DSA IR A-4

GEOHAZARD REPORT REQUIREMENTS: 2022 CBC

Disciplines: Structural Safety

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Division of the State Architect (DSA) documents referenced within this publication are available on the DSA Forms or DSA Publications webpages.

PURPOSE

This Interpretation of Regulations (IR) clarifies geohazard report requirements concerning when a report must be prepared, when the report must be reviewed and accepted by the California Geological Survey (CGS), what information must be included in the report, how geological hazard zones are defined, and how soil improvement work is approved.

SCOPE

This IR is applicable to all projects under DSA jurisdiction.

BACKGROUND

A geohazard is any geologic condition that is a potential danger to life or property. Geohazards include, but are not limited to, ground shaking, surface rupture, liquefaction, tsunami, and landslides.

California Administrative Code (CAC), Section 4-317(e) includes requirements for the performance of geotechnical (soils) studies, geohazard studies, and their associated reports. Note that a "geotechnical report" (or soil investigation report) might not include complete geohazard studies. In addition, California Building Code (CBC) Section 1803A defines requirements for geotechnical investigations, with geohazard reports addressed specifically in Section 1803A.6.

1. GENERAL PROCEDURE

A geohazard report is required for projects as outlined in Section 2 below. This section describes procedural and approval requirements when a geohazard report is required. All geohazard reports will be submitted to DSA as described in Section 1.1 below, while only those with certain conditions need be submitted to CGS per Section 1.2 below.

1.1 Submission to DSA

When a geohazard report is required as outlined in Section 2 below and not exempt per Section 3 below, it shall be submitted to DSA.

1.1.1 Geohazard reports not requiring CGS review and acceptance shall be submitted to DSA as a supporting document with the initial project application.

1.1.2 Geohazard reports requiring CGS review and acceptance shall be submitted to DSA as follows:

1.1.2.1 The geohazard report, site data report, and the application to CGS (including the CGS project number) shall be submitted to DSA with the initial project application.

1.1.2.2 DSA will proceed with the plan review phase of the project. If during the plan review phase CGS issues a review letter (with or without acceptance) or the geotechnical engineer issues supplemental recommendations in response to such a review letter, all such correspondence shall be submitted to the DSA structural safety plan reviewer via email.

1.1.2.3 DSA will proceed with the back check phase of the project. If during the back check phase CGS issues a review letter (with or without acceptance) or the geotechnical engineer issues supplemental recommendations in response to such a review letter, all such correspondence shall be submitted to DSA via Bluebeam Studio per *Procedure (PR) 18-04: Electronic Plan Review for Design Professionals*, Section 4.1.2.

1.1.2.4 DSA approval of the project will not be granted until DSA receives the final (or provisional when applicable) acceptance letter from CGS.

1.2 Submission to CGS

When CGS review and acceptance of the geohazard report is required, the school district is responsible for submitting it to CGS and paying the fee required for their review.

1.2.1 CGS review and acceptance is only required when the preparation of a geohazard report is required per Section 2 below and not exempt per Section 3 below and any of the following conditions occur:

1.2.1.1 Work is located on a new school site.

1.2.1.2 Building will be supported on a deep foundation system as established by CBC Section 1810A.

1.2.1.3 Site (in full or in part) will be subject to soil improvement work as described in Section 6 below.

1.2.1.4 Building seismic design will be based upon a site-specific ground motion hazard analysis as described in Section 2.1 below.

1.2.1.5 Work includes a new essential service building or the rehabilitation of an existing essential service building.

1.2.1.6 Site is located in a mapped geological hazard zone per Section 4 below.

1.2.1.7 Site is not located in a mapped geological hazard zone but the geotechnical or geohazard report identifies a geological hazard at the site.

1.2.1.8 Site is categorized as Site Class E or F in accordance with the American Society of Civil Engineers Standard 7: Minimum Design Loads and Associated Criteria for Buildings and Other Structures (ASCE 7), Chapter 20.

1.2.1.9 Geohazard analysis estimates the seismically induced differential settlement exceeds 25-percent of the threshold values given in ASCE 7 Table 12.13-3.

1.2.2 The report must be submitted to CGS before the project is submitted to DSA. Project applicants are encouraged to contact CGS for current review timelines.

1.2.3 Application and submission information, including answers to frequently asked questions, is available on the school review webpage of the CGS website.

1.2.4 The geohazard report submission to CGS shall include a site data report as required by CBC Section 1603A.2.

1.2.5 After CGS acceptance of the geohazard report, any further change proposed by the geotechnical engineer that is related to the scope of CGS acceptance, shall be resubmitted to CGS for review and acceptance.

