CTL|THOMPSON INCORPORATED

March 15, 2023

Jackson Dearborn Partners
404 South Wells Street, Suite 400
Chicago, Illinois 60607

Attention: Dane Olmstead
Chief Investment Officer

Subject: Response to Review Comments
Solace Apartment Complex
Powers Boulevard and Galley Road
Colorado Springs, Colorado
CTLT Project Nos CS19163.001-125 L2

This letter presents our response to the El Paso County review comments (undated) regarding the Geotechnical Investigation for the Solace Apartment Complex located at Powers Boulevard and Galley Road in El Paso County, Colorado (CTL|T Project No. CS19163.001-125, dated January 15, 2020). While we agree with some of the observations and recommendations made by El Paso County, we present the following discussion with specific items from the review comments and our responses. The following are a summary of the El Paso County review comments and our responses.

El Paso County Comment:

The soils map and engineering conditions map have been removed from this report. Additionally, this report indicates the presence of seasonal groundwater. This report also needs to include an identification of what constitutes a geologic hazard and what constitutes a geologic constraint per the Land Development Code definitions below.

CTL|T Response:

CTLIThompson, Inc. prepared a Geologic Hazards Evaluation and Preliminary Geotechnical Investigation (Project No. CS19163.000-105; report dated December 10, 2019) in addition to the Geotechnical Investigation (Project No. CS19163.001-125 dated January 15, 2020) for the site. The County has previously reviewed the Geologic Hazards Evaluation. The soils map, engineering conditions map, discussion of seasonal groundwater, identification of what constitutes a geologic hazard and what constitutes a geologic constraint per the Land Development Code are contained in the 2019 report. A further discussion of groundwater follows.

As noted in the 2019 report on page 5: Groundwater levels will vary with seasonal precipitation and landscaping irrigation. Typically, seasonal variations in

groundwater will be about 5 feet. At this site, at the time of drilling, groundwater was encountered in fifteen of the exploratory borings at depths of 19 to 27 feet below the existing ground surface. If the groundwater conditions were at their seasonal low, the high groundwater levels would be expected to be at depths of 14 to 22 feet below the existing ground. Given the type of construction at this site, these levels of groundwater are not expected to impact the development and high groundwater is not considered to be a geologic constraint at this site.

El Paso County Comment:

Soil and Geology Conditions:

Geologic Hazard Note – Final Plat: (to be customized based upon the individual circumstances)

The following lots have been found to be impacted by geologic hazards. Mitigation measures and a map of the hazard area can be found in the report (Title of Report, generally from the Preliminary Plan file) by (author of the report) (date of the report) in file (name of file and file number) available at the El Paso County Planning and Community Development Department:

- Downslope Creep: (name lots or location of area)
- Rockfall Source: (name lots or location of area)
- Rockfall Runout Zone: (name lots or location of area)
- Potentially Seasonally High Groundwater: (name lots or location of area)
- Other Hazard: In Areas of High Groundwater: Due to high groundwater in the area, all foundations shall incorporate an underground drainage system.

CTL|T Response:

As discussed above, we do not believe that high groundwater constitutes a geologic hazard at this site. The Geologic Hazards Evaluation and Preliminary Geotechnical Investigation (Project No. CS19163.000-105; report dated December 10, 2019) states:

> We did not identify geologic hazards that we believe will preclude development of the project as panned. The conditions we identified include instability of recently down-cut stream banks in the drainage channel located along the eastern property line and potential for erosion and flooding. Slopes within the development areas appear to be stable and the construction of apartment buildings should not negatively impact slope stability. Regional geologic conditions that impact the site include seismicity and radioactivity. These issues do not pose hazards or constraints to development if mitigated with engineering design and construction methods commonly employed in this area.

The El Paso County review of the 2019 report indicated that this portion of this report should be added as a plat note:

GEOLOGIC HAZARDS AND ENGINEERING CONSTRAINTS

We did not identify geologic hazards that we believe will preclude development of the project as planned. The conditions we identified include instability of recently down-cut stream banks in the drainage channel located along the eastern property line and potential for erosion and flooding. Slopes within the development areas appear to be stable and the construction of apartment buildings should not negatively impact slope stability. Regional geologic conditions that impact the site include seismicity and radio-activity. These issues do not pose hazards or constraints to development if mitigated using normally employed methods. We believe each of these conditions can be mitigat-ed with engineering design and construction methods commonly employed in this area. These conditions are discussed in greater detail in the sections that follow.

Add as plat note and address in Letter of Intent

Engineering Geologic Mapping

The engineering geology conditions from Robinson (1977) were considered and

We suggest the plat note read: "Geologic Hazard Note: Per the Geotechnical Investigation Report prepared by CTL|Thompson, Inc., dated January 15, 2020 (CTL|T Project No. CS19163.001-125,) and the Geologic Hazards Evaluation and Preliminary Geotechnical Investigation dated December 10, 2019, (CTL|T Project No. CS19163.000-105) - No geologic hazards were identified at this site that CTL|Thompson believes preclude development of the project as planned. Regional geologic conditions that impact the site include seismicity and radioactivity and may pose engineering constraints to development. CTL|Thompson believes these conditions can be mitigated with engineering design and construction methods commonly employed in this area. Geologic Hazards and mitigation alternatives are discussed in the Geotechnical Investigation Report and the Geologic Hazards Evaluation."

We believe this note accurately identifies the potential hazards and provides sufficient notice to potential buyers or design professions about the conditions at the site.

If we can be of further service in discussing the contents of this letter, please call.

Sincerely,

CTL|THOMPSON, INC.

Gwendolyn E. Eberhart, P.E.
Project Manager

Reviewed by:

Timothy A. Mitchell, P.E.
Division Manager

GE:TAM:cw

Via Email: dolmstead@jacksondearborn.com; mitch.zimmermann@kimley-horn.com

CTL|THOMPSON INCORPORATED

GEOTECHNICAL INVESTIGATION
SOLACE APARTMENT COMPLEX
POWERS BOULEVARD AND GALLEY ROAD
EL PASO COUNTY, COLORADO

Prepared for:

SUB4 DEVELOPMENT CORPORATION
2301 West Bradley Avenue, Suite 2
Champaign, Illinois 61821

Attention: Josh Stroot

CTL|T Project No. CS19163.001-125

January 15, 2020

5170 Mark Dabling Blvd | Colorado Springs, Colorado 80918 | Telephone: 719-528-8300 Fax: 719-528-5362

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SCOPE

This report presents the results of our Geotechnical Investigation for the Solace Apartment Complex to be located east of Powers Boulevard and north of Galley Road in El Paso County, Colorado. The investigated parcel is planned for development of multi-family, apartment buildings. The purpose of our investigation was to evaluate the sub-surface conditions at the site and provide geotechnical recommendations and criteria for design and construction of foundations, floor systems, and pavement section alternatives, as well as surface drainage precautions. The scope of our services is described in our proposal (CS-20-0134) dated September 4, 2020.

The report was prepared based on conditions interpreted from field reconnaissance of the site, review of previous information, conditions found in our exploratory borings, results of laboratory tests, engineering analysis, and our experience. Observations made during grading or construction may indicate conditions that require revision or re-evaluation of some of the preliminary criteria presented in this report. The criteria presented are for the development as described. Revision in the scope of the project could influence our recommendations. If changes occur, we should review the development plans and the effect of the changes on our preliminary design criteria. Evaluation of the property for the possible presence of potentially hazardous materials (Environmental Site Assessment) was beyond the scope of this investigation.

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

SUMMARY

1. The near-surface soils encountered in the nineteen (19) borings drilled during this investigation consisted of 25 to thirty feet of clean to silty, sand soils with widely scattered lenses of clayey sand and sandy clay.
2. At the time of drilling, groundwater was encountered in fifteen of the exploratory borings at depths of 19 to 27 feet below the existing ground surface. When water levels were checked again several days after the com-

pletion of drilling operations, water was measured in sixteen of the borings at depths of 15 to 25 feet. Groundwater levels will vary with seasonal precipitation and landscaping irrigation.

3. We understand a post tensioned slab is the desired foundation option. In our opinion, a post-tensioned slab-on-grade (PTS) foundation is an acceptable foundation alternative for the proposed apartment buildings and clubhouse. Foundation design and construction criteria are presented in the report.
4. For the PTS system, the foundation is structurally integrated with the floor slab and should therefore exhibit a low risk of differential movement and cracking. Conventional slab-on-grade floors constructed in the garage buildings that are underlain by the natural sands and/or densely compacted sand fill will also exhibit a low risk of movement and damage.
5. Full-depth asphalt concrete and composite asphalt and aggregate base course pavement section alternatives are presented in the report for the planned 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 investigated parcel of land is situated northeast of the intersection of Powers Boulevard and Galley Road (a portion of the northwest quarter of Section 7, Township 14 South, Range 65 West of the 6th Principal Meridian), in El Paso County, Colorado. Current development plans were provided by LCM Architects on September 3, 2020.

The overall ground surface across the property slopes very gently downward to the south at grades of between about 2 and 3 percent. Vegetation on the site consists of a slight to moderate stand of mostly grasses and weeds and scattered deciduous trees. Somewhat heavier vegetation and a thicker concentration of deciduous trees are pre-

sent along the eastern edge of the property in the vicinity of an existing drainage channel that runs in a generally north-to-south direction and separates the investigated parcel from existing commercial buildings to the east of the site. The northern half of the channel is up to about 10 to 15 feet in depth. The channel depth decreases to the south. Areas of erosion and steep downcutting of the channel banks are present, especially in the northern half. Large concrete pieces and other construction debris have been placed as a type of riprap material in an attempt to stabilize the steep banks, primarily in the northern half of the channel and the northern portion of the southern half. Household trash, furniture, and organic materials are present in the channel bottom. The channel exits the site at the south property line through three, parallel culverts under Galley Road.

The parcel is crisscrossed by several narrow, dirt paths. Scattered, small piles of dumped trash and construction debris were observed at several locations on the site. Low earth berms (maximum height of about 5 feet) are present in the center of the property and near the southern edge of the parcel. The berms appear to have been constructed at some point in the property history to control storm runoff. An existing, sanitary sewer main is present in the Paonia Street right-of-way located near the eastern edge of the site.

The land to the north and east is developed with commercial/retail buildings and some light industrial structures. A one-story commercial building that has served as a bank and as a day care center in the recent past is present west of the southern end of the investigated parcel. It is unknown if this building is occupied.

PROPOSED DEVELOPMENT

We understand the proposed apartment complex is to be developed for approximately 350, one to three-bedroom apartment units. The fifteen apartment buildings are anticipated to be three-story, wood-frame structures. Foundation loads are expected to be light to moderate. No habitable, below-grade construction is expected. The complex will include a clubhouse and pool area, paved access roads and automobile parking

stalls, and carports. We anticipate the complex will be serviced by a centralized sanitary sewer collection system and potable water distribution system. Two full-spectrum detention ponds are planned along the eastern edge of the property adjacent to the existing drainage channel.

PREVIOUS INVESTIGATION

We previously conducted a Geologic Hazards Evaluation and Preliminary Geotechnical Investigation, CTL|T Project Number CS19163.000-105, report dated December 10, 2019. This report was reviewed as part of this investigation, and the boring information was used in developing our recommendations.

SUBSURFACE INVESTIGATION

Subsurface conditions at the site were investigated by drilling an additional nineteen exploratory borings to supplement the previous twelve exploratory borings at the locations shown in Fig. 1. Graphical logs of the conditions found in our exploratory borings, the results of field penetration resistance tests, and some laboratory data are presented in Appendix A. Gradation test results are presented in Appendix B. Laboratory test data are summarized in Table B-1. Summary logs from our previous investigation are shown in Appendix D.

Soil 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, gradation analysis, and water-soluble sulfate content tests.

SUBSURFACE CONDITIONS

The near-surface soils encountered in the nineteen borings drilled during this investigation consisted of 25 to 30 feet of sand and silty sand soils with widely scattered lenses of clayey sand and sandy clay. Some of the pertinent engineering characteristics

of the soils encountered and groundwater conditions are discussed in the following paragraphs.

Sand Soils

The predominant soils encountered at the ground surface in each of the borings consisted of clean to silty sand. The sand layer encountered in the borings extended to the maximum depth explored of 30 feet below the existing ground surface. The sand was loose to very dense based on the results of field penetration resistance tests. Samples of the sand tested in our laboratory contained 2 to 46 percent clay and silt-sized particles (passing the No. 200 sieve). Our experience indicates the clean to silty sands are non-expansive when wetted.

Clay Soils

Isolated layers of clayey sand were found to be interbedded with the predominant clean to silty sand in six of the borings. Samples of the clayey sands tested in our laboratory contained 20 to 36 percent clay and silt-sized particles (passing the No. 200 sieve). The clayey sand was loose to dense. Swell consolidation testing on two samples of the clayey sand materials exhibit low measured swell values when wetted.

Pockets of very sandy clay were encountered in two borings (TH-102 and TH-116). The clay was medium stiff to very stiff. Two samples of the clay tested in our laboratory contained 50 and 58 percent clay and silt-sized particles (passing the No. 200 sieve). Swell consolidation testing on the clay materials exhibit low measured swell values when wetted.

Groundwater

At the time of drilling, groundwater was encountered in fifteen of the exploratory borings at depths of 19 to 27 feet below the existing ground surface. When water levels were checked again several days after the completion of drilling operations, water was measured in sixteen of the borings at depths of 19.5 to 25 feet. Groundwater levels will vary with seasonal precipitation and landscaping irrigation.

Seismicity

This area, like most of central Colorado, is subject to a degree of seismic activity. Geologic evidence has been interpreted to indicate that movement along some Front Range faults has occurred during the last two million years (Quaternary). This includes the Rampart Range Fault, which is located several miles west of the site. 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

We do not expect significant issues due to geotechnical considerations to impact the development of the site. The most significant item identified is the presence of undocumented fill and debris. The following sections provide considerations and recommendations as they relate to site development

Undocumented Fill

Undocumented fill was identified at the site. The fill was generally associated with berms present throughout the site. Debris and household trash were also observed along the drainage channel. Other areas of fill or debris may be present; however, they were not identified at the boring locations.

Undocumented fill increases the risk of poor structure performance, as it is possible that poorly compacted or unstable materials may be present within the fill. The most reliable approach is to remove all existing, undocumented fill from below the proposed structures. Based on the finished floor elevations, the depth to existing fills will vary. We believe some fill may remain below structures, provided the owner accepts the risk of potential movements and associated damage, although debris and household waste should be removed, where identified. This approach will still require some removal of existing fill, as discussed in the foundation section of this report.

Site Grading

Current grading plans were provided by LCM Architects on September 3, 2020 and do not appear to differ from the grading plans prepared by JR Engineering (dated December 4, 2019) that were made available for our review during our preliminary geotechnical investigation. The plans suggest comparatively shallow cuts and fills (about 5 feet or less) will be necessary to achieve the desired building pad elevations for the area that will be developed with structures. We believe site grading can be accomplished using conventional, heavy-duty earthmoving equipment. 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.

Excavation

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 (existing and new) 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

The properties of the fill will affect the performance of foundations, slabs-on-grade, and pavements. The on-site soils, when free of debris, can be used as site grading fill. We anticipate most of the grading fill will consist of silty to clayey sand soils that are generated from cuts into the near surface, the existing fill layer as well as the stockpiles of soils present at the site. We understand import materials will be used from a nearby source. Import should preferably consist of granular soils, similar to the on-site soils. Import fill materials should exhibit liquid limits of less than 30 and plasticity indices of less than 10. A sample of the import fill should be submitted to our office for testing before transporting to the site.

Vegetation, topsoil, and organic materials should be removed from the ground surface where fill will be placed at the site. Soft or loose soils, if encountered, should be stabilized or removed to stable material prior to placement of grading fill. Organic soils should be wasted in landscaped areas. The ground surface in areas to receive fill should be scarified, moisture conditioned to near optimum moisture contents, and compacted to a high density to provide a firm base.

We recommend the fill be placed at relatively uniform moisture contents 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) for granular materials. Cohesive materials should be moisture conditioned to higher moisture contents of 1 to 4 percent over optimum and compacted to at least 95 percent of maximum standard Proctor dry density (ASTM D 698). Placement and compaction of the grading fill should be observed and tested by our representative during construction.

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 City of Colorado Springs specifications. Personnel from our firm should periodically observe utility trench backfill placement and test the density of the backfill materials during construction.

Detention Ponds

We understand two full-spectrum detention ponds are to be constructed along the eastern edge of the property, adjacent to the existing drainage channel. Grading plans provided to our office indicated the ponds will drain to the existing channel and will be constructed mostly below surrounding grades. We anticipate any detention pond embankments that are needed to achieve the desired storage capacity will be less than 5 feet in height and will consist of fill materials generated from the on-site, sand soils. We recommend the proposed pond embankments have a maximum slope of 3:1 (horizontal to vertical). The embankment fill materials should be moisture conditioned and compacted as specified previously.

Subsurface conditions encountered in exploratory borings drilled within the proposed sites of the detention ponds (borings TH-5 and TH-12 CTL Project No. CS19163.000-105) consisted of 15 feet of medium dense to dense, slightly silty to silty sand. In our opinion, the anticipated subgrade materials are suitable to underlie the planned embankment fills with minimal subgrade compression.

FOUNDATIONS

Based on the conditions encountered in our exploratory borings and the planned site grading cuts and fills, we anticipate the near-surface soils found at or near shallow foundation levels for the proposed apartment buildings, clubhouse, and garages will consist predominantly of natural, clean to silty sand and new, sand grading fill. These granular materials are non-expansive when wetted. Existing fill encountered within the proposed building footprints should be excavated to expose the underlying natural soil and then moisture conditioned and compacted as specified previously in the FILL PLACEMENT section of the report.

We understand current plans call for the proposed apartment buildings and the clubhouse to be constructed with post-tensioned, slab-on-ground (PTS) foundations. In our opinion, the on-site soils are suitable for construction of the planned PTS foundations. Conditions encountered in our borings suggest that the complex can be consid-

ered a “Non-Active Site” as defined in Section 3.2.3 of the “Design of Post-Tensioned Slabs-on-Ground” manual developed by the Post-Tensioning Institute (PTI, 3rd Edition, 2004). The design of a PTS foundation for a non-active site requires that the foundation need only be checked for bearing and lightly reinforced against shrinkage and temperature cracking.

Post-tensioned slab foundations structurally integrate the floor slabs and foundations and should exhibit more reliable, long-term performance than conventional slabs-on-grade and isolated shallow foundations. Criteria for post-tensioned, slabs-on-grade are presented in the Post-Tensioned, Slabs-on-Grade section. In our opinion the proposed garages can be constructed with spread footing foundations. Criteria for spread footings are presented in the Spread Footings section. We are available to discuss foundation alternatives, as desired.

Post-Tensioned, Slabs-On-Grade (PTS)

1. PTS foundations should be constructed on the natural sands, newly placed grading fill, and/or reconditioned existing fill. Below-foundation fill materials, soils loosened during excavation or in the forming process, or soft or loose soils exposed in the excavation should be moisture conditioned and compacted as specified previously in the FILL PLACEMENT section of the report.
2. The PTS foundations should be designed for a maximum allowable soil pressure of 2,000 psf.
3. Perimeter stiffening beams may be poured “neat” into trenches excavated in the building pads. The on-site sands may cave or slough during trench excavation for the stiffening beams. Disturbed soils should be removed from trench bottoms prior to placement of concrete. Formwork or other methods may be required for proper beam installation.
4. For slab tensioning design, a coefficient of friction value of 0.75 or 1.0 can be used for slab construction on polyethylene sheeting or a sand layer, respectively. A coefficient of friction of 2 should be used for slabs on fill or native soil.
5. Exterior stiffening beams must be protected from frost action. Normally, 30 inches of frost cover is provided in this area.
6. A representative of our firm should observe the completed excavations. We should also observe the placement of the reinforcing tendons and re-

inforcement prior to placing the slabs and beams, as well as observe the tensioning of the tendons.

Spread Footing Foundations

1. We recommend the spread footing foundations be constructed on the natural sand soils and/or new, compacted granular fill. Loose natural sands encountered in the foundation excavations and materials loosened during the excavation process should be moisture conditioned and compacted in accordance with the criteria presented in FILL PLACEMENT, prior to the placement of concrete.
2. Spread footings can be designed for a maximum allowable soil pressure of 2,000 psf.
3. Spread footings beneath continuous foundation walls should be at least 16 inches wide. Footings beneath isolated column pads should be at least 24 inches square. Larger footing sizes could be required to accommodate the anticipated foundation loads.
4. We recommend designs consider total settlement of 1-inch and differential settlement of 3/4-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. Exterior spread footings within the garages must be protected from frost action. Typically, at least 30 inches of soil cover is provided in this area.
7. 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

As previously discussed, soils below the post tensioned slab will consist of a layer of fill over the existing soils. For a 15-foot depth of wetting, our calculations indicate potential ground heave within the building footprint of less than 1 inch to about 2 inches. For the PTS system, the foundation is structurally integrated with the floor slab and should exhibit more reliable long-term performance, as compared to conventional slab-on-grade floors. Under-slab utilities such as water and sewer lines should be pressure tested prior to installing slabs. Utilities that penetrate slabs 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 2 inches of differential movement between the slabs and pipes.

Exterior Flatwork

Exterior flatwork is normally constructed as a slab-on-grade. Performance of conventional slabs-on-grade on expansive soils is erratic. Various properties of the soils and environmental conditions influence the magnitude of movement and other performance characteristics of slabs underlain by expansive soils. Increases in the moisture content of expansive soils will cause heaving and may result in cracking of slabs-on-grade. Exterior flatwork should be designed and constructed to move independently relative to the proposed building foundations.

SWIMMING POOL AND POOL DECK

We understand a swimming pool is planned in association with the proposed clubhouse. No plans were available at the time of this investigation. We anticipate the pool structure may consist of spray-applied gunite against natural soil, or possibly a steel or a fiberglass shell. Because of the 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 option. 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 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.

Pool decking should be constructed directly on the newly moisture conditioned and densely compacted sub-excavation backfill and be isolated from the swimming pool. Movement of the deck should not be transmitted to the swimming pool. The deck slab should be reinforced to function as an independent unit. Frequent control joints should be provided to reduce problems associated with potential soil movements. Panels that are approximately square generally perform better than rectangular areas.

PAVEMENTS

Our exploratory borings and understanding of the proposed construction suggest the subgrade soils within the planned access driveways and parking lots will consist of natural, silty sand, existing sand fill, and new grading fill. The anticipated subgrade soil sample tested in our laboratory classified as A-1-b to A-4 material, according to the American Association of State Highway Transportation Officials (AASHTO) classification system. A-1-b sandy subgrade materials generally exhibit good pavement support characteristics. A-4 silty subgrade materials generally exhibit fair to poor pavement support characteristics. Based on our laboratory classification testing (Atterberg Limits and sieve analysis) and experience with similar soils in the area a Hveem Stabilometer ("R") value of 35 was assigned to the subgrade materials for design purposes.

We anticipate the access driveways could be subjected to occasional heavy vehicle loads such as trash trucks and moving vans. We considered daily traffic numbers (DTN) of 2 for the parking stalls and 10 for the access driveways, which correspond to 18-kip Equivalent Single-Axle Loads (ESAL) of 14,600 and 73,000, respectively, for a 20-year pavement design life. We believe the parking stalls can be paved with 5 inches

of asphalt concrete or 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 or 4 inches of asphalt underlain by 6 inches of aggregate base course.

We recommend a concrete pad be provided at the trash dumpster sites. The pads should be at least 6 inches thick and long enough to support the entire length of the trash truck and dumpster. The concrete pad should extend at least 5 feet outside of the anticipated truck dimensions. 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 City of Colorado Springs “Standard Specifications” and the Pikes Peak Region Asphalt Paving Specifications. 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. Soft or loose subgrade or 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.

CONCRETE

Concrete in contact with soils can be subject to sulfate attack. We measured the water-soluble sulfate concentration in three samples from the site at less than 0.1 percent. Sulfate concentrations of less than 0.1 percent indicate Class 0 exposure to sulfate attack for concrete in contact with the subsoils, according to ACI 201.2R-01, as published in the 2008 American Concrete Institute (ACI) Manual of Concrete Practice. For this level of sulfate concentration, the ACI indicates Type I cement can be used for concrete in contact with the subsoils. Superficial damage may occur to the exposed

surfaces of highly permeable concrete, even though sulfate levels are relatively low. To control this risk and to resist freeze-thaw deterioration, the water-to-cementitious material 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 subjected to freeze-thaw cycles should be air entrained.

LIMITATIONS

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

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

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

CTL | THOMPSON, INC.

