County of Santa Cruz

DEPARTMENT OF COMMUNITY DEVELOPMENT AND INFRASTRUCTURE
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GUIDELINES FOR GEOTECHNICAL INVESTIGATION REPORTS

Beach Drive during 1982-83 El Niño Winter Storms Photo Credit: Gary Griggs

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INTRODUCTION

Geotechnical investigation reports (soils reports) submitted to the County of Santa Cruz Department of Community Development and Infrastructure for support of building permit applications shall be conducted as indicated in the 2019 California Building Code (CBC) Section 1803 (or the most current version of the CBC); and Chapters 16.10 and 16.20 of the Santa Cruz County Code, and the guidelines contained in this document. County engineering staff may allow deviations from these guidelines, if the Planning Director or designee determines the intent of the guidelines have been met.

These standards for geotechnical investigation reports shall be used to address the specific components of Sections 1803.3 through 1803.6 of the 2019 California Building Code. To provide consistent technical report reviews and reduce the need for report revisions or addenda by the Applicant, these guidelines outline the minimum requirements for acceptance of geotechnical investigation reports by the County.

Primary purposes for conducting geotechnical engineering investigations in Santa Cruz County include design of an appropriate foundation system as well as providing safe access to a stable building envelope. A stable building envelope includes control of site drainage and when applicable, long-term stability of onsite sewage and/or stormwater disposal systems.

The County of Santa Cruz contains several fault zones capable of producing large magnitude earthquakes. The County is also subject to episodic, El Niño type, long duration winter storms such as occurred in 1982-1983 and 1997-1998 and caused widespread devastation in the Santa Cruz mountains and along the County's shoreline. These standards specifically address minimum requirements for slope stability analyses and liquefaction analyses presented to the County for review.

REPORT AUTHENTICATION

All geotechnical reports submitted to the County of Santa Cruz for review must be signed and sealed (stamped) by either a California licensed Civil or Geotechnical Engineer. Licensed engineers may choose to affix their signature and seals to their documents through electronic means.

All final civil/geotechnical engineering calculations and reports shall bear the signature and seal or stamp of the licensee. Interim (non-final) documents are not required to be signed and sealed. However, the interim documents must include the name and license number of the engineer as well as a notation as to the intended purpose of the document, such as "preliminary", "not for construction", "for plan check only", or "for review only".

REPORT EXPIRATION DATE

Geotechnical reports submitted for support of building permit applications must reflect current site conditions and the proposed project. An Addendum Report is required if site conditions differ or the proposed project elements have changed relative to those addressed in the geotechnical report.

An Update Report must be prepared for geotechnical reports older than three years from the date of publication unless the geotechnical consultant specifies a shorter expiration date, or until the next California Building Code update; whichever occurs first.

The Update Report must address the latest proposed development, the existing site conditions, and the current building code. The Update Report shall utilize the latest plans and/or tentative map as a basis for the exhibits within the report.

Additional soils data, updated analyses, and updated geotechnical maps may be required to provide adequate revised recommendations and conclusions. The Update Report shall state whether all recommendations of the prior reports are applicable or provide revised recommendations as appropriate.

PROJECT SITE LOCATION AND ASSESSOR'S PARCEL NUMBER

Geotechnical reports submitted to the County of Santa Cruz for review shall identify the project site by the both Assessor's Parcel Number (APN) and street address. The project site's APN is available from the property owners tax records or the County's GIS website. If a street address has been not assigned to the project site by the County, the report shall provide a description of the project site location including the direction and approximate distance from a road intersection or an established address.

SUBSURFACE EXPLORATION

The County of Santa Cruz Department of Community Development and Infrastructure considers exploratory borings incorporating Standard Penetration Testing as the minimum standard of practice necessary to: delineate the project site subsurface soil profile with relative densities; develop the 2019 California Building Code Site Class; determine insitu soil strengths and associated bearing capacities; and evaluate the anticipated total and differential settlements of foundation elements.

Test pits or exploratory trenches are an acceptable exploration alternative to borings where shallow bedrock is present and the proposed foundation elements will be embedded into the bedrock.

