Earthquake Safety Implementation Program

The City and County of San Francisco

EARTHQUAKE RISK AND SAN FRANCISCO'S PRIVATE SCHOOLS | REPORT

December 31, 2013

Earthquake Risk and San Francisco's Private Schools

Task A.6.f, Earthquake Safety Implementation Program Work Plan
Review performance requirements for private schools K-12.

Earthquake Safety Implementation Program

A Community Action Plan for Seismic Safety (CAPSS)

Report: December 31, 2013

Participants in Private Schools Earthquake Safety Working Group

The San Francisco Earthquake Safety Implementation Program would like to thank everyone who participated in the Working Group meetings and discussions. This is a list of people who were members of the Private Schools Earthquake Safety Working Group, attended a Working Group meeting, or who otherwise contributed to the work discussed in this report. This report is the findings of that work.

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Executive Summary

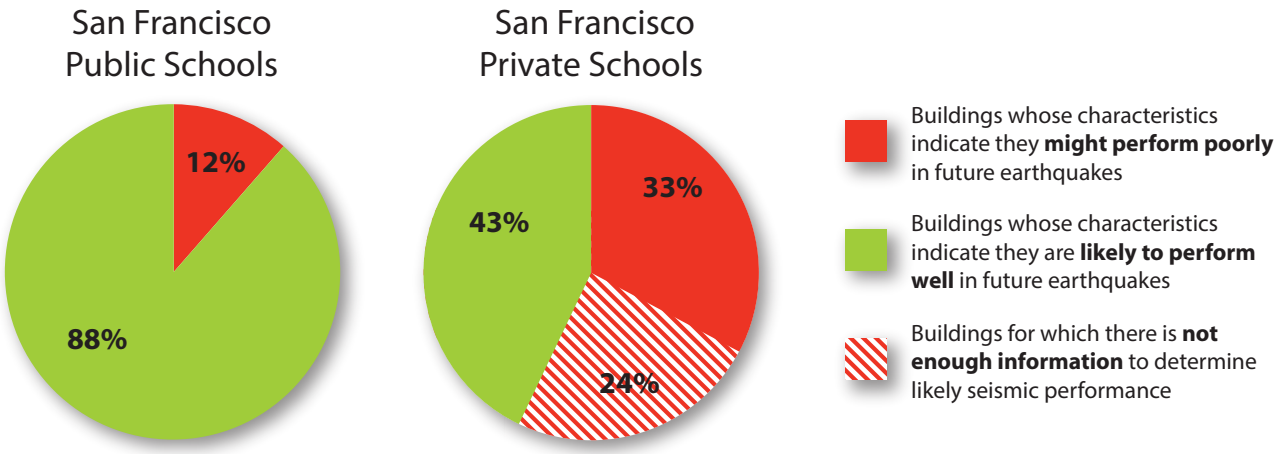
While most San Francisco parents assume that all schools are required to be safe in earthquakes, this is not, in fact, the case. Public and private school buildings are subject to different laws regulating their construction. Since the early 1930s, public schools in California have been subject to special design requirements, regulations, seismic retrofit programs, and quality control measures that have not applied to private school buildings. Over the years, the regulations covering private school buildings have been significantly less stringent and, unfortunately, there is evidence that some private school buildings in San Francisco will pose risks in future earthquakes.

The Private Schools Earthquake Safety Working Group was formed by the City, as part of the Earthquake Safety Implementation Program's Task A.6.f, to study this issue. It met for over a year, with publicly-noticed meetings open to all, and particular effort made to encourage private school representatives to attend. The Working Group found the following:

- 43 percent of all San Francisco private school buildings have characteristics that indicate they are **likely to perform well** in future earthquakes.
- 33 percent of all San Francisco private school buildings have characteristics that indicate they **might perform poorly** in future earthquakes.
- For 24 percent of all San Francisco private school buildings, the Working Group does **not have enough information** to determine their likely seismic performance.

Further, San Francisco's private school buildings appear to have approximately double the risk of its public school buildings in future earthquakes, as shown in Figure A.

Figure A. Comparison of the earthquake risk of San Francisco public and private school buildings.



According to a survey conducted by the Working Group, parents of San Francisco school children are largely unaware that private school buildings are likely to perform more poorly in future earthquakes than public school buildings. Most parents believe that the government requires all schools to be safe in earthquakes.

Schools, buildings used to educate future generations, hold a special place in society. Approximately one-third of San Francisco school children attend private school, the highest rate in the State. Therefore, the risk of private school buildings in the City represents a major piece of the risk to schools in San Francisco. All San Francisco school children deserve to attend schools in buildings that are likely to be safe in future earthquakes. The recommendations in this report are a key step to making that happen.

Key Recommendations

As such, the Private Schools Earthquake Safety Working Group recommends that the City and County of San Francisco pass an ordinance requiring the following:

1. All private school buildings in the City should be evaluated for their seismic risks.

This action would inform school administrators, staff, parents, and the City about the earthquake risks of private schools in San Francisco. This information might motivate some schools to take action to reduce the risk of school buildings and would allow schools to consider earthquake risk in their long-term capital planning activities. Evaluation results would also inform City policy and emergency planning, and would allow parents to consider earthquake risk in their decision making about schools. Also,

2. The evaluations should identify buildings with unacceptable risks of collapse and other life safety risks, as well as indicating the likelihood that buildings will be usable following future earthquakes.

3. The legislative process for this ordinance should be initiated within three months of the receipt of this report. All evaluations should be completed within three years of the effective date of the ordinance.

4. The City should develop training, outreach, and assistance programs to help school building owners and operators to comply with this mandate.

5. The Earthquake Safety Implementation Program should prepare a report that describes the findings of these evaluations in non-technical terms and post it on its website.

6. The Earthquake Safety Implementation Program should analyze the results of the required evaluations with respect to emergency response plans, earthquake resilience and recovery goals, and related public policy issues.

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Cover Photo Credit: Ken Guttmaker,

Stuart Hall School, 2222 Broadway Seismic Retrofit Project, 2008. Tipping Mar Engineers

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Chapter 1
Introduction

Private schools are an important part of the education system in San Francisco, providing education for fully one-third of school children in the City—approximately 24,000 students in grades K through 12.[1] This is the highest rate of private school attendance of all cities in the State. Therefore, the expected damage of San Francisco private school buildings is of major importance to the how the City will fare in future earthquakes. It affects whether students and adults occupying these buildings will be unharmed. It affects how quickly schools will be able to reopen after damaging quakes and, consequently, how quickly parents can get back to work. It also affects San Francisco's public schools, and the number of children they would need to serve. Getting schools up and running quickly after earthquakes is a critical part of a quick recovery for the entire City, and private schools are a major piece of the schools picture in San Francisco.

Over the years, the regulations covering private school buildings have been significantly less stringent than those for public schools and, unfortunately, there is evidence that some private school buildings in San Francisco will pose risks in future earthquakes.

While most San Francisco parents assume that all schools are required by Building Codes to be safe in earthquakes, this is not, in fact, the case, as discussed in the following chapters. Public and private school buildings are subject to different laws regulating their construction. Since 1933, public schools in California have been subject to special design requirements, regulations, seismic retrofit programs, and quality control measures that have not applied to private school buildings. Over the years, the regulations covering private school buildings have been significantly less stringent and, unfortunately, there is evidence that some private school buildings in San Francisco will perform poorly and pose risks to their occupants in future earthquakes.

This report was prepared by the San Francisco Private Schools Earthquake Safety Working Group (hereafter referred to as the Working Group). This group was convened by the San Francisco Earthquake Safety Implementation Program of the City Administrator's Office. This largely volunteer group met approximately monthly for over a year to discuss and research the following questions:

- What is the risk of damage to San Francisco private school buildings in earthquakes?
- How does the earthquake risk of damage to San Francisco private school buildings compare to that of San Francisco public school buildings?
- How does the earthquake risk of damage to San Francisco private school buildings compare to community expectations of that risk?
- What options does the City and County of San Francisco have to reduce the earthquake risk of private school buildings?

[1] CDE, 2013

- What course of action is recommended to the City and County of San Francisco, balancing the risk of San Francisco private school buildings with the costs and challenges of addressing the risk?

Working Group meetings were open to all, and numerous efforts were made to include as many representatives of private schools as possible in the Working Group activities. Appendix A describes the Working Group process.

This report addresses all schools in San Francisco with buildings whose construction is regulated by the City and County of San Francisco, with the exception of home schools. Public school building construction is regulated by the State and is outside of City jurisdiction. School buildings regulated by the City primarily include private schools, but also include a small number of public charter schools. Not all of the non-public schools use the term *private school*. They may refer to themselves as *independent schools*, *religious schools*, *non-public schools*, or with other terms. For this report, all of these schools are referred to as *private schools* for the sake of brevity.

This report examines the earthquake risk of schools in San Francisco serving grades K though 12. It does not address the City's many preschools, which likely face seismic risks similar to those of private schools. However, a number of private schools in the City teach preschool as well as higher grades, and those schools are covered by this report.

Chapter 2
Building Regulations for Public and Private Schools

In California, the laws that govern private school buildings and public school buildings are different. Private school buildings are privately owned and their building design and construction are regulated by local governments, much like houses, office buildings, and other types of privately owned buildings. In San Francisco, construction of private school buildings is regulated by the City and County of San Francisco according to the San Francisco Building Code. Public school buildings, on the other hand, are owned by local school districts. In San Francisco, public schools are owned by the San Francisco Unified School District, which is a government entity that is completely separate and independent from the government of the City and County of San Francisco. The design and construction of public schools is regulated by the State through the Division of the State Architect, part of the California Department of General Services. The building codes and regulations that cover private schools are different, and weaker with regard to earthquake safety, than those that cover public schools.

2.1 Public School Building Earthquake Safety Regulations

On March 10, 1933, an earthquake struck southern California near the City of Long Beach. The earthquake destroyed 70 schools and caused major damage to 120 more.[2] Luckily, it occurred late on a Friday afternoon when children were not in school. Exactly one month later, the Field Act, which regulates public school construction statewide, was passed by the State legislature. The Field Act established the Office of the State Architect (now the Division of the State Architect), which, since 1933, develops earthquake-resistant design standards for public schools, enforces a number of rigorous quality control procedures for design and construction, checks plans for all public schools, and requires that public schools be designed and inspected during construction only by licensed structural engineers and architects.

The key difference between the design of California public school buildings and other buildings in the State is the multifaceted and more rigorous quality control process from design through completion of construction that public schools buildings undergo. These include the following:[3]

- The structural plans for public schools must be designed by professionals with a structural engineering license. A civil engineering license is adequate for preparing building construction documents for buildings that are not public schools, including private schools. A structural engineering license requires additional experience and knowledge of structural and earthquake engineering topics.

- The plan approval process is more rigorous for public schools; plans are checked to ensure they comply with the California Building Code by licensed structural engineers for public school

[2] CSSC, 2004.
[3] These bullets are adapted from CSSC, 2009.

buildings while, in some cases, plans may have been checked by non-licensed professionals for other types of buildings.

California public school buildings constructed according to the Field Act have performed significantly better in earthquakes than similar non-Field Act buildings.

- Public schools are subject to continuous inspection during construction by inspectors approved by the Division of the State Architect. This means a highly-qualified inspector is on-site at all times to ensure buildings are constructed as designed. Other buildings, including private schools, have periodic inspections by certified local inspectors at certain construction milestones.
- Independent testing of materials used in construction by laboratories certified by the Division of the State Architect is required for public schools. Independent testing by certified laboratories of materials used in construction may or may not have been effectively enforced by local building authorities for other building types.
- The structural design requirements for public schools are more rigorous with respect to earthquake forces than structural design requirements for other buildings, including requiring public schools to be designed to resist stronger earthquake forces and requiring specific detailing requirements to improve building performance.

Following the passage of the Field Act, the State passed a series of additional laws that added to earthquake safety requirements for public schools.[4] Notably, a 1968 law required all public schools built before the 1933 Field Act to be evaluated and, if needed, seismically retrofitted or to have their use as a public school discontinued. By the late 1970's, essentially all public school buildings built before the Field Act had been retrofitted or replaced.

The Field Act has made a difference. The California Seismic Safety Commission conducted a study in 2009 that found that in earthquakes since 1933, California public school buildings constructed according to the Field Act have performed significantly better in earthquakes than similar non-Field Act buildings.[5] For example, after the 1994 Northridge Earthquake near Los Angeles, about 3% of the private schools inspected after the earthquake received a red tag, meaning a building was unsafe for occupancy or entry. About 12% of the private schools inspected were given a yellow tag, meaning that part of the building posed a danger or that the facility required more detailed inspection. In comparison, about 1% of the public schools built according to the Field Act that were inspected received a red tag, and about 5% received a yellow tag.

However, it is clear that some public school buildings in California may have significant structural deficiencies that could lead to damage, or even collapse, in large earthquakes. Building codes and regulatory practices have improved significantly since 1933 when the Field Act was passed, with particular advances after dramatic building collapses in the 1971 San Fernando earthquake. There

[4] These include the Garrison Act (1939), the first Green Act (1967), the second Green Act (1968), the School Building Sites Act (1972), and the Alquist-Priolo Act (1972).
[5] CSSC, 2009.

have been no regulations requiring that public schools constructed under the early years of the Field Act conduct seismic retrofits, although some school districts have chosen to do so voluntarily.

In 2002, the State completed an inventory of public school buildings built before 1978 that identifies buildings with characteristics that might make them unsafe in future earthquakes. This inventory resulted in a list of potentially at-risk schools known as the AB 300 list (the program was authorized by Assembly Bill 300 in 1999). The State recommends that public schools on this list undergo detailed seismic evaluations to determine if they pose life safety risks, but the State has neither required nor funded school districts to do this.

San Francisco has 72 public school buildings on the AB 300 list. On its own initiative and through local funding[6], the San Francisco Unified School District has evaluated the seismic risk of 86 percent of San Francisco public school buildings on the AB 300 List. Fifty-seven of the schools on the list have been or are planned to be seismically retrofitted, were found not to need retrofit, or are no longer used as district schools. Fifteen more have been identified as needing seismic upgrades or evaluations, but work has not yet commenced or funding for the work has not yet been identified. These figures are shown in Table 2-1.[7] Appendix B provides more details about the status of San Francisco Unified School District buildings that appear on the AB 300 List.

Table 2-1. San Francisco public school buildings identified on the State list of public schools that may have seismic safety concerns.[7]

Status of San Francisco public school buildings on AB 300 list of schools that may have seismic safety concerns	No. of buildings
Structural upgrades completed	25
First phase upgrades complete, second phase planned	1
Evaluated, no upgrade needed	4
Evaluated, upgrades planned	15
Evaluated, upgrades needed, not yet funded	3
In assessment phase, minor upgrades needed	2
Used for non-school administration	3
Not in use	2
Demolished	2
Sold	5
Not yet evaluated, not yet funded	10
Total	**72**

[6] Funding for the evaluations and upgrades of San Francisco public schools came primarily from bond funds from Proposition A in 2003 and Proposition A in 2006. Funding for work on two schools came from the Mello-Roos fire and life safety parcel tax.

