CTL|THOMPSON INCORPORATED

- The report must include recommendation for the foundation preparation and embankment construction.
See EPC Drainage Criteria Manual Vol. 1 Chapter 11 Section 11.3.3.

GEOTECHNICAL INVESTIGATION
MONUMENT SELF-STORAGE
18910 BASE CAMP ROAD
MONUMENT, COLORADO

Prepared for:

STEEL STRUCTURES AMERICA, INC.
P. O. Box 895
Post Falls, Idaho 83877

Attention: Mr. Justin Sternberg

CTL|T Project No. CS19014-125

February 21, 2019

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SCOPE

This report presents the results of our Geotechnical Investigation for the Monument Self-Storage complex to be constructed in Monument, Colorado (Fig. 1). The purpose of our investigation was to evaluate the subsurface conditions at the site and provide geotechnical recommendations and criteria for design and construction of foundations, floor systems, and pavement section alternatives, as well as surface drainage precautions. The scope of our services was described in our proposal (CS-18-0165) dated October 23, 2018 and a subsequent contract modification (CS-18-0165CM1) dated January 24, 2019.

This report was prepared from data developed during our field exploration, laboratory testing, engineering analysis, and our experience. The report was prepared for use by Steel Structures America, Inc. in design and construction of the planned self-storage complex. Other types of construction may require revision of this report and the recommended design criteria. A summary of our conclusions and recommendations follows. More detailed design criteria are presented within the report.

SUMMARY

1. Subsurface conditions encountered in our exploratory borings drilled during this investigation consisted of 8 to 14 feet of clean to very silty sand with occasional clayey to very clayey sand layers underlain by silty to clayey sandstone. The predominant, near-surface, clean to silty sands and underlying silty sandstone are non-expansive when wetted. The clayey to very clayey sands and clayey sandstone are typically non-expansive or exhibit low measured swell values.

2. At the time of drilling, groundwater was not encountered in the seventeen borings spread across the planned building footprints. When the borings were checked five days after the completion of drilling operations, groundwater was measured in three of the borings at depths of 13 to 17 feet. Groundwater levels will fluctuate seasonally and rise in response to precipitation.

3. We understand current plans call for the proposed self-storage buildings to be constructed with pier and bond footing foundation systems.

The storage facility office and two models are to be pole buildings. In our opinion, these foundation alternatives are appropriate for the planned structures. Foundation design and construction criteria are presented in the report.

4. For the pier and bond footing foundation approach, the foundation is structurally integrated with the floor slab and should therefore exhibit a low risk of differential slab movement and cracking. We understand conventional, unreinforced slab-on-grade floors, supported at the perimeter by the drilled post footings, will be utilized in the three pole buildings. In our opinion, a low risk of poor slab performance (movement and damage) will exist for conventional floor slabs underlain by the on-site sands and/or densely compacted, granular grading fill placed under controlled conditions.

5. In our opinion, the proposed 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 any other portions of the proposed paved areas subjected to occasional truck traffic can be paved with 6 inches of asphalt concrete or 4 inches of asphalt underlain by 6 inches of aggregate base course. Additional pavement alternatives are presented in the report.

6. Surface drainage should be designed, constructed, and maintained to provide rapid removal of runoff away from the proposed buildings.

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 (if included in the complex), 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 Monument Self-Storage complex is located northwest of the intersection of Deer Creek Road and Base Camp Road in Monument, Colorado. The property has been assigned the street address of 18910 Base Camp Road. The general vicinity of the property is presented in Fig. 1.

The property is currently undeveloped. The lot directly north of the project site is also undeveloped. Monument Hill Road, Deer Creek Road and Base Camp Road form the west, south and east boundaries of the property, respectively. Interstate 25 is located directly west of Monument Hill Road. The ground surface within the site slopes gently downward to the southwest at a grade of about 2 to 3 percent. Concrete storm sewer piping was being installed in the Monument Hill Road right-of-way at the time of our investigation.

Vegetation on the parcel consists predominantly of a moderate stand of grasses with scattered pine trees. The land to the north, east and south is developed with light office and commercial buildings.

PROPOSED CONSTRUCTION

We understand the proposed complex is to include four, one-story self-storage buildings. The self-storage buildings are to be pre-engineered, metal structures. Three, one-story "pole construction" buildings are planned in the northwest corner of the site. The furthest north pole building is to include the storage facility office and Steel Structures of America sales office. The other two pole buildings will be models that will be open to the public. The pole buildings are to be wood-frame structures with metal siding and a metal roof.

We understand the storage buildings are typically constructed on what is termed a "pier and bond footing" foundation system. The foundation includes 1-foot diameter, drilled footings around the perimeter of the storage building at each individual storage unit wall line. The footings extend to a depth sufficient to comply with local frost protection requirements. A concrete slab-on-grade floor with a reinforced, thickened perimeter edge is provided in the building. The floor slab is structurally connected to the drilled footings.

The pole buildings have wood columns that are set in concrete in 2-foot diameter holes that typically extend to a depth of about 4 feet below the ground surface. Conventional, unreinforced slab-on-grade floors are planned in the pole buildings.

Foundation loads are expected to be comparatively light for all the proposed structures. No habitable, below-grade construction is anticipated within the facility. Paved access driveways and a small automobile parking lot are planned in association with the development. The proposed site plan is shown in Fig. 1.

A preliminary grading plan dated February 17, 2019 supplied to our office indicated maximum cuts and fills of about 5 feet will be necessary along the northern and southern edges of the property, respectively, to achieve the desired building pad elevations. Most of the central portion of the site is within a few feet of desired grades. We understand this approach to grading could include the import of several thousand yards of material to achieve the pad elevations and site grades. Modification of the grading plan to better balance the cut and fill quantities is under discussion by the design team. Lowering the site about 1 to 2 feet is not expected to have a significant impact on our recommendations.

GEOLOGY

The geology of the parcel was evaluated through the review of published geologic maps, field reconnaissance, and the drilling of seventeen exploratory borings spread across the property. Mapping by Jon P. Thorson and Richard F. Madole of the Colorado Geological Survey (“Geologic Map of the Monument Quadrangle, El Paso County, Colorado,” 2003) indicates the near-surface soils consist of a layer of Middle alluvial-slope deposits (map unit: Qas_2) of the middle Pleistocene age underlain by the Dawson Formation (map unit: Tkda). Our borings generally confirm the mapped conditions.

INVESTIGATION

The field investigation portion of this study included drilling seventeen exploratory borings at the locations shown in Fig. 1. The positions of the borings were established at the site during a field survey performed by Aztec Consultants, Inc., based on a site plan dated September 20, 2018 that was supplied to our office in an email dated October 22, 2018. The building configuration changed at some point after our proposal and Service Agreement were accepted, without our knowledge. In our opinion, the boring layout as drilled provides a reasonably accurate indication of subsurface foundation conditions for the revised building layout.

The borings were advanced to depths of 15 to 20 feet using 4-inch diameter, continuous-flight, solid-stem auger and a track-mounted drill rig. Drilling was observed by our field representative who logged the conditions found in the borings and obtained samples. Summary logs of the borings, results of field penetration resistance tests, and some laboratory test data are presented in Figs. 2 through 5.

Soil and bedrock samples obtained during drilling were returned to our laboratory and visually classified. Laboratory testing was then assigned to representative samples and included moisture content and dry density, Atterberg Limits, gradation analysis, and water-soluble sulfate concentration tests. Results of gradation tests are presented in Figs. 6 through 8. Laboratory test data are summarized in Table 1.

SUBSURFACE CONDITIONS

Subsurface conditions encountered in our exploratory borings drilled during this investigation consisted of 8 to 14 feet of clean to very silty sand with occasional clayey to very clayey sand layers underlain by silty to clayey sandstone. Some of the pertinent engineering characteristics of the soils encountered and groundwater conditions are discussed in the following paragraphs.