Exploration methods shall be sufficient in number and depth to evaluate site conditions, including lateral and vertical variability in material properties, and acquire data to justify all conclusions and recommendations. In all cases, the depth of exploration shall extend deeper than the proposed foundations.

Either laboratory soil strength testing or insitu Standard Penetration Testing are required to substantiate the vertical bearing pressure, lateral bearing pressure, and/or lateral sliding resistance recommended in a geotechnical investigation report in excess of the Presumptive Load-Bearing Values outlined in the 2019 California Building Code Table 1806.2.

When using Cone Penetrometer Testing (CPT), a confirmation boring utilizing insitu Standard Penetration Testing (SPT) are required to correlate the results of the electronic data from CPT probe to the SPT blowcounts and collected soils samples.

Pocket penetrometers are not individually calibrated or certified for accuracy; and shall not be used to determine foundation design criteria or as a substitute for the required insitu or laboratory soil strength testing.

ENGINEERING GEOLOGIC REPORTS

The County of Santa Cruz requires engineering geologic reports be prepared in conjunction with geotechnical investigations for most development within areas considered to be susceptible to geologic hazards. Areas considered susceptible to geologic hazards include beaches and coastal bluffs, State or County designated fault zones, areas of steep terrain susceptible to landsliding, drainage ways and alluvial fans subject to debris flow hazard, flood plains, areas of karst terrain, and areas where soil liquefaction during earthquakes is considered possible. Engineering geologic reports are to be prepared by a California Certified Engineering Geologist (CEG) or a California registered Professional Geologist (PG) with experience in engineering geology ("project engineering geologist").

LANDSLIDES AND SLOPE STABILITY

The movement of a mass of rock or soil down a slope is considered a landslide. Geotechnical Investigations for proposed projects in hillside areas (slopes greater than 4:1 (H:V)) must address the presence of landslides within or adjacent to the site. The placement of buildings or structures on or adjacent to slopes steeper than 3:1 (H:V) shall comply with CBC Section 1808.7 Foundations On or Adjacent to Slopes.

For proposed hillside or blufftop developments, the potential for surficial instability, debris and mudflow, rock fall, and soil creep impacting the proposed development or potentially caused by the proposed project must be investigated and reported. The stability of slopes adjacent to the project site access roadway, onsite sewage system, and/or onsite stormwater disposal system must be addressed in the geotechnical investigation report.

For new residential building envelopes, the section of primary access roadway to be evaluated for slope instability shall extend from the project site building envelope to the parcel boundary.

When proposed development areas are adjacent to or nearby existing landslides, the project geotechnical engineer shall justify their conclusion that the subject site has an acceptable computed factor of safety while adjacent or nearby areas are potentially unstable.

Explorations for slope instability shall be extended to a depth sufficient to confirm that the deepest extent of landsliding has been identified and to evaluate both the geologic and groundwater conditions that may cause future instability. In some cases, it may be necessary to install and monitor inclinometers, piezometers, or other types of slope instrumentation for a period of time to provide sufficient data for accurate stability modelling. If non-standard techniques of exploration are considered, the County Geologist shall be consulted to confirm acceptability.

Modeling of landslides or potentially unstable slopes requires an adequate program of material sampling and testing. In all cases, strength values must be site-specific and may not be chosen from published, generalized strength values or off-site sources, unless specifically approved by the County Geologist or Civil Engineer.

Instrumentation that monitors slope movements is encouraged in situations where recent slope movements are evident or on-going movement is suspected. A slope instrumentation plan must be submitted to the County for concurrence (unless the County defers the initial submittal). Deformation gages and similar instrumentation must be installed per manufacturer recommendations, and readings must be carefully retained and analyzed. A final report must be submitted to the County for review and acceptance.