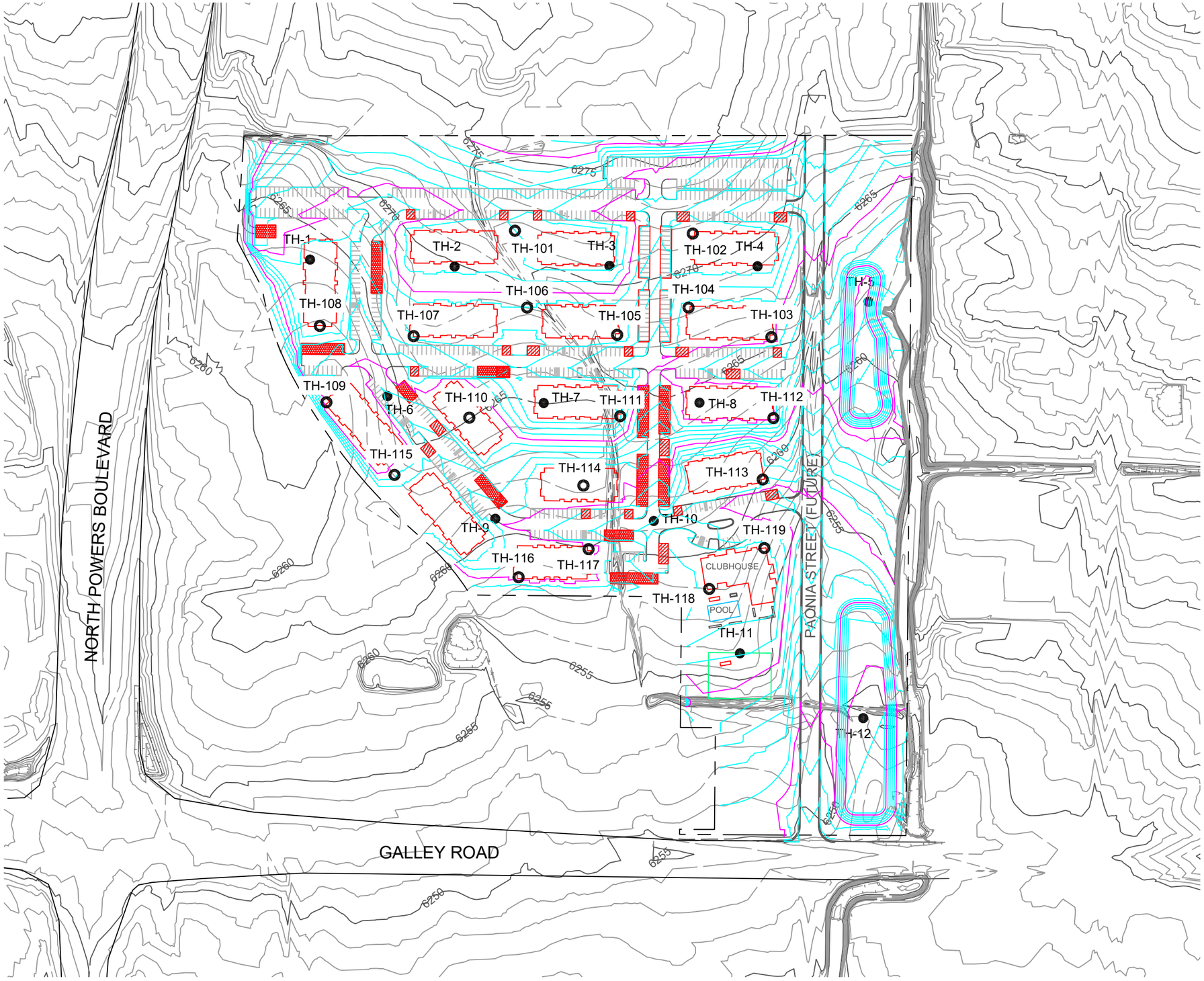
COLORADO LICENSED GWENDOLYN ELIZABETH EBERHART 45929 11/15/2021 PROFESSIONAL ENGINEER

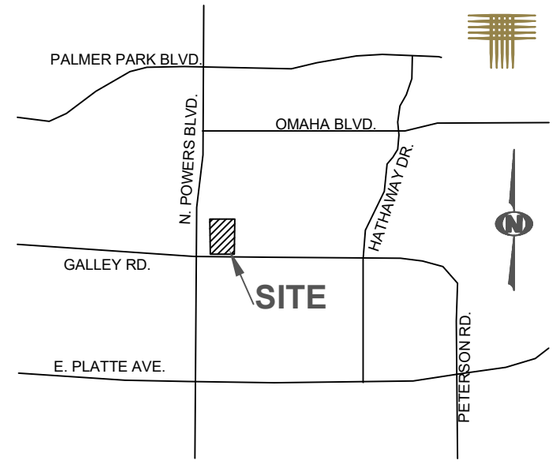
Gwendolyn E. Eberhart, P.E.
Project Engineer

Reviewed by:

Timothy A. Mitchell, P.E.
Division Manager

GE:TAM:ge
(3 copies sent)
Via email: josh@sub4dev.com





VICINITY MAP

(NOT TO SCALE)

LEGEND:

- TH-101 — APPROXIMATE LOCATION OF EXPLORATORY BORING.
- TH-1 — APPROXIMATE LOCATION OF EXPLORATORY BORING DRILLED DURING PREVIOUS INVESTIGATION (PROJECT NO. CS19163--125)
- PROJECT BOUNDARY
- LOCATION OF PROPOSED BUILDING FOOTPRINT.
- EXISTING TOPOGRAPHY
- PROPOSED GRADING CONTOURS
- CARPORT
- GARAGE

0 100' 200'

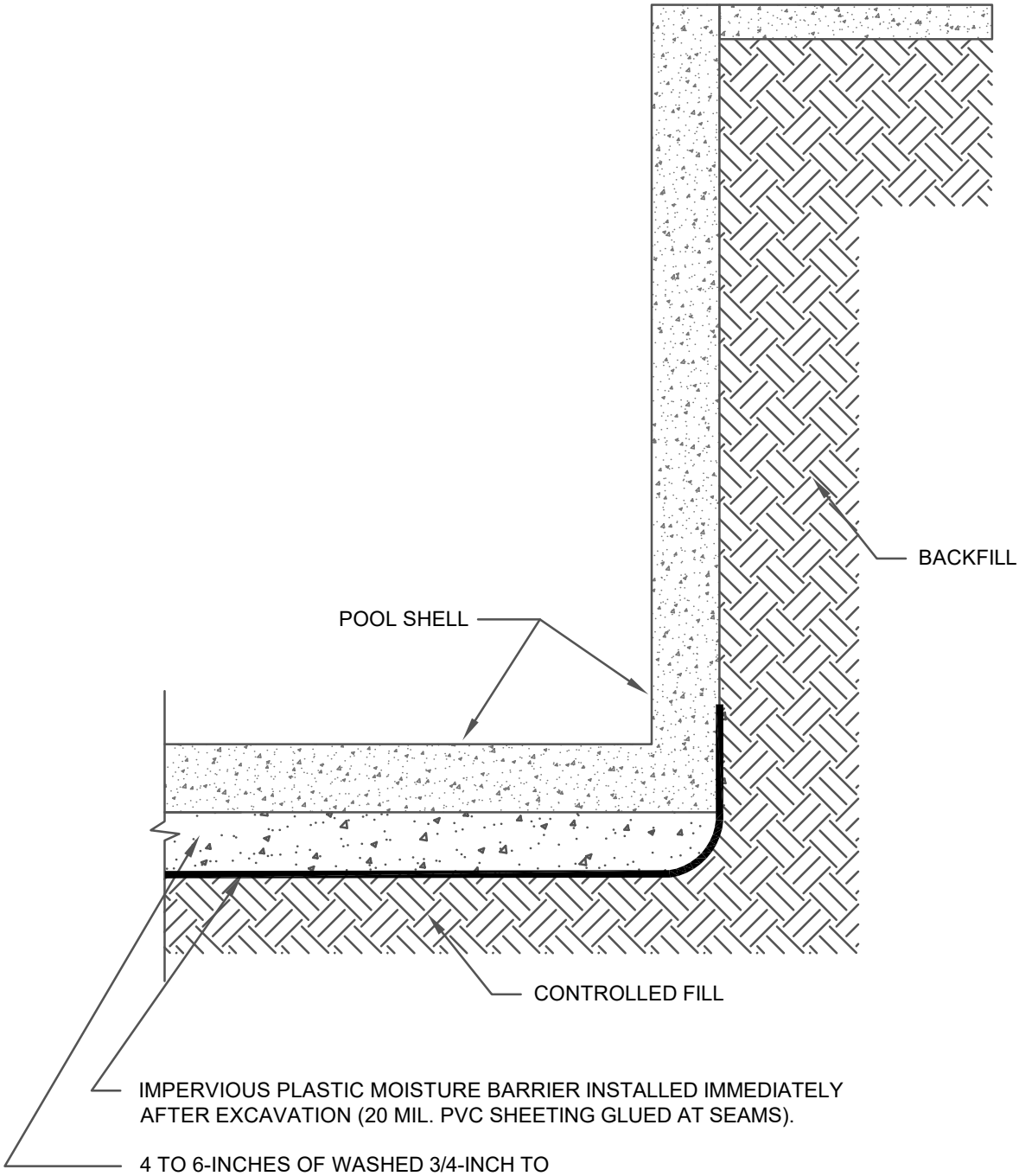
SCALE: 1" = 200'

NOTE:
BASE DRAWING WAS PROVIDED BY NES IN AN EMAIL DATED DECEMBER 4, 2019.

SUB4 DEVELOPMENT CORPORATION
SOLACE COLORADO SPRINGS
CTL|T PROJECT NO. CS19163.001-125

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.

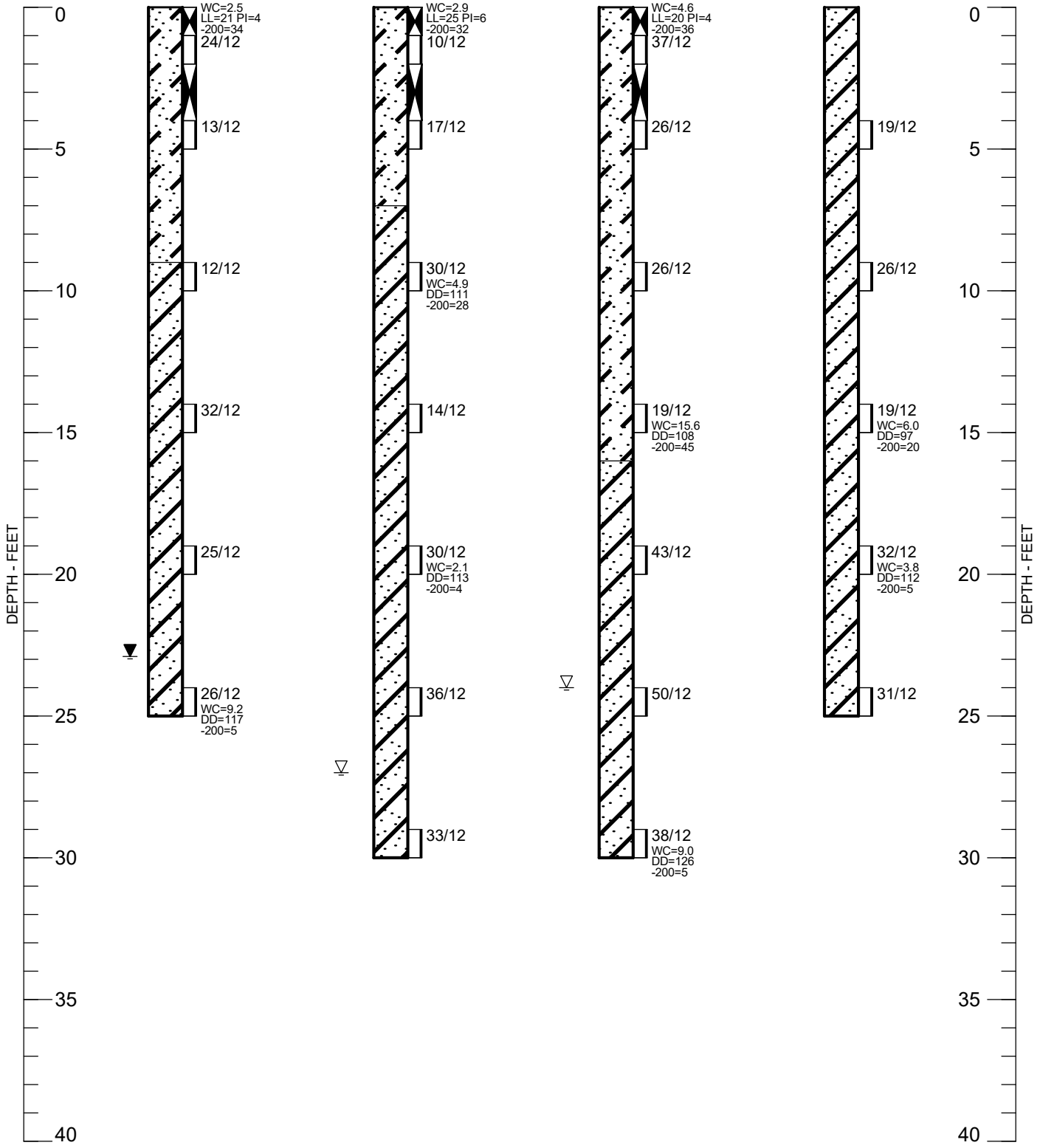
Recommended Pool Drain Detail

FIG. 2

SUB4 DEVELOPMENT CORPORATION
SOLACE APARTMENT COMPLEX
CTL|T PROJECT NO. CS19163.001-125

APPENDIX A

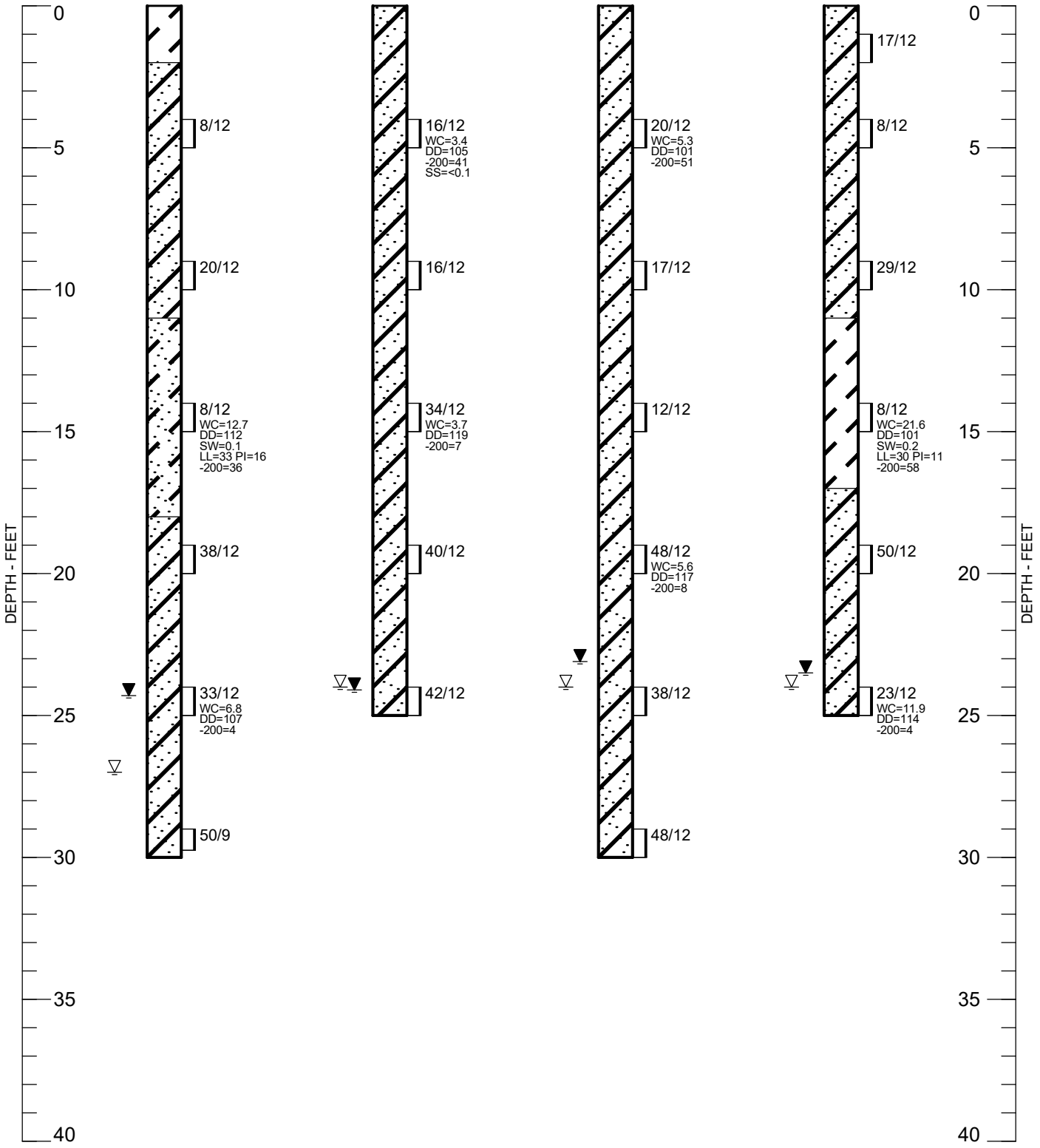
SUMMARY LOGS OF EXPLORATORY BORINGS



SUMMARY LOGS OF EXPLORATORY BORINGS

SUB4 DEVELOPMENT CORPORATION
SOLACE APARTMENT COMPLEX
CTL|T PROJECT NO. CS19163.001-125

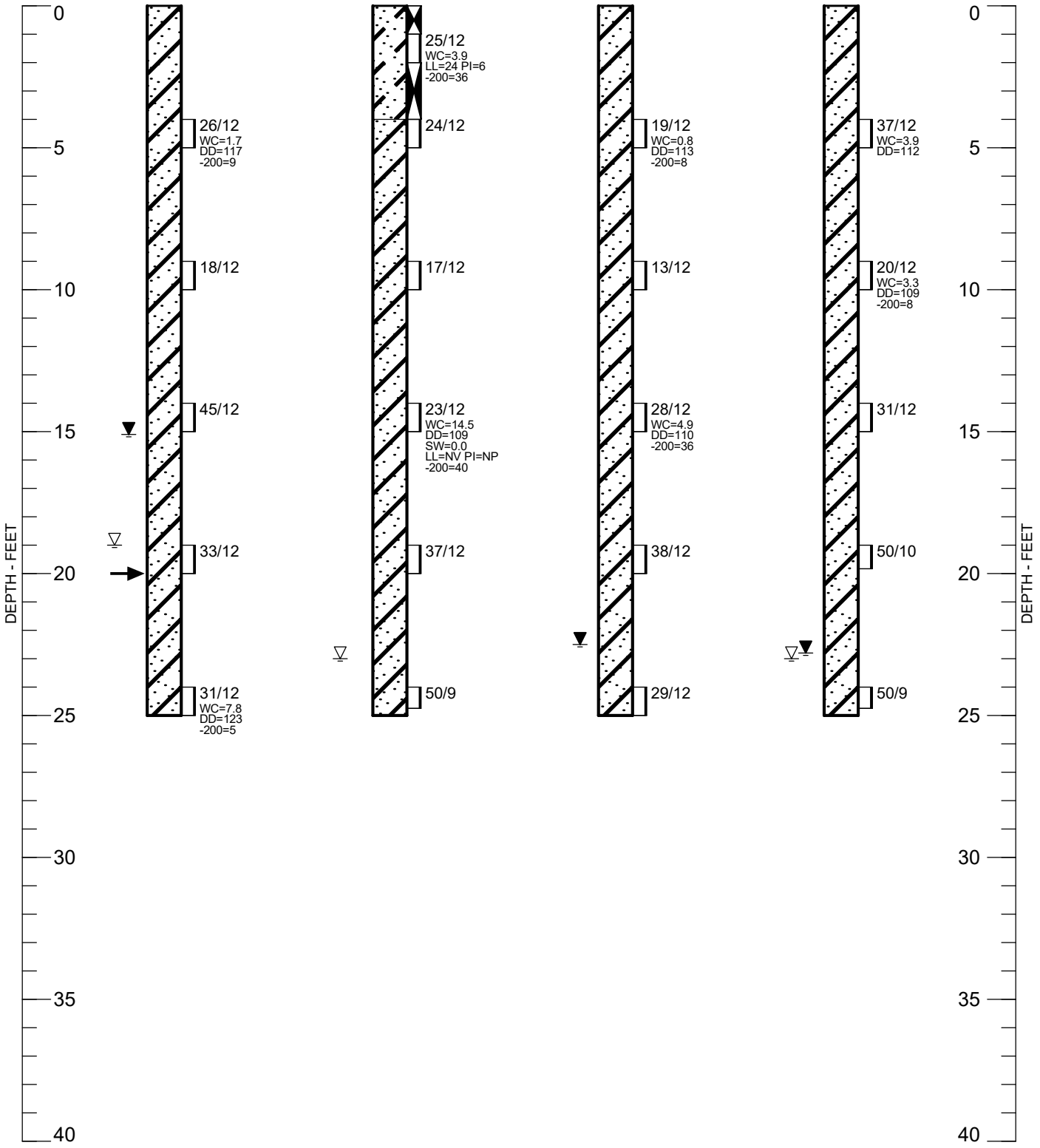
FIG. A- 1



SUMMARY LOGS OF EXPLORATORY BORINGS

SUB4 DEVELOPMENT CORPORATION
SOLACE APARTMENT COMPLEX
CTL|T PROJECT NO. CS19163.001-125

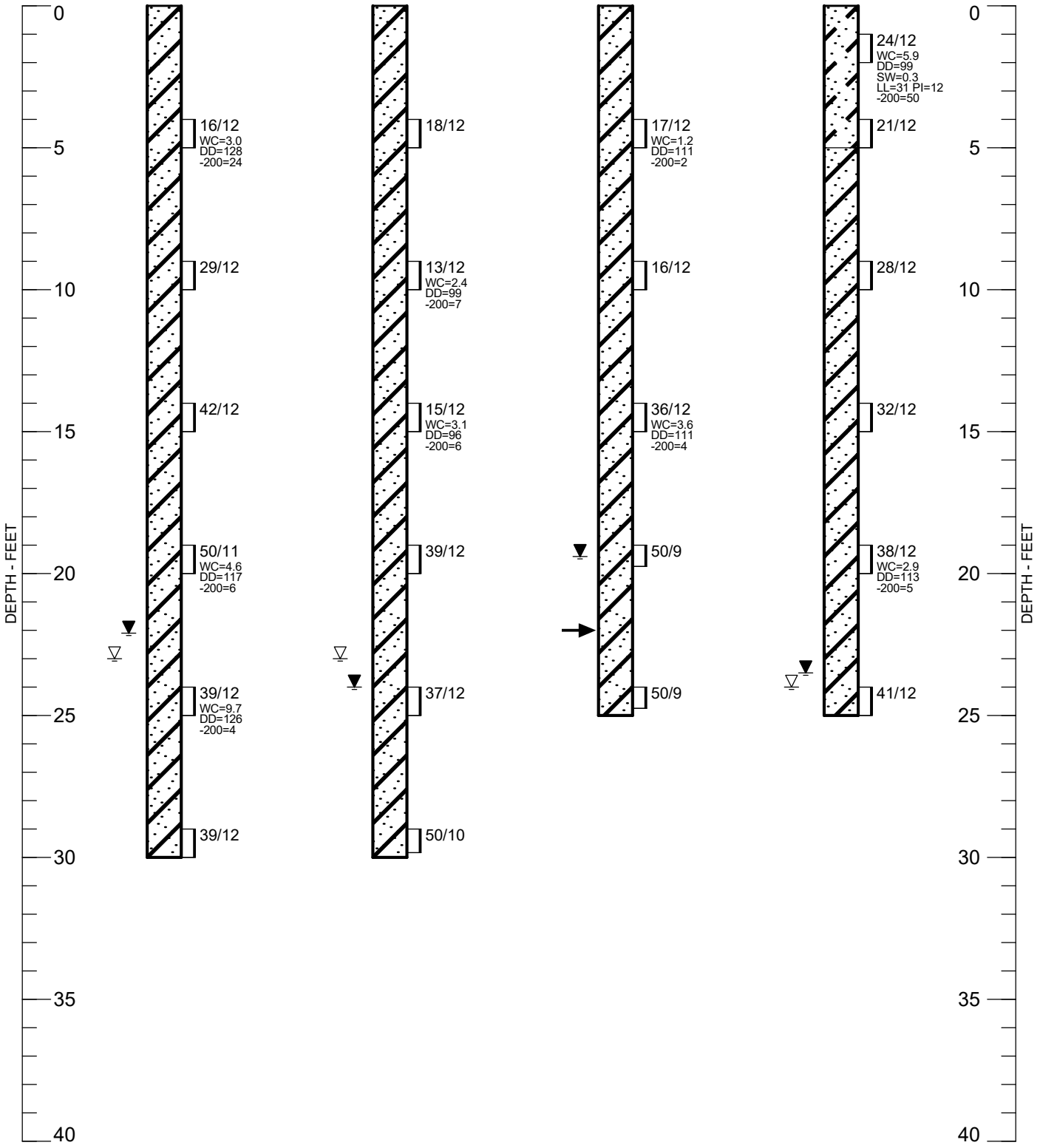
FIG. A- 2



SUMMARY LOGS OF EXPLORATORY BORINGS

SUB4 DEVELOPMENT CORPORATION
SOLACE APARTMENT COMPLEX
CTL|T PROJECT NO. CS19163.001-125

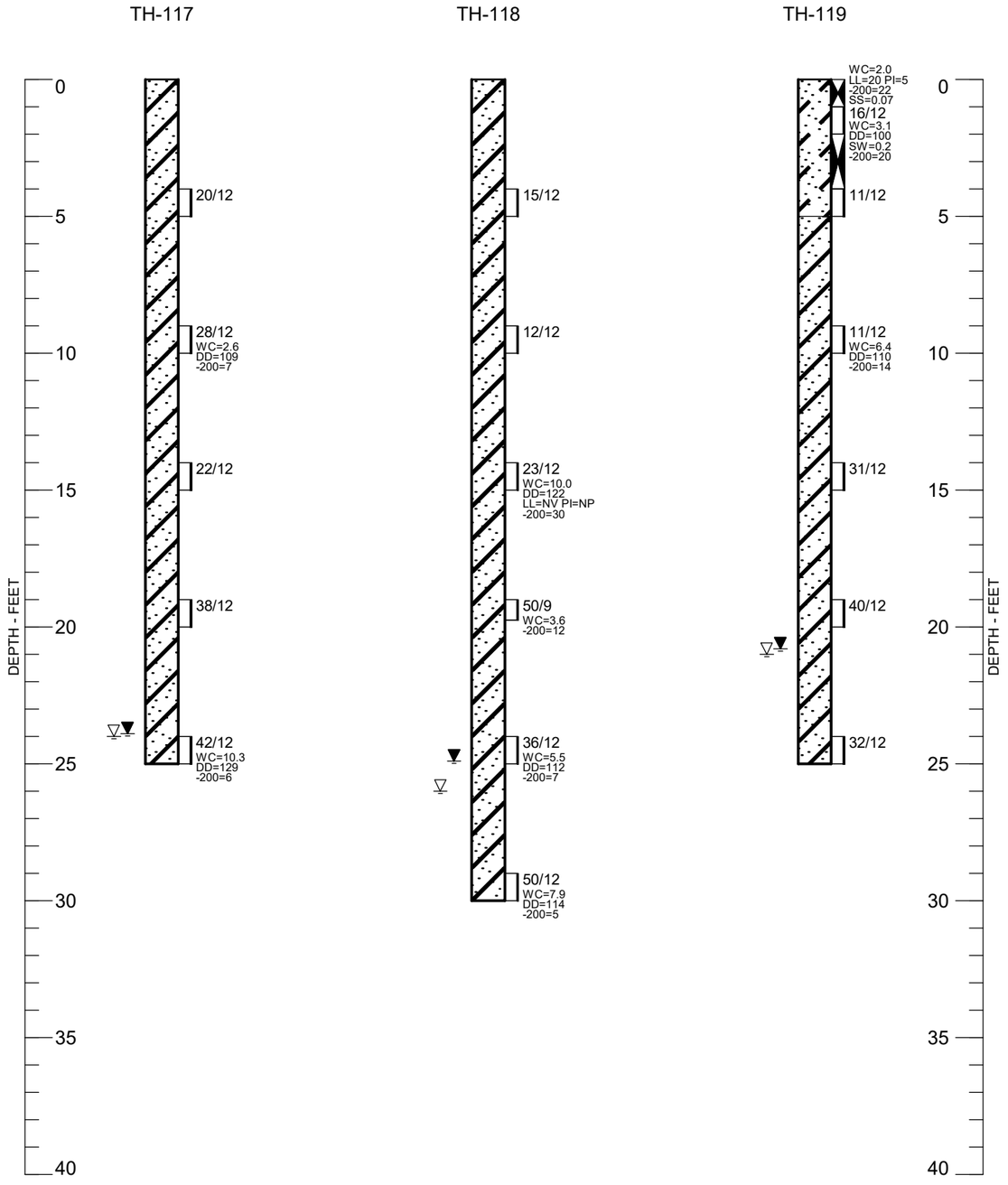
FIG. A- 3



SUMMARY LOGS OF EXPLORATORY BORINGS

SUB4 DEVELOPMENT CORPORATION
SOLACE APARTMENT COMPLEX
CTL|T PROJECT NO. CS19163.001-125

FIG. A- 4



SUMMARY LOGS OF EXPLORATORY BORINGS

LEGEND:

SAND, CLEAN TO VERY SILTY, LOOSE TO DENSE, SLIGHTLY MOIST TO WET, LIGHT TO MEDIUM BROWN, LIGHT GRAY (SP, SP-SM, SW-SM, SM).

SAND, CLAYEY AND SILTY TO CLAYEY, MEDIUM DENSE, DARK BROWN (SC, SC-SM).

CLAY, SANDY TO VERY SANDY, STIFF, VERY MOIST, GRAY, BROWN (CL).

DRIVE SAMPLE. THE SYMBOL 24/12 INDICATES 24 BLOWS OF AN AUTOMATIC 140-POUND HAMMER FALLING 30 INCHES WERE REQUIRED TO DRIVE A 2.5-INCH O.D. SAMPLER 12 INCHES.

BULK SAMPLE COLLECTED FROM AUGER CUTTINGS.

WATER LEVEL MEASURED AT TIME OF DRILLING.

WATER LEVEL MEASURED SEVERAL DAYS AFTER DRILLING.

INDICATES DEPTH WHERE HOLE CAVED.

NOTES:

1. THE BORINGS WERE DRILLED ON SEPTEMBER 28 AND 29, 2020 USING 4-INCH DIAMETER, CONTINUOUS-FLIGHT SOLID-STEM AUGER AND TRUCK-MOUNTED CME-45 DRILL RIG.