[7] SFUSD, 2013.

2.2 Private School Building Earthquake Safety Regulations

Design and construction of private school buildings are regulated by the City and County of San Francisco according to the San Francisco Building Code, like construction of other privately-owned buildings. In the City's early days, there was no regulation of construction with regard to earthquake risk for any type of building. In the mid-1930s, construction of unreinforced masonry buildings, a particularly vulnerable and lethal building type, was prohibited for all buildings, including private schools. The first San Francisco Building Code incorporating earthquake resistant design requirements was enacted in 1948.[8] Since 1948, the San Francisco Building Code has evolved and improved as structural engineering knowledge has advanced. The San Francisco Building Code has been updated periodically to incorporate improved requirements for earthquake resistance of new buildings. In 1984, the San Francisco Building Code was updated to incorporate major improvements in earthquake-resistant construction developed from lessons learned as a result of the 1971 San Fernando earthquake.[9]

For many years, the San Francisco Building Code has included an Importance Factor based on the use of a building.[10] Buildings categorized as having more important uses must meet higher seismic code standards than buildings with less important uses. New buildings are assigned to four Risk Categories[11], ranging from Category I (least important) to Category IV (essential facilities). School buildings with space for more than 250 people are in Category III. All other school buildings are in Category II, which is the category that includes most buildings, including residences, stores, and offices. This means that large private school buildings intended to house more than 250 students and staff members are designed to a nominally higher standard than smaller school buildings. However, this factor is probably less significant at improving earthquake resistance than the quality controls applied to public schools. Importantly, the threshold figure of 250 occupants applies to each individual building, not to a campus as a whole. It is unknown how many of the City's private school buildings were built to accommodate more than 250 occupants; most schools serving large numbers of children have multiple buildings, and it is possible that each building is intended for fewer than 250 occupants.

[8] ATC, 2010b.

[9] The San Francisco Building Code adopted these improvements later than many other jurisdictions. While some provisions improving life safety risks of reinforced concrete structures were incorporated before 1984, the San Francisco Building Code did not incorporate all of these aspects from the Uniform Building Code until 1984 (ATC, 2010b).

[10] An importance factor related to occupancy was first included in the Uniform Building Code in the 1976 version (CSSC, 2009).

[11] This term was formerly Occupancy Category.

In 1986, the State passed the Private Schools Building Safety Act[12], which defines engineering standards required for new construction and major renovations of all private schools in the State. This act took effect in 1987. The goal of this legislation was to provide a level of safety in new private school buildings similar to that of public schools. This law was not retroactive, meaning it did not apply to school buildings constructed before its passage, unless they undertook major renovations. The Private Schools Building Safety Act standards are less rigorous than those of the Field Act in many respects; a detailed comparison of the Private Schools Building Safety Act and the Field Act is presented in Appendix C. The Private Schools Building Safety Act is part of the State Education Code, not the California Building Code or the San Francisco Building Code and is, thus, not well known by structural engineers.

Owners of private school buildings, even those that have buildings that could clearly be unsafe in earthquakes, are not required by law to seismically retrofit those buildings.

A key component of the Field Act covering public schools is rigorous quality control checks throughout the design and construction process, such as a full-time onsite inspector. Private school buildings in San Francisco, or anywhere else in the State, do not have the same level of quality control in their design and construction, which means that errors, both large and small, are more likely. Regardless, since the mid 1980s, the San Francisco Building Code requirements for most newly-constructed structures have required earthquake resistant design elements that are likely to ensure the safety of occupants of most buildings, including private schools.[13]

Like all buildings, private school buildings are only required to meet the standards of the building code from the date in which the building was constructed. This means that a private school building built in the 1920s is required to meet the San Francisco Building Code requirements of the 1920s, which did not include earthquake resistant design requirements. Owners of private school buildings, even those that have buildings that could clearly be unsafe in earthquakes, are not required by law to seismically retrofit those buildings. There are a few exceptions to this rule.[14] San Francisco adopted an ordinance in 1993 requiring that most unreinforced masonry buildings be seismically retrofitted. There were a handful of unreinforced masonry private school buildings that have since been retrofitted, sold, or demolished. Schools that conduct major renovations, alterations, or additions might have been required to upgrade their structural system as part of that work. Schools that have purchased a building that was not previously used for educational purposes might also have been required to conduct seismic retrofits as a condition of the building's change of use. San Francisco, as discussed in the next section, has a number of private schools that use buildings that have been continuously occupied as a school for many years and were constructed to obsolete and deficient building codes.

[12] California Education Code, Section 17320 *et seq*.

[13] Some structural types continued to have earthquake risk issues until later, including steel braced frame, steel moment frame, and concrete tilt-up buildings. Relatively few private schools are constructed with these structural systems.

[14] In addition to the exceptions listed, there are requirements for fire safety, disabled access, and other building related issues that are not related to structural earthquake safety.

Some private schools have conducted voluntary seismic improvements or retrofits of older buildings. The quality and effectiveness of these upgrades are unknown as they typically do not meet any defined standard but, rather, reflect the advice of the engineer hired by the school, balanced with the available budget at the time the work was conducted. Anecdotally, when some private schools conduct renovations of their buildings for reasons such as improved classroom space, they may also incorporate some seismic improvements that are convenient and affordable to the project.

Nonstructural components—everything from windows to chimneys, boilers to light fixtures—can also be prone to earthquake damage. Heavy overhead components, such as brick cladding or plaster ceilings, can be life threatening when they fall. Others, like heating systems, plumbing, or elevators, can affect how quickly a damaged school might reopen. In public school buildings, the design and construction of nonstructural components is thoroughly monitored.[15] Unfortunately, in other types of buildings, nonstructural components often lack adequate earthquake bracing, even in relatively new buildings.[16]

2.3 Comparison of Public School and Private School Building Regulations

Table 2-2 presents a timeline comparing the building regulations that governed the design and construction of both private and public school buildings constructed during different time periods. Though not noted in the table, schools that have undergone major alterations, additions, or a change in Occupancy Category (which relates to building use) may have been required to conduct a seismic retrofit as part of that work.

Table 2-2 is primarily about seismic safety, which is generally a function of structural collapse and nonstructural falling hazards. Safety is the primary concern of most building regulations. Even seismically safe buildings, however, are expected to sustain some damage in large earthquakes, and this damage, while not life-threatening, can affect the ability of a school to reopen quickly or provide full services to its student body.

Table 2-2. Timeline comparing regulations covering San Francisco private school and public school building design and construction, grades K-12.

Date of Building Construction	Public Schools[17]	Private Schools[17]
Schools built before 1933 (pre-Field Act)	• All California public school buildings built before 1933 have been evaluated and, if found to be unsafe, have been seismically retrofitted or removed from use. • Some school buildings retrofitted before	• Some private school buildings built in this time period might be seismically unsafe. • San Francisco private school buildings built in this time period were not required to meet any earthquake-

[15] CalEMA, 2011.
[16] Masek and Ridge, 2009.
[17] Some private schools and all public schools undergoing major alterations or additions, or moving into an existing building that was not previously a school, have been required to seismically retrofit.

Date of Building Construction	Public Schools[17]	Private Schools[17]
	the mid-1970s might be seismically unsafe. These schools are on the AB 300 list.[18]	related code requirements. • Only unreinforced masonry schools with load bearing walls have been required to be seismically retrofitted. • In general, other private schools have not been required to be seismically evaluated or retrofitted.
Schools built between 1933 - 1948 (post Field Act, pre SF Building Code seismic provisions)	• Some public school buildings from this time period might be seismically unsafe, particularly those that are not wood-frame structures. These schools are on the AB 300 list.[19] • Public school buildings built in this time period were subject to the codes and regulations of the Field Act. • Public school buildings from this time period have not been required to be seismically evaluated or retrofitted.	• Some private school buildings built in this time period might be seismically unsafe. • San Francisco private school buildings built in this time period were not required to meet any earthquake-related code requirements. • In general, private school buildings from this time period have not been required to be seismically evaluated or retrofitted.
Schools built between 1948 – 1978 (post SF Building Code seismic provisions, pre concrete lessons)	• Some public school buildings from this time period might be seismically unsafe, particularly those that are not wood-frame structures. These schools are on the AB 300 list.[19] • Public school buildings built in this time period were subject to the codes and regulations of the Field Act. • Public school buildings from this time period have not been required to be seismically evaluated or retrofitted.	• Some private school buildings built in this time period might be seismically unsafe, particularly those that are not wood-frame structures. • New San Francisco private school buildings from this time period were required to incorporate some seismic resistant design features. • The code requirements for new private school buildings improved periodically over this time period. • In general, private school buildings from this time period have not been required to be seismically evaluated or retrofitted.

[18] DGS, 2013.
[19] DGS, 2013.

Date of Building Construction	Public Schools[17]	Private Schools[17]
Schools built between 1978 – 1984 (State code reflects concrete lessons but SF code does not)	• Most public school buildings constructed during this time period are expected to be seismically safe.	• Some private school buildings built in this time period might be seismically unsafe, particularly those that are not wood-frame structures. • San Francisco private school buildings built during this time period were required to incorporate some seismic resistant design features, but the San Francisco Building Code did not yet incorporate all important structural safety provisions for reinforced concrete buildings.[20] • In general, private school buildings from this time period have not been required to be seismically evaluated or retrofitted.
Schools built between 1984 – 1987 (SF code reflects all concrete lessons)	• Most public school buildings constructed during this time period are expected to be seismically safe.	• Most private school buildings constructed during this time period are expected to be seismically safe. • In 1984, The San Francisco Building Code was updated to incorporate the requirements of the 1979 Uniform Building Code, which included important structural safety provisions for reinforced concrete buildings.[20]
Schools built between 1987 – present (Private Schools Act enacted)	• Most public school buildings constructed during this time period are expected to be seismically safe.	• Most private school buildings constructed during this time period are expected to be seismically safe. • The State enacted the Private Schools Building Safety Act in 1987, which requires a similar, but somewhat lower, level of safety than what is required for public school construction.

[20] ATC, 2010b.

2.4 Regulations for Charter Schools

Charter schools are public schools, serving any grades from K through 12, that are exempted from many of the statutes and regulations that apply to school districts. Parents, teachers, or community members may initiate a charter petition, which is typically presented to and approved by a local school district board. Each charter school has a *charter*, which outlines the school's specific goals and operating procedures. Under State law, school districts are required to provide adequate and equivalent facilities to charter public schools, but districts vary in their compliance with this law. Many charter schools secure their own facilities using State financing or donations.[21]

Some charter school buildings are regulated by the Division of the State Architect, meaning those buildings fall under the Field Act and, from the perspective of earthquake risk, can be considered equivalent to non-charter public school buildings. Other charter schools are housed in buildings that are not regulated by the Division of the State Architect. In San Francisco, some charter school buildings are regulated by the City and County of San Francisco according to the San Francisco Building Code and, from the perspective of earthquake risk, can be considered equivalent to private school buildings.

San Francisco has an estimated 16 charter schools, listed in Appendix D. Approximately four of these charter schools are located in buildings that formerly served as non-charter public schools. One former traditional public school building that appears on the AB 300 list now houses two charter schools; ownership of this building has been transferred to the State. Another charter school is located in a building on the AB 300 list that has been seismically upgraded by the San Francisco Unified School District. At least two of the charter schools operate in City and County jails. At least one of the charter schools does not have its own building; it uses a variety of other facilities. It seems likely that a number of these charter schools occupy buildings that are regulated by the City and County of San Francisco according to the San Francisco Building Code, although the regulatory status of the buildings used by each charter school has not been investigated by the Working Group.

[21] CDE, 2013; CCSA, 2013.

Chapter 3
The Vulnerability of San Francisco's Private School Buildings to Earthquakes

Prior to this report, information about San Francisco private schools and their buildings was not available in a single, easily-accessible location. Therefore, the Working Group undertook this study to answer the following questions:

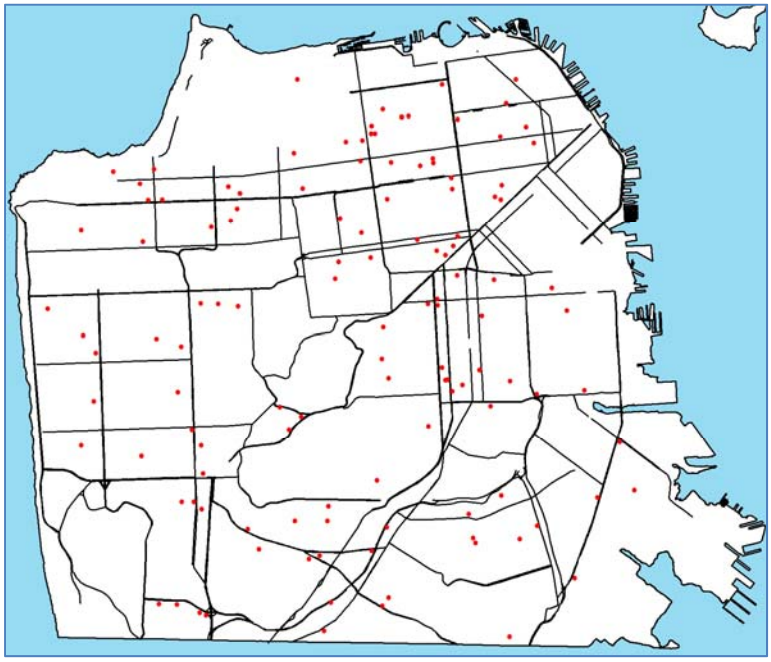
- How many private schools serving any grades from K through 12 currently operate in San Francisco?
- How many buildings do these schools occupy?
- What is the age and structural system of these school buildings?
- How many school buildings have undergone seismic retrofits?
- How vulnerable are San Francisco's private school buildings to future earthquakes?

3.1 Number and Characteristics of Private Schools

The Working Group used City databases and public records, other publicly available information about private schools, and structural engineering expertise to seek answers to these questions. The results of this effort are presented in this section. More details about the process and findings of this effort are in Appendix E.

The Working Group identified 113 private schools currently operating in San Francisco. This list was developed by combining information from the California Department of Education, the San Francisco Fire Department, the San Francisco Department of Emergency Management, internet research, and personal knowledge of Working Group members. Appendix F presents the list of private schools. Figure 3-1 shows the locations of these schools.

Figure 3-1. Map of San Francisco showing locations of private schools.



These schools vary tremendously in number of students, socio-economic background, character, history, educational approach, and the nature of their campuses. Some are large schools that own sprawling campuses and serve more than one thousand students. Others serve fewer than ten students in rented space. Just over half of the schools (an estimated 58 schools) have a religious affiliation. A small percentage of the schools serve special populations, such as children with learning disabilities, physical disabilities, or other special needs. An estimated 26 of the schools serve 50 or fewer students; an estimated 16 schools serve 25 or fewer students. Some have over a hundred years of history, while others are brand new to San Francisco. It appears that new schools open and other schools close on a regular basis, so the exact number and names of private schools in San Francisco vary each year.