Sand

A layer of clean to very silty sand, 7 to 14 feet thick, was encountered in each of the borings, at the ground surface. About 3 to 4.5 feet of clayey to very clayey sand was encountered underlying the siltier material in five of the borings. The total sand layer was 8 to 14 feet thick. The sand was medium dense to dense based on the results of field penetration resistance testing. Eighteen samples of the sand tested in our laboratory contained 4 to 47 percent silt and clay-sized particles (passing the No. 200 sieve). Our experience suggests the predominant, near-surface, clean to silty sands are non-expansive when wetted. The clayey to very clayey sands are typically non-expansive or exhibit low measured swell values.

Sandstone

Silty to clayey sandstone was encountered underlying the near-surface sand in each of the borings at depths of 8 to 14 feet below the existing ground surface. The sandstone was medium hard to very hard based on the results of field penetration resistance testing, but typically poorly cemented. Nine samples of the sandstone contained 17 to 35 percent silt and clay-sized particles (passing the No. 200 sieve). Our experience indicates the silty sandstone is non-expansive when wetted, whereas the clayey sandstone may exhibit low expansion potential.

Groundwater

At the time of drilling, groundwater was not encountered in the seventeen borings spread across the planned building footprints. When the borings were checked five days after the completion of drilling operations, groundwater was measured in three of the borings at depths of 13 to 17 feet. Groundwater levels will fluctuate seasonally and rise in response to precipitation.

Seismicity

This area, like most of central Colorado, is subject to a degree of seismic activity. According to the 2015 International Building Code (2015 IBC) and based on the results of our investigation, we judge the site classifies as Seismic Site Class C (dense soil and soft rock).

SITE GRADING AND UTILITIES

Based on a preliminary grading plan dated February 17, 2019 that was provided to our office, we anticipate maximum site grading cuts and fills of about 5 feet will be necessary to achieve the desired building pad elevations and grades within the planned access driveways. We anticipate 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). Use of flatter slopes (4:1) is preferable to control erosion from run-off and sheet-flow.

Topsoil, vegetation, and organic materials should be removed from the ground surface at the site. Soft or loose soils, if encountered, should be stabilized or removed to stable material prior to placement of fill.

If soil must be imported to the site to achieve the desired site grades, we recommend the imported material consist of non-expansive, silty to clayey sand and gravel with a maximum particle size of 2 inches. The import should exhibit a Liquid Limit of less than 30 and a Plasticity Index of less than 10, and should contain less than 30 percent silt and clay-size particles (passing the No. 200 sieve). A sample of any proposed imported fill material should be submitted our office for testing prior to its use at the site.

The ground surface in areas to receive fill should be scarified, moisture conditioned and compacted. We recommend that 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 grading fill should be observed and tested by our representative during construction.

Buried Utilities

We anticipate utility trench excavation can be accomplished using heavy-duty trackhoes. Excavations for utilities should be braced or sloped to maintain stability and should meet applicable local, state, and federal safety regulations. We recommend the contractor become familiar with the applicable safety regulations, including the current Occupational Safety and Health Administration (OSHA) Excavation and Trench Safety Standards, to determine appropriate excavation slopes. We anticipate the grading fill and the near-surface, natural soils will classify as Type C materials and the bedrock will classify as Type B. Temporary excavations in Type B and Type C soils require a maximum slope inclination of 1:1 (horizontal to vertical) and 1.5:1, respectively, 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.

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

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 self-storage buildings and pole buildings will consist predominantly of silty to possibly clayey sand, silty to clayey sandstone, and new, sand grading fill. These granular materials are typically non-expansive or exhibit low swell potential when wetted. We understand current plans call for the proposed self-storage buildings to be constructed with pier and bond footing foundation systems. The storage facility office and two models are to be pole buildings. These foundation alternatives are discussed above in more detail in the PROPOSED CONSTRUCTION section of the report. In our opinion, these foundation alternatives are appropriate for the planned structures. Design and construction criteria for the two foundation systems are presented below.

Pier and Bond Footings

1. The pier and bond footing foundations should be constructed on the natural sand soils and/or newly placed grading fill. 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 SITE GRADING AND UTILITIES section of the report, prior to concrete placement.

2. The pier and bond footing foundations should be designed for a maximum allowable soil pressure of 3,000 psf.

3. We recommend the foundation design consider total movement of 1-inch and differential movement of 3/4-inch. The structural engineer should consider placing some reinforcing steel in the floor slab portion of the foundation system to create a more rigid system capable of resisting some potential subgrade movements.

4. The drilled footings should be carefully cleaned and loose soil removed prior to the placement of concrete.

5. The drilled footings should extend to a depth greater than the frost depth specified by the local building department. The soils beneath the

edge of the thickened slab should also be protected from frost action, as needed.

6. 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.

Pole Building Foundations

1. We recommend the pole building foundations be constructed on the natural sand soils and/or new, compacted granular fill. Loose sands encountered in the foundation excavations or materials loosened during the excavation process should be moisture conditioned and compacted in accordance with the criteria presented in SITE GRADING AND UTILITIES, prior to the placement of concrete.

2. The post footing elements should be designed for a maximum allowable soil pressure of 3,000 psf.

3. We recommend the foundation design consider total movement of 1-inch and differential movement of 1/2-inch.

4. The pole drilled excavations should be carefully cleaned and loose soil removed prior to the placement of concrete.

5. The drilled post footings should extend to a depth greater than the frost depth specified by the local building department. The soils beneath the edge of the floor slab should also be protected from frost action, as needed. Vertical foam insulation can be used if acceptable to the local building official.

6. 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

FLOOR SYSTEMS

For the pier and bond footing foundation approach, 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. Any utilities that might penetrate the slabs should be provided with sleeves and flexible connections that allow for independent movement of the slab. We recommend these details allow at least 1-1/2 inches of differential movement between the slabs and pipes.

We understand conventional, unreinforced slab-on-grade floors, supported at the perimeter by the drilled post footings, will be utilized in the three pole buildings. In our opinion, a low risk of poor slab performance (movement and damage) will exist for floor slabs underlain by the on-site sands and/or densely compacted, granular grading fill placed in accordance with the recommendations presented previously in SITE GRADING AND UTILITIES.

Frequent control joints should be provided in the floor slabs to reduce the effects of curling and to help control shrinkage cracking. If underslab plumbing is necessary, service lines should be pressure tested for leaks during construction. Utility lines that penetrate the slabs should be separated and isolated from the slabs with joints to allow for free vertical movement.

From a geotechnical viewpoint, we believe the floor slabs in the two types of buildings can be placed directly on the subgrade soils. The 2015 International Building Code (IBC) requires a vapor retarder be placed between a base course layer or the subgrade soils and a concrete slab-on-grade floor, unless the designer of the floor waives this requirement. The merits of installation of a vapor retarder below a floor slab depend on the sensitivity of floor coverings and building use to moisture. A properly installed vapor retarder (10 mil minimum) is more beneficial below concrete slab-on-grade floors where floor coverings, painted floor surfaces, or products stored on the floor will be sensitive to moisture. The vapor retarder is most effective when concrete is placed directly on top of it, rather than placing a sand or gravel leveling course between the vapor retarder and the floor slab. The placement of concrete on the vapor retarder may increase the risk of shrinkage cracking and curling. Use of concrete with reduced shrinkage characteristics including minimized water content, maximized coarse aggregate content, and reasonably low slump will reduce the risk of shrinkage cracking and curling. Considerations and recommendations for the installation of vapor retarders below concrete slabs are outlined in Section 3.2.3 of the 2006 report of the American Concrete Institute (ACI) Committee 302, “Guide for Concrete Floor and Slab Construction (ACI 302.R-96).”

EXTERIOR FLATWORK

Exterior flatwork, including sidewalks, is normally constructed as a slab-on-grade. Various properties of the soils and environmental conditions influence the magnitude of movement and other performance characteristics of slabs. Exterior flatwork should be designed and constructed to move independently relative to the proposed building foundations.