1.2.6 After CGS acceptance of the geohazard report, it is the responsibility of the project applicant to provide a copy of the CGS acceptance letter to DSA.

1.2.7 Refer to Section 6 below for additional requirements when CGS issues a provisional acceptance letter.

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2. PROJECTS REQUIRING A GEOHAZARD REPORT

A geohazard report shall be prepared for projects as described in this section. Where more than one of the following categories listed below occurs in the same project application, any case requiring a geohazard report governs.

2.1 Site-Specific Ground Motion Analysis

A geohazard report is required for any project for which a site-specific ground motion hazard analysis is required or voluntarily used to develop seismic design parameters.

Exception: When the entire scope of work complies with Section 3.1 below and a site-specific ground motion hazard analysis is required by ASCE 7 Section 11.4.8, the site-specific hazard analysis may be provided separate of a geohazard report and does not require CGS review.

2.2 New Site

A geohazard report is required for all construction on a new site.

2.3 New Building on an Existing Site

A geohazard report is required for all new buildings or structures, except for exempt cases based on the characteristics of the building and site as defined in Section 3 below.

2.4 Rehabilitation of an Existing Building

A geohazard report is required for all rehabilitation projects, except for exempt cases based on the characteristics of the building and site as defined in Section 3.5 below. CAC Sections 4-306 and 4-307 address the equivalent nature of a rehabilitation to a new school building.

2.5 Addition to an Existing Building

A geohazard report is required for all additions, except for exempt cases based on the characteristics of the building and site as defined in Section 3.5 below. The 4,000 square feet (SF) floor area limit of CBC Section 1803A.6 as described in Section 3.5.1 below applies to the existing building plus the addition when the two are structurally attached and addition alone when the two are structurally detached.

2.6 Alteration to an Existing Building

A geohazard report is required for alteration scope that includes voluntary modifications to the lateral-force-resisting system per CAC Section 4-309(d) with new foundations carrying seismic forces and consisting of any of the following:

2.6.1 Deep foundations.

2.6.2 Shallow foundations designed for bearing pressures that exceed the maximum recommended foundation soil bearing pressures in an existing geotechnical report for that structure or, when a report is not available, the values set forth in CBC Table 1806A.2.

2.6.3 Foundation elements for which the supporting subgrade stiffness differs substantially from the existing foundation (e.g., adding spread footings to a structure supported on deep foundations).

2.7 Reconstruction of an Existing Building

A geohazard report is required for reconstruction projects that include repair of structural earthquake damage per CAC Section 4-309(e).

2.8 Relocation of an Existing Building

A geohazard report is required for the site a building is relocated to, except for exempt cases based on the characteristics of the building and site as defined in Section 3 below.

2.9 Structures Essential to Operation

Sitework, nonbuilding structures, and structures not intended for human occupancy, only require a geohazard report when such construction is essential to the operation of the facility. Structures deemed essential to operation include the following:

2.9.1 Water tanks necessary for fire protection.

2.9.2 Earth retaining structures when failure of such structures could endanger occupied structures.

2.9.3 Communications towers serving Risk Category IV (essential services) buildings.

2.9.4 Other similar structures.

3. PROJECTS NOT REQUIRING A GEOHAZARD REPORT

For projects on existing sites, with scope limited to the conditions described in this section, a geohazard report is not required.

3.1 Site Improvements

Sitework, nonbuilding structures, or structures not intended for human occupancy, unless such construction is essential to the operation of the facility. See Section 2.9 above for examples of structures deemed essential to operation.

3.1.1 Nonbuilding structures include, but are not limited to, light poles, flag poles, signs, scoreboards, ball walls, fences, and retaining walls. Nonbuilding structures do not include structures that shelter a use or occupancy such as canopies, lunch shelters, or carports. ←

3.1.2 A “structure for human occupancy” is any structure used or intended for supporting or sheltering any use or occupancy, which is expected to have a human occupancy rate of more than 2,000 person-hours per year in accordance with Title 14, California Code of Regulations (CCR), Division 2, Chapter 8, Subchapter 1, Article 3, Section 3601(e). Structures not intended for human occupancy include structures such as storage buildings not entered by students and teachers for school purposes. ←

3.2 Non-School Buildings

Structures not defined as a “School Building” per CAC Section 4-314 and exempt from DSA structural review as indicated in *IR A-22: Construction Projects and Items Exempt from DSA Review*.

3.3 Temporary or Emergency Buildings

Temporary relocatable or emergency buildings as defined in CAC Section 4-302(b).

