# **GEOLOGIC INVESTIGATION AND DATA REPORT**

# PLUM CREEK FRS NO. 21 CALDWELL COUNTY, TEXAS

AECOM Austin, Texas



Balcones GeotechnicaL

Mr. Lance Finnefrock, PE, GE AECOM 9400 Amberglen Blvd Austin, TX 78729 Project No. 0118-039 July 27, 2021

#### Geologic Investigation and Data Report Plum Creek FRS No. 21 Caldwell County, Texas

Submitted herewith is the Geologic Investigation (GI) and Data Report for the above referenced project. This report presents the findings of the geologic and geotechnical field investigation, and was prepared in general compliance with our contract dated September 10, 2018. A previous version of this GI report was issued on September 5, 2019. This updated version of the GI Report is intended to address comments made by the NRCS that were provided to Balcones on December 17, 2020.

A Soil Mechanics Report has been issued under separate cover by AECOM that includes results of laboratory testing, analyses and geotechnical recommendations for design and construction. Balcones Geotechnical, LLC (Balcones) appreciates the opportunity to provide these geotechnical engineering services and looks forward to future assignments. Please do not hesitate to contact us with any questions or comments about this report, or if we can be of further service.



Sincerely,

BALCONES GEOTECHNICAL, LLC TBPE Firm Registration No. F-15624

Rebecca A. Russo, PE Senior Geotechnical Engineer

David R. Mason, PG Senior Geologist

Attachments Distribution: Addressee File (1)

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#### INTRODUCTION

The project will consist of improvements to the existing Plum Creek FRS No. 21 embankment dam including: 1) raising the dam crest, 2) installation of a new horizontal principal spillway conduit, and 3) construction of a new RCC (roller compacted concrete) auxiliary spillway to replace the existing earthen spillway. The dam site is located off of FM 1185, about 1.25 miles east of SH 130, and about 5 miles northeast of the city of Lockhart, as shown on the Vicinity Map, Plate 1.

The dam is owned by the Natural Resource Conservation Service (NRCS) and locally maintained by the Plum Creek Conservation District. The proposed dam safety improvements are being designed by AECOM under contract with the Texas Soil Survey and Water Conservation Board (TSSWCB). Balcones Geotechnical, LLC (Balcones) was retained by AECOM to provide geotechnical engineering services and this Geologic Investigation (GI) and Data Report.

The following sections of this report include a discussion of authorization and scope; project description; field investigation and limited laboratory testing procedures; and a discussion of site and subsurface conditions.

#### AUTHORIZATION AND SCOPE

The investigation was authorized by issuance of AECOM Purchase Order No. 106099 with an effective date of September 10, 2018. The Purchase Order contains Balcones Proposal for Geologic Investigation, project number 0118-039, dated July 31, 2018. The proposal outlines the requested and agreed upon scope of services.

The scope of the investigation included 1) drilling of 17 dam borings, 6 hand auger borings, and 8 borrow borings to determine subsurface conditions and for obtaining representative samples for laboratory testing; 2) limited laboratory testing consisting of soil moisture content and Atterberg Limits determination of hand auger borings, and 3) preparation of this report.

The Geologic Investigation (GI) presented herein contains data collected for this investigation as well as as-built information and site observations. Specific findings and recommendations based on geotechnical analyses will be presented at a later time in a Soil Mechanics Report (SMR), under separate cover.

Field sampling and laboratory testing were in general accordance with methods, procedures, and practices set forth by the American Society for Testing and Materials, latest version of Annual Book of ASTM Standards, where applicable. This GI report was prepared in substantial compliance with the NRCS Title 210 – National Engineering Manual (NEM), Part 531 – Geology, Subpart A – Geologic Investigations, and that specifically discussed with the project team.

#### PROJECT DESCRIPTION

The project will consist of modifications to an existing earthen embankment flood control dam in Caldwell County, Texas. According to the USACE National Inventory of Dams, the dam (TX03428) was built in 1962, has a reported storage capacity of 5,318 acre-feet and dam height of 41 feet. We have been provided with: 1) As-built drawings dated 1961 and associated SMR (Soil Mechanics Report) dated 1961, and 2) GI and SMR dated 2014/2015, prepared by NRCS, associated with borings and headcut analyses along the existing earthen auxiliary spillway channel.

For this current project, we understand that the following dam safety improvements are proposed:

- Existing top of dam El. ranges from about 520 to 523 feet. Proposed top of dam El. will be 527.3 feet. Dam raise will generally range from 4<sup>1</sup>/<sub>2</sub> to 8<sup>1</sup>/<sub>2</sub> ft of new embankment fill.
- Existing auxiliary spillway crest elevation is about El. 516 feet. The existing auxiliary spillway will be replaced with an RCC structure to be located near the middle of the dam; therefore, approximately 11½ ft of embankment fill will be required at the existing auxiliary spillway to achieve the dam crest El. 527.3 feet.
- The existing horizontal conduit principal spillway will be completely removed and replaced with a new 42-inch ID horizontal conduit pipe, riser structure and impact basin.
- The new riser structure will have a (low weir) normal pool El. 498.8 ft, and upper weir El. 500.7 feet. The riser invert El. will be approximately 489 feet. The impact basin invert elevation will be about El. 485 feet.
- A new auxiliary spillway is planned, consisting of 300-ft wide RCC structure with an invert elevation of 518.8 feet.
- Internal drainage consisting of a filter diaphragm is planned.

#### FIELD INVESTIGATION

The geotechnical investigation was initiated on November 26, 2018 and extended through February 27, 2019 due to intermittent periods of inclement weather in mid to late December 2018 and January 2019. Field logging representatives from Balcones included David Mason, PG, and/or Pat Cossins, PG. The full-time NRCS field representative was Bryan Moffat, PG, who was also onsite during the entire field investigation.

A total of seventeen (17) borings and 6 hand-auger borings were drilled along the proposed embankment dam; and 8 borings were advanced in proposed borrow areas. A plan showing the boring locations, prepared by AECOM, is presented on Plate 2.

Summary boring information is presented in the following Tables 1 and 2, with boring designation nomenclature described below. Boring elevations and State plane coordinates were surveyed by others and provided to us. Borings designed with a "P" behind the number denote piezometer installation at these two locations.

Table 1. Boring Summary Table – Embankment Dam									
Poring	Elevation		Drilled	State Plane	Coordinates	Location			
вогіпд	Elevation	Drill Date	Depth	Northing	Easting	Location			
B-01	515.91	2/26/2019	30	13898288.3	2395939.904	Dam Crest			
B-02	523.48	2/27/2019	38	13898192.22	2395458.651	Dam Crest			
B-03	524.92	2/27/2019	52	13898130.25	2395100.308	Dam Crest			
B-04P	526.0	12/21/2018	62	13898060.5	2394711.34	Dam Crest			
B-05	525.07	12/18/2018	70	13898019.28	2394475.342	Dam Crest			
B-06P	525.05	12/6/2018	70	13897994.38	2394329.557	Dam Crest			
B-07	525.79	12/4/2018	60	13897963.44	2394153.397	Dam Crest			
B-08	524.62	12/3/2018	50	13897883.96	2393699.533	Dam Crest			
B-09	523.56	12/3/2018	30	13897786.23	2393149.057	Dam Crest			
B-301	500.1	11/29/2018	25	13898193.84	2394994.979	Upstream Toe			
B-302	503.83	11/29/2018	25	13898023.92	2394132.01	Upstream Toe			
B-601	500.7	11/27/2018	26	13898018.33	2395004.475	Downstream Toe			
B-602	494.98	11/24/2018	35	13897945.63	2394732.122	Downstream Toe			
B-603	494.46	11/28/2018	45	13897902.55	2394499.168	Downstream Toe			
B-604	501.6	11/28/2018	45	13897851.23	2394210.194	Downstream Toe			

Table 1. Boring Summary Table – Embankment Dam										
Doring	Elevation	Drill Data	Drilled State Plane Coordinates		Coordinates	Location				
вогіпд	Elevation	Drill Date	Depth	Northing	Easting	Location				
B-605	498.01	11/27/2018	25	13897792.11	2393717.358	Downstream Toe				
B-606	493.92	11/29/2018	20	13897641.86	2394436.689	Downstream Toe				
HA-1	514.99	1/9/2019	5	13897986.78	2394484.018	Embankment				
HA-2	514.15	1/9/2019	5	13897958.25	2394325.499	Embankment				
HA-3	516.09	1/9/2019	5	13897932.35	2394155.627	Embankment				
HA-4	515.28	1/9/2019	5	13898051.23	2394471.302	Embankment				
HA-5	514.22	1/9/2019	5	13898027.23	2394318.948	Embankment				
HA-6	516.53	1/9/2019	5	13897992.2	2394148.567	Embankment				
Boring De	signation Nor	menclature (NRC	CS):							
B-000 – Borings along Dam Crest										
B-300 – Borings along Upstream Toe										
B-600 – B	B-600 – Borings along the Downstream Toe									
HA-0 – H	and Auger Bo	orings along Emb	oankment Sl	ope Face						

The borrow borings drilled for this study are summarized in the following table. It should be noted that borings B-103 and B-106 were not drilled due to their proximity to the existing embankment dam and anticipated limits of soil borrow near the existing dam.

Table 2. Boring Summary Table – Borrow												
Poring	Elevation	Drill Data	Drilled	State Plane	Coordinates	Looption						
Богінд	Elevation	Driii Date	Depth	Northing	Easting	Location						
B-101	500.33	11/29/2018	10	13898797.37	2395214.085	Borrow Area						
B-102	500.84	11/26/2018	10	13898572.5	2395238.506	Borrow Area						
B-104	502.72	11/29/2018	10	13898845.38	2395477.282	Borrow Area						
B-105	506.44	11/26/2018	10	13898610.97	2395505.782	Borrow Area						
B-107	499.77	11/26/2018	10	13898820.47	2394212.414	Borrow Area						
B-108	500.01	11/26/2018	10	13899014.75	2394284.459	Borrow Area						
B-109	500.69	11/26/2018	10	13899203.14	2394369.853	Borrow Area						
B-110	504.14	11/26/2018	8	13899070.46	2394137.704	Borrow Area						
Boring Des	Boring Designation Nomenclature (NRCS):											
B-100 – Bo	rings from Bo	orrow Area	B-100 – Borings from Borrow Area									

#### **Embankment Dam Drilling**

Detailed descriptions of subsurface materials encountered at the boring locations drilled along the dam are presented on the Logs of Borings included in Appendix A. Photographs of the soil samples taken in the field following each respective boring log. Keys to Terms and Symbols used on the logs are also presented in Appendix A, preceding the boring logs.

Generalized Subsurface Profiles along the Dam Crest, Principal Spillway, and Auxiliary Spillway alignments, and the Downstream Toe are shown on Plates 3, 4, 5, and 6 respectively.

The embankment dam centerline borings were drilled using a truck-mounted CME-55 equipped with 1) continuous flight augers for advancing the holes dry and recovering disturbed samples (ASTM D1452), 2) seamless push tubes for obtaining relatively undisturbed soil samples of cohesive strata (ASTM D1587), 3) split-barrel samplers and drive weight assembly for obtaining representative samples and measuring the penetration resistance (N values) of non-cohesive soil strata (ASTM D1586) and 4) double-tube wireline core barrel with diamond bits for obtaining 2-inch diameter rock cores (ASTM D2113). The upstream and downstream toe embankment borings were drilled using a geoprobe rig equipped with geotechnical sampling items 1, 2 and 3 above. Hand-auger borings were performed at the specified location on the side of the slope, and were advanced using hand tools to the boring termination depth of 5 feet. Photographs of the Field Drilling Equipment used for this investigation are shown on Plate 7.

Pocket penetrometer values, in tons per square foot, and Standard Penetration Test N-values, in blows per foot, are also shown on the logs of borings at the respective test depth. Push tube samples that were field extruded, and relatively undisturbed push tube samples that were collected for NRCS are shown as separate sampling symbols on the boring logs. NRCS collected samples were transported to their Lincoln, Nebraska laboratory for testing by others.

State Plane coordinates and boring elevations shown on the boring logs were provided to us by AECOM, obtained by the project surveyors.

Groundwater and/or drilling fluid observations made during drilling are presented on the boring logs. The dam crest borings (B-01 - B-09), and borings drilled upstream and downstream of the dam (B-300 and B-600 borings) were backfilled with a bentonitic grout upon completion of drilling, with the exception of borings B-04 and B-06 where 2" diameter piezometers were set in the borehole. Piezometer construction schematics are provided in Appendix C.

Dynamic Cone Penetrometer (DCP) testing was conducted at adjacent to each hand auger boring (HAB) location on the upstream and downstream slopes of the embankment. HAB locations are shown on Plate 2. The DCP testing was performed using a DPM-30 portable hammer set manufactured by Pagani Geotechnical Equipment. The DCP test consists of recording the number of blows of a 65-lb hammer falling 8 inches, driving a 1.4-inch diameter conical point 10 centimeters. The number of blows per 10 centimeters can be correlated to SPT (Standard Penetration Test, ASTM D1586) using the following energy conversion:

 $N_{SPT} = N_{DCP} * 6.0 / 7.87$ 

The correlated SPT (N-value) data are plotted versus depth in Appendix A, following the HAB logs. Photographs of the field DCP testing are also included in Appendix A.

#### **Borrow Area Drilling**

Detailed descriptions of subsurface materials encountered at the borrow boring locations are presented on the Logs of Borings included in Appendix B. Photographs of the soil samples taken in the field following each respective boring log. Keys to Terms and Symbols used on the logs are also presented in Appendix B, following the boring logs. Photographs of the bulk borrow samples taken in the laboratory are also included in Appendix B.

The borrow borings were drilled using a geoprobe equipped with a direct push sampler in 5-ft increments. Photographs of the Field Drilling Equipment used for this investigation are shown on Plate 7. Pocket penetrometer values, in tons per square foot were obtained every 1 ft of sample, and are also shown on the logs of borings at the respective test depth.

Groundwater and/or drilling fluid observations made during drilling are presented on the boring logs. The borings were backfilled with a mixture of auger cuttings and bentonite to the ground surface. State Plane coordinates and boring elevations shown on the boring logs were provided to us by AECOM, obtained by the project surveyors.

#### Piezometers

As part of the final phase of the geotechnical investigation, two vertical standpipe piezometers were installed in borings B-04 and B-06. It should be noted that the piezometer that was originally set in boring B-06 was damaged during well construction; therefore, a new borehole was advanced for the piezometer at boring B-06P. The piezometer was constructed in the borehole at B-04P.

The piezometers consists of 2-inch diameter plastic pipe, set vertically in the bored hole, with sections that are slotted to allow any groundwater present to enter the pipe. The upper portion of the piezometer pipe typically consists of solid pipe that is grouted up to the ground surface to deter surface water infiltration. The lower slotted portion of the pipe is backfilled with washed sand in the annular space.

The surface of each piezometer was completed with a flush-mounted 12-inch diameter steel manhole cover and concrete pad. Schematics of the installed piezometer construction, site photographs, and TCEQ well reports are presented in Appendix C. Abandonment of the piezometers and closure reporting to the TCEQ is beyond the scope of this phase of the project.

Piezometer data collected to date is summarized on the table on the following page and presented on the boring log, B-04P and B-06P included in Appendix A. A photograph of the piezometer surface completion follows the summary table.

Table 3 - Summary of Piezometer Data									
Derringer	Boring Surface Date of		Water Depth	Water					
Boring	Elevation	Reading	Measured, ft	Elevation, ft					
B-04P	526	6/7/19	30.8	495.2					
B-06P	525	6/7/19	32.1	492.9					



Site Photos (6/7/19) of two site piezometers installed along dam crest.

#### LABORATORY INVESTIGATION

As mentioned previously, the laboratory testing program is being conducted by the NRCS laboratory in Lincoln, Nebraska. Selected push tube samples (both field extruded and Shelby tubes) were transported to the NRCS lab where laboratory assignments were made by others.

As part of this GI report, we have conducted soil moisture content tests (ASTM D2216) on all embankment dam samples that were retained by us and are being stored in our warehouse in north Austin, Texas. Soil classification tests consisting of Atterberg limit determinations (ASTM D4318) and partial grain-size analyses (ASTM D422) were conducted on representative samples from the hand-auger borings. The results of the limited tests are tabulated on the boring logs at the sample recovery depths.

#### SITE AND SUBSURFACE CONDITIONS

#### Physiography

The project site is located along FM 1185, about 1.25 miles east of SH 130, and 5 miles northeast of the city of Lockhart. The site is currently an embankment dam with principal spillway riser and plunge pool; and earthen channel auxiliary spillway over the left abutment. At the time of our study from December 2018 through June 2019, the lake impoundment was near the normal pool EI. 498 to 500 feet. Site photographs of the impounded reservoir are below.



Site Photo taken 12/4/2018



Site Photo taken 6/7/2019

The USGS Topographic Map is presented on Plate 8. The dam is situated on Dry Creek, within the Plum Creek Watershed district. According the to As-built drawings and review of the USGS Topographic Map, the upgradient watershed is on the order of 5500 acres. The riser (normal pool) elevation is shown as El. 500 ft, and auxiliary spillway El. 517 feet. The As-built top of dam is reported at El. 522.3 ft, and recent survey data shows the top of dam to vary from approximately El. 520 to 523 feet. The dam embankment crest, side slopes, and borrow area were well vegetated at the time of this study.

#### Geology

According to the Geologic Atlas of Texas, Seguin Sheet<sup>1</sup>, the dam site is mapped as being underlain by clay, sand, and gravel of the Leona Formation (Qle), Wilcox Group (Ewi), and Midway Group (Emi). A Geologic Map is presented on Plate 9.

The Leona Formation is a Quaternary-age alluvial deposit which is composed mostly of dark brown clay with layers of gravel that are occasionally cemented. In some areas near Lockhart, the Leona gravels can be quite large, approaching cobble size, sometimes making agricultural and earth moving operations problematic.

The Wilcox and Midway Groups are Eocene era formations comprised of upper clay and sand strata transitioning to less weathered clayshale, shale, and weakly cemented sandstone. According to geologic publications, unweathered Wilcox is described as mudstone with various amounts of sandstone, lignite, and ironstone concretions. Weathered Wilcox soils become reddish or yellowish tan and light gray with abundant sand content and weathered sandstone layers. The Wilcox is also known to contain lignite lenses ranging from 1 to 20 ft thick.

The Midway Group is composed of two formations: Wills Point and Kincaid, but are not mapped separately. The Kincaid is the upper part of the Midway formation and is described as sand and clay, glauconitic, poorly sorted, argillaceous, greenish gray clay, and medium gray to black silty clay in the lower parts. With weathering, the Midway becomes yellowish brown clay. Both the Wilcox and Midway soils have varying amounts of sand and clay. Due to their similarities, it was difficult to discern the two formations (Wilcox and Midway) on the boring logs, and are referred to as "Midway" on the logs, except boring B-01. However, the upper soils of boring B-01 contained a cemented layer from the 13 to 15 ft depth, which could be indicative of the Wilcox formation. The other borings did not encounter similar cemented and/or weathered sandstone layers. Geologic mapping presented on Plate 9 also shows surficial outcropping of the Wilcox at the east end of the dam, in the vicinity of boring B-01.

<sup>&</sup>lt;sup>1</sup> Barnes, V.E. (1979), "Geologic Atlas of Texas, Seguin Sheet," The University of Texas at Austin, map and explanatory bulletin.

