Appendix G:
Preliminary Geotechnical Engineering Study

PRELIMINARY
GEOTECHNICAL ENGINEERING STUDY
for
DIAMOND SPRINGS PARKWAY
El Dorado County
Placerville, California

Project No. E07479.001
February 2008

YOUNGDAHL CONSULTING GROUP, INC.
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Project No. E07479.001
19 February 2008

Michael Brandman Associates
Attention: Mr. Clint Meyer
11060 White Rock Road, Suite 150
Rancho Cordova, California 95670

Subject: **DIAMOND SPRINGS PARKWAY**
Placerville and Diamond Springs, El Dorado County, California
PRELIMINARY GEOTECHNICAL ENGINEERING STUDY

Reference: 1. Proposal and Contract for PE07-562, prepared by Youngdahl Consulting Group, Inc., dated 31 October 2007.

Dear Mr. Meyer,

In accordance with your authorization, Youngdahl Consulting Group, Inc. has performed a preliminary geotechnical engineering study for the project site located east of Missouri Flat Road and north of Pleasant Valley Road in Placerville and Diamond Springs, El Dorado County, California. The purpose of this study was to evaluate the general surface soil conditions at the site and to develop preliminary geotechnical information for the proposed project. Our scope was limited to a site reconnaissance and preparation of this report, which was written for the purpose of providing general geologic and soil information for the initial planning phases of the project.

Based upon our field study, and engineering analysis, we believe the primary geotechnical issues that should be considered for design of the project site include; the presence of deep non-engineered fills, the presence of placer mining and tailings deposits, the presence of expansive soils, the presence of potentially corrosive soils, the presence of perched groundwater conditions, and excavation of shallow bedrock to achieve design grades.

Other geotechnical issues may become more apparent during preparation of the final Geotechnical Engineering Study or during mass grading operations which are not listed above. The descriptions, findings, conclusions and recommendations provided in this report are formulated as a whole, and specific conclusions or recommendations should not be derived or used out of context. Please review the limitations and uniformity of conditions section of this report.

This report has been prepared for the exclusive use of Michael Brandman Associates and their consultants, for specific application to this project, in accordance with generally accepted geotechnical engineering practice. Should you have any questions or require additional information, please contact our office at your convenience.

Very truly yours,
Youngdahl Consulting Group, Inc.

Reviewed by:

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Senior Engineer

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Senior Engineering Geologist

Distribution: (4) to Client

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PRELIMINARY GEOTECHNICAL ENGINEERING STUDY
for
DIAMOND SPRINGS PARKWAY

1.0 INTRODUCTION

This report presents the results of our Preliminary Geotechnical Engineering Study performed for the proposed Diamond Springs Parkway to be constructed in Diamond Springs and Placerville, El Dorado County, California. Refer to Figure A-1 for a vicinity map for the project site.

Purpose and Scope

The purpose of this study was to explore and evaluate the surface conditions at the site and to develop reconnaissance level geotechnical information for the proposed project. The scope of this study includes the following:

- A review of geotechnical and geologic data available to us at the time of our study.
- A reconnaissance level field study consisting of site observations, followed by review of any readily available subsurface information previously prepared on or in the vicinity of the project site to characterize the generalized subsurface conditions.
- Engineering analysis of the data and information obtained from our field study, aerial photograph and literature review.
- Preparation of this report summarizing our findings and geotechnical considerations for the project.

2.0 PROJECT UNDERSTANDING

Based on the preliminary layout plans provided by the Client representative, the proposed construction is expected to include construction of roadway improvements that will connect Highway 49 to Missouri Flat Road through an existing industrial/commercial development. Additional improvements will include re-aligning and widening Highway 49 between Pleasant Valley Road and Finch Road.

The project is currently in the preliminary design phase. As such, for the purposes of this report, we have assumed that grading operations will consist of cuts and fills on the order of 20 feet or less.

