Regular Meeting
of the
Building Inspection Commission

July 16, 2025

Agenda Item 8

Administrative Bulletin - Appendix A6

City and County of San Francisco
Department of Building Inspection

Daniel Lurie, Mayor
Patrick O'Riordan, C.B.O., Director

July 11, 2025

Building Inspection Commission
49 South Van Ness Avenue
San Francisco, CA 94103

Re: Administrative Bulletin AB-103
Application of Engineering Criteria in SFEBC Appendix A, Chapter A6

Honorable Members of the Commission:

On July 7, 2025 the full Code Advisory Committee (CAC) met to consider adoption of Administrative Bulletin (AB-113) Application of Engineering Criteria in SFEBC Appendix A, Chapter A6. Members of the Structural Subcommittee reported they had met multiple times to review AB-113 and recommended the full CAC approve it as written. The full CAC voted unanimously to recommend the Building Inspection Commission (BIC) approve Administrative Bulletin (AB-113).

Respectfully submitted,

Thomas Fessler
DBI Technical Services
Secretary to the Code Advisory Committee

cc. Patrick O'Riordan, C.B.O. Director
Mary Wilkinson-Church, Acting Deputy Director
Christine Gasparac, Assistant Director
Tate Hanna, Legislative Affairs Manager
J. Edgar Fennie, Chair, Code Advisory Committee

City and County of San Francisco
Department of Building Inspection

Daniel Lurie, Mayor
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ADMINISTRATIVE BULLETIN

NO. AB-113 :

DATE : 11 July 2025

SUBJECT : Seismic Retrofit Provisions for Concrete Buildings

TITLE : **Application of Engineering Criteria in SFEBC Appendix A, Chapter A6**

PURPOSE : The purpose of this Administrative Bulletin is to provide technical details and commentary on the application of engineering criteria in SFEBC Appendix A, Chapter A6, which addresses the seismic evaluation and retrofitting of concrete buildings.

REFERENCES : 2022 San Francisco Existing Building Code (SFEBC)
ASCE 7-16 *Minimum Design Loads for Buildings and Other Structures*
ASCE 41-17 *Seismic Evaluation and Retrofit of Existing Buildings*
ACI 318-19 *Building Code Requirements for Structural Concrete*

DISCUSSION :

San Francisco Existing Building Code (SFEBC) Chapter A6 outlines seismic retrofit provisions to reduce the collapse risk of vulnerable concrete buildings, as defined in Chapter 5G. This includes certain types of concrete buildings and their construction dates as well as buildings with rigid walls and flexible diaphragms. If a building owner elects to carry out seismic evaluation or retrofitting to have their building removed from the inventory established per Chapter 5G, they may do so by satisfying the structural engineering criteria in Chapter A6. A key focus is on addressing common seismic deficiencies, detailed in Table A6.4-2, which include weak stories, irregularities in lateral-force-resisting elements, non-ductile moment frames, shear-governed concrete columns or wall piers, punching shear in concrete slabs, weak connections of concrete walls to flexible diaphragms, and inadequate bearing connection lengths.

This bulletin provides further clarification by offering commentary on selected sections of Appendix A, Chapter A6 of the SFEBC.

In addition to commentary, this bulletin provides the specific technical requirements to identify, evaluate, and retrofit the seismic deficiencies of Table A6.4-2 when using Engineering Criteria Option (a).

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SFEBC Chapter A6 technical details and commentary:

I. A6.2 Definitions

Commentary: Chapter A6 includes a definition of the term "wall pier," used to specify buildings exempt from the requirements of the Chapter and to specify seismic deficiencies required to be addressed by Engineering Criteria Option (a). The definition of wall pier is per Section 2.3 of ACI 318-19.

II. A6.3 Design professionals

Commentary: Chapter A6 requires that evaluations and design be performed by or under the supervision of "appropriately licensed individuals." The State of California governs the registration of professional engineers and requires that engineers practice only in areas where they have demonstrated competence. The registration status of any licensed professional engineer can be checked at:

http://www.bpelsg.ca.gov/consumers/lic_lookup.shtml.

The successful execution of a seismic retrofit project and the building's performance in an earthquake rely heavily on the analysis and design by the building owner's engineer. Building owners are encouraged to check references for the engineer they plan to engage, and to understand the engineer's experience and qualifications as they relate to the building's type, size, and other characteristics.

