Geologic Investigation Report

Plum Creek Watershed FRS No. 2 Rehabilitation Design
Hays County, Texas

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1. Introduction

1.1 Project Overview

The Plum Creek Watershed Floodwater Retarding Structure (FRS) No. 2 (Plum Creek 2) is a single-purpose, zoned earthen embankment dam that was designed and constructed as a low hazard (class “a”) structure for the purpose of watershed protection and flood prevention. Plum Creek 2 was constructed in 1969 on Plum Creek, located about 1.5 miles east of Kyle, Texas (Hays County). The National Inventory of Dams (NID) Identification Number is TX01589.

Since original construction of the dam, residential and commercial structures, major highways, and utilities have been constructed downstream. As a result, catastrophic failure of the dam would result in property and infrastructure damages and potential loss of life. As such, the dam has been reclassified by the Natural Resources Conservation Service (NRCS) as a high hazard dam. The existing dam does not meet current conformance criteria and performance standards for high hazard dams.

The Texas State Soil and Water Conservation Board (TSSWCB) is assisting the local sponsors with rehabilitation of the dam. The TSSWCB has contracted with AECOM Technical Services, Inc. (AECOM) to provide geotechnical engineering services and to design proposed improvements that will rehabilitate the dam to meet high-hazard criteria. Development of the dam rehabilitation design will be in general accordance with the NRCS guidelines and criteria as documented in the NRCS National Engineering Handbook (NEH) and in the library of NRCS Technical Releases (TR). However, because the NRCS no longer has an existing agreement with the sponsor, the NRCS criteria no longer apply. The applicable engineering criteria governing development of the rehabilitation modifications are those in Chapter 299 of the Texas Administrative Code, as overseen by the Texas Commission on Environmental Quality's (TCEQ) Office of Dam Safety.

1.2 Proposed Modifications

The proposed rehabilitation of Plum Creek 2 is intended to mitigate identified dam safety deficiencies associated with the dam’s reclassification as a high hazard dam. The proposed modifications include the following major components:

- Widening the vegetated auxiliary spillway (ASW) channel from 150 feet to 250 feet;
- Raising the crest elevation of the existing ASW to Elevation (El.) 659.8 (approximately +1.15 feet);
- Abandoning the existing principal spillway (PSW) inlet riser and 24-inch diameter conduit;
- Installing a new PSW inlet riser with crest at El. 645.4, impact basin, and new 48-inch diameter conduit;
- Installing a filter/drainage diaphragm around the new PSW conduit to provide seepage control and for a preventative measure against internal piping erosion; and
- Constructing a 200-foot-wide structural spillway consisting of roller compacted concrete (RCC) with crest elevation at El. 658.6.

1.3 Purpose and Scope of Work

AECOM was contracted to perform a site-specific field Geologic Investigation (GI) and prepare a GI Report (GIR) of the findings and interpretations. The purpose of the GI is to collect geotechnical information about the following aspects of rehabilitation design:

- the existing earthen embankment fill material;
- foundation soils for construction of the proposed RCC auxiliary spillway, which will consist of a crest structure on the embankment, stepped chute structure on the downstream slope, and stilling basin at the downstream toe;
- erodibility of existing vegetated earthen ASW channel;
- required excavation for the construction of the proposed RCC spillway chute;
- required excavation for the widening of the existing ASW channel and the suitability of this material as dam embankment fill;
- the potential need for additional on-site borrow sources;
- proposed modifications to PSW structures including abandonment of the existing conduit pipe and demolition of the inlet and outlet structures; and
- installation of new PSW structures (inlet tower, conduit pipe, and impact basin) and a filter diaphragm.

Included in AECOM's scope is assignment of geotechnical laboratory testing, geotechnical engineering analyses, and preparation of a Soil Mechanics Report (SMR) which will be issued under separate cover.

1.4 Authorization

This Geologic Investigation Report was prepared by AECOM Technical Services, Inc. (AECOM) for the Texas State Soil and Water Conservation Board (TSSWCB) in accordance with the Statement of Work described in Work Order No. 79017-6-ESF and executed under the terms and conditions of Contract No. IDIQ-AECOM-2018-79017.

2. Site Description

2.1 Site Location

Plum Creek 2 is located in Hays County, Texas about 1.5 miles east of downtown Kyle, TX. The site is located 0.75 miles east of the intersection of IH-35 and Center Street and 1.75 miles south of the intersection of IH-35 and Bunton Rd. Access to the site is through the main entrance of Lake Kyle Park, on 700 Lehman Rd., Kyle, TX 78640. Within the site, access is mostly via pastures and dirt roads. A vicinity map of the site is provided in **Figure 1**.

2.2 Dam Description

Plum Creek 2 has a maximum dam height of 38 feet[1], a dam length of 2,588 feet, designed maximum storage capacity of 1,034 acre-feet[2], and is comprised of about 128,030 cubic yards of earth and rock fill[3]. Primary and auxiliary spillway discharges have a combined design value of 2,679 cubic feet per second (cfs)[4].

The dam is a zoned earthen embankment with a 14-foot wide crest, and 2.5H:1V upstream and downstream slopes. The as-builts indicate the maximum crest elevation is at El. 663.8[5] from original dam centerline stations (Sta.) 23+00 to Sta. 28+00 (i.e., overbuild allowance for settlement), and crest elevations of El. 662.9 and 662.8 at the left and right abutments, respectively. Current topographic survey performed for this project in 2019 indicates the current dam crest varies from about El. 661.2 to 662.4, suggesting apparent post-construction settlements on the order of about 1 to 3 feet across the crest. A 12-foot wide “local berm” at El. 647.5 is present on the upstream slope. A 20-foot wide “crossing berm” with top elevation at El. 635.4 is present at the downstream toe over the PSW conduit. A minimum 12-ft wide cutoff trench, extending to a maximum depth of about 8 feet and with 1H:1V side slopes was constructed at the dam centerline. The original geologic investigation report called for extending the cut-off through the upper alluvial clays, and to partially penetrate the shaley residual clays. The as-built profile suggests the cutoff trench typically extends 2 to 3 feet into the residual clays and a maximum depth of about 6 to 7 feet into residual clays near the original creek alignment.

The as-builts indicate two material zones were used in the embankment, designated as Zone 1 and Zone 2 as described as follows:

- Zone 1 materials were designated for the embankment core and cutoff trench and were prescribed to consist of non-calcareous, silty clays (CH) obtained from the on-site borrow area located in the present-day reservoir.
- Zone 2 materials were designated the upstream and downstream embankment slopes (shell zones). These materials were described as either silty fat clays (CH) from the designated borrow area, or non-calcareous, silty, clayey sand (SC) obtained from required excavations for the ASW channel.

Materials from both zones were specified to be placed in maximum 9-inch thick loose lifts and compacted to a minimum density. Compaction criteria for the silty fat clays (CH) from the borrow area were at least 85% of maximum dry density at a moisture content above optimum moisture per ASTM D1557 (Modified Proctor). Compaction criteria for the silty, clayey sand (SC) sourced

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[1] Based on As-Built Drawings dated May 28th,1969.
[2] Based on As-Built Drawings dated May 28th,1969 and NRCS Dam Assessment Report (Oct, 2010).
[3] Based on As-Built Drawings dated May 28th,1969 and NRCS Dam Assessment Report (Oct, 2010).
[4] Based on As-Built Drawings dated May 28th,1969.
[5] Elevations herein correspond to North American Vertical Datum of 1988 (NAVD88). A correction of +0.39 feet has been applied to elevations obtained from as-builts to convert from National Geodetic Vertical Datum of 1929 (NGVD) to NAVD88, and rounded to the nearest 0.1 feet.

from the ASW excavation spoils were at least 95 percent of maximum dry density at a moisture content above optimum moisture per ASTM D698 (Standard Proctor). The maximum allowable particle size for each material was specified as 6 inches.

The existing ASW consists of vegetated earthen channel located near the left abutment with the crest at El. 658.9. The channel is about 1,140 feet long and 150 feet wide. According to the as-builts, the ASW channel was generally excavated 1 to 8 feet below pre-construction grade to expose alluvial and residual clays. Review of aerial images available on Google Earth indicate the ASW channel was engaged during a storm event in October 2013. The 2018 inspection report (TCEQ, 2018) also indicates the ASW was engaged during another storm event in October 2015 which led to the formation of gullies within the ASW channel.

The existing PSW consists of an approximately 13-foot-tall concrete inlet structure, and a 210-foot long, 24-inch inside diameter (ID) conduit pipe discharging to a plunge basin. The crest of the inlet structure is located at El. 648.0 and it features four low-level ports (two in each side) at El. 640.4. A gated outlet is also provided on the inlet structure at El. 636.6. The PSW conduit pipe is supported on an unreinforced concrete cradle, and the discharge end of the PSW conduit is cantilevered and supported on a concrete column and shallow spread footing. Foundation support for the inlet and pipe cantilever consists of shallow footings, which measure 7.67-feet by 8.16-feet in plan for the inlet, and 3.5-feet by 3.5-feet in plan for the pipe cantilever. The PSW inlet tower, and majority of the conduit pipe, were constructed on compacted embankment fill with a maximum height of about 5-6 feet at the upstream end which gradually tapers to zero in the downstream direction. The downstream 4 or 5 pipe segments were constructed at or slightly below pre-construction grade. The PSW pipe cantilever footing was constructed on native alluvial or residual clays in an excavated trench extending to about 5-6 feet below pre-construction grades. The plunge basin is un-lined and was originally excavated into native soils. The PSW conduit was furnished with a series of five concrete anti-seep collars spaced at 200 feet center-to-center. No internal filter or drainage elements were recommended during original design, and are not present within the dam embankment according to the as-built drawings.

2.3 Geologic Setting

2.3.1 Physiography

The project site is located within the Blackland Prairies physiographic province. The Blackland Prairies are bounded by the Balcones Fault Zone (BFZ, also referred to as the Balcones Escarpment) to the west and north, which consists of a curved band of numerous major normal faults. The Blackland Prairies are a sub-province of the Gulf Coast Plains and the bedrock in this region is described as consisting mostly of chalks and marls which weather to deep, black, fertile clay soils. This sub-province is described to be underlain by Upper Cretaceous marine chalks, marls, limestones, and shales, which allowed for the development of the characteristic black, calcareous, clay soils. The province is also characterized by its low rolling terrain with beds tilted south and east (Wermund, 1996).

2.3.2 Geology

The Geologic Atlas of Texas, Seguin Sheet (Proctor et al., 1974) shows the mapped geologic unit underlying the project site as the late-Cretaceous Pecan Gap Chalk (“Kpg”). The geologic map is reproduced in **Figure 2**. The Pecan Gap Chalk is a formation of the Taylor Group, which also includes the Wolfe City Formation (“Kwc”) and the Ozan Formation (“Ko”), also referred to as “Lower Taylor Marl). The stratigraphic column of Central Texas is provided in **Figure 3.**

Young (1977) describes the Pecan Gap Chalk as a medium gray, chalky, or marly formation with calcium carbonate content ranging from about 25 to over 75 percent. The formation is composed of massive lower chalk which grades upward to a chalky marl with microgranular calcite in the clay matrix. Well-rounded quartz grains are common the lower portion. Insoluble residues include organic material, clay, and silt (TxDOT, 1966).

The Pecan Gap Chalk is typically medium gray, and weathers to a light gray to white color. The formation has a maximum thickness of approximately 200 feet in the vicinity of this site, and grades laterally to a marl in select locations (Proctor et al., 1974). Near the ground surface, the Pecan Gap Chalk weathers into a highly plastic, fat clay with significant potential for vertical movement as a result of changes in moisture content.

The Austin Chalk (Kau) unit is also mapped approximately 1 mile west of the project site. The Austin Chalk underlies the geologically younger Pecan Gap Chalk. This Cretaceous-aged unit is primarily composed of chalk and marl with a nearly 85 percent calcium carbonate content. It is grayish white to white in color with medium gray bentonitic seams and pyrite nodules. This unit is generally observed to form scarps on the land surface. Thicknesses range from 325 feet to 420 feet in this area.

The original 1967 GIR for this project reports the underlying geologic unit at the site to be the Taylor Group, but does not specify which formation is present. The interpretation of Pecan Gap Chalk Formation (Taylor Group) is also supported by data from the current investigation.

2.3.3 Soil Mapping

The NRCS Web Soil Survey database was examined to identify near-surface soils mapping of the site. The Web Soil Survey data is provided in **Appendix A**.

The mapped soil types within the vicinity of the dam areas are described as calcareous clayey alluvium and clayey residuum resulting from in-place weathering of the parent bedrock. Residuum soils are mapped at the abutments and the upper portions of the alluvial valley. Alluvium is mapped in the lower portions of the alluvial valley, approximately below El. 642± based on comparison to current topographic maps. Four specific soil units are mapped within the vicinity of the dam and spillway:

- Heiden clay, 1 to 3 percent slopes (HeB): clayey residuum
- Heiden clay, 3 to 5 percent slopes (HeD3): clayey residuum
- Lewisville silty clay, 1 to 3 percent slopes (LeB): calcareous clayey alluvium
- Tinn clay, 0 to 1 percent slopes (Tn): calcareous clayey alluvium

Typical index and physical properties indicate these materials generally classify as fat clay (CH) with less frequent silty lean clay (CL) according to the Unified Soil Classification System (USCS). The units described as residuum (HeB and HeD3) generally exhibit less of a range in plasticity relative to the alluvium; the liquid limit (LL) of the residuum can range from 50 to 80, and plasticity index (PI) can range from 30 to 55. In contrast, the alluvium has LL generally between 39 and 76, and PI between 18 and 49. Fines content (fraction finer than the U.S. #200 sieve by weight) is typically greater than 60 to 70 percent. Slightly higher clay content is typical in the residuum (40 to 60 percent) versus the alluvium (30 to 60 percent).

2.3.4 Structural Geology

The project site is located along the eastern fringes of the BFZ, the most prominent geologic feature in Central Texas which extends along the IH-35 corridor from San Antonio to Austin to Dallas. The BFZ is several miles wide, consisting of a series of sub-parallel normal faults generally trending northeast-southwest. Downward displacement of the BFZ is to the southeast, forming a series of stepped “echelon” faults.

The BFZ was most recently active about 15 million years ago during the Pliocene epoch, although most of the fault movement is believed to be during early Miocene. This activity was related to subsidence of the Texas Coastal Plain, most likely from seaward-progressing sediment load deposition from Texas rivers, cyclic progression/regression of the Gulf of Mexico, and consolidation of these sediments. The BFZ is in one of the lowest risk zones for earthquakes in the U.S., and is considered seismically inactive (Weeks, 1945).

2.3.5 Faulting

The major fault trend in Hays County is about N 45º E and the individual faults in the major fault zones strike between about N 35º E and N 50º E (DeCook,1963). Based on review of published geologic maps, no faults are mapped intersecting the project site. The nearest mapped faults are located approximately 1.5 miles east (San Marcos Springs fault) and 0.8 miles west of the site (Kyle fault), both of which are northeast-southwest trending normal faults likely associated with the BFZ and are not considered to be seismically active (see **Figure 2**). However, based on the proximity to the BFZ, it is possible that unmapped faults associated with that fault zone (i.e., northeast/southwest trending normal faults and/or secondary faulting) may be present and concealed by the overburden soils.

The San Marcos Springs fault is nearly 2.1 miles long, and forms the southeastern-most boundary of the Edwards limestone in Hays County. The fault branches into two primary faults near San Marcos, located about 7 miles south of Plum 2. The main (southern) branch of the fault has a strike of about N 40º E, and continues north and east of the Plum 2 site. The southern branch is reported to have more than 300 feet of fault displacement at San Marcos Springs (the second largest group of springs in Texas), where the upper part of the Edwards Limestone is thrown against part of the Austin Chalk. The magnitude of fault displacement of the southern branch tends to decrease towards the north. The northern branch only extends a short distance, and strikes about N 25º E toward Kyle (DeCook, 1963).

The Kyle fault marks the contact between the Pecan Gap Chalk and the Austin Chalk. The Kyle fault is a normal fault with a strike of about N 30º E, and is likely an extension of the San Marcos Springs fault, with approximate length of 2.4 miles in this area. The Kyle fault forms the southeastern boundary of the Edwards Aquifer from San Marcos to Buda, and extends through the city of Kyle. The fault is exposed along Plum Creek where it marks the contact between the Austin Chalk and the Pecan Gap Chalk. According to DeCook (1963), immediately northeast of Kyle (in the general area of interest for this project) the fault displacement is likely less than 50 feet.

According to the USGS Quaternary Fault and Fold Database, no Quaternary-active faults are present at the project site. The USGS database indicates the nearest Quaternary-active faults are the Gulf-margin normal faults, the western limits of which are located approximately 46 miles east of the project site. The Gulf-margin normal faults are described as a seaward-facing belt of poorly defined normal faults with low seismicity. This zone borders the northern Gulf of Mexico in westernmost Florida, southwestern Alabama, southern Mississippi, all of Louisiana, southernmost Arkansas, and eastern and southern Texas (Ewing and Lopez, 1991). Due to the large number of faults within this system, the Gulf Coast faults are divided into four groups in order to better represent regional differences. The Texas portion of the Gulf-margin normal faults dip varies widely, reported as 0º to 90º to either the southeast or northwest. The long term slip rate is less than 0.2 mm/year.

2.3.6 Seismicity and Earthquake Record

As required by the current NRCS Technical Release (TR) TR-210-60, a map of recent and historic earthquakes within a 100 kilometer (about 62 miles) radius of the site is provided in **Figures 4 through 6**. The figures present earthquake records from two different sources for comparison: 1) the University of Texas (TXEQ) database spanning a period from 1847 to 2014, and 2) the United States Geological Survey (USGS) database spanning a period from 1900 to 2016. Historic earthquakes are presented in terms of Moment Magnitude (M). Earthquakes with M<3 are not plotted due to the limited effects of such small earthquakes. Within the area of interest (100 km), the TXEQ database shows five recorded earthquakes which occurred as close as 15 miles northeast of the site (1902 in Creedmoor, TX), and as far as 50 miles northeast of Plum Creek 2 (1887 in Paige, TX). These earthquakes were of relatively low intensity, and are summarized below. The USGS database contained no historic earthquakes with M>4.1 within the area of interest. No earthquakes have been recorded in Hays County in either database.

TXEQ Earthquake ID	Year	Magnitude	City	County
1847Feb140200A	1847	3.6	Seguin	Guadalupe
1873May010430A	1873	3.1	Manor	Travis
1887Jan051757A	1887	4.1	Paige	Bastrop
1902Oct091900A	1902	3.9	Creedmoor	Travis
1984Aug080131A	1984	3.1	Spring Branch	Kendall

Prior to conducting the current field investigation, a screening-level analysis was performed to evaluate the potential need for specialized field investigation procedures to characterize seismic hazards (e.g., liquefaction, cyclic softening). The screening procedure was conducted according to Table 2-5 of the *National Engineering Handbook (NEH), Part 631, Chapter 2, Engineering Geologic Investigations* (NRCS 2012). Seismic hazard data for the site was obtained from the online USGS National Seismic Hazards Mapping Tool. Based on the deaggregation of seismic hazard, the Peak Ground Acceleration (PGA) for a site underlain by "soft rock" (i.e., C-D boundary) is 0.025g for the 2% in 50 year earthquake event (2,475-year return period) at the project site. The deaggregation data is provided in **Appendix B**. Sites with PGA less 0.10g for the 2,475-year event do not require specialized additional seismic field investigation, and therefore special field investigation procedures for seismic hazards at this site were found to be not necessary.

For design-level evaluations of seismic hazard, analyses of site seismicity should be conducted in accordance with the current version, NRCS TR-210-60 (2019). That analysis includes an evaluation of the design PGA based on the seismic site class and consequences of seismic failure of the dam, which may correspond to design PGA with earthquake return periods ranging from 1,000 and 10,000 years. Deaggregation data from the USGS database for additional return periods up to the 10,000-year event are provided in **Appendix B**. Further analysis of seismicity will be provided in the SMR.

2.3.7 Other Geologic Hazards

2.3.7.1 Karst

Although the Pecan Gap Chalk contains a relatively high percentage of calcareous material, the unit is not known for long-term dissolution capable of producing karst conditions. Zones of sinkhole development and other karst related features have not been identified at the project location. Therefore, karst risk is anticipated to be very low at this site.

2.3.7.2 Landslides

The project site is located in a relatively flat area with gentle, rolling hills. No landslides have been identified on or near the project site. Therefore, the risk of landslides is anticipated to be very low for this site.

2.4 Previous Site Investigations

2.4.1 Soil Conservation Service – 1967 Geologic Investigation

The original GI for design of the dam was conducted by the former Soil Conservation Service (SCS), a predecessor to NRCS, in May 1967 and summarized in a GI Report dated June 12, 1967 (SCS, 1967a). A plan of borings and subsurface profiles are contained in both the GIR and the as-built drawings (SCS, 1968). The investigation consisted of 12 borings along the dam centerline (holes No. 1 through 7 and 51 through 55); 8 borings along the auxiliary spillway (holes No. 251 through 258); 4 borings along the principal spillway alignment (holes No. 301 through 303 and hole No. 351); and 20 borings in a borrow area located in the present-day reservoir (Holes No. 151 through 170). Six exploratory borings (Holes No. 451 through 456) were also performed in the vicinity of the original creek channel.

The stratigraphy encountered in the borings was generally characterized as about 0 to 8 feet (up to 11 feet in the borrow area) of clayey Alluvium overlying Clayey Residuum. In accordance with the Unified Soil Classification System (USCS) the Alluvium was generally classified in the field as brown, stiff, silty fat clays (CH) and stiff, slightly calcareous, lean clays (CL) with a slight gravel content. Occasional sand and gravel lenses encountered were thicker near the left abutment down to depths of 8 to 11 feet near the interface with the underlying Residuum. The Alluvium thins towards the right abutment. The underlying Residuum was described as tan, stiff, shaley, residual clays of the Taylor Group (which includes the Pecan Gap Chalk formation), and was identified at depths generally ranging between about 1.5 and 8 feet. The Residuum was primarily classified in the field as a fat clay (CH), and generally ranged from about 5 to 17 feet thick. Below depths of about 15 feet in the left abutment and 24 feet in the floodplain, blue shale of the Taylor Group was encountered with a hardness rating of Hd 1 (very soft) to Hd 2 (soft).

It should be noted that the SCS (1967a) characterization of clayey Alluvium covering the majority of the project site differs from the interpretation provided on the NRCS Web Soil Survey database, discussed in **Section 2.3.3**, which maps Alluvium only in the lower portion of the creek valley along the original creek alignment with Residuum overlying the rest of the site.

Groundwater was not encountered during this investigation but was observed within the original stream channel. The GIR recommended the embankment cutoff trench be extended to depths of 3 to 7 feet below the original ground surface, lowest elevation at El. 626.1 (3 feet below original grade) along the centerline of the principal spillway and at El. 619.5 (6 feet below original grade) on the centerline of the embankment. No drainage measures were recommended.

The GIR recommended a zoned embankment with higher plastic clays (CH) reserved for the core and central portion of the embankment, and low plastic clays (CL) and silty clayey sands (SC) be placed in the outer shell of the dam including the crest, upstream slopes, and downstream slopes. A cutoff trench extending through the alluvial gravelly clays to the bottom of the shaley clays was recommended between approximately Sta. 21+00 and Sta. 31+00, in order to remove gravelly materials that may be more permeable and to control seepage in the foundation.

2.4.2 Soil Conservation Service – 1967 Soil Mechanics Report

The original soil mechanics report (SMR) for Plum Creek 2 was completed by SCS on July 18, 1967 (SCS, 1967b). The report contained results of laboratory testing on three (3) composite samples recovered from borings during the 1967 GI drilled in the borrow area and emergency spillway. Lab testing including gradation, Atterberg limits, soluble salts, specific gravity, and dispersion (double-hydrometer). Proctor compaction was also performed on remolded composite bulk samples. Index test results indicated one sample as clayey sand (SC) to sandy lean clay (CL), and the other two samples as fat clay (CH) materials. The liquid limit (LL) of the fat clay was 52 to 56, plasticity index (PI) was 32 to 34, and fines content was 77 to 90%. The clayey sand/sandy clay had LL of 28, PI of 13, and fines content of 48 to 64%. Double hydrometer testing indicated the soils are probably not dispersive. (12 to 21% dispersion).

The SMR concluded that the foundation soils underlying FRS No. 2 had overall low to very low permeability, and a cutoff trench extending below depths of dry weather shrinkage cracks was expected to provide adequate control of seepage through the foundation.

Excavation for the principal spillway conduit was recommended to the extent necessary to remove topsoil and roots, as well to provide adequate grade for the pipe. No recommendation was made in regard to reaching a specific foundation bearing elevation or stratum.

Embankment slopes of 2.5H:1V were recommended for a slope stability minimum safety factor of 2.0 based on total stress (consolidated-undrained) strength parameters. Effective stress strength parameters were not considered in the original dam design. As-built drawings show the recommended 2.5H:1V slopes were adopted into dam design and construction. Settlement corresponding to 2% of the height of the fill was expected; as such, the SMR recommended settlement allowance of 1 foot be added to the fill height during construction.

No groundwater table was encountered during the field GI and the SMR conclusions did not recommend any drainage measures.

2.4.3 NRCS – 2010 Dam Safety Inspection

A visual inspection of the dam was conducted on October 19, 2010 by NRCS and M&E Consultants as part of the dam assessment (NRCS, 2010). The inspection identified erosion on the upstream wave berm, which was obscured by overgrown vegetation. A void was observed under the principal spillway conduit cradle, which had been previously identified during NRCS dam safety inspection dated June 13, 2006.

Photographs in the inspection report depicted good vegetative coverage throughout the dam particularly within the ASW and the dam embankment. A stage recorder and rainfall recorded were identified on site during this inspection.

The 2010 inspection concluded that FRS No. 2 was performing as designed, but due to urban encroachment and the dam’s present deteriorated condition, it likely qualified for assistance through the watershed rehabilitation program. The watershed rehabilitation program is intended to bring this dam up to safety standards of high hazard dams.

3. Field Geologic Investigation

3.1 Geologic Reconnaissance

A limited geologic reconnaissance was conducted by an AECOM geologist during the field drilling program. The reconnaissance included prior desktop review of available data (as-built plans, aerial photos, topography, geologic maps, etc.), and a visual walk-over of the dam conducted in March 2020. Photographs taken during the geologic reconnaissance are presented in **Appendix C**.

In general, the dam appeared to be in relatively good condition. No visual evidence of slope instability or seepage was observed during the visual reconnaissance. The embankment crest was observed to be in good condition, with well-established vegetative covering throughout. However, grass was relatively high in some areas (more than 2 feet tall) which made it difficult to closely observe the ground surface around the dam. No wet areas or ponding were encountered during the site visit. The upstream slope of the dam near the water line appeared to be over-steepened due to wave erosion. A few animal burrows were observed on the upstream embankment slope near the weather monitoring instrumentation, and on the downstream slope. Rut marks were observed near the downstream toe of the dam likely resulting from vehicular and/or mowing equipment traffic. No instance of ponding was observed near the dam, but ponded water was noted on the access road to the site.

Some erosion was observed under the cradle of the principal spillway conduit. This area of erosion was observed in previous inspections and has been monitored by NRCS since at least 2006. High vegetative covering did not allow for closer inspection of the erosion area, but no evidence of structural distress was noted.

The 2020 walk-over was conducted during a relatively dry period, and the PSW inlet tower and debris racks were observed to be in good condition. Some debris and growing vegetation were observed on the upstream slope among the rock riprap protective layer, and should be removed.

3.2 Geologic Investigation Summary

AECOM conducted the first phase (Phase 1) of a geologic investigation (GI) for this project between December 2019 and January 2020. The Phase 1 GI was focused on general characterization of site stratigraphy and groundwater conditions to support rehabilitation design specific to the spillways and embankment modifications.

A second phase (Phase 2) of the GI was initiated following completion of preliminary design activities needed to identify the specified location for the proposed overtopping RCC spillway and outlet channel. The Phase 2 GI was a targeted investigation to characterize subsurface conditions for design of the overtopping RCC spillway, and was focused on evaluating bearing capacity, lateral earth pressures, swelling potential, compressibility, and piezometric levels. The field work for the Phase 2 began in September 2020 and was completed in October 2020.

The investigation was conducted in general accordance with the Field Investigation Plan (FIP) reviewed and approved by the TSSWCB. A total of thirty-six (36) conventional geotechnical borings and seven (7) hand auger borings were completed as part of this geologic investigation. Specific areas of proposed investigation are described below. The locations of the completed boreholes are shown on **Figure 7**. Locations and depths of the borings are also summarized in **Table 1**.

3.2.1 Embankment Crest

Six (6) test borings designated 8-19 through 12-19 and 15-19 were drilled along the existing embankment dam crest. The purpose of these borings was to characterize existing embankment materials, underlying foundation materials, and the phreatic surface through the embankment to support the embankment stability analysis and design of the new PSW structures (i.e. impact basin, inlet tower, and spillway conduit).

Two (2) additional borings, designated 13-20 and 14-20, were drilled during the supplemental investigation in the proposed location of the proposed RCC spillway. These borings were intended to further characterize foundation conditions under the RCC spillway slab and walls, assess material variability, and obtain samples for additional laboratory testing.

Disturbed soil samples were collected for index testing while relatively undisturbed samples (field extruded push tubes and laboratory extruded Shelby tubes) were collected for advanced laboratory testing (shear strength, consolidation, and dispersion potential).

3.2.2 Downstream Toe of the Embankment

Five (5) test borings designated 601-19 through 605-19 were drilled near the downstream toe of the dam. The purpose of these borings was to characterize foundation conditions to support the design of the proposed PSW structures (i.e. impact basin and spillway conduit) and internal drainage/filter layers.

Two additional borings, designated 702-20 and 703-20, were drilled during the supplemental investigation in the proposed location of the new RCC spillway. These borings were intended to further characterize subsurface conditions for the design of the proposed 200-foot-wide structural RCC spillway.

Disturbed soil samples were collected for index testing, and relatively undisturbed samples (field extruded push tubes and laboratory extruded Shelby tubes) were collected for advanced laboratory testing (shear strength, consolidation, swell potential, and dispersion potential).

3.2.3 Upstream toe of the Embankment

One (1) test boring, designated as 701-20, was drilled near the upstream toe of the dam. The purpose of this boring was to characterize upstream foundation conditions for embankment slope stability evaluation at the proposed RCC spillway location.

Disturbed soil samples were collected for index testing, and relatively undisturbed samples (field extruded push tubes and laboratory extruded Shelby tubes) were collected for advanced laboratory testing (shear strength, consolidation, swell potential, and dispersion potential).

3.2.4 Principal Spillway

Two (2) test borings (304-19 and 305-19) were drilled alongside the PSW alignment. Boring 304-19 was located on the local berm on the upstream embankment slope, while 305-19 was drilled at the downstream toe. The purpose of these borings was to provide design information for the proposed replacement of the existing PSW system with a new 48-inch I.D. conduit and inlet tower.

Disturbed soil samples were collected for index testing while relatively undisturbed samples were collected for advanced laboratory testing (shear strength, consolidation, and dispersion potential).

3.2.5 Auxiliary Spillway

Ten (10) test borings designated as 201-19 through 210-19 were drilled near within the existing ASW channel. The purpose of these borings was to characterize subsurface stratigraphy, and develop estimates of headcut erodibility indices and other soil parameters for SITES hydraulic analysis.

To develop estimates of the SITES analysis input parameters, representative samples of each geologic stratum were subjected to index testing (moisture content, Atterberg limits, sieve analysis with hydrometer), dispersion testing, and natural density and unconfined compression testing on relatively undisturbed tube samples (push and Shelby tubes).

3.2.6 Proposed Outlet Channel

Two (2) borings designated 401-20 and 402-20 were drilled within the proposed outlet channel alignment downstream of the dam between the end of the proposed stilling basin for the new RCC spillway and the existing creek. The borings were intended to characterize channel erodibility, and suitability of materials in the required excavation for use as embankment fill borrow source.

Disturbed and relatively undisturbed soil samples were collected for index testing and to delineate stratigraphy. Bulk samples were collected from the auger cuttings in select depth intervals to allow additional laboratory testing including index properties, moisture-density relationship (Standard Proctor compaction), and engineering properties on remolded samples (shear strength, etc.).

3.2.7 On-Site Borrow Area

An on-site borrow area was investigated for suitability as a potential source of embankment fill. Since the embankment crest will not be raised as part of the dam rehabilitation, a relatively small amount of fill was anticipated for the rehabilitation. Preliminary estimates of required borrow volume were on the order of 20,000 cubic yards (CY) or less.

Based on the estimated borrow requirements, six (6) test borings designated as 101-19 through 106-19 were completed in a potential on-site borrow area located on the left bank of the reservoir upstream of the dam embankment. Borings were advanced to maximum depths of 10 feet bgs or to auger refusal, whichever occurred first. Disturbed and relatively undisturbed soil samples were collected for index testing and to delineate stratigraphy. Bulk samples were also collected from the auger cuttings in select depth intervals to allow additional laboratory testing including index properties, moisture-density relationship (Standard Proctor compaction), and engineering properties on remolded samples (shear strength, etc.).

3.2.8 Embankment Slopes

Two (2) hand auger borings designated as 1301-19 and 1302-19 were drilled near the existing PSW alignment on the relatively steep embankment slope faces where drill rig access was not feasible. Five (5) additional borings, designated 1701-20 through 1705-20, were drilled on the upstream and downstream embankment slopes near the proposed location of the new RCC spillway. The purpose of these borings was to confirm whether embankment zoning was performed according to the as-built drawings by sampling soil types in the upstream and downstream shell zones of the dam. Disturbed samples were collected for subsequent laboratory index testing.

3.3 Staking, Utility Locates, and Survey

All borings locations were staked by the AECOM geologist or engineer prior to the beginning of drilling activities and were surveyed in the field by the CP&Y, Inc., project surveyors. The final drilled borehole locations, where different from the original surveyed locations, were re-staked by AECOM and subsequently re-surveyed by the surveyors. Surveyed elevations were measured with respect to the NAVD88 datum. Additional information regarding survey data can be found in the project Design Summary Report (DSR), which is submitted under separate cover.

AECOM notified Texas 811 utility location service as required by law prior to conducting drilling activities. The utility locate service did not find buried utilities in close proximity to the dam embankment, but did provide confirmation of the presence of a known former United Gas Corporation (now Pennzoil) high pressure gas line located at the right abutment approximately 50 feet beyond the right end of the dam. This gas pipeline was shown in the as-built drawings, but appears to have been relocated as part of original dam construction.

3.4 Soil Borings

3.4.1 Drilling Methods

Drilling and sampling activities were performed by Total Support Services (TSS) of Austin, Texas under subcontract to AECOM. AECOM provided full-time monitoring of field activities by a geologist or engineer working under the supervision of a Texas-licensed Professional Geologist (PG) and Texas-licensed Professional Geotechnical Engineer (PE).

Soil test borings were advanced using 3.25-inch inside diameter (ID) and 7.5-inch outside diameter (OD) hollow-stem auger (HSA) drilling methods. Consolidated materials requiring rock coring methods to advance borings were not encountered during the investigation. Soil samples were collected continuously in the upper 10 feet, and at maximum 5-foot intervals thereafter. A truck-mounted drill rig (CME-45B) was used for the first phase of the investigation in December 2019 and January 2020. A track-mounted drill rig (CME-55LC) was used for the second phase of the drilling in September and October 2020.

Hand auger borings on the embankment slopes were performed by TSS using a 3-inch OD hand-operated auger. A 5-foot extension rod was used to reach maximum drilling depths of 10 feet bgs. Grab samples from the cuttings were collected at typically 1- to 2-foot intervals or more frequently when changes in soil type were observed.

3.4.2 Sampling Methods

Sampling methods in conventional borings consisted of alternating Standard Penetration Testing (SPT), thin-wall Shelby tube sampling referred to as “Push Tubes (PT)” for field-extruded samples, and “Shelby Tubes (ST)” for tubes sealed in the field and extruded in the laboratory. For hand auger borings and some conventional borings, “grab (G)” samples were collected from auger cuttings at select depth intervals. Large volume “bulk” samples were collected from auger cuttings in select borings (e.g., 100-series borings) where materials were to be evaluated for suitability as potential embankment fill borrow.

The SPT sampling was conducted in general accordance with ASTM D1586. The number of blows required to advance the sampler a depth of 18 inches was counted for each 6-inch interval. The number of blows required to drive the sample the last 12 inches, referred to as the “N-value”, is recorded and reported in units of blows-per-foot. Practical refusal conditions were generally considered to be 50 blows or greater per 6 or less inches of penetration. An automatic trip hammer was used for the field investigation. TSS provided AECOM with a recent hammer energy calibration report from another project for one of two drill rigs used during the investigation (GRL

Engineers Inc, 2016). The calibration report indicates the energy transfer ratio of the hammer was approximately 80% for the CME-55LC rig (E_R=1.33). While a recent hammer energy calibration report was available for the CME-45b rig, AECOM's experience is that the energy transfer of most automatic hammers is typically about 80% (E_R=1.33) or higher. The hammer calibration report is presented in **Appendix D**.

Both PT and ST sampling was conducted using 3.0-inch OD, thin-wall Shelby tubes (ASTM D1587). Due to the relatively stiff soils, heavy-gauge Shelby tubes (e.g. 1/8-inch walls as opposed to the conventional 1/16-inch walls) were generally required for sampling. For economic reasons, the ST sampling was performed only in select intervals of fine-grained soils to collect relatively undisturbed samples for advanced laboratory testing. The ends of ST samples were sealed in the field to preserve moisture content and transported to the laboratory for subsequent sample extrusion. The PT samples were extruded in the field using a hydraulic jack and placed into resealable bags to preserve moisture content.

3.4.3 Borehole Logging and Sample Preservation

An AECOM geologist or engineer provided full-time monitoring of field drilling and sampling activities. The AECOM geologist or engineer prepared field boring logs, classified soil samples in the field, labeled, and packaged soil samples for transport.

Each soil sample was classified in the field based on the observed texture and plasticity in general accordance with the Unified Soil Classification System (USCS) and NRCS guidelines. Pocket penetrometer testing was performed on PT samples and the exposed end of ST samples. Pocket penetrometer testing was also performed on some of the recovered SPT samples to evaluate variations within the sample; however, they should not be relied upon since these tests were performed on -disturbed samples. Computer-generated logs of the borings are provided in **Appendix E**. Note that while the boring logs herein have been updated to include index test results, where available, from the SMR laboratory testing program, the USCS field classifications have not been modified in order to maintain consistency with the field classifications. A comparison of laboratory and field classifications is provided in the SMR, where available.

Recovered samples were photographed in the field prior to classification and sample preservation to maintain a visual record of the intact sample. Photographic logs of the recovered soil samples are provided in **Appendix F**.

The SPT, PT, and grab samples were placed in resealable plastic bags to minimize moisture loss and labeled for subsequent identification and testing. The bagged samples were placed into corrugated, waxed cardboard core boxes for storage and to reduce the extent of PT sample disturbance during transport. The ST samples were sealed with plastic end caps secured with electrical tape and were labeled for subsequent identification. Prior to sealing, foam packing and/or expandable packers were placed in the top end of the ST tubes to minimize sample movement. The ST samples were stored in the field and transported in an upright position with foam padding to minimize disturbance. The bulk samples were placed into large plastic bags or 5-gallon buckets.

3.4.4 Groundwater Measurements

An electronic water level indicator was used to measure groundwater depth during and at the end of drilling activities of each boring. Following the completion of a borehole and removal of the drill string, the majority of the drill holes were left open overnight prior to backfilling so that a static groundwater level ("24-hour" reading) and/or caving depth could be recorded. In some borings, several days of post-drilling monitoring was required before obtaining a static water level. Note that borings on the embankment were not left open/unsupported for an extended period of time due to the risk of caving within the embankment and were backfilled shortly after completion of drilling activities. A summary of groundwater measurements is provided in **Table 2**.

3.4.5 Borehole Backfilling

Test borings that were not completed as piezometers were abandoned by backfilling with cement-bentonite grout mixture (about 5% bentonite by weight of cement) tremied into the borehole from the bottom of the bore hole to the ground surface. Additionally, for boreholes located in plowed/cultivated fields, the upper approximately 2 feet was backfilled with soil auger cuttings. The use of excessive grout volumes was not observed during backfilling of the completed boreholes.

Hand auger borings on the embankment slopes were backfilled with either granulated bentonite chips or cement bentonite grout mixture. Logs of the borings are provided in **Appendix E**.

3.5 Piezometer Installations

Two (2) conventional stand-pipe piezometers, PZ-9-19 and PZ-11-19, were installed on the embankment crest. The PZ-9-19 was completed in the Residuum and screened within the Residuum and embankment cutoff trench materials at a depth between 14.5 and 34.5 feet below the current ground surface. PZ-11-19 was completed in the shale, and screened through the shale, residuum, and embankment cutoff trench between 34.5 and 59.5 feet below the ground surface. A third piezometer, designated 702-20, was installed at the downstream toe in the vicinity of the proposed RCC spillway stilling basin. Boring 702-20 was completed in the shale, and screened in both shale and residuum.

The piezometers consisted of 2.0-inch diameter Sch. 40 PVC well casing and slotted PVC well screen. Filter pack material consisting of 20/30 washed silica sand was placed in the borehole extending from one foot above and below the screened interval. A 1- to 5-foot thick seal of hydrated bentonite pellets was placed above each filter pack. Following bentonite hydration, the remainder of the annular space was tremie-grouted with cement-bentonite grout mixture. Surface completion consisted of a minimum 2-foot thick concrete surface seal and a traffic-rated flush-mount manhole. Piezometer construction diagrams are provided in **Appendix G**.

After each piezometer was installed water level readings were obtained immediately after installation, and in subsequent site visits in the months following the field investigation. No water was introduced in the boreholes during the drilling operations or completion of the piezometer, with the exception of hydrating the bentonite pellets. A summary of the groundwater readings is provided in **Table 2**. Supplemental groundwater measurements may be obtained from the piezometers over the course of the project design phase for use in slope stability and seepage analyses to be performed as part of the SMR.

3.6 Laboratory Testing

During the field investigation, the soil samples were periodically transported and delivered by AECOM staff to the geotechnical laboratory. TRI Environmental, Inc. (TRI) in Austin, Texas provided the laboratory geotechnical testing for this project. Laboratory test assignments were developed by AECOM and performed by TRI. The results of laboratory testing will be discussed in detail in the SMR.

4. Subsurface Conditions

4.1 Generalized Stratigraphy

Geologic profiles of the field investigation are presented in **Appendix H**. The profiles illustrate existing ground surface (from LIDAR and topographic survey data), preliminary design proposed grades, and abridged boring logs indicating field USCS classification, pocket penetrometer values, SPT N-values, and measured groundwater levels. Abridged logs from the original 1967 GI are also included on the embankment centerline profile.

The results of the current GI were generally consistent with that of the original 1967 GI as the borings encountered foundation materials consisting of a relatively thin, dark brown upper clayey layer (similar to that characterized as alluvium in the 1967 GI) overlying very stiff to hard, shaley clay residuum of the Pecan Gap Chalk (part of the Taylor Group) which then grades to highly weathered, weak calcareous shale with depth.

As noted previously, the interpreted geologic origin of the upper dark brown clayey layer differs between the 1967 GI and NRCS Web Soil Survey. Based on the NRCS Web Soil Survey mapping, the current borings were located in areas mapped as residuum (Heiden Clay)

Due to general site-wide similarities in visual appearance of the upper dark brown clay layer, similarities in description of the residual and alluvial clays within the NRCS Web Soil Survey and general lack of significant spatial differences in material properties of this material across the site in this layer (e.g., field pocket penetrometer and SPT), the “alluvium” interpretation was adopted herein to maintain consistency with the 1967 GI and for convenience.

The generalized stratigraphy is described in the following sections.

4.1.1 Embankment Fill

Compacted Embankment Fill materials were encountered in each of the borings drilled along the dam crest centerline (8-19 through 12-19, 13-20, 14-20, and 15-19) and on the upstream and downstream slopes of the embankment (304-19, 1301-19 through 1302-19, and 1701-20 through 1705-20). The Embankment Fill was classified in the field as predominantly a fat clay (CH) and medium-plastic lean to fat clay (CL-CH), with some intervals of lean clay (CL) and occasional clayey silt (ML). The color and materials characteristics of the Embankment Fill varied considerably, which was likely associated with the geologic origin of borrow sources used as fill material (i.e., residual or alluvial).

The intervals of Embankment Fill identified as fat clay (CH) were typically described as dark brown, black, or dark gray in color, with occasional tan to gray mottling. These intervals were typically moist to slightly moist, and generally stiff to hard in consistency. The material was observed to contain trace to some organics, trace fine subangular to rounded gravel typically about ¼ to ½ inch in diameter, and trace calcareous nodules and shell fragments.

The intervals of Embankment Fill identified as medium-plastic clay (CL-CH), silty lean clay (CL), or clayey silt (ML) were typically light gray, light brown, tan, and/or orange in color with occasional iron oxidation staining. These intervals were typically dry to moist, very stiff to hard in consistency, and in some cases chalky and/or friable. The materials contained trace to some fine to coarse gravel, trace to abundant calcareous nodules and calcite crystals, and typically had a strong reaction to hydrochloric acid (HCl).

Embankment Fill encountered in the upstream and downstream slopes of the embankment was largely similar to that encountered along the centerline, indicating that similar materials were used to construct both the core and shell zones of the dam.

4.1.2 Downstream Fill

Suspected Downstream Fill materials up to about 8 feet thick were encountered in boring 305-19, which was drilled on the PSW crossing berm at the downstream toe. These materials were identified as fill material based on the mixed composition and color of the recovered samples, proximity to the original stream channel where PSW excavation and backfilling areas are indicated on the as-built drawings, and comparison of pre-construction and existing topographic data. The extent of fill likely extends left of 305-19 to at least the designated “waste area” limits shown on the as-built drawings, which are located in the old channel alignment near Sta. 23+00 and corresponds to the left-most extent of the crossing berm. The right extent of the Downstream Fill is likely near Sta. 28+00, where the as-builts show the right-most extent the crossing berm. While boring 603-19 was drilled within these station limits, it appears to have been drilled just downstream of the fill area based on visual characteristics of the material and examination of topographic data.

The Downstream Fill was classified in the field as a fat clay (CH) and medium-plastic clay (CL-CH). It was described as very stiff to hard, moist to dry, with trace to some subangular fine to coarse gravel up to 1.5 inches in diameter. Trace to some organic matter was also present.

4.1.3 Alluvium

Alluvium consists of natural soils developed by floodplain deposition. The Alluvium at this site was identified as a relatively thin, dark brown clayey layer present across much of the project area ranging from about 2 to 8 feet in thickness (where present). Given the relatively broad, low-energy creek valley and predominantly fine-grained soils, there were limited visual indicators of obvious alluvial deposition. It was difficult to clearly discern geologic origin, particularly given the previous ground-disturbing activities at the site.

Alluvium appeared to have been encountered in the proposed borrow area borings (101-19 through 106-19), the ASW borings (201-19 through 210-19), the downstream toe borings (601-19 through 605-19, 702-20, and 703-20), proposed outlet channel borings (401-20 and 402-20), and upstream toe boring 701-19. As indicated in the as-built drawings, the Alluvium appears to have been removed from under the embankment centerline to construct the cutoff trench.

The Alluvium was classified in the field as a high-plastic fat clay (CH). It was described as dark brown, brown, and/or black in color, and typically moist, and stiff to very hard. The Alluvium contained trace to abundant organics, trace to some fine to coarse subrounded to subangular gravel, calcareous nodules and inclusions, iron oxidation staining, and trace shell fragments.

4.1.4 Residuum

Residuum consists of natural soils derived from in-place weathering of the parent Pecan Gap Chalk formation. Residuum was encountered in each boring drilled for the project, except most of the embankment slope borings (1301-19, 1302-19, 1701-20 through 1704-20, and 1705-20).

The Residuum was classified in the field primarily as a medium- to highly plastic, lean to fat clay (CL-CH) and fat clay (CH). However, a significant proportion of the Residuum was classified as a low-plasticity, silty to sandy lean clay (CL) and clayey silt (CL-ML), with some instances of non-plastic silty sand (SM) in the ASW borings.

The Low Plasticity Residuum (LPR) was typically described as light gray, gray, light brown, or tan in color with fine to coarse sand and gravel. The unit was dry to moist, hard, and friable with abundant calcareous material and has a strong reaction to HCl. The LPR was primarily encountered in the upper elevations of ASW borings between about EL. 645 and 655 with a maximum thickness of about 10 feet. Near the dam embankment, the LPR was encountered in both upstream borings (304-19 and 701-19) and upstream borrow area borings (101-19 through

106-19), and downstream toe borings located near the left abutment (601-19 and 602-19) and the right abutment (605-19). The thickness ranged from about 4 feet in the borrow area to nearly 20 feet at the abutments.

The Medium to High Plasticity Residuum (MPR) was typically described as tan and/or light gray in color, becoming increasingly more gray with depth in the less-weathered intervals. The unit was moist and very stiff to hard in consistency, becoming increasingly dry and hard with depth. The weathered upper zones contained trace fine gravel, iron oxidation staining, calcareous inclusions, gypsum crystals, occasional shell fossil imprints, and trace black specks interpreted as manganese oxide. Reaction with hydrochloric acid ranged from slight to strong, indicating appreciable calcareous content of the clays consistent with published information of the Pecan Gap Chalk formation. With depth, the Residuum became increasingly blocky in structure, with instances of very narrow to closed near-vertical fissures that were in some cases oriented in multiple directions (i.e., similar to orthogonal joint sets in rock).

4.1.5 Shale

Bedrock consisting of moderately- to highly-weathered, calcareous shale with occasional chalky marl layers and partings was encountered below the Residuum. The shale was described as light gray to white in color, dry, extremely weak to weak, fine grained, fissile, and friable with strong reaction to HCl. Occasional pyrite and gypsum crystals were noted. Based on published data and sample appearance, the bedrock was judged to be part of the Pecan Gap Chalk formation because of the presence of abundant calcite in the clay matrix and the light gray to white color, both characteristic weathering features of this formation (Barnes, 1979).

4.2 Centerline of Embankment Crest

4.2.1 Stratigraphy

Borings drilled along the centerline of the embankment crest included 8-19 through 12-19, 13-20 through 14-20, and 15-19. Ground surface elevations along the embankment crest ranged from El. 661.2 to 662.4. Total depth of the borings ranged from 30.0 to 60.0 feet bgs. Stratigraphy along the embankment centerline consisted of 8 to 40 feet of Embankment Fill overlying Residuum. Calcareous shale was encountered below the Residuum in borings 11-19, 12-19, 13-20 and 15-19, while the other borings terminated in Residuum. Thickness of the Residuum where fully penetrated ranged from about 15 to 17 feet. The Embankment Fill encountered in boreholes drilled along the dam centerline included cutoff trench materials below surrounding grade, penetrating through Alluvium and into Residuum. The uncorrected field SPT N-values in the Embankment Fill ranged from 8 to 25 blow-per-foot (bpf), with an average of 17 bpf. Pocket penetrometer values ranged from 1.0 to 4.5+ tons-per-square foot (tsf), with most values greater than 2.0 tsf.

The encountered Residuum appeared to be the MPR with field descriptions of light brown to tan and gray, dry to moist, stiff to hard, blocky fat clays (CH) and lean to fat clays (CL-CH), with some lean clay (CL) in boring 12-19. Top elevation of the Residuum ranged from about El. 655 near the left abutment to El. 623 in the lower creek valley near and to the right of the PSW. The uncorrected SPT N-value ranged from 17 bpf to 34 bpf, and pocket penetrometer values generally between 2.5 tsf and 4.5+ tsf.

The underlying shale was encountered at elevations ranging from about El. 622 in the middle of the creek valley down to about El. 608 near the PSW in the lower part of the valley. The upper zone of the shale at the transition from Residuum encountered in borings in 13-20 and 15-19 was dark gray and weathered to a hard clay (classified as CH and CL-CH) with uncorrected SPT N-values of 32 and 70 bpf. At the lower elevations in borings 11-19 and 12-19, the shale was observed to be white to light gray, dry, weak rock that was highly calcareous, highly weathered, and fissile. The SPT N-values ranged from 50 blows for 2 to 3 inches of penetration (50/2” to 50/3”).

4.2.2 Groundwater

Groundwater was encountered at the time of drilling in boring 8-19 at 18.5 feet bgs (El. 643.7) and in boring 11-19 at 27.5 feet bgs (El. 633.7). Boreholes drilled on the embankment crest were backfilled after drilling in order to reduce the likelihood of caving during the collection of delayed groundwater readings. Prior to backfilling, the water level in 8-19 dropped to 28.1 feet bgs (El. 634.1).

Borings 9-19 and 11-19 were completed as piezometers, and a series of groundwater readings were collected between January and October 2020 (see **Table 2**). Both piezometers were screened across the Embankment Fill / Residuum interface, with 9-19 completed in Residuum and 11-19 completed in shale.

While 9-19 was dry during and after drilling, piezometer readings have varied considerably with each subsequent piezometer measurement, ranging from 14.9 feet bgs in August (El. 647.5) to 32.8 feet in March (El. 629.6). These elevations correspond to a groundwater table fluctuating across the Embankment Fill / Residuum interface, from about 3.5 feet above the contact to about 14.4 feet below. With respect to surrounding the grade at the downstream toe, measured groundwater corresponds to depths ranging from about 3 to 20 feet at the toe. The source of the high variability is unclear, as both materials were logged as clay with medium to high plasticity which would be expected as relatively impervious.

The first piezometer reading in 11-19 was nearly 20 feet lower than the groundwater measurement at the time of drilling, but has steadily risen from 46.1 feet bgs (El. 615.1) to 21.0 feet bgs (El. 630.3) which is within a few feet of the initial reading. The results of the 11-19 piezometer suggest a relatively low hydraulic conductivity.

4.3 Embankment Slope

4.3.1 Stratigraphy

Two hand auger borings, 1301-19 and 1302-19, were drilled on the downstream and upstream slope face of the embankment, respectively, near the PSW alignment. The borings were generally drilled at the mid-slope of the embankment, with ground surface at El. 648.5 and El. 657.8, respectively. Borings 1301-19 was advanced to a depth of 10.0 feet bgs, while 1302-19 encountered refusal at 6.5 feet bgs. The borings encountered existing Embankment Fill to their termination depths. The material was generally described as light brown to tan and gray, dry to moist, stiff to hard, fat clays (CH) to borderline lean to fat clays (CL-CH) with organics, fine to coarse gravel, and trace gypsum crystals. Occasional seams of gravelly clay were also encountered. No in-situ testing was performed in the hand auger borings, but pocket penetrometer testing on relatively intact blocks of soil from the inside of the cutting barrel ranged from 1.75 to 4.5+ tsf.

Near the proposed RCC spillway, five additional hand auger borings were drilled in the upstream (1701-20 and 1702-20) and downstream (1703-20 through 1705-20) slopes of the embankment. Ground surface elevation at the borings ranged from El. 653.7 (downstream) to El. 657.7 (upstream). Each of these borings were drilled to depths of 10 feet bgs, except for 1702-20 and 1703-20 which encountered refusal at 4.75 and 6.75 feet bgs, respectively. These borings encountered largely similar Embankment Fill materials as described for the slope borings near the PSW, consisting of medium, low, and high-plastic clays (CL-CH, CL, and CH) with varying proportions of organics, gravel, and calcareous material. Based on the bottom elevations of borings 1703-20 and 1704-20, these borings likely penetrated through the bottom of fill into underlying natural foundation soils; however, an obvious contact of this interface could not be ascertained from the borings due to the relatively disturbed nature of recovered samples.

4.3.2 Groundwater

No groundwater was encountered in the hand auger borings, indicating the absence of a phreatic surface near the surface of the embankment slope. This is consistent with field observations, which did not indicate visual evidence of through-seepage on the downstream slope face.

4.4 Downstream Toe of Dam

4.4.1 Stratigraphy

Borings drilled along the downstream toe of the dam included borings 601-19 through 605-19, boring 305-19 (near the existing PSW alignment), and borings 702-20 and 703-20 (near the proposed RCC spillway alignment). The borings were advanced to depths of 25.0 to 29.5 feet bgs. Ground surface elevation ranged from El. 658.3 at 605-19 near the right abutment to El. 634.9 at 603-19 near the lower part of the creek valley. The lowest ground surface at the downstream toe is approximately El. 629.0 within the existing creek centerline based on topographic survey.

The borings drilled at the downstream toe of the dam encountered a layer of Alluvium extending from ground surface to depths ranging from about 2 to 8 feet bgs, with the exception of boring 305-19 where approximately 6 feet of fill was present overlying the Alluvium. The Alluvium was described in the field as dark brown to black, moist, stiff to hard fat clay (CH) with abundant organic matter, and trace to some subrounded to subangular, fine to coarse gravel. The uncorrected SPT N-value ranged from 12 to 26 bpf, and pocket penetrometer ranged from 3.25 to 4.5+ tsf..

In boring 305-19, a layer of suspected Downstream Fill was encountered to a depth of about 6 feet bgs directly overlying Alluvium at about El. 629. The Downstream Fill consisted of a mix of lean to fat clay (CL-CH, CH) with gravel and organics, with a single uncorrected SPT N-value of 34 bpf and pocket penetrometer values between 3.75 tsf and 4.5+ tsf.

Residuum was encountered below the Alluvium. In general, the top of Residuum was roughly parallel to ground surface, ranging from about El. 647 to 641 on the left side of the dam (601-19, 602-19, 702-20, and 703-20), about El. 655 near the right abutment (605-19), and from about El. 632 to 630 in the lower area of the creek valley right of the PSW. Residuum was encountered deeper in boring 305-19 near the PSW and original creek centerline, located at about a depth of 13 feet bgs (El. 622). Where fully penetrated by the borings, total thickness of the Residuum ranged from about 15 to 22 feet, except at boring 305-19 where the thickness was about 10.5 feet. As discussed previously, the Residuum was broadly subdivided into calcareous, friable low plastic clay and silty clay (LPR) and medium to high plastic clay (MPR) layers. The occurrence of the materials varied along the downstream toe, with the LPR being more prevalent left of the PSW within higher elevation intervals (generally above El. 625 to 635), with some indications of this material in 605-19 near the right abutment in higher elevations. The LPR was generally absent in the lower part of the creek valley. There was no appreciable difference in the consistency of the LPR and MPR; the uncorrected SPT N-values ranged from 1414 to 30 bpf, with pocket penetrometer values of 3.5 to 4.5 tsf.

Shale was encountered in five of the eight borings directly underlying the Residuum at depths ranging from 23 to 28 feet bgs (about El. 620 to 611), with the lowest elevations encountered near the bottom of the creek valley near the PSW. The shale was described as light gray to white, dry, moderately to highly weathered, extremely weak to weak rock that was friable, chalky, and slightly fissile. The shale was calcareous with strong HCl reaction and contained disseminated gypsum crystals and trace pyrite. The uncorrected SPT N-values ranged from 35 to 100 bpf, with several instances SPT refusal in the lower-elevation Shale intervals. Shelby tube samples was possible in 703-20, and the pocket penetrometer reading was 4.5+ tsf.

4.4.2 Groundwater

Groundwater was not encountered at the time of drilling in any of the completed boreholes. The majority of the boreholes were left open overnight for 1 to 5 days to obtain delayed groundwater levels to provide estimates of static water levels. Static groundwater was encountered only in boring 601-19 at a depth of 11.3 feet bgs (El. 638.4), which was similar to the adjacent embankment piezometer 9-19 readings which had ranged from about El. 630 to 647. After one or more days, sidewall caving was encountered in most of the open boreholes at depths ranging from 13.8 to 22 feet bgs (about El. 613 to 642).

Boring 702-20 was completed as a piezometer in October 2020. While the boring was dry during drilling, the water level in the piezometer 3 days after drilling was measured at a depth of 27.5 feet bgs (El. 620.3). The measured groundwater level was lower than the range of measurements obtained in the adjacent open borehole 601-19 and nearby embankment piezometer 9-19, but it is likely that the water level in piezometer 702-20 was still stabilizing. Subsequent readings through the remainder of the design phase and/or prior to construction were recommended to evaluate whether the wide range in fluctuations at boring 9-19 were localized or representative of this area of the dam.

4.5 Principal Spillway

4.5.1 Stratigraphy

Borings drilled adjacent to the existing and proposed principal spillway alignment included 304-19 and 305-19. Boring 305-19 was drilled just to the left of the spillway pipe at the downstream toe, while 304-19 was drilled on the local berm on the upstream slope of the dam embankment. Additional nearby borings also included 11-19, 1301-19, and 1302-19.

Boring 304-19 encountered existing Embankment Fill representative of the embankment shell zones, which was generally described as very stiff to hard, lean to fat clays (CL-CH and CH). The Embankment Fill had SPT N-values ranging from 8 to 10 bpf, and pocket penetrometer values of 1.5 to 4.5+ tsf. Thickness of the Embankment Fill was about 18 feet at 304-19.

Below the Embankment Fill, the underlying Alluvium was encountered at a depth of about 18 feet bgs (El. 628), followed by Residuum at about 23.5 feet bgs (El. 646.4). The Alluvium was about 5.5 feet thick and was described as a dark brown to dark gray fat clay (CH), with a single pocket penetrometer value of 3.0 tsf.

The Residuum was described as medium plastic clay (CL-CH) underlain by silty, friable lean clay (CL-ML). The lowest sample in the Residuum was collected at 33.5 to 35 feet bgs (El. 613 to 611.5) and was more gray in color, relatively less weathered, and was likely obtained slightly above the shale contact as evidenced by the higher SPT N-value of 44 bpf compared to the 13 bpf near the top of Residuum. One pocket penetrometer reading was 4.5+ tsf.

The preliminary bearing level of the proposed PSW structures range from about El. 630 on the upstream side (Inlet Tower) and El. 626.5 on the downstream side (Impact Basin).

Detailed description of subsurface conditions in the other borings is provided in previous sections. In brief, observations in these borings was relatively similar to 304-19. An approximately 5 to 6-foot thick layer of Alluvium was present at about El. 627± under the various fill materials comprising the embankment slopes and at the downstream toe, but was absent under the embankment centerline where the core/cutoff trench was installed into Residuum. The description of the Residuum under the upstream shell of the dam included both the MPR and LPR designations, but descriptions were more characteristic of the MPR designation under the dam centerline and downstream toe areas. Top of shale was encountered around El. 608 to 611 in the vicinity of the PSW alignment.

4.5.2 Groundwater

Groundwater was not encountered at the time of drilling the boreholes along the PSW alignment, with the exception of 11-19, as previously discussed. Sidewall caving was noted at 22 feet bgs (El. 613.1) in downstream boring 305-19. Piezometer readings in boring 11-19 have steadily increased to about El. 630 in the months following installation.

4.6 Existing Vegetated Auxiliary Spillway

4.6.1 Stratigraphy

Borings drilled within the existing ASW channel included 201-19 through 210-19. Borings were advanced to depths ranging from 25.0 to 35.0 feet bgs. Ground surface elevation ranged between El. 635.7 near the existing downstream exit channel (boring 210-19) and El. 658.8 located near the inside edge of the spillway, upstream of the control section (boring 207-19).

The borings encountered 2 to 6 feet of Alluvium underlain by Residuum. The Alluvium was described as dark brown fat clay (CH) with some medium-plasticity clay (CL-CH), with a single uncorrected SPT N-values of 15 bpf and pocket penetrometer values ranging from 2.5 to 4.5+ tsf.

The LPR was encountered above about El. 644 to 650 in each boring except 205-19 and 210-19. The LPR was described as lean clay (CL), silty lean clay (CL-ML), silt (ML), and silty sand (SM) with some intervals of medium plasticity clay (CL-CH). The MPR was encountered in each of the borings to termination depth and was described as lean to fat clay (CL, CL-CH, and CH) with some isolated silty sand (SM).

4.6.2 Groundwater

The groundwater table was not identified at the time of drilling any of the borings in the ASW; however, groundwater was encountered at the end of drilling activities in in boring 209-9 at 21.4 feet bgs (El. 626.9). Delayed groundwater readings in open boreholes were obtained one to several days after the completion of drilling activities. Groundwater was detected in several boreholes at elevations ranging from about El. 622 at the downstream end of the ASW channel (210-19) to El. 646.7 at the outside edge of the ASW channel just downstream of the control section (203-19). The measured groundwater depth ranged from 8.9 to 23.1 feet bgs (where encountered). Sidewall caving was noted in a number of the open holes at depths ranging from 12.2 to 22 feet bgs. A summary of the groundwater readings is provided in Table 2.

4.7 Proposed Roller Compacted Concrete (RCC) Spillway

4.7.1 Stratigraphy

A proposed 200-foot wide structural RCC spillway is planned between the approximate dam centerline Sta. 16+50 to Sta. 18+50. The preliminary proposed bearing elevations for the various structure components of the RCC spillway are listed as follows:

- Crest Structures (embankment crest): El. 655.5±
- Chute Structure (downstream slope): Varies; from El. 655.5± to El. 638.7±
- Stilling Basin (downstream toe): El. 638.7±

A second phase of the geologic investigation was performed to investigate foundation conditions for the proposed RCC spillway alignment to supplement the nearby borings 601-19 and 9-19. The investigation was initiated in September 2020 after the geometry and location of the proposed spillway had been selected by the design team. Borings drilled included the following:

- Upstream toe: 701-20
- Upstream slope (proposed RCC crest structure): 1701-20 and 1702-20
- Dam centerline (proposed RCC crest structure): 13-20 and 14-20
- Downstream slope (proposed RCC chute structure): 1703-20 through 1705-20
- Downstream toe (proposed RCC stilling basin): 702-20 and 702-20

Based on the preliminary design elevations, the proposed RCC crest structure will be founded upon existing Embankment Fill comprising both the core and shell zones of the dam. This material was largely described as fat clay (CH) and medium plasticity clay (CL-CH) in the borings. Below El. 655.5, the thickness of the Embankment Fill is about 12 to 15 feet, and the uncorrected SPT N-values range from 11 to 17 bpf with pocket penetrometer values of 1.0 to 4.25 tsf. Excavated materials above El. 655.5 include fat clay (CH), lean to fat clay (CL-CH), and limited silt (ML). Alluvium and/or Residuum is present below the Embankment Fill.

The upper portions of the proposed RCC chute structure (above about El. 645±) will be primarily located on the downstream shell zone of the Embankment Fill, while the lower portions of the chute will be located on Alluvium and Residuum. Between the planned bearing elevations of El. 655.5 and El. 638.7, the materials were described as typically stiff to hard fat clay (CH), medium plastic clay (CL-CH), and silty clay (CL-ML). Excavated materials will likely consist of similar soil classifications.

The stilling basin structure will be located below the Alluvium and on Residuum at the downstream toe. Below El. 638.7, the total thickness of Residuum is about 15 to 20 feet, and its uncorrected SPT N-values range from 14 to 21 bpf with pocket penetrometer values ranging of 3.5 to 4.5+ tsf. Residuum was generally characterized as LPR at the left side of the stilling basin, with a thinner layer of LPR overlying MPR at the middle and right side of the stilling basin. Materials within required excavations for the stilling basin above El. 638.7 are generally silty clay fat clay (CH), and silty clay (CL-ML).

Discussion of specific borings is provided in previous sections of this report.

4.7.2 Groundwater

Groundwater conditions have been described in earlier sections of this report. Specific to the location of the proposed RCC spillway, measured groundwater levels in open boreholes and piezometers ranged from about El. 630.9 to 647.6 at the dam centerline and El. 620 to 638 at the downstream toe. Based on preliminary structure bearing elevations, the highest measured groundwater levels were 7.9 feet below the crest structure and 0.3 feet above the stilling basin.

4.8 Proposed Outlet Channel for RCC Spillway

4.8.1 Stratigraphy

A new outlet channel is planned to be constructed immediately downstream of the proposed RCC spillway stilling basin. The channel is planned to extend approximately 250 to 300 feet downstream to convey flow away from the dam and towards the creek. The channel will be excavated below existing grade to depths ranging from about 3 to 6 feet based on current design information, corresponding to channel invert elevation between about El. 643 to 644. Planned width is about 200 feet.

Borings drilled within the proposed outlet channel included 401-20 and 402-20. Borings were advanced to depths of 20 feet bgs. Ground surface elevation at the borings ranged from about El. 646.6 to 648.

The borings encountered 4 to 6 feet of Alluvium underlain by Residuum at about El. 642± to termination depth. The Alluvium was described as dark brown to black, moist, very stiff fat clay with gravel (CH) and gravelly fat clay (CH), with pocket penetrometer values ranged from 3.5 to 4.5+ tsf.

The description of the underlying Residuum was consistent with the MPR characterization, consisting primarily of orange, brown, and/or gray medium-plasticity clay (CL-CH). The Residuum was slightly moist, very stiff to hard, became blocky with depth, and contained trace fine to coarse gravel. The pocket penetrometer values in the Residuum exceeded 4.5+ tsf.

4.8.2 Groundwater

Groundwater was not encountered at the time of drilling in either of the borings in the proposed outlet channel. Delayed readings in the open boreholes were dry.

4.9 Borrow Area

A potential borrow area located on the left bank of the reservoir upstream of the embankment was investigated for suitability as a source for embankment fill. Borings drilled in the borrow area included 101-19 through 106-19. The borings were advanced to depths of 10 feet bgs. Ground surface elevation ranged between El. 647.8 closest to the edge of the reservoir (106-19) and El. 652.0 located further inland to the left (in the northeastern direction) away from the reservoir (101-19).

The borrow area borings encountered 2 to 4 feet of Alluvium described as fat clay (CH). Residuum was encountered at depths roughly parallel to ground surface, corresponding to a range of El. 465 to 476, and extended to the boring terminations depths. The upper 3 to 5 feet of the Residuum was LPR and consisted of calcareous silty clay (CL-ML). The lower portion of the Residuum was MPR and consisted of medium-plasticity clay (CL-CH).

No groundwater table was identified at the time of the investigation of the borrow area borings. Borings were left open for several days to check for static groundwater levels. The borings remained dry, but sidewall caving was noted in four of the six borings at depths between about 6.1 to 6.9 feet bgs (El. 635.3 to 645.9).

5. Interpretations and Conclusions

5.1 Existing Embankment

The existing earthen embankment is comprised by mostly lean to fat clays (CH, CL-CH) that appear to be well-compacted on the basis of SPT and pocket penetrometer data. Samples from both the centerline of the embankment and slope faces were visually similar, with no obvious distinction between core/cutoff trench materials and embankment shell materials. This finding differs from the zoned embankment configuration described in the original SMR (SCS 1984b), which suggested that low-plasticity clayey sand and sandy clay (SC, CL) would be reserved for the upstream and downstream shell zones, and that the silty fat clay (CH) materials would be reserved for the central core and cutoff trench. Further review of the original GIR (SCS 1984a) indicates that the estimated borrow volume of available SC/CL materials (7,000 CY) was significantly less than the volume of CH materials (>170,000 CY), which suggests that an insufficient volume of material was available to construct the zoned embankment configuration as shown in the original SMR. This is partially reflected by the as-built drawings, which also specify a zoned embankment configuration but allows the use of SC and CH materials in the embankment shell zones. Consequently, the shell zones of the embankment appear to consist of more clayey soils with higher plasticity than described in the original SMR.

AECOM is not aware of any historic problems of slope instability, erosion, or through-seepage, and has found no evidence of such during the field investigation. Based on this information, the embankment appears to be performing adequately.

The embankment cutoff trench was found to extend through the natural alluvial soils and into the clayey Residuum; generally consistent with the as-built plans. The cutoff trench appears to be providing adequate seepage cutoff based on the depth of groundwater encountered in open boreholes and piezometers along the dam centerline and downstream toe, as well as the lack of any observed seepage at the immediate downstream toe of the dam. AECOM is not aware of any historic under-seepage problems.

Anomalous fluctuations in groundwater levels have been recorded in embankment centerline piezometer 9-19, with successive readings varying between about 14.9 to 32.8 feet bgs (El. 629.6 to El. 647.5). No obviously pervious zones were observed in the borings at this location, and groundwater levels in surrounding borings have been lower than El. 638. Nearby piezometer 702-20 has not been in service long enough to compare relative fluctuations in water level. Piezometer 9-19 is located on the left side of the embankment where the ground surface elevation of the upstream toe (about El. 650±) is significantly higher than the reservoir normal pool (low ports at El. 640.4) and slightly higher than PSW crest (El. 648.0). On this basis, it is unlikely that the measured groundwater levels are due to reservoir fluctuations. The anomalous groundwater levels in piezometer 9-19 could be associated with cross-valley surface water flows and/or perched groundwater originating from the left abutment following storm events. Consideration may be given to instrumenting piezometer 9-19 and/or 702-20 with an automatic water level data logger to provide detailed information on rates of change in groundwater level, which may be compared to precipitation data to provide better understanding of the groundwater regime in this area. Groundwater at this location is of particular importance due to the proposed adjacent RCC spillway.

The proposed rehabilitation design will not include an embankment crest raise or downstream slope flattening. Modification of the embankment will likely be limited to minor amounts of new fill to level the embankment crest, and possibility some minor cut/fill grading to smooth the embankment slopes. Areas to receive fill should be prepared as described in Section 5.6.1.

The normal pool is currently planned to be lowered slightly, with a slight increase (1 to 2 feet) in the ASW crest raise elevations. Based on these factors and the lack of historic seepage problems at the site, internal drainage for the embankment (e.g. toe drain, chimney) are likely not required as part of the rehabilitation. However, if the rehabilitation design is modified to include fill on the downstream slope, consideration may be given to including a toe drain and/or partial height chimney as a protective measure, as well as taking advantage of the protective cover for the drain materials that would be provided by new embankment fill.

5.2 Downstream Toe of Dam

The downstream toe of the dam is underlain by relatively stiff, clayey natural soils and compacted fill materials. Based on correlation with the SPT and field pocket penetrometer values, these foundation soils are expected to be moderately over-consolidated with relatively high shear strength and low to moderate compressibility. Static groundwater is expected to be deeper than 10 feet bgs along the downstream toe based on measurements from open boreholes and piezometers. Further assessment of shear strength, seepage, and settlement estimates will need to be performed as part of the SMR.

The proposed dam modification is currently planned not to include a significant crest raise or slope flattening. New fill placement on the dam itself will likely be limited to minor re-grading on the embankment crest (less than 1 to 2 feet in thickness). Planned excavation and fill placement at the downstream toe of the dam will likely be restricted to abandonment of the existing PSW and channel, construction of the new PSW and RCC spillway, and excavation of the new outlet channel. Interpretations and findings specific to each of these areas are provided in subsequent sections.

5.3 Auxiliary Spillway

5.3.1 General

The stratigraphy encountered in the existing ASW channel borings generally consisted of a relatively thin layer of clayey Alluvium overlying Residuum. The encountered Residuum consisted of a lower-plasticity layer (LPR), and lower medium to high plasticity layer (MPR).

Due to the encroachment of urban development at the left abutment, widening of the ASW on the outside edge of the channel will not be feasible. Channel widening will expand the channel to towards the right side of the dam (interior side of spillway) and will require partial removal of the existing embankment. In general, removal of the left end of the embankment will expose the top of the existing cutoff trench at surrounding grade elevation. The Embankment Fill associated with the cutoff trench will likely be relatively more erodible than the surrounding natural Alluvium and Residuum. However, the soils at this location (based on boring 8-19) were described as very stiff to hard, moderate-plasticity clays (CL-CH) which will likely be relatively erosion resistant.

Based on preliminary design of the ASW modifications, the existing ASW crest may be raised by 1 to 2 feet using earthen fill within the existing ASW and/or proposed channel widening area. Additionally, earthen training dikes will be constructed to manage flow through the spillway. In general, the erodibility of compacted earthfill is greater than that of natural materials. Careful attention to quality assurance (QA) and quality control (QC) measures will be needed to ensure the proposed fill materials meet material specifications and are properly constructed during grading operations. An area of focus during construction of the ASW should be the tie-in of the right training dike to the existing embankment to preclude development of preferential seepage paths. Recommendations on material and placement criteria will be provided in the SMR.

Excavation depths and grading (if required) in the channel widening area should be carefully controlled in order not to remove more material than needed and to assure minimum slopes are maintained to prevent ponding. While not expected, should strongly cemented layers of Residuum be encountered in the excavations, consideration may be given to cleaning the exposed surface to identify any possible surficial irregularities that may cause issues in the future.

Establishment of robust vegetative cover within the widened ASW is crucial to minimize erosion. Project specifications should include references to grass seed mixtures that are well-suited to the local climate and would minimize soil exposure.

5.3.2 Headcut Erodibility

Hydraulic analysis and design of vegetated earthen spillways is typically performed using the Water Resources Site Analysis computer program (SITES) developed by NRCS. SITES is used to evaluate erosional stability and head-cutting potential for auxiliary spillway channels subjected to flows associated with the design flood event. SITES input values includes soil unit weight, plasticity, gradation, and empirical headcut erodibility index (Kh).

Recommended soil stratigraphy and SITES input values are provided in the Technical Memorandum included in **Appendix I**. Recommendations for site-specific soil index parameters were developed based on analysis of laboratory testing data presented in the SMR. The estimated Kh values were developed based on correlation with field and laboratory strength testing according to the procedures in *Part 628, Chapter 52, Field Procedures Guide for the Headcut Erodibility Index* of the NRCS National Engineering Manual (NEH) (NRCS 2001), supplemented by recent guidance provided in the accompanying DRAFT *Appendix 52D, Erodibility Parameter Selection for Soil Material Horizons* (NRCS 2011), other published references (McCook, 2005), and email communication with the NRCS NDSMC.

In general, the soils are relatively stiff and cohesive, which are favorable characteristics with respect to erodibility resistance. Considering the inherent variability in natural soil materials, recommended SITES parameters were provided in sets of “favorable” and “unfavorable” values to ?? the likely values encountered and to examine of the sensitivity of the model outputs. The unfavorable values were selected to represent the approximate 33rd percentile value inferred from the test data (i.e., roughly average minus 0.5 standard deviations), while the favorable values represented the approximate 66th percentile value (i.e., roughly average minus 0.5 standard deviations). Further details are provided in **Appendix I**.

5.4 Principal Spillway

5.4.1 Existing PSW Structures

The current design plans are to abandon the existing PSW by removing the inlet tower, removing several pipe segments on both ends of the PSW, grouting the remaining pipe, and backfilling the plunge basin. The existing invert elevation of the PSW conduit varies from approximately El. 635 to 630. The bottom of the existing plunge basin is at about El. 621.

The existing PSW conduit was constructed with concrete anti-seep collars. A number of case studies published in the years since construction of this dam have demonstrated that concrete anti-seep collars increase the risk of development of preferential seepage paths along the conduit, and may lead to particle migration and internal erosion (piping). The designer should evaluate the need to install a new filter diaphragm around the downstream side of the conduit pipe to mitigate this risk.

Excavations to facilitate structure removal/abandonment and backfilling activities are anticipated to penetrate through Embankment Fill, Downstream Fill, Alluvium, and possibly Residuum. While measured groundwater levels at the downstream toe were generally below the proposed excavation depths, groundwater levels can fluctuate over time based on antecedent rainfall events and other factors. Consequently, construction documents should include a provision for construction dewatering by the Contractor and sloping/shoring of temporary excavations should groundwater be encountered during construction.

5.4.2 Proposed PSW Structures

The proposed new PSW will include a new inlet tower, conduit pipe, and impact basin. The bearing elevation for the impact basin structure and outlet channel excavation will be approximately El. 451. The invert for the new PSW structures and conduit pipe will vary from about El. 630 to 626.5. The proposed PSW structure foundations are anticipated to be constructed upon stiff to hard Residuum, which should provide firm bearing strength.

Construction of proposed PSW structures will require a full breach excavation of the dam embankment. Consequently, reservoir drawdown will be required to construct the inlet tower and upstream portion of the conduit pipe.

Excavations are anticipated to penetrate Embankment Fill, Downstream Fill, Alluvium, and possibly Residuum. Based on measured groundwater levels in borings and piezometers, saturated zones in the embankment and/or foundation materials may be encountered even following drawdown of the reservoir. Construction dewatering and sloped excavations should be anticipated by the Contractor.

The new PSW conduit should be furnished with a concrete cradle to assure good compaction around the sides of the pipe and reduce the risk of preferential seepage zones. A filter diaphragm should be installed around the pipe to collect and filter potential seepage around the pipe. The diaphragm should be furnished with strip drains to discharge the collected seepage. Additionally, the filter materials should be designed to be filter compatible with surrounding embankment and foundation materials according to current NRCS criteria.

5.5 Proposed RCC Spillway

Borings drilled along the proposed RCC spillway alignment encountered relatively stiff clayey soils that should provide firm bearing support for structure foundations. However, these borings also indicate the presence of highly-plastic soils that may have expansive (shrink/swell) properties that are not be compatible with the proposed structures. A focus of the geotechnical laboratory testing (to be performed as part of the SMR) should include characterizing the swelling properties of these soils, and to evaluate whether the soils will provide suitable foundation support and/or can be used as backfill against the structures. Over-excavation and replacement with compacted non-swelling soils may be an option if the laboratory testing identifies unfavorable material properties.

5.6 Borrow Areas and Embankment Fill Sources

An on-site borrow area located on the left bank of the reservoir and upstream of the dam was investigated as a potential source of borrow materials for use in dam rehabilitation activities. The upper 2 to 4 feet consists of fat clay (CH) of alluvial origin, underlain by 3 to 5 feet of calcareous silty lean clay (CL-ML) characterized as LPR. Moderate-plasticity lean to fat clay (CL-CH) characterized as MPR was encountered at depths of about 8 feet bgs. Existing ground surface in the borrow area is generally equal to or higher than the existing PSW crest elevation (El. 648.7), and at least 7 feet above the low-port elevation on the PSW which maintains a normal pool elevation of El. 640.4. In general, the maximum excavation depth (lowest elevation) of the borrow area should be at least 2 feet above the static groundwater elevation to allow equipment access.

For planning purposes, the excavation grade in the borrow area should be no lower than El. 643 unless reservoir drawdown is planned. However, the Contractor should be made aware that surface water inundation of the borrow area is possible during storm events.

Required excavations for the proposed outlet channel from the RCC spillway may also produce cohesive materials suitable for embankment fill. Borings drilled in the proposed outlet channel encountered approximately 6 feet of fat clay (CH) of alluvial origin, underlain by lean to fat clay (CL-CH) of residual origin. Proposed excavations in this area are well above the anticipated groundwater levels in this location, and dewatering should not be necessary. Based on crude approximations of the potential excavation limits associated with the various potential borrow areas, order-of-magnitude estimates of potential borrow volume are provided in the table below (see next page). The estimated available borrow is more than 150% of the estimated 20,000 CY of fill to be identified according to NRCS preference (i.e., 30,000 CY). Actual quantities of required cut and fill will be refined as design advances, and additional guidance on available borrow volume can be provided in the SMR.

An important consideration in evaluating borrow suitability will be plasticity of the fat clays due to potential long-term strength from seasonal wetting-drying cycles and associated risk of shallow wet-weather slides. Plasticity and swell potential should also be evaluated for proposed backfill against structures (e.g. PSW and RCC Spillway) to assess the risk of expansive soils, related shrink/swell movements, and swelling pressures that may be imparted to adjacent structures. Laboratory index classification testing, as well as engineering properties testing on remolded samples from these borings, will be performed as part of the laboratory investigation for the SMR to confirm suitability of these materials as potential embankment fill sources.

Borrow Source	Geologic Origin and USCS	Estimated Average Layer Thickness (feet)	Estimated Plan Area (feet x feet)	Estimated Volume (CY)	Potential Use
Excavation for Proposed Outlet Channel	Alluvium (CH)	4	250 x 200	7,400	Embankment Fill
	Residuum (CL-CH)	0(1)	250 x 200	0	Embankment Fill
On-Site Borrow Area	Alluvium (CH)	4	600 x 600	53,000	Embankment Fill
	Residuum (CL-ML)	3	600 x 600	40,000	Embankment Fill
Excavation for RCC Spillway	Embankment Fill, Residuum, Alluvium (CH, CL-CH, CL-ML, CL, ML)	8(3)	200 x 100	5,900	Embankment Fill
TOTAL		**---**	**---**	**106,300**	**---**

Notes:

(1) Limited by plan excavation grade in outlet channel; bottom varies El. 643 to 644.

(2) Limited by reservoir level; assumes lowest excavation depth of El. 643 with no reservoir drawdown and permanent excavation slopes on the order of 5H:1V.

(3) Based on weighted-average excavation depth along spillway from preliminary design drawings.

5.7 Design and Construction Considerations

5.7.1 Site Preparation

Areas to receive fill should be stripped of vegetation, topsoil, and debris. Soft soils should be over-excavated and replaced with compacted fill. Particular attention should be paid to the areas where possible waste fill was identified in the as-built drawings. Proof rolling of the proposed subgrade is recommended prior to the placement of any new fill to identify potential soft zones. Removal of oversize particles (greater than 3 inches in diameter) from the exposed subgrade will aid compaction efforts. Additional subgrade preparation requirements will be provided in the SMR. For planning purposes, the anticipated depth of stripping/over-excavation will likely be about one (1) foot.

5.7.2 Excavations

Required excavations are not expected to encounter bedrock or other resistant material in the proposed work areas. For the purpose of cost estimating and planning, excavation quantities can generally be classified as “common excavation” according to NRCS Construction Specification (CS) 21, Excavation.

6. Limitations

This report was prepared by AECOM using the degree of care and skill ordinarily exercised under similar circumstances by responsible engineers and geologists practicing in the same general location. No other warranty or representation, either expressed or implied, is made as to the findings and professional advice in this report.

The opinions, conclusions, and recommendations contained in this report are based on the field observations and subsurface explorations, laboratory tests, and present understanding of the proposed improvements. The findings in this report are believed to describe site conditions to the extent practical given the scope of the investigation. However, this investigation, like all such investigations, can only directly explore subsurface conditions at the boring locations within the site. Soil and geologic conditions can vary greatly between or beyond the exploration sites, and different conditions may be found during subsequent investigations or project construction.

The conclusions and recommendations contained herein are based in part upon information provided by others (including our subcontractors), and upon the assumption that all relevant information has been provided by those parties from whom it has been requested and that such information is accurate. Information provided to AECOM has not been independently verified by AECOM, unless otherwise stated.

There is no intention that this report addresses any environmental issues (for example, environmentally affected soil or groundwater, or historic site uses) related to this site. Such evaluations are outside the scope of this work and should be addressed in separate studies. In the event that changes are made to the nature, design, or location of the proposed construction layout or design criteria, the conclusions and recommendations presented herein should not be considered valid, unless AECOM has reviewed the changes and addresses their impact to the recommendations provided.

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TABLES

Table 1. Summary of Borings

Test Hole No.	Surveyed Ground Elev. (ft)	Surveyed Northing	Surveyed Easting	Total Depth (ft)	Groundwater at Time of Drilling		Drill Hole Completion(2)
					Depth (ft)	Elev. (ft)	
Dam Centerline							
008-19	662.21	13908370	2330059	30.0	18.5	643.7	Cement Bentonite Grout
009-19	662.38	13907885	2330266	35.0	NE	---	Stand-Pipe Piezometer
010-19	662.20	13907469	2330416	45.0	NE	---	Cement Bentonite Grout
011-19	661.24	13907218	2330294	60.0	27.5	633.7	Stand-Pipe Piezometer
012-19	662.37	13906968	2330049	60.0	NE	---	Cement Bentonite Grout
013-20	662.27	13907775	2330319	40.0	NE	---	Cement Bentonite Grout
014-20	662.16	13907678	2330360	40.0	NE	---	Cement Bentonite Grout
015-19	662.44	13906655	2329759	45.0	NE	---	Cement Bentonite Grout
Upstream Embankment Slope Face							
1302-19	657.81	13907039	2330083	6.5	NE	---	Cement Bentonite Grout
1701-20	657.91	13907764	2330292	10.0	NE	---	Cement Bentonite Grout
1702-20	657.74	13907667	2330332	4.8	NE	---	Cement Bentonite Grout
Downstream Embankment Slope Face							
1301-19	648.46	13907145	2330273	10.0	NE	---	Cement Bentonite Grout
1703-20	653.67	13907897	2330294	6.8	NE	---	Cement Bentonite Grout
1704-20	653.64	13907784	2330340	10.0	NE	---	Cement Bentonite Grout
1705-20	654.07	13907686	2330380	10.0	NE	---	Cement Bentonite Grout
Principal Spillway							
304-19	646.38	13907232	2330214	35.0	NE	---	Cement Bentonite Grout
305-19	635.10	13907130	2330314	25.0	NE	---	Cement Bentonite Grout
Existing Auxiliary Spillway							
201-19	656.49	13908513	2329837	25.0	NE	---	Cement Bentonite Grout
202-19	656.89	13908622	2329966	25.0	NE	---	Cement Bentonite Grout
203-19	656.91	13908583	2330174	25.0	NE	---	Cement Bentonite Grout
204-19	651.26	13908509	2330413	25.0	NE	---	Cement Bentonite Grout
205-19	644.35	13908421	2330664	25.0	NE	---	Cement Bentonite Grout
206-19	656.55	13908395	2329905	25.0	NE	---	Cement Bentonite Grout
207-19	658.83	13908503	2330038	35.0	NE	---	Cement Bentonite Grout
208-19	654.77	13908437	2330234	25.0	NE	---	Cement Bentonite Grout
209-19	648.34	13908358	2330480	25.0	NE	---	Cement Bentonite Grout

210-19	635.74	13908272	2330732	25.0	NE	---	Cement Bentonite Grout
Proposed Outlet Channel							
401-20	647.96	13907933	2330545	20.0	NE	---	Cement Bentonite Grout
402-20	646.55	13907784	2330496	20.0	NE	---	Cement Bentonite Grout
Downstream Toe of Embankment							
601-19	649.70	13907928	2330345	25.0	NE	---	Cement Bentonite Grout
602-19	642.67	13907467	2330523	25.0	NE	---	Cement Bentonite Grout
603-19	634.86	13906953	2330187	25.0	NE	---	Cement Bentonite Grout
604-19	637.95	13906842	2330077	25.0	NE	---	Cement Bentonite Grout
605-19	658.29	13906607	2329798	25.0	NE	---	Cement Bentonite Grout
Upstream Toe of Embankment							
701-20	648.74	13907753	2330261	30.0	NE	---	Cement Bentonite Grout
Proposed Overtopping Auxiliary Spillway							
702-20	647.79	13907801	2330379	30.0	NE	---	Stand-Pipe Piezometer
703-20	646.33	13907705	2330421	30.0	NE	---	Cement Bentonite Grout
Borrow Area							
101-19	652.04	13908101	2329793	10.0	NE	---	Cement Bentonite Grout
102-19	650.06	13907929	2329831	10.0	NE	---	Cement Bentonite Grout
103-19	647.13	13907727	2329897	10.0	NE	---	Cement Bentonite Grout
104-19	651.25	13908032	2329590	10.0	NE	---	Cement Bentonite Grout
105-19	649.55	13907862	2329630	10.0	NE	---	Cement Bentonite Grout
106-19	647.79	13907684	2329663	10.0	NE	---	Cement Bentonite Grout

Notes:

(1) *Survey coordinates provided by CP&Y.*
(2) *Elevations reported with respect to NAVD88 datum.*
(3) *NE – Not encountered*

Table 2. Summary of Groundwater Readings

Boring ID	Surveyed Ground Elev. (ft)	Groundwater Level at Time of Drilling			Groundwater Level at Completion of Drilling			Delayed Groundwater Level Readings					
		Date	Depth (feet)	Elev. (feet)	Date	Depth (feet)	Elev. (feet)	Date	Time after Drilling (hours)	Depth (feet)	Elev. (feet)	Note	Approx. Reservoir Elev. (NAVD88)
008-19	662.2	1/9/2020	18.5	643.7	1/9/2020	28.1	634.1	---	---	NE	---		
009-19 (piezometer)	662.4	1/27/2020	NE	---	1/27/2020	NE	---	1/30/2020	---	16.3	646.1		
								2/13/2020	---	NE	---		
								3/26/2020	---	32.8	629.6		
								8/26/2020	---	14.9	647.5		
								10/8/2020	---	31.5	630.9		
011-19 (piezometer)	661.2	12/16/2019	27.5	633.7	12/17/2020	27.5	633.7	1/30/2020	---	46.1	615.1		
								2/13/2020	---	43.6	617.6		
								3/26/2020	---	38.8	622.4		
								8/26/2020	---	33.8	627.4		
								10/8/2020	---	31.0	630.2		
101-19	652.0	1/3/2020	NE	---	1/3/2020	NE	---	1/7/2020	---	NE	---	Caved at 6.1'	
102-19	650.1	1/3/2020	NE	---	1/3/2020	NE	---	1/7/2020	---	NE	---		
103-19	647.1	1/3/2020	NE	---	1/3/2020	NE	---	1/7/2020	---	NE	---		
104-19	651.2	1/3/2020	NE	---	1/3/2020	NE	---	1/7/2020	---	NE	---	Caved at 6.9'	
105-19	649.5	1/3/2020	NE	---	1/3/2020	NE	---	1/7/2020	---	NE	---	Caved at 6.1'	
106-19	647.8	1/3/2020	NE	---	1/3/2020	NE	---	1/7/2020	---	NE	---	Caved at 6.3'	
201-19	656.5	12/31/2019	NE	---	12/31/2019	NE	---	1/2/2020	---	NE	---		
								1/7/2020	---	NE	---	Caved at 21.2'	
202-19	656.9	12/30/2019	NE	---	12/30/2019	NE	---	1/2/2020	---	NE	---		
	656.9	---	---	---	---	---	---	1/7/2020	---	NE	---	Caved at 22'	
203-19	656.9	12/30/2019	NE	---	12/30/2019	NE	---	12/31/2019	24	18.4	638.5		
	656.9	---	---	---	---	---	---	1/7/2020	---	10.2	646.7	Caved at 15.2'	

	656.9	---	---	---	---	---	---	1/20/2020	---	10.2	646.7		
204-19	651.3	12/19/2019	NE	---	12/19/2019	NE	---	12/19/2020	3	23.1	628.2		
205-19	644.4	12/18/2019	NE	---	12/18/2019	NE	---	1/2/2020	---	NE	---		
206-19	656.6	1/2/2020	NE	---	1/2/2020	NE	---	1/2/2020	---	NE	---		
								1/7/2020	---	NE	---	Caved at 18.3'	
207-19	658.8	12/31/2019	NE	---	12/31/2019	NE	---	1/2/2020	---	NE	---		
								1/7/2020	---	10.5	648.3	Caved at 15.6'	
208-19	654.8	12/30/2019	NE	---	12/30/2019	NE	---	1/2/2020	72	20.9	633.9		
								1/7/2020	---	16.1	638.7		
209-19	648.3	12/19/2019	NE	---	12/19/2019	21.4	626.9	12/30/2019	---	8.8	639.5		
								12/31/2019	---	8.8	639.5		
								1/2/2020	---	8.2	640.1		
								1/7/2020	---	8.9	639.4	Caved at 12.2'	
210-19	635.7	12/9/2019	NE	---	12/9/2019	NE	---	12/17/2019	---	13.6	622.1		
304-19	646.4	1/9/2020	NE	---	1/9/2020	NE	---	---	---	---	---		
305-19	635.1	1/7/2020	NE	---	1/7/2020	NE	---	1/8/2020	---	NE	---	Caved at 22'	
601-19	649.7	1/2/2020	NE	---	1/2/2020	NE	---	1/6/2020	96	11.4	638.3		
								1/7/2020	---	11.3	638.4	Caved at 13.8'	
602-19	642.7	1/2/2020	NE	---	1/2/2020	NE	---	1/6/2020	---	NE	---		
								1/7/2020	---	NE	---	Caved at 17.8'	
603-19	634.9	1/6/2020	NE	---	1/6/2020	NE	---	1/7/2020	---	NE	---	Caved at 15.3'	
604-19	630.0	12/9/2019	NE	---	12/9/2019	NE	---	12/17/2019	---	NE	---		
605-19	658.3	1/6/2020	NE	---	1/6/2020	NE	---	1/7/2020	---	NE	---	Caved at 16'	
702-20 (piezometer)	647.8	10/5/2020	NE	---	10/5/2020	NE	---	10/8/2020	72	27.5	620.3		
1. Elevations reported with respect to NAVD88 datum.													
2. NE – Not encountered prior to the start of coring.													
3. Values with “ * ” designate measurement is indicative of rock coring fluid level added during drilling.													