Surface expression faults are mapped in the vicinity of the dam site, with one fault mapped about 2,000 LF to the southeast of the site, and another fault set mapped about 1¼ miles northwest of the site at the faulted interface of Midway (Eocene age) and Navarro (Cretaceous age) north and west of the dam site. Faults are generally not considered seismically active in the central Texas region, but are known to transmit groundwater and possibly contain fault gouge.

No faulting is specially mapped at the project site and may have been masked by the overlying Leona (alluvium) where present. However, the transition between the Midway and Wilcox Groups is anticipated at the site, generally about 1,000 ft east of Dry Creek. This transition is mapped on the geologic map (Plate 9) and confirmed in the borings (B-01). The transition is likely low displacement as the Wilcox is lithographically situated above the Midway.

#### Near Surface Soil Survey

The near surface soil survey map is shown on Plate 10, and includes Crockett series soils to the east, and Mabank loam and Fett Gravelly soils to the west. The Crockett series (CrC2) are mapped in the proposed east borrow area and are likely weathered remnants of the Wilcox Group. The Crockett soils are described as moderately well drained to the 43 to 60 inch depth until a restrictive layer is encountered. Depth to the water table is typically greater than 80 inches.

The Mabank loam (MaB) is mapped in the general area of the proposed west borrow area, and is described as moderately well drained is a depth to restrictive layer greater than 80 inches. The unit parent material is reported as "clayey alluvium of quaternary age derived from mixed sources", likely representative of the Leona formation.

#### Site Stratigraphy

Subsurface conditions can best be understood by a thorough review of the Boring Logs included in Appendices A and B, and the Generalized Subsurface Profiles presented on Plates 3, 4, 5, and 6. A description of the subsurface conditions for the Dam Centerline, Principal Spillway Centerline, Auxiliary Spillway Centerline, Downstream Toe, and Borrow Area are presented in the following sections.

**Dam Crest Centerline.** Borings B-01 through B-09 were drilled along the dam crest centerline to depths of 30 to 70 feet below the existing ground surface. The borings encountered 15 to 45 ft of fill material, underlain by clay of the Midway Group, further transitioning to relatively less weathered clayshale to the boring termination depths. Boring B-1, which was drilled in the current auxiliary spillway encountered native soils at the ground surface. The Dam Centerline Subsurface Profile is presented on Plate 3.

The embankment fill material is generally described as tan, light brown, gray and dark brown fat and lean clay. The USCS descriptions (fat or lean clay) are based on visual assessment (ASTM D2488), as laboratory testing was not included in this scope. Pocket penetration test values in the embankment material generally ranged from less than 1 to greater than 4.5 tsf. In some borings, we were able to discern the core trench at the bottom of the fill material above the native Midway stratum. The estimated core trench thickness at the boring locations ranged from 3 to 8 ft thick, but is generally considered to be 4 to 7 ft thick.

The native Midway soils were typically described as tan, light brown, gray and dark gray fat clay with sand seams, silt partings, ferrous staining, and calcareous inclusions. The stratum is described in some borings as blocky, indicating a weak secondary structure. Boring B-1 was classified as Wilcox Group due to the relatively higher sandy nature of the stratum, and the cemented, gravelly layer encountered from the 13 to 15 ft depth. This layer could be associated with fault gouge, but most likely is indicative of iron concretions and weak cementation from calcareous content of the Wilcox.

**Principal Spillway Alignment.** Borings B-301, B-04P, B-03, B-601 and B-602 were drilled in the vicinity of the new principal spillway alignment, and are shown on Plate 4. The borings encountered embankment fill material, alluvium, Midway residual soils, and clayshale. For the proposed principal spillway alignment with a riser invert elevation of about 489 ft, and an outlet invert El. 485 ft, the principal spillway pipe and alignment will be founded mostly in native Midway clay soils.

The Midway soils are typically described as tan, light brown, dark gray and gray high plasticity clay. Accordingly, the Midway clay soils have recognized shrink swell potential associated with change in soil moisture content. Every effort should be made to stabilize the prepared clay subgrade at the time of construction, so that existing clays soils do not lose soil moisture and consequently shrink, causing nonuniform support of the principal spillway pipe cradle. Also, groundwater was encountered in boring B-601 above the proposed principal spillway pipe alignment at approximate elevation 487.5 feet.

**Auxiliary Spillway Alignment.** Borings B-302, B-06P, B-5, B-04P, B-604, B-603, B-602, and B-606 were drilled near and beneath the proposed auxiliary RCC spillway structure and discharge channel. The Generalized Subsurface Profile is shown on Plate 5.

Based on the boring data and a proposed spillway invert of El. 518.8 ft, the auxiliary spillway structure will be supported by existing embankment fill material. As mentioned previously, laboratory testing and classification testing is being performed by others; therefore, it should be noted that the existing embankment soils are generally referred to as fat and lean clay based on visual classification (ASTM D2488).

**Downstream Toe.** Borings B-601 through B-605 were drilled along the downstream toe of the existing embankment dam to depths of 20 to 45 ft below existing grade. The Generalized Subsurface Profile along the dam downstream toe is shown on Plate 6.

The borings encountered fill material, alluvium, and clay and clayshale of the Midway Group. The fill material is typically described as brown to dark brown fat clay with gravel content. Alluvium was encountered in the borings beneath the fill material and atop the Midway residual soils. It should be noted that it was sometimes difficult to discern alluvial soils from (reworked) fill material and native Midway soils. When the alluvial soils contained abundant gravel, this stratum was typically referred to as Leona alluvial soils.

**Borrow Area.** Borings B-101, B-102, B-104, B-105, and B-107 through B-110 were drilled to the 10 ft depth within two proposed borrow areas. In general, the borings encountered 2 to 5 ft of surficial dark brown to dark grayish brown fat clay, transitioning to tan and gray fat clay (Midway Group) to the boring termination depth of 10 feet. Bulk soil samples were also obtained from the auger cuttings. Pocket penetrometer values ranged from 0.5 to 4.5+ tsf, indicating that some areas had likely been previously excavated as possible borrow and backfilled with fill.

#### Groundwater

Groundwater was encountered in 6 of the 31 borings at the time of drilling. A summary of groundwater measurements at the time of drilling, or stabilized 24 hours later prior to backfilling and presented in the following table. As described herein, piezometers were installed at borings B-04P and B-06P and should be referred to for stabilized groundwater levels within the embankment. Groundwater levels measured in the borings and summarized below are based on antecedent rainfall conditions, and may be different at the time of construction.

Table 4. Summary of Stabilized Groundwater Measurements										
Boring	Measurement Date	GW Measured ATD	GW Measured at least 24 Hrs after drilling							
B-01	2/26/19	12								
B-301	11/29/18	18.9	5.9							
B-302	11/29/18		18.5							
B-601	11/27/19		13.4							
B-602	11/27/19		10.3							
B-102	11/26/19		5.5							
GW – Ground Wat	er									
ATD – At the Time	ATD – At the Time of Drilling									

#### INTERPRETATIONS AND CONCLUSIONS

The following interpretations and conclusions are being presented based on the findings of the field investigation, review of geologic publications and experience with area geology, and our experience with similar construction.

#### Existing Embankment

- Relatively stiff clayey soils were encountered which are indicative of well-compacted embankment fill. Slightly lower consistency is noted on upstream slope versus downstream slope based on DCP testing.
- No embankment zoning is evident based on visual appearance and field classifications of recovered samples, confirming the homogenous embankment design as shown on as-built drawings.
- Borings suggest the existing core trench was extended through near-surface alluvial and Leona soils into underlying residuum.
- Groundwater was not encountered in the embankment borings drilled during the field investigation, indicating relatively low permeability of embankment materials.

#### Foundation

• Foundation materials encountered at the upstream and downstream toes of the dam include suspected clayey fill materials, clayey alluvium, Leona Formation gravels/clays, clayey residuum, and clayshale at depth.

- A relatively thin (<6 feet) seam of gravelly Leona Formation soils was encountered right (facing downstream) of original creek centerline at variable depths. This layer is also shown in the original 1961 Geologic Investigation and may be indicative of a previous creek meandering. Coarse-grained nature of these materials may correspond to a higher permeability zone capable of conveying seepage.
- A concealed fault is mapped near the left abutment (near Boring B-01), which appears to be offsetting Wilcox and Midway Formations. While the fault is inactive and not capable of producing significant earthquakes, faults may serve as a conduit for seepage. Additionally, sheared materials within the fault (i.e. gouge) may have lower strengths than adjacent undisturbed units.

#### **Borrow Areas**

- Borrow areas investigated contain sufficient quantities of clayey soils that may be suitable for embankment fill. The suitability of these materials and estimated available borrow volumes will be confirmed by laboratory testing and supplemental evaluations performed by AECOM as part of the Soil Mechanics Report.
- Groundwater was encountered in one of the borrow area borings (B-102) at a depth of 5.5 feet. Groundwater may limit the practical depth of borrow area excavations due to the potential needs for dewatering and/or drying saturated borrow materials to an acceptable moisture content prior to use as embankment fill.

#### Groundwater

- Limited groundwater data suggest the embankment and core trench are performing adequately to limit seepage. No seepage was observed at ground surface during the investigation.
- Groundwater levels as shallow as 10 feet were measured at the downstream toe. Dewatering may be needed to maintain dry excavations deeper than about 10 feet below existing grade. Note that groundwater levels may fluctuate seasonally and in response to rainfall conditions and changes in reservoir levels.

#### Other Considerations

• Excavations should proceed without difficulty through materials encountered using modern excavation equipment, and can be classified as "common" according to NRCS Construction Specifications.

- Gypsum crystals were noted in some samples. This information, in combination with local knowledge of the geologic formations present, suggest site soils may contain elevated concentrations of soluble sulfates.
- High plasticity clays soils were encountered in the various geologic units the site. These soils may shrink/swell in response to moisture fluctuations (i.e. expansive soil behavior), and may be susceptible to long-term weathering / desiccation and loss of shear strength where exposed to repeated wetting and drying cycles.

#### CONDITIONS

Since some variation was found in subsurface conditions at boring locations, all parties involved should take notice that even more variation may be encountered between boring locations. Statements in the report as to subsurface variation over given areas are intended only as estimations from the data obtained at specific boring locations.

Findings and engineering interpretations presented in this report are being offered by Ms. Rebecca A. Russo, PE (signer of this report), and are not being made by Mr. David R. Mason, PG (co-signer) or by Mr. Pat Cossins, PG (field geologist). Mr. Mason was present on site during the initial part of the field investigation, and later replaced by Mr. Pat Cossins, PG, each working under the direction of Balcones Senior Geotechnical Engineer, Ms. Russo; our client, AECOM, and the project owner representative, Mr. Bryan Moffat, PG of the NRCS. Mr. Mason has provided input and review regarding geologic findings presented herein.

The professional services that form the basis for this report have been performed using that degree of care and skill ordinarily exercised, under similar circumstances, by reputable geotechnical engineers practicing in the same locality. No other warranty, expressed or implied, is made as the professional advice set forth. The results contained in this report are directed at, and intended to be utilized within, the scope of work contained in the agreement executed by Balcones Geotechnical, LLC and client. This report is not intended to be used for any other purposes.

\* \* \*

PLATES



Source: Google Earth Professional, aerial Imagery dated 12/21/2018

# **VICINITY MAP**

Balcones Geotechnical Austin, TX 78731 512.380.9969 Plum Creek FRS No. 21 Caldwell County, Texas

Plate 1



# **BORING LOCATION PLAN**

Balcones Geotechnical Austin, TX 78731 512.380.9969

Plum Creek FRS No. 21 Caldwell County, Texas

Plate 2a







550	600	650	
			530
			525
			520
			- 515
			- 510
			505
			500
			495
			490
llway Invert (Approx)			- 485
			480
			475
			470
			465
			460
550	600	650	455

### GENERALIZED SUBSURFACE PROFILE CROSS-SECTION

Project: Plum Creek FRS No. 21 Location: Caldwell County, TX Number: 0118-039

Plate 4





1,200	1,300	1,400	
			- 505
	<b>B-601</b> P=1.25		- 500
	P=1.75		
	P=4.0		- 495
VIUM	P=3.0		- 490
MIDWAY			- 485
	P=4.5+ P=3.25		- 480
	−P=4.5+		- 475
SHALE			- 470
			- 465
			- 460
			- 455
			- 450

### GENERALIZED SUBSURFACE PROFILE DOWNSTREAM TOE

Project: Plum Creek FRS No. 21 Location: Caldwell County, TX Number: 0118-039

Plate 6



CME 75 used to drill Dam Crest Embankment Borings (B-01 – B-09)



Geoprobe rig equipped with geotechnical samplers using to drill borrow borings (using direct push) and B-300 and B-600 borings (geotechnical sampling)

# FIELD DRILLING EQUIPMENT PHOTOS

Balcones Geotechnical Austin, TX 78731 512.380.9969



Source: Earth Point Topo Map, Lockhart North Quadrangle (1994) superimposed into Google Earth Professional

# **USGS TOPOGRAPHIC MAP**

Balcones Geotechnical Austin, TX 78731 512.380.9969



Source: <a href="https://txpub.usgs.gov/txgeology/">https://txpub.usgs.gov/txgeology/</a>

# **GEOLOGIC MAP**

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Source: <a href="https://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx">https://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx</a>

## USDA SOIL SURVEY MAP

Balcones Geotechnical Austin, TX 78731 512.380.9969

APPENDIX A

Embankment Dam Borings and Sample Photographs

TERMS AND SYMBOLS USED ON BORING LOGS FOR SOIL									
SOIL TYPES									
CLAY (CH)	SHALY CLAY (CH)	CLAY (CL)	SANDY CLAY (CL)						
Well-Graded	Poorly-Graded SAND (SP)	SILTY SAND (SM)	CLAYEY SAND (SC)						
Well-Graded GRAVEL (GW)	Poorly-Graded GRAVEL (GP)	SILTY GRAVEL (GM)	FILL Material						
	SOIL GR	AIN SIZE							
12 BOULDERS 30	U.S.STANDARD SIEVE 12" 3" 3/4" 4 10 40 200 BOULDERS COBBLES GRAVEL SAND COARSE FINE COARSE MEDIUM FINE SILT CLAY 304 76.2 19.1 4.76 2.00 0.420 0.074 0.002 SOIL GRAIN SIZE IN MILINETERS								
STRENGT	H OF COHESIVE SOILS (2)	DENSITY OF C	GRANULAR SOILS <sup>(2)</sup>						
CONSISTENC	UNDRAINED COMPRESSIVE STRENGTH Y Tons Per Sq. Ft.	NUMBER OF BLOWS PER FT., N	RELATIVE DENSITY						
Very Soft	Less Than 0.25	0-4	Very Loose						
Soft	0.25 to 0.50	4-10	Loose						
Firm	0.5 to 1.00	10-30	Medium						
Stiff	1.00 to 2.00	30-50	Dense						
Very Stiff	2.00 to 4.00	Over 50	Very Dense						
Hard	greater than 4.00								
	DESCRIPTIVE T	ERMS FOR SOIL <sup>(1)</sup>							
DESCRIPTION	CRITERIA	1	MOISTURE						
Stratified	Alternating layers of varying material or color with layers at least 6 mm thick.	Dry No water evi than plastic l Moist Sample feels limit	dent in sample; fines less imit. s damp; fines near the plastic						
Laminated	Alternating layers of varying material or color with the layers less than 6 mm thick.	Very Moist Water visible plastic limit a Wet Sample bear than liquid lir	e on sample; fines greater and less than liquid limit s free water; fines greater mit						
Fissured	Breaks along definite planes of fracture with little resistance to fracturing.	IN Derting Inclusion of	CLUSIONS <sup>(1)</sup>						
Slickensided	Fracture planes appear polished or glossy, sometimes striated.	Seam Inclusion < 1/2	" to 3" thick extending						
Blocky	Cohesive soil that can be broken down into small angular lumps which resist further breakdown.	through sam Layer Inclusion >3 sample.	ple. " thick extending through						
Lensed	Inclusions of small pockets of different soils.	Trace<5% of sample.Few5% to 10% of sample.Little15 to 25% of sample.With15% to 29% of sample.							
Balcones Geotechnical Austin, TX 78731 512.451.8600 REFER	Information on each boring log is a compilation from the field as well as from laboratory testin procedures. The stratum lines on the logs ma measurements refer only to those observed a condition or construction activity. ENCES: 1) ASTM D 2488 2) Peck, Hansor	on of subsurface conditions and soil ang of samples. Strata have been interay be transitional and approximate in rat the times and places indicated, and n and Thornburn, (1974), Foundation B	Ind rock classifications obtained rpreted from commonly accepted nature. Water level may vary with time, geologic						

TERMS AND SYMBOLS USED ON BORING LOGS FOR ROCK								
	RC	OCK TYPES			SAMPLER TY	'PES		
	ONE	SHALE	SANDST	ONE	Thin- walled Tube	Rock Core		
LIMEST	ERED I	WEATHERED SHALE	WEATH SANDST	ERED ONE	Standard Penetration Test	Auger Sample		
HIGHLY LIMEST	WEATHERED ONE	ARGILLACEOUS LIMESTONE	MARL		THD Cone Penetration Test	Bag Sample		
SOL	UTION & VOID	CONDITIONS	WEAT	HERING GR	ADES OF ROCKN	IASS <sup>(1)</sup>		
Void	Interstice; a gene space or other op	eral term for pore penings in rock.	Sligh	tly	Discoloration indicates weathering of rock mat and discontinuity surface	erial ces.		
Vuggy	Cavities Small solutional concavities. Vuggy Containing small cavities, usual lined with a mineral of different composition from that of the			erately	Less than half of the ro material is decomposed disintegrated to a soil.	ock d or		
Vesicular	Containing nume	rous small, unlined		у	material is decomposed disintegrated to a soil.	d or		
	bubbles or steam of the rock.	during solidification	Com	pletely	All rock material is decomposed and/or disintegrated to soil. The	e		
Porous	Containing pore, other openings w interconnect.	interstices, or hich may or may not			original mass structure is still largely intact.			
Cavernous	Containing caviti sometimes quite in limestones and	es or caverns, large. Most frequent d dolomites.	Resid	dual Soli	All rock material is converted to soil. The mass structure and material fabric are destroyed.			
	HARDNESS			BEDDING THICKNESS <sup>(2)</sup>				
FriableCrumbles under hand pressureLow HardnessCan be carved with a knifeModerately HardCan be scratched easily with a knifeVery HardCannot be scratched with a knife				Very Thick>4'Thick2'-4'Thin2"-2'Very Thin1/2"-2"Laminated0.08"-1/2"Thinly-Laminated<0.08"				
		JOINT DE	SCRIPTION					
	SPACING	INCLIN	ATION		SURFACES			
Very Close<2"HorizontalClose2"-12"ShallowMedium Close12"-3'ModerateWide>3'SteepVertical		0-5 5-35 35-65 65-85 85-90	0-5SlickensidedPolished, grooved5-35SmoothPlanar35-65IrregularUndulating or gra65-85RoughJagged or pitted85-90StateState		d anular			
Balcones Geotechnical Austin, TX 78731 512.451.8600	NOTE: Information obtained for accepted measurer condition	on on each boring log is a co rom the field as well as fron procedures. The stratum lin- nents refer only to those obs or construction activity.	ompilation of subsur n laboratory testing es on the logs may served at the times	face conditions and of samples. Strata be transitional and and places indical	nd soil and rock classific a have been interpreted d approximate in nature ted, and may vary with t	caitons by commonly . Water level ime, geologic		
	REFERENCES:	1) British Standard(1981) <u>Coc</u> 2) The Bridge Division, Texas 2nd Edition,revised June,19	<u>le of Practice for Site</u> Highway Dept. <u>Fou</u> 974.	Investigation BS	5930. n & Design Manual,			

