Taber
Since 1954

3911 West Capitol Avenue
West Sacramento, CA 95691-2116
(916) 371-1690
(707) 575-1568
Fax (916) 371-7265
www.taberconsultants.com

FOUNDATION AND ROADWAY STUDY

New York Creek Pedestrian Bridge and
New York Creek Trail East
Tam O'Shanter Drive to Silva Valley Parkway
El Dorado County, California

El Dorado County
Lead Agency

El Dorado County DOT
Design Engineer

2009-0071-2

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April 30, 2012

Taber Consultants
Engineers and Geologists

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Proposed New York Creek Pedestrian Bridge and
SMUD Bike Path
Tam O'Shanter Drive to Silva Valley Parkway
El Dorado County, California

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Introduction

A limited study of subsurface materials and conditions has been completed for the above project in accordance with the scope of work agreed upon between El Dorado County Department of Transportation (EDCDOT) and Taber Consultants. The EDCDOT project number is 97005 and the task order number is 09-52636-09.

The purpose of this study is to provide geotechnical data for use in planning and design of the proposed bridge and trail. Limitations of this study are discussed in the attached "General Conditions."

Site and Project Description

The project site is located within the Sierra Nevada Geomorphic Province, within the foothills of the Sierra Nevada Mountain Range. The site is 2.9±miles north of U.S. Highway 50, between Tam O'Shanter Drive (west) and Silva Valley Parkway (east). New York Creek flows northward in the site vicinity to Folsom Lake, about 2.5±miles north of the site. Local terrain includes open valleys with gentle slopes separated by rolling to moderately steep hills and mountains reaching elevations of up to 1200±feet. The site location is shown in Figure-1, "Vicinity Map".

The site is vegetated with grass, some thick blackberry bushes, and deciduous trees; minor wetland vegetation was observed in the stream channel. We observed gravel, cobble, and boulder alluvium in the channel, with few apparent rock outcrops.

Near-vertical cut banks approximately 2±feet high were observed at the edges of the channel. Flow within the channel was about one foot deep at the time of our site visits (January 5, 6, and 7, 2012). Site grades are generally about 7H:1V (horizontal:vertical) west of the channel banks, and about 10H:1V or flatter to the east of the creek.

We observed a minor drainage that did not contain any surface water at the time of our visits about 400±feet east of the New York Creek channel. The minor drainage appears to carry the majority of the surface water from the site, draining northward, parallel to New York Creek.

January 3, 2012: Looking North, downstream, along New York Creek near the proposed alignment.

Electronic plans were provided by EDCDOT, the most recent of which was received on April 20, 2012, titled "New York Creek Trail East Class 1 Bike Trail and Shared Use Path" dated March 15, 2012, including 7 sheets (S-1 to S-7), showing the existing grade elevations and existing site features. The proposed bridge, trail, stationing, and site grading are also shown on the plans.

We understand the bridge is to be a 110±foot long, 12±foot wide, single-span wood-deck structure resting on cast-in-place concrete abutments founded on spread footings. Proposed bridge embankment fills are up to 10±feet high above the existing ground surface at the centerline. The full extent of these fills is no shown on provided plans, but appears to be on the order of 60±feet wide at its widest point near the abutments and on the order of 80±feet long behind each abutment. Wing walls are shown on each side of the two abutments and to be 12 feet long parallel to the centerline. The bridge is towards the west end of the proposed roughly 1700±foot-long and 12±foot-wide paved trail.

No bridge loads have been provided. Although the project is designated as a pedestrian bridge, we have assumed the occasional (restricted) light vehicle traffic (ex., County maintenance pickup truck) during the design life.

El Dorado County survey elevations appear similar to the elevations shown on USGS topographic mapping of the area, but it is uncertain if the two are equivalent. The elevations in this report, except those shown in Figure-1, are based on El Dorado County survey elevations.

The stationing for the proposed bridge and trail extends from a few feet west of Tam O'Shanter Drive, on the existing paved trail in Stephen Harris Park (STA 0+00, about elev. 730±feet), to the west edge of Silva Valley Parkway (STA 17+47, about elev. 738±feet). The deck of the proposed bridge is shown from STA 2+95 to STA 4+05, ranging from elev. 712 to 708±feet. New York Creek crosses the alignment at about STA 3+71, with low channel grade at about elev. 694.5±feet. The minor drainage east of New York Creek is at about STA 8+00, with low channel grade at the north edge of the site of about elev. 713±feet.

The site is within the 200-foot wide Sacramento Municipal Utility District (SMUD) overhead power line easement from STA 1+00 to the east end of the project. From STA 0+00 to about STA 1+00, the project alignment is within the 100-foot wide Pacific Gas and Electric (PG&E) overhead power line easement, which is north of and parallel to the SMUD easement.

We observed an unpaved road east of the creek in a somewhat similar alignment to the proposed paved path. West of the creek, there is a paved driveway along the south edge of the site leading to a utility structure west of the creek. The structure is possibly associated with sanitary sewer lines running roughly parallel to the creek on the west side of the creek. The plans show additional sanitary sewer lines on the east side of the creek, also roughly parallel to the creek.

Figure-2, "Boring Location Map" shows site extents, site topography, boring and test pit locations, the proposed alignment, the proposed bridge, major utilities, and New York Creek.

Exploration and Testing

The subsurface conditions at the site were explored by drilling one boring at each proposed abutment location to depths of 33½±ft and 23.5±ft below the existing grade for borings B-1 and B-2, respectively. Borings were drilled with a track-mounted CME-55 HD drill rig. Fifteen test pits were excavated along the proposed bike path alignment to evaluate subsurface materials for cuts and fills. Test pits extended to depths shown in Table-1; maximum depth was 10.0±feet. Test pits were excavated with a Caterpillar 420 D backhoe. Boring and test pit locations are indicated on Figure 2.

Logs of the borings for the proposed bridge are presented in our "Log of Test Borings" drawing and the test pit logs are presented as Figure 3. Based on our boring elevation survey and the site plan provided, ground surface elevations for the borings in the proposed bridge location are 699-703±ft; surface elevations for the test pits are 714-729±feet to the west of the bridge and 716-739±feet to the east of the bridge.

Soil samples were recovered from the auger/rotary borings by means of 2.0-inch outside diameter "Standard Penetration" (per ASTM D1586) "split-spoon" sampler. The sampler was advanced with standard 350 ft-lb striking force (per ASTM D1586) using a calibrated auto hammer (recent energy analysis indicated 93% efficiency). Sampler penetration resistance was recorded to provide a field measure of soil consistency and can be correlated to soils strength and bearing characteristics. The borings were logged and earth materials field-classified by our field engineer as to consistency, color, gradation, and texture based on sampler penetration resistance, examination of samples, and observation of drill cuttings.

Where diamond coring was used to advance the borings (B-1 and B-2), the recovered cores were logged as to percent recovery and Rock Quality Designation (RQD). Cores were stored in core boxes for reference. Rock core samples were subjected to point load index testing (results are presented in the "Log of Test Borings" drawing and in Figure-4). Portions of drive samples were retained in sealed containers for laboratory testing and reference. Moisture content, dry density, and unconfined compressive strength tests were conducted on selected samples (drive sample test results are shown in the "Log of Test Borings" drawing).

Groundwater observations were made in the borings and test pits during drilling and excavating, and also after drilling and excavating, before backfilling. The borings were backfilled with neat cement grout and the test pits were backfilled with the excavated material.

Matt Lattin, EIT, was the field engineer for drilling operations, conducted January 5-6, 2012. Bret McIntyre, CEG, was the field engineering geologist for the test pits excavated on January 17, 2012. The location of borings and test pit excavations are shown on the attached "Boring location Map" and "Log of Test Boring" drawings.

Corrosivity

Corrosivity tests consistent with Caltrans test methods 643, 417, and 422 were performed on bulk sample Bag A. Results of these tests, shown in Figure-4, indicate: soil pH of 6.88; minimum resistivity of 2,440 ohm-cm; Chloride concentration of 20.9 ppm; and Sulfate concentration of 32.3 ppm. These results are considered "non-corrosive" per Caltrans "Corrosion Guidelines," September 2003.

Naturally-Occurring Asbestos (NOA)

NOA testing per EPA test method 600/R-93/116 with preparation per California Air Resource Board (CARB) test method 435 encountered no asbestos fibers, as shown in Figure-4. Four samples were analyzed, including: soil from Bulk A near the surface of B-1; soil and rock from 4.1±feet depth in B-2; rock from 6.5±feet depth in B-2; and rock from 9.7±feet depth in B-2.

Geologic Setting

Geologic mapping of the area (CGS 2011 Preliminary Geologic Map of the Sacramento 30'x60' Quadrangle) shows the site to be underlain by the foothill mélange formation and Copper Hill Volcanics (divided by a fault with similar trace to New York Creek). The rock in these formations consists of metamorphosed volcanic rocks and minor metamorphosed sedimentary rocks.

Naturally-occurring asbestos is mapped within ¼-mile of the site to the north, south, and west; and a fault crosses the site that is a source for nearby naturally-occurring asbestos (El Dorado County "Asbestos Review Areas" and CDMG OFR 2000-002).

Earth Materials and Conditions

Separate investigations were performed for the pedestrian bridge (drilled borings only) and for the paved trail (excavated test pits only). Consequently, subsurface materials encountered have been divided separately for the pedestrian bridge and for the paved trail.

Pedestrian Bridge

Materials encountered in our drilled borings, B-1 and B-2, may be divided into three units for the purpose of design of the subject pedestrian bridge, including upper, middle, and lower units.

Upper unit materials consisting of loose to very dense silty sand, clayey sand, and silty, clayey sand with gravel were encountered from the ground surface to 4±feet depth (elev. 698.7±feet and elev. 695.6±feet in B-1 and B-2, respectively). Upper unit materials are susceptible to erosion if exposed, and are not considered capable of supporting concentrated, heavy loads.