3.4 Fabric Shade Structures

Fabric shade structures used as shade canopies and lunch shelters in a mapped geological hazard zone do not require a geohazard report if the conditions of either Section 3.4.1 or 3.4.2 below are met. Additionally, fabric shade structures outside a mapped geological hazard zone (as defined in Section 4 below), up to a maximum of 4,000 SF do not require a geohazard report in accordance with Section 3.5 below.

3.4.1 Individual fabric shade structures 1,600 SF or less of regular shape (e.g., hip, flat, gable, pyramid) supported on all corners (three minimum) with maximum column grid (bay) spacing of 40 feet.

3.4.2 Multiple-bay fabric shade structures 4,000 SF or less and with each individual bay 1,600 SF or less, submitted with a geotechnical report stating that no liquefaction potential exists.

3.5 Existing Sites Outside of a Mapped Geologic Hazard Zone

Projects on existing sites that are outside of a "mapped geologic hazard zone" (as defined in Section 4 below) are exempt from the requirement to provide a geohazard report if their scope is limited to the following:

3.5.1 In accordance with CBC Section 1803A.6, Exception 1, single-story, wood-frame or light-steel frame structures of Type II or V construction with a floor area of 4,000 SF or less. Floor area shall be taken independently for each seismically separated structure but shall include areas covered by roof overhangs. This exception is specific to geohazard report requirements and is not applicable to any other code requirement. Common structures complying with this exception include, but are not limited to, the following:

3.5.1.1 Most relocatable buildings.

3.5.1.2 Wood framed buildings with repetitive framing and light-frame shear walls.

3.5.1.3 Cold-formed steel framed buildings with repetitive framing and light-frame shear walls.

3.5.1.4 Structural steel buildings with bare metal deck (no concrete or insulating roof fill), including those with braced frames or moment frames.

3.5.2 Isolated elevator towers serving no more than two levels.

3.5.3 Open metal site structures (e.g., structural steel, aluminum, etc.) seismically separated into areas of 4,000 SF or less in covered area including all overhangs. Such structures may include but are not limited to shade structures, bleachers, canopies, and carports.

4. MAPPED GEOLOGIC HAZARD ZONE

A mapped geologic hazard zone as used in this IR is as designated by CGS or the local jurisdiction in accordance with CBC Section 1803A.6, Exception 1. To date CGS has mapped earthquake fault hazard zones throughout the state, and liquefaction hazard zones and landslide hazard zones in select regions. Mapped geologic hazard zones designated by CGS, as well as those regions yet to be evaluated, can be found through the web-based earthquake zones of required investigation tool managed by CGS.

4.1 Sites Fully Mapped by CGS

Sites are considered to be in a mapped geologic hazard zone when any of the following apply:

4.1.1 Earthquake Hazard Fault Zone as identified by the applicable CGS map.

4.1.2 Liquefaction Hazard Zone as identified by the applicable CGS map.

4.1.3 Landslide Hazard Zone as identified by the applicable CGS map.

4.2 Sites Not Yet Fully Mapped by CGS

Sites are considered to be in a mapped geologic hazard zone when any of the following apply:

4.2.1 Earthquake Hazard Fault Zone as identified by the applicable CGS map.

4.2.2 Liquefaction Hazard Zone as identified by the CGS map (if applicable) or the Safety Element of the Local General Plan.

4.2.3 Landslide Hazard Zone as identified by the CGS map (if applicable) or the Safety Element of the Local General Plan.

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5. GEOHAZARD STUDIES AND REPORTS

5.1 Scope of Geohazard Studies

For guidance in conducting a geohazard study and reporting evaluations and recommendations, refer to the following documents available on the CGS Publications webpage:

5.1.1 *Special Publication 117A: Guidelines for Evaluating and Mitigating Seismic Hazards in California*.

5.1.2 *Special Publication 42: Earthquake Fault Zones, A Guide for Government Agencies, Property Owners / Developers, and Geoscience Practitioners for Assessing Fault Rupture Hazards in California*.

5.1.3 *CGS Note 48: Checklist for the Review of Engineering Geology and Seismology Reports for California Public Schools, Hospitals, and Essential Services Buildings*, which is used as a guide for review by CGS.

5.2 Geohazard Report Content

Requirements regarding the content of geohazard reports are addressed on the Geologic and Environmental Review webpage of the CGS website.

5.2.1 The geohazard report shall define the site classification for seismic design in accordance with ASCE 7 Section 20.3.

5.2.2 If Site Class F applies due to the presence of liquefiable soils, but the Exception of ASCE 7 Section 20.3.1, Item 1 is used to assign a lesser site class for the determination of seismic spectral accelerations, this methodology shall be explicitly indicated in the geohazard report.

