Please review the soils & geology report checklist for report requirements. A detailed map, drawn to scale, is required for all soils & geology reports. The checklist details the required information to be included on the map.

Geologic hazards and constraints need to be identified and shown on the map, and also reflected in the soils & geology note on the PUD plan and depicted on the development plan.

CTL | THOMPSON INCORPORATED

GEOTECHNICAL INVESTIGATION
MAYBERRY APARTMENTS AND TOWNHOMES
TRACT K
STATE HIGHWAY 94 AND NEW LOG ROAD
ELLICOTT, COLORADO

Prepared For:

MAYBERRY COMMUNITIES
3296 Divine Heights Road, #208
Colorado Springs, CO 80922

Attention: Mr. Scott Souders, P.E.

CTL|T Project No. CS19587-125

September 9, 2022

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SCOPE

This report presents the results of our Geotechnical Investigation for the Proposed Mayberry Apartments and Townhomes at Tract K to be constructed southeast of the intersection of State Highway 94 and New Log Road in Ellicott, Colorado (Fig. 1). The purpose of our investigation was to evaluate the subsurface conditions at the site and provide geotechnical recommendations, and criteria for design and construction of foundations and floor systems, as well as surface drainage precautions. The scope of our services was described in our proposal (CS-22-0114) dated June 28, 2022.

This report was prepared from data developed during our field exploration, laboratory testing, engineering analysis, and our experience. The report was prepared for use by Mayberry Communities in design and construction of the planned apartment buildings and clubhouse, and the associated site improvements. Other types of construction may require revision of this report and the recommended design criteria. A summary of our conclusions and recommendations follows. More detailed design criteria are presented within the report.

SUMMARY

1. Subsurface conditions encountered in our exploratory borings drilled during this investigation consisted of slightly silty to very silty sand, silty-clayey sand, and clayey sand. The sands are non-expansive or exhibit low expansion potential when wetted. The sands extended to the maximum depths explored of 30 feet.

2. Groundwater was not encountered during drilling to the maximum depth explored of 30 feet. Groundwater levels will fluctuate seasonally and rise in response to precipitation and landscaping irrigation.

3. We understand the proposed apartment buildings, townhomes, and club house are to be constructed with spread footing foundations and slab-on-grade floors. Sporadic layers of loose, natural soils were identified in the near surface soils. As such, we recommend foundations be supported on at least 3 feet of dense, granular fill. Foundation design and construction criteria are presented in the report.

4. In our opinion, a low risk of movement and damage will exist for either conventional slab-on-grade floors underlain by the natural sands or a layer of moisture conditioned and densely compacted granular fill.

5. Full-depth asphalt concrete and composite asphalt and aggregate base course pavement section alternatives are presented in the report for the planned automobile parking lots and access driveways.

6. Surface drainage should be designed, constructed, and maintained to provide rapid removal of runoff away from the proposed buildings. Conservative irrigation practices should be followed to avoid excessive wetting.

7. The design and construction criteria for foundations and slabs-on-grade included in this report were compiled with the expectation that all other recommendations presented related to surface drainage, landscaping irrigation, backfill compaction, etc. will be incorporated into the project and that the property manager will maintain the structures, use prudent irrigation practices, and maintain surface drainage. It is critical that all recommendations in this report are followed.

SITE CONDITIONS

The Tract K site consists of about 8.3 acres of land situated southeast of State Highway 94 and New Log Road in Ellicott, Colorado. A preliminary development plan is shown in Fig. 1.

The parcel is currently vacant and undeveloped and is bordered to the north by State Highway 94, to the east by a single-family residential subdivision that is currently under construction, to the south by undeveloped land, and to the west by the rough graded alignment of New Log Road. The site slopes gently downward to the east at grades estimated to be less than about 3 percent. Vegetation on the parcel consists of a moderate cover of grasses and weeds.

PROPOSED CONSTRUCTION

We understand the proposed Mayberry Apartments and Townhomes will consist of four apartment buildings containing a total of 108 dwelling units, thirteen townhome structures with a total of 48 units, and a clubhouse building. The buildings are planned as three-story, wood-frame structures. No habitable below-grade construction is planned.

Grading plans were not available at the time of this report. Based on the existing grades we expect maximum cuts and fills will be on the order of 5 feet.

Foundation loads for the proposed buildings are expected to be light to moderate. Paved access driveways and automobile parking lots are planned around the development.

GEOLOGY

Geologic mapping by Jon P. Thorson, Christopher J. Carroll, and Matthew L. Morgan of the United States Geological Survey ("Reconnaissance Geologic Map of the Southeastern Part of El Paso County" 1974) indicates the site is underlain by Eolian Sand (Qes) consisting of fine- to coarse-grained silty sand deposited by wind. Conditions encountered in our borings generally confirm the mapping.

INVESTIGATION

The field investigation included drilling a total of thirty-three exploratory borings on an approximate 100-foot grid, as shown in Fig. 1. The borings were advanced to depths of 20 to 30 feet using 4-inch diameter, continuous-flight, solid-stem auger and a truck-mounted drill rig. Drilling was observed by our field representative who logged the conditions found in the borings and obtained samples. Summary logs of the borings, results of field penetration resistance tests, and laboratory test data are presented in the Summary Logs of Exploratory Borings in Appendix A.

Soil and bedrock samples obtained during drilling were returned to our laboratory and visually classified. Laboratory testing was then assigned to representative samples and included moisture content and dry density, gradation analysis, Atterberg limits, swell-consolidation, and water-soluble sulfate concentration tests. Results of laboratory tests are presented in Appendix B and are summarized in Table B-1.

SUBSURFACE CONDITIONS

Subsurface conditions encountered in our exploratory borings, drilled during this investigation, consisted of slightly silty to very silty sand, silty-clayey sand, and clayey to very clayey sand. Some pertinent engineering characteristics of the soils encountered, and groundwater conditions are discussed in the following paragraphs.

Natural Soils

Slightly silty to very silty sand, silty-clayey sand, and clayey to very clayey sand were encountered in the borings drilled during this study. The sand was loose to dense based on field penetration resistance test results. Forty-three samples of the sand tested in our laboratory contained 5 to 42 percent silt and clay-sized particles (passing the No. 200 sieve). Our experience indicates the slightly silty to very silty sand is non-expansive when wetted, and the clayey sand is non-expansive or exhibits low expansion potential. Three samples of the clayey sand compressed up to 1.1 percent when wetted and two samples exhibited no movement when wetted under estimated overburden pressure.

Groundwater

Groundwater was not encountered in our exploratory borings during drilling. Groundwater levels will fluctuate seasonally and rise in response to precipitation and landscaping irrigation.

Seismicity

This area, like most of central Colorado, is subject to a degree of seismic activity. We believe the soils on the property classify as Site Class D (stiff soil profile) according to the 2015 International Building Code (2015 IBC).

SITE DEVELOPMENT

The most significant constraint to construction is the presence of sporadic layers of loose natural soils. In order to mitigate this condition and provide a more uniform bearing layer for new foundations, we recommend foundations be constructed on at least 3 feet of moisture conditioned, dense fill. The fill should extend at least 3 feet beyond the outer edges of foundations. This may be accomplished by any combination of site filling or over-excavation.

A grading plan was unavailable at the time of this report. Based on the relatively flat topography, we anticipate maximum cuts and fills on the order of about 5 feet. We recommend permanent cut and fill slopes be no steeper than 3:1 (horizontal to vertical). Use of flatter slopes (4:1) is preferable to control erosion from run-off and sheet-flow. Seeding and re-vegetation can also be used to reduce erosion.

We believe the soils encountered in our exploratory borings can be excavated with conventional, heavy-duty excavation equipment. We recommend the contractor become familiar with applicable local, state, and federal safety regulations, including the current Occupational Safety and Health Administration (OSHA) Excavation and Trench Safety Standards, to determine appropriate excavation slopes. We anticipate the grading fill and the near-surface, natural soils will classify as Type C materials. Temporary excavations in Type C soils require a maximum slope inclination of 1.5:1 (horizontal to vertical) unless the excavation is shored or braced. If groundwater seepage occurs, flatter slopes will likely be required. The contractor's "competent person" should review excavation conditions and refer to OSHA standards when worker exposure is anticipated. Stockpiles and equipment should not be placed within a horizontal distance equal to one-half the excavation depth, from the edge of the excavation. Excavations deeper than 20 feet should be designed by a registered professional engineer.

Fill Placement and Compaction

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 materials with 100 percent passing the 2-inch sieve and less than 35 percent passing the No. 200 sieve. The import material should exhibit a Liquid Limit of less than 30 and a

Plasticity index of 10 or less. A sample of any potential imported fill material should be submitted to our office for testing prior to its use at the site.

Prior to placement of new fill, topsoil, vegetation and other deleterious materials should be removed. Organic topsoil can be stockpiled and placed in landscaped areas. The ground surface in areas to receive fill should be scarified, moisture conditioned to near optimum moisture content and densely compacted.

Fill materials consisting of the on-site sands or granular import should be moisture conditioned to within 2 percent of optimum moisture content and compacted in thin lifts to at least 95 percent of maximum modified Proctor dry density (ASTM D 1557). The placement and compaction of the grading fill should be observed and tested by a representative of our office during construction.

The onsite soils have very low moisture contents near the surface. Significant moisture conditioning is likely required during placement of grading fill and excavation backfill materials.

Fill should not be placed on top of frozen soils. The frozen soils should be removed prior to placement of new fill.

Utilities

Water and sewer lines are often constructed beneath slabs and pavements. Compaction of utility trench backfill can have a significant effect on the life and serviceability of floor slabs, pavements, and exterior flatwork. We recommend utility trench backfill be placed in compliance with El Paso County specifications. Our experience indicates the use of a self-propelled compactor results in more reliable performance compared to trench backfill compacted by a sheepsfoot wheel attachment on a backhoe or trackhoe. The upper portion of the trenches should be widened to allow the use of a self-propelled compactor. Personnel from our firm should periodically observe utility trench backfill placement and test the density of the backfill materials during construction.

FOUNDATIONS

Our borings indicate non-expansive, loose to dense, natural sand soils will be present at new foundation elevations for the proposed buildings. The materials are predominantly non-expansive when wetted. We understand the buildings are planned to be constructed with a conventional spread footing foundation and slab-on-grade floor system.

Spread Footings

1. We recommend spread footing foundations be constructed on at least 3 feet of moisture conditioned and densely compacted fill. Materials loosened during the excavation process should be moisture conditioned and compacted in accordance with the criteria presented in our previous report, prior to the placement of concrete.

2. Spread footing foundations can be designed for a maximum allowable soil pressure of 3,000 psf.

3. We recommend spread footings beneath continuous foundation walls be at least 16 inches wide. Footings beneath isolated column pads should be at least 24 inches square. Larger footing sizes will likely be required to accommodate the anticipated foundation loads.

4. We recommend designs consider total settlement of 1-inch and differential settlement of 1/2-inch.

5. Continuous foundation stem walls should be reinforced, top and bottom, to span local anomalies in the subsoils. We recommend the reinforcement required to simply span an unsupported distance of at least 10 feet.

6. A coefficient of friction of 0.4 (cast-in-place concrete on silty sands) can be applied during the design of the footing foundations to resist lateral loads.

7. Exterior spread footings must be protected from frost action. Typically, at least 30 inches of soil cover is provided in this area.

8. A representative of our firm should observe the completed foundation excavations to confirm the exposed conditions are similar to those encountered in our exploratory borings. The placement and compaction of below-foundation fill and foundation subgrade preparation should be observed and tested by a representative of our firm during construction.

FLOOR SYSTEMS

We understand a slab-on-grade floor is considered the preferred floor system alternative for the proposed apartment and townhome buildings and clubhouse. In our opinion, a low risk of poor slab performance (movement and damage) will exist for a floor slab underlain by the natural, on-site sands and/or densely compacted, granular site grading fill placed in accordance with the recommendations presented herein. We anticipate apparent floor slab movements on the order of about 1 inch or less are likely. These movements are expected due to settlement of the more heavily loaded foundations and are expected to occur during construction as the deadload of the building is increased.

If the owner elects to use slab-on-grade construction and accepts the risk of movement and possible associated damage, we recommend the following precautions for slab-on-grade construction at this site. These precautions can help reduce, but not eliminate, damage or distress due to slab movement.

1. Spread footing foundations underlain by granular soils will settle relative to more lightly loaded slab-on-grade floors. Settlements generally occur during construction when foundations are constructed on granular soils. The settlement can cause cosmetic cracking of drywall. Slip-joints in slab-bearing partitions should allow for at least 1-1/2 inches of free vertical movement. Slabs should be separated from exterior walls and interior bearing members with a slip joint that allows free vertical movement of the slabs. This detail can reduce cracking if some movement of the slab occurs.

2. Slabs can be placed directly on the exposed subsoils or properly moisture conditioned, compacted fill. The 2015 International Building Code (IBC) requires a vapor retarder be placed between a base course layer or the subgrade soils and the concrete slab-on-grade floor, unless the designer of the floor waives this requirement. The merits of installation of a vapor retarder below a floor slab depend on the sensitivity of floor coverings and building use to moisture. A properly installed vapor retarder (10 mil minimum) is more beneficial below concrete slab-on-grade floors where floor coverings, painted floor surfaces, or products stored on the floor will be sensitive to moisture. The vapor retarder is most effective when concrete is placed directly on top of it, rather than placing a sand or gravel leveling course between the vapor retarder and the floor slab. The placement of concrete on the vapor retarder may in-

crease the risk of shrinkage cracking and curling. Use of concrete with reduced shrinkage characteristics including minimized water content, maximized coarse aggregate content, and reasonably low slump will reduce the risk of shrinkage cracking and curling. Considerations and recommendations for the installation of vapor retarders below concrete slabs are outlined in Section 3.2.3 of the 2006 report of the American Concrete Institute (ACI) Committee 302, "Guide for Concrete Floor and Slab Construction (ACI 302.R-96)".

3. If the "float" is provided at the tops of partitions, the connection between interior, slab-supported partitions and exterior, foundation-supported walls should be detailed to allow differential movement. We recommend slab-on-grade floors be separated from exterior walls and interior bearing members with joints that allow for free vertical movement of the slabs. These architectural connections are critical to help reduce cosmetic damage when foundations and the floor slab move relative to each other, as happens when a slab heaves or when foundations settle relative to a more lightly loaded slab. We have seen instances where these architectural connections were not designed and constructed properly and resulted in moderate cosmetic damage, even though the movement experienced was well within the anticipated range. The architect should pay special attention to these issues and detail the connections accordingly.

4. Underslab utilities such as water and sewer lines should be pressure tested prior to installing slabs. Utilities that penetrate the slab foundations should be provided with sleeves and flexible connections that allow for independent movement of the slab and that reduce the likelihood of damaging buried pipes. We recommend these details allow at least 1-1/2 inches of differential movement between the slabs and pipes.

5. Plumbing and utilities that pass through the slabs should be isolated from the slabs and constructed with flexible couplings. Where water and gas lines are connected to furnaces or heaters, the lines should be constructed with sufficient flexibility to allow for movement.

6. If HVAC equipment is supported on a floor slab, it should be provided with a collapsible connection between the furnace and the ductwork, with allowance for at least 2 inches of vertical movement.

7. Frequent control joints should be provided in the slabs to reduce problems associated with shrinkage and cracking, in accordance with ACI recommendations.

8. Exterior flatwork, including sidewalks and porch slabs, is normally constructed as a slab-on-grade. Various properties of the soils and environmental conditions influence the magnitude of movement and other performance characteristics of slabs. Exterior flatwork should be de-

signed and constructed to move independently relative to the proposed building foundations.

SWIMMING POOL

The preliminary site plan provided at the time of this investigation did not indicate a swimming pool is planned. If a swimming pool is incorporated into the project, the pool structure may consist of spray-applied gunite against natural soil, or possibly a steel or a fiberglass shell. Because of the dry, granular nature of the on-site soils, vertical excavation of the pool walls required for gunite pool construction may not be possible. A fiberglass or steel shell placed in an enlarged excavation may then be the more feasible options. If gunite methods are used, the cement slurry should be properly reinforced.

We recommend the pool be underlain by a drain system that collects water leakage and provides for discharge of the water to a sump or gravity outfall. The drain system should consist of free-draining gravel covering the bottom of the pool excavation. The excavation should slope to a 3 to 4-inch diameter, perforated or slotted pipe placed within the gravel layer. The drain should lead to a positive gravity outlet, such as a subdrain located beneath the sewer, or to a sump where water can be removed by pumping. A conceptual pool drain system is presented in Fig. 2. Overall surface drainage patterns should be planned to provide for the rapid removal of storm runoff and water that splashes over the edges of the pool. The precautions described in SURFACE DRAINAGE should be followed surrounding the swimming pool, as well as for all areas of the site.

The swimming pool structure may settle more than the flatwork surrounding the pool. To avoid damage to the pool structure, a slip joint should be used around the perimeter of the pool structure and adjacent to any other structural elements. Utility lines that penetrate the pool structure should be separated and isolated with joints to allow for free vertical movement. All ducts with connections between the pool structure and surrounding soil should be flexible or "crushable," to allow some relative movement.

PAVEMENTS

Our exploratory borings and understanding of the proposed construction suggest the subgrade soils within the planned access driveways and parking lots surrounding the proposed building will consist predominantly of slightly silty to silty sand. Samples of the subgrade materials obtained from the site were combined and subjected to laboratory testing. The samples were generally non-plastic or exhibited low plasticity, based on laboratory test results. Subgrade soil samples tested in our laboratory classify as A-1-b according to the American Association of State Highway Transportation Officials (AASHTO) system. The silty sand subgrade materials generally exhibit good pavement support characteristics. Based on our laboratory testing of A-1-b soils, a Hveem stabilometer ("R") value of 40 was assigned to the subgrade materials for design purposes.

