



CITY OF PETALUMA

POST OFFICE BOX 61
PETALUMA, CA 94953-0061

ADDENDUM NO. 3

Airport Monument Sign City Project No. C61501907

July 23, 2020

This Addendum No. 3 modifies the Bidding Documents for the Airport Monument Sign project, City Project No. C61501907, and shall become part of the Contract Documents for this Project.

QUESTION AND ANSWER

Q: Are there any available site plans, surveys, soils reports, and/or any documentation indicating hazardous materials?

A: Unfortunately, the City does not have any available site data/documentation specific to the project site. However, please see the attached geotechnical report for a nearby project site just north of the Petaluma Airport. The City does not have any documentation indicating the presence of hazardous materials at the site. Please note that all excavated material can be stored at the Petaluma Airport, and thus will not require off-hauling.

Q: Is it the City's preference that the project work is to remove the existing wooden (Petaluma Airport) sign and to erect the new Airport Monument Sign at the exact same location?

A: Per the bid documents, the existing airport sign shall be removed; however, it is not likely that the new sign will be located in the exact same location as the previous sign. Per the project's technical specifications section 120 "Airport Monument Sign", the new Airport Monument Sign location shall be "coordinated with and approved by both the City of Petaluma project engineer and the Petaluma Airport and Marina Manager (Dan Cohen). This location will be selected in such an area where no line of site issues for the airport exit will be created". The contractor shall also provide braced story poles, that represent the signs outer edges, to aid in the selection of the final sign location.

Q: Have soil tests (potholes) been conducted at or adjacent to the existing sign location?

A: No. As discussed above, the nearest available geotechnical data we have is attached to this addendum.

Q: Is the area around the existing sign and extending toward Sky Ranch Road to the east, available for staging and capable of bearing the weight of a crane truck and other heavy equipment for demolition, excavation, concrete pouring, and erection of the sign?

A: The area around the existing sign is available for staging; however, it is unknown the support capability of this area. There is an area just east of Sky Ranch Road that is available for staging and capable of supporting the weight of a crane truck and other heavy equipment. The contractor must coordinate with the City as well as the Petaluma Airport Manager prior to staging any equipment in the staging area east of Sky Ranch Drive.

Teresa Barrett
Mayor

D'Lynda Fischer
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Public Works & Utilities

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All other items of the documents shall remain unchanged. **A signed copy of this Addendum and the attached acknowledgement form shall be attached to the bid proposal. Failure to do so may cause rejection of your bid as being non-responsive.**



Jonathan Sanglerat
Assistant Engineer II
Public Works & Utilities Department

ADDENDUM NO. 3

**Airport Monument Sign
City Project No. C61501907**

July 23, 2020

ACKNOWLEDGEMENT

Receipt of Addendum No. 3 is hereby acknowledged by _____
(Contractor's Name)

on the _____ day of _____, 2020.

By: _____

Signature

Title

Company



October 25, 2017
File: 1477.072altr.doc

GSM Landscape Architects Inc.
1700 Soscol Ave., Suite 23
Napa, California 94559
Attn: Mr. Bart Ito

Re: Geotechnical Design Recommendations
East Washington Park – Phase 2
Petaluma, California

Introduction & Project Description

We are pleased to present our geotechnical recommendations for the planned synthetic turf play field as part of the East Washington Park – Phase 2 project located in Petaluma, California. The project location is shown on Site Map, Figure 1. We understand the improvements include constructing a new synthetic turf baseball field on currently undeveloped land adjacent to a recently completed synthetic turf soccer field. Additionally, the project includes constructing a new restroom/concession structure, paved pedestrian paths, asphalt parking areas, landscaped areas, and site utilities.

Our work was performed in accordance with our Agreement dated July 1, 2016. We previously performed a Geotechnical Investigation for the entirety of the park project dated September 30, 2008. The scope and purpose of our services includes updating our recommendations in this letter report to aid in the design and construction of the project.

Existing Conditions

The proposed project site is undeveloped and covered in low grasses. As shown on Figure 2, the completed Phase 1 portion of the project, consisting of three synthetic turf soccer fields, is located to the immediate east. Additional undeveloped land to the west will be developed in the future as part of Phase 3 of the East Washington Park project.

Field Exploration and Laboratory Testing

As previously discussed, we provided a Geotechnical Investigation Report, dated September 30, 2008, that included a subsurface exploration in the general vicinity of the proposed improvements. Our previous exploration included 11-borings drilled with track mounted equipment to depths between 4.5 to 15.0-feet on July 30, 2008. The boring locations are shown on Figure 2. The soils encountered in our borings were logged and samples were obtained for laboratory testing. The subsurface exploration program is discussed in more detail in Appendix A along with a Soil Classification Chart on Figure A-1. The boring logs are presented on Figures A-2 through A-12 of Appendix A.

Laboratory testing of samples from the exploratory borings included moisture content, dry density, unconfined compression, and plasticity index testing. The results of the moisture content, dry density, and unconfined compression tests are presented on the boring logs and

the plasticity index test results are presented on Figure A-13. The laboratory testing program also is discussed in more detail in Appendix A.

Subsurface Conditions

The soils within the project site generally consist of high plasticity, silty clay (Adobe Clay) to depths of 3.0- to 9.0-feet below the ground surface, underlain by stiff, low to medium plasticity silty and sandy clay. Lenses of silty and clayey sand were encountered in Boring 3. Our past experience, as well as current site observation and laboratory testing, indicate that the Adobe clay is moderately to highly expansive (will undergo large volume changes with seasonal changes in moisture content).

Groundwater was not observed in any of the borings we excavated. However, our borings were not left open for an extended period of time to allow groundwater levels to equalize. Therefore, the groundwater elevations observed may not reflect actual levels. Typically, groundwater levels fluctuate seasonally with higher levels anticipated during the winter/rainy season.

Discussion and Recommendations

Based on our experience with similar projects, it is our opinion that construction of a new synthetic turf playfield is feasible from a geotechnical engineering standpoint. The primary geotechnical issues at the project site are site grading, expansive soils, providing a firm and uniform subgrade for the proposed field, and design of an adequate drainage system under the field.

