Building on Fault Lines: Seismic Resilience and the Impact of 20th-Century Earthquakes and Housing Policy on 21st-Century Housing Affordability in San Francisco and Tokyo

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Abstract

Given the unpredictability of earthquakes, urban planning in seismically active regions must incorporate both immediate disaster mitigation and long-term resilience to protect populations and infrastructure. This project examines how major seismic events in 20th-century San Francisco and Tokyo catalyzed significant transformations in each city's approach to urban planning and how the persistent threat of seismic destruction has continued to influence 21st-century planning policies, particularly in terms of affordability, resilience, and sustainability. To explore these topics, this thesis develops a comparative case study using qualitative and quantitative data such as historical documents, government data, modern building codes and interviews with housing experts. I argue the stark differences in 21st-century planning priorities, housing affordability, and urban development between San Francisco and Tokyo are rooted in their contrasting approaches to 20th-century post-earthquake recovery, regulatory structures, and public attitudes toward resilience. This thesis also situates earthquake preparedness within broader regulatory and cultural contexts, arguing that Tokyo's centralized governance and national planning laws have enabled swift post-disaster adaptation, fostering a dynamic urban landscape through flexible zoning and high-density construction. In contrast, San Francisco's decentralized approach, characterized by strict zoning laws, historic preservation priorities, and a protracted permitting process, has created bureaucratic barriers that constrain new development and exacerbate housing shortages. This study highlights how regulatory frameworks shape both resilience and long-term urban growth, and contributes to a broader understanding of how cities can balance disaster preparedness, affordability, and sustainable urbanism in an era of increasing seismic uncertainty.

Introduction and Overview of Research & Conceptual Framework

Urban planners and policymakers face a unique challenge in protecting cities from earthquakes. Unlike hurricanes, tornadoes, and floods, earthquakes strike without warning and offer no opportunity for preemptive evacuation. While scientists understand the mechanics of earthquakes, their inability to predict precise timing leaves densely populated areas perpetually vulnerable to sudden decimation. San Francisco and Tokyo, unlike many other global cities, face a distinct challenge: they are both situated on some of the world's most active tectonic fault lines. In fact, according to a 2014 United States Geological Survey (USGS) report, there is a 51% probability that San Francisco will experience a major earthquake measuring above a magnitude of 7.0 by 2044.[1] Similarly, a 2019 report estimates a 70% chance that a 7.0 magnitude earthquake will strike Tokyo by 2050.[2] In response to these risks, building regulations have become central to urban resilience in both cities—yet their approaches and priorities have diverged significantly. Tokyo emphasizes more rapid and continuous redevelopment along with flexible zoning laws. San Francisco, on the other hand, prioritizes the preservation of historic buildings and landscapes.[3]

Diverging from existing scholarship, this project draws an explicit link between historic earthquakes, the subsequent urban planning policies, and contemporary housing affordability issues. While scholars such as Noguchi and Poterba have compared Tokyo's housing system to that of the United States, this project offers a historic lens to examine why these policies exist

[1] "What Is the Probability That an Earthquake Will Occur in the Los Angeles Area? In the San Francisco Bay Area?," U.S. Geological Survey, September 27, 2018, https://www.usgs.gov/faqs/what-probability-earthquake-will-occur-los-angeles-area-san-francisco-bay-area.
[2] Daniel Hurst, "'This Is Not a "What If" Story': Tokyo Braces for the Earthquake of a Century," *The Guardian*, June 12, 2019, sec. Cities, https://www.theguardian.com/cities/2019/jun/12/this-is-not-a-what-if-story-tokyo-braces-for-the-earthquake-of-a-century.
[3]Shane Phillips, "Episode 72: Notes on Tokyo's Housing, Land Use, and Urban Planning with Shane Phillips," UCLA Housing Voice Podcast, n.d., accessed June 3, 2024.

today and how they have been informed and influenced by seismic events.[4] Research on historic disasters and policy developments is urgent due to the need for effective urban resilience strategies against seismic events—unpredictable natural disasters with the potential to cause devastating, life-threatening damage.

To better understand how historical disasters shape contemporary urban planning and housing affordability, this project addresses the following questions: how have historic earthquakes influenced the development of urban planning policies, particularly those related to housing affordability, in Tokyo and San Francisco? And how does the persistent threat of seismic activity and differences in rebuilding strategies impact housing supply and resilience? To answer these questions, the project employs a comparative case study methodology, integrating historical analysis, contemporary policy review, open-source government data, and three qualitative interviews.

This thesis focuses on urban planning policies related specifically to market-rate, owner-occupied housing—rather than rental or public housing—to examine how planning frameworks shape long-term patterns of affordability, resilience, and sustainability in the aftermath of disaster. In both San Francisco and Tokyo, market-rate housing is primarily developed by private actors, making private developers central to how each city rebuilds and grows in response to seismic events.[5] In this context, "resilience" refers to a city's capacity to maintain up-to-date building technologies that withstand seismic shock, as well as its ability to restore housing stock quickly without prolonged delays or widespread displacement. "Sustainability," meanwhile, is

[4] Yukio Noguchi and James M. Poterba, eds., *Housing Markets in the United States and Japan*, A National Bureau of Economic Research Conference Report (Chicago: University of Chicago Press, 1994).
[5] Noguchi and Poterba.

defined as the ability to maintain a stable and affordable housing supply that meets demand over time without intensifying environmental degradation or deepening social inequality.

Ultimately, this thesis argues that the stark differences in housing affordability and urban development between the two cities are rooted in their contrasting approaches to post-earthquake recovery. Tokyo's emphasis on flexible redevelopment has enabled the city to consistently meet housing demand. In contrast, San Francisco's focus on preservation and aesthetic values has limited opportunities for significant growth, resulting in a constrained housing supply and soaring costs. These divergent strategies highlight the critical role of post-disaster policy decisions in shaping long-term urban outcomes and the strengths and weaknesses of prioritizing short- and long-term goals. By analyzing and comparing San Francisco's and Tokyo's distinct approaches to earthquake resilience, this thesis seeks to provide valuable insights for cities globally as they navigate the trade-offs between safety, affordability, and sustainability in disaster-prone environments.

Housing and Earthquakes: Policy and Cultural Perspectives

This project draws on existing bodies of scholarship to examine how cultural attitudes, land use regulation, governance structures, and seismic risk shape housing policy in Tokyo and San Francisco. While there is literature on each of these topics individually, this section aims to show how these ideas inform and reinforce one another. The first section examines cultural views of housing, contrasting Tokyo's perception of housing as a commodity with San Francisco's treatment of it as a long-term investment. These cultural attitudes directly influence political and regulatory frameworks, leading into the second section on zoning policies and their impact on housing supply. The third section focuses on permitting and governance, highlighting how these systems translate zoning rules and cultural norms into actual development outcomes.

Finally, the fourth section considers literature that explicitly links housing policy and seismic events. Together, these sections lay the groundwork for understanding why Tokyo and San Francisco have developed such divergent approaches to housing affordability and resilience.

I. Cultural Views of Housing: Commodity vs. Investment

Cultural attitudes toward housing in Tokyo and San Francisco are unique and greatly impact their respective housing markets. In Tokyo, housing is largely viewed as a temporary commodity—structures are frequently rebuilt and depreciate over time. In contrast, San Francisco's housing market is driven by the perception of homes as long-term investments, where property values appreciate and are protected through policy and preservation efforts.[6]

Tokyo*:* In Tokyo, land and housing are viewed as entirely different entities. Land is viewed as having value due to its scarcity and longevity, while housing, as policy analyst Richard Ronald describes, is viewed as temporary and follows a 'scrap and build' approach—characterized by frequent demolition and rebuilding.[7] As a result, any given domestic structure typically lasts between thirty to fifty years and properties older than fifty years are practically worthless.[8] This is further shown through Yosuke Hirayama's work that points to a survey conducted by the Japanese government in 2004 titled the 'Public Opinion on Housing.' When Japanese residents were asked whether they would prefer a new or older home when purchasing a house, only 1.7% of respondents selected a 'second-hand' home, while 66% favored a newly built one.[9] These findings reflect a broader cultural tendency in Japan: there is little to no

[6] Maria N. Ivanova, "Housing and Hegemony: The US Experience," *Capital & Class* 35, no. 3 (October 1, 2011): 391–414, https://doi.org/10.1177/0309816811417840.
[7] Richard Ronald, "Between Investment, Asset and Use Consumption: The Meanings of Homeownership in Japan," *Housing Studies* 23, no. 2 (March 1, 2008): 233–51, https://doi.org/10.1080/02673030801893099.
[8] Ronald.
[9] Y Hirayama, "Housing and Social Transition in Japan," 2007.

tradition of rehabilitating or preserving older residential structures. More broadly, this reflects a distinctly Japanese view of rebuilding—seen not as a break from tradition, but as a way of renewing and preserving structures over time.[10]

Hirayama and Ronald identify the Government Housing Loan Corporation (GHLC) as a key factor influencing the preference for new housing over older properties in Japan. The GHLC, one of the few government entities involved in the housing market, provides low-interest loans to middle-class households, with more favorable terms for purchasing new homes compared to second-hand ones.[11] While these policies were designed to stimulate construction, they have created significant discrepancies in home values. Japan's practices differ significantly from the United States. For example, in the U.S., housing prices have remained relatively stable across newer and older homes, whereas in Japan, as Hirayama notes, the price disparity between these categories is substantial.[12] According to Japan's Ministry of Land, Infrastructure, Transport and Tourism, the average new home in 2016 cost ¥38.1 million yen (approximately $351,000 USD), while the average second-hand home cost ¥26.9 million yen (around $248,000 USD)—a difference of about ¥11 million yen ($75,000 USD), or roughly 30% less than a new home.[13] In contrast, in 2023, the median price for existing and new homes in the United States was equal at $416,000 USD.[14]

It is also generally agreed that upon purchasing a home in Japan, its value begins to depreciate, creating a cycle where homeowners feel little incentive to maintain, care for, or

[10] Cassandra Adams, "Japan's Ise Shrine and Its Thirteen-Hundred-Year-Old Reconstruction Tradition," *Journal of Architectural Education (1984-)* 52, no. 1 (1998): 49–60.
[11] Hirayama, "Housing and Social Transition in Japan."
[12] Hirayama.
[13] Charles Wetzel, "Buying Old Vs. New Property," *Housekey* (blog), June 16, 2020, https://housekey.jp/buying-old-vs-new-property-in-japan/.
[14] "Old Homes in the U.S. Now Cost Just as Much as New Properties. Here's Why. - CBS News," July 28, 2023, https://www.cbsnews.com/news/real-estate-old-homes-now-cost-same-as-new-homes/.

invest in their properties. Without adequate care, homes quickly fall into disrepair, making them unattractive to buyers, further reinforcing the preference for new developments.[15] Such attitudes greatly contribute to Tokyo's frequent rebuilding of structures and the general perception of housing as impermanent. This cultural outlook, combined with the steady depreciation of property over time, helps explain how Tokyo maintains relatively affordable housing prices. Since homes are often replaced within a few decades, the housing supply stays responsive to demand and avoids scarcity-driven affordability crises seen in cities like San Francisco.[16]

San Francisco: In San Francisco, much like the rest of the United States, housing is generally seen as a valuable, long-term investment.[17] Extensive literature highlights the role of homeownership in the United States, emphasizing the cultural value it holds as a representation of freedom and individualism.[18] With regard to housing in the United States, Ronald argues that homeownership is not just a financial decision but a deeply ingrained cultural ideal—one that is central to the American Dream and reinforced through policy, social expectations, and economic structures.[19] To many, home ownership represents stability, financial independence, and personal success. For centuries, the U.S. government has shaped and reinforced the ideological framework of a 'homeowner society.' In fact, in 1917, the Department of Labor started the Own-Your-Own-Home campaign (OYOH), the first federally funded campaign to encourage home ownership as a means of promoting both individual prosperity and national economic stability.[20] While this initiative did not offer direct financial incentives, it underscored the government's investment in

[15] Ronald, "Between Investment, Asset and Use Consumption: The Meanings of Homeownership in Japan."
[16] Ronald.
[17] Ivanova, "Housing and Hegemony: The US Experience."
[18] Ivanova.
[19] Richard Ronald, *The Ideology of Home Ownership: Homeowner Societies and the Role of Housing*, 2008, https://doi.org/10.1057/9780230582286.
[20] Ronald.

homeownership as essential to both personal financial security and the broader economic foundation of the country.[21]

Homeownership is not only a cultural manifestation of wealth and success; it is also a crucial financial asset for many American households. For many families, a home is the foundation of their financial security, making its value even more critical to protect.[22] As urban studies experts Rohe, Zandt and McCarthy argue in their paper, homeownership can also create pathways to greater economic opportunity by providing financial leverage, social stability, and intergenerational wealth transfer.[23] Their research also indicates that homeownership can lead to improvements in the psychological and physical health of Americans.[24]

This ideological view and economic reality have resulted in policies that protect housing stock from frequent redevelopment and have contributed to residents' strong involvement in the permitting process. People want to preserve their property values and, as a result, homeowners often advocate for restrictive zoning laws and resist new developments, particularly those that could increase density or affordability at the perceived expense of their own investments.[25] This emphasis on individual property rights reinforces the desire for full autonomy over one's home, making homeowners more protective of their neighborhood's character and economic stability.

In San Francisco specifically, resistance to change is further intensified by an attachment to architectural heritage, which directly influences housing prices.[26] Many residents view older homes—particularly Victorian and Edwardian houses—as uniquely valuable due to their charm

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[21] Vincent J. Cannato, "A Home of One's Own," National Affairs, 2010, https://www.nationalaffairs.com/publications/detail/a-home-of-ones-own.
[22] Ronald, *The Ideology of Home Ownership*.
[23] William M. Rohe, Shannon Van Zandt, and George McCarthy, "Home Ownership and Access to Opportunity," *Housing Studies* 17, no. 1 (January 2002): 51–61, https://doi.org/10.1080/02673030120105884.
[24] Rohe, Van Zandt, and McCarthy.
[25] Marcia Rosen and Wendy Sullivan, "From Urban Renewal and Displacement to Economic Inclusion: San Francisco Affordable Housing Policy 1978-2014," *Stan. L. & Pol'y Rev.* 25 (2014): 121.
[26] Dominique Rissolo, "Preserve the Memory of San Francisco's Victorian Architecture," January 1, 2020, https://www.academia.edu/104317522/Preserve_the_Memory_of_San_Franciscos_Victorian_Architecture.

and historical significance.[27] This desirability drives up prices, making age itself a financial asset. As discussed by Yoko Tsukuda, a scholar specializing in Japanese-American history, the preservation of neighborhoods like Japantown illustrates this sentiment, as community members and preservationists have successfully fought to maintain the area's identity through zoning protections and special-use district codes.[28] However, this attachment to history extends beyond Japantown—many San Francisco neighborhoods resist redevelopment to maintain their distinct architectural character. Groups like the Victorian Alliance, founded in 1973, have played a key role in these movements, using advocacy and activism to preserve San Francisco's historic homes and streetscapes.[29] The prioritization of historic preservation over new construction reflects San Franciscans' views of homes as permanent real estate and important cultural artifacts.

