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.

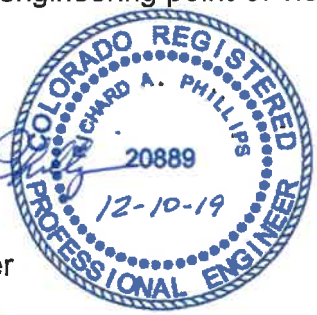
LIMITATIONS

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.

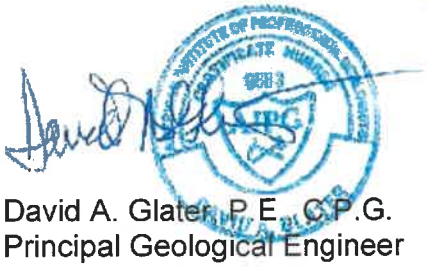
We believe this report was prepared with that level of skill and care ordinarily used by geologists and geotechnical engineers practicing under similar conditions. No warranty, express or implied, is made.

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.

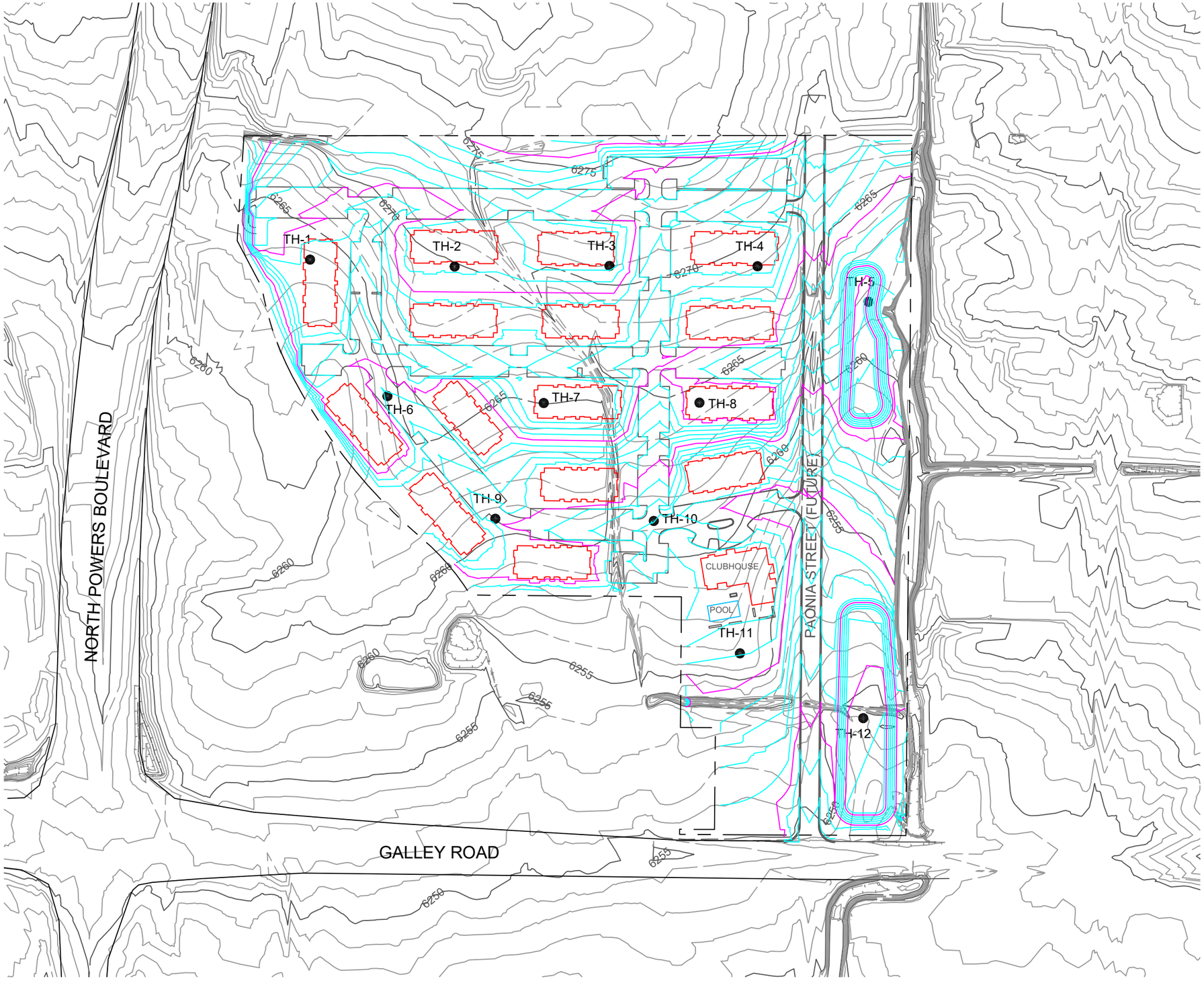
3. International Building Code (2015 IBC).

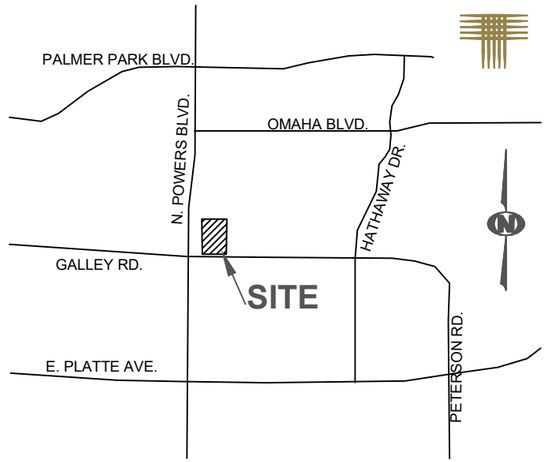
4. Kirkham, R.M. & Rogers, W.P. (1981). Earthquake Potential in Colorado. Colorado Geological Survey, Bulletin 43.

