



Malibu Fire-Rebuild Geotechnical Review Checklist

Checklist for the Review of Geotechnical Reports for Palisades & Franklin Fire - Residential Rebuild Projects for Compliance with 2023 LA County Building Code

This checklist is used by the City of Malibu Community Development Department to review geology, seismology, geologic hazard, and geotechnical engineering reports submitted in support of Palisades Fire Rebuild building or grading permits. The Malibu Municipal Code adopts the 2023 Los Angeles County Building Code (LACBC). Reviews generally focus on compliance with LACBC §110.2, 111, and 1803, as well as the Malibu *Guidelines for the Preparation of Engineering Geology and Geotechnical Engineering Reports and Procedures or Report Submittal* (aka Malibu Geotech Guidelines). This checklist summarizes LACBC requirements.

LACBC: <https://up.codes/codes/los-angeles-county>

Malibu Guidelines <https://www.malibucity.org/DocumentCenter/View/215/Geotechnical-Guidelines?bidId=>

Project Address: _____

Malibu Review ID: _____ Reviewed By: _____

Date Reviewed: _____ Reviewed By: _____

Checklist Item or Topic Within Consulting Report		Acceptable	More Info Req	N.A.
Engineering Geology/Site Characterization				
1	Site Location Map, Street Address			
2	Plot Plan with Exploration Data and Building Footprint: Show locations of borings, CPTs, trenches or other explorations. Show proposed structures, including retaining walls and septic systems.			
3	Regional Geology and Regional Fault Maps: Concise page-sized illustrations with site plotted.			
4	<u>Site Geotechnical Maps</u> - Depict: site & surrounding area, onsite structures & closely-located offsite structures, earth units, borings/trenches, cross sections, legend, scale, and topography.			
5	<u>Geotechnical Cross Sections</u> - Required where natural, cut, or fill slopes, or excavations are >10ft high, or excavation extends below 1:1 (h:v) plane from adjacent foundations, and for beach-front properties. Extend to the top & bottom of adjoining slopes. Depict site boundaries, existing & proposed structures, exploratory excavations, earth units, septic systems, current & historic-high groundwater levels, and bar scale.			
6	<u>Technical Documentation</u> - Reference pertinent regional references and hazard maps. Review all public files for areas with 200 ft of property boundaries & adjoining slope areas. Research shall be current within 2 yrs.			
7	<u>Previous Geotechnical Data</u> - Summarize previous data from site or nearby sites and include copies of data relied upon to support findings/conclusions is presented in the report.			
8	<u>Geologic Hazard Zones</u> : <i>Malibu Geotechnical Staff refer to published Hazard Maps during submittal reviews. It is recommended that consultants review these resources in preparation of their report. Links to selected data sources are below:</i>	Does Not Apply	Hazard Applies	Not Applicable
a	CGS Seismic Hazard Zone: Earthquake-Induced Landslide https://maps.conservation.ca.gov/cgs/informationwarehouse/eqzapp/			
b	CGA Seismic Hazard Zones: Liquefaction https://maps.conservation.ca.gov/cgs/informationwarehouse/eqzapp/			
c	CGS Seismic Hazard Zones: AP Fault Zone https://maps.conservation.ca.gov/cgs/informationwarehouse/eqzapp/			
d	Malibu Fault Hazard Zone: w/i 500'-Malibu Coast Flt trace https://filerequest.conservation.ca.gov/?q=FER_229			
e	CGS Landslide Inventory: https://maps.conservation.ca.gov/cgs/lsi/app/			
f	USGS Post-Fire Debris Flow Hazard: https://www.arcgis.com/apps/dashboards/c09fa874362e48a9afc79432f2ef66fe			
g	CGS Tsunami Hazard Zone: https://maps.conservation.ca.gov/cgs/informationwarehouse/ts_evacuation/			
h	CGS Radon Hazard: https://maps.conservation.ca.gov/cgs/minerals/?page=Indoor-Radon-Potential&views=Legend---Indoor-Radon-Reports			
LACBC §110 - Prohibited Uses of Building Sites		Acceptable	More Info Req	N.A.
§110.2 - Geotechnical Hazards				
§110.2.1: No building or grading permit shall be issued if property outside the site of the proposed work could be damaged by activation or acceleration of a geotechnically hazardous condition and such activation or acceleration could be attributed to the proposed work on, or change in use of, the site for which the permit is requested.				
§110.2.2: Except as provided in Section 110.2.3, work requiring a building or grading permit by this Code is not permitted in an area determined by the Building Official to be subject to hazard from landslide, settlement, or slippage.				
§110.2.3: Subject to the conditions of §110.2.1, permits may be issued in the following cases:				
§110.2.3.1: When the applicant has submitted an engineering geology and/or soils engineering reports complying with the provisions of Section 111 such that said reports show that <i>the hazard will be eliminated</i> prior to the use or occupancy of the land or structures.				
§110.2.3.2: When the applicant has submitted an engineering geology and/or soils engineering report or reports that comply with the provisions of Section 111, and that demonstrate that <i>the site is safe for the intended use</i> .				
§110.2.3.3 - 110.2.3.5: These sections allow work involving alteration, or repair of, or addition to existing structures subject to 25% size or market value limits of the existing structure. See code sections for specific requirements.				