PAVEMENTS

A small, paved automobile parking lot and access driveways will be constructed in association with the planned self-storage facility. Our exploratory borings and understanding of the proposed construction suggest the subgrade soils within the access driveways and parking area will consist predominantly of silty to clayey sand. The anticipated pavement subgrade samples tested in our laboratory classified as SM and SC-SM soils using the Unified Soil Classification System (USCS) and A-1-b, A-2-4 and A-4 materials according to the American Association of State Highway Transportation Officials (AASHTO) classification system. This type of material generally exhibits good pavement support characteristics. Based on our laboratory classification testing (Atterberg Limits and gradation analysis), a Hveem Stabilometer ("R") value of 40 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 <u>or</u> 3 inches of asphalt concrete over 6 inches of aggregate base course. The access driveways and other portions of the proposed paved areas subjected to occasional truck traffic should be paved with 6 inches of asphalt concrete or 4 inches of asphalt underlain by 6 inches of aggregate base course.

We recommend a concrete pad be provided at each trash dumpster site. The pad should be at least 8 inches thick and long enough to support the entire length of the trash truck and dumpster. 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 Town of Monument "Pavement Design and Construction Standards" and the Pikes Peak Regional 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, 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. Subgrade areas that pass the proof-roll should be stable enough to pave. A representative of our office should be present at the site during placement of fill and construction of pavements to perform density testing.

SUBSURFACE DRAINAGE

It is our understanding that no habitable, below-grade construction such as a basement level is planned for the proposed structures. If plans change and habitable, below-grade areas will be included within the complex, our office should be contacted to provide design criteria for lateral earth pressures and subsurface drain systems.

SURFACE DRAINAGE, IRRIGATION AND MAINTENANCE

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

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

2. Positive drainage should be provided away from the buildings. We recommend a minimum slope of at least 5 percent in the first 5 to 10 feet away from the foundations in landscaped areas (if any are included in the complex). In flatwork areas adjacent to the buildings, the slope may be reduced to grades that comply with ADA requirements. Paved surfaces should be sloped to drain away from the buildings. A minimum slope of 2 percent is suggested. More slope is desirable.

3. Foundation wall backfill should be placed in thin, loose lifts, moisture conditioned to within 2 percent of optimum, and compacted to at least 95 percent of maximum standard Proctor dry density (ASTM D 698). Areas behind curb and gutter should be backfilled and well compacted to reduce ponding of surface water. Seals should be provided between the curb and pavement to reduce infiltration.

4. Roof drains should be directed away from the buildings and discharge beyond backfill zones or into an appropriate storm sewer or detention area. Roof drains can also be connected to buried, solid pipe outlets. Roof drains should not be directed below slab-on-grade floors.

CONCRETE

Concrete in contact with soils can be subject to sulfate attack. We measured the water-soluble sulfate concentration in three samples from this site at less than 0.1 percent. Sulfate concentrations 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 ACI Manual of Concrete Practice. For this level of sulfate concentration, the American Concrete Institute (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.

EXCAVATIONS

Excavations made at this site, including those for foundations and utilities, may be governed by local, state, or federal guidelines or regulations. Subcontractors should be familiar with these regulations and take whatever precautions they deem necessary to comply with the requirements and thereby protect the safety of their employees and that of the general public.

CONSTRUCTION OBSERVATIONS

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

GEOTECHNICAL RISK

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

LIMITATIONS

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

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

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

If we can be of further service in discussing the contents of this report or in the analysis of the influence of subsurface conditions on design of the buildings from a geotechnical engineering point-of-view, please call.

CTL | THOMPSON, INC.

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

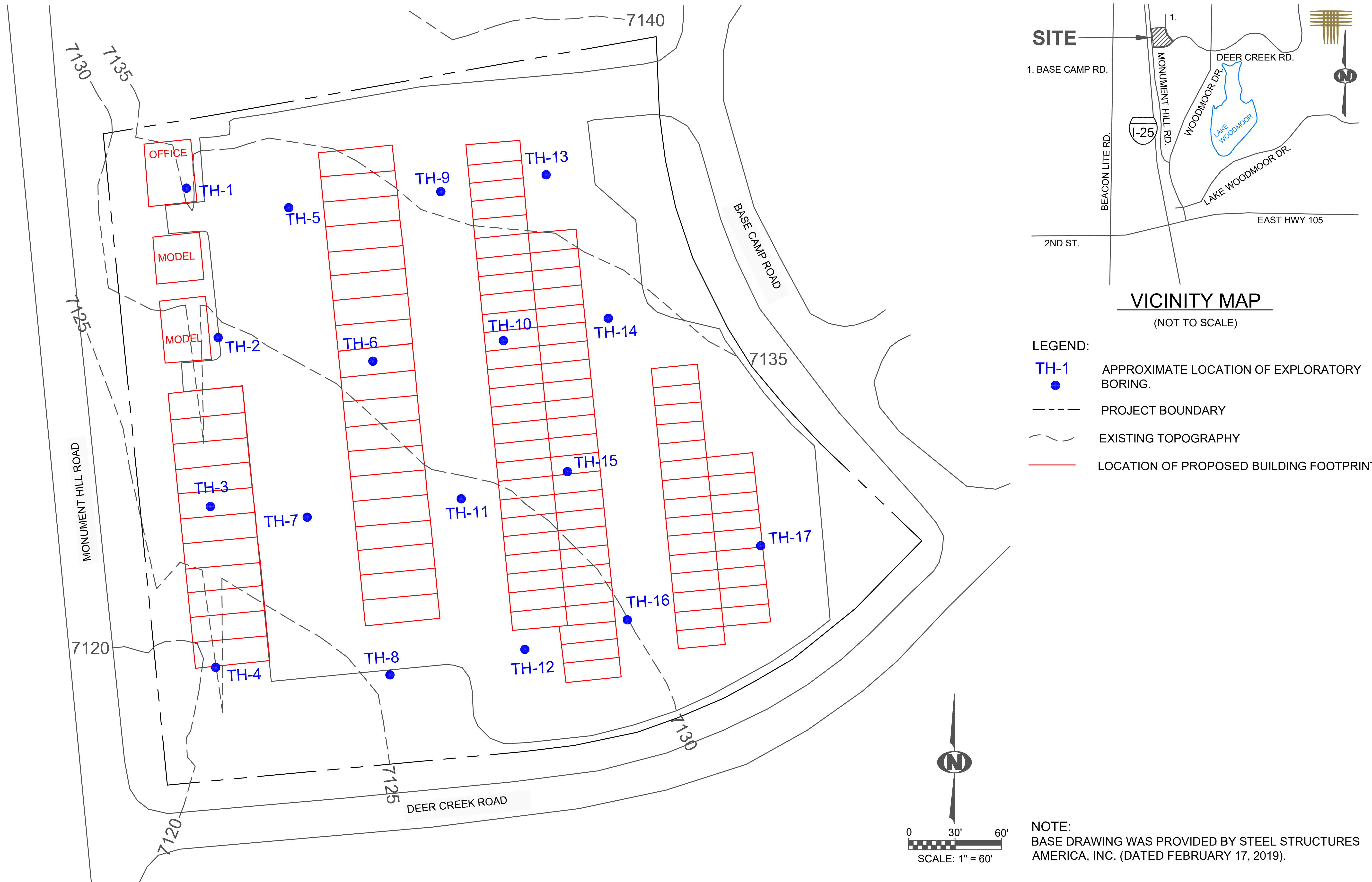
Reviewed by:

Timothy A. Mitchell, P. E.
Division Manager

RAP:TAM:cw

(3 copies sent)