Background

A review of our records indicates that our firm has been involved with several projects either along or near the alignment of the proposed roadway improvements. Our firm has been involved in providing geotechnical consultation for the commercial development at the north corner of Golden Center Drive and Missouri Flat Road (north boundary of the proposed Missouri Flat Road alignment), the commercial development at the north end of Stage Court (south side of the proposed Diamond Springs Parkway alignment), and the realignment of Highway 49 at the intersection of Pleasant Valley Road (south end of the proposed Highway 49 realignment). Additional sources that were reviewed included the Geotechnical Report for the El Dorado Materials Recovery Facility (Terrasearch, 1980).

In conjunction with our field study and literature review, we performed a review of aerial photographs dated 1952, 1962, 1971, 1977, 1985, 1989, 1993 and 2005.

1952 Aerial Photograph
Review of the 1952 aerial photograph indicates that Highway 49 and Missouri Flat Road were already constructed. Several small structures were sporadically observed along the east side of Highway 49, as well as the northwest corner of Highway 49 and Pleasant Valley Road. Lime Kiln Road is observed to be constructed and connected into Highway 49 from the west. The alignment of the proposed Diamond Springs Parkway appears to be relatively undeveloped with the exception of significant surface disturbance and structures at the east half of the central portion of the alignment associated with a lime processing operation. An orchard can also be seen east of the quarry along the northern alignment of the proposed Parkway. Several structures, railroad spurs and surface disturbance can also be seen at the west end of the proposed Parkway where it is proposed to connect with Missouri Flat Road. Railroad tracks associated with the Southern Pacific Railroad can also be seen to the north of the proposed Parkway alignment.

1962 Aerial Photograph
Review of the 1962 aerial photograph indicates no appreciable change in surface topography from the 1952 photo with the exception of the construction of structures at the northeast corner of Highway 49 and Pleasant Valley Road and the southwest corner of Highway 49 and Lime Kiln Road.

1971 Aerial Photograph
Review of the 1971 aerial photograph indicates no appreciable change in surface topography with the exception of additional surface disturbance associated with grading operations and construction of industrial buildings along the east side of Missouri Flat Road. Some additional surface disturbance was also observed to the north of the east end of the proposed Diamond Springs Parkway alignment along the west side of Highway 49. The orchard east of the lime processing area has also been removed.

1977 Aerial Photograph
Review of the 1977 aerial photograph indicates that additional surface disturbance has occurred at the east end of the proposed Diamond Springs Parkway alignment, east of the lime processing area and west of the future Elisa Court. Additional surface disturbance was also observed along the west side of Highway 49, north and south of the areas noted in the 1971 aerial photograph. Additional industrial buildings have also been constructed along the east side of Missouri Flat Road.

1985 Aerial Photograph
Review of the 1985 aerial photograph indicates that by this time, the entire alignment of Diamond Springs Parkway displays indications of surface disturbance and/or construction of structural improvements. Of particular note, it appears that a large stockpiling of materials has occurred south of the railroad tracks, in between the existing storage facility on Stage Court and the industrial buildings along Missouri Flat Road. Surface disturbance was also observed along the west side of Highway 49 between the proposed Parkway south to Lime Kiln Road.

1989 Aerial Photograph
Review of the 1989 aerial photograph indicates continued surface disturbance associated with the quarry operations. The surface disturbance along the west side of Highway 49 was observed to continue to the northwest and is converging on the south end of the proposed Parkway alignment.

1993 Aerial Photograph
Review of the 1993 aerial photograph indicates that Elisa Court has been graded and some additional industrial facility construction has occurred (Kamps Propane) at the east end of the proposed Parkway alignment.

Review of a recent Google Earth aerial photograph (circa May 2005) indicates relatively similar surface conditions with the exception of the realignment of Highway 49 at Pleasant Valley Road. The intersection of Highway 49 and Pleasant Valley Road has been shifted to the west slightly. A review of our records indicates that our firm was involved in providing geotechnical consultation services for the realignment.

3.0 GEOLOGIC FINDINGS

Surface Observations
The project site consists of several parcels in various stages of development from undeveloped land to fully improved industrial/commercial facilities. During our site reconnaissance, several areas of previous stockpiling activities were observed, particularly along the alignment of the proposed Parkway and connector to Missouri Flat Road. These stockpiles appeared to be on the order of about 20 feet in height. In addition to the stockpiling activities, several areas of previous grading operations (cuts and fills) were observed throughout the alignment of the proposed roadways, as well as along the existing roadways proposed for improvement (Missouri Flat Road and Highway 49). Many of the existing cut slopes were observed to have bedrock exposed beneath the surface soils.

