BSK ASSOCIATES

GEOTECHNICAL INVESTIGATION REPORT AND GEOLOGIC HAZARD ASSESSMENT

LIBERTY HIGH SCHOOL CAMPUS EXPANSION

BSK PROJECT NO. G17-238-11L

PREPARED FOR:

LIBERTY UNION SCHOOL DISTRICT
20 OAK STREET
BRENTWOOD, CALIFORNIA 94513

April 11, 2018

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April 11, 2018 BSK Project Number G17-238-11L

Liberty Union School District
20 Oak Street
Brentwood, California 94513

Attention: Liz Robbins (robbinsl@lusd.net)
Chief Business Officer

Subject: Geotechnical Investigation Report and Geologic Hazards Assessment
Campus Expansion
Liberty High School
Brentwood, California

Dear Ms. Robbins:

We are pleased to submit our geotechnical investigation report and geologic hazards assessment for the planned expansion of Liberty High School within the Liberty Union School District in Brentwood, California. The enclosed report describes the geotechnical investigation performed and presents our geotechnical recommendations for foundations, retaining walls, pools, tennis courts, utilities, storm water management, earthwork and pavements. A geologic and seismic hazards assessment is included as Appendix D to this report.

In summary, it is our opinion that the site does not pose significant geotechnical concerns that would preclude the planned development provided the recommendations presented in our report are incorporated in design and construction. The main geotechnical concerns for the project site are the presence of moderately expansive surface clays and soils subject to moderate collapse potential. The buildings can be supported on spread footings, deepened to mitigate the moderately expansive soils at the site. Depending on the sensitivity of the buildings to soil collapse settlement, the affected buildings could instead be supported on mat foundations. The building floor slabs will need to be supported on "non-expansive" or lime-treated soils to reduce the impact of expansive soils at the site.

These and other geotechnical recommendations pertaining to the proposed project are discussed in the report. The apparent geologic hazard for the project, other than those mentioned above, is the potential for strong ground shaking, which is typical of the entire San Francisco Bay Area. A summary of the geologic hazards is presented in the main text of this report and a detailed Geologic and Seismic Hazards Assessment that complies with Title 24 of the California Building Code is included in Appendix D.

Conclusions and recommendations presented in the enclosed report are based on limited subsurface investigation and laboratory testing programs. Consequently, variations between anticipated and actual subsurface soil conditions may be found in localized areas during construction. If significant variation in the subsurface conditions is encountered during construction, BSK should review the recommendations presented herein and provide supplemental recommendations, if necessary.

Additionally, design plans should be reviewed by our office prior to their issuance for conformance with the general intent of our recommendations presented in the enclosed report.

We appreciate the opportunity of providing our services to you on this project and trust this report meets your needs at this time. If you have any questions concerning the information presented, please contact us at (925) 315-3151.

Respectfully Submitted,
BSK Associates, Inc.

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1. INTRODUCTION

This report presents the results of our geotechnical investigation for the planned expansion of the Liberty High School campus within the Liberty Union School District. A Vicinity Map showing the location of the project site is presented on Figure 1. Our investigation has been performed for the Liberty Union School District (LUSD) and was coordinated with Ms. Liz Robbins of LUSD. This report contains a description of our site investigation methods and findings, including field and limited laboratory data. It provides geotechnical recommendations for the project and also presents a geologic and seismic hazards assessment for the campus. This report supersedes previous geotechnical investigation report(s), if any, issued by BSK for this specific project.

1.1 Project Description

The proposed project will include construction of two new maintenance and operations buildings with new paving and chain link fencing; a concessions/ticket booth building and restrooms; new home bleachers; an aquatic center including a new pool, bleachers, locker rooms, a score board, and chain link fencing; new tennis courts; new relocatables; and new asphalt paving. In addition, backstops, foul ball netting, dugouts, bullpens and batting cages will be constructed in the current baseball field area. We have based our services on the conceptual site plans[1], provided by Quattrocchi Kwok Architects, dated December 14, 2017. The Site Exploration Plan, Figure 2, shows the approximate locations of planned improvements and the approximate location of our exploration points overlain on a Google Earth image of the existing campus.

We anticipate that the new buildings will be one-story high and will be either prefabricated or will consist of wood frame construction supported on a shallow foundation system. Exterior and interior wall loads are anticipated to be about 1 to 2 kips per lineal foot and column loads less than 30 kips.

Although a grading plan is not currently available for the project, we anticipate that site grades will remain close to existing elevations and that cuts and fills during construction will be limited to less than 3 feet. However, we anticipate that the area of the new home bleachers may have to be cut about 5 feet to match surrounding grades. Excavations for the removal of existing and installation of new underground utilities are expected to be up to 5 feet deep. Excavation/backfill for the existing and new pools is expected to be up to 15 feet deep.

If the actual project description differs significantly from that anticipated above, we should be notified so that we may review our scope of services and recommendations for applicability.

[1] Plans entitled "M&O/Transportation Site Plan – Option 2, Ball Fields – Option 2, and Aquatics & Tennis Conceptual Site Plan", dated December 14, 2017.

1.2 Approach and Scope of Services

The purpose of this investigation was to explore and evaluate the subsurface conditions at the site in order to provide geotechnical input for the design and construction of the planned improvements for this project. The scope of services, as outlined in our October 17, 2017 proposal (File Number: GL17-15819), consisted of field exploration, laboratory testing, engineering analysis, and preparation of this report. A geologic and seismic hazards evaluation for the entire school campus was also performed concurrently and is presented in Appendix D.

This investigation specifically excludes the assessment of site environmental characteristics, particularly those involving hazardous substances.

2. SITE INVESTIGATION

2.1 Field Exploration

Exploration locations and frequency were chosen to meet the requirements of the Division of State Architect (DSA) and the 2016 California Building Code, which require a minimum of two borings per building and at least one per every 5,000 square feet of foundation footprint area.

Our field investigation was performed on February 5, 2018 to evaluate the subsurface conditions at the site for the planned construction. The field investigation consisted of drilling nine (9) borings and advancing five (5) Cone Penetrometer Tests (CPTs) at the approximate locations shown on Figure 2. Middle Earth Geo Testing of Hayward, California was subcontracted to provide CPT services and Exploration GeoServices of San Jose was subcontracted to provide drilling services. Two bulk samples were obtained in future pavement areas for Resistance (R)-value testing for use in pavement design.

Prior to subsurface exploration, Underground Service Alert (USA) was contacted to provide utility clearance and each exploration location was cleared for detectable underground utilities by GeoTech Utility Locating of Moraga, California. A drilling permit was obtained from Contra Costa County Environmental Health Department (County). Upon completion of the field investigation, the borings and CPTs were backfilled with grout and capped with Quikrete in paved areas. Excess cuttings generated during drilling were disposed of at the site in unimproved areas near the locations of the borings.

The locations of the borings and CPTs were estimated by our field representative based on rough measurements from existing features at the site. Elevations shown on the boring logs were estimated using the elevation information available on Google Earth Pro. As such the elevations and locations of the borings and CPTs should be considered approximate to the degree implied by the methods used.

2.1.1 Auger Borings

The borings were drilled, using a truck-mounted drill rig, to depths of approximately 5 to 25 feet below the existing ground surface (BGS). The borings were logged by an engineer of BSK Associates (BSK) in accordance with the ASTM Standard D2488, 2017, "Standard Practice for Description and Identification of Soils (Visual-Manual Procedure)."

Relatively undisturbed samples of the subsurface materials were obtained using a split spoon sampler fitted with stainless steel (SS) liners. The general diameter measurements of the sampler are 3-inches outside diameter (O.D.), and about 2.5-inches inside diameter (I.D.). A Standard Penetration Test (SPT) sampler (1.4-inch I.D and 2-inch O.D.), which produces disturbed samples, was also used to sample the subsurface materials. The samplers were driven by the force of a 140-pound, semi-automatic trip hammer, dropping 30-inches. The successive blow counts were recorded for 6-inch penetration intervals until the sampler advanced 18-inches. The blow counts for each interval are reported on the final boring logs. After the sampler was withdrawn from the borehole, the soil samples, each contained by the

approximately 6-inch long SS liners, were removed from the sampler, sealed to reduce moisture loss, labeled, and returned to our laboratory. Prior to sealing the samples, strength characteristics of the cohesive soil samples recovered were evaluated using a hand-held pocket penetrometer. The results of these tests are shown on the boring logs.

Laboratory testing and review of the field soil characterizations were completed after the subsurface investigation. Final soil classification was determined through the judgement of a responsible Geotechnical Engineer supplemented with laboratory testing at various intervals, in general accordance with the ASTM Standard D2487, 2011, "Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)."

A summary of the Unified Soil Classification System (USCS), adapted by ASTM D2487 and D2488 is presented in Appendix A, Figure A-1. The Soil Description Key and Log Key are presented on Figures A-2 and A-3. Sample classifications, blow counts recorded during sampling, and other related information are presented on the boring logs within Appendix A. Strength, collapse potential, and indexing laboratory test results appear on the final boring logs. Discussion of the subsurface conditions encountered at the site is presented in the "Subsurface Conditions" section of this report.

2.1.2 Cone Penetration Tests

We advance five (5) CPTs to approximately 50 feet BGS. The CPTs were performed using an integrated electronic cone system in accordance with ASTM D3441, 2016, "Standard Test Method for Mechanical Cone Penetration Testing of Soils." The cone has a tip area of 15 square centimeters, a friction sleeve area of 150 square centimeters, and a ratio of end area friction sleeve to tip end area equal to 0.80. The cone bearing (Qc) and sleeve friction (Fs) were measured and recorded during the tests at 5 centimeters (about 2 inch) depth intervals.

The cone system was pushed using a 50,000-pound, all-wheel drive, CPT rig, having a down pressure capacity of approximately 20 tons. The information gathered from the CPTs was used for identifying potential liquefiable and soft soils and for foundation design. The CPT data (cone resistance, friction ratio, pore pressure, and soil behavior type) versus penetration depth below the existing ground surface, generated with CPT Liquefaction Assessment Software (Cliq)[2], are presented in Appendix C.

The stratigraphic interpretation of the CPT data was performed based on relationships between cone bearing and sleeve friction versus penetration depth. The friction ratio (R_f), which is sleeve friction divided by cone bearing, is a calculated parameter which is used to infer soil behavior type. Generally, cohesive soils (clays) have high friction ratios, low cone bearing and generate large excess pore water pressures. Cohesionless soils (sands) have lower friction ratios, high cone bearing and generate small excess pore water pressures. The interpretation of soil properties from the cone data has been carried out using

[2] Cliq v2.0 by Geologismiki

correlations developed by Robertson et al, 1990[3], and Lunne, Robertson & Powell, 1997[4]. It should be noted that it is not always possible to clearly identify a soil type based on cone bearing (Qc) and sleeve friction (Fs). In these situations, experience and judgment and an assessment of the pore pressure dissipation data should be used to infer the soil behavior type.

2.2 Laboratory Testing

Laboratory tests were performed on selected soil samples to evaluate their physical characteristics and engineering properties. The laboratory testing program included dry density and moisture content, Atterberg Limits, unconsolidated-undrained triaxial compression (TXUU), direct shear, collapse potential, and R-value tests. Most of the laboratory test results are presented on the individual boring logs. The results of the Atterberg limits, TXUU, direct shear, collapse potential, and R-Value tests are also presented graphically in Appendix B.

Analytical testing was performed on samples of near-surface soils in borings B-1 and B-9 to assist in evaluating the corrosion potential of the on-site soils. The corrosivity testing was performed by CERCO Analytical of Concord, California using ASTM methods as described in CERCO Analytical's report. The corrosion results are presented at the end of Appendix B.

[3] Robertson P.K., 1990. Soil classification using the cone penetration test. Canadian Geotechnical Journal, 27(1): 151-158

[4] Lunne, T., Robertson, P.K., and Powell, J.J.M 1997. Cone penetration testing in geotechnical practice, E& FN Spon Routledge, 352 p, ISBN 0-7514-0393-8.

3. SITE CONDITIONS

3.1 Site Description

Liberty High School is located at 850 2nd Street in Brentwood, California. The campus is located within a mixed-use area of residential and commercial retail. The site occupies three separate parcels. The main school buildings, tennis courts, swimming pool, and parking lots within the southern and western side of the campus occupy one parcel. The athletic fields and parking lots which take up the northeastern portion of the campus occupy a second parcel. The unimproved field on the far eastern side of the campus that is bounded by Larkspur Lane and Oak Street, occupy a third parcel. This field has been covered with well compacted gravel. The three parcels have a combined area of approximately 46 acres. The site is essentially flat at an elevation of about 71 feet according to Google Earth Pro. The ground surface at the bleachers is approximately 5 feet above the surrounding ground surface.

3.2 Subsurface Conditions

The underlying stratigraphy of the campus is interbedded fine-grained, alluvial soils. Based on our exploration, this alluvium consists of alternating layers of clays, silts and clayey/silty sands. The clays and silts are typically firm to hard and exhibit low to medium plasticity. The clayey/silty sands are generally medium dense with a high clay and silt content. The laboratory test results are indicative of soils with medium expansion potential when subjected to changes in moisture content. The near surface soils are also moderately susceptible to collapse upon saturation according to our test results.

Free groundwater was observed at depths between about 15 and 22 feet BGS in our borings and CPTs. According to geologic mapping by the California Geological Survey, historic high groundwater is about 15 feet BGS along the east edge of the campus and deepens to about 20 feet BGS on the west edge of the campus. It should be noted that groundwater levels can fluctuate several feet depending on factors such as seasonal rainfall, groundwater withdrawal, and construction activities on this or adjacent properties.

The above is a general description of soil and groundwater conditions encountered at the campus. For a more detailed description of the soils encountered, refer to the boring logs in Appendix A and CPT logs in Appendix B.

It should be noted that subsurface conditions can deviate from those conditions encountered at the boring and CPT locations. If significant variation in the subsurface conditions is encountered during construction, it may be necessary for BSK to review the recommendations presented herein and recommend adjustments as necessary.

4. DISCUSSION AND CONCLUSIONS

4.1 General

Based on the results of our field investigation, it is our opinion that the proposed improvements are geotechnically feasible and that the site may be developed as presently planned. This conclusion is based on the assumption that the recommendations presented in this report will be incorporated in the design and construction of this project. The main geotechnical concerns for the project site are the presence of moderately expansive surface clays and soils subject to moderate collapse potential. While these soils pose additional challenges to the proposed improvements, there are conventional methods which can aid in mitigating the effects of these existing conditions.

4.2 Anticipated Settlements

The subsections below present our estimated elastic, collapse-induced, liquefaction-induced, and dynamic compaction settlement estimates for the project. For design purposes, these settlements should be assumed to be cumulative.

4.2.1 Elastic Settlement

We estimate elastic settlement will be up to approximately ½-inch. However, most of this settlement is expected to occur during construction. Differential elastic settlement is expected to be about half of the total estimated elastic settlement over a horizontal distance of approximately 30 feet.

4.2.2 Soil Collapse Potential

Soil samples obtained within the upper approximately 6 feet below ground surface consisted primarily of lean clay with varying amounts of sand. Some of the samples were observed to be porous. This can be indicative of the soil having a collapse potential, meaning the soil can undergo immediate settlement upon saturation. Saturation could occur due to many reasons such as a flooded adjacent landscaping area, a leaky pool, or a leaking underground utility. Therefore, we performed collapse potential testing on three samples obtained from depths of about 3 to 6 feet in borings B-2, B-6, and B-7. According to our test results, the surficial soils at the site have negligible to moderate collapse potential, with estimated settlements as shown in the table below. Mitigation measures are discussed in the "Foundations" section of this report.

BORING NO. (AREA OF CAMPUS)	ESTIMATED SETTLEMENT	DIFFERENTIAL SETTLEMENT*
B-2 (Aquatic Center/Relocatables)	2¼ inches	1½ inches
B-6 (Concession/Ticket Booth & Restroom)	negligible	negligible
B-7 (Maintenance & Ops Buildings)	1¼ inches	¾-inch
* Over an approximate horizontal distance of 30 feet.		

4.2.3 Soil Liquefaction

Liquefaction is a condition where saturated, granular soils undergo a substantial loss of strength and deformation due to pore pressure increase, resulting from cyclic stress application induced by earthquakes. In the process, the soil acquires mobility sufficient to permit both horizontal and vertical movements if the soil is not confined. Soils most susceptible to liquefaction are loose, clean, uniformly graded, silt and fine sand, as well as some lean clay deposits. Based on the subsurface exploration performed for the investigation, the site is underlain by interbedded alluvial soils consisting primarily of firm to hard sandy and silty clays, and medium dense clayey sand.

We evaluated liquefaction potential across the site in our current CPTs for the project (CPT-1 through CPT-5) using the methods proposed by Boulanger and Idriss (2014)[5]. For our analyses, we used peak ground accelerations of 0.50g associated with an earthquake magnitude of M6.52. These values were obtained from the mapped 2016 CBC seismic parameters and deaggregation analysis as presented in Appendix D. As discussed above, historically high groundwater is anticipated to be about 15 feet BGS, so we used a conservative groundwater level in our analyses of 14 feet BGS to account for fluctuations in the groundwater table. All 5 CPTs predicted magnitudes of potential liquefaction-induced settlement of less than ½-inch based on the design level event. The results of these analyses are presented in Appendix C.

As noted in Special Publication 117A[6], "Guidelines for Evaluating and Mitigating Seismic Hazards in California, 2008", CGS states that "it is very difficult to reliably estimate the amount of localized differential settlement likely to occur as part of the overall predicted settlement: localized differential settlements on the order of up to two-thirds of the total settlements anticipated should be assumed unless more precise predictions of differential settlements can be made". This would approximate our predicted differential settlement to less than 1/3 inch. Based on Youd and Garris (1995)[7], we believe that the potential for ground surface disruption (such as sand boils, ground fissures, etc.) to occur at site is low due to at least

[5] Boulanger, R. W., and Idriss, I. M. (2014). "CPT and SPT based liquefaction triggering procedures." Report No. UCD/CGM-14/01, Center for Geotechnical Modeling, Department of Civil and Environmental Engineering, University of California, Davis, CA, 134 pp.
[6] California Geological Survey (2008), Guidelines for Evaluation and Mitigating Seismic Hazards in California, Special Publication 117A.
[7] Youd, T. L. and Garris, C. T. (1995), Liquefaction-Induced Ground-Surface Disruption, Journal of Geotechnical Engineering, ASCE, Vol. 121, No. 11, November, pp. 805-809.

18 feet of non-liquefiable clayey soils above the thin (less than 1 foot thick) sandy layers and the lateral discontinuity of the liquefiable layers.

4.2.4 Dynamic Compaction/Seismic Settlement

Another type of seismically induced ground failure, which can occur as a result of seismic shaking, is dynamic compaction, or seismic settlement. Such phenomena typically occur in unsaturated, loose granular material or uncompacted fill soils. Due to the composition and apparent relative density of the soils above the water table within the maximum depth of our exploration, we estimate settlements on the order of less than ¼ inch due to dynamic compaction/seismic settlement. These settlements are shown on the CPT liquefaction plots in Appendix C.

4.3 Geologic and Seismic Hazards Summary

As required by the State of California in Title 24 of the California Building Code, a geologic and seismic hazard evaluation is needed for school developments. BSK has provided an evaluation of the campus, along with a discussion of the geology of the site and its vicinity in a separate geologic and seismic hazards assessment report presented in Appendix D. In this assessment, we conclude that the planned structures are free of most geologic and seismic hazards except for those discussed above and the potential for strong ground shaking, which is typical of the entire San Francisco Bay Area.

4.3.1 Faulting and Seismic Shaking

The San Francisco Bay Area is seismically dominated by the active San Andreas Fault system. This fault system movement is distributed across a complex system of generally strike-slip, right-lateral parallel and sub-parallel faults including, among others, the Greenville, Concord, and Hayward faults.

The site is not located within an Alquist-Priolo Earthquake Fault Zone and no mapped active fault traces are known to transverse the site. Nevertheless, the site is located in a seismically active area of California. We expect the site to be subjected to substantial ground shaking due to a major seismic event on the active faults in the Bay Area and surrounding regions during the design life of the project.

In 2015, scientists and engineers released a new earthquake forecast for the State of California[8]. It updates the earthquake forecast made for the greater San Francisco Bay Area by the 2007 Working Group for California Earthquake Probabilities. According to this recent study, there is a 72 percent probability that one or more magnitude M6.7 or greater earthquakes will occur in the San Francisco Bay Area in the next 30 years (2014 to 2044).

[8] Field, E.H., and 2014 Working Group on California Earthquake Probabilities (2015), UCERF3: A new earthquake forecast for California's complex fault system: U.S. Geological Survey 2015–3009, 6 p., https://dx.doi.org/10.3133/fs20153009.

As has been demonstrated recently by the 1989 (M6.9) Loma Prieta, the 1994 (M6.7) Northridge, and the 1995 (M6.9) Kobe earthquakes, earthquakes of this magnitude range can cause severe ground shaking and significant damage to modern urban environments. Therefore, the design of the campus expansion should incorporate the seismic design parameters presented in the "2016 CBC Seismic Design Parameters" section of this report.

4.3.2 Expansive Soils

We performed Atterberg limits tests on near surface samples obtained from approximate depths ranging from 1½ to 9 feet BGS from borings B-1, 2, 4, 5, 6, and 7 which resulted in liquid limits ranging of 31 to 45 and plasticity indexes ranging from 14 to 26. These results are consistent with our visual observation of the near surface soils in the nine borings drilled for this project and are indicative of soils having a moderate expansion potential when subjected to change in moisture content.

5. RECOMMENDATIONS

Presented below are recommendations for foundations, seismic considerations, slabs-on-grade, pools, tennis courts, retaining walls, earthwork, construction considerations, site drainage, and pavements for this project.

5.1 Foundations

In general, the proposed buildings and bleachers can be supported on shallow foundations and the tennis court lighting and fences can be supported on drilled piers. If desired, the bleachers can also be supported on drilled piers as recommended below. Depending on the sensitivity of the buildings to soil collapse settlement, the affected buildings could instead be supported on mat foundations as discussed below.

5.1.1 Shallow Footings

Based on our investigation, the loads for the proposed buildings and bleacher footings can be supported by continuous perimeter footings and isolated interior footings bearing on native undisturbed soil or engineered fill provided that the bottom of the footing excavations have been checked by a BSK representative. The recommended allowable soil bearing pressures in pounds per square foot (psf) are presented below.

STRUCTURE FOUNDATION	ALLOWABLE BEARING CAPACITY
Bleacher Footings	2,500 psf
Concession/Ticket Booth & Restroom Footings	2,500 psf
Maintenance & Operations Buildings Footings	3,500 psf
Aquatics Building & Portables Footings	3,500 psf

These values include a factor of safety of at least 3. Footings should be embedded a minimum of 18 inches and be a minimum of 12 inches wide. The minimum footing embedment depth should be measured below lowest adjacent grade which is defined as the bottom of slab on the interior or finished grade on the exterior. Allowable soil bearing pressures may be increased by one-third for transient loads such as wind and seismic loads.

Minimum bearing pressure on footings should be 1,500 psf. If the bearing pressure is less than 1,500 psf, the footing should be overexcavated at least 6 inches and the resulting excavation should then be replaced with “non-expansive” fill or a 2-sack sand-cement slurry.

Where footings are located adjacent to below-grade structures or near major underground utilities, the footings should extend 9 inches below a 2H:1V (horizontal to vertical) plane projected upward from the structure footing or bottom of the underground utility to avoid surcharging the below grade structure and

underground utility with building loads. If it is not possible to deepen footings below this influence zone, the utility should be backfilled with a 1-sack sand-cement slurry mix within the influence zone. Also, where utilities cross under the perimeter footings line and enter "interior" space, the trench backfill should consist of a vertical barrier of impervious type material as explained in the "Earthwork" section of this report. In addition, where utilities cross through footings, flexible waterproof caulking should be provided between the sleeve and the pipe. Utility plans should be reviewed by BSK prior to trenching for conformance to these requirements.

Concrete for footings should be placed neat against firm native soil or engineered fill. The footing excavations should not be allowed to dry before placing concrete. If shrinkage cracks appear in the footing excavations, the excavations should be thoroughly moistened to close all cracks prior to concrete placement. The footing excavations should be monitored by a representative of BSK for compliance with appropriate moisture control and to confirm the adequacy of the bearing materials. If soft or loose materials are encountered at the bottom of the footing excavations, they should be removed and replaced with lean concrete or engineered fill. BSK should also be present during the overexcavation. Unit prices for such overexcavation and backfilling should be obtained during contractor bidding for this project.

5.1.2 Drilled Piers

New drilled piers to support bleachers (if applicable), tennis court lighting, backstops, fencing, etc. should be at least 18 inches in diameter, spaced at least three pier diameters apart (center to center) or axial capacity reductions may be necessary, and extend at least 5 feet below grade. The piers should be designed using the allowable skin friction values shown in the table below. These values include a factor of safety of 2 and may be increased by one-third for resisting total loads, including wind and seismic. For resistance to uplift loads, the weight of the piers and the skin friction between the piers and supporting soils may be used. Uplift loads for short-term conditions should not exceed 2/3 of the allowable downward skin friction. The upper 1 foot of soil should be ignored for calculation of skin friction unless the ground surface is confined by paving or a slab.

STRUCTURE FOUNDATION	ALLOWABLE PIER SKIN FRICTION
Bleacher, Backstops, Chain Link Fencing, Foul Ball Netting, & Misc. Ball Field Improvements	300 psf, 1' to 10' BGS 500 psf, 10' to 50' BGS
Tennis Court Lighting Piers, Aquatic Center Bleachers, Fencing & Score Board	500 psf

We recommend steel reinforcement and concrete be placed within about 4 to 6 hours upon completion of each drilled pier hole; as a minimum, the holes should be poured the same day they are drilled. The steel reinforcement should be centered in the drilled hole. Concrete used for pier construction should be discharged vertically into the holes to reduce aggregate segregation. Under no circumstances should concrete be allowed to free-fall against either the steel reinforcement or the sides of the excavation during construction. Our borings indicate that shallow drilled piers can be drilled with a standard flight

auger using a standard rig with Kelly bar, subject to access restrictions. The bottom of the drilled holes should be cleaned such that no more than 2 inches of loose soil remains in the hole prior to placement of concrete. A representative from BSK should be present to observe drilled holes to confirm bottom conditions prior to placing steel reinforcement.

If groundwater is encountered within the drilled pier holes, no more than 6 inches of standing water should be present during concrete placement. Otherwise, the water needs to be pumped out or the concrete needs to be placed into the hole using tremie methods. If tremie methods are used, the end of the tremie pipe must remain below the surface of the in-place concrete at all times. In order to develop the design skin friction value previously provided, concrete used for pier construction should have a slump of 6 to 8 inches.

If groundwater is present within the depth of the sandy layers encountered in some of our borings during installation of the piers, such layers could be subjected to caving. This could require the use of temporarily casing or the slurry displacement method during installation of the piers. If temporary casing is used during construction in lieu of the slurry displacement method, it should consist of smooth-walled steel casing. Corrugated metal pipe (CMP) should not be permitted as casing because it results in excessive voids and/or disturbance of the surrounding soil during removal of the casing. If the piers are installed using slurry, then the concrete should be placed using tremie methods and the end of the tremie pipe must remain a minimum of 5 feet below the surface of the in-place concrete at all times.

5.1.3 Mat Foundations

If the settlements discussed in the "Anticipated Settlements" section above are too large for conventional shallow footings for the planned structures, consideration should be given to supporting the pertinent structures on mat foundations. The mats should have a minimum depth at the edges of 18 inches. It is anticipated that the mat foundations will impose a modest bearing pressure (less than 500 psf). If isolated areas of imposed stress concentrations occur, the mats may be designed for an allowable bearing pressure of 1,500 psf within these isolated areas. The allowable bearing pressure value may be increased by 1/3 for short term seismic and wind loads. The bearing capacity value includes a factor of safety of at least 3. We recommend that the mat be underlain by at least 6 inches of compacted Caltrans Class 2 aggregate base. This underlayment material would serve as a leveling course and would reduce the risk for the exposed soils at the bottom of the mat excavation to dry out prior to concrete placement.

5.1.4 Resistance to Lateral Loads

Lateral loads applied against footings may be resisted by a combination of friction between the foundation bottoms and the supporting subgrade, and by passive resistance acting against the vertical faces of the foundation. The frictional and passive resistance may be assumed in design to act concurrently. An allowable friction coefficient of 0.30 between the foundations and supporting subgrade soils may be used. For passive resistance at this site, an allowable equivalent fluid pressure (unit weight) of 300 pounds per cubic foot (pcf) may be used against the sides of foundations. The friction coefficient and passive pressure

values include factors of safety of about 1½. We based these lateral load resistance values on the assumption that the concrete for footings are either placed directly against undisturbed soils or that the voids created from the use of forms are backfilled with material such as flowable fill or lean concrete.

Resistance to lateral loads for drilled piers can be provided by passive resistance against the piers using an allowable rectangular pressure of 1,000 psf. The passive resistance may be applied to a width of twice the diameter of the piers. Piers should be spaced at least 6 diameters apart (center to center) or lateral resistance capacity reductions may be necessary. The passive pressure value includes a factor of safety of about 1½.

The passive pressure may be increased by one-third for wind and/or seismic loading. Passive resistance in the upper foot of soil cover below finished grades should be neglected unless the ground surface is confined by concrete slabs, pavements, or other such positive protection.

5.1.5 Modulus of Subgrade Reaction

A modulus of subgrade reaction, K_{V1}, of 115 pounds per square inch per inch (pci) of deflection (based on a one square foot bearing plate) is considered applicable to the new footings, grade beams or mat foundations. The modulus of subgrade reaction is typically reduced for foundation or slab sizes larger than 1 square foot. For various slab sizes, the subgrade modulus may be calculated using the following formulas:

Square: $K_S = (K_{V1}) \times \left(\frac{1\ \text{foot}}{B}\right)$

Rectangular: $K_R = (K_{V1}) \times \left(\frac{m+0.5}{1.5 \times m}\right)$

Where:

- K_{V1} is the modulus of subgrade reaction for a 1 square foot plate (in units of pci);
- B is the width of the foundation or slab (in units of feet);
- m is the ratio of the foundation or slab length divided by its width (unitless); and
- K_S and K_R are the adjusted modulus of subgrade reaction based on the actual dimensions of the foundation or slab (in units of pci).

If a computer program is used to design the foundations for this project and it requires the input of a modulus of subgrade reaction for the site, the designer should check whether the program requires input of the unadjusted (i.e., K_{V1}) or adjusted (i.e., K_S or K_R) modulus of subgrade reaction.

5.2 2016 Seismic Design Criteria

The seismicity of the region surrounding the site is discussed in the "Faulting and Seismicity" section of this report. From that discussion, it is important to note that the site is in a region of high seismic activity

and will likely be subjected to major shaking during the life of the project. As a result, structures to be constructed on the site should be designed in accordance with applicable seismic provisions of the building codes. For details about the seismic design criteria to be used for this project and how it was developed, please refer to the geologic and seismic hazards assessment report in Appendix D.

5.3 Slabs-on-Grade

Slabs-on-grade for this project will consist of concrete floor slabs and exterior flatwork. The near-surface soils are moderately expansive and will be subject to shrink/swell cycles with fluctuations in moisture content. To reduce these potentially adverse effects, we recommend that interior concrete slabs and exterior flatwork be underlain by 18 inches and 6 inches (12 inches for the pool deck) of "non-expansive" engineered fill, respectively, placed on subgrade prepared as described in the "Earthwork" section of this report. The properties of this "non-expansive" fill should also meet the criteria listed in the "Earthwork" section of this report. See below for additional criteria for interior floor slabs.

High calcium quicklime treatment of the in-situ soils is recommended as an alternative to "non-expansive" fill. If this alternative is utilized, extensive quality control is needed as well as laboratory testing to evaluate the appropriate lime treatment mixture. The client needs to understand the risk of this approach if selected, as quicklime treatment requires extensive quality control. For estimating purposes, approximately 12 inches (the upper 6 inches of the 18-inch "non-expansive" fill needs to consist of crushed drain rock as discussed in the next section of this report) and 6 inches (12 inches for pool deck) of soil would need to be treated for interior slabs and exterior flatwork, respectively, provided that the moisture content of the soils below that is at least 3 percent over optimum moisture. Our experience has indicated that about 5 percent high calcium quicklime by weight is typically needed for treatment. We may elect to perform additional laboratory tests to refine this estimate prior to lime-treatment operations at the site. The negative impact of quicklime treatment on future vegetation should be considered in whether it should be used, and what mitigation measures are needed.

The "non-expansive" fill or quicklime-treated soil should extend a minimum horizontal distance of 5 feet beyond all building areas, where feasible, including the outer edge of perimeter footings and footings extending beyond perimeter walls, where flatwork is planned. The horizontal limits of treatment can be reduced to 3 feet elsewhere, such as for exterior flatwork. The over-build of the quicklime-treatment can be eliminated where landscaping is planned; however, it is important that the lime-treatment extends to the edge of the structural improvements. Therefore, special care should be exercised during surveying and staking of the building limits during construction. It is important that placement of this material be done as soon as possible after compaction of the subgrade to prevent drying of the native subgrade soils and that slabs be constructed as soon as possible after "non-expansive" material or lime-treated soil is placed, as subgrades will dry out even through "non-expansive" fills or quicklime-treated soil. A representative of BSK should be present to observe the condition of the subgrade and observe and test the installation of the "non-expansive" engineered fill or quicklime-treated soil prior to slab construction.

Where "non-expansive" fill or quicklime-treated soil is removed to install utilities inside the building or underneath exterior flatwork, this layer should be replaced with new imported "non-expansive" fill or flowable fill.

5.3.1 Interior Floor Slabs

Concrete floor slabs should be supported on at least 6 inches of crushed drain rock to enhance subgrade support for the slab. This material should be considered part of the required minimum of 18 inches of "non-expansive" fill. If this material is desired to be used as a capillary break, it should be ¾-inch maximum size with no more than 10 percent by weight passing the #4 sieve. It is important that placement of this material and concrete be done as soon as possible after compaction of the "non-expansive" or lime-treated subgrade materials to reduce drying of the subgrade.

Floor slabs should have a minimum thickness of 5 inches. A Structural Engineer should design reinforcing and slab thickness. Special care should be taken so that reinforcement is placed at the slab mid-height. The floor slab should be separated from footings, structural walls, and utilities and provisions made to allow for settlement or swelling movements at these interfaces. If this is not possible from a structural or architectural design standpoint, it is recommended that the slab connection to footings be reinforced such that there will be resistance to potential differential movement.

5.3.2 Floor Slab Moisture

Subsurface moisture and moisture vapor naturally migrate upward through the soil and, where the soil is covered by a building or pavement, this subsurface moisture will collect. To reduce the impact of the subsurface moisture and potential impact of future introduced moisture (such as landscape irrigation or precipitation) the current industry standard is to place a vapor retarder on the compacted crushed rock layer. This membrane typically consists of visqueen or polyvinyl plastic sheeting at least 15 mils in thickness. It should be noted that although vapor barrier systems are currently the industry standard, this system may not be completely effective in preventing floor slab moisture problems. These systems typically will not necessarily assure that floor slab moisture transmission rates will meet floor-covering manufacturer standards and that indoor humidity levels be appropriate to inhibit mold growth. The design and construction of such systems are totally dependent on the proposed use and design of the proposed building and all elements of building design and function should be considered in the slab-on-grade floor design. Building design and construction have a greater role in perceived moisture problems since sealed buildings/rooms or inadequate ventilation may produce excessive moisture in a building and affect indoor air quality.

Various factors such as surface grades, adjacent planters, the quality of slab concrete and the permeability of the on-site soils affect slab moisture and can control future performance. In many cases, floor moisture problems are the result of either improper curing of floors slabs or improper application of flooring adhesives. We recommend contacting a flooring consultant experienced in the area of concrete slab-on-grade floors for specific recommendations regarding your proposed flooring applications.

Special precautions must be taken during the placement and curing of all concrete slabs. Excessive slump (high water-cement ratio) of the concrete and/or improper curing procedures used during either hot or cold weather conditions could lead to excessive shrinkage, cracking, or curling of the slabs. High water-cement ratio and/or improper curing also greatly increase the water vapor permeability of concrete. We recommend that all concrete placement and curing operations be performed in accordance with the American Concrete Institute (ACI) manual.

It is emphasized that we are not floor moisture proofing experts. We make no guarantee nor provide any assurance that use of capillary break/vapor retarder system will reduce concrete slab-on-grade floor moisture penetration to any specific rate or level, particularly those required by floor covering manufacturers. The builder and designers should consider all available measures for floor slab moisture protection.

Exterior grading will have an impact on potential moisture beneath the floor slab. Recommendations for exterior drainage are provided in the "Site Drainage and Storm Water Infiltration" section of this report.

5.3.3 Exterior Concrete Flatwork

Exterior concrete flatwork for this project will consist of the pool deck and other sidewalk and flatwork areas surrounding the new buildings. As previously discussed, the near-surface soils exhibit a moderate expansion potential and can be subject to shrink/swell cycles with fluctuations in moisture content. Some of the adverse effect of swelling and shrinking can be reduced with proper moisture treatment. The intent is to reduce the fluctuations in moisture content by moisture conditioning the soils, sealing the moisture in, and controlling it. Near-surface soils should be moisture conditioned according to the recommendations in Appendix E. In addition, all exterior concrete slabs should be supported on a minimum of 6 inches (12 inches for pool deck) of "non-expansive" imported soil, quicklime-treated on-site soils, Class 2 Aggregate Sub-Base (ASB), or Class 2 Aggregate Base (AB). Even with the 6 to 12 inches of "non-expansive" material, some movement of exterior slabs may occur. Where concrete flatwork is to be exposed to vehicle traffic, the upper 6 inches of fill should be Class 2 Aggregate Base as specified in the current California Department of Transportation Standard Specifications. This may need to be increased if concrete flatwork is to be exposed to heavy truck traffic.

Pedestrian concrete flatwork should have a minimum thickness of 4 inches and minimum reinforcing of #4 bars at 18 inches on center along expansion joints. Vehicular concrete should be designed as discussed in the "Concrete Pavements" section of this report. Final design of exterior concrete flatwork is the responsibility of the civil or structural engineer for the project.

Exterior flatwork will be subjected to edge effects due to the drying out of subgrade soils. To protect against edge effects adjacent to unprotected areas, such as vacant or landscaped areas, lateral cutoffs, such as inverted curbs that extend at least 2 inches below the aggregate base or "non-expansive" layer into the subgrade soils, are recommended. Alternatively, a moisture barrier at least 80 mils thick extending at least 6 inches below the aggregate base or "non-expansive" layer into the subgrade soils

could be installed at the edge of the flatwork. Because of the expansive soils, flatwork should have control joints on no greater than 8 feet centers.

Prior to construction of the flatwork, the upper 12 inches of "non-expansive" fill, quicklime-treated soil, ASB or AB, should be moisture conditioned to near optimum moisture content. If the "non-expansive" fill, ASB or AB is not covered within 30 days after placement, the soils below this material will need to be checked for appropriate moisture of at least optimum. If the moisture is found to be below this level, the flatwork areas will need to be moisture conditioned until the proper moisture content is reached. Where flatwork is adjacent to curbs, reinforcing bars should be placed between the flatwork and the curbs. Expansion joint material should be used between flatwork and curbs, and flatwork and buildings.

5.3.4 Effect of Plants on Foundation and Flatwork Performance

Because of the moderately expansive nature of the on-site soils, trees and other large plants can significantly contribute to differential settlement of a foundation, flatwork and other paved areas. The roots of trees and large plants can absorb the moisture from the soil, causing the soil to shrink much faster than other soil areas exposed to the weather. The soil where the moisture is lost more rapidly will sink lower than the surrounding soil, causing differential settlement in overlying or adjacent improvements. Certain trees and plants are known to be more hydrophilic (water-loving) than others. Research studies indicate that a tree should be at least as far away from a building as the mature height of the tree to minimize the effect of drying caused by the tree. If this is not possible, consideration should be given to installing a root barrier between areas planted with trees and nearby foundations and flatwork.

If lime-treatment is used at the site in lieu of imported "non-expansive" fill, consideration should be given to installing a vertical barrier, such as a moisture or root barrier, along the boundaries between lime-treated soil and landscaping to reduce the risk that lime-treated soil would have a long-term adverse effect on the nearby landscaping.

A plant and tree specialist should be consulted to avoid the issues described above.

5.4 Retaining Walls

It is our understanding that short retaining walls less than 6 feet high may be used at the site. These walls may also be supported on continuous spread footings as discussed in the "Foundations" section above.

The retaining walls should be designed to resist static earth pressures due to the adjacent soil, and any surcharge effects caused by loads adjacent to the walls. It is recommended that the walls be designed for the lateral earth pressures presented in the table below, which are expressed as equivalent fluid pressures.

LATERAL EARTH PRESSURES FOR MODERATELY EXPANSIVE ON-SITE SOILS WITH BACKFILL SLOPES OF 6 TO 1 (HORIZONTAL TO VERTICAL) OR LESS	
Earth Pressures	Equivalent Fluid Density, pcf
Active	45
At-rest	65
Passive (allowable)	300

The passive pressure includes a factor of safety of about 1½.

Walls whose tops are not free to deflect (such as elevator pits) should be designed for an at-rest earth pressure condition, while an active case can be applied for walls that are free to deflect at the top. These values are unfactored, apply to horizontal backfill, and do not include hydrostatic pressures that might be caused by groundwater or water trapped behind the walls.

5.4.1 Retaining Wall Drainage

Retaining walls higher than 2 feet should be either designed to resist hydrostatic pressures or be well-drained to reduce the potential for hydrostatic pressures to develop behind the walls. A typical drainage system for a cantilevered wall may consist of a 1- to 2-foot wide zone of Caltrans Class 2 Permeable material immediately behind the wall with a perforated pipe at the base of the wall discharging to a storm drain or other appropriate discharge facility via gravity flow. As an alternative, a prefabricated drainage board may be used in lieu of the Class 2 Permeable material. Where conditions allow for the use of weep holes, they may be used in lieu of the perforated pipe. The holes should be a minimum of 3 inches in diameter and spaced at 4 feet or less on-center. Filter fabric or wire mesh should be placed over the holes at the backside of the wall to inhibit the permeable material, if used in lieu of a drainage board, from washing through the holes. The drainage zone behind retaining walls should be capped with a minimum 12-inch thick layer of properly compacted onsite clayey soil to reduce the risk of surface runoff discharging into the wall drain.

5.4.2 Surcharge Loads

Surcharge loads caused by vehicular and/or construction traffic adjacent to the walls may be assumed to consist of a rectangular distributed uniform pressure of 100 psf acting over a depth of 10 feet below the ground surface of the retained soil. A rectangular distribution with a uniform pressure equal to one-third of the surcharge pressure should be used for unrestrained walls (active earth pressure condition), while a uniform pressure equal to one-half of the surcharge pressure should be used for restrained walls (at-rest earth pressure condition). The wall designer should evaluate whether this surcharge is appropriate for the expected traffic loading. Additional analyses during design may be needed to evaluate the effects of non-uniform surcharge loads such as point loads, line loads, or other such presently undefined surcharge loads. In that case, we should be consulted for supplemental geotechnical recommendations.

5.5 Swimming Pool

5.5.1 Lateral Earth Pressures

The expansion potential of the near surface soils will need to be considered in the design of the pool. From a geotechnical viewpoint, a pool with rigid side walls to be constructed at an expansive soil site should be designed for two different loading conditions. The first condition is the pool filled with water and no surrounding earth support. This will enable the structure to function where loss of lateral support due to possible soil shrinkage occurs. Under this condition, the pool walls should be designed to resist the full hydrostatic pressures imposed by the pool water without lateral support in the upper 5 feet below the deck grade.

The second loading condition will occur when the pool is empty, such as when the pool is first constructed or when it is drained for maintenance. An equivalent fluid pressure of 65 pcf for a restrained condition (at-rest condition) is recommended for this case due to the expansive soils. This equivalent fluid pressure does not include hydrostatic pressure. If a drainage system similar to that recommended in the "Retaining Wall Drainage" section above is not installed behind the pool walls, then hydrostatic pressures should be included in the design of the pool walls. Any surcharge pressures due to adjacent foundation footings, structures, landscape mounds, etc., should be added to the lateral earth pressures. Passive pressure and a friction coefficient are provided in the "Resistance to Lateral Loads" section above.

Free groundwater was observed between depths of about 15 to 23 feet below existing grade during our investigation. However, local groundwater levels can fluctuate depending on factors such as seasonal rainfall, groundwater withdrawal, and construction activities on this or adjacent properties. The effect of these time dependent factors could not be determined at the time of our investigation, but the groundwater may impact the proposed pool. Because of the potential for variation in the groundwater table, we conservatively recommend that high groundwater design level be assumed at a depth of 10 feet BGS when considering potential hydrostatic uplift forces on the pool.

Prior to placement of the concrete or gunite, the exposed subgrade should be moisture conditioned to at least 2 percent over optimum moisture content. The sides and bottom of the pool excavation should be wetted several times a day to reduce drying and shrinkage. If shrinkage cracks develop on the sides of the excavation, they will be difficult to mitigate without removing and replacing the soil.

5.5.2 Subdrains and Dewatering Systems

Because the pool may extend below the groundwater design level or leaking water from the pool may be trapped below the bottom of the pool long-term, we recommend that an under-drain system be installed below the bottom of the pool. It should consist of a minimum 6-inch thick layer of Caltrans Class 2 Permeable Material (graded filter rock) without fabric. A pressure relief valve should be installed in the low point of the pool to allow discharge from the under-drain if the pool is drained. As an alternative to a pressure relief valve, a perforated PVC drain pipe (Schedule 40 or greater and at least 4 inches in diameter)

can be installed (with the perforations facing down) along the bottom of the low point of the under-drain. The perforated pipe should discharge to a sump or vertical relief well located within the pool deck area outside of the pool footprint. The water discharged to the relief well or sump should be pumped to the storm drain system to prevent buildup of hydrostatic pressures when the pool is drained.

5.6 Demolition

5.6.1 Existing Improvements

As part of the demolition process, existing foundations and other improvements should be removed. Excavations from removal of foundations, the pool, underground utilities or other below ground obstructions should be cleaned of loose soil and deleterious material and backfilled with properly compacted fill. As discussed in the "Earthwork" section of this report, following stripping and removal of deleterious materials, areas of the site to receive fill should be scarified to a minimum depth of 12 inches, moisture-conditioned, and recompacted as indicated in Appendix E. This process should be observed and tested by a BSK representative.

5.6.2 Existing Utilities

Active or inactive utilities within the construction area should be protected, relocated, or abandoned. Pipelines that are 2 inches in diameter or less may be left in place beneath improvements provided they are cut off and capped at the perimeter of the improvement. Pipelines larger than 2 inches in diameter within the planned improvements should be removed or filled with a 1-sack sand-cement slurry mix. Active utilities to be reused should be carefully located and protected during demolition and during construction.

5.7 Earthwork

Earthwork at the site will generally consist of subgrade preparation and placement of concrete slabs and pavements (including possible lime treatment), excavation and backfill of demolished foundations, backfill of the existing pool, excavation of the new pool, and excavation, removal, and backfill for existing and new underground utility line trenches. We anticipate that the required grading will consist of cuts and fills up to 3 feet to create building pads and grade the site to drain. However, we anticipate that the area of the new home bleachers may have to be cut about 5 feet to match surrounding grades. Excavations for the removal of existing underground utilities and installation of new ones are expected to be up to 5 feet deep and excavation/backfill for the existing and new pools is anticipated to be up to 15 feet deep. BSK should review the final grading plans for conformance to our design recommendations prior to construction bidding. In addition, it is important that a representative of BSK observe and evaluate the competency of existing soils or new fill underlying structures, the pool, concrete flatwork, and pavements. In general, soft/loose or unsuitable materials encountered should be overexcavated, removed, and replaced with compacted engineered fill material.

5.7.1 Site Preparation and Grading

Prior to the start of grading and subgrade preparation operations, where appropriate, the site should first be cleared and stripped (minimum of 3 inches deep) to remove all surface vegetation, organic laden topsoil and debris generated during the demolition of existing pavements, concrete slabs and flatwork, foundations, the pool, and landscaping located within the site. Stripped topsoil from landscaped areas may be stockpiled for later use in landscaping areas; however, this material should not be reused for engineered fill.

Following stripping, removal of deleterious materials, and overexcavation (if required), the site should be scarified to a minimum depth of 12 inches, moisture conditioned, and recompacted as indicated in Appendix E. Scarification and recompaction should extend laterally a minimum of 5 feet beyond the limits of structures and 3 feet beyond flatwork and pavement, where achievable.

All fills should be compacted in lifts of 8-inch maximum uncompacted thickness. A summary of compaction requirements of the projects is presented in Appendix E. Laboratory maximum dry density and optimum moisture content relationships should be evaluated based on ASTM Test Designation D1557 (latest edition).

All site preparation and fill placement should be observed by a BSK representative. It is important that, during the stripping and scarification process, our representative be present to observe whether any undesirable material is encountered in the construction area and whether exposed soils are similar to those encountered during our field investigation.

5.7.2 Lime Treatment

Lime-treatment of the in-situ soils (if used) should be performed using high calcium quicklime. Extensive quality control is needed as well as laboratory testing to evaluate the appropriate lime treatment mixture. Our experience has indicated that about 5 percent high calcium quicklime by dry unit weight of the soil is typically needed for treatment. For design purposes, an insitu dry unit weight of 105 pcf may be assumed. The negative impact of lime-treatment on future vegetation should be considered.

The high calcium quicklime treatment operation should be conducted in general accordance with Section 24 of the Caltrans Standard Specifications, 2015 edition. Quicklime-treatment typically consists of spreading the required amount of quicklime over the area to be treated, followed by initial mixing of the quicklime and water within the soil section to be treated. This initial mixing is then allowed to sit for a period of about 24 hours or longer to permit the resulting chemical reaction to break down the material and change it chemically. Following this "mellowing" period, the soil-quicklime section is re-mixed and additional water, if needed, is added. It is important that adequate water be added before final mixing to ensure complete hydration of the quicklime and to bring the soil moisture content to at least 3 percent above the optimum moisture content before compaction takes place.

After the quicklime-treated pad/subgrade is compacted, it should be allowed to harden (cure) until loaded dump trucks and other construction equipment can operate on it without rutting the surface. Throughout this curing period, the surface of the quicklime-treated soil should be kept moist to aid in strength gain. Alternatively, the quicklime-treated surface can be covered with 4 to 6 inches of capillary break or aggregate base material.

It is very important that the general steps outlined above be performed in a manner that introduces sufficient water to the soil-quicklime mix to allow the quicklime to thoroughly hydrate and react chemically with the soil subgrade. Likewise, it is equally important that proper curing of the quicklime-treated section take place.

5.7.3 Fill Material

Except for organic laden soil, the on-site soil is suitable for use as general engineered fill if it is free of deleterious matter. Maximum particle size for fill material should be limited to 3 inches, with at least 90 percent by weight passing the 1-inch sieve. Proper granular bedding and shading should be used beneath and around new utilities (if applicable). Where imported "non-expansive" material is required, it is recommended that it be granular in nature, adhere to the above gradation recommendations and conform to the following minimum criteria:

IMPORTED "NON-EXPANSIVE" FILL CRITERIA	
Plasticity Index	15 or less
Liquid Limit	Less than 30%
% Passing #200 Sieve	8 % – 40%

Highly pervious materials such as pea gravel or clean sands are not recommended for use as general fill because they permit transmission of water to the underlying soils. Imported fill material should not be any more corrosive than the on-site soils and should not be classified as being more corrosive than "moderately corrosive." Prior to transporting proposed import materials to the site, the contractor should make representative samples of the material available to BSK at least 10 working days in advance to allow us enough time to confirm the material meets the above requirements. All on-site or import fill material should be compacted to the recommendations provided for engineered fill in Appendix E.

Due to the expansive soil content within the on-site soils, proper moisture conditioning is important. The moisture conditioning should be performed in accordance with Appendix E. Where low expansion potential soils or aggregate base in paved areas is used, it should immediately be placed over the prepared subgrade to avoid drying of the subgrade. Prior to placement of the capillary break or crushed rock material over the "non-expansive" or lime-treated fill subgrade for the building pads, the subgrade should be moisture conditioned to the moisture content indicated in Appendix E. The subgrade for exterior concrete flatwork should be conditioned to the required moisture content prior to their construction and may require additional conditioning if allowed to dry.

5.7.4 Weather/Moisture Considerations

If earthwork operations and construction for this project are scheduled to be performed during the rainy season (usually November to May) or in areas containing saturated soils, provisions may be required for drying of soil or providing admixtures, such as lime-treatment, to the soil prior to compaction. Conversely, additional moisture may be required during dry months. Water trucks should be made available in sufficient numbers to provided adequate water during earthwork operations.

Since portions of the site are currently capped with concrete slabs or AC pavement, the moisture content of the subgrade soils in these areas may be significantly above the optimum moisture content. This occurrence is usually caused by the migration of irrigation water from landscaped areas into the aggregate base material and/or the entrapment of subsurface moisture underneath slab and pavement areas. As a result, the subgrade soils may need to be dried prior to undergoing recompaction. It is recommended that any landscape watering in the area be turned off at least two weeks prior to the start of grading activities at the site. If site grading is performed during the rainy months, the site soils could become very wet and difficult to compact without undergoing significant drying. This may not be feasible without delaying the construction schedule. For this reason, drier import soils could be required or lime treating may be needed if construction takes place during winter months.

5.7.5 Excavation and Backfill

We anticipate that excavation for the foundations, the pool, and utility trenches can be made with either a backhoe or trencher, or similar earthwork equipment. Where trenches or other excavations are extended deeper than 5 feet, the excavation may become unstable and should be evaluated to monitor stability prior to personnel entering the trenches. Shoring or sloping of any trench wall may be necessary to protect personnel and to provide stability. All trenches should conform to the current OSHA requirements for work safety. It is the contractor's responsibility to follow OSHA temporary excavation guidelines and grade the slopes with adequate layback or provide adequate shoring and underpinning of existing structures and improvements, as needed. Slope layback and/or shoring measures should be adjusted as necessary in the field to suit the actual conditions encountered, in order to protect personnel and equipment within excavations.

Care should be taken during construction to reduce the impact of trenching on adjacent structures and pavements (if applicable). Excavations should be located so that no structures, foundations, and slabs, existing or new, are located above a plane projected 2:1 (horizontal to vertical) upward from any point in an excavation, regardless of whether it is shored or unshored, unless the adjacent surcharge loads are accounted for in the shoring design.

At the time of this geotechnical investigation, free groundwater was observed in some of our borings and CPTs at depths of approximately 15 and 23 feet BGS. However, the actual depth at which groundwater may be encountered in trenches and excavations may vary. As a minimum, provisions should be made to ensure that conventional sump pumps used in typical trenching and excavation projects are available

during construction in case groundwater is found to be higher than observed during our investigation, and/or if substantial runoff water accumulates within the excavations as a result of wet weather conditions.

Backfill for trenches and other small excavations beneath slabs should be compacted as noted in Appendix E. Special care should be taken in the control of utility trench backfilling under structures and flatwork/slab areas. Poor compaction may cause excessive settlements resulting in damage to overlying structures and slabs.

Where utility trenches extend from the exterior into the interior limits of a building, lean concrete or a 2-sack sand-cement slurry should be used as backfill material for a distance of 2 feet laterally on each side of the perimeter footing centerline to reduce the potential for the trench to act as a conduit to exterior surface water. In addition, where utilities cross through exterior footings, flexible waterproof caulking should be provided between the sleeve and the pipe. Utility trenches located in landscaped areas should be capped with a minimum of 12 inches of compacted on-site clayey soils.

5.8 Site Drainage

Proper site drainage is important for the long-term performance of the planned structure. The site should be graded so as to carry surface water away from the building foundations at a minimum of 2 percent in paved areas and 5 percent in landscaped areas to a minimum of 10 feet laterally from the buildings, as required by the 2016 CBC. In addition, all roof gutters should be connected directly into the storm drainage system or drain onto impervious surfaces provided that a safety hazard is not created.

5.9 Pavements and Tennis Courts

5.9.1 Asphalt Concrete Pavements

Pavements for this project will consist of asphalt-paved parking and driveways. We have developed our pavement designs assuming the pavement subgrade soil will be similar to the near surface soils described in the boring logs. If site grading exposes soil other than that assumed, or import fill is used to construct pavement subgrades, we should perform additional tests to confirm or revise the recommended pavement sections for actual field conditions.

Asphalt pavement sections for this project have been calculated using Caltrans Flexible Pavement Design Method. Based on our R-value testing in the area of the planned parking, we have used an R-value of 5 in our analyses and we have developed the pavement sections presented in the table below. Various alternative pavement sections for various different Traffic Indices (TIs) are presented. Each TI represents a different level of use. The owner or designer should determine which level of use best reflects the project and select appropriate pavement sections. Three alternative pavement sections are given for the various TIs in the following table. They include 1) asphalt over aggregate base, 2) asphalt over aggregate base over aggregate subbase, and 3) asphalt over aggregate base over lime-treated soils.

ASPHALT CONCRETE PAVEMENT DESIGN Design R-Value = 5								
	Alternative 1		Alternative 2			Alternative 3		
Traffic index	AC	AB	AC	AB	ASB	AC	AB	LTS
4.0	2.5	7.5	2.5	4.0	4.0	2.5	4.0	12.0
4.5	2.5	9.0	2.5	4.5	5.0	2.5	4.0	12.0
5.0	2.5	11.0	2.5	5.0	6.5	2.5	4.0	12.0
5.5	3.0	12.0	3.0	5.5	7.0	3.0	4.5	12.0
6.0	3.0	13.5	3.0	6.5	8.0	3.0	4.5	12.0
6.5	3.5	14.5	3.5	6.5	9.0	3.0	6.0	12.0

Note: Thicknesses shown are in inches.
AC = Type B Asphalt Concrete
AB = Class 2 Aggregate Base (Minimum R-Value = 78)
ASB = Class 2 Aggregate Subbase (Minimum R-Value = 50)
LTS= Lime-Treated Subgrade (Minimum R-Value = 50)

If the lime-treating alternative of the building pads and flatwork is considered, the third alternative may be the most cost effective for the asphalt-paved areas. This alternative, shown above, would consist of lime-treating the existing subgrade prior to placement of the pavement section. This would result in a reduced asphalt concrete and aggregate base sections, as shown in Alternative 3 in the above table.

5.9.2 Tennis Courts

Subgrade soils underlying the tennis courts should be scarified to a minimum depth of 12 inches, moisture conditioned, and recompacted as indicated in Appendix E. Scarification and recompaction should extend laterally a minimum of 3 feet beyond the court surface, where achievable. The tennis court surfacing should be a minimum of 2 inches of asphalt concrete underlain by at least 8 inches of aggregate base that is moisture conditioned and compacted as indicated in Appendix E. If landscaping is placed immediately adjacent to the tennis courts, a vertical barrier should be installed between the courts and the landscaping as discussed in the Exterior Flatwork section of this report.

If the ground surface of the tennis courts is to be raised above the surrounding grade, consideration should be given to installing a continuous reinforced concrete band along the perimeter of the courts to provide lateral confinement and lower the potential for soil creep and vertical soil movement along the edges of the courts.

5.9.3 Concrete Pavements

If used, Portland Cement Concrete (PCC) pavement should have a minimum thickness of 6 inches supported over 6 inches of Caltrans Class 2 aggregate base over subgrade prepared per Appendix E. The aggregate base and subgrade for PCC pavements should be properly moisture conditioned and compacted. Construction joints should be located no more than 12 feet apart in both directions. Concrete

compressive strength should be tested in lieu of third point loading for rupture strength. A minimum 28-day compressive strength of 3,000 pounds per cubic foot (psi) should be specified for the concrete mix design. The PCC pavement should be continuously reinforced using No. 4 bars (or larger) spaced no more than 18 inches on center in both directions. Steel reinforcement should be located near the mid-thickness of the concrete slab. Final design of the PCC pavement is the responsibility of the civil or structural engineer for the project.

5.9.4 Pavement Drainage

Similar to slabs-on-grade, pavement subgrades will require mitigation of the expansive surface soils. We recommend that pavement subgrades be scarified to a depth of at least 12 inches, moisture conditioned and recompacted per Appendix E.

Paved areas should be sloped and drainage gradients maintained to carry all surface water to appropriate collection points. Surface water ponding should not be allowed anywhere on the site during or after construction. We recommend that the pavement section be isolated from non-developed areas and areas of intrusion of irrigation water from landscaped areas, unless these areas are located at least 10 feet laterally from the pavement. Concrete curbs should extend a minimum of 2 inches below the baserock and into the subgrade to provide a barrier against drying of the subgrade soils, or reduction of migration of landscape water, into the pavement section. Alternatively, a moisture barrier at least 80 mils thick that extends at least 6 inches below the aggregate base or "non-expansive" layer into the subgrade soils could be installed immediately behind concrete curbs.

In addition, we recommend that all pavements conform to the following criteria:

- All trench backfills, including utility and sprinkler lines, should be properly placed and adequately compacted to provide a stable subgrade, in accordance with the compaction recommendations in Appendix E.
- If Alternative 3 above is selected for the pavement section, wherever lime-treated soil is removed to install utilities inside paved areas, this layer should be backfilled with aggregate base.
- An adequate drainage system should be provided to prevent surface water or subsurface seepage from saturating the subgrade soil.
- The asphalt concrete, aggregate base, and aggregate subbase materials should conform to Caltrans Specifications, latest edition.
- Placement and compaction of pavements should be performed in accordance to appropriate Caltrans procedures.

5.10 Storm Water Runoff Mitigation

Storm water runoff regulations require pretreatment of runoff and infiltration of storm water to the extent feasible. Typically, this results in the use of bioretention areas, vegetated swales, infiltration trenches, buried storm water detention/infiltration galleries, or permeable pavement near or within parking lots and at the location of roof run-off collection. These features are not well-suited to the moderately expansive clay soils present at this site due to their relatively low permeability[9], which does not allow significant infiltration over short time periods. In addition, allowing water to pond on expansive clay soils can cause the soils to swell, which can cause distress to pavements, slabs, and lightly loaded structures.

Implementation of storm water infiltration criteria will likely result in increased distress and reduced service life of pavement and flatwork if not carefully designed in clay soils. In general, bioretention areas, vegetated swales and infiltration areas should be located in landscaped areas and well away from pavements, buildings, and slopes.

If it is not possible to locate these infiltration systems at least 10 feet away from buildings and pavements, alternatives that isolate the infiltrated water, such as flow-through planters with underdrains, should be considered. Improvements should be located such that there is at least 1 foot of horizontal distance between the edge of improvements and the top edge of the bioswale excavation for every 1 foot of vertical bioswale depth. If this is not possible, then concrete curbs for pavements or lateral restraint for exterior flatwork located directly adjacent to a vertical bioswale cut should be designed to resist lateral earth pressure per the recommendations in the "Retaining Walls" section of this report, or they should be adequately keyed into the native soil or should be engineered to reduce the potential for rotation or lateral movement of the curbs.

Due to the potential adverse effects on project performance, we should review the geotechnical aspects of the storm water infiltration system and its location prior to issuing the plans to bidding.

5.11 Corrosivity Results

Soil samples were collected during our field investigation at depths of approximately 2 and 2½ feet below the ground surface in borings B-1 and B-9, respectively, and were submitted for corrosion testing. The samples were tested by CERCO Analytical, a State-certified laboratory in Concord, California, for redox potential, pH, resistivity, chloride content, and sulfate content in accordance with ASTM test methods. The test results are presented at the end of Appendix B. Also included is the evaluation by CERCO Analytical of the corrosion test results. Because we are not corrosion specialists, we recommend that a corrosion specialist be consulted for advice on proper corrosion protection for underground piping which will be in contact with the soils and other design details.

[9] Infiltration testing and/or laboratory permeability testing was not performed due to the dominant presence of moderately expansive clays blanketing the site.

Based upon the resistivity measurements, the samples tested classified as "corrosive" by CERCO Analytical. They recommend that all buried iron, steel, cast iron, ductile iron, galvanized steel, and dielectric coated steel or iron be properly protected against corrosion depending upon the critical nature of the structure. They also recommend all buried metallic pressure piping, such as ductile iron firewater pipelines, should be protected against corrosion.

