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El Dorado County
Department of Transportation (DOT)
2850 Fairlane Court
Placerville, California 95667

Project No. E04198.005
7 December 2011

Attention: Mr. Ronald Conway

Subject: **HEADINGTON ROAD MAINTENANCE YARD IMPROVEMENTS – UPDATE**
Headington Road
Placerville, California
FOUNDATION DESIGN CRITERIA UPDATE

References:
1. Proposal and Contract for Headington Maintenance Yard, executed 2 August 2005 by Youngdahl Consulting Group, Inc.
2. Foundation Design Criteria for Headington Road Maintenance Yard Improvements, prepared by Youngdahl Consulting Group, Inc., dated 18 August 2005 (Project No. E04198.005).

Dear Mr. Conway:

This letter updates the recommendations provided in the Reference 2 report to the 2010 California Building Code and the current standard of practice in the vicinity of the project.

Background
The Reference 2 report presents the findings and recommendations resulting from our site visit on 17 August 2005. The purpose of our visit was to observe and evaluate existing conditions relevant to the support of the proposed wash rack and sewer line improvements. We understand that the proposed improvements will include the construction of a wash rack (which may include a sump pit) and two additional sewer line installations for the existing facilities in Placerville, California. Our scope of work for the development of the Reference 2 report included our subsurface exploration, laboratory testing, and preparation of the letter report.

Site Description
The maintenance yard is located at 2441 Headington Road in Placerville, California. The maintenance yard is mostly covered by asphaltic concrete pavement for driveways and parking and has numerous corrugated steel and wood framed buildings throughout the site. The subject site is located north of Headington Road, and is bounded by residential and commercial properties on the north, east and west (which runs parallel to Missouri Flat Road). The proposed wash rack is centrally located on the site where an existing corrugated steel building is currently located. The proposed sewer lines are to be located along the eastern side of the site and the southern third of the site traversing north to south for the eastern line (Sewer Line 1) and west to east for the southern line (Sewer Line 2).

Subsurface Observations
During our subsurface exploration, we observed the soil conditions near the existing footings on the proposed wash rack. The native soil exposed near the footings appeared to be a moderately weathered bedrock in a dry state. A representative of Youngdahl Consulting Group, Inc. continuously observed three test pits excavated at the site. Test Pits TP-1 and TP-2 encountered approximately 2 to 12 inches (variable) asphalt concrete (AC) pavement with no aggregate baserock

beneath the AC. Below the AC, a moderately weathered metavolcanic BEDROCK was encountered to the maximum 6 feet depth explored. An electrical line was encountered in Test Pit TP-1 approximately 3 feet below the surface before the excavation was halted and relocated adjacent to the line. The line was covered by a medium course sand shading and backfilled with bedrock fill to the bottom of the AC pavement.

The eastern sewer line will likely encounter similar condition as the building except for existing fills which were encountered within Test Pit TP-3. The fills above the bedrock were composed of processed weathered bedrock materials and likely associated with the previous ramp buildup and surrounding grading. Beneath the sandy FILL, a layer of native red brown sandy SILT/silty SAND with trace to few clay in a moist and medium stiff/medium dense state was encountered from 4 feet to 6 feet depth. Beneath the native silty SANDS/sandy SILTS, a weathered metavolcanic BEDROCK was encountered (similar to bedrock encountered in Test Pits TP-1 and TP-2) to the maximum depth of 8 feet explored. No caving or groundwater was encountered in any of the test pits excavated. The southern sewer line exploration was not conducted at your request; however, we anticipate similar conditions

The laboratory testing of the collected bulk samples was precluded due to the existence of shallow weathered bedrock observed beneath the existing asphaltic concrete pavement in the proposed wash rack building location. Fill materials were composed of like materials previously graded for the ramp. The strength parameters of the foundation soils were based on exposed bedrock encountered during our exploration.

RECOMMENDATIONS

Seismic Criteria

Based on the 2010 California Building Code, Chapter 16, and our previous site investigation findings, the following seismic parameters are recommended from a geotechnical perspective for structural design. The final choice of design parameters, however, remains the purview of the project structural engineer.

CBC Chapter 16	Seismic Parameter	Recommended Value
Table No. 1613.5.2	Site Class	C
Figure No. 1613.5(3)*	Short-Period MCE at 0.2s, S_S	0.43g
Figure No. 1613.5(4)*	1.0s Period MCE, S_1	0.19g
Table No. 1613.5.3(1)**	Site Coefficient, F_a	1.20
Table No. 1613.5.3(2)**	Site Coefficient, F_v	1.61
Equation 16-36	Adjusted MCE Spectral Response Parameters, $S_{MS} = F_aS_s$	0.52
Equation 16-37	Adjusted MCE Spectral Response Parameters, $S_{M1} = F_vS_1$	0.31
Equation 16-38	Design Spectral Acceleration Parameters, $S_{DS} = ⅔S_{MS}$	0.35
Equation 16-39	Design Spectral Acceleration Parameters, $S_{D1} = ⅔S_{M1}$	0.21
Table 1613.5.6(1)	Seismic Design Category (Short Period) Occupancy I to III	C
Table 1613.5.6(1)	Seismic Design Category (Short Period) Occupancy IV	D
Table 1613.5.6(2)	Seismic Design Category (1-Second Period), Occupancy I to III	D
Table 1613.5.6(2)	Seismic Design Category (1-Second Period), Occupancy IV	D

* Values from Figures 1613.5(3)/(4) are derived from the National Earthquake Hazards Reduction Program (NEHRP) for Site Class B soil profiles.

** Values from Tables 1613.3(1)/(2) are adjustments to account for the Site Class (Project Specific) provided in Table 1613.5.2.

Foundations

We offer the following comments and recommendations for purposes of footing design and construction. **Our firm should be afforded the opportunity to review the project foundation plans to confirm the applicability of the recommendations provided below. Modifications to these recommendations may be made at the time of our review.**

Bearing Capacity: Based on a footing depth of 12 inches, and a minimum width of 12 inches, an allowable dead plus live load bearing pressure of 4,000 psf. may be used for footings based on weathered bedrock. An allowable dead plus live load bearing pressure of 2,500 psf is considered suitable for design of footings 18 inches deep and 12 inches wide founded in firm native soils or engineered fills composed of like materials. The above allowable pressures are for support of dead plus live loads and may be increased by 1/3 for short-term wind and seismic loads.