Questions an owner may ask a structural or civil engineer before selecting them include:

- Do you have experience with seismic retrofitting of concrete buildings?
- Do you have experience using the seismic evaluation and retrofit standard ASCE 41?
- Can you describe structures that you have evaluated or retrofitted that are most similar to my building?

III. A6.4 Structural engineering criteria

A. A6.4.1 Engineering criteria

Commentary: Table A6.4-1 provides two options for engineering criteria that engineers may use for seismic evaluation or retrofit of Concrete Buildings. Option (a) specifies lower seismic forces, and also requires addressing the seismic deficiencies listed in Table A6.4-2. Option (b) specifies greater seismic forces.

i. Criteria Option (a)

For Engineering Criteria Option (a), addressing the seismic deficiencies in Table A6.4-2 is required, even if analysis indicates the building satisfies Collapse Prevention for the BSE-1E earthquake level without addressing a listed deficiency. Addressing the seismic deficiencies in Table A6.4-2 is intended to enable gravity-load-resisting elements to withstand severe earthquake movements, greater than BSE-1E, while maintaining their capacity to support gravity loads. These seismic deficiencies can be critical contributors to the collapse vulnerability of concrete buildings. They do not include all possible seismic deficiencies.

ii. Criteria Option (b)

Engineering Criteria Option (b) equates to the requirements of ASCE 41 for the Basic Performance Objective for Existing Buildings (BPOE) except:

- Non-structural evaluation and retrofitting is limited to elements of unreinforced masonry.

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- Evaluation of the Life Safety structural performance level for the BSE-1E earthquake level is not required.

Addressing the seismic deficiencies specified in Table A6.4-2 is not necessarily required in meeting Engineering Criteria Option (b) if seismic evaluation at the BSE-2E earthquake level demonstrates acceptable performance. For buildings assigned to Risk Category I or II, the criteria for Engineering Criteria Option (b) will typically also provide compliance with triggered retrofit requirements for Substantial Alteration (Section 304.3.2 of the SFEBC).

For Engineering Criteria Option (b), the Life Safety performance check for the BSE-1E earthquake level is omitted because, under San Francisco's seismic hazard parameters, it does not govern over the Collapse Prevention check for the BSE-2E level. This is because the typical ratio between the two ground motion levels is approximately 1.8, while the ratio between the Collapse Prevention and Life Safety acceptance limits in ASCE 41 does not exceed 1.33.

iii. "75% of code" criteria not permitted in Appendix A6

The approach (in Section 304.3.2) of using 75 percent of the prescribed forces of the new building code is intentionally not included in Chapter A6, and thus not permitted for use in Chapter A6 because this approach does not clearly address (a) the design of gravity framing for imposed deformations and (b) structural detailing that does not conform to any concrete seismic-force-resisting system that is permitted in high seismic design categories.

iv. Buildings assigned to Risk Category III or IV

Chapter A6 provides retrofit criteria intended to achieve basic safety for Risk Category II buildings. The criteria can be applied to Risk Category III or IV buildings if the goal is only to achieve this basic safety criteria (i.e., Structural Collapse Prevention (S-5) for the BSE-2E earthquake hazard level). It is not in the scope of Chapter A6 to provide retrofit criteria to achieve the higher performance related to safety or recovery associated with new structures assigned to Risk Category III and IV.

v. Elements of unreinforced masonry

Both engineering criteria options in Table A6.4-1 require removing or retrofitting any unreinforced masonry elements. This requirement addresses the safety risk from elements such as unreinforced masonry chimneys, hollow clay tile partitions, and brick masonry walls falling out of plane. Except for these elements, Chapter A6 does not require seismic retrofitting of nonstructural components.

B. Flexible floor- or roof-diaphragms

Requirements: For buildings with one or more flexible diaphragms, compliance with Appendix A, Chapter A2 is sufficient to comply with the portions of Chapter A6 related to the wall anchorage system and collectors.

In addition, for buildings satisfying all of the following, compliance with Chapter A2 is sufficient to meet the structural requirements of Chapter A6:

(a) The building has no more than two stories above grade plane, excluding mezzanines.

(b) The building does not include concrete columns nor wall piers, as defined in Chapter A6.

(c) The building's floor and roof diaphragms are both flexible in-plane, i.e. sheathed with plywood, wood decking (e.g., 1x or 2x), or metal deck without concrete topping slab.