We anticipate the access driveways may be subjected to occasional heavy vehicle loads such as trash and delivery trucks. We considered a daily traffic number (DTN) of 2 for the auto parking spaces and 10 for the access driveways which correspond to a 20-year, 18-kip equivalent, single-axle loads (ESAL) of 14,600 and 73,000, respectively, for a 20-year pavement design life. We recommend the parking stalls be paved with 4 inches of asphalt concrete <u>or</u> 3 inches of asphalt concrete over 6 inches of aggregate base course. The access driveways and other portions of the proposed paved areas subjected to occasional truck traffic should be paved with 6 inches of asphalt concrete <u>or</u> 4 inches of asphalt underlain by 6 inches of aggregate base course. Alternately, a plain portland cement pavement section consisting of 6 inches of concrete over a prepared subgrade may be used for concrete access roads and parking lots.

We recommend a concrete pad be provided at the trash dumpster site and any service areas. The pad should be at least 8 inches thick and long enough to support the entire length of the trash truck and dumpster or delivery service vehicle. Joints between concrete and asphalt pavements should be sealed with a flexible compound.

Our design considers pavement construction will be completed in accordance with the Pikes Peak Region Asphalt Paving Specifications. Our calculations are based on regionally accepted structural coefficients of locally available materials. The specifications contain requirements for the pavement materials (asphalt, base course, and concrete) as well as the construction practices used (compaction, materials sampling, and proof-rolling). Of particular importance are those recommendations directed toward subgrade and base course compaction and proof-rolling. During proof-rolling, particular attention should be directed toward the areas of confined backfill compaction. Areas that pump excessively should be stabilized prior to pavement construction. A representative of our office should be present at the site during placement of fill and construction of pavements to perform density testing.

SURFACE DRAINAGE

Performance of foundations and flatwork is influenced by the moisture conditions existing within the foundation or subgrade soils. Overall surface drainage should be designed, constructed, and maintained to provide rapid removal of surface water runoff away from the proposed buildings and off pavements and flatwork. Final grading of pavement subgrade should be carefully controlled so that the designed slopes are maintained and low spots in the subgrade that could trap water are eliminated. We recommend the following precautions be observed during construction and maintained at all times after construction is completed.

1. Wetting or drying of open foundation, utility, and earthwork excavations should be avoided.

2. Positive drainage should be provided away from the buildings. We recommend a minimum slope of at least 5 percent in the first 5 to 10 feet away from the foundations in landscaped areas. The sloped area should extend a minimum of 5 feet from the foundation walls. In flatwork areas adjacent to the buildings, the slope may be reduced to grades that comply with ADA requirements. Paved surfaces should be sloped to drain away from the buildings. A minimum slope of 2 percent is suggested. More slope is desirable. Concrete curbs and sidewalks may “dam” surface runoff adjacent to the buildings and disrupt proper flow. Use of “chase” drains or weep holes at low points in the curb should be considered to promote proper drainage.

3. Foundation wall backfill should be placed in thin, loose lifts, moisture conditioned to within 2 percent of optimum, and compacted to at least 95 percent of maximum modified Proctor dry density (ASTM D 1557). Areas behind curb and gutter should be backfilled and well compacted to reduce ponding of surface water. Seals should be provided between the curb and pavement to reduce infiltration.

4. Landscaping concepts should concentrate on use of native plants that require little or no supplemental irrigation after the establishing period. Irrigated sod should not be located within 5 feet of the foundation walls. Area drains can be used to drain areas that cannot be provided with adequate slope.

5. Roof drains should be directed away from the buildings and discharge beyond backfill zones or into an appropriate storm sewer or detention area. Downspout extensions and splash blocks should be provided at all discharge points. Roof drains can also be connected to buried, solid pipe outlets. Roof drains should not be directed below slab-on-grade floors. Roof drain outlets should be maintained.

CONCRETE

Concrete in contact with soil can be subject to sulfate attack. We measured water-soluble sulfate concentrations of less than 0.1 percent in two samples. As indicated in our tests and ACI 318-19, the sulfate exposure class is *Not Applicable* or *S0*.

SULFATE EXPOSURE CLASSES PER ACI 318-19

Exposure Classes		Water-Soluble Sulfate (SO_4) in Soil [A] (%)
Not Applicable	S0	< 0.10
Moderate	S1	0.10 to 0.20
Severe	S2	0.20 to 2.00
Very Severe	S3	> 2.00

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

For this level of sulfate concentration, ACI 318-19 *Code Requirements* 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 318-19

Exposure Class		Maximum Water/ Cement Ratio	Minimum Compressive Strength (psi)	Cementitious Material Types [A]			Calcium Chloride Admixtures
				ASTM C150/ C150M	ASTM C595/ C595M	ASTM C1157/ C1157M	
S0		N/A	2500	No Type Restrictions	No Type Restrictions	No Type Restrictions	No Re-strictions
S1		0.50	4000	II[B]	Type with (MS) Designation	MS	No Re-strictions
S2		0.45	4500	V [B]	Type with (HS) Designation	HS	Not Permitted
S3	Option 1	0.45	4500	V + Pozzo-lan or Slag Cement [C]	Type with (HS) Designation plus Pozzo-lan or Slag Cement [C]	HS + Pozzolan or Slag Cement [C]	Not Permitted
S3	Option 2	0.4	5000	V [D]	Type with (HS) Designation	HS	Not Permitted

A) Alternate combinations of cementitious materials shall be permitted when tested for sulfate resistance meeting the criteria in section 26.4.2.2(c).
B) Other available types of cement such as Type III or Type I are permitted in Exposure Classes S1 or S2 if the C3A contents are less than 8 or 5 percent, respectively.
C) 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 and meeting the criteria in section 26.4.2.2(c) of ACI 318.
D) If Type V cement is used as the sole cementitious material, the optional sulfate resistance requirement of 0.040 percent maximum expansion in ASTM C150 shall be specified.

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.

CONSTRUCTION OBSERVATIONS

We recommend that CTL|Thompson, Inc. provide observation and testing services during construction to allow us the opportunity to verify whether soil conditions are consistent with those found during this investigation. If others perform these observations, they must accept responsibility to judge whether the recommendations in this report remain appropriate.

GEOTECHNICAL RISK

The concept of risk is an important aspect with any geotechnical evaluation primarily because the methods used to develop geotechnical recommendations do not comprise an exact science. We never have complete knowledge of subsurface conditions. Our analysis must be tempered with engineering judgment and experience. Therefore, the recommendations presented in any geotechnical evaluation should not be considered risk-free. Our recommendations represent our judgment of those measures that are necessary to increase the chances that the structures will perform satisfactorily. It is critical that all recommendations in this report are followed during construction.

LIMITATIONS

This report has been prepared for the exclusive use by Mayberry Communities for the purpose of providing geotechnical design and construction criteria for the proposed project. The information, conclusions, and recommendations presented herein are based on consideration of many factors including, but not limited to, the type of structures proposed, the geologic setting, and the subsurface conditions encountered. The conclusions and recommendations contained in the report are not valid for use by others. Standards of practice continuously evolve in geotechnical engineering. The recommendations provided are appropriate for about three years. If the proposed structures are not constructed within about three years, we should be contacted to determine if we should update this report.

Our borings were located to obtain a reasonably accurate indication of subsurface foundation conditions. The borings are representative of conditions encountered at the exact boring location only. Variations in subsurface conditions not indicated by the borings are possible. We recommend a representative of our office observe the completed foundation excavations to verify subsurface conditions are as anticipated from our borings. Representatives of our firm should be present during construction to provide construction observation and materials testing services.

We believe this 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 report or in the analysis of the influence of subsurface conditions on design of the buildings and garages from a geotechnical engineering point-of-view, please call.

CTL | THOMPSON, INC.

COLORADO LICENSED PROFESSIONAL ENGINEER JEFFREY MARK JONES 47539 9/9/22

Jeffrey M. Jones, P.E.
Associate Engineer

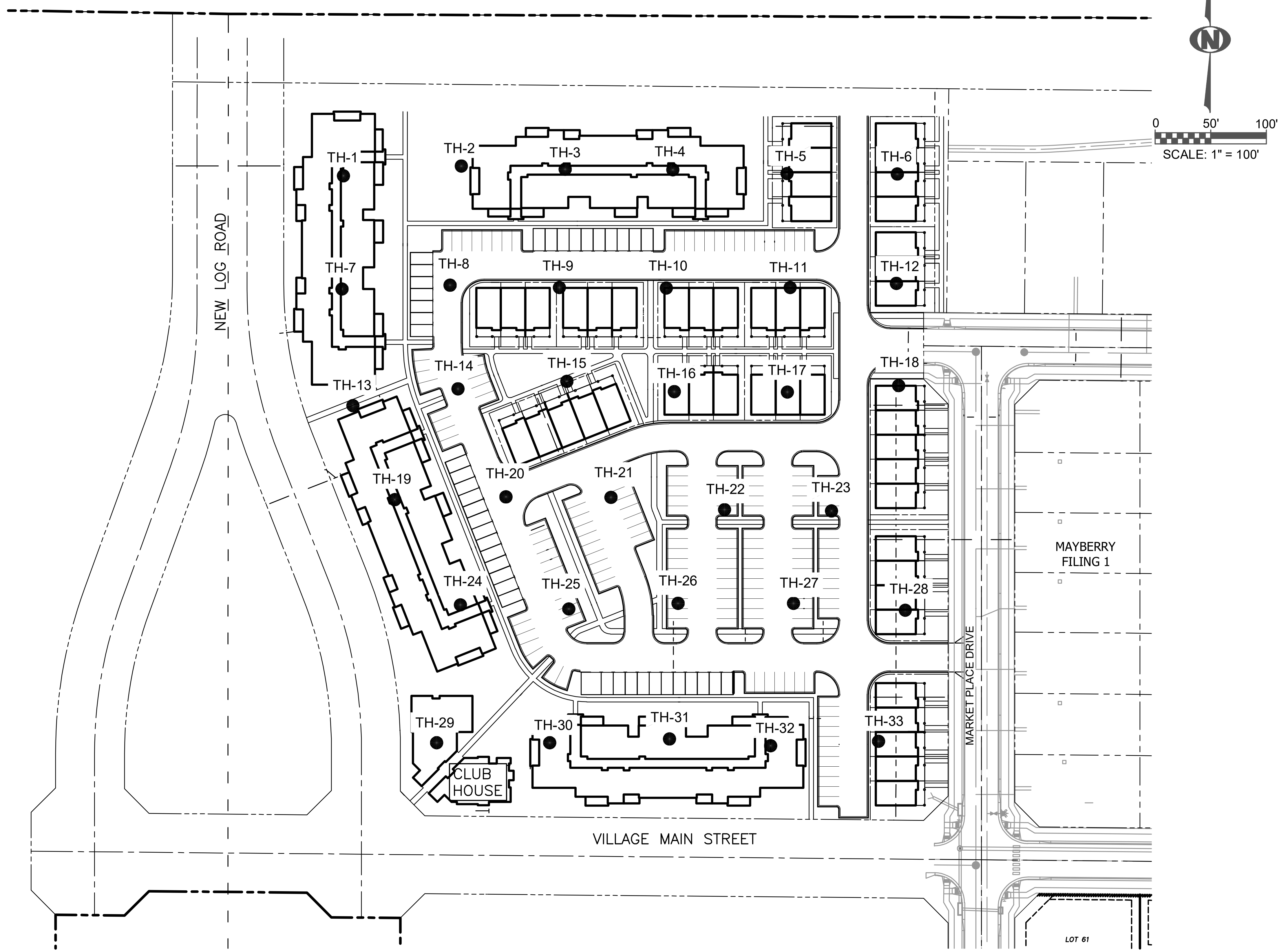
Reviewed by:

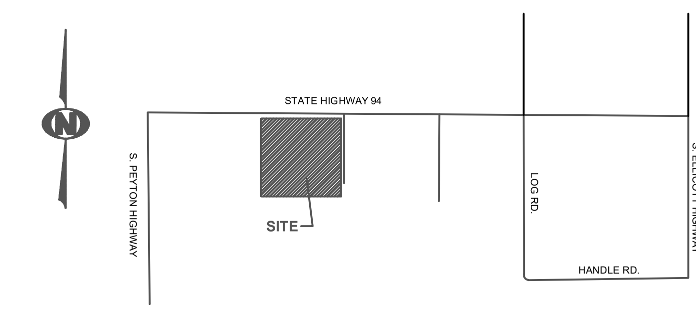
Timothy A. Mitchell, P.E.
Principal Engineer

JMJ:TAM:cw

(2 copies sent)

Via email: scottsouders@mayberrycommunities.com





VICINITY MAP
(NOT TO SCALE)

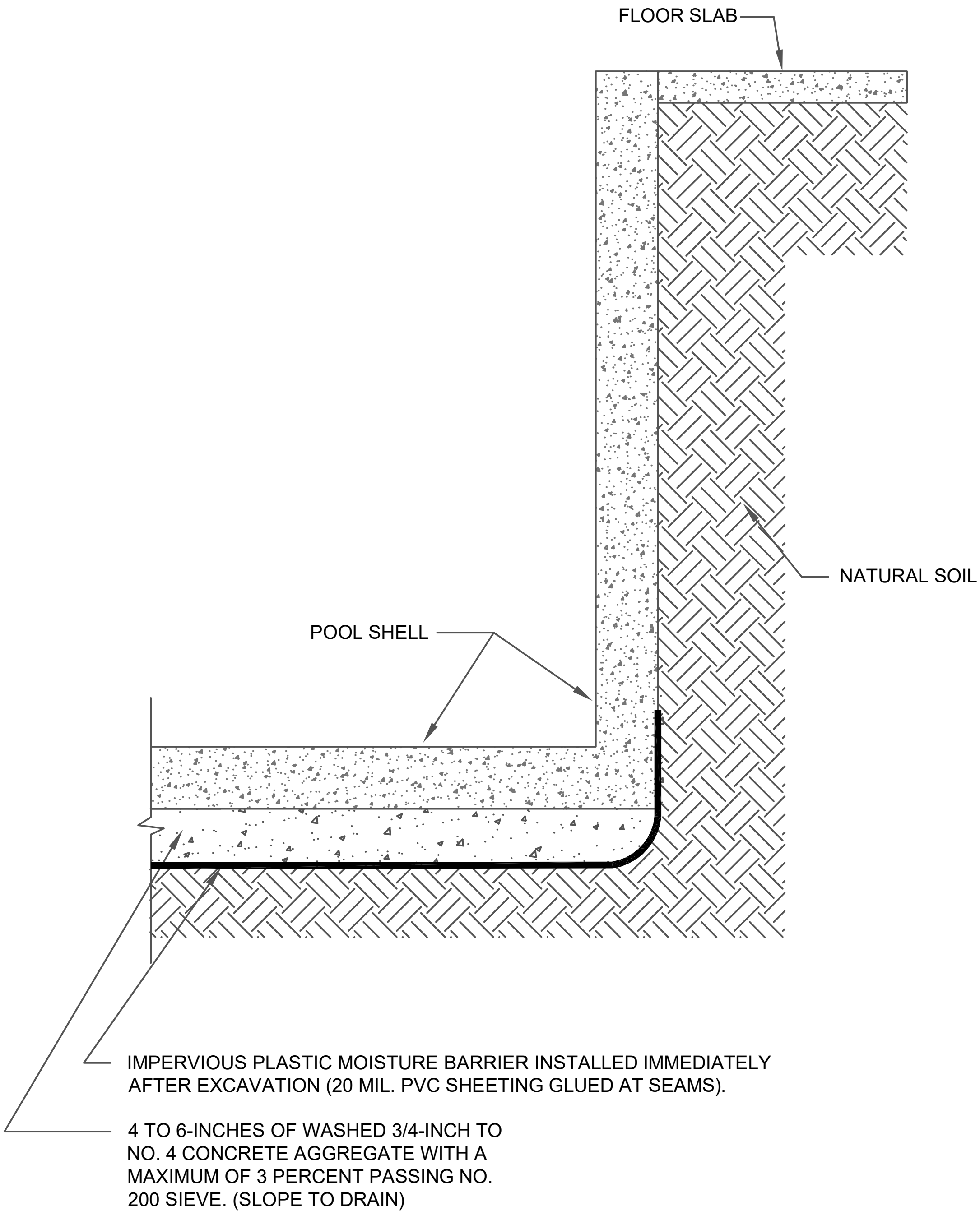
LEGEND:

TH-1 ● APPROXIMATE LOCATION OF EXPLORATORY BORING.

