APPENDIX 3.4

Geotechnical Input for Environmental Impact Report for the San Diego State University Plaza Linda Verde Project San Diego, California, **Southland Geotechnical Consultants (May 2009)**

SGC *Southland Geotechnical Consultants*

GEOTECHNICAL INPUT FOR ENVIRONMENTAL IMPACT REPORT SAN DIEGO STATE UNIVERSITY PLAZA LINDA VERDE PROJECT SAN DIEGO, CALIFORNIA

Prepared for:

DUDEK
605 Third Street
Encinitas, California 92024

May 15, 2009

• *1244 GREENFIELD DRIVE, SUITE C EL CAJON, CALIFORNIA 92021* •
(619)442-8022 • FAX (619)442-7859

SGC Southland Geotechnical Consultants

May 15, 2009

To: Dudek
605 Third Street
Encinitas, California 92024

Attention: Ms. Sarah Lozano

Subject: Geotechnical Input for Environmental Impact Report
San Diego State University Plaza Linda Verde Project
San Diego, California

Dear Ms. Lozano,

Southland Geotechnical Consultants has prepared this report presenting the results of our geotechnical (soils/geologic) study for the San Diego State University Plaza Linda Verde project. We understand that this technical report will be incorporated into the Environmental Impact Report (EIR) for the project.

In summary, based on our geotechnical studies, it appears that the geotechnical conditions in the project area will not significantly impact the proposed SDSU Plaza Linda Verde project if appropriate geotechnical design recommendations developed from site-specific geotechnical investigations (including subsurface exploration, laboratory testing, and geotechnical analysis) are included in the project's design and construction. Incorporation of the site-specific geotechnical mitigation measures into the design and construction of the project components should reduce any potential geology/soils impacts to a level of "less than significant".

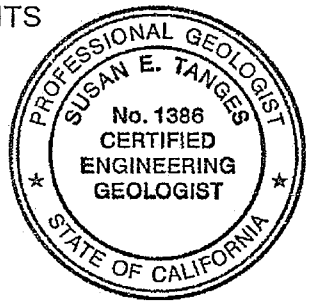
If you have any questions regarding our report, please contact this office. We appreciate this opportunity to be of service.

Sincerely,

SOUTHLAND GEOTECHNICAL CONSULTANTS

Susan E Tanges

Susan E. Tanges, CEG 1386
Engineering Geologist



Distribution: (3) Addressee

• 1244 GREENFIELD DRIVE, SUITE C EL CAJON, CALIFORNIA 92021 •
(619)442-8022 • FAX (619)442-7859

TABLE OF CONTENTS

TABLE OF CONTENTS
(continued)

Attachments

1.0 Introduction

Southland Geotechnical Consultants has evaluated the geotechnical (soils/geologic) conditions for the San Diego State University Plaza Linda Verde project. The purpose of our study was to evaluate the existing geotechnical conditions at the project site and identify potential geotechnically-related impacts so this information could be included in an Environmental Impact Report (EIR) for the project. The geotechnical conditions evaluated included geologic hazards, soil engineering properties, and onsite pedologic characteristics. Mineral resource zonation literature was also consulted to evaluate the presence of potential aggregate resources in the study area.

2.0 Methodology

The scope of our geotechnical (soils/geologic) study for the SDSU Plaza Linda Verde project included the following:

- Review of geologic maps, literature and aerial photographs pertaining to the site and general vicinity. Existing geotechnical reports for portions of the project area and nearby properties were also reviewed. A list of the documents reviewed is included in Section 10.0.

- Field reconnaissance of the existing surficial soils and geologic conditions in the project area.

- Geotechnical analysis of the data obtained.

- Preparation of this report summarizing the results of our geotechnical studies. Our report evaluates potential geologic resources and identifies potential geotechnical constraints to the project. Also included in the text are discussions of mitigation measures which are typically recommended for the geotechnical constraints identified.

This report is based on information presented in existing geologic/geotechnical literature, including previous geotechnical reports prepared for this and other projects at SDSU, and our experience on SDSU projects and properties with similar geotechnical conditions. Please note that geotechnical services to develop appropriate geotechnical design parameters for the project components, including but not limited to subsurface investigation and laboratory testing of the onsite soil conditions, were not included in our study.

3.0 Project Description

The San Diego State University campus is situated primarily on the mesa on the southern side of Alvarado Canyon. Prior to development of the campus and surrounding area, the topography of the area was characterized by deeply-incised drainage canyons dissecting the relatively level mesa, which is commonly called "Montezuma Mesa" at the location of the main SDSU campus. Many of the on-campus and adjacent canyon areas were filled during previous episodes of grading on the SDSU campus and nearby properties.