The buildings that schools occupy are as varied as the schools themselves. Some schools have multiple buildings on their campus. Some schools have multiple buildings across multiple campuses. Some schools share a building with one or more other schools, institutions, or businesses. A number of schools rent the space they occupy. Many schools have buildings on their campus that are not used primarily for school purposes. This particularly applies to religious schools, which often have a place of worship and/or a residence for their religious leaders on the same plot of land as their school buildings. Campuses with many buildings frequently have buildings that were constructed in different decades using different construction materials and styles. There is no typical or representative San Francisco private school building.

There is no typical or representative San Francisco private school building.

The Working Group research finds that San Francisco's private school buildings occupy an estimated 218 buildings used primarily for school purposes. This number excludes buildings on or adjacent to a school campus that do not appear to be primarily used for the school, such as churches, although it is likely that some of these buildings would be used by students on a recurring basis. The 218 buildings do include non-classroom buildings that are integral to school functions, such as gymnasiums and auditoriums.

3.2 Process to Assess Seismic Risk of Private School Buildings

To assess the seismic vulnerability of the City's private school buildings, the Working Group applied the classification process used by the State during its AB 300 survey of the seismic risk of California public schools.[22] In its assessment of California public schools, the State used available information to determine each school building's date of construction, whether it has been seismically retrofitted (and, if so, when), and its structural system (wood-frame, concrete shear wall, or steel moment frame, to name a few possibilities). It used this information to categorize the thousands of public schools in California into one of two categories: (1) building types expected to perform well in future earthquakes, and (2) building types that are not expected to perform as well as Category 1 and require more detailed seismic evaluation.

[22] DGS, 2002.

The Working Group used publicly available information—City databases, school websites, online satellite images and other images of buildings, Sanborn maps, and the experience and judgment of volunteer structural engineer members of the Working Group—to collect information about San Francisco's private school buildings. The available data for San Francisco private school buildings were then analyzed to assign each school building into one of three categories, similar to the categories used in the AB 300 assessment of public schools:

- Buildings whose characteristics indicate they are likely to perform well in future earthquakes,
- Buildings whose characteristics indicate they might perform poorly in future earthquakes, and
- Buildings for which there is not enough information to determine likely seismic performance.

The Working Group data collection and analysis efforts are described in detail in Appendix E. Even for those schools with readily available information, the results of this effort do not produce information that is accurate at a specific school building level. Rather, the results provide a reasonable snapshot of the risk to the San Francisco private school building stock as a whole. To get an accurate assessment of the seismic vulnerability of a particular building, a structural engineer would need to review original design documents (if available), perform calculations (often with computer modeling), and, especially where reliable documents are not available, conduct destructive investigations, where some surface finishes are removed to expose structural elements underneath for visual inspection, or conduct testing on samples of structural materials to determine their strength. This level of access and information was not available to the Working Group. Thus, the results are representative for the private school building stock as a whole, but are not accurate at an individual building level and, therefore, are only appropriate to present in aggregate form.

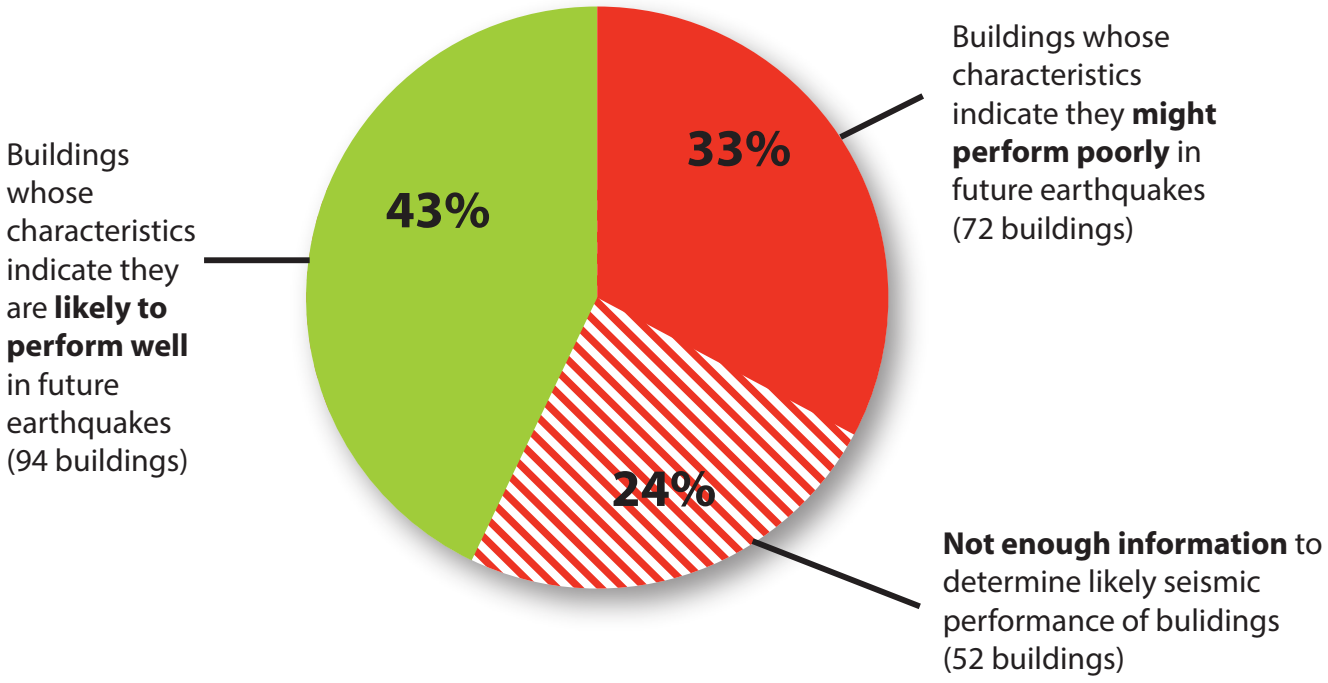
3.3 Earthquake Risk of San Francisco Private School Buildings

The Working Group analysis found the following:

- There are 94 private school buildings (43 percent of all San Francisco private school buildings) whose characteristics indicate they are **likely to perform well** in future earthquakes.
- There are 72 private school buildings (33 percent of all San Francisco private school buildings) whose characteristics indicate they **might perform poorly** in future earthquakes.
- The Working Group does **not have enough information** to determine the likely seismic performance of 52 private school buildings (24 percent of all San Francisco private school buildings).

These findings are illustrated in Figure 3-2.

Figure 3-2. The earthquake risk of San Francisco private school buildings.



The data presented in Figure 3-2 might be more meaningful if they were presented in terms of the number of students at risk or building square footage. Unfortunately, while approximate enrollment figures are available for most schools, there is no rational and consistent way of assigning a number of students to an individual building on a campus. Also, square footage data are not reliably available for all school buildings. Thus, without more complete data, the risk is best presented at this stage in terms of whole buildings.

Figure 3-3 does make clear that, at worst, the private schools pose risks that would likely be deemed unacceptable in public schools, and, at best, the risk posed by San Francisco's private schools is still not well understood.

3.4 Comparing San Francisco's Private and Public School Buildings

San Francisco's private schools serve about 24,000 K through 12 students and comprise, according to the Working Group inventory, about 218 permanent buildings. By comparison, San Francisco public schools serve about 55,000 K through 12 students in about 266 permanent buildings and well over a hundred modular (and possibly temporary) buildings.[23]

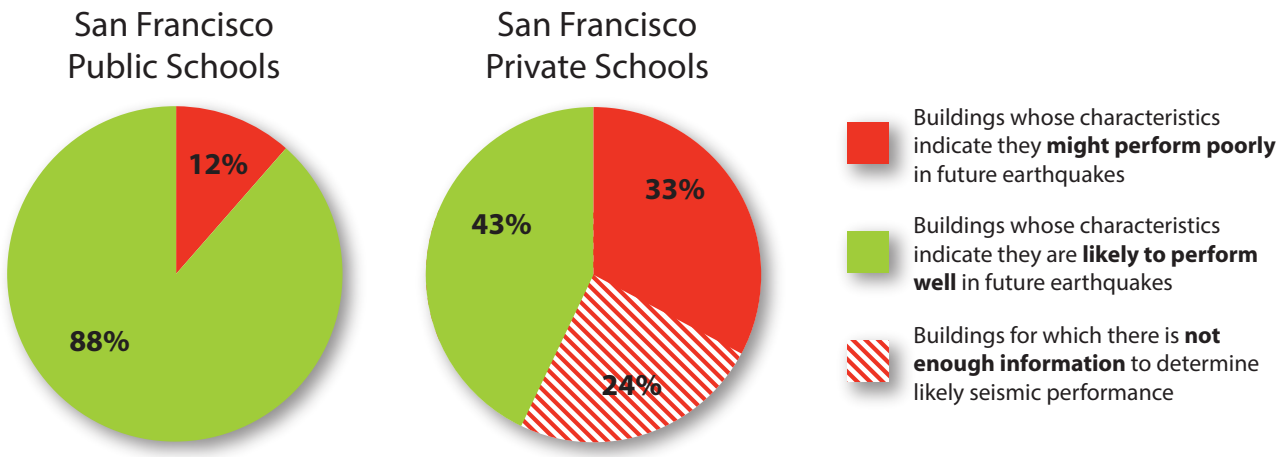
Figure 3-3 compares the seismic risk of 218 San Francisco private school buildings to approximately 266 San Francisco public school buildings, as assessed by the AB 300 effort and the San Francisco Unified School District. This shows that while 88 percent of public school buildings in San Francisco are expected to perform well in future earthquakes, only 43 percent of private schools in San Francisco have characteristics that indicate they will perform well in future earthquakes. Over half of

[23] Appendix E provides an explanation of the process used to estimate the number of public school buildings.

San Francisco private school buildings—57 percent—either have characteristics that indicate they might perform poorly in future earthquakes, or information is not available to the City about the characteristics that indicate seismic performance. This compares to only 12 percent of San Francisco public school buildings that have characteristics that indicate they might perform poorly in future earthquakes.

Figure 3-3 appears to make a stark argument that San Francisco's private schools might be twice as risky as its public schools. While possibly true, this conclusion is premature. As discussed above, there are limits to quantifying risk on a per building basis, as some buildings hold more students than others. Also, the triage-level AB 300 data, which has been supplemented by the San Francisco Unified School District, for public schools is imperfect, as is the private school building data compiled by the Working Group. Finally, the public and private school building stocks differ in the number and size of buildings, the number of students at risk, and the potential impact of damage on neighborhood and citywide recovery. Despite these caveats, Figure 3-3 does make clear that, at worst, the private schools pose risks that would likely be deemed unacceptable in public schools, and, at best, the risk posed by San Francisco's private schools is still not well understood.

Figure 3-3. Comparison of the earthquake risk of San Francisco public and private school buildings.



Chapter 4
Community Expectations for School Safety

Schools, buildings used to educate future generations, hold a special place in society. Accordingly, many communities demand higher safety standards for school buildings than for other buildings. This is certainly true in California for public schools, as evidenced by the Field Act.[24]

This chapter examines community expectations for the earthquake risk of school buildings. It also explores who is responsible for managing the earthquake risk of private school buildings, and who is affected by that risk.

51 percent of parents responded that they believe that public, private, and charter schools are currently held to the same standards for earthquake safety.

4.1 Survey of Parent Perceptions

The Working Group conducted a survey to assess the perception of school earthquake risk among parents of San Francisco school children. Appendix G describes the procedure used for the survey, lists the survey questions, and presents the survey results in detail.

This survey, completed by more than 300 parents whose children attend over 50 San Francisco schools, found the following:

- 51 percent of parents responded that they believe that public, private, and charter schools are currently held to the same standards for earthquake safety. 22 percent thought these types of schools are held to different standards, and 27 percent were unsure about how standards for different types of schools compare. These responses suggest that parents are largely unaware that private school buildings have historically been held to lower earthquake-resistant building standards than public schools.

- 59 percent of parents responded that they thought San Francisco school buildings would be either "very safe" or "safe enough" in the event of an earthquake. 23 percent of parents thought schools were "not as safe as I would like," and 18 percent were "not sure" how safe schools are. These replies suggest that a strong majority of parents think schools are safe. Comments provided by survey respondents noted that information on this topic is not readily available to parents for either private or public schools.

- 60 percent of parents said that earthquake safety either "wasn't considered" or was of "low importance" in selecting their child's school. Numerous comments on this question indicated that parents assumed the City or the San Francisco Unified School District were addressing this issue, or stated that it had not occurred to them to consider this issue during the school selection process.

[24] Part of the rationale for requiring higher safety standards for public schools in California is that the government requires children to attend school, conferring duty to the government to ensure children are safe while they attend school. While children are required to attend school, attending a private school is optional.

Reasonable conclusions to draw from this survey are:

- A majority of San Francisco school parents think all schools are likely to be safe in future earthquakes.
- Most parents believe, incorrectly, that all types of San Francisco schools—public, private, and charter—are held to the same standards for building earthquake safety.
- Few parents consider earthquake risk when selecting a school for their child. Information on this topic is not accessible to parents.

For older existing buildings, responsibility for identifying and remedying any earthquake risks lies with the building owner and school operators.

Earthquake risk appears not to be a common topic of discussion among San Francisco school parents, although probably most parents know that San Francisco faces a high likelihood of future earthquakes. Members of the Working Group hypothesize that most parents in San Francisco assume that the City requires all San Francisco school buildings to meet strict earthquake safety standards and, thus, do not spend significant time or effort thinking about the earthquake safety of their children's school buildings. It was also suggested that, due to the competitive admissions process for many private schools, some parents might be hesitant to raise the issue with their school or during the application process, for fear of jeopardizing their child's admission or continued good standing at the school.

4.2 Responsibility for Private School Earthquake Risk

When a new private school is constructed in San Francisco, ensuring that the school building has adequate structural resistance to earthquakes is the responsibility of the project design team and the City's building code enforcement authorities. For older existing buildings, responsibility for identifying and remedying any earthquake risks lies with the building owner and school operators. Responsibility also lies with parents of the children who attend the school, who can raise this issue with school authorities if they have concerns. However, as suggested by the survey described above, it is possible that some parents, school authorities, and private school building owners may be unaware that they have this responsibility; they assume that the City requires school buildings to be safe in earthquakes.

Many private schools have a Board of Trustees that is responsible for school governance, including managing risks to the school community and finances. Earthquake risk can be managed in a number of ways, such as planning and preparing for emergencies, structural upgrades to facilities, and insurance. Insurance can reduce the financial risks of a school, covering the costs to repair or replace damaged school buildings and other facilities, helping a school to pay bills while tuition income is suspended due to temporary closure, and addressing liability payments. It appears that few San Francisco private schools carry earthquake insurance to cover damage to their buildings because it is

hard to obtain and expensive[25], and it is unknown how many schools are adequately insured to cover the types of financial losses or liabilities that might result from the extended closures and possible casualties an earthquake could cause.