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'

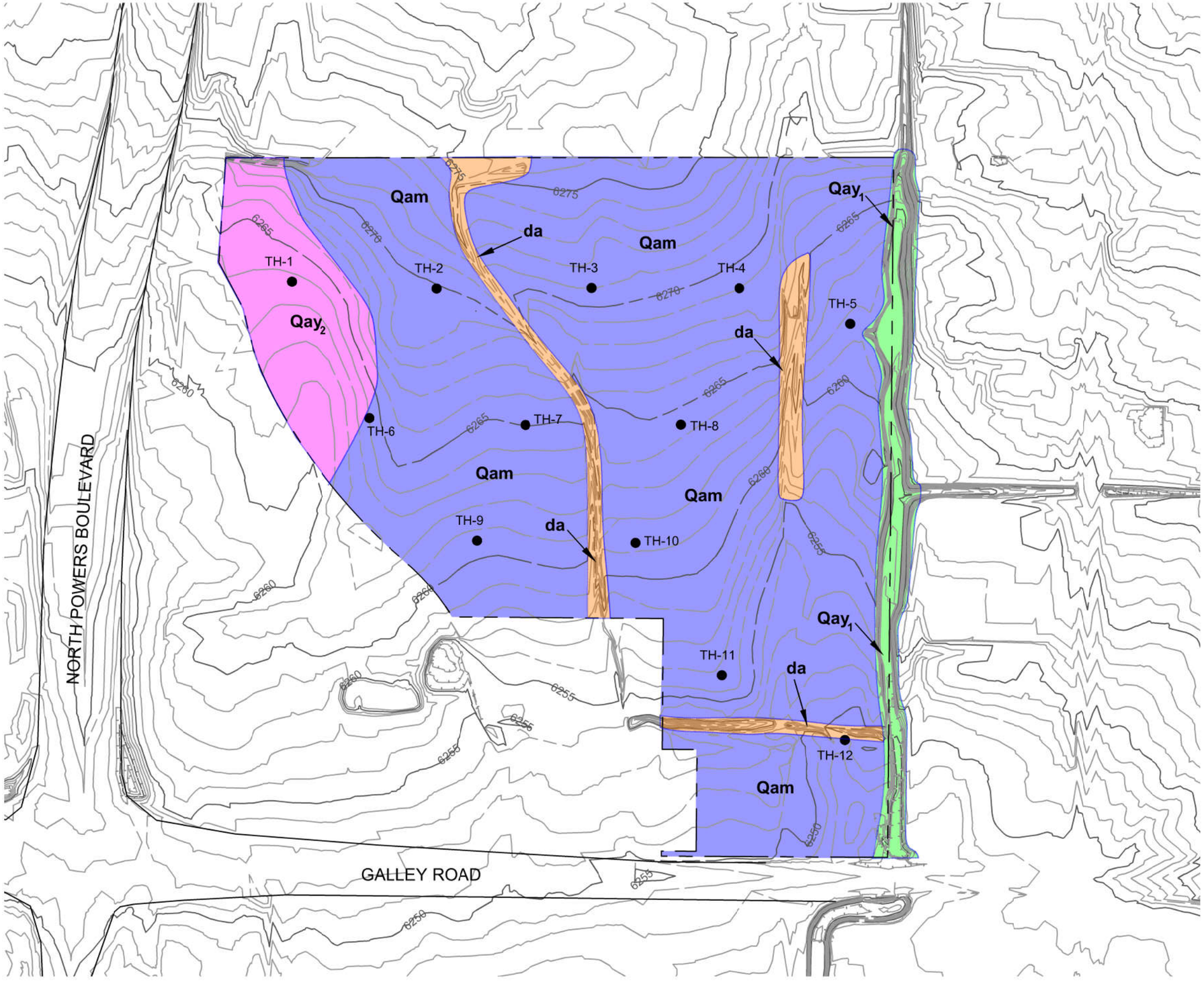
SCALE: 1" = 200'

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.