Geologic Setting
The project site is located within the Sierra Nevada geomorphic province of California. According to the 1:48,000 scale General Geology of the Placerville 15-minute Quadrangle, a majority of the project site is underlain by Mesozoic-age granitic rocks (Mzg), and the south portion of the proposed Highway 49 re-alignment by sedimentary Auriferous Gravels (Tg) (Loyd, 1982). Tectonic activity related to the Sierra Nevada mountain uplift resulted in a rock fabric consisting of northeast to northwest-trending fracturing and foliation. The regional structure and tectonic framework is dominated by the Foothills Fault system, which traverses the western side of the Sierra Nevada tectonic block. This fault system developed in the early Mesozoic during several episodes of continental accretion involving island arc belts. The fault system includes two major fault zones in the project vicinity, the Bear Mountains Fault Zone in El Dorado Hills and the Melones Fault Zone in Placerville, both of which trend north-northwest and dip steeply easterly.

Subsurface Conditions
A review of available subsurface exploration information from the previous reports discussed in the Background section of this report indicates that relatively variable subsurface conditions were encountered in the vicinity of, and along the proposed roadway alignments. The subsurface explorations typically encountered surface soils comprised of native silty SANDS/sandy SILTS overlying weathered metavolcanic bedrock. Several of the previous test pit and boring logs reviewed also encountered undocumented fill materials consisting of silty SANDS/sandy SILTS on the order of 3 to 17 feet thick overlying the native soils described above. Some of the deepest fill materials previously logged are associated with sludge pond materials associated with a former lime processing operation.

Soil (SCS/NRCS)
The Soil Survey of El Dorado County (1974) notes the subject site consists of the following soil types: Placer diggings (PrD), Diamond Springs, very fine sandy loam (DfB and DfC), and Tailings (TaD). The majority of the project area is classified as Placer diggings. Placer diggings consist of areas of stony, cobbly, and gravelly material, commonly in beds of creeks and other streams, or of areas that have been placer mined. Diamond Springs series (DfB and DfC) consist of well-drained soils that are underlain by fine-grained acid igneous rocks at a depth of 24 to 50 inches. A small portion of the project area where Missouri Flat Road intersects with Southern Pacific Railroad is identified with Tailings (TaD) which consist of cobbly and stony tailings generated from dredge mining, hydraulic mining and hard-rock mine dumps.

Soil Corrosivity
The initial soil survey review indicates that the Diamond Springs Series soils present on the site are highly corrosive. The remaining soils types described above are listed as too variable to be estimated.

Soil Expansion Potential
Based on our experience with the soils in the area, clay layers may be present in low lying areas and above the bedrock horizons. In addition, there is also the potential to have concentrated pockets of expansive clay materials within the Auriferous gravel deposits.

Groundwater Conditions
A permanent groundwater table was generally not encountered during our explorations. However, subsurface water conditions typically vary in the foothill region. Our experience in the area shows that water may be perched on less weathered rock and present in the fractures, and seams of the weathered rock found beneath the site at varying times of the year. Shallow groundwater was encountered during the most recent realignment of Highway 49 at the intersection of Pleasant Valley Road necessitating the installation of subdrains.

Flooding Potential
The FEMA map for El Dorado County, published 18 October 1983, shows the project site to be in an area of minimal flooding.

Erosion Potential
The National Resources Conservation Services (NRCS) USDA soil survey of El Dorado Area (1974) classifies the Diamond Springs Series soil (mapped as units DfC and DfB) to have a slight to moderate erosion hazard with a medium surface runoff potential. The Placer Diggings and Tailings (mapped as unit PrD and TaD, respectively) are classified as too variable.

Naturally Occurring Asbestos (NOA)
Asbestos is classified by the EPA as a known human carcinogen. Naturally occurring asbestos (NOA) has been identified as a potential health hazard. The California Geological Survey published a map in 2000 (Open File Report 2000-02) that qualitatively indicates the likelihood for NOA in western El Dorado County.