MAYBERRY COMMUNITIES
MAYBERRY APARTMENTS AND TOWNHOMES - TRACT K
CTL|T PROJECT NO. CS19587-125

Location of Exploratory Borings

FIG. 1



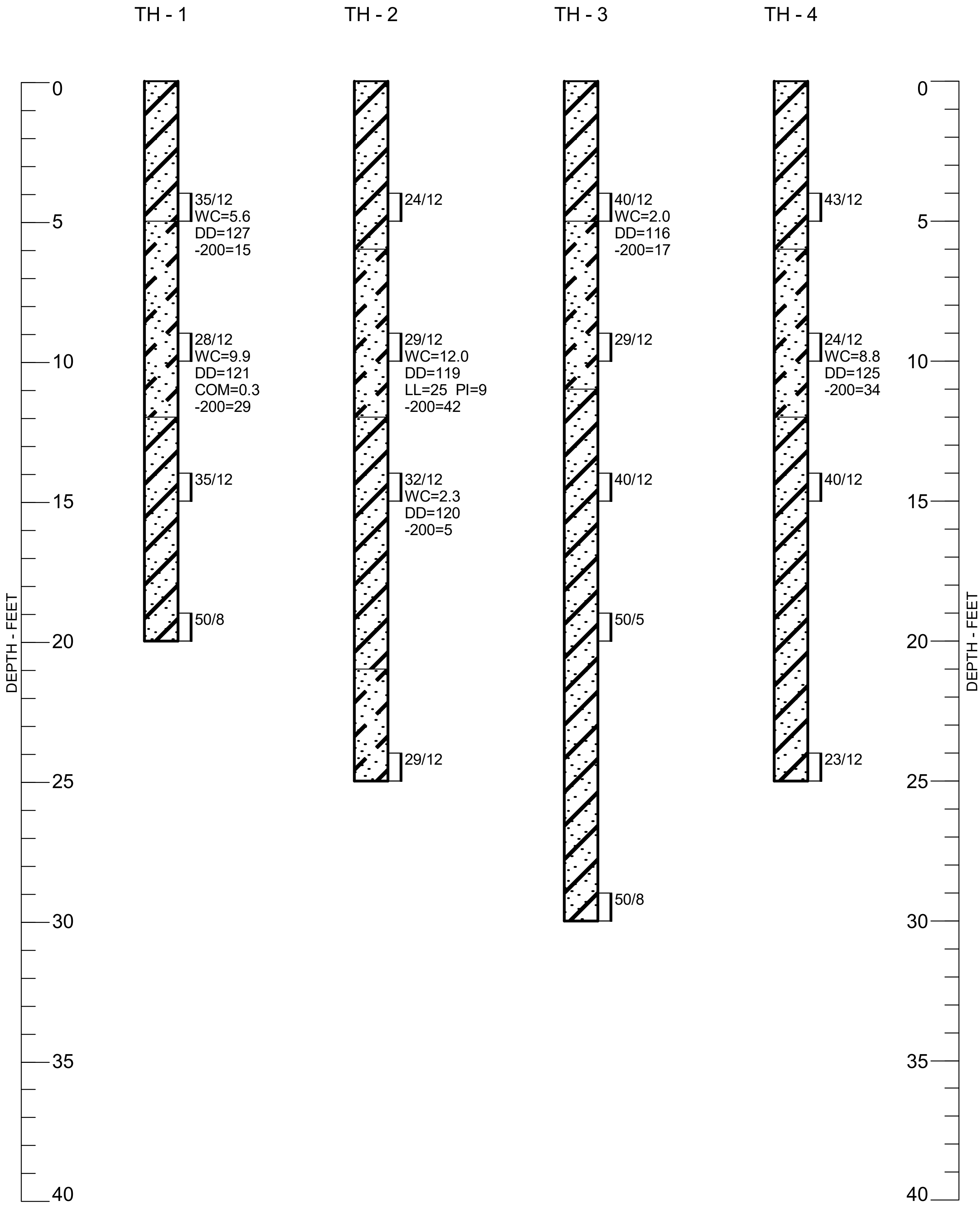
NOTE:
DRAIN PIPE SHOULD CONSIST OF A 3 OR 4-INCH DRAIN PIPE WITH A MINIMUM SLOPE OF 1/8 INCH DROP PER FOOT, TO A POSITIVE GRAVITY OUTLET OR TO A SUMP WHERE WATER CAN BE REMOVED BY PUMPING.

Recommended Pool Drain Detail

FIG. 2

APPENDIX A

SUMMARY LOGS OF EXPLORATORY BORINGS



MAYBERRY COMMUNITIES
MAYBERRY APARTMENTS AND TOWNHOMES - TRACT K
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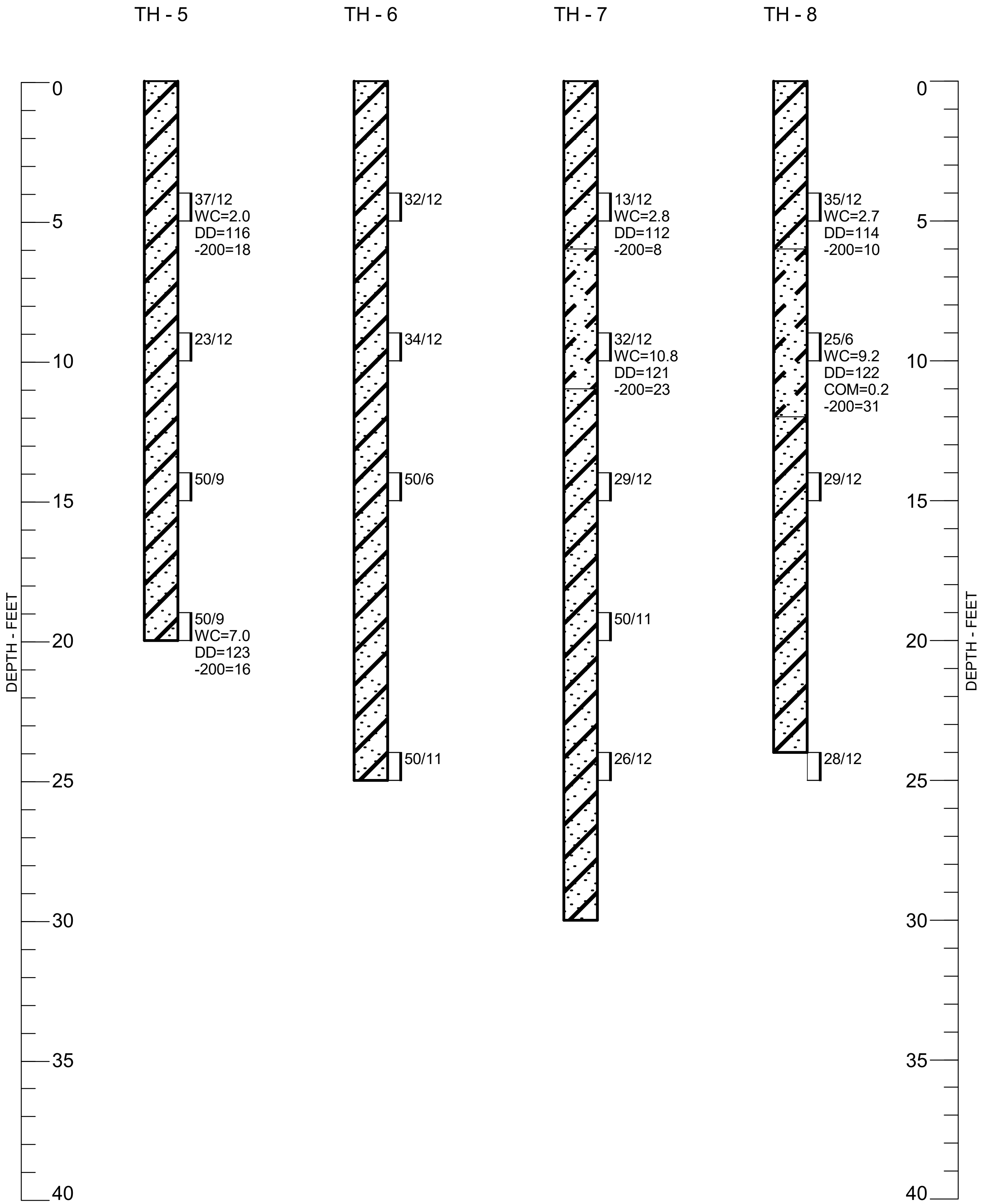
Summary Logs of Exploratory Borings

FIG. A-1



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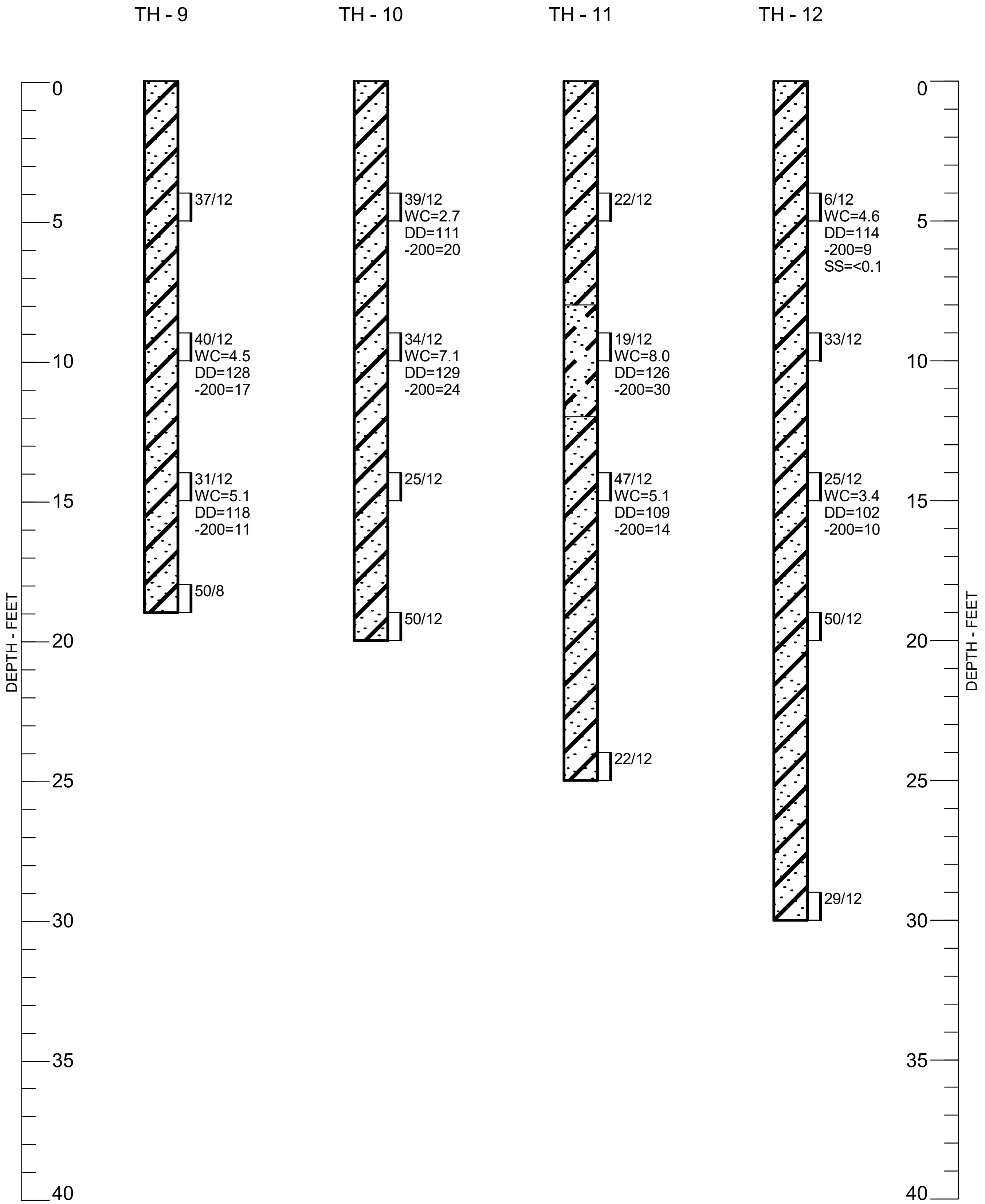
Summary Logs of Exploratory Borings

FIG. A-2



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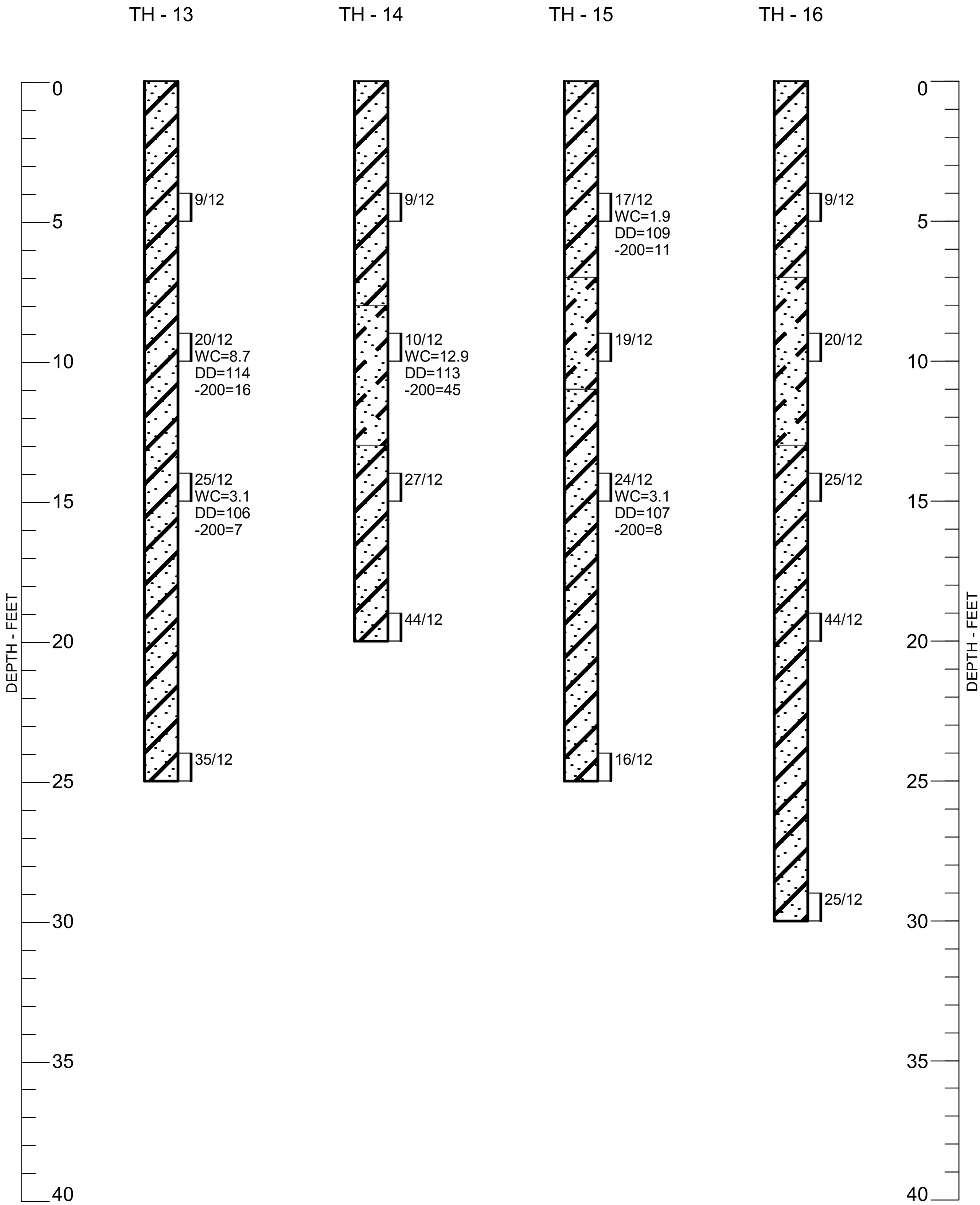
Summary Logs of Exploratory Borings