Footing Configuration: Continuous spread footing foundations should be reinforced with a minimum of four No. 4 reinforcing bars, two located near the bottom of the footing and two near the top of the footing. Final design is the purview of the structural engineer.

All footings should be founded below an imaginary 2.5H:1V plane projected up from the bottoms of adjacent footings and/or parallel utility trenches, or to a depth that achieves a minimum horizontal clearance of 6 feet from the outside toe of the footings to the slope face, whichever requires a deeper excavation.

Settlement: A total settlement of less than ½ inch is anticipated where foundations are bearing on like materials. This settlement is based upon the assumption that foundation loads will be typical of residential wood framed construction with foundations sized in accordance with the provided allowable bearing capacities.

Shallow Footing / Stemwall Backfill: We recommend that all footing or stemwall excavations be backfilled after the concrete has been poured. Either imported select fill or non-organic onsite soils can be used for this purpose. All footing backfill soil should be compacted to at least 90 percent of the maximum dry density (based on ASTM D1557).

Finish Grading Following Foundation Construction: All soils placed against foundations during finish grading should be compacted to at least 90 percent of the maximum dry density (based on ASTM D1557).

Lateral Pressures: Lateral forces on structures may be resisted by passive pressure acting against the sides of shallow footings and/or friction between the soil and the bottom of the footing. For resistance to lateral loads, a friction factor of 0.40 may be utilized for sliding resistance at the base of spread footings and a passive resistance of 400 pcf equivalent fluid weight may be used against the side of shallow footings in firm native materials or engineered fill. A friction factor of 0.45 may be utilized for sliding resistance at the base of spread footings and a passive resistance of 450 pcf equivalent fluid weight may be used against the side of shallow footings in weathered bedrock. If friction and passive pressures are combined, the lesser value should be reduced by 50 percent.

Retaining Walls

Our design recommendations and comments regarding retaining walls for the project site are discussed below.

Retaining Wall Foundations: For footings with a minimum depth of 12 inches into weathered bedrock, an allowable dead plus live load bearing capacity of 4,000 psf is considered appropriate. An allowable dead plus live load bearing capacity of 2,500 psf is considered appropriate for footings founded in firm native soil or engineered fill. The above allowable pressures are for support of dead plus live loads and may be increased by 1/3 for short-term wind and seismic loads.

Resisting Forces: Lateral forces on the retaining walls may be resisted by passive pressure acting against the side of the wall footing and/or friction between the soil and the bottom of the footing. A passive equivalent fluid weight of 400 pcf may be used against the sides of shallow footings and a friction factor of 0.40 may be used at the base of footings founded on firm native soil or engineered fill. A friction factor of 0.45 may be utilized for sliding resistance at the base of spread footings and a passive resistance of 450 pcf equivalent fluid weight may be used against the side of shallow footings in weathered bedrock. If friction and passive pressures are combined, the lesser value should be reduced by 50 percent.

Retaining Wall Lateral Pressures: Based on our observations and testing, the retaining wall should be designed to resist lateral pressure exerted from a soil media having an equivalent fluid weight provided in the following table. All backfill placed behind retaining walls or against retaining wall footings should be compacted to at least 90 percent of the maximum dry density based on the ASTM D1557 test method. The fill should be placed in thin horizontal lifts not to exceed 12 inches in uncompacted thickness. The fill should be moisture conditioned as necessary and compacted to a relative compaction of not less than 90 percent based on the ASTM D1557 test method. The upper

8 inches of fills placed under proposed pavement areas should be compacted to a relative compaction of not less than 95 percent based on the ASTM D1557 test method.

Wall Type	Wall Slope Configuration	Equivalent Fluid Weight (pcf)	Surcharge Load (psf)*	Lateral Pressure Coefficient	Earthquake Loading (plf)***
Free Cantilever	Flat	30	per structural	0.22	$3H^2$ Applied 0.6H above the base of the wall
Restrained**	Flat	50	per structural	0.35	

* The surcharge loads should be applied as uniform loads over the full height of the walls as follows: Surcharge Load (psf) = (q) (K), where q = surcharge in psf, and K = coefficient of lateral pressure. Final design is the purview of the project structural engineer.

** Restrained conditions shall be defined as walls which are structurally connected to prevent flexible yielding, or rigid wall configurations (i.e. walls with numerous turning points) which prevent the yielding necessary to reduce the driving pressures from an at-rest state to an active state.

*** Section 1803.5.12 of the 2010 California Building Code states that a determination of lateral pressures on basement and retaining walls due to earthquake loading shall be provided for structures to be designed in Seismic Design Categories D, E or F (Load value derived from Wood (1973) and modified by Whitman (1991)).

Wall Drainage: The above criteria are based on fully drained conditions. For these conditions, we recommend that a blanket of filter material be placed behind all proposed walls. The blanket of filter material should be a minimum of 12 inches thick and should extend from the bottom of the wall to within 12 inches of the ground surface. The filter material should conform to Class One, Type B permeable material as specified in Section 68 of the California Department of Transportation Standard Specifications, current edition. A clean ¾ inch angular gravel or ¾ inch crushed rock is also acceptable, provided filter fabric is used to separate the open graded gravel/rock from the surrounding soils. The top 12 inches of wall backfill should consist of a compacted native soil cap. A filter fabric should be placed on top of the gravel filter material to separate it from the native soil cap. A 4 inch diameter drain pipe should be installed near the bottom of the filter blanket with perforations facing down. The drainpipe should be underlain by at least 4 inches of filter-type material. As an alternative to drain pipe, where deemed appropriate, weep holes may be provided. Adequate gradients should be provided to discharge water that collects behind the retaining wall to an controlled discharge system. Prior to placement of the drainage blanket, additional consideration should be given to the use of a waterproofing membrane such as bituthene or equivalent membrane system on the outside of the wall.

Pavement Design

We understand that asphaltic pavements may be used for the associated parking and driveways. The following comments and recommendations are given for pavement design and construction purposes. All pavement construction and materials used should conform to applicable sections of the latest edition of the California Department of Transportation Standard Specifications.

Subgrade Compaction: After installation of any underground facilities, the upper 8 inches of subgrade soils under pavements sections should be compacted to a minimum relative compaction of 95 percent based on the ASTM D1557 test method at a moisture content near or up to 3 percent above optimum. Aggregate bases should also be compacted to a minimum relative compaction of 95 percent based on the aforementioned test method. All subgrades should be proof-rolled with a full water truck or equivalent immediately before paving, in order to verify their condition.

