APPENDIX F
GEOTECHNICAL REPORT

SGC *Southland Geotechnical Consultants*

GEOTECHNICAL INPUT FOR ENVIRONMENTAL IMPACT REPORT SAN DIEGO STATE UNIVERSITY 2007 CAMPUS MASTER PLAN REVISION SAN DIEGO, CALIFORNIA

Project No. 270C111

May 22, 2007

Prepared for:

DUDEK
605 Third Street
Encinitas, California 92024

• *1238 GREENFIELD DRIVE, SUITE A EL CAJON, CALIFORNIA 92021* •
(619)442-8022 • FAX (619)442-7859

SGC Southland Geotechnical Consultants

May 22, 2007 Project No. 270C111

To: Dudek
605 Third Street
Encinitas, California 92024

Attention: Ms. Sarah Lozano

Subject: Geotechnical Input for Environmental Impact Report
San Diego State University 2007 Campus Master Plan Revision
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 2007 Campus Master Plan Revision project. We understand that this technical report will be incorporated into the Environmental Impact Report (EIR) for the project.

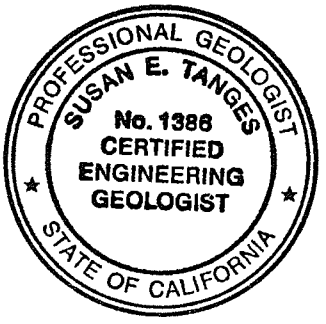
If you have any questions regarding our report, please contact this office. We appreciate this opportunity to be of service.

Sincerely,

SOUTHLAND GEOTECHNICAL CONSULTANTS

Susan E Tanges

Susan E. Tanges, CEG 1386
Engineering Geologist



Distribution: (3) Addressee

• 1238 GREENFIELD DRIVE, SUITE A EL CAJON, CALIFORNIA 92021 •
(619)442-8022 • FAX (619)442-7859

TABLE OF CONTENTS

TABLE OF CONTENTS
(continued)

TABLE OF CONTENTS
(continued)

Attachments

I. Introduction

Southland Geotechnical Consultants has evaluated the geotechnical (soils/geologic) conditions for the San Diego State University (SDSU) 2007 Campus Master Plan Revision project. The purpose of our study was to evaluate the existing geotechnical conditions at the project sites 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.

II. Methodology

The scope of our geotechnical (soils/geologic) study included the following:

- Review of geologic maps, literature and aerial photographs pertaining to the site and general vicinity. A list of the documents reviewed is included in Section X.

- Field reconnaissance of the existing geologic and surficial soil conditions in the project areas.

- 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. A matrix table summarizing this information is included as Table 1. 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 various 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.

III. Project Description

The current San Diego State University campus is situated on the southern side of Alvarado Canyon and the adjacent mesa to the south. 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. Many of these canyon areas were filled during previous episodes of grading on the SDSU campus.

The following descriptions of the SDSU 2007 Campus Master Plan Revision project components were provided by you (Dudek):

I. FTES Increase: 25,000 to 35,000

II. Adobe Falls: Development of up to 370 residential dwelling units for faculty and staff housing on a 33-acre site located north of Interstate 8. Under this project component, which would consist of an Upper Village and a Lower Village, 50-70 units would be developed near-term in the Upper Village, and would be analyzed at the project-level of review. 250-300 units would be developed long-term in the Lower Village, and would be analyzed at the program level of review. The specific number of units ultimately to be developed is dependent upon the vehicle carrying capacities of available access routes to the site. This project component also would include a swimming pool, a 3,600 gross square foot ("GSF") community center, and recreation areas.

III. Alvarado Campus Multi-phase development in northeastern portion of campus. 612,285 gross square feet ("GSF") of new space; and, demolition of 128,678 GSF of existing space; resulting in a net increase of 483,607 GSF of new space upon buildout.[1]

A. Phase 1: D Lot - (I) Demolition of existing structure at 6361 Alvarado Court (12,155 GSF; research and development uses); and (ii) Development of a new 110,000 GSF 5-story building for academic uses, to be analyzed at the project-specific level.

B. Phase 2: D Lot - Development of: (I) an 85,000 GSF 5-story building to house mixed office/research and development uses displaced in subsequent phases from Alvarado Core Site, to be analyzed at the program level; and, (ii) an 85,000 GSF 5-story building, 70,000 GSF to house existing medical/office tenants displaced in subsequent phases from Alvarado Core Site, and 15,000 GSF to house mixed office/research and development uses displaced in subsequent phases from Alvarado Core Site, to be analyzed at the program level; and

C. Subsequent Phase/s: Alvarado Core Site - (I) Demolition of 5 existing office buildings totaling 116,523 GSF, to be analyzed at program level[2]; (ii) Development of three 4/5-story 100,000 GSF buildings, and one 4/5 story 32,385 GSF building for academic uses, analyzed at program level (332,285 GSF Alvarado Core Site net total v. 715,000 GSF, revised to reflect Redevelopment Plan); and (iii) Development of a 6/7-story 552,000 GSF parking structure for 1840 vehicles, to be analyzed at program level. [Note: (1) 191 existing surface parking spaces + 44 below 6386 Alvarado Court total 2075 spaces; (2) Three Alvarado Core Site buildings to be retained, totaling 102,715 GSF of retained university projects/medical office uses.]

IV. Alvarado Hotel: Development of approximately 60,000 GSF six-story building, to be owned by Aztec Shops and operated in cooperation with the SDSU School of Hospitality and Tourism Management, containing up to 120 hotel rooms and studio suites, located on approximately 2 acres of existing Lot C immediately north of Villa Alvarado Residence Hall. To be analyzed at the project-specific level.

---

[1] "Within the Alvarado Road Sub-Area of the College Community Redevelopment Project, a maximum of 600,000 square feet of office, 110,000 square feet of research and development, and 5,000 square feet of local serving commercial uses may develop. Maximum height is eight stories. Uses permitted in the Alvarado Road Sub-Area are... [See, CCRP Master Project Plan, Oct. 12, 1993, pp. 24-27.]

[2] The buildings to be demolished are as follows: (I) 6475 Alvarado Road; (ii) 6495 Alvarado Road; (iii) 6505 Alvarado Road; (iv) 6310 Alvarado Court; and (v) 6330 Alvarado Court.

V. **Student Housing**: Development of new student housing resulting in a net increase of 2,976 student beds, to be developed in multiple phases:

A. **Phase 1 - G Lot Residence Hall**: Near-term development of a 10-story, 350,000 GSF, Type-1 (reinforced concrete) structure to house 800 student beds. Building construction would result in the reconfiguration of existing G parking lot, resulting in a 90% reduction in available surface parking spaces. To be analyzed at the project-specific level; and,

Office of Housing Administration and Residential Education Office ("OHAREO"): Construction of a two-story, 15,000 GSF replacement structure adjacent to H parking lot to replace the structure demolished in Phase 2. To be analyzed at the project-specific level.