Site Grading

We anticipate moderate site grading will be required for the proposed improvements. Site preparation and grading should conform to the following recommendations and criteria:

1. Surface Preparation – Clear all vegetation and over-sized debris from areas that will be within the new project work area. Excavate loose soil to expose firm natural soils. Any landscaping vegetation within the field areas should be scraped from the surface, stockpiled for reuse in landscaping, or removed from the site. Any construction debris or abandoned utilities encountered during site grading should be removed from the site. Utilities could also be abandoned in place, in many cases, provided cement grout completely fills any void in the utility. Rocks or concrete pieces larger than 6 inches encountered during subgrade preparation or site grading should be removed from the site.
2. Materials – In structural areas (i.e., pavement areas, structures, etc.) the underlying expansive soils and rock mixtures generated from on-site excavations are not suitable for use as fill, unless lime treated. If imported fill is required, the material shall consist of soil and rock mixtures that: (1) are free of organic material, (2) have a Liquid Limit less than 40 and a Plasticity Index of less than 20, and (3) have a maximum particle size of 4 inches. Any imported fill material shall be tested to determine its suitability for use as fill material.
3. Compacted Fill –Subgrade surface should be scarified to a depth of 8 inches, moisture conditioned to near optimum moisture content and compacted to a minimum of 90% relative compaction. In landscape areas, the relative compaction may be reduced to 85%. The maximum

laboratory dry density and optimum moisture content of fill materials should be determined in accordance with ASTM Test Method D-1557, "Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using a 10-lb. Rammer and 18-in. Drop."

New fill or backfill should be conditioned to a moisture content within 3% of the optimum moisture content. Properly moisture conditioned and cured on-site materials should be placed in loose horizontal lifts of 8 inches thick or less, and uniformly compacted to at least 90% relative compaction. In areas of new asphalt pavement, the upper 8-inches should be further compacted to 95% relative compaction to provide a firm and unyielding surface under heavy construction equipment.

4. Soil Treatment – As previously discussed, the site is blanketed with high plasticity, highly expansive, clayey soils. These soils will change in volume with fluctuations in moisture content; expanding/swelling when wet and shrinking when dry. Expansive soils are capable of exerting significant expansion pressures on building foundations, interior floor slabs and exterior flatwork. Distress from expansive soil movement can include cracking of brittle wall coverings (stucco, plaster, drywall, etc.), racked door and/or window frames, and uneven floors and cracked slabs. Flatwork, pavements, and concrete slabs-on-grade are particularly vulnerable to distress due to their low bearing pressures. Additionally, expansive soils will result in an uneven playing surface on the synthetic turf fields.

Based on our experience with similar projects, to mitigate the expansive potential of the surficial highly expansive clay these soils should be treated with high calcium lime. The high calcium lime chemically reacts with the highly expansive clay effectively removing its expansive potential and significantly lowering its plasticity. Based on the plasticity index of the surficial clay we recommend introducing at least 6% high calcium lime by soil weight (110 pcf) in the upper 18-inches of soil underlying, and 5-feet beyond, the synthetic turf and flatwork. The treatment depth should be increased to 36-inches in areas where structures will be placed (i.e. restroom/concession building). The lime treatment shall be placed in a manner conforming to the most recent Caltrans Standard Specification.

Synthetic Turf G-Max

The hardness of a field is measured by its G-Max value. This value is a measure of the g-forces (g) absorbed in a 20-pound object falling 24-inches onto a playing surface. A G-Max value of 200 g is considered the maximum safety threshold for a playing surface. An industry standard G-Max range for a safe playing surface is between 120 to 180 g. The g-max value is influenced by the infill type and the drainage layer.

Synthetic Turf Infill

Synthetic turf has been historically been infilled with crumb rubber or a combination of sand and crumb rubber. Recently, the infill trend is shifting from crumb rubber and moving to cork and/or coconut fiber. Crumb rubber infill tends to produce fields that have G-Max values within the safety guidelines, between 120 and 180. However, cork and/or coconut fiber infilled fields tend to produce higher G-Max values and usually require a shock pad underlying the turf to produce acceptable G-Max values. As with all synthetic turf playing surfaces, G-Max values tend to increase with age and routine maintenance and testing is recommended to prolong the design

life within the safety standards.

Synthetic Turf Drainage

For preliminary design, we recommend that the surface of the field be designed with a 0.5% to 1.0% slope. A permeable layer (drainrock, drainage panels, etc.) underlie the synthetic turf to carry water laterally to collector drains, typically located at the field perimeters. If a permeable stone system, as described below, is utilized the subgrade should be graded to a minimum slope of 1.0%.

Permeable Base Options – There are three drainage options for the synthetic turf permeable base. The first option is a single stone permeable system with drainage panels, the second is a two stone (bottom and top rock) permeable system, and the third is a Brock (or similar) continuous panel drain system. Each option is discussed in more detail below:

Single Stone Permeable Base – The single stone permeable section consists of placing a layer of permeable well graded rock on the subgrade over flat drainage panels configured in a “herringbone” pattern. A stabilization fabric (such as Mirafi FW500) should be placed over the subgrade prior to the placement of the rock. The permeable rock will transmit collected rain water to the flat panel drains. The flat panel drains will then transmit the water to a perimeter collector drain that connects to the City Storm Water system. The advantage of this system is fewer materials are used in the permeable base requiring less grading time. However, the single stone permeable system has less water storage capacity and slower drainage than the two-stone system. Depending on the finished grades, excavation may be required to achieve the planned subgrade.

Two-Stone Permeable Base – The two-stone permeable rock system is constructed similar to the one-rock system. The difference is the section consists of a layer of larger, highly permeable “Bottom Rock” and a thin finer graded “Top Rock” to facilitate a smooth finished surface for the placement of the synthetic turf. The bottom rock provides more pore space for water to quickly transfer water to the storm drain collection system. “Top Rock”, is placed on the bottom rock to act as a leveling coarse and reduces the potential of larger gravels “poking” into the synthetic turf causing bumps in the surface. The two-stone system can be designed using either flat panel drains or conventional trench type drains. The advantage of the two-rock system is that the rock section has a higher storage and flow rate capacity compared to the other options. However, the two rock system may cost more in time (grading two layers) and materials than the one rock system. Depending on the finished grades, excavation may be required to achieve the planned subgrade.

