CTL|THOMPSON INCORPORATED

GEOLOGIC HAZARDS EVALUATION AND
PRELIMINARY GEOTECHNICAL INVESTIGATION
MAYBERRY – 540 ACRE SITE
STATE HIGHWAY 94 AND LOG ROAD
EL PASO COUNTY, COLORADO

Prepared for:

MAYBERRY COMMUNITIES
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CTL|T Project No. CS18969.004-105

March 13, 2023

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SCOPE

This report presents the results of our Geologic Hazards Evaluation and Preliminary Geotechnical Investigation for a 540-acre portion of the proposed Mayberry Village located southwest of the intersection of State Highway 94 and Log Road. Our purpose was to evaluate the property for the occurrence of geologic hazards and their potential effect on the proposed development and to evaluate subsurface conditions that influence development and to provide preliminary geotechnical design concepts. This report includes a summary of subsurface and groundwater conditions found in our exploratory borings and preliminary geotechnical design and construction recommendations.

The report was prepared based on our understanding of the planned construction, conditions disclosed by our exploratory borings, results of laboratory tests, engineering analysis, and our experience. The criteria presented are applicable for planning and preliminary design. The geotechnical exploration and laboratory testing information contained in this report can be used as a supplement for future design-level investigations. CTL|Thompson can provide final geotechnical investigation services, including additional borings, as well as pavement design services as a separate scope of work. Evaluation of the property for the possible presence of potentially hazardous materials (environmental site assessment) is beyond the scope of our investigation. Assessment of the site for the potential for wildfire hazards, corrosive soils, erosion problems, or flooding is also beyond the scope of this investigation.

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

SUMMARY

1. The conditions encountered in our borings drilled at the site consisted of predominantly natural silty and clayey sands with sporadic layers of clay with varying amounts of sand. The sand soils are generally non-expansive. The clay soils were generally found in relatively thin layers and exhibited low measured swell when wetted. Localized layers of clay with

moderate to high expansion potential may be present between our boring locations.

2. At the time of drilling, groundwater was encountered in three of our borings at depths ranging between 12 and 22 feet. Groundwater was measured after drilling in three borings at depths ranging between 10.5 and 15 feet.
3. We believe site grading and utility installation for the proposed development can be accomplished using conventional, heavy-duty construction equipment.
4. We anticipate spread footing foundations will be appropriate for lightly to moderately loaded buildings. Where loose or expansive soils are encountered at or near footing and floor slab elevations following grading, it will likely be necessary to sub-excavate this material and then reconstruct the excavated soils as moisture conditioned, densely compacted fill, prior to footing construction. Methods of mitigation are described in the report.
5. The natural sands and dense fills constructed using sands should provide good support for the lightly to moderately loaded slabs-on-grade. Performance of slabs will likely be poor if site grading causes clays or claystone bedrock with high or very high potential for expansion to be near floor levels.
6. Overall plans should provide for the rapid conveyance of surface runoff to the storm sewer system.

SITE CONDITIONS

The site covers approximately 540 acres south of State Highway 94 and west of Log Road in El Paso County, Colorado. The site occupies the northwest quarter, northeast quarter, and southwest quarter of Section 14 and the east halves of the northeast and southeast quarters of Section 15, of Township 14 South, Range 63 West of the 6th Principal Meridian, El Paso County. The general location is shown in Fig. 1.

A single-family residence is present in the northeastern portion of the site. The site is relatively flat to gently rolling and slopes gently down to the southeast at grades estimated to be less than 2 percent. The property is bordered to the east by Log Road, rural residential properties and vacant land, to the south and west by vacant land and to the north by State Highway 94. Vegetation consists of natural grasses. The general size, shape, and vicinity of the site and the locations of our test borings are presented on Figure 1.

PROPOSED DEVELOPMENT

The project will be a mix of residential and commercial development involving the design and construction of single and multi-family residences, a school, business park, and commercial/retail buildings. We anticipate the structures will be serviced by municipal water and wastewater systems. Other improvements will include a network of residential and collector streets, private access driveways and parking areas, underground utilities, and one or more detention basins. We expect cuts and fills will generally be on the order of 10 feet or less.

PREVIOUS INVESTIGATIONS

Our firm performed a Geologic Hazards Evaluation for Filings 1 through 4 (CTL|T Project No. CS18969.001-105R; final report dated September 8, 2022). We previously performed a Preliminary Geotechnical Investigation for about 90 acres of land within the Mayberry development (CTL|T Project No. CS16091-115, report dated July 13, 2006, and updated February 6, 2019, under CTL|T Project No. CS18969.001-115). A geotechnical investigation was performed for an 8.3-acre multi-family site referred to as Tract K (CTL|T Project No. CS19587-125, report dated September 9, 2022. Thirty-three borings were advanced at the site. The Tract K property lies within the 540-acre site investigated for the current study. The information obtained during previous studies was utilized in our analysis for this investigation.

SUBSURFACE INVESTIGATION

Subsurface conditions across the site were investigated by drilling twenty-eight (28), widely-spaced exploratory borings to depths of 20 to 30 feet at the approximate locations shown in Fig. 1. Graphical logs of conditions found in our exploratory borings, the results of field penetration resistance tests, and some laboratory data are 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, Atterberg limits, sieve analysis, and water-soluble sulfate content tests. The swell test samples were wetted under applied loads that approximated the overburden pressure (the weight of overlying soil and bedrock). Swell-consolidation and gradation analysis test results are presented in Appendix B. Laboratory test data is summarized in Table B-1.

SUBSURFACE CONDITIONS

The soils encountered in the exploratory borings drilled at the site during this study and previous studies consisted of predominantly natural, slightly silty to silty sand with sporadic areas of clayey to very clayey sand and clay with varying amounts of sand. Some of the pertinent engineering characteristics of the soils encountered and groundwater conditions are discussed in the following paragraphs.

Sands

The predominant soil consisted of natural, slightly silty to silty sand with sporadic layers of clayey to very clayey sand. The sand soils generally extended to the maximum depths explored of 20 to 30 feet. Fine gravels are present within some of the deeper sand layers. The natural sand was loose to very dense based on the results of field penetration resistance tests. Samples of the sand tested in our laboratory contained 5 to 49 percent clay and silt-size particles (passing the No. 200 sieve). Three samples of the sand compressed between 0.2 and 0.5 percent when wetted under approximate overburden pressure. One sample compressed 6.4 percent; however, we attribute the compression to sample disturbance.

Clays

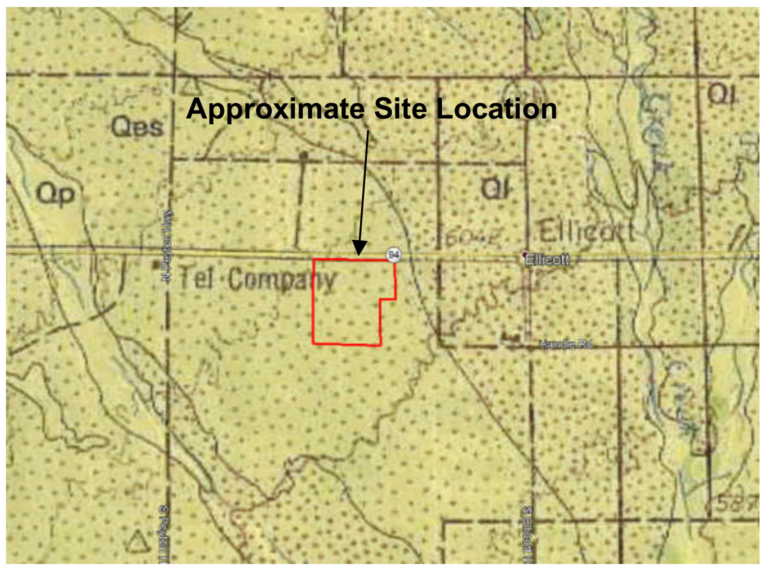
Clay was encountered sporadically at varying depths throughout the site. The clay layers were approximately 1 to 7 feet thick. The clay was stiff to very stiff based on the results of field penetration resistance tests. Samples of the clay tested contained between 53 and 97 percent silt and clay-sized particles. Three samples exhibited measured swell of 0.1 to 1.5 percent and one sample compressed 0.9 percent when wetted under approximate overburden pressure.

Groundwater

At the time of drilling, groundwater was encountered in three of our exploratory borings at depths ranging from 12 to 22 feet below the ground surface. Groundwater was measured approximately 2 to 4 days after drilling in three of our borings at depths ranging from 10.5 to 15 feet. Water levels should be expected to fluctuate in response to altered surface drainage patterns, seasonal precipitation, and irrigation of landscaping. A seasonal fluctuation of 3 to 5 feet is "normal" for this area.

SITE GEOLOGY

The surficial geology at the site was evaluated by reviewing published geologic maps and our site visits. The Geologic Map of the Pueblo 1° x 2° degrees Quadrangle[1], published by the US Geological Survey in Miscellaneous Field Studies Map MF-775, 1978 covers the project site.



Geologic Map

The site is mapped as Holocene and Pinedale Glaciation of the Pleistocene age eolian sand (wind-deposited sediment), overlying the Dawson Formation. The Dawson Formation typically consists of sandstone interbedded with claystone in this area. Our subsurface investigation and observations generally confirm the mapping, although no bedrock was encountered to depths of up to 30-feet. Some areas in the northeast portion of the site have been disturbed by previous development activities.

1 Moore, David W., Straub, Arthur W., Berry, Margaret E., Baker, Michael L., and Brandt, Theodore R., Geologic Map of the Pueblo 1° x 2° Quadrangle, Colorado, United States Geological Survey, 1978.

Expansive Soils

One of the more significant geologic hazards in Colorado is the presence of swelling clays or bedrock. Moisture changes to bedrock or surficial deposits containing swelling clays can result in volumetric expansion and collapse of those units. Changes in soil moisture content can result from precipitation, irrigation, pipeline leakage, surface drainage, perched groundwater, drought, or other factors. Swelling of expansive soil and bedrock may cause excessive cracking and heaving of structures with shallow foundations, concrete slabs-on-grade, or pavements supported on these materials.

The Mayberry 540 Acre Site is generally underlain by granular soils. Clay lenses were found sporadically and were generally 3 feet thick or less, with the exception of TH-14 where clay was found between depths of 4 and 11 feet. Swell testing indicates the clay exhibits low expansion potential in its current condition. Additional geotechnical investigation should be conducted for design level reports. The additional investigation borings may encounter more thicker clay layers with higher swell potential which may impact foundation performance. We believe expansive soils, if encountered, can be mitigated with engineering design and construction methods commonly employed in the area.

Collapsible Soils

Eolian soils are occasionally susceptible to collapse. Soil collapse (or hydro-collapse) is a phenomenon where soils undergo a significant decrease in volume upon an increase in moisture content, with or without an increase in external loads. Buildings, structures, and other improvements may be subject to excessive settlement-related distress when collapsible soils are present. The results of the subsurface evaluation and laboratory testing indicate the collapse potential of the eolian deposits is low to moderate, based on the dry densities and moisture contents of the near surface samples. Significant depths of collapse prone soils are not expected, based on the current test hole data.

Undocumented Fill

Undocumented fill was not found in our borings and is not expected to be present within the undeveloped areas. Fill material may be present between our boring locations. Design-level geotechnical studies should be undertaken to confirm the extents of fills and depths of fills and to provide recommendations for reworking. If documentation of the fill, such as density test records are found, we should review them to determine if they are adequate for the proposed construction. We did not identify fills in our borings located in the areas of the site that are generally undisturbed. Fill within existing streets may have been tested and can be observed for potential issues during construction.

Shallow Bedrock

Based on our investigation shallow bedrock is generally not a concern at the site. Bedrock was not encountered in our borings, which extended to depths of up to 30-feet below existing grades.

Shallow Groundwater

Groundwater was measured in three of our borings at depths between 10.5 and 15 feet below the existing ground surface. Groundwater may locally impact excavations deeper than 10 feet. Changes in surface drainage and irrigation of landscaping associated with this development and any adjacent developments can result in changes to groundwater levels. Seasonal fluctuations from runoff and precipitation may also result in changes in groundwater levels. The presence and depths of groundwater can be altered by site development as groundwater flow is often intercepted by utility trenches. Design-level geotechnical investigations with additional borings should be performed subsequent to site grading and utility installation in order to better delineate areas of shallow groundwater.

Subsidence and Abandoned Mining Activity

No documented underground mining activity was found for the site based on review of the USGS Mineral Resources Data System. We observed no evidence of surface or subsurface mining at the site.

The Colorado Geological Survey maps the site as U3 (upland deposits) in the Aggregate Resources of Colorado mapping and a few sand and/or gravel pits are indicated.

Flooding

Information presented on “Flood Insurance Rate Map” (FIRM), Map Number 08041C0810G, with an effective date of December 7, 2018, indicates the project site is in Zone X, an area of minimal flood hazard. The project Civil Engineer should address localized flood potential.

Faults

The geologic mapping does not indicate the presence of faulting on the project site. The nearest fault interpreted to be active is the Ute Pass fault approximately 24 miles west of the site. The Cheraw Fault lies approximately 66 miles southeast of the site.

Steeply Dipping Bedrock

Steeply Dipping Bedrock is not present on the site. Steeply dipping bedrock is present at the base of the intrusion that created the mountains, far to the west of the site.

Elevated Radioactivity and Radon

We believe no unusual hazard exists from naturally occurring sources of radioactivity on the site. However, the materials found in this area are often associated with the production of radon gas and concentrations in excess of those currently accepted by the

EPA can occur. 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 and sealing the joints and cracks in concrete floors and foundation walls. If the occurrence of radon is a concern, we recommend structures be tested after they are enclosed. Commonly utilized mitigation techniques may minimize risk.

SITE DEVELOPMENT CONSIDERATIONS

Based on the results of this investigation, the near surface materials are predominantly granular and will generally provide good support for spread footing foundations, slabs-on-grade, and pavements. In the event expansive clay soils or claystone bedrock are encountered following grading or are present within 4 feet of proposed foundations and floor slabs, sub-excavation and reworking of these materials will likely be necessary.

Site Grading

The site naturally slopes downward toward the southeast. Site grading will be necessary to construct roads and building pads. We believe site grading can be accomplished using conventional heavy-duty earthmoving equipment.

Vegetation, organic materials, and undocumented fill should be removed from the ground surface of areas to be filled. Soft or loose soils, if encountered, should be stabilized or removed to expose stable material prior to placement of fill.

The onsite materials are generally suitable for use as grading fill, and excavation backfill, provided they are free of debris, vegetation/organics, and other deleterious materials. If imported fill is necessary, it should ideally consist of granular material with 100 percent passing the 2-inch sieve and less than 35 percent material passing the No. 200 sieve.

The ground surface in areas to receive fill should be scarified deeply, moisture conditioned and compacted to a high density to establish a stable subgrade for fill placement. The properties of the fill will affect the performance of foundations, slabs-on-grade, and pavements. Detailed recommendations for moisture conditioning, placement, and compaction of grading fill are set forth in Appendix C. Placement and compaction of the grading fill should be periodically observed and tested by our representative during construction.

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. Flatter slopes should be considered to reduce erosion of the sand soils and fill. Slopes should be revegetated as soon as possible to control erosion by wind and water. Concentrated water flows over slopes should be avoided.

Buried Utilities

Based on the subsurface conditions encountered in our exploratory borings, we anticipate most of the materials encountered during utility trench excavation will consist of silty and clayey sands with localized layers of clay. Utility trench excavation can likely be accomplished using heavy-duty track hoes.

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 and bedrock encountered in trench excavations and refer to Occupational Safety and Health Administration (OSHA) standards to determine appropriate slopes. We anticipate the majority of near-surface soils will consist of silty sands. The silty sand soils will classify as Type C. Temporary excavations in Type C materials require a maximum slope inclination of 1.5:1 (horizontal to vertical) in the absence of groundwater, unless the excavation is shored or braced. Where clay soils are encountered, these materials will classify as Type B requiring maximum slope inclinations of 1:1. Layering of the geologic structure must also be taken into account in determining maximum slope inclinations, and the flatter slope must be used where the excavation extends into the weaker soil. Excavations deeper than 20 feet should be designed by a professional engineer.

Where deep utilities are planned, excavations may extend into groundwater and construction dewatering may be necessary. Relatively clean, granular soils will likely flow into excavations below the groundwater surface. Dewatering using local sump pits and pumps could be effective depending on the amount of water flowing through the sands. More aggressive dewatering techniques including well points installed within the sand soils could be necessary in deep excavations where groundwater is present.

Water and sewer lines are usually constructed beneath paved areas. Compaction of trench backfill will have a significant effect on the life and serviceability of pavements. We recommend trench backfill be moisture conditioned and compacted in accordance with the recommendations set forth in Appendix C. Personnel from our firm should periodically observe and test the placement and compaction of the trench backfill during construction.

FOUNDATION AND FLOOR SYSTEM CONCEPTS

We recommend the preparation of design-level geotechnical investigations for the proposed buildings to develop specific foundation recommendations for the design and construction of foundations and floor systems. The foundation type should be chosen based on the building type, building loads, subsurface conditions, and other factors. Selection of floor system alternatives should consider risk of movement associated with slab-on-grade floors and ventilation in crawl space areas beneath structural floors.

The sands are generally non-expansive. While we do not anticipate widespread areas of expansive soils, localized pockets of expansive clay may be present.