Table 3. Sample Inventory

Boring ID	Top Depth (ft)	Bottom Depth (ft)	Sample ID	Sample Type - see legend	Recovery (inch)	Field Classify
8-19	0.0	2.0	P-1	Push Tube	18	CH
8-19	2.5	4.0	SS-2	Split Spoon (SPT)	15.5	CH
8-19	4.0	6.0	P-3	Push Tube	12	CH,CL/CH
8-19	6.5	8.0	SS-4	Split Spoon (SPT)	15.5	CL/CH
8-19	8.0	10.0	P-5	Push Tube	17.5	CL/CH
8-19	13.0	15.0	ST-6	Shelby Tube	12	CL/CH
8-19	18.5	20.0	SS-7	Split Spoon (SPT)	18	CL/CH
8-19	23.5	25.0	SS-8	Split Spoon (SPT)	18	CL/CH
8-19	28.5	30.0	SS-9	Split Spoon (SPT)	18	CL/CH
9-19	0.0	2.0	P-1	Push Tube	20.5	CH
9-19	2.0	3.5	SS-2	Split Spoon (SPT)	15	ML
9-19	4.0	6.0	P-3	Push Tube	16.5	CL/CH
9-19	6.0	7.5	SS-4	Split Spoon (SPT)	16.5	CL/CH
9-19	8.0	10.0	ST-5	Shelby Tube	12	CH
9-19	13.0	15.0	P-6	Push Tube	16	CL/CH
9-19	18.5	20.0	SS-7	Split Spoon (SPT)	18	CH
9-19	23.0	25.0	ST-8	Shelby Tube	18.5	CH
9-19	28.0	30.0	P-9	Push Tube	19	CH
9-19	33.5	35.0	SS-10	Split Spoon (SPT)	18	CH
10-19	0.0	2.0	P-1	Push Tube	20	CH
10-19	2.0	3.5	SS-2	Split Spoon (SPT)	15	ML
10-19	4.0	6.0	P-3	Push Tube	16	CH
10-19	6.0	8.0	ST-4	Shelby Tube	14	CL
10-19	8.0	9.5	SS-5	Split Spoon (SPT)	14	CH
10-19	13.0	15.0	P-6	Push Tube	16	CH
10-19	18.5	20.0	SS-7	Split Spoon (SPT)	18	CH
10-19	23.0	25.0	ST-8	Shelby Tube	15	CH
10-19	28.0	30.0	P-9	Push Tube	13.5	CH
10-19	33.0	35.0	ST-10	Shelby Tube	19	CH
10-19	38.5	40.0	SS-11	Split Spoon (SPT)	18	CH
10-19	43.0	45.0	P-12	Push Tube	14.5	CLCH
11-19	0.0	2.0	P-1	Push Tube	21	CH
11-19	2.0	3.5	SS-2	Split Spoon (SPT)	11	CH,CH/CL
11-19	4.0	6.0	ST-3	Shelby Tube	13.5	CH/CL
11-19	6.0	8.0	P-4	Push Tube	17.5	CH/CL,CH
11-19	8.5	10.0	SS-5	Split Spoon (SPT)	16	CH/CL,CH
11-19	13.0	15.0	P-6	Push Tube	18.5	CH
11-19	18.0	20.0	ST-7	Shelby Tube	21.5	CH
11-19	23.5	25.0	SS-8	Split Spoon (SPT)	18	CH
11-19	28.0	30.0	P-9	Push Tube	20	CH/CL,CH
11-19	33.5	35.0	SS-10	Split Spoon (SPT)	18	CH/CL
11-19	38.0	40.0	ST-11	Shelby Tube	11.5	CH/CL

11-19	43.0	45.0	P-12	Push Tube	15.5	CH/CL
11-19	48.5	50.0	SS-13	Split Spoon (SPT)	18	CH/CL
11-19	53.0	53.5	ST-14	Shelby Tube	2	Shale
11-19	53.5	55.0	SS-15	Split Spoon (SPT)	4	Shale
11-19	58.5	60.0	SS-16	Split Spoon (SPT)	2.25	Shale
12-19	0.0	2.0	P-1	Push Tube	17.5	CH
12-19	2.0	3.5	SS-2	Split Spoon (SPT)	16	CL/CH
12-19	4.0	6.0	P-3	Push Tube	13	CH
12-19	6.0	7.5	SS-4	Split Spoon (SPT)	16	CL/CH
12-19	8.0	10.0	ST-5	Shelby Tube	12	CL/CH
12-19	13.0	15.0	P-6	Push Tube	20	CL/CH
12-19	18.5	20.0	SS-7	Split Spoon (SPT)	18	CL/CH
12-19	23.0	25.0	ST-8	Shelby Tube	16.5	CL/CH
12-19	28.0	30.0	P-9	Push Tube	19.5	CL/CH
12-19	33.0	34.5	SS-10	Split Spoon (SPT)	18	CL/CH
12-19	38.0	40.0	ST-11	Shelby Tube	21	CL/CH
12-19	43.0	45.0	P-12	Push Tube	21	CL
12-19	48.0	50.0	ST-13	Shelby Tube	17	CL
12-19	53.0	54.5	SS-14	Split Spoon (SPT)	7	Shale
12-19	58.5	60.0	SS-15	Split Spoon (SPT)	3	Shale
15-19	0.0	2.0	P-1	Push Tube	20.5	CH
15-19	2.0	3.5	SS-2	Split Spoon (SPT)	13	CL/CH
15-19	4.0	6.0	P-3	Push Tube	15	CH,CL/CH
15-19	6.0	8.0	ST-4	Shelby Tube	16	CL/CH
15-19	8.5	10.0	SS-5	Split Spoon (SPT)	13	CL/CH
15-19	13.0	15.0	ST-6	Shelby Tube	21	CL/CH
15-19	18.0	20.0	P-7	Push Tube	19	CL/CH
15-19	23.5	25.0	SS-8	Split Spoon (SPT)	18	CL/CH
15-19	28.0	30.0	ST-9	Shelby Tube	20	CL/CH
15-19	33.0	35.0	P-10	Push Tube	20	CL/CH
15-19	38.0	40.0	P-11	Push Tube	20	CL/CH
15-19	43.5	45.0	SS-12	Split Spoon (SPT)	18	CL/CH
1301-19	0.0	2.0	G-1	Shelby Tube	24	CH
1301-19	2.0	4.0	G-2	Shelby Tube	24	CH/CL
1301-19	4.0	6.0	G-3	Shelby Tube	24	CH/CL
1301-19	6.0	8.0	G-4	Shelby Tube	24	CH
1301-19	8.0	10.0	G-5	Shelby Tube	24	CH
1302-19	0.0	2.0	G-1	Shelby Tube	24	CH
1302-19	2.0	4.0	G-2	Shelby Tube	24	CH/CL
1302-19	4.0	6.0	G-3	Shelby Tube	24	CH
1302-19	6.0	6.5	G-4	Shelby Tube	6	CH
101-19	0.0	2.0	P-1	Push Tube	9	CH
101-19	2.0	3.5	SS-2	Split Spoon (SPT)	17	CH
101-19	4.0	6.0	P-3	Push Tube	14	CL-ML
101-19	6.0	7.5	SS-4	Split Spoon (SPT)	16.5	CL-ML

101-19	8.0	10.0	P-5	Push Tube	15	CL-ML
101-19	0.0	5.0	Bucket	Shelby Tube		CH
101-19	5.0	10.0	Bucket	Shelby Tube		CL-ML
102-19	0.0	2.0	P-1	Push Tube	16	CH
102-19	2.0	3.5	SS-2	Split Spoon (SPT)	15	CL-ML
102-19	4.0	6.0	ST-3	Shelby Tube	20	CL-ML
102-19	6.0	7.5	SS-4	Split Spoon (SPT)	18	CL-ML
102-19	8.0	10.0	P-5	Push Tube	13	CL/CH
102-19	0.0	3.5	Bucket	Shelby Tube		CH,CL-ML
102-19	3.5	7.5	Bucket	Shelby Tube		CL-ML,CL/CH
103-19	0.0	2.0	P-1	Push Tube	20	CH
103-19	2.0	3.5	SS-2	Split Spoon (SPT)	16	CH
103-19	4.0	6.0	P-3	Push Tube	21	CL-ML
103-19	6.0	7.5	SS-4	Split Spoon (SPT)	18	CL-ML
103-19	8.0	10.0	P-5	Push Tube	20	CL/CH
103-19	0.0	5.0	Bucket	Shelby Tube		CH
103-19	5.0	10.0	Bucket	Shelby Tube		CL-ML,CL/CH
104-19	0.0	2.0	P-1	Push Tube	17.5	CH
104-19	2.0	3.5	SS-2	Split Spoon (SPT)	18	CH
104-19	4.0	6.0	P-3	Push Tube	11.5	CL-ML
104-19	6.0	7.5	SS-4	Split Spoon (SPT)	18	CL-ML
104-19	8.0	10.0	P-5	Push Tube	15	CL/CH
104-19	0.0	6.0	Bucket	Shelby Tube		CH
104-19	6.0	7.5	Bucket	Shelby Tube		CL-ML
104-19	7.5	10.0	Bucket	Shelby Tube		CL/CH
105-19	0.0	2.0	P-1	Push Tube	19	CH
105-19	2.0	3.5	SS-2	Split Spoon (SPT)	8	CH
105-19	4.0	6.0	P-3	Push Tube	18.5	CL-ML
105-19	6.0	7.5	SS-4	Split Spoon (SPT)	15	CL-ML
105-19	8.0	10.0	P-5	Push Tube	19	CL/CH
105-19	0.0	5.0	Bucket	Shelby Tube		CH
105-19	5.0	10.0	Bucket	Shelby Tube		CL-ML,CL/CH
106-19	0.0	2.0	P-1	Push Tube	21	CH
106-19	2.0	3.5	SS-2	Split Spoon (SPT)	15	CL-ML
106-19	4.0	6.0	P-3	Push Tube	14.5	CL-ML
106-19	6.0	7.5	SS-4	Split Spoon (SPT)	16	CL-ML
106-19	8.0	10.0	P-5	Push Tube	19	CL/CH
106-19	0.0	2.5	Bucket	Shelby Tube		CH
106-19	2.5	2.5-10	Bucket	Shelby Tube		CL-ML,CL/CH
201-19	0.0	2.0	P-1	Push Tube	17.5	CH,CL/CH
201-19	2.0	4.0	ST-2	Shelby Tube	23	CL-ML
201-19	4.5	6.0	SS-3	Split Spoon (SPT)	15	SM
201-19	6.0	8.0	P-4	Push Tube	17	CL/CH
201-19	8.0	9.5	SS-5	Split Spoon (SPT)	18	CL/CH

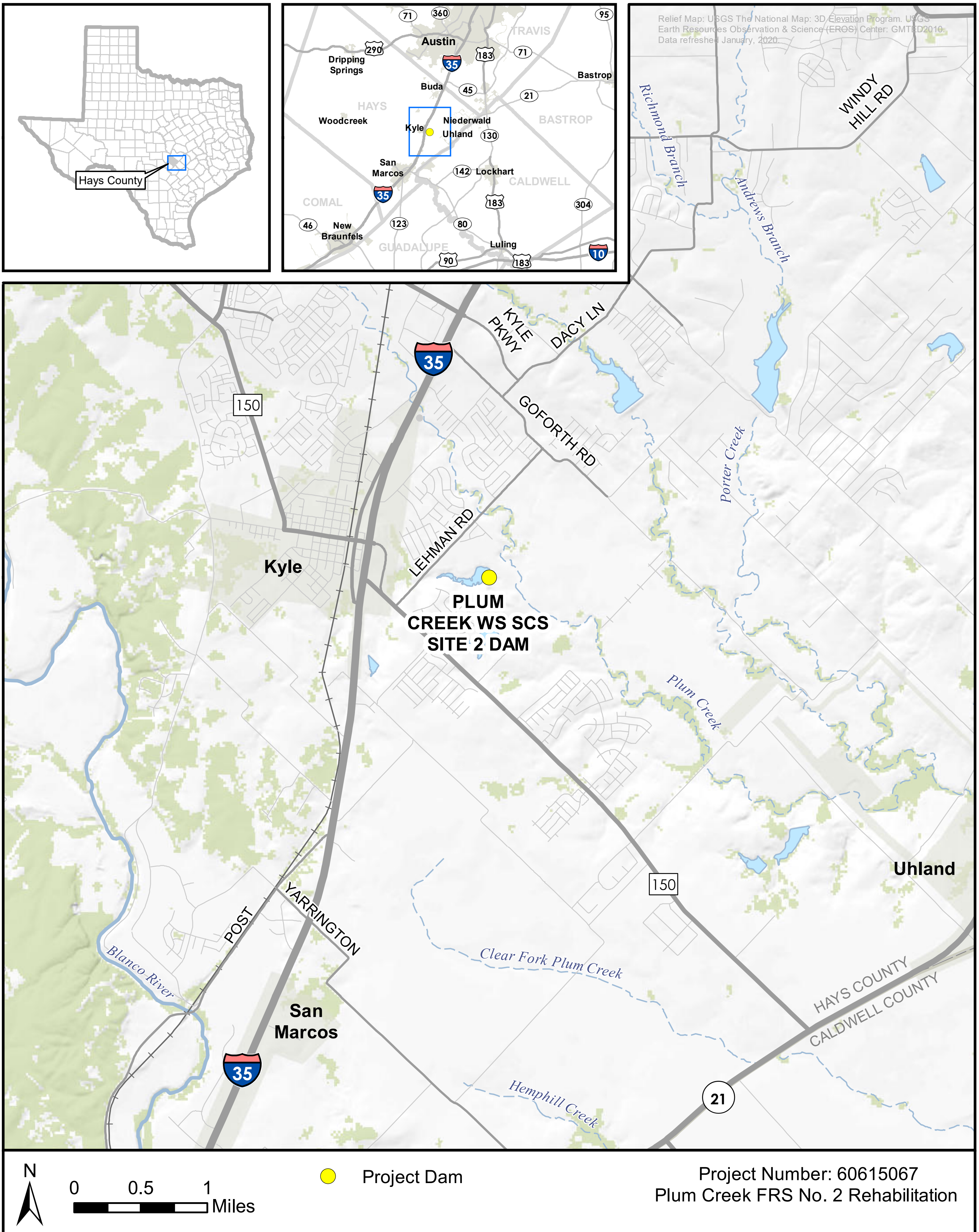
201-19	13.0	15.0	ST-6	Shelby Tube	19.5	CL/CH
201-19	18.0	20.0	P-7	Push Tube	19	CL/CH
201-19	23.5	25.0	SS-8	Split Spoon (SPT)	18	CH
202-19	0.0	2.0	P-1	Push Tube	14	CH
202-19	2.0	4.0	ST-2	Shelby Tube	15	CL
202-19	4.5	6.0	SS-3	Split Spoon (SPT)	18	ML
202-19	6.0	8.0	P-4	Push Tube	15	ML
202-19	8.0	10.0	ST-5	Shelby Tube	16.5	ML
202-19	13.5	15.0	SS-6	Split Spoon (SPT)	18	CH
202-19	18.0	20.0	P-7	Push Tube	18.5	CH
202-19	23.5	25.0	SS-8	Split Spoon (SPT)	18	CH,CL
203-19	0.0	2.0	P-1	Push Tube	10	CH
203-19	2.0	3.5	SS-2A	Split Spoon (SPT)	6.25	CL/CH,CL
203-19	2.0	3.5	SS-2B	Split Spoon (SPT)	10.75	CL/CH,CL
203-19	3.5	5.5	ST-3	Shelby Tube	10	SM
203-19	6.0	8.0	P-4A	Push Tube	3.5	SM
203-19	6.0	8.0	P-4B	Push Tube	7.5	SM
203-19	8.0	9.5	SS-5	Split Spoon (SPT)	18	SM
203-19	13.0	15.0	P-6A	Push Tube	4	SM
203-19	13.0	15.0	P-6AB	Push Tube	12.5	SM
203-19	18.5	20.0	SS-7	Split Spoon (SPT)	18	SM
203-19	22.5	24.5	ST-8	Shelby Tube	21.5	CH
204-19	0.0	2.0	P-1A	Push Tube	12.75	CH
204-19	0.0	2.0	P-1B	Push Tube	12.75	CL/CH
204-19	2.0	4.0	ST-2	Shelby Tube	11.5	CL/CH
204-19	4.0	4.5	SS-3A	Split Spoon (SPT)	18	CL/CH
204-19	4.5	6.0	SS-3B	Split Spoon (SPT)	18	CL/CH
204-19	6.0	8.0	P-4A	Push Tube	12	CL/CH
204-19	6.0	8.0	P-4B	Push Tube	12	CL/CH
204-19	8.0	9.5	SS-5A	Split Spoon (SPT)	18	CL/CH
204-19	8.0	9.5	SS-5B	Split Spoon (SPT)	18	CL/CH
204-19	13.0	15.0	ST-6	Shelby Tube	24	CL/CH
204-19	18.0	20.0	P-7	Push Tube	20.5	CL/CH
204-19	23.5	25.0	SS-8	Split Spoon (SPT)	18	CL/CH
205-19	0.0	2.0	P-1	Push Tube	10.5	CH
205-19	2.0	3.5	SS-2	Split Spoon (SPT)	14.5	CL/CH
205-19	3.5	5.5	P-3A	Push Tube	9.5	CL/CH
205-19	3.5	5.5	P-3B	Push Tube	9.5	CL/CH
205-19	6.0	7.5	SS-4	Split Spoon (SPT)	18	CL/CH
205-19	8.0	10.0	ST-5	Shelby Tube	20.75	CL/CH
205-19	13.5	15.5	P-6	Push Tube	22	CL/CH
205-19	18.5	20.0	SS-7	Split Spoon (SPT)	18	CL/CH
205-19	23.0	25.0	ST-8	Shelby Tube	15.75	CL/CH
206-19	0.0	2.0	P-1	Push Tube	19	CH
206-19	2.0	3.5	SS-2A	Split Spoon (SPT)	18	CL/CH

206-19	2.0	3.5	SS-2B	Split Spoon (SPT)	18	ML
206-19	2.0	3.5	SS-2C	Split Spoon (SPT)	18	CH
206-19	4.0	6.0	P-3A	Push Tube	11.5	CH
206-19	4.0	6.0	P-3B	Push Tube	11.5	SM
206-19	6.0	7.5	SS-4	Split Spoon (SPT)	18	SM
206-19	8.0	10.0	ST-5	Shelby Tube	18.5	CL/CH
206-19	13.0	15.0	P-6	Push Tube	22	CL/CH
206-19	18.0	20.0	ST-7	Shelby Tube	22	CL/CH
206-19	23.5	25.0	SS-8	Split Spoon (SPT)	18	CL/CH
207-19	0.0	2.0	P-1	Push Tube	12.5	CH
207-19	2.0	4.0	ST-2	Shelby Tube	12	CH
207-19	4.5	6.0	SS-3A	Split Spoon (SPT)	15	CH
207-19	4.5	6.0	SS-3B	Split Spoon (SPT)	15	ML
207-19	6.0	8.0	P-4	Push Tube	10.5	ML
207-19	8.0	9.5	SS-5	Split Spoon (SPT)	18	CL-ML
207-19	13.0	15.0	P-6	Push Tube	22	CL/CH
207-19	18.0	20.0	ST-7	Shelby Tube	29.5	CL/CH
207-19	23.5	25.0	SS-8	Split Spoon (SPT)	18	CH
207-19	28.0	30.0	P-9	Push Tube	23	CH
207-19	33.0	35.0	ST-10	Shelby Tube	22.5	CL/CH
208-19	0.0	2.0	P-1A	Push Tube	14	CH
208-19	0.0	2.0	P-1B	Push Tube	14	CL/CH
208-19	2.0	4.0	ST-2	Shelby Tube	11	CL/CH
208-19	4.5	6.0	SS-3A	Split Spoon (SPT)	18	CH
208-19	4.5	6.0	SS-3B	Split Spoon (SPT)	18	CL/CH
208-19	6.0	8.0	P-4	Push Tube	22	s. CL
208-19	8.0	9.5	SS-5	Split Spoon (SPT)	5	CL
208-19	13.0	15.0	ST-6	Shelby Tube	19.5	CL/CH
208-19	18.0	20.0	P-7	Push Tube	20	CL/CH
208-19	23.5	25.0	SS-8A	Split Spoon (SPT)	18	CL/CH
208-19	23.5	25.0	SS-8B	Split Spoon (SPT)	18	CL/CH
209-19	0.0	2.0	P-1A	Push Tube	11	CL/CH
209-19	0.0	2.0	P-1B	Push Tube	11	CL/CH
209-19	2.0	3.5	SS-2	Split Spoon (SPT)	15	CL/CH
209-19	4.0	6.0	P-3A	Push Tube	11.5	CH
209-19	4.0	6.0	P-3B	Push Tube	11.5	CL/CH
209-19	6.0	8.0	ST-4	Shelby Tube	15.25	CL/CH
209-19	8.0	9.5	SS-5	Split Spoon (SPT)	18	CL/CH
209-19	13.0	15.0	P-6	Push Tube	22	CL/CH
209-19	18.0	20.0	ST-7	Shelby Tube	27.25	CL/CH
209-19	23.5	25.0	SS-8	Split Spoon (SPT)	18	CL/CH
210-19	0.0	2.0	P-1	Push Tube	15	CH
210-19	2.0	3.5	SS-2	Split Spoon (SPT)	11.5	CH
210-19	4.0	6.0	P-3	Push Tube	18	CH
210-19	6.0	8.0	P-4	Push Tube	22	CL/CH
210-19	8.0	10.0	ST-5	Shelby Tube	16	CL/CH

210-19	13.5	15.0	SS-6	Split Spoon (SPT)	18	CL/CH
210-19	18.0	20.0	ST-7	Shelby Tube	24.5	CL/CH
210-19	23.5	25.0	SS-8	Split Spoon (SPT)	18	CL/CH
304-19	0.0	2.0	P-1	Push Tube	13.5	CH,CL/CH
304-19	2.5	4.0	SS-2	Split Spoon (SPT)	18	CL/CH,CH
304-19	4.0	6.0	P-3	Push Tube	16	CH,CL/CH
304-19	6.0	8.0	ST-4	Shelby Tube	12	CL/CH
304-19	8.5	10.0	SS-5	Split Spoon (SPT)	18	CL/CH
304-19	13.0	15.0	P-6	Push Tube	18	CL/CH
304-19	18.0	20.0	ST-7	Shelby Tube	14	CH,CL/CH
304-19	23.5	25.0	SS-8	Split Spoon (SPT)	15	CL/CH
304-19	28.0	30.0	ST-9	Shelby Tube	15	CL-ML
304-19	33.5	35.0	SS-10	Split Spoon (SPT)	18	CL-ML
305-19	0.0	2.0	P-1	Push Tube	17	CH
305-19	2.5	4.0	SS-2	Split Spoon (SPT)	15.5	CL/CH
305-19	4.0	6.0	ST-3	Shelby Tube	11	CL/CH
305-19	6.0	8.0	P-4	Push Tube	15.5	CH
305-19	8.5	10.0	SS-5	Split Spoon (SPT)	18	CH
305-19	13.0	15.0	P-6	Push Tube	17	CH,CL/CH
305-19	18.0	20.0	ST-7	Shelby Tube	19.5	CL/CH
305-19	23.5	25.0	SS-8	Split Spoon (SPT)	13	CL/CH
601-19	0.0	2.0	P-1	Push Tube	11	CH
601-19	2.0	3.5	SS-2	Split Spoon (SPT)	5	CH
601-19	3.5	5.5	ST-3	Shelby Tube	12	CL-ML
601-19	6.0	8.0	P-4	Push Tube	15	CH,CL-ML
601-19	8.0	9.5	SS-5	Split Spoon (SPT)	18	CL-ML
601-19	13.0	15.0	ST-6	Shelby Tube	18	CL-ML
601-19	18.0	20.0	P-7	Push Tube	20.5	CL-ML
601-19	23.5	25.0	SS-8	Split Spoon (SPT)	18	CL-ML
602-19	0.0	2.0	P-1	Push Tube	11	CH
602-19	2.0	3.5	SS-2	Split Spoon (SPT)	18	CL-ML
602-19	4.0	6.0	P-3	Push Tube	9.5	CH
602-19	6.0	8.0	ST-4	Shelby Tube	16.5	CL-ML
602-19	8.0	9.5	SS-5	Split Spoon (SPT)	18	CL-ML
602-19	13.0	15.0	ST-6	Shelby Tube	19	CL-ML
602-19	18.0	20.0	P-7	Push Tube	16.5	CL
602-19	23.5	25.0	SS-8	Split Spoon (SPT)	18	CL/CH
603-19	0.0	2.0	P-1	Push Tube	11	CH
603-19	2.0	3.5	SS-2	Split Spoon (SPT)	11.25	CH
603-19	4.0	6.0	P-3	Push Tube	8.5	CL-ML
603-19	6.0	7.5	SS-4	Split Spoon (SPT)	10	CL/CH
603-19	8.0	10.0	ST-5	Shelby Tube	19	CL/CH
603-19	13.0	15.0	P-6	Push Tube	17.5	CL/CH
603-19	18.5	20.0	SS-7	Split Spoon (SPT)	18	CL/CH
603-19	23.5	25.0	SS-8	Split Spoon (SPT)	10.5	Shale

604-19	0.0	2.0	P-1	Push Tube	18.5	CH
604-19	2.0	3.5	SS-2	Split Spoon (SPT)	12	CH
604-19	4.0	6.0	ST-3	Shelby Tube	16.5	CH
604-19	6.0	8.0	P-4	Push Tube	17	CH
604-19	8.5	10.0	SS-5	Split Spoon (SPT)	17	CH/CL
604-19	13.5	15.0	P-6	Push Tube	17	CH/CL
604-19	18.0	20.0	P-7	Push Tube	20.5	CH/CL
604-19	23.5	25.0	SS-8	Split Spoon (SPT)	8	CH/CL
605-19	0.0	2.0	P-1	Push Tube	10	CH
605-19	2.0	3.5	SS-2	Split Spoon (SPT)	14.25	CH
605-19	4.0	6.0	ST-3	Shelby Tube	13	CL
605-19	6.0	8.0	P-4	Push Tube	16	CL
605-19	8.0	9.5	SS-5	Split Spoon (SPT)	18	CL
605-19	13.0	15.0	ST-6	Shelby Tube		CL
605-19	18.0	20.0	P-7	Push Tube	18	CL
605-19	23.5	25.0	SS-8	Split Spoon (SPT)	18	CL

FIGURES



Relief Map: USGS The National Map: 3D Elevation Program. USGS Earth Resources Observation & Science (EROS) Center: GMTED2010. Data refreshed January, 2020.

● Project Dam

Project Number: 60615067
Plum Creek FRS No. 2 Rehabilitation

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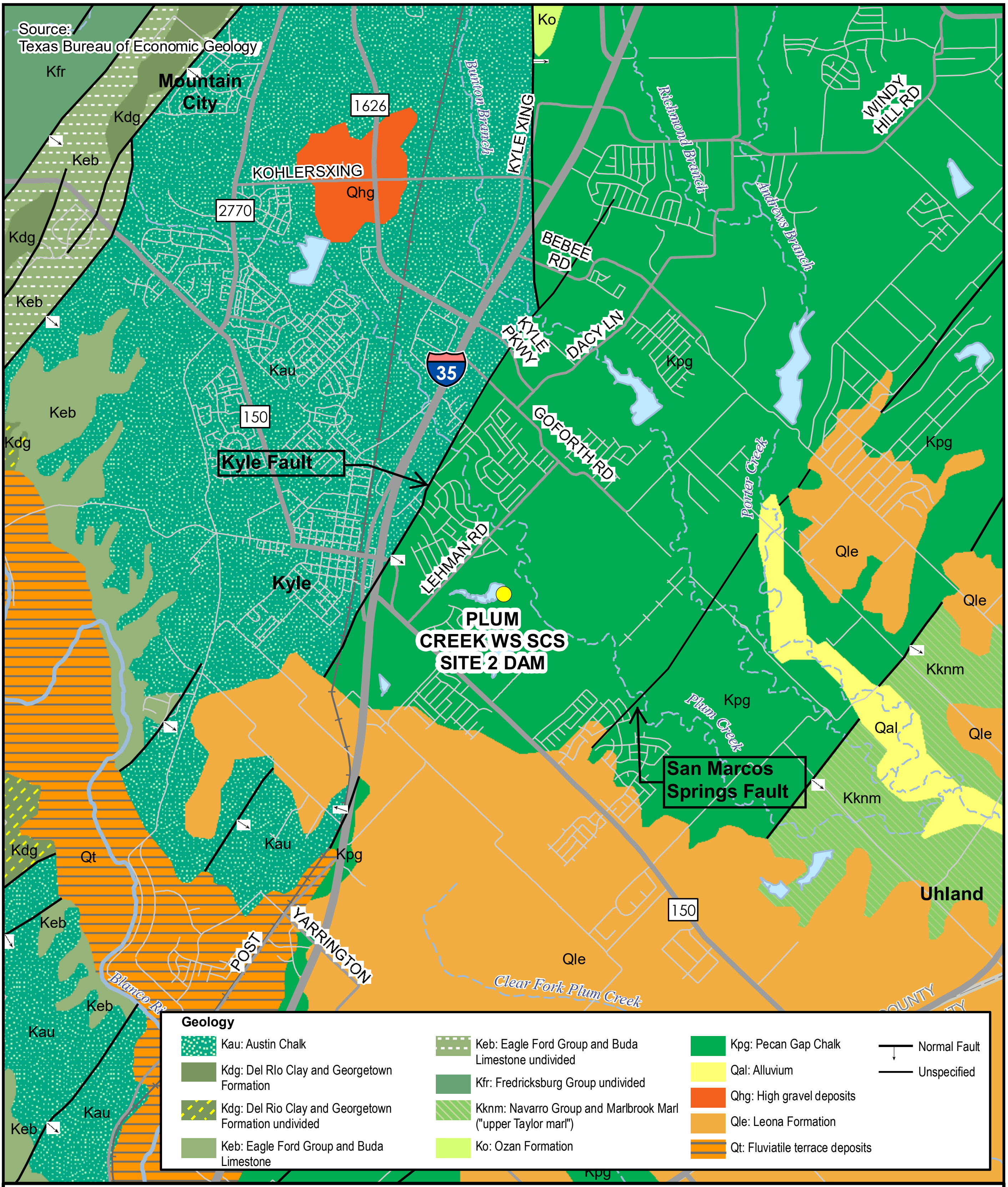
AECOM

Figure 1
Location Map



N

0 0.5 1 Miles

● Project Dam

Project Number: 60615067
Plum Creek FRS No. 2 Rehabilitation

AECOM

Figure 2
Geologic Map

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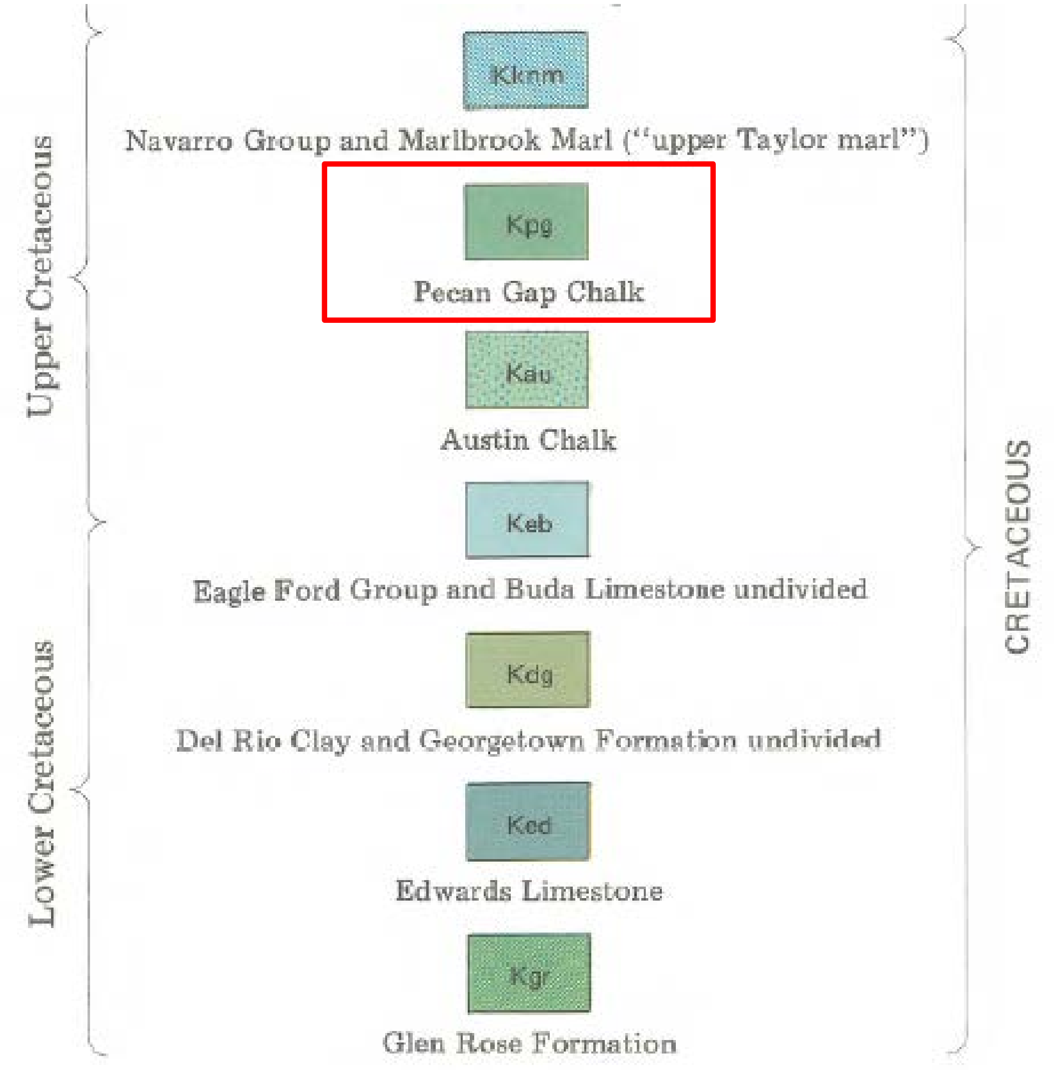
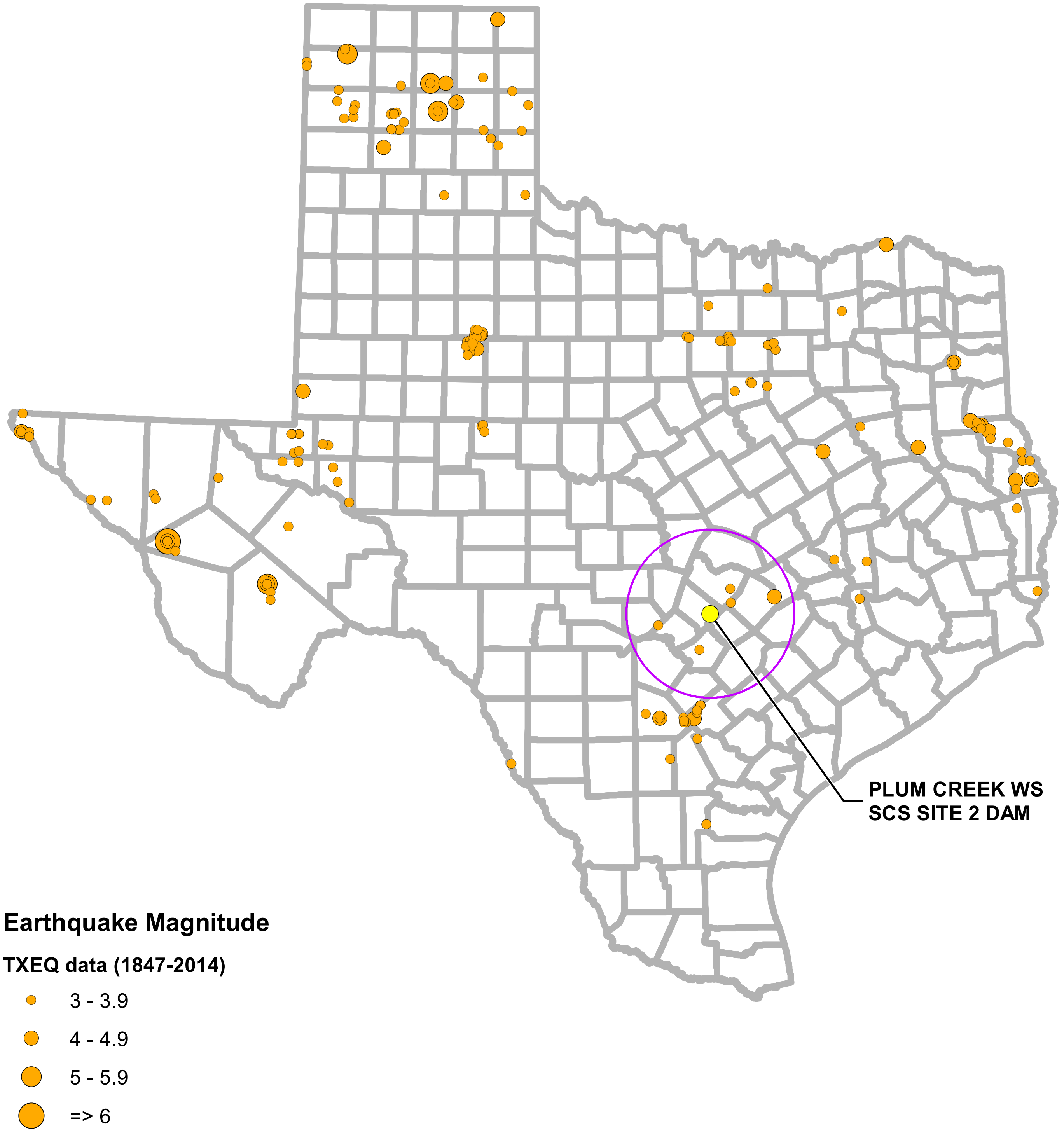
Figure 3. Stratigraphic Column for Hays County



Source:
TXEQ data - University of Texas Institute for Geophysics, the Texas Division of Emergency Management, and the U.S. Department of Energy through its RPSEA program.



Project Number: 60615067
Plum Creek FRS No. 2 Rehabilitation

Figure 4
Map of Recent and Historic Earthquakes with M≥3.0

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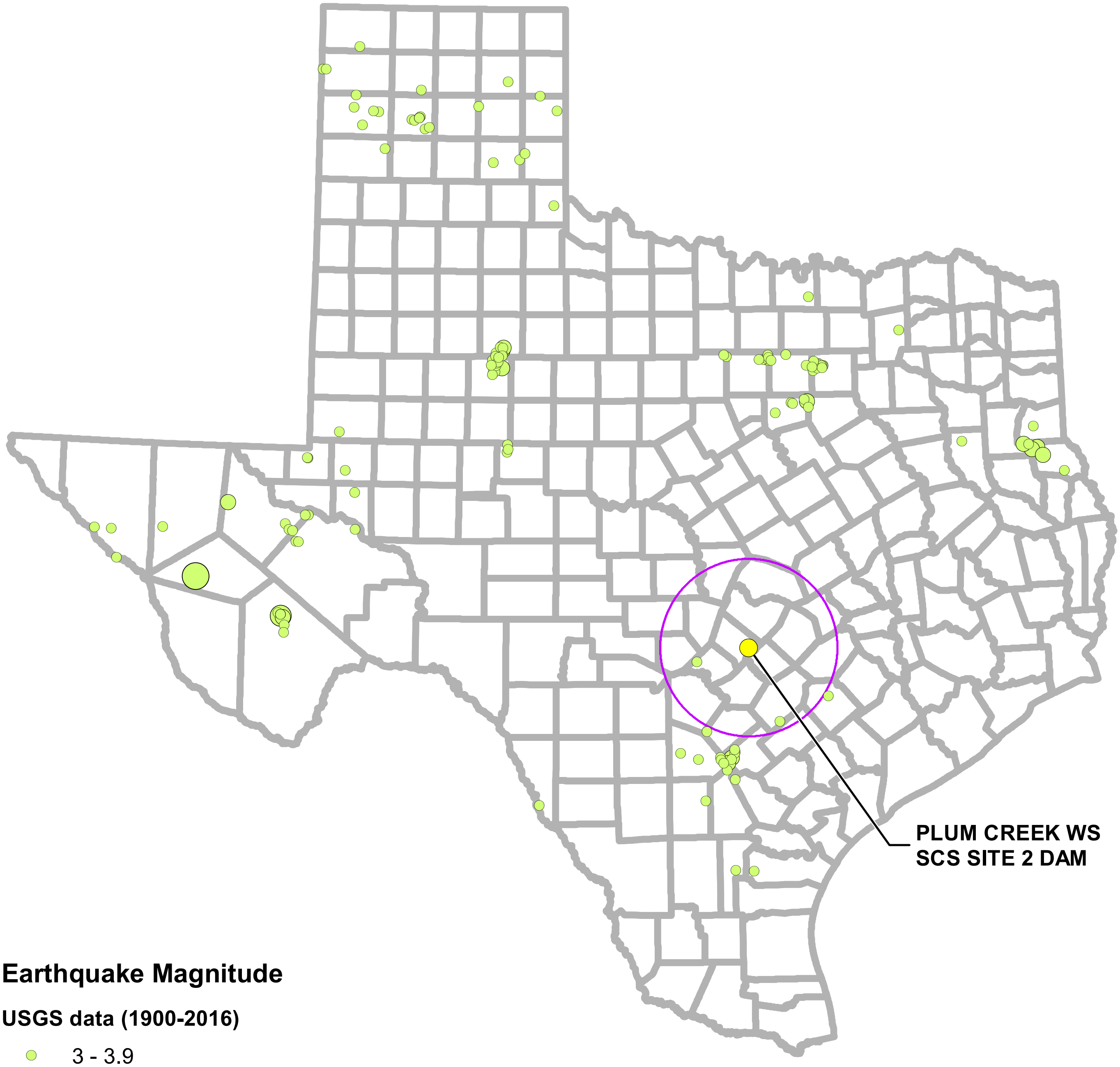
Source:
USGS data - USGS Earthquake
Hazards Program



Earthquake Magnitude

USGS data (1900-2016)

- ● 3 - 3.9
- ● 4 - 4.9
- ● 5 - 5.9
- ● => 6

N

0 50 100
Miles

● Project Dam

▭ 100 km-Radius

Project Number: 60615067
Plum Creek FRS No. 2 Rehabilitation

Figure 5
Map of Recent and Historic
Earthquakes with M≥3.0

AECOM

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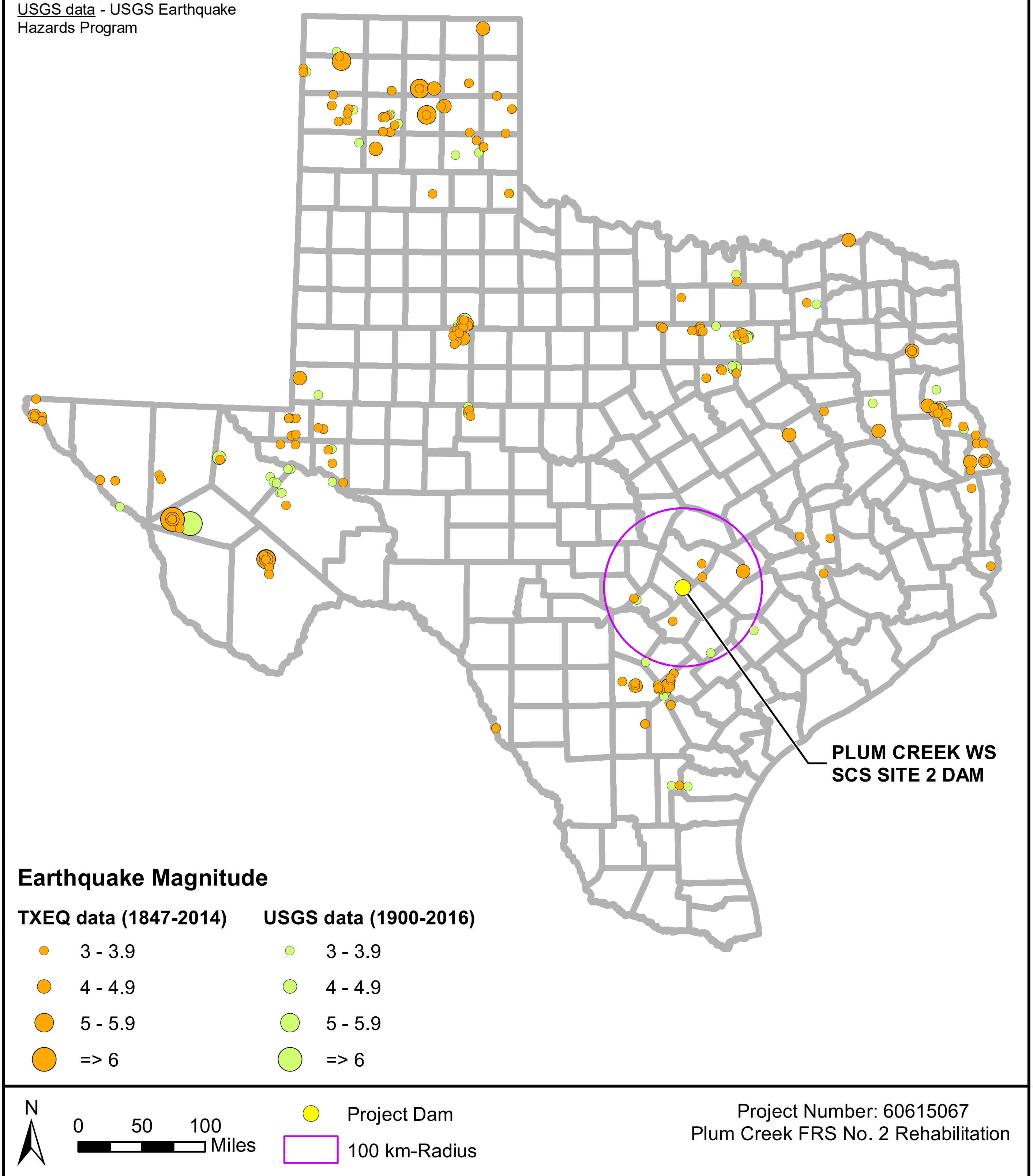
Source:
TXEQ data - University of Texas Institute for Geophysics, the Texas Division of Emergency Management, and the U.S. Department of Energy through its RPSEA program.
USGS data - USGS Earthquake Hazards Program



Project Number: 60615067
Plum Creek FRS No. 2 Rehabilitation

Figure 6
Map of Recent and Historic Earthquakes with M≥3.0

AECOM

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N

0 150 300
Feet

- ▣ Boring Completed as Piezometer
- ⊙ Hand Auger Boring
- ⊕ Soil Boring

Project Number: 60615067
Plum Creek FRS No. 2 Rehabilitation

AECOM

Boring Location
Map

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Appendix A NRCS Websoil Survey Data

Soil Map—Comal and Hays Counties, Texas
(Plum Creek FRS No. 2 Rehabilitation)

Map Scale: 1:7,010 if printed on A landscape (11" x 8.5") sheet.

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 14N WGS84

MAP LEGEND

Area of Interest (AOI)

- ☐ Area of Interest (AOI)

Soils

- ☐ Soil Map Unit Polygons
- Soil Map Unit Lines
- ■ Soil Map Unit Points

Special Point Features

- Blowout
- ☒ Borrow Pit
- Clay Spot
- ◇ Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- + Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- △ Other
- Special Line Features

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Comal and Hays Counties, Texas
Survey Area Data: Version 16, Sep 12, 2019

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Feb 8, 2015—Nov 30, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
ByB	Branyon clay, 1 to 3 percent slopes	0.0	0.0%
DAM	Dams	1.2	0.5%
HeB	Heiden clay, 1 to 3 percent slopes	105.4	43.5%
HeC3	Heiden clay, 3 to 5 percent slopes, eroded	0.0	0.0%
HeD3	Heiden clay, 5 to 8 percent slopes, eroded	53.3	22.0%
LeB	Lewisville silty clay, 1 to 3 percent slopes	28.5	11.8%
Tn	Tinn clay, 0 to 1 percent slopes, frequently flooded	37.0	15.3%
W	Water	16.5	6.8%
Totals for Area of Interest		**242.0**	**100.0%**

Map Unit Description

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions in this report, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named, soils that are similar to the named components, and some minor components that differ in use and management from the major soils.

Most of the soils similar to the major components have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Some minor components, however, have properties and behavior characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. All the soils of a series have major horizons that are similar in composition, thickness, and arrangement. Soils of a given series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Additional information about the map units described in this report is available in other soil reports, which give properties of the soils and the limitations, capabilities, and potentials for many uses. Also, the narratives that accompany the soil reports define some of the properties included in the map unit descriptions.

Comal and Hays Counties, Texas

ByB—Branyon clay, 1 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2shgw
Elevation: 290 to 1,040 feet
Mean annual precipitation: 33 to 39 inches
Mean annual air temperature: 66 to 70 degrees F
Frost-free period: 243 to 288 days

Farmland classification: All areas are prime farmland

Map Unit Composition

Branyon and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Branyon

Setting

Landform: Stream terraces, stream terraces
Landform position (three-dimensional): Tread
Microfeatures of landform position: Circular gilgai, circular gilgai
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Calcareous clayey alluvium derived from mudstone of pleistocene age

Typical profile

Ap - 0 to 12 inches: clay
Bkss - 12 to 72 inches: clay
BCkss - 72 to 80 inches: clay

Properties and qualities

Slope: 1 to 3 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Moderately well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 35 percent
Gypsum, maximum in profile: 5 percent
Salinity, maximum in profile: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 7.0
Available water storage in profile: High (about 10.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: D
Ecological site: Southern Blackland (R086AY011TX)
Hydric soil rating: No

Minor Components

Lewisville

Percent of map unit: 5 percent
Landform: Stream terraces
Landform position (three-dimensional): Riser

Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: Southern Clay Loam (R086AY007TX)
Hydric soil rating: No

Houston black

Percent of map unit: 5 percent
Landform: Ridges
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Microfeatures of landform position: Circular gilgai
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: Southern Blackland (R086AY011TX)
Hydric soil rating: No

Burleson

Percent of map unit: 5 percent
Landform: Stream terraces, stream terraces
Landform position (three-dimensional): Tread
Microfeatures of landform position: Circular gilgai, circular gilgai
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Southern Blackland (R086AY011TX)
Hydric soil rating: No

Data Source Information

Soil Survey Area: Comal and Hays Counties, Texas
Survey Area Data: Version 16, Sep 12, 2019

Comal and Hays Counties, Texas

HeB—Heiden clay, 1 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2v1v9
Elevation: 290 to 1,020 feet
Mean annual precipitation: 33 to 45 inches
Mean annual air temperature: 63 to 68 degrees F
Frost-free period: 224 to 278 days
Farmland classification: Not prime farmland

Map Unit Composition

Heiden and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Heiden

Setting

Landform: Ridges
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Interfluve
Microfeatures of landform position: Linear gilgai
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Clayey residuum weathered from mudstone

Typical profile

Ap - 0 to 6 inches: clay
A - 6 to 18 inches: clay
Bkss - 18 to 58 inches: clay
CBdk - 58 to 70 inches: clay

Properties and qualities

Slope: 1 to 3 percent
Depth to restrictive feature: 40 to 65 inches to densic material
Natural drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 40 percent
Gypsum, maximum in profile: 5 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 12.0
Available water storage in profile: High (about 9.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: D
Ecological site: Southern Blackland (R086AY011TX)
Hydric soil rating: No

Minor Components

Houston black

Percent of map unit: 10 percent
Landform: Ridges
Landform position (two-dimensional): Shoulder, summit
Landform position (three-dimensional): Interfluve
Microfeatures of landform position: Circular gilgai
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: Southern Blackland (R086AY011TX)
Hydric soil rating: No

Ferris

Percent of map unit: 5 percent
Landform: Ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Microfeatures of landform position: Linear gilgai
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: Southern Eroded Blackland (R086AY009TX)
Hydric soil rating: No

Data Source Information

Soil Survey Area: Comal and Hays Counties, Texas
Survey Area Data: Version 16, Sep 12, 2019

Comal and Hays Counties, Texas

HeC3—Heiden clay, 3 to 5 percent slopes, eroded

Map Unit Setting

National map unit symbol: 2v1vb
Elevation: 300 to 1,390 feet
Mean annual precipitation: 33 to 48 inches
Mean annual air temperature: 64 to 68 degrees F
Frost-free period: 233 to 278 days
Farmland classification: Not prime farmland

Map Unit Composition

Heiden, moderately eroded, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Heiden, Moderately Eroded

Setting

Landform: Ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Microfeatures of landform position: Linear gilgai
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Clayey residuum weathered from mudstone

Typical profile

A - 0 to 13 inches: clay
Bss - 13 to 22 inches: clay
Bkss - 22 to 58 inches: clay
CBdk - 58 to 80 inches: clay

Properties and qualities

Slope: 3 to 5 percent
Depth to restrictive feature: 40 to 65 inches to densic material
Natural drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 40 percent
Gypsum, maximum in profile: 5 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 12.0
Available water storage in profile: High (about 9.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: D
Ecological site: Southern Eroded Blackland (R086AY009TX)
Hydric soil rating: No

Minor Components

Houston black

Percent of map unit: 10 percent
Landform: Ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Microfeatures of landform position: Circular gilgai
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: Southern Blackland (R086AY011TX)
Hydric soil rating: No

Ferris, severely eroded

Percent of map unit: 5 percent
Landform: Ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Microfeatures of landform position: Linear gilgai
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: Southern Eroded Blackland (R086AY009TX)
Hydric soil rating: No

Data Source Information

Soil Survey Area: Comal and Hays Counties, Texas
Survey Area Data: Version 16, Sep 12, 2019

Comal and Hays Counties, Texas

HeD3—Heiden clay, 5 to 8 percent slopes, eroded

Map Unit Setting

National map unit symbol: 2v1vd
Elevation: 250 to 940 feet
Mean annual precipitation: 33 to 40 inches
Mean annual air temperature: 64 to 68 degrees F
Frost-free period: 245 to 278 days
Farmland classification: Not prime farmland

Map Unit Composition

Heiden, moderately eroded, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Heiden, Moderately Eroded

Setting

Landform: Ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Microfeatures of landform position: Linear gilgai
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Clayey residuum weathered from mudstone

Typical profile

A1 - 0 to 8 inches: clay
A2 - 8 to 22 inches: clay
Bss - 22 to 44 inches: clay
CBd - 44 to 80 inches: clay

Properties and qualities

Slope: 5 to 8 percent
Depth to restrictive feature: 40 to 65 inches to densic material
Natural drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 40 percent
Gypsum, maximum in profile: 5 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 12.0
Available water storage in profile: Moderate (about 7.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: D
Ecological site: Southern Eroded Blackland (R086AY009TX)
Hydric soil rating: No

Minor Components

Ferris, moderately eroded

Percent of map unit: 10 percent
Landform: Ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Microfeatures of landform position: Linear gilgai
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: Southern Eroded Blackland (R086AY009TX)
Hydric soil rating: No

Heiden, severely eroded

Percent of map unit: 5 percent
Landform: Ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Microfeatures of landform position: Linear gilgai
Down-slope shape: Convex
Across-slope shape: Concave
Ecological site: Southern Eroded Blackland (R086AY009TX)
Hydric soil rating: No

Data Source Information

Soil Survey Area: Comal and Hays Counties, Texas
Survey Area Data: Version 16, Sep 12, 2019

Comal and Hays Counties, Texas

LeB—Lewisville silty clay, 1 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2vtgn
Elevation: 240 to 1,470 feet
Mean annual precipitation: 32 to 44 inches
Mean annual air temperature: 63 to 68 degrees F
Frost-free period: 240 to 270 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Lewisville and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Lewisville

Setting

Landform: Stream terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Calcareous clayey alluvium derived from mudstone

Typical profile

Ap - 0 to 15 inches: silty clay
Bk1 - 15 to 38 inches: silty clay
Bk2 - 38 to 69 inches: silty clay

Properties and qualities

Slope: 1 to 3 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 40 percent
Salinity, maximum in profile: Nonsaline (0.7 to 1.1 mmhos/cm)
Available water storage in profile: High (about 9.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Ecological site: Southern Clay Loam (R086AY007TX)

Hydric soil rating: No

Minor Components

Altoga

Percent of map unit: 10 percent
Landform: Stream terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: Southern Clay Loam (R086AY007TX)
Hydric soil rating: No

Branyon

Percent of map unit: 5 percent
Landform: Stream terraces, stream terraces
Landform position (three-dimensional): Tread
Microfeatures of landform position: Circular gilgai, circular gilgai
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: Southern Blackland (R086AY011TX)
Hydric soil rating: No

Data Source Information

Soil Survey Area: Comal and Hays Counties, Texas
Survey Area Data: Version 16, Sep 12, 2019

Comal and Hays Counties, Texas

Tn—Tinn clay, 0 to 1 percent slopes, frequently flooded

Map Unit Setting

National map unit symbol: 2vtgr
Elevation: 330 to 750 feet
Mean annual precipitation: 35 to 47 inches
Mean annual air temperature: 63 to 68 degrees F
Frost-free period: 226 to 263 days
Farmland classification: Not prime farmland

Map Unit Composition

Tinn and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Tinn

Setting

Landform: Flood plains
Landform position (three-dimensional): Tread
Microfeatures of landform position: Circular gilgai
Down-slope shape: Linear
Across-slope shape: Concave
Parent material: Calcareous clayey alluvium

Typical profile

A - 0 to 17 inches: clay
Bss - 17 to 57 inches: clay
Bkssy - 57 to 80 inches: clay

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Moderately well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Frequent
Frequency of ponding: None
Calcium carbonate, maximum in profile: 25 percent
Gypsum, maximum in profile: 2 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 2.0
Available water storage in profile: Moderate (about 8.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: D
Ecological site: Clayey Bottomland (R086AY013TX)
Hydric soil rating: No

Minor Components

Whitesboro

Percent of map unit: 10 percent
Landform: Flood plains
Microfeatures of landform position: Circular gilgai
Down-slope shape: Linear
Across-slope shape: Concave
Ecological site: Loamy Bottomland (R086AY012TX)
Hydric soil rating: No

Gladewater

Percent of map unit: 5 percent
Landform: Flood plains
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: Clayey Bottomland (R086AY013TX)
Hydric soil rating: Yes

Data Source Information

Soil Survey Area: Comal and Hays Counties, Texas
Survey Area Data: Version 16, Sep 12, 2019

Comal and Hays Counties, Texas

W—Water

Map Unit Composition

Water: 100 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Data Source Information

Soil Survey Area: Comal and Hays Counties, Texas
Survey Area Data: Version 16, Sep 12, 2019

Appendix B Seismicity Data

U.S. Geological Survey - Earthquake Hazards Program

Unified Hazard Tool

Please do not use this tool to obtain ground motion parameter values for the design code reference documents covered by the U.S. Seismic Design Maps web tools (e.g., the International Building Code and the ASCE 7 or 41 Standard). The values returned by the two applications are not identical.

Input

Edition

Dynamic: Conterminous U.S. 2014 (upd

Latitude

Decimal degrees

29.983965

Longitude

Decimal degrees, negative values for western longitudes

-97.857596

Site Class

760 m/s (B/C boundary)

Spectral Period

Peak Ground Acceleration

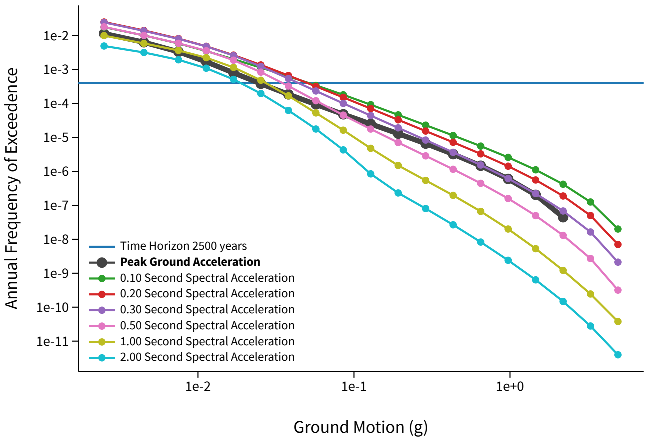
Time Horizon

Return period in years

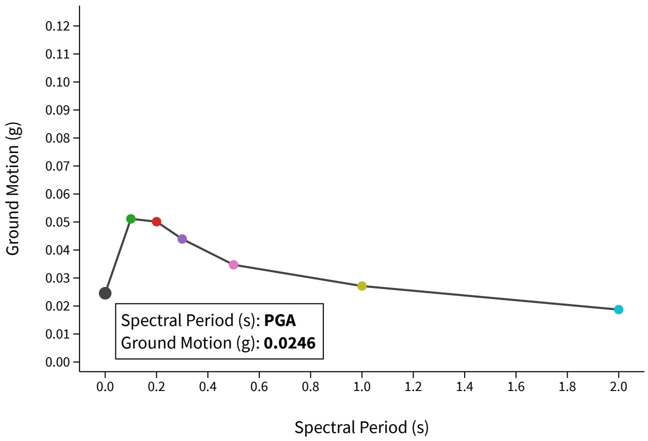
2500

Hazard Curve

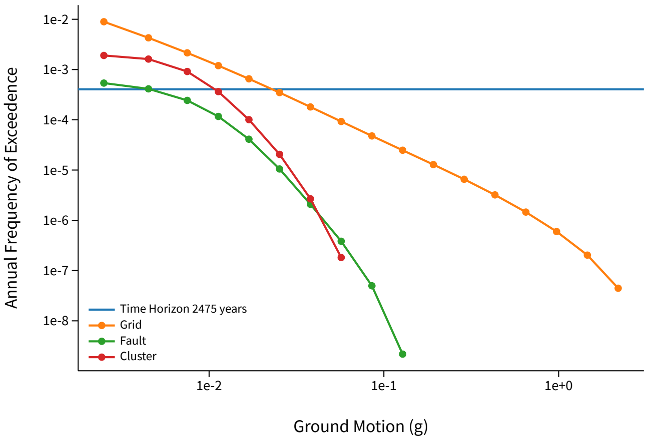
Hazard Curves



Uniform Hazard Response Spectrum



Component Curves for Peak Ground Acceleration

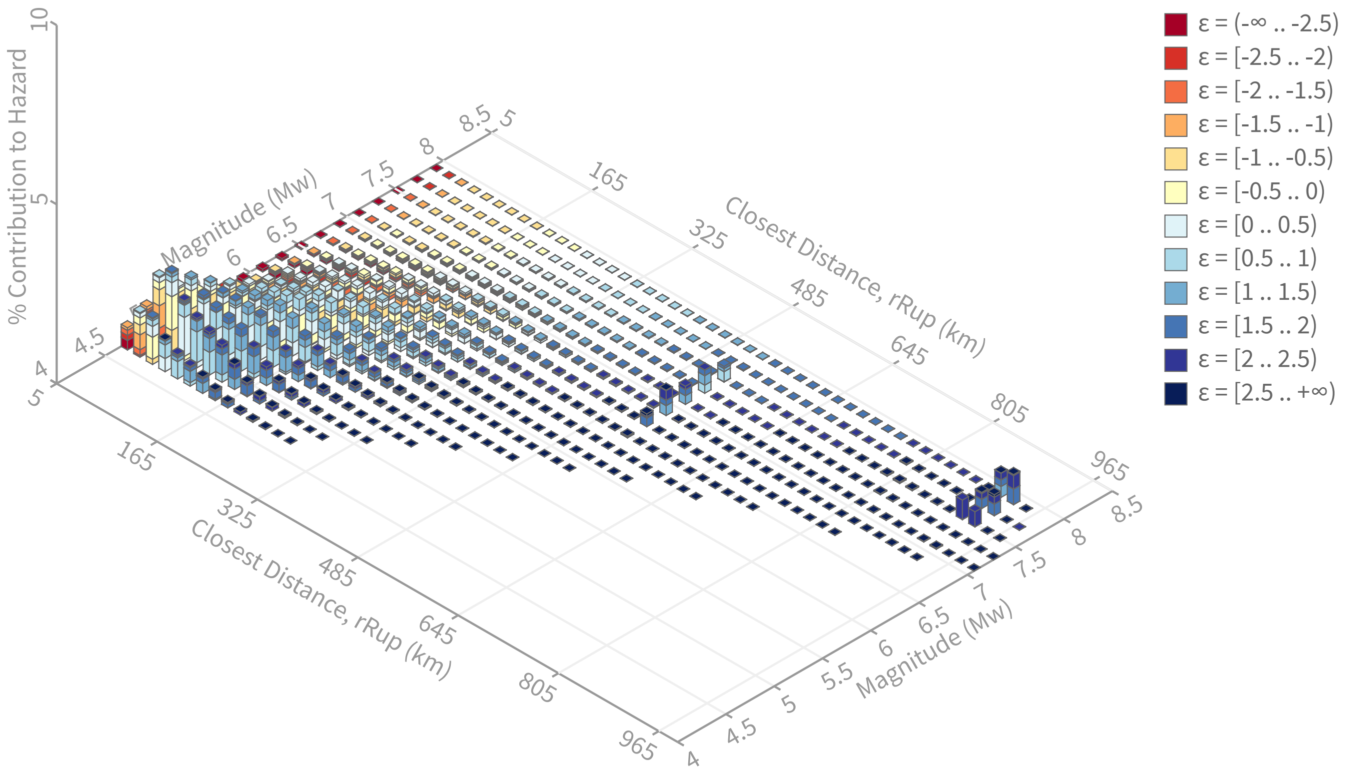


View Raw Data

^ Deaggregation

Component

Total



Summary statistics for, Deaggregation: Total

Deaggregation targets

Return period: 2500 yrs
Exceedance rate: 0.0004 yr^{-1}
PGA ground motion: 0.024562158 g

Recovered targets

Return period: 2505.3577 yrs
Exceedance rate: 0.0003991446 yr^{-1}

Totals

Binned: 97.45 %
Residual: 2.55 %
Trace: 3.1 %

Mean (over all sources)

m: 5.77
r: 177.09 km
ε_0: 0.14 σ

Mode (largest m-r bin)

m: 4.9
r: 49.87 km
ε_0: -0.16 σ
Contribution: 2.25 %

Mode (largest m-r-ε_0 bin)

m: 4.9
r: 69.88 km
ε_0: 0.27 σ
Contribution: 1.08 %

Discretization

r: min = 0.0, max = 1000.0, Δ = 20.0 km
m: min = 4.4, max = 9.4, Δ = 0.2
ε: min = -3.0, max = 3.0, Δ = 0.5 σ

Epsilon keys

ε0: [-∞ .. -2.5)
ε1: [-2.5 .. -2.0)
ε2: [-2.0 .. -1.5)
ε3: [-1.5 .. -1.0)
ε4: [-1.0 .. -0.5)
ε5: [-0.5 .. 0.0)
ε6: [0.0 .. 0.5)
ε7: [0.5 .. 1.0)
ε8: [1.0 .. 1.5)
ε9: [1.5 .. 2.0)
ε10: [2.0 .. 2.5)
ε11: [2.5 .. +∞]

Deaggregation Contributors

Source Set ↳ Source	Type	r	m	ε_0	lon	lat	az	%
USGS Fixed Smoothing Zone 2 (opt)	Grid							14.78
SSCn Fixed Smoothing Zone 2 (opt)	Grid							14.63
USGS Adaptive Smoothing Zone 2 (opt)	Grid							12.15
SSCn Adaptive Smoothing Zone 2 (opt)	Grid							12.01
SSCn Adaptive Smoothing Zone 1 (opt)	Grid							9.64
USGS Adaptive Smoothing Zone 1 (opt)	Grid							9.56
SSCn Fixed Smoothing Zone 1 (opt)	Grid							9.05
USGS Fixed Smoothing Zone 1 (opt)	Grid							8.97
SSCn New Madrid	Cluster							3.51
NMFS RLME 1		987.48	7.74	2.10	90.374°W	35.555°N	46.50	1.03
SSCn Meers Full Rupture	Fault							1.84
Meers CEUS - SSC		526.96	7.14	1.45	98.300°W	34.709°N	355.60	1.84
USGS New Madrid 500-year	Cluster							1.10

U.S. Geological Survey - Earthquake Hazards Program

Unified Hazard Tool

Please do not use this tool to obtain ground motion parameter values for the design code reference documents covered by the U.S. Seismic Design Maps web tools (e.g., the International Building Code and the ASCE 7 or 41 Standard). The values returned by the two applications are not identical.

Input

Edition

Dynamic: Conterminous U.S. 2014 (upd

Latitude

Decimal degrees

29.983965

Longitude

Decimal degrees, negative values for western longitudes

-97.857596

Site Class

760 m/s (B/C boundary)

Spectral Period

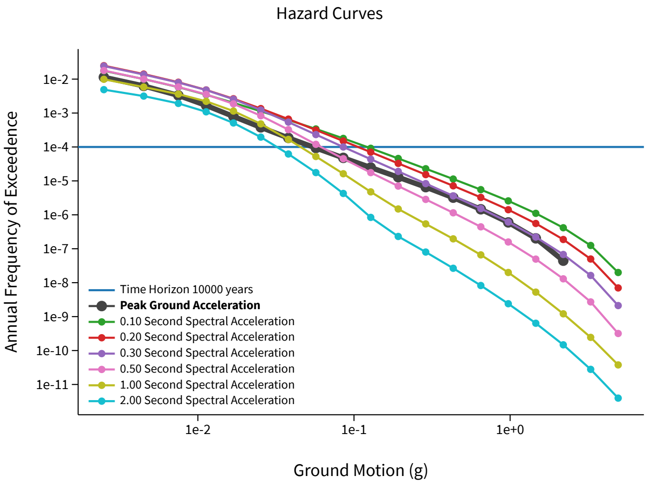
Peak Ground Acceleration

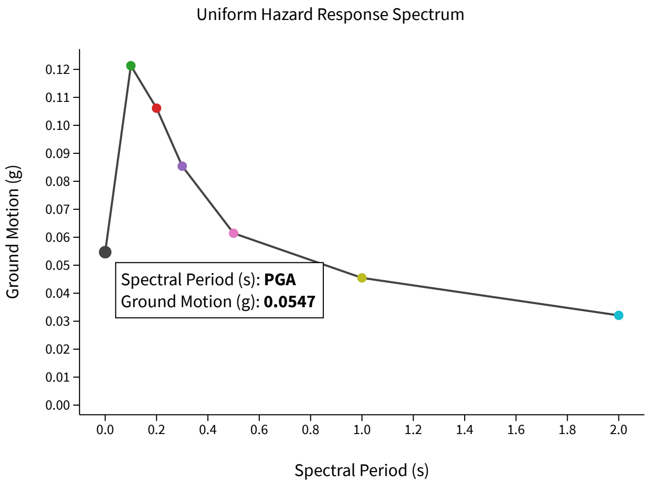
Time Horizon

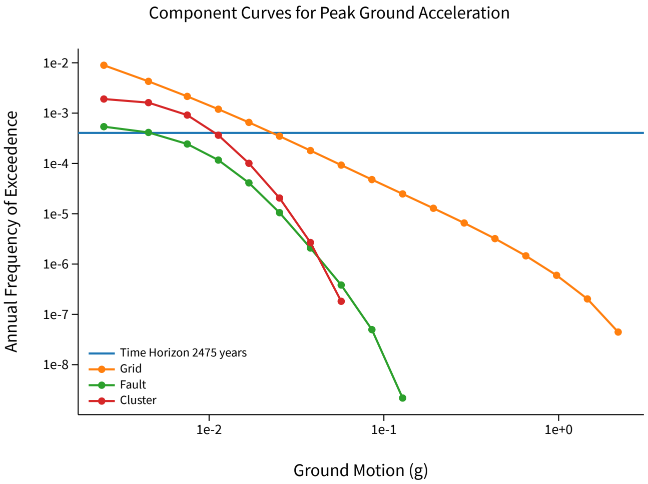
Return period in years

10000

Hazard Curve





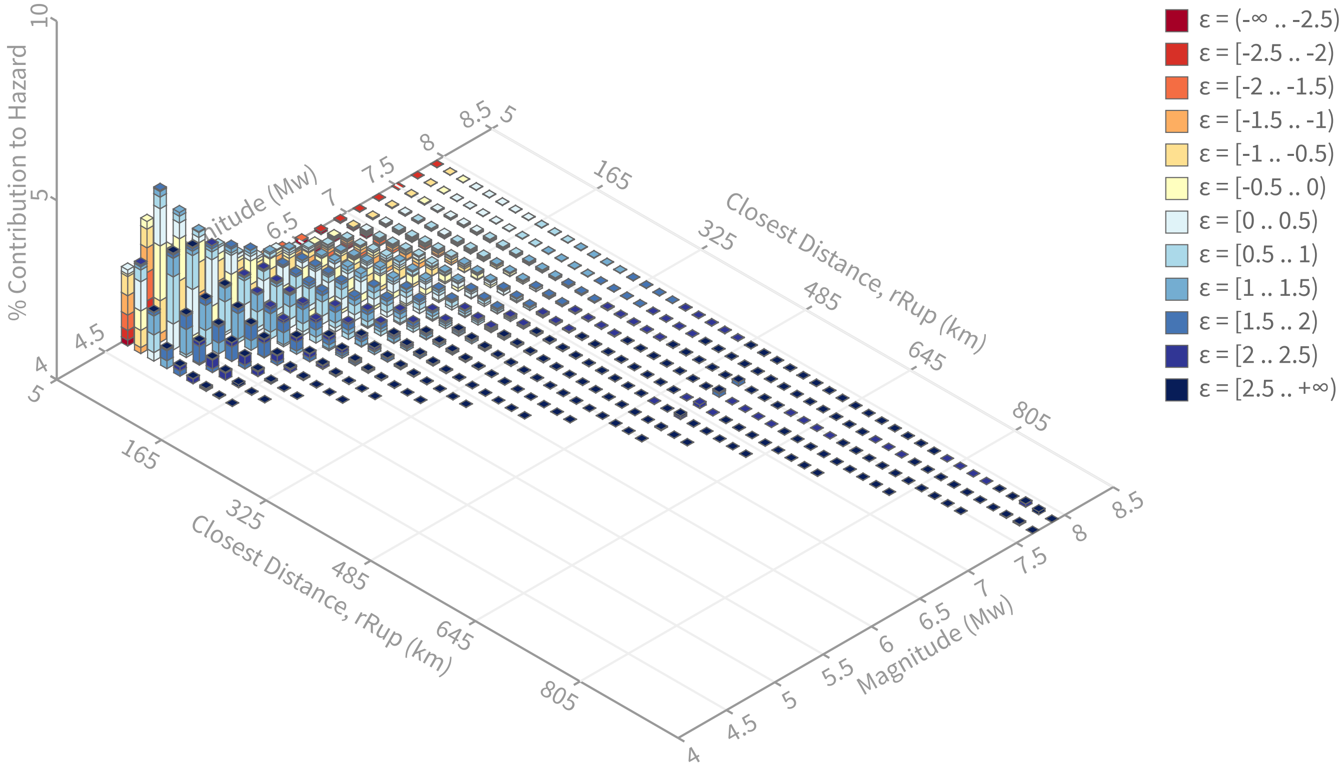


View Raw Data

Deaggregation

Component

Total



Summary statistics for, Deaggregation: Total

Deaggregation targets

Return period: 10000 yrs
Exceedance rate: 0.0001 yr⁻¹
PGA ground motion: 0.054669209 g

Recovered targets

Return period: 10010.396 yrs
Exceedance rate: 0.000099896152 yr⁻¹

Totals

Binned: 99.96 %
Residual: 0.04 %
Trace: 2.05 %

Mean (over all sources)

m: 5.71
r: 91.37 km
ε₀: 0.09 σ

Mode (largest m-r bin)

m: 4.9
r: 29.54 km
ε₀: -0.17 σ
Contribution: 4.24 %

Mode (largest m-r-ε₀ bin)

m: 4.9
r: 29.13 km
ε₀: -0.25 σ
Contribution: 1.53 %

Discretization

r: min = 0.0, max = 1000.0, Δ = 20.0 km
m: min = 4.4, max = 9.4, Δ = 0.2
ε: min = -3.0, max = 3.0, Δ = 0.5 σ

Epsilon keys

ε0: [-∞ .. -2.5)
ε1: [-2.5 .. -2.0)
ε2: [-2.0 .. -1.5)
ε3: [-1.5 .. -1.0)
ε4: [-1.0 .. -0.5)
ε5: [-0.5 .. 0.0)
ε6: [0.0 .. 0.5)
ε7: [0.5 .. 1.0)
ε8: [1.0 .. 1.5)
ε9: [1.5 .. 2.0)
ε10: [2.0 .. 2.5)
ε11: [2.5 .. +∞]

Deaggregation Contributors

Source Set ↳ Source	Type	r	m	ε_0	lon	lat	az	%
SSCn Adaptive Smoothing Zone 1 (opt)	Grid							14.44
PointSourceFinite: -97.858, 30.186		22.81	5.19	-1.02	97.858°W	30.186°N	0.00	1.32
PointSourceFinite: -97.858, 30.096		13.31	5.14	-1.99	97.858°W	30.096°N	0.00	1.25
PointSourceFinite: -97.858, 30.276		32.51	5.27	-0.46	97.858°W	30.276°N	0.00	1.25
PointSourceFinite: -97.858, 30.141		18.01	5.16	-1.43	97.858°W	30.141°N	0.00	1.12
PointSourceFinite: -97.858, 30.231		27.65	5.23	-0.70	97.858°W	30.231°N	0.00	1.09
USGS Adaptive Smoothing Zone 1 (opt)	Grid							14.43
PointSourceFinite: -97.858, 30.186		22.81	5.19	-1.02	97.858°W	30.186°N	0.00	1.32
PointSourceFinite: -97.858, 30.096		13.31	5.14	-1.99	97.858°W	30.096°N	0.00	1.25
PointSourceFinite: -97.858, 30.276		32.51	5.27	-0.46	97.858°W	30.276°N	0.00	1.25
PointSourceFinite: -97.858, 30.141		18.01	5.16	-1.43	97.858°W	30.141°N	0.00	1.12
PointSourceFinite: -97.858, 30.231		27.65	5.23	-0.70	97.858°W	30.231°N	0.00	1.09
SSCn Fixed Smoothing Zone 1 (opt)	Grid							13.30
PointSourceFinite: -97.858, 30.186		22.81	5.19	-1.02	97.858°W	30.186°N	0.00	1.20
PointSourceFinite: -97.858, 30.096		13.31	5.14	-1.99	97.858°W	30.096°N	0.00	1.13
PointSourceFinite: -97.858, 30.276		32.51	5.27	-0.46	97.858°W	30.276°N	0.00	1.13
PointSourceFinite: -97.858, 30.141		18.01	5.16	-1.43	97.858°W	30.141°N	0.00	1.01
USGS Fixed Smoothing Zone 1 (opt)	Grid							13.28
PointSourceFinite: -97.858, 30.186		22.81	5.19	-1.02	97.858°W	30.186°N	0.00	1.20
PointSourceFinite: -97.858, 30.096		13.31	5.14	-1.99	97.858°W	30.096°N	0.00	1.13
PointSourceFinite: -97.858, 30.276		32.51	5.27	-0.46	97.858°W	30.276°N	0.00	1.13
PointSourceFinite: -97.858, 30.141		18.01	5.16	-1.43	97.858°W	30.141°N	0.00	1.01
USGS Fixed Smoothing Zone 2 (opt)	Grid							11.99
SSCn Fixed Smoothing Zone 2 (opt)	Grid							11.96
USGS Adaptive Smoothing Zone 2 (opt)	Grid							9.93
SSCn Adaptive Smoothing Zone 2 (opt)	Grid							9.90

Appendix C Site Photographs

Client Name:	**Site Location:**	**Project No.**
Texas State Soil and Water Conservation Board	Plum FRS No. 2 - East of Kyle, TX	60615067

Photo No.	**Date:**
1	03/26/2020

Description:

Photo facing northwest direction shows the existing dam embankment crest and the reservoir. Uniform vegetative covering is observed throughout the embankment. Rutting marks can be seen on the crest of the dam.

Photo No.	**Date:**
2	03/26/2020

Description:

A focused view of rutting marks near the upstream toe of the dam. Photo facing northwest direction.

Client Name:	Site Location:	Project No.
Texas State Soil and Water Conservation Board	Plum FRS No. 2 - East of Kyle, TX	60615067

Photo No.	Date:
3	03/26/2020

Description:

Photo facing northwest direction provides additional view of the upstream embankment slope and impoundment. Barbed wire fencing can be seen in the foreground along the upstream slope. Tall vegetation is shown along the upstream toe.

Photo No.	Date:
4	03/26/2020

Description:

Photo facing northwest shows the intake tower and stage recorder. Tall vegetation can be seen along the upstream toe of the dam near the reservoir.

Client Name:	**Site Location:**	**Project No.**
Texas State Soil and Water Conservation Board	Plum FRS No. 2 - East of Kyle, TX	60615067

Photo No.	**Date:**
5	03/26/2020

Description:

Photo facing northwest direction depicts area of suspected animal burrowing activity near the upstream toe of the dam.

Photo No.	**Date:**
6	03/26/2020

Description:

A focused view of possible rutting and erosion damage observed near the upstream toe of the dam. Photo facing southwest direction.

Client Name:	**Site Location:**	**Project No.**
Texas State Soil and Water Conservation Board	Plum FRS No. 2 - East of Kyle, TX	60615067

Photo No.	**Date:**
7	03/26/2020

Description:

Photo facing northwest direction shows the reservoir, intake tower, and stage and rainfall instrumentation installed near the upstream of the dam.

Photo No.	**Date:**
8	03/26/2020

Description:

A view of the existing auxiliary spillway and training dike shows good vegetative covering throughout. Photo taken in east direction.

Client Name:	**Site Location:**	**Project No.**
Texas State Soil and Water Conservation Board	Plum FRS No. 2 - East of Kyle, TX	60615067

Photo No.	**Date:**
9	03/26/2020

Description:

Photo facing north/northwest direction shows damage to existing barbed wire fencing present near the upstream toe of the dam.

Photo No.	**Date:**
10	03/26/2020

Description:

A focused view of the dam embankment crest and downstream slope. Fenced area to the left gives access to downstream toe of the dam and principal spillway stilling basin. Photo facing southeast direction.

AECOM

PHOTOGRAPHIC LOG

Client Name:	**Site Location:**	**Project No.**
Texas State Soil and Water Conservation Board	Plum FRS No. 2 - East of Kyle, TX	60615067

Photo No.	**Date:**
11	03/26/2020

Description:

Photo facing southeast direction shows the existing 24-inch I.D. principal spillway conduit, pipe cradle, and stilling basin. Well established vegetation can be seen on the background along the edges of the stilling basin.

Photo No.	**Date:**
12	03/26/2020

Description:

A focused view of suspected animal burrow and/or area of erosion observed near the fencing surrounding the principal spillway stilling basin.

Client Name:	Site Location:	Project No.
Texas State Soil and Water Conservation Board	Plum FRS No. 2 - East of Kyle, TX	60615067

Photo No.	Date:
13	03/26/2020

Description:

Additional view of animal burrow observed during field inspection.

Photo No.	Date:
14	03/26/2020

Description:

A view of faded warning signs on gate entrance to the dam site.

Appendix D Hammer Calibration Report

GRL engineers, inc.
Dynamic Measurements and Analyses

November 28, 2016

Matt Brenna
Total Support Services
4647 Brass Way
Dallas, Texas 75236

Re: Energy Measurement for Dynamic Penetrometers
Standard Penetration Test (SPT) Calibration
Dallas, Texas GRL Job No. 1655059-1

Dear Mr. Brenna:

This report transmits our findings from energy measurements and related data analysis conducted by GRL Engineers, Inc. (GRL) for your four drill rigs located throughout the Dallas region. Four automatic hammer and penetrometer systems were monitored during Standard Penetration (SPT) tests. Dynamic testing summarized in this report was conducted November 11, 2016.

The purpose in collecting the SPT energy measurements was to compute the energy transfer efficiency for four drill rig hammers. To meet this objective, an 8G Model, Pile Driving Analyzer (PDA) was used to acquire and process the dynamic test data. Additional information regarding the testing equipment and analytical procedures is provided in Appendix A.

Test Sequence

Using an instrumented NW-J rod, energy measurements were made at various sample depths for the drill rig. The drill rigs were identified as a CME 55 (SN:76225), CME 55LC (SN:339465), CME 55 (SN:210595) & Mobile B-59 (SN:N/A). Dynamic measurements were obtained for sample depths between 10 and 41.5 feet. Each sample depth consisted of energy measurements of 18 inches of driving.

Energy Transfer Measurements

An 8G model Pile Driving Analyzer was used to take measurements of strain and acceleration. The strain and acceleration signals were conditioned and converted to force and velocities by the PDA. The PDA interprets the measured dynamic data according to the Case Method equations. Force and velocity records from the PDA were also viewed graphically on an LCD screen to evaluate data quality. All force and velocity records were also digitally stored for subsequent analysis.

The maximum energy transferred to the rod (EMX) was calculated by integrating both the force and velocity records over time as follows:

$$EMX = \int F(t)V(t)dt$$

Where: $F(t)$ = the force at time t
$V(t)$ = the velocity at time t

For CME 55LC (SN:339465) and CME 55 (SN:210595), the energy transfer ratio or efficiency is computed by dividing EMX by the theoretical SPT hammer energy of 350 lb-ft (computed from the product of the hammer weight, assumed to be the standard 140 lbs, and the fall height, assumed to be 2.5 ft). For CME 55 (SN:76225), the energy transfer ratio or efficiency is computed by dividing EMX by the theoretical SPT hammer energy of 420 lb-ft (computed from the product of the hammer weight, assumed to be the standard 140 lbs, and the fall height, assumed to be 3.0 ft). For this hammer, an anvil was used in the system that allowed the drop height to increase to 36 inches. For this reason, the theoretical potential energy has been increased to compensate. The SPT N values can then be corrected for a nominal 60% transfer efficiency, $N_{60,}$ as follows:

$$N_{60} = (e_m / 60) N_m$$

Where: e_m = the measured transfer ratio (ETR)
N_m = the measured SPT “N” value

For Mobile B-59 (SN:N/A), the energy transfer ratio or efficiency is computed by dividing EMX by the theoretical TCP hammer energy of 340 lb-ft (computed from the product of the hammer weight, assumed to be the standard 170 lbs, and the fall height, assumed to be 2.0 ft. The potential energy for these samples were modified accordingly). The TCP N values can then be corrected for a nominal 60% transfer efficiency, $N_{60,}$ as follows:

$$N_{60} = (e_m / 60) N_m$$

Where: e_m = the measured transfer ratio (ETR)
N_m = the measured TCP “N” value

Conclusions

Table 1 presents a summary of the average transferred energy and the energy transfer ratio for each drill rig at each sample depth calculated using the *EMX* equation. Included in Table 1 are also average values of the hammer operating rate, maximum impact force and maximum velocity of the rod. The overall performance, which represents the average of data from all sample depths for each rig/rod type is also shown. Complete information, including the maximum, minimum and standard deviation for each sampling depth, is included in Appendix B.

As indicated in Table 1, the average energy transfer ratio (ETR) from individual sample depths ranged from 93.5 to 95.3% for the CME 55 (SN:76225), from 75.9 to 82.0% for the CME 55LC (SN:339465), from 83.6 to 83.7% for the CME 55 (SN:210595) and from 79.7 to 83.2% for the Mobile B-59 (SN:N/A).

The overall transfer ratio (for all sampling depths weighted by N-values for each sample) was as follows:

SPT Rig (*Serial Number*)	**Overall Transfer Efficiency**	**Hammer Operating Rate**
CME 55 (SN:76225)	**94.4%**	**33.4**
CME 55LC (SN:339465)	**79.9%**	**39.7**
CME 55 (SN:210595)	**83.6%**	**52.6**
Mobile B-59 (SN:N/A)	**81.0%**	**43.4**

Presented N_{60} values presented in the table do not account for any required corrections such as overburden or sampling spoon.

We appreciate the opportunity to be of assistance to you. Please do not hesitate to contact us if you have any questions regarding this report, or if we may be of further service.

Sincerely,
GRL Engineers, Inc.

Brandon Phetteplace, P.E.

Appendix A

Introduction to SPT Dynamic Pile Testing

APPENDIX A
AN INTRODUCTION INTO SPT DYNAMIC PILE TESTING

The following has been written by GRL Engineers, Inc. and may only be copied with its written permission.

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1. BACKGROUND

The Standard Penetration Test is frequently conducted as an in-situ assessment of soil strength. This test requires that a 140 lb weight is dropped 30 inches onto a drive rod at whose bottom a sampler is usually installed. The sampler is driven for 18 inches; the number of blows required for the last 12 inches of driving is the so-called N-value. The N-value may be used as a strength indicator for foundation design or as a means of assessing the liquefaction potential of soils.

Obviously, the SPT hammer efficiency is an important consideration when using the N-values for design purposes. Measurements have indicated that the energy in the drive rod is sometimes only 30% and and may reach 90% of the potential or rated energy of the SPT hammer (E-rated = 0.35 kip-ft or 0.475 kJ). The type of hammer used to drive the rod is the main reason for these variations. On the average, the energy in the drive rod is 60% of the standard rated energy.

Because of the variability of energy, methods based on N-values are considered unreliable. However, measurements during SPT testing using the Case Method can be done on a routine basis and these measurements yield the transferred energy values. With measured energy, EMX, known, an adjustment of the measured N-value, N_m, can be made as follows.

$$N_{60} = N_m \, [E_m \, / \, (0.6E_r \,)] \qquad (1)$$

Thus, if the measured energy value is equal to the normally expected transferred energy of 60% of E-rated then the adjusted and measured N-values are identical. On the other hand, if the measured energy is only 30% then the adjusted blow count will be reduced by 50%.

2. DYNAMIC TESTING AND ANALYSIS METHODS APPLIED TO SPT

The Case Method of dynamic pile testing, named after the Case Institute of Technology where it was developed between 1964 and 1975, requires that a substantial ram mass (e.g. a pile driving hammer) impacts the pile top such that the pile undergoes at least a small permanent set. Thus, the method is also referred to as a “High Strain Method”. The Case Method requires dynamic measurements on the pile or shaft under the ram impact and then a calculation of various quantities. Conveniently, for SPT applications, the measurements and analyses are done by a single piece of equipment: the SPT Analyzer. The Pile Driving Analyzer® (PDA) is also suitable to perform these measurements and data processing.

A related analysis method is the “Wave Equation Analysis” which calculates a relationship between bearing capacity, pile stresses, transferred energy and field blow count. The GRLWEAP™ program performs this analysis and provides a complete set of helpful information and input data. This program can be used very effectively to simulate the SPT driving process.

3. MEASUREMENTS

GRL uses equipment manufactured by Pile Dynamics, Inc. The system includes either an SPT-Analyzer™ (SPTA) or a Pile Driving Analyzer® (PDA), an instrumented rod section and two accelerometers. SPT energy testing is very closely related to and borrows procedures from dynamic pile testing. Those interested in the basis of the SPT energy testing method may obtain extensive literature on dynamic pile testing from GRL Engineers, Inc.

3.1 SPT Analyzer or Pile Driving Analyzer

The basis for the results calculated by the SPTA or PDA are strain and acceleration measured in an instrumented rod section. These signals are converted to rod top force, F(t), and rod top velocity, v(t). The SPTA or PDA conditions, calibrates and displays these signals and immediately computes average pile force and velocity thereby eliminating bending effects. The product of these two measurements is then integrated over time which yields the energy transferred to the instrumented section as a function of time (see Section 4.1).

For convenience and accuracy, strain measurements are usually taken on an instrumented section of SPT drive rod. Ideally, the section properties of the instrumented rod and those of the drive rod are the same, however, using subs, other sections can also be utilized.

For the instrumented section, PDI provides a force calibration in such a way that the output of the instrumented rod is directly calculated without the need for an accurate elastic modulus or cross sectional area of the rod section.

The acceleration measurements are often demanding in the SPT environment, because of high frequency and high acceleration motion components. An experienced measurement engineer, therefore, has to evaluate the quality of this data before final conclusions are drawn from the numerical results calculated by SPTA or PDA.

SPTA or PDA records are taken while the standard N-value is acquired in the conventional manner. This then allows a direct correlation between N-value and average transferred energy.

3.2 HPA

The SPT hammer's ram velocity may be directly obtained using radar technology in the Hammer Performance Analyzer™. The impact velocity results can be automatically processed with a PC or recorded on a strip chart. HPA measurements yield a hammer kinetic energy, but not the energy transferred to the drive rod.

4 RECORD EVALUATION BY SPTA OR PDA

4.1 HAMMER PERFORMANCE

The PDA calculates the energy transferred to the pile top from:

$$E(t) = {}_0\int^t F(\tau)v(\tau)\,d\tau \qquad (2)$$

The maximum of the E(t) curve is often called **ENTHRU or EMX;** it is the most important quantity for an overall evaluation of the performance of a hammer and driving system. **EMX** allows for a classification of the hammer's performance when presented as, e_T, the rated transfer efficiency, also called energy transfer ratio (**ETR**) or global efficiency.

$$e_T = EMX/E_R \qquad (3)$$

where E_R is the hammer manufacturer's rated energy value or 0.35 kip-ft (0.475 kJ) in the case of the SPT hammer.

Often in the SPT literature one finds also reference to the EF2 energy. This evaluation is based on assumed proportionality between force and velocity (see also Section 5):

$$v(t) = F(t) / Z \qquad (4)$$

where Z = EA/c is the pile impedance, E is the elastic modulus, A is the cross sectional area and c is the speed of the stress wave in the pile material..

Combining equations 2 and 4 leads to

$$EF(t) = {}_0\int^t F(\tau)^2 / Z\,d\tau \qquad (5)$$

The EF2 transferred energy value is the EF-value at the time t = 2L/c, where L is the drive rod length and c is the stress wave speed in steel (16,800 ft/s or 5,124 m/s). Since the force is easier to measure than both force and velocity, Equation 5 is preferred by some test engineers. However, the EF method is fraught with errors and certain correction factors have to be applied to make it approximately correct. Among the error sources are the following:

- Proportionality is often violated prior to time 2L/c. The proportionality between force and velocity in a downward traveling wave only holds if the wave does not encounter a disturbance prior to reflecting off the pile toe. Such disturbances include a change in cross sectional area, an open or loose splice or joint, or resistance along the shaft.

- Using only one force measurement precludes a data quality check based on the proportionality between force and velocity. Thus, a force measurement that is for some reason in error may not be detectable, which will lead to errors in the EF2 value. Data quality checks will be discussed further in Section 5.

The use if EF2 is therefore not recommended but it is often included in result presentations for the sake of completeness.

4.2 STRESSES

During SPT monitoring, it is also of interest to monitor compressive stresses at both the top of the drive rod and at its bottom.

At the pile top (location of sensors) the maximum compression stress averaged over the rod's cross section, **CSX**, is directly obtained from the measurements. Note that this stress value refers to the instrumented section. If the rod has a different cross sectional area then the stress in the rod will be different from CSX.

The SPTA or PDA can also calculate, in an approximate manner, the force at the rod bottom, **CFB**. To obtain the corresponding stress, this force value should be divided by the appropriate cross sectional area, e.g. by the rod area just above the sampler or by the sampler area itself. Of course, non-uniform stress components as they might occur at the sampler tip due to a sloping rock are not considered in this calculation.

5. DATA QUALITY CHECKS

Quality data is the first and foremost requirement for accurate dynamic testing results. It is therefore important that the measurement engineer performing SPTA or PDA tests has the experience necessary to recognize measurement problems and take appropriate corrective action should problems develop. Fortunately, dynamic pile testing allows for certain data quality checks because two independent measurements are taken that have to conform to the so-called proportionality relationship.

As long as there is only a wave traveling in one direction, as is the case during impact when only a downward traveling wave exists in the rod, force and velocity measured at its top are proportional

$$F = v\,Z \tag{5}$$

where Z is again the pile impedance, Z = EA/c. This relationship can also be expressed in terms of stress

$$\sigma = F/A = v\,(E/c) \tag{6}$$

or strain

$$\epsilon = \sigma/E = v \,/\, c \tag{7}$$

This means that the early portion of strain times wave speed must be equal to the velocity unless the proportionality is affected by high friction near the pile top or by a pile cross sectional change not far below the sensors. Checking the proportionality is an excellent means of assuring meaningful measurements but is only truly meaningful for perfectly uniform rods. Open or loose splices, for example, will lead to a non-proportionality. For SPT rods it is fortunate that usually no soil resistance acts along the shaft and for that reason, proportionality can exist until the stress wave returns from sampler top or rod bottom unless connectors are not sufficiently tightened or have a significant mass.

Velocity data quality can also be checked by looking at the final displacement, DFN, which is calculated from the acceleration by double integration. If the calculated final displacement is much higher or lower than indicated by the N-value, the accelerometer attachment may be loose or the sensor may be faulty. If major drift in the velocity is observed, the EMX value may be in error, even though proportionality from impact to time 2L/c exists. In this case, it may be useful to evaluate the energy transferred to the drill rod at time 2L/c, which is calculated by the PDA or SPTA as the E2E quantity.

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Appendix B

SPT Results

Summary of SPT Test Results

Project: RIG 1013, Test Date: 11/11/2016 - CME 55 (SN:76225)

FMX: Maximum Force
VMX: Maximum Velocity
BPM: Blows/Minute

EMX: Maximum Energy
ETR: Energy Transfer Ratio - Rated
ER: Hammer Energy Rating

Instr. Length ft	Blows Applied /6"	Start Depth ft	Final Depth ft	**N Value**	**N60 Value**	Average FMX kips	Average VMX ft/s	Average BPM bpm	Average EMX ft-lb	Average ETR (%)	Average ER ft-lb
15.00	**1-5-5**	10.00	11.50	**10**	**15**	39	17.8	32.5	394	93.8	420
20.00	**2-3-5**	15.00	16.50	**8**	**12**	40	18.3	34.8	393	93.5	420
25.00	**2-3-4**	20.00	21.50	**7**	**11**	40	17.9	34.9	398	94.7	420
30.00	**3-4-8**	25.00	26.50	**12**	**18**	38	19.1	32.4	400	95.3	420
					Overall Average Values:	39	18.3	33.4	396	94.4	420
					Standard Deviation:	1	0.6	1.3	9	2.0	0
					Overall Maximum Value:	40	19.5	35.3	413	98.3	420
					Overall Minimum Value:	37	17.4	31.7	367	87.3	420

GRL Engineers, Inc.
SPT Analyzer Results

PDA-S Ver. 2016.14.214 - Printed: 11/28/2016

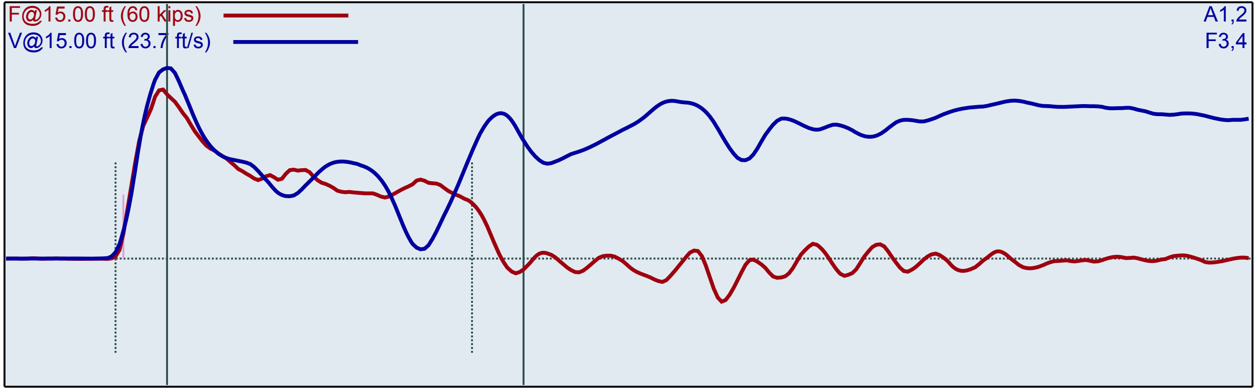
RIG 1013
BP

10
Test date: 11/11/2016

AR: 1.42 in^2
LE: 15.00 ft
WS: 16807.9 ft/s

SP: 0.492 k/ft3
EM: 30000 ksi

Depth: (10.00 - 11.50 ft], displaying BN: 9



FMX: Maximum Force
VMX: Maximum Velocity
BPM: Blows/Minute

EMX: Maximum Energy
ETR: Energy Transfer Ratio - Rated
ER: Hammer Energy Rating

BL#	BC /6"	LP ft	FMX kips	VMX ft/s	BPM bpm	EMX ft-lb	ETR (%)	ER ft-lb
1	1	10.50	30	21.2	1.9	498	118.5	420
2	5	10.60	38	17.9	33.8	392	93.2	420
3	5	10.70	39	17.9	33.9	410	97.6	420
4	5	10.80	39	18.0	33.2	367	87.3	420
5	5	10.90	39	17.9	32.0	413	98.3	420
6	5	11.00	40	18.0	31.7	403	95.9	420
7	5	11.10	40	17.8	32.1	390	92.9	420
8	5	11.20	39	17.7	31.9	386	92.0	420
9	5	11.30	40	17.6	32.2	384	91.5	420
10	5	11.40	39	17.5	31.9	401	95.5	420
11	5	11.50	40	17.5	32.0	394	93.7	420
		Average	39	17.8	32.5	394	93.8	420
		Std Dev	0	0.2	0.8	13	3.1	0
		Maximum	40	18.0	33.9	413	98.3	420
		Minimum	38	17.5	31.7	367	87.3	420

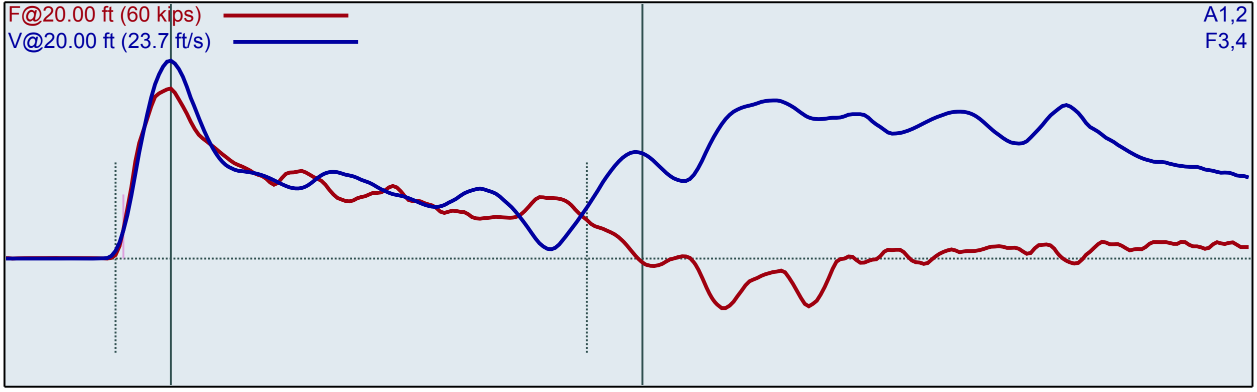
N-value: 10

Sample Interval Time: 18.50 seconds.

RIG 1013 10
BP Test date: 11/11/2016

AR: 1.42 in^2 SP: 0.492 k/ft3
LE: 20.00 ft EM: 30000 ksi
WS: 16807.9 ft/s

Depth: (15.00 - 16.50 ft], displaying BN: 19



BL#	BC /6"	LP ft	FMX kips	VMX ft/s	BPM bpm	EMX ft-lb	ETR (%)	ER ft-lb
12	2	15.25	38	18.4	1.9	386	92.0	420
13	2	15.50	39	18.4	34.2	390	92.8	420
14	3	15.67	40	18.4	34.5	386	91.9	420
15	3	15.83	39	18.4	34.7	383	91.3	420
16	3	16.00	39	18.3	34.4	405	96.4	420
17	5	16.10	40	18.3	34.9	389	92.7	420
18	5	16.20	40	18.3	35.3	392	93.4	420
19	5	16.30	40	18.3	34.8	404	96.2	420
20	5	16.40	40	18.3	34.8	398	94.6	420
21	5	16.50	40	18.1	35.0	385	91.6	420
		Average	40	18.3	34.8	393	93.5	420
		Std Dev	0	0.1	0.3	8	1.9	0
		Maximum	40	18.4	35.3	405	96.4	420
		Minimum	39	18.1	34.4	383	91.3	420

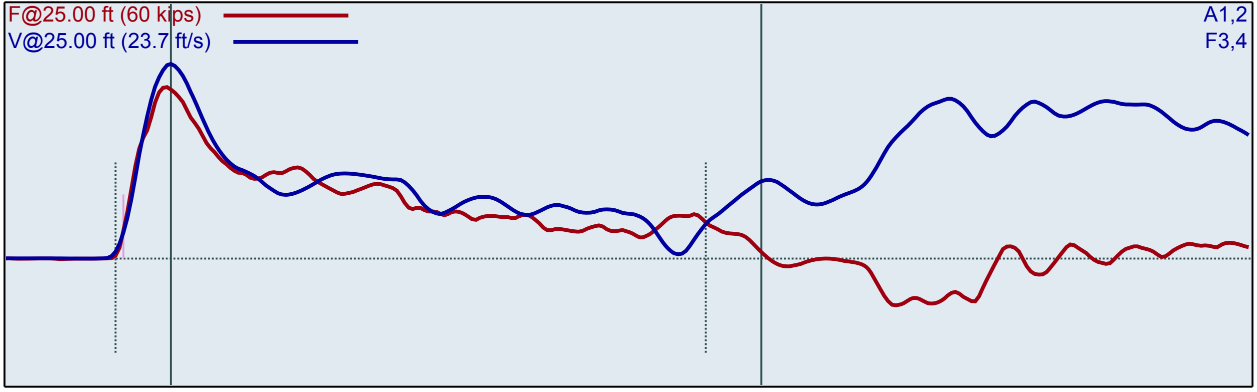
N-value: 8

Sample Interval Time: 15.63 seconds.

RIG 1013 10
BP Test date: 11/11/2016

AR: 1.42 in^2 SP: 0.492 k/ft3
LE: 25.00 ft EM: 30000 ksi
WS: 16807.9 ft/s

Depth: (20.00 - 21.50 ft], displaying BN: 28



BL#	BC /6"	LP ft	FMX kips	VMX ft/s	BPM bpm	EMX ft-lb	ETR (%)	ER ft-lb
22	2	20.25	39	17.0	1.9	383	91.1	420
23	2	20.50	40	17.4	34.9	391	93.1	420
24	3	20.67	40	17.5	35.0	393	93.7	420
25	3	20.83	40	17.4	34.9	392	93.3	420
26	3	21.00	40	17.7	35.0	398	94.7	420
27	4	21.13	40	17.8	34.9	404	96.2	420
28	4	21.25	40	18.0	35.0	398	94.8	420
29	4	21.38	40	18.3	34.9	400	95.2	420
30	4	21.50	40	18.2	34.7	399	95.1	420
		Average	40	17.9	34.9	398	94.7	420
		Std Dev	0	0.3	0.1	4	0.9	0
		Maximum	40	18.3	35.0	404	96.2	420
		Minimum	40	17.4	34.7	392	93.3	420

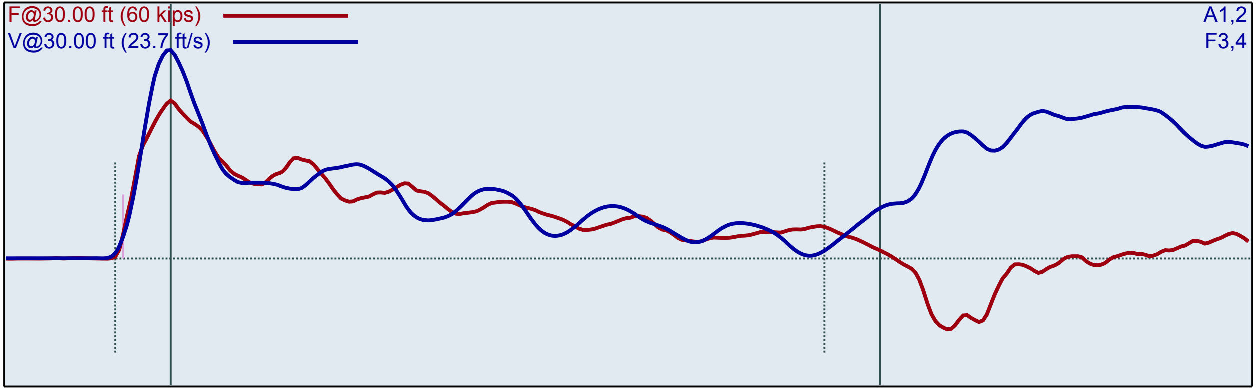
N-value: 7

Sample Interval Time: 13.73 seconds.