Generally speaking, owners and operators of privately-owned buildings are liable for injury to building occupants, economic damages, and property damages if they did not act prudently to prevent such harm. Like all other building owners and operators, school boards have an obligation to assure the safety of students and other building occupants. The question of tort liability[26] for private building owners is determined on a case-by-case basis by a judge or jury based on the following standard: did the owner or operator of the building (that is, the person or entity having control over the facility) act as a reasonable person would have to prevent the harm? Many factors might be considered, including actual or imputed knowledge of the risk, cost to mitigate the risk, the expected degree of harm, timing of corrective actions, alternatives available to the owner and operator of the buildings, and the ability of building occupants to avoid the harm.

Large earthquakes in California are uncommon, but they can have devastating consequences when they occur. There is only one published case in California involving tort liability resulting from earthquake damage: *Myrick v. Mastagni.*[27] In 1989, the City of Paso Robles informed owners of the Acorn Building that the building was an unreinforced masonry building that was potentially hazardous. The City mandated that the building be retrofitted by 2008, but later extended its mandatory retrofit deadline to 2018. The San Simeon earthquake occurred in 2003, and two people were killed as they ran out of the Acorn Building. The jury ruled that the property owners were negligent, since they had not retrofitted the building with the diligence expected of a reasonable person, notwithstanding the City's mandatory retrofit deadline of 2018.

While the earthquake risk of existing private school buildings is the responsibility of school Boards of Trustees or other governance bodies and the building owners, the failure to mitigate that risk affect a wider group. Seismically hazardous private school buildings represent two broad categories of possible consequences. First is the risk posed by individual buildings to an individual school – to its students and staff, its financial resources, and its educational mission. Second is the risk posed by private school buildings as a group to the City and County of San Francisco. Extensive earthquake damage to the private schools will jeopardize the City's ability to provide emergency response and manage an effective recovery. If the private schools perform especially poorly, they would add immediately and disproportionately to the emergency load on first responders. During the recovery period, damaged private schools that otherwise might serve as neighborhood-supporting institutions, or even as emergency shelters, might be unable to fill those roles at a crucial time. Perhaps most significantly, if hundreds or thousands of private school students are unable to return

[25] The California Earthquake Authority, a public entity, ensures that all homeowners in California have access to earthquake insurance. It does not cover earthquake insurance for institutions, such as private schools. Few insurance companies offer earthquake insurance to institutions.

[26] This discussion relates to tort liability, that is, liability for a civil wrong or injury, rather than a criminal wrong, not related to a breach of contract. The liability system seeks to provide damages to the victim of that tort.

[27] 185 Cal App 4th 1082 (2010)

to damaged facilities, the public schools (which will likely be hampered by their own damage) might be unable to cover the surge in demand.

Chapter 5
Options to Address the Earthquake Risks of Private School Buildings

If the City of San Francisco decides that its private school buildings pose an unacceptable level of earthquake risk, there are a variety of ways the City could choose to address this risk. This chapter presents a range of options for the City to consider and discusses the expected advantages and disadvantages of each.

This report focuses on what the government of the City and County of San Francisco can do to improve the earthquake risk of private school buildings. This report does not focus on specific steps that schools themselves can take to reduce their risk, although many of the options described in this chapter could be pursued by a school on its own volition at any time. Further, this report does not focus on actions to reduce the seismic risk of public schools in the City (with the exception of public charter schools in buildings subject to the San Francisco Building Code), as those schools are not under the purview of the City government of San Francisco.

The possible actions the City could take vary in their effectiveness at reducing the risk, and in the cost and effort they would entail. Risk reduction approaches can be viewed as a continuum, as shown in Figure 5-1, beginning with options that merely raise awareness about the issue of earthquake risk in private schools but compel no action. On the other end of the continuum, there are actions that require schools to seismically retrofit their buildings. Each approach can be pursued in multiple ways, and in combination with other options.

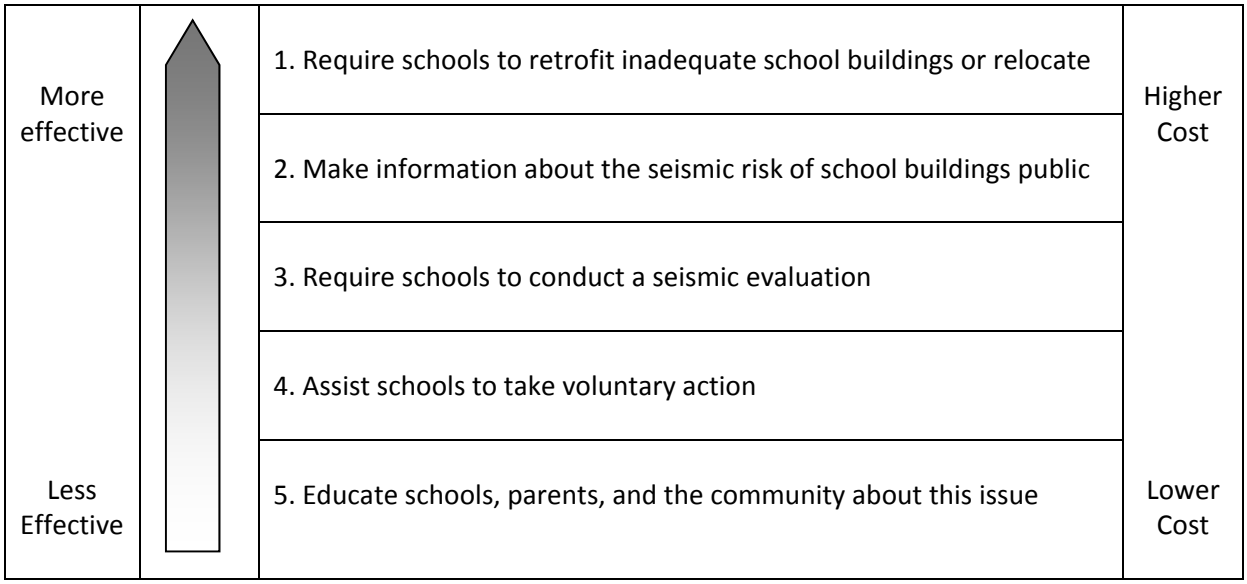
In weighing the pros and cons of each approach, the City should define an objective for San Francisco private schools as a group. Basic safety for every building is usually the minimum acceptable objective, but if the City's overall recovery plan will require schools to serve as shelters or community centers, or will rely on schools to be repaired and reopened on a tight schedule, even better performance might be needed from at least some buildings. Interestingly, these recovery objectives might be functions of nonstructural damage (e.g., damage to plumbing, heating, and lighting systems) as much as structural damage. Nonstructural performance was not considered by the AB 300 inventory of public schools and cannot be estimated from the data the Working Group used to assess San Francisco private schools.

Existing and approved City plans, programs, and publications relating to earthquake risk state a number of relevant goals and policy objectives. The *Earthquake Safety Implementation Program Workplan*[28] outlines a 30-year program for the City to increase its resilience to earthquakes. This workplan includes Task B.3.a, which calls for a mandatory retrofit program for all K through 12 private schools up to a standard that is equivalent to public school construction standards. The Earthquake Safety Implementation Workplan is based on the community-developed plan presented in *A Community Action Plan for Seismic Safety*, the result of a multi-year research and outreach

[28] ESIP, 2011.

process. Both efforts support other existing City policies, including the objectives articulated in the 1986 Proposition M Priority Policies, the General Plan, and the Community Safety Element.[29]

Figure 5-1. Continuum of actions that could be taken to reduce earthquake risk of buildings.



5.1 Option One: Educate Schools, Parents and the Community About this Issue

This approach involves informing schools, parents, and the community in general about potential earthquake risks to the City's private schools. It places no mandates on schools to take any action, but operates on the assumption that informing schools about earthquake risk might compel some schools to make informed decisions about the risk to their buildings, students, and staff. It could also motivate school parents to lead efforts to learn about and remedy earthquake risks in their child's school. The awareness efforts described in this option would be about earthquake risks to the private school building stock as a whole, and would not focus on risk to individual school buildings. This is because detailed information about the seismic risk of individual private school buildings is not currently publicly available for most schools.

This approach could take the following forms:

- *Take no further action.* The City has the option to take no further action beyond the development and publication of this report.

- *Publicize this report*. This report collects and analyzes information about the earthquake risk of private school buildings that was not previously available. The City could work to make sure the findings of this report are widely known by publicizing the report through the media, making the

[29] ATC, 2010a.

report easily accessible to the public, encouraging schools and parents to read the report, sending the report to all private schools in the City, and/or conducting its own outreach efforts.

- *Develop educational materials based on the findings of this report*. This report is written in a technical style for a sophisticated reader. The City could develop simple, clear community outreach materials based on the findings of this report and use them to educate schools, parents, and the community.

- *Inform schools of community resources on earthquake preparedness*. The City could partner with community organizations that focus on earthquake mitigation or disaster preparedness to encourage schools to reduce their earthquake risk in various ways. This could include organizations such as the Red Cross, which has a Ready Rating™ program to assist schools with emergency preparedness. It could also point schools toward existing information sources about evaluating the seismic risk of buildings, retrofitting buildings, or identifying or addressing nonstructural earthquake risks.

While Option One places the least burden on schools, it would be expected to be the least effective at reducing the seismic risk of San Francisco's private schools of all of the options presented.

Because this option does not require any action of schools, it would not impose any financial costs on schools. The financial costs to the City could vary depending on the ambitiousness of any outreach program the City might undertake, ranging from no costs to the City to whatever budget the City deems appropriate for this activity.

While this option places the least burden on schools, it would be expected to be the least effective at reducing the seismic risk of San Francisco's private schools of all of the options presented, as discussed in Section 5.6.

5.2 Option Two: Assist Schools to Take Voluntary Action

This approach involves providing incentives and technical resources to help private schools take action to reduce the seismic risks of their buildings, but it stops short of requiring schools to take any action. This is one step further than the options presented in Section 5.1. These types of incentives could be pursued on their own, or they could be paired with any of the other options presented, including mandatory evaluation or retrofit.

This approach could take the following forms:

- *Offer low interest loans*. The City could offer low interest loans to private schools that undertake seismic retrofits. There are a variety of mechanisms the City could use to provide such loans, with varying costs to the City and advantages to the borrowers. For the City's unreinforced masonry retrofit mandate, voters approved a bond to provide subsidized loans to owners of

unreinforced masonry (brick) buildings.[30] For the City's wood-frame soft-story residential building retrofit mandate, the City worked with numerous financial institutions, including private banks, credit unions, and non-profit lenders, to develop a comprehensive financing package for building owners. Also, the City is offering a public financing option through the City's existing Green Finance Program, in recognition that extending the life of a building by enabling it to survive earthquakes is generally more sustainable than building a new building.[31]

- *Offer permit or impact fee waivers*. The City could waive building, planning, or other permit or development impact fees for private schools that choose to undertake seismic retrofits or replace seismically inadequate buildings. These fees can sum to several thousand dollars or more, depending on the work that is being done. The City has waived selected permit fees for voluntary seismic retrofits in the past. Most recently, the City waived plan review fees and offered expedited plan processing for voluntary retrofits of wood-frame soft-story residential buildings.[32]

- *Provide technical standards for school seismic evaluation and/or retrofit*. The City could develop clear technical standards for what it deems to be an acceptable way to evaluate the earthquake risks of a private school building. It could also develop clear technical standards for what is considered an appropriate seismic retrofit for private school buildings constructed with various structural systems. Existing technical standards could be adapted for both of these purposes; the Division of the State Architect took this approach in a recent program to assist public schools considering retrofit.[33] These activities would provide clarity to engineers and schools about how the City defines seismic evaluation and retrofit. These standards could also be used to provide exemptions from future mandates, meaning that schools that voluntarily evaluate and/or retrofit their buildings using the City-defined standards could be exempted from any future evaluation or retrofit mandates that are enacted in a specific time period. For example, the City exempted any wood-frame soft-story buildings that voluntarily retrofitted to specified technical standards from any retrofits mandates enacted in the next 15 years.[34]

- *Provide training*. The City could offer training seminars on a variety of relevant topics, including private school earthquake risk in general, how to evaluate a school for seismic risk according to

[30] In 1992, San Franciscans passed a bond measure to offer loans for mandated retrofits to unreinforced masonry buildings. Most of the funds were intended for market rate loans (7.5 percent rate), and part of the funds was for low-interest loans (2.5 percent rate) for qualified buildings housing low-income tenants. Very few building owners took advantage of the market rate loans, but the low-interest loans provided a useful source of financing for some affordable housing upgrades. Some building owners have stated that they chose not to seek these loans because there were complex conditions attached to the loans, and it was easier and more cost-effective to deal with commercial lenders (Samant and Tobin, 2008).
[31] ESIP, 2013. The City's Green Finance Program is part of the statewide Property Assessed Clean Energy (PACE) financing program, in which property owners pay back a loan through their property tax bill.
[32] DBI, 2010.
[33] DSA, 2011.
[34] DBI, 2010.

the City's standards, financing for school retrofit or replacement, reducing nonstructural earthquake risks, and other topics. Such training sessions could be aimed at schools, parents, building professionals, or others. One option would be for the City to request training from the Federal Emergency Management Agency's National Earthquake Technical Assistance Program. If approved, FEMA covers many of the costs. FEMA offers a training session associated with its publication *Earthquake Safety and Mitigation for Schools.*[35]

- *Provide City resource staff*. The City could allocate staff to assist schools in a variety of ways. Resource staff could be made available to answer questions from schools and point them toward available resources from the City or others. Appropriate City staff could be directed to answer technical questions from schools about the risk of their buildings, or even to conduct basic seismic evaluations of school buildings. The City could engage outside contractors to serve as a resource for schools in a variety of ways.

- *Reprint the Private Schools Building Safety Act in the San Francisco Building Code*. In 1986, the State passed the Private Schools Building Safety Act, which defines engineering standards required for new construction and major renovations of all private schools in the State. However, these standards appear in the California State Education Code. Architects and engineers designing or retrofitting a school and building officials evaluating those plans are not used to referring to the State Education Code. San Francisco could reprint the relevant sections of the State Education Code in the San Francisco Building Code as a note in the amendments. This would assist all new private school construction and renovations of existing private schools in San Francisco to meet State law.

- *Strengthen requirements for new private school construction*. San Francisco could make changes to the code requirements governing design and construction of private schools in the City to bring them closer to requirements of the Field Act. For example, the City could require a licensed structural engineer be involved, or could require more rigorous plan checking or construction inspections. One straightforward action that could be taken would be to revise Table 1604.5 in the San Francisco Building Code. This table assigns schools with 250 or more expected occupants into Risk Category III, which requires higher design standards for earthquake shaking. The table could be revised to assign all K through 12 schools, regardless of the number of occupants, to Risk Category III. In a large earthquake, there is a significantly increased probability that a building designed for Risk Category II would experience damage that could threaten lives than a building designed for Risk Category III.[36]

Because this option does not require any action of schools, it would not impose any financial costs on schools. The financial costs to the City could vary depending on the approach pursued and could be

[35] FEMA, 2003.

