Brunsing Associates, Inc.

July 19, 2013 12155.04

Mr. Brian Paulson
Sonoma County Water Agency
404 Aviation Boulevard
Santa Rosa, CA 95403

RE: Limited Geotechnical Investigation, Planned Westside Multipurpose Facility at Maxwell Grove, Wohler Road at Westside Road, Sonoma County, California

Dear Mr. Paulson:

This letter presents the results of our Limited Geotechnical Investigation for the Sonoma County Water Agency's (SCWA's) planned Westside Multipurpose Facility at Maxwell Grove, located on Wohler Road at Westside Road, Sonoma County, California. The site is located on the north-northeast side of the intersection of Wohler and Westside Roads, approximately 2.5 miles north of the community of Forestville, as shown on the Vicinity Map, Plate 1.

The Site Plan, Plate 2, shows the planned facility in relation to the mentioned road intersection, a Sonoma County Regional Parks Department parking lot, and the nearby cut slopes of an abandoned quarry. We understand that the SCWA would like to build the new building as close to the quarry cut bank as possible.

The intent of our services is to determine a suitable quarry slope setback for the buildings, as well as provide recommendations for pad grading and structure foundation support. The scope of our services, as outlined in Agreement Memorandum, TW 08/09-33, dated January 24, 2012, consists of:

1. Initial site meeting/observations, research and project coordination.
2.1 Field reconnaissance/mapping of the quarry slopes using Agency-provided plan and section.
2.2 Observe, log and sample test pits within the planned building area using client-provided backhoe.
3.1 Geologic and engineering analyses.
3.2 Preparing a written report presenting a summary of our field data along with recommendations regarding:
   a. Quarry slope setback;
   b. Site grading and drainage;
   c. Structure foundation support.

In addition, in accordance with our Change/Extra Services Order No.1 dated May 22, 2103, we performed California Air Resources Board Test 435 (CARB 435) tests on three of the samples recovered from the test pits, to screen for the presence of naturally-occurring asbestos.

Field Exploration

Our Principal Engineering Geologist, Erik Olsborg met with you and observed the site on January 9, 2012. Olsborg returned to the site on January 26, 2012 and performed a geologic reconnaissance of the quarry cut banks and nearby natural slopes. On February 23, 2012, Olsborg observed the excavation of five test pits at the locations shown on Plate 2. Mr. Olsborg made a descriptive log of each test pit and took samples of the materials observed for testing. Graphic logs of the test pits are included on Plates 3 through 5. Soil classification criteria, and definitions of the terminology used to describe the soil and rock materials are included on Plates 6 through 8.

Site Conditions

The proposed facility is located on the floor of the abandoned quarry. The planned buildings will be very near the lower, very steep quarry cut bank that is approximately 40 to 45 feet high with a very steep slope gradient of two-thirds horizontal to 1 vertical (0.67H:1V). The abandoned quarry has two, gently sloping benches; a lower bench, and an upper bench, as shown on Cross Section A-A', Plate 9. The lower bench slopes gently to the northeast. Stains on the quarry face indicate areas of ponding and runoff from the lower bench during rains. The upper bench has a moderate slope gradient to the northeast for drainage. The slope between the two benches has an average slope gradient of approximately 2H:1V.

The quarry is mostly bare rock with scattered brush and trees, as shown in Site Photograph A, Plate 10. The slopes surrounding the quarry are forested with mostly fir trees. The proposed building and parking areas are covered with grasses, weeds and some brush. The proposed building area below the quarry has mounded areas of quarry waste and what appears to be in-place rock, as shown in Site Photograph B, Plate 11. We understand that in this area the SCWA formerly stored gravels that were mined from the river. The upper and lower quarry benches are shown in Site Photographs C and D, Plate 12.

Ponded water and saturated soils were observed within the lower near-flat ground (former quarry floor) in the vicinity of the Regional Parks parking lot. No other standing water or groundwater seepage was observed within the quarry slopes.

Site Geology

The bedrock exposed in the quarry cut banks consists of Jurassic, Great Valley Sequence basalt that is little to moderately fractured, moderately hard and moderately to little weathered. Portions of the basalt are very hard. The fill (quarry waste) soils covering portions of the bedrock consist of sandy, gravelly silts that are soft, porous and contain roots. The bedrock and soils appear relatively low in expansion potential (tendency for volume change with changes in moisture content).

As observed in our test pits, the proposed building and driveway areas are underlain by about two feet of fill comprised of loose silty, gravelly sand (quarry waste). Beneath the fill, the site bedrock is comprised of moderately weathered basalt and serpentinite. Basalt was encountered in test pit 3 (TP-3), near the planned facility entrance. The remainder of our test pits exposed hard sepentinite. We encountered difficult excavation and near practical refusal in tests pits 1, 2, and 4 between three and six feet below the ground surface (bgs). Minor groundwater seepage was observed within the fill soils in our test pits.

Conclusions

Based upon the results of our reconnaissance and analysis, we conclude that the site is geologically suitable for the planned facility. The geological/geotechnical constraints that should be considered in design and construction of the facility include cut bank setback and protection from ravel; excavation in hard bedrock, and drainage beneath the buildings. These concerns are discussed in the following recommendation sections. Based upon the asbestos TEM Laboratories test results, Appendix A, harmful asbestos fibers from planned cuts into the serpenitite are of little concern at the site.

Recommendations

Slope Setback

California Building Code (CBC), 2010 edition, states that, for building clearance from ascending slopes, the face of the building must be at least the smaller of H/2 and 15 feet, where H is the height of the slope. The far north end of Building 2 (Plate 2) must therefore be set back from the planned cut slope at least 6 feet for a 12 foot high cut slope. The configuration shown on Plate 2 shows this setback. Our engineering geologic opinion of the slope indicates that it is stable and no additional setback beyond the CBC is needed.

Site Grading

Clearing and Stripping

Areas to be graded should be cleared of existing vegetation and debris. After clearing, surface soils that contain organic matter should be stripped. In general, the depth of required stripping will be about 2 to 4 inches; deeper stripping and grubbing may be required to remove isolated concentrations of organic matter or roots. The cleared materials should be removed from the site; however, strippings can be stockpiled for later use in landscape areas.

Structural Area Preparation

As used in this report, "Structural Areas" refers to the building envelopes and the areas extending three feet beyond their perimeters, and to exterior concrete slabs and asphalt paved areas and the areas extending three feet beyond their edges.

Within building and exterior slab areas, existing weak soils should be removed to their full depth; varying from less than one foot up to about two feet below existing grade, to help minimize differential settlement. Deeper excavations may be necessary to remove isolated, very weak soils, if encountered.

After the recommended excavations, a BAI representative should observe the exposed soils/rock. These soils/rock should then be scarified to about six inches deep, moisture conditioned to at or near optimum moisture content (OMC) and compacted to at least 90 percent relative compaction (RC) as determined by the ASTM D 1557 test procedure, latest edition. These moisture conditioning and compaction procedures should be observed by BAI to determine that the material is properly moisture conditioned and the recommended compaction is achieved.

Fill material, either imported or on-site, should be free of perishable matter and rocks greater than six inches in largest dimension, and should be approved by a representative of BAI before fill placement. We anticipate that the existing on-site soils to be excavated, in a "cleaned" condition (i.e., less any organics and debris) are satisfactory for reuse as compacted fill. Imported fill for use in structural areas should be of relatively low expansion potential (i.e., Expansion Index of 30 or less).

Low-expansive engineered fill, on-site or imported, should be placed in thin lifts (six to eight inches depending on compaction equipment), moisture conditioned to near OMC, and compacted to at least 90 percent RC, to achieve planned grades.

Foundation Support

The planned multipurpose facility buildings can be supported on spread footings founded in compacted fill placed in accordance with our recommendations, provided at least 12 inches of compacted fill underlies the bottom of the footing excavations. Building footprints should not span cut-fill lines but should be graded such that foundations bear within compacted fill underlain by at least 12 inches of compacted fill, throughout the entirety of the structure, to minimize differential settlement.