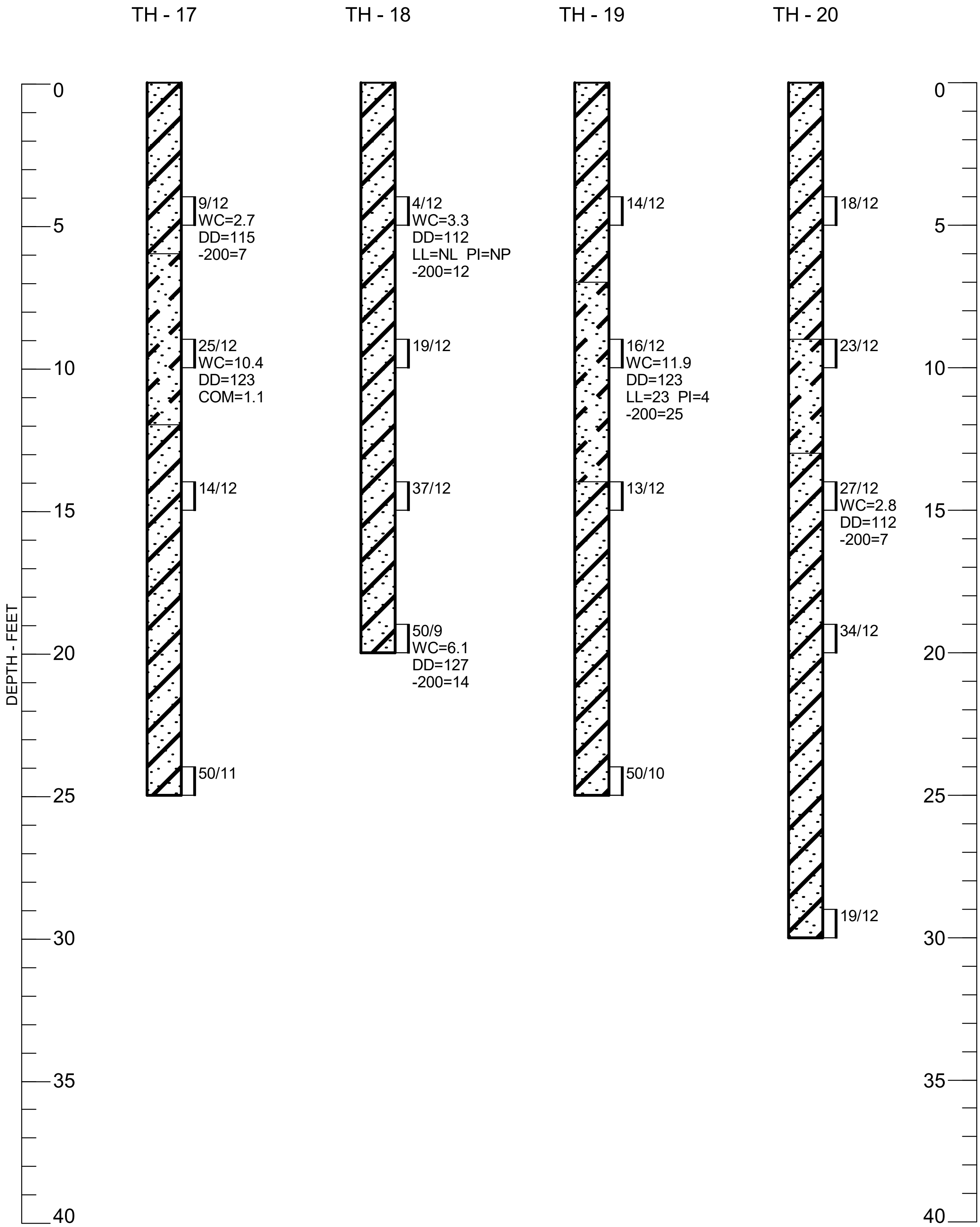
FIG. A-3



MAYBERRY COMMUNITIES
MAYBERRY APARTMENTS AND TOWNHOMES - TRACT K
CTL|T PROJECT NO. CS19587-125

Summary Logs of Exploratory Borings

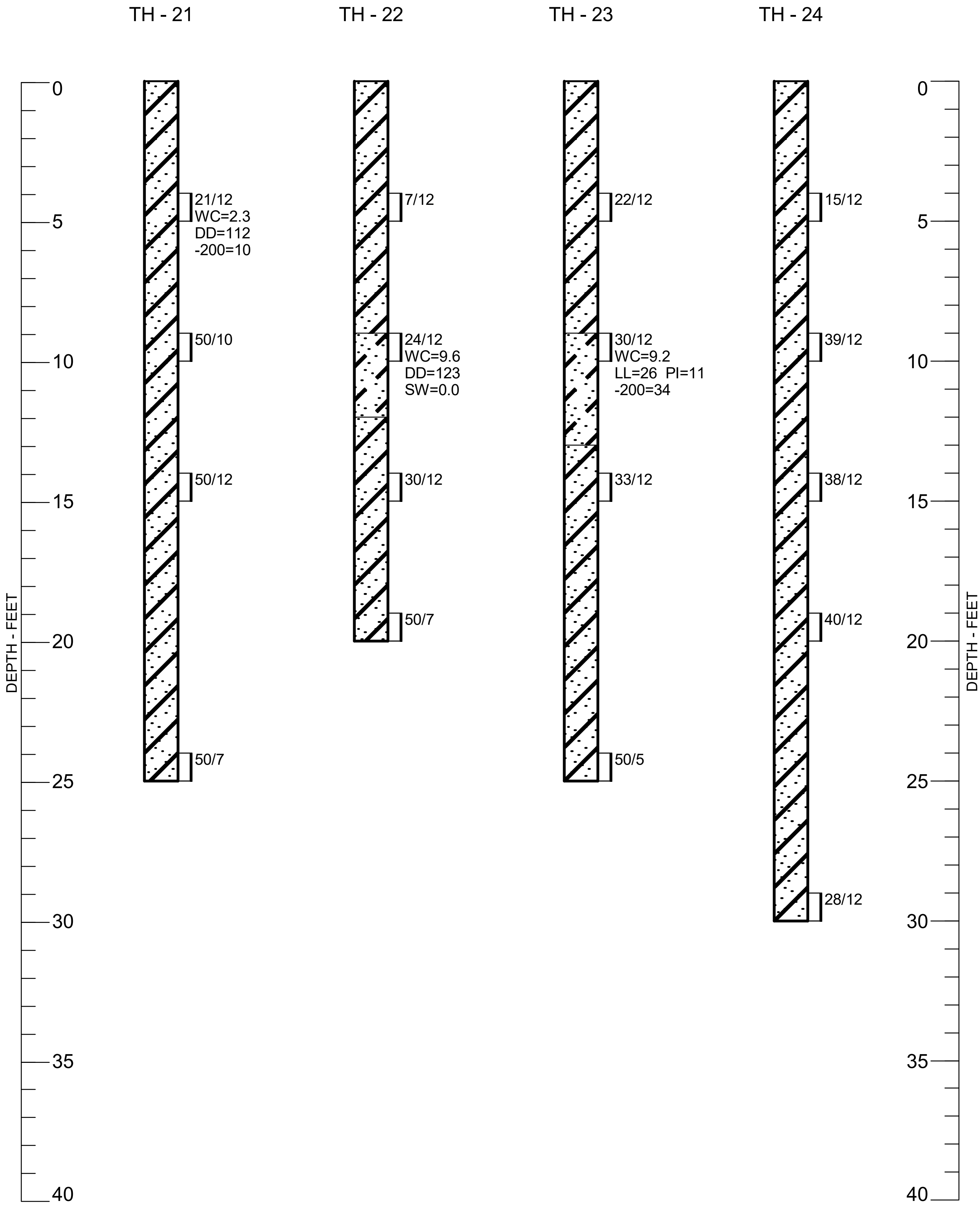
FIG. A-4



MAYBERRY COMMUNITIES
MAYBERRY APARTMENTS AND TOWNHOMES - TRACT K
CTL|T PROJECT NO. CS19587-125

Summary Logs of Exploratory Borings

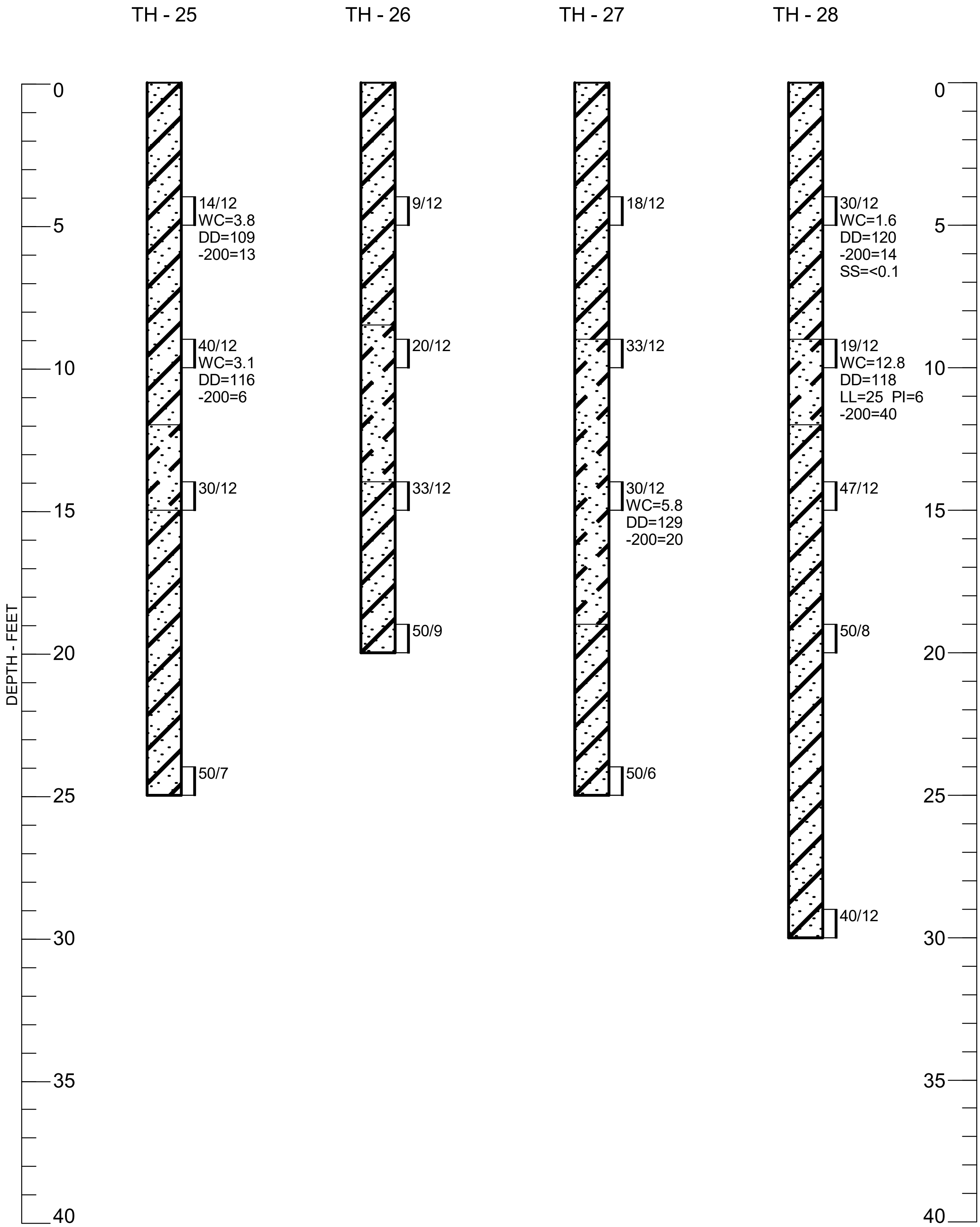
FIG. A-5



MAYBERRY COMMUNITIES
MAYBERRY APARTMENTS AND TOWNHOMES - TRACT K
CTL|T PROJECT NO. CS19587-125

Summary Logs of Exploratory Borings

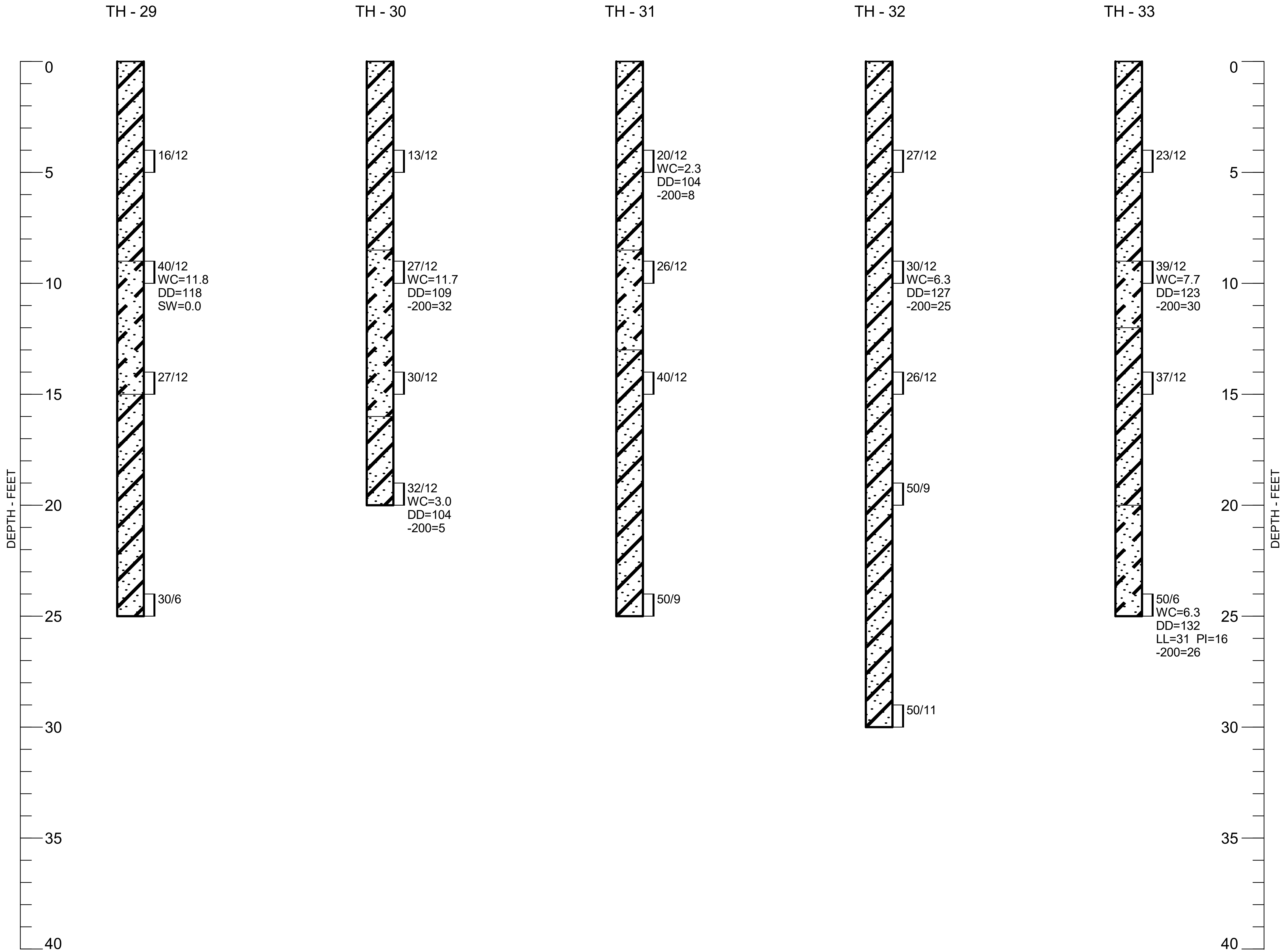
FIG. A-6



MAYBERRY COMMUNITIES
MAYBERRY APARTMENTS AND TOWNHOMES - TRACT K
CTL|T PROJECT NO. CS19587-125

Summary Logs of Exploratory Borings

FIG. A-7



LEGEND:

SAND, SLIGHTLY SILTY TO SILTY, LOOSE TO DENSE, SLIGHTLY MOIST, LIGHT BROWN, MEDIUM BROWN (SM).

SAND, CLAYEY TO VERY CLAYEY, SILTY TO CLAYEY, MEDIUM DENSE TO DENSE, SLIGHTLY MOIST, REDDISH BROWN, MEDIUM BROWN (SC, SC-SM).

DRIVE SAMPLE. THE SYMBOL 35/12 INDICATES 35 BLOWS OF A 140-POUND HAMMER FALLING 30 INCHES WERE REQUIRED TO DRIVE A 2.5-INCH O.D. SAMPLER 12 INCHES.

NOTES:

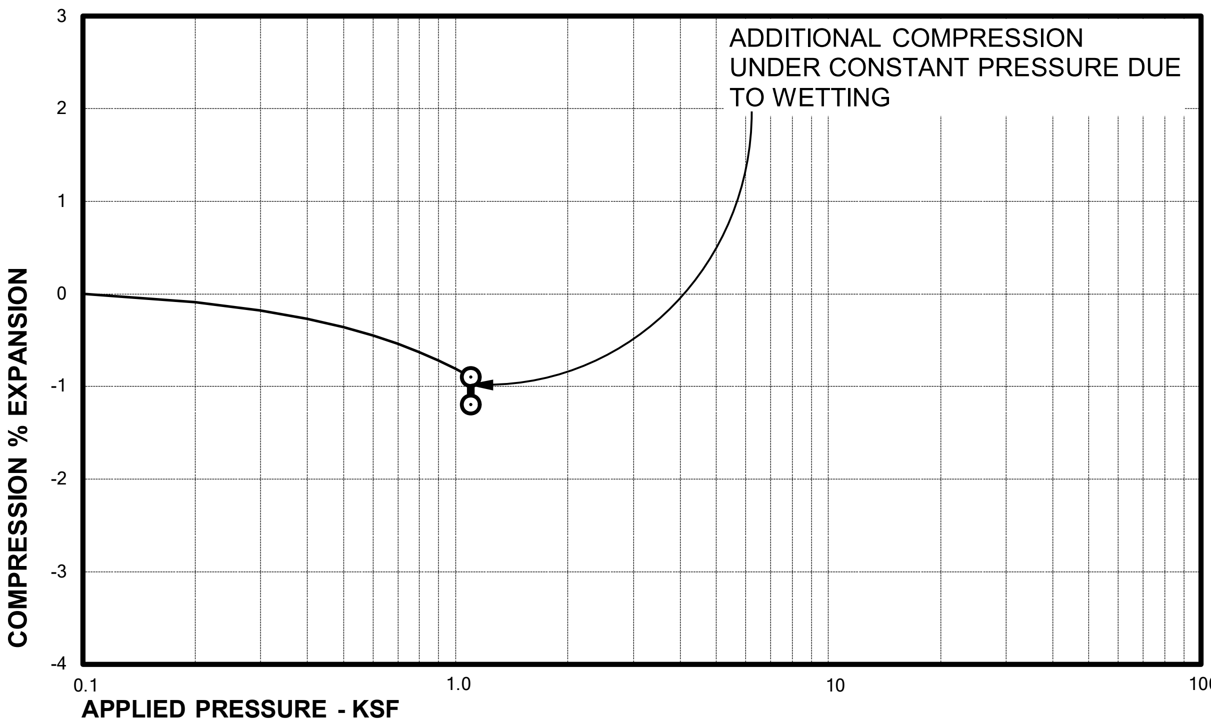
1. THE BORINGS WERE DRILLED AUGUST 3, 8 AND 9, 2022. USING A 4-INCH DIAMETER, CONTINUOUS-FLIGHT AUGER AND A CME-45 OR CME-55 DRILL RIG.
2. THESE LOGS ARE SUBJECT TO THE EXPLANATIONS, LIMITATIONS, AND CONCLUSIONS AS CONTAINED IN THIS REPORT.
3. GROUNDWATER WAS NOT ENCOUNTERED IN THE EXPLORATORY BORINGS DURING THIS INVESTIGATION.
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 APARTMENTS AND TOWNHOMES - TRACT K
CTL|T PROJECT NO. CS19587-125