[36] ASCE 7-10 Table C1.3.1b indicates a 25% chance of failure that could endanger individual lives for a Risk Category II building in the Maximum Considered Earthquake, as defined in that document. This chance is 15% for a Risk Category III building.

significant for some of the alternatives. However, all of these options would be likely to have limited effectiveness in reducing the earthquake risk of private school buildings, as discussed in Section 5.6.

5.3 Option Three: Require Schools to Conduct a Seismic Evaluation

This option requires schools to hire an engineer to conduct a seismic evaluation of their facilities. This action informs school administrators and the City about the earthquake risks of the buildings and campuses of private schools in San Francisco. This information might motivate some schools to take action to reduce the risk of school buildings and would allow schools to consider earthquake risk in their long-term capital planning activities. Evaluation results would also inform City policy and emergency planning. In some cases, evaluations would show that a school building has adequate earthquake resistance; in other cases, evaluations might identify buildings that are highly deficient.

This approach could take the following forms:

- *Require owners of school buildings to conduct evaluations of the earthquake risks posed by their buildings*. The City could require all owners/operators of private school buildings to hire a structural engineer or other qualified building professional to conduct an evaluation of the seismic risk of the school's buildings and campus. The City would, first, need to define a technical standard for the evaluation, so that all schools were evaluated in the same way. The evaluation could focus only on structural issues, or it could also assess nonstructural earthquake risks. Schools that were recently built or retrofitted according to standards recognized by the City could be exempted from this requirement. Schools could opt out of this requirement by conducting a seismic retrofit or replacing the building, instead. Possibly only buildings of a certain size, age, or use would be subject to the mandate. Possibly the evaluation, instead of being mandated right away for every school, would be triggered by an alteration, a license renewal, or other activity. Note that the California Education Code definition of a "Private School Structure" is "any building used for educational purposes through the 12th grade by 50 or more persons for more than 12 hours per week or 4 hours in any one day."[37] This could be one criteria for defining which buildings to evaluate; the City could also define other criteria. Other communities have required various types of buildings to be evaluated for their seismic risk. As a recent example, the City of Berkeley required approximately 300 owners of suspected wood-frame, soft-story buildings to hire engineers to conduct seismic evaluations.[38]

- *Require or encourage schools to participate in a BORP program*. The San Francisco Department of Building Inspection operates the Building Occupancy Resumption Program (BORP). BORP allows building owners to engage a structural engineer prior to an earthquake who will inspect their buildings or facilities to determine if they are safe enough to occupy after

Requiring schools to know about the risk of their buildings does not by itself make students or staff members safer in future earthquakes.

[37] California Education Code Section 17323(c)
[38] City of Berkeley, 2013.

significant earthquakes. The program is intended for building owners who value uninterrupted occupancy in their buildings, and could enable such owners to speed their recovery after an earthquake. The BORP program involves conducting a detailed assessment of each building prior to an earthquake. There are also annual update and renewal activities required for BORP participation.[39] Private schools could either participate in DBI's current BORP program (which is geared toward large commercial buildings) or the City could develop a similar program tailored to school facilities.

A number of schools rent the buildings they occupy. Some schools are tenants in a building with many different occupants that are not schools. Presumably, a mandated evaluation of the building would be the responsibility of both the building owner and the school occupying the building, and may vary based on the rental agreement. It is possible that any mandate on private schools would discourage building owners from renting their space to private schools or could motivate evictions. While this outcome would be undesirable, the State restricts commercial rent control, which could impede the City from mitigating this possibility.[40]

This approach would impose costs on private schools. The cost of a seismic evaluation would vary depending on many factors, including the following:

- The size and complexity of a school campus, including the number and types of buildings and other structures;
- The way the evaluation standard is defined and what it requires an engineer to do, whether it includes nonstructural risk assessment, geologic hazards, schematic retrofit approaches, etc.;
- Whether a school has reliable structural drawings of its buildings;
- Whether destructive investigations or testing are needed; and
- Whether the City would impose a review fee for approval of the submitted evaluation report.

Due to the wide variety of school building types and possible evaluation criteria, it is not possible in this report to estimate the costs of seismic evaluations for San Francisco private schools. However, the cost of an evaluation would be significantly lower than the cost of a seismic retrofit or replacement of a building.

This approach would also have costs for the City. The City's Earthquake Safety Implementation Program would need to develop a program and would likely need additional staff to oversee this program. City staff or outside contractors would be required to review evaluations from the schools to ensure that they meet the City's standards. Again, due to the variables depending on the type of program enacted, it is not possible to estimate costs at this time.

If the City requires owners of private school buildings to conduct and submit evaluations of the seismic risk of their buildings and campuses, the results would be public information. This means

[39] DBI, 2013.
[40] Civil Code Section 1954.25 through 1954.31.

that the media or any member of the public could request the information and the City would be required to provide it.

The benefit of an evaluation program depends entirely on how the parties use the evaluation findings. The City could use the results of a mandatory evaluation program to enhance its understanding of potential losses, to improve response and recovery plans, and to inform public policy initiatives. Individual schools, however, might or might not take action in response to the evaluation. As discussed in Section 5.6, mandatory evaluation programs focused on other types of buildings have been found to motivate slightly higher rates of seismic retrofits than awareness programs and technical assistance programs. However, requiring schools to know about the risk of their buildings does not by itself make students or staff members safer in future earthquakes.

5.4 Option Four: Make Information About the Seismic Risks of School Buildings Public

This approach is focused on disseminating information about the earthquake risks of specific school buildings. This approach can only be taken when there is accurate, building-specific information to disseminate. The purpose of this approach would be to ensure that the findings of seismic risk evaluations of schools are known to parents, staff, potential school applicants, and others. Dissemination of these findings could encourage more aggressive actions by schools to address any deficiencies. It would also ensure that all occupants and parents of occupants of at-risk school buildings are knowledgeable about their risks and can consider them in decision making.

This approach could take the following forms:

- *Post information on a City website*. The City could compile the results of all private school evaluations in an online source. The City could ensure that the information was in a simple, non-technical form that is understandable to the general public. Parents, community members, school staff, and others interested in the results would be required to seek out the information on this website. As discussed in the previous section, the results of any mandated evaluations would be public information.

- *Develop and apply a rating system to schools*. School evaluation results could be interpreted through a rating system. This could be similar to the Food Safety Scores currently evaluated by the San Francisco Health Department for restaurants and cafes in the City. A rating system could make it easy to communicate evaluation results to the public, although some nuances of the evaluations might be lost. Some existing groups are developing seismic rating systems for buildings that could be adapted for this use, but the structural engineering community has not yet developed consensus on a standard rating system.

- *Require schools to post placards on at-risk buildings*. Schools could be required to post placards on buildings that are found to pose unacceptable risks. These placards would inform people entering the building of the potential risks in an earthquake. The California Seismic Safety Commission conducted surveys on the use of placards associated with the State law on

unreinforced masonry buildings. The Commission found that only six percent of jurisdictions in areas with high seismic risk reported that placards made an impact in their community, suggesting that they are a relatively ineffective way to disclose risks.[41] However, placards on schools might be more effective than placards on other types of buildings because parents have low risk thresholds for their children, and enrollment in private schools is optional.

- *Require schools to inform parents and/or potential applicants directly*. Schools could be required to inform parents, staff, and/or potential applicants directly about the earthquake risks of their buildings. This could be done in a number of ways, such as annual letters, a notice on the school website, or upon request. The City of Berkeley required owners of presumed wood-frame soft-story buildings to conduct an evaluation of seismic risk and send letters to all of the building tenants informing them that the building was on Berkeley's soft-story inventory and may not be safe during earthquakes. Berkeley also required owners of these buildings to post notices at their entrances.

The actions listed above could impose small direct costs on both the City and schools. These actions would increase the awareness of parents, students, staff, and others about the earthquake risk of specific schools. However, as discussed in Section 5.6, they are likely to be only marginally more effective at motivating schools to undertake measures to improve at-risk buildings than requiring a mandatory evaluation with no disclosures.

5.5 Option Five: Require schools to retrofit, replace, or discontinue use of inadequate school buildings

This approach requires schools that have buildings with unacceptable seismic risks to seismically retrofit those buildings or to discontinue their use. This approach would ensure that all private school buildings in San Francisco have an acceptable level of safety and resilience in future earthquakes.

This approach could take the following forms:

- *Require owners of private school buildings to seismically retrofit or discontinue use of inadequate school buildings*. First, owners of private school buildings would need to conduct an evaluation of their seismic risks, as discussed in Section 5.3. Then, the City would need to define what level of risk was unacceptable and would require a seismic retrofit or that use of the building be discontinued. This mandate could be applied in various ways. For example, the City could require only those school buildings with the most egregious life safety risks to retrofit, or the City could require retrofits for all schools that do not meet a higher standard, such as the standards in the Private Schools Building Safety Act. Possibly, only buildings of a certain age, size, use, or relevance to the City's resilience goals would be subject to the mandate. The City would need to define technical retrofit standards, which could be more or less stringent. Then, the City would

[41] Turner, 2013.

need to establish deadlines for schools to meet these standards or to demolish or discontinue the use of the building. Enforcement mechanisms would be required, as for any mandate. The City has mandated seismic retrofit of at-risk building before, most notably through its unreinforced masonry building program and the residential wood-frame soft-story retrofit program, and could use those experiences to develop this type of program. Other State programs requiring retrofits of institutional buildings could also provide insights.

- *Develop more aggressive retrofit triggers based on additions, alterations, and repairs*. Retrofits can be classified as voluntary, mandatory, or triggered. Retrofits required by the building code for major alterations and other projects are triggered. The current code only triggers seismic retrofits in rare cases. The City could draft more aggressive retrofit triggers specifically for private school buildings of a certain size, age, structural system, or use. Triggered retrofits might be viewed as less onerous than a mandatory retrofit. On the other hand, triggers can have the unintended effect of discouraging building maintenance and modernization, if owners would be required to retrofit in concert with these types of upgrades.

Past experience shows that successful mandatory retrofit programs share a number of common characteristics: involvement of all affected parties in analysis and planning; reasonable expectations and standard requirements that provide a level playing field; sufficient time to plan for and implement upgrades; support from City policymakers and agencies; and viable financing options.

Again, many schools rent their buildings. It is possible that any mandate on private schools would discourage building owners from renting their space to private schools or could motivate evictions. State law limits what the City can do to address this concern.

This option would be most effective at reducing seismic risk and improving the safety and resilience of private school buildings of all options presented in this chapter. In fact, this approach is the only way to ensure that all children attending San Francisco private schools use buildings that are likely to be safe in future earthquakes. However, it is impossible to eliminate all risk and, even after retrofit, buildings continue to pose some level of earthquake risk to their occupants.

This approach would also place the heaviest financial burden on schools and building owners that lease to schools. Seismic retrofits can vary significantly in scope and cost. Because school buildings can be large and complex, some seismic retrofit projects can be quite expensive. A seismic retrofit mandate could lead to school closures in some cases. Merging of schools with similar missions could be one way to mitigate effects of this type of policy. Schools that serve lower-income or special needs populations might have the most difficulty finding adequate funds for retrofits. These adverse impacts could be somewhat reduced if a City program provided adequate time for schools to plan and fundraise for seismic retrofit work. As discussed in Section 5.2, the City might be able to assist with financing for seismic retrofits or provide help in other ways. While expensive in the short-term,

seismic retrofits are typically a good investment over the long-term and more than pay for themselves in reduced repair or replacement costs after a damaging earthquake.[42]

Seismic retrofits, like all major construction projects, can significantly disrupt ongoing school activities. Schools may be required to find alternate space to teach students during the course of the retrofit work, which can be challenging in San Francisco.

5.6 Effectiveness of Previous Seismic Risk Reduction Programs

Building owners choose to act, or not to act, to reduce the earthquake risk of their buildings for a range of reasons. City policy affects those decisions, with certain types of policies being more effective than others at motivating building owners to undertake action to reduce risk.

Some of the reasons that owners of at-risk building choose to undertake seismic retrofits include the following:[43]

- A desire to keep people who occupy the building safe.
- A desire to keep the building operational after earthquakes. The benefits might include the ability to continue collecting rents and/or keep a business operational.
- A desire to keep inventory and/or equipment from being damaged.
- Concern about potential liability if inadequate action is taken.
- A requirement to act by a property or liability insurance company, and/or reductions in insurance premiums due to action.
- Involvement in an active risk management program promoted by a company or an insurance company.
- A requirement to act due to a government mandate.
- A desire to present a responsible public image, and concern about looking irresponsible after an earthquake if no action is taken.
- Desire to use hazard mitigation to promote an image.
- A desire to do the right thing.
- The efforts of an individual, such as a staff member, a member of the board of directors, a person working in the building, or the owner of a similar building, who acts as an advocate.

Some of the reasons building owners choose not to act to reduce the risk of their building include the following:

- Concerns about costs.
- Lack of ability to obtain funds required to do the work.
- A lack of concern about earthquakes.
- Belief that their building is safe, otherwise someone from the government would have informed them of the risk.
- Lack of knowledge about what to do.

[42] CalEMA, 2011.
[43] Adapted from Perkins and Moy, 1984, Perkins et al., 1999, and Rabinovici, 2012.

- Lack of time to figure out what to do to fix a problem.
- Low prioritization, in terms of schedule or funding.
- Choice to carry insurance to offset building risks.
- Concern about interrupting activities currently occurring in the building.
- Concern about triggering other mandated actions, such as compliance with disabled access requirements.
- Concern about increased liability if risks are identified and not addressed.

The results of past programs can provide insights about the likely effectiveness of various approaches at reducing the earthquake risk of older buildings. Three relevant programs are examined below as case studies.

The California Unreinforced Masonry Retrofit Law: In 1986, the State passed a law requiring communities to develop local programs to reduce risk in unreinforced masonry (brick) buildings. Local governments were required to inventory all unreinforced masonry buildings in their jurisdiction, notify the owners that their building is a type that performs poorly in earthquakes, and adopt a risk reduction program. Many communities, including San Francisco, elected to require owners of unreinforced masonry buildings to retrofit them. Other communities left seismic retrofits as voluntary. The State has compiled statistics on the effectiveness of various types of programs at reducing the number of at-risk buildings through retrofits or demolitions, with findings presented in Table 5-1.[44]

Table 5-1. Rates of retrofit or demolition of Unreinforced Masonry Buildings (URMs) in California communities with various types of risk reduction programs[44].