Via email: justinlsternberg@gmail.com

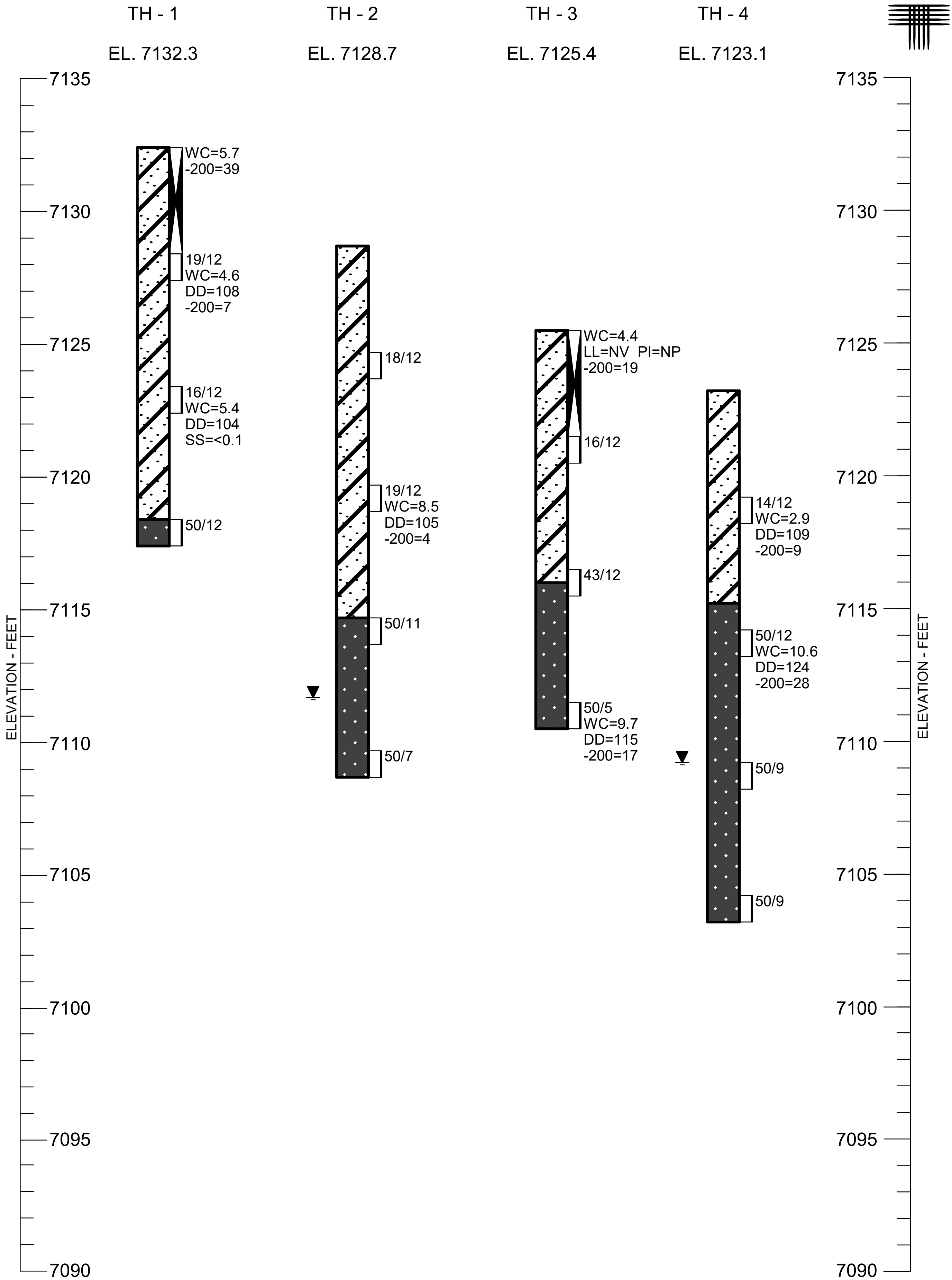


NOTE:
BASE DRAWING WAS PROVIDED BY STEEL STRUCTURES AMERICA, INC. (DATED FEBRUARY 17, 2019).

STEEL STRUCTURES AMERICA, INC.
MONUMENT SELF-STORAGE
CTL|T PROJECT NO. CS19014-125

Location of Exploratory Borings

FIG. 1



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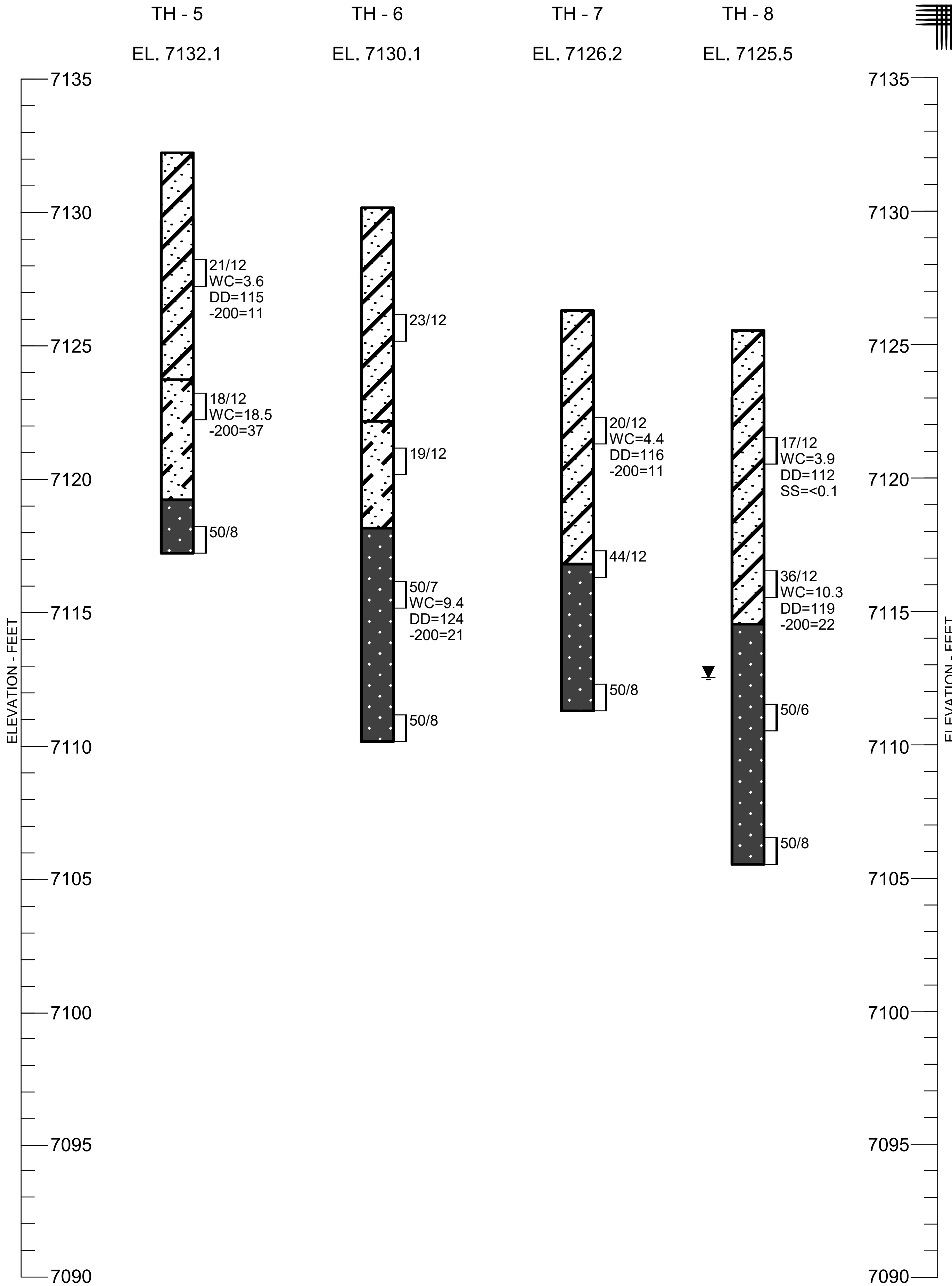
Summary Logs of Exploratory Borings