SLOPE STABILITY ANALYSES

Slope stability analyses including performing calculations and establishing project site development design criteria will generally be required for cut, fill, and natural soil slopes when the slope gradient is steeper that 2:1 (H:V); rock slopes steeper than 1:1 (H:V); and on other slopes that possess unusual geologic conditions such as adverse bedding or evidence of prior landslide activity. Slope stability analyses are commonly required to address alternative setbacks relating to the CBC Section 1808.7 Foundations On or Adjacent to Slopes. Slope stability analyses may be required for any slope height or gradient when there are indications that the slope may not meet County minimum standards.

If on-site wastewater or stormwater disposal exists or is proposed, the slope stability analysis shall include the effects of the elevated groundwater levels on slope stability. Data on the possible adverse impacts of the private sewage and/or stormwater disposal systems relative to site stability and adjacent properties must be provided.

The path of migration of the effluent or percolating storm water as well as the potential for ponding or daylighting of the effluent shall be addressed. Slope stability analyses must also consider the effect of ponded/perched groundwater.

The data to be utilized in the slope stability analyses shall be based on detailed topographic surveys, geologic cross sections, detailed field descriptions, onsite exploration data, critical phreatic surfaces, and laboratory test data. It is the responsibility of the geotechnical consultants to determine the weakest potential failure surface. In performing any analysis, the critical scenario must be evaluated, such that planned use of the site is addressed by all potential adverse scenarios. The most critical potential failure plane must be within the search limits.

Reasonable effort shall be made to obtain in-situ samples for shear strengths of landslide shear/bedding plane material. Shear strength parameters assigned to landslide shear/bedding plane materials may need to be based on original/current slope configuration back-analysis calculations or obtained through repeated shear testing.

A geologic cross section shall be presented for each natural slope or cut slope analyzed for slope stability. The analyzed cross section shall extend beyond the top and toe of the slope being evaluated. Each geologic cross section must be representative of the subsurface geologic and groundwater conditions of the site and adjacent areas.

An appropriate mathematical analysis method shall be chosen for the slope analyzed. Simple planar failure surfaces can be analyzed by force equilibrium methods. Bishop Method shall only be used for circular failure surfaces. Taylor's Method shall only be used for homogeneous simple slopes.

Modeling of the moisture content and groundwater conditions used in each slope stability analysis shall be described. Modeling shall consider all potential sources of water (including rainfall, irrigation, proposed gray water or storm water management facilities, or other sources) on-site and on nearby properties in the evaluation of slope stability.

Each stability analysis presented in a geotechnical report shall be described and the results discussed. The description shall include the method of analysis, specified material profile, pore pressures, and specified search areas for critical failure paths. Where multiple slope stability analyses are conducted, a tabulated summary of the analyses and results shall be provided.

Input and output data computer printouts for the failure surfaces with the required minimum factors of safety for both the static and pseudostatic slope stability analyses shall be included in the geotechnical report.

SLOPE STABILITY BACK-ANALYSES

A back-analysis or back calculation may be the only viable method to determine the shear strength parameters of an active landslide or global slope failure. The back-analysis theory assumes that the factor of safety is 1.0 at the instant the rock/soil mass begins to activate. The slope stability calculations may be based on the landslide mass in its original or current position. The shear strength parameters that satisfy the factor of safety of 1.0 shall be evaluated.

The back-analysis calculated shear strength parameters may be used to design mitigation measures (i.e., buttress fills, soldier piles, etc.). Soil strengths used for design shall be no higher than the lowest computed back calculation.

STRENGTH PARAMETERS FOR SLOPE STABILITY ANALYSES

The assignment of shear strength parameters in slope stability analyses must be substantiated with laboratory test data. The sample description, depth, and location must be included for each set of shear strength parameters. Soil shear strengths shall be utilized as follows:

a. Peak shear strength test parameters may be used for seismic loading, pseudostatic slope stability analyses, and static slope stability analyses when appropriate for the rock or soil type being represented. Parameters not exceeding residual values shall be used for previous landslides, along bedrock bedding planes, highly distorted bedrock, over-consolidated fissured clays and for organic topsoil zone under fill.
b. Prior to shear testing, samples are to be soaked to an approximate saturated moisture content. Saturated shear tests shall be performed with the samples inundated in water during testing. Shearing strain rates/conditions are to be consistent with the material types and drainage conditions used in analyses

SLOPE STABILITY MINIMUM FACTORS OF SAFETY

Conventional static methods of slope stability analysis based upon principles of mechanics may be used to analyze the stability of slopes under both static and pseudostatic conditions.