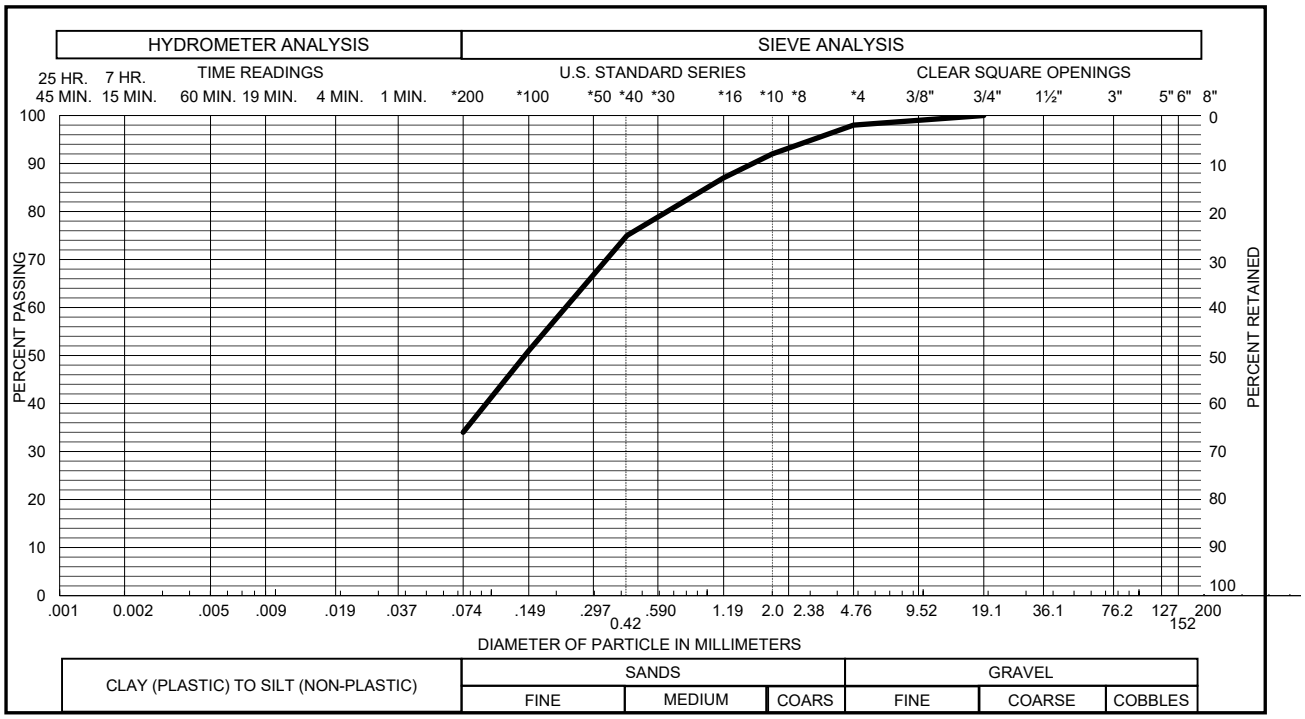
2. WC - INDICATES MOISTURE CONTENT (%).
   DD - INDICATES DRY DENSITY (PCF).
   SW - INDICATES SWELL WHEN WETTED UNDER APPLIED PRESSURE (%).
   COM - INDICATES COMPRESSION WHEN WETTED UNDER APPLIED PRESSURE (%).
   LL - INDICATES LIQUID LIMIT.
   PI - INDICATES PLASTICITY INDEX.
   -200 - INDICATES PASSING NO. 200 SIEVE (%).
   SS - INDICATES WATER-SOLUBLE SULFATE CONTENT (%).

3. THESE LOGS ARE SUBJECT TO THE EXPLANATIONS, LIMITATIONS AND CONCLUSIONS CONTAINED IN THIS REPORT.

SUB4 DEVELOPMENT CORPORATION
SOLACE APARTMENT COMPLEX
CTL|T PROJECT NO. CS19163.001-125

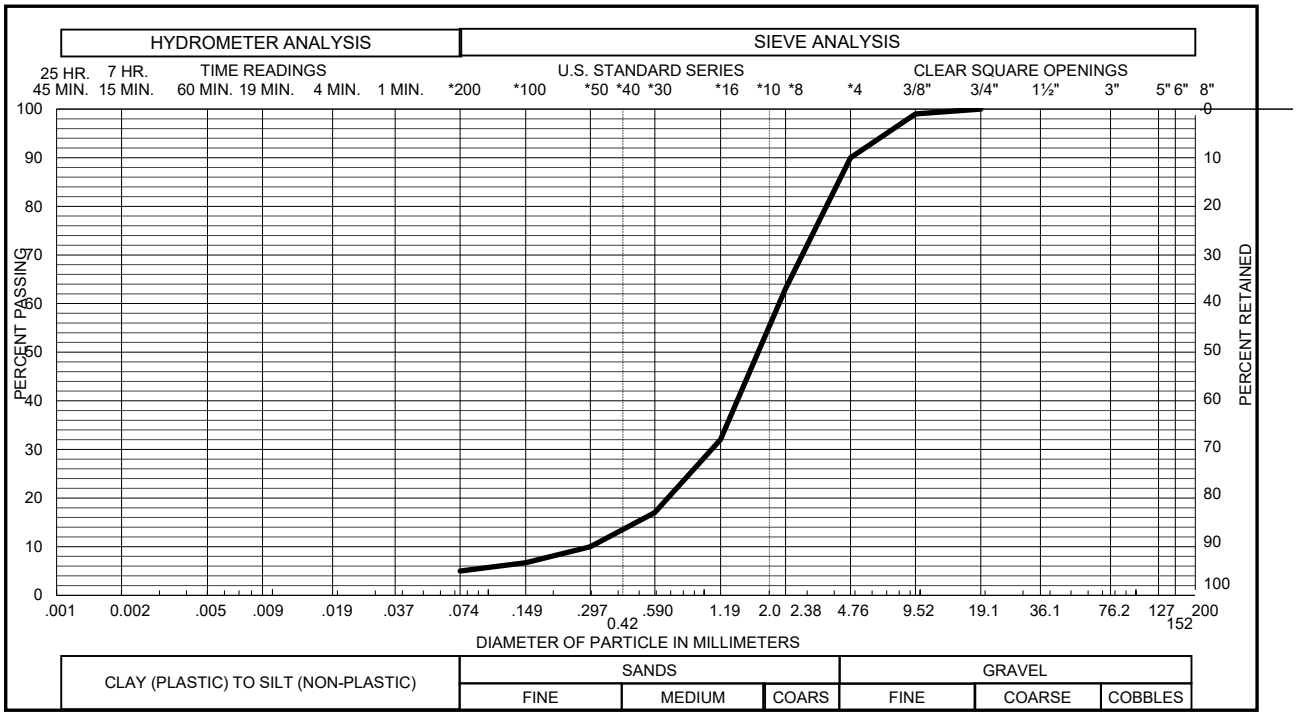
APPENDIX B

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



Sample of SAND, CLAYEY AND SILTY (SC-SM)
From TH - 101 AT 0-4 FEET

GRAVEL	2 %	SAND	64 %
SILT & CLAY	34 %	LIQUID LIMIT	21 %
PLASTICITY INDEX			4 %



Sample of SAND, SLIGHTLY SILTY (SW-SM)
From TH - 101 AT 24 FEET

GRAVEL	10 %	SAND	85 %
SILT & CLAY	5 %	LIQUID LIMIT	%
PLASTICITY INDEX			%

SUB4 DEVELOPMENT
SOLACE APARTMENT COMPLEX
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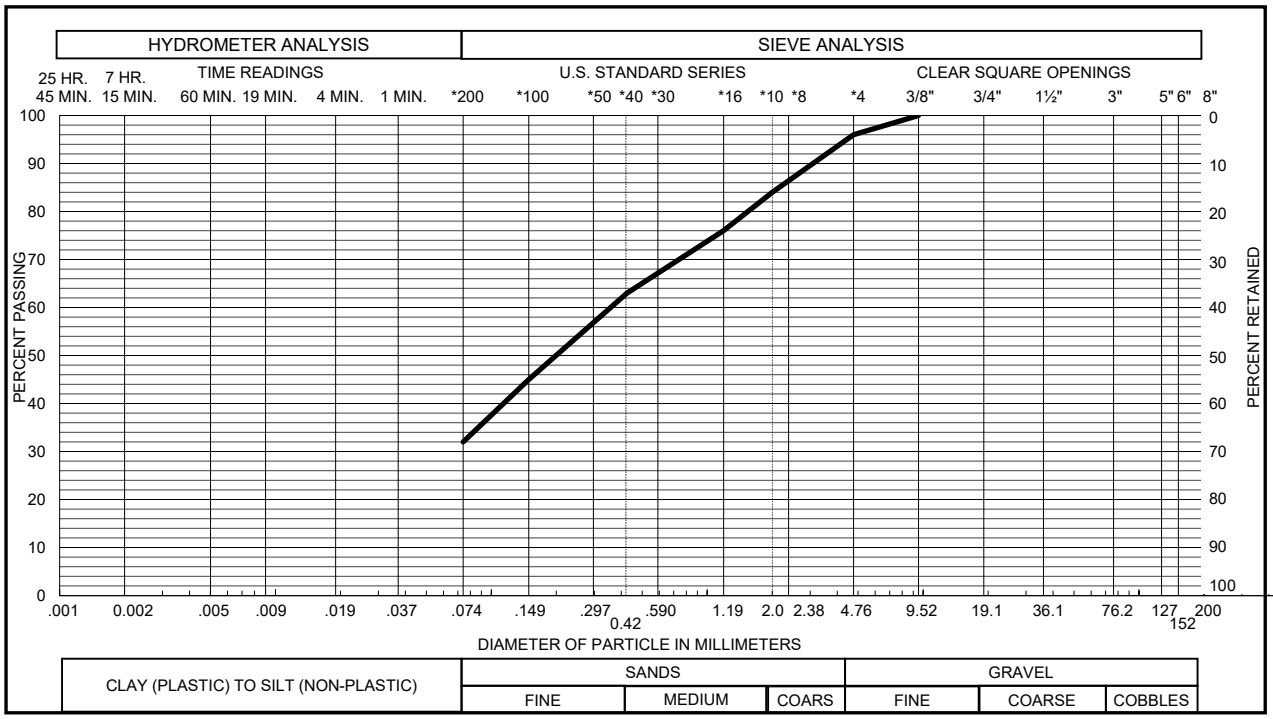
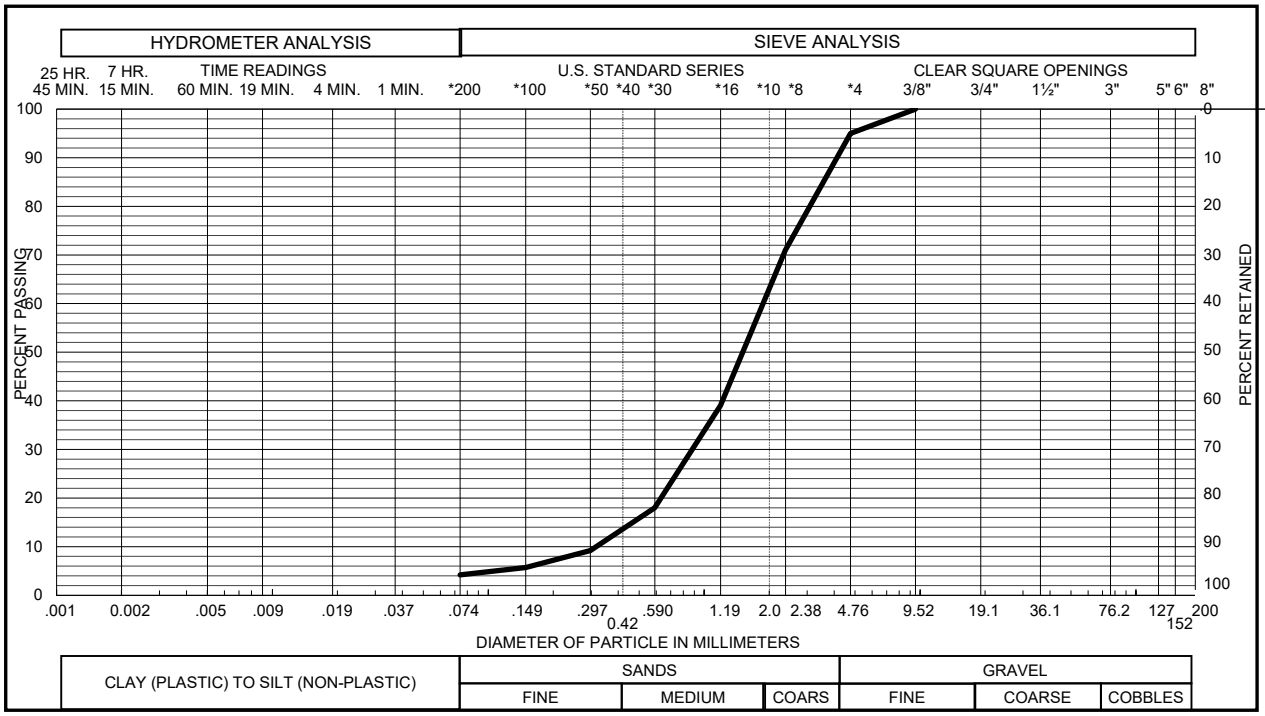
Gradation Test Results

FIG. B-1



Sample of SAND, CLAYEY AND SILTY (SC-SM)
From TH - 102 AT 0-4 FEET

GRAVEL 4 % SAND 64 %
SILT & CLAY 32 % LIQUID LIMIT %
PLASTICITY INDEX %



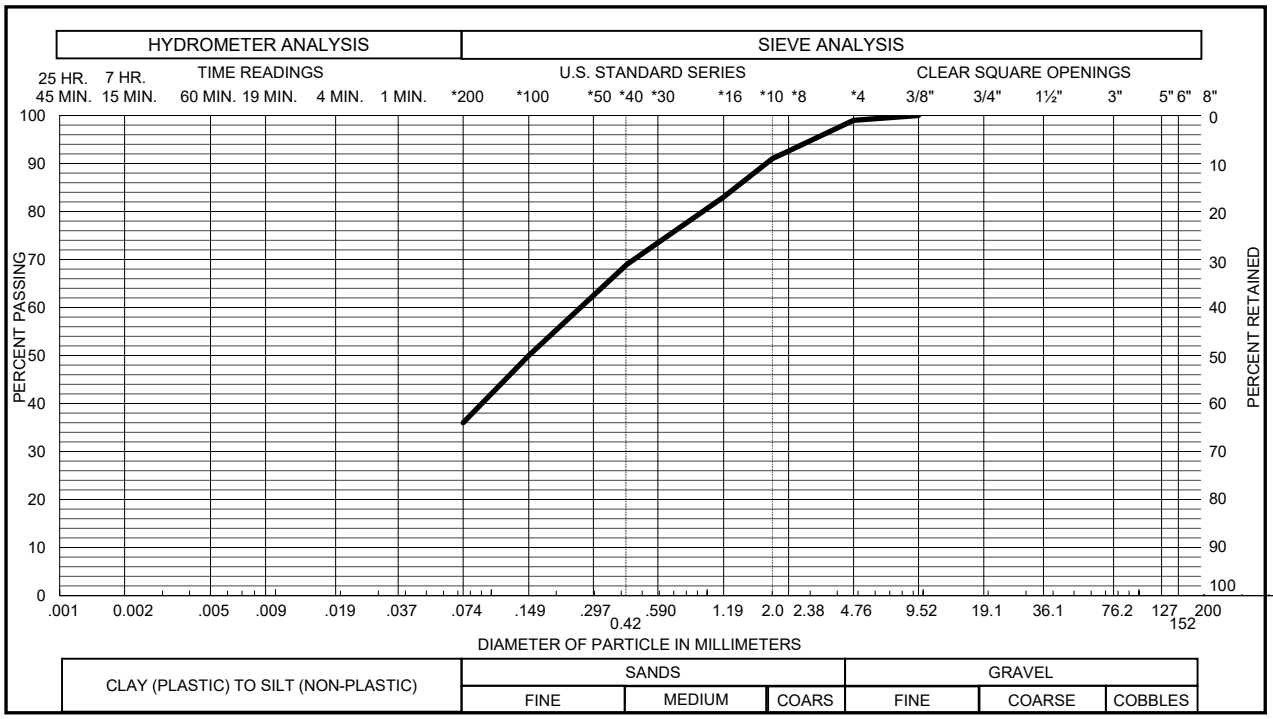
Sample of SAND (SP)
From TH - 102 AT 19 FEET

GRAVEL 5 % SAND 91 %
SILT & CLAY 4 % LIQUID LIMIT %
PLASTICITY INDEX %

SUB4 DEVELOPMENT
SOLACE APARTMENT COMPLEX
CTL|T PROJECT NO. CS19163.001-125

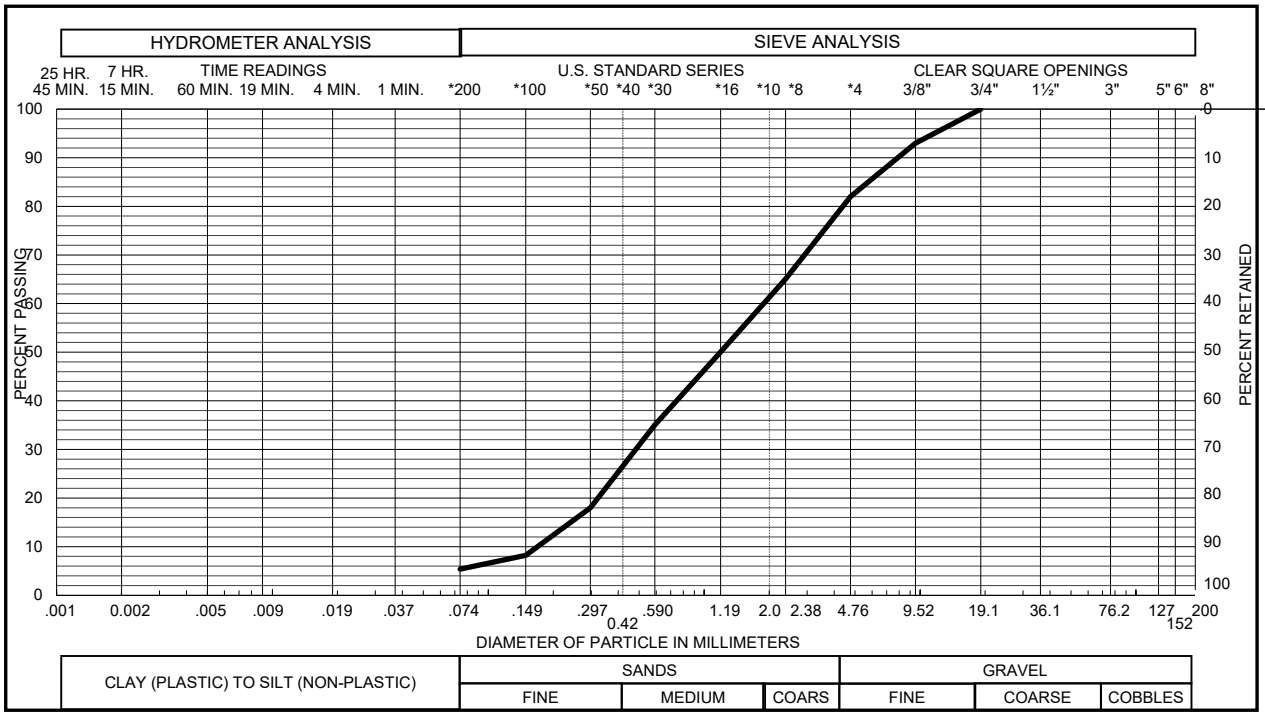
Gradation Test Results

FIG. B-2



Sample of SAND, CLAYEY AND SILTY (SC-SM)
From TH - 103 AT 0-4 FEET

GRAVEL	1 %	SAND	63 %
SILT & CLAY	36 %	LIQUID LIMIT	20 %
PLASTICITY INDEX			4 %



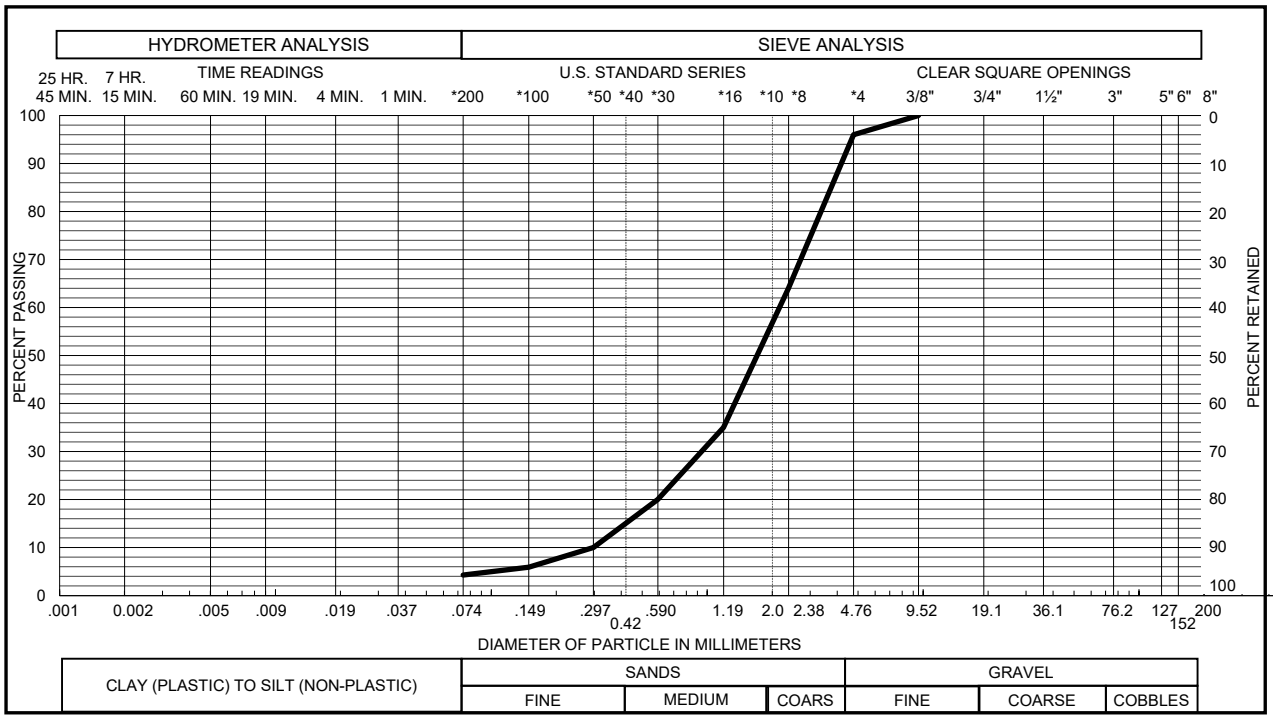
Sample of SAND, SLIGHTLY SILTY (SP-SM)
From TH - 103 AT 29 FEET

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

SUB4 DEVELOPMENT
SOLACE APARTMENT COMPLEX
CTL|T PROJECT NO. CS19163.001-125

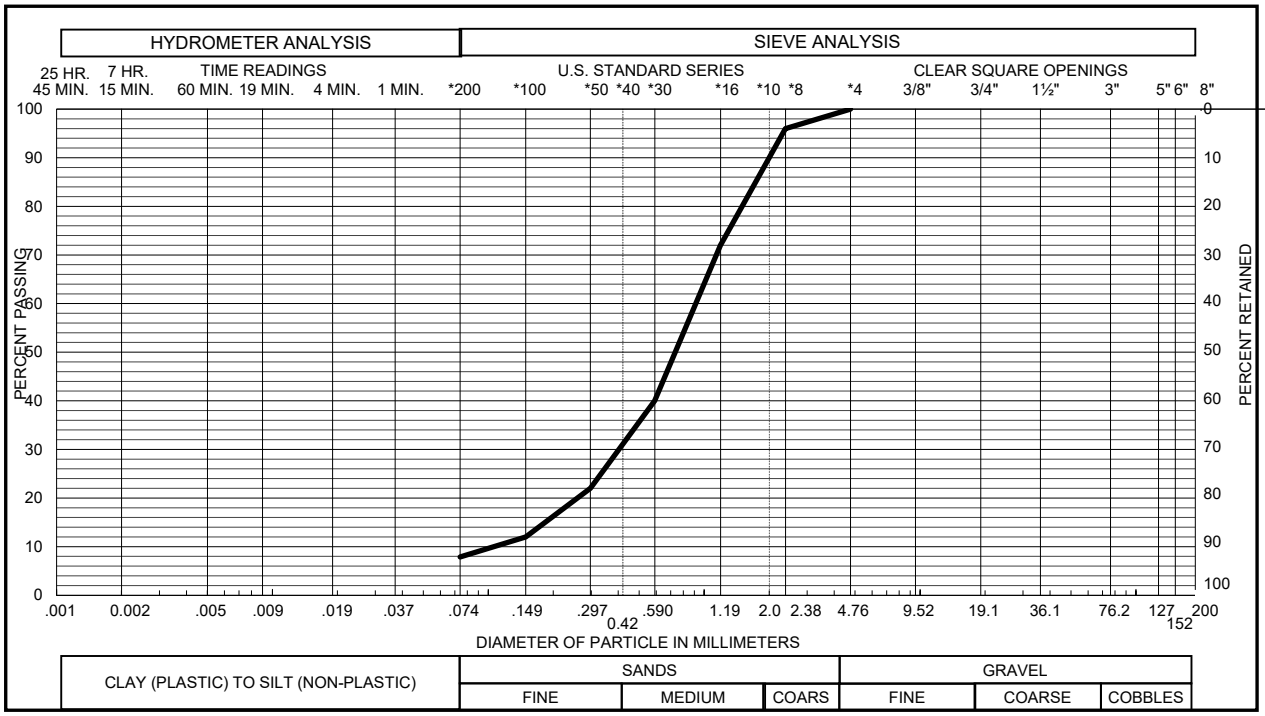
Gradation Test Results

FIG. B-3



Sample of SAND (SW)
From TH - 105 AT 24 FEET

GRAVEL 4 % SAND 92 %
SILT & CLAY 4 % LIQUID LIMIT %
PLASTICITY INDEX %



Sample of SAND, SLIGHTLY SILTY (SP-SM)
From TH - 107 AT 19 FEET

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

SUB4 DEVELOPMENT
SOLACE APARTMENT COMPLEX
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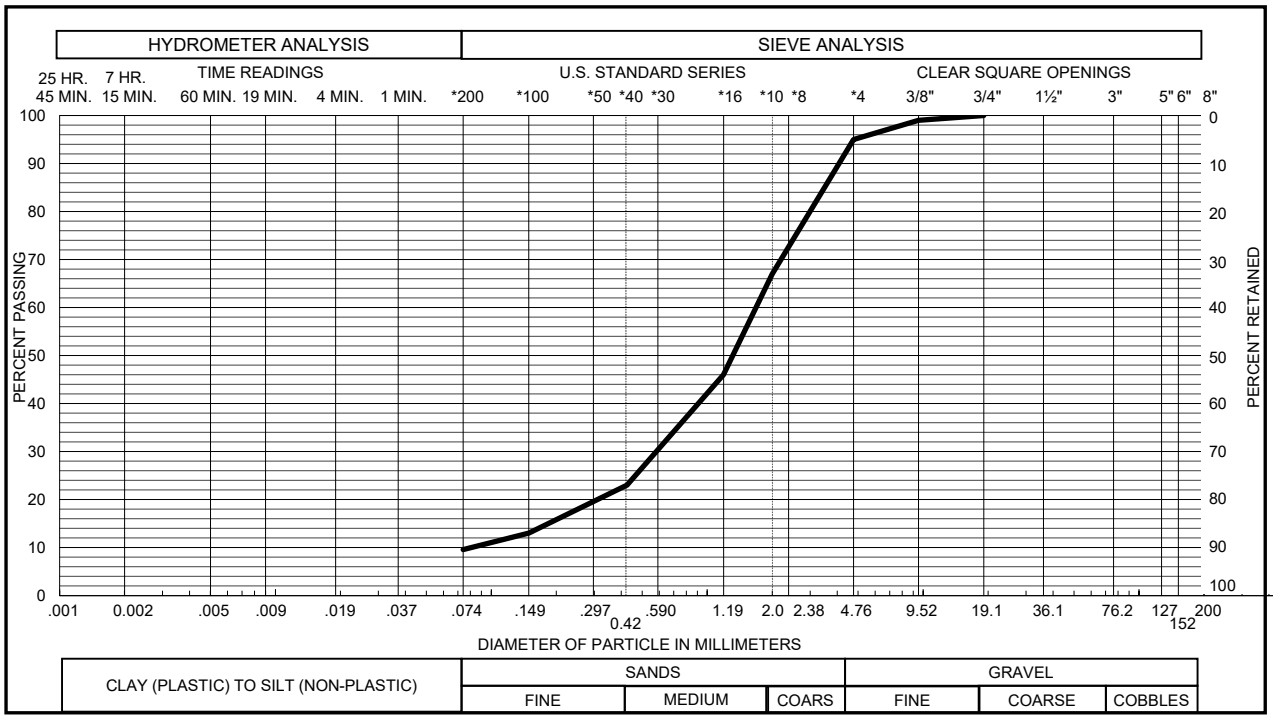
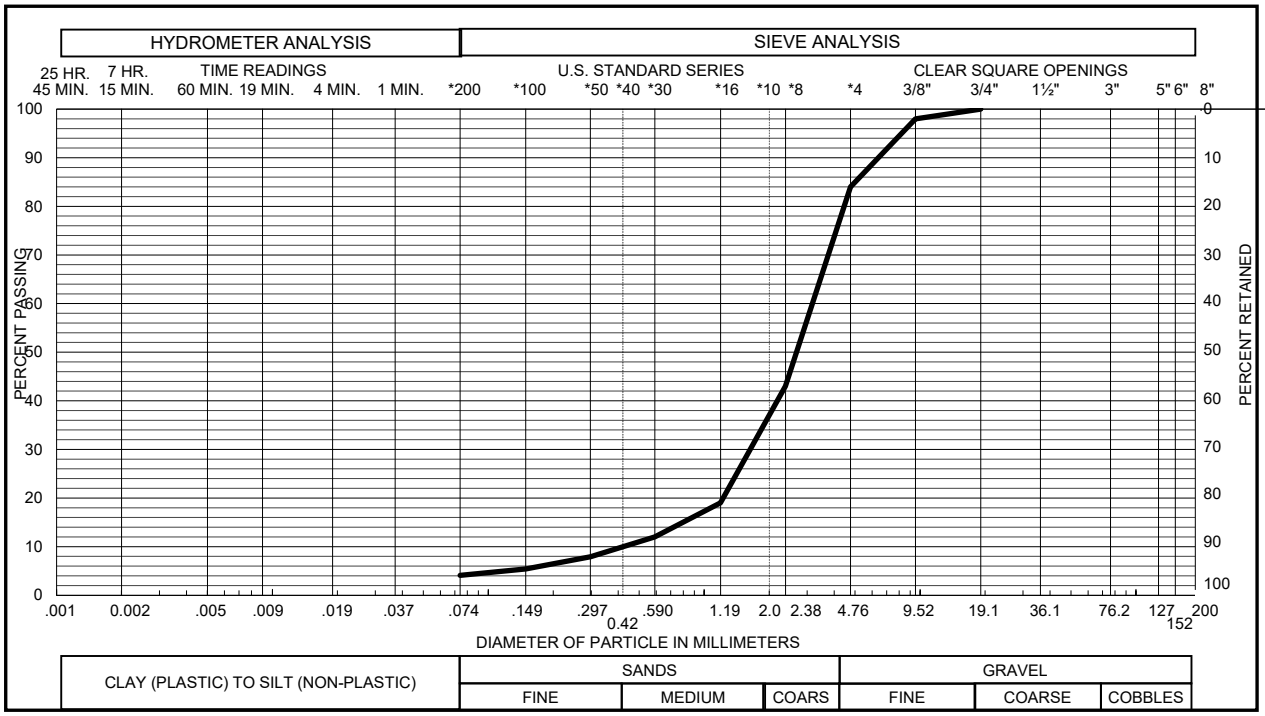
Gradation Test Results