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Commentary: Rigid-wall-flexible-diaphragm (RWFD) buildings are addressed by Chapter A2. Chapter A6 is not expected to be invoked for one-story buildings. For Concrete Buildings taller than one story, where Chapter A6 is invoked and the structure satisfies all of (a), (b), and (c) above, the wall-to-roof diaphragm and wall-to-floor diaphragm anchorage system, and collectors are the only structural aspects of such buildings required to be addressed per Chapter A6.

C. Combinations of seismic-force-resisting systems

Requirements: For buildings having structural systems that are partially concrete and partially other structural materials, the building shall comply with Chapter A6 as a combined system, except:

(a) **Vertical combinations of seismic-force-resisting systems:** For vertical combinations of seismic-force-resisting systems (i.e. different seismic-force-resisting system in upper stories compared to lower stories) where only the lower system is concrete, if the existing upper system (including the lateral-force-resisting system and gravity system) is not of concrete construction, the existing upper system is not required to comply with Chapter A6.

(b) **Combinations of seismic-force-resisting systems in different directions:** For combinations of seismic-force-resisting systems where different seismic-force-resisting systems are used along each of the two orthogonal axes of the structure, if the gravity system is not of concrete construction, the existing non-concrete lateral-force-resisting system need not comply with Chapter A6.

D. Technical requirements for addressing the seismic deficiencies of Table A6.4-2 when using Engineering Criteria Option (a).

Requirements: The following requirements apply to identifying, evaluating, and retrofitting the seismic deficiencies listed in Table A6.4-2.

Potential deficiency	Requirements	Commentary
Weak story: The structure includes one or more stories having lateral strength less than the story above.	The structure shall not have vertical structural irregularity of Type 5a nor Type 5b in Table 12.3-2 of ASCE 7.	If the structure has a weak story or extreme weak story, to meet Engineering Criteria Option (a) the weak story deficiency must be eliminated by retrofitting. Otherwise the structure must meet Engineering Criteria Option (b).
Lateral-force-resisting-element irregularity: The lateral-force-resisting system includes one or more concrete walls or frames that are not continuous to the foundation.	The building shall not have a horizontal structural irregularity Type 4 of Table 12.3-1 or vertical structural irregularity Type 4 of Table 12.3-2 of ASCE 7.	If the structure has either of the specified irregularities—in-plane or out-of-plane offset or discontinuity—to meet Engineering Criteria Option (a), the irregularity must be corrected by retrofitting. Otherwise the structure must meet Engineering Criteria Option (b).
Non-ductile moment frame: The main lateral-force-resisting-system includes concrete moment frames that do not satisfy strong-column-weak-beam requirements or that have shear-	Comply with all of the following: 1. Moment frame columns shall satisfy Section 18.7.3 of ACI 318 and Section 18.7.6.1 of ACI 318.	Section 18.7.3 requires strong-column weak-beam strength proportions. Section 18.6.6.1 requires columns to be flexure governed. Section 18.6.5.1 requires beams to be flexure