RIG 1013 10
BP Test date: 11/11/2016

AR: 1.42 in^2 SP: 0.492 k/ft3
LE: 30.00 ft EM: 30000 ksi
WS: 16807.9 ft/s

Depth: (25.00 - 26.50 ft], displaying BN: 43



BL#	BC	LP	FMX	VMX	BPM	EMX	ETR	ER
	/6"	ft	kips	ft/s	bpm	ft-lb	(%)	ft-lb
31	3	25.17	40	18.2	1.9	399	95.0	420
32	3	25.33	40	18.6	31.6	407	96.9	420
33	3	25.50	39	18.6	32.4	404	96.1	420
34	4	25.63	39	18.8	32.8	405	96.5	420
35	4	25.75	39	18.6	32.8	402	95.6	420
36	4	25.88	39	18.8	32.6	403	95.9	420
37	4	26.00	39	18.9	32.4	404	96.1	420
38	8	26.06	38	19.0	32.4	400	95.2	420
39	8	26.13	38	19.3	32.5	400	95.2	420
40	8	26.19	37	19.3	32.6	400	95.3	420
41	8	26.25	37	19.3	32.3	399	94.9	420
42	8	26.31	37	19.4	32.3	397	94.6	420
43	8	26.38	37	19.3	32.0	398	94.7	420
44	8	26.44	37	19.5	32.2	401	95.4	420
45	8	26.50	37	18.9	32.4	397	94.5	420
		Average	38	19.1	32.4	400	95.3	420
		Std Dev	1	0.3	0.2	2	0.6	0
		Maximum	39	19.5	32.8	405	96.5	420
		Minimum	37	18.6	32.0	397	94.5	420

N-value: 12

Sample Interval Time: 25.94 seconds.

Summary of SPT Test Results

Project: CME55 TRACK, Test Date: 11/11/2016 - CME 55LC (SN:339465)

FMX: Maximum Force
VMX: Maximum Velocity
BPM: Blows/Minute

EMX: Maximum Energy
ETR: Energy Transfer Ratio - Rated
ER: Hammer Energy Rating

Instr. Length ft	Blows Applied /6"	Start Depth ft	Final Depth ft	**N Value**	**N60 Value**	Average FMX kips	Average VMX ft/s	Average BPM bpm	Average EMX ft-lb	Average ETR (%)	Average ER ft-lb
15.00	**6-6-7**	10.00	11.50	**13**	**17**	37	15.7	37.8	280	79.9	350
20.00	**4-5-7**	15.00	16.50	**12**	**15**	32	13.1	37.8	266	75.9	350
25.00	**4-5-7**	20.00	21.50	**12**	**15**	34	12.7	38.1	279	79.6	350
30.00	**5-12-12**	25.00	26.50	**24**	**31**	33	13.9	42.6	287	82.0	350
					Overall Average Values:	34	13.9	39.7	280	79.9	350
					Standard Deviation:	3	1.4	2.6	12	3.4	0
					Overall Maximum Value:	38	16.6	43.9	298	85.2	350
					Overall Minimum Value:	26	10.5	35.6	243	69.4	350

GRL Engineers, Inc.
SPT Analyzer Results

PDA-S Ver. 2016.14.214 - Printed: 11/21/2016

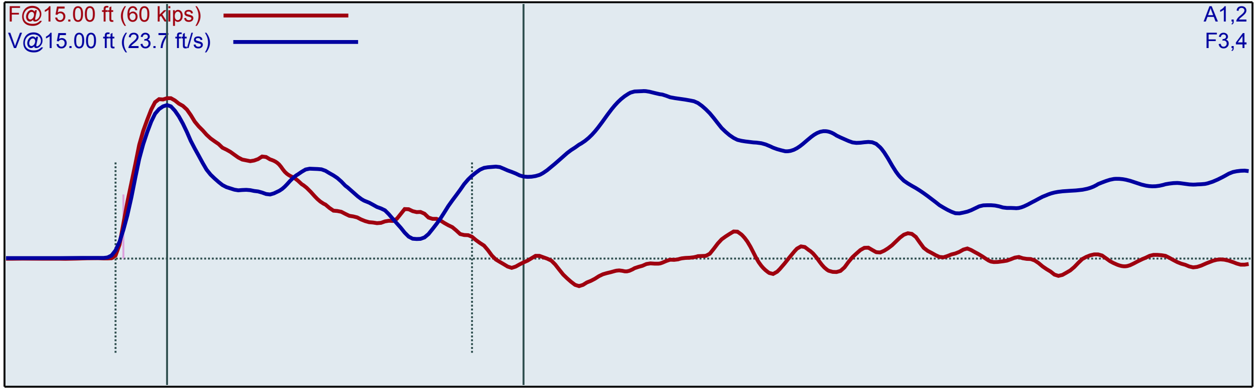
CME55 TRACK
BP

10
Test date: 11/11/2016

AR: 1.42 in^2
LE: 15.00 ft
WS: 16807.9 ft/s

SP: 0.492 k/ft3
EM: 30000 ksi

Depth: (10.00 - 11.50 ft], displaying BN: 17



FMX: Maximum Force
VMX: Maximum Velocity
BPM: Blows/Minute

EMX: Maximum Energy
ETR: Energy Transfer Ratio - Rated
ER: Hammer Energy Rating

BL#	BC /6"	LP ft	FMX kips	VMX ft/s	BPM bpm	EMX ft-lb	ETR (%)	ER ft-lb
1	6	10.08	37	17.1	1.9	260	74.3	350
2	6	10.17	36	16.8	35.7	258	73.7	350
3	6	10.25	37	16.5	35.7	264	75.3	350
4	6	10.33	37	16.7	35.7	261	74.5	350
5	6	10.42	36	16.1	37.5	270	77.2	350
6	6	10.50	38	16.4	38.5	272	77.8	350
7	6	10.58	35	15.9	38.6	285	81.5	350
8	6	10.67	38	16.6	38.7	278	79.4	350
9	6	10.75	37	16.1	38.5	282	80.5	350
10	6	10.83	37	16.0	38.5	274	78.3	350
11	6	10.92	37	16.0	38.5	278	79.4	350
12	6	11.00	37	15.5	35.6	271	77.5	350
13	7	11.07	37	15.5	35.7	275	78.6	350
14	7	11.14	38	15.5	35.8	281	80.3	350
15	7	11.21	38	15.6	36.7	282	80.6	350
16	7	11.29	37	15.2	38.7	280	79.9	350
17	7	11.36	38	15.5	38.6	288	82.3	350
18	7	11.43	38	15.7	38.8	289	82.7	350
19	7	11.50	36	14.8	38.7	272	77.8	350
		Average	37	15.7	37.8	280	79.9	350
		Std Dev	1	0.4	1.3	5	1.6	0
		Maximum	38	16.6	38.8	289	82.7	350
		Minimum	35	14.8	35.6	271	77.5	350

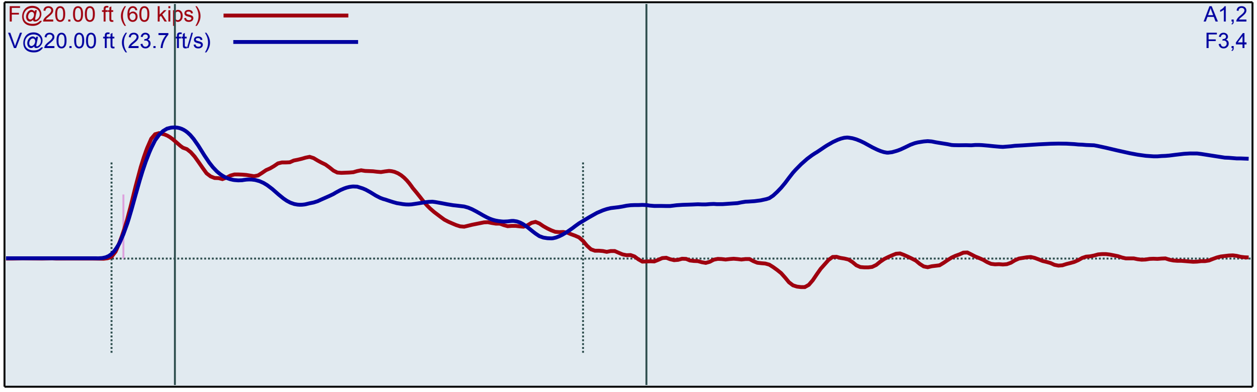
N-value: 13

Sample Interval Time: 28.86 seconds.

CME55 TRACK 10
BP Test date: 11/11/2016

AR: 1.42 in^2 SP: 0.492 k/ft3
LE: 20.00 ft EM: 30000 ksi
WS: 16807.9 ft/s

Depth: (15.00 - 16.50 ft], displaying BN: 33



BL#	BC	LP	FMX	VMX	BPM	EMX	ETR	ER
	/6"	ft	kips	ft/s	bpm	ft-lb	(%)	ft-lb
20	4	15.13	33	13.4	1.9	261	74.6	350
21	4	15.25	33	14.0	37.4	271	77.4	350
22	4	15.38	35	14.6	38.5	284	81.3	350
23	4	15.50	35	14.6	38.7	279	79.7	350
24	5	15.60	31	13.0	38.6	267	76.3	350
25	5	15.70	34	13.9	38.8	265	75.8	350
26	5	15.80	34	14.1	38.8	268	76.6	350
27	5	15.90	33	13.8	38.3	271	77.3	350
28	5	16.00	35	14.7	35.8	273	78.1	350
29	7	16.07	34	14.3	35.8	271	77.3	350
30	7	16.14	33	13.5	35.7	268	76.6	350
31	7	16.21	30	12.4	36.9	261	74.7	350
32	7	16.29	29	11.8	38.7	263	75.0	350
33	7	16.36	29	12.1	38.4	264	75.6	350
34	7	16.43	29	11.6	38.9	258	73.8	350
35	7	16.50	28	11.5	38.6	257	73.5	350
		Average	32	13.1	37.8	266	75.9	350
		Std Dev	2	1.1	1.3	5	1.4	0
		Maximum	35	14.7	38.9	273	78.1	350
		Minimum	28	11.5	35.7	257	73.5	350

N-value: 12

Sample Interval Time: 23.74 seconds.

GRL Engineers, Inc.
SPT Analyzer Results

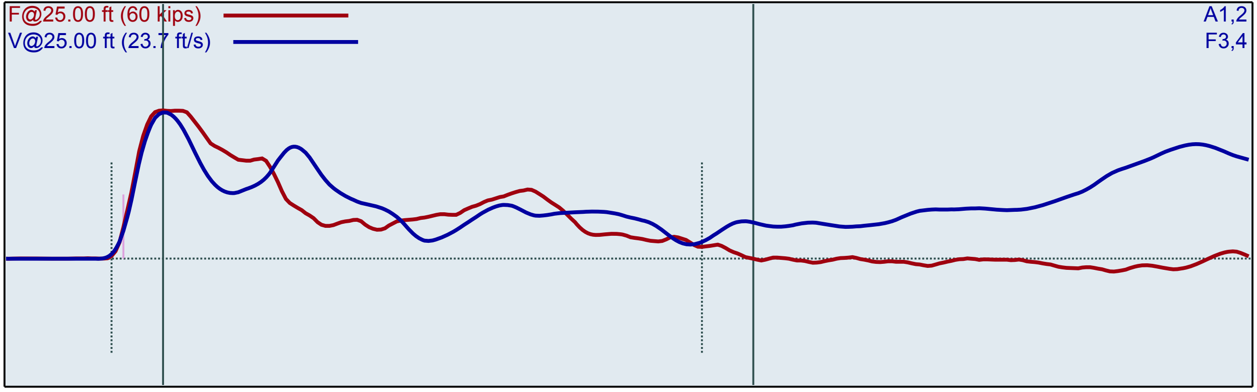
PDA-S Ver. 2016.14.214 - Printed: 11/21/2016

CME55 TRACK
BP

10
Test date: 11/11/2016

AR: 1.42 in^2		SP: 0.492 k/ft3
LE: 25.00 ft		EM: 30000 ksi
WS: 16807.9 ft/s		

Depth: (20.00 - 21.50 ft], displaying BN: 49



BL#	BC /6"	LP ft	FMX kips	VMX ft/s	BPM bpm	EMX ft-lb	ETR (%)	ER ft-lb
36	4	20.13	28	11.4	1.9	250	71.5	350
37	4	20.25	28	11.7	35.8	256	73.0	350
38	4	20.38	28	12.7	36.0	261	74.6	350
39	4	20.50	27	11.1	38.9	266	75.9	350
40	5	20.60	35	13.6	39.0	287	82.0	350
41	5	20.70	36	13.4	38.7	281	80.2	350
42	5	20.80	28	10.6	38.9	261	74.7	350
43	5	20.90	28	10.5	38.9	243	69.4	350
44	5	21.00	34	12.8	38.7	273	78.0	350
45	7	21.07	31	11.8	35.9	268	76.6	350
46	7	21.14	34	12.3	36.0	276	78.8	350
47	7	21.21	34	12.9	36.0	285	81.5	350
48	7	21.29	35	13.0	38.6	289	82.5	350
49	7	21.36	35	13.5	39.1	290	82.7	350
50	7	21.43	36	13.9	38.8	297	84.7	350
51	7	21.50	36	13.8	38.8	294	84.0	350
		Average	34	12.7	38.1	279	79.6	350
		Std Dev	3	1.1	1.2	15	4.2	0
		Maximum	36	13.9	39.1	297	84.7	350
		Minimum	28	10.5	35.9	243	69.4	350

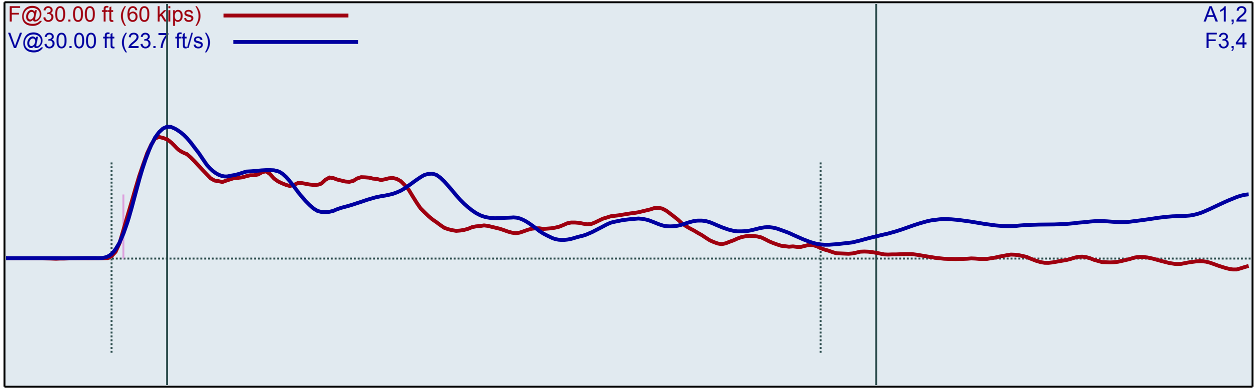
N-value: 12

Sample Interval Time: 23.79 seconds.

CME55 TRACK 10
BP Test date: 11/11/2016

AR: 1.42 in^2 SP: 0.492 k/ft3
LE: 30.00 ft EM: 30000 ksi
WS: 16807.9 ft/s

Depth: (25.00 - 26.50 ft], displaying BN: 78



BL#	BC /6"	LP ft	FMX kips	VMX ft/s	BPM bpm	EMX ft-lb	ETR (%)	ER ft-lb
52	5	25.10	29	12.5	1.9	274	78.4	350
53	5	25.20	29	12.2	3.2	267	76.2	350
54	5	25.30	28	12.6	35.9	283	80.7	350
55	5	25.40	33	14.9	40.5	293	83.6	350
56	5	25.50	33	14.2	40.2	291	83.3	350
57	12	25.54	32	13.9	42.0	292	83.4	350
58	12	25.58	35	14.5	43.4	292	83.4	350
59	12	25.63	34	14.4	43.4	292	83.3	350
60	12	25.67	34	14.2	43.5	290	83.0	350
61	12	25.71	35	14.7	43.3	298	85.2	350
62	12	25.75	32	13.2	43.4	289	82.7	350
63	12	25.79	34	14.2	43.6	290	82.9	350
64	12	25.83	33	14.1	40.1	284	81.1	350
65	12	25.88	34	15.0	40.3	292	83.5	350
66	12	25.92	35	14.6	39.8	297	84.9	350
67	12	25.96	34	14.1	43.9	287	82.1	350
68	12	26.00	34	14.5	43.1	292	83.5	350
69	12	26.04	33	13.9	43.6	289	82.5	350
70	12	26.08	33	14.0	43.5	293	83.7	350
71	12	26.13	33	14.1	43.6	293	83.6	350
72	12	26.17	34	14.8	43.6	295	84.2	350
73	12	26.21	32	13.6	43.1	281	80.3	350
74	12	26.25	35	14.8	40.1	292	83.4	350
75	12	26.29	30	13.0	40.2	276	78.9	350
76	12	26.33	33	14.1	40.3	283	80.9	350
77	12	26.38	29	12.8	43.3	277	79.2	350
78	12	26.42	28	12.2	43.4	276	78.9	350
79	12	26.46	29	12.2	43.4	271	77.6	350
80	12	26.50	26	12.9	43.6	264	75.3	350
		Average	33	13.9	42.6	287	82.0	350
		Std Dev	2	0.8	1.4	8	2.4	0
		Maximum	35	15.0	43.9	298	85.2	350
		Minimum	26	12.2	39.8	264	75.3	350

N-value: 24

Summary of SPT Test Results

Project: CME55 , Test Date: 11/11/2016 - CME 55 (SN:210595)

FMX: Maximum Force
VMX: Maximum Velocity
BPM: Blows/Minute

EMX: Maximum Energy
ETR: Energy Transfer Ratio - Rated
ER: Hammer Energy Rating

Instr. Length ft	Blows Applied /6"	Start Depth ft	Final Depth ft	**N Value**	**N60 Value**	Average FMX kips	Average VMX ft/s	Average BPM bpm	Average EMX ft-lb	Average ETR (%)	Average ER ft-lb
35.00	**5-14-25**	30.00	31.50	**39**	**54**	39	15.9	52.7	293	83.6	350
40.00	**8-6-9**	35.00	36.50	**15**	**20**	36	16.7	52.1	293	83.6	350
45.00	**6-7-9**	40.00	41.50	**16**	**22**	37	16.6	52.8	293	83.7	350
					Overall Average Values:	38	16.2	52.6	293	83.6	350
					Standard Deviation:	2	0.4	0.3	3	0.8	0
					Overall Maximum Value:	41	17.0	53.1	302	86.3	350
					Overall Minimum Value:	35	15.5	51.9	287	82.1	350

GRL Engineers, Inc.

SPT Analyzer Results

PDA-S Ver. 2016.14.214 - Printed: 11/28/2016

CME55

30

BP

Test date: 11/11/2016

AR: 1.42 in^2

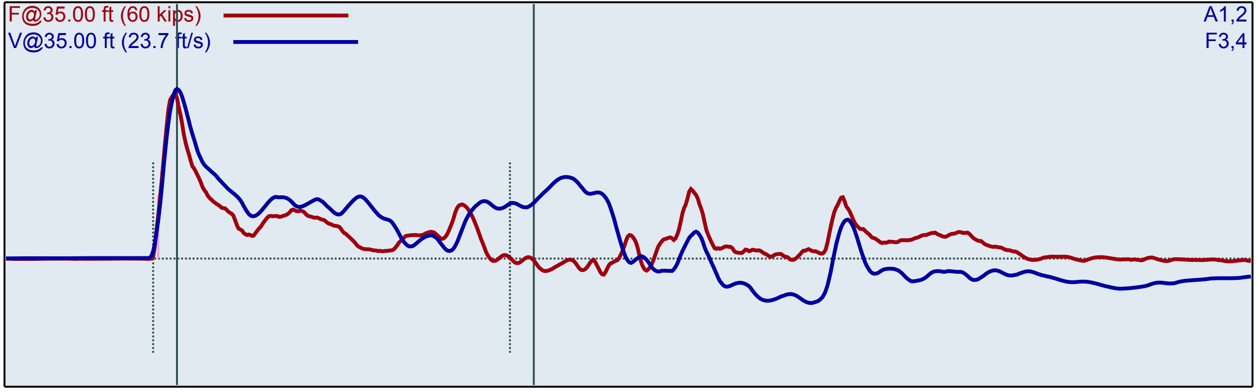
LE: 35.00 ft

WS: 16807.9 ft/s

SP: 0.492 k/ft3

EM: 30000 ksi

Depth: (30.00 - 31.50 ft], displaying BN: 42



FMX: Maximum Force

VMX: Maximum Velocity

BPM: Blows/Minute

EMX: Maximum Energy

ETR: Energy Transfer Ratio - Rated

ER: Hammer Energy Rating

BL#	BC /6"	LP ft	FMX kips	VMX ft/s	BPM bpm	EMX ft-lb	ETR (%)	ER ft-lb
1	5	30.10	39	16.7	1.9	292	83.3	350
2	5	30.20	40	16.3	52.8	292	83.3	350
3	5	30.30	40	16.5	52.0	295	84.4	350
4	5	30.40	40	16.2	52.6	297	84.9	350
5	5	30.50	40	16.2	52.8	293	83.8	350
6	14	30.54	40	16.2	52.9	295	84.2	350
7	14	30.57	40	16.3	52.9	295	84.3	350
8	14	30.61	41	16.3	53.1	294	83.9	350
9	14	30.64	39	15.9	52.9	292	83.3	350
10	14	30.68	40	16.2	52.7	295	84.2	350
11	14	30.71	40	16.3	52.8	294	84.1	350
12	14	30.75	41	16.4	52.8	297	84.8	350
13	14	30.79	41	16.3	52.7	294	84.0	350
14	14	30.82	41	16.3	53.0	294	84.0	350
15	14	30.86	41	16.2	52.8	298	85.2	350
16	14	30.89	40	16.1	52.7	294	83.9	350
17	14	30.93	41	16.3	52.8	295	84.4	350
18	14	30.96	40	16.2	52.8	294	84.1	350
19	14	31.00	40	16.2	52.7	294	84.0	350
20	25	31.02	41	16.2	52.7	294	84.0	350
21	25	31.04	39	16.0	52.8	294	84.1	350
22	25	31.06	40	15.9	52.8	290	82.7	350
23	25	31.08	40	16.0	52.8	291	83.2	350
24	25	31.10	40	16.0	52.7	294	83.9	350
25	25	31.12	41	16.2	52.7	295	84.3	350
26	25	31.14	39	15.9	52.8	292	83.3	350
27	25	31.16	39	16.0	52.8	295	84.2	350
28	25	31.18	39	15.7	52.8	291	83.2	350
29	25	31.20	39	15.7	52.9	289	82.5	350
30	25	31.22	39	15.7	52.7	292	83.4	350
31	25	31.24	38	15.7	52.8	292	83.4	350
32	25	31.26	39	15.6	52.8	289	82.6	350
33	25	31.28	38	15.5	53.0	290	82.9	350

34	25	31.30	38	15.6	52.7	290	82.9	350
35	25	31.32	38	15.7	52.5	291	83.2	350
36	25	31.34	39	15.9	52.5	298	85.2	350
37	25	31.36	38	15.6	52.7	290	82.9	350
38	25	31.38	38	15.5	52.6	287	82.1	350
39	25	31.40	38	15.6	52.4	288	82.3	350
40	25	31.42	38	15.7	52.4	292	83.5	350
41	25	31.44	39	15.6	52.4	289	82.6	350
42	25	31.46	39	15.7	52.6	294	84.1	350
43	25	31.48	39	15.5	52.4	291	83.0	350
44	25	31.50	39	15.7	52.3	292	83.5	350
		Average	39	15.9	52.7	293	83.6	350
		Std Dev	1	0.3	0.2	3	0.8	0
		Maximum	41	16.4	53.1	298	85.2	350
		Minimum	38	15.5	52.3	287	82.1	350

N-value: 39

Sample Interval Time: 49.02 seconds.

GRL Engineers, Inc.
SPT Analyzer Results

PDA-S Ver. 2016.14.214 - Printed: 11/28/2016

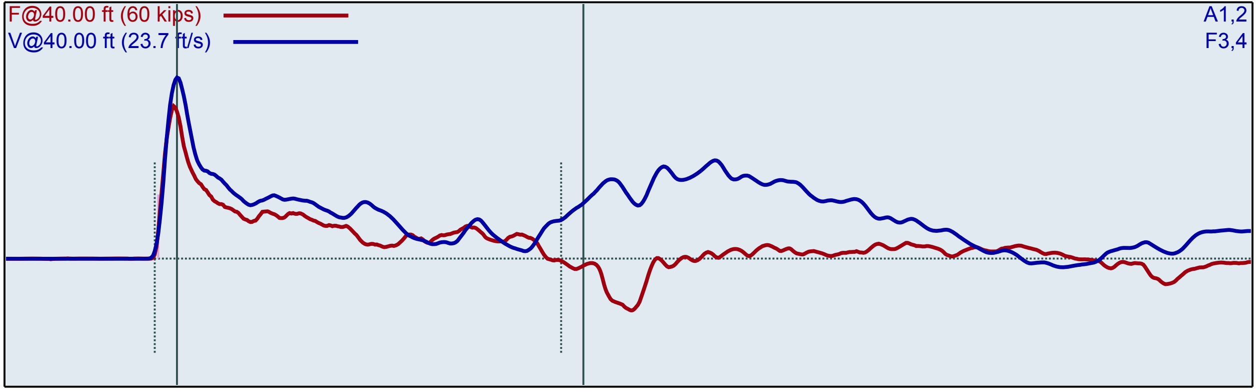
CME55
BP

30
Test date: 11/11/2016

AR: 1.42 in^2
LE: 40.00 ft
WS: 16807.9 ft/s

SP: 0.492 k/ft3
EM: 30000 ksi

Depth: (35.00 - 36.50 ft], displaying BN: 65



BL#	BC	LP	FMX	VMX	BPM	EMX	ETR	ER
	/6"	ft	kips	ft/s	bpm	ft-lb	(%)	ft-lb
45	8	35.06	36	16.4	1.9	278	79.4	350
46	8	35.13	35	16.1	51.4	278	79.5	350
47	8	35.19	34	15.9	51.0	281	80.2	350
48	8	35.25	35	16.0	51.7	284	81.0	350
49	8	35.31	35	15.9	51.7	280	80.1	350
50	8	35.38	35	16.1	52.2	286	81.6	350
51	8	35.44	37	16.4	52.0	293	83.8	350
52	8	35.50	37	16.3	52.2	288	82.3	350
53	6	35.58	36	16.9	52.0	295	84.3	350
54	6	35.67	36	16.4	52.2	291	83.2	350
55	6	35.75	37	16.8	52.0	292	83.5	350
56	6	35.83	36	16.6	52.1	290	83.0	350
57	6	35.92	36	16.7	51.9	295	84.4	350
58	6	36.00	35	16.4	52.1	297	84.8	350
59	9	36.06	36	16.8	52.0	296	84.6	350
60	9	36.11	36	16.8	52.0	291	83.2	350
61	9	36.17	36	16.9	52.1	288	82.3	350
62	9	36.22	36	16.8	52.1	294	83.9	350
63	9	36.28	35	16.3	52.0	291	83.0	350
64	9	36.33	36	17.0	52.1	294	83.9	350
65	9	36.39	36	16.7	52.1	290	83.0	350
66	9	36.44	35	16.6	52.0	293	83.8	350
67	9	36.50	35	16.4	52.1	291	83.0	350
		Average	36	16.7	52.1	293	83.6	350
		Std Dev	1	0.2	0.1	2	0.7	0
		Maximum	37	17.0	52.2	297	84.8	350
		Minimum	35	16.3	51.9	288	82.3	350

N-value: 15

Sample Interval Time: 25.41 seconds.

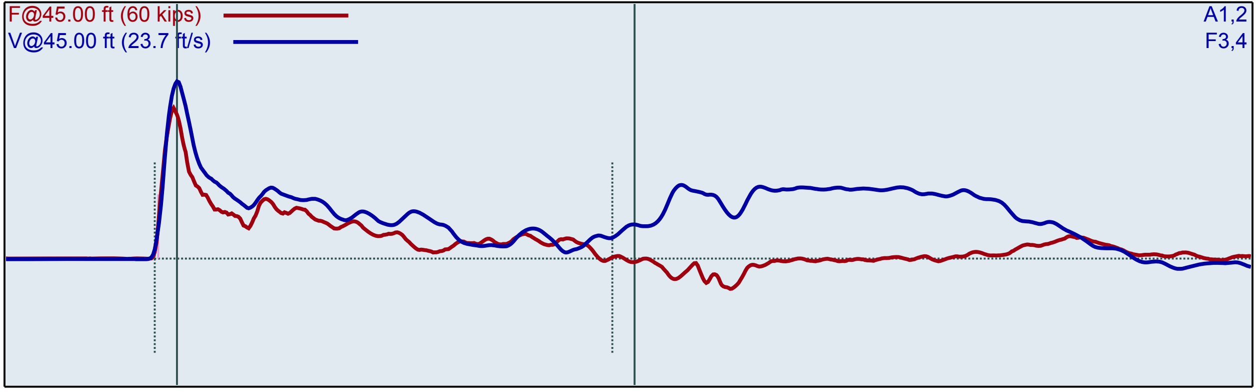
GRL Engineers, Inc.
SPT Analyzer Results

PDA-S Ver. 2016.14.214 - Printed: 11/28/2016

CME55
BP
AR: 1.42 in^2
LE: 45.00 ft
WS: 16807.9 ft/s

30
Test date: 11/11/2016
SP: 0.492 k/ft3
EM: 30000 ksi

Depth: (40.00 - 41.50 ft], displaying BN: 87



BL#	BC /6"	LP ft	FMX kips	VMX ft/s	BPM bpm	EMX ft-lb	ETR (%)	ER ft-lb
68	6	40.08	38	16.6	1.9	299	85.4	350
69	6	40.17	38	16.5	51.4	287	82.1	350
70	6	40.25	38	16.9	51.4	298	85.0	350
71	6	40.33	38	16.8	52.2	303	86.6	350
72	6	40.42	37	16.5	52.5	294	83.9	350
73	6	40.50	38	17.0	52.7	302	86.2	350
74	7	40.57	36	16.4	52.8	289	82.7	350
75	7	40.64	38	16.8	52.8	296	84.7	350
76	7	40.71	37	16.6	52.9	293	83.6	350
77	7	40.79	37	16.7	52.8	297	84.7	350
78	7	40.86	36	16.5	52.9	292	83.3	350
79	7	40.93	36	16.6	52.9	291	83.2	350
80	7	41.00	38	16.7	52.8	294	84.1	350
81	9	41.06	36	16.6	52.9	289	82.5	350
82	9	41.11	38	17.0	52.8	302	86.3	350
83	9	41.17	38	16.8	52.8	296	84.4	350
84	9	41.22	37	16.4	52.9	292	83.6	350
85	9	41.28	36	16.4	52.7	291	83.1	350
86	9	41.33	36	16.2	52.9	288	82.3	350
87	9	41.39	35	16.4	52.7	293	83.7	350
88	9	41.44	37	16.7	53.0	294	83.9	350
89	9	41.50	36	16.5	52.7	293	83.6	350
		Average	37	16.6	52.8	293	83.7	350
		Std Dev	1	0.2	0.1	3	1.0	0
		Maximum	38	17.0	53.0	302	86.3	350
		Minimum	35	16.2	52.7	288	82.3	350

N-value: 16

Sample Interval Time: 23.99 seconds.

Summary of SPT Test Results

Project: MOBILE B59 , Test Date: 11/11/2016 - Mobile B-59 (SN:N/A)

FMX: Maximum Force
VMX: Maximum Velocity
BPM: Blows/Minute

EMX: Maximum Energy
ETR: Energy Transfer Ratio - Rated
ER: Hammer Energy Rating

Instr. Length ft	Blows Applied /6"	Start Depth ft	Final Depth ft	**N Value**	**N60 Value**	Average FMX kips	Average VMX ft/s	Average BPM bpm	Average EMX ft-lb	Average ETR (%)	Average ER ft-lb
13.00	**9-12-13**	10.00	11.50	**25**	**33**	38	15.3	43.6	271	79.7	340
18.00	**7-12-20**	15.00	16.50	**32**	**43**	37	15.1	43.5	273	80.2	340
23.00	**10-10-15**	20.00	21.50	**25**	**33**	39	14.9	43.1	283	83.2	340
					Overall Average Values:	38	15.1	43.4	275	81.0	340
					Standard Deviation:	1	0.2	0.6	7	2.1	0
					Overall Maximum Value:	40	15.6	44.9	293	86.2	340
					Overall Minimum Value:	36	14.6	41.8	258	76.0	340

GRL Engineers, Inc.
SPT Analyzer Results

PDA-S Ver. 2016.14.214 - Printed: 11/28/2016

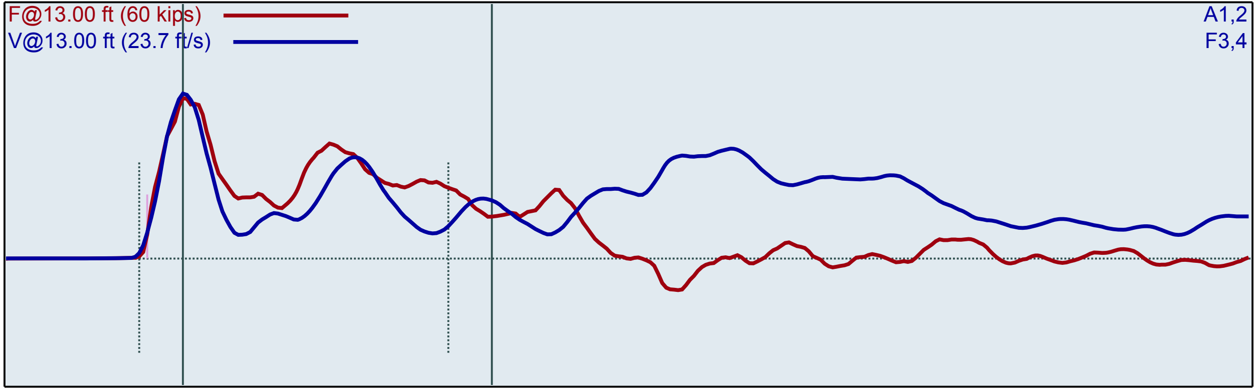
Mobile B59
BP

10
Test date: 11/11/2016

AR: 1.42 in^2
LE: 13.00 ft
WS: 16807.9 ft/s

SP: 0.492 k/ft3
EM: 30000 ksi

Depth: (10.00 - 11.50 ft], displaying BN: 32



FMX: Maximum Force
VMX: Maximum Velocity
BPM: Blows/Minute

EMX: Maximum Energy
ETR: Energy Transfer Ratio - Rated
ER: Hammer Energy Rating

BL#	BC	LP	FMX	VMX	BPM	EMX	ETR	ER
	/6"	ft	kips	ft/s	bpm	ft-lb	(%)	ft-lb
1	9	10.06	31	12.1	1.9	179	52.7	340
2	9	10.11	38	15.5	22.8	275	81.0	340
3	9	10.17	38	15.4	38.6	278	81.8	340
4	9	10.22	39	15.7	42.4	277	81.4	340
5	9	10.28	39	15.4	42.6	279	82.0	340
6	9	10.33	39	15.5	42.8	280	82.3	340
7	9	10.39	38	15.5	42.7	274	80.5	340
8	9	10.44	38	15.3	43.4	276	81.0	340
9	9	10.50	39	15.5	43.2	274	80.6	340
10	12	10.54	38	15.2	43.4	271	79.8	340
11	12	10.58	38	15.3	43.6	274	80.5	340
12	12	10.63	38	15.4	43.2	273	80.4	340
13	12	10.67	38	15.3	43.8	271	79.8	340
14	12	10.71	38	15.3	43.7	273	80.4	340
15	12	10.75	38	15.4	44.1	265	77.9	340
16	12	10.79	38	15.2	44.0	262	77.2	340
17	12	10.83	39	15.6	42.1	270	79.4	340
18	12	10.88	39	15.5	43.8	277	81.4	340
19	12	10.92	38	15.4	42.8	268	78.8	340
20	12	10.96	38	15.2	42.5	258	76.0	340
21	12	11.00	38	15.3	43.6	272	80.0	340
22	13	11.04	39	15.2	43.5	268	78.7	340
23	13	11.08	38	15.2	44.5	269	79.1	340
24	13	11.12	38	15.2	44.1	263	77.5	340
25	13	11.15	38	15.2	44.2	267	78.6	340
26	13	11.19	39	15.3	43.1	273	80.2	340
27	13	11.23	39	15.3	44.1	276	81.1	340
28	13	11.27	38	15.2	43.7	273	80.4	340
29	13	11.31	38	15.2	44.6	274	80.7	340
30	13	11.35	39	15.4	42.4	280	82.4	340
31	13	11.38	39	15.3	43.8	272	80.1	340
32	13	11.42	38	15.2	43.7	274	80.5	340
33	13	11.46	39	15.3	43.6	274	80.6	340

34	13	11.50	39	15.3	44.9	276	81.1	340
		Average	38	15.3	43.6	271	79.7	340
		Std Dev	0	0.1	0.7	5	1.4	0
		Maximum	39	15.6	44.9	280	82.4	340
		Minimum	38	15.2	42.1	258	76.0	340

N-value: 25

BN: 3 8-11-15

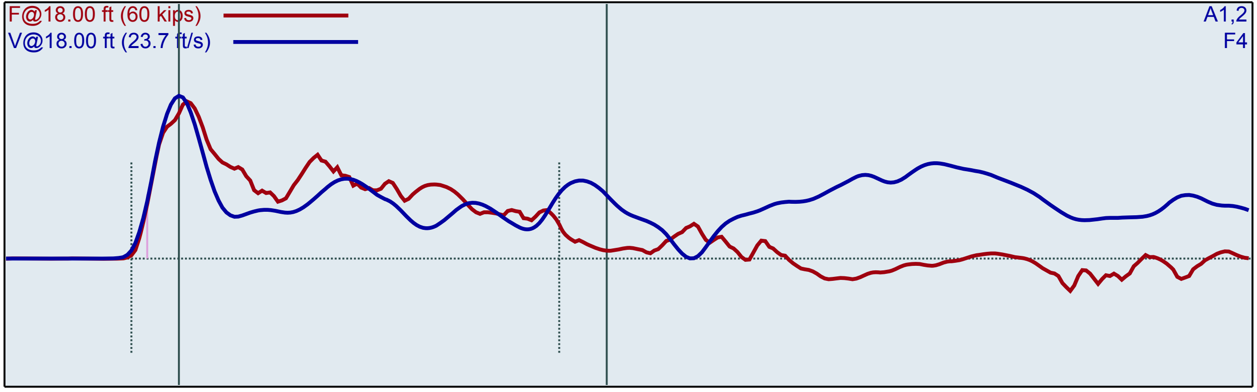
Sample Interval Time: 46.96 seconds.

GRL Engineers, Inc.
SPT Analyzer Results PDA-S Ver. 2016.14.214 - Printed: 11/28/2016

Mobile B59 10
BP Test date: 11/11/2016

AR: 1.42 in^2 SP: 0.492 k/ft3
LE: 18.00 ft EM: 30000 ksi
WS: 16807.9 ft/s

Depth: (15.00 - 16.50 ft], displaying BN: 71



BL#	BC /6"	LP ft	FMX kips	VMX ft/s	BPM bpm	EMX ft-lb	ETR (%)	ER ft-lb
35	7	15.07	38	15.5	1.9	283	83.2	340
36	7	15.14	37	15.7	40.7	273	80.3	340
37	7	15.21	38	15.6	42.6	274	80.6	340
38	7	15.29	38	15.4	42.9	274	80.5	340
39	7	15.36	38	15.5	42.3	278	81.9	340
40	7	15.43	38	15.4	43.1	273	80.3	340
41	7	15.50	38	15.4	43.2	276	81.3	340
42	12	15.54	38	15.4	42.8	282	83.0	340
43	12	15.58	37	15.5	43.2	275	80.9	340
44	12	15.63	38	15.4	43.0	272	79.9	340
45	12	15.67	38	15.5	43.2	279	82.0	340
46	12	15.71	37	15.2	43.5	272	80.1	340
47	12	15.75	37	15.2	43.0	269	79.0	340
48	12	15.79	37	15.2	42.6	276	81.1	340
49	12	15.83	38	15.4	42.6	276	81.2	340
50	12	15.88	37	15.3	43.1	268	79.0	340
51	12	15.92	36	15.3	43.1	269	79.1	340
52	12	15.96	37	15.2	43.5	275	80.8	340
53	12	16.00	37	15.3	43.4	277	81.3	340
54	20	16.03	37	15.1	43.6	274	80.7	340
55	20	16.05	37	15.1	43.6	275	80.9	340
56	20	16.08	36	15.0	42.8	267	78.6	340
57	20	16.10	37	15.1	43.6	270	79.5	340
58	20	16.13	37	15.2	44.2	272	80.1	340
59	20	16.15	37	15.1	43.8	272	79.9	340
60	20	16.18	37	15.0	43.8	270	79.4	340
61	20	16.20	36	15.0	43.8	270	79.5	340
62	20	16.23	36	14.9	43.8	269	79.2	340
63	20	16.25	36	15.0	43.7	278	81.9	340
64	20	16.28	38	14.9	43.9	276	81.3	340
65	20	16.30	37	14.9	44.1	269	79.1	340
66	20	16.33	36	15.0	43.7	274	80.4	340
67	20	16.35	36	15.2	43.5	267	78.7	340
68	20	16.38	38	15.2	44.3	274	80.5	340
69	20	16.40	36	14.9	44.1	268	79.0	340
70	20	16.43	36	15.2	43.8	261	76.9	340

71	20	16.45	37	15.0	44.0	273	80.4	340
72	20	16.48	37	15.0	44.0	273	80.2	340
73	20	16.50	39	15.2	43.6	282	82.9	340
		Average	37	15.1	43.5	273	80.2	340
		Std Dev	1	0.2	0.5	4	1.3	0
		Maximum	39	15.5	44.3	282	83.0	340
		Minimum	36	14.9	42.6	261	76.9	340

N-value: 32

Sample Interval Time: 52.53 seconds.

PDA-S Ver. 2016.14.214 - Printed: 11/28/2016

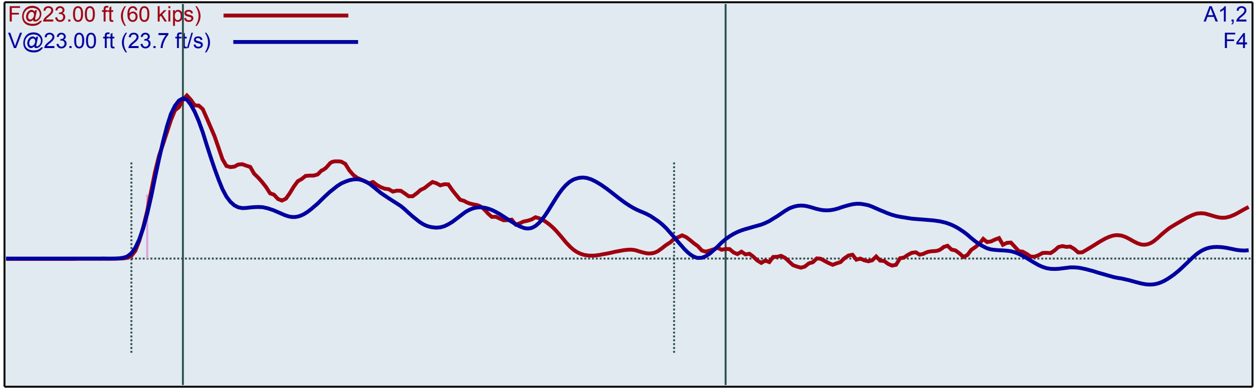
Mobile B59
BP

10
Test date: 11/11/2016

AR: 1.42 in^2
LE: 23.00 ft
WS: 16807.9 ft/s

SP: 0.492 k/ft3
EM: 30000 ksi

Depth: (20.00 - 21.50 ft], displaying BN: 106



BL#	BC	LP	FMX	VMX	BPM	EMX	ETR	ER
	/6"	ft	kips	ft/s	bpm	ft-lb	(%)	ft-lb
74	10	20.05	38	14.9	1.9	277	81.4	340
75	10	20.10	39	14.9	42.6	271	79.7	340
76	10	20.15	39	14.8	43.0	274	80.5	340
77	10	20.20	39	15.3	2.4	287	84.5	340
78	10	20.25	40	15.1	42.2	288	84.8	340
79	10	20.30	39	15.2	42.0	288	84.6	340
80	10	20.35	38	15.2	41.6	289	84.9	340
81	10	20.40	39	14.9	41.7	281	82.7	340
82	10	20.45	39	15.2	41.3	288	84.7	340
83	10	20.50	39	15.0	42.4	284	83.7	340
84	10	20.55	39	15.1	42.8	284	83.4	340
85	10	20.60	40	15.1	41.8	285	83.9	340
86	10	20.65	38	15.1	42.8	279	82.1	340
87	10	20.70	39	14.9	42.3	282	82.8	340
88	10	20.75	39	15.2	42.1	286	84.0	340
89	10	20.80	38	15.0	42.9	278	81.7	340
90	10	20.85	39	14.9	42.7	283	83.3	340
91	10	20.90	40	15.2	42.6	293	86.0	340
92	10	20.95	39	15.1	42.6	292	86.0	340
93	10	21.00	39	14.9	42.9	287	84.3	340
94	15	21.03	39	15.0	42.5	290	85.4	340
95	15	21.07	39	15.1	42.5	293	86.2	340
96	15	21.10	39	14.9	42.8	284	83.6	340
97	15	21.13	39	15.0	43.4	286	84.1	340
98	15	21.17	38	15.0	42.8	288	84.6	340
99	15	21.20	38	14.9	44.2	283	83.3	340
100	15	21.23	37	14.6	43.5	281	82.7	340
101	15	21.27	39	15.0	43.5	286	84.1	340
102	15	21.30	39	14.7	43.8	278	81.8	340
103	15	21.33	39	14.9	43.9	280	82.4	340
104	15	21.37	39	14.9	43.4	283	83.3	340
105	15	21.40	39	14.6	43.4	278	81.9	340
106	15	21.43	38	14.8	44.2	274	80.6	340
107	15	21.47	39	14.8	43.8	271	79.7	340
108	15	21.50	39	14.6	43.8	270	79.3	340

Average	39	14.9	43.1	283	83.2	340
Std Dev	1	0.2	0.6	6	1.8	0
Maximum	40	15.2	44.2	293	86.2	340
Minimum	37	14.6	41.8	270	79.3	340

N-value: 25

BN: 83 8-12-17

Sample Interval Time: 70.86 seconds.

Appendix E Boring Logs

E.1 Key to Terms and Descriptions

UNIFIED SOIL CLASSIFICATION (ASTM D-2487-98)

MATERIAL TYPES	CRITERIA FOR ASSIGNING SOIL GROUP NAMES			GROUP SYMBOL	SOIL GROUP NAMES & LEGEND	
COARSE-GRAINED SOILS >50% RETAINED ON NO. 200 SIEVE	GRAVELS >50% OF COARSE FRACTION RETAINED ON NO 4. SIEVE	CLEAN GRAVELS <5% FINES	$C_u \ge 4$ AND $1 \le C_c \le 3$	GW	WELL-GRADED GRAVEL	●
			$C_u < 4$ AND/OR $1 > C_c > 3$	GP	POORLY-GRADED GRAVEL	●
		GRAVELS WITH FINES >12% FINES	FINES CLASSIFY AS ML OR CL	GM	SILTY GRAVEL	●
			FINES CLASSIFY AS CL OR CH	GC	CLAYEY GRAVEL	●
	SANDS >50% OF COARSE FRACTION PASSES ON NO 4. SIEVE	CLEAN SANDS <5% FINES	$C_u \ge 6$ AND $1 \le C_c \le 3$	SW	WELL-GRADED SAND	⁘
			$C_u < 6$ AND/OR $1 > C_c > 3$	SP	POORLY-GRADED SAND	⁘
		SANDS AND FINES >12% FINES	FINES CLASSIFY AS ML OR MH	SM	SILTY SAND	⁘
			FINES CLASSIFY AS CL OR CH	SC	CLAYEY SAND	▨
FINE-GRAINED SOILS >50% PASSES NO. 200 SIEVE	SILTS AND CLAYS LIQUID LIMIT<50	INORGANIC	PI>7 AND PLOTS>"A" LINE	CL	LEAN CLAY	▨
			PI>4 AND PLOTS<"A" LINE	ML	SILT	▥
		ORGANIC	LL (oven dried)/LL (not dried)<0.75	OL	ORGANIC CLAY OR SILT	☰
	SILTS AND CLAYS LIQUID LIMIT>50	INORGANIC	PI PLOTS >"A" LINE	CH	FAT CLAY	▨
			PI PLOTS <"A" LINE	MH	ELASTIC SILT	▥
		ORGANIC	LL (oven dried)/LL (not dried)<0.75	OH	ORGANIC CLAY OR SILT	~
HIGHLY ORGANIC SOILS	PRIMARILY ORGANIC MATTER, DARK IN COLOR, AND ORGANIC ODOR			PT	PEAT	⁂

OTHER MATERIAL SYMBOLS

▨	Poorly Graded Sand with Clay	⁘	Sand
▨	Clayey Sand	▥	Silt
▥	Sandy Silt	⁘	Well Graded Gravelly Sand
▧	Low to High Plasticity Clay	▥	Gravelly Silt
⁘	Poorly Graded Gravelly Sand	■	Roadbase
⁘	Topsoil	■	Boulders and Cobble
●	Well Graded Gravel with Clay		
●	Well Graded Gravel with Silt		

SAMPLE TYPES

≀	Auger Cuttings		
☰	Modified California Sampler - Phase II (2-1/2" OD)	⧗	Modified California Sampler - Phase I (3" OD)
▨	Grab Sample		
☒	Split Spoon Sampler - Phase II (2" OD)	⧗	Split Spoon Sampler - Phase I (2" OD)
■	Shelby Tube - Phase I & II (3" OD)		

ADDITIONAL TESTS

CA	-	CHEMICAL ANALYSIS (CORROSIVITY)	SW	-	SWELL TEST
CD	-	CONSOLIDATED DRAINED TRIAXIAL	TC	-	CYCLIC TRIAXIAL
CN	-	CONSOLIDATION	TV	-	TORVANE SHEAR
CU	-	CONSOLIDATED UNDRAINED TRIAXIAL	UC	-	UNCONFINED COMPRESSION
DS	-	DIRECT SHEAR	(1.5)	-	(WITH SHEAR STRENGTH IN KSF)
PP	-	POCKET PENETROMETER (TSF)			
(3.0)	-	(WITH SHEAR STRENGTH IN KSF)	UU	-	UNCONSOLIDATED UNDRAINED TRIAXIAL
RV	-	R-VALUE			
SA	-	SIEVE ANALYSIS: % PASSING #200 SIEVE	WA	-	WASH ANALYSIS
(200)	-	(WITH % PASSING NO. 200 SIEVE	(200%)	-	(WITH % PASSING NO. 200 SIEVE)

▽ WATER LEVEL AT TIME DRILLING, OR AS SHOWN

▼ WATER LEVEL AT END OF DRILLING, OR AS SHOWN

▼ WATER LEVEL AFTER 24 HHOURS, OR AS SHOWN

Job No. 60429259

LEGEND TO SOIL DESCRIPTIONS

E.2 Boring Logs

AECOM-SMART-SOIL-LAB-ELEV_SOIL_PP+TV_GW - URS_DENVER STD US LAB.GDT - 5/26/21 17:27 - C:\USERS\LANCE.FINNEFROCK\ONEDRIVE - AECOM DIRECTORY\PROJECTS\TSSWCB - 5 DAMS\07. PLUM 2\01. FIELD & LAB\06. GINT LOGS\PLUM 2 LOGS_2021.G

PROJECT NAME: Plum FRS No. 2 Rehabilitation
DATES DRILLED: 1/9/20 - 1/9/20
PROJECT NO: 60615067
SURFACE ELEVATION (ft): 662.21
LOCATION: Kyle, TX
TOTAL DEPTH (ft): 30

LOG NO: 008-19

PAGE 1 OF 1

AECOM

DRILL COMPANY / DRILLER: Total Support Services / Chris Rios
GROUNDWATER LEVELS:
LOGGED BY: M. Link
DRILL EQUIP: CME 45b
▽ **AT TIME OF:** 18.50 ft / Elev 643.71 ft
CHECKED BY: L. Finnefrock
DRILL METHOD: Hollow Stem Auger
▼ **AT END OF DRILLING** 28.10 ft / Elev 634.11 ft
HOLE LOCATION: Embankment Crest
BIT SIZE/TYPE: 7.5" OD Hollow Stem Auger
AFTER DRILLING ---
LATITUDE (deg) or NORTHING (ft): 13908370.45(ft)
CASING DEPTH (ft bgs): N/A
COMPLETION: Cement Bentonite Grout
LONGITUDE (deg) or EASTING (ft): 2330058.802(ft)

ELEVATION (ft)	DEPTH (ft)	SOIL SAMPLES: SAMPLE SYMBOL	SOIL SAMPLES: SAMPLE TYPE AND NUMBER	SOIL SAMPLES: BLOW COUNTS (N VALUE)	SOIL SAMPLES: POCKET PEN (tsf)	SOIL SAMPLES: RECOVERY (%)	MATERIAL DESCRIPTION AND REMARKS	STRATIGRAPHY	LABORATORY TESTING RESULTS: Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	GRAVEL (%)	SAND (%)	FINES - Passing No. 200 Sieve (%)	CLAY - Passing 2 microns (%)
	0		P 1		4.5+	75	Hard, moist, dark brown with light grayish tan, CLAY, fine gravel, trace organics, subangular, trace calcium nodules and trace shell fragments, (CH), (FILL)		17.5							
660			SS 2	5-10-10 (20)		86	Becomes dry, light gray, subrounded, trace burnt orange pockets, and trace black v-ing, (FILL)		13.6							
	5		P 3		4.5+	50	Becomes moist, dark brown, iron oxide staining, and trace 1/4" to 1/2" gravel, (FILL) Hard, moist, light gray to tan, CLAY, trace organics, trace calcium nodules, trace burnt orange pockets, and trace black specks, (CL-CH), (FILL)		17.6							
655			SS 4		4.5+	86	Gravel, rounded, black striation, thumb sized chalk pocket, (FILL)		11.5							
	10		P 5		4.5+	73	Hard, dry to moist, brown, CLAY, fine gravel, trace sand, trace organics, trace black pockets and calcium nodules, (CH), (FILL) Dark brown and light grayish tan, CLAY, (CL-CH), (RESIDUUM)		17.4							
650							Hard, moist, CLAY, Crumbly, heavy white chalk/calcium pockets, burnt orange pockets, black nodules, (CL-CH), (RESIDUUM)									
	15		ST 6		4.5+	50	Hard, moist, CLAY, fine gravel, rounded to subangular, 1/4"-1/2" subangular and rounded gravel, trace shell fragments, sandy, (CL-CH), (RESIDUUM)		9.8							
645							▽									
	20		SS 7	4-10-12 (22)		100	Hard, moist, tan to light gray, CLAY, trace burnt orange/red compacted layer, trace calcium nodules, trace blue/black spots, (CL-CH), (RESIDUUM)		18.7							
640																
	25		SS 8	6-10-10 (20)		100	Hard, moist, tan to light gray, CLAY, trace calcium nodules, blue/black spots, (CL-CH), (RESIDUUM)		22.1							
635							▼									
	30		SS 9	7-10-14 (24)		100	Hard, moist, tan to light gray, CLAY, trace calcium nodules, trace blue/black spots, tan color becomes burnt orange in places, trace orange/iron powder/filings, (CL-CH), (RESIDUUM)		22.2							

Bottom of hole at 30.0 feet.

PROJECT NAME: Plum FRS No. 2 Rehabilitation	**DATES DRILLED:** 1/27/20 - 1/27/20	**LOG NO: 009-19** PAGE 1 OF 1 AECOM
PROJECT NO: 60615067	**SURFACE ELEVATION (ft):** 662.38	
LOCATION: Kyle, TX	**TOTAL DEPTH (ft):** 35	

DRILL COMPANY / DRILLER: Total Support Services / Chris Rios	**GROUNDWATER LEVELS:**	**LOGGED BY:** M.Lyons
DRILL EQUIP: CME 45b	**AT TIME OF:** --- Dry	**CHECKED BY:** L. Finnefrock
DRILL METHOD: Hollow Stem Auger	**AT END OF DRILLING** --- Dry	**HOLE LOCATION:** Embankment Crest
BIT SIZE/TYPE: 7.5" OD Hollow Stem Auger	▽ **AFTER DRILLING** 16.31 ft / Elev 646.07 ft	**LATITUDE (deg) or NORTHING (ft):** 13907884.65(ft)
CASING DEPTH (ft bgs): N/A	**COMPLETION:** Piezometer	**LONGITUDE (deg) or EASTING (ft):** 2330266.073(ft)

ELEVATION (ft)	DEPTH (ft)	SOIL SAMPLES					MATERIAL DESCRIPTION AND REMARKS	STRATIGRAPHY	LABORATORY TESTING RESULTS							
		SAMPLE SYMBOL	SAMPLE TYPE AND NUMBER	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	RECOVERY (%)			Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	GRAVEL (%)	SAND (%)	FINES - Passing No. 200 Sieve (%)	CLAY - Passing 2 microns (%)
	0		P 1		4.0	85	Moist, dark brown to black, subangular, CLAY, much organics, trace fine gravel, high plasticity, increasing calcite nodules toward base, slight orange mottling, (CH), (FILL)		18.3	116.1	65	41	0	6	94	58.1
660			SS 2	10-11-11 (22)		83	Very stiff, dry, light brown to tan, subangular, silty CLAY, much fine to coarse gravel, strong HCL reaction, abundant calicte nodules, (ML), (FILL)		9.7		40	20			89.8	
	5		P 3		4.5+	69	Slightly moist, dark brown, subrounded to subangular, CLAY, trace organics, trace fine to medium gravel, increasing clay content, abundant calcite nodules, (CL-CH), (FILL)		16.7	122.4	68	43	2.3	11.8	85.9	46.4
655			SS 4	6-10-10 (20)		92	Very stiff, slightly moist, CLAY, S.A.A., (CL-CH), (FILL)		14.2							
	10		ST 5		4.5+	50	Moist to slightly moist, light brown to orange, CLAY, high plasticity, abundant iron staining, gray mottling, trace gypsum crystals, (CH), (FILL)		20.1	128.3	74	50			97.5	
650																
	15		P 6		4.25	67	Moist, light gray to dark gray, CLAY, strong HCL reaction, abundant calcite nodules, abundant iron nodules, decreases toward base, (CL-CH), (FILL)		20.5	118	60	34	3.2	16.2	80.6	48.5
645							▽									
	20		SS 7	8-8-10 (18)		100	Very stiff, very moist, light brown, CLAY, abundant calcite nodules, abundant iron staining, (CH), (RESIDUUM)		12.9							
640																
	25		ST 8		4.5+	77	Slightly moist, light brown to tan, CLAY, high plasticity, no calicite nodules, iron staining, gray mottling, (CH), (RESIDUUM)		23	128.7	50	29			86.4	
635																
	30		P 9		4.5+	79	Slightly moist, CLAY, S.A.A. gray clay seams and iron staining, (CH), (RESIDUUM)		19.7	122	73	48	0	2.1	97.9	48.5
630																
	35		SS 70	7-13-15 (28)		100	Very stiff, slightly moist, CLAY, S.A.A., (CH), (RESIDUUM)		21							

Bottom of hole at 35.0 feet.

PROJECT NAME: Plum FRS No. 2 Rehabilitation	**DATES DRILLED:** 1/27/20 - 1/27/20	**LOG NO: 010-19** PAGE 1 OF 2 AECOM
PROJECT NO: 60615067	**SURFACE ELEVATION (ft):** 662.20	
LOCATION: Kyle, TX	**TOTAL DEPTH (ft):** 45	

DRILL COMPANY / DRILLER: Total Support Services / Chris Rios	**GROUNDWATER LEVELS:**	**LOGGED BY:** M.Lyons
DRILL EQUIP: CME 45b	**AT TIME OF:** --- Dry	**CHECKED BY:** L. Finnefrock
DRILL METHOD: Hollow Stem Auger	**AT END OF DRILLING** --- Dry	**HOLE LOCATION:** Embankment Crest
BIT SIZE/TYPE: 7.5" OD Hollow Stem Auger	**AFTER DRILLING** ---	**LATITUDE (deg) or NORTHING (ft):** 13907469.01(ft)
CASING DEPTH (ft bgs): N/A	**COMPLETION:** Cement Bentonite Grout	**LONGITUDE (deg) or EASTING (ft):** 2330416.031(ft)

ELEVATION (ft)	DEPTH (ft)	SOIL SAMPLES					MATERIAL DESCRIPTION AND REMARKS	STRATIGRAPHY	LABORATORY TESTING RESULTS							
		SAMPLE SYMBOL	SAMPLE TYPE AND NUMBER	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	RECOVERY (%)			Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	GRAVEL (%)	SAND (%)	FINES - Passing No. 200 Sieve (%)	CLAY - Passing 2 microns (%)
660	0	▮	P 1		4.5+	83	Very stiff, moist, dark black brown, subrounded, CLAY, much organics, trace coarse gravel, increasing calcite nodules towards base, light brown mottling toward base, (CH), (FILL)	▨	19.9							
		☒	SS 2	8-9-12 (21)		83	Stiff, dry, light brown tan, subrounded to subangular, silty CLAY, much fine to medium gravel, abundant calcite nodules, trace iron staining, low plasticity, (ML), (FILL)	▥	8.3							
	5	▮	P 3		4.5+	67	Stiff, moist, CLAY, 0-11": S.A.A. trace iron nodules, increasing coarse gravel 11-16": (CH) Dark brown/black, high plasticity clay, trace calcite nodules, trace coarse gravel, (CH), (FILL)	▨	12.6 2.9							
655		■	ST 4		4-4.5+	58		▨	12.5							
	10	☒	SS 5	5-6-10 (16)		78	Stiff, moist, light brown tan, CLAY, decreasing silt content, abundant calcite nodules, trace iron staining, (CL), (FILL)	▨	14.3 11							
650							Stiff to very stiff, moist, CLAY, 0-8.25": (CH) Dark brown/black, high plasticity clay, trace calcite nodules, gray mottling 8.25-14": (CH) Tan/Light brown, high plasticity, gray mottling, abundant iron staining, (CH), (FILL)	▨								
	15	▮	P 6		4.0	67	Stiff, very moist, light brown tan, CLAY, S.A.A. Layer B, (CH), (FILL)	▨	25.3							
645								▨								
	20	☒	SS 7	3-5-7 (12)		100	Stiff, moist, light brown tan, CLAY, S.A.A. black and gray mottling, trace gypsum crystals, (CH), (FILL)	▨	11.7							
640								▨								
	25	■	ST 8		4.0	63	Stiff, moist, light brown tan, CLAY, S.A.A. increasing coarse grained calcite nodules, (CH), (FILL)	▨	14.4							
635								▨								
	30	▮	P 9		4.5+	56	Stiff, moist, light brown tan, CLAY, S.A.A. increase iron staining, no calcite nodules, gray/black mottling, (CH), (RESIDUUM)	▨	23.7							
630								▨								
	35	■	ST 10		4.5	79	Stiff, moist, light brown tan, CLAY, S.A.A., (CH), (RESIDUUM)	▨	24.7							

(Continued Next Page)

PROJECT NAME: Plum FRS No. 2 Rehabilitation

PROJECT NO: 60615067

LOCATION: Kyle, TX

DATES DRILLED: 1/27/20 - 1/27/20

SURFACE ELEVATION (ft): 662.20

TOTAL DEPTH (ft): 45

LOG NO: 010-19

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AECOM

ELEVATION (ft)	DEPTH (ft)	SOIL SAMPLES					MATERIAL DESCRIPTION AND REMARKS	STRATIGRAPHY	LABORATORY TESTING RESULTS							
		SAMPLE SYMBOL	SAMPLE TYPE AND NUMBER	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	RECOVERY (%)			Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	GRAVEL (%)	SAND (%)	FINES - Passing No. 200 Sieve (%)	CLAY - Passing 2 microns (%)
625	35						Stiff, moist, light brown tan, CLAY, S.A.A., (CH), (RESIDUUM) *(continued)*	▨								
	40	☒	SS 11	5-5-12 (17)		100	Stiff, moist, light brown tan, CLAY, S.A.A. last .5" transition into light gray/olive gray, (CH), (RESIDUUM)	▨	21.5							
620								▨								
	45	▮	P 12		4.5+	60	Hard, dry to slightly moist, dark gray olive gray, CLAY, medium plasticity, slight bedding layers, (CL-CH), (RESIDUUM)	▧	17.8							

Bottom of hole at 45.0 feet.

PROJECT NAME: Plum FRS No. 2 Rehabilitation	**DATES DRILLED:** 12/11/19 - 12/11/19	**LOG NO: 011-19** PAGE 1 OF 2 AECOM
PROJECT NO: 60615067	**SURFACE ELEVATION (ft):** 661.24	
LOCATION: Kyle, TX	**TOTAL DEPTH (ft):** 60	

DRILL COMPANY / DRILLER: Total Support Services / Chris Rios	**GROUNDWATER LEVELS:**	**LOGGED BY:** M. Link
DRILL EQUIP: CME 45b	▽ **AT TIME OF:** 27.50 ft / Elev 633.74 ft	**CHECKED BY:** L. Finnefrock
DRILL METHOD: Hollow Stem Auger	▼ **AT END OF DRILLING** 27.50 ft / Elev 633.74 ft	**HOLE LOCATION:** Embankment Crest
BIT SIZE/TYPE: 7.5" OD Hollow Stem Auger	▼ **AFTER DRILLING** 46.06 ft / Elev 615.18 ft	**LATITUDE (deg) or NORTHING (ft):** 13907217.96(ft)
CASING DEPTH (ft bgs): N/A	**COMPLETION:** Piezometer	**LONGITUDE (deg) or EASTING (ft):** 2330293.584(ft)

ELEVATION (ft)	DEPTH (ft)	SOIL SAMPLES: SAMPLE SYMBOL	SAMPLE TYPE AND NUMBER	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	RECOVERY (%)	MATERIAL DESCRIPTION AND REMARKS	STRATIGRAPHY	LABORATORY TESTING RESULTS: Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	GRAVEL (%)	SAND (%)	FINES - Passing No. 200 Sieve (%)	CLAY - Passing 2 microns (%)
660	0		P 1		4-4.5+	88	Very stiff to hard, moist, brown to dark brown, CLAY, organics, trace fine gravel, iron oxide staining, trace shell fragments, trace dry 1/4" layers with gray-brown dry soil and calcium pockets, (CH), (FILL)		16.8							
			SS 2	4-4-6 (10)		61	Hard, dry, light gray to tan, CLAY, medium gravel, angular to subangular, trace gray-black pockets at sample bottom, powdery. Grades to harder and drier from 4 to 6 feet, (CL-CH), (FILL)		8.5							
	5		ST 3		4.5+	56			10	129	34	20	4.3	27.6	68.1	29
655			P 4		4.5+	73			14.7							
	10		SS 5	4-4-6 (10)		89	Very stiff to hard, moist, brown to dark brown, high plasticity, CLAY, trace sand, trace fine gravel, calcium nodules, gray-black pockets, shell fragments, no organics. Soil is tan at 1.5" of soil. Grades to less moist and less plasticity after 13'., (CH), (FILL)		13.3							
650							Very stiff to hard, moist, tan to light gray, CLAY, trace fine gravel, iron oxide staining, trace black specks/nodules, malleable, (CL-CH), (FILL)									
	15		P 6		3-4.0	77	Very stiff to hard, moist, tan to light gray, CLAY, trace fine gravel, iron oxide staining, trace black specks/nodules, malleable, (CL-CH), (FILL)		20.5							
645																
	20		ST 7		3.75-4.5	90	Moist, tannish brown to gray, CLAY, trace fine gravel, iron oxide staining, trace black specks/pockets, calcite nodules/pockets, (CH), (FILL)		9.2	127.5	55	36			82.8	
640																
	25		SS 8	3-5-7 (12)		100	Very stiff to hard, moist, tan to light gray, CLAY, trace fine gravel, iron oxide staining, trace black specks/nodules, malleable, (CL-CH), (FILL)		19.8							
635							▼									
	30		P 9		2.25-3.5	83	Stiff, gray, CLAY, gray/black pockets, (CH), (FILL) Gray to dark brown, CLAY, trace fine gravel, trace shell fragments, (CH), (FILL)		19.4							
630																
	35		SS 10	4-4-8 (12)		100			17.3							

(Continued Next Page)

PROJECT NAME: Plum FRS No. 2 Rehabilitation	**DATES DRILLED:** 12/11/19 - 12/11/19	**LOG NO: 011-19** PAGE 2 OF 2
PROJECT NO: 60615067	**SURFACE ELEVATION (ft):** 661.24	
LOCATION: Kyle, TX	**TOTAL DEPTH (ft):** 60	

ELEVATION (ft)	DEPTH (ft)	SOIL SAMPLES: SAMPLE SYMBOL	SAMPLE TYPE AND NUMBER	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	RECOVERY (%)	MATERIAL DESCRIPTION AND REMARKS	STRATIGRAPHY	LABORATORY TESTING RESULTS: Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	GRAVEL (%)	SAND (%)	FINES - Passing No. 200 Sieve (%)	CLAY - Passing 2 microns (%)
625	35						Very stiff, moist, tannish brown to gray, CLAY, trace organics, trace fine gravel, calcite pockets, black/gray pockets/nodules, malleable, (CL-CH), (FILL) *(continued)*									
620	40		ST 11		4.5+	48	Hard, moist, tan to light gray, CLAY, trace gypsum crystals forming in gray clay, trace black smears/specks, (CL-CH), (RESIDUUM)		22.3	123.9	73	48			94.3	
615	45		P 12		4.5+	65	Hard, dry to moist, gray to dark gray, CLAY, flakey, compacted/bedding layers, powdery at breaks, (CL-CH), (RESIDUUM) ▼		16.6							
610	50		SS 13	7-16-18 (34)		100	Hard, dry to moist, gray to dark gray, CLAY, S.A.A. trace gypsum nodules, gypsum pocket accompanied with softer light gray powdery material, (CL-CH), (RESIDUUM)		16.3							
605	55		ST 14 SS 15	50/3"	4.5+	100 133	Dry, white to light gray SHALE: Weak to extremely weak, very fine grained, fissile, trace gypsum crystals, breaks down to silty clay		5.6 2	147.9						
	60		SS 16	50/2"		100			1.1							

Bottom of hole at 60.0 feet.

PROJECT NAME: Plum FRS No. 2 Rehabilitation
DATES DRILLED: 1/21/20 - 1/22/20
PROJECT NO: 60615067
SURFACE ELEVATION (ft): 662.37
LOCATION: Kyle, TX
TOTAL DEPTH (ft): 60

LOG NO: 012-19

PAGE 1 OF 2

DRILL COMPANY / DRILLER: Total Support Services / Chris Rios
DRILL EQUIP: CME 45b
DRILL METHOD: Hollow Stem Auger
BIT SIZE/TYPE: 7.5" OD Hollow Stem Auger
CASING DEPTH (ft bgs): N/A

GROUNDWATER LEVELS:
AT TIME OF: --- Dry
AT END OF DRILLING --- Dry
AFTER DRILLING ---
COMPLETION: Cement Bentonite Grout

LOGGED BY: L. Cartwright
CHECKED BY: L. Finnefrock
HOLE LOCATION: Embankment Crest
LATITUDE (deg) or NORTHING (ft): 13906968.31(ft)
LONGITUDE (deg) or EASTING (ft): 2330049.478(ft)

		SOIL SAMPLES							LABORATORY TESTING RESULTS							
ELEVATION (ft)	DEPTH (ft) 0	SAMPLE SYMBOL	SAMPLE TYPE AND NUMBER	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	RECOVERY (%)	MATERIAL DESCRIPTION AND REMARKS	STRATIGRAPHY	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	GRAVEL (%)	SAND (%)	FINES - Passing No. 200 Sieve (%)	CLAY - Passing 2 microns (%)
			P 1		4.5+	73	Very stiff, moist, dark brown, subangular, CLAY, much organics, trace fine to coarse gravel, trace shell fragments,, (CH), (FILL)		18.9							
660			SS 2	11-12-13 (25)		89	Hard, dry, tan light gray, subangular, CLAY, trace organics, fine gravel, crumbly, shell fragments, trace chalk, trace iron staining, (CL-CH), (FILL)		12.7							
	5		P 3		4.5+	54	Tan to white, CLAY, calcite deposits, iron staining, gypsum crystals, trace dark brown specks, (CH), (FILL)		2.3							
655			SS 4	8-7-11 (18)		89	Tan light gray, CLAY, trace organics, fine gravel, crumbly, shell fragments, trace chalk, trace iron staining, (CL-CH), (FILL)		10.5							
	10		ST 5		4.5+	50	Very stiff, moist, dark brown dark tan, CLAY, trace gravel, trace iron stains, chalk, shells, (CL-CH), (FILL)		19.3							
650																
	15		P 6		3.25	83	Moist, tan to light gray, subangular, CLAY, trace fine to coarse gravel, iron staining, trace black mottling, trace shell fragments,, (CL-CH), (FILL)		17							
645																
	20		SS 7	2-3-5 (8)		100	Moist, light gray to dark gray, CLAY, trace fine to coarse gravel, trace shell fragments, abundant iron staining, (CL-CH), (FILL)		19.9							
640																
	25		ST 8		4.5+	55	Tan to white, CLAY, calcite deposits, iron staining, gypsum crystals, trace dark brown specks, (CL-CH), (FILL)		23.1							
635																
	30		P 9		3.0	81	Light gray to dark gray, CLAY, trace fine gravel, gray mottling, iron staining, wood chips, trace shell fragments, (CL-CH), (FILL)		21.2							
630																
	35		SS 10	6-8-12 (20)		100	Light olive to gray, CLAY, trace fine gravel, dark gray mottling, trace iron staining, trace chalk, (CL-CH), (FILL)		21.1							

(Continued Next Page)

PROJECT NAME: Plum FRS No. 2 Rehabilitation	**DATES DRILLED:** 1/21/20 - 1/22/20	**LOG NO: 012-19** PAGE 2 OF 2
PROJECT NO: 60615067	**SURFACE ELEVATION (ft):** 662.37	
LOCATION: Kyle, TX	**TOTAL DEPTH (ft):** 60	

ELEVATION (ft)	DEPTH (ft)	SOIL SAMPLES					MATERIAL DESCRIPTION AND REMARKS	STRATIGRAPHY	LABORATORY TESTING RESULTS							
		SAMPLE SYMBOL	SAMPLE TYPE AND NUMBER	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	RECOVERY (%)			Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	GRAVEL (%)	SAND (%)	FINES - Passing No. 200 Sieve (%)	CLAY - Passing 2 microns (%)
625	35						Light olive to gray, CLAY, trace fine gravel, dark gray mottling, trace iron staining, trace chalk, (CL-CH), (FILL) *(continued)*	▨								
	40	■	ST 11		4.5+	88	Tan to light gray, CLAY, trace fine gravel, calcite nodules, trace iron staining, gypsum present, (CL-CH), (RESIDUUM)	▨	23.9							
620																
	45	▮	P 12		4.5+	88	Hard, dark gray, CLAY, (CL), (RESIDUUM)	▨	18.2							
615																
	50	■	ST 13		4.5+	71	Dry, tan with gray, CLAY, trace calcite and iron, (CL), (RESIDUUM)	▨	18.5							
610																
	55	☒	SS 14	50/5"		156	Dry, light gray SHALE: Weak, trace pink shell fragments, breaks down to lean clay (CL)	☰	4.1							
605																
	60	☒	SS 15	50/3"		100	No shell fragments present, strong HCl reaction	☰	4.3							

Bottom of hole at 60.0 feet.

PROJECT NAME: Plum FRS No. 2 Rehabilitation	**DATES DRILLED:** 10/6/20 - 10/6/20	**LOG NO: 013-20** PAGE 1 OF 2
PROJECT NO: 60615067	**SURFACE ELEVATION (ft):** 662.27	
LOCATION: Kyle, TX	**TOTAL DEPTH (ft):** 40	

DRILL COMPANY / DRILLER: Total Support Services / Chester Westb	**GROUNDWATER LEVELS:**	**LOGGED BY:** S. Whipkey
DRILL EQUIP: CME 55LC	**AT TIME OF:** ---	**CHECKED BY:** L. Finnefrock
DRILL METHOD: Hollow Stem Auger	**AT END OF DRILLING** ---	**HOLE LOCATION:** Embankment Crest
BIT SIZE/TYPE: 10" OD Hollow Stem Auger	**AFTER DRILLING** ---	**LATITUDE (deg) or NORTHING (ft):** 13907775(ft)
CASING DEPTH (ft bgs): N/A	**COMPLETION:** Cement Bentonite Grout	**LONGITUDE (deg) or EASTING (ft):** 2330319(ft)

ELEVATION (ft)	DEPTH (ft)	SOIL SAMPLES					MATERIAL DESCRIPTION AND REMARKS	STRATIGRAPHY	LABORATORY TESTING RESULTS							
	0	SAMPLE SYMBOL	SAMPLE TYPE AND NUMBER	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	RECOVERY (%)			Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	GRAVEL (%)	SAND (%)	FINES - Passing No. 200 Sieve (%)	CLAY - Passing 2 microns (%)
			P 1		4.5	42	Stiff, moist, brown, high plasticity, CLAY, trace medium sand, organics, (CH), (FILL)		17.3							
660			ST 2		4.0	50	Stiff, moist, brown, high plasticity, CLAY, with SILT, trace medium sand, organics, soft calcareous material, (CH), (FILL)		16.8	125.4	64	37				
	5		P 3		4.0	29	Tannish yellow brown, high plasticity, CLAY, trace coarse sand, fine gravel, 80% yellow/tan clay, 20% brown clay, subangular (sand), high calcareous content, (CH), (FILL)		19.9							
655			ST 4		2.0	83	Soft, moist, brown, high plasticity, CLAY, trace medium to coarse sand, calcareous sand fissile, (CH), (FILL)		19.1	129.1	61	41			89.5	
	10		SS 5	4-6-5 (11)		67	Moist, tan and orange, high plasticity, CLAY, iron oxide staining, gray clay in fractures, trace iron nodules and mod material, (CH), (FILL)		23.3							
650																
	15		P 6		3.5	58	Moist, dark gray to light gray, high plasticity, CLAY, trace medium sand, blocky, trace green, calcareous sand and shell fragments, (CH), (FILL)		23.4							
645																
	20		ST 7		3.0	63	Medium stiff, moist, light gray to orange, high plasticity, CLAY, trace gravel, iron oxide staining, calcareous material; <5% calcareous gravel, (CH), (RESIDUUM)		23.1	127.2	52	34			99.2	
640																
	25			6-9-12 (21)												
635									23.7							
	30		SS 8	17-13-15 (28)		100	Moist, tan, high plasticity, CLAY, with medium sand, iron oxide staining, gray in fractures, fissile, 60-70% sub-rounded sand, (CH), (RESIDUUM)									
630																
	35		ST 9		3.5	96			24.1							

(Continued Next Page)

PROJECT NAME: Plum FRS No. 2 Rehabilitation	**DATES DRILLED:** 10/6/20 - 10/6/20	**LOG NO: 013-20** PAGE 2 OF 2
PROJECT NO: 60615067	**SURFACE ELEVATION (ft):** 662.27	
LOCATION: Kyle, TX	**TOTAL DEPTH (ft):** 40	

		SOIL SAMPLES							LABORATORY TESTING RESULTS							
ELEVATION (ft)	DEPTH (ft)	SAMPLE SYMBOL	SAMPLE TYPE AND NUMBER	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	RECOVERY (%)	MATERIAL DESCRIPTION AND REMARKS	STRATIGRAPHY	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	GRAVEL (%)	SAND (%)	FINES - Passing No. 200 Sieve (%)	CLAY - Passing 2 microns (%)
	35						Moist, tan, high plasticity, CLAY, with medium sand, iron oxide staining, gray in fractures, fissile, 60-70% sub-rounded sand, (CH), (RESIDUUM) *(continued)*	▨								
625								▨								
							-Gray to dark gray shaley seam from 38.25 to 38.6 ft with gypsum crystals at base	▨	20.2							
	40	☒	SS 10	10-14-18 (32)		100	-Gray to dark gray shaley seam from 39.25 to 39.6 ft with gypsum crystals at the base	▨								

Bottom of hole at 40.0 feet.

PROJECT NAME: Plum FRS No. 2 Rehabilitation	**DATES DRILLED:** 10/7/20 - 10/7/20	**LOG NO: 014-20** PAGE 1 OF 2 AECOM
PROJECT NO: 60615067	**SURFACE ELEVATION (ft):** 662.16	
LOCATION: Kyle, TX	**TOTAL DEPTH (ft):** 40	

DRILL COMPANY / DRILLER: Total Support Services / Chester West	**GROUNDWATER LEVELS:**	**LOGGED BY:** S. Whipkey
DRILL EQUIP: CME 55LC	**AT TIME OF:** ---	**CHECKED BY:** L. Finnefrock
DRILL METHOD: Hollow Stem Auger	**AT END OF DRILLING** ---	**HOLE LOCATION:** Embankment Crest
BIT SIZE/TYPE: 10" OD Hollow Stem Auger	**AFTER DRILLING** ---	**LATITUDE (deg) or NORTHING (ft):** 13907678(ft)
CASING DEPTH (ft bgs): N/A	**COMPLETION:** Cement Bentonite Grout	**LONGITUDE (deg) or EASTING (ft):** 2330360(ft)

ELEVATION (ft)	DEPTH (ft)	SOIL SAMPLES					MATERIAL DESCRIPTION AND REMARKS	STRATIGRAPHY	LABORATORY TESTING RESULTS							
		SAMPLE SYMBOL	SAMPLE TYPE AND NUMBER	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	RECOVERY (%)			Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	GRAVEL (%)	SAND (%)	FINES - Passing No. 200 Sieve (%)	CLAY - Passing 2 microns (%)
	0		P 1		4.5+	46	Stiff, moist, brown, high plasticity, CLAY, trace medium sand, with organics, 5% sand, (CH), (FILL) Moist, tan, medium to high plasticity, CLAY, trace silt, 5-10% silt, calcareous with calc nodules, (CL), (FILL)		16.3							
660			ST 2		4.5+	25	Moist, tan, medium to high plasticity, CLAY, trace silt, 5-10% silt, 20% brown clay, calcareous with calc nodules, (CH), (FILL)		15.3	125	53	33				
	5		P 3		4.5+	33	Moist, tan, medium to high plasticity, CLAY, trace silt, trace gravel, 5-10% silt, 20% brown clay, calcareous with calc nodules, subangular to angular calc gravel (0.25" to 0.5"), (CH), (FILL)		14.4							
655			P 4		4.0	33			12.3							
	10		SS 5	5-7-10 (17)		133	Stiff, moist, brown, high plasticity, CLAY, trace medium sand, trace organics, blocky, iron oxide staining, 5% subrounded calcareous sand, shell fragments, (CH), (FILL)		22.1							
650																
	15		P 6		1.0 2.0	67	Soft, moist, tan with orange, high plasticity, CLAY, iron oxide staining, light gray in fractures, (CH), (FILL) Brown with gray, high plasticity, CLAY, trace medium sand, <5% calcareous sand and shell fragments, (CH), (FILL)		21.3		58	38			80.9	
645																
	20		ST 7		1.5	54	Brown and tan, high plasticity, CLAY, trace medium sand, <5% calcareous sand and shell fragments, (CH), (FILL)		21	129.8						
640																
	25		SS 8	7-9-14 (23)		89	Stiff, moist, tan to orange, medium plasticity, CLAY, some fine to coarse sand, blocky, iron oxide staining, 20% calcareous sand and shell fragments, trace calcareous nodules, (CL), (RESIDUUM)		14.7							
635																
	30		ST 9		4.0	100	Moist, light gray and orange, high plasticity, CLAY, iron oxide staining, fissile, (CH), (RESIDUUM)		24.8							
630																
	35		P 10		2.5	100	Moist, light gray and orange, high plasticity, CLAY, iron oxide staining, fissile, light gray clay in fractures, (CH), (RESIDUUM)		23.3							

(Continued Next Page)

PROJECT NAME: Plum FRS No. 2 Rehabilitation	**DATES DRILLED:** 10/7/20 - 10/7/20	**LOG NO: 014-20** PAGE 2 OF 2
PROJECT NO: 60615067	**SURFACE ELEVATION (ft):** 662.16	
LOCATION: Kyle, TX	**TOTAL DEPTH (ft):** 40	

ELEVATION (ft)	DEPTH (ft)	SOIL SAMPLES					MATERIAL DESCRIPTION AND REMARKS	STRATIGRAPHY	LABORATORY TESTING RESULTS							
		SAMPLE SYMBOL	SAMPLE TYPE AND NUMBER	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	RECOVERY (%)			Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	GRAVEL (%)	SAND (%)	FINES - Passing No. 200 Sieve (%)	CLAY - Passing 2 microns (%)
	35						Moist, light gray and orange, high plasticity, CLAY, iron oxide staining, fissile, light gray clay in fractures, (CH), (RESIDUUM) *(continued)*	▨								
625								▨								
	40	■	ST 11		2.5	58		▨	24							

Bottom of hole at 40.0 feet.

PROJECT NAME: Plum FRS No. 2 Rehabilitation	**DATES DRILLED:** 1/7/20 - 1/7/20	**LOG NO: 015-19** PAGE 1 OF 2 AECOM
PROJECT NO: 60615067	**SURFACE ELEVATION (ft):** 662.44	
LOCATION: Kyle, TX	**TOTAL DEPTH (ft):** 45	

DRILL COMPANY / DRILLER: Total Support Services / Chris Rios	**GROUNDWATER LEVELS:**	**LOGGED BY:** M. Link
DRILL EQUIP: CME 45b	**AT TIME OF:** --- Dry	**CHECKED BY:** L. Finnefrock
DRILL METHOD: Hollow Stem Auger	**AT END OF DRILLING** --- Dry	**HOLE LOCATION:** Embankment Crest
BIT SIZE/TYPE: 7.5" OD Hollow Stem Auger	**AFTER DRILLING** ---	**LATITUDE (deg) or NORTHING (ft):** 13906655.38(ft)
CASING DEPTH (ft bgs): N/A	**COMPLETION:** Cement Bentonite Grout	**LONGITUDE (deg) or EASTING (ft):** 2329758.762(ft)

ELEVATION (ft)	DEPTH (ft)	SOIL SAMPLES					MATERIAL DESCRIPTION AND REMARKS	STRATIGRAPHY	LABORATORY TESTING RESULTS							
		SAMPLE SYMBOL	SAMPLE TYPE AND NUMBER	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	RECOVERY (%)			Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	GRAVEL (%)	SAND (%)	FINES - Passing No. 200 Sieve (%)	CLAY - Passing 2 microns (%)
	0		P 1		4 4.5+	85	Very stiff to hard, moist, brown to dark brown, CLAY, organics, trace fine gravel, trace shell fragments, trace chalk pockets, (CH), (FILL)		16.6							
660		☒	SS 2	5-7-9 (16)		72	Hard, dry, tan to light gray, CLAY, organics, brown mottling, chalky inclusions, slightly friable, (CL-CH), (FILL) -2 ft: contains approx. 30% dark brown fat clay (CH)		9.1							
	5		P 3		4.5+	63	Very stiff to hard, moist, brown to dark brown, CLAY, organics, trace fine gravel, iron oxide staining, iron oxidation staining, trace shell fragments, trace chalky inclusions, (CH), (FILL)		15.3							
655		■	ST 4		4.5+	67	Hard, dry, tan to gray, CLAY, organics, brown mottling, slightly friable, chalky inclusions, gypsum crystals in pockets and along seams, (CL-CH), (FILL)		14							
	10	☒	SS 5	4-7-9 (16)		72	-6 ft: Becomes dry to moist, tan to light gray, trace fine gravel (0.5 to 1 inch), trace black mottling, trace shell fragments -8.5 ft: Becomes moist, some subangular gravel (0.25 to 0.5 inch), increase in chalky inclusions, approximatley 30% dark brown fat clay		11.5							
650																
	15	■	ST 6		4.5+	88	-13.5 ft: No visible shell fragments, gravel, or chalky inclusions		19.3							
645																
	20		P 7		4.5+	79	-18 ft: Increased moisture, tan with light gray mottling, trace black specks		18.6							
640																
	25	☒	SS 8	4-10-12 (22)		100	Hard, moist, tan with light gray, CLAY, (CL-CH), (RESIDUUM)		17							
635																
	30	■	ST 9		4.5+	83	-Some gypsum crystals, (RESIDUUM)		19.2							
630																
	35		P 10		4.5+	83	-Inclined gypsum layer 0.5 to 1 inch thick, (RESIDUUM)		18.5							

(Continued Next Page)

PROJECT NAME: Plum FRS No. 2 Rehabilitation	**DATES DRILLED:** 1/7/20 - 1/7/20	**LOG NO: 015-19** PAGE 2 OF 2
PROJECT NO: 60615067	**SURFACE ELEVATION (ft):** 662.44	
LOCATION: Kyle, TX	**TOTAL DEPTH (ft):** 45	

ELEVATION (ft)	DEPTH (ft)	SOIL SAMPLES: SAMPLE SYMBOL	SAMPLE TYPE AND NUMBER	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	RECOVERY (%)	MATERIAL DESCRIPTION AND REMARKS	STRATIGRAPHY	LABORATORY TESTING RESULTS: Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	GRAVEL (%)	SAND (%)	FINES - Passing No. 200 Sieve (%)	CLAY - Passing 2 microns (%)
	35						Hard, moist, tan with light gray, CLAY, (CL-CH), (RESIDUUM) *(continued)*	▨								
625																
	40	▌	P 11		4.5+	83	-Inclined gypsum layer 0.25 to 0.5 inch thick, (RESIDUUM)	▨	12.3							
620																
	45	☒	SS 12	25-33-37 (70)		100	Hard, dry, gray with dark gray, CLAY, trace very fine crystals, (CL-CH), (RESIDUUM)	▨	20.6							

Bottom of hole at 45.0 feet.

PROJECT NAME: Plum FRS No. 2 Rehabilitation	**DATES DRILLED:** 1/3/20 - 1/3/20	**LOG NO: 101-19** PAGE 1 OF 1
PROJECT NO: 60615067	**SURFACE ELEVATION (ft):** 652.04	
LOCATION: Kyle, TX	**TOTAL DEPTH (ft):** 10	

DRILL COMPANY / DRILLER: Total Support Services / Chris Rios	**GROUNDWATER LEVELS:**	**LOGGED BY:** M. Lyons
DRILL EQUIP: CME 45b	**AT TIME OF:** --- Dry	**CHECKED BY:** L. Finnefrock
DRILL METHOD: Hollow Stem Auger	**AT END OF DRILLING** --- Dry	**HOLE LOCATION:** Borrow Area
BIT SIZE/TYPE: 7.5" OD Hollow Stem Auger	**AFTER DRILLING** --- Dry, caved at 6.1 ft (2pm)	**LATITUDE (deg) or NORTHING (ft):** 13908101.15(ft)
CASING DEPTH (ft bgs): N/A	**COMPLETION:** Cement Bentonite Grout	**LONGITUDE (deg) or EASTING (ft):** 2329792.804(ft)

ELEVATION (ft)	DEPTH (ft) 0	SOIL SAMPLES SAMPLE SYMBOL	SAMPLE TYPE AND NUMBER	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	RECOVERY (%)	MATERIAL DESCRIPTION AND REMARKS	STRATIGRAPHY	LABORATORY TESTING RESULTS Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	GRAVEL (%)	SAND (%)	FINES - Passing No. 200 Sieve (%)	CLAY - Passing 2 microns (%)
650			P 1		3.25	38	Moist, dark brown to black, high plasticity, CLAY, organics, trace fine to medium gravel, subrounded to subangular, calcite nodules increase towards base, (CH), (ALLUVIUM) Strong HCL reaction at 2 feet below ground surface	▨	22.1							
		☒	SS 2	3-5-6 (11)		94		▨	14.6		69	48			90.6	
	5		P 3			58	Hard, slightly moist, light brown to gray, silty to lean CLAY, calcite nodules, abundant iron towards base, (CL-ML), (RESIDUUM) Becomes dry, iron oxide staining, abundant calcite nodules	▨	11.5 25.6		90	63			91.8	
645		☒	SS 4	7-8-13 (21)		92		▨	6.2		39	20			33.3	
	10		P 5		4.25	63	Moist to slightly moist, light brown to orange, CLAY, strong HCL reaction, gray clay seams, abundant calcite nodules, (CL-ML), (RESIDUUM)	▨	12.4							

Bottom of hole at 10.0 feet. Bulk samples from auger cuttings collect as follows: 0'-5' (B-1), 5'-10' (B-2)

LOG NO: 102-19

PAGE 1 OF 1

PROJECT NAME: Plum FRS No. 2 Rehabilitation
PROJECT NO: 60615067
LOCATION: Kyle, TX
DATES DRILLED: 1/3/20 - 1/3/20
SURFACE ELEVATION (ft): 650.06
TOTAL DEPTH (ft): 10

DRILL COMPANY / DRILLER: Total Support Services / Chris Rios
DRILL EQUIP: CME 45b
DRILL METHOD: Hollow Stem Auger
BIT SIZE/TYPE: 7.5" OD Hollow Stem Auger
CASING DEPTH (ft bgs): N/A

GROUNDWATER LEVELS:
AT TIME OF: --- Dry
AT END OF DRILLING --- Dry
AFTER DRILLING --- Dry, no caving (2pm)
COMPLETION: Cement Bentonite Grout

LOGGED BY: M. Lyons
CHECKED BY: L. Finnefrock
HOLE LOCATION: Borrow Area
LATITUDE (deg) or NORTHING (ft): 13907928.75(ft)
LONGITUDE (deg) or EASTING (ft): 2329831.089(ft)

ELEVATION (ft)	DEPTH (ft)	SOIL SAMPLES					MATERIAL DESCRIPTION AND REMARKS	STRATIGRAPHY	LABORATORY TESTING RESULTS							
		SAMPLE SYMBOL	SAMPLE TYPE AND NUMBER	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	RECOVERY (%)			Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	GRAVEL (%)	SAND (%)	FINES - Passing No. 200 Sieve (%)	CLAY - Passing 2 microns (%)
650	0		P 1		3.0	67	Moist, dark brown to black, high plasticity, CLAY, much organics, fine to medium gravel, abundant calcite nodules, increase towards base, (CH), (ALLUVIUM)		18.4		59	37			89.9	
			SS 2	5-8-9 (17)		83	Dry to slightly moist, light brown, silty to lean CLAY, trace organics, abundant calcite nodules, trace black mineral flecks, (CL-ML), (RESIDUUM)		7.7							
645	5		ST 3		4.5+	83	Light brown to orange, silty CLAY, fine to coarse sand, fine to medium gravel, iron oxide staining, calcite nodules, (CL-ML), (RESIDUUM)		7.1	137.1	35	22			47.5	
			SS 4	5-6-7 (13)		100	Becomes dry to slightly moist, well graded		5							
	10		P 5		3.75	54	Moist, light brown to orange, medium plasticity, CLAY, iron oxide staining, gray clay veins, trace black mineral flecks, (CL-ML), (RESIDUUM)		21.5		65	45			98.7	

Bottom of hole at 10.0 feet. Bulk samples from auger cuttings collect as follows: 0'-3.5' (B-1), 3.5'-7.5' (B-2)

PROJECT NAME: Plum FRS No. 2 Rehabilitation	**DATES DRILLED:** 1/3/20 - 1/3/20	**LOG NO: 103-19** PAGE 1 OF 1
PROJECT NO: 60615067	**SURFACE ELEVATION (ft):** 647.13	
LOCATION: Kyle, TX	**TOTAL DEPTH (ft):** 10	

DRILL COMPANY / DRILLER: Total Support Services / Chris Rios	**GROUNDWATER LEVELS:**	**LOGGED BY:** M. Lyons
DRILL EQUIP: CME 45b	**AT TIME OF:** --- Dry	**CHECKED BY:** L. Finnefrock
DRILL METHOD: Hollow Stem Auger	**AT END OF DRILLING** --- Dry	**HOLE LOCATION:** Borrow Area
BIT SIZE/TYPE: 7.5" OD Hollow Stem Auger	**AFTER DRILLING** --- ????????	**LATITUDE (deg) or NORTHING (ft):** 13907727.03(ft)
CASING DEPTH (ft bgs): N/A	**COMPLETION:** Cement Bentonite Grout	**LONGITUDE (deg) or EASTING (ft):** 2329897.299(ft)

ELEVATION (ft)	DEPTH (ft)	SOIL SAMPLES					MATERIAL DESCRIPTION AND REMARKS	STRATIGRAPHY	LABORATORY TESTING RESULTS							
		SAMPLE SYMBOL	SAMPLE TYPE AND NUMBER	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	RECOVERY (%)			Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	GRAVEL (%)	SAND (%)	FINES - Passing No. 200 Sieve (%)	CLAY - Passing 2 microns (%)
	0		P 1		3.25	83	Moist, dark brown to black, CLAY, much organics, trace fine to medium gravel, strong HCL reaction, abundant calcite nodules, (CH), (ALLUVIUM)		21.5		77	52			90.8	
645			SS 2	4-5-5 (10)		89	Becomes slightly moist to dry		14.2							
	5		P 3		4.5+	88	Becomes hard Hard, dry to slightly moist, light brown to tan, silty CLAY, iron oxide staining, abundant calcite nodules, abundant black flecks, (CL-ML), (RESIDUUM)		15.9							
640			SS 4	8-10-14 (24)		100	Becomes very stiff, dry, fine to coarse subangular gravel, strong HCL reaction, well graded		6.3		32	19			58.5	
	10		P 5		4.5+	83	Hard, moist, light brown to orange, medium to high plasticity, CLAY, iron oxide staining, gray clay veins, (CL-CH), (RESIDUUM)		14							

Bottom of hole at 10.0 feet. Bulk samples from auger cuttings collect as follows: 0'-5' (B-1), 5'-10' (B-2)

PROJECT NAME: Plum FRS No. 2 Rehabilitation	**DATES DRILLED:** 1/3/20 - 1/3/20	**LOG NO: 104-19** PAGE 1 OF 1 AECOM
PROJECT NO: 60615067	**SURFACE ELEVATION (ft):** 651.25	
LOCATION: Kyle, TX	**TOTAL DEPTH (ft):** 10	

DRILL COMPANY / DRILLER: Total Support Services / Chris Rios	**GROUNDWATER LEVELS:**	**LOGGED BY:** M. Lyons
DRILL EQUIP: CME 45b	**AT TIME OF:** --- Dry	**CHECKED BY:** L. Finnefrock
DRILL METHOD: Hollow Stem Auger	**AT END OF DRILLING** --- Dry	**HOLE LOCATION:** Borrow Area
BIT SIZE/TYPE: 7.5" OD Hollow Stem Auger	**AFTER DRILLING** --- Dry, caved at 6.9 ft (2pm)	**LATITUDE (deg) or NORTHING (ft):** 13908031.91(ft)
CASING DEPTH (ft bgs): N/A	**COMPLETION:** Cement Bentonite Grout	**LONGITUDE (deg) or EASTING (ft):** 2329590.036(ft)

		SOIL SAMPLES							LABORATORY TESTING RESULTS							
ELEVATION (ft)	DEPTH (ft) 0	SAMPLE SYMBOL	SAMPLE TYPE AND NUMBER	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	RECOVERY (%)	MATERIAL DESCRIPTION AND REMARKS	STRATIGRAPHY	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	GRAVEL (%)	SAND (%)	FINES - Passing No. 200 Sieve (%)	CLAY - Passing 2 microns (%)
650			P 1		3.25	73	Dark brown to black, high plasticity, CLAY, much organics, trace fine to medium gravel, subrounded to subangular, increasing calcite nodules towards base, (CH), (ALLUVIUM)		29.7		62	45			94.7	
			SS 2	5-11-20 (31)		100	Grades to hard, slighly moist		14.9							
	5		P 3		4.5+	48	Very stiff, moist to slightly moist, light brown to gray, silty to lean CLAY, iron oxide staining, abundant calcite nodules, (CL-ML), (RESIDUUM)		14.9		51	32			95.7	
645			SS 4	6-5-11 (16)		100			14.9							
	10		P 5		4.25	63	Stiff, moist, light gray to orange, CLAY, trace medium gravel, iron oxide staining, subrounded, black mineral flecks, (CL-CH), (RESIDUUM)		16.5		51	33			92.5	

Bottom of hole at 10.0 feet. Bulk samples from auger cuttings collect as follows: 0'-6' (B-1), 6'-7.5' (B-2), 7.5'-10' (B-3)

AECOM-SMART-SOIL-LAB-ELEV_SOIL_PP+TV_GW - URS_DENVER STD US LAB.GDT - 5/26/21 17:27 - C:\USERS\LANCE.FINNEFROCK\ONEDRIVE - AECOM DIRECTORY\PROJECTS\TSSWCB - 5 DAMS\07. PLUM 2\01. FIELD & LAB\06. GINT LOGS\PLUM 2 LOGS_2021.