Drainage Panels – Drainage panels such as Brock™ may be utilized in lieu of a permeable rock system. Brock panels are inter-locking Styrofoam panels that are perforated to allow vertical drainage. The bottom of a Brock Panel contains grooves that allow water to be transmitted to the storm drain system. Due to the inherent high permeability of the drainage panels, the subgrade slope may be reduced to 0.5%. To reduce erosion of the subgrade, a layer of Caltrans Class 2 Aggregate Baserock and stabilization fabric should be placed on the subgrade prior to placing the Brock panels. The advantage of the Brock panels is a reduced section thickness (i.e. less excavation) and a softer field with a lower G-Max value. However, the Brock system is usually more costly and is expected to have a shorter design life (20-years).

Seismic Design

Mitigation of ground shaking includes seismic design of the structure in conformance with the provisions of the most recent version (2016) of the California Building Code (CBC). Based on the interpreted subsurface conditions and closest fault type and distance, we recommend the seismic coefficients and site values shown in Table A below for use to calculate the design base shear of the new construction.

TABLE A
2016 CBC FACTORS
East Washington Park – Phase 2
Petaluma, California

<u>Factor Name</u>	<u>Coefficient</u>	<u>Site Specific Value</u>
Site Class	$S_{A,B,C,D,E, \text{ or } F}$	S_D^1
Spectral Acc. (short)	S_s	2.03 g
Spectral Acc. (1-sec)	S_1	0.83 g
Site Coefficient	F_a	1.00
Site Coefficient	F_v	1.50

- 1) Soil Profile Type S_D Description: Stiff Soil Profile, Shear Wave Velocity values between 600 and 1,200 feet per second, blow counts between 15 and 50, and undrained shear strength between 1,000 and 2,000 psf.

Foundation Design

We understand the proposed restroom/concession structure will consist of relatively heavy concrete masonry unit (CMU) construction with concrete slab on grade floors. Provided the soils are lime treated, the restroom/concession structure may be supported on a shallow foundation system. Localized deepening of foundation excavations or over-excavation and re-compaction may be required if looser materials are encountered in the foundation excavations. Shallow foundation design criteria are presented in Table B below.

TABLE B
FOUNDATION DESIGN CRITERIA
East Washington Park – Phase 2
Petaluma, California

Minimum footing width ¹ :	12 inches
Minimum footing embedment depth (below lowest adjacent grade):	18 inches
Allowable soil bearing pressure (lime treated):	
Dead plus live loads:	2,500 psf
Total design loads (includes wind or seismic):	3,300 psf
Base friction coefficient:	0.30
Lateral passive resistance ^{2, 3, 4} :	300 pcf

Notes:

- 1.) Size footing widths to avoid significantly different foundation pressures.
- 2.) Equivalent Fluid Pressure, not to exceed 3,000 psf.
- 3.) Ignore uppermost 6-inches unless concrete or asphalt surfacing exists adjacent to foundation.

Concrete Slab-on-Grade

If interior concrete slabs are planned, we recommend they be at least 5-inches thick and reinforced with steel bars (not wire mesh). Contraction joints should be incorporated in the concrete slab in both directions, no greater than 10-feet on center. Additionally, the reinforcing bars shall extend through the control joints. For improved performance, concrete slabs-on-grade may be increased to 6-inches thick. The project Structural Engineer should design the concrete slab floors.

To improve interior moisture conditions, a minimum 5-inch layer of clean, free draining, 3/4-inch angular gravel or crushed base rock should be placed beneath the interior concrete slabs to form a capillary moisture break. The base rock must be placed on a properly moisture conditioned and compacted subgrade that has been approved by the Geotechnical Engineer. A plastic membrane vapor barrier, 15-mils or thicker, should be placed over the drain rock. The vapor barrier shall meet the Class A requirements outlined in ASTM E 1745 and be installed per ASTM 1643. Eliminating the capillary moisture break and/or plastic vapor barrier may result in excess moisture intrusion through the floor slabs resulting in poor performance of floor coverings, mold growth or other adverse conditions.

Exterior concrete slabs should be at least 4-inches thick and reinforced as described above for interior slabs. For improved performance, exterior concrete slabs shall be underlain with at least 4-inches or more of Caltrans Class 2 Aggregate Base compacted to at least 92 percent relative compaction. Some movement should be expected for exterior concrete slabs as the underlying soils react to seasonal moisture changes and downslope soil creep.

Site Utilities

Excavations for utilities will encounter hard packed lime treated soil and stiff clayey soil. Trench excavations having a depth of five feet or more and will be entered by workers must be sloped, braced, or shored in accordance with current Cal/OSHA regulations. On-site soils appear to be Type B. All excavations where collapse of excavation sidewall, slope or bottom could result in injury or death of workers should be evaluated by the contractor's safety officer and designated competent person prior to entering in accordance with current Cal/OSHA regulations.

Bedding materials for utility pipes should be well graded sand with 90 to 100 percent of particles passing the No. 4 sieve and no more than 5 percent finer than the No. 200 sieve. Provide the minimum bedding beneath the pipe in accordance with the manufacturer's recommendation, typically 3 to 6 inches. Trench backfill may consist of on-site soils moisture conditioned to at least 2 percent over the optimum moisture content, placed in thin lifts and compacted to at least 90 percent R.C. Backfill for trenches within pavement areas should consist of non-expansive granular fill. Use equipment and methods that are suitable for work in confined areas without damaging utility conduits. Where utility lines cross under or through perimeter footings, they should be sealed to reduce moisture intrusion into the areas under the slabs and/or footings.

Pavement Structural Sections

Typically, asphalt pavement sections are designed utilizing two variables, the R-Value (a measure of the subgrade resistance) and the Traffic Index (TI – a measure of the amount of daily traffic). Based on our experience with similar projects, lime treatment will significantly increase the R-Value of a soil. Therefore, for design purposes we utilized an R-Value of 40, for lime treated subgrade, to calculate asphalt pavement sections. We have calculated various pavement sections for the project site and anticipated soil conditions in accordance with Caltrans procedures for flexible pavement design utilizing multiple TI values as shown in Table C.