	Mandatory retrofit	Mandatory evaluation	Notification only	Other programs[A]
Percent of URMs retrofitted or demolished	87%	24%	13%	26%
Number of communities with this type of program	134	39	46	41

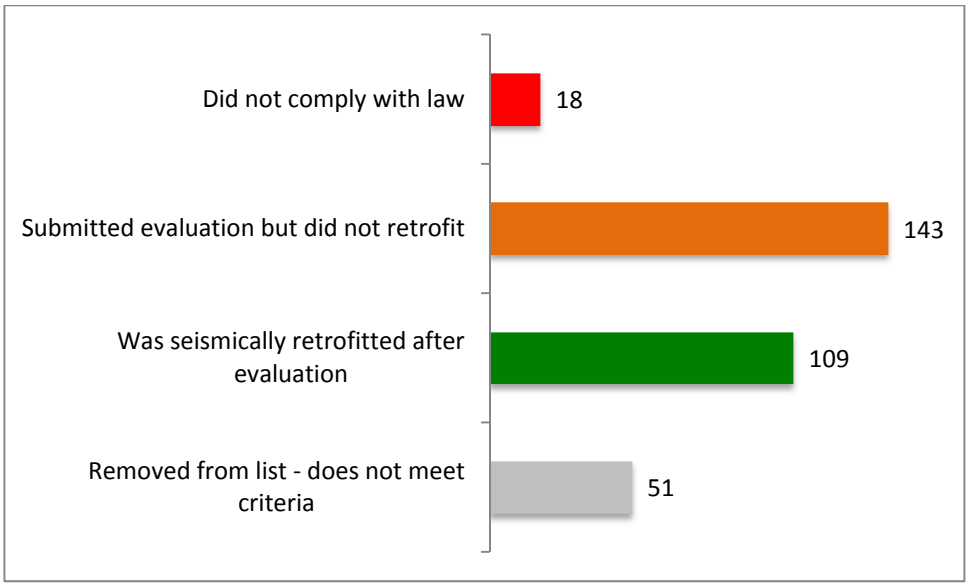
A. *Other programs* are variations of the other program types with unique requirements and ranges of effectiveness.

The City of Berkeley Mandatory Wood-Frame Soft-Story Evaluation Program: In 2005, the City of Berkeley passed a law requiring each owner of a building on a list of suspected soft-story wood-frame buildings to hire engineers to evaluate the risks of their buildings. The City has tracked how many of these buildings have complied with the law, and how many have decided to conduct a

[44] CSSC, 2006.

voluntary seismic retrofit, with results shown in Figure 5-2.[45] As of July 2013, the City found that 40 percent of the soft-story buildings on its inventory have undergone voluntary seismic retrofits after a mandatory seismic evaluation (calculation: 109/(321-51) = 40%).

Figure 5-2. Status of 321 wood-frame buildings on City of Berkeley's Soft-Story Inventory[45].



The City of San Francisco Voluntary Wood-Frame Soft-Story Retrofit Permit Fee Waivers: In 2010, San Francisco passed an ordinance that waived selected permit fees for owners of wood-frame soft-story buildings who chose to conduct voluntary seismic retrofits. According to data from the San Francisco Department of Building Inspection, approximately 57 buildings were seismically retrofitted under this program.[46] Thousands of buildings in San Francisco were eligible for this retrofit benefit, but very few took advantage of it. It is unclear how many building owners were aware of the program.

While each of these programs is different, in general terms they indicate the following:

- Informing buildings owners in general terms that their building type may pose elevated seismic risks and/or providing incentives for seismic retrofits motivates only a small number of building owners to address that risk.
- Requiring building owners to evaluate the seismic risk of their buildings and to disclose that risk to various degrees motivates a slightly larger number of owners to take action to reduce the risk of their buildings.
- Mandating seismic retrofits or discontinued use of buildings is by far the most effective way to reduce the seismic risk of vulnerable buildings.

[45] City of Berkeley, 2013.
[46] Otellini, 2013.

Chapter 6
Working Group Recommendations

Based on the materials presented in this report, the Working Group finds the following:

- Historically, private school buildings in San Francisco have been held to less stringent structural standards than public school buildings.

- As a result, more than half of San Francisco private school buildings either have characteristics that indicate they might perform poorly in future earthquakes, or information is not available to the City about the characteristics that indicate seismic performance. This compares to only 12 percent of San Francisco public school buildings that have characteristics that indicate poor performance in future earthquakes.

- Parents of San Francisco school children are largely unaware that private school buildings are likely to perform more poorly in future earthquakes than public school buildings. Most parents believe that government requires all schools to be safe in earthquakes.

- Parents, students, and staff of private schools currently have no way to know whether their school is safe or likely to be damaged in future earthquakes unless the school has conducted its own voluntary study and elected to share the findings.

- Private schools are not a homogeneous category, and the wealth of the school community varies dramatically among schools. A number of schools are very small, serve students with special needs, and/or may rely on some type of public funding.

- Since approximately one-third of San Francisco school children attend private schools, the risk of earthquake related damage to private schools in the City threatens the resilience of the entire City. For the City to recover quickly after future earthquakes, children need to be in school. The public school system, presumably, would find it challenging to absorb the number of additional children who might be displaced by damaged private schools that need to close for an extended time after earthquakes.

The Working Group developed the recommendations in this chapter through a consensus-based process conducted over approximately twelve months. These recommendations focus on what the government of the City and County of San Francisco can do to reduce the earthquake risk of private school buildings. The recommendations do not focus on specific steps that schools themselves can take to reduce their own risk, nor on actions to reduce the seismic risk of public schools in the City.

The recommendations in this report are guided by the following principles:

- San Francisco will experience strong and damaging earthquakes in the future.

- Society has a special duty to safeguard children. Ultimately, all of San Francisco's schoolchildren should attend school in buildings that are likely to perform well in earthquakes.

- Parents, children, and staff of schools do not have the wherewithal to figure out which schools are seismically safe. Instead, that responsibility belongs to the government agencies that regulate building safety and the owners and operators of school buildings.

- Private school buildings and public school buildings, ideally, should meet equivalent standards for seismic safety. The history of unequal building standards for public and private school buildings, however, makes it difficult to achieve equivalent safety and reliability today.

- Addressing the earthquake risks of school buildings is challenging and potentially expensive and disruptive to schools. Before mandating any structural upgrades, it is critical for the City to have better information about the earthquake risks of private school buildings.

6.1 Primary Recommendation: Mandatory Seismic Evaluations of Private Schools

Applying these principles, the Working Group recommends a program of mandatory evaluations of private school buildings as described in Section 5.3. The information about private school building risk presented in this report, though never before compiled, is not enough to justify an expensive and disruptive program of mandatory seismic retrofits at this time. It does, however, raise red flags about private school building risk. More and better information is needed, and it will only come from a mandatory evaluation program.

Specifically, the Working Group recommends that the City and County of San Francisco require the following:

(1) The San Francisco Building Code should be amended to require all private school and charter school buildings to be seismically evaluated. This mandate should apply to all schools serving any of grades K through 12 operating in buildings that are regulated by the San Francisco Building Code. Exemptions for certain conditions should be considered, but in general all buildings and non-building structures, such as retaining walls or covered walkways, on the parcel occupied by the school should be evaluated, regardless of occupant load or hours of use per day. This includes all buildings on the campus that are used by students, even if their primary purpose is not educational. This evaluation should be conducted under the specific supervision of a licensed structural engineer.

(2) This evaluation should identify the following items, with respect to an earthquake hazard to be specified in the evaluation protocol:
    a) buildings and other structures that pose unacceptable collapse risks,
    b) non-structural components that pose substantial life safety risks,

c) the likelihood of each building being usable prior to repairs, and
d) information about the pre-earthquake use and occupants of each building.

The City should develop an evaluation protocol within nine months of the receipt of this report.

(3) The legislative process for this ordinance should be initiated within three months of the receipt of this report. All evaluations should be completed within three years of the effective date of the ordinance. Evaluations should be submitted to the Earthquake Safety Implementation Program, which should work in partnership with the Department of Building Inspection to review evaluations and administer this program.

(4) The City should develop training, outreach, and assistance programs to help school building owners and operators to comply with this mandate.

(5) The Earthquake Safety Implementation Program should post a report online with the findings of the evaluations in a simple format that is easy for the public to understand, which will be updated if schools submit proof that they have made relevant changes to their buildings or campuses.

(6) The Earthquake Safety Implementation Program should analyze the results of the required evaluations with respect to emergency response plans, earthquake resilience and recovery goals, and related public policy issues, working with the San Francisco Unified School District and other City and County Departments as needed.

6.2 Additional Important Recommendations

The Working Group recommends that the City and County of San Francisco pursue these additional important activities:

- All private schools should be encouraged to evaluate the non-structural and contents hazards in their schools and to remedy all potentially dangerous conditions. The City should explore adding evaluations of non-structural earthquake risks to the annual fire inspections of private schools conducted by the City. Reducing non-structural and contents risks can be a low cost way to save lives and reduce injuries in future earthquakes. There are a number of publications specifically geared towards reducing non-structural seismic risks in schools, such as *Guide and Checklist for Nonstructural Earthquake Hazards in California Schools*[47], that could help this effort.

- The City should offer incentives to encourage private schools to retrofit or replace inadequate buildings. These should include reduced or waived development impact fees when a school building is being retrofitted or replaced due to seismic risk concerns. More resilient private school buildings are a key part of a more resilient City, and this small investment by the City would pay for itself after earthquakes.

[47] OES, 2003.

- The City should explore a future ordinance mandating all private school buildings that are found to be unsafe or to pose unacceptably high earthquake risk to conduct seismic retrofits or to discontinue use of the building. The mandatory evaluations recommended in the previous section would provide a lot of information to the City about the urgency of the earthquake risk of private schools, the effort to retrofit or replace at-risk schools, and the likely costs of a mandatory retrofit program. The City should examine all of these issues to decide if and when a mandatory retrofit program for private school buildings makes sense.

- All private schools should be informed of the City's Building Occupancy Resumption Program (BORP) and should be encouraged to participate. The City's BORP program is focused on quick recovery after earthquakes. Everyone benefits when schools reopen quickly after an earthquake.

- The City should encourage the San Francisco Unified School District to adopt an evaluation program similar to the private school evaluation program recommended in this report. The results of those evaluations should be made available to the public. The school district has done significant work to evaluate and upgrade its buildings. It should publicize its work, and continue those efforts for schools that have not yet been addressed. It would be ideal if parents had access to similar information about the earthquake risk of all public and private school buildings in the City.

- San Francisco should reprint the code language from the Private Schools Building Safety Act in the State Education Code into the San Francisco Building Code as a note in the amendments. This would assist new private school construction and renovations of existing private school buildings to meet State law. This is essentially a no-cost activity.

- The City should consider additional seismic retrofit triggers for private schools undergoing certain additions, alterations, or repairs. The current triggers require seismic upgrades in only limited situations. Triggering seismic upgrades in more situations might be an effective way to improve school buildings that is less onerous than a mandatory seismic retrofit program.

- The City should revise Table 1604.5 in the San Francisco Building Code. This table assigns schools with 250 or more occupants into Risk Category III, which requires higher design standards for earthquake shaking. The table should be revised to assign all K through 12 schools, regardless of the number of occupants, to Risk Category III. This change would largely affect new private school construction.

- The City should amend its building code to revise the California Education Code's definition of "private school structure" as it applies to private schools within San Francisco. In addition the City should consider advocating for a change to the State code. Currently, a private school structure is defined as "any building used for educational purposes through the 12th grade by 50 or more persons for more than 12 hours per week or 4 hours in any one day." The definition

should be revised to include buildings used for more purposes, by fewer persons, and less frequently in order to capture conditions common to a large majority of the City's private schools.

- The findings of this report should be disseminated to San Francisco private schools, parents, and the community. Currently, these groups are largely unaware that private school buildings likely face higher seismic risks than public school buildings.

Appendix A: Process of Private Schools Earthquake Safety Working Group

The Private Schools Earthquake Safety Working Group officially began meeting in January 2013, and held ten public meetings. Prior to this, a small number of planning meetings were held to determine how to structure the Working Group and to identify the Working Group objectives.

Multiple efforts were made to reach out to all private schools in San Francisco to inform them of the Working Group's activities and to invite them to participate in meetings or to provide input through other means. This included researching active contact information for all schools known to the Working Group.

The Working Group met on the following dates:

- January 17, 2013
- February 28, 2013
- March 28, 2013
- April 25, 2013
- May 16, 2013
- July 18, 2013
- August 15, 2013
- September 19, 2013
- October 17, 2013
- December 12, 2013

All meetings followed public noticing requirements and were open to all members of the public. Meeting agendas and minutes were posted online on the Earthquake Safety Implementation Program website (www.sfcapss.org).

Research about private school buildings in San Francisco was conducted by a subcommittee of structural engineers (discussed in more detail in Appendix E). Other topics were researched by inviting expert guest speakers and by reviewing relevant publications and other sources.

Appendix B: Status of San Francisco Unified School District Buildings on AB 300 List

This appendix presents information about the San Francisco Unified School District school buildings that appear on the State AB 300 List of public school buildings with potential seismic safety deficiencies. Table B-1 shows the status of the buildings on the AB 300 list that are currently serving as San Francisco public schools. It does not show the district schools on the AB 300 list that have been demolished, sold, or are being used as non-school administrative buildings. The names of the schools in the table reflect current school names; some school names are out of date on the State AB 300 list and, thus, will not match the names in Table B-1. The information in this table was provided by the San Francisco Unified School District to the Working Group in November of 2013 (SFUSD, 2013). Funding for the evaluations and upgrades of San Francisco public schools came primarily from bond funds from Proposition A in 2003 and Proposition A in 2006. Funding for work on two schools came from the Mello-Roos fire and life safety parcel tax. Information is not currently available for San Francisco public school buildings that do not appear on the AB 300 list.

Table B-1. Status of San Francisco Unified School District public school buildings on AB 300 list.