Understanding these diverging cultural attitudes toward housing in Tokyo and San Francisco is essential, as these perceptions directly influence housing policies, redevelopment practices, and affordability outcomes in each city. Tokyo's approach, rooted in the idea of housing as a temporary commodity and land being the item that holds value, explains its capacity for frequent rebuilding and adaptability to changing needs. Conversely, San Francisco's treatment of housing as a long-term investment underscores the city's preservationist policies and resistance to redevelopment. This divergence exemplifies how values shape market dynamics by influencing political and social processes that drive planning decisions, ultimately determining each city's capacity to adapt to changing housing demands.[30]

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[27] Rissolo.
[28] Yoko Tsukuda, "Place, Community, and Identity: The Preservation Movement of San Francisco's Japantown," n.d.
[29] "About Us," *Victorian Alliance San Francisco* (blog), November 29, 2023, https://victorianalliance.org/about-us/, https://victorianalliance.org/about-us/.
[30] Tsukuda, "Place, Community, and Identity: The Preservation Movement of San Francisco's Japantown."

II. Zoning Laws and Housing Supply: Individual Property Rights

Zoning is one of the most powerful tools a city has to shape its built environment. By controlling land use, density, and what types of structures can be built, zoning policies directly influence how cities grow, who gets to live there, and what kinds of communities emerge. In the context of Tokyo and San Francisco, two cities with distinct zoning frameworks, these policies reflect differing cultural priorities. This section explores academic research on these contrasting strategies, analyzing their effects on housing affordability, urban resilience, and each city's ability to accommodate economic shifts and population growth.

Tokyo: Scholars widely recognize the central role the Japanese government plays in urban planning and its emphasis on flexibility and adaptability to support high-density construction and mixed-use development. What sets Japan apart is its national zoning framework. Unlike many other nations where zoning is handled at the local level, Tokyo follows national zoning laws, which are designed to accommodate rapid urban growth and ensure that housing supply keeps pace with demand. This effectiveness stems in part from Tokyo's zoning system, which permits a high degree of land-use flexibility: nearly all zones allow residential buildings, and many also permit small-scale commercial establishments. In contrast to the exclusionary zoning practices often seen in U.S. cities—where single-use zoning can restrict residential or commercial development—Tokyo's approach promotes efficient land use and adaptable urban growth.[31]

Since the early 20th century, Tokyo's building codes have emphasized flexibility and allowed for a dynamic and responsive urban landscape that prioritizes high-density development and mixed land use. Tokyo passed its first nationwide building code in 1919 which established a

[31] Ronald, "Between Investment, Asset and Use Consumption: The Meanings of Homeownership in Japan."

precedent for flexible urban planning and paved the way for contemporary zoning practices that emphasize adaptability.[32] The current system is based on the national 1968 City Planning Law which updated national zoning laws that are similarly flexible and allow for high-density residential buildings in all classifications except industrial areas.[33] According to Sonia Hirt, the way the Japanese government defines 'residential zoning' is incommensurable with the United States' ideas of this concept because there are no areas solely for single-family housing.[34]

It is also important to note that although there is consensus amongst scholars that this framework encourages more rapid development, it also creates issues for city planners. Carmona and Sakai highlight some of these tensions, observing that strong individual design preferences can lead to a form of 'collective neglect.' Their work underscores the difficulty of balancing rapid development and individual expression with the need for coherent and cohesive urban design.[35] Tokyo's zoning system often prioritizes individual property rights and flexibility over collective urban aesthetics or long-term planning cohesion. Carmona and Sakai argue that this system enables the creation of a disjointed landscape, where individual buildings lack integration with their surroundings—for instance, a new apartment block might sit directly beside an Edo-era temple. This approach can result in fragmented aesthetics and a lack of visual and functional coherence.[36]

[32] Sonia A Hirt, "Zoned in the USA: The Origins and Implications of American Land-Use Regulation," in *Zoned in the USA* (Cornell University Press, 2015).
[33] Hirt.
[34] Hirt.
[35] Hirt.
[36] Hirt.

Residential street in Tokyo showing a mix of building styles and scales, reflecting Japan's flexible zoning policies. Photo by author.

Overall, while this system promotes rapid housing supply to meet demand, it also leaves less room for regulatory oversight to address issues such as design cohesion. Tokyo's flexible approach, however, allows for the continuous adaptation of urban spaces to the changing needs of an individual—including affordable housing and earthquake protections—which stands in sharp contrast to San Francisco's restrictive zoning framework. The adaptability of Tokyo's zoning has proven crucial to responding to natural disasters, a dimension largely absent in San Francisco's policies.

San Francisco: With approximately 70% of residential land zoned for single-family homes, San Francisco's zoning laws emphasize preservation and tend to restrict new housing developments to maintain aesthetics in the city.[37] The permitting process in San Francisco is also highly localized and requires extensive input from community stakeholders, often resulting in significant delays for new developments. These factors, combined with strict zoning regulations, have led to soaring housing costs and a limited capacity to meet growing demand.[38]

These characteristics are similar to those found in many American cities, where zoning has been used as a tool for socio-economic segregation and property value preservation. Sonia Hirt expands on this idea, arguing that zoning in the United States was originally driven by elites seeking to exclude working-class and non-white residents from their neighborhoods.[39] Hirt attributes the development of modern American zoning ideology to these exclusionary motivations, noting that, in comparison to European cities, "the American zoning tradition … focused more heavily on the preservation of property values, it segregated land uses more strictly, and it favored the creation of 'pure' residential areas."[40] Many American urban theorists had similar ideas. For example, Fisher discusses San Francisco's zoning history, saying it has been used as a form of municipal power and control over a space and is justified as a method to create good future 'urban environments.'[41]

San Francisco was one of the first American cities to enact a zoning ordinance. Its 1921 ordinance was relatively barebones but established five major land-use zones. This ordinance was later replaced in 1960 by a more detailed and restrictive version, but it continued to reflect

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[37] Clyde O. Jr. Fisher, "Land Use Control Through Zoning: The San Francisco Experience," *Hastings Law Journal* 13, no. 3 (1962 1961): 322–43.
[38] S Karlinsky et al., "What Caused the Housing Crisis," *What It Will Really Take to Create an Affordable Bay Area: How Much Housing Does the Region Need to Build to Prevent Income Inequality from Getting Worse*, 2020, 6–11.
[39] Hirt, "Zoned in the USA: The Origins and Implications of American Land-Use Regulation."
[40] Hirt.
[41] Fisher, "Land Use Control Through Zoning."

the principles of the 1921 code, particularly in its firm separation of residential and commercial districts and its preference for single-family housing. These ideals have led to a rigid zoning structure that limits mixed-use developments and densification.[42] Fisher further emphasizes that the intent behind the 1960 ordinance as a way to "protect the character of residential, commercial and industrial areas and guide their future development in accordance with the city's master plan" and to "prevent over-crowding of land by buildings and people with resultant loss of light, air, privacy and other vital amenities of urban life."[43]

Overall, the contrasting zoning systems in Tokyo and San Francisco provide a critical foundation for understanding how urban planning decisions impact housing affordability and resilience in the face of natural disasters. Despite their differences, both cities' systems emphasize individualism, though in distinct ways: Tokyo's flexible zoning prioritizes property owners' autonomy, fostering rapid development and frequent rebuilding, while San Francisco's preservationist framework reflects a commitment to safeguarding individual property values, neighborhood aesthetics, and values through the single-family home and separation of use-districts. By analyzing these divergent frameworks, this project explores how post-earthquake policies and zoning priorities have shaped each city's housing landscape. Furthermore, while much research has been conducted on Tokyo and San Francisco's zoning individually, there has been little direct comparison of their approaches, particularly in relation to their ability to withstand and recover from seismic events.

III. The Permitting Process and Government Intervention

While zoning regulations dictate what can be built and where, permitting serves as the enforcement mechanism of zoning laws, shaping the efficiency of housing production and the

[42] Ivanova, "Housing and Hegemony: The US Experience."
[43] Fisher, "Land Use Control Through Zoning."

overall housing stock of a city. The permitting process also reflects broader governmental priorities, balancing property rights, urban development, as well as community interests.

The differences between Tokyo and San Francisco's zoning policies are further reflected in their respective permitting systems. Tokyo's permitting process is streamlined and predictable, reinforcing its pro-development approach, whereas San Francisco's process is highly bureaucratic and subject to extensive community intervention. These distinct approaches illustrate the broader ideological and policy divides that shape each city's housing landscape.

Tokyo: In Tokyo, the permitting process is highly streamlined, which reflects the Japanese government's emphasis on individual property rights and the belief that property owners should have the freedom to build on their land with minimal interference.[44] As Forrest and Lee state in their book "Housing and Social Change: East-West Perspectives:"

> By and large, home-ownership is still the predominant element of Japan's housing policy. Housing has always been regarded as an individual's responsibility, a personal problem, and therefore the responsibility of the private market rather than the state.[45]

Overall, Tokyo's approach reflects these ideals and the government establishes lower regulatory thresholds, where compliance with basic zoning and building codes is almost always sufficient to secure approval.[46] In fact, developers are typically granted automatic permission to proceed as long as they adhere to standard, ministerial requirements, such as permissible building heights determined by the type of road frontage, shadow-line stipulations, and the distance to adjacent

[44] Jim Kemeny, "The Ideology of Home Ownership: Homeownership Societies and the Role of Housing," *Housing, Theory and Society* 28, no. 1 (March 1, 2011): 100–101, https://doi.org/10.1080/14036091003691035.
[45] Ray Forrest and James Lee, *Housing and Social Change: East-West Perspectives* (Routledge, 2003), 32.
[46] Forrest and Lee.

properties. This simplified and very objective process minimizes delays and negotiations, and greatly contributes to Tokyo's steady housing supply.[47]

Tokyo's streamlined permitting system also comes with trade-offs, particularly in terms of urban design and cohesion. As Carmona and Sakai note, "developers quickly build to the maximum permissible volumes, leading to some very strange shaped buildings," which has contributed to a fragmented and often inconsistent urban landscape.[48] The emphasis on individual property rights, coupled with the absence of a formal design review process, means that new developments do not necessarily adhere to a cohesive architectural or aesthetic vision. Instead, Tokyo's built environment is shaped by a strong drive for rapid construction and a cultural acceptance—if not encouragement—of architectural experimentation. Finally, a lack of advertisement regulations allows for signage and billboards to be placed almost anywhere, further adding to the visual chaos of the city.[49]

Carmona and Sakai also discuss how even though Japan has some safeguards for historic preservation, they are far fewer and less stringent than those found in the United States or Europe. As a result, many older buildings are replaced rather than restored, reinforcing the cycle of demolition and redevelopment that defines much of Tokyo's housing landscape. Though this approach allows for continuous adaptation and modernization, it also raises concerns about the erosion of historical character and the long-term sustainability of Tokyo's urban fabric.[50]

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[47] Jiro Yoshida, "Land Scarcity, High Construction Volume, and Distinctive Leases Characterize Japan's Rental Housing Markets," *The Brookings Institution*, April 20, 2021.
[48] Matthew Carmona and Aya Sakai, "Designing the Japanese City – An Individual Aesthetic and a Collective Neglect," *URBAN DESIGN International* 19, no. 3 (August 1, 2014): 186–98, https://doi.org/10.1057/udi.2013.29.
[49] Carmona and Sakai.
[50] Carmona and Sakai.

San Francisco: In contrast, San Francisco's permitting process is among the most complex and time-consuming in the United States.[51] Proponents for the system argue that San Francisco's rigorous permitting process contributes to a more cohesive urban design and preserves the city's unique character. On average, it takes developers 627 days to obtain a building permit.[52] The permitting process is divided into two major stages: entitlement and post-entitlement. During the entitlement phase, which averages 450 days, developers must secure planning approval to ensure the city supports the type, size, and design of the proposed project.[53] This is followed by the post-entitlement phase, where developers must demonstrate compliance with health and safety codes. Both stages are prone to delays due to opposition from community stakeholders and the city's stringent regulations. A striking example is the five-year ordeal faced by two homeowners who wanted to expand their 85-square-foot sunroom in their Eureka Valley home. Billingsley and Podolsky's project faced repeated complaints from neighbors which triggered further inspection each time. This case exemplifies how San Francisco's complaint-driven enforcement and discretionary review processes empower neighbors and slows down projects as small as expanding a deck.[54] As scholars have noted, this process is so cumbersome it effectively discourages development.[55]

The lengthy permitting process is partly due to the city's discretionary review system, which allows for extensive public input and appeals at multiple stages. While this system can lead to more community engagement, it also opens avenues for NIMBYism ("Not In My

[51] Dustin Gardiner and Neilson, "627 Days, Just for the Permit: This Data Shows the Staggering Timeline to Build Homes in S.F.," *San Francisco Chronicle*, December 14, 2022.
[52] Gardiner and Neilson.
[53] Gardiner and Neilson.
[54] Danielle Echeverria, "They Were Ready for S.F.'s Nightmare Permit Process. Then a Simple Mistake Made 'All Hell Break Loose,'" San Francisco Chronicle, April 13, 2024, https://www.sfchronicle.com/sf/article/permit-home-building-code-19369323.php.
[55] Gardiner and Neilson, "627 Days, Just for the Permit: This Data Shows the Staggering Timeline to Build Homes in S.F."

Backyard"), where residents oppose new developments to preserve neighborhood character or prevent perceived negative impacts.[56] McNee and Pojani claim NIMBYism in San Francisco is often dominated by older, white, and financially stable residents—groups more likely to have the time, resources, and political influence to engage in public meetings and file appeals. They disproportionately shape urban development in ways that prioritize maintaining their property values over increasing housing density.[57] This is relevant not just demographically, but structurally: it illustrates how discretionary review can function as an exclusionary tool, allowing privileged groups to block projects that would diversify neighborhoods or increase housing access. Overall, these layers of oversight, while intended to ensure thoughtful development, frequently become tools for obstruction. In a city where housing demand far outstrips supply, these delays further drive-up costs and make it even more difficult to build the types of housing that could alleviate affordability and supply issues.[58]

IV. Earthquakes and Housing Policy

Earthquakes have fundamentally shaped the built environments of both Tokyo and San Francisco, yet each city's approach to rebuilding and housing policy in response to seismic risk have diverged dramatically. Tokyo's approach prioritizes adaptability and mitigating seismic risk through design, while San Francisco tends to focus on preservation and has generally faced more public resistance. These distinct trajectories reveal how natural disasters interact with broader policy frameworks, influencing housing supply and affordability.

[56] Georgina McNee and Dorina Pojani, "NIMBYism as a Barrier to Housing and Social Mix in San Francisco," *Journal of Housing and the Built Environment* 37, no. 1 (March 1, 2022): 553–73, https://doi.org/10.1007/s10901-021-09857-6.
[57] McNee and Pojani.
[58] McNee and Pojani.