El Dorado County has adapted the map from Open File Report 2000-02 into an asbestos review map. All projects within zones identified on the map, plus ¼-mile buffers around the asbestos management areas, or that are in proximity to new discoveries periodically added to the map, are subject to special dust control and asbestos mitigation requirements. This project is not in an asbestos review area.

Mining & Mineral Resources
According to the Mineral Land Classification of the Placerville 15-minute Quadrangle (Loyd, 1982) no mines are present on the project site.

Mining Disturbance and Tailings
As detailed above, a majority of the project area is classified as Placer diggings. Placer diggings consist of areas of stony, cobbly, and gravelly material, commonly in beds of creeks and other streams, or of areas that have been placer mined. In addition, a small portion of the project area where Missouri Flat Road intersects with Southern Pacific Railroad is identified as Tailings (TaD) consisting of cobbly and stony tailings from dredge mining, hydraulic mining and hard-rock mine dumps.

Seismicity
According to the Fault Activity Map of California and Adjacent Areas (Jennings, 1994) and the Peak Acceleration from Maximum Credible Earthquakes in California (CDMG, 1992), no active faults or Earthquake Fault Zones (Special Studies Zones) are located on the project site. No evidence of recent or active faulting was observed during our field study. The nearest mapped faults to the site are related to the Bear Mountains and Melones Fault Zones located about 3.5 miles (6 kilometers) and one mile (2 kilometers) to the west and east of the site, respectively. The nearest known active faults to the site are the North Tahoe fault located approximately 48 miles (77 kilometers) northeast of the site and the Dunnigan Hills fault located approximately 55 miles (88 kilometers) west-northwest.

Liquefaction, Slope Instability and Surface Rupture Potential
Liquefaction is the sudden loss of soil shear strength and sudden increase in porewater pressure caused by shear strains, as could result from an earthquake. Research has shown that saturated, loose to medium-dense sands with a silt content less than about 25 percent located within the top 40 feet are most susceptible to liquefaction and surface rupture/lateral spreading.

Due to the relatively low seismicity of the area, and the relatively shallow depth to bedrock, the potential for site liquefaction is considered negligible. For the above-mentioned reasons, mitigation for these potential hazards is typically not practiced in the geographic region of the project site.

4.0 GEOTECHNICAL CONSIDERATIONS

General
Based upon the results of our field explorations and analysis, it is our opinion that construction of the proposed improvements is feasible from a geotechnical standpoint.

Based upon our field study, and engineering analysis, we believe the primary geotechnical issues to be considered include:

- The presence of deep non-engineered fills.
- The presence of Placer mining and Tailings deposits.
- The presence of expansive soils.
- The presence of potentially corrosive soils.
- The presence of perched groundwater conditions.
- Excavation of shallow bedrock to achieve design grades.

The following paragraphs state our geotechnical considerations. It should be noted that in order to fully address the geotechnical considerations described below, an in-depth Geotechnical Engineering Study that specifically addresses the proposed improvements should be prepared in conjunction with design of the project.

Deep Non-Engineered Fills
A review of our aerial photographs, site reconnaissance observations and previous subsurface investigations indicates that multiple generations of fill placement and site development has occurred along the alignment of the proposed roadway improvements. Based on our available information, fill stockpiles on the order of 20 feet high are present along the proposed Parkway alignment. Additional deep fill areas should be anticipated along the Parkway alignment where it crosses the boundary of the lime processing area where up to 17 feet of non-engineered fills associated with a previous sludge pond may still be present.

We recommend that in conjunction with design of the roadway improvements, a subsurface exploration program be conducted to evaluate the vertical and lateral extents of the existing fill materials.

Placer Mining and Tailings Deposits
As described in the Geologic Findings section of this report, a majority of the project area is classified as Placer diggings and to a lesser extent Tailings.

We recommend that in conjunction with the design of site improvements, a subsurface exploration program be conducted to evaluate whether surface and subsurface disturbance associated with these mining activities will impact design or construction of the proposed improvements.