Footings in supporting compacted fill soils can be designed using an allowable soil bearing pressure of 2,000 pounds per square foot (psf) for dead plus live loads. A one-third increase in allowable bearing pressure is allowable when considering wind or seismic loads.

Footing elements should be founded at least 18 inches below lowest adjacent finish grade. Footings should be no less than 12 inches. The bottom elevations of all footings should be established such that no subsurface structures (such as subsurface walls, tanks, other foundations, or utility lines) are present immediately below the footings, or within a zone defined by a 45-degree angle projected downward from the outside, bottom edges of the footings. Completed foundation excavations should be observed by a representative from BAI prior to the placement of reinforcing steel.

Resistance to lateral loads can be obtained using a combination of passive earth pressure against the face of foundations and frictional resistance along the base of foundations. An allowable passive pressure of 600 psf plus 100 psf per foot of depth below soil subgrade (trapezoidal distribution), and frictional resistance of 0.30 times the net vertical dead load, are appropriate for footing elements poured neat against compacted fill. Passive pressure should be neglected within the upper 6 inches of subgrade soil, unless slabs or pavements confine the surface.

Seismic Design Criteria

The proposed structures should be designed and constructed to resist the effects of strong ground shaking (on the order of Modified Mercalli Intensity IX) in accordance with current building codes. The California Building Code, 2010 edition, indicates that the following seismic design parameters are appropriate for the site:

Site Class = C
Mapped Spectral Response Acceleration at 0.2 sec Ss = 1.500g
Mapped Spectral Response Acceleration at 1.0 sec S_1 = 0.600g
Design Spectral Response Acceleration at 0.2 sec S_{DS} = 1.000g
Design Spectral Response Acceleration at 1.0 sec S_{D1} = 0.520g
Seismic Design Category = D

Concrete Slab Floor Support

If a structural concrete slab is used (i.e., the slab is supported by and able to span between, interconnecting foundation elements without gaining support from underlying soil), then over-excavation of the near-surface weak soil zone is not required. However, topsoils containing organics should be removed beneath the planned slab (as much as four inches to six inches in depth below existing ground surface).

The weak soils in their present condition are not suitable for slab support. Concrete slab-on-grade floors not supported by foundation elements should be supported on properly compacted fill soils placed in accordance with our recommendations previously presented in the Site Grading section.

During foundation and utility trench construction, previously compacted subgrade surfaces may be disturbed. Where this is the case, the subgrade should be moisture conditioned as necessary, and compacted to provide a firm, smooth, unyielding surface compacted to at least 90 percent RC before construction of slabs-on-grade.

Regardless of means of support, the concrete slab floors should be underlain by at least four inches of clean, free-draining gravel or crushed rock, graded in size from 1-1/2 or 3/4 inches maximum to 1/4 inches minimum, to act as a capillary moisture break. An underslab drain should be constructed as shown on the attached Plate 13. If a soil-supported slab is used, shrinkage cracks within the subgrade soils should be closed by wetting before gravel or rock placement. Where migration of moisture through the floor slab would be detrimental to its

intended use, the installation of a vapor retarder membrane should be considered. The moisture/vapor retarder geomembrane, placed upon the gravel layer, should be at least 15 mils thick (i.e., Stego ® Wrap 15-mil Class A, Carlisle RMB 400 15-mil Class A, or equivalent), installed in accordance with the manufacturer's specifications to prevent moisture migration through the seams. With a 15-mil minimum thickness membrane, the 2 inches of wetted sand typically placed upon the membrane may be omitted. Construction of moisture/vapor retarders does not guarantee the prevention of moisture moving through the floor slab. However, this provision should substantially reduce the potential for moisture-vapor problems on the floors and/or future mold and mildew problems.

Site Drainage

Because surface and/or subsurface water is often the cause of foundation problems, care should be taken to intercept and divert concentrated surface flows and subsurface seepage away from the building foundations. Roof runoff water should be directed away from the buildings and dispersed into approved outfalls. Drainage across the lot should be by sheet-flow. Surface grades should maintain a recommended five percent gradient away from building foundations.

Construction Considerations

Portions of the bedrock within the planned building pad may be difficult to excavate. A hoe ram attachment on a large excavator or a D-8 caterpillar tractor with ripper teeth may be needed to remove localized hard rock masses.

Additional Services

BAI should review civil and structural engineering design drawings to check that the designs conform to the intent of our recommendations. During construction, BAI should observe and/or perform field and laboratory testing during site grading activities, including compaction of fill and footing excavations. At or prior to commencement of grading, BAI should be notified to collect bulk samples of on-site and/or imported material to be used as fill, for maximum dry density testing.

Limitations

This geotechnical investigation was performed in accordance with the usual and current standards of the profession, as they relate to this and similar localities. No other warranty, either expressed or implied, is provided as to the conclusions and professional advice presented in this report. Our conclusions are based upon reasonable geologic and engineering interpretation of available data.

The samples taken and tested, and the observations made, are considered to be representative of the site; however, soil and geologic conditions may vary significantly between test borings and across the site. As in most projects, conditions revealed during construction excavation may be

at variance with preliminary findings. If this occurs, the changed conditions must be evaluated by BAI, and revised recommendations be provided as required.

This report is issued with the understanding that it is the responsibility of the Owner, or his/her representative, to insure that the information and recommendations contained herein are brought to the attention of all other design professionals for the project, and incorporated into the plans, and that the Contractor and Subcontractors implement such recommendations in the field. The safety of others is the responsibility of the Contractor. The Contractor should notify the owner and BAI if it considers any of the recommended actions presented herein to be unsafe or otherwise impractical.

Changes in the conditions of a site can occur with the passage of time, whether they are due to natural events or to human activities on this, or adjacent sites. In addition, changes in applicable or appropriate codes and standards may occur, whether they result from legislation or the broadening of knowledge. Accordingly, this report may become invalidated wholly or partially by changes outside our control. Therefore, this report is subject to review and revision as changed conditions are identified.

The recommendations contained in this report are based on certain specific project information regarding type of construction and retaining wall location, which have been made available to us. If conceptual changes are undertaken during final project design, we should be allowed to review them in light of this report to determine if our recommendations are still applicable.