FIG. B-4



Sample of SAND, SLIGHTLY SILTY (SP-SM)
From TH - 108 AT 0-4 FEET

GRAVEL 5 % SAND 85 %
SILT & CLAY 10 % LIQUID LIMIT %
PLASTICITY INDEX %



Sample of SAND (SW)
From TH - 108 AT 24 FEET

GRAVEL 16 % SAND 80 %
SILT & CLAY 4 % LIQUID LIMIT %
PLASTICITY INDEX %

SUB4 DEVELOPMENT
SOLACE APARTMENT COMPLEX
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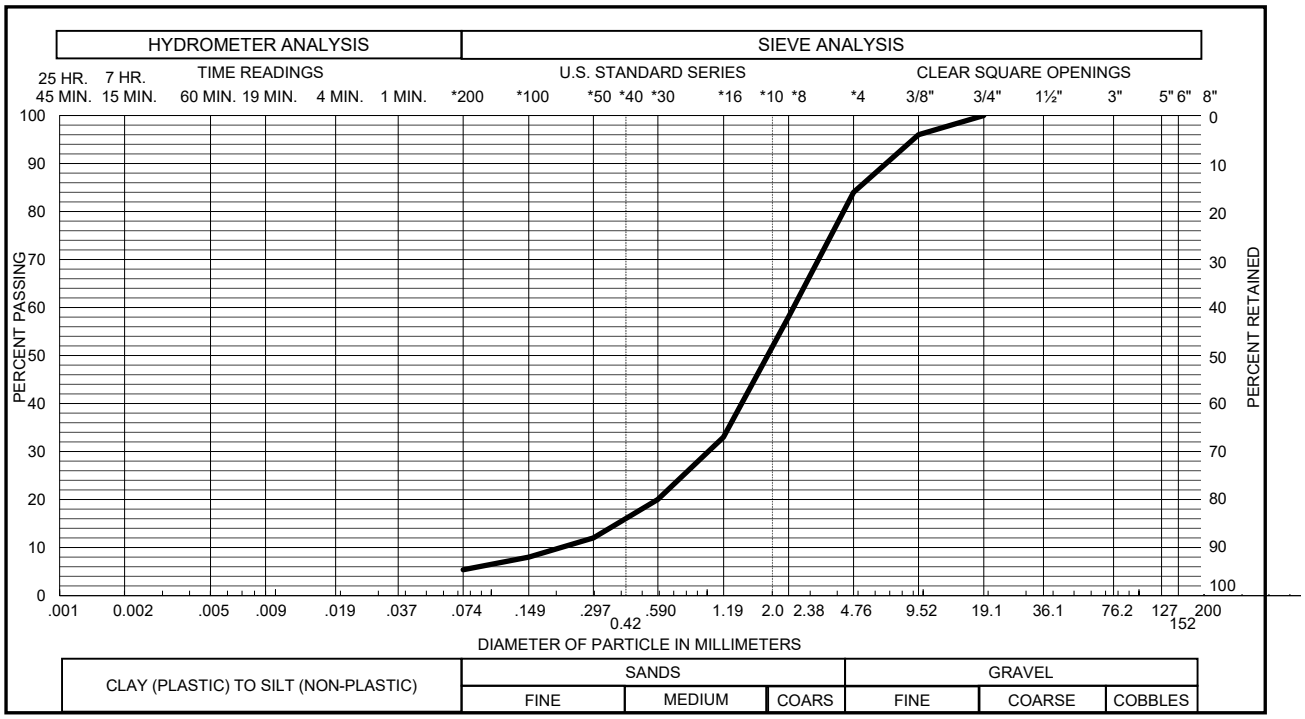
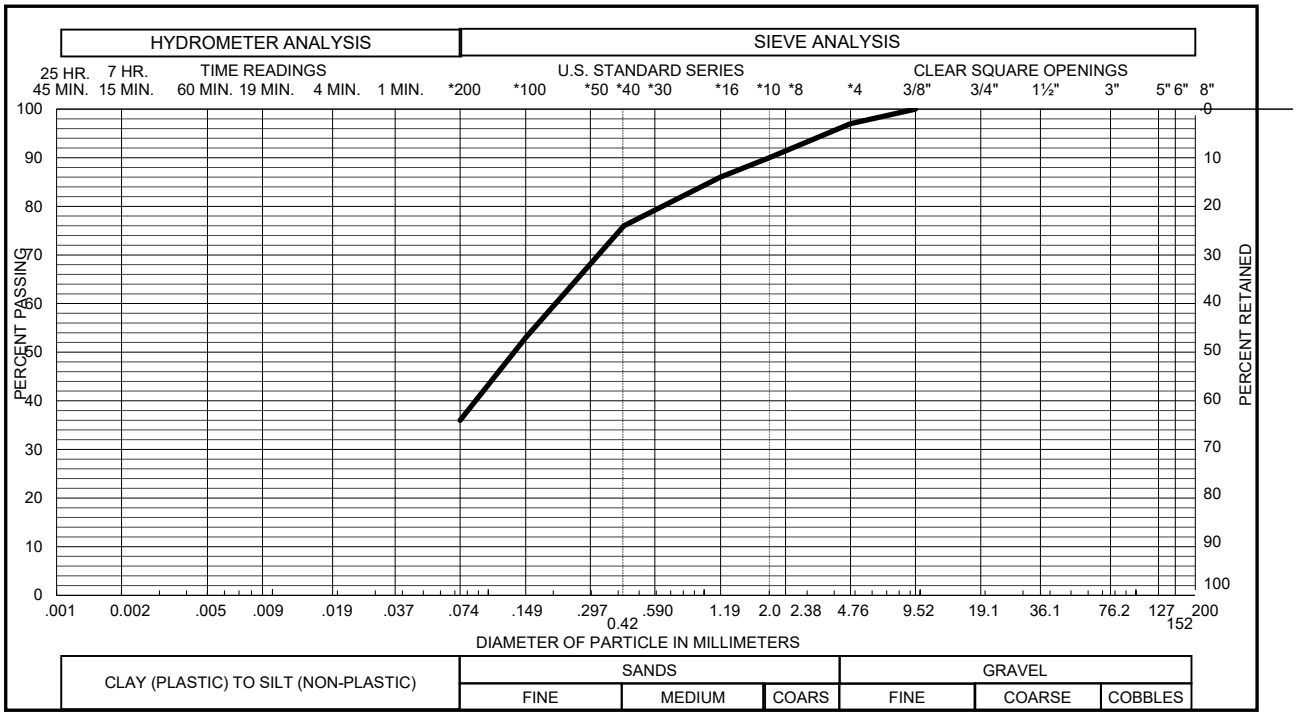
Gradation Test Results

FIG. B-5



Sample of SAND, SLIGHTLY SILTY (SP-SM)
From TH - 109 AT 24 FEET

GRAVEL 16 % SAND 79 %
SILT & CLAY 5 % LIQUID LIMIT %
PLASTICITY INDEX %



Sample of SAND, CLAYEY AND SILTY (SC-SM)
From TH - 110 AT 1-4 FEET

GRAVEL 3 % SAND 61 %
SILT & CLAY 36 % LIQUID LIMIT %
PLASTICITY INDEX %

SUB4 DEVELOPMENT
SOLACE APARTMENT COMPLEX
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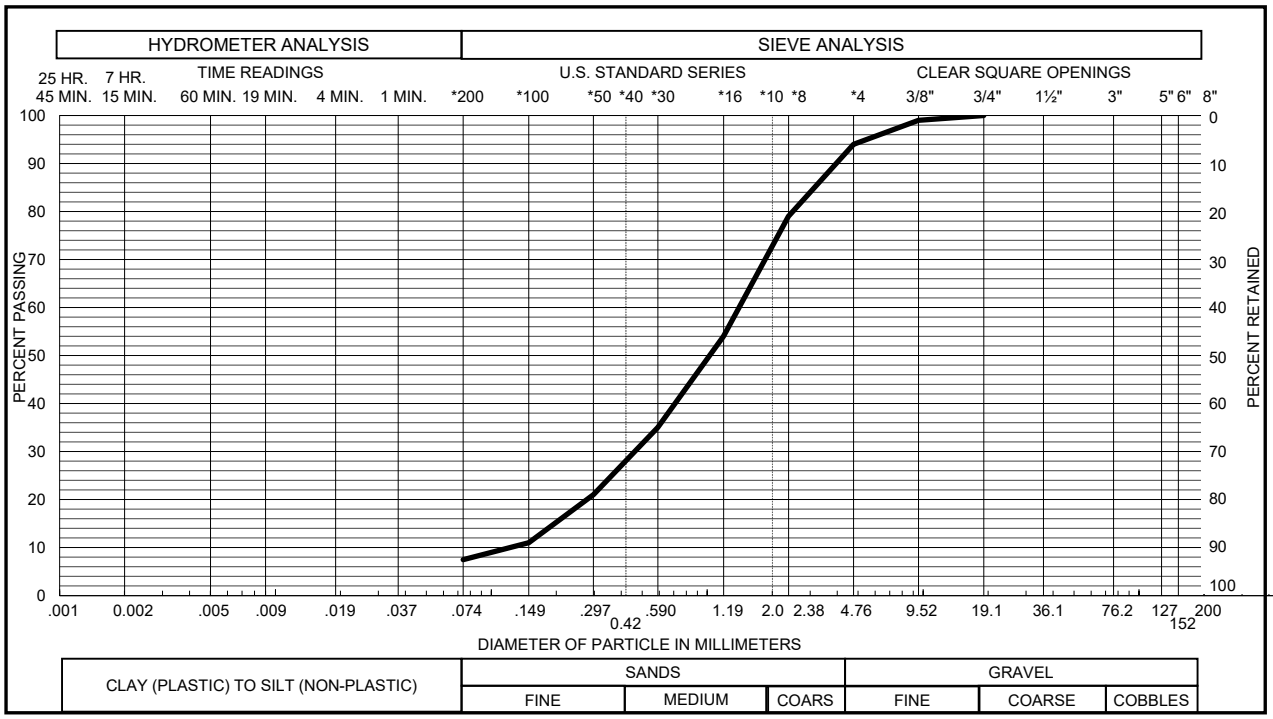
Gradation Test Results

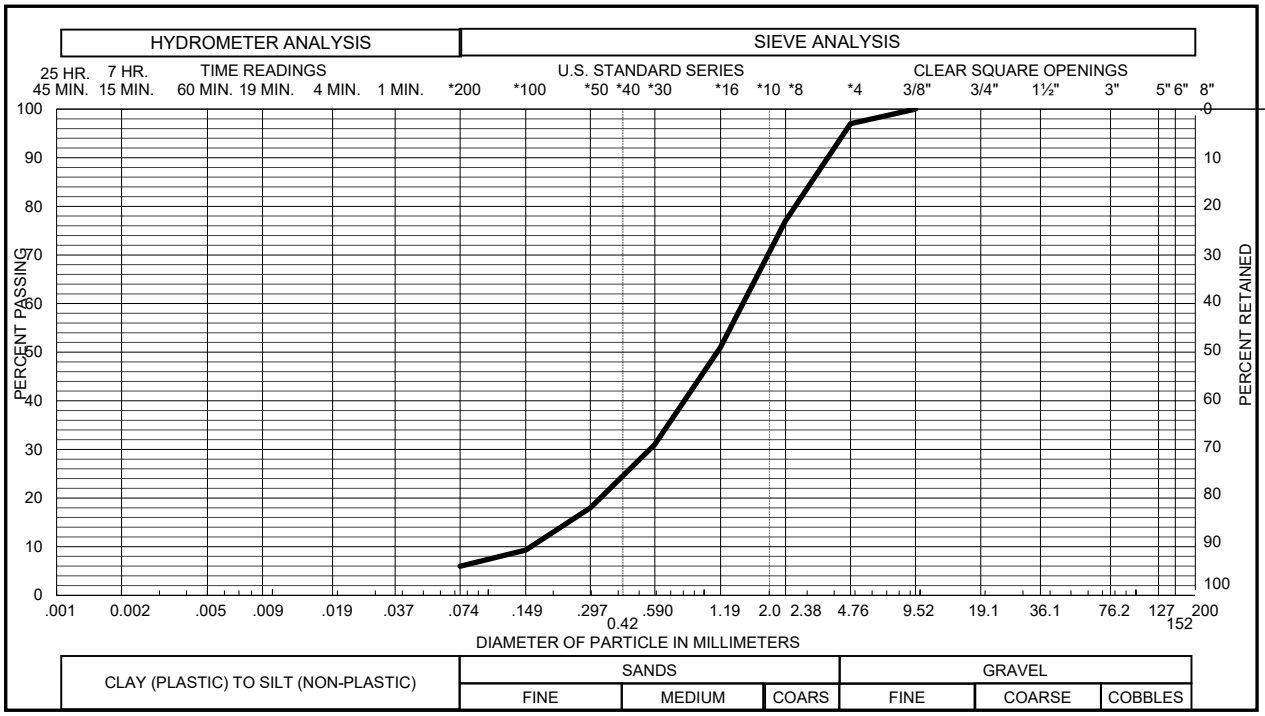
FIG. B-6



Sample of SAND, SLIGHTLY SILTY (SP-SM) GRAVEL 6 % SAND 86 %

From TH - 111 AT 4 FEET SILT & CLAY 8 % LIQUID LIMIT %

PLASTICITY INDEX %



Sample of SAND, SLIGHTLY SILTY (SP-SM) GRAVEL 3 % SAND 91 %

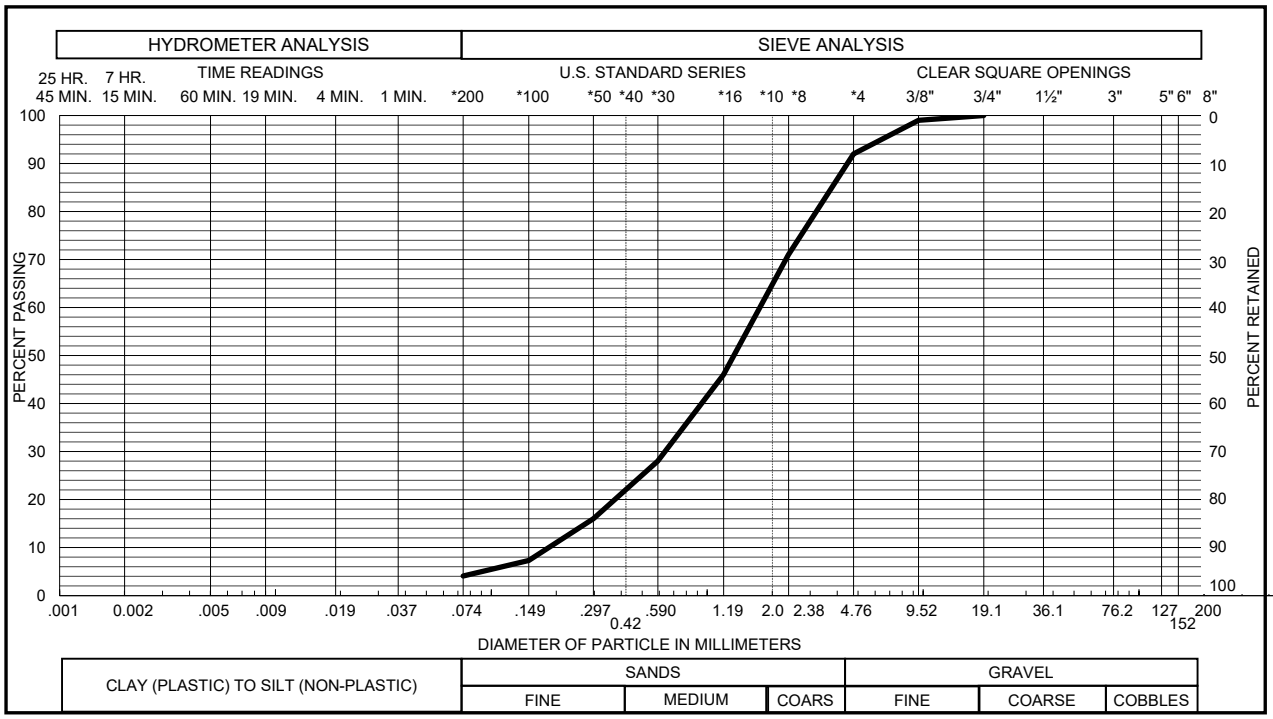
From TH - 113 AT 19 FEET SILT & CLAY 6 % LIQUID LIMIT %

PLASTICITY INDEX %

SUB4 DEVELOPMENT
SOLACE APARTMENT COMPLEX
CTL|T PROJECT NO. CS19163.001-125

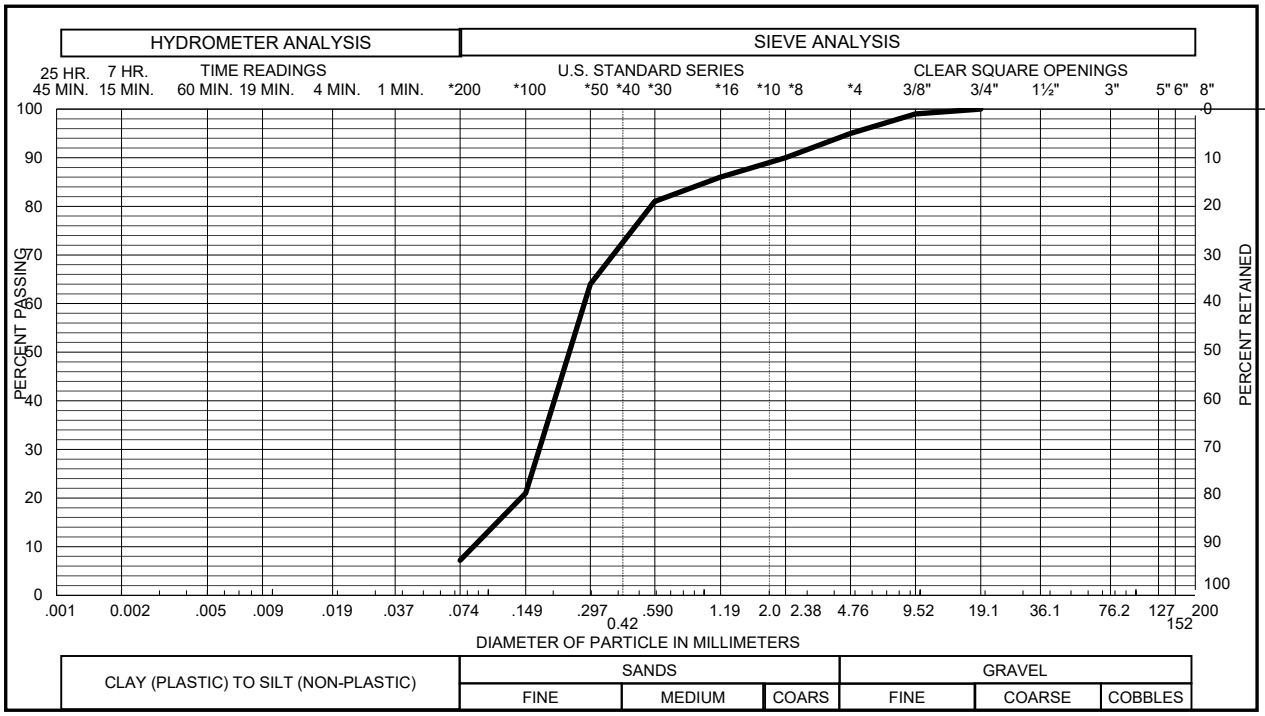
Gradation Test Results

FIG. B-7



Sample of SAND (SW)
From TH - 113 AT 24 FEET

GRAVEL 8 % SAND 88 %
SILT & CLAY 4 % LIQUID LIMIT %
PLASTICITY INDEX %



Sample of SAND, SLIGHTLY SILTY (SP-SM)
From TH - 114 AT 9 FEET

GRAVEL 5 % SAND 88 %
SILT & CLAY 7 % LIQUID LIMIT %
PLASTICITY INDEX %

SUB4 DEVELOPMENT
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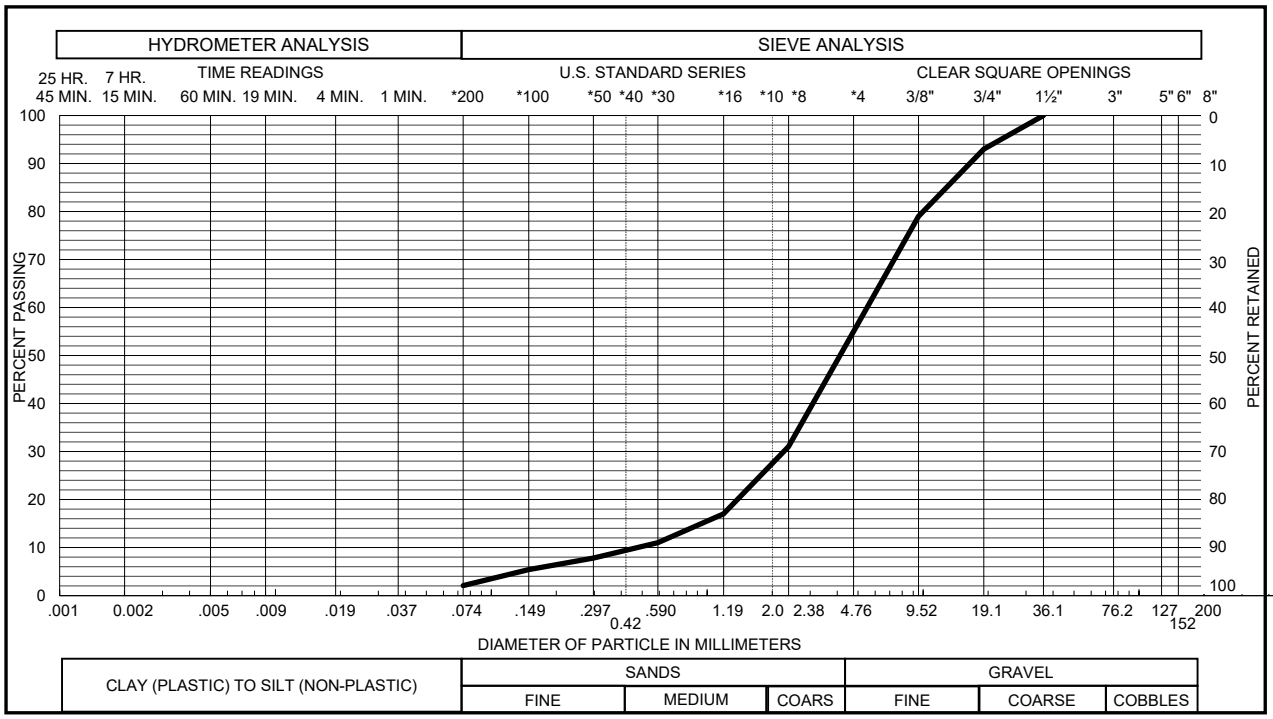
Gradation Test Results