TABLE C
ASPHALT PAVEMENT SECTIONS
East Washington Park
Petaluma, California

<u>T.I.</u>	<u>Asphalt Concrete</u>	<u>Aggregate Baserock</u>
4.0	2.5-inches	6.0-inches
5.0	3.0-inches	6.0-inches
6.0	3.5-inches	6.0-inches

Note:

- 1.) Assumes subgrade has been lime treated.
- 2.) To reduce the overall section thickness the “2 to 1” rule of thumb may be applied, where 2-inches of AB is equivalent to 1-inch of AC. For example a section consisting of 4.0-inches of AC overlying 15.5-inches of AB (19.5-inches total) may be reduced to 6.0-inches of AC overlying 11.5-inches of AB (17.5-inches total).

Prior to construction of the new pavement section, the existing subgrade should be scarified to a minimum depth of 8-inches, moisture-conditioned to near-optimum moisture content. The subgrade should then be compacted to a minimum of 95 percent relative compaction per ASTM D-1557 and to produce a firm and unyielding surface when proof rolled with heavy construction equipment.

The aggregate baserock should conform to requirements for Caltrans Class 2 Aggregate Base as presented in Section 26 of the latest edition of the Caltrans Standard Specifications (2015). The baserock should be placed in 6-inch maximum lifts on a properly prepared, firm and unyielding subgrade and compacted to at least 95 percent relative compaction. Additionally, the compacted aggregate baserock section should be firm and unyielding under heavy construction equipment.

Asphalt concrete should conform to Caltrans ¾-inch maximum, medium Type A specifications, should contain no less than 4.5 percent asphalt, and should be placed in accordance with the procedures outlines in Section 39 of the latest edition (2015) of the Caltrans Standard Specifications. Additionally, the top lift of asphalt should consist of ½-inch maximum aggregate. Asphalt concrete should be compacted in lifts not exceeding 2-inches in thickness to a minimum of 92 percent of the theoretical maximum density.

Additional Services

We are prepared to begin design of the synthetic turf field once the field drainage system and the existing or proposed storm drainage system are known. During construction, we should be present to observe foundation excavations and confirm that the subsurface conditions, materials, and work are as expected and are consistent with our recommendations.

We hope this provides you with the information you require at this time. Please do not hesitate to call with any questions or if we can be of further assistance.

Sincerely,
MILLER PACIFIC ENGINEERING GROUP



Benjamin S. Pappas
Geotechnical Engineer No. 2786
(Expires 9/30/18)

Attachments: Figures 1 and 2
Appendix A



Latitude: 38.2642
 Longitude: -122.6079

SITE LOCATION MAP

(Not to Scale)



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 FILE: 1477.072 Figs.dwg

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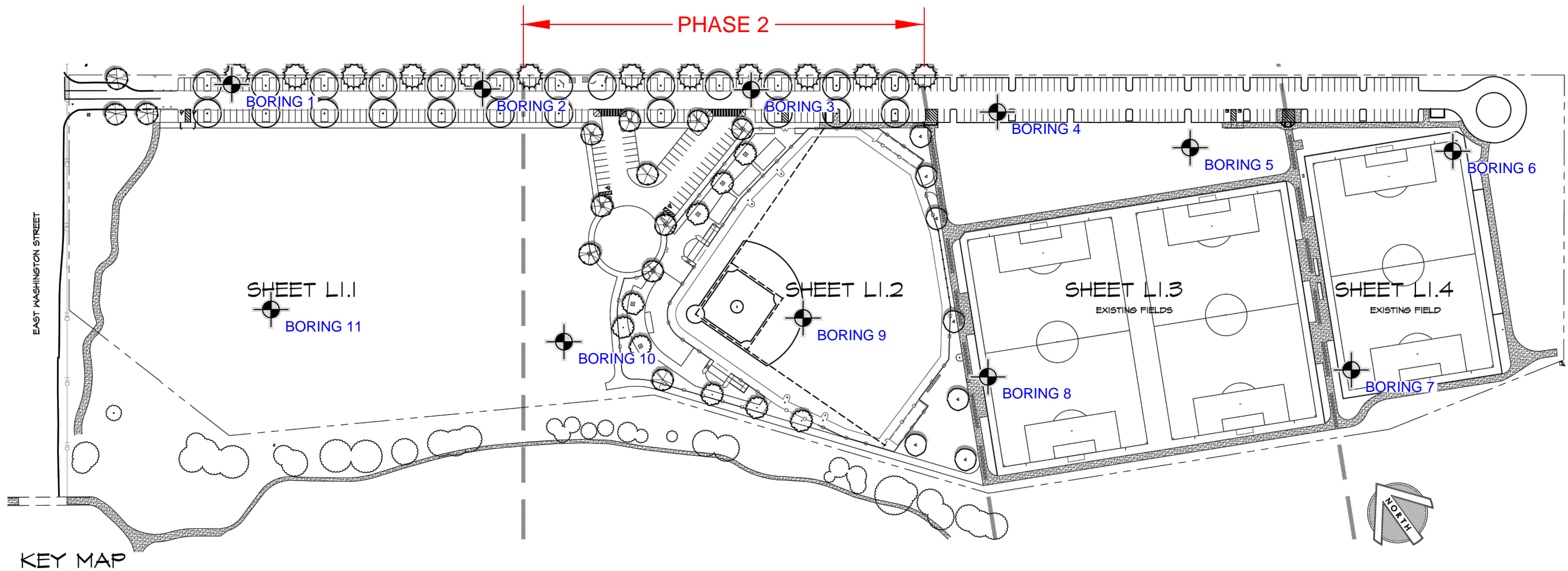
SITE LOCATION MAP


GSM - East Washington Park
 Phase 2 Improvements
 Petaluma, California

Project No. 1477.072 Date: 10/26/17

Drawn BSP
 Checked

1
 FIGURE



 - Boring performed by MPEG 2008

SCALE
0 25 150 300 feet

MPEG

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ENGINEERING GROUP
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SITE PLAN		2 FIGURE
GSM - East Washington Park Phase 2 Improvements Petaluma, California Project No. 1477.072 Date: 10/26/17		
Drawn	BSP	
Checked		

APPENDIX A

SUBSURFACE EXPLORATION AND LABORATORY TESTING

1.0 Subsurface Exploration

We explored subsurface conditions at the site by drilling eleven test borings on July 30, 2008 at the locations shown on Figure 2. Test borings were drilled to maximum depths of 4.5 to 15 feet using 6-inch diameter continuous flight solid augers mounted on an all-terrain drill rig.