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§110.2.3.6 - Fire Rebuilds: When the proposed work involves the replacement of structures destroyed by causes other than landslide, settlement, or slippage (e.g. fire), and the permit applicant was the owner of the property at the time of the loss, their immediate heir(s), or their authorized representative, and the application for a permit under this Section is filed no later than ten (10) years following the date of the loss. The replacement structure(s) shall not exceed the area, number of stories, load, or number of fixtures and bedrooms of the structure that was destroyed. No change in occupancy type shall be permitted. Before a permit may be issued pursuant to this Section, the owner shall do all of the following: (1) Demonstrate that the replacement structure and/or the associated private sewage disposal system (if any) and/or the replacement landscaping (if any) will not result in a greater amount of groundwater infiltration than occurred under the original condition. (2) Submit engineering geology and/or soils engineering reports that contain, at a minimum, a qualitative and/or conditional finding that the proposed work complies with the provisions of §110.2.1, and that <i>contain recommendations for enhancing the stability of the site</i>. (3) Record in the office of the Department of Registrar-Recorder a statement by the owner acknowledging that the owner is aware that the records of the Building Official indicate that the property is potentially subject to a hazard from landslide, settlement, or slippage. (4) Record in the office of the Department of Registrar-Recorder an agreement relieving the County and all officers and employees thereof of any liability for any damage or loss which may result from issuance of such a permit. This agreement shall provide that it is binding on all successors in interest of the owner and shall continue in effect until the Building Official records in the office of the Department of Registrar-Recorder a statement that the Building Official has determined that such hazard from landslide, settlement, or slippage no longer exists. <i>Guidance on Section 110.2.3.6 Statements: Section 110.2.3.6 of the Code requires, "at a minimum, a qualitative and/or conditional finding", that the proposed work will not adversely affect offsite property. In addition, recommendations for "enhancing the stability of the site" must be provided. Examples of such recommendations may include: installation and maintenance of rain gutters draining directly to the municipal storm drain system; xeriscape landscaping requiring minimal irrigation, area drains discharging to storm drain system.</i>			
LACBC §111 - Engineering Geology & Soils Engineering Reports	Accept-able	More Info Req	N.A.
§111: Provide required Section 111 statement "regarding the safety of the site of the proposed work against hazard from landslide, settlement or slippage and a finding regarding the effect that the proposed work will have on the geotechnical stability of the area outside of the proposed work ". This statement is required for all sites, if the site does not have a 1.5 FOS for slope stability, describe the hazard and comply 110.2.3.6 (above). Engineering geology reports shall be prepared by a CA certified engineering geologist; soils engineering reports shall be prepared by a CA licensed civil engineer, experienced in soil mechanics, or a CA-licensed geotechnical engineer. When separate engineering geology and soils engineering reports are required, the two reports shall be coordinated.			
LACBC §113 - Earthquake Faults	Accept-able	More Info Req	N.A.