Middle unit materials were encountered below upper unit materials to 15±feet depth (elev. 687.7±feet) and 10±feet depth (elev. 689.6±feet) in B-1 and B-2, respectively. Middle unit materials consist of very intensely weathered, soft to moderately soft, very intensely to intensely fractured metamorphic rock. Middle unit materials are capable of supporting concentrated, moderate to heavy loads, but are susceptible to erosion if exposed.

Lower unit materials were encountered below middle unit materials to the bottom of B-1 and B-2 at 33.5±feet depth (elev. 664.1±feet) and 23.5±feet depth (elev. 676.1±feet), respectively. Lower unit materials consist of slightly weathered to fresh, hard to very hard, slightly fractured metamorphic rock. Lower unit materials are capable of supporting heavy loads and are considered "resistant" to erosion if exposed.

Paved Trail

Subsurface materials in test pits TP-1 to TP-15, excavated for design of the subject paved trail, may be divided into three units.

Upper unit materials consisting of topsoil and clayey, silty sand were encountered from the ground surface to 0.1-0.8±feet in thickness. Upper unit materials contain roots and other deleterious organic materials, are not considered acceptable for supporting embankment fills or paved areas. Upper unit materials are susceptible to erosion if disturbed.

Middle unit materials were encountered in all test pits below the upper unit materials to depths of 3.5-10±feet, except in TP-10, where the bottom of middle unit materials was not encountered and the bottom of the pit was at 6±feet depth. Middle unit materials consist of weathered metamorphic and igneous rock; (compact) clayey silty sand and clayey gravel; and (stiff) sandy clay. The middle unit materials are interpreted as weathered rock or soil that the test pit backhoe was able to excavate. Middle unit materials are considered somewhat susceptible to erosion if exposed and are capable of supporting embankments and pavements.

Lower unit materials were encountered from as shallow as 3.5±feet to as deep as 9.5±feet, in test pits that reached lower unit materials. Lower unit materials were not encountered in TP-1, TP-08, TP-09, TP-10, and TP-11. Lower unit materials are defined as rock that could not be excavated by the backhoe during our subsurface investigation. Lower unit materials are considered "resistant" to erosion if exposed and capable of supporting the proposed embankments and pavements.

Groundwater

No free groundwater was encountered in our borings or test pits, but water was observed in the creek, flowing moderately with depth less than 1±foot and width less than 10±feet at the time of our site investigation. Moist to wet soils were encountered in TP-10 below 3±feet depth. Groundwater is anticipated to vary seasonally in the project area, consisting of water in the upper and middle unit materials perched above the lower unit materials. Water within the lower unit materials is at an unknown depth.

Although our borings extended to a depth of 33.5±feet, which could be below the water table, groundwater level was not measurable because water was pumped into the hole to facilitate the diamond-bit rock-coring drill method used to penetrate the middle and lower unit materials.

Site Seismic Conditions

The 2010 CGS (California Geological Survey) Fault Activity Map shows the Rescue fault (part of the Bear Mountains fault zone, within the Foothills fault system) to be the closest mapped active fault to the project site (7.6±miles / 12.3±km northeast of the project site). This fault generally strikes northwest and is indicated to be a normal fault, dipping vertically, with late quaternary activity (past 700,000 years).

An un-named fault trace that appears to be part of the Foothills fault system is shown to pass roughly through the site, but it is not shown to be active on the 2010 CGS fault map. These fault locations are consistent with those shown on the geologic map for the area (Gutierrez, C.I., 2011, "Preliminary Geologic Map of the Sacramento 30' x 60' quadrangle, California:" CGS, Preliminary Geologic Maps, scale 1:100,000).

The Caltrans ARS Online tool shows the Bear Mountains fault zone (Rescue fault section) to be the controlling active fault for the deterministic spectrum. The fault is shown the same distance from the site as on the CGS maps. The Caltrans ARS online tool does not show the un-named fault trace that appears to be part of the Foothills fault system.

The site is not in an "Alquist-Priolo Earthquake Fault Zone" for fault-rupture hazard.

Based on available data, the site can be assigned a soils profile Type-C (per Table B.12, Caltrans "Seismic Design Criteria" (SDC) Appendix-B Rev. 9/2009).

Caltrans ARS online tool was used to determine the design ARS spectrum for the proposed bridge location. Coordinates and shear wave velocities for the calculations included:

Latitude:	38.693182
Longitude:	-121.078024
Vs_{30}:	615 m/s

Caltrans structure design practice requires certain increases in ARS curves due to fault proximity and depth to bedrock. The typical Caltrans increase to bedrock acceleration for fault proximity (near-fault factor, if within 15 km) applies to this site due to the proximity of the Bear Mountains fault zone (Rescue fault section); such increases have been applied.

The Caltrans ARS Online Envelope Spectrum (considering both deterministic and probabilistic analyses) is included as Figure-5. For the 0 to 0.7 second portion of the ARS envelope curve, the minimum deterministic spectrum for the State of California controls. For the >0.7 second portion of the ARS envelope spectrum, the Caltrans ARS Online Probabilistic Response (the 2008 USGS 5% in 50 years hazard curve) is the controlling source spectrum.

Based on the above information, structure design is recommended to be based on the following SDC parameters:

- Soil Type C
- Controlling Spectra: Minimum deterministic spectrum for the State of California (0 to 0.7 second period) with Caltrans near-fault factor applied; and Caltrans ARS Online Probabilistic Response (>0.7 second period) with Caltrans near-fault factor applied

The risk of secondary seismic effects (liquefaction, lateral spreading, etc.), is expected to be low at this site owing to the low level of design ground shaking and foundations established in rock. Should there be important structural and/or economic considerations associated with more closely defining the above values or other site-seismicity characteristics, further study would be required.

Conclusions and Discussion

There are no overriding geologic hazards at the site and the materials encountered in our investigation are acceptable for supporting the subject bridge with spread footing foundations. The embankment fills and pavements will not require major over-excavation, but fill material will likely need to be imported to achieve the proposed grades. Local areas of "non-rippable" rock in excavation areas are anticipated.

Recommendations

Although different bridge configuration was discussed in the previous section, the following recommendations are based on the current design. For ease of presentation, separate recommendations follow for the subject bridge and the subject paved trail.

Bridge Recommendations

The proposed bridge may be supported on spread footings embedded into weathered rock. Weathered rock encountered in our test pits and borings is anticipated to be rippable with standard heavy construction equipment in the majority of the proposed cut sections, but rock-breaking equipment will likely be needed in some limited areas.

Spread Footings

We anticipate that the upper surface of intact weathered rock will be encountered at approximately 4±feet below ground surface at both abutment locations, based on materials encountered in our borings. For the design of the abutment and corresponding wing wall footings, excavations of 24-inches or deeper into intact weathered rock are considered appropriate for structure support. Footings should be poured neat into clean and dry excavations. The base of footing excavations should have minimum 5 ft horizontal clearance to slope face. Groundwater is expected in excavations for the proposed footings.

Footing data is provided in the table below based on materials encountered in our borings and Plan Sheet S-4, provided by El Dorado County DOT.

Spread Footing Data Table

Support Location	Apparent Footing Width	Bottom of Footing Elevation	Recommended Soil Bearing Pressure	
			WSD^1	LFD^2
			Gross Allowable Soil Bearing Pressure (q_{al})	Ultimate Soil Bearing Pressure (q_u)
Abut 1	10-ft	696.5	3 tsf	N/A
Abut 2	10-ft	693.0	3 tsf	N/A

Notes:

1) Working Stress Design, (WSD), the Maximum Contact Pressure, (q_{max}), is not to exceed the recommended Gross Allowable Soil Bearing Pressure, (q_{al}). The Ultimate Soil Bearing Capacity, (q_{ult}), will equal or exceed 3 times the recommended Gross Allowable Soil Bearing Pressure, (q_{al}).

2) Load Factor Design, (LFD), The Maximum Contact Pressure (q_{max}) divided by the Strength Reduction Factor ( ) is not to exceed the recommended Ultimate Soil Bearing Pressure (q_u). The Ultimate Soil Bearing Capacity, (q_{ult}), will equal or exceed the recommended Ultimate Soil Bearing Pressure, (q_u).

If variations in rock surface elevation and rock condition are encountered, over-excavation into competent material (to be confirmed by this office at the time of construction) should be performed. Any loose or disturbed materials at the base of footing elevation or within 2±ft horizontally adjacent to (or resulting from) the footing excavation, should be removed and replaced with plain concrete. Removal and replacement in this manner is acceptable for up to 2±ft below and 2±ft horizontally adjacent to the reinforced concrete footings without changing the footing dimensions or configuration.

An engineering geologist from this office should review the completed footing excavations for general compliance with the conclusions and recommendations in our geotechnical report and suitability for support of the intended foundations. Supplementary recommendations will be provided if needed and will be based on our observations during construction.

Earth Pressures

For "Caltrans Standard Backfill," active and at-rest soil pressures of 35 pcf and 55 pcf, respectively, are considered appropriate for use in wall design. Passive earth pressure of 400 pcf may be used for "Caltrans Standard Backfill." Incremental lateral soil pressure due to seismic loading may be calculated on the basis of an equivalent fluid pressure of 8 pcf acting at 0.6 times the wall height above the base of the wall.

Back-of-wall drainage elements per "Caltrans Standard Plans" are an integral part of these earth pressures.

Excavation Conditions

Some foundation areas of the proposed bridge will require excavation into lower unit materials (hard rock). Excavation through lower unit material and some of the middle unit material will only be possible with special tools, due to the hardness of the rock. The (lower unit) rock is not rippable with typical excavation machinery, and will require rock breaking equipment designed for use with hard rock.