School Name	No. of Buildings	Status
Chinese Ed Center	1	Evaluated, no upgrade needed
Creative Arts Charter	1	Structural upgrades completed
Daniel Webster Elem	1	Structural upgrades completed
Dr. Charles Drew Elem	4	Structural upgrades completed
El Dorado Elem	1	Evaluated, minor upgrades planned
Fairmount Elem	2	Structural upgrades completed
Francisco Middle	1	Structural upgrades completed
George Washington Carver	1	Evaluated, no upgrade needed
George Washington High	3	Upgrades done on pedestrian bridge/ stadium; classroom building and auditorium upgrades pending State funding
Glen Park Elem	1	Structural upgrades completed
Grattan Elem	1	Evaluated, no upgrade needed
Guadalupe Elem	2	Structural upgrades completed
Herbert Hoover	4	Not yet evaluated, not yet funded
Hilltop High School	1	Structural upgrades completed
Jefferson Elem	1	Structural upgrades completed
June Jordan and City Arts	1	Structural upgrades completed
Junipero Serra Elem	1	Structural upgrades completed
Lawton Alternative School	1	Evaluated, no upgrade needed
Leola M Havard Early Ed	1	Structural upgrades completed

School Name	No. of Buildings	Status
Longfellow Elem	1	First phase upgrades complete, second phase planned
Lowell HS	3	Upgrades complete for cafeteria and auditorium; classroom building upgrades planned.
Malcolm X Academy	1	Not yet evaluated, not yet funded
Marina Middle	4	Not yet evaluated, not yet funded
Marshall Elem	1	Not yet evaluated, not yet funded
Martin Luther King Middle	1	Structural upgrades completed
Monroe Elem	1	Evaluated, upgrades planned
Presidio Middle	3	Evaluated, upgrades planned
Rafael Weill CDC	1	Not yet evaluated, not yet funded
Rosa Park Elem	1	Structural upgrades completed
School of the Arts	5	Evaluated, upgrades planned
Starr King Elem	1	Evaluated, upgrades planned
Thurgood Marshall HS	5	Upgrades complete for gym and auditorium walkways; upgrades for classroom building pending
Visitacion Valley Elem	1	In assessment phase, will require minor upgrades
Visitacion Valley Middle	1	In assessment phase, will require minor upgrades
West Portal Elem	1	Structural upgrades completed
Yick Wo Alternative Elem	1	Demolished and replaced with new building

Appendix C: Detailed Comparison of Private Schools Building Safety Act and Field Act Requirements

This appendix reprints the bulk of Appendix A of the California Seismic Safety Commission publication *Seismic Safety in California Schools: Findings and Recommendations on Seismic Safety Policies and Requirements for Public, Private and Charter Schools* (CSSC, 2004). The reprinted table presents a side-by-side comparison of building code requirements for public schools governed by the Field Act and regulated by the Division of the State Architect (Title 24 of the California Code of Regulations) and those typically used for private schools (the Uniform Building Code). This comparison was made in 2004, referring to the code standards in effect at that time. A similar comparison made today would no longer reference the Uniform Building Code, but in any case, such a comparison would apply only to new schools being designed today. A comparison of the building codes applied to public and private schools built some time ago would vary, as each of the codes evolved over time. Indeed, if one were to compare the Field Act requirements with Uniform Building Code requirements from the 1970s or 1950s, when many existing San Francisco schools were designed and built, one would likely see even starker differences.

Field Act Title 24, CCR for Public Schools	Uniform Building Code for Private Schools
Administrative Requirements	
Design Professionals	
An architect or a structural engineer must be in general responsible charge of the design and construction.	In addition to an architect and structural engineer, a civil engineer is also allowed to be, in general, responsible charge of the design and construction.
Plan Approval Process	
Requirements for submitting the site data, geologic hazard reports, calculations, change orders are provided in detail. The process of reviewing, marking the plans, and verification of corrections are delineated.	Detailed requirements are not provided.
Inspection	
Continuous inspection by an inspector approved by DSA is required.	Periodic special inspection at construction milestones (i.e. before concrete placement, before covering structural framing, gypsum board inspection).

Field Act Title 24, CCR for Public Schools	Uniform Building Code for Private Schools
Verified Reports	
The inspector is required to provide a verified report under penalty of perjury attesting that the construction is in compliance with the approved plans and specifications based on personal knowledge provided by continuous inspection.	No similar report is required.
The architects, engineers, and contractors are required to provide a verified report under penalty of perjury attesting that the construction is in compliance with the approved plans and specifications based on periodic visits to the site and the reporting of others.	No similar report is required.
Structural Requirements	
Bleachers	
Additional details and inspection requirements above the UBC.	No similar requirements.
Dynamic Analysis	
A calculation is required to determine if an earthquake with a 10% probability of exceedance in 100 years would cause a collapse is required, in addition to the 10% in 50 years calculation of the design of a structural system.	The structural design to resist the forces for the 10% probability in 50 years earthquake is the same as Title 24, CCR. There is no similar 10% probability in 100 years collapse evaluation required.

Field Act Title 24, CCR for Public Schools	Uniform Building Code for Private Schools
Foundation Strength	
Additional requirements above the UBC for foundation and superstructure-to-foundation connections	
Elevators	
The design for stability of the elevator system is subject to additional requirements above the UBC.	
Classroom Floor Loads	
50 pounds per square foot.	40 pounds per square foot.
Seismic Importance Factor for Occupancy over 300	
I = 1.15	I = 1.00
Wind Importance Factor for Occupancy over 300	
I = 1.15	I = 1.00
Precast Concrete Walls	
Additional reinforcing is required above the UBC.	
Post-tensioned Precast Concrete	
Additional requirements for anchorages and couplers, lift slab construction, and flat slab construction are indicated.	

Field Act Title 24, CCR for Public Schools	Uniform Building Code for Private Schools
Expansion Anchors in Concrete	
Tension testing is required.	Testing not required
Bolts Embedded in Concrete	
Allowable loads are much smaller when the force on the bolt is directed towards the edge of the concrete. For example a 1-inch diameter bolt placed 6 inches from the edge would have an allowable shear value of 1,700 pounds.	A 1-inch bolt placed 6 inches from the edge would have an allowable shear value of 4,500 pounds.
Masonry Construction	
All cells filled solid with grout.	Optional based on stresses.
Wall reinforcing spacing 2 feet on center.	Wall reinforcing spacing 4 feet on center.
Masonry core testing required.	Not required.
Wood Construction	
Glue-laminated beams special inspection required.	Not required.
Gypsum sheathing board not allowed to resist lateral forces.	Gypsum sheathing board allowed to resist lateral forces.
"Conventional" wood framing design is not allowed: Project specific design required.	"Conventional" wood framing design allowed – Use of standard sizes and spacing of wood members for design.

Appendix D. List of San Francisco Charter Schools

This appendix presents a list of charter schools believed to be operating in San Francisco in 2013. This list was assembled from reviewing the San Francisco Unified School District website (http://www.sfusd.edu/) and other online sources.

- City Arts and Technology High School, Grades 9-12
- Creative Arts, Grades K-8
- The Edison Charter Academy, Grades K-8
- Five Keys Adult School (high school diploma program)
- Five Keys Charter, at City jail in San Bruno
- Five Keys Independence High School, Grades 9-12
- Gateway High School, Grades 9-12
- Gateway Middle School, Grades 6-8
- KIPP Bayview Academy, Grades 5-8
- KIPP SF Bay Academy, Grades 5-8
- KIPP San Francisco College Preparatory, 9th Grade (will become 9 – 12)
- Leadership Charter High School, Grades 9-12
- Life Learning Academy Charter School, Grades 9-12
- Metropolitan Arts and Tech, Grades 9-12
- Mission Preparatory, Grades K-8
- San Francisco Flex Academy, Grades 6-12

Appendix E: Assessment of Private School Building Risk: Data Collection and Analysis Procedures

The Working Group formed a subcommittee made up of structural engineers and individuals with structural engineering knowledge to research and roughly estimate the earthquake risk of San Francisco private school buildings. This appendix describes the rationale for the subcommittee's activities, the process used to collect data, the process used to analyze data, and commentary on the results of the analysis. It also discusses how the findings for private school buildings compare to public school buildings.

E.1 Rationale for Subcommittee Approach

The subcommittee goal was to better understand the likely risk of San Francisco private school buildings. To get an accurate assessment of the seismic vulnerability of an individual building, a structural engineer must review original design documents (if available), perform calculations (often with computer modeling), and, especially where reliable documents are not available, conduct destructive investigations, where some surface finishes are removed to expose structural elements underneath for visual inspection, or conduct testing on samples of structural materials to determine their strength. This level of access and information was not available to the Working Group. However, it is possible to make general assessments about building risk using information such as the date of original construction, type of lateral system (the structural system that resists earthquake forces), and whether a building has been seismically retrofitted.

The State made a rough assessment of the earthquake risk of all public school buildings in California through its AB 300 process.[48] In its assessment of California public schools, the State used readily available information to determine each school building's date of construction, whether it has been seismically retrofitted (and, if so, when), and its structural system (wood-frame, concrete shear wall, or steel moment frame, to name a few possibilities). It used this information to categorize the thousands of public school buildings in California into one of two categories: (1) building types expected to perform well in future earthquakes, and (2) building types that are not expected to perform as well as Category 1 and require more detailed seismic evaluation.

The subcommittee decided to model its risk assessment process on the AB 300 risk assessment process, so that the risks of private and public school buildings could be compared. Such a comparison provides essential context for understanding the private school risk and sets a basis for public policy. As more information becomes available from engineering evaluations, a more nuanced understanding of the risk will naturally emerge, but for this report, a triage-level assessment along the lines of AB 300 was deemed appropriate.

[48] See DGS, 2002 and DGS, 2013 for more information.

The AB 300 process was useful as a rough triage of thousands of school buildings statewide, but it is not precise with respect to individual buildings. For example, there are certainly some wood-frame buildings and some post-1978 buildings with seismic deficiencies, but the AB 300 effort classified these large groups of buildings as not requiring review. At the same time, there are certainly some pre-1978 public school buildings that are quite well-designed, but the AB 300 effort might have classified them as "not expected to perform as well." The AB 300 process is also not complete with respect to current thinking about earthquake risk. In particular, it takes no account of nonstructural seismic hazards, building size, or building use. Despite those misgivings, however, the AB 300 process is well suited to the level of information currently available regarding San Francisco's private school buildings.

E.2 Data Collection

The Working Group used publicly available information—City databases, school websites, online satellite images and other images of buildings, Sanborn maps, and the experience and judgment of volunteer structural engineer members of the Working Group—to collect the following information about San Francisco's private school buildings:

- Date of original building construction,
- Type of structural system, and
- Whether the building has been seismically retrofitted or has undergone major renovations, and the date of such work.

The first critical step was to identify the list of private schools that are currently active in San Francisco. There was no existing source that appeared to be both accurate and current with this information. The subcommittee developed a list of schools, presented in Appendix F, by combining information from the California Department of Education, the San Francisco Fire Department, the San Francisco Department of Emergency Management, internet research, and personal knowledge of Working Group members.

The next step was to identify the specific buildings used by each school. Only buildings that appeared to be used primarily for school purposes were included in the inventory of school buildings. This includes gymnasiums and auditoriums, but excludes churches and other religious assembly halls. This determination required judgment from subcommittee members, as specific information about the number of buildings used by each school and the purpose of each building was generally not available.

Then, the subcommittee researched relevant information about the structure of each building. Some of the specific information sources used by the subcommittee were:

- The San Francisco Property Information Map, which includes some permit information from the Department of Building Inspection, the Planning Department, and other City departments. It is available at: http://ec2-50-17-237-182.compute-1.amazonaws.com/PIM/
- Sanborn maps, historical annotated maps showing most buildings in the City, originally used for fire insurance purposes.

- Internet image sources, such as Google maps, Apple maps, Bing maps, and other websites with street view images from above, from the side, and from 45-degree angles.
- Google earth, which includes some historical Bay Area aerial images.
- Each school's website. Some schools have pages that describe their history, including when buildings were built, major renovations undertaken, or when a seismic retrofit was conducted.
- Other web searches.
- Personal knowledge.

The desired information was readily available for some schools and impossible to determine for others. The data gathered by the subcommittee represents a vast improvement on previously available information about private school buildings in San Francisco, although it contains gaps and likely errors. All of this information was compiled into a shared database. Names of individual schools were removed from this database to reflect that the information should only be used for a system-wide assessment and does not provide accurate information at a building-specific level.

E.3 Data Analysis

The data for San Francisco private school buildings were then analyzed to assign each school building into one of three categories, similar to the categories used in the AB 300 assessment of public schools:

- Buildings whose characteristics indicate they are likely to perform well in future earthquakes,
- Buildings whose characteristics indicate they might perform poorly in future earthquakes, and
- Buildings for which there is not enough information to determine likely seismic performance.

Characteristics that indicate a building is "likely to perform well in future earthquakes":

- Wood-frame structural system, or
- Clear evidence of a seismic retrofit after 1978, or
- Original construction after 1978.

Characteristics that indicate a building "might perform poorly in future earthquakes":

- Non-wood-frame structural system with original construction prior to 1978, and
- No clear evidence of seismic retrofit after 1978.

Buildings with the following characteristics were categorized as "buildings for which there is not enough information to determine the likely seismic performance":

- Original date of construction is unknown and the building is not known to be wood-frame, or
- Original date of construction is prior to 1978 and the building is not known to be wood-frame.

E.4 Results of Analysis

Even for those schools with readily available information, the results of this effort do not produce information that is accurate at a specific school building level. Rather, the results provide a

reasonable snapshot of the risk to the San Francisco private school building stock as a whole. Thus, the results, as presented in Chapter 3, are only presented in aggregate form.

E.5 Comparing Results with Public Schools

Comparing the results of the subcommittee analysis to San Francisco public schools required an estimation of the number of buildings used for San Francisco Unified School District public schools. The subcommittee identified 266 public school buildings through analysis of the San Francisco Unified School District website, other internet resources, City databases, and satellite imagery. This number excludes buildings used for preschools, transitional kindergartens, charter schools (except for those charter schools that share space with a traditional public school), a county school that operates out of Juvenile Hall, administration, one county school facility in La Honda, and all buildings that appeared to be temporary modular structures (estimated to be approximately 177 additional structures). The count does include a small number of county schools.

The list of schools on the State AB 300 list was adjusted to reflect information provided by the San Francisco Unified School District about the status of buildings on that list (see Appendix B). The AB 300 list includes 72 public school buildings in San Francisco. The subcommittee identified 41 of those school buildings as sold, demolished, used as charter schools, seismically upgraded, or evaluated and found not to require seismic upgrades. Therefore, 31 school buildings were assumed to have characteristics that indicate they might perform poorly in future earthquakes.

Appendix F: List of San Francisco Private Schools, K - 12

The Working Group identified 113 private schools currently operating in San Francisco. This list was developed by combining information from the California Department of Education, the San Francisco Fire Department, the San Francisco Department of Emergency Management, internet research, and personal knowledge of Working Group members. It appears that new schools open and other schools close on a regular bases, so the exact number and names of private schools in San Francisco vary each year. This list represents a best effort to list all private schools currently operating in San Francisco in 2013, but there are likely to be errors and omissions.