§113.4 - Known Active Earthquake Faults: Known active earthquake faults are those faults which have had displacement within Holocene epoch (approximately the last 11,000 years) as defined in the most current issue of Special Publication 42 of the CGS.			
§113.5 - Construction Limitations: No building or structure shall be constructed over or upon the trace of a known active earthquake fault which is shown on maps maintained by the Building Official. The absence of a known active earthquake fault trace at the proposed building location shall be determined by a CA-licensed professional geologist when: (1) the proposed building is within 50 feet of that line designated by the Building Official as the assumed location of a known active earthquake fault on the aforementioned maps; (2) the proposed building is within 50 feet of the most probable ground location of the trace of a known active earthquake fault shown on the aforementioned maps. In these cases the Building Official may require the excavation of a fault trench. Such a trench will be required if a lack of distinguishable fault features in the vicinity prevents the Building Official from determining... that the fault trace does not underlie the proposed building. The trench shall be approximately perpendicular to the most probable direction of the fault trace, at least 1.5-ft wide, and at least 5-ft in depth measured from natural grade, or to a depth satisfactory to the Building Official. The trench must be accessible for mapping and inspection by the Building Official, and comply with CCR Title 8, Construction Safety Orders. The trench need not extend further than the full width of the proposed structure plus 5 feet (1.52 m) beyond the traversed exterior walls. A known active earthquake fault shall be presumed nonexistent if an exposure is not found by the professional geologist in the walls or floor of the trench. The results of the investigation, conclusions and recommendations shall be presented in a geology report prepared by a CA PG and shall comply with the guidelines presented in CGS Note 49. The Building Official may waive the requirements for an active earthquake fault investigation for additions to existing one- or two-family dwelling units certain conditons are met - see LACBC for specific requirements.			
LACBC §1610 - Soil Loads & Hydrostatic Pressure	Accept-able	More Info Req	N.A.
§1610.1 - Lateral Pressures: Foundation walls and retaining walls shall be designed to resist lateral soil loads from adjacent soil in conformance with §1610.1 and Table 1610.1 - see LACBC for specific requirements.			
LACBC §1613 - Earthquake Loads	Accept-able	More Info Req	N.A.
§1613.2 - Seismic Ground Motion Values: General Procedure Ground Motion Analysis: Follows LACBC §1613.2. Report parameters SS, S1, SDS, SD1, and TS. Tools available https://earthquake.usgs.gov/hazards/designmaps/			
§1613.2.2 - Site Class Definitions: Provide Site Class (A, B, C, D, E or F) based on the site soil properties, in accordance with Chapter 20 of ASCE 7 and LACBC §1613.2.2. Provide justification.			
LACBC §1800 - Soils & Foundations			
LACBC §1803 - Geotechnical Investigations	Accept-able	More Info Req	N.A.
§1803.3 - Basis of Investigation: Soil classification based on observation and tests from subsurface exploration made in appropriate locations. Evaluate slope stability, soil strength, position and adequacy of load-bearing soils, effect of moisture variation on soil-bearing capacity, compressibility, liquefaction and expansiveness.			
§1803.4 - Qualified Representative: Investigation procedures shall be in accordance with generally accepted engineering practice. The geotechnical design professional shall have a fully-qualified representative on site during all boring or sampling operations.			