The proposed SDSU Plaza Linda Verde project area is located on the relatively level mesa area adjacent to and south of the main SDSU campus and north of Montezuma Road. The project area encompasses several parcels east and west of College Avenue. The approximate elevation of the project area is 450 feet (mean seal level). Most of the parcels are currently developed (or were previously developed) with existing one- to two-story structures and/or paved parking areas. The SDSU Plaza Linda Verde project will consist of a mixed-use development and will be constructed in multiple phases. More complete descriptions of the SDSU Plaza Linda Verde project components are included in the project's Notice of Preparation of Environmental Impact Report (SDSU, 2009). The following project summary is adapted from this NOP document for use in this document.

- *"Mixed-Use Retail/Student Housing"* structures are proposed to be constructed on four portions of the project site, north and south of Lindo Paseo and east and west of College Avenue. The properties are bounded by Montezuma Place on the west and an alley on the east. The northern boundary aligns with Hardy Avenue and the southern boundary is Montezuma Road. These proposed structures will consist of four five-story buildings with ground-floor retail space and upper levels of residential housing. The two structures proposed east of College Avenue will include one level of below-grade parking.

- *"Student Apartments"* structures are proposed to be constructed on the property bounded by Lindo Paseo on the north, Campanile Drive on the east, Montezuma Road on the south, and existing residential developments on the west. These proposed structures will consist of two four-story residential buildings.

- A *"Parking Facilities"* structure is proposed for that portion of the project site located on the northwest corner of Montezuma Place and Lindo Paseo. Existing structures bound the property to the north and west. The parking structure will include five above-grade levels and one below-grade level.

- A *"Campus Green"* is proposed on that portion of the project site that is located south of the existing SDSU Transit Center, west of College Avenue, north of Hardy Avenue and west of an existing development. This project component will not include structures but will consist of a pedestrian promenade, landscaping, flatwork and outdoor "open-play" areas.

- *"Pedestrian Malls"* are proposed along portions of the existing Montezuma Place and along the alley east of College Avenue. This project component will not include structures but will consist of pedestrian/bicycle friendly open-air spaces that would provide access paths to both existing facilities, such as the SDSU Transit Center, and future buildings. This project component is not essential to development of the overall SDSU Plaza Linda Verde project and is contingent upon approval of the vacation of streets/alleys.

4.0 Existing Geotechnical Conditions

4.1 General Geologic Setting

The SDSU Plaza Linda Verde project site, the San Diego State University campus and the City of San Diego are located in the coastal section of the Peninsular Ranges geomorphic province. The northwesterly-trending mountain ranges of this province are generally underlain by basement rocks consisting of Jurassic metamorphic rocks intruded by Cretaceous igneous rocks of the southern California batholith. During the past 54 million years, the western, coastal flank of this mountainous area has experienced several episodes of marine inundation and subsequent regression. This resulted in deposition of a thick sequence of marine and nonmarine sediments (claystones, siltstones, sandstones and conglomerates) on the basement rocks. Lower base levels, a result of post-Pleistocene sea-level lowering, allowed stream erosion to create the relatively steep, deeply-incised canyons present in the area.

4.2 Geologic/Soil Units

The geologic and soil units underlying the SDSU Plaza Linda Verde project area and nearby vicinity have been mapped and investigated by various geologists and geotechnical consultants. Detailed descriptions of the geologic/soils units encountered by these geologists and consultants are provided in various geologic/geotechnical documents for the campus area (see 10.0 List of References). The relevant geotechnical information

for the SDSU Plaza Linda Verde project area provided in these documents is included herein.

The attached Geologic Map of the SDSU Plaza Linda Verde project area (Figure 1) is from California Division of Mines and Geology Bulletin 200 (Kennedy and Peterson, 1975). Following are summary descriptions (in order of increasing age) of the geologic/soil units that underlie the SDSU Plaza Linda Verde project area.

4.2.1 Existing Fill Soils

Development of the SDSU campus and surrounding areas has included placement of fill in various locations and has included the infilling of previously existing canyons. To the northeast of the SDSU Plaza Linda Verde project site, College Avenue descends from the mesa along the approximate location of one of these previously filled canyons. Fill soils were also placed on portions of the project area during previous grading. In general, the project site consists of a relatively level, mesa-top area and is reported to be underlain by generally less than approximately 3 feet of existing fill soils (Golder, 2004a). Fill soils exceeding 3 feet in depth likely exist in the backfilled excavations for the underground storage tanks that were removed from the project parcels that were previously developed as fuel/service stations. Fill also exists as backfill in underground utility trenches.