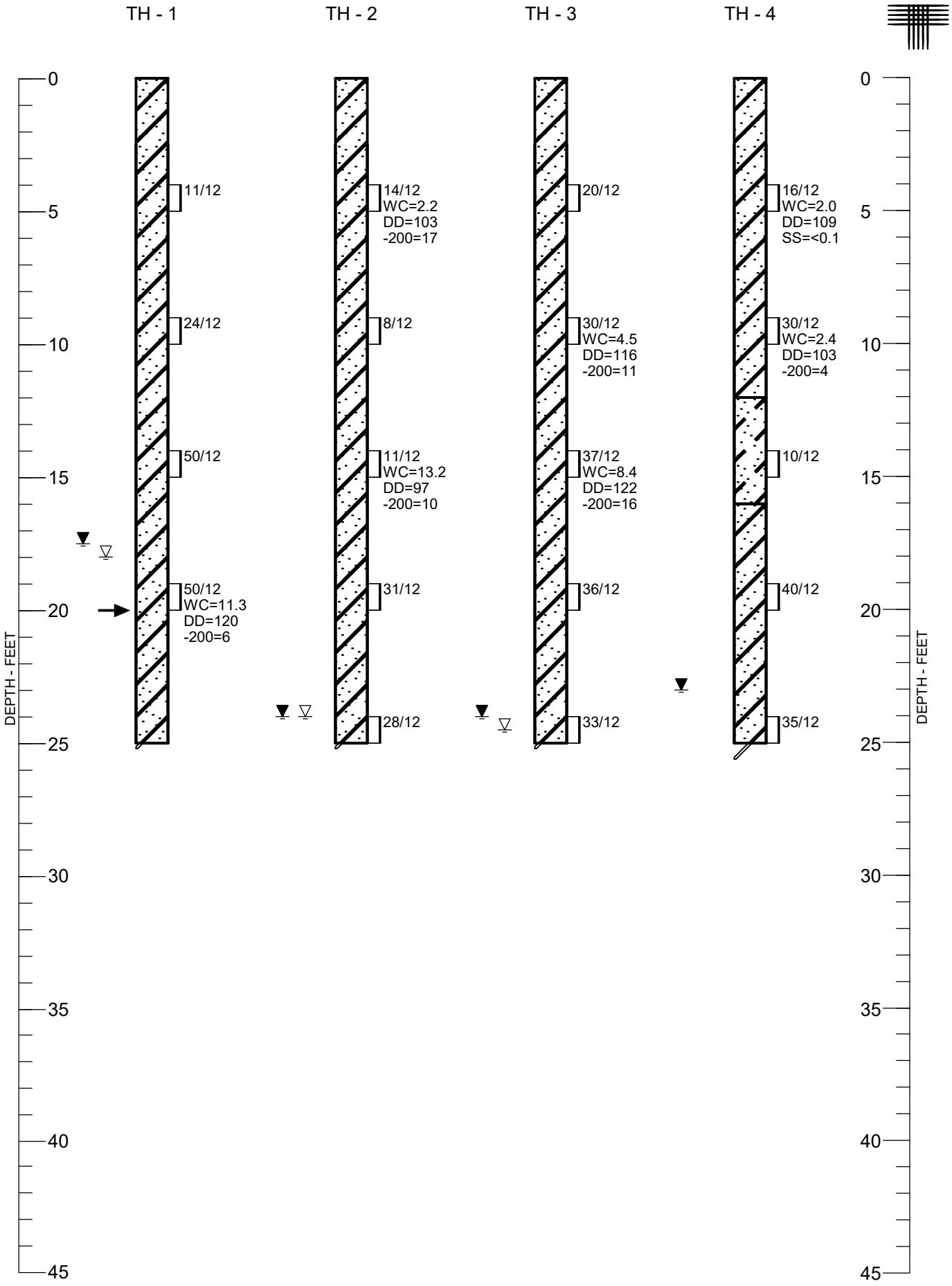
JACKSON DEARBORN PARTNERS
POWERS APARTMENT COMPLEX
CTL|T PROJECT NO. CS19163-105