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§1803.5 - Investigated Conditions §1803.5.1 - 1803.5.3 - Soil Conditions: Classify soils per ASTM D2487. Evaluate for expansive soils: Soils are expansive if: $PI \geq 15$ per ASTM D4318, and $>10\%$ passing #200 sieve (75 μm) per ASTM D422, and $>10\%$ $<5\mu m$; and/or expansion index > 20 per ASTM D4829. §1803.5.4 - Ground-Water Table: A subsurface investigation shall determine whether the existing ground-water table is ≥ 5 feet below the elevation of the lowest floor level where such floor is located below the finished ground level adjacent to the foundation. §1803.5.5 - Rock Strata: Where subsurface explorations indicate variations in the structure of rock on which foundations are to be constructed, a sufficient number of borings shall be drilled to sufficient depths to assess the competency of the rock and its load-bearing capacity. §1803.5.6 - Deep Foundations: Include the following: 1) Deep Foundation type, 2) Center-to-center spacing, 3) Driving criteria, 4) Installation procedures, 5) Field inspection and reporting procedures including procedures for verification of the installed bearing capacity where required, 6) Load test requirements, 7) Suitability of deep foundation materials, 8) Designation of bearing stratum, 9) Reductions for group action, where §1803.5.7 - Excavation Near Foundations: Where excavation will reduce support from any foundation, GEOR shall assess the structure based upon examination of the structure, available design documents, subsurface data, and, if necessary, excavation of test pits. The GEOR shall determine the requirements for support and protection of any existing foundation and prepare site-specific plans, details and sequence of work. Such support shall be provided by underpinning, bracing, excavation retention systems, or by other means acceptable to the building official. §1803.5.8 - Compacted Fill: Where shallow foundations will bear on compacted fill more than 12" depth, a geotechnical investigation shall be conducted and shall include all of the following: (1) Specifications for the preparation of the site prior to placement of compacted fill, (2) Specifications for material to be used as compacted fill, (3) Test methods to be used to determine the maximum dry density and optimum moisture content, (4) Maximum allowable thickness of each lift of compacted fill material. (5) Field test method for determining the in-place dry density of the compacted fill, (6) Minimum acceptable in-place dry density expressed as % of the maximum dry density, (7) Number and frequency of field tests required to determine compliance with Item 6. §1803.5.9 - Controlled Low-Strength Material (CLSM): Provide CLSM specifications per LACBC. §1803.5.10 - Alternate Setback and Clearance: Where setbacks or clearances other than those required in Section 1808.7 are desired, the building official may require a geotechnical investigation to demonstrate that the intent of Section 1808.7 would be satisfied. Such an investigation shall include consideration of material, height of slope, slope gradient, load intensity and erosion characteristics of slope material §1803.5.11 - Seismic Design Categories C - F: For structures assigned to Seismic Design Category C, D, E or F, a geotechnical investigation shall be conducted and evaluate all of the following potential geologic and seismic hazards: (1) Slope instability, (2) Liquefaction, (3) Total and differential settlement, (4) Surface displacement due to faulting or seismically induced lateral spreading or lateral flow. §1803.5.12 - Seismic Design Categories D - F: For structures assigned to Seismic Design Category D, E or F, the geotechnical investigation required by §1803.5.11 shall include all of the following as applicable: (1) The determination of dynamic seismic lateral earth pressures on foundation walls and retaining walls supporting more than 6 feet (1.83 m) of backfill height due to design earthquake ground motions. (2) The potential for liquefaction and soil strength loss evaluated for site peak ground acceleration, earthquake magnitude and source characteristics consistent with the maximum considered earthquake ground motions. Peak ground acceleration shall be determined based on one of the following: (2.1) A site-specific study in accordance with Chapter 21 of ASCE 7, (2.2) In accordance with §11.8.3 of ASCE 7. (3) An assessment of potential consequences of liquefaction and soil strength loss including, but not limited to, the following: (3.1) Estimation of total and differential settlement, (3.2) Lateral soil movement, (3.3) Lateral soil loads on foundations. (3.4) Reduction in foundation soil-bearing capacity and lateral soil reaction. (3.5) Soil down drag and reduction in axial and lateral soil reaction for pile foundations. (3.6) Increases in soil lateral pressures on retaining walls. (3.7) Flotation of buried structures. (4) Discussion of mitigation measures such as, but not limited to, the following: (4.1) Selection of appropriate foundation type and depths. (4.2) Selection of appropriate structural systems to accommodate anticipated displacements and forces. (4.3) Ground stabilization. (4.4) Any combination of these measures and how they shall be considered in the design of the structure.			
§1803.6 - Reporting: The geotechnical report shall include, but need not be limited to, the following: (1) A plot showing the location of the soil investigations. (2) A complete record of the soil boring and penetration test logs and soil samples. (3) A record of the soil profile. (4) Elevation of the water table, if encountered. (5) Recommendations for foundation type & design criteria, including but not limited to: bearing capacity of natural soil or fill; mitigation of expansive soils; mitigation of the effects of liquefaction, differential settlement and varying soil strength; and the effects of adjacent loads. (6) Expected total and differential settlement. (7) Deep foundation information in accordance with §1803.5.5. (8) Special design and construction provisions for foundations of structures founded on expansive soils. (9) Compacted fill material properties and testing in accordance with §1803.5.8. (10) Controlled low-strength material properties and testing in accordance with §1803.5.9.			