Respectfully submitted,

PROFESSIONAL GEOLOGIST
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Keith A. Colorado
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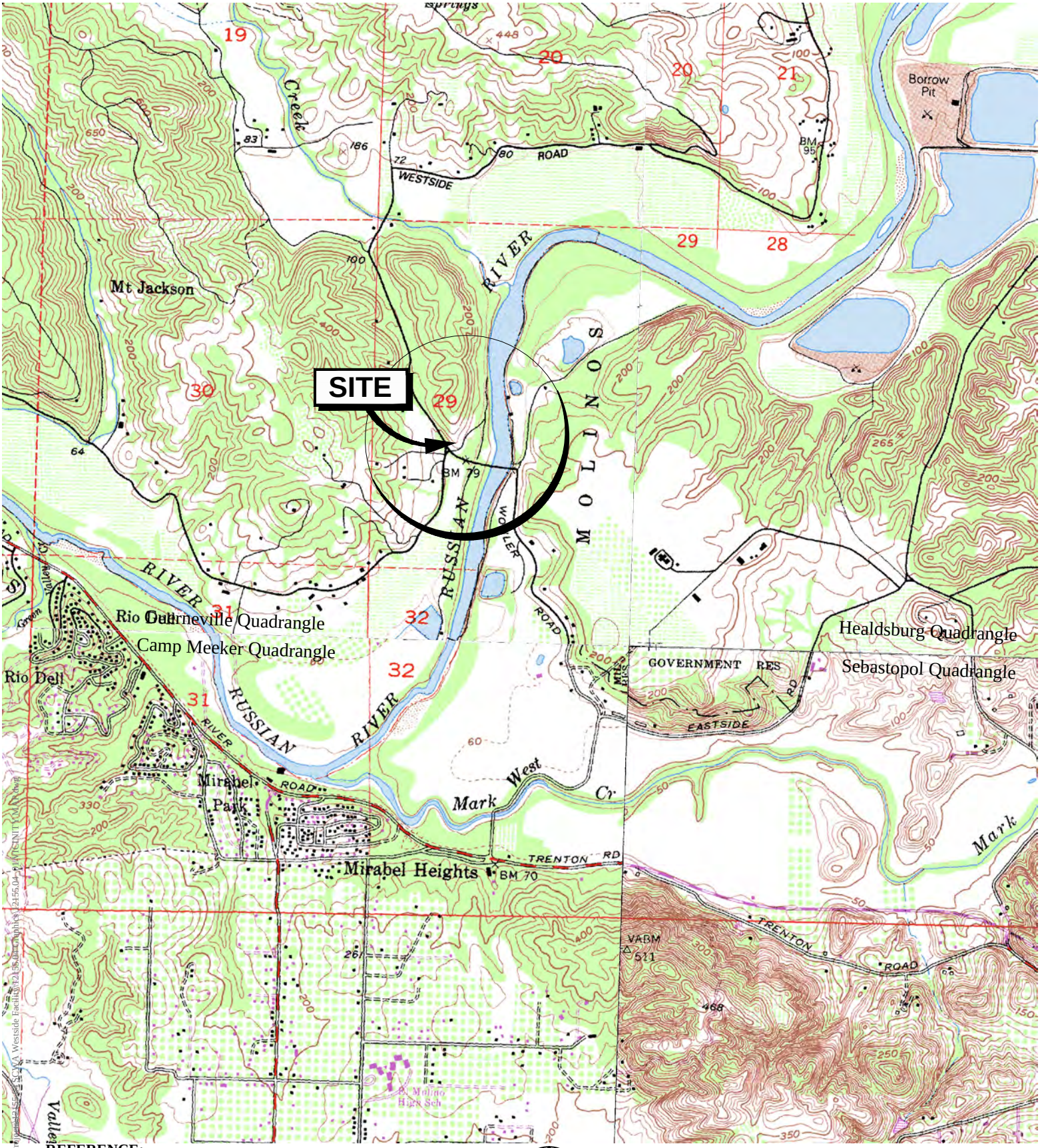
SCL/KAC/EEO/scl

3 copies submitted

Attachments:
Plates 1 through 13
Appendix A - Asbestos TEM Laboratory Report



REFERENCE:
Sebastopol -1980, Camp Meeker - 1971,
Guerneville - 1993, Healdsburg - 1993
7.5 Minute Series, (Topographic), USGS

NORTH

APPROXIMATE SCALE (FEET)

0 1000 2000 4000

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Job No.: 12155.04
Appr.: KAC
Date: 07/19/12

VICINITY MAP
WESTSIDE MULTIPURPOSE FACILITY
Wohler Road at Westside Road
Sonoma County, California

PLATE
1

L:\Geotech Projects\12155.04 SCWA Westside Facility\12155.04 Graphics\12155.04 VICINITY MAP.dwg
7/19/2013 9:03:58 AM save date
7/19/2013 12:16:09 PM plot date

Legend

TP-5 — Number and approximate location of test pit

A — A' — Cross Section location, see Plate 9

REFERENCE:
Grading and Drainage Plan, Drawing C2.0, sheet 3 of 4, dated May 2013, by BKF.

APPROXIMATE SCALE (FEET)

0 20 40 80

NORTH

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SITE PLAN
WESTSIDE MULTIPURPOSE FACILITY
Wohler Road at Westside Road
Sonoma County, California

PLATE 2

L:\Geotech Projects\12155.04 SCWA Westside Facility\12155.04 Graphics\12155.04_02 Site Plan.dwg
7/19/2013 10:29:24 AM save date
7/19/2013 12:17:27 PM plot date

Log of Test Pit TP-1

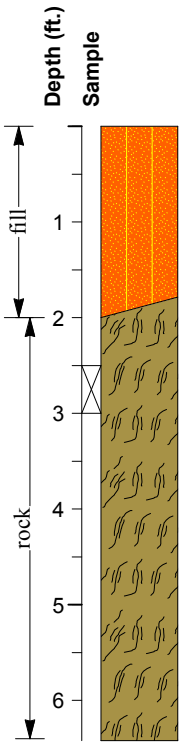
Equipment: CAT 420D Backhoe

Date: 2/23/01

Logged By: EEO **Elevation:** 88 feet *

Laboratory Tests

CARB 435 -
non-detect



BROWN SILTY GRAVELLY SAND (SM)
loose, wet to saturated

BLUE-GREEN SERPENTINITE
with some chlorite and antigorite minerals
moderate hardness to hard, close fractureing, little to moderate weathering

Note:
1. No Caving
2. Minor seepage at 1.5-2 feet
3. Excavated to near practical refusal

Log of Test Pit TP-2

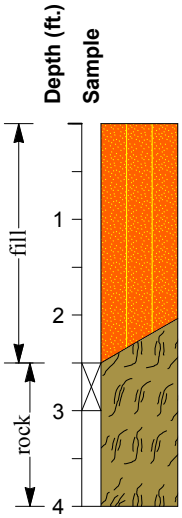
Equipment: CAT 420D Backhoe

Date: 2/23/12

Logged By: EEO **Elevation:** 90.5 feet *

Laboratory Tests

CARB 435 -
non-detect



BROWN SILTY GRAVELLY SAND (SM)
loose, moist to wet

ORANGE BROWN TO BLUE-GREEN SERPENTINITE
close to moderate fracturing, moderate hardness to hard, moderate to little weathering

Notes:
1. No Caving
2. No free water encountered
3. Excavated to near practical refusal

* Elevations interpolated from Grading ad Drainange Plan, Drawing Number C2.0, sheet 3 of 4, dated 05/10/13 by BKF

Scale: 1" = 2'

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LOGS OF TEST PITS TP-1 AND TP-2
WESTSIDE MULTIPURPOSE FACILITY
Wohler Road at Westside Road
Sonoma County, California

PLATE 3

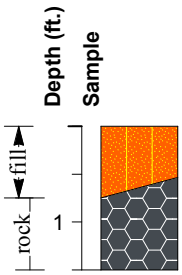
TEST PITS 2 PER PAGE, 12155.04_ GINT.GPJ, 7/19/13

Log of Test Pit TP-3

Equipment: CAT 420D Backhoe

Date: 2/23/12

Logged By: EEO **Elevation:** 79 feet *



BROWN SILTY GRAVELLY SAND (SM)
loose, moist
rounded (river) gravels
ORANGE BROWN BASALT
close fracturing, moderate hardness, little weathering

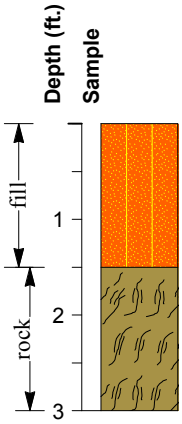
Notes:
1. No caving
2. No free water encountered

Log of Test Pit TP-4

Equipment: CAT 420D Backhoe

Date: 2/23/12

Logged By: EEO **Elevation:** 78.5 feet *



BLUE GRAY TO BROWN SILTY GRAVELLY SAND (SM)
loose, saturated

BLUE GRAY SERPENTINITE

Notes:
1. No caving
2. Minor seepage from about 6 inches to 18 inches

* Elevations interpolated from Grading ad Drainange Plan, Drawing Number C2.0, sheet 3 of 4, dated 05/10/13 by BKF

Scale: 1" = 2'

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LOGS OF TEST PITS TP-3 AND TP-4
WESTSIDE MULTIPURPOSE FACILITY
Wohler Road at Westside Road
Sonoma County, California

