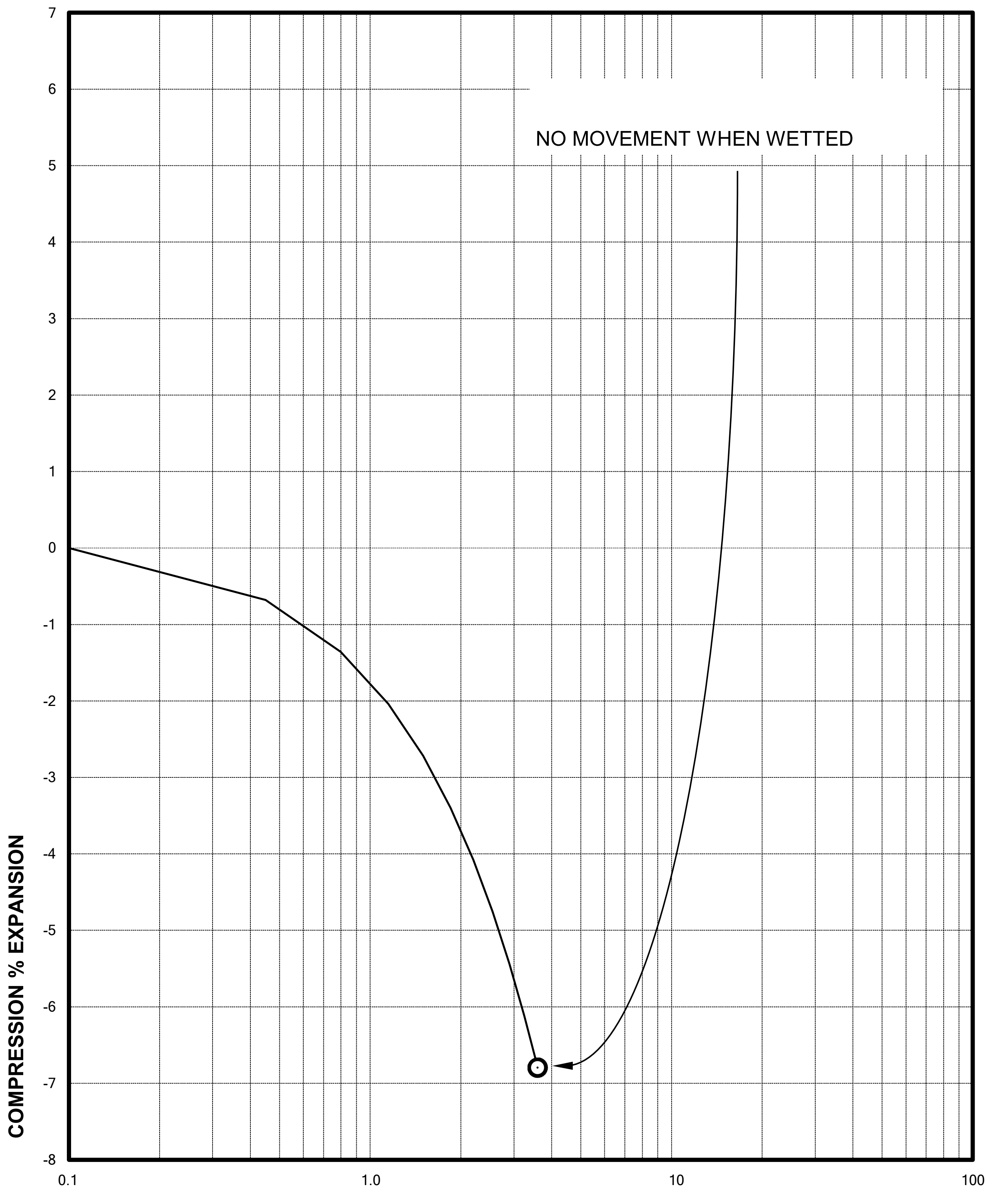
Sample of SAND, VERY CLAYEY (SC)
From TH-121 AT 19 FEET

DRY UNIT WEIGHT= 110 PCF
MOISTURE CONTENT= 18.4 %

LA PLATA COMMUNITIES
SILVER CROSS RANCH
CTL|T PROJECT NO. CS19053.001-115

Swell Consolidation Test Results

FIG. B-17



Sample of CLAY, SANDY (CL)

From TH-121 AT 29 FEET

DRY UNIT WEIGHT= 109 PCF

MOISTURE CONTENT= 20.6 %

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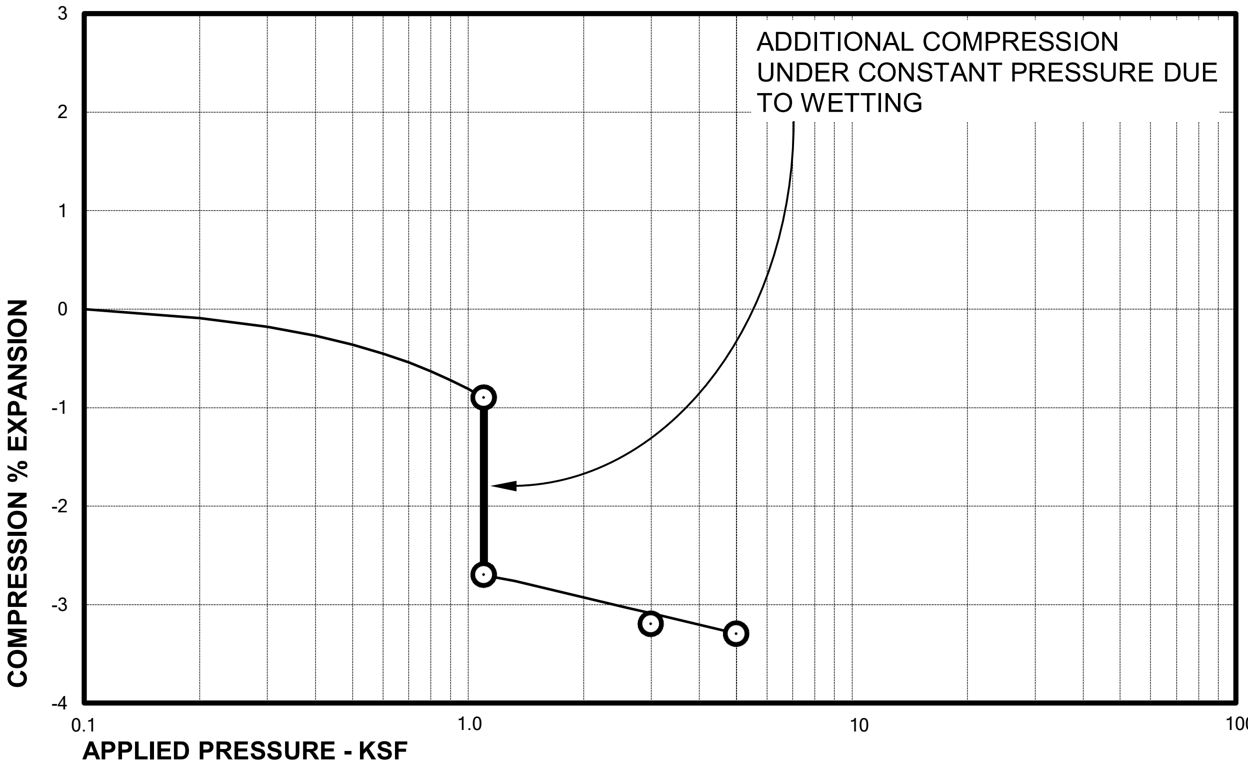
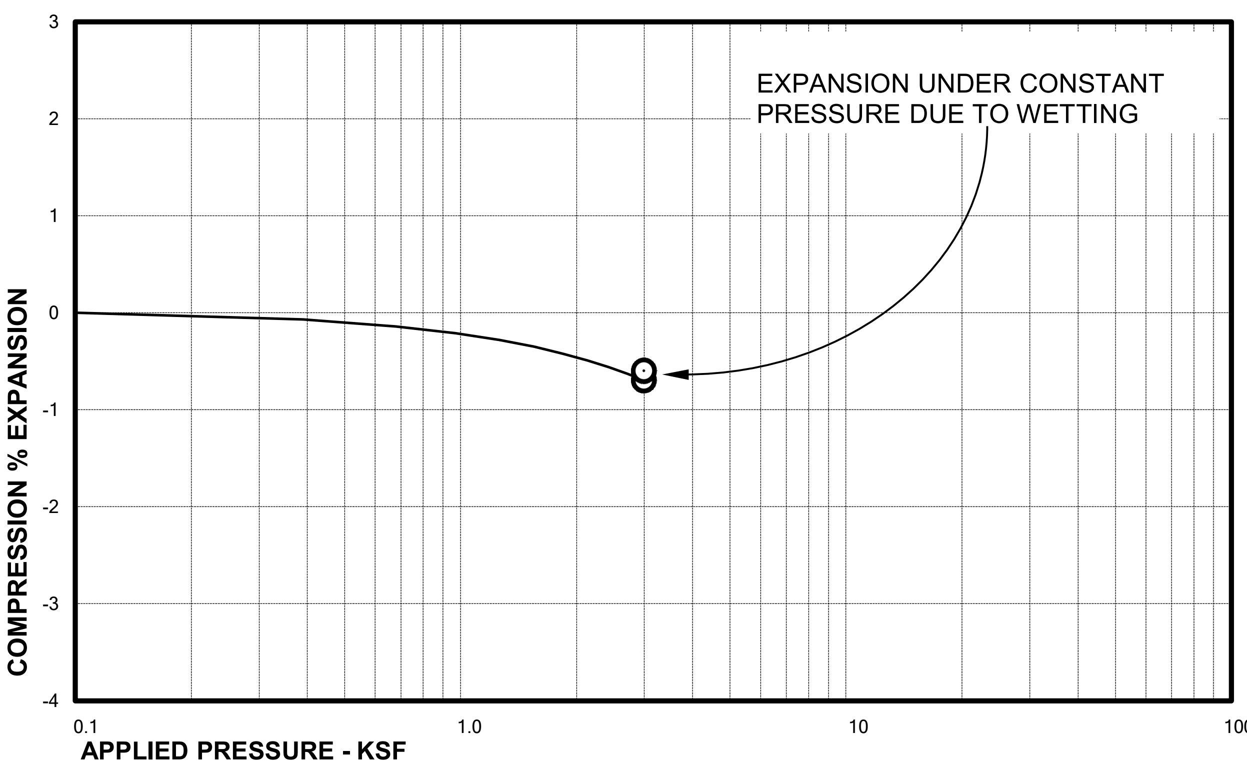
SILVER CROSS RANCH
CTL|T PROJECT NO. CS19053.001-115

Swell Consolidation Test Results

FIG. B-18



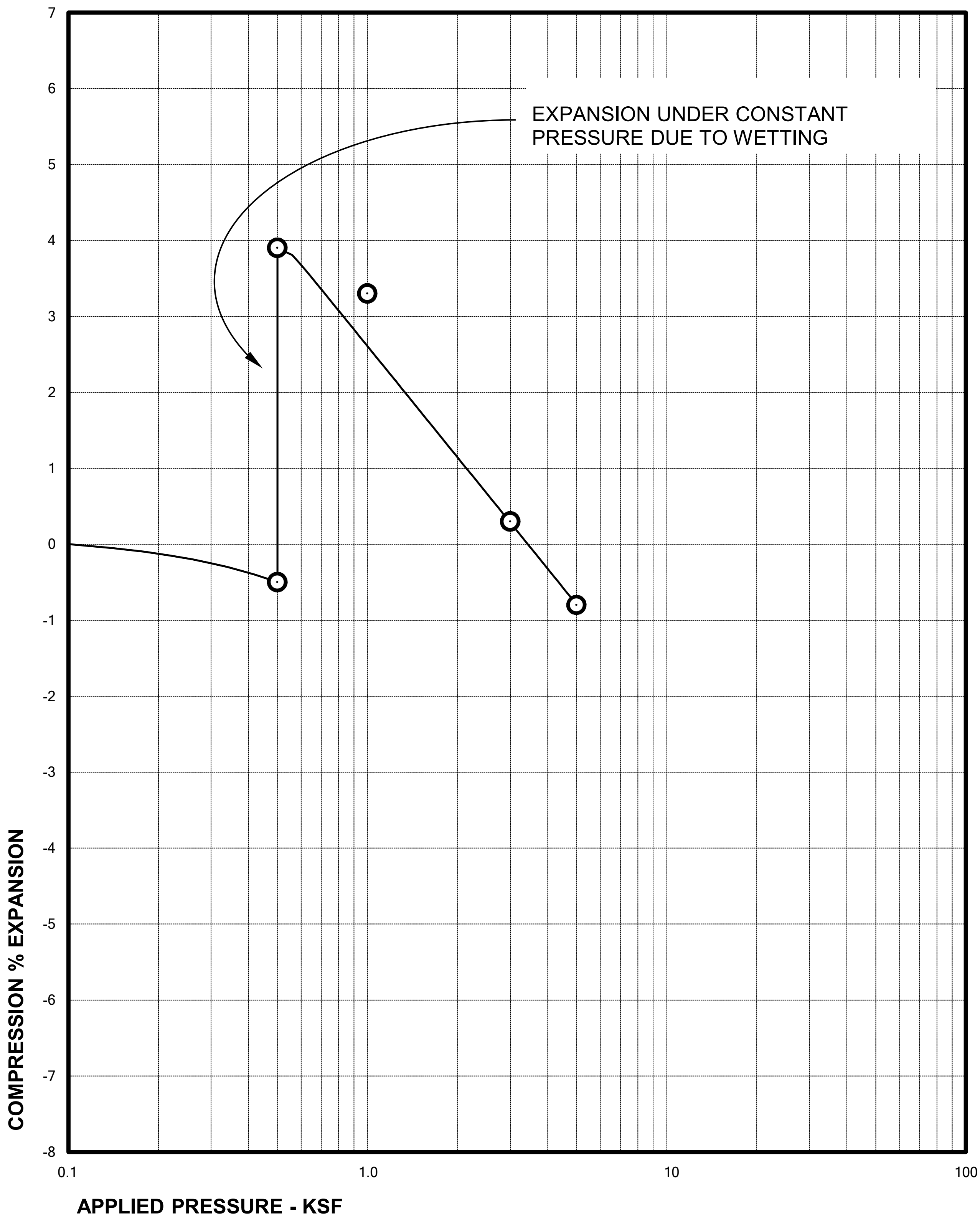
Sample of	SAND, SILTY (SM)	DRY UNIT WEIGHT=	93	PCF
From	TH-125 AT 9 FEET	MOISTURE CONTENT=	6.5	%



Sample of	CLAYSTONE, SANDY	DRY UNIT WEIGHT=	112	PCF
From	TH-126 AT 24 FEET	MOISTURE CONTENT=	17.7	%

Swell Consolidation Test Results

FIG. B-19



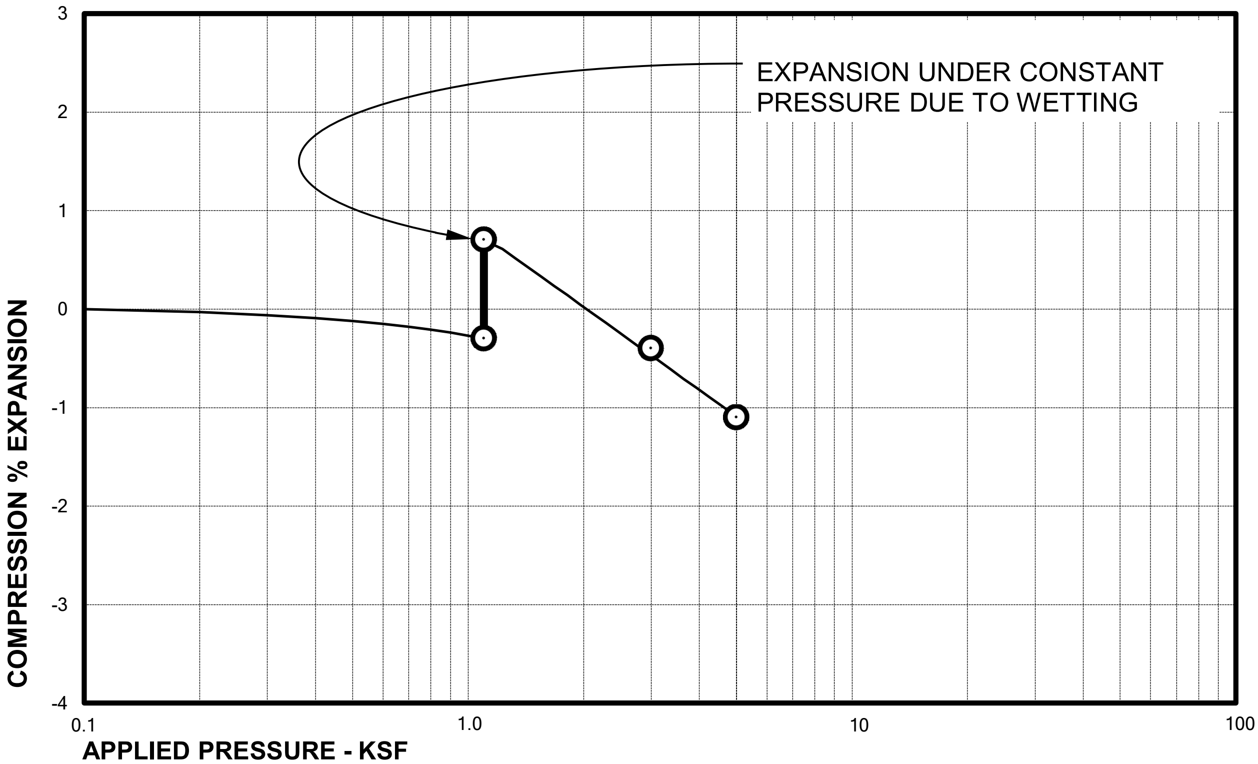
Sample of CLAY, VERY SANDY (CL)
From TH-128 AT 4 FEET

DRY UNIT WEIGHT= 109 PCF
MOISTURE CONTENT= 7.2 %

LA PLATA COMMUNITIES
SILVER CROSS RANCH
CTL|T PROJECT NO. CS19053.001-115

Swell Consolidation Test Results

FIG. B-20

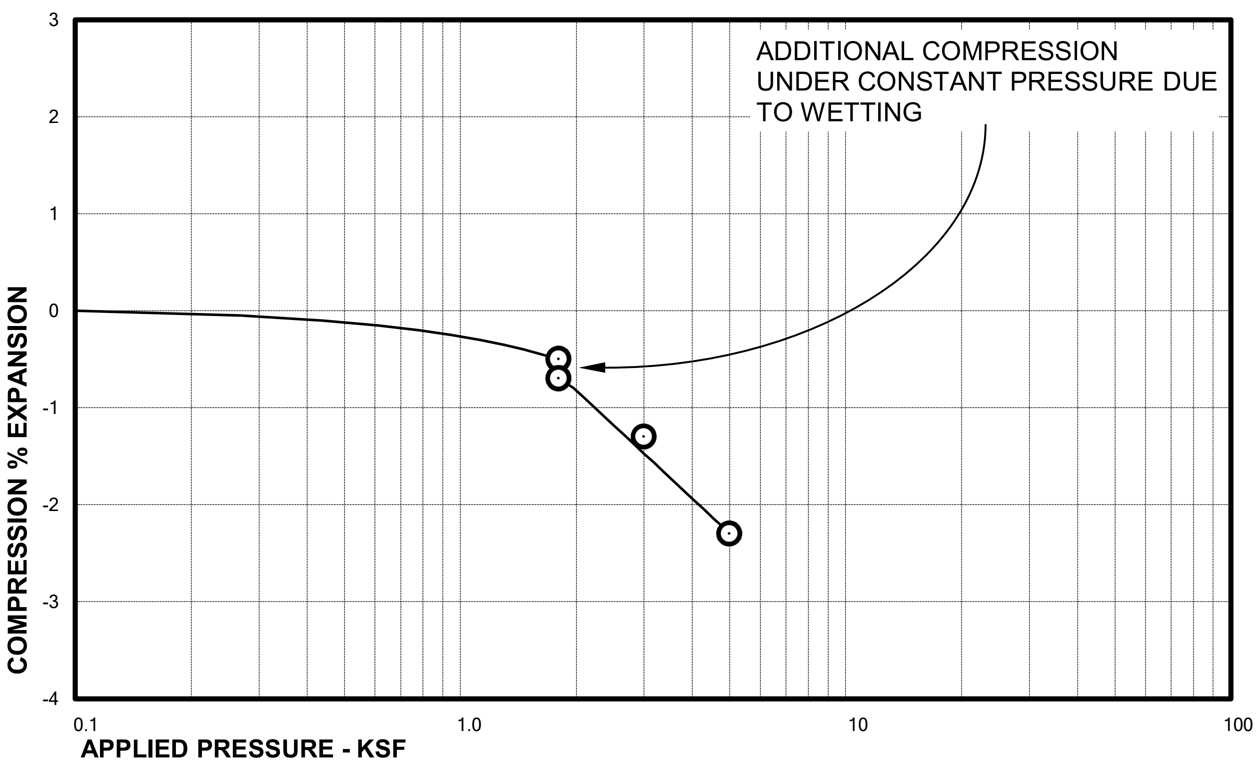


Sample of CLAY, VERY SANDY (CL)

From TH-128 AT 9 FEET

DRY UNIT WEIGHT= 117 PCF

MOISTURE CONTENT= 7.0 %

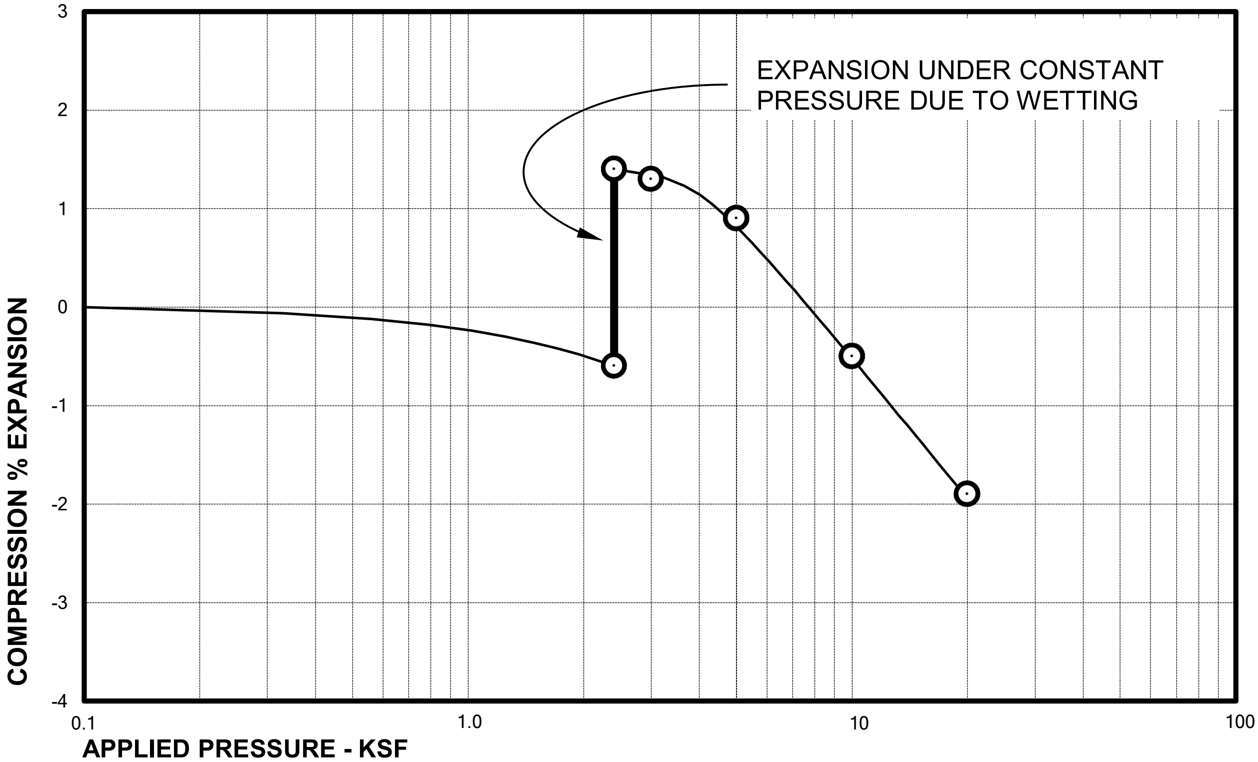


Sample of CLAY, SANDY (CL)

From TH-128 AT 14 FEET

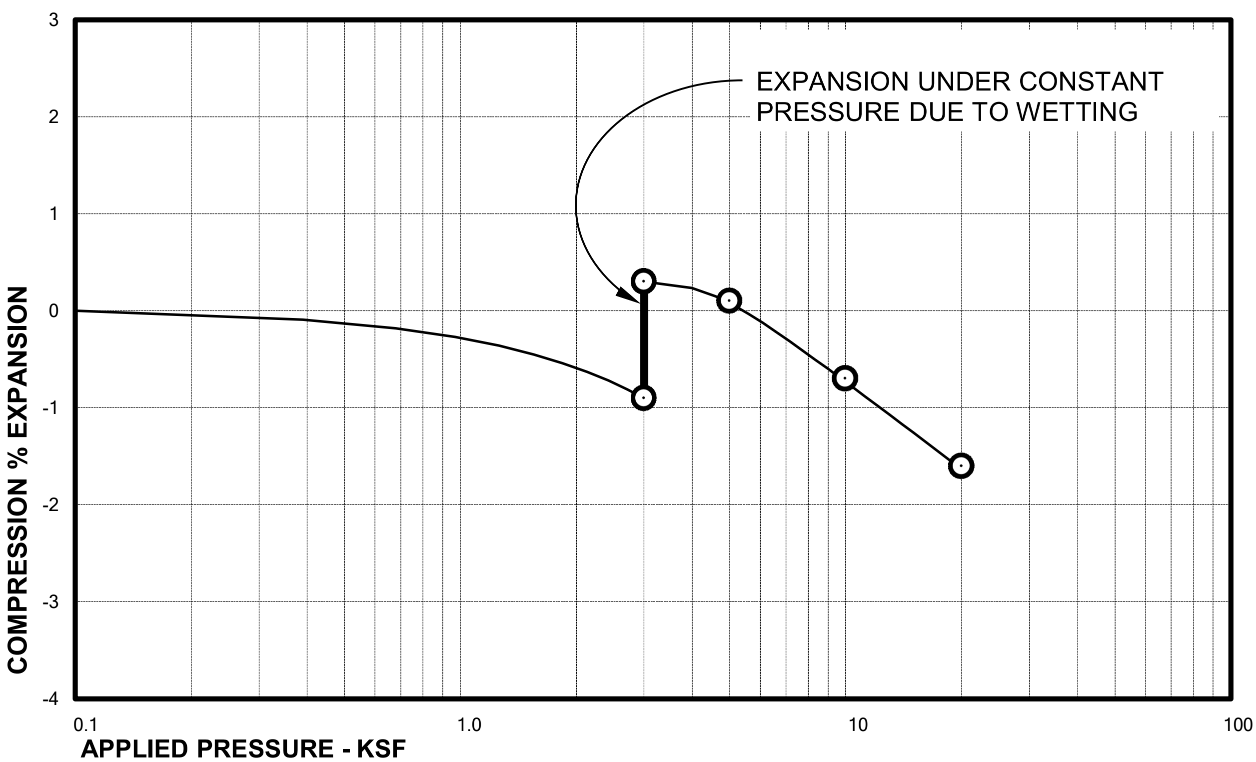
DRY UNIT WEIGHT= 105 PCF

MOISTURE CONTENT= 7.5 %



Sample of CLAY, SANDY (CL)
From TH-128 AT 19 FEET

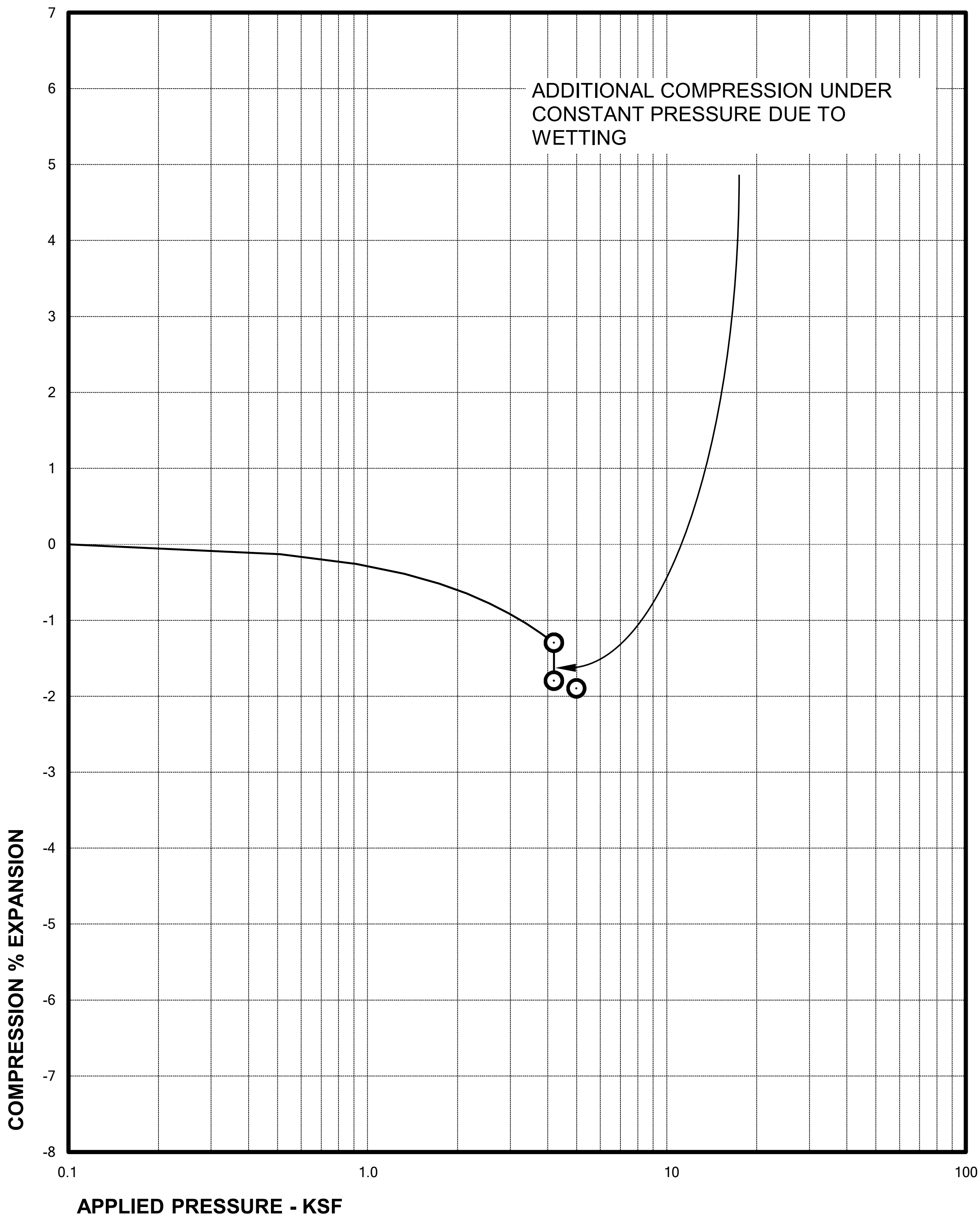
DRY UNIT WEIGHT= 119 PCF
MOISTURE CONTENT= 9.1 %



Sample of CLAY, SANDY (CL)
From TH-128 AT 24 FEET

DRY UNIT WEIGHT= 120 PCF
MOISTURE CONTENT= 10.3 %

Swell Consolidation Test Results



Sample of CLAY, SANDY (CL)
From TH-128 AT 34 FEET

DRY UNIT WEIGHT= 126 PCF
MOISTURE CONTENT= 8.6 %

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SILVER CROSS RANCH
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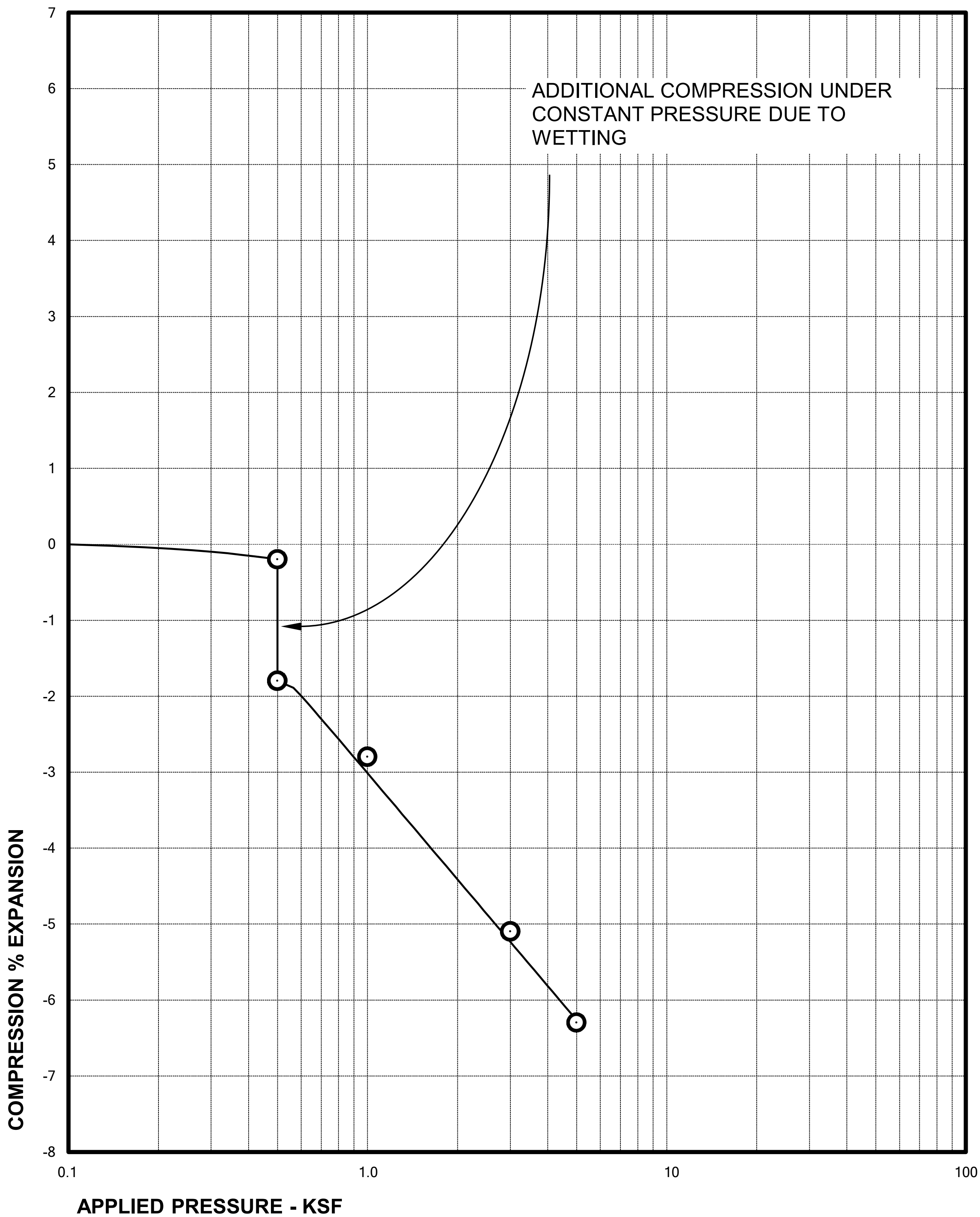
Swell Consolidation Test Results

FIG. B-23



Sample of SAND, SILTY (SM)

From TH-132 AT 4 FEET

DRY UNIT WEIGHT= 98 PCF

MOISTURE CONTENT= 5.4 %

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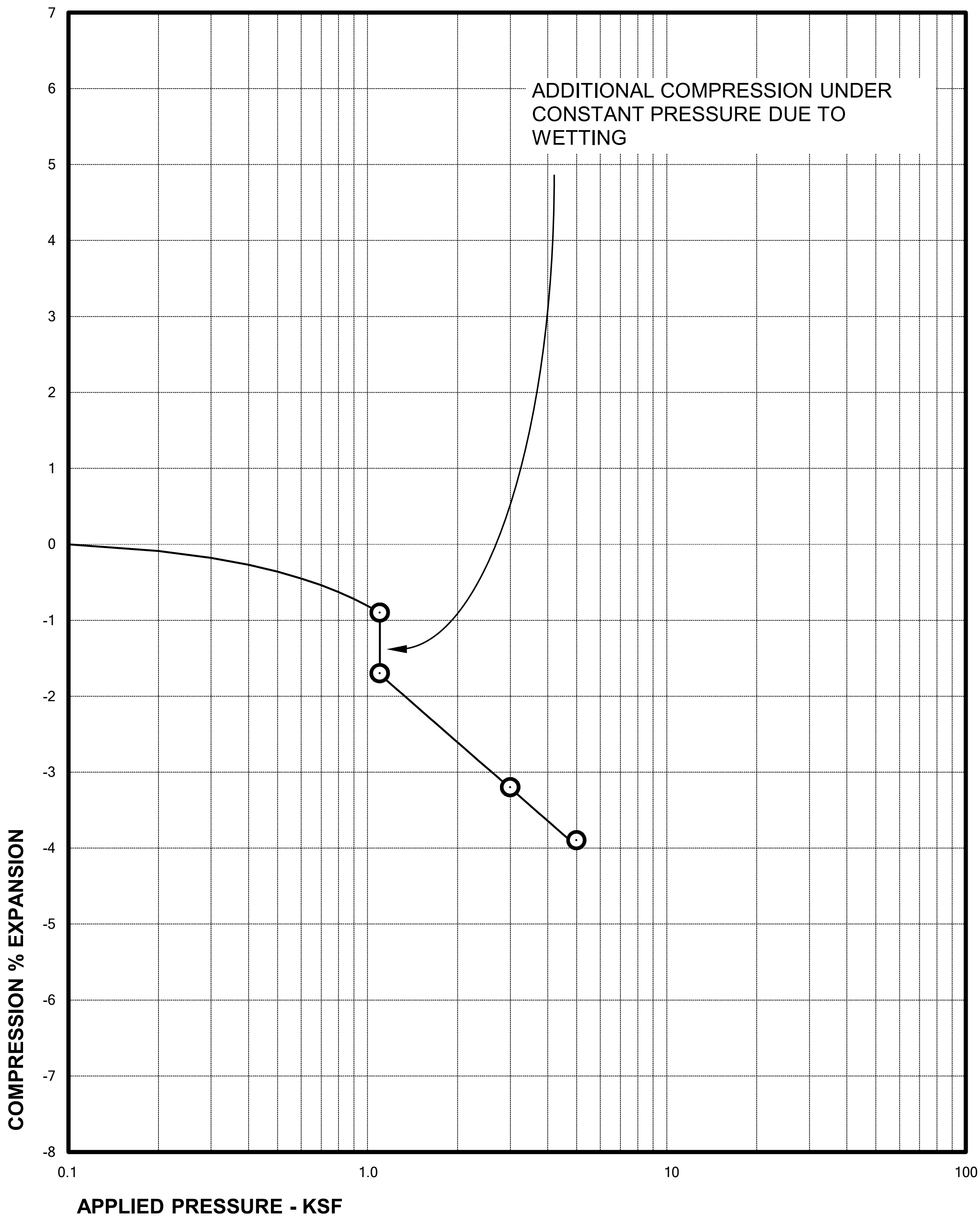
CTL|T PROJECT NO. CS19053.001-115