CERCO also indicated that the sulfate ion concentrations in the test results are sufficient to potentially be detrimental to reinforced concrete structures and cement mortar-coated steel. Therefore, they recommend that concrete that comes into contact with the site soils use sulfate resistant cement such as Type II, with a maximum water-to-cement ratio of 0.55.

The above are general discussions. A more detailed investigation may include more or fewer concerns and should be directed by a corrosion expert. BSK does not practice corrosion engineering. Consideration should also be given to soils in contact with concrete that will be imported to the site during construction, such as topsoil and landscaping materials. For instance, any imported soil materials should not be any more corrosive than the onsite soils and should not be classified as being more corrosive than "moderately corrosive." Also, onsite cutting and filling may result in soils contacting concrete that were not anticipated at the time of this investigation.

5.12 Plan Review and Construction Observation

We recommend that BSK be retained by the Client to review the final foundation and grading plans and specifications before they go out to bid. It has been our experience that this review provides an opportunity to detect misinterpretation or misunderstandings prior to the start of construction.

Variations in soil types and conditions are possible and may be encountered during construction. To permit correlation between the soil data obtained during this investigation and the actual soil conditions encountered during construction, we recommend that BSK be retained to provide observation and testing services during site earthwork and foundation construction. This will allow us the opportunity to compare actual conditions exposed during construction with those encountered in our investigation and to provide supplemental recommendations if warranted by the exposed conditions. Earthwork should be performed in accordance with the recommendations presented in this report, or as recommended by BSK during construction. BSK should be notified at least two weeks prior to the start of construction and prior to when observation and testing services are needed.

6. ADDITIONAL SERVICES AND LIMITATIONS

Our services were performed in a manner consistent with that level of care and skill ordinarily exercised by other members of BSK's profession practicing in the same locality, under similar conditions and at the date the services are provided. Our conclusions, opinions and recommendations are based on a limited number of observations and data. It is possible that conditions could vary between or beyond the data evaluated. BSK makes no other representation, guarantee or warranty, express or implied, regarding the services, communication (oral or written), report, opinion, or instrument of service provided.

This report may be used only by the District (Client) and the registered design professional in responsible charge and only for the purposes stated for this specific engagement within a reasonable time from its issuance, but in no event later than two (2) years from the date of the report.

Our services were performed based on project information provided by the Client. If the Client does not retain BSK to review any plans and specifications, including any revisions or modifications to the plans and specifications, BSK assumes no responsibility for the suitability or misinterpretation of our recommendations. In addition, if there are any changes in the field to the plans and specifications, the Client must obtain written approval from BSK's engineer that such changes do not affect our recommendations. Failure to do so will vitiate BSK's recommendations.

The scope of services was limited to drilling and sampling nine borings and advancing five CPTs at the site, laboratory testing, and preparation of this recommendations report. It should be recognized that definition and evaluation of subsurface conditions are difficult. Judgments leading to conclusions and recommendations are generally made with incomplete knowledge of the subsurface conditions present due to the limitations of data from field studies. The conclusions of this assessment are based on subsurface exploration including 9 borings drilled to a maximum depth of 25 feet BGS, 5 CPTs advanced to a depth of 50 feet BGS, laboratory testing, and engineering analyses.

Recommendations contained in this report are based on our field observations and subsurface explorations, limited laboratory tests, and our present knowledge of the proposed construction. It is possible that soil or groundwater conditions could vary beyond the point explored. If soil or groundwater conditions are encountered during construction that differ from those described herein, the Client is responsible for ensuring that BSK is notified immediately so that we may reevaluate the recommendations of this report. If the scope of the proposed construction, including the estimated structure loads, and the design depths or locations of the foundations, changes from that described in this report, the conclusions and recommendations contained in this report are not considered valid unless the changes are reviewed, and the conclusions of this report are modified or approved in writing, by BSK.

As the geotechnical engineering firm that performed the geotechnical evaluation for this project, BSK should be retained to confirm that the recommendations of this report are properly incorporated in the design of this project, and properly implemented during construction. This may avoid misinterpretation of the information by other parties and will allow us to review and modify our recommendations if

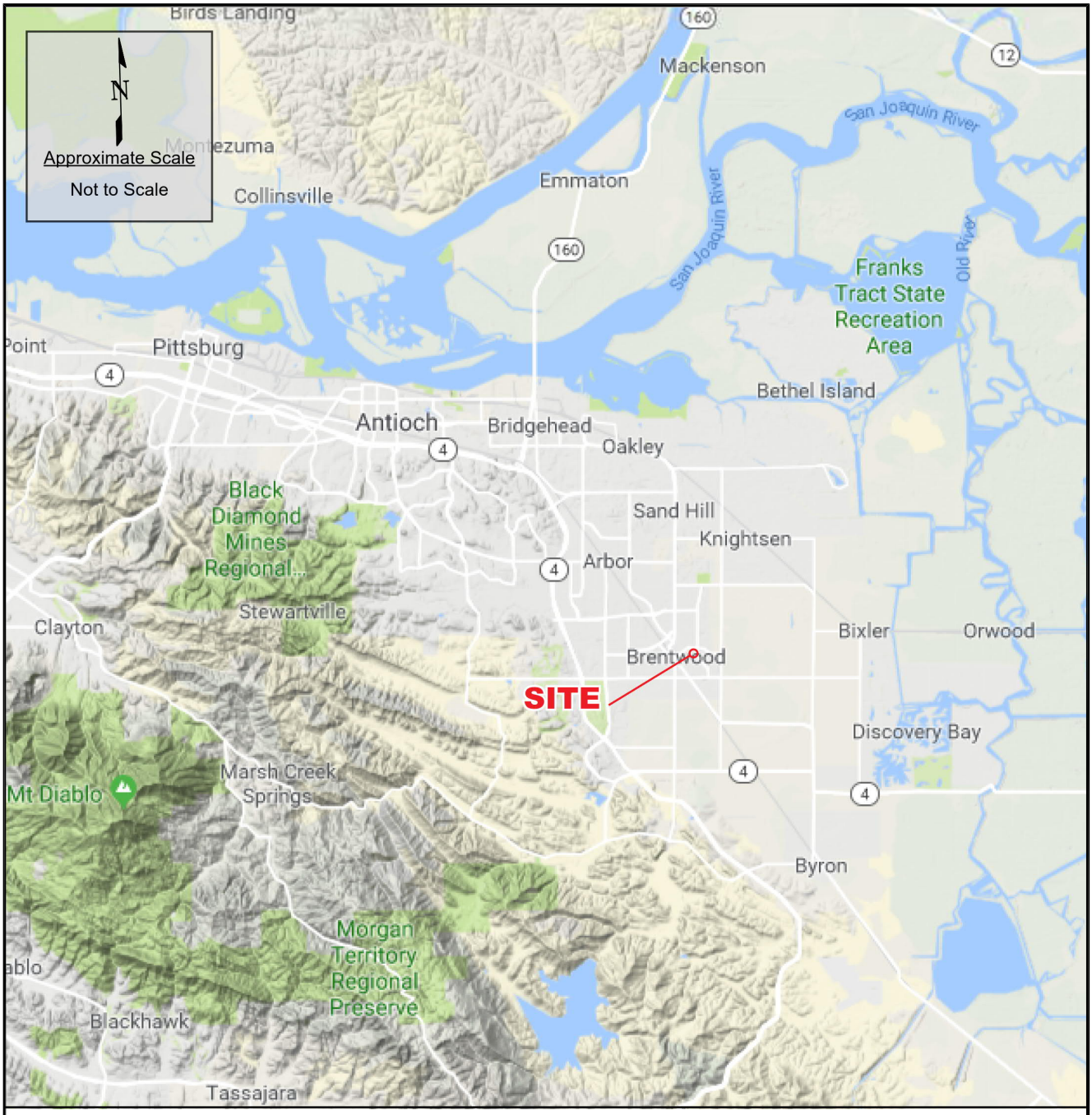
variations in the soil conditions are encountered. As a minimum BSK should be retained to provide the following continuing services for the project:

- Review the project plans and specifications, including any revisions or modifications;
- Observe and evaluate the site earthwork operations to confirm subgrade soils are suitable for construction of foundations, slabs-on-grade, pavements and placement of engineered fill;
- Confirm engineered fill for the structures and other improvements is placed and compacted per the project specifications; and
- Observe shallow foundation and drilled pier excavations to confirm conditions are as anticipated.

The scope of services for this subsurface exploration and geotechnical report did not include environmental assessments or evaluations regarding the presence or absence of wetlands or hazardous substances in the soil, surface water, or groundwater at this site.

This report, and any future addenda or reports regarding this site, may be made available to bidders to supply them with only the data contained in the report regarding subsurface conditions and laboratory test results at the point and time noted. Bidders may not rely on interpretations, opinion, recommendations, or conclusions contained in the report. Because of the limited nature of any subsurface study, the contractor may encounter conditions during construction which differ from those presented in this report. In such event, the contractor should promptly notify the owner so that BSK's geotechnical engineer can be contacted to confirm those conditions. We recommend the contractor describe the nature and extent of the differing conditions in writing and that the construction contract include provisions for dealing with differing conditions. Contingency funds should be reserved for potential problems that may arise during earthwork and foundation construction.

FIGURES



References: 1. https://maps.google.com, 2018

Note: Locations are approximate

BSK ASSOCIATES

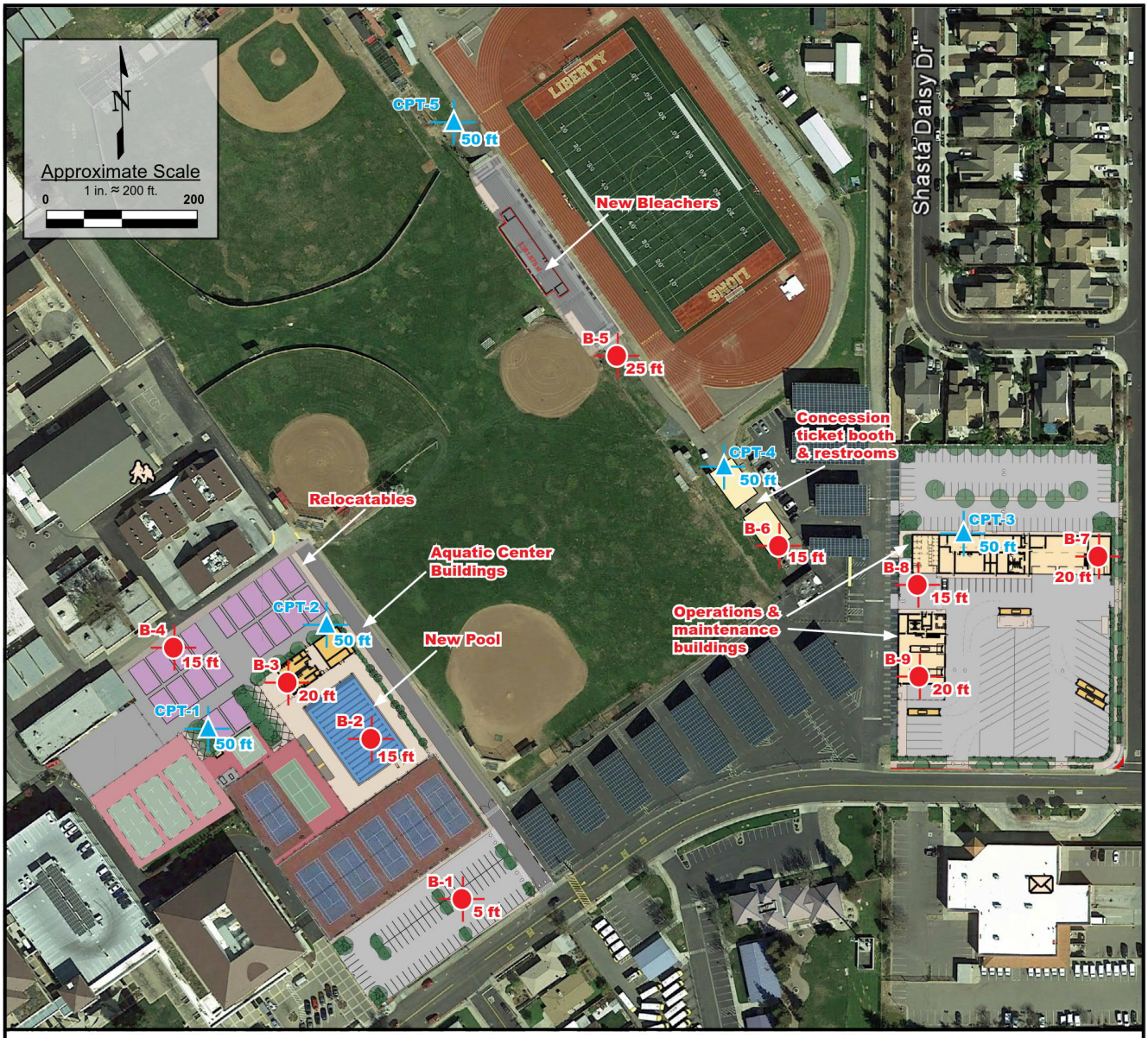
PROJECT NO. G17-238-11L	
DRAWN: 2/5/18	
DRAWN BY: D. Tower	
CHECKED BY: C. Foulk	
FILE NAME: SitePlan.indd	

VICINITY MAP

Campus Expansion
Liberty High School
850 2nd Street
Brentwood, California

FIGURE

1



References

1. http://earth.google.com, 2017
2. "Campus Plan" by Quattrocchi Kwok Architects dated 12/14/17

Legend

B-1 — Approximate Boring Location (with approximate depth), BSK (2018)

CPT-1 — Approximate Cone Penetrometer Test Location (with approximate depth), BSK (2018)

BSK ASSOCIATES

PROJECT NO.	G17-238-11L
DRAWN:	2/5/18
DRAWN BY:	D. Tower
CHECKED BY:	C. Foulk
FILE NAME:	SitePlan.indd

SITE EXPLORATION PLAN

Campus Expansion
Liberty High School
850 2nd Street
Brentwood, California

FIGURE

2

APPENDIX A

BORING LOGS

UNIFIED SOIL CLASSIFICATION SYSTEM (ASTM D 2487/2488)

MAJOR DIVISIONS				GRAPHIC LOG		TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS (More than half of material is larger than the #200 sieve)	GRAVELS (More than half of coarse fraction is larger than the #4 sieve)	CLEAN GRAVELS WITH <5% FINES	Cu ≥4 and 1≤Cc≤3		GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES WITH LITTLE OR NO FINES
			Cu <4 and/or 1>Cc>3		GP	POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES WITH LITTLE OR NO FINES
		GRAVELS WITH 5 to 12% FINES	Cu ≥4 and 1≤Cc≤3		GW-GM	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES WITH LITTLE FINES
					GW-GC	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES WITH LITTLE CLAY FINES
			Cu <4 and/or 1>Cc>3		GP-GM	POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES WITH LITTLE FINES
					GP-GC	POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES WITH LITTLE CLAY FINES
		GRAVELS WITH >12% FINES			GM	SILTY GRAVELS, GRAVEL-SILT-SAND MIXTURES
					GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES
					GC-GM	CLAYEY GRAVELS, GRAVEL-SAND-CLAY-SILT MIXTURES
	SANDS (More than half of coarse fraction is smaller than the #4 sieve)	CLEAN SANDS WITH <5% FINES	Cu ≥6 and 1≤Cc≤3		SW	WELL-GRADED SANDS, SAND-GRAVEL MIXTURES WITH LITTLE OR NO FINES
			Cu <6 and/or 1>Cc>3		SP	POORLY-GRADED SANDS, SAND-GRAVEL MIXTURES WITH LITTLE OR NO FINES
		SANDS WITH 5 to 12% FINES	Cu ≥6 and 1≤Cc≤3		SW-SM	WELL-GRADED SANDS, SAND-GRAVEL MIXTURES WITH LITTLE FINES
					SW-SC	WELL-GRADED SANDS, SAND-GRAVEL MIXTURES WITH LITTLE CLAY FINES
			Cu <6 and/or 1>Cc>3		SP-SM	POORLY-GRADED SANDS, SAND-GRAVEL MIXTURES WITH LITTLE FINES
					SP-SC	POORLY-GRADED SANDS, SAND-GRAVEL MIXTURES WITH LITTLE CLAY FINES
		SANDS WITH >12% FINES			SM	SILTY SANDS, SAND-GRAVEL-SILT MIXTURES
					SC	CLAYEY SANDS, SAND-GRAVEL-CLAY MIXTURES
					SC-SM	CLAYEY SANDS, SAND-SILT-CLAY MIXTURES
FINE GRAINED SOILS (More than half of material is smaller than the #200 sieve)	SILTS AND CLAYS (Liquid limit less than 50)				ML	INORGANIC SILTS AND VERY FINE SANDS, SILTY OR CLAYEY FINE SANDS, SILTS WITH SLIGHT PLASTICITY,
					CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
					CL-ML	INORGANIC CLAYS-SILTS OF LOW PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
					OL	ORGANIC SILTS & ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS (Liquid limit greater than 50)				MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILT
					CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
					OH	ORGANIC CLAYS & ORGANIC SILTS OF MEDIUM-TO-HIGH PLASTICITY

BSK ASSOCIATES

PROJECT NO.	G17-238-11L
DRAWN:	2/5/18
DRAWN BY:	D. Tower
CHECKED BY:	C. Foulk
FILE NAME:	Legend.indd

UNIFIED SOIL CLASSIFICATION SYSTEM (ASTM D 2487/2488)

Liberty Union High School
Campus Expansion
850 2nd Street
Brentwood, California

FIGURE

A-1

SOIL DESCRIPTION KEY

MOISTURE CONTENT

DESCRIPTION	ABBR	FIELD TEST
Dry	D	Absence of moisture, dusty, dry to the touch
Moist	M	Damp but no visible water
Wet	W	Visible free water, usually soil is below water table

CEMENTATION

DESCRIPTION	FIELD TEST
Weakly	Crumbles or breaks with handling or slight finger pressure
Moderately	Crumbles or breaks with considerable finger pressure
Strongly	Will not crumble or break with finger pressure

PLASTICITY

DESCRIPTION	ABBR	FIELD TEST
Non-plastic	NP	A 1/8-in. (3 mm) thread cannot be rolled at any water content.
Low (L)	LP	The thread can barely be rolled and the lump or thread cannot be formed when drier than the plastic limit.
Medium (M)	MP	The thread is easy to roll and not much time is required to reach the plastic limit. The thread cannot be rerolled after reaching the plastic limit. The lump or thread crumbles when drier than the plastic limit
High (H)	HP	It takes considerable time rolling and kneeding to reach the plastic limit. The thread can be rerolled several times after reaching the plastic limit. The lump or thread can be formed without crumbling when drier than the plastic limit

STRUCTURE

DESCRIPTION	CRITERIA
Stratified	Alternating layers of varying material or color with layers at least 1/4 in. thick, note thickness
Laminated	Alternating layers of varying material or color with the layer less than 1/4 in. thick, note thickness
Fissured	Breaks along definite planes of fracture with little resistance to fracturing
Slickensided	Fracture planes appear polished or glossy, sometimes striated
Blocky	Cohesive soil that can be broken down into small angular lumps which resist further breakdown
Lensed	Inclusion of small pockets of different soils, such as small lenses of sand scattered through a mass of clay; note thickness
Homogeneous	Same color and appearance throughout

CONSISTENCY - FINE-GRAINED SOIL

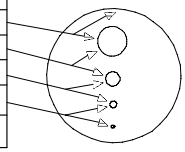
CONSISTENCY	ABBR	FIELD TEST
Very Soft	VS	Thumb will penetrate soil more than 1 in. (25 mm)
Soft	S	Thumb will penetrate soil about 1 in. (25 mm)
Firm	F	Thumb will indent soil about 1/4 in. (6 mm)
Hard	H	Thumb wil not indent soil but readily indented with thumbnail
Very Hard	VH	Thumbnail will not indent soil

GRAIN SIZE

DESCRIPTION		SIEVE SIZE	GRAIN SIZE	APPROXIMATE SIZE
Boulders		>12"	>12"	Larger than basketball-sized
Cobbles		3 - 12'	3 - 12"	Fist-sized to basketball-sized
Gravel	coarse	3/4 -3"	3/4 -3"	Thumb-sized to fist-sized
	fine	#4 - 3/4"	0.19 - 0.75"	Pea-sized to thumb-sized
Sand	coarse	#10 - #4	0.079 - 0.19"	Rock salt-sized to pea-sized
	medium	#40 - #10	0.017 - 0.079"	Sugar-sized to rock salt-sized
	fine	#200 - #10	0.0029 - 0.017"	Flour-sized to sugar-sized
Fines		Passing #200	<0.0029	Flour-sized and smaller

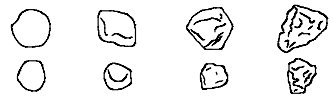
REACTION WITH HCL

DESCRIPTION	FIELD TEST
None	No visible reaction
Weak	Some reaction, with bubbles forming slowly
Strong	Violent reaction, with bubbles forming immediately



ANGULARITY

DESCRIPTION	ABBR	CRITERIA
Angular	A	Particles have sharp edges and relatively plane sides with unpolished surfaces
Subangular	SA	Particles are similar to angular description but have rounded edges
Subrounded	SR	Particles have nearly plane sides but have well-rounded corners and edges
Rounded	R	Particles have smoothly curved sides and no edges



APPARENT / RELATIVE DENSITY - COARSE-GRAINED SOIL

APPARENT DENSITY	ABBR	SPT (# blows/ft)	MODIFIED CA SAMPLER (# blows/ft)	CALIFORNIA SAMPLER (# blows/ft)	RELATIVE DENSITY (%)	FIELD TEST
Very Loose	VL	<4	<4	<5	0 - 15	Easily penetrated with 1/2-inch reinforcing rod by hand
Loose	L	4 - 10	5 - 12	5 - 15	15 - 35	Difficult to penetrate with 1/2-inch reinforcing rod pushed by hand
Medium Dense	MD	10 - 30	12- 35	15 - 40	35 - 65	Easily penetrated a foot with 1/2-inch reinforcing rod driven with 5-lb. hammer
Dense	D	30 - 50	35 - 60	40 - 70	65 - 85	Difficult to penetrate a foot with 1/2-inch reinforcing rod driven with 5-lb. hammer
Very Dense	VD	>50	>60	>70	85 - 100	Penetrated only a few inches with 1/2-inch reinforcing rod driven with 5-lb. hammer

BSK ASSOCIATES

PROJECT NO. G17-238-11L
DRAWN: 2/5/18
DRAWN BY: D. Tower
CHECKED BY: C. Foulk
FILE NAME: Legend.indd

SOIL DESCRIPTION KEY

Liberty Union High School
Campus Expansion
850 2nd Street
Brentwood, California

FIGURE
A-2

LOG SYMBOLS

	BULK / BAG SAMPLE	-4	PERCENT FINER THAN THE NO. 4 SIEVE (ASTM Test Method C 136)
	SPLIT BARREL SAMPLER (2-1/2 inch outside diameter)	-200	PERCENT FINER THAN THE NO. 200 SIEVE (ASTM Test Method C 117)
	SPLIT BARREL SAMPLER (3 inch outside diameter)	LL	LIQUID LIMIT (ASTM Test Method D 4318)
	STANDARD PENETRATION SPLIT SPOON SAMPLER (2 inch outside diameter)	PI	PLASTICITY INDEX (ASTM Test Method D 4318)
	CONTINUOUS CORE	TXUU	UNCONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (EM 1110-1-1906)/ASTM Test Method D 2850
	SHELBY TUBE	EI	EXPANSION INDEX (UBC STANDARD 18-2)
	ROCK CORE	COL	COLLAPSE POTENTIAL
	GROUNDWATER LEVEL (encountered at time of drilling)	UC	UNCONFINED COMPRESSION (ASTM Test Method D 2166)
	GROUNDWATER LEVEL (measured after drilling)		
	SEEPAGE	MC	MOISTURE CONTENT (ASTM Test Method D 2216)

GENERAL NOTES

Boring log data represents a data snapshot.

This data represents subsurface characteristics only to the extent encountered at the location of the boring.

The data inherently cannot accurately predict the entire subsurface conditions to be encountered at the project site relative to construction or other subsurface activities.

Lines between soil layers and/or rock units are approximate and may be gradual transitions.

The information provided should be used only for the purposes intended as described in the accompanying documents.

In general, Unified Soil Classification System designations presented on the logs were evaluated by visual methods.

Where laboratory tests were performed, the designations reflect the laboratory test results.

BSK ASSOCIATES

PROJECT NO. G17-238-11L	**LOG KEY**
DRAWN: 2/5/18	
DRAWN BY: D. Tower	
CHECKED BY: C. Foulk	**Liberty Union High School Campus Expansion 850 2nd Street Brentwood, California**
FILE NAME: Legend.indd	

FIGURE

A-3

BSK Associates
399 Lindbergh Avenue
Livermore, CA 94551
Telephone: (925)-315-3515
Fax: (925)-315-3512

LOG OF BORING NO. B-1

Project Name: **Liberty High School**
Project Number: **G17-238-11L**
Project Location: **850 Second Street, Brentwood**
Logged by: **D. Tower**
Checked by: **M. Romero**

Plate

Surface El.: **72 ft.**
Location: **Southern Bus Parking Lot**

Depth, feet	Graphic Log	MATERIAL DESCRIPTION	Samples	Sample Number	Penetration Blows / Foot	Pocket Penetrometer, TSF	% Passing No. 200 Sieve	In-Situ Dry Weight (pcf)	In-Situ Moisture Content (%)	Liquid Limit	Plastic Limit	Plasticity Index
		ASPHALT: approximately 5 ½-inches of asphalt										
		GRAVEL: approximately 12-inches of possible aggregate baserock	X									
		Sandy Lean CLAY (CL): yellowish brown, moist, medium plasticity, fine to coarse grained sand, high silt content R-Value =5 (see plate B-8)	X							39	18	21
5		Boring terminated at approximately 5 feet. No free groundwater observed. Boring backfilled with cement grout and topped with 6 inches of Quikrete.										
10												
15												
20												

Completion Depth: 5.0
Date Started: 2/5/18
Date Completed: 2/5/18

Drilling Equipment: Exploration GeoServices Mobile B-53
Drilling Method: Hollow Stem
Remarks:

BSK Associates
399 Lindbergh Avenue
Livermore, CA 94551
Telephone: (925)-315-3515
Fax: (925)-315-3512

LOG OF BORING NO. B-2

Project Name: **Liberty High School**
Project Number: **G17-238-11L**
Project Location: **850 Second Street, Brentwood**
Logged by: **D. Tower**
Checked by: **M. Romero**
Plate

Surface El.: **72 ft.**
Location: **Between Maintenance Facility Buildings**

Depth, feet	Graphic Log	MATERIAL DESCRIPTION	Samples	Sample Number	Penetration Blows / Foot	Pocket Penetrometer, TSF	% Passing No. 200 Sieve	In-Situ Dry Weight (pcf)	In-Situ Moisture Content (%)	Liquid Limit	Plastic Limit	Plasticity Index
		ASPHALT: approximately 2 inches of asphalt										
		GRAVEL: approximately 6 inches of possible aggregate baserock										
		Sandy Lean CLAY (CL): brown, moist, firm, low plasticity, fine grained sand, high silt content		1A 1B 1C	3 3 4	2.5		96	17	31	17	14
		Collapse Potential (see Plate B-5)										
		Clayey SILT with Sand (ML): brown, moist, firm, low plasticity, fine grained sand										
5		**Sandy Lean CLAY (CL):** yellowish brown, moist, firm, low plasticity, fine grained sand, high silt content, slightly porous		2A 2B 2C	2 3 4	2.0 4.0	60	91	18			
		TXUU (see plate B-2) c=1,300 psf		3A 3B 3C	3 4 5	1.0		96	18	35	21	14
10												
		Lean CLAY (CL): yellowish brown, moist, hard, medium plasticity, silt present, calcium carbonate present		4A 4B 4C	6 12 16	4.5						
15		very moist to wet, increased fine grained sand, high silt content		5A 5B 5C	5 7 8	2.0						
20		Boring terminated at approximately 20 feet. No free groundwater observed. Boring backfilled with cement grout and topped with 6 inches of Quikrete.										

Completion Depth: 20.0
Date Started: 2/5/18
Date Completed: 2/5/18

Drilling Equipment: Exploration GeoServices Mobile B-53
Drilling Method: Hollow Stem
Remarks:

BSK Associates
399 Lindbergh Avenue
Livermore, CA 94551
Telephone: (925)-315-3515
Fax: (925)-315-3512

LOG OF BORING NO. B-3

Project Name: **Liberty High School**
Project Number: **G17-238-11L**
Project Location: **850 Second Street, Brentwood**
Logged by: **D. Tower**
Checked by: **M. Romero**

Plate

Surface El.: **73 ft.**
Location: **South side of Classroom Portables**

Depth, feet	Graphic Log	MATERIAL DESCRIPTION	Samples	Sample Number	Penetration Blows / Foot	Pocket Penetrometer, TSF	% Passing No. 200 Sieve	In-Situ Dry Weight (pcf)	In-Situ Moisture Content (%)	Liquid Limit	Plastic Limit	Plasticity Index
		ASPHALT: approximately 1 inch of asphalt										
		GRAVEL: approximately 4 inches of possible aggregate baserock										
		Lean CLAY with Sand (CL): dark gray, moist, firm, medium plasticity, fine to medium grained sand										
		Sandy Lean CLAY (CL): yellowish brown, moist, firm to hard, low plasticity, fine grained sand, high silt content		1A 1B 1C	5 4 4	3.5 2.0		104	17			
		TXUU (see plate B-2) c=1,830 psf										
5		increased fine to coarse grained sand content		2A 2B 2C	3 3 3	3.5		107	17			
		Poorly Graded GRAVEL with Sand and Clay (GP-GC): brown, loose to medium dense, fine to coarse grained sand, fine to coarse subrounded gravel up to 1.5 inches diameter		3A 3B	10 7		6.8	113	3			
10		**Silty SAND (SM):** yellowish brown, moist, loose to medium dense, fine grained sand		3C	5							
		Poorly Graded SAND with Silt and Gravel (SP-SM): brown, moist, medium dense, fine to coarse grained sand, fine to coarse subrounded gravel up to 1.5 inches diameter		4	7 8 9		7.3					
15		**Lean CLAY (CL):** yellowish brown, moist, firm, medium plasticity, trace fine grained sand, calcium carbonate present, silt present		5	6 9 10	3.0						
20		Boring terminated at approximately 20 feet. No free groundwater observed. Boring backfilled with cement grout and topped with 6 inches of Quikrete.										

Completion Depth: 20.0
Date Started: 2/5/18
Date Completed: 2/5/18

Drilling Equipment: Exploration GeoServices Mobile B-53
Drilling Method: Hollow Stem
Remarks:

BSK Associates
399 Lindbergh Avenue
Livermore, CA 94551
Telephone: (925)-315-3515
Fax: (925)-315-3512

LOG OF BORING NO. B-4

Project Name: **Liberty High School**
Project Number: **G17-238-11L**
Project Location: **850 Second Street, Brentwood**
Logged by: **D. Tower**
Checked by: **M. Romero**
Plate

Surface El.: **73 ft.**
Location: **Northern Side of Classroom Portables**

Depth, feet	Graphic Log	MATERIAL DESCRIPTION	Samples	Sample Number	Penetration Blows / Foot	Pocket Penetrometer, TSF	% Passing No. 200 Sieve	In-Situ Dry Weight (pcf)	In-Situ Moisture Content (%)	Liquid Limit	Plastic Limit	Plasticity Index
		ASPHALT: approximately 4-inch of asphalt										
		GRAVEL: approximately 4 inches of possible aggregate baserock										
		Sandy Lean CLAY (CL): yellowish brown, moist, firm, low to medium plasticity, fine grained sand, trace coarse grained sand, high silt content		1A 1B 1C	3 5 5	2.5	64	88	17			
5		**Clayey SAND (SC):** brown, moist, loose, fine to coarse grained sand, medium plasticity, high silt content Direct Shear (see plate B-4) c=350 psf, Ø=23°		2A 2B 2C	3 4 5			106	17	32	18	14
10		**Silty SAND (SM):** brown, moist, loose, fine to coarse grained sand fine to coarse gravel up to 1 inch		3A 3B 3C	4 5 5		22					
		Poorly Graded SAND with Gravel (SP): brown, moist, medium dense, fine to coarse grained sand, fine to coarse gravel up to 1-inch diameter, trace silt content		4	6 8 9		4					
15		Boring terminated at approximately 15 feet. No free groundwater observed. Boring backfilled with cement grout and topped with 6 inches of Quikrete.										
20												

Completion Depth: 15.0
Date Started: 2/5/18
Date Completed: 2/5/18

Drilling Equipment: Exploration GeoServices Mobile B-53
Drilling Method: Hollow Stem
Remarks:

BSK Associates
399 Lindbergh Avenue
Livermore, CA 94551
Telephone: (925)-315-3515
Fax: (925)-315-3512

LOG OF BORING NO. B-5

Project Name: **Liberty High School**
Project Number: **G17-238-11L**
Project Location: **850 Second Street, Brentwood**
Logged by: **D. Tower**
Checked by: **M. Romero**

Plate

Surface El.: **72 ft**
Location: **Southeastern Section of Bleachers**

Depth, feet	Graphic Log	MATERIAL DESCRIPTION	Samples	Sample Number	Penetration Blows / Foot	Pocket Penetrometer, TSF	% Passing No. 200 Sieve	In-Situ Dry Weight (pcf)	In-Situ Moisture Content (%)	Liquid Limit	Plastic Limit	Plasticity Index
		Lean CLAY with Sand (CL): brown, moist, firm, medium plasticity, fine grained, silt present										
		olive brown		1A 1B 1C	3 4 6	3.0		104	21			
5		yellowish brown, increased fine grained sand content		2A 2B 2C	3 4 6	1.0				31	14	17
		roots present TXUU (see plate B-2) c=965 psf		3A 3B 3C	3 3 4	1.0		100	23			
10												
15		TXUU (see plate B-2) c= 3,234 psf		4A 4B 4C	8 13 20	2.5 3.5		108	21			
		Sandy Lean CLAY (CL): yellowish brown, moist, firm, low to medium plasticity, fine grained sand, high silt content										
				5A 5B 5C	4 5 8	1.5		104	24			
20												

Completion Depth: 25.0
Date Started: 2/5/18
Date Completed: 2/5/18

Drilling Equipment: Exploration GeoServices Mobile B-53
Drilling Method: Hollow Stem
Remarks:

BSK Associates
399 Lindbergh Avenue
Livermore, CA 94551
Telephone: (925)-315-3515
Fax: (925)-315-3512

LOG OF BORING NO. B-5

Project Name: **Liberty High School**
Project Number: **G17-238-11L**
Project Location: **850 Second Street, Brentwood**
Logged by: **D. Tower**
Checked by: **M. Romero**

Plate

Surface El.: **72 ft**

Location: **Southeastern Section of Bleachers**

Depth, feet	Graphic Log	MATERIAL DESCRIPTION	Samples	Sample Number	Penetration Blows / Foot	Pocket Penetrometer, TSF	% Passing No. 200 Sieve	In-Situ Dry Weight (pcf)	In-Situ Moisture Content (%)	Liquid Limit	Plastic Limit	Plasticity Index
		Lean CLAY (CL): yellowish brown, moist, hard, medium plasticity, fine grained sand, high silt										
				6A 6B 6C	6 12 13	3.0						
25		Boring terminated at approximately 25 feet. Free groundwater was observed at 23 feet. Boring backfilled with cement grout and topped with 6 inches of Quikrete.										
30												
35												
40												

Completion Depth: 25.0
Date Started: 2/5/18
Date Completed: 2/5/18

Drilling Equipment: Exploration GeoServices Mobile B-53
Drilling Method: Hollow Stem
Remarks:

BSK Associates
399 Lindbergh Avenue
Livermore, CA 94551
Telephone: (925)-315-3515
Fax: (925)-315-3512

LOG OF BORING NO. B-6

Project Name: **Liberty High School**
Project Number: **G17-238-11L**
Project Location: **850 Second Street, Brentwood**
Logged by: **D. Tower**
Checked by: **M. Romero**
Plate

Surface El.: **68 ft.**
Location: **Eastern Side of Grassy Playfield**

Depth, feet	Graphic Log	MATERIAL DESCRIPTION	Samples	Sample Number	Penetration Blows / Foot	Pocket Penetrometer, TSF	% Passing No. 200 Sieve	In-Situ Dry Weight (pcf)	In-Situ Moisture Content (%)	Liquid Limit	Plastic Limit	Plasticity Index
		ASPHALT: approximately 2 inches of asphalt										
		GRAVEL: approximately 6 inches of possible aggregate baserock										
		Lean CLAY (CL): yellowish brown, slightly moist, firm, medium plasticity, trace fine grained sand, high silt content		1A 1B 1C	2 4 6	1.5		96	23	41	20	21
		Collapse Potential (see plate B-6)										
5		TXUU (see plate B-3) c= 1,944 psf		2A 2B 2C	3 4 7	1-2		100	25			
		slightly porous		3A 3B 3C	4 10 10	3.0		105	23			
10		hard		4A 4B 4C	9 14 19	4.5						
15		Boring terminated at approximately 15 feet. Free groundwater was observed at approximately 15 feet. Boring backfilled with cement grout and topped with 6 inches of Quikrete.										
20												

Completion Depth: 15.0
Date Started: 2/5/18
Date Completed: 2/5/18

Drilling Equipment: Exploration GeoServices Mobile B-53
Drilling Method: Hollow Stem
Remarks:

BSK Associates
399 Lindbergh Avenue
Livermore, CA 94551
Telephone: (925)-315-3515
Fax: (925)-315-3512

LOG OF BORING NO. B-7

Project Name: **Liberty High School**
Project Number: **G17-238-11L**
Project Location: **850 Second Street, Brentwood**
Logged by: **D. Tower**
Checked by: **M. Romero**

Plate

Surface El.: **66 ft.**
Location: **Grassy Unimproved Lot, East of School**

Depth, feet	Graphic Log	MATERIAL DESCRIPTION	Samples	Sample Number	Penetration Blows / Foot	Pocket Penetrometer, TSF	% Passing No. 200 Sieve	In-Situ Dry Weight (pcf)	In-Situ Moisture Content (%)	Liquid Limit	Plastic Limit	Plasticity Index
		Lean CLAY with Sand (CL): brown, slightly moist, firm, medium plasticity, fine grained sand, high silt content								45	19	26
		hard, increased silt content		1A 1B 1C	5 8 8	>4.5		92	12			
		yellowish brown										
5		olive yellow, porous, manganese oxide staining, calcium carbonate present		2A 2B 2C	4 5 7	3.0	85			39	19	20
		Collapse Potential (see plate B-7)						87	14			
		dark brown, increased silt content, calcium carbonate present		3A 3B 3C	12 17 24	>4.5		107	13			
10												
		yellowish brown, firm to hard		4A 4B 4C	9 10 13	2.5						
15												
		very moist		5A 5B 5C	4 6 6	1.0						
20		Boring terminated at approximately 20 feet. Free groundwater was observed at approximately 19 feet. Boring backfilled with cement grout.										

Completion Depth: 20.0
Date Started: 2/5/18
Date Completed: 2/5/18

Drilling Equipment: Exploration GeoServices Mobile B-53
Drilling Method: Hollow Stem
Remarks:

BSK Associates
399 Lindbergh Avenue
Livermore, CA 94551
Telephone: (925)-315-3515
Fax: (925)-315-3512

LOG OF BORING NO. B-8

Project Name: **Liberty High School**
Project Number: **G17-238-11L**
Project Location: **850 Second Street, Brentwood**
Logged by: **D. Tower**
Checked by: **M. Romero**
Plate

Surface El.: **69 ft.**
Location: **Grassy Unimproved Lot, East of School**

Depth, feet	Graphic Log	MATERIAL DESCRIPTION	Samples	Sample Number	Penetration Blows / Foot	Pocket Penetrometer, TSF	% Passing No. 200 Sieve	In-Situ Dry Weight (pcf)	In-Situ Moisture Content (%)	Liquid Limit	Plastic Limit	Plasticity Index
		Lean CLAY with Sand (CL): dark brown, moist, firm to hard, medium plasticity, fine to coarse grained sand, sand content decreasing with depth, high silt content		1A 1B 1C	4 5 5	3.0						
		TXUU (see plate B-3) c=2,568 psf						103	17			
5		**Silty SAND (SM):** brown, slightly moist, loose, fine to coarse grained sand, fine subrounded gravel up to ¾ inch diameter		2A 2B 2C	4 5 5		39					
10		**Lean CLAY (CL):** yellowish brown, slightly moist, hard, medium plasticity, high silt content, trace fine grained sand		3A 3B 3C	6 12 16	>4.5		112	20			
15				4A 4B 4C	7 15 21	3.5 4.5						
		Boring terminated at approximately 15 feet. Free groundwater was observed at approxmately 15 feet. Boring backfilled with cement grout.										
20												

Completion Depth: 15.0
Date Started: 2/5/18
Date Completed: 2/5/18

Drilling Equipment: Exploration GeoServices Mobile B-53
Drilling Method: Hollow Stem
Remarks:

BSK Associates
399 Lindbergh Avenue
Livermore, CA 94551
Telephone: (925)-315-3515
Fax: (925)-315-3512

LOG OF BORING NO. B-9

Project Name: **Liberty High School**
Project Number: **G17-238-11L**
Project Location: **850 Second Street, Brentwood**
Logged by: **D. Tower**
Checked by: **M. Romero**
Plate

Surface El.: **68 ft.**
Location: **Grassy Unimproved Lot, East of School**

Depth, feet	Graphic Log	MATERIAL DESCRIPTION	Samples	Sample Number	Penetration Blows / Foot	Pocket Penetrometer, TSF	% Passing No. 200 Sieve	In-Situ Dry Weight (pcf)	In-Situ Moisture Content (%)	Liquid Limit	Plastic Limit	Plasticity Index
		Lean CLAY with Sand (CL): yellowish brown, moist, firm, medium plasticity, fine grained sand, high silt content		1A 1B 1C	3 5 7	3.0						
5		**Sandy SILT (ML):** yellowish brown, moist, firm, low plasticity, fine grained sand		2A 2B 2C	3 4 5	3.5 4.5	86	92	18			
		TXUU (see plate B-3) c= 2,043 psf										
10		**Lean CLAY (CL):** yellowish brown, slightly moist, hard, low plasticity, calcium carbonate present, high silt content, trace fine grained sand		3A 3B 3C	8 14 21	>4.5		108	19			
15		firm to hard, medium plasticity, decreased silt content		4A 4B 4C	7 10 18	2.5						
		very moist to wet, low plasticity, increased sand content		5A 5B 5C	6 7 8							
20		seam of silty/clayey sand										
		Boring terminated at approximately 20 feet. No free groundwater observed. Boring backfilled with cement grout.										

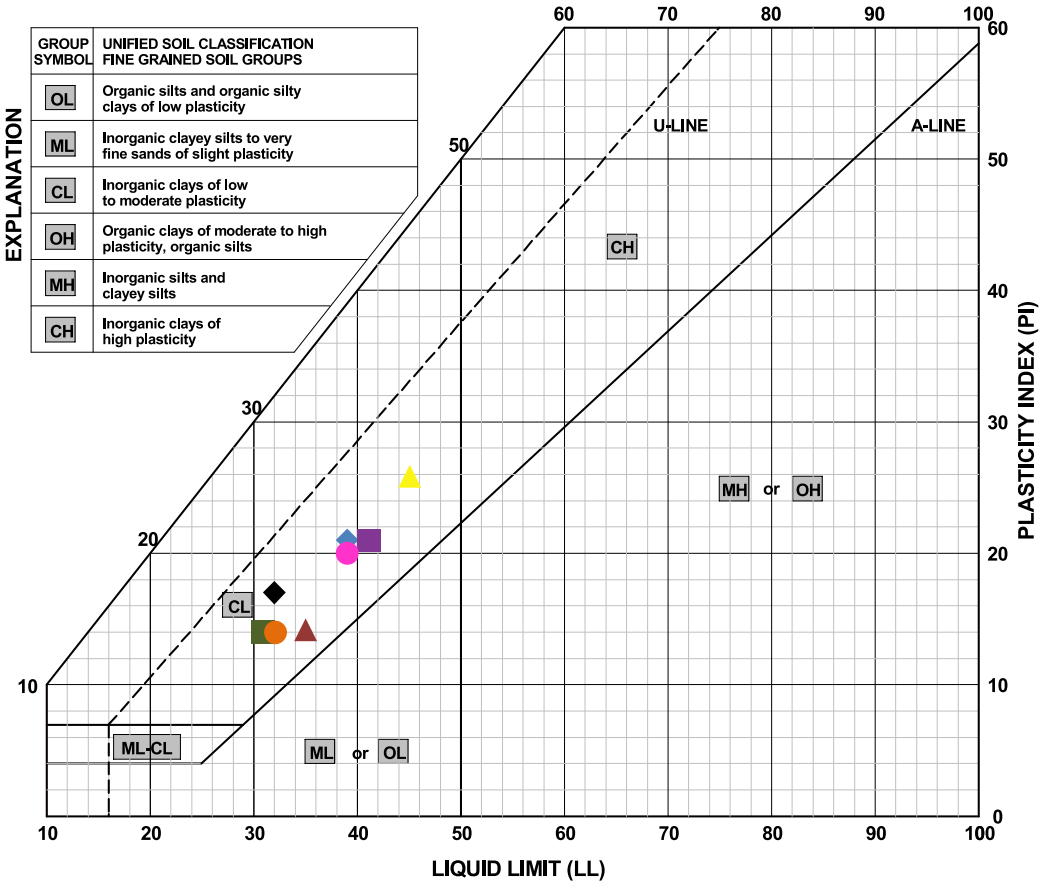
Completion Depth: 20.0
Date Started: 2/5/18
Date Completed: 2/5/18

Drilling Equipment: Exploration GeoServices Mobile B-53
Drilling Method: Hollow Stem
Remarks:

GEO_LIBERTY HS BORING LOGS.GPJ GEOTECHNICAL 08.GDT 3/7/18

APPENDIX B

LABORATORY TEST RESULTS



LEGEND:	SOURCE	DEPTH (ft)	LL	PL	PI	DESCRIPTION
◆	B-1	2.0	39	18	21	Sandy Lean Clay (CL)
■	B-2	2.5	31	17	14	Sandy Lean Clay (CL)
▲	B-2	9.0	35	21	14	Sandy Lean Clay (CL)
●	B-4	5.5	32	18	14	Clayey Sand (SC)
◆	B-5	5.5	31	14	17	Lean Clay with Sand (CL)
■	B-6	2.5	41	20	21	Lean Clay (CL)
▲	B-7	1.5	45	19	26	Lean Clay with Sand (CL)
●	B-7	5.5	39	19	20	Lean Clay with Sand (CL)

BSK ASSOCIATES

PROJECT NO. G17-238-11L
DRAWN: 2/28/18
DRAWN BY: D. Tower
CHECKED BY: C. Foulk
FILE NAME: SitePlan.indd

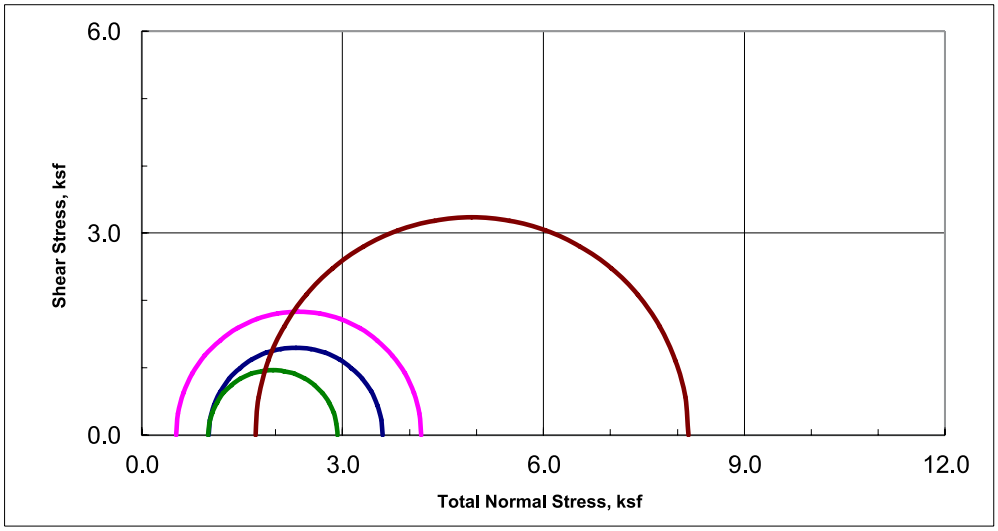
ATTERBERG LIMITS

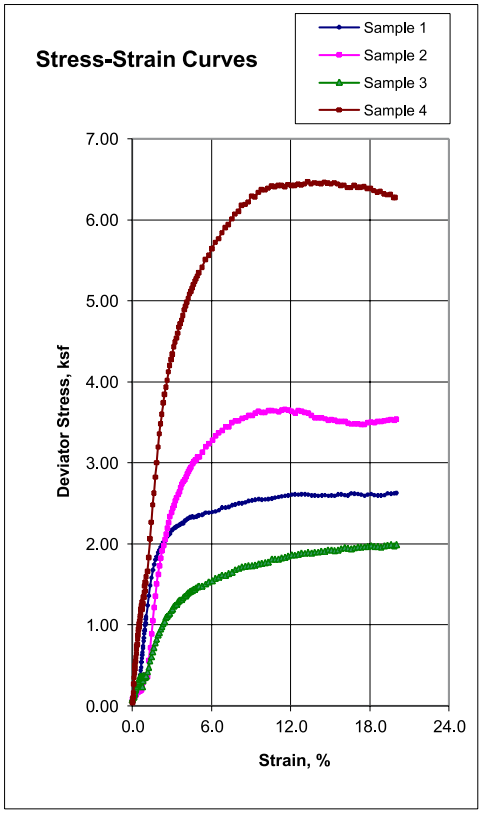
Campus Expansion
Liberty High School
850 2nd Street
Brentwood, California

FIGURE
B-1

COOPER TESTING LABORATORY

Unconsolidated-Undrained Triaxial Test
ASTM D2850





Sample Data				
	1	2	3	4
Moisture %	18.4	17.1	23.2	20.9
Dry Den,pcf	96.2	103.6	100.2	107.8
Void Ratio	0.752	0.627	0.683	0.563
Saturation %	65.9	73.6	91.9	100.0
Height in	5.04	5.02	5.00	5.04
Diameter in	2.41	2.39	2.39	2.42
Cell psi	7.0	3.6	6.9	11.8
Strain %	15.00	11.57	15.00	13.29
Deviator, ksf	2.597	3.662	1.930	6.469
Rate %/min	1.00	1.00	1.00	0.99
in/min	0.050	0.050	0.050	0.050
Job No.:	664-178a			
Client:	BSK Associates			
Project:	G17-238-11L			
Boring:	B-2	B-3	B-5	B-5
Sample:	3C	1C	3C	4C
Depth ft:	9.5	3.0	9.5	14.5

Visual Soil Description	
Sample #	
1	Sandy Lean Clay (CL)
2	Sandy Lean Clay (CL)
3	Lean Clay with Sand (CL)
4	Lean Clay with Sand (CL)

Remarks:

Note: Strengths are picked at the peak deviator stress or 15% strain which ever occurs first per ASTM D2850.

BSK ASSOCIATES

PROJECT NO.	G17-238-11L
DRAWN:	2/27/18
DRAWN BY:	D. Tower
CHECKED BY:	C. Foulk
FILE NAME:	SitePlan.indd

UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION

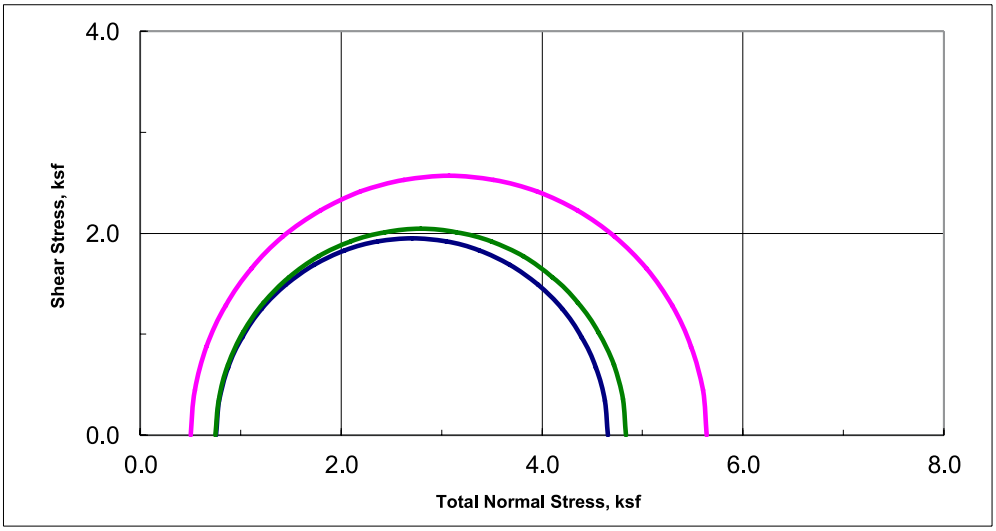
Campus Expansion
Liberty High School
850 2nd Street
Brentwood, California

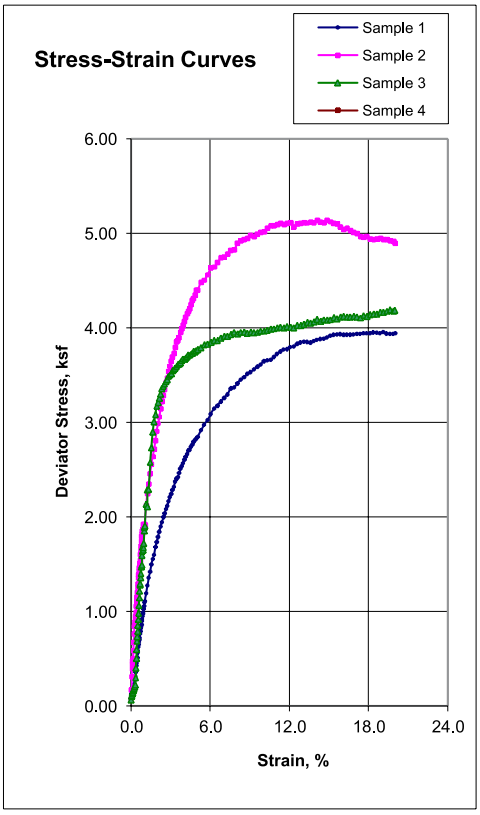
FIGURE

B-2

COOPER TESTING LABORATORY

Unconsolidated-Undrained Triaxial Test
ASTM D2850





Sample Data				
	1	2	3	4
Moisture %	25.0	17.1	17.7	
Dry Den,pcf	100.2	102.9	92.3	
Void Ratio	0.683	0.639	0.825	
Saturation %	99.1	72.2	57.9	
Height in	5.05	5.20	5.02	
Diameter in	2.40	2.39	2.43	
Cell psi	5.2	3.5	5.2	
Strain %	15.00	14.87	15.00	
Deviator, ksf	3.899	5.137	4.086	
Rate %/min	1.00	1.00	1.00	
in/min	0.051	0.052	0.050	
Job No.:	664-178b			
Client:	BSK Associates			
Project:	G17-238-11L			
Boring:	B-6	B-8	B-9	
Sample:	2C	1C	2C	
Depth ft:	6.0	3.0	6.0	

Visual Soil Description	
Sample #	
1	Lean Clay (CL)
2	Lean Clay with Sand (CL)
3	Sandy Silt (ML)
4	

Remarks:

Note: Strengths are picked at the peak deviator stress or 15% strain which ever occurs first per ASTM D2850.

BSK ASSOCIATES

PROJECT NO.	G17-238-11L
DRAWN:	2/27/18
DRAWN BY:	D. Tower
CHECKED BY:	C. Foulk
FILE NAME:	SitePlan.indd

UNCONSOLIDATED-UNDRAINED TRIAXIAL COMPRESSION

Campus Expansion
Liberty High School
850 2nd Street
Brentwood, California

FIGURE

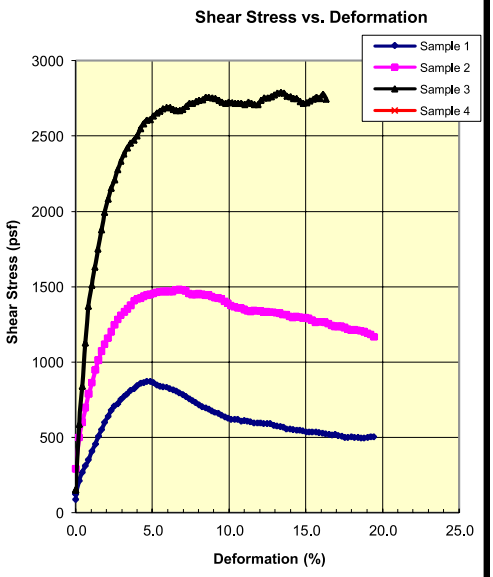
B-3

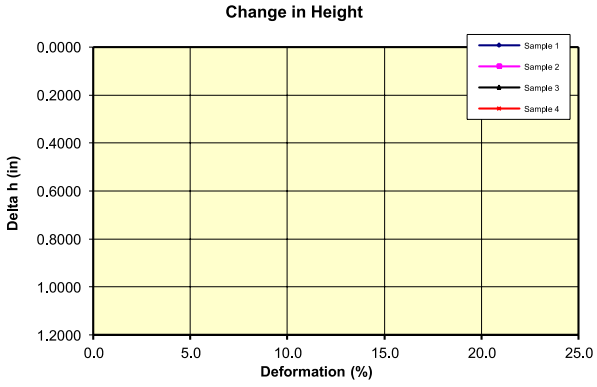
Consolidated Undrained Direct Shear (ASTM D3080M)

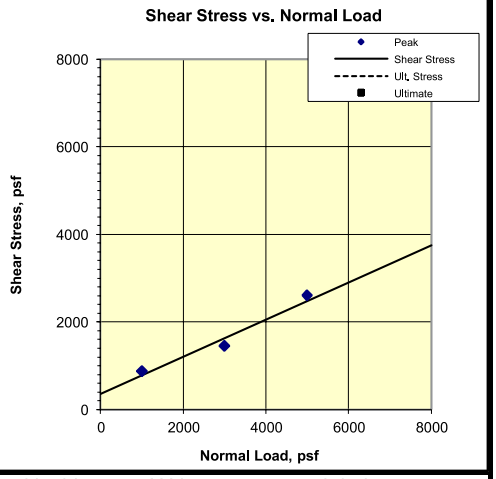
CTL Job #:	664-178	Project #:	G17-238-11L	By:	MD
Client:	BSK Associates	Date:	3/1/2018	Checked:	PJ
Project Name:	Liberty Union HS	Remolding Info:			

Specimen Data				
	1	2	3	4
Boring:	B-4	B-4	B-4	
Sample:	2C	2C	2C	
Depth (ft):	6.0	6.0	6.0	
Visual Description:	Clayey SAND	Clayey SAND	Clayey SAND	
Normal Load (psf)	1000	3000	5000	
Dry Mass of Specimen (g)	130.4	123.1	132.0	
Initial Height (in)	1.02	1.01	1.01	
Initial Diameter (in)	2.42	2.42	2.42	
Initial Void Ratio	0.585	0.664	0.552	
Initial Moisture (%)	17.0	17.7	15.8	
Initial Wet Density (pcf)	124.4	119.3	125.7	
Initial Dry Density (pcf)	106.3	101.3	108.6	
Initial Saturation (%)	78.6	72.0	77.3	
ΔHeight Consol (in)	0.0138	0.0296	0.0350	
At Test Void Ratio	0.564	0.615	0.499	
At Test Moisture (%)	19.2	21.1	17.4	
At Test Wet Density (pcf)	128.4	126.4	132.0	
At Test Dry Density (pcf)	107.8	104.4	112.5	
At Test Saturation (%)	91.8	92.8	94.0	
Strain Rate (%/min)	1.1	1.1	1.1	
Strengths Picked at	5%	5%	5%	
Shear Stress (psf)	871	1449	2612	
ΔHeight (in) at 5%				
Ultimate Stress (psf)				

Phi (deg)	23.0	Ult. Phi (deg)	
Cohesion (psf)	350	Ult. Cohesion (psf)	







Remarks: *DS-CU* A fully undrained condition may not be attained in this test. ΔH is not measured during undrained direct shear tests.