The soils encountered were logged and identified by our field geologist in general accordance with ASTM Standard D 2487, "Field Identification and Description of Soils (Visual-Manual Procedure)." This standard is briefly explained on Figure A-1, Soil Classification Chart and Key to Log Symbols. The boring logs are presented on Figures A-2 through A-12.

We obtained "undisturbed" samples from our borings using a 3-inch diameter, split-barrel modified California sampler with 2.5 by 6-inch brass tube liners, and disturbed samples using a 2-inch diameter Standard Penetration Test sampler and no liners. The sampler was driven with a 140-pound hammer falling 30 inches. The number of blows required to drive the samplers 18 inches was recorded and is reported on the boring logs as blows per foot for the last 12 inches of driving. The samples obtained were examined in the field, sealed to prevent moisture loss, and transported to our laboratory.

2.0 Laboratory Testing

We conducted laboratory tests on selected intact samples to verify field identifications and to evaluate engineering properties. The following laboratory tests were conducted in accordance with the ASTM standard test method cited:

- Laboratory Determination of Water (Moisture Content) of Soil, Rock, and Soil-Aggregate Mixtures, ASTM D 2216;
- Density of Soil in Place by the Drive-Cylinder Method, ASTM D 2937;
- Atterberg Limits (Plasticity), ASTM D 4318; and,
- Unconfined Compressive Strength of Cohesive Soil, ASTM D 2166.

The moisture content, dry density, unconfined compression, and Atterberg Limits test results are shown on the exploratory Boring Logs. The Atterberg Limits tests are summarized on Figure A-13.

The exploratory boring logs, description of soils encountered and the laboratory test data reflect conditions only at the location of the boring at the time they were excavated or retrieved. Conditions may differ at other locations and may change with the passage of time due to a variety of causes including natural weathering, climate and changes in surface and subsurface drainage.

MAJOR DIVISIONS		SYMBOL	DESCRIPTION
COARSE GRAINED SOILS over 50% sand and gravel	CLEAN GRAVEL	GW	Well-graded gravels or gravel-sand mixtures, little or no fines
		GP	Poorly-graded gravels or gravel-sand mixtures, little or no fines
	GRAVEL with fines	GM	Silty gravels, gravel-sand-silt mixtures
		GC	Clayey gravels, gravel-sand-clay mixtures
	CLEAN SAND	SW	Well-graded sands or gravelly sands, little or no fines
		SP	Poorly-graded sands or gravelly sands, little or no fines
	SAND with fines	SM	Silty sands, sand-silt mixtures
		SC	Clayey sands, sand-clay mixtures
FINE GRAINED SOILS over 50% silt and clay	SILT AND CLAY liquid limit <50%	ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity
		CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
		OL	Organic silts and organic silt-clays of low plasticity
	SILT AND CLAY liquid limit >50%	MH	Inorganic silts, micaceous or diatomaceous fine sands or silts, elastic silts
		CH	Inorganic clays of high plasticity, fat clays
		OH	Organic clays of medium to high plasticity
HIGHLY ORGANIC SOILS	PT	Peat, muck, and other highly organic soils	
ROCK		Undifferentiated as to type or composition	

KEY TO BORING AND TEST PIT SYMBOLS

CLASSIFICATION TESTS

AL	ATTERBERG LIMITS TEST
SA	SIEVE ANALYSIS
HYD	HYDROMETER ANALYSIS
P200	PERCENT PASSING NO. 200 SIEVE
P4	PERCENT PASSING NO. 4 SIEVE

STRENGTH TESTS

TV	FIELD TORVANE (UNDRAINED SHEAR)
UC	LABORATORY UNCONFINED COMPRESSION
TXCU	CONSOLIDATED UNDRAINED TRIAXIAL
TXUU	UNCONSOLIDATED UNDRAINED TRIAXIAL
	UC, CU, UU = 1/2 Deviator Stress

SAMPLER TYPE

	MODIFIED CALIFORNIA		HAND SAMPLER
	STANDARD PENETRATION TEST		ROCK CORE
	THIN-WALLED / FIXED PISTON		DISTURBED OR BULK SAMPLE

SAMPLER DRIVING RESISTANCE

Modified California and Standard Penetration Test samplers are driven 18 inches with a 140-pound hammer falling 30 inches per blow. Blows for the initial 6-inch drive seat the sampler. Blows for the final 12-inch drive are recorded onto the logs. Sampler refusal is defined as 50 blows during a 6-inch drive. Examples of blow records are as follows:

- 25 sampler driven 12 inches with 25 blows after initial 6-inch drive
- 85/7" sampler driven 7 inches with 85 blows after initial 6-inch drive
- 50/3" sampler driven 3 inches with 50 blows during initial 6-inch drive or beginning of final 12-inch drive

NOTE: Test boring and test pit logs are an interpretation of conditions encountered at the excavation location during the time of exploration. Subsurface rock, soil or water conditions may vary in different locations within the project site and with the passage of time. Boundaries between differing soil or rock descriptions are approximate and may indicate a gradual transition.

	1333 N. McDowell Blvd. Suite C Petaluma, CA 94947 T 707 / 765-6140 F 707 / 765-6222 www.millerpac.com	SOIL CLASSIFICATION CHART	
	East Washington Park Petaluma, California	Designed _____ Drawn <u>NRS</u> Checked _____	A-1 FIGURE
A CALIFORNIA CORPORATION, © 2008, ALL RIGHTS RESERVED FILE: 1206.04BL.dwg		Project No. 1206.04	Date: 9/22/08

OTHER TEST DATA	OTHER TEST DATA	UNDRAINED SHEAR STRENGTH psf (1)	BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT pcf (2)	DEPTH meters feet	SAMPLE	SYMBOL (3)	BORING 1 EQUIPMENT: Track-mounted AT-300 6" solid flight augers DATE: 7/30/08 ELEVATION: 108-Feet* *REFERENCE: Site Plan, Winzler & Kelly, 2008	
		6300 UC	50	14.0		0 - 0			SILTY CLAY (CH) dark brown, dry to slightly moist, very stiff, high plasticity, rootlets present in upper 6 inches	
			62	23.6	100	- 1				
			67/9"	24.1	100	5			SILTY CLAY (CL) medium brown, moist, very stiff, medium to high plasticity	
			58/7"	17.5	110	10			SANDY CLAY (CL) tan-brown, slightly moist, very stiff, low to medium plasticity, trace fine grained gravel	
			64	27.8	93	15			Bottom of boring at 14.5 feet No groundwater encountered	
						- 5				
						- 6				
						20				

