Initial Study

Mission Viejo Garden Plaza Redevelopment Project

Prepared for:

City of Mission Viejo
Planning Division
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Acronyms and Abbreviations

Alquist-Priolo	Alquist-Priolo Earthquake Fault Zoning Act
CAL FIRE	California Department of Forestry and Fire Protection
CEQA	California Environmental Quality Act
City	City of Mission Viejo
County	County of Orange
EIR	Environmental Impact Report
GHG	greenhouse gas
HCP	Habitat Conservation Plan
IS	Initial Study
MSAA	Master Streambed Alteration Agreement
NCCP	Natural Community Conservation Plan
NO_x	nitrogen oxides
O_3	ozone
$PM_{2.5}$	particulate matter less than 2.5 microns in diameter
PM_{10}	particulate matter less than 10 microns in diameter
Porter-Cologne Act	Porter-Cologne Water Quality Control Act

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Section 1 Project Description

The following Initial Study (IS) and Environmental Checklist presents information on the project and an evaluation of the probable environmental effects anticipated by the Mission Viejo Garden Plaza Redevelopment Project (Proposed Project). This Initial Study has been prepared in accordance with the California Environmental Quality Act of 1970 (CEQA), as amended, and the CEQA Guidelines.

1.1 Project Location

The Proposed Project is at 27001 La Paz Road in the City of Mission Viejo (City). The 6.5-acre Project Site is on the corner of La Paz Road and Marguerite Parkway, east of Interstate 5. Figure 1, Regional Location, shows the project regional location, while Figure 2, Project Site, depicts the Project Site and the surrounding vicinity.

1.2 Environmental Setting

The Project Site is in an urban area of the City and is currently operating as the Mission Viejo Garden Plaza. The site is presently developed with five one and two-story multi-tenant retail and light commercial buildings. The buildings are of wood-frame and stucco construction. Several of the suites within these buildings are currently vacant. The existing building square footage on site is 46,148 square feet.

1.2.1 Surrounding Land Uses

The triangular shaped parcel is surrounded by single-family residential land uses to the north and commercial retail uses to the northeast and southeast. The Mission Viejo Library and City Hall are southwest of the Project Site on the other side La Paz Road.

1.2.2 Existing General Plan and Zoning

The Project Site is currently designated as Office Professional (OP) by the Mission Viejo General Plan and is zoned as Office Professional (OP).

1.3 Project Description

As shown on Figure 3, Site Plan, the project proposes to redevelop a 6.5-acre site with a mixed-use development featuring ground-level market and retail shops, and five-levels of residential uses. The Proposed Project consists of demolishing the existing buildings and constructing 40,000 square feet of grocery store uses, with an additional 3,120 square feet designated for a loading area, and 8,000 square feet of retail uses. The Proposed Project would also include 275,891 square feet of residential uses, totaling 234 multi-family residential units, which would consist of 26 studio units, 131 one-bedroom units, 66 two-bedroom units, and 11 three-bedroom units. The project would have a density

of 36 dwelling units per acre with a 20% housing bonus. The project includes a 20 percent density bonus on 195 units with 5 percent of the total units being affordable (12 units). The residential units would be built over the grocery store, retail structures, and parking deck. The project also includes outdoor seating outside of the grocery retail store area with a canopy/trellis structure overhead (see Figures 4 and 5 for elevations).

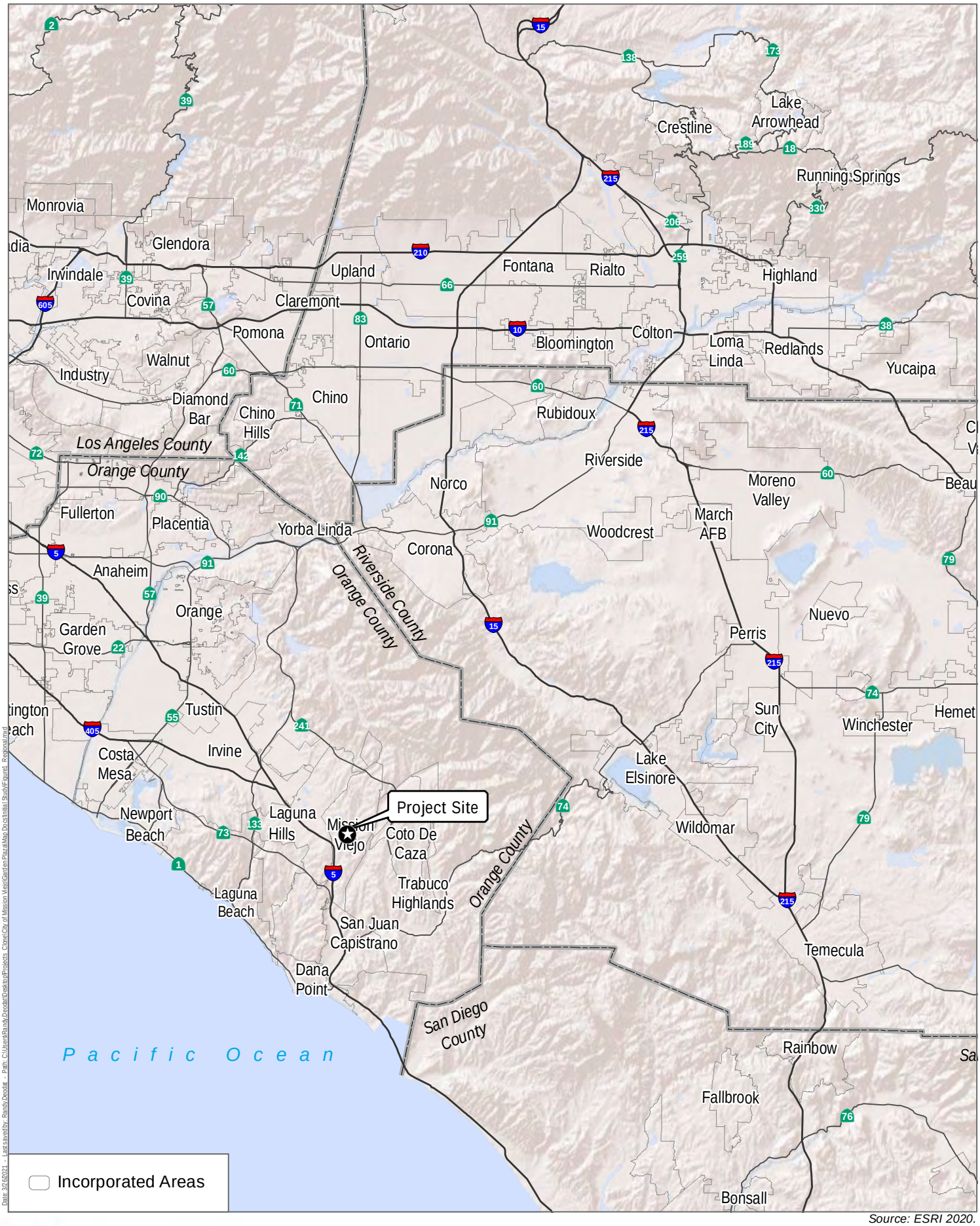
A conceptual plan indicating the extent of the proposed grading has prepared. This plan indicates that the grocery building will have a finished floor elevation of 450 ft MSL. This elevation will require no significant fills, but cuts of up to approximately 19 feet. Establishment of grades in the area of the parking/residential structure will require cuts of up to approximately 30 feet, which will create a retaining wall up to 36 feet in height along the northwestern side of the Project Site. This wall would be used to create one to two levels of below grade parking.

The Project Site is currently designated for Office Professional (OP), which does not allow residential development. Therefore, the project includes a general plan amendment and new zoning designation of Residential Mixed Use (RMU) to permit the construction of 234 multi-family residential units with the density bonus.

The Proposed Project would include a 123,640 square foot parking structure. The Proposed Project would provide 626 parking stalls total. Level 1 would provide 236 parking stalls for retail purposes, Level 2 would provide 17 stalls for retail employees and 53 stalls for residential guests, Level 3 through Level 6 would provide 80 stalls each (320 total) for residential uses. The Proposed Project would also include 31 bike parking spaces.

Vehicular entry and exit would occur at the northeastern portion of the Project Site via Marguerite Parkway. Vehicular entry and exit at the mezzanine would occur along La Paz Road at the southwestern portion of the Project Site. Another vehicular entry and exit point exists just east of this exit along La Paz Road. East of this entry and exit point there is another point for vehicular exit closest to the La Paz Road and Marguerite Parkway intersection.

The Proposed Project would also provide 22,891 square feet of open space areas in the Project Site. This would include a 6,003 square foot corner park adjacent to the La Paz Road and Marguerite Parkway intersection, at the southeast portion of the Project Site. This park would include space for a permitted project event area and a food truck location. Another common area includes Marguerite Park which would be 16,888 square feet and would occur between the proposed Whole Foods Market and Marguerite Parkway at the northeastern portion of the Project Site. An additional 21,628 square feet of residential open space would also be provided in the form of two amenity decks on Level 3 and on amenity deck on Level 7.



Source: ESRI 2020.

Harris & Associates

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Figure 1

Regional Location

Mission Viejo Garden Plaza Redevelopment Project

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Source: Eagle Imagery 2017.

Harris & Associates

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Figure 2

Project Site

Mission Viejo Garden Plaza Redevelopment Project

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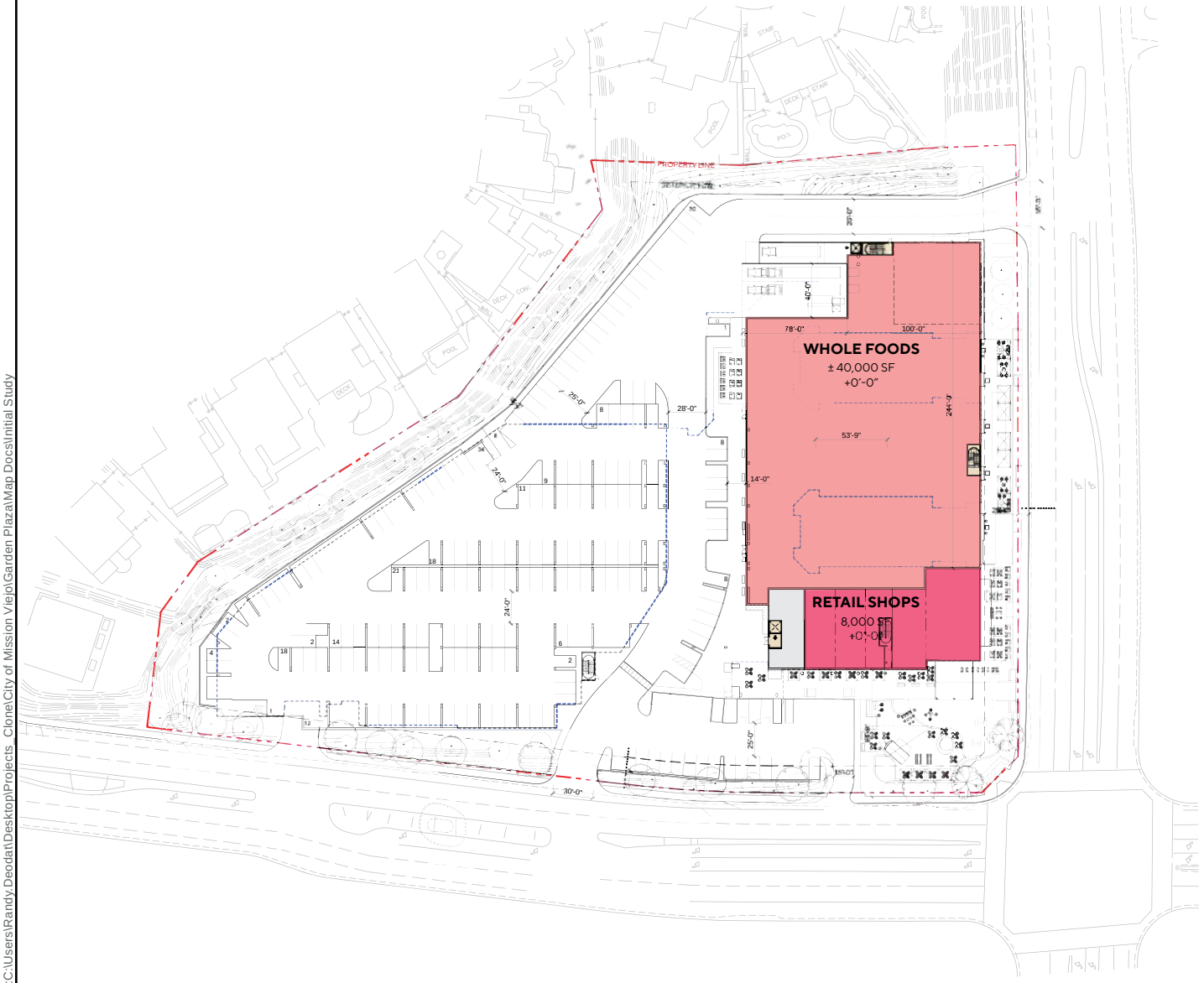

PROJECT SUMMARY

4-STORY OVER PODIUM MIXED USE

RESIDENTIAL			
STUDIO	30	36	UNITS
1 BEDROOM	135	131	UNITS
2 BEDROOM	66	66	UNITS
3 BEDROOM	3	11	UNITS
TOTAL	**234**	**234**	UNITS

RETAIL AREA		
MARKET	40,000	SF
SHOPS	8,000	SF

TOTAL PARKING		
L1	236	STALLS
L2 MEZZANINE	70	STALLS
L3	80	STALLS
L4	80	STALLS
L5	80	STALLS
L6	80	STALLS
TOTAL	**626**	**STALLS**

COMMON AREA		
CORNER PARK	6,003	SF
MARGUERITE PARK	16,888	SF
TOTAL	**22,891**	**SF**

TOTAL RESIDENTIAL AREA: 275,891 SF

NET RENTABLE AREA: 212,640 SF

WHOLE FOODS UNDER DEVELOPMENT

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Source: Architecture Design Relationships 2021.

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Figure 3

Site Plan

Mission Viejo Garden Plaza Redevelopment Project

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LA PAZ ELEVATION

MARGUERITE ELEVATION

Source: Architecture Design Relationships 2021.

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Figure 4

Elevation 1

Mission Viejo Garden Plaza Redevelopment Project

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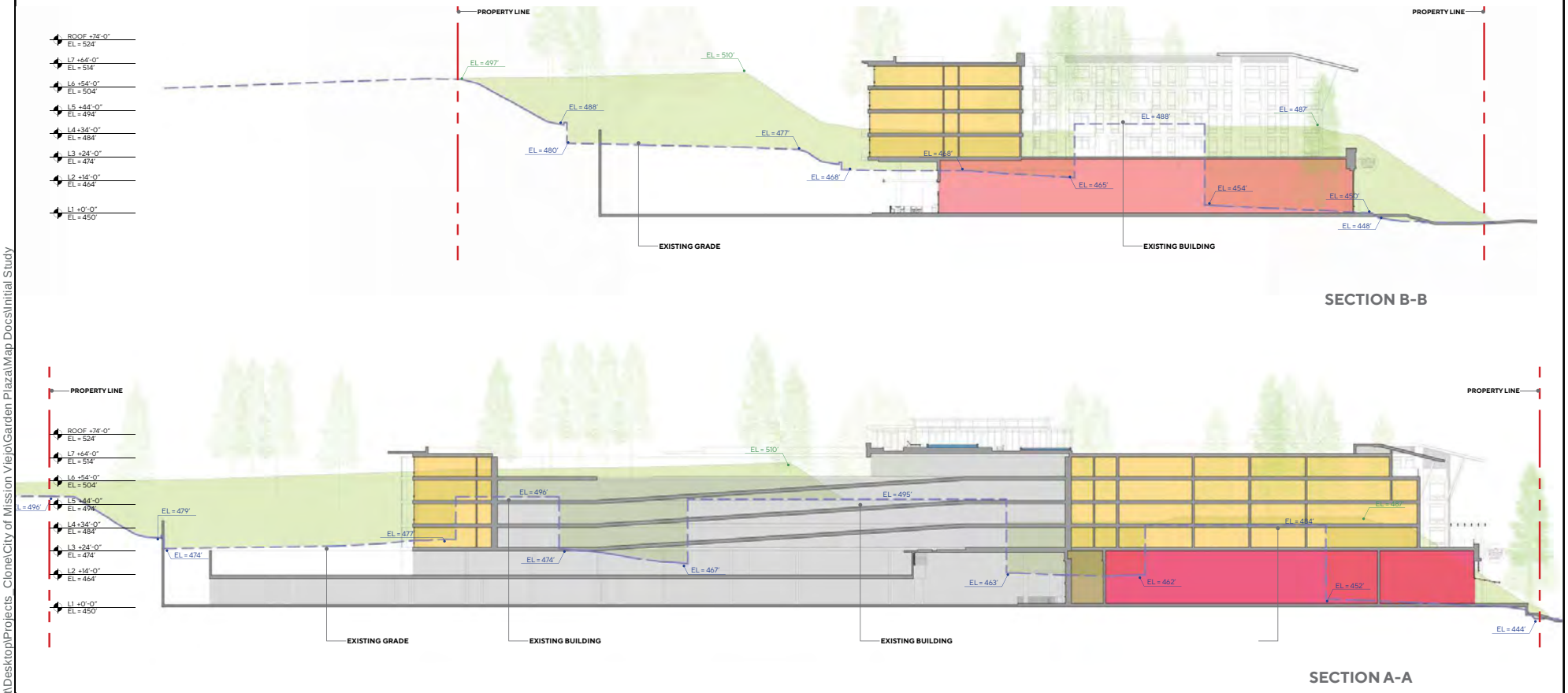

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Source: Architecture Design Relationships 2021.

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Figure 5

Elevation 2

Mission Viejo Garden Plaza Redevelopment Project

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1.3.1 Project Phasing

The Proposed Project would be implemented in one phase upon approval of necessary discretionary actions and permits. The construction is tentatively scheduled to start in 2022 and take approximately 3 years to complete.

1.4 Project Approvals and Permits

The City is the lead agency under CEQA and has the principal approval authority over the Proposed Project. A responsible agency is a public agency other than the lead agency that has responsibility for carrying out or approving a project (CEQA Guidelines, Section 15381, and California Public Resources Code, Section 21069). The following discretionary actions would be required to implement the project (Table 1).

Table 1. Anticipated Discretionary Actions/Approvals

Lead Agency	Action
City of Mission Viejo	Certify Environmental Impact Report and adopt Findings, a Statement of Overriding Considerations, and Mitigation Monitoring Program
	General Plan Amendment
	Zone Change to New Zoning Designation of Residential Mixed Use (RMU)
	Vesting Tentative Tract Map
	Conditional Use Permit
Responsible Agencies	**Action**
South Coast Air Quality Management District	Permits to construct and/or permits to operate new stationary sources of equipment that emit or control air contaminants
Regional Water Quality Control Board	Issue National Pollutant Discharge Elimination System Permit to implement the project

Note: EIR = Environmental Impact Report

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Section 2 Initial Study Checklist

The following discussion of potential environmental effects was completed in accordance with Section 15063 of the CEQA Guidelines to determine if the Proposed Project may have a significant effect on the environment.

2.1 Project Information

1. Project title:	Mission Viejo Garden Plaza Redevelopment Project
2. Lead agency name and address:	City of Mission Viejo Community Development Department 200 Civic Center Mission Viejo, California 92691
3. Contact person name, address, and phone number:	Larry Longenecker, AICP, Planning & Economic Development Manager (949) 470-3053 llongenecker@cityofmissionviejo.org
4. Project location:	27001 La Paz Road Mission Viejo, California 92691 Assessor's Parcel Number 784-53-126
5 Project sponsor's name and address:	Garrett Byers ValueRock Realty Partners 18301 Von Karman Avenue, Suite 850 Irvine, California 92612
6. General plan designation:	Office Professional (OP)
7. Zoning:	Office Professional (OP)
8. Description of project:	Refer to Section 1, Project Description, of this IS.
9. Surrounding land uses and setting:	Refer to Section 1 of this IS.

10. Other public agencies whose approval is required:	South Coast Air Quality Management District Regional Water Quality Control Board
11. Have California Native American tribes traditionally and culturally affiliated with the project area requested consultation pursuant to Public Resources Code section 21080.3.1? If so, is there a plan for consultation that includes, for example, the determination of significance of impacts to tribal cultural resources, procedures regarding confidentiality, etc.?	Tribal consultation will be completed in accordance with Senate Bill 18 and Assembly Bill 52.

2.2 Environmental Factors Potentially Affected

The environmental factors checked below would be potentially affected by the project, involving at least one impact that is a "Potentially Significant Impact" as indicated by the checklist on the following pages.

☒ Aesthetics	☐ Agriculture and Forestry Resources	☒ Air Quality
☐ Biological Resources	☒ Cultural Resources	☒ Energy
☐ Geology and Soils	☒ Greenhouse Gas Emissions	☒ Hazards and Hazardous Materials
☒ Hydrology and Water Quality	☒ Land Use and Planning	☐ Mineral Resources
☒ Noise	☐ Population and Housing	☒ Public Services
☐ Recreation	☒ Transportation	☒ Tribal Cultural Resources
☒ Utilities and Service Systems	☐ Wildfire	☒ Mandatory Findings of Significance

2.3 Lead Agency Determination

On the basis of this initial evaluation:

☐ I find that the Proposed Project COULD NOT have a significant effect on the environment, and a NEGATIVE DECLARATION will be prepared.

☐ I find that although the Proposed Project could have a significant effect on the environment, there will not be a significant effect in this case because revisions in the project have been made by or agreed to by the project proponent (state), including implementation of the mitigation measures identified herein. A MITIGATED NEGATIVE DECLARATION will be prepared.

☐ I find that the Proposed Project MAY have a significant effect on the environment, and an ENVIRONMENTAL IMPACT REPORT is required.

☒ I find that the Proposed Project MAY have a "potentially significant impact" or "potentially significant unless mitigated" impact on the environment, but at least one effect (1) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and (2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets. An ENVIRONMENTAL IMPACT REPORT is required, but it must analyze only the effects that remain to be addressed.

☐ I find that although the Proposed Project could have a significant effect on the environment, because all potentially significant effects (a) have been analyzed adequately in an earlier EIR or NEGATIVE DECLARATION pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier EIR or NEGATIVE DECLARATION, including revisions or mitigation measures that are imposed upon the Proposed Project, nothing further is required.

Signature Date

Name, Title, Agency

2.4 Evaluation of Environmental Impacts

This section documents the screening process used to identify and focus on environmental impacts that could result from the project. The checklist portion of the IS begins below and includes explanations of each CEQA issue topic. CEQA requires that an explanation of all answers be provided along with this checklist, including a discussion of ways to mitigate any significant effects identified. The following terminology is used to describe the potential level of significance of impacts:

- **No Impact.** The analysis concludes that the project would not affect the particular resource in any way.
- **Less Than Significant.** The analysis concludes that the project would not cause substantial adverse change to the environment without the incorporation of mitigation.
- **Less Than Significant with Mitigation Incorporated**. The analysis concludes that it would not cause substantial adverse change to the environment with the inclusion of mitigation agreed upon by the applicant.
- **Potentially Significant.** The analysis concludes that the project could result a substantial adverse effect or significant effect on the environment, even if mitigation is incorporated. If there are one or more "Potentially Significant Impact" entries when the determination is made, an Environmental Impact Report (EIR) is required.

2.4.1 Aesthetics

Except as provided in Public Resources Code Section 21099, would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a. Have a substantial adverse effect on a scenic vista?	☐	☐	☒	☐
b. Substantially damage scenic resources, including but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?	☐	☐	☐	☒
c. In non-urbanized areas, substantially degrade the existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from publicly accessible vantage point.) If the project is in an urbanized area, would the project conflict with applicable zoning and other regulations governing scenic quality?	☒	☐	☐	☐
d. Create a new source of substantial light or glare that would adversely affect day or nighttime views in the area?	☐	☐	☒	☐

Impact Analysis

a. Would the project have a substantial adverse effect on a scenic vista?

Less Than Significant Impact. The Conservation/Open Space Element of the Mission Viejo General Plan includes Policy 3.7 to address the conservation of views of scenic value in the City. The site is already developed and does not contain and scenic views of significant value in the vicinity of the area. The Project Site is currently developed with four buildings totaling 67,629 square feet of office and retail uses. The Proposed Project consists of demolishing existing uses and constructing 40,000 square feet of grocery retail store retail uses and 8,000 square feet of retail shop uses in addition to 234 multi-family residential units. Although the proposed redevelopment would increase the building height, the existing area is already urbanized and the existing and proposed site area remain the same at 283,244 square feet. The proposed redevelopment would not affect views of scenic value along streets or highways. Impacts would be less than significant, and no further discussion is warranted in the EIR.

b. Would the project substantially damage scenic resources, including but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?

No Impact. The project is not within a state scenic highway. Scenic highways are classified as either officially listed or eligible. There are no officially listed or eligible state-designated scenic highways in the City (Caltrans 2019). The nearest eligible state scenic highway is State Route 74 approximately 7 miles east of the Project Site, and no views of the Project Site are from State

Route 74. As such, the project would not impact scenic resources in a state-designated scenic highway. No impact would occur, and this issue will not be further addressed in the EIR.

c. Would the project, in non-urbanized areas, substantially degrade the existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from publicly accessible vantage point). If the project is in an urbanized area, would the project conflict with applicable zoning and other regulations governing scenic quality?

Potentially Significant Impact. The Project Site is currently developed with four buildings totaling 67,629 square feet of office and retail uses. The Proposed Project consists of demolishing existing uses and constructing 40,000 square feet of grocery retail store retail uses and 8,000 square feet of retail shop uses in addition to 234 multi-family residential units. The Project Site is surrounded by residential uses, which are considered to be sensitive receptors, to the north, northeast, west, and southwest. Implementation of the Proposed Project would redevelop an existing neighborhood commercial and office center to a grocery retail store, retail shops, and residential uses. The redevelopment would be consistent with the surrounding uses of both urban and residential nature; however, the Proposed Project would require a zone change to allow the 234 multi-family residential units to be developed. Thus, the EIR will evaluate potential impacts to visual character and quality and identify mitigation measures as necessary.

d. Would the project create a new source of substantial light or glare that would adversely affect day or nighttime views in the area?

Less Than Significant Impact. Existing sources of light on the Project Site include street lights, vehicle headlights, building and security lights, and parking lot lights. Surrounding uses also include a variety of urban and residential uses. Implementation of the Proposed Project would introduce new light sources; however, the lighting would be consistent with existing lighting on site and in the area. The Proposed Project would be consistent with Section 9.20.015(l) of the Mission Viejo Municipal Code, which establishes lighting standards.

Glare is caused by light reflections from pavement, vehicles, and building materials, such as reflective glass and polished surfaces. During daylight hours, the amount of glare depends on intensity and direction of sunlight. Glare can create hazards to motorists and can be a nuisance for pedestrians and other viewers. Proposed exterior building materials primarily include stucco, stone veneer, metal screen frame structure, anodized aluminum, wood, and fiber cement. The Proposed Project would be consistent with Section 9.20.015(i) of the Mission Viejo Municipal Code, which establishes glare and heat standards. These materials would not result in potential glare impacts on the Project Site or in the surrounding areas. Glare from vehicle lights at night would be reduced with the project due to implementation of the parking structure.

Implementation of the project would not result in a significant source of light or glare that would adversely impact day or nighttime views. This issue will not be further addressed in the EIR.

2.4.2 Agriculture and Forestry Resources

In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997) prepared by the California Dept. of Conservation as an optional model to use in assessing impacts on agriculture and farmland. In determining whether impacts to forest resources, including timberland, are significant environmental effects, lead agencies may refer to information compiled by the California Department of Forestry and **Fire Protection regarding the state's** inventory of forest land, including the Forest and Range Assessment Project and the Forest Legacy Assessment project; and forest carbon measurement methodology provided. Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a. Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?	☐	☐	☐	☒
b. Conflict with existing zoning for agricultural use, or a Williamson Act contract?	☐	☐	☐	☒
c. Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g))?	☐	☐	☐	☒
d. Result in the loss of forest land or conversion of forest land to non-forest use?	☐	☐	☐	☒
e. Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?	☐	☐	☐	☒

Impact Analysis

a. Would the project convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?

No Impact. The Project Site is designated as urban and built-up land by the Farmland Mapping and Monitoring Program of the California Department of Conservation (DOC 2019a). The Project Site is developed with urban uses, and the Proposed Project would not convert any special-status farmland to non-agricultural use. Therefore, no impact would occur, and no further discussion is warranted in the EIR.

b. Would the project conflict with existing zoning for agricultural use, or a Williamson Act contract?

No Impact. The Project Site is not zoned for agricultural use, and no Williamson Act contract exists for the site (DOC 2017). Therefore, the Proposed Project would not conflict with existing zoning for agricultural use or with a Williamson Act contract. Therefore, no impact would occur, and no further discussion is warranted in the EIR.

c. Would the project conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g))?

No Impact. The Project Site is zoned for Office Professional (OP) and is not zoned as forest land, timberlands, or timberland zoned timberland production (DOC 2019a). No land that has been zoned as forest land or timberland exists within the boundaries of the Project Site. Therefore, no impact would occur, and no further discussion is warranted in the EIR.

d. Would the project result in the loss of forest land or conversion of forest land to non-forest use?

No Impact. The Project Site is built-up urban land, and no forest land would be lost due to project implementation. Therefore, no impact would occur, and no further discussion is warranted in the EIR.

e. Would the project involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?

No Impact. See Section 2.4.2(a). Implementation of the Proposed Project would have no impact on agriculture or forestry resources. No agricultural land, forest land, or timberland exists on or in the vicinity of the Project Site. The Proposed Project would not involve changes to the existing environment that, because of their location or nature, could result in the conversion of farmland to non-agricultural use or forest land to non-forest use. Therefore, no impact would occur, and no further discussion is warranted in the EIR.

2.4.3 Air Quality

Where available, the significance criteria established by the applicable air quality management district or air pollution control district may be relied upon to make the following determinations. Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a. Conflict with or obstruct implementation of the applicable air quality plan?	☒	☐	☐	☐
b. Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard)?	☒	☐	☐	☐
c. Expose sensitive receptors to substantial pollutant concentrations?	☒	☐	☐	☐
d. Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?	☐	☐	☒	☐

Impact Analysis

a. Would the project conflict with or obstruct implementation of the applicable air quality plan?

Potentially Significant Impact. The Project Site is located in the South Coast Air Basin and is subject to the Air Quality Management Plan prepared by the South Coast Air Quality Management District. Construction activities would generate exhaust from construction equipment and vehicle trips, fugitive dust from demolition and ground-disturbing activities, and off-gas emissions from architectural coatings and paving. Implementation of the Proposed Project would convert commercial uses to residential uses, resulting in a change in development intensity and associated increase in criteria air pollutants. Construction and operational activities associated with the Proposed Project may conflict with the Air Quality Management Plan and might have a potentially significant impact on air quality because emissions may exceed those estimated for the existing Mission Viejo General Plan. Further analysis will be provided in the EIR.

b. Would the project result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard)?

Potentially Significant Impact. Implementation of the Proposed Project may increase existing levels of criteria pollutants and contribute to the non-attainment status for these criteria pollutants in the South Coast Air Basin. Construction and operational activities associated with the implementation of the Proposed Project could result in a cumulatively considerable net increase in these criteria pollutants. Therefore, further analysis will be provided in the EIR.

c. Would the project expose sensitive receptors to substantial pollutant concentrations?

Potentially Significant Impact. Potential mobile and stationary air emissions associated with the construction and operation of the Proposed Project could result in exposure of sensitive receptors to significant concentrations of air pollutants. Therefore, further analysis will be provided in the EIR.

d. Would the project result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?

Less Than Significant Impact. According to the California Air Resources Board's Air Quality and Land Use Handbook (2005), land uses associated with odor complaints typically include agricultural uses, wastewater treatment plants, food-processing plants, chemical plants, composting facilities, refineries, landfills, dairies, and fiberglass molding facilities. The Proposed Project does not include any uses identified by the California Air Resources Board as being associated with odors. Odors may be generated from vehicles and equipment exhaust emissions during construction of the project. Odors produced during construction would be attributable to emissions from tailpipes of construction equipment and architectural coatings. Such odors are temporary and generally occur at magnitudes that would not affect substantial numbers of people. Therefore, odor impacts resulting from project construction and operation would be less than significant, and no further discussion is warranted in the EIR.

2.4.4 Biological Resources

Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a. Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?	☒	☐	☐	☐
b. Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?	☐	☐	☐	☒
c. Have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	☐	☐	☐	☒
d. Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	☐	☐	☒	☐
e. Conflict with any applicable policies protecting biological resources?	☐	☐	☒	☐
f. Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other applicable habitat conservation plan?	☐	☐	☒	☐

Impact Analysis

a. Would the project have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?

Potentially Significant Impact. Special-status species include those listed as endangered or threatened under the federal Endangered Species Act or California Endangered Species Act, species otherwise given certain designations by the California Department of Fish and Wildlife, and plant species listed as rare by the California Native Plant Society. The Project Site is fully developed with commercial and office development and does not provide natural habitat.

Because a number of mature trees are included as part of landscaping on the Project Site, construction activities could disturb nesting birds and destroy their eggs and/or nests. Because

there are potential impacts related to implementation of the Proposed Project elements, a full analysis will be provided in the EIR to determine if a significant impact would occur on candidate, sensitive, or special-status species.

b. Would the project have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?

No Impact. The Project Site is fully developed with a commercial and office plaza and does not contain any riparian habitat or other sensitive natural community. Sensitive natural communities are natural communities that are considered rare in the region by regulatory agencies, that are known to provide habitat for sensitive wildlife or plant species, or that are known to be important wildlife corridors. Riparian habitats are those occurring along the banks of rivers and streams. The Project Site does not contain any areas currently designated Open Space by the Mission Viejo General Plan. No sensitive natural community or riparian habitat are on site. No impact would occur, and this issue will not be further addressed in the EIR.

c. Would the project have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?

No Impact. Wetlands are defined under the federal Clean Water Act as land that is flooded or saturated by surface water or groundwater at a frequency and duration sufficient to support and that normally does support a prevalence of vegetation adapted to life in saturated soils. Wetlands include areas such as swamps, marshes, and bogs. The Project Site is already developed, and no wetlands are on site. This issue will not be further addressed in the EIR.

d. Would the project interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?

Less Than Significant Impact. Wildlife movement corridors facilitate movement of species between large patches of natural habitat. The Project Site is already fully developed except for non-native landscaping materials and, therefore, lacks suitable habitat for wildlife species and is not a native wildlife nursery site. However, several ornamental trees and other vegetation are on site that require removal, and these may be used for nesting by migratory birds, which are protected under the federal Migratory Bird Treaty Act (USC 16 703–712). The Migratory Bird Treaty Act governs the taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts, and nests. It prohibits the take, possession, import, export, transport, sale, purchase, barter, or offering of these activities, except under a valid permit or as permitted in the implementing regulations. If removal of the vegetation occurs during nesting season (typically between February 1 and September 1), the project applicant is required to conduct nesting bird surveys in accordance with the California Department of Fish and Wildlife requirements prior to

removal of the trees. Compliance with the Migratory Bird Treaty Act would ensure that no significant impacts to migratory birds occur. This issue will not be addressed further in the EIR.

e. Would the project conflict with any applicable policies protecting biological resources?

Less Than Significant Impact. The Proposed Project would be required to comply with Chapter 14.30 of the Mission Viejo Municipal Code, which regulated the planting, maintenance, protection, and removal of trees and shrubs on public streets, parks, and other City-owned property and establishes the Office of City Forester in the Department of Public Works. The Proposed Project would include the removal and replacement of trees and ornamental landscaping; however, no trees would be removed within the public right-of-way. Therefore, implementation of the project would not result in the removal of protected trees and vegetation. Additionally, the Proposed Project would follow the provisions of the City's Conservation/Open Space Element, which includes policies protecting biological and natural resources in the City. Because the Proposed Project does not entail the removal of any coast live oak (*Quercus agrifolia*), the Proposed Project would not conflict with any local policies or ordinances with regard to biological resources. This issue will not be further addressed in the EIR.

f. Would the project conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other applicable habitat conservation plan?

Less Than Significant Impact. The City is not a permittee under the Natural Community Conservation Plan/Master Streambed Alteration Agreement/Habitat Conservation Plan (NCCP/MSAA/HCP); however, the City participates in provisions of the NCCP/MSAA/HCP related to preservation of coastal sage scrub. The Southern Subregion NCCP/MSAA/HCP and Joint Programmatic EIR/Environmental Impact Statement were prepared by the County of Orange (County) in cooperation with the California Department of Fish and Wildlife and U.S. Fish and Wildlife Service in accordance with the provisions of the NCCP Act, the California Endangered Species Act, the federal Endangered Species Act, and Section 1600 et seq. of the California Fish and Game Code. The Project Site does not include coastal sage scrub habitat. Additionally, the Project Site is not in an area identified as a wildlife corridor or habitat linkage and is not in an area designated for preservation in the NCCP/MSAA/HCP. Therefore, the project would not conflict with the provisions of an adopted HCP, NCCP, or other approved local, regional, or state HCP. The Project Site is already fully developed with urban uses, and redevelopment of the Project Site to residential uses would not conflict with the provision of the NCCP or any adopted HCP. This issue will not be addressed further in the EIR.

2.4.5 Cultural Resources

Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a. Cause a substantial adverse change in the significance of a historical resource pursuant to Section 15064.5?	☐	☐	☒	☐
b. Cause a substantial adverse change in the significance of an archaeological resource pursuant to Section 15064.5?	☒	☐	☐	☐
c. Disturb any human remains, including those interred outside of dedicated cemeteries?	☐	☐	☒	☐

Impact Analysis

a. Would the project cause a substantial adverse change in the significance of a historical resource pursuant to Section 15064.5?

Less Than Significant Impact. Section 15064.5 defines historic resources as resources listed or determined to be eligible for listing by the State Historical Resources Commission, a local register of historical resources, or the lead agency. Generally, a resource is considered "historically significant" if it meets one of the following criteria:

1. Is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage
2. Is associated with the lives of persons important in our past
3. Embodies the distinctive characteristics of a type, period, region or method of construction, or represents the work of an important creative individual, or possesses high artistic values
4. Has yielded, or may be likely to yield, information important in prehistory or history

The Project Site is currently developed with 67,629 square feet of office and retail use at the Mission Viejo Garden Plaza shopping mall. The existing development is not on federal, state, or local lists of designated historic resources and is not eligible for listing. The development is not historically significant, and therefore, the redevelopment would not cause a substantial adverse change in the significance of a historical resource. This issue will not be addressed further in the EIR.

b. Would the project cause a substantial adverse change in the significance of an archaeological resource pursuant to Section 15064.5?