The highest point load test result (from 17.9±feet depth (elev. 684.8±) in Run B of B-1) indicates a uniaxial compressive strength of about 38,000±psi which correlates to a seismic velocity (p-wave) of 19,400±fps based on Sharma and Sing, 2008. Based on Roberts, 1977, the highest velocity rock with "marginal" rippability is about 11,000±fps. The lowest point load test result in the lower unit that did not include an existing fracture (from 22.0±feet depth (elev. 677.6±) in Run E of B-2) indicates a uniaxial compressive strength of 19,000±psi which correlates to a p-wave velocity of 12,700±fps and is also in the "non-rippable" range.

Lower point load test results were on existing fractures and not representative of the true rock strength (all of these non-representative results are still in the "marginal" and "non-rippable" range). Point load test results are presented in Figure-4. Boulder- and cobble-sized material of similar hardness should also be expected in excavations.

Groundwater is anticipated to be encountered in open excavations and is expected to be controlled with diversion and / or pumping. The bottom of Abutment-2 excavations are at elev. 693±feet, which is about 1±feet below the channel thalweg and about 2±feet below the surface of water in the channel at the time of our exploration. Despite the higher elevation of the Abutment-1 excavation (lowest depth elev. 696.5±feet), groundwater is also anticipated.

Temporary construction backslopes should be reviewed during construction in evaluation of stability and for possible supplemental support (e.g., local shoring in areas of soft/weak materials). It is expected that construction backslopes should be stable at configurations of 2H:1V or flatter. All excavations should conform to CalOSHA standards; excavation and site safety are the responsibility of the contractor.

Bridge Embankments

All earthwork should be performed in accordance with Caltrans "Standard Specifications" supplemented by the recommendations below. It appears from field observations that roadway earthwork can be generally accomplished using typical earthmoving equipment.

The area to be graded should be stripped of all debris, vegetation, and other organic materials. Where woody vegetation is removed, all substantial roots should be excavated and removed. Debris, organic material, and otherwise unsuitable materials should be disposed to an approved location. If soft unsuitable materials are encountered, they should be removed to full depth with the exposed surface approved by this office and replaced with compacted engineered fill.

On-site soils (less debris or organic material, oversized material, or other deleterious material) are considered generally acceptable for use as compacted embankment fill. Native materials up to 4-inches in diameter can be used in the fill (up to 6-inches in diameter can be used as backfill for fills below 4-ft of finished grade). It is recommended that material larger than 3-inches be placed in the lowermost portions of fills. The larger materials should not be nested.

Embankment fill slopes of 3H:1V are shown on the project plans, and are considered acceptable. Where new fill is to be placed onto fill or natural slopes exceeding 5H:1V, it should be placed on discrete benches cut fully into the slope and below any loose/soft or otherwise unsuitable materials (per Section 19 of Caltrans "Standard Specifications"). The benches (1 ft maximum vertical) are typically cut during fill placement activities and, per Section 19-6.01, are a minimum of 6-ft in width.

These recommendations and those that follow can be modified by the Resident Engineer in charge of the project based on soil exposures and grading operations during earthwork activities.

Where new pavement is to be constructed, all existing fill or native soil to 1.0±ft below finish grade should be removed/replaced and/or reprocessed as engineered fill to at least 95% relative compaction (per CTM 216) in accordance with Caltrans "Standard Specifications." The 95% requirement is also applicable to all fills placed within 150 lineal feet of the proposed bridge structure. All structural fill that falls outside of these limits should be compacted to at least 95% relative compaction (per CTM 216).

After unsuitable material has been removed or the 1.0±ft min depth below finished grade has been reached, the surfaces to receive fill should be scarified to 6-inch depth, moisture conditioned to at least optimum-moisture content, and compacted to at least 90% relative compaction (per CTM 216). Inability to achieve the required compaction on the scarified materials may be used as a field criterion to identify areas requiring additional removal and/or compaction (locally soft / loose soils). Near-surface soils exposed during earthwork may be in an over-optimum moisture condition and may require drying prior to compaction activities.

Drainage

Surface water from the paved trail, its graded shoulders, and the embankment slopes should be directed away from the back of the abutment and wing walls. The graded shoulders may be susceptible to erosion in the steeper portions of the trail. Embankment slopes should be properly vegetated so as to avoid surface erosion.

Subsurface drainage elements per "Caltrans Standard Plans" are recommended for the abutment and wing walls.

Paved Trail Recommendations

The following recommendations are concerning the sections of the paved trail that are greater than 150-feet from the subject bridge.

On-site materials encountered in our test pits and borings will likely be acceptable for use as structural fill except for particles larger than 6-inches, or deleterious materials (upper unit materials). Rock encountered in our test pits and borings is anticipated to be rippable with standard heavy construction equipment in the majority of the proposed cut sections, but rock-breaking equipment may be needed in some limited areas.

Excavation Conditions

Some areas of the proposed paved trail may require excavation into lower unit materials (hard rock). Excavation through lower unit material and some of the middle unit material along the proposed alignment will only be possible with special tools, due to the hardness of the rock. The rock is not rippable with typical excavation machinery, and will require rock breaking equipment designed for use with hard rock.

The backhoe reached "digging refusal" while excavating most of the test pits, which is also an indicator of rippability depth for construction. Boulder- and cobble-sized material of similar hardness should also be expected in excavations.

If groundwater is encountered in open excavations it is expected to be controlled with diversion and /or pumping. Temporary construction backslopes of greater than 3±feet in height or greater should be reviewed during construction and evaluation for stability and for possible supplemental support. It is expected that construction backslopes should be stable at configurations of 2H:1V or flatter. All excavations should conform to CalOSHA standards; excavation and site safety is the responsibility of the contractor.

Earthwork

Based on the project plans, we have assembled the cut and fill table below to show apparent cut and fill depths for various locations along the alignment. Over-excavation (over-ex) depths needed for fill areas are equivalent to upper unit thicknesses, and represent minimum depths of removal for all cut and fill areas. The depths to non-rippable rock in cut areas are also shown.

Cut and Fill Table

Location	Cut or Fill, and Depth (±ft)	Depth to over-ex for fill (±ft)	Depth to non-rippable material in cut (±ft)
STA 0+90	Cut, 1.8	n/a	3.5 (inferred from TP-15)
STA 1+05	Fill, 3	0.2 (inferred from TP-15)	n/a
TP-15	Fill, 2	0.2	n/a
TP-14	Fill, 1	0.3	n/a
B-1	Fill, 10.5	2	n/a
B-2	Fill, 16	2	n/a
TP-13	Fill, 4	0.8	n/a
TP-12	0	0.8	6
STA 6+50	Cut, 1	n/a	6 (inferred from TP-11 and TP-12)
TP-11	Cut, 0.8	0.8	6
TP-10	Cut, <0.5	0.8	>6
TP-9	Fill, 2.5	0.8	n/a
TP-8	Fill, <0.5	0.6	n/a
TP-7	Fill, 1	0.3	n/a
TP-6	Fill, <0.5	0.3	n/a
STA 12+00	Cut, 1	n/a	4-5 (inferred from TP-5 and TP-6)
TP-5	Fill, 0.5	0.2	n/a
TP-4	Fill, 0.5-1	0.2	n/a
TP-3	Fill, 1	0.1	n/a
TP-2	Fill, 0.5	0	n/a
TP-1	Fill, 1.5	0.8	n/a

All depths/thicknesses are based on the existing and proposed groundline profiles along the alignment centerline and data from our subsurface investigation.

Based on the table above, it appears that rippability will generally only be an issue in some of the bridge footing excavation areas, however, more shallow depths to hard rock cannot be precluded.

All earthwork should be performed in accordance with Caltrans "Standard Specifications" supplemented by the recommendations below. It appears from field observations that roadway earthwork can be generally accomplished using typical earthmoving equipment.

The area to be graded should be stripped of all debris, vegetation, and other organic materials. Where woody vegetation is removed, all substantial roots should be excavated and removed. Debris, organic material, and otherwise unsuitable materials should be disposed to an approved location. If soft unsuitable materials are encountered, they should be removed to full depth with the exposed surface approved by this office and replaced with compacted engineered fill.

On-site soils (less debris or organic material, oversized material, or other deleterious material) are considered generally acceptable for use as compacted embankment fill. Native materials up to 4-inches in diameter can be used in the fill. Embankment fill slopes of 3H:1V are shown on the project plans, and are considered acceptable.

Where new pavement is to be constructed, all upper unit material of thickness shown in the cut and fill table above or to 1±ft below finish grade, whichever is deeper, should be removed/replaced and/or reprocessed as engineered fill to at least 95% relative compaction (per CTM 216) in accordance with Caltrans "Standard Specifications." All structural fill that falls outside of this limit should be compacted to at least 90% relative compaction (per CTM 216).

After unsuitable material has been removed or the 1±ft min depth below finished grade has been reached, the surfaces to receive fill should be scarified to 6-inch depth, moisture conditioned to at least optimum-moisture content, and compacted to at least 90% relative compaction (per CTM 216). Inability to achieve the required compaction on the scarified materials may be used as a field criterion to identify areas requiring additional removal and/or compaction (locally soft / loose soils).

Near-surface soils exposed during earthwork may be in an over-optimum moisture condition and may require drying prior to compaction activities. "Competent rock" as determined by a geologist or engineer from this office at the time of construction may replace the scarified and compacted zone at the base of the roadway materials.

Drainage

The graded shoulders may be susceptible to erosion in the steeper portions of the trail (west of the bridge and from about STA 10+00 to STA 15+00. Embankment slopes are recommended to be properly vegetated so as to avoid surface erosion.