			-	LOG OF BORING NO.	B-01				LOG OF BORING NO. B-01								
NORT EAST	'HING: ING: 2	13 395	898288.( 5939.904	A300000Plum Creek FRS No. 24000Caldwell County, TPROJECT NO. 0118-039	21												
DEPTH, FT	SYMBOL	SAMPLES	POCKET PEN, tsf Blows/ft. REC./RQD, %		LAYER ELEV./ DEPTH	WATER CONTENT, %	LIQUID LIMIT, %	PLASTICITY INDEX, %	PASSING NO. 4 SIEVE, %	PASSING NO. 200 SIEVE, %	UNIT DRY WEIGHT, PCF	UNCONFINED STRENGTH TSF					
			P=1.75	Dark brown LEAN CLAY, stiff, moist, w/sand and	51/ 0	28											
			<b></b>	organics. (Topsoil)	1.0												
			P=4.0	Tan and gray FAT CLAY, stiff to very stiff, w/ferrous staining, silt seams and partings. CH (Wilcox)		23											
					510.9							1					
- 5 -			P=4.5+	Tan and reddish tan FAT CLAY, stiff to hard, w/ferrous staining and cemented layers, sand seams and silt partings. CH (Wilcox)	5.0												
			P=1.75			25											
- 10 -			N=50/2"														
				- No sample recovery from 11.5 to 14 ft (fell from tube during removal from borehole)	¥												
				- hard drilling (cemented) from 13 to 15 ft													
- 15 -			P=3.25	Tan and gray FAT CLAY, very stiff, w/ferrous staining, sand seams and silt partings CH (Wilcox)	500.9 15.0	21											
											$\left  - \right $						
			P=4.0														
20 -			I _ !		495.9							ı					
- 20 -			P=4.5+	Gray to dark gray CLAYSHALE, hard, dry to moist, laminated, fissile, w/light gray silt seams and	20.0												
ł .		1	I	partings. (wilcox)													
			P=4.5			20											
- 25 -			<b>i</b> 1									l					
- 25																	
L			P=3.5			17											
Í			<b>i</b>		485.9												
Ba	lcon	es	;	COMPLETION DEPTH: 30.0	KEY:	<u> </u>											
Ge	otec	hr	nical	A DATE DRILLED: 2-26-19	P = Poo	ket P	enetro	meter									
Aus 512.	tin, TX .380.99	78 69	731	WATER LEVEL / SEEPAGE: 12.0 UPON COMPLETION:	N = Sta U = Uno	indard confine	Penet ed Con	ration npress	ion (te	sf)	Plat	e 1a					

LOG OF BORING NO. B-01													
Plum Creek FRS No. 21           NORTHING: 13898288.300000         Caldwell County, TX           EASTING: 2395939.904000         PROJECT NO. 0118-039													
<b>DEPTH, FT</b>	SYMBOL	SAMPLES	POCKET PEN, tsf Blows/ft. REC./RQD, %	SURF. ELEVATION: 516±	LAYER ELEV./ DEPTH	WATER CONTENT, %	LIQUID LIMIT, %	PLASTICITY INDEX, %	PASSING NO. 4 SIEVE, %	PASSING NO. 200 SIEVE, %	UNIT DRY WEIGHT, PCF	UNCONFINED STRENGTH TSF	
  - 35 				<ul> <li>NOTES:</li> <li>1. Boring was advanced dry to the 30 ft depth, and perched groundwater was encountered at the 12 to 12.5 ft depth, at the time of boring.</li> <li>2. The boring was advanced using a truck mounted CME 55.</li> <li>3. Shelby tube samples were collected for the NRCS at 5-7.5 ft, 11.5-14 ft, 17.5-20 ft, and 20-22.5 ft</li> </ul>	30.0								
 - 40 													
- 45 - 													
- 50 - 50 													
- 55   													
Bal Geo Austi 512.3	<b>CON</b> <b>otec</b> in, TX 80.99	⊔ es hn <sup>78</sup> 69	i <b>cal</b> 731	COMPLETION DEPTH: 30.0 DATE DRILLED: 2-26-19 WATER LEVEL / SEEPAGE: 12.0 UPON COMPLETION:	KEY: P = Poo N = Sta U = Uno	cket Penetrometer andard Penetration Test (bpf) aconfined Compression (tsf)							


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Plum Creek FRS No. 21 Caldwell County, TX

Sheet 1 of 4



2/26/19 8 - 10 ft



2/26/19 10 - 12 ft



2/26/19 15 - 17 ft

# **SAMPLE PHOTOGRAPHS – B-01**

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Plum Creek FRS No. 21 Caldwell County, TX

Sheet 2 of 4



### **SAMPLE PHOTOGRAPHS – B-01**

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2/26/19 28 - 30 ft

### **SAMPLE PHOTOGRAPHS – B-01**

Balcones Geotechnical Austin, TX 78731 512.380.9969

LOG OF BORING NO. B-02														
NORT EAST	'HING: ING: 2	13 395	898192.2 5458.651	22000 <sup>,</sup> 000	<sup>0</sup> Plum Creek FRS No. Caldwell County, T PROJECT NO. 0118-03	21 X 9								
DEPTH, FT	SYMBOL	SAMPLES	POCKET PEN, tsf Blows/ft. REC./RQD, %	SUI	STRATUM DESCRIPTION	LAYEI ELEV DEPT	L / % WATER CONTENT.%	LIQUID LIMIT, %	PLASTICITY INDEX, %	PASSING NO. 4 SIEVE, %	PASSING NO. 200 SIEVE, %	UNIT DRY WEIGHT, PCF	UNCONFINED STRENGTH TSF	
			P=4.5 P=1.0	Tan, sca	gray and brown FAT CLAY, stiff to hard, w/sand, uttered gravel, and few organics. CH (Fill)		13							
- 5 -			P=4.5+											
			P=4.0											
- 10 - -			P=4.0	- da	rk brown from 10 to 14 ft		16							
- - 15 -			P=3.25		ddiab tan fram 15 ta 19 ft		16							
			r -4.01	- 780		505	5							
- 20 -			P=4.5+ P=1.0	P=4.5+ Grayish brown FAT C w/sand and dark bro Trench) P=1.0	rish brown FAT CLAY, very stiff to hard, moist, and and dark brown clay pockets. CH (Core ench)	18.	0 20							
			P=3.5	P=3.5	Tan stai	and gray FAT CLAY, hard, blocky, w/ferrous ining, sand seams and silt partings. CH (Midway)	501. 22.	5 0 17						
- 25 -			P=4.5+				17							
-						493	5							
Balcones       COMPLETION DEPTH: 38.0       KEY:         Geotechnical       DATE DRILLED: 2-27-19       P = Pocket Penetrometer         Austin, TX 78731       WATER LEVEL / SEEPAGE:       N = Standard Penetration Test (bpf         J12.380.9969       UPON COMPLETION:       U = Unconfined Compression (tsf)									bpf) sf)	) Plate 2a				

LOG OF BORING NO. B-02											
NORT EASTI	HING: ING: 23	13898192. 95458.651	.220000 Plum Creek FRS No. Caldwell County, T 1000 PROJECT NO. 0118-039	21 X							
<b>DEPTH</b> , FT	SYMBOL	SAMPLES POCKET PEN, tsf Blows/ft. REC./RQD, %	STRATUM DESCRIPTION	LAYER ELEV./ DEPTH	WATER CONTENT, %	LIQUID LIMIT, %	PLASTICITY INDEX, %	PASSING NO. 4 SIEVE, %	PASSING NO. 200 SIEVE, %	UNIT DRY WEIGHT, PCF	UNCONFINED STRENGTH TSF
- ·		P=4.5+	Tan and gray CLAYSHALE, weathered, w/sand seams and silt partings. (Midway)	30.0	13						
- 35 - - 35 -		× P=50/1"									
· ·			NOTES:	485.5 38.0							
- 40 -  	-		<ol> <li>Boring was advanced dry to the 37.5-ft depth, and groundwater was not encountered at the time of drilling.</li> <li>The boring was advanced using a truck mounted CME 55.</li> <li>Shelby tube samples were collected by the NRCS at 5-7.5 ft, 15-17.5 ft, 20-22.5 ft, and 30-32.5.</li> </ol>								
- 45 -  	-										
- 50 -	-										
- 55 -	-										
Bal Ge Aust 512.	lcone otech tin, TX 380.996	9 9 9 9 9	COMPLETION DEPTH: 38.0 DATE DRILLED: 2-27-19 WATER LEVEL / SEEPAGE: UPON COMPLETION:	KEY: P = Pocket Penetrometer N = Standard Penetration Test (bpf) U = Unconfined Compression (tsf)							e 2b





2/27/19 5 - 7.5 ft

# **SAMPLE PHOTOGRAPHS – B-02**

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Plum Creek FRS No. 21 Caldwell County, TX

Sheet 2 of 5



#### **SAMPLE PHOTOGRAPHS – B-02**

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Balcones Geotechnical Austin, TX 78731 512.380.9969

Plum Creek FRS No. 21 Caldwell County, TX

Sheet 4 of 5



Balcones Geotechnical Austin, TX 78731 512.380.9969



LOG OF BORING NO. B-03													
NORT EASTI	HING: ING: 2	13( .395	898130.2 5100.308	25000r i000	<sup>0</sup> Plum Creek FRS No. 2 Caldwell County, TX PROJECT NO. 0118-039	21							
<b>DEPTH, FT</b>	SYMBOL	SAMPLES	POCKET PEN, tsf Blows/ft. REC./RQD, %	SUI		LAYER ELEV./ DEPTH	WATER CONTENT, %	LIQUID LIMIT, %	PLASTICITY INDEX, %	PASSING NO. 4 SIEVE, %	PASSING NO. 200 SIEVE, %	UNIT DRY WEIGHT, PCF	UNCONFINED STRENGTH TSF
 			P=4.5+ P=4.5	Tan a stai	and gray FAT CLAY, hard, blocky, w/ferrous ining, sand seams and silt partings. CH (Midway)	30.0	19						
			P=4.5+				23						
  - 45 -		A TI MALI INA TI MALI INA	P=4.5+	Gray lam par	γ to dark gray CLAYSHALE, hard, dry to moist, ninated, fissile, w/light gray silt seams and tings. (Midway)	481.9 43.0	20						
- 50 -			P=4.5+ N=15-21-37	,		472.9	19						
 - 55 - 	-			NOT 1. B <sup>i</sup> groi drill 2. T CM 3. S at {	ES: oring was advanced dry to the 52-ft depth, and undwater was not encountered at the time of ling. 'he boring was advanced using a truck mounted IE 55. Shelby tube samples were collected by the NRCS 5-7.5 ft, 10-12.5 ft, 22.5-25 ft, and 35-37.5 ft.	52.0							
Balcones       COMPLETION DEPTH: 52.0       KEY:         Geotechnical       DATE DRILLED: 2-27-19       P = Pocket Penetrometer         Austin, TX 78731       WATER LEVEL / SEEPAGE:       N = Standard Penetration Test (bpf)         J12.380.9969       UPON COMPLETION:       U = Unconfined Compression (tsf)										e 3b			



BALCHNES GATER 5-75 645 018-035



2/26/19 5 - 7.5 ft

# **SAMPLE PHOTOGRAPHS – B-03**

Balcones Geotechnical Austin, TX 78731 512.380.9969



2/26/19 8 - 10 ft





2/26/19 10 – 12.5 ft



2/26/19 13 - 15 ft

# **SAMPLE PHOTOGRAPHS – B-03**

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Plum Creek FRS No. 21 Caldwell County, TX

Sheet 3 of 6



Balcones Geotechnical Austin, TX 78731 512.380.9969

Plum Creek FRS No. 21 Caldwell County, TX

Sheet 4 of 6



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Plum Creek FRS No. 21 Caldwell County, TX

Sheet 5 of 6





Balcones Geotechnical Austin, TX 78731 512.380.9969



LOG OF BORING NO. B-04P														
NORT EASTI	HING: NG: 2	138 3947	98060.5 711.340	50000( 000	Plum Creek FRS No. Caldwell County, T PROJECT NO. 0118-033	21 X	_			-				
<b>DEPTH, FT</b>	SYMBOL	SAMPLES	POCKET PEN, tsf Blows/ft. REC./RQD, %	SUF	STRATUM DESCRIPTION	LAYER ELEV./ DEPTH	WATER CONTENT, %	LIQUID LIMIT, %	PLASTICITY INDEX, %	PASSING NO. 4 SIEVE, %	PASSING NO. 200 SIEVE, %	UNIT DRY WEIGHT, PCF	UNCONFINED STRENGTH TSF	
				Light w/s (Co	t brown, tan and gray FAT CLAY, very stiff, moist, and, silt, small gravel and scattered organics. CH re Trench)	30.0								
			P=3.0				21							
- 35 -			P=3.5											
			P=3.0	Tan, bloo and	reddish tan and gray FAT CLAY, hard, moist, cky, w/ferrous staining, calcareous nodules, sand l silt seams and partings. CH (Midway)	489.0								
- 40							26							
 - 45 -			P=4.5+											
			P=4.5+				23							
						476.0								
- 50 - 				Gray to dark gray CLAYSHALE, hard, dry to moist, laminated, fissile, w/light gray silt seams and partings. (Midway)	50.0									
			P=4.5+				22							
- 55 -														
Bal Geo	con otec	es hni	ical		COMPLETION DEPTH: 62.0 DATE DRILLED: 12-21-18	KEY: P = Poo N = Sta	cket P	enetro Penet	meter	Test (	bpf)			
Aust 512.3	in, TX 380.99	787 69	/31	*	WATER LEVEL / SEEPAGE: UPON COMPLETION:	U = Unconfined Compression (tsf) Plate 4b								

LOG OF BORING NO. B-04P														
NORT EASTI	HING: 1 NG: 239	3898060. 94711.340	50000( )000	<sup>D</sup> Plum Creek Fl Caldwell Cou PROJECT NO.	RS No. 2 unty, TX <sup>0118-039</sup>	21 (								
DEPTH, FT	SYMBOL	POCKET PEN, tsf Blows/ft. REC./RQD, %	SUE			LAYER ELEV./ DEPTH	WATER CONTENT, %	LIQUID LIMIT, %	PLASTICITY INDEX, %	PASSING NO. 4 SIEVE, %	PASSING NO. 200 SIEVE, %	UNIT DRY WEIGHT, PCF	UNCONFINED STRENGTH TSF	
							21							
		×N=14-21-27				464.0								
						62.0								
- 65			NOT 1. B grou	ES: oring was advanced dry to the 61.5-ft dep undwater was not encountered at the time	th, and of									
			drill 2. T CM	ing. he boring was advanced using a truck mo E 75.	unted									
			3. S at 5 43-4	helby tube samples were collected by the i-7.5 ft, 10-12.5 ft, 20-22.5 ft, 35-37.5 ft, ar 45.5 ft	NRCS nd									
			4. A	2-inch diameter piezometer was installed	in the									
- 10 -			soli	d riser to the ground surface.	n, and									
- 75 -														
	-													
	-													
- 80 -														
- 85 -														
Bal   Ge	cones	s nical		COMPLETION DEPTH: 62.0 DATE DRILL FD: 12-21-18		KEY: P = Poo	ket P	enetro	meter					
Aust	in, TX 7	8731	~/~	WATER LEVEL / SEEPAGE:		N = Sta U = Unc	ndard confine	Penet	ration	Test ( sion (ts	bpf) sf)		. 4.5	
512.3	200.9909	,		UPON COMPLETION:		U = Uncontined Compression (tst)   Plate 4c								



Balcones Geotechnical Austin, TX 78731 512.380.9969



6-8.5 651



12/18/18 6 - 8.5 ft



12/18/18 8.5 - 10 ft



B-04

10-12.5 691



12/18/18 10 - 12.5 ft

### **SAMPLE PHOTOGRAPHS – B-04**

Balcones Geotechnical Austin, TX 78731 512.380.9969

Plum Creek FRS No. 21 Caldwell County, TX

Sheet 2 of 6





12/18/18 20 – 22.5 ft

# SAMPLE PHOTOGRAPHS – B-04

Balcones Geotechnical Austin, TX 78731 512.380.9969

Plum Creek FRS No. 21 Caldwell County, TX

Sheet 3 of 6

# Project No. 0118-039 ŝ 20 5 1114HA 6 222 7 8 9 10 11 18 19 20 21 22 23 12 13 14 15 13 17 2 12/18/18 22.5 - 24 ft 12/18/18 28 - 30 ft 3 CRAFTSMAN 10 11 12 13 5 ALL USA 6 -7 8 9 13-01 28-30 by CRRFTSMRM -5 33.8 10 11 12 13 14 15 13 17 18 6 8 9 12/18/18 33-35 by 33 – 35 ft

# **SAMPLE PHOTOGRAPHS – B-04**

Balcones Geotechnical Austin, TX 78731 512.380.9969



Balcones Geotechnical Austin, TX 78731 512.380.9969

Plum Creek FRS No. 21 Caldwell County, TX

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LOG OF BORING NO. B-05													
NORT EASTI	HING: NG: 23	138 3944	398019.2 475.342	280000 Plum Creek FRS No. Caldwell County, T 000 PROJECT NO. 0118-033	21 X 9								
<b>DEPTH</b> , FT	SYMBOL	SAMPLES	POCKET PEN, tsf Blows/ft. REC./RQD, %	SURE ELEVATION: 525+	LAYER ELEV./ DEPTH	WATER CONTENT, %	LIQUID LIMIT, %	PLASTICITY INDEX, %	PASSING NO. 4 SIEVE, %	PASSING NO. 200 SIEVE, %	UNIT DRY WEIGHT, PCF	UNCONFINED STRENGTH TSF	
			I=13-16-21	Gray and light brown sandy FAT CLAY, very stiff to hard, moist, w/ferrous staining, calcareous nodules, sand and silt seams and partings. CH (Midway) <i>(continued)</i> Dark gray CLAYSHALE, hard, dry to moist, laminated, fissile, w/light gray silt seams and partings. (Midway)	462.1 63.0	22							
- 70 -			=11-18-25		455.1	21							
- 75 - - 75 - - 80 - - 80 -    				<ul> <li>NOTES:</li> <li>1. Boring was advanced dry to the 70-ft depth, and the borehole was dry upon completion.</li> <li>2. The boring was advanced using a truck mounted CME 75.</li> <li>3. Shelby tube samples were collected by the NRCS at 7.5-10 ft, 15-17.5 ft, 20-22 ft, 30-32.5, 45-47.5 ft.</li> </ul>									
Ba Ge	cone otecl	es nni	ical	COMPLETION DEPTH: 70.0 DATE DRILLED: 12-18-18	KEY: P = Po	KEY: P = Pocket Penetrometer							
Aust 512.	tin, TX 380.996	787 59	731	WATER LEVEL / SEEPAGE: UPON COMPLETION:	N = Sta U = Un	N = Standard Penetration Test (bpf) U = Unconfined Compression (tsf) Plate 5c							



Balcones Geotechnical Austin, TX 78731 512.380.9969

Plum Creek FRS No. 21 Caldwell County, TX

Sheet 1 of 8



# **SAMPLE PHOTOGRAPHS – B-05**

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12/17/18 15 – 17.5 ft

12/17/18 17.5 – 19.5 ft



12/17/18 20 – 22 ft

### **SAMPLE PHOTOGRAPHS – B-05**

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Plum Creek FRS No. 21 Caldwell County, TX

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Balcones Geotechnical Austin, TX 78731 512.380.9969