Potentially Significant Impact. Development in accordance with the Proposed Project may cause the disturbance of subsurface archaeological resources. Building construction in undeveloped areas or redevelopment that requires excavation to depths greater than current foundations has the potential to encounter unknown archaeological resources. A record search would be conducted

during the EIR process to determine if any archaeological resources are present on the Project Site. Further analysis will be provided in the EIR.

c. Would the project disturb any human remains, including those interred outside of dedicated cemeteries?

Less Than Significant Impact. California Health and Safety Code, Section 7050.5, requires that in the event that human remains are discovered on a Project Site, disturbance of the site shall halt and remain halted until the County Coroner has conducted an investigation into the circumstances, manner, and cause of any death and the recommendations concerning the treatment and disposition of the human remains have been made to the person responsible for the excavation or to their authorized representative. If the County Coroner determines that the remains are not subject to their authority and if the County Coroner has reason to believe the human remains are those of a Native American, they shall contact the Native American Heritage Commission by telephone within 24 hours. The Proposed Project would comply with existing law, and potential impacts to human remains would be less than significant. This issue will not be addressed further in the EIR.

2.4.6 Energy

Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a. Result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?	☒	☐	☐	☐
b. Conflict with or obstruct a state or local plan for renewable energy or energy efficiency?	☒	☐	☐	☐

Impact Analysis

a. Would the project result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?

Potentially Significant Impact. Project construction would primarily consume diesel fuel through operation of heavy-duty construction equipment and debris hauling, gasoline associated with worker commutes, and minor amounts of electricity associated with operation of electrically powered construction equipment. The project would also consume energy for building heating and cooling, refrigeration, lighting, and electricity. Construction and operation associated with the implementation of the Proposed Project could result in the wasteful, inefficient, or unnecessary use of energy resulting in a potentially significant impact. Further analysis will be provided in the EIR.

b. Would the project conflict with or obstruct a state or local plan for renewable energy or energy efficiency?

Potentially Significant Impact. Federal and state agencies regulate energy use and consumption through various means. Although the Proposed Project would be required to comply with federal and state standards, including the U.S. Department of Transportation, the U.S. Department of Energy, the U.S. Environmental Protection Agency, the California Public Utilities Commission, and the California Energy Commission, the EIR will further analyze consistency with such plans.

2.4.7 Geology and Soils

Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a. Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:				
i. 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? Refer to Division of Mines and Geology Special Publication 42.	☐	☐	☐	☒
ii. Strong seismic ground shaking?	☐	☐	☒	☐
iii. Seismic-related ground failure, including liquefaction?	☐	☐	☒	☐
iv. Landslides?	☐	☐	☒	☐
b. Result in substantial soil erosion or the loss of topsoil?	☐	☐	☒	☐
c. 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?	☐	☐	☒	☐
d. Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property?	☐	☐	☒	☐
e. 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?	☐	☐	☐	☒
f. Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	☒	☐	☐	☐

Impact Analysis

A Preliminary Geotechnical Investigation has been prepared for the Proposed Project by Southern California Geotechnical and is included as Appendix A to this Initial Study. Geologic research indicates that the majority of the site is underlain by light gray sandy siltstone and fine-grained sandstone mapped as Tertiary-aged (Pliocene) Capistrano Formation (Map Symbol Tc). The Tertiary-aged (Pliocene) Niguel Formation (Map Symbol Tn) is mapped in the northwestern portion of the site. The bedding within the Capistrano Formation is indicated to trend northwest-southeast with dips ranging from 13 to 18 degrees on the geologic map. The Niguel Formation is described as a light gray siltstone and sandstone. The bedding within the Niguel Formation is indicated to trend generally north-south with dips ranging from 11 to 13 degrees west.

Based on the materials encountered in the exploratory borings and a review of the previous borings, the site is underlain by sandstone, siltstone, and claystone of the Capistrano Formation. As previously stated, the borings indicate that the bedding at the site generally trends in a northeast direction with dips ranging from 8 to 20 degrees to the southeast. Based on the information provided on the geologic map, Niguel Formation bedrock could be encountered in the northwestern area of the site during grading.

a. Would the project directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:

i. 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? Refer to Division of Mines and Geology Special Publication 42.

No Impact. The Project Site is not on the Alquist-Priolo Earthquake Fault Zoning Map (DOC 2019b). Furthermore, Southern California Geotechnical (SCG) did not identify any evidence of faulting during the geotechnical investigation. Therefore, the possibility of significant fault rupture on the site is considered to be low. Therefore, there is no potential for the rupture of a known earthquake fault at the Project Site. No further discussion is warranted in the EIR.

ii. Strong seismic ground shaking?

Less Than Significant Impact. Similar to the rest of Southern California, the Project Site is subject to ground shaking and potential damage in the event of seismic activity. The closest active faults in the regional vicinity with the potential to cause ground shaking in the City are the San Joaquin Hills Blind Thrust Fault, Newport-Inglewood Fault Zone, and the Whittier-Elsinore Fault Zone. The intensity of ground shaking at a given location depends primarily on the earthquake magnitude, the distance from the source, and the site response characteristics. The Project Site could be subject to moderate and possibly strong ground motion due to the proximity and potential earthquake magnitude of these faults, which would expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death. The Proposed Project is required to be constructed in compliance with the 2019 California Building Code (effective January 1, 2020), which contains standards for building design to minimize the impacts from ground shaking. Therefore, impacts from strong ground shaking would be considered less than significant, and this issue will not be addressed further in the EIR.

iii. Seismic-related ground failure, including liquefaction?

Less Than Significant Impact. Liquefaction refers to loose, saturated sand or gravel deposits that lose their load supporting capability when subjected to intense shaking. Any buildings or structures on these sediments may float, sink, or tilt as if on a body of water. The Project Site is not within an area that has been identified as being potentially susceptible to liquefaction. Therefore,

potentially significant impacts from liquefaction is not anticipated, and this issue will not be addressed further in the EIR.

iv. Landslides?

Less than Significant Impact. Susceptibility of slopes to landslides and other forms of slope failure depend on several factors, which are usually present in combination—steep slopes, condition of rock and soil materials, presence of water, formational contacts, geologic shear zones, and seismic activity. The Project Site is not within an area susceptible to seismic landslides. Therefore, impacts related to landslides would be less than significant, and this issue will not be addressed further in the EIR.

b. Would the project result in substantial soil erosion or the loss of topsoil?

Less than Significant Impact. The Proposed Project would involve construction activities that would result in ground disturbance, including excavation, grading, and soil removal, and, thus, could cause erosion if effective erosion control measures were not used. Erosion control measures would be specified in stormwater pollution prevention plans that would be prepared and implemented for the Proposed Project that would reduce impacts to less than significant. This issue will not be addressed further in the EIR.

c. Would the project 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?

Less than Significant Impact. See responses to Section 2.4.7(a)(iii) for liquefaction and (iv) for landslide impacts. Lateral spreading refers to lateral displacement of large, surficial blocks of soil as a result of pore pressure buildup or liquefaction in a subsurface layer. Based on the consideration that the Project Site is not in an area with potential for liquefaction, lateral spreading induced by soil liquefaction is also not likely to occur. The potential for other geologic hazards such as seismically induced settlement, lateral spreading, landslides, tsunamis, inundation, seiches, flooding, and subsidence affecting the site is considered low. Provided that the recommended remedial grading is completed and adequate foundation embedment is utilized as described in the Preliminary Geotechnical Investigation, the post-construction static settlements of the proposed structures are expected to be within tolerable limits. These issues will not be addressed further in the EIR.

d. Would the project be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property?

Less Than Significant Impact. Expansive soils shrink or swell as the moisture content decreases or increases; the shrinking can shift, crack, or break structures built on such soils. The Project Site is already developed and underlain by artificial fill materials. The Proposed Project would involve excavation of existing soil and import of materials. The imported soil materials would meet the California Building Code standards and would be required to have an expansion index of 20 or

less. Such imported materials are anticipated to contain sufficient fines (binder material) to result in a stable subgrade when compacted, and are required to be approved by the geotechnical engineer of record before being transported to the Project Site. Therefore, the Proposed Project would not be on expansive soil, and substantial risks to life or property due to expansive geologic unit would be less than significant. This issue will not be addressed further in the EIR.

e. Would the project 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?

No Impact. Development of the Proposed Project would not require the installation of a septic tank or alternative wastewater disposal system. The project would use the existing local sewer system. Therefore, no impact would result from septic tanks or other on-site wastewater disposal systems. No mitigation measures would be required. This issue will not be further addressed in the EIR.

f. Would the project directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?

Potentially Significant Impact. Unique paleontological resources may be present on the Project Site. Although the Project Site is currently developed, redevelopment that requires excavations into sedimentary rocks has the potential to encounter paleontological resources. Thus, further evaluation is necessary to determine the potential impacts of the Proposed Project on unique paleontological resources and unique geologic features. This issue will be discussed in the Cultural Resources section of the EIR.

2.4.8 Greenhouse Gas Emissions

Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a. Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	☒	☐	☐	☐
b. Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?	☒	☐	☐	☐

Impact Analysis

a. Would the project generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?

Potentially Significant Impact. Global climate change is not confined to a particular Project Site and is generally accepted as the consequence of global industrialization over the last 200 years. A typical project, even a very large one, does not generate enough greenhouse gas (GHG) emissions on its own to influence global climate change significantly; hence, the issue of global climate change is, by definition, a cumulative environmental impact. The State of California, through its governor and legislature, has established a comprehensive framework for the substantial reduction of GHG emissions over the next 40+ years. This will occur primarily through the implementation of Assembly Bill 32 (2006), Senate Bill 375 (2008), and Senate Bill 32 (2016), which address GHG emissions on a statewide, cumulative basis.

Implementation of the Proposed Project could increase GHG emissions through construction activities and operational emissions, including mobile and stationary sources, which would result in a potentially significant impact. Further evaluation in the EIR is required to determine the increase and effect on GHG emissions.

b. Would the project conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?

Potentially Significant Impact. The City has developed the Mission Viejo Sustainability Action Plan, which provides quantified baseline and future GHG emissions, identifies GHG reductions that would result from specific actions, and establishes a monitoring mechanism for the City. The Proposed Project could result in an increase in GHG emission that could conflict with the Mission Viejo Sustainability Action Plan. Further evaluation in the EIR is required to determine the project's consistency with applicable plans, policies, or regulations adopted for reducing GHG emissions.

2.4.9 Hazards and Hazardous Materials

Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a. Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	☐	☐	☒	☐
b. Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?	☒	☐	☐	☐
c. Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	☐	☐	☒	☐
d. Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?	☒	☐	☐	☐
e. For a project located within an airport land-use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, result in a safety hazard or excessive noise for people residing or working in the project area?	☐	☐	☐	☒
f. Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	☐	☐	☒	☐
g. Expose people or structures, either directly or indirectly, to a significant risk of loss, injury or death involving wildland fires?	☐	☐	☒	☐

Impact Analysis

a. Would the project create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?

Less Than Significant Impact. Construction of the Proposed Project would likely involve the use of some hazardous materials, such as vehicle fuels, solvents, paints, oils, and grease. Operation of the Proposed Project would involve an unquantifiable, but limited, use of potentially hazardous materials typical of residential and retail uses, including cleaning fluids, detergents, solvents, adhesives, sealers, paints, fuels/lubricants, and fertilizers and/or pesticides for landscaping. The use, storage, transport, and disposal of hazardous materials by construction workers, tenants, and residents of the Proposed Project would be required to comply with existing regulations of several agencies, including the California Department of Toxic Substances Control, U.S. Environmental Protection Agency, Occupational Safety and Health Administration, California Department of

Transportation, and City codes. Impacts would be less than significant, and this issue will not be addressed further in the EIR.

b. Would the project create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?

Potentially Significant Impact. A Phase I Environmental Site Assessment would be performed at the existing buildings on the Project Site. The presence of these hazardous materials could create a significant hazard to the public or the environment if they were to be disrupted during demolition activities and released into the environment. Therefore, impacts would be potentially significant, and further analysis is warranted in the EIR.

c. Would the project emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?

Less Than Significant Impact. No existing public schools have been identified within one-quarter mile of the Project Site. The closest schools to the Project Site are Fred Newhart Middle School, approximately 0.6 miles to the east, and De Portola Elementary School, approximately 0.7 miles to the north. As such, the project would not emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school. Therefore, impacts would be less than significant, and no further discussion is warranted in the EIR.

d. Would the project be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?

Potentially Significant Impact. The proposed Project Site may be on a list of hazardous materials sites compiled pursuant to California Government Code, Section 65962.5. During construction, construction workers would be present on the site and could be exposed to significant hazards that would result in a potentially significant impact. Further analysis will be provided in the EIR.

e. Would the project for a project located within an airport land-use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, result in a safety hazard or excessive noise for people residing or working in the project area?

No Impact. The Proposed Project is not located within 2 miles of a public or public use airport. The closest airport is John Wayne Airport located 15 miles to the north. Therefore, the Proposed Project would not result in a safety hazards or excessive noise for people residing or working on the Project Site. The issue will not be further addressed in the EIR.

f. Would the project impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?

Less Than Significant Impact. The Project Site is a 6.5-acre parcel in the City. During construction, surrounding roadways would continue to provide emergency access through the Project Site and to surrounding properties. Further, the project would provide emergency access in accordance with the requirements of the Orange County Fire Authority. Therefore, operation of the Proposed Project would not impede access of emergency vehicles to the Project Site or any surrounding areas. This issue will not be addressed further in the EIR.

g. Would the project expose people or structures, either directly or indirectly, to a significant risk of loss, injury or death involving wildland fires?

Less Than Significant Impact. According to the California Department of Forestry and Fire Protection's (CAL FIRE's) Fire Hazard Severity Zone Map of the County (2020), the Proposed Projects is in a local responsibility non-Very High Fire Hazard Safety Zone. Development of the Proposed Project would not expose people or structures to a significant risk from wildland fires. This issue will not be addressed further in the EIR.

2.4.10 Hydrology and Water Quality

Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a. Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality?	☒	☐	☐	☐
b. Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?	☐	☐	☒	☐
c. Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would:				
i. Result in substantial erosion or siltation on- or off-site?	☒	☐	☐	☐
ii. Substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or offsite?	☒	☐	☐	☐
iii. Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?	☒	☐	☐	☐
iv. Impede or redirect flood flows?	☐	☐	☐	☒
d. In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation?	☐	☐	☒	☐
e. Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?	☒	☐	☐	☐

Impact Analysis

a. Would the project violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality?

Potentially Significant Impact. The Project Site is currently developed with four buildings totaling 67,629 square feet of office and retail uses. The Proposed Project consists of demolishing existing uses and constructing 40,000 square feet of grocery retail store retail uses and 8,000 square feet of retail shop uses in addition to 234 multi-family residential units. Construction activities would involve various types of equipment such as bulldozers, scrapers, backhoes, and other earthmoving equipment; haul trucks; and generators. Pollutants associated with these construction activities that could result in water quality impacts include soils and sediment, debris, fuels, and other fluids associated with the equipment used for construction. During operation, the Proposed Project would generate typical urban pollutants (e.g., sediment, petroleum hydrocarbons, pesticides, and cleaning

agents) that could be discharged into the local and regional drainage systems. Therefore, implementation of the project could result in significant impacts to water quality from construction activities and operation. Additionally, a Water Quality Management Plan would be required to comply with project requirements outlined in the South Orange County Model Water Quality Management Plan. Therefore, further discussion is warranted in the EIR.

b. Would the project substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?

Less Than Significant Impact. No groundwater would be withdrawn as part of the Proposed Project. The project would get its water from the Moulton Niguel Water District that does not rely on groundwater for its potable water.

The Project Site is currently developed. The project would not interfere with groundwater recharge. Therefore, the project would not deplete groundwater supplies, and no impact would occur. No further discussion is warranted in the EIR.

c. Would the project substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would:

i. Result in substantial erosion or siltation on- or off-site?

Potentially Significant Impact. No rivers or streams are on the Project Site. The project proposes the redevelopment of a 6.5-acre site. Land-disturbing activities associated with the Proposed Project, such as vegetation clearing, grading, and demolition, could result in localized alteration of drainage patterns and temporarily increase erosion and sedimentation in the construction area. Alterations may temporarily result in increased erosion and siltation if flows were substantially increased or routed to facilities or channels without capacity to carry the additional flow. In addition, the redevelopment of the Project Site could alter the existing drainage patterns of the site. The Proposed Project would be required to comply with the National Pollutant Discharge Elimination System Construction General Permit, which would require preparation and implementation of a Stormwater Pollution Prevention Plan. The Stormwater Pollutant Prevention Plan would include construction best management practices to reduce erosion and siltation. While the Proposed Project would not involve alteration of a waterway's course, new development could potentially result in substantial erosion or siltation from grading and construction activities. Therefore, further discussion is warranted in the EIR.

ii. Substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or offsite?

Potentially Significant Impact. The Project Site is currently developed with four buildings totaling 67,629 square feet of office and retail uses. The Proposed Project consists of demolishing existing uses and constructing 40,000 square feet of grocery retail store retail uses and 8,000 square feet of retail shop uses in addition to 234 multi-family residential units. The anticipated pollutants of concern include typical urban water pollutants, such as suspended solid sediments, nutrients, pathogens, pesticides, oil and grease, and trash and debris. Impacts related to runoff flow or volume would be potentially significant and will be further analyzed in the EIR.

iii. Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?

Potentially Significant Impact. Soil disturbance during construction and changes in land use could result in polluted runoff different from the existing conditions. The EIR will discuss any issues related to potential additional sources of polluted runoff. This issue will be addressed in the EIR.

iv. Impede or redirect flood flows?

No Impact. The Project Site is outside of the 100-year flood zone and would not place structures in the 100-year flood hazard area. The Proposed Project would not redirect flood flows, and this issue will not be addressed further in the EIR.

d. Would the project, in flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation?

Less Than Significant Impact. Tsunamis are seismic sea waves generated by sudden movements of the sea floor caused by submarine earthquakes, landslides, or volcanic activity. The Project Site is approximately 10 miles from the Pacific Ocean and is outside the Tsunami Inundation Zone.

Seiches are waves that oscillate in enclosed water bodies, such as reservoirs, lakes, ponds, or semi-enclosed bodies of water. Seiches may be triggered by moderate or large submarine earthquakes or by large onshore earthquakes. Lake Mission Viejo is approximately 3 miles north of the Project Site. No significant impacts from an earthquake-induced seiche would occur.

Mud and debris flows are mass movements of dirt and debris that occur after intense rainfall, earthquakes, and severe wildfires. The speed of a slide depends on the amount of precipitation and steepness of the slope. Based on the State of California Seismic Hazard Zones Map for the San Juan Capistrano Quadrangle per compiled maps released by the California Geological Survey (1990), the Project Site is not in an area that has been identified as being potentially susceptible to seismically induced landslides. Therefore, there is no expectation of mudflows or debris slides on the Project Site. Thus, no impact related to the risk of release of pollutants from inundation by mudflow or seiche would occur, and no further discussion is warranted in the EIR.

e. Would the project conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?

Potentially Significant Impact. The Project Site is in the South Orange County Watershed Management Area. Specifically, and the project would be in the San Juan Hydrologic Unit and further located in the Middle San Juan Hydrologic Area. The Project Site is currently developed with office and commercial uses. The proposed multi-family residential units are not anticipated to result in greater water pollutants in runoff water compared to the existing conditions. The anticipated pollutants of concern include typical urban water pollutants, such as suspended solid sediments, nutrients, pathogens, pesticides, oil and grease, and trash and debris. Impacts related to water quality would be potentially significant and will be further analyzed in the EIR.

The Proposed Project is not within a Groundwater Sustainability Agency boundary, and therefore, no Sustainable Groundwater Management Plan has been prepared for the Project Site. In addition, no groundwater would be withdrawn as part of the Proposed Project. Therefore, no impact would occur, and no further discussion is warranted in the EIR.

2.4.11 Land Use and Planning

Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a. Physically divide an established community?	☐	☐	☐	☒
b. Cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect?	☒	☐	☐	☐

Impact Analysis

a. Would the project physically divide an established community?

No Impact. The Project Site is currently developed with commercial uses and surrounded by residential uses and commercial uses. The Project Site does not physically divide any community, and redevelopment of the Project Site would not physically divide an established community. No impact would occur, and no further discussion is warranted in the EIR.

b. Would the project cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect?

Potentially Significant Impact. The Project Site is currently zoned for Office Professional (OP). The project would include a zone change to a new zoning designation of Residential Mixed Use (RMU), which would permit the construction of 234 multi-family residential units. Therefore, further evaluation in the EIR is required to address potential land use impacts due to implementation of the Proposed Project.

2.4.12 Mineral Resources

Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a. Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?	☐	☐	☐	☒
b. Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local General plan, specific plan or other land use plan?	☐	☐	☐	☒

Impact Analysis

a. Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?

No Impact. The County of Orange General Plan Resources Element (2013) includes an inventory of the County-wide resources, including mineral resources. No known mineral resources of value to the region are located in the City, including the Project Site. Therefore, implementation of the Proposed Project would not result in the loss of availability of a known mineral resource. No further analysis is warranted in the EIR.

b. Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?

No Impact. The Project Site is not a locally important mineral resource recovery site delineated in the County of Orange General Plan. Implementation of the Proposed Project would not result in the loss of availability of a locally important mineral resource. Therefore, no impact would occur, and no further analysis is warranted in the EIR.

2.4.13 Noise

Would the project result in:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a. Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	☒	☐	☐	☐
b. Generation of excessive groundborne vibration or groundborne noise levels?	☒	☐	☐	☐
c. For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	☒

Impact Analysis

a. Would the project result in generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?

Potentially Significant Impact. Future development of the Proposed Project would have the potential to result in a permanent increase in noise levels in the project vicinity from stationary sources, including heating, ventilation, and air conditioning systems and parking lots. The Proposed Project could also increase mobile source noise if project-generated trips are more than those currently in the existing conditions. In addition, project-related demolition and construction activities result in the generation of temporary increase in noise to existing sensitive receptors near the Project Site. Noise levels during project construction and operation will be analyzed further in the EIR.

b. Would the project result in the generation of excessive groundborne vibration or groundborne noise levels?

Potentially Significant Impact. Groundborne vibration or noise would primarily be associated with construction activities including demolition and excavation. These temporary increased levels of vibration could impact vibration-sensitive land uses surrounding the Project Site. Therefore, further discussion is warranted in the EIR.

c. Would the project, for a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, expose people residing or working in the project area to excessive noise levels?

No Impact. The proposed Project Site is not within the vicinity of a private airstrip or within 2 miles of a public airport or public use airport. The closest airport is John Wayne Airport located 15 miles to the north. Therefore, the Proposed Project would not result in a safety hazards or excessive noise for people residing or working on the Project Site, and this issue will not be further addressed in the EIR.

2.4.14 Population and Housing

Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a. Induce substantial unplanned population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?	☐	☐	☒	☐
b. Displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☒

Impact Analysis

a. Would the project induce substantial unplanned population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?

Less Than Significant Impact. The Proposed Project would result in a population increase of approximately 644 people in the area. This is based on census data for the City, which estimated 2.8 people per household multiplied by the number of units proposed (234 multi-family residential units). As of 2019, the population for the City was 96,124 (U.S. Census 2019). The increase of 644 people would result in a 0.005 percent population increase. Therefore, the Proposed Project would result in a negligible increase in total population for the City. Additionally, the Proposed Project would increase employment opportunities in the area by providing a grocery retail store and additional retail uses. Therefore, although the Proposed Project would induce population growth on the Project Site directly, this growth was already anticipated by the City and is consistent with the Mission Viejo General Plan. Therefore, impacts would be less than significant, and this issue will not be addressed further in the EIR.

b. Would the project displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?

No Impact. The Project Site is currently developed with office and commercial uses. No housing units would be demolished as part of the project. Therefore, the project would not displace a substantial number of existing people, necessitating the construction of replacement housing elsewhere. No additional discussion is warranted in the EIR.

2.4.15 Public Services

Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a. Result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:				
Fire protection?	☒	☐	☐	☐
Police protection?	☒	☐	☐	☐
Schools?	☒	☐	☐	☐
Parks?	☐	☐	☒	☐
Other public facilities?	☐	☐	☒	☐

Impact Analysis

a. Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:

Fire protection?

Potentially Significant Impact. The Project Site is served by the Orange County Fire Authority for fire protection services. Implementation of the Proposed Project may increase the demand for public services, including fire protection, due to the change in land use and the increase in development intensity. Consultation with the Orange County Fire Authority will be conducted to estimate the level and type of demand associated with the Proposed Project. Further evaluation in the EIR is warranted.

Police protection?

Potentially Significant Impact. The Project Site is served by the Orange County Sherriff's Department. The Orange County Sherriff's Department is responsible for patrol, investigations, traffic enforcement, traffic control, vice and narcotics enforcement, airborne patrol, crime suppression, community policing, tourist-oriented policing, and detention facilities. Implementation of the Proposed Project may increase the demand for public services, including police protection. Consultation with Mission Viejo Police Services will be conducted to estimate

the level and type of demand associated with the Proposed Project. Further evaluation in the EIR is warranted.

Schools?

Potentially Significant Impact. The Proposed Project is served by the Saddleback Valley Unified School District, and development of 234 multi-family residential units would increase the demand for school facilities. Consultation with the school district will be conducted to estimate the level and type of demand associated with the Proposed Project. Project impacts on schools will be analyzed in the EIR.

Parks?

Less Than Significant Impact. Mission Viejo Local Park Code, Chapter 9.85, requires the project applicant to dedicate land for parks or payment of in-lieu fees based on the number and type of dwelling units. The payment of in-lieu fees would offset increased parkland demands created by the Proposed Project. Although the Proposed Project would increase the demand for park services primarily to the Oso Viejo Community Park and the Linda Vista Park, which are the closest parks to the Project Site, the payment of in-lieu fees would allow the City to provide necessary improvements to reduce impacts to a less than significant level. No further analysis is warranted in the EIR.

Other public facilities?

Less Than Significant Impact. The Mission Viejo Library is directly across from the Project Site a 100 Civic Center. Implementation of the Proposed Project would increase the population by approximately 523.6 residents, representing an increase of 0.005 percent to the City's 2019 population. The Mission Viejo Library's needs are assessed annually, and budget allocations are revised accordingly to ensure that adequate levels of service are maintained throughout the City. Library service demand is population based, and an increase of 0.005 percent to City's population is anticipated to have a minimal effect on library resources and would not result in the need for physical expansion of library resources. Impacts would not be significant, and no mitigation measures would be required. This issue will not be addressed further in the EIR.

2.4.16 Recreation

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a. Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	☐	☐	☒	☐
b. Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?	☐	☐	☒	☐

Impact Analysis

a. Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?

Less Than Significant Impact. As discussed in Section 2.4.15, Public Services, the Proposed Project would result in an increased use of existing parks, including but not limited to the nearest public parks, the Oso Viejo Community Park and the Linda Vista Park. However, the required payment of park fees, pursuant to the Mission Viejo Local Park Code, Chapter 9.85, would ensure that adequate improvements are made, and impacts would be less than significant. No mitigation measures would be required, and this issue will not be addressed further in the EIR.

b. Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?

Less Than Significant Impact. The Proposed Project would consist of a 40,000-square-foot new grocery box structure with, 8,000 square feet of retail and 234 multi-family residential units on a currently developed site. The project does not include recreational facilities or require the construction or expansion of recreational facilities. Additionally, the Proposed Project would require payment of local park fees to provide local park benefits to future residents of the area. Therefore, no further analysis is warranted in the EIR.

2.4.17 Transportation

Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a. Conflict with a program plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities?	☒	☐	☐	☐
b. Conflict or be inconsistent with CEQA Guidelines section 15064.3, subdivision (b)?	☒	☐	☐	☐
c. Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	☒	☐	☐	☐
d. Result in inadequate emergency access?	☐	☐	☒	☐

Impact Analysis

a. Would the project conflict with a program plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities?

Potentially Significant Impact. The Proposed Project would convert existing commercial office uses to retail, commercial, and residential uses. This change could result in a redistribution of vehicle trips that could affect the circulation system and nearby transit facilities. A final traffic analysis will be conducted and included in the EIR to assess the future traffic conditions compared to existing conditions and future cumulative scenarios. This analysis will estimate the number of trips associated with the intensification, alteration, and redistribution of land uses and analyze the impact of the Proposed Project to roadways and study area intersections. Impacts related to compliance with plans and policies addressing the circulation system would be potentially significant, and this issue will be discussed in more detail in the EIR.

b. Would the project or be inconsistent with CEQA Guidelines section 15064.3, subdivision (b)?

Potentially Significant Impact. The Proposed Project would consist of a new 40,000-square-foot grocery box structure with 8,000 square feet of retail and 234 multi-family residential units on a currently developed site. The project has the potential to result in an increase in vehicle miles traveled due to the introduction of residential uses on the Project Site. Therefore, further analysis will be provided in the EIR related to vehicle miles traveled.

c. Would the project substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?

Potentially Significant Impact. The Proposed Project would not introduce incompatible uses to area roadways and does not propose any geometric design features that would substantially increase

hazards. However, the Proposed Project would change the existing access and circulation pattern by providing an additional access point at the southern end of the Project Site. Therefore, further analysis in the EIR is necessary for the potential to create hazardous conditions (e.g., modifications to existing roadways and intersections, new driveway approaches). This issue will be evaluated in the EIR, and mitigation measures will be identified as necessary.

d. Would the project result in inadequate emergency access?

Less Than Significant Impact. The Project Site is a 6.5-acre parcel in the City. During construction, surrounding roadways would continue to provide emergency access through the Project Site and to surrounding properties. Further, the project would provide emergency access in accordance with the requirements of the Orange County Fire Authority. Therefore, the Proposed Project would not result in inadequate emergency access, and no further analysis is warranted in the EIR.

2.4.18 Tribal Cultural Resources

Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a. Cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:				
i. Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section 5020.1(k), or	☒	☐	☐	☐
ii. A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1. In applying the criteria set forth in subdivision (c) of Public Resources Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe?	☒	☐	☐	☐

Impact Analysis

a. Would the project cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:

i. Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section 5020.1(k), or

ii. A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1. In applying the criteria set forth in subdivision (c) of Public Resources Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.

Potentially Significant Impact. Tribal cultural resources are sites, features, places, cultural landscapes, sacred places, and objects with cultural value to a California Native American tribe that are either eligible or listed in the California Register of Historical Resources or local register of historical resources (California Public Resources Code, Section 21074). To determine if any tribal cultural resources could be impacted by the Proposed Project, California Native American

tribes that are traditionally and culturally affiliated with the Project Site will be contacted (California Public Resources Code, Section 21080.3.1). The EIR will further evaluate potential impacts of the Proposed Project on tribal cultural resources.

2.4.19 Utilities and Service Systems

Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a. Require or result in the relocation or construction of new or expanded water, wastewater treatment or storm water drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects?	☒	☐	☐	☐
b. Have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry and multiple dry years?	☒	☐	☐	☐
c. Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?	☒	☐	☐	☐
d. Generate solid waste in excess of State or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals?	☒	☐	☐	☐
e. Comply with federal, state, and local management and reduction statutes and regulations related to solid waste?	☐	☐	☒	☐

Impact Analysis

a. Would the project require or result in the relocation or construction of new or expanded water, wastewater treatment or storm water drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects?

Water

Potentially Significant Impact. Implementation of the Proposed Project would likely generate an increase in water uses beyond what existing uses generate. The EIR will analyze existing uses compared to proposed uses to determine the impact the Proposed Project would have on water uses.

Wastewater

Potentially Significant Impact. Implementation of the Proposed Project would generate a potential increase in wastewater with the incorporation of residential uses. The EIR will address impacts to wastewater uses.

Stormwater Drainage

Potentially Significant Impact. A Drainage Study is being prepared for the Proposed Project to analyze existing and proposed site conditions. The EIR will address the results of this study and further analyze impacts to stormwater drainage.

Electric Power and Natural Gas

Potentially Significant Impact. An Energy Technical Memorandum is being prepared for the Proposed Project to quantify the electricity and natural gas from operation of the Proposed Project and existing land use. The EIR will further analyze the Proposed Project's impacts regarding energy and natural gas use.

Telecommunication

Less Than Significant Impact. Telecommunication services are provided by Cox Communications with which service connections for the Proposed Project would be made from existing utility lines along Marguerite Parkway, with new lines to be undergrounded. The Project Site is already developed as a neighborhood commercial and office center where such services are provided. The Proposed Project is not anticipated to result in substantial adverse impacts to telecommunication services. Provision of telephone service improvements would not cause substantial or unusual adverse physical impacts to the environment. This would result in less than significant impacts, and this issue will not be addressed further in the EIR.

b. Would the project have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry and multiple dry years?

Potentially Significant Impact. Implementation of the Proposed Project would generate a potential increase in demand for water for domestic and retail purposes. The potential volume of this demand will be assessed in the EIR. The water demand will be compared to existing and proposed water supplies to determine whether implementation of the Proposed Project would result in significant impacts on local or regional water supplies. This is necessary to determine if needs could be met by the Moulton Niguel Water District, the current water service provider to the Project Site. Potable demands are supplied from an imported source, the Metropolitan Water District of Southern California. The EIR will determine if there would be sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry, and multiple dry years.

c. Would the project result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?

Potentially Significant Impact. Implementation of the Proposed Project would generate a potential increase in wastewater with the incorporation of residential uses. The EIR will address impacts to wastewater use capacity.

d. Would the project generate solid waste in excess of State or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals?

Potentially Significant Impact. The Project Site is currently served by Waste Management, Inc., which is the solid waste provider for the City. The Proposed Project could generate an increase in demand for water for domestic and retail purposes. The EIR will evaluate the existing water demands from the existing neighborhood commercial and office center compared to the proposed grocery retail store, retail, and residential uses that are part of the Proposed Project. Further evaluation in the EIR is required to determine the level of significance and to identify mitigation measures that would reduce impacts to below a level of significance if required. This issue will be further addressed in the EIR.

e. Would the project comply with federal, state, and local management and reduction statutes and regulations related to solid waste?

Less than Significant Impact. To address landfill capacity and solid waste concerns, the Proposed Project would be required to comply with federal, state, and local agency regulations regarding solid waste. Under Assembly Bill 939, the California Integrated Solid Waste Management Act of 1989, the City is required to develop source reduction, reuse, recycling, and composting programs to reduce the amount of solid waste entering landfills. Local jurisdictions are mandated to divert at least 50 percent of their solid waste generation to recycling. Assembly Bill 341 has increased the diversion target to 75 percent (CalRecycle 2018).

The County of Orange Integrated Waste Management Department manages solid waste disposal for the County, operates three active landfills and four household hazardous waste collection centers, and monitors 12 closed landfills. The City complies with the County-wide Integrated Waste Management Plan to plan and facilitate the proper disposal of the County's waste. In addition, the City implements its Municipal Code and Ordinances that help to reduce the waste source and increase the diversion rate. Chapter 6.10 of the Mission Viejo Municipal Code is the City's Integrated Waste Management Plan. Division 10 relates to the diversion of construction and demolition waste from solid waste landfills in the County.

2.4.20 Wildfire

If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a. Substantially impair an adopted emergency response plan or emergency evacuation plan?	☐	☐	☐	☒
b. Due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to, pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?	☐	☐	☐	☒
c. Require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?	☐	☐	☐	☒
d. Expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?	☐	☐	☐	☒

Impact Analysis

a. Would the project substantially impair an adopted emergency response plan or emergency evacuation plan?

No Impact. The Proposed Project would provide emergency access and response in accordance with the requirements of the Orange County Fire Authority. In addition, the Project Site is not located in or immediately near state responsibility areas or lands classified as Very High Hazard Severity Zones according to CAL FIRE's California Fire Hazard Severity Zone Maps (2020). Therefore, no impact would occur, and no further analysis is warranted in the EIR.

b. Would the project, due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to, pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?

No Impact. The Project Site is not on a slope that would expose project occupants to pollutant concentrations from wildfire. In addition, the Project Site is not in or immediately near state responsibility areas or lands classified as Very High Hazard Severity Zones according to CAL FIRE's California Fire Hazard Severity Zone Maps (2020). Therefore, no impact would occur, and no further analysis is warranted in the EIR.

c. Would the project require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?

No Impact. The Proposed Project does not propose the installation of new infrastructure that would exacerbate fire risk. In addition, the Project Site is not in or immediately near state responsibility areas or lands classified as Very High Hazard Severity Zones according to CAL FIRE's California Fire Hazard Severity Zone Maps (2020). Therefore, no impact would occur, and no further analysis is warranted in the EIR.

d. Would the project expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?

No Impact. The Proposed Project is not in an area that is susceptible to landslides. In addition, the Project Site is not in or immediately near state responsibility areas or lands classified as Very High Hazard Severity Zones according to CAL FIRE's California Fire Hazard Severity Zone Maps (2020). Therefore, no impact would occur, and no further analysis is warranted in the EIR.

2.4.21 Mandatory Findings of Significance

Does the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a. Have the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?	☒	☐	☐	☐
b. Have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?	☒	☐	☐	☐
c. Have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?	☒	☐	☐	☐

Note: Authority cited: Sections 21083 and 21083.05, Public Resources Code. Reference: Section 65088.4, Gov. Code; Sections 21080(c), 21080.1, 21080.3, 21083, 21083.05, 21083.3, 21093, 21094, 21095, and 21151, Public Resources Code; Sundstrom v. County of Mendocino,(1988) 202 Cal.App.3d 296; Leonoff v. Monterey Board of Supervisors, (1990) 222 Cal.App.3d 1337; Eureka Citizens for Responsible Govt. v. City of Eureka (2007) 147 Cal.App.4th 357; Protect the Historic Amador Waterways v. Amador Water Agency (2004) 116 Cal.App.4th at 1109; San Franciscans Upholding the Downtown Plan v. City and County of San Francisco (2002) 102 Cal.App.4th 656.

Impact Analysis

a. Does the project have the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?

Potentially Significant Impact. Implementation of the Proposed Project could degrade the quality of the environment. As discussed in this IS, the Proposed Project could result in impacts to aesthetics, air quality, biological resources, cultural resources, energy, geology and soils, GHG emissions, hazards and hazardous materials, hydrology and water quality, land use and planning, noise, public services, transportation, tribal cultural resources, and utilities and service systems. Therefore, these topics will be evaluated in the EIR, and mitigation measures will be identified as necessary.

b. Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?

Potentially Significant Impact. Implementation of the Proposed Project may result in cumulative impacts to air quality, GHG emissions, and transportation. Further analysis is needed to estimate the extent and significance of potential cumulative impacts resulting from the combined effects of the Proposed Project plus other past, present, and reasonably foreseeable future projects. Cumulative impacts will be evaluated in the EIR, and mitigation measures will be identified as necessary.

c. Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?

Potentially Significant Impact. Potentially significant impacts that could substantially affect human beings, directly or indirectly, are identified in this IS in the areas of aesthetics, air quality, biological resources, cultural resources, energy, GHG emissions, hazards and hazardous materials, hydrology and water quality, land use and planning, noise, public services, transportation, tribal cultural resources, and utilities and service systems. Impacts in each of these areas will be discussed in the appropriate topical section of the EIR, and mitigation measures will be identified as necessary.