Swell Consolidation Test Results

FIG. B-24



Sample of SAND, VERY SILTY (SM)

From TH-132 AT 9 FEET

DRY UNIT WEIGHT= 99 PCF

MOISTURE CONTENT= 12.5 %

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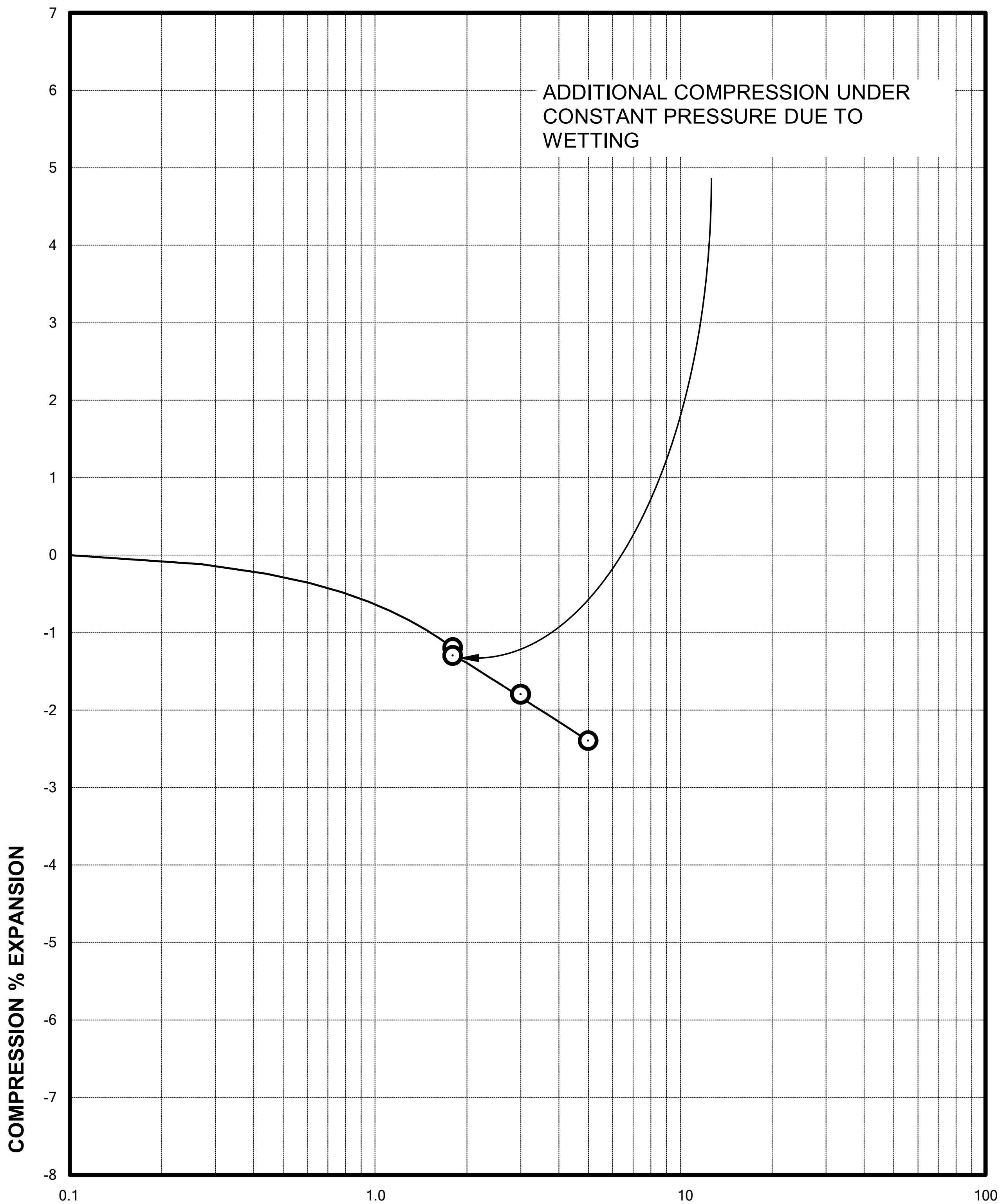
Swell Consolidation Test Results

FIG. B-25



APPLIED PRESSURE - KSF

Sample of SAND, VERY CLAYEY (SC)
From TH-132 AT 14 FEET

DRY UNIT WEIGHT= 106 PCF
MOISTURE CONTENT= 17.5 %

LA PLATA COMMUNITIES
SILVER CROSS RANCH
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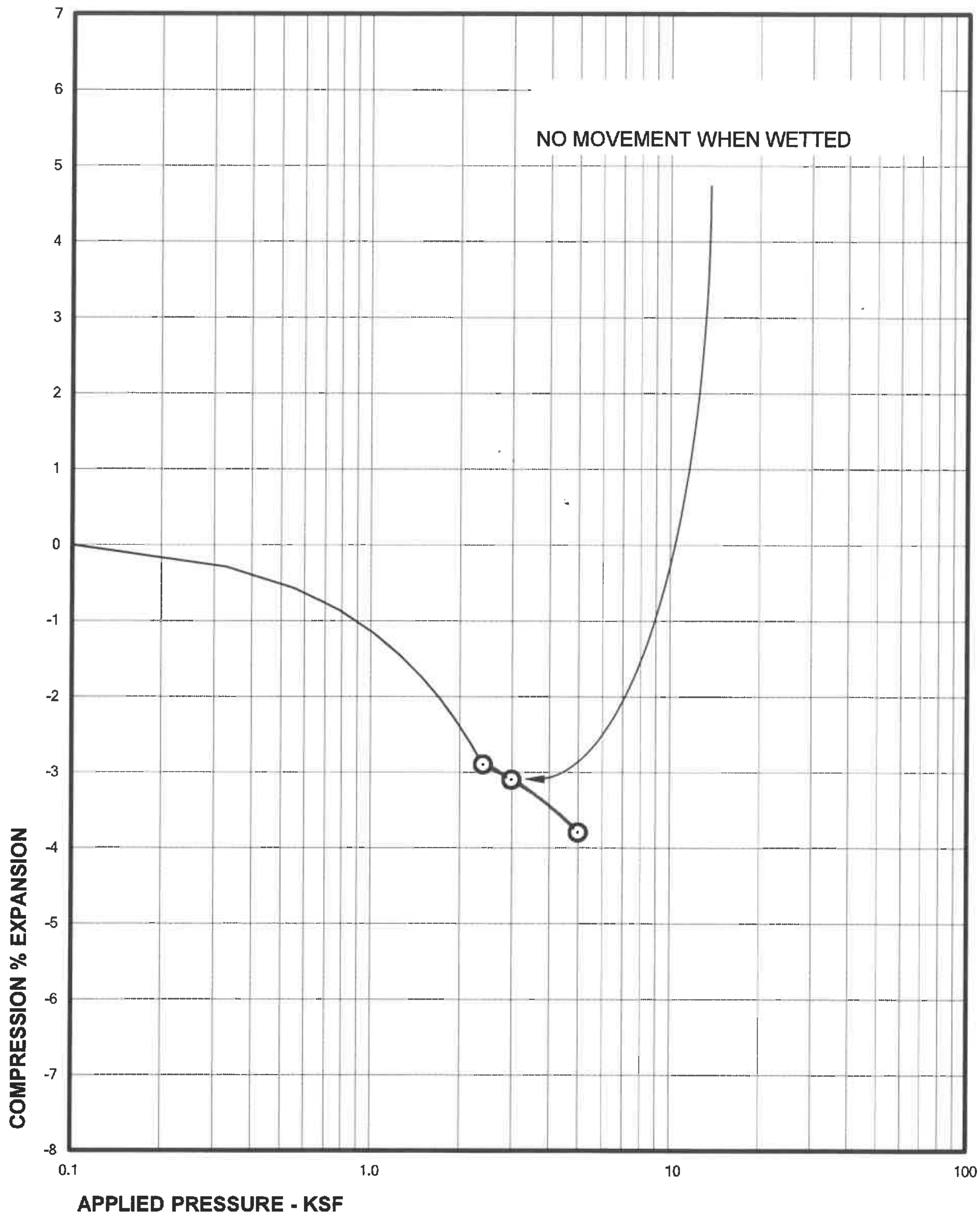
Swell Consolidation Test Results

FIG. B-26



Sample of SAND, SILTY (SM)
From TH-132 AT 19 FEET

DRY UNIT WEIGHT= 103 PCF
MOISTURE CONTENT= 22.0 %

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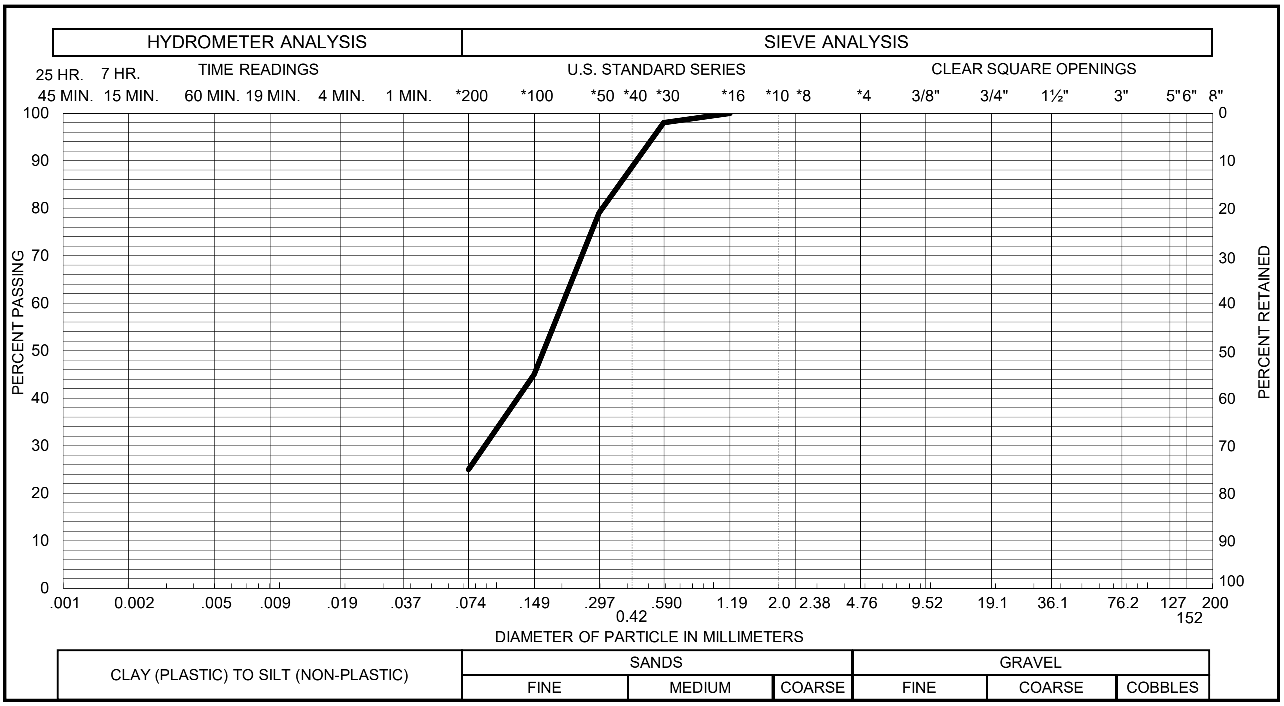
SILVER CROSS RANCH
CTL|T PROJECT NO. CS19053.001-115

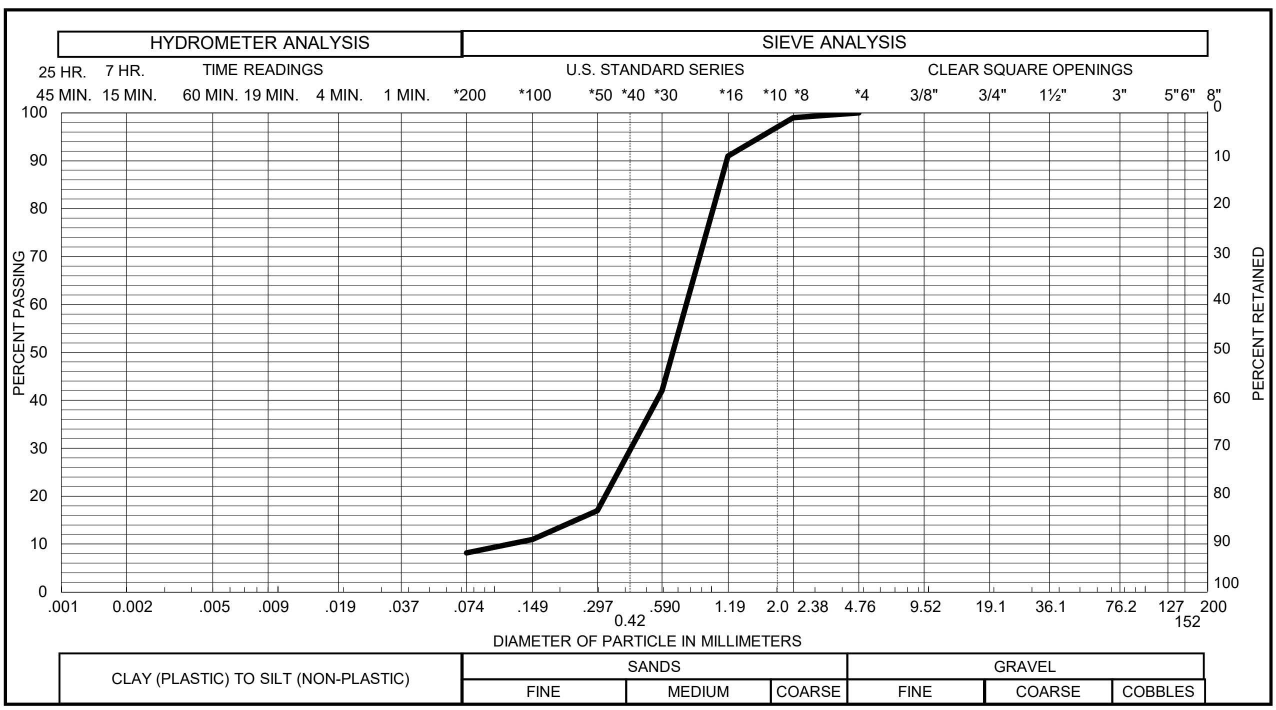
Swell Consolidation Test Results

FIG. B-27



Sample of SAND, SILTY (SM)
From TH - 101 AT 9 FEET

GRAVEL 0 % SAND 75 %
SILT & CLAY 25 % LIQUID LIMIT 21 %
PLASTICITY INDEX 2 %



Sample of SAND, SLIGHTLY SILTY (SP-SM)
From TH - 102 AT 9 FEET

GRAVEL 0 % SAND 92 %
SILT & CLAY 8 % LIQUID LIMIT %
PLASTICITY INDEX %

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SILVER CROSS RANCH
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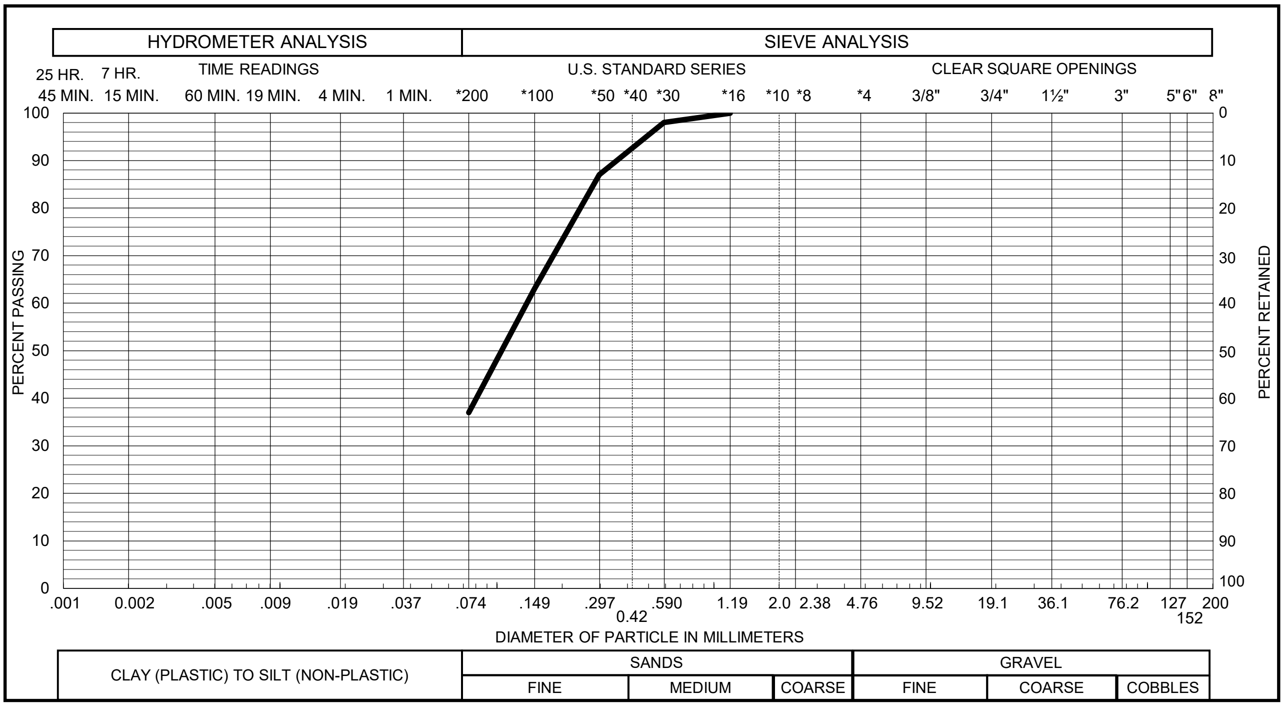
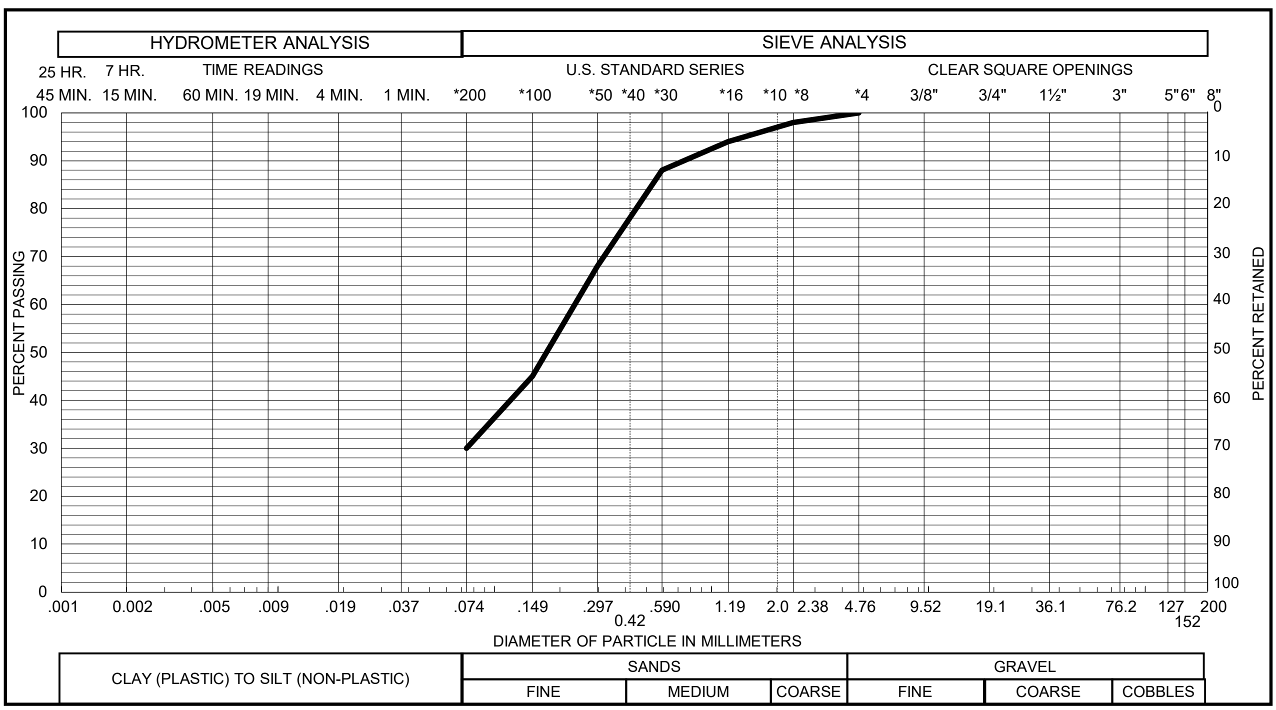
Gradation Test Results

FIG. B-28



Sample of	SAND, VERY SILTY (SM)	GRAVEL	0 %	SAND	63 %
From	TH - 102 AT 14 FEET	SILT & CLAY	37 %	LIQUID LIMIT	%
		PLASTICITY INDEX	%		



Sample of	SAND, SILTY (SM)	GRAVEL	0 %	SAND	70 %
From	TH - 102 AT 19 FEET	SILT & CLAY	30 %	LIQUID LIMIT	25 %
		PLASTICITY INDEX	7 %		

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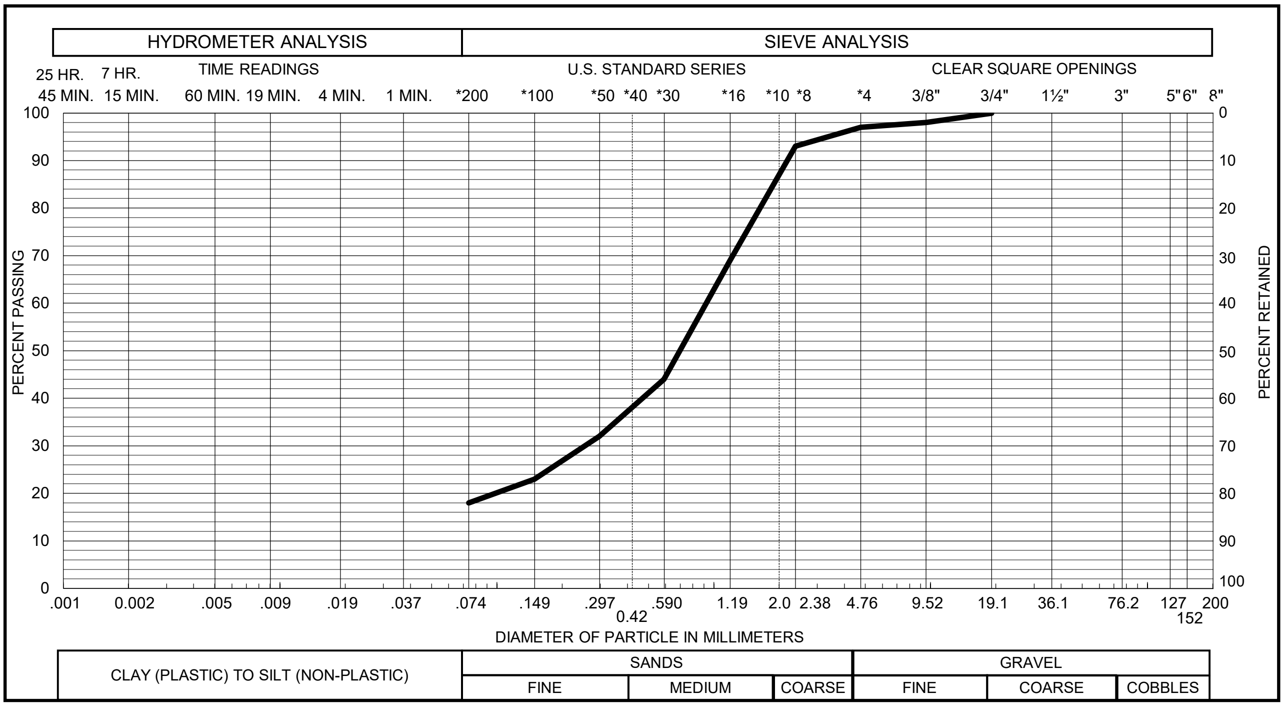
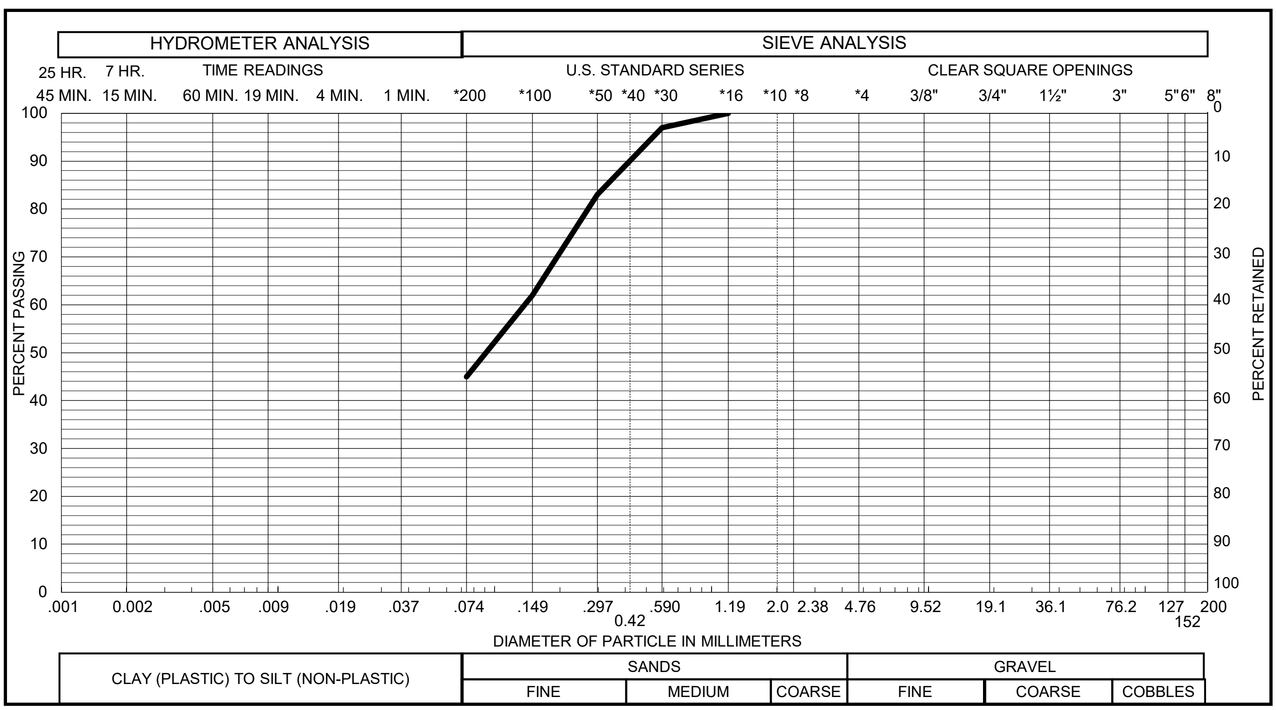
Gradation Test Results

FIG. B-29



Sample of SAND, SILTY (SM)
From TH - 102 AT 29 FEET

GRAVEL 3 % SAND 79 %
SILT & CLAY 18 % LIQUID LIMIT %
PLASTICITY INDEX %



Sample of SAND, VERY SILTY (SM)
From TH - 103 AT 19 FEET

GRAVEL 0 % SAND 55 %
SILT & CLAY 45 % LIQUID LIMIT %
PLASTICITY INDEX %

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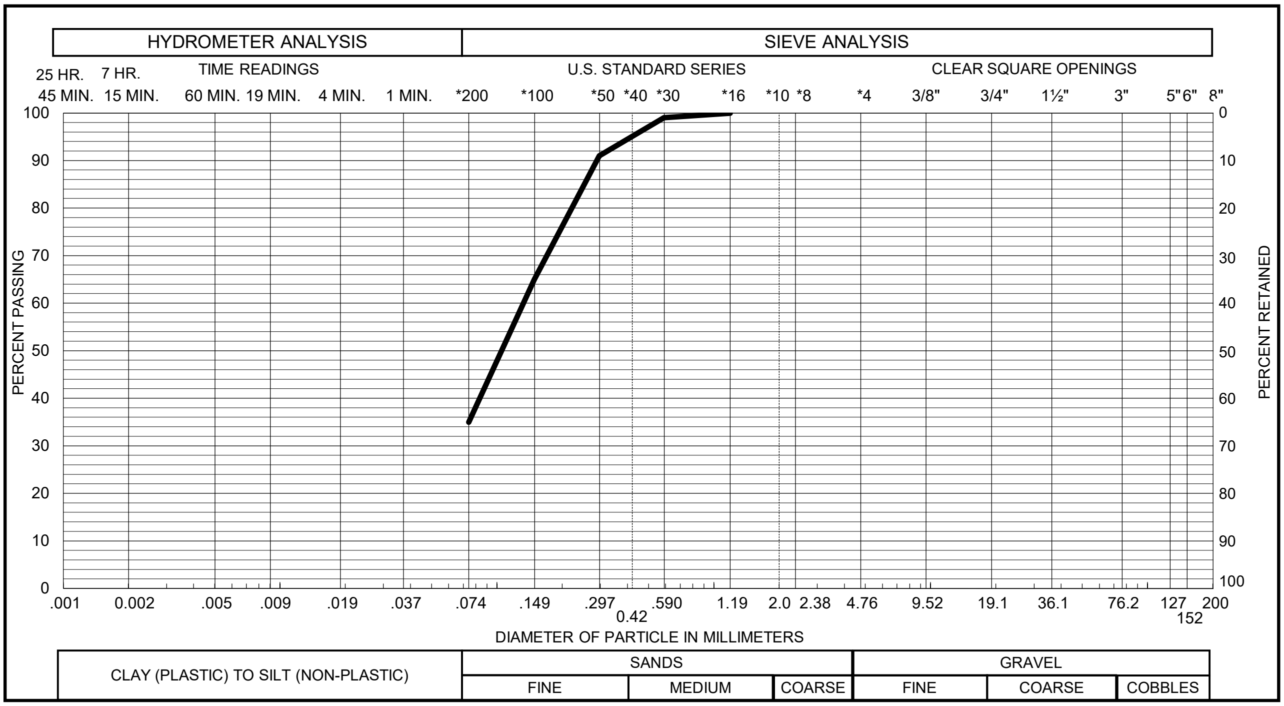
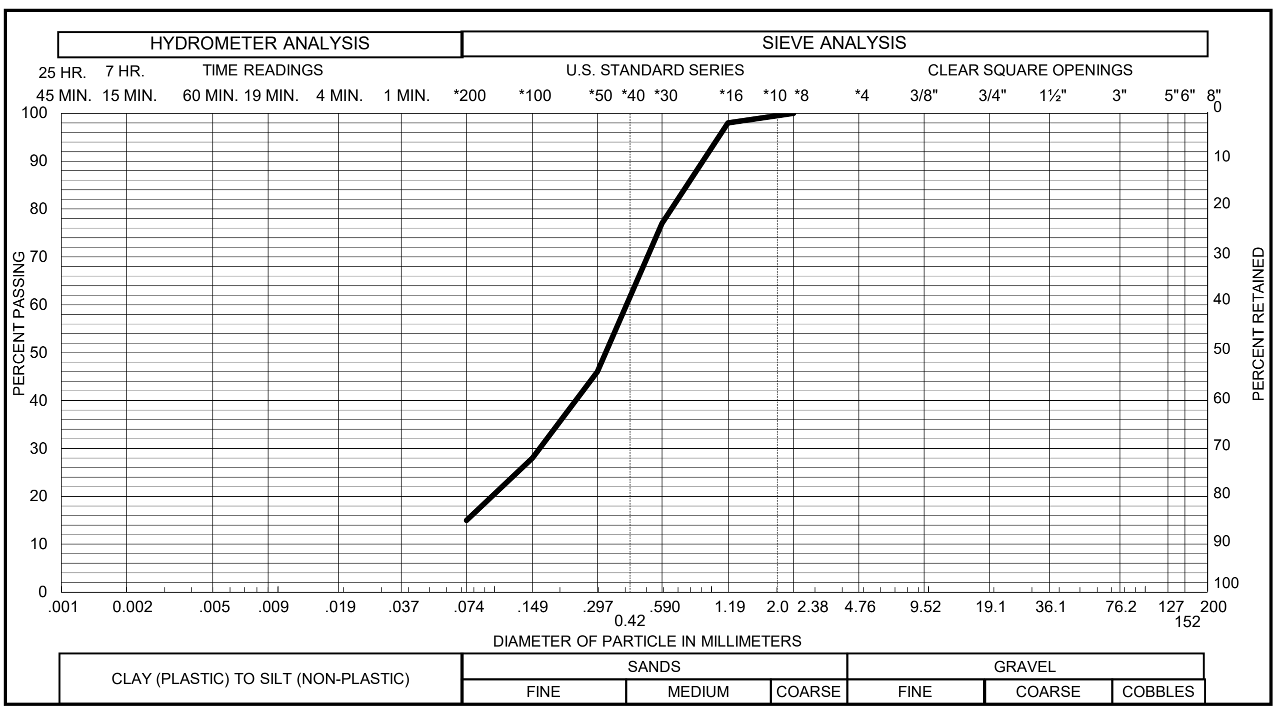
Gradation Test Results