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Balcones Geotechnical Austin, TX 78731 512.380.9969 Plum Creek FRS No. 21 Caldwell County, TX

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Balcones Geotechnical Austin, TX 78731 512.380.9969



12/18/18 68.5 - 70 ft

# **SAMPLE PHOTOGRAPHS – B-05**

Balcones Geotechnical Austin, TX 78731 512.380.9969 Plum Creek FRS No. 21 Caldwell County, TX

Sheet 8 of 8

LOG OF BORING NO. B-06P													
NORT EASTI	'HING: ING: 2	138 394:	397994.3 329.557	38000( 000	Plum Creek FRS No. Caldwell County, TX PROJECT NO. 0118-039	21 K							
<b>DEPTH, FT</b>	SYMBOL	SAMPLES	POCKET PEN, tsf Blows/ft. REC./RQD, %	SUF	STRATUM DESCRIPTION	LAYER ELEV./ DEPTH	WATER CONTENT, %	LIQUID LIMIT, %	PLASTICITY INDEX, %	PASSING NO. 4 SIEVE, %	PASSING NO. 200 SIEVE, %	UNIT DRY WEIGHT, PCF	UNCONFINED STRENGTH TSF
			P=1.75	Dark	brown FAT CLAY, stiff to very stiff, moist,		13						
			P=3.0	w/s	and, roots, and organics. CH (Fill)	523 1							
			P=2.5	Tan a	and gray FAT CLAY, very stiff to hard, dry to	2.0	22						
			P=3.5	moi	st, w/sand, siltly seams, calcareous nodules, and								
			P=4.5+	sma	ali gravel. CH (Fill)		14						
- 5 -													
- ·			P=4.5+										
- 10 -			P=2.5				17						
			P=2.75				21						
15													
- 15 -			P=2.5										
			P=1 75				20						
			D=2.25				20						
- 20 -			P=3.25										
- ·			P=2.75				19						
			P=3.0										
- 25 -													
			P=4.5	- Da	rk brown EAT CLAX layer from 28 - 20 ff		17						
		P=2.0	- Da										
			1 -2.0	T									
Ba	lcon	es	:!		COMPLETION DEPTH: 70.0	KEY:		on ct	meter				
		nn 70-		$\searrow$	DATE DRILLED: 12-6-18	P = Poole N = Sta	ndard	Penetro	ration	Test (	bpf)		
Aus 512.	380.99	787 69	131		UPON COMPLETION:	U = Uno	confine	ed Con	npress	sion (ts	sf)	Plate	e 6a

LOG OF BORING NO. B-06P															
NORT EASTI	HING: NG: 2	138 394:	397994.3 329.557(	380000 000	)	Plum Cre Caldwel PROJEC	ek FRS No. 2 Il County, TX T NO. 0118-039	21 (							
<b>DEPTH, FT</b>	SYMBOL	SAMPLES	POCKET PEN, tsf Blows/ft. REC./RQD, %	SUF	STRATU		N	LAYER ELEV./ DEPTH	WATER CONTENT, %	LIQUID LIMIT, %	PLASTICITY INDEX, %	PASSING NO. 4 SIEVE, %	PASSING NO. 200 SIEVE, %	UNIT DRY WEIGHT, PCF	UNCONFINED STRENGTH TSF
			P=2.0	Tan a moi sma	and gray FAT CLA` st, w/sand, siltly se all gravel. CH (Fill)	Y, very stiff to har eams, calcareous (continued)	d, dry to nodules, and		19						
- 35 - - 35 -			P=2.5	Gray w/sa	ish brown FAT CL/ and and dark brow	AY, very stiff to ha n clay pockets. C	ard, moist, CH (Core	490.1 35.0							
			P=2.5 P=3.5	110				495.1	21						
- 40 			P=3.75	Gray moi and	and light brown FA st, w/ferrous stainin silt seams and par	AT CLAY, very sti ng, calcareous nc rtings. CH (Midw	ff to hard, odules, sand ay)	40.0							
 - 45 -			P=4.5+						27						
			l=10-12-16	Dark	gray CLAYSHALE	, hard, dry to moi	st, laminated,	477.6	25						
- 50 -				fissi (Mio	le, w/light gray silt dway)	seams and partin	igs.								
			D-4 5+						21						
- 55 -			F-4.0T						21						
 			l=10-14-18						22						
Bal	con	es la	• • •		COMPLETION	<b>DEPTH:</b> 70.0		KEY:		·					
Ge Aust 512.	Geotechnical Austin, TX 78731 512.380.9969DATE DRILLED: 12-6-18 WATER LEVEL / SEEPAGE: UPON COMPLETION:P = Pocket Penetrometer N = Standard Penetration Test (bpf) U = Unconfined Compression (tsf)PereceptionPenetrometer N = Standard Penetration Test (bpf) U = Unconfined Compression (tsf)														

LOG OF BORING NO. B-06P												
NORT EASTI	HING: 13	3897994.3 4329.557	380000 000	Plum Creek FRS No. Caldwell County, TX PROJECT NO. 0118-039	21 X							
<b>DEPTH, FT</b>	SYMBOL	POCKET PEN, tsf Blows/ft. REC./RQD, %	SUF		LAYER ELEV./ DEPTH	WATER CONTENT, %	LIQUID LIMIT, %	PLASTICITY INDEX, %	PASSING NO. 4 SIEVE, %	PASSING NO. 200 SIEVE, %	UNIT DRY WEIGHT, PCF	UNCONFINED STRENGTH TSF
			Dark fissi (Mio	gray CLAYSHALE, hard, dry to moist, laminated, ile, w/light gray silt seams and partings. dway) <i>(continued)</i>								
- 65 -		N=10-16-17	7									
- 70 -		N=14-12-18	- mo	hist at 69 ft	455.1	24						
			NOT 1. B the 2. TI CM 3. S at 7 45-4 4. A con soli	ES: oring was advanced dry to the 70-ft depth, and borehole was dry upon completion. he boring was advanced using a truck mounted E 75. helby tube samples were collected by the NRCS 5-10 ft, 15-17.5 ft, 20-22.5 ft, 40-42.5 ft, and 47 ft. 2-inch diameter piezometer was installed in the npleted borehole, screened from 70 to 50 ft, and d riser to the ground surface.	70.0							
- 80 -	-											
- 85 -	-											
Ba Ge Aust 512.	Balcones       COMPLETION DEPTH: 70.0       KEY:         Geotechnical       DATE DRILLED: 12-6-18       P = Pocket Penetrometer         Austin, TX 78731       WATER LEVEL / SEEPAGE:       N = Standard Penetration Test (bpf)         J12.380.9969       UPON COMPLETION:       U = Unconfined Compression (tsf)       Plate 6C											



Balcones Geotechnical Austin, TX 78731 512.380.9969



12/05/18 7.5 - 10 ft



12/05/18 10 - 12 ft



12/05/18 12 - 14 ft

### **SAMPLE PHOTOGRAPHS – B-06**

Balcones Geotechnical Austin, TX 78731 512.380.9969



#### 12/05/18 15 – 17.5 ft



12/05/18 18 -20 ft



PALCONES FERTICIA 13-06 20-27.5



12/05/18 20 – 22.5 ft

### **SAMPLE PHOTOGRAPHS – B-06**

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Plum Creek FRS No. 21 Caldwell County, TX

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Balcones Geotechnical Austin, TX 78731 512.380.9969 Plum Creek FRS No. 21 Caldwell County, TX

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LOG OF BORING NO. B-07												
NORTH EASTI	HING: NG: 2	13 2394	897963. 4153.397	440000 7000 Plum Creek FRS No. 2 Caldwell County, TX PROJECT NO. 0118-039	21							
<b>DEPTH</b> , FT	SYMBOL	SAMPLES	POCKET PEN, tsf Blows/ft. REC./RQD, %	STRATUM DESCRIPTION	LAYER ELEV./ DEPTH	WATER CONTENT, %	LIQUID LIMIT, %	PLASTICITY INDEX, %	PASSING NO. 4 SIEVE, %	PASSING NO. 200 SIEVE, %	UNIT DRY WEIGHT, PCF	UNCONFINED STRENGTH TSF
				<ul> <li>NOTES:</li> <li>1. Boring was advanced dry to the 60-ft depth, and the borehole was dry upon completion.</li> <li>2. The boring was advanced using a truck mounted CME 75.</li> <li>3. Shelby tube samples were collected by the NRCS at 7.5-10 ft, 15-17.5 ft, 20-22.5 ft, 30-32.5 ft, and 35-37.5 ft.</li> </ul>	60.0							
- 70												
- 75 -												
- 80 												
- 85  												
Bal Geo Aust 512.3	<b>CON</b> <b>Stec</b> in, TX 380.99	es hn 78 969	<b>iical</b> 3731	COMPLETION DEPTH: 60.0 DATE DRILLED: 12-4-18 WATER LEVEL / SEEPAGE: UPON COMPLETION:	KEY: P = Poc N = Sta U = Unc	ket P andard	enetro Penet ed Cor	ometer tration npres:	Test ( sion (t	(bpf) sf)	Plat	e 7c



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12/04/18 6 – 7.5 ft



12/04/18 7.5 - 10 ft



12/04/18 10 - 12 ft

# **SAMPLE PHOTOGRAPHS – B-07**

Balcones Geotechnical Austin, TX 78731 512.380.9969

Plum Creek FRS No. 21 Caldwell County, TX

Sheet 2 of 7







12/04/18 17.5 – 19.5 ft

**SAMPLE PHOTOGRAPHS – B-07** 

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Plum Creek FRS No. 21 Caldwell County, TX

Sheet 3 of 7



**SAMPLE PHOTOGRAPHS – B-07** 

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Plum Creek FRS No. 21 Caldwell County, TX

Sheet 4 of 7





12/04/18 30 – 32.5 ft



12/04/18 33 – 35 ft





12/04/18 35 – 37.5 ft

# **SAMPLE PHOTOGRAPHS – B-07**

Balcones Geotechnical Austin, TX 78731 512.380.9969

Plum Creek FRS No. 21 Caldwell County, TX

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Balcones Geotechnical Austin, TX 78731 512.380.9969 Plum Creek FRS No. 21 Caldwell County, TX

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Balcones Geotechnical Austin, TX 78731 512.380.9969 Plum Creek FRS No. 21 Caldwell County, TX

Sheet 7 of 7

LOG OF BORING NO. B-08														
NORT EASTI	'HING: ING: 2	13 393	897883.9 699.533	96000 000	о <b>F</b>	Plum Creek FRS No. 2 Caldwell County, TX PROJECT NO. 0118-039	21 (							
<b>DEPTH</b> , FT	SYMBOL	SAMPLES	POCKET PEN, tsf Blows/ft. REC./RQD, %	SU		CRIPTION	LAYER ELEV./ DEPTH	WATER CONTENT, %	LIQUID LIMIT, %	PLASTICITY INDEX, %	PASSING NO. 4 SIEVE, %	PASSING NO. 200 SIEVE, %	UNIT DRY WEIGHT, PCF	UNCONFINED STRENGTH TSF
			P=2.25	Dark roo	brown FAT CLAY, very st ts, and organics. CH (Fill)	iff, moist, w/sand,		22						
			P=1.75	Tan, har	reddish brown, and gray F d. drv to moist. w/sand. sil	FAT CLAY, very stiff to the seams, calcareous	522.6 2.0	16						
			P=4.5 P=4.5	noc	lules, and small gravel. Cl	H (Fill)		12						
- 5 -			P=4.5											
			P=4.5+					19						
- 10 -														
			P=4.0					15						
- 15 -			P=4.5	- da	rk gray FAT CLAY at 15 ft									
			P=3.0	- m	oist below 18 ft			18						
- 20 - -														
			P=3.0					18						
- 25 -														
			P=2.5					19						
Ba Ge	lcon otec	es hn	ical ,	٨	COMPLETION DEPTH DATE DRILLED: 12-3-	: 50.0 -18	KEY: P = Poo	ket P	enetro	ometer				
Austin, TX 78731 512.380.9969WATER LEVEL / SEEPAGE: UPON COMPLETION:N = Standard Penetration Test (bpf) U = Unconfined Compression (tsf)Plate 8										e 8a				

LOG OF BORING NO. B-08												
NORT EAST	THING:	1389788 93699.5;	3.9600C 33000	00 Plum Creek FRS No. 2 Caldwell County, TX PROJECT NO. 0118-039	21							
<b>DEPTH, FT</b>	SYMBOL	POCKET PEN, tsf Blows/ft.	su	STRATUM DESCRIPTION	LAYER ELEV./ DEPTH	WATER CONTENT, %	LIQUID LIMIT, %	PLASTICITY INDEX, %	PASSING NO. 4 SIEVE, %	PASSING NO. 200 SIEVE, %	UNIT DRY WEIGHT, PCF	UNCONFINED STRENGTH TSF
		P=4.5	Gray Gray Gray	reddish brown, and gray FAT CLAY, very stiff to rd, dry to moist, w/sand, siltly seams, calcareous dules, and small gravel. CH (Fill) <i>(continued)</i> y and light brown FAT CLAY, very stiff to hard, oist, w/ferrous staining, calcareous nodules, sand id silt seams and partings. CH (Midway)	_ 491.6 33.0	21						
- 40 - 		P=4.5-	Darł lan (M	k brown and gray CLAYSHALE, hard, dry to moist, minated, fissile, w/gray silt seams and partings. lidway)	_ 484.6 40.0	23						
- 45 -		N=8-13-	15		474.6							
- 50 -  - 55 - -	-	84	NOT 1. E the 2. T CN 3. S at	TES: Boring was advanced dry to the 50-ft depth, and e borehole was dry upon completion. The boring was advanced using a truck mounted WE 75. Shelby tube samples were collected by the NRCS 5-7.5 ft, 15-17.5 ft, 30-32.5 ft, 35-37.5 ft	50.0							
Balcones       COMPLETION DEPTH: 50.0       KEY:         Geotechnical       DATE DRILLED: 12-3-18       P = Pocket Penetrometer         Austin, TX 78731       VATER LEVEL / SEEPAGE:       N = Standard Penetration Test (bpf)         J12.380.9969       UPON COMPLETION:       UPON COMPLETION:											e 8b	



3

12/03/18 0 - 2 ft

> DRILL #\_ BOX #

2 12

12/03/18 2 - 4 ft



6 1 7 1 8

Min Crest 21

8.08

9

10

11

12/03/18 4 - 5 ft

### **SAMPLE PHOTOGRAPHS – B-08**

Balcones Geotechnical Austin, TX 78731 512.380.9969

Plum Creek FRS No. 21 Caldwell County, TX

Sheet 1 of 6



12/03/18 5 - 7.5 ft



12/03/18 7.5 - 9.5 ft



12/03/18 13 - 15 ft

# **SAMPLE PHOTOGRAPHS – B-08**

Balcones Geotechnical Austin, TX 78731 512.380.9969

Plum Creek FRS No. 21 Caldwell County, TX

Sheet 2 of 6



#### **SAMPLE PHOTOGRAPHS – B-08**

Balcones Geotechnical Austin, TX 78731 512.380.9969



12/03/18 28 - 30 ft



12/03/18 30 – 32.5 ft



12/03/18 32.5 – 34.5 ft

#### **SAMPLE PHOTOGRAPHS – B-08**

Balcones Geotechnical Austin, TX 78731 512.380.9969

Plum Creek FRS No. 21 Caldwell County, TX

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43 - 45 ft

# **SAMPLE PHOTOGRAPHS – B-08**

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Balcones Geotechnical Austin, TX 78731 512.380.9969 Plum Creek FRS No. 21 Caldwell County, TX

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LOG OF BORING NO. B-09														
NORT EAST	'HING: ING: 2	13 393	897786.2 3149.057	230000 '000	Plui Ca Pl	m Creek FRS No. 2 aldwell County, TX ROJECT <u>NO. 0118-039</u>	21 (							
DEPTH, FT	SYMBOL	SAMPLES	POCKET PEN, tsf Blows/ft. REC./RQD, %	SUR	STRATUM DESCR	IPTION	LAYER ELEV./ DEPTH	WATER CONTENT, %	LIQUID LIMIT, %	PLASTICITY INDEX, %	PASSING NO. 4 SIEVE, %	PASSING NO. 200 SIEVE, %	UNIT DRY WEIGHT, PCF	UNCONFINED STRENGTH TSF
			P=1.75	Dark	brown FAT CLAY, very stiff,	moist, w/sand,		16						
				roots	s, and organics. CH (Fill)		521.6	21						
			P=3.0	Brown	n and gray FAT CLAY, stiff to	o hard, w/silt, sand,	2.0	18						
			P=3.5	Calca CH (	Fill)	avel, and organics.		12						
- ·			P=4.5+					13						
- 5 - -			P=4.5+											
			P=4.5					16						
- 10 -			P=4.0					15						
			P=2.25					15						
- 15 -							508.6							
			N=4-3-6	Tan a sear stair	nd gray FAT CLAY, hard, blo ns and partings, calcareous ing. CH (Midway)	ocky, w/sand, silt pockets, and ferrous	15.0	16						
			P=4.5+											
- 20 -			P=4.5+					27						
			P=4.5+					22						
- 25 -														
			P=4.5+				23							
							493.6							
Ge	otec	əs hr	nical .		DATE DRILLED: 12-3-18	1.0	rv⊑ f: P = Poc	ket P	enetro	meter				
Aust 512.	tin, TX 380.99	78 69	731		WATER LEVEL / SEEPAG	E:	N = Sta U = Unc	ndard confine	Penet d Con	ration npress	Test ( sion (ts	bpf) sf)	Plate	e 9a

LOG OF BORING NO. B-09												
NORTH EASTII	HING: NG: 2	13 239	3897786. 3149.057	230000 Plum Creek FRS No. 2 Caldwell County, TX PROJECT NO. 0118-039	21 (							
<b>DEPTH</b> , FT	SYMBOL	SAMPLES	POCKET PEN, tsf Blows/ft. REC./RQD, %	STRATUM DESCRIPTION	LAYER ELEV./ DEPTH	WATER CONTENT, %	LIQUID LIMIT, %	PLASTICITY INDEX, %	PASSING NO. 4 SIEVE, %	PASSING NO. 200 SIEVE, %	UNIT DRY WEIGHT, PCF	UNCONFINED STRENGTH TSF
				<ul> <li>NOTES:</li> <li>1. Boring was advanced dry to the 30-ft depth, and the borehole was dry upon completion.</li> <li>2. The boring was advanced using a truck mounted CME 75.</li> <li>3. Shelby tube samples were collected by the NRCS at 5-7.5 ft, and 18-20 ft.</li> </ul>	30.0							
- 40 -   												
- 45 -												
- 50   												
- 55 -   												
Balcones       COMPLETION DEPTH: 30.0       KEY:         Geotechnical       DATE DRILLED: 12-3-18       P = Pocket Penetrometer         Austin, TX 78731       Varter Level / SEEPAGE:       N = Standard Penetration Test (bp)         512.380.9969       UPON COMPLETION:       U = Unconfined Compression (tsf)								[bpf) sf)	Plate 9b			



Balcones Geotechnical Austin, TX 78731 512.380.9969



Balcones Geotechnical Austin, TX 78731 512.380.9969 Plum Creek FRS No. 21 Caldwell County, TX

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12/03/18 13 - 15 ft



12/03/18 15 - 16.5 ft



12/03/18 18 - 20 ft

## SAMPLE PHOTOGRAPHS – B-09

Balcones Geotechnical Austin, TX 78731 512.380.9969 Plum Creek FRS No. 21 Caldwell County, TX

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Balcones Geotechnical Austin, TX 78731 512.380.9969 Plum Creek FRS No. 21 Caldwell County, TX