NOTES: (1) METRIC EQUIVALENT STRENGTH (kPa) = 0.0479 x STRENGTH (psf)
(2) METRIC EQUIVALENT DRY UNIT WEIGHT kN/m³ = 0.1571 x DRY UNIT WEIGHT (pcf)
(3) GRAPHIC SYMBOLS ARE ILLUSTRATIVE ONLY

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	Project No. 1206.04 Date: 9/22/08				

OTHER TEST DATA	OTHER TEST DATA	UNDRAINED SHEAR STRENGTH psf (1)	BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT pcf (2)	DEPTH meters feet	SAMPLE	SYMBOL (3)	<p align="center">BORING 2</p> <p>EQUIPMENT: Track-mounted AT-300 6" solid flight augers</p> <p>DATE: 7/30/08</p> <p>ELEVATION: 105-Feet*</p> <p>*REFERENCE: Site Plan, Winzler & Kelly, 2008</p>
			30	16.5		0 - 0			<p>SILTY CLAY (CH) dark brown, dry to slightly moist, very stiff, high plasticity, rootlets present in upper 6 inches</p>
			38	21.8		- 1			grades to moist
			36	22.3		5			Bottom of boring at 5.0 feet No groundwater encountered
						- 2			
						- 3 10			
						- 4			
						15			
						- 5			
						- 6 20			

NOTES: (1) METRIC EQUIVALENT STRENGTH (kPa) = 0.0479 x STRENGTH (psf)
(2) METRIC EQUIVALENT DRY UNIT WEIGHT kN/m³ = 0.1571 x DRY UNIT WEIGHT (pcf)
(3) GRAPHIC SYMBOLS ARE ILLUSTRATIVE ONLY

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	Suite C	East Washington Park Petaluma, California	
	Petaluma, CA 94947	Designed _____	<div style="border: 1px solid black; padding: 5px; font-size: 2em; font-weight: bold;">A-3</div> FIGURE
	T 707 / 765-6140	Drawn <u>NRS</u>	
	F 707 / 765-6222	Checked _____	
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OTHER TEST DATA	OTHER TEST DATA	UNDRAINED SHEAR STRENGTH psf (1)	BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT pcf (2)	DEPTH meters feet	SAMPLE	SYMBOL (3)	BORING 3 EQUIPMENT: Track-mounted AT-300 6" solid flight augers DATE: 7/30/08 ELEVATION: 101-Feet* *REFERENCE: Site Plan, Winzler & Kelly, 2008	
			25	12.5		0 - 0			SILTY CLAY (CH) dark brown, dry to slightly moist, very stiff, high plasticity, rootlets present in upper 6 inches	
			56/9"	16.2	107	- 1			CLAYEY SAND (SC) light brown, moist, dense, fine to medium-grained sand	
			62/9"	23.4	95	5			SANDY CLAY (CL) light to medium brown, moist, very stiff, low to medium plasticity	
			37/9"	26.7		- 3 10			SANDY CLAY (CL) light to medium brown, moist, very stiff, low to medium plasticity	
			41	13.1		- 4			SAND w/ GRAVEL (SM) tan, slightly moist, dense, fine to coarse grained	
						15			Bottom of boring at 14.5 feet No groundwater encountered	
						- 5				
						- 6 20				

NOTES: (1) METRIC EQUIVALENT STRENGTH (kPa) = 0.0479 x STRENGTH (psf)
(2) METRIC EQUIVALENT DRY UNIT WEIGHT kN/m³ = 0.1571 x DRY UNIT WEIGHT (pcf)
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Drawn	NRS										
Checked											
East Washington Park Petaluma, California Project No. 1206.04 Date: 9/22/08											

OTHER TEST DATA	OTHER TEST DATA	UNDRAINED SHEAR STRENGTH psf (1)	BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT pcf (2)	DEPTH meters feet	SAMPLE	SYMBOL (3)	<p align="center">BORING 4</p> <p>EQUIPMENT: Track-mounted AT-300 6" solid flight augers</p> <p>DATE: 7/30/08 ELEVATION: 102-Feet*</p> <p>*REFERENCE: Site Plan, Winzler & Kelly, 2008</p>
			40	17.5		0 - 0			<p>SILTY CLAY (CH) dark brown, dry to slightly moist, very stiff, high plasticity, trace sand</p> <p>grades to slightly moist</p>
			65	15.6		- 1			
						5			<p>Bottom of boring at 4.5 feet No groundwater encountered</p>
						- 2			
						- 3			
						10			
						- 4			
						15			
						- 5			
						- 6			
						20			

NOTES: (1) METRIC EQUIVALENT STRENGTH (kPa) = 0.0479 x STRENGTH (psf)
(2) METRIC EQUIVALENT DRY UNIT WEIGHT kN/m³ = 0.1571 x DRY UNIT WEIGHT (pcf)
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<p align="center">Miller Pacific ENGINEERING GROUP</p>	1333 N. McDowell Blvd. Suite C Petaluma, CA 94947 T 707 / 765-6140 F 707 / 765-6222 www.millerpac.com	BORING LOG		<div style="border: 2px solid black; padding: 10px; text-align: center;"> A-5 FIGURE </div>					
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Designed	_____								
Drawn	_____								
Checked	NRS								

OTHER TEST DATA	OTHER TEST DATA	UNDRAINED SHEAR STRENGTH psf (1)	BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT pcf (2)	DEPTH meters feet	SAMPLE	SYMBOL (3)	<p align="center">BORING 5</p> <p>EQUIPMENT: Track-mounted AT-300 6" solid flight augers</p> <p>DATE: 7/30/08 ELEVATION: 100-Feet*</p> <p>*REFERENCE: Site Plan, Winzler & Kelly, 2008</p>
			53	13.7		0 - 0			<p>SILTY CLAY (CH) dark brown, dry to slightly moist, very stiff, high plasticity, rootlets present in upper 6 inches</p>
			53/7"	17.0	93	5			<p>SANDY CLAY (CL) medium brown, slightly moist, very stiff, medium plasticity</p>
			61/9"	20.2	99	10			
			58	21.3	104	15			
						20			<p>Bottom of boring at 14.5 feet No groundwater encountered</p>