FIG. B-30



Sample of SAND, SILTY (SM)
From TH - 103 AT 39 FEET

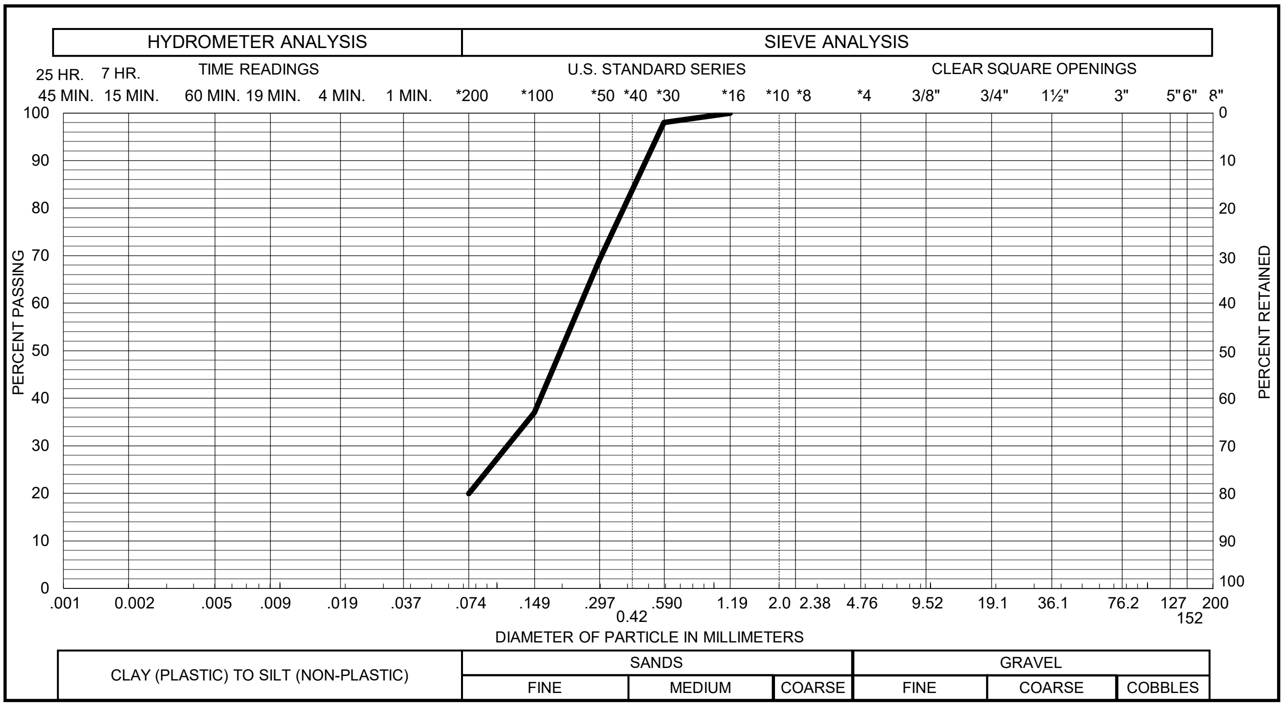
GRAVEL 0 % SAND 65 %
SILT & CLAY 35 % LIQUID LIMIT 23 %
PLASTICITY INDEX 4 %



Sample of SAND, SILTY (SM)
From TH - 104 AT 4 FEET

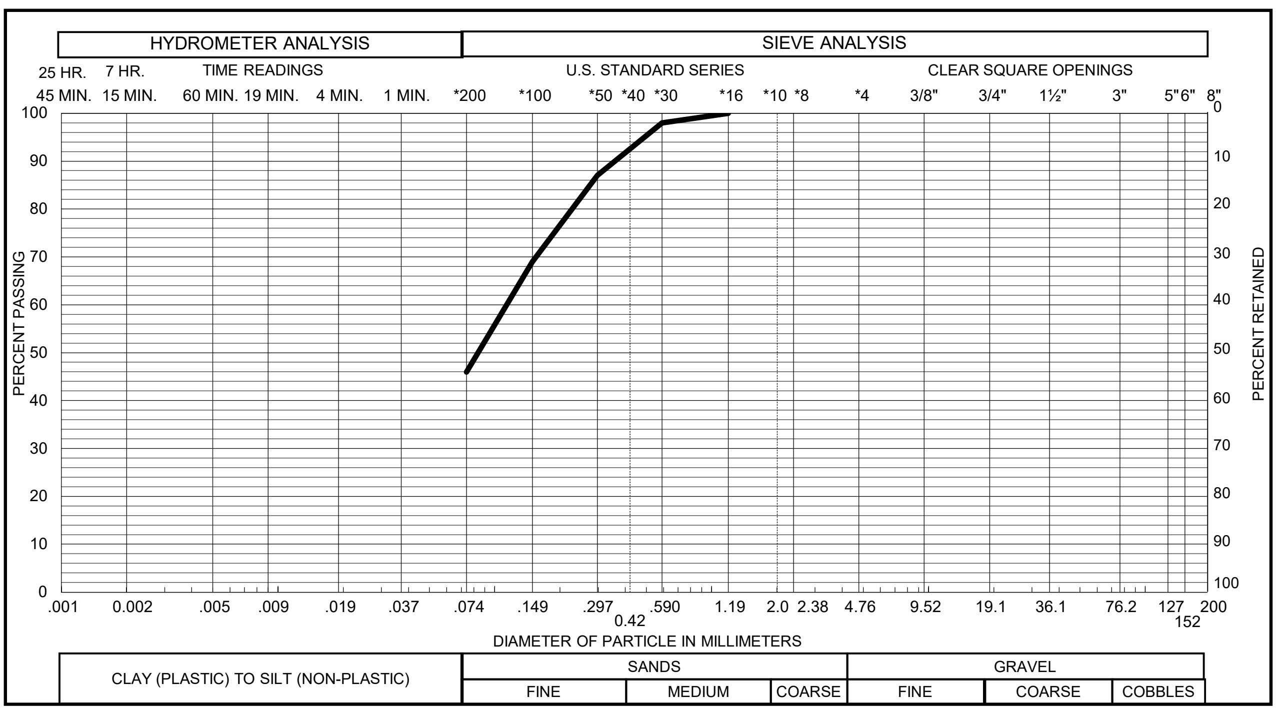
GRAVEL 0 % SAND 85 %
SILT & CLAY 15 % LIQUID LIMIT NL %
PLASTICITY INDEX NP %

Gradation Test Results



Sample of SAND, SILTY (SM)
From TH - 104 AT 24 FEET

GRAVEL 0 % SAND 80 %
SILT & CLAY 20 % LIQUID LIMIT %
PLASTICITY INDEX %



Sample of SAND, VERY CLAYEY (SC)
From TH - 106 AT 9 FEET

GRAVEL 0 % SAND 54 %
SILT & CLAY 46 % LIQUID LIMIT 28 %
PLASTICITY INDEX 9 %

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SILVER CROSS RANCH
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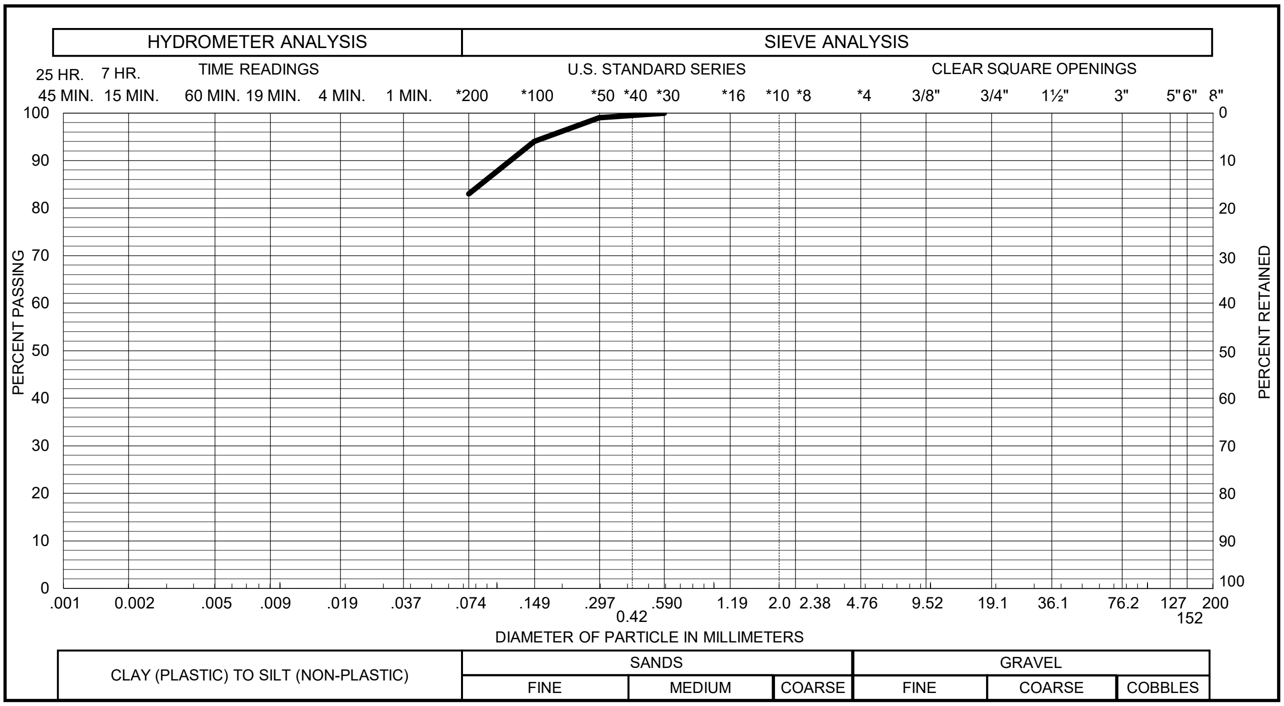
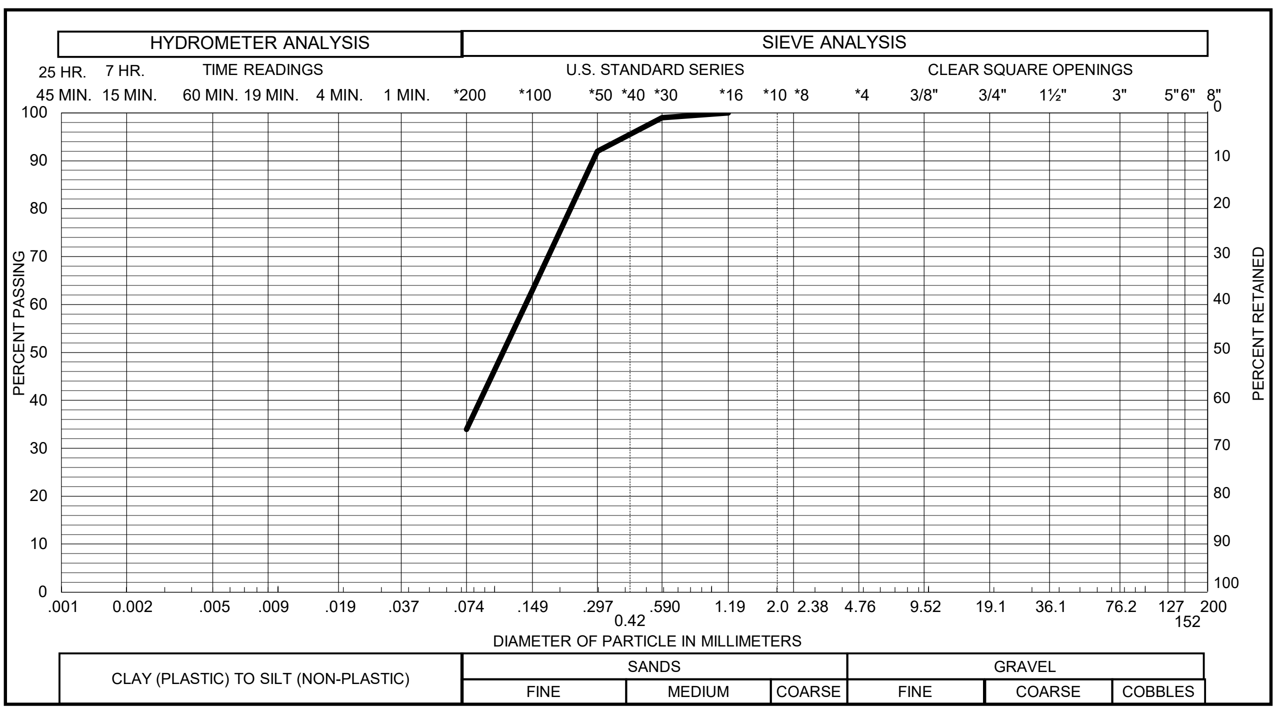
Gradation Test Results

FIG. B-32



Sample of CLAY, SANDY (CL)
From TH - 106 AT 34 FEET

GRAVEL 0 % SAND 17 %
SILT & CLAY 83 % LIQUID LIMIT 38 %
PLASTICITY INDEX 20 %



Sample of SAND, SILTY (SM)
From TH - 107 AT 14 FEET

GRAVEL 0 % SAND 66 %
SILT & CLAY 34 % LIQUID LIMIT 26 %
PLASTICITY INDEX 6 %

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SILVER CROSS RANCH
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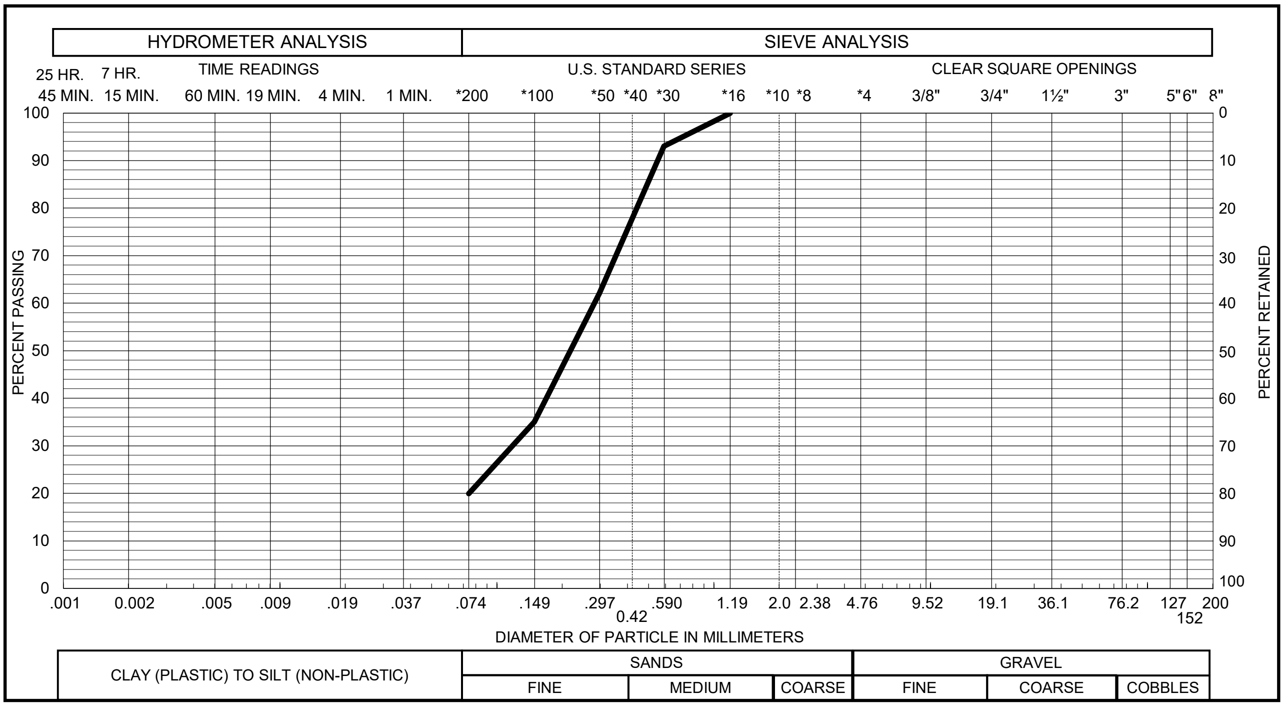
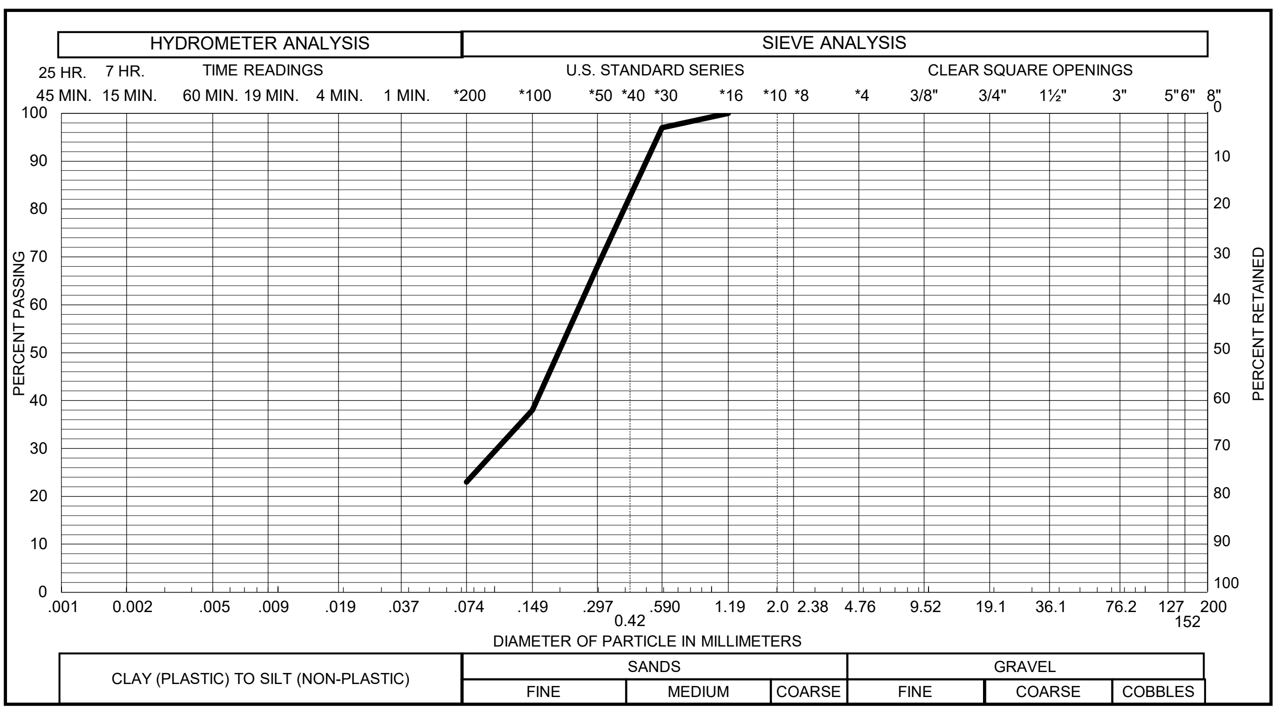
Gradation Test Results

FIG. B-33



Sample of SAND, SILTY (SM)
From TH - 108 AT 4 FEET

GRAVEL	0 %	SAND	80 %
SILT & CLAY	20 %	LIQUID LIMIT	NL %
PLASTICITY INDEX			NP %



Sample of SAND, SILTY (SM)
From TH - 108 AT 14 FEET

GRAVEL	0 %	SAND	77 %
SILT & CLAY	23 %	LIQUID LIMIT	%
PLASTICITY INDEX			%

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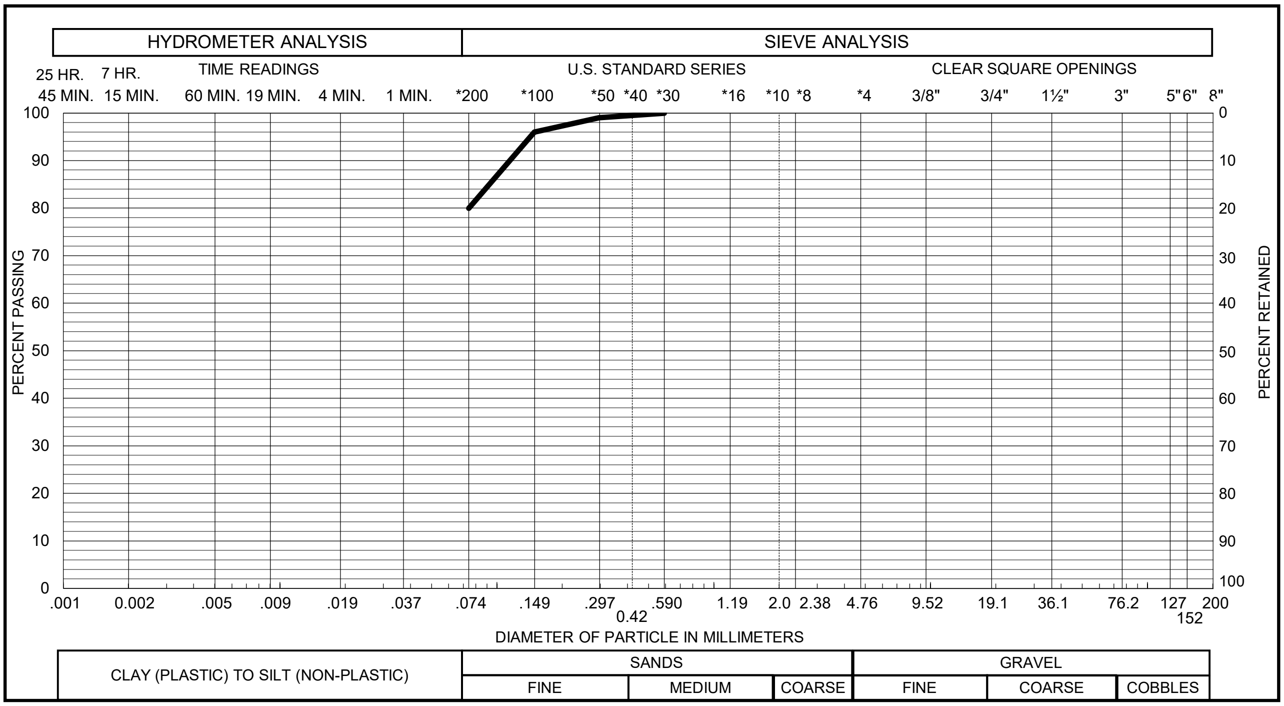
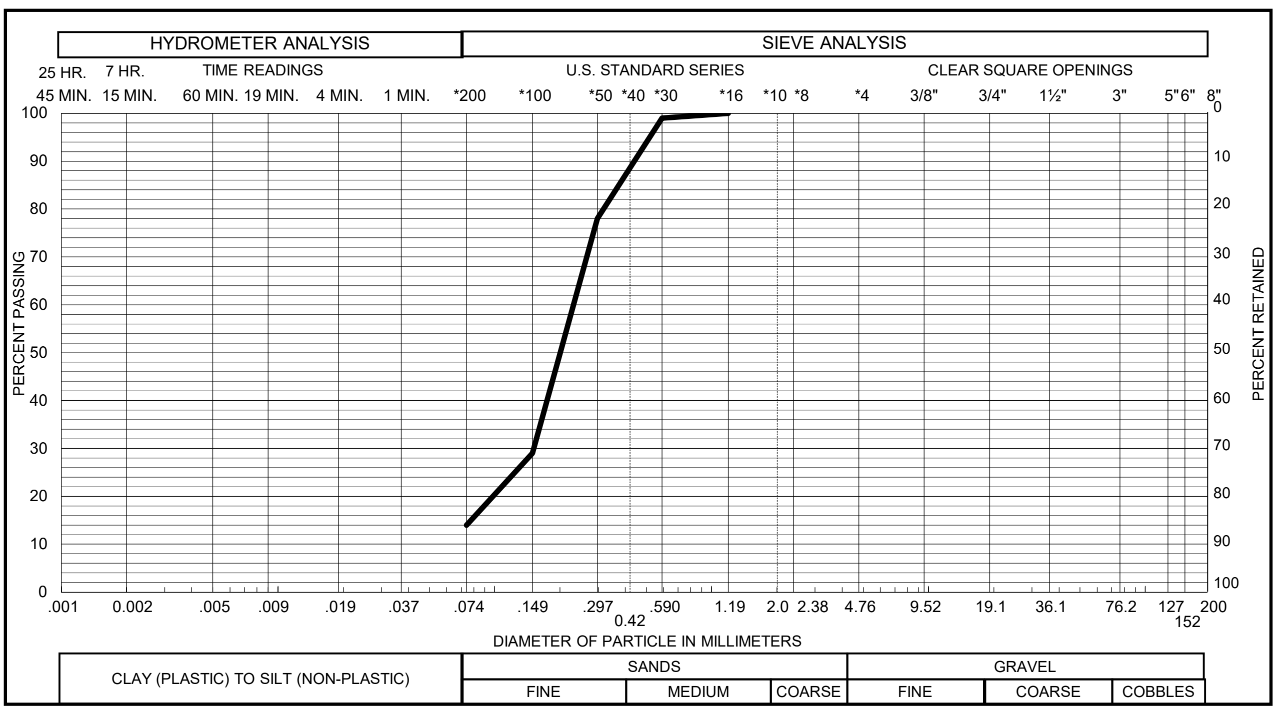
Gradation Test Results

FIG. B-34



Sample of CLAY, SANDY (CL)
From TH - 108 AT 19 FEET

GRAVEL 0 % SAND 20 %
SILT & CLAY 80 % LIQUID LIMIT 34 %
PLASTICITY INDEX 13 %



Sample of SAND, SILTY (SM)
From TH - 109 AT 4 FEET

GRAVEL 0 % SAND 86 %
SILT & CLAY 14 % LIQUID LIMIT %
PLASTICITY INDEX %

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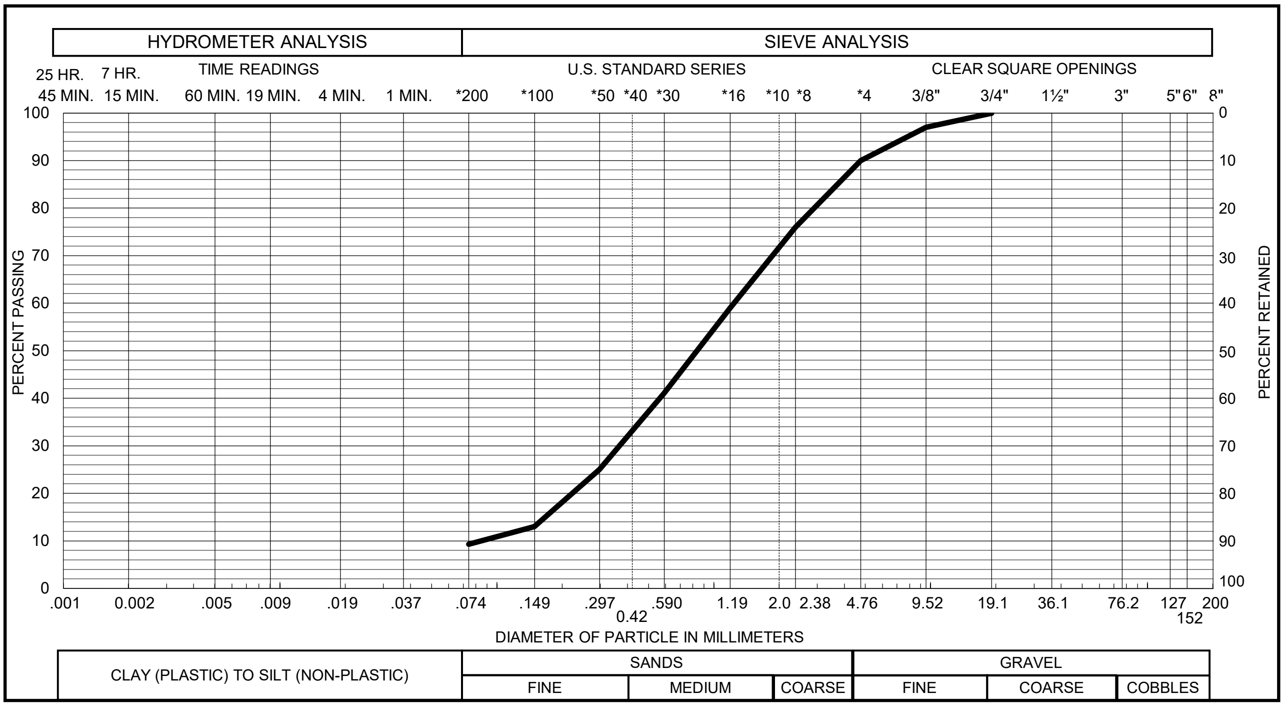
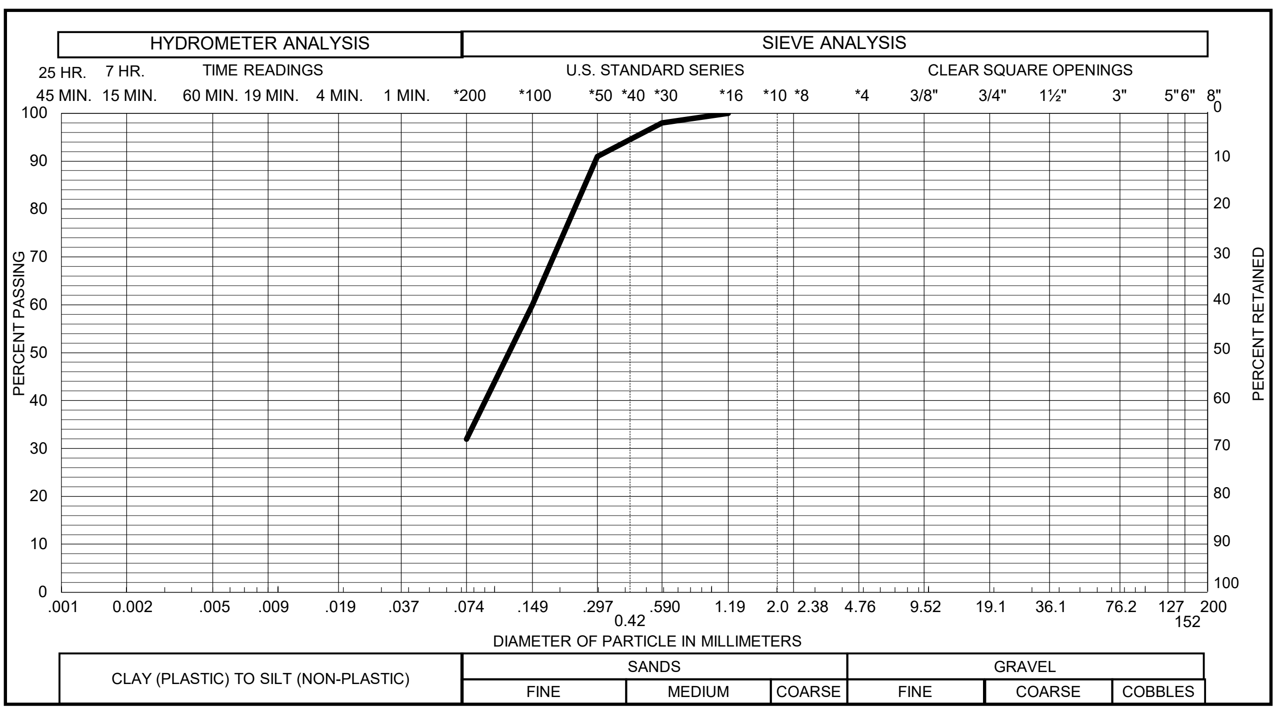
Gradation Test Results

FIG. B-35



Sample of SAND, SLIGHTLY SILTY (SP-SM)
From TH - 109 AT 14 FEET

GRAVEL	10 %	SAND	81 %
SILT & CLAY	9 %	LIQUID LIMIT	%
PLASTICITY INDEX	%		



Sample of SAND, SILTY (SM)
From TH - 109 AT 19 FEET

GRAVEL	0 %	SAND	68 %
SILT & CLAY	32 %	LIQUID LIMIT	24 %
PLASTICITY INDEX	4 %		

LA PLATA COMMUNITIES
SILVER CROSS RANCH
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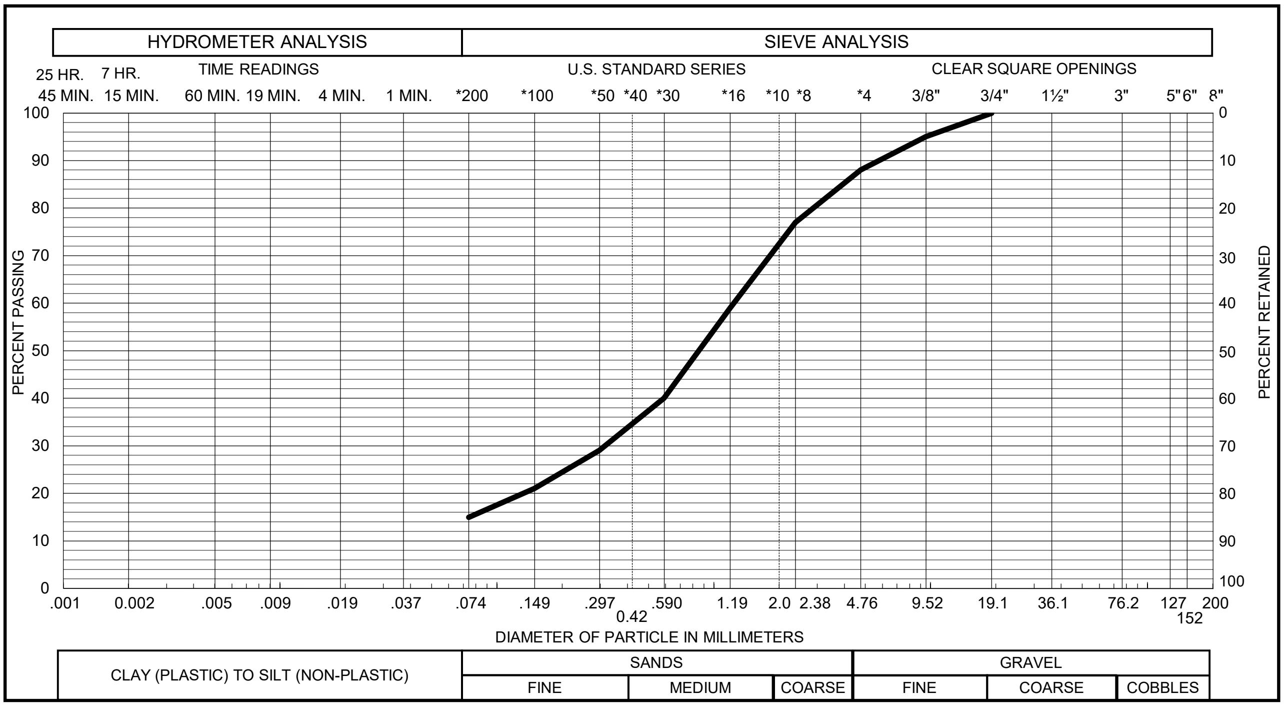
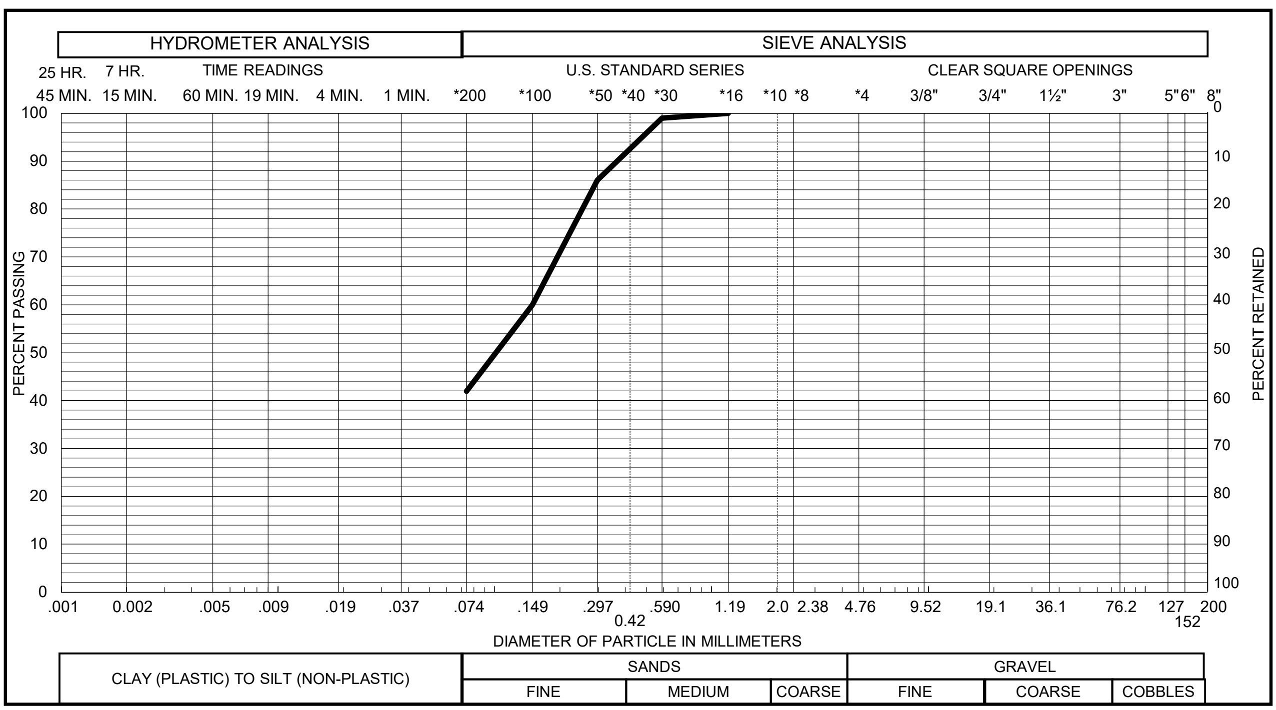
Gradation Test Results

FIG. B-36



Sample of SAND, SILTY (SM)
From TH - 109 AT 29 FEET

GRAVEL	12 %	SAND	73 %		
SILT & CLAY	15 %	LIQUID LIMIT	%		
PLASTICITY INDEX			%		



Sample of SAND, VERY CLAYEY (SC)
From TH - 110 AT 14 FEET

GRAVEL	0 %	SAND	58 %
SILT & CLAY	42 %	LIQUID LIMIT	25 %
PLASTICITY INDEX			11 %

LA PLATA COMMUNITIES
SILVER CROSS RANCH
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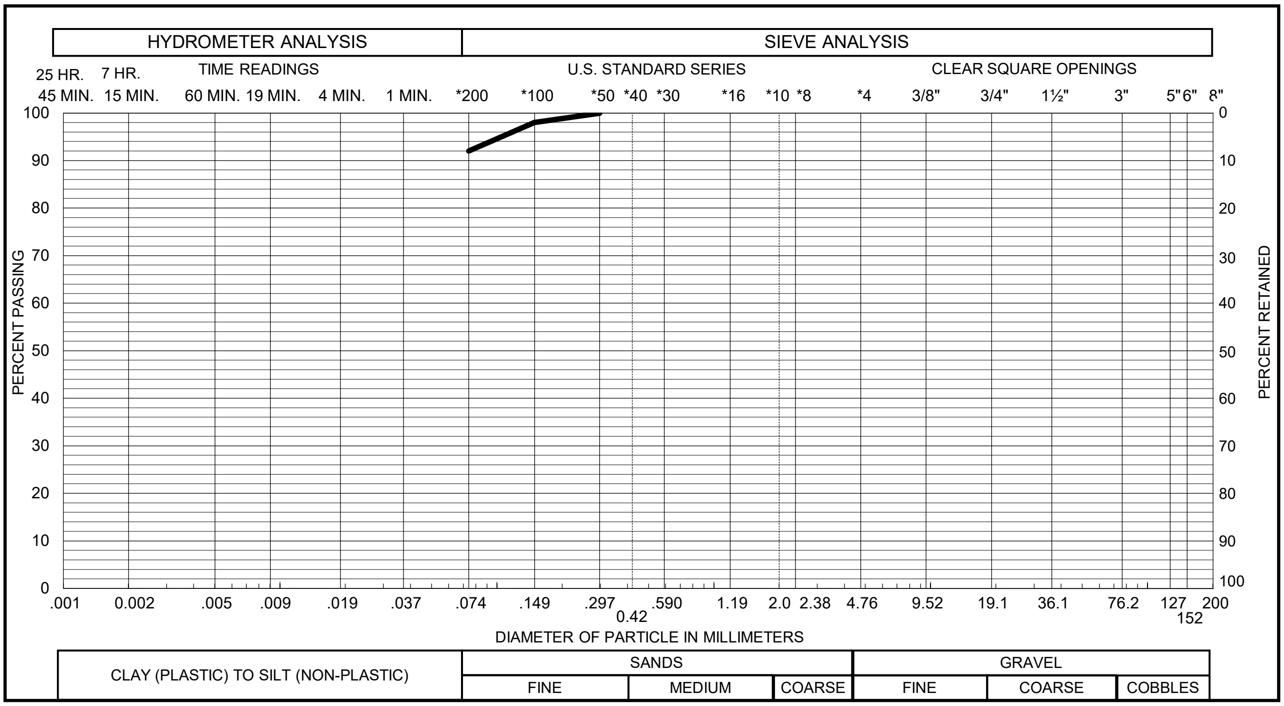
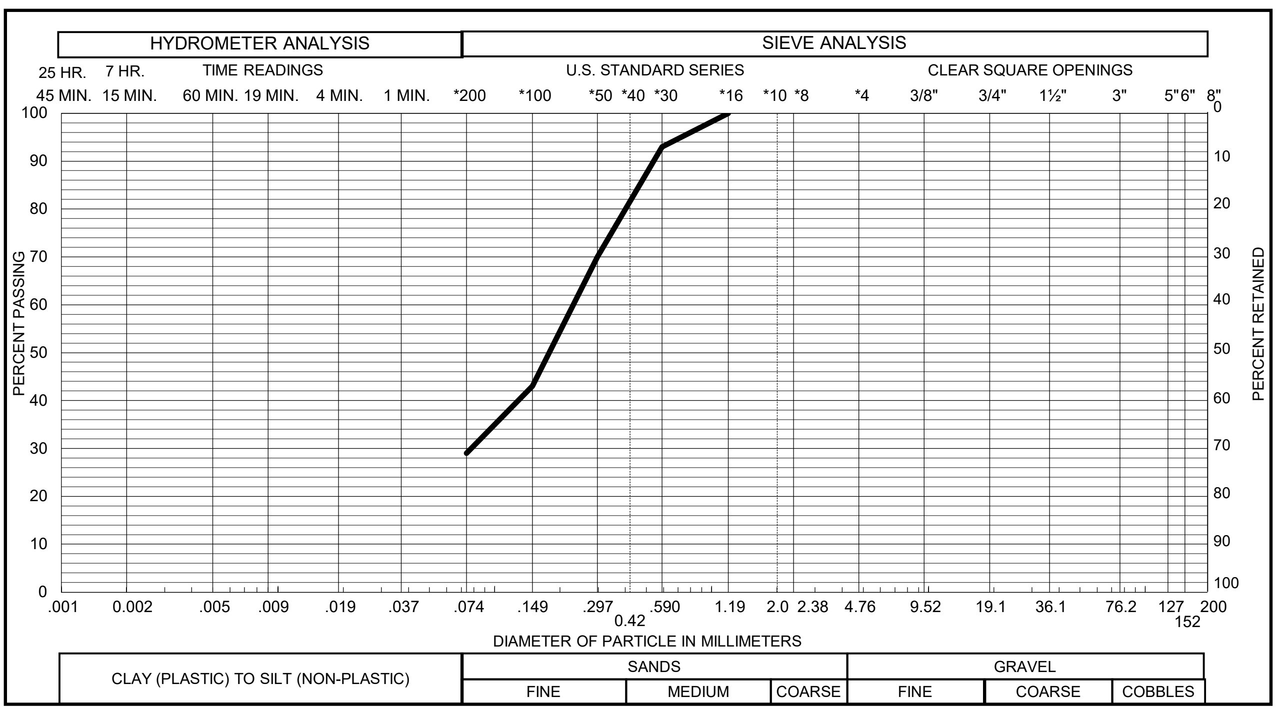
Gradation Test Results