PLATE 4

TEST PITS 2 PER PAGE, 12155.04_ GINT.GPJ, 7/19/13

Log of Test Pit TP-5

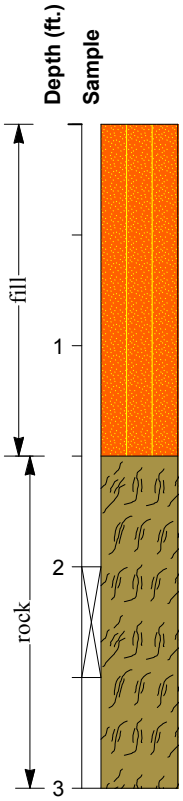
Equipment: CAT 420D Backhoe

Date: 2/23/12

Logged By: EEO **Elevation:** 79.5 feet *

Laboratory Tests

CARB 435 -
non-detect



BROWN SILTY FINE SAND (SM)
loose to medium dense, moist to saturated
rounded (river) gravels in upper 1 foot

BLUE GRAY SERPENTINITE
close fracturing, moderate hardness to hard, little weathering

Notes:
1. No caving
2. No free water encoutnered
3. Minor seepage in upper 6 inches

* Elevations interpolated from Grading ad Drainange Plan, Drawing Number C2.0, sheet 3 of 4, dated 05/10/13 by BKF

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LOG OF TEST PIT TP-5
WESTSIDE MULTIPURPOSE FACILITY
Wohler Road at Westside Road
Sonoma County, California

PLATE
5

TEST PIT 1 PER PAGE_ 12155.04_ GINT.GPJ, 7/19/13

UNIFIED SOIL CLASSIFICATION SYSTEM (USCS)

MAJOR DIVISIONS			SYMBOLS GRAPH	SYMBOLS LETTER	TYPICAL DESCRIPTIONS
COARSE-GRAINED SOILS MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVELS AND GRAVELLY SOILS MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (Less than 5% fines)		GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (Greater than 12% fines)		GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES
	SAND AND SANDY SOILS 50% OR MORE OF COARSE FRACTION PASSING THROUGH NO. 4 SIEVE	CLEAN SANDS (Less than 5% fines)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
		SANDS WITH FINES (Greater than 12% fines)		SM	SILTY SANDS, SAND-SILT MIXTURES
				SC	CLAYEY SANDS, SAND-CLAY MIXTURES
FINE-GRAINED SOILS MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 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 SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILT, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

KEY TO TEST DATA

Consol - Consolidation
LL - Liquid Limit
PI - Plasticity Index
EI - Expansion Index
SA - Sieve Analysis

■ Sample Retained
▨ Sample Recovered, Not Retained
⊠ Bulk Sample
◯ Sample Not Recovered
CA - California Modified Split Barrel Sampler 3.0-inch O.D.
CM - California Modified Split Barrel Sampler 2.5-inch O.D.
SPT - California Split Barrel Sampler 2.0-inch O.D.
SH - Shelby Tube
RC - Rock Coring

Shear Strength, psf	Confining Pressure, psf	
Tx	320 (2600)	- Unconsolidated Undrained Triaxial
TxCU	320 (2600)	- Consolidated Undrained Triaxial
DS	2750 (2600)	- Consolidated Drained Direct Shear
FVS	470	- Field Vane Shear
UC	2000	- Unconfined Compression
PP	2000	- Field Pocket Penetrometer
Sat		- Sample saturated prior to test

▽ Groundwater Level Reading
▼ Second Groundwater Level Reading

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SOIL CLASSIFICATION CHART & KEY TO TEST DATA
WESTSIDE MULTIPURPOSE FACILITY
Wohler Road at Westside Road
Sonoma County, California

PLATE 6

SOIL CLASSIFICATION CHART COLOR, 12155.04_ GINT.GPJ, 7/19/13

RELATIVE DENSITY OF COARSE-GRAINED SOILS

Relative Density	Standard Penetration Test Blow Count (blows per foot)
Very loose	4 or less
Loose	5 to 10
Medium dense	11 to 30
Dense	31 to 50
Very dense	More than 50

CONSISTENCY OF FINE-GRAINED SOILS

Consistency	Identification Procedure	Approximate Shear Strength (psf)
Very soft	Easily penetrated several inches with fist	Less than 250
Soft	Easily penetrated several inches with thumb	250 to 500
Medium stiff	Penetrated several inches by thumb with moderate effort	500 to 1000
Stiff	Readily indented by thumb, but penetrated only with great effort	1000 to 2000
Very stiff	Readily indented by thumb nail	2000 to 4000
Hard	indented with difficulty by thumb nail	More than 4000

NATURAL MOISTURE CONTENT

Dry	No noticeable moisture content. Requires considerable moisture to obtain optimum moisture content* for compaction.
Damp	Contains some moisture, but is on the dry side of optimum.
Moist	Near optimum moisture content for compaction.
Wet	Requires drying to obtain optimum moisture content for compaction.
Saturated	Near or below the water table, from capillarity, or from perched or ponded water. All void spaces filled with water.

* Optimum moisture content as determined in accordance with ASTM Test Method D1557, latest edition.

Where laboratory test data are not available, the above field classifications provide a general indication of material properties; the classifications may require modification based upon laboratory tests.

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SOIL DESCRIPTIVE PROPERTIES
WESTSIDE MULTIPURPOSE FACILITY
Wohler Road at Westside Road
Sonoma County, California

PLATE 7

Generalized Graphic Rock Symbols

Claystone	Siltstone	Tuff (Volcanic Ash)
Shale	Chert	Andesite
Sandstone	Serpentine	Basalt
Conglomerate	Greenstone	Granite

Stratification

Bedding of Sedimentary Rocks	Thickness of Beds
Massive	No apparent bedding
Very thick bedded	Greater than 4 feet
Thick bedded	2 feet to 4 feet
Thin bedded	2 inches to 2 feet
Very thin bedded	0.5 inches to 2 inches
Laminated	0.125 inches to 0.5 inches
Thinly laminated	less than 0.125 inches

Fracturing

Fracturing Intensity	Fracture Spacing
Little	Greater than 4 feet
Occasional	1 foot to 4 feet
Moderate	6 inches to 1 foot
Close	1 inch to 6 inches
Intense	0.5 inches to 1 inch
Crushed	less than 0.5 inches

Strength

Soft	Plastic or very low strength.
Friable	Crumbles by hand.
Low hardness	Crumbles under light hammer blows.
Moderate hardness	Crumbles under a few heavy hammer blows.
Hard	Breaks into large pieces under heavy, ringing hammer blows.
Very hard	Resists heavy, ringing hammer blows and will yield with difficulty only dust and small flying fragments.

Weathering

Deep	Moderate to complete mineral decomposition, extensive disintegration, deep and thorough discoloration, many extensively coated fractures.
Moderate	Slight decomposition of minerals, little disintegration, moderate discoloration, moderately coated fractures.
Little	No megascopic decomposition of minerals, slight to no effect on cementation, slight and intermittent, or localized discoloration, few stains on fracture surfaces.
Fresh	Unaffected by weathering agents, no disintegration or discoloration, fractures usually less numerous than joints.