Tokyo: Tokyo's approach to urban planning and housing development has been deeply shaped by its long history of earthquakes, most notably the Great Kantō Earthquake of 1923. The destruction of vast swaths of the city forced rapid reconstruction and led to a policy environment that prioritized speed, flexibility, and modernization over rigid preservation. As Schencking explains in "The Great Kantō Earthquake," the disaster provided a unique opportunity for the Japanese government to rethink Tokyo's urban landscape. The 1923 tremor also influenced Tokyo's approach to zoning and permitting. In an effort to rapidly increase housing stock and rebuild as efficiently as possible, Japan's national government adopted a highly flexible system.[59]

As Yosuke Hirayama explains in "Collapse and Reconstruction," Japan's housing recovery framework follows a two-tiered system, in which the majority of people are expected to rebuild through market mechanisms, while only a small segment—primarily low-income and elderly individuals—receives direct public housing assistance. This model underscores Japan's broader philosophy of minimal government intervention in housing markets, a characteristic that also shapes Tokyo's urban planning and redevelopment policies.[60]

Overall, scholars agree that Tokyo—and Japan as a whole—adopts a pragmatic approach to disaster recovery. The city rebuilds quickly, relying primarily on market forces to drive reconstruction while simultaneously implementing stricter building codes to mitigate damage from future earthquakes.[61] Scholars also generally agree that Japan learns from each disaster and uses past experiences to refine its zoning laws, permitting processes, and seismic safety regulations. For example, the need for firebreaks and wider roads following the 1923 Great

[59] Yosuke Hirayama, "Collapse and Reconstruction: Housing Recovery Policy in Kobe after the Hanshin Great Earthquake," *Housing Studies* 15, no. 1 (January 1, 2000): 111–28.
[60] Hirayama.
[61] Hirayama.

Kantō Earthquake led to long-term changes in urban design and planning codes that continue to shape Tokyo today. This approach ensures that, while Tokyo remains vulnerable to seismic events, policies are always evolving to be better prepared for the next one.[62]

San Francisco: San Francisco's response to seismic risk has followed a very different trajectory. The 1906 Earthquake, similarly to the Great Kantō Earthquake, was a defining moment that reshaped the city's urban policies. Dyl argues San Francisco's reconstruction efforts, while initially driven by calls for change, ultimately prioritized restoring the past over embracing large-scale modernization.[63] Moreover, while some parts of the city saw rapid rebuilding, much of the planning process was dominated by wealthy landowners and political elites who prioritized quickly rebuilding individual buildings over large-scale redevelopment. Unlike Tokyo, where the earthquake paved the way for new planning eras, San Francisco largely recreated its pre-earthquake urban form.[64]

Understanding how earthquakes have shaped housing policy in Tokyo and San Francisco is critical to addressing their ongoing housing challenges. While much has been written about each city's response to seismic risk, very little comparative scholarship has explored how these policies have influenced housing markets and urban development over time. By analyzing these two case studies side by side, this thesis aims to shed light on how responses to seismic events have shaped present-day housing realities.

[62] Hirayama.
[63] Joanna L Dyl, *Seismic City: An Environmental History of San Francisco's 1906 Earthquake* (University of Washington Press, 2017).
[64] Dyl.

Data & Methods

The comparative case study approach used here combines qualitative and quantitative data to examine how Tokyo and San Francisco's post-earthquake reconstruction strategies have informed each city's present-day zoning laws, permitting processes, and housing affordability trends. Notably, the goal of this project is to consider the evolution of planning frameworks over time to trace a progression of seismic policy adaptations across the 20th- and early 21st-centuries, rather than isolating singular events. This paper's data can be categorized into two sections: historical documents and 21st-century building codes.

In addition to these sources, three interviews were conducted to provide further context on Tokyo and San Francisco's planning and housing policies. These included conversations with a researcher who has focused on housing in Tokyo and Los Angeles, a real estate agent with experience in Tokyo's permitting processes, and a San Francisco-based architect who is familiar with the city's regulatory framework. Given the project's primary reliance on archival research, policy analysis, and statistical data, the interviews are supplemental to the analysis section.

I. San Francisco and Tokyo: Common Ground

Tokyo and San Francisco serve as compelling case studies because both cities are highly seismically active, yet their policy responses to past disasters have diverged significantly. Both cities have experienced landmark earthquakes that necessitated significant reconstruction efforts and policy adaptations.[65] Their continued exposure to seismic activity has led to the evolution of distinct building codes and land-use policies that define their present-day urban landscapes. In addition to their seismic vulnerability, both cities also share high population densities, which

[65] Dyl.

contribute to increased demand for housing and the risk of shortages due to space limitations.[66] Furthermore, their coastal locations expose them to environmental challenges such as flooding and sea level rise and complicate urban development and resilience planning.

Beyond their geographic and climatic similarities, Tokyo and San Francisco are also both global economic hubs that attract diverse populations and foreign investment.[67] These economic factors complicate housing policy decisions, as each city must balance the needs of residents, businesses, and investors, all while ensuring sustainable urban growth. Finally, unlike cities with more extreme seasonal climates, Tokyo and San Francisco benefit from relatively dormant conditions, meaning their policy decisions are shaped less by short-term environmental pressures and more by long-term planning considerations. These shared characteristics make them particularly useful case studies for examining how regulatory frameworks influence housing affordability, especially since, despite these parallels, their responses to urban development have diverged significantly.[68]

II. Research Design

The first section of the analysis draws on historical documents—including government publications, secondary sources, and archival maps—to trace how urban planning policies in Tokyo and San Francisco evolved in response to major seismic events. These materials offer insight into both immediate disaster responses and long-term shifts in planning priorities, revealing how policymakers, planners, and residents have historically understood and adapted to

[66] Nami Sumida, "San Francisco May Be Small, but It's among America's Most Densely Populated Cities," *San Francisco Chronicle*, November 29, 2021, https://www.sfchronicle.com/sf/article/San-Francisco-may-be-small-but-it-s-among-16650575.php.
[67] Tomoko Kubo, "Divided Tokyo: Housing Policy, the Ideology of Homeownership, and the Growing Contrast Between the City Center and the Suburbs," in *Divided Tokyo: Disparities in Living Conditions in the City Center and the Shrinking Suburbs* (Singapore: Springer Singapore, 2020), 21–46, https://doi.org/10.1007/978-981-15-4202-2_2.
[68] James Siodla, "Razing San Francisco: The 1906 Disaster as a Natural Experiment in Urban Redevelopment," *Journal of Urban Economics* 89 (2015): 48–61, https://doi.org/10.1016/j.jue.2015.07.001.

seismic risk. Government records such as post-earthquake reconstruction plans and zoning legislation help identify key changes in land-use priorities and political attitudes toward development over the 20th century. Historical maps from the University of Chicago Map Collection complement this analysis by illustrating how neighborhoods were rebuilt, rezoned, and restructured after earthquakes. While valuable, these maps lack standardized detail, requiring cross-referencing with supplementary records to verify specific changes over time.

The second section focuses on 21st-century building codes to evaluate how each city's current planning framework addresses ongoing seismic risk and housing affordability. San Francisco's system is governed by the San Francisco Planning Code and California Building Standards Codes and Tokyo follows the National Land Use Planning Act. Analyzing these codes provides valuable insight into how each city manages seismic risk and regulates new development. There are, however, important limitations to this analysis. While these codes reflect official policy positions, they do not always translate into real-world outcomes. For example, although San Francisco's zoning laws technically allow for dense development in some areas, discretionary review and local political opposition often prevent projects from being approved or built. Additionally, because these documents are written in different languages and originate from distinct planning cultures, terminology and regulatory structures often vary, making direct comparison difficult. To help bridge this gap, secondary sources are used to examine how policy is implemented in practice. GIS mapping is also used to visualize zoning patterns, seismic risk, housing and land prices, and the distribution of newly built housing units.

Analysis

I. Historical Earthquake and Policy Analysis

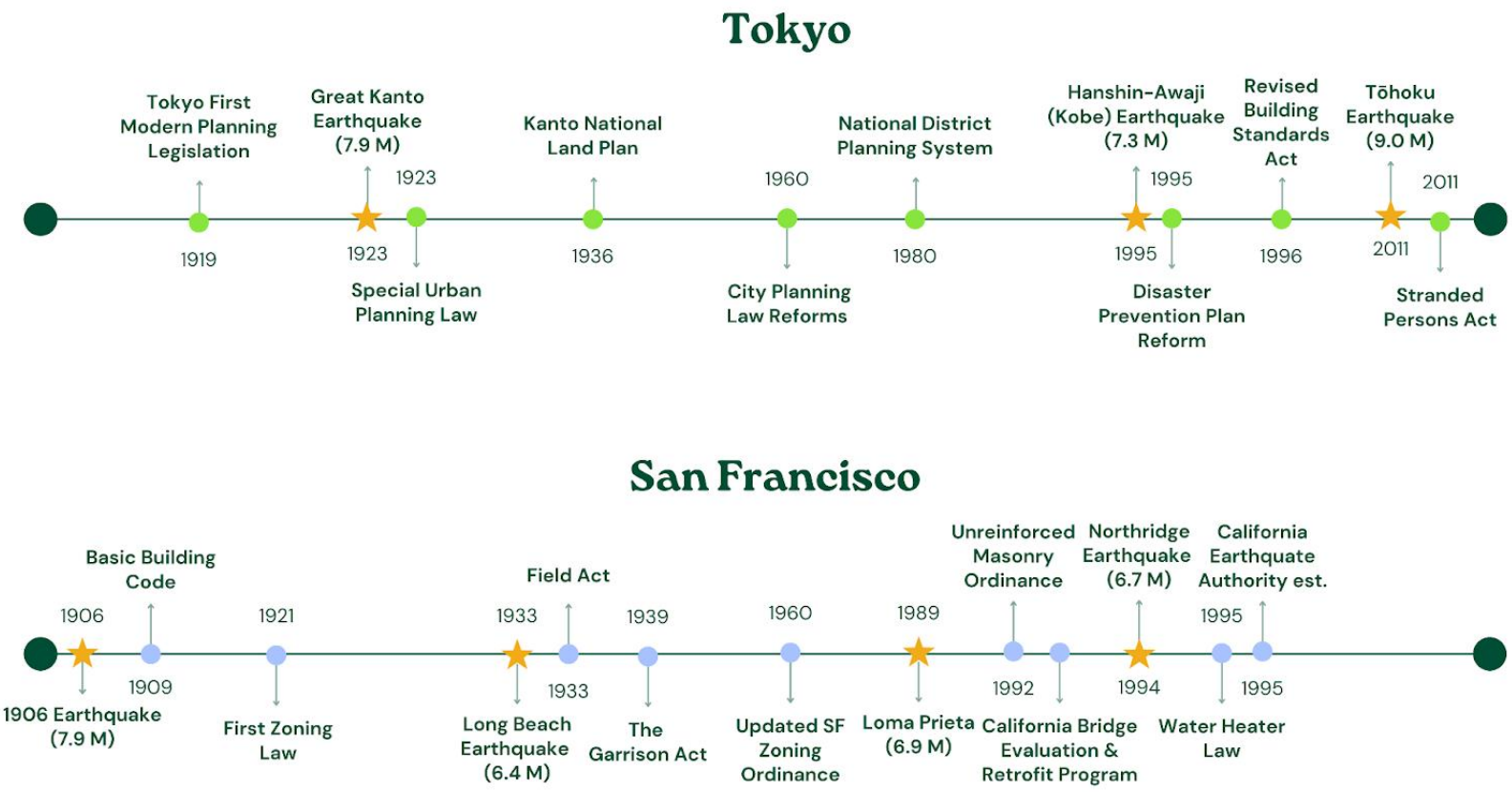

Figure 1: Timeline of Major 20th Century Earthquakes

At the turn of the 20th century, both San Francisco and Tokyo were rapidly expanding, emerging as major economic and cultural hubs. San Francisco's transformation was fueled by the Gold Rush and its growing status as a financial center, while Tokyo, having recently become

Japan's official capital, solidified its position as the country's political and economic core.[69] However, this period of growth came with consequences—both cities developed with little regulation, leaving much of their housing stock vulnerable to disaster.[70]

Earthquakes have repeatedly tested the resilience of these cities, exposing weaknesses in their urban planning frameworks and prompting significant policy shifts. This section examines the most significant 20th-century earthquakes that affected each city's planning frameworks, focusing on how governance structures influenced each city's ability to implement and enforce seismic safety measures. Additionally, it explores how zoning and land-use regulations evolved differently, with Tokyo adopting a more flexible and adaptive approach while San Francisco imposed restrictive policies that limited development. Finally, it considers cultural perceptions of earthquake risk and their impact on the housing market and seismic reaction. Overall, Tokyo's ability to integrate disaster resilience into its urban planning framework has allowed it to maintain both affordability and seismic safety, whereas San Francisco's restrictive zoning, fragmented governance, and resistance to redevelopment have left it struggling with high housing costs and earthquake vulnerabilities.

San Francisco

1906 Earthquake:

San Francisco's approach to urban planning and rebuilding in the early 20th-century reflected a broader tension between aesthetics, economic interests, and public safety. The City Beautiful movement guided city planning and touted the idea of beautification as a way to

[69] Henry Gannett, *Statistical Atlas of the United States, Based upon the Results of the Eleventh Census* (Washington: Govt. print. off, January 1, 1898), G1201.G1 U53 1898, Library of Congress Geography and Map Division Washington, D.C. 20540-4650 USA dcu, https://www.loc.gov/resource/g3701gm.gct00010/.
[70] Saimaru Intānashonaru and Seikatsu Bunkakyoku, *A Hundred Years of Tokyo City Planning by Tokyo Metropolitan Government* (Tokyo, Japan: Tokyo Metropolitan Government, 1994).

improve living standards. San Francisco was becoming increasingly dense and embraced the City Beautiful movement as a way to enhance its urban landscape.[71] In 1904, the local City Beautiful group, Association for the Improvement and Adornment of San Francisco (AIASF), hired Daniel H. Burnham, a renowned urban planner of the era, to develop a plan for San Francisco.[72] This plan envisioned new parks and roads to create a more efficient and beautiful landscape. Burnham, as well as many residents and politicians, believed San Francisco's natural beauty should be carefully integrated into the plans to improve the city's character. Burnham's plans were approved by the Board of Supervisors and Mayor Schmitz in 1905.[73]

Shortly after, on April 18, 1906, San Francisco experienced a 7.9 magnitude earthquake—the largest earthquake in the city's modern history. The tremor and the ensuing fires destroyed more than half of the city and killed approximately 3,000 people, making it the deadliest earthquake in the history of the United States.[74] Immediately following the disaster, many people in the local government viewed this disaster as an opportunity to implement the Burnham plans, improve city aesthetics, and improve social issues such as sanitation and corruption.[75]

Initially, many groups—including the San Francisco Real Estate Board, the Southern Pacific Company, and various labor newspapers—backed the implementation of the plan, saying economic factors should be placed on the backburner to allow for more permanent, long-term changes.[76] However, as efforts stalled, opposition emerged and people pushed city officials to focus on a speedy recovery to resume business activity. Out of this opposition, a plan created by

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[71] Dyl, *Seismic City: An Environmental History of San Francisco's 1906 Earthquake*.
[72] Dyl.
[73] Dyl.
[74] "Apr 18, 1906 CE: Great San Francisco Earthquake," *National Geographic*, n.d., sec. Education, https://education.nationalgeographic.org/resource/great-san-francisco-earthquake/.
[75] Dyl, *Seismic City: An Environmental History of San Francisco's 1906 Earthquake*.
[76] Dyl.