Fill soils in the project area generally appears to be primarily comprised of locally-derived materials. The fill soils generally range in composition from sandy clays to silty and clayey sands, commonly with abundant gravel/cobbles. Some fill areas may include boulder-sized rock fragments, concrete/asphalt chunks and debris.

4.2.2 Lindavista Formation

The Pleistocene-aged Lindavista Formation underlies the majority of the mesa-top portions of the SDSU campus and the SDSU Plaza Linda Verde project area. The Lindavista Formation is approximately 5 to 15 feet thick (Golder, 2004a) . The Lindavista Formation is generally known to consist of orange-brown gravel/cobble conglomerate with a clayey to silty sandstone matrix. Well-cemented zones locally occur within the Lindavista Formation. Boulders up to 2 feet in maximum dimension were encountered in the Stadium Conglomerate, northerly of the project

area (Golder, 20004a). The upper portion of the Lindavista Formation is known to locally weather into an expansive residual clay horizon.

4.2.3 Mission Valley Formation

In the SDSU Plaza Linda Verde project area west of College Avenue, the Eocene-aged Mission Valley Formation is mapped as underlying the Lindavista Formation. The Mission Valley Formation is generally known to consist of gray silty fine sandstone and conglomerate. The Mission Valley Formation is variable in thickness but in the project area is reported to be approximately 3 to 20 feet thick (Golder, 2004a).

4.2.4 Stadium Conglomerate

The Eocene-aged Stadium Conglomerate is mapped as underlying the Mission Valley and Lindavista Formations west of College Avenue and underlies the Lindavista Formation east of College Avenue in the project area. The Stadium Conglomerate is generally known to consist of yellow-brown to orange-brown gravel/cobble conglomerate with a silty to clayey sandstone matrix. Occasional boulders may also exist within this geologic unit. Occasional sandstone interbeds occur within this geologic unit, and the Stadium Conglomerate is locally well cemented.

4.3 Geologic Structure

The sedimentary formations exposed on the SDSU campus and on adjacent areas are interpreted to be generally flat-lying to very gently dipping with respect to their sedimentary bedding. No major folding of the onsite geologic units has been previously reported and is not anticipated in the general SDSU vicinity.

4.4 Faulting

Our review of geologic maps and literature pertaining to the general study area (see 10.0 List of References) indicates that there are no known major or "active" faults on or in the immediate vicinity of the project areas. The project area is not located within a State-delineated "Alquist-Priolo Earthquake Fault Zone". An "active" fault is defined by the California Division of Mines and Geology (CDMG) as one which has "had surface displacement within Holocene time (about the last 11,000 years)". *Please note that the California Division of Mines and*

Geology is now known as the California Geological Survey, however, we refer to this State department as CDMG in this report.

Evidence for active faulting at the SDSU campus was not identified or reported during the previous geologic/geotechnical studies performed on and near the project areas. The nearest known active faults are the Rose Canyon fault located approximately 6 miles west of the SDSU campus, the Coronado Bank fault located offshore approximately 20 miles west of the campus, and the Elsinore fault located approximately 35 miles northeast of the campus. The San Andreas fault is located approximately 80 miles east-northeast of SDSU. A map showing the regional faults in southern California is attached (Figure 2).

Based on our review of the City of San Diego's Seismic Safety Study maps (City, 1995), the SDSU campus is located approximately 0.3 mile east-northeasterly of a mapped trace of the La Nacion fault. The La Nacion fault is generally not known to displace Quaternary deposits, and, therefore, the La Nacion fault is currently interpreted by most geologists not to be an "active" fault based on CDMG criteria. Surficial evidence for onsite active faulting was not observed during our site visits.

4.5 Groundwater

Groundwater seepage was reported in several geotechnical reports for projects on and near this study's project sites. The groundwater encountered appears to be perched at the fill-natural ground contact or perched in permeable sandstone layers in the onsite geologic formations. The likely source of groundwater is infiltration of landscape irrigation waters and precipitation.