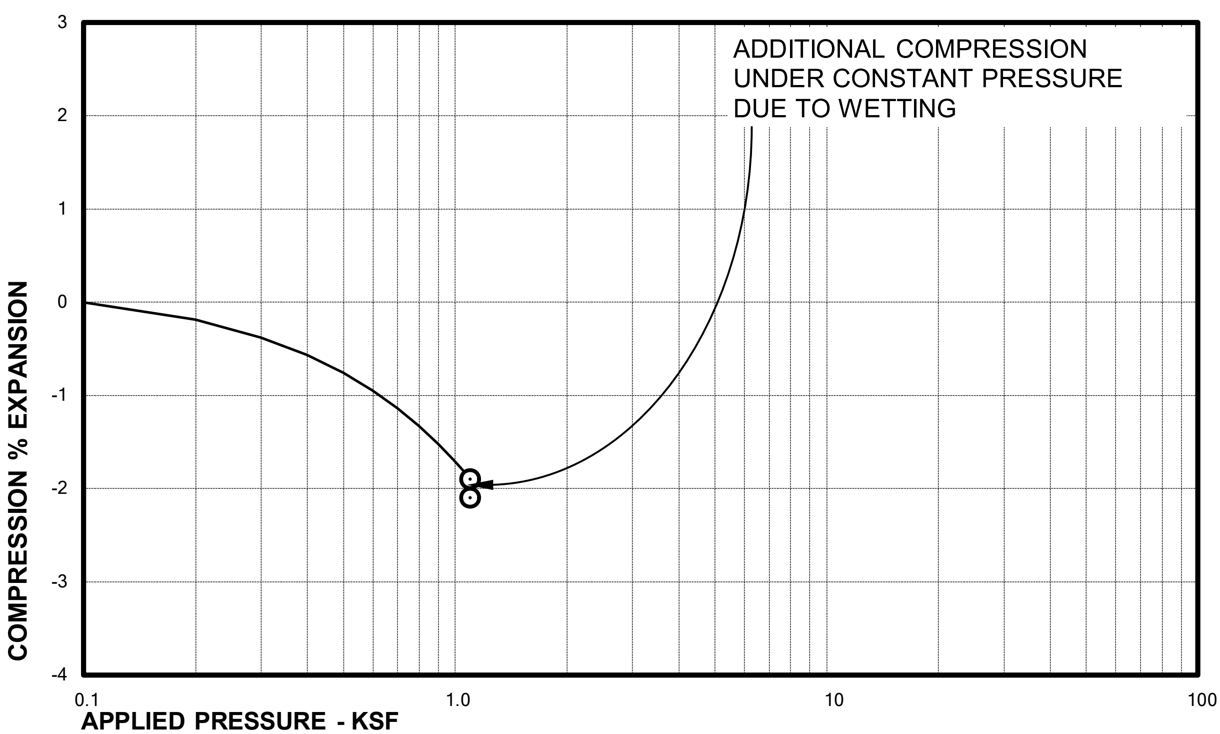
Summary Logs of Exploratory Borings

APPENDIX B

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



Sample of	SAND, CLAYEY (SC)	DRY UNIT WEIGHT=	121	PCF
From	TH-1 AT 9 FEET	MOISTURE CONTENT=	9.9	%



Sample of	SAND, CLAYEY (SC)	DRY UNIT WEIGHT=	120	PCF
From	TH-8 AT 9 FEET	MOISTURE CONTENT=	9.2	%

MAYBERRY COMMUNITIES
MAYBERRY APARTMENTS AND TOWNHOMES - TRACT K
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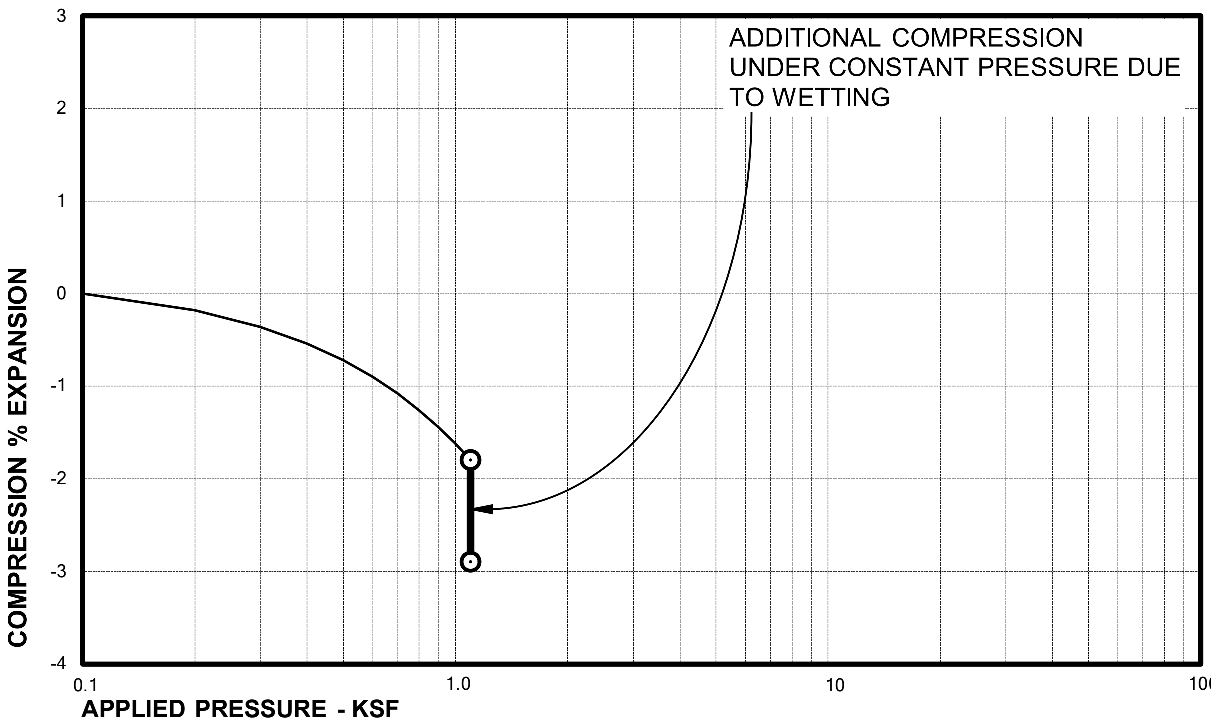
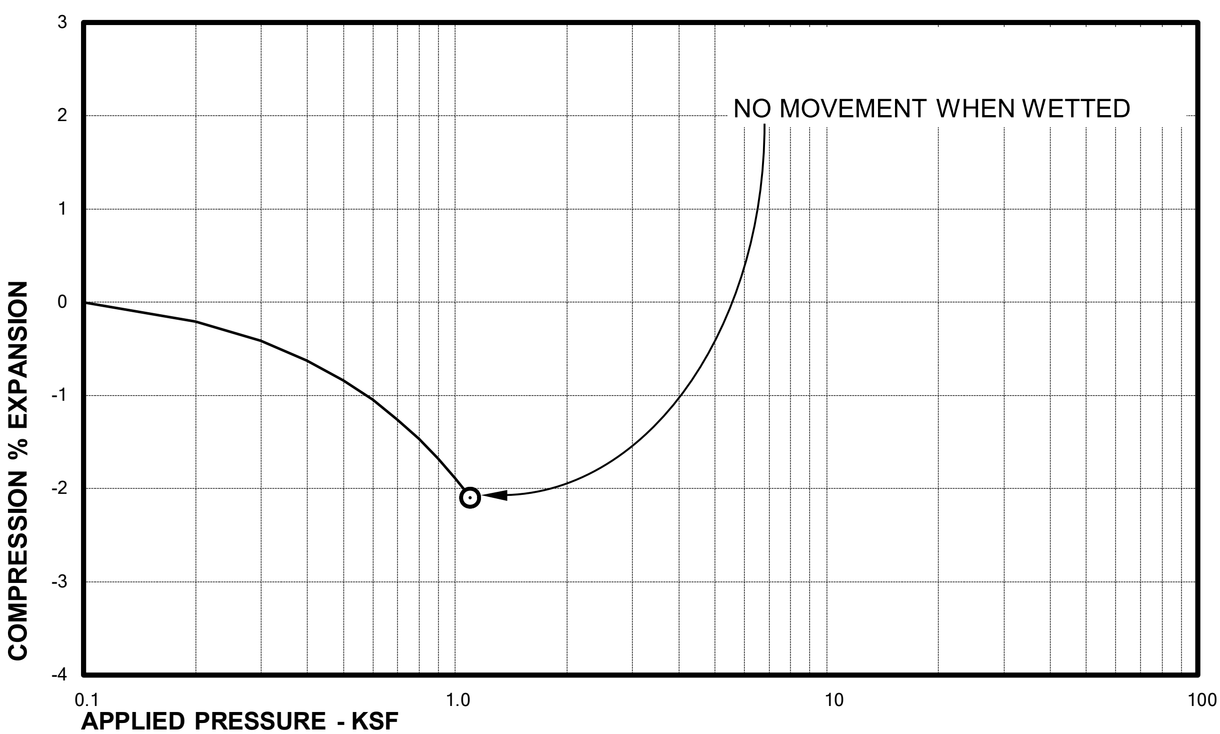
Swell Consolidation

FIG. B-1



Sample of	SAND, CLAYEY (SC)	DRY UNIT WEIGHT=	123	PCF
From	TH-17 AT 9 FEET	MOISTURE CONTENT=	10.4	%



Sample of	SAND, CLAYEY (SC)	DRY UNIT WEIGHT=	123	PCF
From	TH-22 AT 9 FEET	MOISTURE CONTENT=	9.6	%

MAYBERRY COMMUNITIES
MAYBERRY APARTMENTS AND TOWNHOMES - TRACT K
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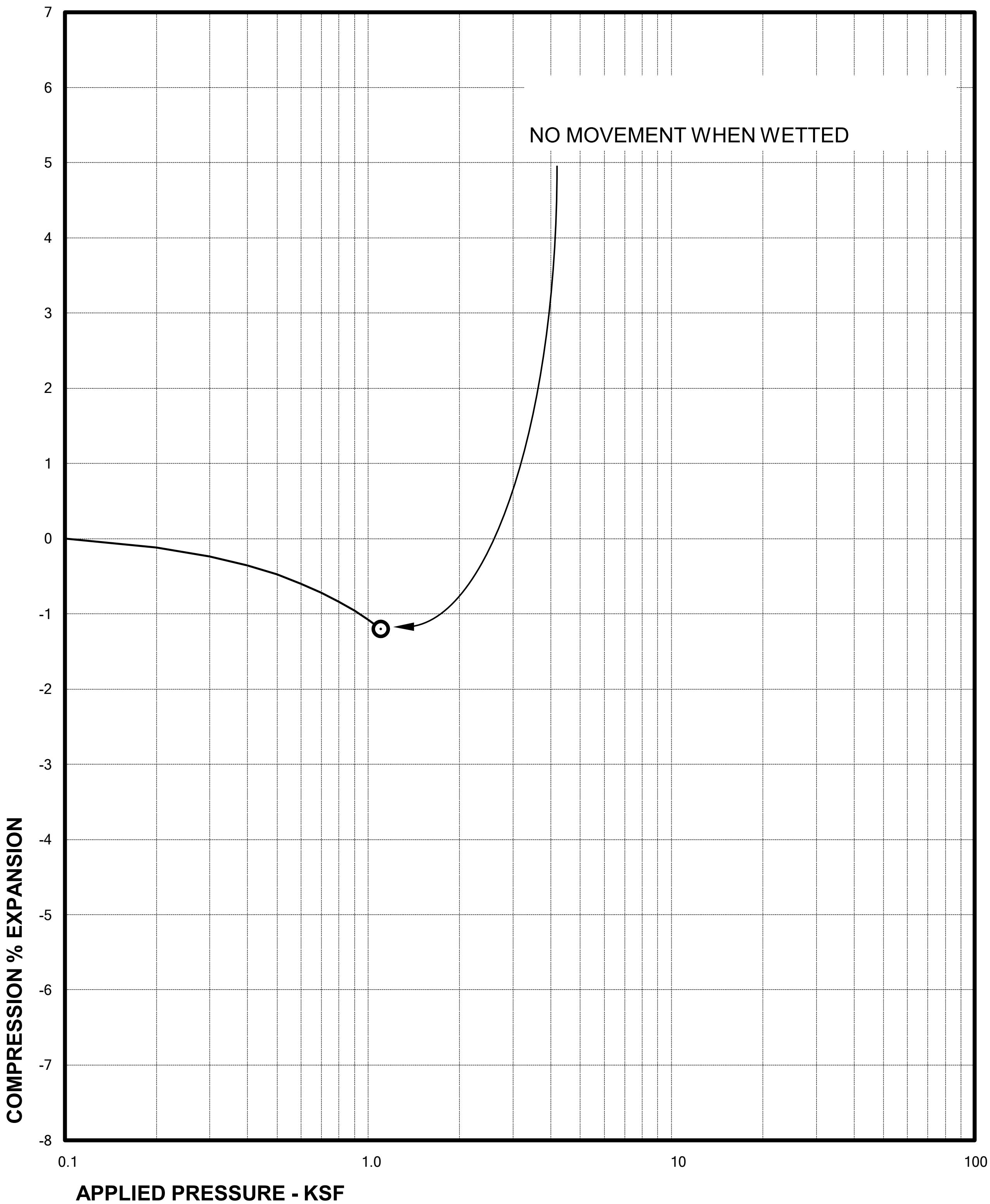
Swell Consolidation

FIG. B-2



Sample of SAND, CLAYEY (SC)