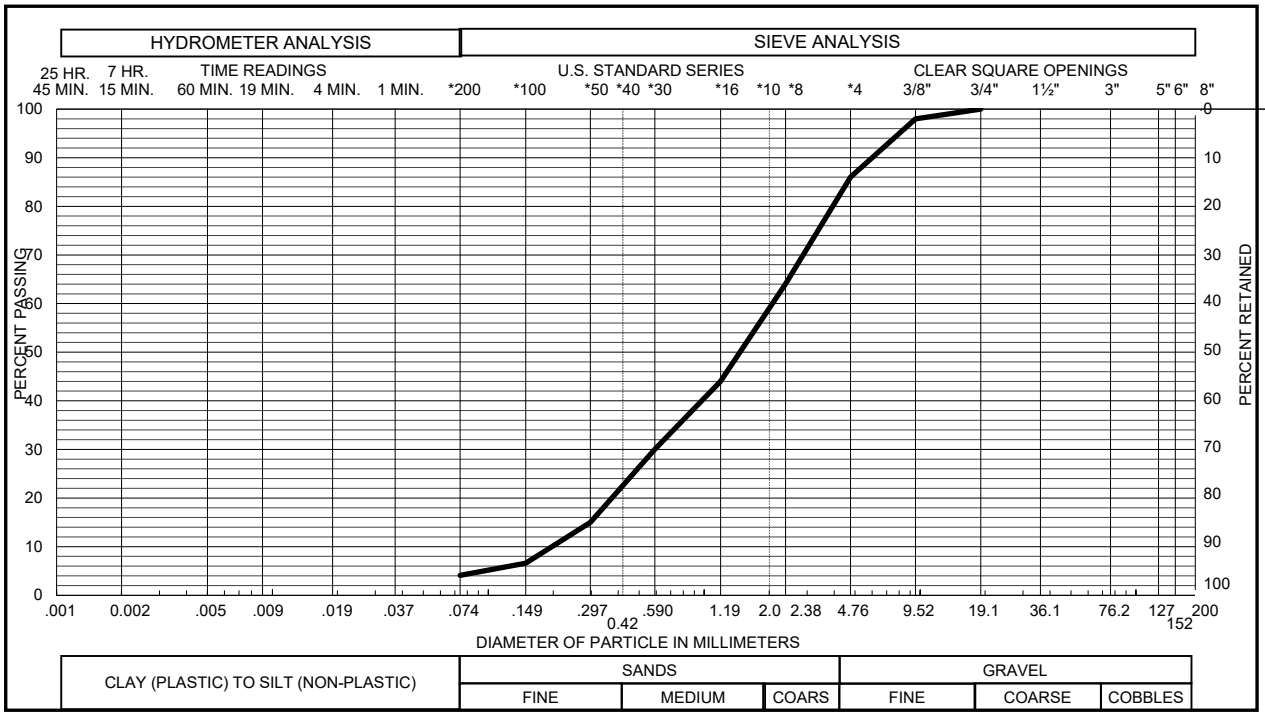
FIG. B-8



Sample of SAND (SW) GRAVEL 45 % SAND 53 %

From TH - 115 AT 4 FEET SILT & CLAY 2 % LIQUID LIMIT %

PLASTICITY INDEX %



Sample of SAND (SP) GRAVEL 14 % SAND 82 %

From TH - 115 AT 14 FEET SILT & CLAY 4 % LIQUID LIMIT %

PLASTICITY INDEX %

SUB4 DEVELOPMENT
SOLACE APARTMENT COMPLEX
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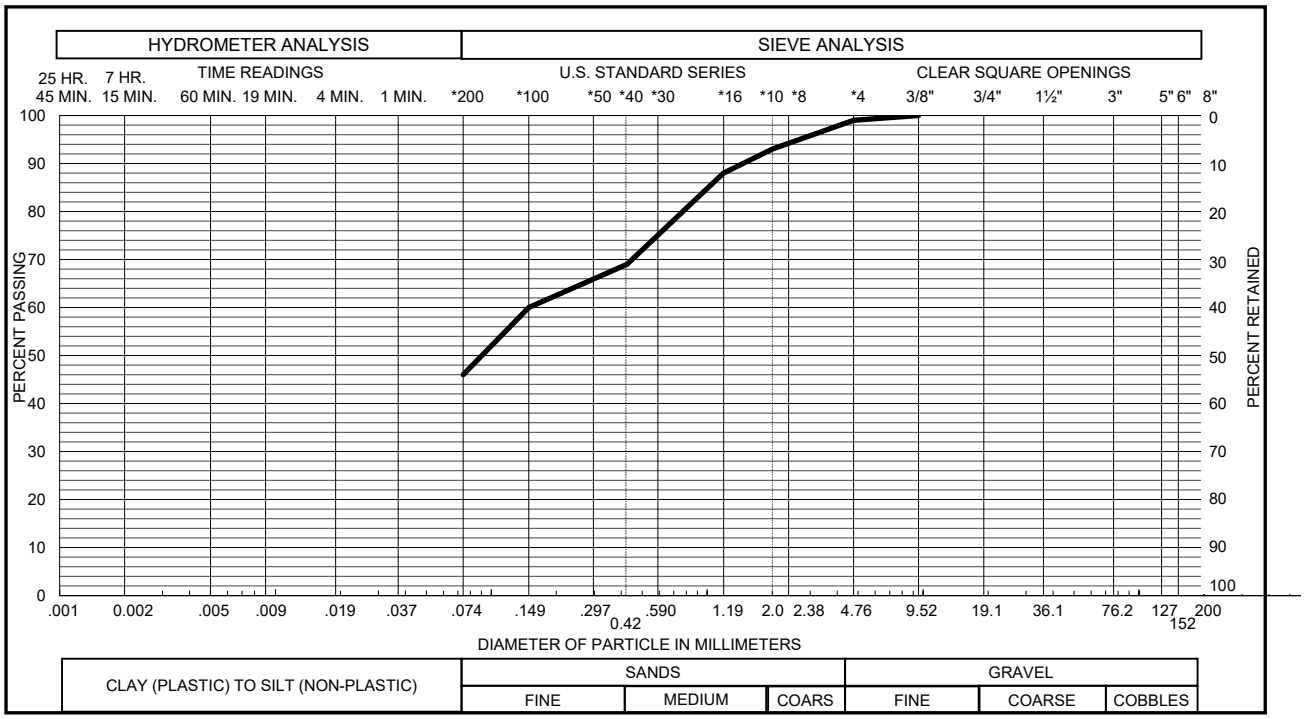
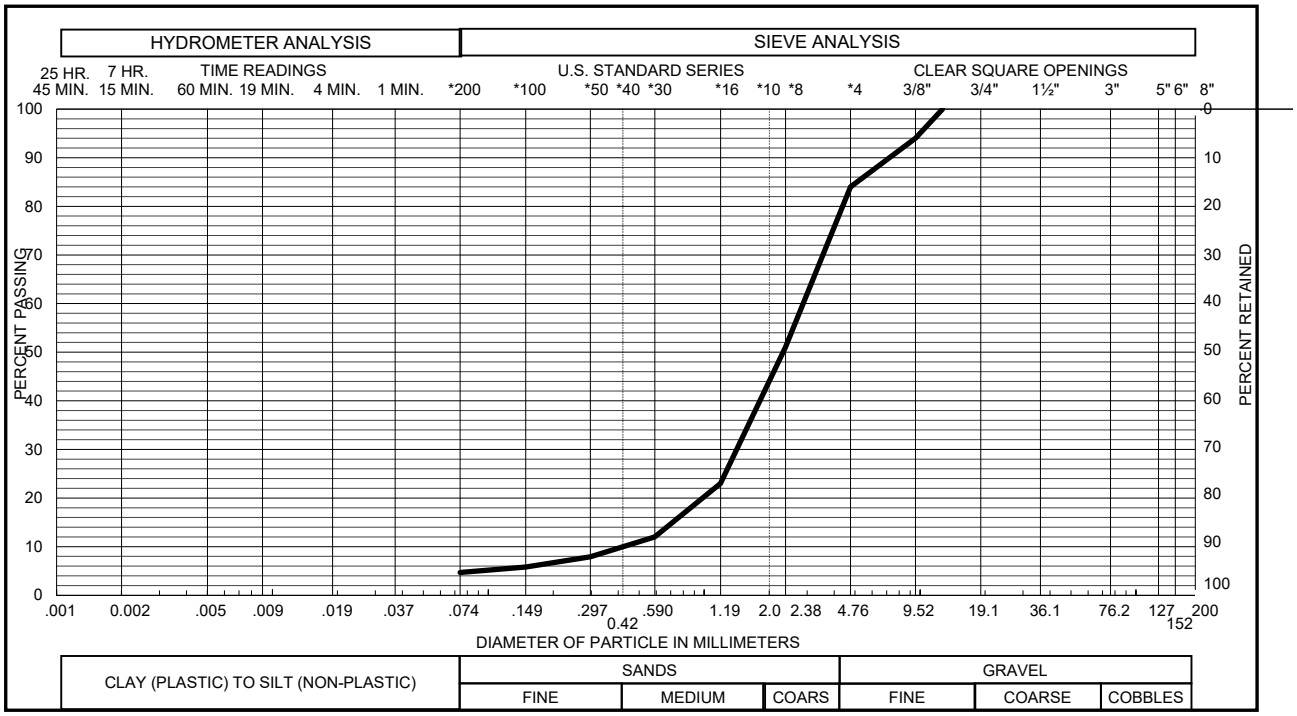
Gradation Test Results

FIG. B-9



Sample of SAND, CLAYEY AND SILTY (SC-SM)
From TH - 116 AT 0-4 FEET

GRAVEL	1 %	SAND	53 %
SILT & CLAY	46 %	LIQUID LIMIT	27 %
PLASTICITY INDEX			7 %



Sample of SAND, SLIGHTLY SILTY (SP-SM)
From TH - 116 AT 19 FEET

GRAVEL	16 %	SAND	79 %
SILT & CLAY	5 %	LIQUID LIMIT	%
PLASTICITY INDEX			%

SUB4 DEVELOPMENT
SOLACE APARTMENT COMPLEX
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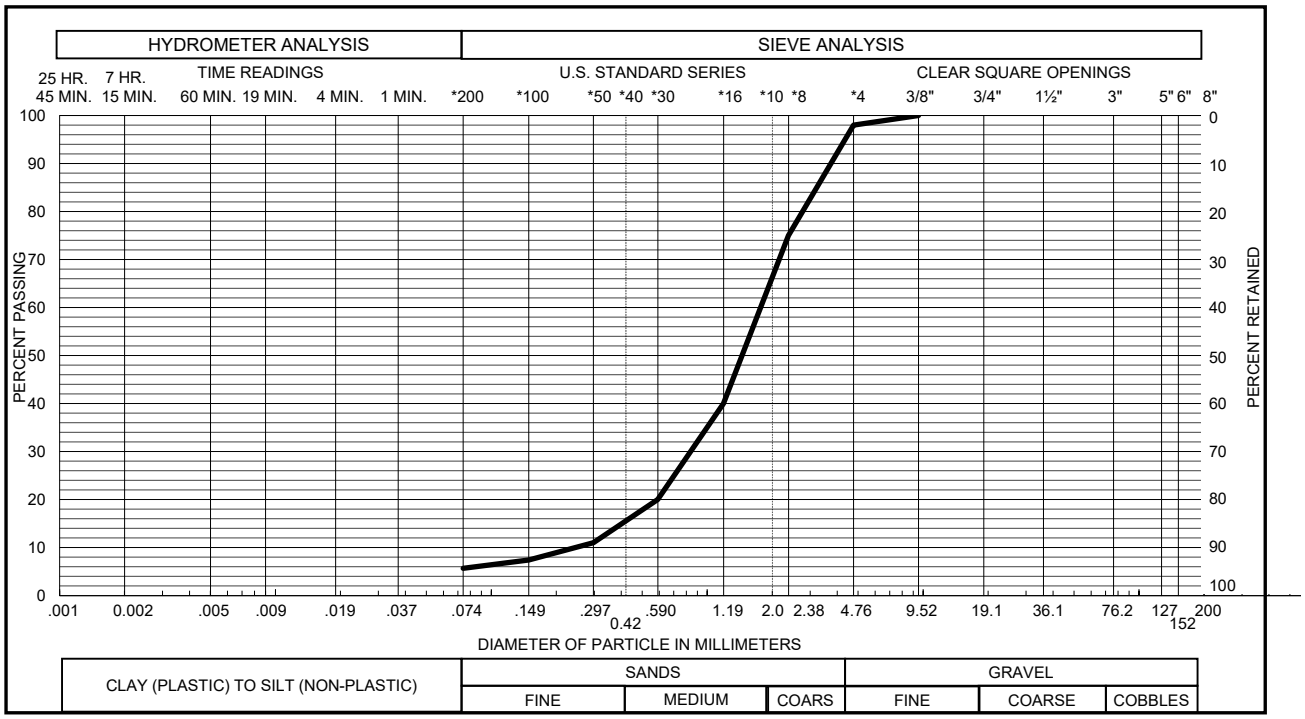
Gradation Test Results

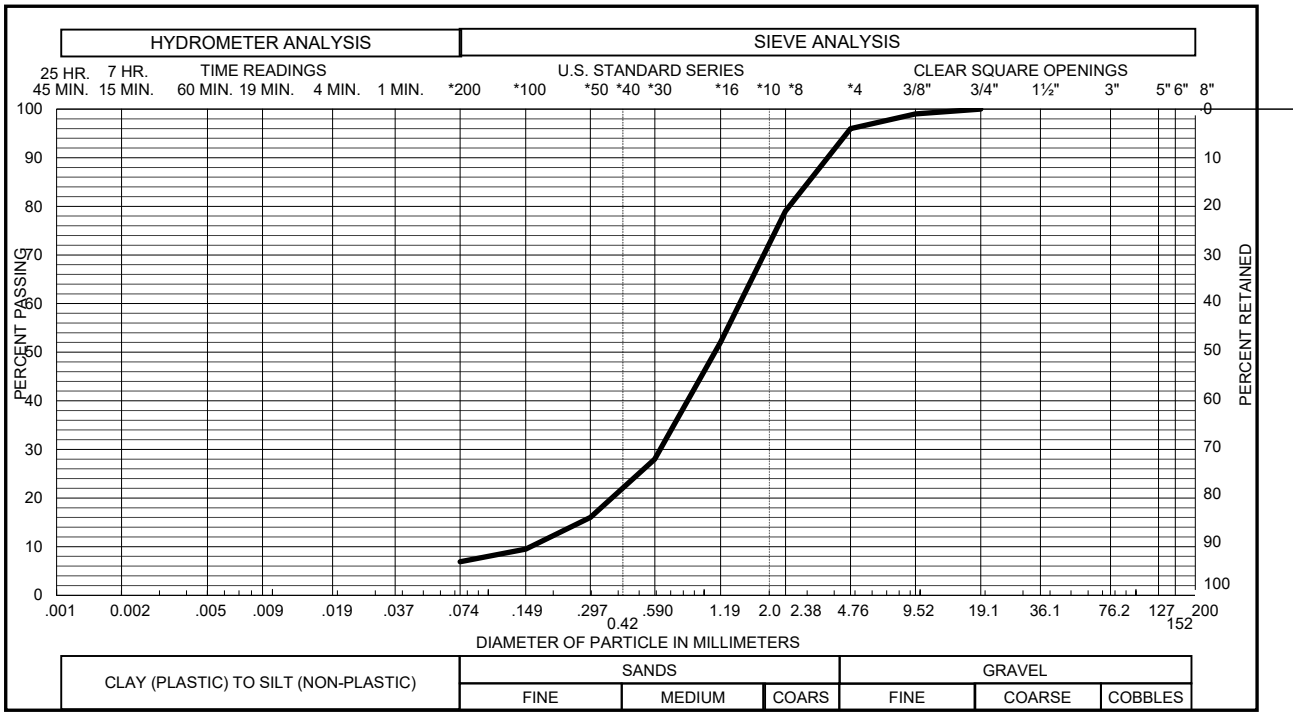
FIG. B-10



Sample of SAND, SLIGHTLY SILTY (SP-SM) GRAVEL 2 % SAND 92 %

From TH - 117 AT 24 FEET SILT & CLAY 6 % LIQUID LIMIT %

PLASTICITY INDEX %



Sample of SAND, SLIGHTLY SILTY (SP-SM) GRAVEL 4 % SAND 89 %

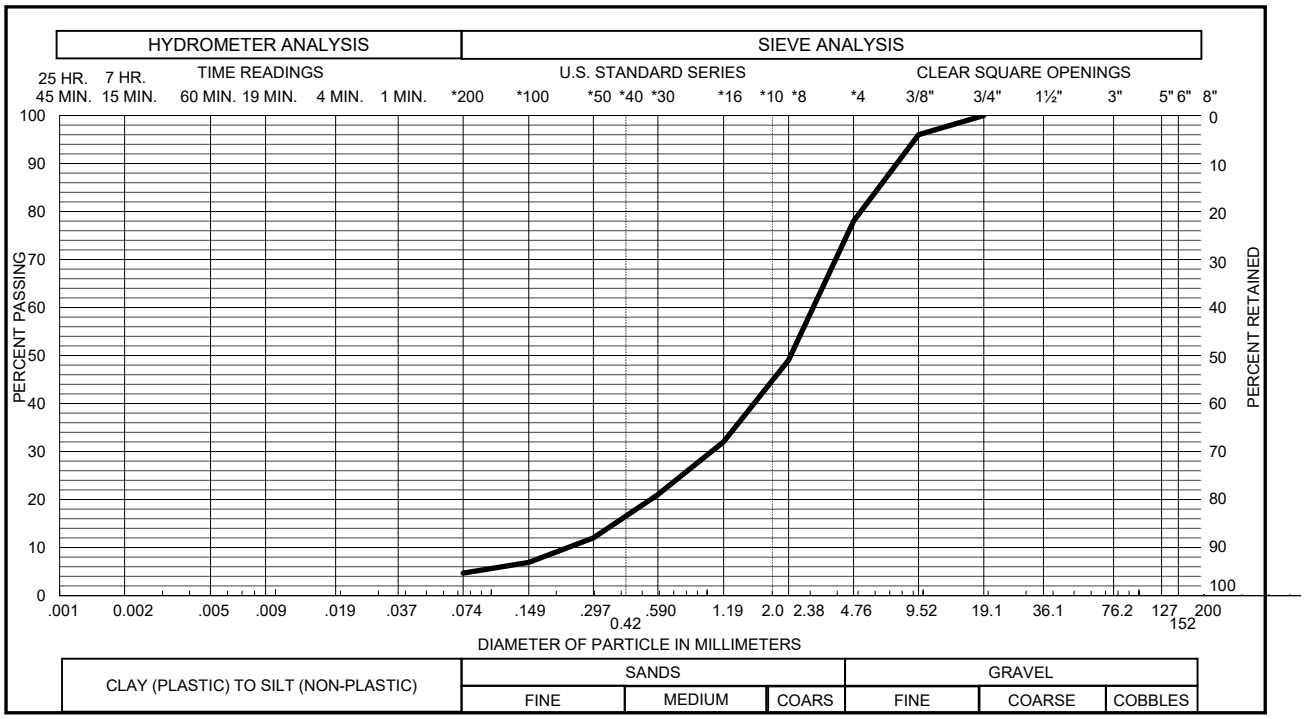
From TH - 118 AT 24 FEET SILT & CLAY 7 % LIQUID LIMIT %

PLASTICITY INDEX %

SUB4 DEVELOPMENT
SOLACE APARTMENT COMPLEX
CTL|T PROJECT NO. CS19163.001-125

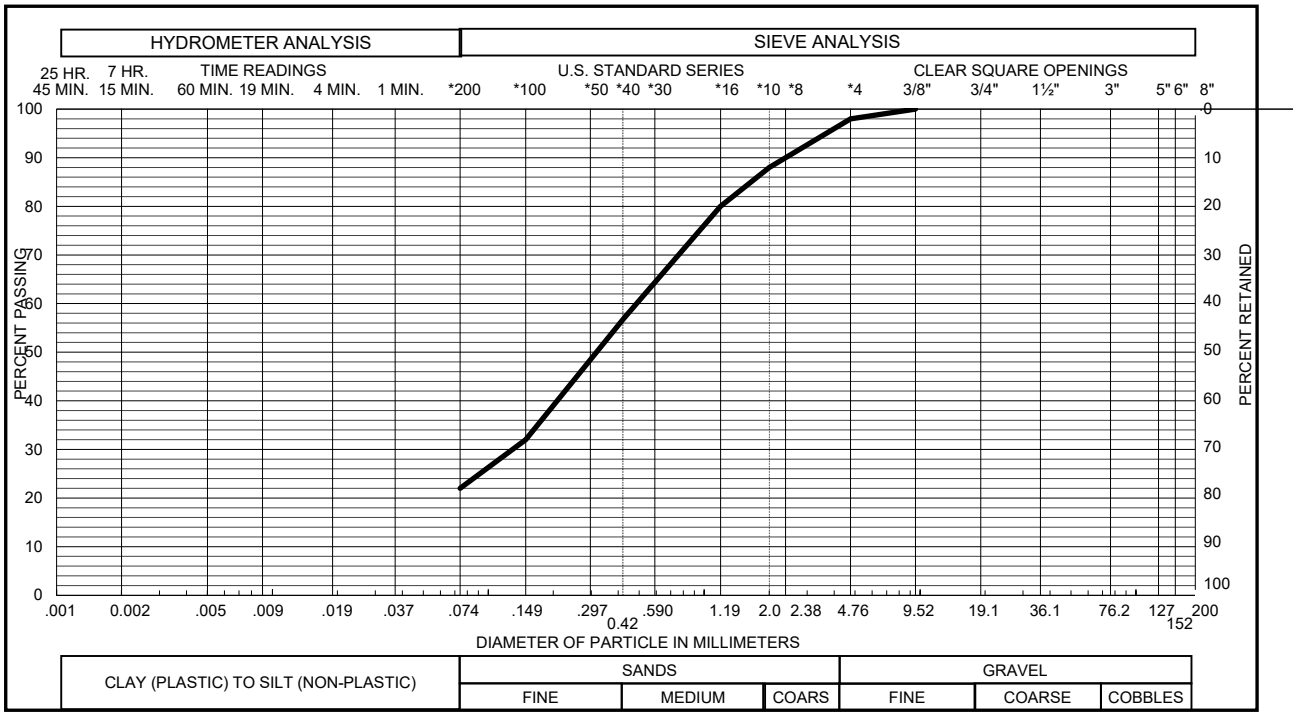
Gradation Test Results

FIG. B-11



Sample of SAND, SLIGHTLY SILTY (SP-SM)
From TH - 118 AT 29 FEET

GRAVEL 22 % SAND 73 %
SILT & CLAY 5 % LIQUID LIMIT %
PLASTICITY INDEX %



Sample of SAND, CLAYEY AND SILTY (SC-SM)
From TH - 119 AT 0-4 FEET

GRAVEL 2 % SAND 76 %
SILT & CLAY 22 % LIQUID LIMIT %
PLASTICITY INDEX %

SUB4 DEVELOPMENT
SOLACE APARTMENT COMPLEX
CTL|T PROJECT NO. CS19163.001-125

Gradation Test Results

FIG. B-12

TABLE B-1

SUMMARY OF LABORATORY TESTING
CTL|T PROJECT NO. CS19163.001-125

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-101	0-4	2.5		21	4				34		SAND, CLAYEY AND SILTY (SC-SM)
TH-101	24	9.2	117						5		SAND, SLIGHTLY SILTY (SW-SM)
TH-102	0-4	2.9		25	6				32		SAND, CLAYEY AND SILTY (SC-SM)
TH-102	9	4.9	111						28		SAND, SLIGHTLY SILTY (SP-SM)
TH-102	19	2.1	113						4		SAND (SP)
TH-103	0-4	4.6		20	4				36		SAND, CLAYEY AND SILTY (SC-SM)
TH-103	14	15.6	108						45		SAND, VERY CLAYEY (SC)
TH-103	29	9.0	126						5		SAND, SLIGHTLY SILTY (SP-SM)
TH-104	14	6.0	97						20		SAND, SILTY (SM)
TH-104	19	3.8	112						5		SAND, SLIGHTLY SILTY (SP-SM)
TH-105	14	12.7	112	33	16	0.1	1800		36		SAND, VERY CLAYEY (SC)
TH-105	24	6.8	107						4		SAND (SW)
TH-106	4	3.4	105						41	<0.1	SAND, VERY SILTY (SM)
TH-106	14	3.7	119						7		SAND, SLIGHTLY SILTY (SP-SM)
TH-107	4	5.3	101						51		SAND, VERY SILTY (SM)
TH-107	19	5.6	117						8		SAND, SLIGHTLY SILTY (SW-SM)
TH-108	0-4	3.4		NV	NP				10		SAND, SLIGHTLY SILTY (SP-SM)
TH-108	14	21.6	101	30	11	0.2	1800		58		CLAY, VERY SANDY (CL)
TH-108	24	11.9	114						4		SAND (SW)
TH-109	4	1.7	117						9		SAND, SLIGHTLY SILTY (SP-SM)
TH-109	24	7.8	123						5		SAND, SLIGHTLY SILTY (SW-SM)
TH-110	1-4	3.9		24	6				36		SAND, CLAYEY AND SILTY (SC-SM)
TH-110	14	14.5	109	NV	NP	0.0	1800		40		SAND, VERY SILTY (SM)
TH-111	4	0.8	113						8		SAND, SLIGHTLY SILTY (SW-SM)
TH-111	14	4.9	110						36		SAND, VERY SILTY (SM)
TH-112	4	3.9	112								SAND, SILTY (SM)
TH-112	9	3.3	109						8		SAND, SLIGHTLY SILTY (SP-SM)
TH-113	4	3.0	128						24		SAND, SILTY (SM)
TH-113	19	4.6	117						6		SAND, SLIGHTLY SILTY (SW-SM)
TH-113	24	9.7	126						4		SAND (SW)
TH-114	9	2.4	99						7		SAND, SLIGHTLY SILTY (SP-SM)
TH-114	14	3.1	96						6		SAND, SLIGHTLY SILTY (SP-SM)
TH-115	4	1.2	111						2		SAND (SW)
TH-115	14	3.6	111						4		SAND (SP)
TH-116	0-4	4.5		27	7				46	<0.1	SAND, CLAYEY AND SILTY (SC-SM)
TH-116	1	5.9	99	31	12	0.3	200		50		CLAY, VERY SANDY (CL)
TH-116	19	2.9	113						5		SAND, SLIGHTLY SILTY (SW-SM)
TH-117	9	2.6	109						7		SAND, SLIGHTLY SILTY (SP-SM)
TH-117	24	10.3	129						6		SAND, SLIGHTLY SILTY (SW-SM)

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

TABLE B-1

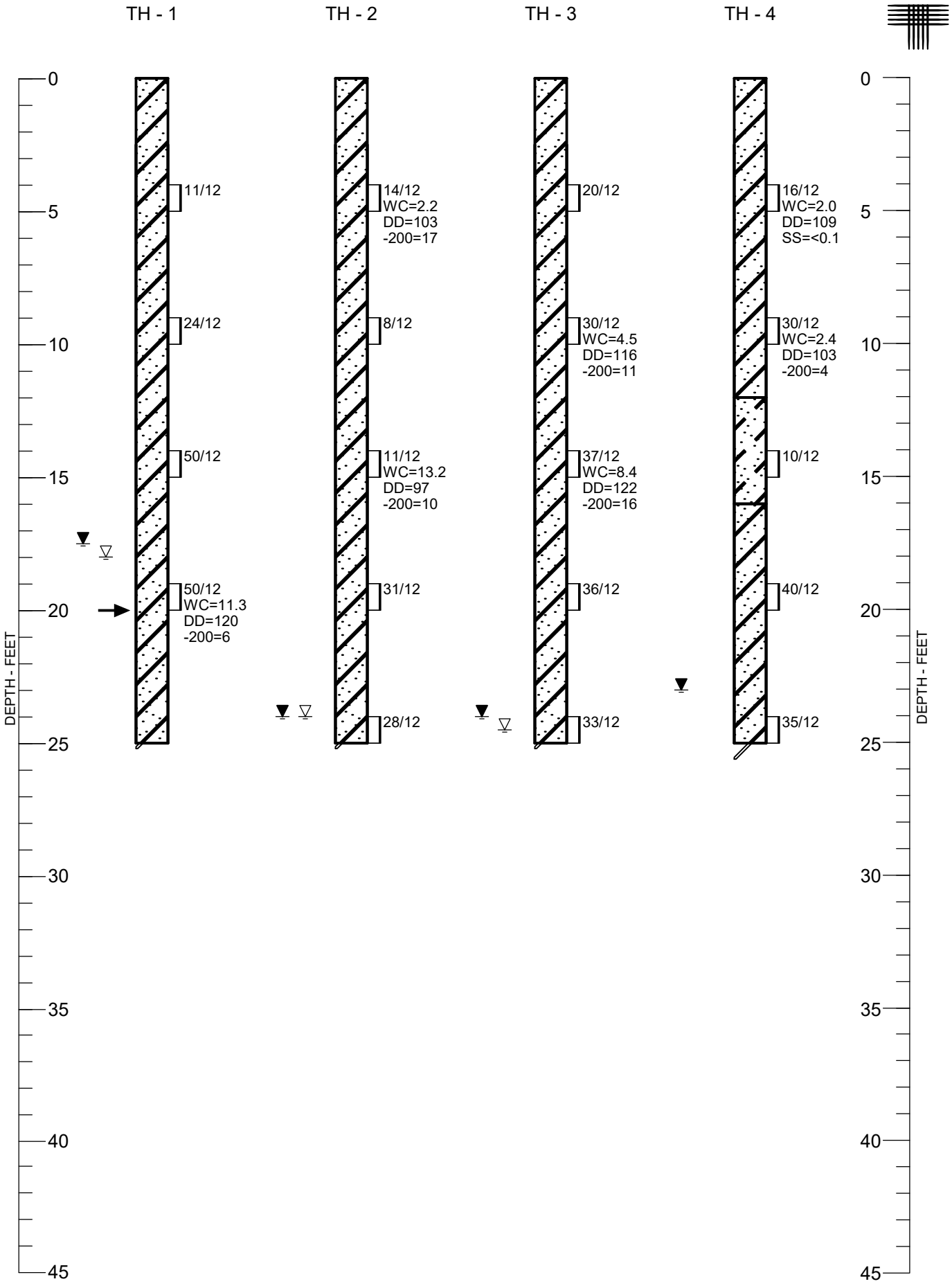
SUMMARY OF LABORATORY TESTING
CTL|T PROJECT NO. CS19163.001-125

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-118	14	10.0	122	NV	NP	-0.3	1800		30		SAND, SILTY (SM)
TH-118	19	3.6							12		SAND, SLIGHTLY SILTY (SP-SM)
TH-118	24	5.5	112						7		SAND, SLIGHTLY SILTY (SW-SM)
TH-118	29	7.9	114						5		SAND, SLIGHTLY SILTY (SW-SM)
TH-119	0-4	2.0		20	5				22	0.07	SAND, CLAYEY AND SILTY (SC-SM)
TH-119	1	3.1	100			0.2	200		20		SAND, CLAYEY AND SILTY (SC-SM)
TH-119	9	6.4	110						14		SAND, SILTY (SM)