Marseden Manson, a civil engineer, emerged as a viable alternative. This plan did not emphasize aesthetics nearly as much as Burhnam's and instead focused more on practical changes. Finally, another plan that gained widespread support was to move Chinatown to a less desirable part of the city. This sentiment was highly racialized and motivated by notions of Chinatown being unsanitary, dark and dangerous.[77] Chinese residents were seen as vectors for disease and the earthquake provided an opportunity to push the longtime residents out of the city.[78] This moment would foreshadow a broader pattern in San Francisco's planning history, where land use, and redevelopment policies would be used as tools to exclude certain groups from desirable areas.

None of these plans were actualized. This was in part because the 'blank slate' was not truly blank. People still held titles to land, didn't want their lives to be uprooted, and held onto attachments and nostalgia for old San Francisco. There was never consensus between long- and short-term goals from politicians. Additionally, there was major opposition from private landowners who thought building codes and height limitations would make their own efforts more complicated. Finally, there was the issue of perception. Many business owners and civic leaders sought to downplay the scale of destruction, fearing that acknowledging widespread devastation would damage the city's reputation, deter outside investment, and scare away potential visitors. This desire to project confidence and continuity further reinforced the already growing movement to restore the familiar, rather than seize the moment to reimagine the city's future.[79]

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[77] Dyl.
[78] "Clean Slate: Land-Use Changes in San Francisco after the 1906 Disaster," ScienceDirect, accessed February 20, 2025, https://www.sciencedirect.com/science/article/pii/S001449831730089X; James Siodla, "Clean Slate: Land-Use Changes in San Francisco after the 1906 Disaster," *Explorations in Economic History* 65 (2017): 1–16, https://doi.org/10.1016/j.eeh.2017.04.001.
[79] "The Great Earthquake Coverup - Cypress Lawn Heritage Museum," accessed February 20, 2025, https://cypresslawnheritagefoundation.org/blog/great-earthquake-coverup/.

The 1906 earthquake did lead to some notable changes including a $5 million bond for the construction of an auxiliary water supply for fire protection as well as a mandate requiring fireproof roofing in certain areas. The tremor also led to the enactment of the first state law outlining safety standards of buildings, the 1909 Tenement House Act, which banned the construction of dark and airless tenement buildings in California cities.[80]

Ultimately, the 1906 earthquake didn't lead to the sweeping reforms that many had envisioned. While the disaster sparked conversations about redesigning the city, resistance from private developers ensured that no large-scale changes were made. By 1909, San Francisco introduced new building codes that required post-construction inspections, but enforcement was lax and if a building met the minimum standards, it was approved.[81] Furthermore, with no formal zoning regulations until 1921, developers had free rein to rebuild however they saw fit, prioritizing speed and cost over safety.[82] Rather than using the earthquake as an opportunity to create a more resilient city, officials downplayed the damage to protect San Francisco's image as a desirable place to live and invest. This reluctance to impose stricter regulations or rethink urban planning meant that seismic risk remained an afterthought, a pattern that would persist for decades. While Tokyo would use seismic events as a catalyst to integrate disaster resilience into its urban planning framework, San Francisco's response to the 1906 quake cemented a hands-off approach—one where private interest dictated rebuilding, and the city's vulnerability to future disasters remained largely unaddressed.

Although seismic safety proved to be an afterthought as San Francisco quite literally rose from the ashes, discussions about the need for urban planning and regulation emerged, leading to

[80] Christopher J. Calton, "Why Can't San Francisco Build Housing? Lessons from the 1906 Fire," The Independent Institute, accessed February 19, 2025, https://www.independent.org/news/article.asp?id=14910.
[81] Hunter Oatman-Stanford, "The Bad Design That Created One of America's Worst Housing Crises," Fast Company, September 28, 2018, https://www.fastcompany.com/90242388/the-bad-design-that-created-one-of-americas-worst-housing-crises/.
[82] Siodla, "Razing San Francisco: The 1906 Disaster as a Natural Experiment in Urban Redevelopment."

the development of more comprehensive planning codes at both local and state levels. While San Francisco focused on maintaining local control over zoning and development, California expanded its role in regulating building safety and urban growth. In 1912, San Francisco created a planning commission with the authority to zone different areas of the city. Businesses quickly recognized zoning as a tool to raise property values by controlling land use and expanding residential areas. As a result, various interest groups began pushing for policies that would protect affluent neighborhoods while limiting certain types of development elsewhere.[83]

By 1921, San Francisco had introduced its first official Zoning Ordinance, aimed at controlling building height and density, reflecting a growing emphasis on balancing rapid development with long-term urban planning. The ordinance, however, also reinforced economic and racial segregation. Wealthier areas were granted low-density zoning protections, while working-class neighborhoods were designated as industrial zones.[84] In 1923, California enacted the State Housing Act—the first State act to regulate housing—which regulated construction, alteration, maintenance, use and occupancy of tenement houses and single-family homes in incorporated municipalities. It also introduced regulations on fireproof building materials, a delayed acknowledgment of the safety concerns raised by the 1906 earthquake but one that still fell short of ensuring widespread seismic resilience.[85] While these zoning and planning laws addressed the need for greater regulation after the city's haphazard reconstruction, they ultimately failed to create a safer, more resilient San Francisco.

[83] Oatman-Stanford, "The Bad Design That Created One of America's Worst Housing Crises."
[84] Oatman-Stanford.
[85] Ali Sahabi, "A History of Earthquake Safety: California's 100-Year Learning Curve," *Optimum Seismic* (blog), April 1, 2020, https://www.optimumseismic.com/earthquake-safety/a-history-of-earthquake-safety-californias-100-year-learning-curve/.

1933 Long Beach Earthquake:

Earthquake safety remained largely overlooked until another major disaster forced action. The 1933 Long Beach Earthquake would prove to be a major turning point in California's approach to seismic safety. This tremor, which took place on the evening of March 10, had a 6.4 magnitude and caused 120 deaths, 500 injuries, and widespread destruction in the region—including the collapse of 70 schools in the Long Beach area. People refer to this disaster as the "Lucky Quake" because it occurred after normal school and work hours.[86] However, the possibility of widespread death if children had been in school, spurred action and three major changes to state legislation.

The Field Act, the first mandated state-wide seismic code, was the main legislation introduced.[87] This act banned the construction of unreinforced masonry buildings, required seismic force to be considered in building design, and specifically required school buildings to be able to withstand lateral forces equal to 3% of the building's mass.[88] The Garrison Act, which passed in 1939, required schools built prior to 1933 to be reviewed and for the Field Act to apply retroactively.[89] Finally, the Riley Act institutionalized building safety regulation, requiring every city and county to have building departments to review plans and issue permits.[90] It is important to note that this legislation was tested a few years later in 1940 when a 6.9 magnitude earthquake struck Southern California right along the border with Mexico and damaged some school buildings. In this instance, buildings built after the Field Act incurred almost no damage, while those built before suffered damage amounting to about 29% of their value.[91] This 1933 event

[86] "The 1933 Long Beach Earthquake," accessed March 4, 2025, https://www.conservation.ca.gov/cgs/earthquakes/long-beach.
[87] Sahabi, "A History of Earthquake Safety."
[88] Sahabi.
[89] Sahabi.
[90] Sahabi.
[91] Sahabi.

changed public perceptions and acted as a wake-up call for California residents who began to see earthquakes as a major threat to their livelihood.[92]

While California made significant strides in improving seismic resilience, San Francisco's local policies increasingly complicated and restricted new development. The mid-20th-century marked significant developments in San Francisco's planning codes, particularly in response to growing concerns about urban development and seismic safety. In 1942, San Francisco formally established its first planning department, which sought to bring order to the city's growth and infrastructure. By 1945, the department introduced its first General Plan, which framed urban renewal as a solution to so-called "blighted areas"—a term disproportionately applied to working-class neighborhoods and communities of color. The plan reflected a broader trend of using planning policies to justify large-scale redevelopment at the expense of marginalized residents. At the same time, California passed the Community Redevelopment Act, allowing cities to establish agencies to rebuild impoverished neighborhoods—though in practice, many of these projects simply displaced existing communities.[93]

By the 1950s, shortcomings within San Francisco's planning system were becoming apparent. The post-war population boom strained the city's infrastructure, and both politicians and residents voiced dissatisfaction with the planning department's inability to accommodate growth. In 1954, discretionary review hearings were introduced into the building process. Although originally intended to provide greater flexibility in interpreting zoning laws, they ultimately came to benefit wealthier, well-connected individuals who could delay or block developments that threatened their interests. This not only obstructed much-needed housing

[92] Kip Wiley, "Living Where the Earth Shakes: A History of the California Seismic Safety Commission," *California Senate Office of Research*, December 2000.
[93] Wiley.

development but also complicated the enforcement of seismic codes, as delays and legal battles slowed efforts to retrofit buildings and implement new safety measures.[94]

In 1960, San Francisco adopted a new zoning code, marking a major turning point in San Francisco's planning history.[95] This new, detailed regulatory framework still largely forms the backbone of the city's zoning laws today. While intended to modernize the city's approach to development, it reinforced suburban-style planning in residential areas while allowing unrestricted growth in certain districts such as downtown and industrial areas in the South-East side of the city. Discretionary review, initially meant as an exceptional measure for egregious cases, also became a routine hurdle for nearly all new projects. The decade also saw the rise of historic preservation efforts and stricter aesthetic controls. San Francisco Beautiful, a group founded in 1947, became a prominent force in promoting aesthetic values as a central consideration in urban planning decisions. This influence was further reflected in policies such as the 1962 Sign Ordinance, which limited advertising and billboards to maintain San Francisco's "aesthetic character." While these measures gave neighborhood coalitions greater influence over development, they also contributed to increased restrictions on new construction, which was often perceived as visually disruptive or out of character with existing neighborhoods. These constraints compounded the city's difficulties in meeting housing demand and updating buildings to comply with evolving seismic and safety codes.[96] Reflecting this slowdown, San Francisco added 38,000 new housing units in the 1940s but only 16,272 in the 1990s.[97]

[94] *SF Planning Centennial Brochure* (SAN FRANCISCO PLANNING COMMISSION, 2017).
[95] *SF Planning Centennial Brochure*.
[96] *SF Planning Centennial Brochure*.
[97] Paragon Real Estate Group, "San Francisco New-Housing Construction Trends," April 24, 2015, https://hometeamsf.com/san-francisco-new-housing-construction-trends/.

1964 Alaska Earthquake:

The growing focus on seismic safety intensified after the devastating 1964 Alaska earthquake, which measured 9.2 on the Richter scale—the second-largest recorded earthquake in history. This event prompted many prominent California academics and politicians to continue advocating for improved seismic safety measures across the state.[98] When another earthquake occurred in 1971 in Southern California, over thirty-five pieces of state-wide legislation were enacted. Some notable pieces of legislation included the Seismic Safety General Plan Element, which required city and county plans to account for seismic safety in their development strategies. The legislation also included monitoring and retrofitting requirements for specific government buildings, hospitals and dams.[99] These events also led to the federal government's involvement in earthquake safety, leading to a 1977 congressional legislation called the National Earthquake Hazards Reduction Act.[100]

California also established a Seismic Safety Commission in 1974, which played a crucial role in shaping the state's earthquake preparedness policies.[101] Throughout the late 1970s and 1980s, the Commission conducted assessments of critical infrastructure, including bridges, hospitals, and schools, advocating for stricter retrofitting requirements. At the same time, San Francisco was undergoing a transformation into a modern city, marked by major redevelopment efforts like the construction of the Embarcadero Center, freeways, and the growth of the downtown core. These changes triggered a backlash in response to fears of "Manhattanization"—the idea that San Francisco was becoming too dense and too vertical.[102] These fears directly influenced San Francisco's own zoning and planning decisions, particularly

[98] Wiley, "Living Where the Earth Shakes: A History of the California Seismic Safety Commission."
[99] Sahabi, "A History of Earthquake Safety."
[100] Wiley, "Living Where the Earth Shakes: A History of the California Seismic Safety Commission."
[101] Wiley.
[102] *SF Planning Centennial Brochure*.

the 1978 residential rezoning, which made rebuilding extremely expensive. The city imposed a 40-foot height limit on most residential areas, new setback rules, and low-density requirements, restricting the construction of multifamily housing and making it even harder to build cost-effective, earthquake-resistant structures.[103] While these measures aimed to preserve neighborhood character, critics argue they worsened the affordability crisis by limiting new housing supply.[104]

Meanwhile, the Seismic Safety Commission recognized that statewide retrofitting structures to modern standards was not financially viable. Instead of mandating comprehensive upgrades, it supported legislative efforts like the 1979 Health and Safety Code, which allowed local governments to lower reconstruction standards for existing buildings to make retrofits more economically feasible.[105] This approach, while practical, left room for greater seismic risk, as many vulnerable structures were only partially reinforced. The state also encouraged strategies such as modifying building uses to reduce occupancy as a way to mitigate risks in highly vulnerable structures. These were often half-measures, not full-scale safety reforms. Ultimately, while California attempted to balance safety with affordability, San Francisco's planning policies made any rebuilding nearly impossible. As a result, earthquake resilience efforts became a patchwork of partial retrofits, restrictive zoning, and financial barriers that left the city both expensive and vulnerable. [106]

[103] *SF Planning Centennial Brochure*.
[104] *SF Planning Centennial Brochure*.
[105] Wiley, "Living Where the Earth Shakes: A History of the California Seismic Safety Commission."
[106] *SF Planning Centennial Brochure*.

1989 Loma Prieta Earthquake:

On October 17, 1989, San Francisco witnessed yet another major temblor: the Loma Prieta earthquake.[107] At 6.9 on the Richter scale, this was the largest quake felt in the city since 1906. The quake caused widespread damage across the Bay Area, killing 63 people, injuring thousands, and exposing significant vulnerabilities in the city's infrastructure.[108] However, unlike 1906, when officials downplayed the disaster, the 1989 quake was widely recognized as a serious seismic event, reflecting a shift toward a more scientific understanding of earthquake risks. This earthquake ushered in many new codes as residents and policymakers acknowledged the need for stronger safety measures. The death count was significantly lower than one might expect, and many attribute this to the fact that the World Series was being played between two Bay Area teams, keeping thousands of people off highways and out of vulnerable buildings. The most striking failures of this event were the collapse of the Cypress Freeway and sections of the Bay Bridge, highlighting the weaknesses in California's highway and transportation infrastructure. The earthquake also devastated unreinforced masonry buildings and older structures that had not undergone proper retrofitting. In response, the state and city introduced several major policy changes. One crucial post-disaster reform included mandatory retrofitting reforms for unreinforced masonry buildings. This legislation had been enacted at a state-wide level, but it was not until after Loma Prieta that San Francisco enacted an official Unreinforced Masonry Ordinance in 1992.[109] This disaster also marked the first time California formally

[107] George Plafker, John P Galloway, and Michael J Bennett, *Lessons Learned from the Loma Prieta, California, Earthquake of October 17, 1989*, vol. 1045 (US Government Printing Office, 1989).
[108] Sarah Atkinson, "The Loma Prieta Earthquake Inspired Major Resilience Efforts. Today, the Need to Invest Continues.," SPUR, October 17, 2024, https://www.spur.org/news/2024-10-17/loma-prieta-earthquake-inspired-major-resilience-efforts-today-need-invest-0.
[109] Atkinson.

changed building codes to discourage construction on active fault lines and to require disclosure of seismic hazards to buyers.[110]

At the state level, another important response was making major seismic improvements to highways and bridges.[111] California began a bridge evaluation and retrofit program that has led to the improvement of over 2,000 major bridges. This work included replacing the eastern span of the San Francisco-Oakland Bay Bridge—a vital artery in the Bay Area that connects San Francisco and the East Bay. This project alone, which was initially estimated to cost $250 million, ended up costing $6.4 billion and was not completed until 2013.[112] This project's excessive cost and lengthy timeline are indicative of the broader issues and delays that continue to undermine earthquake safety today.