B. **Phase 2 - Olmeca/Maya Residence Hall Demo/Rebuild**: Demolish existing Olmeca (Bldg. 47) and Maya (Bldg. 46) residence halls, each containing with a combined total of 424 beds, and demolish existing OHAREO (Bldg. 40), located adjacent to H parking lot. Near-term construction of two 10-story, 350,000 GSF, Type-1 structures, each housing 800 student beds, to be built on the site of former Olmeca/Maya residence halls. To be analyzed at the project-specific level.

C. **Phase 3 - U Lot Residence Hall**: Long-term development of a 10-story, 350,000 GSF, Type-1 structure to house 800 student beds, to be constructed atop the previously master-planned Parking Structure 7. The development site presently serves as U parking lot. The Parking Structure would contain spaces for 750 vehicles, 250 more than previously master-planned. To be analyzed at the program level.

D. **Phase 4 - Villa Alvarado Residence Hall Expansion**: Long-term development of 50 additional two-bedroom apartments, housing 200 student beds, in 2-3-story structures, as part of the Villa Alvarado housing complex located on C Lot. To be analyzed at the program level.

VI. **Campus Conference Center**: Development of a new 70,000 GSF 3-story building on approximately one-half acre located east of Cox Arena (site of existing tennis courts) for meeting/conference space. To be analyzed at the program level.

VII. **Aztec Center Expansion/Renovation**: Renovation of the existing Aztec Center, including up to a 70,000 GSF expansion, to include social space, meeting space, recreation facilities, student organization offices, food services and retail services. To be analyzed at project-specific level.

The proposed SDSU 2007 Campus Master Plan Revision consists of development on the east and west sides of the existing campus and development of an approximately 33-acre undeveloped site to the north of the Interstate 8 freeway corridor. There are six Campus Master Plan Revision project components and brief descriptions of the existing conditions at each of the project component sites follow:

III.A. Adobe Falls (Upper Village and Lower Village)

The Adobe Falls (Upper Village and Lower Village) project component is located north of Interstate 8, west of College Avenue, and south of Adobe Falls Road. This project site generally consists of approximately 33 acres of undeveloped property bordered by single-family residences and condominiums on the north and west. The majority of the site consists of canyon hillside terrain that generally slopes downward to the south, north and west to the bottom of Alvarado Canyon. Alvarado Creek intermittently flows during and after precipitation events.

III.B. Alvarado Campus

The Alvarado Campus project component consists of the existing SDSU campus Parking Lot D and the existing Alvarado Medical Center complex to the east. This project site generally consists of the relatively level, developed property located south of Alvarado Road and the San Diego Trolley alignment, and north of the toe of the northerly-facing slope of Alvarado Canyon. Alvarado Creek and the Alvarado Court roadway cross the western portion of this site.

III.C. Alvarado Hotel

The Alvarado Hotel project component is proposed to be located on approximately 2 acres of the eastern portion of the existing SDSU campus Parking Lot C. This relatively level to gently sloping site is north of the existing SDSU Villa Alvarado residence hall and south of Alvarado Road, Alvarado Creek and the elevated San Diego Trolley trackline.

III.D. Student Housing

The proposed SDSU 2007 Campus Master Plan Revision project includes four sites for student housing:

- The "G Lot Residence Hall" site consists of the existing SDSU campus Parking Lot G which is located southeast of College Avenue and southwest of Zura Way, a campus roadway. The project site generally consists of a relatively level, paved parking lot north of the toe of a northerly-facing slope that descends from the existing East Campus Residence Hall complex. The San Diego Trolley line traverses the site underground. As part of the G Lot Residence Hall project component, the OHAREO two-story structure will be constructed on the relatively level area adjacent to the north end of East H Lot Parking Lot, west of East Campus Drive.

- The "Olmeca/Maya Residence Hall" site is located east of College Avenue and north of Montezuma Road. The project site generally consists of the relatively level mesa-top area developed with the existing Olmeca and Maya Halls.

- The "U Lot Residence Hall" site consists of the existing SDSU campus Parking Lot U which is located north of Remington Road and west of 55th Street. The project site generally consists of a relatively level, paved parking lot at the top of a northerly-facing slope and east of the existing West Campus Residence Hall complex.

- The "Villa Alvarado Residence Hall Expansion" is proposed to be located on the western portion of the existing SDSU campus Parking Lot C. This relatively level to gently sloping site is west of the existing SDSU Villa Alvarado residence hall and south of Alvarado Road. Alvarado Creek crosses the northern portion of the site and the elevated trackline of the San Diego Trolley crosses the site.

III.E. Campus Conference Center

The Campus Conference Center project component is proposed to be constructed east of the existing Cox Arena on the site of the former tennis courts. This site is relatively level. The San Diego Trolley lines traverses the northeastern corner of the site underground.

III.F. Aztec Center Expansion/Renovation

The Aztec Center project component is located at the site of the existing Aztec Center. This site is located west of Aztec Circle Drive and north of the campus transit center

IV. Existing Geotechnical Conditions

IV.A. General Geologic Setting

The SDSU 2007 Campus Master Plan Revision project sites, 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. During formation of the canyons, streams deposited alluvial sediments in canyon bottoms and locally perched on slopes as stream terrace deposits.

IV.B. Geologic/Soil Units

The geologic and soil units underlying the SDSU 2007 Campus Master Plan Revision project sites 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 X. List of References). The relevant geotechnical information for the SDSU 2007 Campus Master Plan Revision project sites provided in these documents is included herein.

The attached Generalized Geologic Map of the SDSU 2007 Campus Master Plan Revision area (Figure 1) is from California Division of Mines and Geology Bulletin 200 (Reference 8). Following are summary descriptions (in order of increasing age) of the geologic/soil units that underlie the SDSU 2007 Campus Master Plan Revision project sites.

IV.B.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. Fill soils (not a mapped unit) were also placed in the project area during grading of the Interstate 8 freeway corridor and construction of the San Diego Trolley extension.

Fill soils in the project component areas generally appear 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.

IV.B.2. Natural Topsoil

Natural topsoil (not a mapped unit) is developed on and is typically gradational with the underlying geologic formations. Topsoil mantles natural ground surfaces and has been encountered underlying fill soils at various locations on the SDSU campus.

IV.B.3. Alluvium/Slopewash

Alluvium is the accumulation of soils deposited chiefly by running water in the bottoms of canyons and their tributaries. Alluvium exists within the Alvarado Creek drainage course. Slopewash is a term applied to the accumulation of soil on the face and along the base of a slope. Slopewash is chiefly deposited by the action of gravity and surface water flow. The slopewash deposits are generally derived from the other geologic units on and near the site. For the purposes of this study, alluvium and slopewash deposits are not differentiated.