Surface water in the area of the site from approximately STA 6+50 to about STA 16+00 appears to drain into the minor drainage at about STA 8+00, that runs northward off of the site. To prevent ponding on the south side of the trail and on the trail in this area, we recommend a culvert be placed at about STA 8+30 or where the lowest grade at the trail within this drainage is determined. Increasing fill heights in this area may also be appropriate. Surface drainage elements are to be designed by others.

* * * * * *

TABER CONSULTANTS

David A. Kitzmann NO. 2412 CERTIFIED ENGINEERING GEOLOGIST

Franklin P. Taber No. 816

David A. Kitzmann
C.E.G. 2412

Franklin P. Taber
G.E. 816

April 30, 2012

Attachments:		"General Conditions"
		"Selected References"
	Figure-1	"Vicinity Map"
	Figure-2	"Boring Location Map"
		"Log of Test Borings" drawing (half-size, 1 sheet)
	Figure-3	"Test Pit Logs"
	Figure-4	"Laboratory Test Results" (3 Pages)
	Figure-5	"ARS Envelope Spectrum"

GENERAL CONDITIONS

The conclusions and recommendations of this study are professional opinion based upon the indicated project criteria and the limited data described herein. It is recognized there is potential for sufficient variation in subsurface conditions that some modification of conclusions and recommendations might emerge from further, more detailed study.

Our professional services have been performed using that degree of care and skill ordinarily exercised, under similar circumstances, by reputable geotechnical consultants practicing in this or similar localities and at similar times. No other warranty, expressed or implied, is made as to the professional advice included in this report.

This report is intended only for the purpose, site location and project description indicated and assumes design and construction in accordance with applicable codes. This report has been prepared for El Dorado County and their design consultants, to be used solely in the design of the proposed slipout mitigation. The report has not been prepared for use by other parties, and may not contain sufficient information for purposes of other parties or other uses.

As changes in appropriate standards, site conditions, and technical knowledge cannot be adequately predicted, review of recommendations by this office for use after a period of two years is a condition of this report.

A review by this office of any foundation and/or grading plans and specifications or other work product insofar as they rely upon or implement the content of this report, together with the opportunity to make supplemental recommendations as indicated therefrom is considered an integral part of this study and a condition of recommendations.

Subsequently defined construction observation procedures and/or agencies are an element of work that may affect supplementary recommendations.

Should there be significant change in the project, or should earth materials or conditions different from those described in this report be encountered during construction, this office should be notified for evaluation and supplemental recommendations as necessary or appropriate.

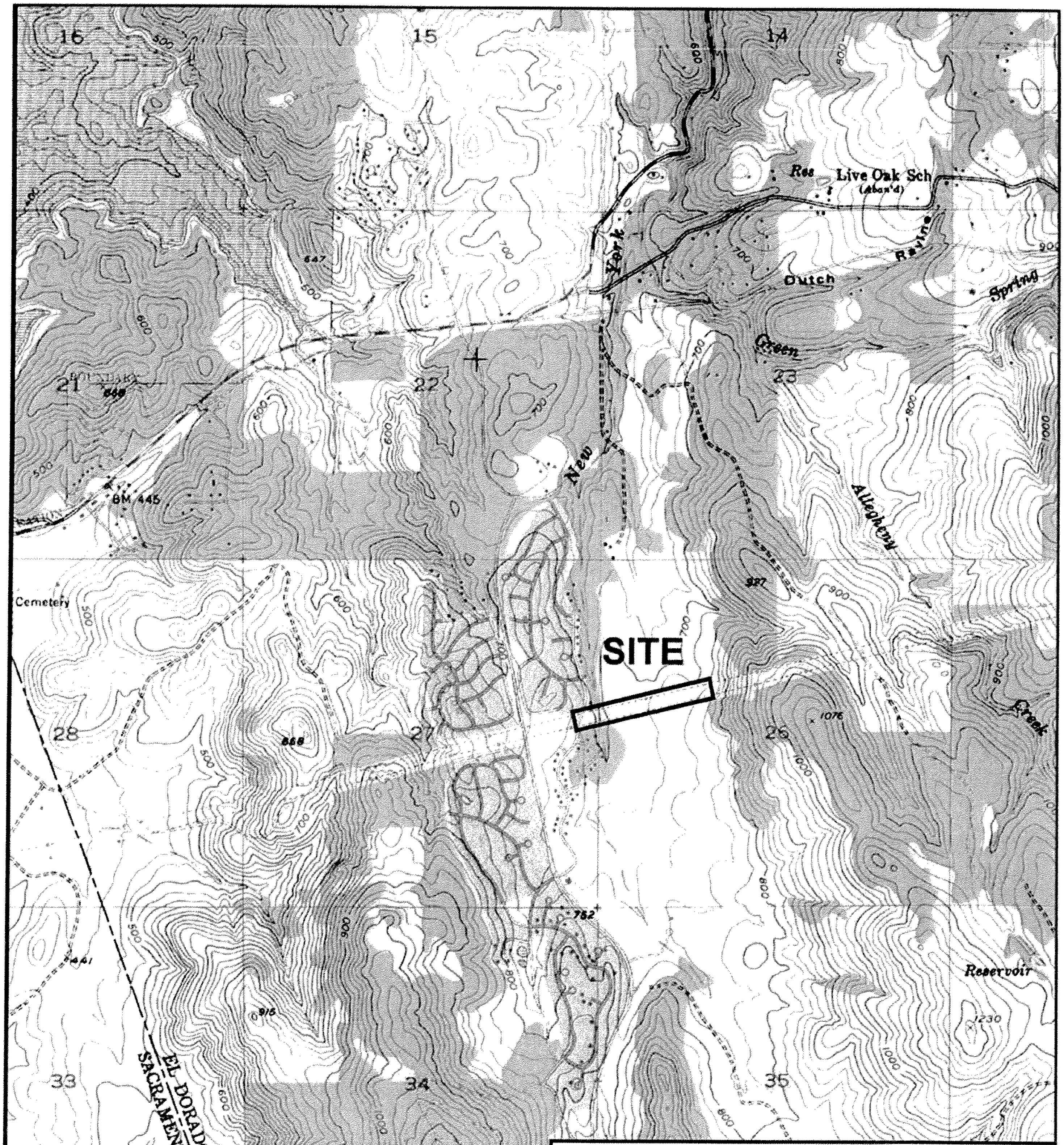
Opinions and recommendations apply to current site conditions and those reasonably foreseeable for the described development--which includes appropriate operation and maintenance thereof. They cannot apply to site changes occurring, made, or induced, of which this office is not aware and has not had opportunity to evaluate.

The scope of this study specifically excluded sampling and/or testing for, or evaluation of the occurrence and distribution of hazardous substances. No opinion is intended regarding the presence or distribution of any hazardous substances at this or nearby sites.

SELECTED REFERENCES

1. Gutierrez, C.I., 2011, "Preliminary Geologic map of the Sacramento 30' x 60' quadrangle, California:" California Geological Survey, Preliminary Geologic Maps, scale 1:100000.
2. Wagner, D.L., Jennings, C.W., Bedrossian, T.L., and Bortugno, E.J., 1981, "Geologic map of the Sacramento quadrangle, California, 1:250,000:" California Division of Mines and Geology, Regional Geologic Map 1A, scale 1:250000.
3. Bruyn, Frank, July 21, 2005, "Asbestos Review Areas, Western Slope, County of El Dorado, State of California," El Dorado County Surveyor/G.I.S. Division, downloaded as an electronic file "Map.pdf" from the El Dorado County Website: http://www.edcgov.us/Government/AirQualityManagement/Asbestos_Maps.aspx.
4. Churchill, Ronald K., Higgins, Chris T., and Hill, Bob, 2000, "Open-File Report 2000-02: Areas More Likely to Contain Natural Occurrences of Asbestos in Western El Dorado County, California," California Department of Conservation, California Geological Survey, scale 1:100,000, downloaded from: ftp://ftp.consrv.ca.gov/pub/dmg/pubs/ofr/ofr_2000-002.pdf
5. Sharma, P.K. and T.N. Singh, 2008, "A correlation between P-wave velocity, impact strength index, slake durability index and uniaxial compressive strength," Bull. Eng. Geol. Environ. 67, 17-22.
6. Roberts, A., 1977, "Geotechnology; An Introductory text for Students and Engineers," Pergamon Press, Ltd., Oxford.