PROJECT NAME: Plum FRS No. 2 Rehabilitation	**DATES DRILLED:** 1/3/20 - 1/3/20	**LOG NO: 105-19** PAGE 1 OF 1
PROJECT NO: 60615067	**SURFACE ELEVATION (ft):** 649.55	
LOCATION: Kyle, TX	**TOTAL DEPTH (ft):** 10	

DRILL COMPANY / DRILLER: Total Support Services / Chris Rios	**GROUNDWATER LEVELS:**	**LOGGED BY:** M. Lyons
DRILL EQUIP: CME 45b	**AT TIME OF:** --- Dry	**CHECKED BY:** L. Finnefrock
DRILL METHOD: Hollow Stem Auger	**AT END OF DRILLING** --- Dry	**HOLE LOCATION:** Borrow Area
BIT SIZE/TYPE: 7.5" OD Hollow Stem Auger	**AFTER DRILLING** --- Dry, caved at 6.1 ft (2pm)	**LATITUDE (deg) or NORTHING (ft):** 13907862.12(ft)
CASING DEPTH (ft bgs): N/A	**COMPLETION:** Cement Bentonite Grout	**LONGITUDE (deg) or EASTING (ft):** 2329630.015(ft)

ELEVATION (ft)	DEPTH (ft)	SOIL SAMPLES					MATERIAL DESCRIPTION AND REMARKS	STRATIGRAPHY	LABORATORY TESTING RESULTS							
		SAMPLE SYMBOL	SAMPLE TYPE AND NUMBER	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	RECOVERY (%)			Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	GRAVEL (%)	SAND (%)	FINES - Passing No. 200 Sieve (%)	CLAY - Passing 2 microns (%)
	0		P 1		3.0	79	Moist to very moist, dark brown to black, high plasticity, CLAY, much organics, trace fine to medium gravel, subrounded to subangular, increasing calcite nodules towards base, (CH), (ALLUVIUM)	▨	16.5		59	36			92.1	
		☒	SS 2	5-7-9 (16)		44		▨	9.5							
645	5		P 3		4.5+	77	Slightly moist to dry, light brown to gray, silty to lean CLAY, iron oxide staining, abundant calcite nodules, trace black mineral flecks, (CL-ML), (RESIDUUM) Grades to trace coarse subrounded gravel, strong HCL reaction	▨	16.8							
		☒	SS 4	4-5-7 (12)		83		▨	12		52	33			91.2	
640	10		P 5		4.25	79	Moist, light brown to orange, CLAY, iron oxide staining, gray clay seams, trace black flecks, (CL-CH), (RESIDUUM)	▨	21.9							

Bottom of hole at 10.0 feet. Bulk samples from auger cuttings collect as follows: 0'-5' (B-1), 5'-10' (B-2)

PROJECT NAME: Plum FRS No. 2 Rehabilitation	**DATES DRILLED:** 1/3/20 - 1/3/20	**LOG NO: 106-19** PAGE 1 OF 1 AECOM
PROJECT NO: 60615067	**SURFACE ELEVATION (ft):** 647.79	
LOCATION: Kyle, TX	**TOTAL DEPTH (ft):** 10	

DRILL COMPANY / DRILLER: Total Support Services / Chris Rios	**GROUNDWATER LEVELS:**	**LOGGED BY:** M. Lyons
DRILL EQUIP: CME 45b	**AT TIME OF:** --- Dry	**CHECKED BY:** L. Finnefrock
DRILL METHOD: Hollow Stem Auger	**AT END OF DRILLING** --- Dry	**HOLE LOCATION:** Borrow Area
BIT SIZE/TYPE: 7.5" OD Hollow Stem Auger	**AFTER DRILLING** --- Dry, caved at 6.3 ft (2pm)	**LATITUDE (deg) or NORTHING (ft):** 13907684.33(ft)
CASING DEPTH (ft bgs): N/A	**COMPLETION:** Cement Bentonite Grout	**LONGITUDE (deg) or EASTING (ft):** 2329662.719(ft)

ELEVATION (ft)	DEPTH (ft)	SOIL SAMPLES: SAMPLE TYPE AND NUMBER	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	RECOVERY (%)	MATERIAL DESCRIPTION AND REMARKS	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	GRAVEL (%)	SAND (%)	FINES - Passing No. 200 Sieve (%)	CLAY - Passing 2 microns (%)
	0	P 1		4.5+	88	Dark brown to black, high plasticity, CLAY, much organics, trace coarse gravel, subrounded, (CH), (ALLUVIUM)	11.4		40	21	2	20.3	77.7	36.6
645		SS 2	8-21-20 (41)		83	Grades to light brown, finer gravel, abundant calcite nodules, strong HCL reaction	5.4							
	5	P 3			60	Dry, light brown to grayish white, silty CLAY, fine sand, iron oxide staining, abundant calcite nodules, (CL-ML), (RESIDUUM) Increasing medium to coarse, subrounded to subangular gravel with depth, well graded	21		69	46	3.4	21.1	75.5	42.6
640		SS 4	21-15-14 (29)		89	Grades to coarse gravel at 7.5 feet below ground surface, strong HCL reaction	2.9						18.7	
	10	P 5		4.25	79	Stiff, moist, light brown to tan, CLAY, iron oxide staining, gray clay seams, (CL-CH), (RESIDUUM)	24.7							

Bottom of hole at 10.0 feet. Bulk samples from auger cuttings collect as follows: 0'-2.5' (B-1), 2.5'-10' (B-2)

PROJECT NAME: Plum FRS No. 2 Rehabilitation	**DATES DRILLED:** 12/11/19 - 12/11/19	**LOG NO: 1301-19** PAGE 1 OF 1 AECOM
PROJECT NO: 60615067	**SURFACE ELEVATION (ft):** 648.46	
LOCATION: Kyle, TX	**TOTAL DEPTH (ft):** 10	

DRILL COMPANY / DRILLER: Total Support Services / Chris Rios	**GROUNDWATER LEVELS:**	**LOGGED BY:** M. Link
DRILL EQUIP: Hand auger	**AT TIME OF:** --- Dry	**CHECKED BY:** L. Finnefrock
DRILL METHOD: Hand Auger	**AT END OF DRILLING** --- Dry	**HOLE LOCATION:** Downstream Slope
BIT SIZE/TYPE: 3" OD Hand Auger	**AFTER DRILLING** ---	**LATITUDE (deg) or NORTHING (ft):** 13907145(ft)
CASING DEPTH (ft bgs): N/A	**COMPLETION:** Cement Bentonite Grout	**LONGITUDE (deg) or EASTING (ft):** 2330273(ft)

ELEVATION (ft)	DEPTH (ft)	SOIL SAMPLES					LABORATORY TESTING RESULTS							
	0	SAMPLE SYMBOL	SAMPLE TYPE AND NUMBER	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	RECOVERY (%)	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	GRAVEL (%)	SAND (%)	FINES - Passing No. 200 Sieve (%)	CLAY - Passing 2 microns (%)
		✋	GRAB 1		1.75 2	100	23.1		67	44			90.8	
645		✋	GRAB 2		4.5+	100	13.1						96.4	
	5	✋	GRAB 3		3 to 4.5+	100	14.9		51	34	0.2	2.9	96.9	66.2
		✋	GRAB 4		1.75 to 2.5	100	20.6				0.2	6.8	93	61.3
640	10	✋	GRAB 5		1.75 to 2.5	100	20.2		63	45			91.1	

MATERIAL DESCRIPTION AND REMARKS

Stiff, moist, light brown to dark brown, CLAY, organics, trace fine gravel, shell fragments, (CH), (FILL)

Stiff to very stiff, moist, tan to light gray, CLAY, trace organics, iron oxide staining, trace gray/black mottling, trace iron oxidation staining, (CL-CH), (FILL)
-2 ft: Becomes hard
-3.3 ft: More gray, calcareous nodules and chalky, trace gypsum crystals
-4 ft: Trace white fine gravel, trace calcareous nodules and gypsum crystals
-5 ft: 2 to 3 inch thick gray layer

Stiff to very stiff, moist, light gray to gray, CLAY, trace gray/black mottling, trace calcareous nodules, (CH), (FILL)
6.5 ft: Trace rounded fine gravel

Stiff to very stiff, moist, brown to gray, CLAY, subangular, trace subangular fine gravel and rounded medium gravel, trace calcareous nodules, trace shell fragments, (CH), (FILL)
Iron oxide staining, -8 ft: trace iron oxidation staining, pockets of hard tan-gray lean-fat clay, trace organics
Iron oxide staining, -8.5 ft: Becomes brown to dark brown
-9.5 ft: Becomes tan to light gray, gypsum crystals within light gray clay seam

Bottom of hole at 10.0 feet.

AECOM-SMART-SOIL-LAB-ELEV_SOIL_PP+TV_GW - URS_DENVER STD US LAB.GDT - 5/26/21 17:27 - C:\USERS\LANCE.FINNEFROCK\ONEDRIVE - AECOM DIRECTORY\PROJECTS\TSSWCB - 5 DAMS\07. PLUM 2\01. FIELD & LAB\06. GINT LOGS\PLUM 2 LOGS_2021.

PROJECT NAME: Plum FRS No. 2 Rehabilitation	**DATES DRILLED:** 12/11/19 - 12/11/19	**LOG NO: 1302-19** PAGE 1 OF 1 AECOM
PROJECT NO: 60615067	**SURFACE ELEVATION (ft):** 657.81	
LOCATION: Kyle, TX	**TOTAL DEPTH (ft):** 6.5	

DRILL COMPANY / DRILLER: Total Support Services / Chris Rios	**GROUNDWATER LEVELS:**	**LOGGED BY:** M. Link
DRILL EQUIP: Hand auger	**AT TIME OF:** --- Dry	**CHECKED BY:** L. Finnefrock
DRILL METHOD: Hand Auger	**AT END OF DRILLING** --- Dry	**HOLE LOCATION:** Upstream Slope
BIT SIZE/TYPE: 3" OD Hand Auger	**AFTER DRILLING** ---	**LATITUDE (deg) or NORTHING (ft):** 13907039(ft)
CASING DEPTH (ft bgs): N/A	**COMPLETION:** Cement Bentonite Grout	**LONGITUDE (deg) or EASTING (ft):** 2330083(ft)

		SOIL SAMPLES							LABORATORY TESTING RESULTS							
ELEVATION (ft)	DEPTH (ft)	SAMPLE SYMBOL	SAMPLE TYPE AND NUMBER	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	RECOVERY (%)	MATERIAL DESCRIPTION AND REMARKS	STRATIGRAPHY	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	GRAVEL (%)	SAND (%)	FINES - Passing No. 200 Sieve (%)	CLAY - Passing 2 microns (%)
	0	✋	GRAB 1		1.75 to 3.5	100	Moist, brown to dark brown, CLAY, organics, trace shell fragments, trace calcite nodules, trace tan-light gray zones, (CH), (FILL)	▨	18.9		51	32	0	6.2	93.8	49.3
655		✋	GRAB 2		3 to 4.5+	100	Moist, tan to light gray, CLAY, trace organics, subangular, trace fine subangular gravel, trace calcareous nodules and inclusions, dry silty inclusions, (CL-CH), (FILL)	▨	18.1		55	38	0	7.9	92.1	
	5	✋	GRAB 3		4.5+	100	Moist, dark brown to light gray, CLAY, organics, trace sand, trace fine gravel, iron oxide staining, trace iron oxidation staining, (CH), (FILL)	▧			56	34			90.3	
		✋	GRAB 4		3.5 to 4.5+	100	Dry to moist, white to tannish gray, CLAY, calcareous inclusions, (CL-CH), (FILL) -4.3 ft: Approximately 30% light gray lean-fat clay with organics, trace shale fragments	▧							98	
							Moist, tan to light gray, CLAY, calcareous nodules and inclusions, less silty, inclusions of gray to dark gray clay with calcite/gypsum crystals, no visible organics, (CL-CH), (FILL) -6 ft: trace orange nodules and inclusions, no visible crystals									

Bottom of hole at 6.5 feet.

PROJECT NAME: Plum FRS No. 2 Rehabilitation	**DATES DRILLED:** 9/3/20 - 9/3/20	**LOG NO: 1701-20** PAGE 1 OF 1 AECOM
PROJECT NO: 60615067	**SURFACE ELEVATION (ft):** 657.91	
LOCATION: Kyle, TX	**TOTAL DEPTH (ft):** 10	

DRILL COMPANY / DRILLER: Total Support Services / Tim	**GROUNDWATER LEVELS:**	**LOGGED BY:** M.Lyons
DRILL EQUIP: Hand auger	**AT TIME OF:** --- Dry	**CHECKED BY:** L. Finnefrock
DRILL METHOD: Hand Auger	**AT END OF DRILLING** --- Dry	**HOLE LOCATION:** Upstream Slope
BIT SIZE/TYPE: 3" OD Hand Auger	**AFTER DRILLING** ---	**LATITUDE (deg) or NORTHING (ft):** 13907764(ft)
CASING DEPTH (ft bgs): N/A	**COMPLETION:** Cement Bentonite Grout	**LONGITUDE (deg) or EASTING (ft):** 2330292(ft)

ELEVATION (ft)	DEPTH (ft)	SOIL SAMPLES					MATERIAL DESCRIPTION AND REMARKS	STRATIGRAPHY	LABORATORY TESTING RESULTS							
		SAMPLE SYMBOL	SAMPLE TYPE AND NUMBER	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	RECOVERY (%)			Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	GRAVEL (%)	SAND (%)	FINES - Passing No. 200 Sieve (%)	CLAY - Passing 2 microns (%)
	0	✋	GRAB 1			100	Stiff, dry, dark brown to black, CLAY, with abundant organics, trace calcareous nodules, (CH), (FILL)	▨	9.3		34	19				
655		✋	GRAB 2			100	Soft, dry, tan to brown, low plasticity, CLAY, (CL), (FILL)	▨	19.8							
	5	✋	GRAB 3			100	Stiff to medium stiff, moist, dark brown and black, high plasticity, CLAY, with trace fine grained gravel, trace calcareous nodules, abundant organics, (CH), (FILL) -3.5 to 4.5 ft: trace iron oxidation staining observed	▨	16.2							
650		✋	GRAB 4			100	Soft, moist, light brown to gray, medium plasticity, CLAY, with abundant iron oxidation staining, (CL-CH), (FILL)	▨	19.9		63	42				
		✋	GRAB 5			100	Soft, moist, light brownish orange with gray, CLAY, with abundant iron oxidation staining, trace calcareous nodules, (CH), (FILL)	▨	21.1							
	10	✋	GRAB 6			100	-9 ft: becomes olive gray, shale fragments at 10 ft	▨	23.2							

Bottom of hole at 10.0 feet.

PROJECT NAME: Plum FRS No. 2 Rehabilitation	**DATES DRILLED:** 9/3/20 - 9/3/20	**LOG NO: 1702-20** PAGE 1 OF 1 AECOM
PROJECT NO: 60615067	**SURFACE ELEVATION (ft):** 657.74	
LOCATION: Kyle, TX	**TOTAL DEPTH (ft):** 4.75	

DRILL COMPANY / DRILLER: Total Support Services / Tim	**GROUNDWATER LEVELS:**	**LOGGED BY:** M.Lyons
DRILL EQUIP: Hand auger	**AT TIME OF:** --- Dry	**CHECKED BY:** L. Finnefrock
DRILL METHOD: Hand Auger	**AT END OF DRILLING** --- Dry	**HOLE LOCATION:** Upstream Slope
BIT SIZE/TYPE: 3" OD Hand Auger	**AFTER DRILLING** ---	**LATITUDE (deg) or NORTHING (ft):** 13907667(ft)
CASING DEPTH (ft bgs): N/A	**COMPLETION:** Cement Bentonite Grout	**LONGITUDE (deg) or EASTING (ft):** 2330332(ft)

		SOIL SAMPLES							LABORATORY TESTING RESULTS							
ELEVATION (ft)	DEPTH (ft) 0	SAMPLE SYMBOL	SAMPLE TYPE AND NUMBER	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	RECOVERY (%)	MATERIAL DESCRIPTION AND REMARKS	STRATIGRAPHY	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	GRAVEL (%)	SAND (%)	FINES - Passing No. 200 Sieve (%)	CLAY - Passing 2 microns (%)
		✋	GRAB 1			100	Medium stiff to stiff, slightly moist, black, CLAY, with calcareous nodules, abundant organics, (CH), (FILL)	▨	15.3		57	35				
655		✋	GRAB 2			100	Stiff, slightly moist, tannish brown and black, CLAY, with trace organics, trace calcareous nodules, trace iron oxidation staining, trace fine grained gravel, (CL), (FILL)	▨	17.3							

Bottom of hole at 4.8 feet. Refusal at 4.75 ft

PROJECT NAME: Plum FRS No. 2 Rehabilitation	**DATES DRILLED:** 9/3/20 - 9/3/20	**LOG NO: 1703-20** PAGE 1 OF 1
PROJECT NO: 60615067	**SURFACE ELEVATION (ft):** 653.67	
LOCATION: Kyle, TX	**TOTAL DEPTH (ft):** 6.75	

DRILL COMPANY / DRILLER: Total Support Services / Tim	**GROUNDWATER LEVELS:**	**LOGGED BY:** M.Lyons
DRILL EQUIP: Hand auger	**AT TIME OF:** --- Dry	**CHECKED BY:** L. Finnefrock
DRILL METHOD: Hand Auger	**AT END OF DRILLING** --- Dry	**HOLE LOCATION:** Downstream Slope
BIT SIZE/TYPE: 3" OD Hand Auger	**AFTER DRILLING** ---	**LATITUDE (deg) or NORTHING (ft):** 13907897(ft)
CASING DEPTH (ft bgs): N/A	**COMPLETION:** Cement Bentonite Grout	**LONGITUDE (deg) or EASTING (ft):** 2330294(ft)

		SOIL SAMPLES							**LABORATORY TESTING RESULTS**								
ELEVATION (ft)	DEPTH (ft)	SAMPLE SYMBOL	SAMPLE TYPE AND NUMBER	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	RECOVERY (%)	**MATERIAL DESCRIPTION AND REMARKS**	STRATIGRAPHY	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	GRAVEL (%)	SAND (%)	FINES - Passing No. 200 Sieve (%)	CLAY - Passing 2 microns (%)
	0		GRAB 1			100	Stiff to medium stiff, dry, dark brown, CLAY, high plasticity, with abundant organics, (CH), (FILL)		18.3							
650			GRAB 2			100	Soft, slightly moist, light brown with gray, CLAY, with abundant iron oxidation staining, (CL-CH), (FILL)		19.1		56	36				
	5		GRAB 3			100	-4 ft: trace calcareous deposits		19							

Bottom of hole at 6.8 feet. Refusal at 6.75 ft

PROJECT NAME: Plum FRS No. 2 Rehabilitation	**DATES DRILLED:** 9/3/20 - 9/3/20	**LOG NO: 1704-20** PAGE 1 OF 1 AECOM
PROJECT NO: 60615067	**SURFACE ELEVATION (ft):** 653.64	
LOCATION: Kyle, TX	**TOTAL DEPTH (ft):** 10	

DRILL COMPANY / DRILLER: Total Support Services / Tim	**GROUNDWATER LEVELS:**	**LOGGED BY:** M.Lyons
DRILL EQUIP: Hand auger	**AT TIME OF:** --- Dry	**CHECKED BY:** L. Finnefrock
DRILL METHOD: Hand Auger	**AT END OF DRILLING** --- Dry	**HOLE LOCATION:** Downstream Slope
BIT SIZE/TYPE: 3" OD Hand Auger	**AFTER DRILLING** ---	**LATITUDE (deg) or NORTHING (ft):** 13907784(ft)
CASING DEPTH (ft bgs): N/A	**COMPLETION:** Cement Bentonite Grout	**LONGITUDE (deg) or EASTING (ft):** 2330340(ft)

		SOIL SAMPLES							LABORATORY TESTING RESULTS							
ELEVATION (ft)	DEPTH (ft)	SAMPLE SYMBOL	SAMPLE TYPE AND NUMBER	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	RECOVERY (%)	MATERIAL DESCRIPTION AND REMARKS	STRATIGRAPHY	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	GRAVEL (%)	SAND (%)	FINES - Passing No. 200 Sieve (%)	CLAY - Passing 2 microns (%)
	0	✋	GRAB 1			100	Stiff to medium stiff, slightly moist, brown to black, high plasticity, CLAY, with trace iron oxidation staining, abundant organics, (CH), (FILL)		17.9		51	33	0.4	10.5	89.1	59.1
650		✋	GRAB 2			100	Soft, light brown with gray, medium plasticity, CLAY, with trace iron oxidation staining, (CL-CH), (FILL)		18.8							
		✋	GRAB 3			100			19.1							
	5	✋	GRAB 4			100	Hard, slightly moist, olive gray, CLAY, shaley, high plasticity, with trace iron oxidation staining, trace calcareous nodules, (CH), (FILL) -4 ft: abundant calcareous deposits		20.7		67	43				
		✋	GRAB 5			100			19.8							
		✋	GRAB 6			100	Soft, slightly moist, light brown with gray, medium plasticity, CLAY, with abundant iron oxidation staining, trace black flecks, (CL-CH), (FILL) -6 ft: moist, gray clay seams, trace calcaerous deposits		23.8							
645		✋	GRAB 7			100										
		✋	GRAB 8			100			24.3							
	10	✋	GRAB 9			100	Soft, moist, light brown, high plasticity, CLAY, with abundant calcareous nodules, trace black flecks, (CH) (FILL)		18		52	35	0	11.5	88.5	56.4

Bottom of hole at 10.0 feet.

PROJECT NAME: Plum FRS No. 2 Rehabilitation	**DATES DRILLED:** 10/2/20 - 10/2/20	**LOG NO: 1705-20** PAGE 1 OF 1 AECOM
PROJECT NO: 60615067	**SURFACE ELEVATION (ft):** 654.07	
LOCATION: Kyle, TX	**TOTAL DEPTH (ft):** 10	

DRILL COMPANY / DRILLER: Total Support Services / Chester Westbrook	**GROUNDWATER LEVELS:**	**LOGGED BY:** M.Lyons
DRILL EQUIP: Hand auger	**AT TIME OF:** --- Dry	**CHECKED BY:** L. Finnefrock
DRILL METHOD: Hand Auger	**AT END OF DRILLING** --- Dry	**HOLE LOCATION:** Downstream Slope
BIT SIZE/TYPE: 3" OD Hand Auger	**AFTER DRILLING** ---	**LATITUDE (deg) or NORTHING (ft):** 13907686(ft)
CASING DEPTH (ft bgs): N/A	**COMPLETION:** Cement Bentonite Grout	**LONGITUDE (deg) or EASTING (ft):** 2330380(ft)

ELEVATION (ft)	DEPTH (ft)	SOIL SAMPLES					MATERIAL DESCRIPTION AND REMARKS	STRATIGRAPHY	LABORATORY TESTING RESULTS							
		SAMPLE SYMBOL	SAMPLE TYPE AND NUMBER	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	RECOVERY (%)			Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	GRAVEL (%)	SAND (%)	FINES - Passing No. 200 Sieve (%)	CLAY - Passing 2 microns (%)
	0		GRAB 1a				Soft, slightly moist, black brown, medium plasticity, CLAY, much organics, trace fine gravel, (CL-CH)	▧	13.9							
650			GRAB 1b				Soft, slightly moist, dark brown black, high plasticity, CLAY, trace organics, strong HCL reaction, (CH)	▨	23.2							
	5		GRAB 2				Soft, slightly moist, light brown with orange, medium plasticity, CLAY, trace iron, (CL-CH)	▧	22 20.4							
			GRAB 3				Soft, slightly moist, light brown with orange, medium plasticity, CLAY, with some stiff gray clay layers, trace iron, trace calcareous, (CL-CH)	▧	21.3							
645	10		GRAB 4				Soft, slightly moist, medium plasticity, CLAY, trace iron with gray clay seams, (CL-CH)	▧	23.8							

Bottom of hole at 10.0 feet.

PROJECT NAME: Plum FRS No. 2 Rehabilitation
DATES DRILLED: 12/31/19 - 12/31/19

LOG NO: 201-19

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PROJECT NO: 60615067
SURFACE ELEVATION (ft): 656.49

LOCATION: Kyle, TX
TOTAL DEPTH (ft): 25

DRILL COMPANY / DRILLER: Total Support Services / Chris Rios
GROUNDWATER LEVELS:
LOGGED BY: M. Lyons

DRILL EQUIP: CME 45b
AT TIME OF: --- Dry
CHECKED BY: L. Finnefrock

DRILL METHOD: Hollow Stem Auger
AT END OF DRILLING --- Dry
HOLE LOCATION: Auxiliary Spillway

BIT SIZE/TYPE: 7.5" OD Hollow Stem Auger
AFTER DRILLING --- Dry
LATITUDE (deg) or NORTHING (ft): 13908512.65(ft)

CASING DEPTH (ft bgs): N/A
COMPLETION: Cement Bentonite Grout
LONGITUDE (deg) or EASTING (ft): 2329836.552(ft)

ELEVATION (ft)	DEPTH (ft)	SOIL SAMPLES: SAMPLE TYPE AND NUMBER	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	RECOVERY (%)	MATERIAL DESCRIPTION AND REMARKS	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	GRAVEL (%)	SAND (%)	FINES - Passing No. 200 Sieve (%)	CLAY - Passing 2 microns (%)
655	0	P 1		2.5 4	73	Moist to very moist, dark brown to black, high plasticity, CLAY, much organics, trace fine gravel, (CH), (ALLUVIUM)	26.4							
		ST 2		4.5+	96	Slightly moist to moist, light brown to tan, CLAY, trace gravel, iron oxide staining, trace calcite at base, (CL-CH), (ALLUVIUM)	11.8	136.9	41	26	0.5	19.6	79.9	37
	5	SS 3	3-3-10 (13)		83	Dry, light brown to orange, silty CLAY, iron oxide staining, trace calcite nodules, (CL-ML), (RESIDUUM) Moist, dark brown to black, high plasticity, CLAY, much organics, (possilbe fall-in from 0' to 0.75'), (CH)	12		23	9			93	
650		P 4		4.5+	71	Light brown to tan, silty CLAY, trace coarse gravel, trace fine sand, subangular, sand is well-graded, gray clay veins, (CL-ML), (RESIDUUM)	19.7							
	10	SS 5	3-5-8 (13)		100	Moist, light brown to orange, medium plasticity, CLAY, iron oxide staining, gray clay seams, trace black flecks, (CL-CH), (RESIDUUM)	23.5							
645														
	15	ST 6		4.5+	81		17.8	128.1	60	31	0	2	98	47.8
640														
	20	P 7			79	Grades to trace calcite nodules	23.4							
635														
	25	SS 8	5-9-13 (22)		100	Light brown to tan, high plasticity, CLAY, iron oxide staining, gray clay veins, gypsum crystal layer at 17" in gray clay layer, (CH), (RESIDUUM)	21.7							

Bottom of hole at 25.0 feet.

PROJECT NAME: Plum FRS No. 2 Rehabilitation	**DATES DRILLED:** 12/30/19 - 12/30/19	**LOG NO: 202-19** PAGE 1 OF 1
PROJECT NO: 60615067	**SURFACE ELEVATION (ft):** 656.89	
LOCATION: Kyle, TX	**TOTAL DEPTH (ft):** 25	

DRILL COMPANY / DRILLER: Total Support Services / Chris Rios	**GROUNDWATER LEVELS:**	**LOGGED BY:** M. Lyons
DRILL EQUIP: CME 45b	**AT TIME OF:** --- Dry	**CHECKED BY:** L. Finnefrock
DRILL METHOD: Hollow Stem Auger	**AT END OF DRILLING** --- Dry	**HOLE LOCATION:** Auxiliary Spillway
BIT SIZE/TYPE: 7.5" OD Hollow Stem Auger	**AFTER DRILLING** --- Dry	**LATITUDE (deg) or NORTHING (ft):** 13908622.21(ft)
CASING DEPTH (ft bgs): N/A	**COMPLETION:** Cement Bentonite Grout	**LONGITUDE (deg) or EASTING (ft):** 2329966.202(ft)

ELEVATION (ft)	DEPTH (ft)	SOIL SAMPLES					MATERIAL DESCRIPTION AND REMARKS	STRATIGRAPHY	LABORATORY TESTING RESULTS							
		SAMPLE SYMBOL	SAMPLE TYPE AND NUMBER	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	RECOVERY (%)			Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	GRAVEL (%)	SAND (%)	FINES - Passing No. 200 Sieve (%)	CLAY - Passing 2 microns (%)
	0		P 1		3.5 4.5+	58	Moist, dark brown to black, high plasticity, CLAY, much organics, trace gravel, (CH), (ALLUVIUM)		21.5							
655			ST 2		4.5+	63	Moist to slightly moist, light brown to orange, silty to lean CLAY, some silt, iron oxide staining, abundant calcite nodules, (CL), (RESIDUUM) Becomes dry		11.4	134.6	24	9	0	18.7	81.3	27.2
	5		SS 3	4-10-12 (22)		100	Dry to slightly moist, light brown to grayish orange, silty CLAY, trace fine gravel, iron oxide staining, abundant calcite nodules, (ML), (RESIDUUM)		4.8							
650			P 4			63	Becomes slighty moist to moist, trace coarse gravel subrounded		10.5		30	18				
	10		ST 5		4.5+	69	Increase in clay content and gravel, well graded		16	137	48	20	3.4	29.6	67	37.2
645																
	15		SS 6	3-5-8 (13)		100	Stiff, moist, orange to gray, high plasticity, CLAY, iron oxide staining, gray clay veins, (CH), (RESIDUUM)		20.4							
640																
	20		P 7		4.5+	77	Light brown to gray, CLAY, iron oxide staining, trace black flecks, (CH), (RESIDUUM)		23.2		51	30				
635																
	25		SS 8	4-6-12 (18)		100	Dark brown to black, CLAY, iron oxide staining, trace black flecks, (CH), (RESIDUUM)		21.9							
							Very moist, light brown to orange, high plasticity, silty to lean CLAY, abundant gypsum crystals in soft gray clay layer, (CL), (RESIDUUM)									

Bottom of hole at 25.0 feet.

PROJECT NAME: Plum FRS No. 2 Rehabilitation
PROJECT NO: 60615067
LOCATION: Kyle, TX

DATES DRILLED: 12/30/19 - 12/30/19
SURFACE ELEVATION (ft): 656.91
TOTAL DEPTH (ft): 25

LOG NO: 203-19

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AECOM

DRILL COMPANY / DRILLER: Total Support Services / Chris Rios
DRILL EQUIP: CME 45b
DRILL METHOD: Hollow Stem Auger
BIT SIZE/TYPE: 7.5" OD Hollow Stem Auger
CASING DEPTH (ft bgs): N/A

GROUNDWATER LEVELS:
AT TIME OF: --- Dry
AT END OF DRILLING --- Dry
▼ **AFTER DRILLING** 18.40 ft / Elev 638.51 ft
COMPLETION: Cement Bentonite Grout

LOGGED BY: M. Lyons
CHECKED BY: L. Finnefrock
HOLE LOCATION: Auxiliary Spillway
LATITUDE (deg) or NORTHING (ft): 13908582.74(ft)
LONGITUDE (deg) or EASTING (ft): 2330174.125(ft)

ELEVATION (ft)	DEPTH (ft)	SOIL SAMPLES					MATERIAL DESCRIPTION AND REMARKS	STRATIGRAPHY	LABORATORY TESTING RESULTS							
		SAMPLE SYMBOL	SAMPLE TYPE AND NUMBER	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	RECOVERY (%)			Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	GRAVEL (%)	SAND (%)	FINES - Passing No. 200 Sieve (%)	CLAY - Passing 2 microns (%)
	0		P 1		4.25	42	Soft, moist, dark brown to black, high plasticity, CLAY, much organics, (CH), (ALLUVIUM)		23.5							
655			SS 2	7-12-16 (28)		94	Soft, moist to slightly moist, brown, CLAY, abundant calcite nodules, (CL-CH), (RESIDUUM)		18.9							
	5		ST 3		4.5+	42	Dry, light brown, CLAY, trace organics, abundant calcite nodules, (CL), (RESIDUUM) Trace organics at 3.5 feet below ground surface		8.5		32	18	0	18.6	81.4	35.1
650			P 4		1.5	46	Very soft, dry to slightly moist, light brown, poorly graded, silty SAND, coarse sand, fine gravel, breaks apart, little clay content, (SM), (RESIDUUM)		7.1 8.7	123.3	18	7			34.8	
	10		SS 5	5-10-10 (20)		100	Grades to trace calcite nodules.		11		NL	NP			46.8	
645																
	15		P 6		4.5+	69	Hard, moist, orange to gray, high plasticity, silty SAND, iron oxide staining, trace black specks, (CL-CH), (RESIDUUM)		10.8 21.1						66.9	
640							▼									
	20		SS 7	3-6-11 (17)		100	Increased iron staining towards base.		21.6						98.6	
635																
	25		ST 8		4.5+	90	Moist, orange to gray, high plasticity, CLAY, (CH), (RESIDUUM)				58	32	0	1.5	98.5	53

Bottom of hole at 25.0 feet.

AECOM-SMART-SOIL-LAB-ELEV_SOIL_PP+TV_GW - URS_DENVER STD US LAB.GDT - 5/26/21 17:27 - C:\USERS\LANCE.FINNEFROCK\ONEDRIVE - AECOM DIRECTORY\PROJECTS\TSSWCB - 5 DAMS\07. PLUM 2\01. FIELD & LAB\06. GINT LOGS\PLUM 2 LOGS_2021.

PROJECT NAME: Plum FRS No. 2 Rehabilitation	**DATES DRILLED:** 12/19/19 - 12/19/19	**LOG NO: 204-19** PAGE 1 OF 1
PROJECT NO: 60615067	**SURFACE ELEVATION (ft):** 651.26	
LOCATION: Kyle, TX	**TOTAL DEPTH (ft):** 25	

DRILL COMPANY / DRILLER: Total Support Services / Chris Rios	**GROUNDWATER LEVELS:**	**LOGGED BY:** M. Lyons
DRILL EQUIP: CME 45b	**AT TIME OF:** --- Dry	**CHECKED BY:** L. Finnefrock
DRILL METHOD: Hollow Stem Auger	**AT END OF DRILLING** --- Dry	**HOLE LOCATION:** Auxiliary Spillway
BIT SIZE/TYPE: 7.5" OD Hollow Stem Auger	▼ **3hrs AFTER DRILLING** 23.05 ft / Elev 628.21 ft	**LATITUDE (deg) or NORTHING (ft):** 13908508.91(ft)
CASING DEPTH (ft bgs): N/A	**COMPLETION:** Cement Bentonite Grout	**LONGITUDE (deg) or EASTING (ft):** 2330413.214(ft)

ELEVATION (ft)	DEPTH (ft)	SOIL SAMPLES					MATERIAL DESCRIPTION AND REMARKS	STRATIGRAPHY	LABORATORY TESTING RESULTS							
		SAMPLE SYMBOL	SAMPLE TYPE AND NUMBER	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	RECOVERY (%)			Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	GRAVEL (%)	SAND (%)	FINES - Passing No. 200 Sieve (%)	CLAY - Passing 2 microns (%)
650	0		P 1		4.5+	53	Moist, dark brown to black, CLAY, trace coarse gravel, trace organics, subrounded to subangular, (CL-CH), (ALLUVIUM)		23.3 10.9							
			ST 2		4.5+	48	Dry to moist, brown to tan, CLAY, trace organics, fine gravel, subrounded to subangular, gradually graded down, layer with possible gypsum or calcite nodules, (CL-CH), (RESIDUUM)		8.1 20	125.7	25	8	1.5	29.3	69.2	36.3
	5		SS 3	5-14-14 (28)		100	Hard, dry, brown to tannish orange, CLAY, trace organics, fine gravel, (CL-CH), (RESIDUUM)		6.8							
645			P 4		3.5	50	Very stiff, moist, dark brown to black, CLAY, trace organics, (CL-CH), (RESIDUUM)		22.4		68	46				
							Stiff, dry, orange to light tan, silty CLAY, (CL-ML), (RESIDUUM)		14.7							
			SS 5	2-5-8 (13)		100	Medium stiff, moist, dark brown to black, CLAY, trace organics, (CL-CH), (RESIDUUM)		9.2 19.5							
640	10						Soft, dry to moist, light brown to tan, CLAY, much coarse gravel, subrounded to subangular, fine white nodules, (CL-CH), (RESIDUUM)									
	15		ST 6		4.5+	100	Moist, brown to orange, CLAY, much fine gravel, iron oxide staining, black flecks, (CL-CH), (RESIDUUM) Iron oxide staining and gray clay veins at 13 feet below ground surface.		18.3	131.1	50	28	0	2.2	97.8	61
635																
	20		P 7		4.5+	85	Hard, moist, orangeish yellow to light tan, CLAY, iron oxide staining, trace soft gray clay veins, (CL-CH), (RESIDUUM)		20.8							
630							▼									
	25		SS 8	5-10-17 (27)		100	Very stiff, moist, orange to light tan, CLAY, abundant gypsum crystals within soft gray clay veins, (CL-CH), (RESIDUUM)									

Bottom of hole at 25.0 feet.

PROJECT NAME: Plum FRS No. 2 Rehabilitation	**DATES DRILLED:** 12/18/19 - 12/18/19	**LOG NO: 205-19** PAGE 1 OF 1 AECOM
PROJECT NO: 60615067	**SURFACE ELEVATION (ft):** 644.35	
LOCATION: Kyle, TX	**TOTAL DEPTH (ft):** 25	

DRILL COMPANY / DRILLER: Total Support Services / Chris Rios	**GROUNDWATER LEVELS:**	**LOGGED BY:** M. Lyons
DRILL EQUIP: CME 45b	**AT TIME OF:** --- Dry	**CHECKED BY:** L. Finnefrock
DRILL METHOD: Hollow Stem Auger	**AT END OF DRILLING** --- Dry	**HOLE LOCATION:** Auxiliary Spillway
BIT SIZE/TYPE: 7.5" OD Hollow Stem Auger	**AFTER DRILLING** --- Dry	**LATITUDE (deg) or NORTHING (ft):** 13908420.58(ft)
CASING DEPTH (ft bgs): N/A	**COMPLETION:** Cement Bentonite Grout	**LONGITUDE (deg) or EASTING (ft):** 2330663.997(ft)

ELEVATION (ft)	DEPTH (ft)	SOIL SAMPLES					MATERIAL DESCRIPTION AND REMARKS	STRATIGRAPHY	LABORATORY TESTING RESULTS							
	0	SAMPLE SYMBOL	SAMPLE TYPE AND NUMBER	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	RECOVERY (%)			Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	GRAVEL (%)	SAND (%)	FINES - Passing No. 200 Sieve (%)	CLAY - Passing 2 microns (%)
			P 1		4.5+	44	Very stiff, moist to dry, dark gray, CLAY, much gravel, subrounded to subangular, slight transition to brown at 9.5 inches, (CL-CH), (ALLUVIUM)		23.1		53	32				
			SS 2	9-10-11 (21)		81	Stiff, dry, yellowish orange, CLAY, much gravel, subrounded to subangular, trace black specks at base, (CL-CH), (RESIDUUM)		11.7							
640	5		P 3		4.5+	40	Very stiff, moist to dry, dark brown, CLAY, trace organics, trace gravel, subrounded, possible calcite nodules; uneven contact between brown and gray layer, (CL-CH), (RESIDUUM)		19.3 16.9							
			SS 4	5-8-9 (17)		100	Grades to yellowish-orange, increase in gravel		19.2							
							Large gravel piece at 4.5 feet below ground surface									
635	10		ST 5		4.5+	86	Light gray clay layer, intermixed, trace gypsum towards base		20.6	125.5	54	30	0	1.9	98.1	66.3
							Very stiff, moist to dry, orange to yellow, CLAY, (CL-CH), (RESIDUUM)									
630	15		P 6		4.5+	92	Moist, light brown to gray, CLAY, iron oxide staining, nodules towards base, massive iron staining midway through around 13 inches, erroding nodule, (CL-CH), (RESIDUUM)		21.7							
625	20		SS 7	3-6-9 (15)		100	Stiff, moist, yellowish orange to brown, medium plasticity, CLAY, iron oxide staining, (CL-CH), (RESIDUUM)		22.7							
620	25		ST 8		4.5+	66	Hard, yellowish orange to brown, CLAY, gray clay vein containing gypsum crystals, (CL-CH), (RESIDUUM)		21.6							

Bottom of hole at 25.0 feet.

PROJECT NAME: Plum FRS No. 2 Rehabilitation	**DATES DRILLED:** 1/2/20 - 1/2/20	**LOG NO: 206-19** PAGE 1 OF 1 AECOM
PROJECT NO: 60615067	**SURFACE ELEVATION (ft):** 656.55	
LOCATION: Kyle, TX	**TOTAL DEPTH (ft):** 25	

DRILL COMPANY / DRILLER: Total Support Services / Chris Rios	**GROUNDWATER LEVELS:**	**LOGGED BY:** M. Lyons
DRILL EQUIP: CME 45b	**AT TIME OF:** --- Dry	**CHECKED BY:** L. Finnefrock
DRILL METHOD: Hollow Stem Auger	**AT END OF DRILLING** --- Dry	**HOLE LOCATION:** Auxiliary Spillway
BIT SIZE/TYPE: 7.5" OD Hollow Stem Auger	**AFTER DRILLING** --- Dry	**LATITUDE (deg) or NORTHING (ft):** 13908395.25(ft)
CASING DEPTH (ft bgs): N/A	**COMPLETION:** Cement Bentonite Grout	**LONGITUDE (deg) or EASTING (ft):** 2329905.22(ft)

ELEVATION (ft)	DEPTH (ft)	SOIL SAMPLES: SAMPLE SYMBOL	SAMPLE TYPE AND NUMBER	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	RECOVERY (%)	MATERIAL DESCRIPTION AND REMARKS	STRATIGRAPHY	LABORATORY TESTING RESULTS: Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	GRAVEL (%)	SAND (%)	FINES - Passing No. 200 Sieve (%)	CLAY - Passing 2 microns (%)
655	0		P 1		3.5	79	Moist to very moist, dark brown to black, high plasticity, CLAY, much organics, much fine gravel, increase abundant calcite nodules at base, (CH), (ALLUVIUM)		19.4							
			SS 2	9-16-17 (33)		100	Light brown to orange, CLAY, iron oxide staining, (CL-CH), (RESIDUUM)		4.3		68	45				
							Hard, dark brown to tan, much medium to coarse gravel, abundant calcite nodules		14.2 5.2							
	5		P 3			48	Dry, light brown to tan, well graded, silty CLAY, much gravel, fine sand, iron oxide staining, subrounded to subangular, abundant calcite nodules, (ML), (RESIDUUM)		19.7 8.9	139.3	NL	NP			17.7	
650			SS 4	15-19-16 (35)		100	Moist, dark brown to black, high plasticity, CLAY, trace organics, trace fine to medium gravel, (CH), (RESIDUUM)		5.8						23.5	
	10		ST 5		4.5+	77	Dry, light brown to tan, well graded, silty SAND, crumbly, trace calcite nodules, (SM), (RESIDUUM) Grades to poorly graded, iron oxide staining		24.9	126.3	67	43	0	2.1	97.9	73.2
645							Moist, light brown to orange, medium plasticity, CLAY, iron oxide staining, (CL-CH), (RESIDUUM)									
	15		P 6		4.5+	92	Hard, moist, light brown to orange, medium plasticity, CLAY, iron oxide staining, gray clay seams, trace black flecks, (CL-CH), (RESIDUUM)		23.5							
640																
	20		ST 7			92	Hard, moist, light brown to orange, medium plasticity, CLAY, gray clay seams, trace black flecks, (CL-CH), (RESIDUUM)		22.5	126.3	57	34	0	0.9	99.1	65.6
635																
	25		SS 8	4-7-11 (18)		100	Very stiff, moist, light brown to orange, medium to high plasticity, CLAY, gray clay seams, trace black flecks, (CL-CH), (RESIDUUM)		23.5							

Bottom of hole at 25.0 feet.

PROJECT NAME: Plum FRS No. 2 Rehabilitation

PROJECT NO: 60615067

LOCATION: Kyle, TX

DATES DRILLED: 12/31/19 - 12/31/19

SURFACE ELEVATION (ft): 658.83

TOTAL DEPTH (ft): 35

LOG NO: 207-19

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AECOM

DRILL COMPANY / DRILLER: Total Support Services / Chris Rios

DRILL EQUIP: CME 45b

DRILL METHOD: Hollow Stem Auger

BIT SIZE/TYPE: 7.5" OD Hollow Stem Auger

CASING DEPTH (ft bgs): N/A

GROUNDWATER LEVELS:

AT TIME OF: --- Dry

AT END OF DRILLING --- Dry

AFTER DRILLING --- Dry

COMPLETION: Cement Bentonite Grout

LOGGED BY: M. Lyons

CHECKED BY: L. Finnefrock

HOLE LOCATION: Auxiliary Spillway

LATITUDE (deg) or NORTHING (ft): 13908502.94(ft)

LONGITUDE (deg) or EASTING (ft): 2330037.576(ft)

ELEVATION (ft)	DEPTH (ft)	SOIL SAMPLES					MATERIAL DESCRIPTION AND REMARKS	STRATIGRAPHY	LABORATORY TESTING RESULTS							
		SAMPLE SYMBOL	SAMPLE TYPE AND NUMBER	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	RECOVERY (%)			Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	GRAVEL (%)	SAND (%)	FINES - Passing No. 200 Sieve (%)	CLAY - Passing 2 microns (%)
	0		P 1		3.5	52	Medium stiff, moist, dark brown to black, high plasticity, CLAY, much organics, trace fine gravel, subrounded, grades toward coarser gravel at last 0.5 inch, (CH), (ALLUVIUM)		13.5							
655			ST 2		4.5+	50	Hard, slightly moist to dry, light brown to white, CLAY, trace coarse gravel, subrounded to subangular, calcite present, low clay content more chalk, (CH), (ALLUVIUM)		12.6	131.1	33	16	14.9	38.9	46.2	35.3
	5		SS 3	5-13-13 (26)		83	Dark brown to black, high plasticity, CLAY, trace gravel, trace organics, (CH), (RESIDUUM)		21.36							
			P 4		4.5+	44	Very stiff, dry, light brown to white, well graded, silty CLAY, fine sand, fine to coarse gravel, iron oxide staining, abundant calcite, (ML), (RESIDUUM)		8.5	133.6	35	20				
650	10		SS 5	4-8-9 (17)		100	Increase in subrounded to subangular, coarse gravel Very moist, light brown to tan, high plasticity, silty CLAY, trace gravel, iron oxide staining, subrounded, trace calcite nodules, (CL-ML), (RESIDUUM)		12.2		37	23				
645	15		P 6		4.5+	92	Hard, moist, light brown to orange, medium plasticity, CLAY, iron oxide staining, gray clay veins intermixed, (CL-CH), (RESIDUUM)		21							
640	20		ST 7		4.5+	123	Hard, moist, light brown to orange, medium plasticity, CLAY, iron oxide staining, gray clay veins intermixed, (CL-CH), (RESIDUUM)		22.1	128	55	29	0	1.1	98.9	64.8
635	25		SS 8	4-8-12 (20)		100	Very stiff, moist, light brown to orange, Becomes very stiff, high plasticity, trace black flecks, (CH), (RESIDUUM)		21.2							
630	30		P 9		4.5+	96	Very stiff, light brown to orange, Gypsum crystal seams in gray clay layer at 28 feet below ground surface, (CH), (RESIDUUM)		21.4							
625	35		ST 10		4.5+	94	Very stiff, moist, Grades to light brown to tan, (CL-CH), (RESIDUUM)		20.3							

Bottom of hole at 35.0 feet.

PROJECT NAME: Plum FRS No. 2 Rehabilitation
DATES DRILLED: 12/30/19 - 12/30/19
PROJECT NO: 60615067
SURFACE ELEVATION (ft): 654.77
LOCATION: Kyle, TX
TOTAL DEPTH (ft): 25

LOG NO: 208-19

PAGE 1 OF 1

DRILL COMPANY / DRILLER: Total Support Services / Chris Rios
GROUNDWATER LEVELS:
LOGGED BY: M. Lyons
DRILL EQUIP: CME 45b
AT TIME OF: --- Dry
CHECKED BY: L. Finnefrock
DRILL METHOD: Hollow Stem Auger
AT END OF DRILLING --- Dry
HOLE LOCATION: Auxiliary Spillway
BIT SIZE/TYPE: 7.5" OD Hollow Stem Auger
▼ **AFTER DRILLING** 20.90 ft / Elev 633.87 ft
LATITUDE (deg) or NORTHING (ft): 13908436.88(ft)
CASING DEPTH (ft bgs): N/A
COMPLETION: Cement Bentonite Grout
LONGITUDE (deg) or EASTING (ft): 2330234.091(ft)

ELEVATION (ft)	DEPTH (ft)	SOIL SAMPLES					MATERIAL DESCRIPTION AND REMARKS	STRATIGRAPHY	LABORATORY TESTING RESULTS							
		SAMPLE SYMBOL	SAMPLE TYPE AND NUMBER	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	RECOVERY (%)			Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	GRAVEL (%)	SAND (%)	FINES - Passing No. 200 Sieve (%)	CLAY - Passing 2 microns (%)
	0		P 1		4.0 4.5+	58	Moist, dark brown to black, CLAY, much organics, trace gravel, (CH), (ALLUVIUM)		22 13.9							
			ST 2		4.5+	46	Slightly moist, light brown to gray, CLAY, trace organics, trace gravel, subangular, abundant calcite, trace black specks, (CL-CH), (ALLUVIUM)		10.2	125.3	29	16	0.2	19.1	80.7	37.9
							Hard, light brown to gray, CLAY, trace organics, iron oxide staining, abundant calcite, (CL-CH), (RESIDUUM)									
650	5		SS 3	5-11-14 (25)		100	Very stiff, moist, dark brown to black, high plasticity, CLAY, much coarse gravel, (possible fall-in from 0' to 0.75'), (CH)		15.4 8.3							
			P 4		4.5+	92	Very stiff, slightly moist to dry, light brown to orange, CLAY, much fine gravel, much coarse sand, iron oxide staining, subrounded to subangular, abundant calcite, (CL-CH), (RESIDUUM)		13.8	133.4	39	24			75.8	
			SS 5	5-8-12 (20)		28	Stiff, moist to very moist, orange to brown, sandy CLAY, trace gravel, iron oxide staining, abundant calcite, sand is well-graded, (CL), (RESIDUUM)		13.5		25	15				
645	10						Moist, light brown to orange, CLAY, subrounded, trace black specks, trace HCL reaction, (CL), (RESIDUUM)									
640	15		ST 6		4.5+	81	Very stiff, brown to gray, medium plasticity, CLAY, strong HCL reaction, iron oxide staining, (CL-CH), (RESIDUUM)		21.1	124.8	59	36	1.6	10.6	87.8	42.4
635	20		P 7		4.5+	83	▼		20							
630	25		SS 8	5-9-14 (23)		100	Stiff, moist, light brown to gray, CLAY, iron oxide staining, abundant gypsum, (CL-CH), (RESIDUUM)		19.2 20.3							

Bottom of hole at 25.0 feet.

PROJECT NAME: Plum FRS No. 2 Rehabilitation
DATES DRILLED: 12/19/19 - 12/19/19
PROJECT NO: 60615067
SURFACE ELEVATION (ft): 648.34
LOCATION: Kyle, TX
TOTAL DEPTH (ft): 25

LOG NO: 209-19

PAGE 1 OF 1

AECOM

DRILL COMPANY / DRILLER: Total Support Services / Chris Rios
GROUNDWATER LEVELS:
LOGGED BY: M. Lyons
DRILL EQUIP: CME 45b
AT TIME OF: --- Dry
CHECKED BY: L. Finnefrock
DRILL METHOD: Hollow Stem Auger
▼ **AT END OF DRILLING** 21.40 ft / Elev 626.94 ft
HOLE LOCATION: Auxiliary Spillway
BIT SIZE/TYPE: 7.5" OD Hollow Stem Auger
▽ **AFTER DRILLING** 8.80 ft / Elev 639.54 ft
LATITUDE (deg) or NORTHING (ft): 13908357.77(ft)
CASING DEPTH (ft bgs): N/A
COMPLETION: Cement Bentonite Grout
LONGITUDE (deg) or EASTING (ft): 2330479.623(ft)

ELEVATION (ft)	DEPTH (ft)	SOIL SAMPLES: SAMPLE SYMBOL	SOIL SAMPLES: SAMPLE TYPE AND NUMBER	SOIL SAMPLES: BLOW COUNTS (N VALUE)	SOIL SAMPLES: POCKET PEN (tsf)	SOIL SAMPLES: RECOVERY (%)	MATERIAL DESCRIPTION AND REMARKS	STRATIGRAPHY	LABORATORY TESTING RESULTS: Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	GRAVEL (%)	SAND (%)	FINES - Passing No. 200 Sieve (%)	CLAY - Passing 2 microns (%)
	0		P 1		3.5	46	Moist, dark brown to black, CLAY, trace gravel, subrounded, (CL-CH), (ALLUVIUM) Grades to moist to dry, light brown to tan, trace organics and iron oxide staining		25.3 15.8							
645			SS 2	5-8-10 (18)		83	Very stiff, white, much coarse gravel, subrounded to subangular, possible calcite nodules, increasing coarse gravel towards base, drier towards base, (CL-CH), (RESIDUUM)		6.6							
	5		P 3		4.5+	48	Moist, dark brown to black, high plasticity, CLAY, (possible fall-in from 0' to 2'), (CH)		21.2 17.5							
			ST 4		4.5+	64	Moist, orange to yellow, CLAY, much coarse gravel, subrounded to subangular, trace black specks, (CL-CH), (RESIDUUM)		22	127.6	61	39	0	1.1	98.9	72.1
640			SS 5	3-5-9 (14)		100	▽ -Abundant coarse gravel at top of ST-4 and trace gravel towards base -8 ft: light gray mottling, iron oxide staining		20.2							
	10															
635																
	15		P 6		4.5+	92	Very stiff, moist, light brown to tan, CLAY, iron oxide staining, (CL-CH), (RESIDUUM) -Iron staining towards bottom of sample P-6		21.5							
630																
	20		ST 7		4.5+	114			21.7	129.1	62	40	0	3.3	96.7	60
							▼									
625																
	25		SS 8	5-9-14 (23)		100	Very stiff, moist, yellowish orange to light brown, CLAY, (CL-CH), (RESIDUUM) -23.9 ft: becomes gray with abundant gypsum crystals, gypsum in interlayered gray veins		22.7							

Bottom of hole at 25.0 feet.

PROJECT NAME: Plum FRS No. 2 Rehabilitation
DATES DRILLED: 12/9/19 - 12/9/19
PROJECT NO: 60615067
SURFACE ELEVATION (ft): 635.74
LOCATION: Kyle, TX
TOTAL DEPTH (ft): 25

LOG NO: 210-19

PAGE 1 OF 1

AECOM

DRILL COMPANY / DRILLER: Total Support Services / Chris Rios
GROUNDWATER LEVELS:
LOGGED BY: M. Link
DRILL EQUIP: CME 45b
AT TIME OF: --- Dry
CHECKED BY: S. Whipke
DRILL METHOD: Hollow Stem Auger
AT END OF DRILLING --- Dry
HOLE LOCATION: Auxiliary Spillway
BIT SIZE/TYPE: 7.5" OD Hollow Stem Auger
AFTER DRILLING --- 13.6
LATITUDE (deg) or NORTHING (ft): 13908271.89(ft)
CASING DEPTH (ft bgs): N/A
COMPLETION: Cement Bentonite Grout
LONGITUDE (deg) or EASTING (ft): 2330732.068(ft)

ELEVATION (ft)	DEPTH (ft)	SOIL SAMPLES					MATERIAL DESCRIPTION AND REMARKS	STRATIGRAPHY	LABORATORY TESTING RESULTS							
		SAMPLE SYMBOL	SAMPLE TYPE AND NUMBER	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	RECOVERY (%)			Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	GRAVEL (%)	SAND (%)	FINES - Passing No. 200 Sieve (%)	CLAY - Passing 2 microns (%)
635	0		P 1		2.5	63	Very stiff, moist, light brown to dark brown, CLAY, with sand, some fine to coarse gravel, with organics, trace inclusions of tan to light gray CH, trace shell fragments, gravel is subangular, (CH), (ALLUVIUM)		20.3	129.4	53	32			71.8	
			SS 2	6-5-10 (15)		64	Very stiff to hard, moist, gray with tan, gravelly CLAY, trace iron oxidation staining, trace black mottling and chalky inclusions, trace black specks, chert fragment at 2', (CL-CH), (RESIDUUM) -4 ft: Grades to hard, moist to dry, calcareous striations, gray mottling, burnt orange pockets, calcite nodules		28.2							
630	5		P 3		4.5+	75			15.2							
			P 4		4.5+	92	Hard, moist to dry, light gray to tan, CLAY, black specks, oxidation stains, brown-black partings, silica veins, slightly friable, (CL-CH), (RESIDUUM) -8 ft: brown-black partings, black specks, iron oxidation staining, silica veins		19.1							
625	10		ST 5		4.5+	67			17.8	132.4	60	38	0	3.1	96.9	65.2
620	15		SS 6	3-5-10 (15)		100	-13.5 to 14 ft: Trace calcite crystals -14 to 15 ft: Seams of gray-white calcite crystals every 3" to 4"		20.6							
615	20		ST 7		4.5+	102	-18 ft: slightly less hard than above		22.4	127	52	23	0	1.9	98.1	57
	25		SS 8	5-17-22 (39)		100	Hard, moist to dry, gray to dark gray, silty CLAY, slightly powdery, alternating seams of tan and light gray clay every 4"-6", less gypsum, (CL-CH), (RESIDUUM)		18.5							

Bottom of hole at 25.0 feet.

PROJECT NAME: Plum FRS No. 2 Rehabilitation	**DATES DRILLED:** 1/9/20 - 1/9/20	**LOG NO: 304-19** PAGE 1 OF 1 AECOM
PROJECT NO: 60615067	**SURFACE ELEVATION (ft):** 646.38	
LOCATION: Kyle, TX	**TOTAL DEPTH (ft):** 35	

DRILL COMPANY / DRILLER: Total Support Services / Chris Rios	**GROUNDWATER LEVELS:**	**LOGGED BY:** M. Link
DRILL EQUIP: CME 45b	**AT TIME OF:** --- Dry	**CHECKED BY:** L. Finnefrock
DRILL METHOD: Hollow Stem Auger	**AT END OF DRILLING** --- Dry	**HOLE LOCATION:** Principal Spillway
BIT SIZE/TYPE: 7.5" OD Hollow Stem Auger	**AFTER DRILLING** ---	**LATITUDE (deg) or NORTHING (ft):** 13907231.85(ft)
CASING DEPTH (ft bgs): N/A	**COMPLETION:** Cement Bentonite Grout	**LONGITUDE (deg) or EASTING (ft):** 2330214.104(ft)

ELEVATION (ft)	DEPTH (ft)	SOIL SAMPLES					MATERIAL DESCRIPTION AND REMARKS	STRATIGRAPHY	LABORATORY TESTING RESULTS							
		SAMPLE SYMBOL	SAMPLE TYPE AND NUMBER	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	RECOVERY (%)			Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	GRAVEL (%)	SAND (%)	FINES - Passing No. 200 Sieve (%)	CLAY - Passing 2 microns (%)
645	0		P 1		1.5 4.5+	56	Stiff, moist, brown to dark brown, CLAY, organics, trace fine gravel, iron oxide staining, trace shell fragments, 1-2cm gravel, (CH), (FILL)		23.8 18.4	116.2					93.9	
			SS 2	4-4-6 (10)		100	Hard, moist, tan to light gray, CLAY, trace organics, iron oxide staining, trace black smudges/pockets, (CL-CH), (FILL) Grades to trace gravel, trace brown striations		13.7 14.9							
640	5		P 3		3.5	67	Trace gravel, iron oxide staining, rounded, brown to dark brown CH with pockets of tan to light gray CL-CH, (CH), (FILL)		22.1	118.1			0.2	6.2	93.6	60.7
			ST 4		4.5+	50	Very stiff, moist, brown to dark brown, CLAY, trace calcite pockets, (CH), (FILL)		24.3	122.9	76	55			91	
	10		SS 5	2-3-5 (8)		100	Hard, tan to light gray, CLAY, more black specks, trace gray CL-CH layer, (CL-CH), (FILL) Grades to iron oxide staining, gray pockets (size of a quarter), trace gray/brown spots		20							
635							Very stiff, moist, tan to light gray, CLAY, trace fine gravel, trace organics, subangular, trace black specks and pockets, trace iron striations, trace shell fragments, trace gray pockets, trace calcite nodules, (CL-CH), (FILL)									
	15		P 6		1.5	75	Soft, CLAY, iron oxide staining, 2-inch thick layer of gray to dark gray clay with shell fragments, (CL-CH), (FILL)		27.4	120.6			0.4	4.7	94.9	59.5
630																
	20		ST 7		3	58	Very stiff, moist, dark gray, CLAY, trace fine gravel, rounded to angular, 1/4-1 inch gravel, shell fragments, trace burnt orange pockets, trace black specks, trace calcite nodules, trace tan pockets, (CH), (ALLUVIUM)		20	121.6	80	59			97.5	
625																
	25		SS 8	2-5-8 (13)		83	Very stiff, moist, brown to dark brown, CLAY, trace fine gravel, iron oxide staining, white specks, trace shell fragments, (CH), (RESIDUUM)		20							
620							Very stiff, moist, tan to light gray, CLAY, trace fine gravel, heavy black mottling, trace calcite nodules, (CL-CH), (RESIDUUM)									
	30		ST 9		4.5+	63	Hard, dry to moist, light gray to gray, silty CLAY, flakey, powdery, (CL-ML), (RESIDUUM)		18.6	131.1	60	39			96.1	
615																
	35		SS 10	6-19-25 (44)		100	Trace gray mottling		15							

Bottom of hole at 35.0 feet.

PROJECT NAME: Plum FRS No. 2 Rehabilitation
PROJECT NO: 60615067
LOCATION: Kyle, TX

DATES DRILLED: 1/7/20 - 1/7/20
SURFACE ELEVATION (ft): 635.10
TOTAL DEPTH (ft): 25

LOG NO: 305-19

PAGE 1 OF 1

AECOM

DRILL COMPANY / DRILLER: Total Support Services / Chris Rios
DRILL EQUIP: CME 45b
DRILL METHOD: Hollow Stem Auger
BIT SIZE/TYPE: 7.5" OD Hollow Stem Auger
CASING DEPTH (ft bgs): N/A

GROUNDWATER LEVELS:
AT TIME OF: --- Dry
AT END OF DRILLING --- Dry
AFTER DRILLING --- Dry, caved at 22 ft (2:30 pm)
COMPLETION: Cement Bentonite Grout

LOGGED BY: M. Link
CHECKED BY: L. Finnefrock
HOLE LOCATION: Principal Spillway
LATITUDE (deg) or NORTHING (ft): 13907130.49(ft)
LONGITUDE (deg) or EASTING (ft): 2330313.757(ft)

		SOIL SAMPLES							LABORATORY TESTING RESULTS							
ELEVATION (ft)	DEPTH (ft)	SAMPLE SYMBOL	SAMPLE TYPE AND NUMBER	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	RECOVERY (%)	MATERIAL DESCRIPTION AND REMARKS	STRATIGRAPHY	Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	GRAVEL (%)	SAND (%)	FINES - Passing No. 200 Sieve (%)	CLAY - Passing 2 microns (%)
635	0		P 1		4.5+	71	Hard, moist, dark brown, CLAY, organics, trace fine gravel, iron oxide staining, shell fragments, 1-2 cm gravel, (CH), (FILL)		17.2	126	71	48	1.1	6.4	92.5	56.8
			SS 2	10-14-20 (34)		86	Becomes tan to light gray, trace burnt orange pockets, trace black mottling, 1-3 cm gravel, trace calcite nodules, (FILL)		5.1							
630	5		ST 3		4.5+	46	Dry, CLAY, gravel, subangular, few 1-1.5 inch gravel, (CL-CH), (FILL) Trace organics, 70% 0.9 to 2 inch layer, 30% 0 to 0.9 inch layer, calcite nodules, (FILL)		15.9	132.4	48	27			89.4	
			P 4		3.75 to 4.5+	65	Very stiff, trace organics, iron oxide staining, alternating layers (90% CH as 0-0.9 inch thick, 10% CL/CH 0.9 to 2 inch thick w/ trace black mottling), (ALLUVIUM)		18.3							
625	10		SS 5	3-5-7 (12)		100	Medium stiff, moist, brown to dark brown, trace sand, iron oxide staining, trace tan and gray color, heavy iron stain nodules, trace shell fragments, black specks, (ALLUVIUM)		17.9				0.3	7.9	91.8	54.6
620	15		P 6		3.75 4.5+	71	80% 0 to 0.9 inch layer, 20% 0.9 to 2 inch layer, (RESIDUUM) Very stiff, moist, brown to tannish gray, CLAY, gravel, gray comes in splotches/mottling, brownish orange inclusions, trace iron staining pockets, gypsum layers starting to form, trace gypsum fissures, one 2.5-inch subangular gravel, (CL-CH), (RESIDUUM)		24.4							
615	20		ST 7		4.5+	81	Very stiff, damp, gray to dark gray, CLAY, fissile, (CL-CH), (RESIDUUM)		19.8	126.5	60	35			95.5	
	25		SS 8	25-50	4.5+	108	-23.5 ft: Moist, increased plasticity SHALE: Extremely weak, dry, white to light gray, fissile, trace black shading, trace fine gravel (1-2 cm), breaks down to silty lean-fat clay		11.5							

Bottom of hole at 25.0 feet.

PROJECT NAME: Plum FRS No. 2 Rehabilitation	**DATES DRILLED:** 10/1/20 - 10/1/20	**LOG NO: 401-20** PAGE 1 OF 1 AECOM
PROJECT NO: 60615067	**SURFACE ELEVATION (ft):** 647.96	
LOCATION: Kyle, TX	**TOTAL DEPTH (ft):** 20	

DRILL COMPANY / DRILLER: Total Support Services / Chester Westb	**GROUNDWATER LEVELS:**	**LOGGED BY:** M.Lyons
DRILL EQUIP: CME 55LC	**AT TIME OF:** --- Dry	**CHECKED BY:** L. Finnefrock
DRILL METHOD: Hollow Stem Auger	**AT END OF DRILLING** --- Dry	**HOLE LOCATION:** Prop outlet channel
BIT SIZE/TYPE: 10" OD Hollow Stem Auger	**AFTER DRILLING** ---	**LATITUDE (deg) or NORTHING (ft):** 13907933(ft)
CASING DEPTH (ft bgs): N/A	**COMPLETION:** Cement Bentonite Grout	**LONGITUDE (deg) or EASTING (ft):** 2330545(ft)

ELEVATION (ft)	DEPTH (ft)	SOIL SAMPLES					MATERIAL DESCRIPTION AND REMARKS	STRATIGRAPHY	LABORATORY TESTING RESULTS							
		SAMPLE SYMBOL	SAMPLE TYPE AND NUMBER	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	RECOVERY (%)			Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	GRAVEL (%)	SAND (%)	FINES - Passing No. 200 Sieve (%)	CLAY - Passing 2 microns (%)
	0		P 1		3.5	46	Slightly moist, dark brown black, high plasticity, CLAY, some coarse gravel, moderate HCL reaction, abundant subrounded gravel, abundant calcarerous, (CH), (ALLUVIUM)		22.4	123.6	58	37	19.5	4.3	76.2	
645			P 2		4.5+	48	Slightly moist, dark brown black, high plasticity, CLAY, some fine to coarse gravel, moderate HCL reaction, trace black flecks, abundant subrounded to subangular gravel, abundant calcarerous, (CH), (ALLUVIUM)		18.8				4.4	6.7	88.9	
	5		P 3		4.5+	67	Very stiff, slightly moist, dark brown, medium plasticity, CLAY, weak HCL reaction, with orange and gray, abundant black flecks, coarse gravel layer at 3", (CL-CH), (RESIDUUM)		16.9						89.9	
640			P 4		4.5+	69			16.8	134.9	73	50			92.1	
	10		P 5		4.5+	71	Very stiff, slightly moist, orange, medium plasticity, CLAY, strong HCL reaction, with gray clay seams, trace black flecks, increase iron presence, (CL-CH), (RESIDUUM)		20.4							
635							Very stiff, slightly moist, orange, medium plasticity, CLAY, strong HCL reaction, with abundant gray clay seams, trace black flecks, iron layers at 8.5" and 8.75", breaks along planes of weakness, (CL-CH), (RESIDUUM)									
	15		P 6		4.5+	88	Very stiff, slightly moist, orange, medium plasticity, CLAY, strong HCL reaction, abundant iron, trace black flecks, (CL-CH), (RESIDUUM)		23.8		75	51			98.3	
630																
	20		P 7		4.5+	100			23.8							

Bottom of hole at 20.0 feet. Bulk samples from auger cuttings collect as follows: 0'-5' (B-1 and B-2), 5'-10' (B-3 and B-4), 10'-15' (B-5 and B-6), 15'-20' (B-7 and B-8)

PROJECT NAME: Plum FRS No. 2 Rehabilitation	**DATES DRILLED:** 10/1/20 - 10/1/20	**LOG NO: 402-20** PAGE 1 OF 1 AECOM
PROJECT NO: 60615067	**SURFACE ELEVATION (ft):** 646.55	
LOCATION: Kyle, TX	**TOTAL DEPTH (ft):** 20	

DRILL COMPANY / DRILLER: Total Support Services / Chester Westb	**GROUNDWATER LEVELS:**	**LOGGED BY:** M.Lyons
DRILL EQUIP: CME 55LC	**AT TIME OF:** --- Dry	**CHECKED BY:** L. Finnefrock
DRILL METHOD: Hollow Stem Auger	**AT END OF DRILLING** --- Dry	**HOLE LOCATION:** Prop outlet channel
BIT SIZE/TYPE: 10" OD Hollow Stem Auger	**AFTER DRILLING** ---	**LATITUDE (deg) or NORTHING (ft):** 13907784(ft)
CASING DEPTH (ft bgs): N/A	**COMPLETION:** Cement Bentonite Grout	**LONGITUDE (deg) or EASTING (ft):** 2330496(ft)

ELEVATION (ft)	DEPTH (ft) 0	SOIL SAMPLES: SAMPLE SYMBOL	SAMPLE TYPE AND NUMBER	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	RECOVERY (%)	MATERIAL DESCRIPTION AND REMARKS	STRATIGRAPHY	LABORATORY TESTING RESULTS: Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	GRAVEL (%)	SAND (%)	FINES - Passing No. 200 Sieve (%)	CLAY - Passing 2 microns (%)
645			P 1		4.0	40	Medium stiff, dark brown, high plasticity, CLAY, trace fine gravel, strong HCL reaction, trace subangular gravel, (CH), (ALLUVIUM)	▨	23.1		72	53			92.9	
			P 2		3.5	29		▨	20.3		82	62			93.4	
	5		P 3		4.5 4.5+	46	Very stiff, dark brown, high plasticity, CLAY, trace fine gravel, strong HCL reaction, trace subangular to subrounded gravel, trace iron, (CH), (ALLUVIUM)	▨	15.7 15.5							
640			P 4		4.5+	46	Very stiff, slightly moist, orange, medium plasticity, CLAY, with gray clay seams, iron, (CL-CH), (ALLUVIUM)	▧	17.2		67	48			95	
	10		P 5		4.5+	56	Very stiff, dark brown, high plasticity, CLAY, trace fine gravel, strong HCL reaction, trace subangular to subrounded gravel, trace iron, (CH), (RESIDUUM)	▧	22.6		73	52			68.8	
635							Very stiff, slightly moist, gray with orange, medium plasticity, CLAY, trace gravel, pockets of calcite crystals in gray clay, trace iron nodules, trace subrounded gravel, (CL-CH), (RESIDUUM)	▧								
	15		P 6		4.5+	88	CLAY, Increase of orange with gray clay seams, increase iron content, breaks along planes of weakness, trace black flecks, (CL-CH), (RESIDUUM)	▧	24.2							
630								▧								
	20		P 7		4.5+	92		▧	25.3							

Bottom of hole at 20.0 feet. Bulk samples from auger cuttings collect as follows: 0'-5' (B-1 and B-2), 5'-10' (B-3 and B-4), 10'-15' (B-5 and B-6), 15'-20' (B-7 and B-8)

PROJECT NAME: Plum FRS No. 2 Rehabilitation	**DATES DRILLED:** 1/2/20 - 1/2/20	**LOG NO: 601-19**
PROJECT NO: 60615067	**SURFACE ELEVATION (ft):** 649.70	PAGE 1 OF 1
LOCATION: Kyle, TX	**TOTAL DEPTH (ft):** 25	AECOM

DRILL COMPANY / DRILLER: Total Support Services / Chris Rios	**GROUNDWATER LEVELS:**	**LOGGED BY:** M. Lyons
DRILL EQUIP: CME 45b	**AT TIME OF:** --- Dry	**CHECKED BY:** L. Finnefrock
DRILL METHOD: Hollow Stem Auger	**AT END OF DRILLING** --- Dry	**HOLE LOCATION:** Downstream Toe
BIT SIZE/TYPE: 7.5" OD Hollow Stem Auger	▼ **AFTER DRILLING** 11.40 ft / Elev 638.30 ft	**LATITUDE (deg) or NORTHING (ft):** 13907928.12(ft)
CASING DEPTH (ft bgs): N/A	**COMPLETION:** Cement Bentonite Grout	**LONGITUDE (deg) or EASTING (ft):** 2330345.003(ft)

ELEVATION (ft)	DEPTH (ft)	SOIL SAMPLES					MATERIAL DESCRIPTION AND REMARKS	STRATIGRAPHY	LABORATORY TESTING RESULTS							
		SAMPLE SYMBOL	SAMPLE TYPE AND NUMBER	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	RECOVERY (%)			Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	GRAVEL (%)	SAND (%)	FINES - Passing No. 200 Sieve (%)	CLAY - Passing 2 microns (%)
	0		P 1		3.25	46	Moist, dark brown black, CLAY, much organics, trace gravel, increasing calcite nodules towards base, (CH), (ALLUVIUM)		21.9	112.9	79	46	0.9	5.7	93.4	64.3
			SS 2	5-11-7 (18)		28	Grades to very stiff		14.7							
645	5		ST 3		4.5+	50	Slightly moist, light brown orange, silty CLAY, abundant calcite nodules, (CL-ML), (RESIDUUM)		25.4	123.6	64	35			96.2	
			P 4		4.5+	63	Moist, dark brown black, subrounded, CLAY, trace organics, trace fine gravel, abundant calcite nodules, (CH), (RESIDUUM)		13	129	31	15	0	19.8	80.2	38.1
640	10		SS 5	3-6-10 (16)		100	Hard, slightly moist, light brown orange, silty CLAY, orange/gray patches, abundant calcite nodules towards base, trace black flecks, (CL-ML), (RESIDUUM) Grades to dry to slightly moist, well graded, fine to coarse sand, increasing fine and coarse gravel towards ▼ gravel									
635	15		ST 6		4.5+	75	Grades to moist, medium plasticity, iron oxide staining		23.8	132.2	67	44			97.1	
630	20		P 7		4.5+	85	Grades to hard, trace black flecks towards base primarily in gray clay seams		22.4	124.7	77	54	0	1.5	98.5	66.2
625	25		SS 8	4-9-12 (21)		100	Gypsum crystals in gray calcareous clay seams		20.4							

Bottom of hole at 25.0 feet.

PROJECT NAME: Plum FRS No. 2 Rehabilitation
PROJECT NO: 60615067
LOCATION: Kyle, TX

DATES DRILLED: 1/2/20 - 1/2/20
SURFACE ELEVATION (ft): 642.67
TOTAL DEPTH (ft): 25

LOG NO: 602-19

PAGE 1 OF 1

AECOM

DRILL COMPANY / DRILLER: Total Support Services / Chris Rios
DRILL EQUIP: CME 45b
DRILL METHOD: Hollow Stem Auger
BIT SIZE/TYPE: 7.5" OD Hollow Stem Auger
CASING DEPTH (ft bgs): N/A

GROUNDWATER LEVELS:
AT TIME OF: --- Dry
AT END OF DRILLING --- Dry
AFTER DRILLING --- Dry
COMPLETION: Cement Bentonite Grout

LOGGED BY: M. Lyons
CHECKED BY: L. Finnefrock
HOLE LOCATION: Downstream Toe
LATITUDE (deg) or NORTHING (ft): 13907467.34(ft)
LONGITUDE (deg) or EASTING (ft): 2330523.174(ft)

ELEVATION (ft)	DEPTH (ft)	SOIL SAMPLES					MATERIAL DESCRIPTION AND REMARKS	STRATIGRAPHY	LABORATORY TESTING RESULTS							
		SAMPLE SYMBOL	SAMPLE TYPE AND NUMBER	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	RECOVERY (%)			Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	GRAVEL (%)	SAND (%)	FINES - Passing No. 200 Sieve (%)	CLAY - Passing 2 microns (%)
	0		P 1		4.5+	46	Moist, dark brown to black, high plasticity, CLAY, much organics, much fine gravel, subrounded to subangular, increasing calcite nodules towards base, (CH), (ALLUVIUM)		15.8							
640			SS 2	5-7-10 (17)		100	Stiff, slightly moist to moist, light brown, silty CLAY, trace organics, fine gravel, strong HCL reaction, subrounded to subangular, abundant calcite nodules, coarser gravel towards base, (CL-ML), (ALLUVIUM)		12.6							
	5		P 3		4.5+	40	Moist, dark brown to black, high plasticity, CLAY, much organics, trace fine gravel, increasing calcite nodules towards base, (CH), (ALLUVIUM)		18.9							
635			ST 4		4.5+	69	Slightly moist, light brown to tan, silty CLAY, much coarse gravel, iron oxide staining, subrounded, abundant calcite nodules, trace black flecks, (CL-ML), (RESIDUUM) Increasing clay content, low plasticity, strong HCL reaction, trace black flecks in gray clay veins		17.3							
	10		SS 5	3-8-14 (22)		100			17.5							
630																
	15		ST 6		4.5+	79			20.6							
625																
	20		P 7			69	Light brown to orange, medium plasticity, CLAY, iron oxide staining, gray clay veins, bladed gypsum crystals in gray clay seams at base, (CL), (RESIDUUM)		19.4							
620																
	25		SS 8	5-12-18 (30)		100	Hard, slightly moist, light gray to olive gray, medium plasticity, CLAY, iron oxide staining, trace small gypsum crystals, (CL-CH), (RESIDUUM)		17.6							

Bottom of hole at 25.0 feet.

PROJECT NAME: Plum FRS No. 2 Rehabilitation
DATES DRILLED: 1/6/20 - 1/6/20
PROJECT NO: 60615067
SURFACE ELEVATION (ft): 634.86
LOCATION: Kyle, TX
TOTAL DEPTH (ft): 25

LOG NO: 603-19

PAGE 1 OF 1

AECOM

DRILL COMPANY / DRILLER: Total Support Services / Chris Rios
GROUNDWATER LEVELS:
LOGGED BY: M. Lyons
DRILL EQUIP: CME 45b
AT TIME OF: --- Dry
CHECKED BY: L. Finnefrock
DRILL METHOD: Hollow Stem Auger
AT END OF DRILLING --- Dry
HOLE LOCATION: Downstream Toe
BIT SIZE/TYPE: 7.5" OD Hollow Stem Auger
AFTER DRILLING --- Dry, caved at 15.3 ft (2pm)
LATITUDE (deg) or NORTHING (ft): 13906952.99(ft)
CASING DEPTH (ft bgs): N/A
COMPLETION: Cement Bentonite Grout
LONGITUDE (deg) or EASTING (ft): 2330186.523(ft)

ELEVATION (ft)	DEPTH (ft)	SOIL SAMPLES					MATERIAL DESCRIPTION AND REMARKS	STRATIGRAPHY	LABORATORY TESTING RESULTS							
		SAMPLE SYMBOL	SAMPLE TYPE AND NUMBER	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	RECOVERY (%)			Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	GRAVEL (%)	SAND (%)	FINES - Passing No. 200 Sieve (%)	CLAY - Passing 2 microns (%)
	0		P 1		4.5+	46	Moist, dark brown black, subangular, high plasticity, CLAY, much organics, trace coarse gravel, strong HCL reaction, increasing calcite nodules towards base, (CH), (ALLUVIUM)		19	132.4	67	48	0	11.7	88.3	53.1
			SS 2	9-11-15 (26)		63	Very stiff, slightly moist, dark brown black, subangular, high plasticity, CLAY, much organics, trace coarse gravel, strong HCL reaction, increasing calcite nodules towards base, (CH), (ALLUVIUM)		12.9							
630	5		P 3		4.5+	35	Hard, slightly moist, light brown tan, subrounded to subangular, silty CLAY, trace coarse gravel, abundant calcite nodules, abundant iron nodules, (CL-ML), (RESIDUUM)		21.7	120.5	62	41			87.9	
			SS 4	9-11-16 (27)		56			14.2							
625	10		ST 5		4.5+	79	Very stiff, moist to slightly moist, light brown orange, CLAY, strong HCL reaction, iron oxide staining, intermixed gray clay seams, (CL-CH), (RESIDUUM)		20.1	129.4	62	40			95	
							Very stiff, moist to slightly moist, light brown orange, CLAY, strong HCL reaction, iron oxide staining, intermixed gray clay seams, (CL-CH), (RESIDUUM)									
620	15		P 6		4.5+	73	Gypsum crystals in 4-inch gray clay seam at 17.25 inches within layer		20.3	119.2	29	14	0	4.2	95.8	68.1
615	20		SS 7	5-10-16 (26)		100	Small layers of olive gray clay about 1 inch thick at 3.4 to 4.5 inches and 18 to 19 inches in layer, bladed gypsum layer approximately 0.5 inch thick at 15 inches in layer		17.8							
									4.2		96	69	0.5	30.2	69.3	
610	25		SS 8	50/6"		191	Strong HCL reaction SHALE: Extremely weak, moderately weathered, white to light gray, very fine grained, iron pyrite in cuttings									

Bottom of hole at 25.0 feet.

PROJECT NAME: Plum FRS No. 2 Rehabilitation	**DATES DRILLED:** 12/9/19 - 12/9/19	**LOG NO: 604-19** PAGE 1 OF 1
PROJECT NO: 60615067	**SURFACE ELEVATION (ft):** 637.95	
LOCATION: Kyle, TX	**TOTAL DEPTH (ft):** 25	

DRILL COMPANY / DRILLER: Total Support Services / Chris Rios	**GROUNDWATER LEVELS:**	**LOGGED BY:** M. Link
DRILL EQUIP: CME 45b	**AT TIME OF:** --- Dry	**CHECKED BY:** L. Finnefrock
DRILL METHOD: Hollow Stem Auger	**AT END OF DRILLING** --- Dry	**HOLE LOCATION:** Downstream Toe
BIT SIZE/TYPE: 7.5" OD Hollow Stem Auger	**AFTER DRILLING** --- Dry	**LATITUDE (deg) or NORTHING (ft):** 13906795(ft)
CASING DEPTH (ft bgs): N/A	**COMPLETION:** Cement Bentonite Grout	**LONGITUDE (deg) or EASTING (ft):** 2330040(ft)

ELEVATION (ft)	DEPTH (ft)	SOIL SAMPLES					MATERIAL DESCRIPTION AND REMARKS	STRATIGRAPHY	LABORATORY TESTING RESULTS							
		SAMPLE SYMBOL	SAMPLE TYPE AND NUMBER	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	RECOVERY (%)			Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	GRAVEL (%)	SAND (%)	FINES - Passing No. 200 Sieve (%)	CLAY - Passing 2 microns (%)
	0	▮	P 1		4.25	77	Hard, moist, brown to dark brown, CLAY, trace gravel, trace organics, angular, trace shell fragments, trace oxidation stains, trace calcareous nodules, sand grains interspersed, trace shell fragments, (CH), (ALLUVIUM)		19.1							
635		☒	SS 2	4-6-11 (17)		67			8.4							
	5	■	ST 3			69	-4 ft: Bent tube, couldn't definitively ID soil, probably new material gray-dark brown, oxidation stains, hard, dry-moist, (ALLUVIUM)		11							
		▮	P 4			200	-6 ft: hard, less moist, less organics Becomes damp		10.7							
630							Hard, moist, light gray to tan, CLAY, trace medium gravel, gypsum striations, gypsum pockets, oxidation stains, rock chips, (CL-CH), (RESIDUUM)									
	10	☒	SS 5	3-7-11 (18)		94	Becomes brown to dark brown, black specks Becomes light gray to tan		12.5							
625																
	15	▮	P 6		4.5+	71	Becomes brown to dark brown, fine to coarse gravel Becomes tan to light gray, 1/4" thick gypsum layers, clear crystals		19							
620																
	20	▮	P 7		4.5+	85	Infrequent gray-dark gray layers/splotches of soil, flakey hard, 1/4" thick gypsum layers, clear crystals		20							
615																
		☒	SS 8	40-50/2"		107	No gypsum crystals		7.4							
	25						SHALE: Weak, dry, light gray, silty, fissile									

Bottom of hole at 25.0 feet.

AECOM-SMART-SOIL-LAB-ELEV_SOIL_PP+TV_GW - URS_DENVER STD US LAB.GDT - 5/26/21 17:28 - C:\USERS\LANCE.FINNEFROCK\ONEDRIVE - AECOM DIRECTORY\PROJECTS\TSSWCB - 5 DAMS\07. PLUM 2\01. FIELD & LAB\06. GINT LOGS\PLUM 2 LOGS_2021.

PROJECT NAME: Plum FRS No. 2 Rehabilitation	**DATES DRILLED:** 1/6/20 - 1/6/20	**LOG NO: 605-19** PAGE 1 OF 1 AECOM
PROJECT NO: 60615067	**SURFACE ELEVATION (ft):** 658.29	
LOCATION: Kyle, TX	**TOTAL DEPTH (ft):** 25	

DRILL COMPANY / DRILLER: Total Support Services / Chris Rios	**GROUNDWATER LEVELS:**	**LOGGED BY:** M. Lyons
DRILL EQUIP: CME 45b	**AT TIME OF:** --- Dry	**CHECKED BY:** L. Finnefrock
DRILL METHOD: Hollow Stem Auger	**AT END OF DRILLING** --- Dry	**HOLE LOCATION:** Downstream Toe
BIT SIZE/TYPE: 7.5" OD Hollow Stem Auger	**AFTER DRILLING** --- Dry, caved at 16 ft (2pm)	**LATITUDE (deg) or NORTHING (ft):** 13906607.14(ft)
CASING DEPTH (ft bgs): N/A	**COMPLETION:** Cement Bentonite Grout	**LONGITUDE (deg) or EASTING (ft):** 2329797.814(ft)

ELEVATION (ft)	DEPTH (ft)	SOIL SAMPLES					MATERIAL DESCRIPTION AND REMARKS	STRATIGRAPHY	LABORATORY TESTING RESULTS							
		SAMPLE SYMBOL	SAMPLE TYPE AND NUMBER	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	RECOVERY (%)			Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	GRAVEL (%)	SAND (%)	FINES - Passing No. 200 Sieve (%)	CLAY - Passing 2 microns (%)
	0		P 1		3.5	42	Moist, dark brown to black, high plasticity, CLAY, much organics, trace coarse gravel, subrounded to subangular, increasing calcite nodules towards base, (CH), (ALLUVIUM)	▨	18.3							
655			SS 2	6-8-10 (18)		79	Very stiff, slightly moist to moist, light brown with black, low plasticity, CLAY, trace organics, abundant calcite nodules, (CH), (ALLUVIUM)	▨	11.7							
	5		ST 3		4.5+	54	Light brown to tan, medium plasticity, CLAY, iron oxide staining, trace black flecks with gray clay seams, (CL), (RESIDUUM)	▧	14.1							
			P 4		4.5+	67	Strong HCL reaction, abundant calcite nodules	▧	16.5							
650	10		SS 5	4-8-14 (22)		100	Lessening calcite nodules	▧	14.8							
645	15		ST 6		4.5+		No calcite nodules	▧	18.7							
640	20		P 7		4.5+	75	Abundant iron black flecks in gray clay seams	▧	17.3							
635	25		SS 8	5-11-17 (28)		100	Bladed gypsum in gray clay layer at 11.5 inches in layer	▧	18.4							

Bottom of hole at 25.0 feet.

PROJECT NAME: Plum FRS No. 2 Rehabilitation

PROJECT NO: 60615067

LOCATION: Kyle, TX

DATES DRILLED: 10/8/20 - 10/8/20

SURFACE ELEVATION (ft): 648.74

TOTAL DEPTH (ft): 30

LOG NO: 701-20

PAGE 1 OF 1

AECOM

DRILL COMPANY / DRILLER: Total Support Services / Chester Westb

DRILL EQUIP: CME 55LC

DRILL METHOD: Hollow Stem Auger

BIT SIZE/TYPE: 10" OD Hollow Stem Auger

CASING DEPTH (ft bgs): N/A

GROUNDWATER LEVELS:

AT TIME OF: --- Dry

AT END OF DRILLING --- Dry

AFTER DRILLING ---

COMPLETION: Cement Bentonite Grout

LOGGED BY: S. Whipkey

CHECKED BY: L. Finnefrock

HOLE LOCATION: Upstream Toe

LATITUDE (deg) or NORTHING (ft): 13907753(ft)

LONGITUDE (deg) or EASTING (ft): 2330261(ft)

ELEVATION (ft)	DEPTH (ft)	SOIL SAMPLES					MATERIAL DESCRIPTION AND REMARKS	STRATIGRAPHY	LABORATORY TESTING RESULTS							
		SAMPLE SYMBOL	SAMPLE TYPE AND NUMBER	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	RECOVERY (%)			Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	GRAVEL (%)	SAND (%)	FINES - Passing No. 200 Sieve (%)	CLAY - Passing 2 microns (%)
	0		P 1		4.0	58	Stiff, moist, brown, high plasticity, CLAY, coarse sand, trace tan clay nodules, 5% calcareous sand and shell fragments, (CH), (ALLUVIUM)		22.1							
645		■	ST 2		4.5+	54	Dry, tan, medium plasticity, silty CLAY, trace fine gravel, blocky, iron oxide staining, calcareous, <5% gine gravel (<0.25"), (CL-ML), (RESIDUUM)		18.3	130.7	51	31				
	5	☒	SS 3	8-7-8 (15)		50			10.3							
		■	ST 4		4.5+	50	With light gray clay		11.2	138.8	57	38				
640	10		P 5		4.5+	54	With increased fine calcareous gravel (5-10%) and trace coare gravel (0.5 to 1")		11.6							
635	15	■	ST 6		4.0	92	Slightly moist, tan to orange, medium to high plasticity, silty CLAY, iron oxide staining, trace gray, fissile, (CL-ML), (RESIDUUM)		25.4							
630	20	☒	SS 7	7-9-11 (20)		100	With light gray clay in vertical fractures		24.1							
625	25	■	ST 8		4.5+	100	SHALE: Slightly moist, gray, clayey, fissle		20.7	126.3	66	44				
620	30	☒	SS 9	17-30-33 (63)		100	Trace gray seams		18.4							

Bottom of hole at 30.0 feet.

PROJECT NAME: Plum FRS No. 2 Rehabilitation	**DATES DRILLED:** 10/5/20 - 10/5/20	**LOG NO: 702-20** PAGE 1 OF 1 AECOM
PROJECT NO: 60615067	**SURFACE ELEVATION (ft):** 647.79	
LOCATION: Kyle, TX	**TOTAL DEPTH (ft):** 30	

DRILL COMPANY / DRILLER: Total Support Services / Chester West	**GROUNDWATER LEVELS:**	**LOGGED BY:** S. Whipkey
DRILL EQUIP: CME 55LC	**AT TIME OF:** --- Dry	**CHECKED BY:** L. Finnefrock
DRILL METHOD: Hollow Stem Auger	**AT END OF DRILLING** --- Dry	**HOLE LOCATION:** Downstream Toe
BIT SIZE/TYPE: 10" OD Hollow Stem Auger	**AFTER DRILLING** --- Dry	**LATITUDE (deg) or NORTHING (ft):** 13907801(ft)
CASING DEPTH (ft bgs): N/A	**COMPLETION:** Piezometer	**LONGITUDE (deg) or EASTING (ft):** 2330379(ft)

ELEVATION (ft)	DEPTH (ft)	SOIL SAMPLES					MATERIAL DESCRIPTION AND REMARKS	STRATIGRAPHY	LABORATORY TESTING RESULTS							
		SAMPLE SYMBOL	SAMPLE TYPE AND NUMBER	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	RECOVERY (%)			Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	GRAVEL (%)	SAND (%)	FINES - Passing No. 200 Sieve (%)	CLAY - Passing 2 microns (%)
	0		P 1		3.5	75	Slightly moist, brown, high plasticity, CLAY, trace medium sand, 5% sand and shell fragments. mostly calcareous sand, (CH), (ALLUVIUM)	▨	22.5							
645			ST 2		3.5	38	Iron oxide staining, with calcareous nodules and iron nodules	▨	15.7	131.3	66	44				
	5		P 3		4.0	46		▨	18.8							
640			ST 4			58	Medium to high plasticity, increase calcareous materials and iron staining, low silt	▨	12.2							
	10	☒	SS 5	10-9-11 (20)		92	Stiff, moist, orange and gray, high plasticity, CLAY, iron oxide staining, fissile, (CH), (RESIDUUM)	▨	16.6							
635								▨								
	15		ST 6		4.0	75	3-4" iron silt seams, gray clay in horizontal beds and vertical fractures	▨	23.3	127.7	73	40	0	1.7	98.3	47.4
630								▨								
	20		P 7		4.0	92		▨	22.9							
625								▨								
	25		ST 8		4.0	100	With trace gypsum crystals	▨	19.9	124.6	66	44				
620								▨								
	30	☒	SS 9	10-15-21 (36)			SHALE: Weak, dry, gray, clayey, trace gypsum crystals in seams	▤	18.7							

Bottom of hole at 30.0 feet.

LOG NO: 703-20

PAGE 1 OF 1

PROJECT NAME: Plum FRS No. 2 Rehabilitation
PROJECT NO: 60615067
LOCATION: Kyle, TX

DATES DRILLED: 10/1/20 - 10/1/20
SURFACE ELEVATION (ft): 646.33
TOTAL DEPTH (ft): 30

DRILL COMPANY / DRILLER: Total Support Services / Chester Westb
DRILL EQUIP: CME 55LC
DRILL METHOD: Hollow Stem Auger
BIT SIZE/TYPE: 10" OD Hollow Stem Auger
CASING DEPTH (ft bgs): N/A

GROUNDWATER LEVELS:
AT TIME OF: --- Dry
AT END OF DRILLING --- Dry
AFTER DRILLING ---
COMPLETION: Cement Bentonite Grout

LOGGED BY: M. Lyons
CHECKED BY: L. Finnefrock
HOLE LOCATION: Downstream Toe
LATITUDE (deg) or NORTHING (ft): 13907705(ft)
LONGITUDE (deg) or EASTING (ft): 2330421(ft)

ELEVATION (ft)	DEPTH (ft)	SOIL SAMPLES					MATERIAL DESCRIPTION AND REMARKS	STRATIGRAPHY	LABORATORY TESTING RESULTS							
		SAMPLE SYMBOL	SAMPLE TYPE AND NUMBER	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	RECOVERY (%)			Natural Moisture Content (%)	Total Unit Weight (pcf)	Liquid Limit	Plasticity Index	GRAVEL (%)	SAND (%)	FINES - Passing No. 200 Sieve (%)	CLAY - Passing 2 microns (%)
	0															
645			P 1		4.5+	46	Stiff, slightly moist to dry, dark brown, high plasticity, CLAY, trace fine gravel, trace organics, trace calcareous subangular gravel, (CH), (ALLUVIUM)		16.9							
			SS 2	9-11-10 (21)		72	Medium dense		16.1							
	5		ST 3		4.5+	40	Stiff, dry, orange with gray, low to medium plasticity, silty CLAY, strong HCL reaction, abundant black flecks, abundant calcareous, (CL), (RESIDUUM)		15.6	131.6	44	26				
640			P 4		4.5+	42			11.8							
	10		ST 5		3.5	81	Medium stiff, slightly moist, gray with orange, medium plasticity, CLAY, fine to coarse gravel, increased clay content, subrounded to rounded gravel, (CL-CH), (RESIDUUM)		14.3							
635																
	15		SS 6	4-5-9 (14)		100	Very stiff, slightly moist, orange, high plasticity, CLAY, strong HCL reaction, with gray clay seams, abundant iron, (CH), (RESIDUUM)		22.6							
630																
	20		ST 7		4.5+	92			23.9	125.6	61	39				
625																
	25		P 8		4.5+	100	Very stiff, slightly moist to moist, dark gray, medium to high plasticity, CLAY, weak HCL reaction, trace iron, light gray clay in seams, (CL-CH), (RESIDUUM) -Gypsum crystals present in seams at 23.7, 24.2, 24.4, and 24.6 ft		21.3							
620									18.5	127.5	65	42				
	30		ST 9		4.5+	106	SHALE: Extremely weak, dark gray, very fine grained									

Bottom of hole at 30.0 feet.

Appendix F Sample Photographs

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	Date:
1	12/9/19

Description:

Boring 8-19.

P-1. Depths ~ 0-2 ft

Photo No.	Date:
2	12/9/19

Description:

Boring 8-19.

SS-2. Depths ~ 2.5-4 ft

AECOM

PHOTOGRAPHIC LOG

Client Name:	**Site Location:**	**Project No.**
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	**Date:**
3	12/9/19

Description:

Boring 8-19.

P-3. Depths ~ 4-6 ft

AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME: Plum 2
DATE: 1/9/20
BORING NUMBER: 8-19
SAMPLE #: P3
DEPTH (ft): From: 4
To: 6
RECOVERY (ft):

Photo No.	**Date:**
4	12/9/19

Description:

Boring 8-19.

SS-4. Depths ~ 6.5-8 ft

AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME: Plum 2
DATE: 1/9/20
BORING NUMBER: 8-19
SAMPLE #: SS4
DEPTH (ft): From: 6.5
To: 8
RECOVERY (ft):
PHOTO: __ of __
BLOWCOUNT:
TOP OF SAMPLE

PHOTOGRAPHIC LOG

Client Name: TSSWCB	**Site Location:** Plum 2: Kyle, TX	**Project No.** 60615067

Photo No.	**Date:**
5	12/9/19

Description:

Boring 8-19.

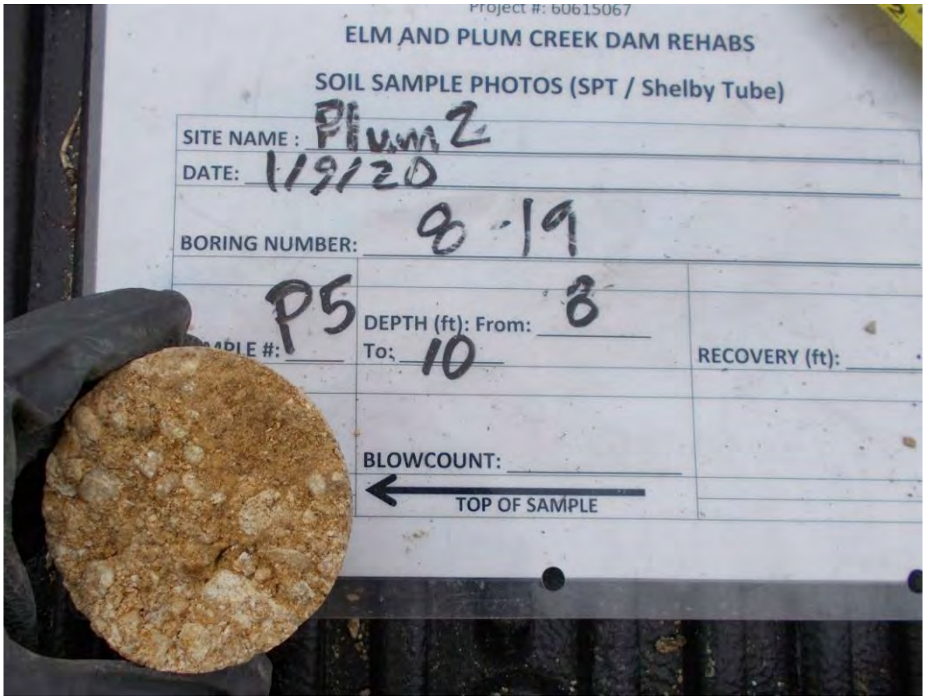
P-5. Depths ~ 8-10 ft

Photo No.	**Date:**
6	12/9/19

Description:

Boring 8-19.

P-5. Depths ~ 8-10 ft



AECOM

PHOTOGRAPHIC LOG

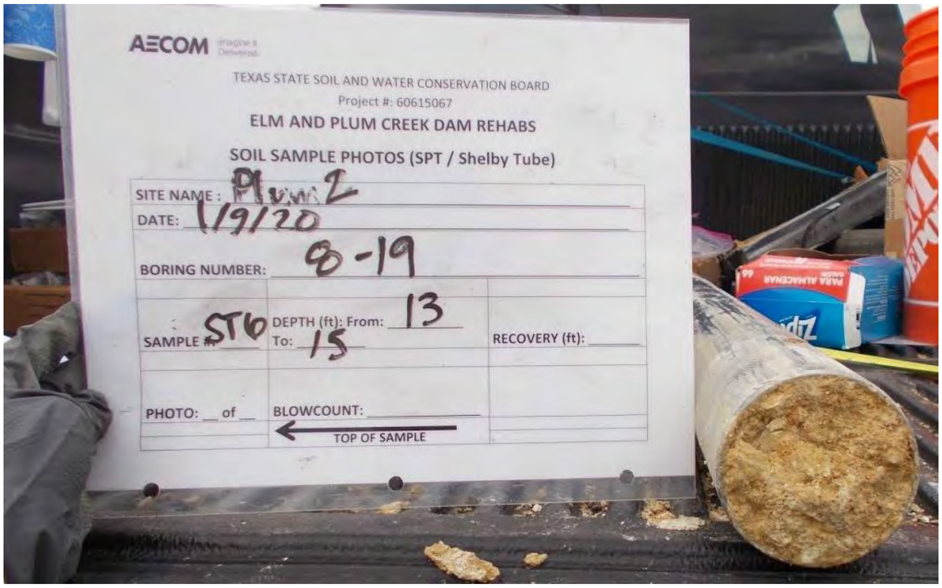
Client Name: TSSWCB	**Site Location:** Plum 2: Kyle, TX	**Project No.** 60615067

Photo No. 7 **Date:** 12/9/19

Description:

Boring 8-19.

ST-6. Depths ~ 13-15 ft



AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME: Plum 2
DATE: 1/9/20
BORING NUMBER: 8-19
SAMPLE #: ST6 DEPTH (ft): From: 13 To: 15 RECOVERY (ft):
PHOTO: __ of __ BLOWCOUNT:
TOP OF SAMPLE

Photo No. 8 **Date:** 12/9/19

Description:

Boring 8-19.

SS-7. Depths ~ 18.5-20 ft

AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME: Plum 2
DATE: 1/9/20
BORING NUMBER: 8-19
SAMPLE #: SS7 DEPTH (ft): From: 18.5 To: 20 RECOVERY (ft):
PHOTO: __ of __ BLOWCOUNT:
TOP OF SAMPLE

PHOTOGRAPHIC LOG

Client Name:	**Site Location:**	**Project No.**
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	**Date:**
9	12/9/19

Description:

Boring 8-19.

SS-8. Depths ~ 23.5-25 ft

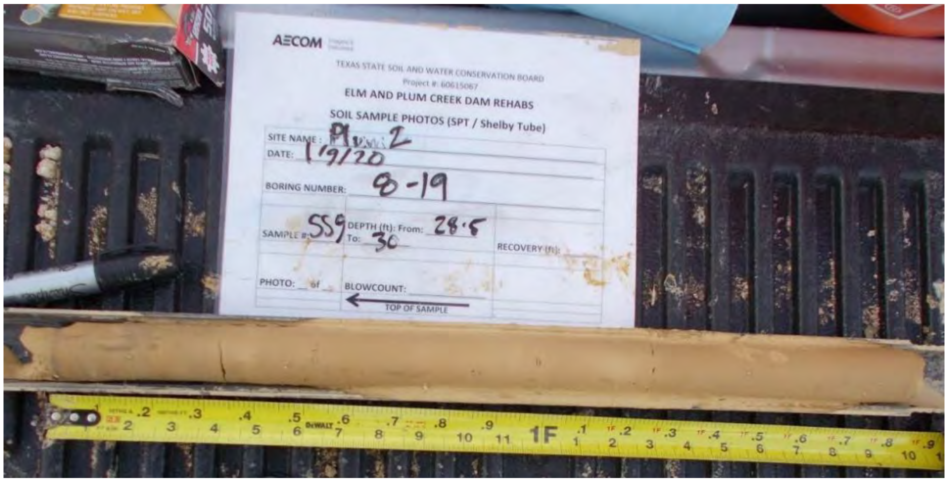
AECOM
TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)
SITE NAME: Plum 2
DATE: 1/9/20
BORING NUMBER: 8-19
SAMPLE #: SS8 DEPTH (ft): From: 23.5 To: 25
RECOVERY (ft):

Photo No.	**Date:**
10	12/9/19

Description:

Boring 8-19.