IV.B.4. Ancient Landslide Deposits

According to the American Geological Institute's Glossary of Geology (Reference 2), a "landslide" is defined as "a general term covering a wide variety of mass-movement landforms and processes involving the downslope transport, under gravitational influence, of soil and rock material en masse. Usually the displaced material moves over a relatively confined zone or surface of shear." As used locally, the term, landslide, typically implies deep-seated movement of a mass of soil/rock over a fairly discrete basal failure surface or surfaces.

An ancient landslide was identified offsite and northwest of the Adobe Falls - Lower Village project area. The landslide appears to have occurred along a weak clay layer or bedding-plane shear within the Friars Formation. In addition, a slope failure is known to have occurred several years ago between Genoa Drive and Adobe Falls Road. Reconnaissance-level geologic observations of the project sites did not indicate the onsite presence of ancient landslides or deep-seated slope instability.

IV.B.5. Lindavista Formation

The Pleistocene-aged Lindavista Formation underlies the majority of the mesa-top portions of the SDSU campus and the general vicinity. 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.

IV.B.6. Mission Valley Formation

In the 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.

IV.B.7. 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. 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.

IV.B.8. Friars Formation

The Eocene-aged Friars Formation is mapped in the northern portion of the existing SDSU campus and in the area north of the Interstate 8 freeway. The Friars Formation is generally known to consist of lagoonal and alluvial sediments that, more specifically, consist of claystone, thinly laminated siltstone/claystone, sandstone and conglomerate. Landslides have been known to have occurred along weak clay layers and bedding-plane shears within the Friars Formation.

IV.B.9. Santiago Peak Volcanics

The Jurassic-aged Santiago Peak Volcanics are the hard "bedrock" unit underlying the sedimentary rocks in the northern portions of the SDSU campus and project area. The Santiago Peak Volcanics are generally known to be comprised of hard, mildly metamorphosed volcanic, volcaniclastic and sedimentary rocks of variable composition and color.

IV.C. Geologic Structure

The sedimentary formations exposed on the SDSU campus and on adjacent areas are 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.

Bedding-plane shears occur within the Friars Formation. The bedding-plane shears are generally parallel to the bedding and typically consist of thin seams of weak, soft remolded clay. As mentioned above, landslides may occur on weak clay layers or bedding-plane shears within the Friars Formation.

The sedimentary geologic units were deposited unconformably on an irregular, erosional surface developed on the underlying hard metamorphic rock of the Santiago Peak Volcanics.

IV.D. Faulting

Our review of geologic maps and literature pertaining to the general study area (see X. 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 (Reference 6), 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.

IV.E. 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. Groundwater also occurs within alluvium deposited within onsite drainage courses, including Alvarado Creek. The likely source of groundwater is infiltration of landscape irrigation waters and precipitation.

V. Thresholds of Significance

The "thresholds of significance" for the potential geotechnical impacts affecting the SDSU 2007 Campus Master Plan Revision project are adapted from the Environmental Checklist Form included in Appendix G of the CEQA Guidelines (Reference 27). 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, as defined in Table 18-1-B of the Uniform Building Code (1997), 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

VI. Geologic/Soil Resource Evaluation

VI.A. USDA Soil Survey

The US Department of Agriculture Soil Survey (Reference 12) has mapped the SDSU 2007 Campus Master Plan Revision project sites as being underlain by the following soil types: Diablo-Urban land complex (DcF), Friant rocky fine sandy loam (FxE), Olivenhain cobbly loam (OhE), Olivenhain-Urban land complex (OkC), Olivenhain-Urban land complex (OkE), Redding-Urban land complex (RhC), Riverwash (Rm), and Tujunga sand (TuB). Table 2 lists some of the pedologic characteristics of these soils. The characteristics listed include percent slope of occurrence, potential for erodibility, shrink-swell behavior, suitability as a source of sand, gravel or decomposed granitics, and suitability of the soils for use as road fill.

Considering the current land use at the project sites and the land use of the surrounding areas, development of the project areas as commercial sources of sand, gravel or decomposed granitics appears unlikely.

VI.B. Aggregate/Mineral Resources

The California Division of Mines and Geology's Special Report 153 (Reference 9) 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 2007 Campus Master Plan Revision project areas are mapped within zones "MRZ-2" and "MRZ-3" with respect to construction aggregate resources. Areas mapped as MRZ-2 are "areas where adequate information indicates that significant mineral deposits are present or where it is judged that there is high likelihood for their presence". 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 sites and the land use of the surrounding areas, development of the project areas as commercial sources of construction-grade sand and aggregate appears unlikely.

VII. Potential Geotechnical Impacts on Project

Following is a summary of the potential geotechnical impacts evaluated for the SDSU 2007 Campus Master Plan Revision project sites. In addition, discussions of which project components may be impacted by the various geotechnical concerns are included. This information is also summarized in the attached Table 1 and on the Potential Geotechnical Constraints Map (Figure 3).

VII.A. Landslides/Slope Instability

Based on our geotechnical studies, there are no known or suspected landslides in the SDSU 2007 Campus Master Plan Revision project areas. However, an ancient landslide does exist offsite northwest of the Adobe Falls - Lower Village site (see Figure 1).

Factors such as the presence of weak clay beds, bedding-plane shears, and adversely-oriented joints and/or bedding my contribute to slope instability. Slope failures could potentially damage project improvements. Grading of these slope areas also has the potential to aggravate deep-seated instability (if present).

Surficial sloughing of slope faces results when there is rapid downhill movement of saturated near-surface soils off of moderate to steep slopes. Accumulated debris may fill drainage canyons or damage improvements. Improvements at the top of a slope may become undermined by surficial sloughing.

The project components that may be potentially impacted by slope instability (if not evaluated and mitigated) include:

Adobe Falls - Upper Village and Lower Village - This area includes hillside terrain, and clayey soils may exist within the geologic units at the site.

Alvarado Campus - A northerly-facing canyon slope borders the southern edge of the site. However, geotechnical evaluations at the site indicated that evidence of ancient landsliding or slope instability was not observed.

Alvarado Hotel - Slopes exist along the Alvarado Creek channel along the northern edge of the site.

Student Housing - Slopes exist along the southern edge of the G Lot Residence Hall site and along the northern edge of the U Lot Residence Hall site. Slopes also exist at the C Lot site where the Villa Alvarado Residence Hall Expansion is proposed.

VII.B. Erosion

Disturbance of the ground surface during construction of proposed facilities may increase or decrease the erosion potential of a site.

Erosion as a potential geotechnical concern is currently evaluated as impacting all the project components (if not anticipated and mitigated):

Adobe Falls - Upper Village and Lower Village
Alvarado Campus
Alvarado Hotel
Student Housing
Campus Conference Center
Aztec Center

VII.C. Unconsolidated Soils

Unconsolidated soils in the SDSU 2007 Campus Master Plan Revision project areas consist of existing fill soils, natural topsoil and alluvium/slopewash. 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.

Unconsolidated soils are a potential geotechnical concern (if not mitigated) at all the project sites:

Adobe Falls - Upper Village and Lower Village - Unconsolidated soils including alluvium/slopewash, natural topsoil, and existing fill soils (associated with the freeway and adjacent development) exist at the site.