Separate calculations shall be performed for static and seismic conditions. The factor of safety is defined as the ratio of the shearing resistance force to the actual driving force acting along the potential failure surface.

The County of Santa Cruz contains several fault zones capable of producing large magnitude earthquakes. Both static slope stability analysis and pseudostatic slope stability analysis shall be included in all projects where quantitative slope stability is required. A minimum factor of safety of 1.5 is required for static slope stability. The minimum factor of safety for pseudostatic slope stability is 1.0 for loading due to seismic shaking.

Rounding up computed factors of safety is not allowed to meet the required minimum safety factors.

The pseudostatic slope stability analyses shall be the minimum seismic analysis accepted for design, provided the soils are not potentially liquefiable or expected to undergo significant strength loss during deformation.

STATIC SURFICIAL SLOPE STABILITY

Surficial instability may occur on steep slopes due to: periods of prolonged/intense rain; excessive irrigation; or waterline breaks. Where natural or proposed soil slopes are steeper that 2:1 (H:V), a surficial stability analysis is typically required. The assessment of surficial slope stability shall be modeled as an infinite slope with seepage parallel to the slope surface. The depth of saturation used in the analysis shall be 3 feet unless bedrock is encountered at a shallower depth. As laboratory testing permits, shear strengths shall be based on fully (100%) saturated samples tested at representative effective overburden pressures of the upper 3 feet of soil. Engineering judgement may be needed to supplement the limits of shallow soil sample collection and shear testing with minimal normal loads.

STATIC GROSS OR GLOBAL STABILITY

Gross or global stability includes rotational and translational, deep-seated failures of slopes or portions of slopes existing within or adjacent the proposed development.

Gross stability analyses shall be based on accurately modeled geologic conditions and appropriate geotechnical test data. The analysis will typically evaluate either rotational or translational stability as appropriate to reflect geologic conditions.

For project sites involving deep-seated landslides, a detailed engineering geologic investigation involving: aerial photograph interpretation; geologic field mapping; subsurface exploration; and geologic analysis is required to determine the limits, geometry, and mode of failure of the landslide. For bedrock sites, subsurface exploration of landslides typically involves detailed direct observation in drilled shafts (borings) conducted by an engineering geologist to describe the geologic profile and collect geologic structural information and samples.

Subsurface exploration performed by the geotechnical consultant shall extend well below the lowest slip surface of the landslide. The number of exploratory excavations shall be sufficient in number and adequately spaced to define the three-dimension geometry of the landslide and groundwater conditions.

SEISMIC DESIGN AND PSEUDOSTATIC (SEISMIC) SLOPE STABILITY ANALYSIS

Current seismic design of structures is dictated by the 2019 CBC Risk Categories. Risk Category II is for Ordinary Structures which includes most residential, commercial, and industrial buildings. Risk Category IV is for Essential Structures. For Ordinary Structures the basic objective of the building code is collapse prevention at the Maximum Credible Earthquake (MCE_G) and protection from life-threatening damage at the design earthquake motion (MCE_G/1.5). Essential Structures are expected to remain operational at the MCE_G with building deflection limited to prevent doors from jamming.

Figures 22-9 through 22-13 of the ASCE 7-16 Minimum Design Loads and Associated Criteria for Buildings and Other Structures (ASCE 7-16) are the contour maps of the MCE_G PGA_M with a 2% in 50 years exceedance (2475-year return period) for use in geotechnical investigations. The U.S. Seismic Design Maps <seismicmaps.org> facilitate an address or coordinate specific search for the MCE_G PGA_M.