FIG. B-37



Sample of CLAY, SLIGHTLY SANDY (CL)
From TH - 110 AT 19 FEET

GRAVEL 0 % SAND 8 %
SILT & CLAY 92 % LIQUID LIMIT 38 %
PLASTICITY INDEX 21 %



Sample of SAND, SILTY (SM)
From TH - 111 AT 14 FEET

GRAVEL 0 % SAND 71 %
SILT & CLAY 29 % LIQUID LIMIT 22 %
PLASTICITY INDEX 6 %

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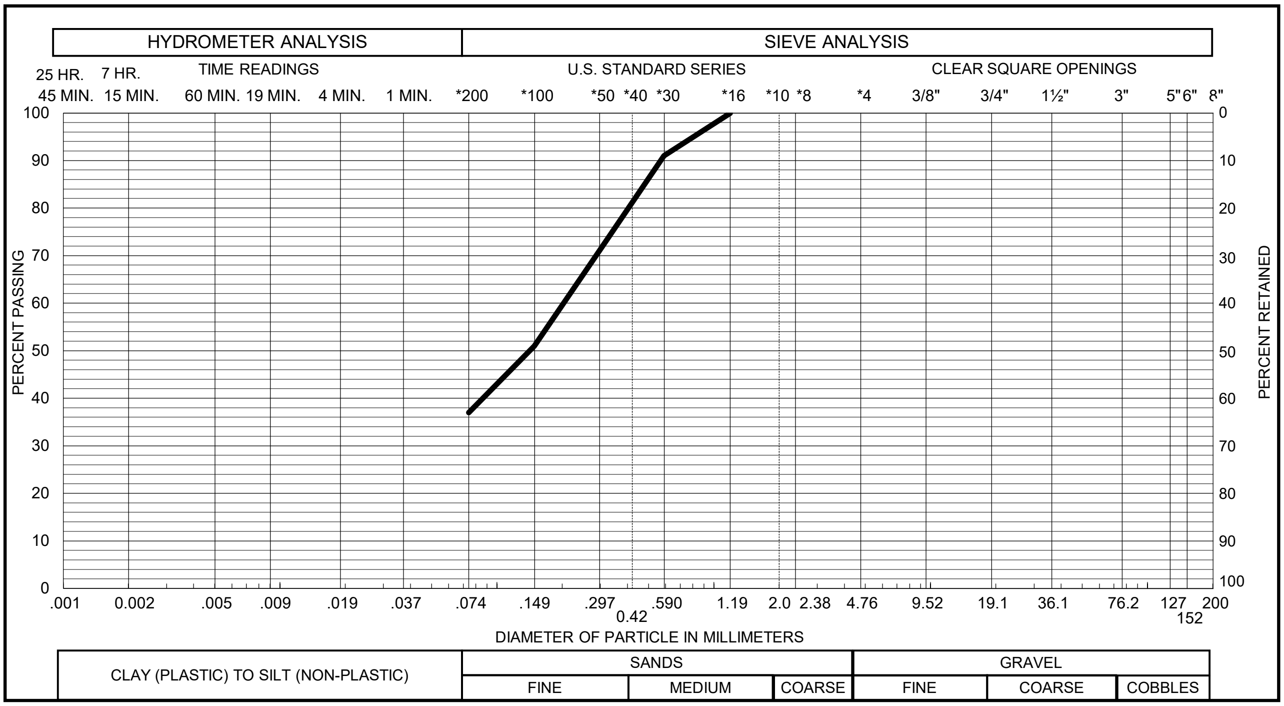
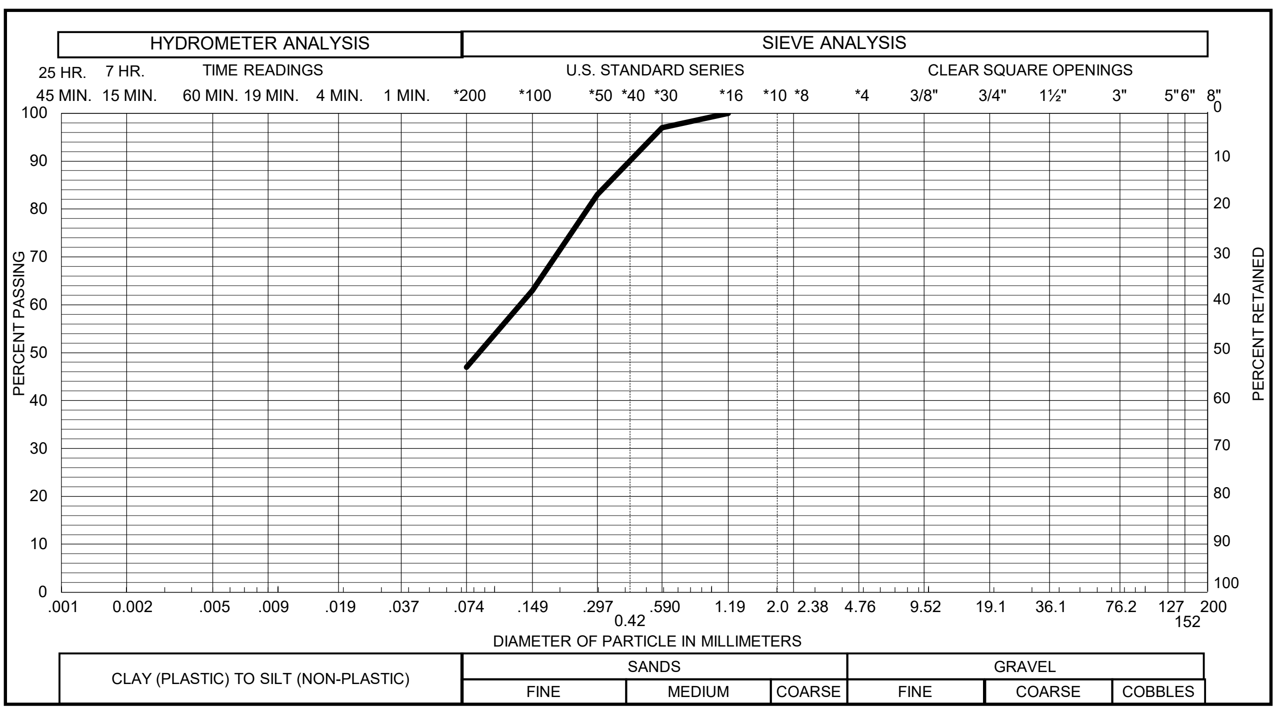
Gradation Test Results

FIG. B-38



Sample of SAND, VERY CLAYEY (SC)
From TH - 112 AT 14 FEET

GRAVEL 0 % SAND 63 %
SILT & CLAY 37 % LIQUID LIMIT 22 %
PLASTICITY INDEX 8 %



Sample of SAND, VERY CLAYEY (SC)
From TH - 112 AT 29 FEET

GRAVEL 0 % SAND 53 %
SILT & CLAY 47 % LIQUID LIMIT 26 %
PLASTICITY INDEX 14 %

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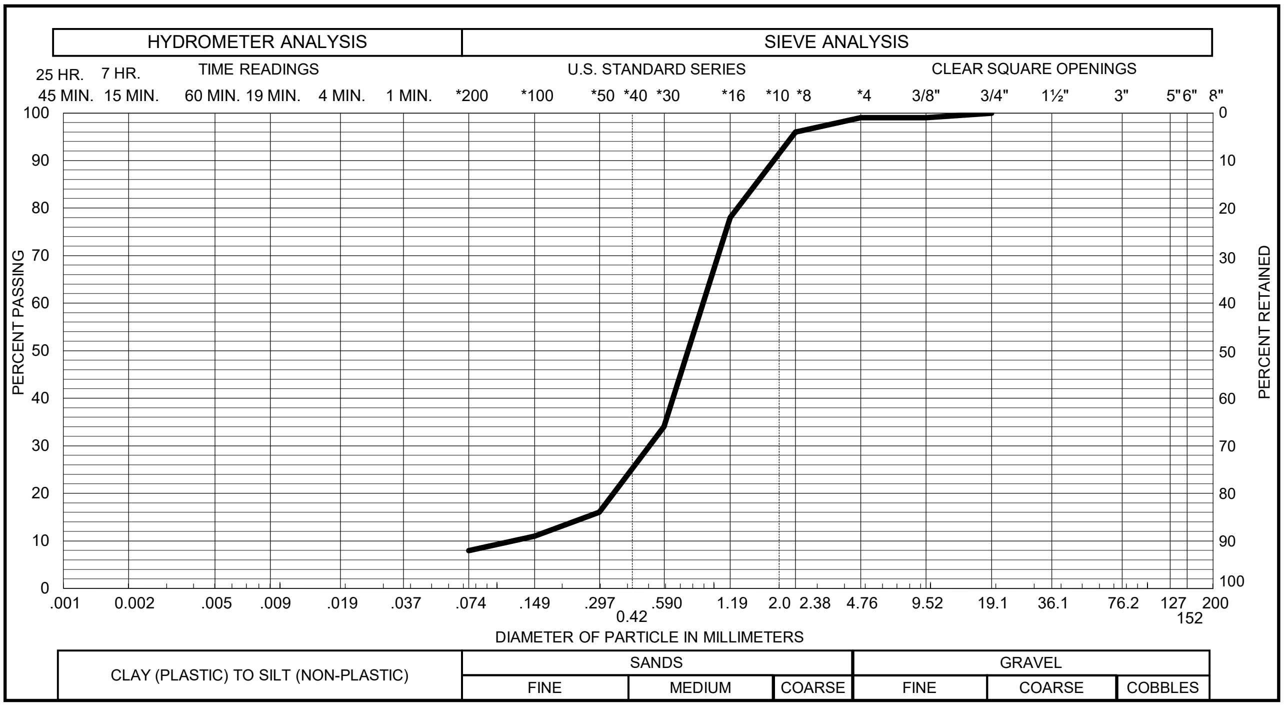
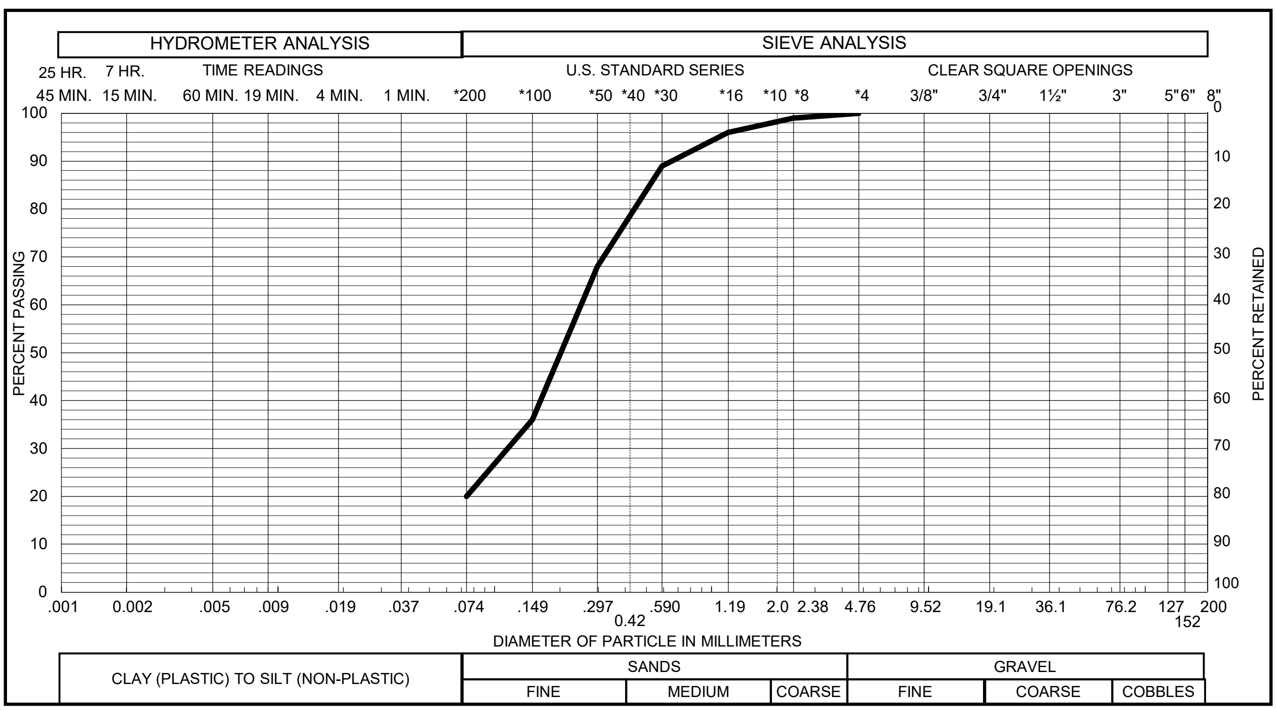
Gradation Test Results

FIG. B-39



Sample of SAND, SLIGHTLY SILTY (SP-SM)
From TH - 113 AT 14 FEET

GRAVEL 1 % SAND 91 %
SILT & CLAY 8 % LIQUID LIMIT %
PLASTICITY INDEX %



Sample of SAND, SILTY (SM)
From TH - 113 AT 19 FEET

GRAVEL 0 % SAND 80 %
SILT & CLAY 20 % LIQUID LIMIT NL %
PLASTICITY INDEX NP %

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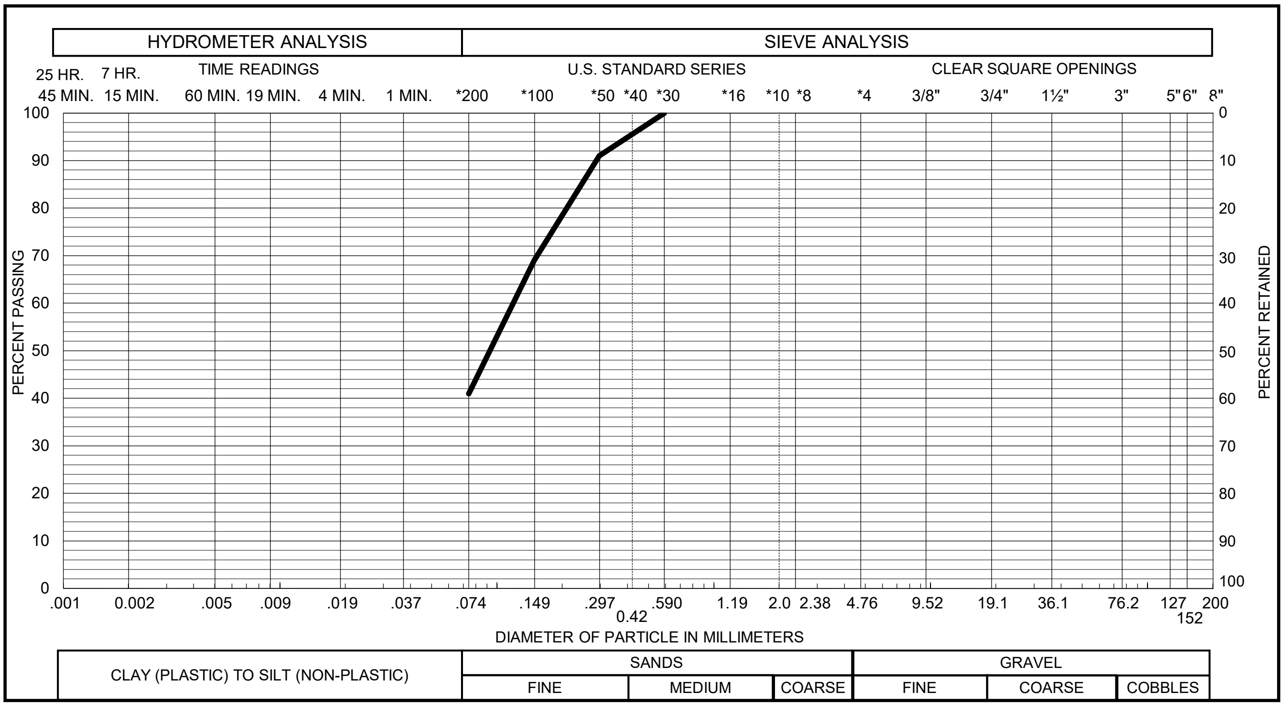
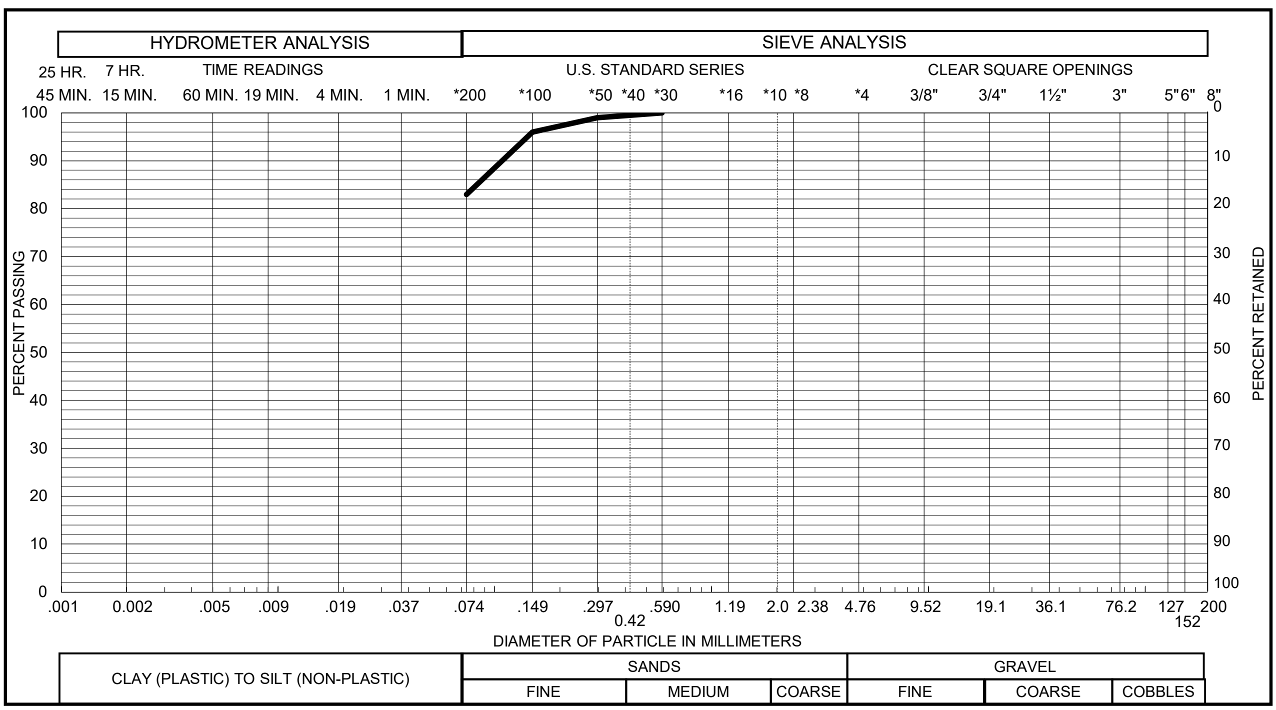
Gradation Test Results

FIG. B-40



Sample of SAND, VERY CLAYEY (SC)
From TH - 114 AT 9 FEET

GRAVEL 0 % SAND 59 %
SILT & CLAY 41 % LIQUID LIMIT 29 %
PLASTICITY INDEX 10 %



Sample of CLAY, SANDY (CL)
From TH - 114 AT 14 FEET

GRAVEL 0 % SAND 17 %
SILT & CLAY 83 % LIQUID LIMIT 36 %
PLASTICITY INDEX 18 %

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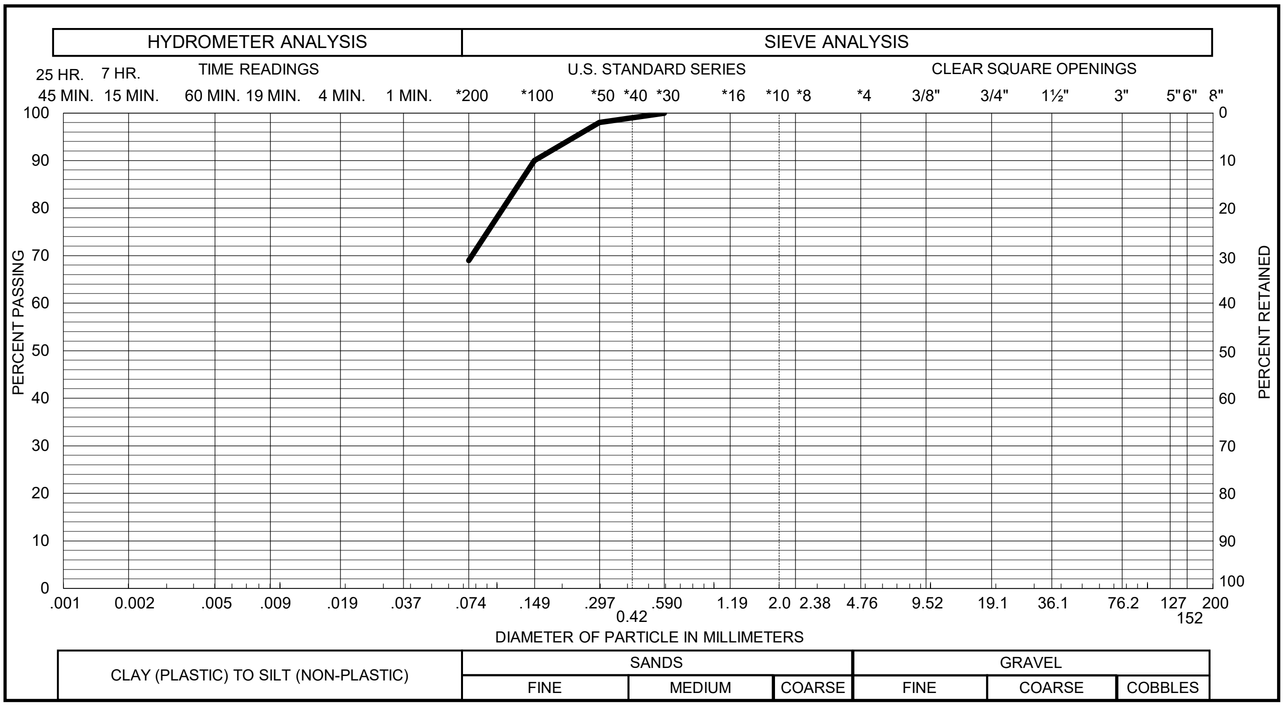
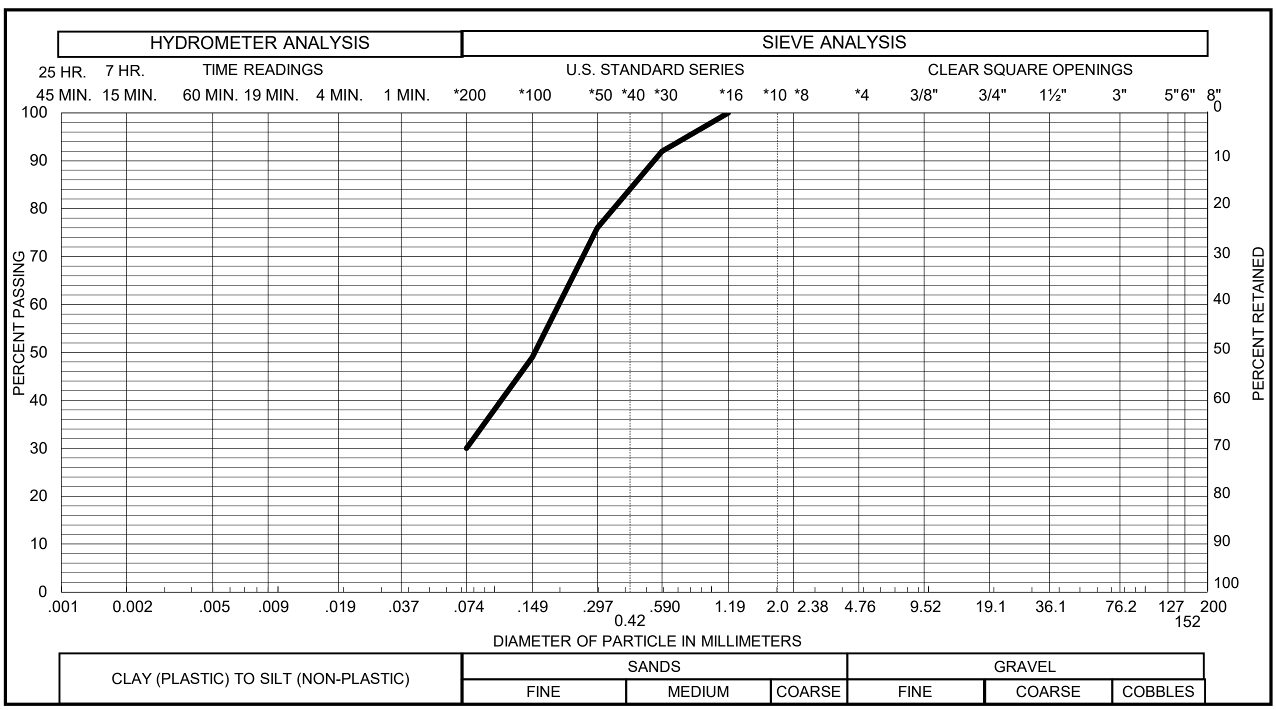
Gradation Test Results

FIG. B-41



Sample of CLAY, SANDY (CL)
From TH - 115 AT 19 FEET

GRAVEL 0 % SAND 31 %
SILT & CLAY 69 % LIQUID LIMIT 30 %
PLASTICITY INDEX 13 %



Sample of SAND, SILTY (SM)
From TH - 116 AT 29 FEET

GRAVEL 0 % SAND 70 %
SILT & CLAY 30 % LIQUID LIMIT %
PLASTICITY INDEX %

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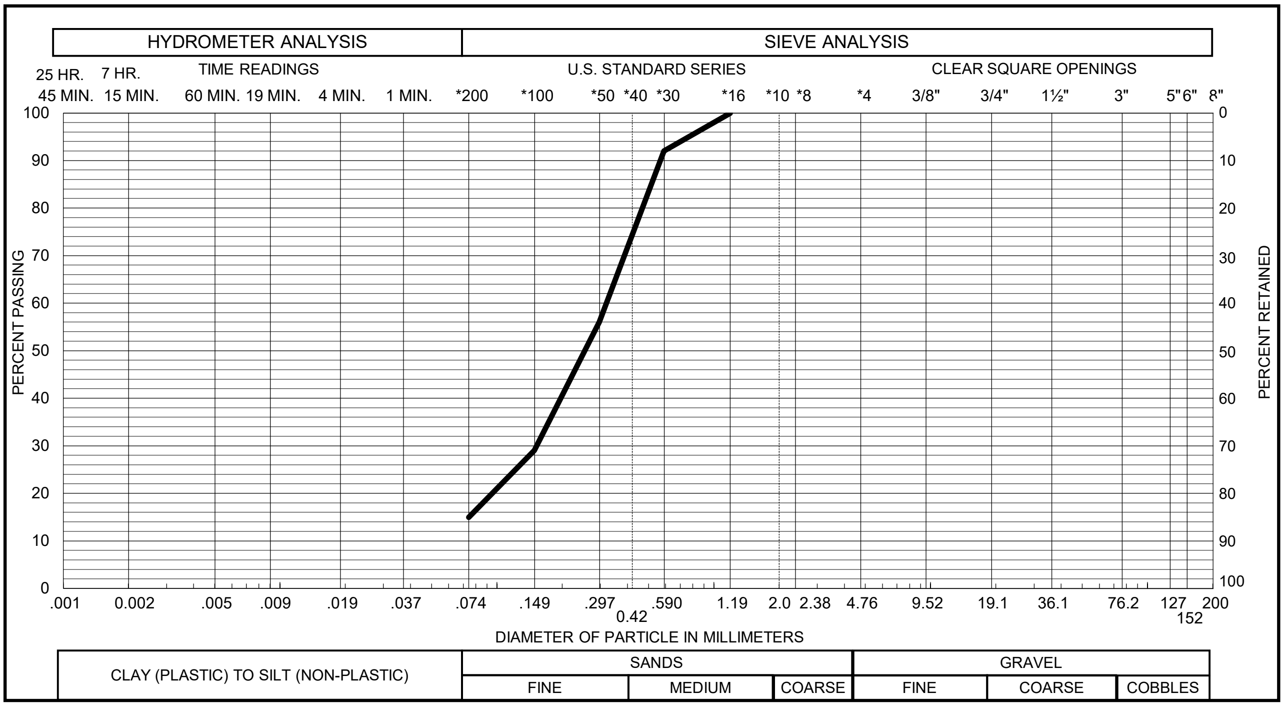
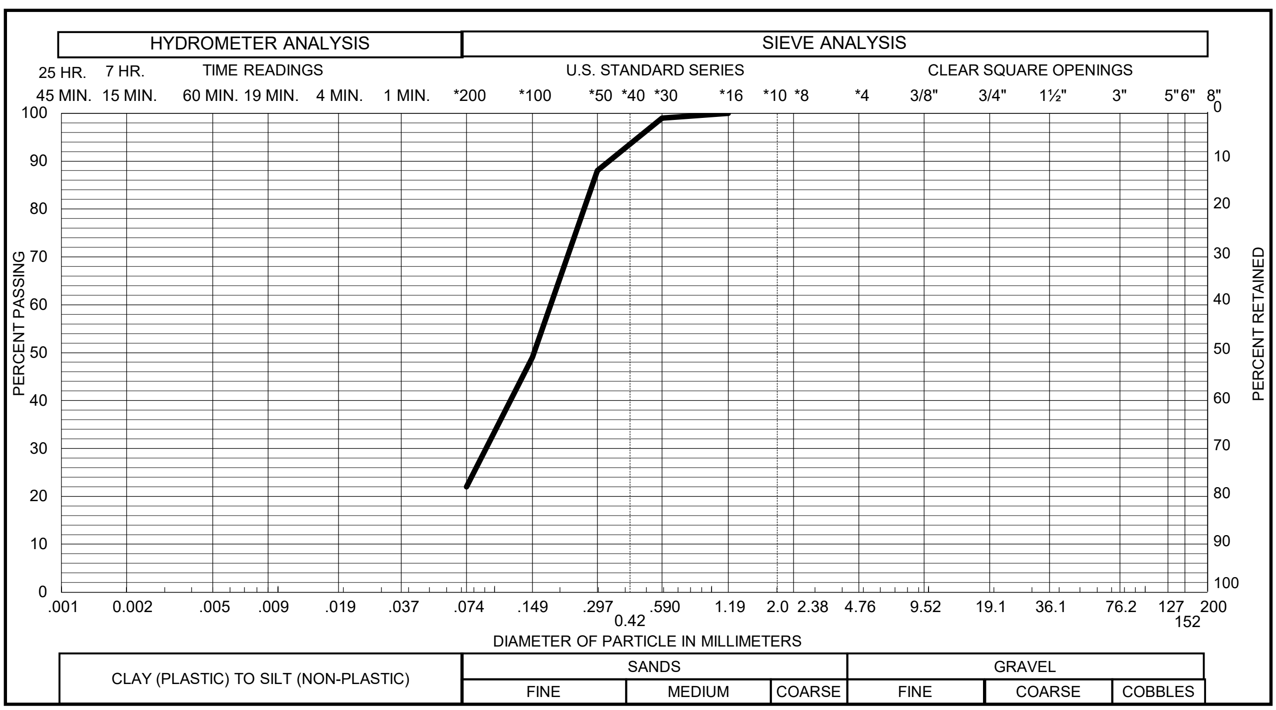
Gradation Test Results

FIG. B-42



Sample of	SAND, SILTY (SM)	GRAVEL	0 %	SAND	85 %
From	TH - 117 AT 14 FEET	SILT & CLAY	15 %	LIQUID LIMIT	NL %
		PLASTICITY INDEX			NP %



Sample of	SAND, SILTY (SM)	GRAVEL	0 %	SAND	78 %
From	TH - 122 AT 4 FEET	SILT & CLAY	22 %	LIQUID LIMIT	%
		PLASTICITY INDEX			%

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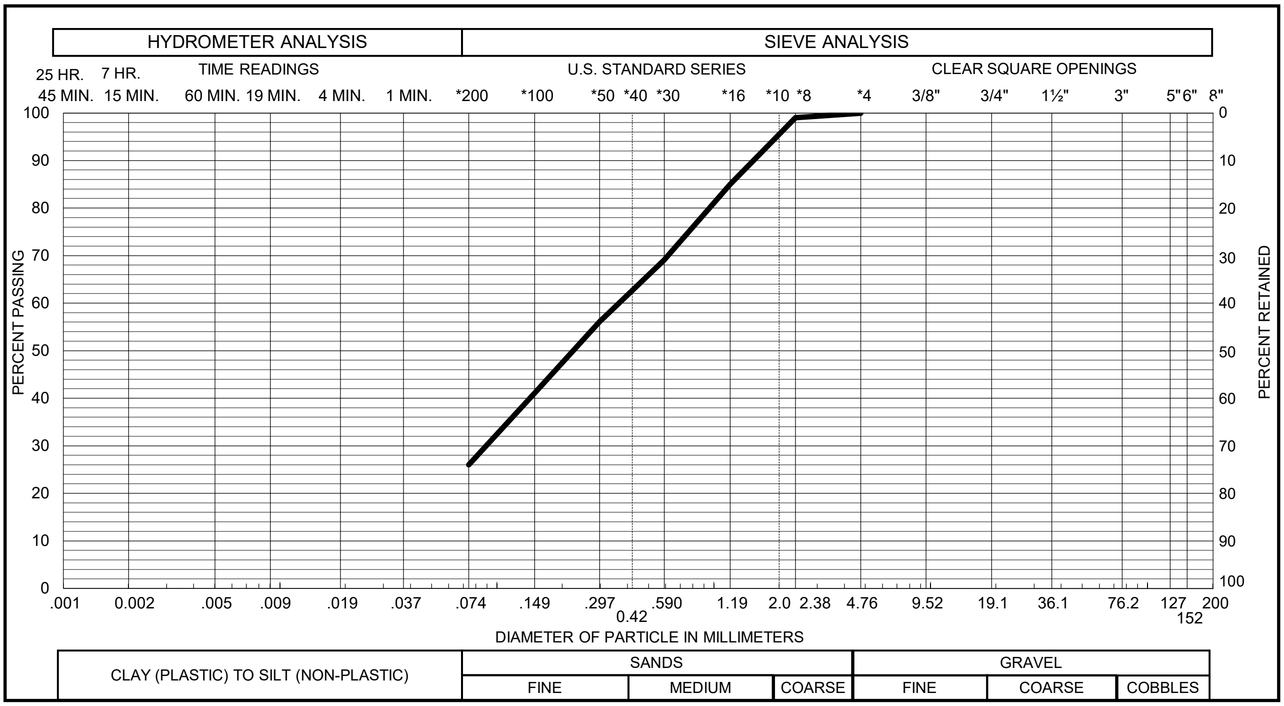
Gradation Test Results

FIG. B-43



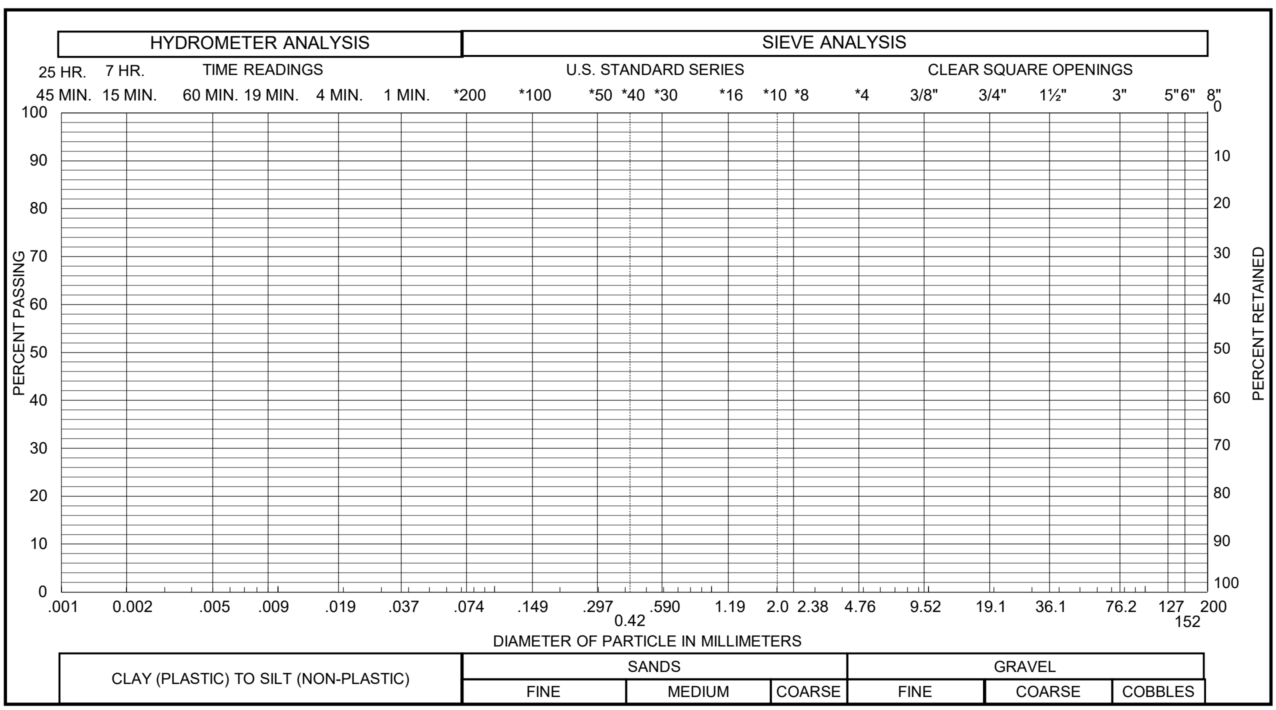
Sample of SAND, CLAYEY (SC)

From TH - 132 AT 29 FEET

GRAVEL 0 % SAND 74 %

SILT & CLAY 26 % LIQUID LIMIT %

PLASTICITY INDEX %



Sample of

From

GRAVEL % SAND %

SILT & CLAY % LIQUID LIMIT %

PLASTICITY INDEX %

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Gradation Test Results

FIG. B-44

APPENDIX C

GEOLOGIC HAZARDS EVALUATION AND PRELIMINARY GEOTECHNICAL INVESTIGATION FOR SILVER CROSS RANCH
CTL|T PROJECT NO. CS19053.001

CTL|THOMPSON INCORPORATED

GEOLOGIC HAZARDS EVALUATION AND PRELIMINARY GEOTECHNICAL INVESTIGATION
SILVER CROSS RANCH
NORTHEAST OF LINK AND SQUIRREL CREEK ROADS
EL PASO COUNTY, COLORADO

Prepared for:

LA PLATA COMMUNITIES
1755 Telestar Drive, Suite 211
Colorado Springs, Colorado 80920

Attention: Steve Rossoll, P.E.

CTL|T Project No. CS19053.001-115

April 1, 2019

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SCOPE

This report presents the results of our Geologic Hazards Evaluation and Preliminary Geotechnical Investigation for an approximately 318 acre parcel of Silver Cross Ranch in El Paso County, Colorado. Our purpose was to evaluate the parcel for the occurrence of potential geologic hazards and geotechnical conditions that we believe impact development of the site, and to provide preliminary geotechnical design concepts. We understand the property is planned for development for mixed uses including various forms of residential, commercial, office and retail. This report includes a summary of subsurface and groundwater conditions found in our exploratory borings, a description of our engineering analysis of the geotechnical conditions at the site, and our opinion of the potential influence of the geologic conditions on the planned structures and other site improvements. The scope of our services was described in our proposal (CS-19-0014_CM1) dated February 8, 2019.