We believe spread footing foundations will be appropriate for lightly to moderately loaded structures. For preliminary planning purposes, spread footings with allowable bearing pressures of 2,000 to 3,000 psf are expected to be appropriate. If loose sands or expansive soils are found near foundation levels, sub-excavation and replacement with moisture conditioned, densely compacted fill may be appropriate.

We anticipate slab-on-grade floors will be the desired floor system for commercial buildings, multi-family for-rent buildings, and single-family structures with basements. Where loose or expansive soils are present at or near finished floor elevations after grading, sub-excavation and replacement below the slab may be appropriate to enhance floor system performance.

Structural floors should generally be used in non-basement, finished living areas of the single-family residences. A structural floor is supported by the foundation system. Design and construction issues associated with structural floors include ventilation and lateral loads. Where structurally supported floors are installed in basements or over a crawlspace, the required air space depends on the materials used to construct the floor and the potential expansion of the underlying soils. Conventionally reinforced, monolithic slab-on-grade foundations could also be considered where the soils are exclusively granular.

The risk of poor performance of floor slabs, driveways, sidewalks, and other surface flatwork may increase where expansive soils are present, unless sub-excavation is performed.

SUBSURFACE DRAINAGE

Surface water can penetrate relatively permeable loose backfill soils located adjacent to residences and collect at the bottom of relatively impermeable foundation excavations, causing wet or moist conditions after construction. Foundation walls and grade beams should be designed to resist lateral earth pressures. Foundation drains should be constructed around the lowest excavation levels of basement and/or crawlspace areas and should discharge to a positive gravity outlet or to a sump where water can be removed by pumping. Foundation drains are not required for slab-on-grade construction where no below-grade levels are planned.

SURFACE DRAINAGE

The performance of foundations, floors, and other improvements is affected by moisture changes within the soil. This is largely influenced by surface drainage. When developing an overall drainage scheme, consideration should be given by the developer to drainage around each residence. The ground surface around structures should be sloped to provide positive drainage away from the foundations. We recommend a slope of at least 10 percent for the first 10 feet surrounding each building, where practical. For single-family residences where the distance between buildings is less than 20 feet, the slope in this area should be 10 percent to the swale between houses. Variation from these criteria is acceptable in some areas. For example, for residential lots graded to direct drainage from the rear yard to the front, it is difficult to achieve the recommended slope at the high point behind the house. We believe it is acceptable to use a slope of about 6 inches in the first 10 feet (5 percent) at this location. A 5 percent slope can also be used adjacent to residences without basements. Roof downspouts and other water collection systems should discharge beyond the limits of backfill around structures.

PAVEMENTS

The natural, silty and clayey sand soils are expected to be the predominant pavement subgrade material at this site. We anticipate pavement sections on the order of 3 to 4 inches of asphalt over 6 or more inches of aggregate base course will be appropriate for drive lanes and parking lots. A subgrade investigation and pavement design should be performed after designs are finalized and site grading is complete.

CONCRETE

Concrete in contact with soil can be subject to sulfate attack. We measured water-soluble sulfate concentrations in two samples for this investigation and several samples for previous investigation at less than 0.1 percent. As indicated in our tests and ACI 332-20, the sulfate exposure class is *Not Applicable* or *RS0.*

SULFATE EXPOSURE CLASSES PER ACI 332-20

Exposure Classes		Water-Soluble Sulfate (SO_4) in Soil [A] (%)
Not Applicable	RS0	< 0.10
Moderate	RS1	0.10 to 0.20
Severe	RS2	0.20 to 2.00
Very Severe	RS3	> 2.00

A) Percent sulfate by mass in soil determined by ASTM C1580

For this level of sulfate concentration, ACI 332-20 *Code Requirements for Residential Concrete* indicates there are no special cement type requirements for sulfate resistance as indicated in the table below.

CONCRETE DESIGN REQUIREMENTS FOR SULFATE EXPOSURE PER ACI 332-20

Exposure Class	Maximum Water/ Cement Ratio	Minimum Compressive Strength [A] (psi)	Cementitious Material Types [B]			Calcium Chloride Admixtures
			ASTM C150/ C150M	ASTM C595/ C595M	ASTM C1157/ C1157M	
RS0	N/A	2500	No Type Restrictions	No Type Restrictions	No Type Restrictions	No Restrictions
RS1	0.50	2500	II	Type with (MS) Designation	MS	No Restrictions
RS2	0.45	3000	V [C]	Type with (HS) Designation	HS	Not Permitted
RS3	0.45	3000	V + Pozzolan or Slag Cement [D]	Type with (HS) Designation plus Pozzolan or Slag Cement [E]	HS + Pozzolan or Slag Cement [E]	Not Permitted

A) Concrete compressive strength specified shall be based on 28-day tests per ASTM C39/C39M
B) Alternate combinations of cementitious materials of those listed in ACI 332-20 Table 5.4.2 shall be permitted when tested for sulfate resistance meeting the criteria in section 5.5.
C) Other available types of cement such as Type III or Type I are permitted in Exposure Classes RS1 or RS2 if the C3A contents are less than 8 or 5 percent, respectively.
D) The amount of the specific source of pozzolan or slag to be used shall not be less than the amount that has been determined by service record to improve sulfate resistance when used in concrete containing Type V cement. Alternatively, the amount of the specific source of the pozzolan or slab to be used shall not be less than the amount tested in accordance with ASTM C1012/C1012M and meeting the criteria in section 5.5.1 of ACI 332-20.
E) Water-soluble chloride ion content that is contributed from the ingredients including water aggregates, cementitious materials, and admixtures shall be determined on the concrete mixture ASTM C1218/C1218M between 29 and 42 days.

Superficial damage may occur to the exposed surfaces of highly permeable concrete. To control this risk and to resist freeze-thaw deterioration, the water-to-cementitious materials ratio should not exceed 0.50 for concrete in contact with soils that are likely to stay moist due to surface drainage or high-water tables. Concrete should have a total air content of 6 percent ± 1.5 percent. We advocate damp-proofing of all foundation walls and grade beams in contact with the subsoils (including the inside and outside faces of garage and crawl space grade beams).

FURTHER INVESTIGATIONS

After site development plans have been formalized, we recommend pavement subgrade investigations and additional design-level geotechnical investigations be completed. Such investigations will be required to determine the appropriate foundation and floor systems for the buildings based upon the over-lot grading and building finished floor elevations.

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 circumstances. 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.

COLORADO LICENSED JEFFREY MARK JONES 47539 PROFESSIONAL ENGINEER 3/13/23

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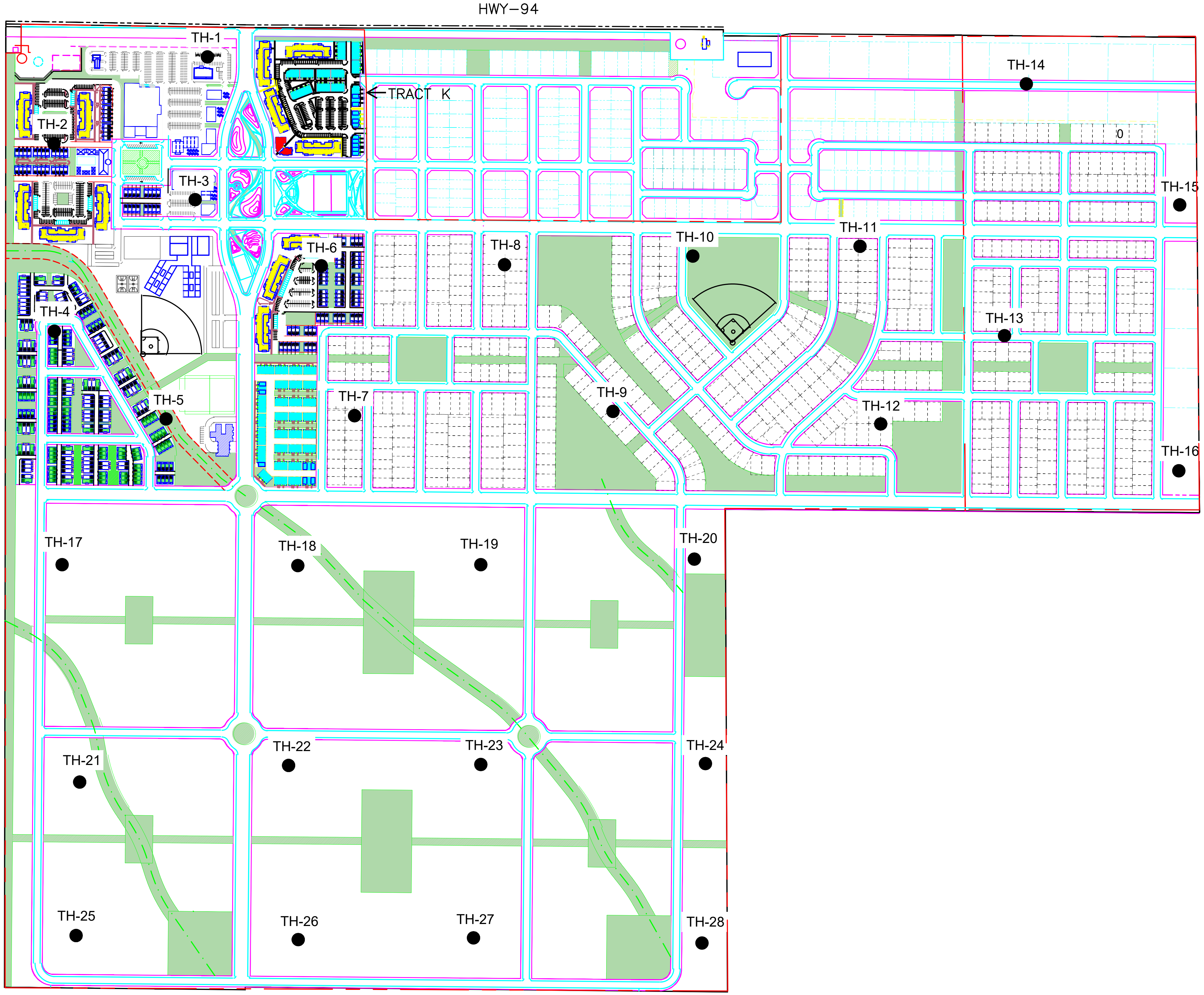

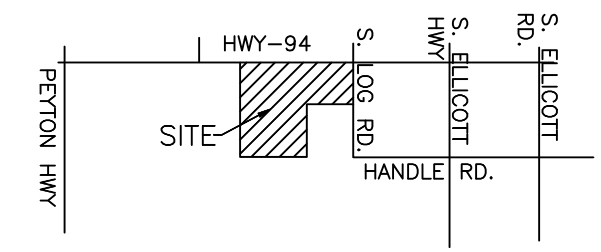

VICINITY MAP
(NOT TO SCALE)

LEGEND:

TH-1 ●	APPROXIMATE LOCATION OF EXPLORATORY BORING.
—·—·—	APPROXIMATE SITE BOUNDARY

300' 600'
SCALE: 1" = 600'

Location of Exploratory Borings

FIG. 1

MAYBERRY COMMUNITIES
MAYBERRY - 540 ACRE SITE
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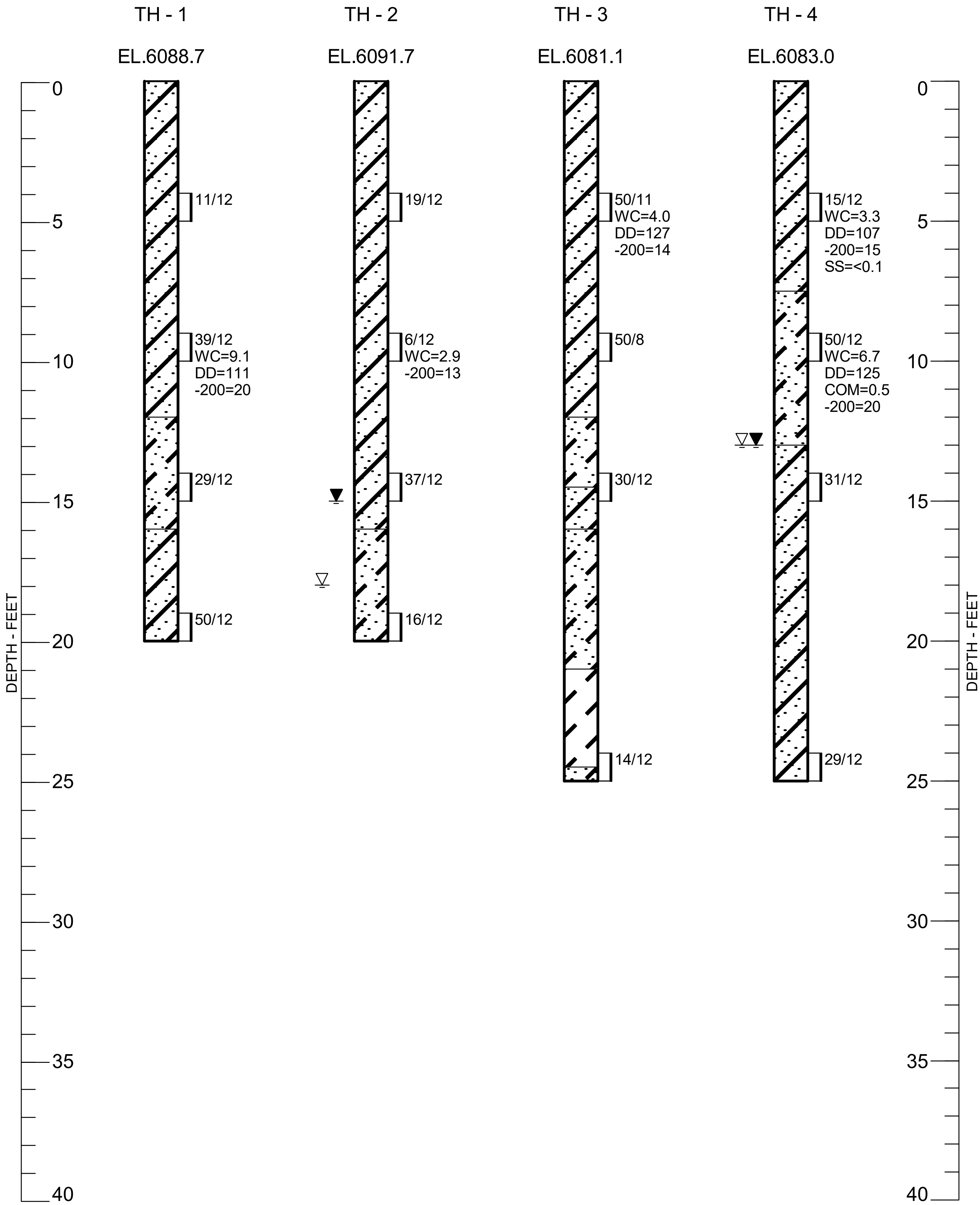
APPENDIX A

SUMMARY LOGS OF EXPLORATORY BORINGS



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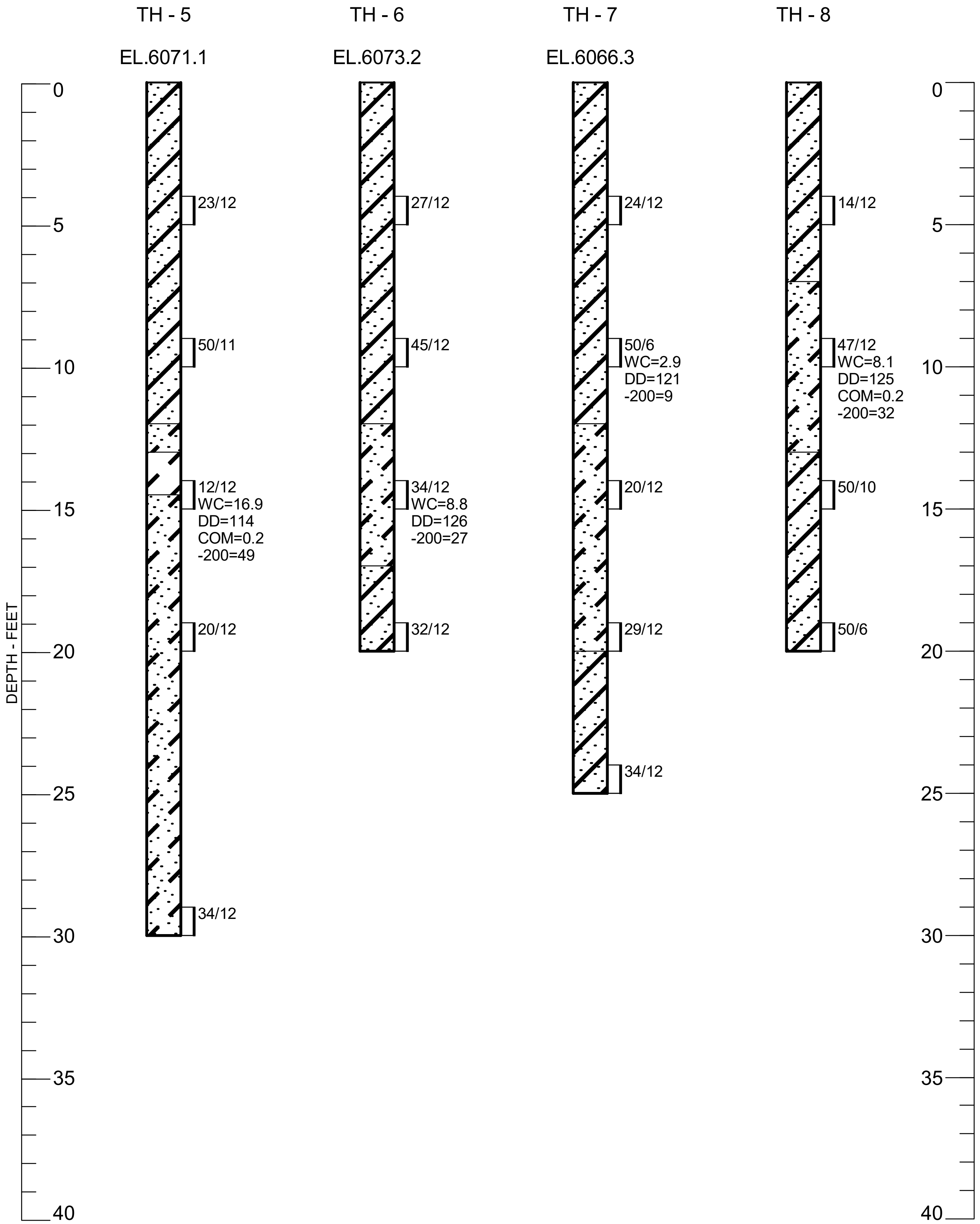
Summary Logs of Exploratory Borings