BSK ASSOCIATES

PROJECT NO. G17-238-11L
DRAWN: 3/1/18
DRAWN BY: D. Tower
CHECKED BY: C. Foulk
FILE NAME: SitePlan.indd

CONSOLIDATED UNDRAINED DIRECT SHEAR

Campus Expansion
Liberty High School
850 2nd Street
Brentwood, California

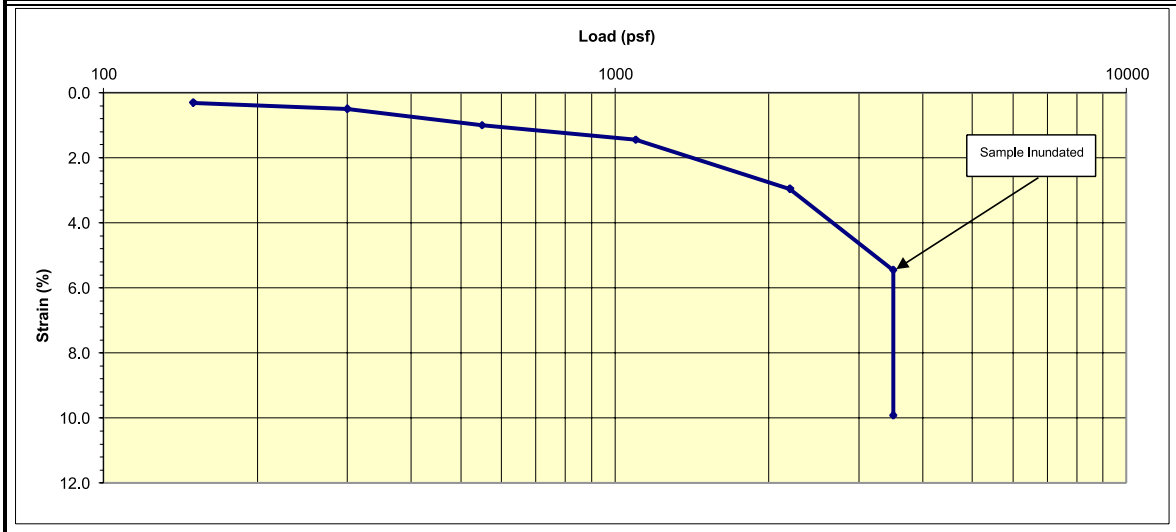
FIGURE
B-4

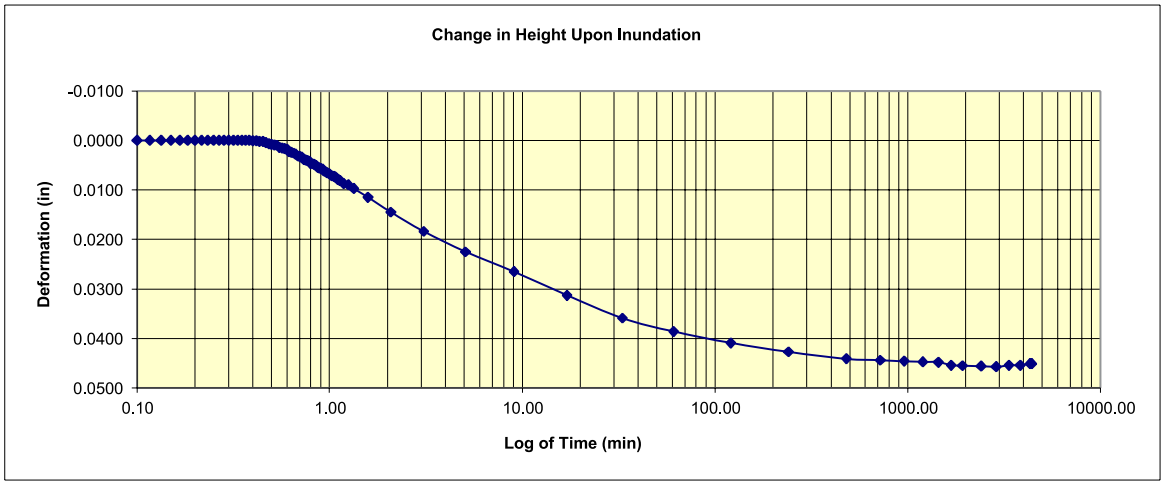
Collapse Potential of Soils
ASTM D5333-03

Job No.:	664-178			**Boring:**	B-2	**Date:**	2/26/2018		
Client:	BSK Associates			**Sample:**	1C	**Tested By:**	MD		
Project:	Liberty Union HS	**Proj. No.:**	G17-238-11L	**Depth, ft.:**	3	**Checked:**	PJ/DC		
Soil Description:	Sandy Lean Clay (CL)								

Load, psf	150	300	550	1100	2200	3500	Inundation		
Deformation, in.:	0.0031	0.0019	0.0051	0.0045	0.0152	0.0253	0.0451		

	Initial	**Final**	**Vertical Stress at Inundation (psf)**	**Collapse Potential (%)**
Moisture Content %	17.4	21.0	**3500**	**4.72**
Dry Density, pcf	96.3	106.9		
Void Ratio	0.750	0.577		
Saturation %	62.6	98.1		
Assumed Specific Gravity		2.70		





BSK ASSOCIATES

PROJECT NO.	G17-238-11L
DRAWN:	2/28/18
DRAWN BY:	D. Tower
CHECKED BY:	C. Foulk
FILE NAME:	SitePlan.indd

COLLAPSE POTENTIAL OF SOILS

Campus Expansion
Liberty High School
850 2nd Street
Brentwood, California

FIGURE

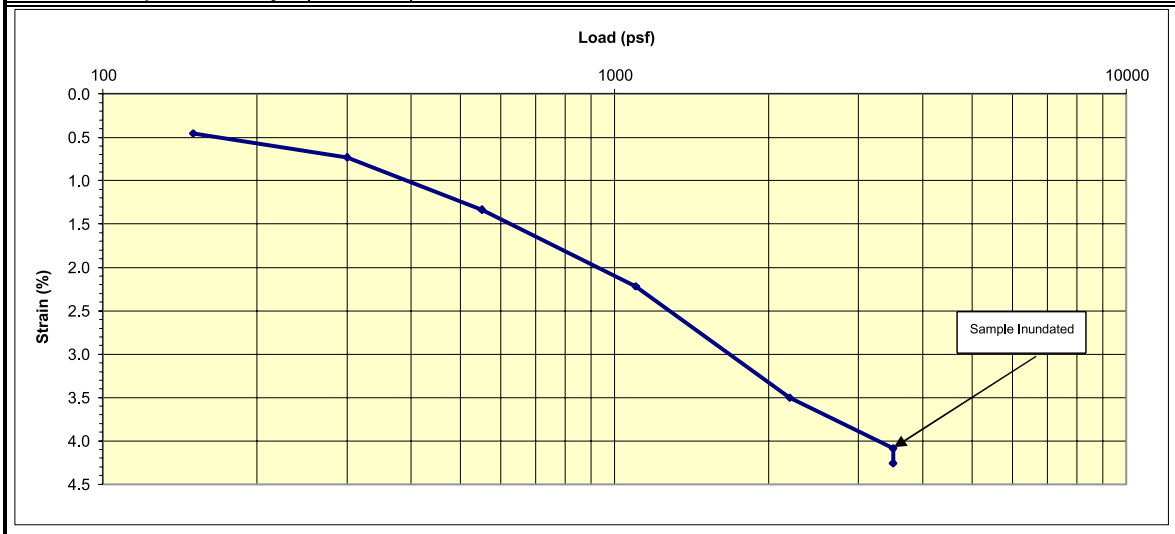
B-5

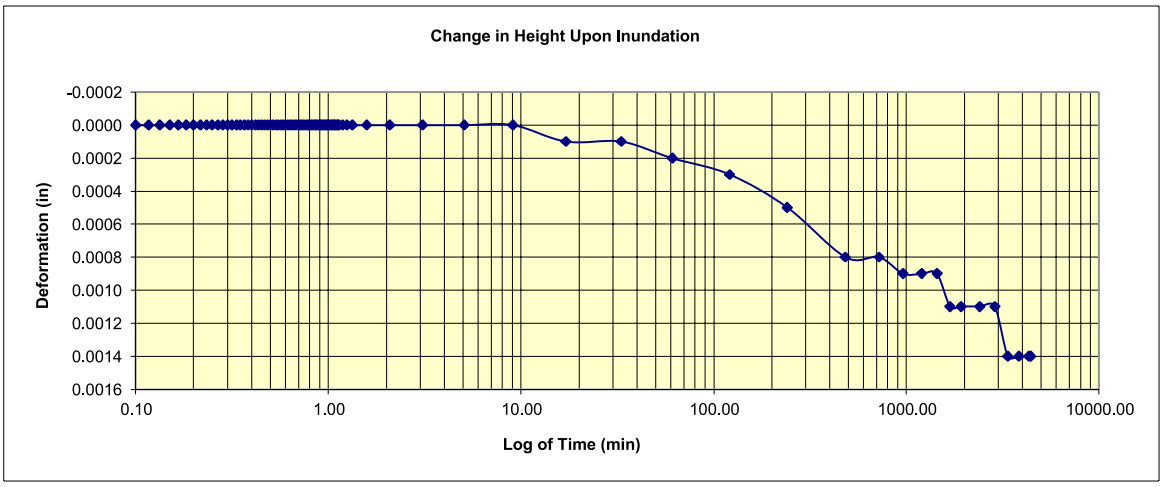
Collapse Potential of Soils
ASTM D5333-03

Job No.:	664-178	**Boring:**	B-6	**Date:**	2/26/2018
Client:	BSK Associates	**Sample:**	1C	**Tested By:**	MD
Project:	Liberty Union HS	**Proj. No.:**	G17-238-11L	**Depth, ft.:**	3	**Checked:**	PJ/DC
Soil Description:	Lean Clay (CL)						

Load, psf	150	300	550	1100	2200	3500	Inundation		
Deformation, in.:	0.0046	0.0028	0.0061	0.0089	0.013	0.0059	0.0017		

	Initial	**Final**	**Vertical Stress at Inundation (psf)**	**Collapse Potential (%)**
Moisture Content %	23.4	25.2	**3500**	**0.18**
Dry Density, pcf	95.7	100.1		
Void Ratio	0.759	0.685		
Saturation %	83.2	99.5		
Assumed Specific Gravity		2.70		





BSK ASSOCIATES

PROJECT NO.	G17-238-11L
DRAWN:	2/28/18
DRAWN BY:	D. Tower
CHECKED BY:	C. Foulk
FILE NAME:	SitePlan.indd

COLLAPSE POTENTIAL OF SOILS

Campus Expansion
Liberty High School
850 2nd Street
Brentwood, California

FIGURE

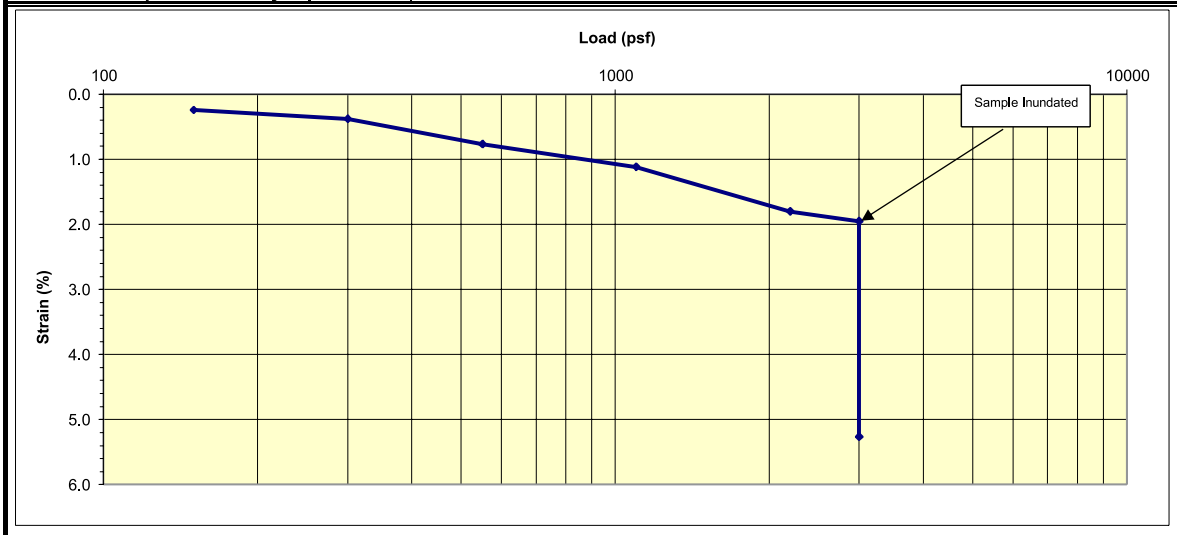
B-6

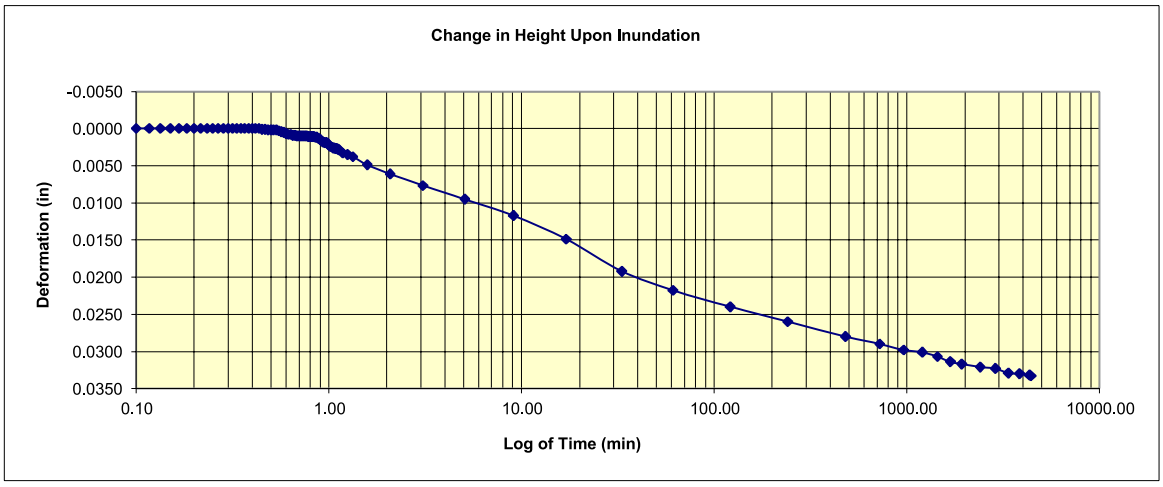
Collapse Potential of Soils
ASTM D5333-03

Job No.:	664-178		**Boring:**	B-7	**Date:**	2/26/2018	
Client:	BSk Associates		**Sample:**	2C	**Tested By:**	MD	
Project:	Liberty Union HS	**Proj. No.:** G17-238-11L	**Depth, ft.:**	6	**Checked:**	PJ/DC	
Soil Description:	Lean Clay with Sand (CL)						

Load, psf	150	300	550	1100	2200	3000	Inundation		
Deformation, in.:	0.0024	0.0014	0.0039	0.0035	0.0069	0.0015	0.0333		

	Initial	**Final**	**Vertical Stress at Inundation (psf)**	**Collapse Potential (%)**
Moisture Content %	13.9	30.6	**3000**	**3.38**
Dry Density, pcf	87.1	91.9		
Void Ratio	0.936	0.834		
Saturation %	40.2	99.2		
Assumed Specific Gravity		2.70		





BSK ASSOCIATES

PROJECT NO. G17-238-11L	**COLLAPSE POTENTIAL OF SOILS**
DRAWN: 2/28/18	
DRAWN BY: D. Tower	
CHECKED BY: C. Foulk	Campus Expansion Liberty High School 850 2nd Street Brentwood, California
FILE NAME: SitePlan.indd	

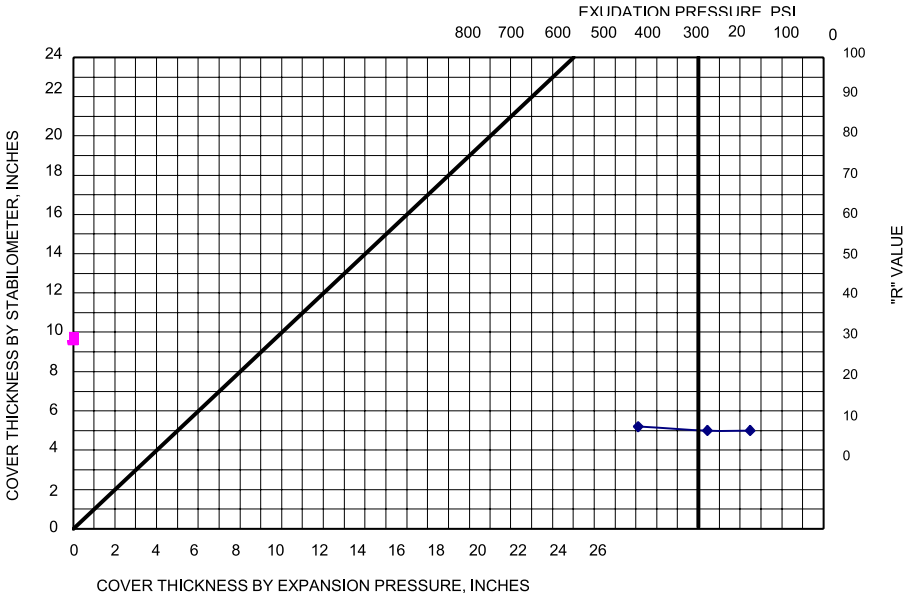
FIGURE

B-7

R-Value Test

Caltrans Test Method 301

Project Name:	Liberty Union High School Campus	**Sample Date:**	2/8/2018
Project Number:	G17-238-11L	**Sample By:**	DT
Sample Source:		**Test Date:**	2/14/2018
Lab Tracking ID:	L18-089	**Report Date:**	2/15/2018
Sample Location:	Bulk B1@1-5	**Tested By:**	RC



Sample Description: Yellowish brown silty/sandy lean clay

SPECIMEN	A	B	C
EXUDATION PRESSURE, LOAD (lb)	5584	3498	2210
EXUDATION PRESSURE, PSI	445	279	176
EXPANSION, * 0.0001 IN	0.0009	0.0004	0.0004
EXPANSION PRESSURE, PSF	0	0	0
STABILOMETER PH AT 2000 LBS	144	146	147
DISPLACEMENT	4.36	4.41	4.42
RESISTANCE VALUE "R"	6	5	5
"R" VALUE CORRECTED FOR HEIGHT	6	5	5
% MOISTURE AT TEST	16.1	17.8	19.4
DRY DENSITY AT TEST, PCF	115.3	113.9	111.9
"R" VALUE AT 300 PSI EXUDATION PRESSURE	**5**		
"R" VALUE BY EXPANSION PRESSURE TI = 4.0, GF=1.50	**N/A**		

Remark:

Reviewed By: JKA

BSK ASSOCIATES

PROJECT NO. G17-238-11L	**RESISTANCE VALUE TEST**	**FIGURE**
DRAWN: 2/27/18		
DRAWN BY: D. Tower		**B-8**
CHECKED BY: C. Foulk	**Campus Expansion** **Liberty High School** **850 2nd Street** **Brentwood, California**	
FILE NAME: SitePlan.indd		

California State Certified Laboratory No. 2153

CERCO analytical
1100 Willow Pass Court, Suite A
Concord, CA 94520-1006
925 462 2771 Fax. 925 462 2775
www.cercoanalytical.com

16 February, 2018

Job No. 1802053
Cust. No. 12667

Ms. Danaige Tower
BSK Associates Engineers & Laboratories
399 Lindbergh Avenue
Livermore, CA 94551

Subject: Project No.: G17-238-11L
Project Name: 850 Second Street, Brentwood
Corrosivity Analysis – ASTM Test Methods

Dear Ms. Tower:

Pursuant to your request, CERCO Analytical has analyzed the soil samples submitted on February 12, 2018. Based on the analytical results, this brief corrosivity evaluation is enclosed for your consideration.

Based upon the resistivity measurements, both samples are classified as "corrosive". All buried iron, steel, cast iron, ductile iron, galvanized steel and dielectric coated steel or iron should be properly protected against corrosion depending upon the critical nature of the structure. All buried metallic pressure piping such as ductile iron firewater pipelines should be protected against corrosion.

The chloride ion concentrations are 17 mg/kg & 46 mg/kg and are determined to be insufficient to attack steel embedded in a concrete mortar coating.

The sulfate ion concentrations are 66 mg/kg & 220 mg/kg and are determined to be sufficient to potentially be detrimental to reinforced concrete structures and cement mortar-coated steel at these locations. Therefore, concrete that comes into contact with this soil should use sulfate resistant cement such as Type II, with a maximum water-to-cement ratio of 0.55.

The pH of the soils are 7.96 & 7.26, which does not present corrosion problems for buried iron, steel, mortar-coated steel and reinforced concrete structures.

The redox potentials are 430-mV & 420-mV, which is indicative of aerobic soil conditions.

This corrosivity evaluation is based on general corrosion engineering standards and is non-specific in nature. For specific long-term corrosion control design recommendations or consultation, please call *JDH Corrosion Consultants, Inc. at (925) 927-6630.*

We appreciate the opportunity of working with you on this project. If you have any questions, or if you require further information, please do not hesitate to contact us.

Very truly yours,
CERCO ANALYTICAL, INC.

J. Darby Howard, Jr., P.E.
President

JDH/jdl
Enclosure

CERCO analytical
1100 Willow Pass Court, Suite A
Concord, CA 94520-1006
925 462 2771 Fax. 925 462 2775
www.cercoanalytical.com

Client: BSK Associates Engineers & Laboratories
Client's Project No.: G17-238-11L
Client's Project Name: 850 Second Street, Brentwood
Date Sampled: 12-Feb-18
Date Received: 12-Feb-18
Matrix: Soil
Authorization: Signed Chain of Custody

Date of Report: 16-Feb-2018

Job/Sample No.	Sample I.D.	Redox (mV)	pH	Conductivity (umhos/cm)*	Resistivity (100% Saturation) (ohms-cm)	Sulfide (mg/kg)*	Chloride (mg/kg)*	Sulfate (mg/kg)*
1802053-001	B-1 @ 2.0'	430	7.96	-	1,200	-	46	66
1802053-002	B-9 @ 2.5'	420	7.29	-	710	-	17	220

Method:	ASTM D1498	ASTM D4972	ASTM D1125M	ASTM G57	ASTM D4658M	ASTM D4327	ASTM D4327
Reporting Limit:	-	-	10	-	50	15	15
	13-Feb-2018	13-Feb-2018	-	15-Feb-2018	-	13-Feb-2018	13-Feb-2018

Cheryl McMillen
Laboratory Director

* Results Reported on "As Received" Basis
N.D. - None Detected

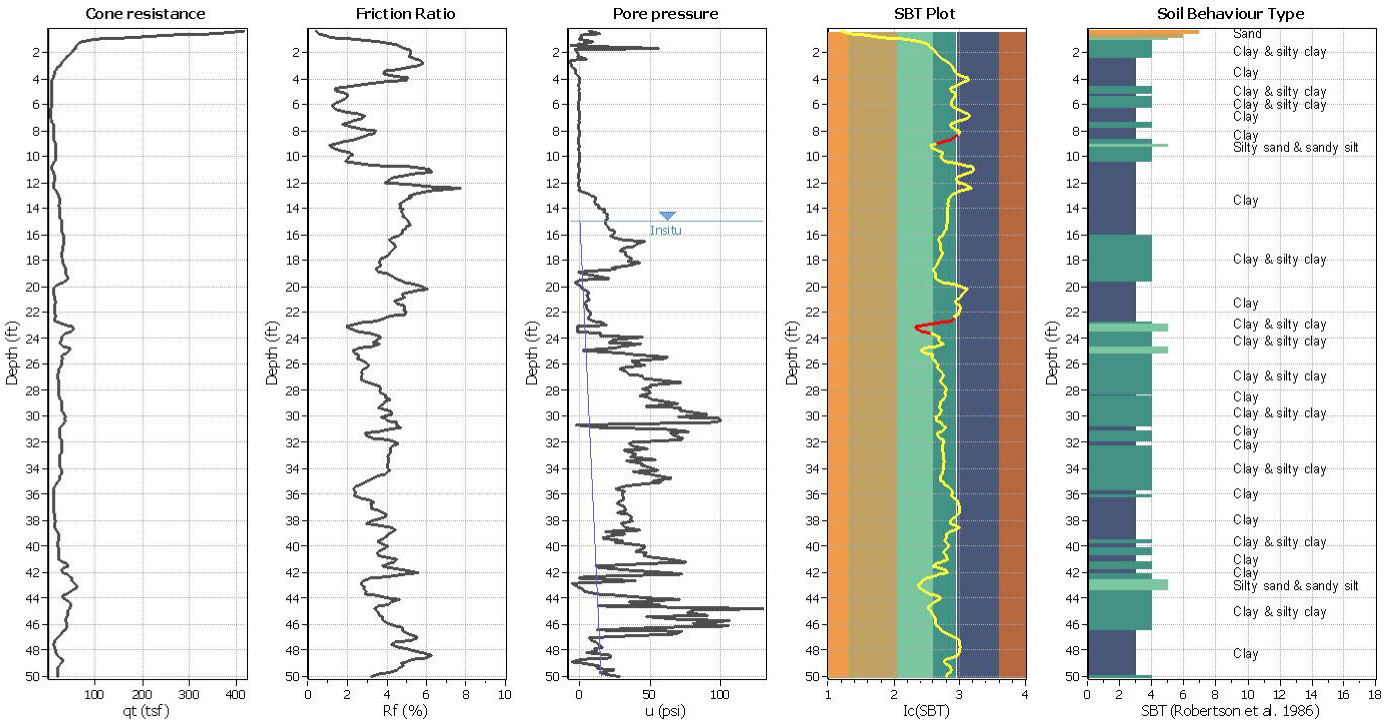
Quality Control Summary - All laboratory quality control parameters were found to be within established limits

APPENDIX C

CONE PENETROMETER TEST RESULTS

AND LIQUEFACTION ANALYSES

CPT basic interpretation plo



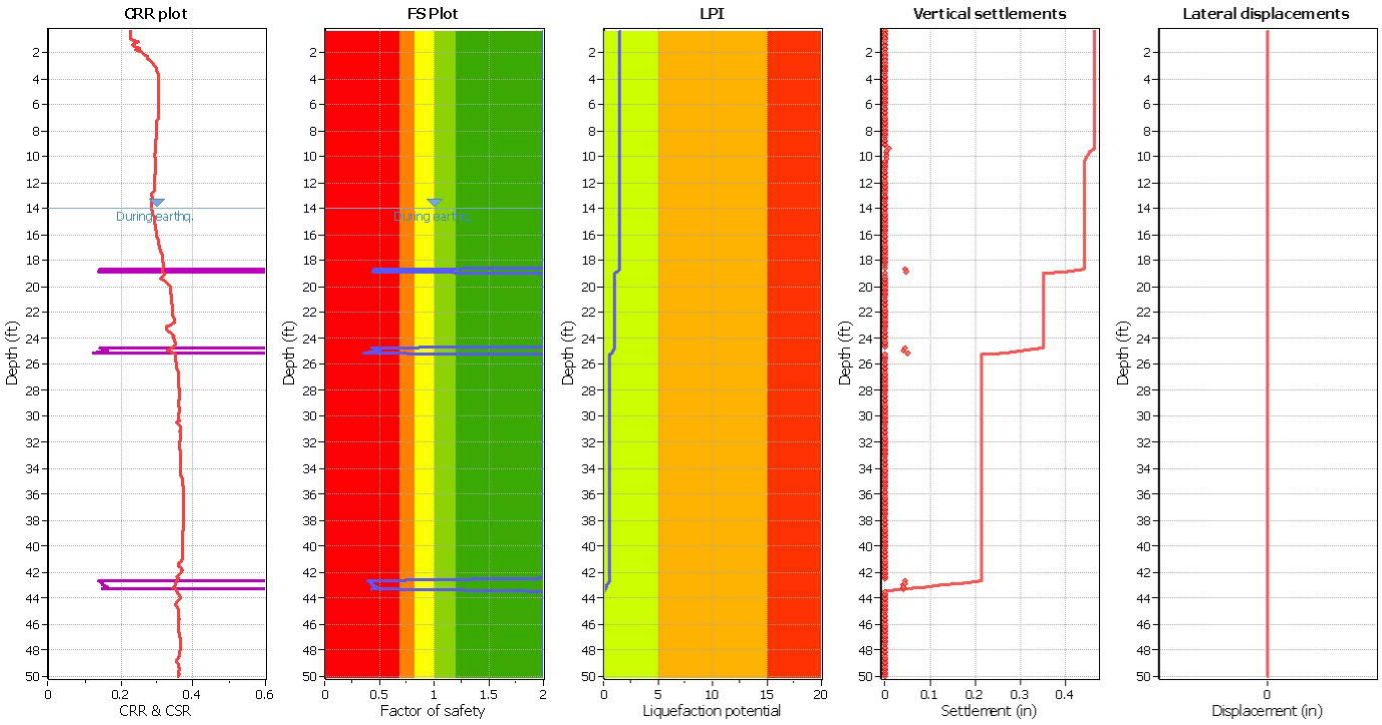
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	14.00 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.52	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.50	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	15.00 ft	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

Liquefaction analysis overall plot



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	14.00 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.52	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.50	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	15.00 ft	Fill height:	N/A	Limit depth:	N/A

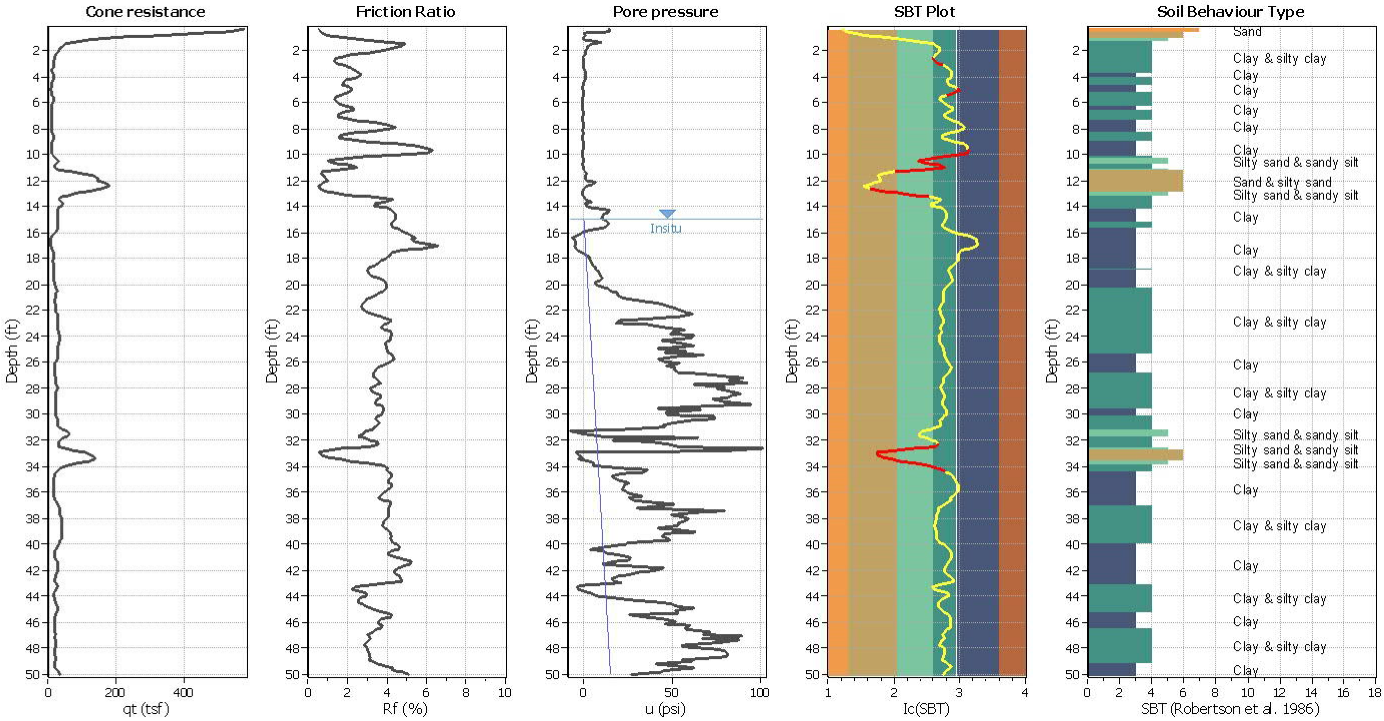
F.S. color scheme

- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

LPI color scheme

- Very high risk
- High risk
- Low risk

CPT basic interpretation plo



Input parameters and analysis data

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Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
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SBT legend

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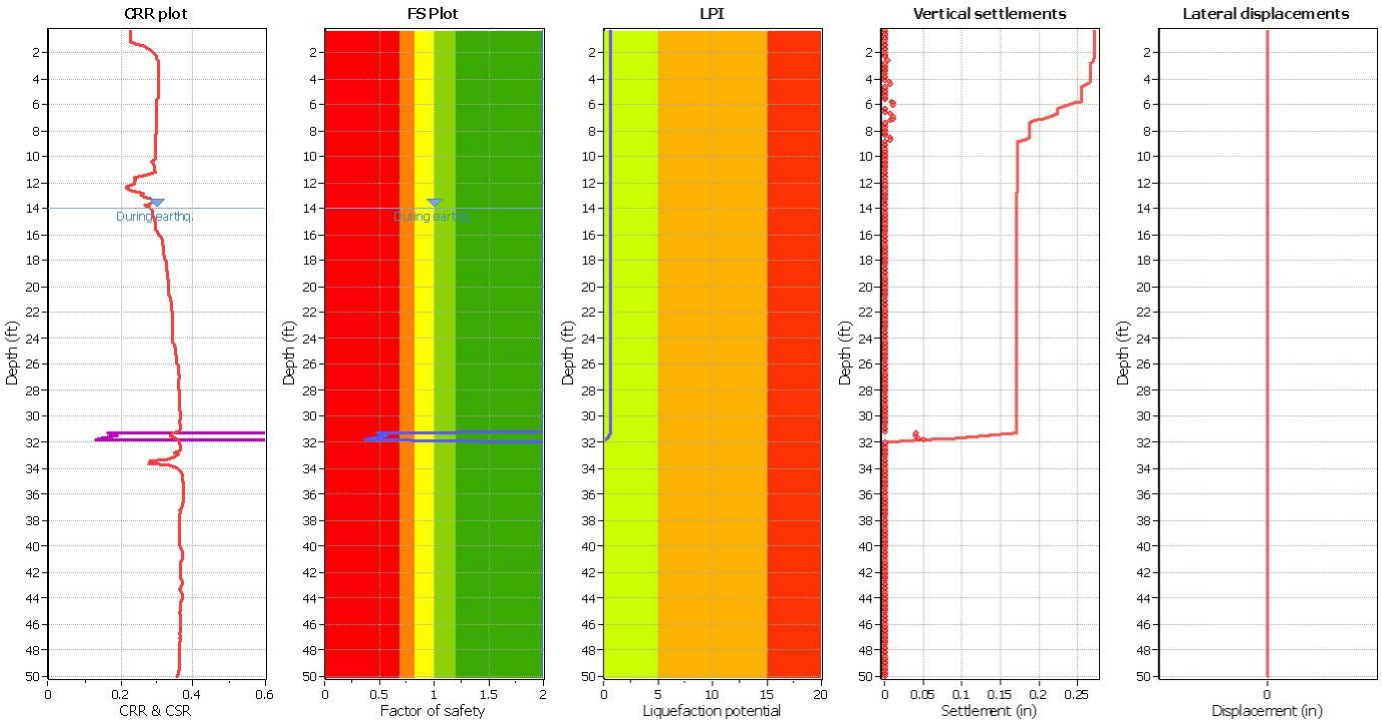
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

Liquefaction analysis overall plot



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	14.00 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
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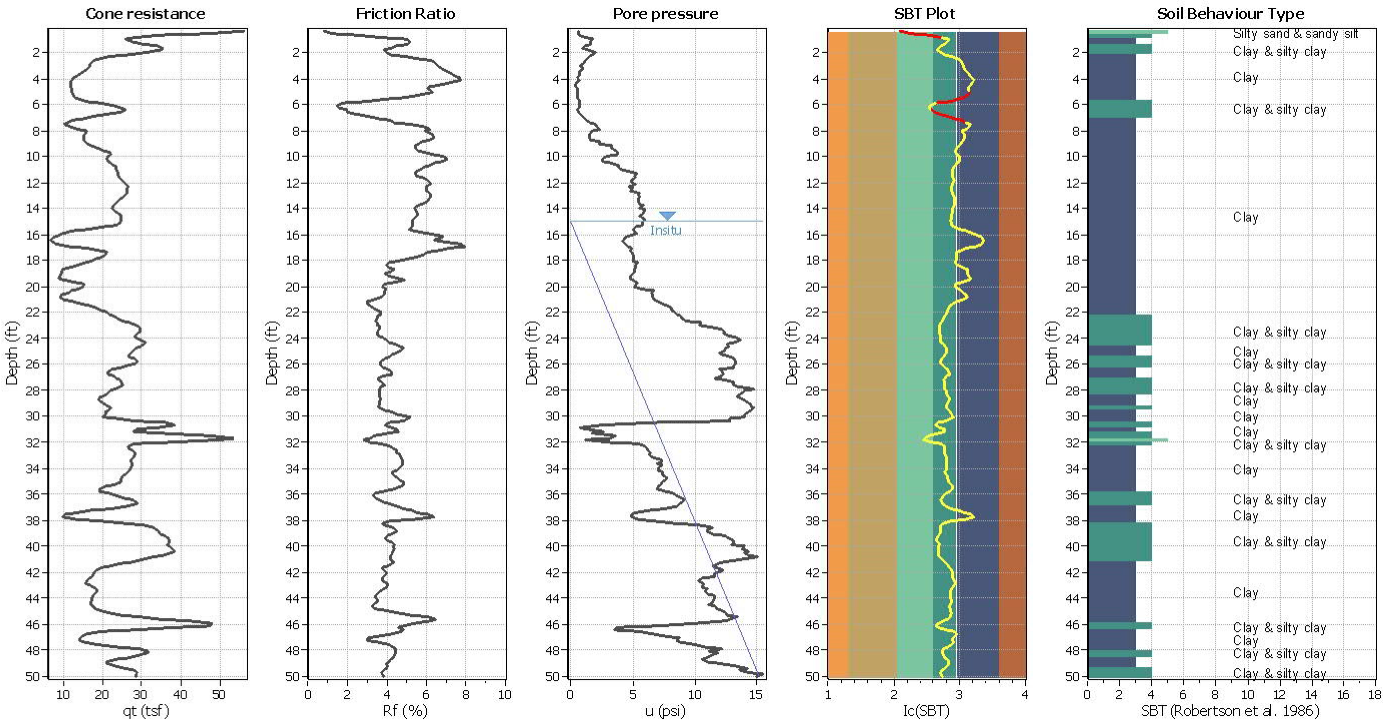

Input parameters and analysis data

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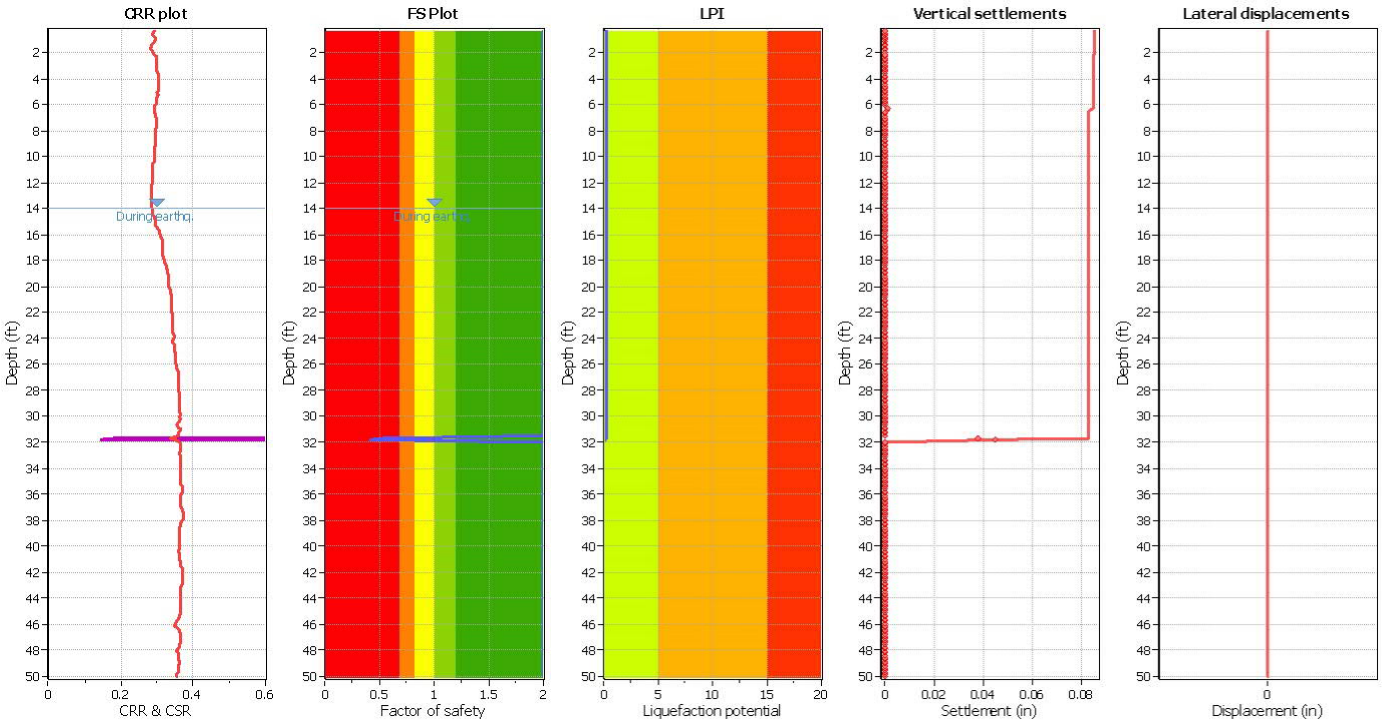
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

Liquefaction analysis overall plot



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	14.00 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.52	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.50	Use fill:	No	Limit depth applied:	No
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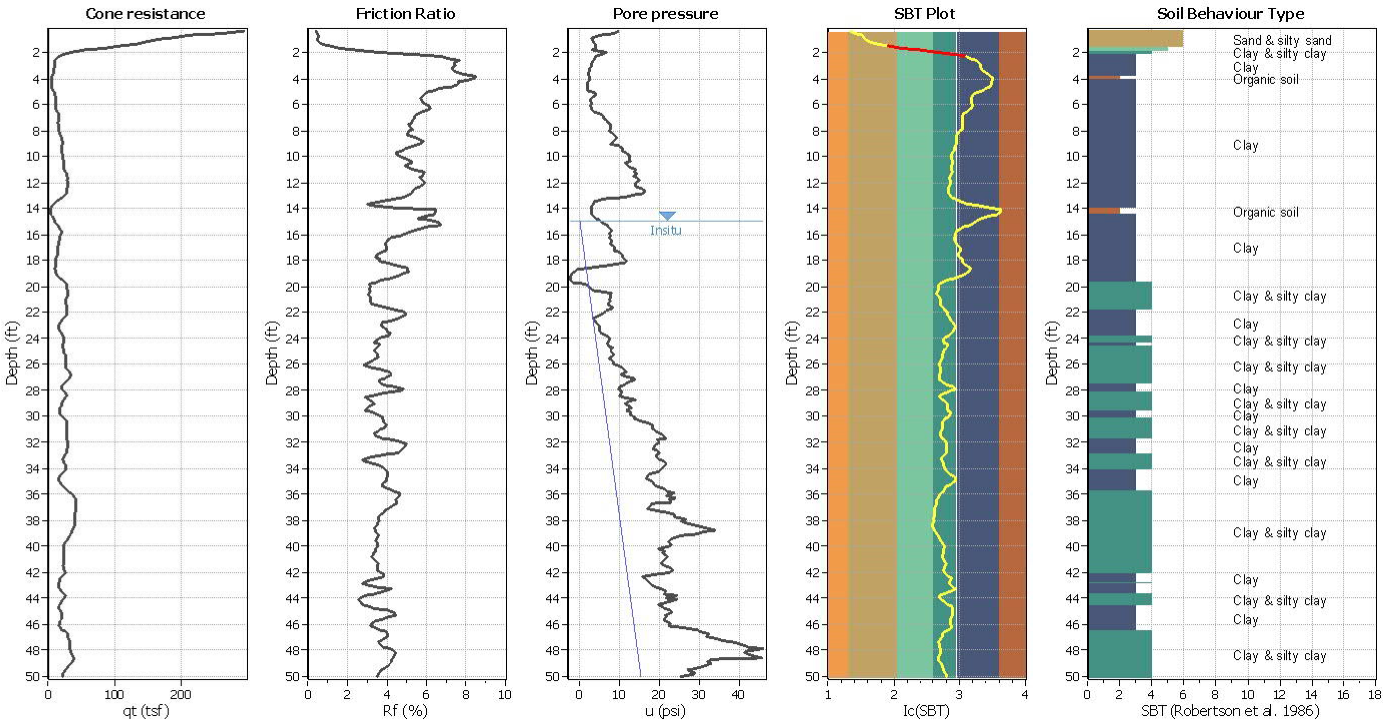
CPT basic interpretation plo



Input parameters and analysis data

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Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.52	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.50	Use fill:	No	Limit depth applied:	No
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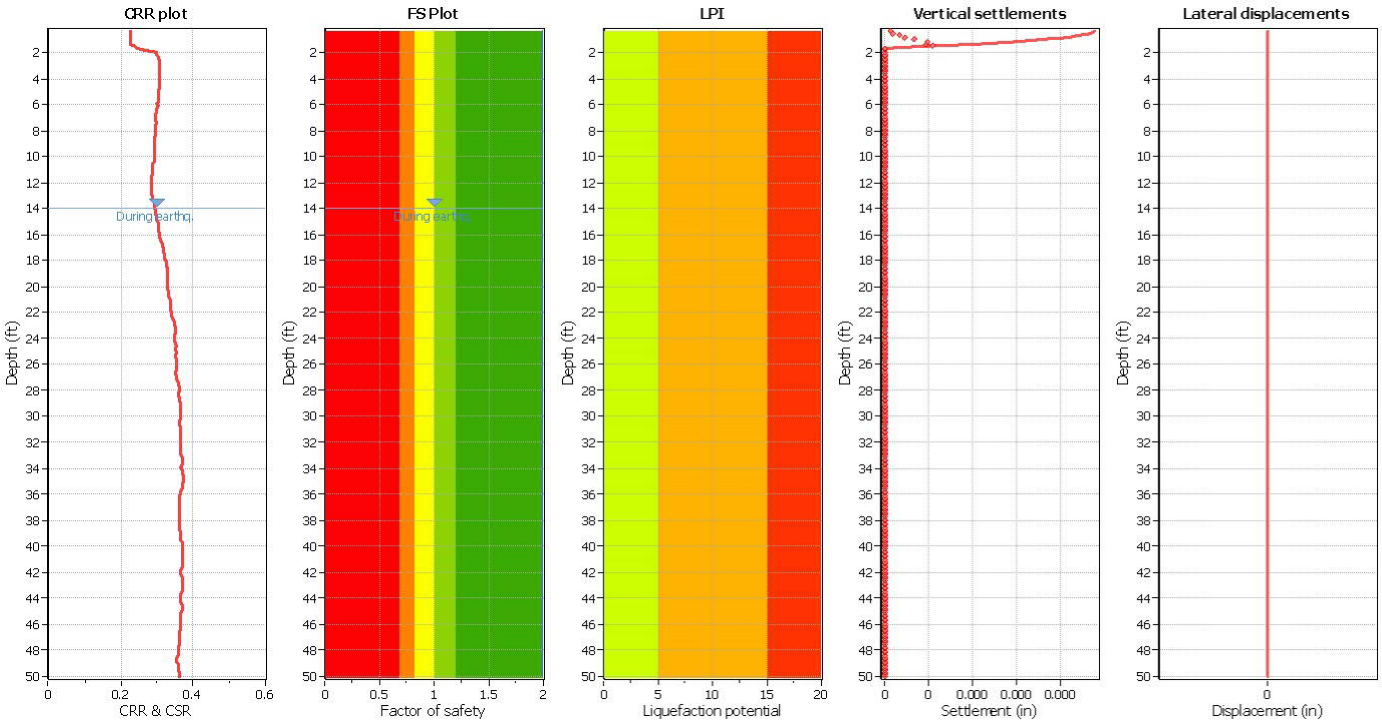
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

Liquefaction analysis overall plot



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	14.00 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.52	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.50	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	15.00 ft	Fill height:	N/A	Limit depth:	N/A

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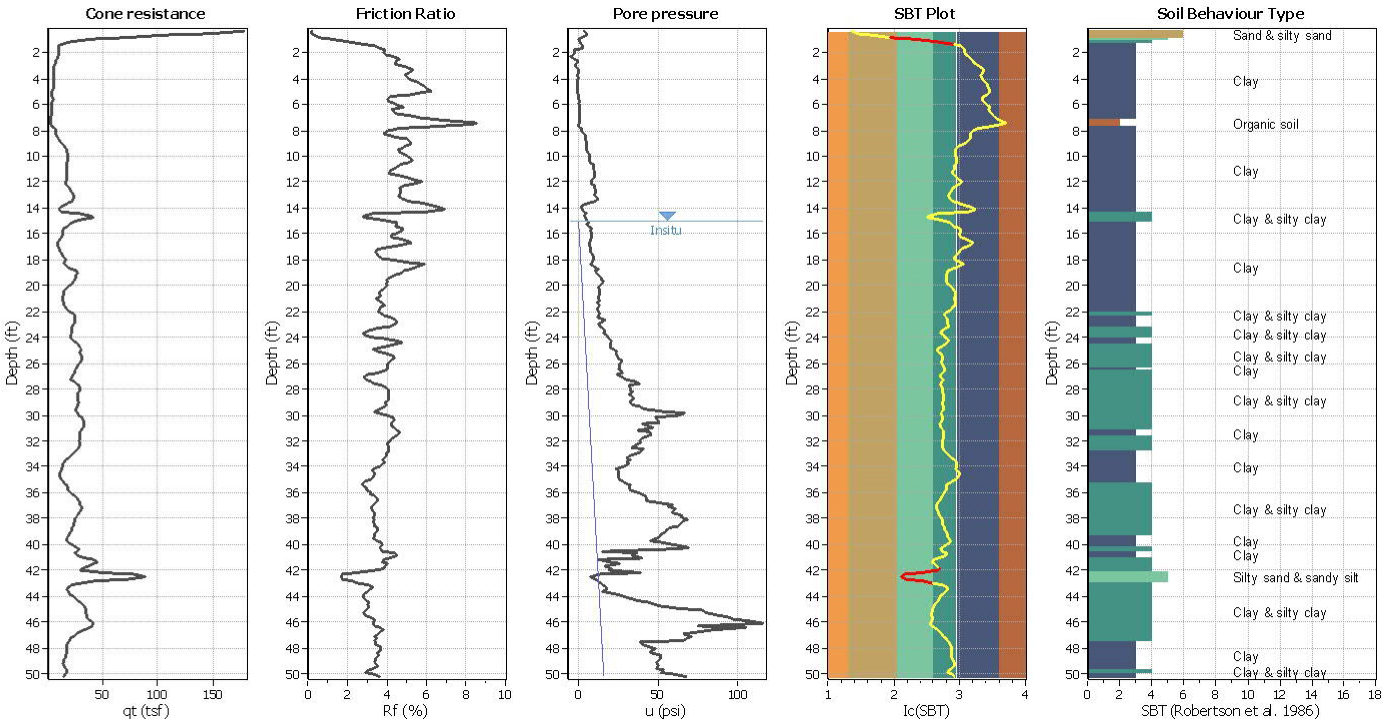
CPT basic interpretation plo



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	14.00 ft	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.52	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.50	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	15.00 ft	Fill height:	N/A	Limit depth:	N/A

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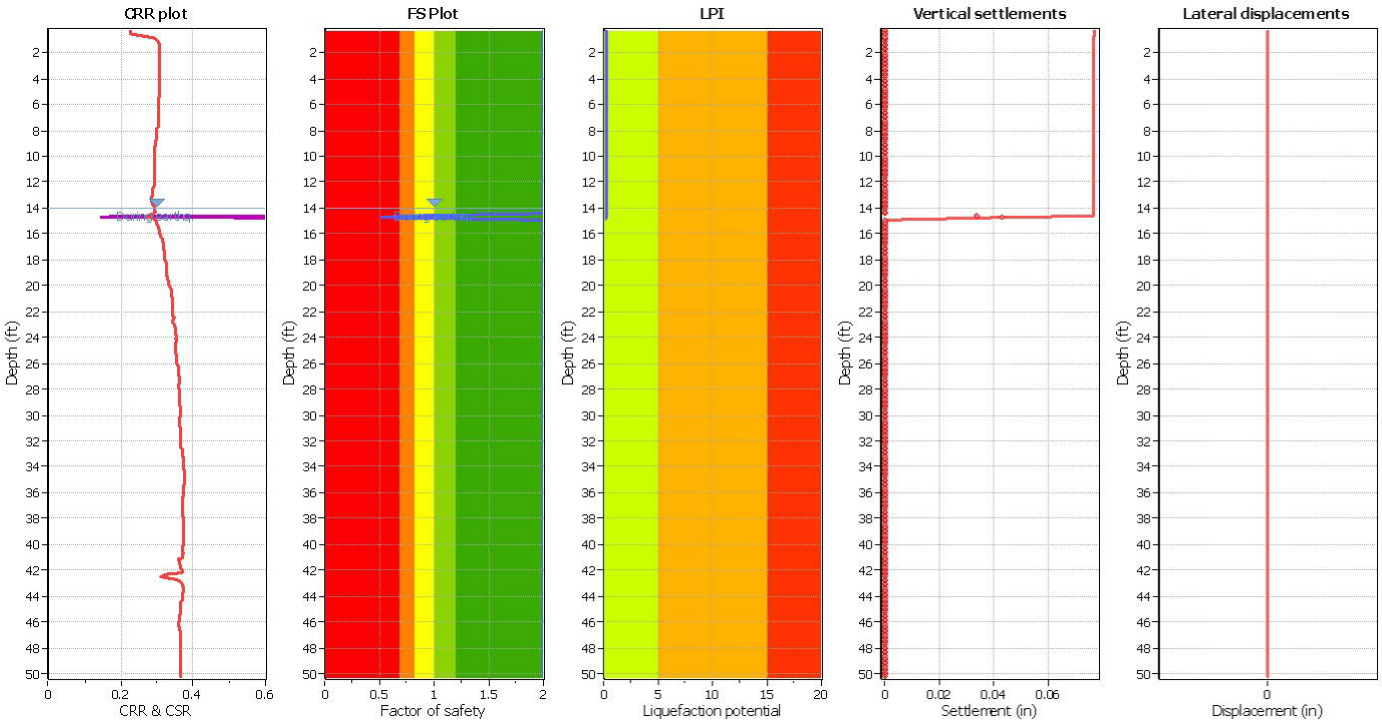
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

Liquefaction analysis overall plot



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Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
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Peak ground acceleration:	0.50	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	15.00 ft	Fill height:	N/A	Limit depth:	N/A

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LPI color scheme

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APPENDIX D

GEOLOGIC AND SEISMIC HAZARDS ASSESSMENT

GEOLOGIC AND SEISMIC HAZARDS ASSESSMENT REPORT
CAMPUS EXPANSION
LIBERTY HIGH SCHOOL
850 2nd STREET
BRENTWOOD, CALIFORNIA

Table of Contents

Figures

Supporting Calculations

D1.0 INTRODUCTION

This report presents the geologic and seismic hazards assessment prepared in accordance with the 2016 California Building Code (CBC), CCR Title 24, Chapters 16A and 18A requirements for a Geotechnical/Engineering Geologic Report. The assessment was performed in conformance with the California Geological Survey (CGS) Note 48 (2013).

D1.1 Purpose and Scope of Services

The purpose of the geologic and seismic hazards assessment is to provide the Client with an evaluation of potential geologic or seismic hazards that may be present at the site or due to regional influences. BSK Associate's (BSK) scope of services for this assessment included the following:

1. Review of published geologic literature, and current investigation at the site;
2. Evaluation of the data collected and preparation of geologic cross sections;
3. Evaluation of potential geologic hazards affecting the site; and
4. Determination of Site Class and code-based seismic design parameters.

The observations and conclusions presented in this report specifically exclude the assessment of environmental characteristics, particularly those involving hazardous substances, and a high-pressure pipeline risk evaluation.

D1.2 Site Location

As shown on the Area Topographic Map, Figure D-1, Liberty High School (Site) is located at 850 2nd Street in Brentwood, Contra Costa County, California. A map of the Site is shown on the Site Plan, Figure D-2.

The Site coordinates are approximately:

Latitude 37.9358°N Longitude 121.6914°W

The school is located in an area with residential and commercial properties.

D1.3 Site Topography

The project area is generally low relief with an elevation of approximately 70 to 75 feet.

D1.4 Groundwater Conditions

The Site is located within the Tracy sub-basin of the San Joaquin groundwater basin (CDWR, 2003). Free groundwater was observed in the borings performed for our concurrent geotechnical investigation for the campus expansion between depths of approximately 15 and 23 feet below the ground surface (BGS). The

estimated groundwater depth measured in the cone penetration test (CPT) probes advanced at the Site concurrently with our recent borings ranged from about 15 to 20 feet BGS. According to the Seismic Hazard Zone Report for the Brentwood Quadrangle (CGS, 2018b), historic high ground water at the Site is between 10 and 20 feet. It should be noted that groundwater levels can fluctuate several feet depending on factors such as seasonal rainfall, groundwater withdrawal, and construction activities on this or adjacent properties.

D2.0 GEOLOGIC SETTING

The Site is located in the California Delta region of the Great Valley geomorphic province near the eastern boundary of the Coastal Ranges geomorphic province. The Great Valley is a 400-mile long, low-relief, alluvial plain which runs north-south through California. The valley contains alluvial sediments which have been deposited almost continuously for the past 160 million years. The Site is located in the upland region of the southwest portion of the San Joaquin River Delta complex. To the west, the area transitions to the Coastal Ranges province that is characterized by northwest trending ridges and valleys that are typically highly folded with numerous faults (CGS, 2002).

As shown on the Geologic Map, Figure D-3, the Site is mapped as Quaternary alluvium, which includes alluvial gravel, sand, silt, and clay of valley areas; specifically, the authors map the area as alluvial loam (Dibblee and Minch, 2006).

Nearby active faults include the Greenville Fault zone located approximately 9 miles southwest of the Site, the Concord Fault located approximately 16 miles west of the Site, the Las Positas Fault located approximately 17 miles south of the Site, and the Green Valley Fault zone located approximately 24 miles northwest of the Site.

D2.1 Subsurface Conditions

Subsurface conditions are described in the 2018 geotechnical investigation report prepared by BSK and to which this geologic and seismic hazards report is appended. The Site was the subject of a current field investigation of nine hollow-stem auger borings which ranged in depth from approximately 5 to 25 feet BGS and five CPTs completed to a depth of approximately 50 feet BGS. The underlying stratigraphy consists predominantly of clay and silty clay. Minor silty sand (loose to medium dense) and sandy silt (firm to hard) layers were observed in the upper 20 feet in borings.

The Geologic Cross Sections, shown on Figure D-4, present the current surface topography and the subsurface conditions inferred from the current borings and CPTs performed at the Site.

D3.0 GEOLOGIC/SEISMIC HAZARDS

The types of geologic and seismic hazards assessed include surface ground fault rupture, liquefaction, seismically induced settlement, slope failure, flood hazards, and inundation hazards.

D3.1 Fault Rupture Hazard Zones in California

The purpose of the Alquist-Priolo Geologic Hazards Zones Act, as summarized in CDMG Special Publication 42 (SP 42) (Bryant and Hart, 2007), is to "prohibit the location of most structures for human occupancy across the traces of active faults and to mitigate thereby the hazard of fault-rupture." As indicated by SP 42, "the State Geologist is required to delineate 'Earthquake Fault Zones' along known active faults in California. Cities and counties affected by the zones must regulate certain development 'projects' within the zones. They must withhold development permits for sites within the zones until geologic investigations demonstrate that the sites are not threatened by surface displacement from future faulting."

The Site is within the Brentwood 7.5 Minute Quadrangle in Contra Costa County. Alquist-Priolo Earthquake Fault Zones have not been prepared for this quadrangle. As shown on the Alquist-Priolo Earthquake Fault Zone Map, Figure D-5, the closest Fault-Rupture Hazard Zone is associated with the Greenville fault zone located approximately 9¼ miles southwest of the Site (CDMG, 1982).

D3.2 State of California Seismic Hazard Zones (Liquefaction and Landslides)

Zones of Required Investigation, referred to as "Seismic Hazard Zones" in CCR Article 10, Section 3722, are areas shown on Seismic Hazard Zone Maps where site investigations are required to determine the need for mitigation of potential liquefaction and/or earthquake-induced landslide ground displacements.

The Site is not located in an Earthquake-Induced Landslide Hazard Zone. The Site is, however, partially located in a state-delineated Liquefaction Hazard Zone, as shown on the Liquefaction Hazard Zone Map, Figure D-6 (CGS, 2018).

The results of our liquefaction analyses are presented in the section titled "Soil Liquefaction" of the geotechnical report.

D3.3 Slope Stability and Potential for Slope Failure

The Site and surrounding area are of low relief; therefore, we conclude that the risk of landsliding within the Site is negligible.

D3.4 Flood and Inundation Hazards

An evaluation of flooding at the Site includes review of potential hazards from flooding during periods of heavy precipitation and flooding due to a catastrophic dam breach from up-gradient surface impoundments.

D3.4.1 Flood Hazards

Federal Emergency Management Agency (FEMA) flood hazard data was obtained to present information regarding the potential for flooding at the Site. As shown on the FEMA Flood Hazard Map, Figure D-7, according to FEMA Flood Hazard Map Layer (Panel 06013C0362G), dated 3/21/2017, the Site lies in Zone X outside of the 100-year floodplain.

D3.4.2 Inundation Hazards - Dams

According to GIS data obtained from California Emergency Management Agency (Cal-EMA), the Los Vaqueros Reservoir is located near the Site; however, the Site is outside of the inundation zone (Dam Inundation GIS data from Cal-EMA, dated 2013).

D3.5 Volcanic Hazards

According to the United States Geological Survey (USGS) Bulletin 1847, the Site is not located in an area that would be subject to hazards from volcanic eruptions (Miller, 1989).

D3.6 Corrosion

Please refer to the section titled "Corrosivity Results" in the geotechnical report for discussion of the corrosivity of the Site soils.

D3.7 Expansive Soils

As discussed in the geotechnical report, the near-surface soils encountered within the current borings at the Site consist of lean clay which exhibits a moderate expansion potential.

D3.8 Contra Costa County General Plan and Safety Element

The Safety Element of the Contra Costa County General Plan (2004) maps the Site as in an area of generally moderate to low liquefaction potential.

D3.9 Tsunami Hazard

According to the Tsunami Inundation Map for Emergency Planning (Cal-EMA, 2009), the Site is not located in a California State Tsunami Hazard Zone.

D4.0 SEISMIC HAZARD ASSESSMENT

D4.1 Seismic Source Deaggregation

Figures D-8 and D-9, Regional Fault Map and Local Fault Map, respectively, present the major faults that may impact the Site in the future. Seismically-induced ground motion at a site can be caused by earthquakes on any of the sources surrounding the site. Deaggregation of the seismic hazard was performed using the USGS Unified Hazard Tool. The deaggregation determination, at the maximum considered earthquake hazard level, results in distance, magnitude, and epsilon (ground-motion uncertainty) for each source that contributes to the hazard.

Results of the deaggregation based on a probabilistic model developed by the USGS (Dynamic: Conterminous U.S. 2008 (v3.3.1)) indicates that the most extreme seismic source that contributes to the peak ground acceleration is from a rupture of multiple segments of the Calaveras fault. The modal magnitude of 6.52 at a distance of 23 km is consistent with the general design earthquake ground motion. For liquefaction and seismic settlement calculations, a magnitude of 6.52 should be used.

D4.2 Historical Seismicity

The project Site and its vicinity are located in an area characterized by high seismic activity. A number of large earthquakes have occurred within the Site region during historic time (since 1800). The Historical Earthquake Map, Figure D-10, presents earthquake magnitudes of significant earthquakes based on the National Seismic Hazard Model (NSHM) Earthquake Catalogs. This earthquake catalog is for the Western United States and provides a listing for all known $M \geq 2.5$ earthquakes. Some of the significant regional earthquake events include the 1980 M5.8 Livermore earthquake located approximately 7 miles southwest of the Site, the 1868 M6.8 earthquake that originated on the Hayward Fault approximately 28 miles southwest of the Site, and the 1892 M6.6 Dunnigan Hills earthquake located approximately 36 miles north of the Site.

In March 2015, scientists and engineers released a new earthquake forecast for the State of California which was compiled by the USGS, the Southern California Earthquake Center, and the CGS with support from the California Earthquake Authority (Field et al., 2014). It updates the earthquake forecast made for the greater San Francisco Bay Area by the 2007 Working Group for California Earthquake Probabilities. According to this recent study, there is a 72 percent probability that one or more magnitude M6.7 or greater earthquakes will occur in the San Francisco Bay Area within the next approximately 30 years (between 2014 and 2044). As has been demonstrated recently by the 1989 (M6.9) Loma Prieta, the 1994

(M6.7) Northridge, and the 1995 (M6.9) Kobe earthquakes, earthquakes of this magnitude range can cause severe ground shaking and significant damage to modern urban environments.

D4.3 Earthquake Ground Motion, 2016 California Building Code

D4.3.1 Site Class

Based on Section 1613A.3.2 of the 2016 CBC, the Site shall be classified as Site Class A, B, C, D, E or F based on the site soil properties and in accordance with Chapter 20 of ASCE 7-10. The average shear wave velocity of the upper 50 feet was interpreted from the CPT test hole data using CPeT-IT v.2.0 developed by GeoLogismiki. This program correlates CPT data to shear wave velocity using correlations based on Lunne, Robertson, and Powell (1997). The time-weighted average of the shear wave velocity of the upper 50 feet for each CPT test hole was calculated as per ASCE 7-10 equation 20.4-1, and then extrapolated to a depth of 100 feet following Boore (2004) as presented in Wair et al. (2012). The average shear wave velocity of the upper 100 feet for the 5 CPT test holes is 623 feet per second. Therefore, as per Table 20.3-1 of ASCE 7-10, the Site is Class D (Stiff soil). See attached supporting calculations which present the CPeT-IT output spreadsheets with the time-weighted averaging columns added (yellow highlighting).

D4.3.2 Seismic Design Criteria

The 2016 CBC utilizes ground motion based on the Risk-Targeted Maximum Considered Earthquake (MCE). The Risk-Targeted MCE is defined in the 2016 CBC as the most severe earthquake effects considered by this code, determined for the orientation that results in the largest maximum response to horizontal ground motions and with an adjustment for targeted risk. Ground motion parameters in the 2016 CBC are based on ASCE 7-10, Chapter 11.

The USGS has prepared maps presenting the Risk-Targeted MCE spectral acceleration (5% damping) for periods of 0.2 seconds (S_S) and 1.0 seconds (S_1). The values of S_S and S_1 can be obtained from the USGS Ground Motion Parameter Application available at:
http://earthquake.usgs.gov/designmaps/us/application.php.