Design Criteria: Critical features that govern the durability of a pavement section include the stability of the subgrade; the presence or absence of moisture, free water, and organics; the fines content of the subgrade soils; the traffic volume; and the frequency of use by heavy vehicles. Soil conditions can be defined by a soil resistance value, or "R"-Value, and traffic conditions can be defined by a Traffic Index (TI).

Design Values: The following table provides recommended pavement sections based on materials expected to be exposed at subgrade as well as our experience with similar materials in the area. An R-value of 35 was utilized for the native and fill BEDROCK encountered. Review of test pit logs indicate that in some locations clay soils were encountered at depths of 5.5 to 6½ feet below grade. *If clay soils are encountered, we should review pavement subgrades to determine the appropriateness of the provided sections, and provide additional pavement design recommendations as field conditions dictate. Even minor clay constituents will greatly reduce the R-Value design value.* The recommended design thicknesses were calculated in accordance with the methods presented in the latest update of the Sixth Edition of the California Department of Transportation Highway Design Manual.

Design Traffic Indices	Alternative Pavement Sections (Inches)	
	Asphalt Concrete *	Aggregate Base **
4.5	2.5 3.0	5.0 4.0
5.0	2.5 3.0	6.0 5.0
5.5	3.0 3.5	6.0 5.0
6.0	3.0 3.5	7.5 6.5
6.5	3.5 4.0	8.0 7.0

Asphaltic Concrete: Meets specifications for Caltrans Type B Asphaltic Concrete
Aggregate Base: Meets specifications for Caltrans Class II Aggregate Base ("R"-Value = minimum 78)

Portland Cement Concrete (PCC) Pavements
The following recommendations are to address the proposed Portland cement concrete pavement construction at the above project site. An in-depth traffic study is beyond the scope of our work for this project. However, we anticipate that the traffic at the project site would consist primarily of construction type trucks and garbage trucks with axle loads varying from 20,000 to 30,000 pounds.

The following table provides recommended pavement section thicknesses based on concrete compressive strengths and varying loading conditions:

Concrete Compressive Strength (psi)	Pavement Thickness (Inches)		
	Axle Load (Pounds)		
	≤ 20,000	25,000	30,000
2,500	7.5	8.0	8.5
3,000	7.0	7.5	8.0
3,500	6.5	7.0	7.5
4,000	6.5	6.5	7.0

The above values were determined in accordance with the computer program PCAPAV 2.10 (Portland Cement Association), modified as necessary for use at the project site. A 20-year design life was assumed, as well as an average daily truck traffic of 4; half of the trucks were assumed to be in the largest axle load range, and the other half distributed among the smaller load ranges. If steel reinforcement is utilized, the above structural section thicknesses may be reduced by 1 inch. The reinforcement should consist of a minimum of #4 deformed reinforcing bars placed at 24 inches on center, both ways in the center of the structural section. A modulus of subgrade reaction of k = 175 psi per inch was utilized in our design

The long-term performance of PCC pavement is related to the volume of traffic it is subjected to short-term performance can be affected by heavy truck traffic when axle loads exceed the values listed in the above table. An increase in the average daily truck traffic would result in a decrease of the design life of the pavement. The final selection of concrete thickness, compressive strength, and traffic volumes should be based on cost and desired level of future maintenance, and is the purview of the project design engineer.

Pavement underlayment should consist of a minimum of 4 inches of Cal Trans Class II aggregate baserock compacted to a minimum of 95 percent of the maximum dry density as determined by the ASTM D1557 test method. The top 8 inches of soil subgrades should also be compacted to a minimum of 95 percent of the maximum dry density. Tooled or saw cut contraction joints grooved to one-fourth the slab thickness should be used to separate the pavement into nearly square sections with a spacing of no more than 30 times the slab thickness, each way. A concrete shrinkage of approximately 1/16 inch per 10 feet of length should be anticipated and contraction joints should be designed accordingly. Expansion (isolation) joints should be substituted for every other joint.

Drainage Considerations

All grades should provide rapid removal of surface water runoff; ponding water should not be allowed on building pads or adjacent to foundations or other structural improvements (during and following construction). All soils placed against foundations during finish grading should be compacted to minimize water infiltration. Finish and landscape grading should include positive drainage away from all foundations. Surface grades should slope a minimum of 2 percent away from all foundations for at least 5 feet but preferably 10 feet, and then 2 percent along a drainage swale to the outlet. Downspouts should be tight piped via an area drain network and discharged to an appropriate non-erosive outlet away from all foundations.

Post Construction: All drainage related issues may not become known until after construction and landscaping are complete. Therefore, some mitigation measures may be necessary following site development. In foothill areas constructed with cut/fill pads on shallow bedrock conditions, seepage may not be apparent until post construction. In order to mitigate these conditions additional subdrainage measures may be necessary.

DESIGN REVIEW AND CONSTRUCTION MONITORING

The design plans and specifications should be reviewed and accepted by Youngdahl Consulting Group, Inc., prior to contract bidding. A review should be performed to determine whether the recommendations contained within this report are still applicable and/or are properly reflected and incorporated into the project plans and specifications.

Construction Monitoring

Construction monitoring is a continuation of the findings and recommendations provided in this report. It is essential that our representative be involved with all grading activities in order for us to provide supplemental recommendations as field conditions dictate. Youngdahl Consulting Group, Inc. should be notified at least two working days before site clearing or grading operations commence, and should observe the stripping of deleterious material and provide consultation to the Grading Contractor in the field.

Post Construction Monitoring
As described in Post Construction section of this report, all drainage related issues may not become known until after construction and landscaping are complete. Youngdahl Consulting Group, Inc. can provide consultation services upon request that relate to proper design and installation of drainage features during and following site development.

LIMITATIONS AND UNIFORMITY OF CONDITIONS

1. This report has been prepared for the exclusive use of El Dorado County Department of Transportation for specific application to the Headington Maintenance Yard Improvements project. Youngdahl Consulting Group, Inc. has endeavored to comply with generally accepted geotechnical engineering practice common to the local area. Youngdahl Consulting Group, Inc. makes no other warranty, expressed or implied.