1994 Northridge Earthquake:

On January 17, 1994, only five years after Loma Prieta, the Northridge earthquake struck Southern California with a magnitude of 6.7, causing widespread destruction and exposing additional critical flaws in seismic safety measures. More than 6,000 commercial and industrial buildings were damaged, including municipal buildings, schools, hospitals, and shopping centers.[113] The quake particularly impacted unreinforced structures, further underscoring the need for stringent retrofitting standards and enforcements. One of the biggest consequences was the reaction from insurance companies, which largely stopped offering earthquake insurance due to the financial risks. This led to the creation of the California Earthquake Authority (CEA), a publicly managed and privately funded organization that now holds about 65% of the earthquake insurance market.[114] Yet despite this market share, only 13% of California residents have

[110] Dyl, *Seismic City: An Environmental History of San Francisco's 1906 Earthquake*.
[111] Atkinson, "The Loma Prieta Earthquake Inspired Major Resilience Efforts. Today, the Need to Invest Continues."
[112] Atkinson.
[113] Sahabi, "A History of Earthquake Safety."
[114] Sahabi.

earthquake insurance, largely due to high premiums and deductibles that make coverage inaccessible for many.[115] Additionally, state policymakers introduced new regulations, including requirements to reinforce freeway bridges against seismic shaking and a law mandating that water heaters be properly strapped to prevent fire hazards.[116] However, despite these measures, the tremor revealed a major gap in California's building codes. While regulations had long focused on protecting schools and hospitals, other commercial and residential buildings remained vulnerable. Another critical finding was that a widely used welding technique in commercial and residential construction was not earthquake resistant. Despite this knowledge, enforcement has remained lax, and many buildings have not been retrofitted decades later.[117] The Northridge earthquake underscored the challenges of seismic safety policy—while each disaster led to incremental legislative improvements, real implementation was still a work in progress.

[115] John Egan, "Who Is The California Earthquake Authority?," Forbes, accessed April 7, 2025, https://www.forbes.com/advisor/homeowners-insurance/california-earthquake-authority/.
[116] Sahabi, "A History of Earthquake Safety."
[117] Sahabi.

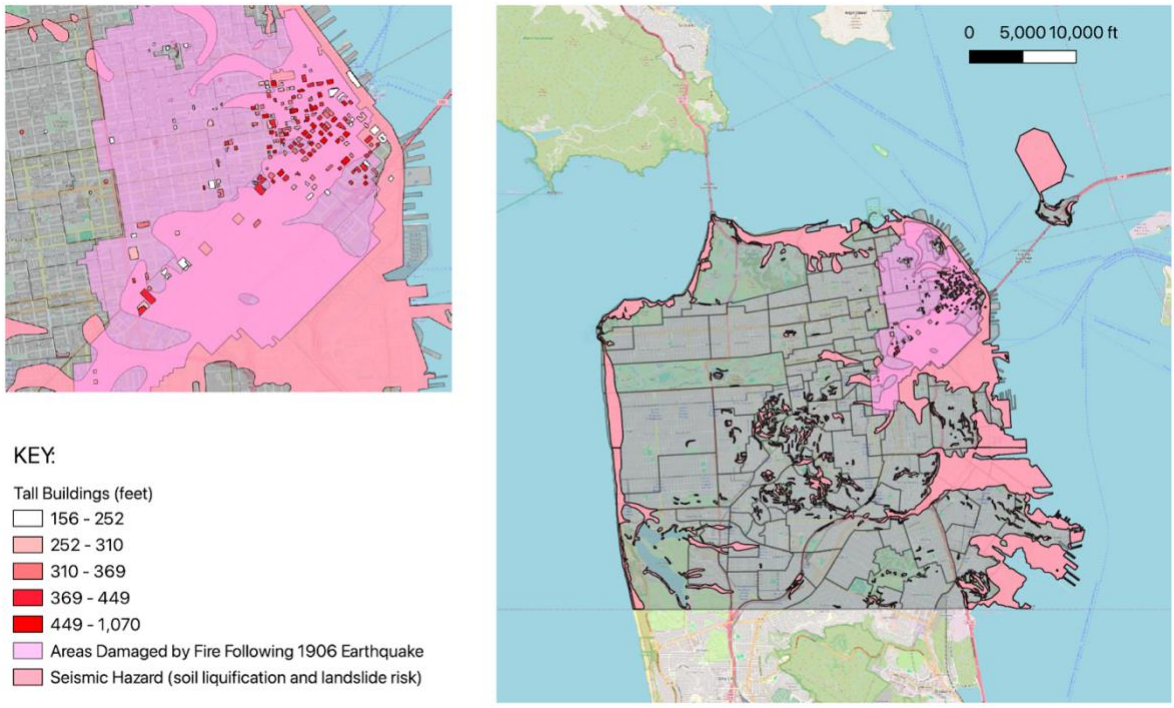

Figure 2: Liquefaction Risk in San Francisco (DataSF)

In large areas of the city, San Francisco also has a heightened risk of liquefaction—a process where loose soil temporarily behaves like liquid during intense earthquakes—leading to widespread concern among experts about the vulnerability of high-rises built on filled land.[118] As shown in Figure 2, San Francisco's most at-risk areas include downtown, waterfront developments, and portions of the Marina District—these neighborhoods are not only densely populated but also contain many of the city's tallest buildings.

A striking example of this ongoing issue is the Millennium Tower, a high-rise luxury condominium in downtown San Francisco that started sinking and tilting in 2015, only 6 years after it opened, due to its unstable foundation. Despite widespread media coverage, residents

[118] Thomas Fuller, "At Risk in a Big Quake: 39 of San Francisco's Top High Rises," The New York Times, accessed February 20, 2025, https://www.nytimes.com/2018/06/14/us/california-earthquakes-high-rises.html.

continue to occupy the building. If this structure is already unstable under normal conditions, the potential consequences in the event of a major earthquake could be catastrophic.[119]

Despite these well-documented risks, San Francisco's seismic regulations continue to leave vast portions of the city's residential and commercial structures vulnerable.[120] This approach reflects a broader mindset—full compliance is seen as unattainable, so policymakers choose to prioritize specific structures rather than comprehensively rebuild and retrofit existing buildings. Meanwhile, residents rarely factor seismic risk into their choices about where to live or work, perpetuating a cycle where preparedness takes a back seat to reactivity. The lack of coordination between state and city efforts further complicates enforcement, leading to inconsistencies in protection across different regions. While incremental improvements have undoubtedly made California more resilient, every tremor exposes new vulnerabilities, proving that seismic policy remains unfinished business.[121]

Tokyo

1923 Great Kantō Earthquake:

Since its inception, Tokyo's urban planning has been part of a larger, centralized system under Japanese law. In 1919, Japan established its first modern planning legislation which aimed to define local planning areas and establish city planning functions and bureaucracies. This legislation was known as the City Planning Law and Urban Building Law and was essential at the time to help control booming population growth. Although this legislation was fairly simple, it was also crucial as it laid the foundation of urban planning in Tokyo, establishing land

[119] Kimberly Veklerov, "Millennium Tower: A Brief History of SF's Sinking Luxury Condo," SF Chronicle, November 3, 2016, https://www.sfchronicle.com/bayarea/article/Millennium-Tower-a-brief-history-of-SF-s-10592238.php.
[120] Jonathan Lloyd, "What's Changed 30 Years after the 1994 Northridge Earthquake," NBC Los Angeles, accessed February 19, 2025, https://www.nbclosangeles.com/news/earthquakes/early-warning-aftershock-forecasts-1994-northridge-earthquake/3313699/.
[121] Lloyd.

readjustment policies, building clearance limits and four zoning designations: residential, commercial, industrial, and undesignated. It also expanded the city area of Tokyo to include eighty-two additional towns and villages on the periphery—a size that is similar to today's twenty-three wards.

Tokyo faced its first major test of its new building code and planning system only five years after the legislation was established. On September 1, 1923, the 7.9 magnitude Great Kantō Earthquake hit Tokyo and killed over 140,000 people, destroyed over 310,000 dwellings, ignited massive fires, and prompted significant changes to the city's urban planning framework.[122] The disaster essentially destroyed 44% of the city and 74% of all homes were severely affected or destroyed—even ones that complied with current fireproofing standards. Tokyo's population also dropped from 2.49 to 1.53 million people due to massive displacement.

Much like the 1906 earthquake in San Francisco, this event was widely viewed as an opportunity to transform Tokyo into a modern "urban metropolis" and to implement its 1919 planning legislation.[123] In fact, a government-published book claims "the quake demonstrated the importance of city planning to the citizenry at large and provided a golden opportunity for planning a radical and comprehensive renewal, which would have been inconceivable under the old city-ward reform framework, limited as it was to local projects."[124] Government officials and urban planners agreed that Tokyo was an imperfect city in need of new design to help with its industrial, densely populated, and inefficient mechanisms. This reconstruction effort was seen not only as a chance to address vulnerabilities to disaster but also as an opportunity to better manage the population and reduce social ills through improved urban design.[125]

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[122] Jeffrey E Hanes, "Urban Planning as an Urban Problem: The Reconstruction of Tokyo after the Great Kanto Earthquake," *Seisaku Kagaku* 7, no. 3 (2000): 123–37.
[123] Hanes.
[124] Intānashonaru and Bunkakyoku, *A Hundred Years of Tokyo City Planning by Tokyo Metropolitan Government*.
[125] Intānashonaru and Bunkakyoku.

To execute these plans, the Tokyo government established the Construction Institute to oversee the city's ambitious reconstruction efforts. The project was led by Shimpei Gotō, the mayor of Tokyo who had been criticized for his grand plans for Tokyo, and Yamamoto Gombei. A central focus of the reconstruction program was land readjustment as this could now be applied to the previously developed urban areas as well as the suburban districts. Another focus was the development of a more robust road network, since many roads in Tokyo before 1923 were unpaved, poorly connected. Other goals included creating more green space, widening streets, digging more canals, giving out subsidies for fireproofed buildings, and broadly creating a more livable, disaster resistant city.[126]

Gotō envisioned a complete transformation of Tokyo into a modern and resilient city and spearheaded a five-year, 1.3 billion yen plan to overhaul its infrastructure.[127] One of the institute's first measures was implementing Ordinance 414 in September 1923.[128] This Ordinance's aim was to prevent poor rebuilding by citizens. It began by classifying buildings built between September 1923 and August 1924 as "temporary structures." By August 1924, there were 170,000 "temporary structures" that all had to be removed by August 1928.[129] There was also a Special Urban Planning Law put into place on December 24, 1923.[130] This law superseded the 1919 Planning Law in Tokyo and Yokohama, and allowed the government to use land readjustment to change residential property boundaries to build public roads and spaces. This law was especially significant because, for the first time in Japan, up to 10% of private land could be confiscated for public use without monetary compensation or majority approval from

[126] J Charles Schencking, *The Great Kanto Earthquake and the Chimera of National Reconstruction in Japan* (Columbia University Press, 2013).
[127] Schencking.
[128] Schencking.
[129] Schencking.
[130] Schencking.

landowners.[131] Because of this land readjustment, Tokyo was able to implement major upgrades to its transportation network. Between 1923 and 1930 Tokyo widened its roads—expanding the total road area from 9.3 to 13.5 million square meters, built 96 new bridges, and upgraded the canal system.[132]

Tokyo's post-earthquake recovery was not without challenges. Although the city mandated the use of fireproof materials like reinforced concrete for large structures, lax enforcement of Ordinance 414 allowed many temporary wooden structures to remain until 1939.[133] Additionally, concerns over urban sprawl prompted the creation of the Kanto National Land Plan in 1936, which introduced a greenbelt to curb unchecked expansion. Despite these difficulties, response to the disaster proved invaluable in shaping future urban planning efforts. Public awareness of city planning grew through pamphlets and brochures, leading to widespread support for major reconstruction programs. The initiative also fostered a new generation of city planning engineers who played a crucial role in Tokyo's continued development. Ultimately, these projects laid the foundation for urban infrastructure that supported Tokyo's rapid growth through the 1960s. The government's introduction of new zoning laws, fire-resistant materials, and wider streets underscored a commitment to resilience and adaptability—principles that continue to define Tokyo's urban planning approach today.

By 1968, Japan had introduced the first major reforms to the City Planning Law that further shifted planning authority from centralized national control to local prefectural governors. This allowed for greater citizen participation and placed a stronger emphasis on land use planning rather than infrastructure development. The amendment detailed stricter regulations on

[131] Schencking.
[132] Schencking.
[133] Suzuki Jun, "How Disasters Made the Modern City of Tokyo," *Journal of Urban History* 48, no. 5 (2022): 1003–16.

land use, including restrictions on total floor area and plot size ratios, and introduced a 10-meter building height requirement in certain residential areas to ensure that neighbors on the northern side would still receive adequate sunlight. These sunlight requirements, designed to maintain fairness in access to natural light, reflect Tokyo's approach to residential zoning—establishing clear, objective rules while still prioritizing the well-being of residents in an increasingly dense urban environment.

The goal of this new legislation was to ensure an adequate supply of city services while balancing individual property rights with the broader public good. Additionally, in 1980, Japan introduced the District Planning System, requiring detailed maps to aid local planning and to regulate land use and building sizes more precisely. Though these laws intended to allow for more localized input in urban planning, this remains an ongoing challenge for the Japanese and Tokyo governments as neighborhood-level input is still minimal.[134]

1995 Hanshin-Awaji Earthquake:

One of the most devastating earthquakes to hit Japan after the 1923 Great Kantō Earthquake was the 1995 Hanshin-Awaji Earthquake, commonly referred to as the Kobe Earthquake. This earthquake had a 7.3 magnitude and resulted in the deaths of 6,434 people—90% of the deaths were caused by collapsed buildings due to outdated construction practices. The disaster highlighted deficiencies in Japan's crisis management system and exposed the consequences of non-retroactive building codes that resulted in the collapse of structures built before the 1981 Building Standards Act revisions.[135] A week after the earthquake, *The Japan Times* reported that "[t]he Hanshin Great Earthquake has forced all Japanese to recognize that

[134] Intānashonaru and Bunkakyoku, *A Hundred Years of Tokyo City Planning by Tokyo Metropolitan Government*.
[135] Thomas L Holzer, "The 1995 Hanshin-Awaji (Kobe), Japan, Earthquake," *GSA Today* 5, no. 8 (August 1995).

this country does not have a reliable crisis management system."[136] This event also emphasized the inefficiencies of Japan's highly centralized government in disaster response, as bureaucratic bottlenecks delayed aid and rebuilding efforts. It did, however, demonstrate the effectiveness of modern building codes as 97% of the total collapsed buildings were built before 1981.[137] Kobe was particularly unprepared because the Kansai region experiences fewer earthquakes compared to other parts of Japan, leading to a lower level of seismic preparedness.[138]

Although Tokyo did not feel the quake itself, it still had significant implications for Tokyo's urban planning. Japan's national Disaster Prevention Plan was amended to allow discretionary dispatches from local officials in instances where timeliness is key—a major shortcoming in the 1995 disaster. Following the tremor, Tokyo also revised its building codes to enforce stricter construction standards and retrofitting requirements, ensuring greater resilience in future seismic events.[139] Overall, the lessons from Kobe played a crucial role in shaping Tokyo's disaster prevention strategies and were instrumental in improving the city's preparedness for the 2011 Tōhoku Earthquake.[140]

2011 Tōhoku Earthquake:

The 2011 Tōhoku Earthquake, also known as the Great East Japan Earthquake, struck on March 11, 2011, with a magnitude of 9.0—the largest seismic event recorded in Japan's history. Although the epicenter was off the coast of the Tōhoku region, the disaster was felt throughout the nation and it exposed the strengths and weaknesses in Japan's disaster preparedness. The earthquake itself caused relatively little direct damage in Tokyo and other urban centers thanks to

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137 Tatsuo Narafu and Mikio Ishiwatari, "Building Performance: Knowledge Note," *Japan International Cooperation Agency*, n.d.