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Section 3 List of Preparers

3.1 Lead Agency

City of Mission Viejo
Community Development Department
200 Civic Center
Mission Viejo, California 92691

3.2 Consultants

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Appendix A. Preliminary Geotechnical Investigation

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PRELIMINARY GEOTECHNICAL INVESTIGATION
PROPOSED MIXED USE DEVELOPMENT

NWC Marguerite Parkway at La Paz Road
Mission Viejo, California
For
ValueRock

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

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A California Corporation

January 14, 2021

VR Garden Plaza LLC and
VR Garden Plaza II LLC
18301 Von Karman Avenue
Suite 850
Irvine, CA 92612

Attention: Mr. Darin Blindell
Director of Construction Management

Project No.: 20G237-1

Subject: Preliminary Geotechnical Investigation
Proposed Mixed Use Development
NWC Marguerite Parkway at La Paz Road
Mission Viejo, California

Gentlemen:

In accordance with your request, we have conducted a preliminary geotechnical investigation at the subject site. We are pleased to present this report summarizing the conclusions and recommendations developed from our investigation.

We sincerely appreciate the opportunity to be of service on this project. We look forward to providing additional consulting services during the course of the project. If we may be of further assistance in any manner, please contact our office.

Respectfully Submitted,

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1.0 EXECUTIVE SUMMARY

Presented below is a brief summary of the conclusions and recommendations of this investigation. Since this summary is not all inclusive, it should be read in complete context with the entire report. It should be noted that this investigation was focused on determining the geotechnical feasibility of the proposed development. This report is preliminary in nature, due to the lack of details regarding the proposed grading and the lack of foundation loading information. Future studies, potentially including additional subsurface exploration, will be necessary to refine the preliminary design parameters that are presented within this report.

Geotechnical Design Considerations

- Undocumented fill soils at borings drilled within the development area extend to depths of 1½ to 8± feet below the existing site grades. The existing fill soils possess variable composition and strength, and no documentation regarding the placement or compaction of these fill soils is available. The results of laboratory testing indicate that some of the near-surface soils are compressible when loaded.
- The fill soils are underlain by moderate to high strength alluvium, generally comprised of silts and clays, and Capistrano formation bedrock, comprised of siltstone and claystone.
- The proposed development is considered to be feasible with respect to the geotechnical conditions encountered at the boring locations at the site. The proposed structures are expected to have relatively high column loads. The most feasible means of supporting the new structures is considered to be the use of either shallow foundations or CIDH piles supported within the Capistrano bedrock. In any areas where the foundations do not extend into the terrace deposits, remedial grading will be necessary to remove and replace the existing undocumented fill soils.
- Based on the results of corrosivity testing, the on-site soils are considered to be corrosive to ductile iron and cast iron pipe. The on-site soils contain elevated levels of soluble sulfates and a medium to high expansion potential.
- The proposed development will include a 35-foot high retaining wall along portions of the northwestern

Preliminary Site Preparation Recommendations

- Demolition of several structures and pavements associated with the existing development will be required. Debris resultant from demolition should be disposed of off-site. Alternatively, concrete and asphalt debris may be pulverized to a maximum 2-inch particle size, well mixed with the on-site soils, and incorporated into new structural fills or it may be crushed and made into crushed miscellaneous base (CMB).
- Preliminarily, the overexcavation within the building areas is recommended to extend to depths of at least 2 to 3 feet below existing and proposed building pad subgrade elevations, to provide a suitable floor slab subgrade. No specific overexcavation is expected to be necessary where foundations extend into the Capistrano bedrock. Where foundations are not extended into the terrace deposits, overexcavation should be performed to remove all of the existing undocumented fill soils, and to a depth of at least 3 to 5 feet below bearing grade within the influence zones of any new foundations. These recommendations are subject to review and may be revised based on the results of the design-level geotechnical investigation.

- Preliminarily, the new parking area subgrade soils are recommended to be scarified to a depth of 12± inches, thoroughly moisture conditioned to within 2 to 4 percent above the optimum moisture content and recompacted to at least 90 percent of the ASTM D-1557 maximum dry density.

Preliminary Foundation Design Recommendations

- Conventional shallow foundations, supported in newly placed compacted fill.
- 3,000 to 4,000 lbs/ft^2 maximum allowable soil bearing pressure for footings supported in high strength bedrock materials.
- 2,500 to 3,000 lbs/ft^2 maximum allowable soil bearing pressure for footings supported in structural fill.
- The design of the foundations will depend on the results of the future design-level geotechnical study. Minimum recommended reinforcement based on geotechnical conditions is expected to consist of four (6) No. 5 rebars (3 top and 3 bottom) in strip footings. Additional reinforcement may be necessary for structural considerations.
- Cast-in-drilled-hole (CIDH) piles can be used to support heavily loaded columns. Preliminarily, 24-inch diameter piles embedded 30 to 40± feet would have capacities of 150 to 250 kips.

Preliminary Floor Slab Design Recommendations

- Conventional slabs-on-grade, minimum 5 to 6 inches thick.
- Steel reinforcement will be necessary, based on the presence of expansive soils.
- The actual thickness and reinforcement of the floor slabs should be determined by the structural engineer.

Preliminary Pavement Design Recommendations

ASPHALT PAVEMENTS (R = 3)			
Materials	Thickness (inches)		
	Auto Drive Lanes (TI = 5.0)	Truck Traffic	
		(TI = 6.0)	(TI = 7.0)
Asphalt Concrete	3	3½	4
Aggregate Base	11	13	16
Compacted Subgrade	12	12	12

PORTLAND CEMENT CONCRETE PAVEMENTS (R = 3)			
Materials	Thickness (inches)		
	Auto Parking & Drives (TI = 5.0)	Truck Traffic	
		(TI = 6.0)	(TI = 7.0)
PCC	5½	5½	6
Compacted Subgrade (95% Relative Compaction)	12	12	12

2.0 SCOPE OF SERVICES

The scope of services performed for this project was in general accordance with our Proposal No. 20P325R2, dated October 27, 2020. The scope of services included a visual site reconnaissance, subsurface exploration, field and laboratory geotechnical testing, and geotechnical engineering analysis to determine the geotechnical feasibility of the proposed development. This report also contains preliminary design criteria for building foundations, building floor slabs, and parking lot pavements. The evaluation of the environmental aspects of this site was beyond the scope of services for this study.

Detailed site plans, grading plans and structural details were not available at the time of this report. Therefore, additional subsurface exploration, laboratory testing and engineering analysis will be necessary to provide a design-level geotechnical report, with specific foundation, floor slab, and grading recommendations for the new structures.

3.0 SITE AND PROJECT DESCRIPTION

3.1 Site Conditions

The site is located at the northwest corner of La Paz Road and Marguerite Parkway in Mission Viejo, California. The site is bounded to the north and west by existing single-family residences, to the south by La Paz Road, to the east by Marguerite Parkway. The general location of the site is illustrated on the Site Location Map, included as Plate 1 of this report.

The site consists of a roughly triangular-shaped lot, 4.2± acres in size. The site is presently developed with five (5) one and two-story multi-tenant retail and light commercial buildings. The buildings are of wood-frame and stucco construction. Several of the suites within these buildings are currently vacated. The buildings are surrounded by asphaltic concrete pavements for parking and drive areas and limited areas of Portland cement concrete flatwork and planters. The pavements in the southeastern areas of the site are in fair to good condition with little cracking throughout. The pavements in the northwestern areas of the site are in poor to moderate condition with moderate to severe cracking throughout. The landscape planters are located around the buildings, in the courtyards of the buildings and along the southeast and southwest property lines. These planters include shrubs and medium to large trees. An existing retaining wall, up to 7± feet in height, is located along the northeast and northwest property lines.

Detailed topographic information was provided by the client. Based on the plan provided to our office, the site topography generally slopes downward, from the highest point in the north-central region of the site (480± feet MSL), to the lowest point in the southeast corner (445± feet MSL).

3.2 Proposed Development

SCG was provided with preliminary conceptual plans for the proposed development prepared by Architects Orange. These plans indicate that the site will be developed with a two-part structure including a Whole Foods grocery store, a parking structure and several levels of residential units. The Whole Foods grocery store will be located on the lower level of the eastern portion of the structure, and will be 40,000± ft^2 in size. Some small areas of retail shops will also be located on the lower level around the perimeter of the building. Four levels of above-grade parking and residential units will be constructed above the Whole Foods grocery store. The eastern portion of the structure will consist of one level of at-grade parking, one level of mezzanine parking and four levels of new residential units. In total, 200 new residential units will be constructed at the site. The buildings will be surrounded by asphaltic concrete or Portland cement concrete pavements for automobile parking and drive lanes. The proposed development is also expected to include some areas of concrete flatwork and landscape planters.

Detailed structural information was not available at the time of this report. Based on previous experience with similar structures, we assume that the lower level of the Whole Foods grocery store and the parking structure will be constructed of reinforced concrete or structural steel

incorporating interior columns and bearing walls. The residential units are expected to be of wood frame construction. Maximum column and wall loads are expected to be on the order of 500 kips and 5 to 10 kips per linear foot, respectively.

A conceptual plan indicating the extent of the proposed grading has been provided to our office, by the project civil engineer, CA Engineering, Inc. This plan indicates that the Whole Foods building will have a finished floor elevation of 450 ft MSL. This elevation will require no significant fills, but cuts of up to 19± feet. Establishment of grades in the area of the parking/residential structure will require cuts of up to 30± feet, which will create a retaining wall up to 36 feet in height along the northwestern side of the site. This wall will be used to create 1 to 2 levels of below grade parking.

3.3 Previous Studies

Southern California Geotechnical, Inc. (SCG) performed research with the City of Mission Viejo in an attempt to obtain copies of geotechnical reports previously generated for the subject site. We were able to obtain copies of 2 relevant reports, which were prepared for the northernmost building, currently located along Marguerite Parkway at the subject site. These reports were prepared in 1986 and 1988 by GeoSoils, Inc. A summary of the relevant information pertaining to the subject site from these documents are presented below:

> Preliminary Soils and Geologic Investigation, Addition to Mission Viejo Garden Plaza, Mission Viejo, County of Orange, California, Job Address 27001 La Paz Road, Mission Viejo, W.O. 1438-OC, dated July 24, 1986.

This report included two (2) borings, extended to depths of 20 to 28± feet. The borings were drilled with a bucket-auger drilling rig, utilizing a 24-inch diameter bucket. The borings encountered fill soils comprised of stiff silty clays to depths of 5 to 8 feet. Capistrano bedrock, consisting of sandy siltstone and claystone was encountered to the maximum depth explored of 28± feet. The upper 4 to 10± feet of bedrock was noted to be in a weathered condition. Geologic mapping performed by GeoSoils indicated that bedding generally trends in a northeast direction with dips ranging from 8 to 20 degrees to the southeast. The bedrock is indicated to be thinly to moderately bedded with poorly to moderately developed bedding surfaces. The bedding is unaffected by folding or shearing. The bedding orientations were not considered to be adverse with respect to the proposed development. GeoSoils performed laboratory testing, including shear tests and expansion index (EI). The EI testing indicated a very high expansion potential. It should be noted that the EI test performed by GeoSoils was not in accordance with current laboratory testing standards. GeoSoils also identified severe levels of soluble sulfates. The boring logs from the GeoSoils investigation are included in Appendix F or this report, and the locations of the borings are included on Plate 2 in Appendix A.

GeoSoils provided grading and foundation design recommendations for the proposed structure. The foundation recommendations include shallow foundations designed for a maximum allowable soil bearing pressure of 2,500 psf.

> Soil Compaction Report, Mission Viejo Garden Plaza, Mission Viejo, County of Orange, California, Job Address 27001 La Paz Road, Mission Viejo, W.O. 1438-B-OC, dated July 29, 1988.

This report provides a summary of the engineering and compaction testing services provided by GeoSoils during construction of the building. The building pad area was overexcavated to a depth of 3 feet below pad grade to mitigate a bedrock/fill transition. The pad was raised to grade with on-site fill soils. All fill soils were compacted to at least 90 percent relative compaction. EI testing performed by GeoSoils at the time of construction indicated an EI of 117, using the UBC test method #29-2. GeoSoils provided an updated bearing pressure of 1,500 psf, subject to increase for footing width or depth.

4.0 SUBSURFACE EXPLORATION

4.1 Scope of Exploration/Sampling Methods

The subsurface exploration conducted for this project consisted of twenty-one (21) borings advanced to depths of 10 to 50± feet below the existing site grades. All of the borings were logged during drilling by a member of our staff.

All of the borings were advanced with hollow-stem augers by a conventional truck-mounted drilling rig. Representative bulk and relatively undisturbed soil samples were taken during drilling. Relatively undisturbed soil samples were taken with a split barrel "California Sampler" containing a series of one inch long, 2.416± inch diameter brass rings. This sampling method is described in ASTM Test Method D-3550. Samples were also taken using a 1.4± inch inside diameter split spoon sampler, in general accordance with ASTM D-1586. Both of these samplers are driven into the ground with successive blows of a 140-pound weight falling 30 inches. The blow counts obtained during driving are recorded for further analysis. Bulk samples were collected in plastic bags to retain their original moisture content. The relatively undisturbed ring samples were placed in molded plastic sleeves that were then sealed and transported to our laboratory.

The approximate locations of the borings are indicated on the Boring Location Plan, included as Plate 2 in Appendix A of this report. The Boring Logs, which illustrate the conditions encountered at the boring locations, as well as the results of some of the laboratory testing, are included in Appendix B.

4.2 Geotechnical Conditions

Pavements

All of the borings were drilled through existing asphaltic concrete pavements. The pavement sections consist of 2 to 4± inches of asphaltic concrete underlain by 3 to 5± inches aggregate base.

Artificial Fill

Artificial fill was encountered beneath the pavements at Boring Nos. B-1, B-4 through B-13, B-16 through B-18 and B-20, extending to depths of 1½ to 8± feet below ground surface. The artificial fill generally consists of medium stiff to very stiff fine sandy clay and medium dense fine sand and silty fine to coarse sand. The fill soils generally possess a mottled and disturbed appearance, with some samples possessing debris such as asphaltic concrete and brick fragments, resulting in their classification as artificial fill.

Soils classified as possible fill were encountered at Boring No. B-4, between depths of 2½ and 6½± feet. These possible fill soils consist of black to dark green stiff sandy clays with trace fine gravel.

Alluvium

Native alluvium was encountered beneath the fill of Boring Nos. B-4, B-12 and B-17, extending to depths of 6½ to at least 10± feet below ground surface. The alluvium generally consists of medium stiff to very stiff fine sandy clay. Boring No. B-12 was terminated within the alluvium at a depth of 10± feet.

Capistrano Formation

Capistrano Formation bedrock was encountered beneath the pavements at Boring Nos. B-2, B-3, B-14, B-15, B-19 and B-21, as well as beneath the fill and alluvial soils at most of the remaining boring locations, extending to at least the maximum depth explored of 50± feet below ground surface. The Capistrano Formation generally consists of poorly consolidated layers of medium dense to dense sandy siltstone, silty sandstone and clayey sandstone, and stiff to hard silty claystone and sandy claystone. The bedrock generally possesses some degree of iron oxide staining and occasionally possess calcareous nodules and veining.

Groundwater

Groundwater was not encountered at any of the boring locations during drilling. Based on the lack of any water within the borings, and the moisture contents of the recovered soil samples, the static groundwater table is considered to have existed at a depth in excess of 50± feet below existing site grades, at the time of the subsurface investigation.

During the subsurface excavation, three temporary piezometers were installed across the site. The groundwater levels within these wells were measured approximately 2 weeks and 4 weeks after installation. Another set of readings will be taken at approximately 6 weeks after installation. The results of the readings are presented below:

WATER LEVEL READINGS TAKEN 12/27/2020

Observation Well No.	Water Depth (ft)	Water Elevation (ft MSL)
B-1	26.3	429.7
B-5	35.5	425.5
B-15	16.2	465.3

WATER LEVEL READINGS TAKEN 1/13/2021

Observation Well No.	Water Depth (ft)	Water Elevation (ft MSL)
B-1		
B-5		
B-15		

Recent water level data was obtained from the California Department of Water Resources Water Data Library website, http://wdl.water.ca.gov/. The nearest monitoring well on record is located 80± feet southeast of the site. Water level readings within this monitoring well indicate a groundwater level of 22± feet below the ground surface in February 2018

4.3 Geologic Conditions

Geologic research indicates that the majority of the site is underlain by light gray sandy siltstone and fine-grained sandstone mapped as Tertiary-aged (Pliocene) Capistrano Formation (Map Symbol Tc). The Tertiary-aged (Pliocene) Niguel Formation (Map Symbol Tn) is mapped in the northwestern portion of the site. The bedding within the Capistrano Formation is indicated to trend northwest-southeast with dips ranging from 13 to 18 degrees on the geologic map. The Niguel Formation is described as a light gray siltstone and sandstone. The bedding within the Niguel Formation is indicated to trend generally north-south with dips ranging from 11 to 13 degrees west. The primary available reference applicable to the subject site is the Geologic Map of the San Joaquin Hills-San Juan Capistrano Area, Orange County, California, by J.G. Vedder, R.F. Yerkes, and J.E. Schoellhamer, 1957. A portion of this map indicating the location of the subject site is included herein as Plate 3 in Appendix A.

Based on the materials encountered in the exploratory borings and a review of the previous GSI borings, the site is underlain by sandstone, siltstone, and claystone of the Capistrano Formation. As previously stated, GSI indicated that the bedding at the site generally trends in a northeast direction with dips ranging from 8 to 20 degrees to the southeast. Based on the information provided on the geologic map, Niguel Formation bedrock could be encountered in the northwestern area of the site during grading.

The Capistrano and Niguel Formations are difficult to distinguish from one another. As encountered at the site, both formations generally consist of siltstone and claystone with minor sandstone. For clarity, this report refers to all of the bedrock at the site as Capistrano.

5.0 LABORATORY TESTING

The soil samples recovered from the subsurface exploration were returned to our laboratory for further testing to determine selected physical and engineering properties of the soils. The tests are briefly discussed below. It should be noted that the test results are specific to the actual samples tested, and variations could be expected at other locations and depths.

Classification

All recovered soil samples were classified using the Unified Soil Classification System (USCS), in accordance with ASTM D-2488. The field identifications were then supplemented with additional visual classifications and/or by laboratory testing. The USCS classifications are shown on the Boring Logs and are periodically referenced throughout this report.

Dry Density and Moisture Content

The density has been determined for selected relatively undisturbed ring samples. These densities were determined in general accordance with the method presented in ASTM D-2937. The results are recorded as dry unit weight in pounds per cubic foot. The moisture contents are determined in accordance with ASTM D-2216, and are expressed as a percentage of the dry weight. These test results are presented on the Boring Logs.

Consolidation

Selected soil samples have been tested to determine their consolidation potential, in accordance with ASTM D-2435. The testing apparatus is designed to accept either natural or remolded samples in a one-inch-high ring, approximately 2.416 inches in diameter. Each sample is then loaded incrementally in a geometric progression and the resulting deflection is recorded at selected time intervals. Porous stones are in contact with the top and bottom of the sample to permit the addition or release of pore water. The samples are typically inundated with water at an intermediate load to determine their potential for collapse or heave. The results of the consolidation testing are plotted on Plates C-1 through C-8 in Appendix C of this report.

Maximum Dry Density and Optimum Moisture Content

A representative bulk sample was tested for its maximum dry density and optimum moisture content. The results have been obtained using the Modified Proctor procedure, per ASTM D-1557. These tests are generally used to compare the in-situ densities of undisturbed field samples, and for later compaction testing. Additional testing of other soil type or soil mixes may be necessary at a later date. The results of the testing are plotted on Plate C-9 in Appendix C of this report.

Direct Shear

Direct shear tests were performed on selected soil samples to determine its shear strength parameters. The test was performed in accordance with ASTM D-3080. The testing apparatus is designed to accept either natural or remolded samples in a one-inch high ring, approximately 2.416 inches in diameter. Three samples of the same soil are prepared by remolding them to

90± percent compaction and near optimum moisture. Each of the three samples are then loaded with different normal loads and the resulting shear strength is determined for that particular normal load. The shearing of the samples is performed at a rate slow enough to permit the dissipation of excess pore water pressure. Porous stones are in contact with the top and bottom of the sample to permit the addition or release of pore water. The results of the direct shear tests are presented on Plates C-10 through C-12 in Appendix C of this report.

Soluble Sulfates

Representative samples of the near-surface soil were submitted to a subcontracted analytical laboratory for determination of soluble sulfate content. Soluble sulfates are naturally present in soils, and if the concentration is high enough, can result in degradation of concrete which comes into contact with these soils. The results of the soluble sulfate testing are presented below, and are discussed further in a subsequent section of this report.

Sample Identification	Soluble Sulfates (%)	Sulfate Classification
B-1 @ 0 to 5 feet	0.029	Not Applicable (S0)
B-4 @ 0 to 5 feet	0.264	Severe (S2)

Corrosivity Testing

Representative bulk samples of the near-surface soils were submitted to a subcontracted corrosion engineering laboratory to identify potentially corrosive characteristics with respect to common construction materials. The corrosivity testing included a determination of the electrical resistivity, pH, and chloride and nitrate concentrations of the soils, as well as other tests. The results of some of these tests are presented below.

Sample Identification	Saturated Resistivity (ohm-cm)	pH	Chlorides (mg/kg)	Nitrates (mg/kg)
B-1 @ 0 to 5 feet	840	7.7	12	7.1
B-4 @ 0 to 5 feet	480	8.1	7	2.6

Expansion Index

The expansion potential of the on-site soils was determined in general accordance with ASTM D-4829 as required by the California Building Code (CBC). The testing apparatus is designed to accept a 4-inch-diameter, 1-inch high, remolded sample. The sample is initially remolded to 50± 1 percent saturation and then loaded with a surcharge equivalent to 144 pounds per square foot. The sample is then inundated with water, and allowed to swell against the surcharge. The resultant swell or consolidation is recorded after a 24-hour period. The result of the EI testing are as follows:

Sample Identification	Expansion Index	Expansive Potential
B-1 @ 0 to 5 feet	53	Medium
B-5 @ 0 to 5 feet	115	High

Grain Size Analysis

The grain size distribution of selected soils have been determined using a range of wire mesh screens. These tests were performed in general accordance with ASTM D-422 and/or ASTM D-1140. The weight of the portion of the sample retained on each screen is recorded and the percentage finer or coarser of the total weight is calculated. The results of these tests are presented on Plates C-13 through C-15 of this report.

Atterberg Limits

Atterberg Limits testing (ASTM D-4318) was performed on three (3) representative samples of near surface soils. This test is used to determine the Liquid Limit and Plastic Limit of the soil. The Plasticity Index is the difference between the two limits. Plasticity Index is a general indicator of the expansive potential of the soil, with higher numbers indicating higher expansive potential. Soils with a PI greater than 25 are considered to have a high plasticity, and a high expansion potential. The results of the Atterberg Limits testing are presented on the boring logs.

R-value

R (resistance)-value testing was conducted on a representative sample of the existing on-site soils. The R-value was determined in accordance with CA Test Method 301. This test provides a measure of the pavement support characteristics of the soils, and is used in the pavement thickness design procedure. The result of the R-value testing is as follows:

Sample ID	R-Value
B-4 @ 0-5 feet	3

6.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the results of our review, field exploration, laboratory testing and geotechnical analysis, the proposed development is considered feasible from a geotechnical standpoint. Based on the preliminary nature of this investigation, further geotechnical investigation may be required prior to construction of the proposed development. The recommendations contained in this report should be taken into the design, construction, and grading considerations. The recommendations are contingent upon all grading and foundation construction activities being monitored by the geotechnical engineer of record.

The Grading Guide Specifications, included as Appendix D, should be considered part of this report, and should be incorporated into the project specifications. The contractor and/or owner of the development should bring to the attention of the geotechnical engineer any conditions that differ from those stated in this report, or which may be detrimental for the development.

6.1 Seismic Design Considerations

The subject site is located in an area which is subject to strong ground motions due to earthquakes. The performance of a site specific seismic hazards analysis was beyond the scope of this investigation. However, numerous faults capable of producing significant ground motions are located near the subject site. Due to economic considerations, it is not generally considered reasonable to design a structure that is not susceptible to earthquake damage. Therefore, significant damage to structures may be unavoidable during large earthquakes. The proposed structures should, however, be designed to resist structural collapse and thereby provide reasonable protection from serious injury, catastrophic property damage and loss of life.

Faulting and Seismicity

Research of available maps indicates that the subject site is not located within an Alquist-Priolo Earthquake Fault Zone. Furthermore, Southern California Geotechnical (SCG) did not identify any evidence of faulting during the geotechnical investigation. Therefore, the possibility of significant fault rupture on the site is considered to be low.

The potential for other geologic hazards such as seismically induced settlement, lateral spreading, tsunamis, inundation, seiches, flooding, and subsidence affecting the site is considered low.

2019 CBC Seismic Design Parameters

Based on the standards in place at the time of this report, we expect that the proposed building will be designed in accordance with the 2019 Edition of the California Building Code (CBC), which was adopted on January 1, 2020. The 2019 CBC Seismic Design Parameters have been generated using the SEAOC/OSHPD Seismic Design Maps Tool, a web-based software application available at the website www.seismicmaps.org. This software application calculates seismic design parameters in accordance with several building code reference documents, including ASCE 7-16, upon which the 2019 CBC is based. The application utilizes a database of risk-targeted maximum

considered earthquake (MCE_R) site accelerations at 0.01-degree intervals for each of the code documents. The table below was created using data obtained from the application
n. The output generated from this program is included as Plate E-1 of this report. Based on this output, the following parameters may be utilized for the subject site:

The 2019 CBC requires that a site-specific ground motion study be performed in accordance with Section 11.4.8 of ASCE 7-16 for Site Class D sites with a mapped S_1 value greater than 0.2. However, Section 11.4.8 of ASCE 7-16 also indicates an exception from the requirement for a site-specific ground motion hazard analysis for certain structures on Site Class D sites. The commentary for Section 11 of ASCE 7-16 (Page 534 of Section C11 of ASCE 7-16) indicates that "In general, this exception effectively limits the requirements for site-specific hazard analysis to very tall and or flexible structures at Site Class D sites." Based on our understanding of the proposed development, the seismic design parameters presented below were calculated assuming that the exception in Section 11.4.8 applies to the proposed structure at this site. However, the structural engineer should verify that this exception is applicable to the proposed structures. Based on the exception, the spectral response accelerations presented below were calculated using the site coefficients (F_a and F_v) from Tables 11.4-1 and 11.4-2 presented in Section 11.4.4 of ASCE 7-16.

2019 CBC SEISMIC DESIGN PARAMETERS

Parameter		Value
Mapped MCE_R Acceleration at 0.2 sec Period	S_S	1.196
Mapped MCE_R Acceleration at 1.0 sec Period	S_1	0.431
Site Class	---	D
Site Modified Spectral Acceleration at 0.2 sec Period	S_{MS}	1.222
Site Modified Spectral Acceleration at 1.0 sec Period	S_{M1}	0.806
Design Spectral Acceleration at 0.2 sec Period	S_{DS}	0.814
Design Spectral Acceleration at 1.0 sec Period	S_{D1}	0.537

It should be noted that the site coefficient F_v and the parameters S_{M1} and S_{D1} were not included in the SEAOC/OSHPD Seismic Design Maps Tool output for the ASCE 7-16. We calculated these parameters-based on Table 11.4-2 in Section 11.4.4 of ASCE 7-16 using the value of S_1 obtained from the Seismic Design Maps Tool, assuming that a site-specific ground motion hazards analysis is not required for the proposed buildings at this site.

Liquefaction

Liquefaction is the loss of the strength in generally cohesionless, saturated soils when the pore-water pressure induced in the soil by a seismic event becomes equal to or exceeds the overburden pressure. The primary factors which influence the potential for liquefaction include groundwater table elevation, soil type and grain size characteristics, relative density of the soil, initial confining pressure, and intensity and duration of ground shaking. The depth within which the occurrence of liquefaction may impact surface improvements is generally identified as the upper 50 feet below the existing ground surface. Liquefaction potential is greater in saturated, loose, poorly

graded fine sands with a mean (d_{50}) grain size in the range of 0.075 to 0.2 mm (Seed and Idriss, 1971). Clayey (cohesive) soils or soils which possess clay particles (d<0.005mm) in excess of 20 percent (Seed and Idriss, 1982) are generally not considered to be susceptible to liquefaction, nor are those soils which are above the historic static groundwater table.

The Earthquake Zones of Required Investigation, San Juan Capistrano Quadrangle map, published by the California Geological Survey (CGS), indicates that the subject site is not located within a designated liquefaction hazard zone. In addition, the subsurface conditions encountered at the subject site are not considered to be conducive to liquefaction. Based on the conditions encountered at the boring locations, and the mapping performed by the CGS, liquefaction is not considered to be a significant design concern for this project. This map also indicates that the site is not located with an Earthquake Induced Landslide Zone.

6.2 Preliminary Geotechnical Design Considerations

General

The subsurface profile at the site generally consists of a surficial layer of fill and/or native alluvium, underlain by Capistrano formation bedrock. The fill soils were apparently placed during previous grading activities, prior to construction of the existing buildings. Only limited documentation regarding the placement and compaction of these fill soils is available. The depth of the fill and alluvium ranges from 0 to 10 ± feet. In general, the fill and alluvial soils are located in the eastern region of the property, near Marguerite Parkway. Most of the borings drilled in the western half of the property encountered little or no fill soils underlain by Capistrano formation bedrock. Based on preliminary grading information, cuts of 0 to 19± feet will be required within the area of the proposed Whole Foods store. Cuts of up to 30 feet will be required in the western region of the property. As a result, most of the existing fill and alluvial soils will be removed as part of the cuts that will be necessary to reach the finish grade elevations.

The existing fill and native alluvial soils possess variable strengths. Based on the relatively high column loads that will be imposed by the new structures, it is recommended that all of the foundations be extended through any remaining fill and alluvial soils into Capistrano bedrock materials. It may be desirable to support heavily loaded columns on deep foundations such as cast-in-drilled-hole (CIDH) piles extending to depths of 30 to 50± feet. Depending on the slab loading conditions, native alluvial soils and/or newly placed structural fill will be suitable for support of new floor slabs.

The proposed grading will require a significant retaining wall along most of the north and west property lines. No details regarding the construction of this retaining wall are available at the time of this report. Based on previous experience, it is expected that this wall will be constructed in a manner similar to permanent shoring, such as soldier piles and lagging or shotcrete.

Settlement

Based on the recommendations contained in this report, the foundations for the new development, consisting of spread footings or CIDH piles, will be supported in high strength Capistrano formation bedrock. Provided that the recommended remedial grading is completed

and adequate foundation embedment is utilized, the post-construction static settlements of the proposed structures are expected to be within tolerable limits.

Soluble Sulfates

The result of the soluble sulfate testing, as discussed in Section 5.0 of this report, indicates that the concentration of soluble sulfates within the selected samples of the on-site soils correspond to Category S2, with respect to the American Concrete Institute (ACI) Publication 318-05 Building Code Requirements for Structural Concrete and Commentary, Section 4.3. Therefore, based on this concentration, the ACI requires that all concrete which will come into contact with the on-site soils incorporate the following characteristics:

- Cement Type: V (Five)
- Minimum Compressive Strength (f'_c) = 4,500 lbs/in^2
- Maximum Water/Cement Ratio: 0.45

It is recommended that additional sulfate testing be performed at the completion of rough grading to verify the concentrations which are present in the actual building pad subgrade soils.

Corrosion Potential

The results of laboratory testing indicate that the tested samples of the on-site soils possess saturated resistivity values of 480 and 840 ohm-cm, and pH values of 7.7 and 8.1. These test results have been evaluated in accordance with guidelines published by the Ductile Iron Pipe Research Association (DIPRA). The DIPRA guidelines consist of a point system by which characteristics of the soils are used to quantify the corrosivity characteristics of the site. Resistivity and pH are two of the five factors that enter into the evaluation procedure. Redox potential, relative soil moisture content and sulfides are also included. Although sulfide testing was not part of the scope of services for this project, we have evaluated the corrosivity characteristics of the on-site soils using resistivity, pH and moisture content. Based on these factors, and utilizing the DIPRA procedure, the on-site soils are considered to be severely corrosive to ferrous pipes. Therefore, corrosion protection is expected to be required for cast iron or ductile iron pipes. It should be noted that SCG does not practice in the field of corrosion engineering, and therefore, the client may also wish to contact a corrosion engineer to provide a more thorough evaluation.

Relatively low concentrations (7 and 12 mg/kg) of chlorides were detected in the samples submitted for corrosivity testing. In general, soils possessing chloride concentrations in excess of 500 parts per million (ppm) are considered to be corrosive with respect to steel reinforcement within reinforced concrete. Based on the lack of any significant chlorides in the tested sample, the site is considered to have a C1 chloride exposure in accordance with the American Concrete Institute (ACI) Publication 318 Building Code Requirements for Structural Concrete and Commentary. Therefore, a specialized concrete mix design for reinforced concrete for protection against chloride exposure is not considered warranted. We recommend that additional corrosivity testing be performed at the time of the design-level geotechnical investigation in order to confirm the chloride exposure category.

Expansion

Laboratory testing performed on representative samples of the near surface soils indicates that these materials are medium to high expansive (EI = 53 to 115). Based on the presence of highly expansive soils at this site, special design and construction considerations are warranted. All subgrade soils as well as any new fill comprised of on-site soils should be properly moisture conditioned and maintained at an adequate moisture content throughout the construction process. Further recommendations concerning the expansive soils are presented in subsequent sections of this report.

Shrinkage/Subsidence

Removal and recompaction of the near-surface fill soils is estimated to result in an average shrinkage of 8 to 14 percent. It should be noted that the potential shrinkage estimate is based on dry density testing performed on small-diameter samples taken at the boring locations. If a more accurate and precise shrinkage estimate is desired, SCG can perform a shrinkage study involving several excavated test-pits where in-place densities are determined using in-situ testing methods instead of laboratory density testing on small-diameter samples. Please contact SCG for details and a cost estimate regarding a shrinkage study, if desired.

Minor ground subsidence is expected to occur in the soils below the zone of removal, due to settlement and machinery working. The subsidence is estimated to be 0.10 feet.

These estimates are based on previous experience and the subsurface conditions encountered at the boring locations. The actual amount of subsidence is expected to be variable and will be dependent on the type of machinery used, repetitions of use, and dynamic effects, all of which are difficult to assess precisely.

Additional Geotechnical Investigation

As discussed above, detailed structural loading information was not available at the time of this study. Prior to preparing detailed grading or foundation plans, a site-specific, detailed geotechnical investigation should be performed. It is expected that additional borings will not be required within the proposed Whole Foods building area. However, additional borings will be required in the northeastern area of the site where cuts of up to 30 feet will be required due to the proposed retaining wall heights. The scope of this future investigation should be sufficient to provide detailed grading recommendations as well as foundation, floor slab, and pavement design recommendations.

6.3 Preliminary Site Grading Recommendations

The preliminary grading recommendations presented below are based on the design details that were available at the time of this report, and the subsurface conditions encountered at our boring locations. These recommendations are general and preliminary in nature, and should be confirmed as part of the future design-level geotechnical investigation.

Site Stripping and Demolition

Initial site stripping should include removal of all surficial vegetation from slopes or landscaped planters. Any organic topsoil and tree root masses should be removed during site stripping. The actual extent of site stripping should be determined in the field by the geotechnical engineer, based on the organic content and stability of the materials encountered.

The proposed development will require demolition all of the existing buildings and pavements. Any existing improvements that will not remain in place for use with the new development should be removed in their entirety. This should include all foundations, floor slabs, utilities, and any other subsurface improvements associated with the existing structures. Debris resultant from demolition should be disposed of off-site. These materials may be crushed and made into miscellaneous base for use in the proposed pavement areas.

Treatment of Existing Soils: Building Areas

Based on the borings performed for this study, and the preliminary grading information provided by the civil engineer, the area of the proposed buildings is underlain by up to 8 feet of fill soils and/or alluvium. These materials are underlain by relatively high strength Capistrano formation bedrock. Most of the existing fill soils and the alluvium will be removed during the initial cuts to achieve the proposed finished grades.

The most feasible means of supporting the proposed structures is to utilize shallow foundations which extend through the fill soils and alluvium into the high strength bedrock below. If this method of construction is utilized, no significant remedial grading will be necessary within the foundation areas of the proposed buildings.

Depending upon the structural loads, CIDH piles may be the most desirable foundation alternative. No remedial grading will be necessary for CIDH piles.

Any existing undocumented fill soil should also be removed from proposed building slab areas. It is also recommended that the slab areas be underlain by a newly placed layer of structural fill, at least 2 to 3 feet in thickness. The actual depth of overexcavation should be determined during the design-level geotechnical investigation.

Based on conditions encountered at the exploratory boring locations, moist to very moist soils may be encountered in some areas of the site at or near the base of the recommended overexcavation. Scarification and air drying of these materials may be sufficient to obtain a stable subgrade. However, if highly unstable soils are identified, and if the construction schedule does not allow for delays associated with drying, mechanical stabilization, usually consisting of coarse crushed stone and/or geotextile, may be necessary. Concrete and asphalt debris that is crushed to a 3 to 6-inch particle size may also be feasible to use as a subgrade stabilization material. If unstable subgrade conditions are encountered, the geotechnical engineer should be contacted for supplementary recommendations.

After a suitable overexcavation subgrade has been achieved, the exposed soils should be scarified to a depth of at least 12 inches, and moisture conditioned to at least 2 to 4 percent above optimum moisture content, and recompacted to at least 90 percent of the ASTM D-1557 maximum dry density. The previously excavated soils may then be replaced as compacted structural fill.

Treatment of Existing Soils: Retaining Walls and Site Walls

The conceptual grading plan indicates that a large retaining wall will be constructed along the north western side of the site. Once the initial cuts to grade have been made in this area, the retaining wall foundations are expected to be underlain by high strength Capistrano formation bedrock materials. It is expected that the new retaining wall will be supported on deep foundations, such as CIDH piles. No significant remedial grading is expected to be necessary in this area prior to foundation construction.

Although not indicated on the site plan, it may be necessary to construct some small retaining walls or site walls at or near the existing surface grade. Overexcavation will also be necessary in these areas to remove all of the existing fill soils. The overexcavation depth should be expected to be on the order of 3 to 5 feet below proposed foundation bearing grade. Alternatively, the retaining wall foundations could be extended into the high strength bedrock materials.