Alvarado Campus - Unconsolidated soils consisting of alluvium and fill soils were reported to underlie the majority of this site.

Alvarado Hotel - Unconsolidated soils consisting of alluvium/slopewash and fill soils (associated with existing development) likely exist at this site.

Student Housing - Unconsolidated soils, primarily consisting of fill soils, likely exist at all four Student Housing sites. In addition, unconsolidated alluvial soils may exist at the Villa Alvarado Residence Hall Expansion site.

Campus Conference Center - The site is located along the edge of a filled canyon and the San Diego Trolley extension crosses the area underground. Fill soils associated with the existing improvements may include unconsolidated soils.

Aztec Center - Fill soils associated with the existing improvements may include unconsolidated soils.

VII.D. 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 2007 Campus Master Plan Revision project areas include clayey existing fill soils, clayey natural topsoils, 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 all project sites:

Adobe Falls - Upper Village and Lower Village
Alvarado Campus
Alvarado Hotel
Student Housing

Campus Conference Center
Aztec Center

VII.E. Hard Rock/Excavatability

Hard metamorphic rock of the Santiago Peak Volcanics underlies portions of the Adobe Falls, Alvarado Campus and Alvarado Hotel sites. Hard rock may present excavation difficulties during grading. In addition, the onsite sedimentary geologic formations (Lindavista Formation, Stadium Conglomerate, Mission Valley Formation and Friars Formation) may include locally well-cemented concretionary horizons. These well-cemented zones may present excavation difficulties during grading and construction activities. All the project sites may include hard rock and/or well-cemented zones:

Adobe Falls - Upper Village and Lower Village
Alvarado Campus
Alvarado Hotel
Student Housing
Campus Conference Center
Aztec Center

VII.F. Groundwater/Seepage

Near-surface groundwater is typically encountered in low-lying areas such as the bottoms of canyons and tributary drainages. The Alvarado Creek drainage crosses or is adjacent to portions of the Adobe Falls, Alvarado Campus, Alvarado Hotel and Villa Alvarado Residence Hall Expansion sites. In addition, perched groundwater was reported in some of the previous geotechnical borings on and near the project areas and may also be encountered during development of project components. The likely sources of the groundwater are the infiltration of landscape irrigation waters and precipitation. Seasonal fluctuations of the onsite groundwater conditions may occur. Groundwater and/or seeps may be encountered at all the project sites:

Adobe Falls - Upper Village and Lower Village
Alvarado Campus
Alvarado Hotel
Student Housing
Campus Conference Center
Aztec Center

VII.G. Flood Inundation

Surface water flow during major storm events may fill and, on occasion, overflow the existing Alvarado Creek drainage channel. In addition, Lake Murray is a dam-impounded reservoir located upstream approximately one mile from the SDSU campus. Flood inundation of portions of the following project components may occur (if not anticipated and mitigated) during severe precipitation events or dam failure at Lake Murray:

Adobe Falls - Lower Village
Alvarado Campus
Alvarado Hotel
Villa Alvarado Residence Hall Expansion

VII.H. 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 sites is considered low due to the density and grain-size characteristics of the geologic/soil units in the project areas.

VII.I. 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 project areas, the potential for surface rupture (ground breakage along fault traces) is considered very low.

VII.J. Seismic Shaking

Southern California is a seismically active region. Ground shaking due to earthquakes on active regional faults should be expected at all the sites and may impact the proposed improvements. All the project components may be potentially impacted by seismic shaking:

Adobe Falls - Upper Village and Lower Village
Alvarado Campus
Alvarado Hotel
Student Housing

Campus Conference Center
Aztec Center

VII.K. Tsunami

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

VII.L. Seiche

Seiche are periodic oscillations of a body of water. The possibility of the inundation of the project sites from a seiche is very low.

VIII. Typical Mitigation Measures

Appropriate mitigation measures will be developed during site-specific geotechnical design studies performed for the SDSU 2007 Campus Master Plan Revision project components. The following chapters of the California Building Code (Reference 26) and corresponding, referenced chapters of the Uniform Building Code (Reference 28) include some requirements for evaluation of potential geotechnical impacts during project-specific geotechnical investigations:

- *Chapter 16 - Structural Design Requirements*
- *Chapter 18 - Foundation and Retaining Walls*
- *Appendix Chapter 18 - Waterproofing and Dampproofing Foundations*
- *Appendix Chapter 31 - Special Construction*
  (Division I - Flood-Resistant Construction)
- *Chapter 33 (and Appendix Chapter 33) - Excavation and Grading*
- *Chapter 35 - Uniform Building Code Standards*

In addition to the California Building Code and Uniform 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* (Reference 29).

Please note that geotechnical investigation studies must meet, but are not limited to, the requirements 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 these projects, geotechnical studies would likely be 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 VII.

VIII.A. Landslides/Slope Instability

There are no known or suspected deep-seated landslides impacting the project sites. Therefore, mitigation of deep-seated landslides does not appear necessary for these sites. However, the deep-seated stability of existing and proposed slopes will likely require further evaluation, including subsurface investigation, laboratory testing and stability analyses. Geologic conditions that may be exposed in cut slopes can be assessed prior to excavation by subsurface exploration during project-specific geotechnical investigations. In addition, temporary excavations and cut 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. Potential landslides or slopes with potential deep-seated instability concerns may be mitigated by generally accepted remedial grading techniques including partial or complete removal, stability with drained earthen buttresses, shear keys or stabilization fills.

In general, to reduce the potential of most slope instability concerns (both deep-seated and surficial), current grading codes (such as Section 3301 of CBC) typically require that graded slopes not exceed a gradient of 2 to 1 (horizontal to vertical). Slopes steeper than 2 to 1 are generally known to be prone to surficial instability. Typical mitigation measures to reduce the potential impacts of surficial instability may include slope flattening, slope-top setbacks, the installation and maintenance of drainage provisions, and planting of slope-stabilizing vegetation. Typical slope setback dimensions are discussed in Section 1806 and provided on Figure 18-I-1 of the CBC.

VIII.B. 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 sites and surrounding areas.

VIII.C. 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 (per Section 1804 of CBC) 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.

VIII.D. 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 UBC test standard 18-2 and classified based on the "expansion index" test result. Section 1803 (and Table 18-I-B) of the CBC states that structures founded on soils with expansion index greater than 20 will require special design. Typical mitigation measures include grading such that expansive soils are not placed within the upper few feet of finished grade. As an alternative, "special" deepened and/or stiffened foundation systems for proposed structures may be considered. Surface and subsurface drainage provisions may also be implemented to reduce moisture fluctuations in subgrade soils.