Table D-1 presents the spectral acceleration parameters produced for Site Class D by the USGS Ground Motion Parameter Application and Chapter 16 of the 2016 CBC based on ASCE 7-10.

TABLE D-1 SPECTRAL ACCELERATION PARAMETERS RISK TARGETED MAXIMUM CONSIDERED EARTHQUAKE			
Criteria	Value		Reference
MCE Mapped Spectral Acceleration (g)	$S_S = 1.500$	$S_1 = 0.510$	USGS Mapped Value
Site Coefficients (Site Class D)	$F_a = 1.000$	$F_v = 1.500$	ASCE Table 11.4
Site Adjusted MCE Spectral Acceleration (g)	$S_{MS} = 1.500$	$S_{M1} = 0.764$	ASCE Equations 11.4.1-2
Design Spectral Acceleration (g)	$S_{DS} = 1.000$	$S_{D1} = 0.510$	ASCE Equations 11.4.3-4

D4.3.3 Seismic Design Category

The long period spectral response acceleration coefficient, S_1, is less than 0.750g. Therefore, as per Table 11.6-1 of ASCE 7-10, the Site lies in Seismic Design Category D, based on Risk Category III.

D4.3.4 Geometric Mean Peak Ground Acceleration

As per Section 1803A.5.12 of the CBC, peak ground acceleration (PGA) utilized for dynamic lateral earth pressures and liquefaction, shall be based on a site-specific study (ASCE 7-10, Section 21.5) or ASCE 7-10, Section 11.8.3. The USGS Ground Motion Parameter Application, based on ASCE 7-10, Section 11.8.3, produced the values shown in Table D-2 based on Site Class D.

TABLE D-2 GEOMETRIC MEAN PEAK GROUND ACCELERATION MAXIMUM CONSIDERED EARTHQUAKE		
Criteria	Value	Reference
Mapped PGA (g)	$PGA = 0.500$	USGS Mapped Value
Site Coefficients (Site Class D)	$F_{PGA} = 1.000$	ASCE Table 11.8-1
Geometric Mean PGA (g)	$PGA_M = 0.500$	ASCE Equation 11.8-1

D4.4 Seismically Induced Ground Failure

D4.4.1 Liquefaction

Liquefaction is a condition where saturated, granular soils undergo a substantial loss of strength and deformation due to pore pressure increase as a result of cyclic stress application induced by earthquakes. It is generally accepted that the four following conditions need to be met in order for liquefaction to occur during ground shaking:

- The subsurface soils are in a relatively loose state,

- The soils are saturated,
- The soils have low plasticity, and
- Ground shaking is of sufficient intensity to act as a triggering mechanism.

When liquefied, the soil acquires mobility sufficient to permit both horizontal and vertical movements if the soil is not confined. Soils most susceptible to liquefaction are loose, clean, uniformly-graded silt and fine sand, as well as some lean clay deposits. In addition, after soil liquefies, dissipation of the excess pore pressures can produce volume changes within the liquefied soil layer, which can result in ground surface settlement.

The Site is underlain by alluvial soils consisting of primarily of lean clay with layers of silt and sand (sometimes loose) throughout the observed depth. Based on our analysis, we conclude that liquefaction-induced settlement of some of the sand and silt layers to be a minor hazard at the Site. The results and discussion of our liquefaction analyses are presented in the "Soil Liquefaction" section of the geotechnical report.

D4.4.2 Lateral Spreading

Lateral spreading is a potential seismic hazard commonly associated with liquefaction where extensional ground cracking and settlement occur as a response to lateral migration of subsurface liquefiable material. This phenomenon typically occurs adjacent to free faces, such as slopes and creek channels. Liquefaction-induced settlement is considered to be a minor hazard at the Site (see above section for additional discussion). In addition, there are no free faces in the vicinity of the Site and the depth to the potentially liquefiable layers identified in our CPTs (refer to Appendix C of the geotechnical report) is significant; therefore, the potential for lateral spread to occur at the Site is considered to be low.

D4.4.3 Dynamic Compaction (Seismic Settlement)

Another type of seismically-induced ground failure, which can occur as a result of seismic shaking, is dynamic compaction (seismic settlement). This phenomenon typically occurs in unsaturated, loose granular material or uncompacted fill soils. Due to the composition and apparent relative density of the soils above the water table within the maximum depth of our exploration, we estimate settlements on the order of less than ¼ inch due to dynamic compaction/seismic settlement. These settlements are shown on the CPT liquefaction plots in Appendix C of the geotechnical report.

D5.0 REFERENCES

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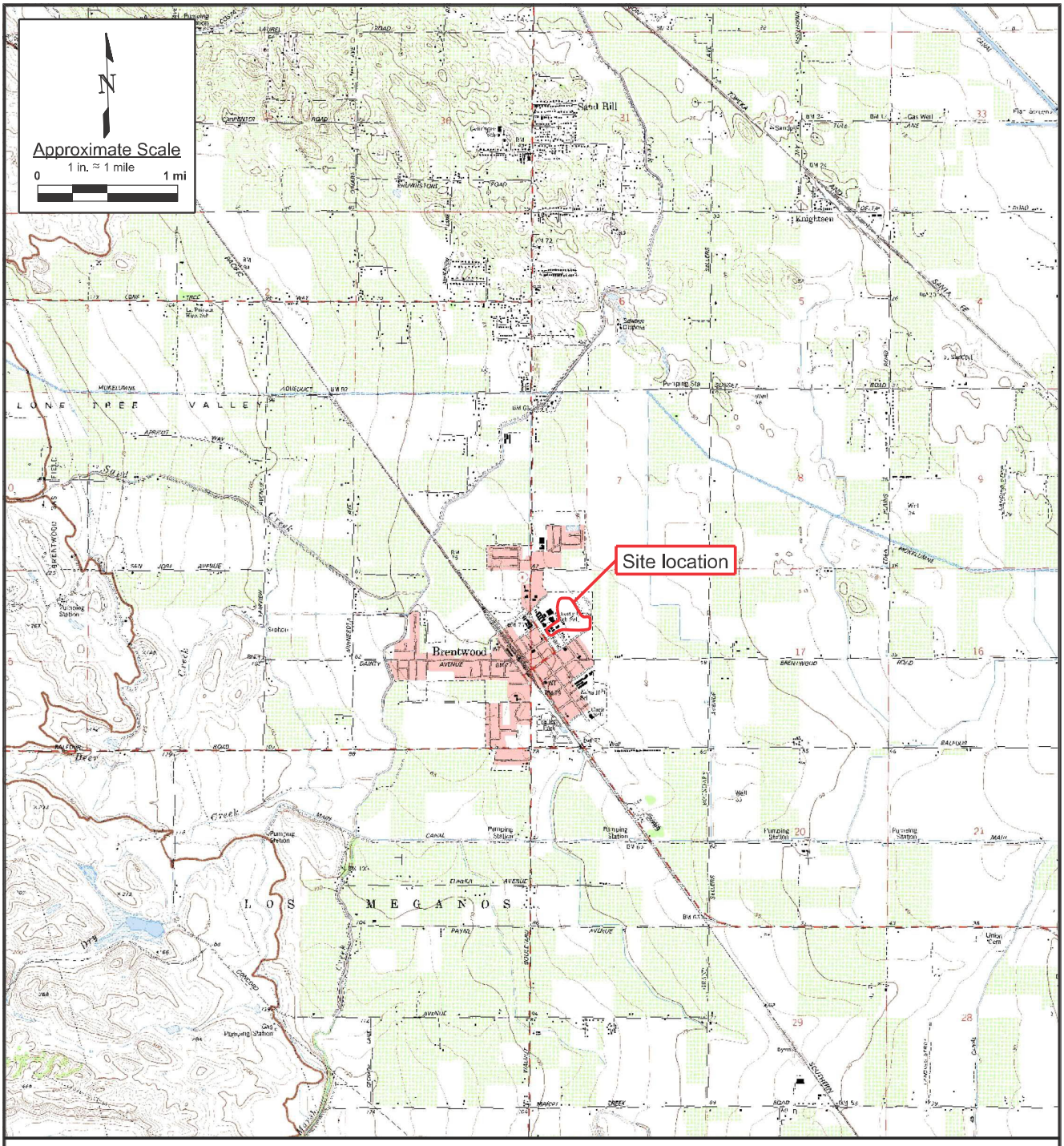


Reference: United States Geological Survey, 1984, Brentwood Quadrangle, California - Contra Costa Co., 7.5 Minute Series, scale 1:24,000.

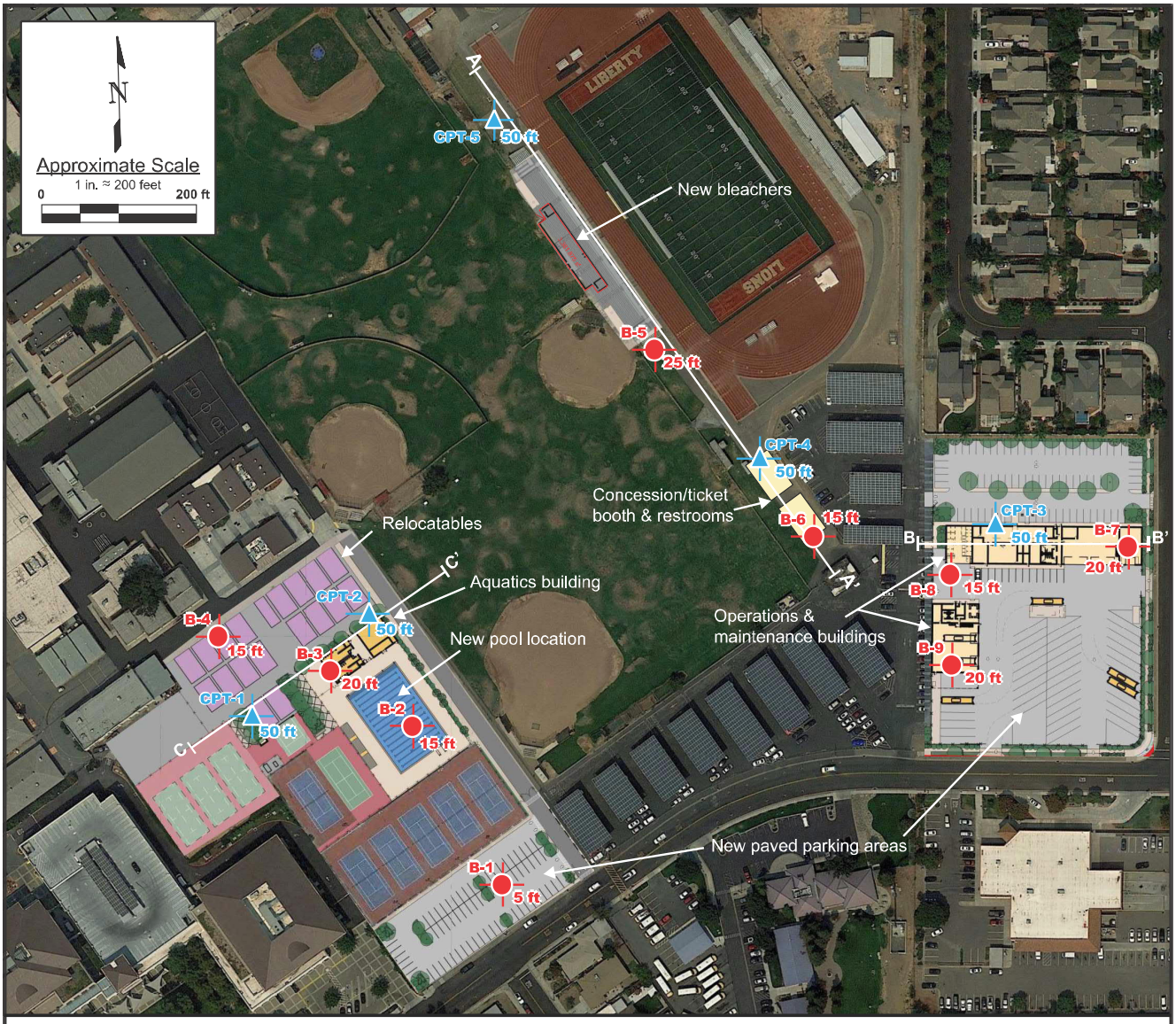
BSK ASSOCIATES

PROJECT NO. G17-238-11L
DRAWN: 2/23/2018
DRAWN BY: R. Renedo
CHECKED BY: M. Cline
FILE NAME: Topo Map

AREA TOPOGRAPHIC MAP

Campus Expansion
Liberty High School
850 2nd Street
Brentwood, California

FIGURE
D-1



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LEGEND

B-1 — Approximate Boring Location (with approximate depth), BSK (2018)

CPT-1 — Approximate Cone Penetrometer Test Location (with approximate depth), BSK (2018)

A A' — Cross section line (see Figure D-4)

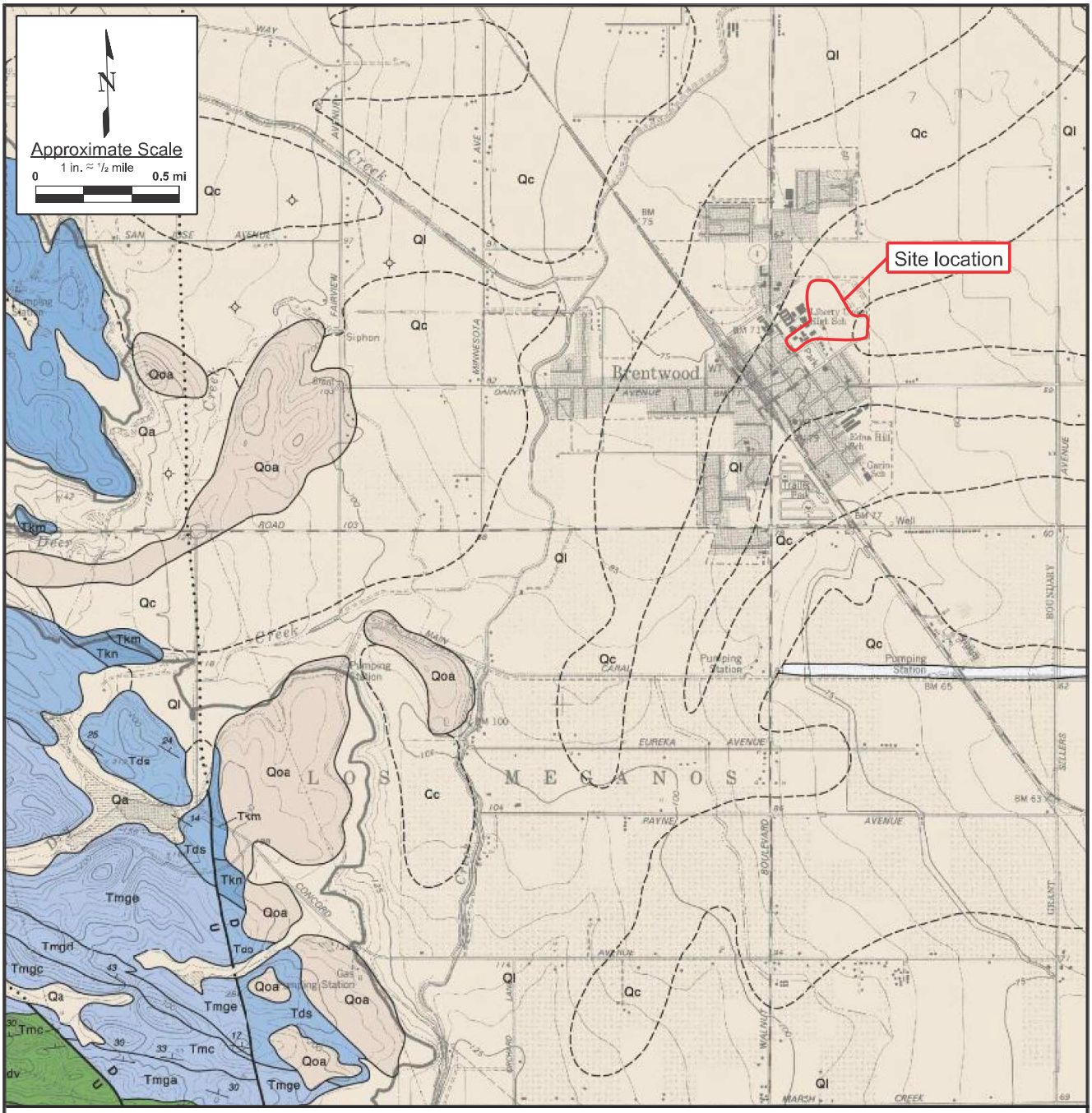
BSK ASSOCIATES

PROJECT NO. G17-238-11L
DRAWN: 2/23/2018
DRAWN BY: R. Renedo
CHECKED BY: M. Cline
FILE NAME: Site Plan

SITE PLAN

Campus Expansion
Liberty High School
850 2nd Street
Brentwood, California

FIGURE
D-2



Reference: Dibblee, T.W., and Minch, J.A., 2006, Geologic map of the Antioch South & Brentwood quadrangles, Contra Costa County, California: Dibblee Geological Foundation, Dibblee Foundation Map DF-193, scale 1:24,000.

LEGEND

af - Surficial sediments - Manmade artificial fill for dam (Holocene)
Qa - Surficial sediments - Alluvial gravel, sand and silt/clay of valley areas and flood plains (Holocene)
Ql - Surficial sediments - Alluvial loam of valley areas (Holocene)
Qc - Surficial sediments - Alluvial clay of valley areas (Holocene)
Qoa - Older surficial sediments - Dissected older alluvial deposits (late Pleistocene)
Tkm/Tkn - Kreyenhagen Formation - marine clastic, lithified sandstone and shale (middle Eocene)
Tds - Domengine Sandstone - marine clastic, lithified sandstone (middle Eocene)
Tmge/Tmgd/Tmgc/Tmga - Meganos Formation - marine clastic, lithified sandstone and shale (middle to early Eocene)

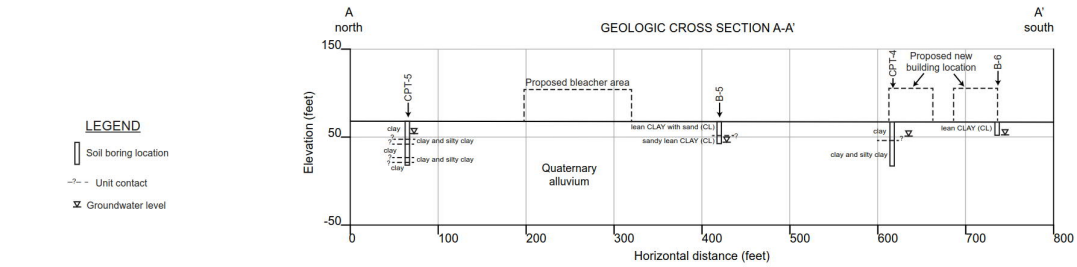
BSK ASSOCIATES

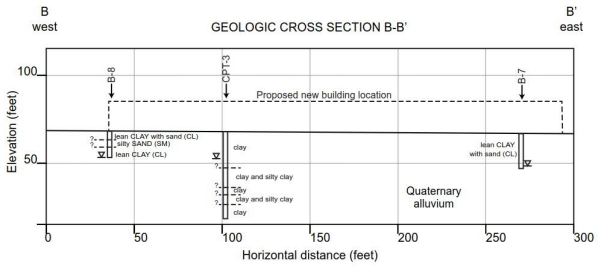
PROJECT NO. G17-238-11L
DRAWN: 2/23/2018
DRAWN BY: R. Renedo
CHECKED BY: M. Cline
FILE NAME: Geologic Map

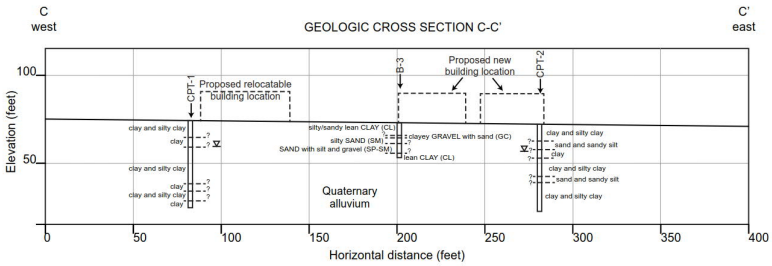
GEOLOGIC MAP

Campus Expansion
Liberty High School
850 2nd Street
Brentwood, California

FIGURE
D-3



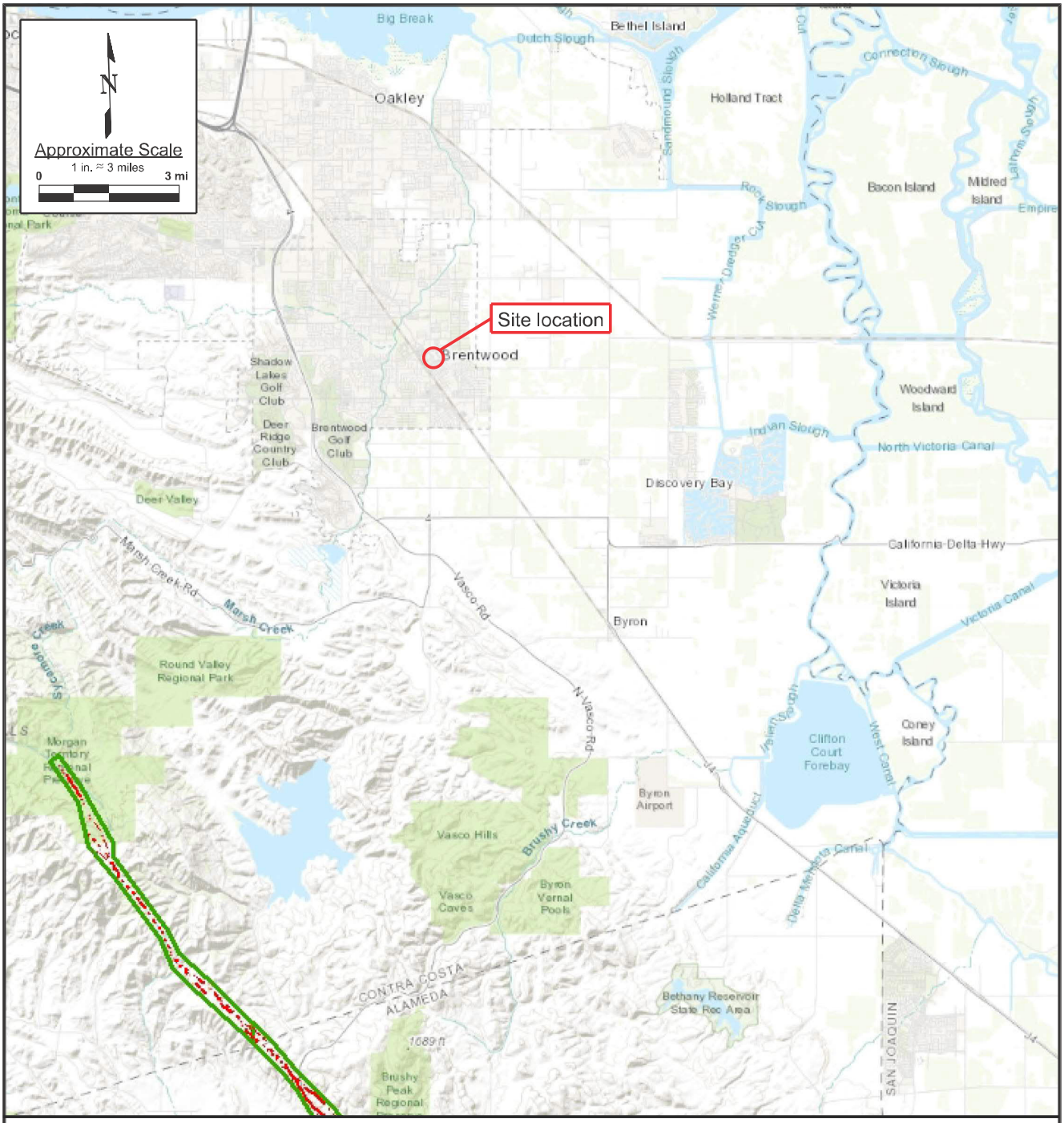




BSK ASSOCIATES

PROJECT NO. G17-238-11L	**GEOLOGIC CROSS SECTIONS**
DRAWN: 2/19/2018	
DRAWN BY: R. Renedo	
CHECKED BY: M. Cline	Campus Expansion Liberty High School 850 2nd Street Brentwood, California
FILE NAME: Cross Sections	

FIGURE
D-4



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LEGEND

- Accurately located
- Approximately located
- Concealed
- Inferred
- Earthquake Fault Zone

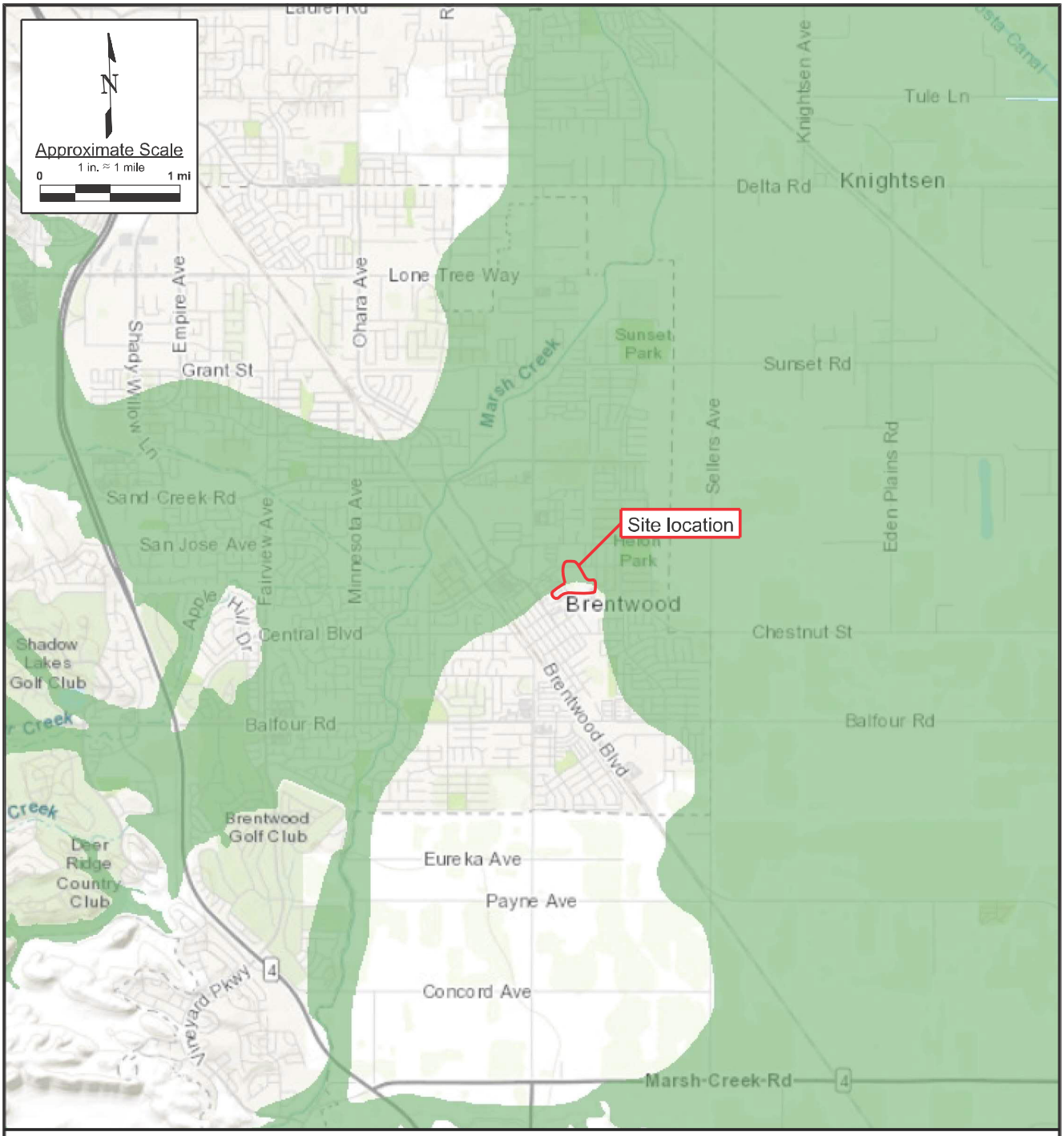
BSK ASSOCIATES

PROJECT NO. G17-238-11L
DRAWN: 2/19/2018
DRAWN BY: R. Renedo
CHECKED BY: M. Cline
FILE NAME: APFZ Map

ALQUIST-PRIOLO EARTHQUAKE FAULT ZONE MAP

Campus Expansion
Liberty High School
850 2nd Street
Brentwood, California

FIGURE
D-5



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LEGEND

Liquefaction Hazard Zone

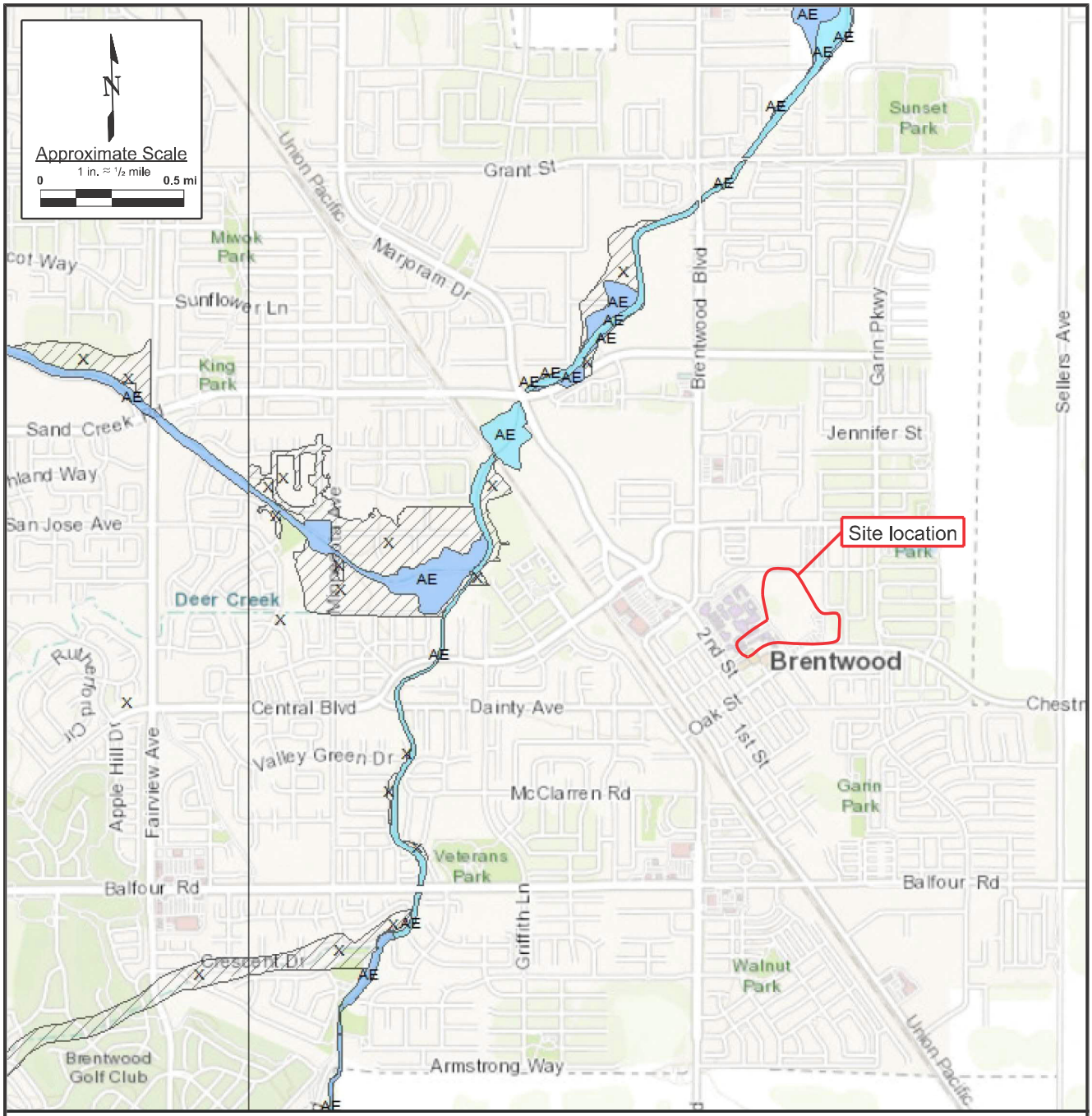
BSK ASSOCIATES

PROJECT NO. G17-238-11L
DRAWN: 2/23/2018
DRAWN BY: R. Renedo
CHECKED BY: M. Cline
FILE NAME: Landslide Map

LIQUEFACTION HAZARD MAP

Campus Expansion
Liberty High School
850 2nd Street
Brentwood, California

FIGURE
D-6



Reference: FEMA National Flood Hazard Layer, Panels 06013C0354G and 06013C0362G, 3/21/2017.

LEGEND

- Zone AE. Areas with a 1% annual chance of flooding. Base flood elevations determined.
- Zone AE. Areas with a 1% annual chance of flooding. Regulatory floodway.
- Zone X. Areas with 0.2% annual chance of flooding, areas with 1% annual chance of flooding with average depth less than 1 ft or with drainage areas of less that 1 mi².

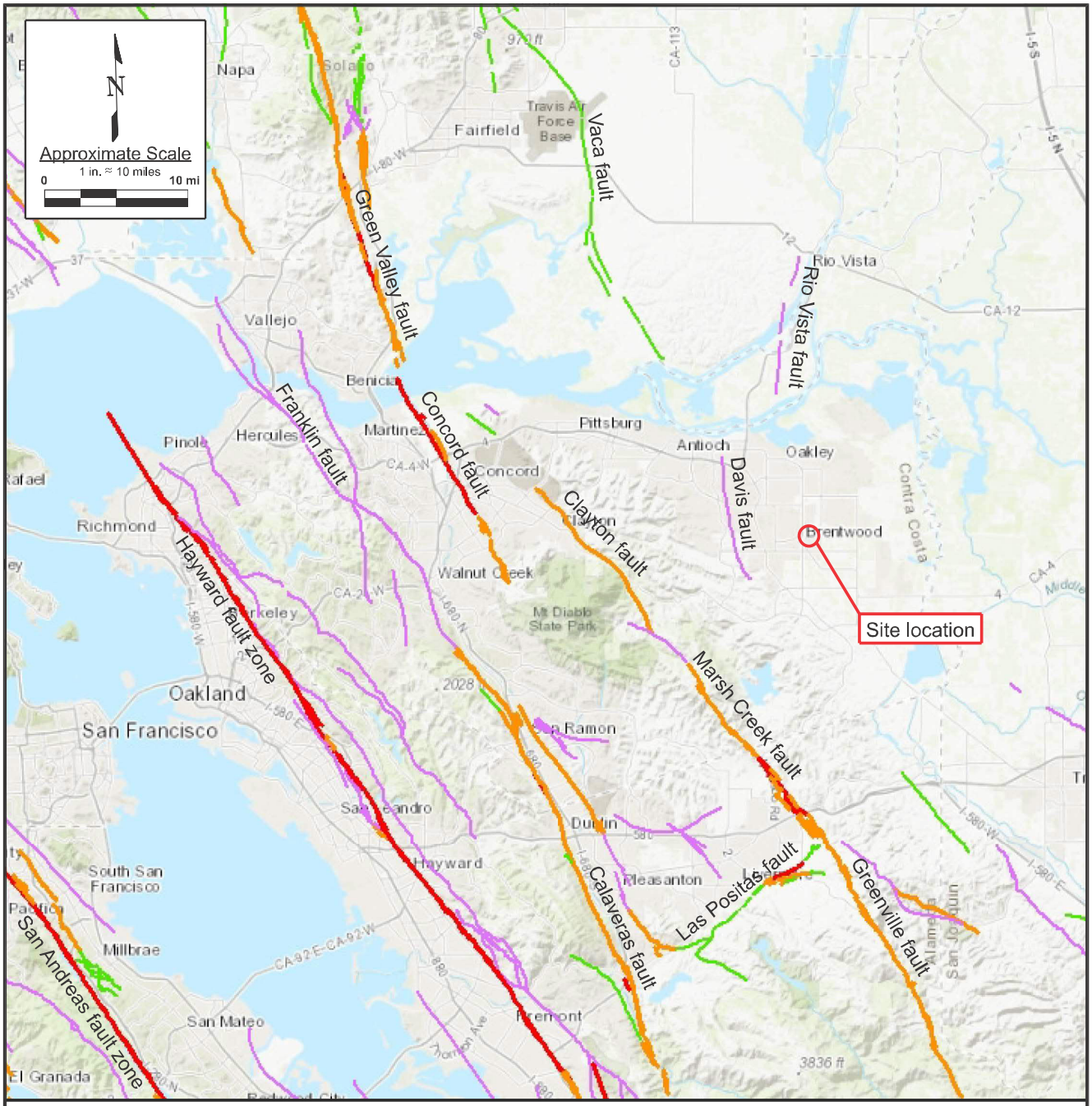
BSK ASSOCIATES

PROJECT NO. G17-238-11L
DRAWN: 2/28/2018
DRAWN BY: R. Renedo
CHECKED BY: M. Cline
FILE NAME: FEMA Flood Map

FEMA FLOOD HAZARD MAP

Campus Expansion
Liberty High School
850 2nd Street
Brentwood, California

FIGURE
D-7



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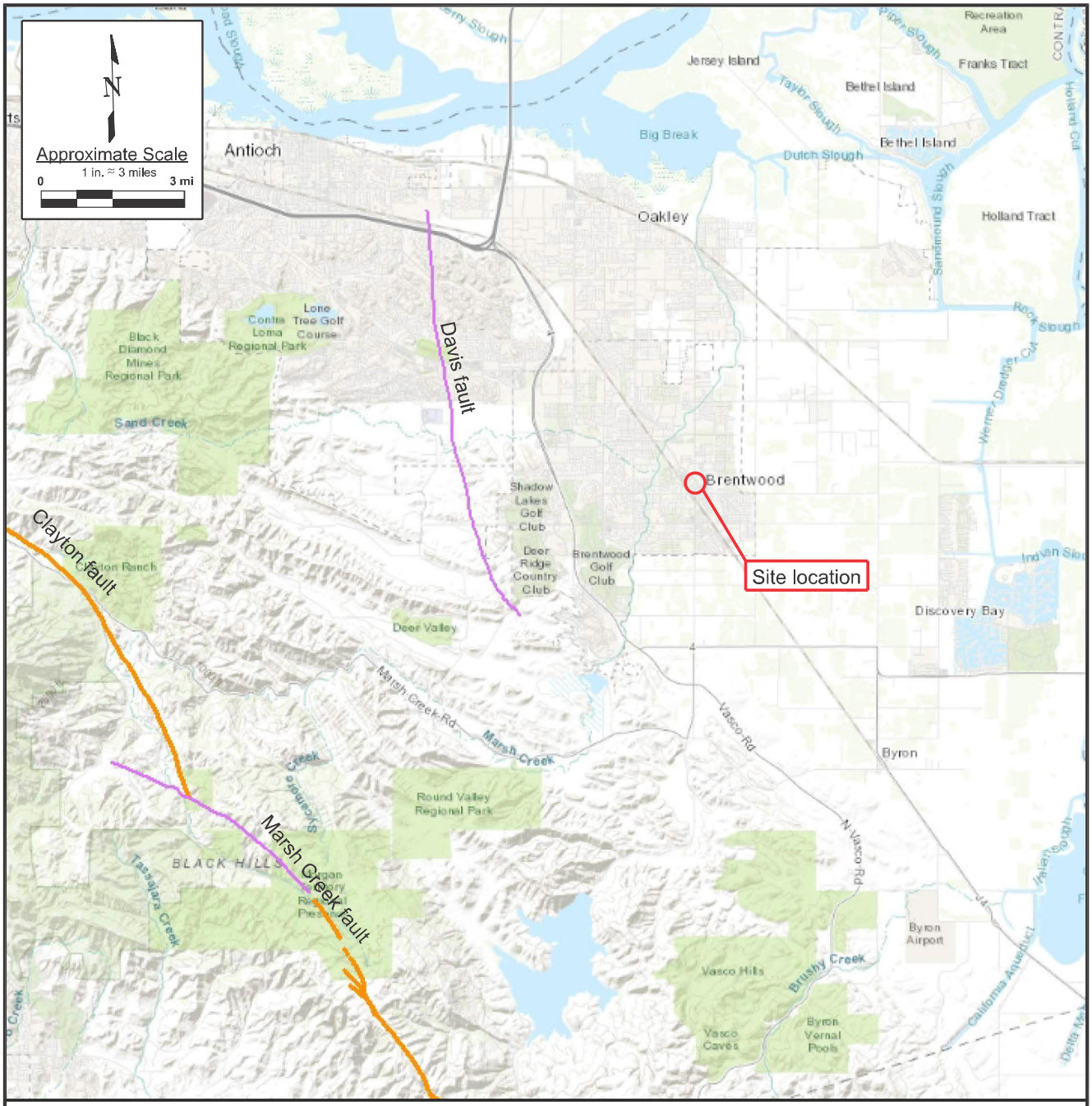
LEGEND

Quaternary Faults (Age)

- <200 years (Historic)
- <11,700 years (Holocene)
- <700,000 years (Late Quaternary)
- <1,600,000 years (Quaternary)

BSK ASSOCIATES

PROJECT NO. G17-238-11L	**REGIONAL FAULT MAP**	FIGURE
DRAWN: 2/19/2018		**D-8**
DRAWN BY: R. Renedo		
CHECKED BY: M. Cline	Campus Expansion Liberty `High School 850 2nd Street Brentwood, California	
FILE NAME: Regional Fault Map		



Reference: Jennings, C.W., and Bryant, W.A., 2010, Fault Activity Map of California, California Geological Survey, scale 1:750,000.

LEGEND

Quaternary Faults (Age)

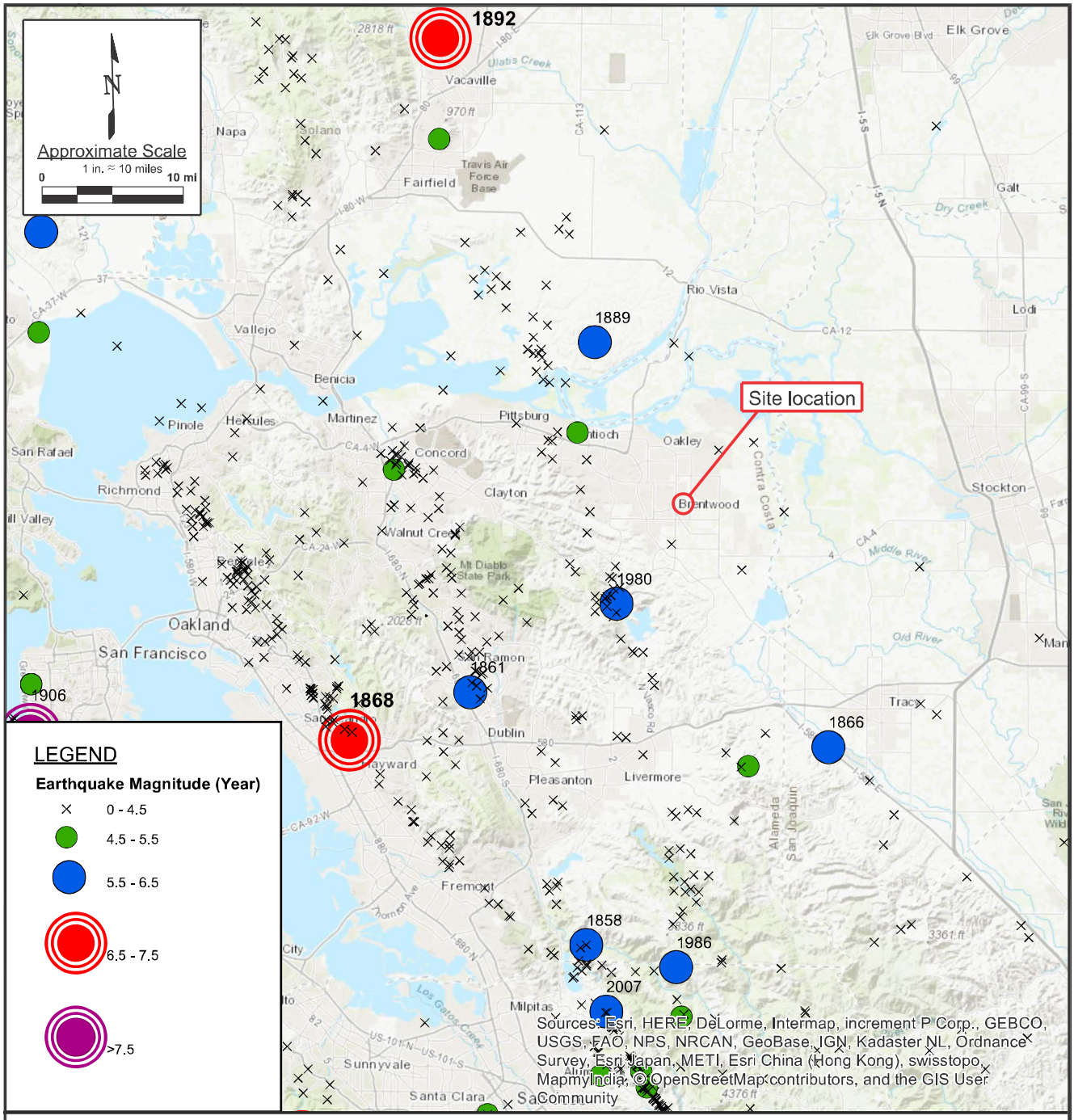
- <200 years (Historic)
- <11,700 years (Holocene)
- <700,000 years (Late Quaternary)
- <1,600,000 years (Quaternary)

BSK ASSOCIATES

PROJECT NO. G17-238-11L	**LOCAL FAULT MAP**
DRAWN: 2/19/2018	
DRAWN BY: R. Renedo	
CHECKED BY: M. Cline	Campus Expansion Liberty High School 850 2nd Street Brentwood, California
FILE NAME: Local Fault Map	

FIGURE

D-9



Reference: National Seismic Hazard Model (NSHM) Earthquake Catalogs, 2014 NSHM Catalogs, USGS, https://github.com/usgs/nshmp-haz-catalogs.

BSK ASSOCIATES

PROJECT NO. G17-238-11L	**HISTORICAL EARTHQUAKE MAP**
DRAWN: 2/27/2018	
DRAWN BY: M. Cline	
CHECKED BY: R. Renedo	Campus Expansion Liberty High School 850 2nd Street Brentwood, California
FILE NAME: Historic EQ Map	

FIGURE

D-10

CPT-1 Estimations

	In situ data					Estimations											
No	Depth (ft)	Thickness (ft)	qc (tsf)	fs (tsf)	SBTn	Ksbt (ft/s)	Cv (ft2/s)	SPT N60 (blows/ft)	Con. Mod. (tsf)	Es (tsf)	Go (tsf)	Su (tsf)	Su ratio	Thickness/ Vs (s)	Vs (ft/s)	Ko	Sensitivity	Peak phi (°)
1	0.33	0.33	451.8	1.5	7	0.00E+00	0.00E+00	54	1215.64	969.93	1215.64	0	0	0.00041019	804.51	0	0	20
2	0.49	0.16	343.5	1.9	7	1.92E-02	3.70E-01	49	1202.86	959.73	1202.86	0	0	0.00019993	800.27	0	0	20
3	0.66	0.17	268.8	2.1	7	4.90E-03	8.78E-02	41	1119.29	893.05	1119.29	0	0	0.00022022	771.97	0	0	20
4	0.82	0.16	161	2.3	6	1.20E-03	1.86E-02	31	966.49	771.13	966.49	0	0	0.00022305	717.34	0	0	20
5	0.98	0.16	88.4	2	8	1.71E-04	2.24E-03	22	821.98	655.84	821.98	0	0	0.00024186	661.55	0	0	20
6	1.15	0.17	60	2.8	8	4.09E-05	4.79E-04	17	731.11	583.33	731.11	0	0	0.00027248	623.91	0	0	20
7	1.31	0.16	64.2	2.7	8	1.97E-05	2.33E-04	17	739.75	590.23	739.75	0	0	0.00025494	627.59	0	0	20
8	1.48	0.17	64.4	2.9	8	1.69E-05	2.01E-04	16	742.72	592.59	742.72	0	0	0.00027034	628.84	0	0	20
9	1.64	0.16	54.9	2.8	9	1.33E-05	1.60E-04	16	754.18	601.74	754.18	4.26	88.84	0.0002525	633.67	3	1.44	20
10	1.8	0.16	59.2	3	9	9.83E-06	1.15E-04	15	729.69	582.2	729.69	3.9	74.17	0.0002567	623.3	3	1.35	20
11	1.97	0.17	49.4	2.7	9	8.62E-06	9.62E-05	15	696.84	555.99	696.84	3.64	63.2	0.0002791	609.11	3	1.35	20
12	2.13	0.16	44.7	2.2	9	7.02E-06	7.18E-05	13	638.66	509.57	638.66	3.21	51.61	0.00027438	583.13	3	1.35	20
13	2.3	0.17	41.3	2.1	9	6.23E-06	6.04E-05	12	604.95	482.67	604.95	2.98	44.31	0.00029954	567.53	3	1.37	20
14	2.46	0.16	39.5	2.1	9	4.64E-06	4.00E-05	12	538.56	469.66	588.64	2.75	38.21	0.0002858	559.83	2.95	1.28	20
15	2.62	0.16	35.1	2.1	9	3.49E-06	2.69E-05	11	482.6	443.16	555.43	2.46	32.15	0.00029422	543.81	2.84	1.23	20
16	2.79	0.17	29.4	1.7	9	2.52E-06	1.66E-05	9	412.2	401.41	503.1	2.1	25.79	0.00032846	517.56	2.69	1.19	20
17	2.95	0.16	24.6	1.4	9	2.10E-06	1.17E-05	8	348.17	350.44	439.22	1.78	20.6	0.00033087	483.58	2.52	1.24	20
18	3.12	0.17	21.4	1.1	9	1.86E-06	8.81E-06	7	295.98	304.52	381.66	1.51	16.56	0.00037712	450.78	2.37	1.35	20
19	3.28	0.16	18.2	0.8	9	1.88E-06	7.72E-06	6	256.87	263.86	330.7	1.31	13.67	0.00038131	419.61	2.23	1.54	20
20	3.45	0.17	16.2	0.6	4	1.94E-06	7.06E-06	5	226.61	231.27	289.85	1.16	11.46	0.00043275	392.84	2.1	1.79	20
21	3.61	0.16	14.9	0.5	4	1.56E-06	5.08E-06	5	203.25	215.87	270.56	1.04	9.83	0.00042156	379.54	2.02	1.79	20
22	3.77	0.16	13.2	0.6	4	9.29E-07	2.64E-06	5	177.6	207.16	259.64	0.91	8.22	0.00043034	371.8	1.95	1.57	20
23	3.94	0.17	10.7	0.6	4	5.29E-07	1.30E-06	4	153.35	198.09	248.27	0.78	6.79	0.00046759	363.57	1.88	1.35	20
24	4.1	0.16	9.7	0.5	4	4.43E-07	9.81E-07	4	138.35	184.55	231.3	0.71	5.89	0.00045593	350.93	1.8	1.38	20
25	4.27	0.17	10	0.4	4	6.46E-07	1.44E-06	4	139.57	173.86	217.91	0.71	5.71	0.00049909	340.62	1.76	1.74	20
26	4.43	0.16	11	0.3	4	1.07E-06	2.42E-06	4	141.74	161.29	202.15	0.72	5.58	0.0004877	328.07	1.72	2.36	20
27	4.59	0.16	10.2	0.2	5	1.84E-06	4.11E-06	3	139.27	143.53	179.9	0	0	0.00051698	309.49	0	0	20
28	4.76	0.17	9.5	0.1	5	2.59E-06	5.41E-06	3	130.75	126.73	158.83	0	0	0.00058459	290.8	0	0	20
29	4.92	0.16	9.2	0.1	5	2.29E-06	4.68E-06	3	127.84	126.69	158.78	0	0	0.00055028	290.76	0	0	20
30	5.09	0.17	9.6	0.2	5	1.56E-06	3.20E-06	3	127.69	135.55	169.89	0	0	0.00056525	300.75	0	0	20
31	5.25	0.16	9.5	0.2	5	1.35E-06	2.92E-06	3	134.58	146.64	183.79	0	0	0.00051149	312.81	0	0	20
32	5.41	0.16	10.7	0.2	5	1.44E-06	3.19E-06	3	138.66	149.47	187.33	0	0	0.00050662	315.82	0	0	20
33	5.58	0.17	10.5	0.2	5	1.50E-06	3.42E-06	4	142.24	152.14	190.68	0	0	0.00053355	318.62	0	0	20
34	5.74	0.16	10.3	0.2	5	1.71E-06	3.77E-06	3	137.88	144.07	180.57	0	0	0.00051603	310.06	0	0	20
35	5.91	0.17	9.8	0.1	5	1.71E-06	3.47E-06	3	126.98	132.67	166.28	0	0	0.00057135	297.54	0	0	20
36	6.07	0.16	8.2	0.1	5	1.61E-06	2.90E-06	3	112.37	118.62	148.67	0	0	0.00056869	281.35	0	0	20
37	6.23	0.16	7.2	0.1	5	1.10E-06	1.78E-06	3	101.5	114.89	144	0	0	0.00057785	276.89	0	0	20
38	6.4	0.17	7.5	0.1	5	8.34E-07	1.27E-06	3	94.84	112.81	141.39	0	0	0.00061958	274.38	0	0	20
39	6.56	0.16	6.8	0.1	4	4.77E-07	7.02E-07	3	91.92	120.97	151.62	0.47	2.45	0.00056314	284.12	1.37	3.45	20
40	6.73	0.17	6.6	0.2	4	2.73E-07	3.84E-07	3	87.59	0	159.77	0.45	2.27	0.00058287	291.66	1.36	2.63	20
41	6.89	0.16	6.6	0.2	4	2.19E-07	3.17E-07	3	90.26	0	171.34	0.46	2.29	0.00052973	302.04	1.37	2.26	20
42	7.05	0.16	7.4	0.2	4	2.78E-07	4.34E-07	3	97.57	0	177.44	0.5	2.42	0.00052056	307.36	1.39	2.44	20
43	7.22	0.17	8.2	0.2	4	4.60E-07	8.39E-07	3	113.77	150.69	188.86	0.58	2.75	0.00053611	317.1	1.43	2.84	20
44	7.38	0.16	10.1	0.2	5	8.06E-07	1.74E-06	4	134.63	161.13	201.95	0	0	0.00048794	327.91	0	0	20
45	7.55	0.17	11.9	0.2	5	1.22E-06	2.99E-06	4	152.68	169.44	212.37	0	0	0.00050556	336.26	0	0	20
46	7.71	0.16	12.1	0.2	5	8.99E-07	2.32E-06	4	160.92	188.82	236.66	0	0	0.00045074	354.97	0	0	20
47	7.87	0.16	11.9	0.4	4	5.87E-07	1.50E-06	4	159.87	202.61	253.94	0.82	3.55	0.00043514	367.7	1.56	2.4	20
48	8.04	0.17	11.7	0.4	4	4.01E-07	1.02E-06	4	158.36	215.07	269.55	0.81	3.44	0.00044874	378.84	1.56	1.98	20
49	8.2	0.16	11.8	0.4	4	3.96E-07	1.01E-06	4	159.17	216.64	271.52	0.81	3.39	0.00042082	380.21	1.56	1.99	20
50	8.37	0.17	12.1	0.4	4	4.73E-07	1.23E-06	4	161.78	213.19	267.19	0.83	3.37	0.00045073	377.17	1.55	2.21	20
51	8.53	0.16	12.3	0.3	4	6.16E-07	1.66E-06	5	167.68	210.66	264.03	0.86	3.43	0.00042675	374.93	1.55	2.52	20
52	8.69	0.16	13.1	0.3	5	8.92E-07	2.55E-06	5	178.26	209.46	262.53	0	0	0.00042796	373.87	0	0	20
53	8.86	0.17	14.4	0.3	5	1.58E-06	5.05E-06	5	199.61	211.51	265.09	0	0	0.0004525	375.69	0	0	20
54	9.02	0.16	16.9	0.2	5	3.26E-06	1.21E-05	5	231.69	215.29	269.83	0	0	0.00042213	379.03	0	0	20
55	9.19	0.17	20	0.2	5	5.56E-06	2.26E-05	6	253.94	214.3	268.59	0	0	0.00044955	378.16	0	0	20
56	9.35	0.16	19.2	0.2	5	4.24E-06	1.72E-05	6	252.87	224.1	280.88	0	0	0.00041375	386.71	0	0	20

57	9.51	0.16	16.7	0.3	5	2.27E-06	8.68E-06	6	239.2	237.45	297.6	0	0	0.00040195	398.06	0	0	20
58	9.68	0.17	17.1	0.4	5	1.48E-06	5.57E-06	6	234.88	251.81	315.6	0	0	0.00041472	409.92	0	0	20
59	9.84	0.16	18.3	0.4	5	1.36E-06	5.22E-06	6	240.37	261.82	328.15	0	0	0.00038278	417.99	0	0	20
60	10.01	0.17	17.9	0.4	5	1.55E-06	6.00E-06	6	241.18	256.37	321.31	0	0	0.00041102	413.61	0	0	20
61	10.17	0.16	17.3	0.3	5	1.34E-06	4.79E-06	6	223.31	243.8	305.56	0	0	0.00039668	403.35	0	0	20
62	10.34	0.17	14.5	0.3	5	1.06E-06	3.23E-06	5	190.92	217.53	272.64	0	0	0.00044619	381	0	0	20
63	10.5	0.16	11	0.2	4	4.32E-07	1.04E-06	4	150.63	201.84	252.97	0.77	2.5	0.00043597	367	1.42	2.82	20
64	10.66	0.16	8.7	0.3	4	1.43E-07	2.73E-07	4	118.74	0	243.44	0.61	1.94	0.00044442	360.02	1.34	1.98	20
65	10.83	0.17	7.7	0.4	3	5.66E-08	1.04E-07	4	114.9	0	278.67	0.59	1.85	0.00044134	385.19	1.35	1.23	20
66	10.99	0.16	10.2	0.7	3	5.02E-08	1.02E-07	4	126.91	0	314.54	0.65	2.02	0.00039098	409.23	1.39	1.06	20
67	11.16	0.17	11.3	0.7	3	6.40E-08	1.51E-07	5	147.3	0	349.38	0.75	2.3	0.00039416	431.3	1.45	1.05	20
68	11.32	0.16	12.1	0.7	3	1.06E-07	2.88E-07	5	169.52	0	366.98	0.86	2.61	0.00036197	442.03	1.5	1.21	20
69	11.48	0.16	15	0.7	4	1.88E-07	5.96E-07	6	198.28	0	387.17	1.01	3.01	0.00035241	454.02	1.55	1.42	20
70	11.65	0.17	17.5	0.7	4	2.57E-07	8.93E-07	6	216.81	0	399.91	1.11	3.25	0.00036841	461.44	1.58	1.55	20
71	11.81	0.16	16.1	0.7	4	2.46E-07	8.07E-07	6	205.03	0	381.31	1.05	3.03	0.0003551	450.58	1.55	1.62	20
72	11.98	0.17	12.5	0.5	4	2.04E-07	5.90E-07	5	180.64	0	347.42	0.92	2.63	0.00039527	430.09	1.48	1.69	20
73	12.14	0.16	12.3	0.4	3	9.88E-08	2.52E-07	5	159.03	0	348.74	0.81	2.29	0.00037131	430.91	1.43	1.33	20
74	12.3	0.16	11.5	0.9	3	6.53E-08	1.70E-07	6	162.18	0	383.29	0.83	2.3	0.00035418	451.75	1.45	1.06	20
75	12.47	0.17	13.2	1	3	4.66E-08	1.28E-07	6	171.38	0	430.48	0.87	2.4	0.00035509	478.75	1.48	0.86	20
76	12.63	0.16	14.3	1.1	3	1.31E-07	4.97E-07	7	237.03	0	494.03	1.21	3.28	0.00031197	512.87	1.62	1.08	20
77	12.8	0.17	25.5	1.2	3	2.44E-07	1.15E-06	9	293.45	0	546.32	1.5	4	0.00031521	539.33	1.71	1.22	20
78	13.06	0.26	25.2	1.3	4	3.59E-07	1.94E-06	9	336.47	0	584.15	1.72	4.5	0.00046621	557.69	1.77	1.33	20
79	13.12	0.06	23.4	1.3	4	3.47E-07	1.88E-06	10	338.67	0	591.69	1.73	4.51	0.0001069	561.28	1.77	1.3	20
80	13.29	0.17	25.9	1.3	4	3.68E-07	2.01E-06	10	340.98	470.22	589.34	1.74	4.48	0.00030348	560.16	1.77	1.35	20
81	13.45	0.16	25.7	1.2	4	4.04E-07	2.24E-06	10	346.01	469.23	588.1	1.77	4.49	0.00028593	559.57	1.77	1.4	20
82	13.62	0.17	24.5	1.2	4	4.10E-07	2.22E-06	9	338.97	458.56	574.72	1.73	4.34	0.00030732	553.17	1.75	1.45	20
83	13.78	0.16	24.4	1.1	4	3.86E-07	2.07E-06	9	335.35	458.58	574.76	1.71	4.25	0.00028923	553.19	1.74	1.44	20
84	13.94	0.16	24.9	1.2	4	3.99E-07	2.17E-06	9	339.84	461.91	578.92	1.73	4.26	0.00028819	555.19	1.74	1.46	20
85	14.11	0.17	25.4	1.2	4	3.81E-07	2.12E-06	10	347.42	476.13	596.75	1.77	4.3	0.00030159	563.67	1.75	1.41	20
86	14.27	0.16	26	1.3	4	4.04E-07	2.29E-06	10	354.25	480.41	602.11	1.81	4.33	0.00028259	566.2	1.75	1.44	20
87	14.44	0.17	26.3	1.2	4	3.87E-07	2.21E-06	10	356.99	487.88	611.48	1.82	4.32	0.00029794	570.58	1.75	1.41	20
88	14.6	0.16	26	1.3	4	3.92E-07	2.26E-06	10	359.84	490.55	614.82	1.84	4.3	0.00027965	572.14	1.75	1.42	20
89	14.76	0.16	26.6	1.3	4	3.70E-07	2.17E-06	10	365.64	503.85	631.49	1.87	4.32	0.00027594	579.84	1.76	1.37	20
90	14.93	0.17	27.6	1.4	4	3.71E-07	2.24E-06	11	377.1	519.41	651	1.92	4.41	0.00028876	588.73	1.77	1.35	20
91	15.09	0.16	28.5	1.5	4	3.70E-07	2.30E-06	11	388.07	534.58	670	1.98	4.49	0.00026789	597.27	1.78	1.32	20
92	15.26	0.17	29	1.5	4	3.76E-07	2.38E-06	11	395.97	543.99	681.8	2.02	4.53	0.00028216	602.5	1.79	1.32	20
93	15.42	0.16	29.3	1.5	4	3.99E-07	2.55E-06	11	398.82	542.13	679.47	2.03	4.51	0.00026601	601.47	1.78	1.36	20
94	15.58	0.16	29.1	1.4	4	4.13E-07	2.64E-06	11	399.09	539.14	675.73	2.04	4.47	0.00026675	599.81	1.78	1.39	20
95	15.75	0.17	29	1.4	4	4.35E-07	2.83E-06	11	406.3	543.6	681.31	2.07	4.5	0.00028226	602.28	1.78	1.42	20
96	15.91	0.16	30.8	1.5	4	4.71E-07	3.22E-06	12	426.29	562.25	704.69	2.17	4.68	0.00026121	612.53	1.8	1.42	20
97	16.08	0.17	33.4	1.6	4	5.77E-07	4.21E-06	12	455.96	579.7	726.56	2.33	4.95	0.00027333	621.97	1.83	1.49	20
98	16.24	0.16	35.4	1.5	4	6.93E-07	5.26E-06	13	473.98	582.94	730.62	2.42	5.09	0.00025653	623.7	1.85	1.58	20
99	16.4	0.16	34.6	1.4	4	7.78E-07	5.96E-06	12	478.29	576.12	722.07	2.44	5.09	0.00025805	620.04	1.85	1.67	20
100	16.57	0.17	34	1.4	4	7.12E-07	5.35E-06	12	469.51	574.71	720.3	2.4	4.95	0.00027451	619.28	1.83	1.64	20
101	16.73	0.16	33.3	1.5	4	6.14E-07	4.52E-06	12	459.52	577.67	724.01	2.34	4.79	0.0002577	620.87	1.82	1.57	20
102	16.9	0.17	32.4	1.5	4	5.54E-07	3.99E-06	12	449.48	575.68	721.51	2.29	4.64	0.00027428	619.8	1.8	1.53	20
103	17.06	0.16	32.1	1.4	4	5.32E-07	3.72E-06	12	435.9	562.34	704.8	2.22	4.46	0.00026119	612.58	1.78	1.56	20
104	17.23	0.17	30.6	1.3	4	5.25E-07	3.57E-06	12	425.12	549.88	689.18	2.17	4.31	0.00028064	605.76	1.76	1.59	20
105	17.39	0.16	30.2	1.3	4	5.14E-07	3.40E-06	11	413.36	536.72	672.69	2.11	4.15	0.00026735	598.46	1.74	1.63	20
106	17.55	0.16	29.6	1.2	4	5.08E-07	3.32E-06	11	408.09	530.97	665.48	2.08	4.06	0.00026879	595.25	1.73	1.65	20
107	17.72	0.17	29.4	1.2	4	5.58E-07	3.64E-06	11	407.81	521.64	653.79	2.08	4.02	0.00028814	589.99	1.72	1.75	20
108	17.88	0.16	30.1	1.1	4	6.24E-07	4.15E-06	11	414.85	520.02	651.76	2.12	4.05	0.00027161	589.08	1.72	1.83	20
109	18.05	0.17	31.1	1.1	4	6.76E-07	4.60E-06	11	424.96	524.99	657.99	2.17	4.11	0.00028722	591.89	1.73	1.87	20
110	18.21	0.16	31.5	1.2	4	7.08E-07	4.97E-06	12	437.83	536.37	672.25	2.23	4.2	0.00026744	598.27	1.74	1.88	20
111	18.37	0.16	32.9	1.2	4	7.26E-07	5.28E-06	12	454.65	554.56	695.05	2.32	4.32	0.00026302	608.33	1.76	1.84	20
112	18.54	0.17	34.9	1.3	4	9.68E-07	7.71E-06	13	497.23	575.65	721.49	2.54	4.68	0.00027429	619.79	1.8	1.96	20
113	18.7	0.16	40.9	1.3	4	1.09E-06	9.19E-06	13	527.27	597.72	749.14	2.69	4.92	0.00025334	631.55	1.83	1.98	20
114	18.87	0.17	39.9	1.4	4	9.90E-07	8.29E-06	13	523.32	603.48	756.37	2.67	4.84	0.00026789	634.59	1.83	1.91	20
115	19.03	0.16	34.4	1.4	4	7.66E-07	6.34E-06	14	516.67	624.13	782.24	2.64	4.74	0.00024792	645.36	1.82	1.72	20