2. As of the present date, the findings of this report are valid for the property studied. With the passage of time, changes in the conditions of a property can occur whether they be due to natural processes or to the works of man on this or adjacent properties. Legislation or the broadening of knowledge may result in changes in applicable standards. Changes outside of our control may cause this report to be invalid, wholly or partially. Therefore, this report should not be relied upon after a period of three years without our review nor should it be used or is it applicable for any properties other than those studied.

3. Section 107.3.4.1 of the 2010 California Building Code states that, in regard to the design professional in responsible charge, the building official shall be notified in writing by the owner if the registered design professional in responsible charge is changed or is unable to continue to perform the duties.

   WARNING: Do not apply any of this report's conclusions or recommendations if the nature, design, or location of the facilities is changed. If changes are contemplated, Youngdahl Consulting Group, Inc. must review them to assess their impact on this report's applicability. Also note that Youngdahl Consulting Group, Inc. is not responsible for any claims, damages, or liability associated with any other party's interpretation of this report's subsurface data or reuse of this report's subsurface data or engineering analyses without the express written authorization of Youngdahl Consulting Group, Inc.

4. The analyses and recommendations contained in this report are based on limited windows into the subsurface conditions and data obtained from subsurface exploration. The methods used indicate subsurface conditions only at the specific locations where samples were obtained, only at the time they were obtained, and only to the depths penetrated. Samples cannot be relied on to accurately reflect the strata variations that usually exist between sampling locations. Should any variations or undesirable conditions be encountered during the development of the site, Youngdahl Consulting Group, Inc., will provide supplemental recommendations as dictated by the field conditions.

5. The recommendations included in this report have been based in part on assumptions about strata variations that may be tested only during earthwork. Accordingly, these recommendations should not be applied in the field unless Youngdahl Consulting Group, Inc. is retained to perform construction observation and thereby provide a complete professional geotechnical engineering service through the observational method. Youngdahl Consulting Group, Inc. cannot assume responsibility or liability for the adequacy of its recommendations when they are used in the field without Youngdahl Consulting Group, Inc. being retained to observe construction. Unforeseen subsurface conditions containing

soft native soils, loose or previously placed non-engineered fills should be a consideration while preparing for the grading of the property. It should be noted that it is the responsibility of the owner or his/her representative to notify Youngdahl Consulting Group, Inc., in writing, a minimum of 48 hours before any excavations commence at the site.

Should you have any questions or require additional information about this update to the Reference 2 Foundation Design Criteria letter, please contact our office at your convenience.

Very truly yours,
Youngdahl Consulting Group, Inc.

Reviewed by:

REGISTERED PROFESSIONAL ENGINEER
MATTHEW J. GROSS
No. 77630
Exp. 06-30-13
CIVIL
STATE OF CALIFORNIA

Matthew J. Gross, P.E.
Project Engineer

REGISTERED PROFESSIONAL ENGINEER
JOHN C. YOUNGDAHL
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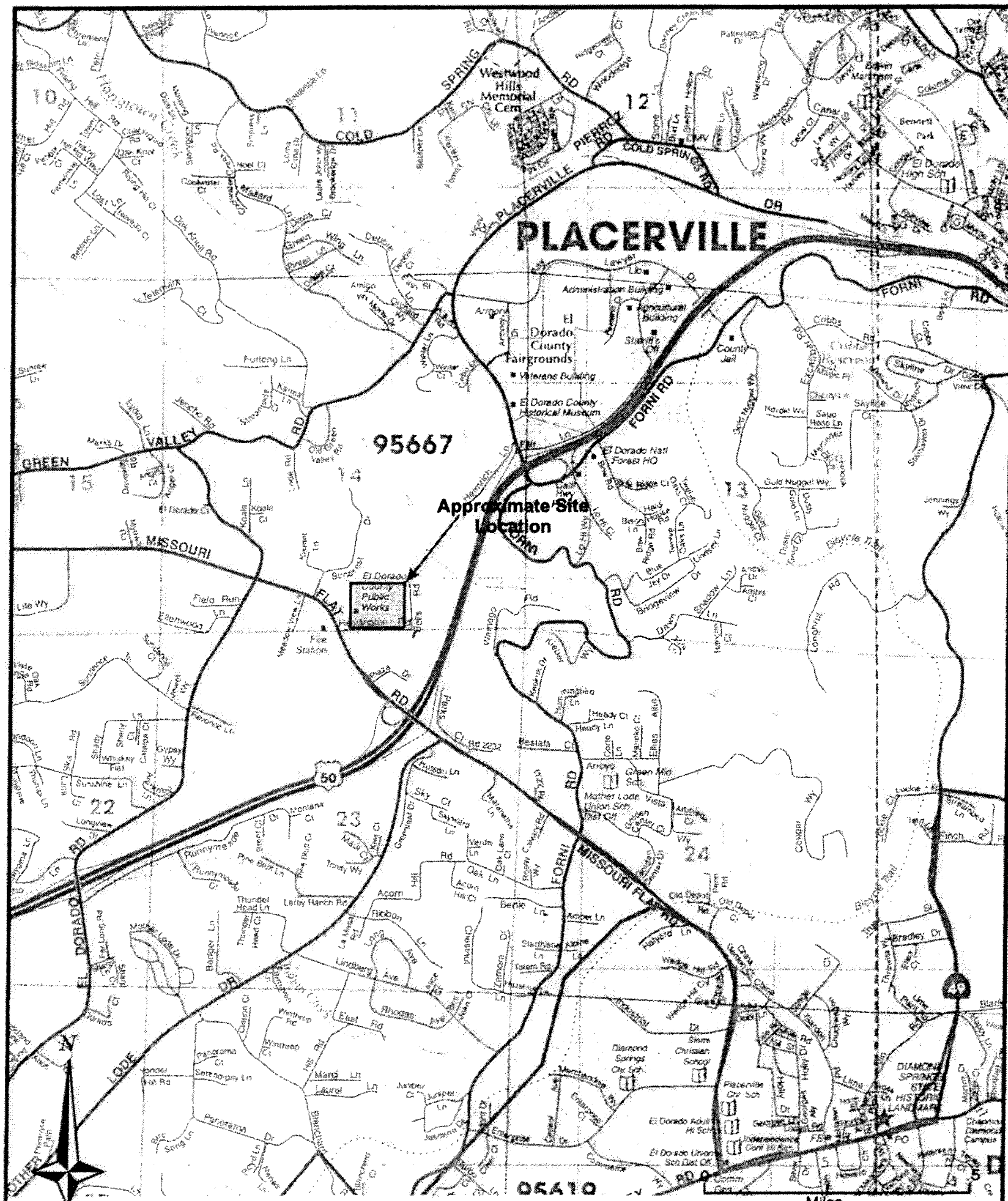
John C. Youngdahl, P.E.
Principal Engineer