FIG. 2



Summary Logs of Exploratory Borings

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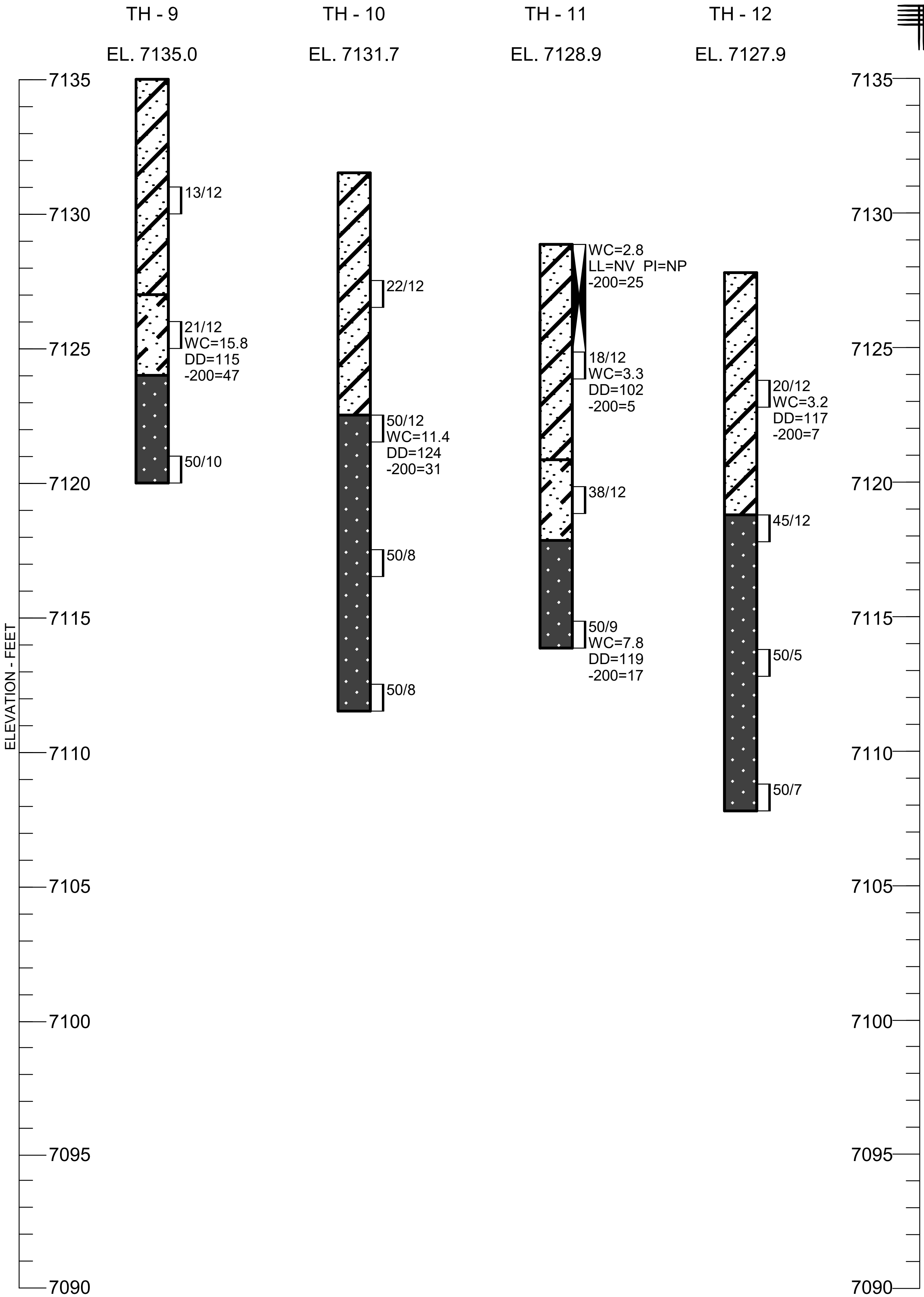
FIG. 3



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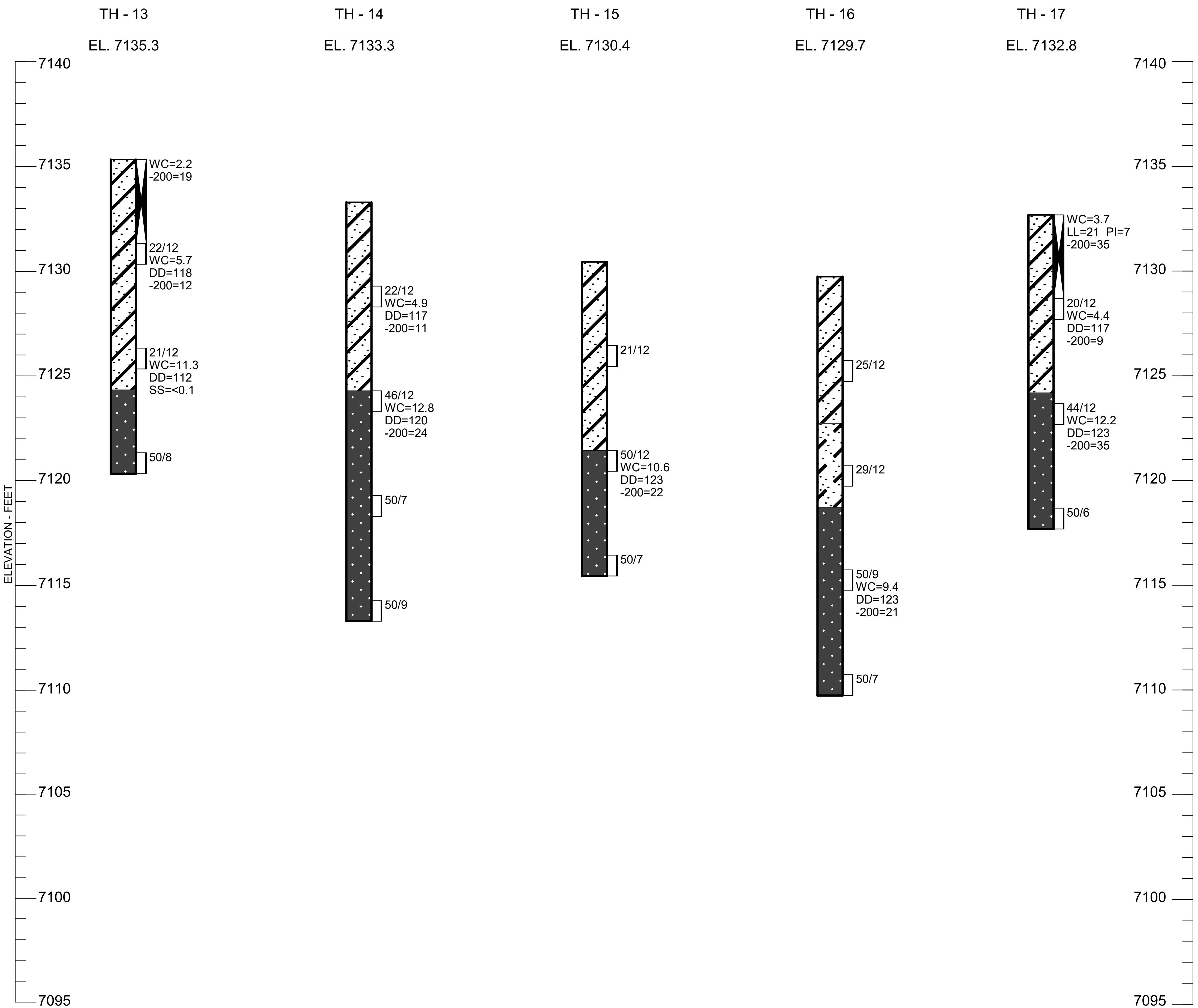
Summary Logs of Exploratory Borings

FIG. 4



LEGEND:

SAND, CLEAN TO VERY SILTY, OCCASIONALLY SILTY AND CLAYEY, MEDIUM DENSE TO DENSE, SLIGHTLY MOIST, LIGHT BROWN. (SP, SP-SM, SM, SC-SM)

SAND, CLAYEY TO VERY CLAYEY, MEDIUM DENSE TO DENSE, MOIST, MEDIUM BROWN. (SC)

BEDROCK. SANDSTONE, SILTY TO CLAYEY, MEDIUM HARD TO VERY HARD, SLIGHTLY MOIST TO MOIST, LIGHT TO MEDIUM BROWN, RUST BROWN.

DRIVE SAMPLE. THE SYMBOL 19/12 INDICATES 19 BLOWS OF A 140-POUND HAMMER FALLING 30 INCHES WERE REQUIRED TO DRIVE A 2.5-INCH O.D. SAMPLER 12 INCHES.

INDICATES BULK SAMPLE OBTAINED FROM AUGER CUTTINGS.

GROUNDWATER LEVEL MEASURED FIVE DAYS AFTER DRILLING.