VIII.E. Hard Rock/Excavatability

Based on the proposed project grading schemes, subsurface geotechnical investigations may be performed to evaluate excavatability characteristics of hard rock that may be encountered in the deeper cut areas of some of the project sites (Adobe Falls, Alvarado Campus, Alvarado Hotel and Villa

Alvarado Residence Hall Expansion sites). In general, excavations deeper than about 10 feet in areas underlain by the hard metamorphic rock of Santiago Peak Volcanics may be facilitated by controlled blasting, heavy ripping, jackhammering, and/or chemical splitting techniques during grading. Pre-construction surveys of the site conditions on nearby properties may be performed prior to controlled blasting, and instrumentation may be installed to monitor noise and vibration during controlled blasting.

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 in the hard rock areas may not be suitable for use as compacted fill and may require offsite disposal or other special handling and placement techniques during grading. Section 300 of the "Greenbook" provides specifications of typical fill materials and their typical maximum allowed dimensions.

VIII.F. Groundwater/Seepage

Site-specific geotechnical investigation studies typically include an evaluation of the depth to the groundwater surface and the potential for seeps. Sections 1804 and 1821 of the CBC state 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 below or near the groundwater level can reduce the potential for caving of excavations due to groundwater seeps.

VIII.G. Flood Inundation

Typical mitigation methods to reduce the impacts of flood inundation include drainage channel improvements, flood-resistant project design (Appendix Chapter 31 of the CBC) and construction, and floodplain management regulations. FEMA generally requires flood insurance in areas subject to 100-year flood inundation. The stability of the Lake Murray dam

is monitored by the City of San Diego and State of California Division of Safety of Dams.

VIII.H. Liquefaction

The potential for liquefaction at the sites is generally considered low but should be specifically addressed during geotechnical design studies for the project components. Mitigation measures with regard to liquefaction likely will not be needed.

VIII.I. Fault Rupture

Surface rupture due to active faulting at the project sites is considered very low and mitigation measures with regard to ground rupture along active faults are not needed at the SDSU 2007 Campus Master Plan Revision project areas.

VIII.J. Seismic Shaking

Evaluations of potential seismic shaking will be performed during site-specific geotechnical studies for the various components of the project. The effects of seismic shaking can be reduced by adhering to current design parameters of the applicable sections of the UBC and CBC (including but not limited to CBC Chapters 16 and 18).

VIII.K. Tsunami

The potential for inundation by tsunami at the sites is considered very low and mitigation measures with regard to tsunami are not needed.

VIII.L. Seiche

The potential for inundation by seiche at the sites is considered very low and mitigation measures with regard to seiche are not needed.

IX. Significance of Impacts After Mitigation

Based on our geotechnical studies, it appears that the geotechnical conditions in the project area will not significantly impact the proposed SDSU 2007 Campus Master Plan Revision project components if appropriate geotechnical design recommendations developed from site-specific geotechnical investigations (including subsurface exploration, laboratory testing, and geotechnical analysis) are included in the projects' 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".

In addition, each component of the proposed SDSU 2007 Campus Master Plan Revision project is confined to a particular site. The site-specific geotechnical conditions at one site do not impact another on this project. Therefore, there will be no significant cumulative geotechnical (geology/soils) impacts on the proposed project.

X. List of References

1. American Geological Institute, 1976, Dictionary of Geological Terms: Anchor Books, Garden City, New York, revised, 472p.

2. American Geological Institute, 1997, Glossary of Geology, Fourth Edition: American Geological Institute, Alexandria, Virginia, 769p.

3. California Division of Mines and Geology, 1982, Geologic map of California, San Diego-El Centro sheet, scale 1:250,000.

4. California Division of Mines and Geology, 1982, Guidelines for geologic/seismic considerations in environmental impact reports, CDMG Note 46.

5. California Division of Mines and Geology, 1994, Fault activity map of California and adjacent areas: CDMG Geologic Data Map No. 6.

6. City of San Diego, 1995, Seismic Safety Study, December.

7. Hart, E.W., 1997, Fault-rupture hazard zones in California: California Division of Mines and Geology, Special Publication 42, revised.

8. Kennedy, M.P., and Peterson, G.L., 1975, Geology of the San Diego metropolitan area, California: California Division of Mines and Geology, Bulletin 200.

9. Kohler, S.L., and Miller, R.V., 1982, Mineral land classification: aggregate materials in the western San Diego County production-consumption region: California Division of Mines and Geology, Special Report 153.

10. Southland Geotechnical Consultants, in-house geologic/geotechnical information.

11. Tan, S.S., 1995, Landslide hazards in the southern part of the San Diego metropolitan area, San Diego County, California: California Division of Mines and Geology, Open-File Report 95-03.

12. US Department of Agriculture, 1973, Soil Survey, San Diego Area, California, issued December.

13. Weber, F.H., Jr., 1963, Geology and mineral resources of San Diego County, California: California Division of Mines and Geology, County Report 3.

X. List of References (continued)

List of Reviewed Reports for Relevant SDSU Projects

14. GeoTek Insite, Inc. 2004, Geotechnical Evaluation for Lot D and 6361 Alvarado Court, San Diego, California, dated October 22.

15. ____, 2002, Preliminary Geotechnical Evaluation for Alvarado Campus Park Project, San Diego, California, dated September 10.

16. Golder Associates, Inc., 2000, Geotechnical Data Report, Mission Valley East LRT-SDSU Tunnel, San Diego, California, dated August.

17. Southland Geotechnical Consultants, 2005, Geotechnical Input for Environmental Impact Report, SDSU 2005 Master Plan Revision, San Diego State University, San Diego, California, dated January 7 (Revised).

18. ____, 2000, Geotechnical Investigation Studies, Proposed Parking Structure 6, San Diego State University, San Diego, California, dated February 17.

19. ____, 2000, Soils Investigation, Proposed Addition to Aztec Center, San Diego State University, San Diego, California, dated January 3.

20. ____, 1999, Geotechnical Investigation, Proposed Cogeneration Facility and Physical Plant Improvements, San Diego State University, San Diego, California, dated October 14.

21. ____, 1998, Geotechnical Input for Environmental Impact Report, Aztec Walk Campus Master Plan, San Diego State University, San Diego, California, dated December 22.

22. ____, 1998, Soils Investigation, Proposed Elevator Project, Aztec Center, San Diego State University, California, dated April 22.

23. ____, 1992, Geotechnical Investigation, Proposed KPBS/SDSU Foundation Gateway Center, San Diego State University, San Diego, California, dated July 15.

24. ____, 1992, Preliminary Geotechnical Investigation for Proposed Tennis Court Replacement and Improvements Projects, San Diego State University, San Diego, California, dated March 20.

X. List of References (continued)

25. ____, 1996, Additional Geotechnical Investigation, Proposed Tennis Courts, San Diego State University, San Diego, California, dated September 17.

Regulatory Documents

26. California Code of Regulations, 2001, Title 24, California Building Code, Part 2, Volumes 1, 2 and 3, effective November 1.

27. California Code of Regulations, Title 14, California Environmental Quality Act (Appendix G, Environmental Checklist Form - 1998).