Treatment of Existing Soils: Parking and Drive Areas

Based on economic considerations, overexcavation of the existing soils in the new parking and drive areas is not considered warranted, with the exception of areas where lower strength, or unstable soils are identified by the geotechnical engineer during grading. Subgrade preparation in the new parking and drive areas should initially consist of removal of all soils disturbed during stripping and demolition operations.

The geotechnical engineer should then evaluate the subgrade to identify any areas of additional unsuitable soils. Any such materials should be removed to a level of firm and unyielding soil. The exposed subgrade soils should then be scarified to a depth of 12± inches, moisture conditioned to at least 2 to 4 percent above optimum, and recompacted to at least 90 percent of the ASTM D-1557 maximum dry density. Based on the presence of variable strength surficial soils throughout the site, it is expected that some isolated areas of additional overexcavation may be required to remove zones of lower strength, unsuitable soils.

The grading recommendations presented above for the proposed parking and drive areas assume that the owner and/or developer can tolerate minor amounts of settlement within the proposed parking and drive areas. The grading recommendations presented above do not completely mitigate the extent of the existing fill soils and low strength alluvium in the parking and drive areas. As such, settlement and associated pavement distress could occur. Typically, repair of such distressed areas involves significantly lower costs than completely mitigating these soils at the time of construction. If the owner cannot tolerate the risk of such settlements, the parking and drive areas may also be overexcavated, with the removed soils replaced as compacted structural fill.

Treatment of Existing Soils: Flatwork

The proposed development will include some areas of Portland cement concrete flatwork. Based on conditions encountered at the boring locations, it is expected that these areas of flatwork will be underlain by moist to very moist medium to high expansive soils. The presence of these soils poses a minor risk of heave and damage to new flatwork, which will be relatively lightly loaded. Based on economic considerations, flatwork is typically constructed immediately over medium expansive soils. However, if the owner desires protection against heaving of flatwork,

a layer of very low expansive select structural fill could be placed below the flatwork areas. Typically, this layer of select fill is 2 feet in thickness.

Subgrade preparation in the new flatwork areas should initially consist of removal of all soils disturbed during stripping and demolition operations. The geotechnical engineer should then evaluate the subgrade to identify any areas of additional unsuitable soils. The subgrade soils should then be scarified to a depth of 12± inches, moisture conditioned to 3 to 5 percent above optimum, and recompacted to at least 90 percent of the ASTM D-1557 maximum dry density. Based on the presence of variable strength fill soils throughout the site, it is expected that some isolated areas of additional overexcavation may be required to remove zones of lower strength, unsuitable soils.

Fill Placement

- Fill soils should be placed in thin (6± inches), near-horizontal lifts, moisture conditioned to 2 to 4 percent above the optimum moisture content, and compacted. Drying of the on-site soils may be required before placement and compaction of structural fill.
- On-site soils may be used for fill provided they are cleaned of any debris to the satisfaction of the geotechnical engineer. Significant drying of these materials will be necessary to reach a moisture content suitable for recompaction.
- All grading and fill placement activities should be completed in accordance with the requirements of the 2019 CBC and the grading code of the city of Mission Viejo.
- All fill soils should be compacted to at least 90 percent of the ASTM D-1557 maximum dry density. Fill soils should be well mixed.
- Compaction tests should be performed periodically by the geotechnical engineer as random verification of compaction and moisture content. These tests are intended to aid the contractor. Since the tests are taken at discrete locations and depths, they may not be indicative of the entire fill and therefore should not relieve the contractor of his responsibility to meet the job specifications.

Imported Structural Fill

All imported structural fill should consist of low expansive (EI < 50), well graded soils possessing at least 10 percent fines (that portion of the sample passing the No. 200 sieve). Additional specifications for structural fill are presented in the Grading Guide Specifications, included as Appendix D.

Utility Trench Backfill

In general, all utility trench backfill should be compacted to at least 90 percent of the ASTM D-1557 maximum dry density. Compacted trench backfill should conform to the requirements of the local grading code, and more restrictive requirements may be indicated by the city of Mission Viejo. All utility trench backfills should be witnessed by the geotechnical engineer. The trench backfill soils should be compaction tested where possible; probed and visually evaluated elsewhere.

Utility trenches which parallel a footing, and extending below a 1h:1v plane projected from the outside edge of the footing should be backfilled with structural fill soils, compacted to at least 90 percent of the ASTM D-1557 standard. Pea gravel backfill should not be used for these trenches.

6.4 Construction Considerations

Excavation Considerations

The near-surface soils generally consist predominantly of silts and clays. These materials are expected to be relatively stable within shallow excavations. Where caving occurs within shallow excavations, flattened excavation slopes may be sufficient to provide excavation stability. On a preliminary basis, temporary excavation slopes consisting of sands and silty sands should be made no steeper than 2h:1v. Temporary excavation slopes consisting of clayey soils should be made no steeper than 1.5h:1v.

The contractor should take all necessary precautions during grading and foundation construction to prevent damage to structures and improvements which are adjacent to the proposed development. Deeper excavations may require some form of external stabilization such as shoring or bracing. Maintaining adequate moisture content within the near-surface soils will improve excavation stability. All excavation activities on this site should be conducted in accordance with Cal-OSHA regulations.

Moisture Sensitive Subgrade Soils

The near-surface soils generally consist of moist to very moist sandy clays and silty clays, and will become unstable if exposed to significant moisture infiltration or disturbance by construction traffic. If grading occurs during a period of relatively wet weather, an increase in subgrade instability should also be expected. The site should, therefore, be graded to prevent ponding of surface water and to prevent water from running into excavations.

As discussed in Section 6.3 of this report, unstable subgrade soils will likely be encountered at the base of the overexcavation within the proposed building areas. The extent of unstable subgrade soils will to a large degree depend on methods used by the contractor to avoid adding additional moisture to these soils or disturbing soils which already possess high moisture contents. If grading occurs during a period of relatively wet weather, an increase in subgrade instability should also be expected. If unstable subgrade conditions are encountered, it is recommended that only track mounted vehicles be used for fill placement and compaction.

If the construction schedule dictates that site grading will occur during a period of wet weather, allowances should be made for costs and delays associated with drying the on-site soils or import of a less moisture sensitive fill material. Grading during wet or cool weather may also increase the depth of overexcavation in the pad areas as well as the need for and or the thickness of the crushed stone stabilization layer, discussed in Section 6.3 of this report.

Expansive Soils

The near surface on-site soils have been determined to possess a medium to high expansion potential. Therefore, care should be given to proper moisture conditioning of all building pad subgrade soils to a moisture content of 2 to 4 percent above the Modified Proctor optimum during site grading. All imported fill soils should have very low expansive (EI < 50) characteristics. In addition to adequately moisture conditioning the subgrade soils and fill soils during

grading, special care must be taken to maintain moisture content of these soils at 2 to 4 percent above the Modified Proctor optimum. This will require the contractor to frequently moisture condition these soils throughout the grading process, unless grading occurs during a period of relatively wet weather.

Due to the presence of expansive soils at this site, provisions should be made to limit the potential for surface water to penetrate the soils immediately adjacent to the structures. These provisions should include directing surface runoff into rain gutters and area drains, reducing the extent of landscaped areas around the structure, and sloping the ground surface away from the buildings. Where possible, it is recommended that landscaped planters not be located immediately adjacent to the building. If landscaped planters around the building are necessary, it is recommended that drought tolerant plants or a drip irrigation system be utilized, to minimize the potential for deep moisture penetration around the structure. Presented below is a list of additional soil moisture control recommendations that should be considered by the owner, developer, and civil engineer:

- Ponding and areas of low flow gradients in unpaved walkways, grass and planter areas should be avoided. In general, minimum drainage gradients of 2 percent should be maintained in unpaved areas.
- Bare soil within five feet of proposed structures should be sloped at a minimum 2 percent gradient away from the structure (about three inches of fall in five feet), or the same area could be paved with a minimum surface gradient of one percent. Pavement is preferable.
- Decorative gravel ground cover tends to provide a reservoir for surface water and may hide areas of ponding or poor drainage. Decorative gravel is, therefore, not recommended and should not be utilized for landscaping unless equipped with a subsurface drainage system designed by a licensed landscape architect.
- Positive drainage devices, such as graded swales, paved ditches, and catch basins should be installed at appropriate locations within the area of the proposed development.
- Concrete walks and flatwork should not obstruct the free flow of surface water to the appropriate drainage devices.
- Area drains should be recessed below grade to allow free flow of water into the drain. Concrete or brick flatwork joints should be sealed with mortar or flexible mastic.
- Gutter and downspout systems should be installed to capture all discharge from roof areas. Downspouts should discharge directly into a pipe or paved surface system to be conveyed offsite.
- Enclosed planters adjoining, or in close proximity to proposed structures, should be sealed at the bottom and provided with subsurface collection systems and outlet pipes.
- Depressed planters should be raised with soil to promote runoff (minimum drainage gradient two percent or five percent, see above), and/or equipped with area drains to eliminate ponding.
- Drainage outfall locations should be selected to avoid erosion of slopes and/or properly armored to prevent erosion of graded surfaces. No drainage should be directed over or towards adjoining slopes.
- All drainage devices should be maintained on a regular basis, including frequent observations during the rainy season to keep the drains free of leaves, soil and other debris.
- Landscape irrigation should conform to the recommendations of the landscape architect and should be performed judiciously to preclude either soaking or excessive drying of the foundation soils. This should entail regular watering during the drier portions of the year and little or no irrigation during the rainy season. Automatic sprinkler systems should, therefore, be switched to manual operation during the rainy season. Good irrigation practice typically requires frequent application of limited quantities of water that are sufficient to sustain plant growth, but do not excessively wet the soils. Ponding and/or run-off of irrigation water are indications of excessive watering.

Other provisions, as determined by the landscape architect or civil engineer, may also be appropriate.

Groundwater

Groundwater at this site is considered to exist at depths of 16 to 35± feet. The groundwater depths measured in the observation wells at Boring Nos. B-1 and B-5 are below the elevation of the proposed Whole Foods building pad. Therefore, groundwater is not expected to impact the grading or shallow foundation construction activities. Deep foundations, such as cast-in-drilled-hole (CIDH) piles or piers extending to depths of 15 feet or more will likely encounter groundwater, and groundwater control should be considered in the design and construction planning.

The groundwater measured at a depth of 16± feet in Boring No. B-15 is considered to be due to a perched condition, likely caused by surface water infiltration on the adjacent slope and within the residential properties located west of the site. Provisions should be made to deal with groundwater intrusion in this area of the site during grading. In addition, the design of the retaining wall and the below grade walls of the new structure should include long-term drainage provisions.

6.5 Preliminary Shallow Foundation Design Recommendations

Based on the preceding geotechnical design considerations and preliminary grading recommendations, it is assumed that the new building foundations will be underlain by existing Capistrano bedrock materials. Based on this subsurface profile, the proposed structures may be supported on conventional shallow foundations.

The foundation design parameters presented below provide anticipated ranges for the allowable soil bearing pressures. These ranges should be refined during the subsequent design-level geotechnical investigation.

Building Foundation Design Parameters

New square and rectangular footings may be designed as follows:

- Maximum, net allowable soil bearing pressure for footings supported on high strength bedrock: 3,000 to 4,000 lbs/ft^2.
- Maximum, net allowable soil bearing pressure for footings supported on newly-placed engineered fill soils: 2,500 to 3,000 lbs/ft^2.
- Minimum longitudinal steel reinforcement within strip footings: Six (6) No. 5 rebars (3 top and 3 bottom) due to the expansion potential of the on-site soils.
- The actual design of the foundations should be determined by the structural engineer.

General Foundation Design Recommendations

The allowable bearing pressures presented above may be increased by one-third when considering short duration wind or seismic loads. Additional reinforcement may be necessary for structural considerations. The actual design of the foundations should be determined by the structural engineer.

Estimated Foundation Settlements

Typically, foundations designed in accordance with the preliminary foundation design parameters presented above will experience total and differential settlements of less than 1.5 and 0.75 inches, respectively. A detailed settlement analysis should be conducted as part of the design-level geotechnical investigation, once detailed foundation loading information is available.

Lateral Load Resistance

Lateral load resistance will be developed by a combination of friction acting at the base of foundations and slabs and the passive earth pressure developed by footings below grade. The following friction and passive pressure may be used to resist lateral forces:

- Passive Earth Pressure: 225 to 275 lbs/ft^3
- Friction Coefficient: 0.25 to 0.30

6.6 Preliminary Deep Foundation Design Recommendations

Deep foundations may be the most feasible foundation type for the proposed buildings. Typically, these deep foundations would consist of cast-in-drilled-hole (CIDH) piles. Based on the subsurface conditions encountered at this site, these piles would need to extend to depths of at least 30± feet. On a preliminary basis, CIDH piles extending to depths of 30 to 40± feet would have the following approximate vertical capacities:

- 24-inch diameter CIDH piles: 150 to 250 kips

We can provide detailed geotechnical design parameters for CIDH piles, once preliminary foundation plans and loads are available.

6.7 Preliminary Floor Slab Design and Construction Recommendations

Subgrades which will support new floor slabs should be prepared in accordance with the recommendations contained in the *Site Grading Recommendations* section of this report. Preliminarily, the floors of the proposed structures may be constructed as conventional slabs-on-grade supported on newly placed structural fill. Based on geotechnical considerations, the floor slabs may be designed as follows:

- Minimum slab thickness: 5 to 6 inches.

- Section 1808.6.2 of the 2019 CBC specifies that slab on grade foundations supported on expansive soils require special design considerations. If this code provision is utilized, an effective plasticity index of 35 should be used by the project structural engineer to design the slab on grade foundations. If the structural design is more stringent than the recommendations presented below, the structural engineer's design should supersede our recommendations. The floor slabs could also be designed and constructed using PTI procedures. SCG can provide PTI design parameters upon request.

- Minimum slab thickness: 6 inches.

- Steel reinforcement is expected to be necessary, based on the expansive potential of the soils underlying the subject site. Typically, No. 3 or No. 4 bars at 16 to 18 inches on center is adequate.

- Slab underlayment: If moisture sensitive floor coverings will be used then minimum slab underlayment should consist of a moisture vapor barrier constructed below the entire area of the proposed slab which will incorporate such coverings. The moisture vapor barrier should meet or exceed the Class A rating as defined by ASTM E 1745-97 and have a permeance rating less than 0.01 perms as described in ASTM E 96-95 and ASTM E 154-88. A polyolefin material such as Stego® Wrap Vapor Barrier or equivalent will meet these specifications. The moisture vapor barrier should be properly constructed in accordance with all applicable manufacturer specifications. Given that a rock free subgrade is anticipated and that a capillary break is not required, sand below the barrier is not required. The need for sand and/or the amount of sand above the moisture vapor barrier should be specified by the structural engineer or concrete contractor. The selection of sand above the barrier is not a geotechnical engineering issue and hence outside our purview. Where moisture sensitive floor coverings are not anticipated, the vapor barrier may be eliminated.

- Moisture condition the floor slab subgrade soils to 2 to 4 percent above the Modified Proctor optimum moisture content, to a depth of 12 inches. The moisture content of the floor slab subgrade soils should be verified by the geotechnical engineer within 24 hours prior to concrete placement.

- Proper concrete curing techniques should be utilized to reduce the potential for slab curling or the formation of excessive shrinkage cracks.

The actual design of the floor slab should be completed by the structural engineer to verify adequate thickness and reinforcement. The recommendations presented above should be confirmed during the design level geotechnical investigation.

6.8 Exterior Flatwork Design and Construction

Subgrades which will support new exterior slabs-on-grade for patios and sidewalks should be prepared in accordance with the recommendations contained in Section 6.3 of this report. Based on these recommendations, the exterior flatwork will be supported on existing soils that have been scarified and moisture conditioned to a depth of 12 inches and recompacted to 90 percent of the ASTM D-1557 maximum dry density. The owner and/or developer should be aware

that flatwork constructed over medium to high expansive soils will be subject to movements and potential distress due to heaving of the underlying expansive soils. If such movements are not acceptable, consideration should be given to the use of a low expansive layer of structural fill beneath the flatwork, as discussed in Section 6.3 of this report. Based on geotechnical considerations, exterior slabs on grade which are not subjected to any vehicular traffic may be designed as follows:

- Minimum slab thickness: 4½ inches
- Minimum slab reinforcement: No. 4 bars at 18 inches on center, in both directions.
- Moisture condition the flatwork subgrade soils to 3 to 5 percent of the optimum moisture content, to a depth of at least 12 inches.
- Proper concrete curing techniques should be utilized to reduce the potential for slab curling or the formation of excessive shrinkage cracks.
- Control joints should be provided at a maximum spacing of 8 feet on center in two directions for slabs and at 6 feet on center for sidewalks. Control joints are intended to direct cracking.
- Expansion or felt joints should be used at the interface of exterior slabs on grade and any fixed structures to permit relative movement.
- Where the flatwork is adjacent to a landscape planter or another area with exposed soil, it should incorporate a turned down edge. This turned down edge should be at least 12 inches in depth and 6 inches in width. The turned down edge should incorporate longitudinal steel reinforcement consisting of at least two (2) No. 4 bars.
- Flatwork which is constructed immediately adjacent to the new structure should be dowelled into the perimeter foundations in a manner determined by the structural engineer.
- Some cracking of exterior flatwork at this site should be expected, due to the presence of expansive soils.

6.9 Preliminary Retaining Wall Design and Construction

The proposed development will require retaining walls up to 36± feet in height. These walls will be part of up to 2 subterranean levels of parking. It is also expected that some small retaining walls, less than 5± feet in height, may be required in other areas of the site to facilitate the new grades. The parameters recommended for use in the design of these walls are presented below.

Retaining Wall Design Parameters

It is expected that the retaining wall along the northwestern side of the site will retain the existing on-site soils. These soils generally consist of silty clays and Capistrano formation bedrock. Direct shear testing indicates that these soils possess relatively low shear strength characteristics (ϕ =

15 to 25 degrees, c = 400 to 900 lbs/ft^2). Retaining walls not associated with the structure are recommended to be backfilled with imported very low to non-expansive sands or silty sands. Such soils are expected to have a friction angle of at least 30 degrees when compacted to 90 percent of the ASTM D-1557 maximum dry density.

The use of select imported backfill material will result in lower lateral earth pressures. In order to use the design parameters for the imported select fill, this material must be placed within the entire active failure wedge. This wedge is defined as extending from the heel of the retaining wall upwards at an angle of approximately 60° from horizontal. If select backfill material behind the retaining wall is desired, SCG should be contacted for supplementary recommendations.

RETAINING WALL DESIGN PARAMETERS

Design Parameter		Soil Type	
		On-site Silty Clays	Imported Silty Sands
Internal Friction Angle (ϕ)		15°	30°
Cohesion (lbs/ft^2)		700	0
Unit Weight		125 lbs/ft^3	130 lbs/ft^3
Equivalent Fluid Pressure:	Active Condition (level backfill)	74 lbs/ft^3	43 lbs/ft^3
	Active Condition (2h:1v backfill)	117 lbs/ft^3	70 lbs/ft^3
	At-Rest Condition (level backfill)	92 lbs/ft^3	65 lbs/ft^3

As discussed above, the retaining walls along the northwestern side of the site will be in a cut condition, and should be designed using the parameters for the on-site silty clays. Freestanding walls backfilled with imported silty sand may be designed using the imported silty sands parameters.

The walls should be designed using a soil-footing coefficient of friction of 0.28 and an equivalent passive pressure of 275 lbs/ft^3. The structural engineer should incorporate appropriate factors of safety in the design of the retaining walls.

The active earth pressure may be used for the design of retaining walls that do not directly support structures or support soils that in turn support structures and which will be allowed to deflect. The at-rest earth pressure should be used for walls that will not be allowed to deflect, such as below-grade building walls, walls which will support foundation bearing soils, or which will support foundation loads directly.

Where the soils on the toe side of the retaining wall are not covered by a "hard" surface such as a structure or pavement, the upper 1 foot of soil should be neglected when calculating passive resistance due to the potential for the material to become disturbed or degraded during the life of the structure.

The large retaining wall in the northwestern region of the site will require special design considerations. Due to the height of this wall, a conventional cantilevered wall is not expected to be feasible. It is expected that this wall will likely consist of drilled soldier piles and lagging or shotcrete facing will be used. Due to the height of the wall, tie-backs may also be required. Typically walls of this type are a designed and constructed by a specialty contractor. It is recommended that additional slope stability analysis be performed by SCG following preliminary design of the new retaining wall, in order to verify adequate stability of any new proposed configuration. It should also be noted that the borings in the western region of the site did not extend below the proposed bottom of wall elevation. Therefore, the retaining wall design parameters presented above should be confirmed by performed additional borings in the area of this wall, prior to finalizing the structural design of the wall.

Seismic Lateral Earth Pressures

In addition to the lateral earth pressures presented above, the 2019 CBC requires that for structures assigned to Seismic Design Categories D through F, retaining walls should be designed for lateral earth pressures due to earthquake motion. The sections of the northwestern retaining wall that will be part of the new residential structure and parking will essentially function as below-grade (basement) walls. The seismic earth pressures for the below grade walls associated with the new building at this site have been developed utilizing the Mononobe-Okabe Method in accordance with guidance published by the Structural Engineers Association of California (SEAOC) in their 2010 Convention Proceedings.

The recommended seismic pressure distribution on the basement walls is triangular in shape, with a maximum magnitude of 10H lbs/ft^2, where H is the overall height of the wall. The maximum pressure should be assumed to occur at the base of the wall, decreasing to 0 at the top of the wall. The seismic pressure distribution is based on the Mononobe-Okabe equation, utilizing a peak ground acceleration of 0.28g. This peak site acceleration is equal to $PGA_M/2$, in accordance with the SEAOC document. In calculating the total pressure exerted on the below grade walls (static plus seismic) during a seismic event, the seismic lateral earth pressure should be added to the active earth pressure, not the at-rest static earth pressure.

In accordance with the 2019 CBC, any freestanding retaining walls more than 6 feet in height must be designed for seismic lateral earth pressures. These walls should be designed using a seismic pressure of 30H, with a distribution as described above for the basement walls.

Retaining Wall Foundation Design

Retaining walls not associated with the new structures should be supported within newly placed compacted structural fill, extending to at least 3 feet below proposed foundation bearing grade. These foundations may be designed using a maximum allowable soil bearing pressure of 2,500 lbs/ft^2.

Backfill Material

Retaining walls should be backfilled with imported sands or silty sands possessing a very low expansion index (EI < 20). As discussed above, it is expected that retaining walls associated with the new structure will be constructed immediately adjacent to the on-site cohesive soils.

It is recommended that a minimum 1 foot thick layer of free-draining granular material (less than 5 percent passing the No. 200 sieve) be placed against the face of the retaining walls. This material should extend from the top of the retaining wall footing to within 1 foot of the ground surface on the back side of the retaining wall. This material should be approved by the geotechnical engineer. In lieu of the 1 foot thick layer of free-draining material, a properly installed prefabricated drainage composite such as the MiraDRAIN 6000XL (or approved equivalent), which is specifically designed for use behind retaining walls, may be used. If the layer of free-draining material is not covered by an impermeable surface, such as a structure or pavement, a 12-inch thick layer of a low permeability soil should be placed over the backfill to reduce surface water migration to the underlying soils. The layer of free draining granular material should be separated from the backfill soils by a suitable geotextile, approved by the geotechnical engineer.

All retaining wall backfill should be placed and compacted under engineering-controlled conditions in the necessary layer thicknesses to ensure an in-place density between 90 and 93 percent of the maximum dry density as determined by the Modified Proctor test (ASTM D1557). Care should be taken to avoid over-compaction of the soils behind the retaining walls, and the use of heavy compaction equipment should be avoided.

Subsurface Drainage

As previously indicated, the retaining wall design parameters are based upon drained backfill conditions. Consequently, some form of permanent drainage system will be necessary in conjunction with the appropriate backfill material. Subsurface drainage may consist of either:

- A weep hole drainage system typically consisting of a series of 4-inch diameter holes in the wall situated slightly above the ground surface elevation on the exposed side of the wall and at an approximate 8-foot on-center spacing. The weep holes should include a 2 cubic foot pocket of open graded gravel, surrounded by an approved geotextile fabric, at each weep hole location.

- A 4-inch diameter perforated pipe surrounded by 2 cubic feet of gravel per linear foot of drain placed behind the wall, above the retaining wall footing. The gravel layer should be wrapped in a suitable geotextile fabric to reduce the potential for migration of fines. The footing drain should be extended to daylight or tied into a storm drainage system.

6.10 Preliminary Pavement Design Parameters Recommendations

Presented below are preliminary recommendations for the proposed pavements at the subject site. Grading recommendations for these pavement areas should be developed during the design-level geotechnical investigation.

Pavement Subgrades

It is anticipated that the new pavements will be supported on the existing fill, native soils, or bedrock that has been scarified, moisture conditioned, and recompacted. These materials generally consist of sandy clays and silty clays, as well as occasional zones of sands and silty sands. These materials are expected to exhibit poor to fair pavement support characteristics. R-

value testing on a representative sample indicated an R-values of 3. The subsequent pavement designs are based upon this R-value. Any fill material imported to the site should have support characteristics equal to or greater than that of the on-site soils and be placed and compacted under engineering controlled conditions. It may be desirable to perform R-value testing after the completion of rough grading to verify the R-value of the as-graded pavement subgrade.

It is recommended that R-value testing be performed during the design-level geotechnical investigation or after completion of rough grading. Depending upon the results of the R-value testing, it may be feasible to use thinner pavement sections in some areas of the site.

Asphaltic Concrete

Presented below are the recommended thicknesses for new flexible pavement structures consisting of asphaltic concrete over a granular base. The pavement designs are based on the traffic indices (TI's) indicated. The client and/or civil engineer should verify that these TI's are representative of the anticipated traffic volumes. If the client and/or civil engineer determine that the expected traffic volume will exceed the applicable traffic index, we should be contacted for supplementary recommendations. The design traffic indices equate to the following approximate daily traffic volumes over a 20-year design life, assuming six operational traffic days per week.

Traffic Index	No. of Heavy Trucks per Day
4.0	0
5.0	1
6.0	3
7.0	11

For the purpose of the traffic volumes indicated above, a truck is defined as a 5-axle tractor trailer unit with one 8-kip axle and two 32-kip tandem axles. All of the traffic indices allow for 1,000 automobiles per day.

ASPHALT PAVEMENTS (R = 3)			
Materials	Thickness (inches)		
	Auto Drive Lanes (TI = 5.0)	Truck Traffic	
		(TI = 6.0)	(TI = 7.0)
Asphalt Concrete	3	3½	4
Aggregate Base	11	13	16
Compacted Subgrade	12	12	12

The aggregate base course should be compacted to at least 95 percent of the ASTM D-1557 maximum dry density. The asphaltic concrete should be compacted to at least 95 percent of the batch plant-reported maximum density. The aggregate base course may consist of crushed aggregate base (CAB) or crushed miscellaneous base (CMB), which is a recycled gravel, asphalt and concrete material. The gradation, R-Value, Sand Equivalent, and Percentage Wear of the CAB

or CMB should comply with appropriate specifications contained in the current edition of the "Greenbook" Standard Specifications for Public Works Construction.

Portland Cement Concrete

The preparation of the subgrade soils within concrete pavement areas should be performed as previously described for proposed asphalt pavement areas. The minimum recommended thicknesses for the Portland Cement Concrete pavement sections are as follows:

PORTLAND CEMENT CONCRETE PAVEMENTS (R = 3)			
Materials	Thickness (inches)		
	Auto Parking & Drives (TI = 5.0)	Truck Traffic	
		(TI = 6.0)	(TI = 7.0)
PCC	5½	5½	6
Compacted Subgrade (95% Relative Compaction)	12	12	12

The concrete should have a 28-day compressive strength of at least 3,000 psi. Reinforcing within all pavements should be designed by the structural engineer. The maximum joint spacing within all of the PCC pavements is recommended to be equal to or less than 30 times the pavement thickness. The actual joint spacing and reinforcing of the Portland cement concrete pavements should be determined by the structural engineer.

7.0 GENERAL COMMENTS

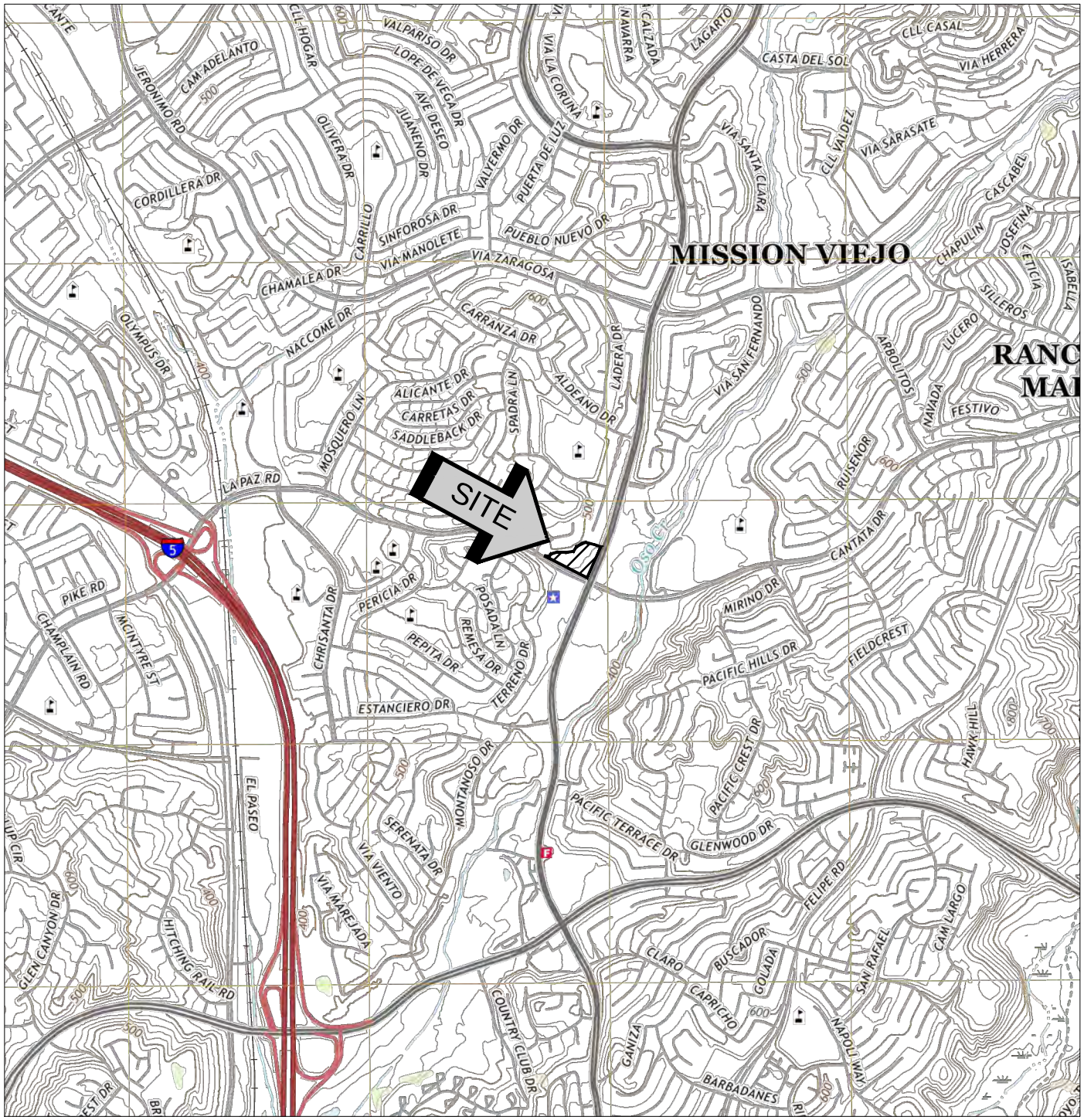
This report has been prepared as an instrument of service for use by the client, in order to aid in the evaluation of this property and to assist the architects and engineers in the design and preparation of the project plans and specifications. This report may be provided to the contractor(s) and other design consultants to disclose information relative to the project. However, this report is not intended to be utilized as a specification in and of itself, without appropriate interpretation by the project architect, civil engineer, and/or structural engineer. The reproduction and distribution of this report must be authorized by the client and Southern California Geotechnical, Inc. Furthermore, any reliance on this report by an unauthorized third party is at such party's sole risk, and we accept no responsibility for damage or loss which may occur. The client(s)' reliance upon this report is subject to the Engineering Services Agreement, incorporated into our proposal for this project.

The analysis of this site was based on a subsurface profile interpolated from limited discrete soil samples. While the materials encountered in the project area are considered to be representative of the total area, some variations should be expected between boring locations and sample depths. If the conditions encountered during construction vary significantly from those detailed herein, we should be contacted immediately to determine if the conditions alter the recommendations contained herein.

This report has been based on assumed or provided characteristics of the proposed development. It is recommended that the owner, client, architect, structural engineer, and civil engineer carefully review these assumptions to ensure that they are consistent with the characteristics of the proposed development. If discrepancies exist, they should be brought to our attention to verify that they do not affect the conclusions and recommendations contained herein. We also recommend that the project plans and specifications be submitted to our office for review to verify that our recommendations have been correctly interpreted.

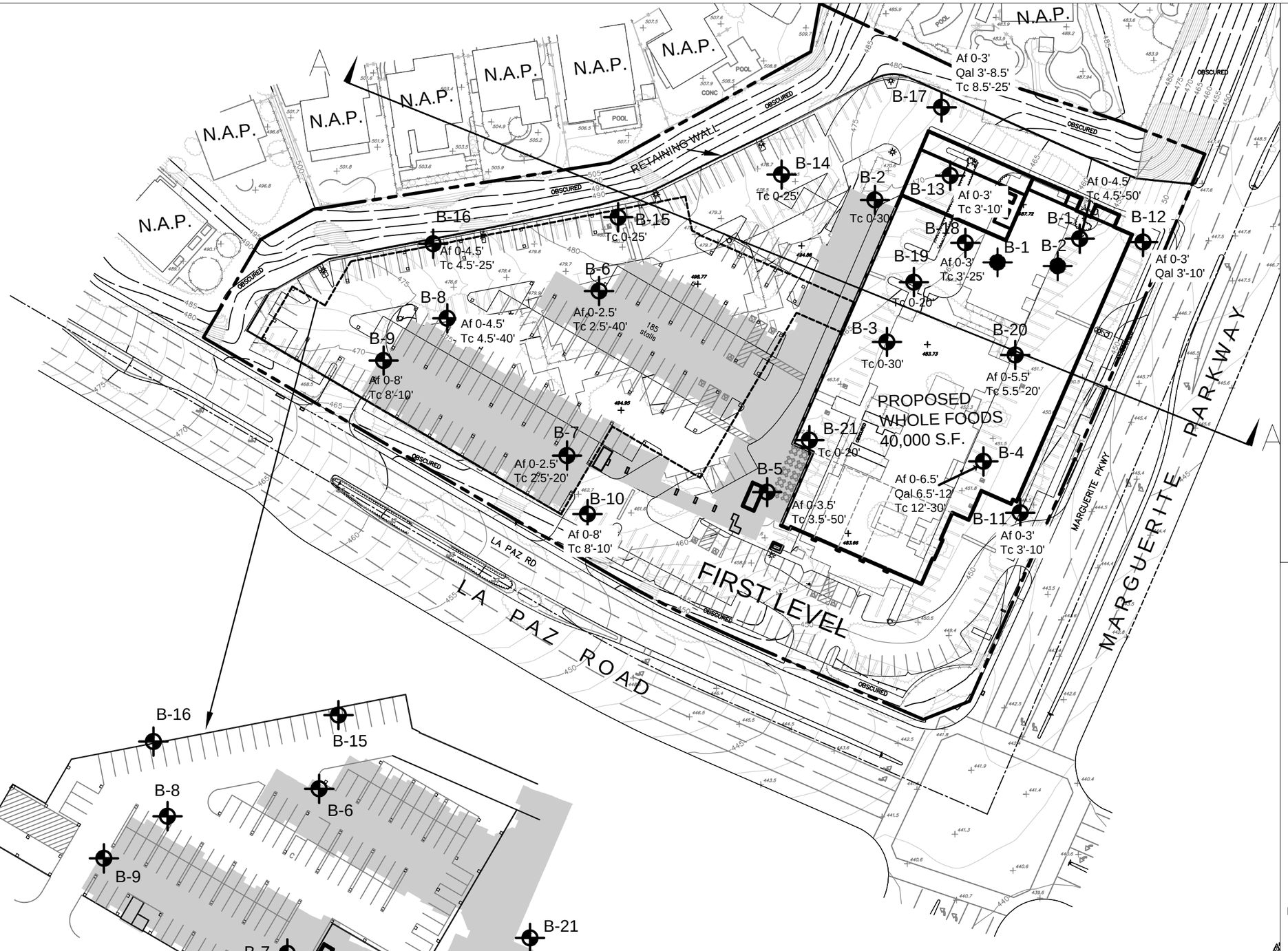
The analysis, conclusions, and recommendations contained within this report have been promulgated in accordance with generally accepted professional geotechnical engineering practice. No other warranty is implied or expressed.

APPENDIX A



SOURCE: USGS TOPOGRAPHIC MAP OF THE SAN JUAN CAPISTRANO QUADRANGLE, SAN BERNARDINO COUNTY, CALIFORNIA, 2018

SITE LOCATION MAP	
PROPOSED MIXED USE DEVELOPMENT	
MISSION VIEJO, CALIFORNIA	
SCALE: 1" = 2000'	SoCalGeo SOUTHERN CALIFORNIA GEOTECHNICAL
DRAWN: JAH CHKD: GKM	
SCG PROJECT 20G237-1	
PLATE 1	



GSI BORING NO. B-1		GSI BORING NO. B-2	
@ 18.5'	20	@ 12.5'	21
@ 21'	83	@ 13.5'	26
	11	@ 14.5'	9
@ 23'	8	@ 15.5'	10
@ 24'	12		32
@ 25'	20	@ 16'	24
@ 26'	15	@ 17'	83
		@ 18'	9

GEOTECHNICAL LEGEND

Af - ARTIFICIAL FILL

Qal - ALLUVIUM

Tc - CAPISTRANO FORMATION

APPROXIMATE BORING LOCATION

PREVIOUS BORING LOCATION (GSI WORK ORDER NO. 1438-OC)

20 STRIKE AND DIP OF BEDDING

11 JOINTS

PROPOSED MULTI-LEVEL HOUSING

NOTE: CONCEPTUAL SITE PLAN PROVIDED BY ARCHITECTS ORANGE.