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Potential deficiency	Requirements	Commentary
governed columns or beams.	2. Moment frame beams shall satisfy Section 18.6.5.1 of ACI 318.	governed. Such requirements are essential for ductile behavior of concrete moment frames.
Shear-governed concrete column or wall pier: The structure includes one or more concrete columns or wall piers that are shear-governed and susceptible to failure resulting in loss of gravity load support.	For each column or wall pier, comply with one or more of the following: 1. Columns and wall piers shall have design shear strength satisfying Section 18.7.6.1 of ACI 318 or greater than the maximum shear that can be delivered to the column or wall pier based on a capacity design approach. For wall piers, joint faces shall be taken as the top and bottom of the clear height of the wall pier. 2. Provide or demonstrate an alternate load path to support design gravity load assuming the column or wall pier fails and cannot support gravity load. 3. For wall piers in buildings that do not have an Extreme Torsional Irregularity per ASCE 7 Table 12.3-1 Type 1b, demonstrate compliance with the Tier 1 Quick Check for shear stress in concrete walls in that story in each plan direction per Section 4.4.3.3 of ASCE 41. Pseudo seismic force V shall be 2 times the pseudo seismic force at the BSE-1E earthquake level, but need not exceed that at BSE-2E. System modification factor M_s shall be for Collapse Prevention performance.	1. Shear governed columns or wall piers can be a serious deficiency that leads to building collapse. Retrofitting columns or wall piers by jacketing, such as with fiber reinforced polymer (FRP), can be used to make the elements flexure-governed. 2. If failure of columns or wall piers can be shown to not cause collapse because of an alternate load path for gravity load, the shear-governed behavior is permitted. An example of an acceptable alternate load path is a beam that can span over a failed column or wall pier to supports not susceptible to failure, or an added column adjacent to the susceptible column or wall pier. The alternate load path is to be a complete load path, i.e. to the foundation and supporting soil, that does not rely on non-compliant elements. 3. If the building meets the quick-check for shear at the specified level and does not have an Extreme Torsional Irregularity, the consequences of shear failure of wall piers will likely be limited. Option 3 is not permitted for structures with high plan-torsion irregularity because, in such cases, columns or wall piers on one side of the building plan are more vulnerable to concentrated damage.
Punching shear in concrete slab: One or more concrete floor or roof slabs are supported by columns without beams framing into the column and susceptible to loss of gravity load support following punching shear failure.	Comply with one or more of the following in each principal plan direction at each column: 1. Demonstrate compliance with Section 18.14.5 of ACI 318 with earthquake force E and design story drift Δ_x taken as 2 times the earthquake force and story drift at the BSE-1E earthquake level, but need not exceed that at BSE-2E, determined in accordance with	1. Section 18.14.5 addresses acceptable punching shear stress from gravity load as a function of story drift, a key indicator of susceptibility to punching shear of slab-column connections. Section 8.7.4.2.2 requires two slab bottom bars to pass between the column cage longitudinal bars in each plan direction. 2. ASCE 41 Table 10-15 footnote d requires one post-tensioning tendon to

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Potential deficiency	Requirements	Commentary
	Section 7.4 of ASCE 41. Also comply with Section 8.7.4.2.2 of ACI 318. The slab bottom bars must be continuous through the column or spliced using mechanical or welded splices. 2. Demonstrate the existence of continuity reinforcement in accordance with ASCE 41 Table 10-15 footnote d. 3. For post-tensioned slabs, demonstrate compliance with Section 8.7.5.6 of ACI 318. 4. Provide an alternate load path to support design gravity load, assuming the slab-column interface fails and cannot support gravity load.	pass through the column cage in each plan direction, or slab bottom bars with steel area based on the gravity shear demand on the slab critical section. 3. Section 8.7.5.6 requires two prestressing tendons to pass through the column cage in each plan direction, or slab bottom bars with steel area based on the column and slab geometry. The tendons or bottom bars help prevent collapse of the slab if punching shear initiates. 4. If the existing condition is susceptible to punching shear, a possible retrofit solution is to provide a path of support such as a collar at the top of a column that supports the bottom of the slab beyond the expected punching shear failure plane.
Weak connection of concrete wall to flexible diaphragm: The structure includes one or more concrete walls supporting one or more flexible diaphragms, where the wall is not adequately anchored into the diaphragm.	For each flexible floor or roof diaphragm, comply with Chapter A2, or ASCE 41 with a performance objective of Structural Collapse Prevention with the BSE-2E earthquake level.	The objective of this item is to reduce the likelihood that a concrete wall will separate from a flexible floor or roof diaphragm in a way that could lead to floor or roof collapse. For floor or roof diaphragms that have timber framing in combination with a complete grid of concrete floor beams, Chapter A2 may be used to demonstrate that existing concrete floor beams are connected to the walls in such a way that they resist out-of-plane forces on the walls at least equal to the forces prescribed in Chapter A2.
Inadequate length of bearing connection: One or more beams or slabs are supported by a bearing connection with short bearing length.	Provide bearing length to support gravity load, such that the bearing length satisfies all of the following: 1. Section 18.14.4.1(d) of ACI 318. 2. Two times the displacement demand at the BSE-1E earthquake level, determined in accordance with Section 7.4 of ASCE 41, but need not exceed that at BSE-2E.	In some cases, including at building expansion joints, concrete floor structures, either cast-in-place or precast, have bearing supports. In older structures such bearing supports may not have adequate bearing length compared to earthquake displacement demands. 1. Section 18.14.4.1(d) requires a bearing length of 5 inches for beams, or 2 inches + L/180 for slabs.

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E. A6.4.2 Building separation

Commentary. Building separation issues are not addressed in Chapter A6 because of the likely impracticalities of addressing property-line separations in San Francisco. Engineers are encouraged to inform the building owner if there is a risk of pounding damage at building separations.