138 Holzer, "The 1995 Hanshin-Awaji (Kobe), Japan, Earthquake."

139 "Tokyo Fire Department," Tokyo Fire Department, accessed March 13, 2025, https://www.tfd.metro.tokyo.lg.jp/ts/bfc_manual/high_school/hanshin_awaji.html.

140 Holzer, "The 1995 Hanshin-Awaji (Kobe), Japan, Earthquake."

decades of strict seismic building codes.[141] What made this disaster unique was that the primary cause of death was not structural collapse but drowning, as the ensuing massive tsunami devastated coastal areas, sweeping away entire towns and infrastructure. The event ended up killing around 20,000 people, making it the deadliest disaster in Japan since World War II.[142]

In Tokyo, one of the most significant challenges was the chaos caused by a sudden halt in transportation. Millions of people were stranded as rail lines and roads shut down, revealing a major vulnerability in the city's infrastructure. Recognizing this, Tokyo enacted the Stranded Persons Act, requiring businesses to store three days' worth of food and water for employees in case of such emergencies. The goal of this was to prevent mass movements of people, which could obstruct emergency response efforts and expose individuals to further danger.[143]

On a national level, Japan also reassessed its approach to disaster response and, specifically, enhanced its tsunami defenses. The government invested in taller, more resilient seawalls and upgraded early warning systems. The 2011 disaster was a turning point for Japan, emphasizing that disaster preparedness needed to go beyond buildings. Since Tokyo, and Japan as a whole, had already developed some of the world's most advanced seismic building codes, it was able to shift its attention to other critical areas and significant steps toward ensuring a resilient future.[144]

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[141] James Glanz and Norimitsu Onishi, "Japan's Strict Building Codes Saved Lives," *The New York Times*, March 11, 2011, sec. World, https://www.nytimes.com/2011/03/12/world/asia/12codes.html.

[142] It should be noted that World War II was a defining event in 20th-century urban planning, fundamentally reshaping cities through destruction, reconstruction, and shifts in planning philosophy. In Japan, the firebombing of major cities and the atomic bombings of Hiroshima and Nagasaki led to massive rebuilding efforts that influenced everything from zoning laws to disaster preparedness. That said, for the scope of this project, this thesis focuses on disasters that are sudden and unavoidable, rather than those resulting from war. While WWII played a major role in shaping Tokyo's urban form, my analysis is centered on seismic events—disasters that cities have no control over but must continually adapt to.

[143] "White Paper on Disaster Management 2011" (Cabinet Office, Government of Japan, 2011).

[144] "White Paper on Disaster Management 2011."

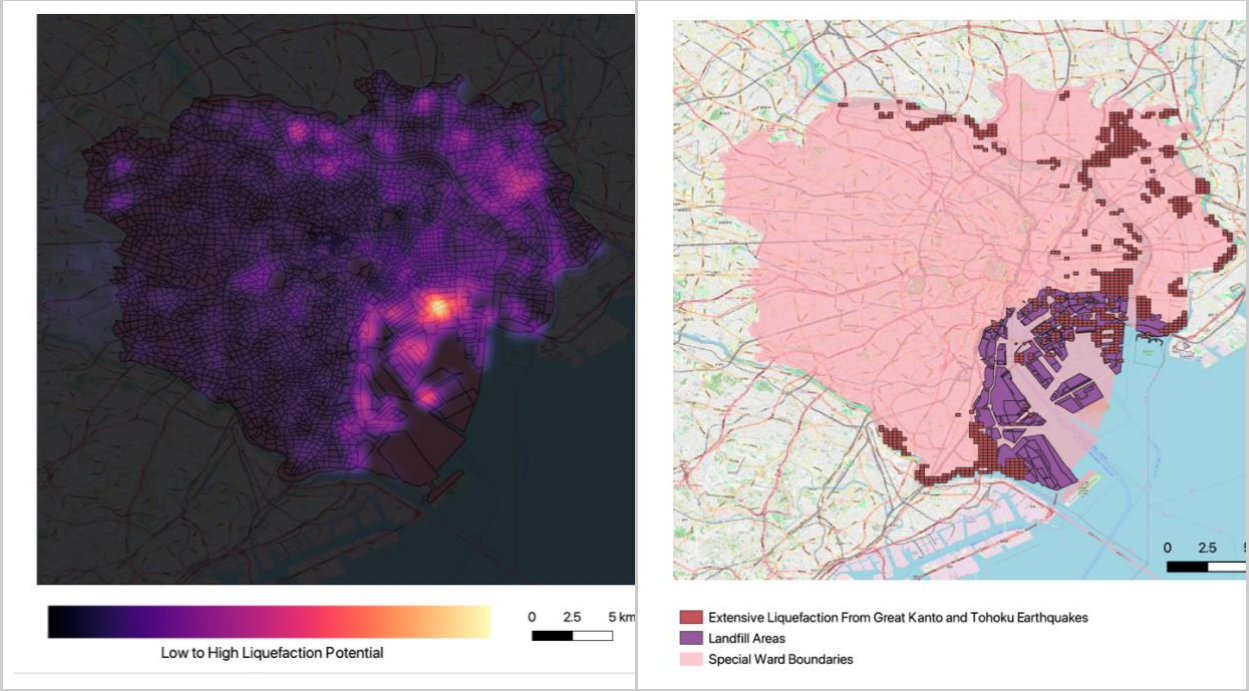

Figure 3: Liquefaction Potential in Tokyo (Bottom Left), and Landfill & Historic Liquefaction Areas in Tokyo (Bottom Right) (Tokyo Statistical Yearbook)

Tokyo's urban planning has been shaped by its continuous response to natural disasters, with each major earthquake prompting policy and infrastructure reforms while simultaneously validating the strengths of previous policies. Much like San Francisco, Tokyo faces significant seismic risks, particularly in areas built on reclaimed land. As shown in Figure 3, large portions of Tokyo—including major commercial and residential districts—are built on land prone to liquefaction. Instead of downplaying these risks, Tokyo has actively adapted its built environment through advanced engineering techniques, strict seismic retrofitting mandates, and reinforced foundations.[145]

A defining characteristic of Japan's disaster response is its ability to learn from each event. Tokyo, in concert with national policy, frequently revises its regulations, ensuring that each new disaster leads to stronger safety measures. It consistently updates building codes,

[145] "How to Optimize the Urban Recovery After Earthquake Disaster – Preparedness for Recovery from the Next Tokyo Earthquake – | IRP," February 1, 2012, https://recovery.preventionweb.net/publication/how-optimize-urban-recovery-after-earthquake-disaster-preparedness-recovery-next-tokyo.

evacuation plans, and emergency protocols, mandating retrofitting and reconstruction to meet the latest seismic standards. Beyond this, the government prioritizes public education, distributing detailed guides, conducting regular drills, and integrating disaster preparedness into school curricula to ensure a well-informed population. This constant emphasis on safety has led many people to seek homes that comply with the latest building codes, reinforcing a culture of resilience prioritized by the government and the public.[146]

Comparison

Tokyo and San Francisco both experienced major earthquakes in the early 20th-century—the 1906 San Francisco earthquake and the 1923 Great Kantō earthquake—that exposed vulnerabilities of their built environments. Yet their responses to these disasters set them on drastically different paths. Tokyo incorporated earthquakes as a foundational element of its urban planning, integrating disaster resilience into zoning laws, land use policies, and building codes. In contrast, San Francisco initially framed its reconstruction efforts around aesthetics and economic interests rather than seismic safety, attributing much of the destruction to fire rather than structural failure. This precedent meant that earthquake preparedness was not integrated into San Francisco's urban planning.[147]

Japan's urban planning and building regulations are highly centralized, in contrast to California's fragmented governance system where federal, state, and local jurisdictions each hold distinct responsibilities.[148] Tokyo's ability to integrate seismic safety with urban growth is

[146] "Tokyo Metropolitan Government Disaster Prevention Website," accessed February 18, 2025, https://translation2.j-server.com/LUCAITBSAI/ns/tl.cgi/https://www.bousai.metro.tokyo.lg.jp/index.html?SLANG=ja&TLANG=en&XMODE=0&XPARAM=q,&XCHARSET=UTF-8&XPORG=,&XJSID=0.
[147] Sahabi, "A History of Earthquake Safety."
[148] Atsushi Koresawa and Fire and Disaster Management Agency (FDMA), Ministry of Internal Affairs and Communications, 2-1-2 Kasumigaseki, Chiyoda-ku, Tokyo 100-8927, Japan, "Government's Response to the Great East Japan Earthquake and Tsunami," *Journal of Disaster Research* 7, no. sp (August 1, 2012): 517–27, https://doi.org/10.20965/jdr.2012.p0517.

largely due to its top-down governance model, where national and municipal governments have strong aligned authority over zoning and building codes. This streamlined decision-making process allows for rapid implementation of necessary policy changes, ensuring that seismic resilience is consistently prioritized and aligns with local policy. San Francisco, on the other hand, has no national planning and operates under a decentralized system where state, county, and city governments each play a role in urban planning. This bottom-up approach has resulted in policies that prioritize local interests over broader city- or state-wide needs.[149]

While both cities introduced stricter building codes after major earthquakes, San Francisco's zoning policies prioritized neighborhood character over flexibility in construction, significantly limiting housing supply.[150] These restrictions, combined with discretionary review processes, have created endless bureaucratic hurdles that developers must navigate, further driving up costs and discouraging large-scale housing development. Tokyo, by contrast, has maintained a flexible and adaptive zoning approach that allows for higher-density construction in response to housing demand. Even as Japan introduced more stringent seismic codes, it simultaneously allowed for efficient rebuilding. As a result, Tokyo has been able to maintain a steady supply of safe, new housing, keeping prices more affordable despite its status as one of the world's largest cities.[151]

Another key difference between the two cities is how earthquakes are perceived by their residents. In Tokyo, seismic risk is deeply ingrained in the real estate market. Buyers and renters prioritize earthquake safety, often seeking newer buildings that meet the latest seismic codes.[152] This has created a cultural expectation that buildings should continuously be improved and

[149] Oatman-Stanford, "The Bad Design That Created One of America's Worst Housing Crises."
[150] Oatman-Stanford.
[151] Glanz and Onishi, "Japan's Strict Building Codes Saved Lives."
[152] Ronald, "Between Investment, Asset and Use Consumption: The Meanings of Homeownership in Japan."

rebuilt to meet evolving safety standards. In contrast, San Francisco's housing market places more emphasis on historical preservation and neighborhood aesthetics. Many residents oppose redevelopment efforts even when they include seismic retrofitting, seeing them as threats to the city's architectural character and existing communities. This resistance has made it difficult to update the city's housing stock to meet modern safety standards while also expanding supply.[153]

I argue Tokyo's relative affordability and resilience to earthquakes can be attributed to its ability to integrate disaster preparedness into its broader urban planning framework. By contrast, San Francisco has struggled to balance seismic safety with restrictive zoning laws that make new development prohibitively expensive. While both cities have faced major natural disasters, their different approaches to governance, zoning, and enforcement have led to drastically different housing outcomes. Tokyo's willingness to continuously update and adapt its regulations—combined with a cultural emphasis on disaster resilience—has allowed it to maintain an affordable and earthquake-resistant housing stock. San Francisco, meanwhile, remains trapped in a cycle where zoning restrictions, local opposition, and bureaucratic inefficiencies make it nearly impossible to build housing that is both safe and affordable. Without significant reforms, San Francisco will continue to struggle with both its housing crisis and its vulnerability to future seismic events.[154]

II. 21st-Century Building Codes

The legacy of 20th-century earthquakes continues to shape 21st-century housing outcomes in San Francisco and Tokyo—not only in terms of safety, but also through regulatory systems that govern development speed, housing supply, and affordability. In cities like San

[153] Sahabi, "A History of Earthquake Safety."
[154] Binyamin Appelbaum, "How Tokyo Achieves Affordable Housing," The New York Times, September 11, 2023, https://www.nytimes.com/2023/09/11/opinion/editorials/tokyo-housing.html.

Francisco and Tokyo—both seismically active, highly urbanized, and globally significant—their building regulations reveal deep contrasts in urban planning philosophies, as outlined in the previous section. While both cities have responded to major 20th-century earthquakes with increasingly stringent seismic codes, their ability to implement those regulations—without undermining affordability—dramatically differs. This section explores four interrelated factors that help explain these outcomes: government systems that determine how codes and planning policies are developed and enforced, the permitting processes that mediate how quickly or slowly those policies are implemented, the implications for housing affordability that result from these systems, and finally, empirical evidence that illustrates how these differences have played out on the ground.

Levels of Governance

San Francisco's approach to building regulations exemplifies a dual system in which state-level legislation and local ordinances must work together. On one hand, the city must adhere to the California Building Standards Code—which sets requirements for construction safety, energy efficiency, and seismic performance—and on the other, it enacts its own Planning Code that tailors zoning, land-use restrictions, and design guidelines for the city's unique needs.[155] The interplay of these two codes has evolved into a permitting landscape notorious for its subjectivity and complexity. The state lays out broad safety and development rules, but San Francisco's local codes layer on additional restrictions meant to preserve neighborhood character and give the public a say in development.