FIGURE -1



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Scale: 1:24,000

USGS
"Clarksville" CA
QUADRANGLE 7.5 MINUTE
SERIES (TOPOGRAPHIC),
DATE 1980

El Dorado County DOT

New York Creek Trail East
El Dorado Hills, California

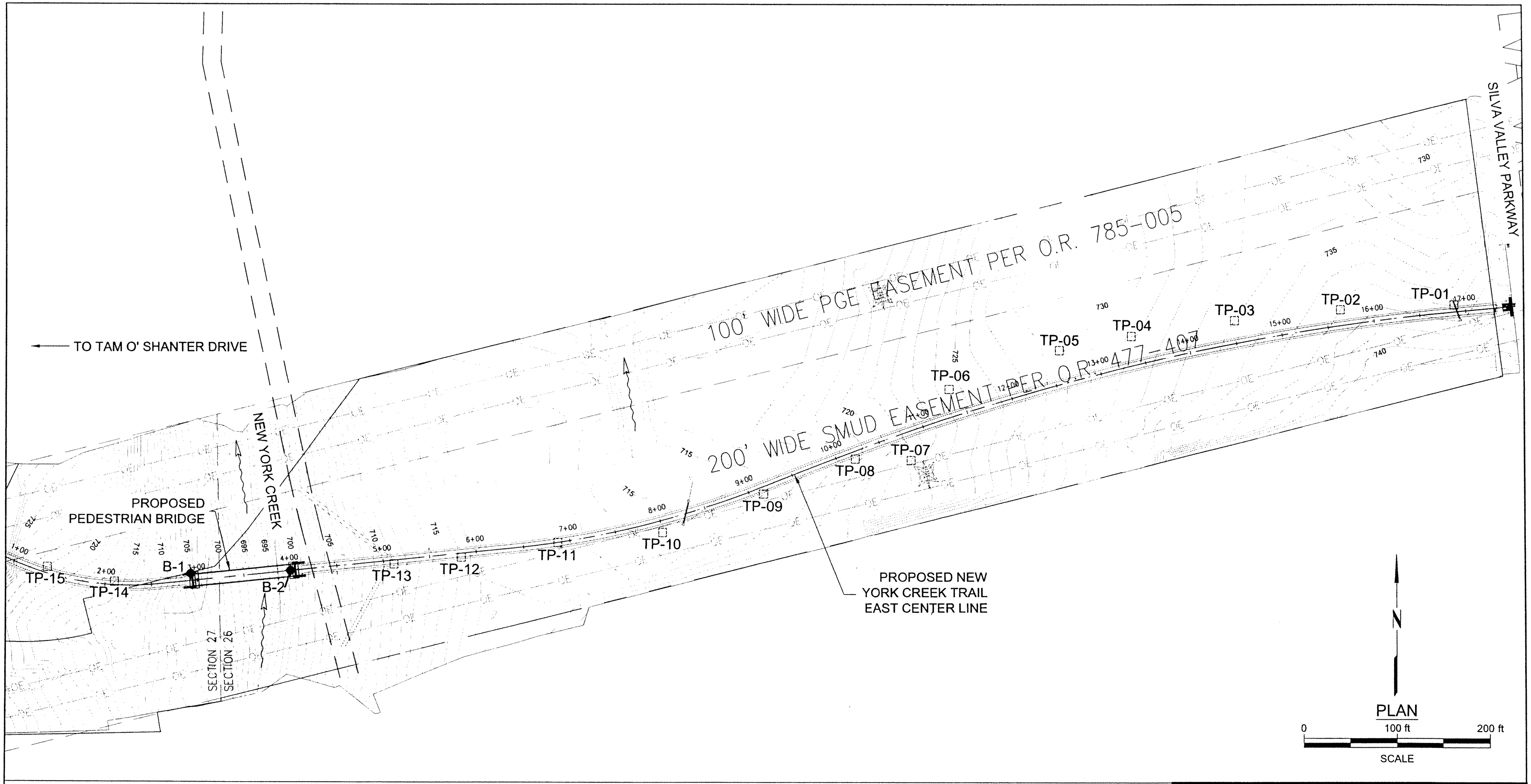
Vicinity Map

2009-0071-2

February 2012

Figure - 1

FIGURE -2



LEGEND:

● B-2 APPROXIMATE LOCATION OF SOIL BORING

☐ TP-15 APPROXIMATE LOCATION OF TEST PIT

NOTE: Electronic media for plan view provided by El Dorado County Department of Transportation.
All locations are approximate and are referenced from existing site features.

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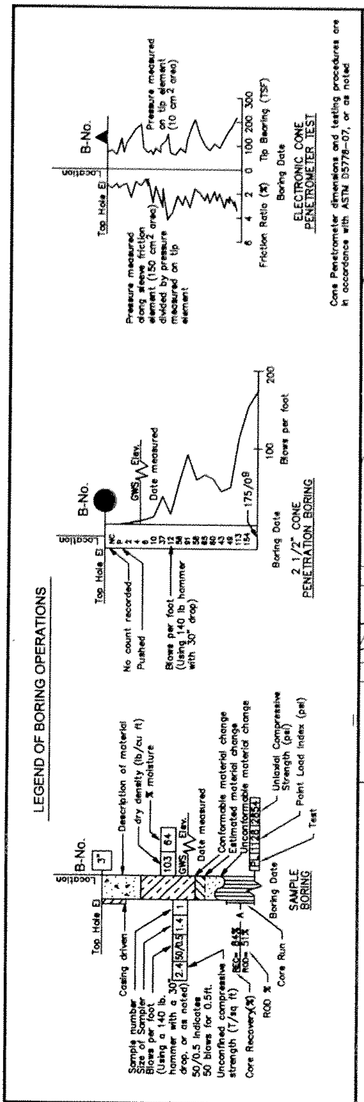
El Dorado County DOT

New York Creek Trail East
El Dorado Hills, California

Boring Location Map

2009-0071-2	April 2012	Figure - 2



Ⓐ ATTERBERG LIMITS
Ⓒ CONSOLIDATION
ⒸⓇ CORROSIVITY
Ⓔ EXPANSION INDEX
Ⓖ GRADATION
Ⓗ HYDROMETER
Ⓜ MAXIMUM DRY DENSITY
Ⓟ PERMEABILITY
Ⓡ RESISTANCE VALUE
Ⓢ DIRECT SHEAR
ⓈⒺ SAND EQUIVALENT
ⓈⒼ SPECIFIC GRAVITY
Ⓣ TRIAXIAL SHEAR

- PLAN OF ANY BORING
- ● 2.5 INCH CONE PENETROMETER
- SIZE AIR ROTARY BORING (DRY)
- SIZE MUD ROTARY BORING (WET)
- SIZE AUGER BORING (DRY)
- SIZE HOLLOW AUGER BORING (DRY)
- ☐ TEST PIT
- SIZE DIAMOND CORE BORING
- SIZE WIRELINE BORING
- ▲ ELECTRONIC CONE PENETROMETER
- ◎ 1 INCH CONE PENETROMETER
- Refraction seismic line

LEGEND OF EARTH MATERIALS

- ▨ GRAVEL
- ▨ SAND
- ▨ SILT
- ▨ CLAY
- ▨ SANDY CLAY or CLAYEY SAND
- ▨ SANDY SILT or SILTY SAND
- ▨ SILTY CLAY or CLAYEY SILT
- ▨ PEAT and/or ORGANIC MATTER
- ▨ FILL MATERIAL
- ▨ IGNEOUS ROCK
- ▨ SEDIMENTARY ROCK
- ▨ METAMORPHIC ROCK