116	19.19	0.16	39.7	1.7	4	7.71E-07	6.92E-06	15	560.03	675.66	846.82	2.86	5.09	0.00023828	671.47	1.87	1.62	20
117	19.36	0.17	48.9	2.1	4	7.90E-07	7.58E-06	16	599	719.53	901.81	3.06	5.4	0.00024534	692.93	1.9	1.55	20
118	19.52	0.16	42.8	2	4	6.16E-07	5.52E-06	15	559.57	703.13	881.26	2.85	5	0.00023358	684.98	1.86	1.47	20
119	19.69	0.17	31.5	1.6	4	3.27E-07	2.27E-06	12	433.29	0	765.2	2.21	3.84	0.00026634	638.29	1.71	1.38	20
120	19.85	0.16	22.2	1.1	3	1.29E-07	6.20E-07	10	300.73	0	628.7	1.53	2.64	0.00027654	578.57	1.53	1.25	20
121	20.01	0.16	14.4	0.9	3	5.00E-08	1.69E-07	7	210.47	0	522.04	1.07	1.84	0.00030348	527.21	1.36	1.13	20
122	20.18	0.17	12.1	0.8	3	2.61E-08	7.01E-08	6	167.38	0	466.84	0.85	1.45	0.00034098	498.56	1.26	1.05	20
123	20.34	0.16	12.9	0.7	3	2.84E-08	7.30E-08	6	160.6	0	441.37	0.82	1.38	0.00033005	484.77	1.24	1.15	20
124	20.51	0.17	12.9	0.6	3	3.74E-08	9.84E-08	6	164.36	0	429.73	0.84	1.4	0.0003554	478.33	1.24	1.3	20
125	20.67	0.16	12.9	0.6	3	4.07E-08	1.10E-07	6	168.49	0	433.87	0.86	1.42	0.0003329	480.63	1.25	1.33	20
126	20.83	0.16	13.8	0.7	3	4.50E-08	1.31E-07	7	181.87	0	459.88	0.93	1.52	0.00032334	494.83	1.28	1.3	20
127	21	0.17	15.8	0.8	3	6.80E-08	2.25E-07	7	206.94	0	485.49	1.06	1.72	0.00033437	508.42	1.33	1.41	20
128	21.16	0.16	18.3	0.7	3	8.03E-08	2.78E-07	7	216.42	0	492.76	1.1	1.79	0.00031237	512.21	1.34	1.48	20
129	21.33	0.17	15.9	0.7	3	6.95E-08	2.33E-07	7	209.64	0	489.95	1.07	1.72	0.00033284	510.75	1.33	1.43	20
130	21.49	0.16	14.4	0.8	3	4.97E-08	1.54E-07	7	193.66	0	480.89	0.99	1.57	0.00031621	506	1.29	1.32	20
131	21.65	0.16	14.9	0.7	3	4.67E-08	1.43E-07	7	191.37	0	480.66	0.98	1.54	0.00031628	505.88	1.28	1.3	20
132	21.82	0.17	15.4	0.7	3	4.78E-08	1.48E-07	7	193.29	0	483.35	0.99	1.55	0.00033511	507.3	1.28	1.32	20
133	21.98	0.16	14.8	0.8	3	4.85E-08	1.55E-07	7	198.89	0	496.03	1.01	1.58	0.00031134	513.91	1.29	1.3	20
134	22.15	0.17	16.1	0.8	3	5.63E-08	1.91E-07	7	211.42	0	513.23	1.08	1.67	0.00032521	522.74	1.32	1.32	20
135	22.31	0.16	18.1	0.8	3	7.94E-08	2.76E-07	7	216.76	0	494.44	1.11	1.7	0.00031184	513.08	1.32	1.55	20
136	22.47	0.16	16	0.5	3	8.59E-08	2.91E-07	7	211.62	0	475.95	1.08	1.64	0.00031785	503.39	1.31	1.67	20
137	22.64	0.17	15	0.6	4	1.03E-07	3.49E-07	7	211.16	0	459.39	1.08	1.63	0.00034374	494.56	1.3	1.86	20
138	22.8	0.16	17.9	0.6	4	4.03E-07	2.07E-06	9	319.7	433.67	543.53	1.63	2.45	0.00029743	537.95	1.48	2.4	20
139	22.97	0.17	39.1	0.8	5	1.98E-06	1.67E-05	13	526.94	535.9	671.66	0	0	0.00028428	598	0	0	20
140	23.13	0.16	59.6	1.1	5	4.74E-06	5.51E-05	16	725.29	629.89	789.46	0	0	0.00024679	648.33	0	0	20
141	23.3	0.17	60.7	1.2	5	4.06E-06	4.96E-05	17	762.97	681.62	854.3	0	0	0.00025206	674.43	0	0	20
142	23.46	0.16	47.5	1.4	5	2.25E-06	2.39E-05	16	662.25	658.19	824.93	0	0	0.00024143	662.73	0	0	20
143	23.62	0.16	37.8	1.1	4	7.97E-07	6.49E-06	13	508.28	609.49	763.9	2.59	3.76	0.00025089	637.74	1.7	2.12	20
144	23.79	0.17	27.5	1.1	4	4.55E-07	3.20E-06	12	438.43	581.86	729.27	2.24	3.22	0.00027282	623.12	1.62	1.88	20
145	23.95	0.16	31.9	1.3	4	3.54E-07	2.31E-06	12	407.59	0	709.63	2.08	2.97	0.0002603	614.67	1.58	1.8	20
146	24.12	0.17	31.1	1	4	3.72E-07	2.36E-06	11	395.77	544.67	682.66	2.02	2.86	0.00028198	602.88	1.56	1.92	20
147	24.28	0.16	24.9	0.8	4	3.07E-07	1.71E-06	10	347.95	0	621.56	1.78	2.5	0.00027813	575.27	1.5	2.01	20
148	24.44	0.16	21.7	0.8	4	2.33E-07	1.26E-06	10	337.97	0	634.71	1.72	2.41	0.00027524	581.32	1.48	1.81	20
149	24.61	0.17	28.9	1.2	4	5.18E-07	3.64E-06	12	439.39	569.7	714.03	2.24	3.12	0.00027571	616.58	1.61	2.06	20
150	24.77	0.16	46.6	1.2	5	1.64E-06	1.60E-05	15	609.59	641.34	803.82	0	0	0.00024457	654.2	0	0	20
151	24.94	0.17	58.8	1.1	5	2.29E-06	2.33E-05	15	634.7	628.7	787.97	0	0	0.00026246	647.72	0	0	20
152	25.1	0.16	34.3	0.9	5	1.52E-06	1.32E-05	13	540.18	576.36	722.37	0	0	0.00025799	620.17	0	0	20
153	25.26	0.16	26.2	0.8	4	6.69E-07	4.42E-06	11	412.56	510.64	640.01	2.1	2.85	0.00027409	583.74	1.56	2.58	20
154	25.43	0.17	30.6	0.7	4	6.28E-07	4.02E-06	11	399.43	500.14	626.84	2.04	2.74	0.00029427	577.71	1.76	2.6	40
155	25.59	0.16	31.1	0.8	4	6.81E-07	4.46E-06	11	408.58	504.11	631.81	2.08	2.79	0.00027587	579.99	1.78	2.66	40
156	25.76	0.17	28.2	0.8	4	4.63E-07	2.87E-06	11	387.79	513.14	643.13	1.98	2.63	0.00029051	585.17	1.52	2.33	20
157	25.92	0.16	26.5	0.9	4	3.73E-07	2.25E-06	11	376.06	517.27	648.31	1.92	2.53	0.00027233	587.52	1.5	2.17	20
158	26.08	0.16	28.8	0.9	4	3.48E-07	2.07E-06	11	370.8	0	647.36	1.89	2.48	0.00027253	587.09	1.5	2.14	20
159	26.25	0.17	27.2	0.8	4	3.58E-07	2.07E-06	10	360.55	0	626.42	1.84	2.4	0.00029436	577.52	1.48	2.25	20
160	26.41	0.16	24.5	0.7	4	3.04E-07	1.59E-06	10	326.85	0	584.74	1.67	2.16	0.00028675	557.97	1.43	2.33	20
161	26.58	0.17	21.8	0.6	4	2.44E-07	1.13E-06	9	289.7	0	539.46	1.48	1.9	0.00031721	535.93	1.37	2.41	20
162	26.74	0.16	19.2	0.5	4	1.84E-07	7.79E-07	8	264.47	0	518.22	1.35	1.73	0.0003046	525.28	1.33	2.33	20
163	26.9	0.16	18.9	0.6	4	1.81E-07	7.46E-07	8	257.19	0	505.43	1.31	1.67	0.00030843	518.75	1.33	2.41	37.85
164	27.07	0.17	20.1	0.5	4	1.95E-07	8.45E-07	8	269.98	0	523.34	1.38	1.74	0.00032206	527.86	1.35	2.38	39.06
165	27.23	0.16	21.7	0.6	4	2.36E-07	1.10E-06	9	290.81	0	544.77	1.48	1.86	0.00029709	538.56	1.4	2.42	40
166	27.4	0.17	23	0.7	4	2.11E-07	1.03E-06	9	304.52	0	582.02	1.55	1.94	0.00030539	556.67	1.44	2.18	40
167	27.56	0.16	23	0.8	4	1.65E-07	8.09E-07	10	306.07	0	611.62	1.56	1.94	0.00028038	570.65	1.44	1.91	40
168	27.72	0.16	22.1	0.9	4	1.39E-07	6.66E-07	10	299.95	0	618.64	1.53	1.89	0.00027878	573.92	1.43	1.8	39.37
169	27.89	0.17	22.1	0.8	4	1.25E-07	5.85E-07	10	293.25	0	616.57	1.5	1.84	0.0002967	572.96	1.41	1.76	39.19
170	28.05	0.16	21.6	0.8	4	1.27E-07	6.01E-07	10	295.37	0	618.99	1.51	1.84	0.00027871	574.08	1.41	1.77	39.09
171	28.22	0.17	22.6	0.9	4	1.28E-07	6.22E-07	10	302.55	0	632.77	1.54	1.87	0.00029289	580.43	1.43	1.75	39.01
172	28.38	0.16	23.7	0.9	4	1.23E-07	6.24E-07	10	316.34	0	666.52	1.61	1.95	0.00026859	595.71	1.46	1.64	39.07
173	28.54	0.16	24.6	1.1	4	1.41E-07	7.54E-07	11	333.17	0	684.73	1.7	2.04	0.00026499	603.79	1.5	1.67	39.35
174	28.71	0.17	26.2	1	4	1.47E-07	8.46E-07	11	358.35	0	730.99	1.83	2.18	0.0002725	623.86	1.56	1.58	40

175	28.87	0.16	28.9	1.3	4	1.96E-07	1.21E-06	12	384.86	0	745.28	1.96	2.33	0.000254	629.93	1.62	1.7	40
176	29.04	0.17	30	1.1	4	2.14E-07	1.37E-06	12	399.28	0	761.58	2.04	2.4	0.00026697	636.78	1.66	1.71	40
177	29.2	0.16	29.4	1.1	4	2.31E-07	1.45E-06	12	390.73	0	734.66	1.99	2.34	0.00025583	625.42	1.63	1.83	40
178	29.36	0.16	26.9	1	4	2.15E-07	1.30E-06	12	379.01	0	722.34	1.93	2.25	0.000258	620.15	1.59	1.83	40
179	29.53	0.17	27.5	1	4	1.66E-07	1.01E-06	12	378.99	0	756.51	1.93	2.24	0.00026786	634.65	1.59	1.62	40
180	29.69	0.16	29	1.5	4	1.85E-07	1.23E-06	13	416.06	0	814.44	2.12	2.45	0.00024298	658.5	1.68	1.56	40
181	29.86	0.17	34.6	1.5	4	2.33E-07	1.73E-06	14	462.03	0	867.28	2.36	2.7	0.00025017	679.53	1.79	1.58	40
182	30.02	0.16	37.4	1.4	4	3.38E-07	2.65E-06	14	488.63	0	857.55	2.49	2.84	0.00023679	675.71	1.84	1.79	40
183	30.19	0.17	34.4	1.2	4	2.85E-07	2.18E-06	14	476.06	0	861.61	2.43	2.75	0.00025099	677.31	1.81	1.7	40
184	30.35	0.16	31.8	1.6	4	2.74E-07	2.12E-06	14	483.62	0	881.71	2.47	2.78	0.00023352	685.16	1.82	1.65	40
185	30.51	0.16	38.7	1.6	4	1.98E-07	1.47E-06	14	463.56	0	896.56	2.37	2.65	0.00023158	690.91	1.77	1.48	40
186	30.68	0.17	31.6	1.5	4	1.61E-07	1.09E-06	13	423.2	0	850.02	2.16	2.41	0.0002527	672.74	1.49	1.48	20
187	30.84	0.16	24.4	1.2	3	9.24E-08	5.18E-07	12	350.29	0	777.52	1.79	1.98	0.00024868	643.41	1.4	1.38	20
188	31.01	0.17	23.6	1.1	3	1.07E-07	5.71E-07	11	334.51	0	723.5	1.71	1.88	0.00027391	620.65	1.44	1.57	38.87
189	31.17	0.16	27.1	0.9	4	1.55E-07	8.55E-07	11	344.15	0	695.53	1.76	1.93	0.00026292	608.54	1.45	1.84	40
190	31.33	0.16	25.8	0.8	4	2.42E-07	1.39E-06	11	357.12	0	665.82	1.82	1.99	0.00026873	595.4	1.47	2.23	40
191	31.5	0.17	26.3	0.7	4	2.26E-07	1.27E-06	11	352.1	0	664.91	1.8	1.95	0.00028572	594.99	1.46	2.2	40
192	31.66	0.16	26.1	0.9	4	1.87E-07	1.07E-06	11	356.29	0	696.32	1.82	1.96	0.00026278	608.88	1.46	1.98	40
193	31.83	0.17	26.6	1.1	4	1.29E-07	7.54E-07	12	364.85	0	762.42	1.86	2	0.00026682	637.13	1.48	1.61	40
194	31.99	0.16	28.6	1.4	3	1.16E-07	6.97E-07	12	376.11	0	801.51	1.92	2.05	0.00024493	653.26	1.42	1.48	20
195	32.15	0.16	29.1	1.3	3	1.13E-07	6.96E-07	12	384.43	0	822.67	1.96	2.09	0.00024175	661.83	1.43	1.44	20
196	32.32	0.17	28.9	1.3	3	1.30E-07	8.12E-07	12	388.81	0	810.83	1.98	2.1	0.00025874	657.04	1.43	1.53	20
197	32.48	0.16	29.4	1.2	3	1.32E-07	8.13E-07	12	385.59	0	802.78	1.97	2.07	0.00024473	653.77	1.42	1.56	20
198	32.65	0.17	28.5	1.2	3	1.26E-07	7.60E-07	12	377.44	0	792.3	1.93	2.02	0.00026174	649.49	1.41	1.57	20
199	32.81	0.16	27.2	1.2	3	1.13E-07	6.60E-07	12	364.1	0	779.03	1.86	1.94	0.00024844	644.03	1.39	1.56	20
200	32.97	0.16	26.7	1.1	3	1.09E-07	6.23E-07	12	356.81	0	768.6	1.82	1.89	0.00025011	639.71	1.38	1.57	20
201	33.14	0.17	26.9	1.1	3	1.09E-07	6.15E-07	12	352.6	0	759.66	1.8	1.86	0.00026731	635.97	1.37	1.6	20
202	33.3	0.16	26.1	1.1	3	1.05E-07	5.91E-07	12	350.6	0	760.07	1.79	1.84	0.00025152	636.14	1.37	1.59	20
203	33.47	0.17	26.4	1.1	3	9.89E-08	5.49E-07	12	346.36	0	759.42	1.77	1.81	0.00026735	635.88	1.36	1.57	20
204	33.63	0.16	25.9	1.1	3	1.01E-07	5.59E-07	11	344.16	0	751.23	1.76	1.79	0.00025299	632.44	1.35	1.61	20
205	33.79	0.16	25.8	1	3	1.00E-07	5.54E-07	11	344.25	0	752.66	1.76	1.78	0.00025275	633.04	1.35	1.61	20
206	33.96	0.17	26.2	1.1	3	1.01E-07	5.70E-07	12	350.95	0	766.01	1.79	1.8	0.00026619	638.63	1.42	1.6	37.85
207	34.12	0.16	27.2	1.2	3	1.06E-07	6.23E-07	12	365.81	0	791.61	1.87	1.87	0.00024645	649.21	1.37	1.57	20
208	34.29	0.17	29.1	1.2	3	1.15E-07	6.88E-07	12	373.58	0	796.94	1.91	1.9	0.00026098	651.39	1.38	1.6	20
209	34.45	0.16	27.9	1.1	4	1.21E-07	7.12E-07	12	368.23	0	778.78	1.88	1.87	0.00024847	643.93	1.37	1.67	20
210	34.61	0.16	26.1	1	4	1.22E-07	6.83E-07	11	348.49	0	735.23	1.78	1.76	0.00025573	625.66	1.39	1.8	38.55
211	34.78	0.17	24.5	0.8	4	1.23E-07	6.42E-07	11	326.57	0	688.48	1.67	1.64	0.00028078	605.45	1.33	1.96	38.32
212	34.94	0.16	23.2	0.7	4	1.15E-07	5.46E-07	10	297.68	0	635.5	1.52	1.49	0.00027507	581.68	1.26	2.13	37.97
213	35.11	0.17	19.9	0.6	4	8.76E-08	3.67E-07	9	261.7	0	586.51	1.34	1.3	0.00030421	558.82	1.18	2.18	36.06
214	35.27	0.16	17.2	0.5	4	6.65E-08	2.35E-07	8	220.55	0	519.6	1.13	1.09	0.00030419	525.98	1.09	2.36	34.06
215	35.43	0.16	14.7	0.3	3	4.51E-08	1.18E-07	7	163.84	0	460.86	0.93	0.9	0.000323	495.35	1.07	2.49	20
216	35.6	0.17	12.2	0.3	3	2.98E-08	5.47E-08	6	114.48	0	416.13	0.78	0.75	0.00036116	470.7	1.01	2.55	20
217	35.76	0.16	11	0.3	3	2.24E-08	3.60E-08	6	100.13	0	410.66	0.73	0.7	0.00034217	467.6	0.98	2.39	20
218	35.93	0.17	12.7	0.3	3	2.26E-08	3.64E-08	6	100.51	0	411.97	0.73	0.7	0.00036298	468.34	0.91	2.4	28.91
219	36.09	0.16	12.3	0.3	3	2.44E-08	4.09E-08	6	104.43	0	414.88	0.75	0.71	0.00034043	469.99	0.92	2.45	28.92
220	36.26	0.17	11.7	0.3	3	1.73E-08	2.67E-08	6	96.63	0	425.98	0.72	0.68	0.00035696	476.24	0.9	2.13	28.68
221	36.42	0.16	11.6	0.4	3	1.33E-08	1.98E-08	6	92.66	0	438.01	0.71	0.67	0.00033132	482.91	0.9	1.9	28.27
222	36.58	0.16	11.8	0.4	3	1.02E-08	1.44E-08	6	87.95	0	448.84	0.69	0.65	0.0003273	488.85	0.96	1.7	20
223	36.75	0.17	11.1	0.4	3	1.04E-08	1.38E-08	6	82.62	0	434.4	0.67	0.63	0.00035349	480.92	0.95	1.8	20
224	36.91	0.16	10.8	0.3	3	8.77E-09	1.07E-08	6	76.21	0	431.4	0.65	0.6	0.00033385	479.26	0.86	1.73	27.54
225	37.08	0.17	10.7	0.4	3	9.05E-09	1.12E-08	6	77.37	0	433.28	0.65	0.6	0.00035395	480.3	0.86	1.75	28.19
226	37.24	0.16	11.3	0.4	3	8.95E-09	1.27E-08	6	88.68	0	465.78	0.7	0.64	0.00032129	497.99	0.88	1.59	28.09
227	37.4	0.16	12.9	0.5	3	1.03E-08	1.76E-08	7	107.11	0	500.23	0.77	0.71	0.00031003	516.08	0.99	1.51	20
228	37.57	0.17	13.7	0.6	3	1.22E-08	2.54E-08	7	129.59	0	534.52	0.85	0.78	0.00031867	533.47	1.02	1.47	20
229	37.73	0.16	14.6	0.6	3	1.60E-08	3.97E-08	8	154.8	0	557.42	0.93	0.85	0.0002937	544.78	0.98	1.52	30.71
230	37.9	0.17	16.2	0.6	3	2.42E-08	6.94E-08	8	178.83	0	557.21	1.01	0.91	0.00031212	544.67	1.01	1.74	31.34
231	38.06	0.16	16.7	0.5	3	2.90E-08	8.56E-08	8	184.58	0	549.29	1.02	0.92	0.00029586	540.79	1.08	1.88	20
232	38.22	0.16	15.5	0.5	3	2.77E-08	7.16E-08	8	161.33	0	518.78	0.96	0.86	0.00030444	525.56	1.05	2.01	20
233	38.39	0.17	13.6	0.4	3	1.58E-08	3.34E-08	7	131.68	0	519.69	0.87	0.77	0.00032318	526.02	1.02	1.7	20

234	38.55	0.16	13	0.6	3	1.00E-08	1.99E-08	8	124.42	0	550.15	0.85	0.75	0.00029563	541.21	0.93	1.38	29.74
235	38.72	0.17	14.4	0.8	3	1.86E-08	6.40E-08	9	215.1	0	648.03	1.11	0.98	0.00028942	587.39	1.1	1.37	20
236	38.88	0.16	25.1	1	3	3.33E-08	1.44E-07	10	269.17	0	718.52	1.37	1.21	0.00025869	618.51	1.18	1.44	20
237	39.04	0.16	23.9	1	3	5.54E-08	2.78E-07	11	313.48	0	763.34	1.6	1.4	0.00025098	637.51	1.25	1.57	20
238	39.21	0.17	24.2	1	3	5.20E-08	2.54E-07	11	304.85	0	750.86	1.56	1.36	0.00026887	632.28	1.23	1.58	20
239	39.37	0.16	23.3	0.9	3	5.17E-08	2.44E-07	11	295.25	0	728.04	1.51	1.31	0.00025699	622.6	1.22	1.64	20
240	39.54	0.17	21.9	0.8	3	5.21E-08	2.35E-07	10	281.2	0	692.21	1.43	1.24	0.00028003	607.08	1.2	1.76	20
241	39.7	0.16	21.2	0.7	3	4.41E-08	1.88E-07	10	265.93	0	674.66	1.36	1.17	0.00026696	599.34	1.17	1.73	20
242	39.86	0.16	19.7	0.8	3	3.60E-08	1.49E-07	10	258.97	0	681.77	1.32	1.13	0.00026556	602.49	1.16	1.62	20
243	40.03	0.17	20.2	0.9	3	3.39E-08	1.44E-07	10	265.37	0	706.29	1.35	1.16	0.00027722	613.23	1.13	1.53	33.62
244	40.19	0.16	22.3	0.9	3	5.04E-08	2.40E-07	11	296.84	0	735.29	1.51	1.29	0.00025572	625.69	1.21	1.65	20
245	40.36	0.17	26.5	0.9	3	6.37E-08	3.15E-07	11	308.85	0	733.15	1.58	1.34	0.0002721	624.78	1.23	1.78	20
246	40.52	0.16	22.8	0.8	3	6.20E-08	3.00E-07	11	302.14	0	720.86	1.54	1.3	0.00025826	619.52	1.22	1.81	20
247	40.68	0.16	20.9	0.8	3	4.64E-08	2.07E-07	10	277.93	0	698.8	1.42	1.19	0.00026231	609.97	1.14	1.74	34.09
248	40.85	0.17	21.2	0.8	3	4.12E-08	1.85E-07	11	280.84	0	721.54	1.43	1.2	0.00027428	619.81	1.14	1.62	35
249	41.01	0.16	23.2	1	3	3.81E-08	1.88E-07	12	308.43	0	803.44	1.57	1.31	0.00024463	654.04	1.18	1.4	36.77
250	41.18	0.17	26.4	1.5	3	8.87E-08	6.05E-07	14	425.56	0	951.59	2.17	1.8	0.00023883	711.79	1.42	1.48	38.24
251	41.34	0.16	46.3	1.8	4	1.69E-07	1.44E-06	17	531.49	0	1057.65	2.71	2.24	0.00021322	750.41	1.47	1.59	20
252	41.5	0.16	46.7	1.7	4	2.28E-07	2.04E-06	17	558.88	0	1053.83	2.85	2.35	0.0002136	749.06	1.49	1.75	20
253	41.67	0.17	33.2	1.3	3	1.22E-07	8.89E-07	15	455.37	0	961.26	2.32	1.91	0.00023763	715.4	1.39	1.63	20
254	41.83	0.16	24.4	1.2	3	4.79E-08	2.86E-07	13	372.41	0	930.82	1.9	1.55	0.00022728	703.98	1.29	1.3	20
255	42	0.17	28.2	1.8	3	4.34E-08	2.78E-07	14	399.63	0	1017.12	2.04	1.66	0.00023101	735.89	1.32	1.15	20
256	42.16	0.16	38.2	2.2	3	1.10E-07	9.30E-07	17	527.65	0	1134.66	2.69	2.18	0.00020585	777.25	1.45	1.34	20
257	42.32	0.16	52.3	1.9	4	2.38E-07	2.34E-06	18	614.25	0	1149.1	3.13	2.53	0.00020456	782.18	1.53	1.65	20
258	42.49	0.17	47.7	1.5	4	4.87E-07	5.25E-06	19	672.54	881.63	1104.98	3.43	2.76	0.00022164	767.02	1.58	2.1	20
259	42.65	0.16	51.2	1.4	4	6.91E-07	7.74E-06	19	699.76	861.21	1079.38	3.57	2.86	0.00021106	758.08	1.6	2.39	20
260	42.82	0.17	58.3	1.5	4	8.80E-07	1.07E-05	20	756.78	891.4	1117.23	3.86	3.08	0.00022042	771.26	1.65	2.47	20
261	42.98	0.16	60	1.7	5	1.07E-06	1.41E-05	21	824.87	937.97	1175.59	0	0	0.00020224	791.15	0	0	20
262	43.15	0.17	66.4	1.8	4	9.16E-07	1.21E-05	22	828.03	968.32	1213.63	4.22	3.35	0.00021148	803.85	1.69	2.3	20
263	43.31	0.16	58.9	1.9	4	8.34E-07	1.05E-05	21	782.18	930.27	1165.94	3.99	3.15	0.00020307	787.89	1.66	2.35	20
264	43.47	0.16	50.1	1.3	4	5.23E-07	5.54E-06	18	662.49	857.53	1074.77	3.38	2.66	0.00021151	756.46	1.56	2.26	20
265	43.64	0.17	40.6	1.2	4	3.22E-07	2.75E-06	16	533.9	0	945.6	2.72	2.14	0.00023959	709.55	1.45	2.29	20
266	43.8	0.16	31	1	4	1.22E-07	8.35E-07	14	428.6	0	905.18	2.19	1.71	0.00023047	694.22	1.34	1.84	20
267	43.97	0.17	26.9	1.3	3	7.93E-08	5.15E-07	14	404.9	0	923.84	2.07	1.61	0.00024239	701.34	1.31	1.6	20
268	44.13	0.16	34.7	1.5	3	8.82E-08	6.76E-07	16	478.04	0	1069.96	2.44	1.89	0.00021199	754.77	1.38	1.41	20
269	44.29	0.16	46.6	2.3	4	1.78E-07	1.71E-06	19	598.3	0	1178.94	3.05	2.36	0.00020195	792.27	1.5	1.55	20
270	44.46	0.17	52.6	2	4	2.43E-07	2.54E-06	20	653.54	0	1218.1	3.33	2.57	0.0002111	805.32	1.54	1.63	20
271	44.62	0.16	47.4	1.7	4	3.06E-07	3.15E-06	19	643.5	0	1150.05	3.28	2.52	0.00020447	782.51	1.53	1.86	20
272	44.79	0.17	43.1	1.5	4	2.88E-07	2.76E-06	18	599.33	0	1083.18	3.06	2.34	0.00022386	759.41	1.49	1.95	20
273	44.95	0.16	42.8	1.4	4	2.54E-07	2.34E-06	17	577.33	0	1067.57	2.95	2.24	0.00021222	753.92	1.62	1.92	40
274	45.11	0.16	41.8	1.6	4	2.28E-07	2.09E-06	17	570.8	0	1075.55	2.91	2.21	0.00021143	756.74	1.61	1.86	40
275	45.28	0.17	42.3	1.6	4	1.92E-07	1.69E-06	17	549.65	0	1069	2.8	2.12	0.00022534	754.43	1.44	1.79	20
276	45.44	0.16	38.8	1.4	4	1.52E-07	1.25E-06	16	511.77	0	1037.6	2.61	1.97	0.00021526	743.27	1.4	1.74	20
277	45.61	0.17	33.8	1.4	4	1.26E-07	9.65E-07	16	480.03	0	1008.05	2.45	1.84	0.00023205	732.61	1.43	1.71	38.75
278	45.77	0.16	35.3	1.4	4	1.23E-07	9.53E-07	16	484.02	0	1020.2	2.47	1.85	0.00021709	737.01	1.43	1.69	39.8
279	45.93	0.16	39.2	1.5	4	1.28E-07	1.05E-06	17	515.16	0	1078.66	2.63	1.96	0.00021113	757.83	1.48	1.61	40
280	46.1	0.17	40	1.9	3	1.10E-07	9.29E-07	17	528.1	0	1136.05	2.69	2	0.00021858	777.73	1.5	1.47	39.67
281	46.26	0.16	38.8	2	3	8.82E-08	7.30E-07	17	516.85	0	1156.88	2.64	1.95	0.00020387	784.83	1.4	1.36	20
282	46.43	0.17	37.8	1.8	3	7.21E-08	5.52E-07	16	477.65	0	1108.83	2.44	1.8	0.00022125	768.35	1.36	1.35	20
283	46.59	0.16	32.1	1.5	3	5.32E-08	3.62E-07	15	425.43	0	1043.48	2.17	1.59	0.00021466	745.37	1.3	1.33	20
284	46.75	0.16	27.5	1.5	3	3.09E-08	1.76E-07	14	356.43	0	964.51	1.82	1.33	0.00022327	716.61	1.22	1.24	20
285	46.92	0.17	22.9	1.3	3	1.52E-08	7.06E-08	12	289.28	0	889.61	1.48	1.08	0.00024701	688.23	1.14	1.11	20
286	47.08	0.16	18.7	1.1	3	8.61E-09	2.74E-08	10	198.64	0	789.22	1.18	0.86	0.00024683	648.23	1.05	1.09	20
287	47.25	0.17	16	0.8	3	5.44E-09	1.12E-08	9	128.14	0	690.1	0.95	0.69	0.00028045	606.16	0.98	1.12	20
288	47.41	0.16	13.4	0.6	3	4.61E-09	6.87E-09	8	93.09	0	607.14	0.81	0.59	0.00028141	568.56	0.92	1.26	20
289	47.57	0.16	12.8	0.5	3	4.10E-09	5.25E-09	8	80.05	0	576.1	0.75	0.54	0.0002889	553.83	0.9	1.3	20
290	47.74	0.17	13.5	0.6	3	4.06E-09	5.71E-09	8	87.8	0	605.41	0.79	0.57	0.00029943	567.75	0.91	1.22	20
291	47.9	0.16	15	0.8	3	4.77E-09	8.55E-09	9	112.01	0	665.31	0.89	0.64	0.00026883	595.17	0.95	1.14	20
292	48.07	0.17	17.2	0.9	3	5.15E-09	1.11E-08	9	134.14	0	719.14	0.98	0.7	0.00027473	618.78	0.98	1.07	20

293	48.23	0.16	17.3	1	3	5.62E-09	1.42E-08	10	158.33	0	770.56	1.07	0.76	0.0002498	640.52	1.01	1.01	20
294	48.39	0.16	18.5	1.2	3	7.81E-09	2.86E-08	11	228.45	0	873.36	1.28	0.91	0.00023464	681.91	1.07	0.97	20
295	48.56	0.17	26.2	1.7	3	1.64E-08	8.61E-08	13	327.34	0	993.16	1.67	1.18	0.00023378	727.18	1.17	1.04	20
296	48.72	0.16	33.6	1.8	3	3.51E-08	2.29E-07	15	407.04	0	1076.12	2.08	1.46	0.00021138	756.94	1.26	1.2	20
297	48.89	0.17	36	1.6	3	4.03E-08	2.64E-07	15	408.88	0	1054.74	2.09	1.46	0.00022685	749.38	1.26	1.28	20
298	49.05	0.16	26.9	1.4	3	3.37E-08	1.97E-07	14	364.75	0	971.82	1.86	1.3	0.00022243	719.32	1.21	1.33	20
299	49.22	0.17	24	1.1	3	1.89E-08	8.97E-08	12	296.72	0	877.79	1.51	1.05	0.00024867	683.64	1.13	1.27	20
300	49.38	0.16	21.2	1	3	1.52E-08	5.99E-08	11	245.53	0	810.46	1.34	0.93	0.00024357	656.89	1.08	1.32	20
301	49.54	0.16	19.5	0.9	3	1.36E-08	4.74E-08	11	218.49	0	782.18	1.27	0.88	0.00024794	645.33	1.06	1.33	20
302	49.71	0.17	20.9	0.9	3	1.47E-08	4.83E-08	10	205.19	0	748.25	1.23	0.85	0.00026934	631.18	1.05	1.45	20
303	49.87	0.16	19.6	0.7	3	1.81E-08	5.87E-08	10	202.36	0	716.64	1.23	0.84	0.00025903	617.7	1.05	1.64	20
304	50.04	0.17	19.2	0.6	3	2.07E-08	6.29E-08	10	189.89	0	678.87	1.19	0.81	0.00028277	601.2	1.03	1.84	20

Sum	0.09316587	
Vs of CPT	537.1065	(ft/s)
	163.752	(m/s)
Extrapolated Vs	633.999	(ft/s)
Following Boore (2004)	193.2924	(m/s)

CPT-2 Estimations

	In situ data					Estimations												
No	Depth (ft)	Thickness (ft)	qc (tsf)	fs (tsf)	SBTn	Ksbt (ft/s)	Cv (ft2/s)	SPT N60 (blows/ft)	Con. Mod. (tsf)	Es (tsf)	Go (tsf)	Su (tsf)	Su ratio	Thickness/ Vs (s)	Vs (ft/s)	Ko	Sensitivity	Peak phi (°)
1	0.33	0.33	584.7	3.1	7	2.53E-02	7.58E-01	79	1867.32	1489.88	1867.32	0	0	0.00033096	997.1	0	0	20
2	0.49	0.16	567	3.7	7	1.65E-02	4.95E-01	76	1868.76	1491.04	1868.76	0	0	0.000160403	997.49	0	0	20
3	0.66	0.17	457.2	3.6	7	9.07E-03	2.55E-01	67	1754.19	1399.62	1754.19	0	0	0.000175905	966.43	0	0	20
4	0.82	0.16	330.6	3.1	6	3.30E-03	8.05E-02	54	1522.85	1215.04	1522.85	0	0	0.000177689	900.45	0	0	20
5	0.98	0.16	192.1	3.4	8	7.64E-04	1.57E-02	40	1284.96	1025.23	1284.96	0	0	0.00019344	827.13	0	0	20
6	1.15	0.17	111.9	3.6	8	1.20E-04	1.99E-03	27	1035.42	826.14	1035.42	0	0	0.000228959	742.49	0	0	20
7	1.31	0.16	61.8	3.1	8	2.83E-05	3.71E-04	19	818.73	653.24	818.73	0	0	0.000242336	660.24	0	0	20
8	1.48	0.17	49	2.4	9	1.19E-05	1.25E-04	14	657.91	524.93	657.91	3.64	84.15	0.000287235	591.85	3	1.43	20
9	1.64	0.16	42.1	2	9	9.86E-06	8.93E-05	12	565.8	451.44	565.8	3.03	63.15	0.000291513	548.86	3	1.48	20
10	1.8	0.16	36.2	1.6	8	8.87E-06	7.02E-05	10	493.79	393.98	493.79	0	0	0.000312043	512.75	0	0	20
11	1.97	0.17	30.8	1.2	8	8.96E-06	6.06E-05	9	422.42	337.04	422.42	0	0	0.000358461	474.25	0	0	20
12	2.13	0.16	26.6	0.8	8	1.06E-05	5.99E-05	8	353.97	282.42	353.97	0	0	0.000368562	434.12	0	0	20
13	2.3	0.17	23.5	0.5	5	1.47E-05	6.95E-05	6	294.7	235.14	294.7	0	0	0.000429163	396.12	0	0	20
14	2.46	0.16	21.5	0.3	5	1.82E-05	7.40E-05	6	254	202.66	254	0	0	0.00043509	367.74	0	0	20
15	2.62	0.16	19.2	0.3	6	1.99E-05	7.15E-05	5	224.24	178.92	224.24	0	0	0.000463057	345.53	0	0	20
16	2.79	0.17	17	0.2	5	1.63E-05	5.48E-05	5	209.6	167.23	209.6	0	0	0.000508891	334.06	0	0	20
17	2.95	0.16	15.9	0.2	5	1.15E-05	3.75E-05	4	204.26	162.97	204.26	0	0	0.000485187	329.77	0	0	20
18	3.12	0.17	14.8	0.3	5	6.87E-06	2.29E-05	4	208.25	166.16	208.25	0	0	0.000510541	332.98	0	0	20
19	3.28	0.16	13.7	0.3	5	4.38E-06	1.35E-05	4	191.85	169.01	211.83	0	0	0.000476432	335.83	0	0	20
20	3.45	0.17	13.2	0.3	5	3.69E-06	1.10E-05	4	185.69	168.73	211.47	0	0	0.000506631	335.55	0	0	20
21	3.61	0.16	13.5	0.3	5	2.92E-06	8.69E-06	4	185.61	175.94	220.51	0	0	0.000466962	342.64	0	0	20
22	3.77	0.16	13.7	0.4	5	2.43E-06	7.30E-06	4	187.38	183.64	230.16	0	0	0.000457065	350.06	0	0	20
23	3.94	0.17	13.6	0.4	5	2.44E-06	7.43E-06	4	190.5	186.66	233.94	0	0	0.000481682	352.93	0	0	20
24	4.1	0.16	14.2	0.3	5	2.74E-06	8.37E-06	4	190.82	183.03	229.4	0	0	0.00045781	349.49	0	0	20
25	4.27	0.17	13.8	0.3	5	3.47E-06	1.04E-05	4	186.45	171.34	214.75	0	0	0.00050275	338.14	0	0	20
26	4.43	0.16	12.7	0.2	5	3.36E-06	9.48E-06	4	176	162.66	203.86	0	0	0.000485643	329.46	0	0	20
27	4.59	0.16	12	0.2	5	2.75E-06	6.89E-06	4	156.66	150.2	188.25	0	0	0.000505386	316.59	0	0	20
28	4.76	0.17	9.7	0.2	5	1.61E-06	3.51E-06	3	135.93	143.52	179.88	0	0	0.000549326	309.47	0	0	20
29	4.92	0.16	8.3	0.2	5	1.08E-06	2.13E-06	3	122.74	139.22	174.49	0	0	0.000524934	304.8	0	0	20
30	5.09	0.17	9.2	0.2	5	9.90E-07	1.92E-06	3	121.25	139.82	175.24	0	0	0.000556538	305.46	0	0	20
31	5.25	0.16	9.4	0.2	5	1.49E-06	3.31E-06	3	138.42	148.2	185.75	0	0	0.000508776	314.48	0	0	20
32	5.41	0.16	12	0.2	5	2.84E-06	7.69E-06	4	169.05	161.08	201.89	0	0	0.000488013	327.86	0	0	20
33	5.58	0.17	15.8	0.2	5	4.37E-06	1.36E-05	4	194.04	171.03	214.36	0	0	0.000503212	337.83	0	0	20
34	5.74	0.16	14.8	0.2	5	4.81E-06	1.56E-05	4	201.79	174.8	219.08	0	0	0.00046848	341.53	0	0	20
35	5.91	0.17	13.7	0.2	5	3.79E-06	1.16E-05	4	190.44	172.27	215.91	0	0	0.000501401	339.05	0	0	20
36	6.07	0.16	13.4	0.2	5	2.87E-06	8.18E-06	4	177.72	169.01	211.82	0	0	0.000476432	335.83	0	0	20
37	6.23	0.16	12.1	0.2	5	1.68E-06	4.45E-06	4	164.99	172.84	216.63	0	0	0.000471115	339.62	0	0	20
38	6.4	0.17	11	0.3	5	1.08E-06	2.71E-06	4	156.44	177.5	222.46	0	0	0.000493956	344.16	0	0	20
39	6.56	0.16	11.6	0.3	5	1.04E-06	2.61E-06	4	156.35	178.63	223.89	0	0	0.000463419	345.26	0	0	20
40	6.73	0.17	12.1	0.2	5	1.60E-06	4.30E-06	4	167.9	177.53	222.5	0	0	0.000493913	344.19	0	0	20
41	6.89	0.16	13.5	0.2	5	2.34E-06	6.63E-06	4	176.64	174.27	218.42	0	0	0.000469181	341.02	0	0	20
42	7.05	0.16	13.5	0.2	5	2.28E-06	6.46E-06	4	176.92	175.44	219.88	0	0	0.000467631	342.15	0	0	20
43	7.22	0.17	12.2	0.2	5	1.50E-06	4.07E-06	4	169.74	181.61	227.62	0	0	0.000488323	348.13	0	0	20
44	7.38	0.16	12	0.3	4	8.56E-07	2.25E-06	4	164.48	194.74	244.07	0.84	3.89	0.00044384	360.49	1.59	2.74	20
45	7.55	0.17	12.4	0.4	4	4.75E-07	1.23E-06	4	161.58	212.82	266.74	0.82	3.74	0.000451108	376.85	1.6	2.02	20
46	7.71	0.16	11.6	0.5	4	3.14E-07	7.87E-07	5	156.8	0	279.01	0.8	3.55	0.000415121	385.43	1.59	1.68	20
47	7.87	0.16	11	0.5	4	2.37E-07	5.74E-07	4	151.53	0	283.7	0.77	3.36	0.000411681	388.65	1.57	1.52	20
48	8.04	0.17	11.3	0.5	4	2.73E-07	6.72E-07	4	153.69	0	280.38	0.78	3.34	0.000439993	386.37	1.57	1.65	20
49	8.2	0.16	12.1	0.4	4	4.82E-07	1.30E-06	5	168.03	220.69	276.59	0.86	3.58	0.000416938	383.75	1.58	2.1	20
50	8.37	0.17	14.1	0.3	5	1.03E-06	2.99E-06	5	182.34	208.93	261.86	0	0	0.000455288	373.39	0	0	20
51	8.53	0.16	14.4	0.2	5	1.86E-06	5.77E-06	5	193.85	199.45	249.98	0	0	0.00043856	364.83	0	0	20
52	8.69	0.16	14.6	0.2	5	1.88E-06	5.91E-06	5	196.03	201.25	252.23	0	0	0.00043661	366.46	0	0	20
53	8.86	0.17	14.6	0.3	5	1.06E-06	3.20E-06	5	188.45	214.66	269.03	0	0	0.000449177	378.47	0	0	20
54	9.02	0.16	12.8	0.4	4	4.62E-07	1.28E-06	5	172.94	228.91	286.9	0.88	3.35	0.000409375	390.84	1.56	2.16	20
55	9.19	0.17	11.3	0.5	4	2.06E-07	5.32E-07	5	161.15	0	309.32	0.82	3.06	0.000418905	405.82	1.54	1.51	20
56	9.35	0.16	12.1	0.7	3	1.30E-07	3.35E-07	5	160.54	0	334.84	0.82	3	0.00037894	422.23	1.55	1.2	20
57	9.51	0.16	12.7	0.8	3	1.15E-07	3.08E-07	5	167.85	0	358.38	0.86	3.08	0.000366284	436.82	1.57	1.09	20

58	9.68	0.17	12.9	0.8	3	1.06E-07	2.89E-07	5	169.54	0	366.85	0.86	3.06	0.000384659	441.95	1.57	1.06	20
59	9.84	0.16	12.5	0.8	3	1.11E-07	3.00E-07	5	168.92	0	362.73	0.86	3	0.000364083	439.46	1.56	1.1	20
60	10.01	0.17	12.6	0.7	3	1.58E-07	4.52E-07	6	178.55	0	359.6	0.91	3.11	0.000388518	437.56	1.57	1.28	20
61	10.17	0.16	15	0.6	5	1.23E-06	5.34E-06	7	271.79	301.44	377.81	0	0	0.000356745	448.5	0	0	20
62	10.34	0.17	32.5	0.3	5	6.04E-06	3.70E-05	8	382.77	305.4	382.77	0	0	0.000376573	451.44	0	0	20
63	10.5	0.16	33.1	0.3	5	1.35E-05	7.89E-05	8	364.82	291.08	364.82	0	0	0.000363034	440.73	0	0	20
64	10.66	0.16	23.1	0.3	5	5.84E-06	3.18E-05	7	339.53	283.98	355.92	0	0	0.000367546	435.32	0	0	20
65	10.83	0.17	18.5	0.4	5	1.56E-06	6.49E-06	6	259.61	275.67	345.51	0	0	0.000396363	428.9	0	0	20
66	10.99	0.16	16	0.5	5	9.48E-07	3.60E-06	6	237.1	275.56	345.37	0	0	0.000373126	428.81	0	0	20
67	11.16	0.17	18.3	0.4	5	8.39E-06	5.84E-05	9	434.73	346.86	434.73	0	0	0.00035335	481.11	0	0	20
68	11.32	0.16	62.6	0.5	6	1.12E-04	1.02E-03	15	565.47	451.18	565.47	0	0	0.000291598	548.7	0	0	20
69	11.48	0.16	118.5	0.6	6	3.62E-04	4.33E-03	22	747.22	596.19	747.22	0	0	0.000253666	630.75	0	0	20
70	11.65	0.17	143.2	1.1	6	4.17E-04	6.07E-03	27	908.38	724.77	908.38	0	0	0.000244446	695.45	0	0	20
71	11.81	0.16	142.3	1.5	6	3.59E-04	5.73E-03	29	995.76	794.49	995.76	0	0	0.000219741	728.13	0	0	20
72	11.98	0.17	145.5	1.3	6	2.85E-04	4.76E-03	30	1043.98	832.96	1043.98	0	0	0.00022802	745.55	0	0	20
73	12.14	0.16	145.4	1.6	6	5.29E-04	8.77E-03	31	1033.73	824.78	1033.73	0	0	0.000215668	741.88	0	0	20
74	12.3	0.16	188.7	1	6	9.08E-04	1.51E-02	33	1039.7	829.55	1039.7	0	0	0.000215048	744.02	0	0	20
75	12.47	0.17	197.5	1	6	1.54E-03	2.37E-02	32	962.65	768.07	962.65	0	0	0.000237457	715.92	0	0	20
76	12.63	0.16	155.4	0.8	6	8.73E-04	1.29E-02	29	921.16	734.97	921.16	0	0	0.000228467	700.32	0	0	20
77	12.8	0.17	115.2	1	6	2.57E-04	3.62E-03	25	879.58	701.79	879.58	0	0	0.000248418	684.33	0	0	20
78	12.96	0.16	88.3	1.3	6	5.82E-05	7.88E-04	21	845.03	674.23	845.03	0	0	0.000238535	670.76	0	0	20
79	13.12	0.16	60.7	1.3	5	1.33E-05	1.65E-04	17	776.29	619.38	776.29	0	0	0.000248872	642.9	0	0	20
80	13.29	0.17	37.5	1.2	5	2.33E-06	2.08E-05	13	557.23	550.34	689.76	0	0	0.000280523	606.01	0	0	20
81	13.45	0.16	23.6	1.4	4	7.92E-07	5.52E-06	11	434.71	521.89	654.11	2.22	5.64	0.000271122	590.14	1.89	1.59	20
82	13.62	0.17	34.4	1.5	4	1.28E-06	1.05E-05	13	512.99	564.85	707.95	2.62	6.57	0.000276896	613.95	1.97	1.75	20
83	13.78	0.16	54.3	1.5	5	2.06E-06	1.90E-05	14	575.42	581.24	728.49	0	0	0.000256908	622.79	0	0	20
84	13.94	0.16	37	1.3	5	1.96E-06	1.72E-05	13	549.03	559.61	701.37	0	0	0.000261827	611.09	0	0	20
85	14.11	0.17	28.8	1.2	4	8.00E-07	5.31E-06	11	414.48	496.75	622.6	2.11	5.13	0.000295267	575.75	1.83	1.73	20
86	14.27	0.16	25.3	1.1	4	5.18E-07	3.00E-06	10	361.49	468.59	587.3	1.84	4.42	0.000286128	559.19	1.76	1.59	20
87	14.44	0.17	25.5	1.1	4	4.59E-07	2.59E-06	10	352.1	466.51	584.69	1.8	4.26	0.000304692	557.94	1.74	1.55	20
88	14.6	0.16	26.7	1.2	4	4.56E-07	2.62E-06	10	358.26	475.36	595.78	1.83	4.28	0.000284086	563.21	1.74	1.54	20
89	14.76	0.16	26.7	1.2	4	4.50E-07	2.62E-06	10	363.97	484	606.62	1.86	4.3	0.000281536	568.31	1.75	1.52	20
90	14.93	0.17	26.8	1.2	4	4.49E-07	2.62E-06	10	365.32	486.1	609.24	1.86	4.27	0.000298486	569.54	1.74	1.52	20
91	15.09	0.16	27	1.2	4	4.71E-07	2.80E-06	10	371.46	489.96	614.08	1.9	4.3	0.000279818	571.8	1.75	1.55	20
92	15.26	0.17	28	1.2	4	5.25E-07	3.23E-06	10	383.66	496.17	621.87	1.96	4.39	0.000295442	575.41	1.76	1.6	20
93	15.42	0.16	29.4	1.2	4	5.59E-07	3.55E-06	11	397	507.68	636.3	2.03	4.49	0.00027489	582.05	1.77	1.61	20
94	15.58	0.16	29.9	1.3	4	5.20E-07	3.26E-06	11	391.35	507.04	635.49	2	4.38	0.000275065	581.68	1.76	1.59	20
95	15.75	0.17	26.9	1.2	4	3.62E-07	2.05E-06	10	353.45	0	612.73	1.8	3.92	0.000297635	571.17	1.7	1.47	20
96	15.91	0.16	21.5	1.1	4	2.17E-07	1.00E-06	9	288.44	0	548.79	1.47	3.16	0.000295995	540.55	1.6	1.4	20
97	16.08	0.17	16.2	0.8	3	1.02E-07	3.51E-07	7	214.7	0	468.05	1.1	2.33	0.000340545	499.2	1.46	1.29	20
98	16.24	0.16	11.3	0.6	3	4.46E-08	1.06E-07	5	148.79	0	376.74	0.76	1.6	0.000357247	447.87	1.3	1.24	20
99	16.4	0.16	7.5	0.4	3	1.80E-08	3.07E-08	4	106.43	0	317.6	0.54	1.13	0.000389086	411.22	1.16	1.14	20
100	16.57	0.17	7.2	0.4	3	1.35E-08	1.98E-08	4	91.41	0	292.82	0.48	0.98	0.000430543	394.85	1.1	1.16	20
101	16.73	0.16	8.5	0.4	3	1.36E-08	2.12E-08	4	97.35	0	305.57	0.5	1.02	0.000396678	403.35	1.12	1.12	20
102	16.9	0.17	8.4	0.5	3	1.03E-08	1.63E-08	4	98.17	0	323.86	0.5	1.01	0.000409392	415.25	1.12	0.98	20
103	17.06	0.16	7.4	0.6	3	1.32E-08	2.41E-08	5	113.92	0	359.53	0.58	1.17	0.000365698	437.52	1.17	0.95	20
104	17.23	0.17	11.9	0.7	3	2.68E-08	5.95E-08	5	138.58	0	384.78	0.71	1.4	0.000375591	452.62	1.25	1.09	20
105	17.39	0.16	13.7	0.6	3	6.02E-08	1.64E-07	6	170.49	0	408.88	0.87	1.71	0.000342921	466.58	1.32	1.35	20
106	17.55	0.16	14.2	0.6	3	8.73E-08	2.56E-07	6	183.36	0	411.18	0.94	1.82	0.000341961	467.89	1.34	1.53	20
107	17.72	0.17	14.6	0.6	3	9.25E-08	2.77E-07	6	186.95	0	414.85	0.95	1.84	0.000361725	469.97	1.35	1.56	20
108	17.88	0.16	14.4	0.6	3	9.18E-08	2.68E-07	6	182.4	0	405.34	0.93	1.78	0.000344412	464.56	1.33	1.61	20
109	18.05	0.17	13.2	0.5	3	8.64E-08	2.43E-07	6	175.39	0	394.08	0.89	1.7	0.00037113	458.06	1.31	1.64	20
110	18.21	0.16	13.1	0.5	3	9.05E-08	2.51E-07	6	173	0	385.42	0.88	1.66	0.000353201	453	1.3	1.73	20
111	18.37	0.16	13.9	0.5	4	1.05E-07	3.04E-07	6	180.49	0	391.32	0.92	1.71	0.000350531	456.45	1.32	1.8	20
112	18.54	0.17	14.8	0.5	4	1.39E-07	4.33E-07	6	194.53	0	401.05	0.99	1.83	0.000367894	462.09	1.34	1.95	20
113	18.7	0.16	16.1	0.5	4	1.82E-07	6.08E-07	7	209	0	410.54	1.07	1.95	0.000342224	467.53	1.37	2.09	20
114	18.87	0.17	17	0.5	4	2.07E-07	7.19E-07	7	216.96	0	416.21	1.11	2.01	0.000361126	470.75	1.38	2.17	20
115	19.03	0.16	16.5	0.5	4	1.97E-07	6.79E-07	7	215.14	0	416.43	1.1	1.97	0.000339797	470.87	1.37	2.15	20
116	19.19	0.16	15.7	0.5	4	1.81E-07	6.13E-07	7	211.49	0	415.62	1.08	1.92	0.000340129	470.41	1.36	2.11	20
117	19.36	0.17	16.2	0.5	4	1.61E-07	5.48E-07	7	212.43	0	426.4	1.08	1.92	0.000356791	476.47	1.36	1.99	20

118	19.52	0.16	16.7	0.6	4	1.42E-07	4.98E-07	7	218.36	0	448.24	1.11	1.95	0.00032752	488.52	1.37	1.82	20
119	19.69	0.17	17	0.7	4	1.33E-07	4.81E-07	7	226.42	0	470.69	1.16	2.01	0.000339586	500.61	1.39	1.7	20
120	19.85	0.16	18	0.7	4	1.50E-07	5.89E-07	8	245.2	0	498.6	1.25	2.16	0.000310535	515.24	1.42	1.67	20
121	20.01	0.16	20.8	0.8	4	1.89E-07	8.40E-07	9	277.35	0	540.76	1.42	2.42	0.000298185	536.58	1.47	1.66	20
122	20.18	0.17	23.9	1	4	2.38E-07	1.19E-06	9	311.68	0	582.76	1.59	2.7	0.00030519	557.03	1.53	1.67	20
123	20.34	0.16	25.3	1	4	2.73E-07	1.46E-06	10	334.48	0	610.46	1.71	2.87	0.000280648	570.11	1.56	1.67	20
124	20.51	0.17	25.6	1	4	3.00E-07	1.62E-06	10	338.15	0	606.51	1.73	2.88	0.000299159	568.26	1.56	1.75	20
125	20.67	0.16	24.6	0.9	4	3.00E-07	1.57E-06	10	327.66	0	587.73	1.67	2.77	0.000286026	559.39	1.54	1.82	20
126	20.83	0.16	23	0.8	4	2.98E-07	1.48E-06	9	310.25	0	557.01	1.58	2.6	0.000293804	544.58	1.51	1.94	20
127	21	0.17	21.8	0.7	4	2.95E-07	1.38E-06	9	291.5	0	524.38	1.49	2.42	0.000321732	528.39	1.47	2.08	20
128	21.16	0.16	20.5	0.6	4	2.97E-07	1.33E-06	8	279.46	0	502.33	1.43	2.31	0.000309382	517.16	1.45	2.21	20
129	21.33	0.17	20.2	0.6	4	3.05E-07	1.35E-06	8	275.51	0	492.71	1.41	2.25	0.000331915	512.18	1.44	2.3	20
130	21.49	0.16	20.7	0.6	4	3.28E-07	1.48E-06	8	281.43	0	496.83	1.44	2.29	0.00031109	514.32	1.56	2.35	40
131	21.65	0.16	21.5	0.6	4	3.90E-07	1.84E-06	8	294.94	402.5	504.47	1.5	2.38	0.000308725	518.26	1.6	2.46	40
132	21.82	0.17	22.9	0.6	4	3.98E-07	1.94E-06	9	304.96	414.68	519.74	1.56	2.44	0.000323169	526.04	1.62	2.41	40
133	21.98	0.16	22.7	0.7	4	3.94E-07	1.97E-06	9	312.56	425.78	533.65	1.59	2.48	0.000300165	533.04	1.64	2.34	40
134	22.15	0.17	23	0.7	4	3.66E-07	1.89E-06	9	321.93	0	557.12	1.64	2.54	0.000312133	544.64	1.67	2.19	40
135	22.31	0.16	24.8	0.8	4	3.54E-07	1.93E-06	10	340.46	0	592.56	1.74	2.66	0.000284855	561.69	1.72	2.04	40
136	22.47	0.16	26.7	1	4	3.06E-07	1.76E-06	10	359.72	0	642.91	1.84	2.79	0.000273472	585.07	1.78	1.8	40
137	22.64	0.17	27.5	1.2	4	2.71E-07	1.62E-06	11	372.68	0	680.67	1.9	2.87	0.000282392	602	1.57	1.64	20
138	22.8	0.16	28.2	1.2	4	2.48E-07	1.49E-06	11	376.2	0	698.38	1.92	2.88	0.00026239	609.78	1.57	1.57	20
139	22.97	0.17	28	1.2	4	2.62E-07	1.56E-06	11	371.99	0	683.57	1.9	2.83	0.000281793	603.28	1.56	1.64	20
140	23.13	0.16	26.6	1	4	2.83E-07	1.67E-06	11	368.78	0	668.68	1.88	2.78	0.00026815	596.68	1.55	1.73	20
141	23.3	0.17	27.2	1	4	3.05E-07	1.82E-06	11	371.27	0	663.82	1.89	2.78	0.000285955	594.5	1.55	1.8	20
142	23.46	0.16	28	1.1	4	3.00E-07	1.86E-06	11	387.99	0	695.91	1.98	2.89	0.000262855	608.7	1.83	1.71	40
143	23.62	0.16	30	1.3	4	2.91E-07	1.90E-06	12	408.21	0	736.17	2.08	3.02	0.000255567	626.06	1.88	1.61	40
144	23.79	0.17	31.5	1.4	4	3.21E-07	2.24E-06	13	435.48	0	771.79	2.22	3.2	0.000265198	641.03	1.95	1.59	40
145	23.95	0.16	33.8	1.4	4	3.43E-07	2.50E-06	13	454.68	0	796.16	2.32	3.31	0.000245749	651.07	2	1.59	40
146	24.12	0.17	34	1.5	4	3.64E-07	2.69E-06	13	462.68	0	801.53	2.36	3.35	0.000260229	653.27	1.65	1.61	20
147	24.28	0.16	33.3	1.4	4	3.50E-07	2.55E-06	13	454.25	0	792.42	2.32	3.27	0.000246328	649.54	1.64	1.62	20
148	24.44	0.16	32.2	1.3	4	3.41E-07	2.38E-06	13	436.21	0	764.49	2.23	3.12	0.000250788	637.99	1.61	1.68	20
149	24.61	0.17	30.2	1.2	4	3.05E-07	2.00E-06	12	409.26	0	731.86	2.09	2.9	0.000272336	624.23	1.84	1.71	40
150	24.77	0.16	27.3	1.1	4	2.50E-07	1.52E-06	11	380.11	0	704.79	1.94	2.68	0.00026119	612.58	1.75	1.68	40
151	24.94	0.17	26.1	1.1	4	2.20E-07	1.26E-06	11	358.93	0	680.96	1.83	2.51	0.000282331	602.13	1.69	1.68	40
152	25.1	0.16	25.7	1	4	1.96E-07	1.10E-06	11	350.21	0	678.17	1.79	2.44	0.000266267	600.9	1.66	1.64	40
153	25.26	0.16	25.7	1.1	4	1.90E-07	1.06E-06	11	348.51	0	678.81	1.78	2.41	0.000266143	601.18	1.65	1.63	40
154	25.43	0.17	25.4	1.1	4	1.67E-07	9.34E-07	11	348.95	0	695.79	1.78	2.4	0.000279307	608.65	1.64	1.54	40
155	25.59	0.16	25.9	1.2	4	1.64E-07	9.18E-07	11	348.59	0	697.12	1.78	2.38	0.000262627	609.23	1.64	1.54	40
156	25.76	0.17	25.7	1.1	4	1.44E-07	7.72E-07	11	333.95	0	683.69	1.7	2.26	0.000281765	603.34	1.59	1.52	40
157	25.92	0.16	22.6	1	3	1.26E-07	6.15E-07	10	304.51	0	638.84	1.55	2.05	0.000274344	583.21	1.49	1.58	40
158	26.08	0.16	19.6	0.8	3	9.89E-08	4.25E-07	9	268.26	0	588.17	1.37	1.8	0.000285919	559.6	1.38	1.61	39.67
159	26.25	0.17	17.9	0.7	3	8.49E-08	3.25E-07	8	239.06	0	538.81	1.22	1.59	0.000317395	535.61	1.28	1.71	39.37
160	26.41	0.16	16.3	0.6	3	7.85E-08	2.83E-07	8	224.73	0	513.7	1.15	1.49	0.000305939	522.98	1.24	1.77	38.88
161	26.58	0.17	16.6	0.6	3	8.26E-08	2.94E-07	8	222.69	0	504.44	1.14	1.46	0.000328033	518.24	1.22	1.86	39.1
162	26.74	0.16	17.4	0.6	4	9.33E-08	3.44E-07	8	230.09	0	509.83	1.17	1.5	0.000307096	521.01	1.23	1.92	39.9
163	26.9	0.16	17.7	0.6	4	1.07E-07	4.19E-07	8	244.49	0	528.52	1.25	1.59	0.000301619	530.47	1.27	1.93	40
164	27.07	0.17	19.3	0.7	4	1.40E-07	6.13E-07	9	273.9	0	564.17	1.4	1.77	0.000310179	548.07	1.36	1.96	40
165	27.23	0.16	23.2	0.8	4	1.59E-07	7.67E-07	10	301.42	0	606.61	1.54	1.93	0.000281536	568.31	1.44	1.88	40
166	27.4	0.17	23.4	0.9	4	1.71E-07	8.73E-07	10	319.37	0	634.43	1.63	2.03	0.000292498	581.2	1.49	1.84	40
167	27.56	0.16	23	0.9	4	1.58E-07	8.12E-07	10	320.19	0	644.74	1.63	2.03	0.000273084	585.9	1.49	1.78	40
168	27.72	0.16	23.8	0.9	4	1.81E-07	9.48E-07	10	325.98	0	640.36	1.66	2.05	0.00027402	583.9	1.5	1.88	40
169	27.89	0.17	24.7	0.8	4	2.12E-07	1.13E-06	10	333.07	0	636.36	1.7	2.08	0.000292056	582.08	1.51	2	40
170	28.05	0.16	24.8	0.8	4	2.23E-07	1.19E-06	10	331.92	0	628.1	1.69	2.07	0.000276678	578.29	1.5	2.07	40
171	28.22	0.17	23.3	0.8	4	1.95E-07	1.00E-06	10	322.1	0	624.81	1.64	1.99	0.000294745	576.77	1.47	2.01	40
172	28.38	0.16	22.5	0.8	4	1.53E-07	7.64E-07	10	310.9	0	629.59	1.59	1.91	0.000276353	578.97	1.43	1.87	40
173	28.54	0.16	22.3	0.9	4	1.30E-07	6.35E-07	10	305.09	0	636.73	1.56	1.87	0.000274796	582.25	1.41	1.76	40
174	28.71	0.17	22.1	0.9	4	1.30E-07	6.39E-07	10	306.23	0	638.72	1.56	1.86	0.000291515	583.16	1.41	1.77	40
175	28.87	0.16	23	0.8	4	1.52E-07	7.62E-07	10	312.83	0	634.55	1.6	1.89	0.000275269	581.25	1.42	1.88	40
176	29.04	0.17	23.8	0.8	4	1.63E-07	8.35E-07	10	319.16	0	639.07	1.63	1.92	0.00029144	583.31	1.44	1.91	40
177	29.2	0.16	23.3	0.9	4	1.67E-07	8.74E-07	10	327.49	0	653.38	1.67	1.96	0.000271274	589.81	1.46	1.89	40