Section 1803.5.12.2 of the CBC states the PGA_M shall be determined by either a site-specific study in accordance with Chapter 21 of the ASCE 7 or in accordance with Section 11.8.3 of the ASCE 7. Section 21.5.3 of the ASCE 7-16 sets the allowable lower limit of the PGA_M determined by a site-specific study.

Slope stability analyses performed for evaluation of habitable structure building sites and their primary access roads is a life-safety concern. Often the results of a slope stability analysis dictate the structural design of the residence and feasibility of site access. The potential risk to life and property from slope instability shall be identified in the summary of the geotechnical investigation report.

Pseudostatic slope stability analyses shall include the effect of static loads combined with the horizontal inertial force acting out of the slope and through the center of gravity of the potential sliding mass.

A significant issue for the review of geotechnical investigation reports submitted to the County in support of building permit applications is the wide range of horizontal seismic coefficients (k_{eq}) employed by the pool of engineering firms preparing reports. The submitted horizontal seismic coefficients are typically derived from either the California Geologic Survey (CGS) publication SP117A, 2008 Guidelines for Evaluating and Mitigating Seismic Hazards in California or a variety of referenced white papers (published research documents). The Beach Drive coastal bluff in Rio del Mar area of the County has produced the most extreme examples of this disparity in professional opinions with submitted horizontal seismic surcharge coefficients varying as much as 200% between geotechnical consulting firms for nearby projects.

To provide consistent reviews of slope stability analyses submitted to the County, slope stability analyses shall include the following:

a. The MCE_G PGA_M presented in the geotechnical investigation and utilized in the geotechnical analyses shall be determined using the U.S. Seismic Design Maps <seismicmaps.org> and Section 11.8.3 of the ASCE 7-16;
b. For analysis of the pseudostatic slope stability condition at the project site, an acceptable method to determine the horizontal seismic coefficient (k_{eq}) is to utilize the *design-level ground motion (PGA_M/1.5)* in conjunction with Figure 1 of the CGS publication SP117A, 2008 Guidelines for Evaluating and Mitigating Seismic Hazards in California, page 30. A displacement of 5 cm shall be used where potential failure planes intersect building envelopes, otherwise a maximum displacement of 15 cm may be assumed. A minimum Safety Factor of 1.0 is required for the pseudo-static (saturated/seismic) condition; and
c. The project site's Geotechnical Engineer of Record shall also comment on sample selection and provide a stated opinion the samples tested represent the weakest material profile along the potential failure path.

The project site geotechnical investigation report may also present pseudostatic slope stability analyses with horizontal seismic coefficients derived by alternative methodologies in addition to using the required *design-level ground motion (PGA_M/1.5)* in conjunction with Figure 1 of the CGS publication SP117A. The comparative merits of the alternative methodology shall be discussed in the geotechnical investigation report.

EFFECTS OF SEVERE SEISMIC SHAKING

The effects of severe seismic shaking upon steep slopes, coastal bluffs or ridgelines can include topographic ridgetop amplification, lurching, ridgetop shattering, or coseismic ground cracking. The effects of severe seismic shaking shall be addressed for areas with steep slopes with mitigation measures outlined in the soils report for the proposed development.

Severe seismic shaking can also cause loose, saturated sandy soils to temporarily transform from a solid to a softened, liquid-like state inducing seismic settlement and lateral spreading. The effects of liquefaction shall also be addressed in the project site geotechnical investigation report.

The 2019 California Building Code is a minimum requirement intended to protect life safety and prevent building collapse. The life safety intent of the code is that the building remains standing after a moderate or large earthquake allowing the occupants to evacuate. Table 12.13-3 of the ASCE 7-16 Minimum Design Loads and Associated Criteria for Buildings and Other Structures outlines differential settlement limits for structures based upon Risk Category.

For proposed development within areas of delineated ground cracking or liquefaction, the following is required prior to closure of the Building Permit:

a. The project structural engineer shall certify in writing "The proposed residence will not collapse due the effects of severe seismic shaking. The proposed residence has been designed to protect the residents and allow evacuation following the design seismic event. The proposed residence has been designed to mitigate the predicted horizontal displacement of _____ inches and vertical displacement of _____ inches as outlined in the project site geotechnical report by_____ dated _____."; and
b. A Declaration of Geologic Hazards shall be recorded by the homeowner acknowledging the proposed residence may be damaged by severe seismic shaking and could require significant repair or reconstruction.