NORTH

BORING LOCATION PLAN

PROPOSED MIXED USE DEVELOPMENT

MISSION VIEJO, CALIFORNIA

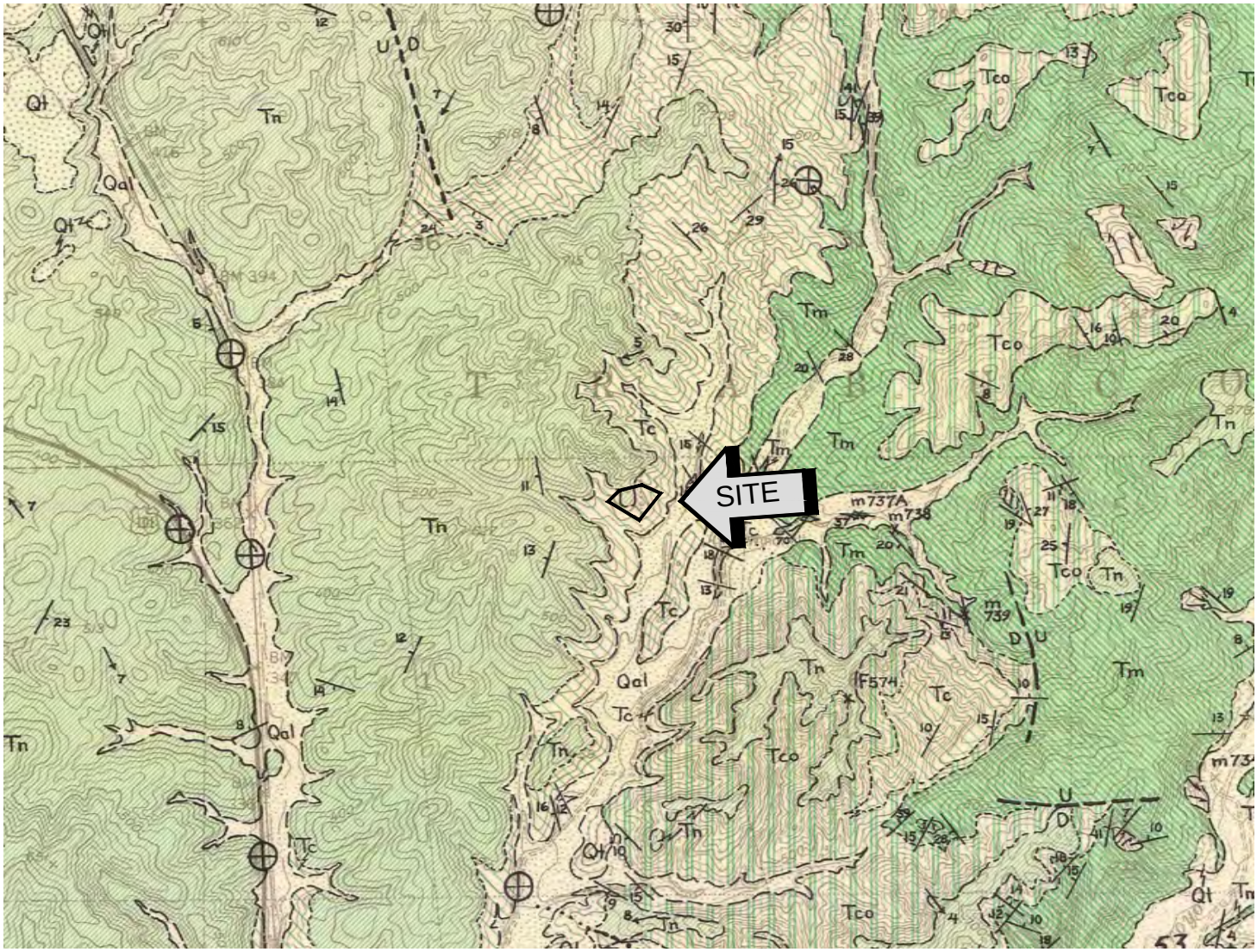
SCALE: 1" = 80'

DRAWN: JH
CHKD: DN

SCG PROJECT 20G237-1

PLATE 2

SOUTHERN CALIFORNIA GEOTECHNICAL



EXPLANATION

SEDIMENTARY ROCKS

Qal

Alluvium, beach sand, artificial fill
Gravel, sand, silt.

Qt | Qtm$_l$ | Qtn$_l$ | Qtu

Continental and marine terrace deposits
Silt, sand, gravel, and rubble. Stream terrace deposits, Qt; marine terrace deposits, Qtm; marine terrace deposits with nonmarine cover, Qtn; undifferentiated terrace deposits, Qtu. Subscripts indicate relative levels with 1 the lowest.

NEWPORT LAGOON AREA

Tus

Unnamed sandstone
Light-gray massive fine-grained sandstone; some beds contain limy concretions; Pliocene and early Pleistocene(?) in age.

Tn

Niguel formation
Light-gray siltstone and sandstone, locally conglomeratic.

ss sts
ss Tc
bc
cg
Tco

Capistrano formation
Light-gray sandy siltstone and fine-grained sandstone; lower part contains limestone concretions; upper part is very sandy; ss, coarse-grained sandstone lens; sts, siltstone and sandstone lens; cg, conglomerate lens; bc, breccia lens. Oso member, Tco, while medium- to coarse-grained massive sandstone and grit.

SOURCE: "GEOLOGIC MAP OF THE SAN JOAQUIN HILLS-SAN JUAN CAPISTRANO AREA, ORANGE COUNTY, CALIFORNIA" COMPILED BY VEDDER, YERKES, AND SCHOELLHAMER, 1957

GEOLOGIC MAP

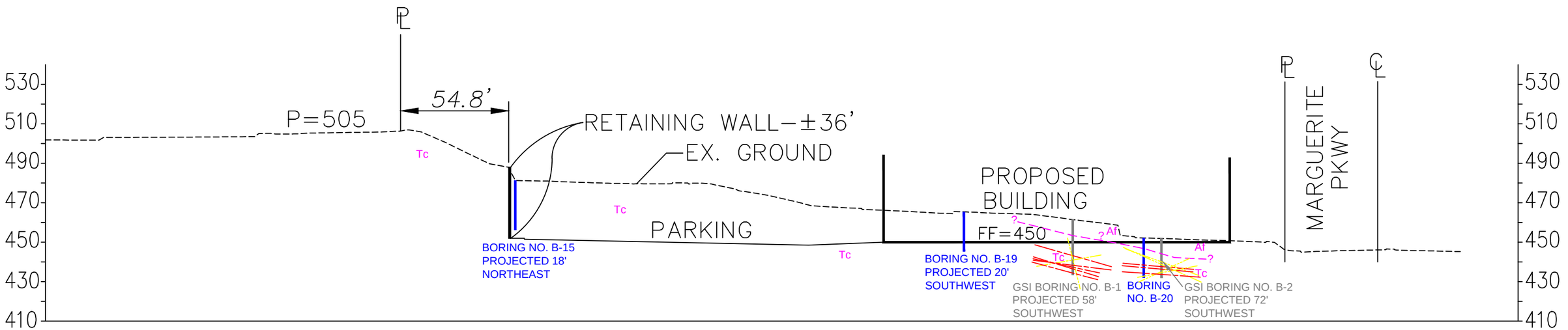
PROPOSED MIXED USE DEVELOPMENT

MISSION VIEJO, CALIFORNIA

SCALE: 1" = 2000'
DRAWN: JAH CHKD: GKM
SCG PROJECT 20G237-1
PLATE 3

SoCalGeo

SOUTHERN CALIFORNIA GEOTECHNICAL



SECTION A–A

GEOTECHNICAL LEGEND

Af - Artificial Fill
Tc - Capistrano Formation Bedrock
– – – – Geologic Contact
—–— Apparent Bedding
—·—·— Apparent Joint

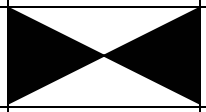
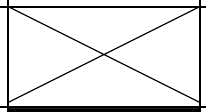
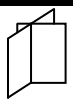
CROSS-SECTION A - A'
PROPOSED MIXED USE DEVELOPMENT
MISSION VIEJO, CALIFORNIA

SCALE: 1" = 50'
DRAWN: DRK
CHKD: GKM
SCG PROJECT
20G237-1
PLATE 4

SoCalGeo
SOUTHERN
CALIFORNIA
GEOTECHNICAL

APPENDIX B

BORING LOG LEGEND

SAMPLE TYPE	GRAPHICAL SYMBOL	SAMPLE DESCRIPTION
AUGER		SAMPLE COLLECTED FROM AUGER CUTTINGS, NO FIELD MEASUREMENT OF SOIL STRENGTH. (DISTURBED)
CORE		ROCK CORE SAMPLE: TYPICALLY TAKEN WITH A DIAMOND-TIPPED CORE BARREL. TYPICALLY USED ONLY IN HIGHLY CONSOLIDATED BEDROCK.
GRAB		SOIL SAMPLE TAKEN WITH NO SPECIALIZED EQUIPMENT, SUCH AS FROM A STOCKPILE OR THE GROUND SURFACE. (DISTURBED)
CS		CALIFORNIA SAMPLER: 2-1/2 INCH I.D. SPLIT BARREL SAMPLER, LINED WITH 1-INCH HIGH BRASS RINGS. DRIVEN WITH SPT HAMMER. (RELATIVELY UNDISTURBED)
NSR		NO RECOVERY: THE SAMPLING ATTEMPT DID NOT RESULT IN RECOVERY OF ANY SIGNIFICANT SOIL OR ROCK MATERIAL.
SPT		STANDARD PENETRATION TEST: SAMPLER IS A 1.4 INCH INSIDE DIAMETER SPLIT BARREL, DRIVEN 18 INCHES WITH THE SPT HAMMER. (DISTURBED)
SH		SHELBY TUBE: TAKEN WITH A THIN WALL SAMPLE TUBE, PUSHED INTO THE SOIL AND THEN EXTRACTED. (UNDISTURBED)
VANE		VANE SHEAR TEST: SOIL STRENGTH OBTAINED USING A 4 BLADED SHEAR DEVICE. TYPICALLY USED IN SOFT CLAYS-NO SAMPLE RECOVERED.

COLUMN DESCRIPTIONS

DEPTH: Distance in feet below the ground surface.

SAMPLE: Sample Type as depicted above.

BLOW COUNT: Number of blows required to advance the sampler 12 inches using a 140 lb hammer with a 30-inch drop. 50/3" indicates penetration refusal (>50 blows) at 3 inches. WH indicates that the weight of the hammer was sufficient to push the sampler 6 inches or more.

POCKET PEN.: Approximate shear strength of a cohesive soil sample as measured by pocket penetrometer.

GRAPHIC LOG: Graphic Soil Symbol as depicted on the following page.

DRY DENSITY: Dry density of an undisturbed or relatively undisturbed sample in lbs/ft^3.

MOISTURE CONTENT: Moisture content of a soil sample, expressed as a percentage of the dry weight.

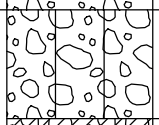
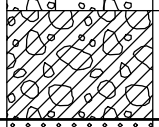
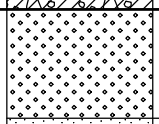
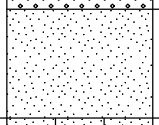
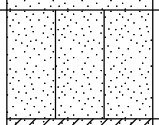
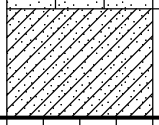
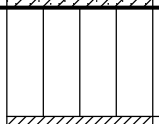
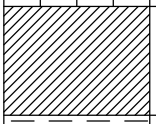
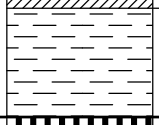
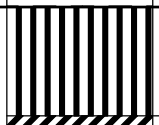
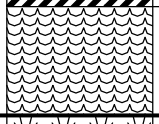
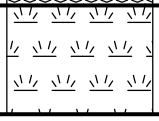
LIQUID LIMIT: The moisture content above which a soil behaves as a liquid.

PLASTIC LIMIT: The moisture content above which a soil behaves as a plastic.

PASSING #200 SIEVE: The percentage of the sample finer than the #200 standard sieve.

UNCONFINED SHEAR: The shear strength of a cohesive soil sample, as measured in the unconfined state.

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS		TYPICAL DESCRIPTIONS
			GRAPH	LETTER	
COARSE GRAINED SOILS MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-1

JOB NO.: 20G237-1
PROJECT: Proposed Mixed Use Development
LOCATION: Mission Viejo, California

DRILLING DATE: 12/10/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Jamie Hayward

WATER DEPTH: Dry
CAVE DEPTH: N/A
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: 456 feet MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					4± Inches Asphaltic Concrete; 5± Inches Aggregate Base							
		17			FILL: Light Brown fine to coarse Sand, little fine Gravel, medium dense-dry	103	1					EI = 53 @ 0 to 5 feet
					FILL: Gray Brown to Gray fine Sand, little Clay nodules, mottled, medium dense-dry							
		29	4.5		FILL: Gray Brown to Black fine Sandy Clay, mottled, very stiff-damp to moist	117	9					
5		16	4.5		CAPISTRANO FORMATION: Light Brown Sandy Claystone, weakly cemented, medium dense to very stiff-moist	111	10					
		26	4.5			110	16					
		30	4.5		@ 9 feet, trace Iron oxide staining	108	15					
10												
		11	2.5		CAPISTRANO FORMATION: Light Gray Brown Silty Claystone, little Iron oxide staining, weakly cemented, stiff to very stiff-very moist		35					
15												
		21			@ 18½ feet, mottled		29					
20												
		27	1.5				25					
25					CAPISTRANO FORMATION: Light Gray Sandy Siltstone, little Iron oxide staining, weakly cemented, medium dense-very moist		18					
					CAPISTRANO FORMATION: Gray to Brown Silty Claystone, trace fine Sand, weakly cemented, little Iron oxide staining, hard-moist to very moist							
		78/10"					17					
30												
		50	2.5		CAPISTRANO FORMATION: Dark Gray Siltstone, trace fine Sand, trace Clay, weakly cemented, very dense to stiff-very moist		24					

TBL 20G237-1.GPJ SOCALGEO.GDT 1/14/21

TEST BORING LOG

PLATE B-1a

SOUTHERN CALIFORNIA GEOTECHNICAL

BORING NO. B-1

JOB NO.: 20G237-1
PROJECT: Proposed Mixed Use Development
LOCATION: Mission Viejo, California

DRILLING DATE: 12/10/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Jamie Hayward

WATER DEPTH: Dry
CAVE DEPTH: N/A
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION (Continued)	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					CAPISTRANO FORMATION: Dark Gray Siltstone, trace fine Sand, trace Clay, weakly cemented, very dense to very stiff-very moist							
40		74/11"	4.5				20					
45		32	4.5				24					
50		78					22					
					Boring Terminated at 50'							

TBL 20G237-1.GPJ SOCALGEO.GDT 1/14/21

TEST BORING LOG

PLATE B-1b

SOUTHERN CALIFORNIA GEOTECHNICAL

BORING NO. B-2

JOB NO.: 20G237-1
PROJECT: Proposed Mixed Use Development
LOCATION: Mission Viejo, California

DRILLING DATE: 12/11/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Jamie Hayward

WATER DEPTH: Dry
CAVE DEPTH: 23 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: 470 feet MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					3± Inches Asphaltic Concrete; 5± Inches Aggregate Base							
		19	4.5		CAPISTRANO FORMATION: Gray Brown Silty Claystone, trace fine Sand, trace Iron oxide staining, weakly cemented, mottled, hard-very moist	93	22					
		33	4.0			104	17					
5		18	4.5		CAPISTRANO FORMATION: Gray Brown to Dark Gray Clayey Siltstone, some Sand, little Iron oxide staining, weakly cemented, very stiff to very dense-very moist	90	30					
		24	4.5			92	27					
		31	4.5			96	27					
10												
		44	4.5				32					
15												
		59	2.5		@ 18½ feet, little Iron oxide staining, little Calcareous nodules		29					
20												
		73/11"	4.5				34					
25												
		34	2.0				31					
30												
					Boring Terminated at 30'							

TBL 20G237-1.GPJ SOCALGEO.GDT 1/14/21

TEST BORING LOG

PLATE B-2

SOUTHERN CALIFORNIA GEOTECHNICAL

BORING NO. B-3

JOB NO.: 20G237-1
PROJECT: Proposed Mixed Use Development
LOCATION: Mission Viejo, California

DRILLING DATE: 12/11/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Jamie Hayward

WATER DEPTH: Dry
CAVE DEPTH: 12 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: 465 feet MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					3± Inches Asphaltic Concrete; 3± Inches Aggregate Base							
		19	2.0		CAPISTRANO FORMATION: Gray Brown Clayey Siltstone, little Iron oxide staining, weakly cemented, stiff to hard-very moist		21					
		11	1.5				26					
5		11	2.0				34					
		15	3.5				32					
10												
		21	4.0				30					
15												
		16	4.5				37					
20												
		32	4.0				34					
25												
		27	3.5		@ 28½ feet, some Iron oxide staining		31					
30					Boring Terminated at 30'							

TBL 20G237-1.GPJ SOCALGEO.GDT 1/14/21

TEST BORING LOG

PLATE B-3

SOUTHERN CALIFORNIA GEOTECHNICAL

BORING NO. B-4

JOB NO.: 20G237-1
PROJECT: Proposed Mixed Use Development
LOCATION: Mission Viejo, California

DRILLING DATE: 12/11/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Jamie Hayward

WATER DEPTH: Dry
CAVE DEPTH: 18 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: 451.5 feet MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					3± Inches Asphaltic Concrete; 3± Inches Aggregate Base							
		13	1.5		FILL: Gray Brown to Brown fine Sandy Clay, little medium to coarse Sand, little fine Gravel, mottled, stiff-moist to very moist	92	31					
		12	3.0		POSSIBLE FILL: Black to Dark Green Gray fine Sandy Clay, trace fine Gravel, trace Iron oxide staining, stiff-very moist	93	27	44	19			PI = 25
5		9	3.0			99	22					
		21	4.5		ALLUVIUM: Light Brown fine Sandy Clay, trace Calcareous veining, very stiff-moist to very moist	109	18	45	16			PI = 29
10		17	4.5			112	13					
		10	2.5		CAPISTRANO FORMATION: Light Gray Brown Silty Claystone, little to some Iron oxide staining, weakly cemented, very stiff to hard-very moist		25					
15												
		19	3.0				36					
20												
		31	4.0				34					
25												
		40	4.5				28					
30					Boring Terminated at 30'							

TBL 20G237-1.GPJ SOCALGEO.GDT 1/14/21

TEST BORING LOG **PLATE B-4**

SOUTHERN CALIFORNIA GEOTECHNICAL

BORING NO. B-5

JOB NO.: 20G237-1
PROJECT: Proposed Mixed Use Development
LOCATION: Mission Viejo, California

DRILLING DATE: 12/10/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Jamie Hayward

WATER DEPTH: Dry
CAVE DEPTH: N/A
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: 461 feet MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					3± Inches Asphaltic Concrete; 5± Inches Aggregate Base							
		24			FILL: Gray Brown Silty Clay, stiff to very stiff-very moist		26					No Recovery, Grab Bag of Spoils
		14				103	25					
					CAPISTRANO FORMATION: Light Gray Silty Claystone, little Iron oxide staining, weakly cemented, very stiff to hard-very moist	96	24					
5		19	4.5			85	29					EI = 115 @ 0 to 5 feet
		21	4.5			94	25					
		17	4.5		@ 9 to 27 feet, little Calcareous nodules/veining	94	29	63	23			PI = 40
10												
		22					28					
15												
		20	4.5				32					
20												
		31	3.0				26					
25												
					CAPISTRANO FORMATION: Gray to Dark Gray Siltstone, little Clay, trace Calcareous nodules/veining, weakly cemented, hard-very moist							
		28	4.5				28					
30												
		49	4.5				13					

TBL 20G237-1.GPJ SOCALGEO.GDT 1/14/21

TEST BORING LOG

PLATE B-5a

SOUTHERN CALIFORNIA GEOTECHNICAL

BORING NO. B-5

JOB NO.: 20G237-1
PROJECT: Proposed Mixed Use Development
LOCATION: Mission Viejo, California

DRILLING DATE: 12/10/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Jamie Hayward

WATER DEPTH: Dry
CAVE DEPTH: N/A
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION (Continued)	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					CAPISTRANO FORMATION: Gray to Dark Gray Siltstone, little Clay, trace Calcareous nodules/veining, weakly cemented, hard-very moist							
		45	4.5				24					
40												
		80	4.5		@ 43½ to 50 feet, very dense to hard		22					
45												
		79/11"	4.5				21					
50												
					Boring Terminated at 50'							

TBL 20G237-1.GPJ SOCALGEO.GDT 1/14/21

TEST BORING LOG

PLATE B-5b

SOUTHERN CALIFORNIA GEOTECHNICAL

BORING NO. B-6

JOB NO.: 20G237-1
PROJECT: Proposed Mixed Use Development
LOCATION: Mission Viejo, California

DRILLING DATE: 12/14/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Jamie Hayward

WATER DEPTH: Dry
CAVE DEPTH: 23 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: 479.5 feet MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					3± Inches Asphaltic Concrete; 5± Inches Aggregate Base							
		16	4.5		FILL: Gray Brown Silty fine to coarse Sand, little fine Gravel, medium dense-damp	101	6					
					FILL: Light Gray fine Sand, medium dense-damp							
		24	4.5		CAPISTRANO FORMATION: Gray Brown Silty Claystone, little Calcareous nodules/veining, little Iron oxide staining, weakly cemented, very stiff to hard-very moist	82	28					
5		22	4.5			91	26					
		19	4.5			88	28					
		23	4.5			96	25					
10												
		17	4.5				26					
15												
		11	2.5				36					
20												
		16	4.0				36					
25												
					CAPISTRANO FORMATION: Dark Gray Sandy Siltstone, little Clay, weakly cemented, medium dense to very dense-very moist							
		16	2.0				30					
30												
		34	3.5				31					

TBL 20G237-1.GPJ SOCALGEO.GDT 1/14/21

TEST BORING LOG

PLATE B-6a

SOUTHERN CALIFORNIA GEOTECHNICAL

BORING NO. B-6

JOB NO.: 20G237-1
PROJECT: Proposed Mixed Use Development
LOCATION: Mission Viejo, California

DRILLING DATE: 12/14/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Jamie Hayward

WATER DEPTH: Dry
CAVE DEPTH: 23 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION (Continued)	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					CAPISTRANO FORMATION: Dark Gray Sandy Siltstone, little Clay, weakly cemented, medium dense to very dense-very moist							
		68/11"	4.5				28					
40					Boring Terminated at 40'							

TBL 20G237-1.GPJ SOCALGEO.GDT 1/14/21

TEST BORING LOG

PLATE B-6b

SOUTHERN CALIFORNIA GEOTECHNICAL

BORING NO. B-7

JOB NO.: 20G237-1
PROJECT: Proposed Mixed Use Development
LOCATION: Mission Viejo, California

DRILLING DATE: 12/14/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Jamie Hayward

WATER DEPTH: Dry
CAVE DEPTH: 15 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: 464 feet MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					3± Inches Asphaltic Concrete; 5± Inches Aggregate Base							
		34			FILL: Gray Brown Silty fine to coarse Sand, little fine Gravel, medium dense-damp	115	6					
					FILL: Light Gray Brown fine Sand, little Clay nodules, mottled, medium dense-damp							
		29	4.5		CAPISTRANO FORMATION: Gray to Brown Sandy Claystone, trace Iron oxide staining, weakly cemented, very stiff to hard-moist to very moist	98	23					
5		21	4.5			111	15					
		37	4.5			107	13					
		28	4.5		@ 9 feet, trace fine Gravel	120	13					
10												
					CAPISTRANO FORMATION: Light Gray to Light Brown Sandstone, weakly cemented, medium dense-damp							
		10					7					
15												
		16					6					
20					Boring Terminated at 20'							

TBL 20G237-1.GPJ SOCALGEO.GDT 1/14/21

TEST BORING LOG

PLATE B-7

SOUTHERN CALIFORNIA GEOTECHNICAL

BORING NO. B-8

JOB NO.: 20G237-1
PROJECT: Proposed Mixed Use Development
LOCATION: Mission Viejo, California

DRILLING DATE: 12/14/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Jamie Hayward

WATER DEPTH: Dry
CAVE DEPTH: 21 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: 476.5 feet MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					3± Inches Asphaltic Concrete; 5± Inches Aggregate Base							
		36			FILL: Gray Brown Silty fine to medium Sand, trace Asphaltic concrete fragments, medium dense-damp	102	5					
					FILL: Light Gray fine Sand, medium dense-damp							
		34			@ 3½ feet, little Clay	104	4					
5		18	4.5		CAPISTRANO FORMATION: Gray Brown Silty Claystone, little Iron oxide staining, weakly cemented, very stiff to hard-very moist	90	30					
		20	4.5			91	25					
		30	4.5			96	25					
10												
		10	2.5				30					
15												
		22	4.0				31					
20												
		16	3.0				35					
25												
		28	2.5				38					
30												
		51	2.5		CAPISTRANO FORMATION: Dark Gray Siltstone, little Clay, weakly cemented, very dense-very moist		28					

TBL 20G237-1.GPJ SOCALGEO.GDT 1/14/21

TEST BORING LOG

PLATE B-8a

SOUTHERN CALIFORNIA GEOTECHNICAL

BORING NO. B-8

JOB NO.: 20G237-1
PROJECT: Proposed Mixed Use Development
LOCATION: Mission Viejo, California

DRILLING DATE: 12/14/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Jamie Hayward

WATER DEPTH: Dry
CAVE DEPTH: 21 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION (Continued)	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					CAPISTRANO FORMATION: Dark Gray Siltstone, little Clay, weakly cemented, very dense-very moist							
		68/11"	4.5				24					
40					Boring Terminated at 40'							

TBL 20G237-1.GPJ SOCALGEO.GDT 1/14/21

TEST BORING LOG

PLATE B-8b

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-9

JOB NO.: 20G237-1
PROJECT: Proposed Mixed Use Development
LOCATION: Mission Viejo, California

DRILLING DATE: 12/14/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Jamie Hayward

WATER DEPTH: Dry
CAVE DEPTH: 6 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: 471.5 feet MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					4± Inches Asphaltic Concrete; 5± Inches Aggregate Base							
		24			FILL: Gray Brown Silty fine to coarse Sand, little fine Gravel, trace Asphaltic concrete fragments, medium dense-damp		7					
		11	2.0		FILL: Gray Brown fine Sandy Clay, trace fine Gravel, trace Brick fragments, mottled, stiff-very moist		20					
5			2.0		FILL: Light Gray Brown fine Sandy Clay, trace fine Gravel, trace fine root fibers, stiff-very moist		20					
		31			FILL: Light Gray Brown fine Sand, dense-damp		5					
		13	2.5		CAPISTRANO FORMATION: Light Gray Silty Claystone, little Iron oxide staining, stiff-very moist		30					
10					Boring Terminated at 10'							

TBL 20G237-1.GPJ SOCALGEO.GDT 1/14/21

TEST BORING LOG

PLATE B-9

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-10

JOB NO.: 20G237-1
PROJECT: Proposed Mixed Use Development
LOCATION: Mission Viejo, California

DRILLING DATE: 12/14/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Jamie Hayward

WATER DEPTH: Dry
CAVE DEPTH: 6 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: 462 feet MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					3± Inches Asphaltic Concrete; 5± Inches Aggregate Base							
		15			FILL: Gray Brown Clayey fine Sand, little Iron oxide staining, little Calcareous nodules, mottled, medium dense-moist to very moist		19					
		20			@ 3½ feet, little fine Gravel		12					
5		14					12					
		14	4.5		CAPISTRANO FORMATION: Gray Brown to Dark Gray Brown Sandy Claystone, some Iron oxide staining, weakly cemented, very stiff-moist		9					
10					Boring Terminated at 10'							

TBL 20G237-1.GPJ SOCALGEO.GDT 1/14/21

TEST BORING LOG

PLATE B-10

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-11

JOB NO.: 20G237-1
PROJECT: Proposed Mixed Use Development
LOCATION: Mission Viejo, California

DRILLING DATE: 12/11/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Jamie Hayward

WATER DEPTH: Dry
CAVE DEPTH: 6 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: 449.5 feet MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					4± Inches Asphaltic Concrete; 5± Inches Aggregate Base							
		10	4.5		FILL: Light Gray Brown fine Sandy Clay, trace fine Gravel, little fine root fibers, mottled, stiff to very stiff-very moist		21					
		15	2.0		CAPISTRANO FORMATION: Gray Brown Silty Claystone, trace Calcareous nodules, weakly cemented, very stiff-moist		17					
5		11	3.0		@ 6 to 10 feet, trace to little Iron oxide staining, little Calcareous nodules/veining		18					
		10	1.5				18					
10					Boring Terminated at 10'							

TBL 20G237-1.GPJ SOCALGEO.GDT 1/14/21

TEST BORING LOG **PLATE B-11**

SOUTHERN CALIFORNIA GEOTECHNICAL

BORING NO. B-12

JOB NO.: 20G237-1
PROJECT: Proposed Mixed Use Development
LOCATION: Mission Viejo, California

DRILLING DATE: 12/11/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Jamie Hayward

WATER DEPTH: Dry
CAVE DEPTH: 6 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: 452.5 feet MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					4± Inches Asphaltic Concrete; 5± Inches Aggregate Base							
		7	2.5		FILL: Gray Brown fine Sandy Clay, little Iron oxide staining, mottled, stiff-very moist		25					
		9	2.5		ALLUVIUM: Black to Gray Brown fine Sandy Clay, stiff to very stiff-moist to very moist		20					
5		9	2.0		@ 6½ feet, little Calcareous nodules/veining		17					
		10	3.5				16					
10					Boring Terminated at 10'							

TBL 20G237-1.GPJ SOCALGEO.GDT 1/14/21

TEST BORING LOG

PLATE B-12

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-13

JOB NO.: 20G237-1
PROJECT: Proposed Mixed Use Development
LOCATION: Mission Viejo, California

DRILLING DATE: 12/11/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Jamie Hayward

WATER DEPTH: Dry
CAVE DEPTH: 6 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: 470 feet MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					3± Inches Asphaltic Concrete; 5± Inches Aggregate Base							
		10	4.0		FILL: Gray Brown fine Sandy Clay, little Iron oxide staining, mottled, stiff-very moist		30					
		9	4.0		CAPISTRANO FORMATION: Gray Brown Silty Claystone, little Iron oxide staining, trace Calcareous veining, weakly cemented, stiff to very stiff-very moist		29					
5		10	4.0				32					
		16	3.0				31					
10					Boring Terminated at 10'							

TBL 20G237-1.GPJ SOCALGEO.GDT 1/14/21

TEST BORING LOG

PLATE B-13

SOUTHERN CALIFORNIA GEOTECHNICAL

BORING NO. B-14

JOB NO.: 20G237-1
PROJECT: Proposed Mixed Use Development
LOCATION: Mission Viejo, California

DRILLING DATE: 12/10/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Jamie Hayward

WATER DEPTH: Dry
CAVE DEPTH: 15 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: 479.5 feet MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					3± Inches Asphaltic Concrete; 5± Inches Aggregate Base							
		38	4.5		CAPISTRANO FORMATION: Gray Clayey Siltstone, little Iron oxide staining, weakly cemented, stiff to very stiff-very moist	95	26					
		17	4.0				21					
5												
		36	4.5			92	29					
		23	2.0				25					
10												
					CAPISTRANO FORMATION: Dark Gray Clayey Siltstone, trace Calcareous nodules/veining, weakly cemented, dense to very dense-very moist							
		69	4.5			100	20					
15												
		40	2.0				25					
20												
		41	4.5			98	23					
25					Boring Terminated at 25'							

TBL 20G237-1.GPJ SOCALGEO.GDT 1/14/21

TEST BORING LOG

PLATE B-14

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. B-15

JOB NO.: 20G237-1
PROJECT: Proposed Mixed Use Development
LOCATION: Mission Viejo, California

DRILLING DATE: 12/10/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Jamie Hayward

WATER DEPTH: Dry
CAVE DEPTH: N/A
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: 481.5 feet MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					3± Inches Asphaltic Concrete; 3± Inches Aggregate Base							
		16			CAPISTRANO FORMATION: Light Gray Brown Silty Claystone, trace fine to coarse Gravel, little to some Iron oxide staining, weakly cemented, very stiff to hard-damp to very moist		20					
		25	4.5			110	12					
5												
		12	2.5				29					
		24	4.5		@ 9 feet, trace fine Sand, trace fine to coarse Gravel	113	7					
10												
		12	3.5				28					
15												
					CAPISTRANO FORMATION: Light Gray Clayey Siltstone, trace Iron oxide staining, trace to little Calcareous nodules, weakly cemented, medium dense to dense-damp to very moist							
		44	4.5			117	12					
20												
		23	3.5				31					
25												
					Boring Terminated at 25'							

TBL 20G237-1.GPJ SOCALGEO.GDT 1/14/21

TEST BORING LOG

PLATE B-15

SOUTHERN CALIFORNIA GEOTECHNICAL

BORING NO. B-16

JOB NO.: 20G237-1
PROJECT: Proposed Mixed Use Development
LOCATION: Mission Viejo, California

DRILLING DATE: 12/14/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Jamie Hayward

WATER DEPTH: Dry
CAVE DEPTH: 17 feet
READING TAKEN: At Completion

FIELD RESULTS					DESCRIPTION	LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	SURFACE ELEVATION: 475 feet MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					3± Inches Asphaltic Concrete; 5± Inches Aggregate Base							
		28			FILL: Light Gray fine Sand, trace Clay, medium dense-damp to moist	107	6					
		31					11					
5			4.5		CAPISTRANO FORMATION: Gray Brown Silty Claystone, trace fine Sand, little Iron oxide staining, weakly cemented, hard-very moist		30					
		23	4.5		CAPISTRANO FORMATION: Gray Brown Clayey Siltstone, little to some Iron oxide staining, weakly cemented, very stiff to hard-moist to very moist	104	11					
		18	4.5				31					
10												
					CAPISTRANO FORMATION: Gray Brown Silty Claystone, little Iron oxide staining, weakly cemented, hard-very moist							
		30	4.5			94	27					
15												
		14					29					
20												
		27	4.5			90	30					
25					Boring Terminated at 25'							

TBL 20G237-1.GPJ SOCALGEO.GDT 1/14/21

TEST BORING LOG

PLATE B-16

SOUTHERN CALIFORNIA GEOTECHNICAL

BORING NO. B-17

JOB NO.: 20G237-1
PROJECT: Proposed Mixed Use Development
LOCATION: Mission Viejo, California

DRILLING DATE: 12/11/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Jamie Hayward

WATER DEPTH: Dry
CAVE DEPTH: 17 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: 471 feet MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					3± Inches Asphaltic Concrete; 5± Inches Aggregate Base							
		42			FILL: Gray Brown Silty fine to coarse Sand, little fine to coarse Gravel, trace Asphaltic concrete fragments, dense-damp		3					
		36	4.5		ALLUVIUM: Dark Gray to Black fine Sandy Clay, very stiff-moist	117	11					
5		17	4.5				13					
		40	4.5		CAPISTRANO FORMATION: Gray Brown Silty Claystone, trace Calcareous veining, mottled, weakly cemented, very stiff to hard-moist to very moist @ 9 feet, trace Calcareous veining	115	13					
10												
		27	4.5				22					
15												
		37	4.5		CAPISTRANO FORMATION: Gray Brown to Dark Gray Siltstone, little Clay, trace Calcareous nodules, weakly cemented, trace Iron oxide staining, medium dense to very dense-very moist	101	23					
20												
		68	4.5				26					
25					Boring Terminated at 25'							

TBL 20G237-1.GPJ SOCALGEO.GDT 1/14/21

TEST BORING LOG

PLATE B-17

SOUTHERN CALIFORNIA GEOTECHNICAL

BORING NO. B-18

JOB NO.: 20G237-1
PROJECT: Proposed Mixed Use Development
LOCATION: Mission Viejo, California

DRILLING DATE: 12/11/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Jamie Hayward

WATER DEPTH: Dry
CAVE DEPTH: 7 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					SURFACE ELEVATION: 456.5 feet MSL							
					3± Inches Asphaltic Concrete; 5± Inches Aggregate Base							
		7	3.0		FILL: Gray Brown fine Sandy Clay, little Iron oxide staining, mottled, stiff-very moist		29					
		10	3.0		CAPISTRANO FORMATION: Gray Brown Silty Claystone, little Silt, trace Iron oxide staining, trace to some Calcareous nodules, weakly cemented, very stiff to hard-very moist		29					
5		15	4.5				32					
		14	2.5				27					
10												
		20	3.5				38					
15												
		22	3.0				36					
20												
25					Boring Terminated at 25'							

TBL 20G237-1.GPJ SOCALGEO.GDT 1/14/21

TEST BORING LOG

PLATE B-18

SOUTHERN CALIFORNIA GEOTECHNICAL

BORING NO. B-19

JOB NO.: 20G237-1
PROJECT: Proposed Mixed Use Development
LOCATION: Mission Viejo, California

DRILLING DATE: 12/11/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Jamie Hayward

WATER DEPTH: Dry
CAVE DEPTH: 13 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: 464 feet MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					2± Inches Asphaltic Concrete; 4± Inches Aggregate Base							
		17	4.5		CAPISTRANO FORMATION: Gray Brown Silty Claystone, little Sand, little Iron oxide staining, trace fine root fibers, weakly cemented, very stiff to hard-damp to very moist	106	6					
		33	4.5			95	24					
5		35	4.5			82	28					
		21	4.0			93	28					
		37	4.5			93	28					
10												
		29					33					
15												
		18	3.0				37					
20					Boring Terminated at 20'							

TBL 20G237-1.GPJ SOCALGEO.GDT 1/14/21

TEST BORING LOG **PLATE B-19**

SOUTHERN CALIFORNIA GEOTECHNICAL

BORING NO. B-20

JOB NO.: 20G237-1 | DRILLING DATE: 12/11/20 | WATER DEPTH: Dry
PROJECT: Proposed Mixed Use Development | DRILLING METHOD: Hollow Stem Auger | CAVE DEPTH: 12 feet
LOCATION: Mission Viejo, California | LOGGED BY: Jamie Hayward | READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: 452 feet MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					4± Inches Asphaltic Concrete; 5± Inches Aggregate Base							
		19			FILL: Light Gray Brown fine Sand, trace Clay nodules, medium dense-damp to moist		10					
		26					8					
5												
		15	2.5		CAPISTRANO FORMATION: Light Gray Brown Silty Claystone, trace Gypsum nodules, weakly cemented, stiff to very stiff-very moist		20					
		12	3.0		@ 8½ feet, trace Charcoal		21					
10												
		17	2.5		@ 13½ to 20 feet, little to some Iron oxide staining		39					
15												
		17	2.5				32					
20					Boring Terminated at 20'							

TBL 20G237-1.GPJ SOCALGEO.GDT 1/14/21

TEST BORING LOG **PLATE B-20**

SOUTHERN CALIFORNIA GEOTECHNICAL

BORING NO. B-21

JOB NO.: 20G237-1
PROJECT: Proposed Mixed Use Development
LOCATION: Mission Viejo, California

DRILLING DATE: 12/11/20
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Jamie Hayward