FIG. A-1



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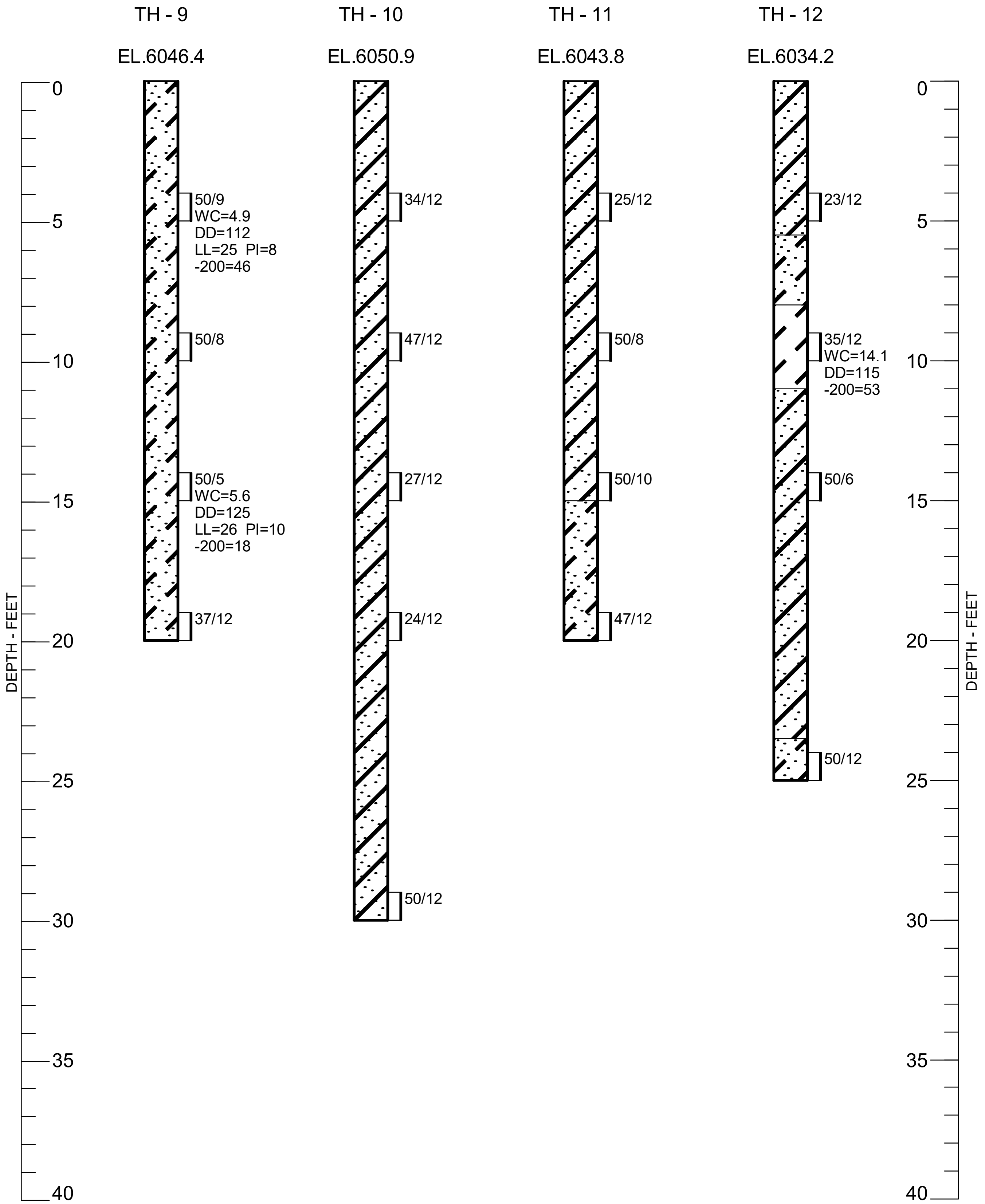
Summary Logs of Exploratory Borings

FIG. A-2



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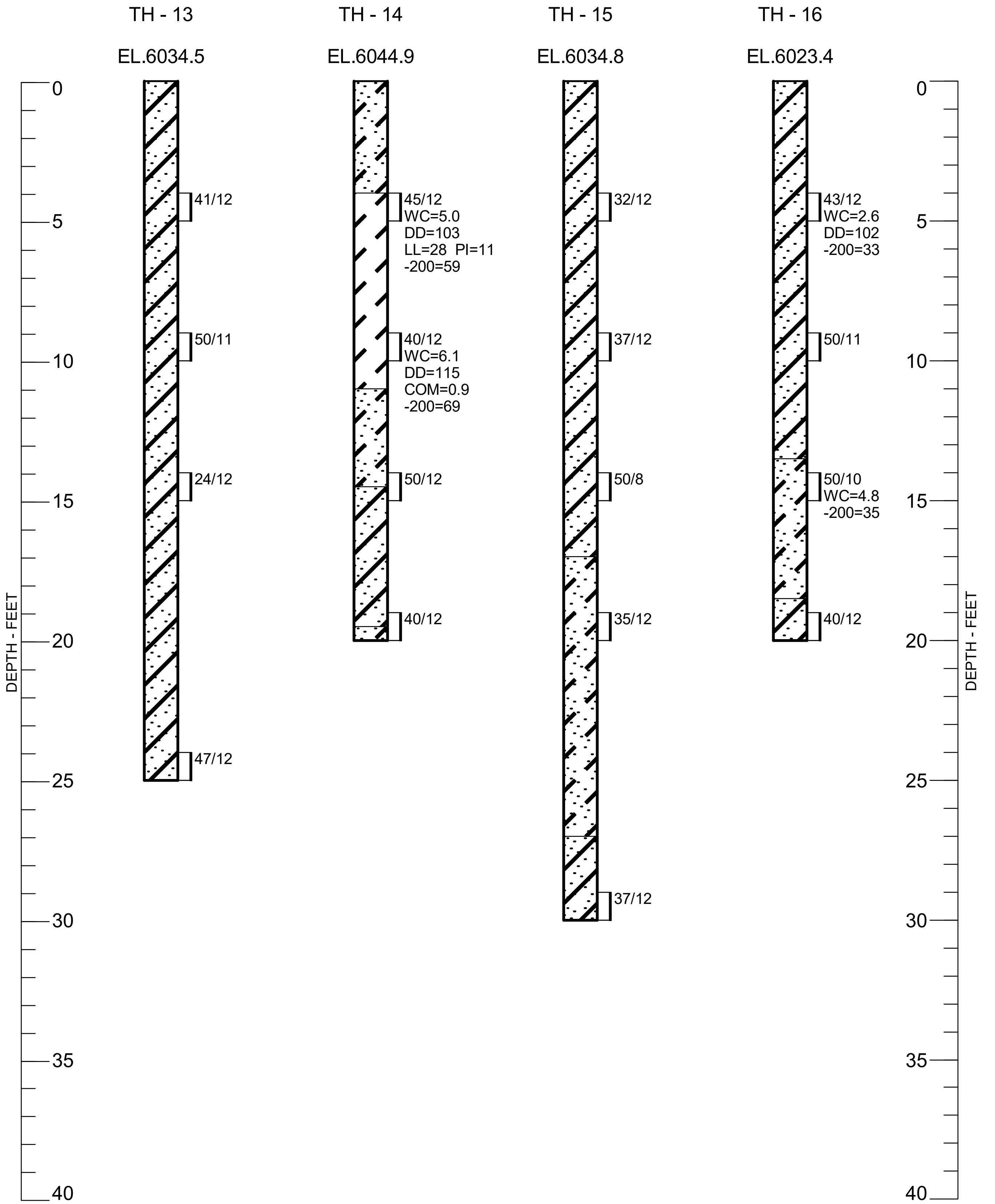
Summary Logs of Exploratory Borings

FIG. A-3



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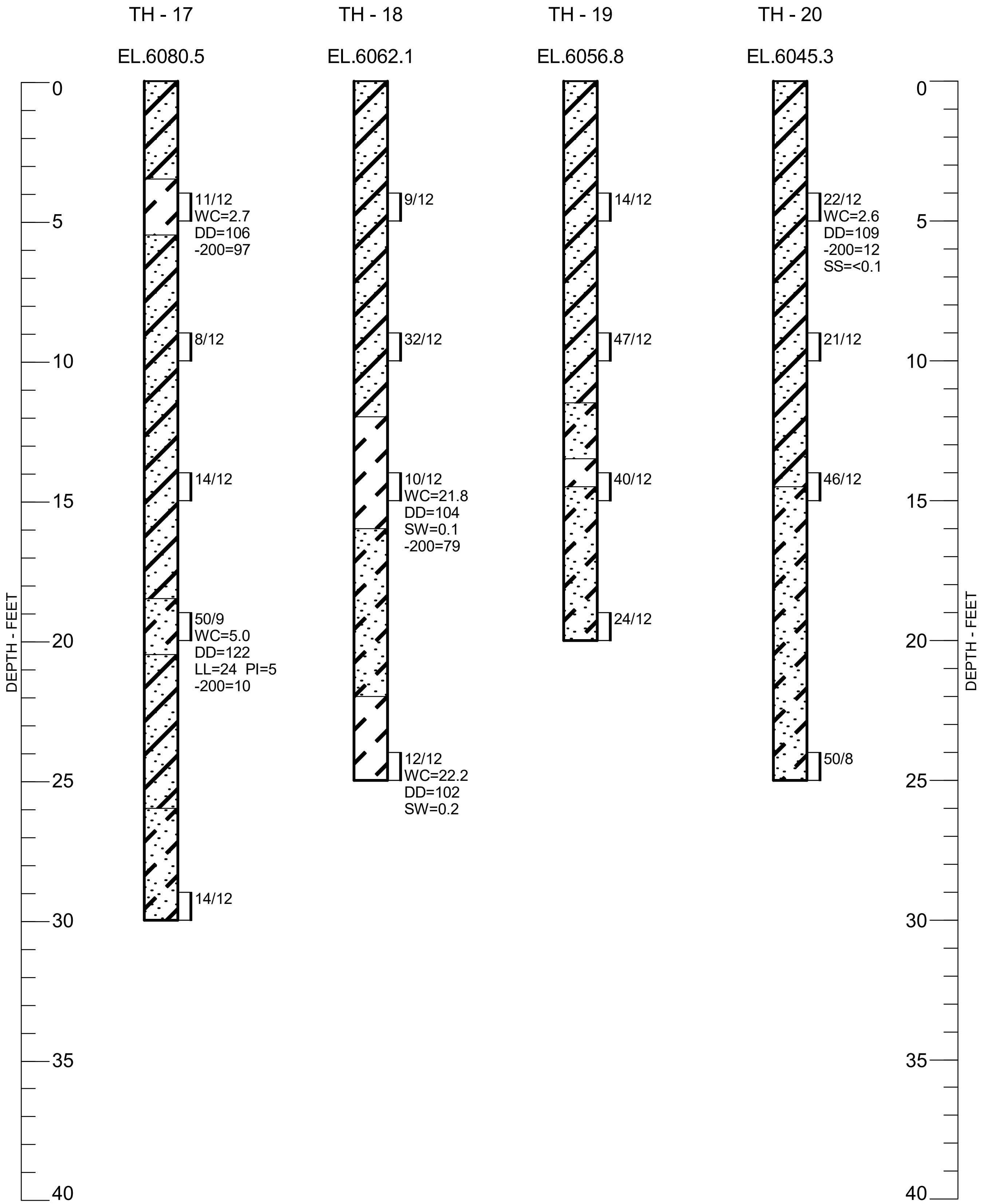
Summary Logs of Exploratory Borings

FIG. A-4



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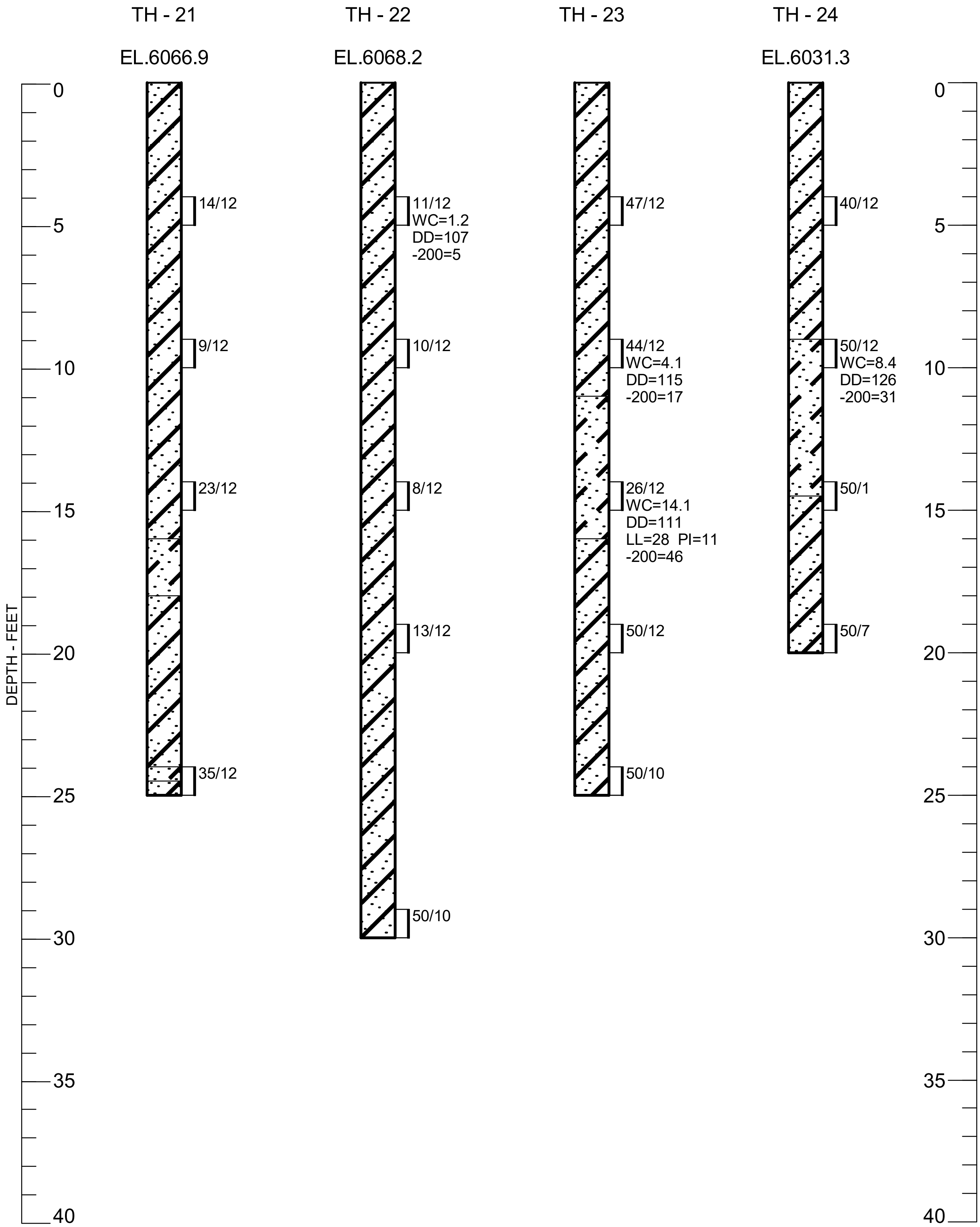
Summary Logs of Exploratory Borings