LIQUEFACTION ANALYSIS

Soil liquefaction or cyclic softening describes the substantial loss of soil shear strength due to pore water pressure increase induced by a rapid, dynamic loading, such as a seismic event, high vibration loading, or pile driving operations. When pore water pressures increase, the effective shear strength of the soil may be reduced to zero.

The following conditions are necessary for soil liquefaction to occur:

- Soil is saturated or near full saturation.
- Sand-like soils exhibit contractive behavior during dynamic loading.
- Clay-like soils exhibit cyclic softening behavior during dynamic loading.
- Soil subjected to rapid loading and does not have an adequate rate of pore water pressure dissipation.
- Pore water pressure exceeds the intergranular pressure within the soil mass.

The liquefaction potential of a proposed development must be evaluated in the geotechnical investigation report and appropriate mitigation measures must be proposed and incorporated into the project plans for the subject site. The fact that a site has been subjected to previous significant earthquakes does not preclude additional seismically induced settlement from occurring.

All reported data and analyses must be clearly supported by the information collected on the project site. Liquefaction analyses provided in geotechnical reports shall use the following methodologies and standards:

a. Provide specific commentary and supporting data for every layer excluded from liquefaction assessment and/or settlement analyses;
b. Depth of exploration to a minimum of 50 feet below ground surface, finished grade, or 20 feet below the lowest expected foundations level (bottom of caisson or pile), whichever is deepest, is required for liquefaction analyses and determination of seismically induced settlement;
c. When using Cone Penetration Testing (CPT), a confirmation boring utilizing Standard Penetration Testing that meets the minimum depth of exploration will be required. The CPT and confirmation boring shall be conducted near each other, but not be spaced so closely that stress relief would significantly affect the results. More than one confirmation boring may be required considering the size of the subject site, onsite soil data, and locations of liquefiable soil;
d. The FS is the ratio of the magnitude corrected cyclic resistance ratio (CRR) to the cyclic stress ratio (CSR). Layers that do not have a FS greater than or equal to 1.0 shall be included in the seismically induced settlement calculations;
e. The MCE_G peak ground acceleration (PGA_M) determined in accordance to ASCE 7-16 Section 11.8.3 shall be used for liquefaction related geotechnical evaluations;

f. All correction factors applied to raw SPT blow counts shall be discussed and justified;
g. Total seismically induced settlement must be the sum of seismically induced settlements of both the saturated and unsaturated soils and;
h. Table 12.13-3 in ASCE 7-16 outlines differential settlement limits intended to provide collapse resistance for Risk Category II and III structures. Anything in excess of these values will require ground modification to mitigate the liquefaction hazard. A combination of mitigation measures that include ground modification, piles, and structural mitigation may be acceptable on a case-by-case basis. Proposed near-surface ground modification measures to diffuse or spread ground movement must be substantiated by engineering analysis.

The liquefaction hazard assessment must delineate the project site plan view areas or zones subject to liquefaction hazards and provide the associated liquefaction analyses for those areas/zones. These areas/zones must be indicated on the geotechnical site map of the report.

SETTLEMENT AND CONSOLIDATION OF SATURATED FINE GRAIN SOILS

When soft to firm clayey or silty soils are present, adequate time-rate consolidation testing shall be performed.

The estimated time for settlement to be 90% complete along with computations shall be provided where significant settlement is anticipated.

A settlement-monitoring program shall be implemented during and after construction where the anticipated total settlement of fill and underlying materials, due to the added weight of fill, exceeds one inch. Settlement monitoring shall consist of surface monuments and subsurface settlement plates.

ADDITIONS TO EXISTING STRUCTURES

For proposed additions to existing structures, the potential for differential settlement between the old and new structure shall be discussed in the soils report with mitigation measures outlined.