Table F-1. List of San Francisco Private Schools[A]

Name of School	Grades taught
Adda Clevenger	K - 8
Alt School	K - 6
Alta Vista School	Pre K - 8
Archbishop Riordan High School	9 - 12
Auditory Oral School of San Francisco	Pre K - 2
Bais Menachem Yeshiva Day School	K - 7
Bay School of San Francisco	9 - 12
Brandeis-Hillel Day School	K - 8
Brightworks	1 - 12
Calvary Baptist Academy	1 - 12
Cathedral School For Boys	K - 8
Children's Day School	Pre K - 8
Chinese American International School	Pre K - 8
Coming of Age Christian Academy	K - 12
Convent of the Sacred Heart Elementary School	K - 8
Convent of the Sacred Heart High School	9 - 12
Cornerstone Academy	K - 4
Cornerstone Academy – Cambridge	5 - 12
Cornerstone Academy – Kindergarten	K
Corpus Christi School	K - 8
De Marillac Academy	4 - 8
Discovery Center School	K - 12
Drew School	9 - 12
Ecole Notre Dame Des Victoires	K - 8
Edgewood Community School	K - 12
Erikson	3 - 12
Eureka Learning Center	Pre K - K
Fei Tian Academy of the Arts California	6 - 12
French American International School and International High School	Pre K - 12
Fusion Academy	6 - 12
German International School of Silicon Valley	K - 3
Golden Bridges School	Pre K - K

Name of School	Grades taught
Hamlin School	K - 8
Hergl School	K - 12
Hillwood Academic Day School	K - 8
Holy Name School	K - 8
Immaculate Conception Academy	9 - 12
Jewish Community High School of the Bay	9 - 12
Joshua Marie Cameron Academy	6 - 12
Katherine Del Mar Burke School	K - 8
Katherine Michiels School	Pre K - 5
Kittredge, Inc. School	K - 8
Krouzian-Zekarian-Vasbouragan Armenian School	Pre K - 8
La Scuola	Pre K - 8
Lakeside Presbyterian Center For Children	Pre K - K
Laurel School	K - 8
Lick-Wilmerding High School	9 - 12
Lisa Kampner Hebrew Academy	K - 12
Live Oak School	K - 8
Living Hope Christian	K - 12
Lycee Francais de San Francisco	Pre K - 12
Marin Preparatory School	K - 3
Meadows-Livingstone School	1 - 6
Mercy High School	9 - 12
Mission Dolores Academy	K - 8
Montessori House of Children	K - 1
Muhammad University of Islam	K - 12
Oakes Children's Center	K - 9
Our Lady of the Visitacion School	K - 8
Parkside Preschool and Kindergarten	Pre K - K
Presidio Hill School	K - 8
Presidio Knolls School	K - 1
RISE Institute	K - 12
Russian American International School	K - 5
Senior Martin College Preparatory School	6 - 12
Sacred Heart Cathedral Preparatory	9 - 12
San Francisco Adventist School	K - 8
San Francisco Christian School	K - 12
San Francisco City Academy	K - 8
San Francisco Day School	K - 8
San Francisco Friends School	K - 8
San Francisco School	K - 8
San Francisco Schoolhouse	K - 8
San Francisco University High School	9 - 12
San Francisco Waldorf School	K - 12
Sand Paths Academy	5 - 12
School of the Epiphany	K - 8

Name of School	Grades taught
St. Anne School	K - 8
St. Anthony - Immaculate Conception School	K - 8
St. Brendan Elementary School	K - 8
St. Brigid School	K - 8
St. Cecilia Elementary School	K - 8
St. Charles Borromeo School	K - 8
St. Finn Barr	K - 8
St. Gabriel Elementary	K - 8
St. Ignatius College Preparatory	9 - 12
St. James School	K - 8
St. John of San Francisco Orthodox Academy	K - 12
St. John the Evangelist	K - 8
St. Mary's School	Pre K - 8
St. Monica School	K - 8
St. Paul's School	K - 8
St. Peter's School	K - 8
St. Philip School	K - 8
St. Stephen Catholic School	K - 8
St. Thomas More School	K - 8
St. Thomas the Apostle School	Pre K - 8
St. Vincent de Paul School	K - 8
Sts. Peter and Paul Salesian School	Pre K - 8
Star of the Sea School	K - 8
Sterne School	5 - 12
Stratford School	Pre K - 5
Stuart Hall for Boys School	K - 8
Stuart Hall High School	9 - 12
Synergy School	K - 8
Town School for Boys	K - 8
Urban School of San Francisco	9 - 12
Voice of Pentecost Academy	K - 12
Wen Jian Ying	K - 12
West Portal Lutheran Elementary	K - 8
Woodside International School	6 - 12
Youth Chance High School	9 - 12
Zion Lutheran School	K - 8

A. This list may contain errors or omissions, but represents a best effort of this Working Group to list all private schools operating in San Francisco during December 2013.
Sources: California Department of Education, San Francisco Department of Emergency Management, San Francisco Fire Department, www.greatschools.org, Working Group member personal knowledge

Appendix G. Working Group Survey Process and Results

The Working Group developed a survey for parents of San Francisco school children in grades K through 12. The purpose of this survey was to find out what level of earthquake risk San Francisco parents believe San Francisco schools face (public, private, and charter), so that expectation could be compared to the actual risk of San Francisco schools. The Working Group drafted the survey questions to be simple and easy to understand, and endeavored to keep the survey short. The survey questions were developed through discussions of the Working Group in its meetings.

The survey was entered into the online survey program SurveyMonkey®. The link to the survey was then shared by Working Group members through email to as many San Francisco parents as possible through parent email lists, community groups, school email newsletters, and other forums. The Working Group made no effort to limit or control the number of survey respondents.

The survey results are presented below. Note that many but not all comments from survey participants are presented below. Included comments have not been edited.

Number of respondents: 305

Question 1: What kind of school do your children attend? (Check multiple boxes as necessary)

Public = 44%
Private = 60%
Charter = <1%

(Note – does not need to sum to 100% because people could answer more than once, to reflect multiple children who attend different schools.)

Question 2: Add school name(s) if you wish.

63% of respondents listed one or more schools. Table G-1 presents the schools that were listed.

Table G-1. Schools listed by survey participants.

Adda Clevenger
AP Giannini
Bay School
Brandeis Hillel Day School
Cathedral School for Boys
Charles Armstrong
Claire Lilienthal
Clarendon
Commodore Sloat
Convent Elementary
Convent High School
Daniel Webster Elementary
Dianne Feinstein Elementary School
Fairmount Elementary

Flynn
Francis Scott Key
French American Intl school
Glen Park School
Hamlin
Hervert Hoover Middle School
Holy Name
Hope Lutheran church & school
James Lick Middle School
Jefferson Elementary
Jose Ortega
Katherine Delmar Burke School
Lakeside Presbyterian Center for Children
Leonard Flynn Elementary
McKinley Elementary
Miraloma Elem.
Notre Dame des Victoires
Paul Revere
Rooftop
Ruth Asawa School of the Arts
Sacred Heart Cathedral Prep
San Francisco Friends School
San Francisco University High School
Sloat Elementary Aptos Middle
St. Gabriels
St. Ignatius College Prep High School
St. Philip
St. Vincent de paul
Starr King
Sunnyside Elementary
Sunset Elementary
Sutro Elementary
The San Francisco Schoolhouse
Thomas Edison Charter
Town School for Boys
University High School
Urban School of San Francisco
Waldorf of San Francisco
Wallenberg High School
West Portal Elementary
West Portal Lutheran
Zion Lutheran

Question 3: How safe do you expect San Francisco school buildings would be for children in the event of an earthquake?

Very safe = 32%
Safe enough = 27%
Not as safe as I would like = 23%

Not sure = 18%

29 comments with additional thoughts were provided. A representative sample is presented below:

- Depends on what part of town the school is in
- I am not sure whether this question is asking whether I think the schools ARE safe or whether they SHOULD BE safe. I would like to think they are some of the safest places in the neighborhood and could serve as community gathering places with resources if a severe earthquake occurrs. But I bet many of them are not.
- Depends on the size of the earthquake, right?
- I would expect them to be very safe but doubt that they are
- I'm certain each school has different points of vulnerability and am not certain every school has been retrofitted to the highest standards.
- I don't know how any parent really would know how safe their particular school is and why it matters what we expect it to be
- I am sure it varies depending on the age of the building and where it is located.
- Most are old, and not newly renovated
- There are many variations in building structures in San Francisco
- I expect that the school buildings SHOULD be very safe. I am not sure how safe they actually are.
- I assume all school buildings should be safe and up to code but I don't know that as a fact.
- We were never given the information as how safe the building are.
- Some schools are older than others and some have not been re-inspected to see if they would wistand a future earthquake.
- I really have no information on this but expect that city codes require them to have a certain measure of seismic safety.
- We are next up for Prop A funding, but I don't know if seismic retrofit will be part of our rebuilding process.
- I have no information on it. Don't know which building is seismic safe.
- Buildings are old and have asbestos-will be released once structures are damaged. Not sure if all the buildings have been earthquake reinforced.
- I want them to be safe but I don't want to divert already limited education funds for this purpose. I assume as SFUSD schools are being upgraded systematically that earthquake issues are being considered.
- The schools in general seem very old & I worry that they are not prepared for a big earthquake
- If they meet current building codes, which I believe they do, they should be safe for most levels of earthquakes
- School is old, has severe budget problems, and several pressing funding needs. Earthquake safety will not rise to the top without government requirements and financial backing.

Question 4: For how long after a significant earthquake would you expect your children's school to be closed? A significant earthquake would have stronger shaking than the 1989 Loma Prieta earthquake, which had a magnitude of 6.9 on the Richter scale and was centered about 75 miles south of San Francisco.

Do not expect that it would need to close at all = 8%

Closed for up to a week for clean up and minor repairs = 44%

Closed for up to a month for repairs = 14%

Closed for months to a year for repairs = 6%

Closed indefinitely for major repairs or replacement = 4%

No idea of what school closure to expect = 23%

36 comments with additional thoughts were provided. A representative sample is presented below:

- I would hope that closure would be minimal because all schools are structurally sound and emergency response will be excellent. But, we live in the real world...
- I would expect a lot of time would be required to verify that the building was safe to continue classes considering aftershocks and general earthquake readiness/safety going forward.
- Depends where it is centered and the damage..
- hard to say just base on the magnitude, if the school has good structure may not need to long to repairs, but for the kids safety and depends on the environment around the school area, I will say a couple weeks
- Closed for up to a week for school staff to deal with their own residences.
- My children's school is very old. I have seen patches of stuff fell down from the wall around the windows in the cafeteria and leaks from the ceilings in the hallways. Maybe they have patched up things to repair. But for structure wise, I doubt anything has been done.
- I would not have been surprised if the schools were closed 1-3 days for cleanup and safety checks, but I would expect the building to survive with minimal damage.
- I think it depends how much damage!
- I would expect that the school closure would be mindful and strategically planned to ensure appropriate safety and conditions for children to return to school while minimizing down time for learning.
- If the school requires repairs, I would want them to take the time to do it correctly - I am assuming that not all the schools would require major repairs since the schools are spread city wide and not all neighborhoods are impacted in the same way.
- Safety first, depending on the damage during earthquake.
- I think it should be flexible, depends on circumstances and the damages made to the school. Class cancel will have a huge impact on students' education as well as parents' schedules. Thus, it's better if the school stays open. However, if there's major damage to the school, it will be great to either arrange a new location for temporary use, or to close for a short time for repairs.
- It depends on the scale and severity of the damage.
- No engineer can predict if a building would satnd. Every earthquake moves different and some are short and some are long in duration.
- It all depends on the condition of the building.
- I would expect the schools to be a safe place for families and the community after an earthquake.
- I suspect this is highly variable based on the specifics of the location and intensity of the earthquake. I would hope that an interim solution of some sort would be put in place if schools were closed for more than a month.
- The length of closure would be depend on the area of the city and the magnitude of the quake.
- I would expect some campuses would be closed with the children doubling up in other facilities for a short period of a month or so.
- It's hard to say since it depends on the strength and location of the quake but I would like the schools to be structurally sound enough that minimal time is needed afterwards. My hope is one week. My expectation based on how safe I think they currently are is that it could be months to a year.
- Even if its just minor damage, I would expect that the demand for clean up and repair labor would be very high (e.g., replacing glass windows, having dumpsters delivered and/or picked up, etc.) so it could take longer than a week.

Question 5: Do you expect that public, private, and charter schools are currently held to the same standards for earthquake safety?

Yes = 51%
No = 22%
Unsure = 27%

No comment field was provided, but one respondent made a comment in another field:

- I think public school should be held to highest standard due to govt oversight and public funding.

Question 6: How important, relative to other considerations, was school earthquake/structural safety in the selection of your child's school?

Most important criteria = 8%
Of equal importance to other criteria = 32%
Low importance = 11%
Wasn't considered = 49%

39 comments with additional thoughts were provided. A representative sample is presented below:

- School facilities matter to me and I feel especially good about his school because it was newly constructed in 2006 so I suspect it is very safe.
- But I will think about it now!
- assume all schools meet high structural safety standards
- I never considered this factor until I did this survey.
- Given the likelihood of an earthquake in SF, one takes it for granted (perhaps not wisely) that a school's physical plant anticipates and is prepared for an event.
- and in hindsight we should have considered it!
- We mostly considered the location of the building and how prepared the school was. I don't think any school has a viable communication plan to instruct/inform parents. Phone trees are outdated and are unlikely to be successful.
- I didn't even think about it..
- In light of recent public tragedies including the school shooting in Newtown, Connecticut, I did consider access to the school, security presence, and other general safety measures including how sturdy the building appears, but I did not formally investigate structural safety.
- But overall safety and look/feel of the building, classroom, play area was important.
- I would like to know more about this now.
- i was concerned about some schools that had major pipelines running under them. didn't really look into specific structural info....
- Didn't think too much about it actually but was happy that the open plan campus was safer in terms of fire danger.
- I'm a California native, so I certainly thought about it and was glad we ended up in a single-story school, but the lottery was the major factor!
- Assumed it was safe
- I did think about it after the fact... the school process was stressful enough without that factored in.
- probably should have been considered, but wasn't

- Overall building site safety including main building(s), temporary classrooms, entrances/exits, security, property fencing, garden area
- I certainly considered it but it wasn't the deal breaker. I also assumed (perhaps incorrectly?) that public schools were required to be seismically safe.
- I was fairly "new" to the city and this area, and really didn't think about that being a criteria for a school. I am used to tornado activitiy more so and the concrete structure of our building seemed to suffice at the time.
- Unless it was in the Marina or an area with known subsidence risk then I would have investigated.
- Seriously? We felt lucky to get into a school. If we'd considered this question we'd never have gotten into a school of our choice!
- now this is brought to my attention; this should likely be a concern that every school addresses given the area in which we live. (FYI - I am not native californian).
- I did inquire about the safety of the building when we initially applied. And, now that I consider it, I settled for a verbal response that the building was considered "safe" and that it had not suffered major damage in Loma Prieta.
- Very important especially we live in an earthquake zone.
- I assume all schools are structurally sound and safe.
- I am not an engineer and I would hope to avoid a lawsuit that the SFUSD and the city would have harsh and strong policies to insure buildings are up to date.
- I think most of us who enter SFUSD's ranked-choice lottery just want to get into a school near us with a decent reputation. If there were a seismic safety rating posted somewhere for each school, I would read it and have that weigh into my decision, but I would also fear narrowing my options too much. Instead, shouldn't every school be safe?
- Didn't really think about it, as I was preoccupied with the education aspect of school selection.
- This consideration was foreign to us as we moved from another area of the country. I would expect that the builders were held to codes which render the buildings safe in an earthquake and I would not need to make that kind of judgement when selecting a school.

Question 7: In what ZIP code is your home located? (enter 5-digit ZIP code)

28 different zip codes were listed. Note that some children who attend San Francisco private schools do not live in San Francisco.

94014
94015
94030
94038
94044
94066
94080
94103
94107
94110
94112
94114
94115
94116
94117
94118
94121

94122
94123
94124
94127
94129
94131
94132
94133
94134
94158
94941

Question 8: Please provide your email address if you wish to become involved in the City of San Francisco's Private Schools Earthquake Safety Working Group.

Approximately 36 people included their email addresses.

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