5.0 Thresholds of Significance

The "thresholds of significance" for the potential geotechnical impacts affecting the SDSU Plaza Linda Verde project are adapted from the Environmental Checklist Form included in Appendix G of the CEQA Guidelines. Geotechnical constraints could be considered potentially significant if the project would "expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:"

- Rupture of a known earthquake fault (as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault)

- Strong seismic ground shaking
- Seismic-related ground failure, including liquefaction
- Landslides

Potential geotechnical constraints could also be considered potentially significant if the project would:

- Result in substantial soil erosion or the loss of topsoil
- Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse
- Be located on expansive soil, creating substantial risks to life or property
- Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water
- Place within a 100-year flood hazard area structures which would impede or redirect flood flows
- Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam
- Inundation by seiche, tsunami, or mudflow

6.0 Geologic/Soil Resource Evaluation

6.1 USDA Soil Survey

The US Department of Agriculture Soil Survey (USDA, 1953) has mapped the SDSU Plaza Linda Verde project area as being underlain by the soil type, Redding-Urban land complex (RhC). The characteristics listed for this soil type include occurrence on 2 to 9 percent slopes, high shrink-swell behavior, and suitability as a source of gravel.

Considering the current land use at the project site and the land use of the surrounding area, development of the project area as commercial sources of gravel appears unlikely.

6.2 Aggregate/Mineral Resources

The California Division of Mines and Geology's Special Report 153 (Kohler and Miller, 1982) classifies land in western San Diego County according to the presence or absence of construction-grade aggregate resources. The purpose of Special Report 153 was to transmit data on the type, quantity, location and distribution of aggregate resources, as well as projections of future regional need, to the State Mining and Geology board and to local government planners. The classification was completed in accordance with guidelines established by the State Mining and Geology Board, in compliance with the Surface Mining and Reclamation Act of 1975.

The SDSU Plaza Linda Verde project area is mapped within zone "MRZ-3" with respect to construction aggregate resources. Areas mapped as MRZ-3 are "areas containing mineral deposits, the significance of which cannot be evaluated from available data".

Considering the current land use at the project site and the land use of the surrounding area, development of the project area as commercial sources of construction-grade gravel appears unlikely.

6.3 City of San Diego Seismic Safety Study

Our review of Geologic Hazards and Faults Sheet 22 of the City of San Diego Seismic Safety Study (City, 1995) indicates that the SDSU Plaza Linda Verde project site is located in Geologic Hazard Category 53. Category 53 is one of several categories that describe and assign a relative risk to "level or sloping terrain" due to hazards associated with "unfavorable geologic structure". Category 53 is assigned a "low to moderate risk" according to the City Seismic Safety Study document.

7.0 Potential Geotechnical Impacts on Project

Following is a summary of the potential geotechnical impacts evaluated for the SDSU Plaza Linda Verde project site.

7.1 Landslides/Slope Instability

Based on our geotechnical studies, there are no known or suspected landslides in the SDSU Plaza Linda Verde project area. The project area is located on a relatively level mesa area. The geologic formations underlying the project area are generally not known to be susceptible to

landslides. Temporary slopes may be excavated during project construction activities and may expose adverse geologic conditions, such as adversely-oriented joints or loosely embedded cobbles/boulders. Temporary slope failures could potentially damage project improvements under construction and adjacent properties.

7.2 Erosion

Disturbance of the ground surface during construction of proposed facilities may increase or decrease the erosion potential of a site. Erosion of exposed soils is as a potential concern if not anticipated and mitigated.

7.3 Unconsolidated Soils

Unconsolidated soils on the SDSU Plaza Linda Verde project area generally consists of existing fill soils. These soils are typically considered potentially compressible and may possess unacceptable settlement characteristics under structural and fill loads. If not mitigated, improvements built on potentially compressible, unconsolidated soils may crack as a result of soil settlement. Excavations exposing unconsolidated soils may be subject to sloughing.

7.4 Expansive Soils

Expansive soils primarily consist of clayey soils that have a potential for significant volume changes (shrinking and swelling) with moisture fluctuations. Expansive soils in the SDSU Plaza Linda Verde project area include clayey existing fill soils and the clayey portions of the onsite geologic formations. If not mitigated, near-surface expansive soils may cause uplift and cracking of slabs, pavements and other improvements. Other expansive soil-related problems include poor drainage and poor establishment of vegetation. Expansive soils may be a potential geotechnical concern, if not mitigated at the project site.

7.5 Excavatability

The onsite sedimentary geologic formations (Lindavista Formation, Stadium Conglomerate, and Mission Valley Formation) may include locally well-cemented concretionary horizons. These well-cemented zones may present excavation difficulties during grading and construction activities.