F. A6.4.3 Liquefaction and landslide risk.

Commentary. Similarly, seismic evaluation and retrofit per Chapter A6 is not required to address soil liquefaction or landslide risk. Engineers are required to notify the owner if their building is in a zone of high or very high risk of liquefaction or landslide.

The exemption from considering the geotechnical hazards of liquefaction and landslide does not apply to lateral earth pressure. Forces from static and dynamic earth pressure on walls (absent liquefaction or landslide) shall be considered in the seismic evaluation in combination with other forces on the structure.

For properties subject to the Slope and Seismic Hazard Zone Protection Act (San Francisco Building Code Section 106A.4.1.4), retrofitting per Chapter A6 does not necessarily trigger the requirements of the act if the project does not include work of the type and quantity specified in the Scope (Section 106A.4.1.4.3) of the act, and further detailed in Information Sheet S-19. However, if the project does include such triggering work, even if the work is done to comply with Chapter A6, then the project must comply with the requirements of the act.

G. A6.4.4 Other retrofit triggers

Commentary. Section A6.4.4 clarifies that meeting the requirements of Chapter A6 does not replace the need to meet Section 304.4 (minimum lateral force for existing buildings) when a project is subject to a Substantial Structural Alteration (Section 503.11) or a Non-structural Alteration (Section 503.11.1).

Triggered retrofits must comply with Section 304.4. In most cases, owners may also choose to meet the requirements of Chapter A6 so the building can be removed from the inventory established under Chapter 5G. However, if the owner does not pursue removal from the inventory, then Chapter A6 does not apply to the retrofit requirements subject to Section 304.4.

H. A6.4.5 Masonry infill

Commentary. If the infill is unreinforced masonry, its attachment to the main structure must be addressed as shown in Table A6.4-1. In addition, for both reinforced and unreinforced masonry infill, the effect of the infill on the building's seismic response must be addressed as required by this subsection.

Patrick O'Riordan, C.B.O. Date
Director
Department of Building Inspection

Approved by the Building Inspection Commission on (date)

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Administrative Bulletin: Technical Guidance on Voluntary Retrofit Standards for Concrete Buildings

City and County of San Francisco
Building Inspection Commission
July 16, 2025

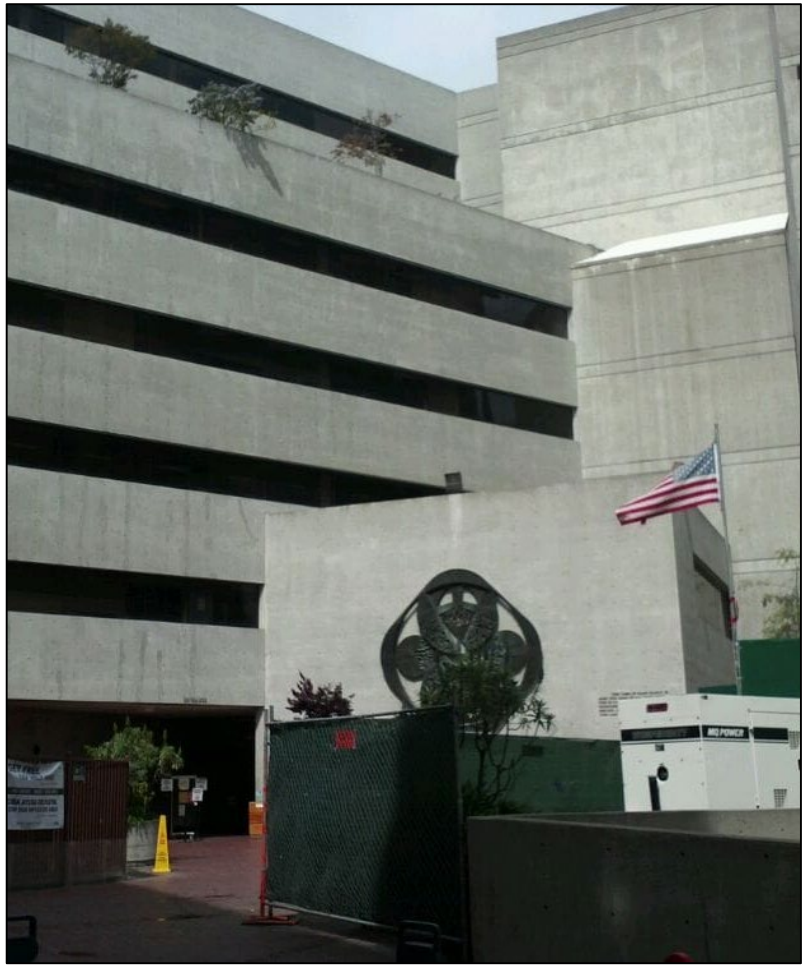
ONESF
Building Our Future

Summary

We are asking this commission to approve the Administrative Bulletin on Voluntary Retrofit Standards for Concrete Buildings.