SS-9. Depths ~ 28.5-30 ft



AECOM
TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)
SITE NAME: Plum 2
DATE: 1/9/20
BORING NUMBER: 8-19
SAMPLE #: SS9 DEPTH (ft): From: 28.5 To: 30
RECOVERY (ft):
PHOTO: __ of __ BLOWCOUNT:
TOP OF SAMPLE

PHOTOGRAPHIC LOG

Client Name:	**Site Location:**	**Project No.**
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	**Date:**
1	12/9/19

Description:

Boring 9-19.

P-1. Depths ~ 0-2 ft

Photo No.	**Date:**
2	12/9/19

Description:

Boring 9-19.

SS-2. Depths ~ 2-3.5 ft

PHOTOGRAPHIC LOG

Client Name:	**Site Location:**	**Project No.**
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	**Date:**
3	12/9/19

Description:

Boring 9-19.

P-3. Depths ~ 4-6 ft

AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME : Plum 2
DATE: 1/27/20
BORING NUMBER: 9-19
SAMPLE #: P-3
DEPTH (ft): From: 4'
To: 6'
RECOVERY (ft):
PHOTO: __ of __
BLOWCOUNT:
TOP OF SAMPLE

Photo No.	**Date:**
4	12/9/19

Description:

Boring 9-19.

SS-4. Depths ~ 6-7.5 ft

AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME : Plum 2
DATE: 1/27/20
BORING NUMBER: 9-19
SAMPLE #: SS-4
DEPTH (ft): From: 6'
To: 7.5'
RECOVERY (ft):
PHOTO: __ of __
BLOWCOUNT:
TOP OF SAMPLE

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	Date:
5	12/9/19

Description:

Boring 9-19.

ST-5. Depths ~ 8-10 ft

TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME: Plum 2
DATE: 1/27/20
BORING NUMBER: 9-19
SAMPLE #: ST-5
DEPTH (ft): From: 8' To: 10'
RECOVERY (ft):
PHOTO: __ of __
BLOWCOUNT:
TOP OF SAMPLE

Photo No.	Date:
6	12/9/19

Description:

Boring 9-19.

P-6. Depths ~ 13-15 ft

TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME: Plum 2
DATE: 1/27/20
BORING NUMBER: 9-19
SAMPLE #: P-6
DEPTH (ft): From: 13' To: 15'
RECOVERY (ft):

PHOTOGRAPHIC LOG

Client Name:	**Site Location:**	**Project No.**
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	**Date:**
7	12/9/19

Description:

Boring 9-19.

SS-7. Depths ~ 18.5-20 ft

ELM AND PLUM CREEK DAM REHABS

SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME : Plum 2

DATE: 1/27/20

BORING NUMBER: 9-19

SAMPLE #: SS7

DEPTH (ft): From: 18.5

To: 20

RECOVERY (ft):

PHOTO: __ of __

BLOWCOUNT:

TOP OF SAMPLE

Photo No.	**Date:**
8	12/9/19

Description:

Boring 9-19.

ST-8. Depths ~ 23-25 ft

AECOM Imagine it. Delivered.

TEXAS STATE SOIL AND WATER CONSERVATION BOARD

Project #: 60615067

ELM AND PLUM CREEK DAM REHABS

SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME : Plum 2

DATE: 1/29/20

BORING NUMBER: 9-19

SAMPLE #: ST-8

DEPTH (ft): From: 23'

To: 25'

RECOVERY (ft):

PHOTO: __ of __

BLOWCOUNT:

TOP OF SAMPLE

AECOM

PHOTOGRAPHIC LOG

Client Name:	**Site Location:**	**Project No.**
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	**Date:**
9	12/9/19

Description:

Boring 9-19.

S-9. Depths ~ 28-30 ft

Photo No.	**Date:**
10	12/9/19

Description:

Boring 9-19.

SS-10. Depths ~ 33.5-35 ft

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	Date:
1	12/9/19

Description:

Boring 10-19.

P-1. Depths ~ 0-2 ft

Photo No.	Date:
2	12/9/19

Description:

Boring 10-19.

SS-2. Depths ~ 2-3.5 ft

AECOM

PHOTOGRAPHIC LOG

Client Name: TSSWCB	**Site Location:** Plum 2: Kyle, TX	**Project No.** 60615067

Photo No.	**Date:**
3	12/9/19

Description:

Boring 10-19.

P-3. Depths ~ 4-6 ft

AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD

Project #: 60615067

ELM AND PLUM CREEK DAM REHABS

SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME: Plum 2

DATE: 1/27/20

BORING NUMBER: 10-19

SAMPLE #: P-3

DEPTH (ft): From: 4'

To: 6'

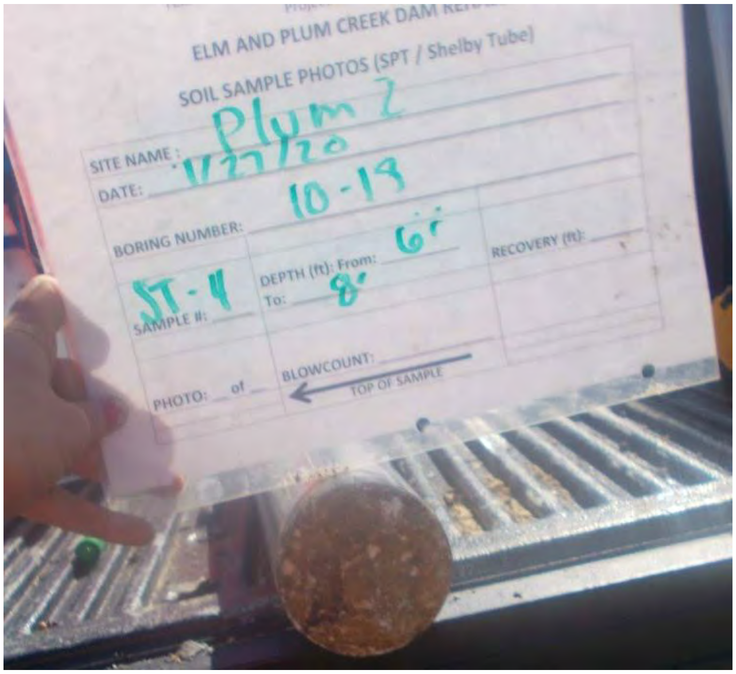
RECOVERY (ft):

Photo No.	**Date:**
4	12/9/19

Description:

Boring 10-19.

ST-4. Depths ~ 6-8 ft



ELM AND PLUM CREEK DAM REHABS

SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME: Plum 2

DATE: 1/27/20

BORING NUMBER: 10-19

SAMPLE #: ST-4

DEPTH (ft): From: 6'

To: 8'

RECOVERY (ft):

PHOTO: __ of __

BLOWCOUNT:

TOP OF SAMPLE

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	Date:
5	12/9/19

Description:

Boring 10-19.

SS-5. Depths ~ 8-9.5 ft

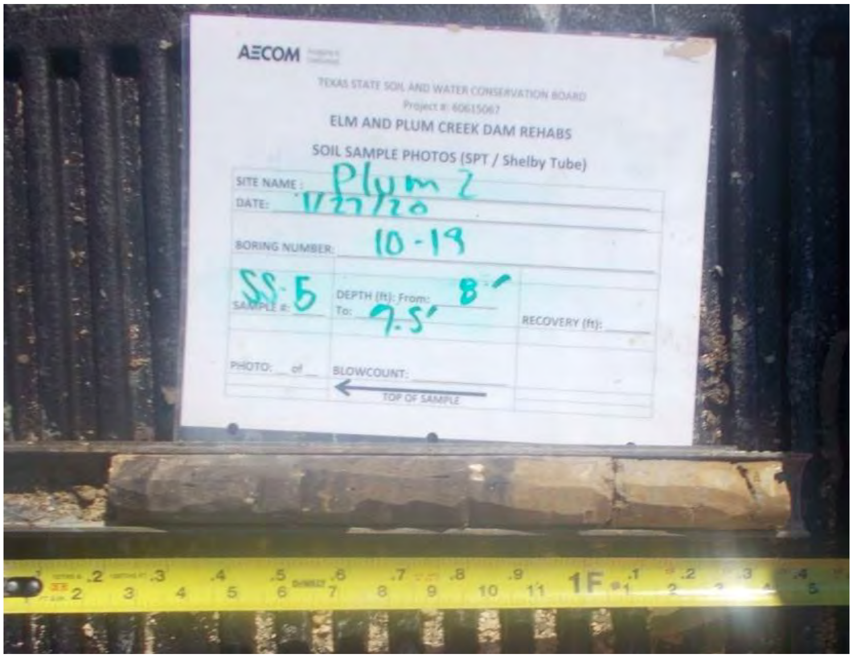


Photo No.	Date:
6	12/9/19

Description:

Boring 10-19.

P-6. Depths ~ 13-15 ft

Client Name:	**Site Location:**	**Project No.**
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	**Date:**
7	12/9/19

Description:

Boring 10-19.

SS-7. Depths ~ 18.5-20 ft

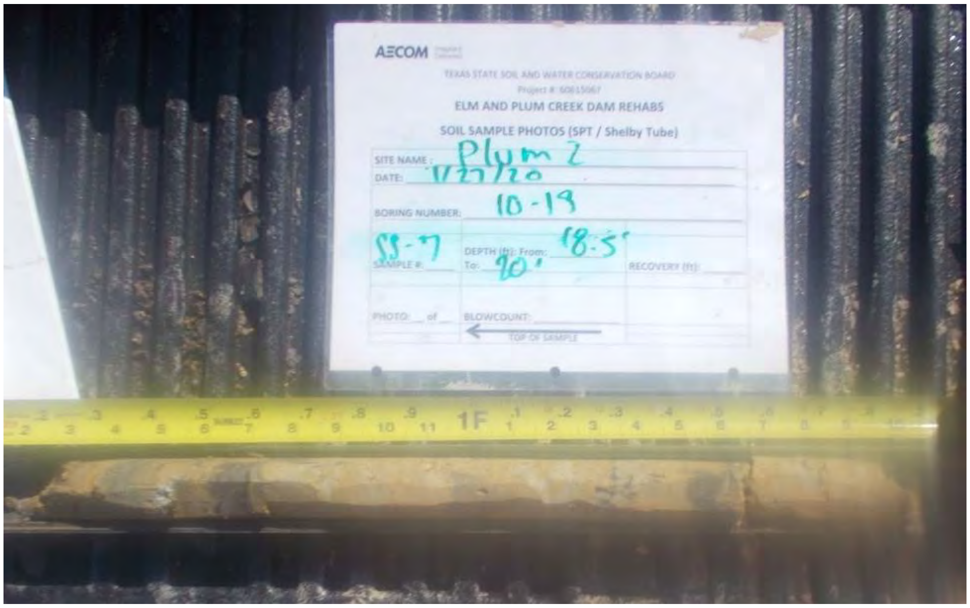
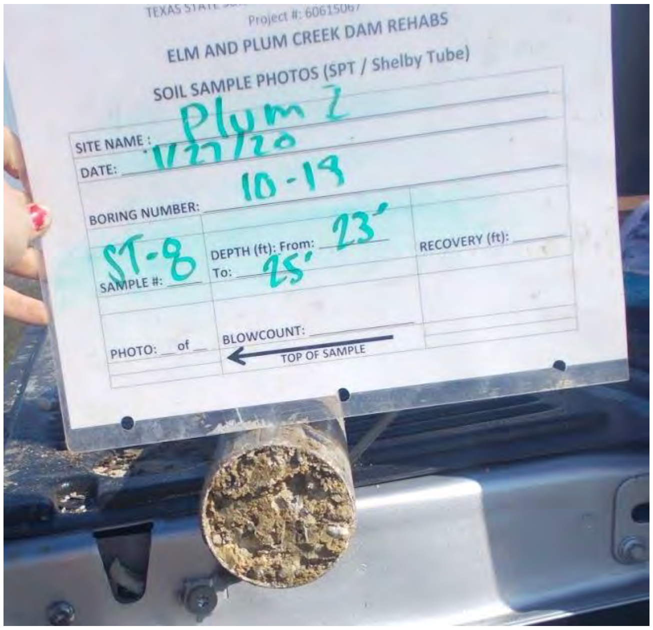


Photo No.	**Date:**
8	12/9/19

Description:

Boring 10-19.

ST-8. Depths ~ 23-25 ft



PHOTOGRAPHIC LOG

Client Name:	**Site Location:**	**Project No.**
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No. 9

Date: 12/9/19

Description:

Boring 10-19.

P-9. Depths ~ 28-30 ft

AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD

Project #: 60615067

ELM AND PLUM CREEK DAM REHABS

SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME: Plum 2

DATE: 1/27/20

BORING NUMBER: 10-19

SAMPLE #: P-9

DEPTH (ft): From: 28' To: 30'

RECOVERY (ft):

PHOTO: __ of __

BLOWCOUNT:

TOP OF SAMPLE

Photo No. 10

Date: 12/9/19

Description:

Boring 10-19.

ST-10. Depths ~ 33-35 ft

ELM AND PLUM CREEK DAM REHABS

SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME: Plum 2

DATE: 1/27/20

BORING NUMBER: 10-19

SAMPLE #: ST-10

DEPTH (ft): From: 33' To: 35'

RECOVERY (ft):

PHOTO: __ of __

BLOWCOUNT:

TOP OF SAMPLE

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	Date:
11	12/9/19

Description:

Boring 10-19.

SS-11. Depths ~ 38.5-40 ft

Photo No.	Date:
12	12/9/19

Description:

Boring 10-19.

SS-11. Depths ~ 38.5-40 ft

PHOTOGRAPHIC LOG

Client Name: TSSWCB	**Site Location:** Plum 2: Kyle, TX	**Project No.** 60615067

Photo No.	**Date:**
13	12/9/19

Description:

Boring 10-19.

P-12. Depths ~ 43-45 ft

AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD

Project #: 60615067

ELM AND PLUM CREEK DAM REHABS

SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME: Plum 2

DATE: 1/27/20

BORING NUMBER: 10-19

SAMPLE #: P-12

DEPTH (ft): From: 43' To: 45'

RECOVERY (ft):

PHOTO: __ of __

BLOWCOUNT:

TOP OF SAMPLE

PHOTOGRAPHIC LOG

Client Name: TSSWCB	**Site Location:** Plum 2: Kyle, TX	**Project No.** 60615067

Photo No. 1	**Date:** 12/9/19

Description:

Boring 11-19.

P-1. Depths ~ 0-2 ft.

AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD

Project #: 60615067

ELM AND PLUM CREEK DAM REHABS

SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME: Plum #2

DATE: 12/11/19

BORING NUMBER: 11-19

SAMPLE #: P1

DEPTH (ft): From: 0' To: 2'

RECOVERY (ft):

PHOTO: __ of __

BLOWCOUNT:

TOP OF SAMPLE

Photo No. 2	**Date:** 12/9/19

Description:

Boring 11-19.

SS-2. Depths ~ 2-3.5 ft.

AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD

Project #: 60615067

ELM AND PLUM CREEK DAM REHABS

SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME: Plum #2

DATE: 12/11/19

BORING NUMBER: 11-19

SAMPLE #: SS2

DEPTH (ft): From: 2' To: 3-5'

RECOVERY (ft):

PHOTO: __ of __

BLOWCOUNT:

TOP OF SAMPLE

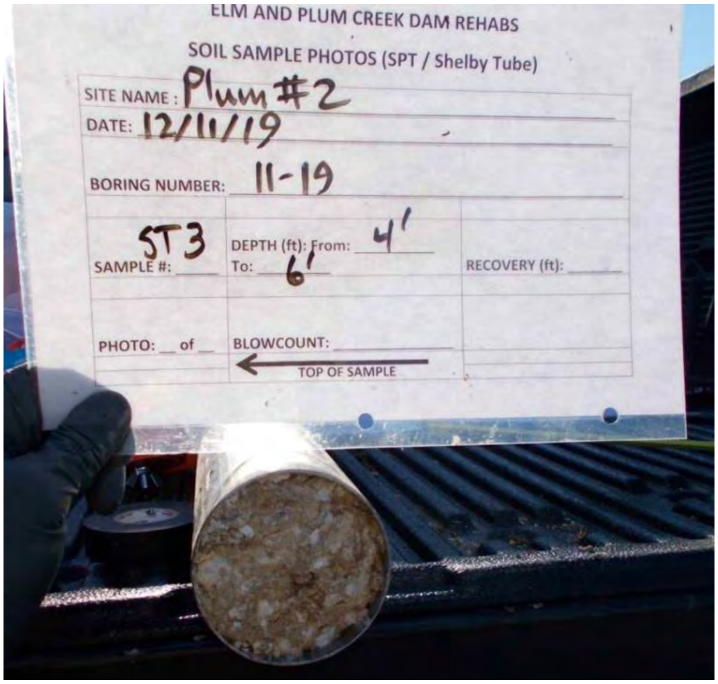
PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	Date:
3	12/9/19

Description:

Boring 11-19.
ST-3. Depths ~ 4-6 ft.



ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)
SITE NAME : Plum #2
DATE: 12/11/19
BORING NUMBER: 11-19
SAMPLE #: ST3
DEPTH (ft): From: 4'
To: 6'
RECOVERY (ft): ___
PHOTO: __ of __
BLOWCOUNT: ___
TOP OF SAMPLE

Photo No.	Date:
4	12/9/19

Description:

Boring 11-19.
P-4. Depths ~ 6-8 ft.

AECOM
TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)
SITE NAME : Plum #2
DATE: 12/11/19
BORING NUMBER: 11-19
SAMPLE #: P4
DEPTH (ft): From: 6'
To: 8'
RECOVERY (ft): ___
PHOTO: __ of __
BLOWCOUNT: ___
TOP OF SAMPLE

AECOM

PHOTOGRAPHIC LOG

Client Name:	**Site Location:**	**Project No.**
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	**Date:**
5	12/9/19

Description:

Boring 11-19.
SS-5. Depths ~ 8.5-10 ft.

Photo No.	**Date:**
6	12/9/19

Description:

Boring 11-19.
P-6. Depths ~ 13-15 ft.

AECOM

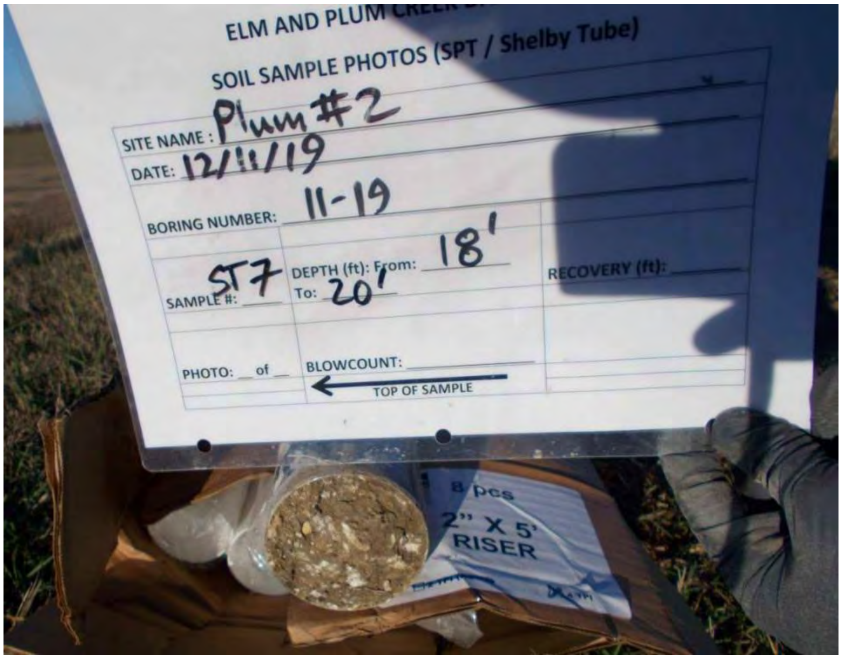
PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	**Date:**
7	12/9/19

Description:

Boring 11-19.
ST-7. Depths ~ 18-20 ft.



ELM AND PLUM CREEK
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)
SITE NAME : Plum #2
DATE: 12/11/19
BORING NUMBER: 11-19
SAMPLE #: ST7
DEPTH (ft): From: 18'
To: 20'
RECOVERY (ft):
PHOTO: __ of __
BLOWCOUNT:
TOP OF SAMPLE

Photo No.	**Date:**
8	12/9/19

Description:

Boring 11-19.
SS-8. Depths ~ 23.5-25 ft.

AECOM
TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)
SITE NAME : Plum #2
DATE: 12/11/19
BORING NUMBER: 11-19
SAMPLE #: SS8
DEPTH (ft): From: 23.5'
To: 25'
RECOVERY (ft):
PHOTO: __ of __
BLOWCOUNT:
TOP OF SAMPLE

AECOM

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	Date:
9	12/9/19

Description:

Boring 11-19.
P-9. Depths ~ 28-30 ft.

AECOM
TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)
SITE NAME : Plum #2
DATE: 12/11/19
BORING NUMBER: 11-19
SAMPLE #: P9
DEPTH (ft): From: 28'
To: 30'
RECOVERY (ft):
PHOTO: __ of __
BLOWCOUNT:

Photo No.	Date:
10	12/9/19

Description:

Boring 11-19.
SS-10. Depths ~ 33.5-35 ft.

AECOM
TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)
SITE NAME : Plum #2
DATE: 12/11/19
BORING NUMBER: 11-19
SAMPLE #: SS10
DEPTH (ft): From: 33.5'
To: 35'
RECOVERY (ft):
PHOTO: __ of __
BLOWCOUNT:
TOP OF SAMPLE

AECOM

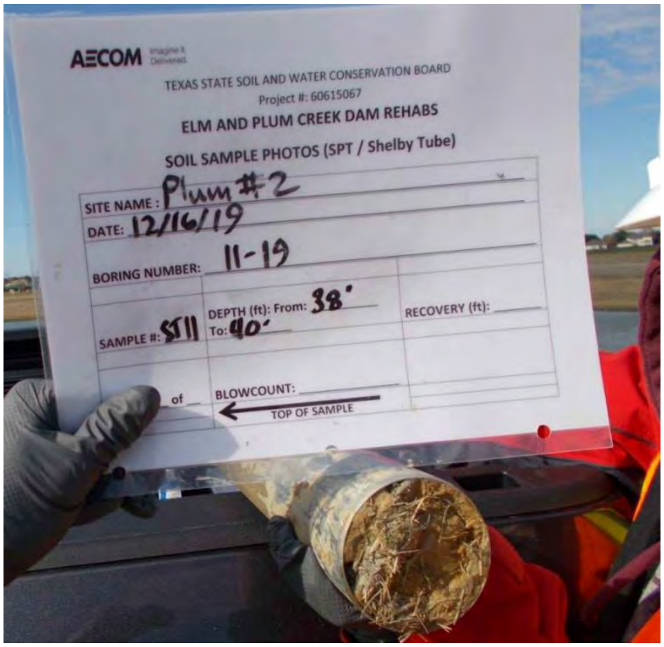
PHOTOGRAPHIC LOG

Client Name:	**Site Location:**	**Project No.**
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	**Date:**
11	12/9/19

Description:

Boring 11-19.
ST-11. Depths ~ 38-40 ft.



AECOM Imagine it. Delivered.
TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)
SITE NAME: Plum #2
DATE: 12/16/19
BORING NUMBER: 11-19
SAMPLE #: ST11 DEPTH (ft): From: 38' To: 40' RECOVERY (ft):
of BLOWCOUNT:
TOP OF SAMPLE

Photo No.	**Date:**
12	12/9/19

Description:

Boring 11-19.
P-12. Depths ~ 43-45 ft.

AECOM
TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)
SITE NAME: Plum 2
DATE: 12/16/19
BORING NUMBER: 11-19
SAMPLE #: P12 DEPTH (ft): From: 43' To: 45' RECOVERY (ft):
PHOTO: of BLOWCOUNT:

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	Date:
13	12/9/19

Description:

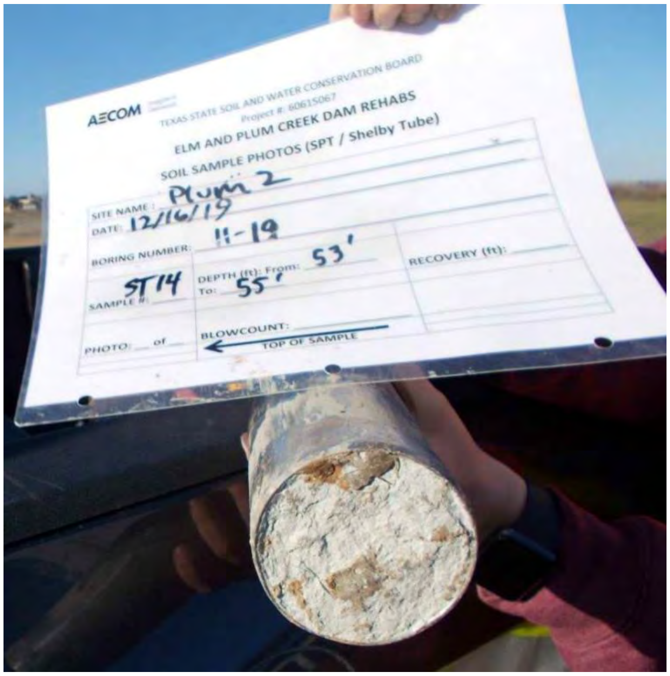
Boring 11-19.
SS-13. Depths ~ 48.5-50 ft.


AECOM
TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)
SITE NAME: Plum 2
DATE: 12/16/19
BORING NUMBER: 11-19
SAMPLE #: SS13
DEPTH (ft): From: 48.5' To: 50'
RECOVERY (ft):

Photo No.	Date:
14	12/9/19

Description:

Boring 11-19.
ST-14. Depths ~ 53-55 ft.


AECOM
TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)
SITE NAME: Plum 2
DATE: 12/16/19
BORING NUMBER: 11-19
SAMPLE #: ST14
DEPTH (ft): From: 53' To: 55'
RECOVERY (ft):
PHOTO: __ of __
BLOWCOUNT:
TOP OF SAMPLE

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	Date:
15	12/9/19

Description:

Boring 11-19.
SS-15. Depths ~ 53.2-54.8 ft.

Photo No.	Date:
16	12/9/19

Description:

Boring 11-19.
SS-16. Depths ~ 58.5-60 ft.

AECOM

PHOTOGRAPHIC LOG

Client Name:	**Site Location:**	**Project No.**
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	**Date:**
1	12/9/19

Description:

Boring 12-19.

P-1. Depths ~ 0-2 ft

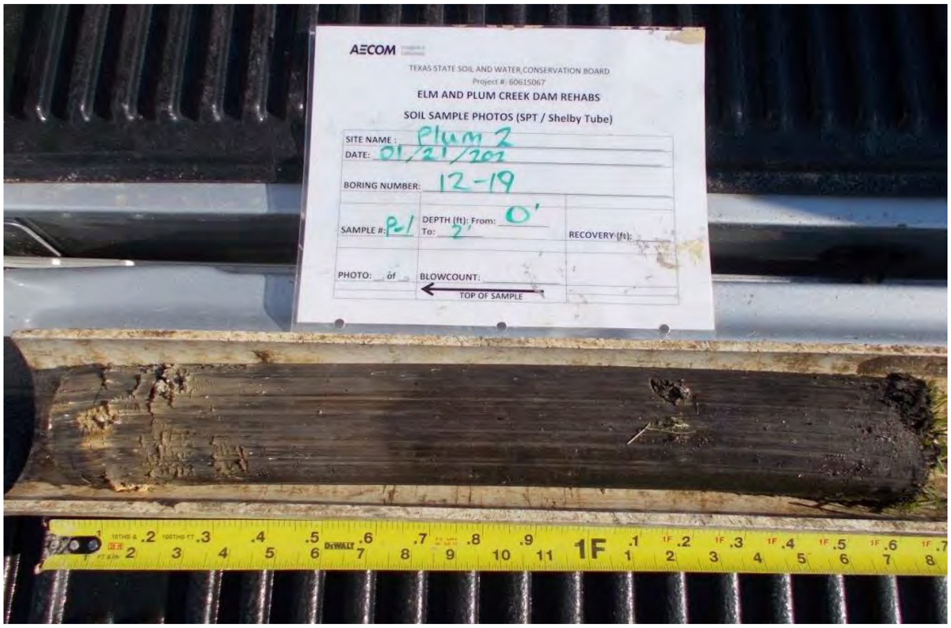
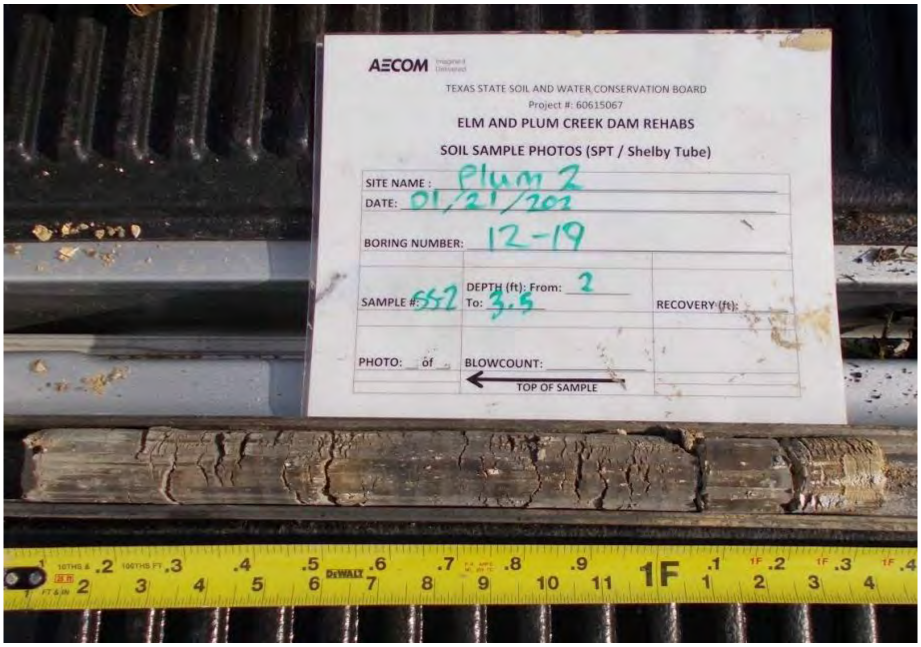


Photo No.	**Date:**
2	12/9/19

Description:

Boring 12-19.

SS-2. Depths ~ 2-3.5 ft



AECOM

PHOTOGRAPHIC LOG

Client Name:	**Site Location:**	**Project No.**
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	**Date:**
3	12/9/19

Description:

Boring 12-19.

P-3. Depths ~ 4-6 ft

Photo No.	**Date:**
4	12/9/19

Description:

Boring 12-19.

SS-4. Depths ~ 6-7.5 ft

AECOM

PHOTOGRAPHIC LOG

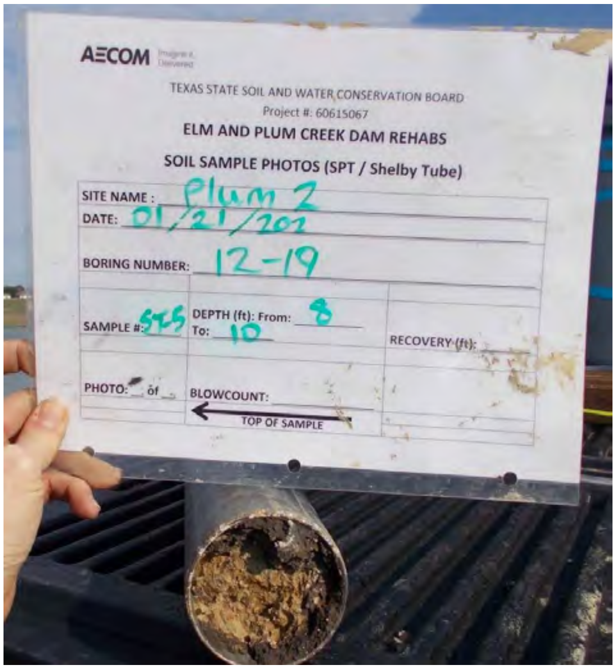
Client Name:	**Site Location:**	**Project No.**
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	**Date:**
5	12/9/19

Description:

Boring 12-19.

ST-5. Depths ~ 8-10 ft



AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD

Project #: 60615067

ELM AND PLUM CREEK DAM REHABS

SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME : Plum 2

DATE: 01/21/202

BORING NUMBER: 12-19

SAMPLE #: ST-5

DEPTH (ft): From: 8 To: 10

RECOVERY (ft):

PHOTO: _ of _

BLOWCOUNT:

TOP OF SAMPLE

Photo No.	**Date:**
6	12/9/19

Description:

Boring 12-19.

P-6. Depths ~ 13-15 ft

AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD

ELM AND PLUM CREEK DAM REHABS

SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME : Plum 2

DATE: 01/21/20

BORING NUMBER: 12-19

SAMPLE #: P-6

DEPTH (ft): From: 13 To: 15

RECOVERY (ft):

PHOTO: _ of _

BLOWCOUNT:

TOP OF SAMPLE

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	Date:
7	12/9/19

Description:

Boring 12-19.

SS-7. Depths ~ 18.5-20 ft

AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD

Project #: 60615067

ELM AND PLUM CREEK DAM REHABS

SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME : Plum 2

DATE: 01/21/20

BORING NUMBER: 12-19

SAMPLE #: SS-7 DEPTH (ft): From: 18.5 To: 20

RECOVERY (ft):

PHOTO: _ of _

BLOWCOUNT:

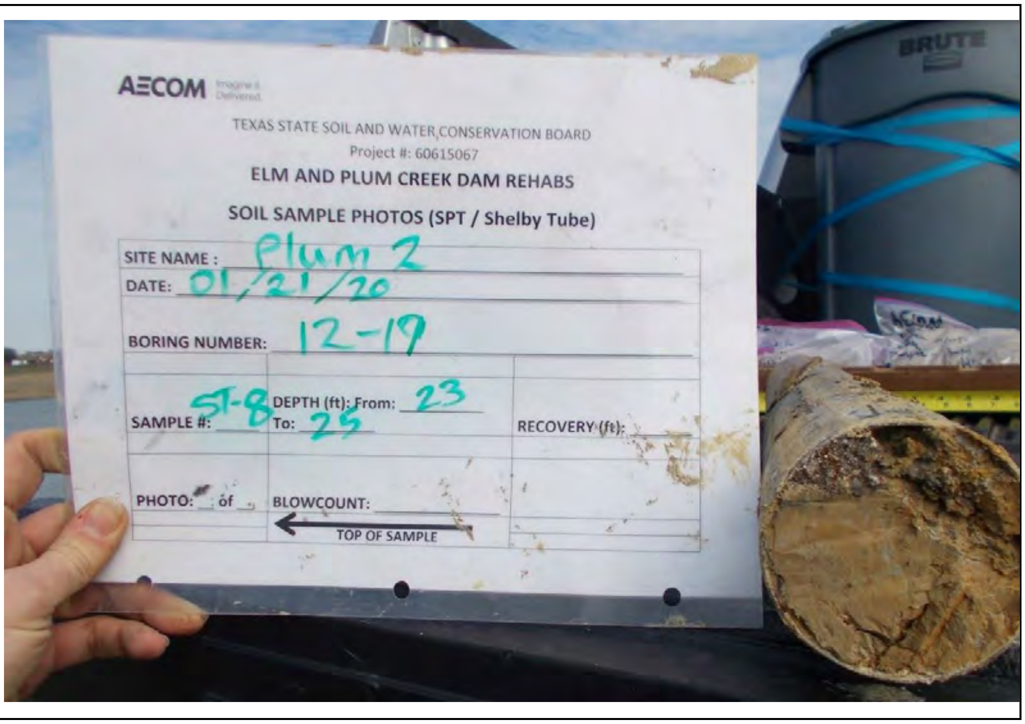
TOP OF SAMPLE

Photo No.	Date:
8	12/9/19

Description:

Boring 12-19.

ST-8. Depths ~ 23-25 ft



AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD

Project #: 60615067

ELM AND PLUM CREEK DAM REHABS

SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME : Plum 2

DATE: 01/21/20

BORING NUMBER: 12-19

SAMPLE #: ST-8 DEPTH (ft): From: 23 To: 25

RECOVERY (ft):

PHOTO: _ of _

BLOWCOUNT:

TOP OF SAMPLE

Client Name:	Site Location:	Project No.
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	Date:
9	12/9/19

Description:

Boring 12-19.

P-9. Depths ~ 28-30 ft

AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD

Project #: 60615067

ELM AND PLUM CREEK DAM REHABS

SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME : Plum 2

DATE: 01/21/20

BORING NUMBER: 12-19

SAMPLE #: P-9

DEPTH (ft): From: 28'

To: 30'

RECOVERY (ft):

PHOTO: _ of _

BLOWCOUNT:

TOP OF SAMPLE

Photo No.	Date:
10	12/9/19

Description:

Boring 12-19.

SS-10. Depths ~ 33-34.5 ft

AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD

Project #: 60615067

ELM AND PLUM CREEK DAM REHABS

SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME : PLUM 2

DATE: 01/21/20

BORING NUMBER: 12-19

SAMPLE #: SS-10

DEPTH (ft): From: 33

To: 34.5

RECOVERY (ft):

PHOTO: _ of _

BLOWCOUNT:

TOP OF SAMPLE

AECOM

PHOTOGRAPHIC LOG

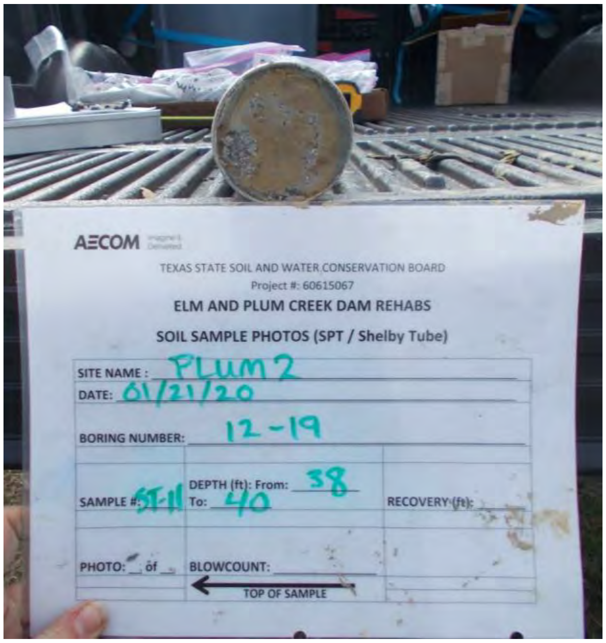
Client Name:	**Site Location:**	**Project No.**
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	**Date:**
11	12/9/19

Description:

Boring 12-19.

ST-11. Depths ~ 38-40 ft



AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME: PLUM 2
DATE: 01/21/20
BORING NUMBER: 12-19
SAMPLE #: ST-11
DEPTH (ft): From: 38 To: 40
RECOVERY (ft):
PHOTO: _ of _
BLOWCOUNT:
TOP OF SAMPLE

Photo No.	**Date:**
12	12/9/19

Description:

Boring 12-19.

P-12. Depths ~ 43-45 ft

AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME: PLUM 2
DATE: 01/21/20
BORING NUMBER: 12-19
SAMPLE #: P-12
DEPTH (ft): From: 43' To: 45'
RECOVERY (ft):
PHOTO: _ of _
BLOWCOUNT:
TOP OF SAMPLE

PHOTOGRAPHIC LOG

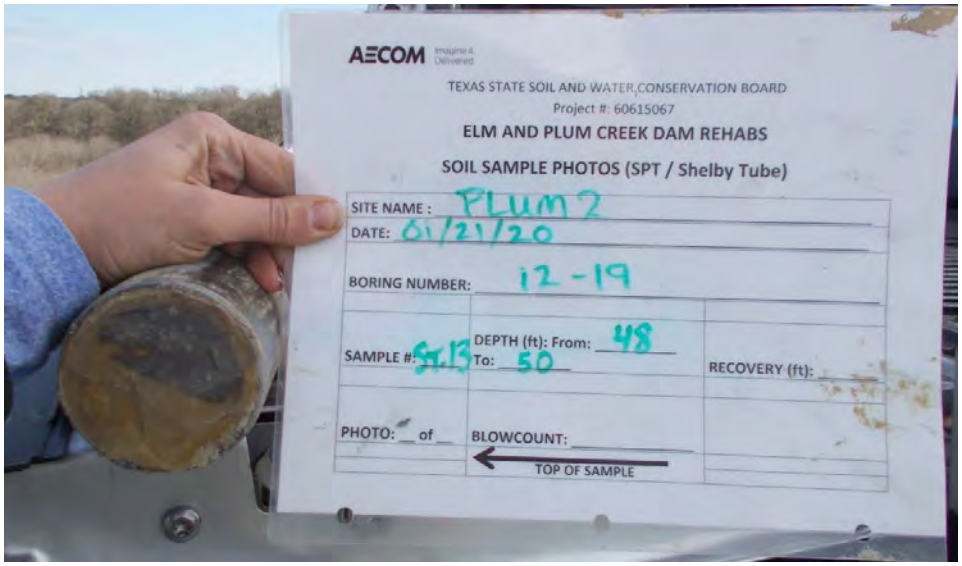
Client Name:	**Site Location:**	**Project No.**
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	**Date:**
13	12/9/19

Description:

Boring 12-19.

ST-13. Depths ~ 48-50 ft



TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

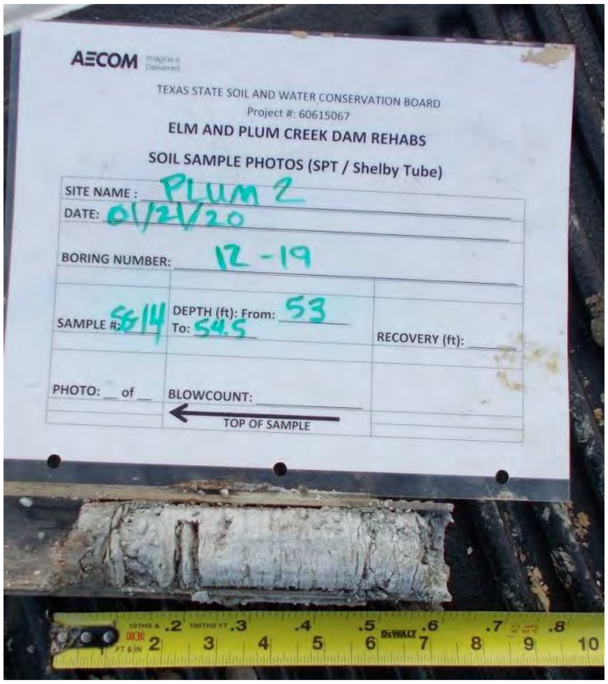
SITE NAME : PLUM 2
DATE: 01/21/20
BORING NUMBER: 12-19
SAMPLE #: ST-13
DEPTH (ft): From: 48 To: 50
RECOVERY (ft):
PHOTO: __ of __
BLOWCOUNT:
TOP OF SAMPLE

Photo No.	**Date:**
14	12/9/19

Description:

Boring 12-19.

SS-14. Depths ~ 53-54.5 ft



TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME : PLUM 2
DATE: 01/21/20
BORING NUMBER: 12-19
SAMPLE #: SS14
DEPTH (ft): From: 53 To: 54.5
RECOVERY (ft):
PHOTO: __ of __
BLOWCOUNT:
TOP OF SAMPLE

PHOTOGRAPHIC LOG

Client Name: TSSWCB	**Site Location:** Plum 2: Kyle, TX	**Project No.** 60615067

Photo No. 15	**Date:** 12/9/19

Description:

Boring 12-19.

SS-15. Depths ~ 58-60 ft

AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME : PLUM 2
DATE: 1/27/20
BORING NUMBER: 12-19
SAMPLE #: SS-15
DEPTH (ft): From: 58.5' To: 60'
RECOVERY (ft):
PHOTO: __ of __
BLOWCOUNT:
TOP OF SAMPLE

PHOTOGRAPHIC LOG

Client Name:	**Site Location:**	**Project No.**
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	**Date:**
1	10/1/20

Description:

Boring 13-20

Sample: P-1.

Depths: 0-2 ft

AECOM
TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME : Plum 2
DATE: 10/6/20
BORING NUMBER: 13-20
SAMPLE #: P1
DEPTH (ft): From: 0
To: 2
RECOVERY (ft): 10"
PHOTO: 1 of __
BLOWCOUNT: —
TOP OF SAMPLE

Photo No.	**Date:**
2	10/1/20

Description:

Boring 13-20

Sample: ST-2.

Depths: 2-4 ft

AECOM
TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME : Plum 2
DATE: 10/6/20
BORING NUMBER: 13-20
SAMPLE #: ST2
DEPTH (ft): From: 2
To: 4
RECOVERY (ft):
PHOTO: 2 of __
BLOWCOUNT: —
TOP OF SAMPLE

AECOM

PHOTOGRAPHIC LOG

Client Name:	**Site Location:**	**Project No.**
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	**Date:**
3	10/1/20

Description:

Boring 13-20

Sample: P-3

Depths: 4-6 ft

AECOM
TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME: Plum 2
DATE: 10/6/20
BORING NUMBER: 13-20
SAMPLE #: P-3
DEPTH (ft): From: 4 To: 6
RECOVERY (ft): 7
PHOTO: 3 of __
BLOWCOUNT: —
TOP OF SAMPLE

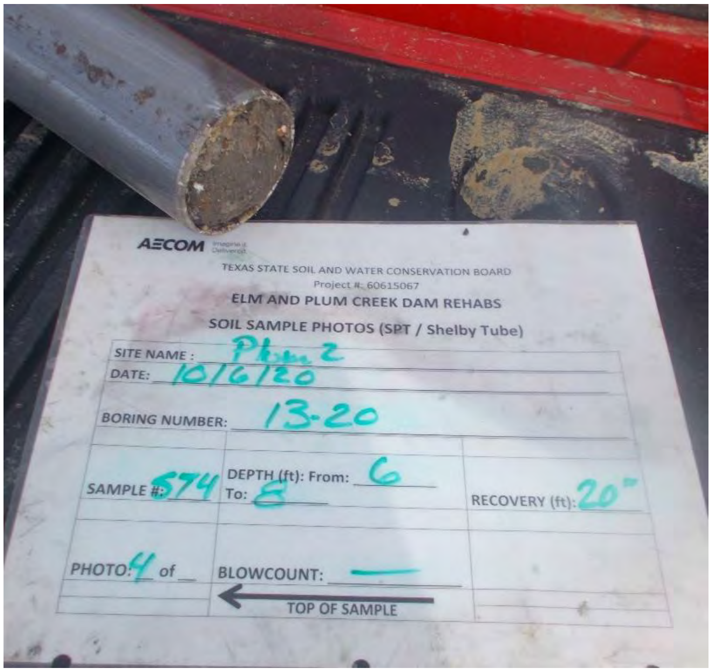
Photo No.	**Date:**
4	10/1/20

Description:

Boring 13-20

Sample: ST-4

Depths: 6-8 ft



AECOM
TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME: Plum 2
DATE: 10/6/20
BORING NUMBER: 13-20
SAMPLE #: ST4
DEPTH (ft): From: 6 To: 8
RECOVERY (ft): 20"
PHOTO: 4 of __
BLOWCOUNT: —
TOP OF SAMPLE

AECOM

PHOTOGRAPHIC LOG

Client Name:	**Site Location:**	**Project No.**
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	**Date:**
5	10/1/20

Description:

Boring 13-20

Sample: SS-5

Depths: 8-10 ft

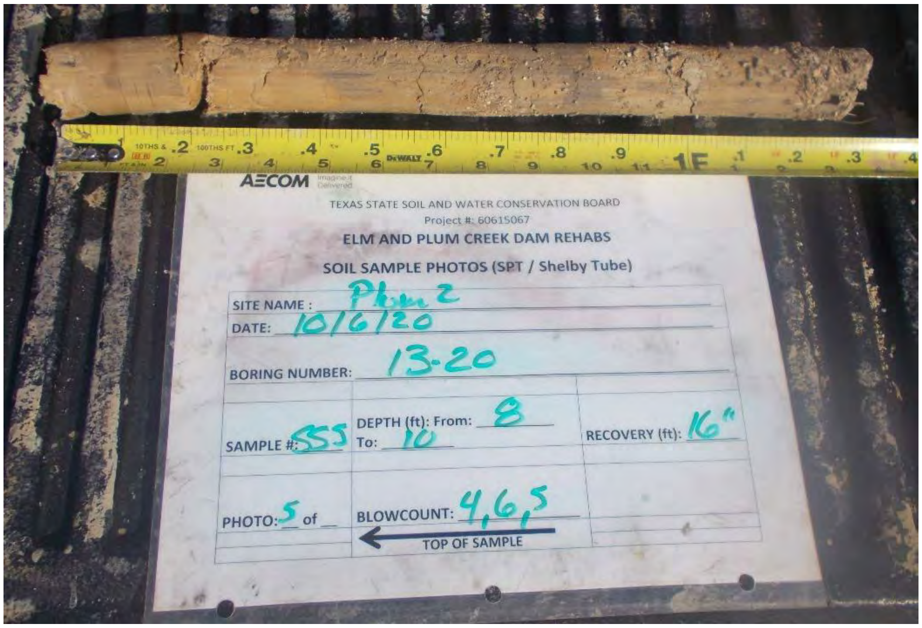

AECOM
TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)
SITE NAME: Plum 2
DATE: 10/6/20
BORING NUMBER: 13-20
SAMPLE #: SS5
DEPTH (ft): From: 8 To: 10
RECOVERY (ft): 16"
PHOTO: 5 of __
BLOWCOUNT: 4,6,5
TOP OF SAMPLE

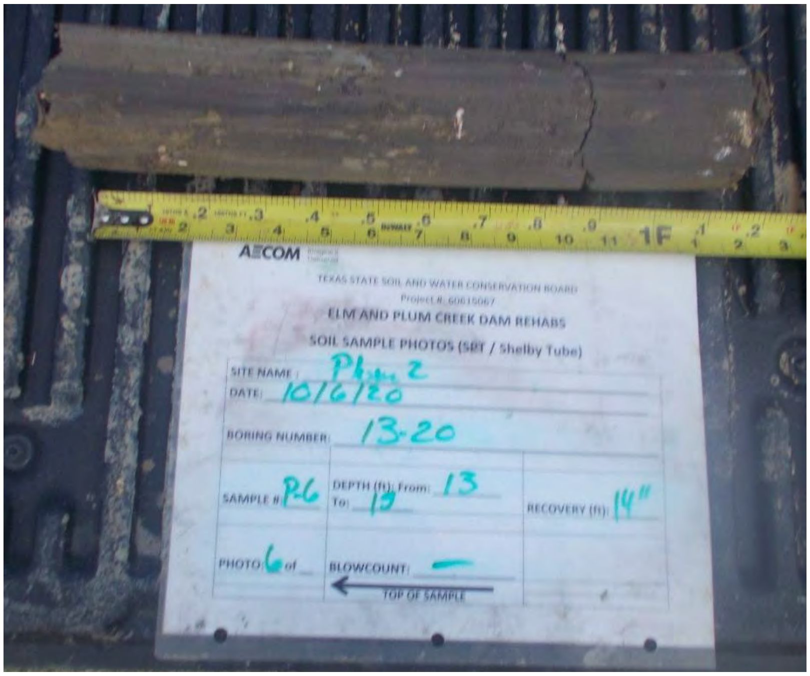
Photo No.	**Date:**
6	10/1/20

Description:

Boring 13-20

Sample: P-6

Depths: 13-15 ft


AECOM
TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)
SITE NAME: Plum 2
DATE: 10/6/20
BORING NUMBER: 13-20
SAMPLE #: P-6
DEPTH (ft): From: 13 To: 15
RECOVERY (ft): 14"
PHOTO: 6 of __
BLOWCOUNT: —
TOP OF SAMPLE

PHOTOGRAPHIC LOG

Client Name: TSSWCB	**Site Location:** Plum 2: Kyle, TX	**Project No.** 60615067

Photo No.	**Date:**
7	10/1/20

Description:

Boring 13-20

Sample: SS-8

Depths: 28-30 ft

AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD

Project #: 60615067

ELM AND PLUM CREEK DAM REHABS

SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME : Plum 2

DATE: 10/6/20

BORING NUMBER: 13-20

SAMPLE #: SS8

DEPTH (ft): From: 28 To: 30

RECOVERY (ft): 24"

PHOTO: 8 of

BLOWCOUNT: 7,13,18

TOP OF SAMPLE

Photo No.	**Date:**
8	10/1/20

Description:

Boring 13-20

Sample: ST-9

Depths: 33-35 ft

AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD

Project #: 60615067

ELM AND PLUM CREEK DAM REHABS

SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME : Plum 2

DATE: 10/6/20

BORING NUMBER: 13-20

SAMPLE #: ST9

DEPTH (ft): From: 33 To: 35

RECOVERY (ft): 23"

PHOTO: 9 of

BLOWCOUNT: —

TOP OF SAMPLE

AECOM

PHOTOGRAPHIC LOG

Client Name:	**Site Location:**	**Project No.**
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	**Date:**
9	10/1/20

Description:

Boring 13-20

Sample: SS-10

Depths: 38-40 ft

AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD

Project #: 60615067

ELM AND PLUM CREEK DAM REHABS

SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME : Plum 2

DATE: 10/6/20

BORING NUMBER: 13-20

SAMPLE #: SS10

DEPTH (ft): From: 38 To: 40

RECOVERY (ft): 24

PHOTO: 10 of __

BLOWCOUNT: 10,14,18

TOP OF SAMPLE

PHOTOGRAPHIC LOG

Client Name: TSSWCB	**Site Location:** Plum 2: Kyle, TX	**Project No.** 60615067

Photo No. 1 **Date:** 10/1/20

Description:

Boring 14-20

Sample: P-1.

Depths: 0-2 ft

AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD

Project #: 60615067

ELM AND PLUM CREEK DAM REHABS

SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME : Plum 2

DATE: 10/1/20

BORING NUMBER: 14-20

SAMPLE #: P1 DEPTH (ft): From: 0 To: 2 RECOVERY (ft): 11"

PHOTO: 1 of __ BLOWCOUNT: —

TOP OF SAMPLE

Photo No. 2 **Date:** 10/1/20

Description:

Boring 14-20

Sample: ST-2.

Depths: 2-4 ft

AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD

Project #: 60615067

ELM AND PLUM CREEK DAM REHABS

SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME : Plum 2

DATE: 10/1/20

BORING NUMBER: 14-20

SAMPLE #: ST2 DEPTH (ft): From: 2 To: 4 RECOVERY (ft): 6"

PHOTO: 2 of __ BLOWCOUNT: —

TOP OF SAMPLE

AECOM

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	Date:
3	10/1/20

Description:

Boring 14-20

Sample: P-3

Depths: 4-6 ft

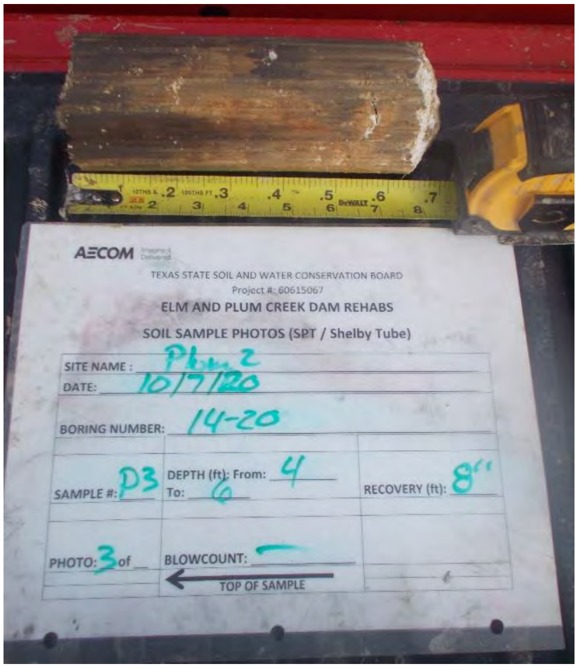

AECOM Imagine it. Delivered.
TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)
SITE NAME : Plum 2
DATE: 10/7/20
BORING NUMBER: 14-20
SAMPLE #: P3
DEPTH (ft): From: 4
To: 6
RECOVERY (ft): 8''
PHOTO: 3 of __
BLOWCOUNT: —
TOP OF SAMPLE

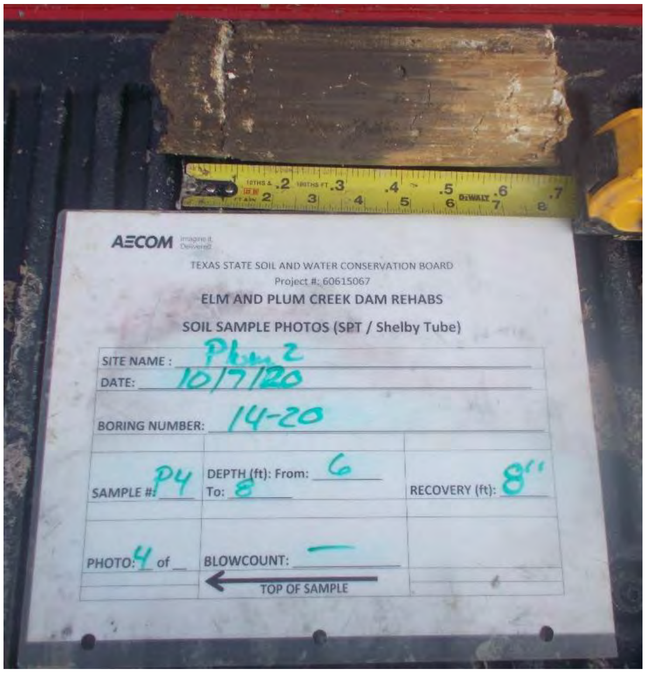
Photo No.	Date:
4	10/1/20

Description:

Boring 14-20

Sample: P-4

Depths: 6-8 ft


AECOM Imagine it. Delivered.
TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)
SITE NAME : Plum 2
DATE: 10/7/20
BORING NUMBER: 14-20
SAMPLE #: P4
DEPTH (ft): From: 6
To: 8
RECOVERY (ft): 8''
PHOTO: 4 of __
BLOWCOUNT: —
TOP OF SAMPLE

AECOM

PHOTOGRAPHIC LOG

Client Name:	**Site Location:**	**Project No.**
TSSWCB	Plum 2: Kyle, TX	60615067

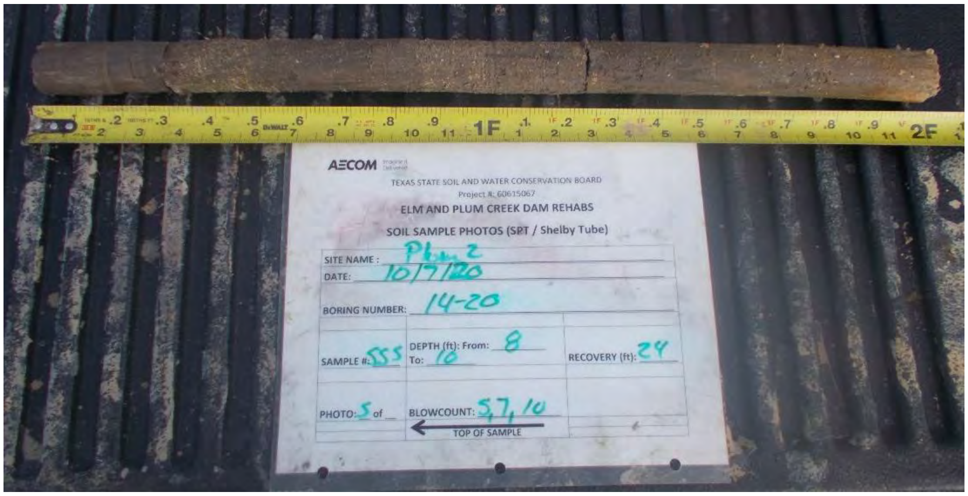
Photo No.	**Date:**
5	10/1/20

Description:

Boring 14-20

Sample: SS-5

Depths: 8-10 ft



AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME : Plum 2
DATE: 10/1/20
BORING NUMBER: 14-20
SAMPLE #: SS5
DEPTH (ft): From: 8 To: 10
RECOVERY (ft): 24
PHOTO: 5 of
BLOWCOUNT: 5,7,10
TOP OF SAMPLE

Photo No.	**Date:**
6	10/1/20

Description:

Boring 14-20

Sample: P-6

Depths: 13-15 ft

AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME : Plum 2
DATE: 10/1/20
BORING NUMBER: 14-20
SAMPLE #: P6
DEPTH (ft): From: 13 To: 15
RECOVERY (ft): 16"
PHOTO: 6 of
BLOWCOUNT: —
TOP OF SAMPLE

AECOM

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	Date:
7	10/1/20

Description:

Boring 14-20

Sample: ST-7

Depths: 18-20 ft

AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME : Plum 2
DATE: 10/7/20
BORING NUMBER: 14-20
SAMPLE #: ST7
DEPTH (ft): From: 18
To: 20
RECOVERY (ft): 13
PHOTO: 7 of __
BLOWCOUNT: —
TOP OF SAMPLE

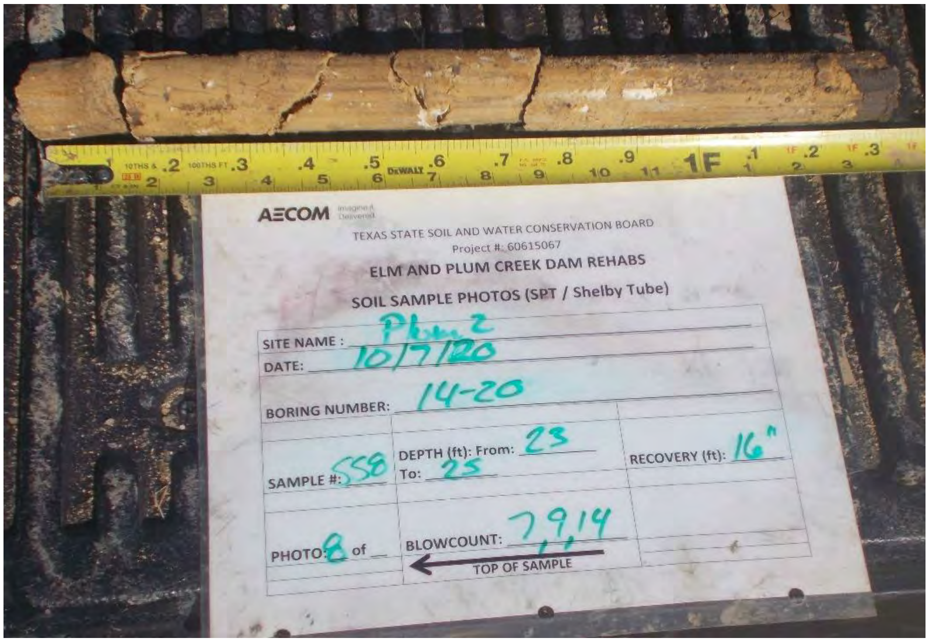
Photo No.	Date:
8	10/1/20

Description:

Boring 14-20

Sample: SS-8

Depths: 23-25 ft



AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME : Plum 2
DATE: 10/7/20
BORING NUMBER: 14-20
SAMPLE #: SS8
DEPTH (ft): From: 23
To: 25
RECOVERY (ft): 16"
PHOTO: 8 of __
BLOWCOUNT: 7,9,14
TOP OF SAMPLE

AECOM

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
TSSWCB	Plum 2: Kyle, TX	60615067

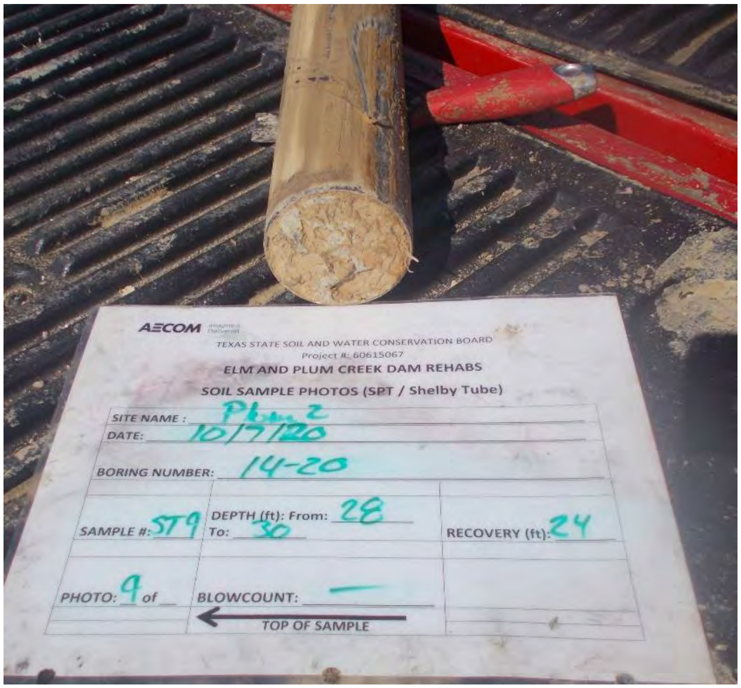
Photo No.	Date:
9	10/1/20

Description:

Boring 14-20

Sample: ST-9

Depths: 28-30 ft



AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME : Plum 2
DATE: 10/7/20
BORING NUMBER: 14-20
SAMPLE #: ST9
DEPTH (ft): From: 28 To: 30
RECOVERY (ft): 24
PHOTO: 9 of __
BLOWCOUNT: —
TOP OF SAMPLE

Photo No.	Date:
10	10/1/20

Description:

Boring 14-20

Sample: P-10

Depths: 38-40 ft

AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME : Plum 2
DATE: 10/7/20
BORING NUMBER: 14-20
SAMPLE #: P10
DEPTH (ft): From: 38 To: 40
RECOVERY (ft): 24
PHOTO: 10 of __
BLOWCOUNT: —
TOP OF SAMPLE

PHOTOGRAPHIC LOG

Client Name:	**Site Location:**	**Project No.**
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	**Date:**
9	10/1/20

Description:

Boring 14-20

Sample: ST-11

Depths: 38-40 ft

AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD

Project #: 60615067

ELM AND PLUM CREEK DAM REHABS

SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME : Plum 2

DATE: 10/7/20

BORING NUMBER: 14-20

SAMPLE #: ST11

DEPTH (ft): From: 38

To: 40

RECOVERY (ft): 14"

PHOTO: 11 of __

BLOWCOUNT: —

TOP OF SAMPLE

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	Date:
1	12/9/19

Description:

Boring 15-19.

P-1. Depths ~ 0-2 ft

AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD

Project #: 60615067

ELM AND PLUM CREEK DAM REHABS

SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

5-7-9

SITE NAME: Plum 2

DATE: 1/7/20

BORING NUMBER: 15-19

SAMPLE #: P1

DEPTH (ft): From: 0

To: 2

RECOVERY (ft):

PHOTO: __ of __

BLOWCOUNT:

TOP OF SAMPLE

Photo No.	Date:
2	12/9/19

Description:

Boring 15-19.

SS-2. Depths ~ 2-3.5 ft

AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD

Project #: 60615067

ELM AND PLUM CREEK DAM REHABS

SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

5-7-9

SITE NAME: Plum 2

DATE: 1/7/20

BORING NUMBER: 15-19

SAMPLE #: SS2

DEPTH (ft): From: 2'

To: 3.5'

RECOVERY (ft):

PHOTO: __ of __

BLOWCOUNT:

TOP OF SAMPLE

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	Date:
3	12/9/19

Description:

Boring 15-19.

P-3. Depths ~ 4-6 ft

AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD

Project #: 60615067

ELM AND PLUM CREEK DAM REHABS

SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME: Plum 2

DATE: 1/7/20

BORING NUMBER: 15-19

SAMPLE #: P3

DEPTH (ft): From: 4' To: 6'

RECOVERY (ft):

PHOTO: __ of __

BLOWCOUNT:

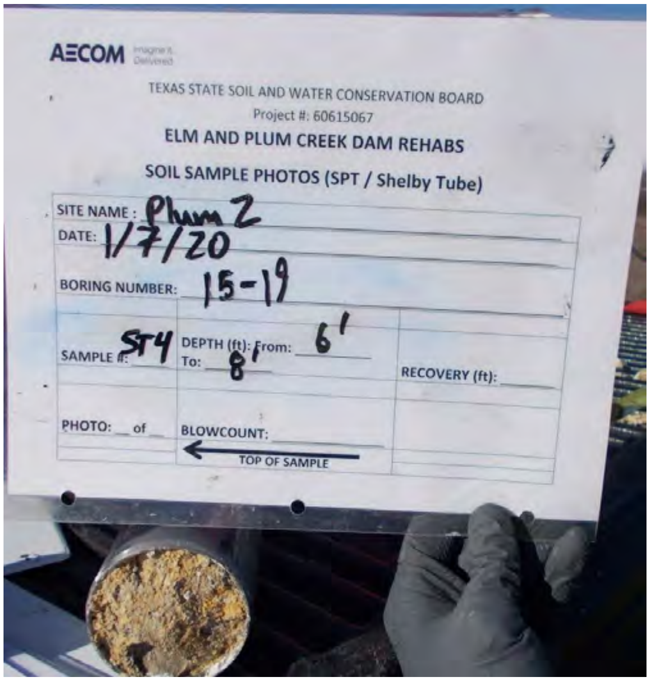
TOP OF SAMPLE

Photo No.	Date:
4	12/9/19

Description:

Boring 15-19.

ST-4. Depths ~ 6-8 ft



AECOM Imagine it. Delivered.

TEXAS STATE SOIL AND WATER CONSERVATION BOARD

Project #: 60615067

ELM AND PLUM CREEK DAM REHABS

SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME: Plum 2

DATE: 1/7/20

BORING NUMBER: 15-19

SAMPLE #: ST4

DEPTH (ft): From: 6' To: 8'

RECOVERY (ft):

PHOTO: __ of __

BLOWCOUNT:

TOP OF SAMPLE

PHOTOGRAPHIC LOG

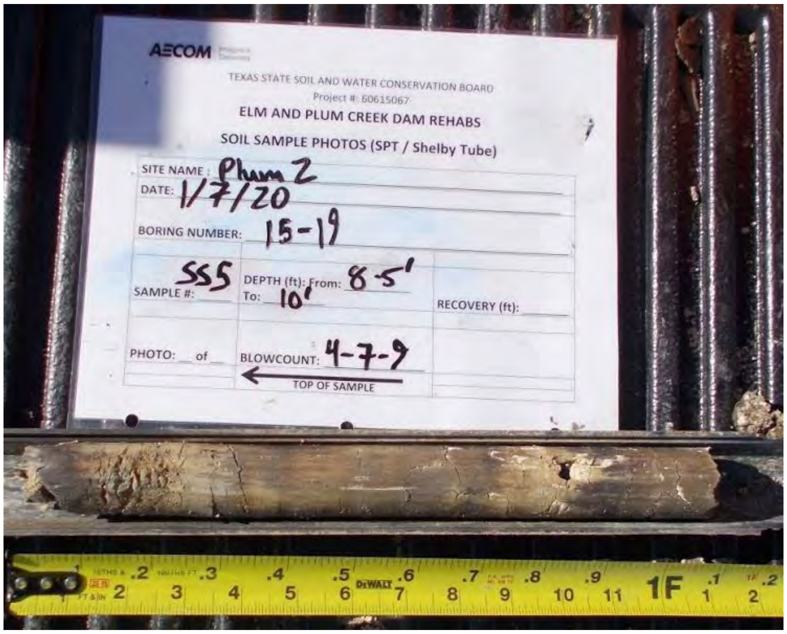
Client Name:	Site Location:	Project No.
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	Date:
5	12/9/19

Description:

Boring 15-19.

SS-5. Depths ~ 8.5-10 ft



AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD

Project #: 60615067

ELM AND PLUM CREEK DAM REHABS

SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME: Plum 2

DATE: 1/7/20

BORING NUMBER: 15-19

SAMPLE #: SS5

DEPTH (ft): From: 8.5' To: 10'

RECOVERY (ft):

PHOTO: __ of __

BLOWCOUNT: 4-7-9

TOP OF SAMPLE

Photo No.	Date:
6	12/9/19

Description:

Boring 15-19.

ST-6. Depths ~ 13-15 ft

SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME: Plum 2

DATE: 1/7/20

BORING NUMBER: 15-19

SAMPLE #: ST6

DEPTH (ft): From: 13' - To: 15'

RECOVERY (ft):

PHOTO: __ of __

BLOWCOUNT:

TOP OF SAMPLE

PHOTOGRAPHIC LOG

Client Name: TSSWCB	**Site Location:** Plum 2: Kyle, TX	**Project No.** 60615067

Photo No. 7	**Date:** 12/9/19

Description:

Boring 15-19.

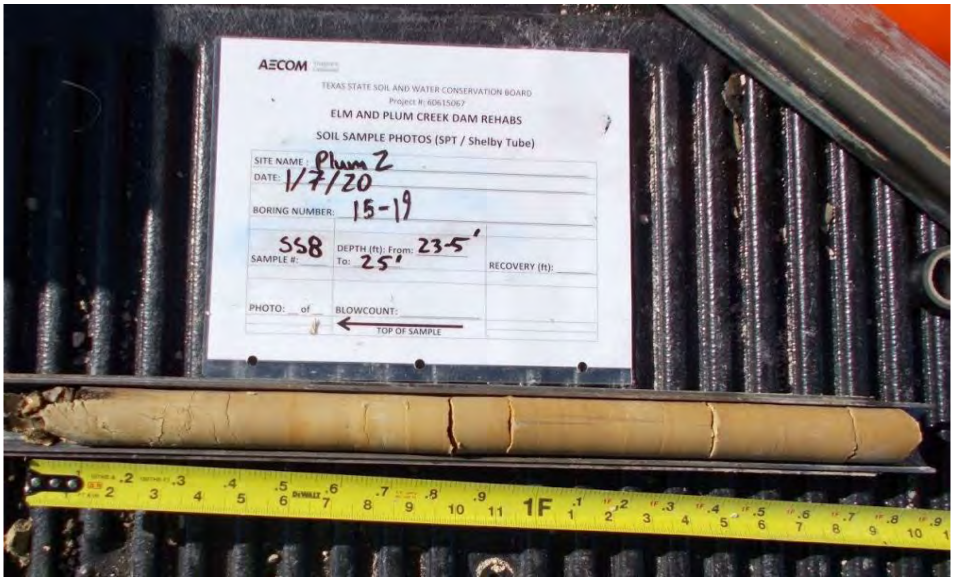
P-7. Depths ~ 18-20 ft

Photo No. 8	**Date:** 12/9/19

Description:

Boring 15-19.

SS-8. Depths ~ 23.5-25 ft



AECOM

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	Date:
9	12/9/19

Description:

Boring 15-19.

ST-9. Depths ~ 28-30 ft

AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD

Project #: 60615067

ELM AND PLUM CREEK DAM REHABS

SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME: Plum 2

DATE: 1/7/20

BORING NUMBER: 15-19

SAMPLE #: ST9

DEPTH (ft): From: 28' To: 30'

RECOVERY (ft):

PHOTO: __ of __

BLOWCOUNT:

TOP OF SAMPLE

Photo No.	Date:
10	12/9/19

Description:

Boring 15-19.

P-10. Depths ~ 33-35 ft

AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD

Project #: 60615067

ELM AND PLUM CREEK DAM REHABS

SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME: Plum 2

DATE: 1/7/20

BORING NUMBER: 15-19

SAMPLE #: P10

DEPTH (ft): From: 33' To: 35'

RECOVERY (ft):

PHOTO: __ of __

BLOWCOUNT:

TOP OF SAMPLE

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	Date:
11	12/9/19

Description:

Boring 15-19.

P-11. Depths ~ 38-40 ft

AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD

Project #: 60615067

ELM AND PLUM CREEK DAM REHABS

SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME: Plum 2

DATE: 1/7/20

BORING NUMBER: 15-19

SAMPLE #: P11

DEPTH (ft): From: 38'

To: 40'

RECOVERY (ft):

PHOTO: __ of __

BLOWCOUNT:

TOP OF SAMPLE

Photo No.	Date:
10	12/9/19

Description:

Boring 15-19.

SS-12. Depths ~ 43.5-45 ft

AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD

Project #: 60615067

ELM AND PLUM CREEK DAM REHABS

SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME: Plum 2

DATE: 1/7/20

BORING NUMBER: 15-19

SAMPLE #: SS12

DEPTH (ft): From: 43.5'

To: 45'

RECOVERY (ft):

PHOTO: __ of __

BLOWCOUNT:

TOP OF SAMPLE

AECOM

PHOTOGRAPHIC LOG

Client Name:	**Site Location:**	**Project No.**
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	**Date:**
1	12/9/19

Description:

Boring 101-19.

P-1. Depths ~ 0-2 ft

Photo No.	**Date:**
2	12/9/19

Description:

Boring 101-19.

SS-2. Depths ~ 2-3.5 ft

PHOTOGRAPHIC LOG

Client Name: TSSWCB	**Site Location:** Plum 2: Kyle, TX	**Project No.** 60615067

Photo No. 3

Date: 12/9/19

Description:

Boring 101-19.

P-3. Depths ~ 4-6 ft

AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD

Project #: 60615067

ELM AND PLUM CREEK DAM REHABS

SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME: Plum 2

DATE: 1/3/20

BORING NUMBER: 101-19

SAMPLE #: P-3

DEPTH (ft): From: 4'

To: 6'

RECOVERY (ft):

PHOTO: __ of __

BLOWCOUNT:

TOP OF SAMPLE

Photo No. 4

Date: 12/9/19

Description:

Boring 101-19.

SS-4. Depths ~ 6-7.5 ft

AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD

Project #: 60615067

ELM AND PLUM CREEK DAM REHABS

SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME: Plum 2

DATE: 1/3/20

BORING NUMBER: 101-19

SAMPLE #: SS-4

DEPTH (ft): From: 6'

To: 7.5'

RECOVERY (ft):

PHOTO: __ of __

BLOWCOUNT:

TOP OF SAMPLE

PHOTOGRAPHIC LOG

Client Name:	**Site Location:**	**Project No.**
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	**Date:**
5	12/9/19

Description:

Boring 101-19.

P-5. Depths ~ 8-10 ft

AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD

Project #: 60615067

ELM AND PLUM CREEK DAM REHABS

SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME : Plum 2

DATE: 1/31/20

BORING NUMBER: 101-19

SAMPLE #: P-5

DEPTH (ft): From: 8'

To: 10'

RECOVERY (ft): ___

PHOTO: __ of __

BLOWCOUNT: ___

TOP OF SAMPLE

AECOM

PHOTOGRAPHIC LOG

Client Name:	**Site Location:**	**Project No.**
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	**Date:**
1	12/9/19

Description:

Boring 102-19.

P-1. Depths ~ 0-2 ft

AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD

Project #: 60615067

ELM AND PLUM CREEK DAM REHABS

SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME : Plum 2

DATE: 1/3/20

BORING NUMBER: 102-19

SAMPLE #: P-1

DEPTH (ft): From: 0'

To: 2'

RECOVERY (ft):

PHOTO: __ of __

BLOWCOUNT:

TOP OF SAMPLE

Photo No.	**Date:**
2	12/9/19

Description:

Boring 102-19.

SS-2. Depths ~ 2-3.5 ft

AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD

Project #: 60615067

ELM AND PLUM CREEK DAM REHABS

SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME : Plum 2

DATE: 1/3/20

BORING NUMBER: 102-19

SAMPLE #: SS2

DEPTH (ft): From: 2'

To: 3.5'

RECOVERY (ft):

PHOTO: __ of __

BLOWCOUNT:

TOP OF SAMPLE

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	Date:
3	12/9/19

Description:

Boring 102-19.

ST-3. Depths ~ 4-6 ft

Photo No.	Date:
4	12/9/19

Description:

Boring 102-19.

SS-4. Depths ~ 6-7.5 ft

PHOTOGRAPHIC LOG

Client Name:	**Site Location:**	**Project No.**
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	**Date:**
5	12/9/19

Description:

Boring 102-19.

P-5. Depths ~ 8-10 ft

AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD

Project #: 60615067

ELM AND PLUM CREEK DAM REHABS

SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME : Plum 2

DATE: 1/3/20

BORING NUMBER: 102-19

SAMPLE #: P-5

DEPTH (ft): From: 8'

To: 10'

RECOVERY (ft):

PHOTO: __ of __

BLOWCOUNT:

TOP OF SAMPLE

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	Date:
1	12/9/19

Description:

Boring 103-19.

P-1. Depths ~ 0-2 ft

AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD

ELM AND PLUM CREEK DAM REHABS

SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME: Plum 2

DATE: 1/3/20

BORING NUMBER: 103-19

SAMPLE #: P-1

DEPTH (ft): From: 0

To: 2'

RECOVERY (ft):

PHOTO: __ of __

BLOWCOUNT:

Photo No.	Date:
2	12/9/19

Description:

Boring 103-19.

SS-2. Depths ~ 2-3.5 ft

ELM AND PLUM CREEK DAM REHABS

SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME: Plum 2

DATE: 1/3/20

BORING NUMBER: 103-19

SAMPLE #: SS-2

DEPTH (ft): From: 2'

To: 3.5'

RECOVERY (ft):

PHOTO: __ of __

BLOWCOUNT:

TOP OF SAMPLE

PHOTOGRAPHIC LOG

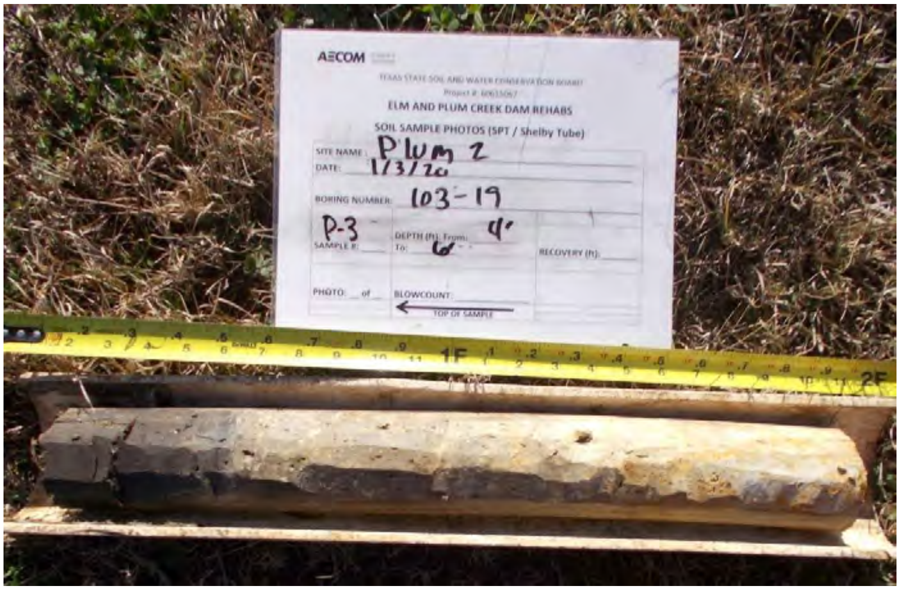
Client Name:	Site Location:	Project No.
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	Date:
3	12/9/19

Description:

Boring 103-19.

P-3. Depths ~ 4-6 ft



AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME: Plum 2
DATE: 1/3/20
BORING NUMBER: 103-19
SAMPLE #: P-3
DEPTH (ft): From: 4'
To: 6'
RECOVERY (ft):
PHOTO: _ of _
BLOWCOUNT:
TOP OF SAMPLE

Photo No.	Date:
4	12/9/19

Description:

Boring 103-19.

SS-4. Depths ~ 6-7.5 ft

AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME: Plum 2
DATE: 1/3/20
BORING NUMBER: 103-19
SAMPLE #: SS-6
DEPTH (ft): From: 6'
To: 7.5'
RECOVERY (ft):
PHOTO: _ of _
BLOWCOUNT:
TOP OF SAMPLE

PHOTOGRAPHIC LOG

Client Name:	**Site Location:**	**Project No.**
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	**Date:**
5	12/9/19

Description:

Boring 103-19.

P-5. Depths ~ 8-10 ft

Project #: 60615067

ELM AND PLUM CREEK DAM REHABS

SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME : Plum 2
DATE: 1/3/20
BORING NUMBER: 103-19
SAMPLE #: P-5
DEPTH (ft): From: 8´
To: 10´
RECOVERY (ft): ____
PHOTO: __ of __
BLOWCOUNT: ____

PHOTOGRAPHIC LOG

Client Name:	**Site Location:**	**Project No.**
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	**Date:**
1	12/9/19

Description:

Boring 104-19.

P-1. Depths ~ 0-2 ft

AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD

ELM AND PLUM CREEK DAM REHABS

SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME Plum 2

DATE: 1/3/20

BORING NUMBER: 104-19

SAMPLE #: P1

DEPTH (ft): From: 0'

To: 2'

RECOVERY (ft):

PHOTO: __ of __

BLOWCOUNT:

TOP OF SAMPLE

Photo No.	**Date:**
2	12/9/19

Description:

Boring 104-19.

SS-2. Depths ~ 2-3.5 ft

AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD

ELM AND PLUM CREEK DAM REHABS

SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME Plum 2

DATE: 1/3/20

BORING NUMBER: 104-19

SAMPLE #: SS-2

DEPTH (ft): From: 2'

To: 3.5'

RECOVERY (ft):

PHOTO: __ of __

BLOWCOUNT:

TOP OF SAMPLE

AECOM

PHOTOGRAPHIC LOG

Client Name:	**Site Location:**	**Project No.**
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	**Date:**
3	12/9/19

Description:

Boring 104-19.

P-3. Depths ~ 4-6 ft

Photo No.	**Date:**
4	12/9/19

Description:

Boring 104-19.

SS-5. Depths ~ 6-7.5 ft

AECOM

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No. 5

Date: 12/9/19

Description:

Boring 104-19.

P-5. Depths ~ 8-10 ft

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	Date:
1	12/9/19

Description:

Boring 105-19.

P-1. Depths ~ 0-2 ft

AECOM
TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME: Plum 2
DATE: 1/3/20
BORING NUMBER: 105-19
SAMPLE #: P1
DEPTH (ft): From: 0'
To: 2
RECOVERY (ft):
PHOTO: __ of __
BLOWCOUNT:
TOP OF SAMPLE

Photo No.	Date:
2	12/9/19

Description:

Boring 105-19.

SS-2. Depths ~ 2-3.5 ft

AECOM
TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME: Plum 2
DATE: 1/3/20
BORING NUMBER: 105-19
SAMPLE #: SS-2
DEPTH (ft): From: 2'
To: 3.5'
RECOVERY (ft):
PHOTO: __ of __
BLOWCOUNT:
TOP OF SAMPLE

AECOM

PHOTOGRAPHIC LOG

Client Name:	**Site Location:**	**Project No.**
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	**Date:**
3	12/9/19

Description:

Boring 105-19.

P-3. Depths ~ 4-6 ft

Photo No.	**Date:**
4	12/9/19

Description:

Boring 105-19.

SS-4. Depths ~ 6-7.5 ft

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	Date:
5	12/9/19

Description:

Boring 105-19.

P-5. Depths ~ 8-10 ft

CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME : Plum 2
DATE: 1/3/20
BORING NUMBER: 105-19
SAMPLE #: P-5
DEPTH (ft): From: 8- To: 10'
RECOVERY (ft):
PHOTO: __ of __
BLOWCOUNT:
TOP OF SAMPLE

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	Date:
1	12/9/19

Description:

Boring 106-19.

P-1. Depths ~ 0-2 ft

AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME : Plum 2.
DATE: 1/3/20
BORING NUMBER: 106-19
SAMPLE #: P-1
DEPTH (ft): From: 0'
To: 2'
RECOVERY (ft):
PHOTO: __ of __
BLOWCOUNT:

Photo No.	Date:
2	12/9/19

Description:

Boring 106-19.

SS-2. Depths ~ 2-3.5 ft

AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME : Plum 2.
DATE: 1/3/20
BORING NUMBER: 106-19
SAMPLE #: SS 2
DEPTH (ft): From: 2'
To: 3-5'
RECOVERY (ft):
PHOTO: __ of __
BLOWCOUNT:
TOP OF SAMPLE

AECOM

PHOTOGRAPHIC LOG

Client Name:	**Site Location:**	**Project No.**
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	**Date:**
3	12/9/19

Description:

Boring 106-19.

P-3. Depths ~ 4-6 ft

Photo No.	**Date:**
4	12/9/19

Description:

Boring 106-19.

SS-4. Depths ~ 6-7.5 ft

PHOTOGRAPHIC LOG

Client Name:	**Site Location:**	**Project No.**
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	**Date:**
5	12/9/19

Description:

Boring 106-19.

P-5. Depths ~ 8-10 ft

AECOM

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	Date:
1	12/9/19

Description:

Boring 201-19.

P-1. Depths ~ 0-2 ft


AECOM
TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)
SITE NAME: Plum2
DATE: 12/31/19
BORING NUMBER: 201-19
SAMPLE #: P1
DEPTH (ft): From: 0 To: 2
RECOVERY (ft):
PHOTO: __ of __
BLOWCOUNT:
TOP OF SAMPLE

Photo No.	Date:
2	12/9/19

Description:

Boring 201-19.

ST-2. Depths ~ 2-4 ft


ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)
SITE NAME: Plum2
DATE: 12/31/19
BORING NUMBER: 201-19
SAMPLE #: ST2
DEPTH (ft): From: 2' To: 4'
RECOVERY (ft):
PHOTO: __ of __
BLOWCOUNT:
TOP OF SAMPLE

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	Date:
3	12/9/19

Description:

Boring 201-19.

SS-3. Depths ~ 4-5.5 ft

Photo No.	Date:
4	12/9/19

Description:

Boring 201-19.

P-4. Depths ~ 6-8 ft

AECOM

PHOTOGRAPHIC LOG

Client Name:	**Site Location:**	**Project No.**
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	**Date:**
5	12/9/19

Description:

Boring 201-19.

SS-5. Depths ~ 8-9.5 ft

Photo No.	**Date:**
6	12/9/19

Description:

Boring 201-19.

ST-6. Depths ~ 13-15 ft

AECOM

PHOTOGRAPHIC LOG

Client Name:	**Site Location:**	**Project No.**
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	**Date:**
7	12/9/19

Description:

Boring 201-19.

P-7. Depths ~ 18-20 ft

AECOM
TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)
SITE NAME: Plum2
DATE: 12/31/19
BORING NUMBER: 201-19
SAMPLE #: P7
DEPTH (ft): From: 18' To: 20'
RECOVERY (ft):
PHOTO: __ of __
BLOWCOUNT:
TOP OF SAMPLE

Photo No.	**Date:**
8	12/9/19

Description:

Boring 201-19.

SS-8. Depths ~ 23.5-25 ft

AECOM
TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)
SITE NAME: Plum2
DATE: 12/31/19
BORING NUMBER: 201-19
SAMPLE #: SS8
DEPTH (ft): From: 23.5 To: 25'
RECOVERY (ft):
PHOTO: __ of __
BLOWCOUNT:
TOP OF SAMPLE

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	Date:
1	12/9/19

Description:

Boring 202-19.

P-1. Depths ~ 0-2 ft

Photo No.	Date:
2	12/9/19

Description:

Boring 202-19.

ST-2. Depths ~ 2-4 ft

Photo No.	**Date:**
3	12/9/19

Description:

Boring 202-19.

SS-3. Depths ~ 4-5.5 ft

TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)
SITE NAME: Plum 2
DATE: 12/30/19
BORING NUMBER: 202-19
SAMPLE #: SS3
DEPTH (ft): From: 4' To: 5.5'
RECOVERY (ft):
PHOTO: __ of __
BLOWCOUNT:
TOP OF SAMPLE

Photo No.	**Date:**
4	12/9/19

Description:

Boring 202-19.

P-4. Depths ~ 6-8 ft

AECOM
TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)
SITE NAME: Plum 2
DATE: 12/30/19
BORING NUMBER: 202-19
SAMPLE #: P4
DEPTH (ft): From: 6' To: 8'
RECOVERY (ft):
PHOTO: __ of __
BLOWCOUNT:
TOP OF SAMPLE

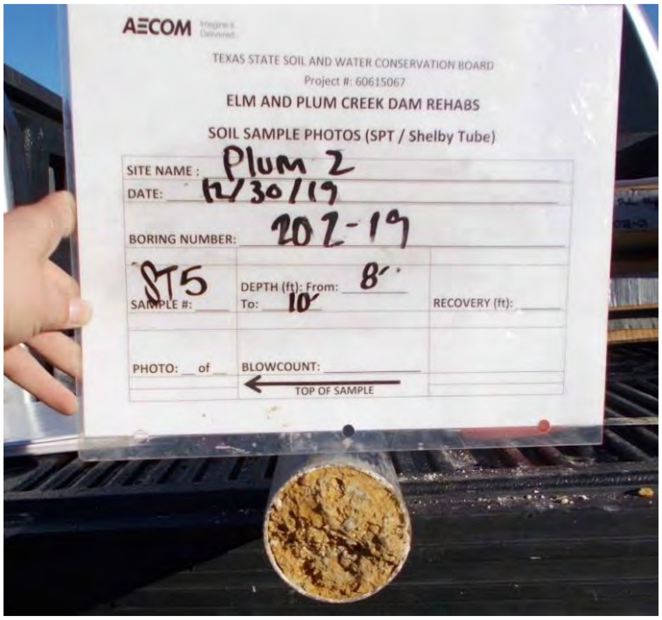
Client Name:	**Site Location:**	**Project No.**
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	**Date:**
5	12/9/19

Description:

Boring 202-19.

ST-5. Depths ~ 8-10 ft



AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME : Plum 2
DATE: 12/30/19
BORING NUMBER: 202-19
SAMPLE #: ST5
DEPTH (ft): From: 8'
To: 10'
RECOVERY (ft):
PHOTO: __ of __
BLOWCOUNT:
TOP OF SAMPLE

Photo No.	**Date:**
6	12/9/19

Description:

Boring 202-19.

SS-6. Depths ~ 13.5-15 ft

AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME : Plum 2
DATE: 12/30/19
BORING NUMBER: 202-19
SAMPLE #: SS6
DEPTH (ft): From: 13.5'
To: 15'
RECOVERY (ft):
PHOTO: __ of __
BLOWCOUNT:
TOP OF SAMPLE

AECOM

PHOTOGRAPHIC LOG

Client Name: TSSWCB	**Site Location:** Plum 2: Kyle, TX	**Project No.** 60615067

Photo No. 7	**Date:** 12/9/19

Description:

Boring 202-19.

P-7. Depths ~ 18-20 ft

SITE NAME: Plum 2
DATE: 12/30/19
BORING NUMBER: 202-19
SAMPLE #: P7
DEPTH (ft): From: 18 To: 20'
RECOVERY (ft):
PHOTO: __ of __
BLOWCOUNT:

Photo No. 8	**Date:** 12/9/19

Description:

Boring 202-19.

SS-8. Depths ~ 23.5-25 ft

SITE NAME: Plum 2
DATE: 12/30/19
BORING NUMBER: 202-19
SAMPLE #: SS 8
DEPTH (ft): From: 23.5 To: 25'
RECOVERY (ft):
PHOTO: __ of __
BLOWCOUNT:

AECOM

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	Date:
1	12/9/19

Description:

Boring 203-19.

P-1. Depths ~ 0-2 ft

Photo No.	Date:
2	12/9/19

Description:

Boring 203-19.

SS-2. Depths ~ 2-3.5 ft

AECOM

PHOTOGRAPHIC LOG

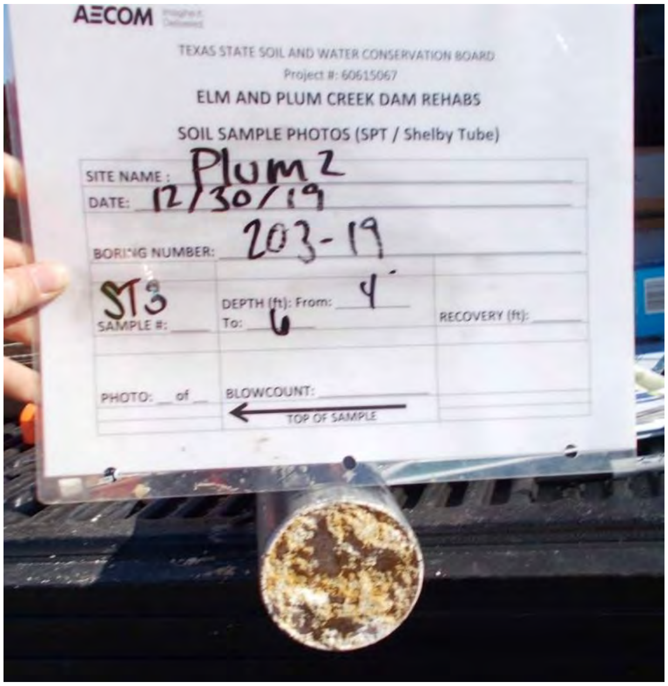
Client Name:	Site Location:	Project No.
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	Date:
3	12/9/19

Description:

Boring 203-19.

ST-3. Depths ~ 4-6 ft



AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME: Plum 2
DATE: 12/30/19
BORING NUMBER: 203-19
SAMPLE #: ST3
DEPTH (ft): From: 4'
To: 6
RECOVERY (ft): ____
PHOTO: __ of __
BLOWCOUNT: ____
TOP OF SAMPLE

Photo No.	Date:
4	12/9/19

Description:

Boring 203-19.

P-4. Depths ~ 6-8 ft

TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME: Plum 2
DATE: 12/30/19
BORING NUMBER: 203-19
SAMPLE #: P4
DEPTH (ft): From: 6'
To: 8'
RECOVERY (ft): ____
PHOTO: __ of __
BLOWCOUNT: ____
TOP OF SAMPLE

AECOM

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No. 5 **Date:** 12/9/19

Description:

Boring 203-19.

SS-5. Depths ~ 8-9.5 ft

Photo No. 6 **Date:** 12/9/19

Description:

Boring 203-19.

P-6. Depths ~ 13-15 ft

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	Date:
7	12/9/19

Description:

Boring 203-19.

SS-7. Depths ~ 18.5-20 ft

Photo No.	Date:
8	12/9/19

Description:

Boring 203-19.

ST-8. Depths ~ 23-25 ft

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	Date:
1	12/9/19

Description:

Boring 204-19.

P-1. Depths ~ 0-2 ft

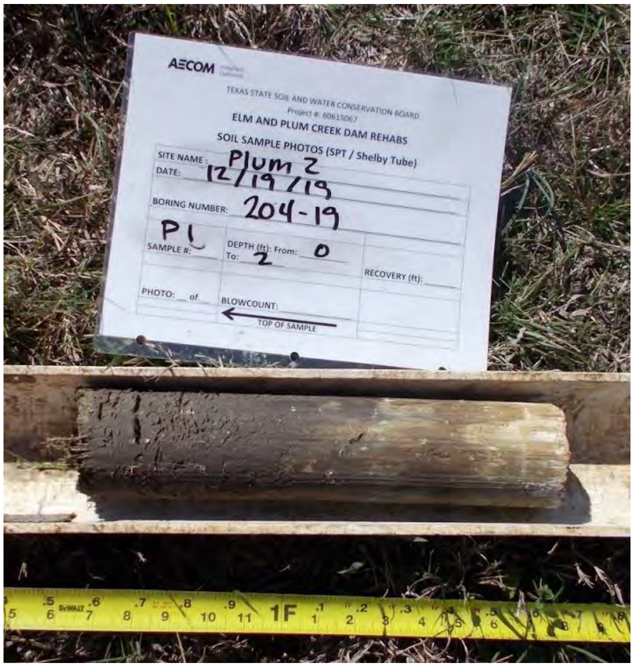


Photo No.	Date:
2	12/9/19

Description:

Boring 204-19.

ST-2. Depths ~ 2-4 ft

PHOTOGRAPHIC LOG

Client Name: TSSWCB	**Site Location:** Plum 2: Kyle, TX	**Project No.** 60615067

Photo No. 3

Date: 12/9/19

Description:

Boring 204-19.

SS-3. Depths ~ 4-5.5 ft

Photo No. 4

Date: 12/9/19

Description:

Boring 204-19.

P-4. Depths ~ 6-8 ft

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	Date:
5	12/9/19

Description:

Boring 204-19.

SS-5. Depths ~ 8-9.5 ft

AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

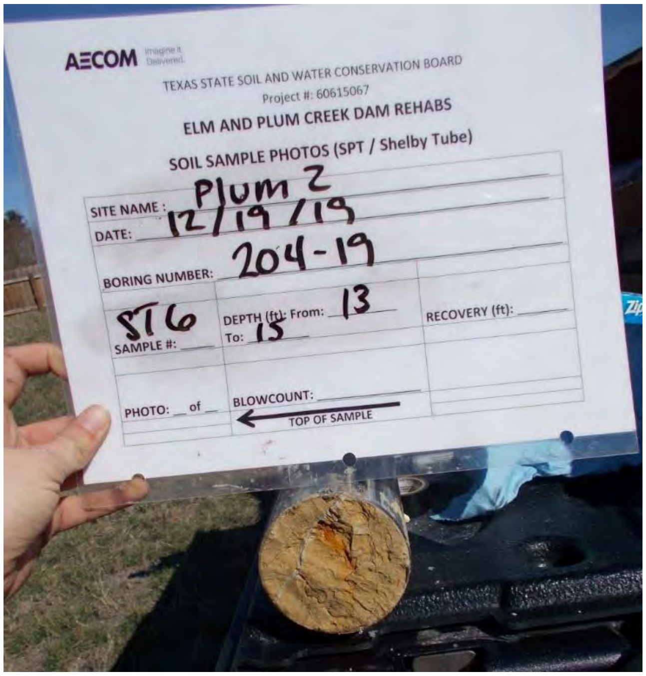
SITE NAME: Plum 2
DATE: 12/19/19
BORING NUMBER: 204-19
SAMPLE #: SS5
DEPTH (ft): From: 8
To: 9.5
RECOVERY (ft):
PHOTO: __ of __
BLOWCOUNT:
TOP OF SAMPLE

Photo No.	Date:
6	12/9/19

Description:

Boring 204-19.