NOTES: (1) METRIC EQUIVALENT STRENGTH (kPa) = 0.0479 x STRENGTH (psf)
(2) METRIC EQUIVALENT DRY UNIT WEIGHT kN/m³ = 0.1571 x DRY UNIT WEIGHT (pcf)
(3) GRAPHIC SYMBOLS ARE ILLUSTRATIVE ONLY

<p align="center">Miller Pacific ENGINEERING GROUP</p>	1333 N. McDowell Blvd. Suite C Petaluma, CA 94947 T 707 / 765-6140 F 707 / 765-6222	BORING LOG		<p align="center">A-6 FIGURE</p>					
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Designed	_____								
Drawn	NRS								
Checked	_____								

OTHER TEST DATA	OTHER TEST DATA	UNDRAINED SHEAR STRENGTH psf (1)	BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT pcf (2)	meters feet	DEPTH	SAMPLE	SYMBOL (3)	BORING 6 EQUIPMENT: Track-mounted AT-300 6" solid flight augers DATE: 7/30/08 ELEVATION: 98-Feet* *REFERENCE: Site Plan, Winzler & Kelly, 2008	
		6300 UC	25	12.7		0	0			SILTY CLAY (CH) dark brown, moist, very stiff, high plasticity	
			55/9"	20.2	106	5	5			SANDY CLAY (CL) medium brown, moist, very stiff, medium plasticity	
			63/9"	19.0	108	10	10				
			50/10"	21.8	102	15	15				
						20	20			Bottom of boring at 14.5 feet No groundwater encountered	

NOTES: (1) METRIC EQUIVALENT STRENGTH (kPa) = 0.0479 x STRENGTH (psf)
(2) METRIC EQUIVALENT DRY UNIT WEIGHT kN/m³ = 0.1571 x DRY UNIT WEIGHT (pcf)
(3) GRAPHIC SYMBOLS ARE ILLUSTRATIVE ONLY

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		Project No. 1206.04 Date: 9/22/08			

OTHER TEST DATA	OTHER TEST DATA	UNDRAINED SHEAR STRENGTH psf (1)	BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT pcf (2)	DEPTH meters feet	SAMPLE	SYMBOL (3)	<p align="center">BORING 7</p> <p>EQUIPMENT: Track-mounted AT-300 6" solid flight augers</p> <p>DATE: 7/30/08</p> <p>ELEVATION: 95-Feet*</p> <p>*REFERENCE: Site Plan, Winzler & Kelly, 2008</p>
			18	26.9		0 - 0			<p>SILTY CLAY (CH) dark brown, dry to slightly moist, very stiff, high plasticity</p> <p>grades to moist</p>
			58	25.4		- 1 5			<p>Bottom of boring at 4.5 feet No groundwater encountered</p>

NOTES: (1) METRIC EQUIVALENT STRENGTH (kPa) = 0.0479 x STRENGTH (psf)
(2) METRIC EQUIVALENT DRY UNIT WEIGHT kN/m³ = 0.1571 x DRY UNIT WEIGHT (pcf)
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<p align="center">Miller Pacific ENGINEERING GROUP</p>	1333 N. McDowell Blvd. Suite C Petaluma, CA 94947 T 707 / 765-6140 F 707 / 765-6222	BORING LOG		<div style="border: 1px solid black; padding: 5px; text-align: center;"> A-8 FIGURE </div>
	A CALIFORNIA CORPORATION, © 2008, ALL RIGHTS RESERVED FILE: 1206,04BL.dwg	East Washington Park Petaluma, California Project No. 1206.04 Date: 9/22/08	Designed _____ Drawn <u>NRS</u> Checked _____	

OTHER TEST DATA	OTHER TEST DATA	UNDRAINED SHEAR STRENGTH psf (1)	BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT pcf (2)	DEPTH meters feet	SAMPLE	SYMBOL (3)	BORING 8 EQUIPMENT: Track-mounted AT-300 6" solid flight augers DATE: 7/30/08 ELEVATION: 99.5-Feet* *REFERENCE: Site Plan, Winzler & Kelly, 2008	
			18	18.4		0 - 0			SILTY CLAY (CH) dark brown, dry to slightly moist, very stiff, high plasticity, rootlets present in upper 6 inches	
			36	28.1	90	5			SILTY CLAY (CL) medium brown, moist, very stiff, medium to high plasticity	
			52/6"	15.5	113	10			SANDY CLAY (CL) tan-brown, slightly moist, very stiff, low to medium plasticity, trace fine grained gravel	
			49	21.7		15			Bottom of boring at 14.5 feet No groundwater encountered	
						20				

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	Project No. 1206.04 Date: 9/22/08				

OTHER TEST DATA	OTHER TEST DATA	UNDRAINED SHEAR STRENGTH psf (1)	BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT pcf (2)	meters feet	DEPTH	SAMPLE	SYMBOL (3)	BORING 9 EQUIPMENT: Track-mounted AT-300 6" solid flight augers DATE: 7/30/08 ELEVATION: 100-Feet* *REFERENCE: Site Plan, Winzler & Kelly, 2008	
			30	15.9		0	0			SILTY CLAY (CH) dark brown, dry to slightly moist, very stiff, high plasticity	
			32/9"	19.0		-1				SANDY CLAY (CL) medium brown, slightly moist to moist, very stiff, low to medium plasticity	
						-5				Bottom of boring at 4.5 feet No groundwater encountered	
						-2					
						-3	10				
						-4					
						15					
						-5					
						-6	20				



NOTES: (1) METRIC EQUIVALENT STRENGTH (kPa) = 0.0479 x STRENGTH (psf)
(2) METRIC EQUIVALENT DRY UNIT WEIGHT kN/m³ = 0.1571 x DRY UNIT WEIGHT (pcf)
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	Designed										
Drawn	NRS										
Checked											
East Washington Park Petaluma, California Project No. 1206.04 Date: 9/22/08											