Engineering Conditions

FIG. 3

APPENDIX A

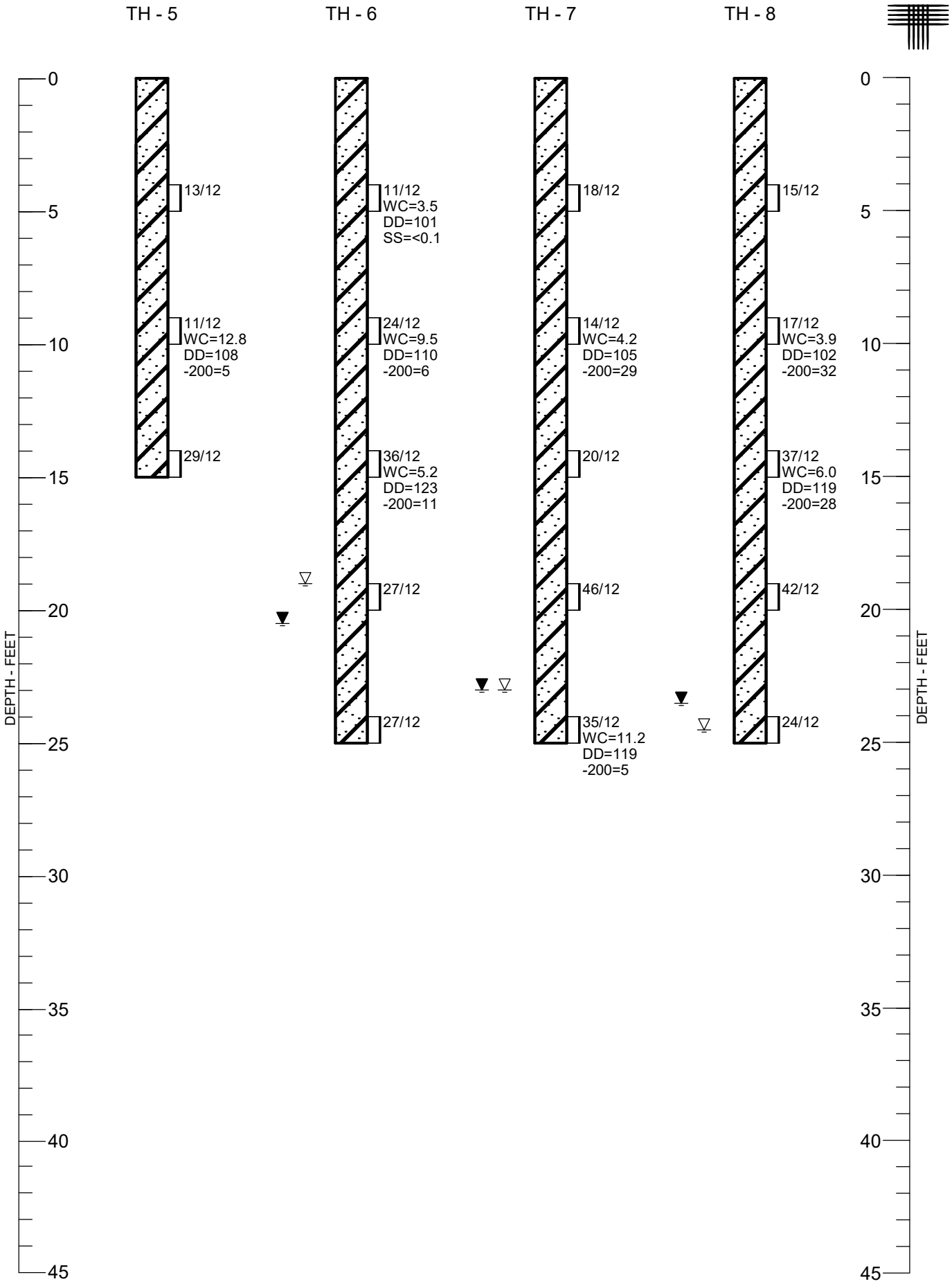
SUMMARY LOGS OF EXPLORATORY BORINGS



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

Summary Logs of Exploratory Borings

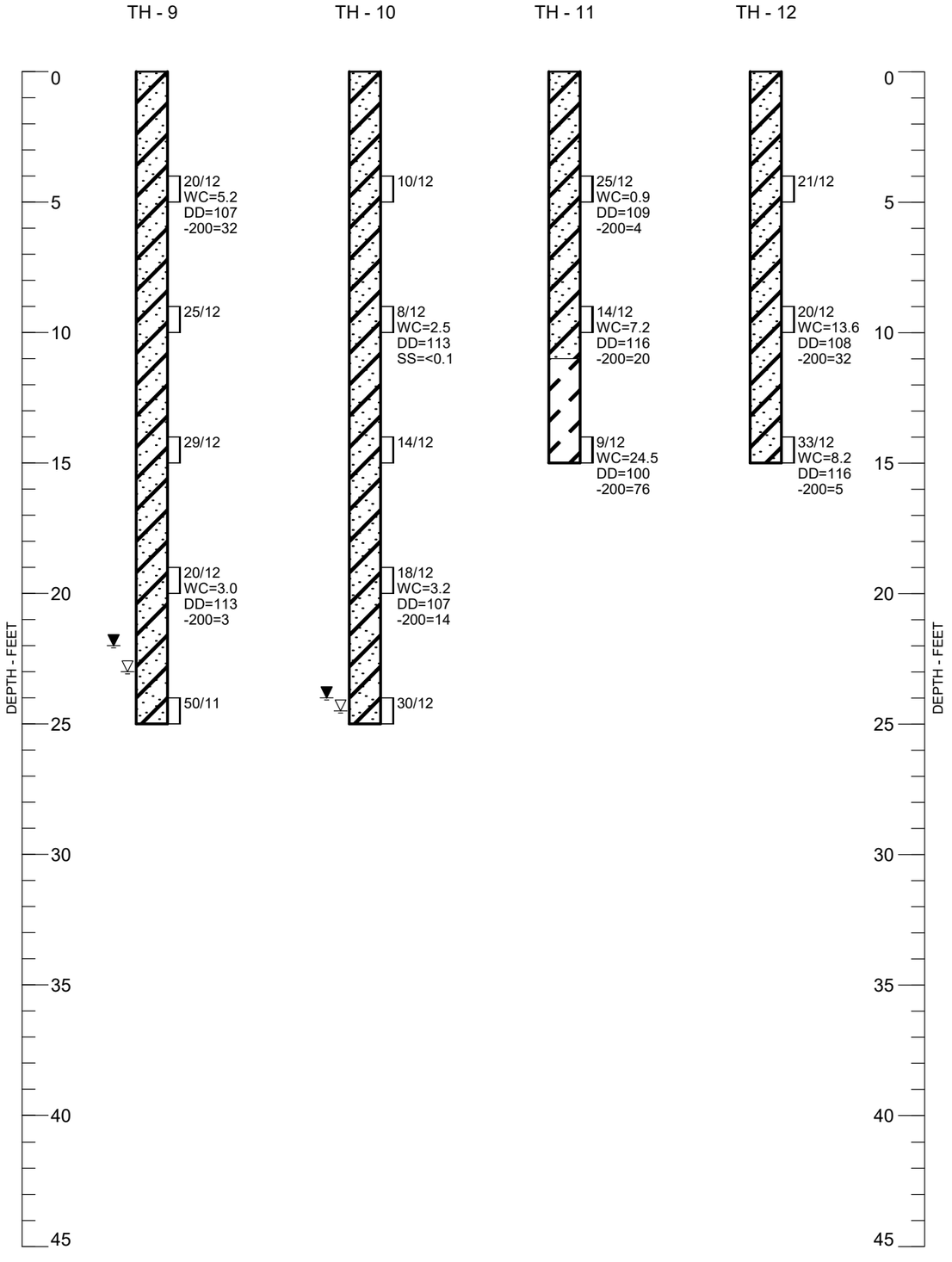
FIG. A-1



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.