28. International Conference of Building Officials, 1997, Uniform Building Code, Volumes 1, 2 and 3.

29. Southern California Chapter of American Public Works Association and Southern California Districts Associated General Contractors of California, 2003, "Greenbook", Standard Specifications for Public Works Construction.

Topographic Maps

City of San Diego, 1951 (edition of), Topographic Map Sheets 281-1743, 218-1749, 222-1743 and 222-1749, scale: 1 inch = 200 feet.

City of San Diego, 1978 (edition of), Orthophoto Topographic Map Sheets 281-1743, 218-1749, 222-1743 and 222-1749, scale: 1 inch = 200 feet.

US Geological Survey, 1975 (photorevised), La Mesa 7.5 minute topographic quadrangle.

Aerial Photographs

County of San Diego, 1928-9, Photos 60D5, 60D6 and 60D7 (stereoscopic, black and white).

County of San Diego, 1966, Series GS-VB01 21155, Photos 1-150 and 151, dated November 2 (stereoscopic).

X. List of References (continued)

Aerial Photographs (continued)

County of San Diego, 1970, Series S.D. CO., Flight Line 9, Photos 9-12 and 9-13 (stereoscopic, color).

County of San Diego, 1973, Series SDPD, Flight Line 22, Photos 22-22 and 22-23, dated December 5 (stereoscopic, color).

County of San Diego, 1978, Series SDCO 210, Flight Line 26, Photos 26C3 (8292) and 26C4 (8293) (stereoscopic, color).

US Department of Agriculture, 1953, San Diego County, Series AXN, Flight Line 14M, Photos 99 and 100, dated May 2 (stereoscopic, black and white).

PLANS

Nolte, 2007, San Diego State University, Adobe Falls - Upper Village, 21 Buildings, dated March 27.

Nolte, 2007, San Diego State University, Adobe Falls - Lower Village, 112 Lots, dated March 27.

TABLE 1 - GENERALIZED SUMMARY OF GEOLOGIC UNITS, GEOLOGIC RESOURCES AND GEOTECHNICAL CONSTRAINTS

San Diego State University 2007 Campus Master Plan Revision

	Adobe Falls	Alvarado Campus	Alvarado Hotel	Student Housing	Campus Conference Center	Aztec Center
GEOLOGIC UNITS (see Figure 1)	fill soils alluvium/slopewash Stadium Conglomerate Friars Formation Santiago Peak Volcanics	fill soils alluvium/slopewash Stadium Conglomerate Santiago Peak Volcanics	fill soils alluvium/slopewash Stadium Conglomerate Santiago Peak Volcanics	fill soils Lindavista Formation Mission Valley Formation Stadium Conglomerate Santiago Peak Volcanics	fill soils Mission Valley Formation Stadium Conglomerate	fill soils Lindavista Formation
GEOLOGIC/SOIL RESOURCES						
USDA Soil Survey	Rm, FxE, Ohe	TuB, FxE, DcF	FxE	OkC, RhC, FxE	OkC	OkC
CDMG Mineral Resource Zone	MRZ-3	MRZ-2	MRZ-2/3	MRZ-2/3	MRZ-2	MRZ-2
POTENTIAL GEOTECHNICAL CONSTRAINTS						
Landslides/ Slope Instability	X	X	X	X	---	---
Erosion	X	X	X	X	X	X
Unconsolidated Soils	X	X	X	X	X	X
Expansive Soils	X	X	X	X	X	X
Hard Rock/ Excavatability	X	X	X	X	X	X
Groundwater/ Seepage	X	X	X	X	X	X
Flood Inundation	X	X	X	X	---	---
Liquefaction	---	---	---	---	---	---
Fault Rupture	---	---	---	---	---	---
Seismic Shaking	X	X	X	X	X	X
Tsunami	---	---	---	---	---	---
Seiche	---	---	---	---	---	---

Notes: Please refer to accompanying text for further discussion of this summarized information.
X - indicates potential geotechnical constraint may exist at project component site.

SGC

TABLE 2 - USDA SOIL SURVEY
RELEVANT SOIL CHARACTERISTICS
San Diego State University 2007 Campus Master Plan Revision

SOIL NAME (symbol)	PERCENT SLOPE	POTENTIAL FOR ERODIBILITY *	SHRINK-SWELL BEHAVIOR	SUITABILITY AS SOURCE OF...	SUITABILITY FOR ROAD FILL**
Diablo-Urban land complex (DcF)	15-50	---	High	Unsuitable	---
Friant rocky fine sandy loam (FxE)	9-30	Severe	Low	Unsuitable	Fair
Olivenhain cobbly loam (OhE)	9-30	Severe	Moderate	Gravel	Fair to Poor
Olivenhain-Urban land complex (OkC)	2-9	---	Moderate	Gravel	---
Olivenhain-Urban land complex (OkE)	9-30	---	Moderate	Gravel	---
Redding-Urban land complex (RhC)	2-9	---	High	Gravel	---
Riverwash (Rm)	---	Severe	Low	Varying amounts of gravel and sand	---
Tujunga sand (TuB)	0-5	Severe	Low	Sand	Good

*"Absence of rating means no valid interpretations can be made."

**"No interpretations are given for Urban land and other land types, all of which are highly variable and require onsite investigation."

SGC

DOTTED LINES REPRESENT 10-FOOT CONTOURS
DATUM IS MEAN SEA LEVEL

1975

EXPLANATION

QUATERNARY

Holocene

Qsw / Qal + Qsw

Alluvium and Slopewash

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

Qls

Landslide deposits

Pleistocene

Qt

Stream-terrace deposits

Ql

Lindavista Formation

TERTIARY

Pliocene

Tsd

San Diego Formation

Eocene

Tp / Tmv / Tst

Poway Group

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

Tf

Friars Formation

Conglomerate marked by circle pattern.