ROCK DESCRIPTIVE PROPERTIES COLOR, 12155.04_ GINT.GPJ, 7/19/13

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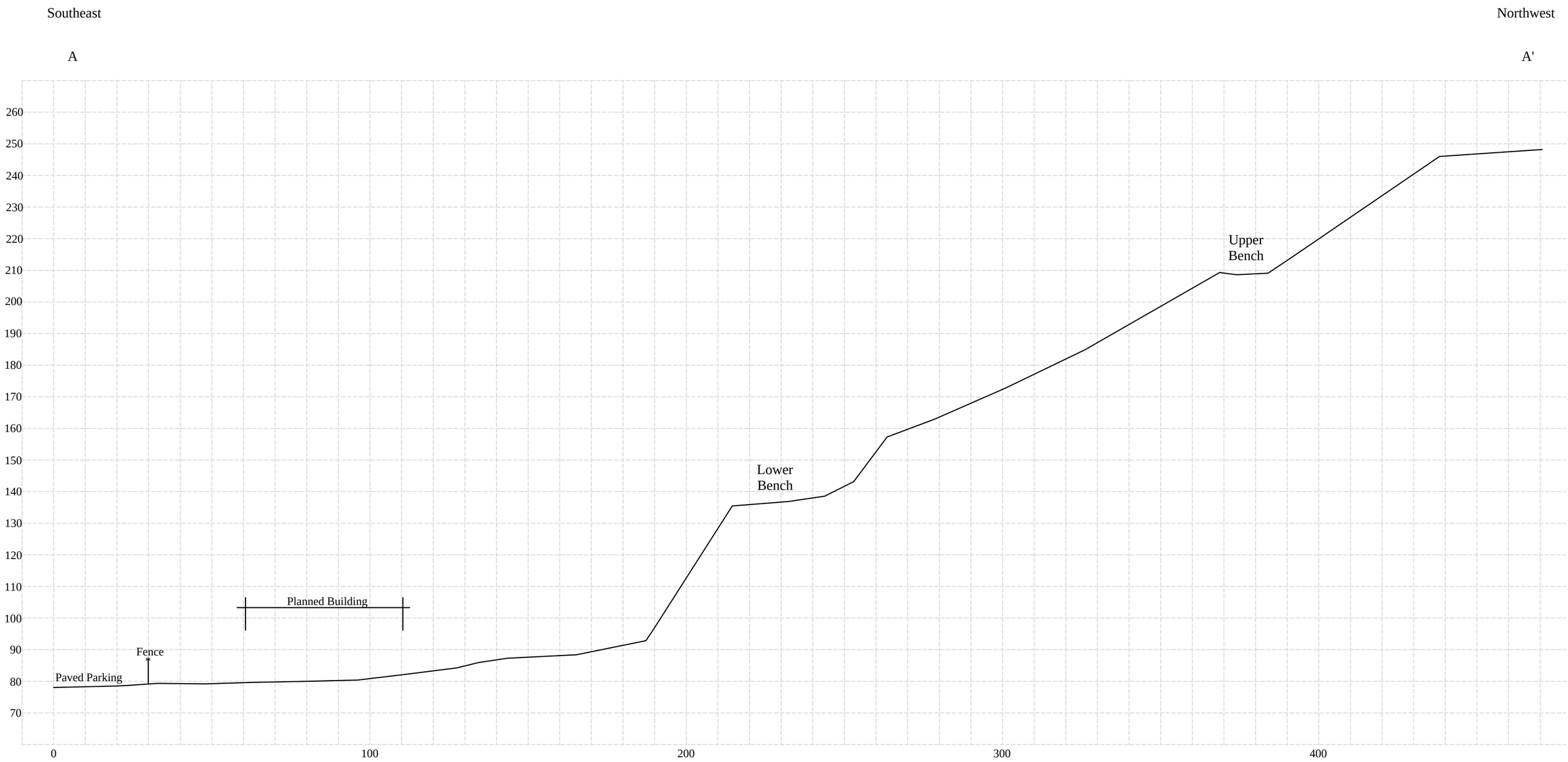
Santa Rosa, California 95403
Tel: (707) 838-3027

Job No.: 12155.04
Appr.: KAC
Date: 07/19/13

ROCK DESCRIPTIVE PROPERTIES
WESTSIDE MULTIPURPOSE FACILITY
Wohler Road at Westside Road
Sonoma County, California

PLATE 8



L:\Geotech Projects\12155.04 SCWA Westside Facility\12155.04 Graphics\12155.04_09 Cross Section A-A'.dwg

7/19/2013 12:18:39 PM save date
7/19/2013 12:16:54 PM plot date

REFERENCE:
Cross section created from survey data provide by Sonoma County Water Agency, received 1/19/12

APPROXIMATE SCALE (FEET)

0 15 30 60

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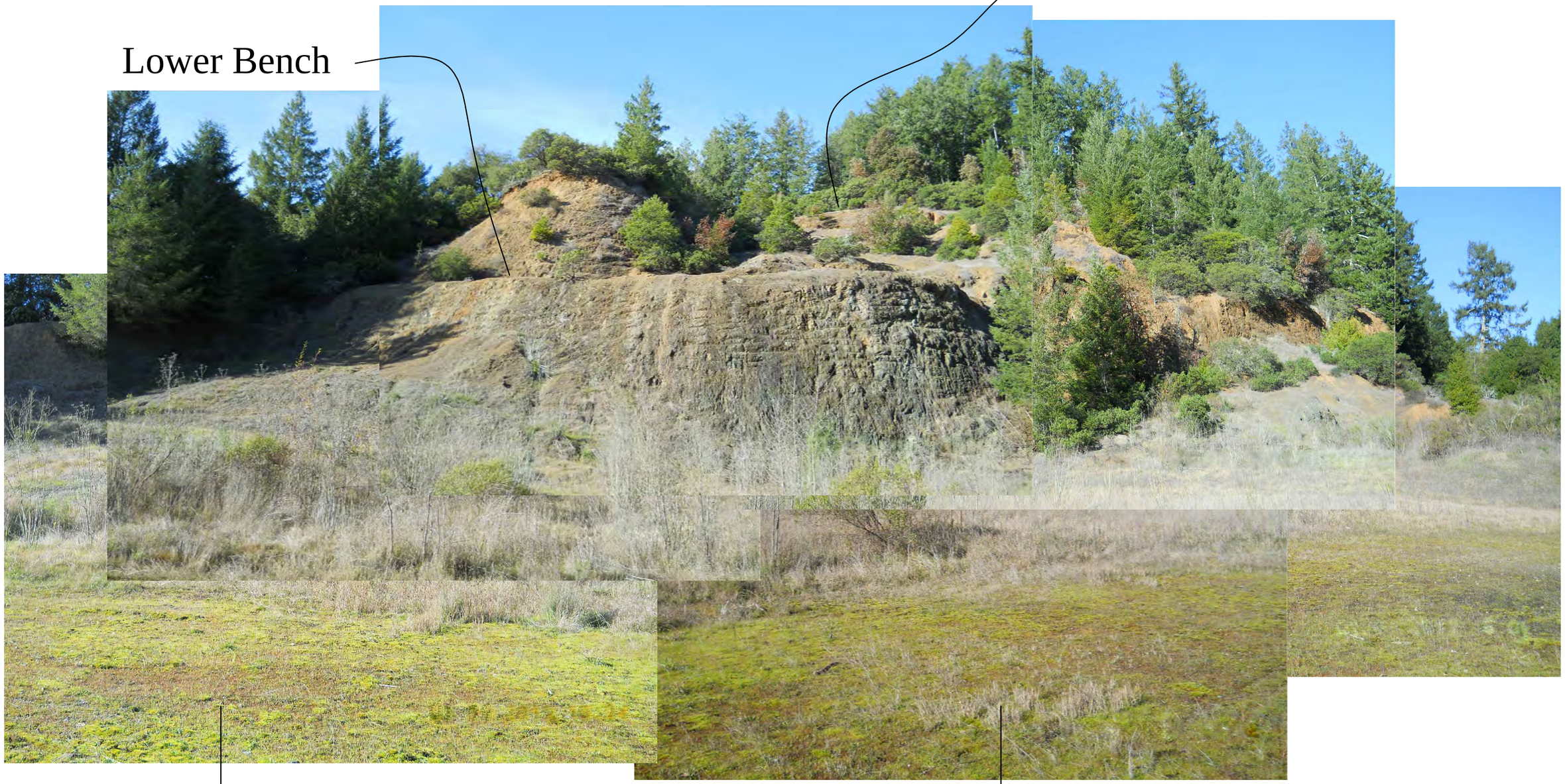
CROSS SECTION A - A'
WESTSIDE MULTIPURPOSE FACILITY
Wohler Road at Westside Road
Sonoma County, California