NOTES:

1. THE BORINGS WERE DRILLED FEBRUARY 1, 2019 USING A 4-INCH DIAMETER, CONTINUOUS-FLIGHT AUGER AND A DIEDRICH D-90, TRACK-MOUNTED DRILL RIG.
2. THESE LOGS ARE SUBJECT TO THE EXPLANATIONS, LIMITATIONS, AND CONCLUSIONS AS CONTAINED IN THIS REPORT.
3. THE BORING ELEVATIONS WERE DETERMINED DURING A FIELD SURVEY PERFORMED BY AZTEC CONSULTANTS, INC.
4. WC - INDICATES MOISTURE CONTENT. (%)
   DD - INDICATES DRY DENSITY. (PCF)
   LL - INDICATES LIQUID LIMIT. (%) (NV : NO VALUE)
   PI - INDICATES PLASTICITY INDEX. (%) (NP : NON-PLASTIC)
   -200 - INDICATES PASSING NO. 200 SIEVE. (%)
   SS - INDICATES WATER-SOLUBLE SULFATE CONTENT. (%)

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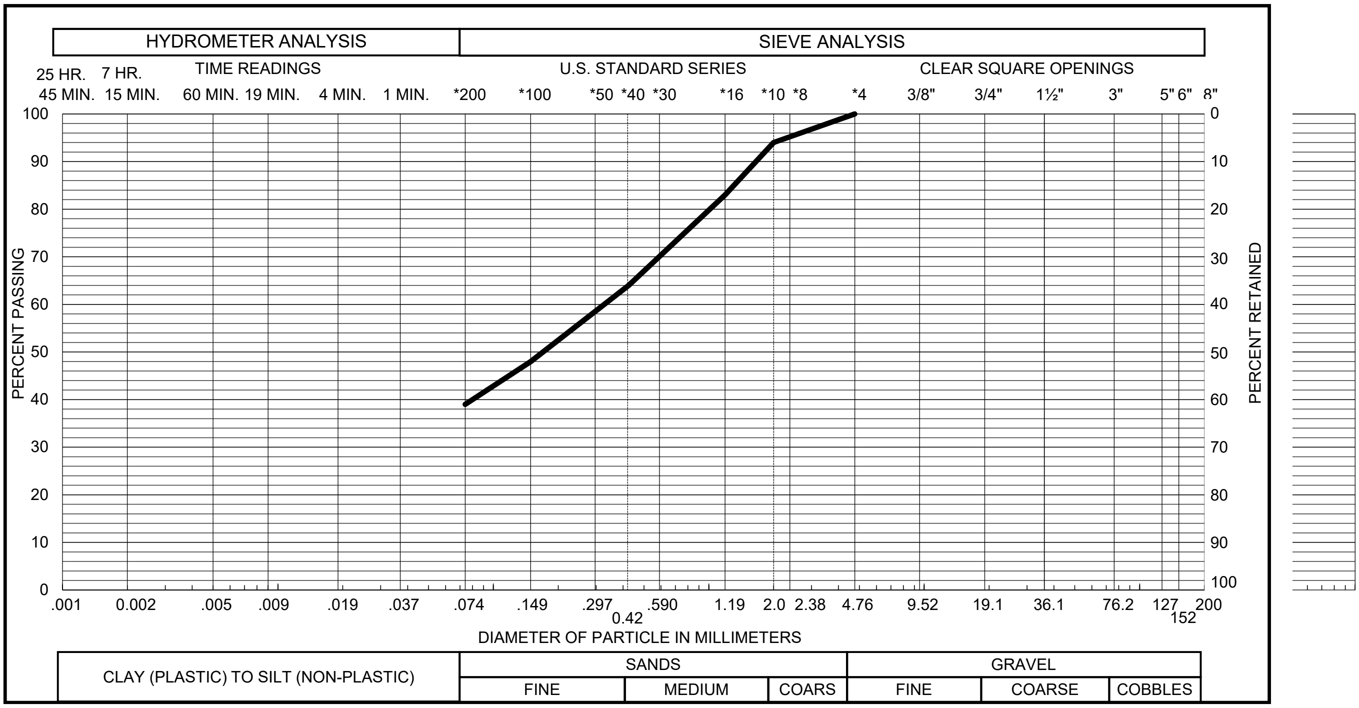
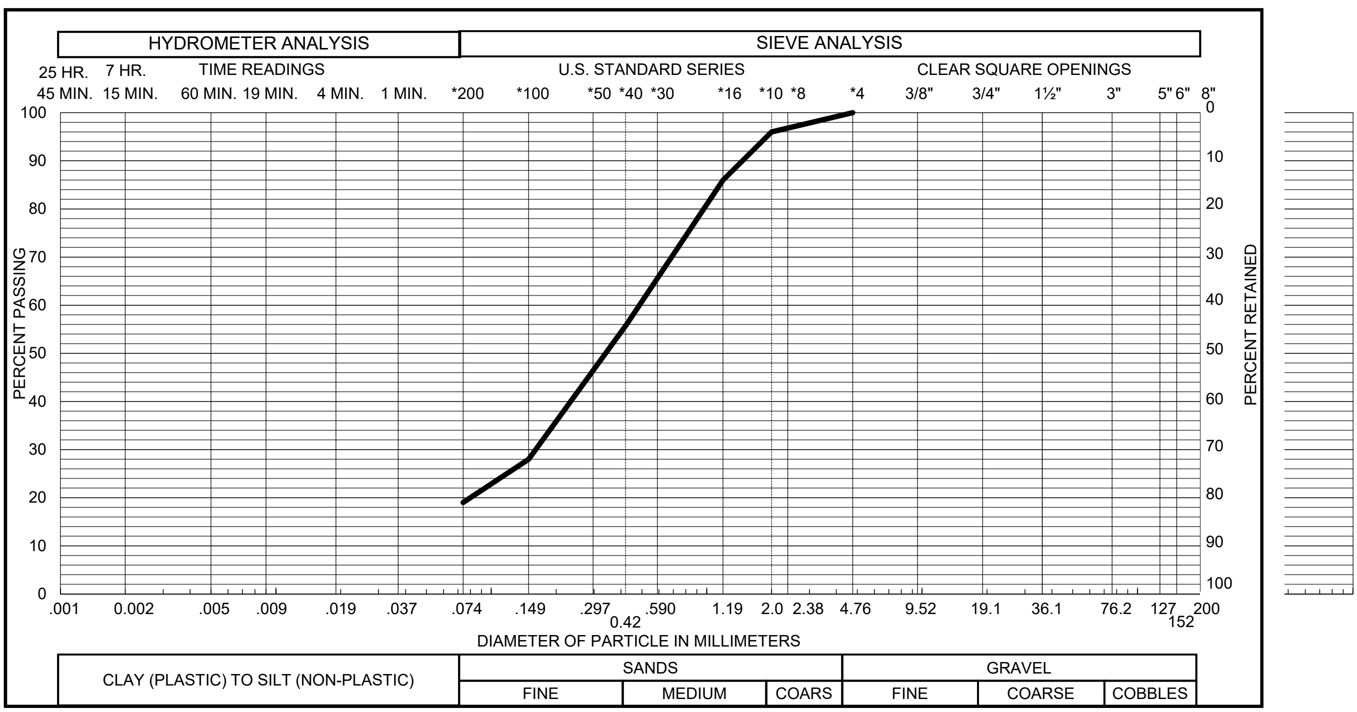
Summary Logs of Exploratory Borings

FIG. 5



Sample of	SAND, VERY SILTY (SM)	GRAVEL	0 %	SAND	61 %
From	TH - 1 AT 0-4 FEET	SILT & CLAY	39 %	LIQUID LIMIT	%
		PLASTICITY INDEX			%



Sample of	SAND, SILTY (SM)	GRAVEL	0 %	SAND	81 %
From	TH - 3 AT 0-4 FEET	SILT & CLAY	19 %	LIQUID LIMIT	NV %
		PLASTICITY INDEX			NP %