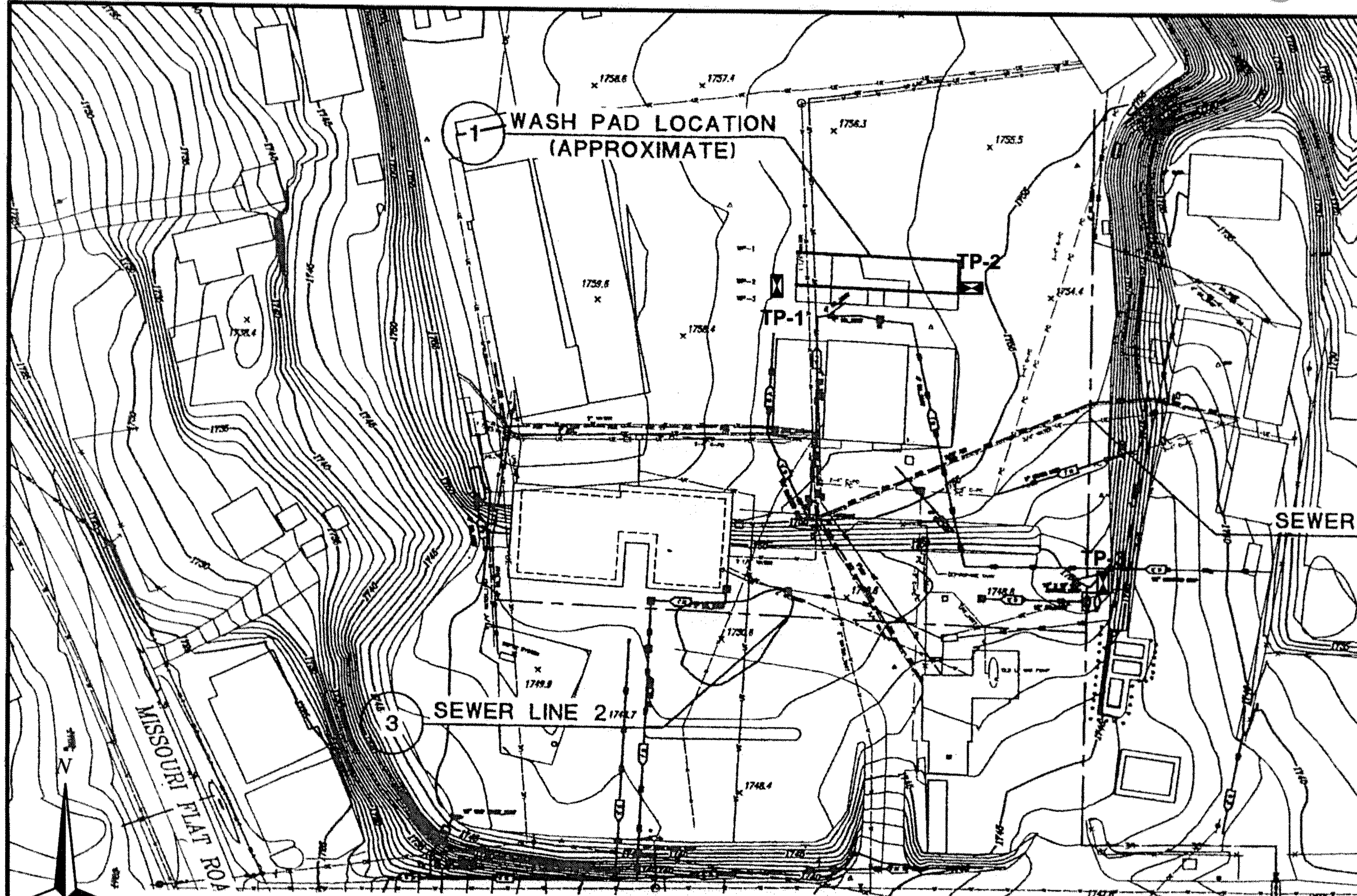
Attachments: Figure 1 (Vicinity Map)
Figure 2 (Site Map)
Figures 3-5 (Exploratory Test Pit Logs)
Figure 6 (Soil Classification Chart and Pit Log Legend)

Copies: (4) to Client



REFERENCE: El Dorado County Compass Map 2004 Page 200

YOUNGDAHL CONSULTING GROUP, INC. GEOTECHNICAL • ENVIRONMENTAL • MATERIALS TESTING	Project No.: E04198.005 **December 2011**	**VICINITY MAP** **Headington Maintenance Yard** Placerville, California	**FIGURE** **1**



= Approximate Test Pit Locations

REFERENCE: El Dorado County DOT, preliminary, dated 8/01/05

0 20 40 80

Approximate Scale: 1" = 40'