The report was prepared based on conditions interpreted from field reconnaissance of the site, review of geologic reports readily available, conditions found in our exploratory borings, results of laboratory tests, engineering analysis, and our experience. Observations made during grading or construction may indicate conditions that require revision or re-evaluation of some of the criteria presented in this report.

The criteria presented are for the development as described. Revision in the scope of the project could influence our recommendations. If changes occur, we should review the development plans and the effect of the changes on our preliminary design criteria. We also performed a Phase I Environmental Site Evaluation of the property for the possible presence of potentially hazardous materials provided in a separate report (CTL/T Project No. CS19053.000-115). Assessment of the site for the potential for wildfire hazards, corrosive soils, erosion problems, or flooding is beyond the scope of this investigation.

The following section summarizes the report. A more complete description of the conditions found at the site, our interpretations, and our recommendations are included in the report.

SUMMARY

1. We did not identify geologic hazards that we believe preclude development of the site for the construction planned. The conditions we identified on the property that may pose hazards or constraints to development include the presence of steep, potentially unstable slopes along Jimmy Camp Creek drainages, highly expansive clay soils, potentially hard bedrock in the extreme eastern portion of the site at depth, and flood and erosion potential. Regional geologic conditions that impact the site include seismicity and radioactivity. We believe each of these conditions can be mitigated with engineering design and construction methods commonly employed in this area.

2. Subsurface conditions encountered in the eleven exploratory borings drilled at the site consisted of 19.5 to more than 44 feet of silty to clayey sand and sandy clay. Claystone bedrock was encountered in one test hole located in the southwest corner of the site at a depth of 19.5 feet. Relatively shallow claystone is expected in the extreme eastern section of the site.

3. At the time of drilling, groundwater was encountered in four of the exploratory borings at a depth of 12 to 30 feet below the existing ground surface. When water levels were checked again seven days after the completion of drilling operations, groundwater was encountered in three of the exploratory borings at depths of 24 to 28.5 feet below the existing ground surface. Groundwater levels will vary with seasonal precipitation and landscaping irrigation.

4. In our opinion, site grading and utility installation across much of the site can be accomplished using conventional, heavy-duty construction equipment. If shale bedrock is encountered, ripping may be required to expedite the process. Heavy duty track hoes with rock buckets and rock teeth will likely be needed for trenching into the shale.

5. We believe conventional spread footing foundations designed to apply minimum deadload and slab-on-grade floors will be appropriate for most of the structures constructed at this site provided a zone of the expansive materials are excavated and re-placed as fill compacted to high density at moisture contents above optimum. Post-tension slab-on-grade foundations on a similar fill zone is an alternative. Straight-shaft, drilled pier foundations and structurally supported floors may be the more reliable alternative where bedrock occurs at shallow depth.

6. We believe a low risk of poor, long-term performance (movement and damage) will exist for conventional slab-on-grade floors underlain by densely compacted, grading fill placed at high moisture contents. The risk of poor performances is judged to be very high without subgrade mitigation. Structurally supported floors (crawl space construction) below the slab may be appropriate alternatives to enhance floor system performance.

7. Irrigation of landscaping should be minimized to reduce problems associated with expansive soils. Overall plans should provide for the rapid conveyance of surface runoff to the storm sewer system and centralized drainage channels.

SITE CONDITIONS

Silver Cross Ranch is an approximately 400 acre parcel east of Link Road and north of Squirrel Creek (eastern half of Section 33 and western quarter of Section 34, Township 15 South, Range 65 West of the 6th Principal Meridian), within El Paso County, Colorado. We understand only about 318 acres of the parcel are available for development as the northerly 82 acres is within the Jimmy Camp Creek flood plain. The overall location is shown in Fig. 1.

The majority of the parcel is currently undeveloped. A Colorado Interstate Gas Line runs north-south on the east side of the site. An equestrian riding arena, stables, a small barn and a maintenance shed occupies the land directly east of Link Road. Vacant land is to the east of the site. Jimmy Camp Creek borders the site to the north and Link Road to the west. Scattered residences are located to the south of the site just north of Squirrel Creek Road. The property is predominately covered with grass and was being used as pastureland. A portion of land located on the eastern part of the site was being used for irrigated agriculture (hay). The ground surface predominately consists of gently rolling hills separated by local drainages. Areas of steep erosional cuts are present along Jimmy Camp Creek. The ground surface generally slopes gently downward to the west and northwest. Elevations range from approximately 5610 along the west side to approximately 5690 along the east side of the site.

PROPOSED DEVELOPMENT

We were not provided with a development plan for the parcel prior to our investigation. We understand the property is planned for development for mixed uses including residential, commercial, office and retail. We anticipate the residences will be one and two-story, wood-frame structures with basement areas and attached, multi-automobile garages. We anticipate the structures will be serviced by a centralized sanitary sewer collection system and potable water distribution system. Paved access roads are typically constructed within similar developments. Grading plans had not been developed at the time this report was prepared. We expect the local knobs will be leveled and the cut material placed to fill the low areas near Jimmy Camp Creek, requiring cuts and fills of about 10 feet.

SUBSURFACE INVESTIGATION

Subsurface conditions at the site were investigated by drilling eleven exploratory borings at the approximate locations shown in Fig. 1. Graphical logs of the conditions found in our exploratory borings, the results of field penetration resistance tests, and some laboratory data are presented in Appendix A.

Soil and bedrock samples obtained during this study were returned to our laboratory and visually classified. Laboratory testing was then assigned to representative samples. Testing included moisture content and dry density, swell-consolidation, sieve analysis (passing the No. 200 sieve), Atterburg limits, unconfined compressive strength, and water-soluble sulfate content tests. The swell test samples were wetted under an applied pressure that approximated the overburden pressure (the weight of overlying soil). Swell-consolidation test results and gradation test results are presented in Appendix B. All laboratory test data are summarized in Table B-1.

SUBSURFACE CONDITIONS

Subsurface conditions encountered in the eleven exploratory borings drilled at the site predominately consisted of up to 44 feet of silty to clayey sand and sandy to very sandy clay. The sand and clay becomes more moist with depth. Claystone bedrock was encountered in one of our borings (TH-5) at a depth of 19.5 feet below the existing ground surface. Bedrock may occur shallower in the eastern-most portion of the site. Sandy, clay fill was encountered in one of our borings located in the area of existing structures (TH-1) to a depth of 5 feet below the existing ground surface. Some of the pertinent engineering characteristics of the soils and bedrock encountered and groundwater conditions are discussed in the following paragraphs.

Fill

We encountered fill in the area of the existing structures on the west side of the parcel, directly east of Link Road. The existing fill material was stiff based on the results of field penetration resistance tests. No documentation regarding the construction of the fill, such as the results of field density testing, was available for our review at the time of this study. Because of the lack of documentation regarding the placement and compaction of the existing fill, we must consider this material to be of suspect quality and unsuitable to underlie the proposed structures, in its current condition.

Sand

Natural silty to very silty, and very clayey sand was encountered at the ground surface or below the fill and natural clay in nine of the borings. The sand was loose to dense and very stiff to medium hard and becomes more moist to wet with depth. Twelve samples of the sand tested in our laboratory contained 18 to 49 percent clay and silt-sized particles (passing the No. 200 sieve). One sample of the sand that was subjected to swell-consolidation testing exhibited a measured swell value of 0.2 percent and one sample consolidated 0.6 percent when wetted under estimated overburden pressures.

Clay

Natural slightly sandy to very sandy clay was encountered at the ground surface or below natural sands in eight of our borings. The clay was stiff to very stiff. The clay was slightly moist at the surface and became more moist to wet with depth. Sixteen samples of the clay tested in our laboratory contained 51 to 99 percent clay and silt-sized particles (passing the No. 200 sieve). Eight samples of the clay subject to swell-consolidation testing exhibited measured swell values of 0.8 to 11.0 percent. One sample consolidated 1.2 percent. All samples were wetted under estimated overburden pressures. We believe the clay sample that exhibited consolidation had been disturbed during sampling as it was slightly moist. Six of the samples exhibited high to very high expansion potential. Atterberg limits testing indicated the clay was predominately highly plastic.

Bedrock

Weathered claystone was encountered below the natural sand in one of our borings at a depth of 19.5 feet below the existing ground surface. The weathered claystone was medium hard. Claystone bedrock was encountered below the weathered bedrock at a depth of about 23 feet below the existing ground surface. The claystone bedrock was hard to very hard based on the results of field penetration resistance tests. One sample of the claystone subjected to swell-consolidation testing exhibited a measured swell value of 4.6 percent when wetted. Two samples of the claystone tested in our laboratory contained 97 and 98 percent clay and silt-sized particles (passing the No. 200 sieve). Atterberg limits testing indicated the claystone to also be borderline low to highly plastic. The original drawing provided to our office did not extend as far east as the most current drawing. Based on existing published geologic mapping, the claystone bedrock may occur at shallower depths in the eastern portions of the site.

Groundwater

At the time of drilling, groundwater was encountered in four of the exploratory borings at depths between 12 and 30 feet below the existing ground surface. When water levels were checked seven days after the completion of drilling operations, groundwater was encountered in three of the exploratory borings at depths of 24 to 28.5 feet below the existing ground surface. Most measured groundwater levels were 25 feet or more below the existing ground surface. Groundwater levels will vary with seasonal precipitation, flows in Jimmy Camp Creek and landscaping irrigation.

SITE GEOLOGY

Geologic conditions were evaluated through the review of published geologic maps, field reconnaissance, and exploratory borings. Information from these sources was used to produce our interpretation of site geology, as shown in Fig. 2. A list of references is included at the end of this report.

The Silver Cross Ranch 318-acre parcel evaluated is situated directly south of Jimmy Camp Creek, a tributary of Fountain Creek. The terrace surrounding Jimmy

Camp Creek contains grasses and isolated trees. The parcel was used as pastureland and for agriculture. The ground surface slopes generally downward from the northeast portion of the site toward the west and northwest to Jimmy Camp Creek. The south-west-flowing Jimmy Camp Creek created deeply-eroded, steep and locally unstable side slopes.

Most of the areas surrounding Jimmy Camp Creek and of lower elevations, are covered by recent alluvial-colluvial deposits composed of slightly sandy to sandy, clay and silty to very silty, very clayey sand deposited by streams and sheet-wash from the adjacent Pierre Shale hills. Early Holocene-age eolian deposits (sand and clay deposited by wind) form the small hills located in the middle of the site. Bedrock is from the Cretaceous-aged Pierre Shale formation, composed of claystone over shale. The Pierre Shale formation generally forms low colluvium-covered slopes. When exposed, the material readily weathers into residual soil. The following sections discuss the mapped units. Figure 2 shows our interpretation of site geology, and Figure 3 shows our interpretation of engineering conditions.

Surficial Deposits (Qac, Qes)

Our borings encountered 19.5 to 44 feet of slightly sandy to sandy clay soil and very silty to very silty and very clayey sand soil. We believe that for the purposes of engineering geologic evaluation of this site, the surficial soils mapped as “Qac” can be considered as being sheet-wash and stream deposited alluvium-colluvium. The surficial soils mapped as “Qes” can be considered as eolian (wind-blown) deposits. The alluvium-colluvium are more recent deposits superimposed over the eolian deposits in flatter areas. These soils are geologically recent, Holocene-age deposits. The surficial clay alluvium-colluvium and eolian deposits exhibited low to high expansion potential. Our testing indicated the clays found (Qac areas) possess mainly high to very high expansion potential.

Bedrock (Kp)

We encountered hard to very hard claystone bedrock underlying the surficial sands and clays in only one of our test holes. Geologic mapping suggests the claystone bedrock may occur more shallow in the most eastern portion of the site. The materials are from the Cretaceous-aged Pierre Shale formation (Map Unit Kp), predominately fine-grained, claystone over shale. The formation tends to generally form low, colluvium covered slopes. The parent shale bedrock is fissile and tends to fracture more easily along the bedding plane. The Pierre Shale formation exhibits a gentle dip toward the east. The claystone develops from geologic weathering of the shale. The claystone portion of this formation can exhibit expansion potentials ranging from low to very high.

GEOLOGIC HAZARDS AND ENGINEERING CONSTRAINTS

We did not identify geologic hazards that we believe preclude development of the project for the planned purpose. Conditions we identified at the site that may pose hazards or constraints to development include expansive soil and bedrock, the presence of steep, unstable and potentially unstable slopes adjacent to drainages, and erosion potential. Slopes outside of the drainages appear to be stable. Regional geologic conditions that impact the site include seismicity and radioactivity. We believe each of these conditions can be mitigated with engineering design and construction methods commonly employed in this area. These conditions are discussed in greater detail in the sections that follow.

The Engineering Geology classification developed by Charles Robinson (1977) was considered for evaluation of the parcel of Silver Cross Ranch and is mapped as described below. Portions with steep, unstable and potentially unstable slopes are shown in Fig. 3. These areas are typically adjacent to physiographic flood plains that are undergoing active bank erosion. The civil engineer should determine the flood potential and inundation areas for site design. The other issues are site-wide concerns and are not depicted in Fig. 3.

Map Unit "3B" depicts expansive and potentially expansive alluvium, colluvium and bedrock on flat to moderate slopes (0-12%).

Map Unit "5C" depicts unstable or potentially unstable colluvium or bedrock on steep slopes (12-30%).

Map Unit "7A" depicts physiographic floodplain and special flood hazard areas.

Expansive Soils

Testing showed the alluvium-colluvium soils (Qac) and claystone bedrock (Kp) are expansive when wetted. Issues associated with the expansive soil and bedrock can be mitigated through engineered foundations and floor systems, possibly in conjunction with ground modification such as sub-excavation and reworking the soil to create a layer of low-swelling, moisture conditioned fill, as discussed later in the report.

Unstable Slopes

Areas with unstable or potentially unstable slopes were observed in and adjacent to Jimmy Camp Creek. Down-cutting erosion has over-steepened slopes. Over-steepened slopes are subject to creep and slump failure. A method to reduce risk is to avoid the slopes. A reasonable rule of thumb is to limit development to areas outside of a 3:1 (horizontal to vertical) line from the base of the steep slope. Grading to flatten slopes is an alternative, along with erosion protection.

Flooding

Information presented in the "Flood Insurance Rate Map" (FIRM), Map Numbers 08041C0958G, effective date December 7, 2018, indicates the areas of lower elevation directly adjacent to Jimmy Camp Creek physiographic floodplain has a 0.2% annual chance flood hazard. The majority of proposed development within the 318 acres is outside areas mapped as prone to surface flooding. The project Civil Engineer should determine the flood potential and design surface drainage.

Erosion

The subject parcel contains moderate to steep slopes an areas adjacent to Jimmy Camp Creek. Site soils are dry clays and sands and are susceptible to the effects of water erosion. Maintaining vegetative cover and providing engineered surface drainage will reduce the potential for erosion.

Seismicity

This area, like most of central Colorado, is subject to a degree of seismic activity. Geologic evidence indicates that movement along some Front Range faults has occurred during the last two million years (Quaternary). We believe the soils on the property classify as Site Class D (stiff soil) according to the 2015 International Building Code (2015 IBC).

Economic Minerals and Underground Mines

We doubt the material we encountered in our borings could be economically mined or permitted given its small extent and surrounding land uses. Energy fuels such as uranium, oil, and gas may or not be present. The bedrock formation found historically does not contain mineable lenses of coal.

Radon and Radioactivity

We believe no unusual hazard exists from naturally occurring sources of radioactivity on this site. The cited study indicates the materials found in our borings are not likely associated with the production of radon gas and concentrations in excess of EPA guidelines. Radon tends to collect in below-grade, residential areas due to limited outside air exchange and interior ventilation. Passive and active mitigation procedures are commonly employed in this region to effectively reduce the buildup of radon gas. Measures that can be taken after a structure is enclosed during construction include installing a blower connected to the foundation drain (if present) and sealing the joints and cracks in concrete floors and foundation walls. If the occurrence of radon is a concern, we recommend the structures be tested after they are enclosed and mitigation systems installed to reduce the risk.

SITE DEVELOPMENT CONSIDERATIONS

From an engineering point-of-view, the more significant subsurface conditions impacting construction is the occurrence of expansive materials. The following sections discuss the impact of these conditions on development and possible methods of mitigation.

Site Grading

Grading plans were not provided to us prior to our investigation. We believe excavation into the clay soils and claystone bedrock can be accomplished using conventional heavy-duty equipment. Bedrock may occur at shallow depths to the east. As the bedrock occurs at shallow depth, very hard shale bedrock may be encountered below the claystone. Cuts into the very hard shale bedrock (if found) will likely require ripping to expedite the excavation process. We recommend grading plans consider long-term cut and fill slopes no steeper than 3:1 (horizontal to vertical). This ratio considers that no seepage of groundwater occurs. If groundwater seepage does occur, a drain system and flatter slopes may be appropriate.

Vegetation and organic materials should be removed from the ground surface in areas to be filled. Soft or loose soils, if encountered, should be stabilized or removed to stable material prior to placement of fill. Organic soils should be wasted in landscaping areas. If insufficient landscaping areas are planned, topsoil can be mixed with clean fill soils at a ratio of 15:1 (fill:topsoil) and placed as fill deeper than 8 feet below final grade.

Areas of highly expansive clays and claystone are present across the site. Where clays or claystone are present at or near final grades, sub-excavation of up to 6 feet may be required in high volume streets and 10 feet below and outside structures.

We encountered fill in the area of the existing structures on the west end of the parcel. Because of the lack of documentation regarding the placement and compaction of the existing fill, we must consider this material to be of suspect quality and unsuitable to underlie the proposed construction, in its current condition. The existing fill should be excavated to depths that expose the natural soils. If free of deleterious or organic substances, can be reused as new fill to achieve desired building pad elevations and site grades. The suitability of the existing fill for re-use should occur once grading is underway.

Where the natural slopes are steeper than 20 percent (5:1, horizontal to vertical) and fill is to be placed, horizontal benches must be cut into the hillside prior to placement. The benches must be at least 12 feet wide or 1-1/2 times the width of the compaction equipment and be provided at a vertical spacing of not more than 5 feet (minimum of two benches). Larger bench widths may be required. We do not expect benching will be needed excepts to fill areas within the Jimmy Camp Creek flood plain.

The ground surface in areas to receive fill should be scarified, moisture conditioned and compacted. The properties of the fill will affect the performance of foundations, slabs-on-grade, and pavements. We recommend general grading fill composed of cohesive soils (clays and very clayey sands) and claystone be placed in thin, loose lifts, moisture conditioned to within 2 percent of optimum moisture content, and compacted to at least 95 percent of maximum standard Proctor dry density (ASTM D 698). We recommend grading fill composed of silty sands containing less than 35 percent passing the number 200 sieve be placed in thin, loose lifts, moisture conditioned to within 2 percent of optimum moisture content and compacted to at least 95 percent of maximum modified Proctor dry density (ASTM D 1557). Placement and compaction of the grading fill should be observed and tested by our representative during construction. Guideline specifications for overlot grading are presented in Appendix C.

Buried Utilities

Over most of the site, we believe utility trench excavation into the clay soils and claystone bedrock can be accomplished using heavy-duty track hoes. Although shale was not encountered in any of our borings, bedrock may become more shallow to the east. If shale is encountered, rock buckets and rock teeth may be needed where utility excavations extend well into the shale formation. Utility contractors should be made aware of this possibility and anticipate slower rates of utility installation in the shale bedrock.

Excavations for utilities should be braced or sloped to maintain stability and should meet applicable local, state, and federal safety regulations. The contractor should identify the soils encountered in trench excavations and refer to Occupational Safety and Health Administration (OSHA) standards to determine appropriate slopes. We anticipate the near-surface soils and grading fill will classify as Type C materials. The bedrock will likely classify as Type B. Temporary excavations in Type C and Type B materials require a maximum slope inclination of 1.5:1 and 1:1 (horizontal to vertical), respectively, unless the excavation is shored or braced. Where groundwater seepage occurs, flatter slopes will likely be required. Excavations deeper than 20 feet should be designed by a professional engineer.

Water and sewer lines are usually constructed beneath paved roads. Compaction of trench backfill will have a significant effect on the life and serviceability of pavements. Personnel from our firm should observe and test the placement and compaction of the trench backfill during construction.

Underdrain Systems

Underdrains incorporated into the design of sanitary sewer systems can provide a positive gravity outlet for individual, below-grade foundation drains, if desired. Where no groundwater is encountered in sanitary sewer excavations, “passive” underdrains may be used. The drain pipe should consist of smooth wall, rigid PVC pipe placed at a minimum slope of 0.5 percent. An “active” section of smooth, perforated or slotted, rigid PVC pipe should be placed for a minimum distance of one pipe length upstream of manholes. The perforated pipe should be encased in at least 6 inches of free-draining gravel, separated from the surrounding trench backfill by geotextile fabric. Seepage collars should be constructed at the manhole locations to force water flowing through pipe bedding into the underdrain. The seepage collars can be constructed of concrete or clay.

If high moisture conditions or groundwater are encountered in the sanitary sewer trench, we recommend an active underdrain system with perforated or slotted pipe for these areas. A cutoff collar should be constructed around the sewer pipe and underdrain pipe immediately downstream of the point where the underdrain pipe exits the sewer trench or changes from active to passive. Solid pipe should be used down gradient of this cutoff collar to the point of discharge. The underdrain should be maintained at least 3 to 5 feet below the lowest nearby foundation elevation. Conceptual drain details are presented in Figs. 4 and 5.

As-built plans for the underdrain system should be prepared including location, elevations, and cleanouts. The entity responsible for maintenance of the underdrain system should retain the as-built plans for future reference.

FOUNDATION AND FLOOR SYSTEM CONCEPTS

Our investigation indicates expansive clay and claystone are present at depths likely to affect the performance of shallow foundation and slabs-on-grade. We estimate potential ground heave of about 10 inches where thick deposits of clay occur based on a 24-foot depth of wetting. To reduce the impact of the expansive materials on shallow foundations and improve slab performance and create a more uniform layer of support, the expansive clays and claystone bedrock conceptually should be removed below proposed footing elevations to depths preliminarily up to 10-feet or until natural, non to low expansion potential sands are encountered, whichever comes first. The thickness and composition of grading fill influence the appropriate depths of treatment. The clay and claystone that have been sub-excavated should be replaced, moisture conditioned to between 1 and 4 percent above optimum, and densely compacted to at least 95 percent of maximum standard Proctor dry density (ASTM D 698). This procedure has been successfully used in the Pikes Peak region and results in spread footing foundations and slab-on-grade floors being appropriate.

Overall, the risk of slab movement and cracking is believed to be low to possibly moderate if they are underlain by new, densely compacted fill placed at high moisture content as discussed. The risk of poor performance is judged to be very high without subgrade enhancement. Structurally supported floors (crawl space construction) may be an appropriate alternative to enhance floor system performance. Soils and foundation investigation reports prepared after completion of site grading should address appropriate foundation systems and floor system alternatives on a lot-by-lot basis.

PAVEMENTS

Natural clays, sands, claystone bedrock, and new grading fill are expected to be the predominant pavement subgrade materials. Cohesive materials (clay, very clayey sand and claystone) normally exhibit poor subgrade support for pavements. Expansion of the subgrade materials can result in damage of pavements. Sub-excavation and moisture treatment of the subgrade materials may make sub-excavation of 4 to 6 feet appropriate depending on the classification of the roadway. We recommend replacing the sub-excavated clays with moisture conditioned and densely compacted on-site silty to clayey sands.

Based on our laboratory testing, a Hveem stabilometer (“R”) value of 5 was assigned to the subgrade materials for preliminary design purposes. On a preliminary basis, we suggest budgeting for the pavement section for low volume streets consisting of 4 inches of asphalt over 6 to 8 inches of aggregate base course. Higher volume street pavement will likely require pavement section of 4+ inches of asphalt over 8 inches or more of aggregate base. Subgrade investigations and pavement design should be conducted after grading and utility installation are completed to develop site-specific pavement sections.

CONCRETE

Concrete in contact with soil can be subject to sulfate attack. We measured a water-soluble sulfate concentration of 0.14 percent in two of the clay samples. Water-soluble sulfate concentrations between 0.1 and 0.2 percent indicate Class 1 exposure to sulfate attack, according to the American Concrete Institute (ACI) *Guide to Durable Concrete (ACI 201.2R-01)*. ACI 201 indicates adequate sulfate resistance can be achieved by using Type II cement with a water-to-cementitious material ratio of 0.50 or less. In addition, ACI 318 indicates concrete in Class 1 exposure environments should have a minimum compressive strength of 4,000 psi.

We measured a water-soluble sulfate concentration of 1.4 percent in one claystone sample. Water-soluble sulfate concentrations between 0.2 and 2 percent indicate Class 2 exposure to sulfate attack, according to the American Concrete Institute (ACI) *Guide To Durable Concrete (ACI 201.2R)*. For sites with Class 2 sulfate exposure, ACI 201 recommends using a cement meeting the requirements for Type V (sulfate resistant) cement or the equivalent, with a maximum water-to-cementitious material ratio of 0.45. As an alternative, ACI allows the use of cement that conforms to ASTM C 150 Type II requirements, if it meets the Type V performance requirements (ASTM C 452) of ASTM C 150 Table 4. ACI 201 also allows a blend of any type of portland cement and fly ash with an expansion of less than 0.05 percent at 6 months when tested in accordance with ASTM C 1012. ACI 318 indicates concrete in severe exposure should have a specified compressive strength of 4,500 psi. Concrete subjected to freeze-thaw cycles should be air entrained.

SURFACE DRAINAGE AND IRRIGATION

The performance of structures, flatwork, and roads within the subdivision will be influenced by surface drainage. When developing an overall drainage scheme, consideration should be given to drainage around each structure and pavement areas. Drainage should be planned such that surface runoff is directed away from foundations and is not allowed to pond adjacent to or between residences or over pavements. Ideally, slopes of at least 6 inches in the first 10 feet should be planned for the areas surrounding the houses, where possible. Roof downspouts and other water collection systems should discharge well beyond the limits of all backfill around the structures. Proper control of surface runoff is also important to prevent the erosion of surface soils. Concentrated flows should not be directed over unprotected slopes. Permanent slopes should be seeded or mulched to reduce the potential for erosion. Backfill soils behind the curb and gutter adjacent to streets and in utility trenches within individual lots should be compacted. If surface drainage between preliminary development and construction phases is neglected, performance of the roadways, flatwork, and foundations may be compromised.

RECOMMENDED FUTURE INVESTIGATIONS

Based on the results of this study, we recommend the following investigations and services be provided by our firm:

1. Construction materials testing and observation services during site development and construction.
2. Individual lot Soils and Foundation Investigations for foundation design.
3. Subgrade Investigation and Pavement Design for on-site pavements.

LIMITATIONS

The recommendations and conclusions presented in this report were prepared based on conditions disclosed by our exploratory borings, geologic reconnaissance, engineering analyses, and our experience. Variations in the subsurface conditions not indicated by the borings are possible and should be expected.

We believe this report was prepared with that level of skill and care ordinarily used by geologists and geotechnical engineers practicing under similar conditions. No warranty, express or implied, is made.

Should you have any questions regarding the contents of this report or the project from a geotechnical engineering point-of-view, please call.

CTL | THOMPSON, INC.

Mary Ray
Staff Geologist

Reviewed by:

COLORADO REGISTERED PROFESSIONAL ENGINEER
WILLIAM CHARLES HOFFMANN, JR.
19181
4.3.19

William C. Hoffmann, Jr., P.E.
Senior Principal Engineer

MBR:WCH:cw
(4 copies sent)

Via email: SRossoll@laplatallc.com

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1. Colorado Geological Survey. (1991). Results of the 1987-88 EPA Supported Radon Study in Colorado, with a Discussion on Geology, Colorado Geological Survey Open File Report 91-4.

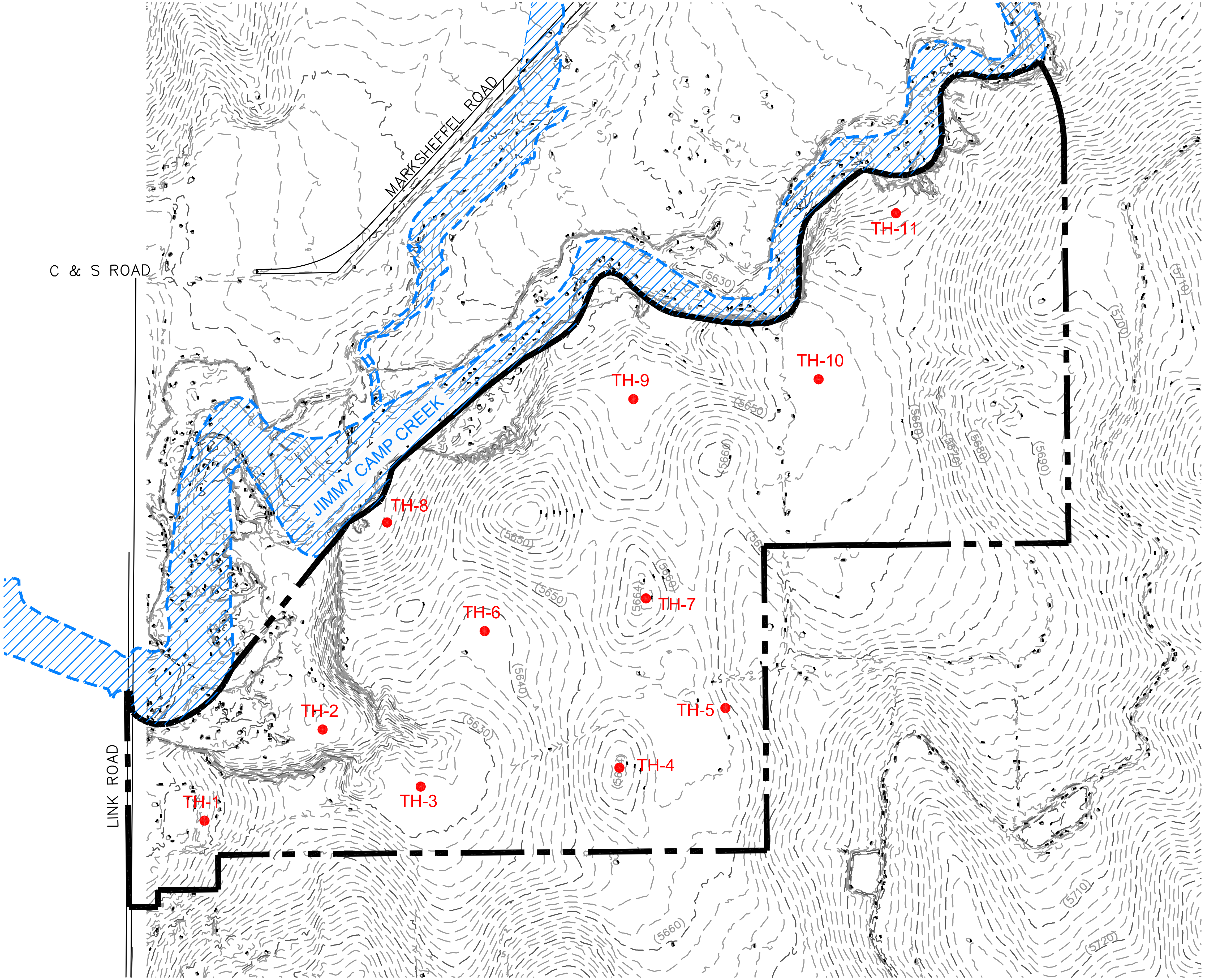
2. Federal Emergency Management Agency, Flood Insurance Rate Map, Map Number 08041C0958G, effective date December 7, 2018.

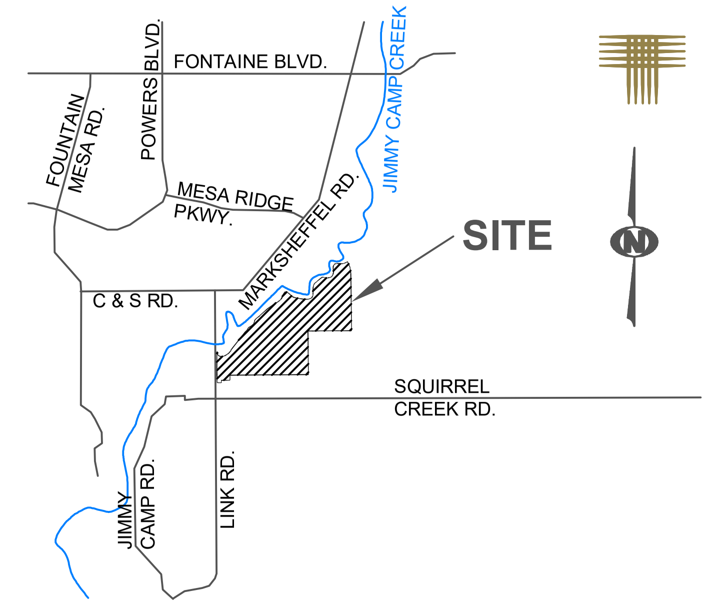
3. International Building Code (2015 IBC).

4. Kirkham, R.M. & Rogers, W.P. (1981). Earthquake Potential in Colorado. Colorado Geological Survey, Bulletin 43.

5. Scott, G.R., Taylor, R.B., Epis, R.C., and Wobus, R.A. (1976). Geologic Map of Pueblo 1 degree x 2 degrees quadrangle, south-central, Colorado, Colorado Geological Survey.

6. Robinson and Associates, Inc. (1977). El Paso County, Colorado Potential Geologic Hazards and Surficial Deposits, Environmental and Engineering Geologic Maps and Tables for Land Use.





VICINITY MAP

(NOT TO SCALE)

LEGEND:

- TH-1 ● APPROXIMATE LOCATION OF EXPLORATORY BORING.
- PROJECT BOUNDARY
- EXISTING TOPOGRAPHY

0 350' 700'

SCALE: 1" = 700'

NOTE:
BASE DRAWING WAS PROVIDED BY CLASSIC CONSULTING (PROJECT NO. 2550.00, DATED FEBRUARY 19, 2019).

LA PLATA COMMUNITIES
SILVER CROSS RANCH
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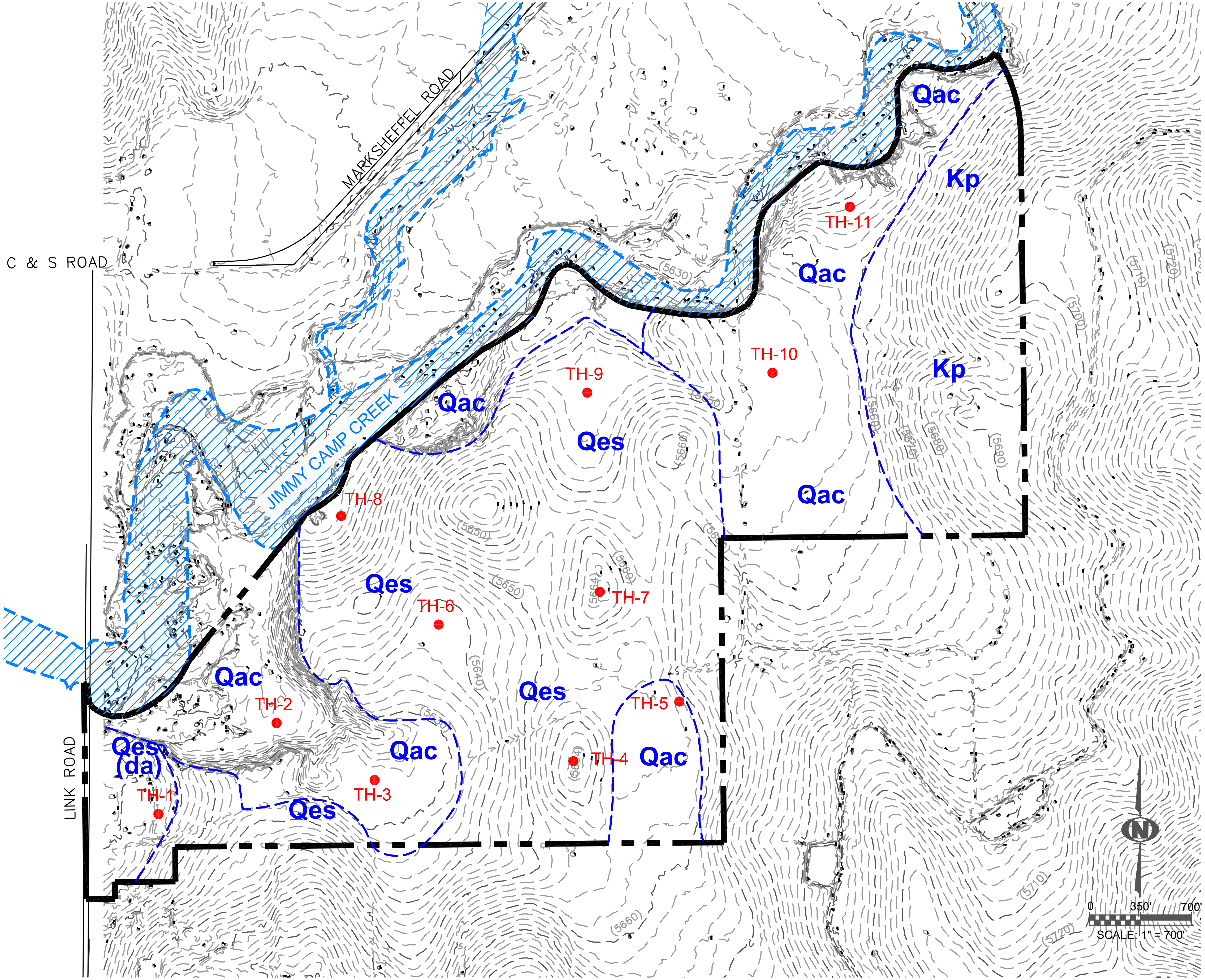
Location of Exploratory Borings

FIG. 1



LEGEND:

TH-1 ● APPROXIMATE LOCATION OF EXPLORATORY BORING.

PROJECT BOUNDARY

EXISTING TOPOGRAPHY

GEOLOGIC UNITS AND (MODIFIERS)

SURFICIAL GEOLOGIC CONTACTS

(da) DISTURBED AREA.

Qac ALLUVIUM (CLAYEY AND SILTY SAND, AND SANDY, CLAY) DEPOSITED IN PRESENT STREAM VALLEYS AND SLOPE WASH COLLUVIUM. HOLOCENE AGE.

Qes FINE TO COARSE GRAINED SAND AND CLAY DEPOSITED BY WIND. EARLY HOLOCENE.

Kp PIERRE SHALE. GRAY, BLACK AND OLIVE COLORED, SILICEOUS CLAYSTONE OVER FISSILE SHALE. LATE CRETACEOUS.