From TH-29 AT 9 FEET

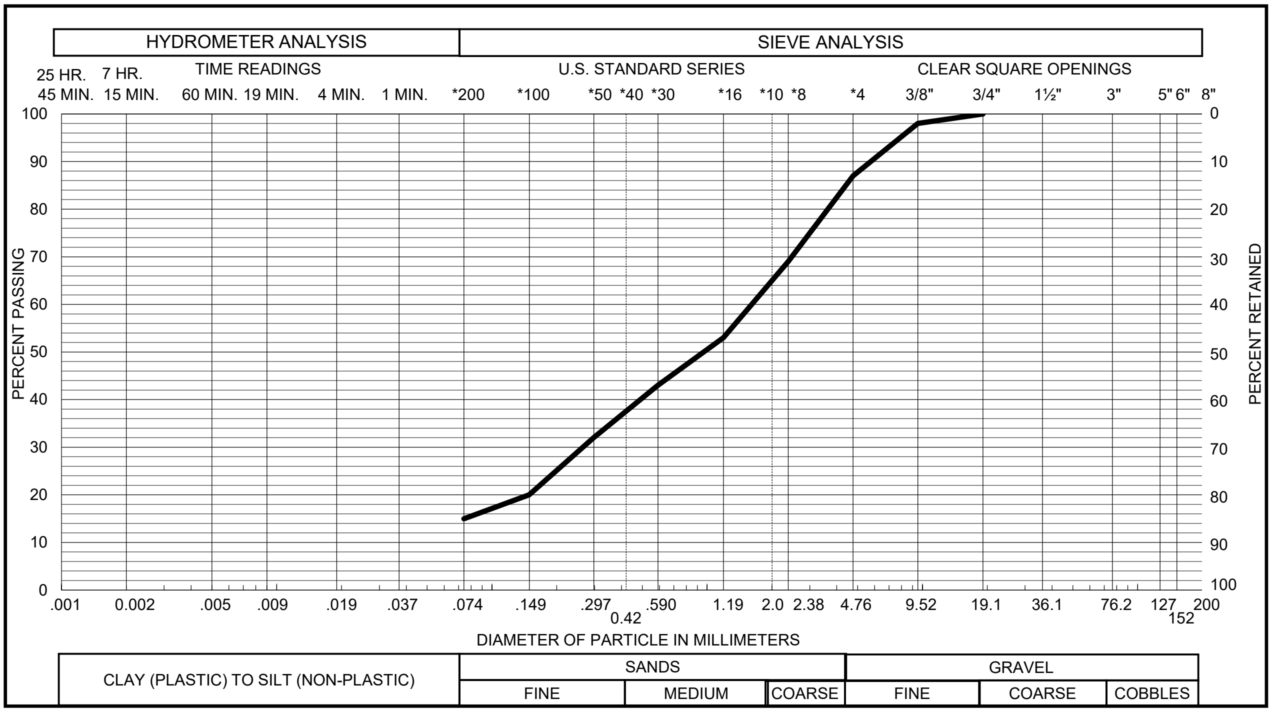
DRY UNIT WEIGHT= 118 PCF

MOISTURE CONTENT= 11.8 %

MAYBERRY COMMUNITIES
MAYBERRY APARTMENTS AND TOWNHOMES - TRACT K
CTL|T PROJECT NO. CS19587-125

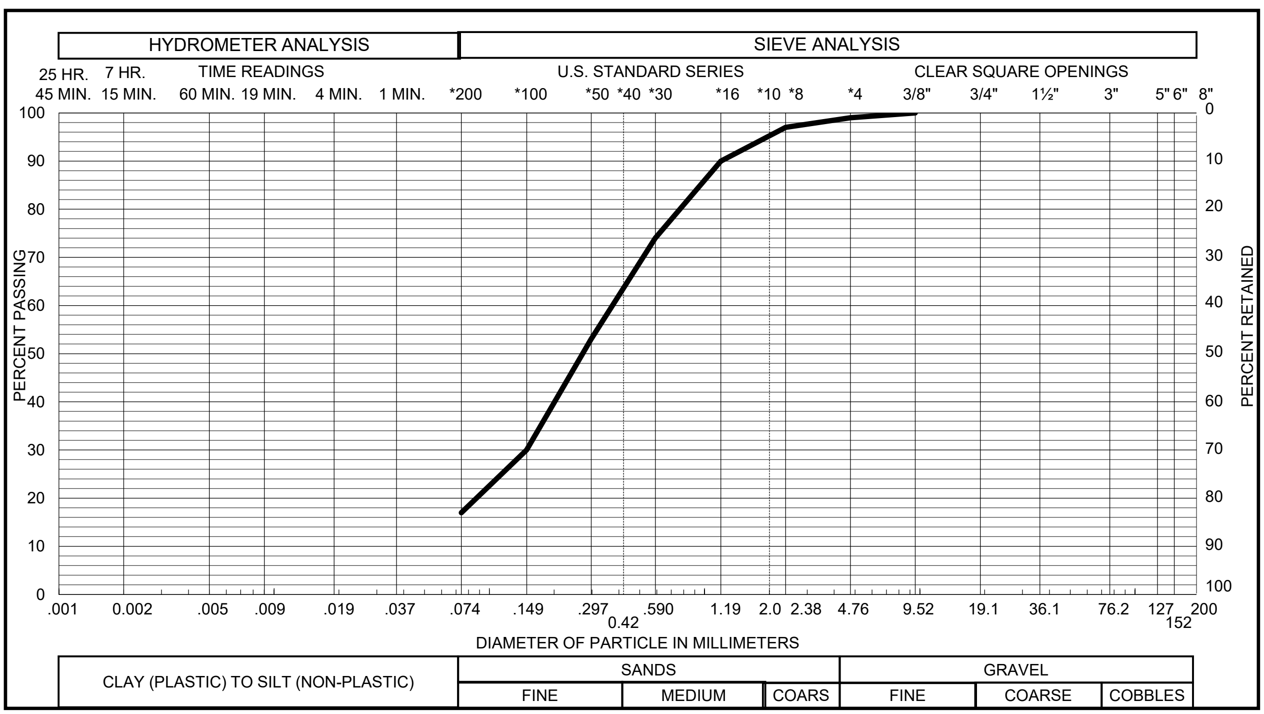
Swell Consolidation Test Results

FIG. B-3



Sample of SAND, SILTY (SM)
From TH - 1 AT 4 FEET

GRAVEL 13 % SAND 72 %
SILT & CLAY 15 % LIQUID LIMIT %
PLASTICITY INDEX %



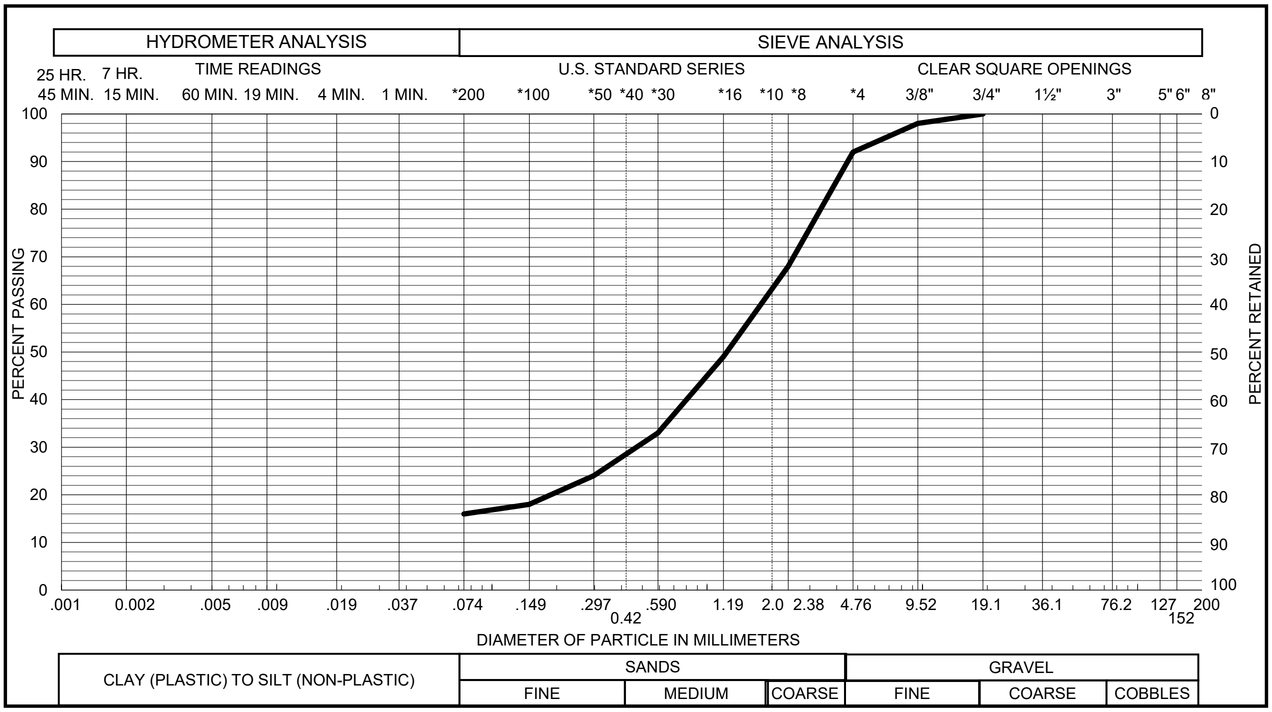
Sample of SAND, SILTY (SM)
From TH - 3 AT 4 FEET

GRAVEL 1 % SAND 82 %
SILT & CLAY 17 % LIQUID LIMIT %
PLASTICITY INDEX %

MAYBERRY COMMUNITIES
MAYBERRY APARTMENT AND TOWNHOMES - TRACT K
CTL|T PROJECT NO. CS19587-125

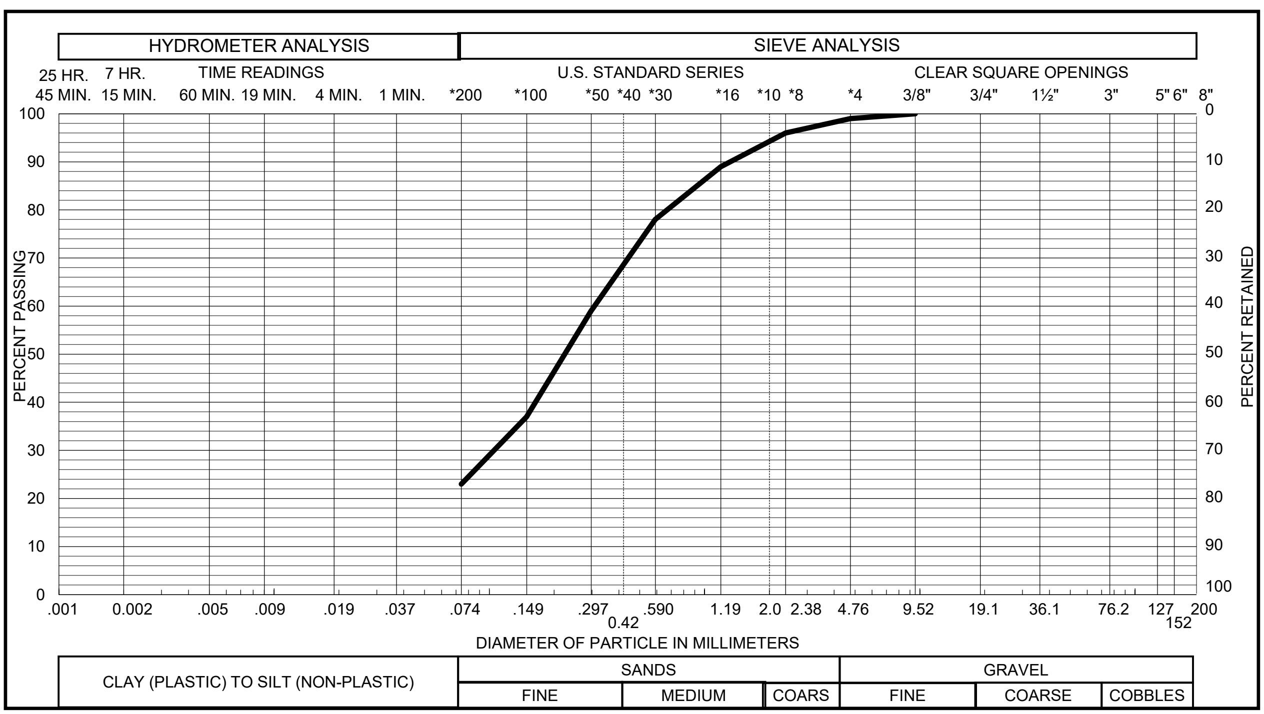
Gradation Test Results

FIG. B-4



Sample of SAND, SILTY (SM)
From TH - 5 AT 19 FEET

GRAVEL 8 % SAND 76 %
SILT & CLAY 16 % LIQUID LIMIT %
PLASTICITY INDEX %



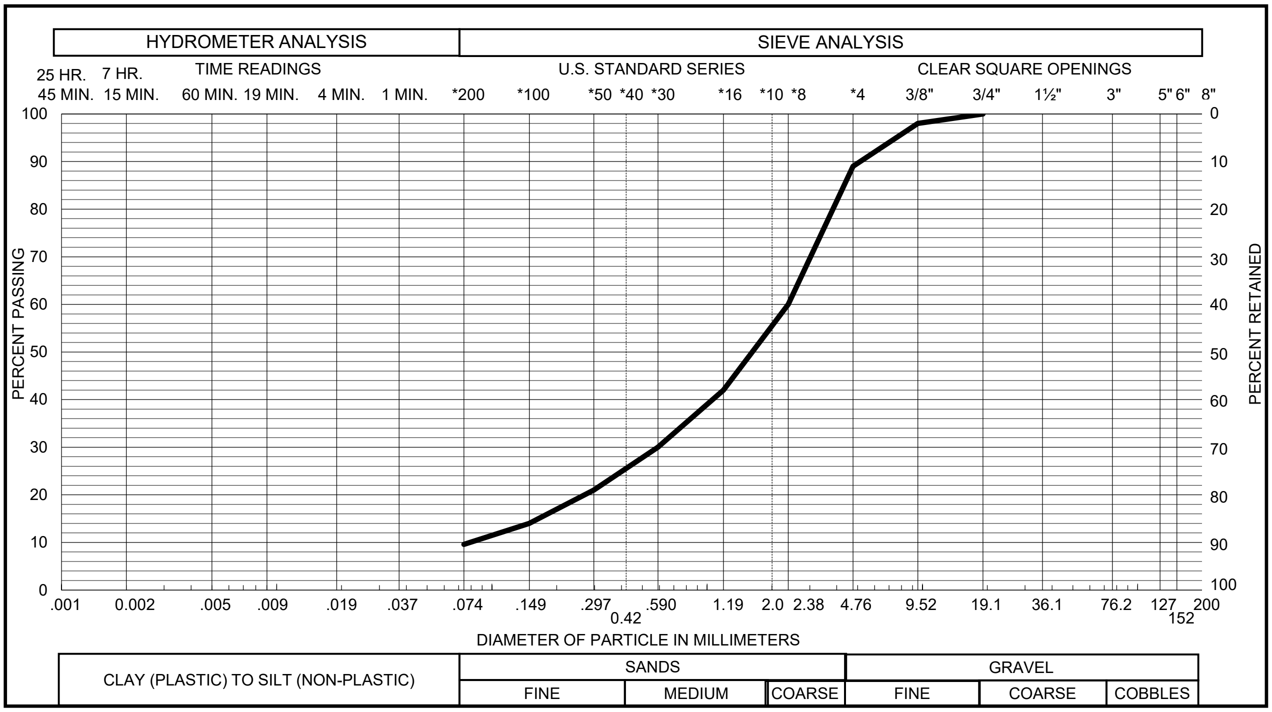
Sample of SAND, SILTY (SM)
From TH - 7 AT 9 FEET