PLATE
9

Site Photograph A



REFERENCE:
Images photographed by BAI

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SITE PHOTOGRAPH A
WESTSIDE MULTIPURPOSE FACILITY
Wohler Road at Westside Road
Sonoma County, California

PLATE
10

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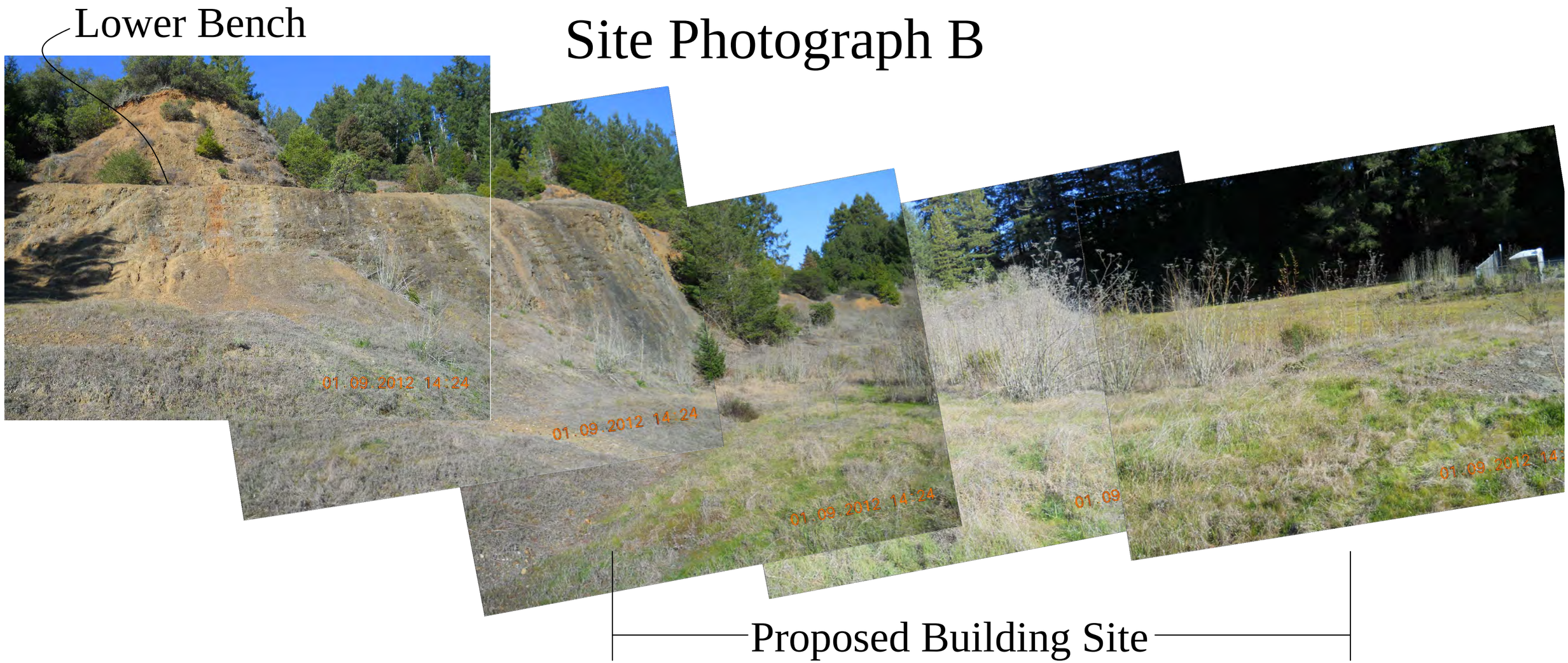
7/19/2013 12:19:26 PM plot date

Site Photograph B



Proposed Building Site

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SITE PHOTOGRAPH B
WESTSIDE MULTIPURPOSE FACILITY
Wohler Road at Westside Road
Sonoma County, California

PLATE
11

L:\Geotech Projects\12155.04 SCWA Westside Facility\12155.04 Graphics\12155.04_11 Site Photograph B.dwg
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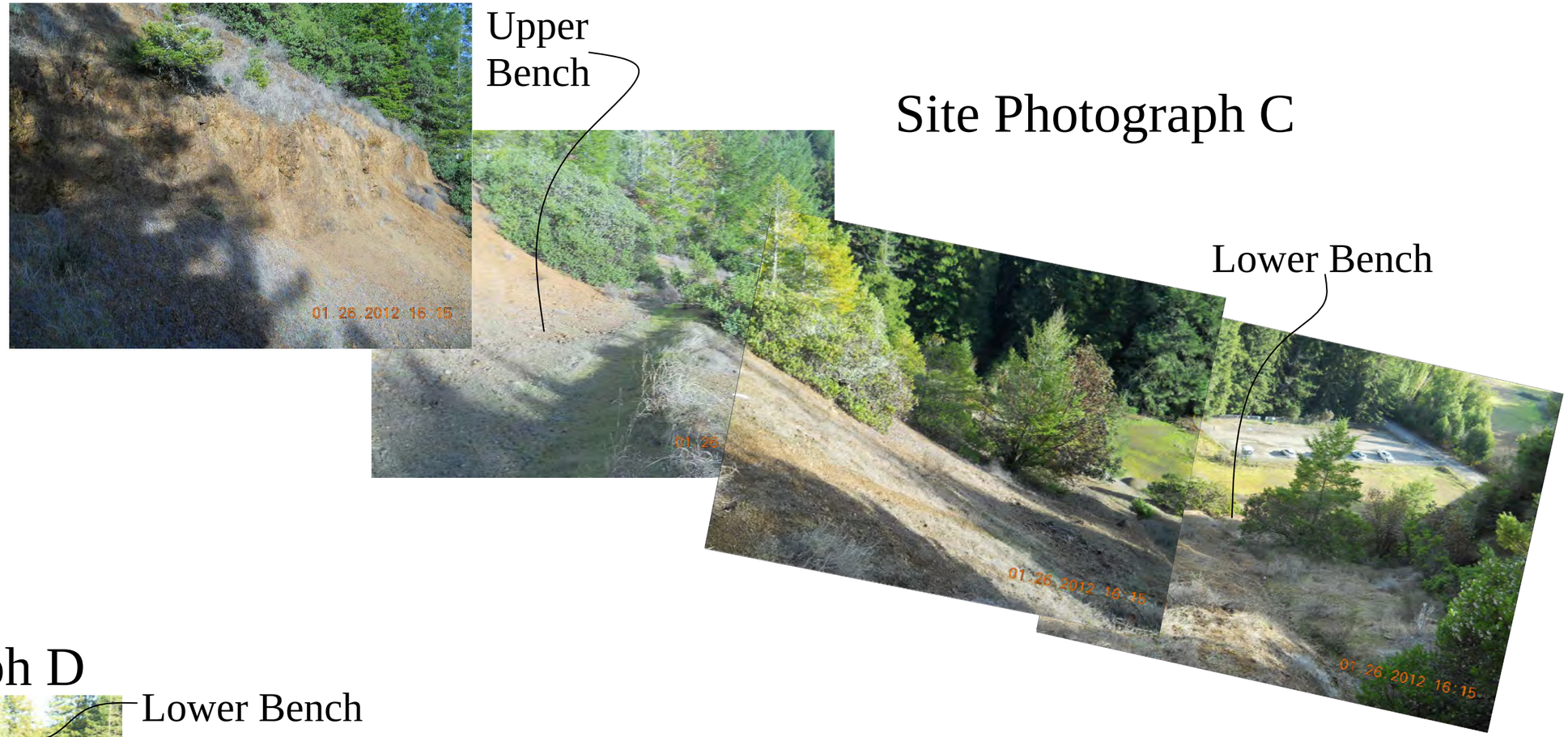
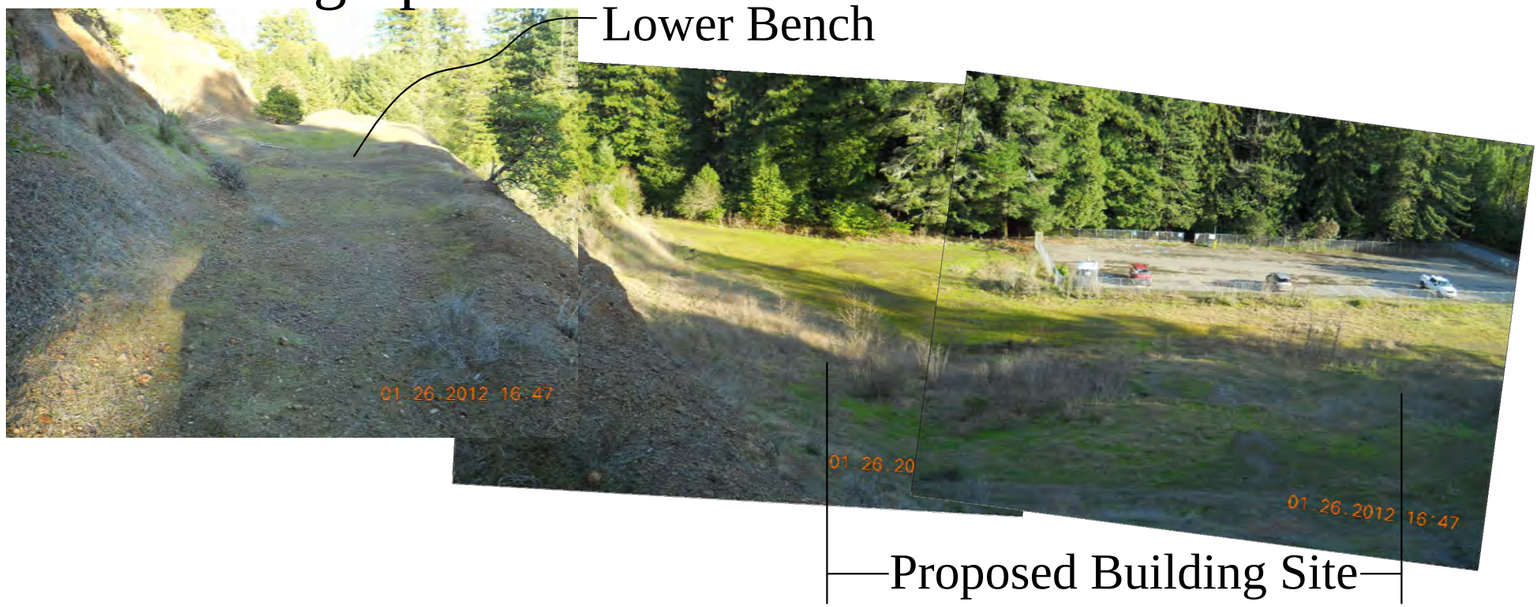
Site Photograph C