YOUNGDAHL CONSULTING GROUP, INC.
GEOTECHNICAL • ENVIRONMENTAL • MATERIALS TESTING

Project No.: E04198.005

December 2011

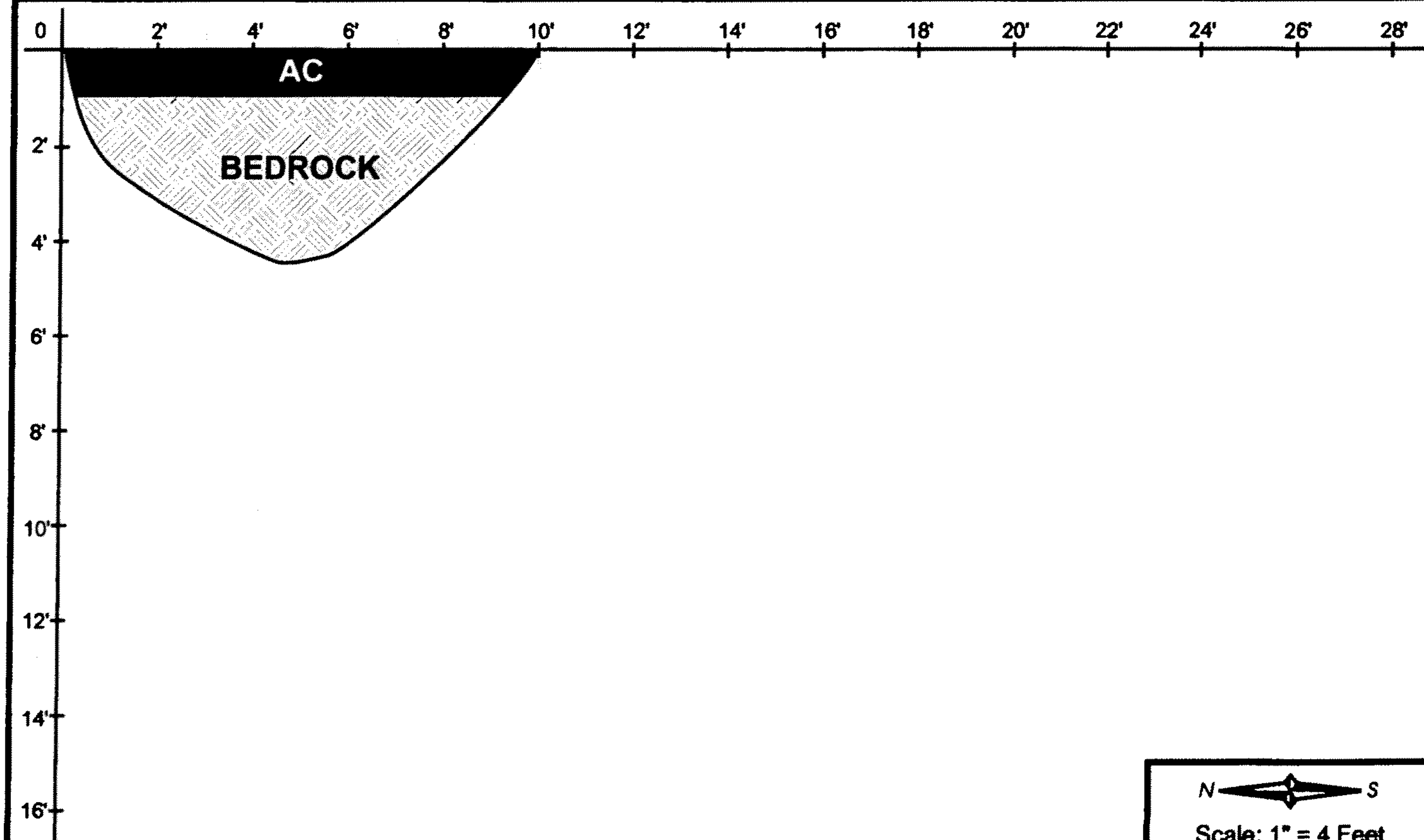
SITE PLAN

Headington Maintenance Yard
Placerville, California

FIGURE 2

Logged By: **VPD**	Date: **17 August 2005**	Elevation:	Pit No. **TP-1**
Equipment: **John Deere 310 SG with 24" Bucket**		Pit Orientation: **N - S**	

Depth (Feet)	Geotechnical Description & Unified Soil Classification	Sample	Tests & Comments
@ 0 - 1'	AC		
@ 1' - 4.5'	Yellow brown metavolcanic **BEDROCK**, moderately weathered, moderately indurated to indurated	**Rock 1** @ 1.5'-4.5'	
	Test pit terminated at 4.5' (practical refusal) No free groundwater encountered No caving noted		