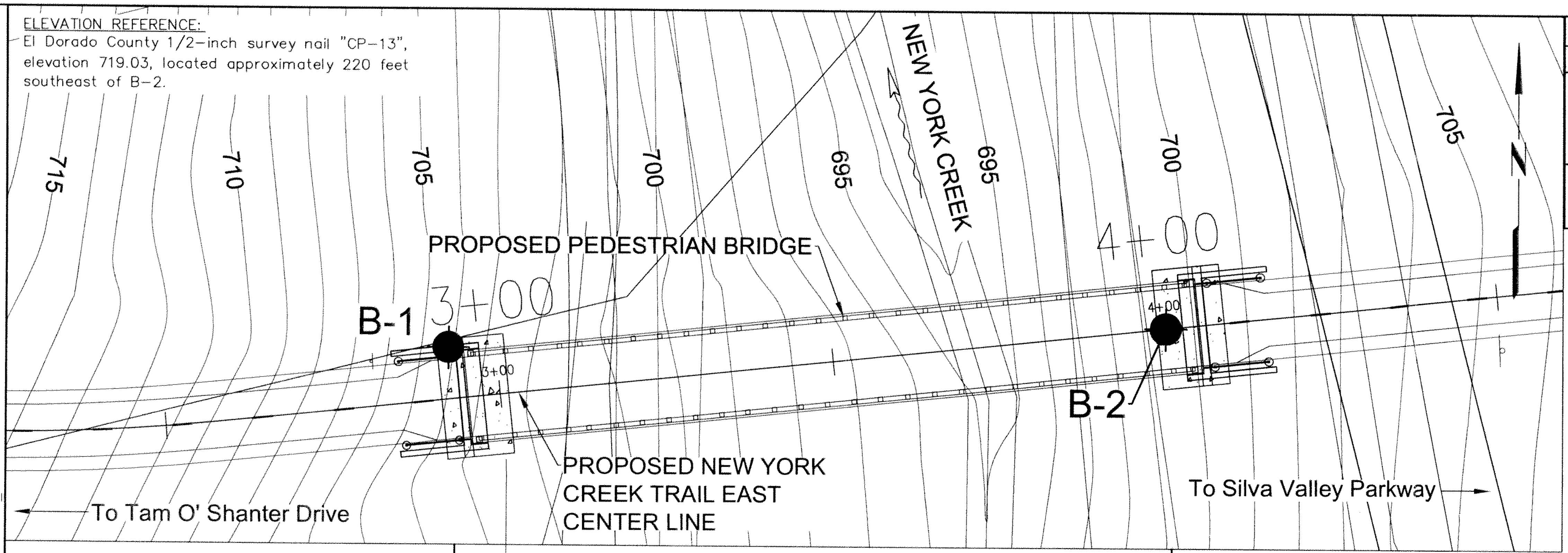
CONSISTENCY CLASSIFICATION FOR SOILS

According to the Standard Penetration Test

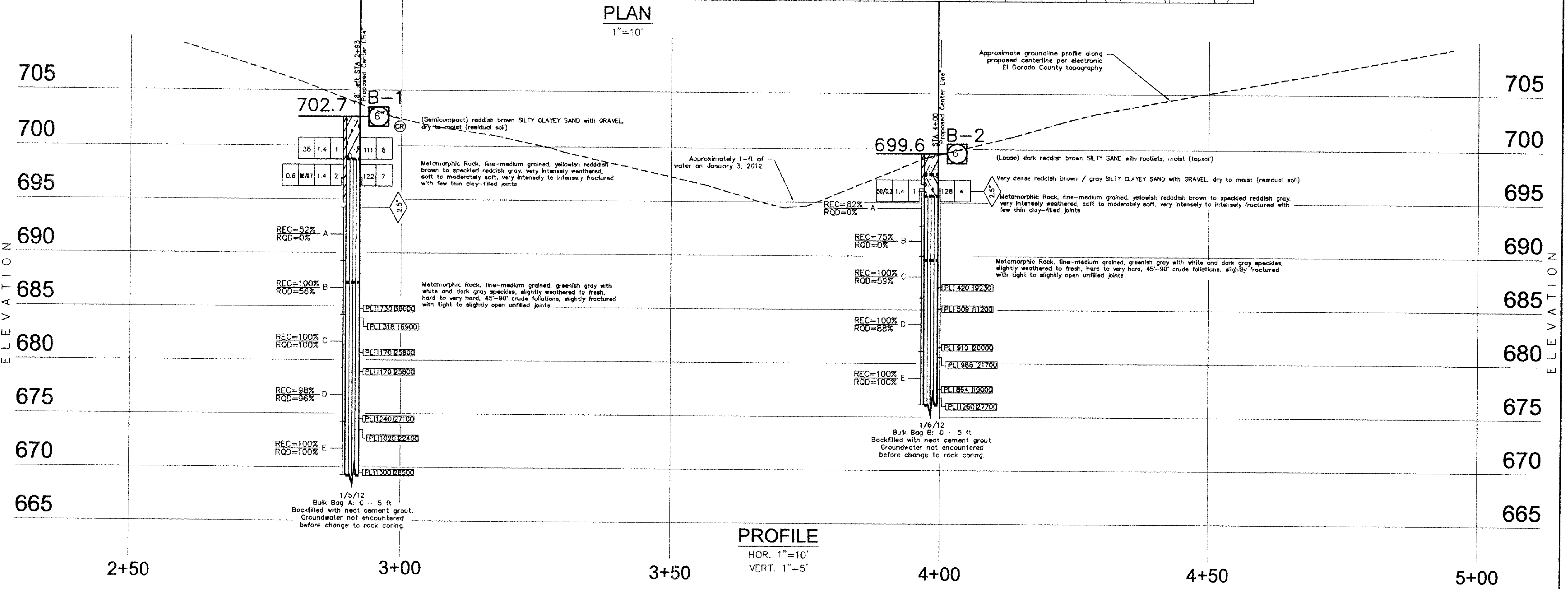
Standard Penetration "N"-Value	Granular	Cohesive
0-5	Very loose	Very soft
6-10	Loose	Soft
11-20	Semicompact	Stiff
21-35	Compact	Very stiff
36-70	Dense	Hard
>70	Very dense	Very hard

NOTE: Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed to imply mechanical analysis.

ELEVATION REFERENCE:
El Dorado County 1/2-inch survey nail "CP-13", elevation 719.03, located approximately 220 feet southeast of B-2.



PLAN
1"=10'



PROFILE
HOR. 1"=10'
VERT. 1"=5'

DIST.	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
03	ED			1	1

CERTIFIED ENGINEERING GEOLOGIST

PLANS APPROVAL DATE

DAVID A. KITZMANN
No. 2412

TABER CONSULTANTS
3911 West Capitol Avenue
West Sacramento, CA 95691-2116

JOB No. 2009-0071-2
LOCATION: 38121-F1: 254N; 206W

NOTES:
1. Field classification of soils was in accordance with ASTM D 2488-09a "Description and Identification of Soils (Visual-Manual Procedure)".
2. Standard Penetration tests were performed in accordance with ASTM D 1586-11 using a hammer operated with an automated drop system. Drill rods were 1 5/8-inch diameter "A"-rods; sampler was driven with brass liners.
3. The length of each sampled interval is shown graphically on the boring log. Whole number blow counts ("N") represent the "standard penetration resistance" interval in accordance with ASTM D1586-11. Where less than 1 foot of penetration is achieved, the blow count shown is for that fraction of the "standard penetration resistance" interval actually penetrated.
4. Where indicated by an asterisk (*) the number of blows shown is for only that fraction of the initial 0.5 ft. "seating drive" interval penetrated.
5. SPT hammer energy measurements were not taken.
6. Consistency of soils shown in ( ) where estimated.
7. Groundwater surface elevations are subject to seasonal fluctuations and may occur at higher or lower elevations depending on the conditions at any particular time.
8. Electronic media for plan view provided by El Dorado County Department of Transportation.

DESIGN OVERSIGHT
SIGN OFF DATE
DRAWN BY G. Lim
CHECKED BY G. Wade
M. Lattin
FIELD INVESTIGATOR
DATE January 2012

PREPARED FOR
EL DORADO COUNTY
DEPARTMENT OF TRANSPORTATION

PROJECT ENGINEER

BRIDGE NO.
POST MILE

NEW YORK CREEK TRAIL EAST BRIDGE

LOG OF TEST BORINGS

04/26/2012 2009-0071-2.dwg

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3
CU
DISREGARD PRINTS BEARING
REVISION DATES (PRELIMINARY STAGE ONLY)
SHEET OF

FIGURE -3

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TEST PIT LOG

Job No. 2011-0203

TYPE: CAT 420 D Backhoe   SURFACE ELEVATION: 737.0   TEST PIT TP-01

POCKET PENETROMETER (tsf)	OTHER TESTS	DRY DENSITY (lbs/cu. ft.)	Moisture (%)	BLOWS/FOOT 350 ft-lb	SAMPLE SIZE (inches)	SAMPLE No.	DEPTH IN FEET	MATERIAL SYMBOL	UNIFIED SOIL CLASS		
4.5									SM / SC	Dry grass and weeds at the surface. (Compact), strong brown CLAYEY SILTY very fine SAND, moist; ~60% fine sand; ~40% clayey silt; porous with abundant fine roots in upper 0.8-ft.	1.2
										Metamorphic Rock, fine grained, yellowish brown, moderately to intensely weathered, soft matrix/hard blocks, folded moderately spaced fractures	4.5
							5			Metamorphic rock, medium grained, yellowish brown, moderately weathered, moderately hard to hard, thickly bedded, moderately spaced fractures	10.0
							10 15			Bottom of test pit at 10.0 feet. No caving No freewater encountered	

TYPE: CAT 420 D Backhoe   SURFACE ELEVATION: 737.0   TEST PIT TP-02

POCKET PENETROMETER (tsf)	OTHER TESTS	DRY DENSITY (lbs/cu. ft.)	Moisture (%)	BLOWS/FOOT 350 ft-lb	SAMPLE SIZE (inches)	SAMPLE No.	DEPTH IN FEET	MATERIAL SYMBOL	UNIFIED SOIL CLASS		
										0.1-ft sandy topsoil	0.1
										Metamorphic Rock, fine to medium grained, light grayish brown, moderately to intensely weathered, soft to moderately hard; foliations dip steeply west by northwest (340°, 72° dip)	4.5
							5 10 15			Bottom of test pit at 4.5 feet. No caving No freewater encountered Digging refusal at 4.5-ft	

THE TEST PIT LOGS SHOW SUBSURFACE CONDITIONS AT THE DATES AND LOCATIONS INDICATED AND IT IS NOT WARRANTED THAT THEY ARE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

LOGGED BY: BDM   DATE: 01-17-2012

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TEST PIT LOG

Job No. 2011-0203

TYPE: CAT 420 D Backhoe

SURFACE ELEVATION: 734.0

TEST PIT TP-03

DEPTH IN FEET	Description	
0–0.1	0.1-ft sandy topsoil	0.1
0.1–4.5	Metamorphic Rock, fine to medium grained, light grayish brown, moderately to intensely weathered, soft to moderately hard	4.5
4.5–6.0	Igneous Rock, aphanitic, white, fresh, hard, widely spaced fractures	6.0

Bottom of test pit at 6.0 feet.

No caving

No freewater encountered

Digging refusal at 6.0-ft

TYPE: CAT 420 D Backhoe

SURFACE ELEVATION: 731.0

TEST PIT TP-04

DEPTH IN FEET	Description	
0–0.2	Topsoil	0.2
0.2–3.5	Metamorphic Rock, fine to medium grained, light grayish brown, moderately to intensely weathered, soft to moderately hard	3.5
3.5–7.0	Igneous Rock, aphanitic, white, fresh, hard, widely spaced fractures	7.0

Bottom of test pit at 7.0 feet.

No caving
No freewater encountered
Digging refusal at 7.0-ft

POCKET PENETROMETER (tsf)	OTHER TESTS	DRY DENSITY (lbs/cu. ft.)	Moisture (%)	BLOWS/FOOT 350 ft-lb	SAMPLE SIZE (inches)	SAMPLE No.	DEPTH IN FEET	MATERIAL SYMBOL	UNIFIED SOIL CLASS

THE TEST PIT LOGS SHOW SUBSURFACE CONDITIONS AT THE DATES AND LOCATIONS INDICATED AND IT IS NOT WARRANTED THAT THEY ARE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

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Figure 3

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TEST PIT LOG

Job No. 2011-0203

TYPE: CAT 420 D Backhoe

SURFACE ELEVATION: 728.5

TEST PIT TP-05

DEPTH IN FEET	DESCRIPTION	
	Topsoil	0.2
	Metamorphic Rock, fine to medium grained, light grayish brown, moderately to intensely weathered, soft to moderately hard	1.0
	Igneous Rock, aphanitic, white, fresh, hard, widely spaced fractures	4.0
5		
10		
15		

Bottom of test pit at 4.0 feet.

No caving
No freewater encountered
Digging refusal at 4.0-ft

TYPE: CAT 420 D Backhoe

SURFACE ELEVATION: 724.5

TEST PIT TP-06

DEPTH IN FEET	DESCRIPTION	
	0.3-ft sandy topsoil	0.3
	Metamorphic Rock, medium-grained, light brown, moderately weathered, hard, thinly bedded, moderaterly spaced fractures; with near-vertical jointing striking 200°	
5		5.0
10		
15		

Bottom of test pit at 5.0 feet.