- This AB would provide guidance to design professionals on how to meet the voluntary seismic retrofit standards for concrete buildings that were published in June.
- This AB is related to Appendix A, Chapter A6 of the San Francisco Existing Building Code.

Concrete Building Ordinance



- In May, the Board of Supervisors passed an ordinance which published voluntary seismic retrofit standards for concrete buildings.
- Buildings that retrofit to this newly established standard are exempt from any future mandatory retrofit program for 20 years.
- The goal of these standards is to tell concrete building owners who are ready to retrofit what level of safety the City wants their building to meet.

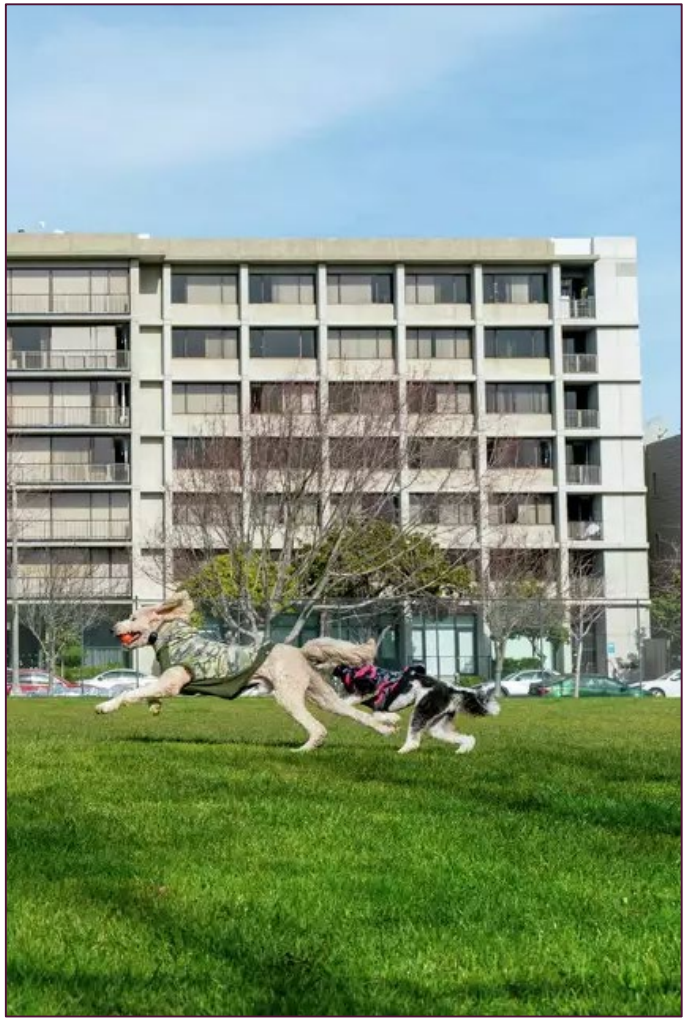
Voluntary Retrofit Standards

The newly established Appendix Chapter A6 describes two retrofit options that building owners can choose from if they wish to receive the exemption:

- Option (a) is a newly established retrofit option that involves addressing seven key deficiencies and then retrofitting to a lower earthquake level.
- Option (b) is equivalent to the level of retrofit that is already triggered when seismic work is required by the code.

The Appendix describes these options at a high level but relies on the Administrative Bulletin to provide the details needed by design professionals.

Technical Guidance Administrative Bulletin



This concrete building has recently been retrofitted. (Image source: SF Chronicle)

The Administrative Bulletin:

- Defines the seven key deficiencies from Option (a) in detail.
- Provides the technical guidance that design professionals and building owners need to meet the standards of Appendix Chapter A6.

This bulletin has been reviewed by:

- The Code Advisory Committee (recommended approval).
- The Structural Subcommittee (recommended approval).
- DBI Technical staff.
- DBI Communications staff.

Thank you

Questions?

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