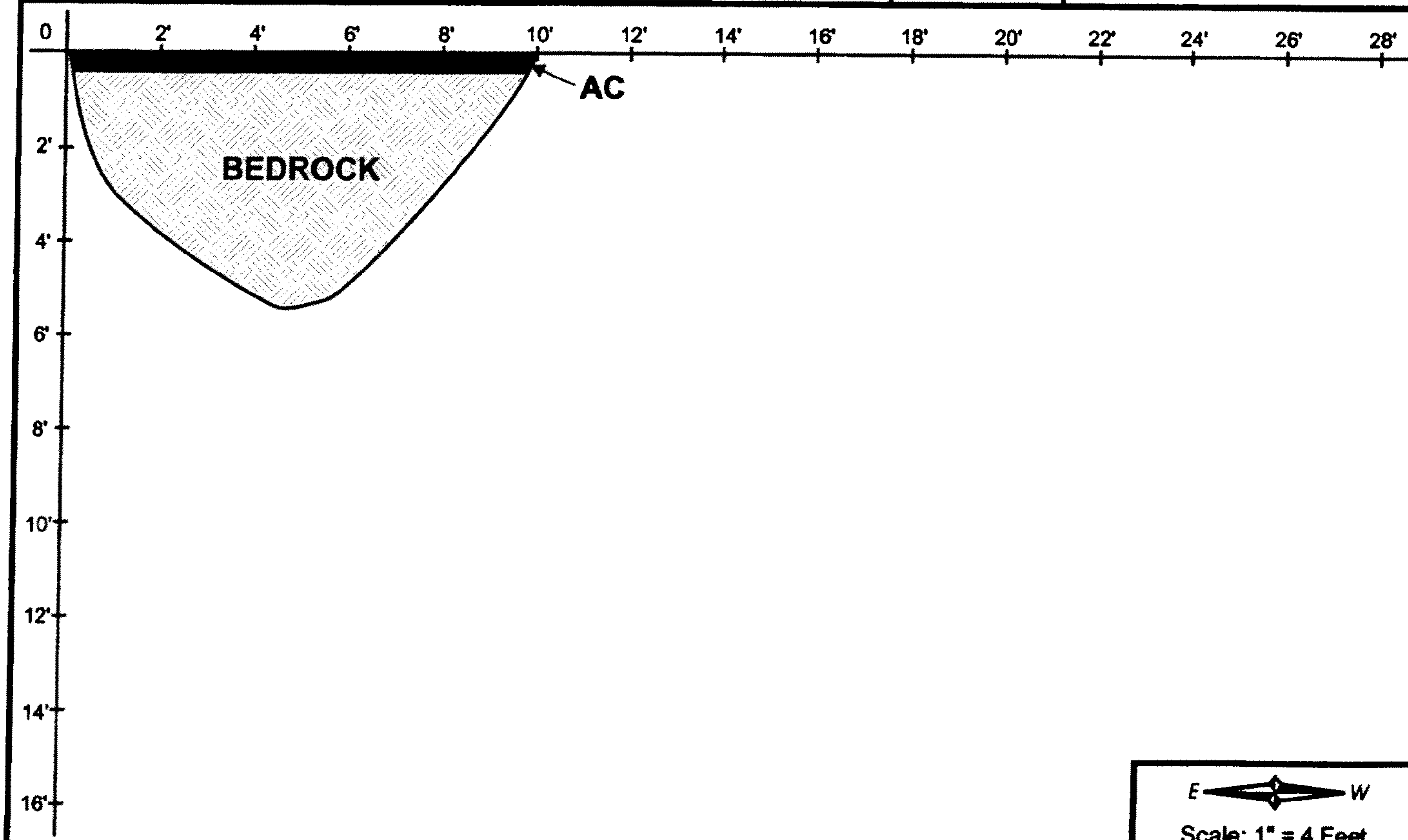


Note: The test pit log indicates subsurface conditions only at the specific location and time noted. Subsurface conditions, including groundwater levels, at other locations of the subject site may differ significantly from conditions which, in the opinion of Youngdahl Consulting Group, Inc., exist at the sampling locations, Note, too, that the passage of time may affect conditions at the sampling locations.

YOUNGDAHL CONSULTING GROUP, INC. GEOTECHNICAL • ENVIRONMENTAL • MATERIALS TESTING	Project No.: E04198.005 **December 2011**	**EXPLORATORY TEST PIT LOG** **Headington Maintenance Yard** Placerville, California	**FIGURE 3**

Logged By: **VPD**	Date: **17 August 2005**	Elevation:	Pit No. **TP-2**
Equipment: **John Deere 310 SG with 24" Bucket**		Pit Orientation: **E - W**	

Depth (Feet)	Geotechnical Description & Unified Soil Classification	Sample	Tests & Comments
@ 0 - 3"	AC		
@ 3" - 5'	Yellow brown metavolcanic **BEDROCK**, moderately weathered, weakly indurated to moderately indurated		
	Test pit terminated at 5' No free groundwater encountered No caving noted		

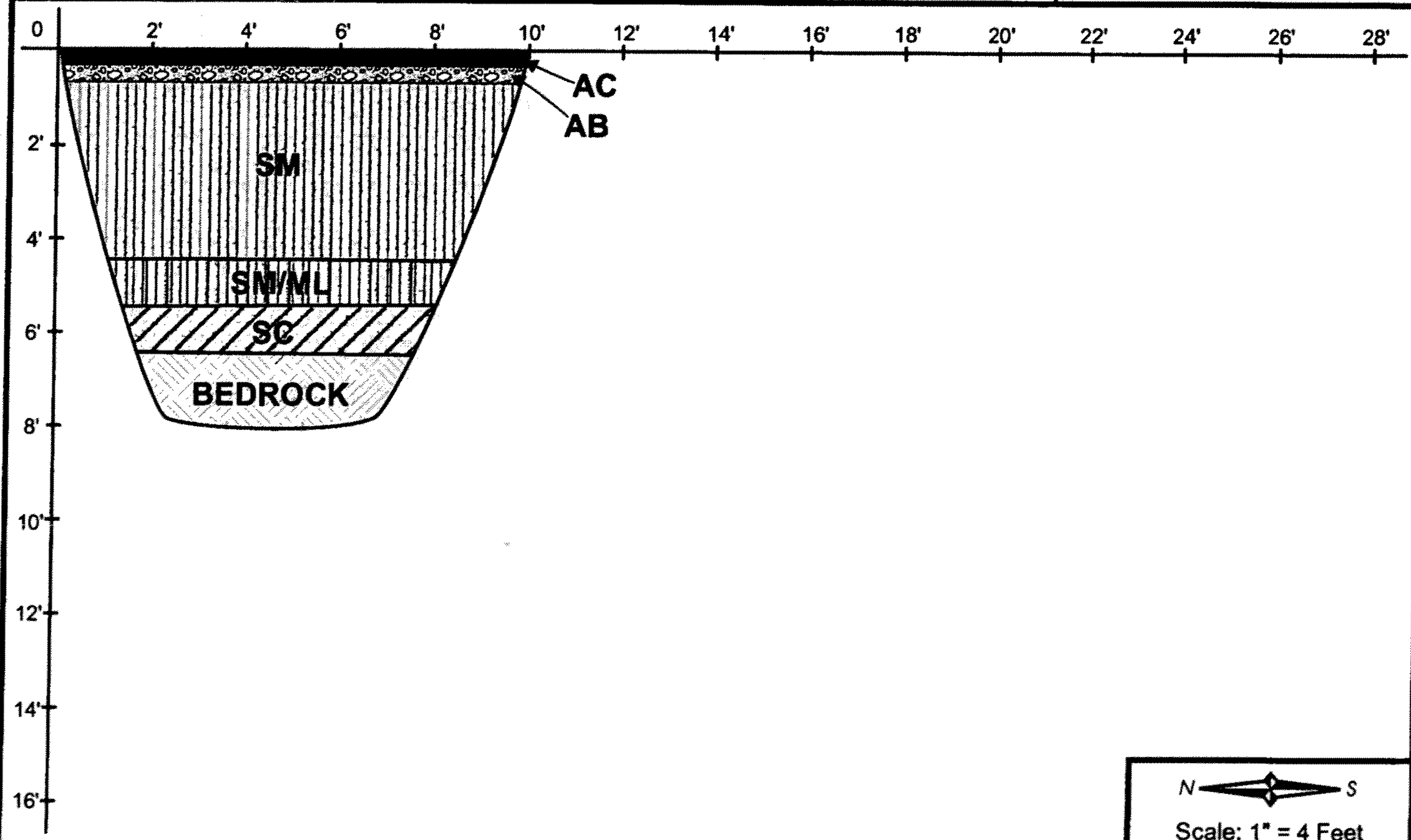


Note: The test pit log indicates subsurface conditions only at the specific location and time noted. Subsurface conditions, including groundwater levels, at other locations of the subject site may differ significantly from conditions which, in the opinion of Youngdahl Consulting Group, Inc., exist at the sampling locations, Note, too, that the passage of time may affect conditions at the sampling locations.