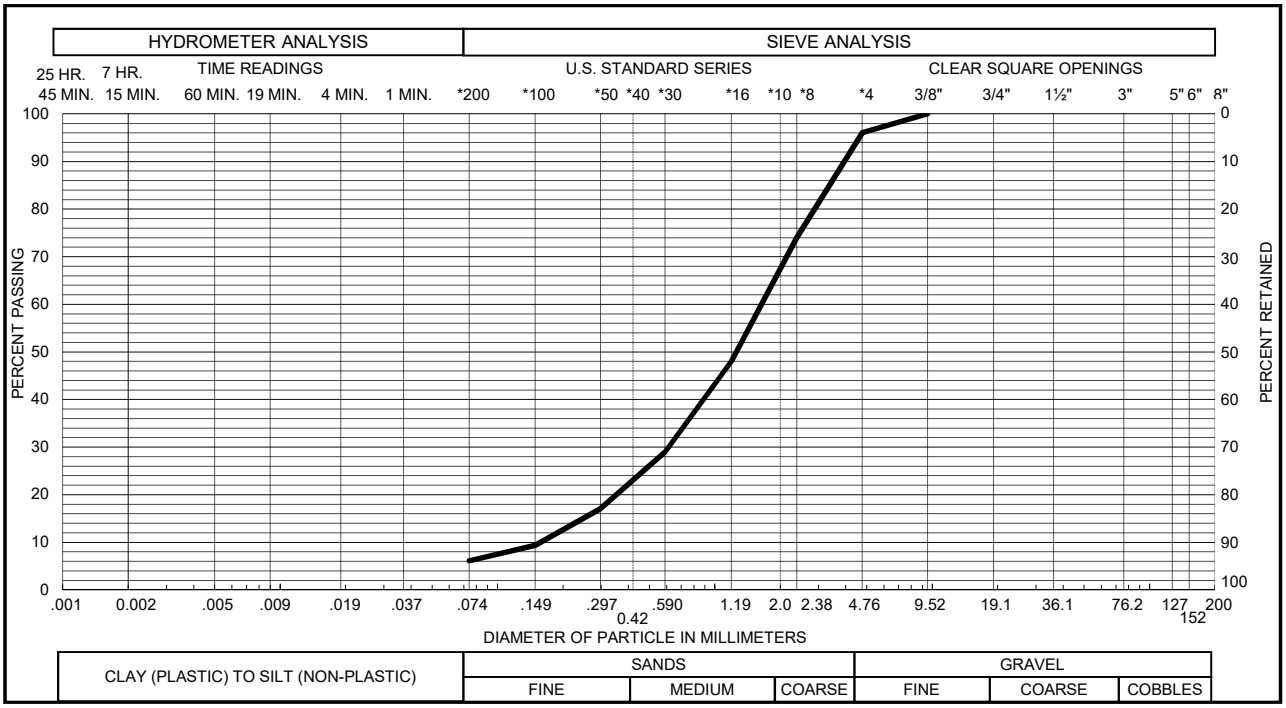
JACKSON DEARBORN PARTNERS
POWERS APARTMENT COMPLEX
CTL|T PROJECT NO. CS19163-105