Expansive Soils
As described in the Soil Expansion Potential section of this report, clay layers may be present in low lying areas and above the bedrock horizons. In addition, there is also the potential to have concentrated pockets of expansive clay materials within the Auriferous gravel deposits.

We recommend that during the subsurface exploration program described in the sections above, if expansive soils are encountered, laboratory testing of these materials be performed in order to determine the engineering and index properties of these materials.

Corrosive Soils
As described in the Corrosive Soil section of this report, the Diamond Springs Series soils present on the site are highly corrosive. The remaining soils types described above are listed as too variable to be estimated.

We recommend that during the subsurface exploration program described in the sections above, representative samples of the subsurface soils be sampled, and laboratory testing of these materials be performed in order to evaluate their potential for corrosivity.

Perched Groundwater Conditions
As described in the Groundwater Conditions section of this report, shallow groundwater was encountered during the most recent realignment of Highway 49 at the intersection of Pleasant Valley Road necessitating the installation of subdrains. In addition, water may be perched on less weathered rock and present in the fractures, and seams of the weathered rock found beneath the site at varying times of the year.

We recommend that a subsurface exploration program described in the sections above be performed to evaluate whether perched groundwater conditions will impact design or construction of the proposed improvements.

Excavation of Shallow Bedrock to Achieve Design Grades
As described in the Surface Observations and Subsurface Conditions sections of this report, bedrock conditions were observed and logged at relatively shallow depths. During excavation for the previous realignment of Highway 49 at Pleasant Valley Road, hard rock excavation conditions were present that required large excavation equipment and blasting to achieve the design grade.

We recommend that in conjunction with the subsurface exploration program described in the sections above, a seismic refraction survey be performed along any roadway alignments where deep cuts are proposed.

5.0 LIMITATIONS AND UNIFORMITY OF CONDITIONS

1. This report has been prepared for the exclusive use of Michael Brandman Associates and their Clients and/or Subconsultants for specific application to Diamond Springs Parkway 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, express 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 106.3.4.1 of the International Building Code and Appendix Chapter 1 of the 2007 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.

ADDITIONAL GEOLOGICAL REFERENCES

1. Boore, D.M., Joyner, W.B., and Fumal, T.E., (1994): "Estimation of Response Spectra and Peak Accelerations From Western North American Earthquakes: An Interim Report, Part 2", U.S. Geological Survey, Open-File Report 94-127.

2. Boore, D.M., Joyner, W.B., and Fumal, T.E., (1997): "Equations for Estimating Horizontal Response Spectra and Peak Acceleration From Western North American Earthquakes: A Summary of Recent Work" in *Some Comparisons Between Recent Ground-Motion Relations (Compilation of 11 Technical Articles)", Seismological Society of America, Seismological Research Letters, Volume 68, no. 1*, Abrahamson, N.A., and Shedlock, K.M. (eds.).

3. Churchill, R.K. and others, (2000): “Areas More Likely To Contain Natural Occurrences of Asbestos in Western El Dorado County, California”, California Department of Conservation, Division of Mines and Geology, Open File Report 2000-002

4. Jennings, C.W., (1994): "Fault Activity Map of California and Adjacent Areas", California Department of Conservation, Division of Mines and Geology, Geologic Data Map No. 6, Scale 1:750,000.