178	29.36	0.16	24.8	0.9	4	1.37E-07	7.11E-07	10	324.37	0	670.59	1.65	1.93	0.000267769	597.53	1.44	1.74	40
179	29.53	0.17	23.7	1	4	1.24E-07	6.31E-07	10	317.69	0	668.65	1.62	1.88	0.000284919	596.66	1.42	1.7	40
180	29.69	0.16	22.3	0.9	3	1.06E-07	5.12E-07	10	301.7	0	653.15	1.54	1.77	0.00027132	589.71	1.38	1.68	39.04
181	29.86	0.17	21.8	0.8	3	9.74E-08	4.46E-07	10	286.01	0	628.78	1.46	1.67	0.000293813	578.6	1.33	1.72	38.98
182	30.02	0.16	20.3	0.8	3	9.58E-08	4.30E-07	9	280.32	0	618.08	1.43	1.63	0.000278911	573.66	1.31	1.75	39.19
183	30.19	0.17	21	0.8	4	1.28E-07	6.32E-07	10	307.22	0	642.44	1.57	1.78	0.000290673	584.85	1.37	1.84	40
184	30.35	0.16	27.2	0.9	4	1.67E-07	9.07E-07	11	339.71	0	677.69	1.73	1.95	0.000266365	600.68	1.46	1.89	40
185	30.51	0.16	27.1	1	4	1.93E-07	1.13E-06	11	364.61	0	708.45	1.86	2.09	0.000260514	614.17	1.52	1.89	40
186	30.68	0.17	26.7	1	4	1.67E-07	9.63E-07	11	359.24	0	716.05	1.83	2.04	0.000275326	617.45	1.51	1.8	39.43
187	30.84	0.16	26.5	1	4	1.78E-07	1.02E-06	11	359.52	0	708.87	1.83	2.03	0.000260438	614.35	1.41	1.86	20
188	31.01	0.17	27.4	0.9	4	2.54E-07	1.65E-06	12	404.96	0	748.45	2.07	2.28	0.000269298	631.27	1.46	1.96	20
189	31.17	0.16	36.9	1.2	4	5.64E-07	5.07E-06	15	560.93	716.05	897.45	2.86	3.14	0.000231465	691.25	1.63	2.05	20
190	31.33	0.16	60.7	2	5	1.40E-06	1.71E-05	19	761.61	824.41	1033.25	0	0	0.000215718	741.71	0	0	20
191	31.5	0.17	71.1	1.7	5	1.82E-06	2.44E-05	20	836.33	863.53	1082.3	0	0	0.000223946	759.11	0	0	20
192	31.66	0.16	53.1	1.5	5	1.70E-06	2.05E-05	18	750.49	784.53	983.28	0	0	0.000221132	723.55	0	0	20
193	31.83	0.17	41.3	1.1	4	8.12E-07	7.74E-06	16	594.68	710.71	890.75	3.03	3.26	0.000246853	688.67	1.65	2.35	20
194	31.99	0.16	37.5	1.2	4	4.33E-07	3.42E-06	14	493.77	661.25	828.76	2.52	2.69	0.000240866	664.27	1.55	2.12	20
195	32.15	0.16	31.1	1.2	4	2.56E-07	1.79E-06	13	437.01	0	806.81	2.23	2.37	0.000244122	655.41	1.49	1.87	20
196	32.32	0.17	29.4	1.1	4	2.13E-07	1.39E-06	12	408.15	0	778.63	2.08	2.2	0.000264033	643.86	1.45	1.86	20
197	32.48	0.16	30.8	1	4	2.95E-07	1.96E-06	12	415.55	0	747.64	2.12	2.23	0.000253598	630.92	1.59	2.15	40
198	32.65	0.17	31.8	0.8	5	2.86E-06	3.05E-05	16	665.65	633.66	794.18	0	0	0.000261434	650.26	0	0	20
199	32.81	0.16	82.6	0.7	6	3.07E-05	4.06E-04	20	825.5	658.65	825.5	0	0	0.000241342	662.96	0	0	20
200	32.97	0.16	116.9	0.5	6	1.65E-04	2.31E-03	24	873.18	696.69	873.18	0	0	0.000234659	681.84	0	0	20
201	33.14	0.17	132.1	0.6	6	1.51E-04	2.46E-03	28	1015	809.84	1015	0	0	0.000231252	735.13	0	0	20
202	33.3	0.16	130.9	1.5	6	7.38E-05	1.47E-03	32	1244.67	993.09	1244.67	0	0	0.000196546	814.06	0	0	20
203	33.47	0.17	145.7	2.3	6	3.08E-05	7.18E-04	34	1456.54	1162.14	1456.54	0	0	0.000193044	880.63	0	0	20
204	33.63	0.16	131.6	2.8	5	1.12E-05	2.73E-04	33	1517.61	1210.86	1517.61	0	0	0.000177995	898.9	0	0	20
205	33.79	0.16	77.8	2.8	5	2.95E-06	5.53E-05	27	1168.94	1106.05	1386.25	0	0	0.000186239	859.11	0	0	20
206	33.96	0.17	47	2	4	5.87E-07	6.79E-06	20	721.99	915.04	1146.85	3.68	3.71	0.000217553	781.42	1.73	1.75	20
207	34.12	0.16	35.6	1.4	4	2.23E-07	1.76E-06	15	491.5	0	930.02	2.51	2.51	0.000227376	703.68	1.52	1.64	20
208	34.29	0.17	28	1.1	4	1.28E-07	7.86E-07	12	383.13	0	801.54	1.95	1.95	0.000260229	653.27	1.39	1.64	20
209	34.45	0.16	23.4	1	3	7.26E-08	3.63E-07	11	312.51	0	724.63	1.59	1.58	0.000257591	621.14	1.3	1.56	20
210	34.61	0.16	20.5	0.9	3	4.67E-08	2.01E-07	10	269.01	0	675.5	1.37	1.36	0.000266796	599.71	1.23	1.49	20
211	34.78	0.17	19	0.8	3	3.22E-08	1.21E-07	9	234.23	0	629.15	1.2	1.18	0.000293726	578.77	1.17	1.46	20
212	34.94	0.16	16.2	0.7	3	2.65E-08	8.95E-08	8	211.11	0	587.53	1.08	1.05	0.000286072	559.3	1.13	1.51	20
213	35.11	0.17	15.6	0.6	3	1.92E-08	5.41E-08	8	175.45	0	553.85	0.96	0.93	0.000313058	543.03	1.08	1.48	20
214	35.27	0.16	13.9	0.6	3	1.61E-08	3.98E-08	8	154.01	0	536.99	0.9	0.87	0.000299233	534.7	1.06	1.47	20
215	35.43	0.16	13.7	0.6	3	1.33E-08	2.99E-08	7	140.71	0	532.82	0.86	0.83	0.000300402	532.62	1.04	1.41	20
216	35.6	0.17	14	0.6	3	1.30E-08	2.90E-08	7	139.33	0	533.61	0.86	0.83	0.000318937	533.02	1.04	1.4	20
217	35.76	0.16	13.9	0.6	3	1.39E-08	3.05E-08	7	136.92	0	523.55	0.85	0.82	0.000303048	527.97	1.04	1.48	20
218	35.93	0.17	13.5	0.5	3	1.41E-08	3.12E-08	7	137.89	0	525.33	0.86	0.82	0.000321446	528.86	1.04	1.49	20
219	36.09	0.16	14.2	0.6	3	1.89E-08	4.78E-08	8	158.04	0	534.85	0.92	0.87	0.000299828	533.64	1.06	1.6	20
220	36.26	0.17	16.4	0.6	3	2.68E-08	8.41E-08	8	196	0	560.3	1.03	0.97	0.000311247	546.19	1.1	1.68	20
221	36.42	0.16	18	0.6	3	3.37E-08	1.18E-07	8	218.58	0	582.31	1.12	1.05	0.000287351	556.81	1.13	1.73	20
222	36.58	0.16	17.8	0.7	3	3.29E-08	1.20E-07	9	227.85	0	609.56	1.16	1.09	0.000280854	569.69	1.14	1.63	20
223	36.75	0.17	18.4	0.8	3	4.29E-08	1.87E-07	10	272.37	0	694.56	1.39	1.29	0.000279555	608.11	1.21	1.51	20
224	36.91	0.16	27.2	1.2	3	7.35E-08	4.00E-07	12	339.66	0	785.86	1.73	1.61	0.000247353	646.85	1.31	1.54	20
225	37.08	0.17	32.1	1.3	3	1.25E-07	8.48E-07	14	422.33	0	887.03	2.15	1.99	0.00024737	687.23	1.41	1.58	20
226	37.24	0.16	36.2	1.5	4	1.57E-07	1.16E-06	15	461.43	0	930.92	2.35	2.16	0.000227266	704.02	1.45	1.61	20
227	37.4	0.16	35.2	1.5	4	1.66E-07	1.27E-06	15	478.99	0	956.4	2.44	2.24	0.000224218	713.59	1.46	1.6	20
228	37.57	0.17	35.5	1.5	4	1.67E-07	1.29E-06	15	481.07	0	958.95	2.45	2.24	0.000237915	714.54	1.61	1.6	39.94
229	37.73	0.16	36.4	1.5	4	1.71E-07	1.33E-06	15	484.54	0	962	2.47	2.24	0.000223564	715.68	1.47	1.62	20
230	37.9	0.17	36.3	1.5	4	1.81E-07	1.43E-06	15	491.95	0	966.83	2.51	2.27	0.000236944	717.47	1.47	1.64	20
231	38.06	0.16	37.2	1.5	4	1.87E-07	1.49E-06	15	496.94	0	970.49	2.54	2.28	0.000222584	718.83	1.47	1.66	20
232	38.22	0.16	37.4	1.5	4	2.05E-07	1.66E-06	15	503.11	0	966.38	2.57	2.3	0.000223056	717.31	1.48	1.72	20
233	38.39	0.17	37.7	1.4	4	2.13E-07	1.74E-06	15	508.64	0	970.3	2.6	2.31	0.000236518	718.76	1.48	1.73	20
234	38.55	0.16	38.5	1.5	4	2.22E-07	1.82E-06	16	514.09	0	974.06	2.62	2.33	0.000222176	720.15	1.49	1.75	20
235	38.72	0.17	38.8	1.5	4	2.05E-07	1.70E-06	16	517.1	0	993.49	2.64	2.33	0.000233741	727.3	1.49	1.69	20
236	38.88	0.16	38.4	1.6	4	1.92E-07	1.59E-06	16	515.75	0	1002.64	2.63	2.32	0.000218986	730.64	1.48	1.65	20
237	39.04	0.16	38.1	1.6	4	1.78E-07	1.48E-06	16	518.18	0	1021.34	2.64	2.32	0.000216973	737.42	1.48	1.59	20

238	39.21	0.17	39.3	1.7	4	1.73E-07	1.43E-06	16	515.67	0	1021.95	2.63	2.3	0.000230465	737.64	1.48	1.58	20
239	39.37	0.16	38	1.6	4	1.66E-07	1.36E-06	16	511.73	0	1021.84	2.61	2.27	0.00021692	737.6	1.47	1.57	20
240	39.54	0.17	37.5	1.6	4	1.57E-07	1.24E-06	16	495.93	0	1000.61	2.53	2.19	0.000232909	729.9	1.45	1.58	20
241	39.7	0.16	35.9	1.5	4	1.36E-07	1.04E-06	15	476.31	0	985.44	2.43	2.09	0.000220888	724.35	1.43	1.55	20
242	39.86	0.16	34.1	1.5	3	1.07E-07	7.57E-07	15	441.85	0	955.05	2.25	1.93	0.000224376	713.09	1.39	1.51	20
243	40.03	0.17	30.5	1.4	3	7.51E-08	4.80E-07	14	399.14	0	919.85	2.04	1.74	0.00024292	699.82	1.34	1.43	20
244	40.19	0.16	27.3	1.3	3	5.20E-08	2.92E-07	13	350.46	0	863.11	1.79	1.52	0.000236023	677.9	1.28	1.38	20
245	40.36	0.17	24	1.1	3	3.78E-08	1.84E-07	11	305.08	0	796.19	1.56	1.32	0.000261101	651.09	1.22	1.39	20
246	40.52	0.16	21	0.9	3	2.97E-08	1.25E-07	10	263.46	0	718.26	1.34	1.13	0.000258732	618.4	1.16	1.46	20
247	40.68	0.16	18.4	0.7	3	2.41E-08	9.04E-08	9	234.01	0	662.27	1.19	1	0.000269446	593.81	1.11	1.53	20
248	40.85	0.17	17.5	0.7	3	2.13E-08	7.59E-08	9	221.97	0	659.51	1.16	0.97	0.000286886	592.57	1.1	1.49	20
249	41.01	0.16	19.5	0.9	3	2.40E-08	9.86E-08	10	256.61	0	726.94	1.31	1.09	0.000257181	622.13	1.14	1.37	20
250	41.18	0.17	24.4	1.2	3	2.98E-08	1.45E-07	12	303.93	0	827.91	1.55	1.29	0.000256051	663.93	1.21	1.27	20
251	41.34	0.16	27.7	1.5	3	3.81E-08	2.14E-07	13	350.81	0	914.13	1.79	1.48	0.000229345	697.64	1.27	1.22	20
252	41.5	0.16	29.8	1.6	3	4.39E-08	2.61E-07	13	371.33	0	943.08	1.89	1.56	0.000225797	708.6	1.29	1.24	20
253	41.67	0.17	28.9	1.4	3	4.79E-08	2.85E-07	13	371.68	0	928.97	1.9	1.56	0.000241724	703.28	1.29	1.3	20
254	41.83	0.16	27.4	1.3	3	5.34E-08	3.12E-07	13	364.64	0	893.65	1.86	1.52	0.000231958	689.78	1.28	1.4	20
255	42	0.17	27.9	1.2	3	5.55E-08	3.20E-07	13	359.64	0	875.37	1.83	1.49	0.000249015	682.69	1.27	1.46	20
256	42.16	0.16	27.7	1.2	3	4.98E-08	2.77E-07	13	346.97	0	861.11	1.77	1.44	0.000236298	677.11	1.26	1.45	20
257	42.32	0.16	25	1.2	3	3.78E-08	1.92E-07	12	317.47	0	828.16	1.62	1.31	0.000240953	664.03	1.22	1.4	20
258	42.49	0.17	21.9	1	3	2.44E-08	1.08E-07	11	275.18	0	777.15	1.4	1.13	0.000264283	643.25	1.16	1.33	20
259	42.65	0.16	18.9	0.9	3	1.67E-08	6.35E-08	10	237.48	0	728.59	1.23	0.99	0.000256892	622.83	1.11	1.29	20
260	42.82	0.17	17.8	0.9	3	1.40E-08	4.73E-08	10	211.46	0	711.48	1.16	0.93	0.000276212	615.47	1.08	1.27	20
261	42.98	0.16	19.1	0.9	3	2.97E-08	1.30E-07	11	272.25	0	741.85	1.39	1.11	0.000254582	628.48	1.15	1.51	20
262	43.15	0.17	28.7	0.9	4	1.18E-07	6.82E-07	12	362.18	0	769.57	1.85	1.47	0.000265579	640.11	1.27	2.17	20
263	43.31	0.16	37.4	0.7	4	1.78E-07	1.06E-06	12	369.78	0	728.66	1.89	1.49	0.00025688	622.86	1.28	2.64	20
264	43.47	0.16	21.1	0.5	4	1.32E-07	6.71E-07	11	316.16	0	657.47	1.61	1.27	0.00027043	591.65	1.21	2.79	20
265	43.64	0.17	17.2	0.5	3	3.48E-08	1.08E-07	9	194.32	0	583.85	1.12	0.88	0.000304911	557.54	1.06	2.2	20
266	43.8	0.16	16.8	0.5	3	2.28E-08	5.82E-08	8	159.4	0	571.77	1.02	0.8	0.000289986	551.75	1.03	2	20
267	43.97	0.17	16.6	0.5	3	2.32E-08	5.96E-08	8	160.66	0	573.53	1.03	0.8	0.000307637	552.6	1.03	2.01	20
268	44.13	0.16	17.3	0.5	3	3.44E-08	1.07E-07	9	193.62	0	587.28	1.13	0.88	0.000286133	559.18	1.06	2.21	20
269	44.29	0.16	20.8	0.5	3	5.63E-08	2.31E-07	10	255.86	0	621.19	1.31	1.01	0.000278212	575.1	1.11	2.4	20
270	44.46	0.17	23.5	0.6	4	8.04E-08	3.77E-07	10	292.59	0	665.99	1.49	1.15	0.000285489	595.47	1.17	2.44	20
271	44.62	0.16	24.7	0.7	4	8.37E-08	4.24E-07	11	316.15	0	714.44	1.61	1.24	0.000259424	616.75	1.2	2.26	20
272	44.79	0.17	25.5	0.8	4	8.22E-08	4.32E-07	11	328.33	0	744.35	1.68	1.28	0.000270043	629.53	1.18	2.14	34.89
273	44.95	0.16	25.9	0.8	3	7.52E-08	4.03E-07	12	334.44	0	770.57	1.71	1.3	0.000249793	640.53	1.19	2.01	35.06
274	45.11	0.16	26	0.9	3	5.49E-08	2.84E-07	12	322.62	0	786.89	1.65	1.25	0.000247192	647.27	1.17	1.79	34.83
275	45.28	0.17	23	1	3	3.49E-08	1.68E-07	11	300.44	0	795.15	1.53	1.16	0.000261273	650.66	1.17	1.55	20
276	45.44	0.16	21.7	1	3	2.29E-08	9.85E-08	11	268.47	0	766.88	1.37	1.03	0.000250395	638.99	1.12	1.44	20
277	45.61	0.17	19.4	0.8	3	1.86E-08	6.75E-08	10	226.86	0	722.28	1.24	0.93	0.000274136	620.13	1.08	1.46	20
278	45.77	0.16	17.8	0.7	3	1.88E-08	5.89E-08	10	195.52	0	670.4	1.16	0.86	0.000267809	597.44	0.99	1.62	31.05
279	45.93	0.16	17.7	0.6	3	1.89E-08	5.67E-08	9	187.72	0	657.69	1.13	0.84	0.000270384	591.75	0.97	1.67	31.46
280	46.1	0.17	18.4	0.7	3	1.85E-08	5.52E-08	9	186.19	0	658.41	1.13	0.84	0.000287123	592.08	0.96	1.66	32.25
281	46.26	0.16	17.5	0.7	3	1.73E-08	5.21E-08	9	188.21	0	671.4	1.14	0.84	0.000267608	597.89	0.96	1.6	32.48
282	46.43	0.17	18	0.7	3	1.86E-08	5.81E-08	10	194.96	0	675.47	1.16	0.86	0.000283475	599.7	0.96	1.63	33.1
283	46.59	0.16	19.2	0.7	3	2.67E-08	9.90E-08	10	231.2	0	690.05	1.27	0.93	0.000263965	606.14	1	1.77	33.99
284	46.75	0.16	21.8	0.7	3	3.26E-08	1.32E-07	10	253.67	0	698.73	1.33	0.97	0.000262325	609.93	1.01	1.86	34.63
285	46.92	0.17	20.5	0.7	3	4.08E-08	1.76E-07	10	269.65	0	693.91	1.38	1	0.000279683	607.83	1.02	2.02	35.96
286	47.08	0.16	20.7	0.6	3	3.46E-08	1.39E-07	10	250.35	0	689.07	1.33	0.96	0.000264153	605.71	1	1.95	35.57
287	47.25	0.17	19.8	0.7	3	3.31E-08	1.30E-07	10	245.51	0	688.9	1.32	0.95	0.000280699	605.63	0.98	1.93	36.22
288	47.41	0.16	19.8	0.7	3	4.01E-08	1.77E-07	11	275.89	0	712.21	1.41	1.02	0.000259829	615.79	1.02	1.97	36
289	47.57	0.16	24.8	0.7	3	5.29E-08	2.50E-07	11	295.05	0	724.33	1.51	1.08	0.000257645	621.01	1.06	2.11	35.85
290	47.74	0.17	24.1	0.7	3	5.48E-08	2.56E-07	11	291.83	0	712.02	1.49	1.07	0.000276104	615.71	1.07	2.19	34.5
291	47.9	0.16	19.6	0.6	3	3.76E-08	1.50E-07	10	249.68	0	683.79	1.34	0.95	0.000265173	603.38	1.01	2.07	33.88
292	48.07	0.17	18.4	0.6	3	2.67E-08	8.71E-08	10	203.32	0	657.34	1.21	0.86	0.000287356	591.6	0.95	1.97	34.34
293	48.23	0.16	18.4	0.6	3	2.75E-08	9.08E-08	10	206.16	0	659.62	1.22	0.86	0.000269988	592.62	0.94	1.99	35.31
294	48.39	0.16	19.7	0.6	3	2.70E-08	9.25E-08	10	214.07	0	675.59	1.24	0.88	0.000266778	599.75	0.94	1.92	35.57
295	48.56	0.17	19.4	0.7	3	3.15E-08	1.21E-07	10	240.65	0	697.8	1.32	0.93	0.000278903	609.53	0.97	1.94	35.73
296	48.72	0.16	21.7	0.7	3	3.23E-08	1.31E-07	10	253.96	0	714.9	1.36	0.95	0.00025934	616.95	1	1.9	34.9
297	48.89	0.17	21.7	0.7	3	3.75E-08	1.64E-07	11	272.81	0	722.18	1.41	0.99	0.000274154	620.09	1.03	1.97	34.24

CPT-2 Estimations

298	49.05	0.16	21.9	0.7	3	2.73E-08	1.03E-07	10	235.03	0	711.23	1.31	0.91	0.000260006	615.37	1.01	1.84	32.13
299	49.22	0.17	18.1	0.7	3	1.91E-08	6.09E-08	10	198.92	0	699.1	1.21	0.84	0.000278643	610.1	0.97	1.69	31.7
300	49.38	0.16	17.4	0.7	3	1.28E-08	3.65E-08	10	178.39	0	713.21	1.15	0.79	0.000259648	616.22	0.94	1.47	31.45
301	49.54	0.16	19.3	0.9	3	1.54E-08	5.53E-08	11	224.42	0	774.73	1.29	0.89	0.000249124	642.25	0.99	1.4	32.25
302	49.71	0.17	24	1.1	3	2.67E-08	1.35E-07	12	314.9	0	874.86	1.61	1.11	0.000249088	682.49	1.15	1.43	20
303	49.87	0.16	31	1.3	3	3.69E-08	2.29E-07	15	388.44	0	1018.18	1.98	1.36	0.000217309	736.28	1.23	1.32	20
304	50.04	0.17	35.6	2	3	4.32E-08	3.05E-07	16	441.19	0	1123.52	2.25	1.54	0.0002198	773.43	1.29	1.25	20

Sum	0.093098709	
Vs of CPT	537.494	(ft/s)
	163.8701	(m/s)
Extrapolated Vs	634.4684	(ft/s)
Following Boore (2004)	193.4355	(m/s)

CPT-3 Estimations

	In situ data					Estimations												
No	Depth (ft)	Thickness (ft)	qc (tsf)	fs (tsf)	SBTn	Ksbt (ft/s)	Cv (ft2/s)	SPT N60 (blows/ft)	Con. Mod. (tsf)	Es (tsf)	Go (tsf)	Su (tsf)	Su ratio	Thickness /Vs (s)	Vs (ft/s)	Ko	Sensitivity	Peak phi (°)
1	0.33	0.33	61.9	0.4	6	1.08E-03	5.52E-03	10	319.38	254.82	319.38	0	0	0.0008003	412.36	0	0	20
2	0.49	0.16	44.1	0.6	6	3.24E-04	1.71E-03	9	329.62	263	329.62	0	0	0.0003819	418.93	0	0	20
3	0.66	0.17	33.4	0.8	8	5.80E-05	3.10E-04	8	334.33	266.75	334.33	0	0	0.0004029	421.91	0	0	20
4	0.82	0.16	26.1	1.1	8	1.54E-05	8.38E-05	7	340.9	272	340.9	0	0	0.0003756	426.03	0	0	20
5	0.98	0.16	23.6	1.3	9	7.46E-06	4.29E-05	7	359.37	286.73	359.37	1.83	63.83	0.0003658	437.42	3	1.41	20
6	1.15	0.17	27.2	1.4	9	6.42E-06	4.08E-05	8	397	316.76	397	1.97	58.48	0.0003698	459.76	3	1.34	20
7	1.31	0.16	31.9	1.6	9	6.99E-06	4.84E-05	9	432.49	345.08	432.49	2.17	56.79	0.0003334	479.87	3	1.39	20
8	1.48	0.17	32.4	1.6	8	9.07E-06	6.68E-05	10	459.78	366.85	459.78	0	0	0.0003436	494.77	0	0	20
9	1.64	0.16	37.7	1.4	8	1.03E-05	7.68E-05	10	465.08	371.07	465.08	0	0	0.0003215	497.61	0	0	20
10	1.8	0.16	35.5	1.4	8	1.13E-05	8.20E-05	10	452.99	361.43	452.99	0	0	0.0003258	491.1	0	0	20
11	1.97	0.17	31.4	1.2	8	8.39E-06	5.72E-05	9	426.2	340.06	426.2	0	0	0.0003569	476.36	0	0	20
12	2.13	0.16	26.4	1.1	8	5.52E-06	3.23E-05	8	364.88	308.29	386.39	0	0	0.0003528	453.57	0	0	20
13	2.3	0.17	20.7	1	9	2.94E-06	1.43E-05	7	303.56	287.39	360.19	1.55	23.04	0.0003882	437.92	2.52	1.42	20
14	2.46	0.16	18.3	1.1	9	1.68E-06	7.06E-06	6	262.32	274.85	344.48	1.34	18.61	0.0003736	428.26	2.43	1.23	20
15	2.62	0.16	17.6	1.1	9	1.18E-06	4.63E-06	6	245.36	274.12	343.57	1.25	16.35	0.0003741	427.7	2.37	1.12	20
16	2.79	0.17	17.1	1.1	9	9.76E-07	3.70E-06	6	236.78	273.72	343.06	1.21	14.81	0.0003978	427.38	2.33	1.08	20
17	2.95	0.16	16.5	1.1	9	8.56E-07	3.18E-06	6	231.96	274.6	344.16	1.18	13.73	0.0003738	428.07	2.29	1.05	20
18	3.12	0.17	16.6	1.1	9	7.59E-07	2.77E-06	6	228.08	275.94	345.85	1.16	12.76	0.0003962	429.11	2.25	1.04	20
19	3.28	0.16	16.3	1.1	9	6.52E-07	2.32E-06	6	221.88	275.91	345.81	1.13	11.81	0.0003729	429.09	2.22	1.01	20
20	3.45	0.17	15.2	1.1	9	5.46E-07	1.84E-06	6	210.52	270.34	338.83	1.07	10.65	0.0004002	424.74	2.17	0.99	20
21	3.61	0.16	14.2	1	9	4.37E-07	1.38E-06	5	197.29	263.82	330.65	1.01	9.54	0.0003813	419.58	2.11	0.95	20
22	3.77	0.16	13.5	1	9	3.48E-07	1.03E-06	5	184.07	0	321.43	0.94	8.52	0.0003868	413.69	2.05	0.92	20
23	3.94	0.17	12.4	1	9	2.91E-07	8.10E-07	5	174.13	0	314.13	0.89	7.71	0.0004157	408.96	2	0.9	20
24	4.1	0.16	12.1	0.9	9	2.46E-07	6.51E-07	5	165.12	0	306.94	0.84	7.03	0.0003958	404.26	1.96	0.88	20
25	4.27	0.17	11.6	0.9	9	2.49E-07	6.43E-07	5	161.23	0	299.14	0.82	6.59	0.000426	399.08	1.92	0.93	20
26	4.43	0.16	11.6	0.8	9	2.71E-07	6.95E-07	5	160.14	0	292.59	0.82	6.31	0.0004054	394.7	1.89	1	20
27	4.59	0.16	11.9	0.7	9	3.31E-07	8.67E-07	5	163.74	0	288.58	0.84	6.23	0.0004082	391.98	1.87	1.12	20
28	4.76	0.17	12.4	0.7	3	3.33E-07	8.88E-07	5	166.4	0	292.82	0.85	6.1	0.0004305	394.85	1.86	1.13	20
29	4.92	0.16	12.2	0.8	9	3.01E-07	8.08E-07	5	167.67	0	300.6	0.86	5.95	0.0003999	400.06	1.85	1.09	20
30	5.09	0.17	12.2	0.8	3	2.73E-07	7.21E-07	5	165.19	0	301.48	0.84	5.66	0.0004243	400.64	1.83	1.08	20
31	5.25	0.16	11.9	0.7	4	3.36E-07	9.08E-07	5	168.79	0	296.63	0.86	5.61	0.0004026	397.41	1.82	1.21	20
32	5.41	0.16	13	0.6	4	4.62E-07	1.31E-06	5	177.06	234.4	293.78	0.9	5.71	0.0004046	395.49	1.81	1.4	20
33	5.58	0.17	14	0.6	4	7.23E-07	2.22E-06	5	191.87	234.17	293.5	0.98	6	0.0004301	395.3	1.81	1.69	20
34	5.74	0.16	15.1	0.5	5	1.60E-06	5.63E-06	5	219.28	231.77	290.48	0	0	0.0004068	393.27	0	0	20
35	5.91	0.17	18.9	0.3	5	5.54E-06	2.37E-05	6	267.67	226.05	283.32	0	0	0.0004377	388.39	0	0	20
36	6.07	0.16	24.4	0.2	5	9.10E-06	4.39E-05	6	301.29	240.39	301.29	0	0	0.0003995	400.52	0	0	20
37	6.23	0.16	24.5	0.5	5	9.12E-06	4.84E-05	7	331.26	264.31	331.26	0	0	0.000381	419.97	0	0	20
38	6.4	0.17	25.6	0.5	5	6.73E-06	3.90E-05	7	361.22	288.21	361.22	0	0	0.0003876	438.55	0	0	20
39	6.56	0.16	26.8	0.5	5	5.54E-06	2.99E-05	7	337.57	285.1	357.32	0	0	0.0003668	436.17	0	0	20
40	6.73	0.17	21.1	0.5	5	3.70E-06	1.80E-05	7	304.33	276.49	346.54	0	0	0.0003958	429.54	0	0	20
41	6.89	0.16	18.5	0.5	5	1.41E-06	5.51E-06	6	243.1	262.8	329.37	0	0	0.0003821	418.77	0	0	20
42	7.05	0.16	13.7	0.6	4	6.91E-07	2.22E-06	5	201	247.38	310.05	1.03	4.98	0.0003938	406.3	1.73	1.88	20
43	7.22	0.17	12.1	0.5	4	3.53E-07	9.21E-07	5	163.1	0	284.12	0.83	3.94	0.0004371	388.94	1.64	1.63	20
44	7.38	0.16	10.4	0.4	4	2.48E-07	5.74E-07	4	144.35	0	267.9	0.74	3.41	0.0004237	377.67	1.58	1.55	20
45	7.55	0.17	9.7	0.5	3	1.57E-07	3.44E-07	4	137.26	0	276.96	0.7	3.17	0.0004427	384.01	1.56	1.29	20
46	7.71	0.16	10.6	0.7	3	1.57E-07	4.02E-07	5	159.57	0	321.64	0.81	3.61	0.0003866	413.82	1.63	1.14	20
47	7.87	0.16	15.2	0.9	3	1.91E-07	5.79E-07	6	189.75	0	369.48	0.97	4.21	0.0003607	443.53	1.71	1.09	20
48	8.04	0.17	16.2	1	3	2.48E-07	8.49E-07	6	213.84	0	397.06	1.09	4.64	0.0003697	459.79	1.76	1.15	20
49	8.2	0.16	15.8	0.9	3	2.22E-07	7.58E-07	6	213.18	0	403.77	1.09	4.54	0.0003451	463.66	1.75	1.1	20
50	8.37	0.17	15.1	1	3	1.93E-07	6.40E-07	6	206.96	0	402.03	1.06	4.32	0.0003674	462.66	1.73	1.07	20
51	8.53	0.16	14.9	1	3	1.80E-07	5.88E-07	6	204.49	0	402.5	1.04	4.18	0.0003456	462.93	1.72	1.06	20
52	8.69	0.16	15.3	0.9	3	1.97E-07	6.52E-07	6	207.21	0	401.23	1.06	4.16	0.0003462	462.19	1.71	1.11	20
53	8.86	0.17	15.7	0.9	3	2.22E-07	7.54E-07	6	211.79	0	401.03	1.08	4.17	0.0003679	462.08	1.71	1.18	20
54	9.02	0.16	15.9	0.9	3	2.46E-07	8.64E-07	6	219.24	0	407.58	1.12	4.24	0.0003435	465.84	1.71	1.22	20
55	9.19	0.17	16.9	0.9	4	2.72E-07	1.01E-06	7	231.29	0	422.29	1.18	4.39	0.0003585	474.17	1.73	1.24	20
56	9.35	0.16	18.3	1	4	3.13E-07	1.26E-06	7	250.84	0	446.47	1.28	4.68	0.0003282	487.56	1.77	1.25	20

57	9.51	0.16	20.1	1.1	4	3.40E-07	1.50E-06	8	275.93	0	483.93	1.41	5.06	0.0003152	507.6	1.81	1.22	20
58	9.68	0.17	22.3	1.3	4	3.39E-07	1.60E-06	8	294.95	0	517.38	1.5	5.32	0.0003239	524.85	1.84	1.16	20
59	9.84	0.16	22.4	1.4	9	2.86E-07	1.37E-06	9	299.43	0	541.88	1.53	5.31	0.0002979	537.13	1.85	1.07	20
60	10.01	0.17	21.1	1.5	9	2.28E-07	1.06E-06	9	291.28	0	549.04	1.49	5.08	0.0003144	540.67	1.84	0.99	20
61	10.17	0.16	20.6	1.5	9	2.03E-07	9.22E-07	8	284.07	0	546.98	1.45	4.88	0.0002965	539.65	1.82	0.97	20
62	10.34	0.17	20.9	1.4	3	2.19E-07	1.01E-06	8	288.15	0	547.15	1.47	4.86	0.000315	539.74	1.81	1.01	20
63	10.5	0.16	22	1.4	3	2.53E-07	1.21E-06	9	297.43	0	550.06	1.52	4.94	0.0002957	541.17	1.82	1.06	20
64	10.66	0.16	22.6	1.4	3	2.88E-07	1.43E-06	9	309.51	0	559.24	1.58	5.07	0.0002932	545.67	1.83	1.11	20
65	10.83	0.17	23.5	1.4	4	3.20E-07	1.62E-06	9	315.96	0	560.18	1.61	5.09	0.0003113	546.13	1.83	1.16	20
66	10.99	0.16	23.4	1.3	4	3.42E-07	1.75E-06	9	319.16	0	558.98	1.63	5.07	0.0002933	545.54	1.83	1.2	20
67	11.16	0.17	23.3	1.3	4	3.70E-07	1.92E-06	9	323.32	445.44	558.28	1.65	5.06	0.0003118	545.2	1.82	1.24	20
68	11.32	0.16	24.4	1.3	4	3.64E-07	1.89E-06	9	323.71	0	560.62	1.65	4.99	0.0002929	546.34	1.82	1.25	20
69	11.48	0.16	23.5	1.3	4	3.57E-07	1.88E-06	9	328.27	0	570.49	1.67	4.99	0.0002903	551.13	1.82	1.23	20
70	11.65	0.17	24.3	1.4	4	3.16E-07	1.66E-06	9	328.1	0	583.15	1.67	4.92	0.0003051	557.21	1.82	1.17	20
71	11.81	0.16	24.4	1.5	3	2.95E-07	1.59E-06	10	336.35	0	605.24	1.72	4.97	0.0002819	567.67	1.83	1.12	20
72	11.98	0.17	25.3	1.6	3	2.86E-07	1.58E-06	10	343.67	0	621.71	1.75	5.01	0.0002955	575.34	1.83	1.1	20
73	12.14	0.16	25.9	1.6	3	2.96E-07	1.67E-06	10	352.39	0	633.77	1.8	5.07	0.0002754	580.89	1.84	1.1	20
74	12.3	0.16	26.3	1.6	3	3.21E-07	1.84E-06	10	357.86	0	633.92	1.83	5.08	0.0002754	580.96	1.84	1.14	20
75	12.47	0.17	26.5	1.5	3	3.08E-07	1.76E-06	10	355.82	0	635.15	1.82	4.98	0.0002923	581.53	1.83	1.14	20
76	12.63	0.16	25.5	1.6	3	3.02E-07	1.72E-06	10	355.75	0	637.3	1.82	4.92	0.0002747	582.51	1.83	1.14	20
77	12.8	0.17	26.3	1.6	3	2.73E-07	1.54E-06	10	352.36	0	642.88	1.8	4.81	0.0002906	585.05	1.82	1.1	20
78	12.96	0.16	25.8	1.6	3	2.64E-07	1.48E-06	10	350.88	0	644.24	1.79	4.73	0.0002732	585.67	1.81	1.1	20
79	13.12	0.16	25.2	1.6	3	2.46E-07	1.35E-06	10	342.33	0	636.54	1.75	4.55	0.0002748	582.16	1.79	1.09	20
80	13.29	0.17	24.5	1.5	3	2.34E-07	1.25E-06	10	331.92	0	622.61	1.69	4.36	0.0002953	575.76	1.77	1.11	20
81	13.45	0.16	23.6	1.4	3	2.22E-07	1.14E-06	9	321.05	0	608.03	1.64	4.17	0.0002812	568.98	1.74	1.12	20
82	13.62	0.17	22.9	1.4	3	2.29E-07	1.15E-06	9	313.01	0	589.47	1.6	4.01	0.0003035	560.22	1.72	1.17	20
83	13.78	0.16	22.8	1.2	3	2.31E-07	1.14E-06	9	306.82	0	576.86	1.57	3.89	0.0002887	554.2	1.7	1.21	20
84	13.94	0.16	22.3	1.2	3	2.37E-07	1.15E-06	9	301.58	0	564.47	1.54	3.78	0.0002919	548.22	1.68	1.26	20
85	14.11	0.17	21.8	1.2	3	2.33E-07	1.14E-06	9	306.1	0	574.73	1.56	3.79	0.0003073	553.17	1.69	1.24	20
86	14.27	0.16	23.8	1.3	3	2.36E-07	1.20E-06	9	317.18	0	594.16	1.62	3.88	0.0002845	562.45	1.7	1.22	20
87	14.44	0.17	24.7	1.4	3	2.48E-07	1.32E-06	10	331.48	0	615.33	1.69	4.01	0.000297	572.38	1.72	1.21	20
88	14.6	0.16	24.9	1.4	3	2.52E-07	1.35E-06	10	334.14	0	618.74	1.7	3.99	0.0002788	573.96	1.72	1.22	20
89	14.76	0.16	24.4	1.3	4	2.57E-07	1.37E-06	10	333.08	0	614.44	1.7	3.94	0.0002797	571.96	1.71	1.25	20
90	14.93	0.17	24.5	1.3	4	2.64E-07	1.41E-06	10	332.49	0	610.39	1.7	3.89	0.0002982	570.08	1.7	1.28	20
91	15.09	0.16	24.8	1.3	4	2.51E-07	1.32E-06	10	329.55	0	610.69	1.68	3.81	0.0002806	570.22	1.69	1.27	20
92	15.26	0.17	23.8	1.3	3	2.25E-07	1.13E-06	9	313.48	0	592.21	1.6	3.59	0.0003027	561.52	1.66	1.27	20
93	15.42	0.16	21.1	1.1	3	1.71E-07	7.45E-07	8	272.23	0	540.68	1.39	3.08	0.0002982	536.54	1.59	1.28	20
94	15.58	0.16	16	0.8	3	1.11E-07	3.83E-07	7	216.04	0	464.1	1.1	2.42	0.0003219	497.09	1.47	1.3	20
95	15.75	0.17	11.8	0.6	3	5.44E-08	1.41E-07	6	162.24	0	396.33	0.83	1.8	0.0003701	459.36	1.34	1.22	20
96	15.91	0.16	9.6	0.6	3	2.35E-08	4.74E-08	5	125.68	0	357.3	0.64	1.38	0.0003668	436.16	1.24	1.05	20
97	16.08	0.17	8.2	0.6	3	1.10E-08	1.82E-08	4	103.09	0	336.07	0.53	1.12	0.0004019	423	1.15	0.91	20
98	16.24	0.16	7	0.5	3	7.55E-09	1.04E-08	4	85.82	0	312	0.46	0.96	0.0003926	407.57	1.1	0.89	20
99	16.4	0.16	6.7	0.4	3	6.40E-09	7.12E-09	4	69.46	0	290.67	0.41	0.86	0.0004067	393.39	1.05	0.93	20
100	16.57	0.17	6.4	0.4	3	6.19E-09	7.27E-09	4	73.35	0	302.06	0.43	0.88	0.0004239	401.03	1.06	0.89	20
101	16.73	0.16	7.6	0.6	3	7.23E-09	1.16E-08	4	100.6	0	354.08	0.51	1.05	0.0003685	434.19	1.13	0.79	20
102	16.9	0.17	10.4	0.9	3	1.61E-08	3.73E-08	6	144.83	0	441.07	0.74	1.5	0.0003508	484.6	1.27	0.8	20
103	17.06	0.16	15.9	1.2	3	4.20E-08	1.39E-07	7	205.86	0	526.87	1.05	2.11	0.0003021	529.64	1.43	0.91	20
104	17.23	0.17	20.7	1.3	3	7.83E-08	3.21E-07	9	256.13	0	585.86	1.31	2.59	0.0003044	558.51	1.52	1.01	20
105	17.39	0.16	21.2	1.3	3	1.09E-07	4.86E-07	9	279.34	0	602.15	1.43	2.8	0.0002826	566.22	1.55	1.1	20
106	17.55	0.16	20.9	1.2	3	1.11E-07	4.86E-07	9	274.08	0	588.82	1.4	2.73	0.0002858	559.91	1.54	1.14	20
107	17.72	0.17	19.6	1.1	3	1.13E-07	4.70E-07	8	260.41	0	557.66	1.33	2.57	0.000312	544.9	1.51	1.22	20
108	17.88	0.16	18.3	0.9	3	1.09E-07	4.24E-07	8	242.54	0	522.47	1.24	2.37	0.0003034	527.42	1.47	1.3	20
109	18.05	0.17	17.1	0.8	3	1.15E-07	4.14E-07	7	224.23	0	478.24	1.14	2.17	0.0003369	504.61	1.42	1.46	20
110	18.21	0.16	15.7	0.6	3	1.09E-07	3.54E-07	7	202.64	0	436.43	1.03	1.94	0.0003319	482.04	1.37	1.6	20
111	18.37	0.16	13.7	0.5	3	7.92E-08	2.20E-07	6	173.12	0	395.08	0.88	1.64	0.0003489	458.64	1.3	1.62	20
112	18.54	0.17	10.8	0.5	3	4.62E-08	1.05E-07	5	142.62	0	358.91	0.73	1.34	0.0003889	437.14	1.22	1.53	20
113	18.7	0.16	9.2	0.4	3	2.81E-08	5.51E-08	5	122.41	0	337	0.62	1.14	0.0003777	423.59	1.16	1.41	20
114	18.87	0.17	9.4	0.4	3	2.71E-08	5.10E-08	5	117.59	0	325.9	0.6	1.09	0.0004081	416.55	1.14	1.47	20
115	19.03	0.16	9.8	0.4	3	2.86E-08	5.28E-08	5	115.1	0	315.76	0.59	1.06	0.0003902	410.02	1.13	1.57	20

116	19.19	0.16	8.7	0.3	3	2.26E-08	3.93E-08	4	108.74	0	313.23	0.56	0.99	0.0003918	408.38	1.11	1.49	20
117	19.36	0.17	8.2	0.4	3	1.54E-08	2.43E-08	4	98.51	0	320.83	0.53	0.94	0.0004113	413.3	1.09	1.31	20
118	19.52	0.16	8.8	0.5	3	2.13E-08	4.28E-08	5	125.43	0	363.09	0.64	1.12	0.0003639	439.68	1.15	1.25	20
119	19.69	0.17	13.2	0.6	3	5.32E-08	1.42E-07	6	166.85	0	409.21	0.85	1.48	0.0003642	466.77	1.26	1.47	20
120	19.85	0.16	17.1	0.6	3	9.32E-08	2.96E-07	7	197.99	0	438.78	1.01	1.74	0.000331	483.34	1.33	1.65	20
121	20.01	0.16	15.5	0.6	3	9.08E-08	2.80E-07	6	192.29	0	428.15	0.98	1.68	0.0003351	477.45	1.31	1.7	20
122	20.18	0.17	12	0.5	3	6.22E-08	1.70E-07	6	170.77	0	407.22	0.87	1.48	0.0003651	465.63	1.26	1.6	20
123	20.34	0.16	12.5	0.5	3	4.74E-08	1.14E-07	6	150.66	0	377.38	0.77	1.29	0.0003569	448.25	1.21	1.61	20
124	20.51	0.17	11.2	0.4	3	3.69E-08	8.13E-08	5	137.51	0	360.28	0.7	1.17	0.0003881	437.98	1.17	1.59	20
125	20.67	0.16	9.2	0.4	3	2.55E-08	4.75E-08	5	116.19	0	328.54	0.6	0.99	0.0003826	418.24	1.11	1.6	20
126	20.83	0.16	8.2	0.3	3	2.14E-08	3.36E-08	4	98.3	0	313.35	0.55	0.91	0.0003917	408.46	1.07	1.62	20
127	21	0.17	9.3	0.3	3	3.60E-08	7.10E-08	5	123.13	0	324.12	0.63	1.02	0.0004092	415.42	1.12	1.85	20
128	21.16	0.16	12.4	0.4	3	6.77E-08	1.64E-07	5	151.04	0	354.64	0.77	1.25	0.0003682	434.53	1.19	2.06	20
129	21.33	0.17	14.2	0.4	4	1.08E-07	3.18E-07	6	183.63	0	396.1	0.94	1.5	0.0003702	459.23	1.26	2.12	20
130	21.49	0.16	16.3	0.5	4	1.43E-07	4.82E-07	7	210.64	0	432.12	1.07	1.71	0.0003336	479.66	1.32	2.11	20
131	21.65	0.16	18.2	0.6	4	1.61E-07	6.10E-07	7	236.68	0	475.21	1.21	1.91	0.0003181	503	1.36	1.97	20
132	21.82	0.17	19.8	0.7	4	1.71E-07	7.07E-07	8	258.98	0	514.53	1.32	2.07	0.0003248	523.4	1.4	1.85	20
133	21.98	0.16	21.1	0.8	4	1.77E-07	7.76E-07	9	273.81	0	540.33	1.4	2.17	0.0002983	536.36	1.43	1.79	20
134	22.15	0.17	21.4	0.8	4	1.93E-07	8.83E-07	9	286.32	0	556.46	1.46	2.26	0.0003123	544.31	1.44	1.79	20
135	22.31	0.16	22.5	0.8	4	2.30E-07	1.11E-06	9	300.23	0	564.93	1.53	2.35	0.0002917	548.44	1.46	1.88	20
136	22.47	0.16	24.1	0.8	4	2.52E-07	1.27E-06	9	314.14	0	581.41	1.6	2.44	0.0002876	556.38	1.48	1.88	20
137	22.64	0.17	24.4	0.9	4	2.93E-07	1.56E-06	10	333.24	0	600.29	1.7	2.57	0.0003007	565.34	1.51	1.92	20
138	22.8	0.16	26.6	0.9	4	3.22E-07	1.83E-06	10	354.67	0	627.93	1.81	2.72	0.0002767	578.21	1.53	1.9	20
139	22.97	0.17	28.7	1	4	3.62E-07	2.19E-06	11	378.44	0	656.26	1.93	2.88	0.0002876	591.11	1.56	1.89	20
140	23.13	0.16	29.5	1.1	4	3.54E-07	2.21E-06	11	389.62	0	678.37	1.99	2.94	0.0002662	600.98	1.58	1.83	20
141	23.3	0.17	29	1.1	4	3.54E-07	2.22E-06	11	391.01	0	680.62	1.99	2.93	0.0002824	601.98	1.57	1.83	20
142	23.46	0.16	29	1	4	3.78E-07	2.37E-06	11	392.36	538.54	674.97	2	2.92	0.0002669	599.48	1.57	1.9	20
143	23.62	0.16	29.8	1	4	3.55E-07	2.17E-06	11	381.52	0	663.69	1.95	2.82	0.0002692	594.45	1.55	1.91	20
144	23.79	0.17	26.7	1	4	3.20E-07	1.91E-06	11	373.04	0	661.38	1.9	2.74	0.0002865	593.41	1.54	1.87	20
145	23.95	0.16	27.2	1	4	2.85E-07	1.71E-06	11	375.33	0	679.52	1.91	2.74	0.000266	601.5	1.54	1.76	20
146	24.12	0.17	30.3	1.2	4	2.89E-07	1.83E-06	12	394.82	0	712.95	2.01	2.86	0.0002759	616.11	1.57	1.69	20
147	24.28	0.16	30.9	1.3	4	2.82E-07	1.85E-06	12	410.03	0	743.65	2.09	2.95	0.0002543	629.24	1.58	1.62	20
148	24.44	0.16	30.5	1.3	4	2.37E-07	1.53E-06	12	404.23	0	756.8	2.06	2.89	0.0002521	634.78	1.57	1.52	20
149	24.61	0.17	29.1	1.4	4	1.93E-07	1.21E-06	12	390.51	0	758.82	1.99	2.77	0.0002675	635.62	1.55	1.43	20
150	24.77	0.16	28	1.4	3	1.64E-07	9.86E-07	12	376.36	0	753.33	1.92	2.65	0.0002526	633.32	1.53	1.38	20
151	24.94	0.17	27.5	1.3	3	1.61E-07	9.47E-07	11	366.84	0	736.31	1.87	2.57	0.0002715	626.12	1.52	1.41	20
152	25.1	0.16	27.1	1.2	4	1.66E-07	9.50E-07	11	356.42	0	711.16	1.82	2.48	0.00026	615.34	1.5	1.49	20
153	25.26	0.16	25.8	1.1	4	1.76E-07	9.91E-07	11	352.12	0	695.78	1.8	2.43	0.0002629	608.65	1.49	1.55	20
154	25.43	0.17	26.6	1.1	4	1.91E-07	1.09E-06	11	355.31	0	691.42	1.81	2.44	0.0002802	606.74	1.49	1.62	20
155	25.59	0.16	27.8	1.1	4	2.25E-07	1.34E-06	11	370.65	0	700.38	1.89	2.53	0.000262	610.65	1.51	1.68	20
156	25.76	0.17	29.1	1.1	4	2.60E-07	1.58E-06	11	379.4	0	698.28	1.94	2.57	0.0002788	609.74	1.52	1.78	20
157	25.92	0.16	28.5	1	4	2.51E-07	1.49E-06	11	371.34	0	688.02	1.89	2.5	0.0002644	605.24	1.5	1.8	20
158	26.08	0.16	26.1	1	4	2.15E-07	1.20E-06	11	347.4	0	661.92	1.77	2.33	0.0002695	593.65	1.47	1.8	20
159	26.25	0.17	24	0.9	4	1.59E-07	8.13E-07	10	318.7	0	641.06	1.63	2.12	0.000291	584.22	1.42	1.71	20
160	26.41	0.16	22.4	0.9	3	1.14E-07	5.27E-07	9	289.56	0	619.05	1.48	1.91	0.0002787	574.11	1.38	1.61	20
161	26.58	0.17	19.9	0.9	3	9.44E-08	4.20E-07	9	277.69	0	614	1.42	1.82	0.0002973	571.76	1.36	1.54	20
162	26.74	0.16	21.5	0.9	3	8.92E-08	3.93E-07	9	274.77	0	613.74	1.4	1.79	0.0002799	571.64	1.35	1.53	20
163	26.9	0.16	21.8	0.9	4	1.31E-07	6.23E-07	10	297	0	618.86	1.52	1.93	0.0002787	574.02	1.38	1.71	20
164	27.07	0.17	24.7	0.8	4	1.58E-07	7.77E-07	10	306.2	0	616.46	1.56	1.97	0.0002967	572.9	1.39	1.84	20
165	27.23	0.16	23.5	0.8	4	1.68E-07	8.55E-07	10	317.33	0	632	1.62	2.03	0.0002758	580.08	1.4	1.83	20
166	27.4	0.17	24.2	1	4	1.53E-07	7.92E-07	10	322.42	0	652.89	1.64	2.05	0.0002883	589.59	1.41	1.73	20
167	27.56	0.16	25.8	1	4	1.49E-07	7.80E-07	10	326.55	0	664.63	1.67	2.07	0.000269	594.86	1.41	1.69	20
168	27.72	0.16	24.4	0.9	4	1.52E-07	7.76E-07	10	318.12	0	645.05	1.62	2	0.000273	586.04	1.4	1.77	20
169	27.89	0.17	22.4	0.8	4	1.38E-07	6.62E-07	10	300.29	0	620.21	1.53	1.88	0.0002958	574.65	1.37	1.8	20
170	28.05	0.16	22	0.8	4	1.18E-07	5.39E-07	9	284.78	0	604.68	1.45	1.77	0.000282	567.41	1.34	1.78	20
171	28.22	0.17	21.1	0.8	4	1.08E-07	4.76E-07	9	274.29	0	591.59	1.4	1.7	0.0003029	561.23	1.32	1.79	20
172	28.38	0.16	20.2	0.7	3	9.28E-08	3.86E-07	9	259.66	0	575.9	1.32	1.6	0.0002889	553.74	1.3	1.77	20
173	28.54	0.16	18.9	0.7	3	8.19E-08	3.25E-07	8	247.4	0	561.18	1.26	1.51	0.0002927	546.61	1.28	1.77	20
174	28.71	0.17	18.5	0.7	3	7.17E-08	2.76E-07	8	240.29	0	558.44	1.23	1.46	0.0003118	545.28	1.26	1.72	20

175	28.87	0.16	18.7	0.7	3	7.85E-08	3.09E-07	9	246.28	0	563.07	1.26	1.49	0.0002922	547.53	1.27	1.76	20
176	29.04	0.17	20.2	0.7	3	9.04E-08	3.78E-07	9	261.11	0	581.82	1.33	1.57	0.0003054	556.57	1.29	1.78	20
177	29.2	0.16	21.7	0.8	4	1.04E-07	4.61E-07	9	276.42	0	600.46	1.41	1.65	0.000283	565.42	1.31	1.8	20
178	29.36	0.16	22	0.8	3	1.02E-07	4.60E-07	9	281.43	0	613.42	1.44	1.67	0.00028	571.49	1.32	1.76	20
179	29.53	0.17	21.3	0.8	3	8.37E-08	3.68E-07	9	274.27	0	619.77	1.4	1.62	0.0002959	574.44	1.31	1.65	20
180	29.69	0.16	20.2	0.9	3	6.51E-08	2.75E-07	9	263.82	0	623.83	1.35	1.55	0.0002776	576.32	1.29	1.52	20
181	29.86	0.17	19.8	0.9	3	5.62E-08	2.38E-07	9	264.57	0	642.42	1.35	1.55	0.0002907	584.84	1.29	1.42	20
182	30.02	0.16	21.5	1	3	3.91E-08	1.60E-07	9	255.47	0	662.44	1.3	1.49	0.0002694	593.89	1.27	1.24	20
183	30.19	0.17	18.3	1.2	3	5.91E-08	2.84E-07	10	299.58	0	720.84	1.53	1.73	0.0002744	619.51	1.34	1.28	20
184	30.35	0.16	29.3	1.3	3	1.02E-07	6.04E-07	12	369.43	0	805.27	1.88	2.12	0.0002444	654.79	1.43	1.35	20
185	30.51	0.16	36.6	1.6	4	2.50E-07	1.92E-06	14	479.68	0	889.09	2.45	2.74	0.0002326	688.02	1.56	1.6	20
186	30.68	0.17	42.1	1.6	4	3.24E-07	2.66E-06	15	511.39	0	904.42	2.61	2.91	0.000245	693.93	1.59	1.7	20
187	30.84	0.16	36.3	1.3	4	1.99E-07	1.42E-06	14	446.48	0	862.47	2.28	2.53	0.0002361	677.64	1.52	1.56	20
188	31.01	0.17	22.8	1.4	3	1.18E-07	7.11E-07	12	376.81	0	800.38	1.92	2.12	0.0002604	652.8	1.43	1.45	20
189	31.17	0.16	27.2	1.2	3	1.04E-07	6.04E-07	12	362.27	0	786.85	1.85	2.03	0.0002472	647.25	1.41	1.43	20
190	31.33	0.16	33.2	1.2	4	2.07E-07	1.49E-06	14	448.62	0	860.62	2.29	2.5	0.0002364	676.92	1.51	1.6	20
191	31.5	0.17	41.3	1.8	4	6.87E-07	6.95E-06	17	631.45	777.82	974.86	3.22	3.5	0.000236	720.45	1.69	2.02	20
192	31.66	0.16	66.4	1.7	4	1.04E-06	1.20E-05	18	719.94	822.58	1030.96	3.67	3.97	0.000216	740.89	1.77	2.16	20
193	31.83	0.17	52.2	1.5	5	1.12E-06	1.21E-05	17	673.57	759.48	951.88	0	0	0.0002388	711.9	0	0	20
194	31.99	0.16	31.4	1	4	4.05E-07	3.15E-06	14	485.99	658.79	825.68	2.48	2.65	0.0002413	663.03	1.54	2.08	20
195	32.15	0.16	26.2	1	4	1.51E-07	8.83E-07	12	364.38	0	739.76	1.86	1.98	0.0002549	627.59	1.4	1.76	20
196	32.32	0.17	26.1	1.1	3	1.01E-07	5.53E-07	11	342.04	0	747.12	1.75	1.85	0.0002695	630.7	1.37	1.55	20
197	32.48	0.16	26.6	1.2	3	9.49E-08	5.28E-07	12	347.55	0	767.7	1.77	1.87	0.0002503	639.33	1.37	1.49	20
198	32.65	0.17	27.4	1.2	3	9.52E-08	5.46E-07	12	358.17	0	790.67	1.83	1.91	0.000262	648.83	1.38	1.45	20
199	32.81	0.16	28.4	1.3	3	9.89E-08	5.81E-07	12	366.9	0	804.5	1.87	1.95	0.0002445	654.47	1.39	1.45	20
200	32.97	0.16	28.5	1.3	3	9.31E-08	5.48E-07	12	367.25	0	813.99	1.87	1.94	0.000243	658.32	1.39	1.41	20
201	33.14	0.17	27.5	1.3	3	8.48E-08	4.89E-07	12	360.17	0	811.92	1.84	1.9	0.0002586	657.49	1.38	1.39	20
202	33.3	0.16	26.9	1.3	3	7.76E-08	4.39E-07	12	353.58	0	809.96	1.8	1.85	0.0002436	656.69	1.37	1.36	20
203	33.47	0.17	27.1	1.3	3	7.58E-08	4.28E-07	12	352.53	0	810.99	1.8	1.84	0.0002587	657.11	1.37	1.36	20
204	33.63	0.16	27.3	1.3	3	7.75E-08	4.41E-07	12	355.2	0	813.89	1.81	1.84	0.0002431	658.28	1.37	1.37	20
205	33.79	0.16	27.5	1.3	3	7.66E-08	4.35E-07	12	355.05	0	815.3	1.81	1.83	0.0002428	658.85	1.37	1.37	20
206	33.96	0.17	27.1	1.3	3	7.76E-08	4.38E-07	12	352.58	0	807.74	1.8	1.81	0.0002592	655.79	1.36	1.39	20
207	34.12	0.16	26.8	1.2	3	7.95E-08	4.41E-07	12	346.38	0	789.95	1.77	1.77	0.0002467	648.53	1.35	1.44	20
208	34.29	0.17	26.2	1.1	3	8.18E-08	4.46E-07	12	340.19	0	771.83	1.74	1.73	0.0002652	641.05	1.34	1.5	20
209	34.45	0.16	25.8	1.1	3	7.54E-08	3.98E-07	11	329.81	0	759.45	1.68	1.67	0.0002516	635.89	1.32	1.5	20
210	34.61	0.16	24.6	1.1	3	6.68E-08	3.44E-07	11	321.3	0	756.34	1.64	1.62	0.0002521	634.58	1.31	1.46	20
211	34.78	0.17	24.4	1.1	3	5.94E-08	3.02E-07	11	317.9	0	764.3	1.62	1.6	0.0002665	637.91	1.3	1.4	20
212	34.94	0.16	25.1	1.2	3	5.53E-08	2.82E-07	11	317.76	0	773.83	1.62	1.59	0.0002493	641.88	1.3	1.36	20
213	35.11	0.17	24.6	1.2	3	4.97E-08	2.47E-07	11	310.58	0	771.35	1.58	1.54	0.0002653	640.85	1.29	1.33	20
214	35.27	0.16	22.9	1.1	3	3.98E-08	1.83E-07	11	287.55	0	743.29	1.47	1.42	0.0002543	629.08	1.25	1.31	20
215	35.43	0.16	20.2	1	3	3.21E-08	1.33E-07	10	257.99	0	693.37	1.32	1.27	0.0002633	607.59	1.21	1.33	20
216	35.6	0.17	18.3	0.8	3	3.05E-08	1.17E-07	9	238.74	0	647.38	1.22	1.17	0.0002896	587.1	1.17	1.43	20
217	35.76	0.16	18.8	0.7	3	4.10E-08	1.59E-07	9	241.94	0	621.93	1.23	1.18	0.000278	575.44	1.18	1.65	20
218	35.93	0.17	20.9	0.7	3	6.24E-08	2.68E-07	10	267.57	0	637.56	1.37	1.3	0.0002918	582.62	1.21	1.82	20
219	36.09	0.16	23.8	0.8	3	8.85E-08	4.21E-07	10	296.92	0	664.17	1.51	1.44	0.0002691	594.66	1.26	1.94	20
220	36.26	0.17	25.1	0.8	4	1.05E-07	5.48E-07	11	327.18	0	710.12	1.67	1.57	0.0002765	614.89	1.3	1.89	20
221	36.42	0.16	27.4	1	4	1.15E-07	6.51E-07	12	352.74	0	752.21	1.8	1.69	0.0002528	632.85	1.33	1.82	20
222	36.58	0.16	29.3	1.1	3	1.07E-07	6.36E-07	12	369.39	0	797.78	1.88	1.76	0.0002455	651.74	1.35	1.68	20
223	36.75	0.17	28.7	1.2	3	9.58E-08	5.69E-07	12	370.61	0	817.27	1.89	1.76	0.0002577	659.65	1.35	1.59	20
224	36.91	0.16	27.7	1.2	3	5.99E-08	3.19E-07	12	333.04	0	799.53	1.7	1.57	0.0002452	652.45	1.3	1.43	20
225	37.08	0.17	21.3	1.1	3	3.23E-08	1.43E-07	11	277.2	0	744.11	1.41	1.3	0.0002701	629.43	1.22	1.3	20
226	37.24	0.16	16.8	0.9	3	1.30E-08	4.22E-08	9	202.32	0	657.22	1.06	0.97	0.0002705	591.54	1.1	1.15	20
227	37.4	0.16	12.9	0.7	3	5.31E-09	9.39E-09	7	110.37	0	572.24	0.78	0.72	0.0002899	551.97	0.99	1.05	20
228	37.57	0.17	9.8	0.6	3	2.59E-09	2.54E-09	6	61.24	0	509.95	0.59	0.53	0.0003263	521.06	0.9	0.91	20
229	37.73	0.16	8.5	0.6	3	2.28E-09	1.96E-09	6	53.65	0	503.53	0.55	0.5	0.000309	517.78	0.88	0.85	20
230	37.9	0.17	11.4	0.7	3	5.50E-09	9.49E-09	7	107.71	0	565.47	0.78	0.7	0.0003098	548.7	0.99	1.09	20
231	38.06	0.16	19.5	0.8	3	2.79E-08	1.06E-07	9	237.96	0	655.87	1.21	1.09	0.0002708	590.94	1.14	1.49	20
232	38.22	0.16	26.7	0.9	3	7.64E-08	4.02E-07	11	328.69	0	755.17	1.68	1.5	0.0002523	634.09	1.28	1.7	20
233	38.39	0.17	30.8	1.2	3	1.10E-07	6.86E-07	13	390.93	0	841.39	1.99	1.78	0.000254	669.31	1.35	1.68	20