FIG. A-5



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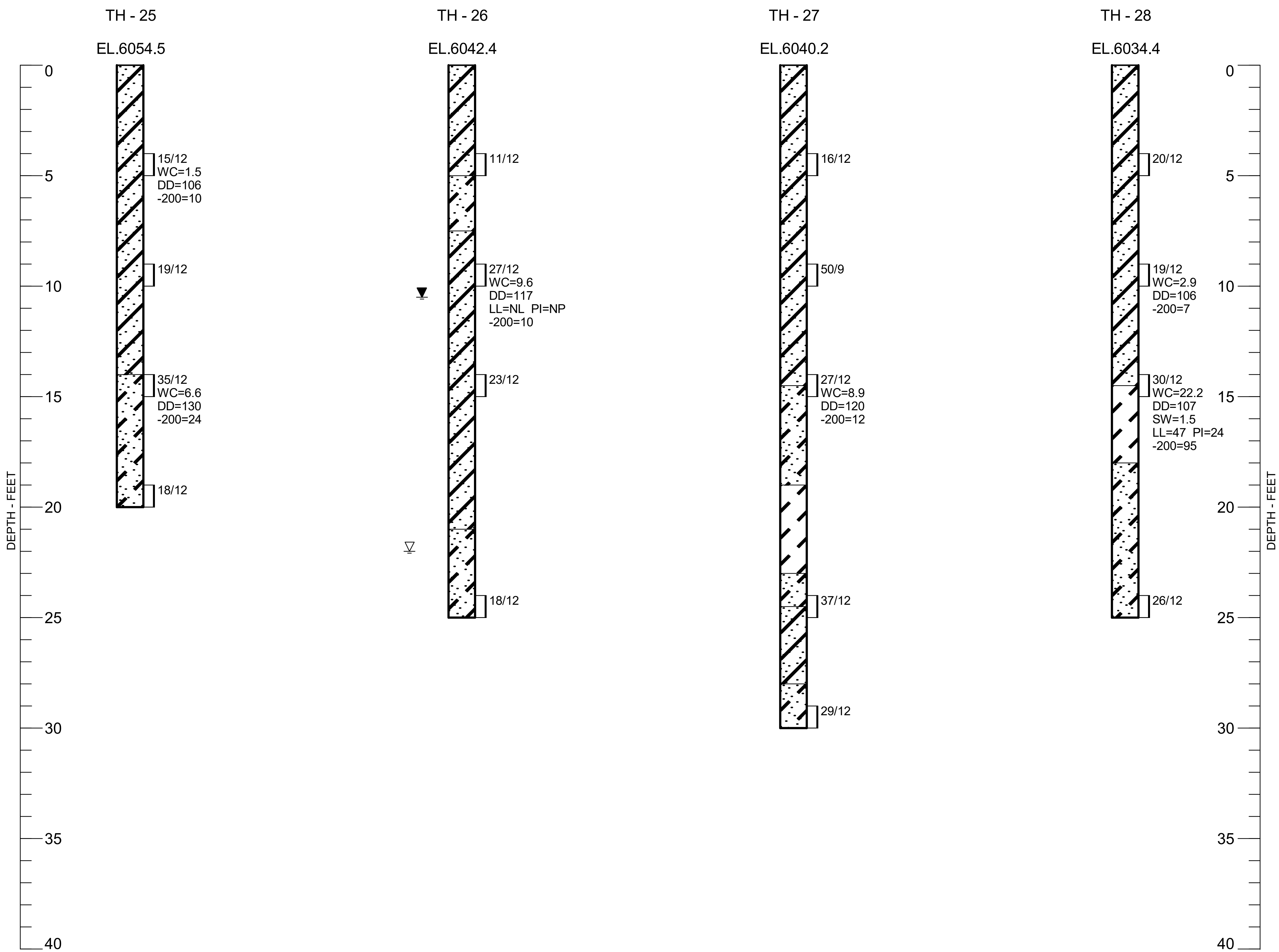
Summary Logs of Exploratory Borings

FIG. A-6



LEGEND:

- CLAY, SLIGHTLY SANDY TO VERY SANDY, STIFF TO VERY STIFF, SLIGHTLY MOIST, MEDIUM BROWN (CL).
- SAND, CLAYEY TO VERY CLAYEY, MEDIUM DENSE TO VERY DENSE, SLIGHTLY MOIST, MEDIUM BROWN (SC).
- SAND, SLIGHTLY SILTY TO SILTY, LOOSE TO VERY DENSE, SLIGHTLY MOIST, BROWN, RED (SM, SP-SM, SW-SM).
- DRIVE SAMPLE. THE SYMBOL 11/12 INDICATES 11 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 AFTER DRILLING.

NOTES:

1. THE BORINGS WERE DRILLED BETWEEN FEBRUARY 6 AND 10, 2023 USING A 4-INCH DIAMETER, CONTINUOUS-FLIGHT AUGER AND A CME-45 OR 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 APPROXIMATE OVERBURDEN PRESSURE. (%)
   COM - INDICATES COMPRESSION WHEN WETTED UNDER APPROXIMATE 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. (%)

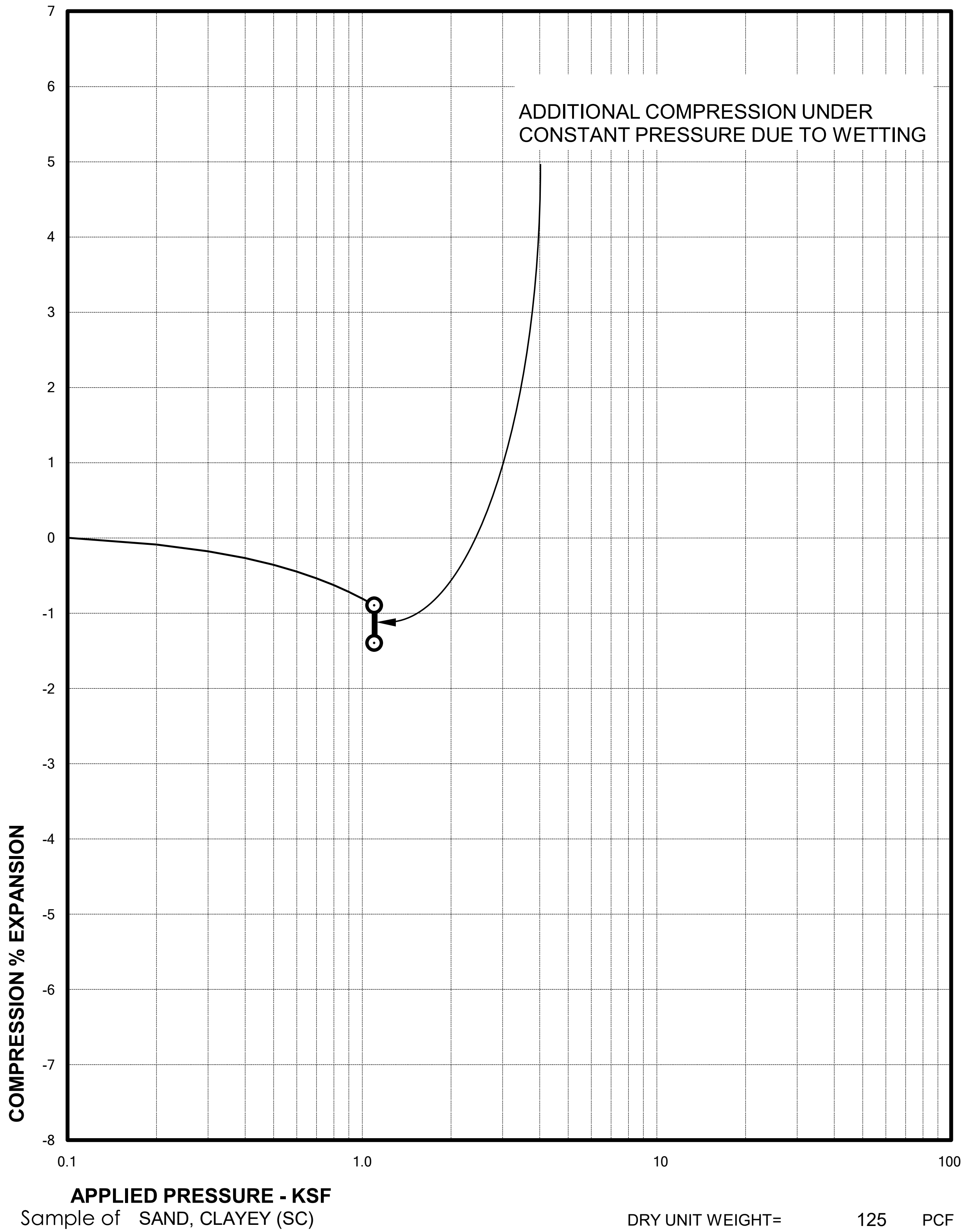
MAYBERRY COMMUNITIES
MAYBERRY - 540 ACRE SITE
CTL|T PROJECT NO. CS18969.004-105

Summary Logs of Exploratory Borings

FIG. A-7

APPENDIX B

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



Sample of SAND, CLAYEY (SC)

From TH-4 AT 9 FEET

DRY UNIT WEIGHT= 125 PCF

MOISTURE CONTENT= 6.7 %

MAYBERRY COMMUNITIES
MAYBERRY - 540 ACRE SITE
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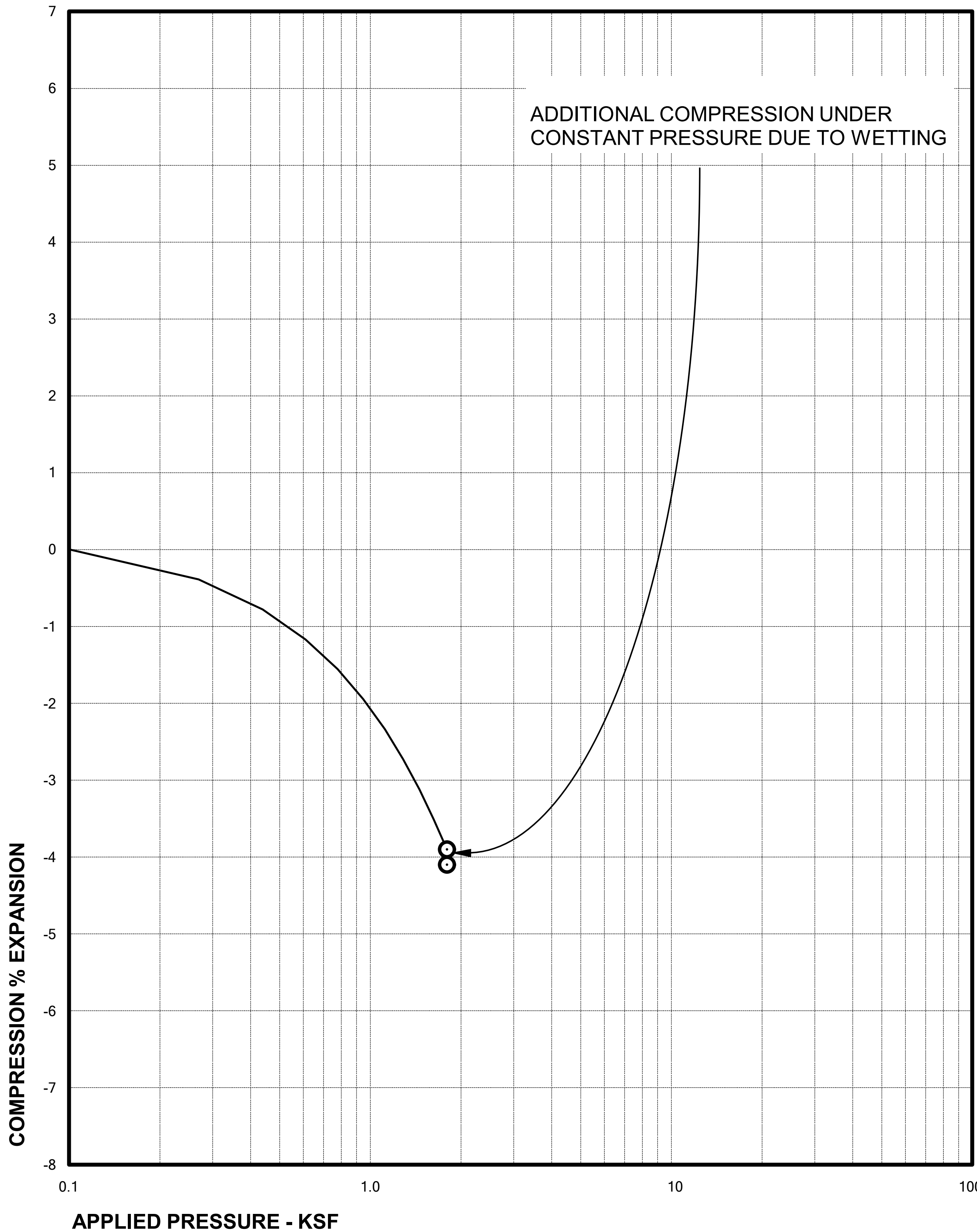
Swell Consolidation Test Results

FIG. B-1



Sample of SAND, VERY CLAYEY (SC)
From TH-5 AT 14 FEET

DRY UNIT WEIGHT= 114 PCF
MOISTURE CONTENT= 16.9 %

MAYBERRY COMMUNITIES
MAYBERRY - 540 ACRE SITE
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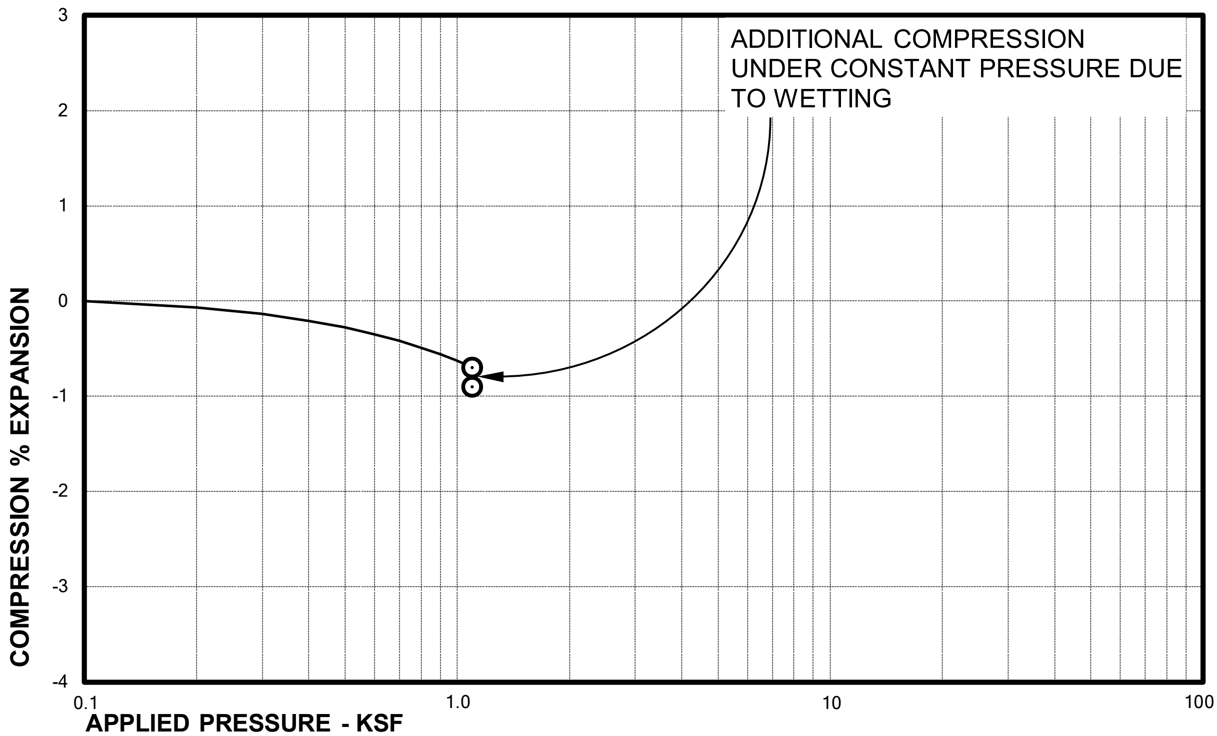
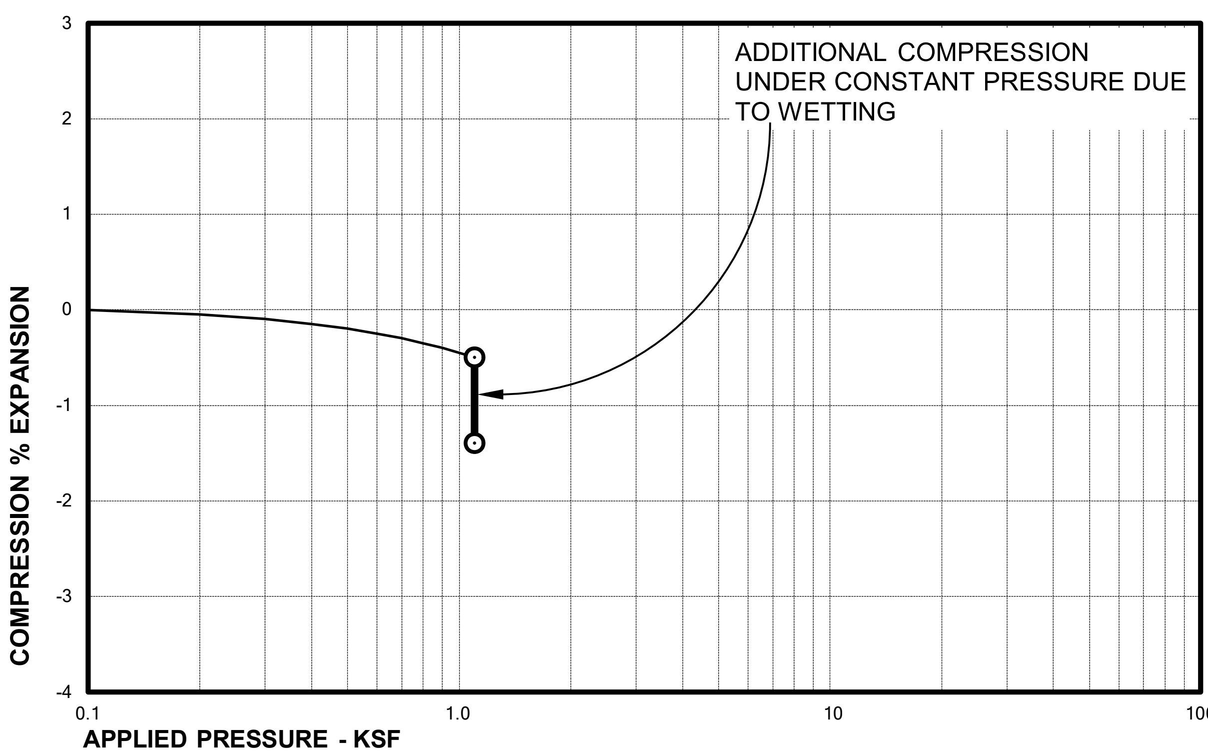
Swell Consolidation Test Results