Summary Logs of Exploratory Borings

FIG. A-3

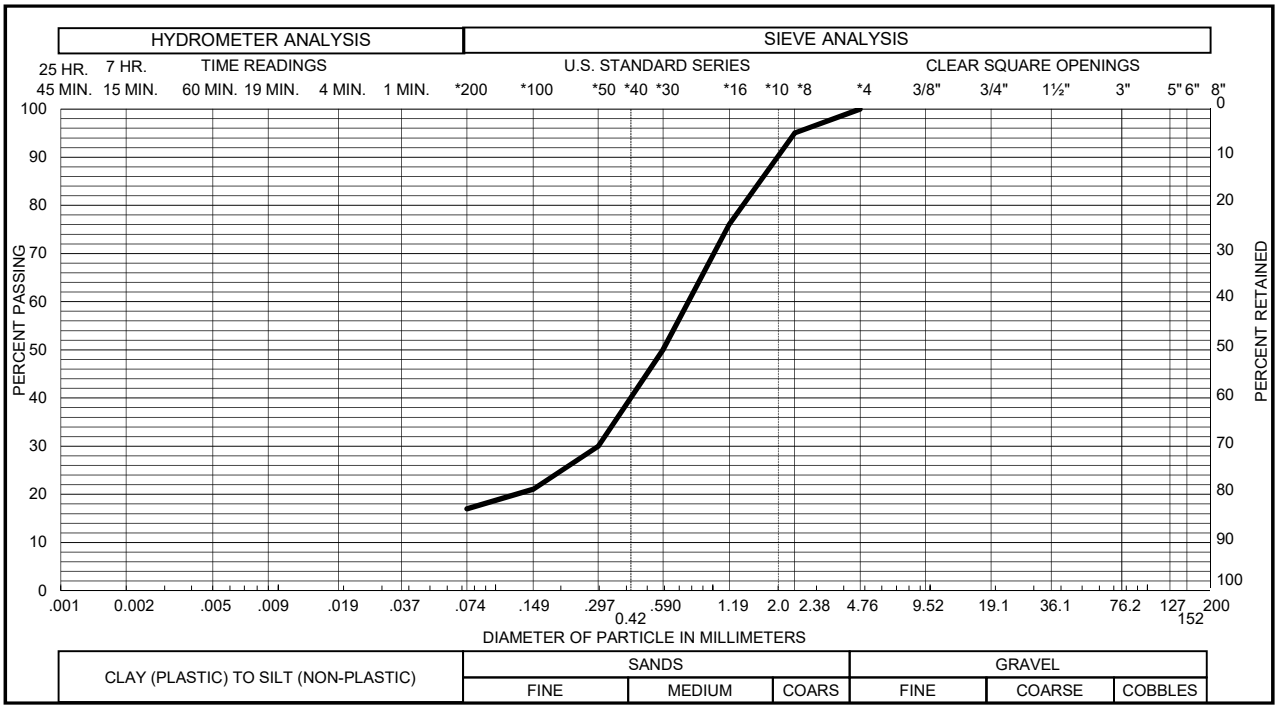
APPENDIX B

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			%



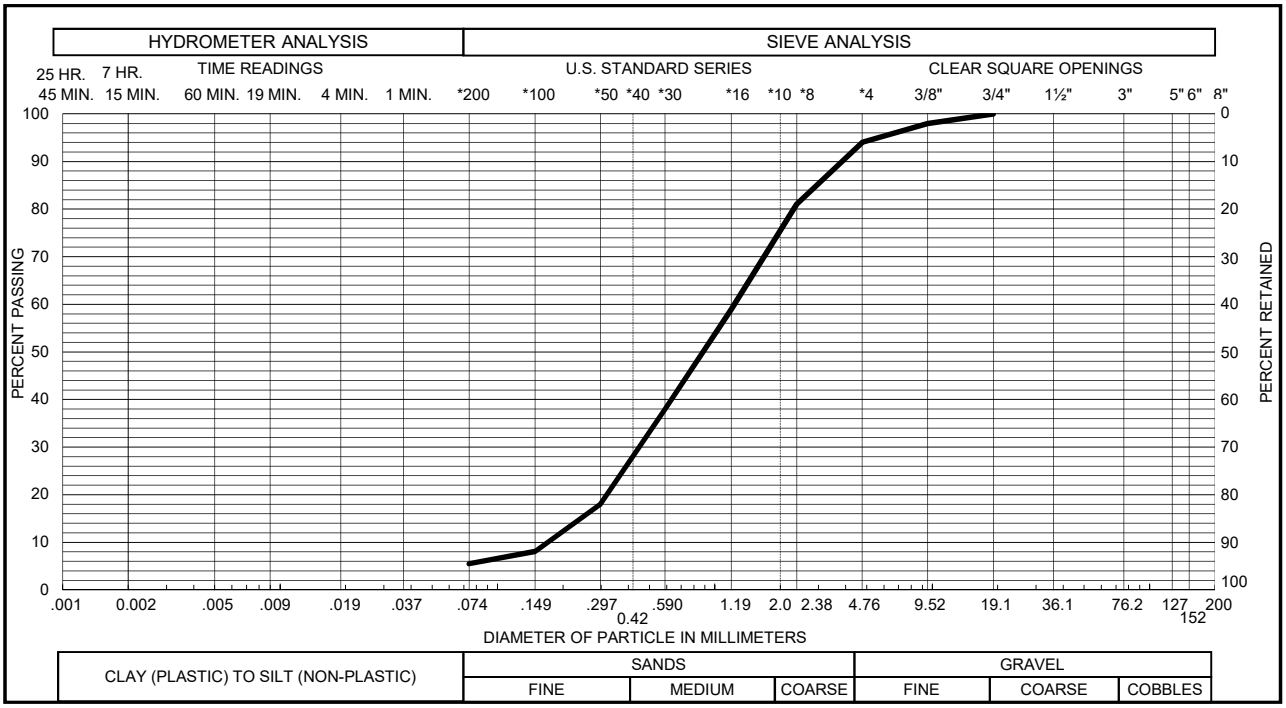
Sample of SAND, SILTY (SM)
From TH - 2 AT 4 FEET