234	38.55	0.16	32.8	1.4	3	1.09E-07	7.42E-07	14	426.44	0	919.12	2.18	1.93	0.0002287	699.55	1.39	1.52	20
235	38.72	0.17	34.3	1.6	3	1.09E-07	7.73E-07	14	442.21	0	952.47	2.26	1.99	0.0002387	712.12	1.41	1.47	20
236	38.88	0.16	34.2	1.5	3	1.08E-07	7.72E-07	15	446.74	0	964.12	2.28	2.01	0.0002233	716.47	1.41	1.46	20
237	39.04	0.16	33.8	1.5	3	1.23E-07	8.92E-07	15	451.83	0	951.84	2.31	2.02	0.0002248	711.89	1.41	1.54	20
238	39.21	0.17	35.4	1.4	4	1.44E-07	1.07E-06	15	464.4	0	950.81	2.37	2.07	0.0002389	711.5	1.43	1.62	20
239	39.37	0.16	36.9	1.4	4	1.65E-07	1.27E-06	15	479.79	0	959	2.45	2.13	0.0002239	714.56	1.44	1.67	20
240	39.54	0.17	37.1	1.5	4	1.56E-07	1.21E-06	15	485.3	0	979.65	2.48	2.14	0.0002354	722.21	1.44	1.62	20
241	39.7	0.16	36.6	1.6	4	1.39E-07	1.07E-06	15	483.31	0	996.65	2.47	2.12	0.0002196	728.45	1.44	1.54	20
242	39.86	0.16	36.5	1.6	3	1.23E-07	9.41E-07	15	476.23	0	1003.09	2.43	2.09	0.0002189	730.8	1.43	1.49	20
243	40.03	0.17	35.6	1.6	3	1.31E-07	1.01E-06	15	483.59	0	1008.04	2.47	2.11	0.0002321	732.6	1.44	1.51	20
244	40.19	0.16	38.2	1.6	3	1.34E-07	1.05E-06	16	491.95	0	1021.31	2.51	2.14	0.000217	737.41	1.44	1.51	20
245	40.36	0.17	38.3	1.7	4	1.42E-07	1.14E-06	16	500.21	0	1026.6	2.55	2.16	0.0002299	739.32	1.45	1.53	20
246	40.52	0.16	37.4	1.6	3	1.32E-07	1.03E-06	16	487.5	0	1014.55	2.49	2.1	0.0002177	734.96	1.43	1.52	20
247	40.68	0.16	35.5	1.5	3	1.21E-07	8.88E-07	15	458.96	0	970.57	2.34	1.97	0.0002226	718.86	1.4	1.56	20
248	40.85	0.17	32.2	1.3	3	1.01E-07	6.88E-07	14	426.59	0	932.13	2.18	1.82	0.0002413	704.48	1.37	1.56	20
249	41.01	0.16	30.5	1.3	3	7.78E-08	4.84E-07	13	388.52	0	889.72	1.98	1.65	0.0002325	688.27	1.32	1.53	20
250	41.18	0.17	27.4	1.2	3	5.55E-08	3.12E-07	13	351.3	0	855.16	1.79	1.49	0.0002519	674.77	1.27	1.46	20
251	41.34	0.16	24.3	1.1	3	4.16E-08	2.05E-07	11	307.14	0	787.48	1.57	1.3	0.0002471	647.51	1.21	1.49	20
252	41.5	0.16	21.1	0.8	3	3.19E-08	1.36E-07	10	266.83	0	718.05	1.36	1.12	0.0002588	618.31	1.16	1.54	20
253	41.67	0.17	18.8	0.7	3	2.68E-08	1.02E-07	9	237.76	0	661.65	1.22	1	0.0002864	593.53	1.11	1.62	20
254	41.83	0.16	18.2	0.7	3	2.10E-08	6.84E-08	9	203.57	0	641.15	1.13	0.92	0.0002739	584.26	1.08	1.58	20
255	42	0.17	17.4	0.7	3	1.74E-08	5.19E-08	9	186.51	0	636.21	1.08	0.88	0.0002921	582.01	1.06	1.51	20
256	42.16	0.16	16.9	0.7	3	1.65E-08	4.82E-08	9	182.22	0	635.84	1.07	0.87	0.000275	581.84	1.06	1.5	20
257	42.32	0.16	17.8	0.7	3	1.67E-08	4.70E-08	9	175.55	0	624.01	1.05	0.85	0.0002776	576.4	1.05	1.55	20
258	42.49	0.17	16.7	0.6	3	1.53E-08	3.96E-08	9	161.3	0	608.72	1.01	0.81	0.0002986	569.3	1.04	1.56	20
259	42.65	0.16	15.2	0.6	3	1.28E-08	2.89E-08	8	141.33	0	590.02	0.95	0.76	0.0002855	560.49	1.01	1.55	20
260	42.82	0.17	15.2	0.6	3	1.09E-08	2.41E-08	8	137.75	0	600.4	0.94	0.75	0.0003007	565.39	1.01	1.45	20
261	42.98	0.16	16.3	0.7	3	1.26E-08	3.12E-08	9	154.28	0	620.12	0.99	0.79	0.0002785	574.6	1.03	1.46	20
262	43.15	0.17	17.6	0.7	3	1.56E-08	4.45E-08	9	177.91	0	642.19	1.07	0.85	0.0002907	584.74	1.05	1.5	20
263	43.31	0.16	18.4	0.7	3	1.96E-08	6.22E-08	9	198.13	0	651.42	1.13	0.89	0.0002717	588.93	1.07	1.58	20
264	43.47	0.16	18.9	0.7	3	2.16E-08	6.89E-08	9	198.87	0	642.31	1.14	0.89	0.0002736	584.79	1.07	1.67	20
265	43.64	0.17	17.8	0.6	3	2.09E-08	6.27E-08	9	187.25	0	628.35	1.1	0.87	0.0002939	578.4	1.06	1.71	20
266	43.8	0.16	17.1	0.6	3	2.03E-08	5.71E-08	9	176.11	0	614.03	1.07	0.84	0.0002798	571.78	1.05	1.75	20
267	43.97	0.17	17.6	0.6	3	1.87E-08	5.09E-08	9	169.84	0	612.79	1.06	0.82	0.0002976	571.2	1.04	1.72	20
268	44.13	0.16	17.1	0.6	3	1.73E-08	4.53E-08	9	163.69	0	611.44	1.04	0.8	0.0002804	570.56	1.03	1.7	20
269	44.29	0.16	16.4	0.6	3	1.63E-08	4.15E-08	9	159.12	0	610.67	1.03	0.79	0.0002806	570.21	1.03	1.67	20
270	44.46	0.17	17.1	0.6	3	1.80E-08	4.59E-08	9	159.04	0	600.47	1.03	0.79	0.0003007	565.42	1.02	1.78	20
271	44.62	0.16	17.2	0.5	3	2.02E-08	5.44E-08	9	167.99	0	605.47	1.06	0.81	0.0002818	567.77	1.03	1.83	20
272	44.79	0.17	17.7	0.6	3	1.96E-08	5.47E-08	9	174.08	0	620.85	1.08	0.82	0.0002957	574.94	1.04	1.76	20
273	44.95	0.16	18	0.7	3	1.87E-08	6.08E-08	10	202.82	0	677.18	1.17	0.89	0.0002665	600.46	1.07	1.56	20
274	45.11	0.16	20.9	0.9	3	1.93E-08	8.09E-08	11	261.12	0	769.18	1.33	1.01	0.00025	639.95	1.11	1.35	20
275	45.28	0.17	24.7	1.3	3	2.24E-08	1.11E-07	12	310.54	0	890.68	1.58	1.2	0.0002469	688.64	1.18	1.19	20
276	45.44	0.16	28.6	1.7	3	2.49E-08	1.47E-07	14	369.22	0	1038.74	1.88	1.42	0.0002151	743.67	1.25	1.04	20
277	45.61	0.17	33.5	2.3	3	3.35E-08	2.39E-07	16	444.67	0	1185.68	2.27	1.7	0.000214	794.54	1.33	1	20
278	45.77	0.16	40.9	2.7	3	5.80E-08	5.07E-07	19	546.04	0	1318.54	2.79	2.08	0.000191	837.87	1.43	1.05	20
279	45.93	0.16	50.4	2.8	3	1.11E-07	1.12E-06	20	629.51	0	1351.99	3.21	2.39	0.0001886	848.43	1.5	1.23	20
280	46.1	0.17	51.5	2.2	3	1.34E-07	1.33E-06	20	618.97	0	1283.8	3.16	2.34	0.0002056	826.76	1.49	1.37	20
281	46.26	0.16	38.8	1.8	3	9.23E-08	7.45E-07	17	504.06	0	1119.02	2.57	1.9	0.0002073	771.88	1.39	1.43	20
282	46.43	0.17	25.9	1.3	3	3.30E-08	1.84E-07	13	348.42	0	931.95	1.78	1.31	0.0002413	704.41	1.22	1.31	20
283	46.59	0.16	18.2	0.9	3	1.23E-08	4.11E-08	10	207.86	0	752.51	1.2	0.88	0.0002528	632.97	1.06	1.26	20
284	46.75	0.16	14.6	0.6	3	7.80E-09	1.55E-08	9	124.35	0	633.58	0.93	0.68	0.0002755	580.81	0.97	1.37	20
285	46.92	0.17	14.5	0.5	3	8.48E-09	1.37E-08	8	101.1	0	563.72	0.84	0.61	0.0003103	547.85	0.94	1.65	20
286	47.08	0.16	14.4	0.4	3	9.95E-09	1.54E-08	8	96.8	0	536.78	0.82	0.6	0.0002993	534.6	0.93	1.86	20
287	47.25	0.17	13.9	0.4	3	9.25E-09	1.39E-08	8	93.59	0	535.76	0.81	0.59	0.0003183	534.09	0.93	1.84	20
288	47.41	0.16	14	0.5	3	9.37E-09	1.68E-08	8	112.13	0	586	0.89	0.64	0.0002864	558.57	0.95	1.64	20
289	47.57	0.16	17.7	0.7	3	1.34E-08	3.91E-08	10	181.82	0	700.33	1.14	0.82	0.000262	610.63	1.04	1.45	20
290	47.74	0.17	24.2	1.1	3	2.51E-08	1.19E-07	12	295.02	0	829.03	1.51	1.08	0.0002559	664.38	1.14	1.43	20
291	47.9	0.16	29.5	1.3	3	4.09E-08	2.41E-07	14	368.23	0	947.06	1.88	1.34	0.0002253	710.1	1.23	1.42	20
292	48.07	0.17	33.4	1.5	3	5.06E-08	3.25E-07	14	401.28	0	993.22	2.05	1.46	0.0002338	727.2	1.26	1.43	20

CPT-3 Estimations

293	48.23	0.16	31.3	1.4	3	5.04E-08	3.24E-07	14	401.55	0	994.73	2.05	1.45	0.0002199	727.75	1.26	1.43	20
294	48.39	0.16	29.6	1.3	3	4.21E-08	2.48E-07	14	368.27	0	942.23	1.88	1.33	0.0002259	708.28	1.22	1.45	20
295	48.56	0.17	26.3	1.1	3	3.20E-08	1.69E-07	13	328.84	0	884.06	1.68	1.18	0.0002478	686.08	1.18	1.45	20
296	48.72	0.16	22.9	1	3	2.34E-08	1.07E-07	11	284.82	0	810.42	1.45	1.02	0.0002436	656.88	1.12	1.47	20
297	48.89	0.17	20.2	0.8	3	1.78E-08	6.61E-08	11	231.93	0	762.1	1.3	0.91	0.0002669	636.99	1.08	1.47	20
298	49.05	0.16	19.9	0.8	3	1.83E-08	6.66E-08	11	227.04	0	751.42	1.29	0.9	0.000253	632.52	1.07	1.52	20
299	49.22	0.17	22.4	0.9	3	2.28E-08	1.02E-07	11	278.41	0	801.12	1.43	0.99	0.0002603	653.1	1.11	1.5	20
300	49.38	0.16	26.1	1.1	3	3.32E-08	1.70E-07	12	320.77	0	856.99	1.64	1.13	0.0002369	675.49	1.16	1.55	20
301	49.54	0.16	28.6	1.1	3	4.42E-08	2.47E-07	13	348.7	0	884.27	1.78	1.23	0.0002332	686.15	1.19	1.63	20
302	49.71	0.17	28.4	1	3	4.99E-08	2.87E-07	13	359.38	0	891.6	1.83	1.26	0.0002467	688.99	1.2	1.68	20
303	49.87	0.16	28.4	1.1	3	4.87E-08	2.79E-07	13	357.94	0	892.01	1.83	1.25	0.0002322	689.15	1.2	1.68	20
304	50.04	0.17	28.3	1.1	3	4.52E-08	2.59E-07	13	357.38	0	902.68	1.82	1.25	0.0002452	693.26	1.2	1.62	20

Sum	0.0919794	
Vs of CPT	544.035	(ft/s)
	165.864	(m/s)
Extrapolated Vs	642.394	(ft/s)
Following Boore (2004)	195.852	(m/s)

CPT-4 Estimations

	In situ data					Estimations											
No	Depth (ft)	Thickness (ft)	qc (tsf)	fs (tsf)	SBTn	Ksbt (ft/s)	Cv (ft2/s)	SPT N60 (blows/ft)	Con. Mod. (tsf)	Es (tsf)	Go (tsf)	Su (tsf)	Su ratio	Thickness/Vs (s)	Vs (ft/s)	Ko	Sensitivity	Peak phi (°)
1	0.33	0.33	323.7	1.2	7	2.43E-02	3.73E-01	40	956.24	762.96	956.24	0	0	0.000462489	713.53	0	0	20
2	0.49	0.16	235.3	1.4	7	1.42E-02	2.08E-01	37	916.99	731.64	916.99	0	0	0.000228987	698.73	0	0	20
3	0.66	0.17	208.6	1.2	7	7.88E-03	1.06E-01	32	841.33	671.28	841.33	0	0	0.000254001	669.29	0	0	20
4	0.82	0.16	189.5	1	7	7.49E-03	9.06E-02	29	755.29	602.63	755.29	0	0	0.00025231	634.14	0	0	20
5	0.98	0.16	165.4	0.7	7	6.17E-03	6.87E-02	26	694.89	554.43	694.89	0	0	0.000263045	608.26	0	0	20
6	1.15	0.17	145.8	0.8	7	4.57E-03	4.77E-02	24	652.38	520.52	652.38	0	0	0.000288448	589.36	0	0	20
7	1.31	0.16	134	0.8	6	1.89E-03	2.03E-02	22	668.7	533.54	668.7	0	0	0.00026815	596.68	0	0	20
8	1.48	0.17	109.3	1.3	6	7.30E-04	7.86E-03	21	672.06	536.22	672.06	0	0	0.000284195	598.18	0	0	20
9	1.64	0.16	85.9	1.4	6	2.25E-04	2.30E-03	18	637.71	508.81	637.71	0	0	0.000274584	582.7	0	0	20
10	1.8	0.16	57.3	1.3	6	5.75E-05	4.91E-04	13	533.63	425.77	533.63	0	0	0.000300171	533.03	0	0	20
11	1.97	0.17	21.9	1.1	8	1.09E-05	7.39E-05	9	424.8	338.93	424.8	0	0	0.000357458	475.58	0	0	20
12	2.13	0.16	18.1	1.1	9	1.78E-06	7.28E-06	6	255.44	264.92	332.03	1.3	20.93	0.000380545	420.45	2.49	1.2	20
13	2.3	0.17	14.9	1	9	9.17E-07	3.03E-06	5	206.55	241.48	302.66	1.05	15.67	0.000423486	401.43	2.35	1.03	20
14	2.46	0.16	11.5	0.9	9	5.61E-07	1.50E-06	4	167.57	214.17	268.42	0.85	11.89	0.000423236	378.04	2.2	0.97	20
15	2.62	0.16	9.8	0.7	9	3.48E-07	7.72E-07	4	138.45	0	241.75	0.71	9.22	0.000445968	358.77	2.07	0.9	20
16	2.79	0.17	8.7	0.7	9	2.90E-07	5.74E-07	4	123.8	0	223.48	0.63	7.75	0.000492825	344.95	1.97	0.93	20
17	2.95	0.16	8.4	0.6	9	2.40E-07	4.46E-07	3	116.15	0	216.94	0.59	6.87	0.000470782	339.86	1.92	0.92	20
18	3.12	0.17	8.2	0.6	9	2.14E-07	3.84E-07	3	111.76	0	213.01	0.57	6.25	0.000504796	336.77	1.87	0.93	20
19	3.28	0.16	7.8	0.6	9	1.84E-07	3.11E-07	3	105.51	0	206.75	0.54	5.61	0.000482247	331.78	1.82	0.93	20
20	3.45	0.17	7.1	0.5	3	1.49E-07	2.34E-07	3	97.86	0	199.22	0.5	4.95	0.000521969	325.69	1.76	0.92	20
21	3.61	0.16	6.6	0.5	3	1.09E-07	1.54E-07	3	87.92	0	189.27	0.45	4.25	0.000504032	317.44	1.7	0.88	20
22	3.77	0.16	5.7	0.5	3	7.39E-08	9.46E-08	3	79.85	0	184.53	0.41	3.7	0.000510448	313.45	1.65	0.8	20
23	3.94	0.17	5.4	0.5	3	6.10E-08	7.24E-08	2	74.12	0	177.37	0.38	3.28	0.000553205	307.3	1.6	0.79	20
24	4.1	0.16	5.4	0.4	3	5.86E-08	6.72E-08	2	71.64	0	172.68	0.37	3.05	0.00052767	303.22	1.56	0.83	20
25	4.27	0.17	5.2	0.4	3	5.91E-08	6.63E-08	2	70.08	0	168.67	0.36	2.86	0.000567291	299.67	1.53	0.88	20
26	4.43	0.16	5.1	0.4	3	5.67E-08	6.40E-08	2	70.4	0	170.69	0.36	2.77	0.00053075	301.46	1.52	0.88	20
27	4.59	0.16	5.5	0.4	3	6.10E-08	7.14E-08	2	73.05	0	174.76	0.37	2.78	0.000524521	305.04	1.51	0.91	20
28	4.76	0.17	5.8	0.4	3	8.05E-08	1.04E-07	3	80.37	0	182.89	0.41	2.95	0.000544784	312.05	1.53	1	20
29	4.92	0.16	6.7	0.4	3	1.06E-07	1.56E-07	3	92	0	199.13	0.47	3.26	0.000491385	325.61	1.57	1.06	20
30	5.09	0.17	8	0.5	3	1.58E-07	2.84E-07	3	112.52	0	226.78	0.57	3.86	0.000489237	347.48	1.64	1.13	20
31	5.25	0.16	10.2	0.6	3	2.10E-07	4.44E-07	4	132.04	0	252.65	0.67	4.39	0.000436241	366.77	1.7	1.17	20
32	5.41	0.16	10.9	0.6	3	2.34E-07	5.34E-07	4	142.12	0	266.55	0.73	4.59	0.000424719	376.72	1.72	1.18	20
33	5.58	0.17	10.2	0.6	3	2.23E-07	5.07E-07	4	141.9	0	268.54	0.72	4.44	0.000449593	378.12	1.71	1.18	20
34	5.74	0.16	10.2	0.6	3	2.08E-07	4.70E-07	4	140.82	0	269.79	0.72	4.28	0.000422152	379.01	1.69	1.17	20
35	5.91	0.17	10.7	0.6	3	1.92E-07	4.28E-07	4	139.28	0	270.81	0.71	4.11	0.000447698	379.72	1.68	1.16	20
36	6.07	0.16	9.9	0.6	3	1.72E-07	3.88E-07	4	140.56	0	278.72	0.72	4.04	0.000415347	385.22	1.67	1.11	20
37	6.23	0.16	10.5	0.7	3	1.75E-07	4.10E-07	4	146.51	0	289.82	0.75	4.1	0.000407311	392.82	1.68	1.1	20
38	6.4	0.17	12	0.7	3	2.04E-07	5.32E-07	5	162.75	0	312.95	0.83	4.44	0.000416463	408.2	1.72	1.11	20
39	6.56	0.16	13.4	0.8	3	2.70E-07	7.87E-07	5	181.89	0	332.47	0.93	4.84	0.000380282	420.74	1.76	1.19	20
40	6.73	0.17	14.6	0.8	4	3.11E-07	9.75E-07	6	195.47	0	348.24	1	5.07	0.000394807	430.59	1.78	1.22	20
41	6.89	0.16	14.9	0.8	4	3.51E-07	1.15E-06	6	203.9	0	355.46	1.04	5.17	0.000367782	435.04	1.79	1.27	20
42	7.05	0.16	15.2	0.8	4	3.34E-07	1.09E-06	6	202.92	0	356.97	1.04	5.02	0.000367006	435.96	1.78	1.27	20
43	7.22	0.17	14.4	0.8	4	3.13E-07	9.88E-07	6	196.78	0	350.19	1	4.76	0.000393701	431.8	1.75	1.28	20
44	7.38	0.16	13.6	0.7	4	2.95E-07	9.00E-07	5	190.69	0	343.12	0.97	4.51	0.000374339	427.42	1.72	1.3	20
45	7.55	0.17	13.9	0.7	4	3.03E-07	9.41E-07	6	193.9	0	347.16	0.99	4.48	0.000395413	429.93	1.72	1.32	20
46	7.71	0.16	15.1	0.8	4	3.02E-07	9.65E-07	6	199.88	0	358.18	1.02	4.53	0.000366384	436.7	1.73	1.3	20
47	7.87	0.16	14.9	0.8	4	2.93E-07	9.58E-07	6	204.41	0	368.29	1.04	4.53	0.000361321	442.82	1.73	1.28	20
48	8.04	0.17	14.9	0.8	4	3.28E-07	1.12E-06	6	212.7	0	375.36	1.09	4.62	0.000380271	447.05	1.74	1.33	20
49	8.2	0.16	16.9	0.8	4	3.69E-07	1.34E-06	6	226.17	311.71	390.67	1.15	4.81	0.000350816	456.08	1.76	1.36	20
50	8.37	0.17	17.8	0.9	4	4.05E-07	1.58E-06	7	243.41	329.96	413.55	1.24	5.08	0.000362288	469.24	1.79	1.35	20
51	8.53	0.16	18.6	1	4	3.71E-07	1.53E-06	7	257.76	355.01	444.95	1.32	5.27	0.000328724	486.73	1.82	1.25	20
52	8.69	0.16	20	1.2	4	3.67E-07	1.60E-06	8	272.07	375.46	470.58	1.39	5.46	0.000319648	500.55	1.85	1.2	20
53	8.86	0.17	20.9	1.2	4	3.53E-07	1.58E-06	8	279.75	0	487.32	1.43	5.51	0.000333739	509.38	1.86	1.17	20
54	9.02	0.16	20.3	1.2	4	3.64E-07	1.61E-06	8	275.49	0	477.06	1.41	5.33	0.000317473	503.98	1.84	1.22	20
55	9.19	0.17	19.1	1	4	3.69E-07	1.59E-06	8	269.43	371.47	465.57	1.37	5.12	0.000341448	497.88	1.81	1.26	20
56	9.35	0.16	19.6	1	4	4.07E-07	1.72E-06	7	264.38	357.98	448.67	1.35	4.94	0.000327359	488.76	1.79	1.37	20

57	9.51	0.16	19.2	0.9	4	4.28E-07	1.82E-06	7	264.82	355.31	445.33	1.35	4.86	0.000328589	486.93	1.78	1.42	20
58	9.68	0.17	19.2	0.9	4	4.88E-07	2.12E-06	7	270.86	355	444.93	1.38	4.88	0.000349277	486.72	1.78	1.5	20
59	9.84	0.16	20.9	0.9	4	5.22E-07	2.37E-06	8	282.96	366.28	459.08	1.44	5.02	0.000323631	494.39	1.79	1.52	20
60	10.01	0.17	21.8	1	4	5.20E-07	2.46E-06	8	295.03	382.18	479	1.51	5.14	0.000336627	505.01	1.81	1.48	20
61	10.17	0.16	21.8	1.1	4	4.48E-07	2.15E-06	8	300.04	399.32	500.48	1.53	5.15	0.000309951	516.21	1.82	1.36	20
62	10.34	0.17	22	1.2	4	4.06E-07	1.97E-06	8	303.56	411.27	515.46	1.55	5.12	0.000324508	523.87	1.82	1.3	20
63	10.5	0.16	22.6	1.2	4	4.03E-07	1.97E-06	8	304.81	413.47	518.22	1.56	5.07	0.000304599	525.28	1.82	1.31	20
64	10.66	0.16	22.1	1.1	4	4.46E-07	2.18E-06	8	305.12	406.48	509.45	1.56	5	0.000307214	520.81	1.8	1.39	20
65	10.83	0.17	22.1	1	4	4.22E-07	2.08E-06	9	307.5	413.65	518.44	1.57	4.96	0.000323569	525.39	1.8	1.36	20
66	10.99	0.16	23.1	1.3	4	3.88E-07	1.97E-06	9	316.33	432.13	541.61	1.61	5.02	0.000297952	537	1.82	1.28	20
67	11.16	0.17	24	1.4	4	3.32E-07	1.76E-06	9	331.25	0	583.33	1.69	5.18	0.000305042	557.3	1.84	1.16	20
68	11.32	0.16	25.3	1.6	9	3.79E-07	2.17E-06	10	357.66	490.72	615.03	1.82	5.51	0.000279603	572.24	1.88	1.17	20
69	11.48	0.16	28.8	1.6	9	4.16E-07	2.51E-06	10	377.17	508.8	637.7	1.92	5.73	0.000274589	582.69	1.9	1.18	20
70	11.65	0.17	28.2	1.6	9	4.43E-07	2.73E-06	11	385.47	514.19	644.45	1.97	5.78	0.000290216	585.77	1.91	1.2	20
71	11.81	0.16	27.1	1.6	9	4.13E-07	2.55E-06	11	384.92	519.83	651.52	1.96	5.69	0.000271661	588.97	1.9	1.18	20
72	11.98	0.17	28.7	1.7	9	3.91E-07	2.42E-06	11	385.69	526.12	659.4	1.97	5.62	0.00028691	592.52	1.9	1.16	20
73	12.14	0.16	28.4	1.7	9	3.97E-07	2.48E-06	11	389.24	529.42	663.54	1.99	5.6	0.000269188	594.38	1.89	1.17	20
74	12.3	0.16	27.9	1.6	9	4.13E-07	2.56E-06	11	386.37	521.9	654.11	1.97	5.48	0.000271122	590.14	1.88	1.21	20
75	12.47	0.17	28.1	1.5	4	4.28E-07	2.63E-06	11	383.11	514.1	644.34	1.95	5.36	0.000290241	585.72	1.87	1.25	20
76	12.63	0.16	27.7	1.5	4	4.42E-07	2.71E-06	11	383.56	511.77	641.42	1.96	5.3	0.00027379	584.39	1.86	1.28	20
77	12.8	0.17	28	1.5	4	4.22E-07	2.51E-06	10	371.65	500.12	626.81	1.9	5.07	0.00029427	577.7	1.83	1.3	20
78	12.96	0.16	25.6	1.3	4	3.76E-07	2.07E-06	10	344.1	472.76	592.53	1.76	4.63	0.00028486	561.68	1.78	1.32	20
79	13.12	0.16	21.9	1.1	4	3.04E-07	1.41E-06	8	290.11	0	519.27	1.48	3.86	0.000304292	525.81	1.68	1.4	20
80	13.29	0.17	16.6	0.7	4	2.04E-07	7.23E-07	7	221.16	0	425.32	1.13	2.9	0.00035724	475.87	1.54	1.51	20
81	13.45	0.16	11	0.4	4	1.28E-07	3.14E-07	5	152.83	0	319.65	0.78	1.98	0.000387841	412.54	1.36	1.76	20
82	13.62	0.17	7.4	0.2	3	6.46E-08	1.00E-07	3	96.95	0	229.6	0.49	1.24	0.000486228	349.63	1.18	2.08	20
83	13.78	0.16	4.7	0.1	3	1.84E-08	1.40E-08	3	47.6	0	182.2	0.31	0.78	0.00051371	311.46	1.02	1.84	20
84	13.94	0.16	3.4	0.2	3	3.09E-09	1.00E-09	2	20.18	0	166.13	0.2	0.5	0.000537978	297.41	0.88	1.2	20
85	14.11	0.17	2.9	0.2	2	1.65E-09	3.27E-10	2	12.35	0	168.14	0.16	0.39	0.000568182	299.2	0.81	0.79	20
86	14.27	0.16	2.9	0.2	2	1.62E-09	3.14E-10	2	12.11	0	168.8	0.16	0.38	0.000533725	299.78	0.8	0.79	20
87	14.44	0.17	3.4	0.2	3	2.10E-09	6.13E-10	2	18.21	0	187.62	0.2	0.47	0.000537873	316.06	0.86	0.83	20
88	14.6	0.16	4.5	0.3	3	4.15E-09	2.66E-09	3	40.06	0	225.25	0.3	0.69	0.000462027	346.3	0.98	0.96	20
89	14.76	0.16	7	0.4	3	1.05E-08	1.26E-08	3	74.44	0	260.89	0.4	0.94	0.0004293	372.7	1.09	1.08	20
90	14.93	0.17	8	0.4	3	1.56E-08	2.53E-08	4	101.27	0	310.04	0.52	1.18	0.00041842	406.29	1.18	1.01	20
91	15.09	0.16	9.2	0.7	3	2.29E-08	4.69E-08	5	127.93	0	365.54	0.65	1.48	0.00036268	441.16	1.27	0.96	20
92	15.26	0.17	12.7	0.9	3	3.64E-08	9.40E-08	6	161.05	0	423.01	0.82	1.84	0.000358219	474.57	1.36	0.97	20
93	15.42	0.16	15.1	0.9	3	6.95E-08	2.25E-07	7	202.13	0	472.33	1.03	2.29	0.000319056	501.48	1.45	1.08	20
94	15.58	0.16	18	1	3	1.07E-07	3.97E-07	7	230.99	0	498.92	1.18	2.59	0.000310438	515.4	1.51	1.19	20
95	15.75	0.17	18.9	1	3	1.29E-07	5.09E-07	8	247.21	0	516.86	1.26	2.74	0.000324063	524.59	1.53	1.24	20
96	15.91	0.16	18.6	1	3	1.47E-07	5.83E-07	8	248.01	0	506.31	1.27	2.72	0.000308166	519.2	1.53	1.33	20
97	16.08	0.17	18.2	0.8	3	1.58E-07	6.06E-07	7	239.89	0	483.33	1.22	2.6	0.000335121	507.28	1.5	1.44	20
98	16.24	0.16	17.2	0.7	4	1.63E-07	5.95E-07	7	228.14	0	457	1.16	2.45	0.000324366	493.27	1.47	1.56	20
99	16.4	0.16	16.1	0.7	4	1.61E-07	5.63E-07	7	218.23	0	437.98	1.11	2.32	0.000331332	482.9	1.45	1.64	20
100	16.57	0.17	16.1	0.6	4	1.36E-07	4.48E-07	7	205.03	0	424.11	1.05	2.16	0.000357752	475.19	1.41	1.62	20
101	16.73	0.16	14.4	0.6	4	1.25E-07	3.81E-07	6	190.93	0	401.4	0.97	1.99	0.000346096	462.3	1.38	1.68	20
102	16.9	0.17	13.1	0.5	3	9.51E-08	2.65E-07	6	174.03	0	384.24	0.89	1.8	0.000375848	452.31	1.34	1.63	20
103	17.06	0.16	12.5	0.5	3	7.91E-08	2.05E-07	6	161.84	0	369.47	0.83	1.66	0.00036075	443.52	1.3	1.62	20
104	17.23	0.17	11.8	0.5	3	7.58E-08	1.95E-07	6	160.87	0	370.12	0.82	1.63	0.000382961	443.91	1.3	1.61	20
105	17.39	0.16	12.9	0.5	3	8.24E-08	2.11E-07	5	159.92	0	362.36	0.82	1.61	0.000364266	439.24	1.29	1.71	20
106	17.55	0.16	12.3	0.4	3	9.04E-08	2.30E-07	5	158.97	0	354.25	0.81	1.58	0.000368417	434.29	1.28	1.83	20
107	17.72	0.17	11.6	0.4	3	7.67E-08	1.81E-07	5	147.7	0	339.11	0.75	1.45	0.000400085	424.91	1.25	1.85	20
108	17.88	0.16	10.5	0.4	3	6.21E-08	1.40E-07	5	140.63	0	335.43	0.72	1.37	0.000378609	422.6	1.23	1.76	20
109	18.05	0.17	10.8	0.4	3	6.07E-08	1.37E-07	5	140.54	0	336.54	0.72	1.36	0.000401606	423.3	1.22	1.76	20
110	18.21	0.16	11.6	0.4	3	4.79E-08	1.06E-07	5	137.83	0	344.58	0.7	1.32	0.000373544	428.33	1.21	1.59	20
111	18.37	0.16	10	0.5	3	3.46E-08	7.30E-08	5	131.94	0	349.89	0.67	1.25	0.000370696	431.62	1.2	1.41	20
112	18.54	0.17	9.7	0.5	3	2.21E-08	4.35E-08	5	123.06	0	353.89	0.63	1.16	0.000391633	434.08	1.17	1.23	20
113	18.7	0.16	9.9	0.5	3	2.18E-08	4.30E-08	5	123.26	0	355.29	0.63	1.15	0.000367875	434.93	1.17	1.23	20
114	18.87	0.17	10.2	0.5	3	2.42E-08	5.06E-08	5	130.76	0	369.92	0.67	1.21	0.000383055	443.8	1.19	1.23	20
115	19.03	0.16	11.4	0.6	3	3.52E-08	8.32E-08	6	147.78	0	390.66	0.75	1.36	0.000350823	456.07	1.23	1.3	20

116	19.19	0.16	13.6	0.6	3	5.82E-08	1.65E-07	6	177.45	0	428.29	0.91	1.61	0.000335057	477.53	1.3	1.4	20
117	19.36	0.17	16.6	0.7	3	1.12E-07	3.94E-07	7	220.21	0	472.2	1.12	1.99	0.000339044	501.41	1.38	1.57	20
118	19.52	0.16	20.6	0.8	4	2.24E-07	9.85E-07	8	274.72	0	519.57	1.4	2.46	0.000304206	525.96	1.48	1.79	20
119	19.69	0.17	25.3	0.8	4	3.66E-07	1.90E-06	9	324.75	0	561.88	1.66	2.88	0.000310815	546.95	1.55	1.95	20
120	19.85	0.16	27.3	0.9	4	5.34E-07	3.06E-06	10	358.06	461.72	578.69	1.83	3.15	0.000288252	555.07	1.59	2.15	20
121	20.01	0.16	27.7	0.8	4	5.56E-07	3.29E-06	10	369.92	473.49	593.44	1.89	3.23	0.000284642	562.11	1.61	2.13	20
122	20.18	0.17	27.8	0.9	4	5.62E-07	3.35E-06	10	372.26	475.56	596.03	1.9	3.22	0.000301777	563.33	1.61	2.15	20
123	20.34	0.16	27.8	0.9	4	5.79E-07	3.55E-06	10	383.24	486.95	610.31	1.96	3.29	0.000280682	570.04	1.62	2.13	20
124	20.51	0.17	30	0.9	4	5.95E-07	3.69E-06	11	387.15	489.56	613.58	1.98	3.29	0.000297426	571.57	1.62	2.15	20
125	20.67	0.16	28.6	0.9	4	5.93E-07	3.62E-06	10	381.21	482.24	604.41	1.94	3.22	0.000282048	567.28	1.61	2.2	20
126	20.83	0.16	26.5	0.8	4	4.79E-07	2.73E-06	10	355.82	467.97	586.53	1.82	2.98	0.000286318	558.82	1.57	2.13	20
127	21	0.17	24.6	0.8	4	4.15E-07	2.25E-06	10	337.93	456.07	571.6	1.72	2.81	0.000308155	551.67	1.54	2.11	20
128	21.16	0.16	24.8	0.8	4	4.04E-07	2.18E-06	10	336.82	456.78	572.5	1.72	2.78	0.000289803	552.1	1.54	2.11	20
129	21.33	0.17	26.3	0.8	4	4.12E-07	2.29E-06	10	346.48	468.1	586.68	1.77	2.84	0.000304169	558.9	1.55	2.08	20
130	21.49	0.16	26.7	0.9	4	3.71E-07	2.12E-06	10	357.6	492.51	617.28	1.82	2.9	0.000279091	573.29	1.56	1.92	20
131	21.65	0.16	27.2	1.1	4	2.91E-07	1.71E-06	11	366.3	0	660.61	1.87	2.95	0.000269783	593.07	1.58	1.66	20
132	21.82	0.17	28.2	1.3	4	2.28E-07	1.35E-06	11	371.21	0	699.9	1.89	2.97	0.000278483	610.45	1.58	1.47	20
133	21.98	0.16	27.8	1.4	4	1.91E-07	1.13E-06	11	370.41	0	721.24	1.89	2.94	0.000258198	619.68	1.58	1.36	20
134	22.15	0.17	27.1	1.4	3	1.66E-07	9.43E-07	11	354.75	0	708.29	1.81	2.8	0.000276832	614.09	1.56	1.33	20
135	22.31	0.16	24.9	1.2	3	1.46E-07	7.68E-07	10	327.35	0	668.49	1.67	2.56	0.000268191	596.59	1.51	1.36	20
136	22.47	0.16	22	1	3	1.25E-07	5.80E-07	9	288.85	0	606.7	1.47	2.24	0.000281517	568.35	1.45	1.44	20
137	22.64	0.17	18.9	0.8	3	1.06E-07	4.22E-07	8	249.46	0	540.55	1.27	1.92	0.000316886	536.47	1.38	1.56	20
138	22.8	0.16	16.5	0.6	3	8.87E-08	3.05E-07	7	214.87	0	480.45	1.1	1.64	0.000316349	505.77	1.31	1.7	20
139	22.97	0.17	14.6	0.5	3	7.36E-08	2.31E-07	7	195.65	0	452.54	1	1.49	0.000346331	490.86	1.26	1.73	20
140	23.13	0.16	14.8	0.6	3	6.83E-08	2.11E-07	7	192.79	0	451.95	0.98	1.45	0.000326171	490.54	1.26	1.7	20
141	23.3	0.17	15.9	0.6	3	7.11E-08	2.34E-07	7	205.74	0	478.78	1.05	1.54	0.000336707	504.89	1.28	1.62	20
142	23.46	0.16	17.4	0.7	3	8.18E-08	2.93E-07	8	223.83	0	507.94	1.14	1.67	0.000307669	520.04	1.31	1.6	20
143	23.62	0.16	18.7	0.8	3	1.06E-07	4.44E-07	9	260.2	0	562.93	1.33	1.92	0.000292259	547.46	1.38	1.56	20
144	23.79	0.17	23.7	1	4	1.36E-07	6.28E-07	9	287.76	0	595.38	1.47	2.11	0.000301943	563.02	1.42	1.6	20
145	23.95	0.16	23.3	0.9	4	2.03E-07	1.03E-06	10	318.1	0	612.53	1.62	2.32	0.000280171	571.08	1.46	1.77	20
146	24.12	0.17	25.2	0.8	4	2.17E-07	1.09E-06	10	312.83	0	595	1.6	2.26	0.00030204	562.84	1.45	1.88	20
147	24.28	0.16	22.6	0.8	4	2.12E-07	1.02E-06	9	300.08	0	573.03	1.53	2.16	0.000289671	552.35	1.43	1.96	20
148	24.44	0.16	20.6	0.7	4	1.42E-07	6.21E-07	9	272.88	0	560.35	1.39	1.95	0.000292928	546.21	1.38	1.78	20
149	24.61	0.17	19.4	0.8	4	1.46E-07	6.32E-07	9	270.04	0	551.65	1.38	1.92	0.000313682	541.95	1.37	1.84	20
150	24.77	0.16	22	0.7	4	1.63E-07	7.40E-07	9	283.95	0	568.88	1.45	2	0.000290724	550.35	1.39	1.85	20
151	24.94	0.17	23.6	0.8	4	2.01E-07	9.63E-07	9	299.74	0	578.29	1.53	2.1	0.000306373	554.88	1.41	1.95	20
152	25.1	0.16	22.8	0.8	4	2.06E-07	1.04E-06	10	314.56	0	604.17	1.6	2.19	0.000282102	567.17	1.43	1.89	20
153	25.26	0.16	25.2	0.9	4	2.26E-07	1.19E-06	10	328.9	0	620.98	1.68	2.27	0.000278261	575	1.45	1.9	20
154	25.43	0.17	26.7	0.9	4	2.25E-07	1.21E-06	10	335.68	0	634.1	1.71	2.3	0.000292579	581.04	1.46	1.86	20
155	25.59	0.16	24.3	0.9	4	2.27E-07	1.21E-06	10	331.32	0	624.97	1.69	2.26	0.000277368	576.85	1.45	1.91	20
156	25.76	0.17	24.3	0.8	4	2.44E-07	1.27E-06	10	325.61	0	606.39	1.66	2.21	0.000299185	568.21	1.44	2.04	20
157	25.92	0.16	25.5	0.7	4	2.83E-07	1.47E-06	10	325.14	0	589.44	1.66	2.19	0.000285607	560.21	1.43	2.22	20
158	26.08	0.16	24.2	0.7	4	2.96E-07	1.53E-06	10	322.84	0	580.32	1.65	2.16	0.000287842	555.86	1.43	2.31	20
159	26.25	0.17	23.8	0.7	4	2.42E-07	1.27E-06	10	327.99	0	611.56	1.67	2.18	0.000297922	570.62	1.43	2.05	20
160	26.41	0.16	26.6	1	4	2.39E-07	1.39E-06	11	364.41	0	681.1	1.86	2.41	0.000265697	602.19	1.48	1.82	20
161	26.58	0.17	32	1.3	4	2.43E-07	1.61E-06	12	411.84	0	767.21	2.1	2.7	0.000265987	639.13	1.54	1.63	20
162	26.74	0.16	34	1.5	4	2.64E-07	1.87E-06	13	442.51	0	812.36	2.26	2.89	0.000243287	657.66	1.58	1.58	20
163	26.9	0.16	33.2	1.4	4	2.83E-07	2.02E-06	13	445.79	0	808.16	2.27	2.89	0.000243917	655.96	1.58	1.63	20
164	27.07	0.17	32.7	1.2	4	2.80E-07	1.90E-06	12	423.92	0	769.92	2.16	2.73	0.000265517	640.26	1.55	1.72	20
165	27.23	0.16	29.3	1.1	4	2.52E-07	1.56E-06	12	386.04	0	714.79	1.97	2.47	0.000259357	616.91	1.5	1.81	20
166	27.4	0.17	25.1	0.9	4	1.79E-07	9.56E-07	10	334.38	0	658.84	1.71	2.13	0.000287031	592.27	1.43	1.79	20
167	27.56	0.16	21.7	0.8	3	1.12E-07	5.09E-07	9	284.08	0	609.02	1.45	1.8	0.000280978	569.44	1.35	1.7	20
168	27.72	0.16	18.6	0.8	3	6.13E-08	2.42E-07	9	246.47	0	589.18	1.26	1.55	0.000285673	560.08	1.29	1.48	20
169	27.89	0.17	17.1	0.9	3	4.42E-08	1.68E-07	9	236.95	0	601.06	1.21	1.48	0.000300507	565.71	1.27	1.32	20
170	28.05	0.16	19.7	1	3	6.45E-08	2.83E-07	10	273.7	0	648.27	1.4	1.7	0.00027234	587.5	1.33	1.37	20
171	28.22	0.17	26.5	1.1	4	1.44E-07	7.58E-07	10	327.71	0	670.94	1.67	2.03	0.000284433	597.68	1.41	1.7	20
172	28.38	0.16	28.7	0.8	4	2.28E-07	1.27E-06	11	348.12	0	656.4	1.78	2.14	0.00027065	591.17	1.43	2.01	20
173	28.54	0.16	24.1	0.7	4	2.44E-07	1.29E-06	10	328.65	0	611.77	1.68	2.01	0.000280348	570.72	1.4	2.24	20
174	28.71	0.17	22.3	0.7	4	1.64E-07	7.70E-07	9	293.18	0	586.57	1.5	1.78	0.000304202	558.84	1.35	2.09	20

175	28.87	0.16	21.1	0.7	4	1.17E-07	4.96E-07	9	265.09	0	563.86	1.35	1.6	0.000292013	547.92	1.3	1.99	20
176	29.04	0.17	18.1	0.6	3	8.63E-08	3.34E-07	8	241.52	0	542.72	1.23	1.45	0.00031625	537.55	1.26	1.91	20
177	29.2	0.16	17.3	0.6	4	8.53E-08	3.14E-07	8	229.77	0	517.43	1.17	1.37	0.000304837	524.87	1.23	2.03	20
178	29.36	0.16	18.6	0.5	4	8.13E-08	2.89E-07	8	221.73	0	503.71	1.13	1.32	0.000308958	517.87	1.22	2.08	20
179	29.53	0.17	16.4	0.5	4	7.95E-08	2.74E-07	8	215.06	0	490.48	1.1	1.27	0.000332668	511.02	1.2	2.15	20
180	29.69	0.16	15.9	0.5	3	6.06E-08	2.02E-07	7	207.9	0	498	1.06	1.22	0.000310728	514.92	1.19	1.95	20
181	29.86	0.17	17.1	0.6	3	6.33E-08	2.30E-07	8	227.48	0	540.74	1.16	1.33	0.000316827	536.57	1.22	1.8	20
182	30.02	0.16	20.6	0.8	3	7.89E-08	3.32E-07	9	262.42	0	599.29	1.34	1.53	0.000283251	564.87	1.28	1.71	20
183	30.19	0.17	23.4	0.9	3	1.11E-07	5.48E-07	10	307.73	0	660.44	1.57	1.78	0.000286683	592.99	1.35	1.71	20
184	30.35	0.16	26.8	1	4	1.40E-07	7.66E-07	11	342.32	0	705	1.75	1.97	0.000261152	612.67	1.39	1.71	20
185	30.51	0.16	28	1.1	4	1.55E-07	8.98E-07	11	362.55	0	733.06	1.85	2.07	0.000256107	624.74	1.42	1.7	20
186	30.68	0.17	27.7	1.1	4	1.45E-07	8.47E-07	12	363.55	0	743.31	1.85	2.07	0.000270232	629.09	1.42	1.65	20
187	30.84	0.16	27	1.1	4	1.43E-07	8.22E-07	11	357.95	0	733.73	1.83	2.03	0.000255988	625.03	1.41	1.68	20
188	31.01	0.17	26.8	1	4	1.50E-07	8.45E-07	11	351.8	0	715.31	1.79	1.98	0.000275469	617.13	1.4	1.76	20
189	31.17	0.16	26.4	0.9	4	1.64E-07	9.13E-07	11	348.5	0	697.61	1.78	1.95	0.000262532	609.45	1.39	1.87	20
190	31.33	0.16	26.3	0.9	4	1.79E-07	1.00E-06	11	350.86	0	691.07	1.79	1.95	0.000263774	606.58	1.39	1.95	20
191	31.5	0.17	27.3	0.9	4	1.70E-07	9.65E-07	11	353.67	0	702.82	1.8	1.96	0.000277905	611.72	1.39	1.89	20
192	31.66	0.16	27	1	4	1.46E-07	8.39E-07	11	358.63	0	732.78	1.83	1.98	0.000256156	624.62	1.4	1.74	20
193	31.83	0.17	27.4	1.2	3	1.14E-07	6.63E-07	12	364.02	0	778.19	1.86	2	0.000264106	643.68	1.4	1.52	20
194	31.99	0.16	28.5	1.4	3	9.41E-08	5.60E-07	12	371.66	0	822.26	1.9	2.03	0.000241816	661.66	1.41	1.36	20
195	32.15	0.16	28.7	1.5	3	8.88E-08	5.35E-07	13	376.16	0	841.02	1.92	2.04	0.000239106	669.16	1.42	1.31	20
196	32.32	0.17	28.4	1.4	3	8.86E-08	5.29E-07	12	372.63	0	833.42	1.9	2.01	0.000255205	666.13	1.41	1.33	20
197	32.48	0.16	27.8	1.3	3	8.65E-08	5.02E-07	12	362.69	0	814.7	1.85	1.95	0.000242936	658.61	1.39	1.36	20
198	32.65	0.17	26.6	1.3	3	8.41E-08	4.75E-07	12	352.36	0	795.51	1.8	1.88	0.000261213	650.81	1.38	1.39	20
199	32.81	0.16	26.2	1.2	3	8.20E-08	4.49E-07	12	342.02	0	775.82	1.75	1.82	0.00024895	642.7	1.36	1.43	20
200	32.97	0.16	25.6	1.1	3	9.80E-08	5.14E-07	11	327.89	0	720.14	1.67	1.74	0.000258394	619.21	1.34	1.64	20
201	33.14	0.17	23.6	0.7	4	1.19E-07	5.80E-07	10	304.4	0	645.44	1.55	1.6	0.000289994	586.22	1.3	1.99	20
202	33.3	0.16	21.2	0.5	4	1.33E-07	5.96E-07	9	280.59	0	583.37	1.43	1.47	0.000287088	557.32	1.27	2.34	20
203	33.47	0.17	20.5	0.6	4	1.24E-07	5.61E-07	9	283.41	0	596.74	1.45	1.48	0.000301595	563.67	1.27	2.24	20
204	33.63	0.16	24.2	0.8	4	1.09E-07	5.22E-07	10	300.17	0	647.09	1.53	1.56	0.000272591	586.96	1.29	1.96	20
205	33.79	0.16	24.8	0.9	4	1.07E-07	5.54E-07	11	322.88	0	697.65	1.65	1.67	0.000262523	609.47	1.32	1.79	20
206	33.96	0.17	25.4	1	3	9.35E-08	4.85E-07	11	324.02	0	717.71	1.65	1.67	0.00027501	618.16	1.32	1.68	20
207	34.12	0.16	24.5	1	3	7.94E-08	3.97E-07	11	312.57	0	713.12	1.59	1.6	0.00025966	616.19	1.3	1.62	20
208	34.29	0.17	22.4	0.9	3	5.99E-08	2.72E-07	10	283.73	0	681.19	1.45	1.44	0.000282284	602.23	1.26	1.58	20
209	34.45	0.16	19.3	0.8	3	4.17E-08	1.65E-07	9	247.46	0	634.43	1.26	1.25	0.000275297	581.19	1.2	1.55	20
210	34.61	0.16	16.8	0.7	3	2.90E-08	9.94E-08	8	214.47	0	587.26	1.09	1.08	0.000286138	559.17	1.14	1.53	20
211	34.78	0.17	15.4	0.6	3	2.27E-08	6.90E-08	8	189.51	0	555.85	0.99	0.98	0.000312494	544.01	1.1	1.53	20
212	34.94	0.16	15	0.6	3	2.22E-08	6.69E-08	8	187.67	0	556.62	0.99	0.97	0.000293907	544.39	1.1	1.53	20
213	35.11	0.17	16.7	0.7	3	3.04E-08	1.04E-07	8	213.88	0	580.56	1.09	1.06	0.000305772	555.97	1.13	1.6	20
214	35.27	0.16	19.7	0.7	3	4.27E-08	1.66E-07	9	242.3	0	618.5	1.24	1.2	0.000278819	573.85	1.18	1.65	20
215	35.43	0.16	21.1	0.8	3	6.08E-08	2.72E-07	10	279.69	0	669.58	1.43	1.38	0.000267971	597.08	1.24	1.68	20
216	35.6	0.17	24.7	1	3	7.52E-08	3.92E-07	11	325.5	0	749.9	1.66	1.6	0.000269043	631.87	1.3	1.57	20
217	35.76	0.16	29.5	1.3	3	9.63E-08	5.94E-07	13	385.38	0	849	1.97	1.88	0.000237978	672.33	1.38	1.48	20
218	35.93	0.17	33.9	1.6	3	1.20E-07	8.59E-07	14	445.45	0	942.51	2.27	2.16	0.000239981	708.39	1.45	1.42	20
219	36.09	0.16	37.6	1.8	3	1.51E-07	1.19E-06	16	494.44	0	1004.42	2.52	2.39	0.000218791	731.29	1.5	1.43	20
220	36.26	0.17	40	1.8	4	1.83E-07	1.53E-06	16	523.14	0	1026.36	2.67	2.52	0.000229969	739.23	1.52	1.48	20
221	36.42	0.16	40.1	1.7	4	2.01E-07	1.74E-06	16	540.83	0	1043.12	2.76	2.59	0.000214696	745.24	1.54	1.5	20
222	36.58	0.16	41.4	1.9	4	1.96E-07	1.71E-06	17	544.03	0	1053.61	2.78	2.6	0.000213624	748.98	1.54	1.48	20
223	36.75	0.17	40.8	1.9	4	1.99E-07	1.76E-06	17	551.98	0	1066.2	2.82	2.62	0.000225632	753.44	1.54	1.48	20
224	36.91	0.16	41.9	1.8	4	2.25E-07	1.99E-06	17	553.32	0	1045.89	2.82	2.62	0.000214411	746.23	1.54	1.57	20
225	37.08	0.17	41.8	1.6	4	2.48E-07	2.19E-06	16	551.35	0	1023.6	2.81	2.6	0.000230277	738.24	1.54	1.65	20
226	37.24	0.16	40.4	1.6	4	2.44E-07	2.08E-06	16	533.79	0	994.15	2.72	2.5	0.000219919	727.54	1.52	1.7	20
227	37.4	0.16	38.1	1.5	4	2.34E-07	1.94E-06	16	518.7	0	973.27	2.65	2.42	0.000222265	719.86	1.5	1.73	20
228	37.57	0.17	38.5	1.4	4	2.48E-07	2.05E-06	15	515.64	0	957.06	2.63	2.4	0.000238149	713.84	1.5	1.8	20
229	37.73	0.16	39.7	1.4	4	2.59E-07	2.14E-06	15	515.8	0	950.19	2.63	2.39	0.00022495	711.27	1.5	1.84	20
230	37.9	0.17	38.1	1.4	4	2.60E-07	2.16E-06	15	517.64	0	952.51	2.64	2.38	0.000238717	712.14	1.5	1.85	20
231	38.06	0.16	38.9	1.4	4	2.49E-07	2.05E-06	15	513.53	0	952.35	2.62	2.36	0.000224694	712.08	1.49	1.83	20
232	38.22	0.16	38.8	1.4	4	2.61E-07	2.15E-06	15	513.99	0	945.45	2.62	2.35	0.000225514	709.49	1.49	1.88	20
233	38.39	0.17	38.2	1.3	4	2.54E-07	2.06E-06	15	505.81	0	935.05	2.58	2.3	0.000240937	705.58	1.48	1.9	20

234	38.55	0.16	37.1	1.3	4	2.55E-07	2.02E-06	15	494.94	0	914.48	2.53	2.24	0.000229299	697.78	1.47	1.95	20
235	38.72	0.17	36.4	1.2	4	2.20E-07	1.67E-06	14	473.5	0	898.34	2.42	2.13	0.00024581	691.59	1.44	1.92	20
236	38.88	0.16	33.6	1.2	4	1.95E-07	1.42E-06	14	455.51	0	883.26	2.32	2.04	0.000233318	685.76	1.42	1.9	20
237	39.04	0.16	33.3	1.2	4	1.57E-07	1.07E-06	14	428.18	0	863.9	2.18	1.91	0.000235915	678.21	1.39	1.84	20
238	39.21	0.17	30.7	1.1	4	1.29E-07	8.28E-07	13	399.5	0	834.34	2.04	1.78	0.000255064	666.5	1.35	1.82	20
239	39.37	0.16	27.6	1	4	1.07E-07	6.29E-07	12	366.71	0	792.49	1.87	1.63	0.000246317	649.57	1.31	1.83	20
240	39.54	0.17	26.4	0.9	3	9.17E-08	4.96E-07	11	337.91	0	751.05	1.72	1.49	0.000268834	632.36	1.27	1.88	20
241	39.7	0.16	24.6	0.8	3	7.35E-08	3.72E-07	11	316.27	0	731.75	1.61	1.39	0.000256336	624.18	1.24	1.82	20
242	39.86	0.16	23	0.9	3	6.19E-08	2.97E-07	11	299.35	0	714.35	1.53	1.31	0.000259437	616.72	1.22	1.8	20
243	40.03	0.17	22.8	0.8	3	5.58E-08	2.62E-07	11	292.96	0	712.33	1.49	1.28	0.000276046	615.84	1.21	1.76	20
244	40.19	0.16	23.3	0.8	3	6.09E-08	2.87E-07	11	294.11	0	703.96	1.5	1.28	0.000261344	612.22	1.21	1.84	20
245	40.36	0.17	23.3	0.8	3	5.88E-08	2.76E-07	11	292.46	0	704.4	1.49	1.26	0.000277596	612.4	1.2	1.83	20
246	40.52	0.16	22.5	0.8	3	6.37E-08	2.99E-07	10	292.93	0	695.4	1.49	1.26	0.00026295	608.48	1.2	1.91	20
247	40.68	0.16	23.4	0.7	3	6.53E-08	3.08E-07	11	295.18	0	697.74	1.51	1.27	0.000262506	609.51	1.2	1.93	20
248	40.85	0.17	23.8	0.8	3	6.81E-08	3.26E-07	11	298.82	0	700.84	1.52	1.28	0.000278296	610.86	1.21	1.95	20
249	41.01	0.16	23.3	0.8	3	6.03E-08	2.87E-07	11	296.74	0	711.52	1.51	1.26	0.000259955	615.49	1.2	1.85	20
250	41.18	0.17	23	0.8	3	5.18E-08	2.38E-07	11	287.16	0	707.67	1.47	1.22	0.00027695	613.83	1.19	1.79	20
251	41.34	0.16	21.8	0.8	3	4.42E-08	1.96E-07	10	277.23	0	703.22	1.41	1.17	0.000261485	611.89	1.17	1.73	20
252	41.5	0.16	21.2	0.8	3	4.48E-08	1.96E-07	10	273.51	0	691.99	1.4	1.15	0.000263596	606.99	1.17	1.78	20
253	41.67	0.17	22.2	0.7	3	4.97E-08	2.28E-07	11	286.16	0	710.7	1.46	1.2	0.00027636	615.14	1.18	1.79	20
254	41.83	0.16	24.5	0.9	3	5.65E-08	2.72E-07	11	301	0	730.31	1.54	1.26	0.000256587	623.57	1.2	1.81	20
255	42	0.17	24.4	0.9	3	5.09E-08	2.49E-07	11	304.84	0	753.62	1.56	1.27	0.000268376	633.44	1.2	1.69	20
256	42.16	0.16	23.1	0.9	3	3.85E-08	1.73E-07	11	281.32	0	731.56	1.44	1.16	0.000256369	624.1	1.17	1.62	20
257	42.32	0.16	19.6	0.8	3	2.73E-08	1.08E-07	10	246.25	0	681.41	1.26	1.02	0.000265635	602.33	1.12	1.61	20
258	42.49	0.17	17	0.6	3	2.02E-08	5.94E-08	9	183.61	0	617.8	1.08	0.87	0.00029641	573.53	1.06	1.67	20
259	42.65	0.16	15.7	0.5	3	2.15E-08	5.30E-08	8	154.26	0	561.18	0.99	0.79	0.000292708	546.62	1.03	1.94	20
260	42.82	0.17	15.9	0.4	3	2.29E-08	5.19E-08	8	141.29	0	531.69	0.95	0.76	0.000319513	532.06	1.01	2.15	20
261	42.98	0.16	15.3	0.4	3	1.87E-08	4.09E-08	8	136.59	0	543.46	0.94	0.74	0.000297448	537.91	1	1.96	20
262	43.15	0.17	15.1	0.6	3	1.35E-08	2.99E-08	8	138.21	0	581.14	0.94	0.75	0.000305618	556.25	1.01	1.63	20
263	43.31	0.16	16.2	0.7	3	1.14E-08	2.80E-08	9	153.59	0	632.82	1	0.79	0.000275643	580.46	1.02	1.39	20
264	43.47	0.16	17.5	0.8	3	2.37E-08	8.93E-08	10	234.88	0	686.48	1.23	0.97	0.000264651	604.57	1.1	1.58	20
265	43.64	0.17	25.1	0.8	3	4.64E-08	2.11E-07	11	283.52	0	712.92	1.45	1.13	0.000275929	616.1	1.16	1.85	20
266	43.8	0.16	25.1	0.7	4	7.62E-08	3.74E-07	11	306.25	0	703.88	1.56	1.22	0.000261361	612.18	1.19	2.19	20
267	43.97	0.17	22.4	0.6	4	6.99E-08	3.15E-07	10	281.61	0	657.37	1.44	1.12	0.000287351	591.61	1.15	2.35	20
268	44.13	0.16	19.8	0.5	3	5.57E-08	2.27E-07	9	254.7	0	619.53	1.3	1.01	0.000278585	574.33	1.11	2.39	20
269	44.29	0.16	19.4	0.5	3	3.60E-08	1.14E-07	9	197.9	0	589.97	1.14	0.88	0.00028548	560.46	1.06	2.24	20
270	44.46	0.17	15.9	0.5	3	2.48E-08	6.23E-08	8	156.84	0	562.88	1.02	0.78	0.000310536	547.44	1.02	2.14	20
271	44.62	0.16	14.7	0.4	3	1.51E-08	3.01E-08	8	124.28	0	548.96	0.91	0.7	0.000295951	540.63	0.98	1.91	20
272	44.79	0.17	14.8	0.5	3	1.35E-08	2.84E-08	8	131.8	0	578.4	0.94	0.72	0.000306339	554.94	0.99	1.72	20
273	44.95	0.16	17.1	0.7	3	1.29E-08	3.40E-08	9	163.82	0	650.54	1.05	0.8	0.000271864	588.53	1.03	1.47	20
274	45.11	0.16	19.3	0.9	3	1.43E-08	4.60E-08	10	200.56	0	708.04	1.16	0.88	0.000260591	613.99	1.06	1.37	20
275	45.28	0.17	19.6	0.9	3	1.57E-08	5.46E-08	10	216.99	0	725.64	1.21	0.91	0.000273501	621.57	1.08	1.37	20
276	45.44	0.16	19.2	0.8	3	1.72E-08	5.79E-08	10	210.68	0	704.81	1.19	0.9	0.000261186	612.59	1.07	1.46	20
277	45.61	0.17	18.7	0.7	3	1.71E-08	5.11E-08	9	186.88	0	665.68	1.13	0.85	0.000285556	595.33	1.05	1.58	20
278	45.77	0.16	16.8	0.6	3	1.72E-08	4.51E-08	9	164	0	624.04	1.06	0.79	0.000277575	576.42	1.02	1.73	20
279	45.93	0.16	16.3	0.5	3	1.52E-08	3.40E-08	8	139.98	0	590.66	0.98	0.73	0.000285312	560.79	1	1.8	20
280	46.1	0.17	15.4	0.5	3	1.40E-08	2.86E-08	8	127.68	0	573.48	0.94	0.7	0.000307653	552.57	0.98	1.84	20
281	46.26	0.16	15	0.5	3	1.44E-08	3.30E-08	9	143.73	0	606.75	1	0.74	0.000281507	568.37	1	1.72	20
282	46.43	0.17	18.7	0.7	3	2.26E-08	8.03E-08	10	222.28	0	696.51	1.24	0.91	0.000279164	608.96	1.08	1.66	20
283	46.59	0.16	25.6	1	3	3.49E-08	1.71E-07	12	305.09	0	807.62	1.56	1.14	0.000243999	655.74	1.16	1.58	20
284	46.75	0.16	28.2	1.2	3	4.89E-08	2.78E-07	13	355.5	0	885.47	1.81	1.33	0.000233026	686.62	1.22	1.57	20
285	46.92	0.17	29.5	1.2	3	5.45E-08	3.28E-07	13	375.18	0	916.13	1.91	1.4	0.00024341	698.41	1.24	1.56	20
286	47.08	0.16	29.8	1.2	3	6.23E-08	3.82E-07	14	382.78	0	912.33	1.95	1.42	0.000229568	696.96	1.25	1.64	20
287	47.25	0.17	29.8	1.1	3	6.82E-08	4.22E-07	14	386.34	0	905.97	1.97	1.43	0.000244773	694.52	1.25	1.7	20
288	47.41	0.16	30.2	1.1	3	7.49E-08	4.68E-07	14	389.95	0	899.11	1.99	1.44	0.000231251	691.89	1.26	1.77	20
289	47.57	0.16	30.5	1.1	3	7.16E-08	4.50E-07	14	392.11	0	911.34	2	1.44	0.000229694	696.58	1.26	1.73	20
290	47.74	0.17	30.2	1.2	3	6.76E-08	4.31E-07	14	398.09	0	934.99	2.03	1.46	0.000240943	705.56	1.26	1.66	20
291	47.9	0.16	31.4	1.3	3	6.00E-08	3.91E-07	14	407.35	0	977.63	2.08	1.48	0.000221769	721.47	1.27	1.53	20
292	48.07	0.17	32.5	1.5	3	6.02E-08	4.07E-07	15	422.53	0	1013.4	2.16	1.53	0.000231434	734.55	1.29	1.47	20