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

APPENDIX C

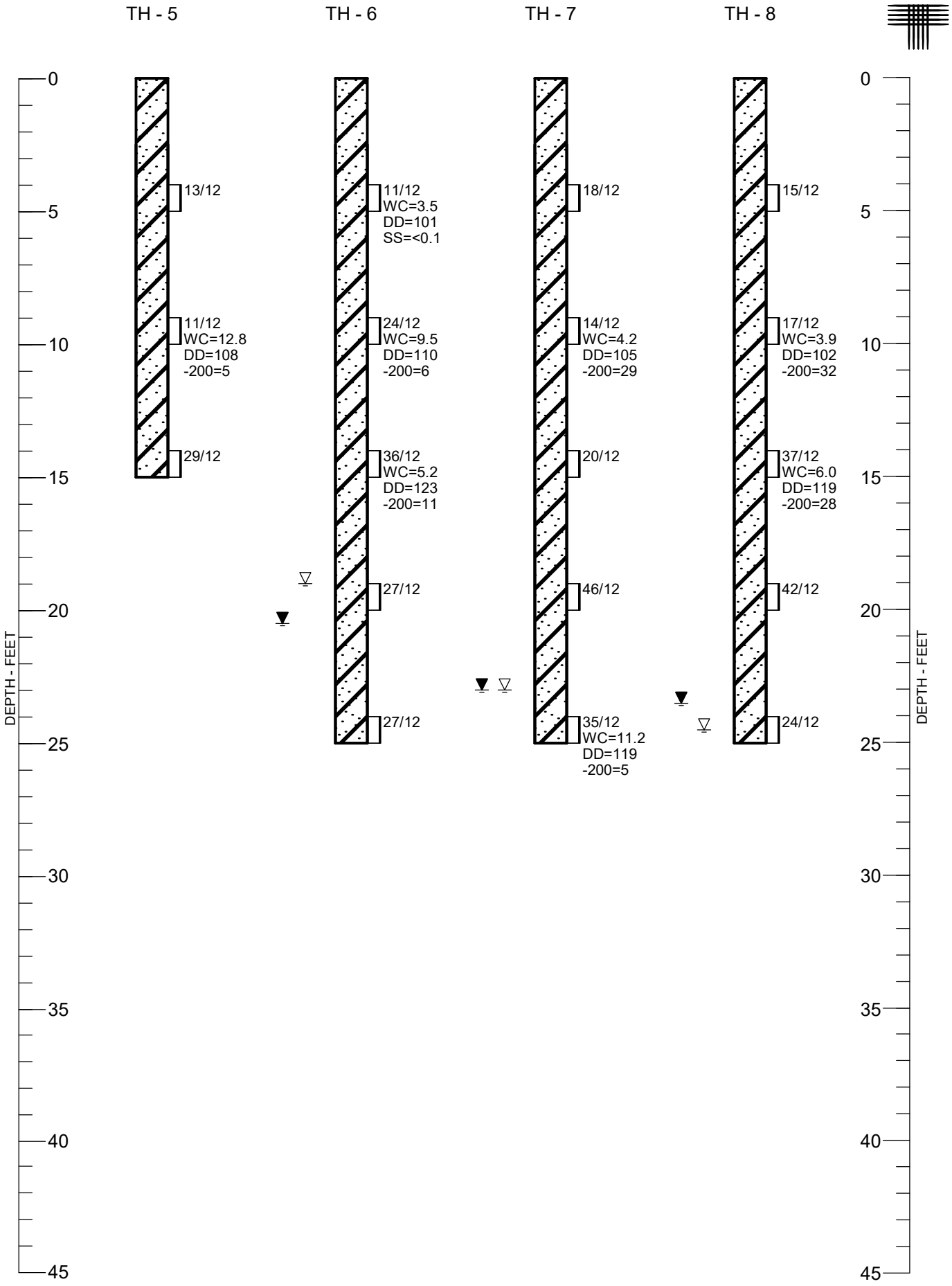
SUMMARY LOGS CTL|T PROJECT NO. CS19163.000



JACKSON DEARBORN PARTNERS
POWERS APARTMENT COMPLEX
CTL|T PROJECT NO. CS19163-105

Summary Logs of Exploratory Borings

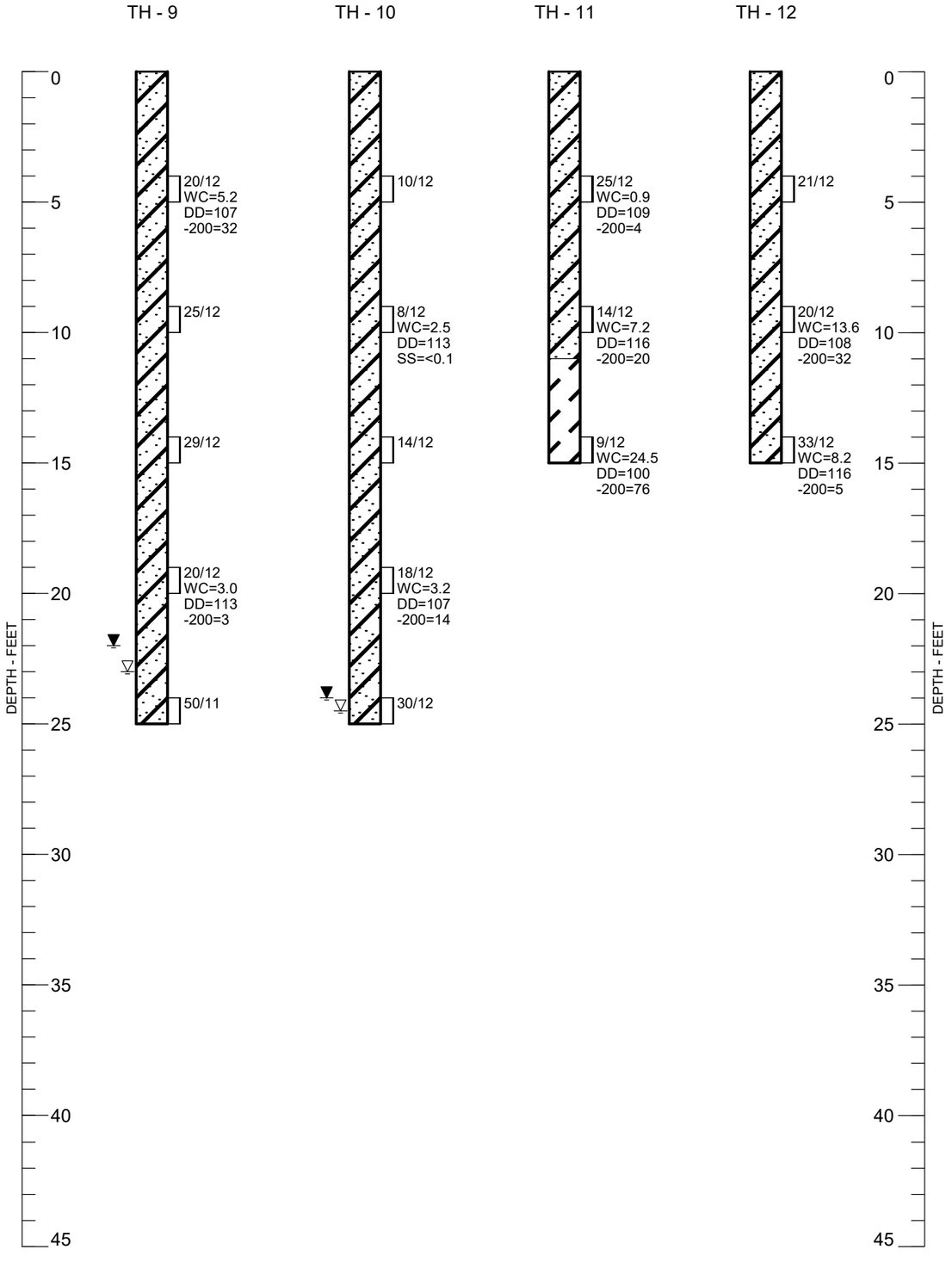
FIG. A-1



JACKSON DEARBORN PARTNERS
POWERS APARTMENT COMPLEX
CTL|T PROJECT NO. CS19163-105

Summary Logs of Exploratory Borings

FIG. A-2



NOTES:

1. THE BORINGS WERE DRILLED OCTOBER 10 AND 17, 2019 USING A 4-INCH DIAMETER, CONTINUOUS-FLIGHT AUGER AND A CME-55, TRUCK-MOUNTED DRILL RIG.
2. THESE LOGS ARE SUBJECT TO THE EXPLANATIONS, LIMITATIONS, AND CONCLUSIONS AS CONTAINED IN THIS REPORT.
3. WC - INDICATES MOISTURE CONTENT. (%)
   DD - INDICATES DRY DENSITY. (PCF)
   -200 - INDICATES PASSING NO. 200 SIEVE. (%)
   SS - INDICATES WATER-SOLUBLE SULFATE CONTENT. (%)

LEGEND:

SAND, CLEAN TO SILTY, LOOSE TO DENSE, SLIGHTLY MOIST TO WET, LIGHT TO MEDIUM BROWN, LIGHT GRAY. (SP, SP-SM, SW-SM, SM)

SAND, CLAYEY, MEDIUM DENSE, MOIST, DARK BROWN. (SC)

CLAY, SANDY, STIFF, VERY MOIST, GRAY BROWN. (CL)

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

GROUNDWATER LEVEL MEASURED AT TIME OF DRILLING.

GROUNDWATER LEVEL MEASURED SIX DAYS AFTER DRILLING.

INDICATES DEPTH WHERE THE TEST HOLE CAVED DURING DRILLING.

JACKSON DEARBORN PARTNERS
POWERS APARTMENT COMPLEX
CTL|T PROJECT NO. CS19163-105

Summary Logs of Exploratory Borings

FIG. A-3

CTL | THOMPSON INCORPORATED

March 2, 2021

Jackson Dearborn Partners
404 South Wells Street, Suite 400
Chicago, Illinois 60607

Attention: Dane Olmstead
Chief Investment Officer

Subject: Response to Review Comments
Solace Apartment Complex
Powers Boulevard and Galley Road
Colorado Springs, Colorado
CTLT Project Nos CS19163.000-105

CTLIThompson, Inc. prepared a Geologic Hazards Evaluation and Preliminary Geotechnical Investigation (Project No. CS19163.000-105; report dated December 10, 2019) and a Geotechnical Investigation (Project No. CS19163.001-125 dated January 15, 2020) for the proposed apartment complex located at Powers Boulevard and Galley Road in Colorado Springs, Colorado. The development plan changed after preparation of our report. We were provided the most recent development and grading plans in order to address review comments.

Comment: Per the submitted construction documents the embankments appear to be larger than 5 ft in height. Please coordinate the project civil engineer and revise your analysis accordingly.

Response: The updated construction plans indicate embankment heights of about 5-feet and cuts below the embankments of about 4 feet to create the overall pond volume. The proposed embankment slopes are flatter than 3:1 (horizontal to vertical). We believe this layout is consistent with recommendations made in our reports.

Comment: Please also provide recommendations for embankment along the channel as some of the slopes are 2:1. Coordinate with the project civil engineer.

Response: We have reviewed the updated construction plans and the channel embankments with slopes greater than 3:1 (horizontal to vertical) appear to be lined with concrete. The concrete lining will stabilize the surficial materials at the side slopes. The proposed conditions are considered acceptable from a geotechnical point-of-view.

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

Very truly yours,

CTL | THOMPSON, INC.

Gwendolyn E. Eberhart, P.E.
Project Engineer

Reviewed by:

Jeffrey Jones For

Timothy A. Mitchell, P.E.
Division Manager

GE:TAM:tam
Sent via email: dolmstead@jacksondearborn.com

CTL|THOMPSON INCORPORATED

GEOLOGIC HAZARDS EVALUATION AND PRELIMINARY GEOTECHNICAL INVESTIGATION POWERS APARTMENT COMPLEX POWERS BOULEVARD AND GALLEY ROAD EL PASO COUNTY, COLORADO

Prepared for:

JACKSON DEARBORN PARTNERS
404 South Wells Street, Suite 400
Chicago, Illinois 60607

Attention: Mr. Dane Olmstead

CTL|T Project No. CS19163-105

December 10, 2019

5170 Mark Dabling Blvd | Colorado Springs, Colorado 80918 | Telephone: 719-528-8300 Fax: 719-528-5362

TABLE OF CONTENTS

SCOPE

This report presents the results of our Geologic Hazards Evaluation and Preliminary Geotechnical Investigation for the Powers Apartment Complex to be located east of Powers Boulevard and north of Galley Road in El Paso County, Colorado. The investigated parcel is planned for development of multi-family, apartment buildings. Our purpose was to evaluate the parcel for the occurrence of geologic hazards that may impact development of the property, and to provide preliminary geotechnical design concepts. This report includes a summary of subsurface and groundwater conditions found in our exploratory borings, a description of our engineering analysis of the geologic conditions at the site, and our opinion of the potential influence of the geologic hazards on the planned structures and other site improvements. The scope of our services is described in our proposal (CS-19-0139) dated September 25, 2019.

The report was prepared based on conditions interpreted from field reconnaissance of the site, conditions found in our exploratory borings, results of laboratory tests, engineering analysis, and our experience. Observations made during grading or construction may indicate conditions that require revision or re-evaluation of some of the preliminary criteria presented in this report. The criteria presented are for the development as described. Revision in the scope of the project could influence our recommendations. If changes occur, we should review the development plans and the effect of the changes on our preliminary design criteria. Evaluation of the property for the possible presence of potentially hazardous materials (Environmental Site Assessment) was beyond the scope of this 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 at the site, our interpretations, and our recommendations are included in the report.

SUMMARY

1. We did not identify geologic hazards that we anticipate will preclude development of the project as planned. The conditions we identified include instability of recently downcut stream banks in the drainage channel located along the eastern property line and potential for erosion and flooding. Slopes within and near the development area appear to be stable and the construction of the proposed apartment buildings should not negatively impact slope stability. Regional geologic conditions that impact the site include seismicity and radioactivity. We believe each of these conditions can be mitigated with engineering design and construction methods commonly employed in this area.
2. The near-surface soils encountered in the twelve borings drilled during this investigation consisted of 25 feet of clean to silty, sand soils with widely-scattered lenses of clayey sand and sandy clay.
3. At the time of drilling, groundwater was encountered in eight of the exploratory borings at depths of 18 to 24.5 feet below the existing ground surface. When water levels were checked again six days after the completion of drilling operations, water was measured in nine of the borings at depths of 17.5 to 24 feet. Groundwater levels will vary with seasonal precipitation and landscaping irrigation.
4. In our opinion, site grading and utility installation across the site can be accomplished using conventional, heavy-duty construction equipment.
5. We anticipate spread footing foundations and conventional, slab-on-grade floors for at-grade levels within the planned apartment buildings and clubhouse will be appropriate at this site.
6. Overall plans should provide for the rapid conveyance of surface runoff to the storm sewer system.

SITE CONDITIONS

The investigated parcel of land is situated northeast of the intersection of Powers Boulevard and Galley Road (a portion of the northwest quarter of Section 7, Township 14 South, Range 65 West of the 6th Principal Meridian), in El Paso County, Colorado. The overall development plan prepared by JR Engineering, Inc. (dated December 4, 2019) is shown in Fig. 1.

The overall ground surface across the property slopes very gently downward to the south at grades of between about 2 and 3 percent. Vegetation on the site consists of a slight to moderate stand of mostly grasses and weeds and scattered deciduous trees.

Somewhat heavier vegetation and a thicker concentration of deciduous trees are present along the eastern edge of the property in the vicinity of an existing drainage channel that runs in a generally north-to-south direction and separates the investigated parcel from existing commercial buildings to the east of the site. The northern half of the channel is up to about 10 to 15 feet in depth. The channel depth decreases to the south. Areas of erosion and steep downcutting of the channel banks are present, especially in the northern half. Large concrete pieces and other construction debris have been placed as a type of riprap material in an attempt to stabilize the steep banks, primarily in the northern half of the channel and the northern portion of the southern half. Household trash, furniture, and organic materials are present in the channel bottom. The channel exits the site at the south property line through three, parallel culverts under Galley Road.

The parcel is crisscrossed by several narrow, dirt paths. Scattered, small piles of dumped trash and construction debris were observed at several locations on the site. Low earth berms (maximum height of about 5 feet) are present in the center of the property and near the southern edge of the parcel. The berms appear to have been constructed at some point in the property history to control storm runoff. An existing, sanitary sewer main is present in the Paonia Street right-of-way located near the eastern edge of the site.

The land to the north and east is developed with commercial/retail buildings and some light industrial structures. A one-story commercial building that has served as a bank and as a day care center in the recent past is present west of the southern end of the investigated parcel. This building is currently unoccupied.

PROPOSED DEVELOPMENT

We understand the proposed apartment complex is to be developed for approximately 350, one to three-bedroom apartment units. The apartment buildings are anticipated to be three-story, wood-frame structures. Foundation loads are expected to be light to moderate. No habitable, below-grade construction is expected. The complex will include a clubhouse and pool area, paved access roads and automobile parking stalls,

and carports. We anticipate the complex will be serviced by a centralized sanitary sewer collection system and potable water distribution system. Two full-spectrum detention ponds are planned along the eastern edge of the property adjacent to the existing drainage channel.

SUBSURFACE INVESTIGATION

Subsurface conditions at the site were investigated by drilling twelve exploratory borings at the locations shown in Fig. 1. Graphical logs of the conditions found in our exploratory borings, the results of field penetration resistance tests, and some laboratory data are presented in Appendix A. Gradation test results are presented in Appendix B. Laboratory test data are summarized in Table B-1.

Soil 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, gradation analysis, and water-soluble sulfate content tests.

SUBSURFACE CONDITIONS

The near-surface soils encountered in the twelve borings drilled during this investigation consisted of 25 feet of sand soils with widely scattered lenses of clayey sand and sandy clay. Some of the pertinent engineering characteristics of the soils encountered and groundwater conditions are discussed in the following paragraphs.

Sand Soils

The predominant soils encountered at the ground surface in each of the borings consisted of clean to silty sand. The sand layer encountered in the borings extended to the maximum depth explored of 25 feet below the existing ground surface. The sand was loose to dense based on the results of field penetration resistance tests. Twenty samples of the sand tested in our laboratory contained 4 to 32 percent clay and silt-sized particles (passing the No. 200 sieve). Our experience indicates the clean to silty sands are non-expansive when wetted. Furthermore, the particle size distributions, the

silt and clay fines contents, and the natural dry densities of the sand samples, are not representative of a material that is prone to collapse.

Isolated layers of clayey sand and sandy clay were found to be interbedded with the predominant clean to silty sand in two of the borings (TH-4 and TH-11), at depths greater than 10 feet below the existing ground surface. The clayey sand was medium dense, and the sandy clay was stiff and very moist. Our experience suggests the clayey sand and sandy clay are non-expansive or exhibit low measured swell values when wetted.

Groundwater

At the time of drilling, groundwater was encountered in eight of the exploratory borings at depths of 18 to 24.5 feet below the existing ground surface. When water levels were checked again six days after the completion of drilling operations, water was measured in nine of the borings at depths of 17.5 to 24 feet. Groundwater levels will vary with seasonal precipitation and landscaping irrigation.

SITE GEOLOGY

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

The gently-sloping parcel contains a thick layer of clean to silty sand with widely-scattered lenses of clayey sand and sandy clay. The following paragraphs discuss the mapped units.

Our borings encountered loose to medium dense, clean to silty sand with occasional lenses of medium dense, clayey sand and stiff, sandy clay to the maximum depth explored of 25 feet. For the purposes of engineering geologic evaluation of this site, the surficial soils can be considered as being alluvial deposits (Map Units: Qam, Qay_1 and Qay_2). These soils are geologically-recent, Pleistocene and Holocene-age materials.

The dominant stratum is light to medium brown, poorly-sorted sand (Qam, Middle Alluvium, late Pleistocene). Younger alluvial deposits (Qay_1, Young Alluvium One, late Holocene; and Qay_2, Young Alluvium Two, late and middle Holocene) that consist of poorly-sorted, silty sands that are typically found in narrow flood plains and the floors of stream channels (Qay_1) and broad valley floors (Qay_2) were encountered along the eastern and western edges of the parcel, respectively.

Portions of the property mapped as “Disturbed Area” (Map Unit: da) contain low earth berms (maximum height of about 5 feet). The berms appear to have been constructed at some point in the property history to control storm runoff and during installation of the sanitary sewer main within the Paonia Street right-of-way.

GEOLOGIC HAZARDS AND ENGINEERING CONSTRAINTS

We did not identify geologic hazards that we believe will preclude development of the project as planned. The conditions we identified include instability of recently downcut stream banks in the drainage channel located along the eastern property line and potential for erosion and flooding. Slopes within the development areas appear to be stable and the construction of apartment buildings should not negatively impact slope stability. Regional geologic conditions that impact the site include seismicity and radioactivity. These issues do not pose hazards or constraints to development if mitigated using normally employed methods. We believe each of these conditions can be mitigated with engineering design and construction methods commonly employed in this area. These conditions are discussed in greater detail in the sections that follow.

Add as plat note and address in Letter of Intent

Engineering Geologic Mapping

The engineering geology conditions from Robinson (1977) were considered and areas were mapped as described below and shown in Fig. 3. The other issues are site-wide concerns and are not depicted in Fig. 3.

Map Unit “1A” depicts stable alluvium on flat to gentle slopes of 0 to 5 percent. The planned area for construction of residential structures falls within this classification. These areas are low risk for problems due to geologic hazards.

Map Unit "7A" depicts physiographic flood plain where erosion and deposition presently occur and is generally subject to recurrent flooding. Mitigation can consist of avoidance or channel improvements to convey the design flow.

Expansive Soil

Site soils are predominantly non-expansive, clean to silty sand. Current data indicates the proposed structures can be constructed with conventional, shallow foundations and slab-on-grade, first-level floors without soil improvement other than proper moisture conditioning and compaction of site grading fill materials.

Flooding and Stream Bank Erosion

The on-site sands are easily eroded and a drainage channel with some areas of bank undercutting is present along the eastern property line of the parcel. Review of available FEMA mapping and our site observations suggest this drainage channel is subject to periodic flooding. Areas affected by flooding should be addressed in the site-specific drainage report. The drainage report and related plans should also address the need to stabilize the channel banks along the drainage. Site soils are sandy and susceptible to the effects of erosion. The project Civil Engineer should design site grading to mitigate the unstable slopes and arrest downcutting of the existing drainage channel banks, and to prevent flood damage to the proposed site improvements. Maintaining vegetative cover and providing engineered surface drainage will reduce the potential for erosion.

Unstable Slopes

Other than steeply-eroded stream banks outside planned building areas, there appear to be no other unstable, steep slopes that affect development.

Economic Minerals and Underground Mines

While the site does contain significant sand deposits, we doubt permitting for mining of the material is feasible, considering the surrounding land uses. Energy fuels

such as uranium, oil and gas may or not be present. No record of underground mining was found.

Seismicity

This area, like most of central Colorado, is subject to a degree of seismic activity. Geologic evidence has been interpreted to indicate that movement along some Front Range faults has occurred during the last two million years (Quaternary). This includes the Rampart Range Fault, which is located several miles west of the site. We believe the soils on the property classify as Site Class D (stiff soil profile) according to the 2015 International Building Code (2015 IBC).

Radon and Radioactivity

We believe no unusual hazard exists from naturally occurring sources of radioactivity on this site. However, the materials found in our borings can be associated with the production of radon gas and concentrations in excess of EPA guidelines can occur. Radon tends to collect in below-grade, residential areas due to limited outside air exchange and interior ventilation. Passive and active mitigation procedures are commonly employed in this region to effectively reduce the buildup of radon gas. Measures that can be taken after a structure is enclosed during construction include installing a blower connected to the foundation drain (if present) and sealing the joints and cracks in concrete floors and foundation walls. If the occurrence of radon is a concern, we recommend the structures be tested after they are enclosed, and mitigation systems installed to reduce the risk.

SITE DEVELOPMENT CONSIDERATIONS

From an engineering point-of-view, the more significant conditions impacting construction are the potential for erosion and flooding. The following sections discuss the impact of these conditions on development and possible methods of mitigation.

Site Grading

Grading plans prepared by JR Engineering (dated December 4, 2019) were made available for our review. The plans suggest comparatively shallow cuts and fills (about 5 feet or less) will be necessary to achieve the desired building pad elevations for the area that will be developed with structures. We believe site grading can be accomplished using conventional, heavy-duty earthmoving equipment. 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.

On-site evidence of flooding and some erosion is present in the existing drainage channel located along the eastern property line. A combination of channel improvements and possibly some energy dissipation structures may be necessary in this portion of the complex. The project Civil Engineer will need to consider these issues when preparing development design plans.

Vegetation, organic materials, and trash/debris should be removed from the ground surface in areas to be filled. Soft or loose soils, if encountered, should be stabilized or removed to stable material prior to placement of fill. Organic soils should be wasted in landscaping areas.

The ground surface in areas to receive fill should be scarified, moisture conditioned and compacted. We recommend the granular grading fill be placed in thin, loose lifts, moisture conditioned to within 2 percent of optimum moisture content, and compacted to at least 95 percent of maximum modified Proctor dry density (ASTM D 1557). Placement and compaction of the grading fill should be observed and tested by our representative during construction. Guideline specifications for site grading are presented in Appendix C.

Buried Utilities

In our opinion, utility trench excavation can 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 encountered in trench excavations and refer to Occupational Safety and Health Administration (OSHA) standards to determine appropriate slopes. We anticipate the near-surface, natural sand soils and sand grading fill will classify as Type C materials. Temporary excavations in Type C materials require a maximum slope inclination of 1.5:1 (horizontal to vertical), unless the excavation is shored or braced. Where groundwater seepage occurs, flatter slopes will likely be required. Excavations deeper than 20 feet should be designed by a professional engineer.

Water and sewer lines are usually constructed beneath paved roads. Compaction of trench backfill will have a significant effect on the life and serviceability of pavements. We recommend trench backfill be moisture conditioned and compacted in accordance with El Paso County specifications. Personnel from our firm should observe and test the placement and compaction of the trench backfill during construction.

Detention Ponds

Per the submitted Construction documents the embankments appear to be larger than 5 ft in height. Please coordinate the project civil engineer and revise your analysis accordingly.

We understand two full-spectrum detention ponds are to be constructed along the eastern edge of the property, adjacent to the existing drainage channel. Preliminary grading plans provided to our office indicated the ponds will drain to the existing channel and will be constructed mostly below surrounding grades. We anticipate any detention pond embankments that are needed to achieve the desired storage capacity will be less than 5 feet in height and will consist of fill materials generated from the on-site, sand soils. We recommend the proposed pond embankments have a maximum slope of 3:1 (horizontal to vertical). The embankment fill materials should be moisture conditioned and compacted as specified previously.

Subsurface conditions encountered in exploratory borings drilled within the proposed sites of the detention ponds (borings TH-5 and TH-12) consisted of 15 feet of medium dense to dense, slightly silty to silty sand. In our opinion, the anticipated subgrade materials are suitable to underlie the planned embankment fills with minimal subgrade compression.

Please also provide recommendations for embankment along the Channel as some of the slopes are 2:1. Coordinate with the project civil engineer

FOUNDATION AND FLOOR SYSTEM CONCEPTS

We anticipate spread footing foundations underlain by the natural, on-site sands and/or densely compacted sand grading fill will be appropriate for the proposed apartment buildings and clubhouse to be constructed at this site. We expect a low risk of detrimental movement and damage will exist for conventional slab-on-grade floors constructed within the first level of the apartment buildings and clubhouse, if underlain by the natural sands and/or properly moisture conditioned and compacted sand grading fill. A Soils and Foundation Investigation report prepared after completion of site grading should address appropriate foundation systems and floor system alternatives on a building-by-building basis.

PAVEMENTS

Natural sands and granular grading fill are expected to be the predominant pavement subgrade materials. These materials exhibit generally good subgrade support for pavements. For the granular materials, we anticipate composite asphalt concrete and aggregate base course pavement sections on the order of 4 inches of asphalt over 6 to 7 inches of base course may be needed for the access roads. This pavement thickness may not be sufficient for construction traffic and some maintenance and repair work may be needed prior to completion of the project. A Subgrade Investigation and Pavement Design should be performed after site grading is complete.

CONCRETE

Concrete in contact with soils can be subject to sulfate attack. We measured the water-soluble sulfate concentration in three samples from the site at less than 0.1 percent. Sulfate concentrations of less than 0.1 percent indicate Class 0 exposure to sulfate attack for concrete in contact with the subsoils, according to ACI 201.2R-01, as published in the 2008 American Concrete Institute (ACI) Manual of Concrete Practice. For this level of sulfate concentration, the ACI indicates Type I cement can be used for concrete in contact with the subsoils. Superficial damage may occur to the exposed surfaces of highly permeable concrete, even though sulfate levels are relatively low. To

control this risk and to resist freeze-thaw deterioration, the water-to-cementitious material 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 subjected to freeze-thaw cycles should be air entrained.