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					LOG OF BORING NO.	B-301							
NORT EASTI	'HING: ING: 2	13 394	898193.8 994.979	84000 000	Plum Creek FRS No. 2 Caldwell County, TX PROJECT NO. 0118-039	21 K							
<b>DEPTH</b> , FT	SYMBOL	SAMPLES	POCKET PEN, tsf Blows/ft. REC./RQD, %	SUF	STRATUM DESCRIPTION	LAYER ELEV./ DEPTH	WATER CONTENT, %	LIQUID LIMIT, %	PLASTICITY INDEX, %	PASSING NO. 4 SIEVE, %	PASSING NO. 200 SIEVE, %	UNIT DRY WEIGHT, PCF	UNCONFINED STRENGTH TSF
			P=1.0	Dark gra	brown sandy FAT CLAY, medium, moist, w/trace vel. CH (Fill)		24						
			P=2.5				26						
- 5 -			P=4.5	Light slig	t brown, tan and gray FAT CLAY, stiff to hard, htly moist to moist, w/ferrous staining, calcareous	496.1 4.0	20						
			P=2.75	incl (All	usions, and silt partings and seams. CH uvium)	¥	21						
			P=3.5				22						
- 10 -				Tan	and gray FAT CLAY, stiff to hard, slightly moist to	490.1 10.0							
			D-4 5+	moi silt	ist, w/ferrous staining, calcareous inclusions, and partings and seams. CH (Midway)								
- 15 -			P=4.5+ N=3-6-10				26						
- ·			P=4.5+		2	¥	25						
- 20 -													
 				Dark fiss	gray CLAYSHALE, hard, dry to moist, laminated, ile, w/light gray silt seams and partings, and	478.1 22.0							
- 25 -			N=8-12-15	ferr	ous staining. (Midway)	475.1	24						
	-			NOT 1. B the upo	ES: oring was advanced dry to the 25-ft depth, and water level was measured at a depth of 18.92 ft on completion.	25.0							
				2. B equ	aring ariled using a track-mounted geoprobe hipped to obtain geotechnical samples.								
	otec	+5 hn 78	ical	$\searrow$	DATE DRILLED: 11-29-18 WATER LEVEL / SEEPAGE: 18.9	R = Poole N = Sta	cket P Indard	enetro Penet	meter	Test (	bpf)		
512.	380.99	69			UPON COMPLETION:	U = Un	confine	ed Con	npress	sion (ts	<sup>sf)</sup>   F	Plate	18a

						LOG OF BOR	NG NO.	B-301							
NORTI EASTI	HING: NG: 2	13 394	898193.8 994.979	84000( 000	0	Plum Creek Caldwell ( PROJECT N	FRS No. 2 County, TX 10. 0118-039	21 (							
<b>DEPTH, FT</b>	SYMBOL	SAMPLES	POCKET PEN, tsf Blows/ft. REC./RQD, %	SUF	STRAT	UM DESCRIPTION		LAYER ELEV./ DEPTH	WATER CONTENT, %	LIQUID LIMIT, %	PLASTICITY INDEX, %	PASSING NO. 4 SIEVE, %	PASSING NO. 200 SIEVE, %	UNIT DRY WEIGHT, PCF	UNCONFINED STRENGTH TSF
				3. W 11/29 dep 11/29 dep 11/30 dep 11/30 dep 11/30	Vater level reading 9/2018 13:55 wat oth, the borehole v 9/2018 14:20 wat oth, the borehole v 9/2018 16:49 wat oth, the borehole v 0/2018 8:46 wate oth, the borehole v 0/2018 15:26 wat oth, the borehole v 0/2018 15:30 the	gs: er was measured at th was open to 22.0 ft er was measured at th was open to 22.0 ft er was measured at th was open to 18.6 ft r was measured at the was open to 7.8 ft er was measured at th was open to 7.0 ft borehole was grouted	ne 18.9 ft ne 19.9 ft ne 8.6 ft e 5.9 ft ne 5.9 ft								
- 40  															
- 45 -  															
- 50 -   															
- 55 -   															
Bal Geo Aust 512.3	<b>CON</b> <b>Dtec</b> in, TX 380.99	es hn <sup>78</sup>	i <b>cal</b> <sup>731</sup>	∕—	COMPLETIO DATE DRILLI WATER LEVI UPON COMP	N DEPTH: 25.0 ED: 11-29-18 EL / SEEPAGE: 18.9 LETION:		KEY: P = Poc N = Sta U = Unc	ket P ndard confine	enetro Penet d Con	meter ration npress	Test ( sion (ts	bpf) sf)	Plate	e 18b



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Plum Creek FRS No. 21 Caldwell County, TX

Sheet 1 of 3



Balcones Geotechnical Austin, TX 78731 512.380.9969 Plum Creek FRS No. 21 Caldwell County, TX



11/29/18 18 - 20 ft



11/29/18 23.5 - 25 ft

# **SAMPLE PHOTOGRAPHS – B-301**

Plum Creek FRS No. 21 Caldwell County, TX

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					LOG OF BORING NO.	B-302							
NORT EASTI	HING: NG: 2	138 3941	98023.9	92000 000	Plum Creek FRS No. Caldwell County, TX PROJECT NO. 0118-039	21 X							
<b>DEPTH, FT</b>	SYMBOL	SAMPLES	POCKET PEN, tsf Blows/ft. REC./RQD, %	SUE		LAYER ELEV./ DEPTH	WATER CONTENT, %	LIQUID LIMIT, %	PLASTICITY INDEX, %	PASSING NO. 4 SIEVE, %	PASSING NO. 200 SIEVE, %	UNIT DRY WEIGHT, PCF	UNCONFINED STRENGTH TSF
			P=0.5	Dark orga	brown FAT CLAY, soft, very moist, w/roots, anics, and trace gravel. CH	501.8	19						
			=8-10-13	Tan den	CLAYEY GRAVEL with red clay, medium to use, wet, subangular to subrounded. GC (Leona)	2.0	8						
- 5 -			=10-18-15				6						
			=16-16-13 P=3.75	Tana	and gray FAT CLAY, stiff to hard, slightly moist	495.8	28						
- 10 -				w/fe	errous staining, calcareous inclusions, and silt tings and seams. CH (Midway)	0.0							
- ·			P=4.5+				26						
- 15 -													
- 20 -			P=4.5+			¥							
 		$\mathbf{x}$					28						
			V=8-9-11 P=4.5+	Dark	gray CLAYSHALE hard dry to moist laminated	479.8	20						
- 25 -				fiss ferr NOT	ile, w/light gray silt seams and partings, and ous staining. (Midway) ES:	- 478.8 25.0							
 	-			1. B the 2. B equ 3. W	oring was advanced dry to the 25-ft depth, and borehole was dry upon completion. oring drilled using a track-mounted geoprobe iipped to obtain geotechnical samples. /ater level readings:								
Ba	lcon otoc	es bri	cal		COMPLETION DEPTH: 25.0	KEY:	ket D	enetro	meter				
Aust	tin, TX	787	31	$\searrow$	WATER LEVEL / SEEPAGE:	N = Sta U = Un	indard	Penet ed Con	tration npress	Test ( sion (te	bpf) sf) 🗗		10-
512.	380.99	09			UPON COMPLETION:	5 01					·'/	<b>'late</b>	; 19a

						LOG (	OF BORING	g no. I	B-302							
NORTH	HING: NG: 2	138 394	398023.9 132.010	920000 000	)	PI	um Creek FR Caldwell Cou PROJECT NO. 0	RS No. 2 Inty, TX	21							
<b>DEPTH, FT</b>	SYMBOL	SAMPLES	POCKET PEN, tsf Blows/ft. REC./RQD, %	SUR	STR RF. ELEVATIO	ATUM DESC	RIPTION		LAYER ELEV./ DEPTH	WATER CONTENT, %	LIQUID LIMIT, %	PLASTICITY INDEX, %	PASSING NO. 4 SIEVE, %	PASSING NO. 200 SIEVE, %	UNIT DRY WEIGHT, PCF	UNCONFINED STRENGTH TSF
  - 35 				11/29 ft 11/29 ft 11/30 11/30 ft 11/30	9/2018 11:30 t 9/2018 16:42 t 0/2018 8:35 th 0/2018 16:25 t 0/2018 16:30 t	the borehole w the borehole w the borehole w the borehole w	was dry, open to was dry, open to as dry, open to was dry, open to was grouted	o 19.0 o 19.0 18.7 ft o 18.5								
  - 45																
- 50 -																
 - 55 																
Bal Geo Austi 512.3	<b>CON</b> <b>Dtec</b> in, TX 380.99	es hn <sup>787</sup> 69	<b>ical</b> <sup>731</sup>	∕—	COMPLET DATE DRI WATER L UPON CO	TION DEPTH: ILLED: 11-29 EVEL / SEEPA MPLETION:	25.0 -18 <b>AGE:</b>		KEY: P = Poc N = Sta U = Unc	ket Pondard	enetro Penet d Con	meter ration npress	Test ( sion (ts	bpf) sf)	Plate	e 19b



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Plum Creek FRS No. 21 Caldwell County, TX



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					LOG OF BORING NO.	B-60	1							
NORT EAST	'HING: ING: 2	13 395	898018.3 004.475	33000( 000	Plum Creek FRS No. Caldwell County, T PROJECT NO. 0118-039	21 X								
<b>DEPTH</b> , FT	SYMBOL	SAMPLES	POCKET PEN, tsf Blows/ft. REC./RQD, %	SUF	STRATUM DESCRIPTION	LAYE ELE\ DEP1	:R /./ TH	WATER CONTENT, %	LIQUID LIMIT, %	PLASTICITY INDEX, %	PASSING NO. 4 SIEVE, %	PASSING NO. 200 SIEVE, %	UNIT DRY WEIGHT, PCF	UNCONFINED STRENGTH TSF
-			P=1.25 P=1.75	Tan, sca	brown and gray FAT CLAY, stiff, w/sand, ttered gravel, and organics. CH (Fill)			24						
- 5 -						494	4.7							
-			P=4.0	Light slig incl (All	t brown, tan and gray FAT CLAY, stiff to hard, htly moist to moist, w/ferrous staining, calcareous usions, and silt partings and seams. CH uvium)	6	5.0 - -	18						
- 10 - - -			P=3.0	Tan a moi silt	and gray FAT CLAY, stiff to hard, slightly moist to ist, w/ferrous staining, calcareous inclusions, and partings and seams. CH (Midway)	490 10	).7 ).0							
- - 15 -			P=4.5			¥		23						
-			P=4.5+					22						
- - 20 - -			P=3.25											
-			P=4.5+	Dark fiss	gray CLAYSHALE, hard, dry to moist, laminated, ile, w/light gray silt seams and partings, and	477	7.7	24						
- 25 - - -				terr - we	ous staining. (Midway) at at 23 ft	474	4.7 6.0							
-	_			NOT 1. B the 2. B	ES: oring was advanced dry to the 26-ft depth, and borehole was dry upon completion. oring drilled using a track-mounted geoprobe									
Ba Ge Aus 512.	lcon otec tin, TX 380.99	95 hn 78 59	i <b>cal</b> <sup>731</sup>	∕—	COMPLETION DEPTH: 26.0 DATE DRILLED: 11-27-18 WATER LEVEL / SEEPAGE: UPON COMPLETION:	KEY P =   N = U =	/: Pock Stan Uncc	tet Po dard onfine	enetro Penet d Con	meter ration	Test ( sion (te	bpf) sf)	Plate	20a

				LOG OF BORING NO	. B-601							
NORT EASTI	HING: NG: 2	13	898018.3 5004.475	Plum Creek FRS No.           330000         Caldwell County, T           000         PROJECT NO. 0118-03	21 X 9							
DEPTH, FT	SYMBOL	SAMPLES	POCKET PEN, tsf Blows/ft. REC./RQD, %	SURF. ELEVATION: 501±	LAYER ELEV./ DEPTH	WATER CONTENT, %	LIQUID LIMIT, %	PLASTICITY INDEX, %	PASSING NO. 4 SIEVE, %	PASSING NO. 200 SIEVE, %	UNIT DRY WEIGHT, PCF	UNCONFINED STRENGTH TSF
				<ul> <li>equipped to obtain geotechnical samples.</li> <li>3. Shelby tube samples were collected by the NRCS at 5'-6.5', 10'-12.5', and 19'-20.5'.</li> <li>4. Water level readings: 11/27/2018 10:30 the borehole was dry and open to 23.0 ft 11/28/2018 12:50 water was measured at the 15 ft</li> </ul>								
- 35 -   				depth, the borehole was open to 19.0 ft 11/28/2018 17:10 water was measured at the 14.5 ft depth, the borehole was open to 19.0 ft 11/29/2018 7:45 water was measured at the 14.0 ft depth, the borehole was open to 18.8 ft 11/29/2018 16:33 water was measured at the 13.8 ft depth, the borehole was open to 18.6 ft								
- 40 -  				11/30/2018 8:28 water was measured at the 13.6 ft depth, the borehole was open to 18.7 ft 11/30/2018 12:53 water was measured at the 13.4 ft depth, the borehole was open to 18.5 ft 11/30/2018 13:29 the borehole was grouted								
- 45 -  												
- 50 - - 50 - 												
- 55 -  												
Bal Geo Aust 512.3	<b>CON</b> <b>OteC</b> in, TX 380.99	es hn 78	ical	COMPLETION DEPTH: 26.0 DATE DRILLED: 11-27-18 WATER LEVEL / SEEPAGE: UPON COMPLETION:	KEY: P = Poo N = Sta U = Un	cket P andard confine	enetro Penet ed Cor	ometer ration	Test ( sion (ts	bpf) sf)	Plate	e 20b



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						LOG O	F BORING NO	). B-6	02							
NORT EASTI	HING: ING: 2	1389 3947:	97945.6 32.1220	630000 000	)	Plu C P	m Creek FRS No aldwell County, <sup>-</sup> ROJECT NO. 0118-03	o. 21 TX <sup>39</sup>								
DEPTH, FT	SYMBOL	SAMPLES	PUCNET FEN, IST Blows/ft. REC./RQD, %	SUR	STRA	ATUM DESCF	RIPTION	LAY ELE DEP	′ER EV./ PTH	WATER CONTENT, %	LIQUID LIMIT, %	PLASTICITY INDEX, %	PASSING NO. 4 SIEVE, %	PASSING NO. 200 SIEVE, %	UNIT DRY WEIGHT, PCF	UNCONFINED STRENGTH TSF
			P=2.5	Dark scat CH	brown to brow ttered gravel, c (Fill)	n FAT CLAY, alcareous noo	very stiff, w/sand, dules and organics.			22						
			P=3.0							21						
- 5 -			P=4.5	Light	brown, tan and	d gray FAT CL	AY, stiff to hard,	49	90.0 5.0							
				sligh inclu (Allu	ntly moist to mo usions, and silt uvium)	oist, w/ferrous partings and	staining, calcareous seams. CH	S								
 			P=3.5							18						
- 10 - 			√=5-7-8	Tan a mois	and gray FAT ( st, w/ferrous st	CLAY, stiff to h aining, calcar	nard, slightly moist to	48 ⊃ ¥ 1 1	85.0 10.0	19						
			P=4.0	siit p	partings and se	eams. CH (Mi	dway)									
- 15 -		F	P=4.5+							24						
		F	P=4.5+							19						
- 20 -																
				Dark fissi	gray CLAYSH le, w/light gray	ALE, hard, dry silt seams an	<i>i</i> to moist, laminated d partings, and	47 1, 2	74.0 21.0							
 - ·			<u>?</u> =4.5+	ferro	ous staining.(	Midway)				22						
- 25 -			P=4.5+													
			:10-16-19							18						
Bal Ge Aust 512.	cone otecl tin, TX 380.990	35 1nio 7873 69		∕—	COMPLET DATE DRIL WATER LE UPON COM	ION DEPTH: 3 LED: 11-27-1 VEL / SEEPAC	5.0 8 <b>3E</b> :	KE P = N = U =	= Poc = Poc = Stai = Unc	ket Po ndard confine	enetro Penet d Con	meter ration npress	Test ( sion (ts	bpf) if)	Plate	21a

				LOG OF BORING NO.	B-602							
NORT EASTI	HING: 1 ING: 239	3897945.( )4732.122	63000 2000	<sup>0</sup> Plum Creek FRS No. 2 Caldwell County, TX PROJECT NO. 0118-039	21 (							
<b>DEPTH</b> , FT	SYMBOL	POCKET PEN, tsf Blows/ft. REC./RQD, %	SUI		LAYER ELEV./ DEPTH	WATER CONTENT, %	LIQUID LIMIT, %	PLASTICITY INDEX, %	PASSING NO. 4 SIEVE, %	PASSING NO. 200 SIEVE, %	UNIT DRY WEIGHT, PCF	UNCONFINED STRENGTH TSF
		8	Dark fiss ferr	TF. ELEVATION: 495± gray CLAYSHALE, hard, dry to moist, laminated, sile, w/light gray silt seams and partings, and rous staining. (Midway) <i>(continued)</i>								
		N=11-16-30			460.0	21						
			NOT 1. B the 2. B equ 3. S at 5 4. W 11/2 dep 11/2 dep 11/2 dep 11/2 dep 11/2 dep 11/2 dep 11/2 dep 11/2	ES: oring was advanced dry to the 35-ft depth, and borehole was dry upon completion. oring drilled using a track-mounted geoprobe ipped to obtain geotechnical samples. helby tube samples were collected by the NRCS 5'-7.5', 15'-17.5', and 25'-26'. Vater level readings: 7/2018 14:22 the borehole was dry and open to 0 ft 8/2018 12:47 water was measured at the 24.5 ft oth, the borehole was open to 28.0 ft 8/2018 17:00 water was measured at the 22.6 ft oth, the borehole was open to 27.4 ft 9/2018 7:50 water was measured at the 18.0 ft oth, the borehole was open to 25.9 ft 9/2018 16:28 water was measured at the 15.3 ft oth, the borehole was open to 24.3 ft 0/2018 8:25 water was measured at the 11.3 ft oth, the borehole was open to 22.6 ft 0/2018 13:31 water was measured at the 10.3 ft oth, the borehole was open to 21.8 ft 0/2018 13:55 the borehole was grouted	35.0							
	-											
Bal Geo Aust 512.	CONES Otech tin, TX 7 380.9969	<b>ical</b>	∕	COMPLETION DEPTH: 35.0 DATE DRILLED: 11-27-18 WATER LEVEL / SEEPAGE: UPON COMPLETION:	KEY: P = Poc N = Sta U = Unc	ket Po Indard	enetro Penet ed Cor	ometer ration	Test ( sion (te	bpf) sf)	Plate	e 21b



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Plum Creek FRS No. 21 Caldwell County, TX