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

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

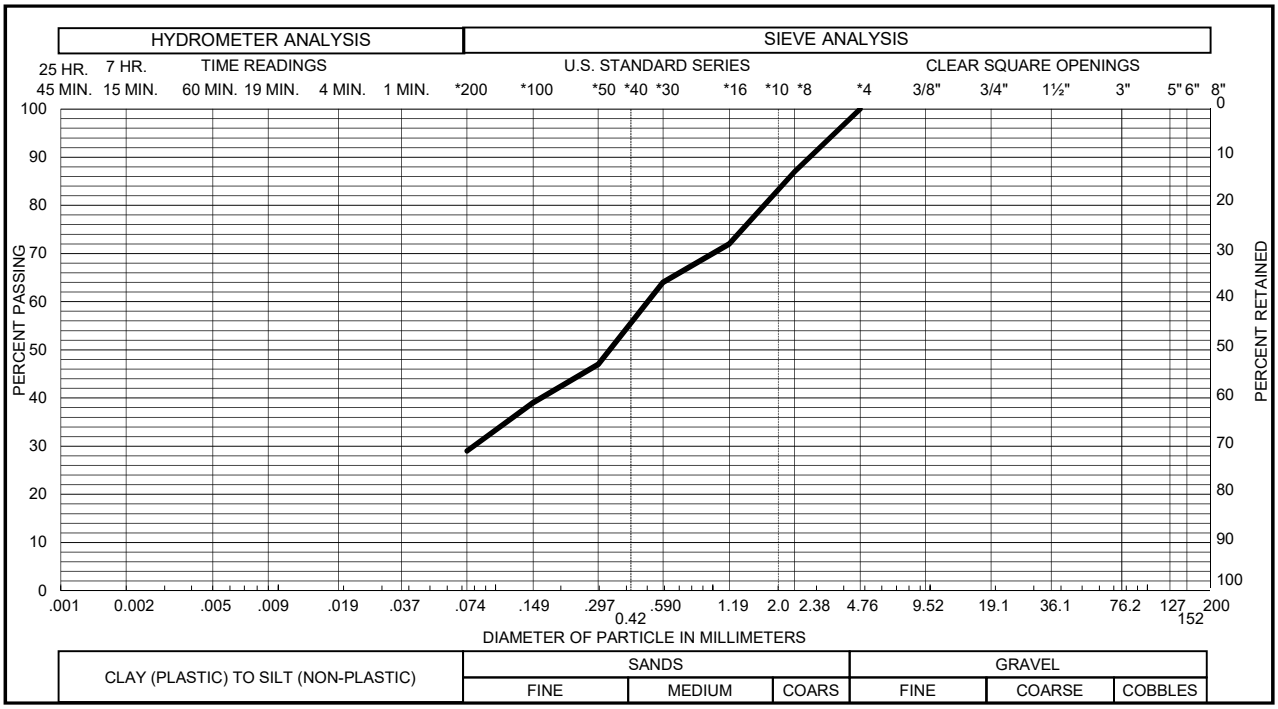
Gradation Test Results

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			%



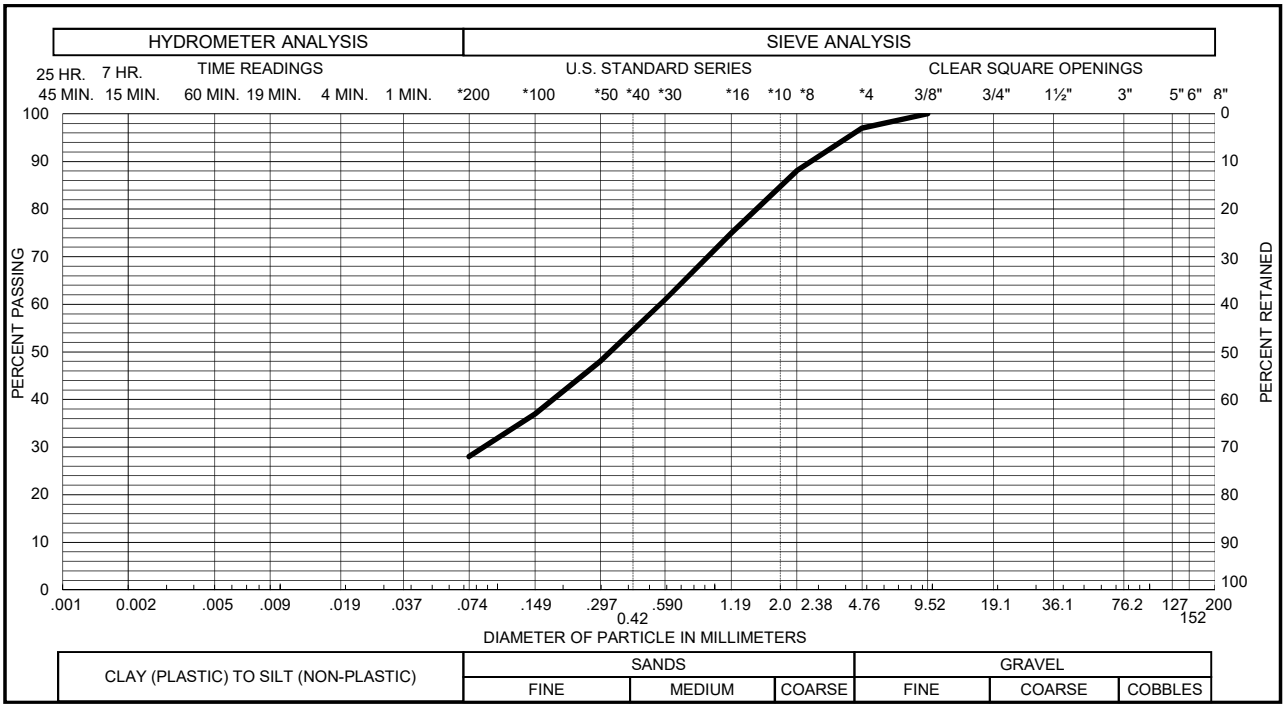
Sample of SAND, SILTY (SM)
From TH - 7 AT 9 FEET