5.3 Reuse of Existing Geohazard Report

In accordance with CBC Section 1803A.6, Exception 2, an existing geohazard report may be used for a new project if the existing report is based on adequate studies (refer to CGS Note 48 for guidance), a reevaluation is made, and the report is found to be currently appropriate. The existing report for the site and the reevaluation must be submitted to CGS for review for each project when required per Section 1.2 above. A reevaluation is not required if all of the following conditions are met:

5.3.1 The original geohazard report included the scope of construction proposed for the project.

5.3.2 The applicable building code has not changed since the original report was issued.

5.3.3 The project is submitted to DSA within the time limit described in the original report.

Note: Subsequent significant geologic events or discoveries may invalidate an existing geohazard report.

6. PROVISIONAL CGS ACCEPTANCE PENDING SOIL IMPROVEMENT

When CGS issues a provisional acceptance letter for projects with soil improvement work, DSA approval of the construction documents will follow the requirements of this section. Soil improvement techniques might consist of compaction grouting, permeation grouting, vibro stone columns (refer to CBC Section 1813A), or other techniques recommended by the geotechnical engineer and accepted by CGS.

6.1 Procedural Requirements

Prior to submission of a project with soil improvement work to DSA, the applicant shall schedule and participate in a pre-application meeting with the DSA regional office having jurisdiction over the subject project.

6.1.1 DSA approval of the construction documents may occur based on CGS provisional acceptance provided the conditions described herein are met. The approved construction documents shall include items listed in Section 6.2 below.

6.1.2 Upon DSA approval of the construction documents, soil improvement work may proceed subject to the quality assurance requirements described in Section 6.3 below.

6.1.3 The geotechnical engineer shall submit to CGS a comprehensive report documenting the constructed soil improvements, test results, and analysis for review and final acceptance.

6.1.3.1 Any additional information, testing, and/or analysis requested by CGS for their final acceptance shall be provided.

6.1.3.2 Any additional soil improvement work required to obtain final acceptance by CGS shall be performed.

6.1.4 CGS will issue a final acceptance letter when the soil improvement work and supporting tests, analysis, and documentation is deemed adequate. DSA will process the final acceptance letter from CGS as a deferred submittal.

6.1.5 Foundation construction may not commence until the final acceptance letter issued by CGS has been processed by DSA as a deferred submittal.

6.1.6 If foundation construction work begins prior to receipt of the CGS final acceptance letter, DSA may issue a stop work order as described in *IR A-13: Stop Work and Order to Comply*.

6.2 Construction Documents

When provisional CGS acceptance of a geohazard report is granted pending completion of soil improvement work, the design professional shall comply with the following in the preparation of the construction documents.

6.2.1 The following paragraph shall be placed on the project title sheet:

> "The Geotechnical Engineer shall submit a comprehensive report documenting final soil improvements constructed, construction observation, and the results of the confirmation testing and analysis to the California Geological Survey (CGS). Foundation construction shall not commence until the final acceptance letter is issued by CGS and processed by DSA as a deferred submittal."

6.2.2 The following shall be indicated as a deferred submittal on the construction documents: "Soil Improvement – CGS Final Acceptance of Geohazard Report".

6.3 Statement of Structural Tests and Special Inspections

The following items shall be added to the form *DSA 103: List of Required Structural Tests and Special Inspections,* under item "S6 | Other Soils":

	TYPE	BY
S6 | OTHER SOILS		
☑ S6a: Soil Improvement Test	Test	GE*
☑ S6b: Soil Improvement Inspection	Continuous	GE*

6.4 DSA eTracker

When provisional CGS acceptance of a geohazard report is given pending completion of soil improvement work, it will be documented in eTracker by the structural safety plan reviewer as follows:

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6.4.1 The following shall be manually entered as a deferred submittal on the Plan Check Worksheet under one of the "Other" fields: "Soil Improvement – CGS Final Acceptance".

6.4.2 The following note shall be added to the Plan Check Worksheet under the "Notes" field:

"The CGS final acceptance is not issued; Geotechnical engineer shall submit a comprehensive report documenting final soil improvements constructed, construction observation, and the results of the confirmation testing and analysis to CGS for final acceptance prior to foundation construction."

REFERENCES:

2022 California Code of Regulations, Title 24
Part 1: California Administrative Code (CAC), Sections 4-302, 4-306, 4-307, 4-309, 4-314, and 4-317.
Part 2: California Building Code (CBC), Sections 1603A.2, 1803A, 1803A.6, 1813A, and Table 1806A.2.