JURASSIC CRETACEOUS

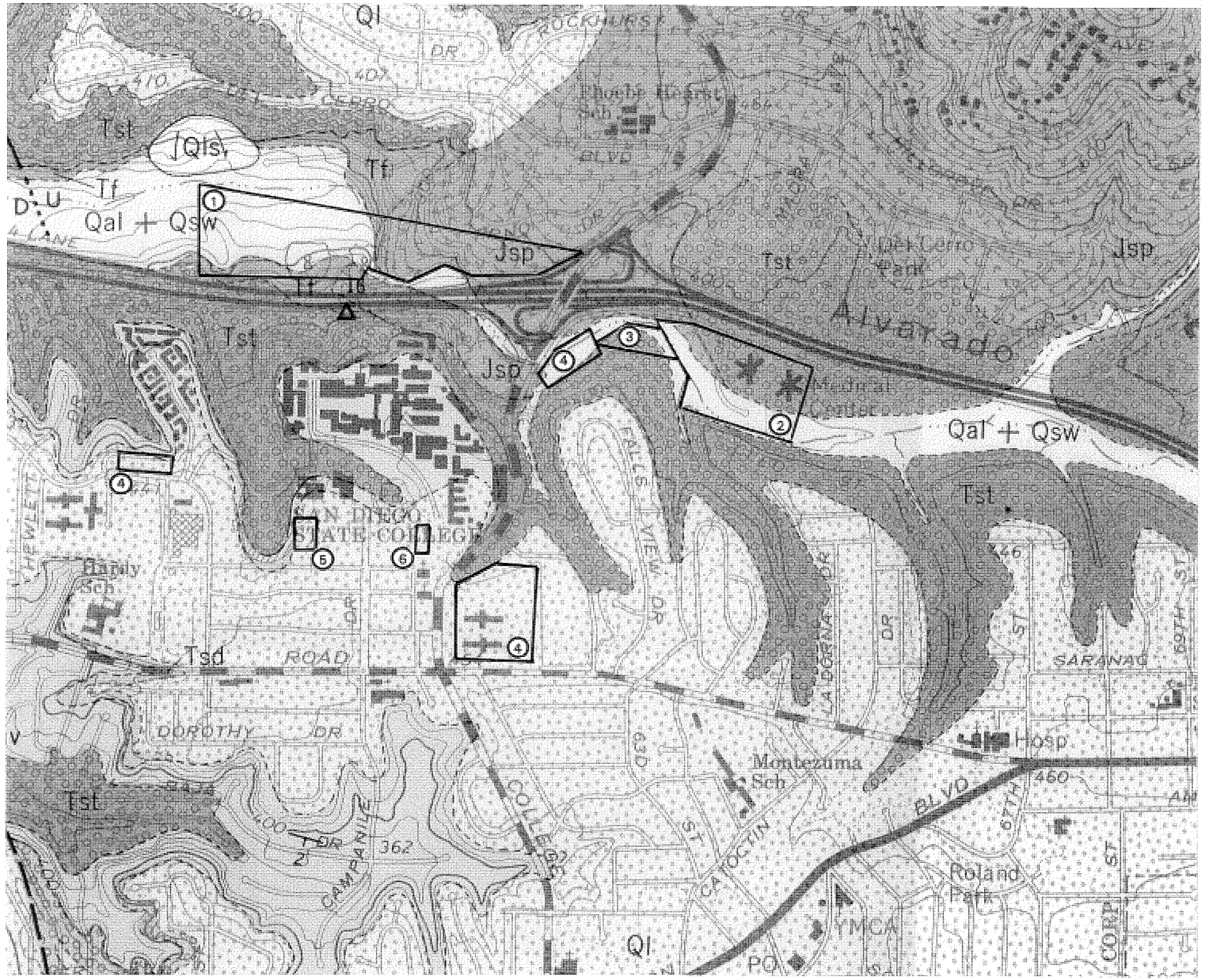
Kg

Granite rocks

Undifferentiated granitic rocks of the southern California batholith.

Jsp

Santiago Peak Volcanics



NORTH

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).

Approximated Locations of Project Components:

1. Adobe Falls
2. Alvarado Campus
3. Alvarado Hotel
4. Student Housing
5. Campus Conference Center
6. Aztec Center

This is excerpted from Kennedy and Peterson's map "Geology of the La Mesa Quadrangle, San Diego County, California" in CDMG Bulletin 200 (Reference 5)

1000 0 1000 2000 3000

SCALE in FEET

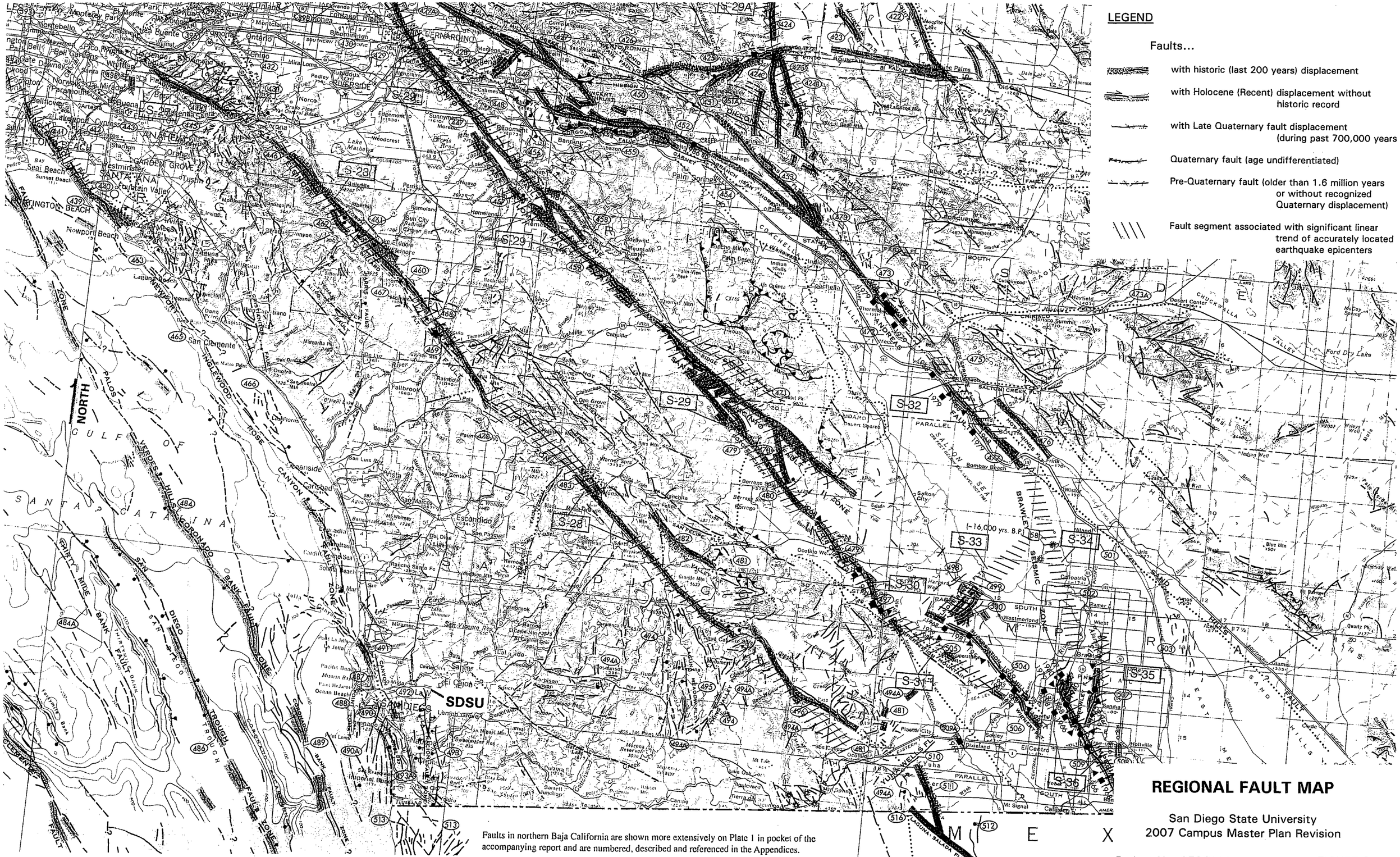
GENERALIZED GEOLOGIC MAP

San Diego State University
2007 Campus Master Plan Revision

Project No. 270C111

FIGURE 1

SGC



LEGEND

Faults...