FIG. B-2



Sample of SAND, CLAYEY (SC)
From TH-8 AT 9 FEET

DRY UNIT WEIGHT= 125 PCF
MOISTURE CONTENT= 8.1 %



Sample of CLAY, SANDY (CL)
From TH-14 AT 9 FEET

DRY UNIT WEIGHT= 115 PCF
MOISTURE CONTENT= 6.1 %

MAYBERRY COMMUNITIES
MAYBERRY - 540 ACRE SITE
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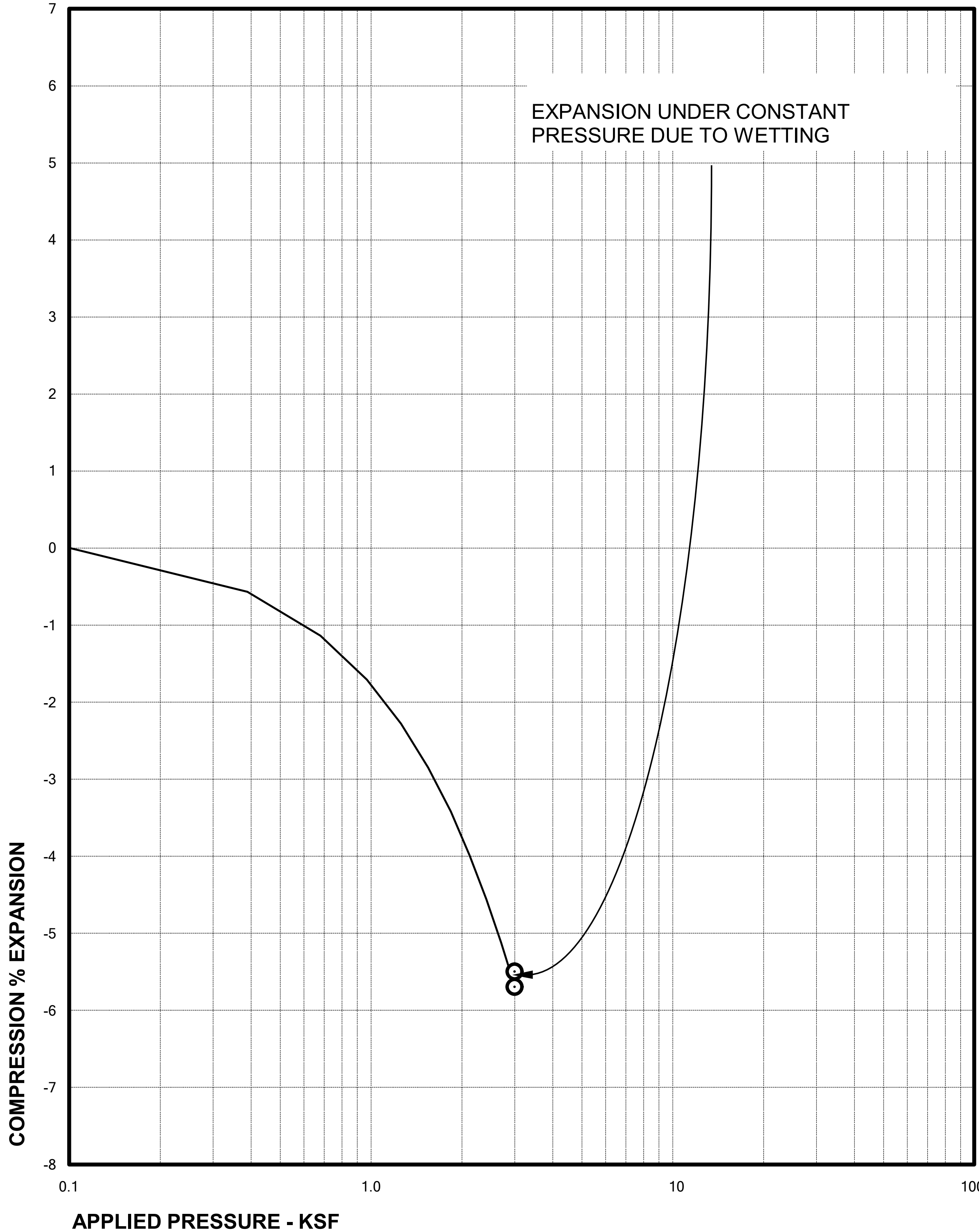
Swell Consolidation



Sample of CLAY, SANDY (CL)

From TH-18 AT 24 FEET

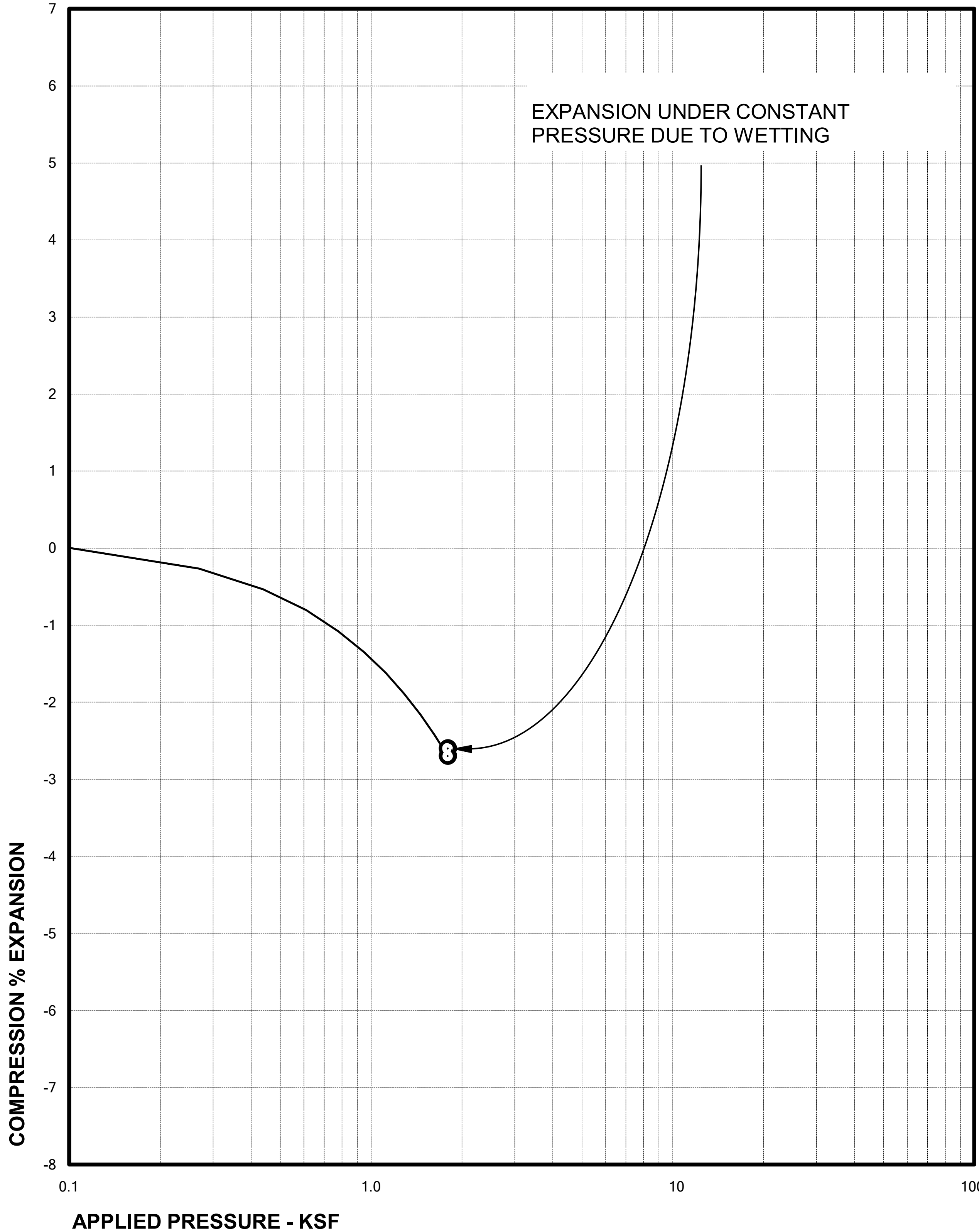
DRY UNIT WEIGHT= 102 PCF

MOISTURE CONTENT= 22.2 %

MAYBERRY COMMUNITIES
MAYBERRY - 540 ACRE SITE
CTL|T PROJECT NO. CS18969.004-105

Swell Consolidation Test Results

FIG. B-5



Sample of CLAY, SANDY (CL)

From TH-18 AT 14 FEET

DRY UNIT WEIGHT= 104 PCF

MOISTURE CONTENT= 21.8 %

MAYBERRY COMMUNITIES
MAYBERRY - 540 ACRE SITE
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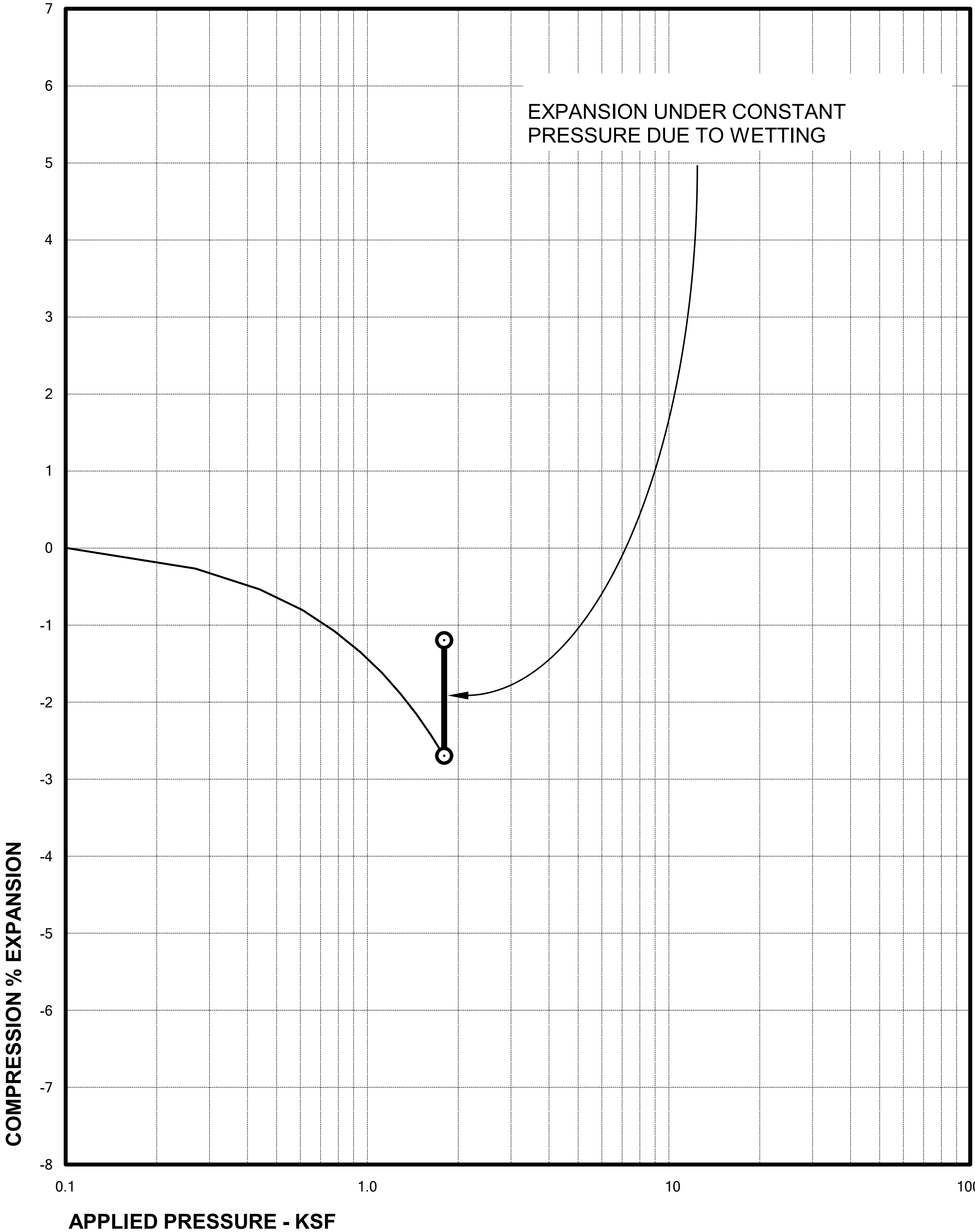
Swell Consolidation Test Results

FIG. B-4



Sample of CLAY, SANDY (CL)