STEEL STRUCTURES AMERICA, INC.
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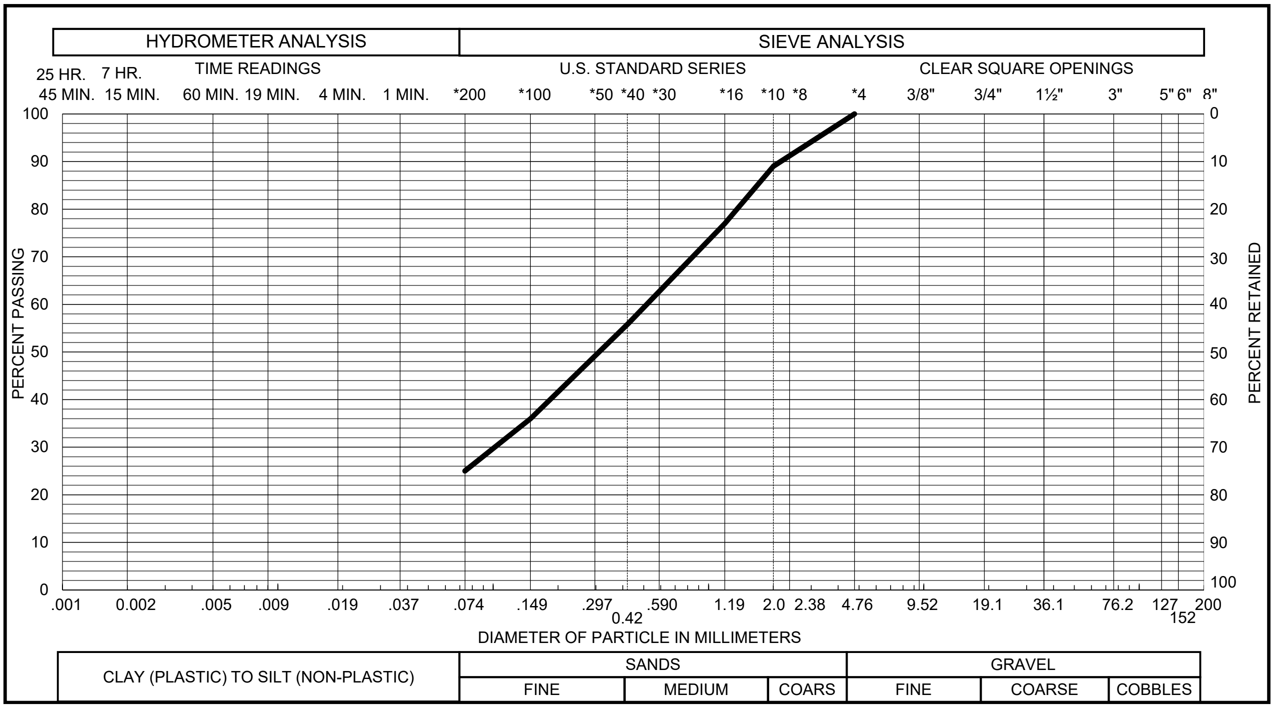
CTL|T PROJECT NO. CS19014-125