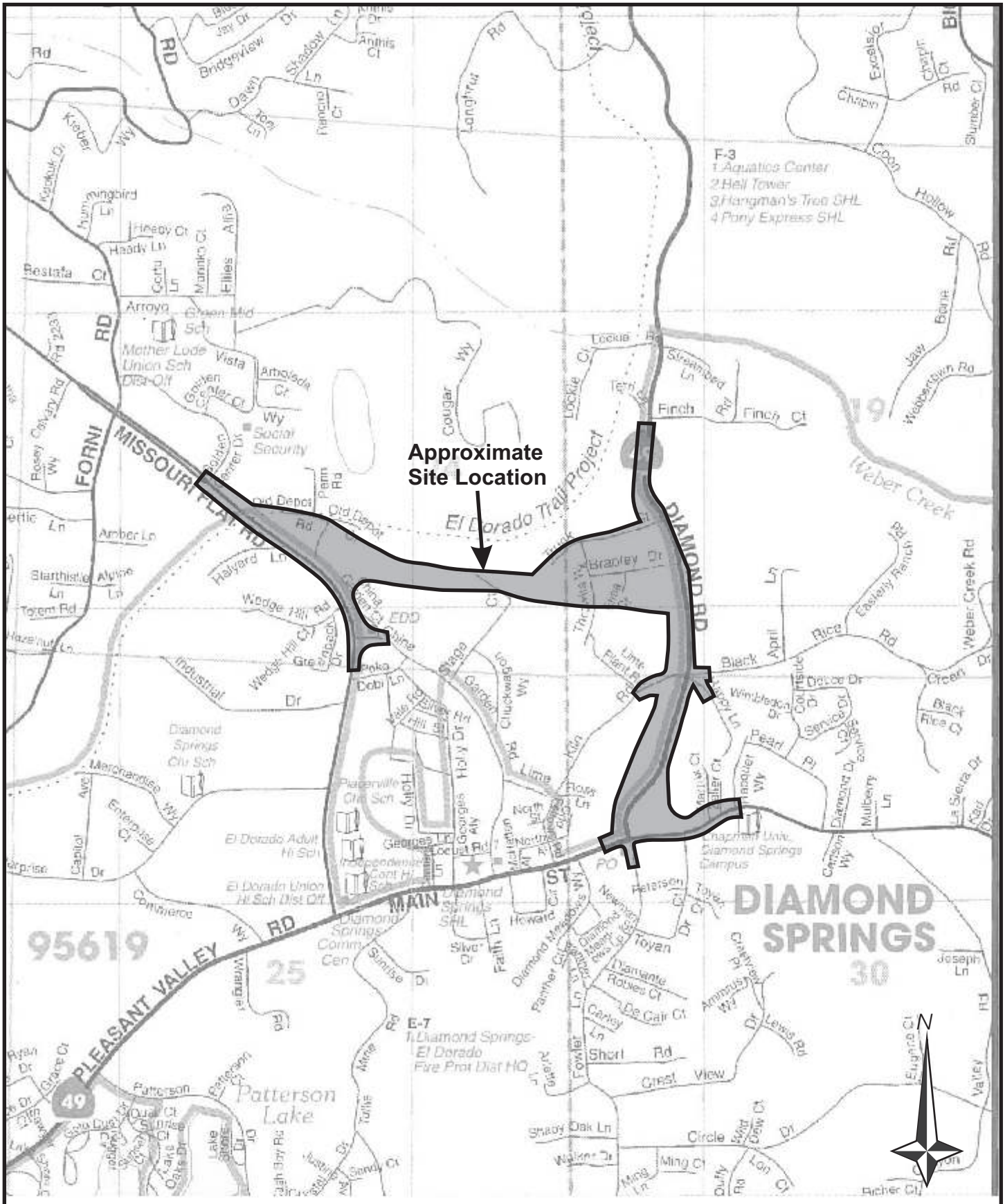
5. Loyd, R.C., and others, (1983): Mineral Land Classification of the Placerville 15-Minute Quadrangle, El Dorado and Amador Counties, California”, California Department of Conservation, Division of Mines and Geology, Open-File Report 83-29.

6. U.S. Department of Agriculture (USDA) Soil Conservation Service, Soil Survey of El Dorado County - Western Part, California (1974).

7. U.S. Geological Survey Topographic Map – Placerville, California Topographic Quadrangle, 7.5 minute series, 1949 (photorevised 1973).