11/27/18 10 - 11.5 ft



11/27/18 13.5 - 15 ft





11/27/18 15 - 17.5ft

## **SAMPLE PHOTOGRAPHS – B-602**

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#### Project No. 0118-039



11/27/18 17.5 - 19 ft



11/27/18 23 - 24 ft





11/27/18 25 - 26 ft

#### **SAMPLE PHOTOGRAPHS – B-602**

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				LOG OF BORING	g no.	B-603							
NORT EASTI	HING: ING: 2	13 394	897902.5 1499.168	50000     Plum Creek FF       50000     Caldwell Cou       000     PROJECT NO.	RS No. 2 unty, TX 0 <u>118-039</u>	21							
<b>DEPTH</b> , FT	SYMBOL	SAMPLES	POCKET PEN, tsf Blows/ft. REC./RQD, %	STRATUM DESCRIPTION		LAYER ELEV./ DEPTH	WATER CONTENT, %	LIQUID LIMIT, %	PLASTICITY INDEX, %	PASSING NO. 4 SIEVE, %	PASSING NO. 200 SIEVE, %	UNIT DRY WEIGHT, PCF	UNCONFINED STRENGTH TSF
			P=2.25 P=4.5	Brown to light brown FAT CLAY, very stiff to haw w/sand, scattered gravel, calcareous nodules few organics. CH (Fill)	ard, and		23						
 - 5 			P=4.5+			487.5	14						
			P=4.5+	Brown to grayish brown GRAVELLY FAT CLAN stiff, w/ clacareous nodules and pockets, suba to subrounded gravel, and sand. CH (Leona)	Y, very angular	7.0							
			N=8-10-10	Brown and gray FAT CLAY, stiff to hard, block	у,	_ 482.5 12.0	10						
 - 15 -			P=4.5+	slightly moist to moist, w/ferrous staining, cald inclusions, and silt partings and seams. CH (Midway)	careous		23						
 			P=4.5+										
- 20 -			P=4.5+										
			N=9-16-20	Dark gray CLAYSHALE, hard, dry to moist, lan fissile, w/light gray silt seams and partings, ar ferrous staining. (Midway)	ninated, nd	_ 472.5 22.0	23						
- 25 -			P=4.5										
			P=4.5+										
Bal Geo Aust 512.3	<b>CON</b> <b>otec</b> tin, TX 380.99	€S hn 78 69	i <b>cal</b>	COMPLETION DEPTH: 45.0 DATE DRILLED: 11-28-18 WATER LEVEL / SEEPAGE: UPON COMPLETION:		KEY: P = Poc N = Sta U = Unc	ket P ndard confine	enetro Penet d Con	meter ration npress	Test ( sion (ts	bpf) sf)	Plate	22a

							L	OG C	of Bor	RING NO	). B	8-603							
NORTI EASTI	HING: NG: 2	138 3944	397902.5 499.1680	55000 000	0			Plu C	um Cree Caldwell PROJECT	k FRS No County, 7 NO. 0118-03	). 21 FX 39	I							
<b>DEPTH</b> , FT	SYMBOL	SAMPLES	POCKET PEN, tsf Blows/ft. REC./RQD, %	SUF	RF. ELI	<b>STR</b> Evatio	<b>XATUN</b> N: 494	1 DESC	RIPTION		I	LAYER ELEV./ DEPTH	WATER CONTENT, %	LIQUID LIMIT, %	PLASTICITY INDEX, %	PASSING NO. 4 SIEVE, %	PASSING NO. 200 SIEVE, %	UNIT DRY WEIGHT, PCF	UNCONFINED STRENGTH TSF
 			P=4.5+	Dark fiss ferr - un	c gray ( sile, w/l rous sta actuous	CLAYSI ight gra aining. below	HALE, ly silt s (Midw 32 ft	hard, dr seams ai ay) <i>(con</i>	ry to moist nd parting ntinued)	t, laminated js, and	I,								
- 35			I=10-17-22										23						
 - 40	P=4.5+												25						
 													24						
- 45 -			=12-18-21								_	449.5 45.0	24						
  - 50	-			NOT 1. B the 2. B equ 3. S	ES: oring v boreh oring c uipped helby t	vas adv ole was Irilled u to obtai tube sai	ranced dry up sing a in geot mples	dry to th oon com track-m echnica were co	he 45-ft de opletion. ounted ge l samples ollected by	epth, and coprobe the NRCS									
	-			at 7 4. W 11/28 38.0	7.5'-8.5 Vater le 8/2018 0 ft	'', 15.5'- evel rea 17:54 1	17.5', dings: the boi	and 20'- rehole w	-21'. vas dry an	d open to									
 				11/29 37.0 11/29 37.9	9/2018 6 ft 9/2018 5 ft	7:53 th 16:22 t	the bore	ehole wa rehole w	as dry and vas dry an	open to d open to									
	55 -         37.5 ft           11/30/2018 8:16 the borehole was dry and oper           37.2 ft           11/30/2018 13:37 the borehole was dry and oper           36.3 ft																		
				11/3	0/2018	14:00	the boi	rehole w	vas groute	ed									
Bal Geo Aust 512.3	<b>CON</b> <b>Otec</b> in, TX 380.99	⊔ es hni <sup>787</sup> 69	ical	\	C D W U	OMPLE ATE DR ATER L PON CC	TION D ILLED: EVEL / DMPLE	DEPTH: 4 : 11-28- / SEEPA TION:	45.0 18 <b>.GE:</b>			KEY: P = Poc N = Sta U = Unc	ket P ndard	enetro Penet ed Cor	meter ration	Test ( sion (ts	bpf) sf)	Plate	e 22b



Balcones Geotechnical Austin, TX 78731 512.380.9969 Plum Creek FRS No. 21 Caldwell County, TX

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Balcones Geotechnical Austin, TX 78731 512.380.9969 Plum Creek FRS No. 21 Caldwell County, TX

#### Project No. 0118-039



3603

5

2

18.0-19.0

11/28/18 15.5 - 17.5 ft





11/28/18 20 - 21 ft

12

13

10

9

8

7

6

11

#### **SAMPLE PHOTOGRAPHS – B-603**

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Plum Creek FRS No. 21 Caldwell County, TX



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Balcones Geotechnical Austin, TX 78731 512.380.9969 Plum Creek FRS No. 21 Caldwell County, TX

Sheet 5 of 5

				LOG OF BORING NO.	B-604							
NORT EAST	'HING: ING: 2:	1389785	1.23000	Plum Creek FRS No. Caldwell County, TX PROJECT NO. 0118-039	21 X							
<b>DEPTH, FT</b>	SYMBOL	SAMPLES POCKET PEN, tsf Blows/ft. DEC /DOD %	SU		LAYER ELEV./ DEPTH	WATER CONTENT, %	LIQUID LIMIT, %	PLASTICITY INDEX, %	PASSING NO. 4 SIEVE, %	PASSING NO. 200 SIEVE, %	UNIT DRY WEIGHT, PCF	UNCONFINED STRENGTH TSF
		P=0.25	Brov	wn FAT CLAY, soft, moist, w/silt, sand, organics d trace gravel. CH (Fill)		23						
		N=7-11-	₂₅ Tan suł	and brown CLAYEY GRAVEL, medium dense, bangular to subrounded. GC (Leona)	498.6 3.0							
- 5 - -		N=3-6-	Tan 7 mo inc	and gray FAT CLAY, stiff to hard, blocky, slightly bist to moist, w/ferrous staining, calcareous lusions, and silt partings and seams. CH	490.0 5.0	19						
		P=4.54		uway)								
- 10 - -		P=4.54				22						
- · ·		P=4.5+				21						
		P=4.54										
- 		P=4.5+				22						
		P=4.5+	Dark	k grav CLAYSHALE hard, drv to moist laminated.	479.6							
		P=4.5+	fiss	sile, w/light gray silt seams and partings, and rous staining. (Midway)	22.0	23						
- 25 - - -		N=10-18-	18			24						
		N=10-17-	23			22						
Ba Ge Aus 512.	icone oteci tin, TX .380.990	es nnical <sup>78731</sup>	-/	COMPLETION DEPTH: 45.0 DATE DRILLED: 11-28-18 WATER LEVEL / SEEPAGE: UPON COMPLETION:	KEY: P = Poo N = Sta U = Uno	ket P Indard	enetro Penet ed Cor	meter ration	Test ( sion (ts	bpf) sf)	Plate	e 23a

				LOG OF BORING NO.	B-604							
NORT EASTI	HING: 1	3897851.2 4210.194	23000( 000	Plum Creek FRS No. 2 Caldwell County, TX PROJECT NO. 0118-039	21 K							
DEPTH, FT	SYMBOL	POCKET PEN, tsf Blows/ft. REC./RQD, %	SUF	STRATUM DESCRIPTION	LAYER ELEV./ DEPTH	WATER CONTENT, %	LIQUID LIMIT, %	PLASTICITY INDEX, %	PASSING NO. 4 SIEVE, %	PASSING NO. 200 SIEVE, %	UNIT DRY WEIGHT, PCF	UNCONFINED STRENGTH TSF
		P=4.5+	Dark fissi ferro - un	gray CLAYSHALE, hard, dry to moist, laminated, ile, w/light gray silt seams and partings, and ous staining. (Midway) ( <i>continued</i> ) <i>ctuous below 32 ft</i>								
- 35 - 												
 - 40 -		P=4.5+				23						
 		N=12-19-26			456.6	21						
 	-		NOT 1. B the 2. B equ	ES: oring was advanced dry to the 45-ft depth, and borehole was dry upon completion. oring drilled using a track-mounted geoprobe upped to obtain geotechnical samples. helpy tube samples were collected by the NRCS	45.0							
- 50 -  	-		3. 3 at 7 4. W 11/28 39.( 11/28 38.;	<ul> <li>'.5'-9', 15'-16', 20'-21', and 30'-31'.</li> <li>/ater level readings:</li> <li>8/2018 12:37 the borehole was dry and open to</li> <li>0 ft</li> <li>8/2018 16:55 the borehole was dry and open to</li> <li>5 ft</li> </ul>								
- 55 - 	-		11/29 38.4 11/29 38.4 11/30	9/2018 7:57 the borehole was dry and open to 4 ft 9/2018 16:19 the borehole was dry and open to 4 ft 0/2018 7:57 the borehole was dry and open to								
· ·	-		38.4 11/3( 38.( 11/3(	0/2018 14:10 the borehole was dry and open to 0 ft 0/2018 14:30 the borehole was grouted								
Ba Ge Aust 512.	<b>CONE</b> otechi tin, TX 7 380.9969	\$ nical 8731	∕—	COMPLETION DEPTH: 45.0 DATE DRILLED: 11-28-18 WATER LEVEL / SEEPAGE: UPON COMPLETION:	KEY: P = Poo N = Sta U = Uno	cket P Indard	enetro Penet ed Cor	ometer ration	Test ( sion (ts	bpf) sf) <b>F</b>	Plate	e 23b



Balcones Geotechnical Austin, TX 78731 512.380.9969 Plum Creek FRS No. 21 Caldwell County, TX

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Balcones Geotechnical Austin, TX 78731 512.380.9969 Plum Creek FRS No. 21 Caldwell County, TX





11/28/18 20 - 21 ft

# **SAMPLE PHOTOGRAPHS – B-604**

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Balcones Geotechnical Austin, TX 78731 512.380.9969

Plum Creek FRS No. 21 Caldwell County, TX
					LOG OF BORING NO.	B-605							
NORT EASTI	'HING: ING: 2	138 3937	97792.′ 17.358	11000 000	Plum Creek FRS No. Caldwell County, T PROJECT NO. 0118-039	21 X							
<b>DEPTH, FT</b>	SYMBOL	SAMPLES	POCKET PEN, tsf Blows/ft. REC./RQD, %	SUE		LAYER ELEV./ DEPTH	WATER CONTENT, %	LIQUID LIMIT, %	PLASTICITY INDEX, %	PASSING NO. 4 SIEVE, %	PASSING NO. 200 SIEVE, %	UNIT DRY WEIGHT, PCF	UNCONFINED STRENGTH TSF
 			P=1.5	Brow clac sub - lar	in to dark brown GRAVELLY FAT CLAY, stiff, w/ careous nodules and pockets, subangular to prounded gravel, and sand. CH (Leona) ge gravel at 1 ft		20						
 			=12-13-12	Brow den poc	vn and reddish brown CLAYEY GRAVEL, medium nse, subangular to subrounded, w/sand and clay skets. GC (Leona)	494.0 4.0							
		J				490 (							
P=3.75 Tan, brown and gray FAT CLAY, stiff to hard, blocky, slightly moist to moist, w/ferrous staining, calcareous inclusions, and silt partings and seams. CH													
P=4.5+ Slightly moist to moist, w/ferrous staining, calcareous inclusions, and silt partings and seams. CH (Midway)													
- 15 - 			P=4.5+				21						
			P=3.75				26						
- 20 - 			P=4.5+ P=4.5+				24						
- 25 -						473.0							
	-			NOT 1. B the 2. B equ 3. S	ES: oring was advanced dry to the 25-ft depth, and borehole was dry upon completion. oring drilled using a track-mounted geoprobe iipped to obtain geotechnical samples. helby tube samples were collected by the NRCS								
Ba	lcon	es .	ac!		COMPLETION DEPTH: 25.0	KEY:		on -1			_	_	
Ge Aust 512.	<b>018C</b> tin, TX 380.99	787 69	<b>Cal</b> 31	∕—	DATE DRILLED: 11-27-18 WATER LEVEL / SEEPAGE: UPON COMPLETION:	P = Pc N = St U = Ur	cket P andard confine	enetro Penet ed Cor	meter ration npress	Test ( sion (te	bpf) sf)	Plate	24a

				I	LOG OF BORING NO.	B-605							
NORTH EASTII	HING: NG: 2	13 2393	897792. 3717.358	10000 00	Plum Creek FRS No. 2 Caldwell County, TX PROJECT NO. 0118-039	21 (							
<b>DEPTH, FT</b>	SYMBOL	SAMPLES	POCKET PEN, tsf Blows/ft. REC./RQD, %	SURF. ELEVATION: 49		LAYER ELEV./ DEPTH	WATER CONTENT, %	LIQUID LIMIT, %	PLASTICITY INDEX, %	PASSING NO. 4 SIEVE, %	PASSING NO. 200 SIEVE, %	UNIT DRY WEIGHT, PCF	UNCONFINED STRENGTH TSF
				at 10'-11.5', and 20'-2 4. Water level readings 11/27/2018 17:20 the bo 21.0 ft 11/28/2018 12:31 the bo 21.0 ft 11/28/2018 16:50 the bo 21.0 ft 11/29/2018 8:01 the bor 21.0 ft 11/30/2018 16:15 the bo 21.0 ft 11/30/2018 15:55 the bo 21.0 ft 11/30/2018 16:00 the bo	22'. :: prehole was dry and open to prehole was dry and open to rehole was dry and open to orehole was dry and open to orehole was dry and open to orehole was grouted								
Bal Geo Austi 512.3	<b>CON</b> <b>Stec</b> in, TX 380.99	es hn 78 969	<b>ical</b>	COMPLETION DATE DRILLEE WATER LEVEL UPON COMPLI	DEPTH: 25.0 D: 11-27-18 - / SEEPAGE: ETION:	KEY: P = Poo N = Sta U = Uno	cket P Indard	enetro Penet ed Cor	meter ration	Test ( sion (te	bpf) sf) <b>F</b>	Plate	e 24b



Balcones Geotechnical Austin, TX 78731 512.380.9969 Plum Creek FRS No. 21 Caldwell County, TX



Balcones Geotechnical Austin, TX 78731 512.380.9969 Plum Creek FRS No. 21 Caldwell County, TX

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Balcones Geotechnical Austin, TX 78731 512.380.9969 Plum Creek FRS No. 21 Caldwell County, TX

Sheet 3 of 3

					LOG OF BORING NO.	B-606							
NORT EAST	'HING: ING: 2	13 394	897641.3 436.689	86000 000	Plum Creek FRS No. 2 Caldwell County, TX PROJECT NO. 0118-039	21 (							
<b>DEPTH, FT</b>	SYMBOL	SAMPLES	POCKET PEN, tsf Blows/ft. REC./RQD, %	SUF	STRATUM DESCRIPTION	LAYER ELEV./ DEPTH	WATER CONTENT, %	LIQUID LIMIT, %	PLASTICITY INDEX, %	PASSING NO. 4 SIEVE, %	PASSING NO. 200 SIEVE, %	UNIT DRY WEIGHT, PCF	UNCONFINED STRENGTH TSF
-			P=1.0	Dark org	a brown FAT CLAY, soft to stiff, moist, w/roots, anics, sand and trace gravel. CH		22						
-			P=1.5			489.9							
- 5 -			P=2.75 P=2.5	Tan, slig incl	brown and gray FAT CLAY, stiff to hard, blocky, htly moist to moist, w/ferrous staining, calcareous usions, and silt and fine sand partings and	4.0	18						
P=4.5+ - gravel seam at 8 ft													
- 10 -													
-		$\sim$					20						
- 15 -			N=8-11-15										
-			D ( 5)										
-			P=4.5+				21						
- 20 -						473.9 20.0							
	-			NOT 1. B the 2. B equ	ES: oring was advanced dry to the 20-ft depth, and borehole was dry upon completion. oring drilled using a track-mounted geoprobe upped to obtain geotechnical samples.								
- 25 - -	-			3. W 11/2 11. 11/3	Vater level readings: 9/2018 15:55 the borehole was dry and open to 1 ft 0/2018 8:11 the borehole was dry and open to								
-	-			11. 11/30 11.	1 ft 0/2018 16:53 the borehole was dry and open to 1 ft								
				11/3	0/2018 17:00 the borehole was grouted								
Ba Ge	lcon otec	es hn	ical	^	COMPLETION DEPTH: 20.0 DATE DRILLED: 11-29-18	KEY: P = Poo	ket P	enetro	meter				
Aus 512.	tin, TX 380.99	78 69	731		WATER LEVEL / SEEPAGE: UPON COMPLETION:	N = Sta U = Uno	indard confine	Penet ed Con	ration npress	Test ( sion (te	bpf) sf)	Plate	e 25



Balcones Geotechnical Austin, TX 78731 512.380.9969

#### Project No. 0118-039



11/29/18 13.5 - 15 ft



11/29/18 18 - 20 ft

#### **SAMPLE PHOTOGRAPHS – B-606**

Balcones Geotechnical Austin, TX 78731 512.380.9969 Plum Creek FRS No. 21 Caldwell County, TX

Sheet 2 of 2

				LOG OF BORING NO.	HA-01							
NORT EASTI	HING: NG: 23	13897§ 94484	986.7800 .018000	DOD Plum Creek FRS No. Caldwell County, T PROJECT NO. 0118-039	21 X							
DEPTH, FT	SYMBOL	SAMPLES POCKET PEN, tsf Blowe/ft	REC./RQD, %		LAYER ELEV./ DEPTH	WATER CONTENT, %	LIQUID LIMIT, %	PLASTICITY INDEX, %	PASSING NO. 4 SIEVE, %	PASSING NO. 200 SIEVE, %	UNIT DRY WEIGHT, PCF	UNCONFINED STRENGTH TSF
			Da	ark brown FAT CLAY, moist, w/roots. CH		24						
2 - - 2 -			Та	n and brown FAT CLAY, moist, sandy. CH	513.5 1.5	23						
						25						
- 4 -					510.0	27	52	28	100	95		
	-		NC	DTES:	5.0							
	-		1. b 2.	Boring was advanced dry to the 5-ft depth, and the orehole was dry upon completion. Soil samples were obtained using a hand auger.								
- 8 -	-											
	-											
Ba Ge Aust 512.	icone oteci tin, TX 380.996	9 <b>S</b> 1nica 78731 9	al	COMPLETION DEPTH: 5.0 DATE DRILLED: 1-9-19 WATER LEVEL / SEEPAGE: UPON COMPLETION:	KEY: P = Poo N = Sta U = Uno	cket P Indard confine	enetro Penet ed Con	ometer ration npress	Test ( sion (te	bpf) sf)	Plate	e 26





(1/9/19) 1 - 2 ft



(1/9/19) 2 - 3 ft



(1/9/19) 3 - 4 ft



(1/9/19) 4 - 5 ft

# **SAMPLE PHOTOGRAPHS – HAB-01**

Balcones Geotechnical Austin, TX 78731 512.380.9969 Plum Creek FRS No. 21 Caldwell County, TX