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§1804 - Excavation, Grading & Fill	Acceptable	More Info Req	N.A.																																
§1804.1-1804.3 - Excavation Near Foundations, Underpinning & Placement of Backfill : Conform with §1803.5.7; backfill shall be free of organic material, construction debris, cobbles and boulders or with CSLM. §1804.5 - Grading & Fill in Flood Hazard Areas: Grading in flood hazard areas shall not be permitted unless: (1) Fill is compacted and sloped to minimize slumping & erosion under flooding & where applicable, wave action. (2) It has been demonstrated through analyses that the proposed grading will not result in any increase in flood levels during the design flood, (3) In coastal high hazard areas, unless fill is placed to avoid diversion of water and waves toward any building or structure, (4) where design flood elevations are specified but floodways have not been designated unless it is demonstrated the cumulative effect of the proposed flood area encroachment, combined with all other existing & anticipated flood area encroachments, will not increase the DFE >1 ft.																																			
§1806 Presumptive Load-Bearing Values of Soils	Acceptable	More Info Req	N.A.																																
§1806.1 Load Combinations - The values in Table 1806.2 shall be used with the allowable stress design load combinations specified in ASCE 7, §2.4 or §1605.2. The values of vertical foundation pressure and lateral bearing pressure shall be permitted to be increased by one-third where used with the alternative allowable stress design load combinations of §1605.2 that include wind or earthquake loads. 1806.2 Presumptive Load-Bearing Values: The load-bearing values used in design for supporting soils near the surface shall not exceed the values specified in Table 1806.2 unless data to substantiate the use of higher values are submitted and approved. If the classification is questionable, the requirements of Section 1803.5.2 shall be satisfied. Presumptive load-bearing values shall apply to materials with similar physical characteristics and dispositions. Mud, organic silt, organic clays, peat or unprepared fill shall not be assumed to have a presumptive load-bearing capacity unless substantiating data are submitted. Exception: A presumptive load-bearing capacity shall be permitted where the load-bearing capacity of mud, organic silt or unprepared fill is adequate for the support of lightweight or temporary structures.																																			
TABLE 1806.2 - PRESUMPTIVE LOAD-BEARING VALUES <table border="1"> <thead> <tr> <th rowspan="2">CLASS OF MATERIALS</th> <th rowspan="2">VERTICAL FOUNDATION PRESSURE (psf)</th> <th rowspan="2">LATERAL BEARING PRESSURE (psf/ft below natural grade)</th> <th colspan="2">LATERAL SLIDING RESISTANCE</th> </tr> <tr> <th>Coefficient of friction^a</th> <th>Cohesion (psf)^b</th> </tr> </thead> <tbody> <tr> <td>1. Crystalline bedrock</td> <td>12,000</td> <td>1,200</td> <td>0.70</td> <td>—</td> </tr> <tr> <td>2. Sedimentary and foliated rock</td> <td>4,000</td> <td>400</td> <td>0.35</td> <td>—</td> </tr> <tr> <td>3. Sandy gravel and gravel (GW&GP)</td> <td>3,000</td> <td>200</td> <td>0.35</td> <td>—</td> </tr> <tr> <td>4. Sand, silty sand, clayey sand, silty gravel & clayey gravel (SW, SP, SM, SC, GM & GC)</td> <td>2,000</td> <td>150</td> <td>0.25</td> <td>—</td> </tr> <tr> <td>5. Clay, sandy clay, silty clay, clayey silt, silt & sandy silt (CL, ML, MH & CH)</td> <td>1,500</td> <td>100</td> <td>—</td> <td>130</td> </tr> </tbody> </table> a. Coefficient to be multiplied by the dead load. b. Cohesion value to be multiplied by the contact area, as limited by Section 1806.3.2.				