From TH-28 AT 14 FEET

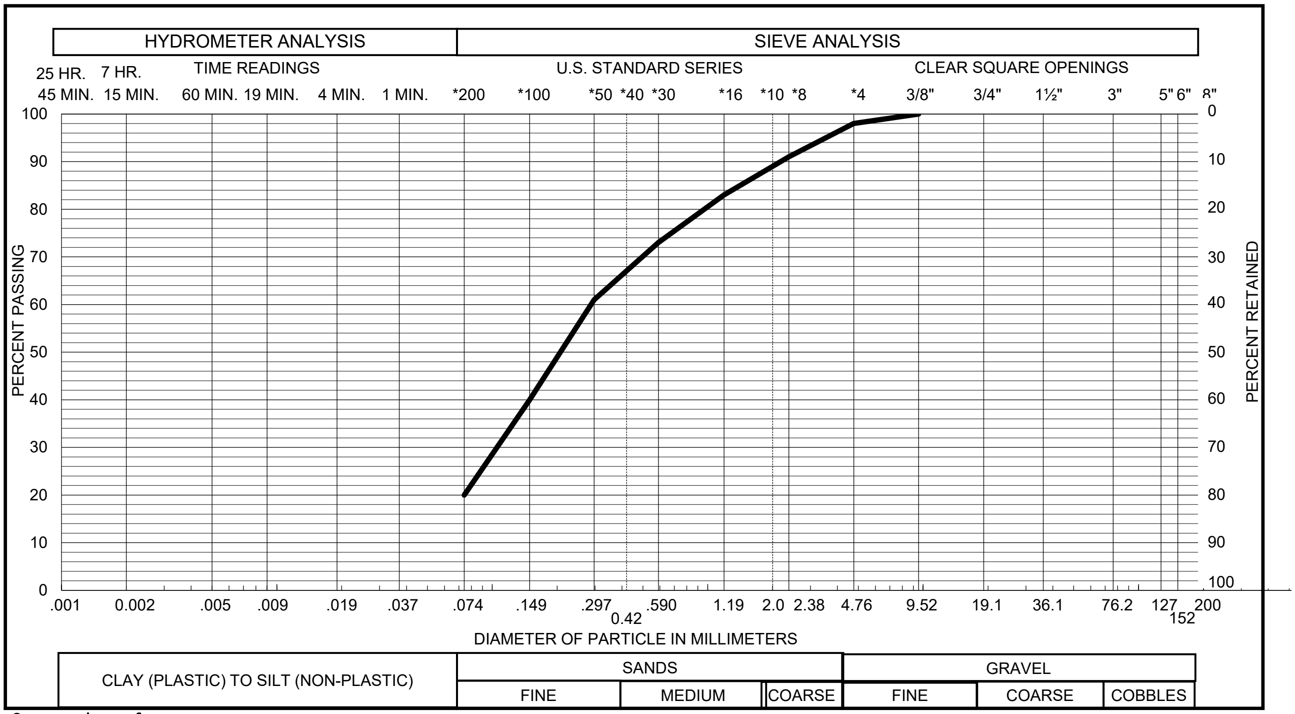
DRY UNIT WEIGHT= 107 PCF

MOISTURE CONTENT= 22.2 %

MAYBERRY COMMUNITIES
MAYBERRY - 540 ACRE SITE
CTL|T PROJECT NO. CS18969.004-105

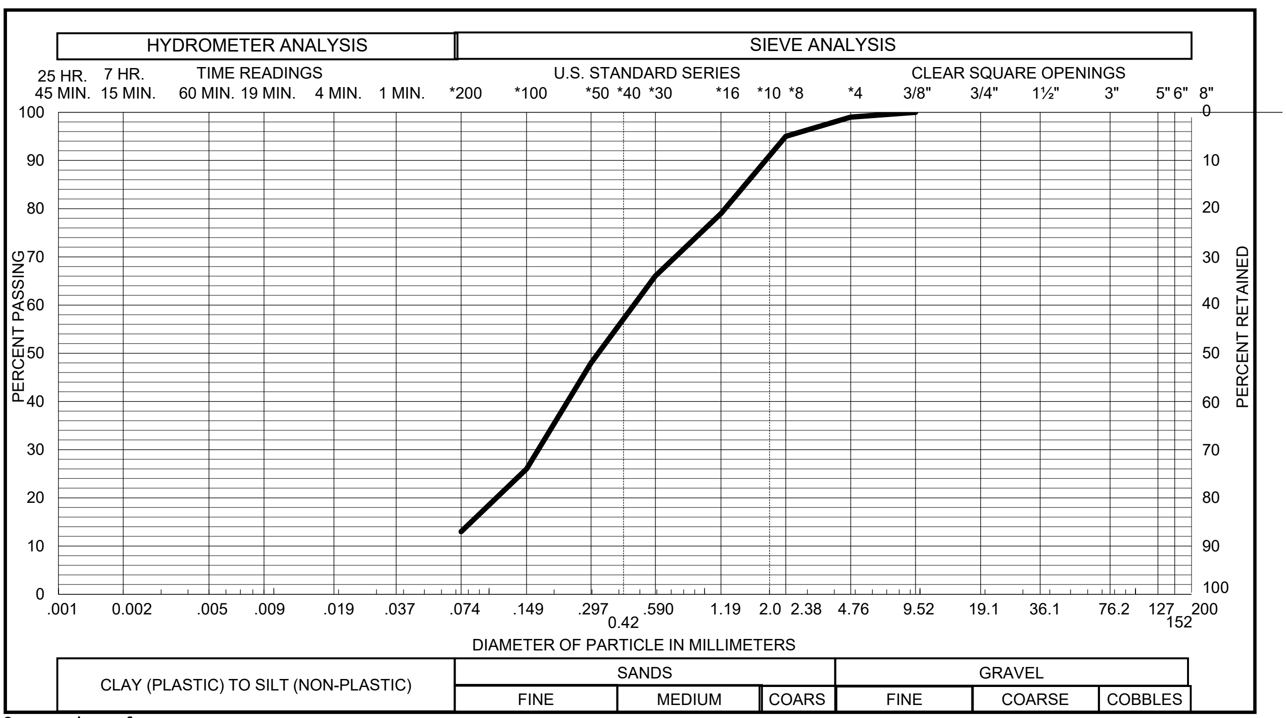
Swell Consolidation Test Results

FIG. B-6



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

GRAVEL 2 % SAND 78 %
SILT & CLAY 20 % LIQUID LIMIT
PLASTICITY INDEX



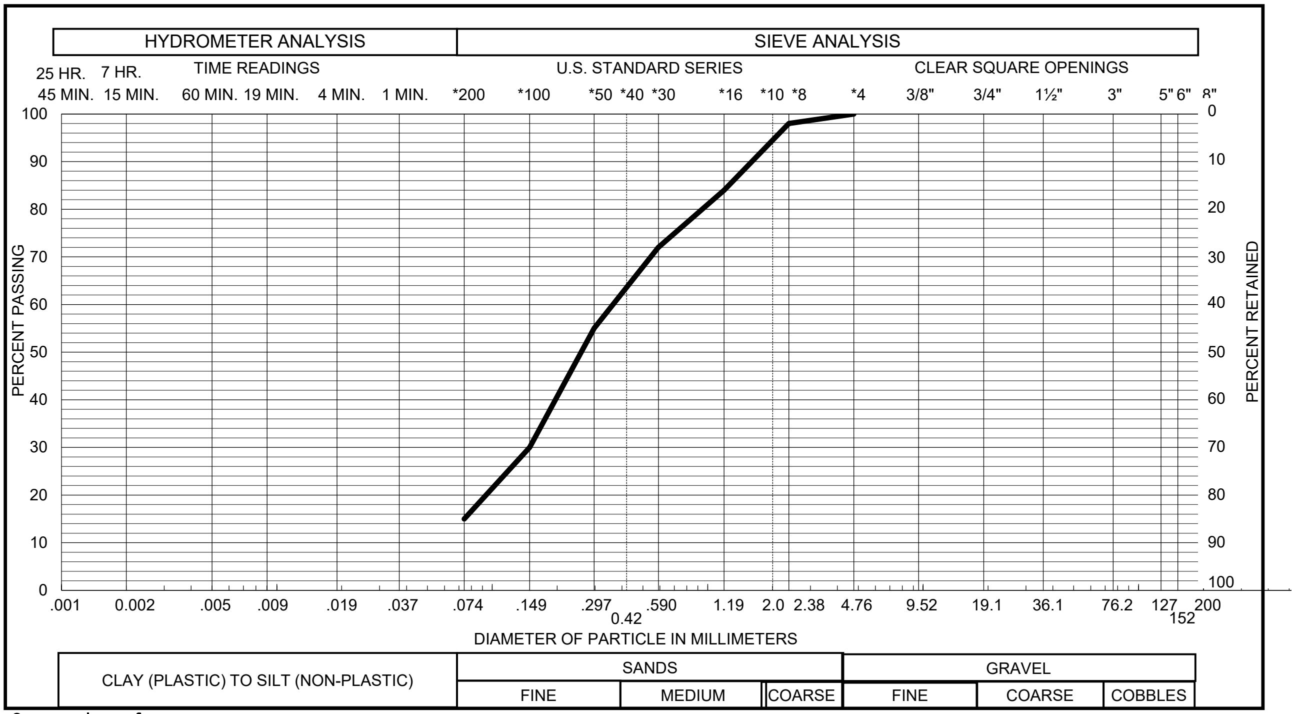
Sample of SAND, SILTY (SM)
From TH - 2 AT 9 FEET

GRAVEL 1 % SAND 86 %
SILT & CLAY 13 % LIQUID LIMIT
PLASTICITY INDEX

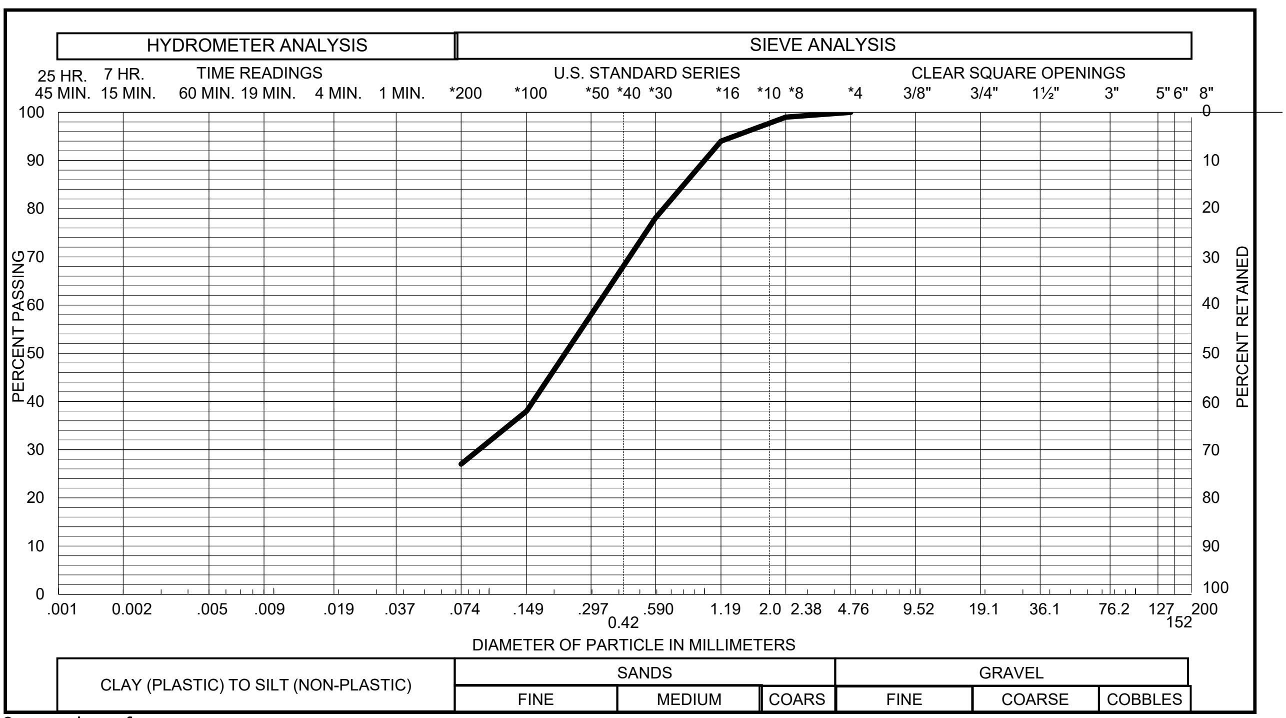
MAYBERRY DEVELOPMENT
MAYBERRY - 540 ACRE SITE
CTL|T PROJECT NO. CS18969.004-105

Gradation Test Results

FIG. B-7



Sample of	SAND, SILTY (SM)	GRAVEL	0 %	SAND	85 %
From	TH - 4 AT 4 FEET	SILT & CLAY	15 %	LIQUID LIMIT	
		PLASTICITY INDEX			



Sample of	SAND, CLAYEY (SC)	GRAVEL	0 %	SAND	73 %
From	TH - 6 AT 14 FEET	SILT & CLAY	27 %	LIQUID LIMIT	
		PLASTICITY INDEX			

MAYBERRY DEVELOPMENT
MAYBERRY - 540 ACRE SITE
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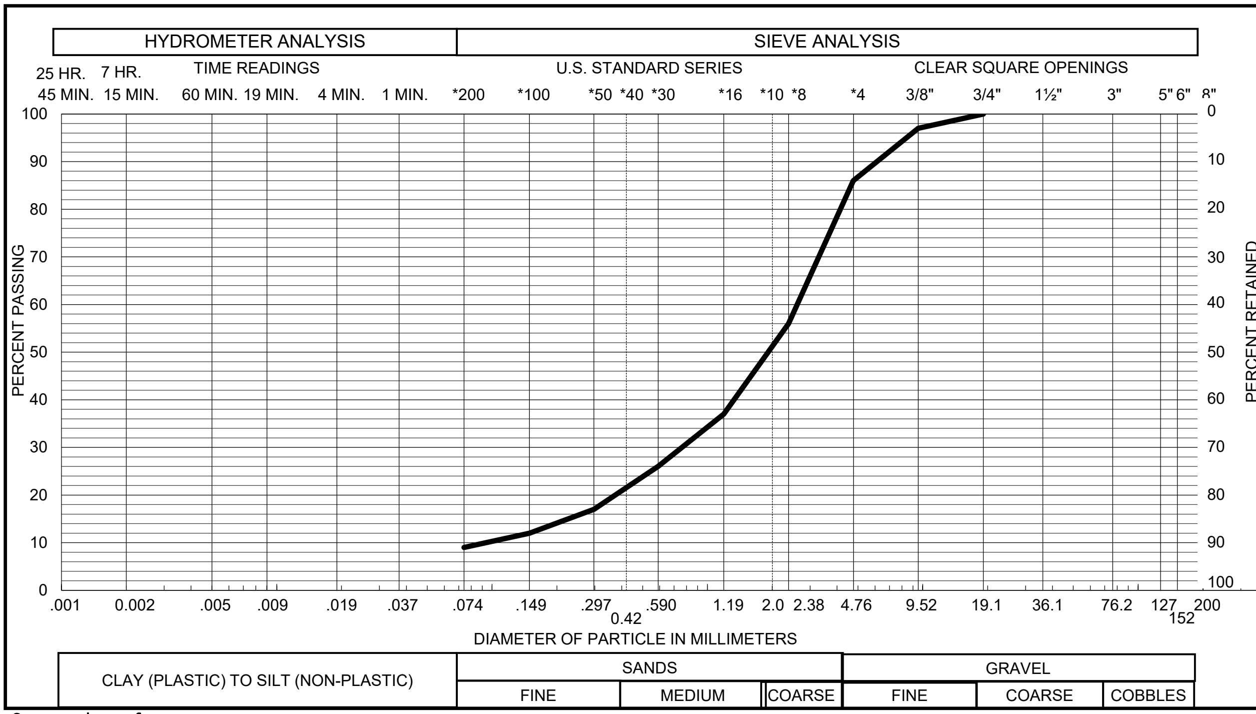
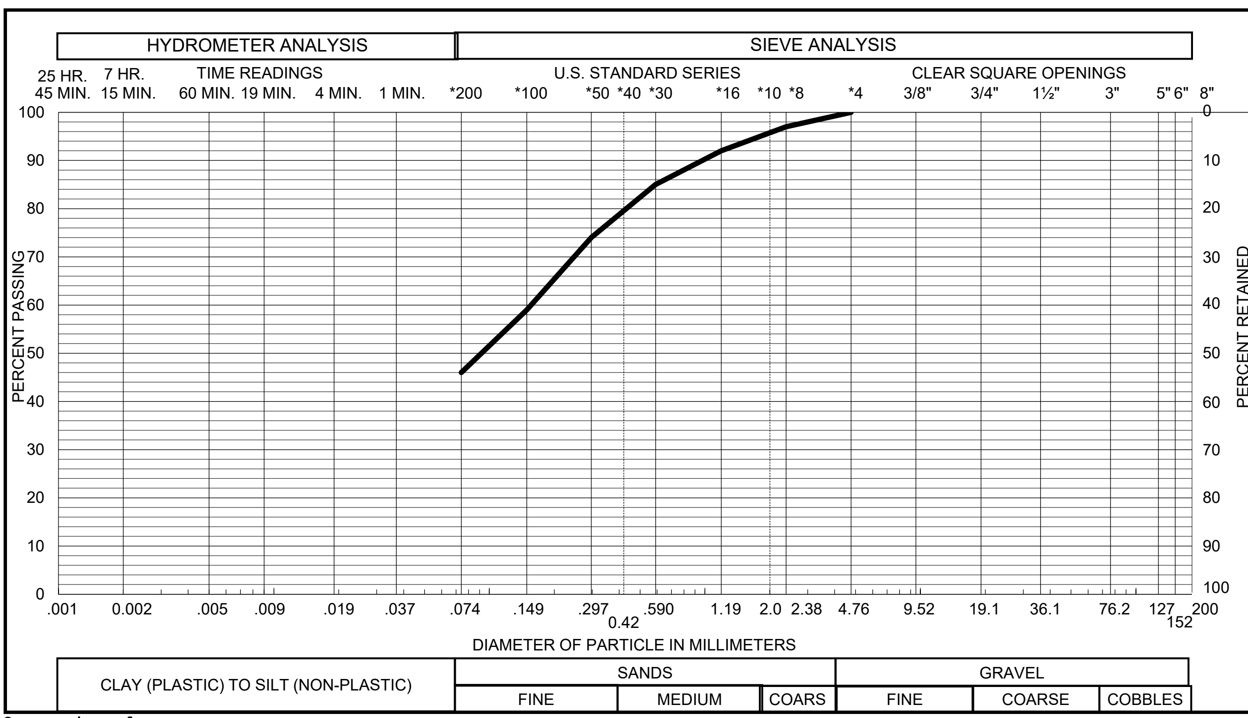
Gradation Test Results

FIG. B-8



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

GRAVEL 14 % SAND 77 %
SILT & CLAY 9 % LIQUID LIMIT
PLASTICITY INDEX



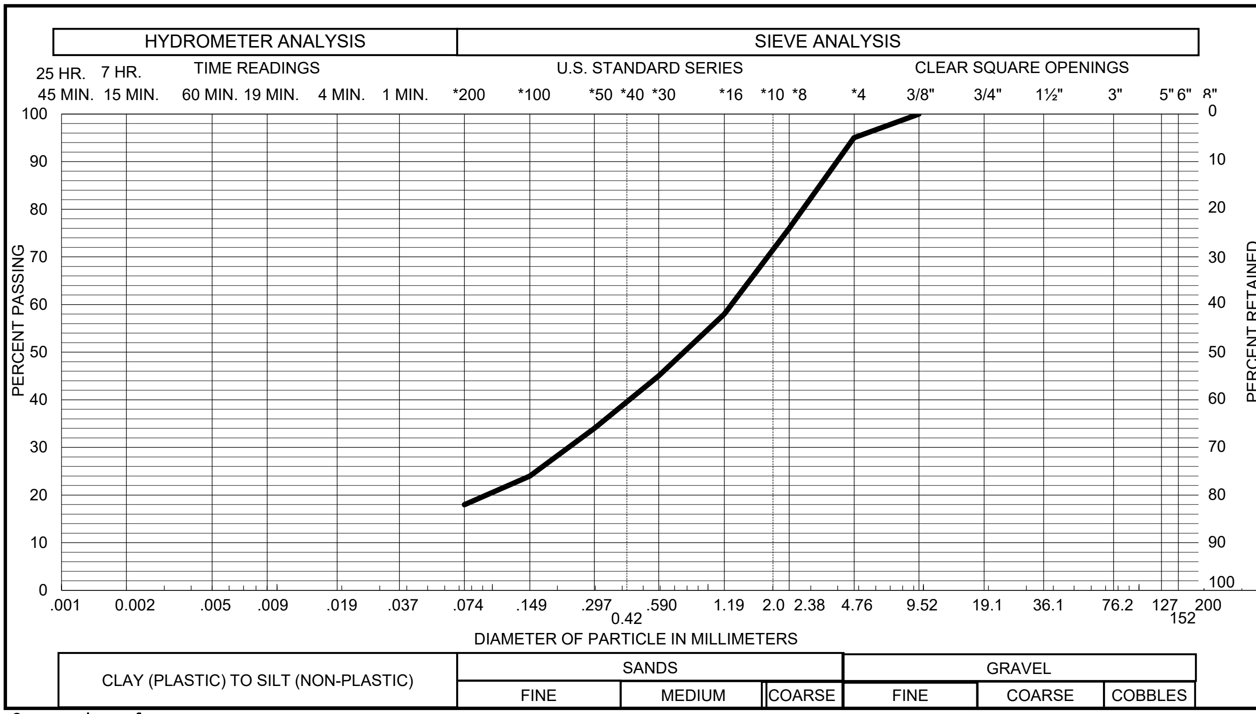
Sample of SAND, VERY CLAYEY (SC)
From TH - 9 AT 4 FEET