SURFACE DRAINAGE AND IRRIGATION

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

RECOMMENDED FUTURE INVESTIGATIONS

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

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

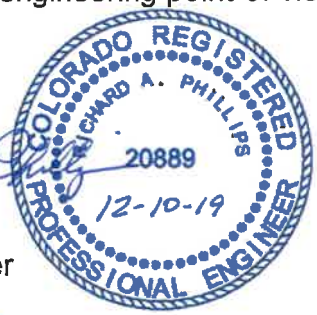
LIMITATIONS

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

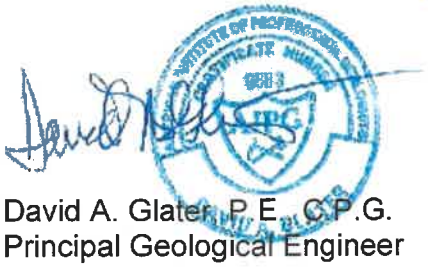
We believe this report was prepared with that level of skill and care ordinarily used by geologists and geotechnical engineers practicing under similar conditions. No warranty, express or implied, is made.

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

CTL | THOMPSON, INC.



Richard A. Phillips, P.E.
Senior Principal Engineer



David A. Glater, P.E., C.P.G.
Principal Geological Engineer

Reviewed by:

Timothy A. Mitchell, P.E.
Division Manager

RAP:DAG:TAM:cw

(3 copies sent)

Via email: dolmstead@jacksondearborn.com
tbaxter@nescolorado.com

REFERENCES

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

2. Federal Emergency Management Agency, Flood Insurance Rate Maps, Map Number 08041C0752G, Panel 752 of 1300, effective date December 7, 2018.

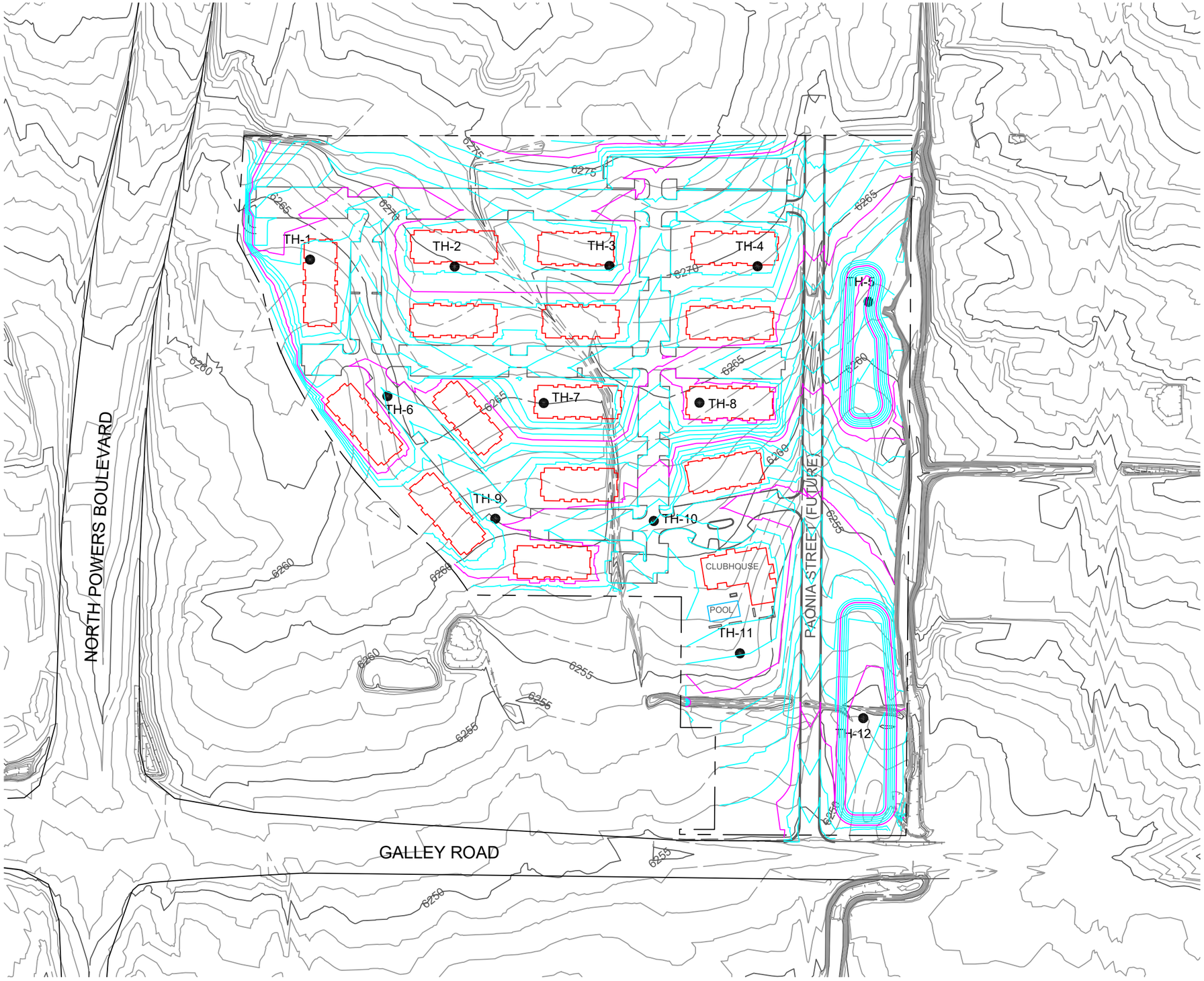
3. International Building Code (2015 IBC).

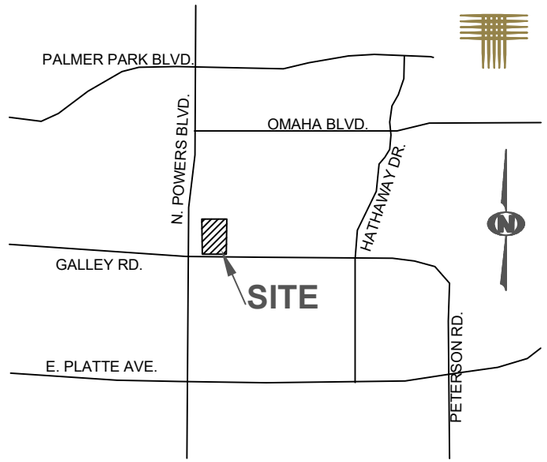
4. Kirkham, R.M. & Rogers, W.P. (1981). Earthquake Potential in Colorado. Colorado Geological Survey, Bulletin 43.

5. Robinson and Associates, Inc. (1977). El Paso County, Colorado - Potential Geologic Hazards and Surficial Deposits, Environmental and Engineering Geologic Maps and Tables for Land Use, Maps 1A and 1B.

6. State of Colorado, Division of Mined Land Reclamation (April 1985). Prepared by Dames and Moore. Colorado Springs Subsidence Investigation.

7. Madole, Richard F. and Thorson, Jon P. “Geologic Map of the Elsmere Quadrangle, El Paso County, Colorado,” Colorado Geological Survey (2002).





VICINITY MAP

(NOT TO SCALE)

LEGEND:

- TH-1 ● — APPROXIMATE LOCATION OF EXPLORATORY BORING.
- PROJECT BOUNDARY
- LOCATION OF PROPOSED BUILDING FOOTPRINT.
- EXISTING TOPOGRAPHY
- PROPOSED GRADING CONTOURS

N

0 100' 200'

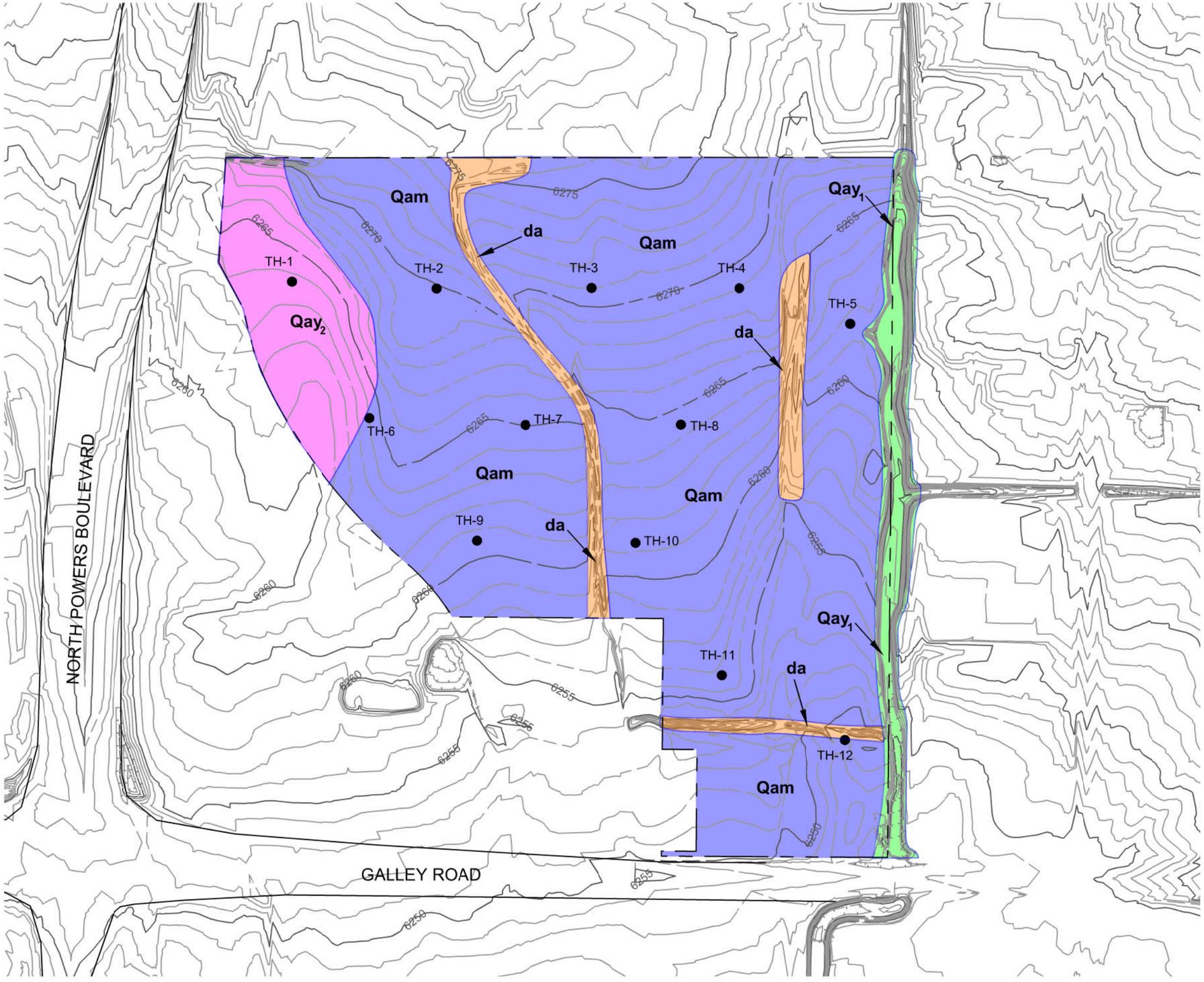
SCALE: 1" = 200'

NOTE:
BASE DRAWING WAS PROVIDED BY NES IN AN EMAIL DATED DECEMBER 4, 2019.

JACKSON DEARBORN PARTNERS
POWERS APARTMENT COMPLEX
CTL|T PROJECT NO. CS19163-105

Location of Exploratory Borings

FIG. 1



LEGEND:

TH-1 ● APPROXIMATE LOCATION OF EXPLORATORY BORING.

PROJECT BOUNDARY

GEOLOGIC MAP LEGEND

SURFICIAL GEOLOGIC CONTACTS

Qay$_1$ YOUNG ALLUVIUM ONE, LATE HOLOCENE, POORLY-SORTED, SILTY SANDS TYPICALLY FOUND IN NARROW FLOOD PLAINS AND THE FLOORS OF STREAM CHANNELS.

Qay$_2$ YOUNG ALLUVIUM TWO, LATE AND MIDDLE HOLOCENE, POORLY-SORTED, SILTY SANDS TYPICALLY FOUND IN BROAD VALLEY FLOORS.

Qam MIDDLE ALLUVIUM, LATE PLEISTOCENE, POORLY-SORTED SANDS.

da DISTURBED AREA

N

0 100' 200'

SCALE: 1" = 200'

NOTES:

1. BASE DRAWING WAS PROVIDED BY NES IN AN EMAIL DATED NOVEMBER 21, 2019.
2. ALL BOUNDARIES SHOWN SHOULD BE CONSIDERED APPROXIMATE. THEY ARE BASED UPON A SUBJECTIVE INTERPRETATION OF PUBLISHED MAPS, AERIAL PHOTOGRAPHS AND AN INITIAL FIELD RECONNAISSANCE. CHANGES IN THE MAPPED BOUNDARIES SHOWN ARE POSSIBLE AND SHOULD BE EXPECTED WITH MORE DETAILED WORK AND FURTHER INFORMATION. ALL NTERPRETATIONS AND CONDITIONS SHOWN ARE PRELIMINARY AND FOR LAND-USE PLANNING ONLY.

JACKSON DEARBORN PARTNERS
POWERS APARTMENT COMPLEX
CTL|T PROJECT NO. CS19163-105

Surficial Geologic Conditions

FIG. 2

LEGEND:

TH-1 ● APPROXIMATE LOCATION OF EXPLORATORY BORING.

PROJECT BOUNDARY

ENGINEERING UNITS

ENGINEERING CONTACTS

1A STABLE ALLUVIUM WITH GENTLE SLOPES LESS THAN ABOUT 5 PERCENT. THESE AREAS HAVE THICK SAND SOILS THAT CAN BE EROSION PRONE.

7A PHYSIOGRAPHIC FLOOD PLAIN AND ADJACENT AREAS WHERE EROSION IS ON-GOING. SOME OVER-STEEPENED STREAM BANKS ARE PRESENT AND ARE CONSIDERED UNSTABLE. FLOODING AND SLOPE STABILITY ARE CONCERNS.

da DISTURBED AREA

NOTES:

1. BASE DRAWING WAS PROVIDED BY NES IN AN EMAIL DATED NOVEMBER 21, 2019.
2. ALL BOUNDARIES SHOWN SHOULD BE CONSIDERED APPROXIMATE. THEY ARE BASED UPON A SUBJECTIVE INTERPRETATION OF PUBLISHED MAPS, AERIAL PHOTOGRAPHS AND AN INITIAL FIELD RECONNAISSANCE. CHANGES IN THE MAPPED BOUNDARIES SHOWN ARE POSSIBLE AND SHOULD BE EXPECTED WITH MORE DETAILED WORK AND FURTHER INFORMATION. ALL INTERPRETATIONS AND CONDITIONS SHOWN ARE PRELIMINARY AND FOR INITIAL LAND-USE PLANNING ONLY.
3. MAP LEGEND IS MODIFIED FROM CHARLES S. ROBINSON & ASSOCIATES, INC., GOLDEN, COLORADO, DATED 1977.

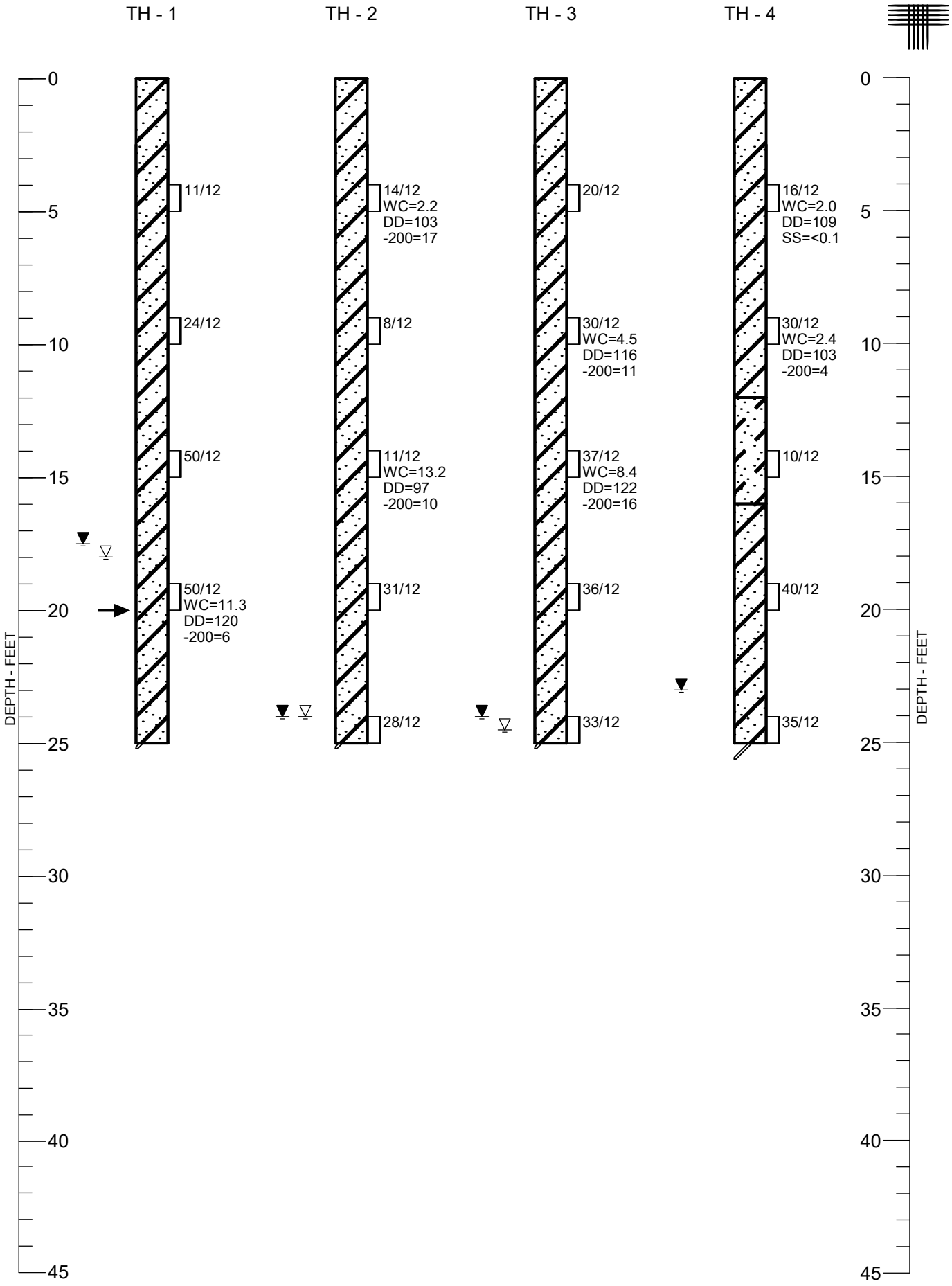
JACKSON DEARBORN PARTNERS
POWERS APARTMENT COMPLEX
CTL|T PROJECT NO. CS19163-105

Engineering Conditions

FIG. 3

APPENDIX A

SUMMARY LOGS OF EXPLORATORY BORINGS



JACKSON DEARBORN PARTNERS
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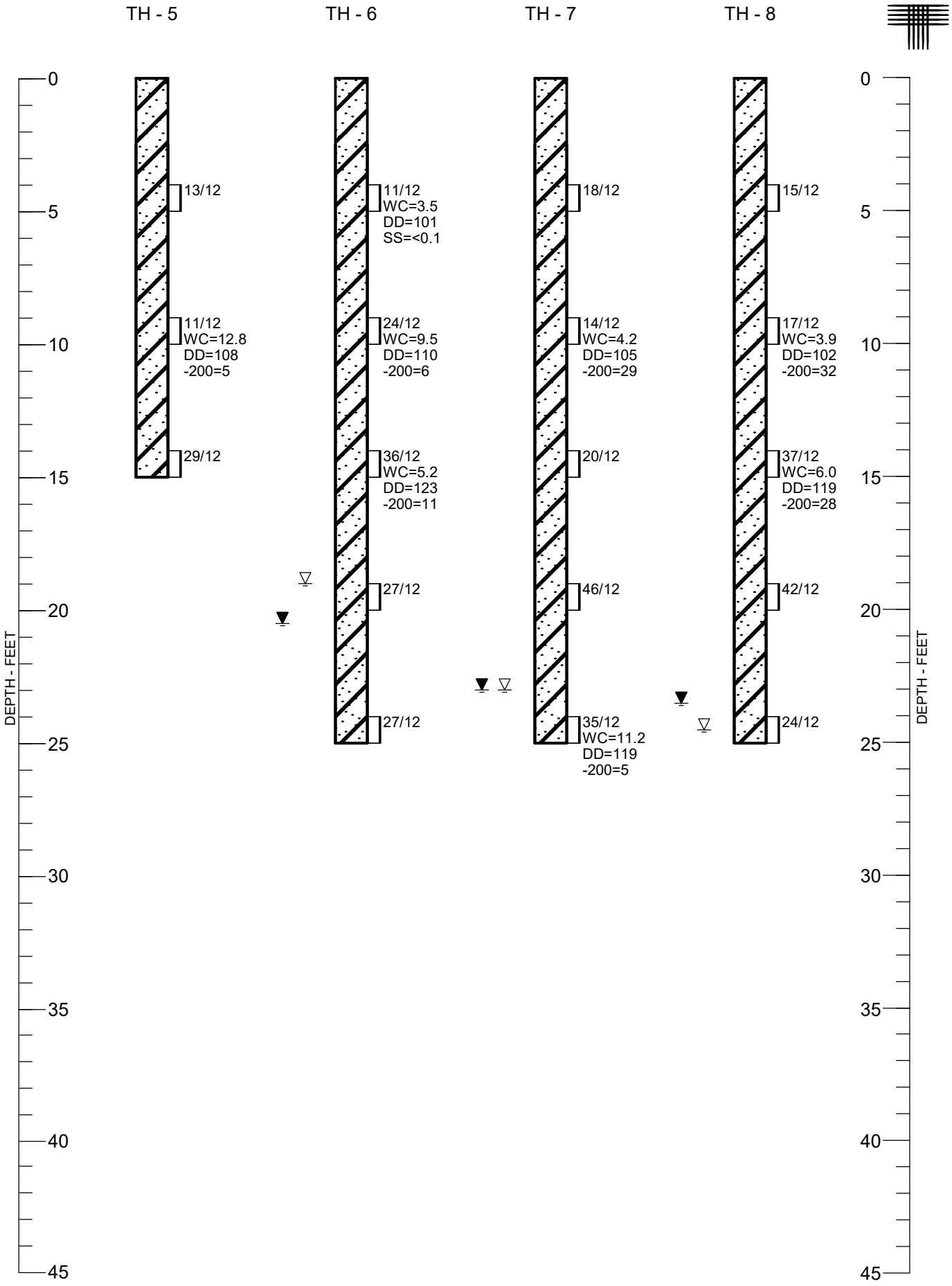
CTL|T PROJECT NO. CS19163-105

Summary Logs of Exploratory Borings

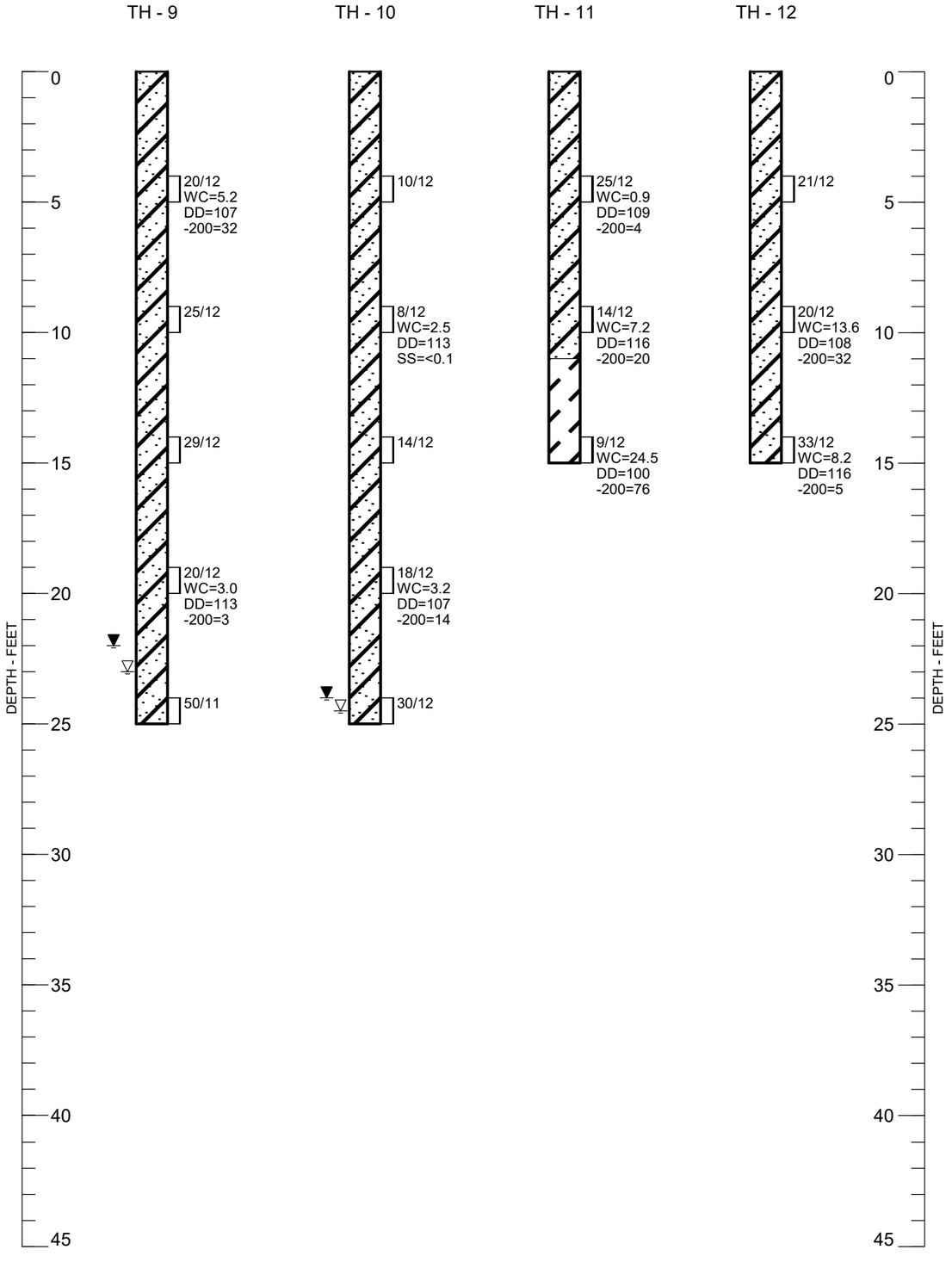
FIG. A-1



JACKSON DEARBORN PARTNERS
POWERS APARTMENT COMPLEX
CTL|T PROJECT NO. CS19163-105

Summary Logs of Exploratory Borings

FIG. A-2



NOTES:

1. THE BORINGS WERE DRILLED OCTOBER 10 AND 17, 2019 USING A 4-INCH DIAMETER, CONTINUOUS-FLIGHT AUGER AND A CME-55, TRUCK-MOUNTED DRILL RIG.
2. THESE LOGS ARE SUBJECT TO THE EXPLANATIONS, LIMITATIONS, AND CONCLUSIONS AS CONTAINED IN THIS REPORT.
3. WC - INDICATES MOISTURE CONTENT. (%)
   DD - INDICATES DRY DENSITY. (PCF)
   -200 - INDICATES PASSING NO. 200 SIEVE. (%)
   SS - INDICATES WATER-SOLUBLE SULFATE CONTENT. (%)

LEGEND:

SAND, CLEAN TO SILTY, LOOSE TO DENSE, SLIGHTLY MOIST TO WET, LIGHT TO MEDIUM BROWN, LIGHT GRAY. (SP, SP-SM, SW-SM, SM)

SAND, CLAYEY, MEDIUM DENSE, MOIST, DARK BROWN. (SC)

CLAY, SANDY, STIFF, VERY MOIST, GRAY BROWN. (CL)

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

GROUNDWATER LEVEL MEASURED AT TIME OF DRILLING.

GROUNDWATER LEVEL MEASURED SIX DAYS AFTER DRILLING.

INDICATES DEPTH WHERE THE TEST HOLE CAVED DURING DRILLING.