WATER DEPTH: Dry
CAVE DEPTH: 5 feet
READING TAKEN: At Completion

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: 462.5 feet MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	ORGANIC CONTENT (%)	COMMENTS
					3± Inches Asphaltic Concrete; 3± Inches Aggregate Base							
		15	3.5		CAPISTRANO FORMATION: Gray Brown Silty Claystone, little to some Iron oxide staining, weakly cemented, stiff to hard-very moist		32					
		13	1.0				32					
5		12	2.5				34					
		11	2.5				35					
10												
		27	2.5				32					
15												
		20	3.0				36					
20					Boring Terminated at 20'							

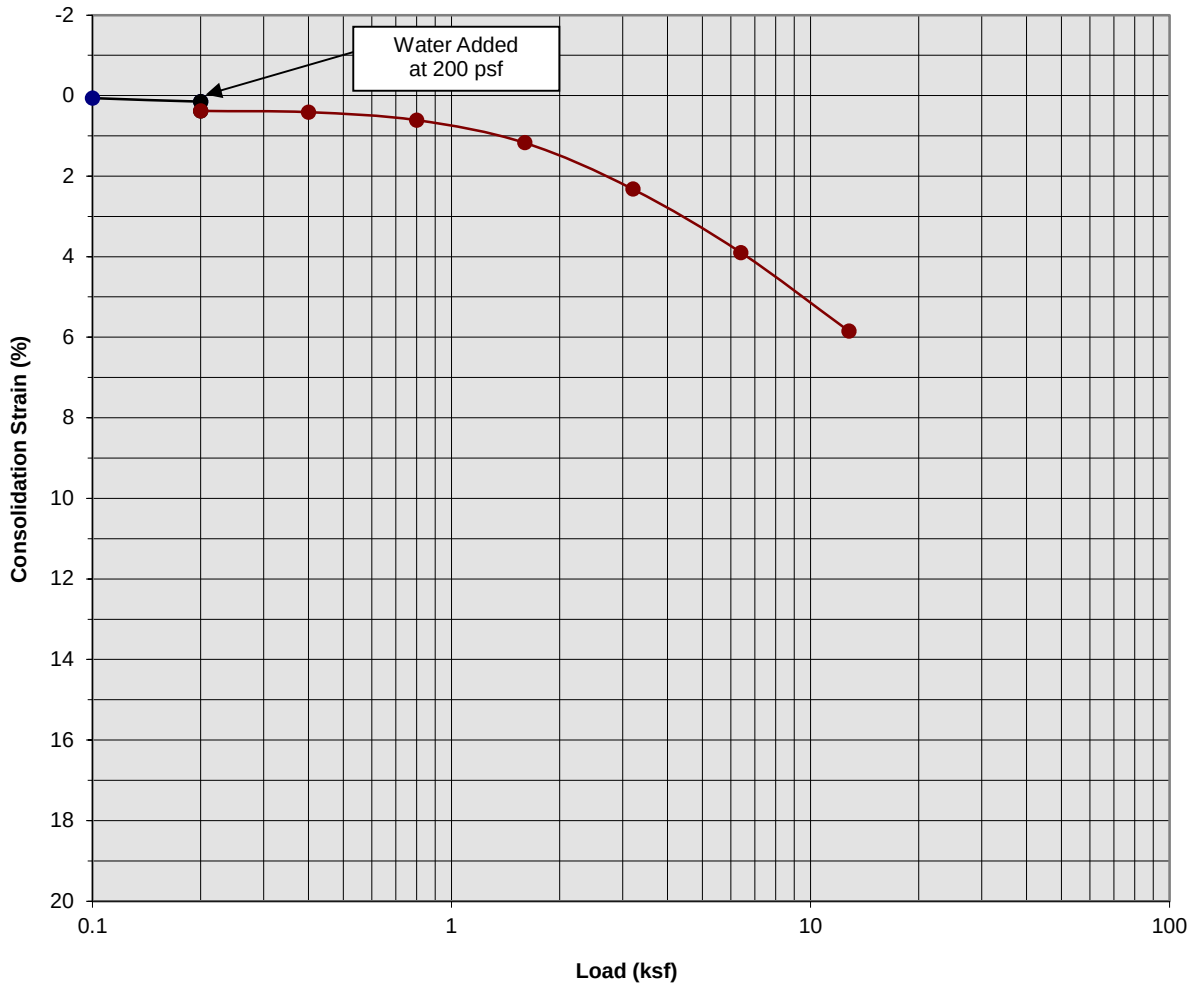
TBL 20G237-1.GPJ SOCALGEO.GDT 1/14/21

TEST BORING LOG

PLATE B-21

APPENDIX C

Consolidation/Collapse Test Results



Classification: POSS. FILL: Black to Dark Green Gray fine Sandy Clay, trace fine Gravel

Boring Number:	B-4	Initial Moisture Content (%)	27
Sample Number:	---	Final Moisture Content (%)	27
Depth (ft)	3 to 4	Initial Dry Density (pcf)	93.2
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	98.2
Specimen Thickness (in)	1.0	Percent Collapse (%)	0.23

Proposed Mixed Use Development
Mission Viejo, California
Project No. 20G237-1

PLATE C- 1

SoCalGeo
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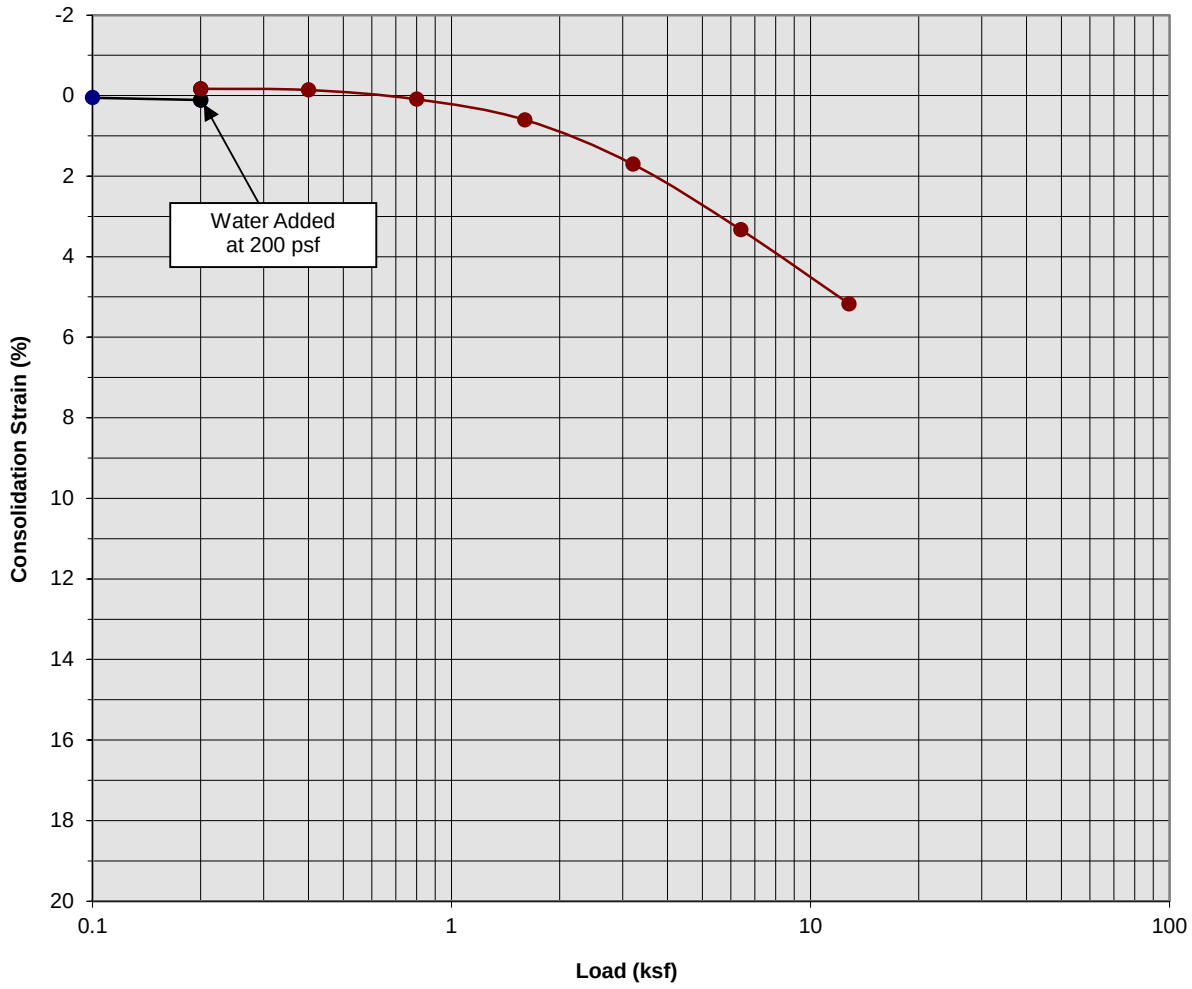
Consolidation/Collapse Test Results



Classification: POSS. FILL: Black to Dark Green Gray fine Sandy Clay, trace fine Gravel

Boring Number:	B-4	Initial Moisture Content (%)	23
Sample Number:	---	Final Moisture Content (%)	25
Depth (ft)	5 to 6	Initial Dry Density (pcf)	99.6
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	104.5
Specimen Thickness (in)	1.0	Percent Collapse (%)	-0.28

Proposed Mixed Use Development
Mission Viejo, California
Project No. 20G237-1

PLATE C- 2

SoCalGeo
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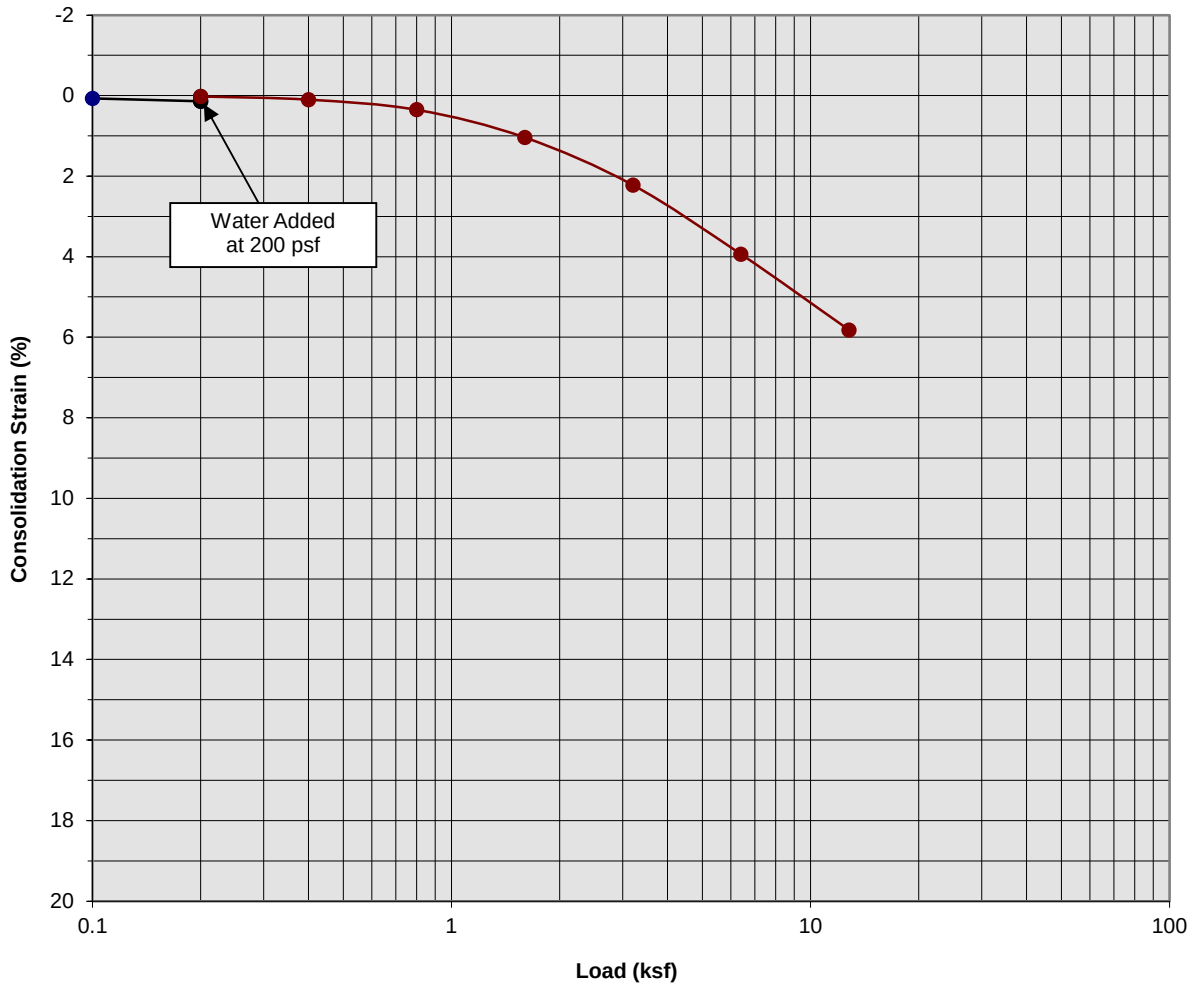
Consolidation/Collapse Test Results



Classification: ALLUVIUM: Light Brown fine Sandy Clay

Boring Number:	B-4	Initial Moisture Content (%)	19
Sample Number:	---	Final Moisture Content (%)	19
Depth (ft)	7 to 8	Initial Dry Density (pcf)	109.2
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	116.2
Specimen Thickness (in)	1.0	Percent Collapse (%)	-0.12

Proposed Mixed Use Development
Mission Viejo, California
Project No. 20G237-1

PLATE C- 3

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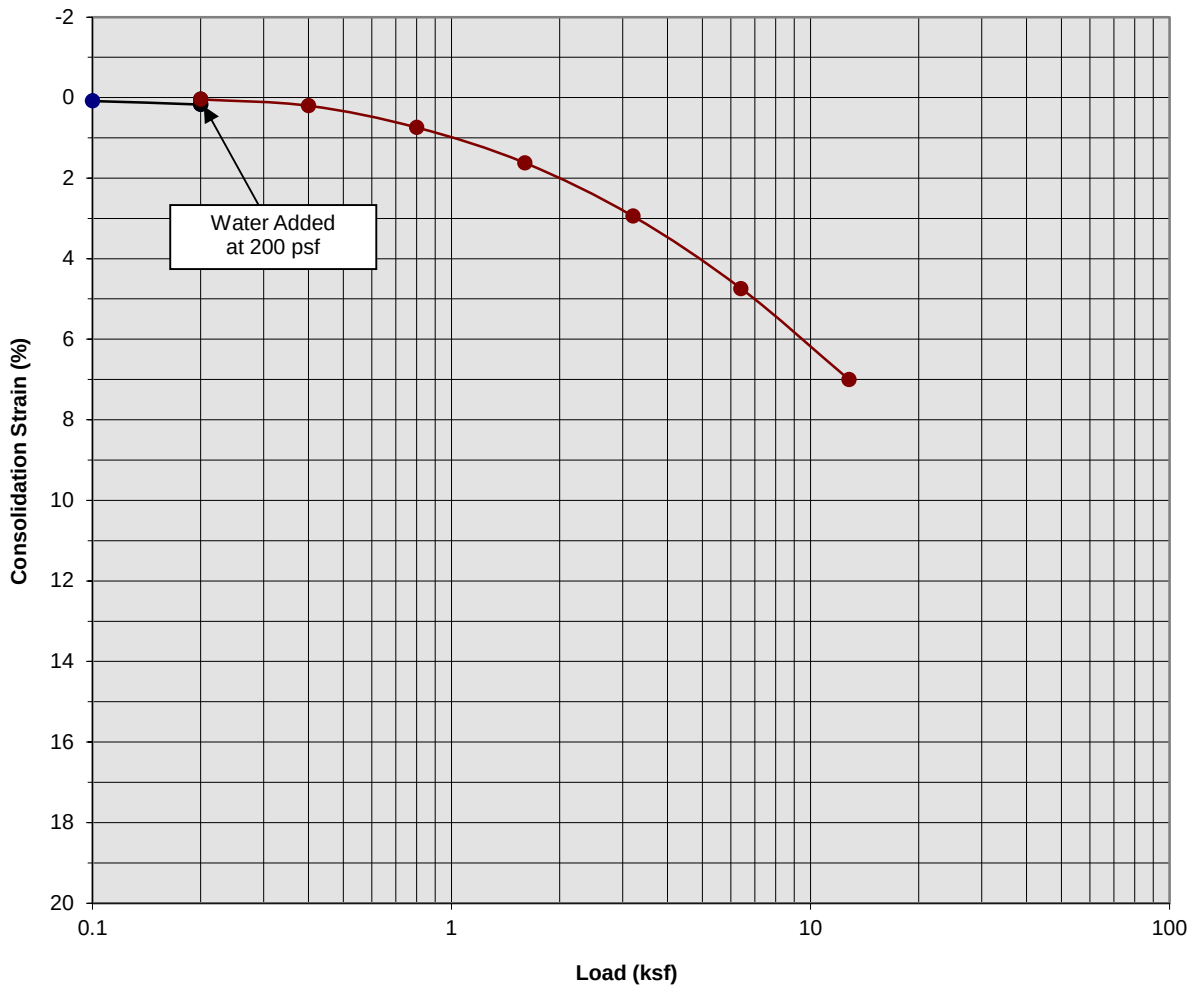
Consolidation/Collapse Test Results



Classification: Light Brown fine Sandy Clay

Boring Number:	B-4	Initial Moisture Content (%)	15
Sample Number:	---	Final Moisture Content (%)	15
Depth (ft)	9 to 10	Initial Dry Density (pcf)	112.3
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	120.8
Specimen Thickness (in)	1.0	Percent Collapse (%)	-0.13

Proposed Mixed Use Development
Mission Viejo, California
Project No. 20G237-1

PLATE C- 4

SoCalGeo
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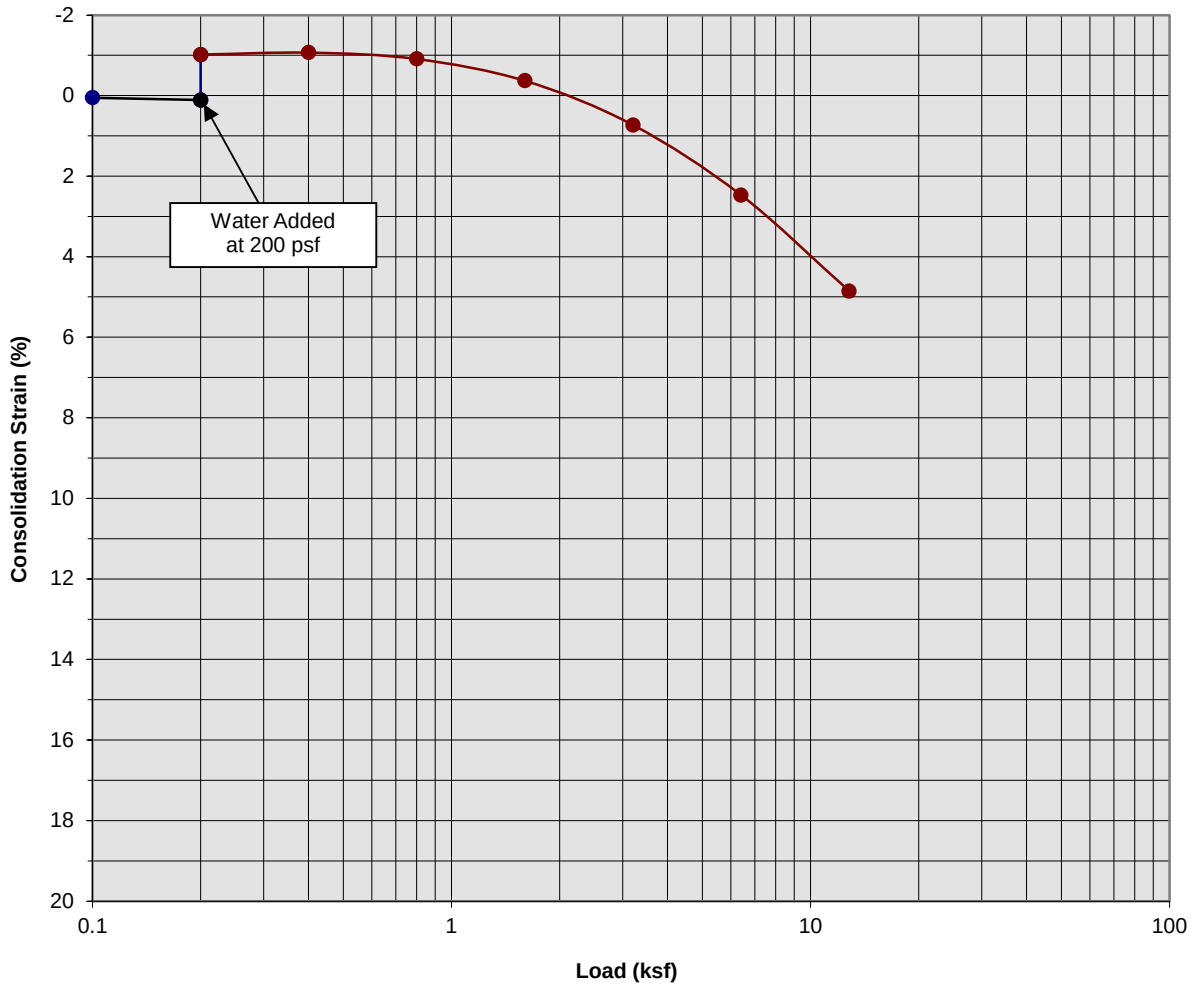
Consolidation/Collapse Test Results



Classification: BEDROCK: Light Gray Silty Claystone

Boring Number:	B-5	Initial Moisture Content (%)	24
Sample Number:	---	Final Moisture Content (%)	26
Depth (ft)	3 to 4	Initial Dry Density (pcf)	95.6
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	100.6
Specimen Thickness (in)	1.0	Percent Collapse (%)	-1.13

Proposed Mixed Use Development
Mission Viejo, California
Project No. 20G237-1

PLATE C- 5

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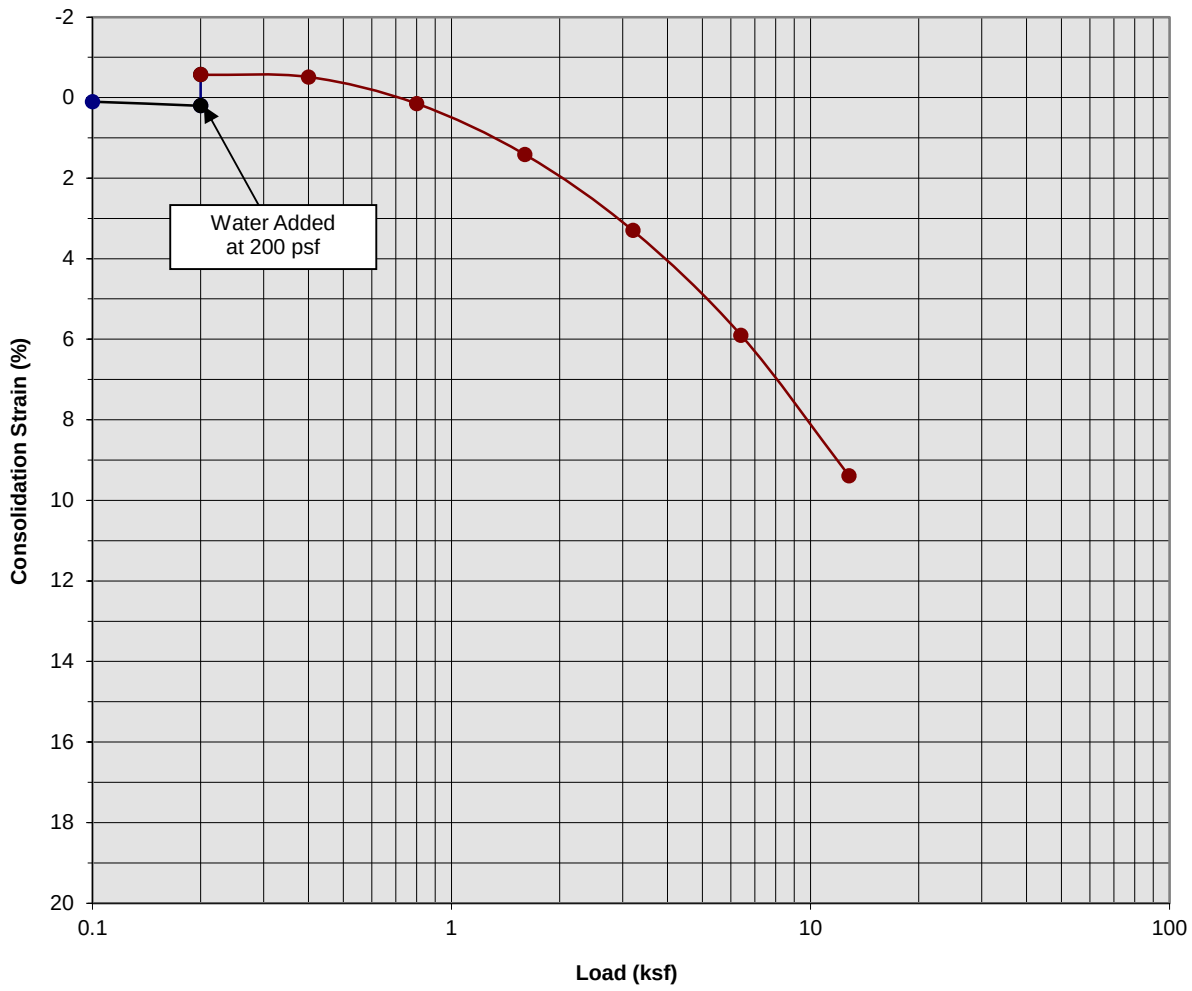
Consolidation/Collapse Test Results



Classification: BEDROCK: Light Gray Silty Claystone

Boring Number:	B-5	Initial Moisture Content (%)	30
Sample Number:	---	Final Moisture Content (%)	32
Depth (ft)	5 to 6	Initial Dry Density (pcf)	84.5
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	93.3
Specimen Thickness (in)	1.0	Percent Collapse (%)	-0.77

Proposed Mixed Use Development
Mission Viejo, California
Project No. 20G237-1

PLATE C- 6

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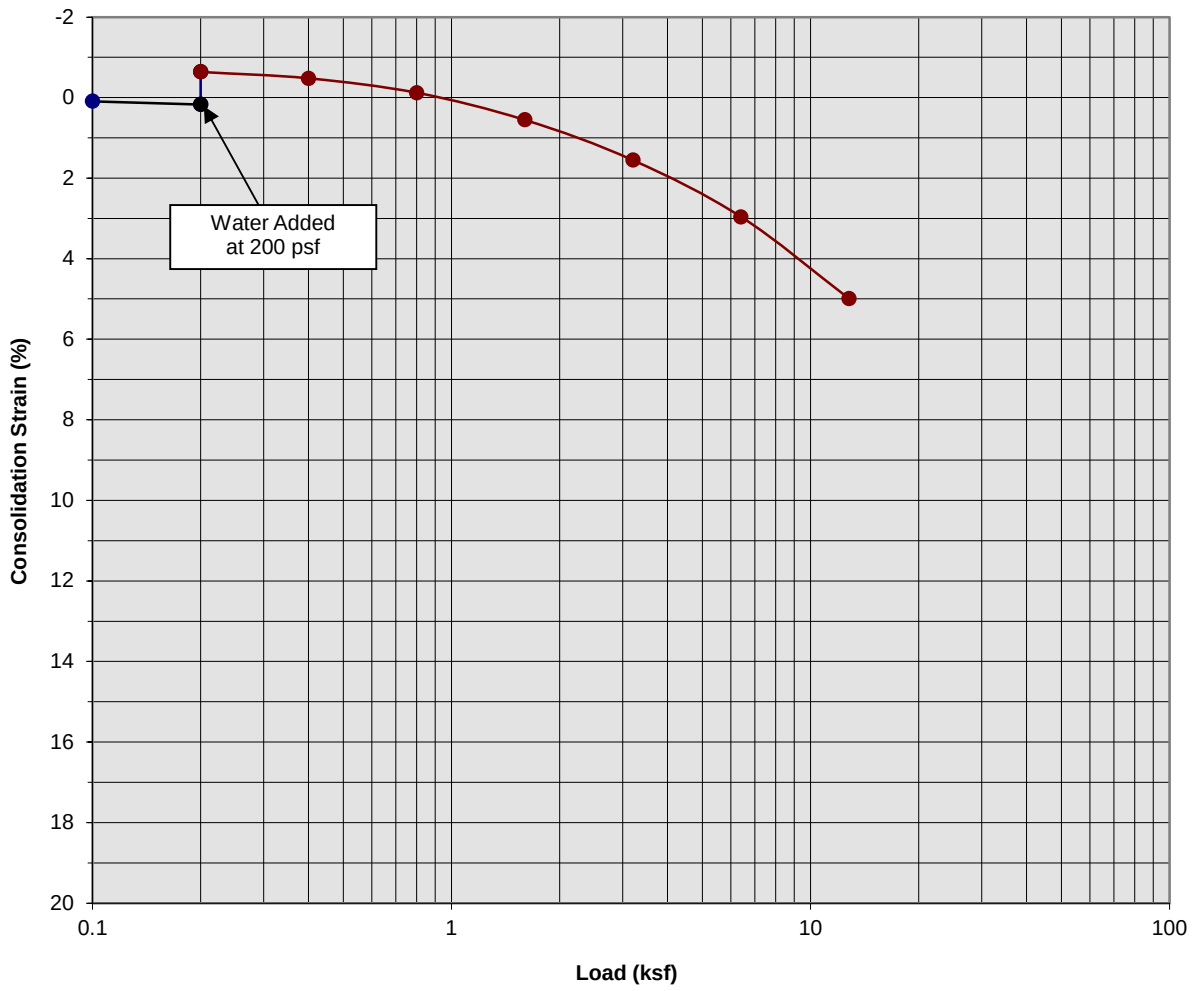
Consolidation/Collapse Test Results



Classification: BEDROCK: Light Gray Silty Claystone, some Sand

Boring Number:	B-5	Initial Moisture Content (%)	25
Sample Number:	---	Final Moisture Content (%)	28
Depth (ft)	7 to 8	Initial Dry Density (pcf)	94.4
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	99.2
Specimen Thickness (in)	1.0	Percent Collapse (%)	-0.81

Proposed Mixed Use Development
Mission Viejo, California
Project No. 20G237-1

PLATE C- 7

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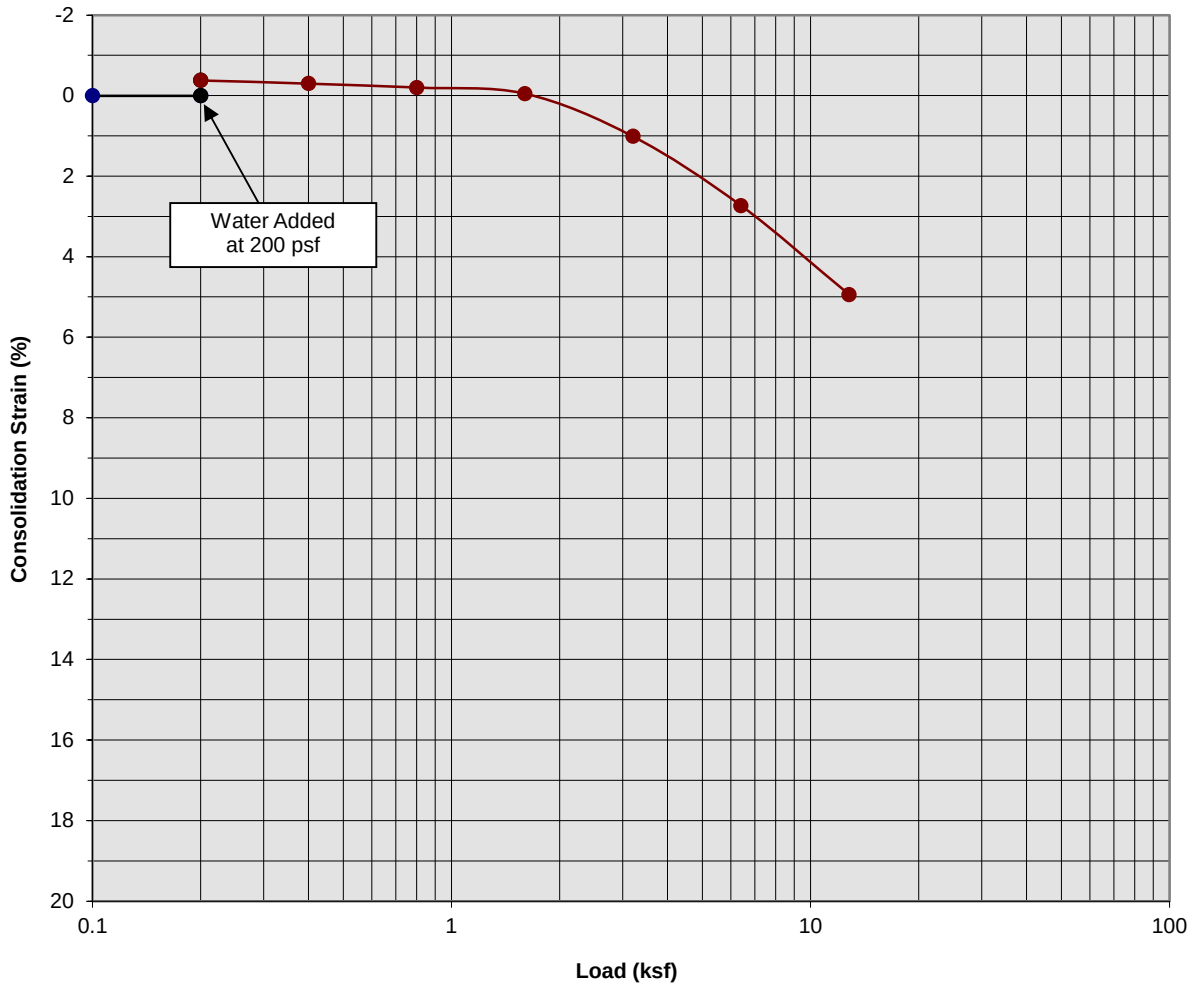
Consolidation/Collapse Test Results



Classification: BEDROCK: Light Gray Silty Claystone

Boring Number:	B-5	Initial Moisture Content (%)	28
Sample Number:	---	Final Moisture Content (%)	32
Depth (ft)	9 to 10	Initial Dry Density (pcf)	93.7
Specimen Diameter (in)	2.4	Final Dry Density (pcf)	98.3
Specimen Thickness (in)	1.0	Percent Collapse (%)	-0.38

Proposed Mixed Use Development
Mission Viejo, California
Project No. 20G237-1

PLATE C- 8

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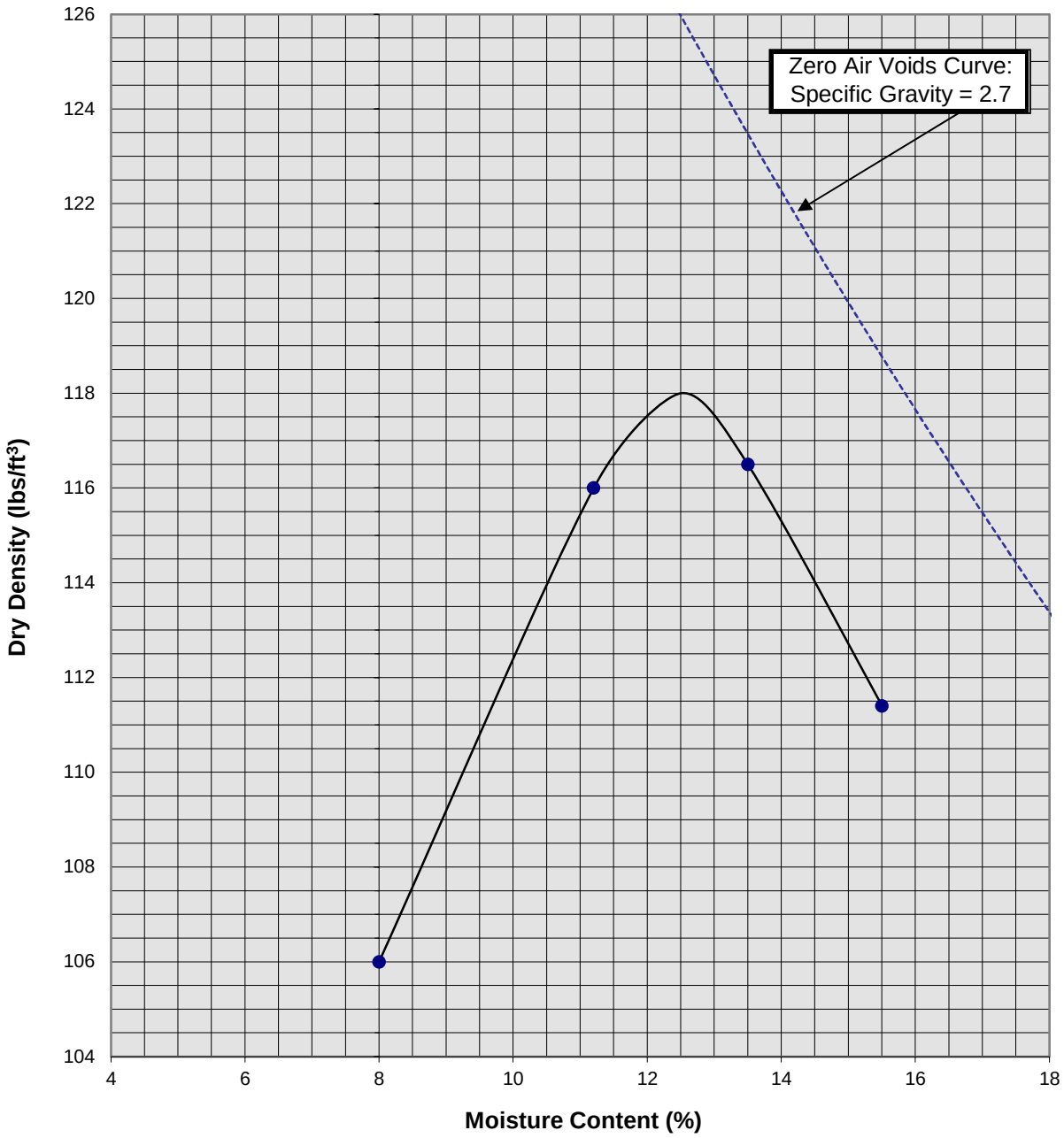
Moisture/Density Relationship
ASTM D-1557



Soil ID Number	B-5 @ 0-5'
Optimum Moisture (%)	12.5
Maximum Dry Density (pcf)	118
Soil Classification	Gray Brown Silty Clay