7.6 Groundwater/Seepage

The reported estimate to the depth of the static groundwater surface is approximately 60 feet below the existing ground surface (Golder, 2004a). Perched groundwater seeps were reported in some of the previous geotechnical borings on and near the SDSU Plaza Linda Verde project area and may also be encountered during development of project components, especially those structures that include a below-grade parking level. The likely sources of the groundwater seepage are the infiltration of landscape irrigation waters and precipitation. Seasonal fluctuations of the onsite groundwater conditions may occur.

7.7 Flood Inundation

Flood inundation of the SDSU Plaza Linda Verde project area is not likely due to its site elevation and distance from natural drainage channels susceptible to flooding during precipitation events, and due to its site elevation and distance from projected areas of inundation by a dam failure (such as Lake Murray).

7.8 Liquefaction

Liquefaction is caused by strong vibratory motion (typically due to earthquakes) and may occur in areas underlain by loose granular soils and a near-surface groundwater table. Soils that liquefy may settle. Improvements underlain by soils that liquefy may also settle and suffer damage. The potential for seismically-induced liquefaction at the SDSU Plaza Linda Verde project site is considered very low due to the density and grain-size characteristics of the geologic/soil units in the project area and the depth to a static groundwater surface (reported to be approximately 60 feet below the existing ground surface).

7.9 Fault Rupture

Ground rupture is typically associated with moderate to large earthquakes occurring on active faults. The hazard associated with ground rupture is potential damage to structures situated across a ruptured fault trace. Since no mapped active fault traces are known to cross the SDSU Plaza Linda Verde project area, the potential for surface rupture (ground breakage along fault traces) is considered very low.

7.10 Seismic Shaking

Southern California is a seismically active region. Ground shaking due to earthquakes on active regional faults should be expected at the SDSU Plaza Linda Verde site and may impact the proposed improvements.

7.11 Tsunami

Tsunami are sea waves generated by submarine earthquakes, landslides, or volcanic action. Due to the distance from the coastline and elevation of the project site, the possibility of inundation of the site by a tsunami is considered very low.

7.12 Seiche

Seiche are periodic oscillations of a body of water. Due to the distance from bodies of water and elevation of the site, the possibility of inundation of the project site from a seiche is considered very low.

7.13 Mudflows

A mudflow is a flowing mass of soil with a high fluidity during movement. The project site is located on a relatively level mesa top in an urbanized area with minimally exposed soil surfaces. The possibility of the inundation of the project site by mudflows is considered low.

8.0 Typical Mitigation Measures

Appropriate mitigation measures will be developed during site-specific geotechnical design studies performed for the SDSU Linda Plaza Verde project components. The following chapters of the currently-adopted edition of the California Building Code (California Building Standards Commission, 2007) and corresponding, referenced standards of the International Building Code (International Code Council, 2006) include some requirements for evaluation of potential geotechnical impacts during project-specific geotechnical investigations:

- *Chapter 16 - Structural Design*
- *Chapter 18 - Soils and Foundations*
- *Chapter 31 - Special Construction*
- *Chapter 35 - Referenced Standards*

In addition to the California Building Code and International Building Code, the "Greenbook" also provides specifications that have applicability to public works projects that may be applied to private projects. The "Greenbook" is the common, popular title of the book, *Standard Specifications for Public Works Construction* (BNi Building News, 2009).

Please note that geotechnical investigation studies must meet, but are not limited to, the requirements of the currently-adopted edition of the California Building Code (CBC). Many geotechnical investigation studies exceed the CBC requirements with scopes that may be based on project design, site constraints, the anticipated geotechnical conditions, and the geotechnical consultant's experience. Geotechnical design studies may include (but not be limited to) preliminary soils investigations, engineering geologic investigations, and/or ground-response reports. Specific geotechnical investigation tasks may include (but not be limited to) subsurface exploration, geotechnical laboratory testing, and geotechnical analyses. For the Plaza Linda Verde project, some geotechnical studies have been performed and more will be performed. Geotechnical studies are performed by State of California-licensed registered Civil Engineers (practicing soils engineering), Geotechnical Engineers, Professional Geologists (formerly known as registered geologists) and certified Engineering Geologists.

Project-specific mitigation measures for potential geotechnical constraints are developed during the geotechnical design studies. Several alternatives may be developed for a specific project. Following are discussions of typical mitigation measures for the potential geotechnical impacts outlined in Section 7.0.