No caving
No freewater encountered
"Near-Practical" digging refusal at 5.0-ft

POCKET PENETROMETER (tsf)	OTHER TESTS	DRY DENSITY (lbs/cu. ft.)	Moisture (%)	BLOWS/FOOT 350 ft-lb	SAMPLE SIZE (inches)	SAMPLE No.	DEPTH IN FEET	MATERIAL SYMBOL	UNIFIED SOIL CLASS

THE TEST PIT LOGS SHOW SUBSURFACE CONDITIONS AT THE DATES AND LOCATIONS INDICATED AND IT IS NOT WARRANTED THAT THEY ARE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

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TEST PIT LOG

Job No. 2011-0203

TYPE: CAT 420 D Backhoe

SURFACE ELEVATION: 722.0

TEST PIT TP-07

Clayey topsoil — 0.3

Metamorphic Rock, medium-grained, light brown, moderately weathered, hard, thinly bedded, moderaterly spaced fractures — 9.5

Bottom of test pit at 9.5 feet.

No caving
No freewater encountered
"Near-practical" digging refusal (Could have dug deeper, with effort)

DEPTH IN FEET: 5, 10, 15

TYPE: CAT 420 D Backhoe

SURFACE ELEVATION: 719.0

TEST PIT TP-08

SM / SC — Dry grass and weeds at the surface. (Compact), strong brown CLAYEY SILTY very fine SAND, moist; ~60% fine sand; ~40% clayey silt; porous with abundant fine roots in upper 0.8-ft. — 2.0

Metamorphic Rock, medium-grained, light brown, moderately weathered, hard, thinly bedded, moderaterly spaced fractures — 7.0

Bottom of test pit at 7.0 feet.

No caving
No freewater encountered

DEPTH IN FEET: 5, 10, 15

POCKET PENETROMETER (tsf)	OTHER TESTS	DRY DENSITY (lbs/cu. ft.)	Moisture (%)	BLOWS/FOOT 350 ft-lb	SAMPLE SIZE (inches)	SAMPLE No.	DEPTH IN FEET	MATERIAL SYMBOL	UNIFIED SOIL CLASS

THE TEST PIT LOGS SHOW SUBSURFACE CONDITIONS AT THE DATES AND LOCATIONS INDICATED AND IT IS NOT WARRANTED THAT THEY ARE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

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TEST PIT LOG

Job No. 2011-0203

TYPE: CAT 420 D Backhoe

SURFACE ELEVATION: 716.0

TEST PIT TP-09

POCKET PENETROMETER (tsf)	OTHER TESTS	DRY DENSITY (lbs/cu. ft.)	Moisture (%)	BLOWS/FOOT 350 ft-lb	SAMPLE SIZE (inches)	SAMPLE No.	DEPTH IN FEET	MATERIAL SYMBOL	UNIFIED SOIL CLASS		
								▨	SM / SC	Dry grass and weeds at the surface. (Compact), strong brown CLAYEY SILTY very fine SAND, moist; ~60% fine sand; ~40% clayey silt; porous with abundant fine roots in upper 0.8-ft.	2.0
							5	▥		Metamorphic Rock, medium-grained, light brown, moderately weathered, soft, thinly bedded to moderaterly spaced fractures, moist	7.0
							10 15			Bottom of test pit at 7.0 feet. No caving No freewater encountered	

TYPE: CAT 420 D Backhoe

SURFACE ELEVATION: 715.5

TEST PIT TP-10

POCKET PENETROMETER (tsf)	OTHER TESTS	DRY DENSITY (lbs/cu. ft.)	Moisture (%)	BLOWS/FOOT 350 ft-lb	SAMPLE SIZE (inches)	SAMPLE No.	DEPTH IN FEET	MATERIAL SYMBOL	UNIFIED SOIL CLASS		
								▨	GM	(Semicompact), light brown, SILTY subangular GRAVEL with SAND, dry, porous, with fine roots in upper 0.8-ft	1.5
								▨	SM / SC	(Compact), strong brown CLAYEY SILTY very fine SAND, moist; ~60% fine sand; ~40% clayey silt	3.0
								▨	GC	(Compact), yellowish brown, CLAYEY subangular GRAVEL with SAND, moist to wet	4.0
4.0							5	▨	CL	(Stiff), light grayish brown, fine SANDY CLAY, moist to wet	6.0
							10 15			Bottom of test pit at 6.0 feet. Minor caving at 1-ft depth No freewater encountered	

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TEST PIT LOG

Job No. 2011-0203

TYPE: CAT 420 D Backhoe

SURFACE ELEVATION: 717.0

TEST PIT TP-11

DEPTH IN FEET	UNIFIED SOIL CLASS	
0–2.0	SM / SC	Dry grass and weeds at the surface. (Compact), strong brown CLAYEY SILTY very fine SAND, moist; ~60% fine sand; ~40% clayey silt; porous with abundant fine roots in upper 0.8-ft.
2.0–6.0	CL / ML	(Stiff to very stiff), light grayish brown, SANDY CLAY, moist (residual soil)
6.0–9.5		Metamorphic rock, fine to medium grained, light grayish brown, moderately to intensely weathered, soft to moderately hard

Bottom of test pit at 9.5 feet.

No caving
No freewater encountered

TYPE: CAT 420 D Backhoe

SURFACE ELEVATION: 716.0

TEST PIT TP-12

DEPTH IN FEET	UNIFIED SOIL CLASS	
0–1.0	SM / SC	Dry grass and weeds at the surface. (Compact), strong brown CLAYEY SILTY very fine SAND, moist; ~60% fine sand; ~40% clayey silt; porous with abundant fine roots in upper 0.8-ft.
1.0–6.0		Metamorphic Rock, fine grained, yellowish brown, moderately to intensely weathered, soft matrix/hard blocks, folded moderately spaced fractures
6.0–7.0		Metamorphic rock, medium grained, yellowish brown, moderately weathered, moderately hard to hard, thickly bedded, moderately spaced fractures

Bottom of test pit at 7.0 feet.

Minor caving at 1-ft depth
No freewater encountered
Near practical digging refusal at 7.0-ft

POCKET PENETROMETER (tsf) | OTHER TESTS | DRY DENSITY (lbs/cu. ft.) | Moisture (%) | BLOWS/FOOT 350 ft-lb | SAMPLE SIZE (inches) | SAMPLE No. | DEPTH IN FEET | MATERIAL SYMBOL | UNIFIED SOIL CLASS

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TEST PIT LOG

Job No. 2011-0203

TYPE: CAT 420 D Backhoe

SURFACE ELEVATION: 711.0

TEST PIT TP-13

SM / SC

Dry grass and weeds at the surface. (Compact), strong brown CLAYEY SILTY very fine SAND, moist; ~60% fine sand; ~40% clayey silt; porous with abundant fine roots in upper 0.8-ft. 1.0

Metamorphic Rock, fine grained, yellowish brown, moderately to intensely weathered, soft matrix/hard blocks, folded moderately spaced fractures 5.0

Metamorphic rock, medium grained, yellowish brown, moderately weathered, moderately hard to hard, thickly bedded, moderately spaced fractures 6.0

Bottom of test pit at 6.0 feet.

No caving
No freewater encountered
Practical digging refusal at 6.0-ft depth

5
10
15

TYPE: CAT 420 D Backhoe

SURFACE ELEVATION: 716.0

TEST PIT TP-14

Silty sandy topsoil 0.3

Metamorphic Rock, medium-grained, red brown, slightly weathered, hard, thinly bedded to moderaterly spaced fractures 4.0

Bottom of test pit at 4.0 feet.

No caving
No freewater encountered
Digging refusal at 4.0-ft depth

5
10
15

POCKET PENETROMETER (tsf)	OTHER TESTS	DRY DENSITY (lbs/cu. ft.)	Moisture (%)	BLOWS/FOOT 350 ft-lb	SAMPLE SIZE (inches)	SAMPLE No.	DEPTH IN FEET	MATERIAL SYMBOL	UNIFIED SOIL CLASS

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TEST PIT LOG

Job No. 2011-0203

TYPE: CAT 420 D Backhoe

SURFACE ELEVATION: 721.0

TEST PIT TP-15

POCKET PENETROMETER (tsf)	OTHER TESTS	DRY DENSITY (lbs/cu. ft.)	Moisture (%)	BLOWS/FOOT 350 ft-lb	SAMPLE SIZE (inches)	SAMPLE No.	DEPTH IN FEET	MATERIAL SYMBOL	UNIFIED SOIL CLASS	
										Silty sandy topsoil 0.2
										Metamorphic Rock, medium-grained, red brown, slightly weathered, hard, thinly bedded to moderaterly spaced fractures 3.5
							5			Bottom of test pit at 3.5 feet. No caving No freewater encountered Digging refusal at 3.5-ft depth
							10			
							15			

THE TEST PIT LOGS SHOW SUBSURFACE CONDITIONS AT THE DATES AND LOCATIONS INDICATED AND IT IS NOT WARRANTED THAT THEY ARE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