GRAVEL 1 % SAND 76 %
SILT & CLAY 23 % LIQUID LIMIT %
PLASTICITY INDEX %

MAYBERRY COMMUNITIES
MAYBERRY APARTMENT AND TOWNHOMES - TRACT K
CTL|T PROJECT NO. CS19587-125

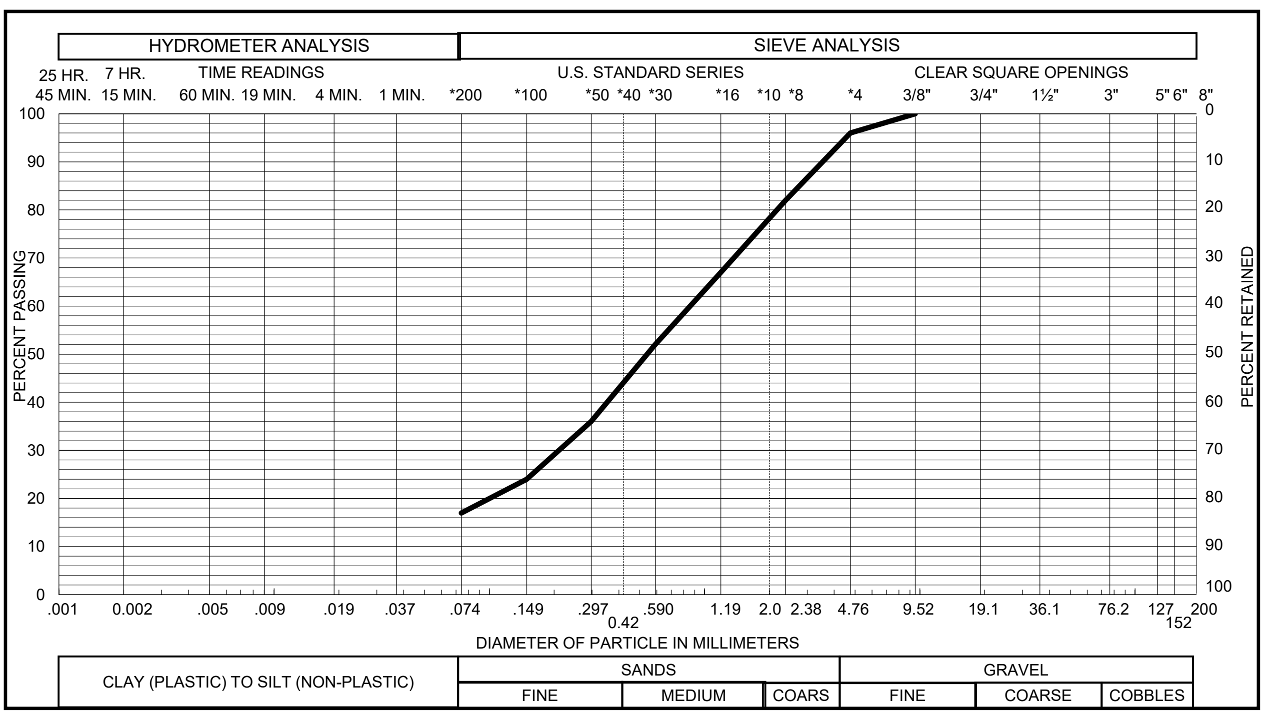
Gradation Test Results

FIG. B-5



Sample of SAND, SLIGHTLY SILTY (SP-SM)
From TH - 8 AT 4 FEET

GRAVEL 11 % SAND 79 %
SILT & CLAY 10 % LIQUID LIMIT %
PLASTICITY INDEX %



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

GRAVEL 4 % SAND 79 %
SILT & CLAY 17 % LIQUID LIMIT %
PLASTICITY INDEX %

MAYBERRY COMMUNITIES
MAYBERRY APARTMENT AND TOWNHOMES - TRACT K
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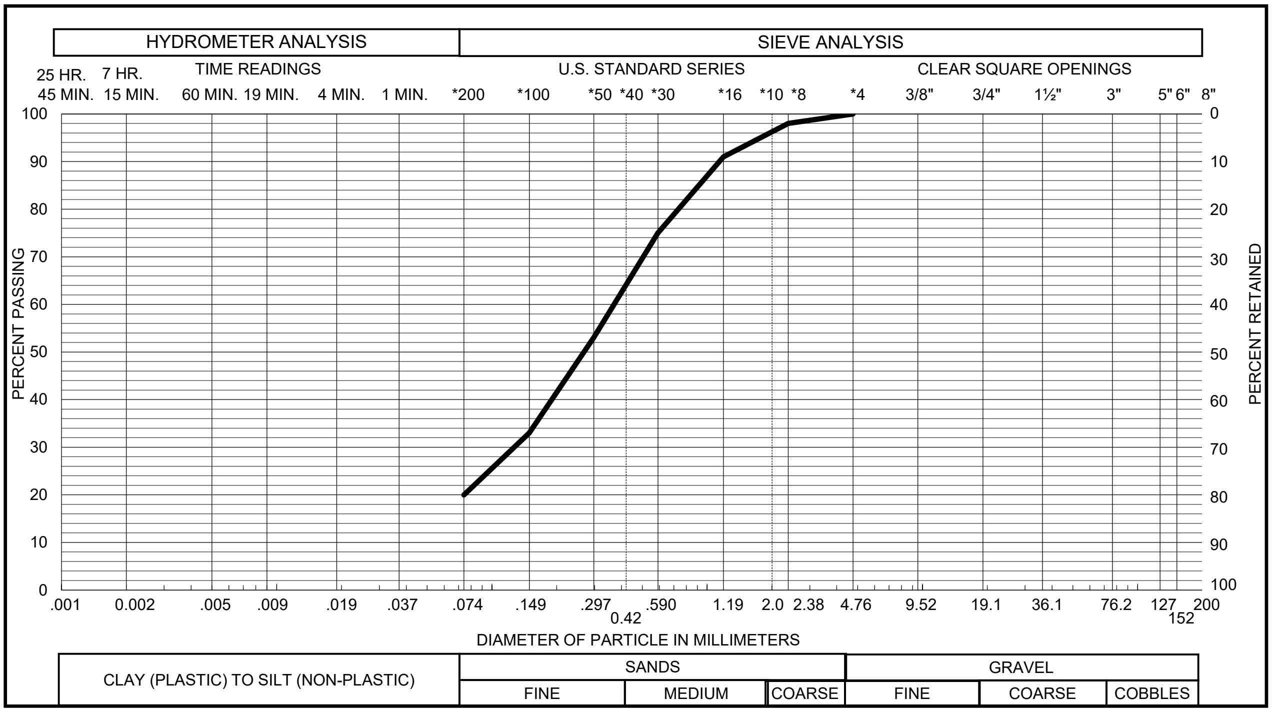
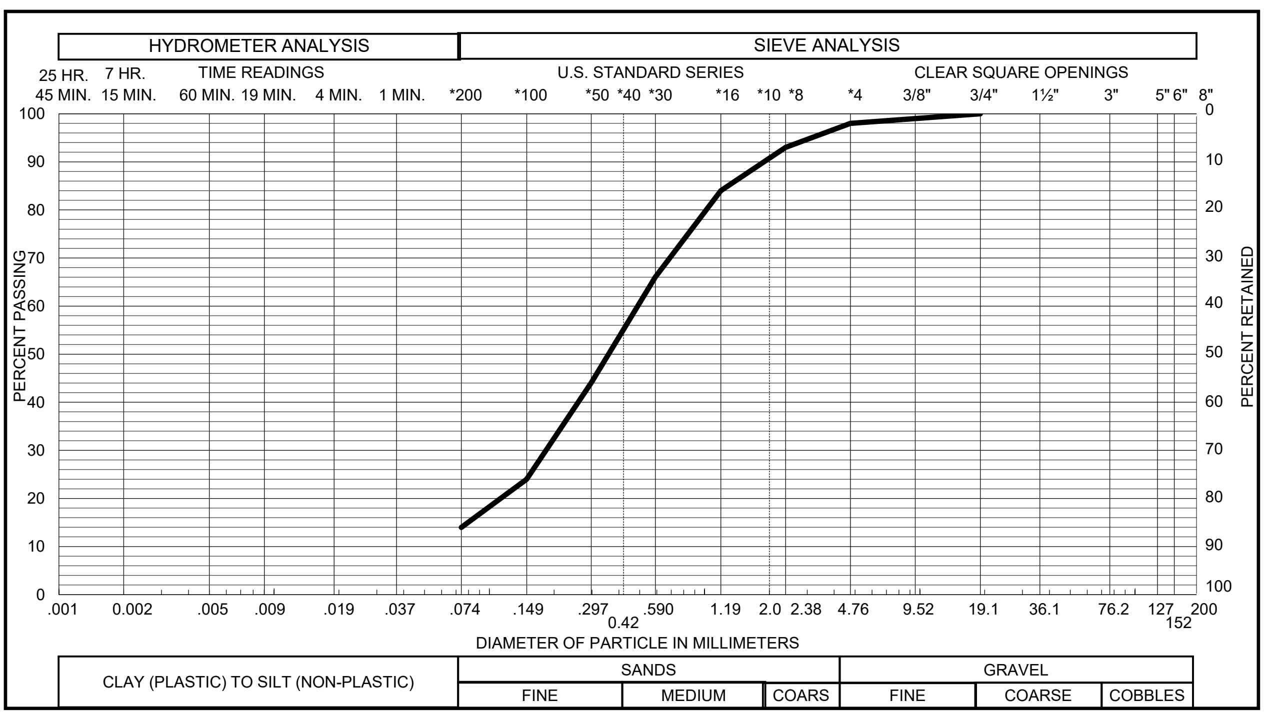
Gradation Test Results

FIG. B-6



Sample of SAND, SILTY (SM)
From TH - 10 AT 4 FEET

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



Sample of SAND, SILTY (SM)
From TH - 11 AT 14 FEET

GRAVEL 2 % SAND 84 %
SILT & CLAY 14 % LIQUID LIMIT %
PLASTICITY INDEX %

MAYBERRY COMMUNITIES
MAYBERRY APARTMENT AND TOWNHOMES - TRACT K
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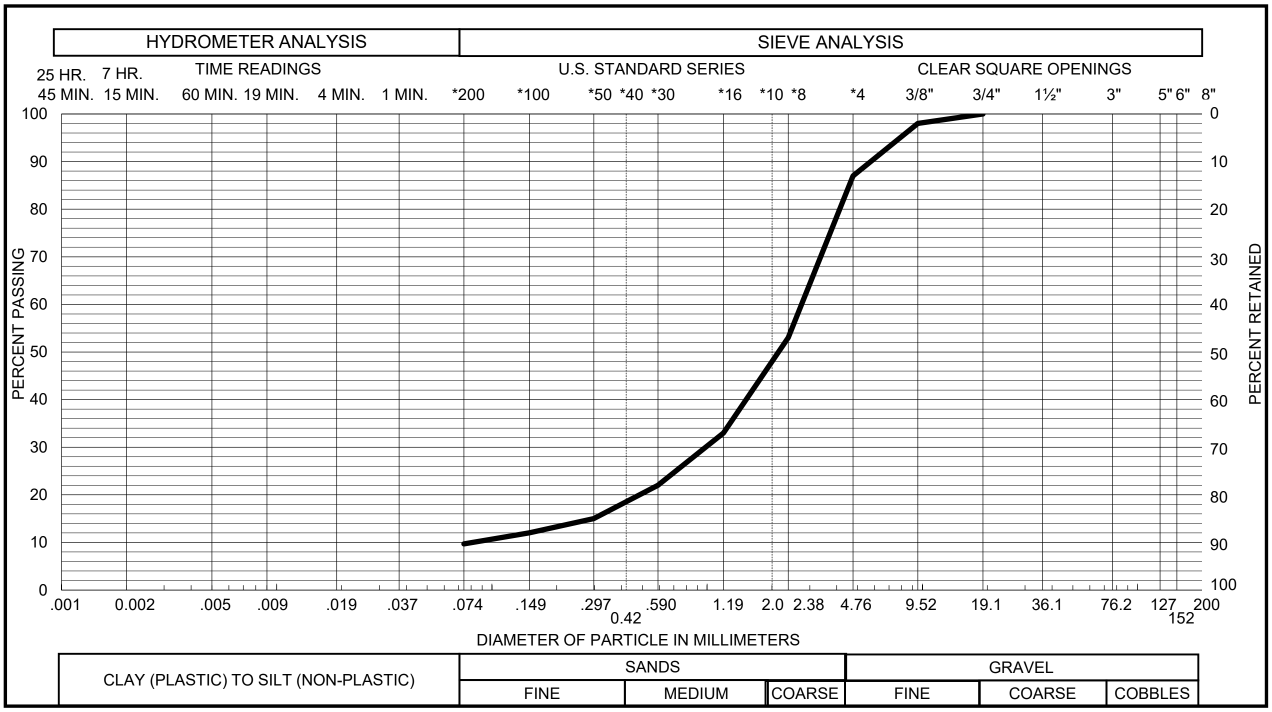
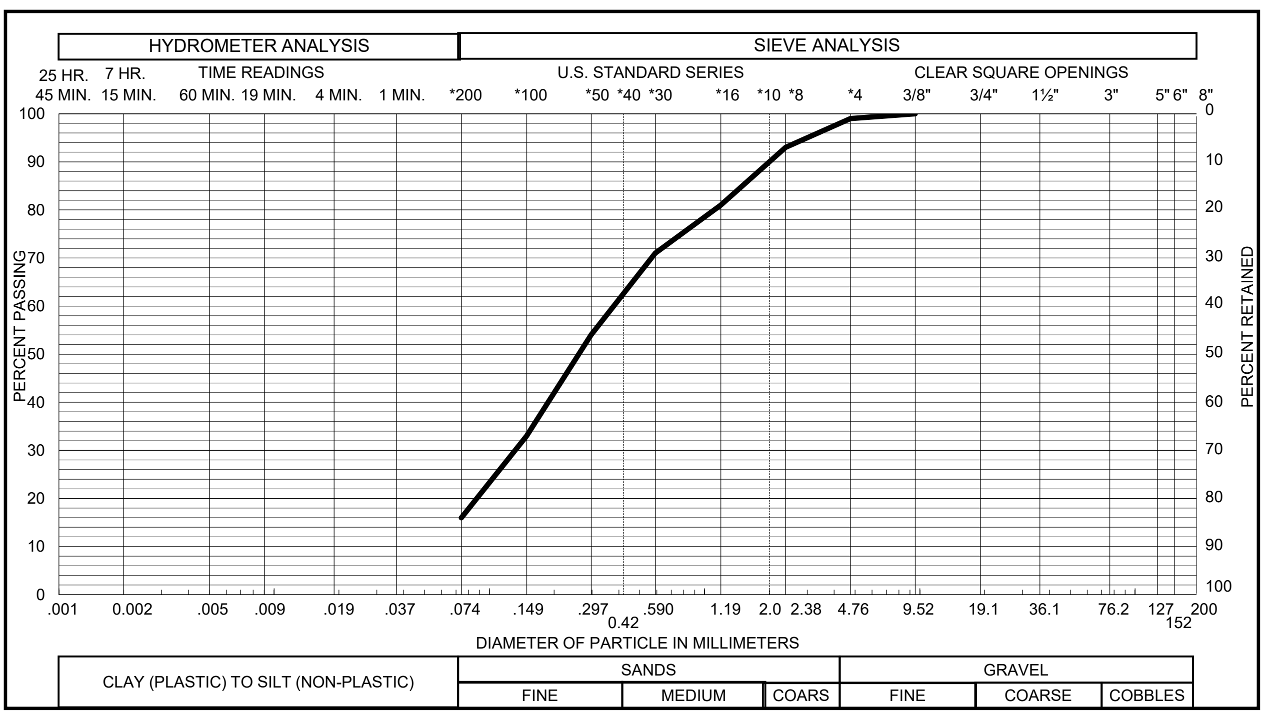
Gradation Test Results

FIG. B-7



Sample of SAND, SLIGHTLY SILTY (SP-SM)
From TH - 12 AT 14 FEET

GRAVEL 13 % SAND 77 %
SILT & CLAY 10 % LIQUID LIMIT %
PLASTICITY INDEX %



Sample of SAND, SILTY (SM)
From TH - 13 AT 9 FEET

GRAVEL 1 % SAND 83 %
SILT & CLAY 16 % LIQUID LIMIT %
PLASTICITY INDEX %

MAYBERRY COMMUNITIES
MAYBERRY APARTMENT AND TOWNHOMES - TRACT K
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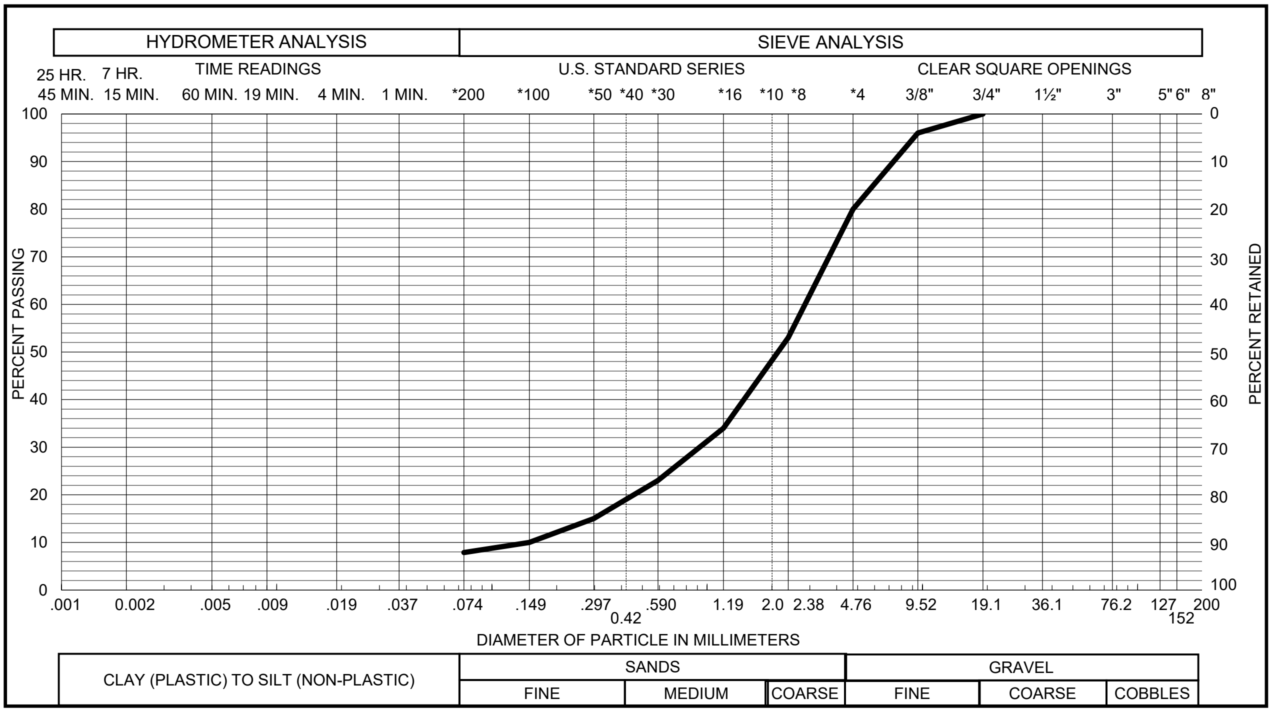
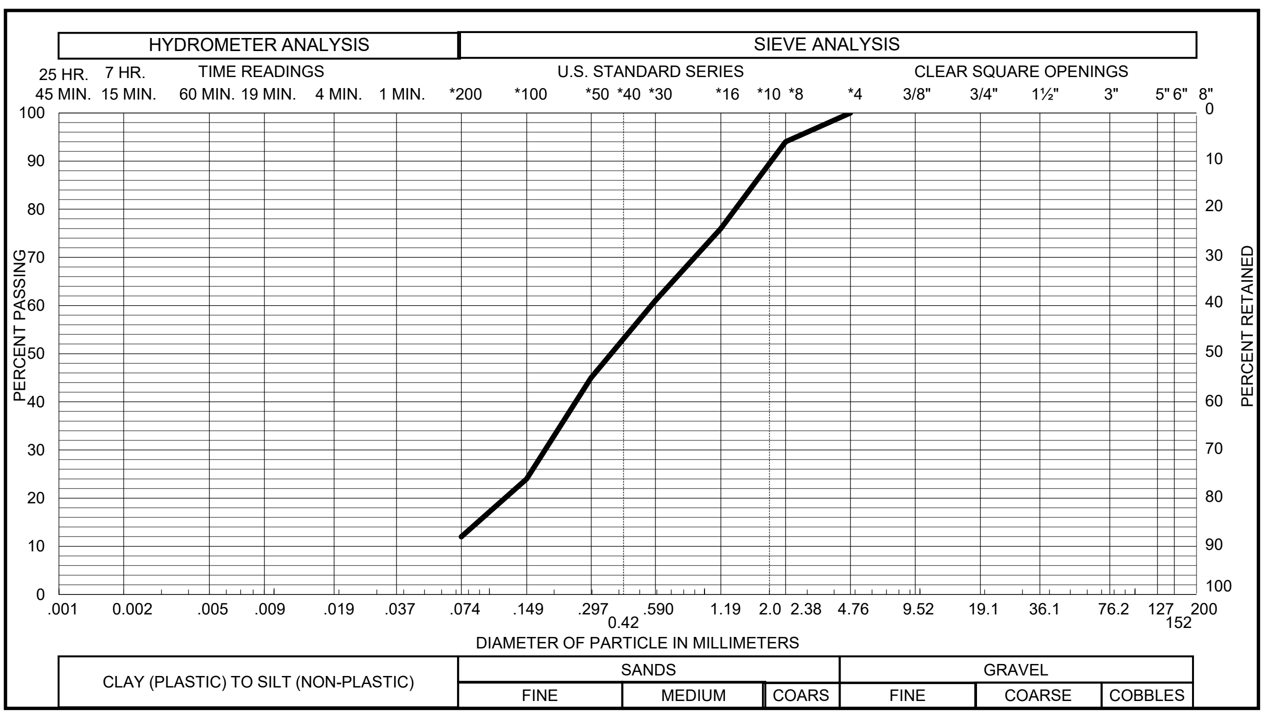
Gradation Test Results