FINAL COMPACTION REPORTS

A Final Compaction Report shall be prepared by the geotechnical consultant at the completion of grading and shall: describe the actual geologic/geotechnical conditions encountered during construction; document the as-built configuration of all mitigation measures; and present data from soils compaction testing.

Final Compaction Reports to be reviewed and accepted by the Planning Division shall include the following minimum information:

a. Results of all laboratory compaction curves showing maximum dry density and optimum moisture content;
b. Results of all in-place density tests and moisture content determinations with the approximate elevation of test locations indicated relative to project site finish grade;
c. Site plan showing approximate locations of compaction tests; and
d. Statement by the Geotechnical Engineer of Record confirming all grading activities have been completed per the geotechnical engineer's recommendations.

MINIMUM DESIGN LIFE OF STRUCTURES

For estimation of geologic hazards setbacks, such as the erosion of an arroyo or riverbank, the minimum design lifetime of structures shall be 50 years.

HYDROLOGY REPORTS FOR FEMA A ZONES

Hydrology reports are required in areas of proposed development which may be affected by flooding but a FEMA Base Flood Elevation (BFE) has not yet been established. As required by FEMA, hydrology reports must be signed and stamped by a California registered Civil Engineer.

Hydrology reports submitted to Environmental Planning for review shall follow the guidelines set forth in the County of Santa Cruz Design Criteria, December 2021 Edition, specifically Part 3/Section H - Hydrology - Minimum Design Requirements. For areas larger than 200 acres, the USGS Regional Regression Equations for the Central Coast Region may be used with a 25 percent safety factor.

The County of Santa Cruz Design Criteria, December 2021 Edition may be found at:
Department of Public Works > Home (santa-cruz.ca.us)

FOUNDATION DESIGN IN AREAS SUBJECT TO FLOODING

ASCE 24-14 Flood Resistant Design and Construction shall be utilized for design and construction of structures in areas subject to flooding. Current Santa Cruz County Code and the applicable FEMA Flood Insurance Rate Map (FIRM) shall be used to determine project site Design Flood Elevation (DFE).

SANTA CRUZ COUNTY GIS PORTAL

Parcel information and mapped geologic hazards may be found at:
https://gis.santacruzcounty.us/gisweb/

GUIDELINES FOR WHEN A GEOTECHNICAL (SOILS) REPORT IS REQUIRED

The following types of projects are provided to help the applicant determine whether their project will require submittal of a Geotechnical Investigation Report or Soils Report. Soils Reports are typically not required for non-habitable structures. Please note that the Department of Community Development and Infrastructure (CDI) reserves the right to require soils reports for projects that are not listed below. The County Geologist or a Registered Civil Engineer on the CDI staff will make the final determination.

1. New single-family, multi-family or habitable accessory buildings
2. Commercial buildings, industrial buildings or critical facilities
3. Non-habitable buildings which consist of two or more stories
4. Additions to any of the above which is located on slopes greater than 20%, located on fill, located in an area of mapped expansive soils or potential liquefaction (moderate to very high), or located in a flood plain, floodway or coastal high hazard zone.
5. Additions to single-family, multi-family habitable accessory buildings greater than 500 square feet
6. Additions to a commercial buildings, industrial buildings or critical facilities greater than 250 square feet
7. Modification, reconstruction or replacement of 65 percent of the major structural components—consisting of the foundation, floor framing, exterior wall framing, and roof framing—of an existing habitable structure within any consecutive five-year period, or modification, reconstruction or replacement of 50 percent of the major structural components of an existing critical structure or facility, as defined by this chapter, within any consecutive five-year period, whether the work is done at one time or as the sum of multiple projects.
8. The addition of habitable space to any building, where the addition increases the habitable space by more than fifty (50) percent over the existing habitable space, measured in square feet, whether the additions are constructed at one time or as the sum of multiple additions during the life of the building.