In theory, this system is meant to promote democratic participation and ensure state policy aligns with local circumstances. In practice, however, this has led to a complex process

[155] "California Building Standards Codes" (n.d.), https://www.dgs.ca.gov/bsc/codes.

where even projects that fully comply with building and zoning codes can become slowed in months-long discretionary reviews and public hearings.[156] This dynamic often gives unelected citizens or interest groups outsized influence.[157] This is in part because local politics tend to have lower voter turnout and less media coverage, making them more susceptible to sway by a vocal minority.[158] Additionally, many residents vote differently at local versus national levels. For example, San Francisco may support progressive housing policies at the state or national level but resist implementation in their own neighborhoods.[159]

In contrast, Tokyo's centralized governance structure is more balanced between national, prefectural, and municipal policies. The national government sets overarching standards, ensuring a cohesive framework for urban development across the country. This includes legislation like the City Planning Law, which outlines the objectives and procedures for urban planning nationwide. Prefectural governments act as intermediaries between national and municipal governments and are responsible for designating City Planning Areas—identified zones for urban development or conservation—in alignment with national policy.[160] In cases where urban issues span multiple municipalities, prefectures coordinate efforts to create unified City Plans that effectively address regional needs.[161]

At the municipal level, local governments are tasked with the detailed planning and execution of urban development projects within their jurisdictions. They develop specific plans that align with both national policies and prefectural guidelines, tailoring solutions to local

[156] California Building Standards Codes.
[157] Jerusalem Demsas, "Who's Responsible for the Housing Crisis?," The Atlantic, accessed April 11, 2025, https://www.theatlantic.com/podcasts/archive/2024/09/housing-crisis-local-government/679670/.
[158] William A. Fischel, "The Rise of the Homevoters: How the Growth Machine Was Subverted by OPEC and Earth Day," in *Evidence and Innovation in Housing Law and Policy*, ed. Lee Anne Fennell and Benjamin J. Keys (Cambridge: Cambridge University Press, 2017), 13–37, https://doi.org/10.1017/CBO9781316691335.002.
[159] David Schleicher, "Stuck! The Law and Economics of Residential Stagnation," n.d.
[160] ALMEC Corporation, "Urban Planning System in Japan," n.d.
[161] Corporation.

conditions and community needs. This allows for more flexibility and responsiveness and allows municipal governments to have some degree of flexibility while still ensuring local land use policies are not overly restrictive in comparison to national guidelines.[162] While Tokyo's system promotes coordination across levels of government, San Francisco's often results in fragmentation. Rather than supporting statewide efforts to expand housing, its regulatory framework can end up slowing or blocking development altogether—the kind of disconnect that Tokyo's structure is designed to avoid.

Permitting Process: Overview

San Francisco

San Francisco's permitting process is notoriously slow, expensive, and difficult to navigate. It has evolved beyond just a framework for building safety to become a tool for controlling growth and preserving the status quo. Earthquakes have played a key role in shaping these regulations, with seismic codes tightening after each major disaster, particularly after the 1906 and 1989 quakes. State-level seismic codes dictate the technical aspects of safety, like structural reinforcements, but local laws go much further, regulating everything from building height to window placement.[163] The result is a system where even projects that meet the most stringent safety requirements are still entangled in a labyrinth of local restrictions, making it nearly impossible to build anything new without a fight.[164]

The average permitting timeline for a housing project in San Francisco is 18 to 24 months, among the longest in the country, with some projects taking years to clear all regulatory hurdles. Its intricacy has led to the emergence of a specialized profession: permit

[162] Corporation.
[163] "Residential Design Guidelines," 2003.
[164] "Residential Design Guidelines."

expediters. These expediters specialize in managing paperwork, coordinating with city agencies, and ensuring that applications move through the system as quickly as possible. Most architecture firms in San Francisco have someone on staff solely dedicated to handling permitting, and many individual homeowners hire private permit expediters—underscoring just how time-consuming and bureaucratic the process is.[165] It also highlights how much connections matter—having the right relationships within the permitting department can dramatically influence the speed of project approval. The fact that navigating the system practically requires a specialist, shows how expensive and exclusive the process is and how those with influence and resources often fare better, while smaller developers and homeowners are left behind.[166]

The permitting process starts with the Initial Planning Review, where every project must be reviewed by the San Francisco Planning Department to ensure compliance with the Planning Code.[167] Even minor changes, like adding a bedroom or deck can trigger extensive reviews. Furthermore, if a building is deemed historic or architecturally significant, demolition or major alterations are virtually impossible unless the structure is damaged in an earthquake or fire or violates state or federal laws.[168] But even if a building is not officially designated as historic, there are neighborhoods—like Alamo Square and North Beach—where demolitions are essentially prohibited, making large-scale redevelopment nearly impossible.[169]

Once a project clears the Planning Review stage, it faces Environmental and Design Reviews, which introduce even more hurdles. The California Environmental Quality Act (CEQA) was originally designed to protect against harmful environmental impacts, but it has increasingly been used to stall or block developments on shaky legal grounds. Opponents can

[165] Richard Parker, San Francisco Permitting Process, February 5, 2025.
[166] "Homeowners," SF Planning, accessed February 23, 2025, https://sfplanning.org/permit/homeowners.
[167] "Homeowners."
[168] § 157.006 STANDARDS FOR ALTERATIONS AND DEMOLITIONS.
[169] Parker, San Francisco Permitting Process.

force developers to complete time-consuming and expensive environmental impact reports, even for projects that clearly wouldn't cause significant harm.[170] The length of this process varies, as the Planning Department ultimately decides what level of review is required for each project. It can take up to a year or more to clean this hurdle, adding significant delays and uncertainty to an already lengthy timeline.[171]

Alongside the environmental review, most projects also face design review based on the Residential Design Guidelines. These guidelines are technically not legally binding. In practice, however, they are treated as such, giving Planning Department staff the discretion to approve, modify, or reject projects based purely on aesthetic and subjective interpretations of neighborhood 'character' and 'values.'[172] This phase is invoked for construction or renovations that expand an existing building or change exterior features in any way. This can range from changing windows to constructing a dormer to repainting the façade.[173]

The Residential Design Guidelines have been criticized as they are highly subjective and vague. The guidelines include language about "harmonizing" with surrounding buildings and maintaining "visual interest" of a neighborhood, but there are no clear, codified metrics for what actually qualifies as an issue.[174] This means projects can be delayed or rejected simply because a planner—or a vocal neighbor—feels a design doesn't "fit in" with the rest of the street.[175]

The final—and arguably the most subjective—part of obtaining a permit is the notification process. While intended to provide public input, this step is often cited as a source of delay for projects, often for reasons unrelated to building safety or zoning compliance. While

[170] "Homeowners."
[171] "Homeowners."
[172] "Residential Design Guidelines."
[173]"Residential Design Guidelines."
[174] "Residential Design Guidelines."
[175] "Residential Design Guidelines."

some exemptions exist, most projects that alter a building's exterior must go through this process. Once a project is approved by the planning department, a public notice is required to be posted on-site and mailed to interested parties. The list of parties that must receive mailed permit notices includes: all neighbors within 150 feet, registered neighborhood groups, certain nonprofits, and even the district's assembly member.[176]

From the time the notice is sent, there is a 30-day window during which anyone—even a single person—can request a discretionary review, triggering another round of hearings that can last for months. This effectively allows anyone with an objection, regardless of how minor or arbitrary, to delay a project indefinitely. While the intent behind the notification process was to increase transparency and community input, in practice, it gives people with power, money and influence the tools to stall or prevent even the most straightforward home improvements.[177]

Ultimately, San Francisco's permitting system—though rooted in concerns about safety and preservation—has become one of the primary obstacles to housing production and has made San Francisco notorious as one of the most difficult cities to build in the country. The layers of bureaucracy, community opposition, and subjective review have created an environment where housing supply lags far behind demand, and where even projects that check every regulatory box can be delayed for years—or never happen at all.

Tokyo

Japan's national response to frequent earthquakes led to the creation of a streamlined permitting system—one designed not only for safety, but for rapid redevelopment after disasters. Tokyo's permitting process is fast, structured, and largely handled by architects, making it a

[176] San Francisco Planning Code SEC. 311. PERMIT REVIEW PROCEDURES.
[177] San Francisco Planning Code SEC. 311.

relatively smooth system compared to San Francisco's. The process typically takes around six weeks from start to finish and has clear regulatory standards that focus on safety, structural integrity, and zoning compliance.[178] Rather than multiple layers of discretionary review, the approval process follows a straightforward, objective set of requirements that developers and architects must meet before construction can begin.[179]

There are two primary permits involved in the process. The Development Permit is required for large-scale projects or significant land use changes, particularly within designated Urbanization Promotion Areas. This permit is issued at the prefectural level under the City Planning Act (CPA) and determines whether a proposed project aligns with zoning laws and broader urban planning goals.[180] Once secured, developers move on to the Construction Permit, which ensures that building plans comply with safety regulations, fire codes, and structural integrity standards. This permit is issued by local governments or certified inspection agencies under the Building Standards Act (BSA) and must be obtained before any construction begins.[181]

The review process is based on measurable criteria and architects are responsible for ensuring compliance with structural calculations, seismic safety, fire prevention, and land-use ratios. Buildings must meet strict standards based on materials, ground angle, height limits, and space efficiency. For example, buildings over 11 stories require sprinklers, and those over four stories must have an elevator. Sunlight regulations also dictate how buildings can be shaped, particularly in cases where a new structure might block natural light for neighboring properties.[182]

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[178] San Francisco Planning Code SEC. 311.
[179] "Building Code Administration and Development Control" (Tokyo Metropolitan Government, 2023).
[180] Corporation, "Urban Planning System in Japan."
[181] Corporation.
[182] Alex Shapiro, Tokyo Permitting Process, January 16, 2025.

Japan's permitting process is extremely objective and transparent, making it nearly impossible for residents to delay or influence projects based on personal preference. This rule-based structure ensures that construction proceeds without major delays, allowing cities such as Tokyo to maintain a steady pace of development. Once a project meets all regulatory requirements—including those for seismic safety and structural integrity—it undergoes a final inspection. If it passes, a completion certificate is issued. This streamlined system reflects Japan's broader commitment to disaster preparedness and rapid recovery: rather than treating permitting as a gatekeeping mechanism, Tokyo's approach sees safety and speed as complementary goals.

Implications for Housing Affordability

San Francisco

San Francisco's permitting system doesn't just slow down housing production—it exponentially increases costs due to higher labor costs from extended project timelines and rising material prices caused by delays.[183] Every additional month of permitting delays inflates financing costs; a six-month delay alone can raise total project costs by an estimated 3 to 4%.[184] For a 1,400-square-foot home, that translates to roughly $30,000 in added expenses every six months.[185] Due to the lengthy process, a project's initial budget may no longer be feasible once it's approved due to inflation and rising interest rates.[186] This unpredictability forces developers to anticipate the financial burden of drawn-out approval periods, discretionary reviews, and legal challenges when starting a project. The consequences of these delays are felt well beyond

[183] Parker, San Francisco Permitting Process.
[184]Sarah Wright, "How San Francisco Makes It Insanely Hard to Build Housing," The San Francisco Standard, September 13, 2022, https://sfstandard.com/2022/09/13/how-san-francisco-makes-it-insanely-hard-to-build-housing/.
[185] Sandy John, "The Cost to Build a House in California (2024)," HomeLight Blog, January 8, 2024, https://www.homelight.com/blog/buyer-cost-to-build-a-house-in-california/.
[186] Susie Neilson and Dustin Gardiner, "This Data Shows the Staggering Timeline to Build New Homes in S.F.," SF Chronicle, December 14, 2022, https://www.sfchronicle.com/sf/article/housing-permits-san-francisco-17652633.php.

developers—they impact the entire housing market. With new construction moving at a glacial pace, housing shortages intensify, prices rise, and middle-class families are forced out of the city.[187]

San Francisco's approach to housing policy continues to layer new regulations and narrowly targeted incentives onto an already complex permitting system. One project highlighting the numerous obstacles facing developments is the 303-unit, 22-story building at 1101–1123 Sutter Street in San Francisco. Despite including a mix of market-rate and 80 affordable units, the project's financial viability was on the verge of collapse due to additional regulatory costs.[188] A last-minute dispute over a water recycling ordinance—which exempted 100% affordable projects—would have added $3 million in extra costs (about $10,000 per unit).[189] Even though this project was ultimately saved after the Board of Supervisors granted a rare exemption, the delays drove up costs and strained the project's budget.[190] This case also illustrates how navigating the permitting process requires not just compliance with safety or design standards, but has become as much about political strategy as it is about urban planning. It also reflects San Francisco's all-or-nothing approach to housing policy, where targeted incentives often exclude mixed-income developments that could still make meaningful contributions to housing supply. While affordable housing projects are crucial, introducing more units overall—affordable or not—will naturally bring down costs by increasing supply.[191]

Policymakers and residents alike have acknowledged that the permitting process is a major obstacle to housing production; however, recent reforms have added more layers of

[187] Neilson and Gardiner.
[188] J.K. Dineen, "Creative Financing Paves Way for 22-Story Tower on SF's Lower Nob Hill," SF Chronicle, February 3, 2025, https://www.sfchronicle.com/bayarea/article/sf-sutter-street-tower-20102886.php.
[189] Dineen.
[190] Dineen.
[191] Parker, San Francisco Permitting Process.

regulation rather than eliminating root issues. One example is Accessory Dwelling Units (ADUs): although California has passed several laws to encourage their construction, San Francisco has been slow to implement them.[192] The San Francisco Fire Department, for instance, requires three feet of uncovered access to the yard or ADU site—a restrictive condition in a city known for its attached housing.[193] This policy reflects San Francisco's historic tendency to restrict what gets built rather than making it easier.

Overall, while there is growing recognition that San Francisco's permitting system is broken, meaningful reform remains politically challenging. The city's deep-seated culture of historic preservation and neighborhood activism has stalled most serious efforts to streamline approvals or limit discretionary reviews. Even when new policies are introduced, they tend to create new restrictions rather than simplify the process. Without a significant shift in how the city approaches development, San Francisco will remain a city where only the wealthiest can afford to stay, and only the wealthiest can afford to build.

Tokyo

Tokyo's permitting system plays a direct role in maintaining a steady housing supply, which helps keep housing costs relatively affordable compared to other major global cities. The efficiency and predictability of the approval process mean that developers can build quickly, reducing financial uncertainty and avoiding inflated costs that come with prolonged delays. With fewer regulatory bottlenecks, the city can consistently produce new housing, which prevents extreme shortages.[194]

[192] Parker.
[193] Parker.
[194] Corporation, "Urban Planning System in Japan."

One of the key factors influencing affordability is zoning flexibility. Tokyo's zoning laws allow for mixed-use development in most areas, meaning that multi-unit residential buildings can be constructed in practically any zone (except industrial ones) without major restrictions. Furthermore, there are no strict limits on the number of units per building allowed within designated urban areas, and high-density construction is encouraged rather than blocked. This approach ensures that as demand for housing grows, supply can keep up, keeping prices from skyrocketing.[195]

Another major factor is Tokyo's redevelopment culture. The city has no housing shortage—in fact, it often has a surplus of units due to the high rate of redevelopment. In contrast to many Western countries, older buildings are not seen as long-term investments but instead as temporary structures that will eventually be rebuilt. A home's value is largely tied to the land it sits on, not the structure itself, which is why many buildings are demolished and replaced every 30 to 50 years.[196] In San Francisco, while location and land value are crucial, the structure itself plays a much more important role in resale compared to Tokyo. With construction constantly in demand, architecture is a popular profession, and many firms specialize in redevelopment projects. This cycle of frequent redevelopment means that Tokyo's housing stock is constantly renewed, creating a steady supply of modern, earthquake-resistant homes.[197] Tokyo—and Japan more broadly—has some of the most advanced earthquake-resistant building technology in the world. Despite facing similar seismic risks, cities like San Francisco have been slow to adopt this technology.[198]

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[195] Oscar Holland, "How Japan Spent More than a Century Earthquake-Proofing Its Architecture," CNN, January 6, 2024, https://www.cnn.com/2024/01/06/style/japan-earthquake-architecture-dfi-hnk/index.html.
[196] Eliza Relman, "The Sure-Fire Way to Save America's Cities? Do What Tokyo Does.," Business Insider, accessed February 10, 2025, https://www.businessinsider.com/america-build-like-tokyo-housing-crisis-doom-loop-2023-10.
[197] Relman.
[198] Holland, "How Japan Spent More than a Century Earthquake-Proofing Its Architecture."