YOUNGDAHL CONSULTING GROUP, INC. GEOTECHNICAL • ENVIRONMENTAL • MATERIALS TESTING	Project No.: E04198.005 **December 2011**	**EXPLORATORY TEST PIT LOG** **Headington Maintenance Yard** Placerville, California	**FIGURE 4**

Logged By: **VPD**	Date: **17 August 2005**	Elevation:	Pit No. **TP- 3**
Equipment: **John Deere 310 SG with 24" Bucket**		Pit Orientation: **N - S**	

Depth (Feet)	Geotechnical Description & Unified Soil Classification	Sample	Tests & Comments
@ 0 - 4"	AC		
@ 4" - 1'	AB		
@ 1' - 4.5'	Yellow brown silty **SAND (SM)**, medium dense, moist (FILL)		
@ 4.5' - 5.5'	Red brown silty **SAND** to sandy **SILT(SM/ML)**, with trace clay, medium dense, moist (Native)		
@ 5.5' - 6.5'	Red brown clayey **SAND (SC)**, medium dense, moist		
@ 6.5' - 8'	Yellow brown to red brown metavolcanic **BEDROCK**, moderately weathered, moderately indurated		
	Test pit terminated at 8' No free groundwater encountered No caving noted		



Note: The test pit log indicates subsurface conditions only at the specific location and time noted. Subsurface conditions, including groundwater levels, at other locations of the subject site may differ significantly from conditions which, in the opinion of Youngdahl Consulting Group, Inc., exist at the sampling locations, Note, too, that the passage of time may affect conditions at the sampling locations.

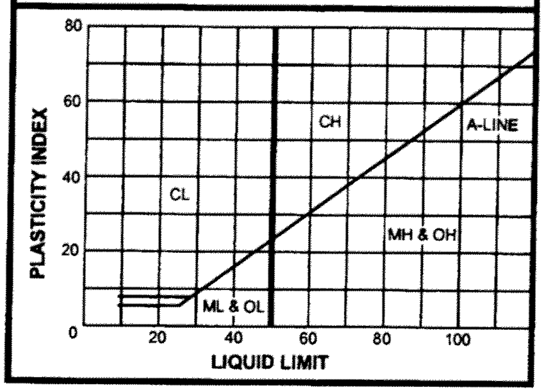
YOUNGDAHL CONSULTING GROUP, INC. GEOTECHNICAL • ENVIRONMENTAL • MATERIALS TESTING	Project No.: E04198.005 **December 2011**	**EXPLORATORY TEST PIT LOG** **Headington Maintenance Yard** Placerville, California	**FIGURE 5**

UNIFIED SOIL CLASSIFICATION SYSTEMS

MAJOR DIVISION			SYMBOLS	TYPICAL NAMES
COARSE GRAINED SOILS Over 50% > #200 sieve	GRAVELS Over 50% > #4 sieve	Clean **GRAVELS** With Little Or No Fines	GW	Well graded **GRAVELS**, **GRAVEL-SAND** mixtures
			GP	Poorly graded **GRAVELS**, **GRAVEL-SAND** mixtures
		GRAVELS With Over 12% Fines	GM	Silty **GRAVELS**, poorly graded **GRAVEL-SAND-SILT** mixtures
			GC	Clayey **GRAVELS**, poorly graded **GRAVEL-SAND-CLAY** mixtures
	SANDS Over 50% < #4 sieve	Clean **SANDS** With Little Or No Fines	SW	Well graded **SANDS**, gravelly **SANDS**
			SP	Poorly graded **SANDS**, gravelly **SANDS**
		SANDS With Over 12% Fines	SM	Silty **SANDS**, poorly graded **SAND-SILT** mixtures
			SC	Clayey **SANDS**, poorly graded **SAND-CLAY** mixtures
FINE GRAINED SOILS Over 50% < #200 sieve	SILTS & CLAYS Liquid Limit < 50		ML	Inorganic **SILTS**, silty or clayey fine **SANDS**, or clayey **SILTS** with plasticity
			CL	Inorganic **CLAYS** of low to medium plasticity, gravelly, sandy, or silty **CLAYS**, lean **CLAYS**
			OL	Organic **CLAYS** and organic silty **CLAYS** of low plasticity
	SILTS & CLAYS Liquid Limit > 50		MH	Inorganic **SILTS**, micaceous or diamacious fine sandy or silty soils, elastic **SILTS**
			CH	Inorganic **CLAYS** of high plasticity, fat **CLAYS**
			OH	Organic **CLAYS** of medium to high plasticity, organic **SILTS**
HIGHLY ORGANIC CLAYS			PT	PEAT & other highly organic soils

PLASTICITY CHART

USED FOR CLASSIFICATION OF FINE GRAINED SOILS



SAMPLE DRIVING RECORD

BLOWS PER FOOT	DESCRIPTION
25	25 Blows drove sampler 12 inches, after initial 6 inches of seating
50/7"	50 Blows drove sampler 7 inches, after initial 6 inches of seating
50/3"	50 Blows drove sampler 3 inches during or after initial 6 inches of seating

Note: To avoid damage to sampling tools, driving is limited to 50 blows per 6 inches during or after seating interval.

SOIL GRAIN SIZE

U.S. STANDARD SIEVE	6"		3"	¾"	4	10	40	200	
SOIL	BOULDER	COBBLE	GRAVEL COARSE	GRAVEL FINE	SAND COARSE	SAND MEDIUM	SAND FINE	SILT	CLAY
GRAIN SIZE IN MILLIMETERS	150		75	19	4.75	2.0	.425	0.075	0.002

KEY TO PIT & BORING SYMBOLS

- Standard Penetration test
- 2.5" O.D. Modified California Sampler
- 3" O.D. Modified California Sampler
- Shelby Tube Sampler
- 2.5" Hand Driven Liner
- Bulk Sample
- Water Level At Time Of Drilling
- Water Level After Time Of Drilling
- P Perched Water

KEY TO PIT & BORING SYMBOLS

	Joint
	Foliation
	Water Seepage
NFWE	No Free Water Encountered
FWE	Free Water Encountered
REF	Sampling Refusal
DD	Dry Density (pcf)
MC	Moisture Content (%)
LL	Liquid Limit
PI	Plasticity Index
PP	Pocket Penetrometer
UCC	Unconfined Compression (ASTM D2166)
TVS	Pocket Torvane Shear
EI	Expansion Index (ASTM D4829)
Su	Undrained Shear Strength

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GEOTECHNICAL • ENVIRONMENTAL • MATERIALS TESTING

Project No.: E04198.005	**SOIL CLASSIFICATION CHART & LOG EXPLANATION** **Headington Maintenance Yard** Placerville, California	**FIGURE 6**
December 2011		