CPT-4 Estimations

293	48.23	0.16	33.5	1.5	3	6.28E-08	4.39E-07	15	436.66	0	1039.41	2.23	1.58	0.000215077	743.92	1.3	1.46	20
294	48.39	0.16	34.5	1.5	3	7.06E-08	5.14E-07	16	454.08	0	1058.11	2.32	1.64	0.000213168	750.58	1.32	1.48	20
295	48.56	0.17	36.2	1.6	3	7.88E-08	5.95E-07	16	471.1	0	1076.13	2.4	1.69	0.000224588	756.94	1.33	1.5	20
296	48.72	0.16	37.3	1.6	3	8.07E-08	6.13E-07	16	474.43	0	1079.13	2.42	1.7	0.000211082	758	1.33	1.51	20
297	48.89	0.17	35.4	1.5	3	7.26E-08	5.29E-07	16	454.74	0	1054.27	2.32	1.62	0.000226906	749.21	1.31	1.52	20
298	49.05	0.16	32.2	1.4	3	5.88E-08	3.91E-07	15	415.31	0	1000.47	2.12	1.48	0.000219223	729.85	1.27	1.52	20
299	49.22	0.17	28.9	1.2	3	4.76E-08	2.84E-07	14	372.96	0	933.4	1.9	1.32	0.000241148	704.96	1.22	1.55	20
300	49.38	0.16	26.4	1	3	3.98E-08	2.13E-07	13	334.64	0	865.21	1.71	1.18	0.000235738	678.72	1.18	1.62	20
301	49.54	0.16	24.1	0.9	3	3.30E-08	1.59E-07	12	301.65	0	806.69	1.54	1.06	0.000244137	655.37	1.13	1.68	20
302	49.71	0.17	21.9	0.8	3	2.70E-08	1.18E-07	11	272.56	0	772.8	1.42	0.98	0.000265025	641.45	1.1	1.67	20
303	49.87	0.16	21.5	0.8	3	2.39E-08	9.16E-08	11	239.43	0	741.55	1.33	0.92	0.000254635	628.35	1.08	1.71	20
304	50.04	0.17	20.5	0.7	3	2.29E-08	8.31E-08	10	226.17	0	727.17	1.3	0.89	0.000273211	622.23	1.07	1.74	20

Sum	0.094811771	
Vs of CPT	527.78257	(ft/s)
	160.90932	(m/s)
Extrapolated Vs	622.70611	(ft/s)
Following Boore (2004)	189.84942	(m/s)

CPT-5 Estimations

	In situ data					Estimations												
No	Depth (ft)	Thickness (ft)	qc (tsf)	fs (tsf)	SBTn	Ksbt (ft/s)	Cv (ft2/s)	SPT N60 (blows/ft)	Con. Mod. (tsf)	Es (tsf)	Go (tsf)	Su (tsf)	Su ratio	Thickness/ Vs (s)	Vs (ft/s)	Ko	Sensitivity	Peak phi (°)
1	0.33	0.33	195.2	0.4	7	0.00E+00	0.00E+00	23	541.63	432.16	541.63	0	0	0.000614514	537.01	0	0	20
2	0.49	0.16	144.5	0.3	7	2.10E-02	1.66E-01	20	492.05	392.6	492.05	0	0	0.000312598	511.84	0	0	20
3	0.66	0.17	102.7	0.3	7	6.30E-03	4.43E-02	16	438.68	350.01	438.68	0	0	0.000351763	483.28	0	0	20
4	0.82	0.16	70	0.5	6	1.35E-03	8.18E-03	12	378.32	301.85	378.32	0	0	0.000356498	448.81	0	0	20
5	0.98	0.16	34.4	0.5	6	2.08E-04	1.04E-03	9	310.68	247.88	310.68	0	0	0.000393401	406.71	0	0	20
6	1.15	0.17	17	0.4	6	2.69E-05	1.01E-04	5	234.87	187.4	234.87	0	0	0.000480728	353.63	0	0	20
7	1.31	0.16	12.1	0.4	5	7.01E-06	2.08E-05	4	185.11	147.69	185.11	0	0	0.000509652	313.94	0	0	20
8	1.48	0.17	10.2	0.3	5	3.39E-06	8.18E-06	3	150.77	139.17	174.43	0	0	0.000557834	304.75	0	0	20
9	1.64	0.16	10.2	0.4	5	2.48E-06	5.63E-06	3	141.54	138.19	173.19	0	0	0.000526888	303.67	0	0	20
10	1.8	0.16	10.2	0.4	4	2.05E-06	4.71E-06	3	143.44	144.98	181.71	0.73	13.91	0.000514403	311.04	2.12	1.79	20
11	1.97	0.17	10.7	0.4	4	1.87E-06	4.31E-06	3	143.85	147.84	185.29	0.73	12.75	0.000541246	314.09	2.08	1.8	20
12	2.13	0.16	10.4	0.4	4	1.54E-06	3.43E-06	3	139.32	148.32	185.9	0.71	11.42	0.000508566	314.61	2.04	1.74	20
13	2.3	0.17	9.3	0.4	4	1.09E-06	2.24E-06	3	128.85	146.12	183.13	0.66	9.78	0.000544418	312.26	1.98	1.61	20
14	2.46	0.16	8.5	0.4	4	7.60E-07	1.44E-06	3	118.64	143.49	179.84	0.61	8.42	0.000517063	309.44	1.93	1.48	20
15	2.62	0.16	8.2	0.4	4	6.64E-07	1.18E-06	3	111.31	137.98	172.93	0.57	7.42	0.000527287	303.44	1.86	1.52	20
16	2.79	0.17	7.7	0.3	4	5.56E-07	9.16E-07	3	102.85	131.64	164.99	0.52	6.43	0.000573569	296.39	1.8	1.54	20
17	2.95	0.16	6.7	0.3	4	4.26E-07	6.27E-07	3	91.92	123.47	154.75	0.47	5.44	0.000557414	287.04	1.72	1.53	20
18	3.12	0.17	5.9	0.3	4	2.64E-07	3.44E-07	2	81.56	0	149.74	0.42	4.56	0.00060209	282.35	1.67	1.36	20
19	3.28	0.16	5.5	0.3	3	2.01E-07	2.48E-07	2	76.87	0	148.21	0.39	4.09	0.000569577	280.91	1.63	1.28	20
20	3.45	0.17	5.7	0.3	3	1.94E-07	2.42E-07	2	77.73	0	150.81	0.4	3.93	0.000599922	283.37	1.61	1.3	20
21	3.61	0.16	6.1	0.3	4	2.08E-07	2.69E-07	2	80.84	0	154.93	0.41	3.91	0.000557084	287.21	1.61	1.35	20
22	3.77	0.16	6.2	0.3	4	2.10E-07	2.77E-07	2	82.54	0	157.96	0.42	3.82	0.000551724	290	1.6	1.38	20
23	3.94	0.17	6.1	0.3	3	1.79E-07	2.30E-07	2	80.51	0	158.63	0.41	3.57	0.000584956	290.62	1.57	1.34	20
24	4.1	0.16	5.7	0.3	3	1.45E-07	1.79E-07	2	77.1	0	157.68	0.39	3.28	0.0005522	289.75	1.54	1.28	20
25	4.27	0.17	5.5	0.3	3	1.12E-07	1.30E-07	2	72.72	0	155.93	0.37	2.97	0.000590011	288.13	1.51	1.21	20
26	4.43	0.16	5.2	0.3	3	9.17E-08	1.02E-07	2	69.76	0	155.07	0.36	2.75	0.000556832	287.34	1.48	1.16	20
27	4.59	0.16	5.1	0.3	3	7.84E-08	8.51E-08	2	67.75	0	154.91	0.35	2.58	0.000557122	287.19	1.46	1.13	20
28	4.76	0.17	5.1	0.3	3	6.83E-08	7.24E-08	2	66.2	0	155.17	0.34	2.43	0.000591448	287.43	1.44	1.1	20
29	4.92	0.16	4.9	0.3	3	5.41E-08	5.44E-08	2	62.83	0	153.65	0.32	2.23	0.000559401	286.02	1.41	1.05	20
30	5.09	0.17	4.4	0.3	3	5.32E-08	5.11E-08	2	59.92	0	146.96	0.31	2.05	0.000607751	279.72	1.38	1.12	20
31	5.25	0.16	4.5	0.2	3	6.32E-08	6.06E-08	2	59.84	0	142.27	0.31	1.99	0.000581353	275.22	1.35	1.28	20
32	5.41	0.16	4.9	0.2	3	9.07E-08	9.08E-08	2	62.55	0	139.32	0.32	2.02	0.000587458	272.36	1.34	1.56	20
33	5.58	0.17	5	0.2	3	9.74E-08	1.01E-07	2	64.8	0	142.48	0.33	2.03	0.000617217	275.43	1.34	1.62	20
34	5.74	0.16	5	0.2	3	8.78E-08	8.97E-08	2	63.77	0	142.84	0.33	1.94	0.000580173	275.78	1.33	1.59	20
35	5.91	0.17	4.7	0.2	3	6.91E-08	6.69E-08	2	60.39	0	141.27	0.31	1.78	0.000619872	274.25	1.3	1.51	20
36	6.07	0.16	4.3	0.2	3	5.24E-08	4.74E-08	2	56.53	0	139.04	0.29	1.63	0.000588062	272.08	1.28	1.41	20
37	6.23	0.16	4.2	0.2	3	3.93E-08	3.32E-08	2	52.69	0	136.48	0.27	1.48	0.000593538	269.57	1.25	1.32	20
38	6.4	0.17	3.9	0.2	3	4.14E-08	3.30E-08	2	49.76	0	127.73	0.25	1.36	0.00065189	260.78	1.21	1.49	20
39	6.56	0.16	3.7	0.1	3	3.54E-08	2.74E-08	2	48.26	0	127.39	0.25	1.28	0.000614369	260.43	1.19	1.45	20
40	6.73	0.17	3.9	0.2	3	3.01E-08	2.25E-08	2	46.71	0	127.02	0.24	1.21	0.00065372	260.05	1.18	1.4	20
41	6.89	0.16	3.6	0.2	3	1.97E-08	1.45E-08	2	46.08	0	135.31	0.24	1.17	0.000596103	268.41	1.17	1.15	20
42	7.05	0.16	3.6	0.2	3	1.54E-08	1.09E-08	2	44.05	0	135.22	0.22	1.09	0.000596303	268.32	1.14	1.1	20
43	7.22	0.17	3.5	0.2	3	8.30E-09	5.53E-09	2	41.56	0	142.64	0.21	1	0.000616881	275.58	1.11	0.89	20
44	7.38	0.16	3.1	0.3	3	3.93E-09	2.11E-09	2	33.55	0	147.98	0.19	0.89	0.000570024	280.69	1.07	0.71	20
45	7.55	0.17	2.8	0.3	3	5.73E-09	4.04E-09	2	44.04	0	161.65	0.22	1.02	0.000579473	293.37	1.12	0.73	20
46	7.71	0.16	4.9	0.3	3	2.47E-08	2.47E-08	2	62.63	0	176.54	0.32	1.42	0.00052187	306.59	1.25	1.04	20
47	7.87	0.16	7.1	0.3	3	6.77E-08	9.06E-08	3	83.6	0	196.32	0.43	1.85	0.000494881	323.31	1.33	1.39	20
48	8.04	0.17	7.3	0.3	3	1.12E-07	1.75E-07	3	97.19	0	208.19	0.5	2.11	0.000510603	332.94	1.37	1.62	20
49	8.2	0.16	7.8	0.3	4	1.33E-07	2.20E-07	3	102.82	0	213.56	0.52	2.19	0.000474496	337.2	1.38	1.71	20
50	8.37	0.17	8.3	0.3	4	1.34E-07	2.36E-07	3	109.38	0	226.85	0.56	2.28	0.000489152	347.54	1.4	1.64	20
51	8.53	0.16	8.7	0.4	3	1.25E-07	2.37E-07	4	118.19	0	248.24	0.6	2.42	0.000440105	363.55	1.44	1.48	20
52	8.69	0.16	9.7	0.5	3	1.21E-07	2.55E-07	4	131.67	0	278.46	0.67	2.64	0.000415541	385.04	1.48	1.32	20
53	8.86	0.17	11.2	0.6	3	1.50E-07	3.72E-07	5	154.46	0	313.96	0.79	3.04	0.0004158	408.85	1.55	1.29	20
54	9.02	0.16	13.6	0.7	3	2.00E-07	5.82E-07	5	181.89	0	351.09	0.93	3.52	0.000370062	432.36	1.62	1.3	20
55	9.19	0.17	15.6	0.8	4	2.72E-07	9.11E-07	6	208.79	0	381.09	1.07	3.97	0.0003774	450.45	1.67	1.36	20
56	9.35	0.16	17	0.8	4	3.36E-07	1.22E-06	6	227.32	0	399.56	1.16	4.24	0.000346899	461.23	1.7	1.42	20
57	9.51	0.16	17.6	0.8	4	3.85E-07	1.47E-06	7	237.52	324.88	407.18	1.21	4.36	0.000343635	465.61	1.72	1.48	20

58	9.68	0.17	17.8	0.8	4	3.92E-07	1.54E-06	7	245.44	334.68	419.46	1.25	4.43	0.000359727	472.58	1.73	1.47	20
59	9.84	0.16	18.7	0.9	4	3.76E-07	1.53E-06	7	254.28	349.37	437.87	1.3	4.51	0.000331373	482.84	1.74	1.41	20
60	10.01	0.17	19.5	1	4	3.52E-07	1.47E-06	7	261.17	0	455.11	1.33	4.55	0.000345353	492.25	1.75	1.35	20
61	10.17	0.16	19.3	1	4	3.04E-07	1.25E-06	7	257.3	0	460.45	1.31	4.42	0.000323147	495.13	1.74	1.29	20
62	10.34	0.17	17.9	1	4	2.71E-07	1.07E-06	7	246.94	0	451.02	1.26	4.17	0.000346918	490.03	1.71	1.28	20
63	10.5	0.16	17.3	0.9	4	2.74E-07	1.05E-06	7	240	0	437.58	1.22	3.99	0.000331483	482.68	1.69	1.33	20
64	10.66	0.16	17.8	0.8	4	3.11E-07	1.20E-06	7	240.05	0	427.69	1.22	3.93	0.000335296	477.19	1.68	1.44	20
65	10.83	0.17	17.9	0.8	4	3.33E-07	1.29E-06	7	240.94	0	424	1.23	3.88	0.000357797	475.13	1.67	1.51	20
66	10.99	0.16	17.5	0.8	4	3.43E-07	1.31E-06	7	238.96	0	418.41	1.22	3.8	0.00033899	471.99	1.65	1.56	20
67	11.16	0.17	17.4	0.7	4	3.61E-07	1.38E-06	7	238.36	0	413.49	1.22	3.73	0.000362311	469.21	1.64	1.63	20
68	11.32	0.16	17.8	0.7	4	3.60E-07	1.38E-06	7	239.69	0	415.9	1.22	3.7	0.000340013	470.57	1.64	1.63	20
69	11.48	0.16	17.8	0.8	4	3.18E-07	1.24E-06	7	243.75	0	432.64	1.24	3.71	0.000333368	479.95	1.65	1.52	20
70	11.65	0.17	18.3	0.9	4	2.32E-07	8.92E-07	7	239.81	0	450.54	1.22	3.59	0.000347095	489.78	1.64	1.33	20
71	11.81	0.16	17	1	3	1.78E-07	6.55E-07	7	229.28	0	451.87	1.17	3.39	0.000326198	490.5	1.62	1.23	20
72	11.98	0.17	15.6	0.9	3	1.36E-07	4.70E-07	7	215.05	0	444.87	1.1	3.13	0.000349305	486.68	1.59	1.15	20
73	12.14	0.16	15.3	0.9	3	1.62E-07	5.65E-07	7	217.79	0	436.72	1.11	3.13	0.000331813	482.2	1.58	1.26	20
74	12.3	0.16	17.6	0.8	4	2.15E-07	8.14E-07	7	235.97	0	449.39	1.2	3.35	0.000327098	489.15	1.61	1.36	20
75	12.47	0.17	19.5	0.9	4	2.95E-07	1.24E-06	8	262.55	0	472.51	1.34	3.68	0.000338936	501.57	1.65	1.46	20
76	12.63	0.16	21	1	4	3.29E-07	1.51E-06	8	286.75	0	505.85	1.46	3.96	0.000308303	518.97	1.69	1.43	20
77	12.8	0.17	22.8	1.1	4	3.63E-07	1.78E-06	9	305.77	0	529.97	1.56	4.17	0.00032003	531.2	1.72	1.43	20
78	12.96	0.16	23.6	1.1	4	3.97E-07	2.03E-06	9	319.64	434.89	545.06	1.63	4.3	0.000297006	538.71	1.74	1.45	20
79	13.12	0.16	24	1.1	4	4.14E-07	2.15E-06	9	324.74	438.48	549.56	1.66	4.32	0.000295787	540.93	1.74	1.48	20
80	13.29	0.17	23.9	1.1	4	3.71E-07	1.91E-06	9	322.26	443.83	556.27	1.64	4.23	0.000312374	544.22	1.73	1.42	20
81	13.45	0.16	23.1	1.2	4	2.71E-07	1.29E-06	9	298.52	0	545.46	1.52	3.87	0.000296901	538.9	1.69	1.32	20
82	13.62	0.17	19	1.1	3	1.58E-07	6.51E-07	8	257.1	0	517.8	1.31	3.29	0.000323773	525.06	1.62	1.17	20
83	13.78	0.16	15.2	1	3	8.23E-08	2.69E-07	7	204.14	0	462.67	1.04	2.59	0.000322366	496.33	1.51	1.06	20
84	13.94	0.16	11.9	0.8	3	4.59E-08	1.18E-07	6	160.33	0	403.88	0.82	2.01	0.000345036	463.72	1.4	1	20
85	14.11	0.17	9.7	0.6	3	2.59E-08	5.41E-08	5	130.4	0	364.31	0.67	1.61	0.000385995	440.42	1.31	0.93	20
86	14.27	0.16	8.8	0.7	3	5.39E-08	1.40E-07	6	161.74	0	395.81	0.83	1.98	0.000348531	459.07	1.39	1.1	20
87	14.44	0.17	18.6	0.9	4	9.57E-07	5.90E-06	10	385.21	446.9	560.12	1.97	4.66	0.000311298	546.1	1.77	2.06	20
88	14.6	0.16	57.6	1.2	5	2.50E-06	2.16E-05	13	538.19	524.76	657.7	0	0	0.00027038	591.76	0	0	20
89	14.76	0.16	41.6	1.2	5	2.68E-06	2.43E-05	13	566.49	545.69	683.93	0	0	0.000265146	603.44	0	0	20
90	14.93	0.17	24.7	1.1	4	7.24E-07	4.58E-06	10	394.81	481.81	603.87	2.01	4.62	0.000299813	567.02	1.78	1.79	20
91	15.09	0.16	20.8	1	4	2.96E-07	1.43E-06	9	300.48	0	540.19	1.53	3.48	0.000298346	536.29	1.64	1.5	20
92	15.26	0.17	21.4	0.9	4	2.30E-07	9.88E-07	8	268.3	0	504.96	1.37	3.07	0.000327863	518.51	1.58	1.49	20
93	15.42	0.16	17.8	0.8	4	1.83E-07	7.04E-07	7	239.81	0	470.27	1.22	2.71	0.000319757	500.38	1.52	1.5	20
94	15.58	0.16	14.7	0.7	3	1.10E-07	3.57E-07	7	202.51	0	435.47	1.03	2.27	0.000332281	481.52	1.44	1.38	20
95	15.75	0.17	13.4	0.7	3	8.77E-08	2.58E-07	6	183.32	0	410.74	0.94	2.03	0.000363527	467.64	1.39	1.37	20
96	15.91	0.16	13.7	0.6	3	9.56E-08	2.81E-07	6	183.67	0	405.18	0.94	2.02	0.000344479	464.47	1.39	1.45	20
97	16.08	0.17	14.8	0.6	3	1.04E-07	3.04E-07	6	183.56	0	399.16	0.94	1.99	0.000368764	461	1.38	1.53	20
98	16.24	0.16	13.4	0.6	3	8.99E-08	2.49E-07	6	173.14	0	386.2	0.88	1.86	0.000352843	453.46	1.35	1.53	20
99	16.4	0.16	11.5	0.5	3	5.30E-08	1.25E-07	5	147.72	0	362.52	0.75	1.57	0.000364191	439.33	1.29	1.38	20
100	16.57	0.17	9.4	0.5	3	2.86E-08	5.65E-08	5	123.18	0	337.96	0.63	1.3	0.000400764	424.19	1.21	1.23	20
101	16.73	0.16	8.2	0.5	3	2.05E-08	3.63E-08	4	110.83	0	323.13	0.57	1.16	0.000385747	414.78	1.17	1.19	20
102	16.9	0.17	8.9	0.4	3	2.95E-08	5.54E-08	5	117.22	0	319.91	0.6	1.21	0.000411912	412.71	1.19	1.35	20
103	17.06	0.16	10.8	0.4	3	5.34E-08	1.13E-07	5	132.09	0	323.75	0.67	1.35	0.000385375	415.18	1.22	1.65	20
104	17.23	0.17	11.4	0.4	3	7.47E-08	1.73E-07	5	144.63	0	333.63	0.74	1.47	0.00040335	421.47	1.25	1.81	20
105	17.39	0.16	11.6	0.4	3	7.89E-08	1.86E-07	5	147.38	0	336.59	0.75	1.48	0.000377956	423.33	1.25	1.84	20
106	17.55	0.16	11.4	0.4	3	9.16E-08	2.34E-07	5	159.48	0	354.58	0.81	1.59	0.000368248	434.49	1.28	1.84	20
107	17.72	0.17	14	0.5	4	1.15E-07	3.34E-07	6	181.36	0	386.93	0.93	1.79	0.00037454	453.89	1.33	1.81	20
108	17.88	0.16	16.3	0.6	4	1.41E-07	4.71E-07	7	208.78	0	429.45	1.07	2.04	0.000334602	478.18	1.39	1.74	20
109	18.05	0.17	17.3	0.7	3	1.10E-07	3.76E-07	7	212.31	0	456.29	1.08	2.05	0.000344905	492.89	1.4	1.52	20
110	18.21	0.16	14.8	0.8	3	6.67E-08	2.09E-07	7	196.19	0	461.98	1	1.88	0.000322613	495.95	1.37	1.28	20
111	18.37	0.16	12.9	0.8	3	4.59E-08	1.40E-07	7	190.55	0	479.94	0.97	1.81	0.000316518	505.5	1.35	1.1	20
112	18.54	0.17	16.1	1	3	8.22E-08	3.13E-07	8	237.83	0	539.13	1.21	2.24	0.0003173	535.77	1.45	1.19	20
113	18.7	0.16	24.9	1.2	3	1.54E-07	7.43E-07	9	301.8	0	610.93	1.54	2.82	0.000280539	570.33	1.55	1.29	20
114	18.87	0.17	26.6	1.3	4	2.35E-07	1.32E-06	10	351.23	0	658.56	1.79	3.25	0.000287094	592.14	1.62	1.39	20
115	19.03	0.16	26.7	1.3	4	2.53E-07	1.45E-06	11	359.03	0	664.29	1.83	3.29	0.000269034	594.72	1.63	1.42	20
116	19.19	0.16	26.6	1.2	4	2.77E-07	1.57E-06	10	353.58	0	643.46	1.8	3.22	0.000273355	585.32	1.61	1.52	20
117	19.36	0.17	25.4	1	4	2.82E-07	1.54E-06	10	341	0	618.35	1.74	3.07	0.000296281	573.78	1.59	1.6	20

118	19.52	0.16	24	1	4	2.78E-07	1.45E-06	10	324.76	0	590.42	1.66	2.9	0.000285368	560.68	1.56	1.68	20
119	19.69	0.17	23.1	0.9	4	2.44E-07	1.21E-06	9	310.13	0	577.34	1.58	2.75	0.000306621	554.43	1.53	1.66	20
120	19.85	0.16	22.3	0.9	4	2.14E-07	9.94E-07	9	290.34	0	553.74	1.48	2.55	0.00029467	542.98	1.5	1.68	20
121	20.01	0.16	19.8	0.8	4	1.59E-07	6.65E-07	8	260.59	0	524.04	1.33	2.27	0.000302904	528.22	1.45	1.63	20
122	20.18	0.17	16.8	0.7	4	1.21E-07	4.35E-07	7	224.01	0	473.33	1.14	1.94	0.000338639	502.01	1.37	1.68	20
123	20.34	0.16	14.5	0.5	3	9.93E-08	3.15E-07	7	198.22	0	434.31	1.01	1.7	0.00033273	480.87	1.32	1.75	20
124	20.51	0.17	14.3	0.5	3	9.07E-08	2.75E-07	6	189.26	0	421.46	0.97	1.61	0.000358869	473.71	1.29	1.77	20
125	20.67	0.16	14.9	0.6	3	8.63E-08	2.59E-07	6	187.65	0	421.66	0.96	1.58	0.000337681	473.82	1.29	1.76	20
126	20.83	0.16	14.2	0.5	3	8.05E-08	2.39E-07	6	185.11	0	421.27	0.94	1.55	0.000337838	473.6	1.28	1.74	20
127	21	0.17	13.8	0.5	3	8.88E-08	2.63E-07	6	184.95	0	413.48	0.94	1.54	0.000362319	469.2	1.27	1.85	20
128	21.16	0.16	14.9	0.5	3	8.06E-08	2.41E-07	6	186.66	0	424.68	0.95	1.54	0.000336481	475.51	1.28	1.75	20
129	21.33	0.17	14.6	0.6	3	8.12E-08	2.51E-07	7	193.09	0	438.7	0.99	1.58	0.000351748	483.3	1.29	1.7	20
130	21.49	0.16	15.2	0.6	3	7.81E-08	2.47E-07	7	197.11	0	450.99	1.01	1.6	0.000326517	490.02	1.29	1.64	20
131	21.65	0.16	15.8	0.6	3	9.68E-08	3.23E-07	7	208.64	0	459.24	1.06	1.68	0.000323572	494.48	1.31	1.74	20
132	21.82	0.17	17.1	0.6	4	1.21E-07	4.41E-07	7	227.11	0	479.94	1.16	1.82	0.000336301	505.5	1.35	1.79	20
133	21.98	0.16	19.2	0.7	4	1.83E-07	7.94E-07	8	270.43	0	530.3	1.38	2.15	0.000301114	531.36	1.42	1.84	20
134	22.15	0.17	25.1	0.9	4	2.29E-07	1.14E-06	9	310.45	0	584.8	1.58	2.45	0.000304659	558	1.48	1.79	20
135	22.31	0.16	25.7	1	4	2.27E-07	1.19E-06	10	327.54	0	618.13	1.67	2.56	0.000278901	573.68	1.51	1.69	20
136	22.47	0.16	22.9	1	4	1.93E-07	1.01E-06	10	326.19	0	633.95	1.66	2.53	0.000275401	580.97	1.5	1.58	20
137	22.64	0.17	24.8	1.1	4	1.74E-07	9.20E-07	10	329.4	0	651.8	1.68	2.54	0.000288576	589.1	1.51	1.5	20
138	22.8	0.16	26.4	1.2	4	1.71E-07	9.17E-07	10	334	0	662.9	1.7	2.56	0.000269319	594.09	1.51	1.47	20
139	22.97	0.17	23.9	1.1	4	1.58E-07	8.06E-07	10	318.72	0	642.12	1.63	2.42	0.000290742	584.71	1.48	1.49	20
140	23.13	0.16	21.6	0.9	4	1.42E-07	6.66E-07	9	292.09	0	599.58	1.49	2.2	0.000283181	565.01	1.44	1.56	20
141	23.3	0.17	20.7	0.8	4	1.94E-07	9.11E-07	9	293.64	0	570.05	1.5	2.2	0.000308575	550.92	1.43	1.84	20
142	23.46	0.16	24.2	0.7	4	2.58E-07	1.23E-06	9	296.96	0	547.23	1.52	2.21	0.000296417	539.78	1.43	2.12	20
143	23.62	0.16	22.3	0.6	4	2.96E-07	1.40E-06	9	294.17	0	528.86	1.5	2.17	0.000301523	530.64	1.42	2.32	20
144	23.79	0.17	20.1	0.6	4	2.44E-07	1.07E-06	8	274.54	0	511.22	1.4	2.01	0.000325845	521.72	1.39	2.29	20
145	23.95	0.16	20	0.6	4	1.93E-07	8.41E-07	8	272.75	0	530.1	1.39	1.99	0.000301171	531.26	1.39	2.05	20
146	24.12	0.17	21.9	0.8	4	1.42E-07	6.43E-07	9	282.16	0	579.25	1.44	2.04	0.000306119	555.34	1.4	1.69	20
147	24.28	0.16	22.1	1.1	3	1.22E-07	5.98E-07	10	306.85	0	648.08	1.57	2.21	0.000272382	587.41	1.44	1.44	20
148	24.44	0.16	25.3	1.3	3	1.37E-07	7.47E-07	11	340.36	0	703.52	1.74	2.43	0.000261429	612.02	1.49	1.38	20
149	24.61	0.17	29.1	1.3	4	2.23E-07	1.36E-06	11	379.38	0	717.78	1.94	2.69	0.000274992	618.2	1.54	1.58	20
150	24.77	0.16	30.5	1	4	3.35E-07	2.16E-06	12	402.2	0	707.33	2.05	2.83	0.000260722	613.68	1.56	1.83	20
151	24.94	0.17	30.2	1	4	4.08E-07	2.64E-06	11	404.2	547.22	685.84	2.06	2.83	0.000281322	604.29	1.56	2.02	20
152	25.1	0.16	29.5	1	4	3.45E-07	2.22E-06	12	401.45	0	702.23	2.05	2.79	0.000261669	611.46	1.55	1.88	20
153	25.26	0.16	29.9	1.2	4	2.82E-07	1.81E-06	12	400.58	0	726.63	2.04	2.77	0.000257239	621.99	1.55	1.72	20
154	25.43	0.17	30	1.3	4	2.31E-07	1.49E-06	12	403.76	0	759.42	2.06	2.77	0.00026735	635.87	1.56	1.55	20
155	25.59	0.16	30.2	1.4	4	2.23E-07	1.45E-06	12	406.65	0	769.6	2.07	2.77	0.000249953	640.12	1.56	1.52	20
156	25.76	0.17	30.5	1.3	4	2.33E-07	1.52E-06	12	407.12	0	764.3	2.08	2.76	0.000266495	637.91	1.55	1.57	20
157	25.92	0.16	30.1	1.2	4	2.45E-07	1.58E-06	12	402.37	0	748.9	2.05	2.71	0.000253385	631.45	1.54	1.63	20
158	26.08	0.16	29.2	1.2	4	2.25E-07	1.39E-06	12	384.94	0	727.13	1.96	2.58	0.000257148	622.21	1.52	1.65	20
159	26.25	0.17	26.8	1.1	4	1.93E-07	1.12E-06	11	361.37	0	702.03	1.84	2.4	0.000278064	611.37	1.48	1.64	20
160	26.41	0.16	25.1	1	4	1.59E-07	8.56E-07	11	335.63	0	675.1	1.71	2.22	0.000266876	599.53	1.45	1.62	20
161	26.58	0.17	23.7	1	4	1.55E-07	8.04E-07	10	323.9	0	654.71	1.65	2.13	0.000287936	590.41	1.43	1.68	20
162	26.74	0.16	24.3	0.9	4	1.97E-07	1.03E-06	10	326.96	0	632.62	1.67	2.13	0.000275691	580.36	1.43	1.89	20
163	26.9	0.16	25.8	0.7	4	2.33E-07	1.18E-06	10	315.68	0	592.81	1.61	2.05	0.000284794	561.81	1.41	2.15	20
164	27.07	0.17	21.3	0.6	4	2.25E-07	1.06E-06	9	293.77	0	555	1.5	1.89	0.000312736	543.59	1.37	2.32	20
165	27.23	0.16	19.6	0.6	4	1.80E-07	8.03E-07	9	278.98	0	548.98	1.42	1.79	0.000295946	540.64	1.34	2.2	20
166	27.4	0.17	22.5	0.7	4	1.96E-07	9.62E-07	9	305.7	0	591.97	1.56	1.95	0.000302809	561.41	1.38	2.08	20
167	27.56	0.16	26.9	0.9	4	2.28E-07	1.28E-06	11	349.54	0	658.95	1.78	2.21	0.000270124	592.32	1.44	1.94	20
168	27.72	0.16	29	1.1	4	2.25E-07	1.37E-06	11	379.06	0	716	1.93	2.39	0.000259139	617.43	1.48	1.78	20
169	27.89	0.17	28.9	1.2	4	2.03E-07	1.26E-06	12	386.92	0	745.11	1.97	2.42	0.000269906	629.85	1.49	1.66	20
170	28.05	0.16	28.7	1.2	4	1.84E-07	1.13E-06	12	384.16	0	753.04	1.96	2.39	0.000252685	633.2	1.49	1.6	20
171	28.22	0.17	28.4	1.2	4	1.78E-07	1.07E-06	12	376.96	0	743.42	1.92	2.33	0.00027021	629.14	1.47	1.62	20
172	28.38	0.16	27.4	1.1	4	1.62E-07	9.43E-07	11	364.33	0	730.92	1.86	2.24	0.00025648	623.83	1.45	1.61	20
173	28.54	0.16	26	1.1	4	1.51E-07	8.59E-07	11	354.47	0	719.61	1.81	2.17	0.00025849	618.98	1.44	1.61	20
174	28.71	0.17	26.3	1.1	4	1.45E-07	8.14E-07	11	351.58	0	719.71	1.79	2.14	0.000274623	619.03	1.43	1.6	20
175	28.87	0.16	26.8	1.1	4	1.55E-07	8.89E-07	11	358.37	0	724.52	1.83	2.17	0.000257612	621.09	1.44	1.63	20
176	29.04	0.17	27.5	1.1	4	1.71E-07	1.01E-06	11	367.98	0	730.74	1.88	2.21	0.000272545	623.75	1.45	1.67	20
177	29.2	0.16	28.4	1.1	4	1.62E-07	9.49E-07	11	364.5	0	730.5	1.86	2.18	0.000256554	623.65	1.44	1.66	20

178	29.36	0.16	26	1.1	4	1.53E-07	8.55E-07	11	349.51	0	708.29	1.78	2.08	0.000260548	614.09	1.42	1.69	20
179	29.53	0.17	24.2	0.9	4	1.51E-07	8.04E-07	11	332.95	0	676.3	1.7	1.97	0.0002833	600.07	1.39	1.78	20
180	29.69	0.16	24.6	0.8	4	1.74E-07	9.33E-07	10	333.83	0	660.47	1.7	1.96	0.000269815	593	1.46	1.93	39.76
181	29.86	0.17	25.8	0.9	4	1.78E-07	1.01E-06	11	354.2	0	698.01	1.81	2.07	0.000278862	609.62	1.51	1.83	40
182	30.02	0.16	28.3	1.2	4	1.66E-07	1.01E-06	12	381.67	0	762.3	1.95	2.22	0.000251146	637.08	1.58	1.64	40
183	30.19	0.17	30.6	1.4	4	1.62E-07	1.06E-06	13	406.47	0	814.71	2.07	2.35	0.000258119	658.61	1.48	1.52	20
184	30.35	0.16	31.4	1.4	4	1.73E-07	1.18E-06	13	423.83	0	839.61	2.16	2.44	0.000239306	668.6	1.5	1.51	20
185	30.51	0.16	32.2	1.4	4	1.91E-07	1.33E-06	13	434.79	0	846.3	2.22	2.49	0.000238358	671.26	1.51	1.55	20
186	30.68	0.17	33.1	1.4	4	2.00E-07	1.41E-06	13	440.83	0	850.74	2.25	2.51	0.000252593	673.02	1.51	1.57	20
187	30.84	0.16	32.8	1.4	4	1.92E-07	1.35E-06	13	437.58	0	850.81	2.23	2.48	0.000237724	673.05	1.51	1.56	20
188	31.01	0.17	31.6	1.4	4	1.67E-07	1.13E-06	13	424.22	0	846.24	2.16	2.39	0.000253263	671.24	1.49	1.52	20
189	31.17	0.16	30.3	1.4	3	1.39E-07	9.07E-07	13	407.3	0	839.7	2.08	2.28	0.000239292	668.64	1.47	1.45	20
190	31.33	0.16	29.2	1.4	3	1.24E-07	7.88E-07	13	397.33	0	836.37	2.03	2.21	0.000239769	667.31	1.45	1.42	20
191	31.5	0.17	29.5	1.4	3	1.23E-07	7.77E-07	13	393.26	0	828.47	2.01	2.18	0.000255966	664.15	1.45	1.44	20
192	31.66	0.16	29.4	1.3	3	1.29E-07	8.06E-07	12	389.1	0	812.63	1.99	2.15	0.000243246	657.77	1.44	1.5	20
193	31.83	0.17	28.4	1.2	3	1.32E-07	8.11E-07	12	382.38	0	795.23	1.95	2.1	0.000261261	650.69	1.43	1.55	20
194	31.99	0.16	28.2	1.2	4	1.34E-07	8.14E-07	12	379.31	0	787.2	1.94	2.07	0.000247142	647.4	1.42	1.58	20
195	32.15	0.16	28.8	1.2	4	1.44E-07	8.93E-07	12	386.82	0	792.28	1.97	2.1	0.000246347	649.49	1.43	1.61	20
196	32.32	0.17	30.1	1.2	4	1.43E-07	8.83E-07	12	386.81	0	793.83	1.97	2.09	0.00026149	650.12	1.43	1.61	20
197	32.48	0.16	28.3	1.2	4	1.30E-07	7.78E-07	12	374.2	0	781.03	1.91	2.01	0.000248116	644.86	1.41	1.6	20
198	32.65	0.17	26.1	1.1	3	1.10E-07	6.15E-07	12	350.5	0	754.31	1.79	1.87	0.000268253	633.73	1.37	1.59	20
199	32.81	0.16	25	1	3	9.20E-08	4.82E-07	11	327.3	0	727.05	1.67	1.74	0.00025716	622.18	1.34	1.58	20
200	32.97	0.16	23.3	1	3	8.23E-08	4.01E-07	10	304.66	0	690.6	1.55	1.61	0.000263861	606.38	1.31	1.63	20
201	33.14	0.17	21.4	0.8	3	5.94E-08	2.55E-07	10	268.4	0	645.35	1.37	1.41	0.000290013	586.18	1.25	1.61	20
202	33.3	0.16	17.4	0.7	3	4.11E-08	1.50E-07	9	227.84	0	585.66	1.16	1.19	0.000286528	558.41	1.18	1.63	20
203	33.47	0.17	14.7	0.6	3	2.71E-08	8.39E-08	8	193.44	0	536.14	0.99	1.01	0.000318185	534.28	1.11	1.61	20
204	33.63	0.16	14.1	0.5	3	2.02E-08	5.24E-08	7	161.91	0	516.05	0.9	0.92	0.000305244	524.17	1.08	1.56	20
205	33.79	0.16	13.8	0.6	3	1.93E-08	4.65E-08	7	150.32	0	502.55	0.87	0.88	0.000309316	517.27	1.06	1.6	20
206	33.96	0.17	13.5	0.5	3	1.88E-08	4.24E-08	7	140.5	0	489.3	0.84	0.85	0.000333066	510.41	1.05	1.65	20
207	34.12	0.16	13.1	0.4	3	1.89E-08	3.76E-08	7	124.33	0	461.26	0.8	0.8	0.000322861	495.57	1.03	1.8	20
208	34.29	0.17	11.9	0.4	3	1.60E-08	2.74E-08	6	107.41	0	443.03	0.74	0.74	0.000350032	485.67	1	1.82	20
209	34.45	0.16	11.3	0.4	3	1.24E-08	1.90E-08	6	95.51	0	438.2	0.7	0.7	0.000331249	483.02	0.98	1.72	20
210	34.61	0.16	11.4	0.4	3	1.22E-08	1.86E-08	6	94.9	0	439.01	0.7	0.69	0.000330941	483.47	0.98	1.71	20
211	34.78	0.17	11.9	0.4	3	1.35E-08	2.15E-08	6	99.56	0	442.65	0.72	0.71	0.000350176	485.47	0.99	1.76	20
212	34.94	0.16	12.1	0.4	3	1.71E-08	3.05E-08	6	111.34	0	449.57	0.76	0.75	0.000327031	489.25	1	1.87	20
213	35.11	0.17	13.2	0.4	3	2.55E-08	5.48E-08	7	134.36	0	460.71	0.84	0.82	0.000343247	495.27	1.04	2.05	20
214	35.27	0.16	15.1	0.4	3	3.99E-08	1.13E-07	7	177.61	0	489.59	0.97	0.94	0.000313381	510.56	1.09	2.19	20
215	35.43	0.16	17.4	0.5	3	5.35E-08	1.80E-07	8	210.13	0	514.78	1.07	1.04	0.000305618	523.53	1.12	2.25	20
216	35.6	0.17	17.6	0.5	3	5.61E-08	2.03E-07	8	225.57	0	548.02	1.15	1.11	0.000314716	540.17	1.15	2.11	20
217	35.76	0.16	18.4	0.6	3	5.95E-08	2.24E-07	9	235.42	0	565.86	1.2	1.15	0.000291497	548.89	1.16	2.08	20
218	35.93	0.17	19.5	0.6	3	6.45E-08	2.61E-07	9	252.62	0	598.32	1.29	1.23	0.000301199	564.41	1.19	1.99	20
219	36.09	0.16	21.2	0.7	3	7.87E-08	3.50E-07	10	277.35	0	633.68	1.42	1.34	0.000275458	580.85	1.23	1.98	20
220	36.26	0.17	23.6	0.8	4	9.47E-08	4.77E-07	11	314.05	0	693.92	1.6	1.51	0.000279683	607.83	1.28	1.88	20
221	36.42	0.16	27.3	1	4	1.15E-07	6.38E-07	11	346.77	0	739.98	1.77	1.66	0.000254907	627.68	1.32	1.86	20
222	36.58	0.16	28.2	1	4	1.29E-07	7.61E-07	12	368.57	0	770.29	1.88	1.76	0.00024984	640.41	1.35	1.84	20
223	36.75	0.17	28.2	1	4	1.47E-07	8.95E-07	12	380.79	0	777.33	1.94	1.81	0.00026425	643.33	1.36	1.9	20
224	36.91	0.16	29.7	1	4	1.66E-07	1.04E-06	12	392.74	0	784.02	2	1.86	0.000247644	646.09	1.37	1.96	20
225	37.08	0.17	30.6	1	4	1.82E-07	1.17E-06	13	402.27	0	789.62	2.05	1.89	0.000262184	648.4	1.46	2.01	38.57
226	37.24	0.16	30.1	1	4	1.78E-07	1.14E-06	13	400.73	0	790.28	2.04	1.88	0.000246662	648.66	1.45	2	38.5
227	37.4	0.16	29.4	1	4	1.58E-07	9.91E-07	12	391	0	787.31	1.99	1.82	0.000247127	647.44	1.43	1.95	38.47
228	37.57	0.17	28.5	1	4	1.40E-07	8.39E-07	12	374.8	0	771.92	1.91	1.74	0.000265178	641.08	1.38	1.94	38.41
229	37.73	0.16	26.6	0.9	4	1.18E-07	6.72E-07	12	355.37	0	754.65	1.81	1.64	0.000252418	633.87	1.34	1.9	38.31
230	37.9	0.17	25.2	0.9	4	1.04E-07	5.57E-07	11	334.37	0	726.52	1.71	1.54	0.000273334	621.95	1.28	1.93	38.36
231	38.06	0.16	23.9	0.8	3	8.95E-08	4.56E-07	11	317.95	0	709.83	1.62	1.46	0.000260264	614.76	1.24	1.91	38.12
232	38.22	0.16	23.1	0.8	3	8.37E-08	4.13E-07	11	308.04	0	696.06	1.57	1.41	0.000262825	608.77	1.22	1.93	37.94
233	38.39	0.17	23.1	0.8	3	7.70E-08	3.73E-07	11	302.84	0	694.74	1.55	1.38	0.000279518	608.19	1.21	1.89	37.58
234	38.55	0.16	22.9	0.8	3	7.31E-08	3.51E-07	11	299.85	0	694.44	1.53	1.36	0.000263132	608.06	1.2	1.87	37.16
235	38.72	0.17	22.6	0.8	3	6.28E-08	2.92E-07	10	290.19	0	690.76	1.48	1.31	0.00028032	606.45	1.18	1.81	36.54
236	38.88	0.16	21.2	0.8	3	5.48E-08	2.43E-07	10	276.51	0	674.56	1.41	1.24	0.000266983	599.29	1.15	1.8	35.94
237	39.04	0.16	20.1	0.7	3	4.48E-08	1.86E-07	10	259.15	0	655.79	1.32	1.16	0.000270773	590.9	1.11	1.77	35.28

238	39.21	0.17	19	0.7	3	4.12E-08	1.61E-07	9	244.29	0	627.43	1.25	1.09	0.000294128	577.98	1.08	1.83	34.75
239	39.37	0.16	18.1	0.6	3	3.58E-08	1.33E-07	9	231.6	0	610.24	1.18	1.03	0.000280697	570.01	1.05	1.83	34.12
240	39.54	0.17	17.5	0.6	3	3.14E-08	1.07E-07	9	213.36	0	593.24	1.12	0.97	0.000302486	562.01	1.03	1.83	33.48
241	39.7	0.16	16.6	0.6	3	2.76E-08	9.29E-08	9	210.53	0	604.58	1.12	0.96	0.000282008	567.36	1.02	1.73	33.44
242	39.86	0.16	17.9	0.7	3	2.98E-08	1.11E-07	9	233.42	0	635.9	1.19	1.02	0.000274976	581.87	1.05	1.67	34.29
243	40.03	0.17	20.5	0.8	3	4.45E-08	1.98E-07	10	277.83	0	703.9	1.42	1.21	0.000277692	612.19	1.13	1.67	36.2
244	40.19	0.16	25.8	1	3	7.35E-08	3.88E-07	11	329.3	0	761.85	1.68	1.43	0.000251221	636.89	1.24	1.76	37.38
245	40.36	0.17	28.8	1	3	8.43E-08	4.82E-07	12	356.93	0	805.51	1.82	1.54	0.00025959	654.88	1.29	1.73	20
246	40.52	0.16	27.1	1.1	3	7.23E-08	3.94E-07	12	340.14	0	789.15	1.74	1.47	0.000246837	648.2	1.27	1.7	20
247	40.68	0.16	22.7	0.9	3	4.51E-08	2.31E-07	12	319.37	0	807.03	1.63	1.37	0.000244088	655.5	1.24	1.45	20
248	40.85	0.17	24.8	1.3	3	5.00E-08	2.74E-07	12	341.47	0	846.94	1.74	1.46	0.000253157	671.52	1.26	1.42	20
249	41.01	0.16	31.5	1.4	3	1.19E-07	8.68E-07	15	454.51	0	963.28	2.32	1.93	0.000223417	716.15	1.39	1.59	20
250	41.18	0.17	47.3	1.6	4	2.15E-07	1.89E-06	17	549.62	0	1047.05	2.8	2.33	0.000227687	746.64	1.49	1.72	20
251	41.34	0.16	45.4	1.8	4	2.78E-07	2.67E-06	18	601.22	0	1093.67	3.07	2.54	0.000209677	763.08	1.53	1.77	20
252	41.5	0.16	42.8	1.7	4	1.84E-07	1.60E-06	17	543.03	0	1064	2.77	2.28	0.000212579	752.66	1.48	1.63	20
253	41.67	0.17	34.8	1.5	4	1.50E-07	1.16E-06	15	482.73	0	981.74	2.46	2.02	0.000235138	722.98	1.42	1.68	20
254	41.83	0.16	32.5	1.1	3	9.62E-08	6.20E-07	13	401.9	0	885.49	2.05	1.68	0.000233022	686.63	1.33	1.67	20
255	42	0.17	25.6	1	4	1.11E-07	6.91E-07	13	388.32	0	833.72	1.98	1.61	0.000255159	666.25	1.31	1.88	20
256	42.16	0.16	31.6	1	4	8.26E-07	8.72E-06	18	659.73	786.16	985.32	3.37	2.73	0.000220903	724.3	1.58	2.75	20
257	42.32	0.16	90.8	1.6	5	4.99E-06	8.46E-05	23	1059.25	911.71	1142.67	0	0	0.000205131	779.99	0	0	20
258	42.49	0.17	111.4	1.5	5	7.45E-06	1.46E-04	26	1219.05	972.65	1219.05	0	0	0.000211012	805.64	0	0	20
259	42.65	0.16	65.5	1.4	5	4.09E-06	6.41E-05	22	979.99	874.42	1095.94	0	0	0.000209457	763.88	0	0	20
260	42.82	0.17	40.4	0.9	4	7.03E-07	6.63E-06	16	589.18	722.88	906.01	3.01	2.4	0.000244766	694.54	1.51	2.95	20
261	42.98	0.16	27.6	0.7	4	1.71E-07	1.04E-06	12	379.33	0	753.48	1.94	1.54	0.000252613	633.38	1.29	2.47	20
262	43.15	0.17	20.5	0.7	3	5.43E-08	2.39E-07	10	275.01	0	671.98	1.4	1.11	0.00028421	598.15	1.15	2.06	20
263	43.31	0.16	18	0.6	3	2.85E-08	9.89E-08	9	216.4	0	636.17	1.18	0.93	0.000274919	581.99	1.08	1.83	20
264	43.47	0.16	18.3	0.6	3	2.70E-08	8.29E-08	9	191.72	0	605.89	1.11	0.88	0.000281705	567.97	1.06	1.93	20
265	43.64	0.17	17.7	0.5	3	3.24E-08	1.08E-07	9	208.98	0	613.26	1.17	0.91	0.000297504	571.42	1.08	2.02	20
266	43.8	0.16	20.1	0.6	3	4.52E-08	1.77E-07	9	244.61	0	625.77	1.26	0.99	0.000277195	577.21	1.11	2.19	20
267	43.97	0.17	22.3	0.6	3	6.12E-08	2.74E-07	10	279.51	0	668.46	1.43	1.11	0.000284958	596.58	1.15	2.21	20
268	44.13	0.16	24.3	0.7	4	7.81E-08	3.87E-07	11	309.26	0	707.68	1.58	1.22	0.000260658	613.83	1.19	2.21	20
269	44.29	0.16	26.3	0.8	4	9.30E-08	5.09E-07	12	341.94	0	758.1	1.74	1.35	0.000251842	635.32	1.23	2.14	20
270	44.46	0.17	29.1	0.9	4	1.09E-07	6.56E-07	13	374.68	0	806.67	1.91	1.47	0.000259399	655.36	1.27	2.08	20
271	44.62	0.16	31.1	1	4	1.39E-07	9.12E-07	13	409.47	0	844.03	2.09	1.6	0.000238678	670.36	1.31	2.12	20
272	44.79	0.17	33.6	1	4	1.52E-07	1.05E-06	14	431.72	0	875.36	2.2	1.68	0.000249015	682.69	1.33	2.09	20
273	44.95	0.16	33.6	1.1	4	1.74E-07	1.24E-06	14	445.63	0	882.35	2.27	1.73	0.000233437	685.41	1.35	2.16	20
274	45.11	0.16	33.7	1	4	1.79E-07	1.29E-06	14	449.32	0	885.13	2.29	1.74	0.00023307	686.49	1.39	2.17	38.42
275	45.28	0.17	34	1	4	1.97E-07	1.43E-06	14	453.54	0	877.75	2.31	1.75	0.000248676	683.62	1.39	2.27	39.19
276	45.44	0.16	34.2	1	4	1.93E-07	1.42E-06	14	459.16	0	891.73	2.34	1.76	0.000232207	689.04	1.39	2.22	39.69
277	45.61	0.17	34.7	1.1	4	1.79E-07	1.34E-06	15	465.32	0	916.09	2.37	1.78	0.000243417	698.39	1.4	2.12	40
278	45.77	0.16	35.1	1.2	4	1.58E-07	1.21E-06	15	477.67	0	961.88	2.44	1.82	0.000223579	715.63	1.42	1.94	40
279	45.93	0.16	36.6	1.4	4	1.86E-07	1.51E-06	16	508.45	0	994.67	2.59	1.93	0.000219862	727.73	1.47	1.96	40
280	46.1	0.17	41	1.3	4	2.17E-07	1.88E-06	17	540.4	0	1027.41	2.76	2.05	0.000229851	739.61	1.53	1.98	40
281	46.26	0.16	42.3	1.4	4	2.06E-07	1.77E-06	16	535.04	0	1026.81	2.73	2.02	0.000216395	739.39	1.52	1.96	40
282	46.43	0.17	35.5	1.4	4	1.42E-07	1.12E-06	16	492.61	0	1011.56	2.51	1.85	0.000231646	733.88	1.43	1.8	39.83
283	46.59	0.16	32.4	1.3	3	8.74E-08	5.98E-07	14	426.85	0	956.99	2.18	1.6	0.000224149	713.81	1.31	1.68	39.26
284	46.75	0.16	28.2	1.1	3	6.74E-08	4.08E-07	13	377.88	0	887.99	1.93	1.41	0.000232693	687.6	1.23	1.72	37.44
285	46.92	0.17	25.6	0.9	3	5.15E-08	2.72E-07	12	330.2	0	814.64	1.68	1.23	0.000258127	658.59	1.14	1.77	36.32
286	47.08	0.16	22.4	0.8	3	3.97E-08	1.85E-07	11	290.72	0	751.69	1.48	1.08	0.000252912	632.63	1.07	1.82	35.34
287	47.25	0.17	19.9	0.7	3	2.70E-08	1.05E-07	10	242.25	0	710.16	1.31	0.95	0.000276468	614.9	1	1.75	34.72
288	47.41	0.16	18.2	0.7	3	2.30E-08	7.60E-08	10	206.78	0	676.74	1.21	0.87	0.000266551	600.26	0.97	1.78	32.9
289	47.57	0.16	18.8	0.6	3	1.82E-08	5.18E-08	9	177.6	0	655.01	1.12	0.81	0.000270934	590.55	0.96	1.74	31
290	47.74	0.17	16.7	0.6	3	1.55E-08	3.89E-08	9	157.06	0	635.64	1.06	0.76	0.000292222	581.75	1.01	1.73	20
291	47.9	0.16	15.8	0.6	3	1.18E-08	2.74E-08	9	144.89	0	642.33	1.02	0.73	0.000273598	584.8	0.92	1.57	29.72
292	48.07	0.17	17	0.7	3	1.19E-08	2.76E-08	9	145.38	0	643.84	1.02	0.73	0.000290355	585.49	0.92	1.58	30.04
293	48.23	0.16	16.8	0.6	3	1.23E-08	2.92E-08	9	148.05	0	646.38	1.03	0.73	0.00027274	586.64	0.92	1.6	30.02
294	48.39	0.16	16.3	0.6	3	1.24E-08	2.80E-08	9	141.56	0	632.82	1.01	0.71	0.000275643	580.46	0.91	1.65	30.02
295	48.56	0.17	16.1	0.6	3	1.17E-08	2.59E-08	9	138.17	0	632.29	1	0.7	0.000292997	580.21	0.9	1.63	30.3
296	48.72	0.16	16.3	0.6	3	1.14E-08	2.36E-08	9	129.71	0	617.17	0.97	0.68	0.00027912	573.23	0.88	1.68	30.44
297	48.89	0.17	15	0.5	3	9.53E-09	1.73E-08	8	113.52	0	597.01	0.91	0.64	0.000301525	563.8	0.86	1.67	29.93

CPT-5 Estimations

298	49.05	0.16	13.6	0.5	3	7.80E-09	1.22E-08	8	97.9	0	575.8	0.85	0.59	0.00028897	553.69	0.83	1.66	29.33
299	49.22	0.17	13.7	0.5	3	6.90E-09	1.02E-08	8	92.46	0	573.1	0.82	0.57	0.000307754	552.39	0.82	1.61	29.09
300	49.38	0.16	14.1	0.5	3	7.36E-09	1.19E-08	8	100.7	0	592.09	0.86	0.6	0.000284966	561.47	0.84	1.58	29.28
301	49.54	0.16	15.2	0.6	3	1.13E-08	2.24E-08	9	123.41	0	607.29	0.95	0.66	0.000281378	568.63	0.87	1.75	30.05
302	49.71	0.17	17.6	0.5	3	1.49E-08	3.37E-08	9	140.7	0	617.78	1.02	0.7	0.000296415	573.52	0.9	1.88	30.44
303	49.87	0.16	16.9	0.5	3	1.60E-08	3.53E-08	9	137.78	0	604.75	1.01	0.69	0.000281968	567.44	0.89	1.98	30.9
304	50.04	0.17	14.7	0.5	3	1.08E-08	2.09E-08	9	120.84	0	609.23	0.95	0.65	0.000298486	569.54	0.85	1.74	31.21
305	50.2	0.16	14.8	0.6	3	7.81E-09	1.37E-08	9	109.25	0	615.25	0.9	0.62	0.000279554	572.34	0.82	1.56	31.66

Sum 0.101458463

Vs of CPT 494.78376 (ft/s)
150.84871 (m/s)

Extrapolated Vs 582.78194 (ft/s)
Following Boore (2004) 177.67742 (m/s)

APPENDIX E

SUMMARY OF COMPACTION RECOMMENDATIONS

SUMMARY OF COMPACTION RECOMMENDATIONS

Area	Compaction Recommendations (See Notes 1, 2, 3, 4, 6)
Subgrade Preparation and Placement of General Engineered Fill, Including Imported Fill	Compact upper 12 inches of subgrade and entire fill to a minimum of 90 percent compaction at near optimum content for granular soils and to a minimum of 90 percent compaction at a minimum of 2 percent over optimum moisture content for clayey soils.
Lime-Treated Soil	Compact lime-treated on-site soils to a minimum of 90 percent compaction and at least 3 percent over optimum moisture content.
Trenches[5]	Compact trench backfill to a minimum of 90 percent compaction at near optimum moisture content for granular soils and to a minimum of 90 percent compaction at a minimum of 2 percent over optimum moisture content for clayey soils. Where trenches will be under flatwork or paving, the upper 12 inches should be compacted as recommended below for flatwork and pavement. Proper granular bedding and shading should be used beneath and around new utilities.
Exterior Flatwork	Compact upper 12 inches of subgrade to a minimum of 90 percent compaction at near optimum moisture content for granular soils and to a minimum of 90 percent compaction at a minimum of 2 percent over optimum moisture content for clayey soils. Compact aggregate base to a minimum of 90 percent compaction at near optimum moisture content. Where exterior flatwork is exposed to vehicular traffic, compact upper 12 inches of subgrade to a minimum of 92 percent compaction and aggregate base to a minimum of 95 percent compaction.
Pavements	Compact upper 12 inches of subgrade to a minimum of 95 percent compaction at near optimum moisture content for granular soils and to a minimum of 92 percent compaction at a minimum of 2 percent over optimum moisture content for clayey soils. Compact aggregate base to a minimum of 95 percent compaction near optimum moisture content.

Notes:

(1) Depths are below finished subgrade elevation.
(2) All compaction requirements refer to relative compaction as a percentage of the laboratory standard described by ASTM D 1557.
(3) Fill material should be compacted in lifts not exceeding 8 inches in loose thickness.
(4) All subgrades should be firm and stable.
(5) In landscaping areas only, the percent compaction in trenches may be reduced to 85 percent.
(6) Where fills are greater than 7 feet in depth below finish grade, the portion below a depth of 7 feet should be compacted to a minimum of 95 percent compaction.