					LOG	OF BORING NO.	HA-02							
NORT EASTI	HING: NG: 23	138 943	97958.2 25.499	250000 000	1	Plum Creek FRS No. 2 Caldwell County, TX PROJECT NO. 0118-039	21 (							
<b>DEPTH</b> , FT	SYMBOL	SAMPLES	POCKET PEN, tsf Blows/ft. REC./RQD, %	SUR	STRATUM DES	SCRIPTION	LAYER ELEV./ DEPTH	WATER CONTENT, %	LIQUID LIMIT, %	PLASTICITY INDEX, %	PASSING NO. 4 SIEVE, %	PASSING NO. 200 SIEVE, %	UNIT DRY WEIGHT, PCF	UNCONFINED STRENGTH TSF
				Dark part	brown FAT CLAY, moist icles. CH	, w/roots and calcareous		20						
- 2 -				Tan a	nd gray FAT CLAY, moi	st, w/sand. CH	512.7	31						
		_						23						
- 4 -		_						21						
							509.2 5.0							
- 6 -	-			NOTI	ES:									
	-			1. Bo bore 2. So	bring was advanced dry t shole was dry upon comp bil samples were obtaine	o the 5-ft depth, and the detion. d using a hand auger.								
- 8 -	-													
	-													
	-													
Ba Ge Aust 512.	ICONE otech tin, TX 380.996	9 <b>S</b> 1ni 787 9	<b>cal</b>		COMPLETION DEPTH DATE DRILLED: 1-9- WATER LEVEL / SEE UPON COMPLETION	<b>I</b> : 5.0 19 <b>PAGE</b> : :	KEY: P = Poo N = Sta U = Uno	ket P ndard confine	enetro Penet ed Con	meter ration npress	Test ( sion (te	bpf) sf)	Plate	e 27





(1/9/19) 1 - 2 ft



(1/9/19) 3 - 4 ft



(1/9/19) 4 - 5 ft

### **SAMPLE PHOTOGRAPHS – HAB-02**

Balcones Geotechnical Austin, TX 78731 512.380.9969 Plum Creek FRS No. 21 Caldwell County, TX

				LOG OF BORING NO.	HA-03							
NORT EASTI	HING: ING: 23	13897932 94155.62	2.35000 ?7000	Plum Creek FRS No. Caldwell County, T PROJECT NO. 0118-03	21 X 9							
<b>DEPTH</b> , FT	SYMBOL	POCKET PEN, tsf Blows/ft. REC./R.OD. %	SU		LAYER ELEV./ DEPTH	WATER CONTENT, %	LIQUID LIMIT, %	PLASTICITY INDEX, %	PASSING NO. 4 SIEVE, %	PASSING NO. 200 SIEVE, %	UNIT DRY WEIGHT, PCF	UNCONFINED STRENGTH TSF
			Dark	and brown FAT CLAY, moist, w/roots. CH	514.6	20						
- 2 -						31						
 - 4		_	- sli	ightly calcareous, w/trace fine gravel below 3.5 ft	511.1	21						
			NOT 1. E bor 2. S	TES: Boring was advanced dry to the 5-ft depth, and the rehole was dry upon completion. Boil samples were obtained using a hand auger.	5.0							
- 8 -	-											
	-											
Ba Ge Aust 512.	lcone otech tin, TX 380.996	e <b>S</b> Inical <sup>78731</sup> 9	-//	COMPLETION DEPTH: 5.0 DATE DRILLED: 1-9-19 WATER LEVEL / SEEPAGE: UPON COMPLETION:	KEY: P = Poo N = Sta U = Uno	cket P andard confine	enetro Penet ed Con	ometer ration npress	Test ( sion (te	bpf) sf)	Plate	e 28





(1/9/19) 1 - 2 ft



(1/9/19) 2 - 3 ft



(1/9/19) 3 - 4 ft



(1/9/19) 4 - 5 ft

# **SAMPLE PHOTOGRAPHS – HAB-03**

Balcones Geotechnical Austin, TX 78731 512.380.9969 Plum Creek FRS No. 21 Caldwell County, TX

				LOG OF BORING NO.	HA-04							
NORT EAST	HING: ING: 23	138980 894471.	)51.2300 302000	<sup>00</sup> Plum Creek FRS No. Caldwell County, T PROJECT NO. 0118-039	21 X 9							
<b>DEPTH, FT</b>	SYMBOL	SAMPLES POCKET PEN, tsf Blows/ft.	REC./RQD, %		LAYER ELEV./ DEPTH	WATER CONTENT, %	LIQUID LIMIT, %	PLASTICITY INDEX, %	PASSING NO. 4 SIEVE, %	PASSING NO. 200 SIEVE, %	UNIT DRY WEIGHT, PCF	UNCONFINED STRENGTH TSF
			Dar	k brown and tan FAT CLAY, moist, w/roots. CH		29	70	44	100	95		
- 2 -			Tar	and brown FAT CLAY, moist, w/sand. CH	1.5	25						
						28						
- 4 -						29						
					510.3 5.0							
- 6 -	-		NO 1.   bc 2. \$	TES: Boring was advanced dry to the 5-ft depth, and the orehole was dry upon completion. Soil samples were obtained using a hand auger.								
- 8 -	_											
	_											
	-											
Ba Ge Aus 512.	ICONE otecl tin, TX 380.996	es nnica <sup>78731</sup>	<u>al_</u>	COMPLETION DEPTH: 5.0 DATE DRILLED: 1-9-19 WATER LEVEL / SEEPAGE: UPON COMPLETION:	KEY: P = Poo N = Sta U = Uno	cket P Indard confine	enetro Penet ed Cor	ometer tration npress	Test ( sion (ts	bpf) sf)	Plate	e 29





(1/9/19) 1 - 2 ft

(1/9/19) 3 - 4 ft



(1/9/19) 2 - 3 ft





(1/9/19) 4 - 5 ft

### **SAMPLE PHOTOGRAPHS – HAB-04**

Balcones Geotechnical Austin, TX 78731 512.380.9969 Plum Creek FRS No. 21 Caldwell County, TX

					LOG OF BORIN	g no.	HA-05							
NORTH EASTII	HING: NG: 23	138 943	98027.2 18.948	23000( 000	Plum Creek F Caldwell Co PROJECT NO.	RS No. 2 ounty, TX . 0118-039	21 (							
DEPTH, FT	SYMBOL	SAMPLES	POCKET PEN, tsf Blows/ft. REC./RQD, %	SUF			LAYER ELEV./ DEPTH	WATER CONTENT, %	LIQUID LIMIT, %	PLASTICITY INDEX, %	PASSING NO. 4 SIEVE, %	PASSING NO. 200 SIEVE, %	UNIT DRY WEIGHT, PCF	UNCONFINED STRENGTH TSF
				Dark	brown FAT CLAY, moist, sandy, w/roots	. CH	513.2	20						
				Tan a	and gray FAT CLAY, moist, w/silt and sar	nd. CH	- 1.0	22	46	25	100	81		
								25						
								27						
							_ 509.2	27						
							5.0							
				NOT 1. B bore 2. S	ES: oring was advanced dry to the 5-ft depth, ehole was dry upon completion. oil samples were obtained using a hand a	and the auger.								
8														
Bal Geo Austi 512.3	cone otech in, TX 380.996	es nni 787: 9	<b>cal</b> 31	$\searrow$	COMPLETION DEPTH: 5.0 DATE DRILLED: 1-9-19 WATER LEVEL / SEEPAGE:		KEY: P = Poc N = Sta U = Unc	ket P ndard confine	enetro Penet ed Con	meter ration	Test ( sion (ts	bpf) sf)	Plat	e 30





(1/9/19) 1 - 2 ft

(1/9/19) 3 - 4 ft



(1/9/19) 2 - 3 ft





(1/9/19) 4 - 5 ft

### **SAMPLE PHOTOGRAPHS – HAB-05**

Balcones Geotechnical Austin, TX 78731 512.380.9969 Plum Creek FRS No. 21 Caldwell County, TX

					LOG OF BORING NO	). HA-	-06							
NORT EAST	THING: ING: 23	138 3941	897992.2 148.567	200000 000	<sup>0</sup> Plum Creek FRS No Caldwell County, PROJECT NO. 0118-0	o. 21 TX <sup>39</sup>								
<b>DEPTH</b> , FT	SYMBOL	SAMPLES	POCKET PEN, tsf Blows/ft. REC./RQD, %	SUF	STRATUM DESCRIPTION	LAY ELE DEF	/ER EV./ PTH	WATER CONTENT, %	LIQUID LIMIT, %	PLASTICITY INDEX, %	PASSING NO. 4 SIEVE, %	PASSING NO. 200 SIEVE, %	UNIT DRY WEIGHT, PCF	UNCONFINED STRENGTH TSF
				Dark	brown FAT CLAY, moist, w/roots. CH	5,	15.5	18						
- 2 -				Tan a	and gray FAT CLAY, moist, w/silt and sand. CH		1.0	23						
							29							
- 4 -				- mc	oist at 3 ft			23						
						5′	11.5	23	48	25	99	85		
- 6 -	_			NOT	<b>F0</b> .		5.0							
	_			1. B bore 2. S	es. oring was advanced dry to the 5-ft depth, and the ehole was dry upon completion. oil samples were obtained using a hand auger.	e								
- 8 -	_													
	_													
	_													
Ba Ge <sup>Aus</sup>	lcone otecl	es nni 787	i <b>cal</b> ′31	∕—	COMPLETION DEPTH: 5.0 DATE DRILLED: 1-9-19 WATER LEVEL / SEEPAGE:	KE P = N =	EY: = Pocl = Star	ket Po ndard	enetro Penet	meter	Test (	bpf)		
512.	.380.996	59			UPON COMPLETION:	U =	- Unc	onine		npress	son (te	<sup>n)</sup>	Plate	e 31





(1/9/19) 1 - 2 ft

(1/9/19) 3 - 4 ft



(1/9/19) 2 - 3 ft





(1/9/19) 4 - 5 ft

# **SAMPLE PHOTOGRAPHS – HAB-06**

Balcones Geotechnical Austin, TX 78731 512.380.9969 Plum Creek FRS No. 21 Caldwell County, TX



1/10/2019 - DCP testing at HAB-4, upstream slope



1/10/2019 - DCP testing at HAB-2 and HAB-3, downstream slope

# Dynamic Cone Penetrometer (DCP) Site Photographs

Balcones Geotechnical Austin, TX 78731 512.380.9969 Plum Creek FRS No. 21 Caldwell County, TX



Sheet 2of 3



Sheet 3 of 3

**APPENDIX B** 

**Borrow Borings and Sample Photographs** 

					LOG OF BORING NO	D. B-1	01							
NORT EAST	"HING: ING: 2	138 3952	98797.3 214.085	37000 000	Plum Creek FRS No Caldwell County, PROJECT NO. 0118-0	o. 21 TX <sup>039</sup>								
<b>DEPTH, FT</b>	SYMBOL	SAMPLES	POCKET PEN, tsf Blows/ft. REC./RQD, %	SUF	STRATUM DESCRIPTION	LAY ELE DEP	ER V./ TH	WATER CONTENT, %	LIQUID LIMIT, %	PLASTICITY INDEX, %	PASSING NO. 4 SIEVE, %	PASSING NO. 200 SIEVE, %	UNIT DRY WEIGHT, PCF	UNCONFINED STRENGTH TSF
			P=0.5	Dark CH	brown FAT CLAY, moist, w/roots and organics.		0.2							
-			P=1.0	Light	t gray FAT CLAY, stiff, moist, w/sand, silt,		1.0							
-			P=2.0	oun										
-			P=2.5			49	96.8							
-			P=2.0	Tan silt ferr	and gray FAT CLAY, stiff to hard, blocky, w/sand seams and partings, calcareous pockets, and ous staining. CH (Midway)	d,	3.5							
- 5 -			P=2.0				·							
-			P=1.75											
-			P=2.75											
-			P=3.5											
-			P=4.5				0.0							
- 10 -						49	10.0							
-	-			NOT	ES: oring was advanced dry to the 10-ft depth, and									
-	-			the 2. S	borehole was dry upon completion. oil samples were obtained using direct-push									
-	-			geo 3. B	probe and auger cuttings. ulk soils samples were obtained from 0 to 4 ft ar	nd								
-	-			4 to 4. W	o 10 feet. /ater level readings:									
- 15 -	_			11/2	9/2018 17:25 the borehole was dry, open to 9.3 t 0/2018 08:48 the borehole was dry, open to 9.0 t 0/2018 17:10 the borehole was dry, open to 9.0 t	ft ft								
-	-			11/3	0/2018 17:10 the borehole was dry, open to 9.01 0/2018 17:20 the borehole was grouted									
-	-													
ŀ	-													
ŀ	-													
Ва	lcon	es			COMPLETION DEPTH: 10.0	KE	Y:							
	otec	hni 787	ical	$\sim$	DATE DRILLED: 11-29-18 WATER LEVEL / SEEPAGE:	P = N =	Poc Stai	ket P ndard	enetro Penet	meter	Test (	bpf)		
512.	.380.99	69			UPON COMPLETION:	U =	Unc	onfine	ed Cor	npress	sion (te	sf)	Plat	e 10



Balcones Geotechnical Austin, TX 78731 512.380.9969

Plum Creek FRS No. 21 Caldwell County, TX



Balcones Geotechnical Austin, TX 78731 512.380.9969

					LOG OF BORING NO.	B-102							
NORT EAST	'HING: ING: 2	13 395	898572. 238.506	50000 000	<sup>0</sup> Plum Creek FRS No. Caldwell County, T PROJECT NO. 0118-03	21 X 9							
DEPTH, FT	SYMBOL	SAMPLES	POCKET PEN, tsf Blows/ft. REC./RQD, %	SUF	STRATUM DESCRIPTION	LAYER ELEV./ DEPTH	WATER CONTENT, %	LIQUID LIMIT, %	PLASTICITY INDEX, %	PASSING NO. 4 SIEVE, %	PASSING NO. 200 SIEVE, %	UNIT DRY WEIGHT, PCF	UNCONFINED STRENGTH TSF
			P=1.75 P=3.50	Dark mo	grayish brown FAT CLAY, stiff to very stiff, ist, w/sand and organics. CH								
			P=3.25			497 8							
			P=2.25 P=1.25	Gray calo CH	<i>i</i> to light gray FAT CLAY, stiff, moist, w/sand, silt, careous pockets, scattered gravel and organics.	3.0							
- 5 -			P=0.75			¥							
P=1.00													
			P=1.50										
- 10 -			P=3.00			490.8							
- 15 -	-			NOT 1. B the 2. S gec 3. B 4 tc 4. W 11/2 11/3 dep	TES: Boring was advanced dry to the 10-ft depth, and borehole was dry upon completion. Boil samples were obtained using direct-push opprobe and auger cuttings. Bulk soils samples were obtained from 0 to 4 ft and to 10 feet. Water level readings: 6/2018 17:30 the borehole was dry, open to 9.0 ft 0/2018 17:20 water was measured at the 5.5 ft oth, the borehole was open to 5.7 ft	10.0							
	_												
Ba Ge Aus 512.	lcon otec tin, TX 380.99	es hn 78 69	i <b>cal</b> <sup>731</sup>	∕—	COMPLETION DEPTH: 10.0 DATE DRILLED: 11-26-18 WATER LEVEL / SEEPAGE: UPON COMPLETION:	KEY: P = Poo N = Sta U = Un	cket P andard confine	enetro Penet ed Cor	ometer tration npress	Test ( sion (ts	bpf) sf)	Plate	e 11



Balcones Geotechnical Austin, TX 78731 512.380.9969



Sheet 2 of 2

Austin, TX 78731 512.380.9969

Caldwell County, TX

					LOG	OF BORING NO.	B-104							
NORT EAST	'HING: ING: 2(	1389 39547	)8845.3 77.282	38000C 2000	)	Plum Creek FRS No. Caldwell County, T) PROJECT NO. 0118-039	21 X							
DEPTH, FT	SYMBOL	SAMPLES	REC./RQD, %	SUF	STRATUM DE	SCRIPTION	LAYER ELEV./ DEPTH	WATER CONTENT, %	LIQUID LIMIT, %	PLASTICITY INDEX, %	PASSING NO. 4 SIEVE, %	PASSING NO. 200 SIEVE, %	UNIT DRY WEIGHT, PCF	UNCONFINED STRENGTH TSF
		P	°=0.75	Brown w/sa	n to light brown FAT CLA and and organics. CH	AY, soft to stiff, moist,								
			P=1.5											
		P	°=1.75				499.7							
		F	P=3.5	Tan a belc	and gray FAT CLAY, very ow 5 ft, w/sand, silt seam	/ stiff to hard, blocky s and partings,	3.0							
		F	P=4.0	calc (Mic	areous pockets, and ferr Jway)	ous staining. CH								
- 5 -		F	P=3.0											
		F	P=3.0											
		P	>=3.25											
		P	°=4.5+											
10 -		P	°=4.5+				492.7							
							10.0							
				NOTE	ES: oring was advanced dry t	o the 10-ft depth, and								
				2. Sc	borehole was dry upon or oil samples were obtaine probe and auger cuttings	ompletion. d using direct-push								
				3. Bu	ulk soils samples were of 10 feet.	btained from 0 to 4 ft and								
- 15 -				4. W 11/29	ater level readings: 9/2018 16:55 the borehol	e was dry, open to 4.5 ft								
				11/30	)/2018 08:45 the borehold	e was dry, open to 4.5 tt								
-														
Ba Ge	Icone otecl	}s nni∉	cal _	۸	COMPLETION DEPTH DATE DRILLED: 11-:	<b>H:</b> 10.0 29-18	KEY: P = Poo	cket P	enetro	ometer		(h = = <b>f</b> )		
Aust 512.	tin, TX .380.996	7873 39	31	V	WATER LEVEL / SEE UPON COMPLETION	PAGE: :	N = Sta U = Uno	confine	Penet ed Cor	npress	sion (te	sf)	Plate	e 12





Balcones Geotechnical Austin, TX 78731 512.380.9969

				LOG OF BORING NO	). B-105										
Plum Creek FRS No. 21       NORTHING: 13898610.970000     Caldwell County, TX       EASTING: 2395505.782000     PROJECT NO. 0118-039															
<b>DEPTH</b> , FT	SYMBOL	SAMPLES POCKET PEN, tsf Blows/ft.	REC./RQD,%	STRATUM DESCRIPTION	LAYER ELEV./ DEPTH	WATER CONTENT, %	LIQUID LIMIT, %	PLASTICITY INDEX, %	PASSING NO. 4 SIEVE, %	PASSING NO. 200 SIEVE, %	UNIT DRY WEIGHT, PCF	UNCONFINED STRENGTH TSF			
		P=1	.0 Dar	k brown sandy FAT CLAY, moist, w/roots. CH											
		P=1.	<sup>25</sup> Ligł an	Light brown to reddish brown FAT CLAY, stiff, w/sand and scattered organics. CH	505.4 d 1.0										
		P=4.0													
-		P=3	.5												
- 5 -		P=4.	<sup>5+</sup> Tan	and gray FAT CLAY, very stiff to hard, w/sand, seams and partings, calcareous pockets, and	501.4 5.0										
-		P=4.5+		ferrous staining. CH (Midway)											
		P=4. P=4.	5+												
		P=4	.0		100.4										
- 10 -					496.4										
-	-		NO <sup>.</sup> 1. E	TES: Boring was advanced dry to the 10-ft depth, and e borehole was dry upon completion. Soil samples were obtained using direct-push eoprobe and auger cuttings. Bulk soils samples were obtained from 1 to 5.5 ft ad 5.5 to 10 feet.											
-			the 2. S ge												
-	-		3. E an												
- 15 -	_		4. (	26/2018 16:51 the borehole was dry, open to 9.0 f 30/2018 17:20 the borehole was dry, open to 8.2 f	t										
-	-			,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,, _,, _											
-	_														
-	-														
-	-														
Ba Ge	Balcones COMPLETION DEPTH: 10.0   Geotechnical Date Drilled: 11-26-18   Austin TX 70724 WATER LEVEL (SEEDACE)							KEY: P = Pocket Penetrometer N = Standard Penetration Test (bpf)							
512.380.9969 UPON COMPLETION:						U = Unconfined Compression (tsf) Plate 13									