GRAVEL 0 % SAND 54 %
SILT & CLAY 46 % LIQUID LIMIT 25
PLASTICITY INDEX 8

MAYBERRY DEVELOPMENT
MAYBERRY - 540 ACRE SITE
CTL|T PROJECT NO. CS18969.004-105

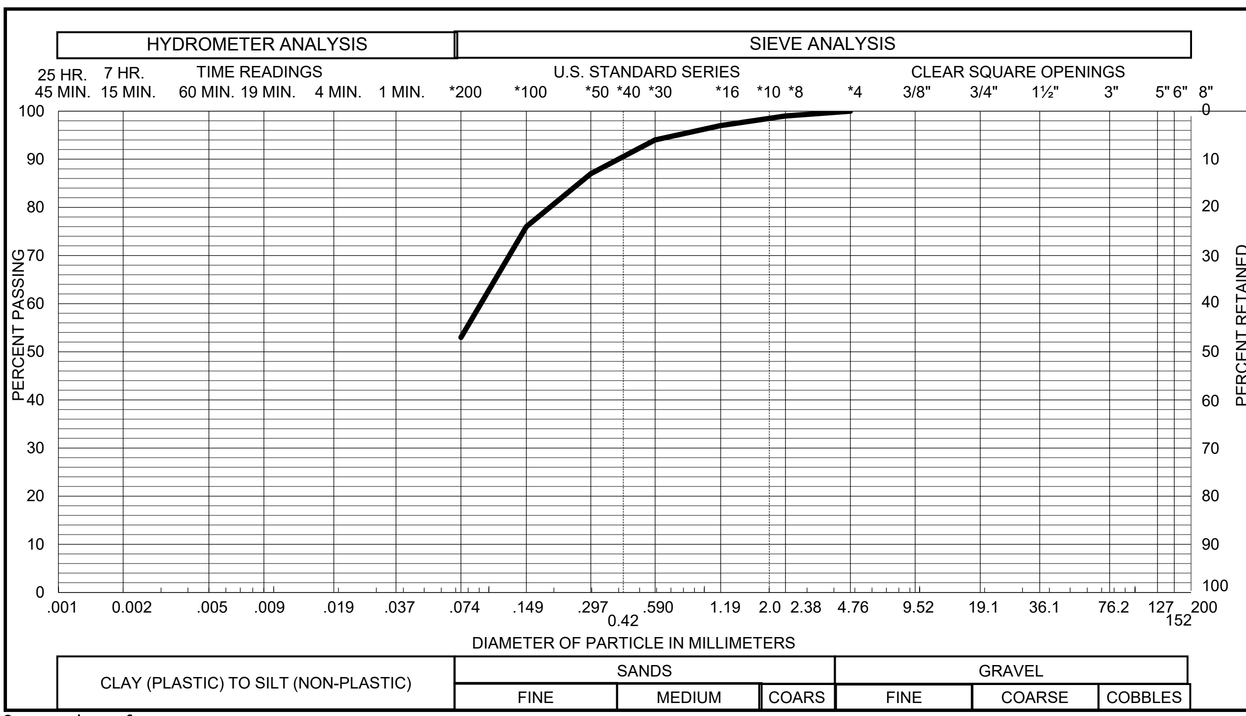
Gradation Test Results

FIG. B-9



Sample of SAND, CLAYEY (SC)
From TH - 9 AT 14 FEET

GRAVEL 5 % SAND 77 %
SILT & CLAY 18 % LIQUID LIMIT 26
PLASTICITY INDEX 10



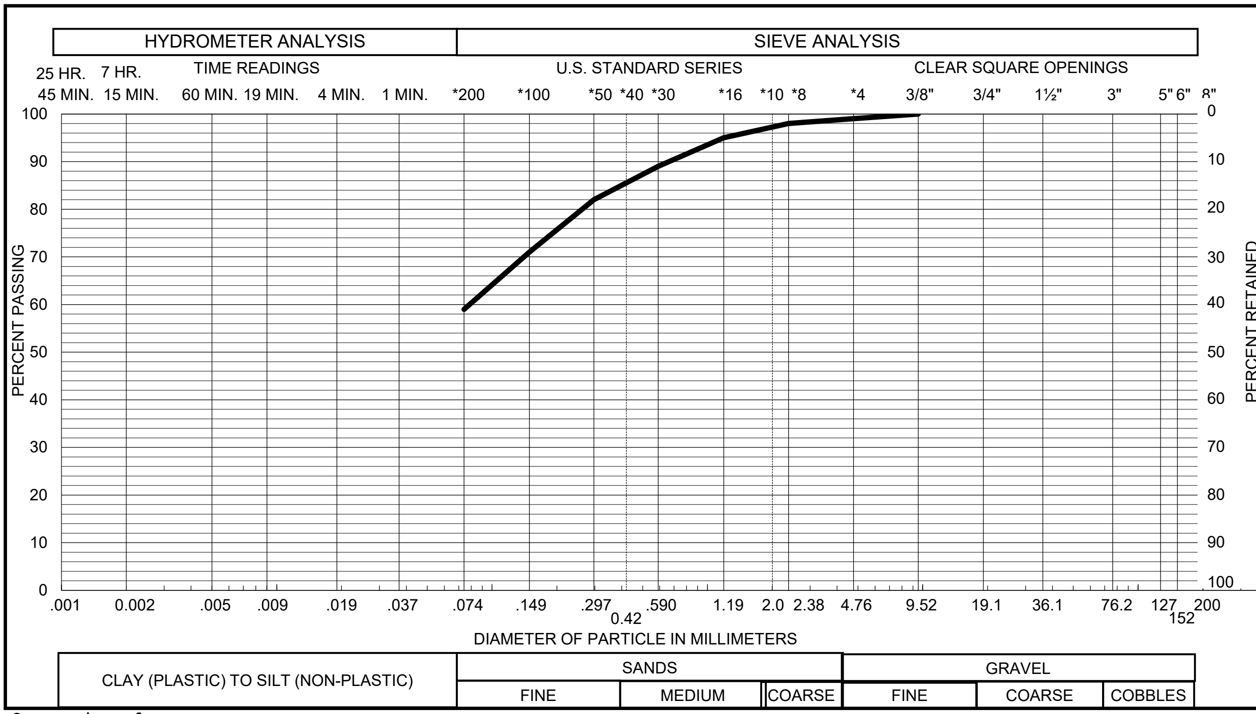
Sample of CLAY, VERY SANDY (CL)
From TH - 12 AT 9 FEET

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

MAYBERRY DEVELOPMENT
MAYBERRY - 540 ACRE SITE
CTL|T PROJECT NO. CS18969.004-105

Gradation Test Results

FIG. B-10



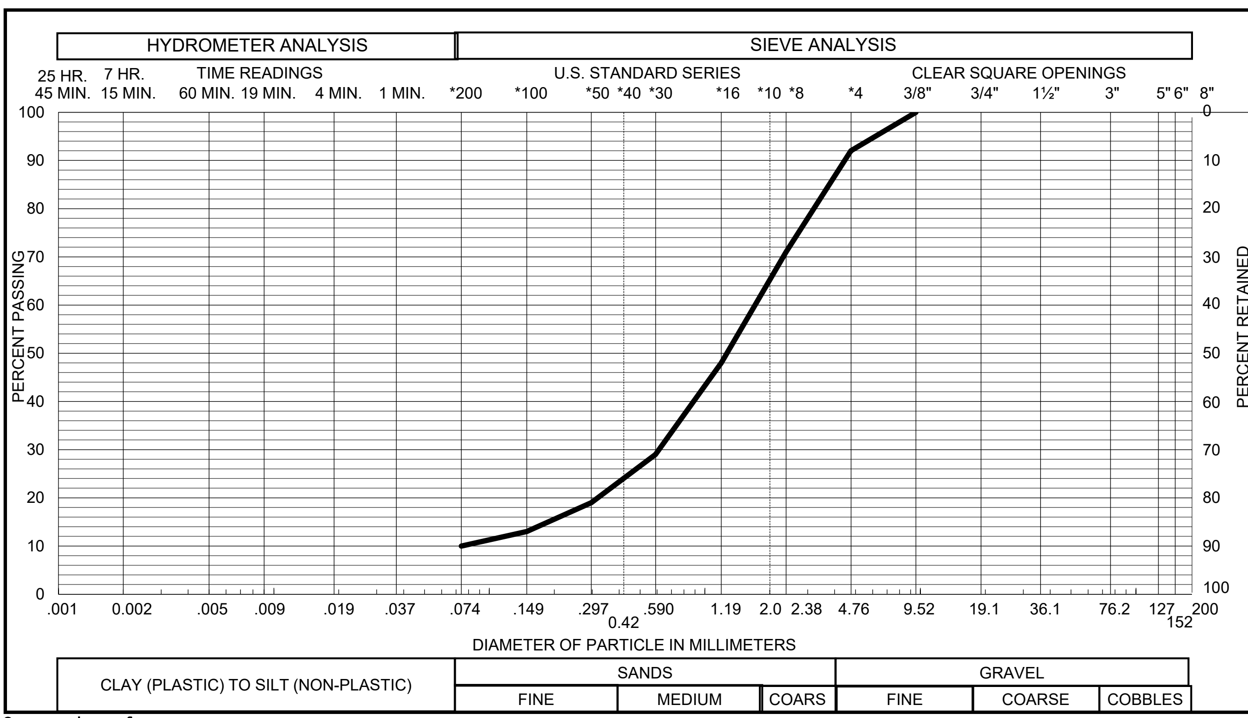
Sample of CLAY, VERY SANDY (CL)

From TH - 14 AT 4 FEET

GRAVEL 1 % SAND 40 %

SILT & CLAY 59 % LIQUID LIMIT 28

PLASTICITY INDEX 11



Sample of SAND, SLIGHTLY SILTY (SW-SM)