8.1 Landslides/Slope Instability

The SDSU Plaza Linda Verde project site is located on a relatively level mesa area. There are no known or suspected landslides impacting the project site, and mitigation of landslides is not necessary. The stability of any proposed slopes, especially those temporary slopes constructed during excavation activities, will likely require further evaluation, including subsurface investigation, laboratory testing and stability analyses. Geologic conditions that may be exposed in these temporary cut slopes can be assessed prior to excavation during the project-specific geotechnical investigations. In addition, temporary excavation slopes are typically checked by an Engineering Geologist during construction for indications of potentially adverse conditions, such as out-of-slope joints or loosely embedded boulders. Temporary slopes with instability concerns may be mitigated by generally accepted construction techniques including slope flattening or shoring.

8.2 Erosion

Proper grading techniques (with appropriate compaction efforts), use of stormwater pollution prevention devices (per regulatory agency guidelines), revegetation of disturbed areas, and construction of appropriate drainage provisions can reduce the potential for erosion of sites. Maintenance of drainage provisions, such as periodic removal of accumulated eroded soils and debris from surface drains, is also needed. A project designed and constructed in accordance with properly-engineered grading and drainage plan will not negatively impact the erosion potential of the project site and surrounding areas.

8.3 Unconsolidated Soils

The extent and depths of potentially compressible, unconsolidated soils can be assessed by subsurface exploration and laboratory testing during project-specific geotechnical investigations. A below-grade parking level is proposed on portions of the project site, and the potentially compressible soils in these areas will likely be exported from the site during below-grade excavation. Mitigative measures for structural/fill areas underlain by unconsolidated soils typically include removal of the compressible soils and replacement with properly compacted fill or deep foundation systems, such as drilled piers or piles, which extend through the compressible soils and are supported by the underlying, firm natural soils.

8.4 Expansive Soils

The expansion (shrink-swell) potentials of the onsite soils can be assessed by laboratory testing of representative soil samples obtained during site-specific geotechnical investigation studies. The expansion potential of soils is typically tested in accordance with ASTM test method D4829 and classified based on the "expansion index" test result. Chapter 18 of the 2007 CBC states that structures founded on expansive soils will require special design. Typical mitigation measures include grading such that expansive soils are not placed within the upper few feet of finished grade. A below-grade parking level is proposed on portions of the SDSU Plaza Linda Verde project, and potentially expansive clayey soils in these areas may be exported from the site during below-grade excavation. Alternative, "special" deepened and/or stiffened foundation systems for proposed at-grade structures may also be considered. Surface and subsurface drainage provisions may also be implemented to reduce moisture fluctuations in subgrade soils.

8.5 Excavatability

Subsurface exploration at the project site and on nearby sites has been performed to evaluate excavatability characteristics of the geologic formations that are anticipated to be encountered at the project site. Below-grade parking levels are proposed on portions of the SDSU Plaza Linda Verde project. The geologic formations at the project site are generally excavatable with suitable construction equipment in good operating condition. The Lindavista Formation, Mission Valley Formation, Stadium Conglomerate and Friars Formation may have locally well-cemented concretionary horizons which may present excavation difficulties during grading operations. In general, construction blasting is not used to facilitate excavation of concretionary horizons, however, heavy ripping efforts and jackhammering may be considered.

An evaluation of the suitability of the onsite soils and rock for use as fill should also be made during the site-specific geotechnical studies. In general, the onsite soils appear suitable for processing into fills, however, oversize materials from excavations may not be suitable for use as compacted fill and may require offsite disposal or other special handling and placement techniques during grading. The "Greenbook" provides specifications of typical fill materials and their typical maximum allowed dimensions.

8.6 Groundwater/Seepage

Site-specific geotechnical investigation studies typically include an evaluation of the depth to the groundwater surface and the potential for seeps. The California Building Code states that groundwater levels should be investigated. Subsurface and surface drains in filled areas and behind retaining walls are commonly designed and constructed to reduce potential adverse impacts associated with seepage conditions. Appropriate shoring and possibly dewatering in excavations can reduce the potential for caving of excavations due to groundwater seeps.

8.7 Flood Inundation

Flood inundation from natural drainages or failure of a dam (such as Lake Murray) is considered very low, and mitigation measures with regard to flood inundation are not needed for the SDSU Plaza Linda Verde project.

EXPLANATION

QUATERNARY — Holocene

Qsw / Qal + Qsw — **Alluvium and Slopewash**

Qsw, Slopewash; Qal & Qsw, Alluvium and Slopewash undifferentiated.

Qls — **Landslide deposits**

QUATERNARY — Pleistocene

Qt — **Stream-terrace deposits**

Ql — **Lindavista Formation**

TERTIARY — Pliocene

Tsd — **San Diego Formation**

TERTIARY — Eocene

Tp / Tmv / Tst — **Poway Group**

Tp, Pomerado Conglomerate; Tmv, Mission Valley Formation; Tst, Stadium Conglomerate. Conglomerate marked by circle pattern.