Site Photograph D



REFERENCE:
Images photographed by BAI

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Tel: (707) 838-3027

Job No.: 12155.04
Appr.: EEO
Date: 07/19/13

SITE PHOTOGRAPHS C and D
WESTSIDE MULTIPURPOSE FACILITY
Wohler Road at Westside Road
Sonoma County, California

PLATE
12

L:\Geotech Projects\12155.04 SCWA Westside Facility\12155.04 Graphics\12155.04_12 Site Photographs C and D.dwg
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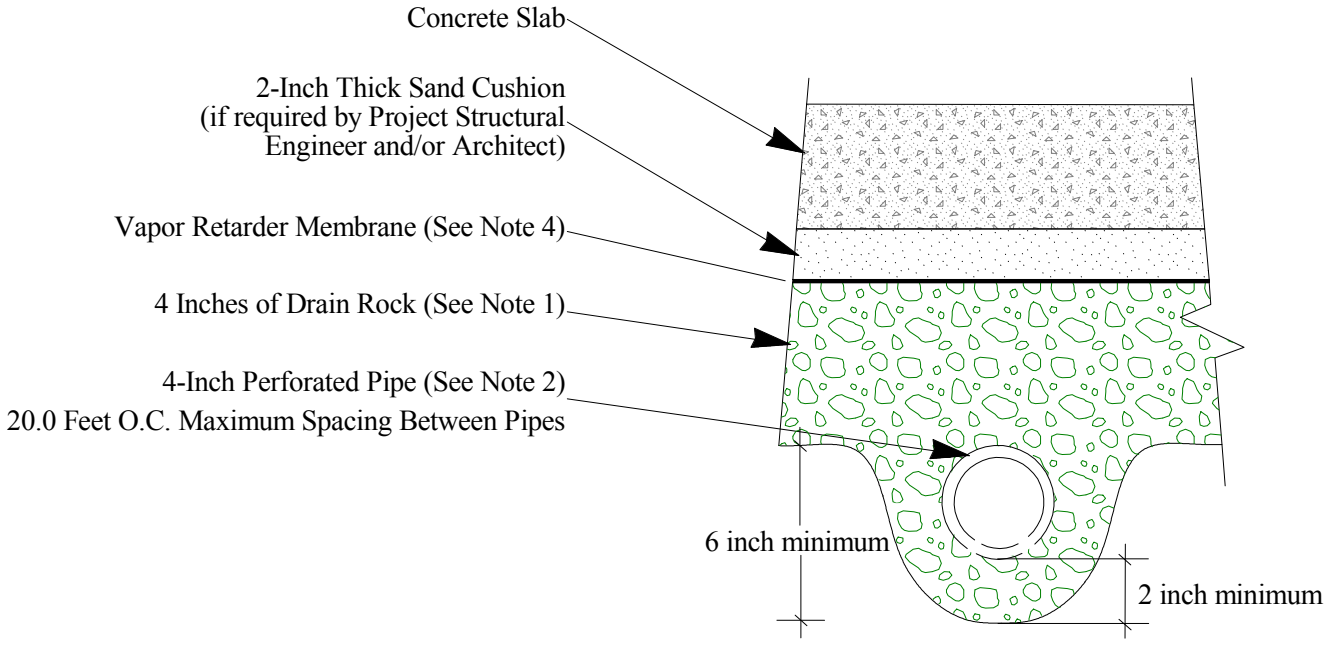

NOT TO SCALE

NOTES:

1. Drain rock should be clean, free-draining material graded in size between the No.4 and 3/4 inch sieves.
2. Pipe should be SDR 35 or equivalent, perforations placed down, sloped at least 1% to gravity outlet, or sump with automatic pump.
3. A clean-out pipe with cap should be installed at the up-slope end of perforated pipe.
4. Vapor retarder should be at least 15-mils thick and installed in accordance with the manufacturer's specifications.

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Appr.: KAC
Date: 07/19/13

UNDERSLAB DRAINAGE DETAILS
WESTSIDE MULTIPURPOSE FACILITY
Wohler Road at Westside Road
Sonoma County, California

PLATE 13

UNDERSLAB DRAINAGE DETAILS, 12155.04_GINT.GPJ, 7/19/13

APPENDIX A

Asbestos TEM Laboratories, Inc.

ASBESTOS TEM LABORATORIES, INC.