FIG. B-8



Sample of SAND, SLIGHTLY SILTY (SP-SM)
From TH - 15 AT 14 FEET

GRAVEL 20 % SAND 72 %
SILT & CLAY 8 % LIQUID LIMIT %
PLASTICITY INDEX %



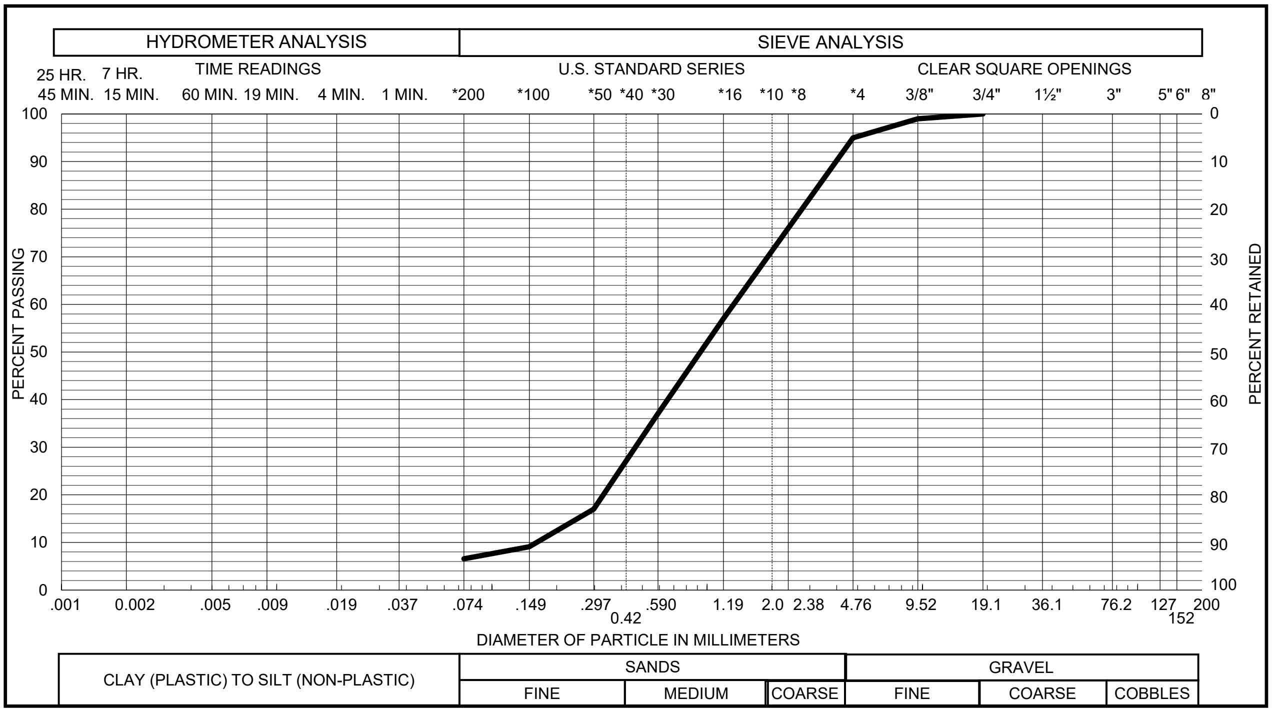
Sample of SAND, SLIGHTLY SILTY (SP-SM)
From TH - 18 AT 4 FEET

GRAVEL 0 % SAND 88 %
SILT & CLAY 12 % LIQUID LIMIT %
PLASTICITY INDEX %

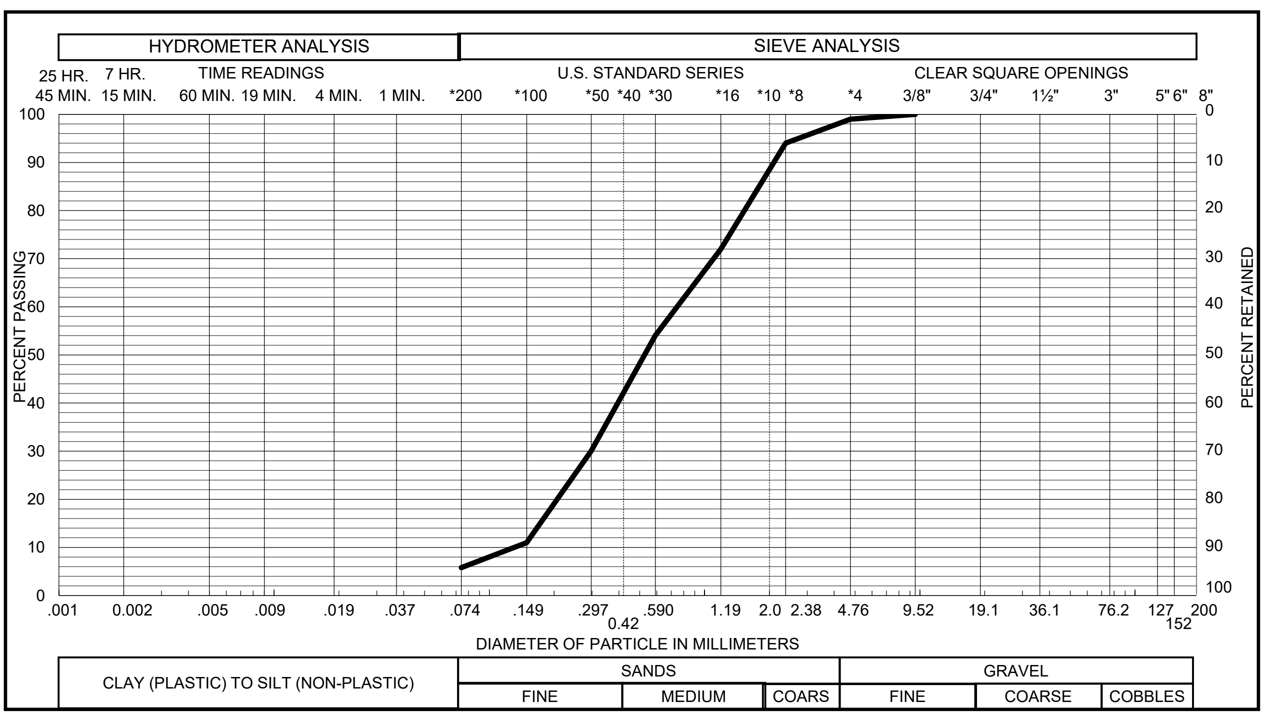
MAYBERRY COMMUNITIES
MAYBERRY APARTMENT AND TOWNHOMES - TRACT K
CTL|T PROJECT NO. CS19587-125

Gradation Test Results

FIG. B-9



Sample of	SAND, SLIGHTLY SILTY (SP-SM)	GRAVEL 5 %	SAND 88 %
From	TH - 20 AT 14 FEET	SILT & CLAY 7 %	LIQUID LIMIT %
		PLASTICITY INDEX %	

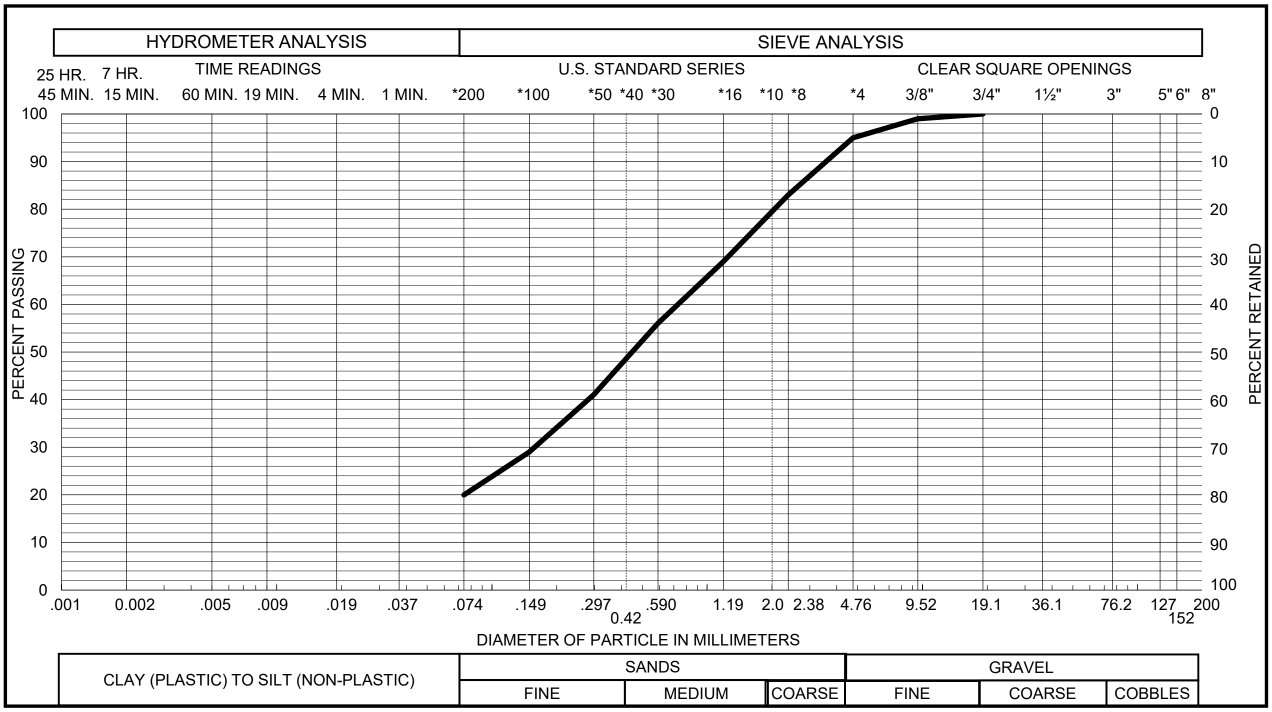


Sample of	SAND, SLIGHTLY SILTY (SP-SM)	GRAVEL 1 %	SAND 93 %
From	TH - 25 AT 9 FEET	SILT & CLAY 6 %	LIQUID LIMIT %
		PLASTICITY INDEX %	

MAYBERRY COMMUNITIES
MAYBERRY APARTMENT AND TOWNHOMES - TRACT K
CTL|T PROJECT NO. CS19587-125

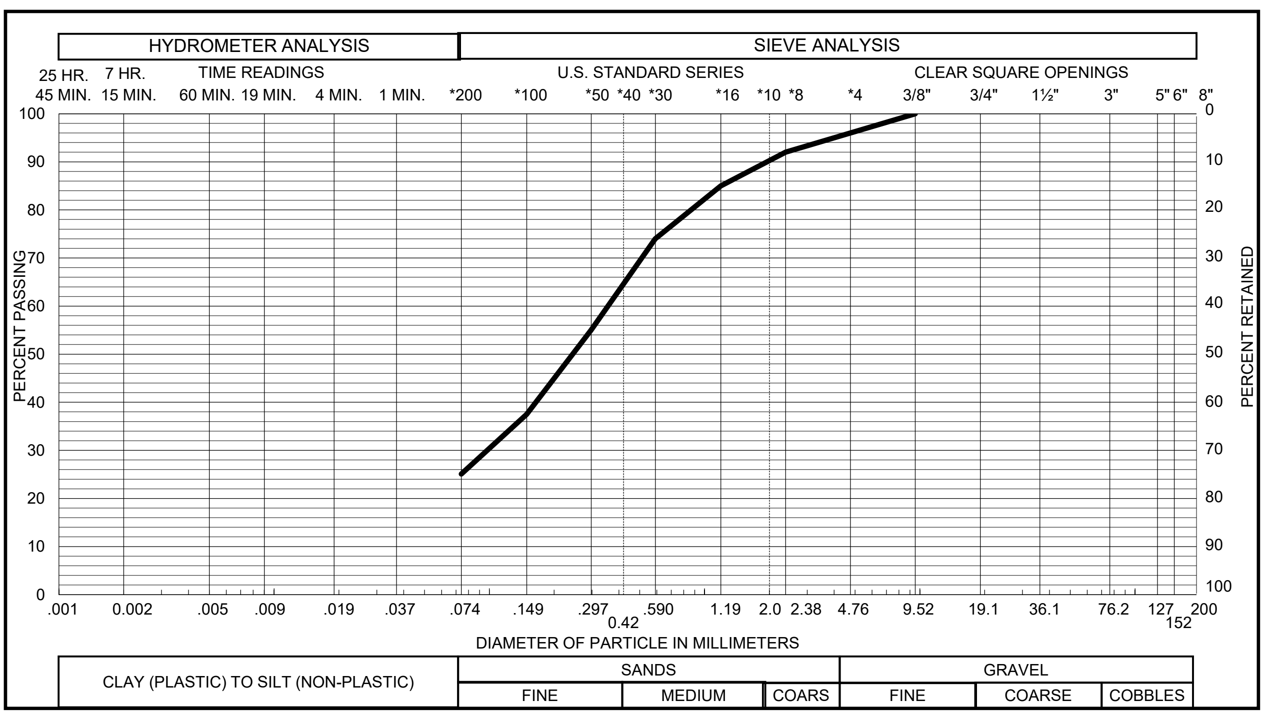
Gradation Test Results

FIG. B-10



Sample of SAND, CLAYEY (SC)
From TH - 27 AT 14 FEET

GRAVEL 5 % SAND 75 %
SILT & CLAY 20 % LIQUID LIMIT %
PLASTICITY INDEX %



Sample of SAND, SILTY (SM)
From TH - 32 AT 9 FEET

GRAVEL 4 % SAND 71 %
SILT & CLAY 25 % LIQUID LIMIT %
PLASTICITY INDEX %

MAYBERRY COMMUNITIES
MAYBERRY APARTMENT AND TOWNHOMES - TRACT K
CTL|T PROJECT NO. CS19587-125

Gradation Test Results

FIG. B-11

TABLE B-1

SUMMARY OF LABORATORY TESTING
CTL|T PROJECT NO. CS19587-125

BORING	DEPTH (FEET)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	ATTERBERG LIMITS LIQUID LIMIT (%)	ATTERBERG LIMITS PLASTICITY INDEX (%)	SWELL TEST RESULTS* SWELL (%)	SWELL TEST RESULTS* APPLIED PRESSURE (PSF)	SWELL TEST RESULTS* SWELL PRESSURE (PSF)	PASSING NO. 200 SIEVE (%)	WATER SOLUBLE SULFATES (%)	DESCRIPTION
TH-1	4	5.6	127						15		SAND, SILTY (SM)
TH-1	9	9.9	121			-0.3	1100		29		SAND, CLAYEY (SC)
TH-2	9	12.0	119	25	9				42		SAND, VERY CLAYEY (SC)
TH-2	14	2.3	120						5		SAND, SLIGHTLY SILTY (SP-SM)
TH-3	4	2.0	116						17		SAND, SILTY (SM)
TH-4	9	8.8	125						34		SAND, CLAYEY (SC)
TH-5	4	2.0	116						18		SAND, SILTY (SM)
TH-5	19	7.0	123						16		SAND, SILTY (SM)
TH-7	4	2.8	112						8		SAND, SLIGHTLY SILTY (SP-SM)
TH-7	9	10.8	121						23		SAND, SILTY (SM)
TH-8	4	2.7	114						10		SAND, SLIGHTLY SILTY (SP-SM)
TH-8	9	9.2	122			-0.2	1100		31		SAND, CLAYEY (SC)
TH-9	9	4.5	128						17		SAND, SILTY (SM)
TH-9	14	5.1	118						11		SAND, SLIGHTLY SILTY (SP-SM)
TH-10	4	2.7	111						20		SAND, SILTY (SM)
TH-10	9	7.1	129						24		SAND, SILTY (SM)
TH-11	9	8.0	126						30		SAND, CLAYEY (SC)
TH-11	14	5.1	109						14		SAND, SILTY (SM)
TH-12	4	4.6	114						9	<0.1	SAND, SLIGHTLY SILTY (SP-SM)
TH-12	14	3.4	102						10		SAND, SLIGHTLY SILTY (SP-SM)
TH-13	9	8.7	114						16		SAND, SILTY (SM)
TH-13	14	3.1	106						7		SAND, SLIGHTLY SILTY (SP-SM)
TH-14	9	12.9	113						45		SAND, VERY CLAYEY (SC)
TH-15	4	1.9	109						11		SAND, SLIGHTLY SILTY (SP-SM)
TH-15	14	3.1	107						8		SAND, SLIGHTLY SILTY (SP-SM)
TH-17	4	2.7	115						7		SAND, SLIGHTLY SILTY (SP-SM)
TH-17	9	10.4	123			-1.1	1100				SAND, CLAYEY (SC)
TH-18	4	3.3	112	NL	NP				12		SAND, SLIGHTLY SILTY (SP-SM)
TH-18	19	6.1	127						14		SAND, SILTY (SM)
TH-19	9	11.9	123	23	4				25		SAND, SILTY-CLAYEY (SC-SM)
TH-20	14	2.8	112						7		SAND, SLIGHTLY SILTY (SP-SM)
TH-21	4	2.3	112						10		SAND, SLIGHTLY SILTY (SP-SM)
TH-22	9	9.6	123			0.0	1100				SAND, CLAYEY (SC)
TH-23	9	9.2		26	11				34		SAND, CLAYEY (SC)
TH-25	4	3.8	109						13		SAND, SILTY (SM)
TH-25	9	3.1	116						6		SAND, SLIGHTLY SILTY (SP-SM)

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

TABLE B-1

SUMMARY OF LABORATORY TESTING
CTL|T PROJECT NO. CS19587-125

BORING	DEPTH (FEET)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	ATTERBERG LIMITS LIQUID LIMIT (%)	ATTERBERG LIMITS PLASTICITY INDEX (%)	SWELL TEST RESULTS* SWELL (%)	SWELL TEST RESULTS* APPLIED PRESSURE (PSF)	SWELL TEST RESULTS* SWELL PRESSURE (PSF)	PASSING NO. 200 SIEVE (%)	WATER SOLUBLE SULFATES (%)	DESCRIPTION
TH-27	14	5.8	129						20		SAND, CLAYEY (SC)
TH-28	4	1.6	120						14	<0.1	SAND, SILTY (SM)
TH-28	9	12.8	118	25	6				40		SAND, SILTY-CLAYEY (SC-SM)
TH-29	9	11.8	118			0.0	1100				SAND, CLAYEY (SC)
TH-30	9	11.7	109						32		SAND, CLAYEY (SC)
TH-30	19	3.0	104						5		SAND, SLIGHTLY SILTY (SP-SM)
TH-31	4	2.3	104						8		SAND, SLIGHTLY SILTY (SP-SM)
TH-32	9	6.3	127						25		SAND, SILTY (SM)
TH-33	9	7.7	123						30		SAND, SILTY (SM)
TH-33	24	6.3	132	31	16				26		SAND, CLAYEY (SC)

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