Ti — **Friars Formation**

Conglomerate marked by circle pattern.

JURASSIC CRETACEOUS

Kg — **Granite rocks**

Undifferentiated granitic rocks of the southern California batholith.

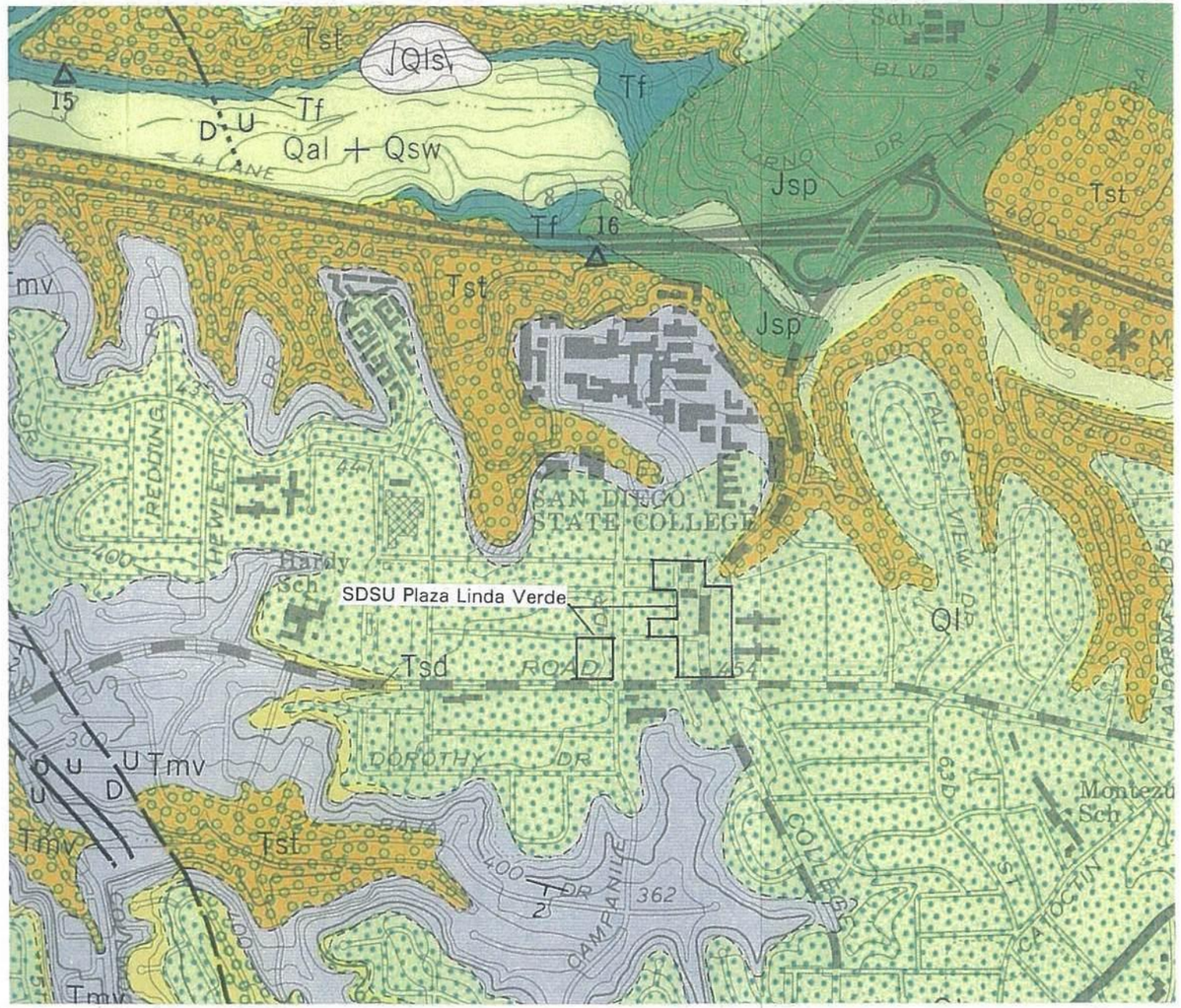
JURASSIC

Jsp — **Santiago Peak Volcanics**

SYMBOLS

Contact
(dashed where approximately located; dotted where concealed)

Fault, showing dip
(dashed where approximately located; dotted where concealed; U, upthrown side; D, downthrown side).