- with historic (last 200 years) displacement
- with Holocene (Recent) displacement without historic record
- with Late Quaternary fault displacement (during past 700,000 years
- Quaternary fault (age undifferentiated)
- Pre-Quaternary fault (older than 1.6 million years or without recognized Quaternary displacement)
- Fault segment associated with significant linear trend of accurately located earthquake epicenters

Faults in northern Baja California are shown more extensively on Plate 1 in pocket of the accompanying report and are numbered, described and referenced in the Appendices.

REGIONAL FAULT MAP

San Diego State University
2007 Campus Master Plan Revision

Project No. 270C111 FIGURE 2

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

SGC

LEGEND

MAPPED POTENTIAL GEOTECHNICAL CONSTRAINTS
(with potentially impacted project components listed)

- Slope instability
  (AF, AC, AH, SH)
- Unconsolidated soils (natural topsoil not included on map)
  (AF, AC, AH, SH, CCC, AzC)
- Hard metavolcanic rock
  (AF, AC, AH, SH)
  (well-cemented concretionary zones not mapped)
- Near-surface groundwater (Alvarado Creek only)
  (AF, AC, AH)
  (seepage not mapped)

OTHER POTENTIAL GEOTECHNICAL CONSTRAINTS (NOT MAPPED)
(all project components are potentially impacted)

- Erosion
- Expansive soils
- Seismic shaking

GEOTECHNICAL CONSTRAINTS EVALUATED - NO IMPACT

- Liquefaction
- Fault rupture
- Tsunami
- Seiche

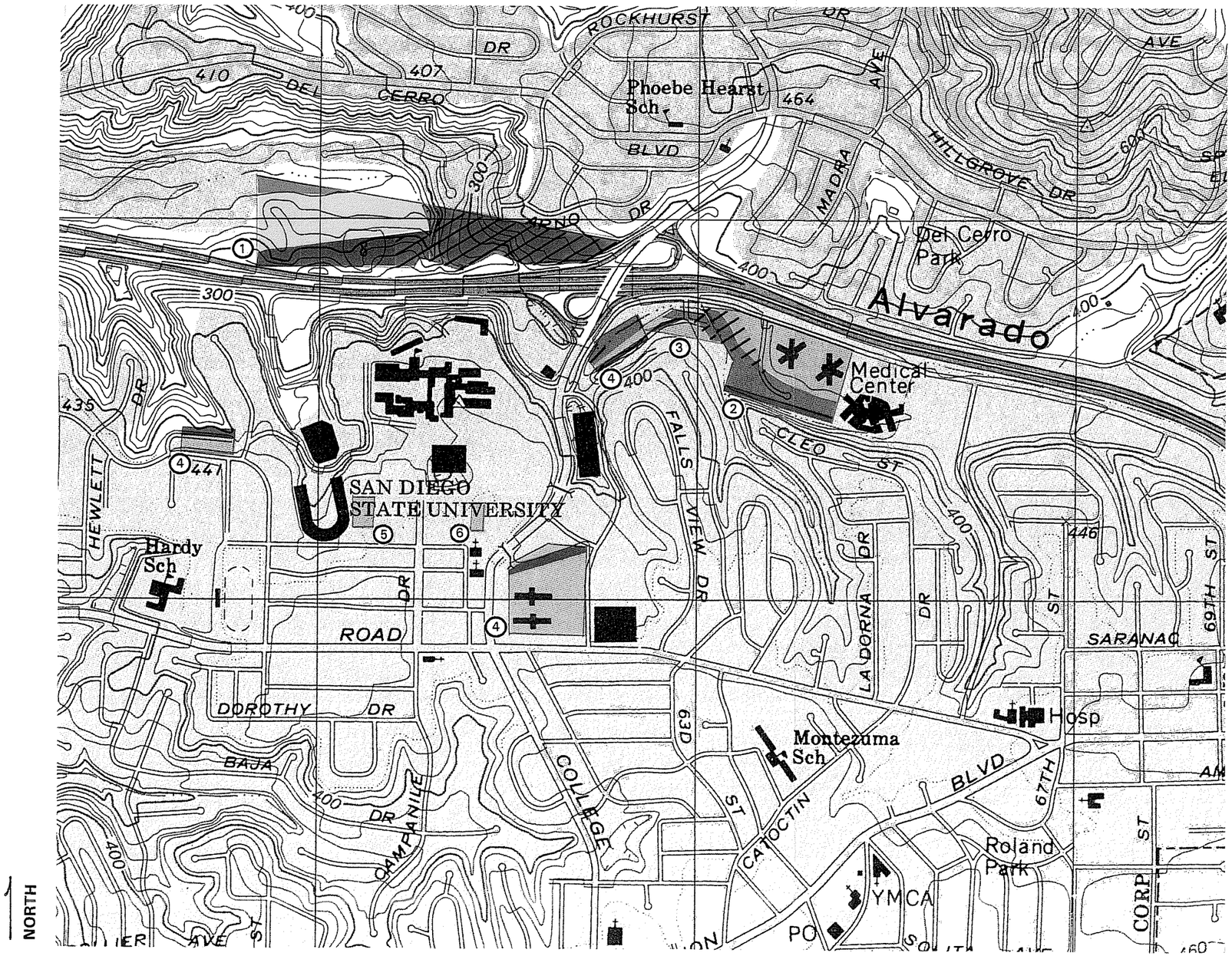
APPROXIMATED LOCATIONS OF PROJECT COMPONENTS

1. Adobe Falls (AF)
2. Alvarado Campus (AC)
3. Alvarado Hotel (AH)
4. Student Housing (SH)
5. Campus Conference Center (CCC)
6. Aztec Center (AzC)

APPROXIMATE SCALE: 1 inch = 1,000 feet

Base map is an enlargement of a portion of the
USGS 7.5-minute La Mesa topographic quadrangle
San Diego County, California, (1994 edition)

PLEASE NOTE THAT THIS MAP IS A GENERALIZED REPRESENTATION OF THE POTENTIAL CONSTRAINTS IMPACTING THE SDSU 2007 CAMPUS MASTER PLAN REVISION PROJECT COMPONENTS. PLEASE REFER TO THE ACCOMPANYING TEXT FOR MORE EXPLANATION OF THE POTENTIAL GEOTECHNICAL CONSTRAINTS FOR THIS PROJECT



POTENTIAL GEOTECHNICAL CONSTRAINTS MAP

San Diego State University
2007 Campus Master Plan Revision

Project No. 270C111 FIGURE 3

SGC