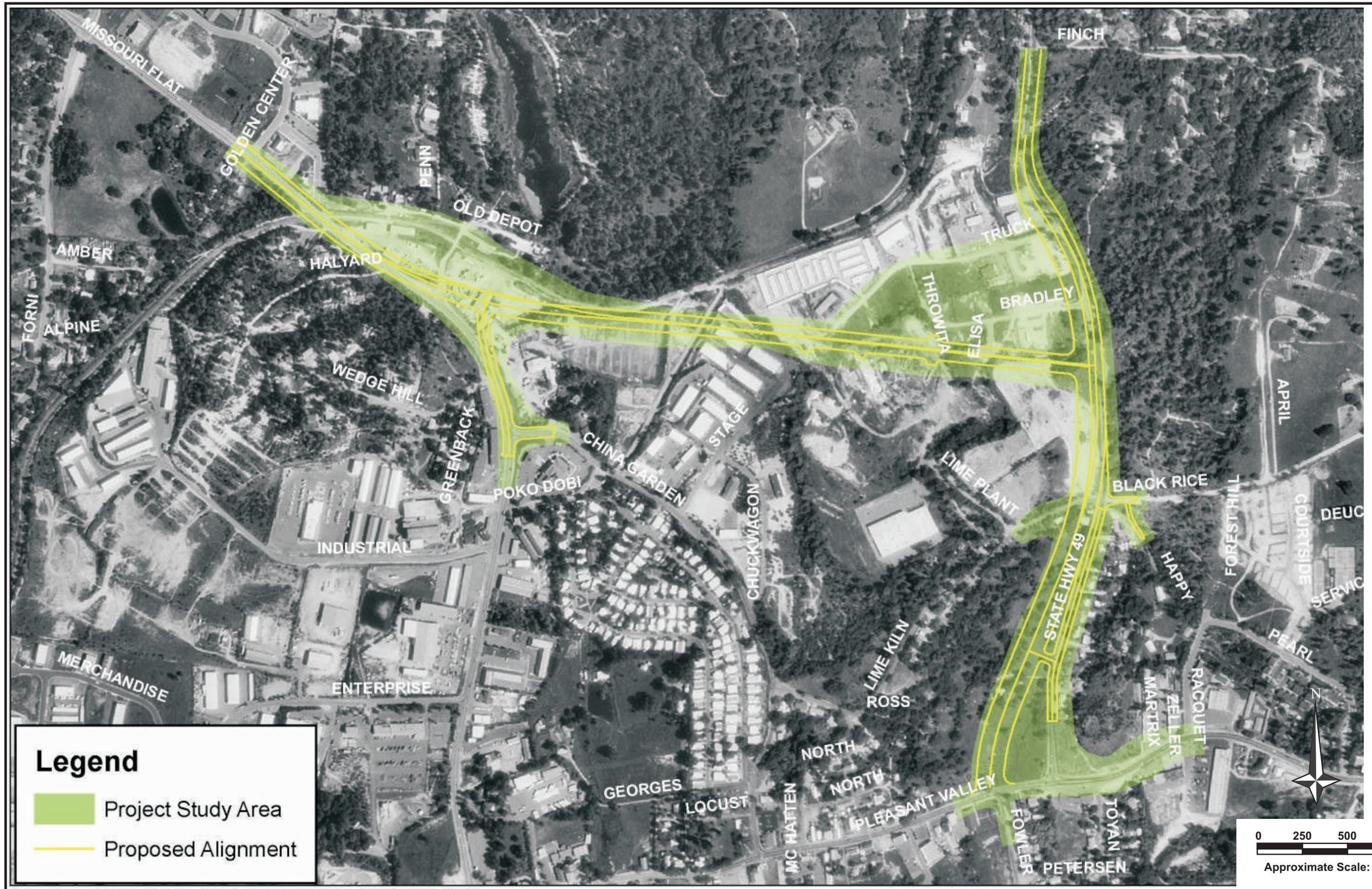
APPENDIX A

Vicinity Map
Site Plan



BASE MAP REF: El Dorado County Street And Road Atlas. Compass Maps 2006 Page 200

YOUNGDAHL CONSULTING GROUP, INC. GEOTECHNICAL • ENVIRONMENTAL • MATERIALS TESTING	Project No.: E07479.001 **February 2008**	**VICINITY MAP** **Diamond Springs Parkway** Placerville / Diamond Springs, California	**FIGURE** **A-1**



Source: El Dorado County, 2007; CTA Engineers, 2007; MBA, 2007

BASE MAP REFERENCE: Proposed Parkway Alignment, Exhibit 2, El Dorado County DOT, Michael Brandman Associates, Dated 2007

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

Project No.: E07479.001

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SITE PLAN

Diamond Springs Parkway
Placerville / Diamond Springs, California

FIGURE **A-2**