Balcones Geotechnical Austin, TX 78731 512.380.9969



Balcones Geotechnical Austin, TX 78731 512.380.9969
			LOG OF BORING NO. B-107										
NORTH EASTII	HING: NG: 23	138 3942	98820.4 212.414	47000( 000	Plum Creek FRS No. Caldwell County, T PROJECT NO. 0118-039	21 X							
<b>DEPTH, FT</b>	SYMBOL	SAMPLES	POCKET PEN, tsf Blows/ft. REC./RQD, %	SUF	STRATUM DESCRIPTION	LAYER ELEV./ DEPTH	WATER CONTENT, %	LIQUID LIMIT, %	PLASTICITY INDEX, %	PASSING NO. 4 SIEVE, %	PASSING NO. 200 SIEVE, %	UNIT DRY WEIGHT, PCF	UNCONFINED STRENGTH TSF
			P=1.25 P=2.5 P=4.0 P=3.5	Dark stiff calc	brown to grayish brown FAT CLAY, stiff to very , moist, w/organics, sand, small gravel, and careous nodules. CH								
- 5 -	P=4.0 Light brown, gray and dark gray to hard, w/sand, silt seams and pockets, and ferrous staining.			Light to h poc	brown, gray and dark gray FAT CLAY, very stiff hard, w/sand, silt seams and partings, calcareous kets, and ferrous staining. CH (Midway)	495.8 4.0							
			P=4.5 P=4.5										
- 10 -			P=4.5			489.8							
  - 15 	15 - NOTES 1. Bori 1. Bori 1. Bori 1. Bori 1. Bori 2. Soil geopri 3. Bulk 3 to 10 4. Wat 11/26/2 11/26/2 11/26/2		NOT 1. B the 2. S geo 3. B 3 to 4. W 11/26 11/26	TES: Boring was advanced dry to the 10-ft depth, and e borehole was dry upon completion. Soil samples were obtained using direct-push eoprobe and auger cuttings. Bulk soils samples were obtained from 0 to 3 ft and to 10 feet. Water level readings: 26/2018 14:30 the borehole was dry, open to 9.0 ft 26/2018 14:59 the borehole was dry, open to 9.0 ft 26/2018 the borehole was bentonite plugged									
Bal Geo Austi 512.3	cone otech	es nni 787	ical	√	COMPLETION DEPTH: 10.0 DATE DRILLED: 11-26-18 WATER LEVEL / SEEPAGE:	KEY: P = Po N = Sta U = Un	cket P andard confine	enetro Penet ed Cor	ometer ration	Test (	bpf) sf)	Plat	e 14



Balcones Geotechnical Austin, TX 78731 512.380.9969



Balcones Geotechnical Austin, TX 78731 512.380.9969

LOG OF BORING NO. B-108																		
NORT EAST	'HING: ING: 2	13 394	899014. 284.459	75000 000	<sup>0</sup> Plum Creek FRS No Caldwell County, PROJECT NO. 0118-0	o. 21 TX <sup>039</sup>												
DEPTH, FT	SYMBOL	SAMPLES	POCKET PEN, tsf Blows/ft. REC./RQD, %	SUF	STRATUM DESCRIPTION	LAY ELE DEP	ER V./ TH	WATER CONTENT, %	LIQUID LIMIT, %	PLASTICITY INDEX, %	PASSING NO. 4 SIEVE, %	PASSING NO. 200 SIEVE, %	UNIT DRY WEIGHT, PCF	UNCONFINED STRENGTH TSF				
			P=1.0 P=1.25 P=2.5	Dark w/c	brown to black FAT CLAY, stiff, moist, alcareous nodules and scattered gravel. CH	49	97.0											
			P=3.25 P=4.0	Gray stiff	<i>r</i> ish brown to light brown FAT CLAY, stiff to very f, w/sand, calcareous nodules, and gravel. CH	49	3.0											
- 5 -			P=4.5+ P=3.75	Tan w/s anc	and gray FAT CLAY, very stiff to hard, blocky, and, silt seams and partings, calcareous pocket d ferrous staining. CH (Midway)	S,	5.0											
			P=4.5+															
- 10 -			P=4.5+			49	90.0 10.0											
	<ul> <li>NOTES:</li> <li>1. Boring was advanced dry to the 10-ft depth, a the borehole was dry upon completion.</li> <li>2. Soil samples were obtained using direct-push geoprobe and auger cuttings.</li> <li>3. Bulk soils samples were obtained from 0 to 3</li> </ul>			ES: boring was advanced dry to the 10-ft depth, and borehole was dry upon completion. boil samples were obtained using direct-push poprobe and auger cuttings. bulk soils samples were obtained from 0 to 3 ft ar	nd													
- 15 -	- 15 - 11/26 		4. W 11/2 11/2 11/2	3 to 10 feet. 4. Water level readings: 11/26/2018 13:50 the borehole was dry, open to 9.0 ft 11/26/2018 14:56 the borehole was dry, open to 9.0 ft 11/26/2018 15:00 the borehole was bentonite plugged							-							
- ·	-																	
	-				Γ													
Ba Ge Aus 512.	Icon otec tin, TX 380.99	es hn 78 <sup>°</sup> 69	i <b>cal</b> <sup>731</sup>	∕—	COMPLETION DEPTH: 10.0 DATE DRILLED: 11-26-18 WATER LEVEL / SEEPAGE: UPON COMPLETION:	KE P = N = U =	Y: Poc Sta Unc	ket P ndard confine	enetro Penet ed Cor	ometer tration npress	Test ( sion (ts	bpf) sf)	Plate	e 15				



Balcones Geotechnical Austin, TX 78731 512.380.9969



Balcones Geotechnical Austin, TX 78731 512.380.9969

	LOG OF BORING NO. B-109														
NORT EASTI	HING: NG: 2	138 394:	399203. 369.853	14000 000	0	Plum C Caldy PROJ	Creek FRS No. 2 well County, TX ECT NO. 0118-039	21							
DEPTH, FT	SYMBOL	SAMPLES	POCKET PEN, tsf Blows/ft. REC./RQD, %	SUF	STRA	TUM DESCRIPT	ION	LAYER ELEV./ DEPTH	WATER CONTENT, %	LIQUID LIMIT, %	PLASTICITY INDEX, %	PASSING NO. 4 SIEVE, %	PASSING NO. 200 SIEVE, %	UNIT DRY WEIGHT, PCF	UNCONFINED STRENGTH TSF
			P=0.5 P=0.5 P=1.25 P=4.0 P=4.5+ P=4.5+ P=4.5+ P=4.5+ P=4.5+	Dark moi Light han par CH - inc - tar	brown and gray ist, w/sand and o t brown, tan and d, blocky below tings, calcareous (Midway) clined fracture w/ nsitions to gray, b	ish brown FAT C calcareous nodule gray FAT CLAY, 5 ft, w/sand, silt s s pockets, and fe gypsum at 7.2 ft blocky at 7.5 ft	LAY, soft to stiff, es. CH very stiff to seams and rrous staining.	_ 497.7 3.0							
- 10 -				<ul> <li>NOTES:</li> <li>1. Boring was advanced dry to the the borehole was dry upon comp</li> <li>2. Soil samples were obtained usi geoprobe and auger cuttings.</li> <li>3. Bulk soils samples were obtain 4 to 10 feet.</li> <li>4. Water level readings:</li> <li>11/26/2018 13:23 the borehole wa 11/26/2018 14:54 the borehole wa 11/26/2018 15:00 the borehole wa</li> </ul>		aced dry to the 10 ry upon completic e obtained using r cuttings. s were obtained t ngs: borehole was dr borehole was dr borehole was b	0-ft depth, and on. direct-push from 0 to 4 ft and ry, open to 9.0 ft ry, open to 9.0 ft pentonite plugged	_ 490.7 10.0							
Bal Ge Aust 512.	icon otec tin, TX 380.99	95 hn 787 69	ical <sup>731</sup>	∕—	COMPLETIC DATE DRILL WATER LEV UPON COM	<b>DN DEPTH:</b> 10.0 LED: 11-26-18 /EL / SEEPAGE: PLETION:		KEY: P = Poc N = Sta U = Unc	ket P ndard confine	enetro Penet ed Con	meter ration npress	Test ( sion (te	bpf) sf)	Plate	e 16



Balcones Geotechnical Austin, TX 78731 512.380.9969



Balcones Geotechnical Austin, TX 78731 512.380.9969

	LOG OF BORING NO. B-110											
NORT EAST	THING: 1 ING: 239	3899070.4 4137.704	Plum Creek FRS No. 1460000Caldwell County, T000PROJECT NO. 0118-039	21 K								
DEPTH, FT	SYMBOL	POCKET PEN, tsf Blows/ft. REC./RQD, %	SURF. ELEVATION: 504±	LAYER ELEV./ DEPTH	WATER CONTENT, %	LIQUID LIMIT, %	PLASTICITY INDEX, %	PASSING NO. 4 SIEVE, %	PASSING NO. 200 SIEVE, %	UNIT DRY WEIGHT, PCF	UNCONFINED STRENGTH TSF	
		P=2.0	Dark brown FAT CLAY, stiff, w/sand, calcareous nodules, and organics. CH	503.1								
-		P=1.75 P=2.25	Light brown, tan and gray FAT CLAY, very stiff to hard, w/sand, calcareous pockets, ferrous staining, and cemented gravel. CH	1.0								
-		P=1.75 P=4.0										
- 5 -		P=2.5										
-		P=4.25										
		P=2.5	- Medium gravel sheared sample at 7 ft	496.1								
-	_		NOTES:	8.0								
- 10 -	-		1. Boring was advanced dry to the 8-ft depth, and the borehole was dry upon completion.									
-	-		<ol> <li>Soil samples were obtained using direct-push geoprobe and auger cuttings.</li> <li>Bulk soils samples were obtained from 0 to 3 ft and</li> </ol>									
-	-		3 to 8 feet. 4. Water level readings:									
-	-		11/26/2018 12:44 the borehole was dry, open to 6.0 ft 11/26/2018 14:50 the borehole was dry, open to 6.0 ft 11/26/2018 15:00 the borehole was bentonite plugged									
- 15 -												
-	_											
-	_											
-	-											
-	-											
Ва		⊥ }	COMPLETION DEPTH: 8.0	KEY:								
Ge Aus 512	otechr itin, TX 7 .380.9969	1ical 8731	V DATE DRILLED: 11-26-18 WATER LEVEL / SEEPAGE: UPON COMPLETION:	P = Poo N = Sta U = Uno	ket Po Indard confine	enetro Penet ed Con	meter ration npress	Test (I sion (ts	bpf) sf)	Plat	e 17	



Balcones Geotechnical Austin, TX 78731 512.380.9969



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21/18 Creck 21 11:29:1 B-101 0-4 -124 ark 2. 018 ark 2. 11-29 B-101 0-4' Ding R 5 7 9 PILA CREFK 21 11:29/1 0188-039 11:29/1 B-101 4-10' Plum Creek 2/ 4-10-Plum Creek 21 018-039 5-102 4-10 CIIE. C39 ing Greek a B-102 0-4-Plum Creek 21 Ong-cosq B-102









**APPENDIX C** 

**Piezometer Construction** 

Project No: 0118-039

Balcones Geotechnical Austin, TX 78731 512.380.9969



PIEZOMETER SCHEMATIC Plum Creek FRS No. 21

	STA	TE OF TEXAS	WELL R	EPC	ORT for Tra	acking #506561
Owner:	Plum	Creek Conservation	on District		Owner Well #	: <b>P4</b>
Address:	1101	W. San Antonio St			Grid #:	67-03-6
Well Location:	LOCKI	185			Latitude:	29° 57' 26.64" N
	Lock	nart, TX 78644			Longitude:	097° 39' 10.81" W
	6,600 130 fr on the dam e	feet east of the Shortage road. Piez contage road. Piez crest of the SCS on the north side c	I northbound to is located Reservoir 21 of the FM 118	I 5	Elevation:	524 ft. above sea leve
Well County:	Caldv	vell				
Type of Work:	New V	Vell			Proposed Us	e: <b>piezometer</b>
Borehole Compl	etion:	Sand packed	Bottom Dept	h (ft.)	Desc	ription (number of sacks & material.
Annular Seal Da	ta:	Top Depth (ft.)	Bottom Dept	h (ft.)	Desc	ription (number of sacks & material, Grout 3
		20	37.5			Bentonite 7
		37.5	60			Sand 13
Seal Meth	nod: <b>Tr</b>	emie		0	Distance to Prop	perty Line (ft.): <b>No Data</b>
Sealed	By: Dr	iller		Dist con	ance to Septic	Field or other amination (ft.): <b>No Data</b>
					Distance to Se	eptic Tank (ft.): <b>No Data</b>
					Method	of Verification: No Data
Surface Comple	tion:	Surface Slab Inst	alled		Sur	face Completion by Driller
Water Level:		No Data				
Packers:		No Data				
Type of Pump:		No Data				

Well Tests: No Test Data Specified

	Strata Depth (ft.)	Water Type		
Water Quality:	No Data	No Data		
		Chemical Analysis Made:	No	
	Did the driller know	vingly penetrate any strata which contained injurious constituents?:	Νο	
Certification Data:	The driller certified that th driller's direct supervision correct. The driller under the report(s) being return	he driller drilled this well (or the wel ) and that each and all of the state stood that failure to complete the r ed for completion and resubmittal.	l was drille ments he equired ite	ed under the rein are true and ems will result in
Company Information:	Austin Geo-Logic			
	1316 Ridgefield Loop Round Rock, TX 7866	5		
Driller Name:	Hamilton L. McRae	License N	lumber:	59656
Comments:	No Data			
Lith	nology:	(	Casing:	

#### DESCRIPTION & COLOR OF FORMATION MATERIAL

**BLANK PIPE & WELL SCREEN DATA** 

Top (ft.)	Bottom (ft.)	Description	Dla (in.)	Туре	Material	Sch./Gage	Top (ft.)	Bottom (ft.)
0	60	Silty clay	2	Riser	New Plastic (PVC)	40	0	40
			2	Screen	New Plastic (PVC)	40 0.010	40	60

#### IMPORTANT NOTICE FOR PERSONS HAVING WELLS DRILLED CONCERNING CONFIDENTIALITY

TEX. OCC. CODE Title 12, Chapter 1901.251, authorizes the owner (owner or the person for whom the well was drilled) to keep information in Well Reports confidential. The Department shall hold the contents of the well log confidential and not a matter of public record if it receives, by certified mail, a written request to do so from the owner.

Please include the report's Tracking Number on your written request.

**Texas Department of Licensing and Regulation** P.O. Box 12157 Austin, TX 78711 (512) 334-5540





PIEZOMETER SCHEMATIC Plum Creek FRS No. 21

				3
Owner:	Plum Creek Conserva	tion District	Owner Well #	*: <b>P6</b>
Address:	1101 W. San Antonio	St.	Grid #:	67-03-6
Wall Location:	LOCKhart, IX 78644		Latitude:	29° 57' 27.32" N
	Lockhart, TX 78644		Longitude:	097° 39' 06.46" W
	7,100 feet east of the 5 130 frontage road. Pi on the crest of the SC dam on the north side	SH northbound ezo is located S Reservoir 21 of the FM 1185	Elevation:	524 ft. above sea leve
Well County:	Caldwell			
Type of Work:	New Well		Proposed Us	e: <b>piezometer</b>
Borehole:	8		0	70
Drilling Start Date	: <b>2/27/2019</b> Drillin	ng End Date: 2/27/2	019	
Dorenoie.	8		0	70
Drilling Method:	Hollow Stem A	uger		
Borehole Complet	ion: Sand packed			
	Top Depth (ft.)	Bottom Depth (ft.)	Desc	cription (number of sacks & material
Annular Seal Data	l: <b>O</b>	35		Grout 6
	35	38		Bentonite 2
	38	70		Sand 18
Seal Metho	d: Tremie		Distance to Pro	perty Line (ft.): No Data
	VI Driller	D	stance to Septic	Field or other
Sealed E	y. Driller	C	oncentrated cont	amination (ft.): No Data
Sealed E	y. Driner	C	Distance to Se	amination (ft.): <b>No Data</b> eptic Tank (ft.): <b>No Data</b>
Sealed E	y. Driner	C	oncentrated cont Distance to So Method	amination (ft.): <b>No Data</b> eptic Tank (ft.): <b>No Data</b> of Verification: <b>No Data</b>
Sealed E Surface Completion	on: Surface Slab In	stalled	Distance to So Distance to So Method Su	amination (ft.): No Data eptic Tank (ft.): No Data of Verification: No Data rface Completion by Driller
Sealed E Surface Completio Water Level:	on: Surface Slab In	stalled	Distance to Se Distance to Se Method	amination (ft.): No Data eptic Tank (ft.): No Data of Verification: No Data face Completion by Driller
Sealed E Surface Completio Water Level: Packers:	on: Surface Slab In No Data No Data	c	Distance to So Distance to So Method Su	amination (ft.): No Data eptic Tank (ft.): No Data of Verification: No Data rface Completion by Driller

Well Tests: No Test Data Specified

	Strata Depth (ft.)	Water Type		
Water Quality:	No Data	No Data		
		Chemical Analysis Made:	No	
	Did the driller know	wingly penetrate any strata which contained injurious constituents?:	Νο	
Certification Data:	The driller certified that th driller's direct supervision correct. The driller under he report(s) being return	ne driller drilled this well (or the wel and that each and all of the state rstood that failure to complete the r ed for completion and resubmittal.	l was drille ments he equired ite	ed under the rein are true and ems will result in
Company Information:	Austin Geo-Logic			
	1316 Ridgefield Loop Round Rock, TX 7866	5		
Driller Name:	Hamilton L. McRae	License N	lumber:	59656
Comments:	No Data			
Lith	ology:	(	Casing:	

#### DESCRIPTION & COLOR OF FORMATION MATERIAL

**BLANK PIPE & WELL SCREEN DATA** 

Top (ft.)	Bottom (ft.)	Description	Dla (in.)	Туре	Material	Sch./Gage	Top (ft.)	Bottom (ft.)
0	60	Silty clay	2	Riser	New Plastic (PVC)	40	0	50
			2	Screen	New Plastic (PVC)	40 0.010	50	70

#### IMPORTANT NOTICE FOR PERSONS HAVING WELLS DRILLED CONCERNING CONFIDENTIALITY

TEX. OCC. CODE Title 12, Chapter 1901.251, authorizes the owner (owner or the person for whom the well was drilled) to keep information in Well Reports confidential. The Department shall hold the contents of the well log confidential and not a matter of public record if it receives, by certified mail, a written request to do so from the owner.

Please include the report's Tracking Number on your written request.

**Texas Department of Licensing and Regulation** P.O. Box 12157 Austin, TX 78711 (512) 334-5540