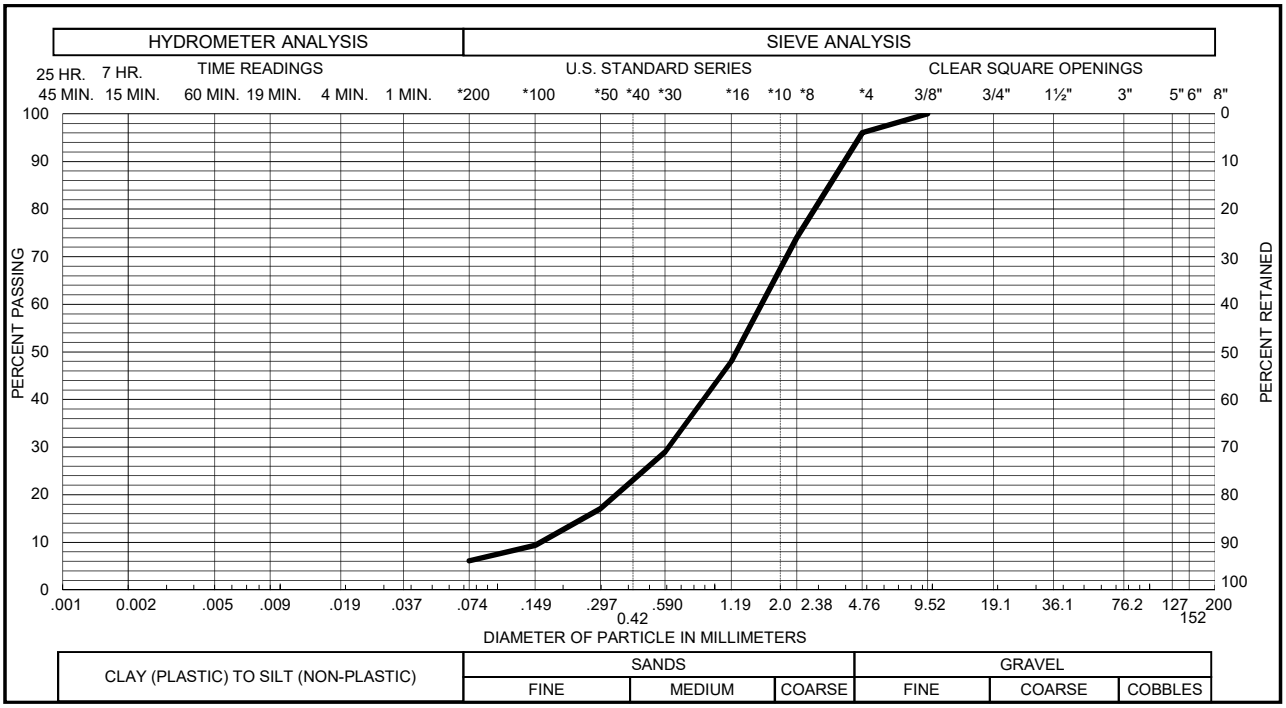
JACKSON DEARBORN PARTNERS
POWERS APARTMENT COMPLEX
CTL|T PROJECT NO. CS19163-105

Summary Logs of Exploratory Borings

FIG. A-3

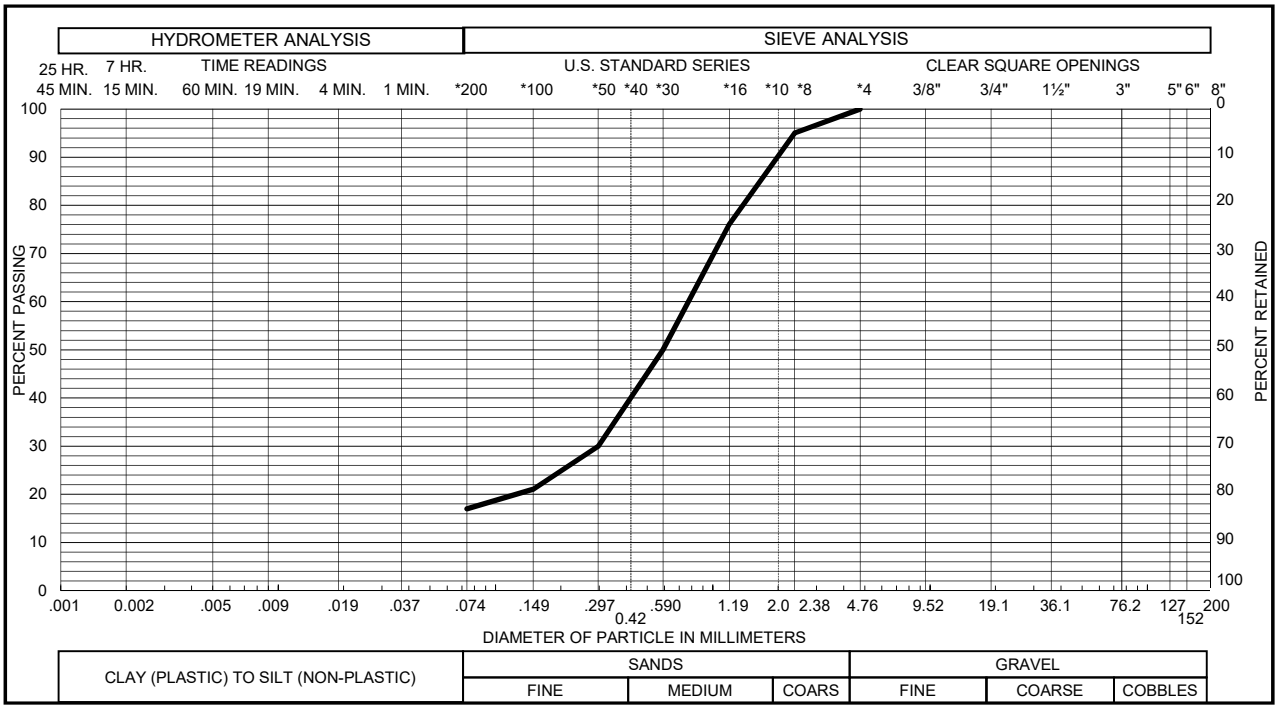
APPENDIX B

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



Sample of SAND, SLIGHTLY SILTY (SW-SM)
From TH - 1 AT 19 FEET

GRAVEL	4 %	SAND	90 %
SILT & CLAY	6 %	LIQUID LIMIT	%
PLASTICITY INDEX			%



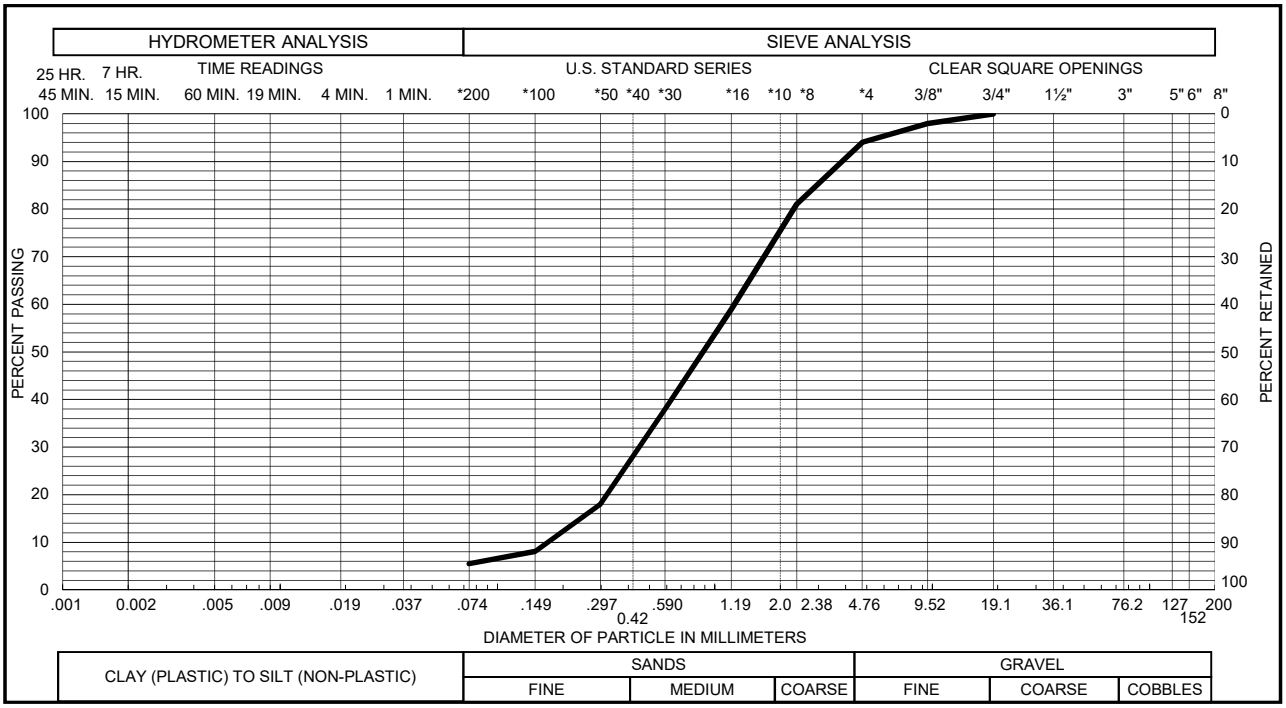
Sample of SAND, SILTY (SM)
From TH - 2 AT 4 FEET

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

JACKSON DEARBORN PARTNERS
POWERS APARTMENT COMPLEX
CTL|T PROJECT NO. CS19163-105

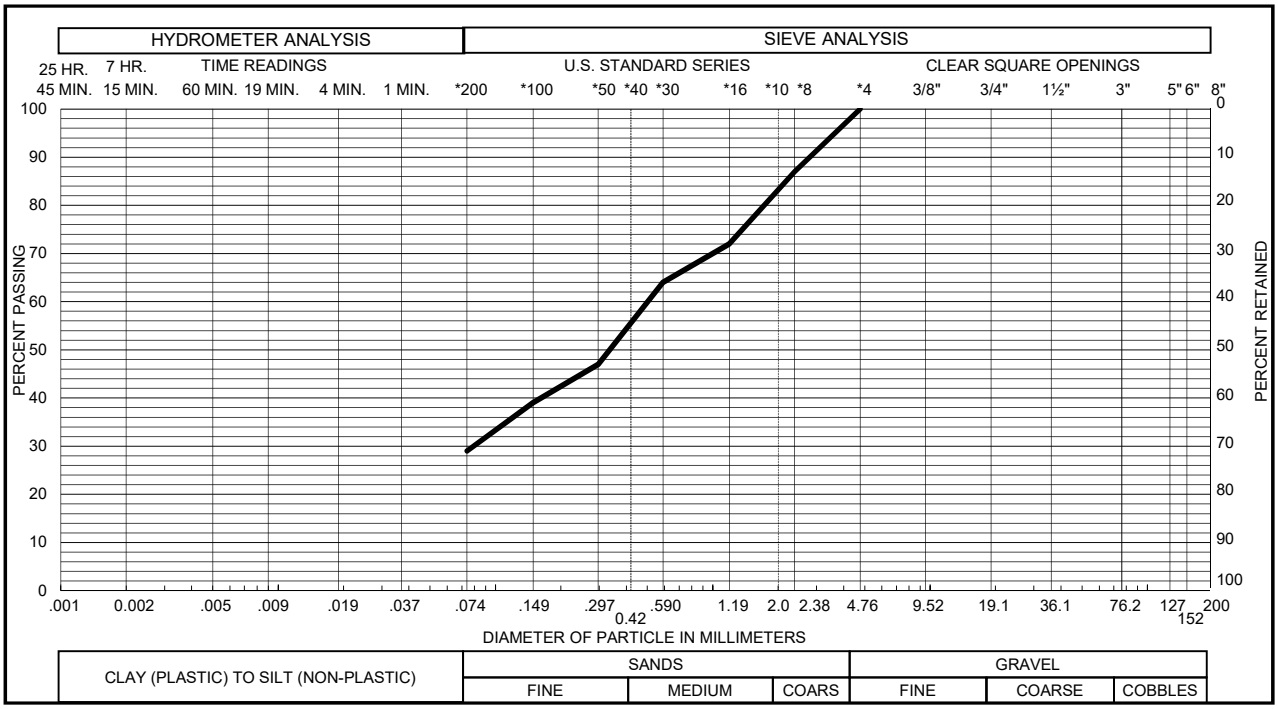
Gradation Test Results

FIG. B-1



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

GRAVEL	6 %	SAND	88 %
SILT & CLAY	6 %	LIQUID LIMIT	%
PLASTICITY INDEX			%



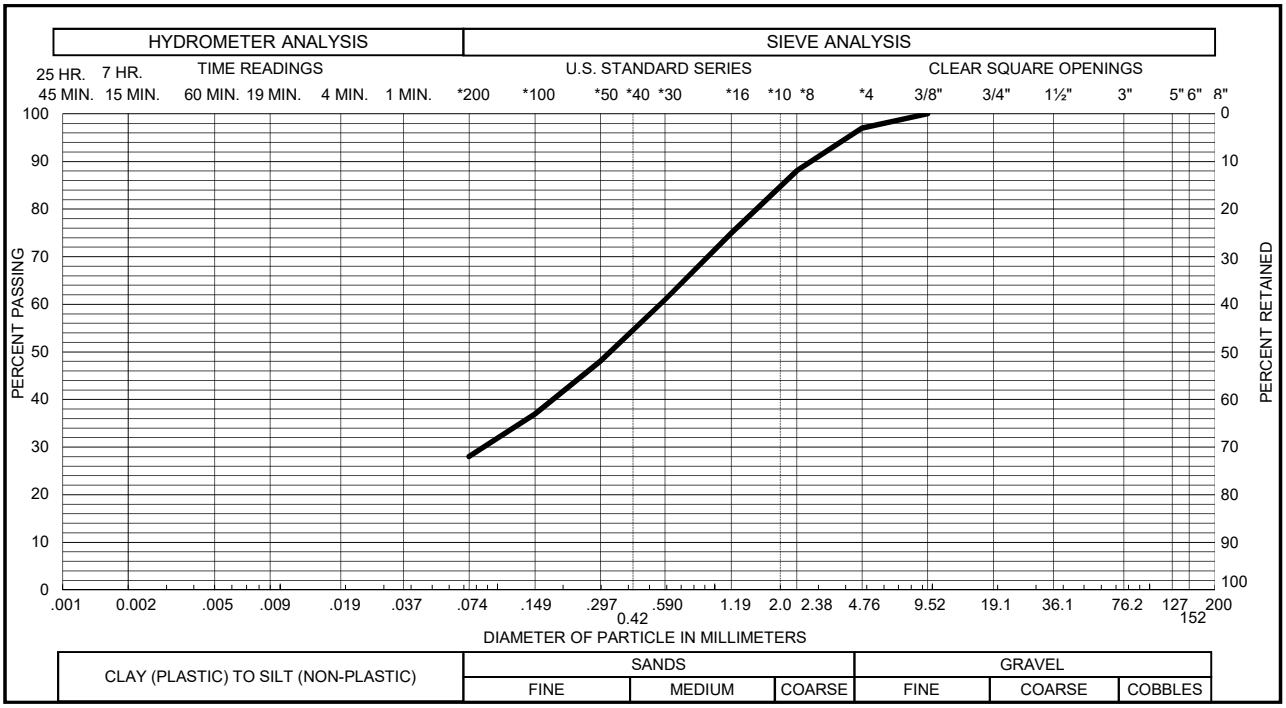
Sample of SAND, SILTY (SM)
From TH - 7 AT 9 FEET

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

JACKSON DEARBORN PARTNERS
POWERS APARTMENT COMPLEX
CTL|T PROJECT NO. CS19163-105

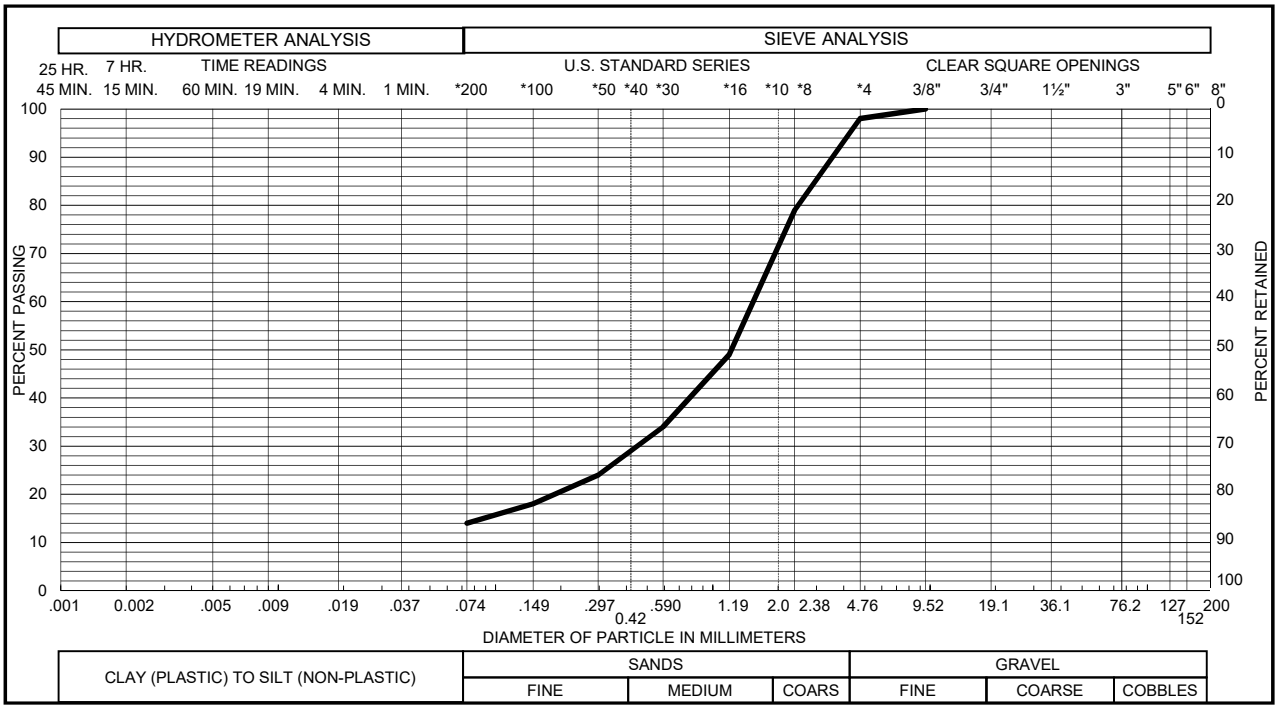
Gradation Test Results

FIG. B-2



Sample of SAND, SILTY (SM)
From TH - 8 AT 14 FEET

GRAVEL	3 %	SAND	69 %
SILT & CLAY	28 %	LIQUID LIMIT	%
PLASTICITY INDEX			%



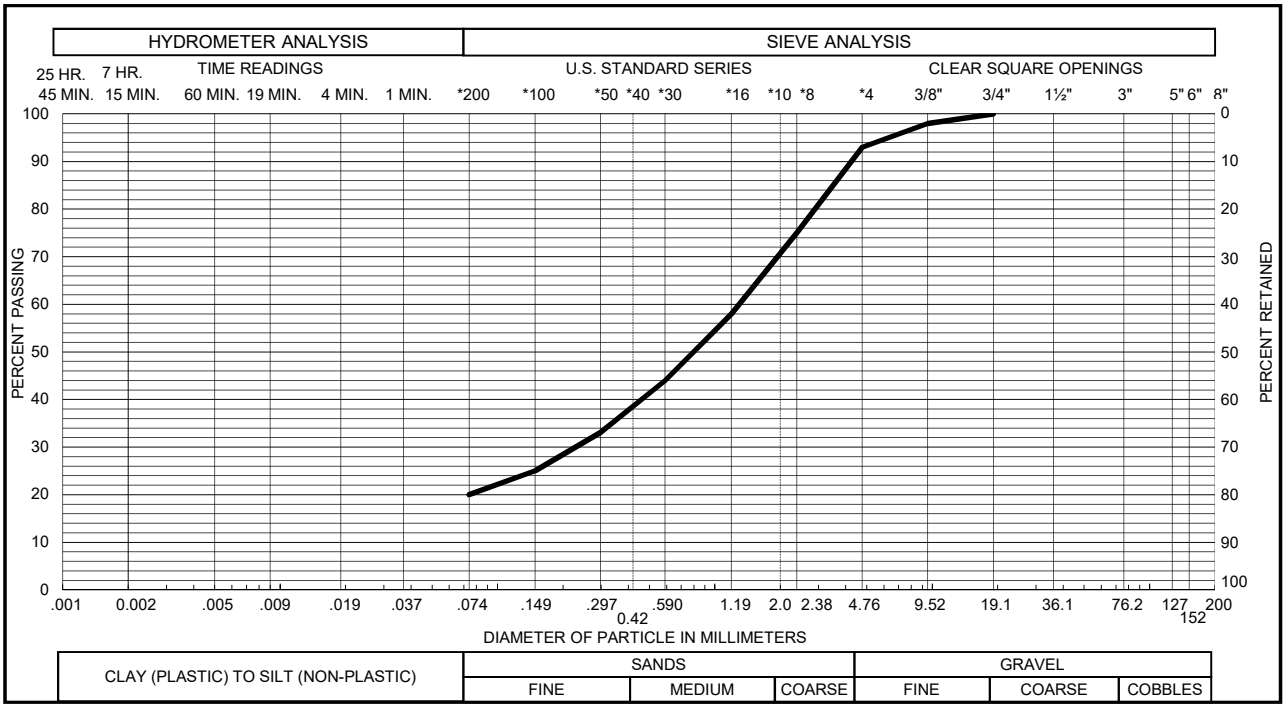
Sample of SAND, SILTY (SM)
From TH - 10 AT 19 FEET

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

JACKSON DEARBORN PARTNERS
POWERS APARTMENT COMPLEX
CTL|T PROJECT NO. CS19163-105

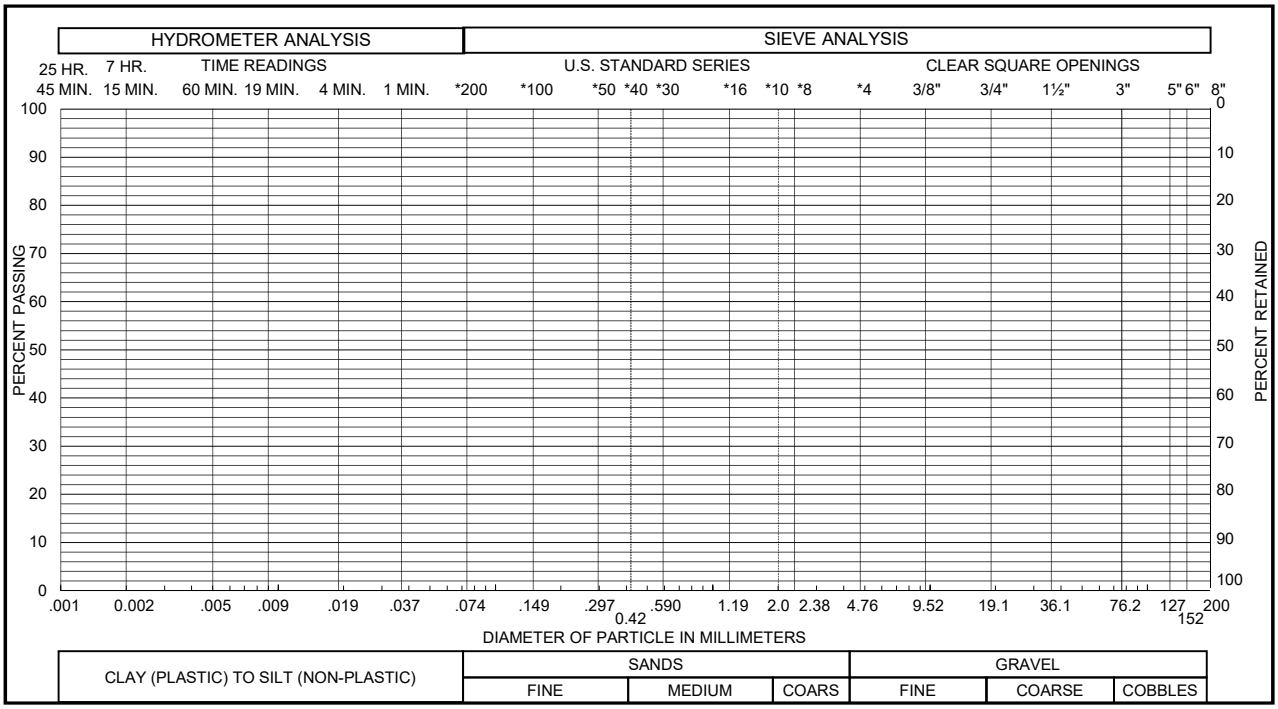
Gradation Test Results

FIG. B-3



Sample of SAND, SILTY (SM)
From TH - 11 AT 9 FEET

GRAVEL 7 %
SAND 73 %
SILT & CLAY 20 %
LIQUID LIMIT %
PLASTICITY INDEX %



Sample of
From

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

JACKSON DEARBORN PARTNERS
POWERS APARTMENT COMPLEX
CTL|T PROJECT NO. CS19163-105

Gradation Test Results

FIG. B-4

TABLE B-1

SUMMARY OF LABORATORY TESTING
CTL|T PROJECT NO. CS19163-105

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	19	11.3	120						6		SAND, SLIGHTLY SILTY (SW-SM)
TH-2	4	2.2	103						17		SAND, SILTY (SM)
TH-2	14	13.2	97						10		SAND, SLIGHTLY SILTY (SP-SM)
TH-3	9	4.5	116						11		SAND, SLIGHTLY SILTY (SP-SM)
TH-3	14	8.4	122						16		SAND, SILTY (SM)
TH-4	4	2.0	109							<0.1	SAND, SILTY (SM)
TH-4	9	2.4	103						4		SAND (SP)
TH-5	9	12.8	108						5		SAND, SLIGHTLY SILTY (SP-SM)
TH-6	4	3.5	101							<0.1	SAND, SLIGHTLY SILTY (SP-SM)
TH-6	9	9.5	110						6		SAND, SLIGHTLY SILTY (SP-SM)
TH-6	14	5.2	123						11		SAND, SLIGHTLY SILTY (SP-SM)
TH-7	9	4.2	105						29		SAND, SILTY (SM)
TH-7	24	11.2	119						5		SAND, SLIGHTLY SILTY (SP-SM)
TH-8	9	3.9	102						32		SAND, SILTY (SM)
TH-8	14	6.0	119						28		SAND, SILTY (SM)
TH-9	4	5.2	107						32		SAND, SILTY (SM)
TH-9	19	3.0	113						3		SAND (SP)
TH-10	9	2.5	113							<0.1	SAND, SLIGHTLY SILTY (SP-SM)
TH-10	19	3.2	107						14		SAND, SILTY (SM)
TH-11	4	0.9	109						4		SAND (SP)
TH-11	9	7.2	116						20		SAND, SILTY (SM)
TH-11	14	24.5	100						76		CLAY, SANDY (CL)
TH-12	9	13.6	108						32		SAND, SILTY (SM)
TH-12	14	8.2	116						5		SAND, SLIGHTLY SILTY (SP-SM)

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

APPENDIX C

GUIDELINE SITE GRADING SPECIFICATIONS
POWERS APARTMENT COMPLEX
EL PASO COUNTY, COLORADO

GUIDELINE SITE GRADING SPECIFICATIONS
POWERS APARTMENT COMPLEX
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 Civil Engineer, as necessary to achieve preliminary pavement and building pad elevations. These specifications also apply to compaction of materials that may be placed outside of the project.

2. GENERAL

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

3. CLEARING JOB SITE

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

4. SCARIFYING AREA TO BE FILLED

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

5. PLACEMENT OF FILL ON NATURAL SLOPES

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

6. COMPACTING AREA TO BE FILLED

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

7. FILL MATERIALS

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

8. MOISTURE CONTENT

For fill material classifying as CH 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. Deep cohesive fill (greater than 15 feet below final grade) 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 Geotechnical Engineer, it is not possible to obtain uniform moisture content by adding water on the fill surface. The Contractor may be required to rake or disc the fill soils to provide uniform moisture content throughout the soils.

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

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

9. COMPACTION OF FILL AREAS

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

Compaction, as specified above, shall be obtained using sheepsfoot rollers, multiple-wheel pneumatic-tired rollers, or other equipment approved by the Geotechnical Engineer for soils classifying as claystone, CL, CH or SC. Granular fill shall be compacted using vibratory equipment or other equipment approved by the

Geotechnical Engineer. Compaction shall be accomplished while the fill material is at the specified moisture content. Compaction of each layer shall be continuous over the entire area. Compaction equipment shall make sufficient trips to ensure that the required density is obtained.

10. COMPACTION OF SLOPES

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

11. DENSITY TESTS

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

A. Moisture:

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

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

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

12. SEASONAL LIMITS

No fill material shall be placed, spread or rolled while it is frozen, thawing, or during unfavorable weather conditions. When work is interrupted by heavy precipitation, fill operations shall not be resumed until the Geotechnical Engineer

indicates the moisture content and density of previously placed materials are as specified.

13. NOTICE REGARDING START OF GRADING

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

14. REPORTING OF FIELD DENSITY TESTS

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