NOTES:

1. BASE DRAWING WAS PROVIDED BY CLASSIC CONSULTING (PROJECT NO. 2550.00, DATED FEBRUARY 19, 2019).
2. ALL BOUNDARIES SHOWN SHOULD BE CONSIDERED APPROXIMATE. THEY ARE BASED UPON A SUBJECTIVE INTERPRETATION OF PUBLISHED MAPS, AERIAL PHOTOGRAPHS AND A BRIEF FIELD RECONNAISSANCE. CHANGES IN THE MAPPED BOUNDARIES SHOWN ARE POSSIBLE AND SHOULD BE EXPECTED WITH MORE DETAILED WORK AND FURTHER INFORMATION. ALL INTERPRETATIONS AND CONDITIONS SHOWN ARE PRELIMINARY AND FOR LAND-USE PLANNING ONLY.

LA PLATA COMMUNITIES
SILVER CROSS RANCH
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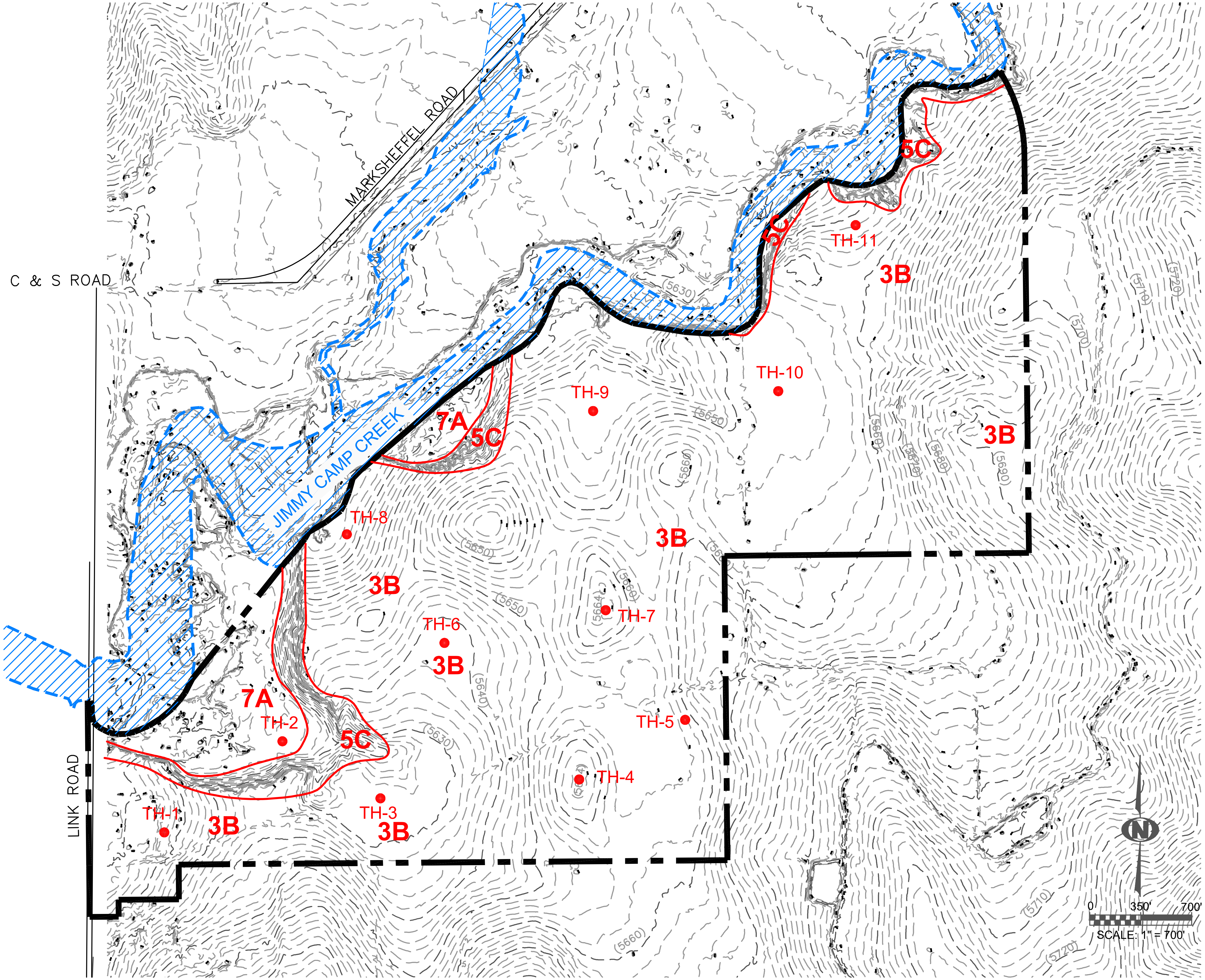
Surficial Geologic Conditions

FIG. 2



LEGEND:

TH-1 ● APPROXIMATE LOCATION OF EXPLORATORY BORING.

PROJECT BOUNDARY

EXISTING TOPOGRAPHY

ENGINEERING UNITS AND (MODIFIERS)

ENGINEERING CONTACTS

3B EXPANSIVE AND POTENTIALL EXPANSIVE SOIL AND BEDROCK ON FLAT TO MODERATE SLOPES (0 - 12%).

5C POTENTIALLY UNSTABLE COLLUVIUM AND BEDROCK ON STEEP SLOPES (12 - 30%).

7A PHYSIOGRAPHIC FLOODPLAIN AND SPECIAL FLOOD HAZARD AREAS.

NOTES:

1. BASE DRAWING WAS PROVIDED BY CLASSIC CONSULTING (PROJECT NO. 2550.00, DATED FEBRUARY 19, 2019).
2. ALL BOUNDARIES SHOWN SHOULD BE CONSIDERED APPROXIMATE. THEY ARE BASED UPON A SUBJECTIVE INTERPRETATION OF PUBLISHED MAPS, AERIAL PHOTOGRAPHS AND AN INITIAL FIELD RECONNAISSANCE. CHANGES IN THE MAPPED BOUNDARIES SHOWN ARE POSSIBLE AND SHOULD BE EXPECTED WITH MORE DETAILED WORK AND FURTHER INFORMATION. ALL INTERPRETATIONS AND CONDITIONS SHOWN ARE PRELIMINARY AND FOR INITIAL LAND-USE PLANNING ONLY.
3. MAP LEGEND IS MODIFIED FROM CHARLES S. ROBINSON & ASSOCIATES, INC., GOLDEN, COLORADO, DATED 1977.

LA PLATA COMMUNITIES
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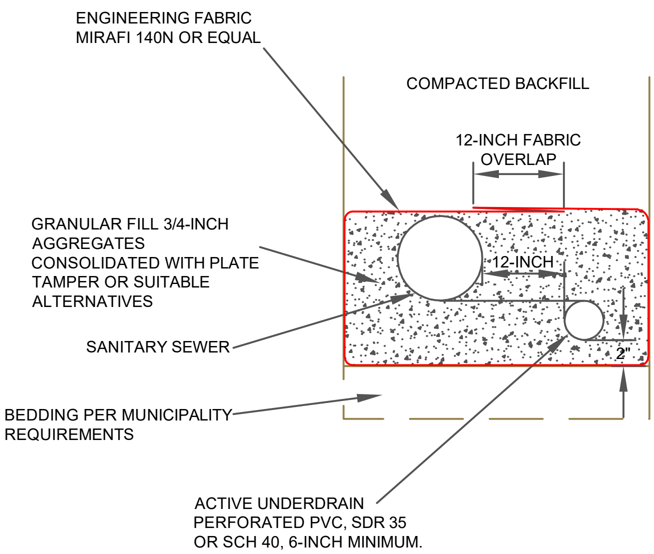
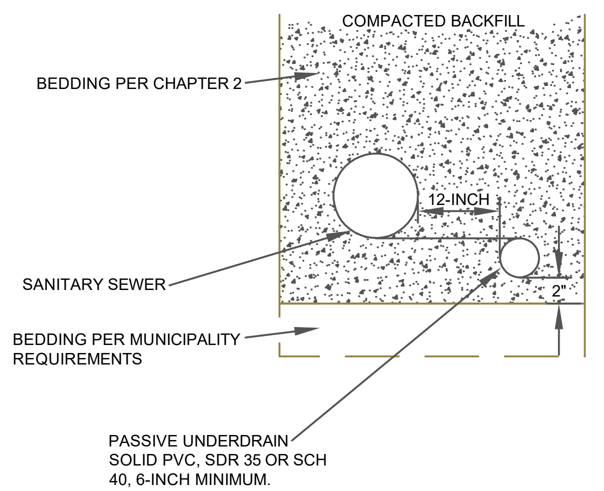
Engineering Conditions

FIG. 3

NOTE:
- POINT OF DISCHARGE TO PUBLIC SYSTEM REQUIRED.
- UNDERDRAIN SERVICE LINE CONNECTIONS SHALL BE 3" SCH 40.



ACTIVE UNDERDRAIN PIPE



(ACTIVE RELIEF SECTION 10 FEET DOWNSTREAM OF EACH MANHOLE)

PASSIVE UNDERDRAIN PIPE

GENERAL NOTES:
1. MINIMUM UNDERDRAIN SIZE OF MAINLINE PIPE TO BE SIX (6") INCHES.
2. UNDERDRAIN TO BE LOCATED OPPOSITE THE WATERLINE LOCATION.
3. TO BE BEDDED PER APPLICABLE MUNICIPALITY.
4. BEDDING MATERIAL SPECIFICATIONS CLASS I, II OR III FOR PIPE SLOPE GREATER THAN 1.04 PERCENT FOR SLOPE OF 1.04 PERCENT OR FLATTER.

SIEVE SIZE	PERCENT PASSING
1 1/2"	100
3/4"	0 TO 100
#40	0 TO 100
#50	0 TO 80
#100	0 TO 40
#200	0 TO 26

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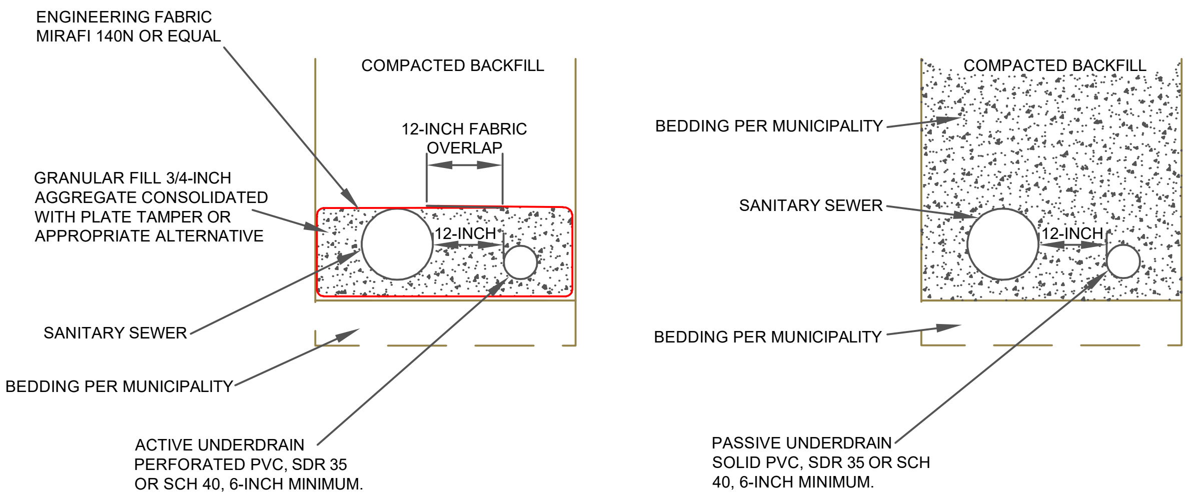
Alternate 1 Underdrain Trench Details

FIG. 4

NOTE:
- POINT OF DISCHARGE TO PUBLIC SYSTEM REQUIRED.
- UNDERDRAIN SERVICE LINE CONNECTIONS SHALL BE 3" SCH 40.



(ACTIVE RELIEF SECTION 10 FEET DOWNSTREAM OF EACH MANHOLE)

ACTIVE UNDERDRAIN PIPE

PASSIVE UNDERDRAIN PIPE

GENERAL NOTES:
1. MINIMUM UNDERDRAIN SIZE OF MAINLINE PIPE TO BE SIX (6") INCHES.
2. UNDERDRAIN TO BE LOCATED ON THE SOUTH AND WEST OF THE SANITARY SEWER LINE, OPPOSITE THE WATERLINE LOCATION.
3. TO BE BEDDED PER APPLICABLE MUNICIPALITY.
4. BEDDING MATERIAL SPECIFICATIONS CLASS I, II OR III FOR PIPE SLOPE GREATER THAN 1.04 PERCENT FOR SLOPE OF 1.04 PERCENT OR FLATTER.

SIEVE SIZE	PERCENT PASSING
1 1/2"	100
3/4"	0 TO 100
#40	0 TO 100
#50	0 TO 80
#100	0 TO 40
#200	0 TO 26

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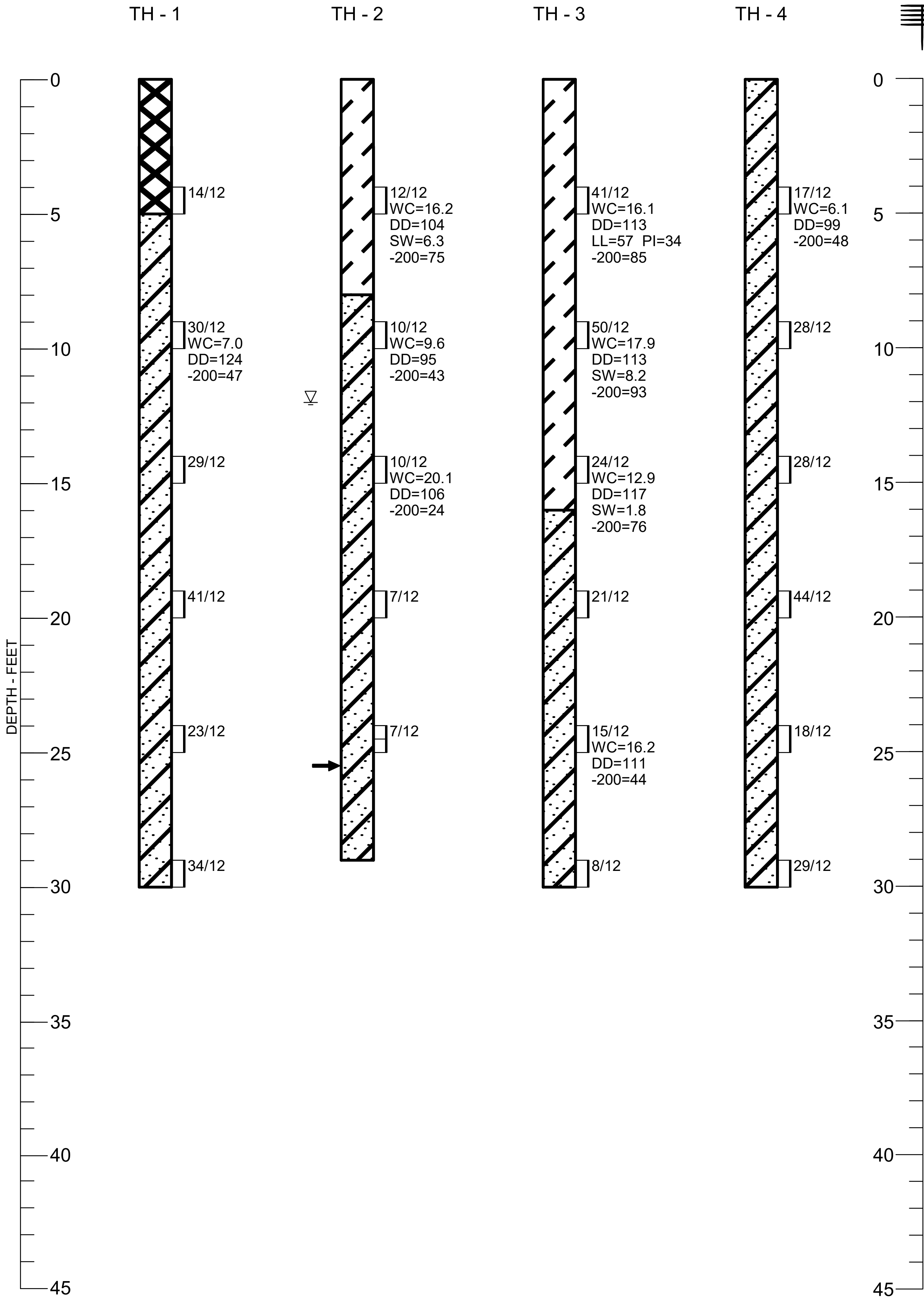
Alternate 2 Underdrain Trench Details

FIG. 5

APPENDIX A

SUMMARY LOGS OF EXPLORATORY BORINGS



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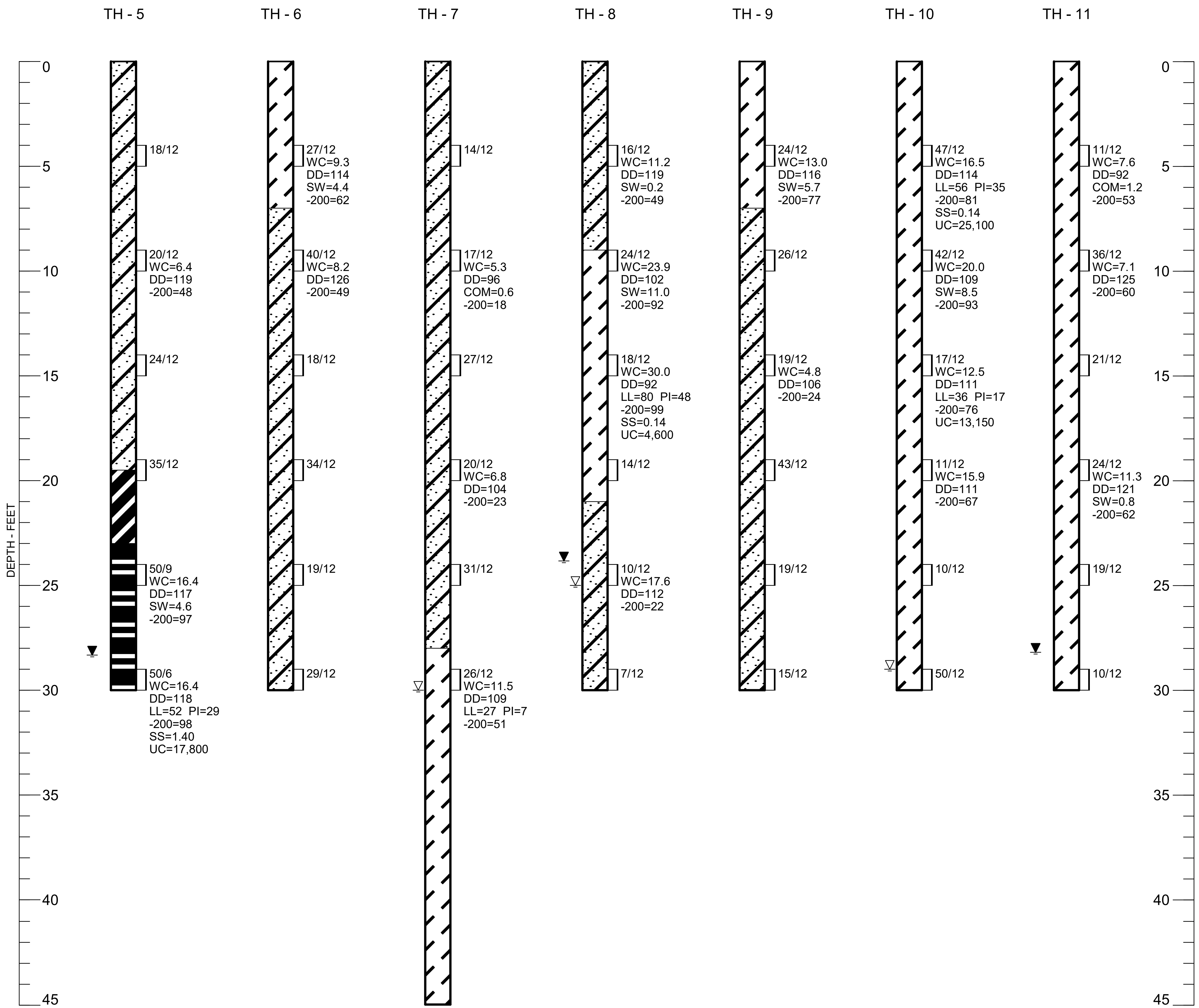
Summary Logs of Exploratory Borings

FIG. A-1



LEGEND:

FILL, CLAY, SANDY, STIFF, SLIGHTLY MOIST, DARK BROWN, SOME ORGANIC MATERIAL.

SAND, SILTY TO VERY SILTY AND SAND, VERY CLAYEY, LOOSE TO DENSE AND VERY STIFF, SLIGHTLY MOIST NEAR SURFACE BECOMING MOIST TO WET AT DEPTH, LIGHT BROWN TO BROWN. (SM-SC)

CLAY, SLIGHTLY SANDY TO VERY SANDY, STIFF TO VERY STIFF, SLIGHTLY MOIST NEAR SURFACE BECOMING MOIST TO WET AT DEPTH, LIGHT BROWN TO BROWN. (CL-CH)

WEATHERED CLAYSTONE BEDROCK, MEDIUM HARD, MOIST, GRAY BROWN.

CLAYSTONE BEDROCK, HARD, MOIST, RUST, GRAY, BROWN.

DRIVE SAMPLE. THE SYMBOL 14/12 INDICATES 14 BLOWS OF A 140-POUND HAMMER FALLING 30 INCHES WERE REQUIRED TO DRIVE A 2.5-INCH O.D. SAMPLER 12 INCHES.

GROUNDWATER LEVEL MEASURED AT TIME OF DRILLING.

GROUNDWATER LEVEL MEASURED MARCH 1, 2019.

INDICATES DEPTH WHERE THE TEST HOLE CAVED DURING DRILLING.

NOTES:

1. THE BORINGS WERE DRILLED FEBRUARY 21 AND 22, 2019 USING A 4-INCH DIAMETER, CONTINUOUS-FLIGHT AUGER AND A CME-45, TRUCK-MOUNTED DRILL RIG.
2. THESE LOGS ARE SUBJECT TO THE EXPLANATIONS, LIMITATIONS, AND CONCLUSIONS AS CONTAINED IN THIS REPORT.
3. WC - INDICATES MOISTURE CONTENT. (%)
   DD - INDICATES DRY DENSITY. (PCF)
   SW - INDICATES SWELL WHEN WETTED UNDER ESTIMATED OVERBURDEN PRESSURE. (%)
   COM - INDICATES COMPRESSION WHEN WETTED UNDER ESTIMATED OVERBURDEN PRESSURE. (%)
   LL - INDICATES LIQUID LIMIT. (%) (NV : NO VALUE)
   PI - INDICATES PLASTICITY INDEX. (%) (NP : NON-PLASTIC)
   -200 - INDICATES PASSING NO. 200 SIEVE. (%)
   SS - INDICATES WATER-SOLUBLE SULFATE CONTENT. (%)
   UC - INDICATES UNCONFINED COMPRESSIVE STRENGTH. (PSF)

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SILVER CROSS RANCH
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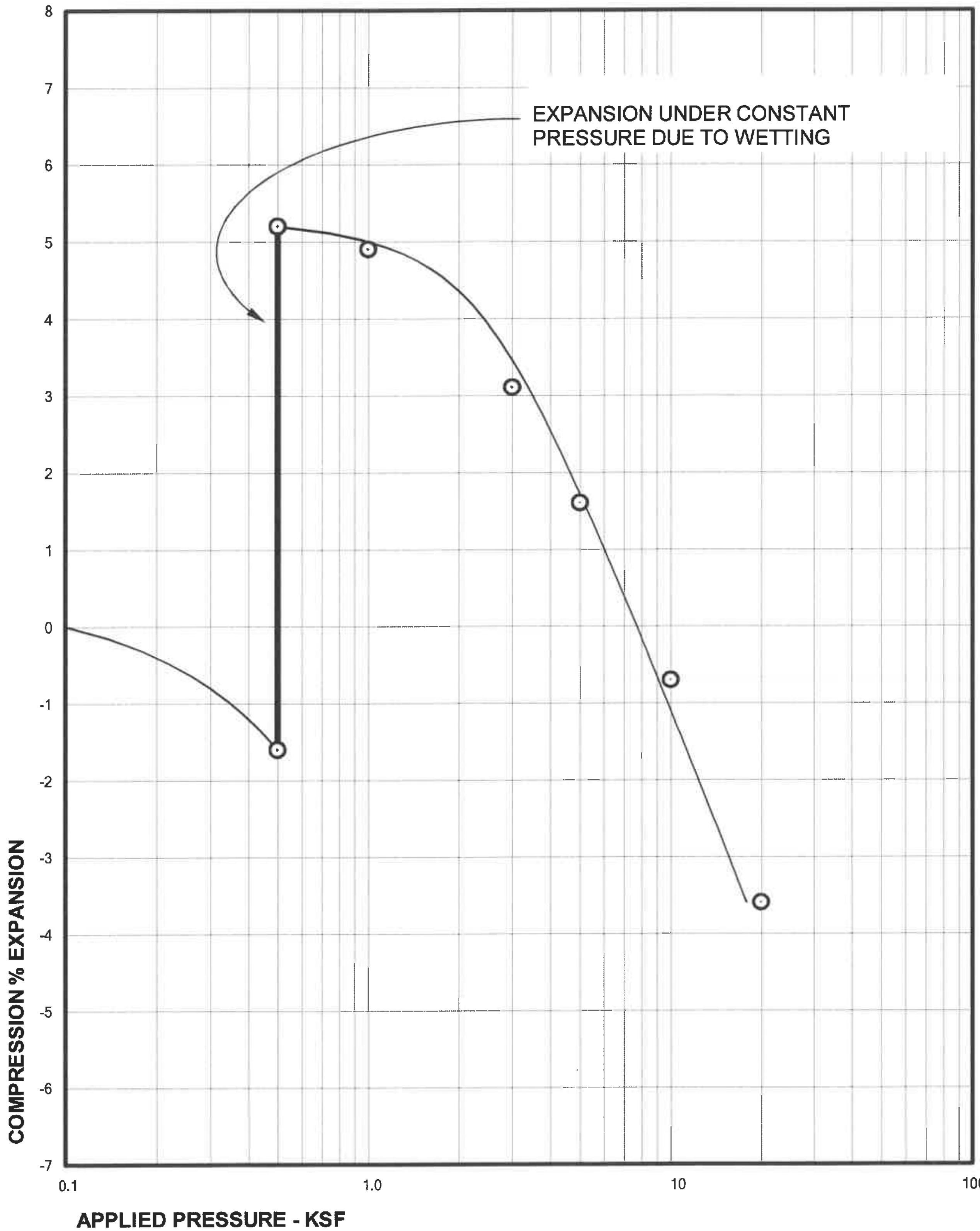
Summary Logs of Exploratory Borings

FIG. A-2

APPENDIX B

LABORATORY TEST RESULTS
TABLE B-1: SUMMARY OF LABORATORY TESTING



Sample of CLAY, SANDY (CL)

From TH-2 AT 4 FEET

DRY UNIT WEIGHT= 104 PCF

MOISTURE CONTENT= 16.2 %

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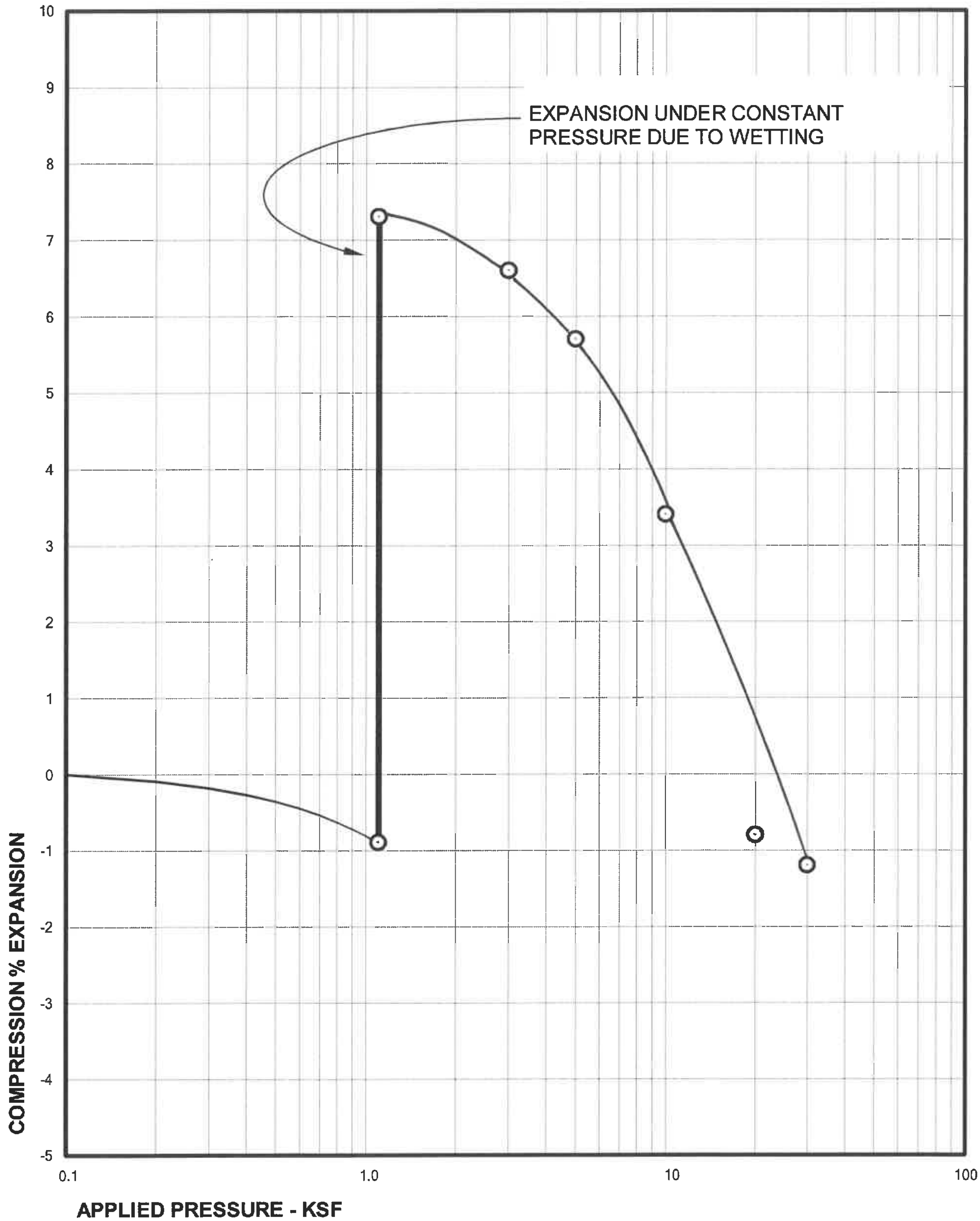
Swell Consolidation Test Results

FIG. B-1



Sample of CLAY, SLIGHTLY SANDY (CH)

From TH-3 AT 9 FEET

DRY UNIT WEIGHT= 113 PCF

MOISTURE CONTENT= 17.9 %

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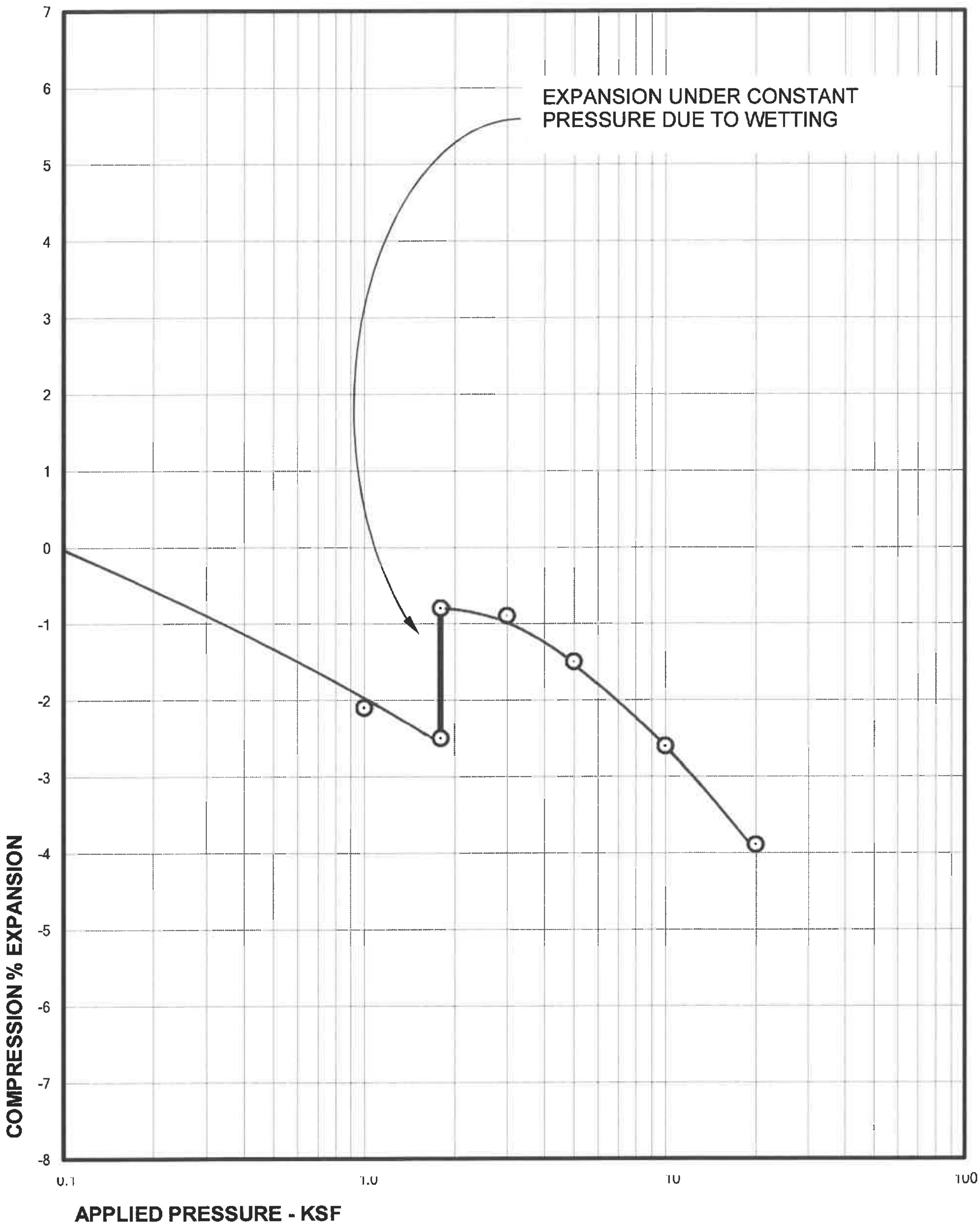
Swell Consolidation Test Results

FIG. B-2



Sample of CLAY, SANDY (CL)
From TH-3 AT 14 FEET

DRY UNIT WEIGHT= 117 PCF
MOISTURE CONTENT= 12.9 %

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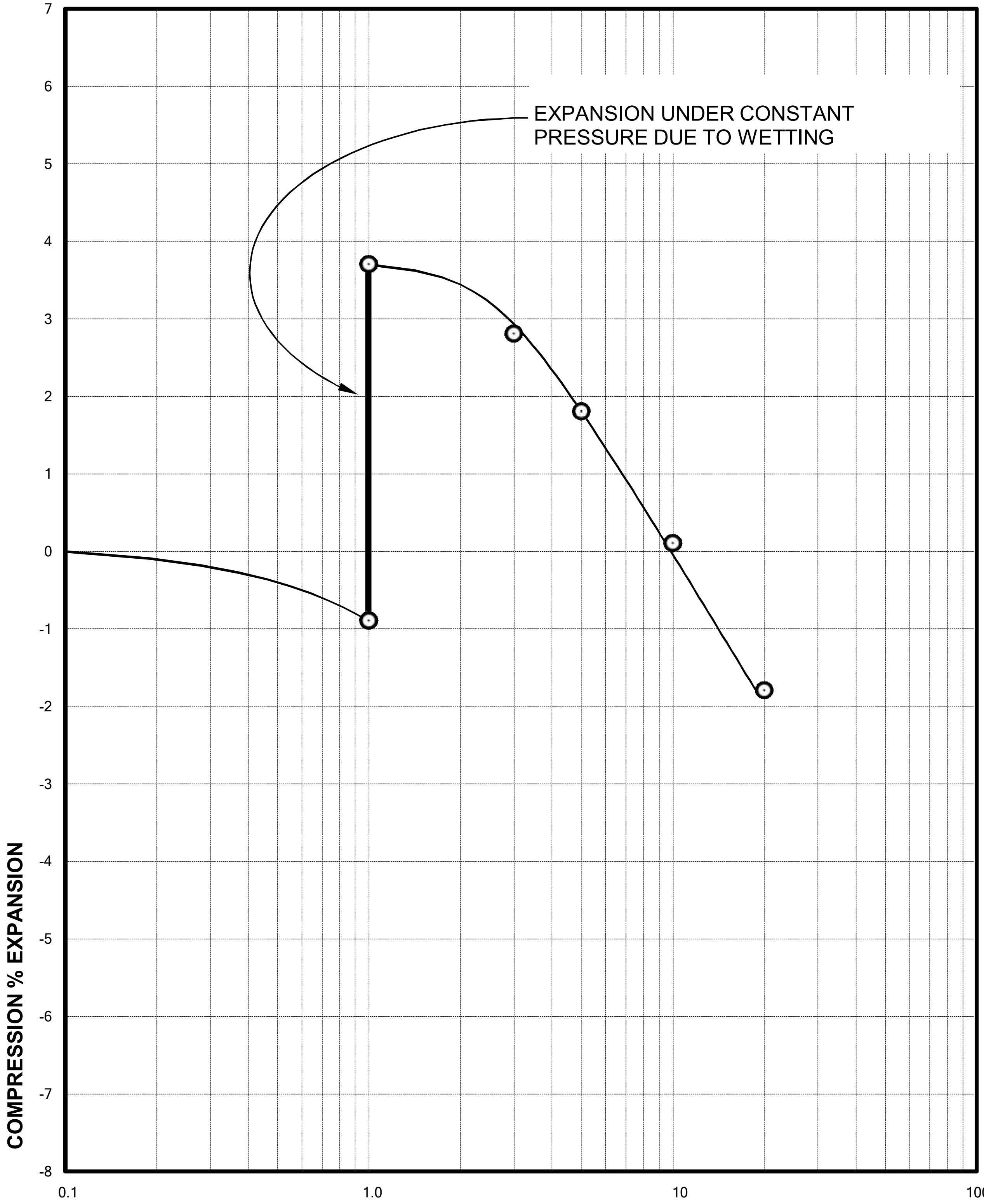
Swell Consolidation Test Results