NORTH

1000 0 1000 2000 3000

SCALE in FEET

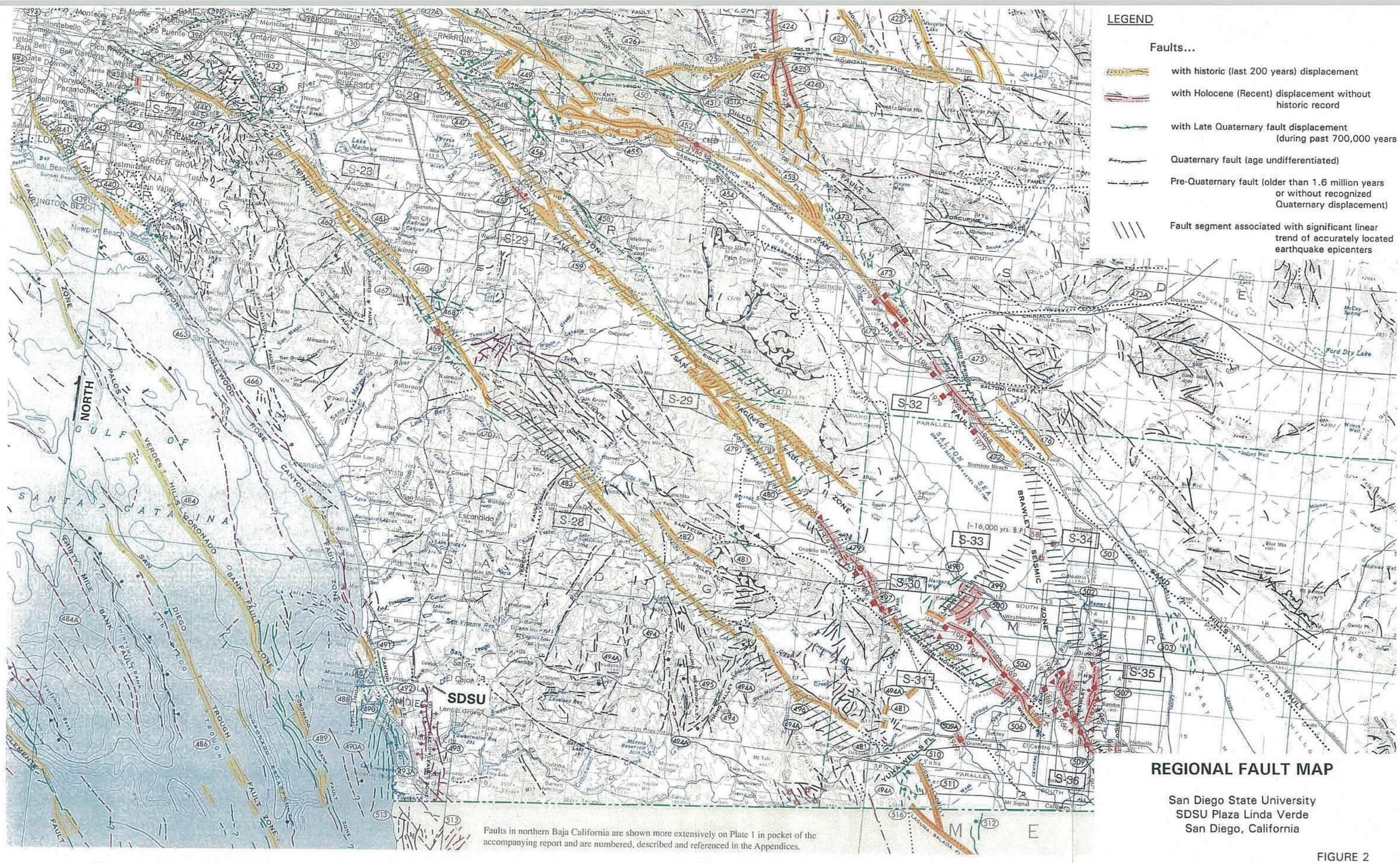
This map is excerpted from Kennedy and Peterson's map "Geology of the La Mesa Quadrangle, San Diego County, California" in CDMG Bulletin 200 (Kennedy and Peterson, 1975)

GEOLOGIC MAP

San Diego State University
SDSU Plaza Linda Verde
San Diego, California

FIGURE 1

SGC



Modified from Fault Activity Map of California and Adjacent Areas (Reference 5)

REGIONAL FAULT MAP

San Diego State University
SDSU Plaza Linda Verde
San Diego, California

FIGURE 2

SGC