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

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

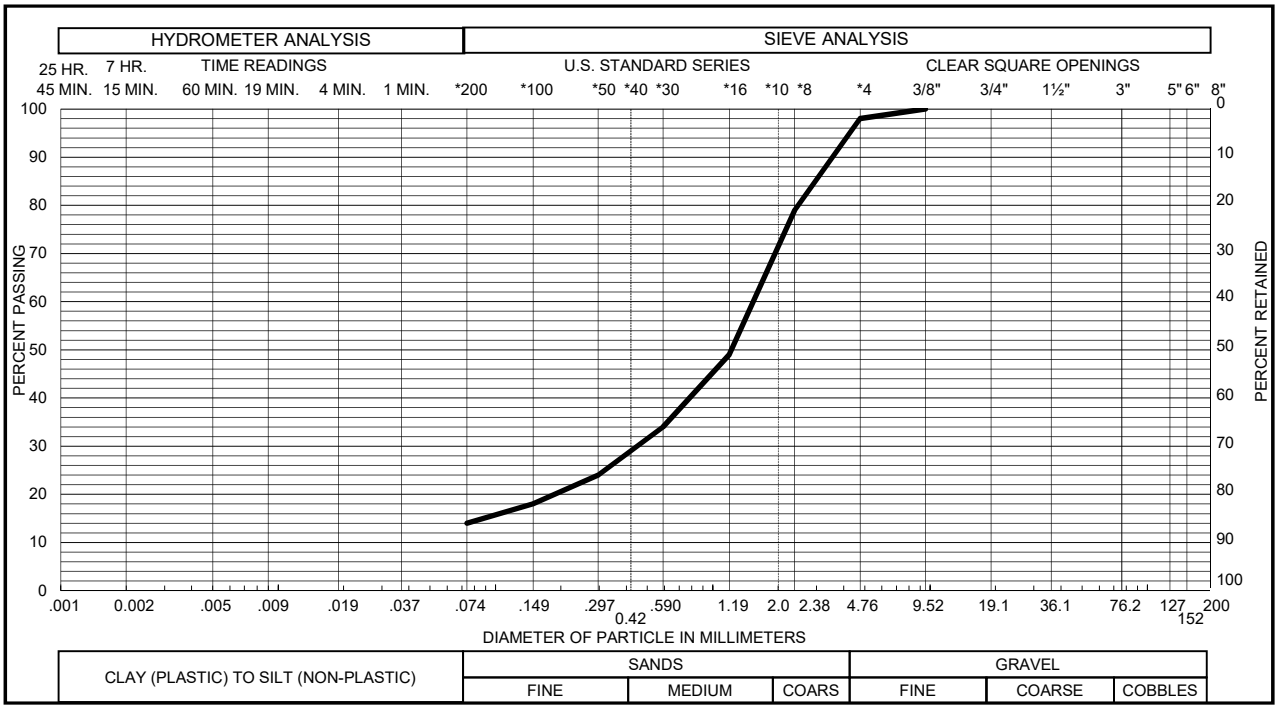
Gradation Test Results

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			%



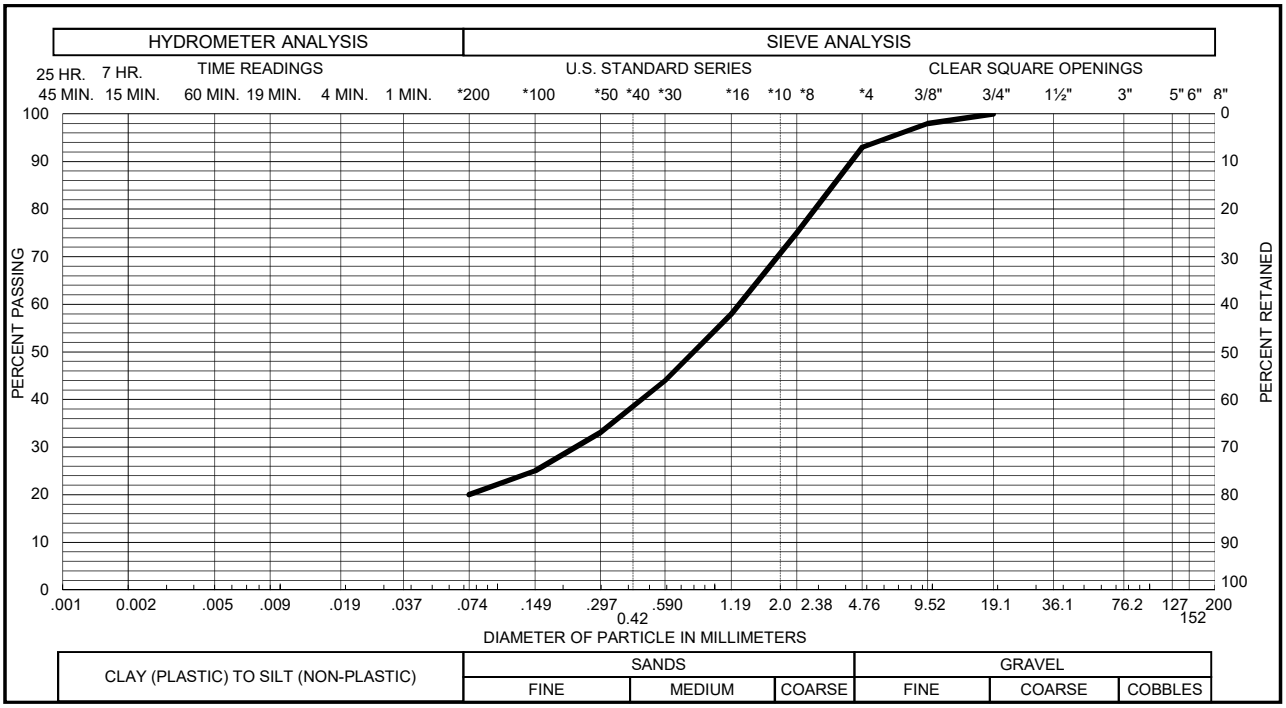
Sample of SAND, SILTY (SM)
From TH - 10 AT 19 FEET

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

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

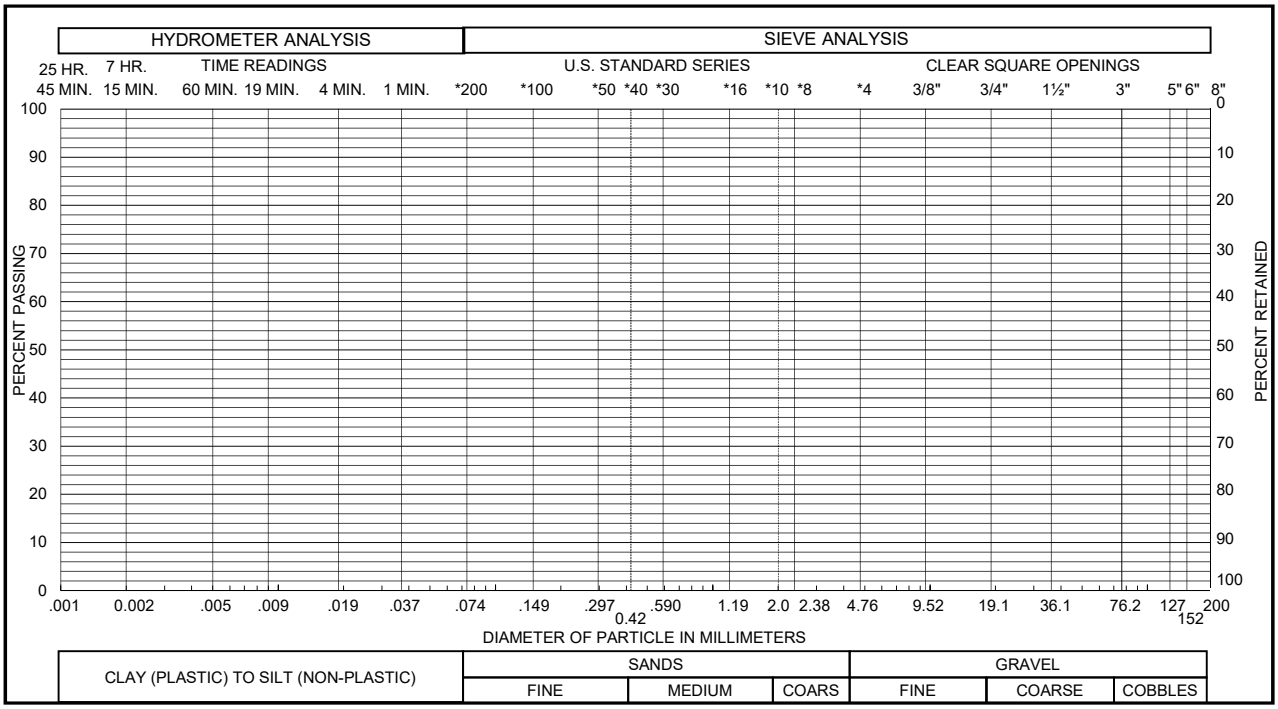
Gradation Test Results

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.