EPA Interim Method
Polarized Light Microscopy
Analytical Report

Laboratory Job #318886

630 Bancroft Way
Berkeley, CA 94710
(510) 704-8930
FAX (510) 704-8429
www.asbestostemlabs.com

With Branch Offices Located At:
1350 FREEPORT BLVD. UNIT 104, SPARKS, NV 89431
Ph. (775) 359-3377

ASBESTOS TEM LABORATORIES, INC

CA DPH ELAP
Lab No. 1866

NVLAP Lab Code: 101891-0
Berkeley, CA

Jul-15-13

Sarah Lockwood
Brunsing Associates, Inc.
5468 Skylane Blvd. Ste 201
Santa Rosa, CA 95403

RE: LABORATORY JOB # 318886
Polarized light microscopy analytical results for 3 bulk sample(s).
Job Site: Westside Facility - Wohler Rd.
Job No.: 12155.04

Enclosed please find the bulk material analytical results for one or more samples submitted for asbestos analysis. The analyses were performed in accordance with EPA Method 600/R-93/116 or 600/M4-82-020 for the determination of asbestos in bulk building materials by polarized light microscopy (PLM). Please note that while PLM analysis is commonly performed on non-friable and fine grained materials such as floor tiles and dust, the EPA method recognizes that PLM is subject to limitations. In these situations, accurate results may only be obtainable through the use of more sophisticated and accurate techniques such as transmission electron microscopy (TEM) or X-ray diffraction (XRD).

Prior to analysis, samples are logged-in and all data pertinent to the sample recorded. The samples are checked for damage or disruption of any chain-of-custody seals. A unique laboratory ID number is assigned to each sample. A hard copy log-in sheet containing all pertinent information concerning the sample is generated. This and all other relevant paper work are kept with the sample throughout the analytical procedures to assure proper analysis.

Each sample is opened in a class 100 HEPA negative air hood. A representative sampling of the material is selected and placed onto a glass microscope slide containing a drop of refractive index oil. The glass slide is placed under a polarizing light microscope where standard mineralogical techniques are used to analyze and quantify the various materials present, including asbestos. The data is then compiled into a standard report format and reviewed by the authorized signatory before being released to the client.

Sincerely Yours,

Lab Manager
ASBESTOS TEM LABORATORIES, INC.

--- These results relate only to the samples tested and must not be reproduced, except in full, with the approval of the laboratory. This report must not be used to claim product endorsement by NVLAP or any other agency of the U.S. Government. ---

Note: Test samples will be stored for three months after data of receipt, after which they will be properly disposed unless client makes other arrangements with the laboratory.

POLARIZED LIGHT MICROSCOPY
ANALYTICAL REPORT

EPA Method 600/R-93/116 or 600/M4-82-020

Contact: Sarah Lockwood

Address: Brunsing Associates, Inc.
5468 Skylane Blvd. Ste 201
Santa Rosa, CA 95403

Samples Indicated: 3
Reg. Samples Analyzed: 3
Split Layers Analyzed:

Job Site / No. Westside Facility - Wohler Rd.
12155.04

Report No. **318886**
Date Submitted: Jul-08-13
Date Reported: Jul-15-13

SAMPLE ID	ASBESTOS %	ASBESTOS TYPE	OTHER DATA (1) Non-Asbestos Fibers (2) Matrix Materials (3) Date/Time Collected (4) Date Analyzed	DESCRIPTION FIELD / LAB
Test Pit 1	<0.25%	None Detected	1) 2)	
Lab ID # 1408-00001-001			3) Feb-23-12 4) Jul-15-13	No Point Count Performed - ARB
Test Pit 2	<0.25%	None Detected	1) 2)	
Lab ID # 1408-00001-002			3) Feb-23-12 4)	No Point Count Performed - ARB
Test Pit 5	<0.25%	None Detected	1) 2)	
Lab ID # 1408-00001-003			3) Feb-23-12 4)	No Point Count Performed - ARB
			1) 2)	
Lab ID #			3) 4)	
			1) 2)	
Lab ID #			3) 4)	
			1) 2)	
Lab ID #			3) 4)	
			1) 2)	
Lab ID #			3) 4)	
			1) 2)	
Lab ID #			3) 4)	
			1) 2)	
Lab ID #			3) 4)	
			1) 2)	
Lab ID #			3) 4)	

Detection Limit of Method is Estimated to be 1% Asbestos Using a Visual Area Estimation Technique

Analyst Jo Ann Hinestro

ASBESTOS TEM LABORATORIES, INC.
www.asbestostemlabs.com
630 Bancroft Way, Berkeley CA 94710 **(510) 704-8930**
With Offices in Reno, NV (775) 359-3377

ASBESTOS TEM LABORATORIES CHAIN OF CUSTODY – *www.asbestostemlabs.com*

CALIFORNIA: 630 Bancroft Way, Berkeley, CA 94710 Phone (510) 704-8930 Fax (510) 704-8429
NEVADA: 1350 Freeport Blvd. #104, Sparks, NV 89431 Phone (775) 359-3377 Fax (775) 359-2798

Company: Brunsing Associates	Contact: Sarah Lockwood	Phone/Fax: 707-838-3027	Email: slockwood@brunsing.com
Address: 5460 Skylane Blvd Ste 201	City: Santa Rosa	State: CA Zip: 95403	Country: USA
Job Site: Westside Facility, Wohler Road		Job No: 12155.04	P.O. No:

Reporting	□ Fax	□ Phone	X Email	X Mail	~~□ FTP~~	□ EDD/State Form	□ Verbal	□ Pickup	**Billing**	□ Fax	X Email	□ Mail	□ Pre-Paid	□ 3rd Party

Results Due:*	□ 2 hr □ 4 hr □ 6 hr □ 8 hr □ 24 hr □ 48 hr □ 3 day □ 4 day X 5 day □ 10 day □ Time due:____ * Contact lab to confirm TAT
Asbestos Air	□ PCM (NIOSH 7400A □ TEM AHERA □ TEM CARB Mod. AHERA □ TEM EPA Yamate Level □ TEM NIOSH 7402, Issue 2 □ ISO 10312 □ ISO 13794
Asbestos Bulk	□ PLM Standard (EPA 600/R-93-1 □ PLM 400 PC □ PLM 1000 PC □ PLM 400 PC Grav. Red. □ PLM 1000 PC Grav. Red. □ TEM EPA Qualitative □ TEM EPA Quantitatve □ TEM Chatfield (Semi-Quant) □ PLM Vermiculite Attic Insulation □ **Custom Analysis:** Type:
Asbestos Soils	□ CARB 435 Prep Only X CARB 435 PLM 400 PC □ CARB 435 PLM 1000 PC □ EPA Soil Screening Qualitative □ TEM EPA/CARB Quantitative
Asbestos Dust	□ ASTM D-5755 Fiber Count □ ASTM D-5756 Wt. % □ ASTM D-5756 Mass □ ASTM D-6840-99 Dust Wipe □ Total Particulates (Grav.)
Asbestos Water	□ 100.2 Potable Drinking Water □ 100.1 Non Potable Water
Lead	□ Paint Chips □ Dust Wipe □ Air Cassette □ Soil **Lead Waste Characterization:** □ TTLC □ STLC □ TCLP
Sample Storage	*□ No Test, Hold Sample Until: _____ *□ Post Test, Hold Sample Until:_____
Custom Order	□ Reanalysis by:_____ □ Sensitivity: _____ □ Composite □ Other:

Sample #	Sample Type	Date Collected	Time On	Time Off	Total Time (min)	Flow Rate (lpm) On	Flow Rate (lpm) Off	Flow Rate (lpm) Average	Volume or Area Sampled	8 Hour TWA Requested	Description
Test Pit 1	Soil (Rock)	2/23/12								□	CARB 435 PLM 400PC
Test Pit 2	Soil (Rock)	2/23/12								□	"
Test Pit 5	Soil (Rock)	2/23/12								□	"
										□	
										□	
										□	
										□	
										□	
										□	
										□	
										□	
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Submitted By	Sarah C. Lockwood	**Received By**	
Date/Time Submitted	7/5/13 / 14:00	**Date/Time Received**	07-08-13 P02:13 IN
Submitted By		**Received By**	ATEM/RJapaly
Date/Time Submitted		**Date/Time Received**	

*All samples will be held for 3 months from the date of receipt at ATEM. Additional sample storage time may be obtained through ATEM Customer Service