As strong seismic standards are already built into Tokyo's planning system, the city can focus more directly on housing issues like seismic vulnerability. Even though 87% of Japan's housing stock is already 'earthquake resistant,' the Japanese government has set ambitious goals to further improve earthquake resilience. They are aiming for a 95% resistance rate by 2025 and the complete elimination of outdated, vulnerable housing by 2030.[199]

Overall, Tokyo's permitting system, zoning flexibility, and redevelopment culture work together to maintain housing affordability. By ensuring that housing production remains steady and responsive to demand, the city avoids the extreme price surges seen in other global cities. While affordability challenges still exist—especially in central, high-demand areas—the overall accessibility of housing in Tokyo is a direct result of its efficient, pro-development approach to urban planning.[200]

Empirical Evidence of Housing Policy Outcomes

San Francisco and Tokyo illustrate two fundamentally different approaches to housing policy, with dramatically different outcomes. While both cities face severe earthquake risk and high demand for housing, Tokyo has managed to sustain an affordable, resilient, and growing housing stock, while San Francisco has stagnated under layers of bureaucratic inefficiency, discretionary reviews, and exclusionary zoning. The data presented here, spanning 2018 to 2022, underscores these differences, showing how Tokyo consistently produces more housing per capita, distributes development more evenly across the city, and maintains relative affordability, whereas San Francisco's restrictive policies exacerbate its housing crisis.[201]

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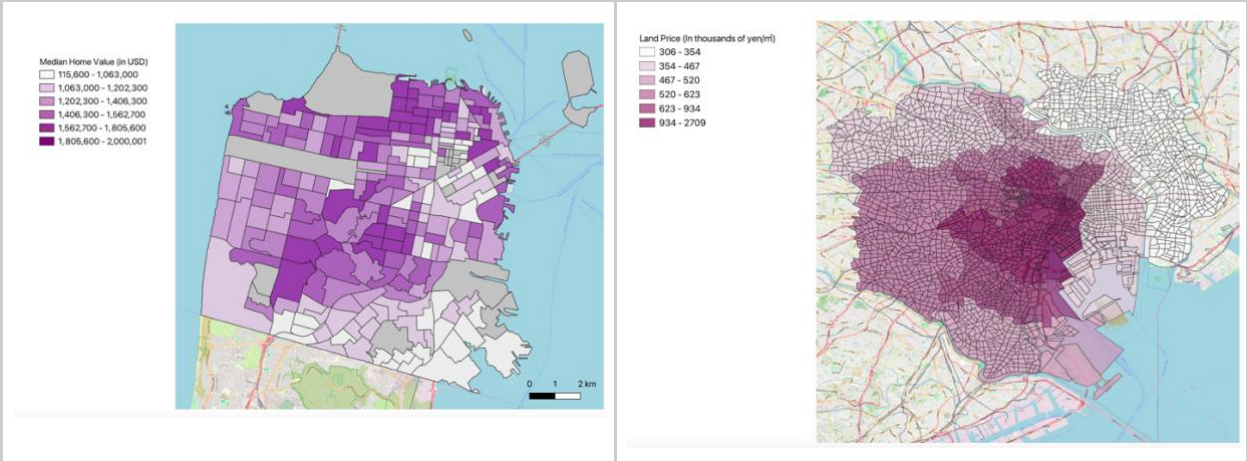
[199] Norio Maki and Haruo Hayashi, "BUILDING CODES AND TRADEOFFS FOR EARTHQUAKE RISK REDUCTION:DISASTER MANAGEMENT FOR HOUSING," n.d.
[200] Maki and Hayashi.
[201] Appelbaum, "How Tokyo Achieves Affordable Housing."

Year	San Francisco	Tokyo	Tokyo (accounting for homes destroyed)
2018	6.32	21.48	20.51
2019	10.60	21.12	20.24
2020	12.81	20.13	19.35
2021	12.66	20.44	19.42
2022	7.62	20.15	19.35
Average	**10.00**	**20.66**	**19.77**

Table 1: New Units Per 1,000 Households (Tokyo Statistical Yearbook, DataSF)

One of the starkest differences between these two cities is the rate of new housing construction. As shown in Table 1, Tokyo has consistently built housing at a rate nearly double that of San Francisco, with an average of 20.66 new units per 1,000 households annually compared to San Francisco's 10.00. Even when accounting for units lost due to demolition and redevelopment, Tokyo's net housing production is significantly higher.



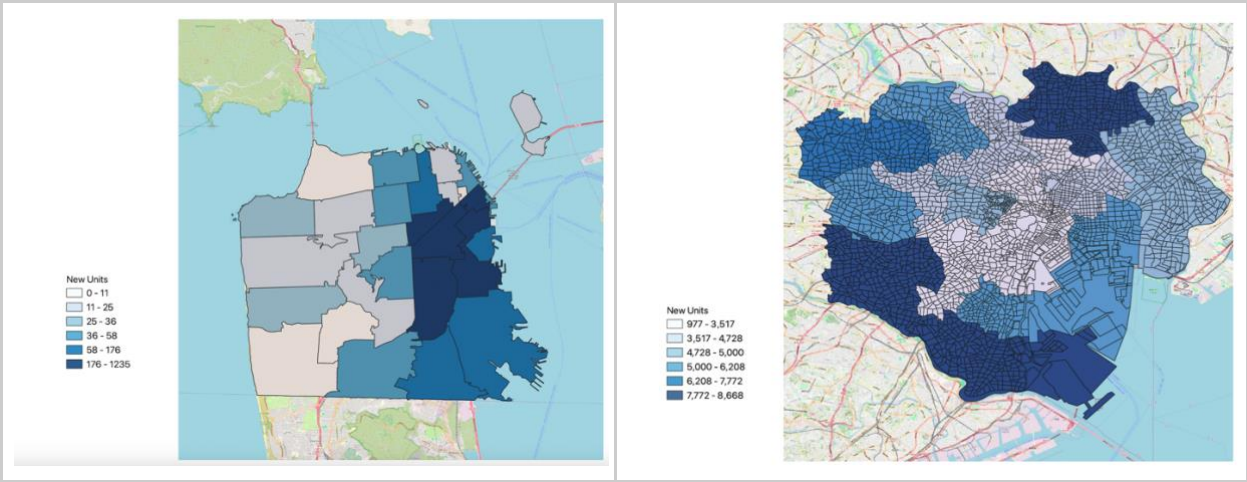


Figure 4: Median Home Values (SF, Top Left) and Median Land Values (Tokyo, Top Right) compared with New Units Built (SF, Bottom Left) and New Units Built (Tokyo, Bottom Right), averaged from 2018-2022 (Tokyo Statistical Yearbook, DataSF)

Beyond the overall production numbers, it is equally important to examine where new housing is being built. As seen in Figure 4, Tokyo's housing development follows an expected trend—construction is concentrated in areas with lower land values, allowing for a steady supply of new housing. San Francisco, on the other hand, shows a far more restricted development pattern: while some lower-cost areas see new construction, much of the city remains unchanged, particularly in historically wealthy, low-density neighborhoods that have long resisted upzoning.

Zoning regulations play a crucial role in these disparities. In San Francisco, the highest levels of development are concentrated downtown—the only area zoned for skyscrapers—while the western side of the city, dominated by single-family zoning, has remained largely immune from new housing.[202] This exclusionary pattern is reinforced by historic zoning laws and persistent NIMBY opposition to density increases. Tokyo, by contrast, has far more flexible zoning laws, allowing for mixed-use and residential developments across most of the city.[203] This has allowed for a system that is not only more responsive to demand, but also reflects a

[202] J.K. Dineen, "Contentious SF Land Use Battle Ends with Construction of New Housing," SF Chronicle, August 26, 2024, https://www.sfchronicle.com/sf/article/s-f-housing-sunset-19541530.php.
[203] McNee and Pojani, "NIMBYism as a Barrier to Housing and Social Mix in San Francisco."

broader cultural trust in individuals to shape the urban environment in ways that meet collective needs. While San Francisco relies on a rigid framework in a different way to meet the needs of the people, Tokyo's system is structured to adapt. This difference in zoning philosophy reflects deeper contrasts in governance and individualism: in Tokyo, flexibility and incremental change are built into the system, whereas in San Francisco, the ability to build often depends on navigating an antiquated, discretionary process rooted in preserving the past.

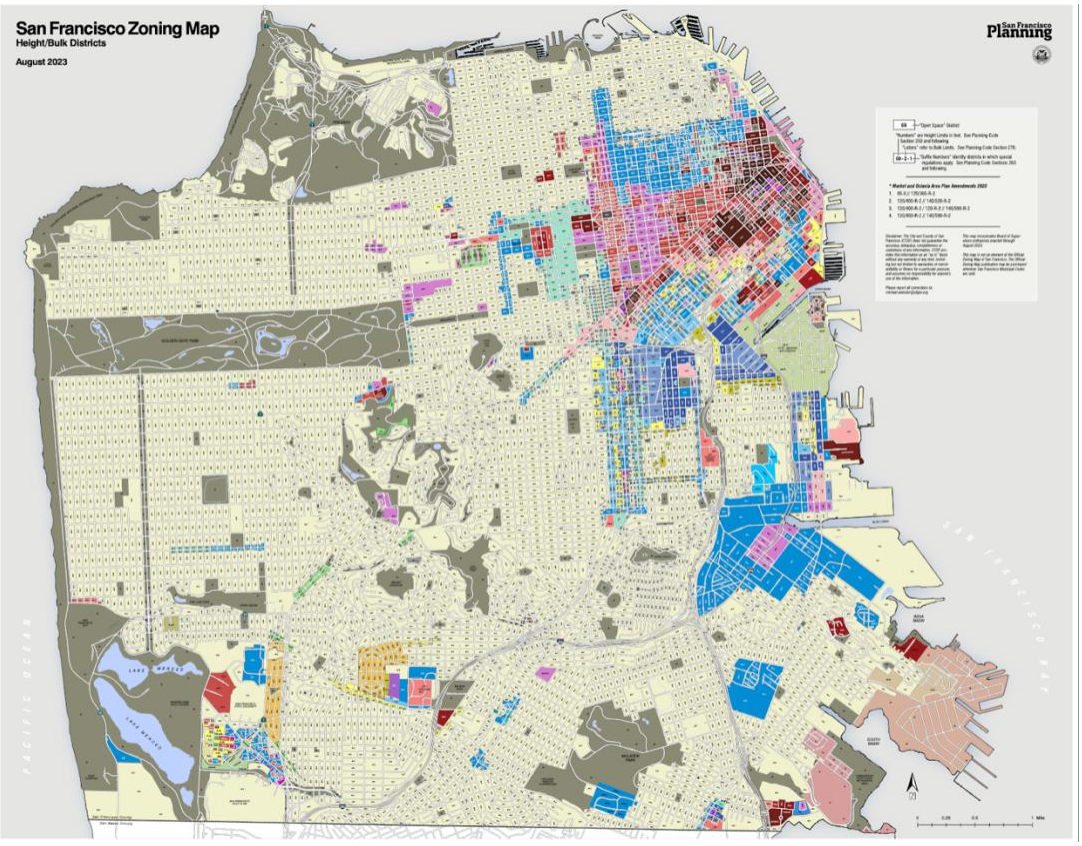


Figure 5: San Francisco Zoning Height and Bulk Districts (SF Planning Department)

Figure 5 further illustrates this issue and aptly shows why San Francisco has been unable to meet housing demand. Areas marked in red and blue are the only zones where high-rise construction is permitted, while the vast majority of the city only allows low-rise zoning (white areas). This limits housing supply and ensures that new development remains concentrated in only a handful

of areas, worsening affordability issues. This also suggests that higher-density housing often takes on a horizontal rather than vertical character—an inefficient use of land in a city like San Francisco, which is bounded by the ocean on three sides. This map clearly shows that San Francisco's ongoing crisis is not inevitable—it is the result of policy choices. Without significant reform, the city will continue to experience soaring housing costs, persistent shortages, and a dangerously unprepared built environment in the face of future earthquakes.

Conclusion

San Francisco and Tokyo have faced the same fundamental challenge—frequent, devastating earthquakes throughout their histories as modern cities. Yet their responses have led to two different urban landscapes. Tokyo has built earthquake resilience into its zoning, permitting, and housing policies, allowing for constant redevelopment and high-density construction.[204] San Francisco, on the other hand, has created a system filled with restrictive zoning laws, a grueling permitting process, and historic preservation protections that make new development extremely difficult.[205] These choices have not just shaped how these cities recovered from past disasters, but also continue to define their realities today.

Given the inevitability of future seismic events in both San Francisco and Tokyo, these issues are not only historically significant, but also crucial for contemporary urban planning and disaster preparedness. The decisions made in the aftermath of these events have long-term consequences on each city's resilience, affordability, and overall urban development. Currently, San Francisco remains ill-equipped for a major earthquake. Many of its older structures remain vulnerable, and its restrictive zoning laws and permitting processes significantly hinder the speed

[204] James Gleeson, "How Tokyo Built Its Way to Abundant Housing," February 19, 2018.
[205] Rosen and Sullivan, "From Urban Renewal and Displacement to Economic Inclusion: San Francisco Affordable Housing Policy 1978-2014."

and efficiency of post-disaster reconstruction. In contrast, Tokyo has created a system that prioritizes adaptability and resilience, allowing for continuous redevelopment.[206]

The rapid development approach has its own drawbacks, and a key takeaway is that neither model is foolproof nor entirely effective. For instance, Tokyo's frequent redevelopment is deeply tied to Japan's cultural perception of housing as a temporary asset and is supported by a top-down government structure. Additionally, rebuilding every thirty years is not environmentally sustainable nor practical for most global cities, and some degree of historic preservation and cultural continuity can be valuable to maintain a city's historic identity.[207] Future research could specifically explore the relationship between rebuilding practices and the environmental impacts of frequent redevelopment, providing a deeper analysis of the trade-offs in San Francisco's restrictive model and Tokyo's rapid-rebuilding approach.

Ultimately, the most effective strategy likely requires a balance between these extremes. Cities should streamline permitting and zoning processes to enable the construction of safe, resilient housing while ensuring long-term sustainability and affordability. Moreover, seismic resilience should not be treated as an afterthought in housing and urban policy. Instead, disaster preparedness must be embedded in long-term planning efforts rather than addressed reactively after a crisis. Tokyo's and San Francisco's successes and failures serve as case studies for other cities facing similar challenges and make one thing clear: resilience cannot be an afterthought nor can a city wait for the next major tremor to fix what is already broken. Cities that fail to prioritize proactive, long-term sustainability and affordability risk repeating past mistakes instead of ensuring a livable, affordable, and adaptive environment in the face of inevitable change.

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[206] Appelbaum, "How Tokyo Achieves Affordable Housing."
[207] Phillips, "Episode 72: Notes on Tokyo's Housing, Land Use, and Urban Planning with Shane Phillips."

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