Proposed Mixed Use Development
Mission Viejo
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PLATE C-9

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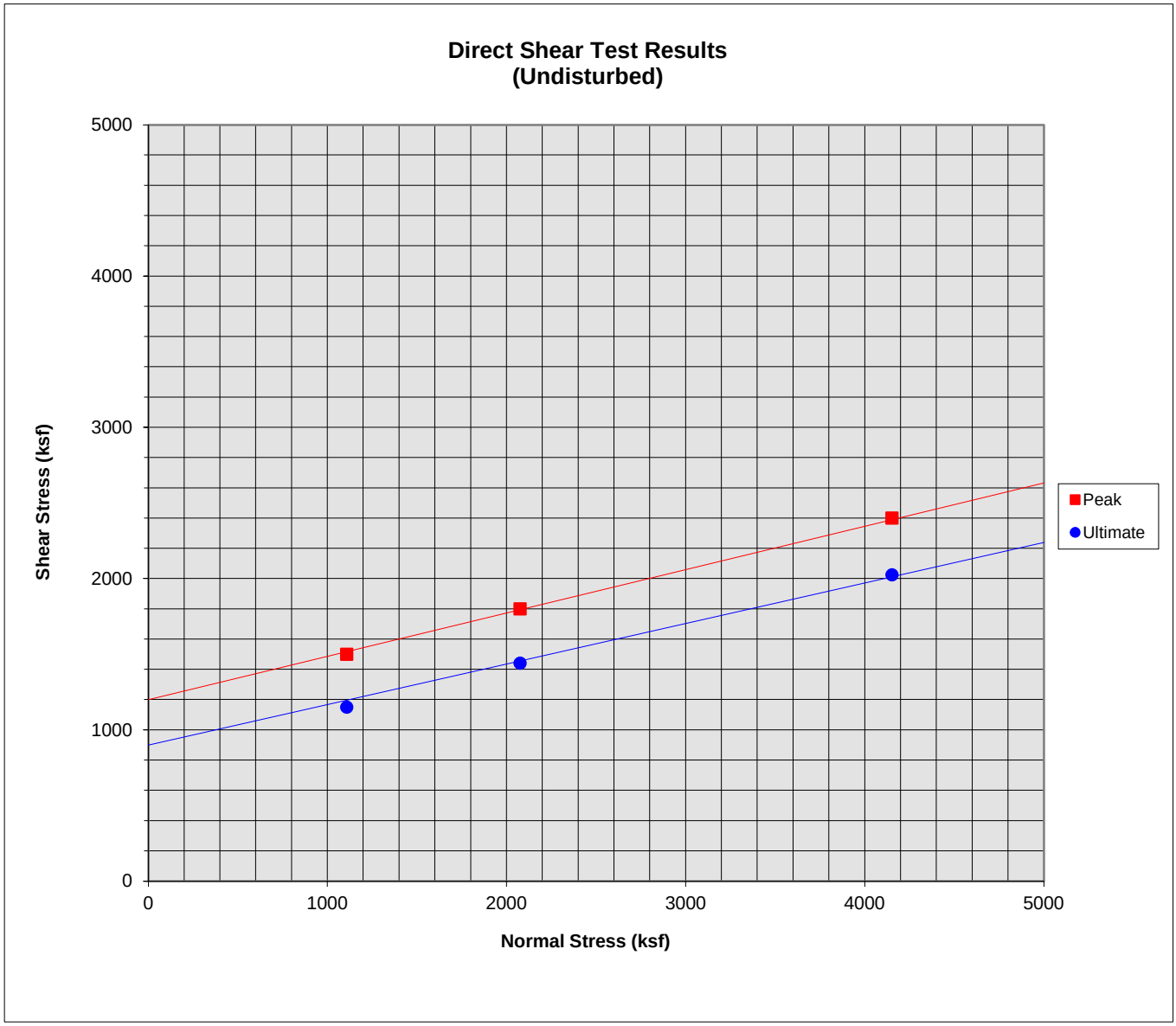

Sample Description: B-14 @ 14'

Classification: BEDROCK: Gray Clayey Siltstone

Sample Data		Test Results		
Initial Moisture Content	20.0			
Final Moisture Content	36.0		Peak	Ultimate
Initial Dry Density	100.0	ϕ (°)	16.0	15.0
Final Dry Density	--	C (psf)	1200	900
Specimen Diameter (in)	2.4			
Specimen Thickness (in)	1.0			

Proposed Mixed Use Development
Mission Viejo, California
Project No. 20G237-1

PLATE C- 10

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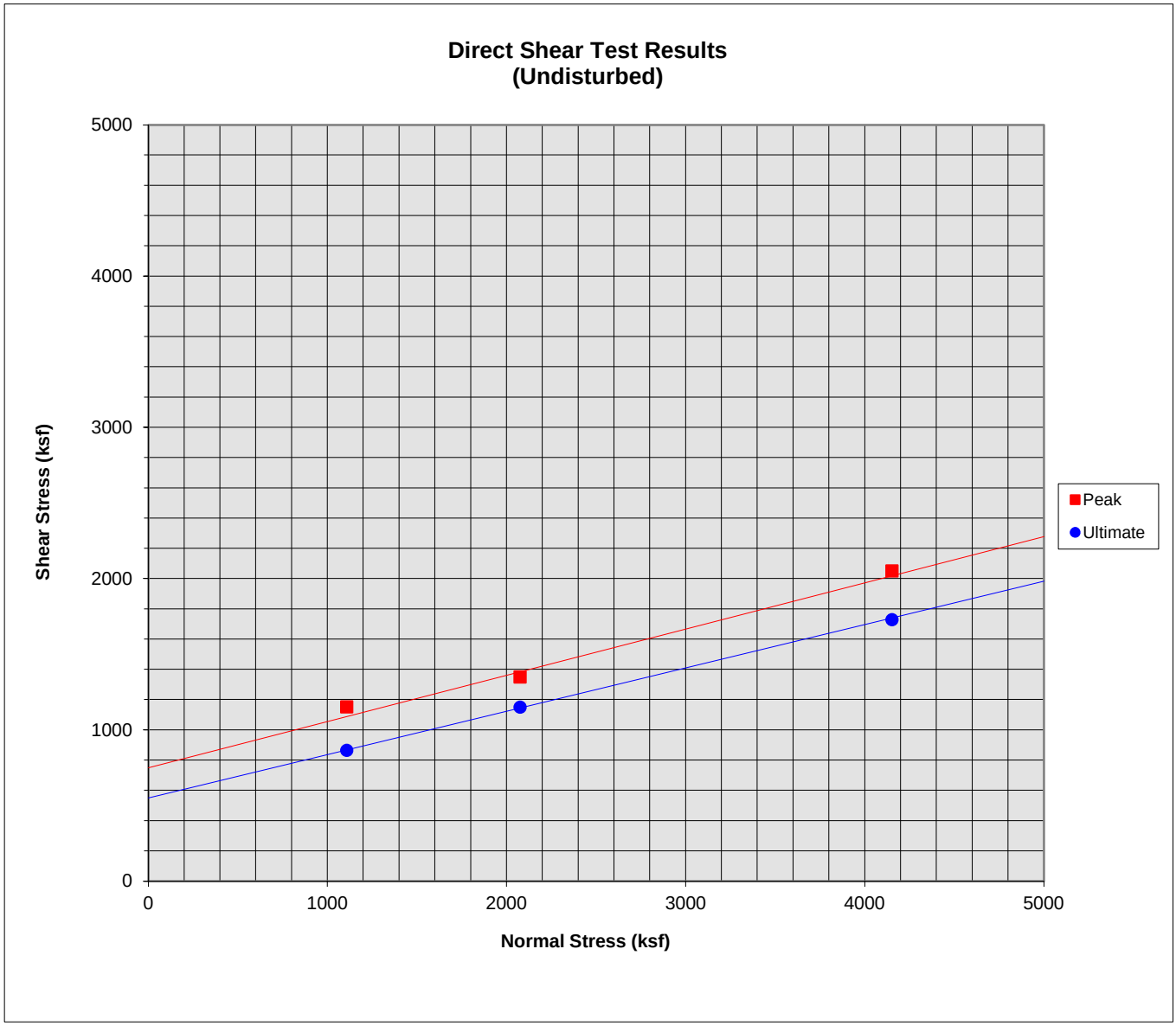

Sample Description: B-16 @ 24'

Classification: BEDROCK: Gray Brown Silty Claystone

Sample Data	
Initial Moisture Content	30.0
Final Moisture Content	37.0
Initial Dry Density	90.0
Final Dry Density	--
Specimen Diameter (in)	2.4
Specimen Thickness (in)	1.0

Test Results	Peak	Ultimate
ϕ (°)	17.0	16.0
C (psf)	750	550

Proposed Mixed Use Development
Mission Viejo, California
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PLATE C- 11

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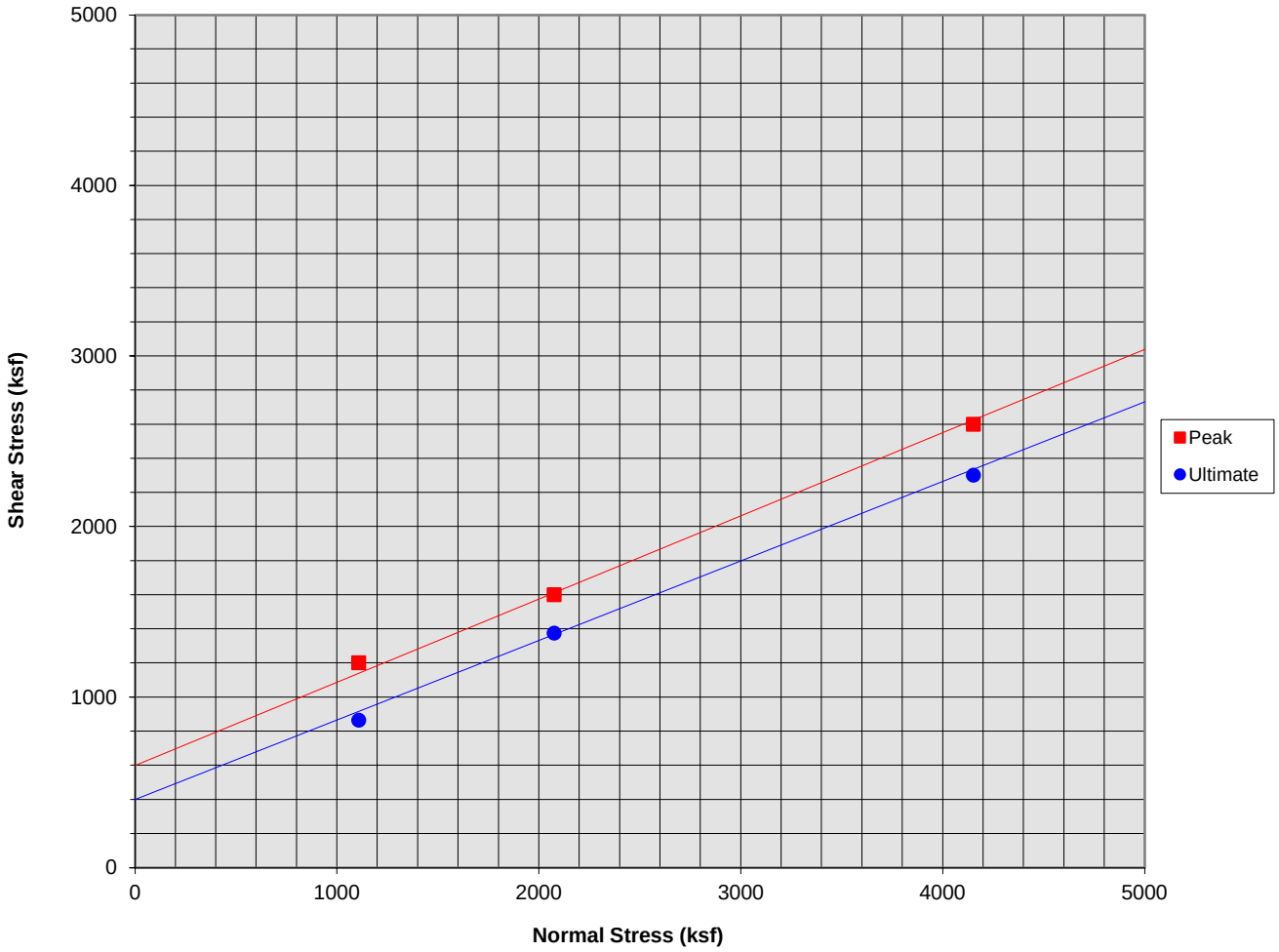
Direct Shear Test Results
(Undisturbed)



Sample Description: B-17 @ 19'

Classification: BEDROCK: Gray Brown to Dark Gray Siltstone, little Clay

Sample Data	
Initial Moisture Content	23.0
Final Moisture Content	34.0
Initial Dry Density	101.0
Final Dry Density	--
Specimen Diameter (in)	2.4
Specimen Thickness (in)	1.0

Test Results		
	Peak	Ultimate
ϕ (°)	26.0	25.0
C (psf)	600	400

Proposed Mixed Use Development
Mission Viejo, California
Project No. 20G237-1

PLATE C- 12

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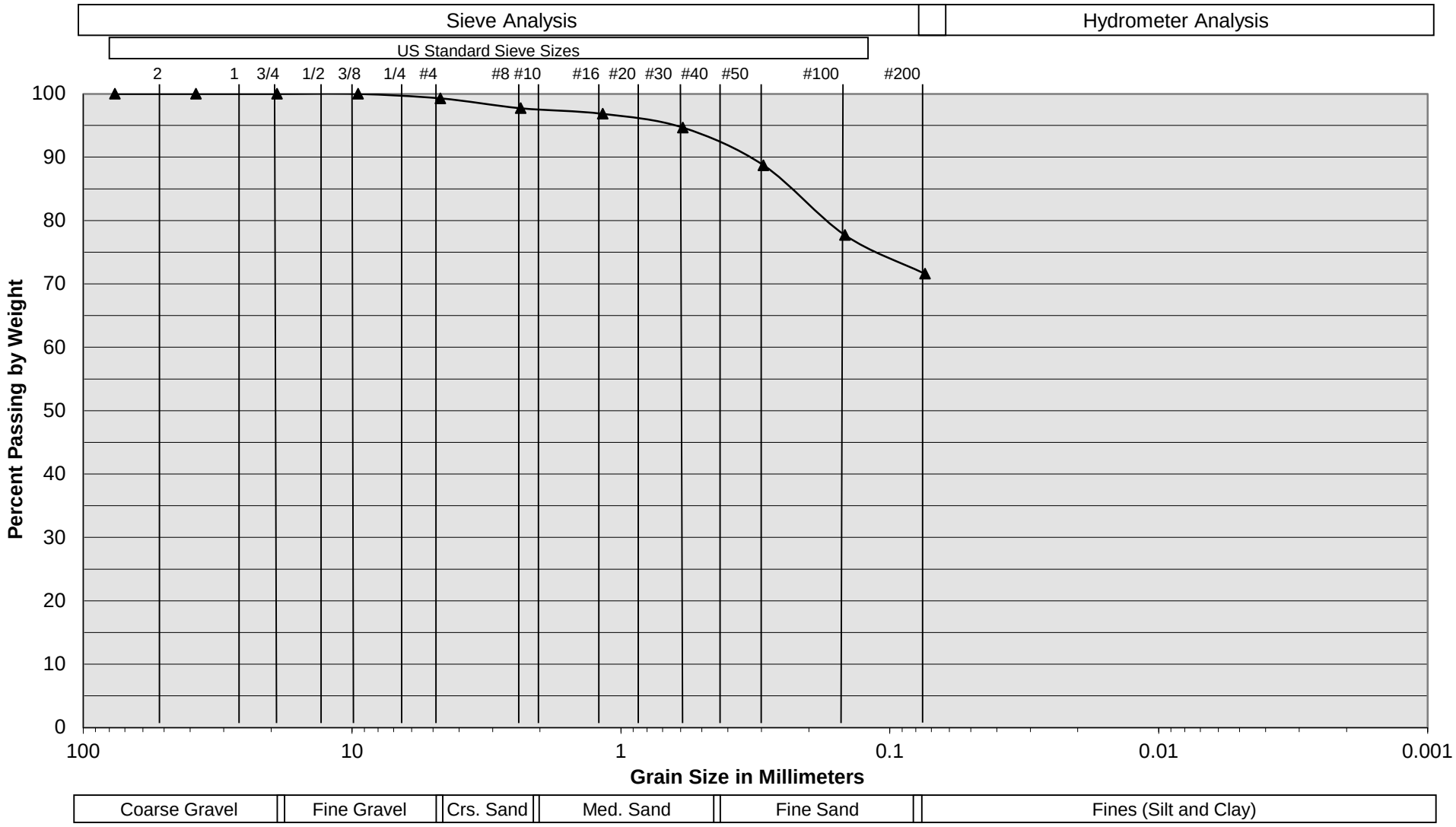
Grain Size Distribution



Sample Description	B-1 @ 3'
Soil Classification	FILL: Fine Sandy Clay, trace medium Sand

Proposed Mixed Use Development
Mission Viejo, California
Project No. 20G237-1
PLATE C- 13

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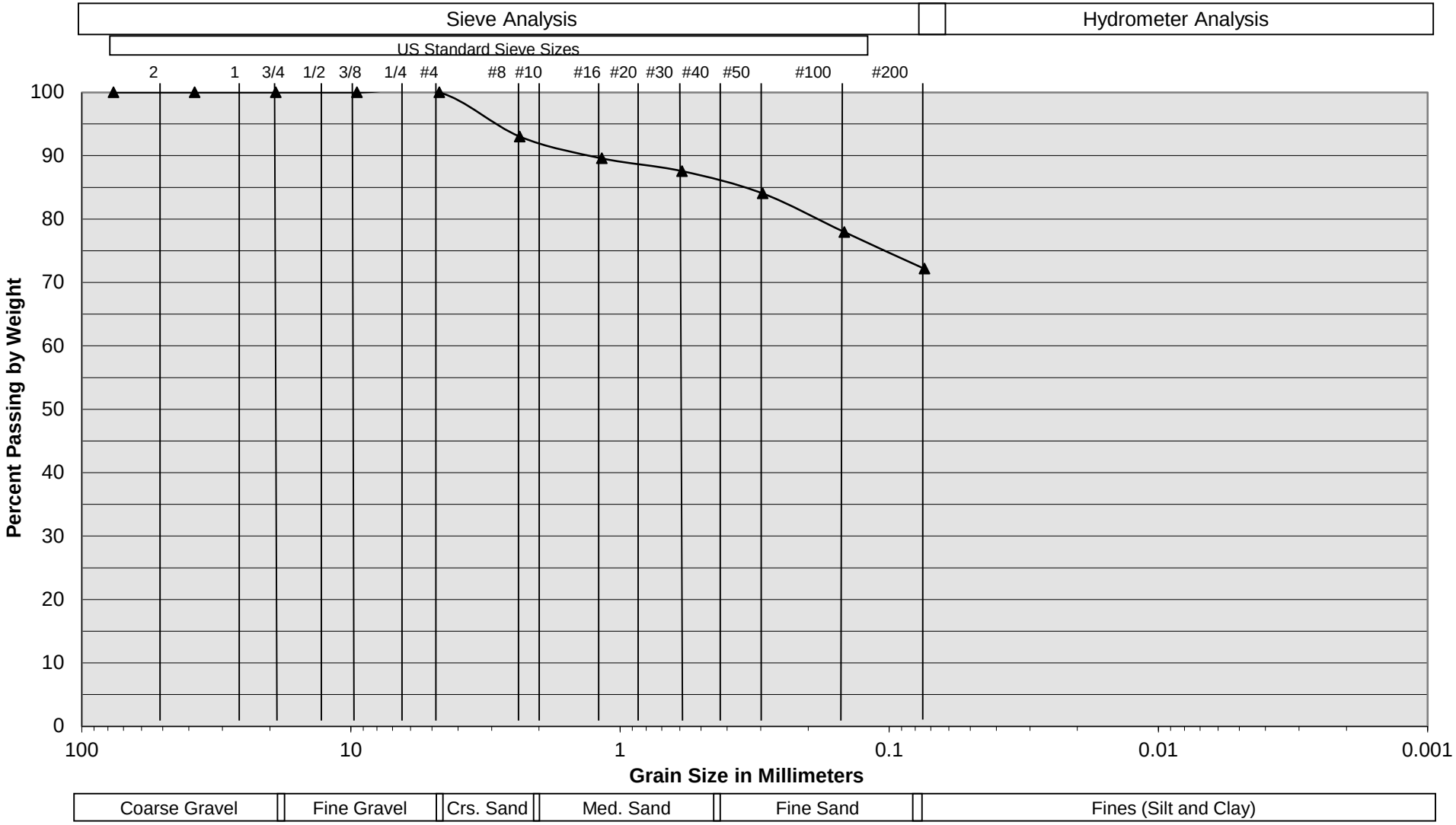
Grain Size Distribution



Sample Description	B-2 @ 9'
Soil Classification	BEDROCK: Clayey Siltstone, little fine to coarse Sand

Proposed Mixed Use Development
Mission Viejo, California
Project No. 20G237-1
PLATE C- 14

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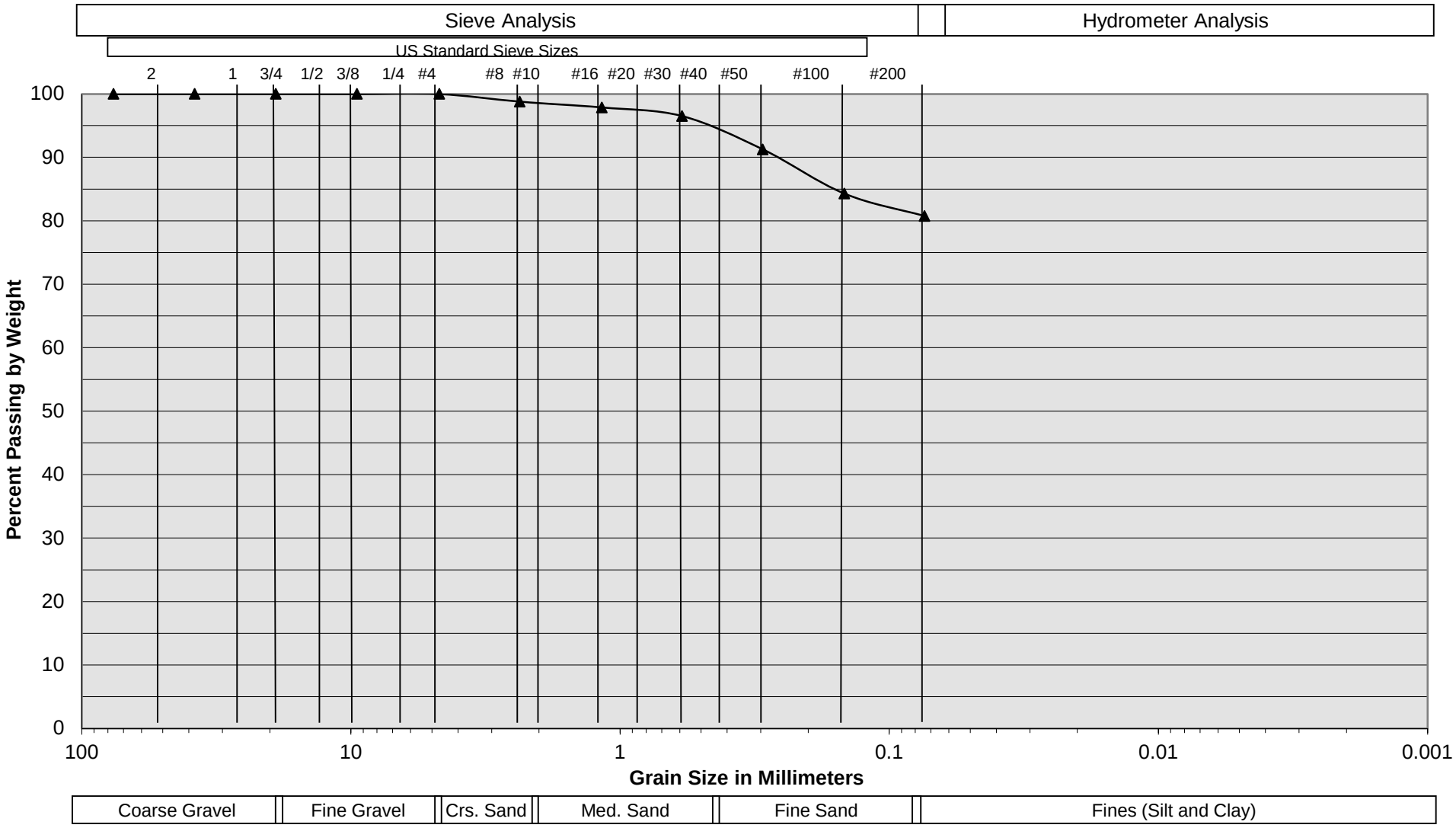
Grain Size Distribution



Sample Description	B-19 @ 9'
Soil Classification	BEDROCK: Silty Claystone, little fine to medium Sand

Proposed Mixed Use Development
Mission Viejo, California
Project No. 20G237-1
PLATE C- 15

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APPENDIX D

GRADING GUIDE SPECIFICATIONS

These grading guide specifications are intended to provide typical procedures for grading operations. They are intended to supplement the recommendations contained in the geotechnical investigation report for this project. Should the recommendations in the geotechnical investigation report conflict with the grading guide specifications, the more site specific recommendations in the geotechnical investigation report will govern.

General

- The Earthwork Contractor is responsible for the satisfactory completion of all earthwork in accordance with the plans and geotechnical reports, and in accordance with city, county, and applicable building codes.

- The Geotechnical Engineer is the representative of the Owner/Builder for the purpose of implementing the report recommendations and guidelines. These duties are not intended to relieve the Earthwork Contractor of any responsibility to perform in a workman-like manner, nor is the Geotechnical Engineer to direct the grading equipment or personnel employed by the Contractor.

- The Earthwork Contractor is required to notify the Geotechnical Engineer of the anticipated work and schedule so that testing and inspections can be provided. If necessary, work may be stopped and redone if personnel have not been scheduled in advance.

- The Earthwork Contractor is required to have suitable and sufficient equipment on the job-site to process, moisture condition, mix and compact the amount of fill being placed to the approved compaction. In addition, suitable support equipment should be available to conform with recommendations and guidelines in this report.

- Canyon cleanouts, overexcavation areas, processed ground to receive fill, key excavations, subdrains and benches should be observed by the Geotechnical Engineer prior to placement of any fill. It is the Earthwork Contractor's responsibility to notify the Geotechnical Engineer of areas that are ready for inspection.

- Excavation, filling, and subgrade preparation should be performed in a manner and sequence that will provide drainage at all times and proper control of erosion. Precipitation, springs, and seepage water encountered shall be pumped or drained to provide a suitable working surface. The Geotechnical Engineer must be informed of springs or water seepage encountered during grading or foundation construction for possible revision to the recommended construction procedures and/or installation of subdrains.

Site Preparation

- The Earthwork Contractor is responsible for all clearing, grubbing, stripping and site preparation for the project in accordance with the recommendations of the Geotechnical Engineer.

- If any materials or areas are encountered by the Earthwork Contractor which are suspected of having toxic or environmentally sensitive contamination, the Geotechnical Engineer and Owner/Builder should be notified immediately.

- Major vegetation should be stripped and disposed of off-site. This includes trees, brush, heavy grasses and any materials considered unsuitable by the Geotechnical Engineer.

- Underground structures such as basements, cesspools or septic disposal systems, mining shafts, tunnels, wells and pipelines should be removed under the inspection of the Geotechnical Engineer and recommendations provided by the Geotechnical Engineer and/or city, county or state agencies. If such structures are known or found, the Geotechnical Engineer should be notified as soon as possible so that recommendations can be formulated.

- Any topsoil, slopewash, colluvium, alluvium and rock materials which are considered unsuitable by the Geotechnical Engineer should be removed prior to fill placement.

- Remaining voids created during site clearing caused by removal of trees, foundations basements, irrigation facilities, etc., should be excavated and filled with compacted fill.

- Subsequent to clearing and removals, areas to receive fill should be scarified to a depth of 10 to 12 inches, moisture conditioned and compacted

- The moisture condition of the processed ground should be at or slightly above the optimum moisture content as determined by the Geotechnical Engineer. Depending upon field conditions, this may require air drying or watering together with mixing and/or discing.

Compacted Fills

- Soil materials imported to or excavated on the property may be utilized in the fill, provided each material has been determined to be suitable in the opinion of the Geotechnical Engineer. Unless otherwise approved by the Geotechnical Engineer, all fill materials shall be free of deleterious, organic, or frozen matter, shall contain no chemicals that may result in the material being classified as "contaminated," and shall be very low to non-expansive with a maximum expansion index (EI) of 50. The top 12 inches of the compacted fill should have a maximum particle size of 3 inches, and all underlying compacted fill material a maximum 6-inch particle size, except as noted below.

- All soils should be evaluated and tested by the Geotechnical Engineer. Materials with high expansion potential, low strength, poor gradation or containing organic materials may require removal from the site or selective placement and/or mixing to the satisfaction of the Geotechnical Engineer.

- Rock fragments or rocks less than 6 inches in their largest dimensions, or as otherwise determined by the Geotechnical Engineer, may be used in compacted fill, provided the distribution and placement is satisfactory in the opinion of the Geotechnical Engineer.

- Rock fragments or rocks greater than 12 inches should be taken off-site or placed in accordance with recommendations and in areas designated as suitable by the Geotechnical Engineer. These materials should be placed in accordance with Plate D-8 of these Grading Guide Specifications and in accordance with the following recommendations:

    - Rocks 12 inches or more in diameter should be placed in rows at least 15 feet apart, 15 feet from the edge of the fill, and 10 feet or more below subgrade. Spaces should be left between each rock fragment to provide for placement and compaction of soil around the fragments.

    - Fill materials consisting of soil meeting the minimum moisture content requirements and free of oversize material should be placed between and over the rows of rock or

concrete. Ample water and compactive effort should be applied to the fill materials as they are placed in order that all of the voids between each of the fragments are filled and compacted to the specified density.

- Subsequent rows of rocks should be placed such that they are not directly above a row placed in the previous lift of fill. A minimum 5-foot offset between rows is recommended.

- To facilitate future trenching, oversized material should not be placed within the range of foundation excavations, future utilities or other underground construction unless specifically approved by the soil engineer and the developer/owner representative.

- Fill materials approved by the Geotechnical Engineer should be placed in areas previously prepared to receive fill and in evenly placed, near horizontal layers at about 6 to 8 inches in loose thickness, or as otherwise determined by the Geotechnical Engineer for the project.

- Each layer should be moisture conditioned to optimum moisture content, or slightly above, as directed by the Geotechnical Engineer. After proper mixing and/or drying, to evenly distribute the moisture, the layers should be compacted to at least 90 percent of the maximum dry density in compliance with ASTM D-1557-78 unless otherwise indicated.

- Density and moisture content testing should be performed by the Geotechnical Engineer at random intervals and locations as determined by the Geotechnical Engineer. These tests are intended as an aid to the Earthwork Contractor, so he can evaluate his workmanship, equipment effectiveness and site conditions. The Earthwork Contractor is responsible for compaction as required by the Geotechnical Report(s) and governmental agencies.

- Fill areas unused for a period of time may require moisture conditioning, processing and recompaction prior to the start of additional filling. The Earthwork Contractor should notify the Geotechnical Engineer of his intent so that an evaluation can be made.

- Fill placed on ground sloping at a 5-to-1 inclination (horizontal-to-vertical) or steeper should be benched into bedrock or other suitable materials, as directed by the Geotechnical Engineer. Typical details of benching are illustrated on Plates D-2, D-4, and D-5.

- Cut/fill transition lots should have the cut portion overexcavated to a depth of at least 3 feet and rebuilt with fill (see Plate D-1), as determined by the Geotechnical Engineer.

- All cut lots should be inspected by the Geotechnical Engineer for fracturing and other bedrock conditions. If necessary, the pads should be overexcavated to a depth of 3 feet and rebuilt with a uniform, more cohesive soil type to impede moisture penetration.

- Cut portions of pad areas above buttresses or stabilizations should be overexcavated to a depth of 3 feet and rebuilt with uniform, more cohesive compacted fill to impede moisture penetration.

- Non-structural fill adjacent to structural fill should typically be placed in unison to provide lateral support. Backfill along walls must be placed and compacted with care to ensure that excessive unbalanced lateral pressures do not develop. The type of fill material placed adjacent to below grade walls must be properly tested and approved by the Geotechnical Engineer with consideration of the lateral earth pressure used in the design.

Foundations

- The foundation influence zone is defined as extending one foot horizontally from the outside edge of a footing, and proceeding downward at a ½ horizontal to 1 vertical (0.5:1) inclination.

- Where overexcavation beneath a footing subgrade is necessary, it should be conducted so as to encompass the entire foundation influence zone, as described above.

- Compacted fill adjacent to exterior footings should extend at least 12 inches above foundation bearing grade. Compacted fill within the interior of structures should extend to the floor subgrade elevation.

Fill Slopes

- The placement and compaction of fill described above applies to all fill slopes. Slope compaction should be accomplished by overfilling the slope, adequately compacting the fill in even layers, including the overfilled zone and cutting the slope back to expose the compacted core

- Slope compaction may also be achieved by backrolling the slope adequately every 2 to 4 vertical feet during the filling process as well as requiring the earth moving and compaction equipment to work close to the top of the slope. Upon completion of slope construction, the slope face should be compacted with a sheepsfoot connected to a sideboom and then grid rolled. This method of slope compaction should only be used if approved by the Geotechnical Engineer.

- Sandy soils lacking in adequate cohesion may be unstable for a finished slope condition and therefore should not be placed within 15 horizontal feet of the slope face.

- All fill slopes should be keyed into bedrock or other suitable material. Fill keys should be at least 15 feet wide and inclined at 2 percent into the slope. For slopes higher than 30 feet, the fill key width should be equal to one-half the height of the slope (see Plate D-5).

- All fill keys should be cleared of loose slough material prior to geotechnical inspection and should be approved by the Geotechnical Engineer and governmental agencies prior to filling.

- The cut portion of fill over cut slopes should be made first and inspected by the Geotechnical Engineer for possible stabilization requirements. The fill portion should be adequately keyed through all surficial soils and into bedrock or suitable material. Soils should be removed from the transition zone between the cut and fill portions (see Plate D-2).

Cut Slopes

- All cut slopes should be inspected by the Geotechnical Engineer to determine the need for stabilization. The Earthwork Contractor should notify the Geotechnical Engineer when slope cutting is in progress at intervals of 10 vertical feet. Failure to notify may result in a delay in recommendations.

- Cut slopes exposing loose, cohesionless sands should be reported to the Geotechnical Engineer for possible stabilization recommendations.

- All stabilization excavations should be cleared of loose slough material prior to geotechnical inspection. Stakes should be provided by the Civil Engineer to verify the location and dimensions of the key. A typical stabilization fill detail is shown on Plate D-5.

- Stabilization key excavations should be provided with subdrains. Typical subdrain details are shown on Plates D-6.

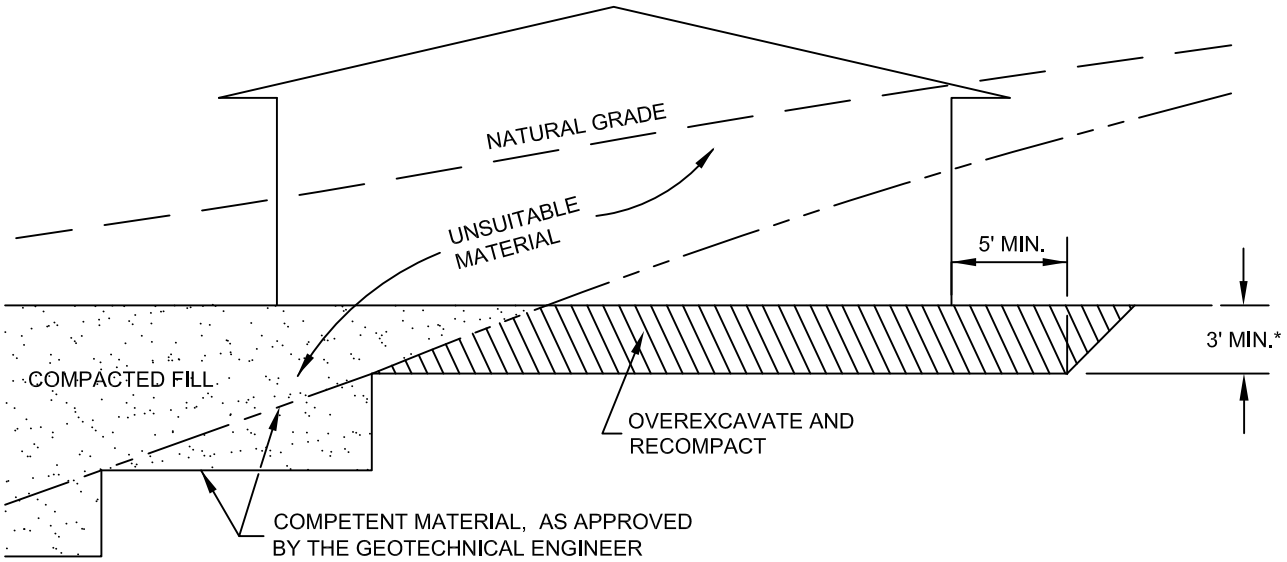
Subdrains

- Subdrains may be required in canyons and swales where fill placement is proposed. Typical subdrain details for canyons are shown on Plate D-3. Subdrains should be installed after approval of removals and before filling, as determined by the Soils Engineer.