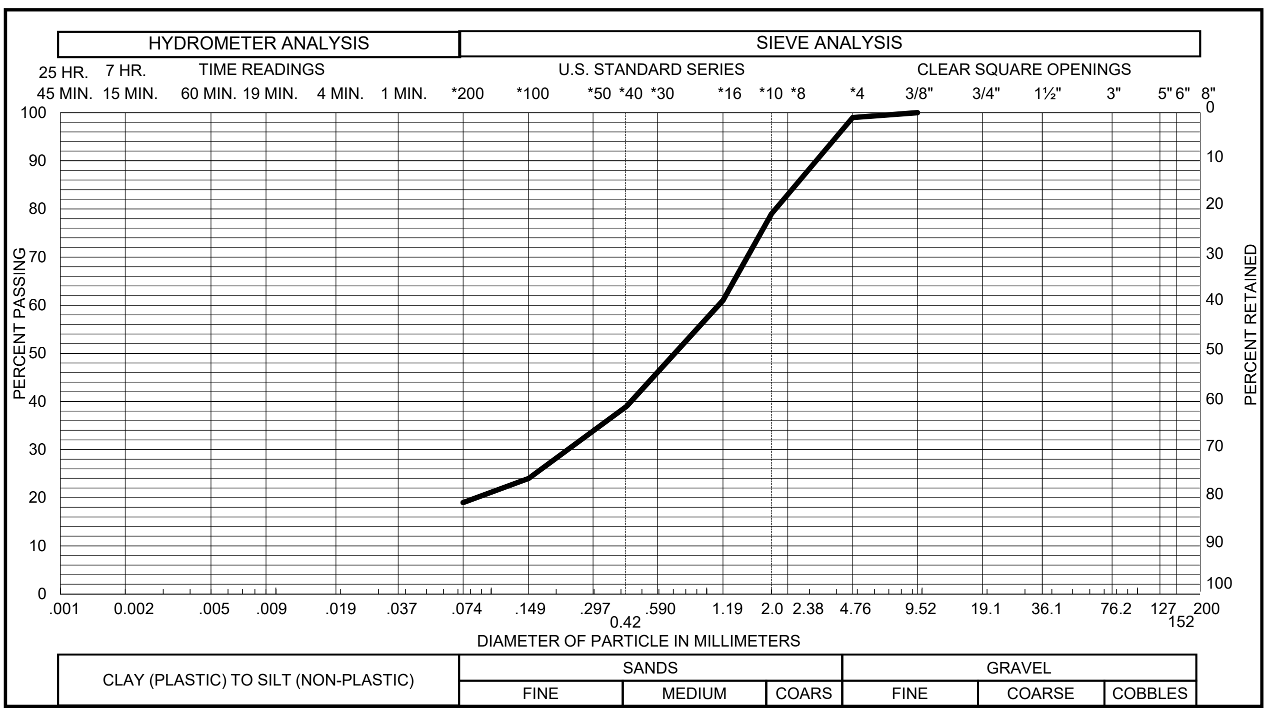
Gradation Test Results

FIG. 6



Sample of SAND, SILTY (SM)
From TH - 11 AT 0-4 FEET

GRAVEL 0 % SAND 75 %
SILT & CLAY 25 % LIQUID LIMIT NV %
PLASTICITY INDEX NP %

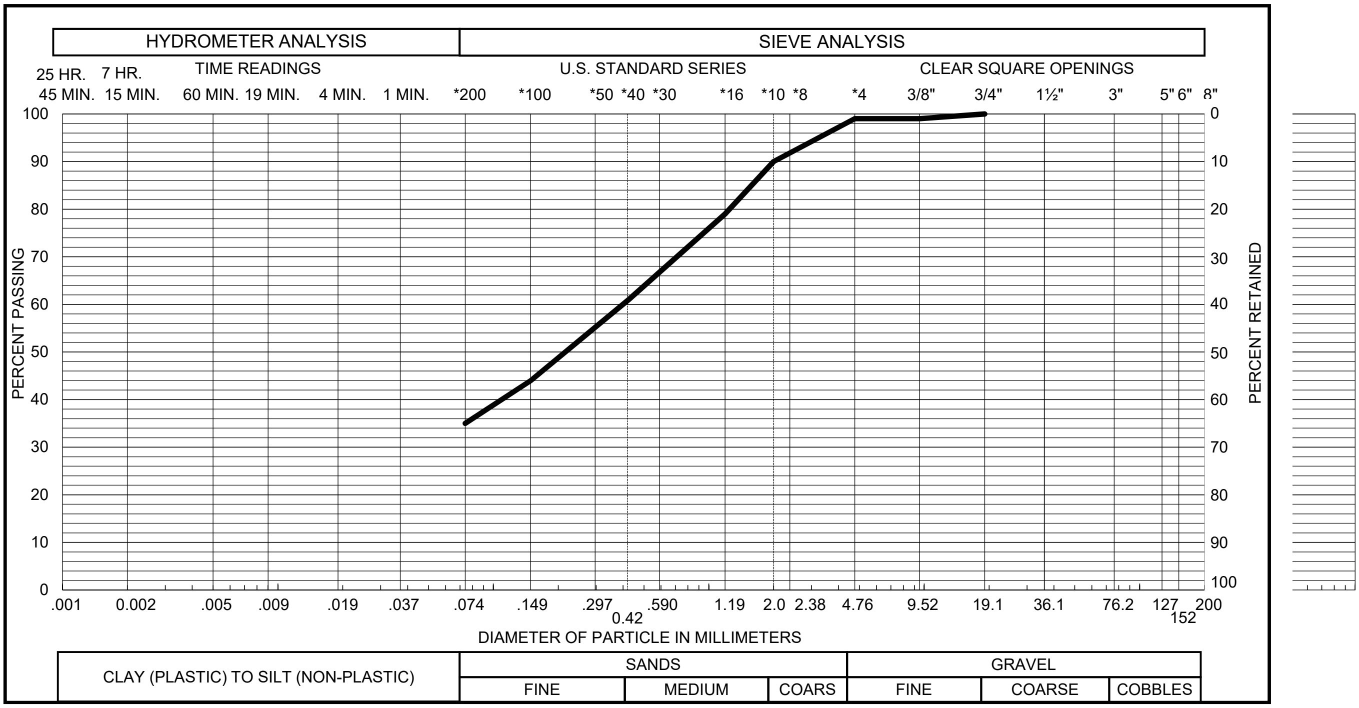


Sample of SAND, SILTY (SM)
From TH - 13 AT 0-4 FEET

GRAVEL 1 % SAND 80 %
SILT & CLAY 19 % LIQUID LIMIT %
PLASTICITY INDEX %

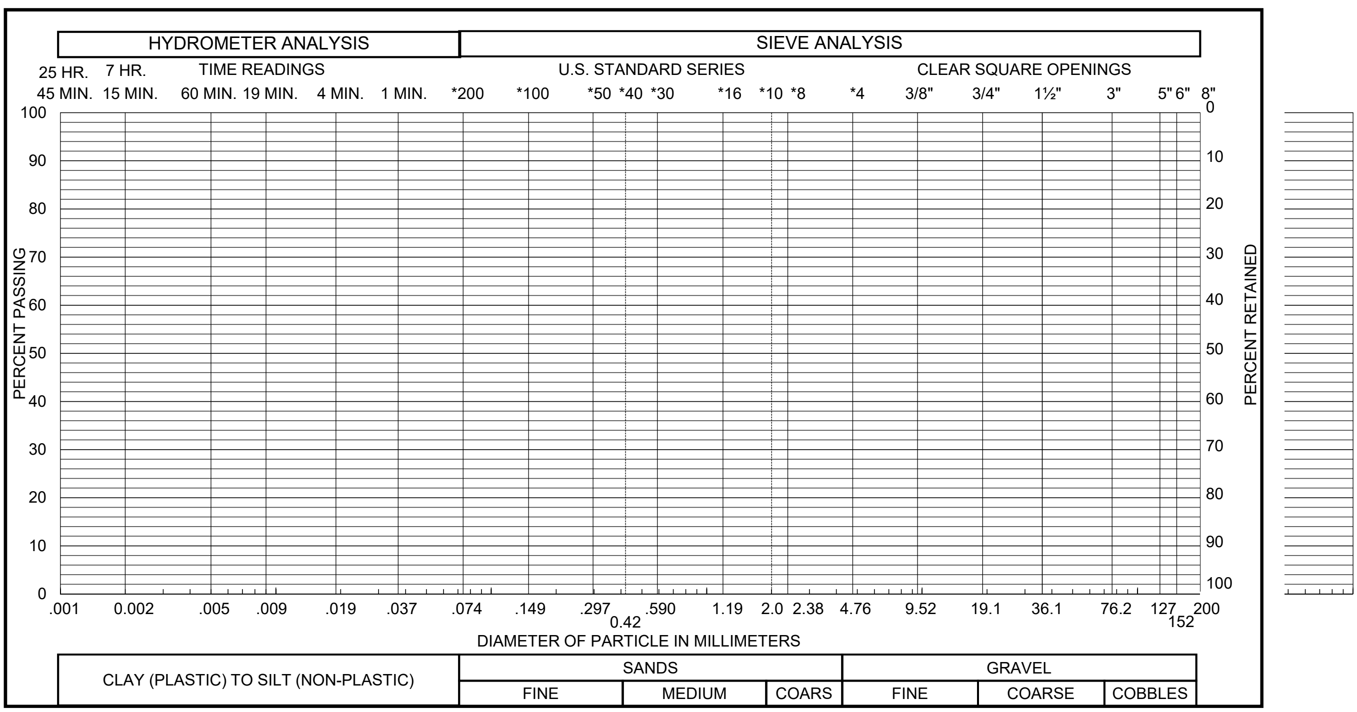
Gradation Test Results

FIG. 7



Sample of SAND, SILTY, CLAYEY (SC-SM)
From TH - 17 AT 0-4 FEET

GRAVEL 1 % SAND 64 %
SILT & CLAY 35 % LIQUID LIMIT 21 %
PLASTICITY INDEX 7 %



Sample of
From

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

STEEL STRUCTURES AMERICA, INC.
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CTL|T PROJECT NO. CS19014-125

Gradation Test Results

FIG. 8

TABLE 1

SUMMARY OF LABORATORY TESTING
CTL|T PROJECT NO. CS19014-125

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-1	0 TO 4	5.7							39		SAND, VERY SILTY (SM)
TH-1	4	4.6	108						7		SAND, SLIGHTLY SILTY (SP-SM)
TH-1	9	5.4	104							<0.1	SAND, SLIGHTLY SILTY (SP-SM)
TH-2	9	8.5	105						4		SAND (SP)
TH-3	0 TO 4	4.4		NV	NP				19		SAND, SILTY (SM)
TH-3	14	9.7	115						17		SANDSTONE, SILTY
TH-4	4	2.9	109						9		SAND, SLIGHTLY SILTY (SP-SM)
TH-4	9	10.6	124						28		SANDSTONE, CLAYEY
TH-5	4	3.6	115						11		SAND, SLIGHTLY SILTY (SP-SM)
TH-5	9	18.5							37		SAND, VERY CLAYEY (SC)
TH-6	14	9.4	124						21		SANDSTONE, CLAYEY
TH-7	4	4.4	116						11		SAND, SLIGHTLY SILTY (SP-SM)
TH-8	4	3.9	112							<0.1	SAND, SLIGHTLY SILTY (SP-SM)
TH-8	9	10.3	119						22		SAND, SILTY (SM)
TH-9	9	15.8	115						47		SAND, VERY CLAYEY (SC)
TH-10	9	11.4	124						31		SANDSTONE, SILTY
TH-11	0 TO 4	2.8		NV	NP				25		SAND, SILTY (SM)
TH-11	4	3.3	102						5		SAND, SLIGHTLY SILTY (SP-SM)
TH-11	14	7.8	119						17		SANDSTONE, SILTY
TH-12	4	3.2	117						7		SAND, SLIGHTLY SILTY (SP-SM)
TH-13	0 TO 4	2.2							19		SAND, SILTY (SM)
TH-13	4	5.7	118						12		SAND, SLIGHTLY SILTY (SP-SM)
TH-13	9	11.3	112							<0.1	SAND, SILTY (SM)
TH-14	4	4.9	117						11		SAND, SLIGHTLY SILTY (SP-SM)
TH-14	9	12.8	120						24		SANDSTONE, SILTY
TH-15	9	10.6	123						22		SANDSTONE, SILTY
TH-16	14	9.4	123						21		SANDSTONE, SILTY
TH-17	0 TO 4	3.7		21	7				35		SAND, SILTY, CLAYEY (SC-SM)
TH-17	4	4.4	117						9		SAND, SLIGHTLY SILTY (SP-SM)
TH-17	9	12.2	123						35		SANDSTONE, CLAYEY

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

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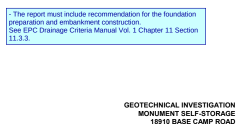

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- The report must include recommendation for the foundation preparation and embankment construction.
See EPC Drainage Criteria Manual Vol. 1 Chapter 11 Section 11.3.3.