FIG. B-3



Sample of	CLAYSTONE		DRY UNIT WEIGHT=	117	PCF
From	TH-5 AT 24 FEET		MOISTURE CONTENT=	16.4	%

LA PLATA COMMUNITIES
SILVER CROSS RANCH
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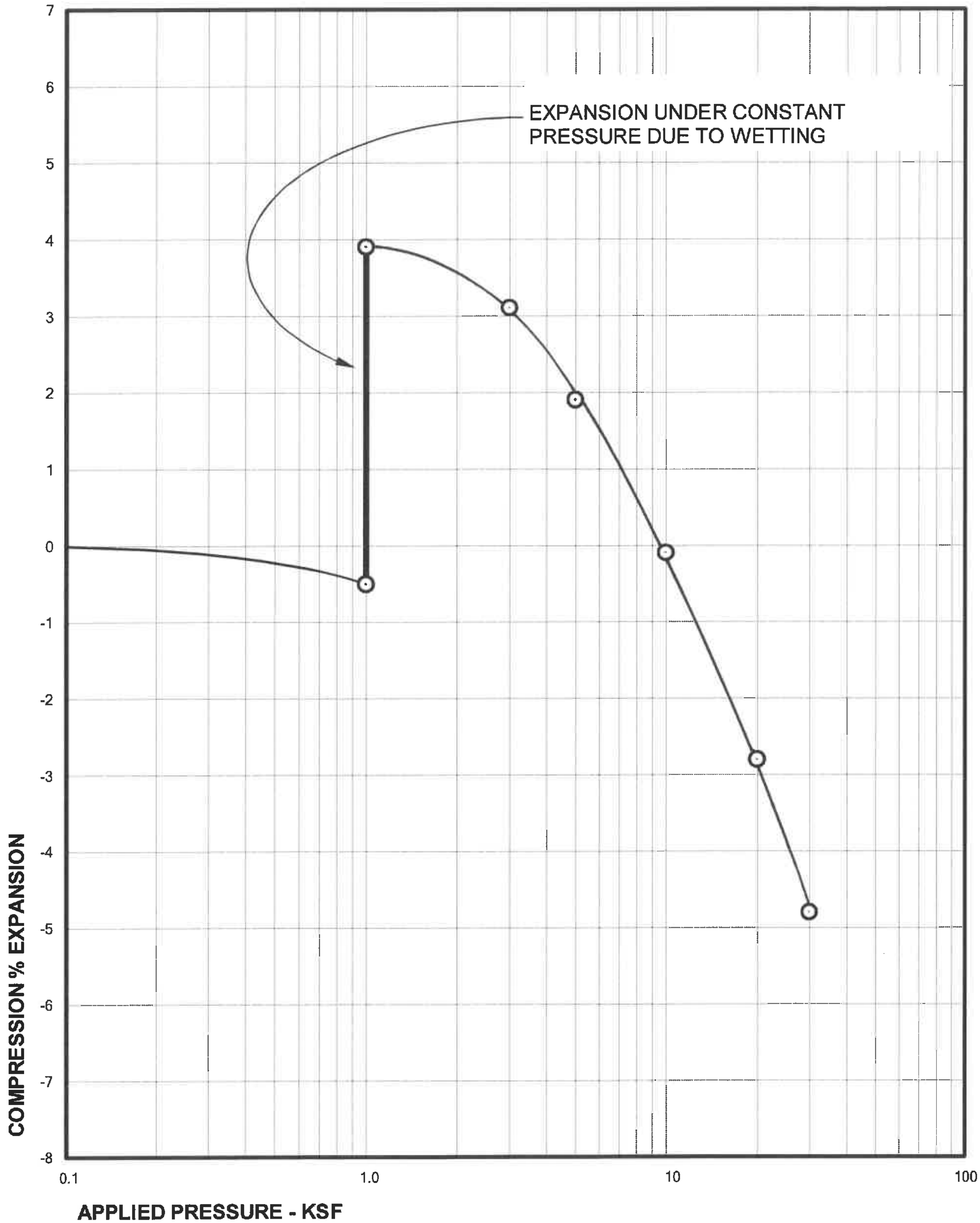
Swell Consolidation Test Results

FIG. B-4



Sample of CLAY, VERY SANDY (CL)
From TH-6 AT 4 FEET

DRY UNIT WEIGHT= 114 PCF
MOISTURE CONTENT= 9.3 %

LA PLATA COMMUNITIES
SILVER CROSS RANCH
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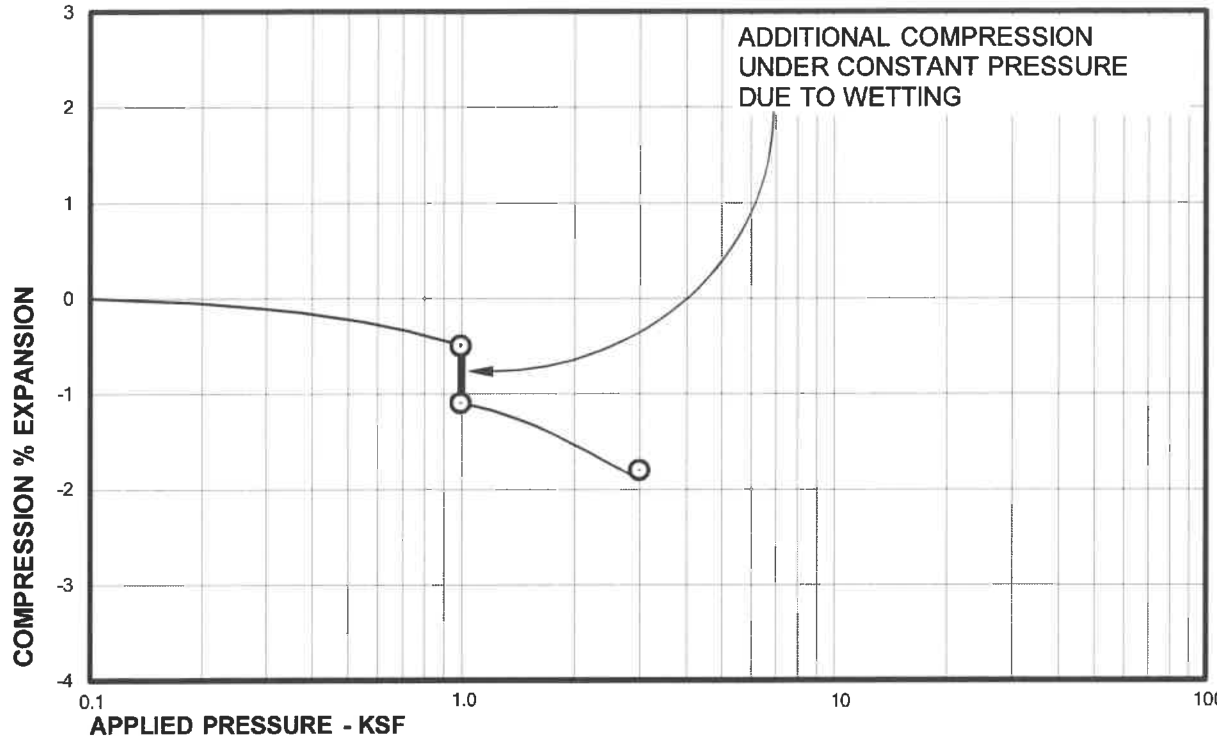
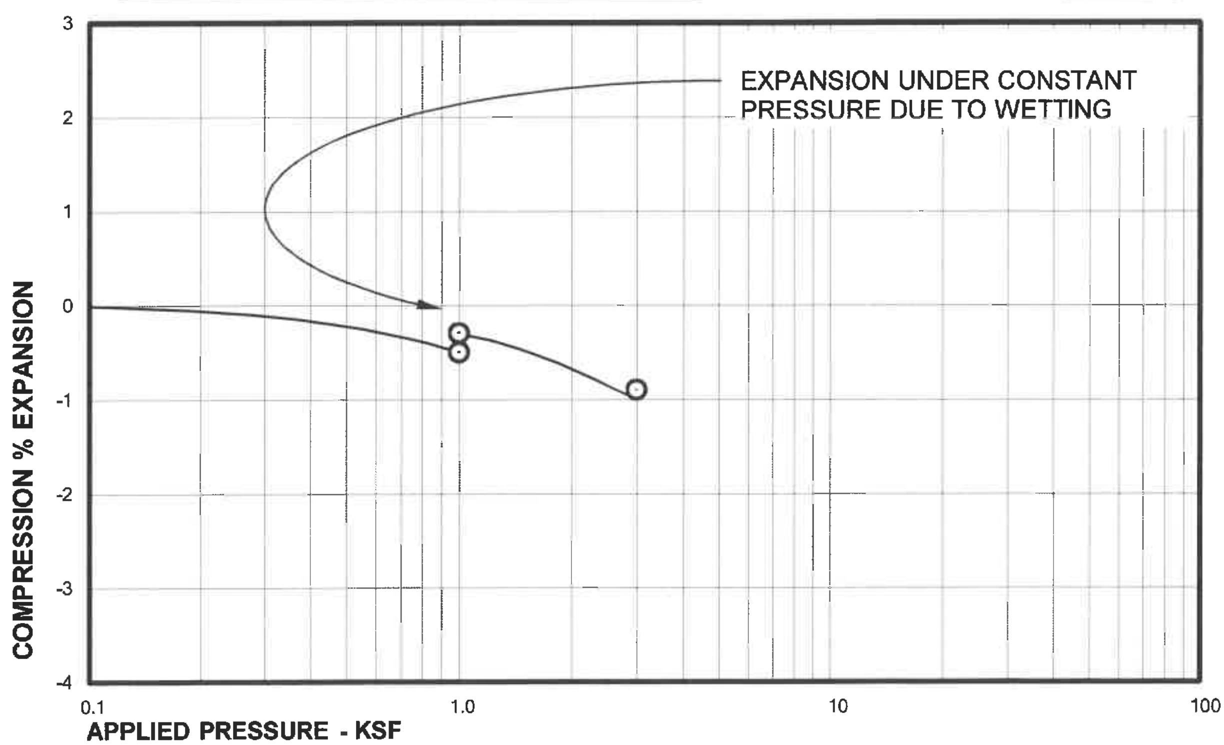
Swell Consolidation Test Results

FIG. B-5



Sample of SAND, SILTY (SM)
From TH-7 AT 9 FEET

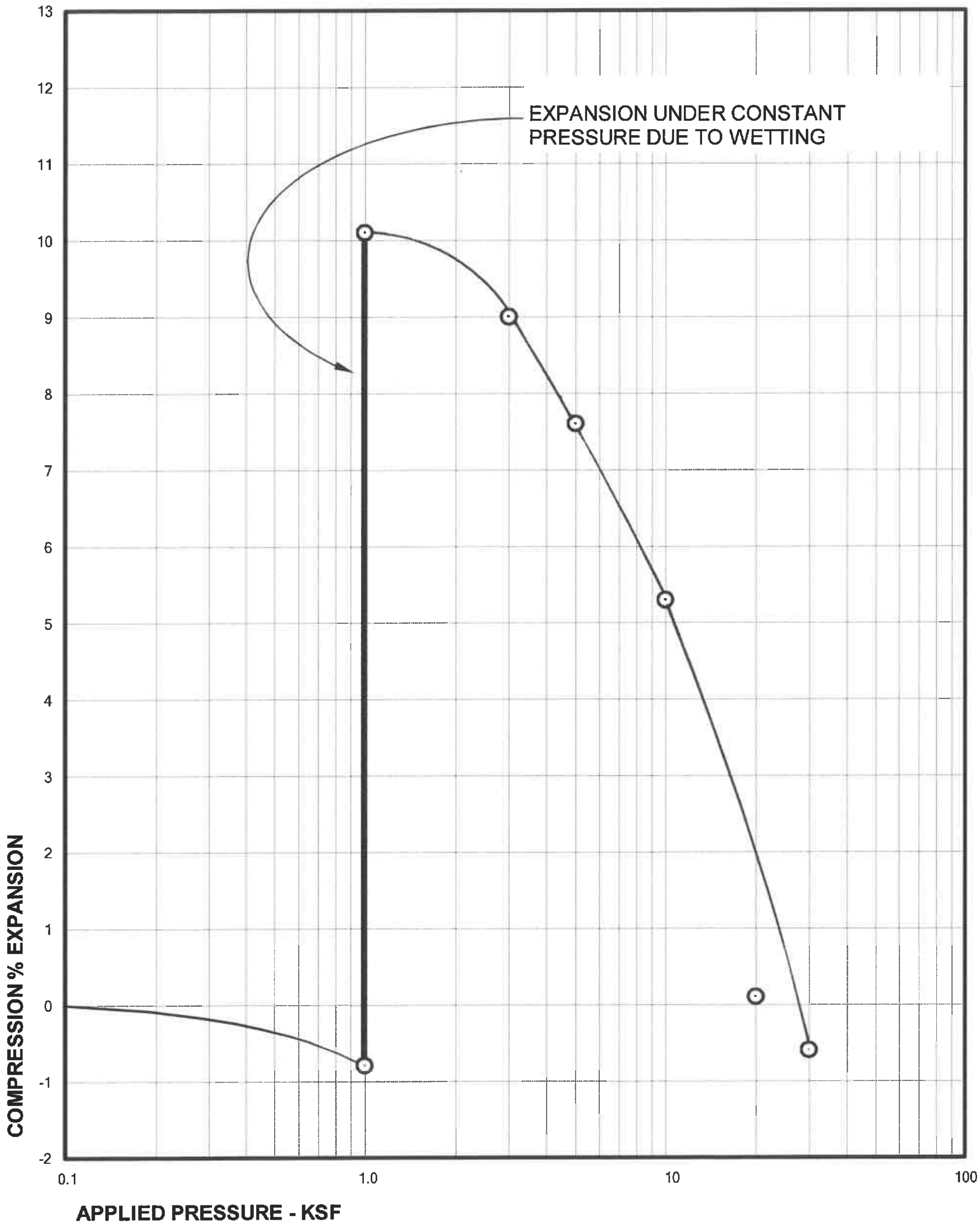
DRY UNIT WEIGHT= 96 PCF
MOISTURE CONTENT= 5.3 %



Sample of SAND, VERY CLAYEY (SC)
From TH-8 AT 4 FEET

DRY UNIT WEIGHT= 119 PCF
MOISTURE CONTENT= 11.2 %

Swell Consolidation Test Results



Sample of CLAY, SLIGHTLY SANDY (CH)
From TH-8 AT 9 FEET

DRY UNIT WEIGHT= 102 PCF
MOISTURE CONTENT= 23.9 %

LA PLATA COMMUNITIES
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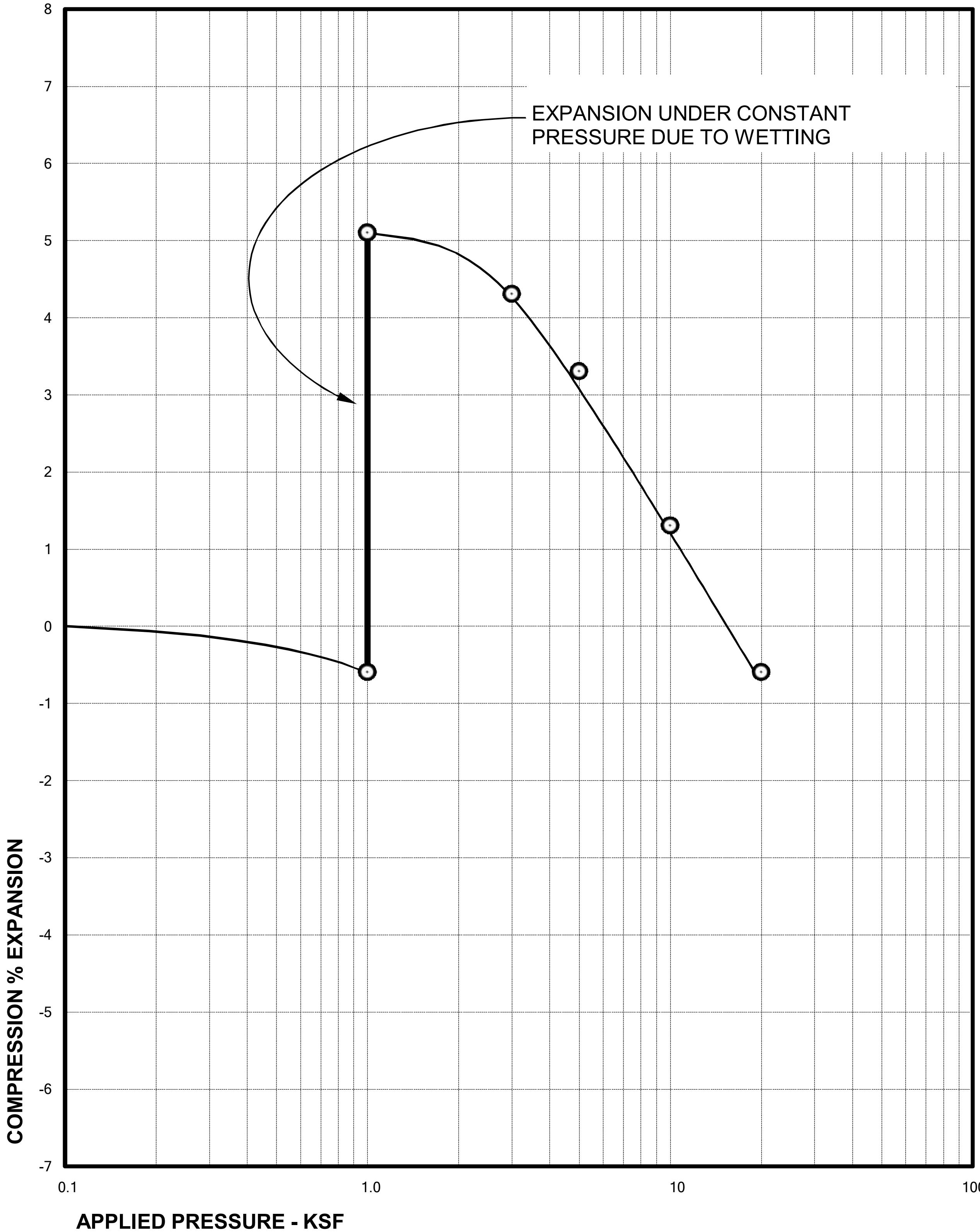
Swell Consolidation Test Results

FIG. B-7



Sample of CLAY, SANDY (CL)

From TH-9 AT 4 FEET

DRY UNIT WEIGHT= 116 PCF

MOISTURE CONTENT= 13.0 %

LA PLATA COMMUNITIES
SILVER CROSS RANCH
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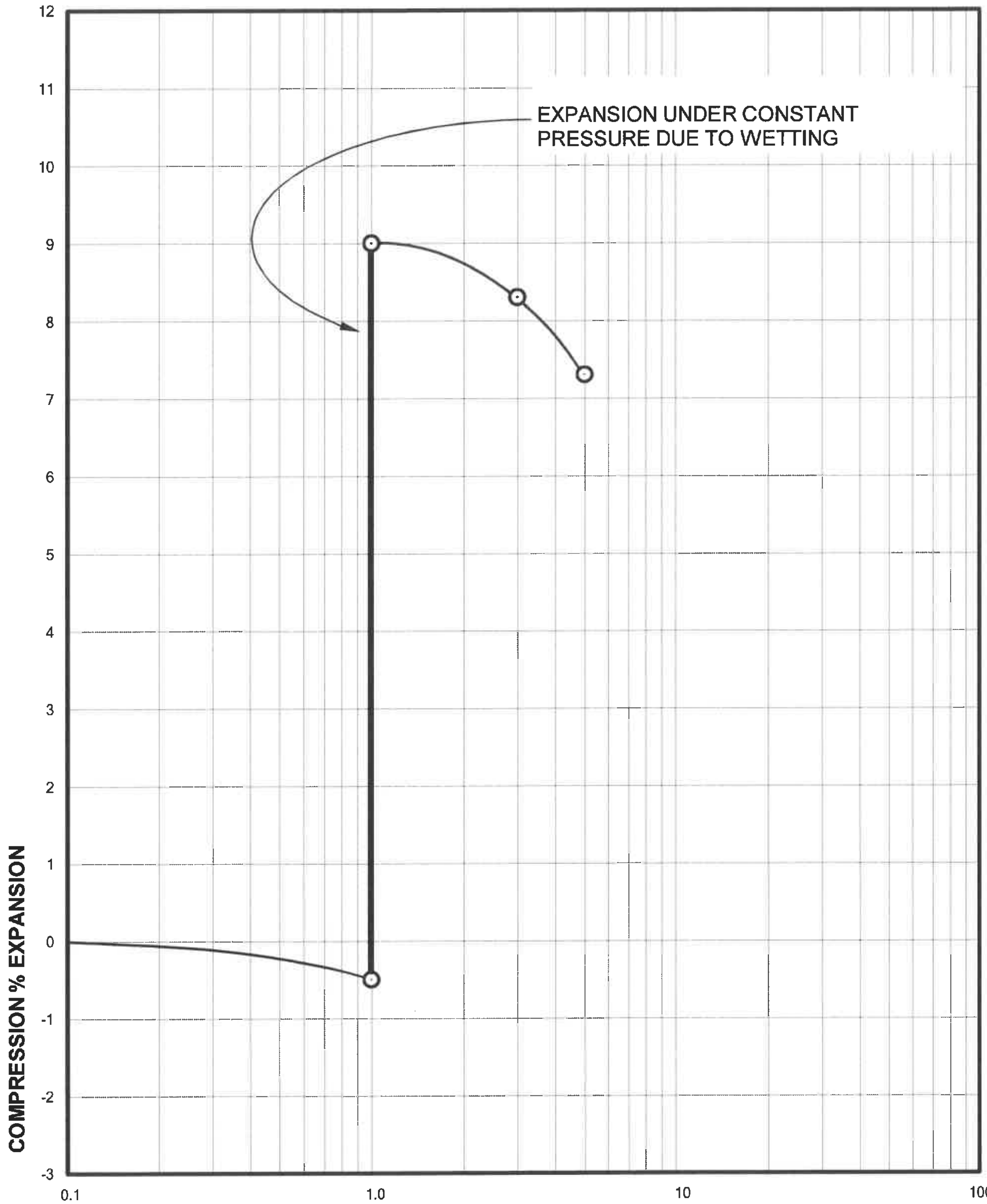
Swell Consolidation Test Results

FIG. B-8



Sample of CLAY, SLIGHTLY SANDY (CH)
From TH-10 AT 9 FEET

DRY UNIT WEIGHT= 109 PCF
MOISTURE CONTENT= 20.0 %

LA PLATA COMMUNITIES
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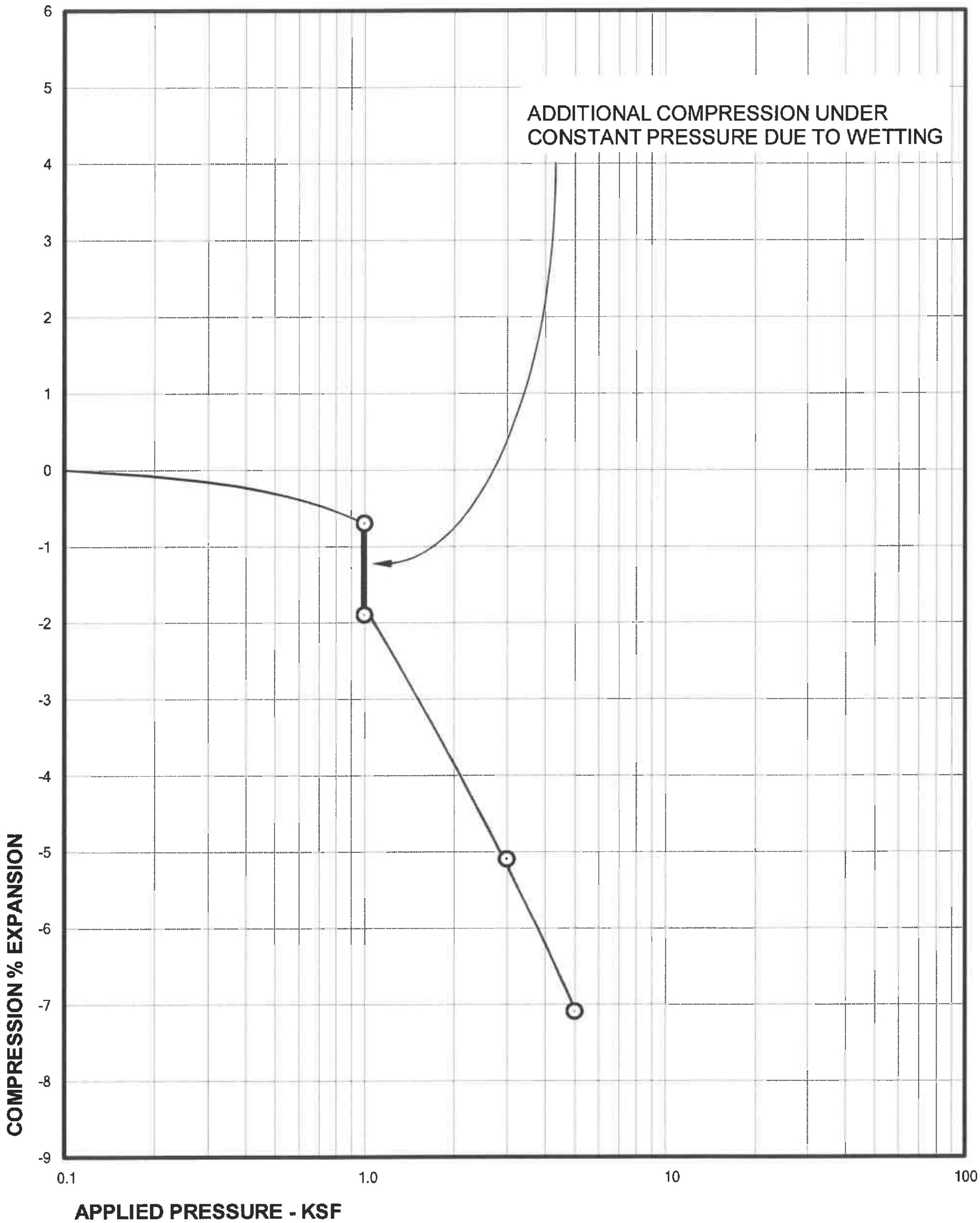
Swell Consolidation Test Results

FIG. B-9



Sample of CLAY, VERY SANDY (CL)
From TH-11 AT 4 FEET

DRY UNIT WEIGHT= 92 PCF
MOISTURE CONTENT= 7.6 %

LA PLATA COMMUNITIES
SILVER CROSS RANCH
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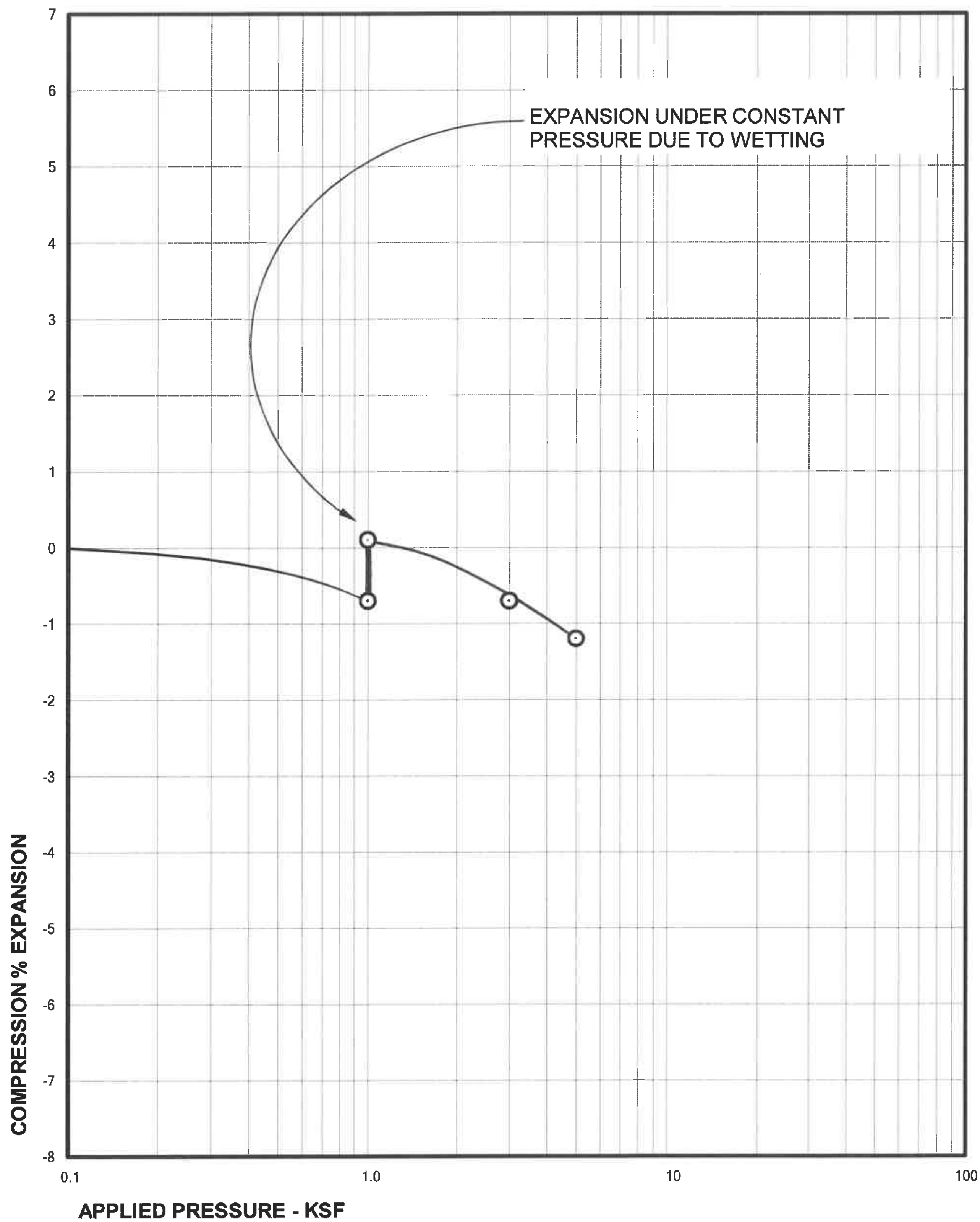
Swell Consolidation Test Results

FIG. B-10



Sample of CLAY, VERY SANDY (CL)

From TH-11 AT 19 FEET

DRY UNIT WEIGHT= 121 PCF

MOISTURE CONTENT= 11.3 %

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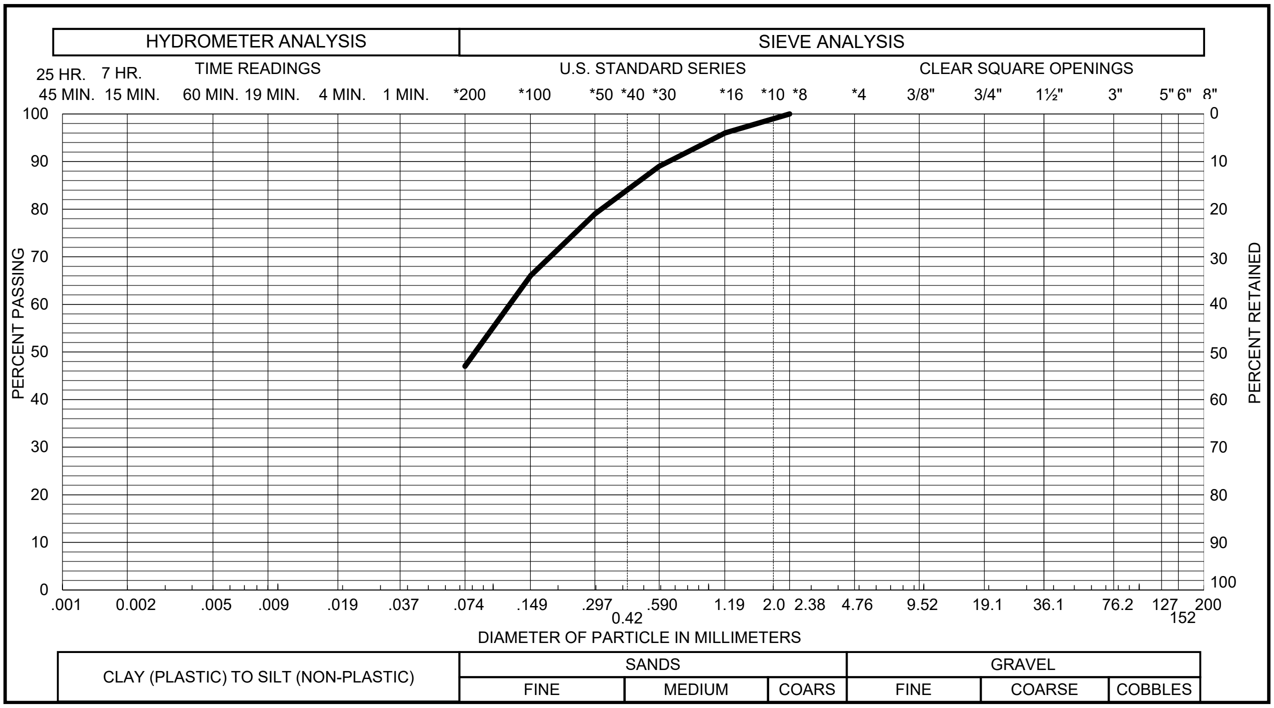
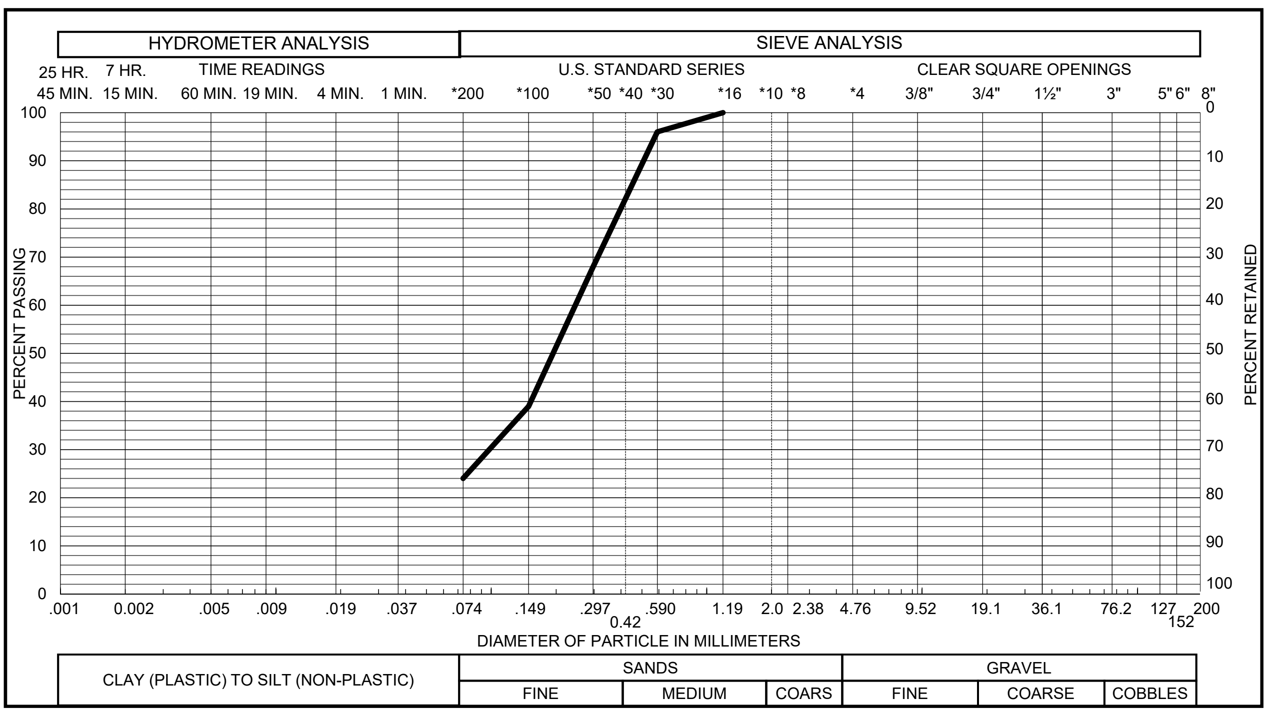
Swell Consolidation Test Results

FIG. B-11



Sample of SAND, VERY SILTY (SM)
From TH - 1 AT 9 FEET

GRAVEL 0 % SAND 53 %
SILT & CLAY 47 % LIQUID LIMIT %
PLASTICITY INDEX %



Sample of SAND, SILTY (SM)
From TH - 2 AT 14 FEET

GRAVEL 0 % SAND 76 %
SILT & CLAY 24 % LIQUID LIMIT %
PLASTICITY INDEX %

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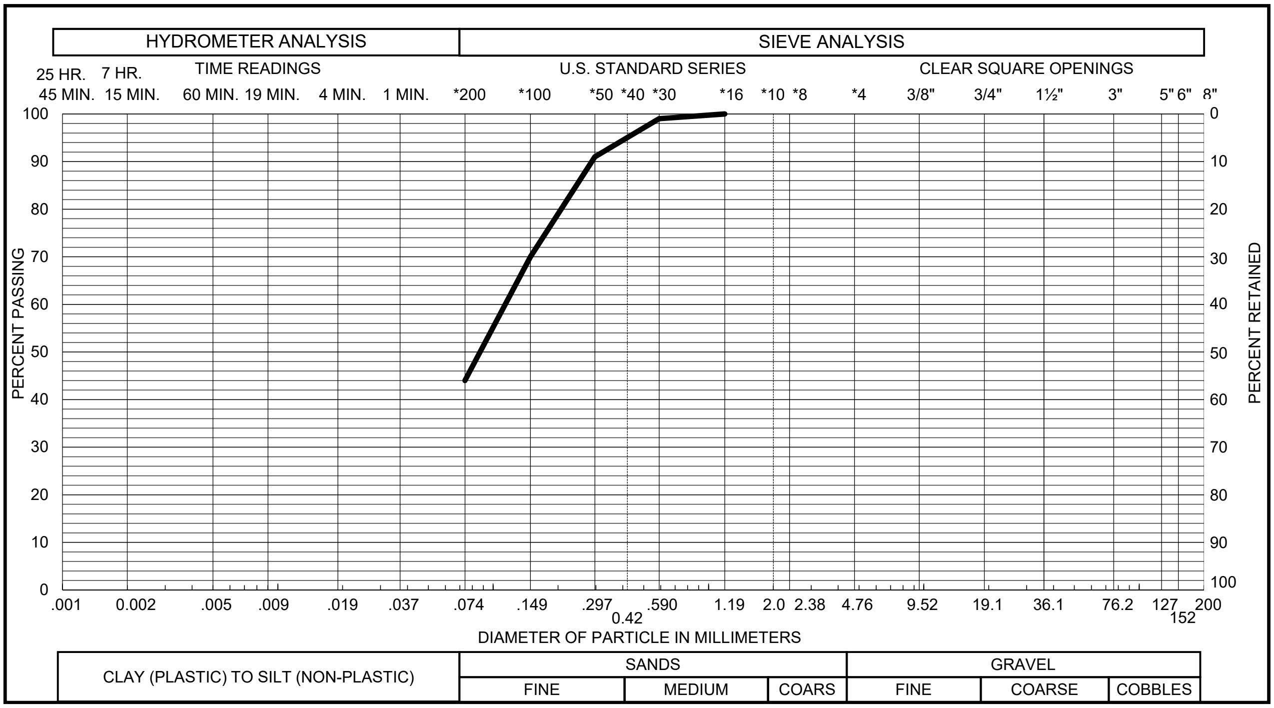
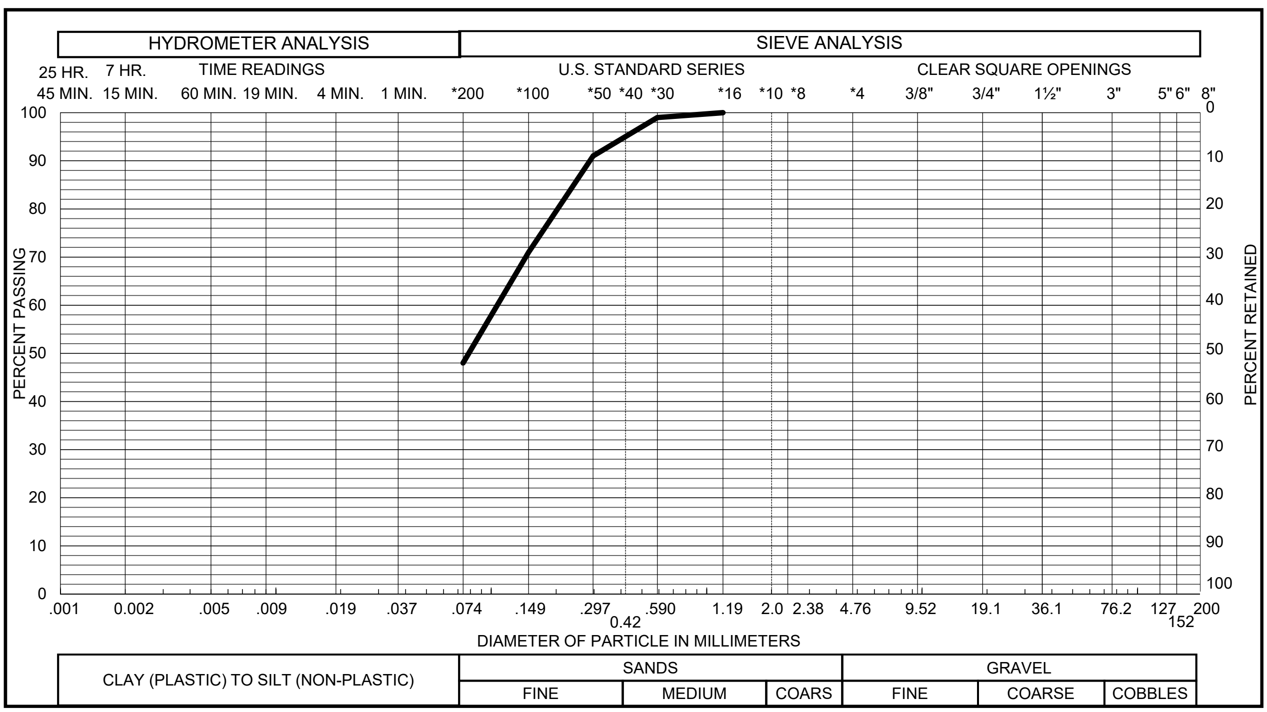
Gradation Test Results