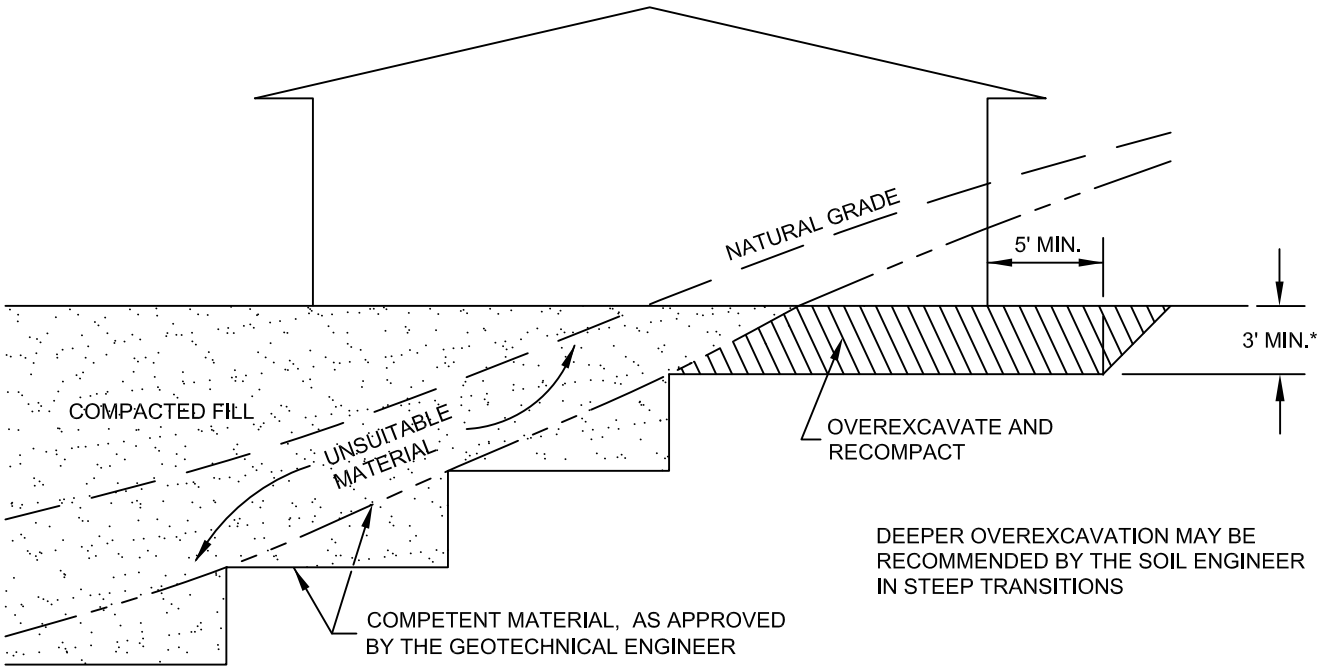
- Plastic pipe may be used for subdrains provided it is Schedule 40 or SDR 35 or equivalent. Pipe should be protected against breakage, typically by placement in a square-cut (backhoe) trench or as recommended by the manufacturer.

- Filter material for subdrains should conform to CALTRANS Specification 68-1.025 or as approved by the Geotechnical Engineer for the specific site conditions. Clean ¾-inch crushed rock may be used provided it is wrapped in an acceptable filter cloth and approved by the Geotechnical Engineer. Pipe diameters should be 6 inches for runs up to 500 feet and 8 inches for the downstream continuations of longer runs. Four-inch diameter pipe may be used in buttress and stabilization fills.

CUT LOT



CUT/FILL LOT (TRANSITION)



*SEE TEXT OF REPORT FOR SPECIFIC RECOMMENDATION. ACTUAL DEPTH OF OVEREXCAVATION MAY BE GREATER.

TRANSITION LOT DETAIL

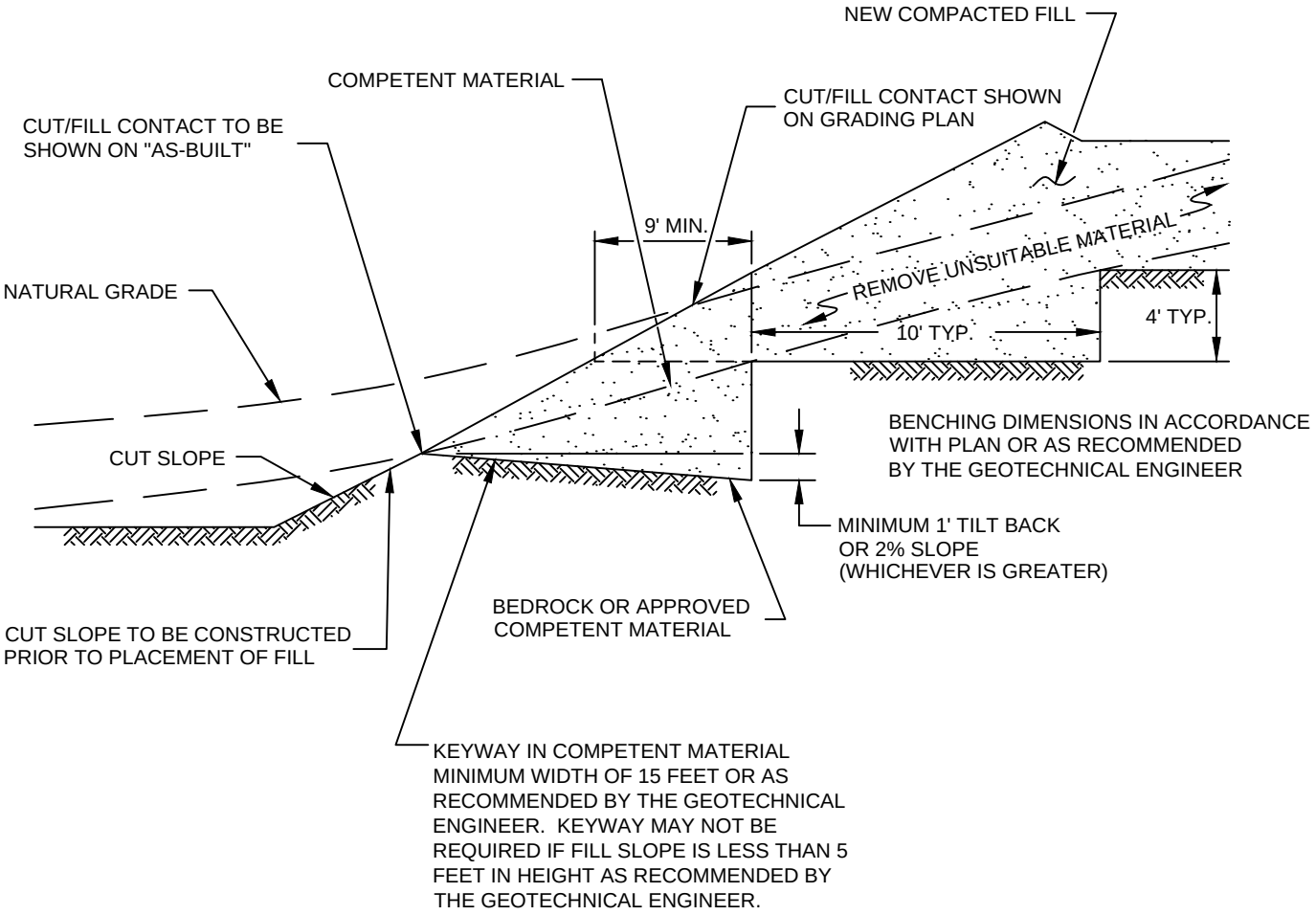
GRADING GUIDE SPECIFICATIONS

NOT TO SCALE

DRAWN: JAS
CHKD: GKM

PLATE D-1

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL



FILL ABOVE CUT SLOPE DETAIL

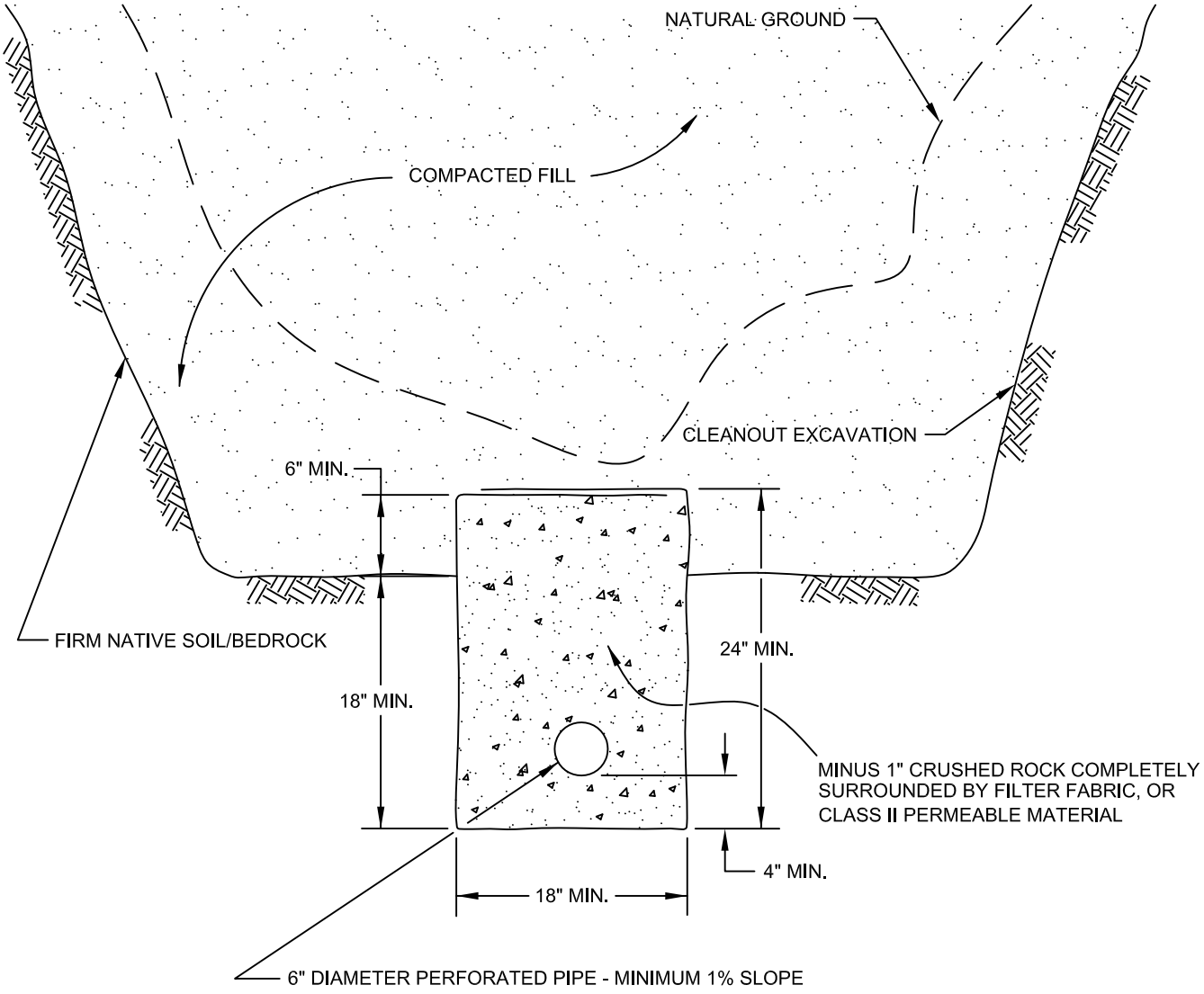
GRADING GUIDE SPECIFICATIONS

NOT TO SCALE

DRAWN: JAS
CHKD: GKM

PLATE D-2

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL



PIPE MATERIAL	DEPTH OF FILL OVER SUBDRAIN
ADS (CORRUGATED POLETHYLENE)	8
TRANSITE UNDERDRAIN	20
PVC OR ABS: SDR 35	35
SDR 21	100

SCHEMATIC ONLY
NOT TO SCALE

CANYON SUBDRAIN DETAIL

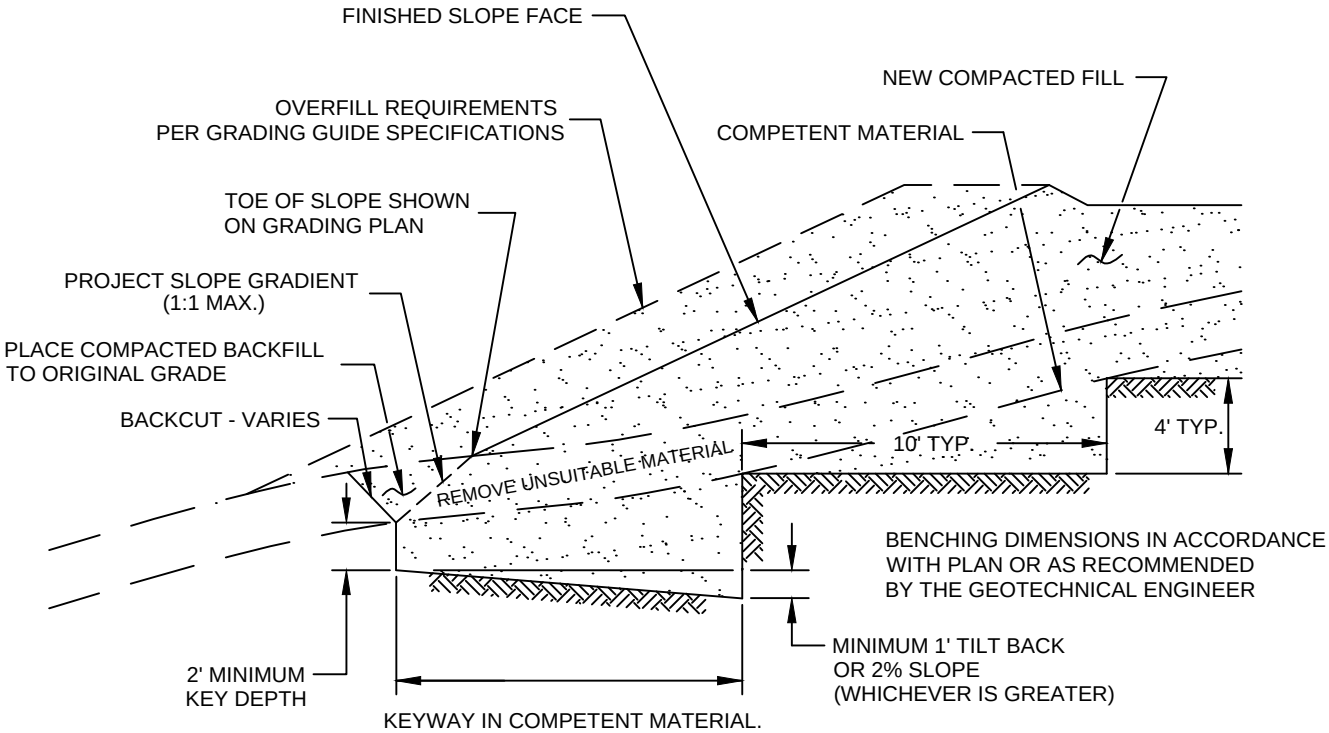
GRADING GUIDE SPECIFICATIONS

NOT TO SCALE

DRAWN: JAS
CHKD: GKM

PLATE D-3

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL



NOTE:
BENCHING SHALL BE REQUIRED WHEN NATURAL SLOPES ARE EQUAL TO OR STEEPER THAN 5:1 OR WHEN RECOMMENDED BY THE GEOTECHNICAL ENGINEER.

FILL ABOVE NATURAL SLOPE DETAIL

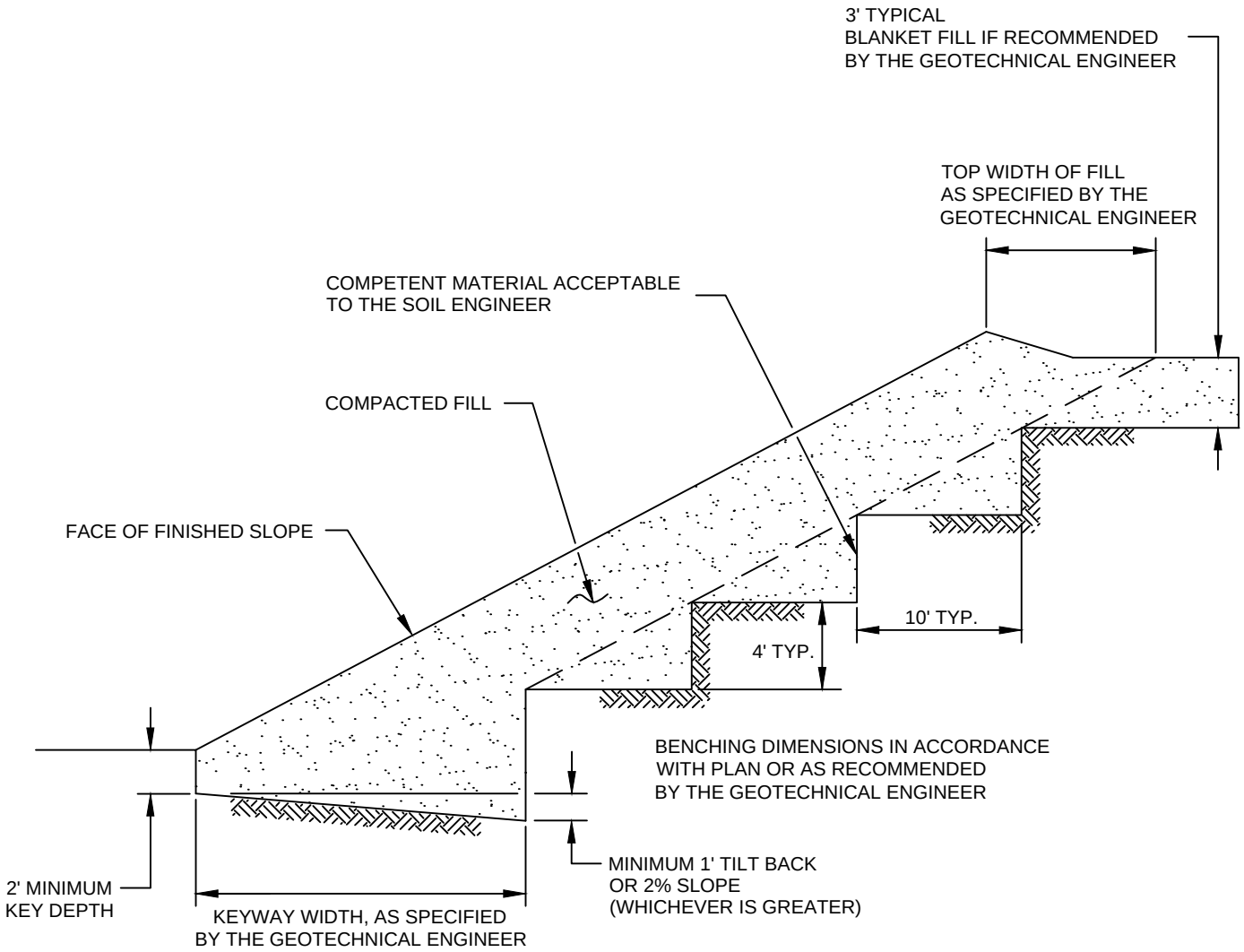
GRADING GUIDE SPECIFICATIONS

NOT TO SCALE

DRAWN: JAS
CHKD: GKM

PLATE D-4

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL



STABILIZATION FILL DETAIL

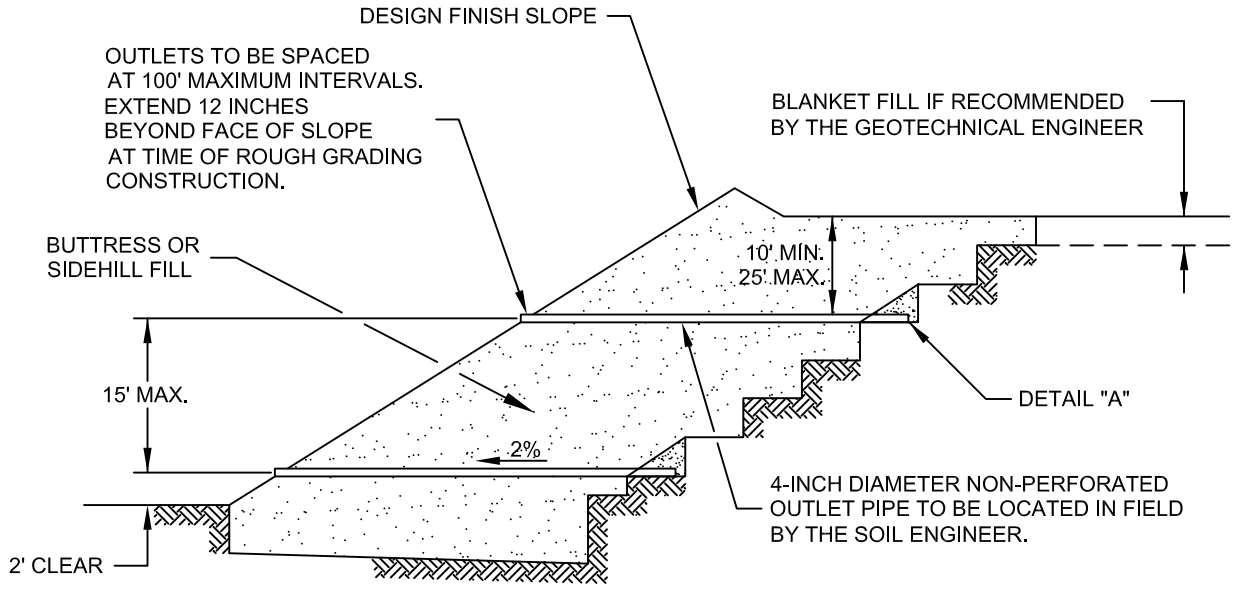
GRADING GUIDE SPECIFICATIONS

NOT TO SCALE

DRAWN: JAS
CHKD: GKM

PLATE D-5

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL



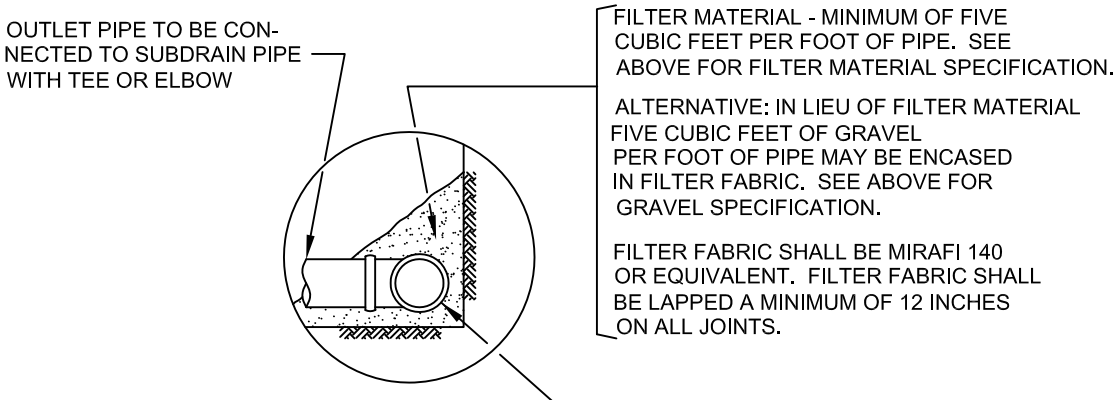
"FILTER MATERIAL" TO MEET FOLLOWING SPECIFICATION OR APPROVED EQUIVALENT: (CONFORMS TO EMA STD. PLAN 323)

SIEVE SIZE	PERCENTAGE PASSING
1"	100
3/4"	90-100
3/8"	40-100
NO. 4	25-40
NO. 8	18-33
NO. 30	5-15
NO. 50	0-7
NO. 200	0-3

"GRAVEL" TO MEET FOLLOWING SPECIFICATION OR APPROVED EQUIVALENT:

SIEVE SIZE	MAXIMUM PERCENTAGE PASSING
1 1/2"	100
NO. 4	50
NO. 200	8

SAND EQUIVALENT = MINIMUM OF 50



DETAIL "A"

NOTES:
1. TRENCH FOR OUTLET PIPES TO BE BACKFILLED WITH ON-SITE SOIL.

SLOPE FILL SUBDRAINS

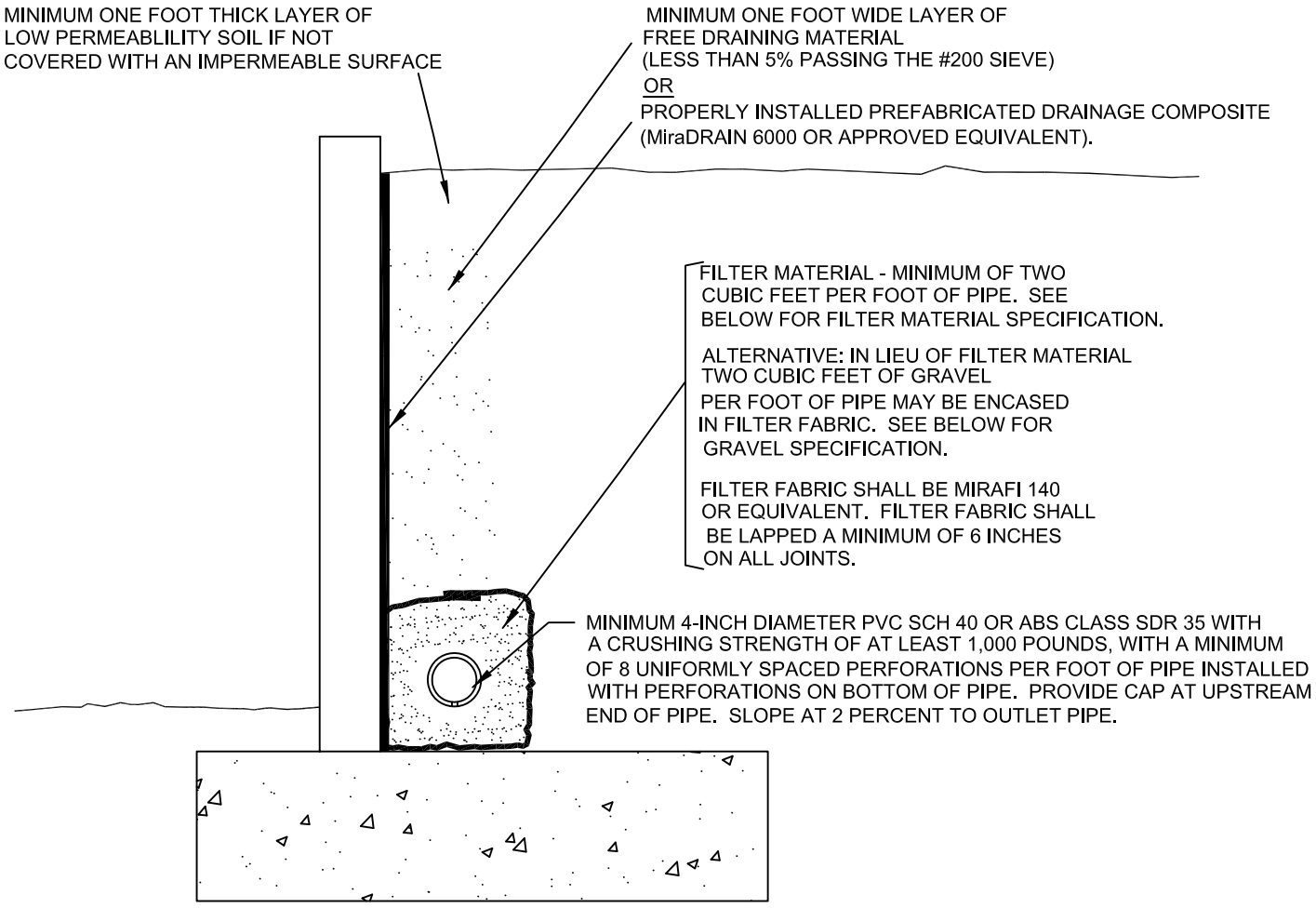
GRADING GUIDE SPECIFICATIONS

NOT TO SCALE

DRAWN: JAS
CHKD: GKM

PLATE D-6

SoCalGeo
SOUTHERN CALIFORNIA GEOTECHNICAL



"FILTER MATERIAL" TO MEET FOLLOWING SPECIFICATION OR APPROVED EQUIVALENT: (CONFORMS TO EMA STD. PLAN 323)

SIEVE SIZE	PERCENTAGE PASSING
1"	100
3/4"	90-100
3/8"	40-100
NO. 4	25-40
NO. 8	18-33
NO. 30	5-15
NO. 50	0-7
NO. 200	0-3

"GRAVEL" TO MEET FOLLOWING SPECIFICATION OR APPROVED EQUIVALENT:

SIEVE SIZE	MAXIMUM PERCENTAGE PASSING
1 1/2"	100
NO. 4	50
NO. 200	8

SAND EQUIVALENT = MINIMUM OF 50

RETAINING WALL BACKDRAINS

GRADING GUIDE SPECIFICATIONS

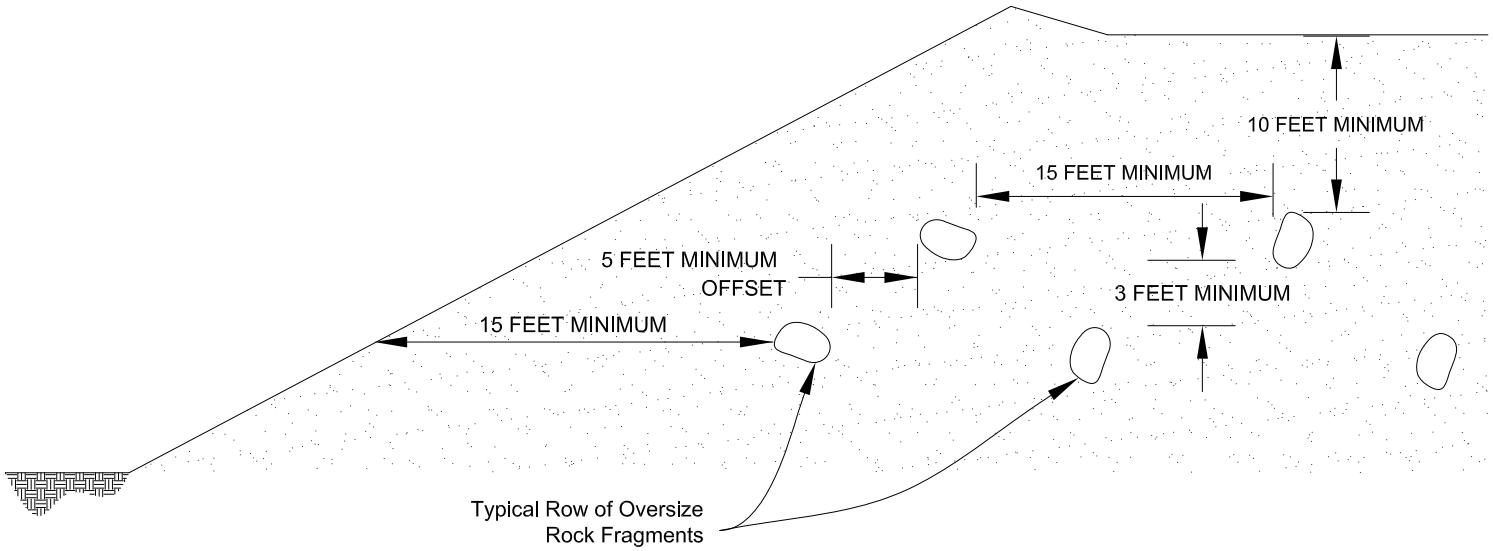
NOT TO SCALE

DRAWN: JAS
CHKD: GKM

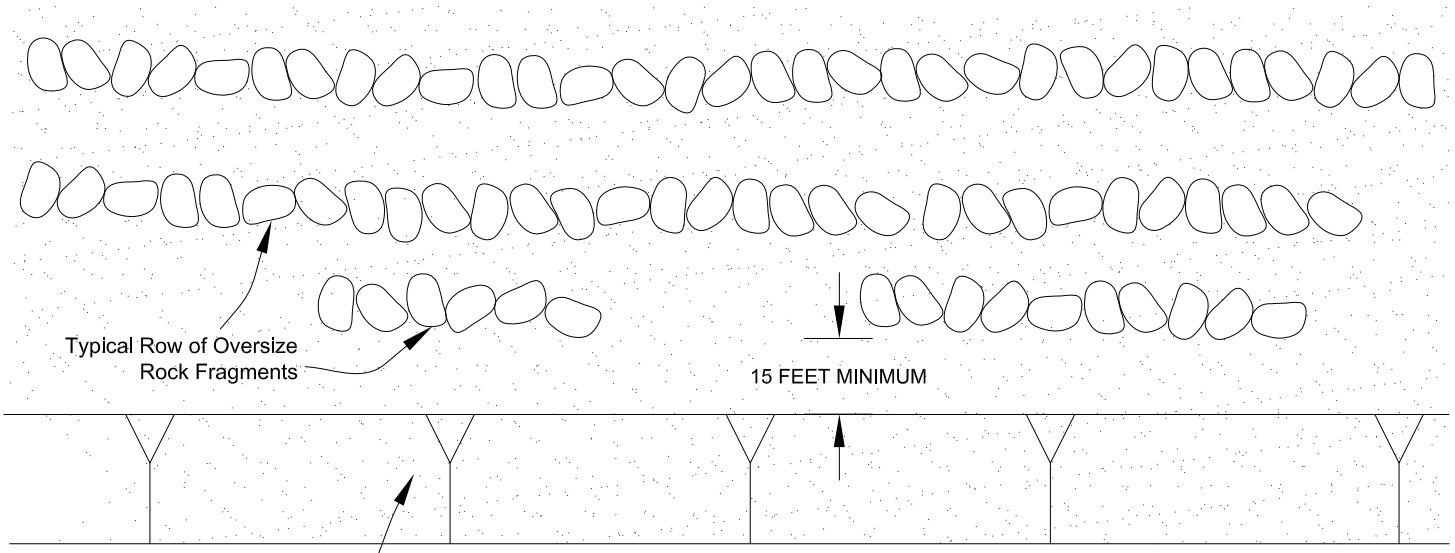
PLATE D-7

SoCalGeo

SOUTHERN CALIFORNIA GEOTECHNICAL



Section View



Plan View

PLACEMENT OF OVERSIZED MATERIAL

GRADING GUIDE SPECIFICATIONS

NOT TO SCALE

DRAWN: PM
CHKD: GKM

PLATE D-8

SoCalGeo

SOUTHERN CALIFORNIA GEOTECHNICAL

APPENDIX E

OSHPD

Latitude, Longitude: 33.597814, -117.658660

Date	12/18/2020, 2:45:37 PM
Design Code Reference Document	ASCE7-16
Risk Category	III
Site Class	D - Stiff Soil

Type	Value	Description
S_S	1.196	MCE_R ground motion. (for 0.2 second period)
S_1	0.431	MCE_R ground motion. (for 1.0s period)
S_{MS}	1.222	Site-modified spectral acceleration value
S_{M1}	null -See Section 11.4.8	Site-modified spectral acceleration value
S_{DS}	0.814	Numeric seismic design value at 0.2 second SA
S_{D1}	null -See Section 11.4.8	Numeric seismic design value at 1.0 second SA

Type	Value	Description
SDC	null -See Section 11.4.8	Seismic design category
F_a	1.022	Site amplification factor at 0.2 second
F_v	null -See Section 11.4.8	Site amplification factor at 1.0 second
PGA	0.5	MCE_G peak ground acceleration
F_{PGA}	1.1	Site amplification factor at PGA
PGA_M	0.55	Site modified peak ground acceleration
T_L	8	Long-period transition period in seconds
SsRT	1.196	Probabilistic risk-targeted ground motion. (0.2 second)
SsUH	1.274	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration
SsD	2.216	Factored deterministic acceleration value. (0.2 second)
S1RT	0.431	Probabilistic risk-targeted ground motion. (1.0 second)
S1UH	0.462	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration.
S1D	0.734	Factored deterministic acceleration value. (1.0 second)
PGAd	0.9	Factored deterministic acceleration value. (Peak Ground Acceleration)
C_{RS}	0.938	Mapped value of the risk coefficient at short periods
C_{R1}	0.934	Mapped value of the risk coefficient at a period of 1 s

SOURCE: SEAOC/OSHPD Seismic Design Maps Tool
<https://seismicmaps.org/>

SEISMIC DESIGN PARAMETERS - 2019 CBC

PROPOSED MIXED USE DEVELOPMENT

MISSION VIEJO, CALIFORNIA

DRAWN: JAH
CHKD: GKM

SCG PROJECT
20G237-1

PLATE E-1

SoCalGeo SOUTHERN CALIFORNIA GEOTECHNICAL

APPENDIX F

GeoSoils, Inc. • BORING LOG B-1

CLIENT Pacific Equity W.O. 1438-OC DATE DRILLED 6/18/86 LOGGED BY SNK/RCK

PROJECT M.V.Garden Plaza SURFACE ELEV. _____ DRIVING WT. 2400# *1550#

WATER	DEPTH (FEET)	GRAPHIC LOG		GROUP SYMB. USCS	PENE. RESIST. BLOWS/FOOT	C-CORE B-BAG	DRY DENSITY pcf	MOISTURE CONTENT(%)
	0		4" asphaltic concrete over 4" aggregate base			B		
				CL	P	C	86.6	31.5
			FILL: Silty Clay, greyish brown, very moist, stiff		P	C	88.4	31.8
	5				P	C	89.2	32.1
					3	C	107.8	19.7
			WEATHERED BEDROCK (Tc_W): Sandy Siltstone, light brown, moist, very stiff, caliche powder infilling along discontinuous fractures					
	10							
					3	C	104.6	21.2
	15							
					3	C	86.7	34.3
			BEDROCK (Tc): Fine Sand Siltstone, light brown, moist, hard, red and yellow oxidation stains					
	20		@18½' B: N10W 20NE			B		
			@21' J: N32W 83NE		4	C	81.0	41.7
			J: N10E 11SE gypsum infilled					
			@23' B: NS 8E					
	25		@24' B: N15E 12SE					
			@25' B: N45E 20SE					
			@26' B: N25E 15SE		12*	C	90.0	32.6
			TOTAL DEPTH: 28' NO WATER NO CAVING					
	30							

PLATE A-1

GeoSoils Inc. • BORING LOG B-2

CLIENT Pacific Equity W.O. 1438-OC DATE DRILLED 6/19/86 LOGGED BY SNK/RCK

PROJECT M.V.Garden Plaza SURFACE ELEV. _____ DRIVING WT. 2400#

WATER	DEPTH (FEET)	GRAPHIC LOG		GROUP SYMB. USCS	PENE. RESIST. BLOWS/FOOT	C-CORE B-BAG	DRY DENSITY pcf	MOISTURE CONTENT(%)
	0		3" A/C pavement over 6" aggregate base			B		
			FILL:		P	C	89.2	32.2
			Silty Clay, greyish brown, moist, stiff, plastic		1	C	102.4	27.0
	5		@3' become black brown		2	C	114.5	17.3
			Sandy Silt and Silty Clay, interlayered, light brown, moist, stiff		4	C	94.6	25.8
	10		WEATHERED BEDROCK (Tc_W): Silty Clay, medium brown, moist, stiff			B		
			@10½'-12' gravel interbed in clay matrix, scattered cobbles to 9" in diameter		2	C	80.8	40.4
	15		BEDROCK (Tc) Sandy Siltstone, light brown, very moist, stiff to very stiff					
			@12½' J:N43E 21SE					
			@13½' J:N57E 26SE					
			@14½' B:N77E 9SE					
	20		@15½' J:N25W 32SW		5	C	86.6	34.8
			B:N80E 10SE					
			@16' J:N47W 24SW gypsum filled concretion nodules 1/8" thick					
			@17' J:N50W 83SW orange oxidation stains					
			@18' B:EW 9S					
			TOTAL DEPTH 20'					
			NO WATER					
			NO CAVING					

PLATE A-2