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FIGURE -4

POINT LOAD TEST RESULTS

Job # 2011-0203

New York Creek Pedestrian Bridge

Boring	Top Hole Elevation		Core Run	Depth		Elevation		Core Diameter (inches)	Failure Load (lbf)	Point Load Index (psi)	Point Load Index (MPa)	Uniaxial Compressive Strength (psi)	Uniaxial Compressive Strength (MPa)	Remarks/Notes
	(feet)	(m)		(feet)	(m)	(feet)	(m)							
1	702.7	214.2	B	17.9	5.5	684.8	208.7	1.8	5600	1730	11.9	38000	262.0	chipped surface
1	702.7	214.2	C	18.8	5.7	683.9	208.5	1.8	1030	320	2.20	6900	47.6	break along weathered joint
1	702.7	214.2	C	22.0	6.7	680.7	207.5	1.8	3800	1170	8.10	25800	178.0	chipped surface
1	702.7	214.2	D	23.8	7.3	678.9	206.9	1.8	3800	1170	8.10	25800	178.0	chipped surface
1	702.7	214.2	D	28.2	8.6	674.5	205.6	1.8	4000	1240	8.50	27100	187.0	clean mechanical break
1	702.7	214.2	E	29.2	8.9	673.5	205.3	1.8	3300	1020	7.00	22400	154.0	deep chip of surface
1	702.7	214.2	E	33.2	10.1	669.5	204.1	1.8	4200	1300	8.90	28500	197.0	deep chip of surface
2	699.6	213.2	C	12.5	3.8	687.1	209.4	1.8	1360	420	2.90	9200	63.6	break along weathered joint
2	699.6	213.2	D	14.5	4.4	685.1	208.8	1.8	1650	510	3.50	11200	77.2	weathered joint & mechanical break
2	699.6	213.2	D	18.1	5.5	681.5	207.7	1.8	2950	910	6.30	20000	138.0	chipped surface
2	699.6	213.2	E	19.0	5.8	680.6	207.4	1.8	3200	990	6.80	21700	150.0	chipped surface
2	699.6	213.2	E	22.0	6.7	677.6	206.5	1.8	2800	860	6.00	19000	131.0	chipped surface
2	699.6	213.2	E	22.8	6.9	676.8	206.3	1.8	4080	1260	8.70	27700	191.0	rough mechanical break
											AVERAGE:	21800	150.0	

Uniaxial compressive strength values based on point load test data and correlations derived from Bieniawski (1975); "Rock Mechanics for Underground Mining", Brady & Brown, 1985 (page 98-99).

Equation to determine Uniaxial Compressive Strength:

Uniaxial Compressive Strength = $\sigma_c = (14+ 0.175D)I_s$

Point Load Index = $I_s = P/D^2$

Figure-4

1 psi = 6.8948 kN/m^2 = 6.8948 kPa

1 psi = 0.0068948 Mpa

N·A·L
ENVIRONMENTAL TESTING & CONSULTING

Login #: 31430

Glen Wade
Taber Consultants
3911 West Capitol Avenue
West Sacramento, CA 956912116
Phone # (916) 371-7265
Fax #:

Attention: Glen Wade
Email: gwade@taberconsultants.com

Job Site:

New York Creek Pedestrian Bridge
El Dorado County, CA

Job Number

Date Samples Taken: 2/7/2012
Date Report Submitted: 2/7/2012
NAL ID # / Lot #: 4443 / 2
Lab Tracking #: 041203003
Total Samples: 4

PLM ANALYSIS OF BULK SAMPLES FOR ASBESTOS VIA EPA 600/R-93/116 METHOD WITH CARB 435 PREP (MILLING). LEVEL B FOR 0.1% TARGET ANALYTICAL SENSITIVITY

Samples ID #	Asbestos Fibers		Non-Asbestos Fibers		Non-Fibrous Materials	
	%	Type	%	Type	%	Type
Sample ID #: Bulk A Surface **NAL ID:** 4443-2-1 **Location:** Boring B1, West Side **Material:** Soil	0	None Detected	1	Cellulose	99	Misc. Particles
Sample ID #: Run A 4.1ft Depth **NAL ID:** 4443-2-2 **Location:** Boring B2, East Side **Material:** Soil	0	None Detected	2	Cellulose	98	Misc. Particles
Sample ID #: Run A 6.5ft Depth **NAL ID:** 4443-2-3 **Location:** Boring B2, East Side **Material:** Soil	0	None Detected	<0.1	None Detected	0	Misc. Particles
Sample ID #: Run C 9.7ft Depth **NAL ID:** 4443-2-4 **Location:** Boring B2, East Side **Material:** Soil	0	None Detected	1	Cellulose	99	Misc. Particles

Comments: Results relate only to the items analyzed. For all obviously inhomogeneous samples easily separated into sub samples, and for layered samples, each component is analyzed separately. The Analylitical Uncertainty is plus or minus 1 percent

Key: Detection Limit = 1%
Trace Amount <1%
None Detected = 0%

Reviewed By: ______________________

All analyses performed at EMSL Analytical, Inc. are analyzed utilizing the procedures for the EPA-600/R-93/116. This report may not be used to claim endorsement of agencies of the U.S. government and may not be reproduced except in full without written approval of NAL. EMSL Analytical, Inc. is accredited by the NVLAP certification programs. NVLAP # 101048-10 and CAELAP#2339

Sunland Analytical
11353 Pyrites Way, Suite 4
Rancho Cordova, CA 95670
(916) 852-8557

Date Reported 01/20/2012
Date Submitted 01/16/2012

To: Alexander Taber
Taber Consultants
3911 West Capital Avenue
W. Sacramento, CA 95691-2116

From: Gene Oliphant, Ph.D. \ Randy Horney
General Manager \ Lab Manager

The reported analysis was requested for the following location:
Location : 2011-0203 Site ID : BAG A.
Thank you for your business.

* For future reference to this analysis please use SUN # 61609-126640.

EVALUATION FOR SOIL CORROSION

Soil pH	6.88	
Minimum Resistivity	2.44 ohm-cm (x1000)	
Chloride	20.9 ppm	00.00209 %
Sulfate	32.3 ppm	00.00323 %

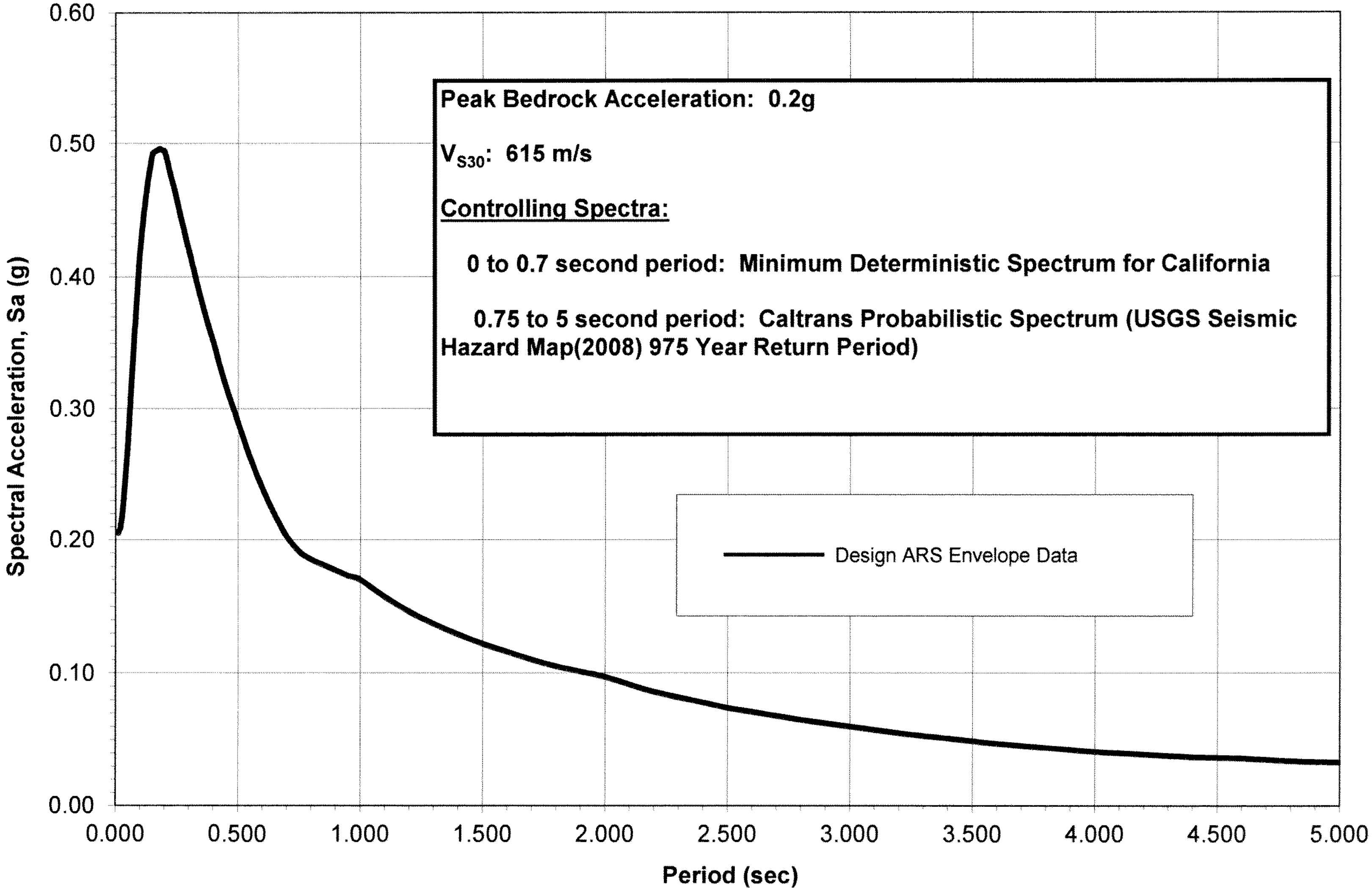
METHODS
pH and Min.Resistivity CA DOT Test #643
Sulfate CA DOT Test #417, Chloride CA DOT Test #422

FIGURE -5

2009-0071-2
February 2012

Caltrans ARS Online Envelope Spectrum

New York Creek Pedestrian Bridge



Peak Bedrock Acceleration: 0.2g

V_{S30}: 615 m/s

Controlling Spectra:

0 to 0.7 second period: Minimum Deterministic Spectrum for California

0.75 to 5 second period: Caltrans Probabilistic Spectrum (USGS Seismic Hazard Map(2008) 975 Year Return Period)

Figure-5