FIG. B-12



Sample of	SAND, VERY SILTY (SM)	GRAVEL 0 %	SAND 56 %
From	TH - 3 AT 24 FEET	SILT & CLAY 44 %	LIQUID LIMIT %
		PLASTICITY INDEX %	



Sample of	SAND, VERY SILTY (SM)	GRAVEL 0 %	SAND 52 %
From	TH - 4 AT 4 FEET	SILT & CLAY 48 %	LIQUID LIMIT %
		PLASTICITY INDEX %	

LA PLATA COMMUNITIES
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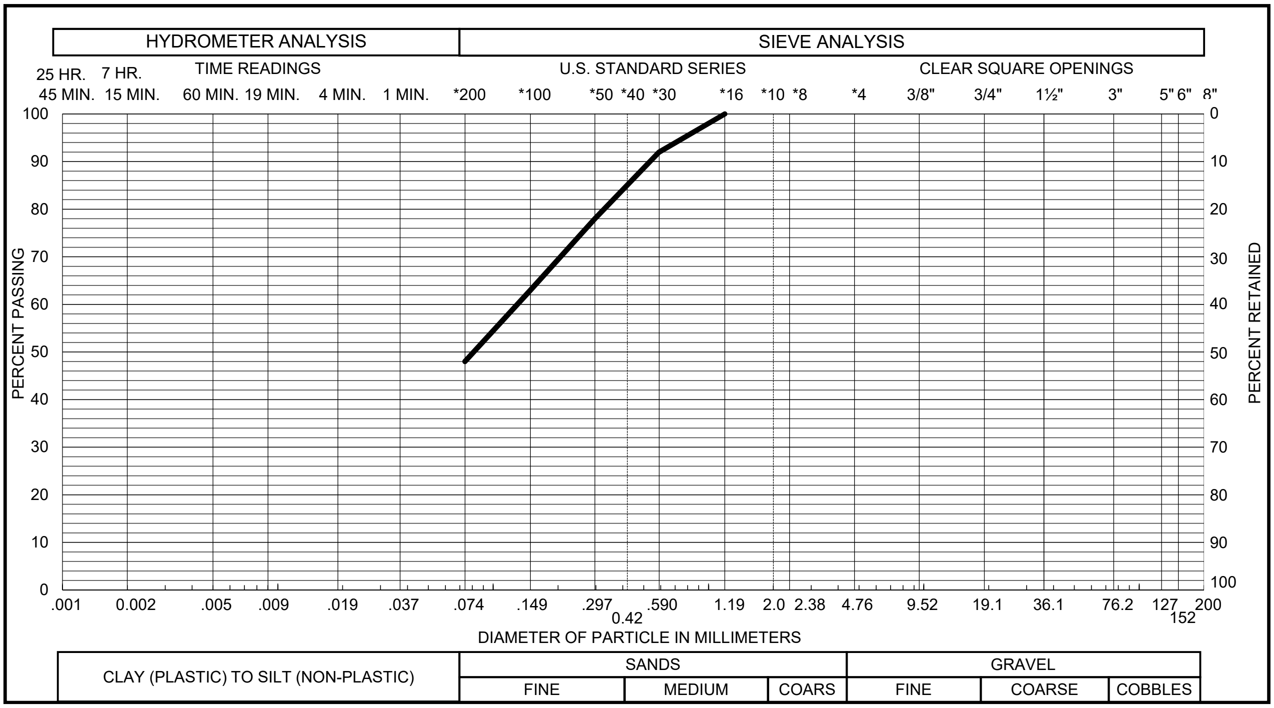
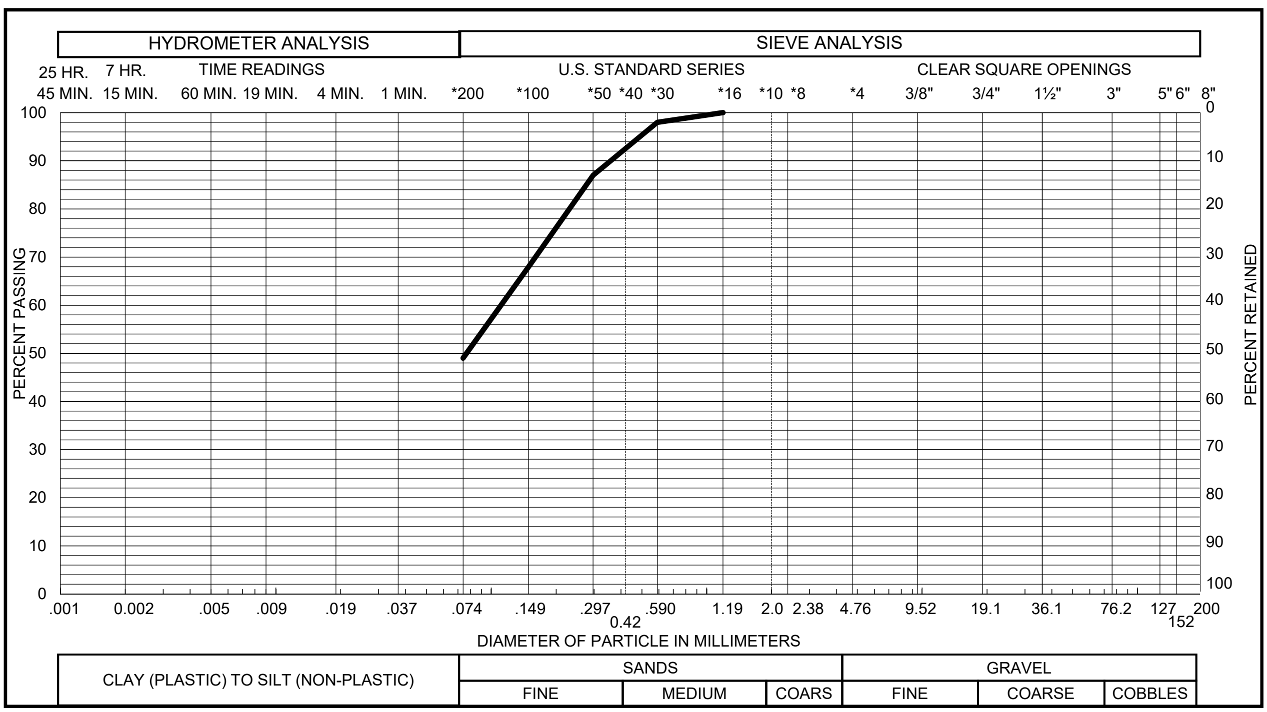
Gradation Test Results

FIG. B-13



Sample of SAND, VERY SILTY (SM)
From TH - 5 AT 9 FEET

GRAVEL 0 % SAND 52 %
SILT & CLAY 48 % LIQUID LIMIT %
PLASTICITY INDEX %



Sample of SAND, VERY SILTY (SM)
From TH - 6 AT 9 FEET

GRAVEL 0 % SAND 51 %
SILT & CLAY 49 % LIQUID LIMIT %
PLASTICITY INDEX %

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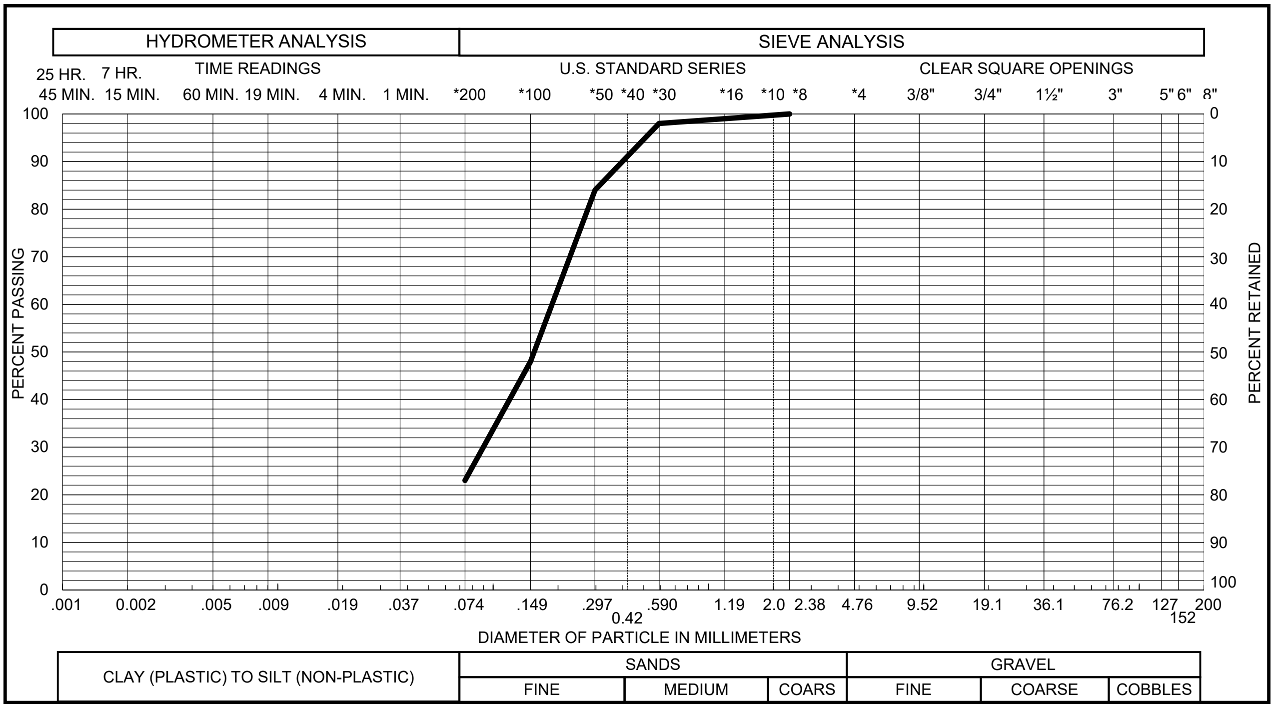
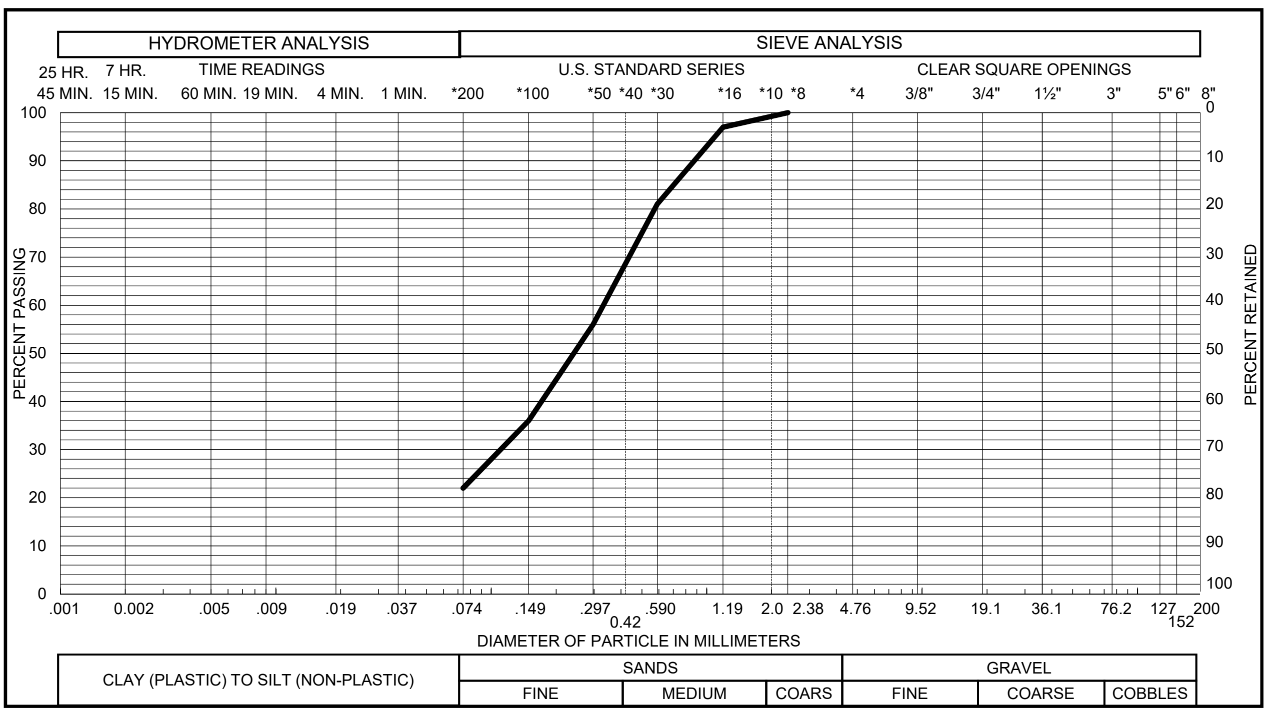
Gradation Test Results

FIG. B-14



Sample of SAND, SILTY (SM)
From TH - 7 AT 19 FEET

GRAVEL 0 % SAND 77 %
SILT & CLAY 23 % LIQUID LIMIT %
PLASTICITY INDEX %



Sample of SAND, SILTY (SM)
From TH - 8 AT 24 FEET

GRAVEL 0 % SAND 78 %
SILT & CLAY 22 % LIQUID LIMIT %
PLASTICITY INDEX %

LA PLATA COMMUNITIES
SILVER CROSS RANCH
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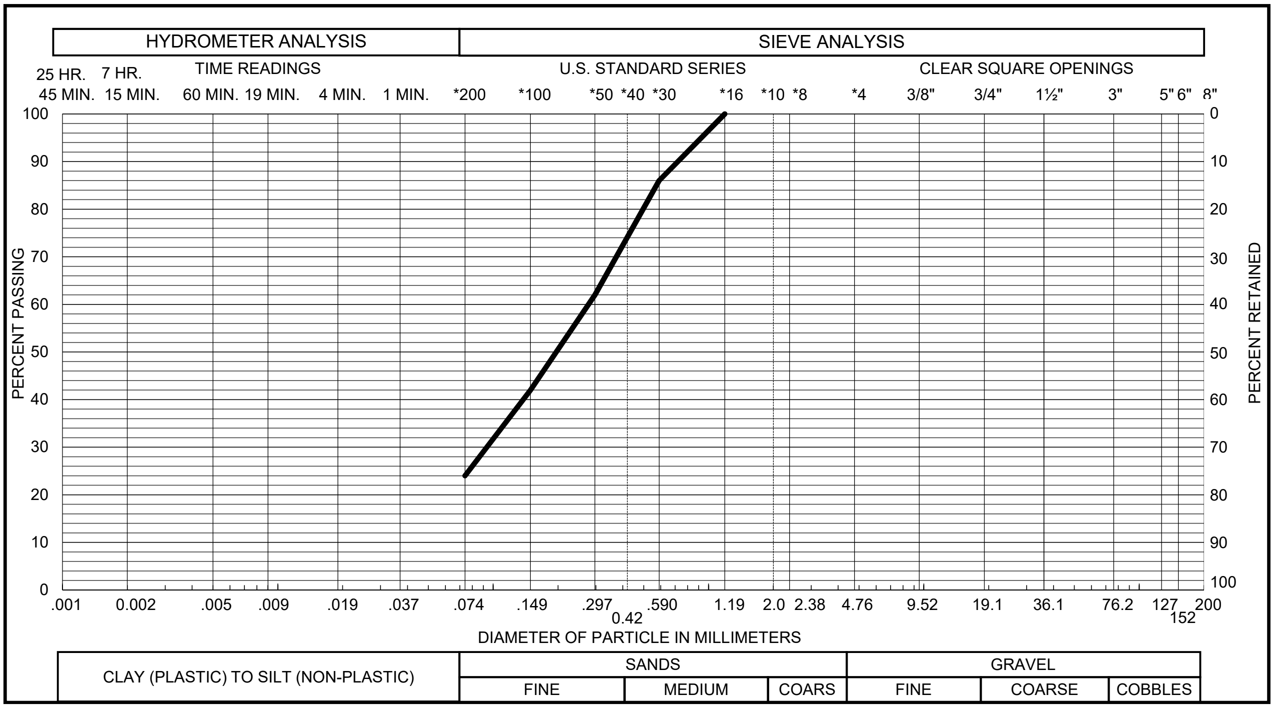
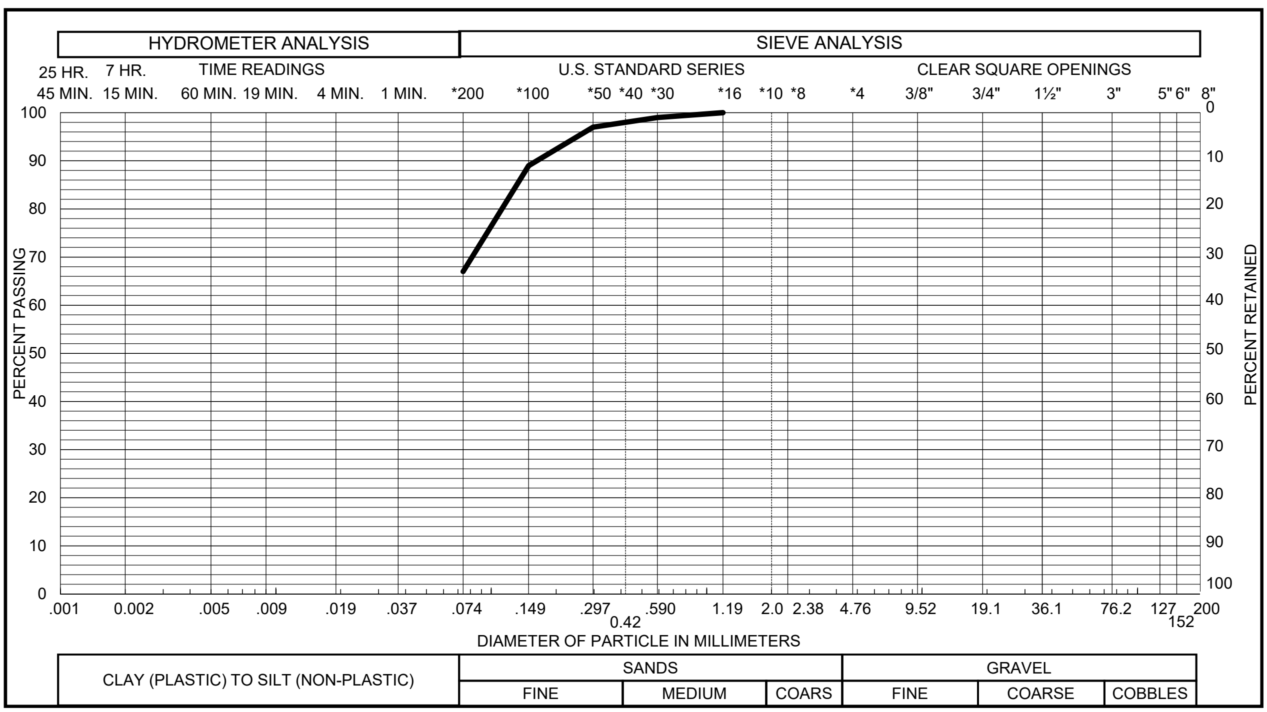
Gradation Test Results

FIG. B-15



Sample of SAND, SILTY (SM)
From TH - 9 AT 14 FEET

GRAVEL 0 % SAND 76 %
SILT & CLAY 24 % LIQUID LIMIT %
PLASTICITY INDEX %



Sample of CLAY, SANDY (CL)
From TH - 10 AT 19 FEET

GRAVEL 0 % SAND 33 %
SILT & CLAY 67 % LIQUID LIMIT %
PLASTICITY INDEX %

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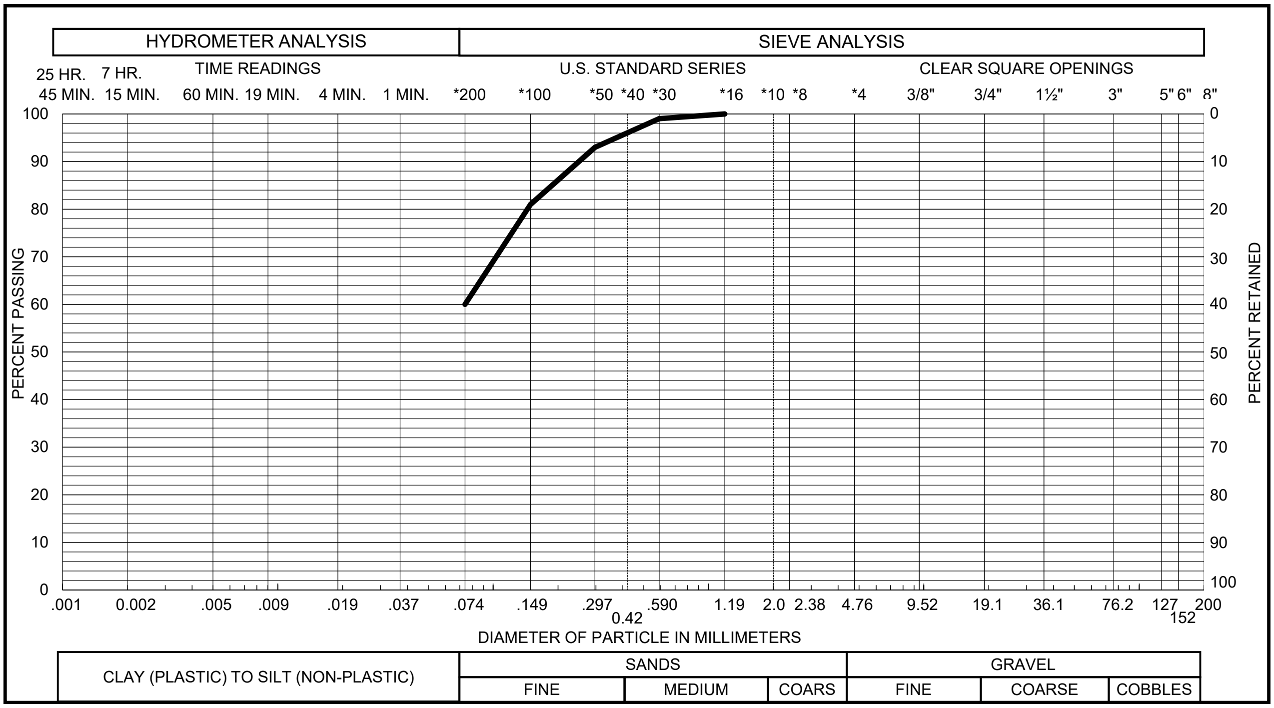
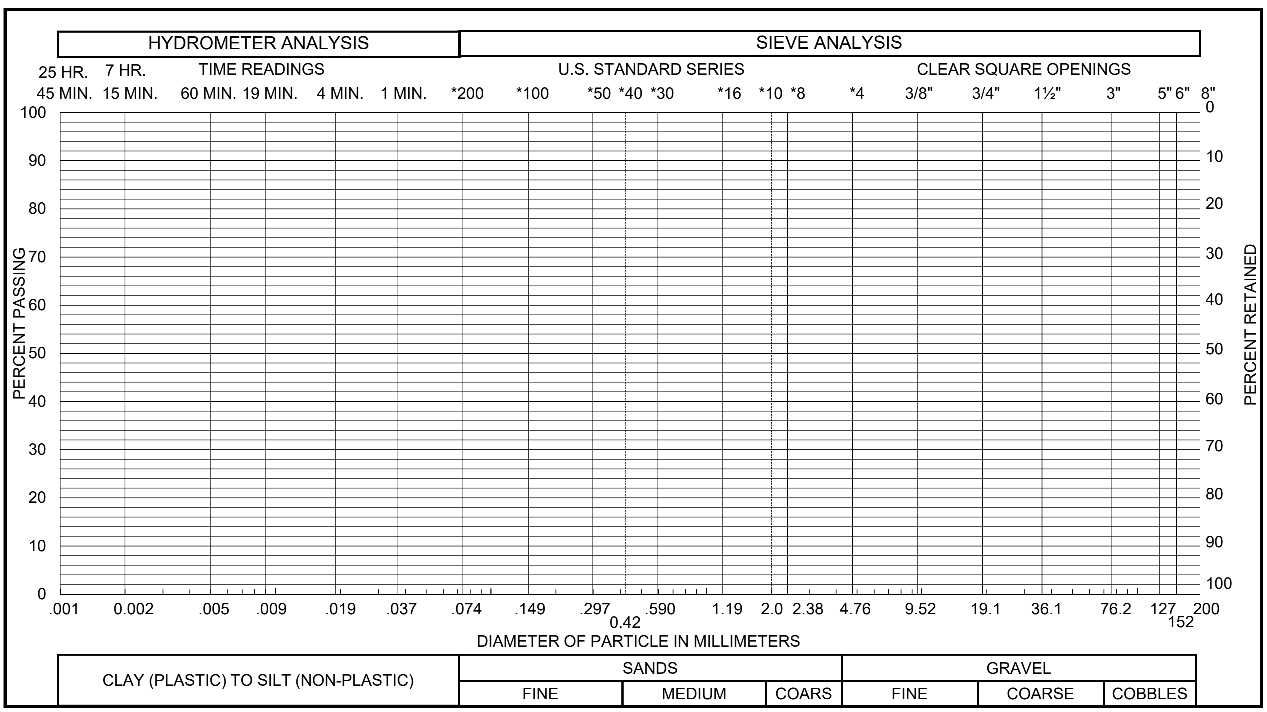
Gradation Test Results

FIG. B-16



Sample of CLAY, VERY SANDY (CL)
From TH - 11 AT 9 FEET

GRAVEL 0 % SAND 40 %
SILT & CLAY 60 % LIQUID LIMIT %
PLASTICITY INDEX %



Sample of
From

GRAVEL % SAND %
SILT & CLAY % LIQUID LIMIT %
PLASTICITY INDEX %

LA PLATA COMMUNITIES
SILVER CROSS RANCH
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Gradation Test Results

FIG. B-17

TABLE B-1

SUMMARY OF LABORATORY TESTING
CTL|T PROJECT NO. CS19053.001-115

				ATTERBERG LIMITS		SWELL TEST RESULTS*						
BORING	DEPTH (FEET)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	SWELL (%)	APPLIED PRESSURE (PSF)	SWELL PRESSURE (PSF)	UNCONFINED COMPRESSION (PSF)	PASSING NO. 200 SIEVE (%)	WATER SOLUBLE SULFATES (%)	DESCRIPTION
TH-1	9	7.0	124							47		SAND, VERY SILTY (SM)
TH-2	4	16.2	104			6.3	500	11,000		75		CLAY, SANDY (CL)
TH-2	9	9.6	95							43		SAND, VERY SILTY (SM)
TH-2	14	20.1	106							24		SAND, SILTY (SM)
TH-3	4	16.1	113	57	34					85		CLAY, SANDY (CH)
TH-3	9	17.9	113			8.2	1100	21,000		93		CLAY, SLIGHTLY SANDY (CH)
TH-3	14	12.9	117			1.8	1800	10,000		76		CLAY, SANDY (CL)
TH-3	24	16.2	111							44		SAND, VERY SILTY (SM)
TH-4	4	6.1	99							48		SAND, VERY SILTY (SM)
TH-5	9	6.4	119							48		SAND, VERY SILTY (SM)
TH-5	24	16.4	117			4.6	1000	11,000		97		CLAYSTONE
TH-5	29	16.4	118	52	29				17,800	98	1.4	CLAYSTONE
TH-6	4	9.3	114			4.4	1000	10,500		62		CLAY, VERY SANDY (CL)
TH-6	9	8.2	126							49		SAND, VERY SILTY (SM)
TH-7	9	5.3	96			-0.6	1000			18		SAND, SILTY (SM)
TH-7	19	6.8	104							23		SAND, SILTY (SM)
TH-7	29	11.5	109	27	7					51		CLAY, VERY SANDY (CL)
TH-8	4	11.2	119			0.2	1000	1,300		49		SAND, VERY CLAYEY (SC)
TH-8	9	23.9	102			11.0	1000	11,200		92		CLAY, SLIGHTLY SANDY (CH)
TH-8	14	30.0	92	80	48				4,600	99	0.14	CLAY (CH)
TH-8	24	17.6	112							22		SAND, SILTY (SM)
TH-9	4	13.0	116			5.7	1000	11,000		77		CLAY, SANDY (CL)
TH-9	14	4.8	106							24		SAND, SILTY (SM)
TH-10	4	16.5	114	56	35				25,100	81	0.14	CLAY, SANDY (CH)
TH-10	9	20.0	109			8.5	1000			93		CLAY, SLIGHTLY SANDY (CH)
TH-10	14	12.5	111	36	17				13,150	76		CLAY, SANDY (CL)
TH-10	19	15.9	111							67		CLAY, SANDY (CL)
TH-11	4	7.6	92			-1.2	1000			53		CLAY, VERY SANDY (CL)
TH-11	9	7.1	125							60		CLAY, VERY SANDY (CL)
TH-11	19	11.3	121			0.8	1000	2,000		62		CLAY, VERY SANDY (CL)

* SWELL MEASURED WITH 1000 PSF APPLIED PRESSURE, OR ESTIMATED IN-SITU OVERBURDEN PRESSURE.
NEGATIVE VALUE INDICATES COMPRESSION.

APPENDIX C

GUIDELINE SITE GRADING SPECIFICATIONS
SILVER CROSS RANCH
EL PASO COUNTY, COLORADO

GUIDELINE SITE GRADING SPECIFICATIONS
SILVER CROSS RANCH
COLORADO SPRINGS, COLORADO

1. DESCRIPTION

This item consists of the excavation, transportation, placement and compaction of materials from locations indicated on the plans, or staked by the Civil Engineer, as necessary to achieve preliminary pavement and building pad elevations. These specifications also apply to compaction of materials that may be placed outside of the project.

2. GENERAL

The Geotechnical Engineer will be the Owner's representative. The Geotechnical Engineer will approve fill materials, method of placement, moisture contents and percent compaction.

3. CLEARING JOB SITE

The Contractor shall remove all trees, brush and rubbish before excavation or fill placement is begun. The Contractor shall dispose of the cleared material to provide the Owner with a clean, neat appearing job site. Cleared material shall not be placed in areas to receive fill or where the material will support structures of any kind.

4. SCARIFYING AREA TO BE FILLED

All topsoil, vegetable matter, and existing fill shall be removed from the ground surface upon which fill is to be placed. The surface shall then be plowed or scarified until the surface is free from ruts, hummocks or other uneven features that would prevent uniform compaction by the equipment to be used.

5. PLACEMENT OF FILL ON NATURAL SLOPES

Where natural slopes are steeper than 20 percent (5:1, horizontal to vertical) and fill placement is required, horizontal benches shall be cut into the hillside. The benches shall be at least 12 feet wide or 1-1/2 times the width of the compaction equipment and be provided at a vertical spacing of not more than 5 feet (minimum of two benches). Larger bench widths may be required by the Geotechnical Engineer. Fill shall be placed on completed benches as outlined within this specification.

6. COMPACTING AREA TO BE FILLED

After the foundation for the fill has been cleared and scarified, it shall be disced or bladed until it is free from large clods, brought to a workable moisture content and compacted.

7. FILL MATERIALS

Fill soils shall be free from vegetable matter or other deleterious substances and shall not contain rocks or lumps having a diameter greater than six (6) inches. Fill materials shall be obtained from cut areas shown on the plans or staked in the field by the Civil Engineer or imported to the site.

8. MOISTURE CONTENT

For fill material classifying as CH, SC or CL, the fill shall be moisture treated to within 2 percent of optimum moisture content as determined by ASTM D698. Soils classifying as SM, SW, SP, GP, and GM shall be moisture treated to within 2 percent of optimum moisture content as determined by ASTM D1557. Sufficient laboratory compaction tests shall be made to determine the optimum moisture content for the various soils encountered in borrow areas.

The Contractor may be required to add moisture to the excavation materials in the borrow area if, in the opinion of the Geotechnical Engineer, it is not possible to obtain uniform moisture content by adding water on the fill surface. The Contractor may be required to rake or disc the fill soils to provide uniform moisture content throughout the soils.

The application of water to embankment materials shall be made with any type of watering equipment approved by the Geotechnical Engineer, which will give the desired results. Water jets from the spreader shall not be directed at the embankment with such force that fill materials are washed out.

Should too much water be added to any part of the fill, such that the material is too wet to permit the desired compaction to be obtained, all work on that section of the fill shall be delayed until the material has been allowed to dry to the required moisture content. The Contractor will be permitted to rework wet material in an approved manner to hasten its drying.

9. COMPACTION OF FILL AREAS

Selected fill material shall be placed and mixed in evenly spread layers. After each fill layer has been placed, it shall be uniformly compacted to not less than the specified percentage of maximum density. Granular fill placed less than 15 feet below final grade shall be compacted to at least 95 percent of maximum dry density as determined in accordance with ASTM D 1557. Cohesive fills placed less than 15 feet below final grade shall be compacted to at least 95 percent of maximum dry density as determined in accordance with ASTM D698. For deep, cohesive fill (to be placed 15 feet or deeper below final grade), the material shall be compacted to at least 98 percent of maximum standard Proctor dry density (ASTM D 698). Granular fill placed more than 15 feet below final grade shall be compacted to at least 95 percent of maximum modified Proctor dry density (ASTM D 1557). Deep fills shall be placed within 2 percent of optimum moisture content. Fill materials shall be placed such that the thickness of loose materials does not exceed 10 inches and the compacted lift thickness does not exceed 6 inches.

Compaction, as specified above, shall be obtained using sheepsfoot rollers, multiple-wheel pneumatic-tired rollers, or other equipment approved by the Geotechnical

Engineer for soils classifying as claystone, CL, CH or SC. Granular fill shall be compacted using vibratory equipment or other equipment approved by the Geotechnical Engineer. Compaction shall be accomplished while the fill material is at the specified moisture content. Compaction of each layer shall be continuous over the entire area. Compaction equipment shall make sufficient trips to ensure that the required density is obtained.

10. COMPACTION OF SLOPES

Fill slopes shall be compacted by means of sheepsfoot rollers or other suitable equipment. Compaction operations shall be continued until slopes are stable, but not too dense for planting, and there is no appreciable amount of loose soil on the slopes. Compaction of slopes may be done progressively in increments of 3 to 5 feet in height or after the fill is brought to its total height. Permanent fill slopes shall not exceed 3:1 (horizontal to vertical).

11. DENSITY TESTS

Field density tests will be made by the Geotechnical Engineer at locations and depths of his/her choosing. Where sheepsfoot rollers are used, the soil may be disturbed to a depth of several inches. Density tests will be taken in compacted material below the disturbed surface. When density tests indicate the density or moisture content of any layer of fill or portion thereof is below that required, the particular layer or portion shall be reworked until the required density or moisture content has been achieved. The criteria for acceptance of fill shall be:

A. Moisture:

The allowable ranges for moisture content of the fill materials specified above in "Moisture Content" are based on design considerations. The moisture shall be controlled by the Contractor so that moisture content of the compacted earth fill, as determined by tests performed by the Geotechnical Engineer, shall be within the limits given. The Geotechnical Engineer will inform the Contractor when the placement moisture is less than or exceeds the limits specified above and the Contractor shall immediately make adjustments in procedures as necessary to maintain placement moisture content within the specified limits.

B. Density:

1. The average dry density of all material shall not be less than the dry density specified.

2. No more than 20 percent of the material represented by the samples tested shall be at dry densities less than the dry density specified.

3. Material represented by samples tested having a dry density more than 2 percent below the specified dry density will be rejected. Such rejected materials shall be reworked until a dry density equal to or greater than the specified dry density is obtained.

12. SEASONAL LIMITS

No fill material shall be placed, spread or rolled while it is frozen, thawing, or during unfavorable weather conditions. When work is interrupted by heavy precipitation, fill operations shall not be resumed until the Geotechnical Engineer indicates the moisture content and density of previously placed materials are as specified.

13. NOTICE REGARDING START OF GRADING

The Contractor shall submit notification to the Geotechnical Engineer and owner advising them of the start of grading operations at least three (3) days in advance of the starting date. Notification shall also be submitted at least three days in advance of any resumption dates when grading operations have been stopped for any reason other than adverse weather conditions.

14. REPORTING OF FIELD DENSITY TESTS

Density tests made by the Geotechnical Engineer, as specified under "Density Tests" above, will be submitted progressively to the Owner. Dry density, moisture content and percent compaction will be reported for each test taken.