9. Additions of any size to a building that is located on a coastal bluff, dune, or in the coastal hazard area, that extends the existing building in a seaward direction.
10. Installation of a new foundation for a habitable building.
11. The repair, replacement, or upgrade of an existing foundation of a habitable building that affects more than fifty (50) percent of the foundation (measured in linear feet for perimeter foundations, square feet for slab foundations, or fifty (50) percent of the total number of piers), or an addition to an existing foundation that adds more than fifty (50) percent of the original foundation area, whether the work is performed at one time or as the sum of multiple projects during the life of the building.
12. Any change of use from non-habitable to habitable use, according to the definition of "habitable" found in Section 16.10.040 of the Santa Cruz County Code, or a change of use from any non-critical facility to a critical facility
13. Any alteration of any building posted "Unsafe to Occupy" due to geologic hazards
14. Retaining walls greater than 4 feet in height, which require a building permit, retaining walls that function as a part of a landslide repair whether or not a building permit is required, sea walls, and gravity walls
15. Bridges
16. Water tanks greater than 10,000 gallons
17. Above ground commercial storage facilities for hazardous or flammable material
18. Proposed building sites or access roadways located on property having undocumented or un-permitted grading (such as log landings, logging roads or prior unauthorized grading)
19. Grading with cuts or fills over three feet in height located within five feet (horizontally) of a property line, or grading that has the potential to cause instability or other grading related impacts to adjacent property
20. Access driveways or roadways that include fill greater than 2'
21. Grading on slopes greater than 20%
22. Creation of cut or fill slopes five feet or greater in height related to slope stabilization, landslide repairs, or streambank protection
23. Grading activities where there is evidence of high groundwater or spring activity
24. Any portion of development located within a FEMA floodplain or floodway
25. Coastal protection structures
26. Land Divisions
27. Any other project deemed by civil engineering staff or the County Geologist that a geotechnical report is required to ensure the integrity of the proposed work.
28. Any project or structure required by the California Building Code to have a geotechnical report.

SOILS REPORT WAIVER REQUIREMENTS

Waiver of the 2019 California Building Code Section 1803.2 requirement for a geotechnical investigation or soils report is at the discretion of the Department's Geotechnical Engineer and will be considered for the following:

-One story and two-story additions attached to an existing residential single family or duplex structure;
-Conversion of an attached non-habitable space (e.g., garage) to habitable space; or
-One story residences or habitable accessory structures of 4,000 square feet or less in floor area, with non-eccentric loading.

Note: A Soils Report by a California Registered Civil or Geotechnical Engineer is required for detached two story structures either habitable or non-habitable

Requirements for new or existing structures requesting a soil report waiver include:

-Project site slopes no more than 20%;
-No existing cut or fill slopes;
-No proposed cut or fill slopes;

- -No mapped or known geologic hazards including liquefaction, landslides, expansive soils, or fault zones;
- -Slope setback in conformance with the 2019 California Building Code Section 1808.7 Foundations On or Adjacent to Slopes; and
- -No observed structural distress to onsite foundation elements or slabs on grade.

Existing foundation elements supporting attached non-habitable space to be converted to habitable space must meet current building code requirements.

New foundations for structures granted a soils report waiver shall comply with the following:

- -In the absence of a Geotechnical Investigation, the maximum allowable soil bearing pressure used for foundation design is 1,500 psf per California Building Code Table 1806.2 for Class 5 soils; and
- -All footings shall be a minimum of 12” wide and 18” below undisturbed natural grade for single story; and 15” wide and 24” below undisturbed natural grade for two stories, unless deeper footings are required to satisfy structural requirements.

In seeking a waiver for requirements of the 2019 California Building Code Section 1803.2 – Geotechnical Investigations, it shall be the permit holder’s responsibility to submit a request in writing to the Planning Division Civil Engineer; and the permit holder accepts full and absolute responsibility for any adverse consequences of waiving the requirement for a soils report. The request for a Soils Report Waiver shall include with a site plan showing the location(s) of the proposed improvement(s).

For questions regarding these guidelines for the preparation of geotechnical investigation reports or the soils report waiver process, please contact Rick Parks, GE at rick.parks@santacruzcounty.us.