From TH - 17 AT 19 FEET

GRAVEL 8 % SAND 82 %

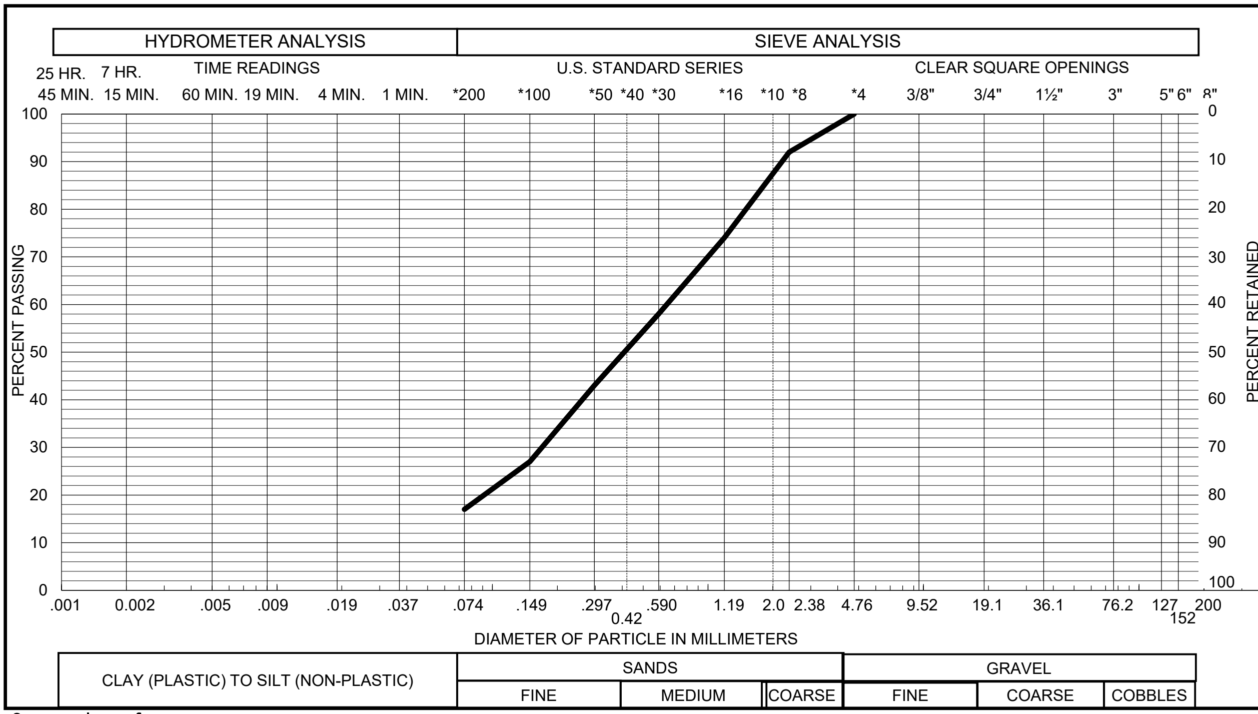
SILT & CLAY 10 % LIQUID LIMIT 24

PLASTICITY INDEX 5

MAYBERRY DEVELOPMENT
MAYBERRY - 540 ACRE SITE
CTL|T PROJECT NO. CS18969.004-105

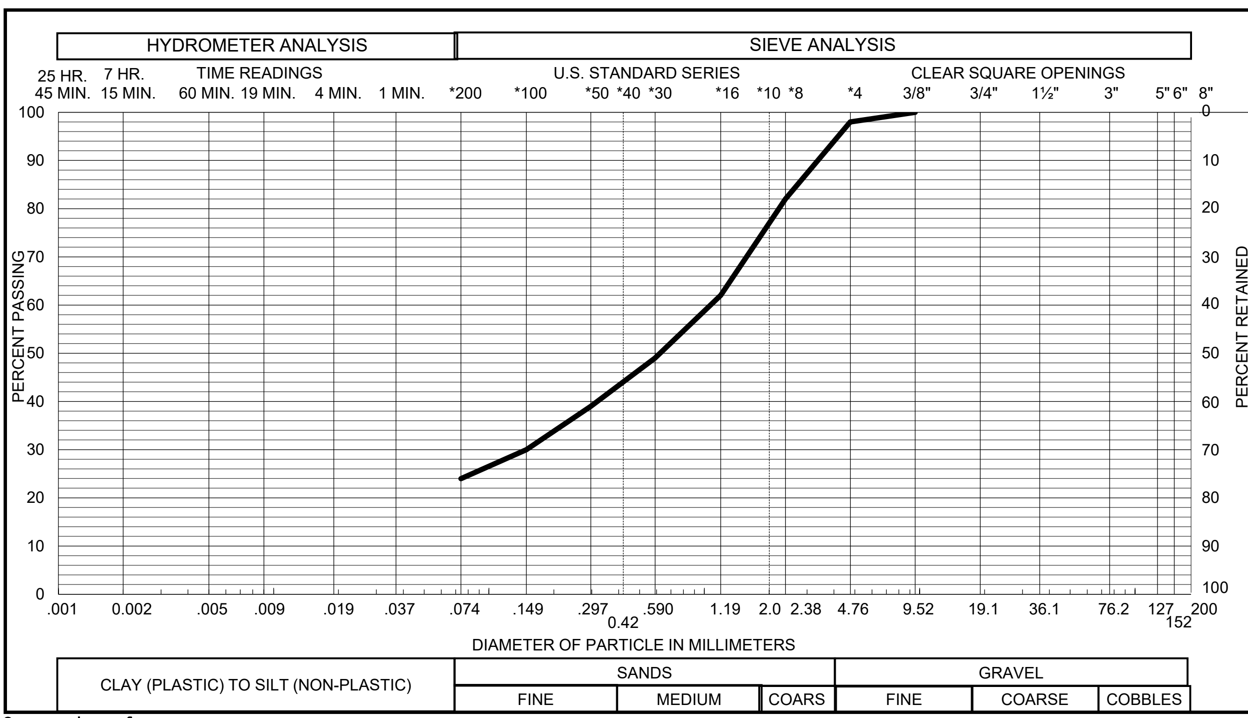
Gradation Test Results

FIG. B-11



Sample of SAND, SILTY (SM)
From TH - 23 AT 9 FEET

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



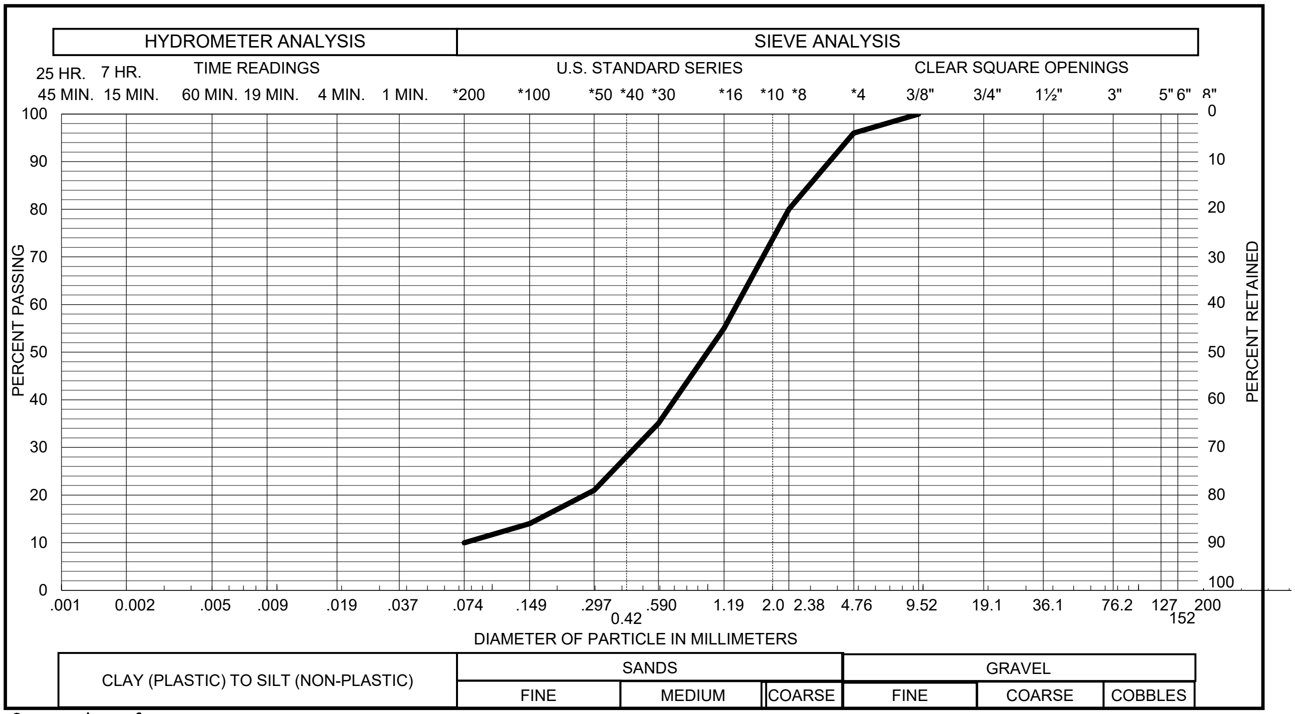
Sample of SAND, CLAYEY (SC)
From TH - 25 AT 14 FEET

GRAVEL 2 % SAND 74 %
SILT & CLAY 24 % LIQUID LIMIT
PLASTICITY INDEX

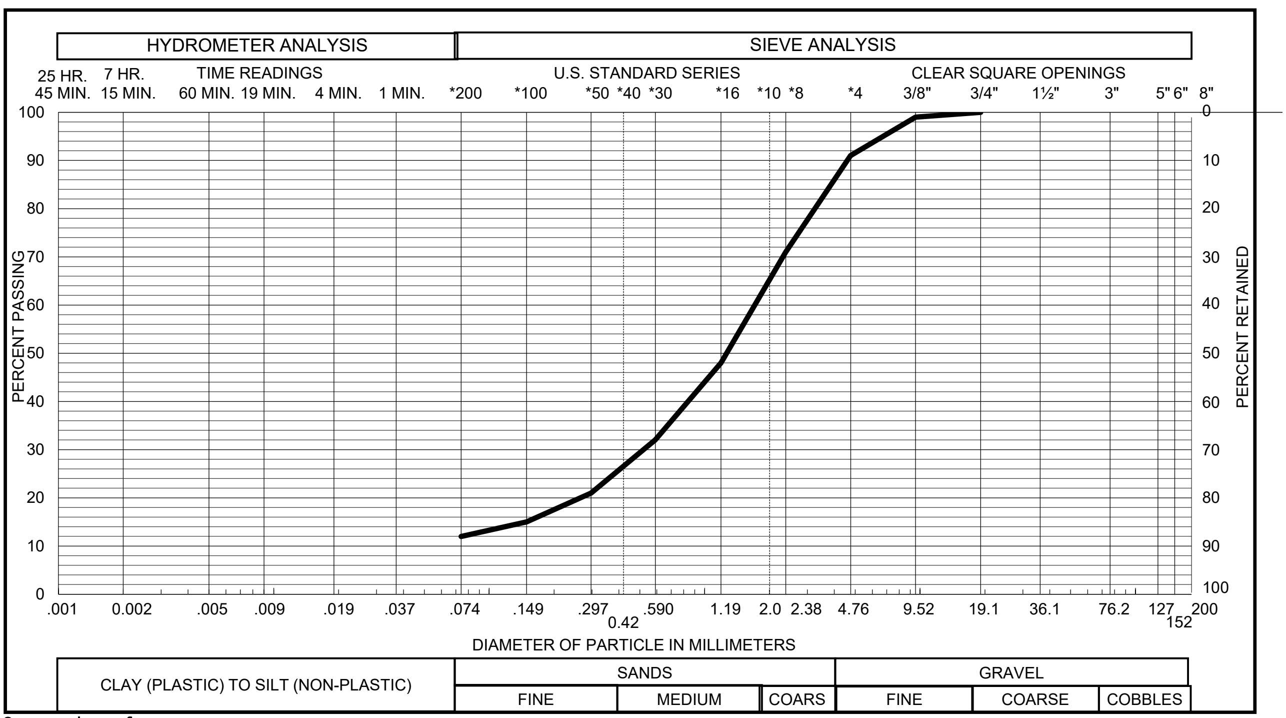
MAYBERRY DEVELOPMENT
MAYBERRY - 540 ACRE SITE
CTL|T PROJECT NO. CS18969.004-105

Gradation Test Results

FIG. B-12



Sample of	SAND, SLIGHTLY SILTY (SW-SM)	GRAVEL	4 %	SAND	86 %
From	TH - 26 AT 9 FEET	SILT & CLAY	10 %	LIQUID LIMIT	
		PLASTICITY INDEX			

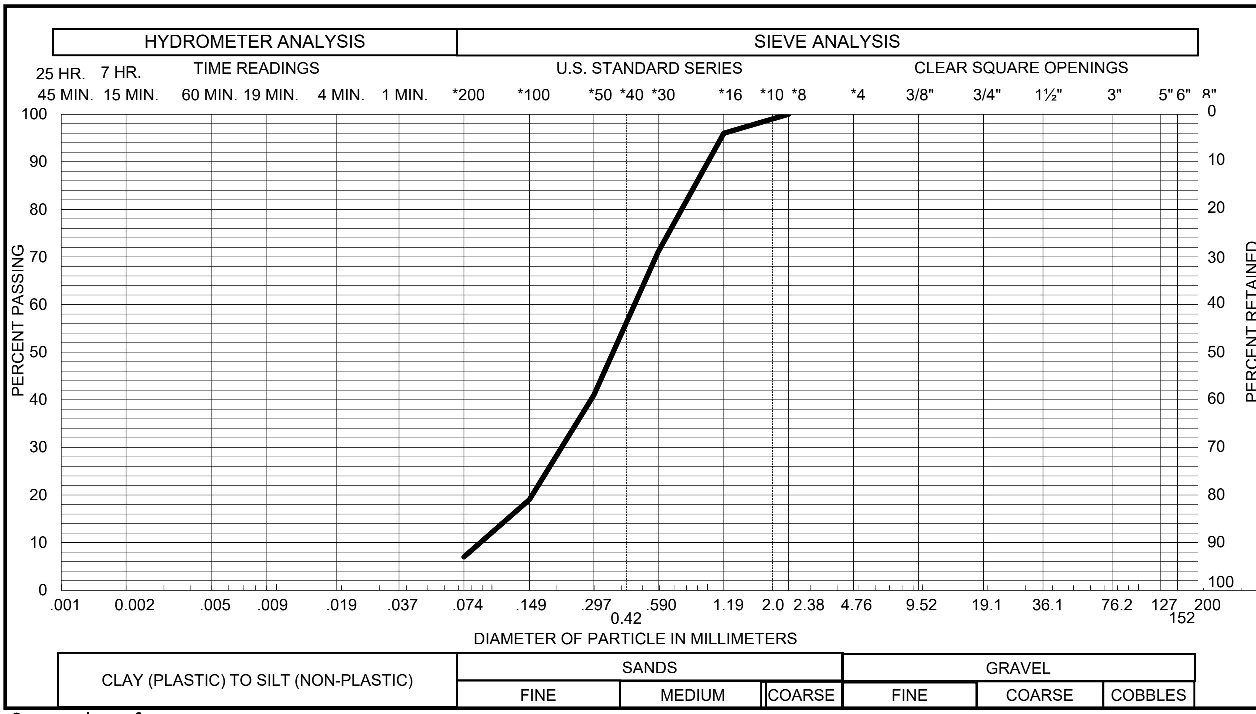


Sample of	SAND, SLIGHTLY SILTY (SP-SM)	GRAVEL	9 %	SAND	79 %
From	TH - 27 AT 14 FEET	SILT & CLAY	12 %	LIQUID LIMIT	
		PLASTICITY INDEX			

MAYBERRY DEVELOPMENT
MAYBERRY - 540 ACRE SITE
CTL|T PROJECT NO. CS18969.004-105

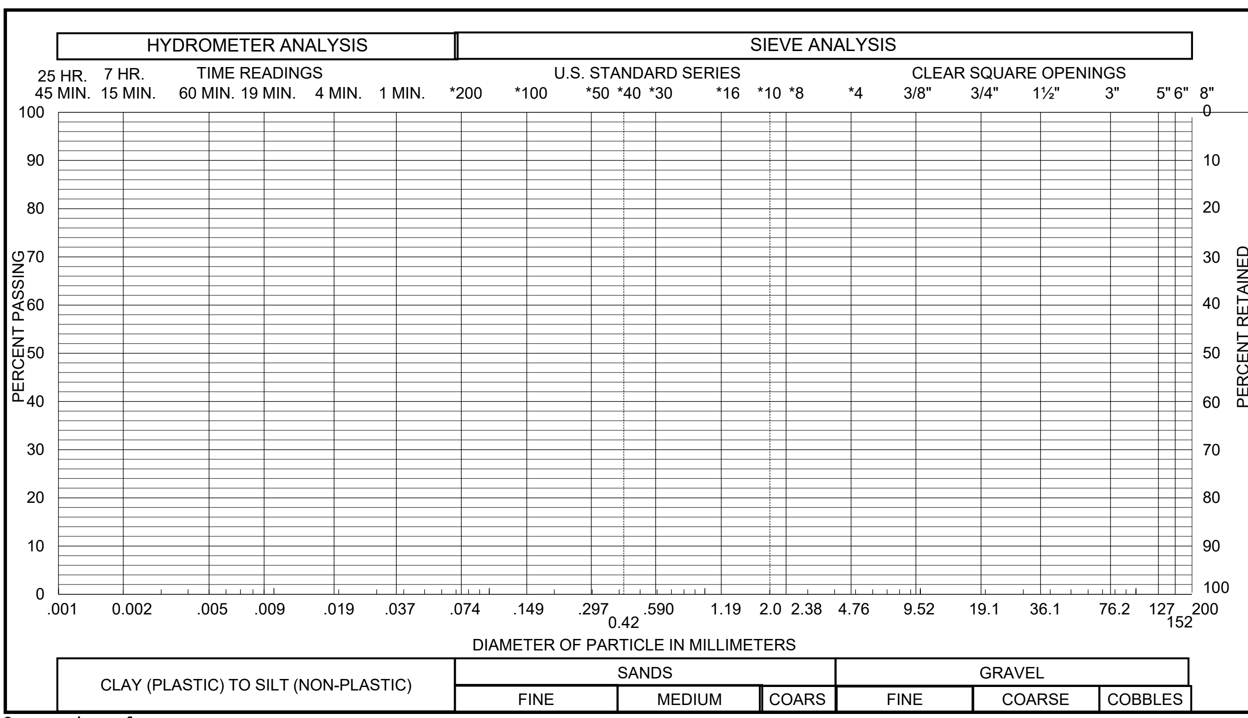
Gradation Test Results

FIG. B-13



Sample of SAND, SLIGHTLY SILTY (SP-SM)
From TH - 28 AT 9 FEET

GRAVEL 0 % SAND 93 %
SILT & CLAY 7 % LIQUID LIMIT
PLASTICITY INDEX



Sample of
From

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

MAYBERRY DEVELOPMENT
MAYBERRY - 540 ACRE SITE
CTL|T PROJECT NO. CS18969.004-105

Gradation Test Results

FIG. B-14

TABLE 1

SUMMARY OF LABORATORY TESTING
CTL|T PROJECT NO. CS18969.004-105

BORING	DEPTH (FEET)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	ATTERBERG LIMITS		SWELL TEST RESULTS*			PASSING NO. 200 SIEVE (%)	WATER SOLUBLE SULFATES (%)	DESCRIPTION
				LIQUID LIMIT (%)	PLASTICITY INDEX (%)	SWELL (%)	APPLIED PRESSURE (PSF)	SWELL PRESSURE (PSF)			
TH-1	9	9.1	111						20		SAND, SILTY (SM)
TH-2	9	2.9							13		SAND, SILTY (SM)
TH-3	4	4.0	127						14		SAND, SILTY (SM)
TH-4	4	3.3	107						15	<0.1	SAND, SILTY (SM)
TH-4	9	6.7	125			-0.5	1100		20		SAND, CLAYEY (SC)
TH-5	14	16.9	114			-0.2	1800		49		SAND, VERY CLAYEY (SC)
TH-6	14	8.8	126						27		SAND, CLAYEY (SC)
TH-7	9	2.9	121						9		SAND, SLIGHTLY SILTY (SW-SM)
TH-8	9	8.1	125			-0.2	1100		32		SAND, CLAYEY (SC)
TH-9	4	4.9	112	25	8				46		SAND, VERY CLAYEY (SC)
TH-9	14	5.6	125	26	10				18		SAND, CLAYEY (SC)
TH-12	9	14.1	115						53		CLAY, VERY SANDY (CL)
TH-14	4	5.0	103	28	11				59		CLAY, VERY SANDY (CL)
TH-14	9	6.1	115			-0.9	1100		69		CLAY, SANDY (CL)
TH-16	4	2.6	102						33		SAND, SILTY (SM)
TH-16	14	4.8							35		SAND, SILTY (SM)
TH-17	4	2.7	106						97		CLAY (CL)
TH-17	19	5.0	122	24	5				10		SAND, SLIGHTLY SILTY (SW-SM)
TH-18	14	21.8	104			0.1	1800		79		CLAY, SANDY (CL)
TH-18	24	22.2	102			0.2	3000				CLAY, SANDY (CL)
TH-20	4	2.6	109						12	<0.1	SAND, SLIGHTLY SILTY (SW-SM)
TH-22	4	1.2	107						5		SAND, SLIGHTLY SILTY (SW-SM)
TH-23	9	4.1	115						17		SAND, SILTY (SM)
TH-23	14	14.1	111	28	11				46		SAND, VERY CLAYEY (SC)
TH-24	9	8.4	126						31		SAND, CLAYEY (SC)
TH-25	4	1.5	106						10		SAND, SLIGHTLY SILTY (SP-SM)
TH-25	14	6.6	130						24		SAND, CLAYEY (SC)
TH-26	9	9.6	117	NL	NP				10		SAND, SLIGHTLY SILTY (SW-SM)
TH-27	14	8.9	120						12		SAND, SLIGHTLY SILTY (SP-SM)
TH-28	9	2.9	106						7		SAND, SLIGHTLY SILTY (SP-SM)
TH-28	14	22.2	107	47	24	1.5	1800		95		CLAY, SANDY (CL)

* SWELL MEASURED UNDER ESTIMATED IN-SITU OVERBURDEN PRESSURE.
NEGATIVE VALUE INDICATES COMPRESSION.

APPENDIX C

GUIDELINE SITE GRADING SPECIFICATIONS
MAYBERRY – 540 ACRE SITE
EL PASO COUNTY, COLORADO

GUIDELINE SITE GRADING SPECIFICATIONS

MAYBERRY 540 – ACRE SITE
EL PASO COUNTY, 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 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 Soils Engineer will be the Owner's representative. The Soils 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 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 Engineer or imported to the site.

8. MOISTURE CONTENT

For fill material classifying as CH or CL, the fill shall be moisture treated to between 1 and 4 percent above optimum moisture content as determined by ASTM D 698, if it is to be placed within 15 feet of the final grade. For deep cohesive fill (greater than 15 feet below final grade), it shall be moisture conditioned to within ±2 percent of optimum. Soils classifying as SM, SC, SW, SP, GP, GC and GM shall be moisture treated to within 2 percent of optimum moisture content as determined by ASTM D 1557. 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 Soils 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 Soils 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 D 698. 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 by the use of sheepsfoot rollers, multiple-wheel pneumatic-tired rollers, or other equipment approved by the Soils Engineer for soils classifying as claystone, CL, CH or SC. Granular fill shall be compacted using vibratory equipment or other equipment approved by the Soils 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 Soils 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 Soils Engineer, shall be within the limits given. The Soils 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 Soils 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 Soils 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 Soils 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.