CLASS OF MATERIALS	VERTICAL FOUNDATION PRESSURE (psf)	LATERAL BEARING PRESSURE (psf/ft below natural grade)	LATERAL SLIDING RESISTANCE		Coefficient of friction ^a	Cohesion (psf) ^b	1. Crystalline bedrock	12,000	1,200	0.70	—	2. Sedimentary and foliated rock	4,000	400	0.35	—	3. Sandy gravel and gravel (GW&GP)	3,000	200	0.35	—	4. Sand, silty sand, clayey sand, silty gravel & clayey gravel (SW, SP, SM, SC, GM & GC)	2,000	150	0.25	—	5. Clay, sandy clay, silty clay, clayey silt, silt & sandy silt (CL, ML, MH & CH)	1,500	100	—	130
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§1807.2 Retaining Walls	Acceptable	More Info Req	N.A.																																
§1808.7.1 Retaining Walls - Retaining walls shall be designed in accordance with Section 1807.2.1 through 1807.2.5. Freestanding cantilever walls shall be designed in accordance with Section 1807.2.5. <i>Retaining walls assigned to Seismic Design Category D, E, or F shall not be partially or wholly constructed of wood.</i>																																			
§1808.7 Foundations on or Adjacent to Slopes	Acceptable	More Info Req	N.A.																																
§1808.7.1 Building Clearance From Ascending Slopes - In general, buildings below slopes shall be set a sufficient distance from the slope to provide protection from slope drainage, erosion and shallow failures. Except as provided in §1808.7.5 and Figure 1808.7.1, the following criteria will be assumed to provide this protection. Where the existing slope is steeper than one unit vertical in one unit horizontal (100-percent slope), the toe of the slope shall be assumed to be at the intersection of a horizontal plane drawn from the top of the foundation and a plane drawn tangent to the slope at an angle of 45° to the horizontal. Where a retaining wall is constructed at the toe of the slope, the height of the slope shall be measured from the top of the wall to the top of the slope. §1808.7.2 Foundation Setback From Descending Slope Surface - Foundations on or adjacent to slope surfaces shall be founded in firm material with an embedment and set back from the slope surface sufficient to provide vertical and lateral support for the foundation without detrimental settlement. Except as provided for in §1808.7.5 and Figure 1808.7.1, the following setback is deemed adequate to meet the criteria. Where the slope is steeper than 1 unit vertical in 1 unit horizontal (100-percent slope), the required setback shall be measured from an imaginary plane 45° to the horizontal, projected upward from the toe of the slope.																																			
The diagram illustrates the required setbacks for foundations on slopes. It shows two scenarios: one for a structure on a slope and another for a structure on a descending slope. Key labels include 'FACE OF STRUCTURE', 'TOE OF SLOPE', 'TOP OF SLOPE', 'FACE OF FOOTING', and 'AT LEAST THE SMALLER OF H/2 AND 15 FEET'.																																			