OTHER TEST DATA	OTHER TEST DATA	UNDRAINED SHEAR STRENGTH psf (1)	BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT pcf (2)	DEPTH meters feet	SAMPLE	SYMBOL (3)	BORING 10 EQUIPMENT: Track-mounted AT-300 6" solid flight augers DATE: 7/30/08 ELEVATION: 101-Feet* *REFERENCE: Site Plan, Winzler & Kelly, 2008	
		8500 UC	45	13.3		0 - 0			SILTY CLAY (CH) dark brown, dry to slightly moist, very stiff, high plasticity, rootlets present in upper 6 inches	
			57	19.0	103	- 1			SILTY CLAY (CL) medium brown, moist, very stiff, medium to high plasticity	
			60/9"	16.7	96	- 3	10		SANDY CLAY (CL) tan-brown, slightly moist, very stiff, low to medium plasticity, trace fine grained gravel	
			67	25.4	103	- 4	15		Bottom of boring at 14.5 feet No groundwater encountered	
						- 5				
						- 6	20			

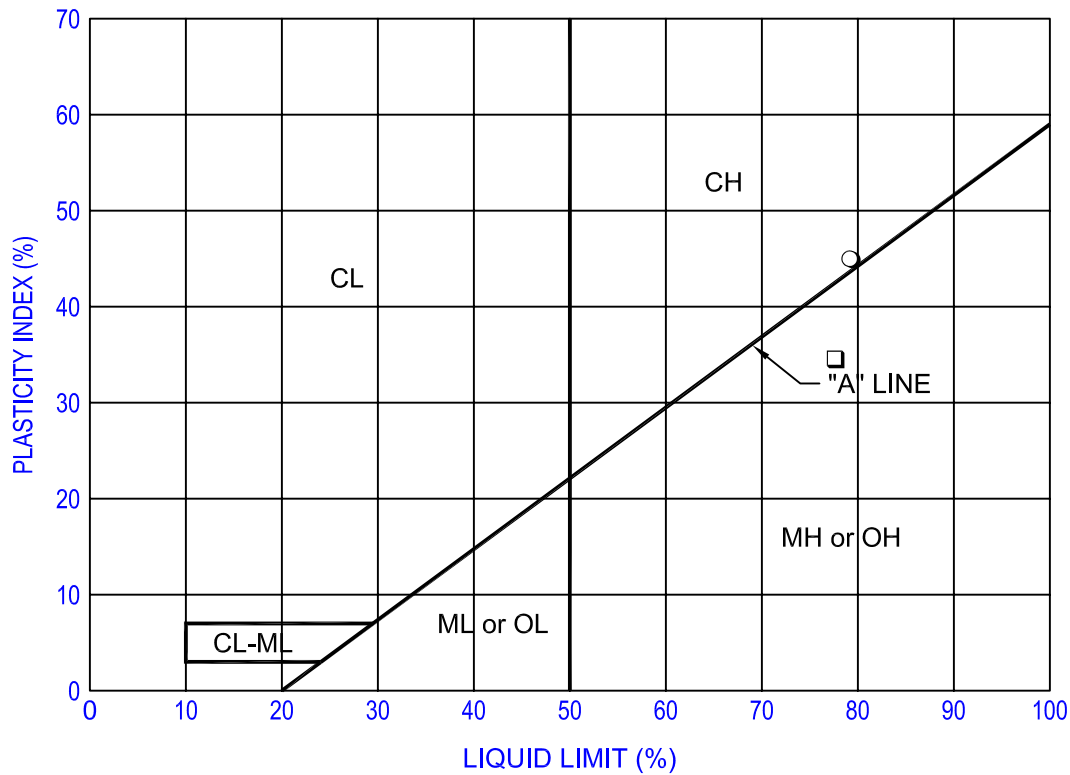
NOTES: (1) METRIC EQUIVALENT STRENGTH (kPa) = 0.0479 x STRENGTH (psf)
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	Project No. 1206.04 Date: 9/22/08				

OTHER TEST DATA	OTHER TEST DATA	UNDRAINED SHEAR STRENGTH psf (1)	BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT pcf (2)	DEPTH meters feet	SAMPLE	SYMBOL (3)	<p align="center">BORING 11</p> <p>EQUIPMENT: Track-mounted AT-300 6" solid flight augers</p> <p>DATE: 7/30/08 ELEVATION: 103.5-Feet*</p> <p>*REFERENCE: Site Plan, Winzler & Kelly, 2008</p>
			30	16.4		0 - 0			<p>SILTY CLAY (CH) dark brown, dry to slightly moist, very stiff, high plasticity</p> <p>grades to moist</p>
			53/9"	19.8		- 1 5			<p>Bottom of boring at 4.8 feet No groundwater encountered</p>
						- 2 - 3 10 - 4 15 - 5 - 6 20			

NOTES: (1) METRIC EQUIVALENT STRENGTH (kPa) = 0.0479 x STRENGTH (psf)
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<p align="center">Miller Pacific ENGINEERING GROUP</p>	1333 N. McDowell Blvd. Suite C Petaluma, CA 94947 T 707 / 765-6140 F 707 / 765-6222 www.millerpac.com	BORING LOG		Designed _____ Drawn <u>NRS</u> Checked _____	<div style="border: 2px solid black; padding: 10px; text-align: center;"> <h1 style="margin: 0;">A-12</h1> <p style="margin: 0;">FIGURE</p> </div>
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SYMBOL	SAMPLE SOURCE	CLASSIFICATION	LIQUID LIMIT (%)	PLASTIC LIMIT (%)	PLASTICITY INDEX (%)
□	BORING 6 1 to 2.5 Feet	CLAYEY SILT (MH) dark brown	77	43	34
○	BORING 11 2 to 2.5 Feet	SILTY CLAY (CH) dark brown	79	34	45

REFERENCE: Liquid Limit, Plastic Limit, and Plasticity Index of Soils, ASTM D 4318

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	Suite C	East Washington Park Petaluma, California	
	Petaluma, CA 94947	Designed _____	<div style="font-size: 2em; font-weight: bold;">A-13</div> FIGURE
	T 707 / 765-6140	Drawn <u>NRS</u>	
	F 707 / 765-6222	Checked _____	
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