ST-6. Depths ~ 13-15 ft



AECOM Imagine it. Delivered.

TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME: Plum 2
DATE: 12/19/19
BORING NUMBER: 204-19
SAMPLE #: ST6
DEPTH (ft): From: 13
To: 15
RECOVERY (ft):
PHOTO: __ of __
BLOWCOUNT:
TOP OF SAMPLE

AECOM

PHOTOGRAPHIC LOG

Client Name:	**Site Location:**	**Project No.**
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	**Date:**
7	12/9/19

Description:

Boring 204-19.

P-7. Depths ~ 18-20 ft

Photo No.	**Date:**
8	12/9/19

Description:

Boring 204-19.

SS-8. Depths ~ 23.5-25 ft

PHOTOGRAPHIC LOG

Client Name: TSSWCB	**Site Location:** Plum 2: Kyle, TX	**Project No.** 60615067

Photo No. 1

Date: 12/9/19

Description:

Boring 205-19.
P-1. Depths ~ 0-2 ft

AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME: Plum 2
DATE: 12/18/19
BORING NUMBER: 205-19
SAMPLE #: P-1
DEPTH (ft): From: 0 To: 2
RECOVERY (ft):
PHOTO: __ of __
BLOWCOUNT:
TOP OF SAMPLE

Photo No. 2

Date: 12/9/19

Description:

Boring 205-19.

SS-2. Depths ~ 3.5-4 ft

ELM AND PLUM CREEK DAM
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME: Plum 2
DATE: 12/18/19
BORING NUMBER: 205-19
SAMPLE #: SS2
DEPTH (ft): From: 2 To: 3.5
RECOVERY (ft): ___
PHOTO: __ of __
BLOWCOUNT: ___
TOP OF SAMPLE

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	Date:
3	12/9/19

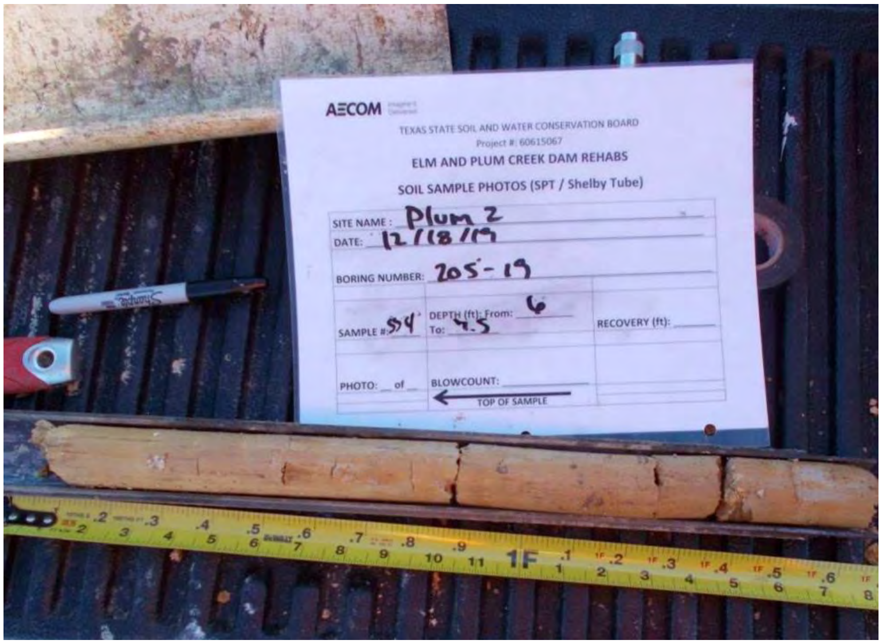
Description:

Boring 205-19.
P-3. Depths ~ 4-6 ft

Photo No.	Date:
4	12/9/19

Description:

Boring 205-19.
SS-4. Depths ~ 6-7.5 ft



PHOTOGRAPHIC LOG

Client Name:	**Site Location:**	**Project No.**
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	**Date:**
5	12/9/19

Description:

Boring 205-19.
ST-5. Depths ~ 8-10 ft

Photo No.	**Date:**
6	12/9/19

Description:

Boring 205-19.
P-6. Depths ~ 13-15 ft

AECOM

PHOTOGRAPHIC LOG

Client Name:	**Site Location:**	**Project No.**
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No. 7

Date: 12/9/19

Description:

Boring 205-19.
ST-8. Depths ~ 23-25 ft

TEXAS STATE
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME : Plum 2
DATE: 12/18/19
BORING NUMBER: 205-19
SAMPLE # ST-8
DEPTH (ft): From: 23
To: 25
RECOVERY (ft): ____
PHOTO: __ of __
BLOWCOUNT: ____
TOP OF SAMPLE

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	Date:
1	12/9/19

Description:

Boring 206-19.

P-1. Depths ~ 0-2 ft

AECOM
TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)
SITE NAME: PlUM2
DATE: 1/2/20
BORING NUMBER: 206-19
SAMPLE #: P1
DEPTH (ft): From: 0
To: 2'
RECOVERY (ft):
PHOTO: __ of __
BLOWCOUNT:
TOP OF SAMPLE

Photo No.	Date:
2	12/9/19

Description:

Boring 206-19.

SS-2. Depths ~ 2-3.5 ft

AECOM
TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)
SITE NAME: PlUM2
DATE: 1/2/20
BORING NUMBER: 206-19
SAMPLE #: SS2
DEPTH (ft): From: 2
To: 3.5
RECOVERY (ft):
PHOTO: __ of __
BLOWCOUNT:

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	Date:
3	12/9/19

Description:

Boring 206-19.

P-3. Depths ~ 4-6 ft

AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD

Project #: 60615067

ELM AND PLUM CREEK DAM REHABS

SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME: PLUM 2

DATE: 1/2/20

BORING NUMBER: 206-19

SAMPLE #: P3

DEPTH (ft): From: 4' To: 6'

RECOVERY (ft):

PHOTO: __ of __

BLOWCOUNT:

TOP OF SAMPLE

Photo No.	Date:
4	12/9/19

Description:

Boring 206-19.

SS-4. Depths ~ 6-7.5 ft

AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD

Project #: 60615067

ELM AND PLUM CREEK DAM REHABS

SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME: PLUM 2

DATE: 1/2/20

BORING NUMBER: 206-19

SAMPLE #: SS4

DEPTH (ft): From: 6' To: 7.5'

RECOVERY (ft):

PHOTO: __ of __

BLOWCOUNT:

TOP OF SAMPLE

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	Date:
5	12/9/19

Description:

Boring 206-19.

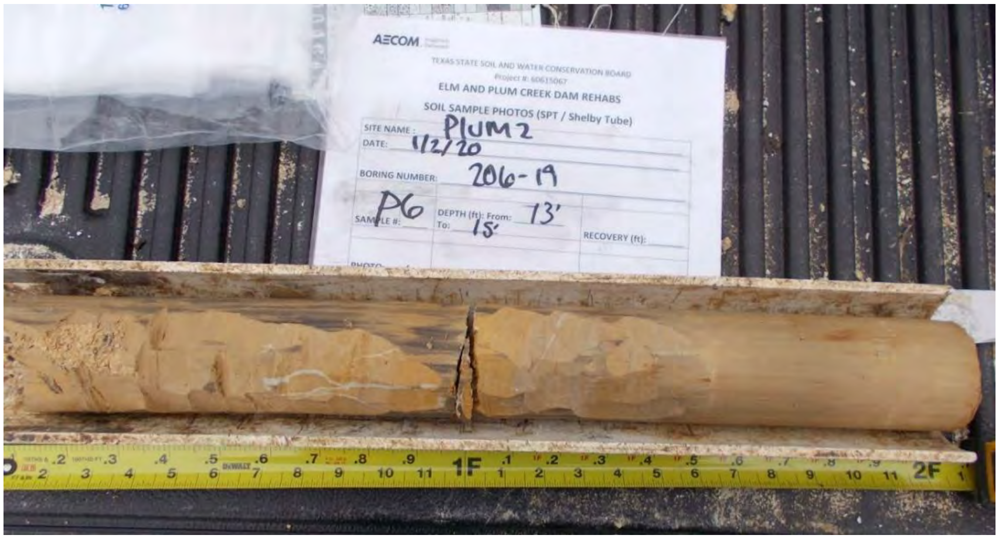
ST-5. Depths ~ 8-10 ft

Photo No.	Date:
6	12/9/19

Description:

Boring 206-19.

P-6. Depths ~ 13-15 ft



AECOM

PHOTOGRAPHIC LOG

Client Name:	**Site Location:**	**Project No.**
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	**Date:**
7	12/9/19

Description:

Boring 206-19.

ST-7. Depths ~ 18-20 ft

Photo No.	**Date:**
8	12/9/19

Description:

Boring 206-19.

SS-8. Depths ~ 23.5-25 ft

PHOTOGRAPHIC LOG

Client Name:	**Site Location:**	**Project No.**
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	**Date:**
1	12/9/19

Description:

Boring 207-19.

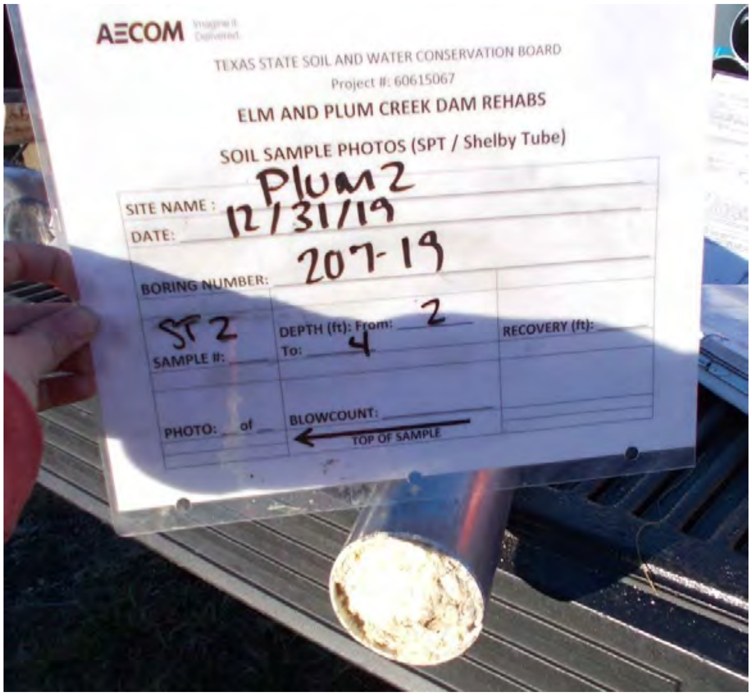
P-1. Depths ~ 0-2 ft

Photo No.	**Date:**
2	12/9/19

Description:

Boring 207-19.

ST-2. Depths ~ 2-4 ft



PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	Date:
3	12/9/19

Description:

Boring 207-19.

SS-3. Depths ~ 4-5.5 ft

AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD

Project #: 60615067

ELM AND PLUM CREEK DAM REHABS

SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME : Plum2

DATE: 12/31/19

BORING NUMBER: 207-19

SAMPLE #: SS-3

DEPTH (ft): From: 4'

To: 5.5'

RECOVERY (ft):

PHOTO: __ of __

BLOWCOUNT:

TOP OF SAMPLE

Photo No.	Date:
4	12/9/19

Description:

Boring 207-19.

P-4. Depths ~ 6-8 ft

AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD

Project #: 60615067

ELM AND PLUM CREEK DAM REHABS

SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME : Plum2

DATE: 12/31/19

BORING NUMBER: 207-19

SAMPLE #: P4

DEPTH (ft): From: 6'

To: 8'

RECOVERY (ft):

PHOTO: __ of __

BLOWCOUNT:

TOP OF SAMPLE

PHOTOGRAPHIC LOG

Client Name:	**Site Location:**	**Project No.**
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	**Date:**
5	12/9/19

Description:

Boring 207-19.

SS-5. Depths ~ 8-9.5 ft

Photo No.	**Date:**
6	12/9/19

Description:

Boring 207-19.

P-6. Depths ~ 13-15 ft

AECOM

PHOTOGRAPHIC LOG

Client Name:	**Site Location:**	**Project No.**
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	**Date:**
7	12/9/19

Description:

Boring 207-19.

ST-7. Depths ~ 18-20 ft

TEXAS STATE SOIL AND WATER
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)
SITE NAME : Plum2
DATE: 12/31/19
BORING NUMBER: 207-19
SAMPLE #: ST-7
DEPTH (ft): From: 18'
To: 20'
RECOVERY (ft):
PHOTO: __ of __
BLOWCOUNT:
TOP OF SAMPLE

Photo No.	**Date:**
8	12/9/19

Description:

Boring 207-19.

SS-8. Depths ~ 23.5-25 ft

AECOM
TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)
SITE NAME: Plum2
DATE: 12/31/19
BORING NUMBER: 207-19
SAMPLE #: SS8
DEPTH (ft): From: 23.5
To: 25
RECOVERY (ft):
PHOTO: __ of __
BLOWCOUNT:
TOP OF SAMPLE

AECOM

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	Date:
9	12/9/19

Description:

Boring 207-19.

P-9. Depths ~ 28-30 ft

AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

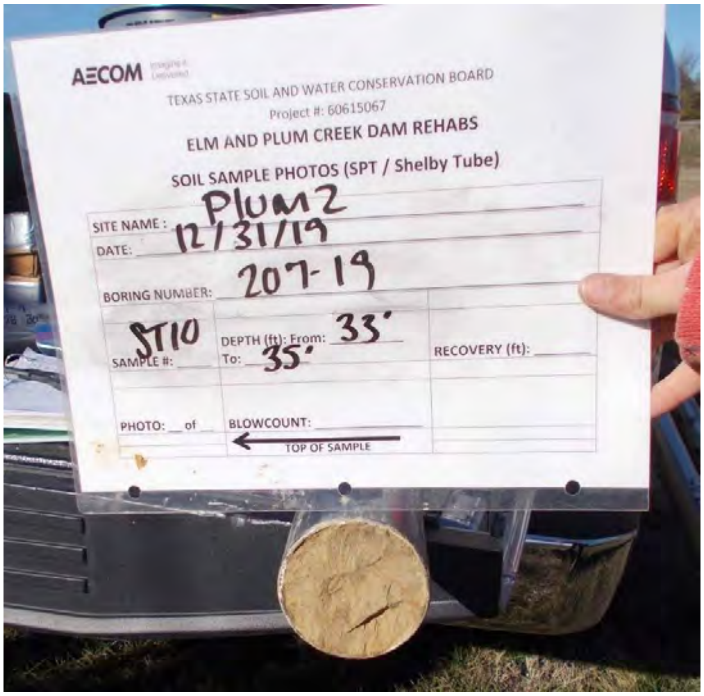
SITE NAME: Plum2
DATE: 12/31/19
BORING NUMBER: 207-19
SAMPLE #: P9
DEPTH (ft): From: 28' To: 30'
RECOVERY (ft):
PHOTO: __ of __
BLOWCOUNT:

Photo No.	Date:
10	12/9/19

Description:

Boring 207-19.

ST-10. Depths ~ 33-35 ft



AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME: Plum2
DATE: 12/31/19
BORING NUMBER: 207-19
SAMPLE #: ST10
DEPTH (ft): From: 33' To: 35'
RECOVERY (ft):
PHOTO: __ of __
BLOWCOUNT:
← TOP OF SAMPLE

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	Date:
1	12/9/19

Description:

Boring 208-19.

P-1. Depths ~ 0-2 ft

AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD

Project #: 60615067

ELM AND PLUM CREEK DAM REHABS

SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME : Plum 2

DATE: 12/30/19

BORING NUMBER: 208-19

SAMPLE #: P1

DEPTH (ft): From: 0

To: 2'

RECOVERY (ft): ____

PHOTO: __ of __

BLOWCOUNT: ____

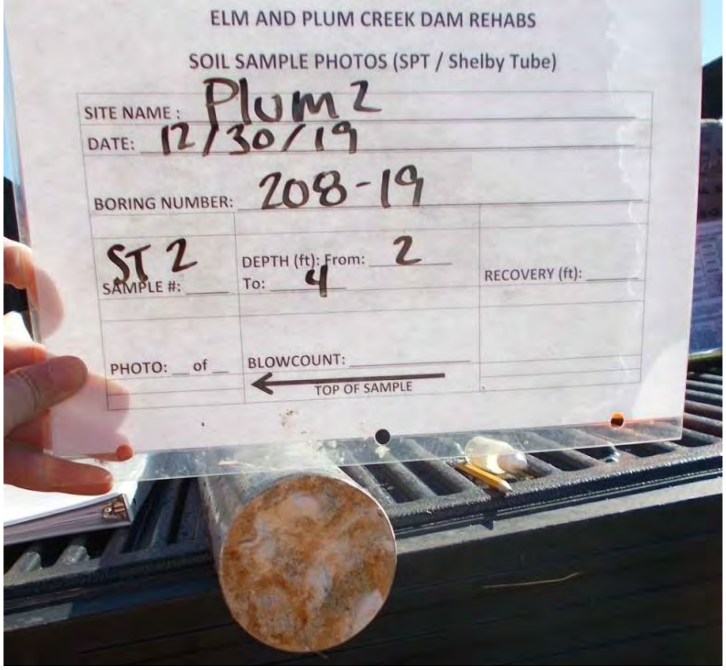
TOP OF SAMPLE

Photo No.	Date:
2	12/9/19

Description:

Boring 208-19.

ST-2. Depths ~ 2-4 ft



ELM AND PLUM CREEK DAM REHABS

SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME : Plum 2

DATE: 12/30/19

BORING NUMBER: 208-19

SAMPLE #: ST 2

DEPTH (ft): From: 2

To: 4

RECOVERY (ft): ____

PHOTO: __ of __

BLOWCOUNT: ____

TOP OF SAMPLE

AECOM

PHOTOGRAPHIC LOG

Client Name: TSSWCB	**Site Location:** Plum 2: Kyle, TX	**Project No.** 60615067

Photo No. 3	**Date:** 12/9/19

Description:

Boring 208-19.

SS-3. Depths ~ 4-5.5 ft

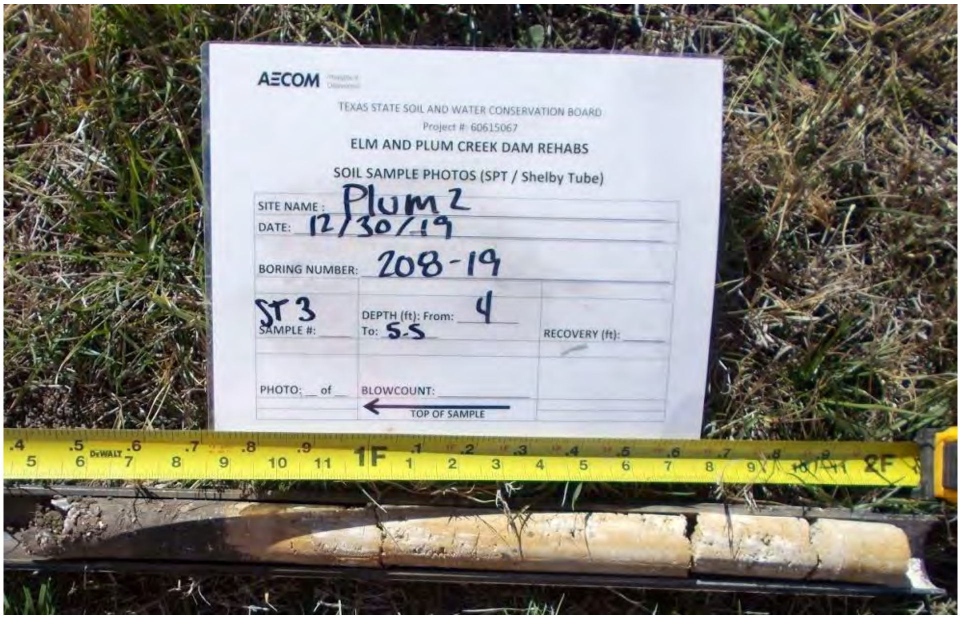


Photo No. 4	**Date:** 12/9/19

Description:

Boring 208-19.

P-4. Depths ~ 6-8 ft

AECOM

PHOTOGRAPHIC LOG

Client Name:	**Site Location:**	**Project No.**
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	**Date:**
5	12/9/19

Description:

Boring 208-19.

SS-5. Depths ~ 8-9.5 ft


AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD

Project #: 60615067

ELM AND PLUM CREEK DAM REHABS

SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME: Plum 2

DATE: 12/30/19

BORING NUMBER: 208-19

SAMPLE #: SS-5

DEPTH (ft): From: 8

To: 9.5

RECOVERY (ft):

PHOTO: __ of __

BLOWCOUNT:

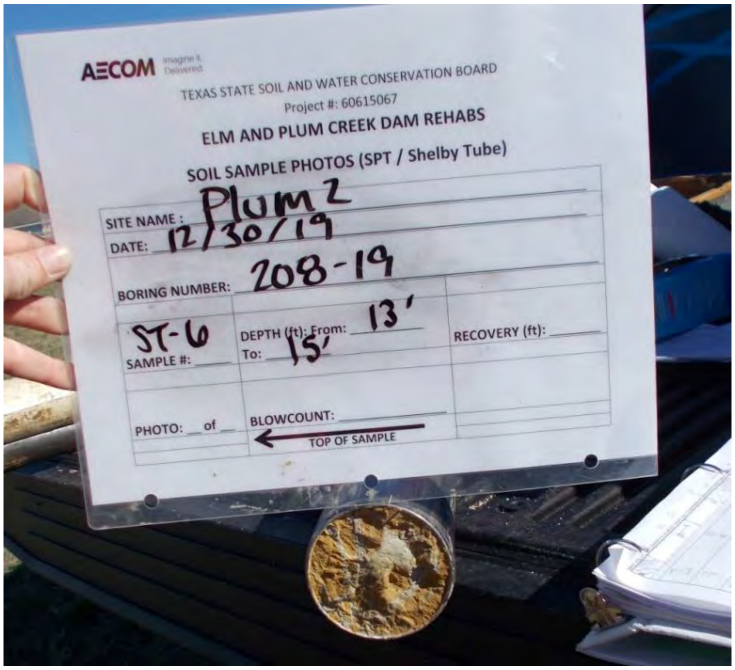
TOP OF SAMPLE

Photo No.	**Date:**
6	12/9/19

Description:

Boring 208-19.

ST-6. Depths ~ 13-15 ft


AECOM Imagine it. Delivered

TEXAS STATE SOIL AND WATER CONSERVATION BOARD

Project #: 60615067

ELM AND PLUM CREEK DAM REHABS

SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME: Plum 2

DATE: 12/30/19

BORING NUMBER: 208-19

SAMPLE #: ST-6

DEPTH (ft): From: 13'

To: 15'

RECOVERY (ft):

PHOTO: __ of __

BLOWCOUNT:

TOP OF SAMPLE

AECOM

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	Date:
7	12/9/19

Description:

Boring 208-19.

P-7. Depths ~ 18-20 ft

Photo No.	Date:
8	12/9/19

Description:

Boring 208-19.

SS-8. Depths ~ 23.5-25 ft

AECOM

PHOTOGRAPHIC LOG

Client Name:	**Site Location:**	**Project No.**
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	**Date:**
1	12/9/19

Description:

Boring 209-19.

P-1. Depths ~ 0-2 ft


AECOM
TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)
SITE NAME: Plum 2
DATE: 12/19/19
BORING NUMBER: 209-19
SAMPLE #: P-1
DEPTH (ft): From: 0' To: 2'
RECOVERY (ft):
PHOTO: __ of __
BLOWCOUNT:
TOP OF SAMPLE

Photo No.	**Date:**
2	12/9/19

Description:

Boring 209-19.

SS-2. Depths ~ 2-3.5 ft


AECOM
TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)
SITE NAME: Plum 2
DATE: 12/19/19
BORING NUMBER: 209-19
SAMPLE #: SS2
DEPTH (ft): From: 2' To: 3.5'
RECOVERY (ft):
PHOTO: __ of __
BLOWCOUNT:
TOP OF SAMPLE

PHOTOGRAPHIC LOG

Client Name:	**Site Location:**	**Project No.**
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	**Date:**
3	12/9/19

Description:

Boring 209-19.

P-3. Depths ~ 4-6 ft

AECOM
TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)
SITE NAME: Plum 2
DATE: 12/19/19
BORING NUMBER: 209-19
SAMPLE #: P-3
DEPTH (ft): From: 4'
To: 6'
RECOVERY (ft):
PHOTO: __ of __
BLOWCOUNT:
TOP OF SAMPLE

Photo No.	**Date:**
4	12/9/19

Description:

Boring 209-19.

ST-4. Depths ~ 6-8 ft

AECOM
TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)
SITE NAME: Plum 2
DATE: 12/19/19
BORING NUMBER: 209-19
SAMPLE #: ST4
DEPTH (ft): From: 6
To: 8
RECOVERY (ft):
PHOTO: __ of __
BLOWCOUNT:
TOP OF SAMPLE

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	Date:
5	12/9/19

Description:

Boring 209-19.

SS-5. Depths ~ 8-9.5 ft

Photo No.	Date:
6	12/9/19

Description:

Boring 209-19.

P-6. Depths ~ 13-15 ft

AECOM

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	Date:
7	12/9/19

Description:

Boring 209-19.

ST-7. Depths ~ 18-20 ft

AECOM Imagine it. Delivered.

TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME: Plum 2
DATE: 12/19/19
BORING NUMBER: 209-19
SAMPLE #: ST-7
DEPTH (ft): From: 18 To: 20
RECOVERY (ft): ___
PHOTO: __ of __
BLOWCOUNT: ___
TOP OF SAMPLE

Photo No.	Date:
8	12/9/19

Description:

Boring 209-19.

SS-8. Depths ~ 23.5-25 ft

AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME: Plum 2
DATE: 12/19/19
BORING NUMBER: 209-19
SAMPLE #: SS 8
DEPTH (ft): From: 23.5 To: 25
RECOVERY (ft): ___
PHOTO: __ of __
BLOWCOUNT: ___
TOP OF SAMPLE

AECOM

PHOTOGRAPHIC LOG

Client Name:	**Site Location:**	**Project No.**
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	**Date:**
1	12/9/19

Description:

Boring 304-19.

P-1. Depths ~ 0-2 ft

AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD

Project #: 60615067

ELM AND PLUM CREEK DAM REHABS

SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME : Plum 2

DATE: 1/9/20

BORING NUMBER: 304-19

SAMPLE #: PT1

DEPTH (ft): From: 0

To: 2'

RECOVERY (ft):

PHOTO: __ of __

BLOWCOUNT:

TOP OF SAMPLE

Photo No.	**Date:**
2	12/9/19

Description:

Boring 304-19.

SS-2. Depths ~ 2.5-4 ft

AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD

Project #: 60615067

ELM AND PLUM CREEK DAM REHABS

SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME : Plum 2

DATE: 1/9/20

BORING NUMBER: 304-19

SAMPLE #: SS2

DEPTH (ft): From: 2.5

To: 4

RECOVERY (ft):

PHOTO: __ of __

BLOWCOUNT:

TOP OF SAMPLE

PHOTOGRAPHIC LOG

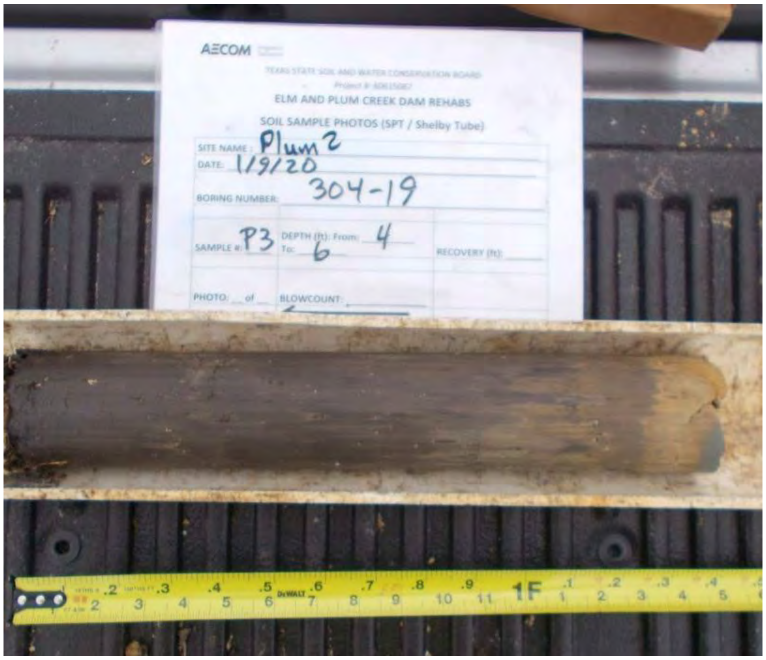
Client Name:	Site Location:	Project No.
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	Date:
3	12/9/19

Description:

Boring 304-19.

P-3. Depths ~ 4-6 ft



AECOM
TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)
SITE NAME: Plum 2
DATE: 1/9/20
BORING NUMBER: 304-19
SAMPLE #: P3
DEPTH (ft): From: 4 To: 6
RECOVERY (ft):
PHOTO: __ of __
BLOWCOUNT:

Photo No.	Date:
4	12/9/19

Description:

Boring 304-19.

P-3. Depths ~ 4-6 ft

AECOM
TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)
SITE NAME: Plum 2
DATE: 1/9/20
BORING NUMBER: 304-19
SAMPLE #: P3
DEPTH (ft): From: 4 To: 6
RECOVERY (ft):
BLOWCOUNT:

PHOTOGRAPHIC LOG

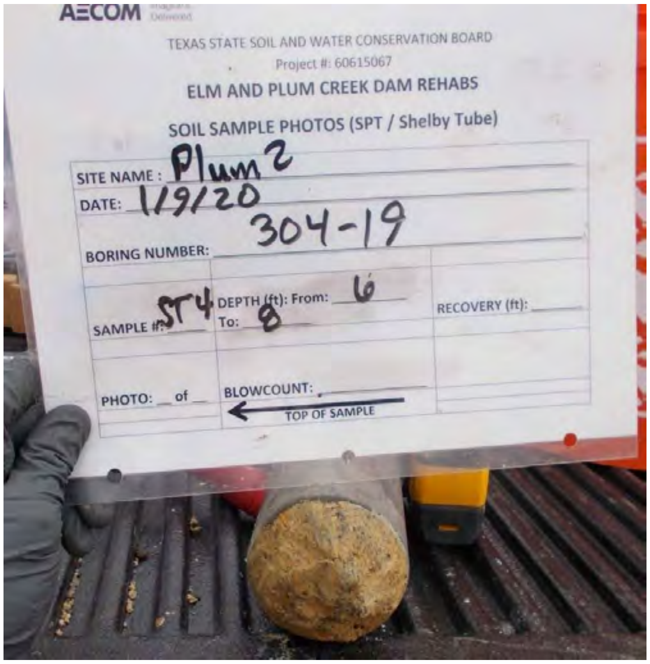
Client Name:	**Site Location:**	**Project No.**
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	**Date:**
5	12/9/19

Description:

Boring 304-19.

ST-4. Depths ~ 6-8 ft



AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD

Project #: 60615067

ELM AND PLUM CREEK DAM REHABS

SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME : Plum 2

DATE: 1/9/20

BORING NUMBER: 304-19

SAMPLE #: ST4

DEPTH (ft): From: 6 To: 8

RECOVERY (ft): ____

PHOTO: __ of __

BLOWCOUNT: ____

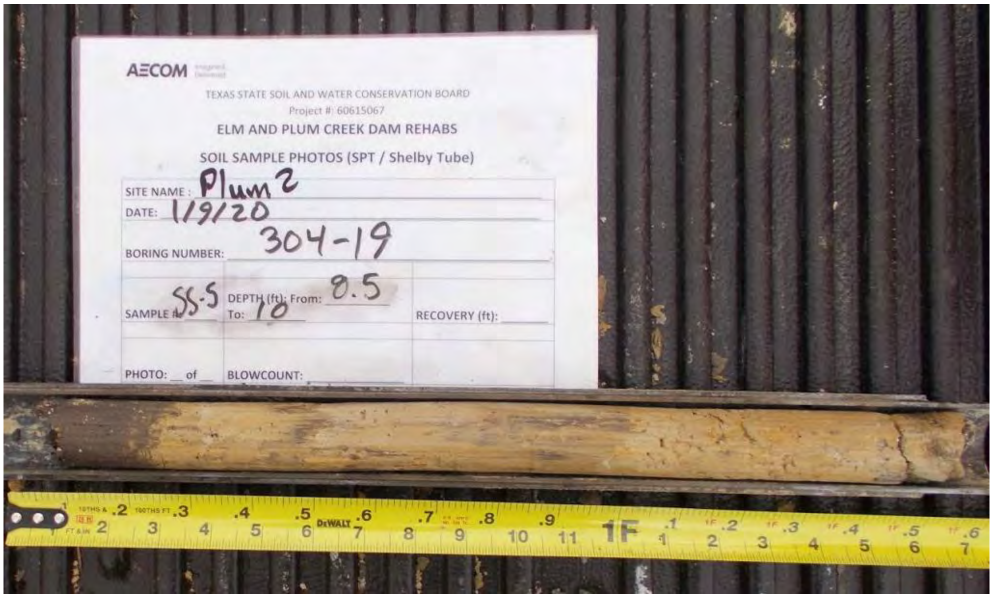
TOP OF SAMPLE

Photo No.	**Date:**
6	12/9/19

Description:

Boring 304-19.

SS-5. Depths ~ 8.5-10 ft



AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD

Project #: 60615067

ELM AND PLUM CREEK DAM REHABS

SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME : Plum 2

DATE: 1/9/20

BORING NUMBER: 304-19

SAMPLE #: SS-5

DEPTH (ft): From: 8.5 To: 10

RECOVERY (ft): ____

PHOTO: __ of __

BLOWCOUNT: ____

PHOTOGRAPHIC LOG

Client Name: TSSWCB	**Site Location:** Plum 2: Kyle, TX	**Project No.** 60615067

Photo No. 7	**Date:** 12/9/19

Description:

Boring 304-19.

P-6. Depths ~ 13-15 ft

Photo No. 8	**Date:** 12/9/19

Description:

Boring 304-19.

P-6. Depths ~ 13-15 ft

AECOM

PHOTOGRAPHIC LOG

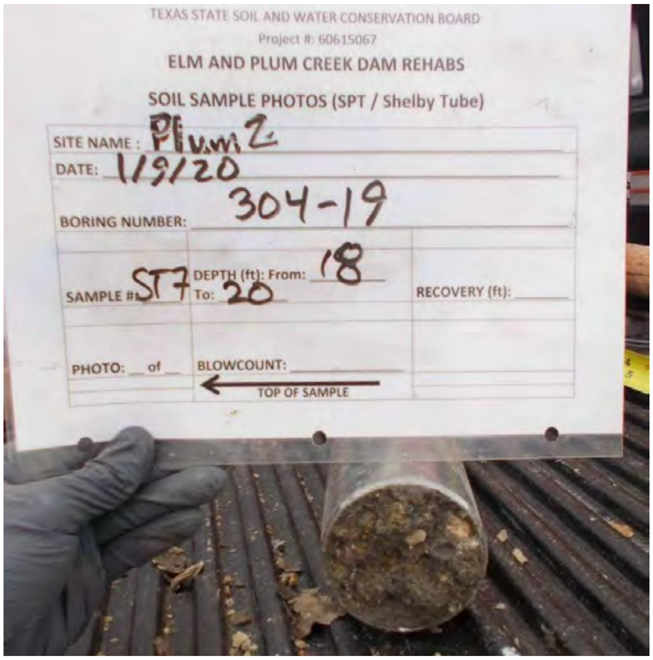
Client Name:	Site Location:	Project No.
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	Date:
9	12/9/19

Description:

Boring 304-19.

ST-7. Depths ~ 18-20 ft



TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

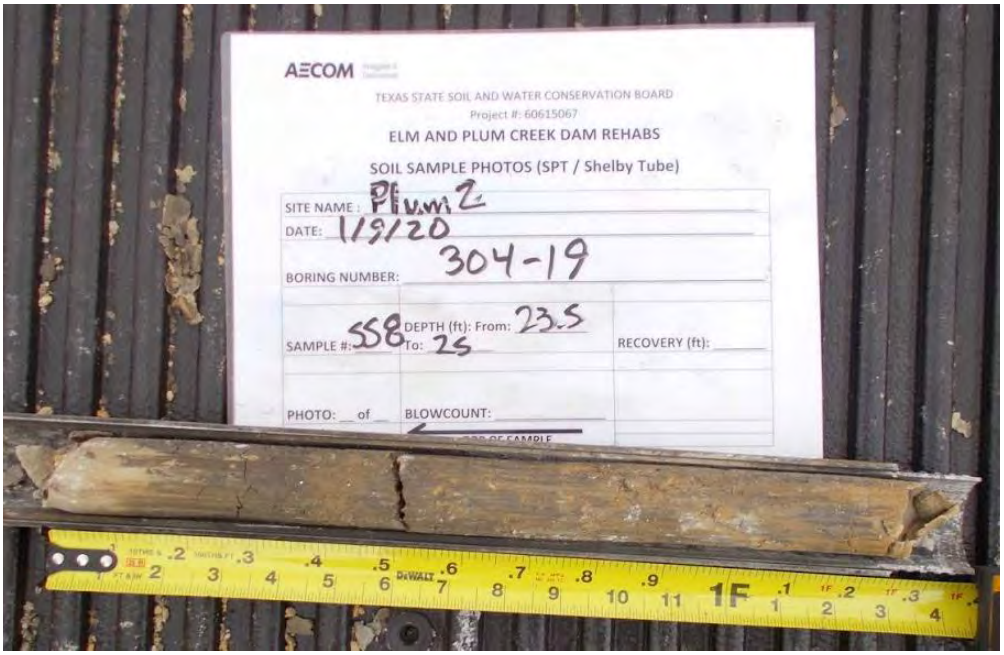
SITE NAME: Plum 2
DATE: 1/9/20
BORING NUMBER: 304-19
SAMPLE #: ST7 DEPTH (ft): From: 18 To: 20 RECOVERY (ft):
PHOTO: __ of __ BLOWCOUNT:
TOP OF SAMPLE

Photo No.	Date:
10	12/9/19

Description:

Boring 304-19.

SS-8. Depths ~ 23.5-25 ft



AECOM
TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME: Plum 2
DATE: 1/9/20
BORING NUMBER: 304-19
SAMPLE #: SS8 DEPTH (ft): From: 23.5 To: 25 RECOVERY (ft):
PHOTO: __ of __ BLOWCOUNT:

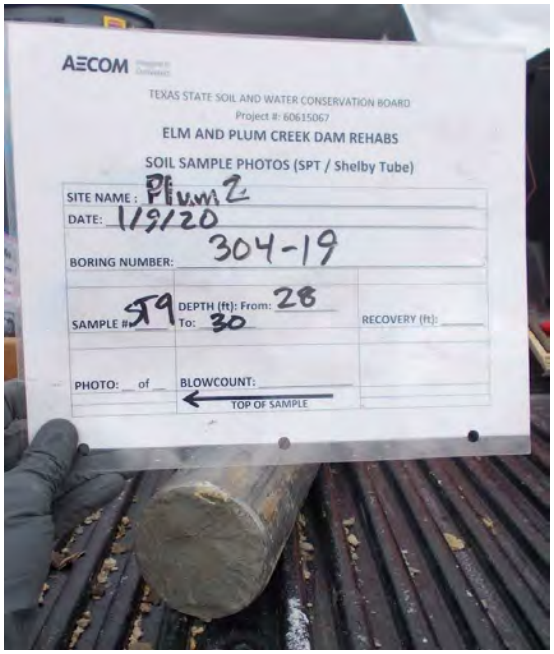
Client Name:	**Site Location:**	**Project No.**
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	**Date:**
11	12/9/19

Description:

Boring 304-19.

ST-9. Depths ~ 28-30 ft



AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

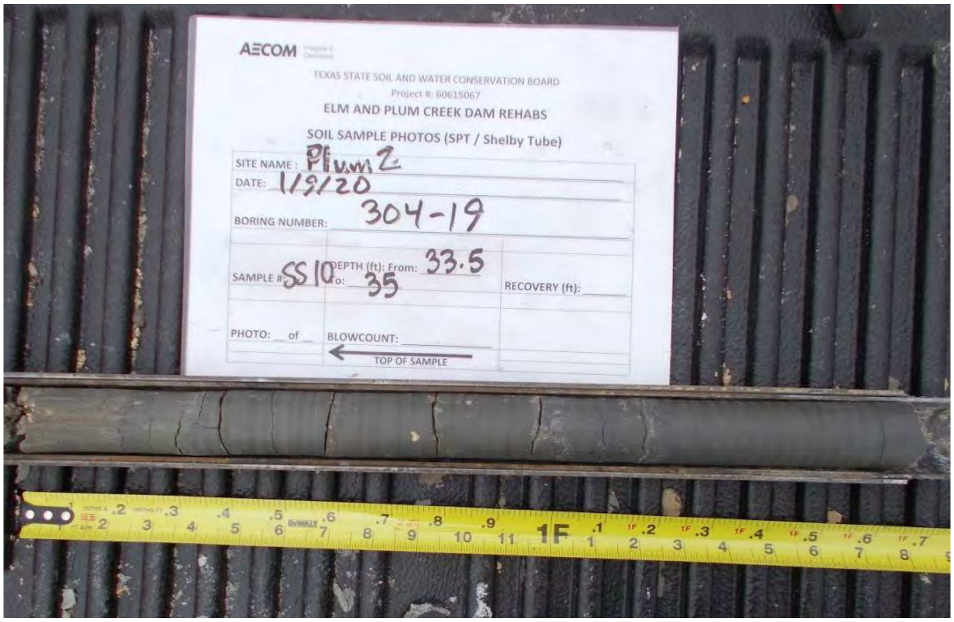
SITE NAME: Plum 2
DATE: 1/9/20
BORING NUMBER: 304-19
SAMPLE #: ST9
DEPTH (ft): From: 28
To: 30
RECOVERY (ft): ____
PHOTO: __ of __
BLOWCOUNT: ____
TOP OF SAMPLE

Photo No.	**Date:**
12	12/9/19

Description:

Boring 304-19.

SS-10. Depths ~ 33.5-35 ft



AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME: Plum 2
DATE: 1/9/20
BORING NUMBER: 304-19
SAMPLE #: SS10
DEPTH (ft): From: 33.5
To: 35
RECOVERY (ft): ____
PHOTO: __ of __
BLOWCOUNT: ____
TOP OF SAMPLE

AECOM

PHOTOGRAPHIC LOG

Client Name: TSSWCB	**Site Location:** Plum 2: Kyle, TX	**Project No.** 60615067

Photo No.	**Date:**
1	12/9/19

Description:

Boring 305-19.

P-1. Depths ~ 0-2 ft

AECOM
TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)
SITE NAME: Plum 2
DATE: 1/8/20
BORING NUMBER: 305-19
SAMPLE #: P1
DEPTH (ft): From: 0'
To: 2'
RECOVERY (ft):
PHOTO: __ of __
BLOWCOUNT:
TOP OF SAMPLE

Photo No.	**Date:**
2	12/9/19

Description:

Boring 305-19.

SS-2. Depths ~ 2.5-4 ft

AECOM
TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)
SITE NAME: Plum 2
DATE: 1/8/20
BORING NUMBER: 305-19
SAMPLE #: SS2
DEPTH (ft): From: 2.5'
To: 4'
RECOVERY (ft):
PHOTO: __ of __
BLOWCOUNT:
TOP OF SAMPLE

PHOTOGRAPHIC LOG

Client Name:	**Site Location:**	**Project No.**
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	**Date:**
3	12/9/19

Description:

Boring 305-19.

ST-3. Depths ~ 4-6 ft

SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME: Plum 2

DATE: 1/8/20

BORING NUMBER: 305-19

SAMPLE #: ST3

DEPTH (ft): From: 4' To: 6'

RECOVERY (ft):

PHOTO: __ of __

BLOWCOUNT:

TOP OF SAMPLE

Photo No.	**Date:**
4	12/9/19

Description:

Boring 305-19.

P-4. Depths ~ 6-8 ft

AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD

Project #: 60615067

ELM AND PLUM CREEK DAM REHABS

SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME: Plum 2

DATE: 1/8/20

BORING NUMBER: 305-19

SAMPLE #: P4

DEPTH (ft): From: 6' To: 8'

RECOVERY (ft):

PHOTO: __ of __

BLOWCOUNT:

TOP OF SAMPLE

AECOM

PHOTOGRAPHIC LOG

Client Name:	**Site Location:**	**Project No.**
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	**Date:**
5	12/9/19

Description:

Boring 305-19.

SS-5. Depths ~ 8.5-10 ft

AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD

Project #: 60615067

ELM AND PLUM CREEK DAM REHABS

SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME: Plum 2

DATE: 1/8/20

BORING NUMBER: 305-19

SAMPLE #: SS5

DEPTH (ft): From: 8.5'

To: 10'

RECOVERY (ft):

PHOTO: __ of __

BLOWCOUNT:

TOP OF SAMPLE

Photo No.	**Date:**
6	12/9/19

Description:

Boring 305-19.

SS-5. Depths ~ 8.5-10 ft

AECOM

ELM AND PLUM CREEK DAM REHABS

SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME: Plum 2

DATE: 1/8/20

BORING NUMBER: 305-19

SAMPLE #: SS5

DEPTH (ft): From: 8.5'

To: 10'

RECOVERY (ft):

BLOWCOUNT:

TOP OF SAMPLE

AECOM

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	Date:
7	12/9/19

Description:

Boring 305-19.

P-6. Depths ~ 13-15 ft

Photo No.	Date:
8	12/9/19

Description:

Boring 305-19.

P-6. Depths ~ 13-15 ft

PHOTOGRAPHIC LOG

Client Name:	**Site Location:**	**Project No.**
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	**Date:**
9	12/9/19

Description:

Boring 305-19.

ST-7. Depths ~ 18-20 ft

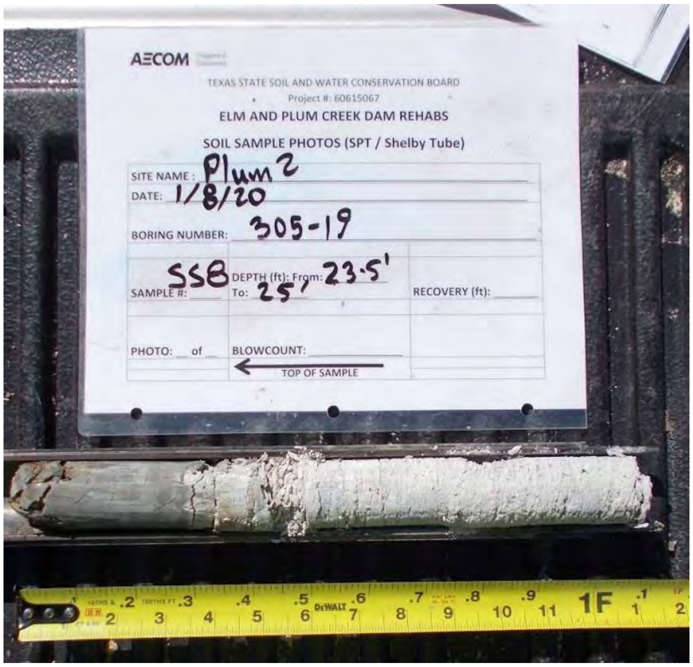
AECOM
TEXAS STATE SOIL AND WATER CONSERVATIO
Project #: 60615067
ELM AND PLUM CREEK DAM REHA
SOIL SAMPLE PHOTOS (SPT / Shelby
SITE NAME : Plum 2
DATE: 1/8/20
BORING NUMBER: 305-19
SAMPLE #: ST7
DEPTH (ft): From: 18'
To: 20'
RECO
PHOTO: __ of __
BLOWCOUNT: ____
TOP OF SAMPLE

Photo No.	**Date:**
10	12/9/19

Description:

Boring 305-19.

SS-8. Depths ~ 23.5-25 ft



AECOM
TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)
SITE NAME : Plum 2
DATE: 1/8/20
BORING NUMBER: 305-19
SAMPLE #: SS8
DEPTH (ft): From: 23.5'
To: 25'
RECOVERY (ft): ____
PHOTO: __ of __
BLOWCOUNT: ____
TOP OF SAMPLE

AECOM

PHOTOGRAPHIC LOG

Client Name:	**Site Location:**	**Project No.**
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No. 1	**Date:** 10/1/20

Description:

Boring 401-19.

Sample: P-1.

Depths: 0-2 ft

Photo No. 2	**Date:** 10/1/20

Description:

Boring 401-19.

Sample: P-2.

Depths: 2-4 ft

PHOTOGRAPHIC LOG

Client Name:	**Site Location:**	**Project No.**
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	**Date:**
3	10/1/20

Description:

Boring 401-19.

Sample: P-3.

Depths: 4-6 ft

Photo No.	**Date:**
4	10/1/20

Description:

Boring 401-19.

Sample: P-4.

Depths: 6-8 ft

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No. 5 **Date:** 10/1/20

Description:

Boring 401-19.

Sample: P-5.

Depths: 8-10 ft

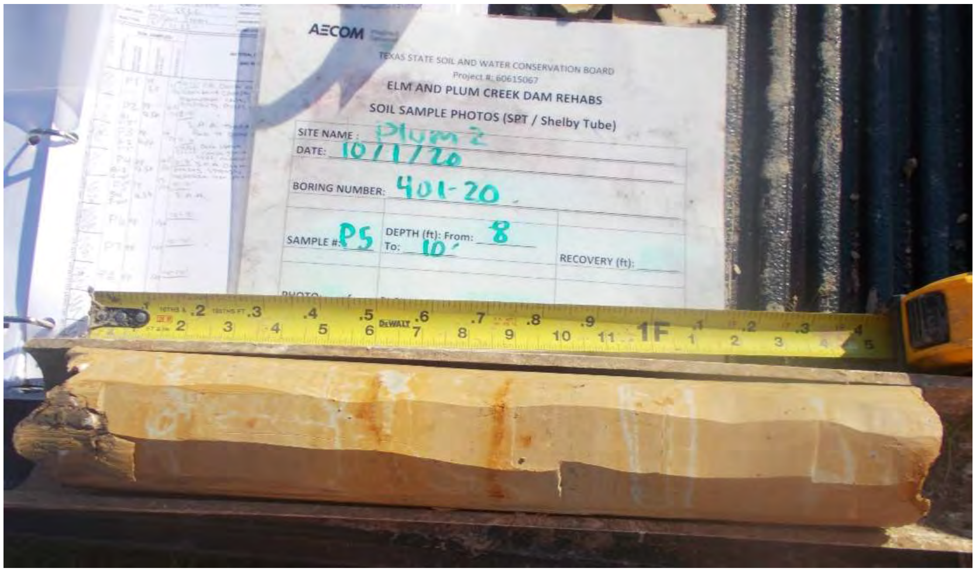


Photo No. 6 **Date:** 10/1/20

Description:

Boring 401-19.

Sample: P-6

Depths: 13-15 ft

AECOM

PHOTOGRAPHIC LOG

Client Name:	**Site Location:**	**Project No.**
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	**Date:**
7	10/1/20

Description:

Boring 401-19.

Sample: P-7

Depths: 18-20 ft

AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD

Project #: 60615067

ELM AND PLUM CREEK DAM REHABS

SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME: Plum 2

DATE: 10/1/20

BORING NUMBER: 401-20

SAMPLE #: P7

DEPTH (ft): From: 18 To: 20'

RECOVERY (ft):

PHOTO: of

BLOWCOUNT:

PHOTOGRAPHIC LOG

Client Name:	**Site Location:**	**Project No.**
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	**Date:**
1	10/1/20

Description:

Boring 402-20

Sample: P-1.

Depths: 0-2 ft

Photo No.	**Date:**
2	10/1/20

Description:

Boring 402-20

Sample: P-2.

Depths: 2-4 ft

AECOM

PHOTOGRAPHIC LOG

Client Name:	**Site Location:**	**Project No.**
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	**Date:**
3	10/1/20

Description:

Boring 402-20B

Sample: P-4

Depths: 6-8 ft

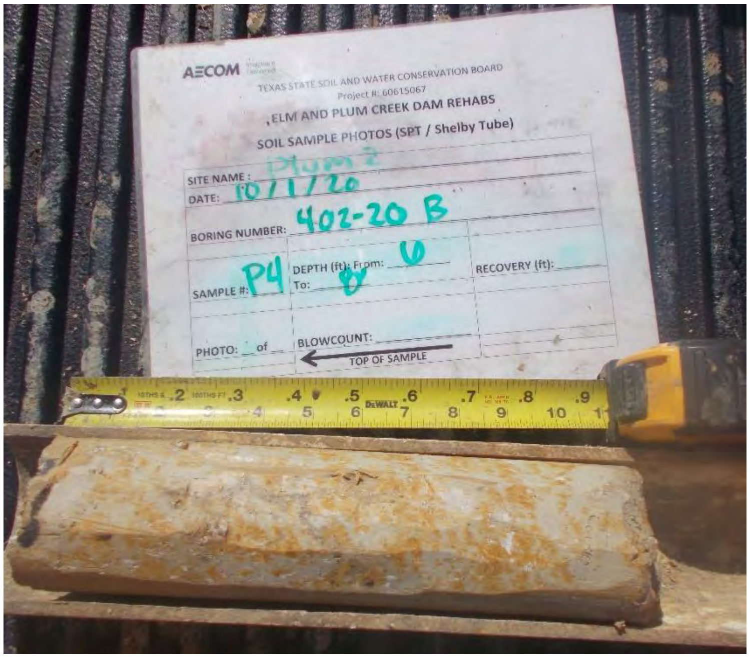


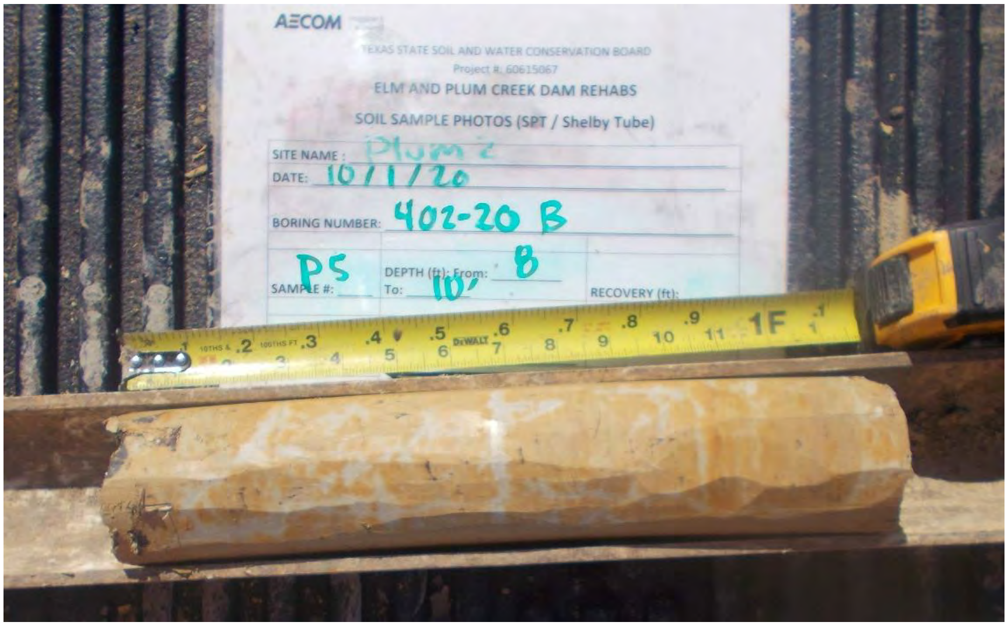
Photo No.	**Date:**
4	10/1/20

Description:

Boring 402-20B

Sample: P-5

Depths: 8-10 ft



PHOTOGRAPHIC LOG

Client Name:	**Site Location:**	**Project No.**
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	**Date:**
5	10/1/20

Description:

Boring 402-20B

Sample: P-5.

Depths: 8-10 ft

Photo No.	**Date:**
6	10/1/20

Description:

Boring 402-20B

Sample: P-7

Depths: 18-20 ft

AECOM

PHOTOGRAPHIC LOG

Client Name:	**Site Location:**	**Project No.**
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	**Date:**
1	12/9/19

Description:

Boring 601-19.

P-1. Depths ~ 0-2 ft

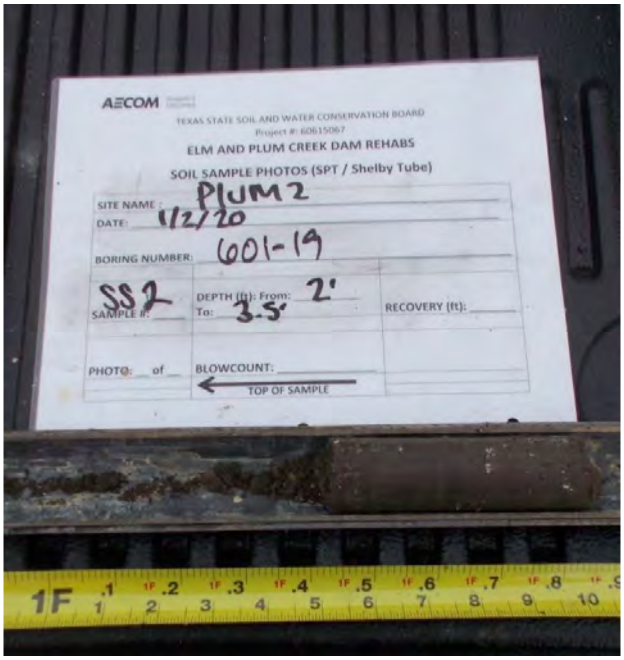
AECOM
TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)
SITE NAME: PLUM 2
DATE: 1/2/20
BORING NUMBER: 601-19
SAMPLE #: P-1
DEPTH (ft): From: 0' To: 2'
RECOVERY (ft):
PHOTO: __ of __
BLOWCOUNT:
TOP OF SAMPLE

Photo No.	**Date:**
2	12/9/19

Description:

Boring 601-19.

SS-2. Depths ~ 2-3.5 ft



AECOM
TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)
SITE NAME: PLUM 2
DATE: 1/2/20
BORING NUMBER: 601-19
SAMPLE #: SS 2
DEPTH (ft): From: 2' To: 3.5'
RECOVERY (ft):
PHOTO: __ of __
BLOWCOUNT:
TOP OF SAMPLE

PHOTOGRAPHIC LOG

Client Name: TSSWCB

Site Location: Plum 2: Kyle, TX

Project No. 60615067

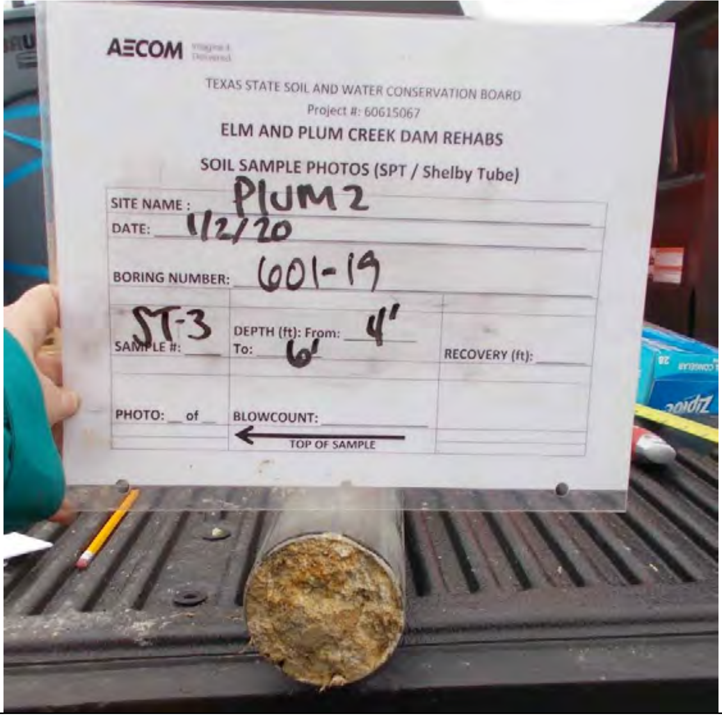
Photo No. 3

Date: 12/9/19

Description:

Boring 601-19.

ST-3. Depths ~ 4-6 ft



AECOM
TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)
SITE NAME: PLUM 2
DATE: 1/2/20
BORING NUMBER: 601-19
SAMPLE #: ST-3
DEPTH (ft): From: 4'
To: 6'
RECOVERY (ft):
PHOTO: __ of __
BLOWCOUNT:
TOP OF SAMPLE

Photo No. 4

Date: 12/9/19

Description:

Boring 601-19.

P-4. Depths ~ 6-8 ft

AECOM
TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)
SITE NAME: PLUM 2
DATE: 1/2/20
BORING NUMBER: 601-19
SAMPLE #: P-4
DEPTH (ft): From: 6'
To: 8'
RECOVERY (ft):
PHOTO: __ of __
BLOWCOUNT:
TOP OF SAMPLE

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	Date:
5	12/9/19

Description:

Boring 601-19.

SS-5. Depths ~ 8-9.5 ft

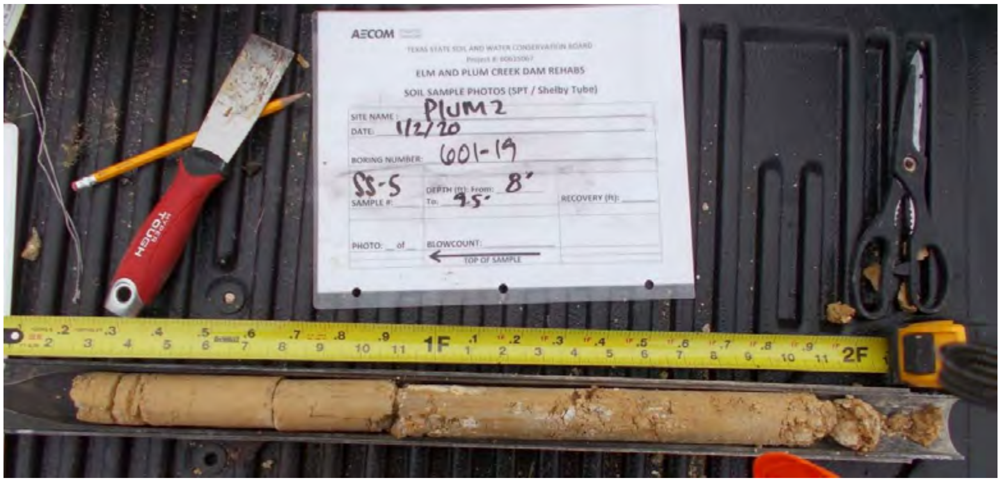
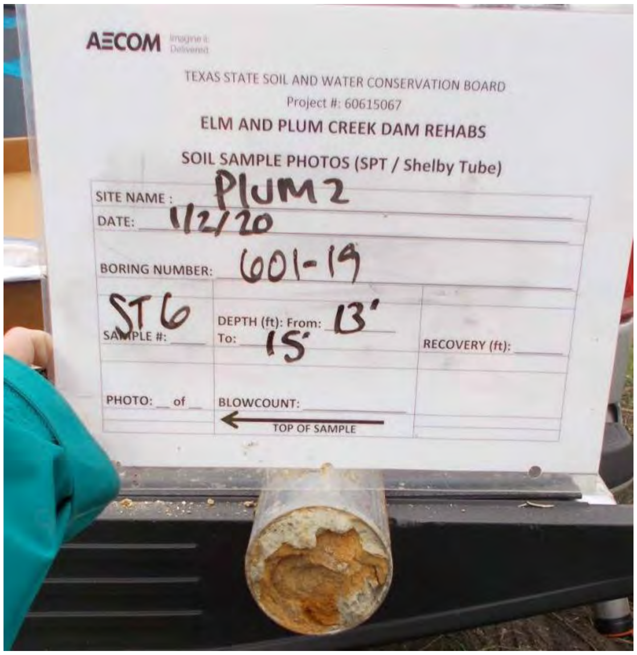


Photo No.	Date:
6	12/9/19

Description:

Boring 601-19.

ST-6. Depths ~ 13-15 ft



PHOTOGRAPHIC LOG

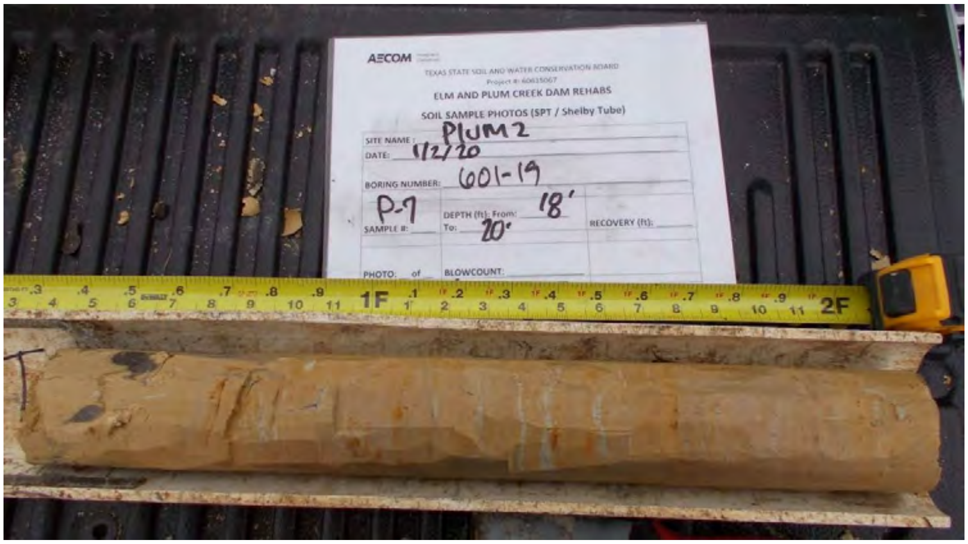
Client Name:	**Site Location:**	**Project No.**
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	**Date:**
7	12/9/19

Description:

Boring 601-19.

P-7. Depths ~ 18-20 ft



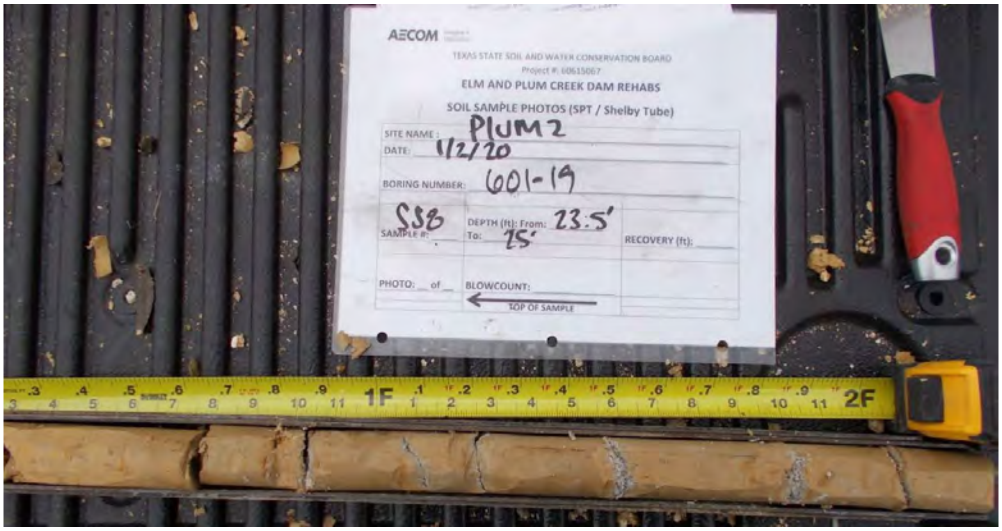
AECOM
TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)
SITE NAME: Plum2
DATE: 1/2/20
BORING NUMBER: 601-19
SAMPLE #: P-7
DEPTH (ft): From: 18'
To: 20'
RECOVERY (ft):
PHOTO: __ of __
BLOWCOUNT:

Photo No.	**Date:**
8	12/9/19

Description:

Boring 601-19.

SS-8. Depths ~ 23.5-25 ft



AECOM
TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)
SITE NAME: Plum2
DATE: 1/2/20
BORING NUMBER: 601-19
SAMPLE #: SS8
DEPTH (ft): From: 23.5'
To: 25'
RECOVERY (ft):
PHOTO: __ of __
BLOWCOUNT:
TOP OF SAMPLE

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	Date:
1	12/9/19

Description:

Boring 602-19.

P-1. Depths ~ 0-2 ft

AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD

Project #: 60615067

ELM AND PLUM CREEK DAM REHABS

SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME: PLUM 2

DATE: 1/2/20

BORING NUMBER: 602-19

SAMPLE #: P-1

DEPTH (ft): From: 0' To: 2'

RECOVERY (ft):

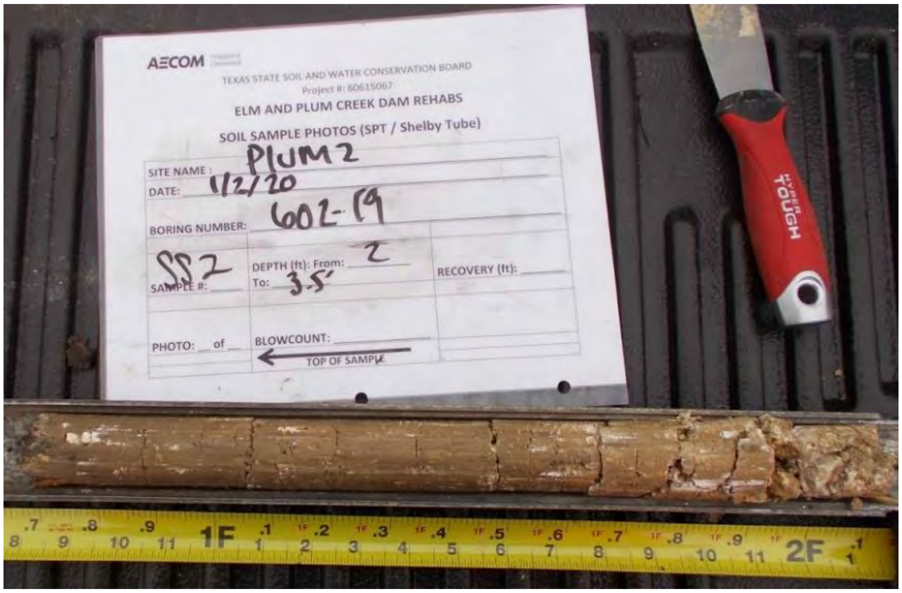
BLOWCOUNT:

Photo No.	Date:
2	12/9/19

Description:

Boring 602-19.

SS-2. Depths ~ 2-3.5 ft



AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD

Project #: 60615067

ELM AND PLUM CREEK DAM REHABS

SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME: PLUM 2

DATE: 1/2/20

BORING NUMBER: 602-19

SAMPLE #: SS2

DEPTH (ft): From: 2 To: 3.5'

RECOVERY (ft):

PHOTO: __ of __

BLOWCOUNT:

TOP OF SAMPLE

PHOTOGRAPHIC LOG

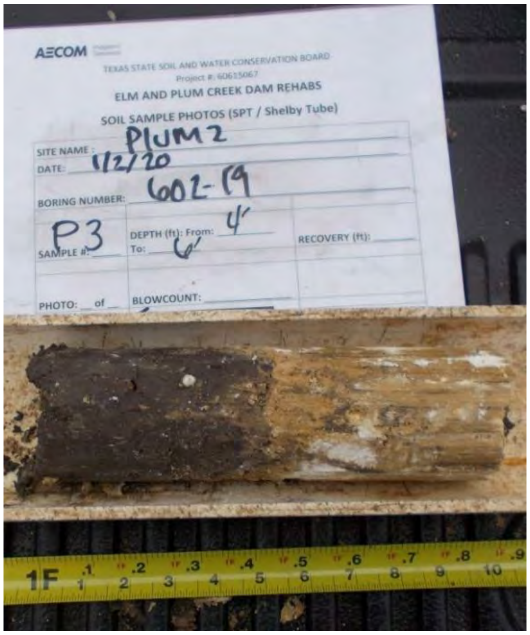
Client Name:	Site Location:	Project No.
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	Date:
3	12/9/19

Description:

Boring 602-19.

P-3. Depths ~ 4-6 ft



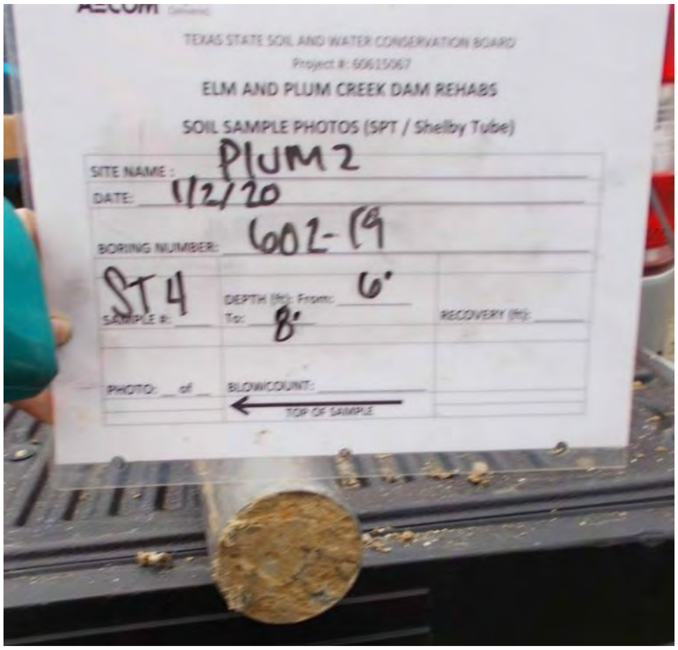
AECOM
TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)
SITE NAME: PLUM2
DATE: 1/2/20
BORING NUMBER: 602-19
SAMPLE #: P3
DEPTH (ft): From: 4' To: 6'
RECOVERY (ft): ____
PHOTO: __ of __
BLOWCOUNT: ____

Photo No.	Date:
4	12/9/19

Description:

Boring 602-19.

ST-4. Depths ~ 6-8 ft



AECOM
TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)
SITE NAME: PLUM2
DATE: 1/2/20
BORING NUMBER: 602-19
SAMPLE #: ST4
DEPTH (ft): From: 6' To: 8'
RECOVERY (ft): ____
PHOTO: __ of __
BLOWCOUNT: ____
TOP OF SAMPLE

AECOM

PHOTOGRAPHIC LOG

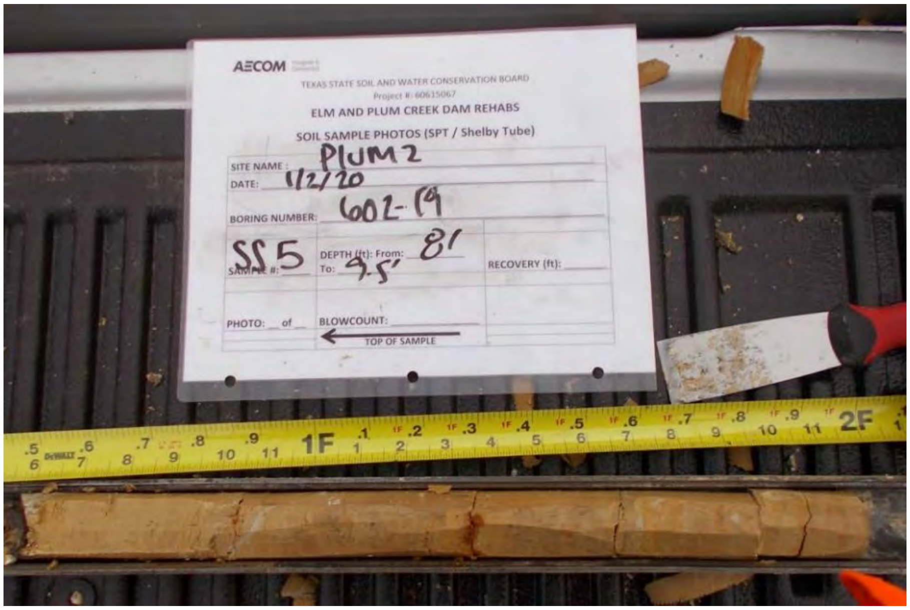
Client Name: TSSWCB	**Site Location:** Plum 2: Kyle, TX	**Project No.** 60615067

Photo No. 5	**Date:** 12/9/19

Description:

Boring 602-19.

SS-5. Depths ~ 8-9.5 ft



AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD

Project #: 60615067

ELM AND PLUM CREEK DAM REHABS

SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME: PLUM2

DATE: 1/2/20

BORING NUMBER: 602-19

SAMPLE #: SS5 DEPTH (ft): From: 8' To: 9.5' RECOVERY (ft): ____

PHOTO: __ of __ BLOWCOUNT: ____

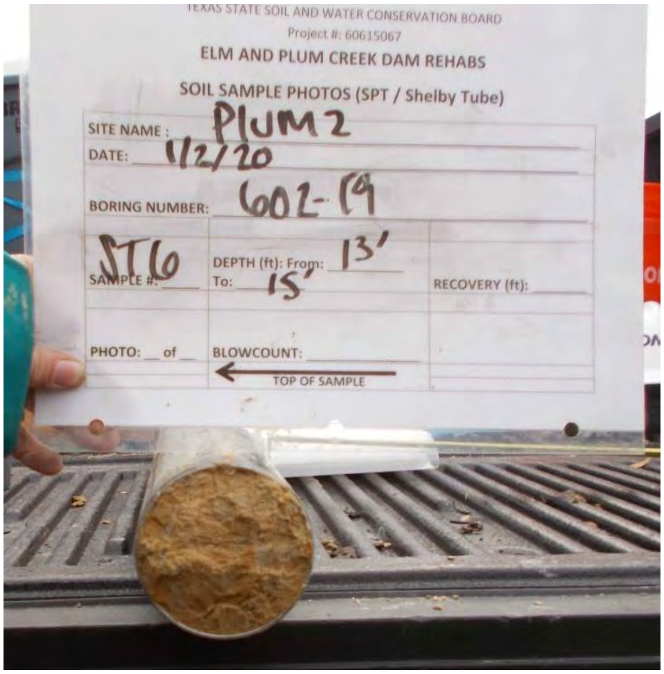
TOP OF SAMPLE

Photo No. 6	**Date:** 12/9/19

Description:

Boring 602-19.

ST-6. Depths ~ 13-15 ft



TEXAS STATE SOIL AND WATER CONSERVATION BOARD

Project #: 60615067

ELM AND PLUM CREEK DAM REHABS

SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME: PLUM2

DATE: 1/2/20

BORING NUMBER: 602-19

SAMPLE #: ST6 DEPTH (ft): From: 13' To: 15' RECOVERY (ft): ____

PHOTO: __ of __ BLOWCOUNT: ____

TOP OF SAMPLE

AECOM

PHOTOGRAPHIC LOG

Client Name:	**Site Location:**	**Project No.**
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	**Date:**
7	12/9/19

Description:

Boring 602-19.

P-7. Depths ~ 18-20 ft

Photo No.	**Date:**
8	12/9/19

Description:

Boring 602-19.

SS-8. Depths ~ 23.5-25 ft

PHOTOGRAPHIC LOG

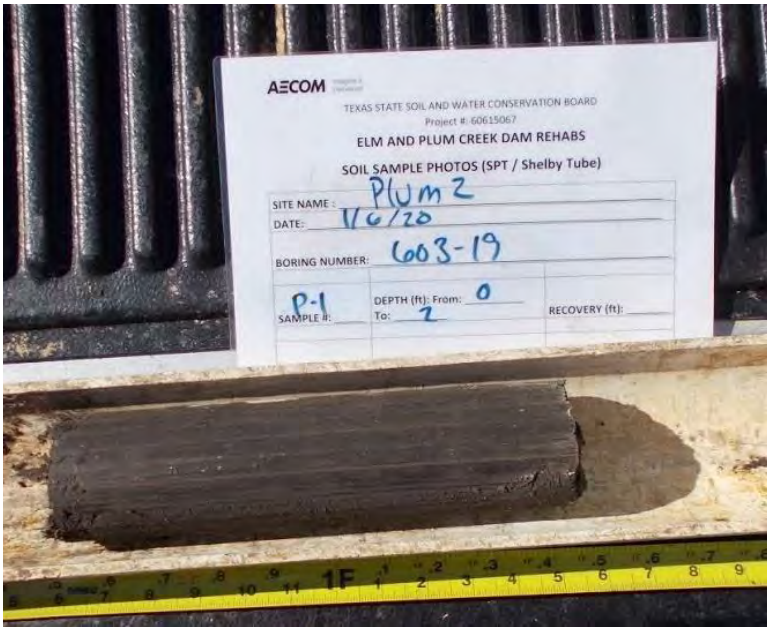
Client Name:	Site Location:	Project No.
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	Date:
1	12/9/19

Description:

Boring 603-19.

P-1. Depths ~ 0-2 ft



AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME : Plum 2
DATE: 1/6/20
BORING NUMBER: 603-19
SAMPLE #: P-1
DEPTH (ft): From: 0
To: 2
RECOVERY (ft):

Photo No.	Date:
2	12/9/19

Description:

Boring 603-19.

SS-2. Depths ~ 2-3.5 ft

AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME : Plum 2
DATE: 1/6/20
BORING NUMBER: 603-19
SAMPLE #: SS-2
DEPTH (ft): From: 2'
To: 3.5'
RECOVERY (ft):
PHOTO: __ of __
BLOWCOUNT:
TOP OF SAMPLE

AECOM

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	Date:
3	12/9/19

Description:

Boring 603-19.

P-3. Depths ~ 4-6 ft


AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD

Project #: 60615067

ELM AND PLUM CREEK DAM REHABS

SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME: Plum 2

DATE: 1/6/20

BORING NUMBER: 603-19

SAMPLE #: PP3

DEPTH (ft): From: 4' To: 6'

RECOVERY (ft):

Photo No.	Date:
4	12/9/19

Description:

Boring 603-19.

SS-4. Depths ~ 6-7.5 ft


AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD

Project #: 60615067

ELM AND PLUM CREEK DAM REHABS

SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME: Plum 2

DATE: 1/6/20

BORING NUMBER: 603-19

SAMPLE #: SS-4

DEPTH (ft): From: 6' To: 7.5'

RECOVERY (ft):

PHOTO: __ of __

BLOWCOUNT:

TOP OF SAMPLE

AECOM

PHOTOGRAPHIC LOG

Client Name:	**Site Location:**	**Project No.**
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	**Date:**
5	12/9/19

Description:

Boring 603-19.

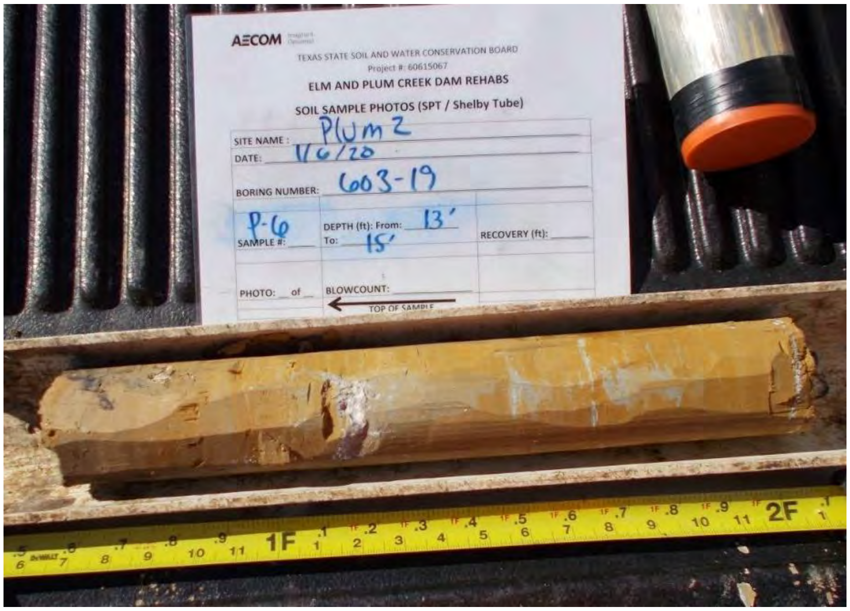
ST-5. Depths ~ 8-10 ft

Photo No.	**Date:**
6	12/9/19

Description:

Boring 603-19.

P-6. Depths ~ 13-15 ft



PHOTOGRAPHIC LOG

Client Name:	**Site Location:**	**Project No.**
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	**Date:**
7	12/9/19

Description:

Boring 603-19.

SS-7. Depths ~ 18-20.5 ft

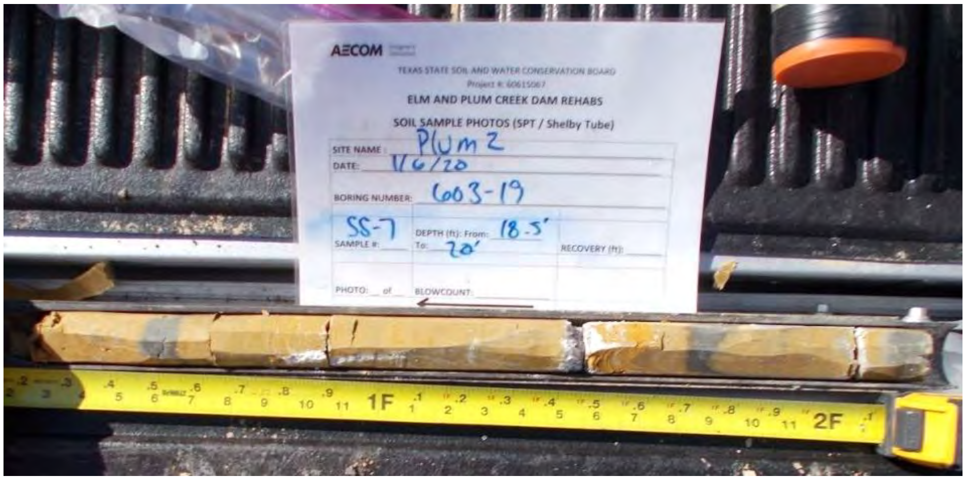


Photo No.	**Date:**
8	12/9/19

Description:

Boring 603-19.

SS-8. Depths ~ 23.5-25 ft

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	Date:
1	12/9/19

Description:

Boring 604-19.

P-1. Depths ~ 0-2 ft

AECOM

ELM AND PLUM CREEK DAM REHABS

SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME: Plum 2

DATE: 12/9/19

BORING NUMBER: 604-19

SAMPLE #: P1

DEPTH (ft): From: 0' To: 2'

RECOVERY (ft):

PHOTO: __ of __

BLOWCOUNT:

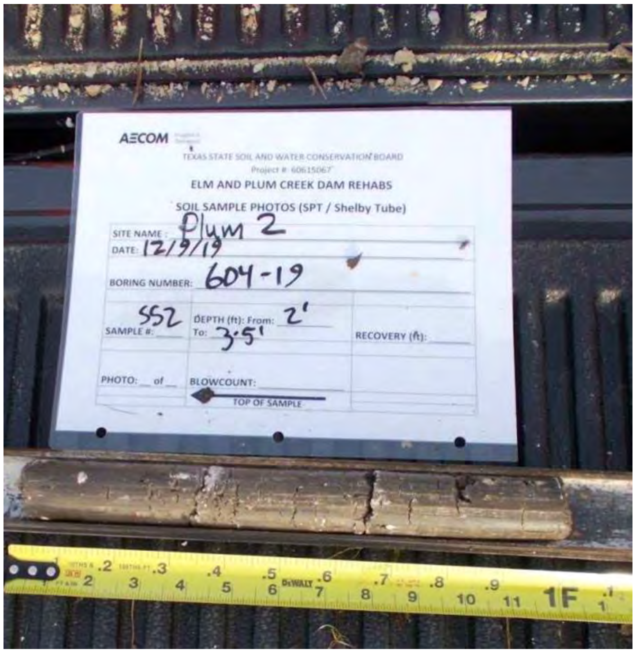
TOP OF SAMPLE

Photo No.	Date:
2	12/9/19

Description:

Boring 604-19.

SS-2. Depths ~ 2-3.5 ft



AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD

Project #: 60615067

ELM AND PLUM CREEK DAM REHABS

SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME: Plum 2

DATE: 12/9/19

BORING NUMBER: 604-19

SAMPLE #: SS2

DEPTH (ft): From: 2' To: 3.5'

RECOVERY (ft):

PHOTO: __ of __

BLOWCOUNT:

TOP OF SAMPLE

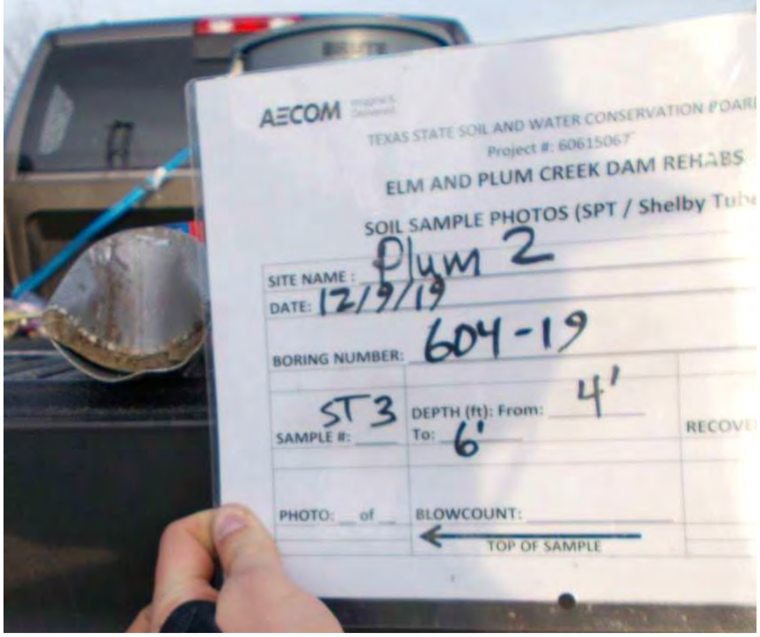
PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	Date:
3	12/9/19

Description:

Boring 604-19.
ST-3. Depths ~ 4-6 ft



AECOM
TEXAS STATE SOIL AND WATER CONSERVATION BOAR
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tu

SITE NAME : Plum 2
DATE: 12/9/19
BORING NUMBER: 604-19
SAMPLE #: ST3
DEPTH (ft): From: 4'
To: 6'
RECOVE
PHOTO: __ of __
BLOWCOUNT: ____
TOP OF SAMPLE

Photo No.	Date:
4	12/9/19

Description:

Boring 604-19.
P-4. Depths ~ 6-8 ft

AECOM
TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME : Plum 2
DATE: 12/9/19
BORING NUMBER: 604-19
SAMPLE #: P4
DEPTH (ft): From: 6'
To: 8'
RECOVERY (ft): ____
PHOTO: __ of __
BLOWCOUNT: ____
TOP OF SAMPLE

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	Date:
5	12/9/19

Description:

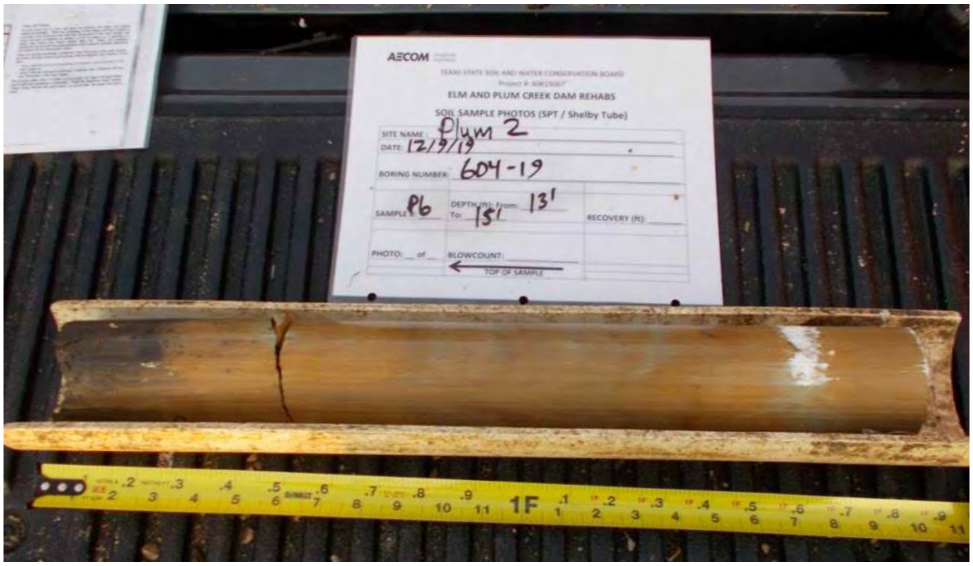
Boring 604-19.
SS-5. Depths ~ 8.5-10 ft

AECOM
TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)
SITE NAME : Plum 2
DATE: 12/9/19
BORING NUMBER: 604-19
SAMPLE #: SS5
DEPTH (ft): From: 8.5'
To: 10'
RECOVERY (ft): ____
PHOTO: __ of __
BLOWCOUNT: ____
TOP OF SAMPLE

Photo No.	Date:
6	12/9/19

Description:

Boring 210-19.
SS-6. Depths ~ 13.5-15 ft..



AECOM
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)
SITE NAME : Plum 2
DATE: 12/9/19
BORING NUMBER: 604-19
SAMPLE #: P6
DEPTH (ft): From: 13'
To: 15'
RECOVERY (ft): ____
PHOTO: __ of __
BLOWCOUNT: ____
TOP OF SAMPLE

AECOM

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	Date:
7	12/9/19

Description:

Boring 604-19.
P-7. Depths ~ 18-20 ft

AECOM
TEXAS STATE SOIL AND WATER CONSERVATION BOARD
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)
SITE NAME: Plum 2
DATE: 12/9/19
BORING NUMBER: 604-19
SAMPLE #: P7
DEPTH (ft): From: 18'
To: 20'
RECOVERY (ft): ____
PHOTO: __ of __
BLOWCOUNT: ____
TOP OF SAMPLE

Photo No.	Date:
8	12/9/19

Description:

Boring 604-19.
SS-8. Depths ~ 23.5-25 ft

AECOM
TEXAS STATE SOIL AND WATER CONSERVATION BOARD
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)
SITE NAME: Plum 2
DATE: 12/9/19
BORING NUMBER: 604-19
SAMPLE #: SS8
DEPTH (ft): From: 235'
To: 25'
RECOVERY (ft): ____
PHOTO: __ of __
BLOWCOUNT: ____
TOP OF SAMPLE

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	Date:
1	12/9/19

Description:

Boring 605-19.

P-1. Depths ~ 0-2 ft

AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD

Project #: 60615067

ELM AND PLUM CREEK DAM REHABS

SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME: Plum 2

DATE: 1/6/20

BORING NUMBER: 605-19

SAMPLE #: P-1

DEPTH (ft): From: 0' To: 2'

RECOVERY (ft):

PHOTO: __ of __

BLOWCOUNT:

TOP OF SAMPLE

Photo No.	Date:
2	12/9/19

Description:

Boring 605-19.

SS-2. Depths ~ 2-3.5 ft

TEXAS STATE SOIL AND WATER CONSERVATION BOARD

Project #: 60615067

ELM AND PLUM CREEK DAM REHABS

SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME: Plum 2

DATE: 1/6/20

BORING NUMBER: 605-19

SAMPLE #: SS-2

DEPTH (ft): From: 2' To: 3.5'

RECOVERY (ft):

PHOTO: __ of __

BLOWCOUNT:

TOP OF SAMPLE

PHOTOGRAPHIC LOG

Client Name:	**Site Location:**	**Project No.**
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No. 3

Date: 12/9/19

Description:

Boring 605-19.

ST-3. Depths ~ 4-6 ft

Photo No. 4

Date: 12/9/19

Description:

Boring 605-19.

P-4. Depths ~ 6-8 ft

PHOTOGRAPHIC LOG

Client Name:	**Site Location:**	**Project No.**
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	**Date:**
5	12/9/19

Description:

Boring 605-19.

SS-5. Depths ~ 8-9.5 ft

AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD

Project #: 60615067

ELM AND PLUM CREEK DAM REHABS

SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME : Plum 2

DATE: 1/6/20

BORING NUMBER: 605-19

SAMPLE #: SS-5

DEPTH (ft): From: 8'

To: 9.5'

RECOVERY (ft): ____

PHOTO: __ of __

BLOWCOUNT: ____

TOP OF SAMPLE

Photo No.	**Date:**
6	12/9/19

Description:

Boring 605-19.

ST-6. Depths ~ 13-15 ft

Project #: 60615067

ELM AND PLUM CREEK DAM REHABS

SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME : Plum 2

DATE: 1/6/20

BORING NUMBER: 605-19

SAMPLE #: ST-6

DEPTH (ft): From: 13'

To: 15'

RECOVERY (ft): ____

PHOTO: __ of __

BLOWCOUNT: ____

TOP OF SAMPLE

PHOTOGRAPHIC LOG

Client Name:	**Site Location:**	**Project No.**
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	**Date:**
7	12/9/19

Description:

Boring 605-19.

P-7. Depths ~ 18-20 ft

Photo No.	**Date:**
8	12/9/19

Description:

Boring 605-19.

SS-8. Depths ~ 23.5-25 ft

AECOM

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	Date:
1	10/1/20

Description:

Boring 701-20

Sample: P-1.

Depths: 0-2 ft

AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME: Plum 2
DATE: 10/8/20
BORING NUMBER: 701-20
SAMPLE #: P1
DEPTH (ft): From: 0 To: 2
RECOVERY (ft): 14"
PHOTO: 1 of __
BLOWCOUNT: —
TOP OF SAMPLE

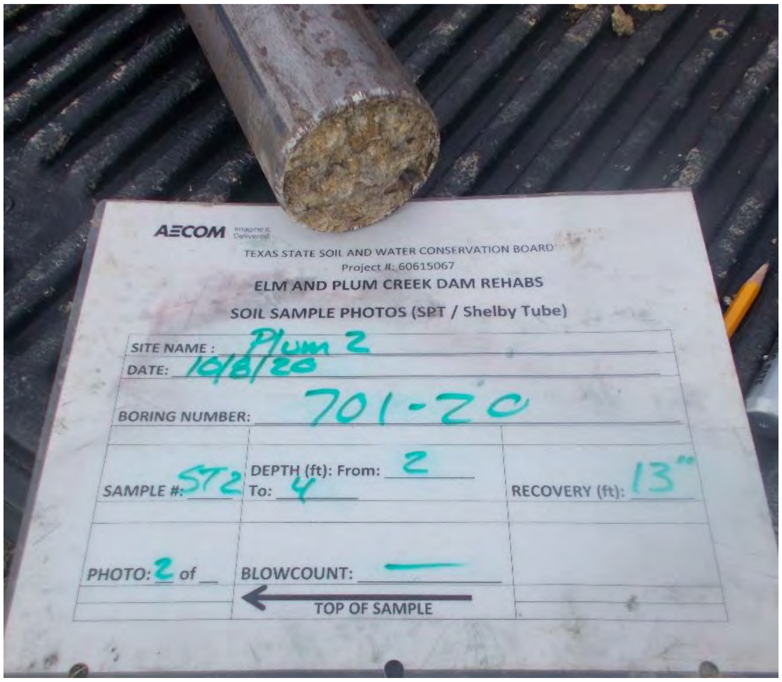
Photo No.	Date:
2	10/1/20

Description:

Boring 701-20

Sample: ST-2.

Depths: 2-4 ft



AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME: Plum 2
DATE: 10/8/20
BORING NUMBER: 701-20
SAMPLE #: ST2
DEPTH (ft): From: 2 To: 4
RECOVERY (ft): 13"
PHOTO: 2 of __
BLOWCOUNT: —
TOP OF SAMPLE

PHOTOGRAPHIC LOG

Client Name: TSSWCB	**Site Location:** Plum 2: Kyle, TX	**Project No.** 60615067

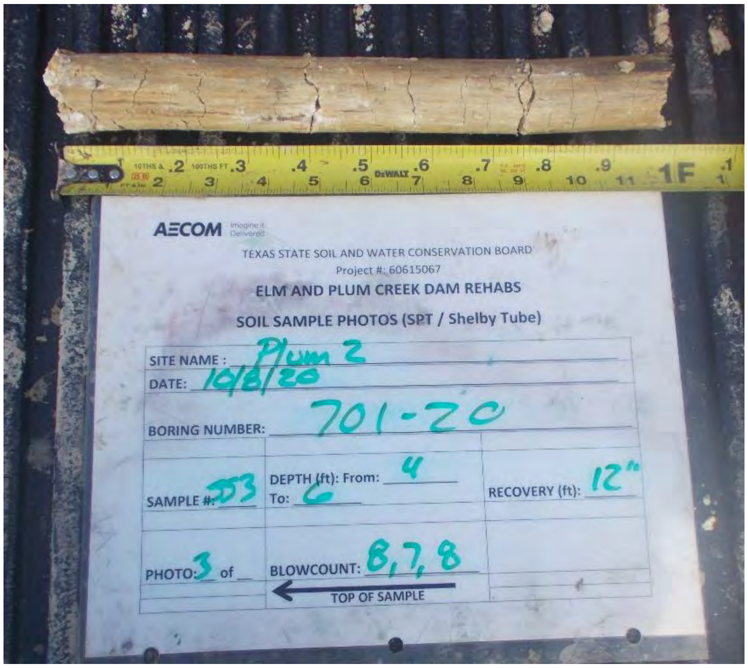
Photo No.	**Date:**
3	10/1/20

Description:

Boring 701-20

Sample: SS-3

Depths: 4-6 ft



AECOM Imagine it. Delivered.

TEXAS STATE SOIL AND WATER CONSERVATION BOARD

Project #: 60615067

ELM AND PLUM CREEK DAM REHABS

SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME : Plum 2

DATE: 10/8/20

BORING NUMBER: 701-20

SAMPLE #: SS3

DEPTH (ft): From: 4 To: 6

RECOVERY (ft): 12"

PHOTO: 3 of __

BLOWCOUNT: 8,7,8

TOP OF SAMPLE

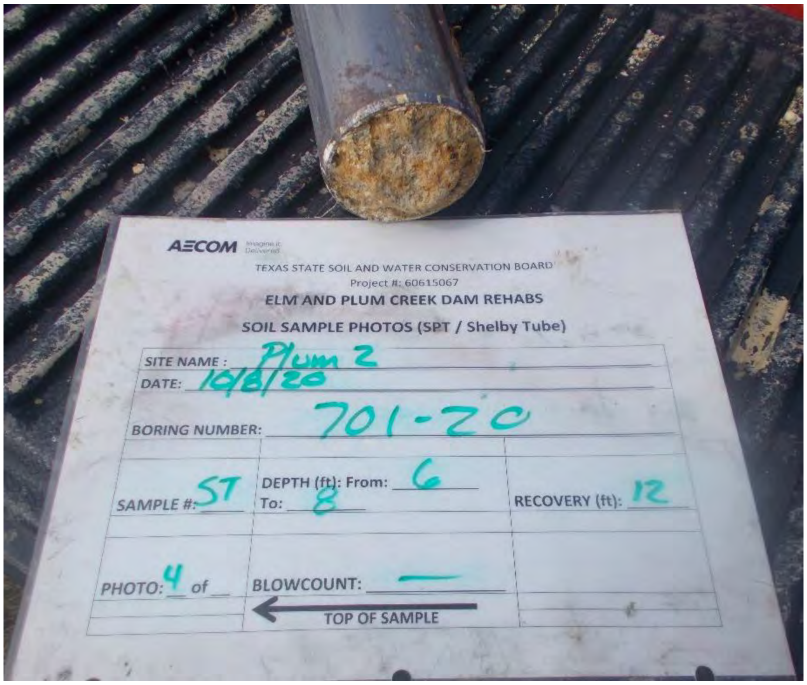
Photo No.	**Date:**
4	10/1/20

Description:

Boring 701-20

Sample: ST-4

Depths: 6-8 ft



AECOM Imagine it. Delivered.

TEXAS STATE SOIL AND WATER CONSERVATION BOARD

Project #: 60615067

ELM AND PLUM CREEK DAM REHABS

SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME : Plum 2

DATE: 10/8/20

BORING NUMBER: 701-20

SAMPLE #: ST

DEPTH (ft): From: 6 To: 8

RECOVERY (ft): 12

PHOTO: 4 of __

BLOWCOUNT: —

TOP OF SAMPLE

PHOTOGRAPHIC LOG

Client Name:	**Site Location:**	**Project No.**
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	**Date:**
5	10/1/20

Description:

Boring 701-20

Sample: P-5

Depths: 8-10 ft

AECOM
TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)
SITE NAME: Plum 2
DATE: 10/8/20
BORING NUMBER: 701-20
SAMPLE #: P5
DEPTH (ft): From: 8
To: 10
RECOVERY (ft): 13"
PHOTO: 5 of __
BLOWCOUNT: —
TOP OF SAMPLE

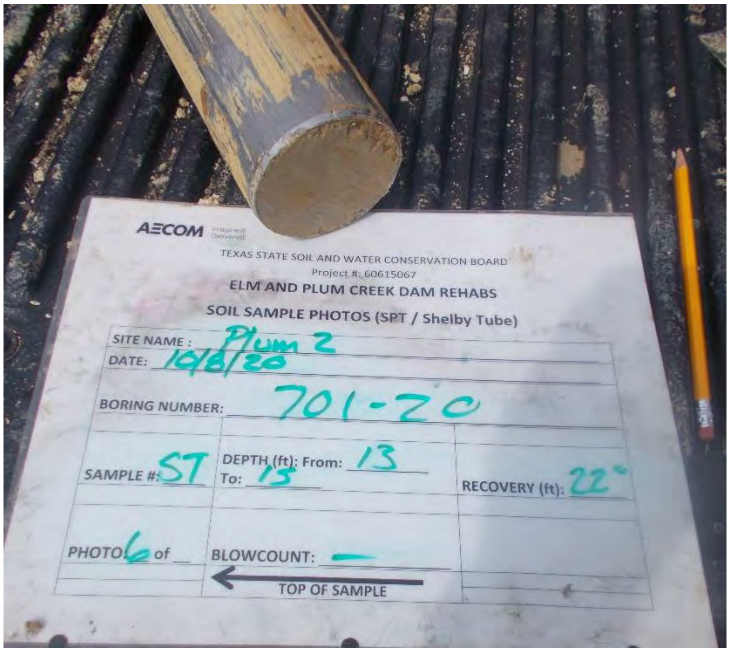
Photo No.	**Date:**
6	10/1/20

Description:

Boring 701-20

Sample: ST-6

Depths: 13-15 ft



AECOM
TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)
SITE NAME: Plum 2
DATE: 10/8/20
BORING NUMBER: 701-20
SAMPLE #: ST
DEPTH (ft): From: 13
To: 15
RECOVERY (ft): 22"
PHOTO: 6 of __
BLOWCOUNT: —
TOP OF SAMPLE

PHOTOGRAPHIC LOG

Client Name:	**Site Location:**	**Project No.**
TSSWCB	Plum 2: Kyle, TX	60615067

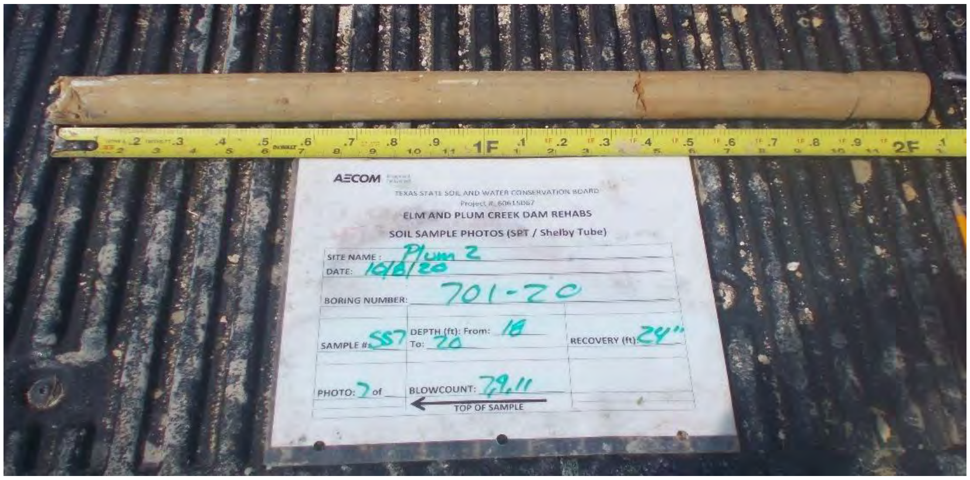
Photo No.	**Date:**
7	10/1/20

Description:

Boring 701-20

Sample: SS-7

Depths: 18-20 ft



AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD

Project #: 60615067

ELM AND PLUM CREEK DAM REHABS

SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME : Plum 2

DATE: 10/8/20

BORING NUMBER: 701-20

SAMPLE #: SS7

DEPTH (ft): From: 18 To: 20

RECOVERY (ft): 24"

PHOTO: 7 of

BLOWCOUNT: 7,9,11

TOP OF SAMPLE

Photo No.	**Date:**
8	10/1/20

Description:

Boring 701-20

Sample: SS-9

Depths: 28-30 ft

AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD

Project #: 60615067

ELM AND PLUM CREEK DAM REHABS

SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME : Plum 2

DATE: 10/8/20

BORING NUMBER: 701-20

SAMPLE #: SS9

DEPTH (ft): From: 28 To: 30

RECOVERY (ft): 24"

PHOTO: 9 of

BLOWCOUNT: 17,30,33

TOP OF SAMPLE

PHOTOGRAPHIC LOG

Client Name:	**Site Location:**	**Project No.**
TSSWCB	Plum 2: Kyle, TX	60615067

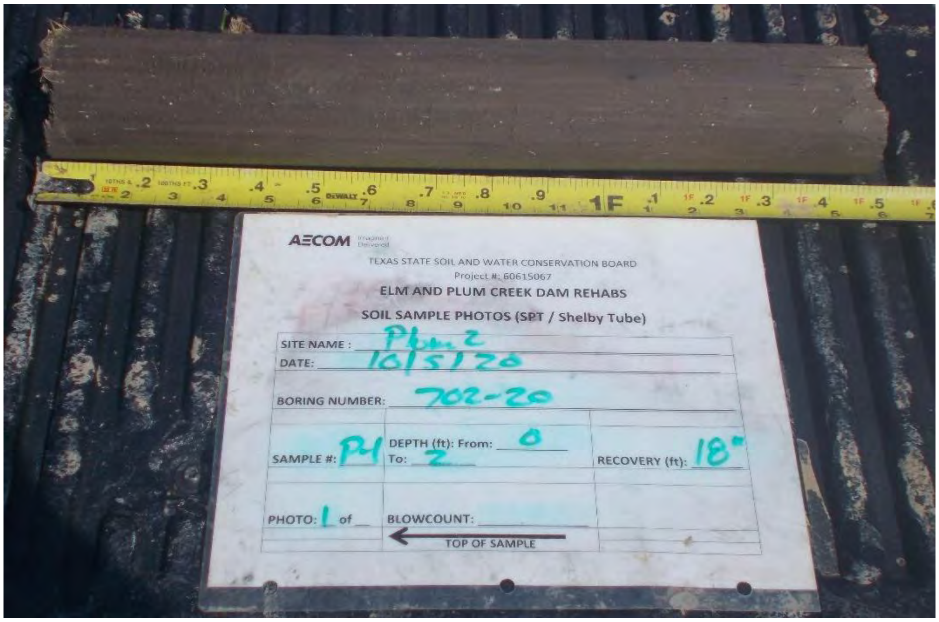
Photo No.	**Date:**
1	10/1/20

Description:

Boring 702-20

Sample: P-1.

Depths: 0-2 ft


AECOM
TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME : Plum 2
DATE: 10/5/20
BORING NUMBER: 702-20
SAMPLE #: P-1
DEPTH (ft): From: 0
To: 2
RECOVERY (ft): 18"
PHOTO: 1 of
BLOWCOUNT:
TOP OF SAMPLE

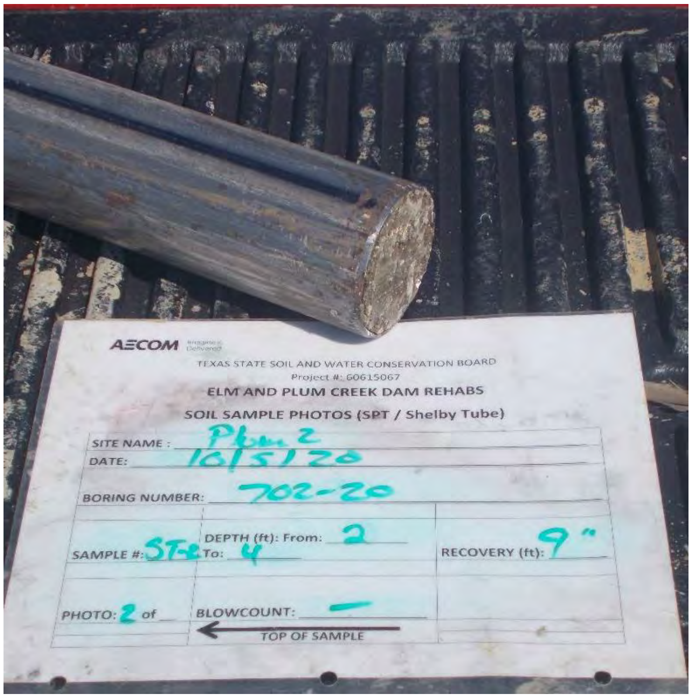
Photo No.	**Date:**
2	10/1/20

Description:

Boring 702-20

Sample: ST-2.

Depths: 2-4 ft


AECOM
TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME : Plum 2
DATE: 10/5/20
BORING NUMBER: 702-20
SAMPLE #: ST-2
DEPTH (ft): From: 2
To: 4
RECOVERY (ft): 9"
PHOTO: 2 of
BLOWCOUNT: —
TOP OF SAMPLE

AECOM

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
TSSWCB	Plum 2: Kyle, TX	60615067

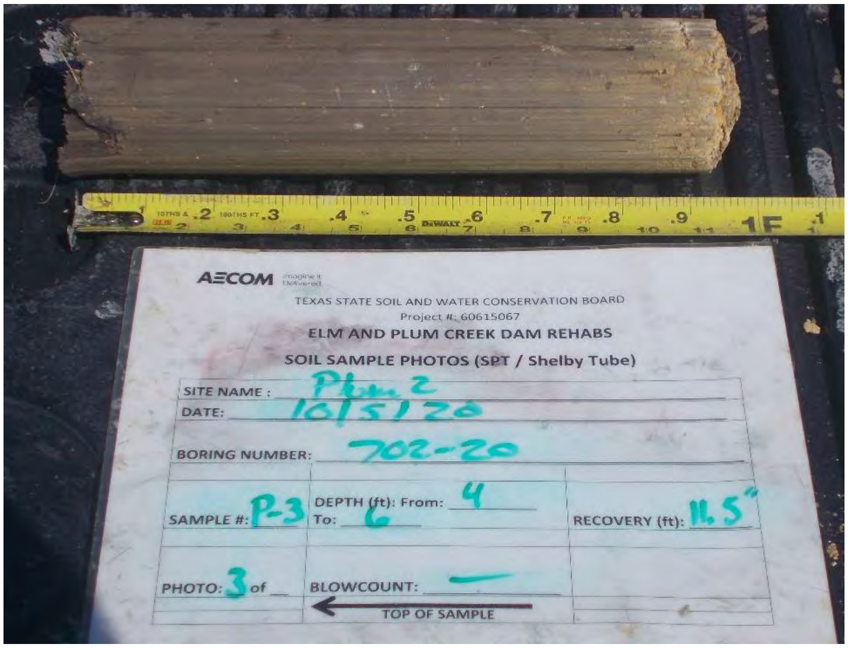
Photo No.	Date:
3	10/1/20

Description:

Boring 702-20

Sample: P-3

Depths: 4-6 ft



AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD

Project #: 60615067

ELM AND PLUM CREEK DAM REHABS

SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME : Plum 2

DATE: 10/5/20

BORING NUMBER: 702-20

SAMPLE #: P-3

DEPTH (ft): From: 4 To: 6

RECOVERY (ft): 11.5"

PHOTO: 3 of

BLOWCOUNT: —

TOP OF SAMPLE

Photo No.	Date:
4	10/1/20

Description:

Boring 702-20

Sample: SS-4

Depths: 8-10 ft

AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD

Project #: 60615067

ELM AND PLUM CREEK DAM REHABS

SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME : Plum 2

DATE: 10/5/20

BORING NUMBER: 702-20

SAMPLE #: SS-4

DEPTH (ft): From: 8 To: 10

RECOVERY (ft): 22"

PHOTO: 4 of

BLOWCOUNT: 10, 9, 11

TOP OF SAMPLE

PHOTOGRAPHIC LOG

Client Name:	**Site Location:**	**Project No.**
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	**Date:**
5	10/1/20

Description:

Boring 702-20

Sample: ST-6

Depths: 13-15 ft

AECOM
TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME : Plum 2
DATE: 10/5/20
BORING NUMBER: 702-20
SAMPLE #: ST6
DEPTH (ft): From: 13
To: 15
RECOVERY (ft): 18
PHOTO: 6 of
BLOWCOUNT: —
TOP OF SAMPLE

Photo No.	**Date:**
6	10/1/20

Description:

Boring 702-20

Sample: P-7

Depths: 18-20 ft

AECOM
TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME : Plum 2
DATE: 10/5/20
BORING NUMBER: 702-20
SAMPLE #: P-7
DEPTH (ft): From: 18
To: 20
RECOVERY (ft): 22"
PHOTO: 7 of
BLOWCOUNT: —
TOP OF SAMPLE

PHOTOGRAPHIC LOG

Client Name:	**Site Location:**	**Project No.**
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	**Date:**
7	10/1/20

Description:

Boring 702-20

Sample: ST-8

Depths: 23-25 ft

AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD

Project #: 60615067

ELM AND PLUM CREEK DAM REHABS

SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME : Plum 2

DATE: 10/5/20

BORING NUMBER: 702-20

SAMPLE #: ST-8

DEPTH (ft): From: 23 To: 25

RECOVERY (ft): 24"

PHOTO: 8 of __

BLOWCOUNT: —

TOP OF SAMPLE

Photo No.	**Date:**
8	10/1/20

Description:

Boring 702-20

Sample: SS-9

Depths: 28-30 ft

AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD

Project #: 60615067

ELM AND PLUM CREEK DAM REHABS

SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME : Plum 2

DATE: 10/5/20

BORING NUMBER: 702-20

SAMPLE #: SS9

DEPTH (ft): From: 28 To: 30

RECOVERY (ft): 24"

PHOTO: 9 of __

BLOWCOUNT: 10,15,21

TOP OF SAMPLE

AECOM

PHOTOGRAPHIC LOG

Client Name:	**Site Location:**	**Project No.**
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	**Date:**
1	10/1/20

Description:

Boring 703-20

Sample: P-1.

Depths: 0-2 ft

AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD

Project #: 60615067

ELM AND PLUM CREEK DAM REHABS

SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME : Plum 2

DATE: 10/1/20

BORING NUMBER: 703-20

SAMPLE #: P1

DEPTH (ft): From: 0

To: 2'

RECOVERY (ft): ___

PHOTO: __ of __

BLOWCOUNT: ___

TOP OF SAMPLE

Photo No.	**Date:**
2	10/1/20

Description:

Boring 703-20

Sample: SS-2.

Depths: 2-3.5 ft

AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD

Project #: 60615067

ELM AND PLUM CREEK DAM REHABS

SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME : Plum 2

DATE: 10/1/20

BORING NUMBER: 703-20

SAMPLE #: SS2

DEPTH (ft): From: 2

To: 3.5'

RECOVERY (ft): ___

PHOTO: __ of __

BLOWCOUNT: ___

TOP OF SAMPLE

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	Date:
3	10/1/20

Description:

Boring 703-20

Sample: ST-3

Depths: 4-6 ft

AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD

Project #: 60615067

ELM AND PLUM CREEK DAM REHABS

SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME : Plum 2

DATE: 10/1/20

BORING NUMBER: 703-20

SAMPLE #: ST 3

DEPTH (ft): From: 4

To: 6

RECOVERY (ft):

PHOTO: __ of __

BLOWCOUNT:

TOP OF SAMPLE

Photo No.	Date:
4	10/1/20

Description:

Boring 703-20

Sample: P-4

Depths: 6-8 ft

AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD

Project #: 60615067

ELM AND PLUM CREEK DAM REHABS

SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME : Plum 2

DATE: 10/1/20

BORING NUMBER: 703-20

SAMPLE #: P4

DEPTH (ft): From: 6

To: 8

RECOVERY (ft):

PHOTO: __ of __

BLOWCOUNT:

TOP OF SAMPLE

AECOM

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	Date:
5	10/1/20

Description:

Boring 703-20

Sample: ST-5.

Depths: 8-10 ft

AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD

Project #: 60615067

ELM AND PLUM CREEK DAM REHABS

SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME : Plum 2

DATE: 10/1/20

BORING NUMBER: 703-20

SAMPLE #: ST5

DEPTH (ft): From: 8 To: 10

RECOVERY (ft):

PHOTO: __ of __

BLOWCOUNT:

TOP OF SAMPLE

Photo No.	Date:
6	10/1/20

Description:

Boring 703-20

Sample: SS-6

Depths: 13.5-15 ft

AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD

Project #: 60615067

ELM AND PLUM CREEK DAM REHABS

SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME : Plum 2

DATE: 10/1/20

BORING NUMBER: 703-20

SAMPLE #: SS6

DEPTH (ft): From: 13.5 To: 15

RECOVERY (ft):

PHOTO: __ of __

BLOWCOUNT:

TOP OF SAMPLE

AECOM	PHOTOGRAPHIC LOG	
Client Name: TSSWCB	**Site Location:** Plum 2: Kyle, TX	**Project No.** 60615067

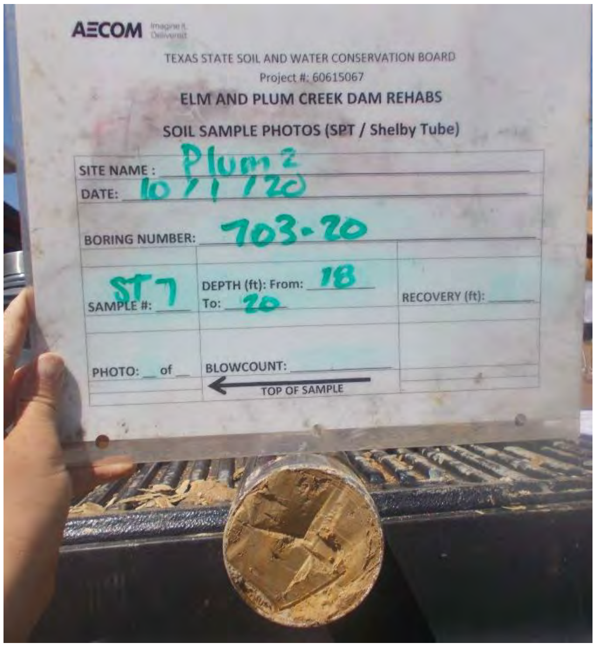
Photo No. 7	**Date:** 10/1/20

Description:

Boring 703-20

Sample: ST-7.

Depths: 18-20 ft



AECOM Imagine it. Delivered.
TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)
SITE NAME: Plum 2
DATE: 10/1/20
BORING NUMBER: 703-20
SAMPLE #: ST 7
DEPTH (ft): From: 18
To: 20
RECOVERY (ft):
PHOTO: __ of __
BLOWCOUNT:
TOP OF SAMPLE

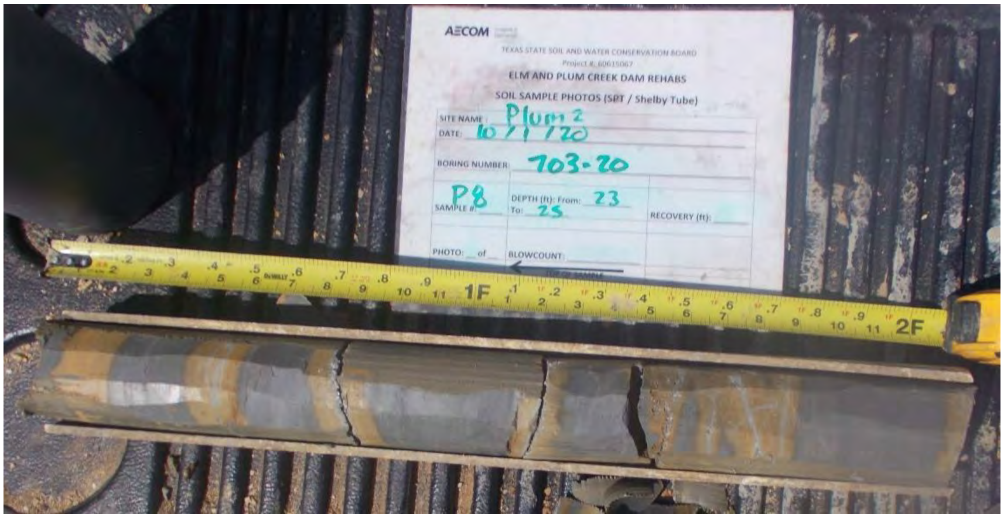
Photo No. 8	**Date:** 10/1/20

Description:

Boring 703-20

Sample: P-8

Depths: 23-25 ft



AECOM
TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)
SITE NAME: Plum 2
DATE: 10/1/20
BORING NUMBER: 703-20
SAMPLE #: P8
DEPTH (ft): From: 23
To: 25
RECOVERY (ft):
PHOTO: __ of __
BLOWCOUNT:
TOP OF SAMPLE

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	Date:
1	12/9/19

Description:

Boring 1301-19.
G-1. Depths ~ 0-2 ft

Photo No.	Date:
2	12/9/19

Description:

Boring 1301-19.

G-2. Depths ~ 2-4 ft

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	Date:
3	12/9/19

Description:

Boring 1301-19.
G-3. Depths ~ 4-6 ft

Photo No.	Date:
4	12/9/19

Description:

Boring 1301-19.
G-4. Depths ~ 6-8 ft

PHOTOGRAPHIC LOG

Client Name: TSSWCB	**Site Location:** Plum 2: Kyle, TX	**Project No.** 60615067

Photo No. 5	**Date:** 12/9/19

Description:

Boring 1301-19.
G-5. Depths ~ 8-10 ft

TEXAS STATE SOIL AND WATER CONSERVATION BOARD

ELM AND PLUM CREEK DAM REHABS

SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME: Plum #2

DATE: 12/11/19

BORING NUMBER: 1301-19

SAMPLE #: G5

DEPTH (ft): From: 8' To: 10'

RECOVERY (ft): ___

PHOTO: __ of __

BLOWCOUNT: ___

TOP OF SAMPLE

AECOM

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	Date:
1	12/9/19

Description:

Boring 1302-19.
G-1. Depths ~ 0-2 ft

Photo No.	Date:
2	12/9/19

Description:

Boring 1302-19.

G-2. Depths ~ 2-4 ft

PHOTOGRAPHIC LOG

Client Name:	**Site Location:**	**Project No.**
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	**Date:**
3	12/9/19

Description:

Boring 1302-19.
G-3. Depths ~ 4-6 ft

SITE NAME: Plum#2
DATE: 12/11/19
BORING NUMBER: 1302-19
SAMPLE #: G3 DEPTH (ft): From: 4' To: 6'
RECOVERY (ft):
PHOTO: __ of __ BLOWCOUNT:
TOP OF SAMPLE

Photo No.	**Date:**
4	12/9/19

Description:

Boring 1302-19.
G-4. Depths ~ 6-6.5 ft

SITE NAME: Plum#2
DATE: 12/11/19
BORING NUMBER: 1302-19
SAMPLE #: G4 DEPTH (ft): From: 6' To: 6.5'
RECOVERY (ft):
PHOTO: __ of __ BLOWCOUNT:
TOP OF SAMPLE

PHOTOGRAPHIC LOG

Client Name: TSSWCB	**Site Location:** Plum 2: Kyle, TX	**Project No.** 60615067

Photo No. 1	**Date:** 10/1/20

Description:

Boring 1701-20

Sample: G-1

Depths: 0-1 ft

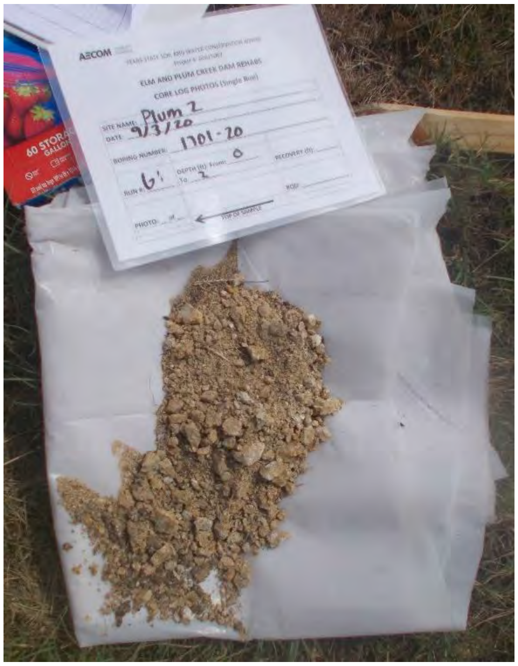


Photo No. 2	**Date:** 10/1/20

Description:

Boring 1701-20

Sample: G-2

Depths: 1-2 ft

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	Date:
3	10/1/20

Description:

Boring 1701-20

Sample: G-3

Depths: 03.5-4.5 ft

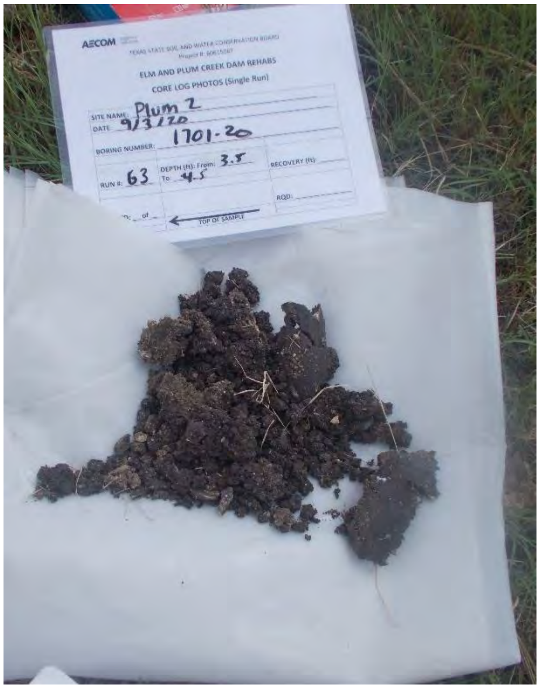


Photo No.	Date:
4	10/1/20

Description:

Boring 1701-20

Sample: G-4

Depths: 6-8 ft

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	Date:
5	10/1/20

Description:

Boring 1701-20

Sample: G-5

Depths: 8-9 ft

Photo No.	Date:
6	10/1/20

Description:

Boring 1701-20

Sample: G-6

Depths: 9-10 ft

PHOTOGRAPHIC LOG

Client Name: TSSWCB	**Site Location:** Plum 2: Kyle, TX	**Project No.** 60615067

Photo No. 1	**Date:** 10/1/20

Description:

Boring 1702-20

Sample: P-1.

Depths: 0-2 ft

Photo No. 2	**Date:** 10/1/20

Description:

Boring 1702-20

Sample: ST-2.

Depths: 2-4 ft

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	Date:
1	10/1/20

Description:

Boring 1703-20

Sample: G-1

Depths: 0-2 ft

Photo No.	Date:
2	10/1/20

Description:

Boring 1703-20

Sample: G-2

Depths: 3-4 ft

PHOTOGRAPHIC LOG

Client Name:	**Site Location:**	**Project No.**
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	**Date:**
3	10/1/20

Description:

Boring 1703-20

Sample: G-3

Depths: 4-6 ft

Photo No.	**Date:**
4	10/1/20

Description:

Boring 1703-20

Sample: G-4

Depths: 6-7 ft

PHOTOGRAPHIC LOG

Client Name: TSSWCB	**Site Location:** Plum 2: Kyle, TX	**Project No.** 60615067

Photo No. 5	**Date:** 10/1/20

Description:

Boring 1703-20

Sample: G-5

Depths: 8-10 ft

AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD

Project #: 60615067

ELM AND PLUM CREEK DAM REHABS

CORE LOG PHOTOS (Single Run)

SITE NAME: Plum 2

DATE: 9/3/20

BORING NUMBER: 1703-20

RUN #: G5

DEPTH (ft): From: 7'

To: ____

RECOVERY (ft): ____

RQD: ____

PHOTO: __ of __

AECOM

PHOTOGRAPHIC LOG

Client Name: TSSWCB	**Site Location:** Plum 2: Kyle, TX	**Project No.** 60615067

Photo No.	**Date:**
1	10/1/20

Description:

Boring 1704-20

Sample: G-1

Depths: 0-2 ft

Photo No.	**Date:**
2	10/1/20

Description:

Boring 1704-20

Sample: G-2

Depths: 2.5-3 ft

AECOM

PHOTOGRAPHIC LOG

Client Name:	**Site Location:**	**Project No.**
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	**Date:**
3	10/1/20

Description:

Boring 1704-20

Sample: G-3

Depths: 3-3.5 ft

Photo No.	**Date:**
4	10/1/20

Description:

Boring 1704-20

Sample: G-4

Depths: 4-4.5 ft

PHOTOGRAPHIC LOG

Client Name:	**Site Location:**	**Project No.**
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No. 5 **Date:** 10/1/20

Description:

Boring 1704-20

Sample: G-5

Depths: 85-5.5 ft

Photo No. 6 **Date:** 10/1/20

Description:

Boring 1704-20

Sample: G-4

Depths: 6-6.5 ft

PHOTOGRAPHIC LOG

Client Name:	**Site Location:**	**Project No.**
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	**Date:**
7	10/1/20

Description:

Boring 1704-20

Sample: G-8

Depths: 10-10.5 ft

AECOM

TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067

ELM AND PLUM CREEK DAM REHABS
CORE LOG PHOTOS (Single Run)

SITE NAME: Plum 2
DATE: 9/3/20
BORING NUMBER: 1704-20
RUN #: G8
DEPTH (ft): From: 10
To: 10.5'
RECOVERY (ft):
RQD:
PHOTO:

PHOTOGRAPHIC LOG

Client Name:	**Site Location:**	**Project No.**
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	**Date:**
1	10/1/20

Description:

Boring 1705-20

Sample: G-1.

Depths: 0-1 ft

TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
CORE LOG PHOTOS (Single Run)

SITE NAME: Plum 2
DATE: 9/3/20
BORING NUMBER: 1705-20
RUN #: G1
DEPTH (ft): From: 0
To: 1
RECOVERY (ft): ____
PHOTO: __ of __
RQD: ____
TOP OF SAMPLE

Photo No.	**Date:**
2	10/1/20

Description:

Boring 1705-20

Sample: G-2.

Depths: 2-4 ft

AECOM
TEXAS STATE SOIL AND WATER CONSERVATION BOARD
Project #: 60615067
ELM AND PLUM CREEK DAM REHABS
SOIL SAMPLE PHOTOS (SPT / Shelby Tube)

SITE NAME : Plum 2
DATE: 10/1/20
BORING NUMBER: 1705-20
SAMPLE #: G1
DEPTH (ft): From: 2
To: [illegible]
RECOVERY (ft): ____
PHOTO: __ of __
BLOWCOUNT: ____
TOP OF SAMPLE

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	Date:
3	10/1/20

Description:

Boring 1705-20

Sample: G2

Depths: 4-6 ft

Photo No.	Date:
4	10/1/20

Description:

Boring 1705-20

Sample: G3

Depths: 6-8 ft

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
TSSWCB	Plum 2: Kyle, TX	60615067

Photo No.	Date:
5	10/1/20

Description:

Boring 1705-20

Sample: G4.

Depths: 8-10 ft

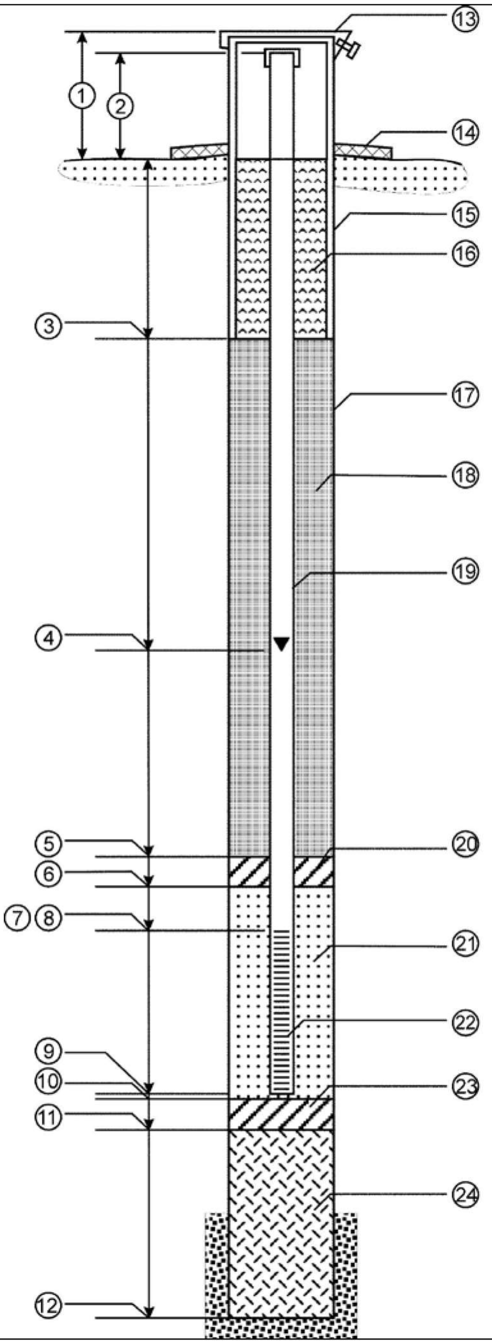
Appendix G Piezometer Construction Diagrams

Well/Hole Number: PZ-9-19

Monitoring Well Installation Log

LOCATION: Embankment Crest
Northing: 13907884.65
Easting: 2330266.073

Drilling Contractor: Total Support Services
Project Name: Plum FRS No. 2
Date/Time Started: 1/29/2020 10:30 am
Geologist: M. Lyons
Project Number: 60615067
Date/Time Completed: 1/29/2020
Driller: C. Rios
Type of Drilling: Hollow Stem Auger 3.25" I.D.
Ground Surface Elev. 662.38 ft (NAVD88)
Top of Well Casing Elev. 662.38 ft (NAVD88)



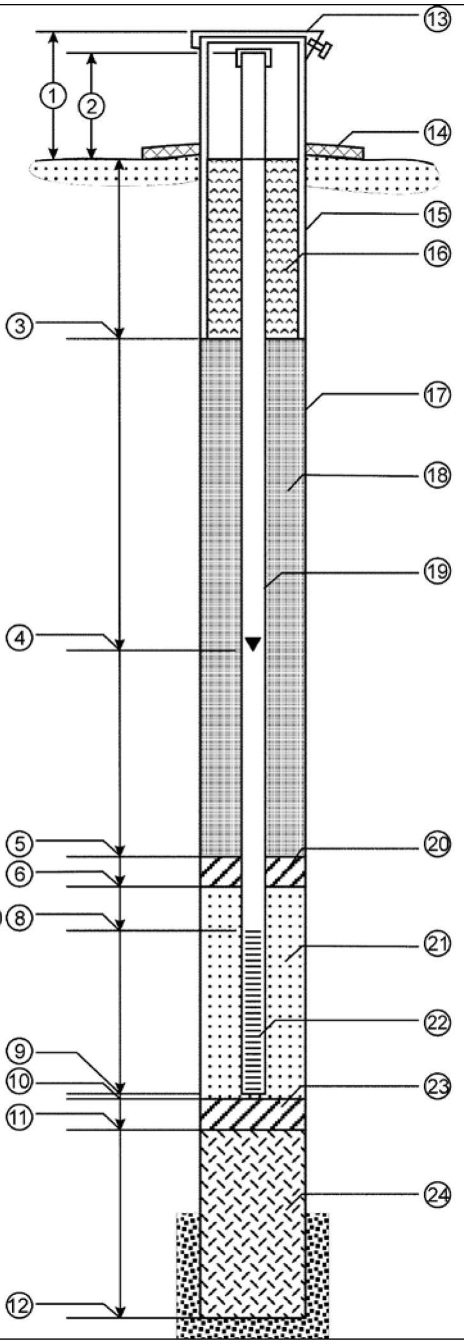
1. Stick-Up of Protective Casing (If Any) Above Ground: N/A ft.
2. Stick-Up Well Casing Above Ground: N/A ft.
3. Depth to Base of Surface Seal/Protective Casing: 2.0 ft.
4. Depth to Static Water Level: Measured on 1/30/2020 16.31 ft.
5. Depth to Top of Screen Interval Seal: 7.5 ft.
6. Depth to Bottom of Screen Interval Seal: 9.5 ft.
7. Depth to Top of Well Screen: 14.5 ft.
8. Total Length of Blank Casing: 15.0 ft.
9. Depth to Bottom of Well Screen: 34.5 ft.
9a. Bottom Cap Length: 6.0 in.
10. Depth to Base of Sand Pack: 35.0 ft.
11. Depth to Base of Bottom Hole Seal: No bottom seal ft.
12. Depth to Base of Hole: 35.0 ft.
13. Protective Casing: ☒ **Yes** ☐ **No** **Locking Cap:** ☐ **Yes** ☑ **No**
14. Concrete Pad: ☒ **Yes** ☐ **No**
15. Type of Protective Casing: Steel casing Diameter: 4.0 in.
16. Type of Surface Seal: Concrete
17. Borehole Diameter: 7.5" O.D./ 3.25" I.D. in.
18. Type of Annular Seal: Cement-bentonite grout
19. Type of Well Casing: Sch. 40 PVC Diameter: 2.0 in.
20. Type of Screen Interval Seal: Hydrated Bentonite chips
21. Type/Size of Sand Filter Pack: 20/30 Sand Diameter: 0.028 in.
22. Type of Screen Material: Slotted PVC Slot Size: 0.010 in
23. Type of Bottom Hole Seal: No bottom hole seal
24. Borehole backfill material and thickness No backfill/In-situ Soil

Recorded By M. Lyons
Date 1/29/2020
Checked By L. Finnefrock
Date

Well/Hole Number: PZ-11-19	**Monitoring Well Installation Log**	LOCATION: Embankment Crest Northing: 13907217.96 Easting: 2330293.584

Drilling Contractor: Total Support Services	Project Name: Plum FRS No. 2	Date/Time Started: 12/17/2019
Geologist: M. Lyons	Project Number: 60615067	Date/Time Completed: 12/17/2019

Driller: C. Rios	Type of Drilling: Hollow Stem Auger 3.25" I.D.	Ground Surface Elev. 661.24 ft (NAVD88)	Top of Well Casing Elev. 661.24 ft (NAVD88)



1. Stick-Up of Protective Casing (If Any) Above Ground: N/A ft.
2. Stick-Up Well Casing Above Ground: N/A ft.
3. Depth to Base of Surface Seal/Protective Casing: No surface seal (grout) ft.
4. Depth to Static Water Level: -- ft.
5. Depth to Top of Screen Interval Seal: 31.5 ft.
6. Depth to Bottom of Screen Interval Seal: 33.5 ft.
7. Depth to Top of Well Screen: 34.5 ft.
8. Total Length of Blank Casing: 35.0 ft.
9. Depth to Bottom of Well Screen: 59.5 ft.

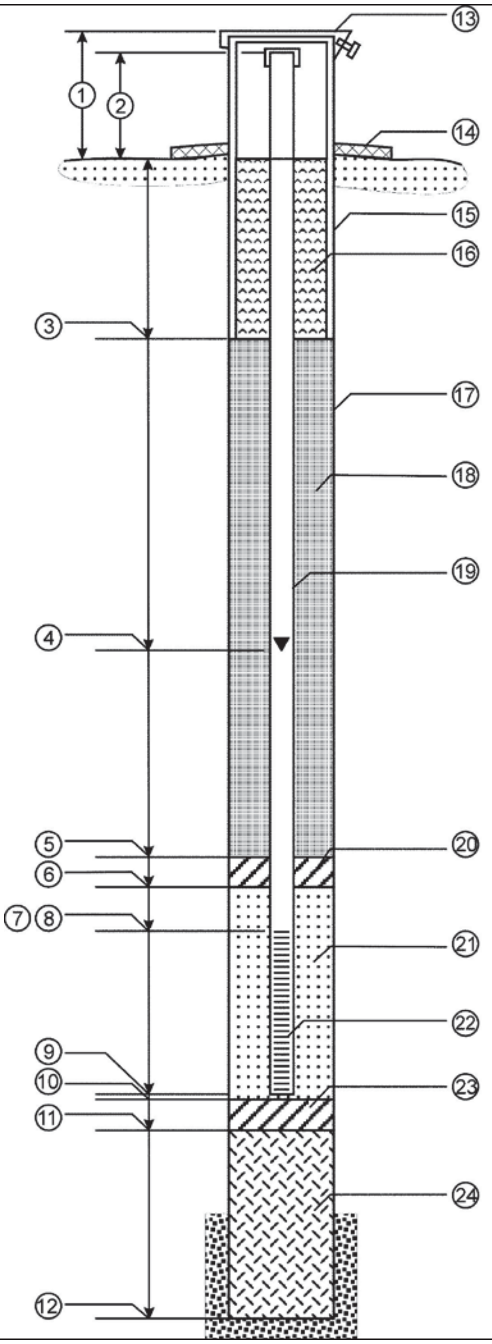
9a. Bottom Cap Length: 6.0 in.

10. Depth to Base of Sand Pack: 60.0 ft.
11. Depth to Base of Bottom Hole Seal: No bottom seal ft.
12. Depth to Base of Hole: 60.0 ft.
13. Protective Casing: ■ **Yes** ☐ **No** **Locking Cap:** ☐ **Yes** ☑ **No**
14. Concrete Pad: ■ **Yes** ☐ **No** 2 ft x 2 ft
15. Type of Protective Casing: Steel casing Diameter: 8.0 in.
16. Type of Surface Seal: Concrete
17. Borehole Diameter: 7.5" O.D./ 3.25" I.D. in.
18. Type of Annular Seal: Cement-bentonite grout
19. Type of Well Casing: Sch. 40 PVC Diameter: 2.0 in.
20. Type of Screen Interval Seal: Hydrated Bentonite chips
21. Type/Size of Sand Filter Pack: 20/30 Sand Diameter: 0.028 in.
22. Type of Screen Material: Slotted PVC Slot Size: 0.010 in
23. Type of Bottom Hole Seal: No bottom hole seal
24. Borehole backfill material and thickness No backfill/In-situ Soil

Recorded By M. Lyons	Date 12/17/2019	Checked By L. Finnefrock	Date

Well/Hole Number: PZ-702-20	**Monitoring Well Installation Log**	LOCATION: Downstream Toe Northing: 13907801 Easting: 2330379

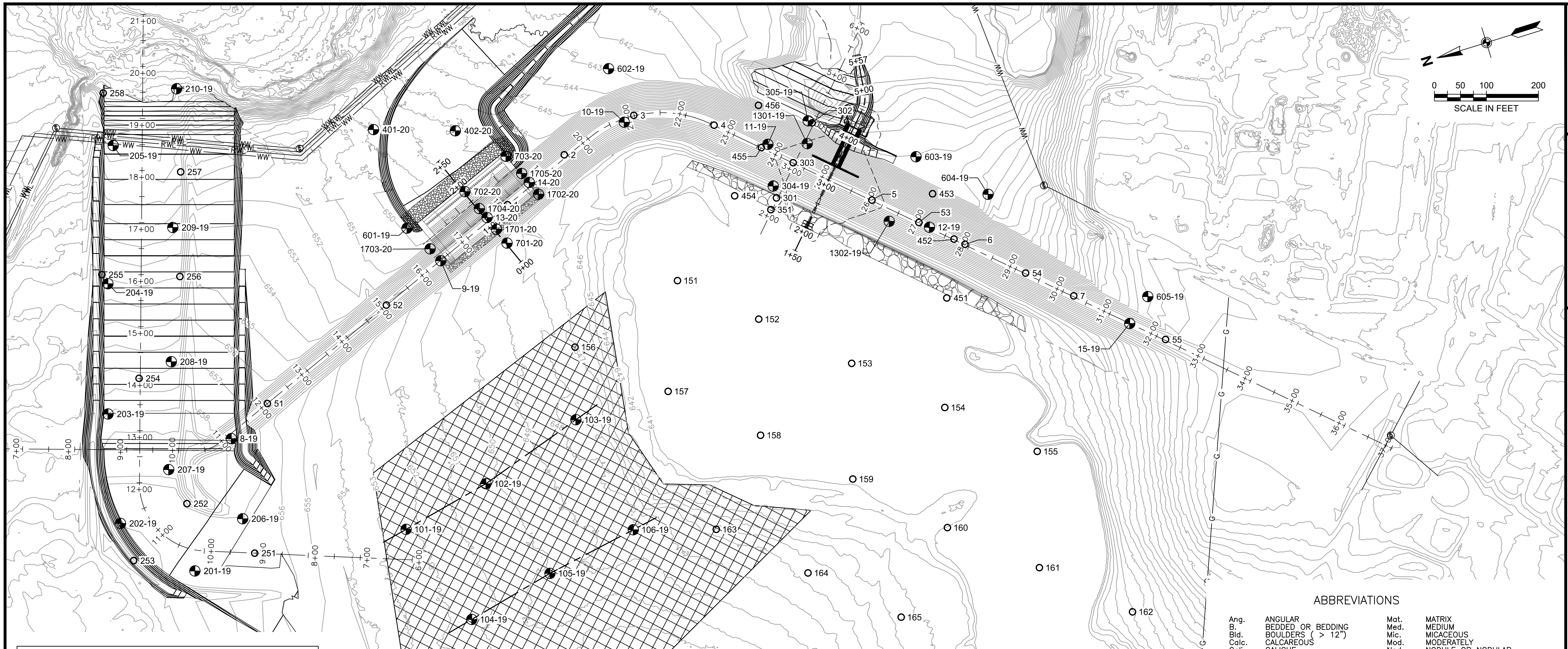
Drilling Contractor: TSS		Project Name: Plum Creek FRS #2	Date/Time Started: 10/5/20 - 2:00pm
Geologist: S. Whipkey		Project Number: 60615067	Date/Time Completed: 10/6/20 - 9:30am
Driller: C. Westbrook	Type of Drilling: Hollow Stem Auger 3.25" ID	Ground Surface Elev. 647.79 ft.msl	Top of Well Casing Elev. 647.79 ft.msl



1. Stick-Up of Protective Casing (If Any) Above Ground: n/a ft.
2. Stick-Up Well Casing Above Ground: n/a ft.
3. Depth to Base of Surface Seal/Protective Casing: 2.0 ft.
4. Depth to Static Water Level: Dry ft.
5. Depth to Top of Screen Interval Seal: 5.0 ft.
6. Depth to Bottom of Screen Interval Seal: 8.0 ft.
7. Depth to Top of Well Screen: 10.0 ft.
8. Total Length of Blank Casing: 10.0 ft.
9. Depth to Bottom of Well Screen: 30.0 ft.
9a. Bottom Cap Length: 6.0 in.
10. Depth to Base of Sand Pack: 30.0 ft.
11. Depth to Base of Bottom Hole Seal: n/a ft.
12. Depth to Base of Hole: 30.0 ft.
13. Protective Casing: ☑ **Yes** ☐ **No** **Locking Cap:** ☐ **Yes** ☒ **No**
14. Concrete Pad: ☒ **Yes** ☐ **No**
15. Type of Protective Casing: Flush-mount Diameter: 8.0 in.
16. Type of Surface Seal: Concrete
17. Borehole Diameter: 10.0 in.
18. Type of Annular Seal: Cement-Bentonite Grout
19. Type of Well Casing: Schedule 40 PVC Diameter: 2.0 in.
20. Type of Screen Interval Seal: Hydrated Bentonite Chips
21. Type/Size of Sand Filter Pack: SIlica Sand Diameter: 20/40 in.
22. Type of Screen Material: Schedule 40 PVC Slot Size: 0.01 in
23. Type of Bottom Hole Seal: n/a
24. Borehole backfill material and thickness n/a

Recorded By S. Whipkey	Date 10/6/20	Checked By L. Finnefrock	Date 10/8/20

Appendix H Geologic Profiles



NRCS CLASSIFICATION FOR UNCONSOLIDATED & SYMBOL CHART			
COARSE–GRAINED SOILS (more than 50% of material is larger than No. 200 sieve size.)			
GRAVEL More than 50% of coarse fraction greater than No. 4 sieve size	CLEAN GRAVELS (Less than 5% fines)		
	▨	GW	WELL–GRADED GRAVELS, GRAVEL–SAND MIXTURES, LITTLE OF NO FINES
	▨	GP	POORLY–GRADED GRAVELS, GRAVEL–SAND MIXTURES, LITTLE OF NO FINES
	GRAVELS WITH FINES (More than 12% fines)		
	▨	GM	SILTY GRAVELS, GRAVEL–SAND–SILT MIXTURES
	▨	GC	CLAYEY GRAVELS, GRAVEL–SAND–CLAY MIXTURES
SAND More than 50% of coarse fraction smaller than No. 4 sieve size	CLEAN SAND (Less than 5% fines)		
	▨	SW	WELL GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES.
	▨	SP	POORLY–GRADED SANDS, GRAVEL–SAND MIXTURES, LITTLE OF NO FINES
	SAND WITH FINES (More than 12% fines)		
	▨	SM	SILTY SAND, SAND–SILT MIXTURE
	▨	SC	CLAYEY SAND, SAND–CLAY MIXTURE
FINE–GRAINED SOILS (more than 50% of material is smaller than No. 200 sieve size.)			
SILTS & CLAYS Liquid limit less than 50%	▥	ML	INORGANIC SILTS WITH SLIGHT PLASTICITY
	▨	CL	INORGANIC CLAY WITH LOW OR MEDIUM PLASTICITY, LEAN CLAY
SILTS & CLAYS Liquid limit Greater than 50%	▥	MH	INORGANIC SILTS WITH ELASTICITY
	▨	CH	INORGANIC CLAY WITH HIGH PLASTICITY, FAT CLAY.

NRCS CLASSIFICATION FOR CONSOLIDATED & SYMBOL CHART

▨	CONGLOM– ERATE CNG.	▤	SHALE SH.	▦	LIMESTONE LS.		
▨	BRECCIA BRC.	▦	SILTSTONE MS	▤	DOLOMITE DOL.	▩	GYPSUM GYP.
▨	SAND– STONE SS.	▨	CLAYSTONE CS.	▦	CHALK CH.	▨	CHERT CHT.

OTHER SYMBOLS

- ● HOLE LOGGED ONLY
- STRIKE AND DIP
- ◉ HOLE SAMPLED
- PIT OR TRENCH

TEST HOLE NUMBERING SYSTEM					
	COMBINA– TION RIG	POWER AUGER	HAND BORINGS	TRENCH OR PIT EXCAVA– TIONS	NATURAL OUTCROPS, STREAMBANKS, AND GULLIES
CENTERLINE OF DAM	1–49	51–99	1001–1099	2001–2099	3001–3099
BORROW AREA	101–149	151–199	1101–1199	2101–2199	3101–3199
EMERGENCY SPILLWAY	201–249	251–299	1201–1299	2201–2299	3201–3299
PRINCIPAL SPILLWAY	301–349	351–399	1301–1399	2301–2399	3301–3399
STREAM CHANNELS	401–449	451–499	1401–1499	2401–2499	3401–3499
EXPLORATORY BORINGS	501–549	551–599	1501–1599	——	——
FOUNDATION DRAIN	601–649	651–699	1601–1699	2601–2699	3601–3699
MISCELLANEOUS	701–749	751–799	1701–1799	2701–2799	3701–3799

CLASSIFICATION	RANGE OF GRAIN SIZE U.S. standard sieve size
BOULDERS	ABOVE 12"
COBBLES	12" TO 3"
GRAVEL Course Fine	3" to No. 4 3" to 3/4" 3/4" to No. 4
SAND Coarse Medium Fine	No. 4 to No. 200 No. 4 to No. 10 No. 10 to No. 40 No. 40 to No. 200
SILT & CLAY	Below No. 200

ABBREVIATIONS

Ang.	ANGULAR
B.	BEDDED OR BEDDING
Bld.	BOULDERS (> 12")
Calc.	CALCAREOUS
Cali.	CALICHE
Carb.	CARBONATE
Cav.	CAVITIES
Cmt.	CEMENTED
Ch.	CHALK OR CHALKY
C	CLAY, CLAYEY
Cse.	COARSE
Cbl.	COBBLES (3" – 12")
Cpt.	COMPACT
Con.	CONCRETIONS
Cng.	CONGLOMERATE
Cs.	CLAYSTONE
C.T.	CAVED TO
Xln.	CRYSTALLINE
Ds.	DENSE
Dip.	DIPPING
D.S.	DOWNSTREAM
Fe. Stn.	Iron Stains
Flg.	FLAGSTONE OR FLAGGY
Fn.	FINE
Frm.	FIRM
Frac.	FRACTURED
Frg.	FRAGMENTS
Fri.	FRIABLE
Grn.	GRAIN
G	GRAVEL, GRAVELLY
Gyp.	GYPSEOUS
Hd.	ROCK HARDNESS
H.	HIGHLY
Int.	INTERBEDDED
Lam.	LAMINATED
Lay.	LAYER OR LAYERS
Len.	LENS OR LENSES
Lig.	LIGNITE
Ls.	LIMESTONE
Lse.	LOOSE
Ma.	MARL, OR MARLY
Mas.	MASSIVE
Mat.	MATRIX
Med.	MEDIUM
Mic.	MICACEOUS
Mod.	MODERATELY
Nod.	NODULE OR NODULAR
N.R.	NO RECOVERY
O	ORGANIC
Part.	PARTINGS
Peb.	PEBBLE
Per.	PERMEABLE
Po.	POORLY
P.	POORLY GRADED
Rdd.	ROUNDED
S	SAND, SANDY
Ss.	SANDSTONE
Sat.	SATURATED
Sh.	SHALE, OR SHALY
Sl/.	SLIGHTLY
Slo.	SLOWLY
M	SILT, SILTY
Sft.	SOFT
Sl.	SOME
Stf.	STIFF
Str.	STREAKS
T.	THIN
T.B.	THIN – BEDDED
Tuff.	TUFFACEOUS
U.A.D.	UNABLE TO AUGER DEEPER
U.D.B.D.	UNABLE TO DRY BARREL DEEPER
U.E.D.	UNABLE TO EXCAVATE DEEPER
U.S.	UPSTREAM
Var.	VARIABLE
V/.	VERY
Vug.	VUGULAR
Wtr.	WATER LEVEL AS ENCOUNTERED DURING DRILLING PROCESS
W	WELL GRADED
W/.	WITH
Wea.	WEATHERED
▼	(DATE) STATIC WATER LEVEL

LEGEND:

- ○ 1967 NRCS TEST HOLE
- ◐ AUGER/CORE BORING
- ☐ HAND AUGER BORING

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PLAN OF GEOLOGIC INVESTIGATION

FLOODWATER RETARDING STRUCTURE SITE NO. 2 REHABILITATION
PLUM CREEK WATERSHED
IN
HAYS COUNTY, TEXAS

Texas State
Soil & Water
Conservation Board

AECOM

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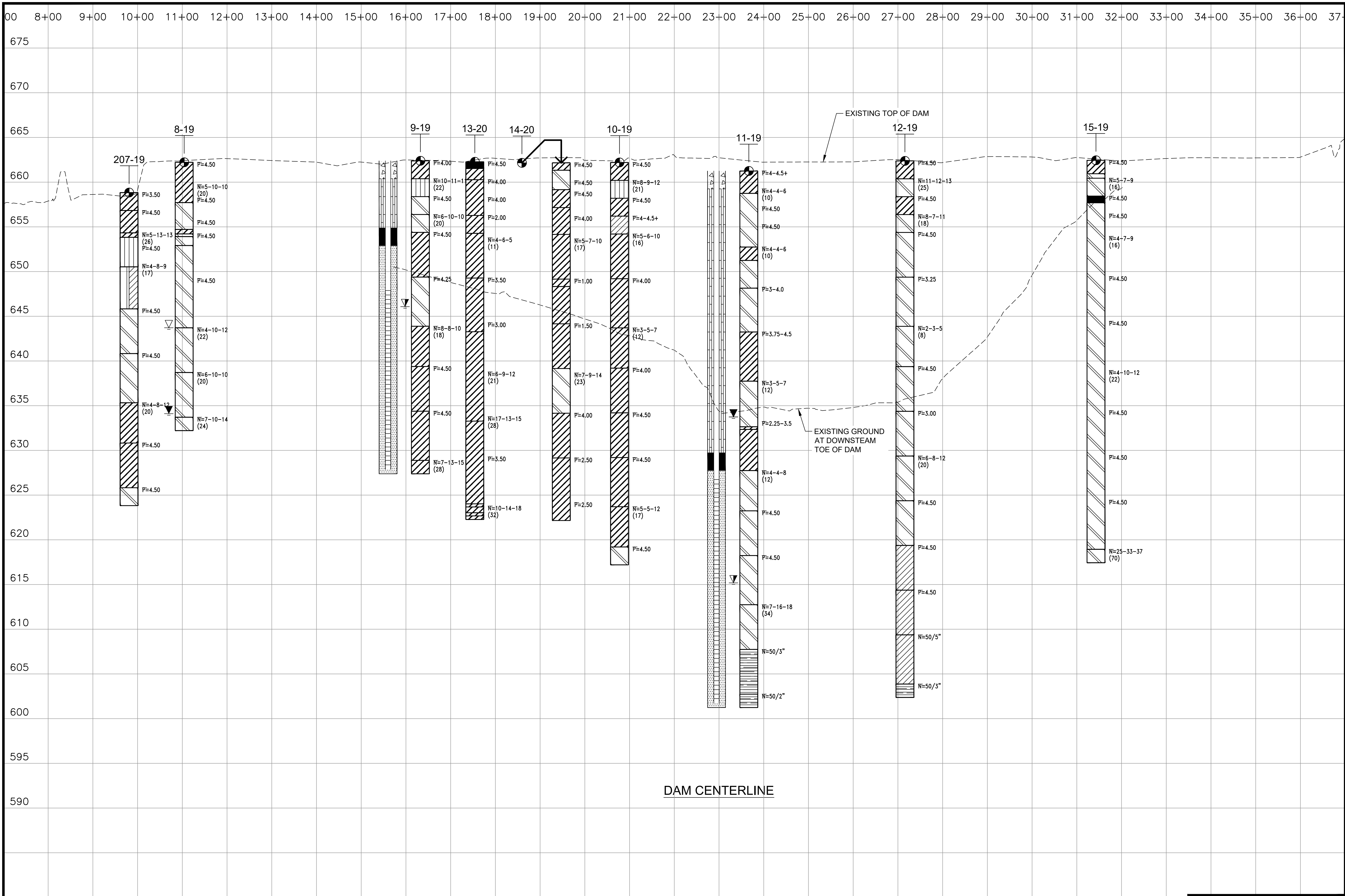

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GEOLOGIC INVESTIGATIONS – PROFILES (1 OF 7)

FLOODWATER RETARDING STRUCTURE SITE NO. 2 REHABILITATION
PLUM CREEK WATERSHED
IN
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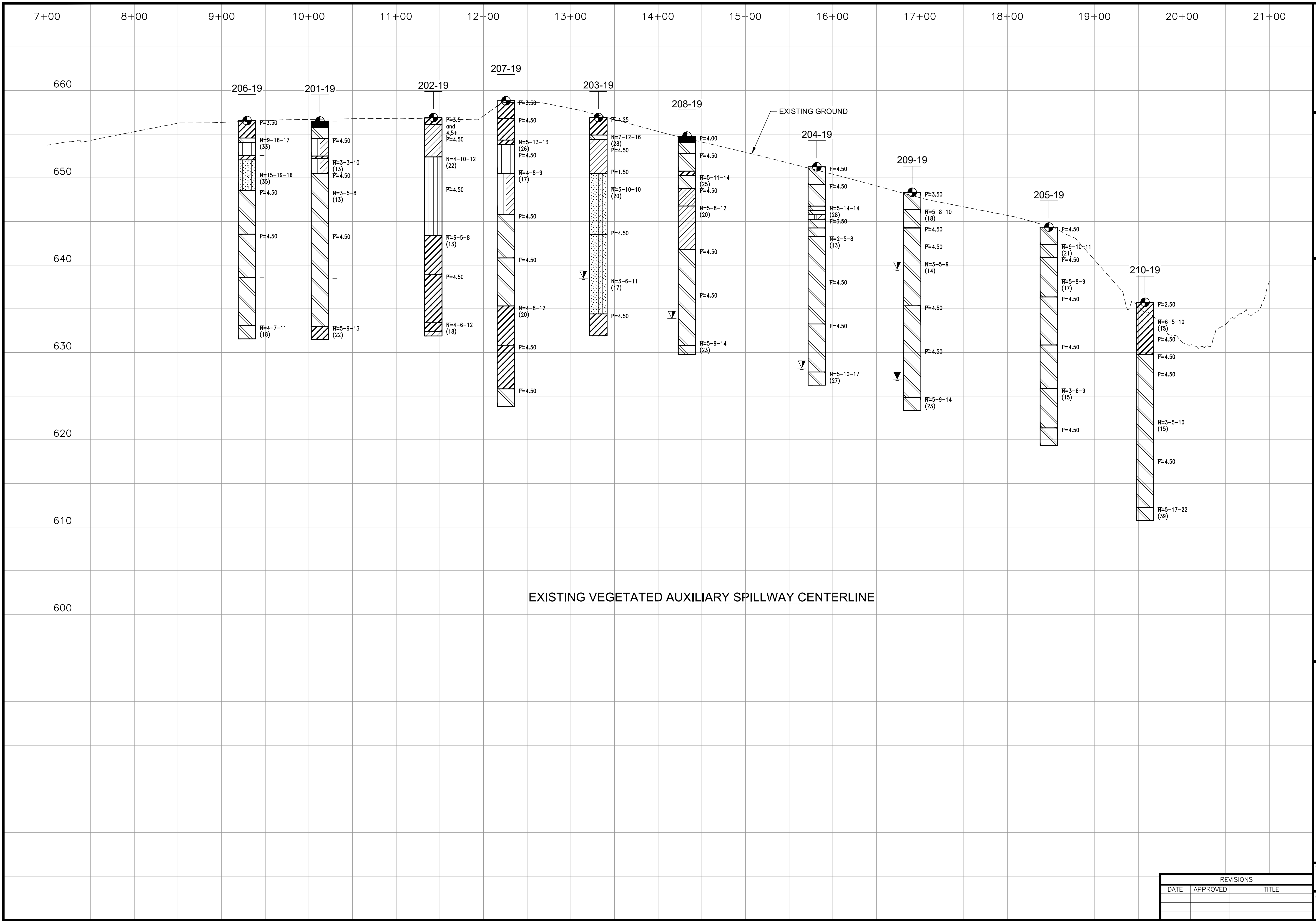

EXISTING VEGETATED AUXILIARY SPILLWAY CENTERLINE

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GEOLOGIC INVESTIGATIONS – PROFILES (2 OF 7)

FLOODWATER RETARDING STRUCTURE SITE NO. 2 REHABILITATION
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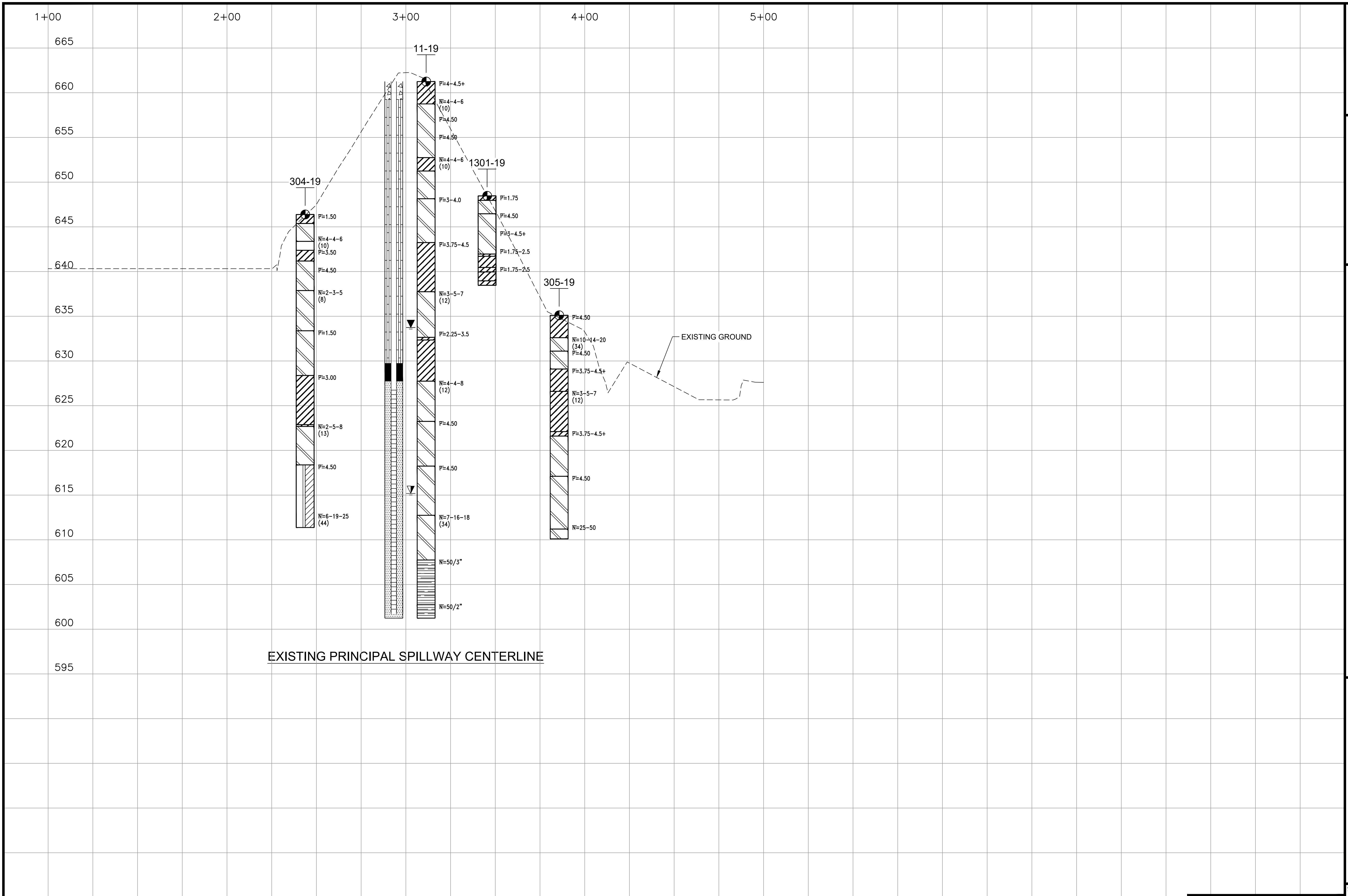

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GEOLOGIC INVESTIGATIONS – PROFILES (3 OF 7)

FLOODWATER RETARDING STRUCTURE SITE NO. 2 REHABILITATION
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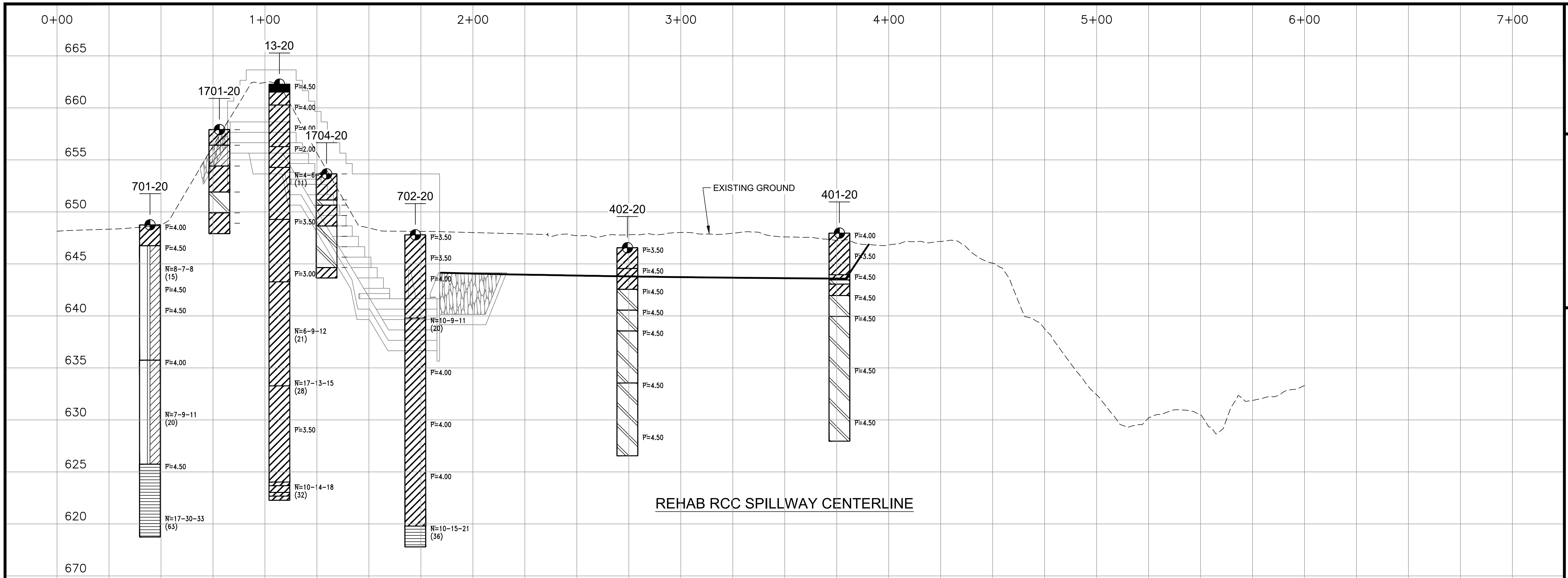
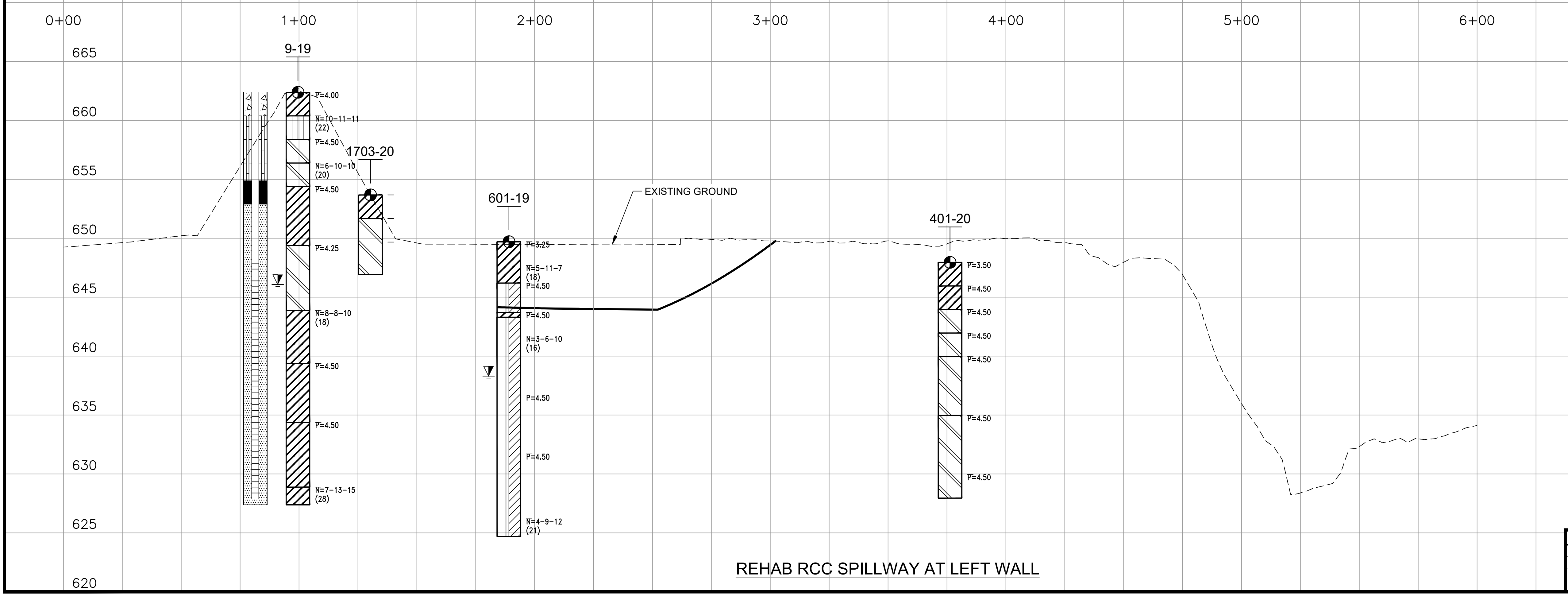


REHAB RCC SPILLWAY CENTERLINE



REHAB RCC SPILLWAY AT LEFT WALL

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GEOLOGIC INVESTIGATIONS - PROFILES (4 OF 7)

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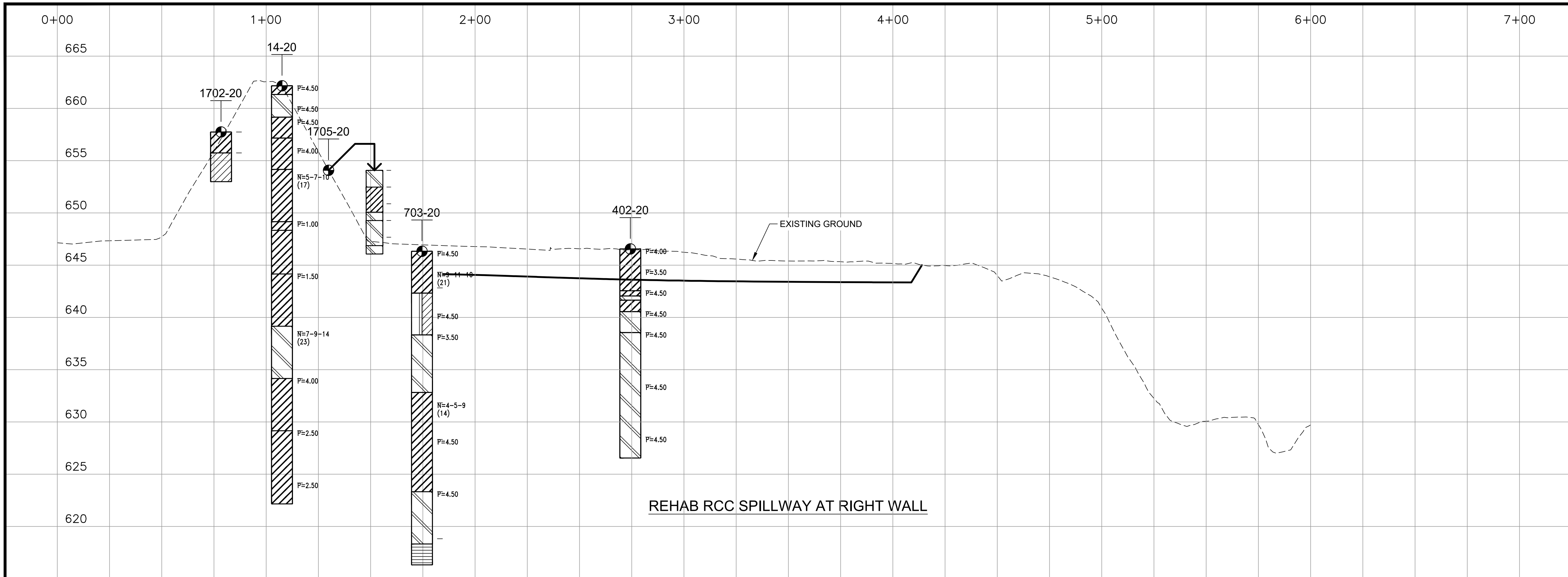

REHAB RCC SPILLWAY AT RIGHT WALL

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GEOLOGIC INVESTIGATIONS – PROFILES (5 OF 7)

FLOODWATER RETARDING STRUCTURE SITE NO. 2 REHABILITATION
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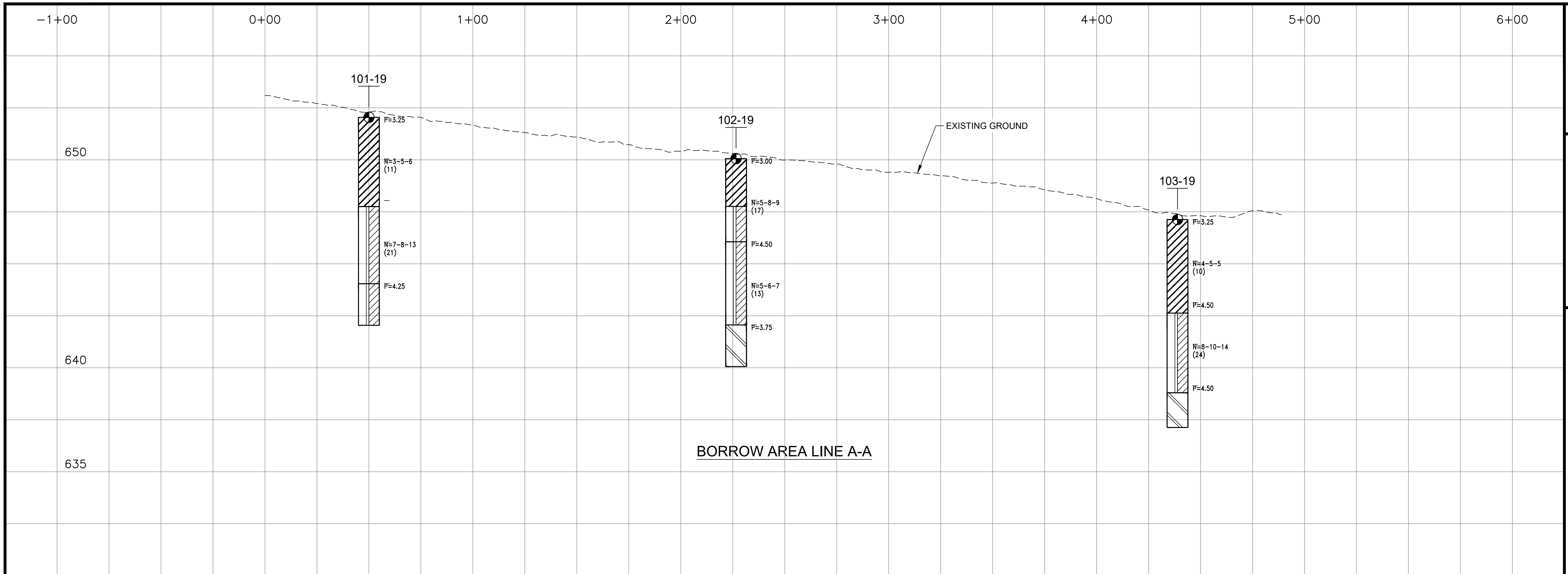
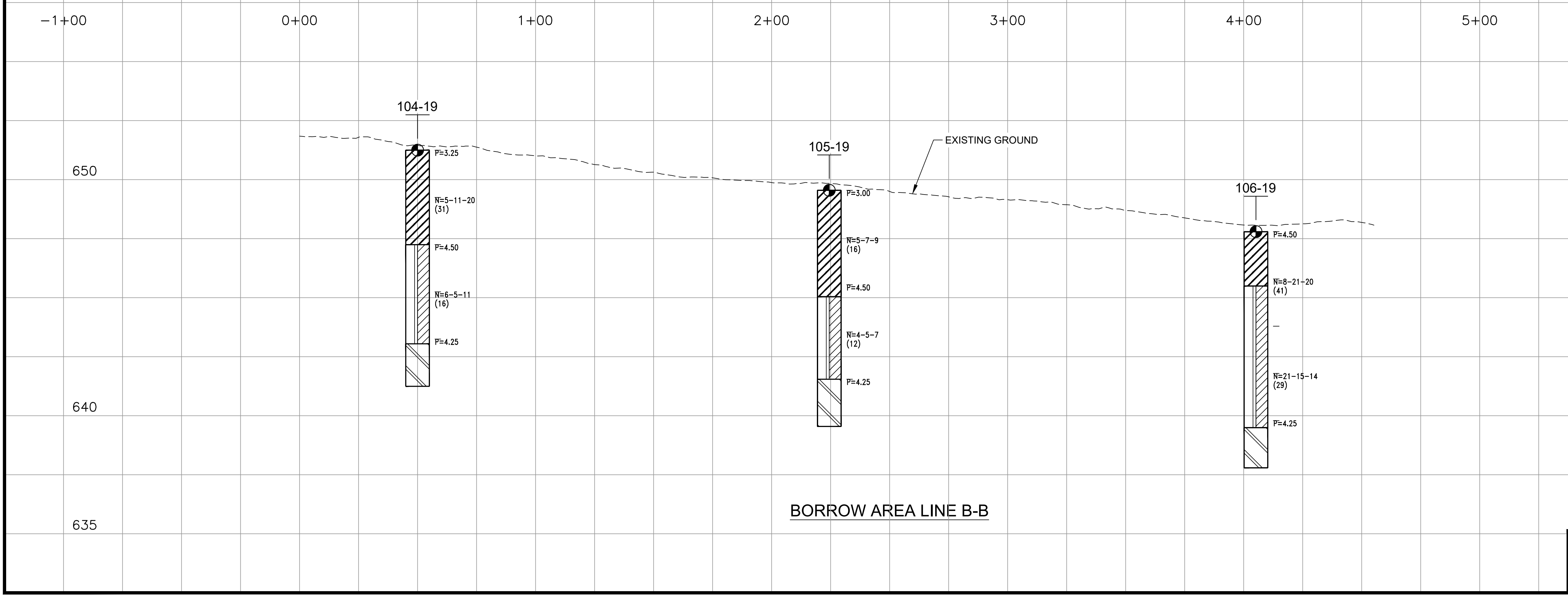


BORROW AREA LINE A-A



BORROW AREA LINE B-B

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GEOLOGIC INVESTIGATIONS - PROFILES (6 OF 7)

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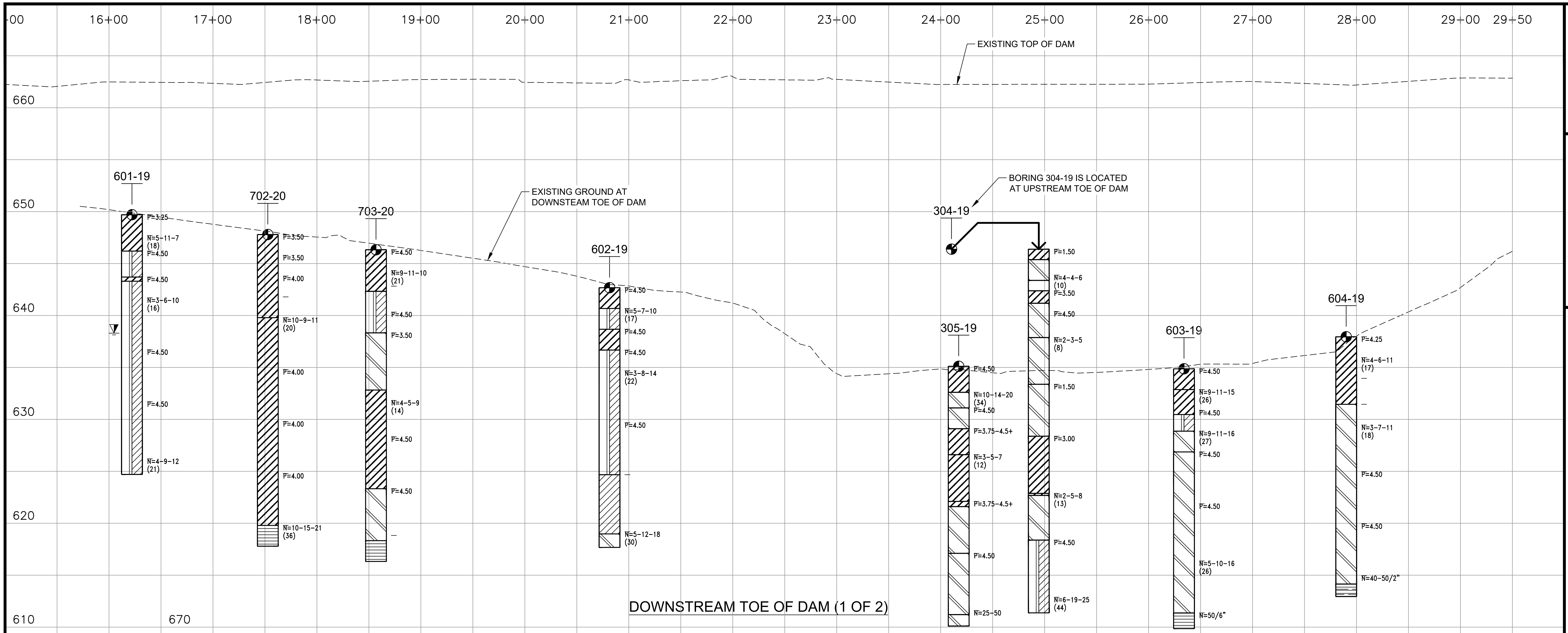
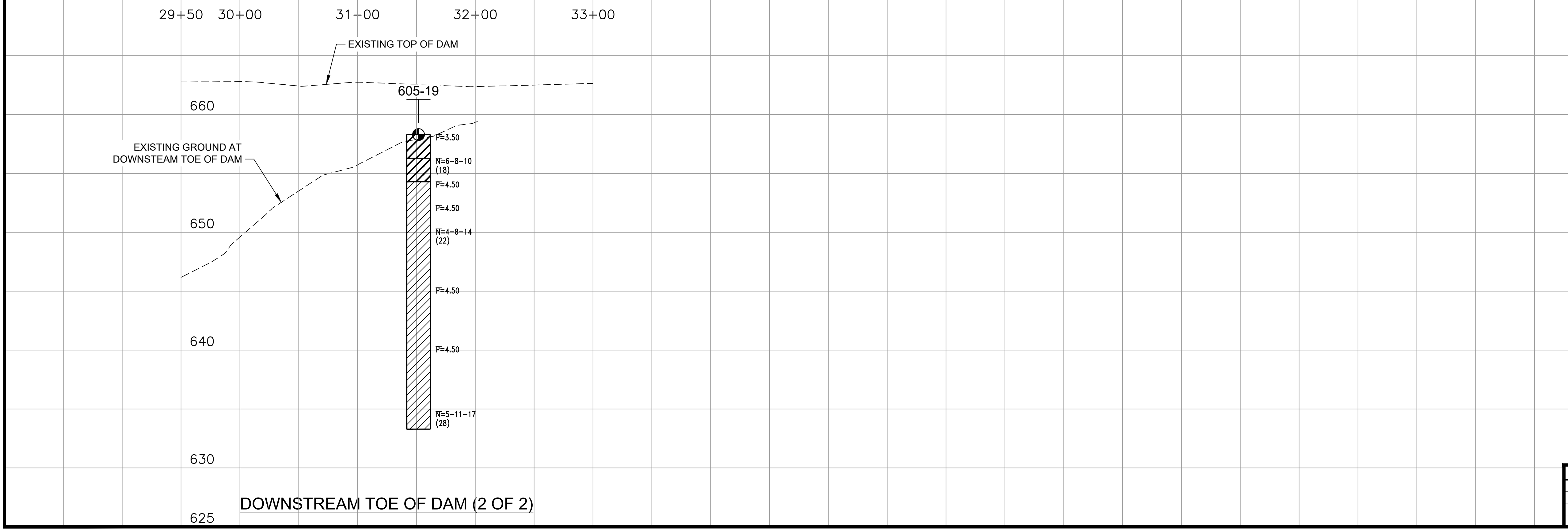


DOWNSTREAM TOE OF DAM (1 OF 2)



DOWNSTREAM TOE OF DAM (2 OF 2)

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GEOLOGIC INVESTIGATIONS – PROFILES (7 OF 7)

FLOODWATER RETARDING STRUCTURE SITE NO. 2 REHABILITATION
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Appendix I Recommended Headcut Erodibility Index Parameters

AECOM
9400 Amberglen Boulevard
Austin, TX 78729
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Project name:
Plum Creek FRS No. 2 Rehabilitation Design,
Hays County, TX

Project ref:
60615067

To:
Jeff Irvin, PE (AECOM)
Monica Wedo, PE (AECOM)

From:
Lance Finnefrock, PE, GE (AECOM)
Mariana Conceição de Sá, EIT (AECOM)

CC:
Aaron Humphrey, PE (AECOM)
Glenn Hilton, PG (AECOM)

Date:
May 19, 2021

Technical Memorandum

Subject: Geotechnical Recommendations for SITES Parameters

1. Project Information

1.1 Proposed Modifications

The proposed rehabilitation of Plum Creek FRS No. 2 is intended to mitigate identified dam safety deficiencies associated with the dam's reclassification as a high hazard dam. The proposed modifications presently include the following major components:

- Raising the existing vegetated auxiliary spillway crest by 1.15 feet to Elevation (El.) 659.8;
- Widening the existing vegetated auxiliary spillway from 150 feet to 250 feet;
- Constructing a new 200-foot-wide overtopping roller-compacted concrete (RCC) spillway with crest at El. 658.6;
- Abandoning the existing principal spillway inlet and 24-inch diameter conduit;
- Replacing the existing principal spillway with a new 48-inch diameter conduit, inlet riser with crest at El. 645.4, and impact basin at the outlet;
- Installing rock riprap wave protection on the upstream embankment slope; and
- Maintaining the embankment crest at El. 662.8 (top of compacted earthfill which excludes additional height of topsoil) with nominal raise in areas that have experienced settling.

1.2 Purpose and Scope

The purpose of this memorandum is to provide geotechnical recommendations for soil parameters to be used in hydraulic analysis of the existing earthen auxiliary spillway at Plum Creek FRS No. 2 using SITES software.

2. Subsurface Information

2.1 Site Geology

Published geologic mapping from The Geologic Atlas of Texas, Seguin Sheet (Proctor et al., 1974) indicates the project site is primarily underlain by the Pecan Gap Chalk (Kpg). The Pecan Gap Chalk is a Late Cretaceous formation of the Taylor Group. Young (1977) describes the Pecan Gap Chalk as a medium gray, chalky, or marly formation with calcium carbonate content ranging from about 25 to over 75 percent. The formation is composed of a massive lower chalk with well-rounded quartz grains which grades upward to a chalky marl with microgranular calcite in the clay matrix.

The Pecan Gap Chalk weathers to light gray and white. The formation has a maximum thickness of approximately 200 feet in the vicinity of this site, and grades laterally to a marl in select locations (Proctor et al., 1972). Near the ground surface, the Pecan Gap Chalk weathers to a highly plastic, fat clay with significant potential for vertical movement as a result of changes in moisture content.

2.2 Soil Maps

The NRCS Websoil Survey database (NRCS, 2020) was examined to identify near-surface soil mapping of the site (i.e., approximately upper 7 feet). The mapped soil types in the vicinity of the dam are largely described as clayey residuum weathered from mudstone. Calcareous clayey Alluvium is mapped in the lower portions of the creek valley, generally within about 150- to 200-foot wide zone along the original creek alignment and below about Elevation (El.) 630± feet according to the NAVD88 datum. Alluvium is mapped just north of the discharge channel of the existing auxiliary spillway (ASW) between approximately Station 12+00 and Station 18+00.

2.3 Previous Geologic Investigations

2.3.1 Soil Conservation Service – 1967 Geologic Investigation

The original geologic investigation (GI) for design of the dam was conducted by the Soil Conservation Service (former SCS, now NRCS) in May 1967 and summarized in a GI Report dated June 12, 1967 (SCS, 1967a). A plan of borings and subsurface profiles are contained within historical documentation made available to AECOM for review (NRCS, 1967b). The investigation consisted of 12 borings along the dam centerline (holes No. 1 through 7 and 51 through 55); 8 borings along the auxiliary spillway (holes No. 251 through 258); 4 borings along the principal spillway alignment (holes No. 301 through 303 and hole No. 351); and 20 borings in a borrow area located in the present-day reservoir (Holes No. 151 through 170). Six exploratory borings (Holes No. 451 through 456) were also performed in the vicinity of the original creek channel.

The stratigraphy encountered in the borings was generally characterized as 0 to 8 feet (up to 11 feet in the borrow area) of clayey Alluvium overlying clayey Residuum. In accordance with the Unified Soil Classification System (USCS), the Alluvium was generally classified in the field as brown, stiff, silty fat clays (CH) and stiff, slightly calcareous, gravelly, lean clays (CL). Occasional sand and gravel lenses encountered were thicker near the left abutment down to depths of 8 to 11 feet near the interface with the underlying Residuum. The Alluvium thins towards the right abutment. The underlying Residuum stratum consisted of tan, stiff, shaley, residual clays of the Pecan Gap Formation and was identified at depths ranging between 1.5 and 8 feet. The Residuum was primarily classified in the field as fat clay (CH), and generally ranged from about 5 to 17 feet thick. Below depths of about 15 feet in the left abutment and 24 feet in the floodplain, blue shale of the Taylor Group was encountered with hardness rating of Hd 1 (very soft) to Hd 2 (soft).

Groundwater was not encountered during this investigation, but was observed within the original stream channel. The report recommended the embankment cutoff trench be extended to depths of 3 to 7 feet below the original ground surface, with the lowest elevation at El. 626.1 (3 feet below original grade) along the centerline of the principal spillway and El. 619.5 (6 feet below original grade) on the centerline of the embankment. No internal drainage measures were recommended.

2.3.2 Soil Conservation Service – 1967 Soil Mechanics Report

The original soil mechanics report (SMR) for Plum Creek FRS No. 2 was completed by SCS on July 18, 1967 (SCS, 1967b). The report contained results of laboratory testing on samples retrieved from the 1967 GI, including gradation, Atterberg limits, and dispersion. Proctor compaction and swell testing were also performed on remolded composite bulk samples. Index test results from the borings indicated clayey sand (SC) and fat clay (CH) materials, with liquid limits (LL) between 28 and 56, plasticity index (PI) between 13 and 34, and fines content average of approximately 73%.

The SMR concluded that the foundation soils underlying FRS No. 2 had overall low to very low permeability and a cutoff trench that extended below all dry weather cracks was expected to suffice in controlling seepage through the foundation.

Excavation for the principal spillway conduit was recommended to the extent necessary to remove topsoil and roots, as well to provide adequate grade for the pipe. No recommendation was made in regard to reaching a specific foundation bearing elevation or stratum.

Embankment slopes of 2.5H:1V were recommended for a slope stability minimum safety factor of 2.0 based on total stress (consolidated-undrained) strength parameters. As-built drawings show the recommended 2.5H:1V slopes were adopted into dam design and construction..Settlement corresponding to 2% of the height of the fill was expected; as such, the SMR recommended settlement allowance of 1 foot be added to the fill height during construction.

No groundwater table was encountered during the field GI and the SMR conclusions did not recommend any drainage measures.

2.3.3 NRCS – 2010 Dam Safety Inspection

A visual inspection of the dam was conducted on October 19, 2010 by NRCS and M&E Consultants as part of the dam assessment (NRCS, 2010). The inspection identified erosion on the upstream wave berm, which was obscured by overgrown vegetation. A void was observed under the principal spillway conduit cradle, this void had been previously identified during NRCS dam safety inspection dated June 13, 2006.

Photographs in the inspection report depicted good vegetative coverage throughout the dam particularly within the auxiliary spillway and the dam embankment. A stage recorder and rainfall recorded were identified on site during this inspection.

The 2010 inspection concluded that FRS No. 2 was performing as designed but due to urban encroachment and its present deteriorate condition, it likely qualified for assistance through the watershed rehabilitation program. The watershed rehabilitation program is intended to bring this dam to safety standard of high hazard dams.

2.4 AECOM Geologic Investigation

AECOM conducted a geologic investigation (GI) of the site to support rehabilitation design between December 2019 and January 2020. The GI was conducted in general accordance with the Field Investigation and Testing Plan submitted to TSSWCB prior to field mobilization. Geologic investigation of the existing ASW included ten (10) borings in the existing channel designated 201-19 through 210-20, boring locations are illustrated in **Figure 1**. A description of procedure, findings, and interpretations from the geologic investigation will be provided in a forthcoming Geologic Investigation Report (GIR) prepared as part of the scope of this project.

Additional boreholes, including 9-19, 12-19, 601-19, 603-19, 604-19, were completed in two preliminary locations investigated for placement of the proposed RCC overtopping spillway. Because the RCC spillway will be a structural spillway, SITES analyses are not required.

Laboratory testing conducted on the soil samples recovered from the existing ASW borings included natural moisture content, natural unit weight, Atterberg limits, sieve and hydrometer, unconfined compression (UC) testing, and dispersion testing including crumb and double-hydrometer. A summary of the laboratory test results performed on samples recovered from the existing ASW borings are provided in Attachment 2. The remainder of laboratory results will be provided in a forthcoming SMR prepared as part of this project.

2.5 Generalized Subsurface Stratigraphy

The results of the current GI were generally consistent with that of the original 1967 GI, as the borings encountered a relatively thin dark brown upper clay layer (similar to that characterized as Alluvium in the 1967 GI) overlying low to medium plasticity Residuum. However, based on the NRCS Websoil survey, the completed ASW borings were primarily located in areas mapped as residuum. Due to general site-wide similarities in visual appearance of the upper dark brown clay layer and general lack of significant spatial differences in material properties, this material is generally referred to as “alluvium” herein consistently with the 1967 GI.

Within the existing ASW channel, the alluvium ranged in thickness from 1 to 2 feet and consisted of soft to hard, dark brown fat clays (CH) with abundant organic matter and fine grained gravel. A light brown to tan, silty, clayey sand (SM-SC) to lean silt (ML) stratum was identified in boreholes 202-19, 203-19, 206-19 and 207-19 from approximately El. 644 feet in 203-19 to El. 652 feet in 206-19, with thicknesses of 1.5 to 7.5 feet. This low plasticity, silty to sandy seam is believed to be of residual nature. A uniform medium plasticity Residuum stratum was also identified in all boreholes completed on the existing ASW channel underlying the Alluvium and Low Plasticity Residuum strata to the termination depths of all boreholes. The Medium Plasticity Residuum consisted of stiff to hard, moist, tannish orange to gray lean to fat clays (CL-CH) with gravel and disseminated gypsum.

Based on preliminary design, the existing ASW crest will be raised approximately 1.5 fe or less using earthen fill. Material within the designated borrow area sampled during this field investigation will be evaluated for use as an on-site borrow source for the proposed fill, results will be presented in the forthcoming SMR.

Geologic profiles of the field data along the existing ASW profile is presented in **Figure 2**. The profile illustrates abridged boring logs indicating field USCS classification, pocket penetrometer values, SPT N-values, and measured groundwater levels (when encountered).

2.6 Groundwater

Groundwater table was not identified at the time of drilling in the existing ASW boreholes completed. However, after drilling, groundwater table was encountered in about half of the boreholes drilled in the existing auxiliary spillway channel, including boreholes 203-19, 204-19, and 208-19 through 210-19. Groundwater table was encountered at the end of drilling only in borehole 209-19 at 21.4 feet bgs (El. 626.9).

Static groundwater levels (readings obtained several hours to days after drilling is completed) indicated the presence of groundwater table at elevations ranging from El. 622.1 (13.6 feet bgs) in boring 210-19 to El. 638.5 (18.4 feet bgs) in borehole 203-19. Additional readings indicated groundwater recharge in borehole 209-19 in which groundwater was identified as 21.4 feet bgs (El. 626.9) at the end of drilling and at 8.2 feet bgs (El. 640.1) several days after the end of drilling. The relatively slow groundwater recharge rate of this borehole may be suggestive of the presence of a low permeability zone in the vicinity of this borehole consistently with the clayey nature of samples recovered in this borehole.

3. Geotechnical Analysis of Auxiliary Spillway Erodibility

3.1 Analysis Methodology

Hydraulic analysis and design of vegetated earthen spillway for dams is typically performed using the Water Resources Site Analysis computer program (SITES) developed by NRCS. SITES is used to evaluate erosional stability and head-cutting potential for auxiliary spillway channels subjected to flows associated with the design flood event. SITES input values includes soil unit weight, plasticity, gradation, and the empirical headcut erodibility index (K_h). The K_h is calculated based on the following formula:

$$K_h = M_S \cdot K_b \cdot K_d \cdot J_S$$

where:

M_s = material strength number of the earth material

K_b = block or particle size number

K_d = discontinuity or interparticle bond shear strength number

J_s = relative ground structure number

3.2 Material Parameters Development

3.2.1 Methodology Overview

Development of recommended material parameters for SITES analysis was performed according to the guidance provided in the *National Engineering Handbook, 210-VI-NEH, Part 628, Chapter 52, Field Procedures Guide for the Headcut Erodibility Index* (NRCS, 2001) and the accompanying *DRAFT Appendix 52D, Erodibility Parameter Selection for Soil Material Horizons* (NRCS 2011).

Materials considered in the evaluation included those encountered beginning near the proposed finished-grade elevation of the ASW channel surface and extending down to slightly below the elevation of the downstream exit channel. The generalized strata in the existing ASW were considered based on the GI results and proposed grading plan: 1) Alluvium; 2) Medium Plasticity Residuum; 3) Low Plasticity Residuum; and 4) Proposed Fill.

To account for inherent variability in the geologic units, an “unfavorable” and a “favorable” value for each of the various SITES input data were developed to check the model sensitivity. The unfavorable and favorable values were generally selected considering approximate lower one-third (i.e., 33rd percentile) and upper one-third (i.e., 67th percentile) values of available test data with application of engineering judgment. Note that in some cases, the lower value may correspond to favorable value for some derived parameters whereas the lower value may correspond to the unfavorable value for other derived parameters (e.g., UCS for the Ms parameter).

Potential trends between various measured data (e.g., unconfined compressive strength versus liquid limit) were examined in an attempt to reduce the chance of selecting over-conservative or under-conservative combinations of favorable and unfavorable input values. However, no evident trend could be distinguished between most of these various test data, with the exception of plasticity and clay fraction. A brief description of the various input parameters is provided in the following sections.

3.2.2 Index Properties

Index properties for soil-like materials used directly in the SITES model and/or used to derive the empirical components of the Kh calculation include the following:

- Dry Unit Weight, γ_{dry} (pounds-per-cubic-foot [pcf])

- Liquid Limit, LL
- Plasticity Index, PI
- Clay Fraction, CF (% finer than 0.002 millimeter diameter)
- Representative Diameters, D_{75} and D_{50} (millimeters [mm])

A tabulated summary of the minimum, maximum, and average test data values for each stratum is provided in **Table 1.** A tabulated laboratory test results for each of the ASW borings is provided in **Attachment 2.**

Plots of γ_{dry}, LL, PI, CF, D_{75}, and D_{50} versus depth, annotated to include the selected favorable and unfavorable values, are provided in **Attachment 2**. The selected favorable and unfavorable values are also summarized in **Table 2**.

Note that D_{75} is typically used in analysis of soil-like materials, and D_{50} is typically used for rock-like materials. While the materials at this site are considered soil-like, both the D_{75} and D_{50} values are provided herein for reference. Gradation plots indicating the D_{75} and D_{50} are provided in **Attachment 1**. Note that D_{50} values could only be only be developed from hydrometer test data due to the fine-grained nature of the test materials. The hydrometer tests indicate the D_{50} is smaller than 0.002 mm for select samples, but a precise value could not be obtained in those cases. Consequently, an assumed value of 0.001 mm was used to reasonably represent many of these samples.

The Alluvium was generally classified as fat clay (CH) in the field, with laboratory classifications including fat clay (CH) and clayey sand (SC). Index properties for Alluvium were based on results of index testing performed on samples collected in the upper 2 to 6 feet of boreholes drilled within the existing ASW channel. Based on these data, the LL ranges from 33 to 53, PI ranges from 16 to 32, fines content ranges from 46 to 72% (based on two test samples), and clay fraction ranges from 25 to 40%. A single SPT N-value corrected to 60% hammer efficiency (N_{60}) was 15 blows-per-foot (bpf). Pocket penetrometer values ranged from 2.5 to 4.5+ tons-per-square-foot (tsf), but were generally 3.5 tsf or greater.

The Low Plasticity Residuum (LPR) was encountered below the Alluvium in boreholes 202-19, 203-19, 206-19, and 207-19. The material was classified in the field as lean to fat clay (CL, CL-CH, CH), silty clay (CL-ML), silt (ML), and silty sand (SM). Laboratory classifications included lean clay (CL), silt (ML), and silty sand (SM).. . Results of laboratory index testing indicate the LL ranges from 18 to 48 (with the exception of two non-plastic [NP] results from samples classifying as SM), PI ranges from 7 to 23 (with the exception of the two NP samples of SM), fines content ranges from 18 to 67%, and clay fraction ranges from 25 to 40%. The field N_{60} ranges from 23 to 47 bpf. Pocket penetrometer values generally exceed 4.5+ tsf, with the exception of one sample classifying as SM which had a value of 1.5 tsf.

The Medium Plasticity Residuum (MPR) materials were encountered underlying either the Alluvium or Low Plasticity Residuum.The material was classified in the field as lean to fat caly (CL-CH) and fat clay (CH), with laboratory classifications of fat clay (CH) and elastic silt (MH). Results of laboratory index testing indicates the LL ranges from 23 to 68, PI ranges from 8 to 46, fines content ranges from 69 to 99%, and clay fraction ranges from 27 to 73%. The field N_{60} ranges from 17 to 52 bpf. Pocket penetrometer values generally exceed 4.5+ tsf, with the exception of one sample classifying as CH which had a value of 3.5 tsf.

Proposed fill materials for the ASW crest raise will be sourced from required excavations and/or a designated on-site borrow area located on the upstream left bank of the reservoir.. Due to the variability in potential borrow materials at the site, recommendations have been provided for two types of proposed fill denoted as Proposed Fill Type 1 and Proposed Fill Type 2. Type 1 includes low- to moderate-plasticity clay-rich soils anticipated to be encountered in the required excavation for the proposed ASW, and may be encountered in other required excavations and/or borrow areas at the site. Type 2 includes high-plasticity clays encountered across much of the project site.

Favorable and unfavorable values for each material were selected based on the preliminary index test results obtained and are summarized in **Table 2**.

3.2.3 Material Strength Number, Ms

Alluvium and Medium Plasticity Residuum materials were considered “cohesive” for the purposes of estimating the Ms parameter. The Low Plasticity Residuum was considered “cohesionless” in the unfavorable analysis since the fines content (percent passing the No. 200 sieve) was less than 50% for two samples which classified as silty sand (SM) with 18 and 46% fines, and both samples were NP (i.e., PI = 0). The NRCS (2001) further defines cohesionless soils as those with plasticity index less than or equal to 10. Due to the limited distribution of NP samples and higher plasticity measured on other samples of Low Plasticity Residuum, a PI = 11 was selected for the unfavorable case despite the “cohesionless” designation torepresent the transitional nature of soils in this stratum which included silts, clays, and sands. The favorable case of Low Plasticity Residuum was considered as a cohesive material. .

The selected Ms values for Alluvium were estimated based on twelve field pocket penetrometer test results and a single SPT test which yielded N_{60} = 20 bpf. Estimated low and high UCS values of 7,290 psf and 9,000 psf were selected for analyses which correspond to derived Ms values of 0.25 to 0.31, respectively.

The selected Ms values for the Low Plasticity Residuum were estimated based on the results of pocket penetrometer testing, three (3) field SPT N_{60} values, and a single laboratory UCS test. The unfavorable analysis considered N_{60} value of 24 bpf and a PI of 11 in order to reproduce conditions in which the soil could be treated as “cohesionless”. Based on the ranges stipulated in Table 52-2 (NRCS, 2001), the materials in the unfavorable case were considered to be medium dense and yielded M_s value of 0.085. In the favorable analysis, the soil was considered “cohesive” given the PI of 22 and upper bound N_{60} of 40 bpf. While the blow count exceeds the range established in Table 52-3 (NRCS, 2001) for cohesive soils, the single UCS value of 6,422 psf reported from laboratory testing is within the proposed UCS ranges for cohesive soils. Thus, the material was treated as cohesive (instead of soft rock), in the favorable analysis to obtain derived M_s value of 0.22.

The selected Ms values for the Medium Plasticity Residuum were estimated based on the results of pocket penetrometer, SPT N_{60}, and fifteen (15) laboratory UCS tests. The Medium Plasticity Residuum was treated as “cohesive”, and was not generally described as blocky on the boring logs. The selected favorable and unfavorable UCS values for the Medium Plasticity Residuum of 8,019 psf and 9,554 psf respectively, yielded a range of derived Ms values of 0.27 to 0.33, respectively.

As discussed previously, two types of Proposed Fill materials were considered in the analysis. The Proposed Fill Type 1 considered similar index properties as the Low Plasticity Residuum, with Ms values based on “cohesive” soil with a range of UCS values typical for compacted fill material (3,000 to 4,000 psf). On-site materials with similar properties include the required excavations for widening the ASW, and middle layer of the borrow area (from about 4 to 8 feet bgs). The Proposed Fill Type 2 considered index properties from samples of fat clay materials encountered in the existing dam embankment and near the downstream toe of the dam where excavations will be required to construct the proposed improvements, as well as the near-surface layer (0 to 4 feet bgs) in the borrow area. The same typical range of UCS values (3,000 to 4,000 psf) was assumed for the Proposed Fill Type 2. The results of site-specific moisture-density (Proctor) compaction tests and remolded UCS test on bulk samples of materials collected from the borrow area (COMP-100A, COMP-100B), downstream toe (COMP-400A), and dam embankment (COMP-1700A), as well as other index test data on disturbed and undisturbed samples from those areas, confirm that the selected values presented herein are reasonable; these test results are presented under separate cover in the SMR.

Plots of N_{60}, Su, and UCS versus depth, with interpreted lower and upper bounds, are provided in **Attachment 2**. Calculations for the derived Ms values are provided in **Attachment 3**, and a summary of resulting values is provided in **Table 2**.

3.2.4 Block or particle size number, Kb

Because the Alluvium, Medium Plasticity Residuum, and Low Plasticity Residuum (favorable case) were considered as “cohesive” materials, the value of K_b is 1.0 for each analysis case per NRCS 2001. Similarly, the value of K_b was also 1.0 for the single “cohesionless” analysis performed (unfavorbale case of the Low Plasticity Residuum).

3.2.5 Interparticle Bond Shear Strength Number, Kd

The value of K_d is equal to the tangent of the residual friction angle (ϕ'_r) of the soil. According to NRCS 2001, the value of K_d is estimated based on the values of LL and CF using the following formulas:

$$\text{For} \leq 20\% \text{ clay,} \quad \phi'_r = 169.58\,(\text{LL})^{-0.4925} \qquad [52\text{–}7]$$

$$\text{For } 25 - 45\% \text{ clay,} \quad \phi'_r = 329.56\,(\text{LL})^{-0.7100} \qquad [52\text{–}8]$$

$$\text{For} \geq 50\ \% \text{ clay,} \quad \phi'_r = 234.73\,(\text{LL})^{-0.6655} \qquad [52\text{–}9]$$

Plots of LL and CF versus depth, with interpreted lower and upper bounds, are provided in **Attachment 2**.

Based on feedback received from NRCS geologists at the NDCSMC (email dated April 7, 2020), the equations presented in NRCS 2001 often produced overly conservative values for K_d. The email indicated that internal NRCS guidance is to assume $K_d = 1.0$ for soil-like materials, which is supported by publication subsequent to NRCS 2001 including McCook (2005) and the Draft Appendix 52D (NRCS, 2011). Consequently, $K_d = 1.0$ was adopted for these analyses since all materials were considered to be “soil-like”.

3.2.6 Relative Ground Structure Number, Js

Because the Alluvium, Medium Plasticity Residuum, and the favorable case of the Low Plasticity Residuum present in the existing ASW are considered as “cohesive” materials, the value of J_S is 1.0 per NRCS 2001. Similarly, J_S was also 1.0 for the unfavorable analysis of the Low Plasticity Residuum which was treated as “cohesionless”.

3.2.7 Adjustment for High-Plasticity, Blocky Soils

The Draft Appendix 52D (NRCS 2011) and McCook (2005) caution that very stiff, high-plasticity fat clays (CH) with plastic limits (PL) > 25 often have blocky or fissured secondary structure, and such deposits may be more erodible than indicated by the unconfined compressive strength on intact samples typically used to obtain the Ms value. While the document states that no case history is available, interim guidance is to apply a reduction factor of 0.5 to the calculated Ms and thus Kh value.

While the ASW boring logs did not specifically note blocky structure of the materials encountered, the deeper Residuum from the Pecan Gap Chalk typically exhibits blocky structure. Photographs of some of the recovered Shelby tube samples in the deeper Medium Plasticity Residuum indicate some degree of blocky structure. However, the blocky soil reduction factor was not applied to the Kh values for this project on the following bases:

1. The Alluvium is not considered to be blocky, and the PL < 25 (ranged from 17 to 21).
2. The Low Plasticity Residuum is not considered to be blocky, with PL that generally ranged from NP to 17 with the exception of a single value of 28 on a sample classifying as ML for which the blocky reduction would not typically apply.
3. The Medium Plasticity Residuum had PL ranging from 21 to 29, with an average of 24 which is less than the cited threshold value of 25.

3.3 Recommendations

Recommended parameters for SITES analyses are presented in **Table 2**. Supporting calculations are provided in **Attachment 3**. Based on the assumption stated herein, the estimated K_h ranges of unfavorable and favorable values are as follows:

- Alluvium: Kh = 0.25 to 0.31
- Medium Plasticity Residuum: Kh = 0.27 to 0.33
- Low Plasticity Residuum: Kh = 0.09 to 0.22
- Proposed Fill (Type 1): Kh = 0.06 to 0.10
- Proposed Fill (Type 2): Kh = 0.06 to 0.10

3.4 Limitations

This memorandum was prepared by AECOM using the degree of care and skill ordinarily exercised under similar circumstances by responsible engineers and geologists practicing in the same general location. No other warranty or representation, either expressed or implied, is made as to the findings and professional advice in this memorandum.

The opinions and conclusions contained in this memorandum are based on interpretations of limited subsurface information. Soil and geologic conditions can vary greatly between or beyond the exploration sites, and different conditions may be found during subsequent investigations.

There is no intention that this memorandum addresses any environmental issues (for example, environmentally-affected soil or groundwater, or historic site uses) related to this site. Such evaluations are outside the scope of this work and should be addressed in separate studies.

3.5 References

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3.6 Attachments

Table 1. Summary of Laboratory Test Results by Stratum for ASW Borings
Table 2. Recommended SITES Parameters

Figure 1. Plan of Borings
Figure 2. Subsurface Profile for the existing ASW

Attachment 1. Laboratory Test Results Summary Table for ASW Borings
Attachment 2. Laboratory Test Data Plots for ASW Borings
Attachment 3. Kh Calculations

TABLES

Table 1. Summary of Laboratory Test Data by Stratum for Borings in Existing ASW Channel (1)

Stratum Description (USCS)	Thickness (ft)	USCS	N_{60} (bpf)	Undrained Shear Strength, S_u (psf)	Unconfined Compressive Strength, UCS		Dry Unit Weight (pcf)	LL	PI	Fines (%)	CF (%)	D_{75} (mm)	D_{50} (mm)	Crumb
					(psf)	(kPa)								
Alluvium	2 – 6	CH,CL-CH, SC	20(2)	2,500 – 4,500(3)	5,000 – 9,000 (3980)(3)	239 – 431 (191)(3)	108-117	33 - 53 (46)	16 - 32 (27)	46 - 72 (59)	35(2)	2.08(2)	0.12(2)	Gr. 2(2)
Medium Plasticity Residuum	15 - 24	CH, CL-CH	17 - 52 (28)	3,125 – 7,819 (4,710)	6,250 -15,638 (9,420)	299 - 749 (451)	101 - 123 (110)	23 - 68 (47)	8 - 46 (27)	69 - 99 (91)	27 - 73 (53)	0.001 - 0.14	0.001 - 0.013	Gr. 1 – 3 (Gr. 1)
Low Plasticity Residuum	1.5 – 7.5	SM, ML	23 - 47 (32)	3,211(2)	6,422(2)	307.5(2)	113 – 128 (120)	18 - 48 (34)	7 - 23 (17)	18 - 67 (43)	37 (2)	0.14(2)	0.02(2)	Gr. 2(2)

Notes:

(1) Format of reported values is Minimum – Maximum (Average). Average value not reported when two of fewer results are available. Average not reported for D_{75} and D_{50}.
(2) Single test result reported at the time of this report.
(3) Correlated from field pocket penetrometer tests.

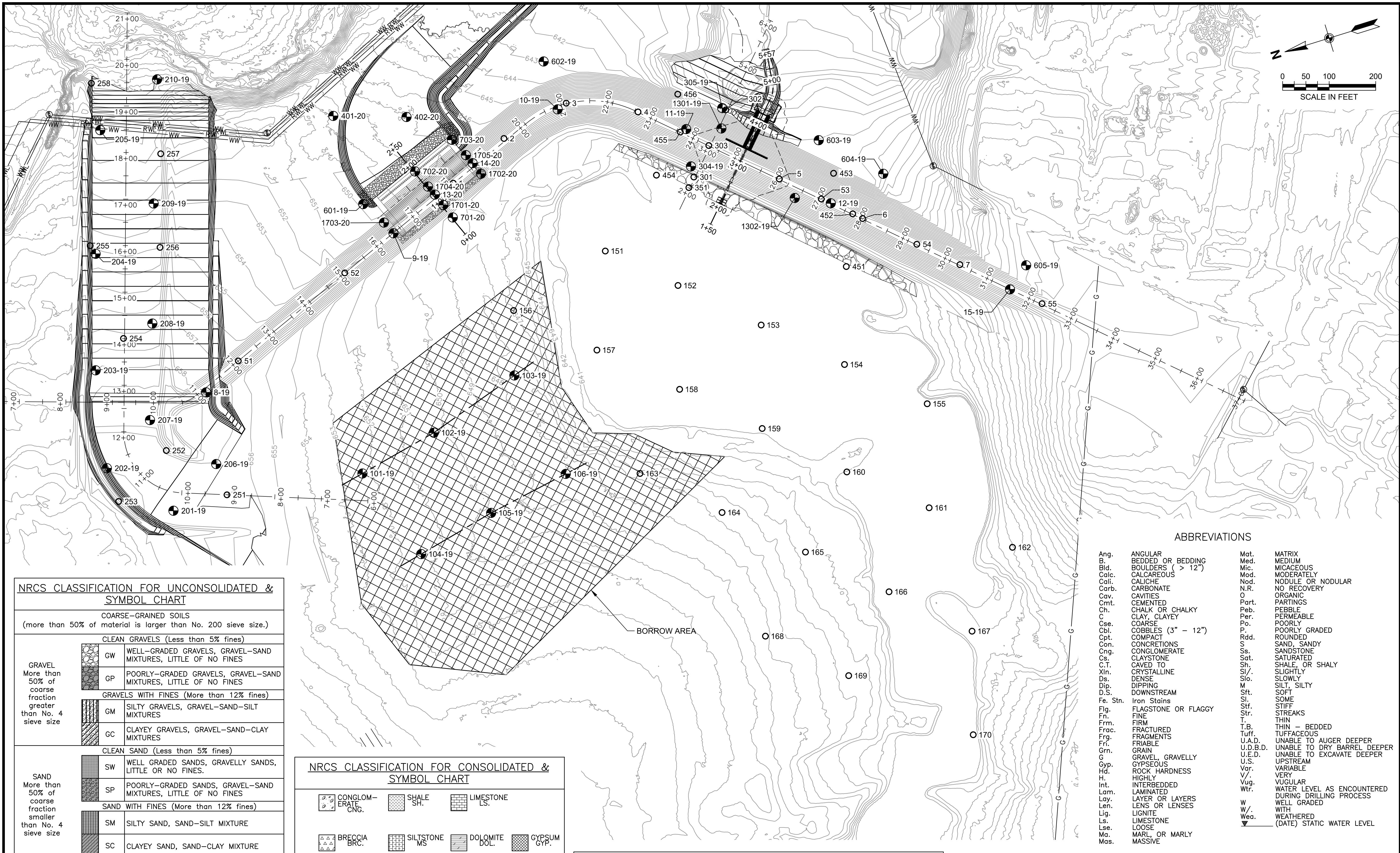
Table 2. Recommended Material Parameters for SITES Analysis of Existing ASW

Stratum Description (USCS)	Post-Grading Thickness (ft)	USCS	Bounding Case	Dry Unit Weight (pcf)	N_{60} (bpf)	UCS (psf)	LL	PI	Clay Fraction(2) (%)	D_{75} (mm)	D_{50} (mm)	Derived Headcut Erodibilty Index Parameters				
												Ms	Kb	Kd	Js	**Kh**
Alluvium	2 – 6	CH, CL-CH, SC	Unfavorable Values	108	20	7,290(1)	39	21	25	0.50	0.05	0.25	1.0	1.0	1.0	**0.25**
			Favorable Values	117	20	9,000(1)	53	32	40	2.00	0.20	0.31	1.0	1.0	1.0	**0.31**
Medium Plasticity Residuum	> 15	CH, CL-CH	Unfavorable Values	105	23	8,019	37	22	42	0.004	0.001	0.27	1.0	1.0	1.0	**0.27**
			Favorable Values	114	31	9,554	58	33	65	0.017	0.004	0.33	1.0	1.0	1.0	**0.33**
Low Plasticity Residuum	1.5 – 7.5	SM, ML	Unfavorable Values	115	24	--	24	11	25	0.02	0.005	0.09	1.0	1.0	1.0	**0.09**
			Favorable Values	125	40	6,422	45	22	40	0.20	0.050	0.22	1.0	1.0	1.0	**0.22**
Proposed Fill Type 1 (2)	1.5 - 3	CH, CL, SC	Unfavorable Values	100	--	2,000	24	11	25	0.004	0.001	0.061	1.0	1.0	1.0	**0.06**
			Favorable Values	110	--	3,000	58	33	65	2.0	0.20	0.096	1.0	1.0	1.0	**0.10**
Proposed Fill Type 2 (3)	Varies	CH	Unfavorable Values	90	--	2,000	60	35	40	0.004	0.001	0.06	1.0	1.0	1.0	**0.06**
			Favorable Values	95	--	3,000	75	55	65	0.007	0.001	0.10	1.0	1.0	1.0	**0.10**

Notes:

(1) Correlated from field pocket penetrometer tests.
(2) Proposed low- to moderate-plasticity fill material obtained from required excavations in the existing ASW channel, or other on-site sources of low-plasticity clayey soils.
(3) Proposed high-plasticity fill materials obtained from required excavations and designated borrow sources in areas of the site other than the ASW channel.

FIGURES



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NRCS CLASSIFICATION FOR UNCONSOLIDATED & SYMBOL CHART

COARSE-GRAINED SOILS (more than 50% of material is larger than No. 200 sieve size.)			
GRAVEL More than 50% of coarse fraction greater than No. 4 sieve size	CLEAN GRAVELS (Less than 5% fines)		
	▨	GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OF NO FINES
	▨	GP	POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OF NO FINES
	GRAVELS WITH FINES (More than 12% fines)		
	▨	GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES
	▨	GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES
SAND More than 50% of coarse fraction smaller than No. 4 sieve size	CLEAN SAND (Less than 5% fines)		
	▨	SW	WELL GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES.
	▨	SP	POORLY-GRADED SANDS, GRAVEL-SAND MIXTURES, LITTLE OF NO FINES
	SAND WITH FINES (More than 12% fines)		
	▨	SM	SILTY SAND, SAND-SILT MIXTURE
	▨	SC	CLAYEY SAND, SAND-CLAY MIXTURE
FINE-GRAINED SOILS (more than 50% of material is smaller than No. 200 sieve size.)			
SILTS & CLAYS Liquid limit less than 50%	▨	ML	INORGANIC SILTS WITH SLIGHT PLASTICITY
	▨	CL	INORGANIC CLAY WITH LOW OR MEDIUM PLASTICITY, LEAN CLAY
SILTS & CLAYS Liquid limit Greater than 50%	▨	MH	INORGANIC SILTS WITH ELASTICITY
	▨	CH	INORGANIC CLAY WITH HIGH PLASTICITY, FAT CLAY.

NRCS CLASSIFICATION FOR CONSOLIDATED & SYMBOL CHART

▨ CONGLOM-ERATE CNG.	▨ SHALE SH.	▨ LIMESTONE LS.	
▨ BRECCIA BRC.	▨ SILTSTONE MS	▨ DOLOMITE DOL.	▨ GYPSUM GYP.
▨ SAND-STONE SS.	▨ CLAYSTONE CS.	▨ CHALK CH.	▨ CHERT CHT.

OTHER SYMBOLS

● HOLE LOGGED ONLY	STRIKE AND DIP
◉ HOLE SAMPLED	PIT OR TRENCH

TEST HOLE NUMBERING SYSTEM	COMBINA-TION RIG	POWER AUGER	HAND BORINGS	TRENCH OR PIT EXCAVA-TIONS	NATURAL OUTCROPS, STREAMBANKS, AND GULLIES
CENTERLINE OF DAM	1-49	51-99	1001-1099	2001-2099	3001-3099
BORROW AREA	101-149	151-199	1101-1199	2101-2199	3101-3199
EMERGENCY SPILLWAY	201-249	251-299	1201-1299	2201-2299	3201-3299
PRINCIPAL SPILLWAY	301-349	351-399	1301-1399	2301-2399	3301-3399
STREAM CHANNELS	401-449	451-499	1401-1499	2401-2499	3401-3499
EXPLORATORY BORINGS	501-549	551-599	1501-1599	——	——
FOUNDATION DRAIN	601-649	651-699	1601-1699	2601-2699	3601-3699
MISCELLANEOUS	701-749	751-799	1701-1799	2701-2799	3701-3799

CLASSIFICATION	RANGE OF GRAIN SIZE U.S. standard sieve size
BOULDERS	ABOVE 12"
COBBLES	12" TO 3"
GRAVEL Course Fine	3" to No. 4 3" to 3/4" 3/4" to No. 4
SAND Coarse Medium Fine	No. 4 to No. 200 No. 4 to No. 10 No. 10 to No. 40 No. 40 to No. 200
SILT & CLAY	Below No. 200

ABBREVIATIONS

Ang.	ANGULAR
B.	BEDDED OR BEDDING
Bld.	BOULDERS (> 12")
Calc.	CALCAREOUS
Cali.	CALICHE
Carb.	CARBONATE
Cav.	CAVITIES
Cmt.	CEMENTED
Ch.	CHALK OR CHALKY
C	CLAY, CLAYEY
Cse.	COARSE
Cbl.	COBBLES (3" - 12")
Cpt.	COMPACT
Con.	CONCRETIONS
Cng.	CONGLOMERATE
Cs.	CLAYSTONE
C.T.	CAVED TO
Xln.	CRYSTALLINE
Ds.	DENSE
Dip.	DIPPING
D.S.	DOWNSTREAM
Fe. Stn.	Iron Stains
Flg.	FLAGSTONE OR FLAGGY
Fn.	FINE
Frm.	FIRM
Frac.	FRACTURED
Frg.	FRAGMENTS
Fri.	FRIABLE
Grn.	GRAIN
G	GRAVEL, GRAVELLY
Gyp.	GYPSEOUS
Hd.	ROCK HARDNESS
H.	HIGHLY
Int.	INTERBEDDED
Lam.	LAMINATED
Lay.	LAYER OR LAYERS
Len.	LENS OR LENSES
Lig.	LIGNITE
Ls.	LIMESTONE
Lse.	LOOSE
Ma.	MARL, OR MARLY
Mas.	MASSIVE
Mat.	MATRIX
Med.	MEDIUM
Mic.	MICACEOUS
Mod.	MODERATELY
Nod.	NODULE OR NODULAR
N.R.	NO RECOVERY
O	ORGANIC
Part.	PARTINGS
Peb.	PEBBLE
Per.	PERMEABLE
Po.	POORLY
P.	POORLY GRADED
Rdd.	ROUNDED
S	SAND, SANDY
Ss.	SANDSTONE
Sat.	SATURATED
Sh.	SHALE, OR SHALY
Sl/.	SLIGHTLY
Slo.	SLOWLY
M	SILT, SILTY
Sft.	SOFT
Sl.	SOME
Stf.	STIFF
Str.	STREAKS
T.	THIN
T.B.	THIN - BEDDED
Tuff.	TUFFACEOUS
U.A.D.	UNABLE TO AUGER DEEPER
U.D.B.D.	UNABLE TO DRY BARREL DEEPER
U.E.D.	UNABLE TO EXCAVATE DEEPER
U.S.	UPSTREAM
Var.	VARIABLE
V/.	VERY
Vug.	VUGULAR
Wtr.	WATER LEVEL AS ENCOUNTERED DURING DRILLING PROCESS
W	WELL GRADED
W/.	WITH
Wea.	WEATHERED
▼	(DATE) STATIC WATER LEVEL

LEGEND:

- ○ 1967 NRCS TEST HOLE
- ◐ AUGER/CORE BORING
- ☐ HAND AUGER BORING

REVISIONS		
DATE	APPROVED	TITLE

THIS DRAWING IS
ISSUED FOR REVIEW
ONLY UNDER THE
AUTHORITY OF
MICHAEL J. LENHERR
TEXAS P.E. #100021
ON NOVEMBER 30, 2020.

DESIGNED BY: MRD
DRAWN BY: CAD
CHECKED BY: MJL
FILE NAME: Plum 2 - Sht 49-55.dwg
DATE CHECKED: 11/25/2020

PLAN OF GEOLOGIC INVESTIGATION

FLOODWATER RETARDING STRUCTURE SITE NO. 2 REHABILITATION
PLUM CREEK WATERSHED
IN
HAYS COUNTY, TEXAS

**Texas State
Soil & Water
Conservation Board**

AECOM

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TBPE Reg. No. F-3580

SHEET NO.
49
OF
58

AECOM AECOM

SUMMARY LOG DIAGRAM
Existing Auxiliary Spillway

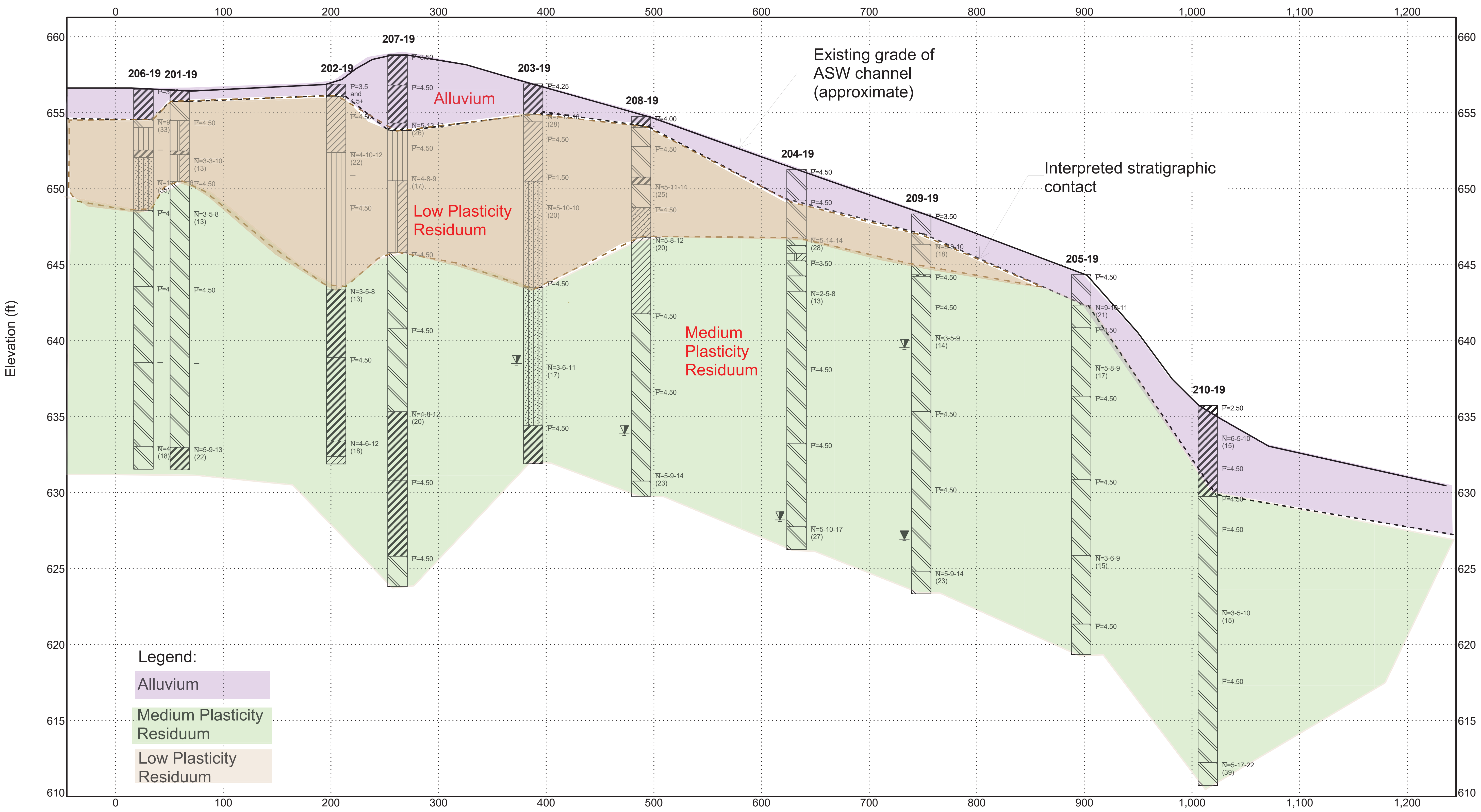
CLIENT TSSWCB
PROJECT NUMBER 60615067
PROJECT NAME Plum 2
PROJECT LOCATION Kyle, TX

- ▨ High Plasticity Clay
- ▧ Low to High Plasticity Clay
- ▥ Silty Clay (half silt, half clay)
- ▨ Low Plasticity Clay
- ▥ Silt
- ░ Silty Sand
- ▨ Low Plasticity Sandy Clay

— Sample Top Depth
N= SPT blows per 6" increment (N-value, bpf)
P= Pocket Penetrometer (tsf)
RC= Core Recovery (%) - RQD (%)

▽ Water Level at Time Drilling, or as Shown
▼ Water Level at End of Drilling, or as Shown
▼ Water Level After 24 Hours, or as Shown

AECOM FENCE_GRAPHICS-GW-N-PP-RQD - URS_DENVER STD US LAB.GDT - 7/1/20 10:44 - C:\USERS\MARIANA.CONCEICAODES\ONEDRIVE - AECOM DIRECTORY\5 TSSWCB DAMS\PLUM 2\GINT LOGS\PLUM 2 LOGS_2020.05.08.GPJ



ATTACHMENT 1.

LABORATORY TEST RESULTS SUMMARY TABLE

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Sample Information				Stratum	Field USCS	Lab USCS	w_C (%)	γ_{dry} (pcf)	γ_{total} (pcf)	Sieve/Hydrometer				Atterberg Limits			Shear Strength			Other Tests		Field Tests					Rep. Particle Size	
Boring ID	Depth (feet bgs)		Sample ID							Gravel	Sand	Pass #200	Pass 2µm	LL	PL	PI	σ'_3 (psf)	$\varepsilon_{failure}$ (%)	Su (psf)	Crumb	Double Hydro. (%)	N (bpf)	E_h (-)	N_{60} (bpf)	PP (psf)	Est. Su (psf)	D_{75} (mm)	D_{50} (mm)
	Top	Bottom								(%)	(%)	(%)	(%)															
201-19	0.0	2.0	P-1	Alluvium	CH,CL /CH		26.4																					
201-19	2.0	4.0	ST-2	LPR	CL-ML	CL	11.8	122.5	136.9	0.5	19.6	79.9	37	41	15	26	0	7.6	4,378	1	14				4.5	4500	0.054	0.005
201-19	4.5	6.0	SS-3	LPR	SM	CL	12					93		23	14	9						13	80%	17				
201-19	6.0	8.0	P-4	MPR	CL/CH		19.7																		4.5	4500		
201-19	8.0	9.5	SS-5	MPR	CL/CH		23.5															13	80%	17				
201-19	13.0	15.0	ST-6	MPR	CL/CH	CH	17.8	108.7	128.1	0	2	98	47.8	60	29	31	0	15.0	3,269	1	-				4.5	4500	0.016	0.002
201-19	18.0	20.0	P-7	MPR	CL/CH		23.4																					
201-19	23.5	25.0	SS-8	MPR	CH		21.7															22	80%	29				
202-19	0.0	2.0	P-1	Alluvium	CH		21.5																		4.0	4000		
202-19	2.0	4.0	ST-2	LPR	CL	CL	11.4	120.8	134.6	0	18.7	81.3	27.2	24	15	9	0	5.2	6,437	2	48				4.5	4500	0.050	0.010
202-19	4.5	6.0	SS-3	LPR	ML		4.8															22	80%	29				
202-19	6.0	8.0	P-4	LPR	ML	CL	10.5							30	12	18												
202-19	8.0	10.0	ST-5	LPR	ML	ML	16	118.1	137.0	3.4	29.6	67	37.2	48	28	20	0	10.7	3,211	2	-				4.5	4500	0.139	0.021
202-19	13.5	15.0	SS-6	MPR	CH		20.4															13	80%	17				
202-19	18.0	20.0	P-7	MPR	CH	CH	23.2							51	21	30									4.5	4500		
202-19	23.5	25.0	SS-8	MPR	CH,CL		21.9															18	80%	24				
203-19	0.0	2.0	P-1	Alluvium	CH		23.5																		4.25	4250		
203-19	2.0	3.5	SS-2A	MPR	CL/CH ,CL		18.9															28	80%	37				
203-19	2.0	3.5	SS-2B	LPR	CL/CH ,CL		8.5															28	80%					
203-19	3.5	5.5	ST-3	LPR	SM	CL	10.4			0	18.6	81.4	35.1	32	14	18				1	-				4.5	4500	0.047	0.011
203-19	6.0	8.0	P-4A	LPR	SM		7.1																		1.5	1500		
203-19	6.0	8.0	P-4B	LPR	SM	SM	8.7	113.4	123.3			34.8		18	11	7												
203-19	8.0	9.5	SS-5	LPR	SM	SM	11					46.8			NP							20	80%	27				
203-19	13.0	15.0	P-6A	LPR	SM		10.8					66.9													4.5	4500		
203-19	13.0	15.0	P-6AB	MPR	SM		21.1																		4.5	4500		
203-19	18.5	20.0	SS-7	MPR	SM		21.6					98.6										17	80%	23				
203-19	22.5	24.5	ST-8	MPR	CH	CH	23.6			0	1.5	98.5	53	58	26	32				3	-				4.5	4500	0.005	0.002
204-19	0.0	2.0	P-1A	Alluvium	CH		23.3																		4.5	4500		
204-19	0.0	2.0	P-1B	MPR	CL/CH		10.9																		4.5	4500		
204-19	2.0	4.0	ST-2	LPR	CL/CH	CL	8.1	116.3	125.7	1.5	29.3	69.2	36.3	25	17	8	0	3.0	4,378		-				4.5	4500	0.14	0.013
204-19	4.0	4.5	SS-3A	MPR	CL/CH		20.0															28	80%	37				
204-19	4.5	6.0	SS-3B	MPR	CL/CH		6.8															28	80%					
204-19	6.0	8.0	P-4A	MPR	CL/CH	CH	22.4							68	22	46									3.5	3500		
204-19	6.0	8.0	P-4B	MPR	CL/CH		14.7																					
204-19	8.0	9.5	SS-5A	MPR	CL/CH		9.2															13	80%	17				
204-19	8.0	9.5	SS-5B	MPR	CL/CH		19.5															13	80%					

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204-19	13.0	15.0	ST-6	MPR	CL/CH	CH	18.3	110.8	131.1	0	2.2	97.8	61	50	22	28	0	8.4	3,917	1	-				4.5	4500	0.005	0.001
204-19	18.0	20.0	P-7	MPR	CL/CH		20.8																		4.5	4500		
204-19	23.5	25.0	SS-8	MPR	CL/CH																	27	80%	36				
205-19	0.0	2.0	P-1	Alluvium	CH	CH	23.1							53	21	32									4.5	4500		
205-19	2.0	3.5	SS-2	MPR	CL/CH		11.7															21	80%	28				
205-19	3.5	5.5	P-3A	MPR	CL/CH		19.3																		4.5	4500		
205-19	3.5	5.5	P-3B	MPR	CL/CH		16.9																					
205-19	6.0	7.5	SS-4	MPR	CL/CH		19.2															17	80%	23				
205-19	8.0	10.0	ST-5	MPR	CL/CH	CH	20.6	104.1	125.5	0	1.9	98.1	66.3	54	24	30	0	15.0	4,550	1	-				4.5	4500	0.005	0.001
205-19	13.5	15.5	P-6	MPR	CL/CH		21.7																		4.5	4500		
205-19	18.5	20.0	SS-7	MPR	CL/CH		22.7															15	80%	20				
205-19	23.0	25.0	ST-8	MPR	CL/CH		21.6																		4.5	4500		
206-19	0.0	2.0	P-1	Alluvium	CH		19.4																		3.5	3500		
206-19	2.0	3.5	SS-2A	MPR	CL/CH		14.2															33	80%	44				
206-19	2.0	3.5	SS-2B	MPR	ML	CH	4.3							68	23	45						33	80%					
206-19	2.0	3.5	SS-2C	MPR	CH		5.2															33	80%					
206-19	4.0	6.0	P-3A	LPR	CH		19.7																					
206-19	4.0	6.0	P-3B	LPR	SM	SM	8.9	127.9	139.3			17.7			NP													
206-19	6.0	7.5	SS-4	LPR	SM		5.8					23.5										35	80%	47				
206-19	8.0	10.0	ST-5	MPR	CL/CH	CH	24.9	101.1	126.3	0	2.1	97.9	73.2	67	24	43	0	6.7	3,802	1	-				4.5	4500	0.002	0.001
206-19	13.0	15.0	P-6	MPR	CL/CH		23.5																		4.5	4500		
206-19	18.0	20.0	ST-7	MPR	CL/CH	CH	22.5	103.1	126.3	0	0.9	99.1	65.6	57	23	34	0	11.7	3,643		-						0.005	0.001
206-19	23.5	25.0	SS-8	MPR	CL/CH		23.5															18	80%	24				
207-19	0.0	2.0	P-1	Alluvium	CH		13.5																		3.5	3500		
207-19	2.0	4.0	ST-2	Alluvium	CH	SC	12.6	116.5	131.1	14.9	38.9	46.2	35.3	33	17	16	0	7.0	5,270	2	15				4.5	4500	2.08	0.122
207-19	4.5	6.0	SS-3A	MPR	CH		21.3															26	80%	35				
207-19	4.5	6.0	SS-3B	LPR	ML		6															26	80%					
207-19	6.0	8.0	P-4	LPR	ML	CL	8.5	123.1	133.6					35	15	20									4.5	4500		
207-19	8.0	9.5	SS-5	LPR	CL-ML	CL	12.2							37	14	23						17	80%	23				
207-19	13.0	15.0	P-6	MPR	CL/CH		21																		4.5	4500		
207-19	18.0	20.0	ST-7	MPR	CL/CH	CH	22.1	104.9	128.0	0	1.1	98.9	64.8	55	26	29	0	8.0	4,766	1	-				4.5	4500	0.004	0.001
207-19	23.5	25.0	SS-8	MPR	CH		21.2															20	80%	27				
207-19	28.0	30.0	P-9	MPR	CH		21.4																		4.5	4500		
207-19	33.0	35.0	ST-10	MPR	CL/CH		20.3																		4.5	4500		
208-19	0.0	2.0	P-1A	Alluvium	CH		22																		4.0	4000		
208-19	0.0	2.0	P-1B	MPR	CL/CH		13.9																		4.5	4500		
208-19	2.0	4.0	ST-2	LPR	CL/CH	CL	10.2	113.6	125.3	0.2	19.1	80.7	37.9	29	13	16	0	3.8	3,125	1	-				4.5	4500	0.043	0.005
208-19	4.5	6.0	SS-3A	LPR	CH		15.4															25	80%	33				
208-19	4.5	6.0	SS-3B	LPR	CL/CH		8.3															25	80%					

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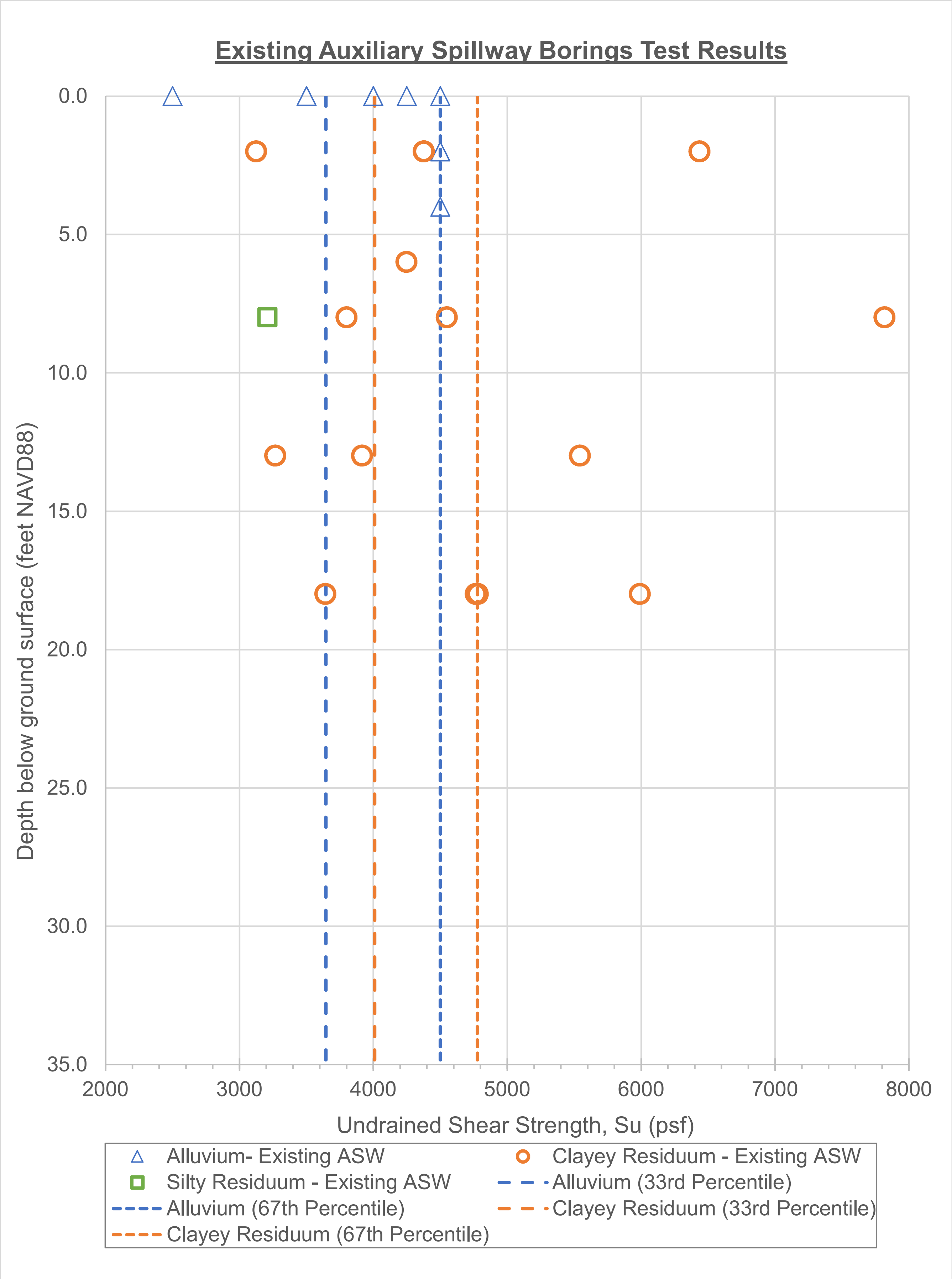
208-19	6.0	8.0	P-4	LPR	s. CL	CL	13.8	117.2	133.4			75.8		39	15	24									4.5	4500		
208-19	8.0	9.5	SS-5	LPR	CL	CL	13.5							25	10	15						20	80%	27				
208-19	13.0	15.0	ST-6	MPR	CL/CH	CH	21.1	103	124.8	1.6	10.6	87.8	42.4	59	23	36	0	7.2	5,544	1	-				4.5	4500	0.001	0.0035
208-19	18.0	20.0	P-7	MPR	CL/CH		20																		4.5	4500		
208-19	23.5	25.0	SS-8A	MPR	CL/CH		19.2															23	80%	31				
208-19	23.5	25.0	SS-8B	MPR	CL/CH		20.3															23	80%					
209-19	0.0	2.0	P-1A	Alluvium	CL/CH		25.3																		3.5	3500		
209-19	0.0	2.0	P-1B	LPR	CL/CH		15.8																					
209-19	2.0	3.5	SS-2	LPR	CL/CH		6.6															18	80%	24				
209-19	4.0	6.0	P-3A	MPR	CH		21.2																		4.5	4500		
209-19	4.0	6.0	P-3B	MPR	CL/CH		17.5																					
209-19	6.0	8.0	ST-4	MPR	CL/CH	CH	22	104.6	127.6	0	1.1	98.9	72.1	61	22	39	0	9.0	4,248	1	10				4.5	4500	0.003	0.001
209-19	8.0	9.5	SS-5	MPR	CL/CH		20.2															14	80%	19				
209-19	13.0	15.0	P-6	MPR	CL/CH		21.5																		4.5	4500		
209-19	18.0	20.0	ST-7	MPR	CL/CH	CH	21.7	106.1	129.1	0	3.3	96.7	60	62	22	40	0	6.9	5,990	1	-				4.5	4500	0.005	0.001
209-19	23.5	25.0	SS-8	MPR	CL/CH		22.7															23	80%	31				
210-19	0.0	2.0	P-1	Alluvium	CH	CH	20.3	107.6	129.4			71.8		53	21	32									2.5	2500		
210-19	2.0	3.5	SS-2	Alluvium	CH		28.2															15	80%	20	4.5	4500		
210-19	4.0	6.0	P-3	Alluvium	CH		15.2																		4.5	4500		
210-19	6.0	8.0	P-4	MPR	CL/CH		19.1																		4.5	4500		
210-19	8.0	10.0	ST-5	MPR	CL/CH	CH	17.8	112.4	132.4	0	3.1	96.9	65.2	60	22	38	0	13.6	7,819	1	-				4.5	4500	0.004	0.001
210-19	13.5	15.0	SS-6	MPR	CL/CH		20.6															15	80%	20	4.5	4500		
210-19	18.0	20.0	ST-7	MPR	CL/CH	MH	22.4	103.8	127.0	0	1.9	98.1	57	52	29	23	0	5.4	4,781	1	-				4.5	4500	0.005	0.001
210-19	23.5	25.0	SS-8	MPR	CL/CH		18.5															39	80%	52	4.5	4500		

Notes:

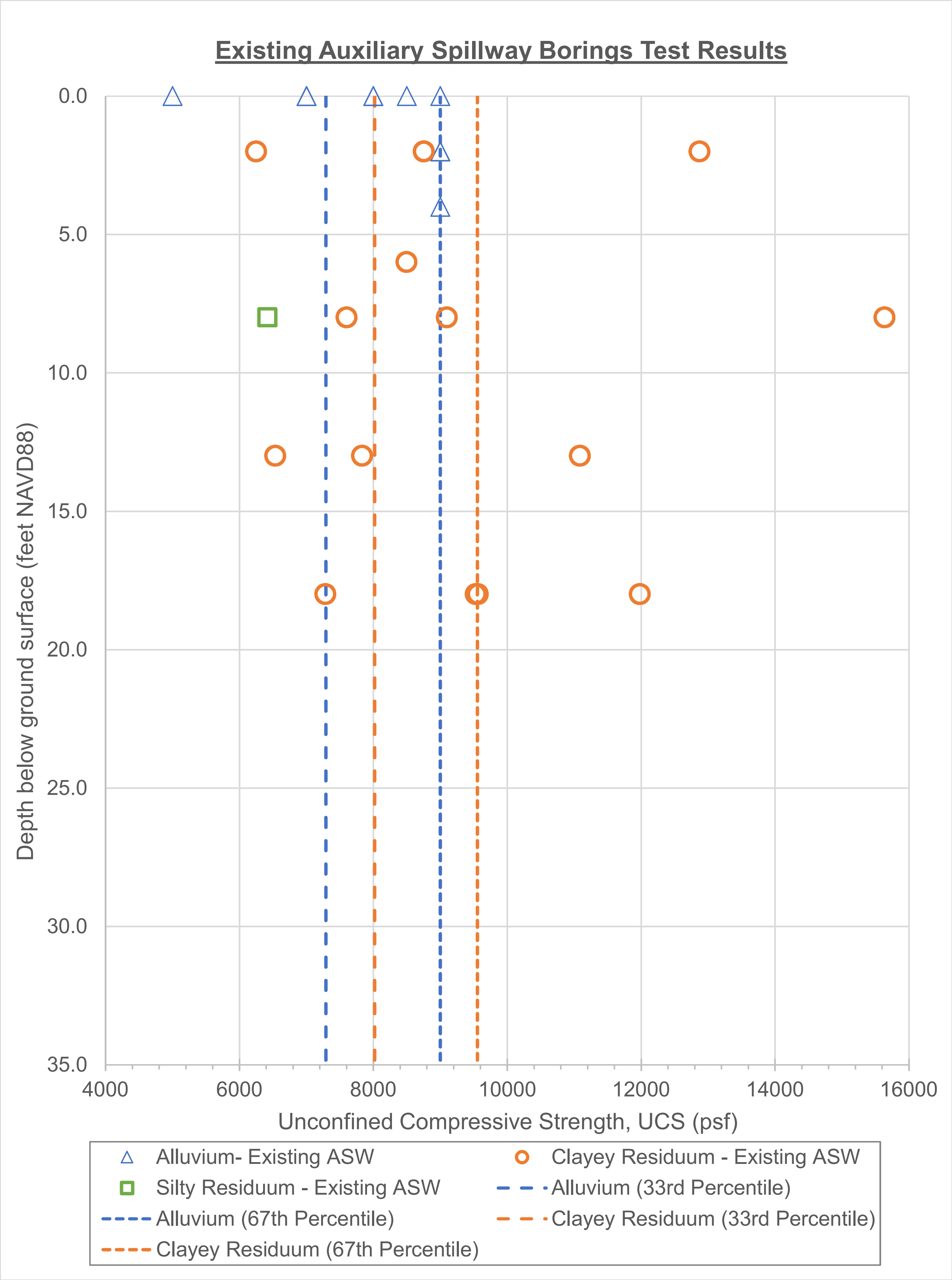
1. Abbreviations:
   a. USCS – United Soil Classification System
   b. LL – Liquid Limit
   c. PL – Plastic Limit
   d. PI – Plasticity Index
   e. LPR – Low Plasticity Residuum
   f. MPR – Medium Plasticity Residuum

ATTACHMENT 2.

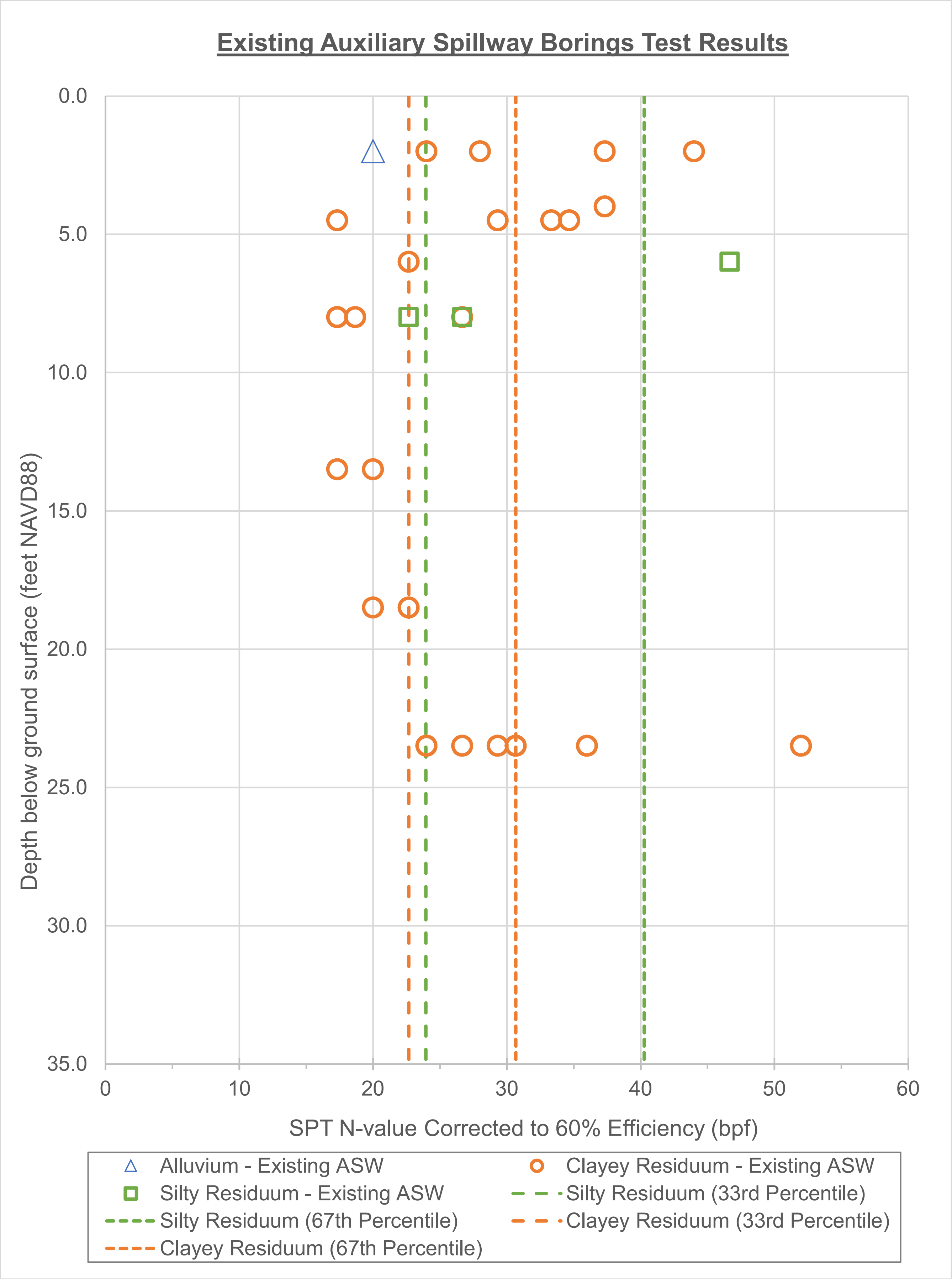
LABORATORY TEST DATA PLOTS

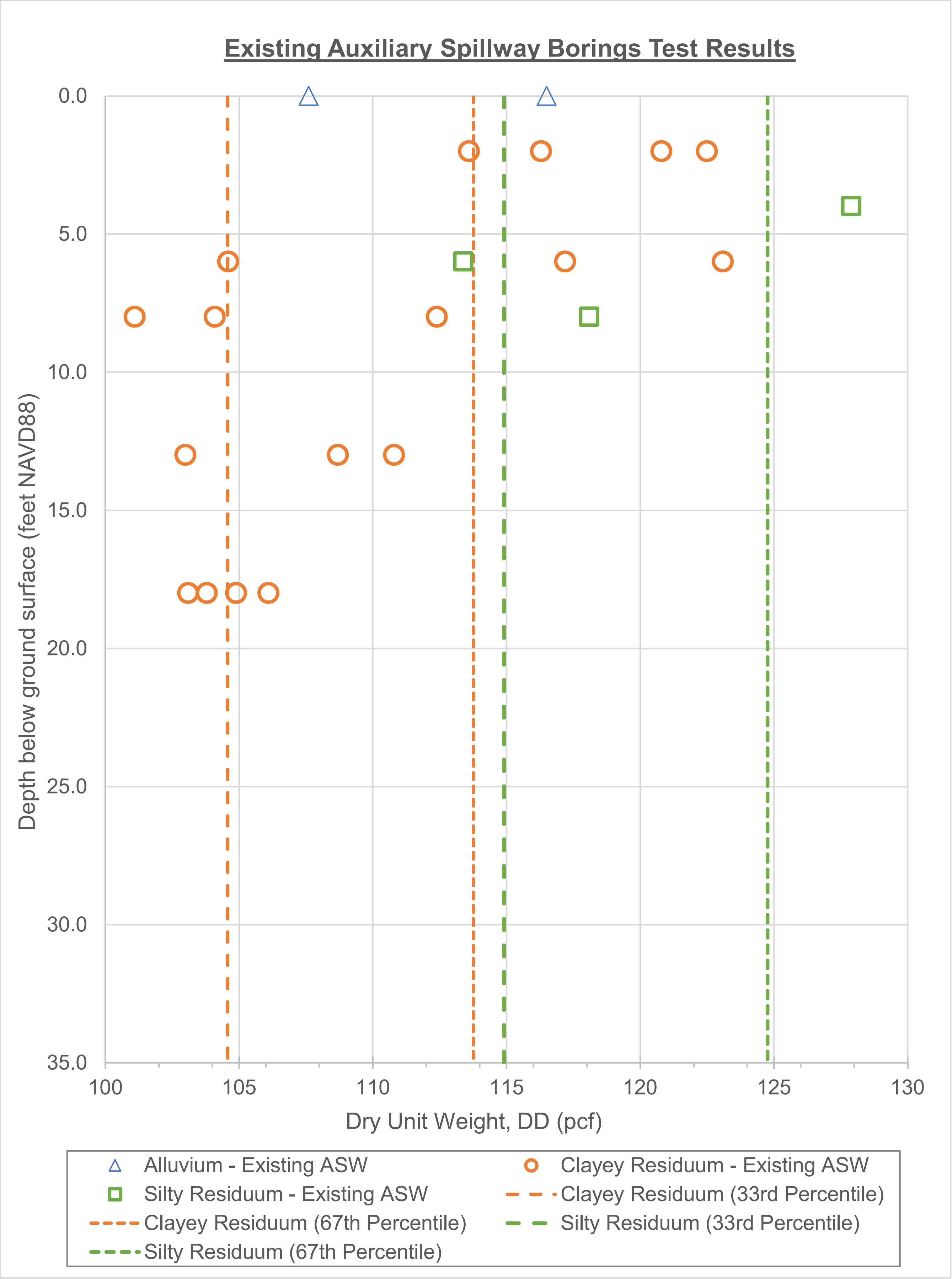


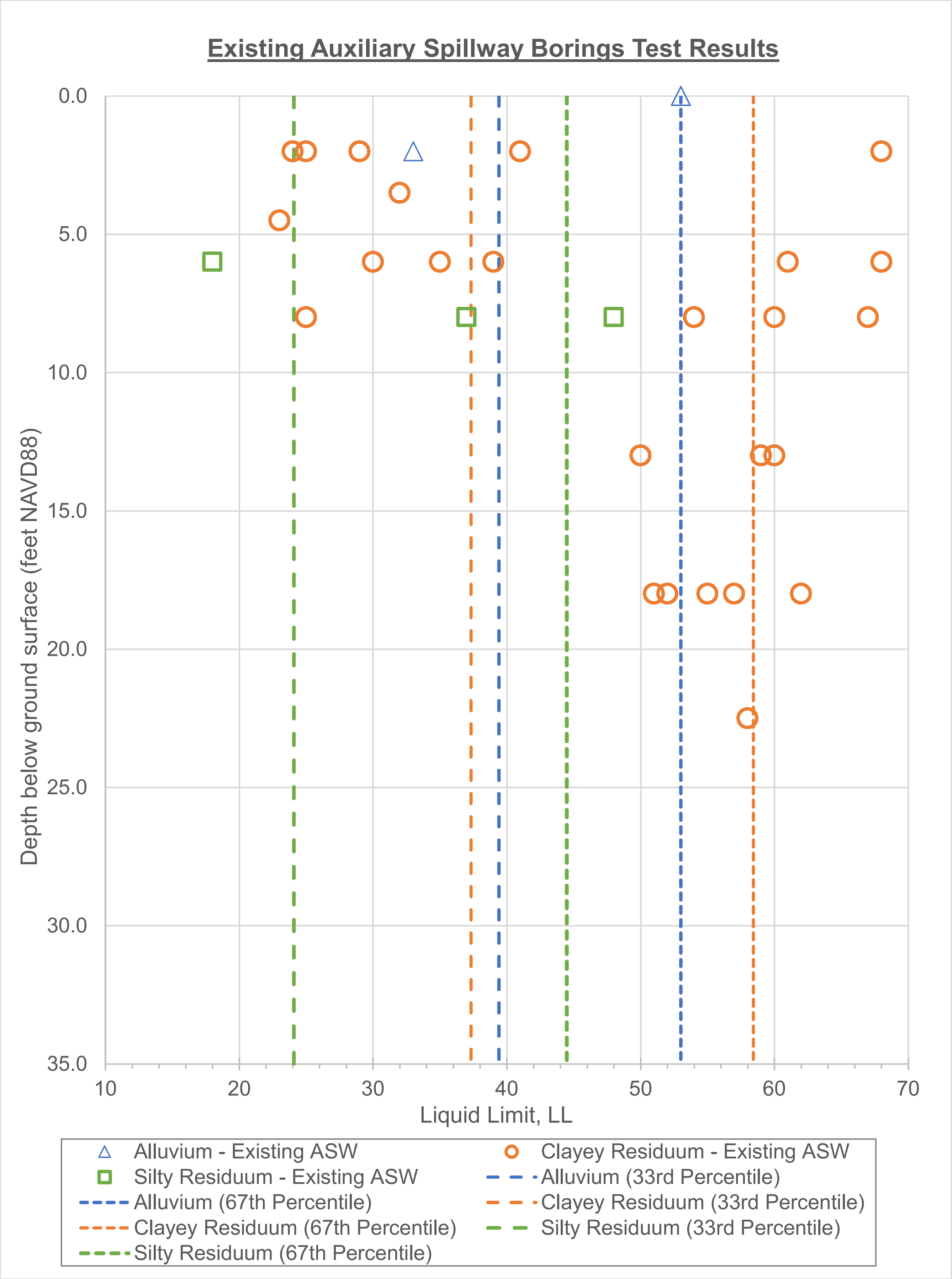
Existing Auxiliary Spillway Borings Test Results

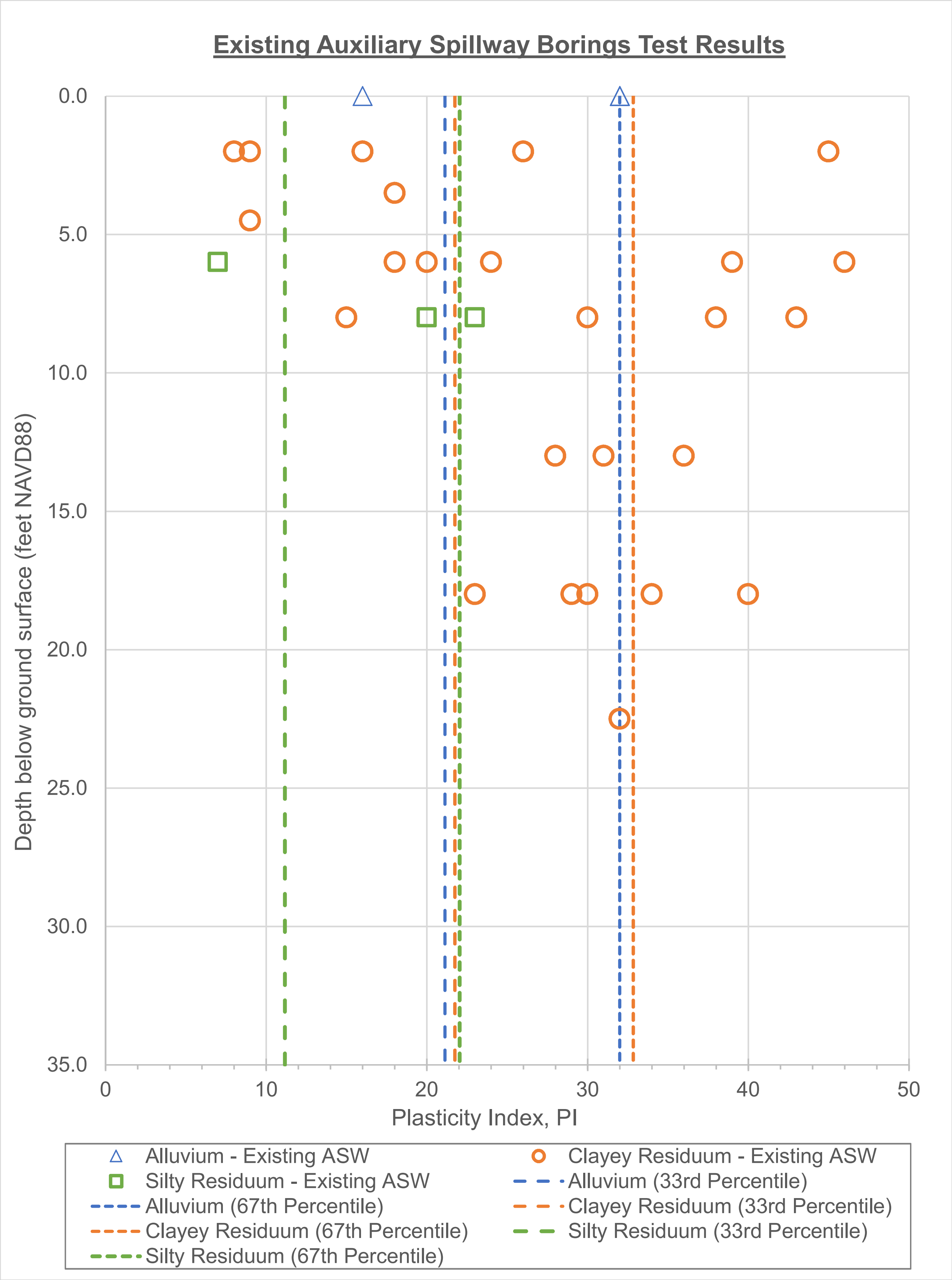


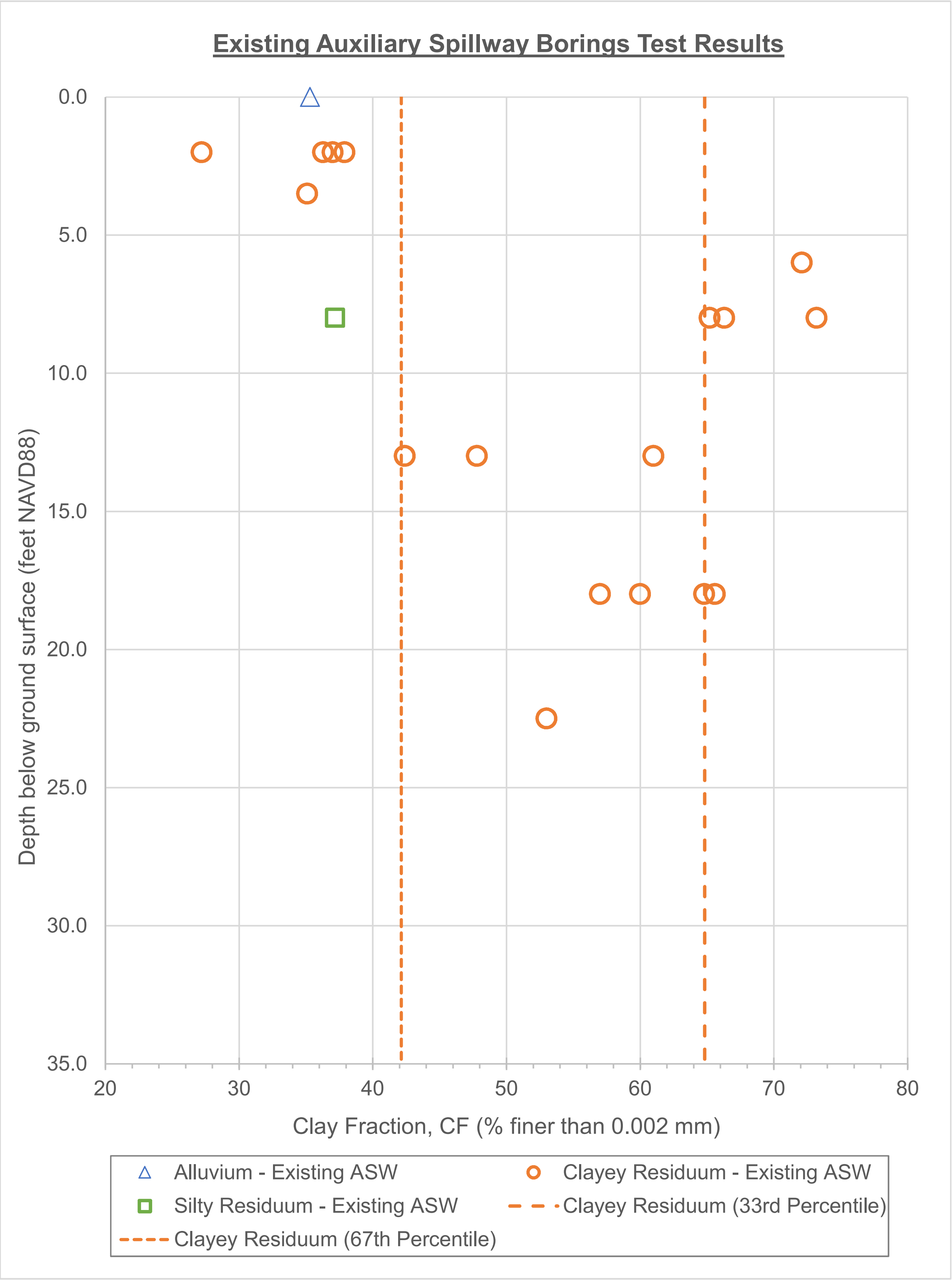
Existing Auxiliary Spillway Borings Test Results
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
Depth below ground surface (feet NAVD88)
4000
6000
8000
10000
12000
14000
16000
Unconfined Compressive Strength, UCS (psf)
Alluvium- Existing ASW
Clayey Residuum - Existing ASW
Silty Residuum - Existing ASW
Alluvium (33rd Percentile)
Alluvium (67th Percentile)
Clayey Residuum (33rd Percentile)
Clayey Residuum (67th Percentile)


Existing Auxiliary Spillway Borings Test Results
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
Depth below ground surface (feet NAVD88)
0
10
20
30
40
50
60
SPT N-value Corrected to 60% Efficiency (bpf)
△ Alluvium - Existing ASW
○ Clayey Residuum - Existing ASW
□ Silty Residuum - Existing ASW
Silty Residuum (33rd Percentile)
Silty Residuum (67th Percentile)
Clayey Residuum (33rd Percentile)
Clayey Residuum (67th Percentile)


Existing Auxiliary Spillway Borings Test Results
Depth below ground surface (feet NAVD88)
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
100
105
110
115
120
125
130
Dry Unit Weight, DD (pcf)
△ Alluvium - Existing ASW
○ Clayey Residuum - Existing ASW
□ Silty Residuum - Existing ASW
Clayey Residuum (33rd Percentile)
Clayey Residuum (67th Percentile)
Silty Residuum (33rd Percentile)
Silty Residuum (67th Percentile)


Existing Auxiliary Spillway Borings Test Results
Depth below ground surface (feet NAVD88)
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
10
20
30
40
50
60
70
Liquid Limit, LL
Alluvium - Existing ASW
Clayey Residuum - Existing ASW
Silty Residuum - Existing ASW
Alluvium (33rd Percentile)
Alluvium (67th Percentile)
Clayey Residuum (33rd Percentile)
Clayey Residuum (67th Percentile)
Silty Residuum (33rd Percentile)
Silty Residuum (67th Percentile)


Existing Auxiliary Spillway Borings Test Results
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
Depth below ground surface (feet NAVD88)
0
10
20
30
40
50
Plasticity Index, PI
Alluvium - Existing ASW
Clayey Residuum - Existing ASW
Silty Residuum - Existing ASW
Alluvium (33rd Percentile)
Alluvium (67th Percentile)
Clayey Residuum (33rd Percentile)
Clayey Residuum (67th Percentile)
Silty Residuum (33rd Percentile)
Silty Residuum (67th Percentile)



Existing Auxiliary Spillway Borings Test Results

ATTACHMENT 3.

HEADCUT ERODIBILITY INDEX CALCULATION SHEETS

Summary of Index Parameters and Kh Calculations

	Stratum	1	2	3	4	5	6
	Material	1a - Alluvium (Unfavorable)	1b - Alluvium (Favorable)	2a- Medium Plasticity Residuum (Unfavorable)	2b- Medium Plasticity Residuum (Favorable)	2c -Low Plasticity Residuum (Unfavorable)	2d - Low Plasticity Residuum (Favorable)
Index Parameters	Ms	0.25	0.31	0.27	0.33	0.09	0.22
	Kb	1.00	1.00	1.00	1.00	1.00	1.00
	Kd	1.00	1.00	1.00	1.00	1.00	1.00
	Js	1.00	1.00	1.00	1.00	1.00	1.00
	Blocky soil factor	1.00	1.00	1.00	1.00	1.00	1.00
	Kh	0.25	0.31	0.27	0.33	0.09	0.22

HEADCUT ERODIBILITY INDEX CALCULATOR

Project Name and Site Number: Plum Creek FRS No. 2
Material Type: 1a - Alluvium (Unfavorable)

Calculate Material Strength Number, Ms	
Cohesionless Soils	
Standard Penetration Test N_{60} (bpf)	-
In-Situ Deformation Modulus, IDM (MPa) - Cohesionless Soils	n/a
Calculated Material Strength Number, Ms - Cohesionless Soils	n/a
Cohesive Soils	
Standard Penetration Test N_{60} (bpf)	20
Unconfined Compressive Strength (psf) - Cohesive Soils	7290
Unconfined Compressive Strength (kPa) - Cohesive Soils	349.05
Unconfined Compressive Strength (MPa) - Cohesive Soils	0.35
Calculated Material Strength Number, Ms - Cohesive Soils	0.25
Rock	
Standard Penetration Test N_{60} (bpf)	-
Unconfined Compressive Strength (psi) - Rock	-
Unconfined Compressive Strength (MPa) - Rock	n/a
Calculated Material Strength Number, Ms - Cohesive Soils	n/a
Selection of Material Type	
Is material being evaluated rock/cohesive soil? (enter "yes" or "no")	yes
Is material being evaluated cohesive soil? (enter "yes" or "no")	yes
Is soil overconsolidated, fissured/blocky fat clay (CH)? (enter "yes" or "no")	no
Calculated Material Strength Number, Ms, for Cohesive Soil	**0.248**

Calculate Block/Particle Size Number, Kb	
Is material being evaluated rock or jointed cohesive soil? (enter "yes" or "no")	no
If "yes", go to C22	
Is material being evaluated a massive (unjointed) **cohesive** soil (enter "yes" or "no")	yes
If "yes", Kb = 1 (spreadsheet calculates)	
Is material being evaluated a **cohesionless** soil (coarse detritus, gravel, or boulder formation) where D < 0.1 m? (enter "yes" or "no")	no
If "yes", go to C26, Kb = 1; if "no" go to C25	
RQD (enter from drill logs or enter "NA" and enter Jc below to calculate RQD)	NA
Joint Set Number, Jn (table 52-5)	NA
Joint Count Number, Jc, (table 52-6 or enter "NA" and enter D below (C25) to calculate)	NA
Mean Block Diameter, D (in meters)	NA
Mean Particle Size Diameter, D_{50}	0.500
Dry density (in PCF)	108
Calculated RQD (from input value or calculated from Jc number)	NA
Calculated Jn (from input value or calculated based on material)	NA
Calculated Block/Particle Size Number, Kb	**1.00**

Discontinuity/Interparticle Bond Shear Strength Number, Kd	
Is material being evaluated a soil? (enter "yes" or "no")	yes
If yes, enter "NA" for Jr and Ja parameters	
Joint Roughness Number, Jr (table 52-8)	NA
Joint Alteration Number, Ja (table 52-9)	NA
Select Kd calculation method for soil: NRCS NEH Ch 52 (1997) or Draft Appendix 52D (2011)	NRCS(2011)
Residual friction angle from lab test in degrees (Enter "NA" to calculate based on correlation)	NA
Clay Content (percent)	25.0
Liquid Limit (percent)	39.4
Plasticity Index (percent)	21.1
Residual friction angle in degrees (calculated or from input value)	24.3
Calculated Discontinuity/Interparticle Bond Shear Strength Number, Kd	**1.00**

Calculate Ground Structure Number, Js	
Is material being evaluated a soil? (enter "yes" or "no")	yes
If yes, Js = 1 (spreadsheet calculates)	
Exit Channel Slope (degrees)	1.00
Spillway Flow Direction (azimuth degrees)	0.0
Bedrock Strike (azimuth degrees)	0.0
Bedrock Dip (degrees)	0.0
Bedrock Dip Direction (azimuth degrees)	0.0
Calculated Apparent Dip, a (degrees)	0.0
Calculated Effective Dip, q (degrees)	1.0
Is dip direction **against** or **with** the flow? (Spreadsheet calculates)	WITH
Calculated Ground Structure Number, Js	**1.00**

Summary of Key Properties	
Material Strength Number, Ms	0.25
Block/Particle Size Number, Kb	1.00
Discontinuity/Interparticle Bond Shear Strength Number, Kd	1.00
Relative Ground Structure Number, Js	1.00
Correction factor for overconsolidated, blocky/fissured high-plasticity soils	1.00
Calculated Headcut Erodibility Index, Kh	**0.25**

HEADCUT ERODIBILITY INDEX CALCULATOR

Project Name and Site Number: Plum Creek FRS No. 2
Material Type: 1b - Alluvium (Favorable)

Calculate Material Strength Number, Ms	
Cohesionless Soils	
Standard Penetration Test N_{60} (bpf)	-
In-Situ Deformation Modulus, IDM (MPa) - Cohesionless Soils	n/a
Calculated Material Strength Number, Ms - Cohesionless Soils	n/a
Cohesive Soils	
Standard Penetration Test N_{60} (bpf)	20
Unconfined Compressive Strength (psf) - Cohesive Soils	9000
Unconfined Compressive Strength (kPa) - Cohesive Soils	430.93
Unconfined Compressive Strength (MPa) - Cohesive Soils	0.43
Calculated Material Strength Number, Ms - Cohesive Soils	0.31
Rock	
Standard Penetration Test N_{60} (bpf)	-
Unconfined Compressive Strength (psi) - Rock	-
Unconfined Compressive Strength (MPa) - Rock	n/a
Calculated Material Strength Number, Ms - Cohesive Soils	n/a
Selection of Material Type	
Is material being evaluated rock/cohesive soil? (enter "yes" or "no")	yes
Is material being evaluated cohesive soil? (enter "yes" or "no")	yes
Is soil overconsolidated, fissured/blocky fat clay (CH)? (enter "yes" or "no")	no
Calculated Material Strength Number, Ms, for Cohesive Soil	**0.312**

Calculate Block/Particle Size Number, Kb	
Is material being evaluated rock or jointed cohesive soil? (enter "yes" or "no")	no
If "yes", go to C22	
Is material being evaluated a massive (unjointed) **cohesive** soil (enter "yes" or "no")	yes
If "yes", Kb = 1 (spreadsheet calculates)	
Is material being evaluated a **cohesionless** soil (coarse detritus, gravel, or boulder formation) where D < 0.1 m? (enter "yes" or "no")	no
If "yes", go to C26, Kb = 1; if "no" go to C25	
RQD (enter from drill logs or enter "NA" and enter Jc below to calculate RQD)	NA
Joint Set Number, Jn (table 52-5)	NA
Joint Count Number, Jc, (table 52-6 or enter "NA" and enter D below (C25) to calculate)	NA
Mean Block Diameter, D (in meters)	NA
Mean Particle Size Diameter, D_{50}	2.0
Dry density (in PCF)	117
Calculated RQD (from input value or calculated from Jc number)	NA
Calculated Jn (from input value or calculated based on material)	NA
Calculated Block/Particle Size Number, Kb	**1.00**

Discontinuity/Interparticle Bond Shear Strength Number, Kd

Is material being evaluated a soil? (enter "yes" or "no")	yes
If yes, enter "NA" for Jr and Ja parameters	
Joint Roughness Number, Jr (table 52-8)	NA
Joint Alteration Number, Ja (table 52-9)	NA
Select Kd calculation method for soil: NRCS NEH Ch 52 (1997) or Draft Appendix 52D (2011)	NRCS(2011)
Residual friction angle from lab test in degrees (Enter "NA" to calculate based on correlation)	NA
Clay Content (percent)	40.0
Liquid Limit (percent)	53
Plasticity Index (percent)	32
Residual friction angle in degrees (calculated or from input value)	19.7
Calculated Discontinuity/Interparticle Bond Shear Strength Number, Kd	**1.00**

Calculate Ground Structure Number, Js

Is material being evaluated a soil? (enter "yes" or "no")	yes
If yes, Js = 1 (spreadsheet calculates)	
Exit Channel Slope (degrees)	1.00
Spillway Flow Direction (azimuth degrees)	0.0
Bedrock Strike (azimuth degrees)	0.0
Bedrock Dip (degrees)	0.0
Bedrock Dip Direction (azimuth degrees)	0.0
Calculated Apparent Dip, a (degrees)	0.0
Calculated Effective Dip, q (degrees)	1.0
Is dip direction **against** or **with** the flow? (Spreadsheet calculates)	WITH
Calculated Ground Structure Number, Js	**1.00**

Summary of Key Properties

Material Strength Number, Ms	0.31
Block/Particle Size Number, Kb	1.00
Discontinuity/Interparticle Bond Shear Strength Number, Kd	1.00
Relative Ground Structure Number, Js	1.00
Correction factor for overconsolidated, blocky/fissured high-plasticity soils	1.00
Calculated Headcut Erodibility Index, Kh	**0.31**

HEADCUT ERODIBILITY INDEX CALCULATOR

Project Name and Site Number: Plum Creek FRS No. 2
Material Type: 2a- Medium Plasticity Residuum (Unfavorable)

Calculate Material Strength Number, Ms	
Cohesionless Soils	
Standard Penetration Test N_{60} (bpf)	-
In-Situ Deformation Modulus, IDM (MPa) - Cohesionless Soils	n/a
Calculated Material Strength Number, Ms - Cohesionless Soils	n/a
Cohesive Soils	
Standard Penetration Test N_{60} (bpf)	23
Unconfined Compressive Strength (psf) - Cohesive Soils	8019
Unconfined Compressive Strength (kPa) - Cohesive Soils	383.96
Unconfined Compressive Strength (MPa) - Cohesive Soils	0.38
Calculated Material Strength Number, Ms - Cohesive Soils	0.27
Rock	
Standard Penetration Test N_{60} (bpf)	-
Unconfined Compressive Strength (psi) - Rock	-
Unconfined Compressive Strength (MPa) - Rock	n/a
Calculated Material Strength Number, Ms - Cohesive Soils	n/a
Selection of Material Type	
Is material being evaluated rock/cohesive soil? (enter "yes" or "no")	yes
Is material being evaluated cohesive soil? (enter "yes" or "no")	yes
Is soil overconsolidated, fissured/blocky fat clay (CH)? (enter "yes" or "no")	no
Calculated Material Strength Number, Ms, for Cohesive Soil	**0.275**

Calculate Block/Particle Size Number, Kb	
Is material being evaluated rock or jointed cohesive soil? (enter "yes" or "no")	no
If "yes", go to C22	
Is material being evaluated a massive (unjointed) **cohesive** soil (enter "yes" or "no")	yes
If "yes", Kb = 1 (spreadsheet calculates)	
Is material being evaluated a **cohesionless** soil (coarse detritus, gravel, or boulder formation) where D < 0.1 m? (enter "yes" or "no")	no
If "yes", go to C26, Kb = 1; if "no" go to C25	
RQD (enter from drill logs or enter "NA" and enter Jc below to calculate RQD)	NA
Joint Set Number, Jn (table 52-5)	NA
Joint Count Number, Jc, (table 52-6 or enter "NA" and enter D below (C25) to calculate)	NA
Mean Block Diameter, D (in meters)	NA
Mean Particle Size Diameter, D_{50}	0.0045
Dry density (in PCF)	105
Calculated RQD (from input value or calculated from Jc number)	NA
Calculated Jn (from input value or calculated based on material)	NA
Calculated Block/Particle Size Number, Kb	**1.00**

Discontinuity/Interparticle Bond Shear Strength Number, Kd	
Is material being evaluated a soil? (enter "yes" or "no")	yes
If yes, enter "NA" for Jr and Ja parameters	
Joint Roughness Number, Jr (table 52-8)	NA
Joint Alteration Number, Ja (table 52-9)	NA
Select Kd calculation method for soil: NRCS NEH Ch 52 (1997) or Draft Appendix 52D (2011)	NRCS(2011)
Residual friction angle from lab test in degrees (Enter "NA" to calculate based on correlation)	NA
Clay Content (percent)	42.0
Liquid Limit (percent)	37.3
Plasticity Index (percent)	21.7
Residual friction angle in degrees (calculated or from input value)	25.2
Calculated Discontinuity/Interparticle Bond Shear Strength Number, Kd	**1.00**

Calculate Ground Structure Number, Js	
Is material being evaluated a soil? (enter "yes" or "no")	yes
If yes, Js = 1 (spreadsheet calculates)	
Exit Channel Slope (degrees)	1.00
Spillway Flow Direction (azimuth degrees)	0.0
Bedrock Strike (azimuth degrees)	0.0
Bedrock Dip (degrees)	0.0
Bedrock Dip Direction (azimuth degrees)	0.0
Calculated Apparent Dip, a (degrees)	0.0
Calculated Effective Dip, q (degrees)	1.0
Is dip direction **against** or **with** the flow? (Spreadsheet calculates)	WITH
Calculated Ground Structure Number, Js	**1.00**

Summary of Key Properties	
Material Strength Number, Ms	0.27
Block/Particle Size Number, Kb	1.00
Discontinuity/Interparticle Bond Shear Strength Number, Kd	1.00
Relative Ground Structure Number, Js	1.00
Correction factor for overconsolidated, blocky/fissured high-plasticity soils	1.00
Calculated Headcut Erodibility Index, Kh	**0.27**

HEADCUT ERODIBILITY INDEX CALCULATOR

Project Name and Site Number: Plum Creek FRS No. 2
Material Type: 2b- Medium Plasticity Residuum (Favorable)

Calculate Material Strength Number, Ms

Cohesionless Soils	
Standard Penetration Test N_{60} (bpf)	-
In-Situ Deformation Modulus, IDM (MPa) - Cohesionless Soils	n/a
Calculated Material Strength Number, Ms - Cohesionless Soils	n/a
Cohesive Soils	
Standard Penetration Test N_{60} (bpf)	31
Unconfined Compressive Strength (psf) - Cohesive Soils	9554
Unconfined Compressive Strength (kPa) - Cohesive Soils	457.44
Unconfined Compressive Strength (MPa) - Cohesive Soils	0.46
Calculated Material Strength Number, Ms - Cohesive Soils	0.33
Rock	
Standard Penetration Test N_{60} (bpf)	-
Unconfined Compressive Strength (psi) - Rock	-
Unconfined Compressive Strength (MPa) - Rock	n/a
Calculated Material Strength Number, Ms - Cohesive Soils	n/a
Selection of Material Type	
Is material being evaluated rock/cohesive soil? (enter "yes" or "no")	yes
Is material being evaluated cohesive soil? (enter "yes" or "no")	yes
Is soil overconsolidated, fissured/blocky fat clay (CH)? (enter "yes" or "no")	no
Calculated Material Strength Number, Ms, for Cohesive Soil	**0.333**

Calculate Block/Particle Size Number, Kb

Is material being evaluated rock or jointed cohesive soil? (enter "yes" or "no")	no
If "yes", go to C22	
Is material being evaluated a massive (unjointed) **cohesive** soil (enter "yes" or "no")	yes
If "yes", Kb = 1 (spreadsheet calculates)	
Is material being evaluated a **cohesionless** soil (coarse detritus, gravel, or boulder formation) where D < 0.1 m? (enter "yes" or "no")	no
If "yes", go to C26, Kb = 1; if "no" go to C25	
RQD (enter from drill logs or enter "NA" and enter Jc below to calculate RQD)	NA
Joint Set Number, Jn (table 52-5)	NA
Joint Count Number, Jc, (table 52-6 or enter "NA" and enter D below (C25) to calculate)	NA
Mean Block Diameter, D (in meters)	NA
Mean Particle Size Diameter, D_{50}	0.0175
Dry density (in PCF)	114
Calculated RQD (from input value or calculated from Jc number)	NA
Calculated Jn (from input value or calculated based on material)	NA
Calculated Block/Particle Size Number, Kb	**1.00**

Discontinuity/Interparticle Bond Shear Strength Number, Kd	
Is material being evaluated a soil? (enter "yes" or "no")	yes
If yes, enter "NA" for Jr and Ja parameters	
Joint Roughness Number, Jr (table 52-8)	NA
Joint Alteration Number, Ja (table 52-9)	NA
Select Kd calculation method for soil: NRCS NEH Ch 52 (1997) or Draft Appendix 52D (2011)	NRCS(2011)
Residual friction angle from lab test in degrees (Enter "NA" to calculate based on correlation)	NA
Clay Content (percent)	65.0
Liquid Limit (percent)	58.4
Plasticity Index (percent)	32.8
Residual friction angle in degrees (calculated or from input value)	15.7
Calculated Discontinuity/Interparticle Bond Shear Strength Number, Kd	**1.00**

Calculate Ground Structure Number, Js	
Is material being evaluated a soil? (enter "yes" or "no")	yes
If yes, Js = 1 (spreadsheet calculates)	
Exit Channel Slope (degrees)	1.00
Spillway Flow Direction (azimuth degrees)	0.0
Bedrock Strike (azimuth degrees)	0.0
Bedrock Dip (degrees)	0.0
Bedrock Dip Direction (azimuth degrees)	0.0
Calculated Apparent Dip, a (degrees)	0.0
Calculated Effective Dip, q (degrees)	1.0
Is dip direction **against** or **with** the flow? (Spreadsheet calculates)	WITH
Calculated Ground Structure Number, Js	**1.00**

Summary of Key Properties	
Material Strength Number, Ms	0.33
Block/Particle Size Number, Kb	1.00
Discontinuity/Interparticle Bond Shear Strength Number, Kd	1.00
Relative Ground Structure Number, Js	1.00
Correction factor for overconsolidated, blocky/fissured high-plasticity soils	1.00
Calculated Headcut Erodibility Index, Kh	**0.33**

HEADCUT ERODIBILITY INDEX CALCULATOR

Project Name and Site Number: Plum Creek FRS No. 2
Material Type: 2c -Low Plasticity Residuum (Unfavorable)

Calculate Material Strength Number, Ms	
Cohesionless Soils	
Standard Penetration Test N_{60} (bpf)	24
In-Situ Deformation Modulus, IDM (MPa) - Cohesionless Soils	0.027
Calculated Material Strength Number, Ms - Cohesionless Soils	0.085
Cohesive Soils	
Standard Penetration Test N_{60} (bpf)	-
Unconfined Compressive Strength (psf) - Cohesive Soils	-
Unconfined Compressive Strength (kPa) - Cohesive Soils	n/a
Unconfined Compressive Strength (MPa) - Cohesive Soils	n/a
Calculated Material Strength Number, Ms - Cohesive Soils	n/a
Rock	
Standard Penetration Test N_{60} (bpf)	-
Unconfined Compressive Strength (psi) - Rock	-
Unconfined Compressive Strength (MPa) - Rock	n/a
Calculated Material Strength Number, Ms - Cohesive Soils	n/a
Selection of Material Type	
Is material being evaluated rock/cohesive soil? (enter "yes" or "no")	no
Is material being evaluated cohesive soil? (enter "yes" or "no")	no
Is soil overconsolidated, fissured/blocky fat clay (CH)? (enter "yes" or "no")	no
Calculated Material Strength Number, Ms, for Cohesionless Soil	**0.085**

Calculate Block/Particle Size Number, Kb	
Is material being evaluated rock or jointed cohesive soil? (enter "yes" or "no")	no
If "yes", go to C22	
Is material being evaluated a massive (unjointed) **cohesive** soil (enter "yes" or "no")	no
If "yes", Kb = 1 (spreadsheet calculates)	
Is material being evaluated a **cohesionless** soil (coarse detritus, gravel, or boulder formation) where D < 0.1 m? (enter "yes" or "no")	yes
If "yes", go to C26, Kb = 1; if "no" go to C25	
RQD (enter from drill logs or enter "NA" and enter Jc below to calculate RQD)	NA
Joint Set Number, Jn (table 52-5)	NA
Joint Count Number, Jc, (table 52-6 or enter "NA" and enter D below (C25) to calculate)	NA
Mean Block Diameter, D (in meters)	NA
Mean Particle Size Diameter, D_{50}	0.020
Dry density (in PCF)	115
Calculated RQD (from input value or calculated from Jc number)	5
Calculated Jn (from input value or calculated based on material)	5
Calculated Block/Particle Size Number, Kb	**1.00**

Discontinuity/Interparticle Bond Shear Strength Number, Kd	
Is material being evaluated a soil? (enter "yes" or "no")	yes
If yes, enter "NA" for Jr and Ja parameters	
Joint Roughness Number, Jr (table 52-8)	NA
Joint Alteration Number, Ja (table 52-9)	NA
Select Kd calculation method for soil: NRCS NEH Ch 52 (1997) or Draft Appendix 52D (2011)	NRCS(2011)
Residual friction angle from lab test in degrees (Enter "NA" to calculate based on correlation)	NA
Clay Content (percent)	25.0
Liquid Limit (percent)	24.1
Plasticity Index (percent)	11.2
Residual friction angle in degrees (calculated or from input value)	34.4
Calculated Discontinuity/Interparticle Bond Shear Strength Number, Kd	**1.00**

Calculate Ground Structure Number, Js	
Is material being evaluated a soil? (enter "yes" or "no")	yes
If yes, Js = 1 (spreadsheet calculates)	
Exit Channel Slope (degrees)	1.00
Spillway Flow Direction (azimuth degrees)	0.0
Bedrock Strike (azimuth degrees)	0.0
Bedrock Dip (degrees)	0.0
Bedrock Dip Direction (azimuth degrees)	0.0
Calculated Apparent Dip, a (degrees)	0.0
Calculated Effective Dip, q (degrees)	1.0
Is dip direction **against** or **with** the flow? (Spreadsheet calculates)	WITH
Calculated Ground Structure Number, Js	**1.00**

Summary of Key Properties	
Material Strength Number, Ms	0.09
Block/Particle Size Number, Kb	1.00
Discontinuity/Interparticle Bond Shear Strength Number, Kd	1.00
Relative Ground Structure Number, Js	1.00
Correction factor for overconsolidated, blocky/fissured high-plasticity soils	1.00
Calculated Headcut Erodibility Index, Kh	**0.09**

HEADCUT ERODIBILITY INDEX CALCULATOR

Project Name and Site Number: Plum Creek FRS No. 2
Material Type: 2d - Low Plasticity Residuum (Favorable)

Calculate Material Strength Number, Ms	
Cohesionless Soils	
Standard Penetration Test N_{60} (bpf)	-
In-Situ Deformation Modulus, IDM (MPa) - Cohesionless Soils	n/a
Calculated Material Strength Number, Ms - Cohesionless Soils	n/a
Cohesive Soils	
Standard Penetration Test N_{60} (bpf)	40
Unconfined Compressive Strength (psf) - Cohesive Soils	6422
Unconfined Compressive Strength (kPa) - Cohesive Soils	307.49
Unconfined Compressive Strength (MPa) - Cohesive Soils	0.31
Calculated Material Strength Number, Ms - Cohesive Soils	0.22
Rock	
Standard Penetration Test N_{60} (bpf)	-
Unconfined Compressive Strength (psi) - Rock	-
Unconfined Compressive Strength (MPa) - Rock	n/a
Calculated Material Strength Number, Ms - Cohesive Soils	n/a
Selection of Material Type	
Is material being evaluated rock/cohesive soil? (enter "yes" or "no")	yes
Is material being evaluated cohesive soil? (enter "yes" or "no")	yes
Is soil overconsolidated, fissured/blocky fat clay (CH)? (enter "yes" or "no")	no
Calculated Material Strength Number, Ms, for Cohesive Soil	**0.216**

Calculate Block/Particle Size Number, Kb	
Is material being evaluated rock or jointed cohesive soil? (enter "yes" or "no")	no
If "yes", go to C22	
Is material being evaluated a massive (unjointed) **cohesive** soil (enter "yes" or "no")	yes
If "yes", Kb = 1 (spreadsheet calculates)	
Is material being evaluated a **cohesionless** soil (coarse detritus, gravel, or boulder formation) where D < 0.1 m? (enter "yes" or "no")	no
If "yes", go to C26, Kb = 1; if "no" go to C25	
RQD (enter from drill logs or enter "NA" and enter Jc below to calculate RQD)	NA
Joint Set Number, Jn (table 52-5)	NA
Joint Count Number, Jc, (table 52-6 or enter "NA" and enter D below (C25) to calculate)	NA
Mean Block Diameter, D (in meters)	NA
Mean Particle Size Diameter, D_{50}	0.20
Dry density (in PCF)	125
Calculated RQD (from input value or calculated from Jc number)	NA
Calculated Jn (from input value or calculated based on material)	NA
Calculated Block/Particle Size Number, Kb	**1.00**

Discontinuity/Interparticle Bond Shear Strength Number, Kd	
Is material being evaluated a soil? (enter "yes" or "no")	yes
If yes, enter "NA" for Jr and Ja parameters	
Joint Roughness Number, Jr (table 52-8)	NA
Joint Alteration Number, Ja (table 52-9)	NA
Select Kd calculation method for soil: NRCS NEH Ch 52 (1997) or Draft Appendix 52D (2011)	NRCS(2011)
Residual friction angle from lab test in degrees (Enter "NA" to calculate based on correlation)	NA
Clay Content (percent)	40.0
Liquid Limit (percent)	44.5
Plasticity Index (percent)	22.0
Residual friction angle in degrees (calculated or from input value)	22.3
Calculated Discontinuity/Interparticle Bond Shear Strength Number, Kd	**1.00**

Calculate Ground Structure Number, Js	
Is material being evaluated a soil? (enter "yes" or "no")	yes
If yes, Js = 1 (spreadsheet calculates)	
Exit Channel Slope (degrees)	1.00
Spillway Flow Direction (azimuth degrees)	0.0
Bedrock Strike (azimuth degrees)	0.0
Bedrock Dip (degrees)	0.0
Bedrock Dip Direction (azimuth degrees)	0.0
Calculated Apparent Dip, a (degrees)	0.0
Calculated Effective Dip, q (degrees)	1.0
Is dip direction **against** or **with** the flow? (Spreadsheet calculates)	WITH
Calculated Ground Structure Number, Js	**1.00**

Summary of Key Properties	
Material Strength Number, Ms	0.22
Block/Particle Size Number, Kb	1.00
Discontinuity/Interparticle Bond Shear Strength Number, Kd	1.00
Relative Ground Structure Number, Js	1.00
Correction factor for overconsolidated, blocky/fissured high-plasticity soils	1.00
Calculated Headcut Erodibility Index, Kh	**0.22**